

GE Healthcare

VIVID E9

Service Manual

OPERATING DOCUMENTATION



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Important Precautions

TRANSLATION POLICY

THIS SERVICE MANUAL IS AVAILABLE IN ENGLISH ONLY.

WARNING
(EN)

- 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.

CE MANUEL DE MAINTENANCE N'EST DISPONIBLE QU'EN ANGLAIS.

AVERTISSEMENT
(FR)

- SI LE TECHNICIEN DU CLIENT A BESOIN DE CE MANUEL DANS UNE AUTRE LANGUE QUE L'ANGLAIS, C'EST AU CLIENT QU'IL INCOMBE DE LE FAIRE TRADUIRE.
- NE PAS TENTER D'INTERVENTION SUR LES ÉQUIPEMENTS TANT QUE LE MANUEL SERVICE N'A PAS ÉTÉ CONSULTÉ ET COMPRIS.
- LE NON-RESPECT DE CET AVERTISSEMENT PEUT ENTRAÎNER CHEZ LE TECHNICIEN, L'OPÉRATEUR OU LE PATIENT DES BLESSURES DUES À DES DANGERS ÉLECTRIQUES, MÉCANIQUES OU AUTRES.

DIESES KUNDENDIENST-HANDBUCH EXISTIERT NUR IN ENGLISCHER SPRACHE.

WARNUNG
(DE)

- FALLS EIN FREMDER KUNDENDIENST EINE ANDERE SPRACHE BENÖTIGT, IST ES AUFGABE DES KUNDEN FÜR EINE ENTSPRECHENDE ÜBERSETZUNG ZU SORGEN.
- VERSUCHEN SIE NICHT, DAS GERÄT ZU REPARIEREN, BEVOR DIESES KUNDENDIENST-HANDBUCH NICHT ZU RATE GEZOGEN UND VERSTANDEN WURDE.
- WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.

AVISO
(ES)

ESTE MANUAL DE SERVICIO SÓLO EXISTE EN INGLÉS.

- SI ALGÚN PROVEEDOR DE SERVICIOS AJENO A GEHC SOLICITA UN IDIOMA QUE NO SEA EL INGLÉS, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCIÓN.
- NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.
- LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.

ATENÇÃO
(PT-Br)

ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONÍVEL EM INGLÊS.

- SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEHC, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, É DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.
- NÃO TENTE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.
- O NÃO CUMPRIMENTO DESTE AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A' CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.

AVISO
(PT-pt)

ESTE MANUAL DE ASSISTÊNCIA ESTÁ DISPONÍVEL APENAS EM INGLÊS.

- SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEHC, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, É DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.
- NÃO TENTE EFECTUAR REPARAÇÕES NO EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO PREVIAMENTE ESTE MANUAL.
- A INOBSERVÂNCIA DESTE AVISO PODE RESULTAR EM FERIMENTOS NO TÉCNICO DE ASSISTÊNCIA, OPERADOR OU PACIENTE EM CONSEQUÊNCIA DE CHOQUE ELÉCTRICO, PERIGOS DE ORIGEM MECÂNICA, BEM COMO DE OUTROS TIPOS.

AVVERTENZA
(IT)

IL PRESENTE MANUALE DI MANUTENZIONE È DISPONIBILE SOLTANTO IN INGLESE.

- SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEHC RICHIEDE IL MANUALE IN UNA LINGUA DIVERSA, IL CLIENTE È TENUTO A PROVVEDERE DIRETTAMENTE ALLA TRADUZIONE.
- SI PROCEDA ALLA MANUTENZIONE DELL'APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO.
- NON TENERE CONTO DELLA PRESENTE AVVERTENZA POTREBBE FAR COMPIERE OPERAZIONI DA CUI DERIVINO LESIONI ALL'ADDETTO ALLA MANUTENZIONE, ALL'UTILIZZATORE ED AL PAZIENTE PER FOLGORAZIONE ELETTRICA, PER URTI MECCANICI OD ALTRI RISCHI.

**HOIATUS
(ET)**

KÄESOLEV TEENINDUSJUHEND ON SAADAVAL AINULT INGLISE KEELES.

- KUI KLIENDITEENINDUSE OSUTAJA NÕUAB JUHENDIT INGLISE KEELEST ERINEVAS KEELES, VASTUTAB KLIENT TÕLKETEENUSE OSUTAMISE EEST.
- ÄRGE ÜRITAGE SEADMEID TEENINDADA ENNE EELNEVALT KÄESOLEVA TEENINDUSJUHENDIGA TUTVUMIST JA SELLEST ARU SAAMIST.
- KÄESOLEVA HOIATUSE EIRAMINE VÕIB PÕHJUSTADA TEENUSEOSUTAJA, OPERAATORI VÕI PATSIENDI VIGASTAMIST ELEKTRILÖÖGI, MEHAANILISE VÕI MUU OHU TAGAJÄRJEL.

**VAROITUS
(FI)**

TÄMÄ HUOLTO-OHJE ON SAATAVILLA VAIN ENGLANNIKSI.

- JOS ASIAKKAAN PALVELUNTARJOAJA VAATII MUUTA KUIN ENGLANNINKIELISTÄ MATERIAALIA, TARVITTAVAN KÄÄNNÖKSEN HANKKIMINEN ON ASIAKKAAN VASTUULLA.
- ÄLÄ YRITÄ KORJATA LAITTEISTOA ENNEN KUIN OLET VARMASTI LUKENUT JA YMMÄRTÄNYT TÄMÄN HUOLTO-OHJEEN.
- MIKÄLI TÄTÄ VAROITUSTA EI NOUDATETA, SEURAUKSENA VOI OLLA PALVELUNTARJOAJAN, LAITTEISTON KÄYTTÄJÄN TAI POTILAAN VAHINGOITTUMINEN SÄHKÖISKUN, MEKAANISEN VIAN TAI MUUN VAARATILANTEEN VUOKSI.

**ΠΡΟΕΙΔΟΠΟΙΗΣΗ
(EL)**

ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΣΕΡΒΙΣ ΔΙΑΤΙΘΕΤΑΙ ΣΤΑ ΑΓΓΛΙΚΑ ΜΟΝΟ.

- ΕΑΝ ΤΟ ΑΤΟΜΟ ΠΑΡΟΧΗΣ ΣΕΡΒΙΣ ΕΝΟΣ ΠΕΛΑΤΗ ΑΠΑΙΤΕΙ ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΣΕ ΓΛΩΣΣΑ ΕΚΤΟΣ ΤΩΝ ΑΓΓΛΙΚΩΝ, ΑΠΟΤΕΛΕΙ ΕΥΘΥΝΗ ΤΟΥ ΠΕΛΑΤΗ ΝΑ ΠΑΡΕΧΕΙ ΥΠΗΡΕΣΙΕΣ ΜΕΤΑΦΡΑΣΗΣ.
- ΜΗΝ ΕΠΙΧΕΙΡΗΣΕΤΕ ΤΗΝ ΕΚΤΕΛΕΣΗ ΕΡΓΑΣΙΩΝ ΣΕΡΒΙΣ ΣΤΟΝ ΕΞΟΠΛΙΣΜΟ ΕΚΤΟΣ ΕΑΝ ΕΧΕΤΕ ΣΥΜΒΟΥΛΕΥΤΕΙ ΚΑΙ ΕΧΕΤΕ ΚΑΤΑΝΟΗΣΕΙ ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΣΕΡΒΙΣ.
- ΕΑΝ ΔΕ ΛΑΒΕΤΕ ΥΠΟΨΗ ΤΗΝ ΠΡΟΕΙΔΟΠΟΙΗΣΗ ΑΥΤΗ, ΕΝΔΕΧΕΤΑΙ ΝΑ ΠΡΟΚΛΗΘΕΙ ΤΡΑΥΜΑΤΙΣΜΟΣ ΣΤΟ ΑΤΟΜΟ ΠΑΡΟΧΗΣ ΣΕΡΒΙΣ, ΣΤΟ ΧΕΙΡΙΣΤΗ Ή ΣΤΟΝ ΑΣΘΕΝΗ ΑΠΟ ΗΛΕΚΤΡΟΠΛΗΞΙΑ, ΜΗΧΑΝΙΚΟΥΣ Ή ΑΛΛΟΥΣ ΚΙΝΔΥΝΟΥΣ.

**FIGYELMEZTETÉS
(HU)**

EZEN KARBANTARTÁSI KÉZIKÖNYV KIZÁRÓLAG ANGOL NYELVEN ÉRHEŐ EL.

- HA A VEVŐ SZOLGÁLTATÓJA ANGOLTÓL ELTÉRŐ NYELVRE TART IGÉNYT, AKKOR A VEVŐ FELELŐSSÉGE A FORDÍTÁS ELKÉSZÍTTETÉSE.
- NE PRÓBÁLJA ELKEZDENI HASZNÁLNI A BERENDEZÉST, AMÍG A KARBANTARTÁSI KÉZIKÖNYVBEN LEÍRTAKAT NEM ÉRTELMEZTÉK.
- EZEN FIGYELMEZTETÉS FIGYELMEN KÍVÜL HAGYÁSA A SZOLGÁLTATÓ, MŰKÖDTETŐ VAGY A BETEG ÁRAMÚTÉS, MECHANIKAI VAGY EGYÉB VESZÉLYHELYZET MIATTI SÉRÜLÉSÉT EREDMÉNYEZHETI.

ÞESSI ÞJÓNUSTUHANDBÓK ER EINGÖNGU FÁANLEG Á ENSKU.

- EF ÞJÓNUSTUAÐILI VIÐSKIPTAMANNS ÞARFNAST ANNARS TUNGUMÁLS EN ENSKU, ER ÞAÐ Á ÁBYRGÐ VIÐSKIPTAMANNS AÐ ÚTVEGA ÞÝÐINGU.
- REYNIÐ EKKI AÐ ÞJÓNUSTA TÆKIÐ NEMA EFTIR AÐ HAFA SKOÐAÐ OG SKILIÐ ÞESSA ÞJÓNUSTUHANDBÓK.
- EF EKKI ER FARIÐ AÐ ÞESSARI VIÐVÖRUN GETUR ÞAÐ VALDIÐ MEIÐSLUM ÞJÓNUSTUVEITANDA, STJÓRNANDA EÐA SJÚKLINGS VEGNA RAFLOSTS, VÉLRÆNNAR EÐA ANNARRAR HÆTTU.

VIÐVÖRUN
(IS)

TENTO SERVISNÍ NÁVOD EXISTUJE POUZE V ANGLICKÉM JAZYCE.

- V PŘÍPADĚ, ŽE POSKYTOVATEL SLUŽEB ZÁKAZNÍKŮM POTŘEBUJE NÁVOD V JINÉM JAZYCE, JE ZAJIŠTĚNÍ PŘEKladU DO ODPOVÍDAJÍCÍHO JAZYKA ÚKOLEM ZÁKAZNÍKA.
- NEPROVÁDĚJTE ÚDRŽBU TOHOTO ZAŘÍZENÍ, ANIŽ BYSTE SI PŘEČETLI TENTO SERVISNÍ NÁVOD A POCHOPILI JEHO OBSAH.
- V PŘÍPADĚ NEDODRŽOVÁNÍ TÉTO VÝSTRAHY MŮŽE DOJÍT ÚRAZU ELEKTRICKÁM PROUDEM PRACOVNÍKA POSKYTOVATELE SLUŽEB, OBSLUŽNÉHO PERSONÁLU NEBO PACIENTŮ VlivEM ELEKTRICKÉHO PROUDU, RESPEKTIVE VlivEM K RIZIKU MECHANICKÉHO POŠKOZENÍ NEBO JINÉMU RIZIKU.

VÝSTRAHA
(CS)

DENNE SERVICEMANUAL FINDES KUN PÅ ENGELSK.

- HVIS EN KUNDES TEKNIKER HAR BRUG FOR ET ANDET SPROG END ENGELSK, ER DET KUNDENS ANSVAR AT SØRGE FOR OVERSÆTTELSE.
- FORSØG IKKE AT SERVICERE Udstyret medmindre denne servicemanual er blevet læst og forstået.
- MANGLENDE OVERHOLDELSE AF DENNE ADVARSEL KAN MEDFØRE SKADE PÅ GRUND AF ELEKTRISK, MEKANISK ELLER ANDEN FARE FOR TEKNIKEREN, OPERATØREN ELLER PATIENTEN.

ADVARSEL
(DA)

DEZE ONDERHOUDSHANDLEIDING IS ENKEL IN HET ENGELS VERKRIJGBAAR.

- ALS HET ONDERHOUDSPERSONEEL EEN ANDERE TAAL VEREIST, DAN IS DE KLANT VERANTWOORDELIJK VOOR DE VERTALING ERVAN.
- PROBEER DE APPARATUUR NIET TE ONDERHOUDEN VOORDAT DEZE ONDERHOUDSHANDLEIDING WERD GERAADPLEEGD EN BEGREPEN IS.
- INDIEN DEZE WAARSCHUWING NIET WORDT OPGEVOLGD, ZOU HET ONDERHOUDSPERSONEEL, DE OPERATOR OF EEN PATIËNT GEWOND KUNNEN RAKEN ALS GEVOLG VAN EEN ELEKTRISCHE SCHOK, MECHANISCHE OF ANDERE GEVAREN.

WAARSCHUWING
(NL)

**BRĪDINĀJUMS
(LV)**

ŠĪ APKALPES ROKASGRĀMATA IR PIEEJAMA TIKAI ANGLŪ VALODĀ.

- JA KLIENTA APKALPES SNIEDZĒJAM NEPIECIEŠAMA INFORMĀCIJA CITĀ VALODĀ, NEVIS ANGLŪ, KLIENTA PIENĀKUMS IR NODROŠINĀT TULKOŠANU.
- NEVEICIET APRĪKOJUMA APKALPI BEZ APKALPES ROKASGRĀMATAS IZLASĪŠANAS UN SAPRAŠANAS.
- ŠĪ BRĪDINĀJUMA NEIEVĒROŠANA VAR RADĪT ELEKTRISKĀS STRĀVAS TRIECIENA, MEHĀNISKU VAI CITU RISKU IZRAISĪTU TRAUMU APKALPES SNIEDZĒJAM, OPERATORAM VAI PACIENTAM.

**ĮSPĖJIMAS
(LT)**

ŠIS EKSPLOATAVIMO VADOVAS YRA IŠLEISTAS TIK ANGLŲ KALBA.

- JEI KLIENTO PASLAUGŲ TEIKĖJUI REIKIA VADOVO KITA KALBA – NE ANGLŲ, VERTIMU PASIRŪPINTI TURI KLIENTAS.
- NEMĖGINKITE ATLIKTI ĮRANGOS TECHNINĖS PRIEŽIŪROS DARBŲ, NEBENT VADOVAUTUMĖTĖS ŠIUO EKSPLOATAVIMO VADOVU IR JĮ SUPRASTUMĖTE
- NEPAISANT ŠIO PERSPĖJIMO, PASLAUGŲ TEIKĖJAS, OPERATORIUS AR PACIENTAS GALI BŪTI SUŽEISTAS DĖL ELEKTROS SMŪGIO, MECHANINIŲ AR KITŲ PAVOJŲ.

**ADVARSEL
(NO)**

DENNE SERVICEHÅNDBOKEN FINNES BARE PÅ ENGELSK.

- HVIS KUNDENS SERVICELEVERANDØR TRENGER ET ANNET SPRÅK, ER DET KUNDENS ANSVAR Å SØRGE FOR OVERSETTELSE.
- IKKE FORSØK Å REPARERE UTSTYRET UTEN AT DENNE SERVICEHÅNDBOKEN ER LEST OG FORSTÅTT.
- MANGLENDE HENSYN TIL DENNE ADVARSELEN KAN FØRE TIL AT SERVICELEVERANDØREN, OPERATØREN ELLER PASIENTEN SKADES PÅ GRUNN AV ELEKTRISK STØT, MEKANISKE ELLER ANDRE FARER.

**OSTRZEŻENIE
(PL)**

NINIEJSZY PODRĘCZNIK SERWISOWY DOSTĘPNY JEST JEDYNIE W JĘZYKU ANGIELSKIM.

- JEŚLI FIRMA ŚWIADCZĄCA KLIENTOWI USŁUGI SERWISOWE WYMAGA UDOSTĘPNIENIA PODRĘCZNIKA W JĘZYKU INNYM NIŻ ANGIELSKI, OBOWIĄZEK ZAPEWNIENIA STOSOWNEGO TŁUMACZENIA SPOCZYWA NA KLIENCIE.
- NIE PRÓBOWAĆ SERWISOWAĆ NINIEJSZEGO SPRZĘTU BEZ UPRZEDNIEGO ZAPOZNANIA SIĘ Z PODRĘCZNIKIEM SERWISOWYM.
- NIEZASTOSOWANIE SIĘ DO TEGO OSTRZEŻENIA MOŻE GROZIĆ OBRAŻENIAMI CIAŁA SERWISANTA, OPERATORA LUB PACJENTA W WYNIKU PORAŻENIA PRĄDEM, URAZU MECHANICZNEGO LUB INNEGO RODZAJU ZAGROŻEŃ.

**ATENȚIE
(RO)**

ACEST MANUAL DE SERVICE ESTE DISPONIBIL NUMAI ÎN LIMBA ENGLEZĂ.

- **DACĂ UN FURNIZOR DE SERVICII PENTRU CLIEȚI NECESITĂ O ALTĂ LIMBĂ DECÂT CEA ENGLEZĂ, ESTE DE DATORIA CLIENTULUI SĂ FURNIZEZE O TRADUCERE.**
- **NU ÎNCERCAȚI SĂ REPARAȚI ECHIPAMENTUL DECÂT ULTERIOR CONSULTĂRII ȘI ÎNȚELEGERII ACESTUI MANUAL DE SERVICE.**
- **IGNORAREA ACESTUI AVERTISMENT AR PUTEA DUCE LA RĂNIREA DEPARATORULUI, OPERATORULUI SAU PACIENTULUI ÎN URMA PERICOLELOR DE ELECTROCUTARE, MECANICE SAU DE ALTĂ NATURĂ.**

**ОСТОРОЖНО!
(RU)**

ДАННОЕ РУКОВОДСТВО ПО ОБСЛУЖИВАНИЮ ПРЕДОСТАВЛЯЕТСЯ ТОЛЬКО НА АНГЛИЙСКОМ ЯЗЫКЕ.

- **ЕСЛИ СЕРВИСНОМУ ПЕРСОНАЛУ КЛИЕНТА НЕОБХОДИМО РУКОВОДСТВО НЕ НА АНГЛИЙСКОМ ЯЗЫКЕ, КЛИЕНТУ СЛЕДУЕТ САМОСТОЯТЕЛЬНО ОБЕСПЕЧИТЬ ПЕРЕВОД.**
- **ПЕРЕД ОБСЛУЖИВАНИЕМ ОБОРУДОВАНИЯ ОБЯЗАТЕЛЬНО ОБРАТИТЕСЬ К ДАННОМУ РУКОВОДСТВУ И ПОЙМИТЕ ИЗЛОЖЕННЫЕ В НЕМ СВЕДЕНИЯ.**
- **НЕСОБЛЮДЕНИЕ УКАЗАННЫХ ТРЕБОВАНИЙ МОЖЕТ ПРИВЕСТИ К ТОМУ, ЧТО СПЕЦИАЛИСТ ПО ТЕХОБСЛУЖИВАНИЮ, ОПЕРАТОР ИЛИ ПАЦИЕНТ ПОЛУЧАТ УДАР ЭЛЕКТРИЧЕСКИМ ТОКОМ, МЕХАНИЧЕСКУЮ ТРАВМУ ИЛИ ДРУГОЕ ПОВРЕЖДЕНИЕ.**

**ПРЕДУПРЕЖДЕНИЕ
(BG)**

ТОВА СЕРВИЗНО РЪКОВОДСТВО Е НАЛИЧНО САМО НА АНГЛИЙСКИ ЕЗИК.

- **АКО ДОСТАВЧИКЪТ НА СЕРВИЗНИ УСЛУГИ НА КЛИЕНТ СЕ НУЖДАЕ ОТ ЕЗИК, РАЗЛИЧЕН ОТ АНГЛИЙСКИ, ЗАДЪЛЖЕНИЕ НА КЛИЕНТА Е ДА ПРЕДОСТАВИ ПРЕВОДАЧЕСКА УСЛУГА.**
- **НЕ СЕ ОПИТВАЙТЕ ДА ИЗВЪРШВАТЕ СЕРВИЗНО ОБСЛУЖВАНЕ НА ТОВА ОБОРУДВАНЕ, ОСВЕН ВСЛУЧАЙ, ЧЕ СЕРВИЗНОТО РЪКОВОДСТВО Е ПРОЧЕТЕНО И СЕ РАЗБИРА.**
- **НЕСПАЗВАНЕТО НА ТОВА ПРЕДУПРЕЖДЕНИЕ МОЖЕ ДА ДОВЕДЕ ДО НАРАНЯВАНЕ НА ДОСТАВЧИКА НА СЕРВИЗНИ УСЛУГИ, НА ОПЕРАТОРА ИЛИ ПАЦИЕНТА ВСЛЕДСТВИЕНА ТОКОВ УДАР, МЕХАНИЧНИ ИЛИ ДРУГИ РИСКОВЕ.**

**UPOZORENJE
(SR)**

OVAJ PRIRUČNIK ZA SERVISIRANJE DOSTUPAN JE SAMO NA ENGLISKOM JEZIKU.

- **AKO KLIJENTOV SERVISER ZAHTJEVA JEZIK KOJI NIJE ENGLISKI, ODGOVORNOST JE NA KLIJENTU DA PRUŽI USLUGE PREVOĐENJA.**
- **NEMOJTE POKUŠAVATI DA SERVISIRATE OPREMU AKO NISTE PROČITALI I RAZUMELI PRIRUČNIK ZA SERVISIRANJE.**
- **AKO NE POŠTUJETE OVO UPOZORENJE, MOŽE DOĆI DO POVREĐIVANJA SERVISERA, OPERATERA ILI PACIJENTA UZROKOVANOG ELEKTRIČNIM UDAROM, MEHANIČKIM I DRUGIM OPASNOSTIMA.**

**OPOZORILO
(SL)**

TA SERVISNI PRIROČNIK JE NA VOLJO SAMO V ANGLEŠČINI.

- **ČE PONUDNIK SERVISNIH STORITEV ZA STRANKO POTREBUJE NAVODILA V DRUGEM JEZIKU, JE ZA PREVOD ODGOVORNA STRANKA SAMA.**
- **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.**

**UPOZORENJE
(HR)**

OVAJ SERVISNI PRIRUČNIK DOSTUPAN JE SAMO NA ENGLESKOM JEZIKU.

- **AKO KLIJENTOV SERVISER ZAHTIJEVA JEZIK KOJI NIJE ENGLESKI, ODGOVORNOST KLIJENTA JE PRUŽITI USLUGE PREVOĐENJA.**
- **NEMOJTE POKUŠAVATI SERVISIRATI OPREMU AKO NISTE PROČITALI I RAZUMJELI SERVISNI PRIRUČNIK.**
- **AKO NE POŠTUJETE OVO UPOZORENJE, MOŽE DOĆI DO OZLJEDE SERVISERA, OPERATERA ILI PACIJENTA PROUZROČENE STRUJNIM UDAROM, MEHANIČKIM I DRUGIM OPASNOSTIMA.**

**UPOZORNENIE
(SK)**

TÁTO SERVISNÁ PRÍRUČKA JE K DISPOZÍCII LEN V ANGLIČTINE.

- **AK ZÁKAZNÍKOV POSKYTOVATEĽ SLUŽIEB VYŽADUJE INÝ JAZYK AKO ANGLIČTINU, POSKYTNUTIE PREKLADATEĽSKÝCH SLUŽIEB JE ZODPOVEDNOSŤOU ZÁKAZNÍKA.**
- **NEPOKÚŠAJTE SA VYKONÁVAŤ SERVIS ZARIADENIA SKÔR, AKO SI NEPREČÍTATE SERVISNÚ PRÍRUČKU A NEPOROZUMIETE JEJ.**
- **ZANEDBANIE TOHTO UPOZORNENIA MÔŽE VYÚSTIŤ DO ZRANENIA POSKYTOVATEĽA SLUŽIEB, OBSLUHUJÚCEJ OSOBY ALEBO PACIENTA ELEKTRICKÝM PRÚDOM, PRÍPADNE DO MECHANICKÉHO ALEBO INÉHO NEBEZPEČENSTVA.**

**VARNING
(SV)**

DEN HÄR SERVICEHANDBOKEN FINNS BARA TILLGÄNGLIG PÅ ENGELSKA.

- **OM EN KUNDS SERVICETEKNIKER HAR BEHOV AV ETT ANNAT SPRÅK ÄN ENGELSKA ANSVARAR KUNDEN FÖR ATT TILLHANDAHÅLLA ÖVERSÄTTNINGSTJÄNSTER.**
- **FÖRSÖK INTE UTFÖRA SERVICE PÅ UTRUSTNINGEN OM DU INTE HAR LÄST OCH FÖRSTÅR DEN HÄR SERVICEHANDBOKEN.**
- **OM DU INTE TAR HÄNSYN TILL DEN HÄR VARNINGEN KAN DET RESULTERA I SKADOR PÅ SERVICETEKNIKERN, OPERATÖREN ELLER PATIENTEN TILL FÖLJD AV ELEKTRISKA STÖTAR, MEKANISKA FAROR ELLER ANDRA FAROR.**

DİKKAT
(TR)

BU SERVİS KILAVUZU YALNIZCA İNGİLİZCE OLARAK SAĞLANMIŞTIR.

- **EĞER MÜŞTERİ TEKNİSYENİ KILAVUZUN İNGİLİZCE DIŞINDAKİ BİR DİLDE OLMASINI İSTERSE, KILAVUZU TERCÜME ETTİRMEK MÜŞTERİNİN SORUMLULUĞUNDADIR.**
- **SERVİS KILAVUZUNU OKUYUP ANLAMADAN EKİPMANLARA MÜDAHALE ETMEYİNİZ.**
- **BU UYARININ GÖZ ARDI EDİLMESİ, ELEKTRİK ÇARPMASI YA DA MEKANİK VEYA DİĞER TÜRDE KAZALAR SONUCUNDA TEKNİSYENİN, OPERATÖRÜN YA DA HASTANIN YARALANMASINA YOL AÇABİLİR.**

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(JA)

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警告
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Chinese

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Revision History

REVISION	DATE	REASON FOR CHANGE
1	2008-NOV-14	Initial release of manual.
2	2010-APR-30	Updated per BT10 release.
3	2011-MAR-01	Updated per BT'11-M4 release of product.
4	2011-SEP-19	Updated per BT'12 release.
5	2012-DEC-10	Updated with changes since Rev. 4.

List of Effected Pages

Pages	Revision	Pages	Revision	Pages	Revision
Title Page	5	4-1 to 4-54	5	9-1 to 9-106	5
i to xii	5	5-1 to 5-102	5	10-1 to 10-32	5
1-1 to 1-36	5	6-1 to 6-18	5	Back Cover	N/A
2-1 to 2-14	5	7-1 to 7-24	5		
3-1 to 3-52	5	8-1 to 8-316	5		

Table of Contents

CHAPTER 1

Introduction

Overview	1 - 1
Purpose of this chapter	1 - 1
Contents in this chapter	1 - 1
Service manual overview	1 - 2
Contents in this service manual	1 - 2
Typical users of the Service Manual	1 - 2
VIVID E9 models covered by this manual	1 - 3
Product description	1 - 5
Important conventions	1 - 6
Conventions used in this book	1 - 6
Standard hazard icons	1 - 7
Product icons	1 - 8
Safety considerations	1 - 11
Introduction	1 - 11
Human safety	1 - 11
Mechanical safety	1 - 13
Electrical safety	1 - 15
Labels locations	1 - 16
Label on Front of LCD Monitor	1 - 16
Label on Rear of LCD Monitor	1 - 16
Label on Upper OP Panel	1 - 17
Labels on Front Handle	1 - 17
Labels on top of Console	1 - 17
Labels near Connectors on Front	1 - 18
Labels on DVD Units	1 - 19
Label on External I/O	1 - 19
Labels at AC Mains Inlet and Circuit Breaker	1 - 20
Label on Rear Cover	1 - 21
Label on Rear Cover - detailed descriptions	1 - 26
Label on the BEP6's door	1 - 29
Label on the BEP5's door	1 - 30
Label, Disassembly Nester	1 - 31

Dangerous procedure warnings

1 - 32

Lockout/Tagout (LOTO) requirements

1 - 33

Returning/Shipping Probes and Repair Parts

1 - 33

Electromagnetic compatibility (EMC)

1 - 34

What is EMC?

1 - 34

Compliance

1 - 34

Electrostatic discharge (ESD) prevention

1 - 34

Customer assistance

1 - 35

Contact information

1 - 35

System manufacturer

1 - 36

CHAPTER 2

Site preparations

Overview	2 - 1
Purpose of this chapter	2 - 1
Contents in this chapter	2 - 1
General console requirements	2 - 2
Console environmental requirements	2 - 2
Electrical requirements	2 - 4
EMI limitations	2 - 7
Probes environmental requirements	2 - 8
Time and manpower requirements	2 - 8
Facility needs	2 - 9
Purchaser responsibilities	2 - 9
Required facility needs	2 - 10
Desirable features	2 - 11
Minimal floor plan suggestion	2 - 11
Suggested Floor Plan, VIVID E9 and EchoPAC PC in Same Room	2 - 11
Networking setup requirements	2 - 12

CHAPTER 3

System setup

Overview	3 - 1
Purpose of this chapter	3 - 1
Contents in this chapter	3 - 1
Setup reminders	3 - 2
Average setup time	3 - 2
Setup warnings	3 - 2
Receiving and unpacking the equipment	3 - 3
Purpose of this section	3 - 3
Receiving and unpacking warnings	3 - 3
The Tilt & Shock indicators	3 - 4
Receiving the VIVID E9	3 - 5
Unpacking VIVID E9 from the Wooden Box	3 - 10
Unpacking VIVID E9 from the Carton Box	3 - 12
Packing materials for the Wooden Box - recycling information	3 - 16
Packing materials for the Carton Box - recycling information	3 - 17
Preparing for setup	3 - 19
Verify Customer Order	3 - 19
Physical inspection	3 - 19
EMI protection	3 - 19
Completing the setup	3 - 20
Purpose of this section	3 - 20
System specifications	3 - 20
Electrical specifications	3 - 21
Connections on the External IO	3 - 22
Connections on the Patient I/O panel	3 - 23
Connecting Probes	3 - 24
Power On/Boot Up	3 - 26
Power shut down	3 - 26
Configuration	3 - 27
Purpose of this section	3 - 27
VIVID E9 configuration	3 - 27
Service Screen setup	3 - 32
Optional Peripherals/Peripheral Connection	3 - 36

Software Options Configuration	3 - 38
Connectivity overview	3 - 40
Physical connection	3 - 40
Connectivity setup	3 - 41
Introduction	3 - 41
Compatibility	3 - 41
Select TCP/IP Screen	3 - 42
Changing the AE Title and/or Port Number (Port No.)	3 - 43
DHCP setup	3 - 44
Set the Remote Archive's Network Information	3 - 47
Save the New Settings	3 - 48
Options Setup	3 - 49
Software options	3 - 49
Color Video Printer (optional) installation	3 - 49
Setup paperwork	3 - 50
User's Manual(s)	3 - 50
Product Locator Installation Card	3 - 51

CHAPTER 4

General procedures and Functional checks

Overview	4 - 1
Purpose of this chapter	4 - 1
Contents in this chapter	4 - 1
Special Equipment required	4 - 2
General procedures	4 - 3
Power ON/Boot Up	4 - 4
Power shut down	4 - 8
Top Console position adjustment	4 - 11
LCD Monitor position adjustment	4 - 14
Logging on to VIVID E9 as 'ADM'	4 - 15
Moving and Transporting the VIVID E9	4 - 17
Recording important settings and parameters	4 - 19
Cleaning the Trackball from the outside (OP-5)	4 - 31
Cleaning the Trackball (OP-1 to OP-4)	4 - 32
Functional checks	4 - 37
Preparation	4 - 37
2D Mode (B mode) Checks	4 - 37
M Mode Checks	4 - 39
Color Mode Checks	4 - 40
PW/CW Doppler Mode Checks	4 - 42
Tissue Velocity Imaging (TVI) Checks	4 - 43
Probe/Connectors Check	4 - 44
ECG Check	4 - 45
Cineloop Check	4 - 46
Back End Processor checks	4 - 47
Operator Panel Test	4 - 47
Peripheral checks	4 - 47
Mechanical Functions Checks	4 - 51
Site Log	4 - 52

CHAPTER 5

Components and functions (theory)

Overview	5 - 1
Purpose of this chapter	5 - 1
Contents in this chapter	5 - 1
InSite ExC	5 - 4
Introduction	5 - 4
InSite ExC Icon	5 - 4
InSite ExC Status	5 - 5
Initiating a Request for Service (RFS)	5 - 6
Automatic Request for Service (ARFS)	5 - 7
InSite ExC Definitions	5 - 8
Exiting InSite ExC	5 - 8
VIVID E9 overview	5 - 9
Purpose of this section	5 - 9
Introduction	5 - 9
VIVID E9 general description	5 - 10
VIVID E9 block diagram	5 - 10
Signal flow overview	5 - 11
System configuration and software	5 - 12
The electronics	5 - 12
VIVID E9 interconnection diagram	5 - 13
VIVID E9's Operating Modes	5 - 15
Top Console with LCD monitor and Operator Panel	5 - 17
Top Console description	5 - 17
Operator Panel (Control Panel)	5 - 21
Main Console	5 - 24
Main Console description	5 - 24
Air Flow control	5 - 25
General description	5 - 25
Casters and Brakes	5 - 26
Front End Processor (FEP)	5 - 27
Front End Card Rack description	5 - 27
Transmitter and Receiver subsystem	5 - 29
Transmitter Board (GTX)	5 - 32

Relay Board (RLY)	5 - 38
Receiver Board (GRX)	5 - 41
Front Plane boards (XD BUS)	5 - 43
Digital Receiver board (DRX)	5 - 44
Front End Interface Board (GFI)	5 - 47
FEP Backplane	5 - 50
Back End Processor (BEP)	5 - 52
Purpose of this section	5 - 52
Introduction	5 - 52
Signal Flow and Processing	5 - 52
Location of the Back End Processor (BEP)	5 - 53
CPU/Back End Processor (BEP) - block diagram	5 - 54
BEP description	5 - 55
BEP6 Face, Top and Rear connections	5 - 56
BEP5 Face and Top connections	5 - 58
Input DC Voltages	5 - 63
Input Signals	5 - 64
Bi-directional signals	5 - 65
Outputs	5 - 65
LEDs	5 - 66
BEP Power Supply	5 - 69
IO Board	5 - 74
Graphics Adapter	5 - 76
Internal Storage Devices	5 - 76
Power distribution	5 - 77
Purpose of this section	5 - 77
Main Power Supply	5 - 77
Power Up Sequence Description	5 - 82
Power Down Sequence description	5 - 86
Input and Output (I/O) modules	5 - 88
Purpose of this section	5 - 88
Patient I/O (Physio)	5 - 88
BEP6 I/O Board	5 - 92
BEP5 I/O Board	5 - 94
Probe Connectors	5 - 95
Peripherals overview	5 - 96
Internal peripherals	5 - 96
External peripherals	5 - 97

Product manuals.	5 - 99
User documentation	5 - 99
Service documentation	5 - 99
Common Service Desktop overview.	5 - 100
Purpose of this section	5 - 100
Introduction	5 - 100
<i>iLinq</i> Interactive Platform Features	5 - 100
Global Service User Interface (GSUI)	5 - 101
Restart VIVID E9 after diagnostics.	5 - 102

CHAPTER 6

Service adjustments

Overview	6 - 1
Purpose of this chapter	6 - 1
Contents in this chapter	6 - 1
LCD Monitor adjustments	6 - 2
Purpose of this section	6 - 2
Cautions and Warnings	6 - 2
Access to Adjustments	6 - 2
LCD Adjustment Procedure	6 - 2
Advanced LCD adjustments	6 - 3
Test the LCD Arm and LCD Monitor range of motion	6 - 4
Backlight adjustment	6 - 5
Purpose of this section	6 - 5
Cautions and Warnings	6 - 5
Accessing the Main LCD and Touch Screen Backlight Adjustments	6 - 5
Backlight and Blue Tint Adjustment	6 - 6
Adjust LCD Brightness and Contrast	6 - 6
Test Images	6 - 7
Touch Screen Calibration	6 - 10
DC Offset Calibration (Front End Alignment)	6 - 11
Introduction	6 - 11
When to do a Front End Alignment	6 - 11
Front End Alignment Procedure	6 - 11
Adjusting the XYZ Mechanism	6 - 12
Operator Panel XY movement - principle of operation	6 - 12
Adjusting the XY Lock	6 - 13
XY Manual Release for Lock and Brake Mechanism and Adjustment	6 - 14
Using the Park Lock Properly	6 - 17
Adjusting the Z mechanism	6 - 17
Adjust time-out for DICOM servers	6 - 17

CHAPTER 7

Diagnostics / troubleshooting

Overview	7 - 1
Purpose of this chapter	7 - 1
Contents in this chapter	7 - 1
Service Safety Considerations	7 - 2
FAQ - Frequently Asked Questions	7 - 2
High System Temperature Error	7 - 2
Reset the BEP from a Hang	7 - 2
How to Release the Top Console when power is unavailable	7 - 3
Troubleshooting Tips	7 - 4
Shortcut Keys	7 - 4
Image Artifacts Caused by Front End Boards	7 - 5
Back End Processor	7 - 6
Operator Panel	7 - 7
Probes	7 - 7
Software	7 - 7
Network Connectivity Troubleshooting	7 - 8
First Status	7 - 8
Cannot connect to anything via the network	7 - 8
No Verify	7 - 9
System Pings and Verifies OK, but does NOT Send	7 - 9
Gathering Troubleshooting Data	7 - 10
Collect Vital System Information	7 - 10
Collect a Trouble Image with Logs	7 - 11
Screen Captures	7 - 12
Purpose of this Section	7 - 12
Ctrl+PrintScreen shortcut	7 - 12
To Capture a Screen Image Using the Shortcut	7 - 12
Restart VIVID E9 After Diagnostics	7 - 12
Motor Controller Test	7 - 13
Troubleshooting	7 - 15
No Response from VIVID E9 - It's "Locked"	7 - 15
Unable to scan	7 - 16

XY Lock is not working . . . . .	.7 - 17
XY Brake Motors Troubleshooting . . . . .	.7 - 17
Z Movement fails . . . . .	.7 - 17
Difficult to lock and release the alphanumeric keyboard . . . . .	.7 - 18
USB Footswitch . . . . .	.7 - 19
USB Device(s) stopped working . . . . .	.7 - 19
System Temperature Too High . . . . .	.7 - 20
Noise troubleshooting . . . . .	.7 - 21
General Recommendations . . . . .	.7 - 21
EMI Prevention/abatement . . . . .	.7 - 22

CHAPTER 8

Replacement procedures

Overview	8 - 1
Purpose of this chapter	8 - 1
Contents in this chapter	8 - 1
Warnings and important information.	8 - 2
Purpose of this section	8 - 2
Warnings	8 - 2
Returning/Shipping probes and Repair Parts	8 - 3
Manpower - When two persons are needed	8 - 3
Tools needed for servicing VIVID E9	8 - 4
Definitions of Left, Right, Front and Back	8 - 5
Reloading the software	8 - 6
Purpose of this section	8 - 6
VIVID E9 models versus software requirement	8 - 7
Customer provided prerequisite	8 - 9
Tools provided with the VIVID E9 at delivery or after an upgrade	8 - 9
Data Management - moving all images	8 - 10
Backing up the Patient Archive and System Configurations	8 - 10
Recording important settings and parameters	8 - 11
When to load or reload the software	8 - 12
Reloading the Software from Repository	8 - 13
Loading the Software - from DVD/CD	8 - 16
Setup after Software loading	8 - 37
Verifications after the software has been re-loaded	8 - 37
Replacing Covers and Bumpers.	8 - 38
Purpose of this section	8 - 38
Side Covers replacement	8 - 38
Top Cover replacement	8 - 41
Side Bumpers Replacement Procedure	8 - 44
Foot Rest Bumper replacement	8 - 45
Front Cover replacement	8 - 47
Plate Connectors w/Guide replacement	8 - 49
Filter Cover replacement	8 - 51
Rear Cover replacement	8 - 52
Door, I/O Panel replacement	8 - 54
Cable Hooks replacement	8 - 56

Rear Bumper replacement	8 - 59
Rear Handle replacement	8 - 60
Column Cover Assembly replacement	8 - 62
Main Cable Cover replacement	8 - 65
Covers under XY / Frogleg motors replacement	8 - 67
Bulkhead Cover replacement	8 - 70
Top Console Parts Replacement	8 - 73
Purpose of this section	8 - 73
Replacing the 17" LCD Monitor assembly	8 - 73
Replacing the 19" LCD Monitor assembly	8 - 79
Replacing the LCD Arm assembly	8 - 85
Replacing the LCD Cables	8 - 89
LCD Mount Lock replacement	8 - 96
Replacing the Upper Operator Panel/Touch Panel Assembly	8 - 98
Replacing the Frame w/LCD and Touch Screen	8 - 104
Replacing the Main Controller Board	8 - 108
USB Connector Board replacement	8 - 113
High Voltage Inverter Board with Cable replacement	8 - 116
Upper Bezel replacement	8 - 118
Frame UI Upper replacement	8 - 119
Options Holder / Left or Right Support replacement	8 - 121
Knobs for Encoders and Slidepots replacement	8 - 122
Replacing the Operator Panel, Lower	8 - 124
Replacing the Trackball	8 - 128
Encoder Board replacement	8 - 130
Lower Switch Board with Elastomer replacement	8 - 132
Lower Bezel replacement	8 - 135
Lower Frame Assembly replacement	8 - 138
Operator Panel Cable Kit Replacement	8 - 141
Replacing the Alpha-Numeric Keyboard Assembly	8 - 144
Replacing the A/N Keyboard or the A/N Keyboard Enclosure	8 - 147
Wagon AN Drawer Sheet Met. Assembly replacement	8 - 151
J-Rail Assy replacement	8 - 153
Replacing the Speaker Assembly	8 - 155
Replacing the Bulkhead Board	8 - 157
Bulkhead, Plate, Extended replacement	8 - 160
Probe Cable Hook Twin replacement	8 - 162
Non-Magnetic Touch Latch replacement	8 - 163
Handle, Left Top / Handle Right Top, replacement	8 - 164
Palm Rest ASSY replacement	8 - 166
Replacing the Probe Holder Inserts	8 - 168

Replacing the Gel Cup	8 - 169
Up-Down Button Board (Buttons Frame UI Assy) replacement	8 - 170
Button IF Board Assy replacement	8 - 172
Replacing XYZ Parts	8 - 174
XY Mechanism replacement	8 - 174
XY Brake Assy replacement	8 - 177
XY Park Lock replacement	8 - 181
Z-Mechanism replacement	8 - 182
Drive Gear Assembly replacement	8 - 185
XYZ Control Assembly replacement	8 - 188
Main Console parts replacement	8 - 190
Purpose of this section	8 - 190
Rear Filter and “handle type” Bottom Filter replacement	8 - 190
Rear Air Filter replacement	8 - 194
Bottom “nylon strip” Air Filter replacement	8 - 196
Fan Assembly replacement	8 - 198
Replacing Fan Screen and Fan Screen Frame	8 - 200
Main Cable replacement	8 - 202
Subwoofer replacement	8 - 205
Casters and Brakes replacement	8 - 208
Rear Casters replacement	8 - 208
Front Casters replacement	8 - 211
Pedal Mechanism replacement	8 - 214
Brake Pedal replacement	8 - 216
Pedal Release replacement	8 - 217
Pedal Dir Lock replacement	8 - 217
Front End Processor (FEP) / Card Cage parts replacement	8 - 218
Front End parts overview	8 - 219
Front End (FEP) Cover replacement	8 - 221
Front Plane / XD BUS replacement	8 - 224
Relay Board (RLY) replacement	8 - 229
Receiver Board (GRX) replacement	8 - 232
Transmitter Board (GTX) replacement	8 - 235
Digital Receiver Board (DRX) replacement	8 - 239
GFI Board replacement	8 - 241
Back End Processor (BEP) parts replacement.	8 - 244
Back End Processor (BEP) replacement	8 - 244
Back End Processor Power Supply replacement	8 - 251

Hard Disk Drive (HDD) replacement . . . . .	.8 - 256
Graphics Adapter replacement . . . . .	.8 - 262
BEP Front Module replacement . . . . .	.8 - 273
BEP6 Fan replacement . . . . .	.8 - 276
BEP Power In Cable replacement . . . . .	.8 - 279
SATA Jumper replacement . . . . .	.8 - 281
Patient I/O Interface Cable replacement . . . . .	.8 - 282
Video Jumper (Flex) replacement . . . . .	.8 - 284
DVI to Samtec Jumper (Flex) replacement . . . . .	.8 - 285
SATA Cable - DVR to BEP6 MBD replacement . . . . .	.8 - 287
DVI Flex Main Yggdrasil replacement . . . . .	.8 - 288
DVR Audio cable replacement . . . . .	.8 - 289
BEP6 to GFI and Card Rack Backplane Cable replacement . . . . .	.8 - 290
Main Power Supply replacement . . . . .	.8 - 292
Preparations . . . . .	.8 - 292
I/O Modules replacement . . . . .	.8 - 295
Patient I/O Assembly replacement . . . . .	.8 - 295
Side I/O Board Assembly replacement . . . . .	.8 - 298
Peripherals replacement . . . . .	.8 - 303
DVD R/W drive replacement . . . . .	.8 - 303
Digital Video Recorder (DVR) replacement . . . . .	.8 - 305
Black & White Digital Graphic Printer replacement . . . . .	.8 - 312
USB Flash Card replacement . . . . .	.8 - 313
Color Video Printer Replacement . . . . .	.8 - 314
GFI PCIe Cable replacement . . . . .	.8 - 315

CHAPTER 9

Renewal parts

Overview	9 - 1
Contents in this chapter	9 - 1
Definitions of Left, Right, Front and Back	9 - 2
List of Abbreviations	9 - 3
VIVID E9 models and hardware/software compatibility	9 - 4
Software for VIVID E9	9 - 6
Overview	9 - 6
BT'12 Software (Application Software Version 112)	9 - 6
BT'11 Software (Application Software Version 110)	9 - 9
BT'09 Software (Application software v108.x.x)	9 - 13
Covers and Bumpers	9 - 15
Top Console parts	9 - 18
LCD Monitor parts	9 - 18
Operator Panel (OP) parts	9 - 19
Top Console PCBs	9 - 30
Trackball parts	9 - 33
Operator Panel Cable Kit for Vivid E9 and Logiq E9	9 - 34
Button Kits and Knobs	9 - 36
Common Top Console parts	9 - 43
XYZ parts	9 - 50
Main Console parts.	9 - 52
Casters (Wheels) parts	9 - 54
Front End Processor (FEP) Card Rack parts	9 - 56
Front End Processor Card Rack - BT'11/BT'12 with 2D	9 - 56
Front End Processor Card Rack - BT'11/BT'12 with 4D Expert Option	9 - 58
Front End Processor Card Rack - BT'09	9 - 59
Back End Processor (BEP) Spare Parts	9 - 60
Content in this section	9 - 60
BEP6 Spare Parts	9 - 60
BEP5 Spare Parts	9 - 62

Main Power Supply	9 - 64
I/O modules	9 - 65
Peripherals for VIVID E9	9 - 66
DVD drives	9 - 66
Printer, Internal	9 - 66
Printers, External - USB	9 - 66
Printers, Network	9 - 67
Digital Video Stream Recorder	9 - 69
USB Flash Card	9 - 69
USB Hard Drive 2TB with RAID1	9 - 70
Mains Power Cables - VIVID E9	9 - 71
Internal Cables - VIVID E9	9 - 72
Cable Harness	9 - 72
Top Console Cables	9 - 74
XYZ Controller cables	9 - 76
Main Power Supply cables	9 - 77
Front End Processor (FEP) cables	9 - 78
Back End Processor (BEP) cables	9 - 79
Peripherals Cables	9 - 89
ECG cables - VIVID E9	9 - 91
Labels VIVID E9	9 - 92
Physio TX Parts	9 - 92
Options - VIVID E9	9 - 93
Options - VIVID E9 - BT'12, application software v112.x	9 - 93
Options - VIVID E9 - BT'11, application software v110.x	9 - 95
Options - VIVID E9 - BT'09, application software v108.x	9 - 96
Product Manuals for VIVID E9	9 - 97
Overview	9 - 97
Product manuals for BT'12	9 - 97
Product manuals for BT'11	9 - 99
Product manuals for BT'09	9 - 101
Probes Documentation	9 - 103

CHAPTER 10

Care & maintenance

Overview	10 - 1
Periodic maintenance inspections	10 - 1
Purpose of this chapter	10 - 1
Contents in this chapter	10 - 1
Warnings	10 - 2
Why do maintenance	10 - 2
Keeping records	10 - 2
Quality assurance	10 - 2
Maintenance task schedule	10 - 3
How often should maintenance tasks be performed?	10 - 3
Tools required	10 - 5
System maintenance	10 - 6
Preliminary checks	10 - 6
Functional checks	10 - 7
Input Power	10 - 8
Physical inspection	10 - 9
Cleaning	10 - 10
Probe maintenance	10 - 14
Electrical Safety Tests	10 - 20
Safety Test Overview	10 - 21
Leakage Current Limits	10 - 22
Outlet Test - Wiring Arrangement - USA & Canada	10 - 24
Grounding Continuity	10 - 24
Chassis Leakage Current Test	10 - 25
Isolated Patient Lead (Source) Leakage—Lead to Ground	10 - 26
Isolated Patient Lead (Source) Leakage—Lead to Lead	10 - 28
Probe Leakage Current Test	10 - 29
When there's too much leakage current	10 - 32
Chassis Fails	10 - 32
Probe Fails	10 - 32
Peripheral Fails	10 - 32
Still Fails	10 - 32
New Unit	10 - 32
ECG Fails	10 - 32

Chapter 1

Introduction

Section 1-1 Overview

1-1-1 Purpose of this chapter

This chapter describes important issues related to safely servicing VIVID E9. 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
1-2	Service manual overview	1-2
1-3	Important conventions	1-6
1-4	Safety considerations	1-11
1-5	Labels locations	1-16
1-6	Dangerous procedure warnings	1-32
1-7	Lockout/Tagout (LOTO) requirements	1-33
1-8	Returning/Shipping Probes and Repair Parts	1-33
1-9	Electromagnetic compatibility (EMC)	1-34
1-10	Customer assistance	1-35

Section 1-2

Service manual overview

The service manual provides installation and service information for the VIVID E9 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 service 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 Healthcare'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	Introduction	Contains a content summary and warnings.
2	Site preparations	Contains pre-installation requirements for the VIVID E9.
3	System setup	Contains installation procedure with installation checklist.
4	General procedures and Functional checks	Contains functional checks that must be performed as part of the installation, or as required during servicing and periodic maintenance.
5	Components and functions (theory)	Contains block diagrams and functional explanations of the electronics.
6	Service adjustments	Contains instructions on how to make any available adjustments to the VIVID E9.
7	Diagnostics / troubleshooting	Provides procedures for running and diagnostic or related routines for the VIVID E9.
8	Replacement procedures	Provides disassembly procedures and reassembly procedures for all changeable FRU.
9	Renewal parts	Contains a complete list of replacement parts for VIVID E9.
10	Care & maintenance	Provides periodic maintenance procedures for VIVID E9.
N/A	Index	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 sheet 1 of 2

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO	
GA000940	Vivid E9 100-230V 4D Expert Option - 17" LCD	GA200824 VE9 Card Rack Complete with MLA16, 4D TEE backplane, 192 RX channels and one TX card with 192 channels	GB200001 BEP6 w/4D	v104.3.4 (or higher)	v112.0.7 or higher	v112.1.x	
			GB200003 BEP5 w/4D Nvidia Quadro 2000D	v104.3.3 (or higher)	v112.0.x or higher	v112.1.x	
						v112.1.x	
						v112.1.x	
GA000890 BEP5 w/4D Nvidia	v104.3.x		v112.0.x or higher	v112.1.x			
	GA000950		Vivid E9 100-230V 4D Expert Option - 19" LCD	GB200001 BEP6 w/4D	v104.3.4 (or higher)	v112.0.7 or higher	v112.1.x
				GB200003 BEP5 w/4D Nvidia Quadro 2000D	v104.3.3 (or higher)	v112.0.x or higher	v112.1.x
GA200890 BEP w/4D Nvidia		v104.3.x		v112.0.x or higher	v112.1.x		
GB000040	Vivid E9 100-230V BT12 Pro Configuration - 17" LCD	GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.4 (or higher)	v112.1.0 or higher	v112.1.x	
GB000050	Vivid E9 100-230V BT12 Pro Configuration - 19" LCD					v112.1.x	
GA000945	Vivid E9 100-230V 2D - 17" LCD		GB200002 BEP6 wo/4D	v104.3.x	v112.0.6 or higher	v112.1.x	
			GA200900 BEP5 wo/4D	v104.3.x	v112.0.x or higher	v112.1.x	
GA000955	Vivid E9 100-230V 2D - 19" LCD		GB200002 BEP6 wo/4D	v104.3.x	v112.0.6 or higher	v112.1.x	
		GA200900 BEP5 wo/4D	v104.3.x	v112.0.x or higher	v112.1.x		

Table 1-2 VIVID E9 Models and Hardware/Software Compatibility (cont'd) sheet 2 of 2

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO
GA000810	VIVID E9 100-230V 4D Expert Option - 17" LCD	GA200824 VE9 Card Rack Complete with MLA16, 4D TEE backplane and 192 RX channels	GB200001 BEP6 w/4D	v104.3.x	v110.1.12	v112.1.x
			GA200890 or GA200800 BEP5 w/4D Nvidia		v110.1.x	
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.2.x v104.1.x	v110.0.x	
GA000815	VIVID E9 100-230V 4D Expert Option - 19" LCD	GA200824 VE9 Card Rack Complete with MLA16, 4D TEE backplane and 192 RX channels	GB200001 BEP6 w/4D	v104.3.x	v110.1.12	v112.1.x
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.3.2	v110.1.x	
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.3.2	v110.1.x	
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.2.x v104.1.x	v110.0.x	
GA000830	VIVID E9 100-230V 2D - 17" LCD	GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.x	v110.1.12	v112.1.x
			GA200900 or GA200805 BEP5 wo/4D		v110.1.x	
GA000835	VIVID E9 100-230V 2D - 19" LCD	GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.x	v110.1.12	v112.1.x
			GA200900 or GA200805 BEP5 wo/4D		v110.1.x	
			GA200900 or GA200805 BEP5 wo/4D	v104.2.x v104.1.x	v110.0.x	
GA000100	VIVID E9, 100-230 VAC (with 4D)	GA200744	GA200890, GA200800 or 5145000-10 BEP5 w/4D	v104.0.x	v108.x.x	v112.1.x
		GA200035				v112.1.x NOTE! Hardware update or box (console) swap required.

NOTE: When not otherwise specified, the contents in this manual applies to all VIVID E9 models.

1-2-4 Product description

1-2-4-1 Overview of the VIVID E9 ultrasound scanner

The VIVID E9 ultrasound unit is a high performance digital ultrasound imaging system with total data management.

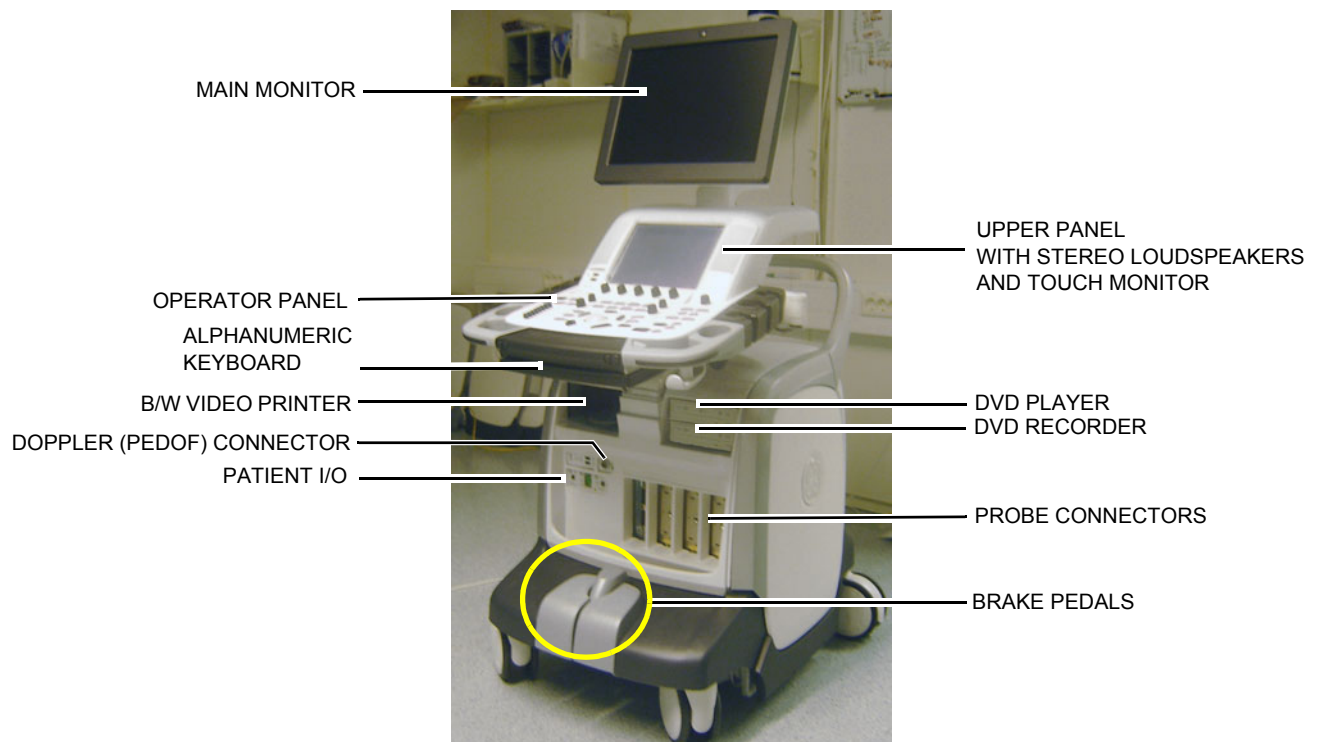
The system provides image generation in 4D, 2D (B) Mode, Color Doppler, Power Doppler (Angio), M-Mode, Color M-Mode, PW and CW Doppler spectra, Tissue Velocity imaging, Advanced Strain and Contrast applications. The fully digital architecture of the VIVID E9 unit allows optimal usage of all scanning 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 major components



1-2-4-2 Purpose of the operator manual(s)

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

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

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 scanners listed in [1-2-3 "VIVID E9 models covered by this manual" on page 1-3](#).

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 1-3 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 1-4 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 1-5 Product icons sheet 1 of 3






LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
Identification and Rating Plate	<ul style="list-style-type: none"> - 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 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 1-5 Product icons (cont'd) sheet 2 of 3










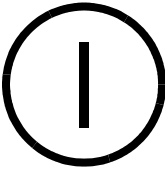



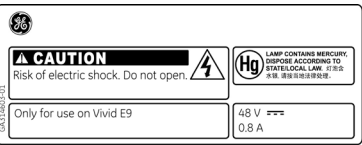
LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
	The system is not designed for use with flammable anesthetic gases.	Rear of console
<p>VIVID E9 SCANNERS</p> 	<p>VIVID E9 SCANNERS</p> <p>"TESTED AND PRODUCTION MONITORED BY TUV PRODUCT SERVICE NRTL WITH RESPECT TO ELECTRICAL SHOCK, FIRE AND MECHANICAL HAZARDS ONLY IN ACCORDANCE WITH UL2601-1 AND CAN/CSA C22.2 NO.601.1"</p>	REAR OF CONSOLE ON VIVID E9
	<p>This unit carries the CE mark.</p> <p>The VIVID E9 unit complies with regulatory requirements of the European Directive 93/ 42/EEC concerning medical devices.</p> <p>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>	REAR OF CONSOLE
	<p>"CAUTION" The equilateral triangle is usually used in combination with other symbols to advise or warn the user.</p>	VARIOUS
	<p>"ATTENTION - Consult accompanying documents"</p> <p>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>	VARIOUS
	<p>"CAUTION - Dangerous voltage"</p> <p>(the lightning flash with arrowhead in equilateral triangle) is used to indicate electric shock hazards.</p>	VARIOUS
	<p>"PINCH POINT"</p> <p>Indicates moving parts that may cause injury (such as LCD arm)</p>	VARIOUS
	<p>"Mains OFF"</p> <p>Indicates the power off position of the mains power switch.</p>	REAR OF SYSTEM ADJACENT TO MAINS SWITCH

Table 1-5 Product icons (cont'd) sheet 3 of 3

LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
	<p>"Mains ON" Indicates the Power ON position of the mains power switch.</p> <p>"ON" Indicates the power on position of the power switch.</p> <p>CAUTION THE ON/OFF BUTTON ON THE OPERATOR PANEL DOES NOT ISOLATE MAINS SUPPLY</p>	Rear of system
	<p>On/off button</p> <p>CAUTION SYSTEM SHUTDOWN USING THE ON/OFF BUTTON DOES NOT DISCONNECT VIVID E9 FROM MAINS VOLTAGE.</p> <p>For disconnecting VIVID E9 from mains voltage after system shutdown, please set the circuit breaker close to the mains inlet to OFF as described in 4-2-2 "Power shut down" on page 4-8.</p>	Operating Panel
	<p>"Protective Earth" Indicates the protective earth (grounding) terminal.</p>	USED SEVERAL PLACES INSIDE THE SCANNER.
	<p>"Equipotential" Indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment as described in IEC60601-1.</p>	REAR OF CONSOLE
	<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>	REAR OF CONSOLE
	<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>	REAR OF LCD Monitor

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 Training Seminar are authorized to service the equipment.



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, 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. ATTEMPTS TO MOVE THE UNIT CONSIDERABLE DISTANCES OR ON AN INCLINE BY ONE PERSON COULD RESULT IN INJURY OR DAMAGE OR BOTH.
















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


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

-  **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.

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 DVD OR 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 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 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 unit 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 SCANNER TO THE WRONG VOLTAGE LEVEL WILL MOST LIKELY DESTROY IT.*

1-4-4-2 Probes

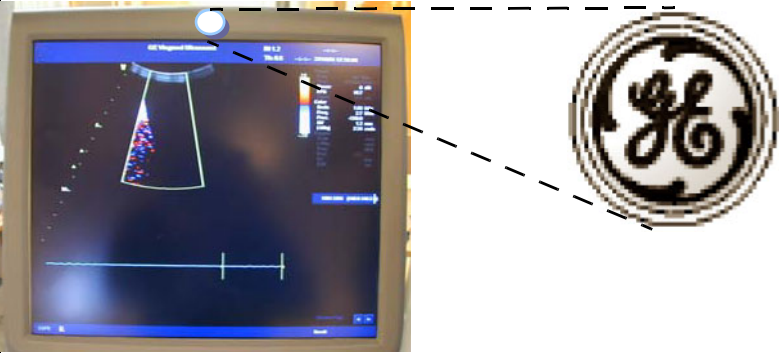
Follow these guidelines before connecting a probe to the scanner:

- 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.

Section 1-5
Labels locations

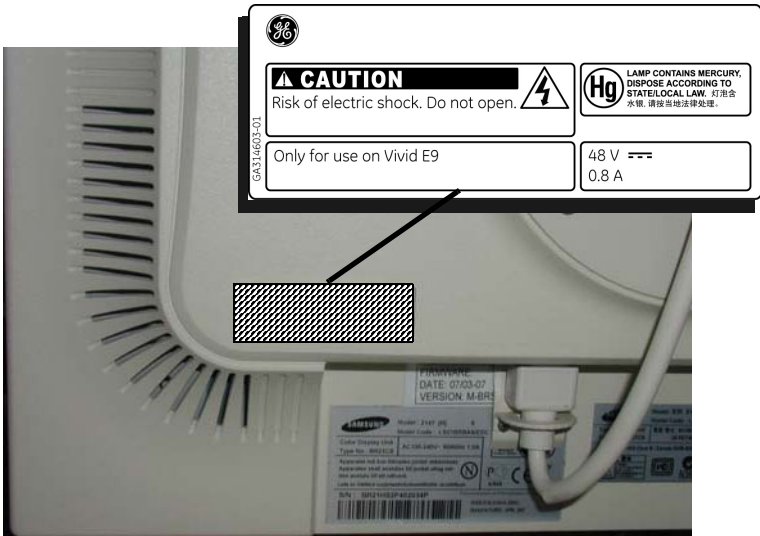
1-5-1 Label on Front of LCD Monitor

Table 1-6 Label on Front of LCD Monitor

DESCRIPTION	ILLUSTRATION
LABEL GE LOGO	 The illustration shows the front of the LCD monitor. A dashed line points from the top center of the monitor frame to a circular GE logo. The monitor screen displays a medical ultrasound image.

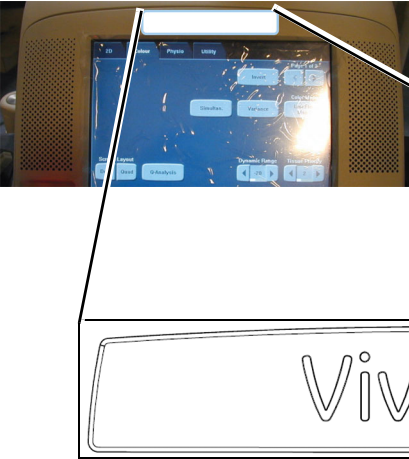
1-5-2 Label on Rear of LCD Monitor

Table 1-7 Label on Rear of LCD Monitor

DESCRIPTION	ILLUSTRATION
LABEL, LCD MERCURY_RATING	 The illustration shows the rear of the LCD monitor. A label is located on the upper right side of the rear panel. The label contains the following information: GE logo, CAUTION Risk of electric shock. Do not open. (with a lightning bolt symbol), LAMP CONTAINS MERCURY, DISPOSE ACCORDING TO STATE/LOCAL LAW. (with a mercury symbol and Chinese text), Only for use on Vivid E9, 48 V, 0.8 A. A dashed line points from the label to the text 'LABEL, LCD MERCURY_RATING' in the description column.

1-5-3 Label on Upper OP Panel

Table 1-8 Label on Upper OP Panel



DESCRIPTION	ILLUSTRATION
VIVID E9 NAMEPLATE, GOLD, UPPER OP PANEL (Used on VIVID E9 with 4D Expert option)	
VIVID E9 NAMEPLATE, BRONZE, UPPER OP PANEL (Used on VIVID E9 with 2D)	
Vivid E9 Nameplate, Periwinkle, Upper OP Panel (Used on VIVID E9 Pro)	
VIVID E9 NAMEPLATE, UPPER OP PANEL, SILVER (Used on VIVID E9 BT'09)	

1-5-4 Labels on Front Handle

None.

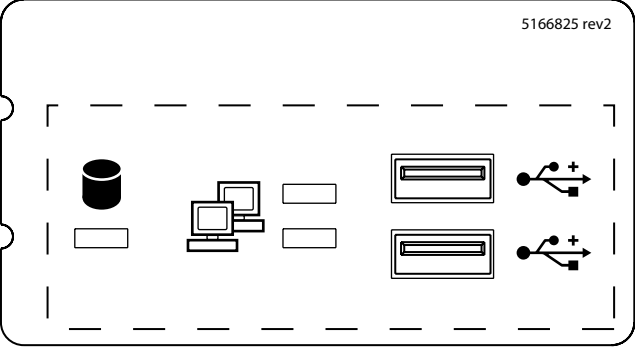
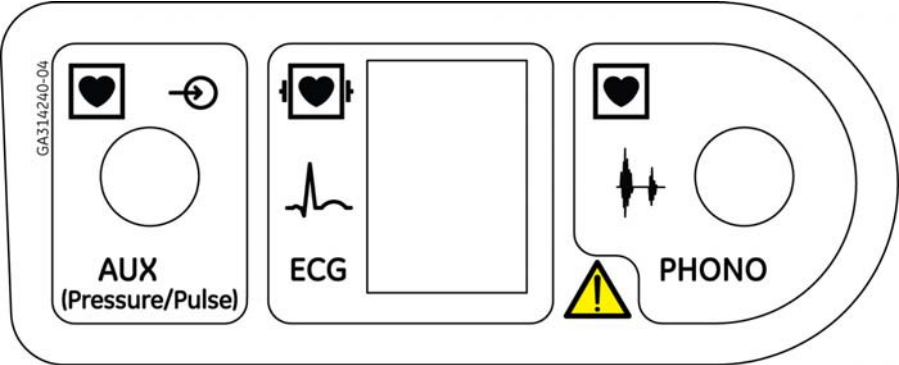


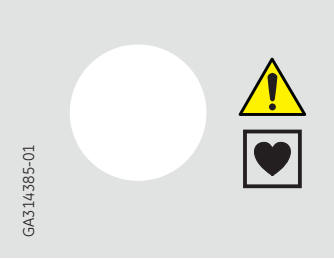
1-5-5 Labels on top of Console

Table 1-9 Labels on top of Console

DESCRIPTION	ILLUSTRATION
<p>LABEL WARNING</p> <p>Do not push VIVID E9 sideways when casters are in brakeage position. Instability may occur.</p>	 <p>LABELS ON BOTH SIDES OF SCANNER.</p> 

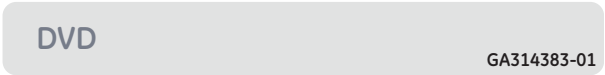

1-5-6 Labels near Connectors on Front

Table 1-10 Labels near Connectors on Front

DESCRIPTION	ILLUSTRATION
Label, Front Panel	
Label, Patient IO	
DEFIBRILLATOR-PROOF TYPE CF EQUIPMENT.	
Label, Probe Connectors	
Label, Doppler (Pedof) Connector	

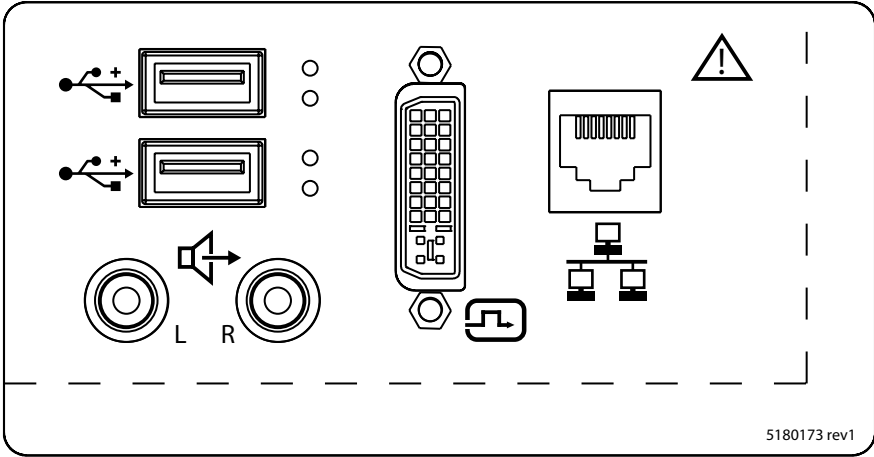
1-5-7 Labels on DVD Units

Table 1-11 Labels on DVD units

DESCRIPTION	ILLUSTRATION
Label, DVD	 <p>DVD label illustration showing the text "DVD" in a grey box. Part number GA314383-01 is visible in the bottom right corner.</p>
Label, DVR Digital Video Recorder	 <p>DVR Digital Video Recorder label illustration showing the text "DVR Digital Video Recorder" in a grey box, with "Recorder" in red. Part number GA314384-01 is visible in the bottom right corner.</p>

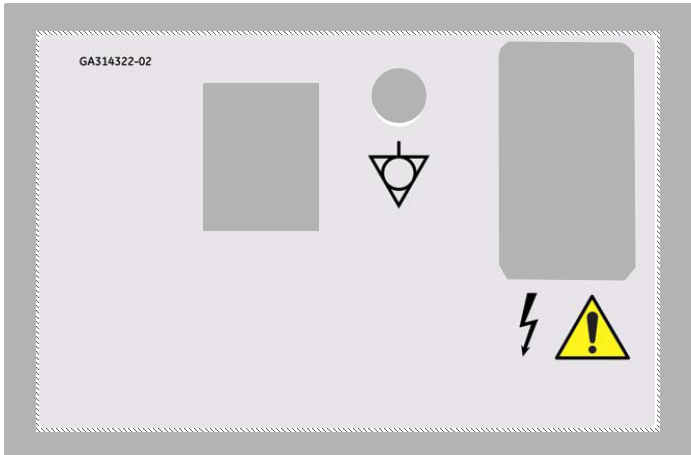


1-5-8 Label on External I/O

Table 1-12 Labels on External I/O

DESCRIPTION	ILLUSTRATION
Label for External Connectors, IO Board	 <p>Label for External Connectors, IO Board illustration showing various connectors: two USB ports, two FireWire ports, two circular audio ports labeled L and R, a multi-pin connector, a network port, and a warning symbol. The text "5180173 rev1" is in the bottom right corner.</p>

1-5-9 Labels at AC Mains Inlet and Circuit Breaker

Table 1-13 Labels on AC Power Supply (Main Power Supply)

DESCRIPTION	ILLUSTRATION												
Label, AC Controller													
Label, System Part Number and Power Rating	<table><tr><td>REF #1</td><td>GA000100</td><td>100-230</td><td>VAC</td></tr><tr><td>REF #2</td><td>H45541SD</td><td>1100</td><td>W</td></tr><tr><td>Model:</td><td>Vivid E9</td><td>50/60</td><td>Hz</td></tr></table> <div>GA 314323 08</div>	REF #1	GA000100	100-230	VAC	REF #2	H45541SD	1100	W	Model:	Vivid E9	50/60	Hz
REF #1	GA000100	100-230	VAC										
REF #2	H45541SD	1100	W										
Model:	Vivid E9	50/60	Hz										
Label, System Serial Number and manufacturing week/year.	<div><div><div>SN</div><div>VE9XXXX</div><div></div><div>MM/YYYY</div></div><div>GA 314323 08</div></div> 												

1-5-10 Label on Rear Cover

1-5-10-1 Label, General Info - BT'12

Table 1-14 Label, General Info - BT'12

DESCRIPTION	ILLUSTRATION
Label, General Info - BT'12 (International) (Introduced JUN. 2012)	
Label, General Info - BT'12 (International)	
Label, General Info - BT'11 and BT'12 (Importer: Alkan Medical, Egypt)	
Label, General Info - BT'11 and BT'12 (Importer: GE Medical Systems, Egypt)	

1-5-10-2 Label, General Info - BT'11/BT'10

Table 1-15 Label, General Info - BT'11/BT'10 sheet 1 of 3

DESCRIPTION	ILLUSTRATION
Label, General Info - BT'11 (International) (Introduced SEP 2010)	
Label, General Info - BT'11 (International) (Introduced AUG 2010)	
Label, General Info - BT'11 (International)	
Label, General Info - BT'11 and BT'12 (Importer: Alkan Medical, Egypt)	

Table 1-15 Label, General Info - BT'11/BT'10 (cont'd) sheet 2 of 3

DESCRIPTION	ILLUSTRATION
Label, General Info - BT'11 and BT'12 (Importer: GE Medical Systems, Egypt)	<p>GE Healthcare Model: Vivid E9</p> <p>Label, General Info - BT'11 and BT'12 (Importer: GE Medical Systems, Egypt)</p> <p>Imported by: GE Medical Systems Egypt</p> <p>Caution: United States law restricts this device to sale or use by or on the order of a physician.</p>
Label, General Info - BT'11 Korean Used <u>after</u> June 1, 2012	<p>GE Healthcare Model: Vivid E9</p> <p>Label, General Info - BT'11 Korean Used <u>after</u> June 1, 2012</p> <p>Imported by: GE Medical Systems Egypt</p> <p>Caution: United States law restricts this device to sale or use by or on the order of a physician.</p>
Label, General Info - BT'11 Korean Used <u>before</u> June 1, 2012.	<p>GE Healthcare Model: Vivid E9</p> <p>Label, General Info - BT'11 Korean Used <u>before</u> June 1, 2012.</p> <p>Imported by: GE Medical Systems Egypt</p> <p>Caution: United States law restricts this device to sale or use by or on the order of a physician.</p>
Label, General Info - BT'11 and BT'12 (Egypt)	<p>GE Healthcare Model: Vivid E9</p> <p>Label, General Info - BT'11 and BT'12 (Egypt)</p> <p>Imported by: GE Medical Systems Egypt</p> <p>Caution: United States law restricts this device to sale or use by or on the order of a physician.</p>

Table 1-15 Label, General Info - BT'11/BT'10 (cont'd) sheet 3 of 3

DESCRIPTION	ILLUSTRATION
<p>Label, General Info - BT10</p> <p>Chinese</p>	<p>GE Healthcare Model: Vivid E9</p> <p>SAFETY WARNINGS:</p> <ul style="list-style-type: none"> Read manual (person reading book icon) High voltage (lightning bolt icon) Caution (exclamation mark icon) No arc (AP icon) <p>CERTIFICATIONS:</p> <ul style="list-style-type: none"> MEDICAL ELECTRICAL EQUIPMENT UL 60601-1 CAN/CSA C22.2 No. 601.1 TUV NRTL US (UL Recognized Component) <p>EMC: CISPR11 Group 1 Class A Groupe 1 Classe A</p> <p>TECHNICAL SPECIFICATIONS:</p> <ul style="list-style-type: none"> Product name: Color Doppler ultrasound machine Model: Vivid E9 Input voltage: 100-230 V Input frequency: 50/60 Hz Maximum input power: 1100 W SFDA registration: SFDAB02013233888 Product standard number: Y23/NOR 4720-2011 Production date: See separate label <p>OTHER INFORMATION:</p> <ul style="list-style-type: none"> Weight: 126 kg, 263 lbs (person moving box icon) CLASS I TYPE CF (heart icon) Caution (小心) - Comply with laws and regulations for use of medical equipment, some countries prohibit use for fetal sex determination. GE Vingmed Ultrasound AS, Strandpromenen 45, N-3191 Horten, Norway (factory icon)

1-5-10-3 Label, General Info - BT'09

Table 1-16 Label on Rear Cover

DESCRIPTION	ILLUSTRATION
Label, General Info - BT'09 International	<p>GE Healthcare Model: Vivid E9</p>
Label, General Info - BT'09 Chinese	<p>GE Healthcare Model: Vivid E9</p>
Label, General Info - BT'09 Korean	<p>GE Healthcare Model: Vivid E9</p>

1-5-11 Label on Rear Cover - detailed descriptions

Table 1-17 Label on Rear Cover - detailed descriptions sheet 1 of 3

DESCRIPTION	ILLUSTRATION
Label on Rear Cover.	<p>GE Healthcare Model: Vivid E9</p> <p>Label on Rear Cover.</p>
Follow instructions for use. Read and understand all instructions in the User's Manual before attempting to use the ultrasound unit.	
“CAUTION - Dangerous voltage” (the lightning flash with arrowhead in equilateral triangle) is used to indicate electric shock hazards.	
“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.	
The system is not designed for use with flammable anesthetic gases.	
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.	<p>“CAUTION - This unit weighs... Special care must be used to avoid...”</p>

Table 1-17 Label on Rear Cover - detailed descriptions (cont'd) sheet 2 of 3










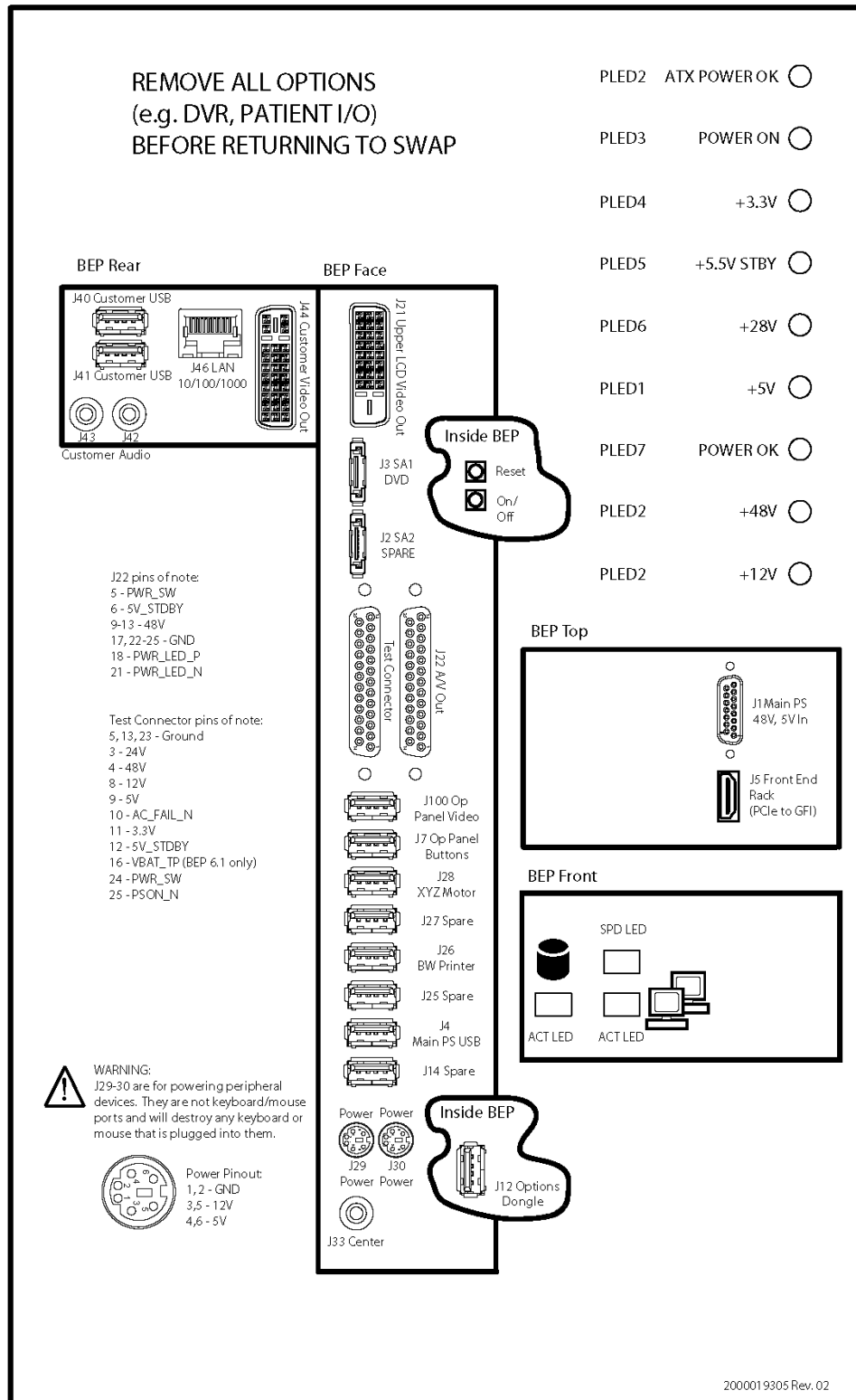
DESCRIPTION	ILLUSTRATION
<p>VIVID E9 SCANNERS</p> <p>"TESTED AND PRODUCTION MONITORED BY TUV PRODUCT SERVICE NRTL WITH RESPECT TO ELECTRICAL SHOCK, FIRE AND MECHANICAL HAZARDS ONLY IN ACCORDANCE WITH UL2601-1 AND CAN/CSA C22.2 NO.601.1"</p>	<p>MEDICAL ELECTRICAL EQUIPMENT UL 60601-1 CAN/CSA C22.2 No. 601.1</p> 
GOST	
	
<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>This unit carries the CE mark.</p> <p>The VIVID E9 unit complies with regulatory requirements of the European Directive 93/ 42/EEC concerning medical devices.</p> <p>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>GROUP 1 Class A</p> <p>(Some units produced in 2010 are Class B).</p>	

Table 1-17 Label on Rear Cover - detailed descriptions (cont'd) sheet 3 of 3

DESCRIPTION	ILLUSTRATION
<p>CAUTION</p> <p>United States law restricts this device to sale or use by or on the order of a physician.</p>	
<p>CLASS I</p> <p>The VIVID E9 ultrasound unit is a Class I device, type CF, according to Sub-clause 14 of IEC60601-1 (1988).</p> <p>TYPE CF</p> <p>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.</p>	
<p>MANUFACTURER</p>	

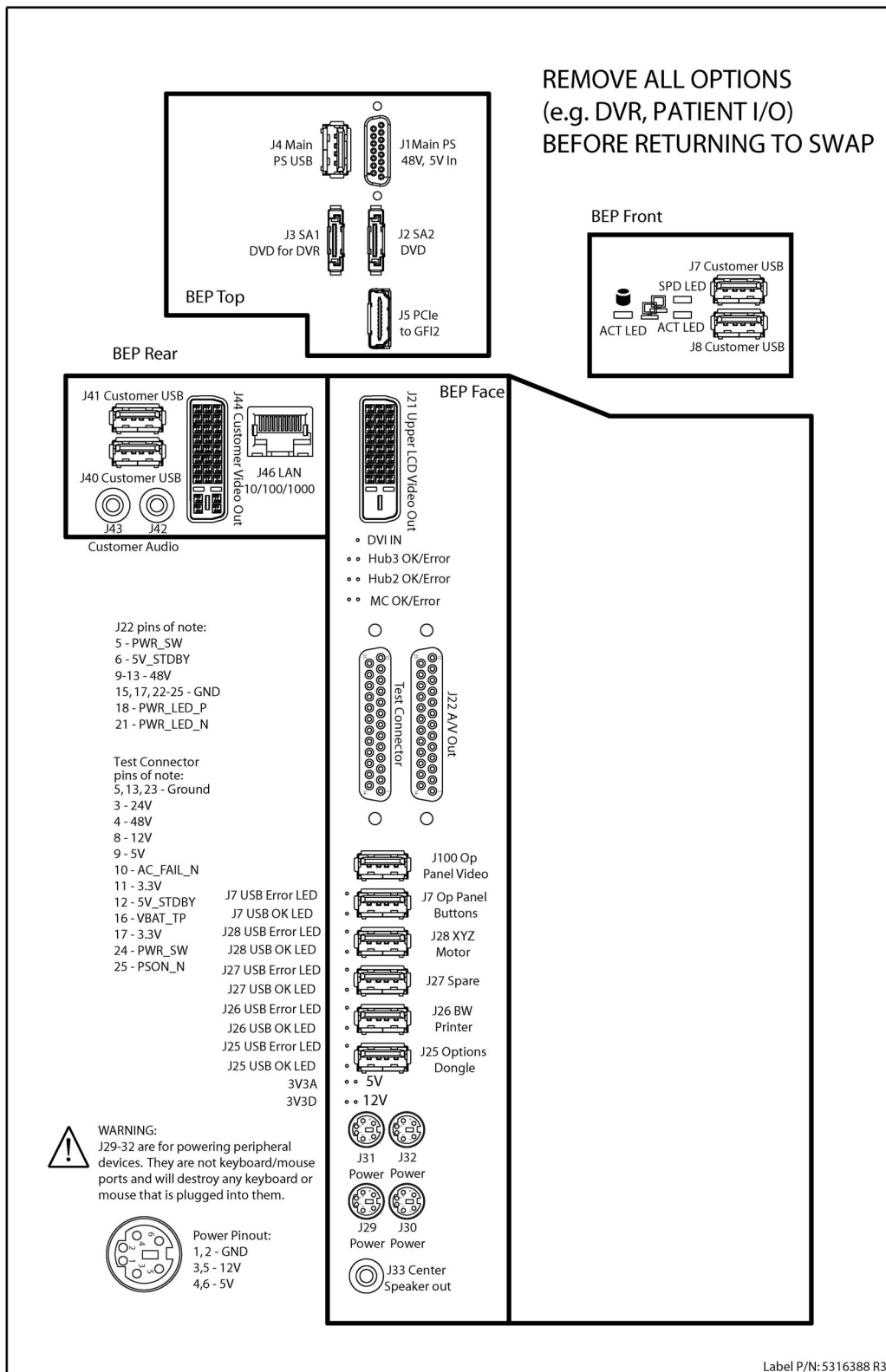
1-5-12 Label on the BEP6's door

Figure 1-2 Label on the BEP6's door



1-5-13 Label on the BEP5's door

Figure 1-3 Label on the BEP5's door



1-5-14 Label, Disassembly Nester

This label is located on the outside of the Front End Rack's cover (inside unit).

Figure 1-4 Label, Disassembly Nester

Disassembly instructions

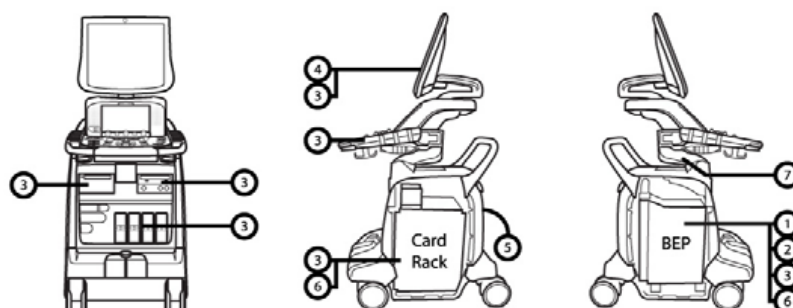
Remove one screw on the rear side of monitor cable cover, and remove cover.
Remove the monitor from the arm by disconnecting the cables and removing 4 screws.
Remove all screws on monitor rear side for removing the front cover.
Remove the rear cover from the monitor metal bracket by removing all screws.
Remove Bulkhead Cover.
Disconnect monitor cables.
Remove monitor arm by releasing the mount lock.
Remove Upper Operating Panel by loosening 4 screws on rear side of UI Upper Frame.
Remove one screw on each speaker bracket and remove speakers from UI Carrier.
Remove 4 screws underneath the UI Lower Frame to remove the Lower Operating Panel.
Disconnect and remove the alphanumeric keyboard.
Remove probe holder inserts and gel cups.
Remove Palm Rest and Upper Handles.
Remove the small switch boards located in Palm Rest and Handle area.
Remove 2 screws, which fasten the top console cable to the UI Lower Frame and loosen the cable.
Remove 2 screws, which fasten the cable chain to the console.
Remove Bulkhead Board by removing 2 screws.
Remove both UI Upper Frame and UI Lower Frame by removing the Bulkhead Bracket / Rectangular Washers and all screws fixing these parts.
Remove the front part of the Z-bumper by removing 2 M4 screws on each side of the Z-Boss.
Remove XY Mech (horizontal movement mechanism) by unscrewing 4 screws underneath the Z and XY connection.
Remove the two Side Covers by releasing two snap lock on each side of the Side bumpers.
Remove the screws underneath the pedals to remove the pedal plastics.
Remove the foot rest bumper by unscrewing four screws.
Remove all screws on the rear, top and front covers to loosen the covers.
Remove the rear handle by unscrewing all screws.
Remove all peripheral units.
Disconnect, and then remove all cables.
Detach the BEP by unscrewing the two fastening screws inside the BEP (bottom). Remove the Printer Bracket.
Remove the dc-power box by unscrewing all fastening screws.
Remove the sheet metal cover on the electronic rack on the lower right side.
Remove the fan drawer by pulling it out.
Remove all PCB's from the electronic rack.
Remove the electronic cabinet by unscrewing all fastening screws (front and rear).
Remove the pedal mechanism by unscrewing all fastening screws.
Remove the wheels by unscrewing all fastening screws.
Remove the Gas Spring between the two Z-arms by removing the rear screws on the upper arm (**WARNING**, extend to max limit before removal).

Special Items / Materials

- 1 Lithium
- 2 Lead
- 3 Printed circuit boards
- 4 LCD
- 5 External electric cables
- 6 Electrolyte capacitors
- 7 Nitrogen filled gas spring

Location information

BEP battery
BEP standby battery
Circuit boards inside all sub units
Main LCD on the system
Part of the trolley
Inside BEP-, Rack, PS and OP-panels
User Interface locking system



Vivid E9

GA314325-02

Section 1-6 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, 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 1-7 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.



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.
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 1-8 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.*

Section 1-9 Electromagnetic compatibility (EMC)

1-9-1 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.

1-9-2 Compliance

VIVID E9 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.*

1-9-3 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 1-10 Customer assistance

1-10-1 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:

- 1.) System ID serial number.
- 2.) Software version.
- 3.) Date and time of occurrence.
- 4.) Sequence of events leading to issue.
- 5.) Is the issue repeatable?
- 6.) Imaging mode, probe, preset/application.
- 7.) Media brand, speed, capacity, type.
- 8.) Save secondary image capture, cine loop, 4D multi-volume loop.

NOTE: Restart the application before resuming clinical scanning.

Table 1-18 Phone numbers for Customer Assistance

LOCATION	PHONE NUMBER	
USA GE Medical Systems Ultrasound Service Engineering 9900 Innovation Drive Wauwatosa, WI 53226	Service: On-site	1-800-437-1171
	Service Parts	1-800-558-2040
	Application Support	1-800-682-5327 or 1-262-524-5698
Canada		1-800-668-0732
Latin America	Service	1-800-321-7937
	Application Support	1-262-524-5698
Europe (OLC- EMEA) GE Ultraschall Deutschland GmbH Beethovenstraße 239 Postfach 11 05 60, D-42655 Solingen Germany	OLC - EMEA Phone: +49 (0)212 2802 - 652 +33 1 3083 1300 Fax: +49 (0) 212 2802 - 431	
Online Services Ultrasound Asia Australia China India Japan Korea Singapore	Phone: +(61) 1-800-647-855 +(86) 800-810-8188 +(91) 1800-425-8025 +(81) 42-648-2940 +(82) 2620 13585 +(95) 6277-3444	

1-10-2 System manufacturer

Table 1-19 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

Chapter 2

Site preparations

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. 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	2-9

Section 2-2

General console requirements

2-2-1 Console environmental requirements

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

 **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 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 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 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 Healthcare 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 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

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

Table 2-2 Electrical specifications for VIVID E9

PART NUMBER	DESCRIPTION	VOLTAGE	TOLERANCES	POWER CONSUMPTION	FREQUENCY
BT'12					
GA000940	Vivid E9 4D Expert Option - 17" LCD	100-230 VAC	±10%	1100 W	50/60 Hz
GA000950	Vivid E9 4D Expert Option - 19" LCD				
GA000945	Vivid E9 2D - 17" LCD				
GA000955	Vivid E9 2D - 19" LCD				
GB000040	Vivid E9 BT12 PRO Configuration 17" LCD				
GB000050	Vivid E9 BT12 PRO Configuration 19" LCD				
BT'11					
GA000810	VIVID E9 4D Expert Option - 17" LCD	100-230 VAC	±10%	1100 W	50/60 Hz
GA000815	VIVID E9 4D Expert Option - 19" LCD				
GA000830	VIVID E9 2D - 17" LCD				
GA000835	VIVID E9 2D - 19" LCD				
BT'09					
GA000100	VIVID E9 (with 4D) - v108.x.x	100-230 VAC	±10%	1100 W	50/60 Hz

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 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 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
- portable phones.

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

See [Table 2-3 on page 2-7](#) for EMI Prevention tips.

Table 2-3 EMI prevention/abatement sheet 1 of 2

EMI RULE	DETAILS
Be aware of RF sources	<ul style="list-style-type: none"> • Keep the unit at least 5 meters (15 feet) away from other EMI sources. • Special shielding may be required to eliminate interference problems caused by high frequency, high powered radio or video broadcast signals.
Ground the unit	<ul style="list-style-type: none"> • Poor grounding is the most likely reason a unit will have noisy images. • Check grounding of the power cord and power outlet.
Install all screws, RF gaskets, covers, cores	<ul style="list-style-type: none"> • After you finish repairing or updating the system, replace all covers and tighten all screws. • Any cable with an external connection requires a magnet wrap at each end. • Install the Card Rack Cover over the Card Rack. <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"> • If more than 20% or a pair of the fingers on an RF gasket are broken, replace the gasket. • Do not turn on the unit until any loose metallic part is removed.
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"> • The interconnect cables are grounded and require ferrite beads and other shielding. • Also, cable length, material, and routing are all important; do not change from what is specified.
Take care with cellular phones	Cellular phones may transmit a 5 V/m signal; that could cause image artifacts.


Table 2-3 EMI prevention/abatement (cont'd) sheet 2 of 2

EMI RULE	DETAILS
Properly dress peripheral cables	<ul style="list-style-type: none"> Do not allow cables to lie across the top of the Card Rack or hang out of the peripheral bays. Loop the excess length for peripheral cables inside the peripheral bays. attach the monitor cables to the frame.

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 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. 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 Healthcare 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 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 has two outlets inside the unit, one is for the B/W printer and one spare.*

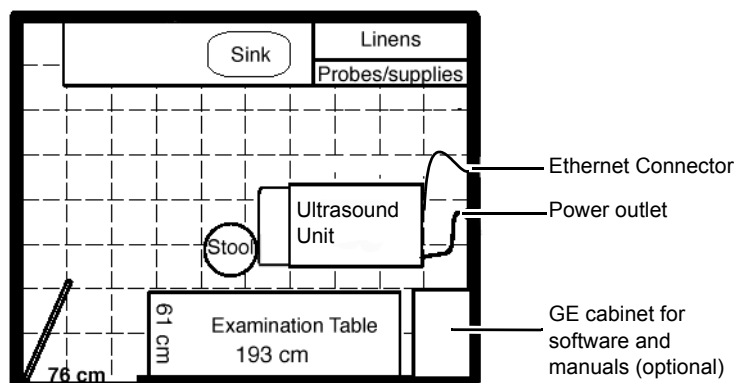
- Power outlets for other medical equipment
- Power outlets for test equipment within 1 m (3.2 ft.) of unit
- Clean and protected space to store probes (in their cases or on a rack)
- Material to safely clean probes (done with a plastic container, never metal)

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)



Scale:
Each square equals one
square foot (app. 31 x 31 cm)

2-3-5 Suggested Floor Plan, VIVID E9 and EchoPAC PC in Same Room

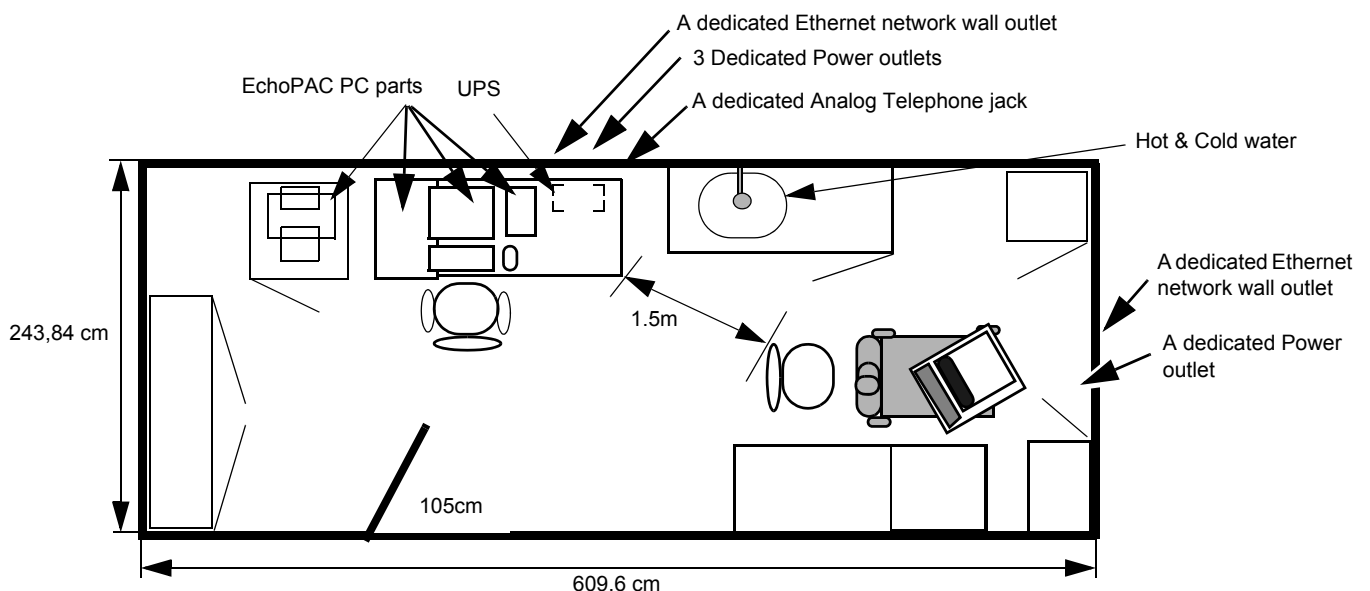


Figure 2-2 Suggested Room with EchoPAC PC and Ultrasound Scanner

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 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 2-13](#). 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.
- 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 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					
Host Name	<input style="width: 100%;" type="text"/>	Local Port	<input style="width: 100%;" type="text"/>	IP Address	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>
AE Title	<input style="width: 200px;" type="text"/>	Net Mask	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>		
ROUTING INFORMATION					
	Destination IP Addresses	Default	GATEWAY IP Addresses		
ROUTER1	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>		<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>		
ROUTER2	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>		<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>		
ROUTER3	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>		<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>		
DICOM APPLICATION INFORMATION					
	NAME	MAKE/REVISION	AE TITLE	IP ADDRESSES	PORT
Store 1	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>	<input style="width: 20px;" type="text"/>
Store 2	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>	<input style="width: 20px;" type="text"/>
Store 3	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>	<input style="width: 20px;" type="text"/>
Store 4	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>	<input style="width: 20px;" type="text"/>
Store 5	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>	<input style="width: 20px;" type="text"/>
Store 6	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>	<input style="width: 20px;" type="text"/>
Worklist	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>	<input style="width: 20px;" type="text"/>
Storage Commit	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>	<input style="width: 20px;" type="text"/>
MPPS	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/> . <input style="width: 20px;" type="text"/>	<input style="width: 20px;" type="text"/>

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Chapter 3

System setup

Section 3-1 Overview

3-1-1 Purpose of this chapter

This chapter contains information needed to install VIVID E9. 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
3-2	Setup reminders	3-2
3-3	Receiving and unpacking the equipment	3-3
3-4	Packing materials for the Wooden Box - recycling information	3-16
3-5	Packing materials for the Carton Box - recycling information	3-17
3-6	Preparing for setup	3-19
3-7	Completing the setup	3-20
3-8	Configuration	3-27
3-9	Connectivity overview	3-40
3-10	Connectivity setup	3-41
3-11	Options Setup	3-49
3-12	Setup paperwork	3-50

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 / I LINK	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 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 AND KEPT NEAR THE UNIT FOR QUICK REFERENCE.



CAUTION ACOUSTIC OUTPUT HAZARD

ALTHOUGH THE ULTRASOUND ENERGY TRANSMITTED FROM THE VIVID E9 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.

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 UNIT BECAUSE OF ITS WEIGHT.

ATTEMPTS TO MOVE THE UNIT 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 The Tilt & Shock indicators

3-3-3-1 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.

3-3-3-2 Position of the Tilt and Shock indicators

The Tilt & Shock indicators have been attached to the right side of the transportation box as illustrated in the figure below. The wooden box is used in the illustrated below, but the Tilt and Shock indicators are also used on the carton box.



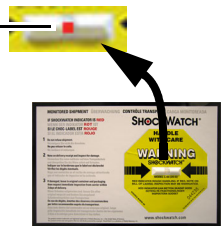
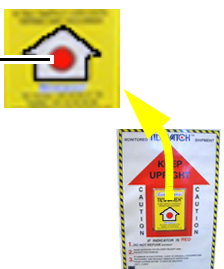
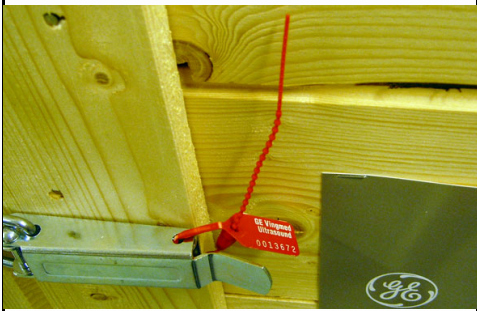
Figure 3-1 Tilt & Shock indicators' position on right side of transportation box

3-3-4 Receiving the VIVID E9

3-3-4-1 Examine all packages

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

Table 3-3 Examine all packages

STEP	TASK	ILLUSTRATIONS
1	Is damage apparent? <ul style="list-style-type: none"> If <i>yes</i>; continue with the instructions in subsection 3-3-4-2 - Damage in transportation. If <i>no</i>; continue with the next step. 	
2	Is the Shock Indicator red colored inside the middle of the indicator? <ul style="list-style-type: none"> If <i>yes</i>: The Shock Indicator has been activated. Continue with the instructions in subsection 3-3-4-2 - Damage in transportation, then continue with the next step. If <i>no</i>: continue with the next step. 	RED COLOR 
3	Is the Tilt Indicator red colored inside the middle of the indicator? <ul style="list-style-type: none"> If <i>yes</i>: The Tilt Indicator has been activated. Continue with the instructions in subsection 3-3-4-2 - Damage in transportation before you continue with the next step. If <i>no</i>: continue with the next step 	RED COLOR 
4	Wooden box ONLY: The two upper hinges on the Front Side and the Rear Side of the wooden transportation box have been sealed with red plastic seals, marked GE Vingmed Ultrasound and a serial number. Verify that the four red plastic seals are intact at arrival. If seals are broken: If broken, it indicates that the container may have been opened after it left the manufacturer. Continue with the instructions in subsection 3-3-4-2 - Damage in transportation . Continue with the instructions in 3-3-5 - Unpacking VIVID E9 from the Wooden Box .	
5	Carton Box ONLY: Continue with 3-3-6 "Unpacking VIVID E9 from the Carton Box" on page 3-12 .	

3-3-4-2 Damage in transportation

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

Table 3-4 Damage in transportation

STEP	TASK
1	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.
2	Report the damage to the carrier. <ul style="list-style-type: none">• 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.

3-3-4-3 If Shock Indicator has triggered or is missing

Table 3-5 Shock Indicator has triggered or is missing

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

3-3-4-4 If Tilt Indicator has triggered or is missing

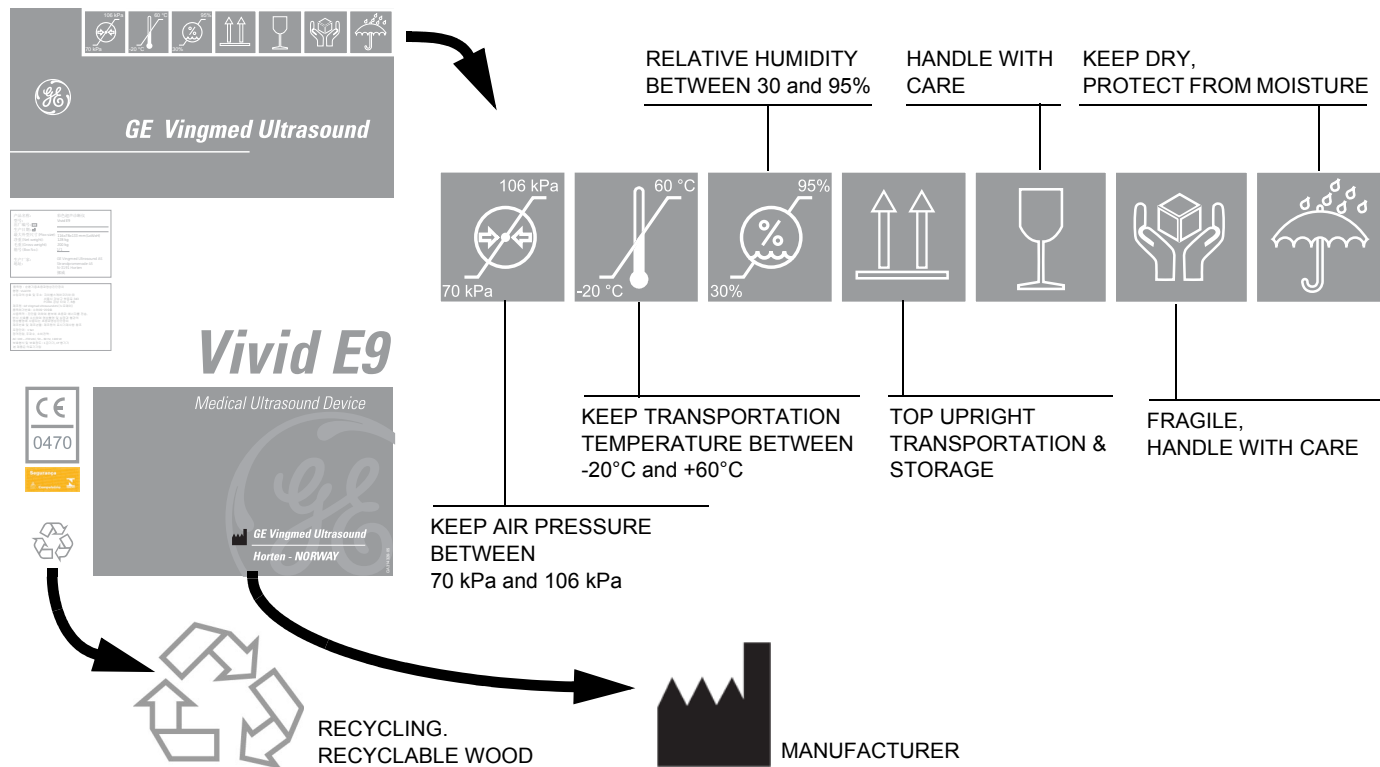
Table 3-6 Tilt Indicator has triggered or is missing

STEP	TASK
1	If the Tilt Indicator is missing: Note on the shipping papers at the time of receipt that the Tilt Indicator label is missing. If the Tilt Indicator has triggered: 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.

3-3-4-5 VIVID E9 Transportation Box Label for the Wooden Box

The VIVID E9 Transportation Box Label is located at the front of the Wooden Transportation Box.

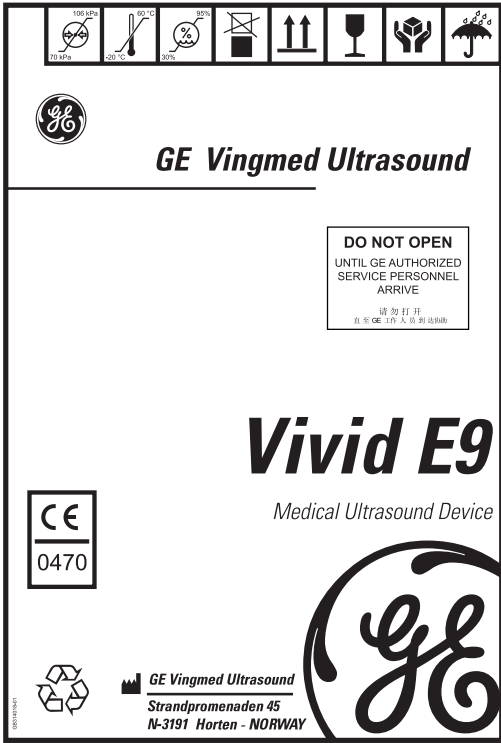
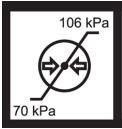


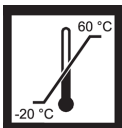






Figure 3-2 VIVID E9 Transportation Box Label used on the Wooden Box



3-3-4-6 VIVID E9 Transportation Box Label on the Carton Box

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

Figure 3-3 VIVID E9 Transportation Box Label printed on the Carton Box


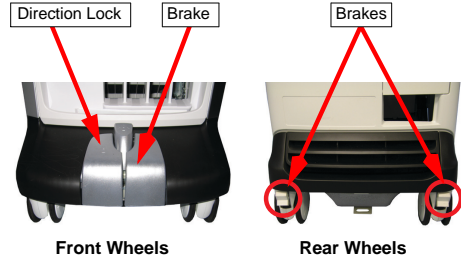
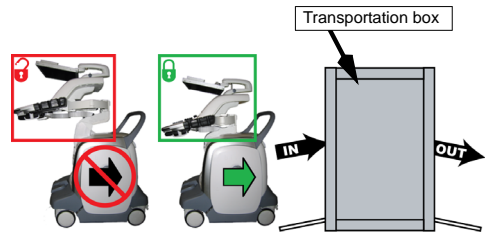

					
ICONS and SYMBOLS	DESCRIPTION	ICONS and SYMBOLS	DESCRIPTION	ICONS and SYMBOLS	DESCRIPTION
	KEEP AIR PRESSURE BETWEEN 70 kPa and 106 kPa		DO NOT STACK		FRAGILE, HANDLE WITH CARE
	KEEP TRANSPORTATION TEMPERATURE BETWEEN -20°C AND +60°C		TOP UPRIGHT TRANSPORTATION AND STORAGE		KEEP DRY, PROTECT FROM MOISTURE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

3-3-5 Unpacking VIVID E9 from the Wooden Box

Table 3-7 Unpacking VIVID E9 from the Wooden Box sheet 1 of 2

Step	Task
1.	<p>Open the four hinges on each door and remove the doors. One of the doors are used as ramp out off and into the transportation box. On the first version of the Transportation Box, only the front door is meant to be used as a ramp. It has bevel cut in one end.</p> <div> </div> <div> </div> <p>Front door bevel cut. This end of the door should be used as the lower end of the ramp.</p>
2.	<p>Place the front door as a ramp against the rear edge of the pallet.</p> <div> </div> <p>On the second version transportation box, the ramp is placed directly on the labank ends.</p>
3.	<p>Carefully remove the accessory box, and any other items, including the wooden shelf above the scanners Operator Panel and all the filling material, from the Transportation Box.</p>

Table 3-7 Unpacking VIVID E9 from the Wooden Box (cont'd) sheet 2 of 2

Step	Task
4.	<div style="text-align: center;"> <h2>NOTICE</h2> <h3>Moving the unit in and out of the transportation box</h3> <p>The unit has brakes on all wheels, but direction lock only on the front wheels. The wheels position when moving the system into its transportation box are therefore vital. If the wheels are swiveling when the system is inside the transportation box, it may jam the system inside the box. The system must be moved backwards both into and out of the transportation box.</p> <p>Moving the system into the transportation box</p> <ol style="list-style-type: none"> Align the front wheel under the front end of the system as shown in Figure 1. Push the direction lock pedal to lock the front wheels in this direction. Check that they are locked. Push the Top Console to its lowest and most backward locked position. Pull the system into the box with the rear end first. <p>Moving the system out of the transportation box</p> <ol style="list-style-type: none"> Unlock brakes but keep direction lock activated. The direction lock keeps the front wheels in position, and secures the direction stability when the system is rolled out of the transportation box. Pull the system out of the box with rear end first. <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>CAUTION</p>  <p><i>Have two people available to unpack the system. Attempts to move the system considerable distances or on an incline by one person could result in injury or damage or both.</i></p> <p><small>Transport notice</small></p> </div> <div>  <p style="text-align: center;">Figure 1: Brakes and direction locks</p>  <p style="text-align: center;">Figure 2: Console and Wheels position</p> </div> </div> <p style="text-align: right;"><small>GA314329-02</small></p> </div>
	<ul style="list-style-type: none"> Press once on the Release pedal to release the brakes. Press once on the Direction Lock pedal to keep direction lock activated. The direction lock keeps the front wheels from swiveling and blocking the system inside the narrow transportation box.
5.	<p>Carefully move the instrument out of the Transportation Box, down the ramp, with rear end first.</p> 
6.	Remove the clear plastic (wrapped around the scanner) from the unit.
7.	Place all the filling material inside the Transportation Box, close it and store it for possible use in the future.

3-3-6

Unpacking VIVID E9 from the Carton Box

Table 3-8 Uncrating the VIVID E9 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 (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).	

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





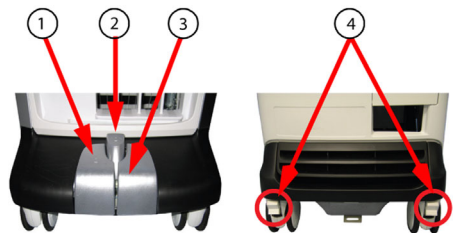
Step	Task	Illustration
7.	Remove the Inlay UI Top.	
8.	Remove the Support For Monitor.	
9.	Remove the Complete Front Protection.	
10.	Remove the clear plastic bag from the VIVID E9.	

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

Step	Task	Illustration
11.	Fold down the assembled Exit Ramp.	
12.	Unlock the Front Brakes on the VIVID E9, 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.	 <p>1 - Direction (Dir) Lock 2 - Release Dir Lock and Front Brakes 3 - Front Brakes 4 - Rear Brakes</p>
13.	Unlock the Rear Brakes.	
14.	Carefully move the VIVID E9 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.	

Section 3-4

Packing materials for the Wooden Box - recycling information

The packing materials for VIVID E9 are recyclable:

- The Transportation Box is made of spruce or similar material.
(“PHYTOSANITARY CERTIFICATE” included in all shipments to The People's Republic of China.)
- Lever lockings (hinges) are made of zinc plated steel.
- The inner reinforcements are made of Ethafoam (Polyethylene foam).
- The plastic foil is made of LDPE (Low Density Polyethylene).

Section 3-5 Packing materials for the Carton Box - recycling information

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

Table 3-9 Packaging parts for VIVID E9 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.	Complete Exit ramp	1	A	
8.	Frame 1112 x 740 x 1225	2	A	
9.	Exit ramp base	2	A	
10.	Box for accessories	1	A	
11.	Top cover 1140 x 755 x 150	1	A	

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

Item	Description	Qty.	Material *)	Illustration
	*) Material type:	A:	BB34bc with varnish C9068	
		B:	BB27c with varnish C9068	
		C:	PE foam, Stratocell	
		D:	Wood ISPM15	

Section 3-6

Preparing for setup

3-6-1 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.

3-6-2 Physical inspection

Verify that the system arrived intact (visual inspection).

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

3-6-3 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 3-7

Completing the setup

3-7-1 Purpose of this section

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

3-7-2 System specifications

3-7-2-1 System requirements verification

- Verify that the site meets the requirements listed in [Chapter 2](#) (see: "[Facility needs](#)" on page 2-9).
- Verify that the specifications below don't conflict with any on-site conditions.

3-7-2-2 Physical dimensions

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

Table 3-10 Physical dimensions of VIVID E9 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

3-7-2-3 Mass with monitor and peripherals

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

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

3-7-2-4 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.

3-7-3 Electrical specifications

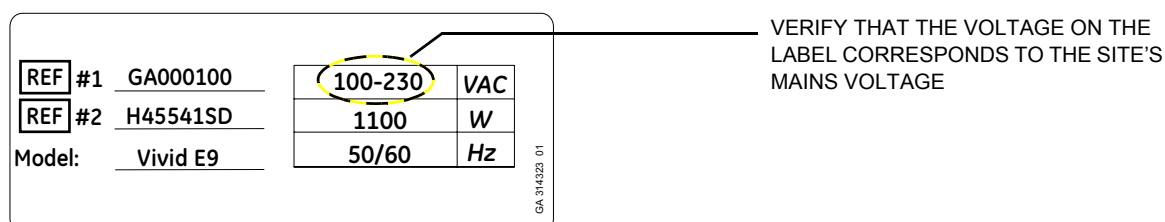
WARNING *CONNECTING A VIVID E9 UNIT TO THE WRONG VOLTAGE LEVEL WILL MOST LIKELY DESTROY THE UNIT.*

3-7-3-1 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 3-4 Mains Voltage Rating label



3-7-3-2 Electrical specifications for VIVID E9

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

Table 3-12 Electrical specifications for VIVID E9

PART NUMBER	DESCRIPTION	VOLTAGE	TOLERANCES	POWER CONSUMPTION	FREQUENCY
BT'12					
GA000940	Vivid E9 4D Expert Option - 17" LCD	100-230 VAC	±10%	1100 W	50/60 Hz
GA000950	Vivid E9 4D Expert Option - 19" LCD				
GA000945	Vivid E9 2D - 17" LCD				
GA000955	Vivid E9 2D - 19" LCD				
GB000040	Vivid E9 BT12 PRO Configuration 17" LCD				
GB000050	Vivid E9 BT12 PRO Configuration 19" LCD				
BT'11					
GA000810	VIVID E9 4D Expert Option - 17" LCD	100-230 VAC	±10%	1100 W	50/60 Hz
GA000815	VIVID E9 4D Expert Option - 19" LCD				
GA000830	VIVID E9 2D - 17" LCD				
GA000835	VIVID E9 2D - 19" LCD				
BT'09					
GA000100	VIVID E9 (with 4D) - v108.x.x	100-230 VAC	±10%	1100 W	50/60 Hz

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.

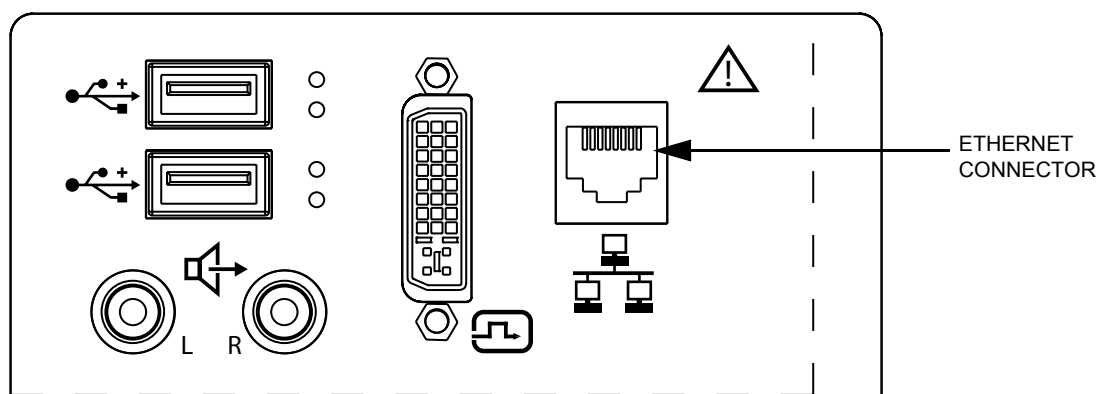
3-7-4 Connections on the External IO

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, 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 Healthcare.*

3-7-4-1 Connect Ethernet

Connect the Ethernet cable to the Ethernet connector on the External I/O (rear side of VIVID E9).

Figure 3-5 Ethernet connection on rear side of VIVID E9



3-7-4-2 Connect USB Flash Card

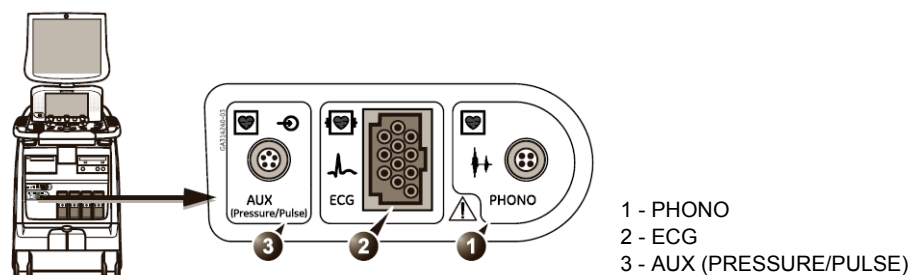
NOTE: *USB Flash Cards approved for VIVID E9 are verified for EMC performance according to EN55011 class B. The use of any other USB Flash Cards will compromise this verification, and may cause interference on VIVID E9 itself, or on other electronic devices. For approved models, see: [Section 9-15 "Peripherals for VIVID E9" on page 9-66](#).*

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

3-7-5 Connections on the Patient I/O panel

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

Figure 3-6 Patient I/O Panel



3-7-5-1 Connect ECG

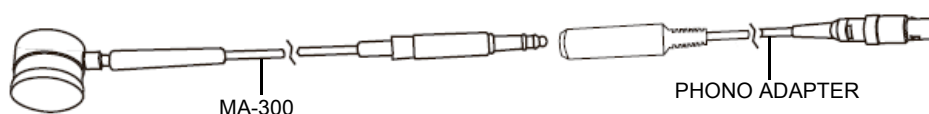
Connect the ECG cable to the ECG connector on the Patient I/O panel.

3-7-5-2 Connect Heart Microphone (Phono)

The Heart Microphone has its corresponding Phono adapter. See [Section 9-20 "Physio TX Parts" on page 9-92](#).

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

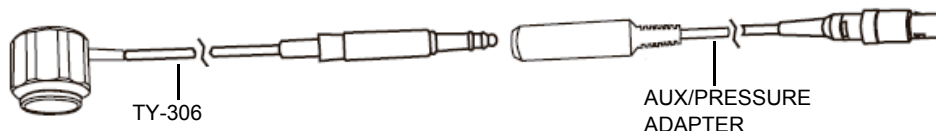
Figure 3-7 Heart Microphone (Phono)



3-7-5-3 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 9-20 "Physio TX Parts" on page 9-92](#).

Figure 3-8 Pulse Pressure Transducer



3-7-6 Connecting Probes

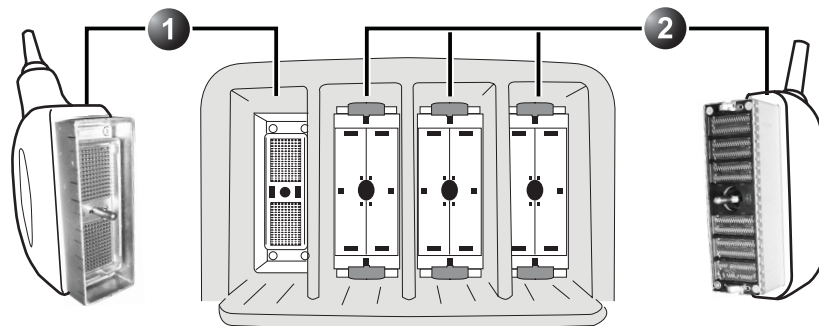
3-7-6-1 Introduction to Connecting Probes

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 3-9) 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 probe connectors.
- The Doppler probe port is used for CW Doppler probes (non-sector-probes), sometimes called PEDOF probes.

Figure 3-9 Probe connectors



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

NOTE! The Doppler probe port is not illustrated here.

3-7-6-2 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.

3-7-6-3 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 "Cleaning" on page 10-10](#) for cleaning instructions.

3-7-7 Power On/Boot Up

3-7-7-1 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 Healthcare.

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.

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

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

3-7-8 Power shut down

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

Section 3-8 Configuration

3-8-1 Purpose of this section

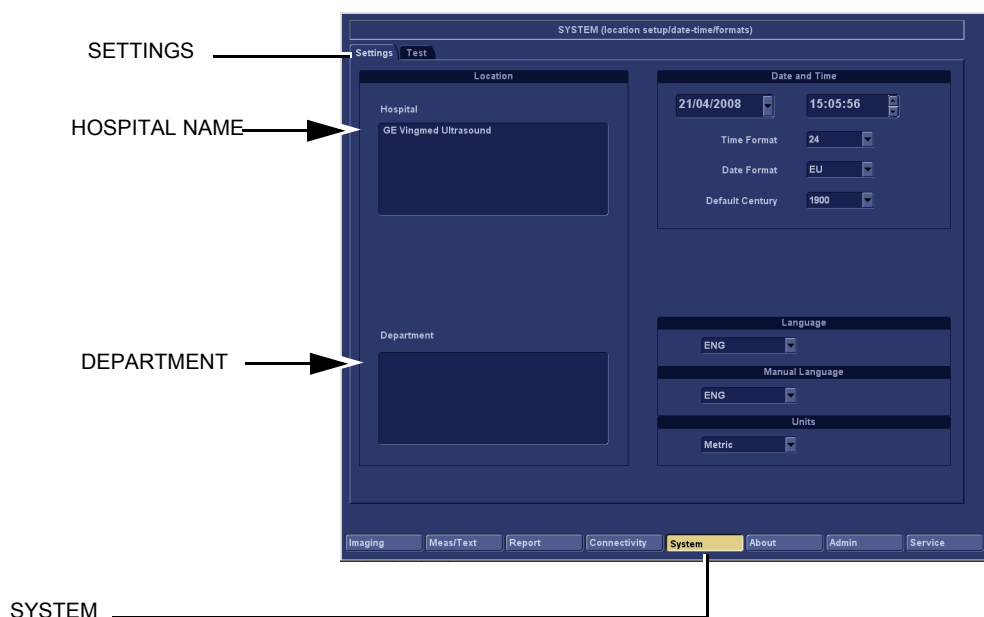
This section describes how to configure the VIVID E9.

3-8-2 VIVID E9 configuration

3-8-2-1 Select System Settings screen

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

Figure 3-10 Hospital and department name



3-8-2-2 Enter Location

Table 3-13 Location name

STEP	TASK	EXPECTED RESULT(S)
1	Select the Hospital field, see Figure 3-10 , 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 Figure 3-10 , 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.

3-8-2-3 Date and time adjustments

Figure 3-11 Date and time adjustments

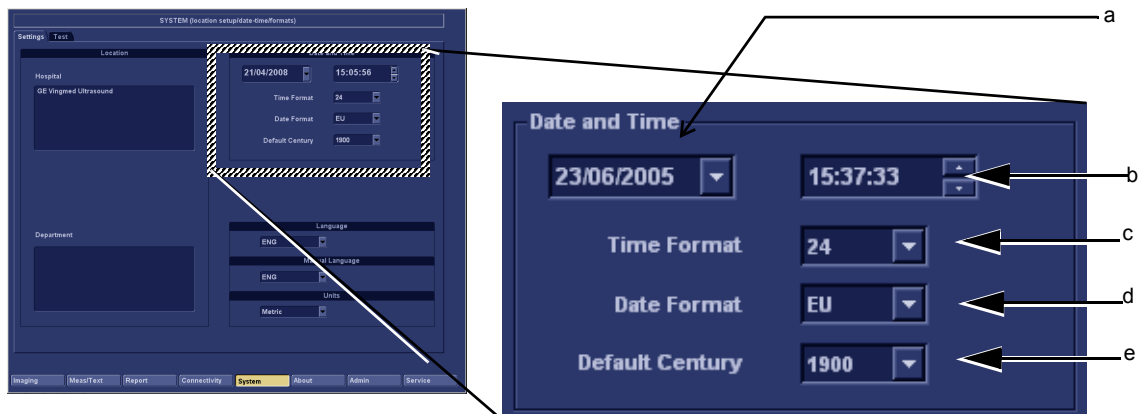


Table 3-14 Date and Time adjustments

STEP	TASK	EXPECTED RESULT(S)
1	Open the System (Configuration) Window, see 4-2-5 "Logging on to VIVID E9 as 'ADM'" on page 4-15. Select System , if needed.	The System Settings window is displayed.
2	Select the preferred Date Format , see (d) in Figure 3-11. DD = Date (two digits) MM = Month (two digits) YYYY = Year (four digits)	EU : the European/International "DD.MM.YYYY" format is used US : the American "MM.DD.YYYY" format is used
3	Select the preferred Time Format , see (c) in Figure 3-11.	24 : the 24 hour format is used 12 : the 12 AM/PM hour format is used
4	Adjust the date , see (a) in Figure 3-11.	New date is displayed
5	Adjust the time , see (b) in Figure 3-11.	New time is displayed
6	Select Default Century (1900, 2000 or None), see (e) in Figure 3-11.	1900 : the number 19 is automatically displayed when entering the year in the patient date of birth. To edit century, press BACKSPACE twice. 2000 : the number 20 is automatically displayed when entering the year in the patient date of birth. To edit century, press BACKSPACE twice. None : 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.

3-8-2-4 Select User Interface Language

Figure 3-12 Select User Interface Language

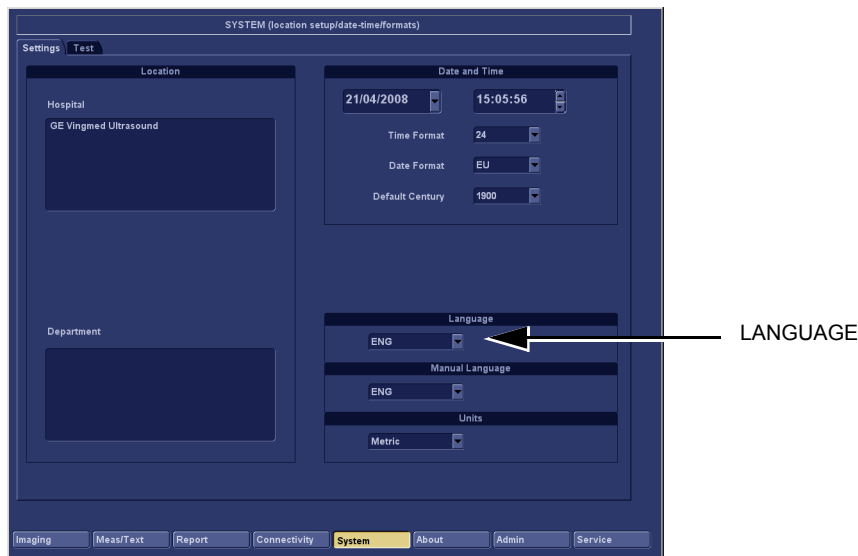


Table 3-15 Language Adjustments

STEP	TASK	EXPECTED RESULT(S)
1.	Open the Configuration Window, see 4-2-5 "Logging on to VIVID E9 as 'ADM'" on page 4-15. Select System , if needed.	The System Settings window is displayed.
2.	Use the Language drop down dialog, see Figure 3-12, to select your preferred language for the on-screen interface.	The selected language will be used as soon as the unit has been restarted.

3-8-2-5 Select Online Manual Language

Figure 3-13 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 as 'ADM'" on page 4-15. Select System , if needed.	The System Settings window is displayed.
2.	Use the Manual Language drop down dialog, see Figure 3-13, to select your preferred language.	The selected language will be used as soon as the unit has been restarted.

3-8-2-6 **Select Units of Measure**

Figure 3-14 Select Units of Measure

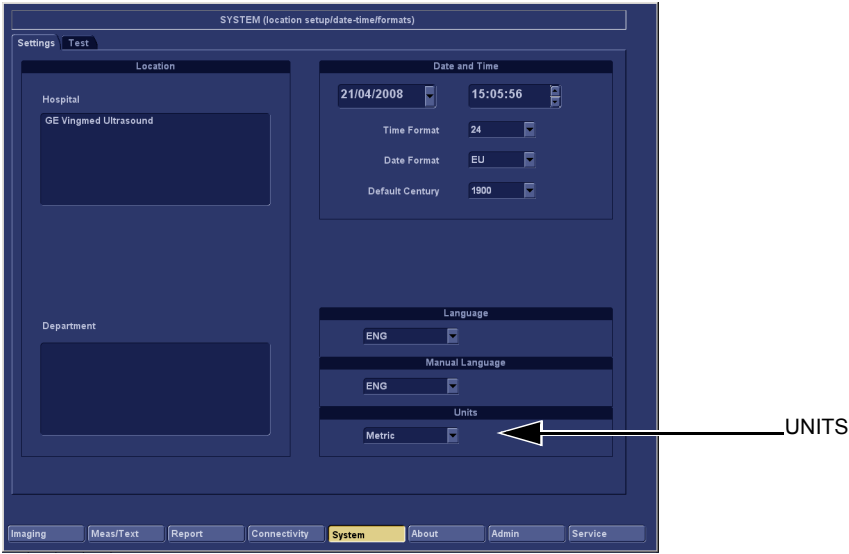


Table 3-17 Select Units of Measure

STEP	TASK	EXPECTED RESULT(S)
1.	Open the Configuration Window, see 4-2-5 "Logging on to VIVID E9 as 'ADM'" on page 4-15. Select System, if needed.	The System Settings 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.

3-8-3 Service Screen setup

3-8-3-1 Overview

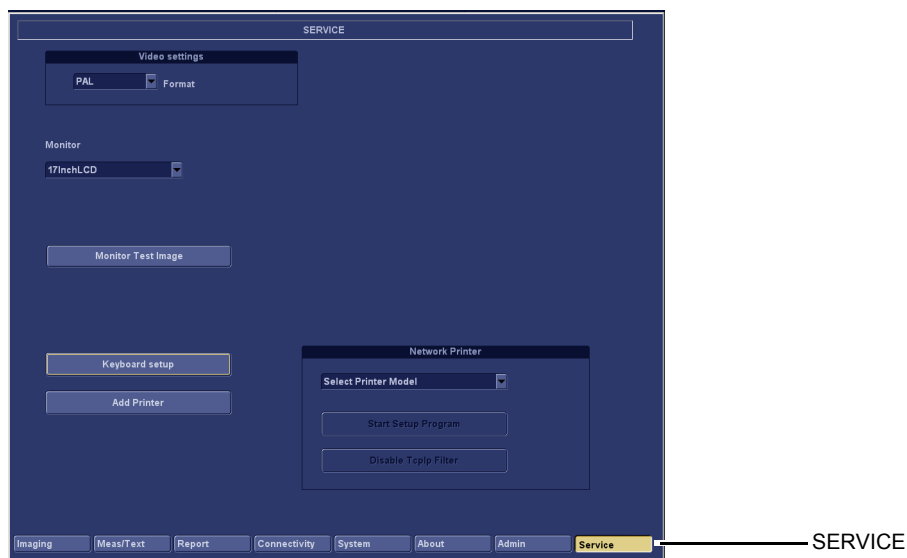
The Service Screen gives you access to:

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

3-8-3-2 Open Service Screen

- 1.) Press **Config (F2)** and log on as *adm*, see [4-2-5 "Logging on to VIVID E9 as 'ADM'" on page 4-15.](#)
- 2.) Select **Service** (lower, right part of window) to view the Service Screen, see [Figure 3-15 on page 3-32.](#)

Figure 3-15 Service Screen

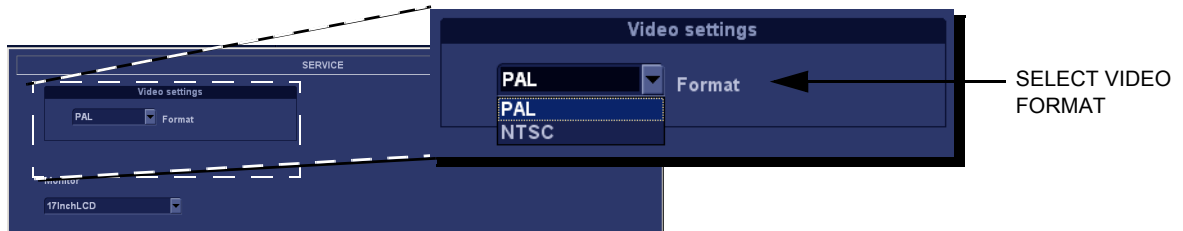


3-8-3-3 Select Video Format, PAL or NTSC

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).

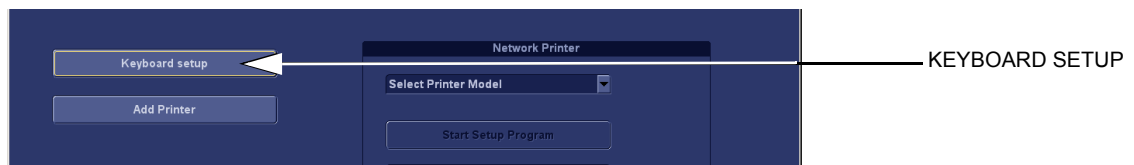
Figure 3-16 Select Video Format



3-8-3-4 Alphanumeric Keyboard configuration

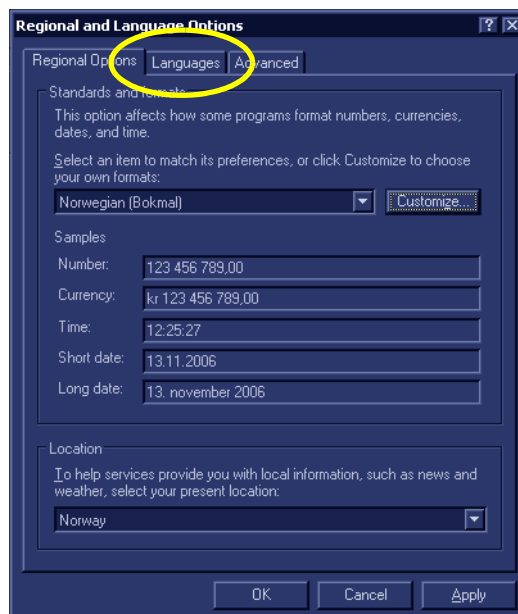
NOTE: This Procedure is not required if the alphanumeric keyboard is a US keyboard, since the default setting is set to US English keyboards.

Figure 3-17 Select Keyboard Setup



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

Figure 3-18 Select Keyboard Properties

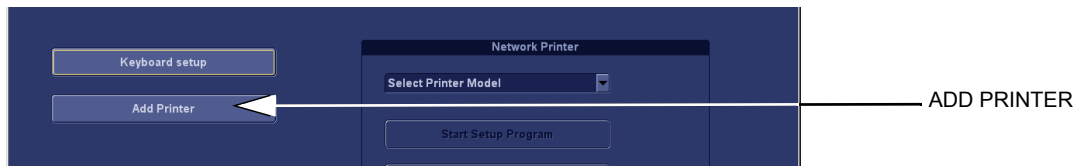


- 2.) Select **Languages**, to display the program languages screen.
- 3.) Use the Language used in menus and dialogs scroll bar to find the correct language for your use.

3-8-3-5 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 [3-8-4 "Optional Peripherals/Peripheral Connection"](#) on page 3-36 for more information.

Figure 3-19 Add Printer



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

Figure 3-20 Add Printer Wizard



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

3-8-3-6 Monitor Selection

Some characteristics are different for the different LCD monitors.

Figure 3-21 Select Monitor model



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

3-8-3-7 **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.

3-8-4 Optional Peripherals/Peripheral Connection

3-8-4-1 Approved Internal Peripherals

This list covers the internal peripherals available for VIVID E9:

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

3-8-4-2 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:

- **Footswitch**
Configuration of the footswitch is done on the **Config > Imaging > Application** screen.
For more information, refer to the VIVID E9 User Manual.
- **External Data Storage:**
 - USB Flash Card
 - Iomega Ultramax desktop hard drive (2TB with RAID1)
- **COLOR Printers:**
 - SONY UPD-25MD
 - SONY UPD-23MD
 - MITSUBISHI Digital Color Printer CP30DW

3-8-4-3 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 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

3-8-5 Software Options Configuration

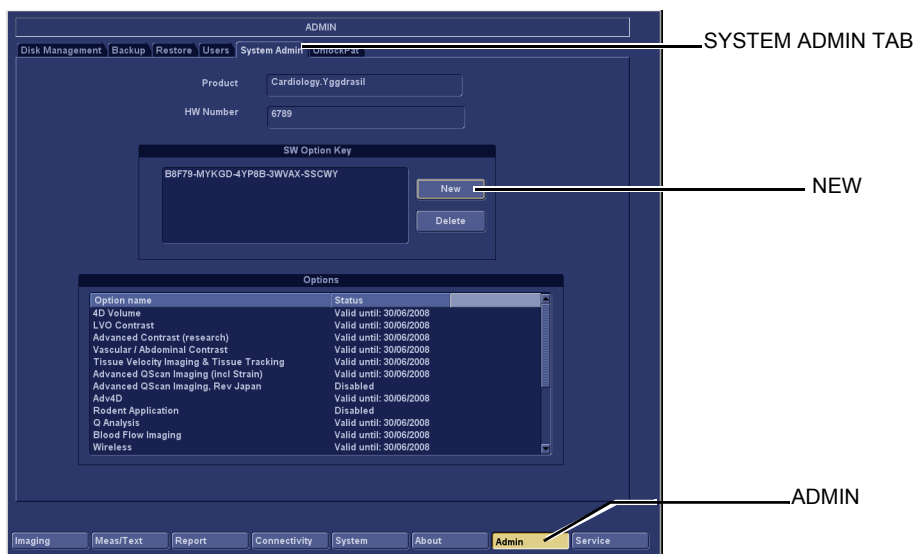
3-8-5-1 Software Option installation introduction

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

3-8-5-2 Installing a Software Option

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

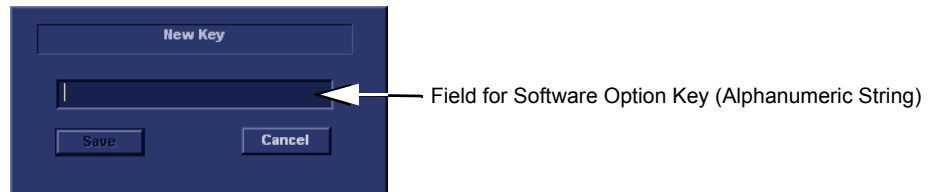
Figure 3-22 System Admin screen



3-8-5-2 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 3-23 Type Software Option Key (Alphanumeric string)



CAUTION INCORRECT PASSWORD ENTRY WILL RESULT IN LOSS OF SYSTEM OPTIONS. IF PASSWORD IS INCORRECT, 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 3-9 Connectivity overview

3-9-1 Physical connection

3-9-1-1 Stand-alone VIVID E9

No network connection needed.

3-9-1-2 “Sneaker Net” environment

No network connection needed.

Use removable media to move data from the VIVID E9 to an other unit.

3-9-1-3 Connection from VIVID E9 to an EchoPAC PC Workstation

- Direct Cable Connection from VIVID E9 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.
 - 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 to a wall outlet on the hospital's network.

3-9-1-4 Connection from VIVID E9 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.
- 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 to the Peer-to-Peer Network.

Section 3-10

Connectivity setup

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

3-10-1 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 2-13](#) can be used for gathering this information.
- Typical source for this information is the network administrator.

3-10-2 Compatibility

VIVID E9 can communicate with:

- EchoPAC PC
- Image Vault
- Other units via DICOM

3-10-3 Select TCP/IP Screen

- 1.) Press **Config (F2)** and log on as *adm*, see 4-2-5 "Logging on to VIVID E9 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.

Figure 3-24 TCP/IP Overview screen for VIVID E9

COMPUTER NAME / AE TITLE:

FOR VIVID E9, 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'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

3-10-4 Changing the AE Title and/or Port Number (Port No.)

Figure 3-25 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 3-26 Warning

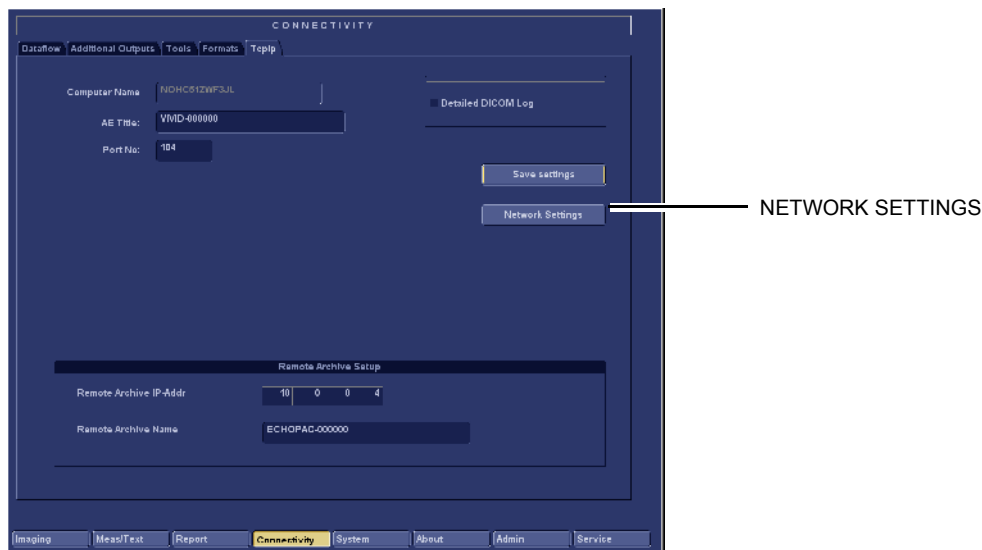


- 3.) Select **Ok** to save your changes or **Cancel** to return without saving any changes.
- 4.) Reboot VIVID E9 to activate the settings or continue with other Tcpip set-up tasks.

3-10-5 DHCP setup

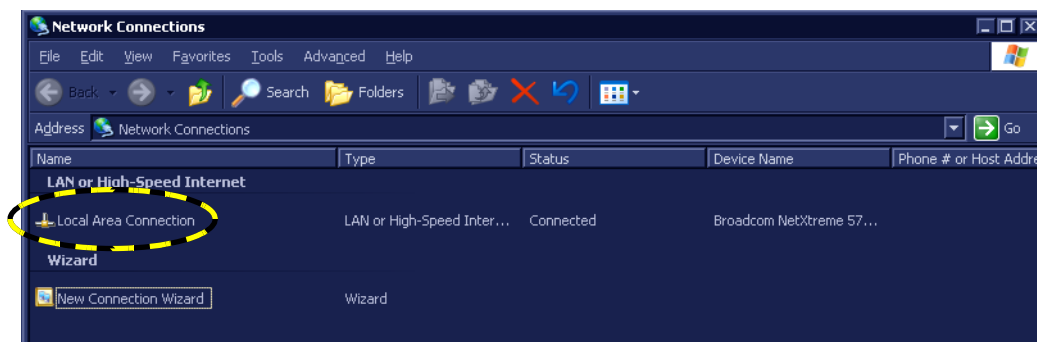
Follow the instructions below to configure the VIVID E9's use of DHCP.

Figure 3-27 Advanced Settings



- 1.) When in the TCP/IP screen, select **Network Settings** to display the **Network Connections** screen, see [Figure 3-28 "Network Connections" on page 3-44](#).

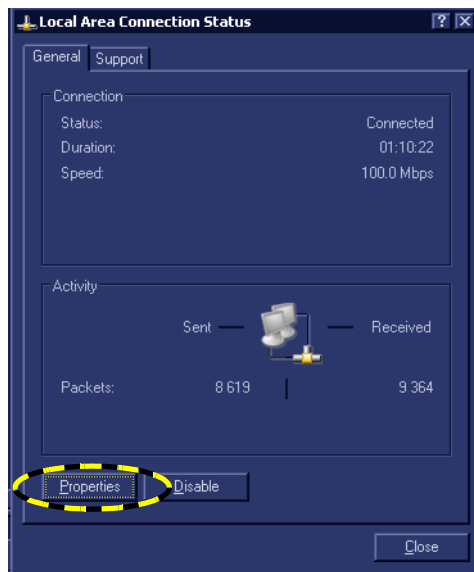
Figure 3-28 Network Connections



- 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).

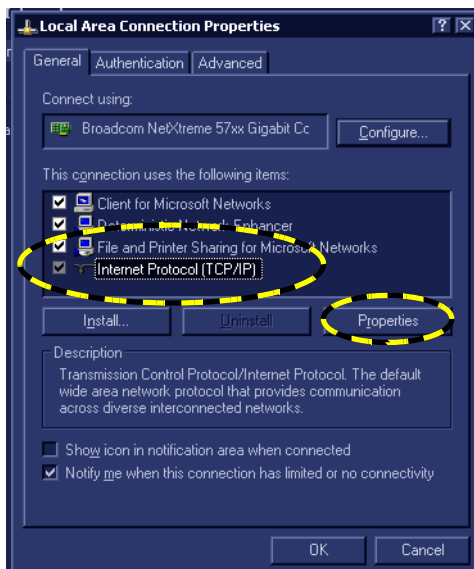
3-10-5 DHCP setup (cont'd)

Figure 3-29 Local Area Connection Status



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

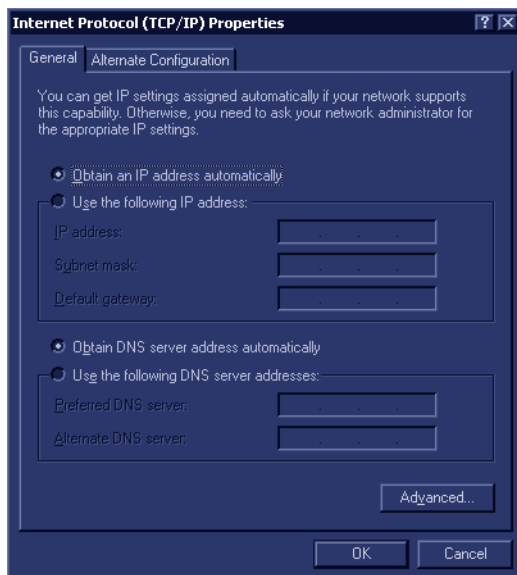
Figure 3-30 Local Area Connection Properties



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

3-10-5 DHCP setup (cont'd)

Figure 3-31 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.

3-10-6 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 to communicate with it.

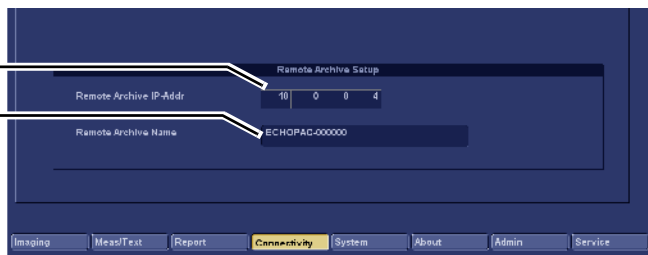
In the Remote Archive Setup area of the Tcpip screen (see example in [Figure 3-32](#)), enter the;

- 1.) Remote Archive IP address. (Default IP Address from factory: 10.0.0.4).
- 2.) Remote Archive Name. (Default Remote Archive Name from factory: ECHOPAC7-000001).

Figure 3-32 TCP/IP Set-up for VIVID E9

IP ADDRESS FOR THE
REMOTE ARCHIVE

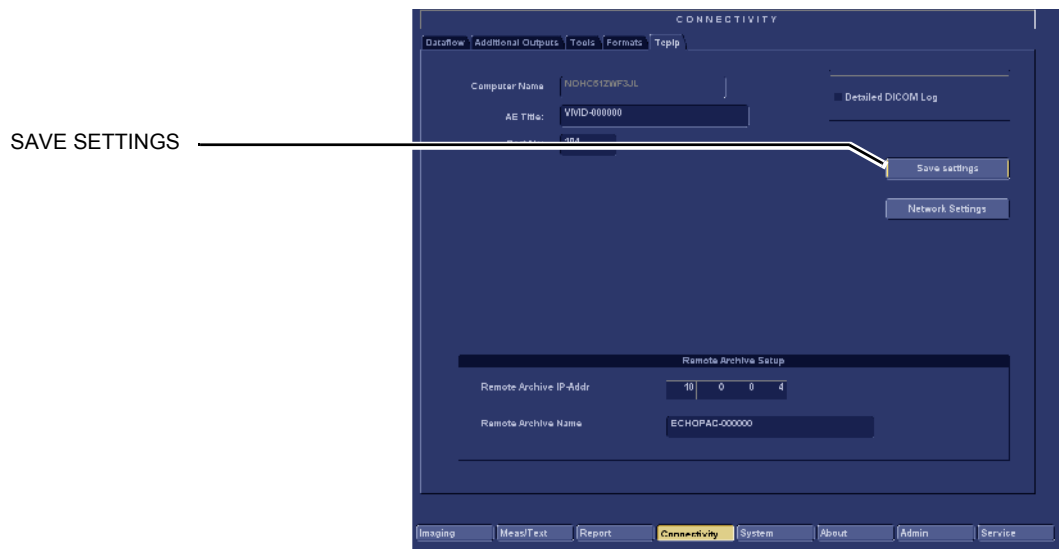
COMPUTER NAME FOR
THE REMOTE ARCHIVE



3-10-7 Save the New Settings

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

Figure 3-33 Save New TCP/IP settings



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

Figure 3-34 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 to activate the changes.
- 5.) Select **Worklist**. (The "Worklist" entry must be highlighted.)
- 6.) Select **Properties** to display the Properties dialog.

Section 3-11 Options Setup

3-11-1 Software options

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

- For installation instructions, see: [3-8-5 "Software Options Configuration" on page 3-38](#).
- For available options, see: [Section 9-21 "Options - VIVID E9" on page 9-93](#).

3-11-2 Color Video Printer (optional) installation

An external Color Video Printer may be connected to the USB port on VIVID E9.

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

3-11-2-1 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. 3 (or newer) if you need to install a new printer driver.

3-11-2-2 Generic installation instructions

- 1.) Connect the USB cable to the printer and to the USB port on VIVID E9'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.

For more information, please refer to the "Printer Driver Installation Manual", Direction GA294652, Rev. 3 (or newer).

Section 3-12

Setup paperwork

NOTE: *During and after installation, the documentation (i.e. CDs 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.*

3-12-1 User's Manual(s)

Check that the correct User Manual(s) or CD with User Manuals, per software (SW) revision and language, for the system is included.

3-12-2 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 3-35 Product Locator Installation Card (Example)

		GE Medical Systems Mailing Address 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	
DESCRIPTION		FDA	MODEL		REV	SERIAL	
SHIPMENT		OCP	BS	ORD			
		DISTRICT		CUSTOMER NO.		DATE (MO-DA-YR)	
		DESTINATION NAME AND ADDRESS					
		ZIP CODE					
		GE Medical Systems Mailing Address 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	
DESCRIPTION		FDA	MODEL		REV	SERIAL	
SYSTEM I.D.				OCP	BS	ORD	EMPLOYEE NO.
				DISTRICT		ROOM	DATE (MO-DA-YR)
INSTALLATION		CUSTOMER N°					
		DESTINATION NAME AND ADDRESS					
		ZIP CODE					

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Chapter 4

General procedures and Functional checks

Section 4-1

Overview

4-1-1	Purpose of this chapter	
	This chapter provides procedures for quickly checking major functions of the VIVID E9 scanner and diagnostics instructions using the built-in service software.	
4-1-2	Contents in this chapter	
4-1	Overview	4-1
4-2	General procedures	4-3
4-3	Functional checks	4-37
4-4	Site Log	4-52

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: 164L0027or
 - 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.








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 Healthcare.

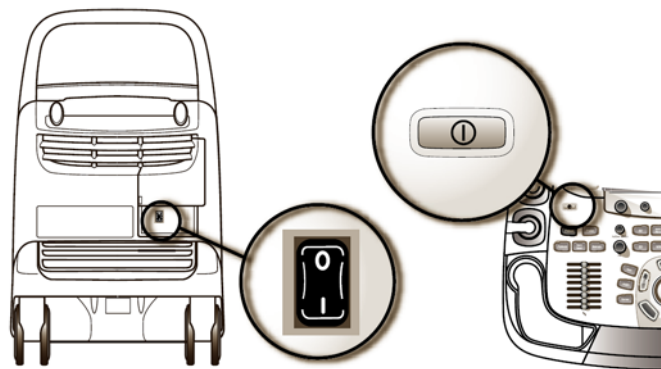
NOTE: Do not cycle the Circuit Breaker ON-OFF-ON in less than five (5) seconds. When turning OFF the Circuit Breaker, the system should de-energize completely before turning the circuit breaker ON.

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

Connecting AC Power to the VIVID E9 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

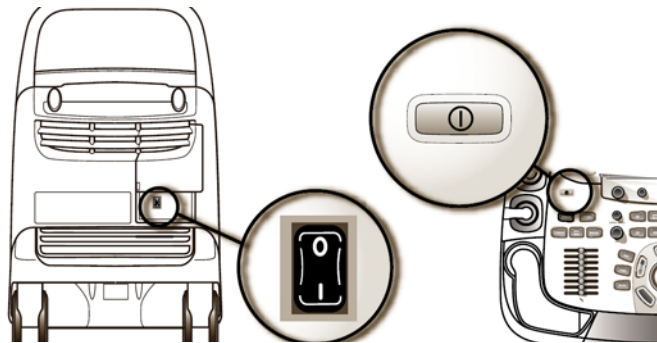


- 8.) Connect the Power Cable's other end (male plug) to a hospital grade mains power outlet with the proper rated voltage, and the unit is ready for Power ON/Boot Up.

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 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



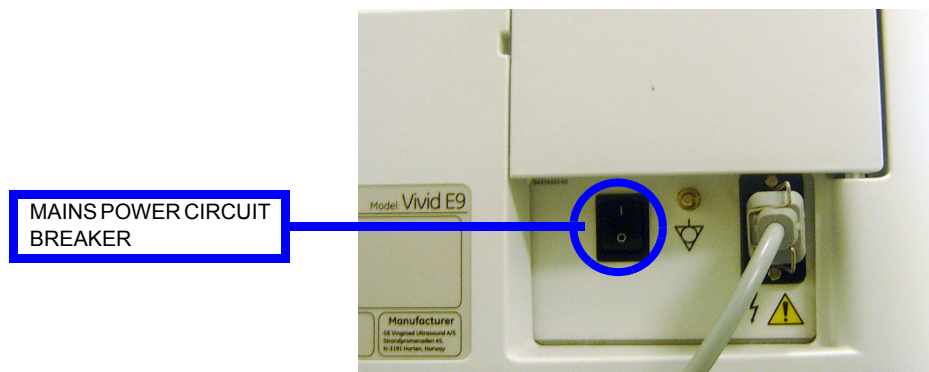
- 3.) Select Shutdown to do a complete power down of the unit.
The Back End Processor will first turn off the scanner activity and print the message "Please wait - Shutdown in progress" in the LCD display on the Operator Panel.
Next, it starts to shut down itself. The time to turn down the unit, including 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



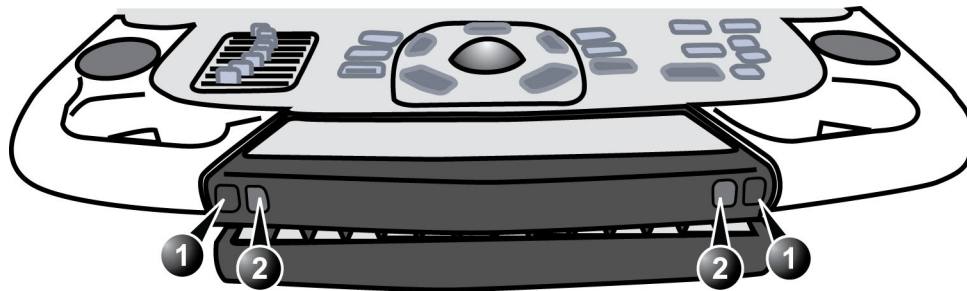
4-2-3 Top Console position adjustment

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

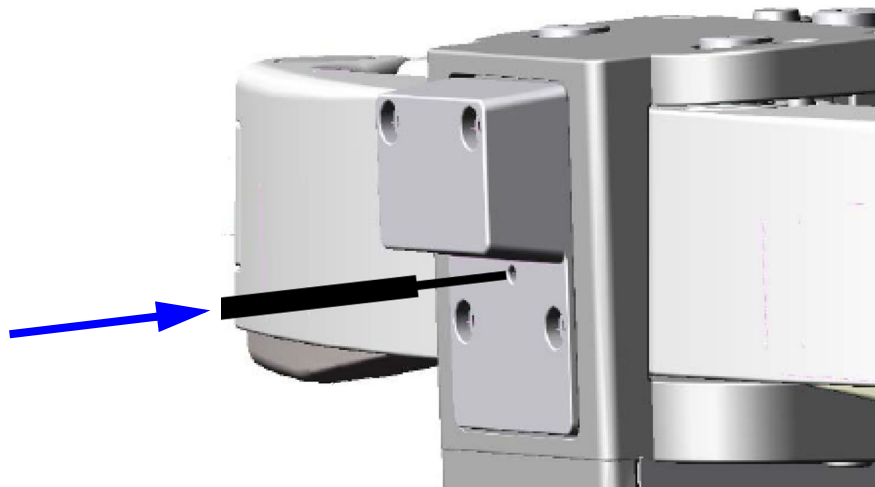
Even if the power is OFF, it is possible to manually release the console's XY-mechanism (frog leg).
The release point is located on the rear of the XY Mechanism (Frog Leg).

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

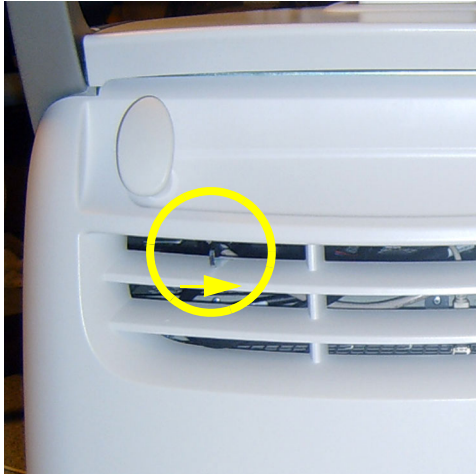


- 2.) Move the console to the wanted position.

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

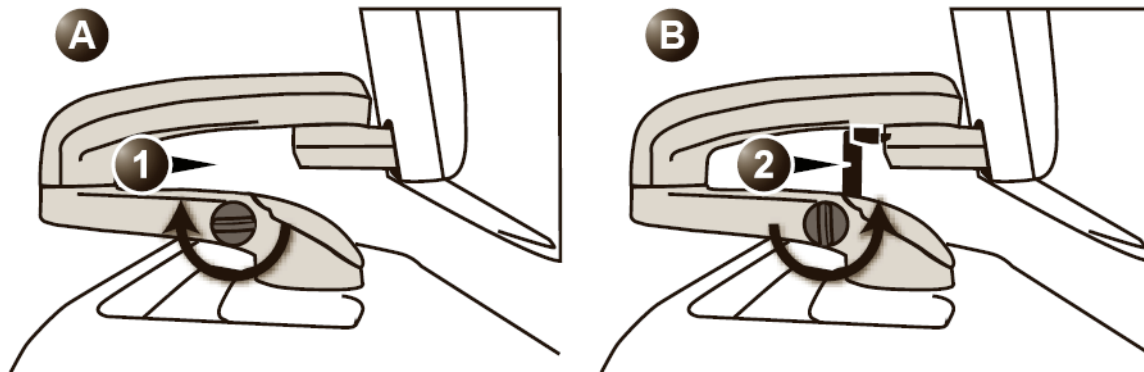


WARNING *OPERATOR CONSOLE CAN DROP UNEXPECTEDLY WHEN THE MECHANISM IS RELEASED.*

- 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.

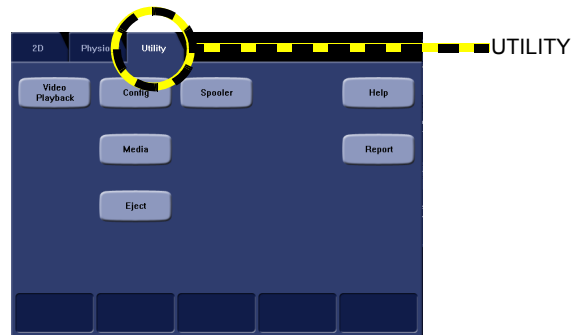
4-2-5 Logging on to VIVID E9 as 'ADM'

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

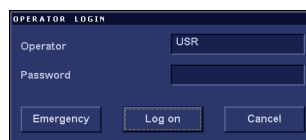


B.) **Procedure B**: On the alphanumeric keyboard:

- 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 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**.

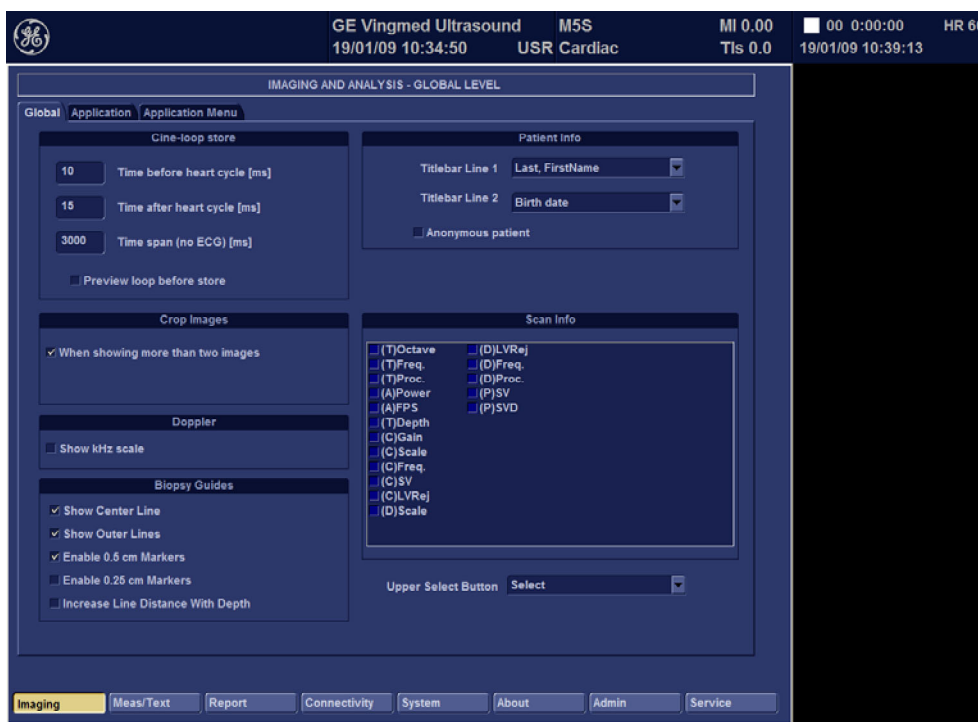
It is possible for the administrator (ADM) to establish new users and set unique passwords for each user, including a new password for ADM. If the login as ADM fails, contact the responsible person in the hospital to get access.

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 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

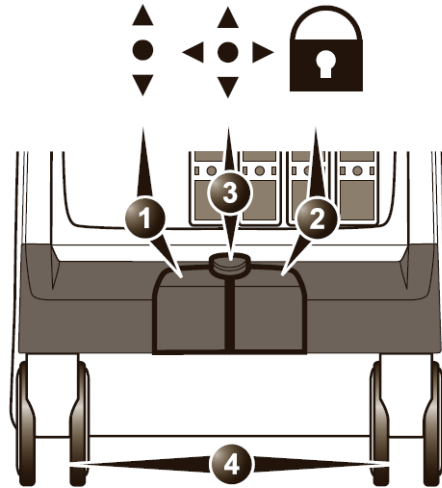


4-2-6 Moving and Transporting the VIVID E9

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 on paper. Verify if it is current before starting a software loading!

4-2-7-1 Overview

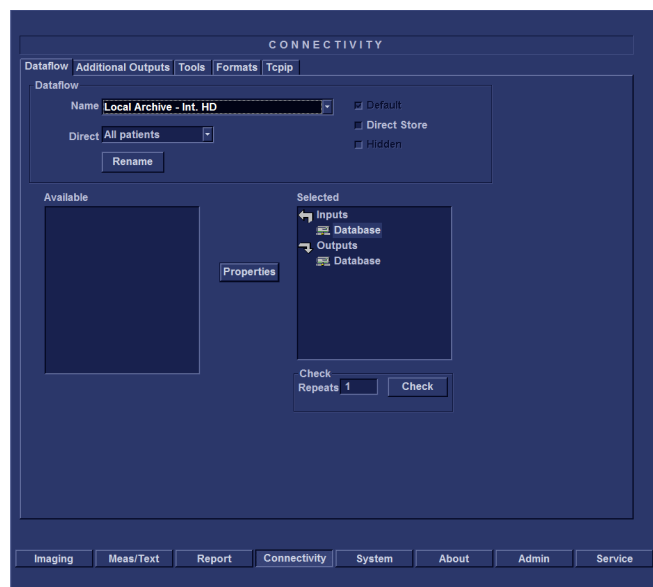
This subsection includes descriptions for recording data from the following screens:

- **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 as 'ADM'" on page 4-15.](#)
- 2.) Select **Connectivity > Dataflow**

Figure 4-19 The Dataflow screen

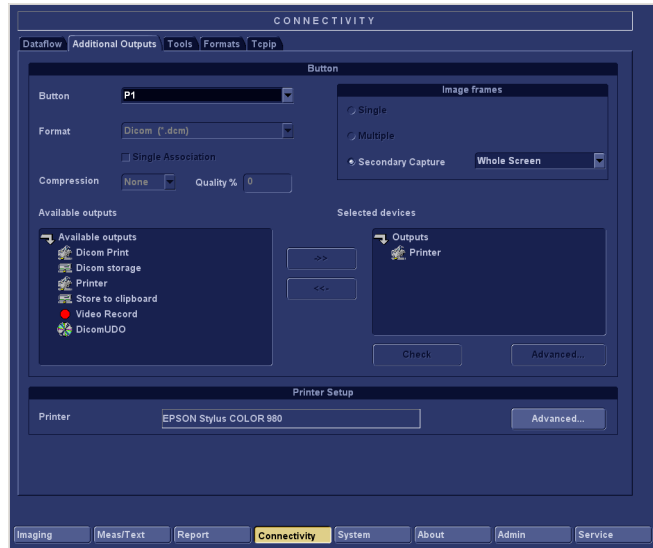


- 3.) Record the settings for each Dataflow in use by the site.

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 as 'ADM'" on page 4-15](#).
- 2.) Select **Connectivity > Additional Outputs**.

Figure 4-20 Additional Outputs

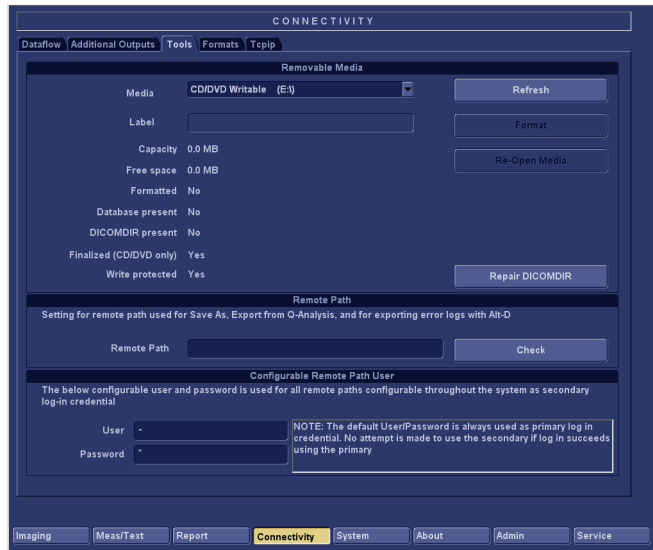


- 3.) Select Button **P1** in the **Button** pull-down menu.
- 4.) Record the settings for **Button P1**.
- 5.) Select Button **P2** in the **Button** pull-down menu.
- 6.) Record the settings for **Button P2**.
- 7.) Select Button **Record** in the **Button** pull-down menu.
- 8.) Record the settings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

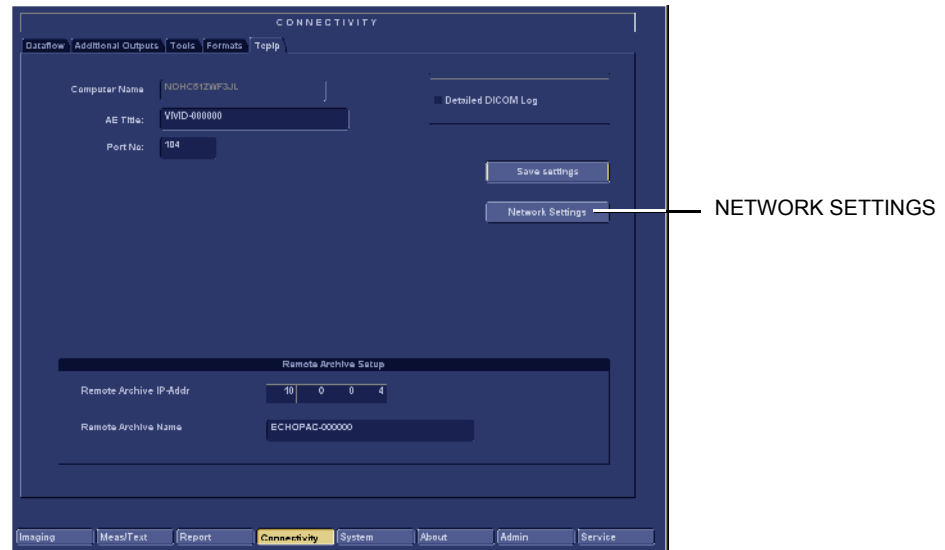
4-2-7-5 Connectivity — Formats

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

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

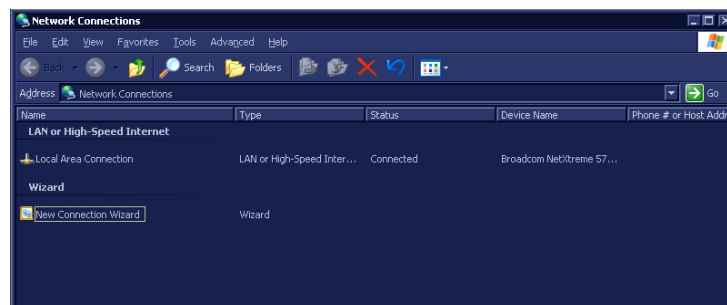
- 1.) Select **Config/F2** to log on as **ADM**. (Default password: ulsadm).
For a detailed description, see: [4-2-5 "Logging on to VIVID E9 as 'ADM'" on page 4-15.](#)
- 2.) Select **Connectivity > Tcpiip**.
- 3.) Record all settings in: [Table 4-1 "Record settings from Tcpiip screen and sub-screens" 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				
REMOTE ARCHIVE SETUP				
REMOTE ARCHIVE IP-ADDR				
REMOTE ARCHIVE NAME				
DHCP				
DHCP	ENABLED ____ DISABLED ____			
IP SETTINGS - IF DHCP IS DISABLED				
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 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**.

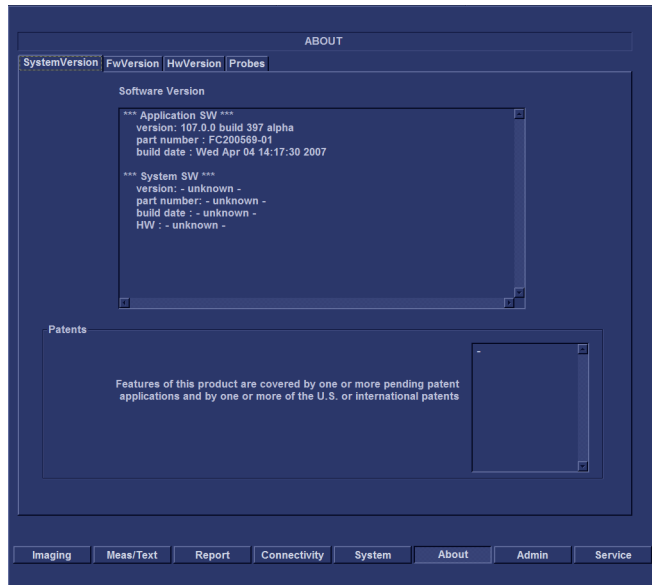
4-2-7-8 System — Test

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 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.

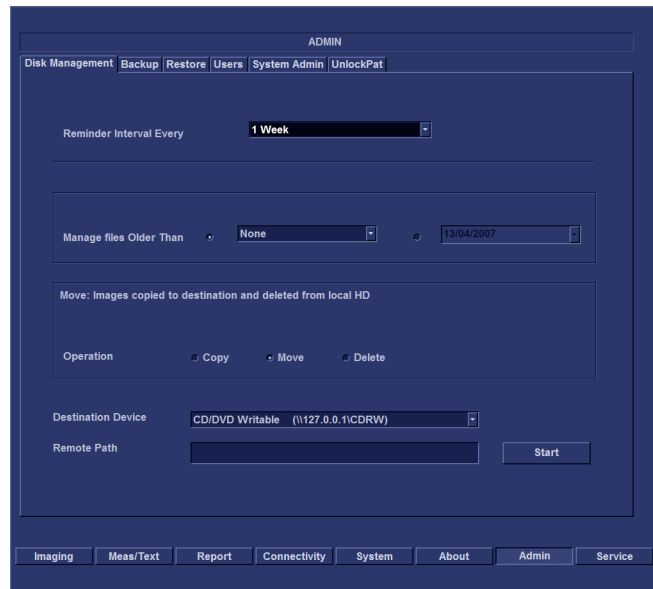
4-2-7-12 About — Probes

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 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 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 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 as 'ADM'" on page 4-15.](#)
- 2.) Select **Admin > Users**.

Figure 4-27 Users

The screenshot shows the 'ADMIN' interface for the 'Users' section. At the top, there are tabs: 'Disk Management', 'Backup', 'Restore', 'Users', 'System Admin', and 'UnlockPat'. The 'Users' tab is active. On the left, a 'User List' shows 'ADM' and 'USR'. The main area displays the details for the 'ADM' user. The 'Identity' section includes fields for 'Id' (ADM), 'Password' (masked), 'Last Name' (System Administrator), 'First Name', 'Email', 'Address', 'Title', and 'Phone'. There are 'New' and 'Delete' buttons. Below this is the 'Member of Group(s)' section with a grid of checkboxes for roles: Cardiologist, HospAdmin, Sonographer, DiagPhys, Operator, SysAdmin, Fellow, Physician, GEAdmin, RefDoc. The 'Operator Rights' section has a grid of checkboxes for permissions: Admin, Service, Create, StoreRep, PrintRep. At the bottom, there are fields for 'Autologon' (Disable) and 'Auto screenlock' (0). The bottom navigation bar includes: Imaging, Meas/Text, Report, Connectivity, System, About, Admin, and Service.

- 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 as 'ADM'" on page 4-15.](#)
- 2.) Select **Admin > System Admin**.

Figure 4-28 System Admin (Example)

The screenshot shows the 'ADMIN' interface with a menu bar containing 'Disk Management', 'Backup', 'Restore', 'Users', 'System Admin', and 'UnlockPat'. The 'System Admin' tab is active. Below the menu, there are two input fields: 'Product' with the value 'Cardiology.Idunn' and 'HW Number' with the value '6789'. Below these is a section titled 'SW Option Key' containing a large text area with the value 'BXD5V-H4C46-KP5JY-RFHV2-2ECEN' and two buttons, 'New' and 'Delete'.

- 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.*

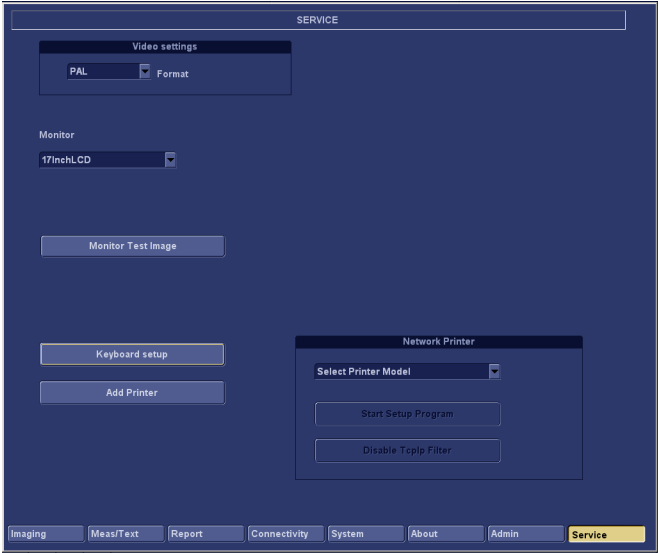
Table 4-3 Software Options Keys

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 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.

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).

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 and check that the trackball now works as intended.

4-2-9 Cleaning the Trackball (OP-1 to OP-4)

4-2-9-1 Introduction

- **OP-4, OP-3 and OP-2:**
On these Operator Panels, an optical trackball is used. If dust is interfering with the light in an optical trackball, cleaning is required. This involves removing the OP and then remove and open the Trackball, as described in the procedure below.
- **OP-1:**
An inductive trackball is used on the first version of the Operator Panel. It is only needed to clean the inductive trackball if it doesn't move easy. This involves removing the OP and then remove and open the Trackball, as described in the procedure below.

4-2-9-2 Manpower

One person, 30 minutes,

4-2-9-3 Tools

- Antistatic brush and/or antistatic vacuum cleaner
- Tools as listed in: [8-2-5 "Tools needed for servicing VIVID E9" on page 8-4](#)

4-2-9-4 Preparations



CAUTION ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.

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.

To get access to the trackball for cleaning, you must perform the following steps:

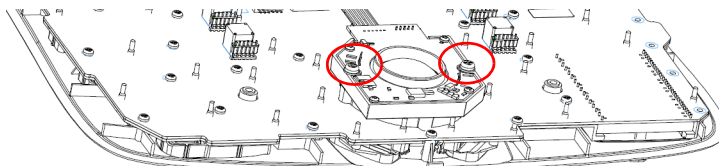
- 1.) Power down the system.
- 2.) Disconnect the mains power cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Operator Panel, Upper
- 5.) Remove the Operator Panel, Lower and place it on a clean surface with the front down.

Follow these links if you need more information:

- [4-2-2 "Power shut down" on page 4-8.](#)
- [8-6-7-2 "Remove the Upper OP Panel/Touch Panel Assembly" on page 8-99.](#)
- [8-6-16-2 "Remove the Operator Panel, Lower" on page 8-125.](#)

4-2-9-5 Remove the Trackball

Figure 4-31 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 shims.
- 3.) Remove the Trackball and the Fixing Ring.

Figure 4-32 Trackball removed



4-2-9-6 Clean the Trackball

Dust is often building up behind the ball, so it interferes with the ball rotation and for optical trackballs the light used for sensing. To get access for cleaning, you need to remove the ball.

The ball is held in position by the Dust Gasket.

- 1.) Turn the Dust Gasket counter-clockwise to unlock it.

Figure 4-33 Remove Trackball Dust Gasket



- 2.) Remove the Dust Gasket.

Figure 4-34 Dust Gasket removed



- 3.) Remove the ball.
- 4.) Use a soft antistatic brush and/or an antistatic vacuum cleaner to remove any dust, both on the ring and inside the ball house.
- 5.) When done, install the ball and the Dust Gasket.

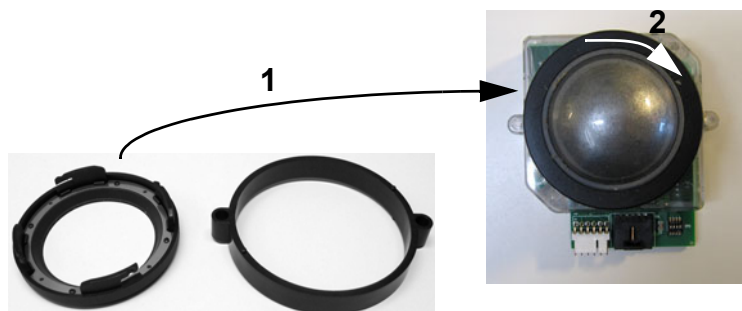


Figure 4-35 Install Dust Gasket

4-2-9-6 Clean the Trackball (cont'd)

6.) Install 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.

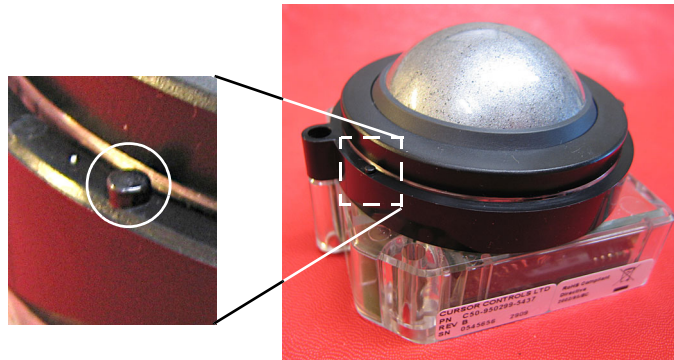


Figure 4-36 Fixing Ring installed for use on the Vivid E9.

4-2-9-7 Install the Trackball

Follow these steps to install the Trackball:

- 1.) Install the Trackball.
- 2.) Install the two fixing screws with shims so it locks the Trackball and Fixing Ring in the correct position.
- 3.) Connect signal cable connectors to the Trackball.

4-2-9-8 Install the Front Panel

- 1.) Install the Operator Panel, Upper.
- 2.) Install the Operator Panel, Lower.

4-2-9-9 Test the Trackball

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

Section 4-3 Functional checks

4-3-1 Preparation

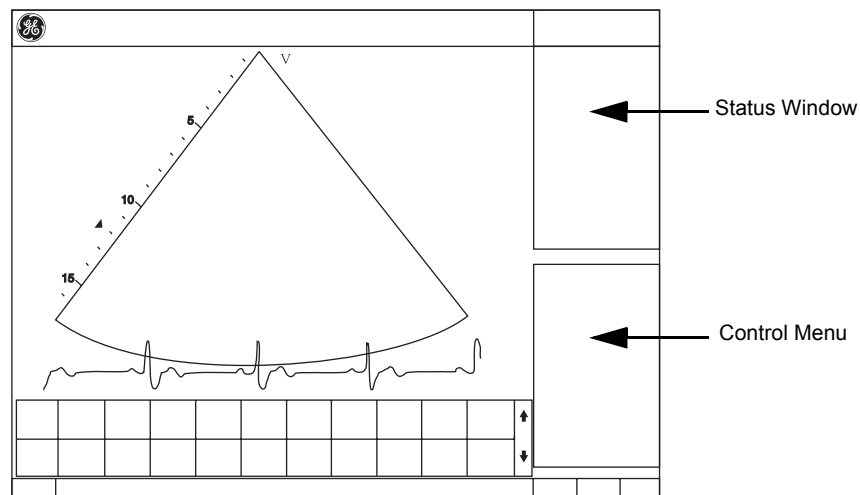
Turn on power to VIVID E9.

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

4-3-2-1 Introduction

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

Figure 4-37 2D Mode Screen Example



4-3-2-2 Preparations

- 1.) Connect one of the probes.
 - See ["Connecting Probes" on page 3-24](#) 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

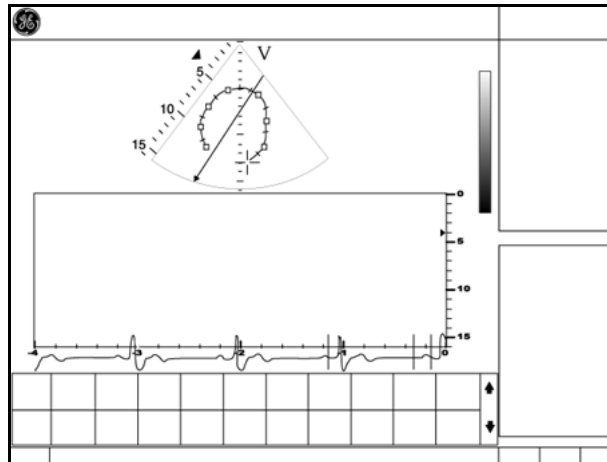
 **WARNING** *ALWAYS USE THE MINIMUM POWER REQUIRED TO OBTAIN ACCEPTABLE IMAGES IN ACCORDANCE WITH APPLICABLE GUIDELINES AND POLICIES.*

- 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 pool artifact without diluting tissue appearance of moving structures.

4-3-3 M Mode Checks

4-3-3-1 Introduction

Figure 4-38 M-Mode Screen Example



4-3-3-2 Preparations

- 1.) Connect one of the probes, to the scanner's left-most probe connector.
 - See [3-7-6 "Connecting Probes" on page 3-24](#) 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 3-24* 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: *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 4-39](#)).
- 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 [3-7-6 "Connecting Probes" on page 3-24](#) 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 3-24 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 Probe 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 Select to launch the application. To change application without changing the current probe, press Appl. 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 3-7-6 "Connecting Probes" on page 3-24	It will display pictorial data each time
7.	Do a leakage test on the probe, see Section 10-6 "Electrical Safety Tests" on page 10-20	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

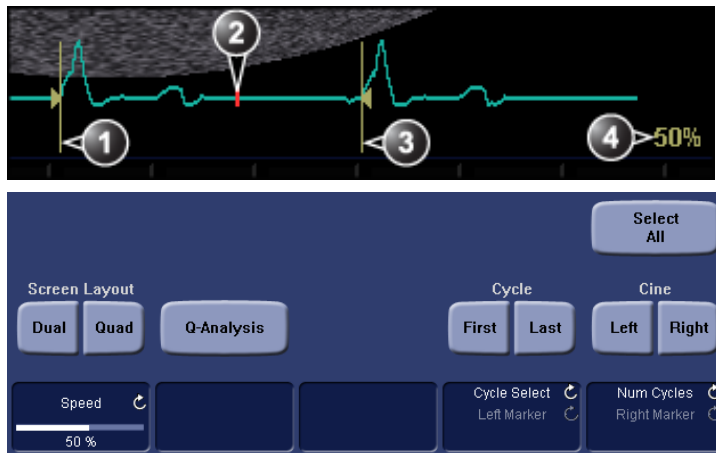
Step	Task	Expected Result(s)
1.	Connect the ECG harness to the connector on the front of the system	The unit displays a straight curve along the bottom edge of the image sector on the screen.
2.	Connect the three leads to a ECG simulator, or Fasten the three ECG Pads to your body and connect the three 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 4-39).

Figure 4-39 The Cineloop controls display



- | | |
|------------------|-----------------|
| 1. Left marker | 3. Right marker |
| 2. Current frame | 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 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'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 Freeze to stop image acquisition.	Image scanning stops with the last picture on the screen.
2.	Press P1 on the Operator Panel	The image displayed on the screen is printed on the assigned printer.
3.	Press P2 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

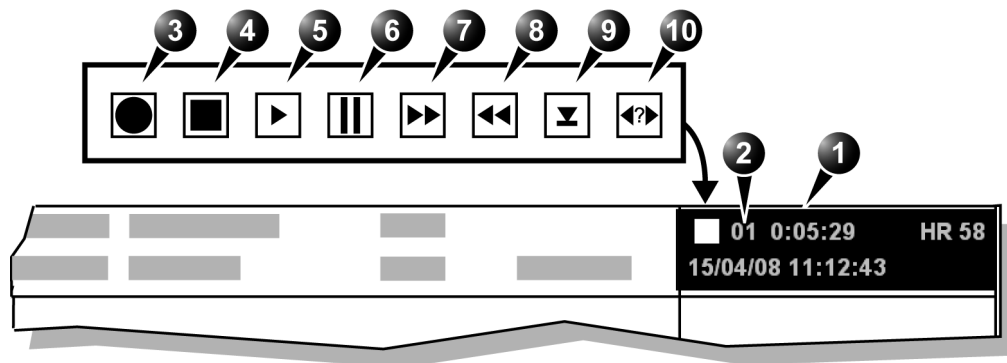
- Go to **Utility > System > Peripherals**
- Click on **Properties**.

4-3-12-4 DVR checks

Overview

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

Figure 4-40 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

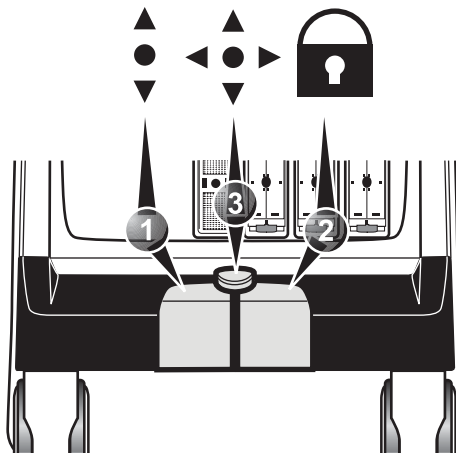
4-3-13-1 Casters (Wheels), Brakes and Direction Lock Checks

The wheels are controlled by the pedals situated between the front wheels of the unit (see Figure 4-41).
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 4-41 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.

Section 4-4 Site Log

Table 4-9 Site Log

[illegible]

Table 4-9 Site Log (cont'd)

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Chapter 5

Components and functions (theory)

Section 5-1 Overview

5-1-1 Purpose of this chapter

This chapter explains VIVID E9'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

5-1	Overview	5-1
5-2	InSite ExC.	5-4
5-3	VIVID E9 overview	5-9
5-4	Top Console with LCD monitor and Operator Panel.	5-17
5-5	Main Console	5-24
5-6	Air Flow control.	5-25
5-7	Casters and Brakes	5-26
5-8	Front End Processor (FEP)	5-27
5-9	Back End Processor (BEP)	5-52
5-10	Power distribution	5-77
5-11	Input and Output (I/O) modules	5-88
5-12	Peripherals overview	5-96
5-13	Product manuals.	5-99
5-14	Common Service Desktop overview.	5-100
5-15	Restart VIVID E9 after diagnostics	5-102

Table 5-1 VIVID E9 Models and Hardware/Software Compatibility sheet 1 of 2

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(s)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO
GA000940	Vivid E9 100-230V 4D Expert Option - 17" LCD	GA200824 VE9 Card Rack Complete with MLA16, 4D TEE backplane, 192 RX channels and one TX card with 192 channels	GB200001 BEP6 w/4D	v104.3.4 (or higher)	v112.0.7 or higher	v112.1.x
			GB200003 BEP5 w/4D Nvidia Quadro 2000D	v104.3.3 (or higher)	v112.0.x or higher	v112.1.x
						v112.1.x
			GA200890 BEP5 w/4D Nvidia	v104.3.x	v112.0.x or higher	v112.1.x
GA000950	Vivid E9 100-230V 4D Expert Option - 19" LCD		GB200001 BEP6 w/4D	v104.3.4 (or higher)	v112.0.7 or higher	v112.1.x
			GB200003 BEP5 w/4D Nvidia Quadro 2000D	v104.3.3 (or higher)	v112.0.x or higher	v112.1.x
		GA200890 BEP w/4D Nvidia	v104.3.x	v112.0.x or higher	v112.1.x	
GB000040	Vivid E9 100-230V BT12 Pro Configuration - 17" LCD	GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.4 (or higher)	v112.1.0 or higher	v112.1.x
GB000050	Vivid E9 100-230V BT12 Pro Configuration - 19" LCD					v112.1.x
GA000945	Vivid E9 100-230V 2D - 17" LCD		GB200002 BEP6 wo/4D	v104.3.x	v112.0.6 or higher	v112.1.x
			GA200900 BEP5 wo/4D	v104.3.x	v112.0.x or higher	v112.1.x
GA000955	Vivid E9 100-230V 2D - 19" LCD		GB200002 BEP6 wo/4D	v104.3.x	v112.0.6 or higher	v112.1.x
			GA200900 BEP5 wo/4D	v104.3.x	v112.0.x or higher	v112.1.x

Table 5-1 VIVID E9 Models and Hardware/Software Compatibility (cont'd) sheet 2 of 2

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO
GA000810	VIVID E9 100-230V 4D Expert Option - 17" LCD	GA200824	GB200001 BEP6 w/4D	v104.3.x	v110.1.12	v112.1.x
			GA200890 or GA200800 BEP5 w/4D Nvidia		v110.1.x	
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.2.x v104.1.x	v110.0.x	
GA000815	VIVID E9 100-230V 4D Expert Option - 19" LCD	VE9 Card Rack Complete with MLA16, 4D TEE backplane and 192 RX channels	GB200001 BEP6 w/4D	v104.3.x	v110.1.12	v112.1.x
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.3.2	v110.1.x	
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.3.2	v110.1.x	
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.2.x v104.1.x	v110.0.x	
GA000830	VIVID E9 100-230V 2D - 17" LCD	GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.x	v110.1.12	v112.1.x
			GA200900 or GA200805 BEP5 wo/4D		v110.1.x	
GA000835	VIVID E9 100-230V 2D - 19" LCD	GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.x	v110.1.12	v112.1.x
			GA200900 or GA200805 BEP5 wo/4D		v110.1.x	
GA000100	VIVID E9, 100-230 VAC (with 4D)	GA200744	GA200890, GA200800 or 5145000-10 BEP5 w/4D	v104.0.x	v108.x.x	v112.1.x
		GA200035				v112.1.x NOTE! Hardware update or box (console) swap required.

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.
- **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 5-2 InSite ExC Icons, depending on ongoing activity

ICON	DESCRIPTION
	Idle State - Online Center Is Not Connected Black and White Icon - InSite ExC activated but system not open for Technical Support access.
	Servicing State - Online Center Is Connected 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 > D and look at logs, but cannot perform any service related functions.
	Disruptive State - Online Center Is Connected Red Icon with clock - InSite ExC activated.
	Disrupted State - Online Center Is Connected Red Icon with GE Logo - InSite ExC activated and Technical Support can look around on your system, run diagnostics, gather logs, and initiate VCO.
	Active Messaging State - Online Center Is Connected The system has received information from the GEHC remote service office.

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 of 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 displays the 'Request for Service' (RFS) interface. At the top, there are tabs for 'RFS', 'Queue', 'Machine Queue', and 'Items'. The main form is titled 'Contact Information' and includes fields for 'Last', 'First', 'Phone', 'E-mail', and 'System ID' (set to 'LEP12345'). Below this is a section for 'Problem Type' with 'Service' and 'Applications' buttons. The 'Problem Area' section has two dropdown menus: 'Service' (with options: Hardware Electrical, Hardware Mechanical, Software, Image Quality) and 'Applications' (with options: Hardware Electrical, Hardware Mechanical, Software, Image Quality). A 'Problem Description' text area is provided, with a 'DateTime of Problem' field set to '07/10/2008 10:20' and a '300 characters left' indicator. At the bottom are 'Send' and 'Cancel' buttons. A status bar at the very bottom shows 'Connection Checked Out' and a 'Status' indicator.

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 5-3 Monitored parameters for ARFS

#	Report Error (RFS)	Accepted Values	Comment
1.	DRX4_TOP (DRX1-4)	-10 °C - 80 °C	If the temperature on any of the DRX cards rise above 80 °C (176 °F), an ARFS is generated. (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]	If the fan speed is lower than 100 RPM, the fan has most likely stopped, and an ARFS is generated. (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	ARFS is generated on Probe CRC failure.

5-2-6 InSite ExC Definitions

Here are definitions for the different InSite ExC states:

- **Virtual Console Observation (VCO).** Allows Technical Support to control VIVID E9 functionality remotely.
- **Disruptive.** Allows GE's Technical Support person to connect to your system via VCO, to run diagnostics directly on your VIVID E9 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 system.

Section 5-3

VIVID E9 overview

5-3-1 Purpose of this section

The purpose of this section is to give you an overview of VIVID E9 and how it function.

5-3-2 Introduction

The VIVID E9 ultrasound unit is a high performance digital ultrasound imaging system with total data management.

The system provides image generation in 4D, 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 unit allows optimal usage of all scanning modes and probe types, throughout the full spectrum of operating frequencies.

5-3-3 VIVID E9 general description

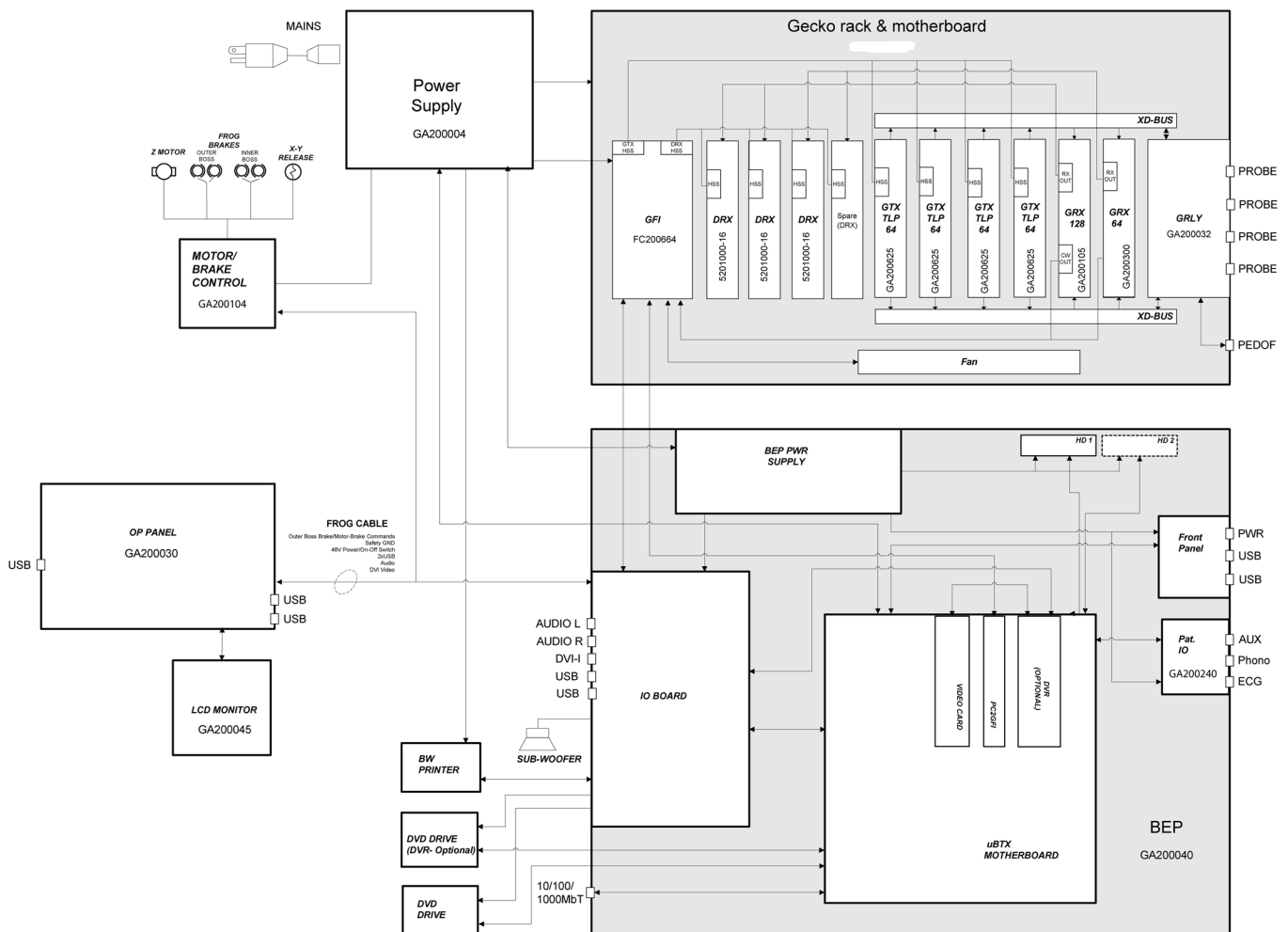
VIVID E9 is a digital beamforming system. Signal flow travels from the Probe Connector Panel to the Front End Electronics, then to the Back End Processor, and finally, the results are displayed on the monitor.

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 block diagram

Figure 5-4 VIVID E9 block diagram



NOTE: Depending on VIVID E9 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.

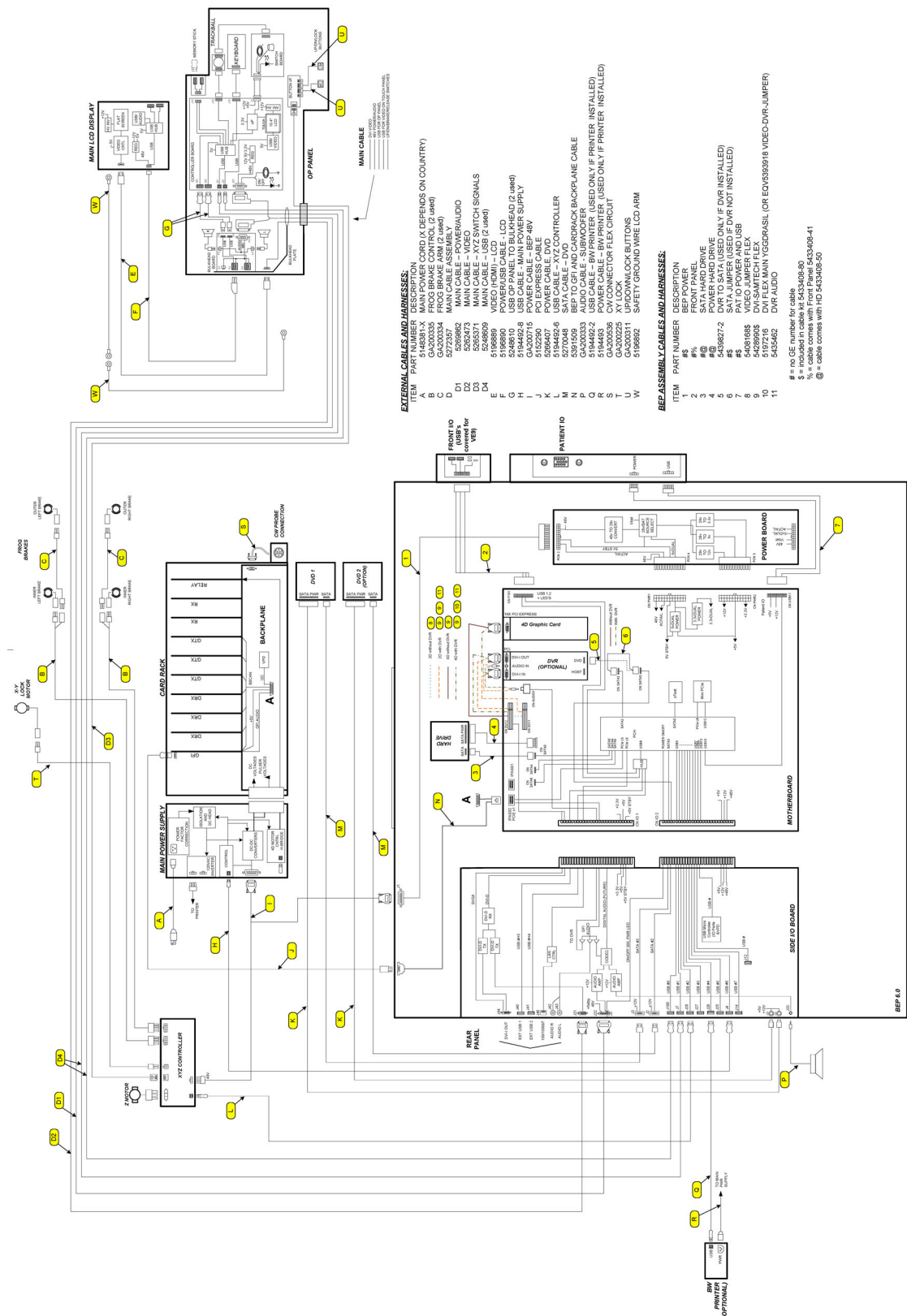
5-3-7 The electronics

VIVID E9 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 interconnection diagram

Figure 5-5 VIVID E9 w/ BEP6 interconnection diagram



5-3-9 VIVID E9'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'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

- 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/User Guide.

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

A flexible harness of electrical wires secures the connection between the Top Console and the rest of the VIVID E9.

5-4-1-3 The XYZ mechanism

The Top Console can be adjusted without moving the complete VIVID E9 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.

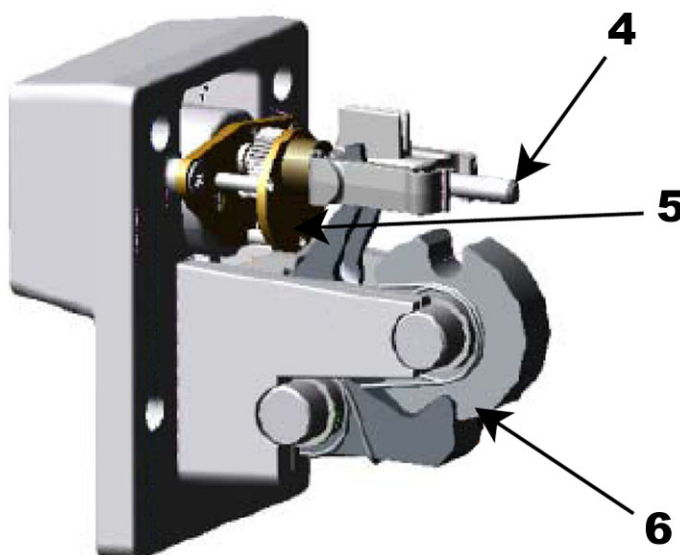
5-4-1-4 The XY Locking mechanism

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 5-7 shows the Park Lock when the Operator Panel is in a locked position.

Figure 5-7 Park Lock in locked position

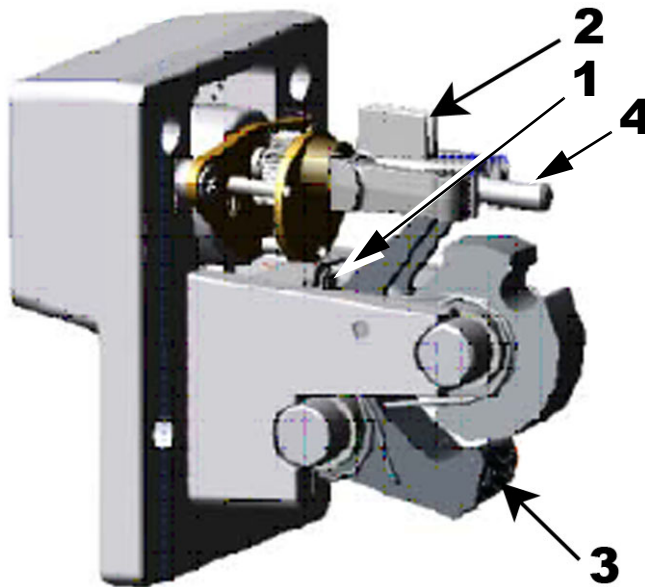


When the Operator Panel releases, the **Threaded Lead Screw** (4) rotates clockwise, moving the **Lock Nut** outwards and thus lowering the **Park Lock Lever** downwards and the Park Lock mechanism is released.

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 5-8 "Unlocked position" on page 5-19](#).

Figure 5-8 Unlocked position



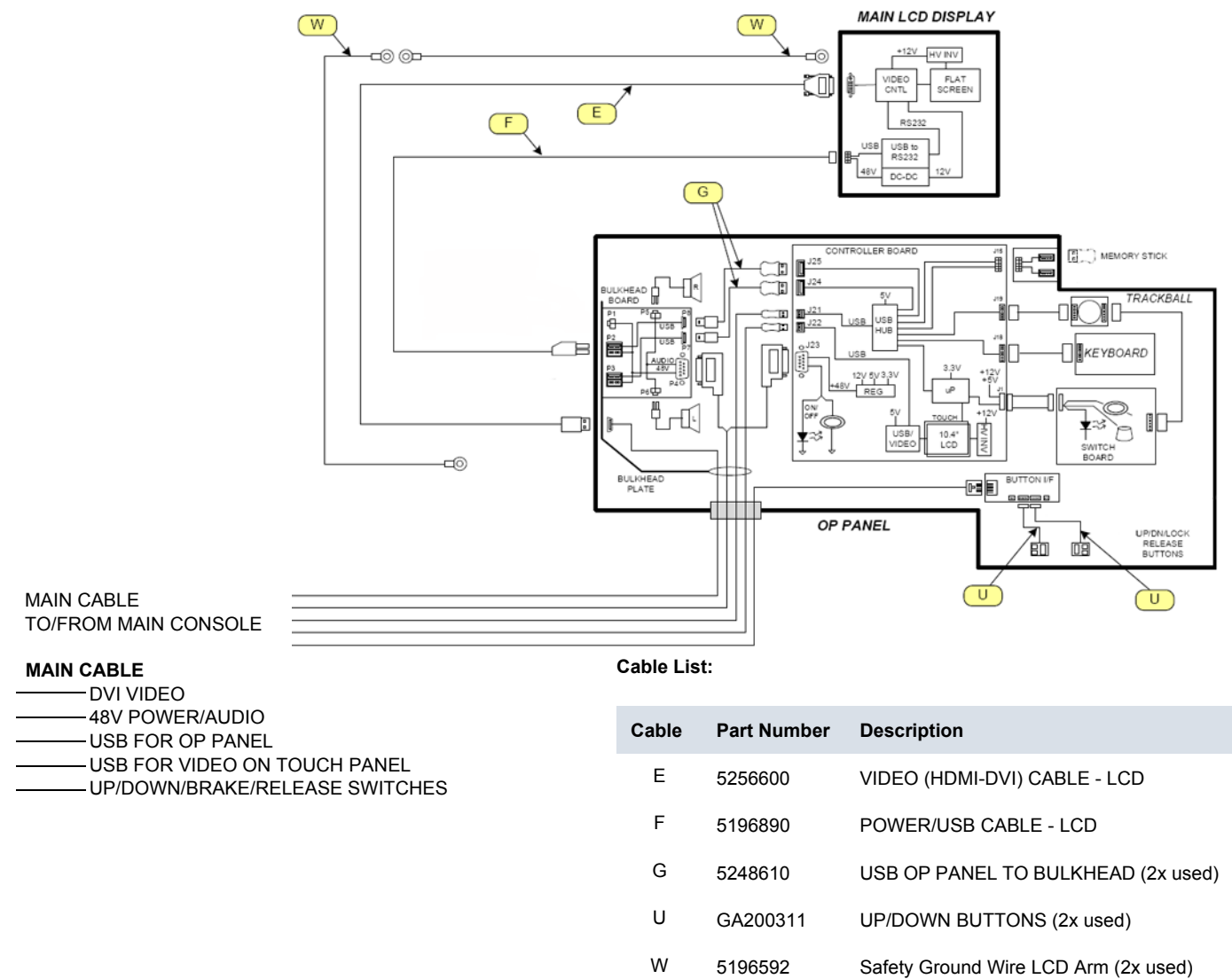
When the Operator Panel moves into locked position a micro switch (1) is activated.

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 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 5-9 Top Console block diagram



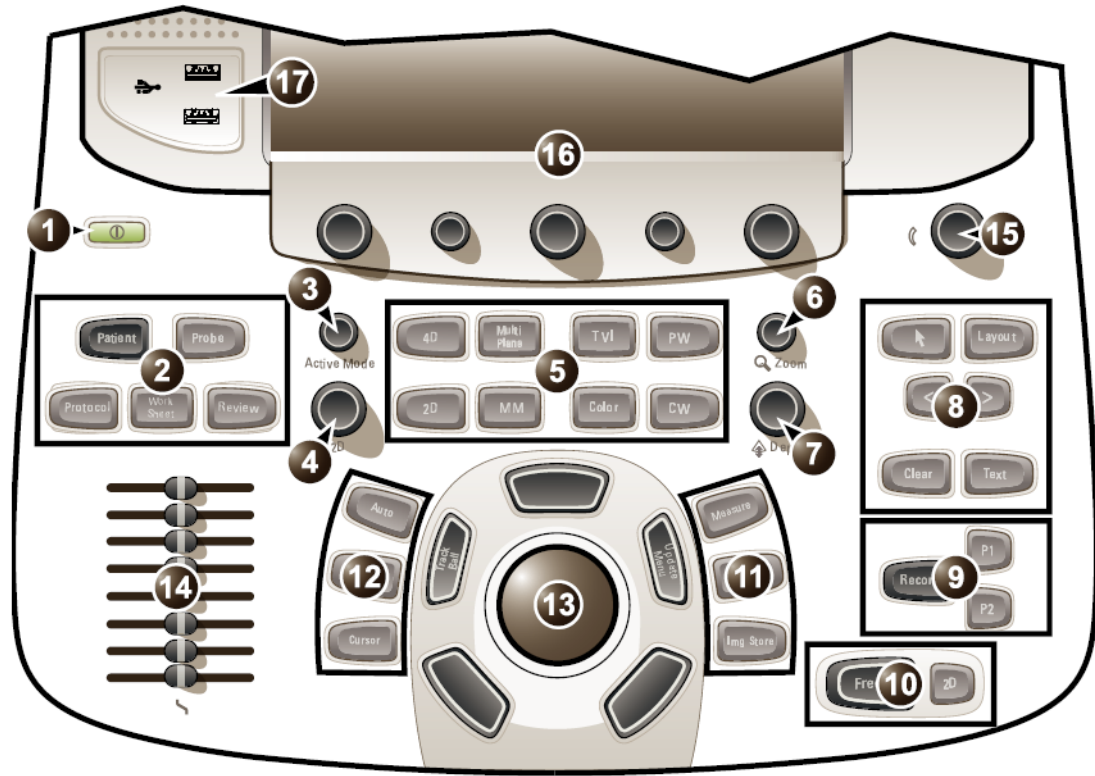
5-4-2 Operator Panel (Control Panel)

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.

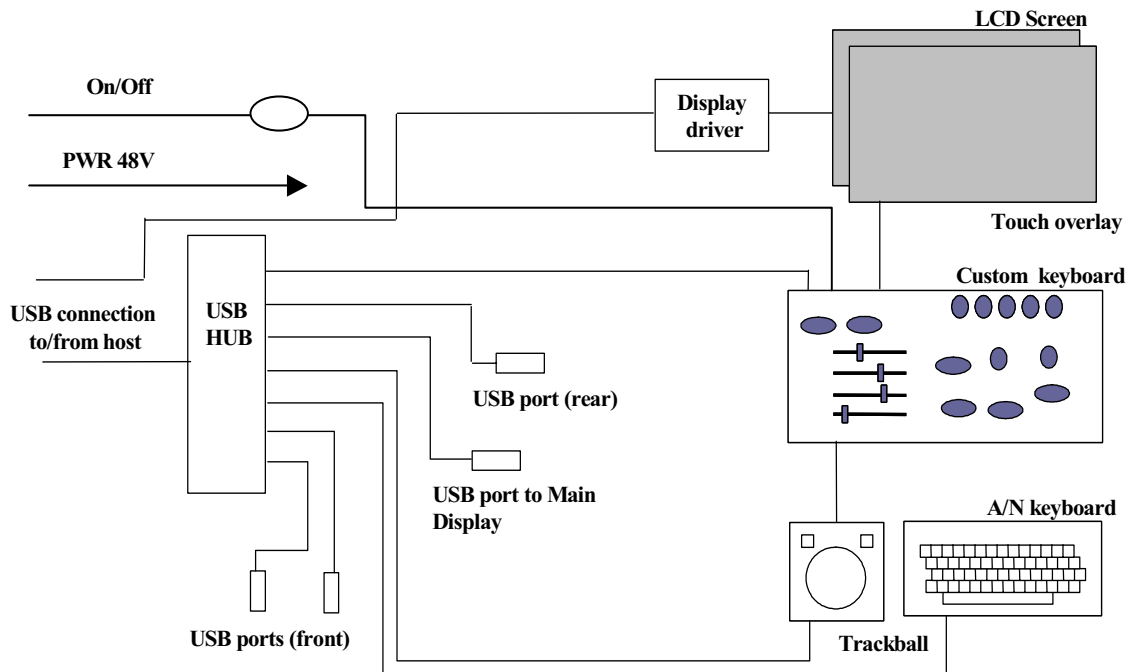
Figure 5-10 Operator Panel



5-4-2-2 Operator Panel block diagram

The VIVID E9 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 5-11 Operator Panel block diagram



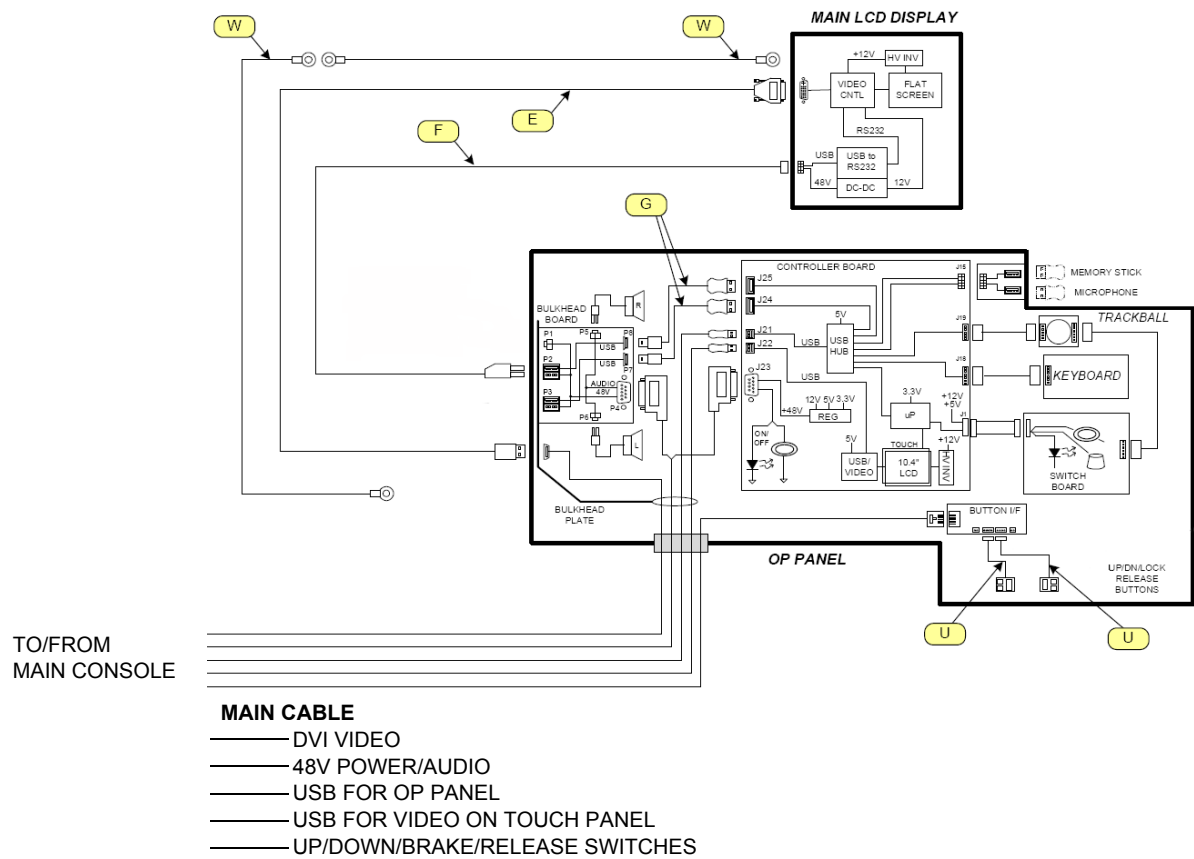
The custom keyboard is the main controller for the operating panel. It interfaces all of the additional rotaries, push buttons, potentiometers etc. It also connects to the touch panel overlay and handles the push events from this.

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.

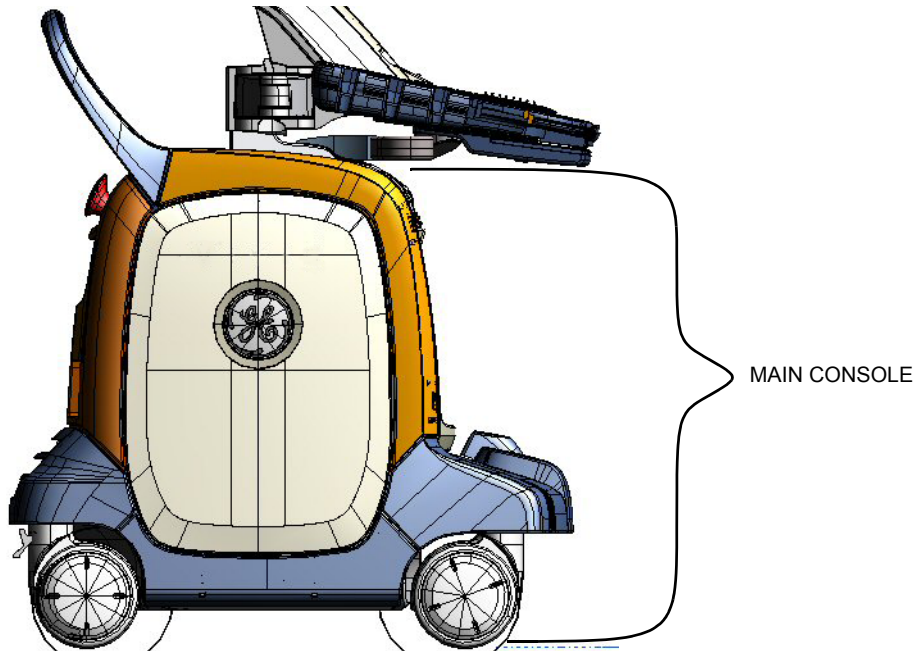
Figure 5-12 Top Console (with Operator Panel) block diagram



Section 5-5 Main Console

5-5-1 Main Console description

Figure 5-13 Main Console



The Main Console hosts the:

- Patient I/O
- Front End Processor (FEP)
- Back End Processor (BEP)
- External I/O
- 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.
- Air filter in the air intake below the fans of the of the VIVID E9 (ref. next step).
- Fan unit on bottom of the VIVID E9.
- Two fans on top of the Card Rack.
- Fans inside the BEP and the Main Power Supply.
- Temperature sensors several places inside VIVID E9.
- 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 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 has four casters (wheels), the Front Casters and the Rear Casters.

- All Casters are mounted on swivels so they can change direction as needed.
- Additionally, 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 will be destroyed.

5-8-1-1 Front End Processor cards overview

Table 5-4 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
 - I²C bus
 - BSCAN

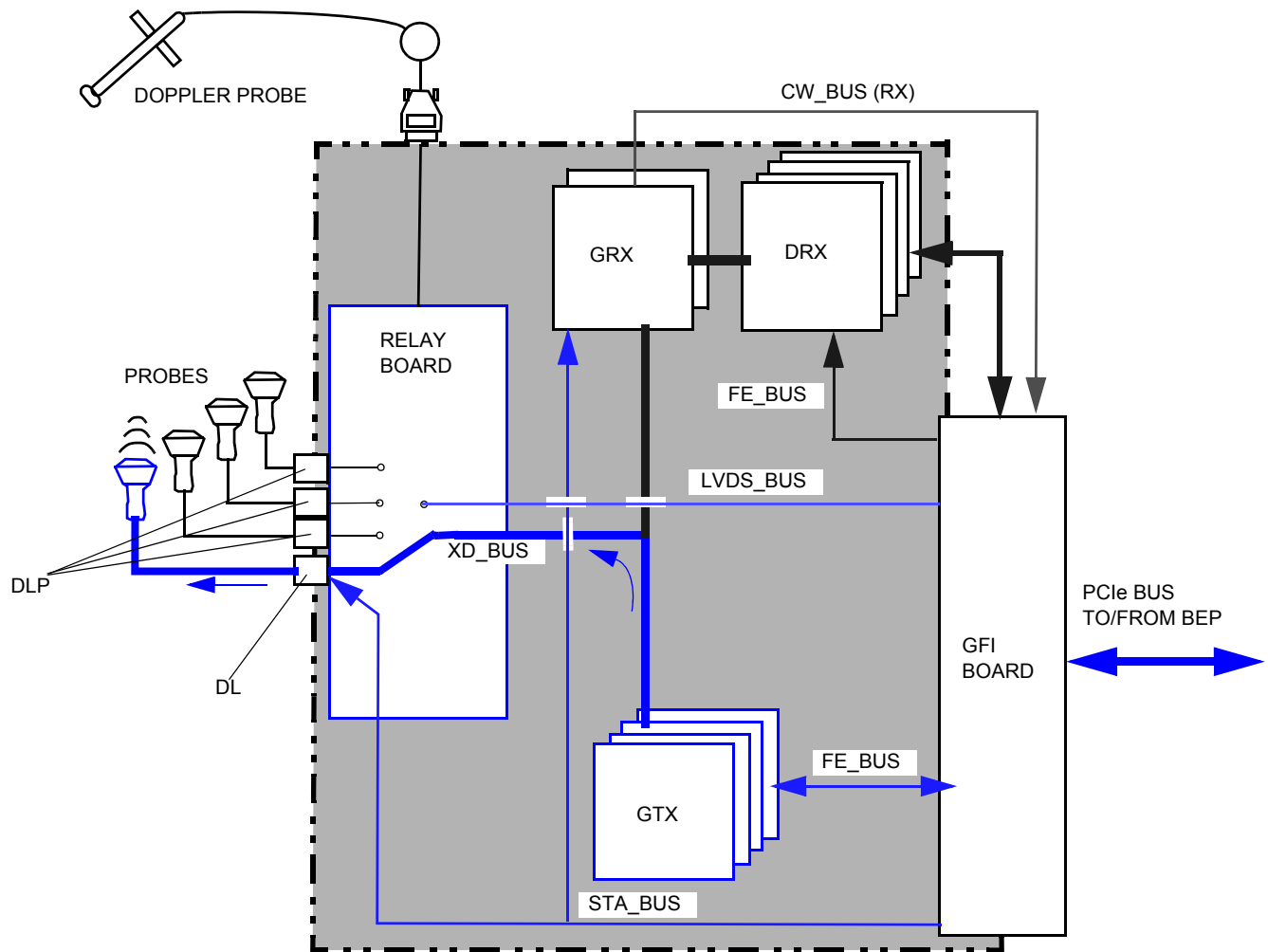
5-8-1-7 Output signals

- 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 5-14 The Ultrasound Transmitter with up to four GTX boards.



NOTE: The number of cards depend on the VIVID E9 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.

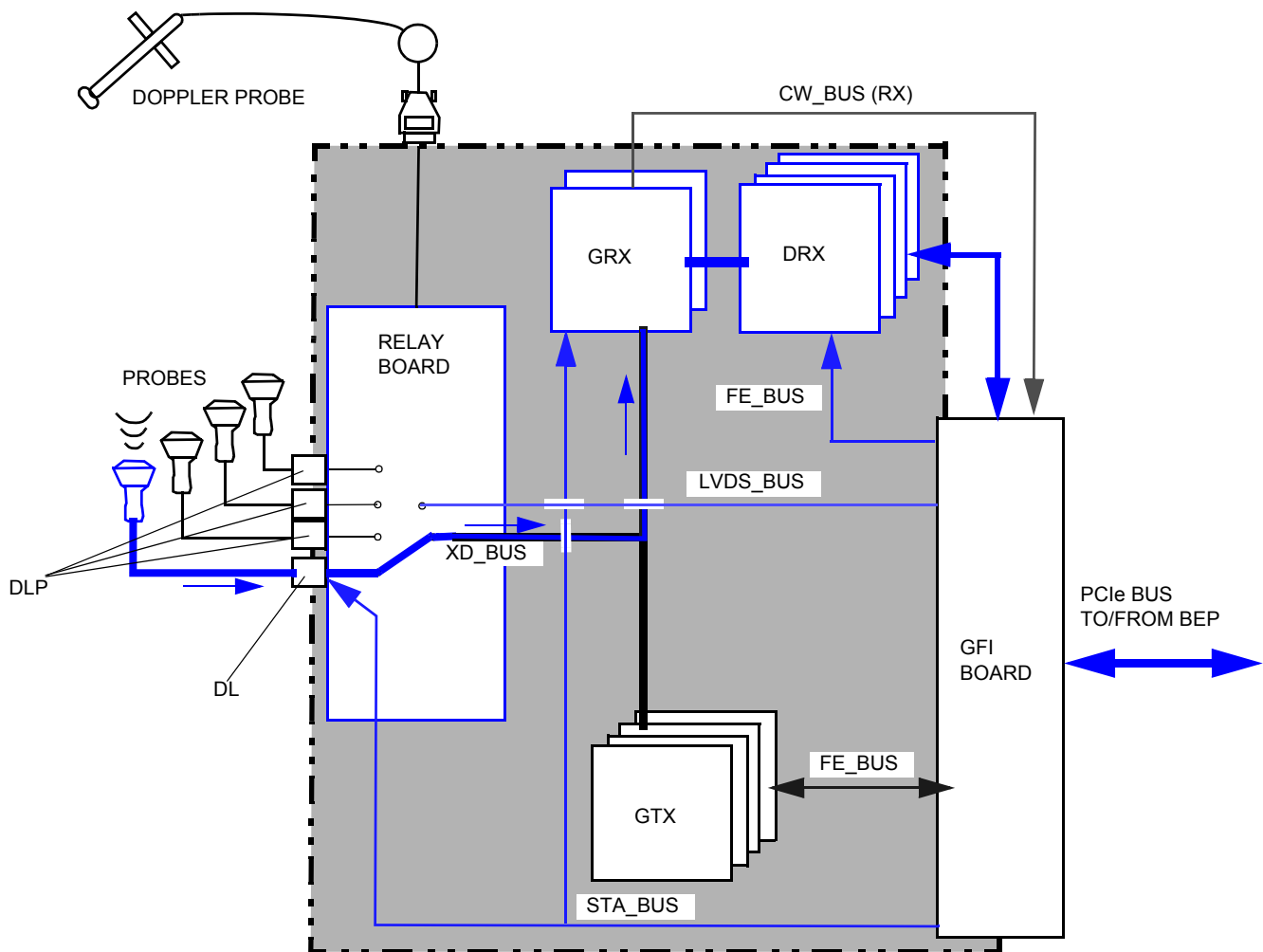
If the CW Doppler probe is selected, one of the TX channels from the GTX is routed via the Back Plane to a separate connector, then via a cable to the Doppler probe connector on the front of VIVID E9. In the Doppler probe, the signal is connected to one of the two probe elements.

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 5-15 The Ultrasound Receiver

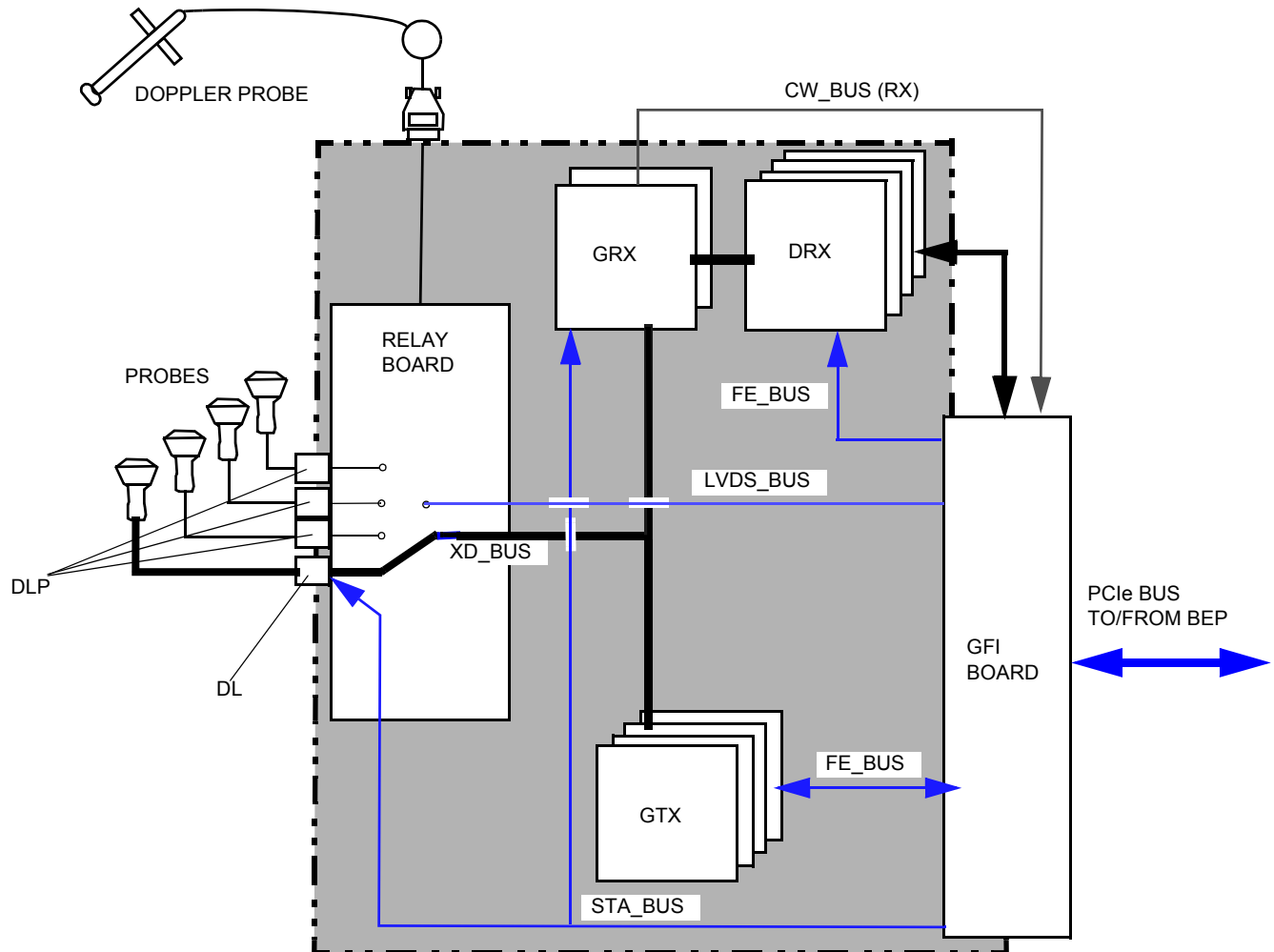


NOTE: The number of cards depend on the VIVID E9 model, and options installed.

- 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 5-16 The Ultrasound Transmitter and Receiver Control Signals



NOTE: The number of cards depend on the VIVID E9 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:

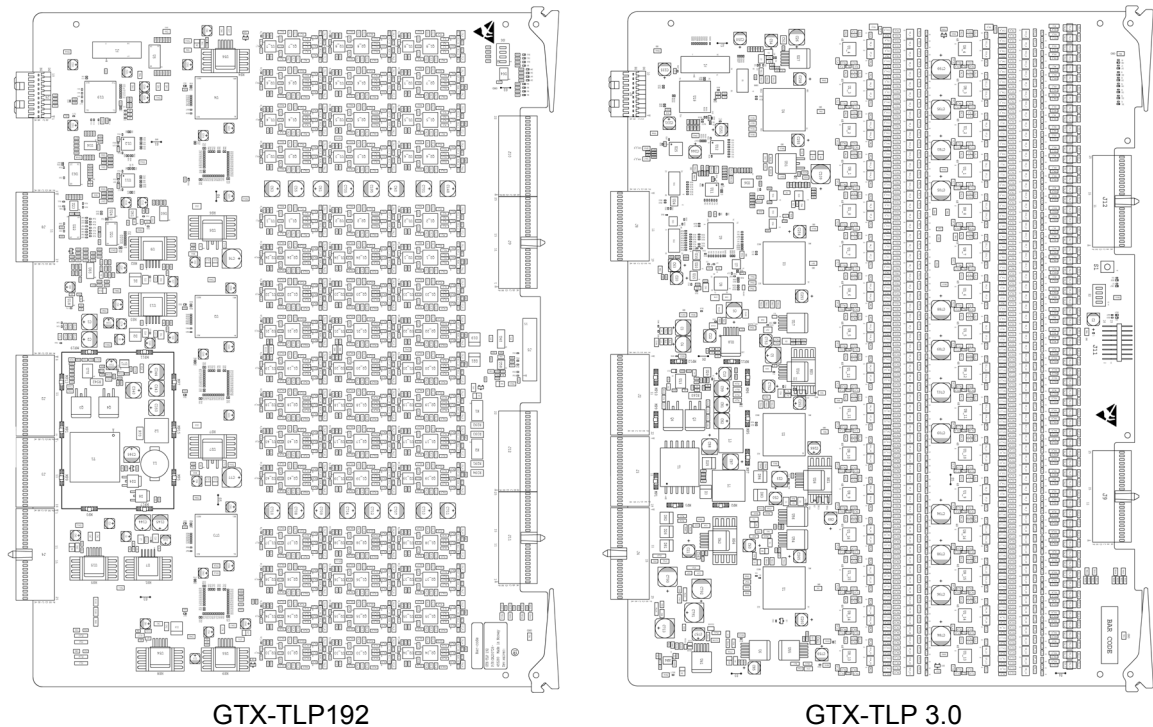
- the transmit trigger pulse for GTX
- a receive synchronization pulse (TXTRIG_L) used by DRX
- a differential ATGC voltage used by GRX
- global 50 MHz and 200 MHz system clocks and Reset pulse (SRES)
- Test signal / Dither signal
- Probe ATGC for 3V probe

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 5-17 GTX boards



Two Transmitter Board models have been used in VIVID E9:

- GTX-TLP 3.0 with 64 channels per card
- GTX-TLP192 with 192 channels per card (Introduced August 2011)

GTX-TLP 3.0

The GTX-TLP 3.0 contains 64 individually controlled transmit channels. In VIVID E9, either three or four boards are used, giving a total of 192 or 256 TX channels.

- The 3V-D probe, used on BT'08 systems, requires 256 TX channels, so four TX boards with 64 TX channels each, are used. Each channel from the TX boards is connected to 4 elements in the probe, so we can transmit on 1024 elements (256 x 4).
- All other probes use 192 or less TX channels. In this case, three TX boards with 64 channels are used.

GTX-TLP192

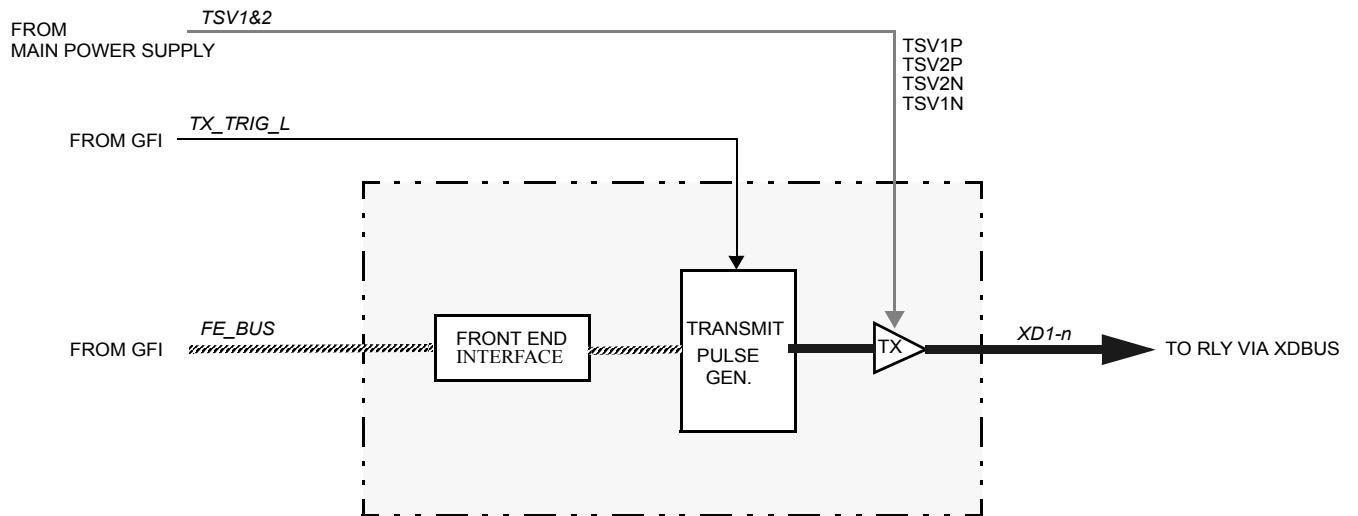
The GTX-TLP192 contains 192 individually controlled transmit channels on one board, and replaces the three TX boards with 64 TX channels each, described above.

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).

NOTE: *The GTX-TLP 3.0 and the GTX-TLP192 requires different Front Plane cards.*

5-8-3-1 General description (cont'd)

Figure 5-18 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

- VIVID E9 BT'08 uses **four GTX TLP 3.0 boards**, ref. [Figure 5-19](#).
- VIVID E9 BT'09 uses **three GTX TLP 3.0 boards**, ref. [Figure 5-20](#).
- VIVID E9 BT'11 uses either **three GTX TLP 3.0 boards**, ref. [Figure 5-20](#), or **one GTX-TLP192 board**, ref. [Figure 5-21](#).

NOTE: If the GTX-TLP192 card is used, only one TX card is required.

Figure 5-19 GTX TLP 3.0 boards location - 256 TX channels (BT'08 systems)

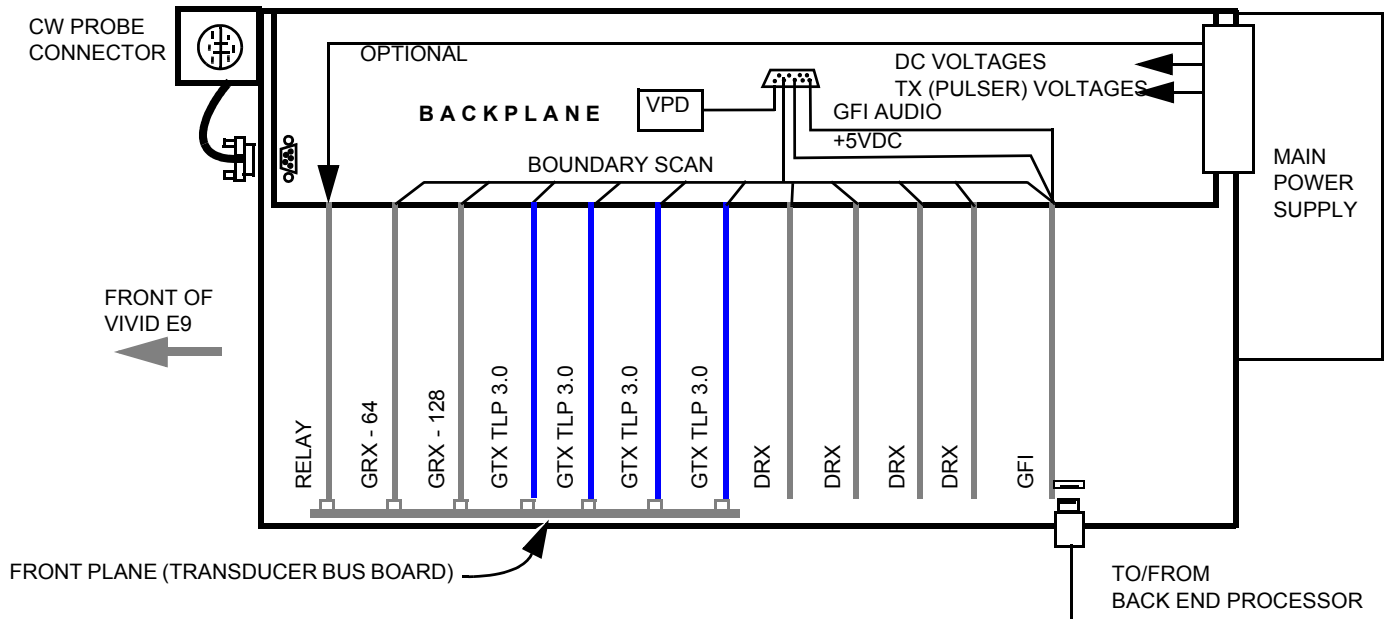
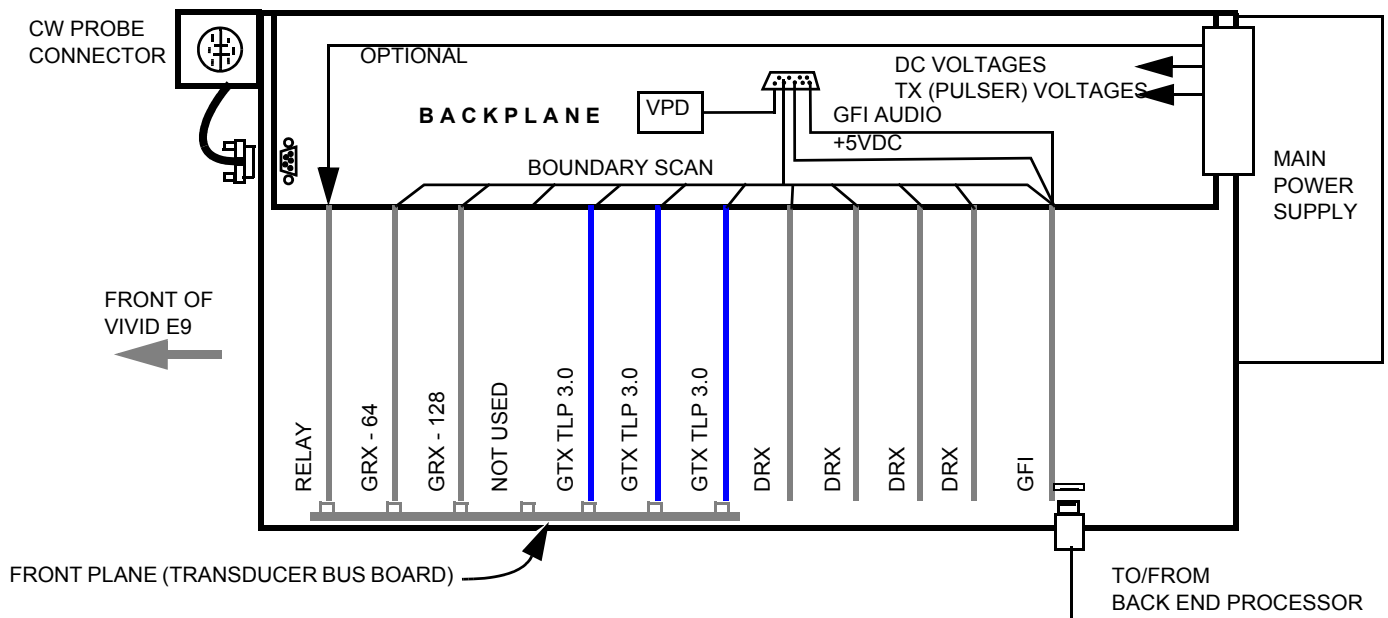
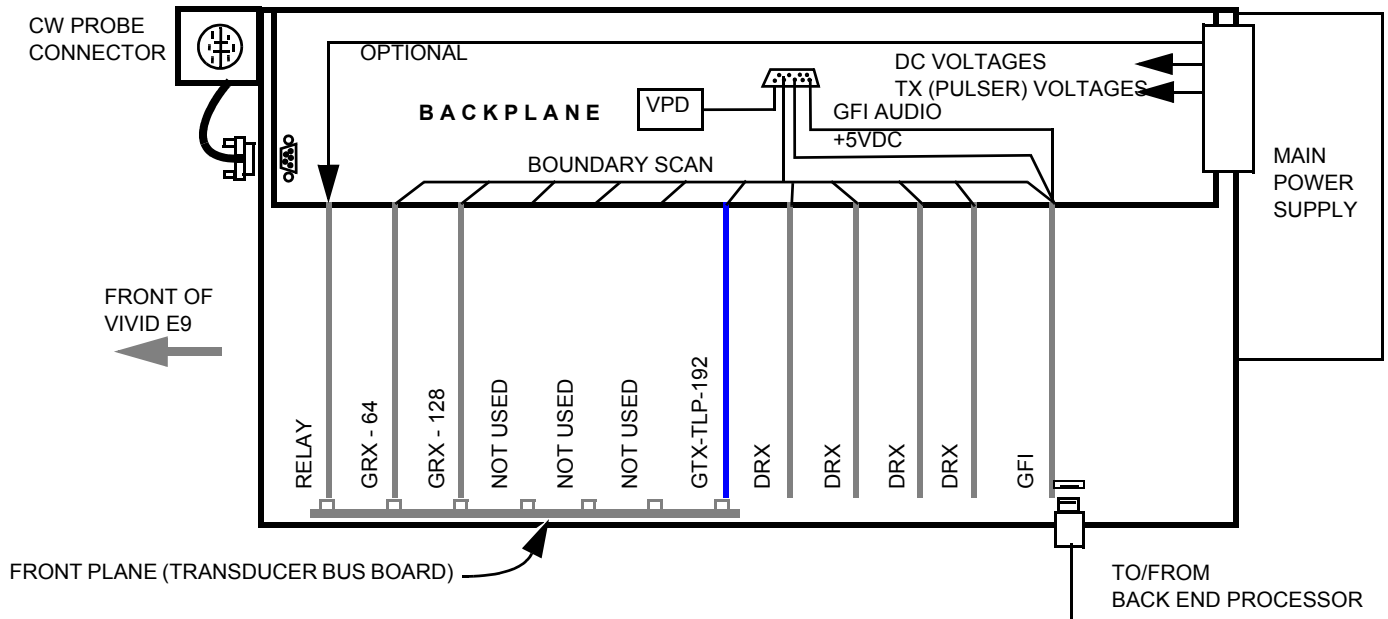


Figure 5-20 GTX TLP-3.0 boards location - 192 TX channels (BT'09 and some BT'11 systems)



5-8-3-2 Location in the Unit (cont'd)

Figure 5-21 GTX TLP-192 board location - 192 TX channels (introduced 2011)



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 5-22 LEDs on GTX-192

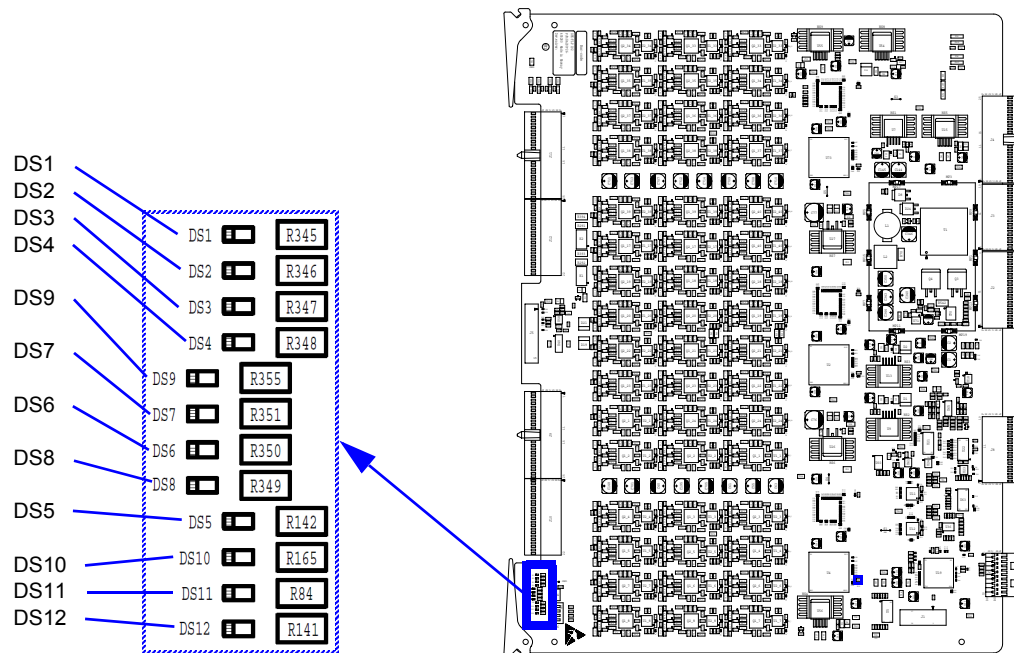


Table 5-5 LEDs on the GTX-192 board

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			

5-8-3-7 LEDs on the GTX-64 board

Figure 5-23 LEDs

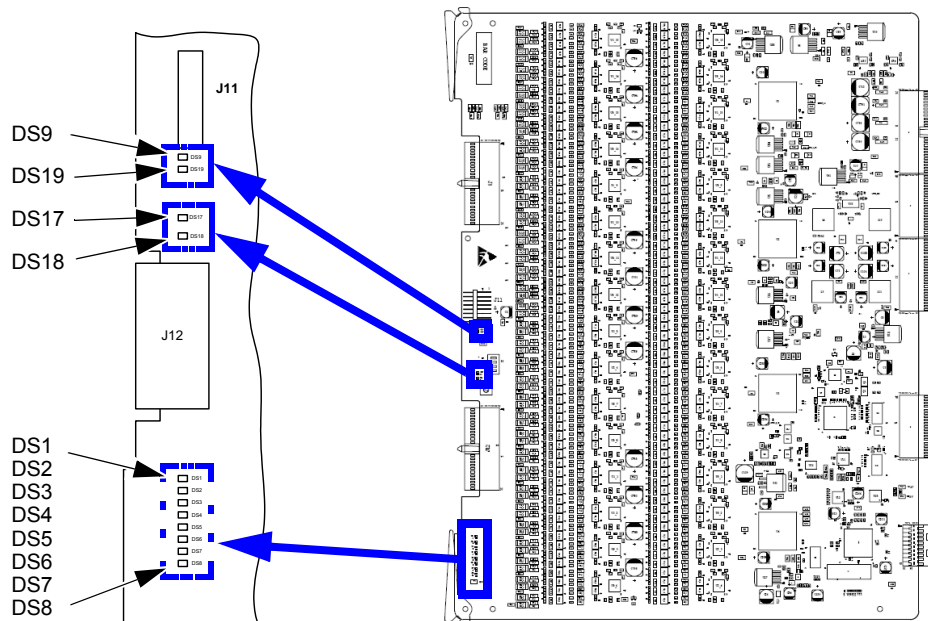


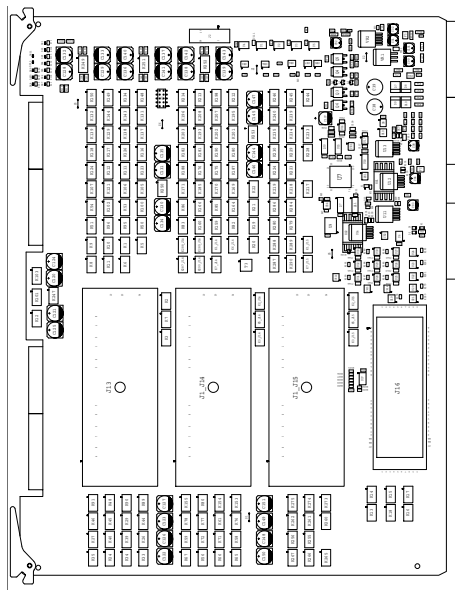
Table 5-6 LEDs on the GTX-64 board

LED NO.	COLOR	DESCRIPTION	NORMAL OPERATION	START UP	ERROR CONDITION
DS9	GREEN	CPLD – MD1711 ANALOG POWER ENABLED	ON	ON	
DS19	GREEN	ADM1062 – ALL DIGITAL POWER IS GOOD	ON	ON	
DS17	GREEN	CPLD – IF_FPGA init done	ON	OFF	
DS18	GREEN	CPLD – IF_FPGA init	ON	OFF	
DS1	GREEN	IF_FPGA - GTXIF_DAVID_ERROR_sig(0)	OFF	OFF	FPGA/DAVID ERROR
DS2	GREEN	IF_FPGA - GTXIF_DAVID_ERROR_sig(1)	OFF	OFF	FPGA/DAVID ERROR
DS3	GREEN	IF_FPGA - GTXIF_DAVID_ERROR_sig(2)	OFF	OFF	FPGA/DAVID ERROR
DS4	GREEN	IF_FPGA - GTXIF_DAVID_ERROR_sig(3)	OFF	OFF	FPGA/DAVID ERROR
DS5	GREEN	IF_FPGA - ctrlRegFFF0out(0)	OFF	OFF	
DS6	RED	IF_FPGA - Txtrig_n_sig(0)	ON	OFF	
DS7	RED	IF_FPGA - Global_rst_n	OFF	OFF	
DS8	RED	IF_FPGA – DEBUG_BUTTON AND FE_global_rst_n	ON	OFF	

5-8-4 Relay Board (RLY)

5-8-4-1 General description

Figure 5-24 Relay board



NOTE:
THE PROBE CONNECTORS ARE
MOUNTED ON THE SOLDER SIDE
OF THE BOARD.

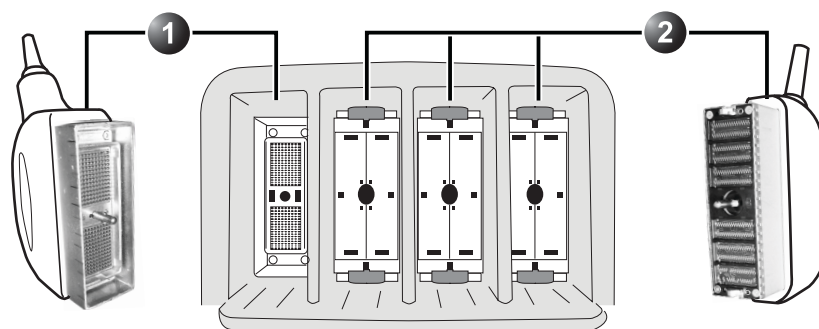
The main task of the Relay Board is to route the transducer channels between the active probe and the Transmitter or Receiver modules that are active.

Relays are used in order to switch the connections between the active probe connectors.

The module contains 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 5-25 Probe connectors



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

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 5-26 LEDs on the Relay board

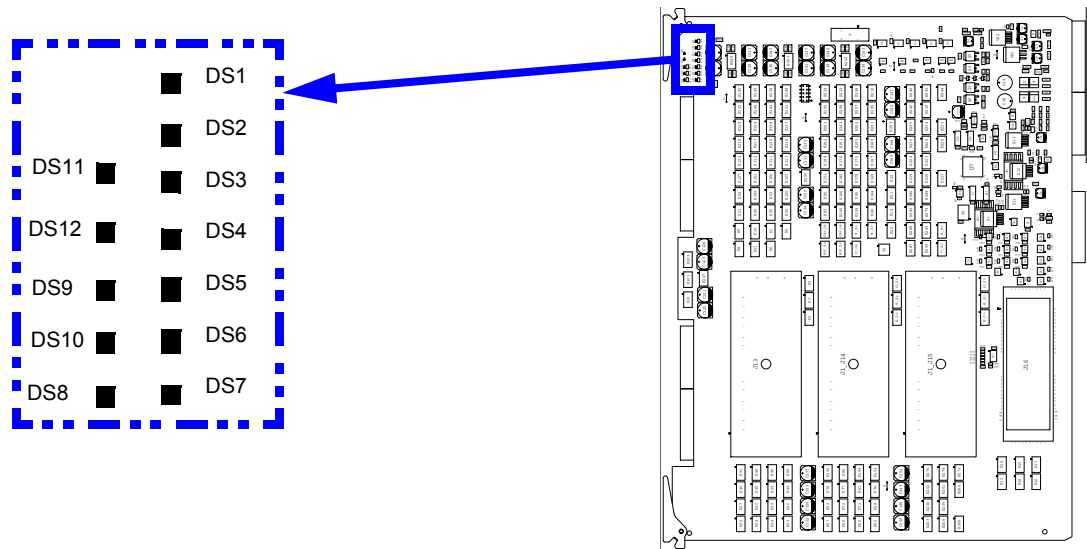


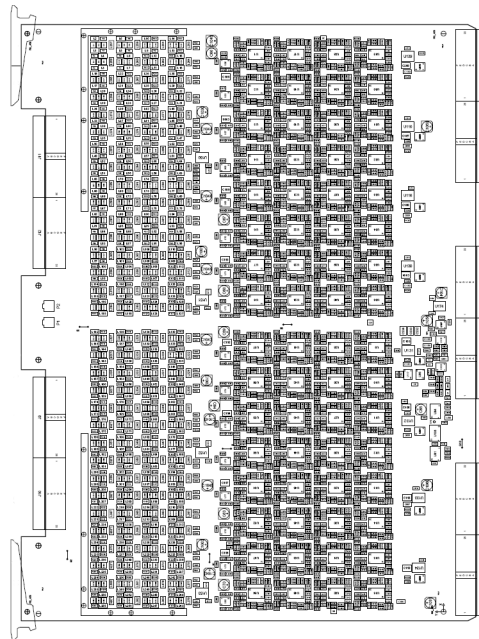
Table 5-7 LEDs on the Relay board

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 5-27 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:

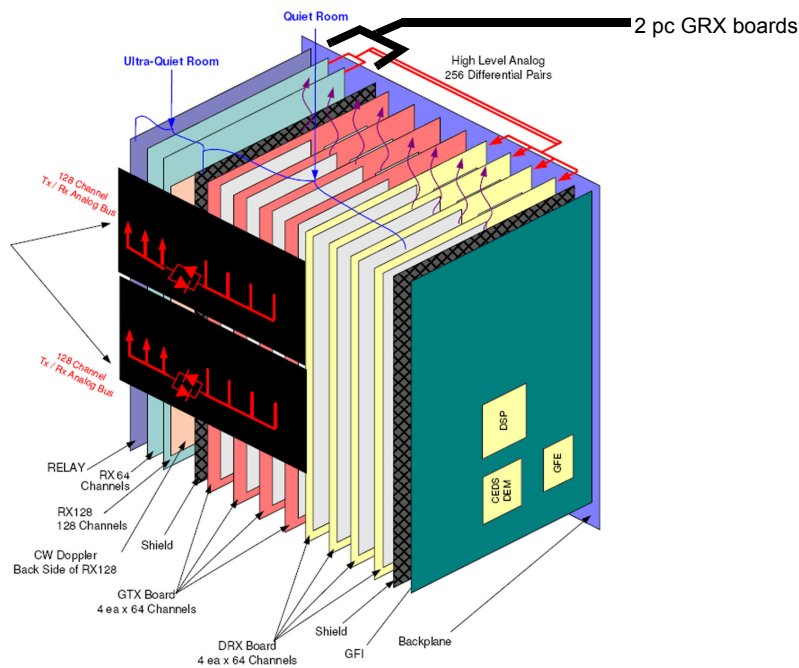
- 64 Channel Receiver board *without* analog CW Doppler
- 128 Channel Receiver board with analog CW Doppler

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 5-28 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:

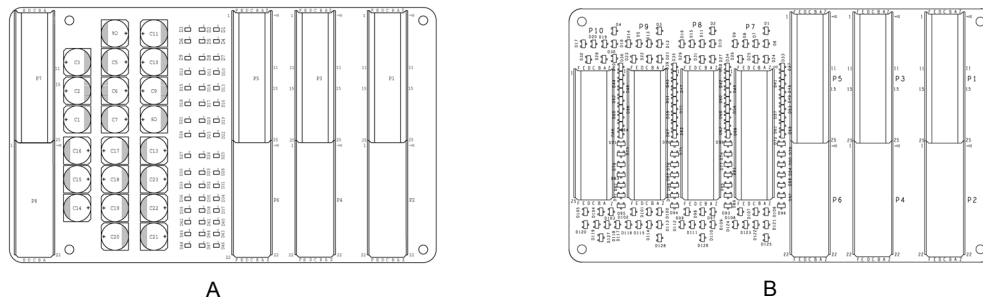
5-8-6 Front Plane boards (XD BUS)

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 5-29 Front Plane board for GTX w/192 channels (A) and for GTX w/64 channels (B)



Two different Front Plane boards have been used:

- The first model (B), supporting up to four TX cards with 64 channels each, was used from the introduction of VIVID E9.
- In August 2011, a new Front Plane board model (A), supporting the TX card with 192 TX channels, was phased into production.

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

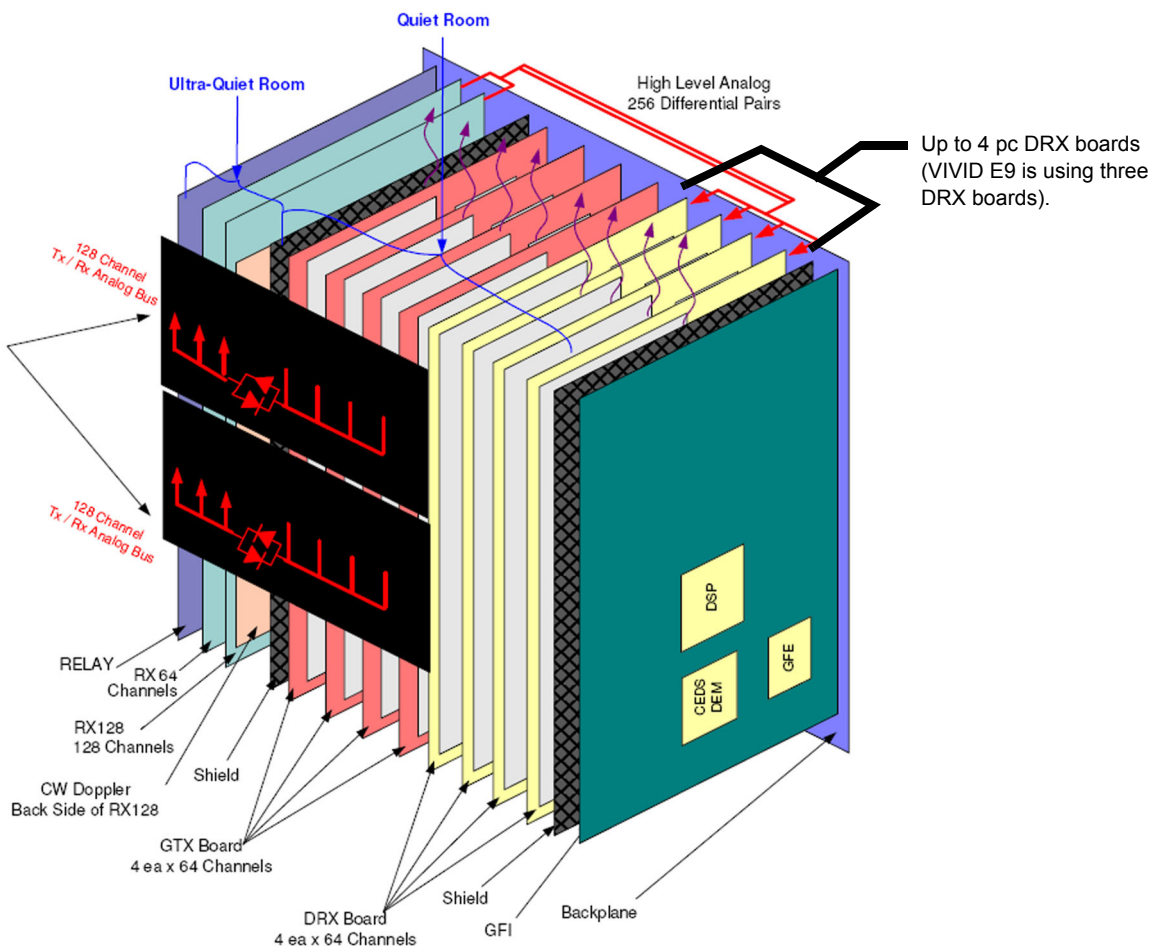
A DRX board provides two main functions to the beamformer:

- 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 5-30 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)

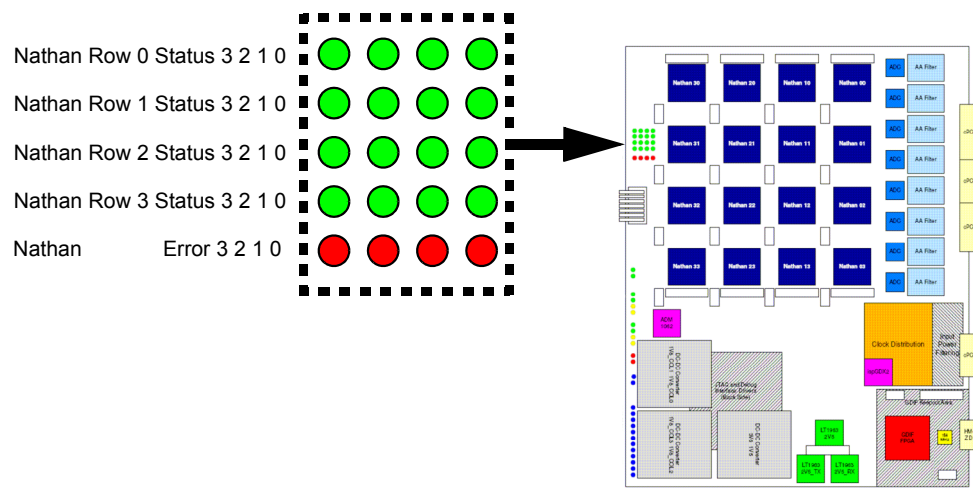
5-8-7-5 Outputs

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 5-31 LEDs for Nathan (beamforming) circuits



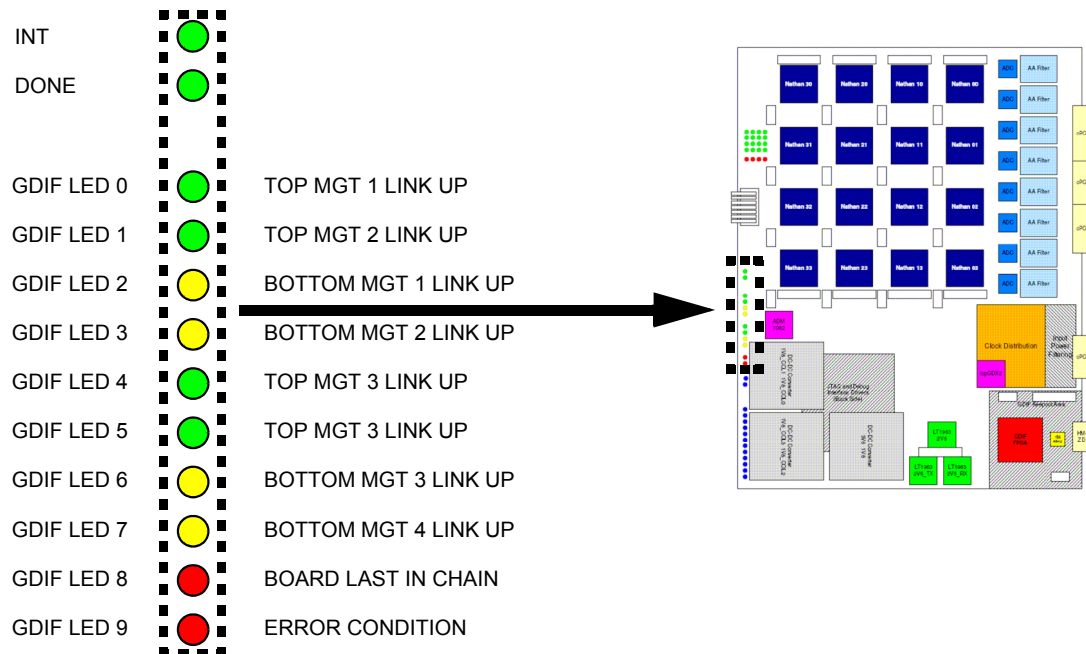
Each Nathan drives two signals connected to LEDs, a green “running light” and a red “error” status light.

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 5-32 GDIF status display



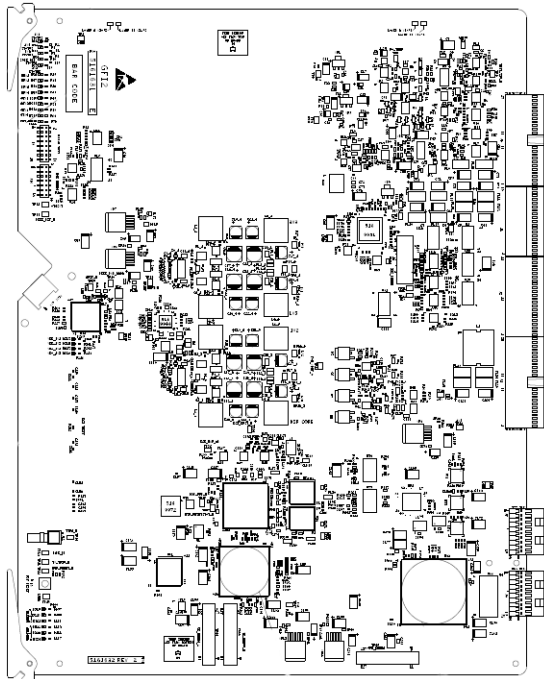
5-8-7-8 Troubleshooting hints

- During power up, the 4 x 4 LEDs (see [Figure 5-31 "LEDs for Nathan \(beamforming\) circuits" on page 5-45](#)) 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 5-33 GF12 board



The GFI is the Front End Processor's (FEP's) interface to the Back End Processor (BEP).

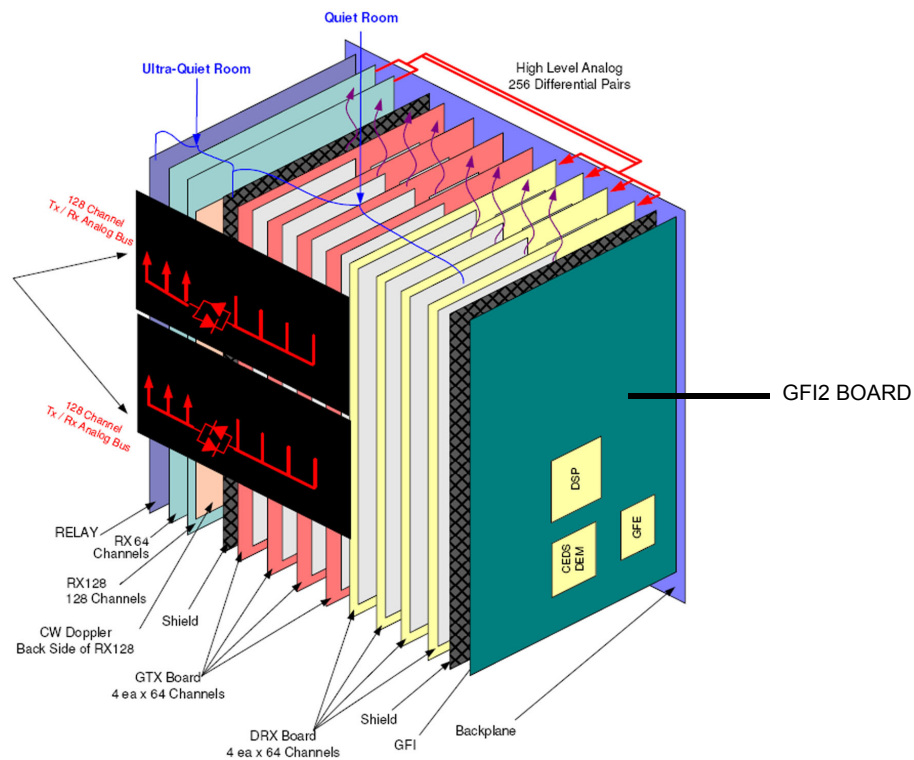
During boot, various setup parameters are downloaded from the BEP's hard drive, via the PCI Express bus to the GF12 board. When a scanning mode is selected, or scanning parameters are adjusted, the GFI board receives setup parameters from the BEP and pass these on to the FE boards. The GFI also, based 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 5-34 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 GF1.

5-8-8-4 Clocks

These clocks are generated on the board:

- 200 MHz for on board (GF1) 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

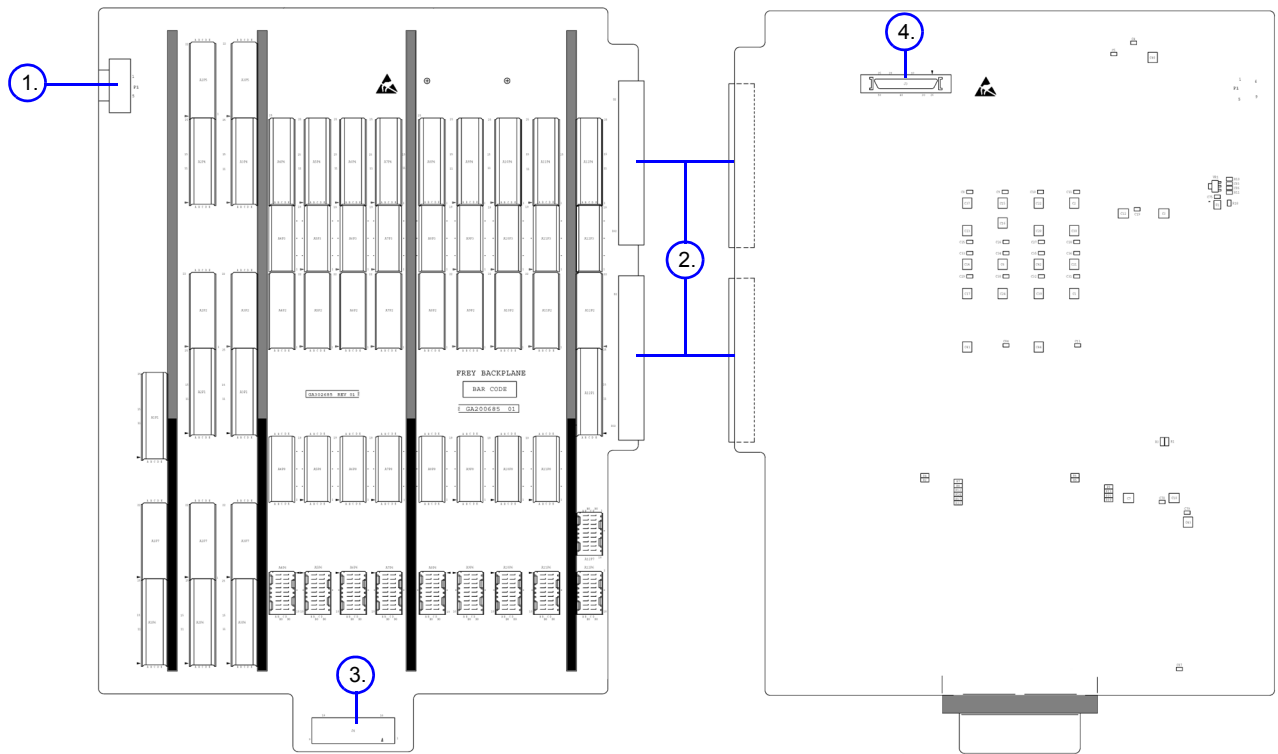
Table 5-8 LEDs on the GFI board

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 5-35 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 External I/O, 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 I²C 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 I²C signals are routed to the BEP and/or External I/O, depending on the BEP model in use.

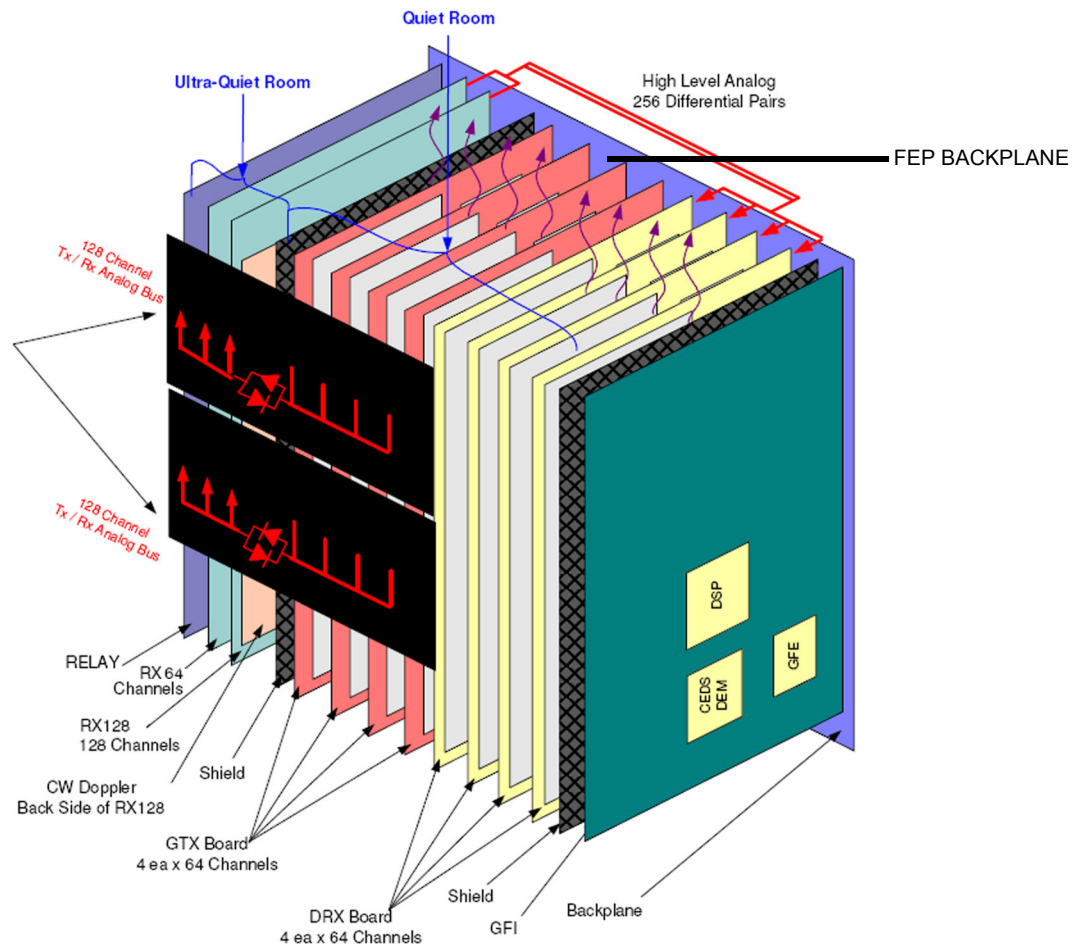
The only active electronics on the FEP Backplane is a I²C memory device for the Board Info and a voltage regulator for the power supply to the I²C memory.

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 5-36 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'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 ultrasound scanners made by GE.

The following BEP models have been used for VIVID E9:

- BEP6 was introduced in manufacturing in October 2012.
The BEP6 is also called BEPY3.
- BEP5 was introduced at the introduction of VIVID E9 and was phased out of manufacturing in October-November 2012.
 - BEP5 has also been called BEPY1 or BEPY2, depending on the installed System Software version.

5-9-3 Signal Flow and Processing

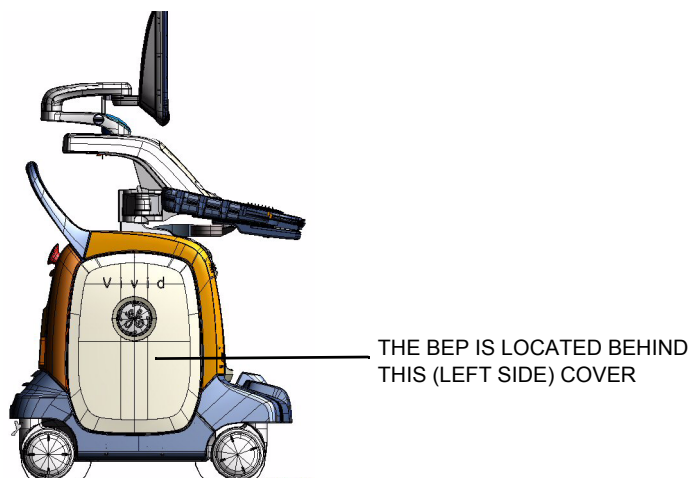
The Back End Processor receives the data from the Front End electronics, stores it in memory, performs scan conversion to pixel domain, and drives the system's monitors.

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 5-37](#).

Figure 5-37 Back End Processor



5-9-5 CPU/Back End Processor (BEP) - block diagram

The wiring is somewhat different between the BEP5 and the BEP6, as illustrated in:

- [Figure 5-38 - BEP6 block diagram](#)
- [Figure 5-39 - BEP5 block diagram](#)

Figure 5-38 BEP6 block diagram

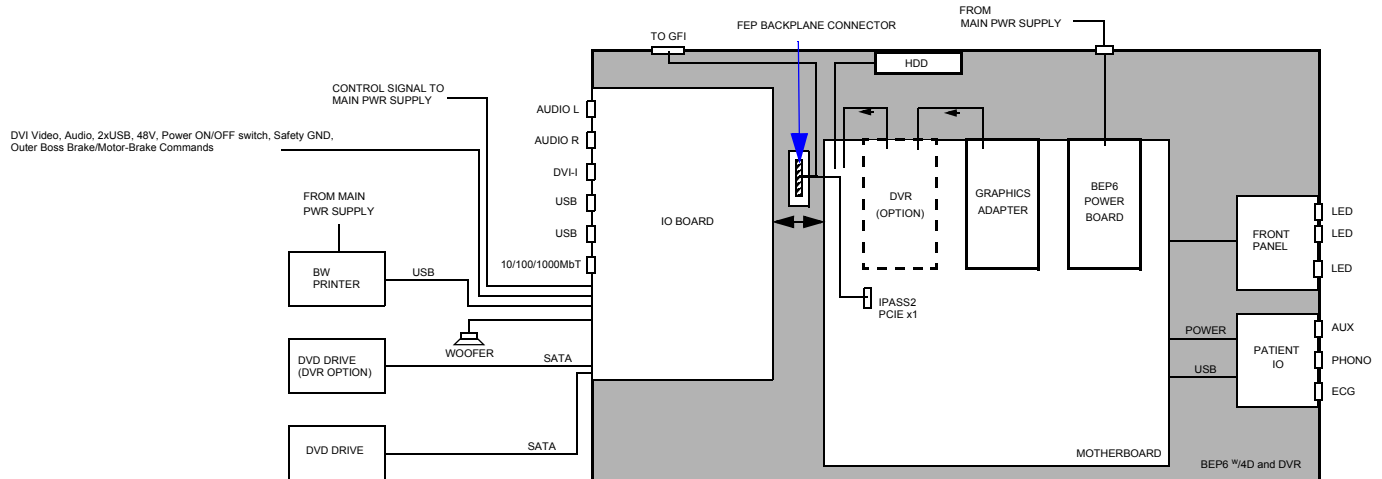
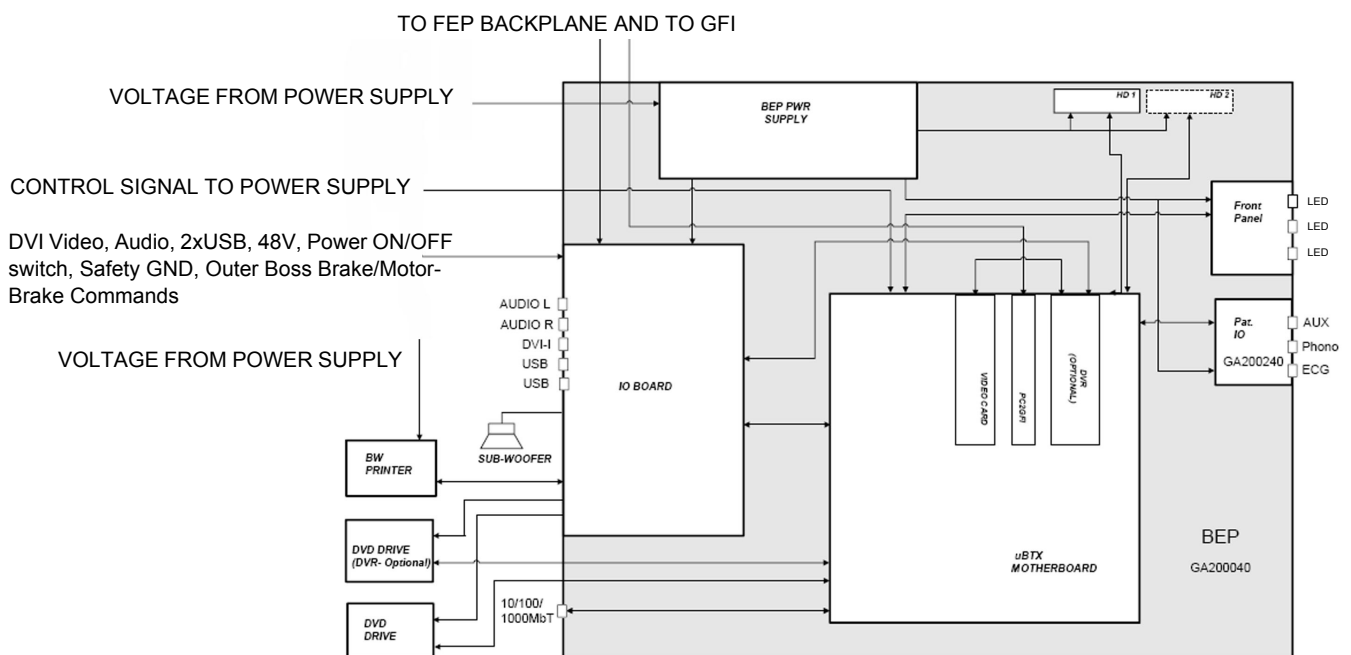


Figure 5-39 BEP5 block diagram



NOTE:
ON VIVID E9 WITHOUT DVR, THE SHORT CABLE BETWEEN THE GRAPHICS BOARD AND THE DVR IS MISSING, AND THE DVI OUT CABLE FOR THE IO BOARD IS CONNECTED TO THE VIDEO CARD.

5-9-6 BEP description

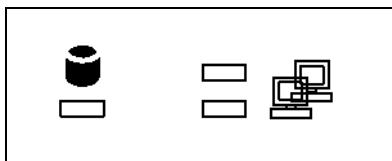
5-9-6-1 The EMC Enclosure House

- 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 5-40 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 5-9 BEP6 Face connections

ITEM	DESCRIPTION	ILLUSTRATION
1.	J21 - Upper LCD Video Out (Main LCD Video)	<p>The diagram illustrates the rear panel connections for the BEP6 Face. It shows a vertical arrangement of connectors. Callout 1 points to J21 (Upper LCD Video Out). Callout 2 points to J3 (SA1 DVD). Callout 3 points to J2 (SA2 SPARE). Callout 4 points to J22 (AV Out). Callout 5 points to a Test Connector. Callout 6 points to J100 (Op Panel Video). Callout 7 points to J7 (Op Panel Buttons). Callout 8 points to J28 (XYZ Motor). Callout 9 points to J27 (Spare). Callout 10 points to J26 (BW Printer). Callout 11 points to J25 (Spare). Callout 12 points to J4 (Main PS USB). Callout 13 points to J14 (Spare). Callout 14 points to J29 (Power). Callout 15 points to J30 (Power). Callout 16 points to J33 (Center). The diagram also includes labels for J100 Op Panel Video, J7 Op Panel Buttons, J28 XYZ Motor, J27 Spare, J26 BW Printer, J25 Spare, J4 Main PS USB, J14 Spare, J29 Power, J30 Power, and J33 Center.</p>
2.	J3 - SA1 DVD (SATA to DVD)	
3.	J2 - SA2 SPARE (SATA to DVD)	
4.	J22 - AV OUT (OP Console) Pins of note: 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) 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: 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 5-10 BEP6 Top connections

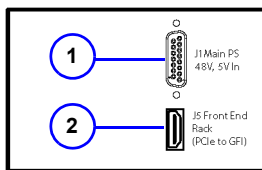
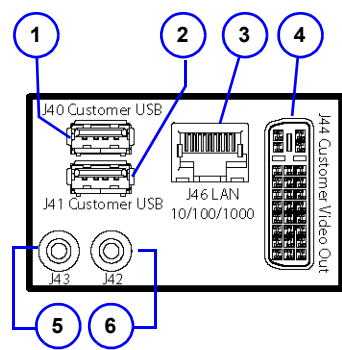
ITEM	DESCRIPTION	ILLUSTRATION
1.	J1 - Main PS 48V, 5V In	
2.	J5 - Front End Rack (PCIe to GFI)	

Table 5-11 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	

5-9-8 BEP5 Face and Top connections

Please refer to the illustrations.

Figure 5-41 BEP5 Face connections

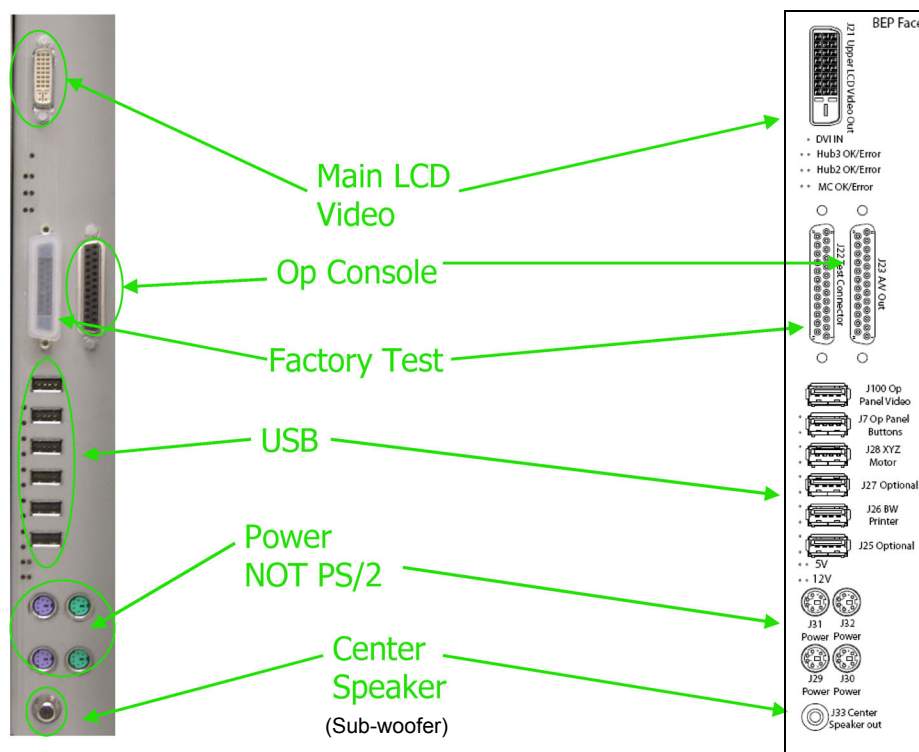
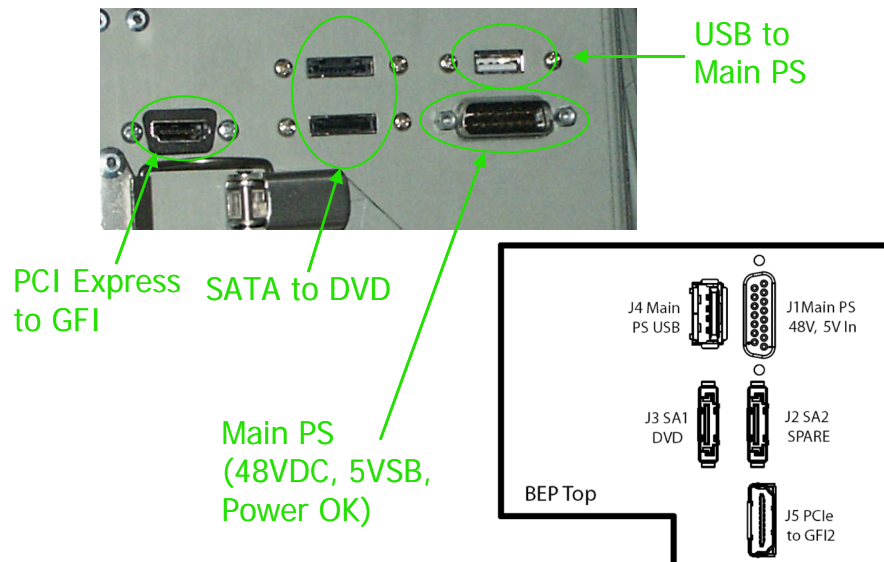


Figure 5-42 BEP5 Top connections

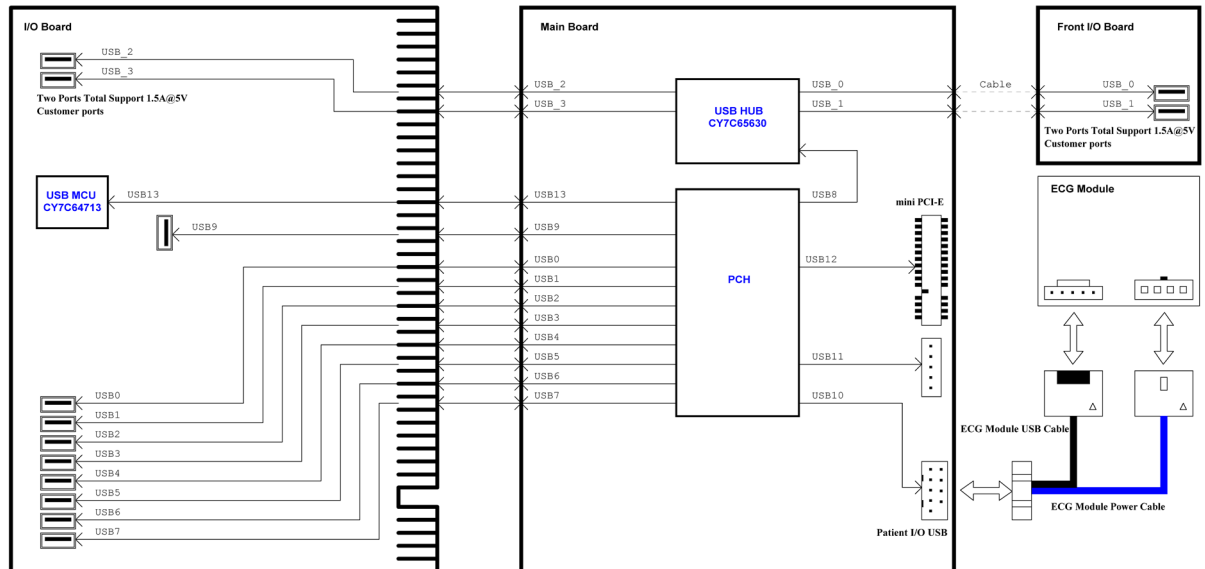


5-9-8-1 USB distribution

USB is used to communicate with, and/or control, many functions and devices in the VIVID E9.

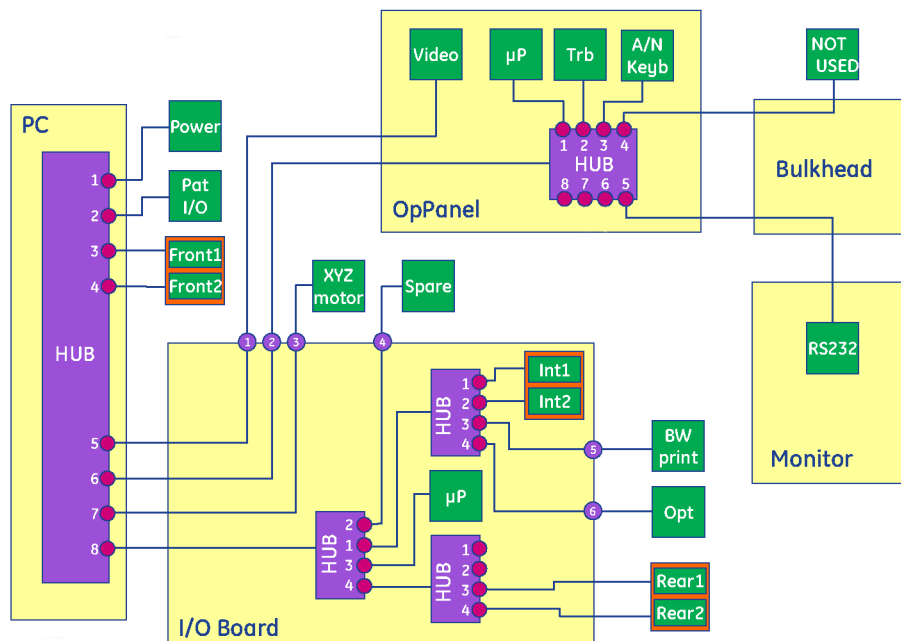
The illustration below shows how the USB signals are distributed in BEP6.

Figure 5-43 USB distribution in BEP6



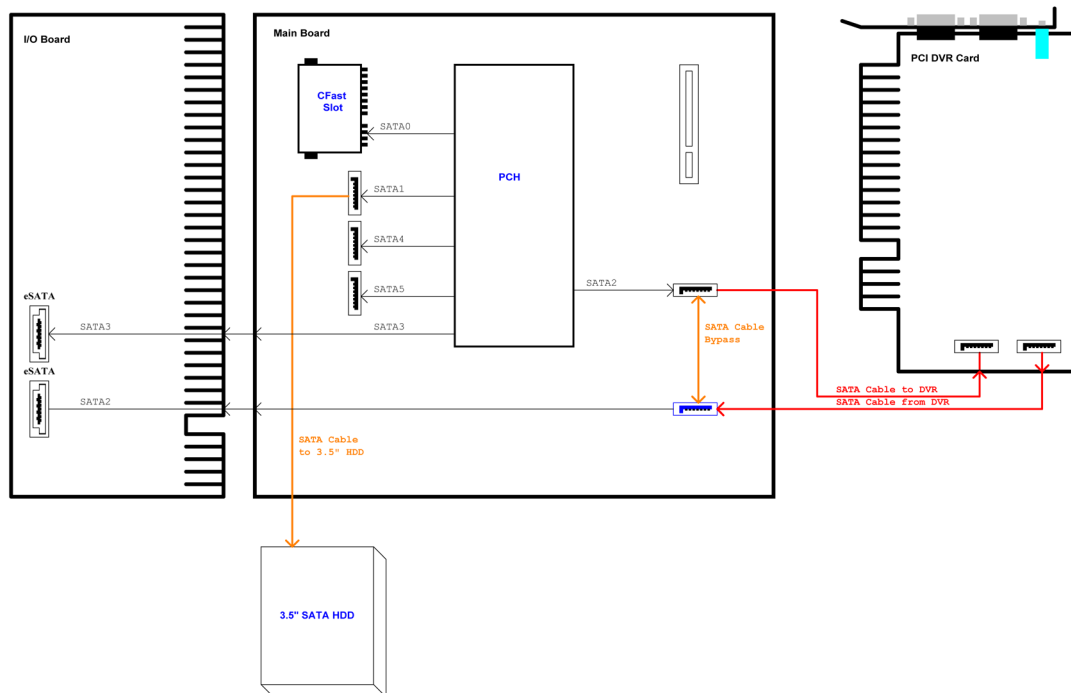
The illustration below shows how the USB signals are distributed in BEP5.

Figure 5-44 USB distribution in BEP5



5-9-8-2 SATA distribution - BEP6

Figure 5-45 BEP6 - SATA distribution



5-9-8-3 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.

5-9-8-4 Use of Expansion Slots on BEP5 Motherboard

Use of Expansion Slots, listed from the rightmost slot:

- DVR Board (Optional)
- Graphics Adapter (Video Card)

5-9-8-5 BIOS Beep Codes

BIOS uses beeps of varying duration. A long beep will typically last for 2 seconds while a short beep will last only 1 second. BIOS also uses beeps of different frequency to indicate critical errors. If BIOS detects that the CPU is overheating it may play a high pitched repeating beep while the computer is running.

Table 5-12 BEP Beep Codes

Beep Code	Meaning	Possible Cause
1 Long, 2 Short	Video adapter failure	Bad video adapter
Repeating (Endless loop)	Memory error	Bad memory or bad connection
1 Long, 3 Short	Video adapter failure	Bad video adapter or memory
High freq. beeps (while running)	CPU is overheating	CPU fan failure
Repeating High, Low beeps	CPU failure	Bad processor

5-9-9 Input DC Voltages

NOTE: The BEP **is not** connected to AC power.

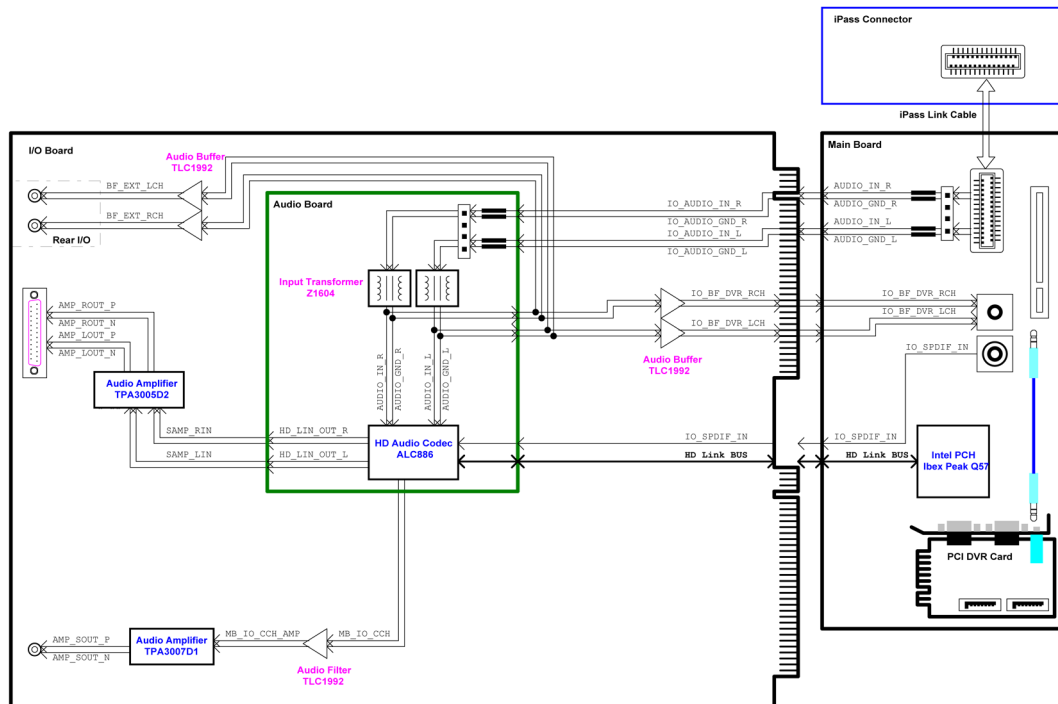
The BEP gets its power supply via the BEP Power Supply.

5-9-10 Input Signals

BEP6:

- Audio signal path: GFI > FEP Backplane > BEP6 MBD > [a and b]
a: > IO Board > Audio Out
b: > DVR

Figure 5-46 Audio map - BEP6



BEP5:

- Audio signal path: GFI > FEP Backplane > BEP > IO Board > Audio Out / BEP Motherboard)

5-9-11 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.)

BEP5:

Table 5-14 BEP5 Bi-directional Signals

Signal Name	Description	Signal Path
PCIe	PCI Express	J3 (BEP Motherboard) > Cable 4 (inside BEP) > J5 (BEP) > PCI Express Cable > GFI
BSCAN	Boundary Scan (GTX/DRX/GFI)	Card Rack (FEP) Motherboard > Cable N > I/O Board > USB
Network	10/100/1000 Mbit	BEP Motherboard > Cable 12 > J46 (Rear Panel)

5-9-12 Outputs

Table 5-15 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	

5-9-13 LEDs

5-9-13-1 LEDs on the BEP5/BEP6 Front

Figure 5-47 Front Panel

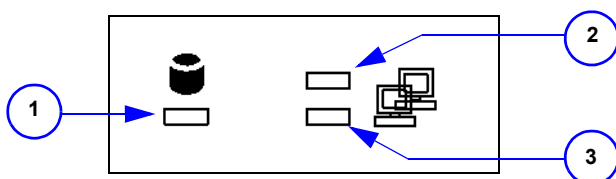


Table 5-16 LEDs on the BEP's front

ITEM	LED NAME	DESCRIPTION
1	ACT LED	HD ACTIVITY Blinks when the Hard Disk drive is active
2	SPD LED	NETWORK SPEED 10MBit: No Light 100 MBit: Amber Light 1000 Mbit: Green Light
3	ACT LED	NETWORK ACTIVITY Lit (green)

5-9-13-2 LEDs on the BEP6's Front Cover

Table 5-17 LEDs on the BEP6's Front Cover

DESCRIPTION	ILLUSTRATION
<p>The LEDs for the BEP6's Power Supply can be viewed without removing the BEP6's Front Cover</p> <p>Description of the LEDs (listed from the top):</p> <ul style="list-style-type: none"> • ATX POWER OK • POWER ON • +3.3V • +5.5V STBY • +28V • +5V • POWER OK • +48V • +12V 	<p>REMOVE ALL OPTIONS (e.g. DVR, PATIENT I/O) BEFORE RETURNING TO SWAP</p> <p>LED Legend:</p> <ul style="list-style-type: none"> PLED2 ATX POWER OK PLED3 POWER ON PLED4 +3.3V PLED5 +5.5V STBY PLED6 +28V PLED1 +5V PLED7 POWER OK PLED2 +48V PLED2 +12V <p>BEP Top:</p> <ul style="list-style-type: none"> J1 Main PS 48V, 5V In J5 Front End Rack (PCIe to GFI) <p>BEP Front:</p> <ul style="list-style-type: none"> SPD LED ACT LED ACT LED <p>Inside BEP:</p> <ul style="list-style-type: none"> J12 Options Dongle <p>WARNING: J29-J30 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>Power Pinout: 1,2 - GND 3,5 - 12V 4,6 - 5V</p> <p>2000019305 Rev. 02</p>

5-9-13-3 LEDs on the BEP5's face

Figure 5-48 LEDs on the BEP5's face

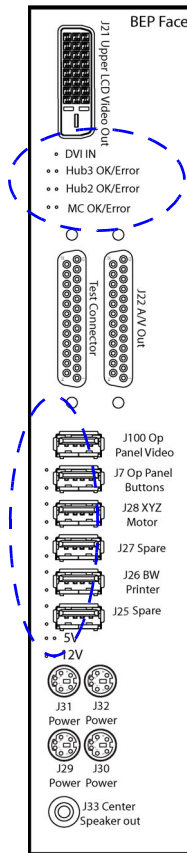


Table 5-18 LEDs below DVI connector

LED NAME	DESCRIPTION	ERROR Conditions
DVI IN	Green LED indicates that there is video output from the Graphic Card to the BEP IO	Blinking Green/Amber or OFF
Hub3 OK/Error	Green LED means OK	Blinking Green/Amber or OFF
Hub2 OK/Error	Green LED means OK	Blinking Green/Amber or OFF
MC OK/Error	Green LED means USB micro controller is OK	Blinking Green/Amber or OFF

Table 5-19 LEDs at the USB connectors

LED NAME	OK LED	ERROR LED
J7 USB LEDs	Lit green	Blinking Green/Amber or OFF
J28 USB LEDs	Lit green	Blinking Green/Amber or OFF
J27 USB LEDs	Lit green	Blinking Green/Amber or OFF
J26 USB LEDs	Lit green	Blinking Green/Amber or OFF
J225 USB LEDs	Lit green	Blinking Green/Amber or OFF

5-9-14 BEP Power Supply

5-9-14-1 Description

Three different BEP Power Supplies have been used, depending on the BEP model:

- BEP6.0 Power Board Assembly
- BEP Power Supply, VIVID E9 (for the latest BEP5 models)
- GE Custom Power Supply Board (for the first BEP5 models)

NOTE: The BEP Power Supply does not handle AC voltages.

The BEP Power Supply receives its input DC voltage from the VIVID E9's Main Power Supply.

Dedicated control signals, are used for controlling the BEP Power Supply.

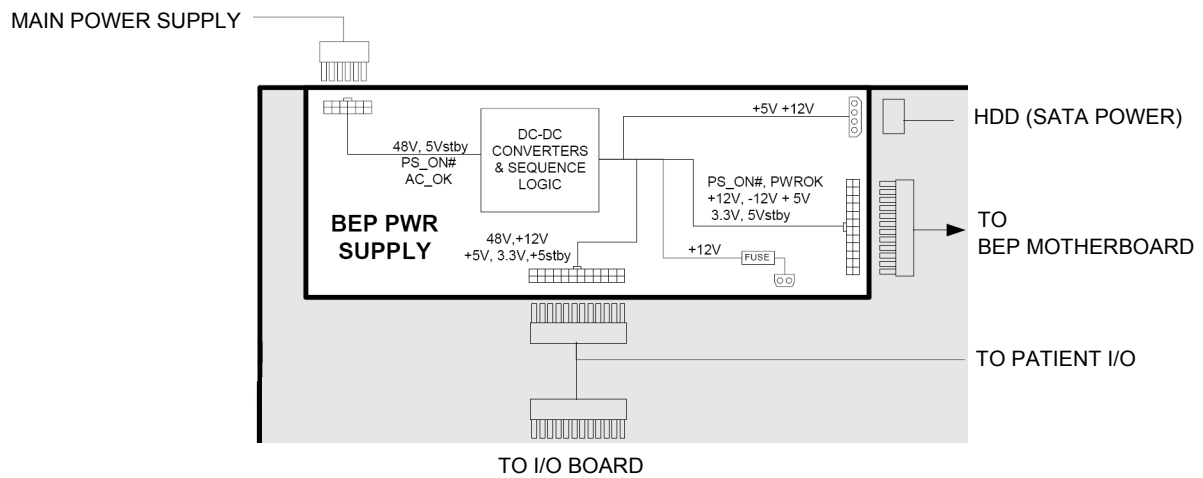
5-9-14-2 BEP6 Power Supply Block Diagram

Table 5-20 BEP6 Power Supply Block Diagram

ITEM	DESCRIPTION	ILLUSTRATION
1.	This connector is not used in the VIVID E9.	
2.	PCN 2 <ul style="list-style-type: none"> • +48 VDC from Main Power Supply > "POWER CABLE – BEP 48V" (GA200715) > connector J1 (on top of BEP6) > PCN 2. • Control signals: ACFAIL and 5V STBY. 	
3.	PCN 3 <p>This plug fits into the connector CN PWR2 on the BEP6's motherboard.</p> <ul style="list-style-type: none"> • +12 VDC to the BEP6 motherboard. • + 5VDC to the BEP6 motherboard. • +3.3VDC to the BEP6 motherboard. 	
4.	PCN 4 <p>This plug fits into the connector CN PWR1 on the BEP6's motherboard.</p> <ul style="list-style-type: none"> • +48 VDC to the BEP6 motherboard. • Control signals: ACFAIL, 5V STBY and 5vDUAL 	

5-9-14-3 BEP5 Power Supply Block Diagram

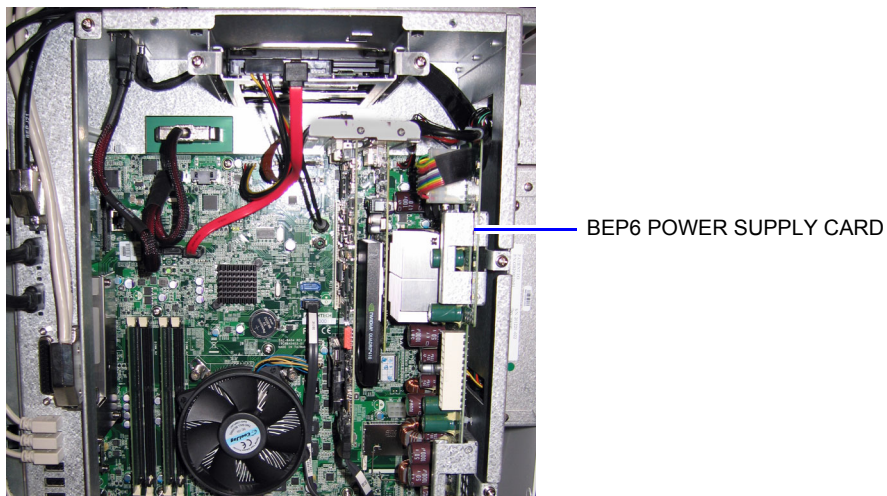
Figure 5-49 BEP5 Power Supply Block Diagram



5-9-14-4 Location in the BEP6

The BEP6 Power Supply Card is located inside the BEP6, at the right-hand side (when opening the BEP).

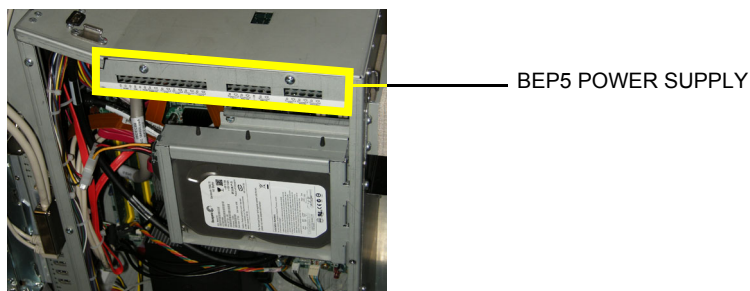
Figure 5-50 BEP6 Power Supply Card location



5-9-14-5 Location in the BEP5

The BEP Power Supply is located inside, at the top of the BEP5.

Figure 5-51 BEP5 Power Supply Location



5-9-14-6 Input Voltage (BEP6 / BEP5)

+48 VDC from the Main Power Supply.

5-9-14-7 Input Signals (BEP6 / BEP5)

- 48V_OK from Main Power Supply

5-9-14-8 Bi-directional Signals

- None.

5-9-14-9 **Output Voltages**

- +48V
- +12V
- +5V
- +3.3V
- +5Vstby

5-9-14-10 **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:
[5-9-13-2 "LEDs on the BEP6's Front Cover" on page 5-67.](#)

5-9-14-11 **LEDs on BEP5 Power Supply**

Several LEDs are viewable through cut-outs in the BEP Power supply.

Figure 5-52 LEDs

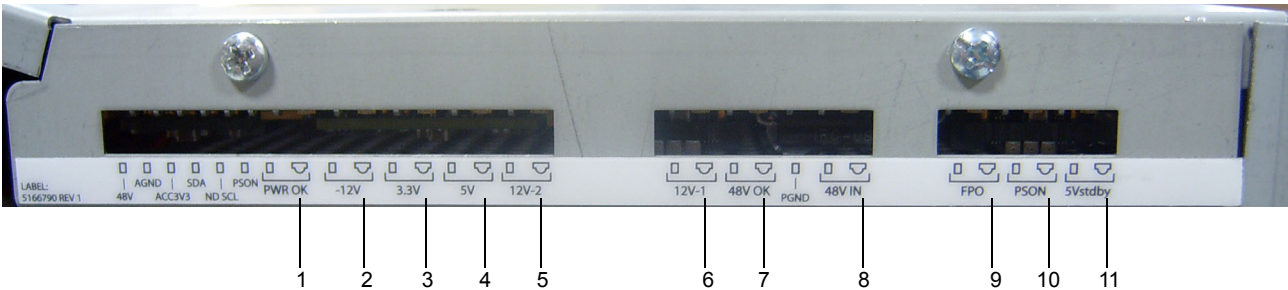


Table 5-21 **LEDs**

POSITION	LED	POWER OFF	POWER ON	COMMENTS
1.	PWR OK	OFF	LIT	
2.	-12V	OFF	LIT	
3.	3.3V	OFF	LIT	
4.	5V	OFF	LIT	
5.	12V-2	OFF	LIT	
6.	12V-1	OFF	LIT	
7.	48V OK	OFF	LIT	
8.	48V IN	OFF	LIT	
9.	FPO	OFF	OFF	
10.	PSON	OFF	LIT	
11.	5Vstdby	LIT	LIT	

5-9-14-12 Test Points on BEP5 Power Supply

Several Test Points are available through cut-outs in the BEP Power supply.



NOTICE Be careful so you don't short-circuit the signals when placing the test probe(s).

Figure 5-53 Test Points on BEP5 Power Supply



Table 5-22 Test Points

Test Point	COMMENTS
48V	
AGND	Analog Ground
ACC3V3	
SDA	
ND SCL	
PSN	
PWR OK	
-12V	
3.3V	
5V	
12V-2	
12V-1	
48V OK	
PGND	Power Ground
48V IN	
FPO	
PSN	
5Vstdby	

5-9-15 IO Board

5-9-15-1 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 BEP5 I/O Board has *one* connector for connection to the BEP5 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

5-9-15-2 Location in the unit

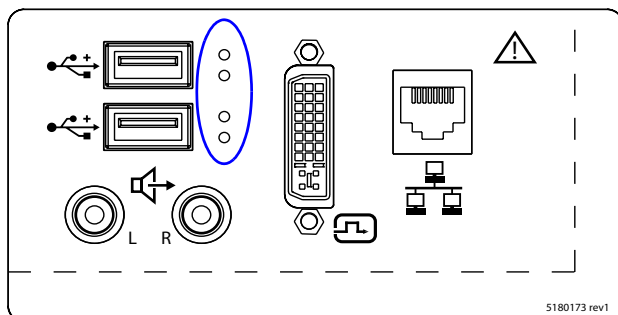
At the rear of the BEP with the Rear panel available at the rear of the VIVID E9.

5-9-15-3 Input DC voltages

Internal in BEP from the BEP Power Supply.

5-9-15-4 LEDs on the BEP5 Rear Panel

Figure 5-54 LEDs on the BEP5 Rear Panel



Two LEDs are located to the right for each USB connector.

- The upper LED next to a USB connector: is USB connected and in use: Lit (green).
- The lower LED next to a USB connector is USB activity: Lit (green).

NOTE: The BEP6 Rear Panel doesn't have any LEDs.

5-9-16 Graphics Adapter

5-9-16-1 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.

5-9-16-2 Location in the Unit

The Graphics Adapter is located in the PCI Express slot (PCI Express x16) inside the BEP cabinet.

5-9-16-3 Input Signals

- Graphics data from the BEP (via the BEP's motherboard).

5-9-16-4 Output Signals

- DVI to the LCD screen (main screen).
- Video to the external output on the rear of VIVID E9.

5-9-17 Internal Storage Devices

VIVID E9 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. 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

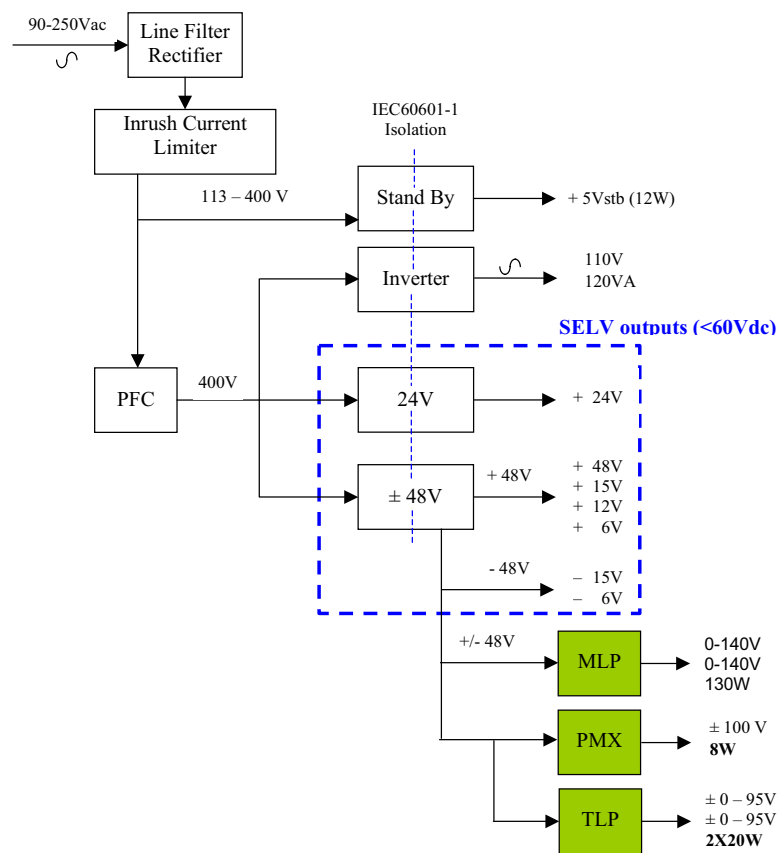
The power distribution within the VIVID E9 is described in this section.

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.

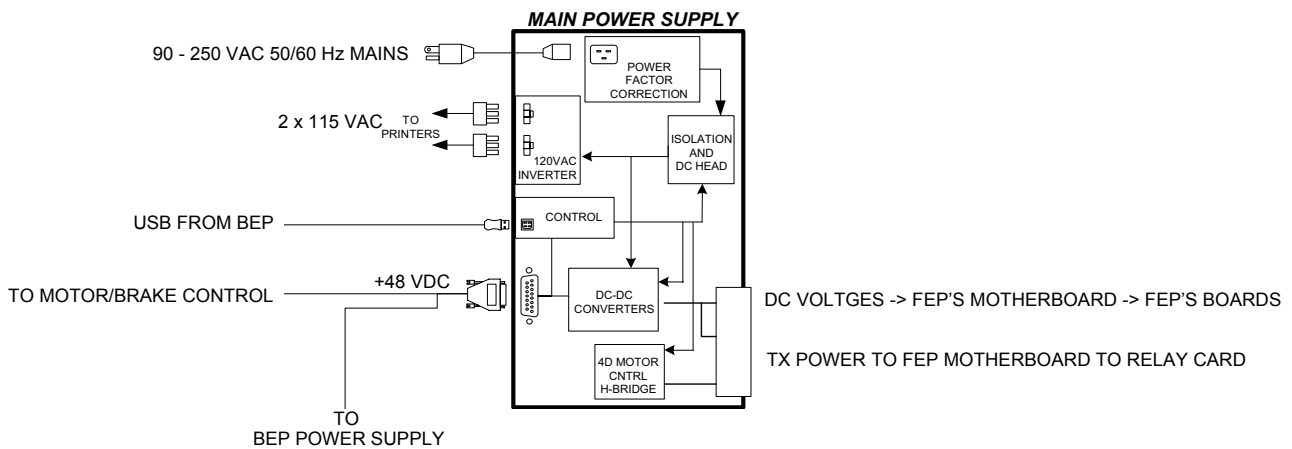
Figure 5-55 Main Power Supply Principle



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 5-56 Main Power Supply block diagram



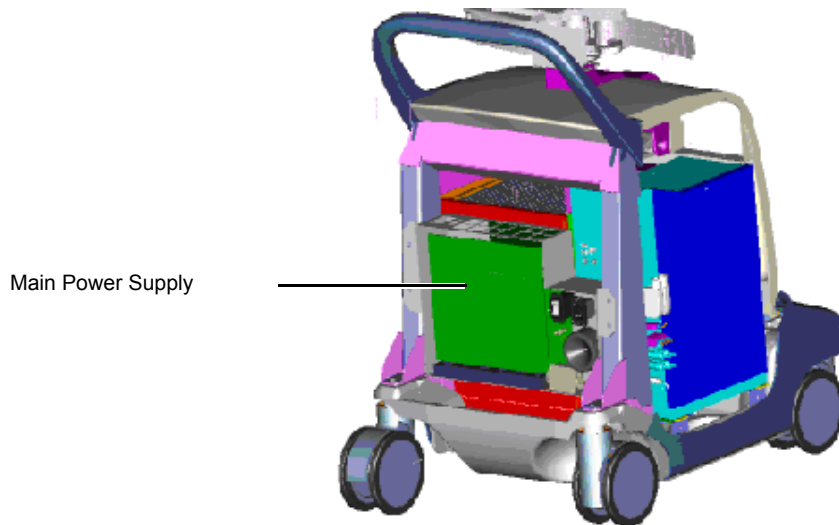
The Main Power Supply delivers the needed voltages to the rest of the system:

- 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 5-57 Main Power Supply



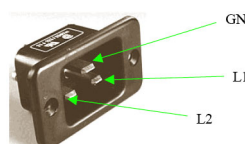
5-10-2-2 Temperature Control

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

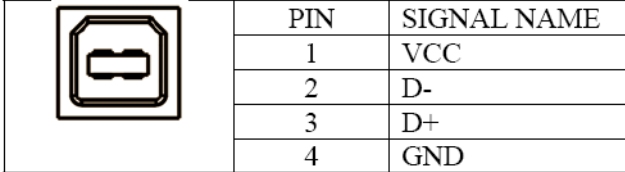
Mains Power, 110 VAC or 230 VAC, 50/60 Hz

Figure 5-58 L1 - Mains Inlet connector



5-10-2-4 Bidirectional Signals
USB bus

Table 5-23 USB connector

DESCRIPTION	COMMENTS										
<p>USB TYPE B</p>  <table border="1"> <thead> <tr> <th>PIN</th><th>SIGNAL NAME</th></tr> </thead> <tbody> <tr> <td>1</td><td>VCC</td></tr> <tr> <td>2</td><td>D-</td></tr> <tr> <td>3</td><td>D+</td></tr> <tr> <td>4</td><td>GND</td></tr> </tbody> </table>	PIN	SIGNAL NAME	1	VCC	2	D-	3	D+	4	GND	<p>Originates on the BEP. The USB is used to set the power supply to the correct transmit (XD) voltages.</p>
PIN	SIGNAL NAME										
1	VCC										
2	D-										
3	D+										
4	GND										

5-10-2-5 Outputs

Table 5-24 Power outputs sheet 1 of 2

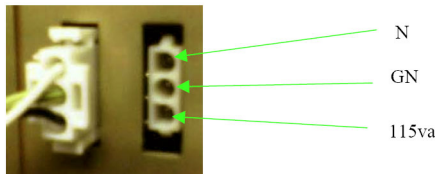
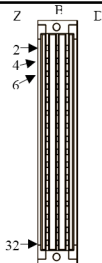
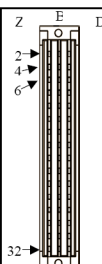
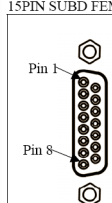
CONNECTOR	DESCRIPTION	COMMENTS																																																																							
P2	<p>115 VAC OUT ON TWO CONNECTORS</p> <div></div>	PERIPHERALS (B/W PRINTER)																																																																							
P3	<p>Card Rack Connector</p> <div><table><thead><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>TS0N_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></div>	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	TS0N_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	<p>FRONT END PROCESSOR</p> <p>- The 'TS0N_STRB' signal is a watchdog for the Transmit Signal (TS).</p>
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																																																																						
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16	V_LEVEL_OK	4D_STB	PMXVOUTN																																																																						
18	TS-OK	GND	PMXVOUTP																																																																						
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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																																																																						
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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																																																																						
10	GND	GND	GND																																																																						
12	+15V	AC_FAIL_N	EXT_SYNC																																																																						
14	-15V	GND																																																																							
16																																																																									
18	GND	GND	GND																																																																						
20	+12V	+12V	+12V																																																																						
22	+24V	+24V	+24V																																																																						
24	+24V	+24V	+24V																																																																						
26	+24V	+24V	+24V																																																																						
28	GND	GND	GND																																																																						
30	GND	GND	GND																																																																						
32	GND	GND	GND																																																																						

Table 5-24 Power outputs (cont'd) sheet 2 of 2

CONNECTOR	DESCRIPTION	COMMENTS																																
P5	<div><div><div>+48 VDC</div><div>15PIN SUBD FEMALE</div><div></div></div><table><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></div>	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	<div>BACK END PROCESSOR AND MOTOR POWER</div> <div><div>- The '48V_OK' indicates that the 48 VDC measured on the BEP, is OK.</div><div>- 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.</div></div>
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: Table 5-23 "USB connector" on page 5-80.	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

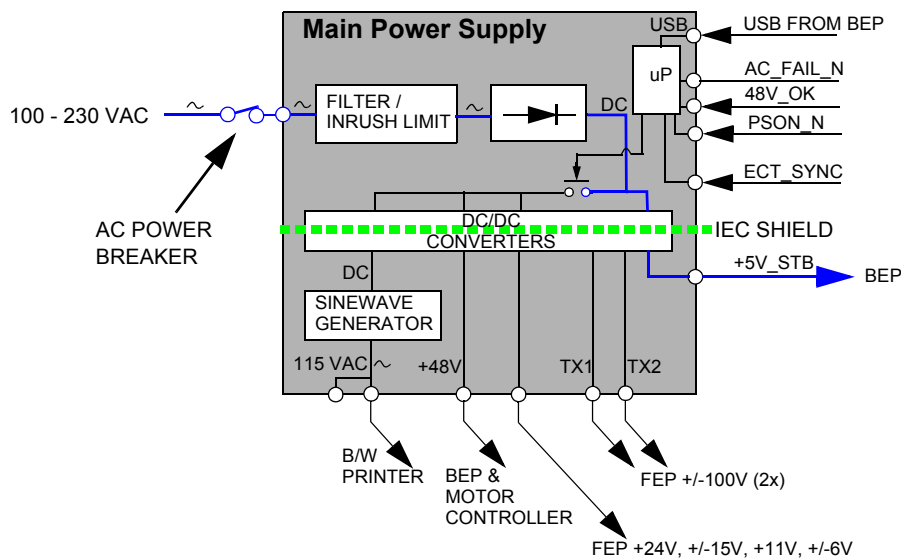
The Power Up Sequence can be divided in the following steps:

- 1.) Connect the mains power to the VIVID E9 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 and switch AC Breaker to ON position:

Figure 5-59 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 5-60 LEDs on BEP6 Power Supply (standby)

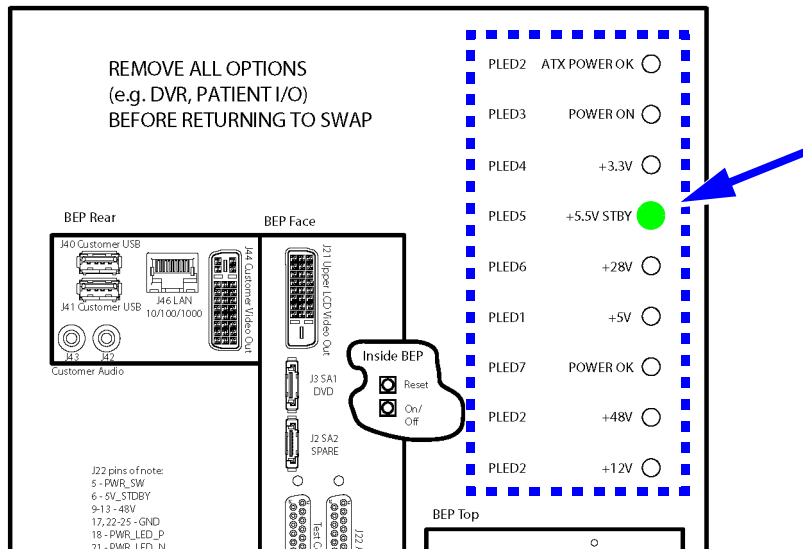
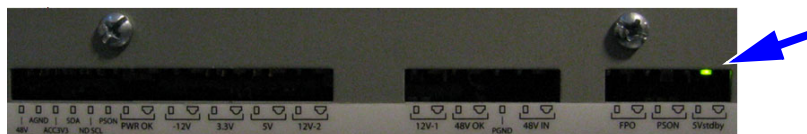


Figure 5-61 LEDs on BEP5 Power Supply (standby)

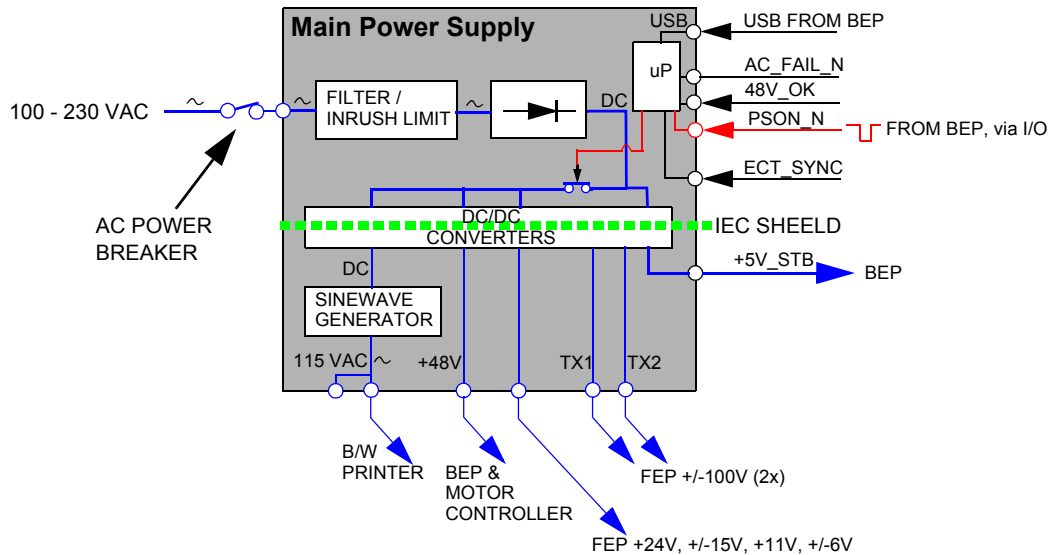


- The ON/OFF switch on the OP is lit (amber color).
- One green LED (LED-1) on the BEP's motherboard is lit.

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 5-62 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 5-63 LEDs on BEP6 Power Supply (powered)

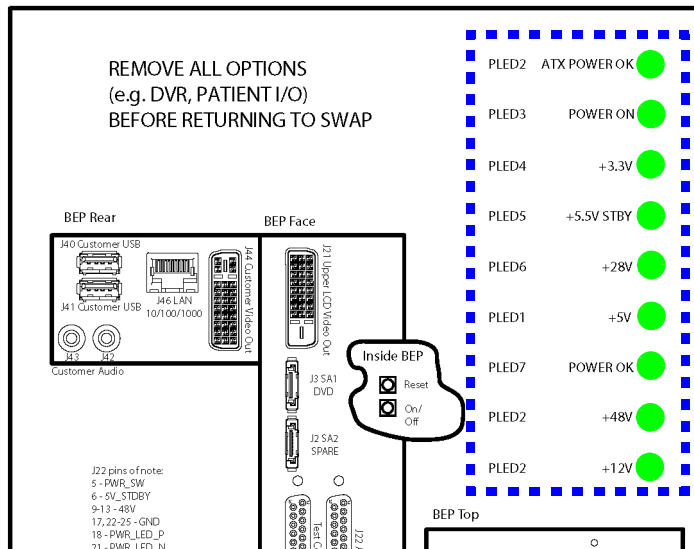
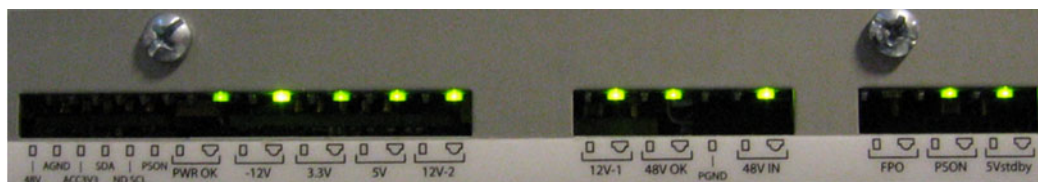


Figure 5-64 LEDs on BEP Power Supply (powered)



- 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). Please ref. the LED descriptions for each card.

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.) Then, the DVD drive is checked for a bootable disc.
- 3.) 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.

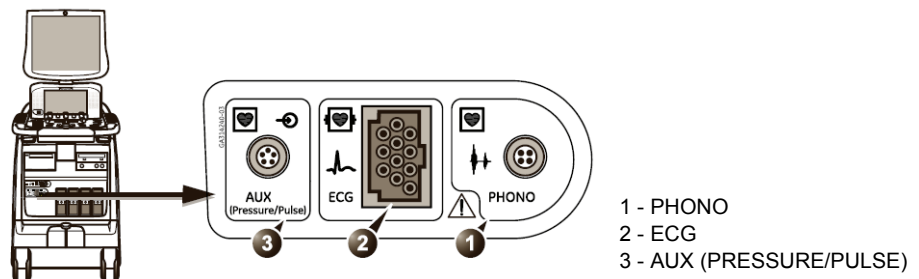
5-11-2 Patient I/O (Physio)

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.

Figure 5-65 Patient I/O Panel



The Patient IO contains the electronics for:

- Phono
- ECG/Respiration
- Analog inputs - AUX (Pressure/Pulse)

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.

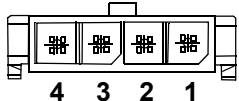
5-11-2-2 Patient I/O Location in the Unit

The Patient I/O is located in front of the Back End Processor with the connector panel available from the front of the system.

- 5-11-2-3 Input DC Voltages**
+5 VDC
+12 VDC

Pinout for the DC input on the Patient I/O module

Table 5-25 DC input pinout on the Patient I/O Module

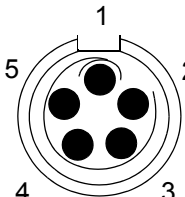
CONNECTOR	SIGNAL NAME
	<p>DC INPUT</p> <ul style="list-style-type: none"> • Pin 1: +12VDC • Pin 2: GND • Pin 3: GND • Pin 4: +5VDC

- 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 5-26 Pinout for the AUX Connectors

CONNECTOR	SIGNAL NAME
	<p>AUX</p> <ul style="list-style-type: none"> • Pin 1: Input - • Pin 2: Input + • Pin 3: Gnd • Pin 4: Nasal Sensor 1 • Pin 5: Nasal Sensor 2

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.

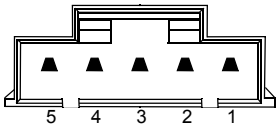
5-11-2-5 Patient I/O - outputs

USB2:

- Digital Trace Data
- Module ID PROM communication

Pinout for the USB outlet on the Patient I/O module

Table 5-27 USB outlet on the Patient I/O Module

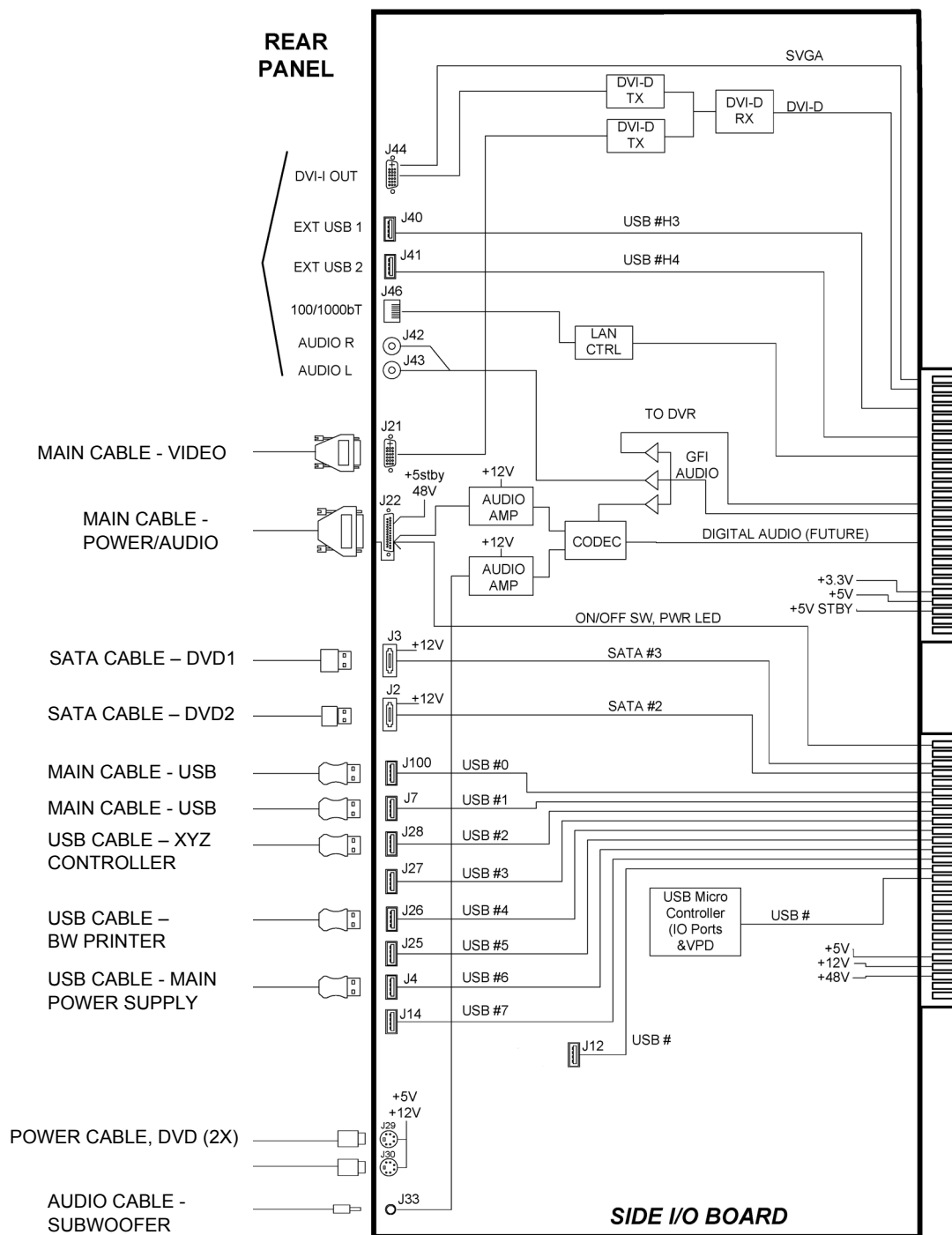
CONNECTOR	SIGNAL NAME
	<p>USB 2</p> <ul style="list-style-type: none"> • Pin 1: +5V (NOT USED BY PATIENT I/O) • Pin 2: D- • Pin 3: D+ • Pin 4: GND • Pin 5: GND

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 5-66 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

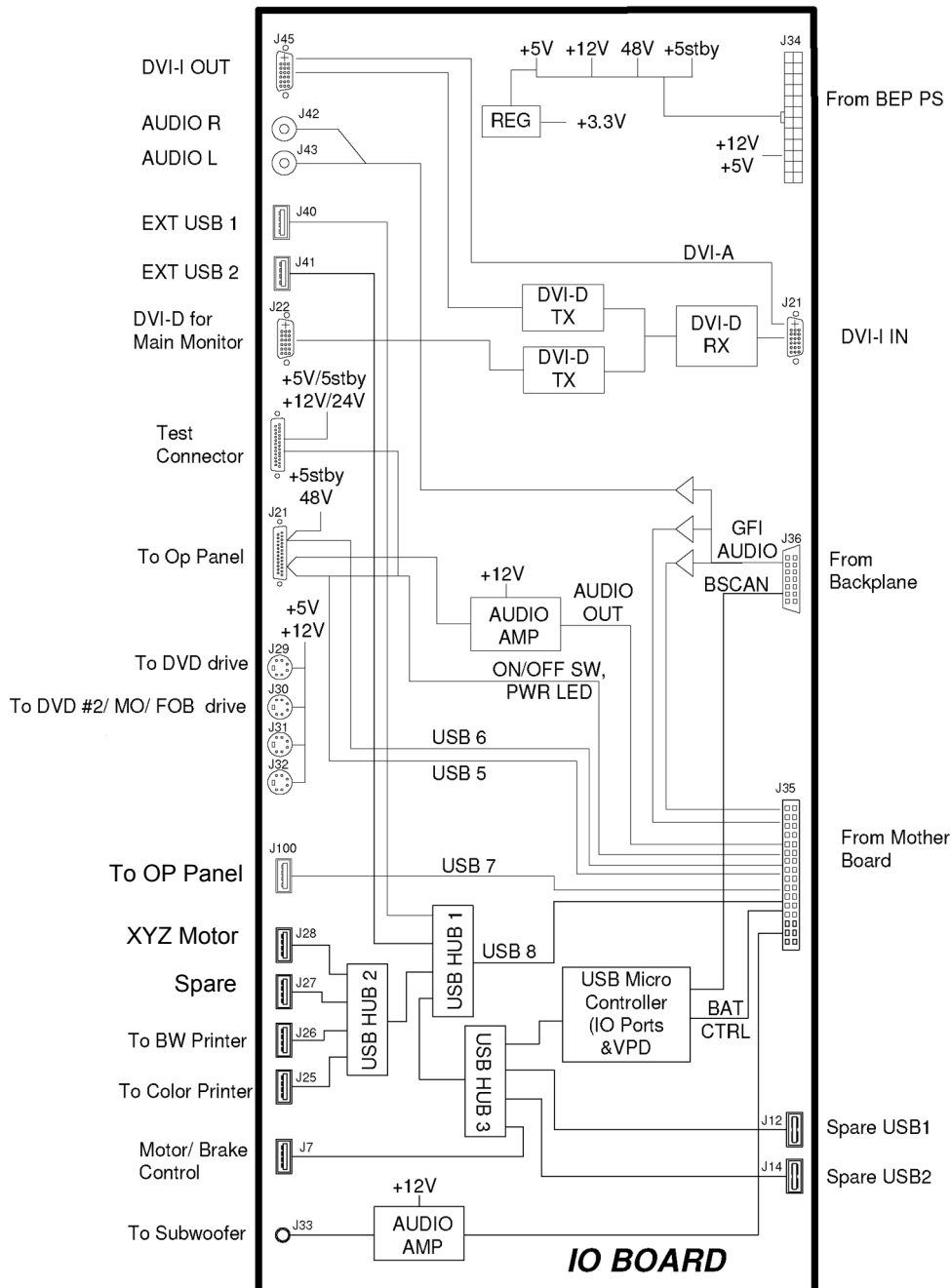
- 12V DC and 5V DC for Patient IO, DVD drive and HDD.
- 5V STDBY from the BEP power supply card for OPIO (pass through)
- USB ports
- Audio to the OP Panel for the speakers.
- External Audio outputs
- Audio to the woofer (center speaker)
- DVI-D output for Main Monitor (Digital Video)
- DVI-I output for External Monitor (only the Digital Video Signal is included)

5-11-4 BEP5 I/O Board

5-11-4-1 General description

The I/O board is the interface between the BEP and the rest of the system. It contains three USB hubs, and it splits video between the main monitor and rear video output. It also distributes audio to speakers and rear connectors.

Figure 5-67 BEP5's I/O Board Block Diagram



5-11-4-2 Location in the Unit

The I/O board is located inside the BEP with some connectors available on the rear of the system.

5-11-4-3 Input signals

- Supply voltage of 5V and 12V from BEP power supply card.
The power voltages are regulated at +/-10%.
- 5V STDBY from the BEP power supply card for OPIO (Pass through).
- PWR_ON signal from the Operator panel to the Motherboard (pass through).
- Two USB ports for OP Panel (pass through), one USB for USB 'hub' and one USB for Patient IO module.
- Doppler Audio from GFI
- Doppler audio mixed with Windows system sounds from motherboard
- DVI (Digital Video) input from the video card or DVR Board.
- AC Fail and PSON_N signal from the BEP PS.

5-11-4-4 Output signals

- 12V DC and 5V DC for Patient IO, DVD drive and High capacity drive.
- 5V STDBY from the BEP power supply card for OPIO (Pass through)
- USB ports for Color and BW printer
- 3 x USB ports (Spare)
- Audio Line In to the Motherboard
- Audio to DVR board on Motherboard
- Audio to the OP Panel for the speakers.
- External Audio outputs
- Audio to the sub woofer
- DVI-D output for Main Monitor (Digital Video)
- DVI-I output for External Monitor (only the Digital Video Signal is included)
- Two external USB ports
- Two spare internal USB ports
- External Test connector
- I²C bus clock and data signals to the Backplane and BEP PS.

5-11-5 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

The DVD Drive is available from the front of the VIVID E9.

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.

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.

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 (Introduced for BT'12, software v112.0.0.).



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.

5-12-2-3 USB Flash Card (option)

Due to the EMC requirements, only USB Flash Cards tested for use with VIVID E9 may be used.

For a list of available USB Flash Cards, see: [9-15-6 "USB Flash Card" on page 9-69](#).

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 (USB2-0)
- The following USB Flash Cards, approved for Vivid 7, may also be used on the VIVID E9, 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 USB Hard Drive 2TB with RAID1

The **Iomega Ultramax desktop hard drive** is an external desktop hard drive, connected via USB to either a Vivid E9 or an EchoPAC PC workstation. It is configured as RAID 1, so the content is mirrored on two hard disk drives. Due to the RAID 1 mirroring, the unit can store maximum 1 TB of data.

The intended use for **Iomega Ultramax desktop hard drive** is for **Disk Management**.

NOTE: When Disk Management has been performed, it is recommended to backup the Patient Archive to a medical grade DVD recordable disc (DVD-R).

NOTE: Only connect one USB storage device (like this Iomega Ultramax Desktop Hard Drive) to the Vivid E9 or EchoPAC PC at a time.

NOTE: To be able to use an USB storage device (like this Iomega Ultramax Desktop Hard Drive) on a Vivid E9, the Vivid E9 may need a BIOS upgrade. A CD with the new BIOS software is included in the kit. Verification and installation instructions are included in the Iomega Ultramax Desktop Hard Drive Installation Manual, Direction Number EY194147.

*NOTE: To be able to use an USB storage device (like this Iomega Ultramax Desktop Hard Drive) on a PC with **EchoPAC SW Only**, the user must log on with **Administrator** rights.*

 **WARNING IF THE IOMEGA ULTRAMAX DESKTOP HARD DRIVE IS CONNECTED TO A VIVID E9, ENSURE THAT IT IS PLACED OUTSIDE THE PATIENT VICINITY/PATIENT ENVIRONMENT**

5-12-2-5 Ethernet

- Ethernet is connected to the I/O panel on the rear of the VIVID E9. Printers and external servers may be available via the Ethernet network.

5-12-2-6 Network printers

For more information, see: [3-8-4-3 "External Peripherals \(Optional\) for Connection to Ethernet \(TCP/IP Network\)" on page 3-37.](#)

Section 5-13

Product manuals

The information needed to use and service the VIVID E9 scanner is collected in the documents described in this section.

5-13-1 User documentation

- VIVID E9 User Manual/User Guide
- Special Probes User Guide

5-13-2 Service documentation

- VIVID E9 Service Manual
- VIVID E9 Unpacking/Packing Procedure

For a list of available product manuals for VIVID E9, see: [Section 9-22 "Product Manuals for VIVID E9" on page 9-97](#).

Section 5-14

Common Service Desktop overview

5-14-1 Purpose of this section

In this section, the Common Service Desktop, as implemented on the VIVID E9, is described.

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 5-28 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 after diagnostics

Always shutdown the system and reboot after a diagnostics session.

Chapter 6

Service adjustments

Section 6-1 Overview

6-1-1 Purpose of this chapter

This chapter describes how to adjustments the VIVID E9.

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 dropdown menu on the Config > Service screen.*

The monitor adjustment is done via three controls (buttons) on front of the monitor.

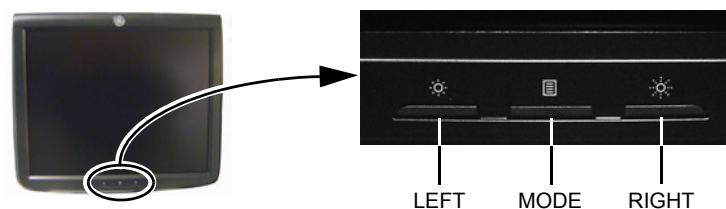
The LCD settings have been optimized at the factory, so normally, there should be no need for any further adjustments.

Default Brightness for the 19" LCD screen on VIVID E9 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

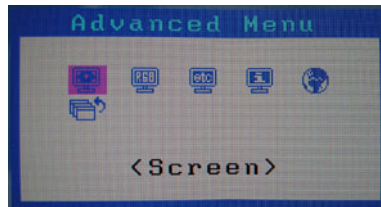
- To reduce the brightness, press the left arrow button. A popup box with the current brightness setting will be displayed on the screen.
- To increase the brightness, press the right button.
- Push the mode button once to remove the popup box from the screen and save the current values.

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	-
	Return	-
Other	Screen Size: FullScreen / Enlarged / Normal	FullScreen
	Menu Position	Center
	Reset	-
	Return	-
Information	Resolution, fH/fV	-
	Model name, GPN No. (PSP No.), Serial No. , Using time	-
Language	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

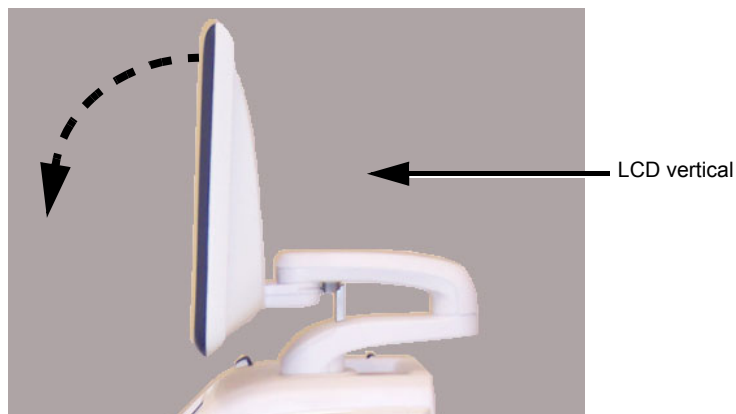


Figure 6-4 Adjusting LCD Hinge Nuts



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.

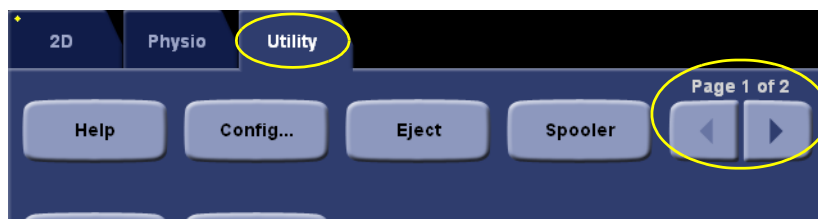
6-4-2 Cautions and Warnings

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.

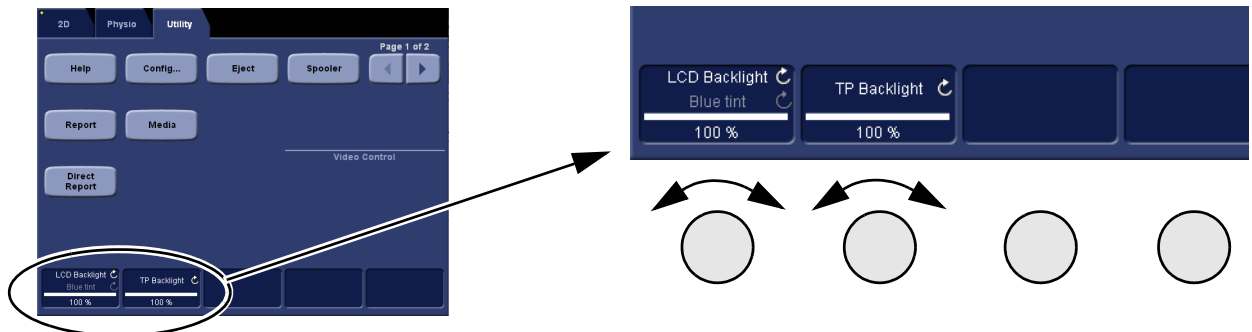
Figure 6-5 Utility screen - page 1



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



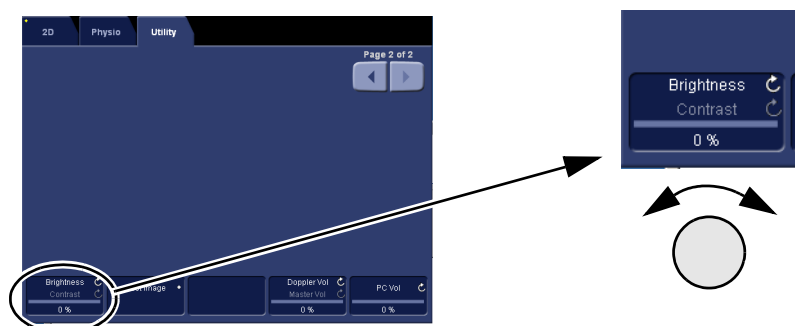
- Adjust the left most rotary to adjust the **LCD Backlight**.
- Push and adjust the left most rotary to adjust the LCD **Blue Tint**.
- Adjust the second rotary from the left side, to adjust the **Touch Panel (TP) Backlight**.

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**.

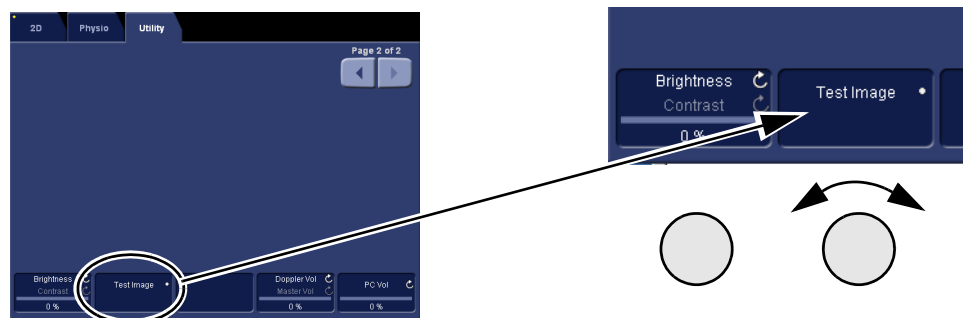
Figure 6-7 Adjust LCD Brightness and Contrast



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

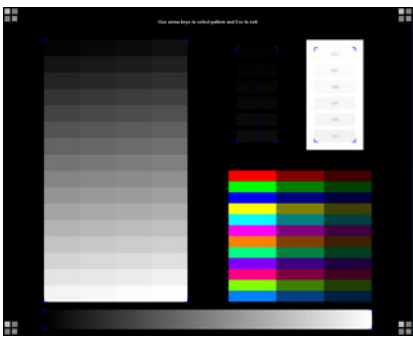
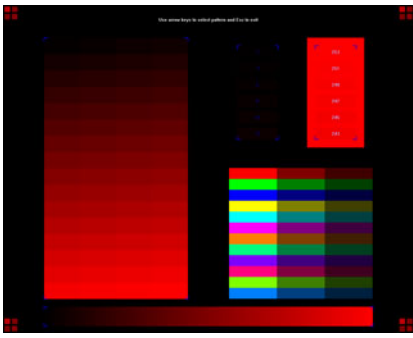
TEST IMAGE No.	TEST IMAGES	DESCRIPTION
1.		Test - Standard
2.		Test - Red grades

Table 6-2 Test Images (cont'd) sheet 2 of 3

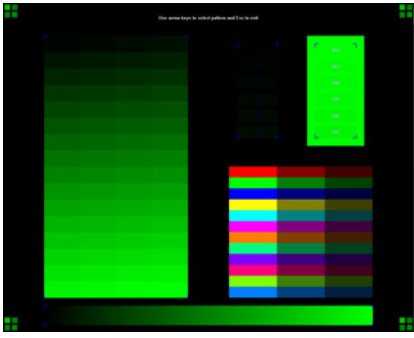
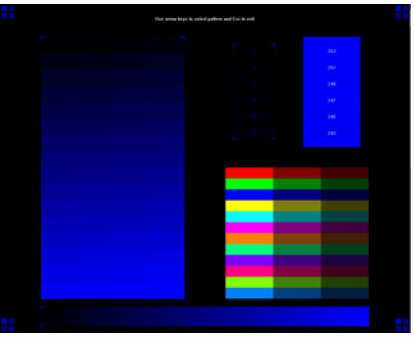
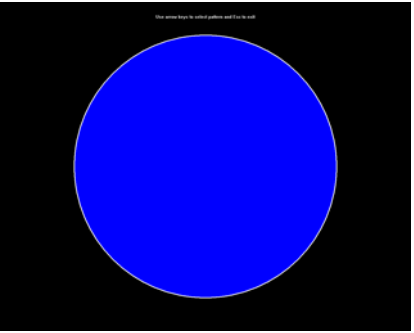
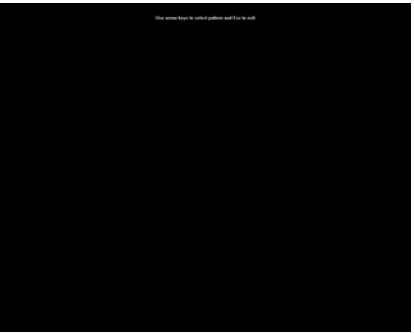

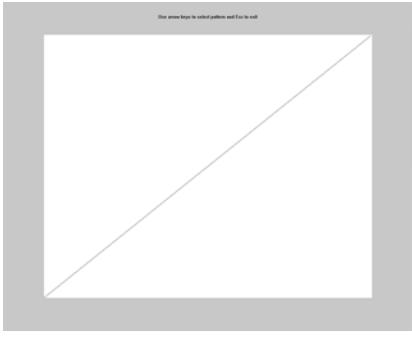
TEST IMAGE No.	TEST IMAGES	DESCRIPTION
3.		Test - Green grades
4.		Test - Blue grades
5.		Blue Circle on Black background
6.		Black

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
- 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.
- 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.

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.

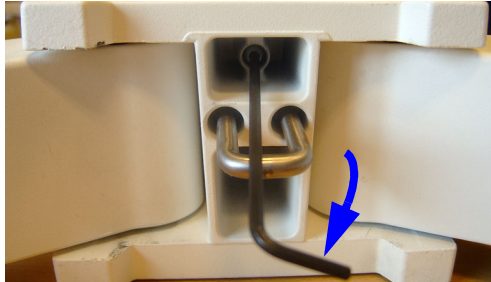
NOTE: *Remember, if the device brakes are not locked when trying to lock the OP, this can act as a "shock absorber" and make it more difficult for the park lock to lock.*

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 will reduce slack, but will also require more force for engaging the Lock.
- Rotating 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.

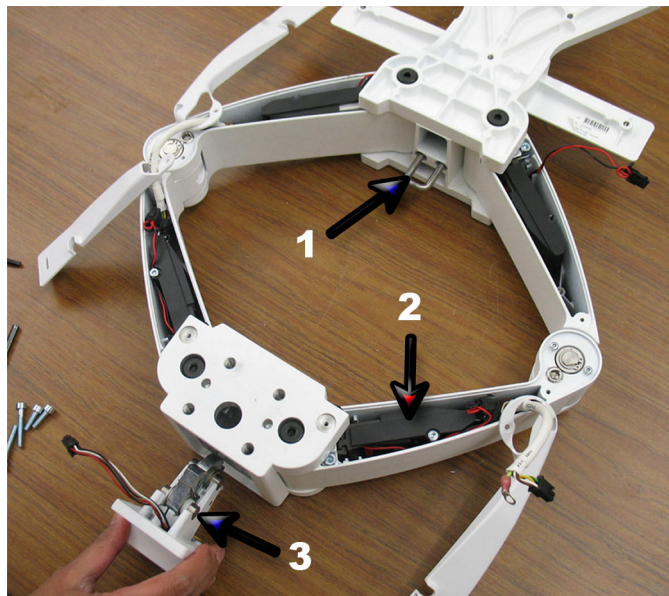
Too tight will reduce the slack and make it harder to engage the Lock. Make the adjustments in 1/4 turn increments and test the lock until the optimum adjustment is achieved.

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

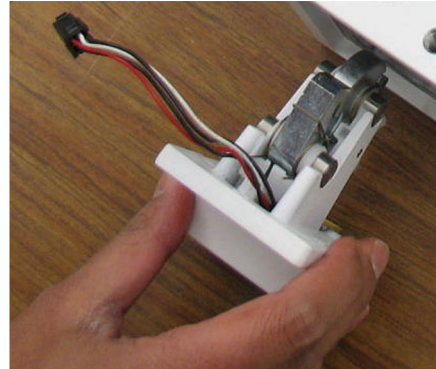
Follow this procedure if the park lock is not working, or the lock does not respond when pressing the Frogleg Controls:

- 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.

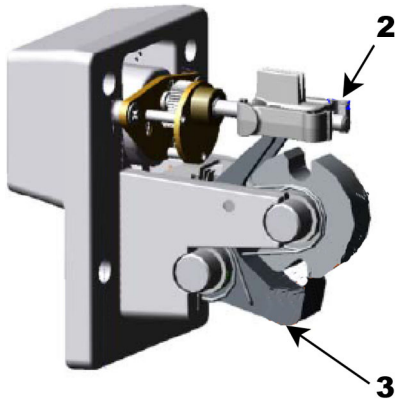
Figure 6-14 Remove the Park Lock



6-7-3-2 XY Lock Adjustment for Lock and Brake Mechanism (cont'd)

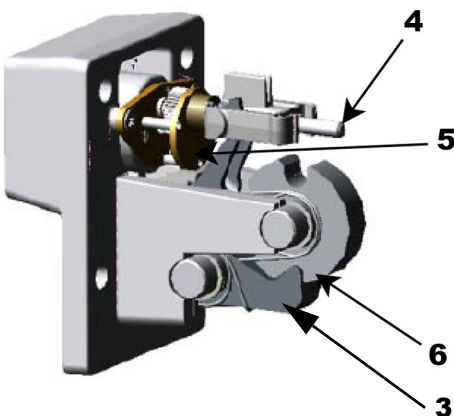
- If the **Park Lock Nut (2)** and the **Park Lock Lever (3)**, are in the positions illustrated in [Figure 6-15](#), the lock will not engage.
(This occurred in some earlier systems. The nut and retainer did not return to the “charged” mode after unlock.)

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

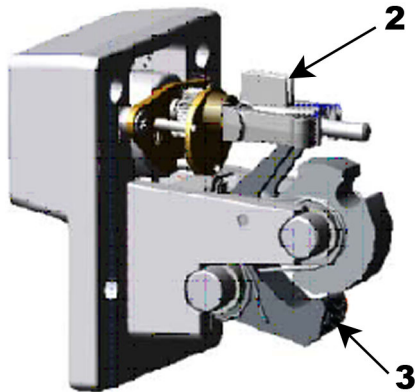


- Make sure the **Park Lock Lever (3)** is loose and can engage and hold the **Lock Wheel, (6)**, in locked position, as illustrated in [Figure 6-16](#).

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

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, 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 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)
- New in v110.1.10 - 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).
- New in v112.0:
 - There is a new reminder showing “**Clean air filter**”.It is displayed at start-up of the VIVID E9, 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 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:

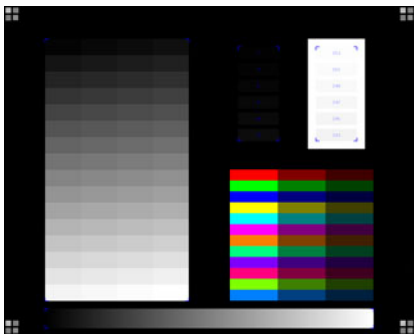
See the instructions in: [4-2-3-5 "Manually releasing the XY Lock" on page 4-12.](#)

Section 7-4 Troubleshooting Tips

7-4-1 Shortcut Keys

This is a list of useful shortcuts for use during VIVID E9 service.

Table 7-1 Shortcuts

SHORTCUT	DESCRIPTION
Alt+B	BOOKMARK. PLACE A BOOKMARK IN LOGS.
Alt+D	SYSTEM PROBLEM REPORTING. See: 7-6-2 "Collect a Trouble Image with Logs" on page 7-11. PRINT SCREEN / Make a SCREENSHOT: See: 7-6-2 "Collect a Trouble Image with Logs" on page 7-11.
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: Section 7-7 "Screen Captures" on page 7-12.
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 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.
- 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.
- Check device configuration.
- Clean the spooler (F4).
- Check Connectivity configuration on the VIVID E9.
 - 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

Select **Config (F2) > About** screen.

Applications Software

- Application Software Version
- Application Software CD Part Number

System Software

- System Software Revision
- System Software CD Part Number

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.

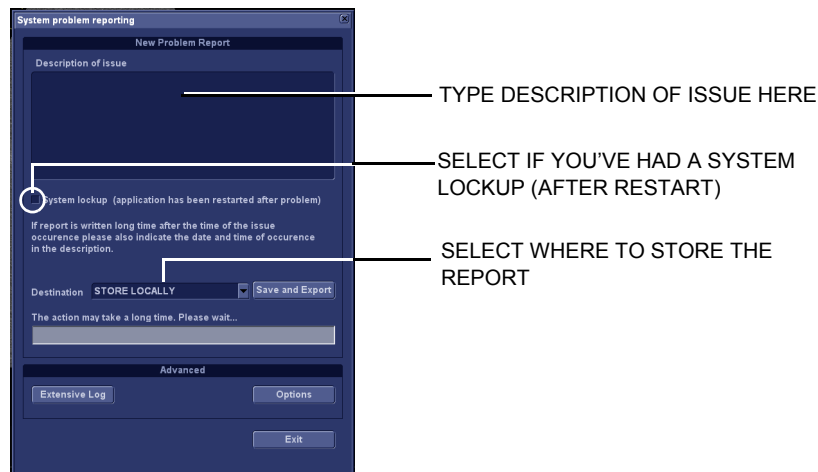
When **Alt+D** is pressed, a menu box appears that allows for;

- 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 Restart VIVID E9 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.*

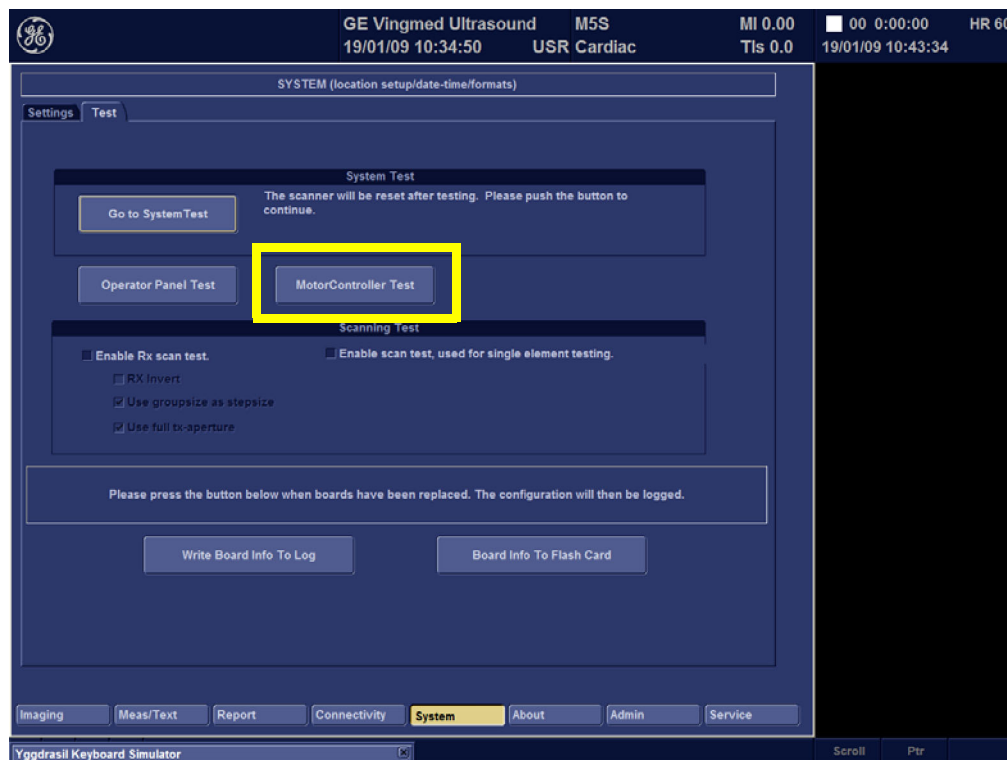
Section 7-8 Motor Controller Test

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,.
See [4-2-1 "Power ON/Boot Up" on page 4-4](#) for detailed instructions.
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.
See [4-2-5 "Logging on to VIVID E9 as 'ADM'" on page 4-15](#) for detailed instructions.
- 4.) Select **System** from the bottom of the menu that appears on the monitor.
- 5.) Select **Test**.

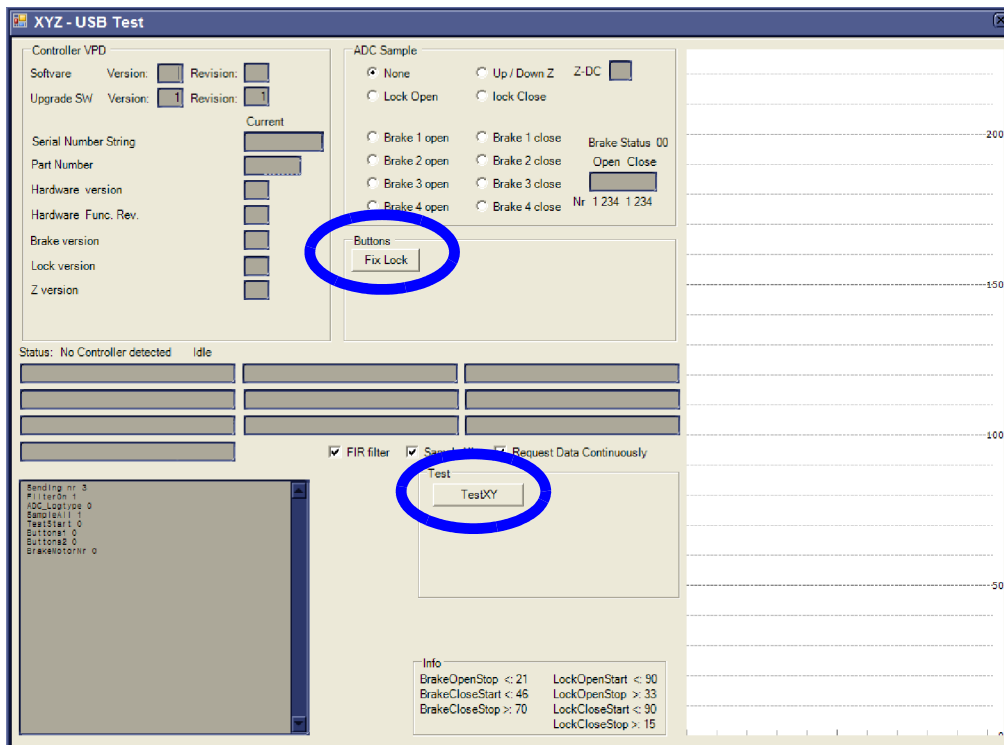
Figure 7-2 Test screen



- 6.) Select **MotorController Test**
The following dialog is displayed on the screen.

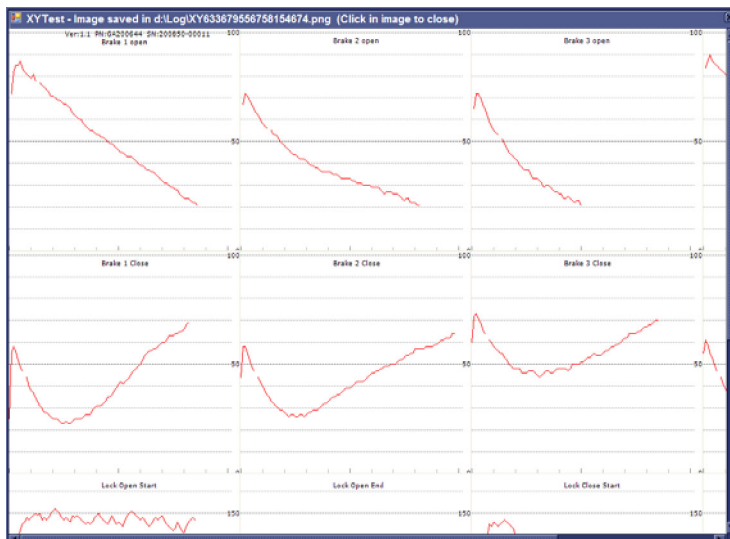
Section 7-8 Motor Controller Test (cont'd)

Figure 7-3 Motor Controller Test dialog



- 7.) Push **Fix Lock** button.
If in a quiet environment it should be possible to hear the **Lock Engine** engage for a few seconds.
- 8.) 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



- 9.) Continue with step 2 in [7-9-3 "XY Lock is not working"](#) on page 7-17.

Section 7-9 Troubleshooting

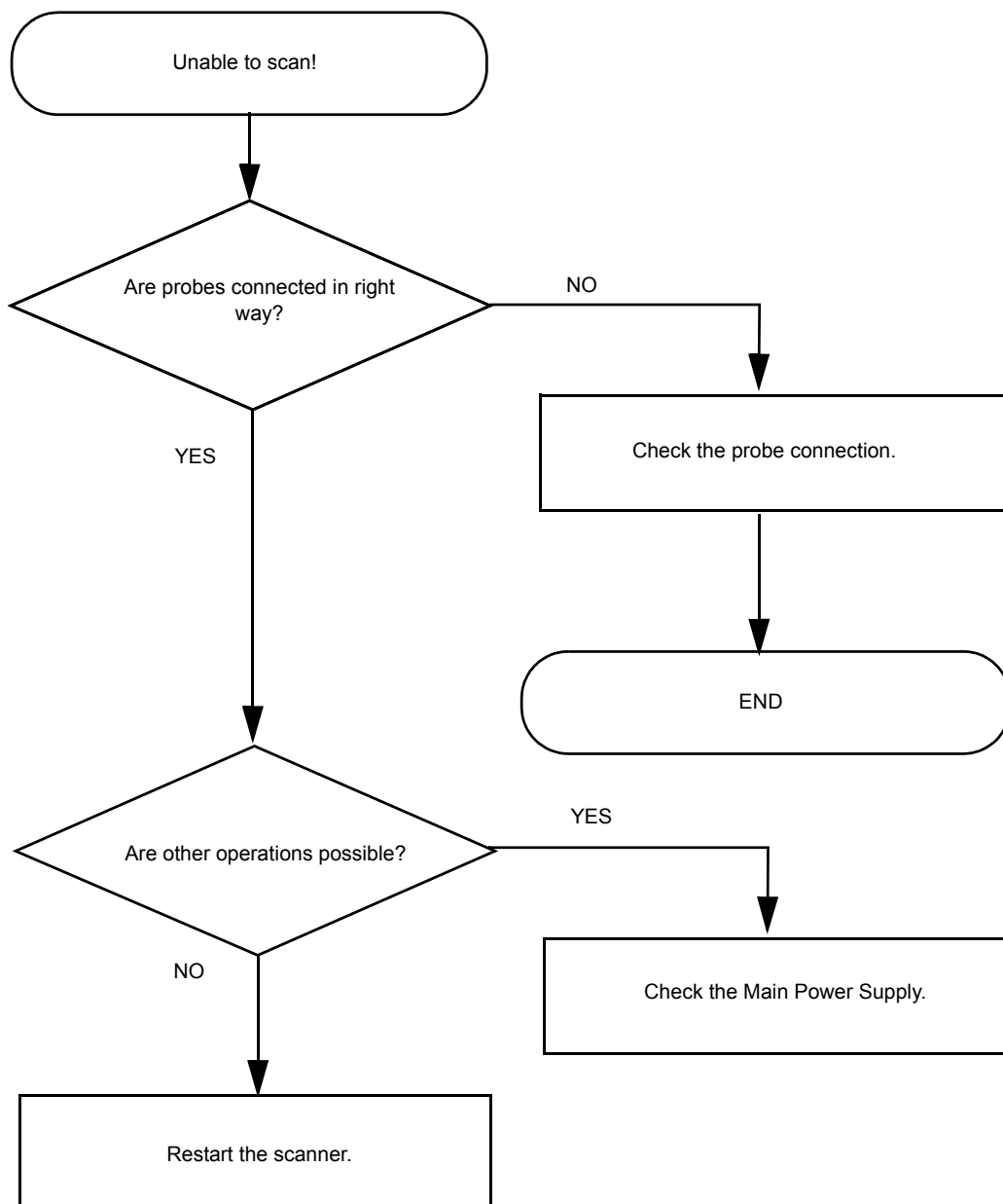
7-9-1 No Response from VIVID E9 - It's "Locked"

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.
See: [4-2-3-5 "Manually releasing the XY Lock" on page 4-12](#).
- 3.) Remove the **Park Lock** and adjust it manually.
See: [6-7-3-2 "XY Lock Adjustment for Lock and Brake Mechanism" on page 6-15](#).

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.

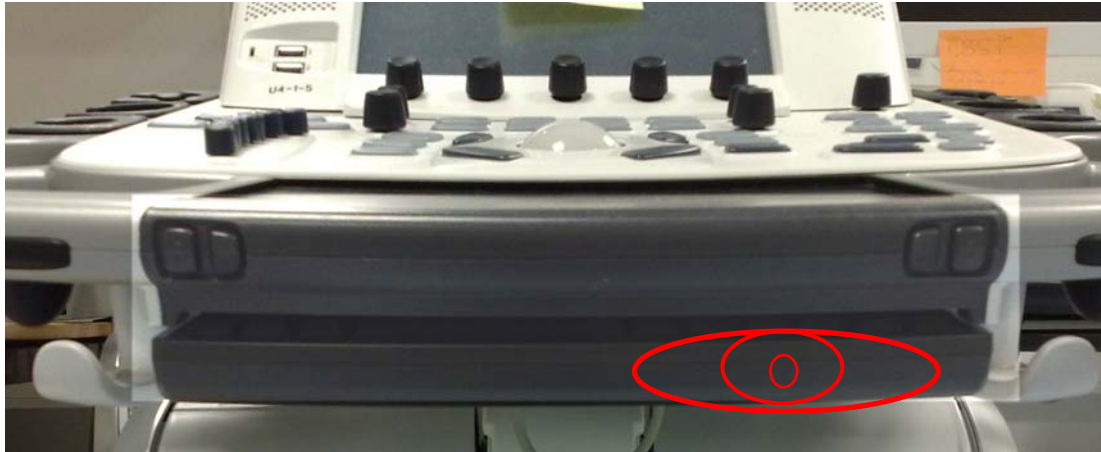
7-9-5 Z Movement fails

- 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 rightmost section of the drawer, thus the force needed to release and lock the alphanumeric keyboard will increase significantly if the leftmost section of the keyboard is used.

Figure 7-6 Best area to press to release (or lock) the alphanumeric keyboard



- Press the rightmost 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.
- Verify that the software configuration is set up for the Footswitch (**Config > Imaging > Application screen**).
- Try a replacement USB Footswitch.

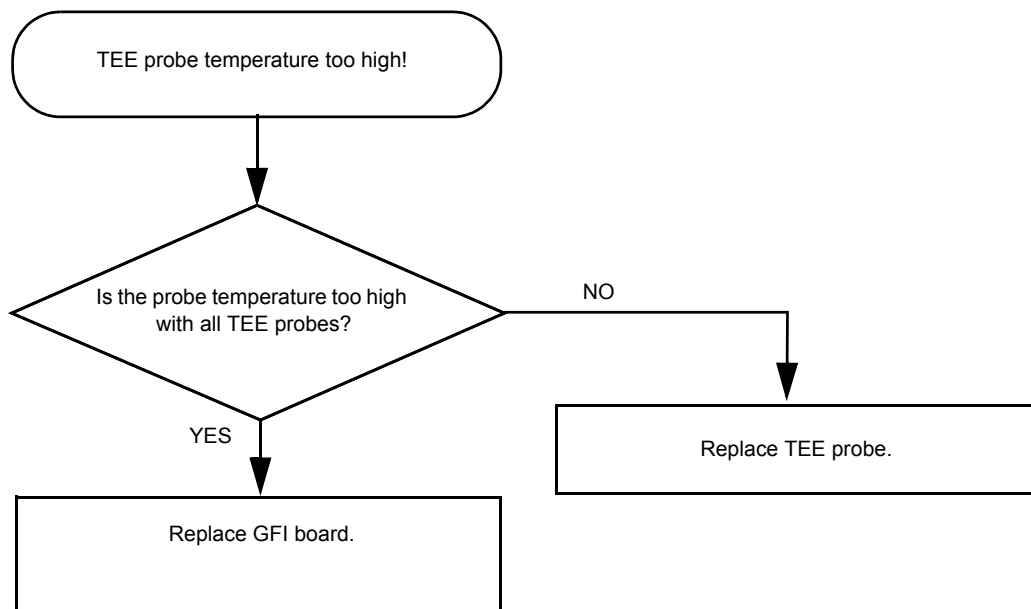
7-9-8 USB Device(s) stopped working

If a keyboard and mouse, or other equipment, not intended for connection to the VIVID E9, has been connected to any of the USB connectors on the front of the VIVID E9, all the USB devices may stop working due to an overload condition.

The workaround is to use one of the USB ports on the External I/O.

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 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 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"> Keep the unit at least 5 meters (15 feet) away from other EMI sources. Special shielding may be required to eliminate interference problems caused by high frequency, high powered radio or video broadcast signals.
Ground the unit	<ul style="list-style-type: none"> Poor grounding is the most likely reason a unit will have noisy images. Check grounding of the power cord and power outlet.
Install all screws, RF gaskets, covers, cores	<ul style="list-style-type: none"> After you finish repairing or updating the system, replace all covers and tighten all screws. Any cable with an external connection requires a magnet wrap at each end. Install the Card Rack Cover over the Card Rack. <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"> If more than 20% or a pair of the fingers on an RF gasket are broken, replace the gasket. Do not turn on the unit until any loose metallic part is removed.
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"> The interconnect cables are grounded and require ferrite beads and other shielding. Also, cable length, material, and routing are all important; do not change from what is specified.
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"> Do not allow cables to lie across the top of the Card Rack or hang out of the peripheral bays. Loop the excess length for peripheral cables inside the peripheral bays. attach the monitor cables to the frame.

7-10-2-1 Different Power Outlet

Connect the unit to another power outlet and verify if the noise changes or disappear.

NOTE: *GE Healthcare 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 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

- 1.) Disconnect all external cables (network, all unused probes, ECG leads and verify if the noise disappears.

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Chapter 8

Replacement procedures

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. 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	8-5
8-4	Reloading the software	8-6
8-5	Replacing Covers and Bumpers	8-38
8-6	Top Console Parts Replacement	8-73
8-7	Replacing XYZ Parts	8-174
8-8	Main Console parts replacement	8-190
8-9	Castors and Brakes replacement	8-208
8-10	Front End Processor (FEP) / Card Cage parts replacement	8-218
8-11	Back End Processor (BEP) parts replacement	8-244
8-12	Main Power Supply replacement	8-292
8-13	I/O Modules replacement	8-295
8-14	Peripherals replacement	8-303


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.
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.

8-2-3 **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.

8-2-4 **Manpower - When two persons are needed**


This replacement procedure requires two persons:

- Casters Replacement

The rest of the replacement procedures can be carried out by one person.

8-2-5 Tools needed for servicing VIVID E9

Table 8-1 Tools used for servicing VIVID E9

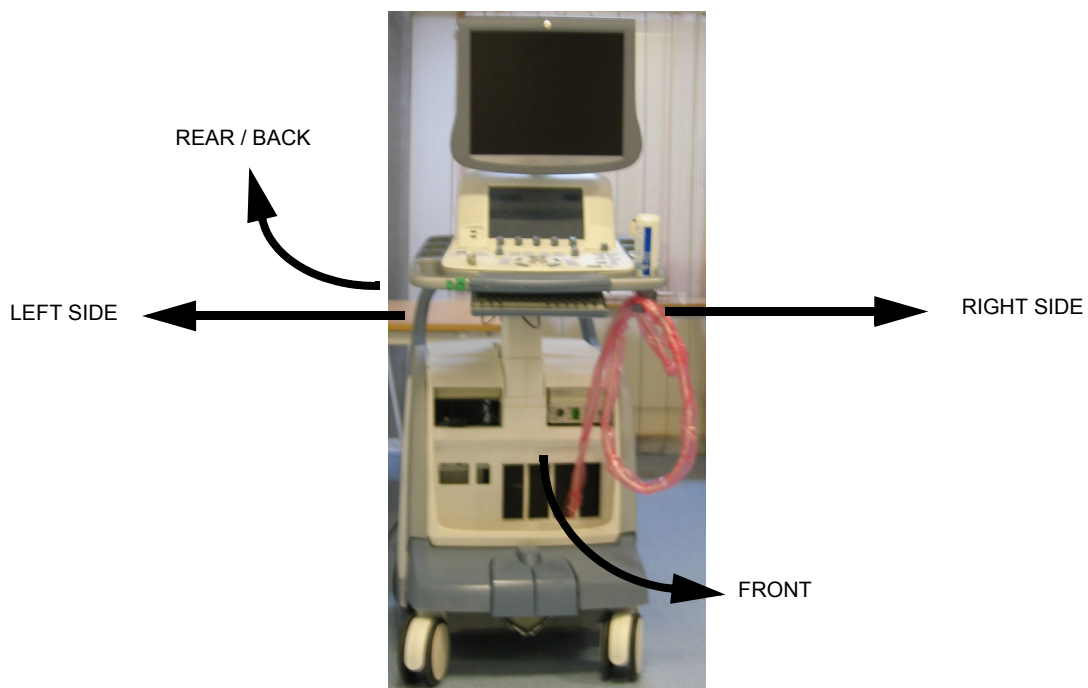
ITEM NO.	TOOL	SIZE	TORQUE	COMMENTS
1.	BIT # TX-10	M2.5		<ul style="list-style-type: none"> • Use Torque specified in procedure. • If the torque is not indicated with the procedure, hand tighten the screws/ nuts. • 90 degree "L" are suggested. • A full set of 90 degree "L" Torx wrenches are recommended.
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.	Torque Wrench, Up to 81 Nm			Heavy mechanical parts may need a specific torque. Each procedure will indicate the torque needed.
20.	WHEEL CHANGE KIT	N/A	N/A	<p>FC200829</p>  <p>WOODEN WEDGE</p> <p>BEVEL EDGED BOARD</p>

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.

Figure 8-1 Definition of Left, Right, Front and Back of VIVID E9



Section 8-4

Reloading the software

8-4-1 Purpose of this section

This section describes how to reinstall the software on VIVID E9.

8-4-2 VIVID E9 models versus software requirement

Table 8-2 VIVID E9 Models and Hardware/Software Compatibility sheet 1 of 2

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO	
GA000940	Vivid E9 100-230V 4D Expert Option - 17" LCD	GA200824 VE9 Card Rack Complete with MLA16, 4D TEE backplane, 192 RX channels and one TX card with 192 channels	GB200001 BEP6 w/4D	v104.3.4 (or higher)	v112.0.7 or higher	v112.1.x	
			GB200003 BEP5 w/4D Nvidia Quadro 2000D	v104.3.3 (or higher)	v112.0.x or higher	v112.1.x	
						v112.1.x	
						v112.1.x	
GA000890 BEP5 w/4D Nvidia	v104.3.x		v112.0.x or higher	v112.1.x			
	GA000950		Vivid E9 100-230V 4D Expert Option - 19" LCD	GB200001 BEP6 w/4D	v104.3.4 (or higher)	v112.0.7 or higher	v112.1.x
				GB200003 BEP5 w/4D Nvidia Quadro 2000D	v104.3.3 (or higher)	v112.0.x or higher	v112.1.x
GA200890 BEP w/4D Nvidia		v104.3.x		v112.0.x or higher	v112.1.x		
GB000040	Vivid E9 100-230V BT12 Pro Configuration - 17" LCD	GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.4 (or higher)	v112.1.0 or higher	v112.1.x	
GB000050	Vivid E9 100-230V BT12 Pro Configuration - 19" LCD					v112.1.x	
GA000945	Vivid E9 100-230V 2D - 17" LCD		GB200002 BEP6 wo/4D	v104.3.x	v112.0.6 or higher	v112.1.x	
			GA200900 BEP5 wo/4D	v104.3.x	v112.0.x or higher	v112.1.x	
GA000955	Vivid E9 100-230V 2D - 19" LCD		GB200002 BEP6 wo/4D	v104.3.x	v112.0.6 or higher	v112.1.x	
			GA200900 BEP5 wo/4D	v104.3.x	v112.0.x or higher	v112.1.x	

Table 8-2 VIVID E9 Models and Hardware/Software Compatibility (cont'd) sheet 2 of 2

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO
GA000810	VIVID E9 100-230V 4D Expert Option - 17" LCD	GA200824	GB200001 BEP6 w/4D	v104.3.x	v110.1.12	v112.1.x
			GA200890 or GA200800 BEP5 w/4D Nvidia		v110.1.x	
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.2.x v104.1.x	v110.0.x	
GA000815	VIVID E9 100-230V 4D Expert Option - 19" LCD	VE9 Card Rack Complete with MLA16, 4D TEE backplane and 192 RX channels	GB200001 BEP6 w/4D	v104.3.x	v110.1.12	v112.1.x
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.3.2	v110.1.x	
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.3.2	v110.1.x	
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.2.x v104.1.x	v110.0.x	
GA000830	VIVID E9 100-230V 2D - 17" LCD	GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.x	v110.1.12	v112.1.x
			GA200900 or GA200805 BEP5 wo/4D		v110.1.x	
GA000835	VIVID E9 100-230V 2D - 19" LCD	GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.x	v110.1.12	v112.1.x
			GA200900 or GA200805 BEP5 wo/4D		v110.1.x	
			GA200900 or GA200805 BEP5 wo/4D	v104.2.x v104.1.x	v110.0.x	
GA000100	VIVID E9, 100-230 VAC (with 4D)	GA200744	GA200890, GA200800 or 5145000-10 BEP5 w/4D	v104.0.x	v108.x.x	v112.1.x
		GA200035				v112.1.x NOTE! Hardware update or box (console) swap required.

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.


8-4-4 Tools provided with the VIVID E9 at delivery or after an upgrade

- VIVID E9 System software (DVD)
- Application software (CD)

If present:

- Patch for VIVID E9 (CD)
- Printer Driver Software (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 *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 like DVD or CD discs. 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/User Guide.

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 *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 like DVD or CD discs. 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/User Guide.

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. 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.)
- The printer's IP Number.
The printer's IP number is not easily available via the VIVID E9'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 8-3 Installation choices

Why	Start here
<ul style="list-style-type: none">• The software installed on the VIVID E9 has become corrupted• VIVID E9'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.	8-4-9 "Reloading the Software from Repository" on page 8-13.
The same as above, but it is impossible to access OLC.	8-4-10 "Loading the Software - from DVD/CD" on page 8-16. (When asked, select B.)
<ul style="list-style-type: none">• You want to erase all data on the HDD• BEP or HDD has been exchanged.• The other methods failed.	8-4-10 "Loading the Software - from DVD/CD" on page 8-16. (When asked, select A.)

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, the compressed original files, from the 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 DVD/CD once more!

8-4-9-2 Preparations

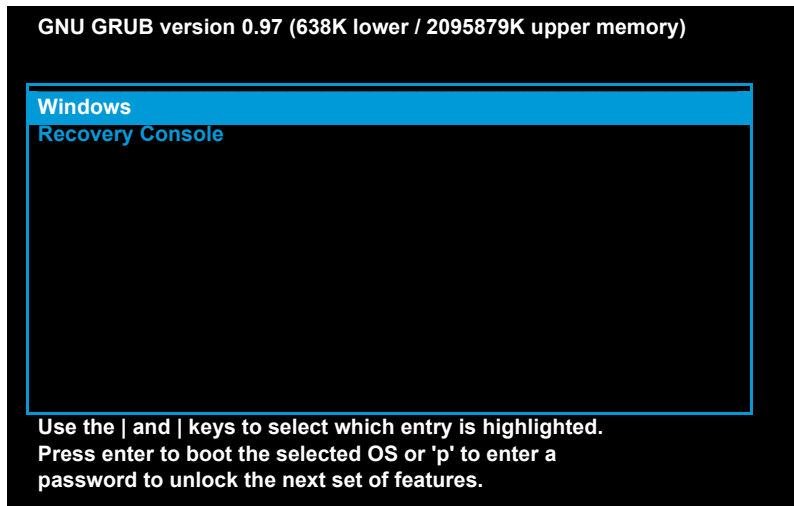
Disconnect all external USB devices before starting the reload. (This is to ensure that the drive letters are not mixed up during the software reload.)

8-4-9-3 Initiate software reload from the Recovery Console

Ensure that the VIVID E9 is powered down.

- 1.) Depress the **On/Off** button on the **Operator Panel**. The VIVID E9 starts.
- 2.) Press the **Esc** button, on the alphanumeric keyboard, multiple times until the **GRUB** menu is displayed on the screen.

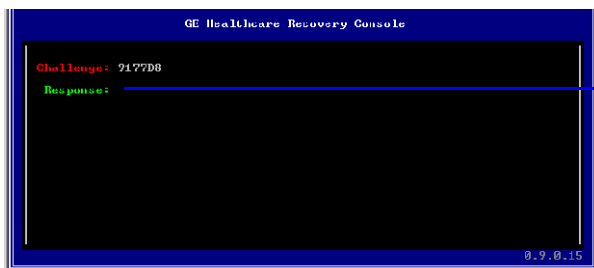
Figure 8-2 GRUB menu



USE THE ARROW DOWN KEY
TO SELECT RECOVERY
CONSOLE, THEN PRESS
ENTER.

- 3.) On the **Grub** menu, select: **Recovery Console**.
The GE Healthcare Recovery Console is displayed.

Figure 8-3 GE Healthcare Recovery Console (Example)



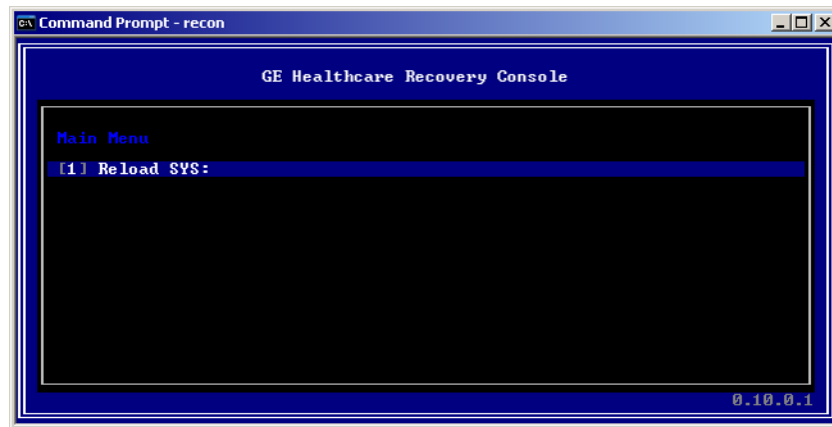
Enter the password (from OLC).

- 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 reboots.
- After the reboot, the VIVID E9 starts to load the Application Software. This is done without any interactions. The TCP/IP settings, Computer Name etc. are restored.
- The VIVID E9 shuts down.

8-4-10 Loading the Software - from DVD/CD

8-4-10-1 Introduction

The VIVID E9 software is delivered on:

- one DVD for the VIVID E9 System Software
- one CD for the VIVID E9 Application Software
- extra CD(s) with software patch(es), may also be included.

A Software Patch CD is used when one or a few files should be replaced or added, but the change doesn't require a complete software load. *Example:* Virus hardening software.

- one CD with Printer Driver software

When installing the software, start with the System Software, then continue with the Application Software and, if included, install the patch software after you loaded the Application Software.

The Printer Driver software must be loaded later, after the network connection has been verified or set up.

8-4-10-2 Preparations for software loading

1.) If not already done, perform these tasks:

- a.) [8-4-5 "Data Management - moving all images" on page 8-10](#)
- b.) [8-4-6 "Backing up the Patient Archive and System Configurations" on page 8-10](#)
- c.) [8-4-7 "Recording important settings and parameters" on page 8-11](#)

2.) Disconnect all external USB devices (USB Flash Card, USB Hard Drive etc.) before you start loading the software.

8-4-10-3 Boot from the System Software DVD

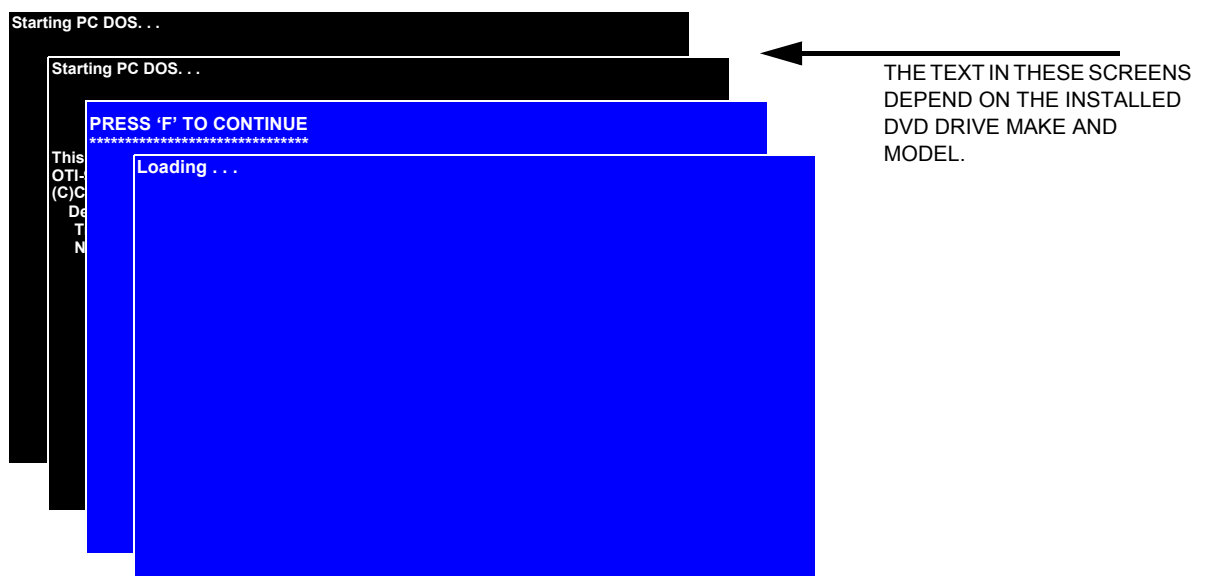
- 1.) Insert the applicable VIVID E9 System Software DVD into the DVD drive.
- 2.) Power down the VIVID E9.
- 3.) Wait until the ON/Standby switch has turned amber.
- 4.) Power ON the VIVID E9. The VIVID E9 starts to boots.
First, the BIOS software is loaded, and the BIOS Boot Screen is displayed.

Figure 8-5 BIOS Boot Screen (BEP6)



Next, the BEP starts to boot from the disc in the DVD drive.

Figure 8-6 First four screens - starting PC-DOS and loading drivers for the DVD-drive



Several screens will be displayed, indicating the progress.

- 5.) If asked for; press **F**, and the booting continues.

8-4-10-4 Selecting installation (A, B or R)

NOTICE If you select “A” in the next step, **ALL** existing software and data will be erased. If backup has not been performed, all data like: Patient Database, System Configuration and User Configurations (Customer Presets), will be lost.

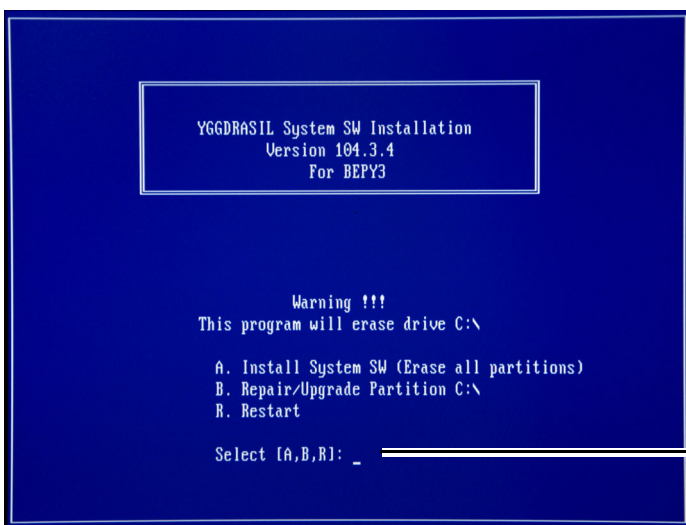
When the screen in [Figure 8-7](#) is displayed, the installation halts and waits for your input.

You can choose if you want to do a complete software installation, deleting all data on the HDD, or if you only want to update or reinstall the software on the C:\ partition.

Table 8-4 Descriptions of your choices

WHEN TO USE	DESCRIPTION	COMMAND
Use this procedure if: <ul style="list-style-type: none"> The BEP or the HDD has been exchanged You want to erase all data on the HDD The installation on C:\ failed. 	To do a complete VIVID E9 software installation. All data on the Hard Disk Drive will be erased.	A
Use this procedure if you are going to: <ul style="list-style-type: none"> Repair the software on C:\ Upgrade the software on C:\. 	To update or re-install the software on the C:\ partition. Only data on the C:\ partition will be erased. This keeps Patient Archive and Presets intact.	B
Stop the software installation	This choice stops the instalation. After stopping the installation, remove the DVD disc and reboot the VIVID E9.	R

Figure 8-7 Choices (A, B or R)



SELECT 'A' TO INSTALL THE SYSTEM SOFTWARE AND TO DELETE THE DATABASE, THE SETTINGS AND THE ARCHIVE.

6.) Make your choice, based on the information in Table 8-4.

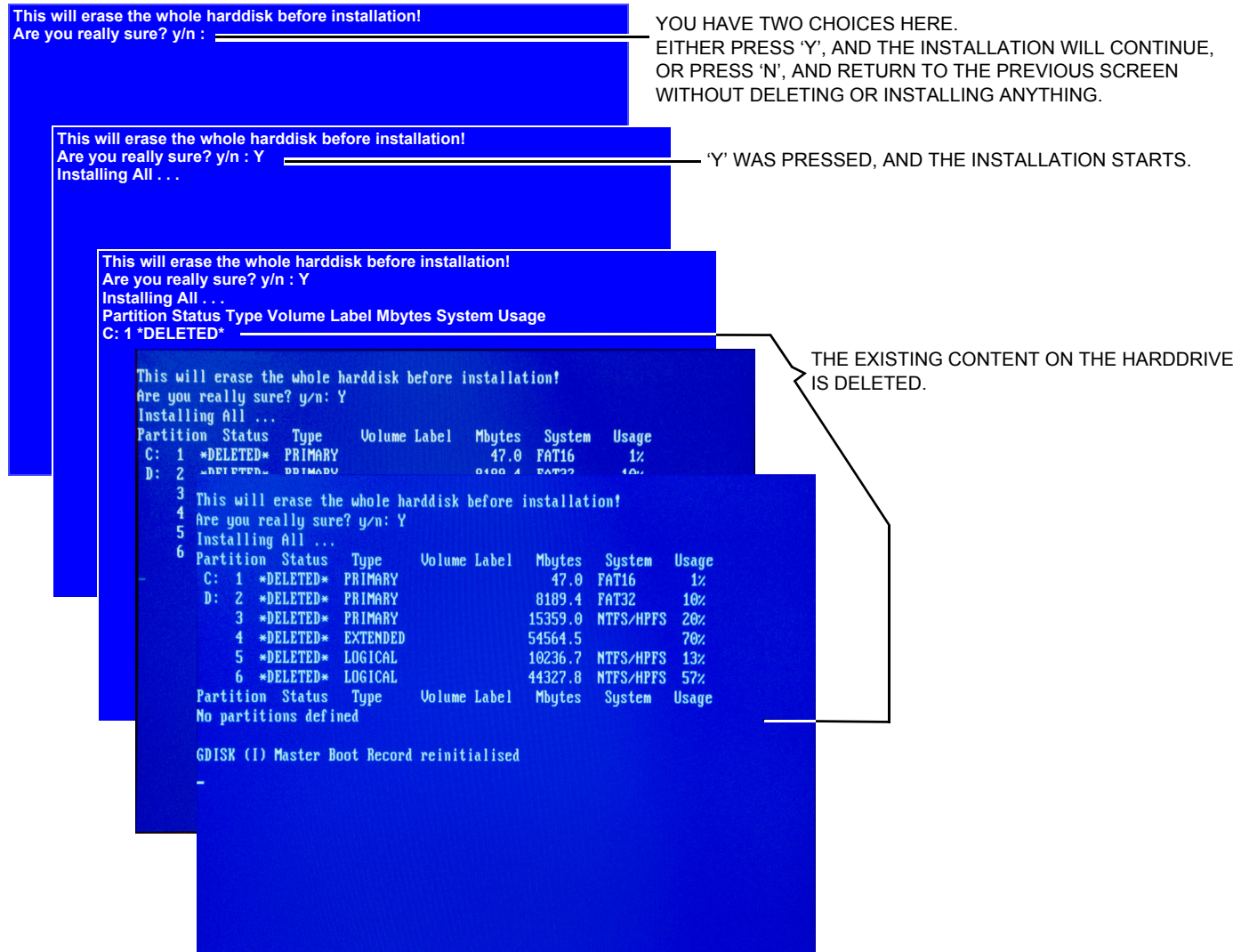
- If you choose “A”, continue with:
[8-4-10-5 "Press A. Install System Software. \(Erase all partitions\)" on page 8-19.](#)
- If you choose “B”, continue with:
[8-4-10-6 "Press B. Repair/Upgrade Partitions C:\" on page 8-32.](#)

8-4-10-5 Press A. Install System Software. (Erase all partitions)

Installing the System Software

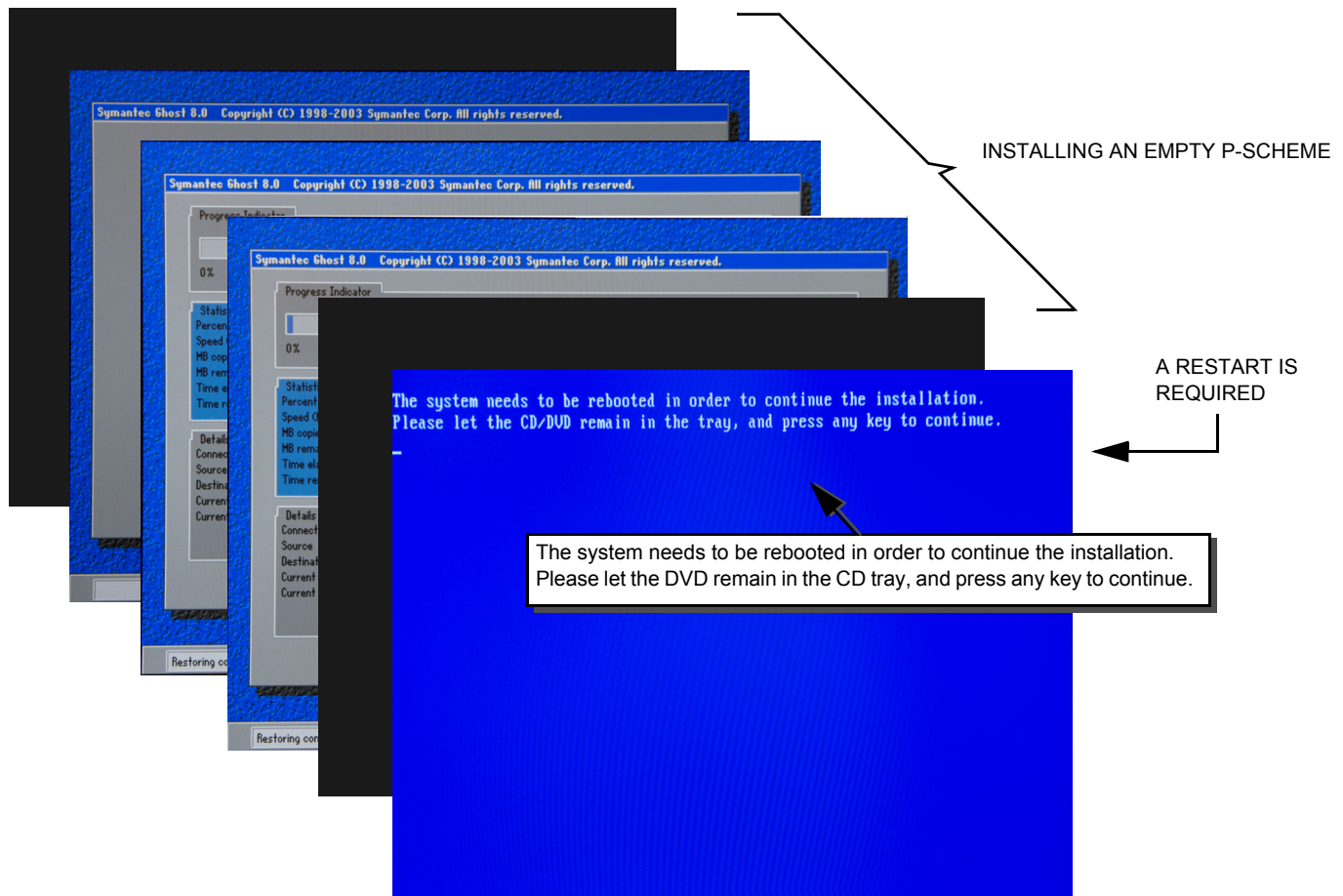
- 1.) Press "A" to erase all the content on the HDD and install the System Software.
Next, you are asked to confirm that you will erase the whole disk.
- 2.) Press "Y" to confirm that you will continue. (If you want to return to the previous screen, press "N")

Figure 8-8 Are you really sure? Delete HDD Content



8-4-10-5 Press A. Install System Software. (Erase all partitions) (cont'd)

Figure 8-9 Installing Empty P-scheme onto the HDD



To be able to copy anything into the new partitions on the HDD, a reboot is required. You are prompted to press a key to initiate the reboot.

NOTE: Let the DVD remain in the DVD tray.

- 3.) Press any key to continue.
The VIVID E9 will reboot.

The monitor may display the message "No sync" for a few seconds before the BIOS Boot Screen is displayed (see next page).

8-4-10-5 Press A. Install System Software. (Erase all partitions) (cont'd)

The VIVID E9 loads the BIOS ...

Figure 8-10 BIOS Boot Screen (BEP6)

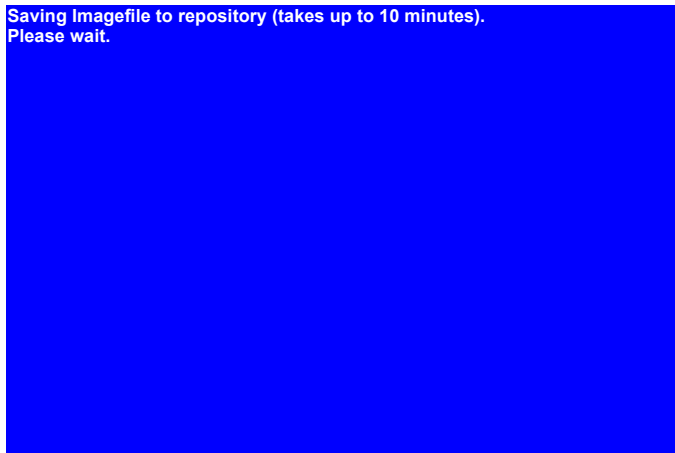


The BEP starts to boot into PC-DOS. (Refer to [Figure 8-6 on page 8-17](#) for illustrations).

8-4-10-5 Press A. Install System Software. (Erase all partitions) (cont'd)

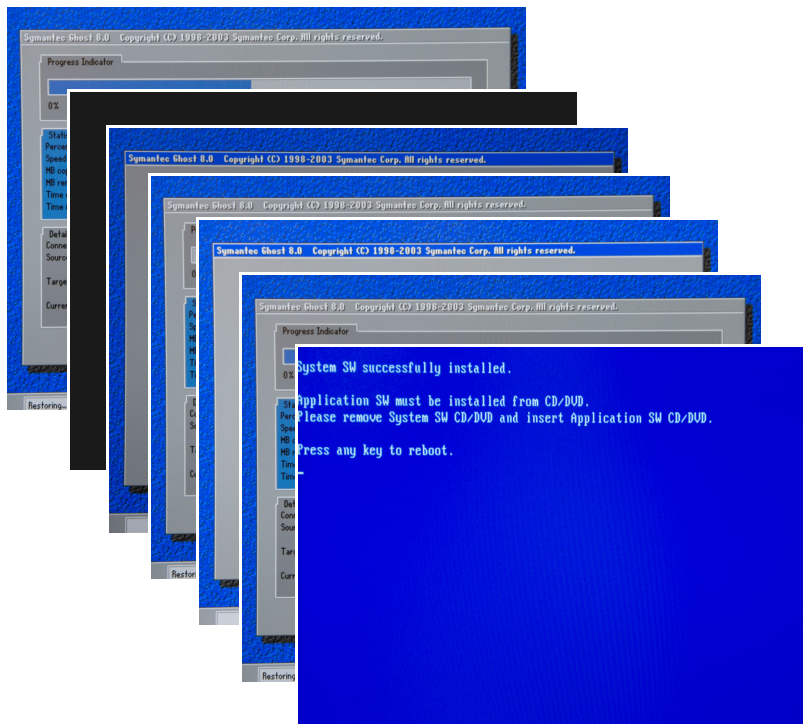
The BEP starts to copy the Image file from the DVD to the Repository partition on the HDD. This will take typically eight to ten minutes.

Figure 8-11 Move contents from DVD to Repository



Next, the copied Image file is used as source when the System software is installed on the C:\ partition. Several screens will be displayed.

Figure 8-12 Installing the System Software



When the installation of the System Software has finished, the DVD is ejected and you are requested to remove the System Software DVD and insert the Application Software CD.

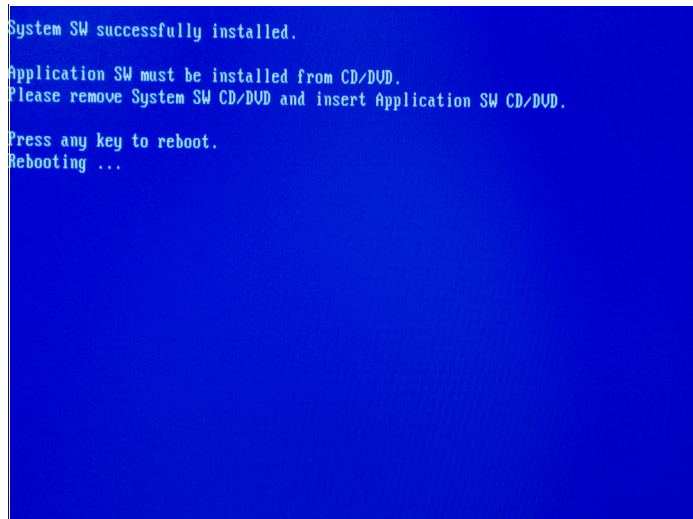
4.) Continue with: ["Loading the Application Software" on page 8-23.](#)

8-4-10-5 Press A. Install System Software. (Erase all partitions) (cont'd)

Loading the Application Software

- 1.) If not already done, remove the System Software DVD and insert the applicable Application Software CD in the DVD drive.
- 2.) Press any key to continue.
The VIVID E9 will reboot.

Figure 8-13 Rebooting ...



The monitor may display the message "No sync" for a few seconds before the BIOS Boot Screen is displayed.

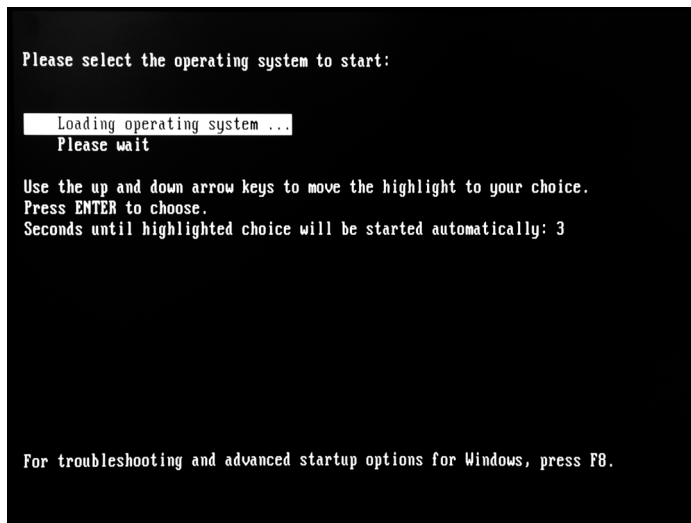
Figure 8-14 BIOS Boot Screen (BEP6)



8-4-10-5 Press A. Install System Software. (Erase all partitions) (cont'd)

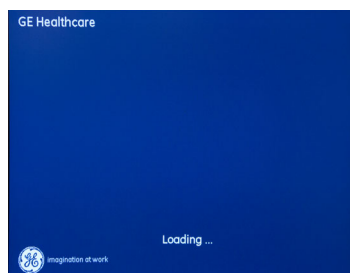
When the screen below is displayed, just wait, and the installation continues.

Figure 8-15 Ready to boot

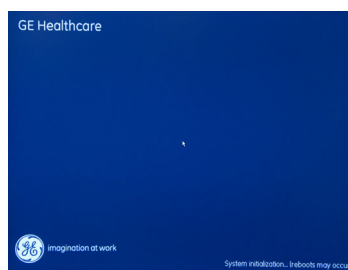


Several screens are displayed as illustrated below.

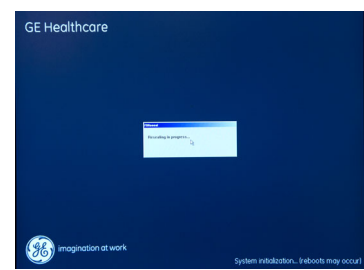
Figure 8-16 Booting ...



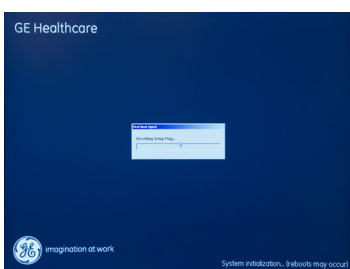
1.



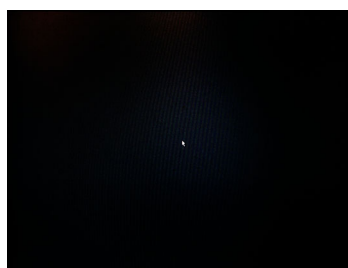
2.



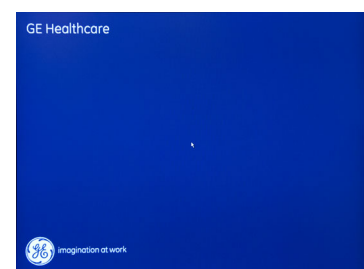
3.



4.



5.



6.

The VIVID E9 will then reboot once more, before it can continue.

8-4-10-5 Press A. Install System Software. (Erase all partitions) (cont'd)

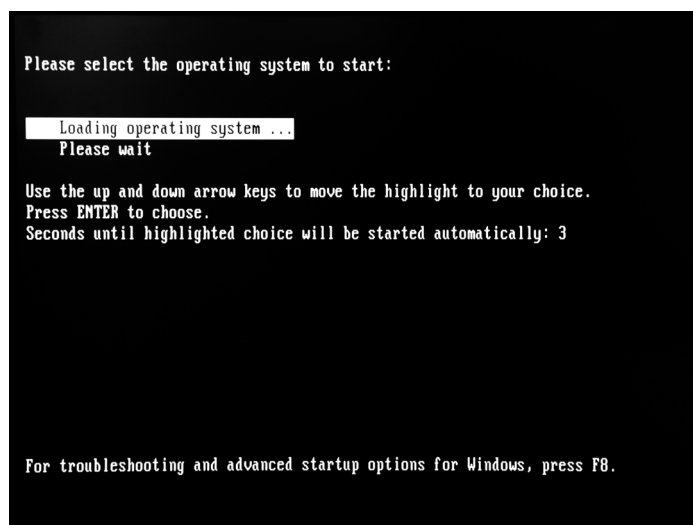
The monitor may display the message "No sync" for a few seconds before the BIOS Boot Screen is displayed.

Figure 8-17 BIOS Boot Screen (BEP6)



When the screen below is displayed, just wait, and the installation continues.

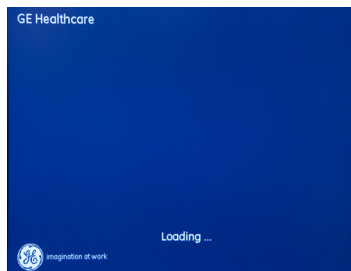
Figure 8-18 Ready to boot (once more)



8-4-10-5 Press A. Install System Software. (Erase all partitions) (cont'd)

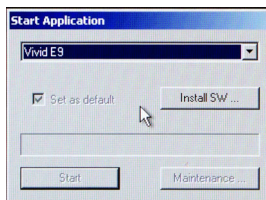
The booting continues.

Figure 8-19 Loading ...



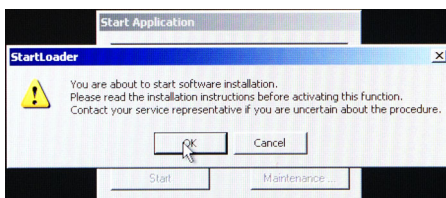
When booted, the Start Application dialog will display on the screen.

Figure 8-20 Start Application dialog



3.) Select **Install SW ...** to continue the installation.

Figure 8-21 StartLoader dialog - 1



4.) Select **OK**.

Figure 8-22 StartLoader dialog - 2

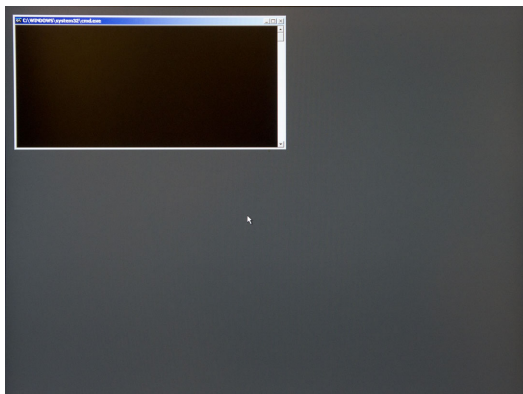


5.) Select **OK** once more.

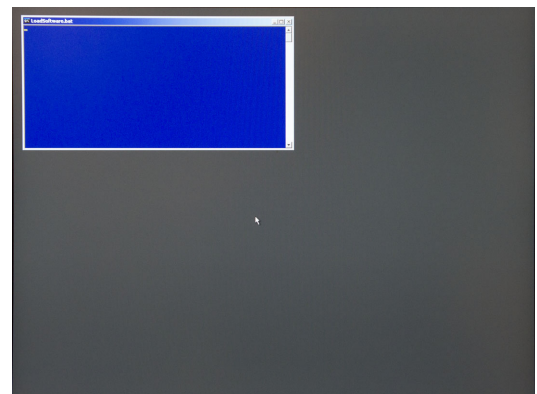
8-4-10-5 Press A. Install System Software. (Erase all partitions) (cont'd)

The **LoadSoftware.bat** file starts to run.

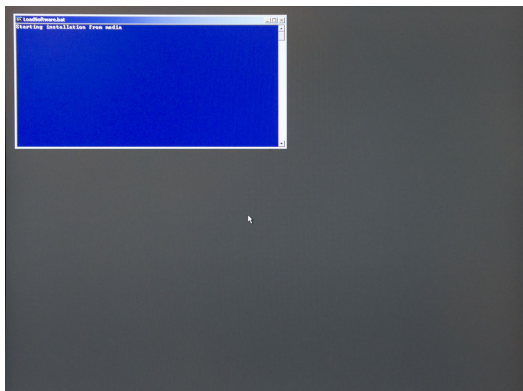
Figure 8-23 Starting the LoadSoftware.bat file



1.

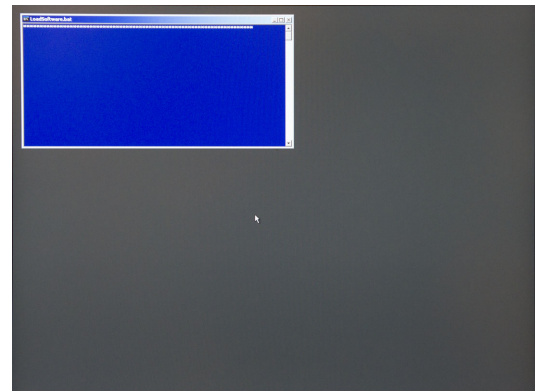


2.



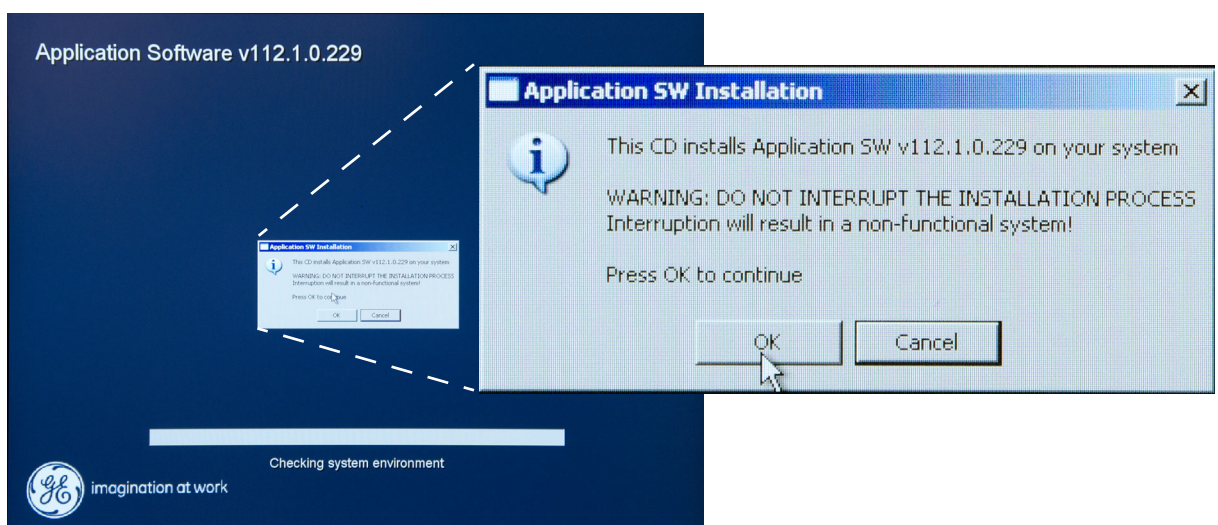
3.

(Text in screenshot: "Starting installation from media.")



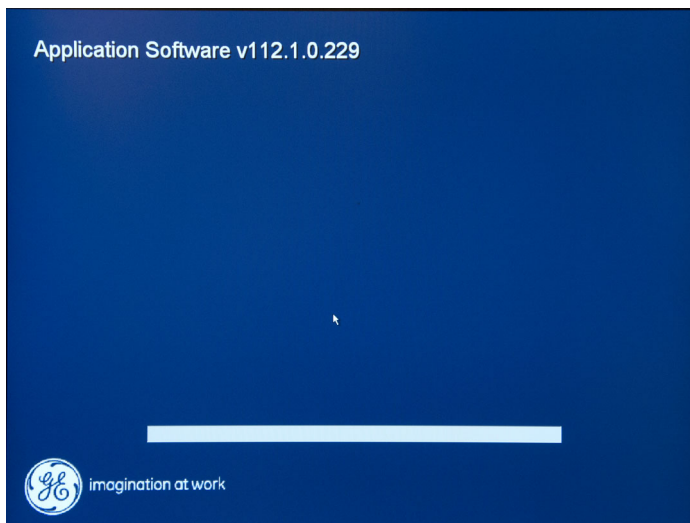
4.

Figure 8-24 Click OK to continue.



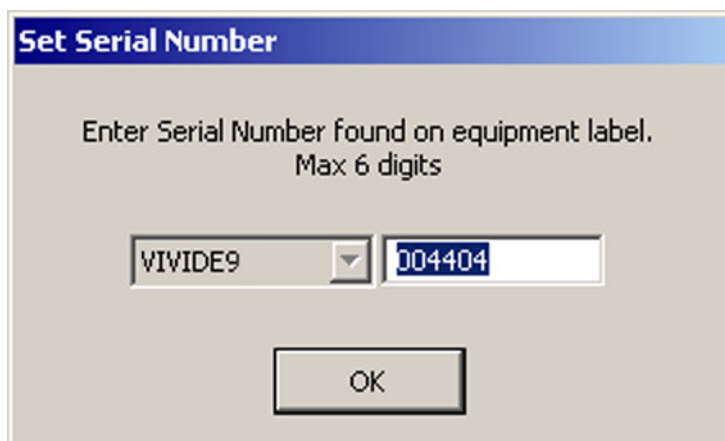
8-4-10-5 Press A. Install System Software. (Erase all partitions) (cont'd)

Figure 8-25 Preparing to load the Application software



NOTE: The next screen (Figure 8-26) will only be displayed if this is the first time the software is installed. i.e. after a HDD replacement. If the computer name has been generated previously, the pop-up screen in Figure 8-27 will be displayed.

Figure 8-26 Enter Serial Number



6.) Enter the VIVID E9's Serial Number. The Serial Number is located on a label at the rear of the VIVID E9.

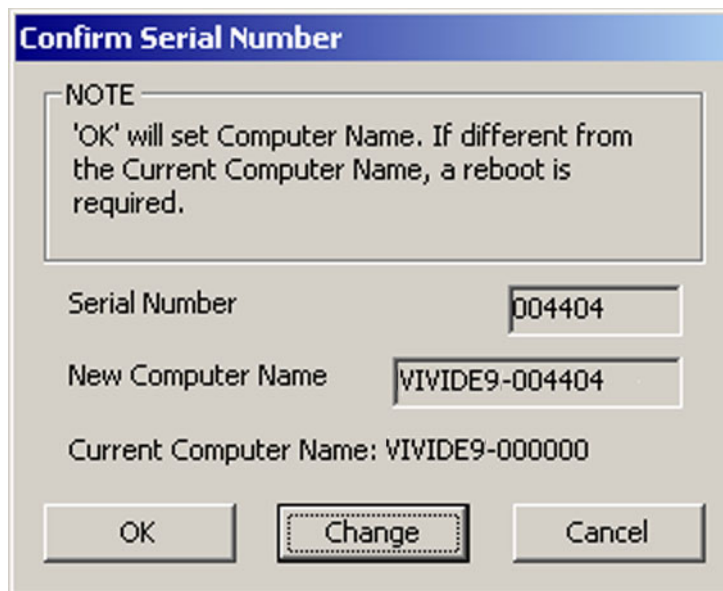
NOTE: You don't need to include the leading zeroes in the Serial Number. They will be automatically added.

Example: "4404" (Zeros will be added, so the result will be "004404")
The Serial Number is used when the Computer Name is generated.

8-4-10-5 Press A. Install System Software. (Erase all partitions) (cont'd)

In the next screen, you are prompted to confirm the serial number (and Computer Name).

Figure 8-27 Confirm the Serial Number



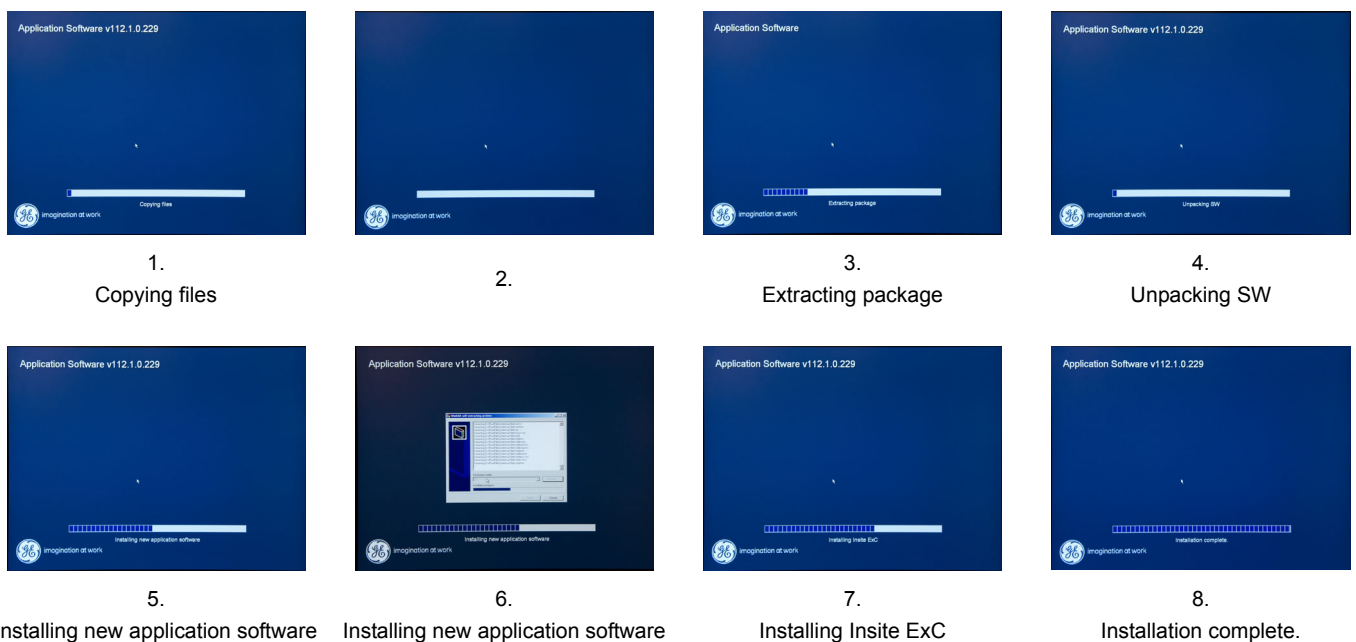
The dialog box titled "Confirm Serial Number" contains a "NOTE" section stating: "NOTE 'OK' will set Computer Name. If different from the Current Computer Name, a reboot is required." Below the note, there are three input fields: "Serial Number" with the value "004404", "New Computer Name" with the value "VIVIDE9-004404", and "Current Computer Name: VIVIDE9-000000". At the bottom, there are three buttons: "OK", "Change" (which is highlighted with a dashed border), and "Cancel".



CAUTION Computer Name must match original computer name. If changed, access to archived images from this system will be lost.

- 7.) Select **OK** to confirm that the **Serial Number** and **New Computer Name** is correct., or select **Change** if you want to change the Serial Number.
When confirmed, the software installation starts.

Figure 8-28 The next screens



Installing new application software

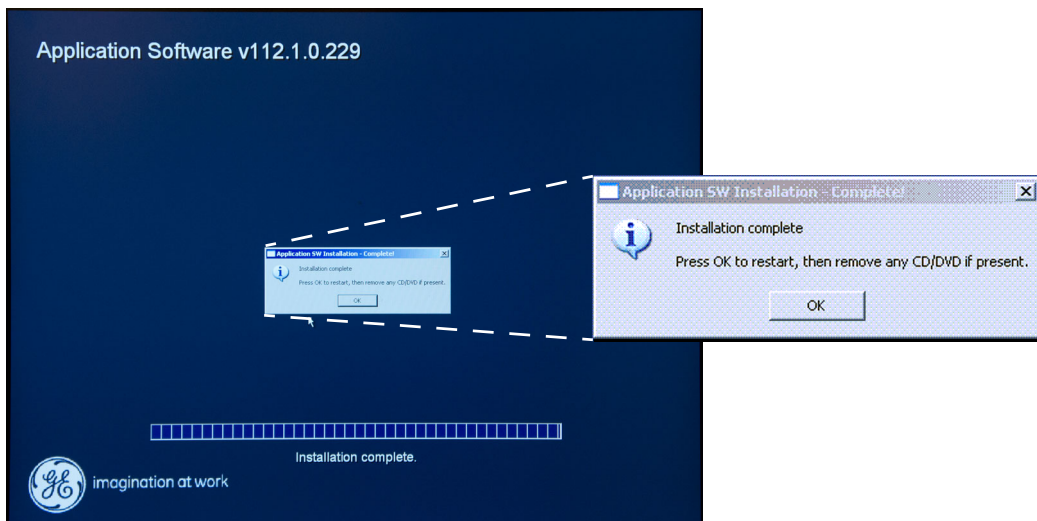
Installing new application software

Installing Insite ExC

Installation complete.

8-4-10-5 Press A. Install System Software. (Erase all partitions) (cont'd)

Figure 8-29 Installation complete. Press OK to restart.



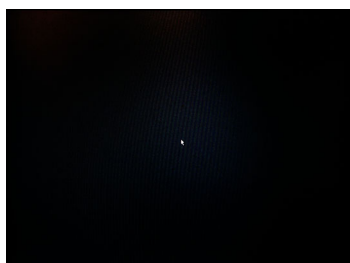
After the installation is complete, you are prompted to restart the VIVID E9, but remove the CD first.

- 8.) Remove the CD.
- 9.) Select **OK** to restart.

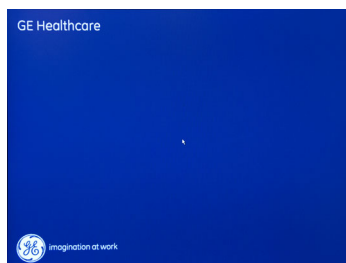
When you have selected OK to restart, the CD/DVD drawer will close, and the VIVID E9 will restart.

Several screens will display during this first boot from the installed software.

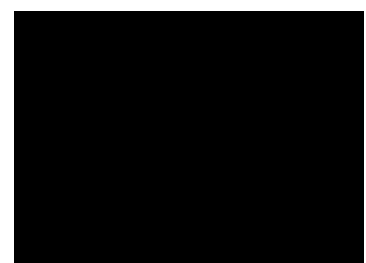
Figure 8-30 Screens during first boot



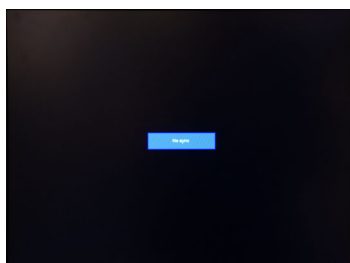
1.



2.



3.



4.



5.

- 8-4-10-5 Press A. Install System Software. (Erase all partitions) (cont'd)
The VIVID E9 boots.

Figure 8-31 The Application software starts



Soon, the **SW Licence dialog**, asking for the **Option Key**, is displayed.

Figure 8-32 SW Licence dialog, asking for the Option Key



- 10.)Type the **Option Key** and select **OK** to continue.
The VIVID E9 continue to boot.

11.)Next:

- If any Software Patches or Virus Hardening software CDs are available, continue with:
[8-4-10-7 "Loading Software Patches" on page 8-37.](#)
- Else, start setup as described in: [Section 3-8 "Configuration" on page 3-27.](#)

8-4-10-6 Press B. Repair/Upgrade Partitions C:\

Installing the System Software

Follow these steps to install the System Software:

- 1.) Select "B" to update the software on C:\.

Next, a screen with the following text is displayed:

"This will repair/upgrade partition C:

Are you really sure? y/n:"

- 2.) Select "y".

The System Software image file is being copied from the DVD to the repository. Due to the file size, this may take from 8 to 10 minutes.

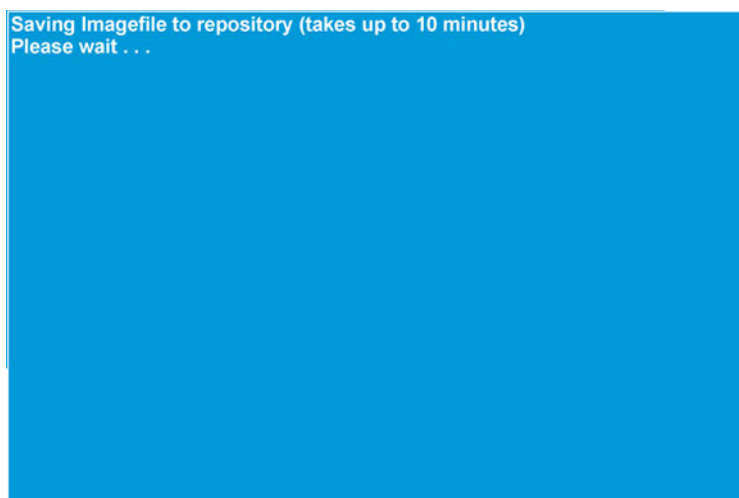


Figure 8-33 Copying System Software image file from DVD to Repository.

Next, the installation of the System Software starts.

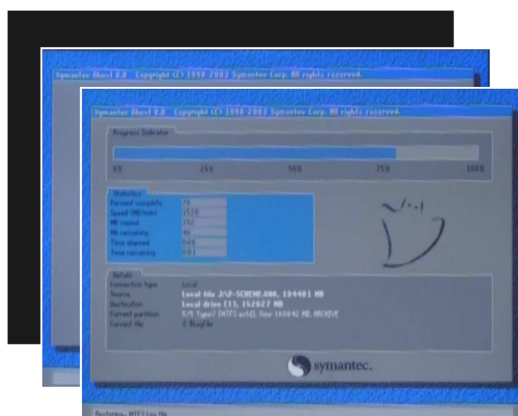


Figure 8-34 Installing the System Software

8-4-10-6 Press B. Repair/Upgrade Partitions C:\ (cont'd)

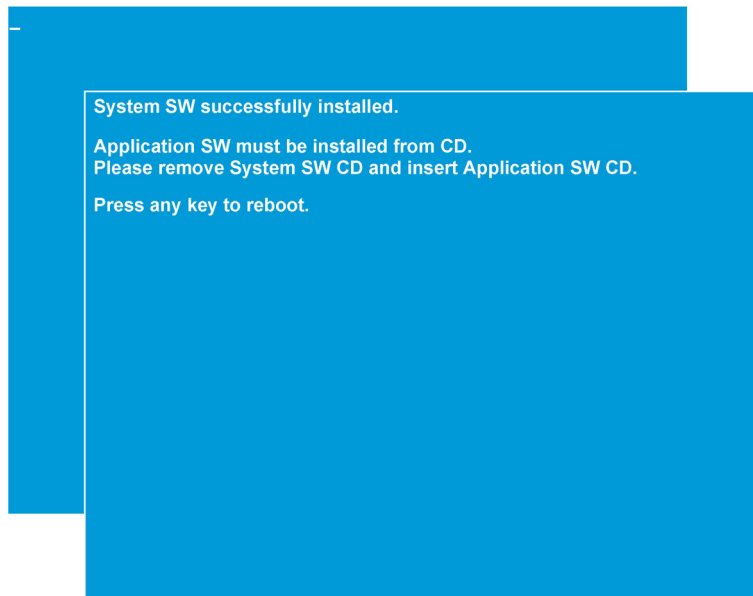


Figure 8-35 Prepare for application software installation

Installing the Application Software

Follow these steps to install the Application Software:

- 1.) Remove the System Software DVD.
- 2.) Insert the Application Software CD.
- 3.) Press a key on the keyboard to reboot.

After several minutes, and after an additional automatic reboot, a dialog box is displayed on the screen.

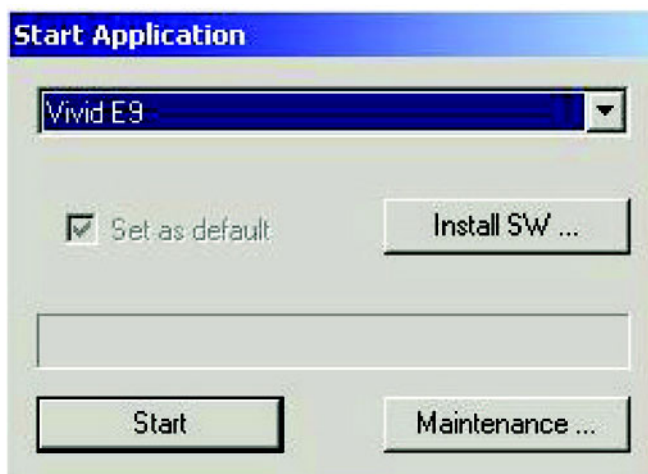


Figure 8-36 Select "Install SW ..."

- 4.) Select **Install SW ...**
Next, the Start Loader screen is displayed.

8-4-10-6 Press B. Repair/Upgrade Partitions C:\ (cont'd)



Figure 8-37 Select "OK"

5.) Select **OK** to confirm the software installation.



Figure 8-38 Select "OK" to start the software installation

6.) Select **OK** to start the software installation.

Next, the Application SW Installation warning is displayed on the screen.



Figure 8-39 Select "OK"

7.) At the prompt, select **OK** to confirm that you will continue the installation.



**WARNING DO NOT INTERRUPT THE INSTALLATION PROCESS.
INTERRUPTION WILL RESULT IN A NON-FUNCTIONAL SYSTEM!**

8-4-10-6 Press B. Repair/Upgrade Partitions C:\ (cont'd)

In the next screen, you are prompted to confirm the serial number (and Computer Name).

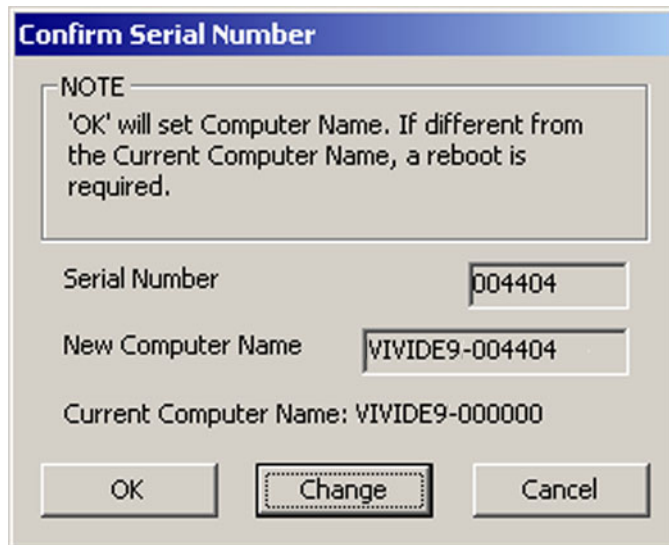


Figure 8-40 Confirm the Serial Number

- 8.) Select **OK** to confirm that the Serial Number is correct, or select **Change** if you want to change the Serial Number.



CAUTION Computer Name must match original computer name. If changed, access to archived images from this system will be lost.

When confirmed, the unpacking of the software starts.

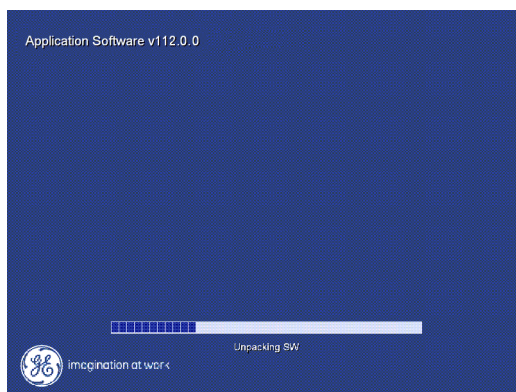


Figure 8-41 Unpacking the software

When the software has been unpacked, the installation of the Application software starts.

8-4-10-6 Press B. Repair/Upgrade Partitions C:\ (cont'd)

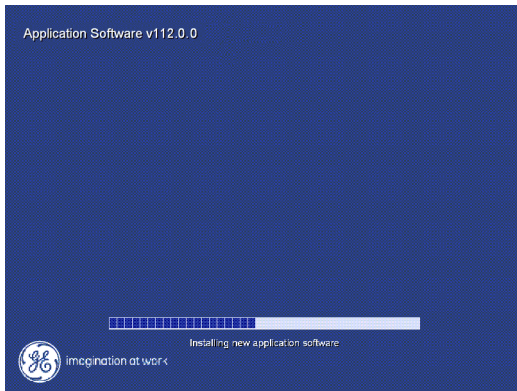


Figure 8-42 Installing the Application software

When the Application software has been installed, the InSite ExC software is installed.

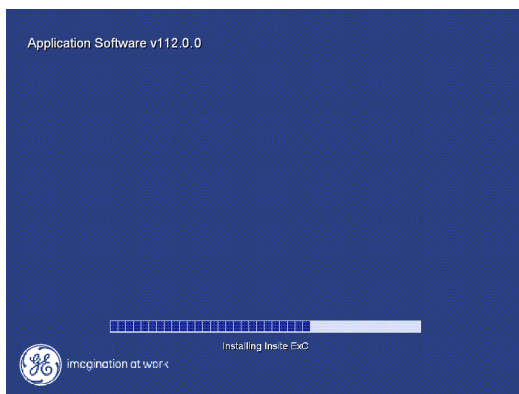


Figure 8-43 Installing the InSite ExC software

After the InSite ExC software has been installed, the installation is complete and you are prompted to restart the Vivid E9.

9.) Remove the CD from the DVD/CD drive.

10.) Select **OK** to restart.

When you have selected OK to restart, the CD/DVD drawer will close, and the Vivid E9 will restart.

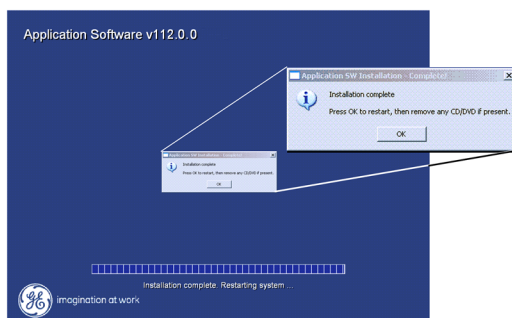


Figure 8-44 Installation complete. Restart the Vivid E9 and remove the CD.

8-4-10-7 Loading Software Patches

If a CD with a software patch is included, insert the disc in the drive, restart the VIVID E9 and follow the on-screen instructions.

Please continue with [8-4-12 "Verifications after the software has been re-loaded" on page 8-37](#).

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 8-37](#).

- 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/User Guide.
- 2.) With your recordings from before the software loading, available, continue with the setup instructions starting in: [Section 3-8 "Configuration" on page 3-27](#). Correct the settings as needed.
- 3.) Continue with: [Section 3-10 "Connectivity setup" on page 3-41](#). Based on your recordings, correct the settings as needed.
- 4.) Continue with: [Section 3-11 "Options Setup" on page 3-49](#). 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 8-37](#).

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 3-8 "Configuration" on page 3-27](#). Correct the settings if needed.
- 2.) Continue with: [Section 3-10 "Connectivity setup" on page 3-41](#). Based on your recordings, correct the settings if needed.
- 3.) Continue with: [Section 3-11 "Options Setup" on page 3-49](#). 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.

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.



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.
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
- 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.*

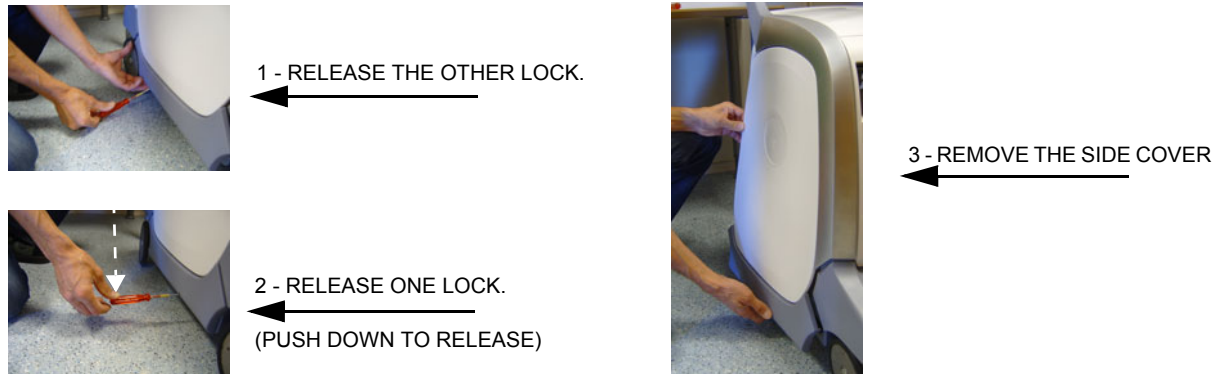
The Side Covers are “clicked” on to the VIVID E9 with two locks, located at the lower end of the cover. Two rectangular holes give access to the locks. By inserting a #1 Phillips screwdriver (10 - 16 cm / 4 - 6 inch length) (or similar size and length tool) into the holes and bending the handle on the 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 8-45 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.
- 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 8-46 Side Cover removed

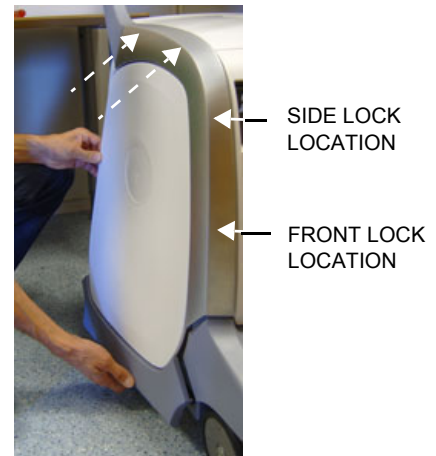
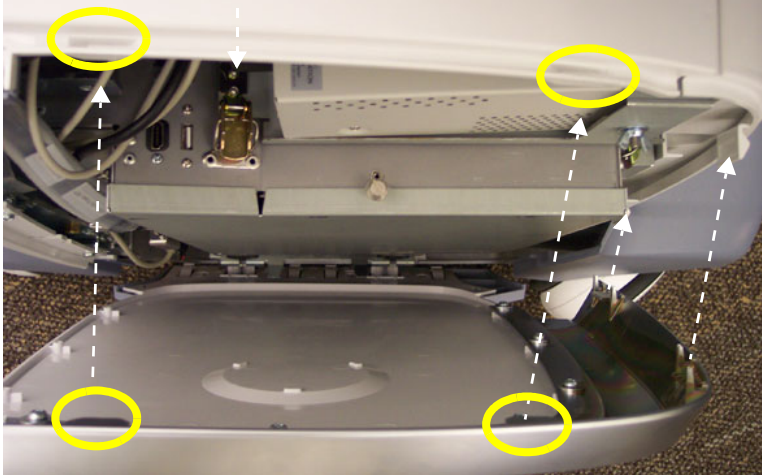


8-5-2-3 Side Covers installation

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 8-47 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.



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.
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.

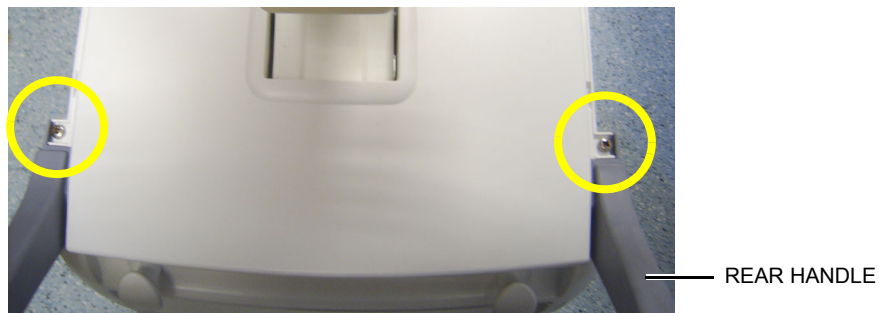
- 1.) Power down the VIVID E9
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Side Covers.

8-5-3-2 Top Cover removal procedure

Follow these steps to remove the Top Cover:

- 1.) Remove two screws.

Figure 8-48 Top Cover fixing screws (seen from above)



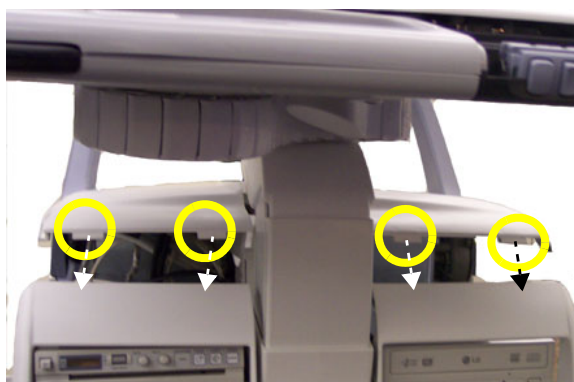
- 2.) Remove the Top Cover.

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 8-49 Hook Top Cover onto Front Cover (seen from front)



- 2.) Hook Top Cover onto Front Cover.

Figure 8-50 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.*



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.
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
- 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.



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.
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
- 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 8-51), 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 8-51 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.



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.
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.
- 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 8-52 Fixing screws



- 2.) Pull the upper end of the Front Cover out and upwards to free it from the pedals and the frame.

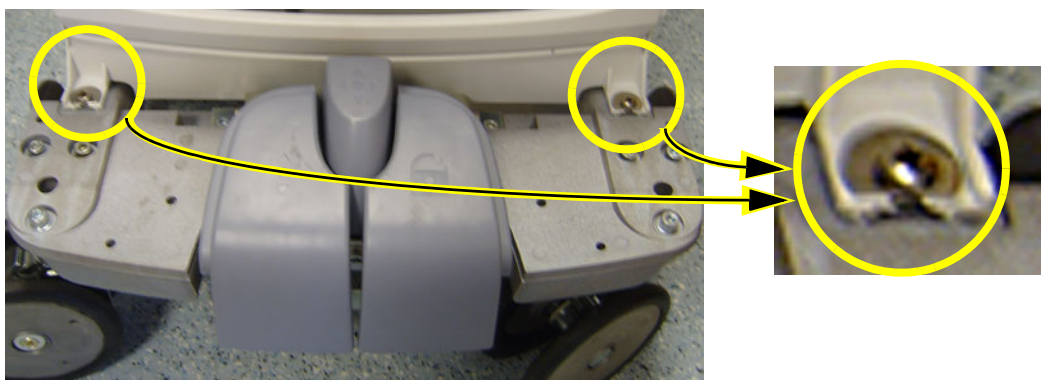
8-5-6-3 Front Cover installation

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 8-53 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.



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.
 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.
- 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:



CAUTION



**ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.
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
- 2.) Disconnect the Mains Power Cable from the wall outlet.

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.



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.
 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.

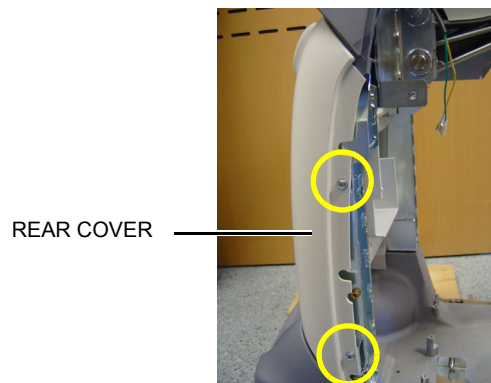
- 1.) Power down the VIVID E9
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove both Side Covers.
- 5.) Remove the Rear Bumper.
- 6.) Remove Filter Cover at rear.
- 7.) Remove Filter.

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 8-54 Rear Cover fixing screws



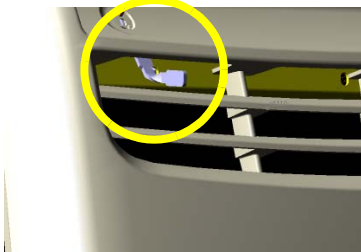
8-5-9-3 Rear Cover installation

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 frame.
- 2.) Tilt the top edge of the Rear Cover toward the VIVID E9 frame.

Be sure the Z mechanism's manual release handle extends through the air vent on the Rear Cover.

Figure 8-55 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.*



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.
 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.

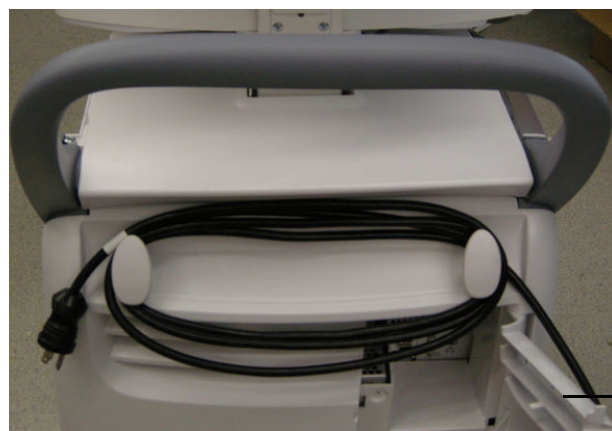
- 1.) Power down the VIVID E9
- 2.) Disconnect the Mains Power Cable from the wall outlet.

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, push a 4 mm flat blade screwdriver into the rectangular hole at the Door I/O panel until it reaches the lock mechanism.

Figure 8-56 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 8-57 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:

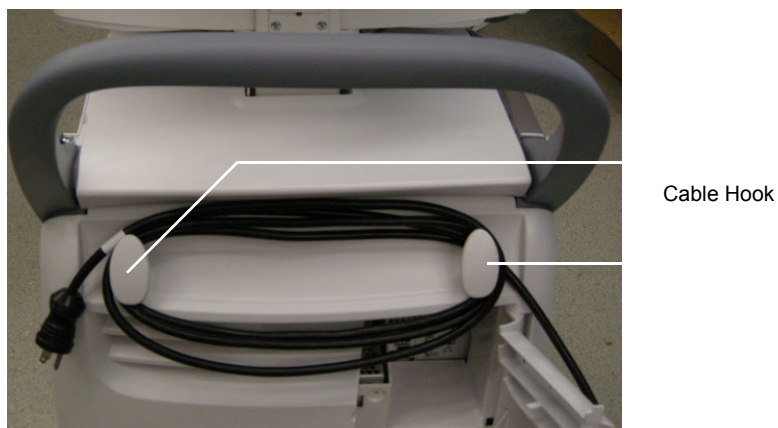
- 1.) Power down the VIVID E9
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Remove the Side Covers.
- 4.) Remove the Rear Bumper.
- 5.) Remove Filter Cover at rear.
- 6.) Remove Filter.
- 7.) Remove the Top Cover.
- 8.) Remove the Rear Cover.

8-5-11-2 Cable Hook removal

Follow these steps to remove the Cable Hook:

- 1.) Locate the Cable Hook(s).

Figure 8-58 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 8-59 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.



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.
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.

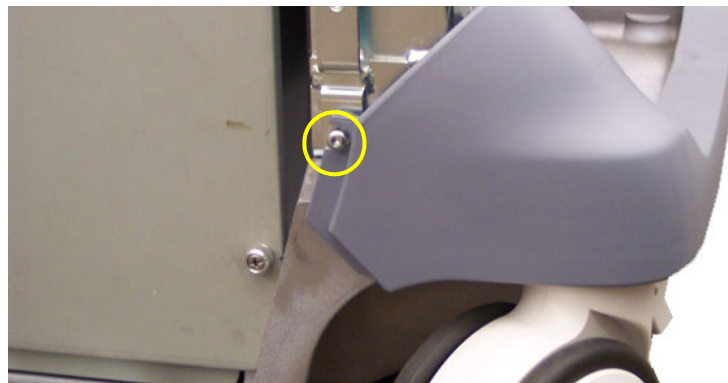
- 1.) Power down the VIVID E9
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove Side Covers.
- 5.) Remove Rear Cover.

8-5-12-2 Rear Bumper removal procedure

Follow these steps to remove the Rear Bumper:

- 1.) Remove one screw on each side of the VIVID E9.

Figure 8-60 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.



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.
 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
- 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

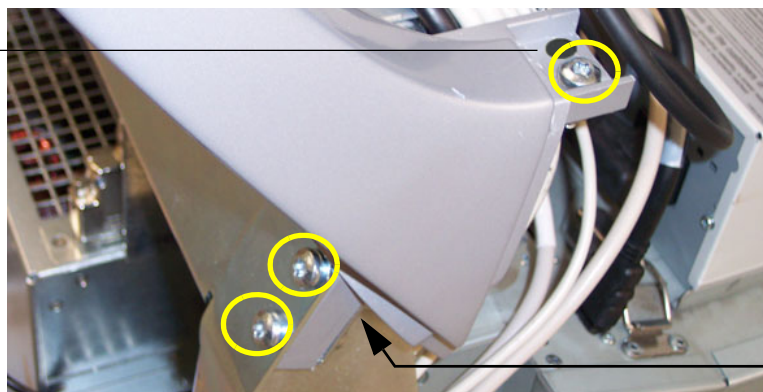
Follow these steps to remove the Rear Handle:

- 1.) Remove the 2 upper screws, one on each side.
- 2.) Remove the 4 lower screws, two on each side.

Figure 8-61 Three screws on each side (left side illustrated)

TOP COVER
SCREW REMOVED

2 OF 4
SCREWS



LEFT UPPER
SCREWS USED TO
SECURE THE REAR
HANDLE

AREA SUPPORTED
WHEN
SCREWS ARE IN
PLACE

- 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.



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.
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.



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.
 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.

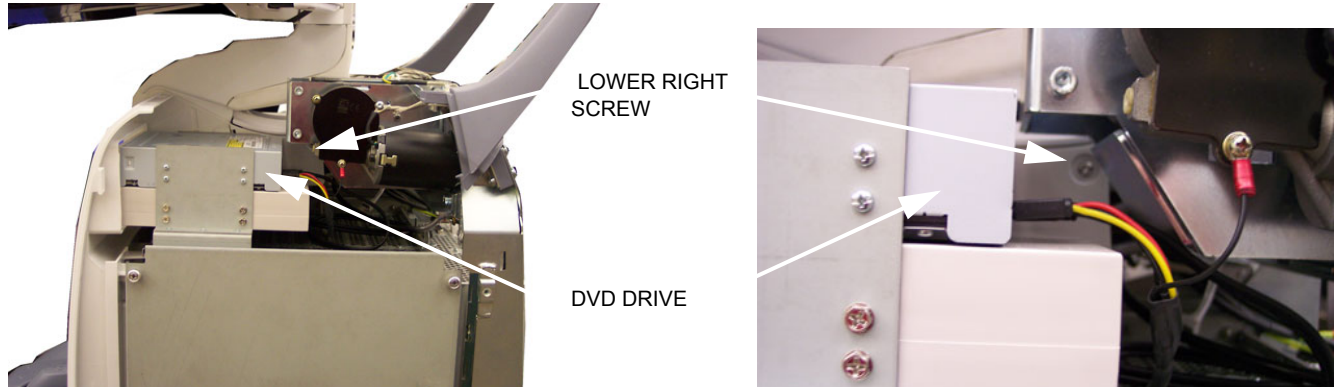
- 1.) Shut down the VIVID E9.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Side covers.
- 5.) Remove the Top Cover.

8-5-14-2 Column Cover Assembly removal

Follow these steps to remove the Column Cover Assembly:

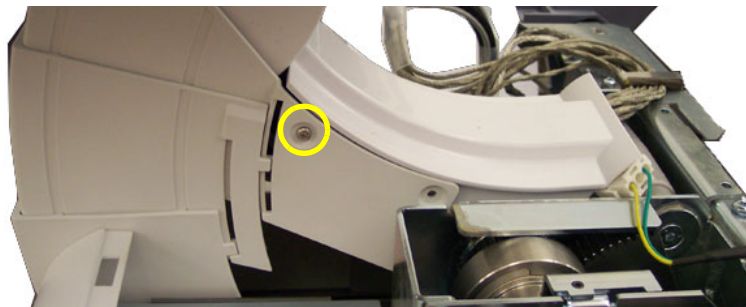
- 1.) Lower the console to lowest possible level.
- 2.) Remove the lower screw on the right side that is visible near the rear of the DVD drive.

Figure 8-62 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 8-63 With console raised, upper right side screw placement



- 5.) Remove the 2 screws on the left side that secure the Column Cover Assembly.

Figure 8-64 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 8-65 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.



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.
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
- 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.

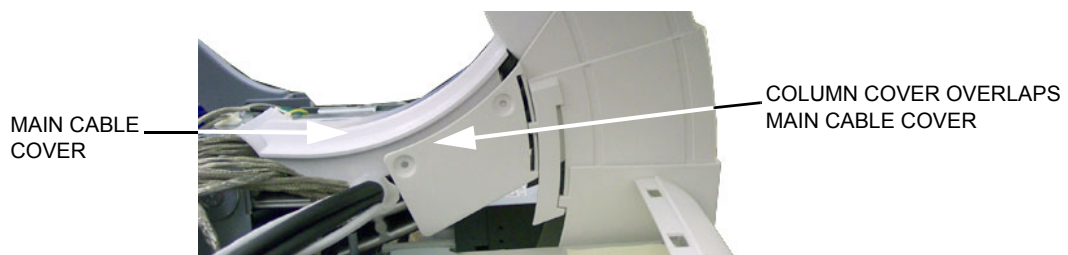
NOTE: *To get access to the screws on the other side (not illustrated), you must move the Top Console to its lower position.*

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 8-66 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 8-66](#)).
- 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 8-62 "With console lowered, lower right side screw placement" on page 8-63](#)).
- 4.) Position the lower Column Cover tab inside the Front Cover.

Figure 8-67 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.



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.
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.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.

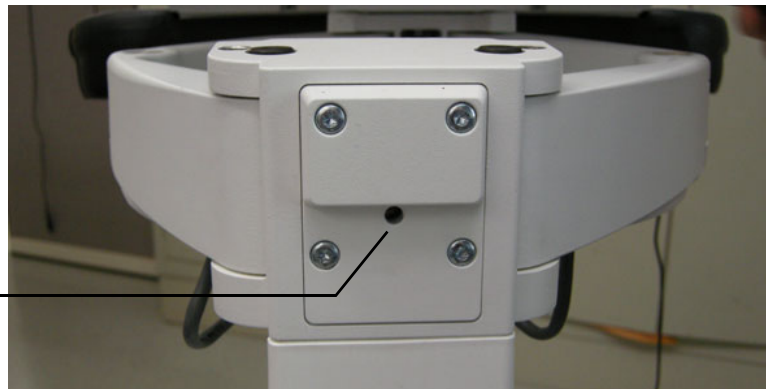
8-5-16-2 Covers under XY / Frogleg motors removal procedure

Follow these steps to remove the Covers under XY / Frogleg motors:

- 1.) At the rear of the VIVID E9, 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 8-68 XY mechanism release

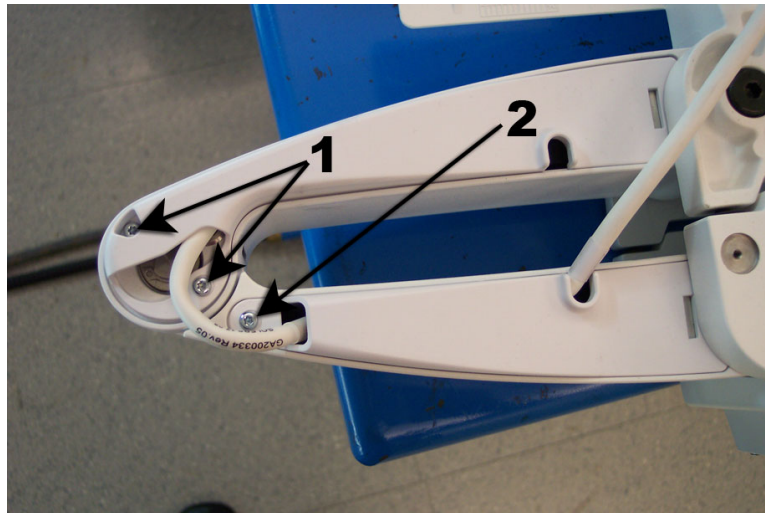
XY
(FROGLEG)
RELEASE



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.

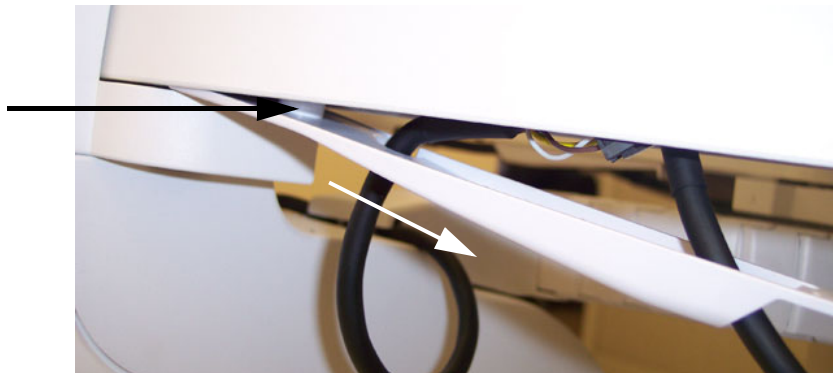
Figure 8-69 XY / Frogleg mechanism covers, right side frog leg, from underneath



- 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 8-70 Pull down and slide XY cover out

PLASTIC MUST
CLEAR FOR THE
COVER TO
RELEASE AND
SLIDE OUT

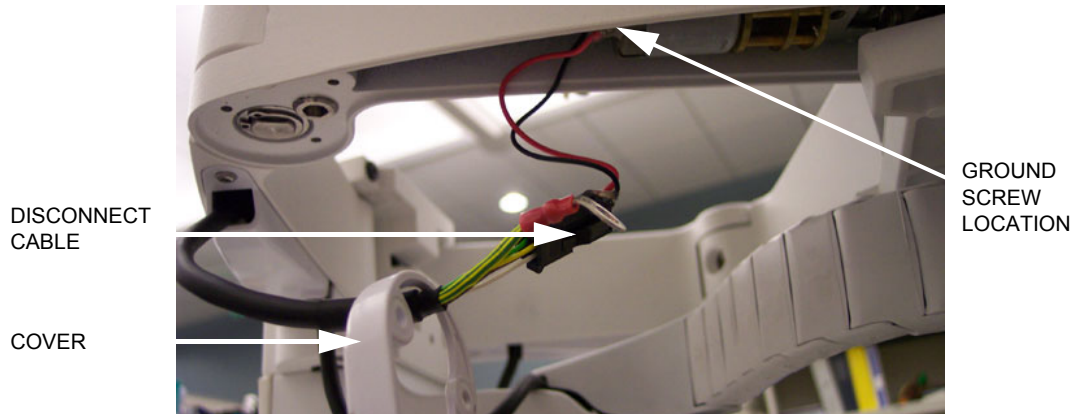


- 5.) Disconnect the cable.

8-5-16-2 Covers under XY / Frogleg motors removal procedure (cont'd)

- 6.) Remove the screw securing the ground.

Figure 8-71 Pull down and slide XY cover out



- 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'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.

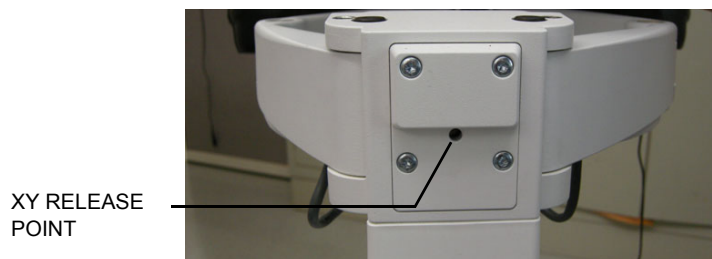


WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
 2. TURN OFF THE BREAKER.
 3. UNPLUG THE VIVID E9.
 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.

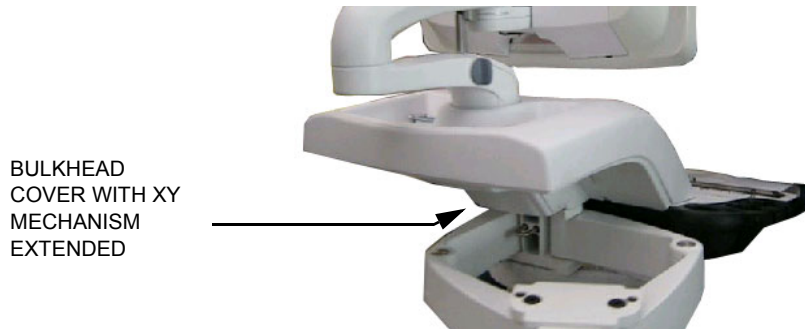
- 1.) Power down the VIVID E9.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) At the rear of the VIVID E9, release the console's frogleg mechanism by inserting a screwdriver into the release point and pressing until release. Pull the console out to its extended position to gain access to the screws in the next step.

Figure 8-72 XY / Frogleg mechanism release



8-5-17-1 Preparations (cont'd)

Figure 8-73 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 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 8-74 Upper tab lock placement on Bulkhead Cover

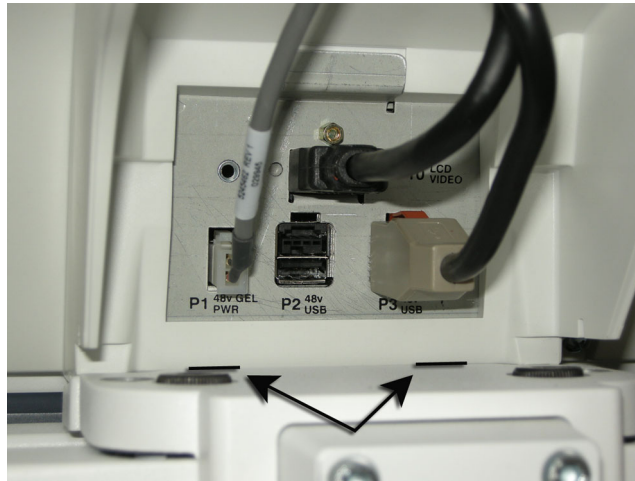


- 2.) Pull the Bulkhead Cover away from the VIVID E9.

8-5-17-2 Remove the Bulkhead Cover (cont'd)

Figure 8-75 Bulkhead Cover removed

BULKHEAD
COVER
LOWER TAB
LOCKS



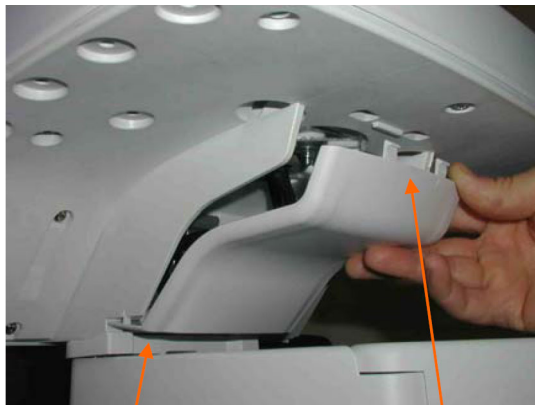
8-5-17-3 Install the Bulkhead Cover

Follow these steps to install the Bulkhead Covers:

- 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 8-76 Install Bulkhead Cover



MOUNTING ANGLE

Tab locks

- 2.) Push the two upper tab locks into the openings in the Frame UI Carrier.

Section 8-6 Top Console Parts Replacement

8-6-1 Purpose of this section

This section describes how to replace the Top Console parts.

8-6-2 Replacing the 17" LCD Monitor assembly

8-6-2-1 Preparations

When preparing for the replacement, you must perform the following steps:



WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.



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.
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.
- 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.

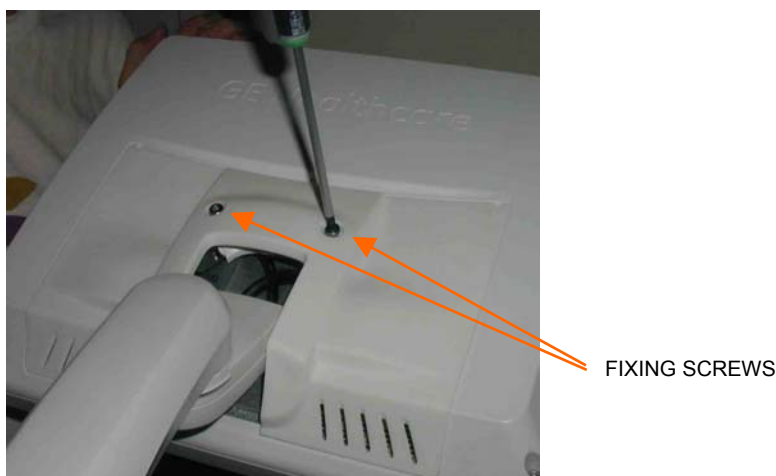
8-6-2-2 Remove the 17" LCD Rear Cover

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 8-77 LCD Monitor assembly - rear view

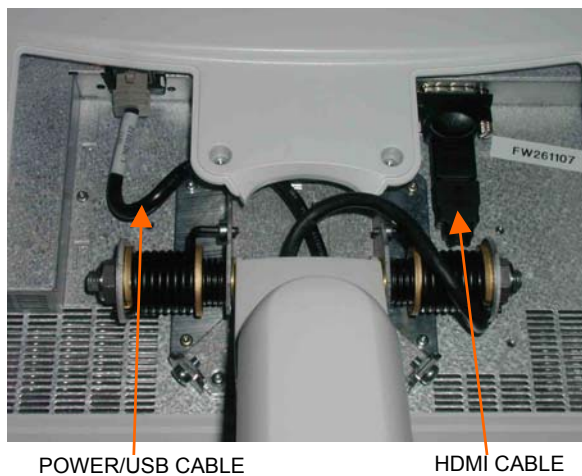


- 2.) Unscrew the two fixing screws on the rear side of the LCD Monitor assembly.
- 3.) Remove the LCD Rear Cover and place it on a safe place.

8-6-2-3 Disconnect the 17" LCD Monitor Cables

- 1.) Disconnect the two cables.

Figure 8-78 Disconnect cables

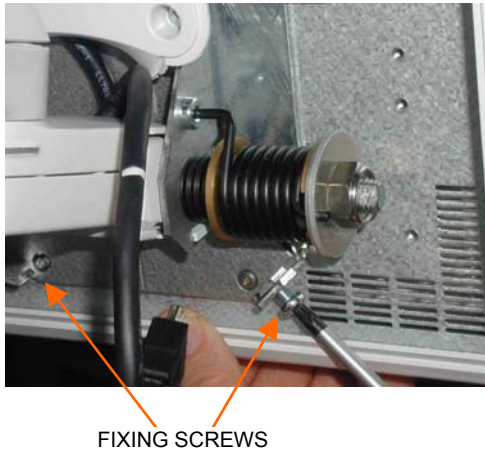


- 2.) Tilt the monitor back to vertical position.

8-6-2-4 Remove the 17" LCD Monitor assembly

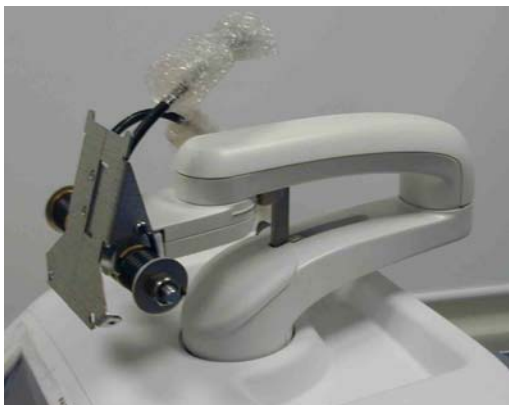
Two screws are used for fixing the LCD Monitor assembly to the LCD Arm Bracket.

Figure 8-79 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 8-80 LCD Bracket

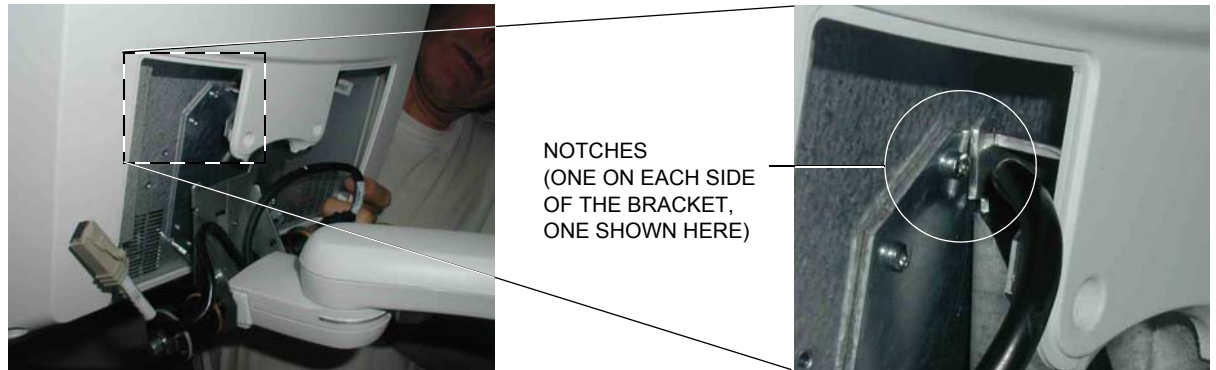


8-6-2-5 Install the 17" LCD Monitor

Follow these steps to install the LCD Monitor:

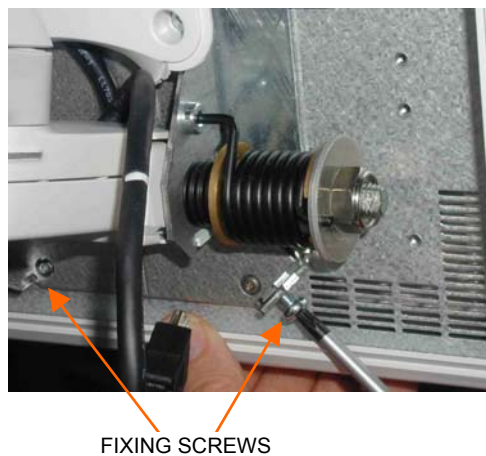
- 1.) Place the LCD assembly onto the LCD Arm Bracket. Be sure that the notches in the LCD fixing bracket is well aligned onto the corresponding positions on the LCD Arm Bracket.

Figure 8-81 Install the LCD Monitor



- 2.) Install the two screws (M5x8, Torque: 5.7 Nm).

Figure 8-82 Two fixing screws

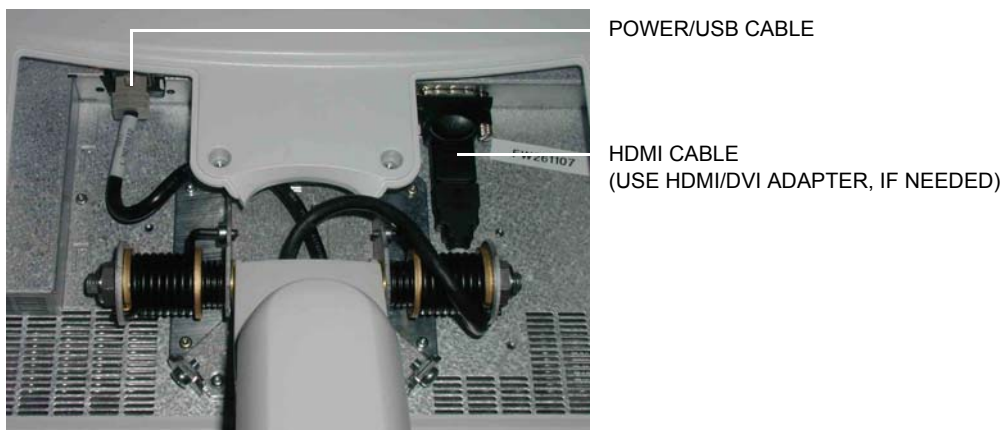


- 3.) Tilt the monitor to horizontal position.

8-6-2-5 Install the 17" LCD Monitor (cont'd)

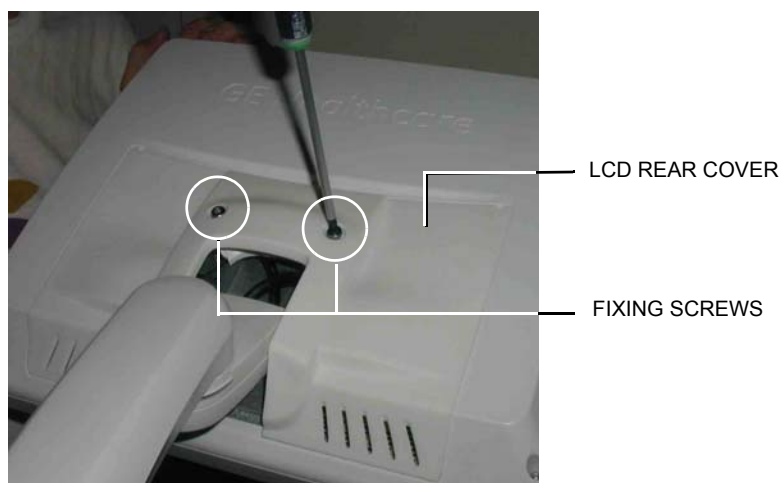
4.) Connect the two cables. Arrange the cables as illustrated in [Figure 8-83 - Connect cables](#).

Figure 8-83 Connect cables



5.) Install the LCD Rear Cover and fasten it with the fixing screws.

Figure 8-84 LCD Monitor - Rear View



8-6-3 Replacing the 19" LCD Monitor assembly

8-6-3-1 Manpower

One person, 15 minutes

8-6-3-2 Tools

For tools needed, please refer to: [8-2-5 "Tools needed for servicing VIVID E9" on page 8-4.](#)

8-6-3-3 Preparations

When preparing for the replacement, you must perform the following steps:



WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.



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.
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.
- 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.

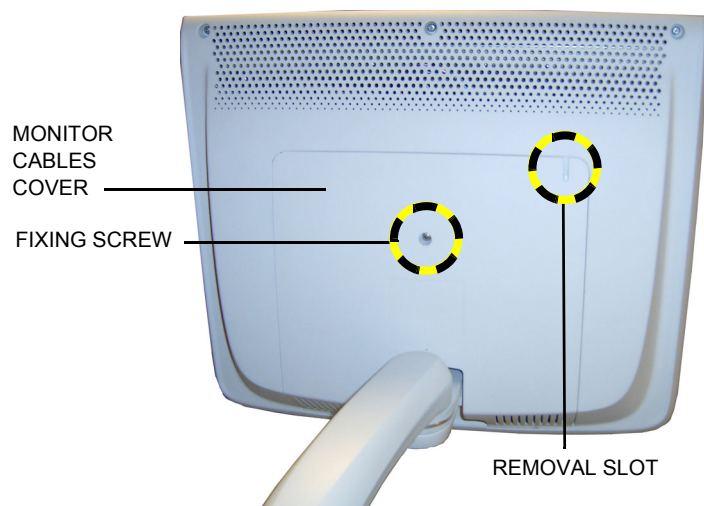
8-6-3-4 Remove the 19" LCD Monitor Cables Cover

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 8-85 LCD Monitor assembly- rear view



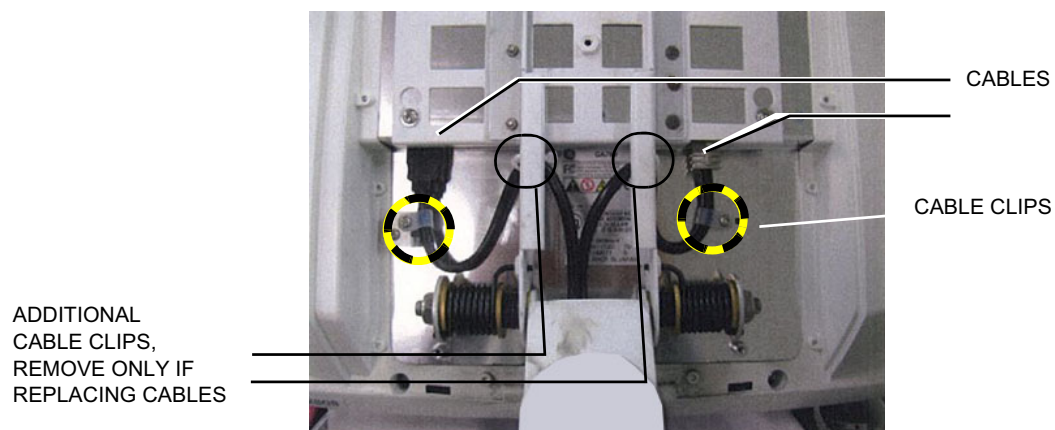
- 2.) Unscrew the fixing screw on the rear side of the LCD Monitor assembly.
- 3.) Remove the Monitor Cables Cover. Carefully insert a screwdriver into the Removal Slot" to separate the cover from the LCD Monitor assembly.
- 4.) Lift the cover away and place it on a safe place.

8-6-3-5 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.*

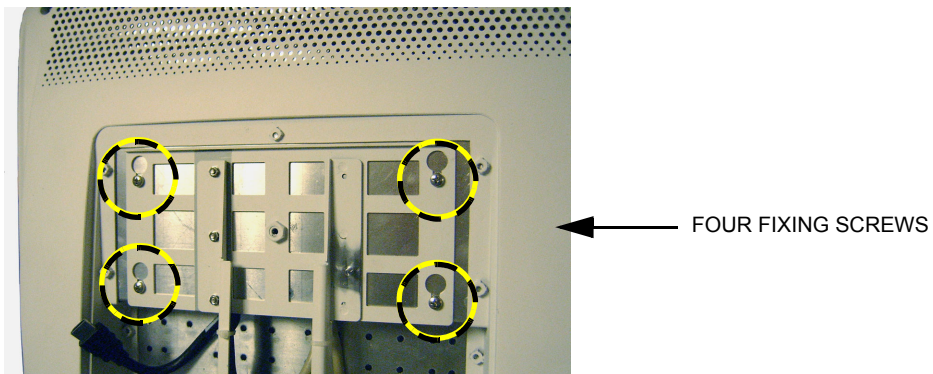
Figure 8-86 Disconnect cable clips and cables



8-6-3-6 Remove the 19" LCD Monitor assembly

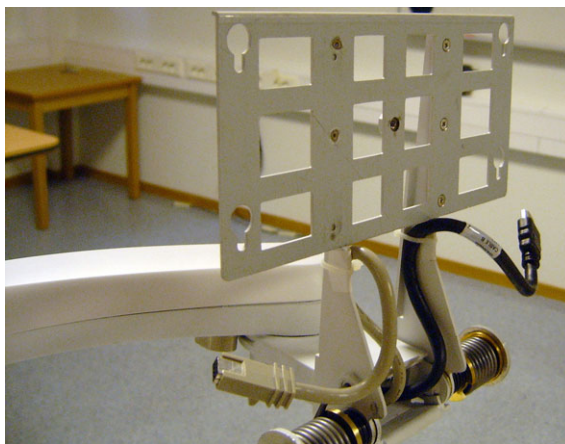
Four screws are used to hold the LCD Monitor assembly to the Monitor Bracket.

Figure 8-87 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 8-88 Monitor Bracket

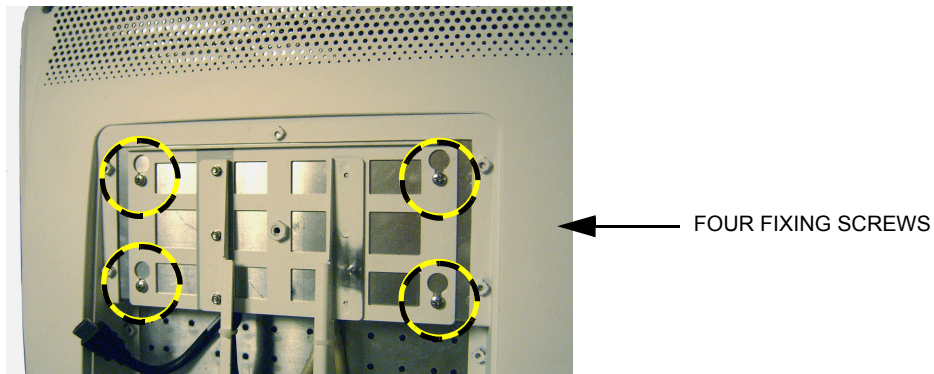


8-6-3-7 Install the 19" LCD Monitor assembly

Follow these steps to install the LCD Monitor:

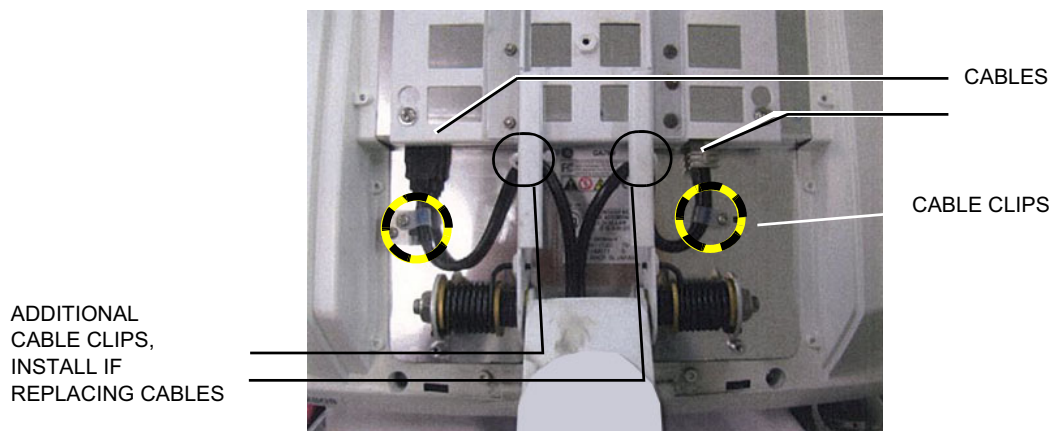
- 1.) Install the LCD Monitor assembly on the Monitor Bracket. Verify that all four fixing screws have engaged in their slots.
- 2.) Tighten the four screws.

Figure 8-89 Four fixing screws



- 3.) Tilt the monitor to horizontal position.
- 4.) Connect the cables.
- 5.) Connect the cable clips, if present.

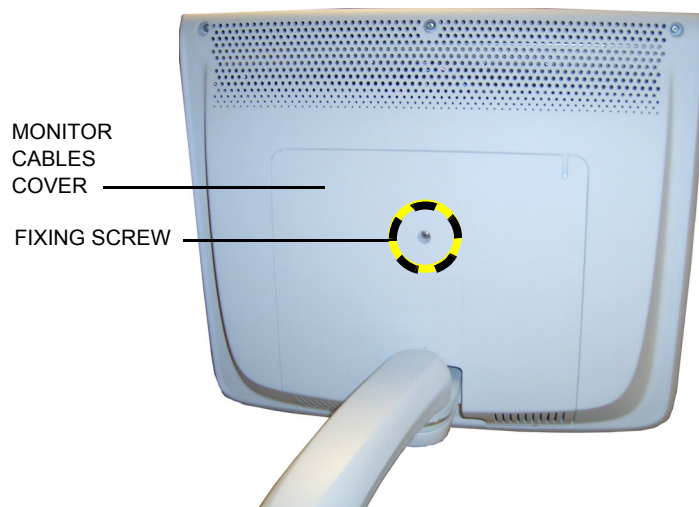
Figure 8-90 Connect cables



8-6-3-8 Install the Monitor Cables Cover

- 1.) Install the Monitor Cables Cover and fasten it with the fixing screw.

Figure 8-91 LCD Monitor - rear view



8-6-4 Replacing the LCD Arm assembly

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.



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.
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.

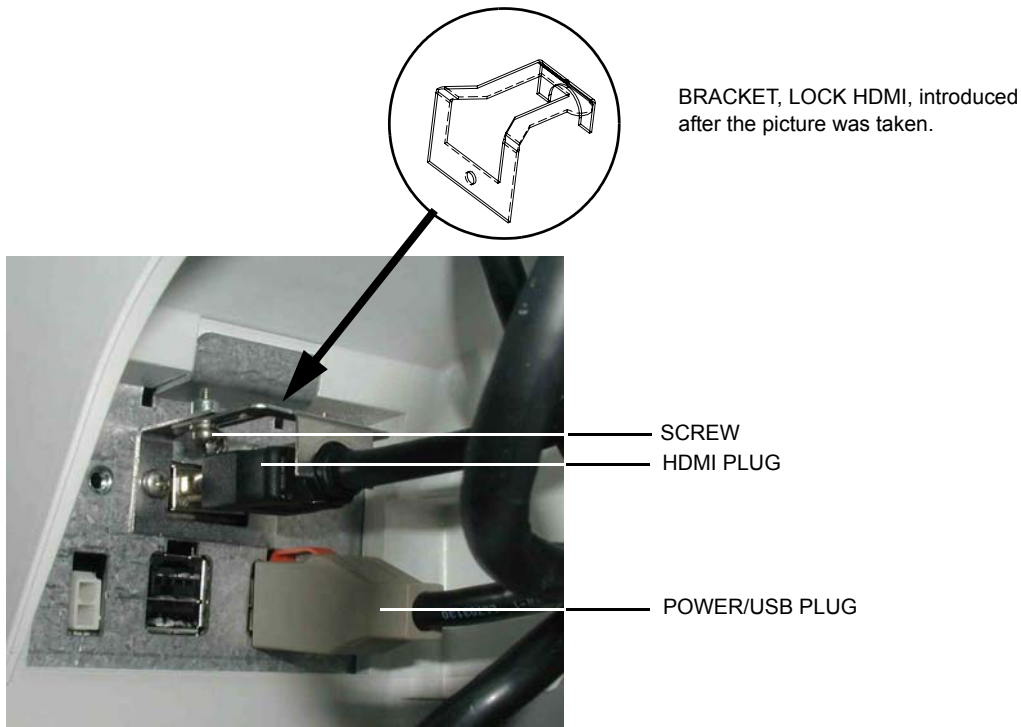
- 1.) Power down the VIVID E9
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the LCD Monitor assembly.
- 5.) Remove the Bulkhead cover.

8-6-4-2 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 8-92 LCD Cables at Bulkhead

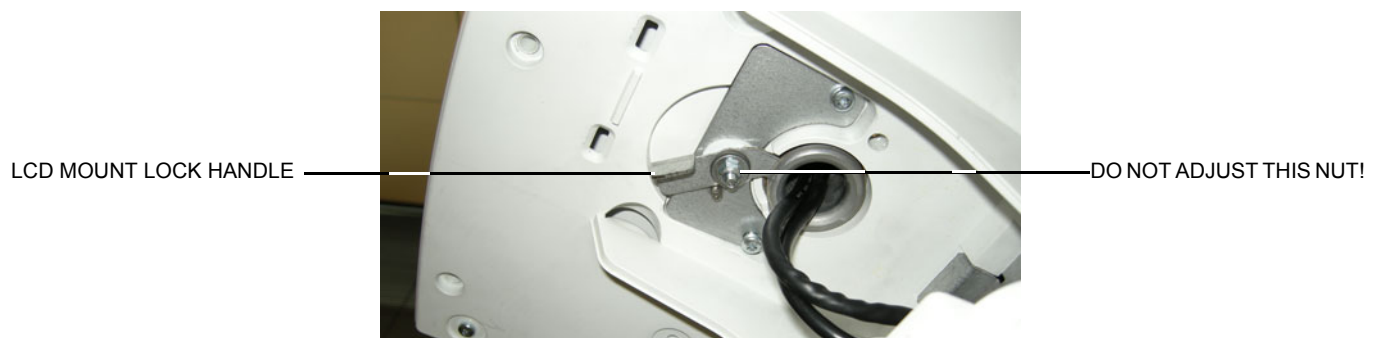


- 2.) Bend the HDMI Connector Lock upwards, then disconnect the HDMI plug.

8-6-4-3 Remove the LCD Arm assembly

Follow these steps to remove the LCD Arm assembly:

Figure 8-93 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.

8-6-4-4 Install the LCD Arm assembly

Follow these steps to install the LCD Arm Assembly:

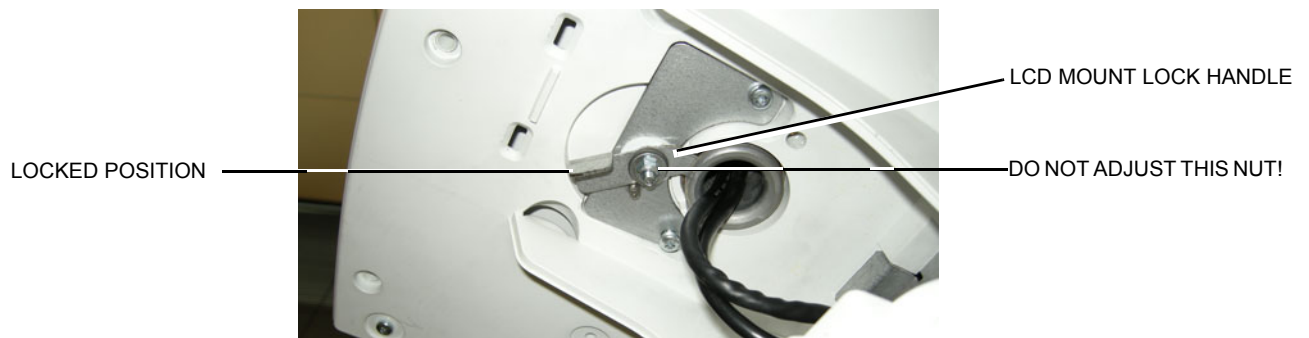
- 1.) Carefully install the LCD Arm assembly into position, first feeding the LCD Arm cables down through the console opening.

Figure 8-94 LCD Arm installed onto the UI Frame Upper (Arm for 17" screen illustrated)



- 2.) Push the LCD Mount Lock Handle into locked position.

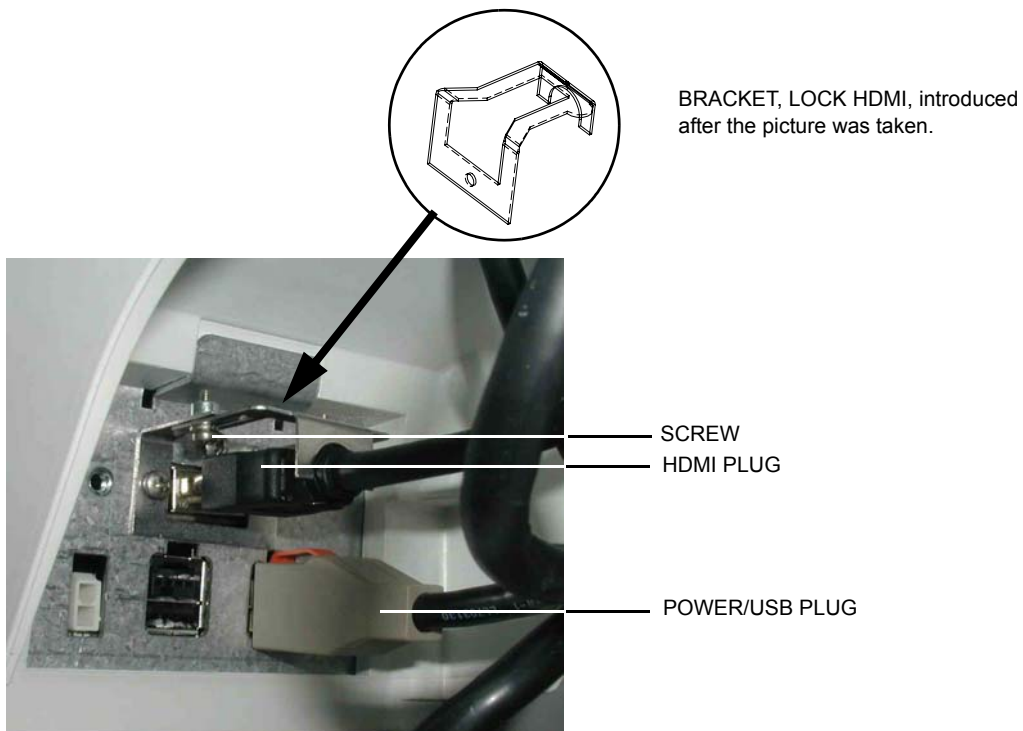
Figure 8-95 LCD Mount Lock Handle



8-6-4-4 Install the LCD Arm assembly (cont'd)

- 3.) Connect the LCD cables to the connectors on the Bulkhead.

Figure 8-96 Bulkhead board connections



- 4.) Install the Bulkhead Cover.

- 5.) Install the LCD monitor:

8-6-4-5 Calibration and adjustments

See: [Section 6-4 "Backlight adjustment" on page 6-5](#) for LCD Monitor calibration instructions.

8-6-5 Replacing the LCD Cables

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.



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.
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
- 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.

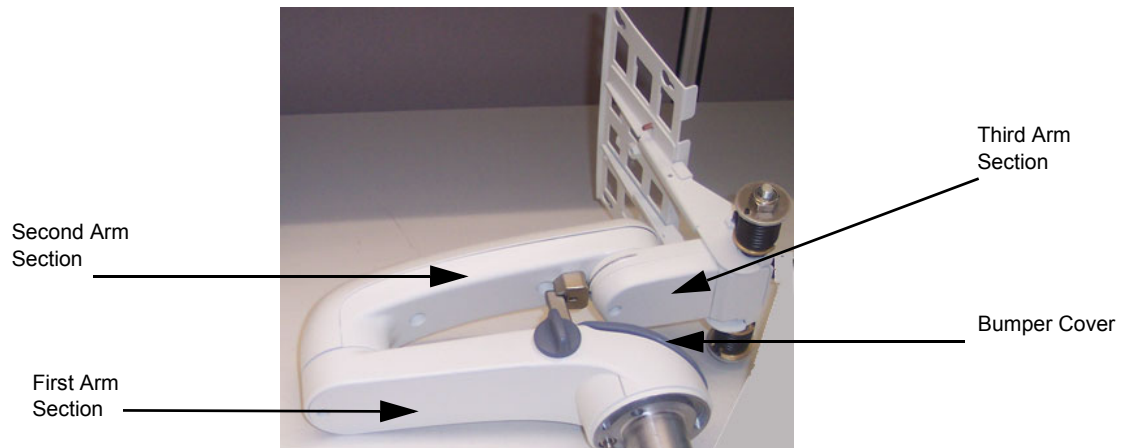
8-6-5-2 Remove the LCD Cables

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 8-97 Three Arm Sections



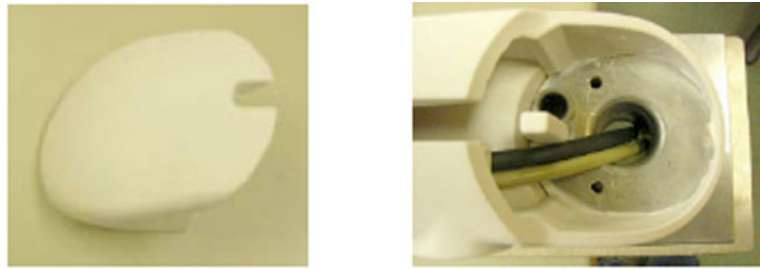
- 1.) Remove the two M4 x 8 screws holding the Bumper Cover to the Arm.

Figure 8-98 Screws for Bumper cover

8-6-5-2 Remove the LCD Cables (cont'd)

- 2.) Remove the bumper cover from the end of the first arm, as shown in Figure 8-99.

Figure 8-99 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 8-100 Third Arm Section Cover Removal



8-6-5-2 Remove the LCD Cables (cont'd)

- c.) Remove the M4 x 16 screws holding the second arm section cover with Phillips screwdriver.

Figure 8-101 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.

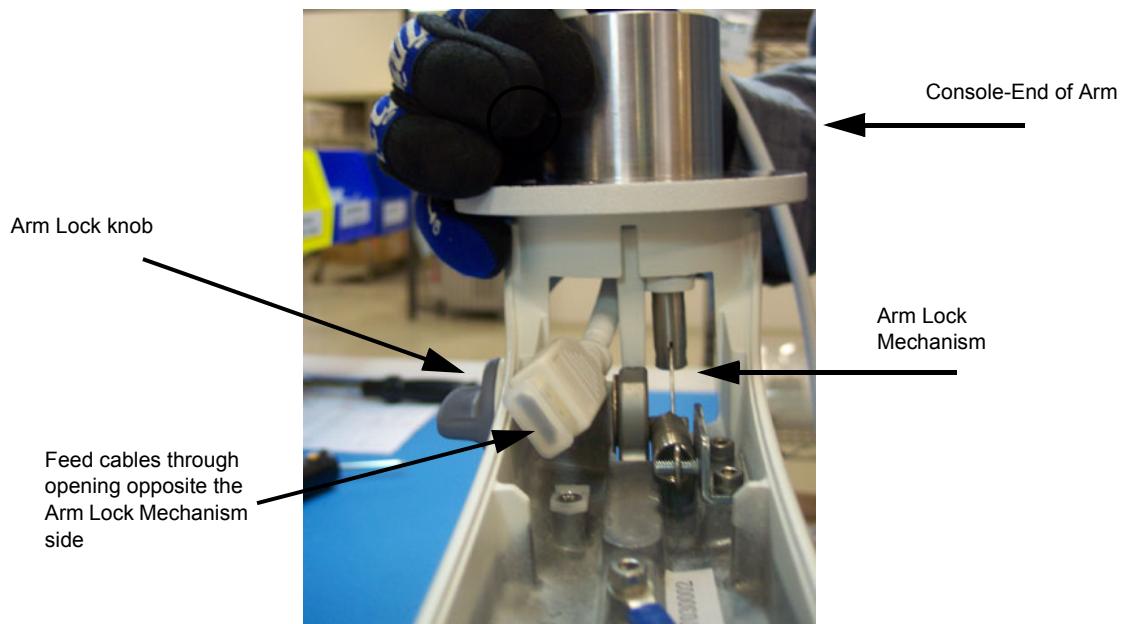
8-6-5-3 Install the LCD Cables

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:

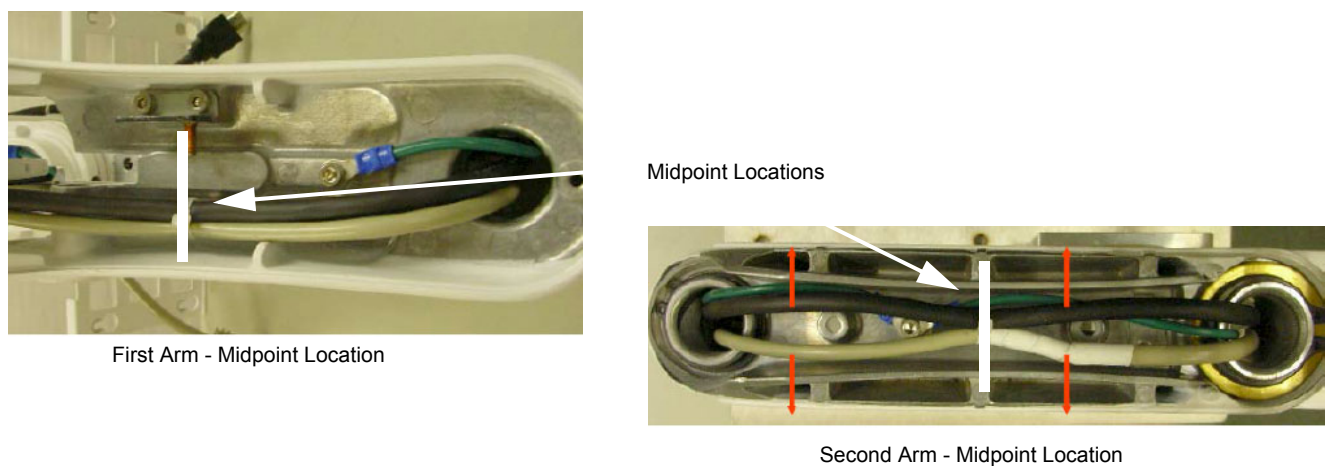
- 1.) Holding the monitor-end of the cable and starting at the console-end of the first arm section, thread the replacement cable(s) through the arm sections toward the monitor-end.

Figure 8-102 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 8-103).

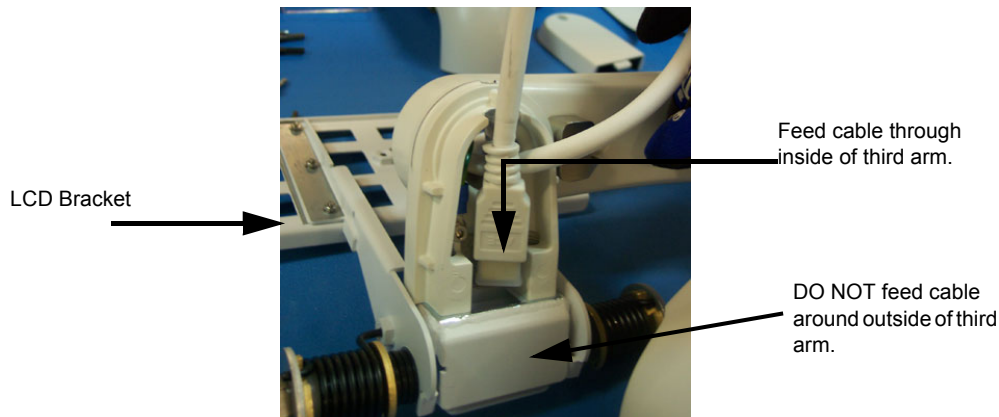
Figure 8-103 First (left) and Second Arm Section Midpoint Locations



8-6-5-3 Install the LCD Cables (cont'd)

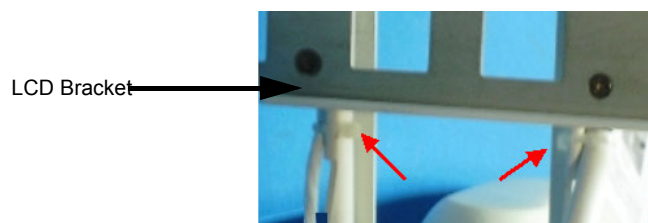
- 4.) Feed cable through opening for second arm section.
- 5.) Make sure the markings **line up with the midpoint placement location for the second arm (Figure 8-104).**
- 6.) Feed cable through opening for third arm section.

Figure 8-104 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 8-105).

Figure 8-105 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 8-103. 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.

8-6-5-4 Calibration and adjustments

See: [Section 6-4 "Backlight adjustment" on page 6-5](#) for LCD Monitor calibration instructions.

8-6-6 LCD Mount Lock replacement

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.



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.
 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.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Bulkhead Cover.

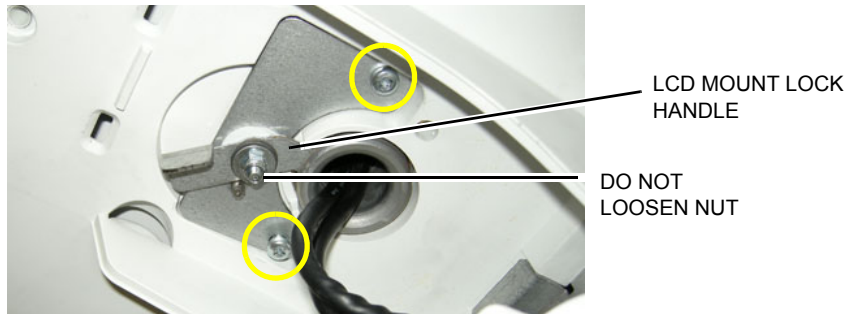
8-6-6-2 LCD Mount Lock removal procedure

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 8-106 Screw placement, LCD Mount Lock



- 2.) Remove the LCD Mount Lock.

8-6-6-3 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.

8-6-7 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.

8-6-7-1 Preparations

When preparing for the replacement, you must perform the following steps:



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

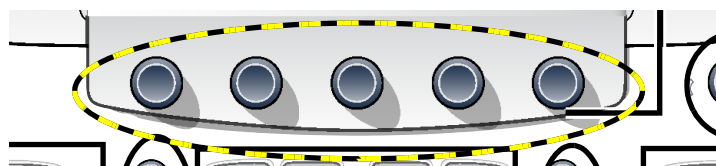


WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
 2. TURN OFF THE BREAKER.
 3. UNPLUG THE VIVID E9.
 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.
- 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 8-107](#).

Figure 8-107 Remove five knobs



Remove the Operator Panel, Upper.

8-6-7-2 Remove the Upper OP Panel/Touch Panel Assembly

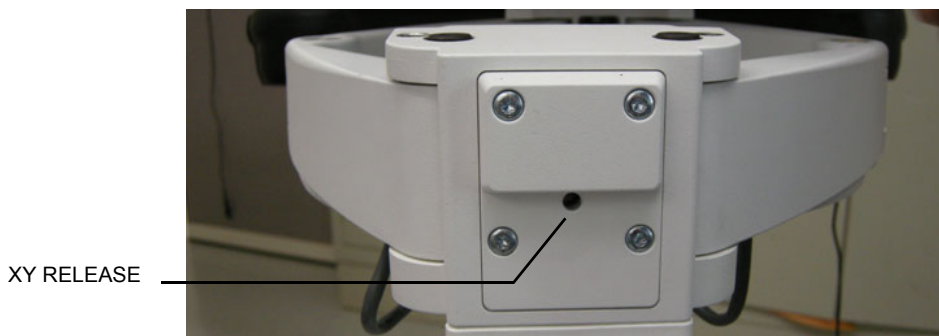
Figure 8-108 Upper OP Panel/Touch Panel Assembly



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:

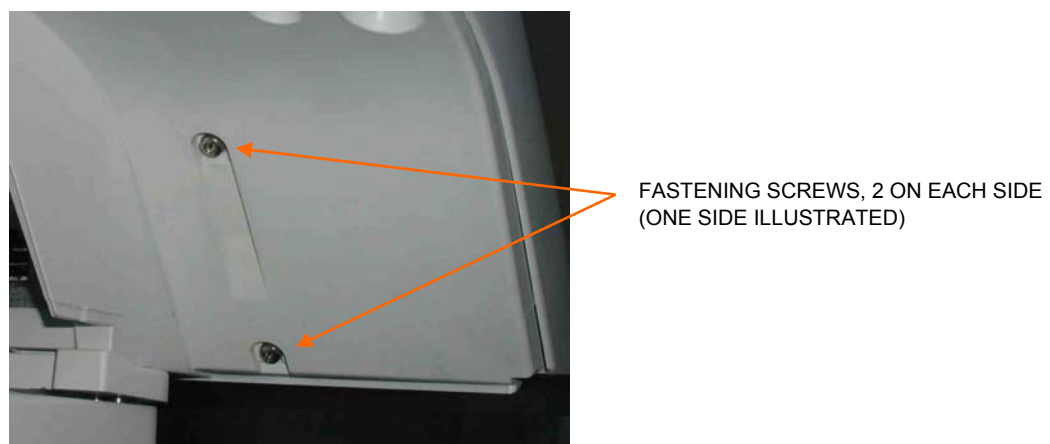
- 1.) At the rear of the VIVID E9, release the console's XY mechanism by inserting a screwdriver into the release point and pressing until release. Pull the console out to its extended position to gain access to the screws in the next step.

Figure 8-109 XY / Frogleg mechanism release



- 2.) Remove four screws with washers from the Operator Panel's back cover.

Figure 8-110 Upper Operator Panel's Back Cover



8-6-7-2 Remove the Upper OP Panel/Touch Panel Assembly (cont'd)

Be sure to remove the five OP Panel Knobs. See: [Figure 8-107 "Remove five knobs" on page 8-98](#).

- 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. 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.

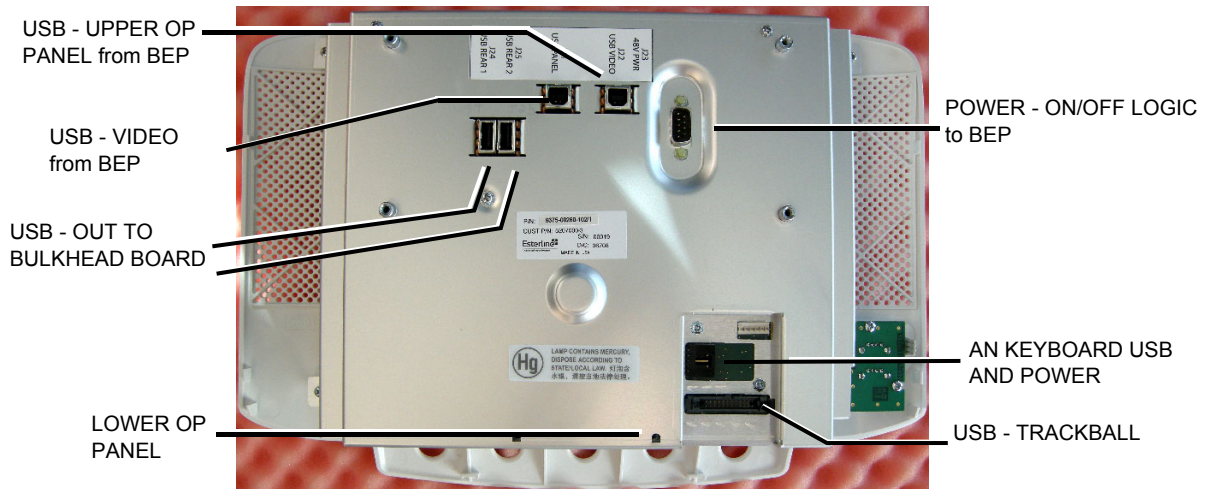
Figure 8-111 Remove Upper OP Panel/Touch Screen Assembly



8-6-7-2 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 8-112 "Upper OP Panel/Touch Panel assembly cable placement" on page 8-101](#).

Figure 8-112 Upper OP Panel/Touch Panel assembly cable placement



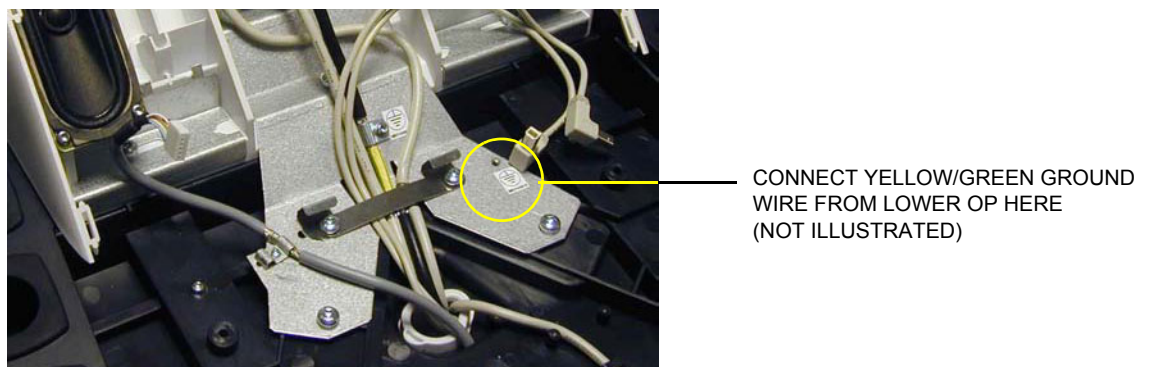
- 5.) Lift out the Touch Screen Assembly and place it on an ESD safe surface.

8-6-7-3 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 8-113 "OP Grounding" on page 8-101](#).

Figure 8-113 OP Grounding



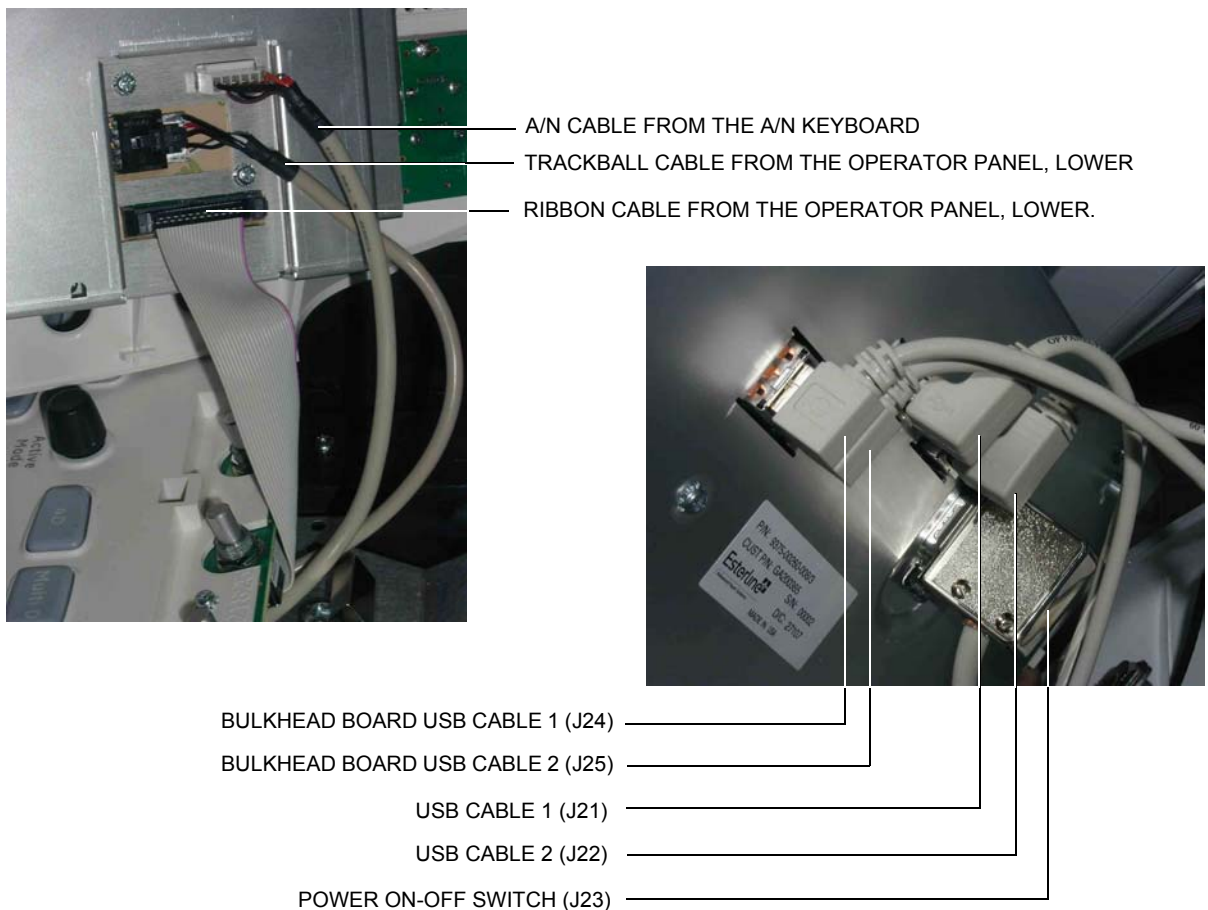
8-6-7-3 Install the Upper OP Panel/Touch Panel Assembly (cont'd)

NOTICE Do not apply stretch on the Ribbon Cable. It stretched, the connector on Operator Panel, Lower may break, resulting in a malfunction.

3.) Connect the following cables to the Operator Panel, Upper:

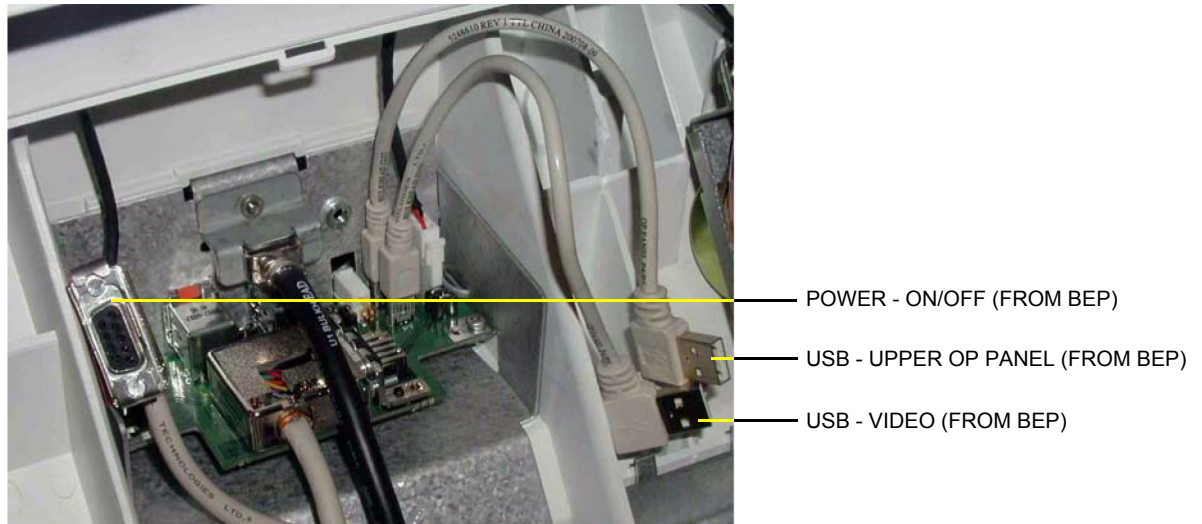
- Ribbon Cable from the Operator Panel, Lower
- Trackball Cable from the Operator Panel, Lower
- A/N Cable from the A/N Keyboard
- Power/On-Off switch (part of Main Cable) in position J23
- USB Cable 1 (part of Main Cable) in position J21
- USB Cable 2 (part of Main Cable) in position J22
- Bulkhead 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 8-114 Cables on rear of Operator Panel, Upper



8-6-7-3 Install the Upper OP Panel/Touch Panel Assembly (cont'd)

Figure 8-115 Cables to Upper OP

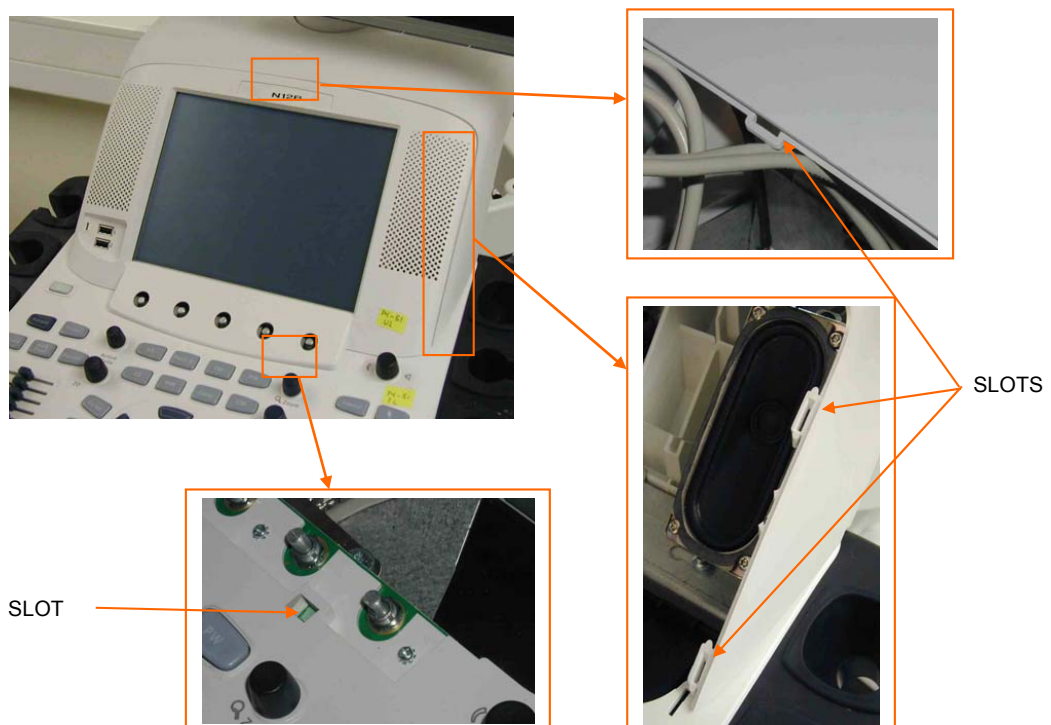


4.) Install the Upper OP Panel/Touch Panel Assembly by securing the 5 tabs and 2 hooks.



NOTICE Be careful not to pinch any of the cables when installing the Upper OP Panel/Touch Panel Assembly.

Figure 8-116 Slots for alignment tabs.



5.) Install the four screws to the Back Cover from behind.

6.) Install the five OP Panel Knobs.

8-6-8 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.

8-6-8-1 Preparations

When preparing for the replacement, you must perform the following steps:



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

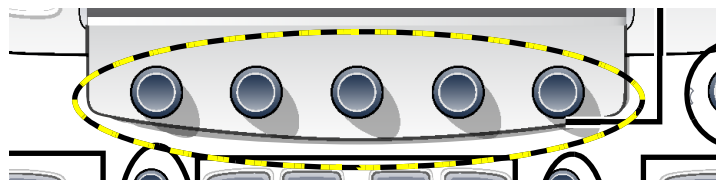


WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
 2. TURN OFF THE BREAKER.
 3. UNPLUG THE VIVID E9.
 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.
- 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 8-117](#).

Figure 8-117 Remove five knobs

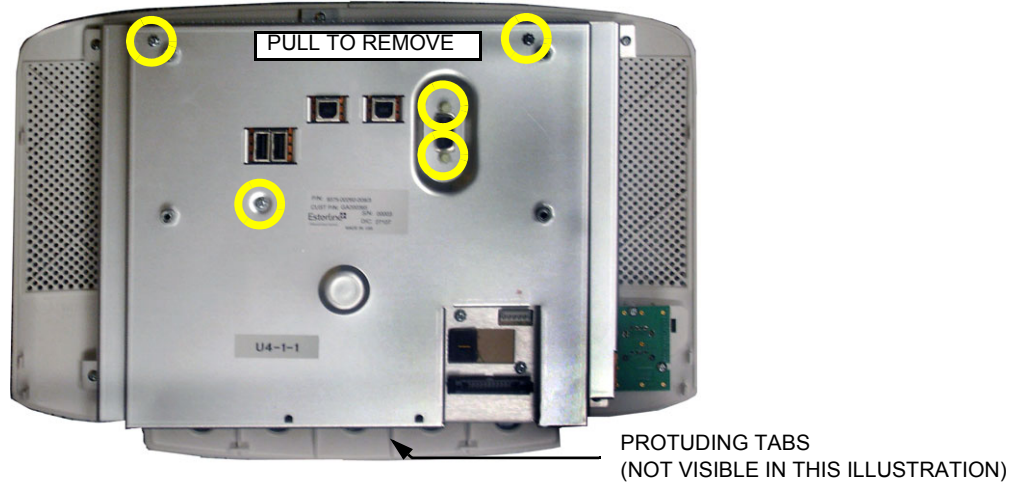


- 5.) Remove the Operator Panel, Upper.

8-6-8-2 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 8-118](#).

Figure 8-118 Operator Panel, Upper, seen from the rear side

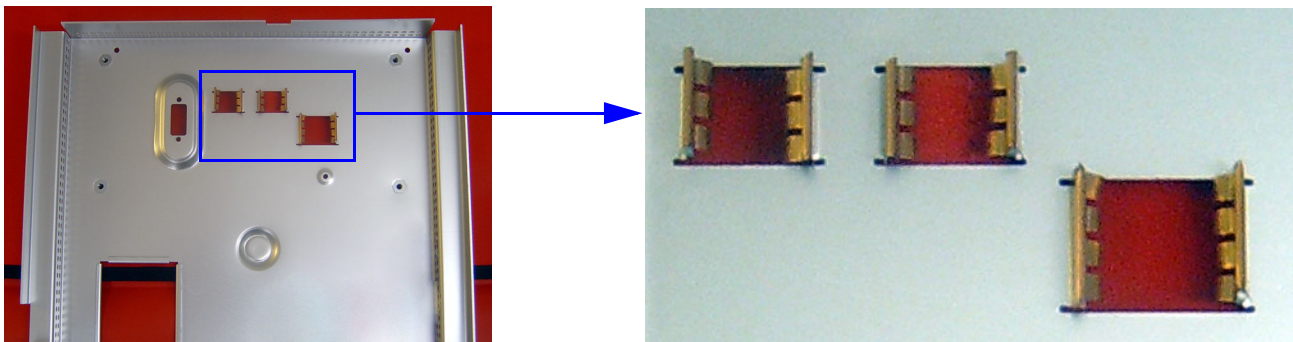


NOTE: On some VIVID E9s, the openings for the USB connectors have EMC fingers attached on the right and left sides of each opening, ref. [Figure 8-119](#). Be careful to not loose these EMC fingers when you remove the LCD Cover.

On newer VIVID E9s, 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.

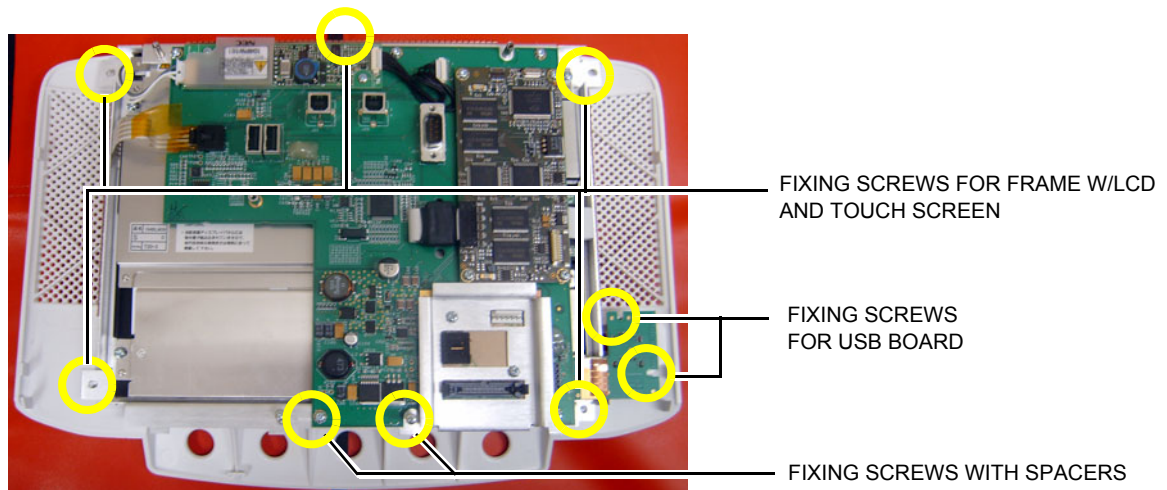
Figure 8-119 EMC fingers at openings for USB connectors



8-6-8-2 Remove the Frame w/LCD and Touch Screen (cont'd)

- 4.) Remove the two (2x) fixing screws with spacers, see: [Figure 8-120](#).
- 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 8-120 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 8-121 Frame w/LCD and Touch Screen (left) and Upper Bezel (right)



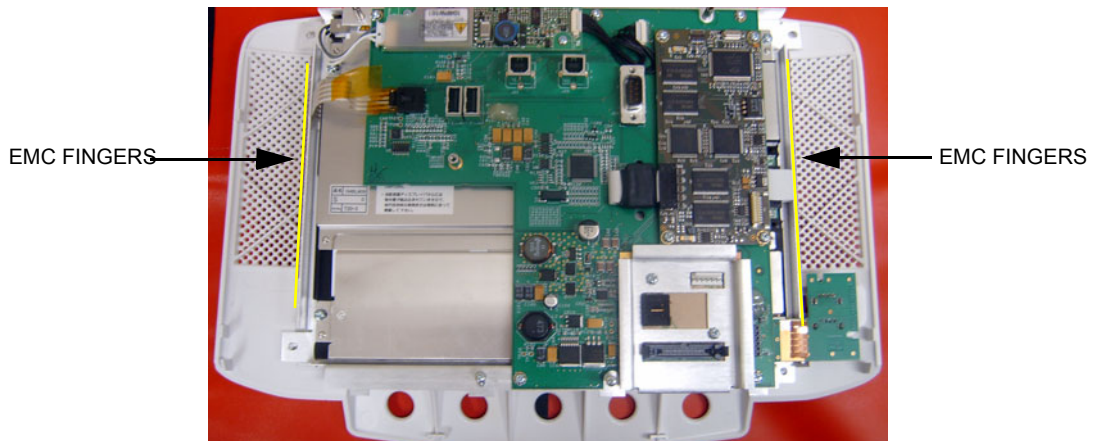
- 9.) Transfer the existing Main Controller Board to the new Frame w/LCD.
- 10.) Transfer the High Voltage Backlight Inverter to the new Frame w/LCD.

8-6-8-3 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.

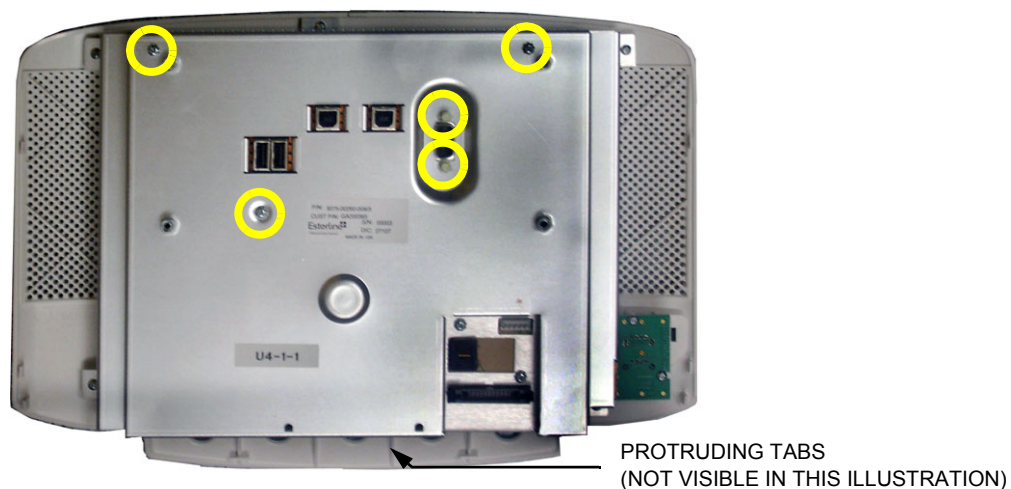
NOTE: Be careful so you don't bend the EMC fingers (see: [Figure 8-122](#)) when installing the LCD Cover.

Figure 8-122 EMC fingers



- 4.) Install the LCD Cover.
- 5.) Install the five (5x) fixing screws.

Figure 8-123 Position for screws



- 6.) Install the Operator Panel, Upper.
- 7.) Install the Control Knobs.

8-6-8-4 Calibration and adjustments

Run the Touch Screen Calibration in section [Section 6-5 "Touch Screen Calibration"](#) on page 6-10.

8-6-9 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.

8-6-9-1 Preparations

When preparing for the replacement, you must perform the following steps:



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



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

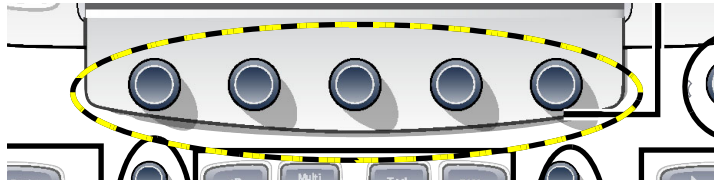
1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
 2. TURN OFF THE BREAKER.
 3. UNPLUG THE VIVID E9.
 4. MAINTAIN CONTROL OF THE POWER PLUG.
 5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- 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.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.

8-6-9-1 Preparations (cont'd)

- 4.) Remove five OP Panel Knobs, see [Figure 8-124](#).

Figure 8-124 Remove five knobs

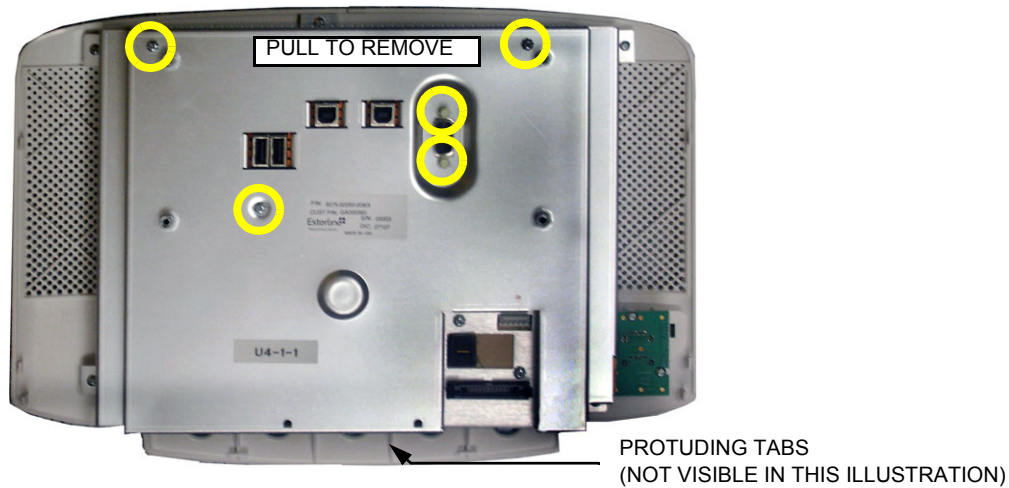


8-6-9-2 Remove the Main Controller Board

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 8-125 "Operator Panel, Upper, seen from the rear side" on page 8-110](#).

Figure 8-125 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.

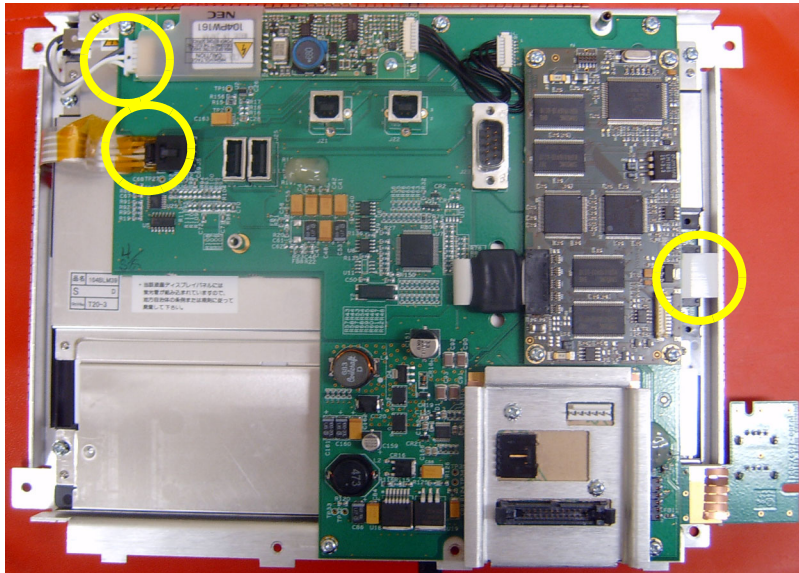
NOTE: Take care not to damage the EMC gasketing that goes around the Touch Panel Assembly, especially during re-assembly.

8-6-9-2 Remove the Main Controller Board (cont'd)

4.) Disconnect three (3x) cables:

- Disconnect the High Voltage cable (upper, left side in [Figure 8-126](#)).
- 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 8-126](#)).

Figure 8-126 Disconnect three cables



5.) Disconnect the plug on the black cable from the connector on the Main Controller board.

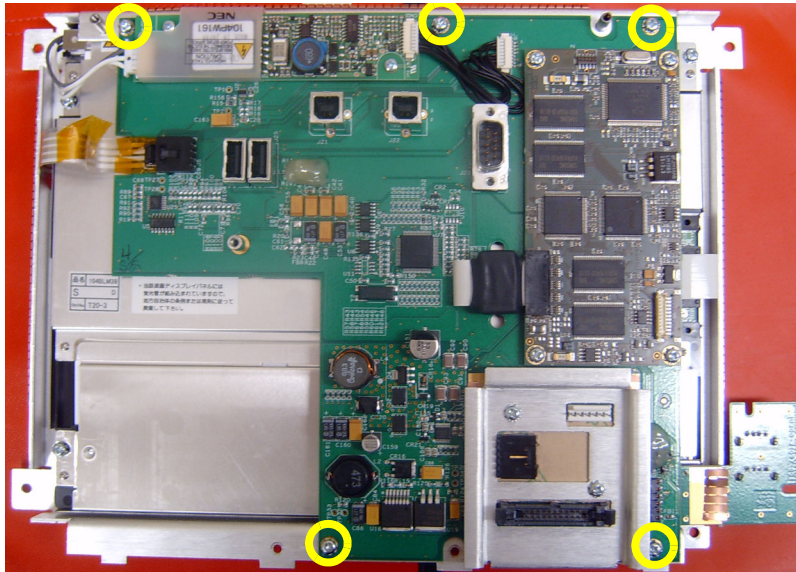
NOTE: *The Main Controller Board does not come with the High Voltage Inverter Board, BUT it does come with the USB Video Board.*

6.) If you are going to change the Main Controller board, you may want to remove the High Voltage Inverter board now. (See: [8-6-11 "High Voltage Inverter Board with Cable replacement"](#) on [page 8-116](#).) If not, continue with the next steps.

8-6-9-2 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 8-127 Remove screws



- 8.) Remove the Main Controller Board.

8-6-9-3 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 8-127](#)).
- 3.) If removed, install the High Voltage Inverter board.
- 4.) Connect the three (3x) cables (refer to [Figure 8-126](#)).

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.

8-6-10 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.

8-6-10-1 Preparations

When preparing for the replacement, you must perform the following steps:

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

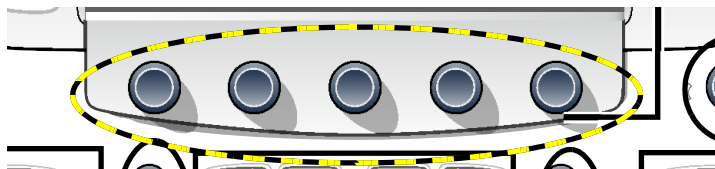


1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

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.
- 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 8-128](#).

Figure 8-128 Remove five knobs



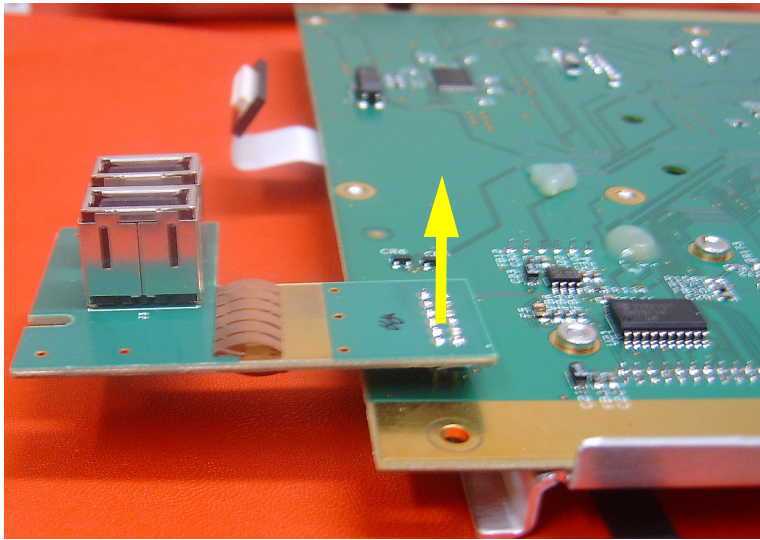
8-6-10-1 Preparations (cont'd)

- 5.) Remove the Operator Panel, Upper.
- 6.) Remove the Main Controller Board.

8-6-10-2 USB Connector Board removal procedure

- 1.) Place the Main Controller Board on a clean, antistatic surface with the solder side up.

Figure 8-129 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.

8-6-10-3 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.

8-6-11 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.

8-6-11-1 Preparations

When preparing for the replacement, you must perform the following steps:



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

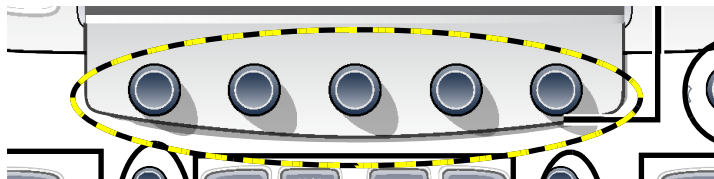


WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
 2. TURN OFF THE BREAKER.
 3. UNPLUG THE VIVID E9.
 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.
- 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 8-128](#).

Figure 8-130 Remove five knobs

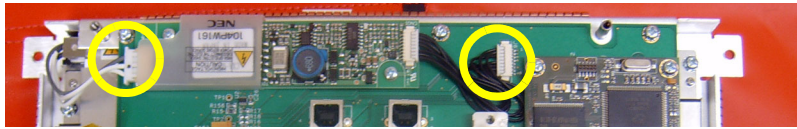


- 5.) Remove the Operator Panel, Upper.

8-6-11-2 High Voltage Inverter Board with Cable removal procedure

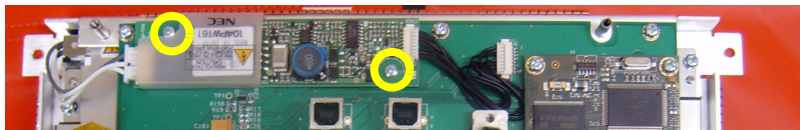
- 1.) Disconnect the cables to the High Voltage Inverter Board.

Figure 8-131 Remove cables



- 2.) Remove the two fixing screws.

Figure 8-132 Remove screws



- 3.) Remove the High Voltage Inverter Board with Cable.

8-6-11-3 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 cable to the connector on the Main Controller Board.
- 4.) Install the Operator Panel, Upper.
- 5.) Install the Control Knobs.

8-6-12 Upper Bezel replacement

8-6-12-1 Upper Bezel removal

Figure 8-133 Upper Bezel



The Upper Bezel is what is left when you have removed the Frame w/LCD and Touch Screen.

- Use the procedure in [8-6-8-2 "Remove the Frame w/LCD and Touch Screen" on page 8-105](#), to remove the Upper Bezel.

8-6-12-2 Upper Bezel installation

- Use the procedure in [8-6-8-3 "Install the Frame w/LCD and Touch Screen" on page 8-107](#), to install the Upper Bezel.

8-6-13 Frame UI Upper replacement

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.



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.
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.

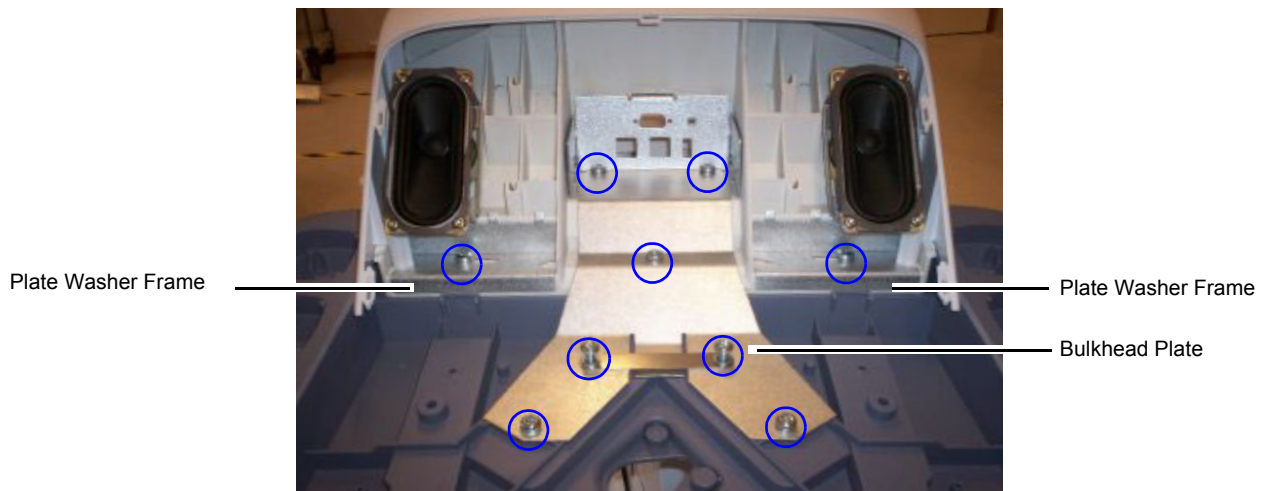
BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9
- 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.

8-6-13-2 Remove the Frame UI Upper

The Bulkhead Plate is used to secure the Upper UI Frame to the Lower UI Frame.

Figure 8-134 Bulkhead Plate and Plate Washer Frame



- 1.) Remove the eleven fixing screws (see: [Figure 8-134 "Bulkhead Plate and Plate Washer Frame" on page 8-120](#)).
- 2.) Remove the Bulkhead Plate and the Cable Clamp.
- 3.) Remove the Frame UI Upper.

8-6-13-3 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 8-170 "The Bulkhead Plate" on page 8-161](#)).
- 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.

8-6-14 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 can support one Left Options Holder and one Right Options Holder at the same time.

8-6-14-1 Preparations

When preparing for the replacement, you must perform the following steps:



WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.



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.
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.

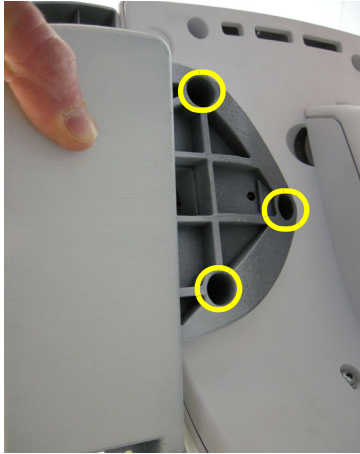
- 1.) Power down the VIVID E9.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Separate and remove the Storage Tray.

8-6-14-2 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 8-135 Screws, beneath upper console



- 2.) Remove the Options Holder from the Upper Console.

8-6-14-3 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.

8-6-15 Knobs for Encoders and Slidepots 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.

8-6-15-1 Tools

No tools are needed for this procedure.

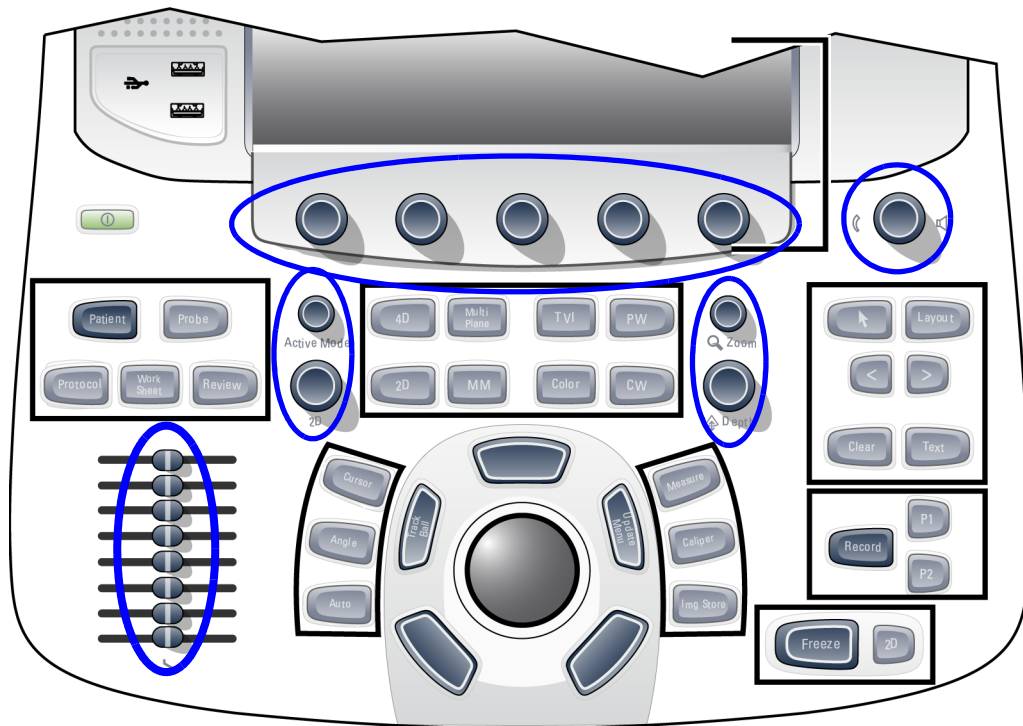
8-6-15-2 Knobs for Encoders and Slidepots removal procedure

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.

8-6-15-3 Knobs for Encoders and Slidepots installation procedure

Figure 8-136 Knobs for Encoders and Slidepots



Install the knobs one by one. Refer to the illustration above for the correct position for the knobs.

8-6-16 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.

8-6-16-1 Preparations

When preparing for the replacement, you must perform the following steps:



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



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.
 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.

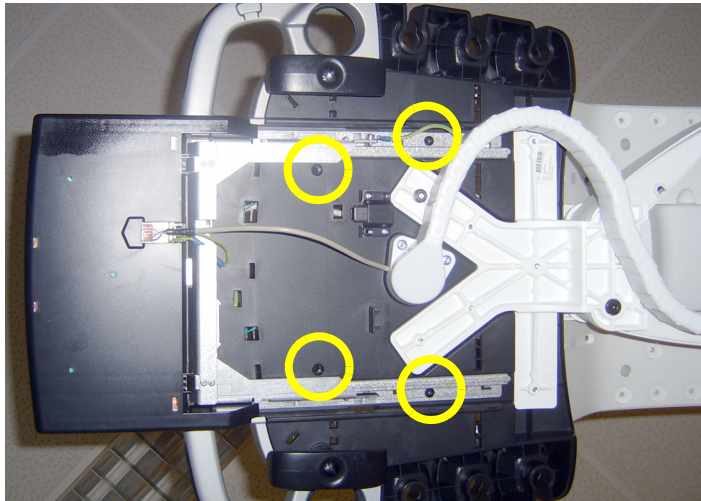
- 1.) Power down the VIVID E9
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove Operator Panel, Upper.

8-6-16-2 Remove the Operator Panel, Lower

Follow these steps to remove the Operator Panel:

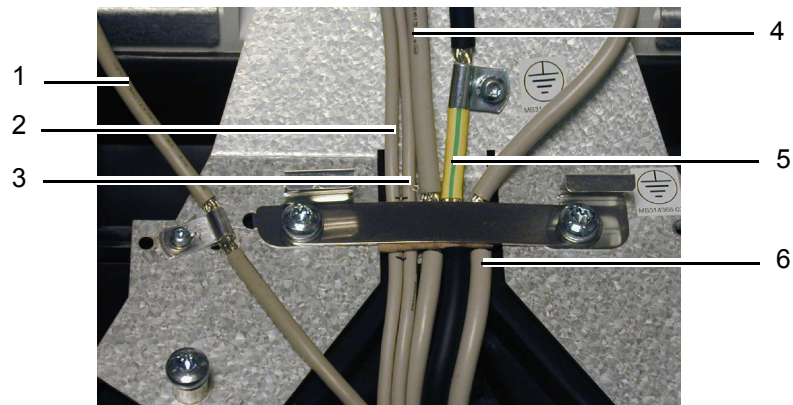
- 1.) Pull the Alphanumeric keyboard to its extended position to get access to the screws in the next step.

Figure 8-137 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 8-138 OP Cables Grounding



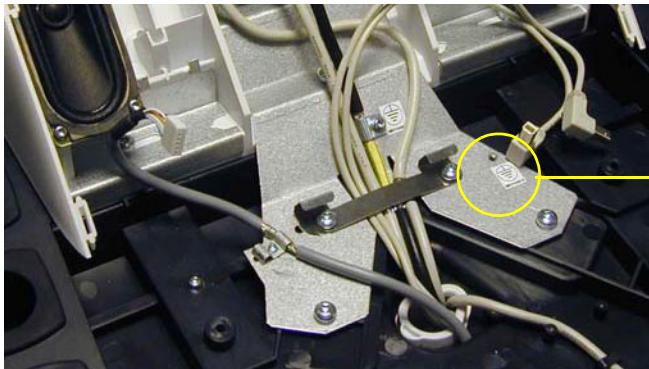
1 - Cable, A/N Keybd.
2 - USB2
3 - USB1

4 - Bulkhead cable
5 - HDMI Cable
6 - OP Cable

8-6-8-2 Remove the Frame w/LCD and Touch Screen (cont'd)

- 4.) On the Bulkhead Bracket, loosen the ESD wire from the Lower Panel.

Figure 8-139 OP Grounding



YELLOW/GREEN GROUND WIRE FROM
LOWER OP HERE
(NOT ILLUSTRATED)

Figure 8-140 Remove OP Panel Lower assembly



FINGER

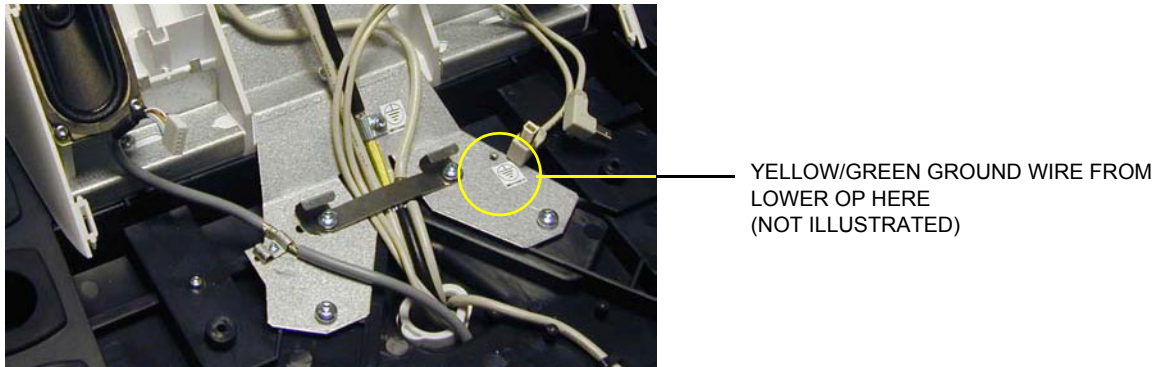
- 5.) Pull and lift the Operator Panel assembly up and away. Be careful to not destroy the fingers on each side of the Operator Panel, Lower.
- 6.) Store it on an ESD safe place.

8-6-16-3 Install the Operator Panel, Lower

Follow these steps to install the Operator Panel:

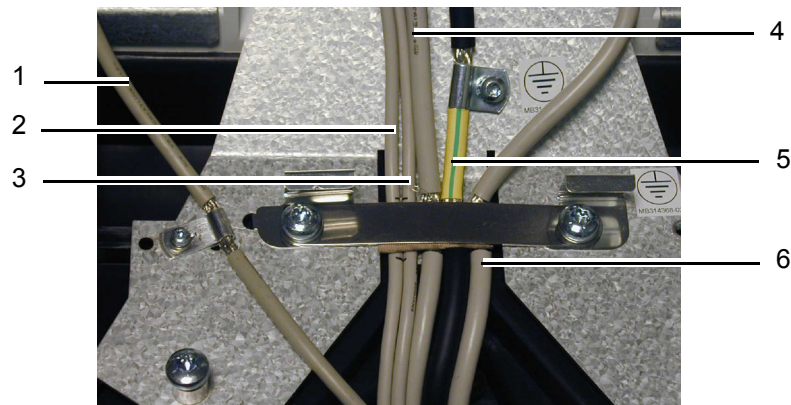
- 1.) Carefully, Slide in the Operator Panel. Lower.
Be careful with the fingers which have to be placed under the side walls of the UI Frame, Upper.
- 2.) On the Bulkhead Bracket, fasten the ESD wire from the Lower Panel.

Figure 8-141 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 8-142 OP Cables Grounding



1 - Cable, A/N Keybd.
2 - USB2
3 - USB1

4 - Bulkhead cable
5 - HDMI Cable
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.

8-6-17 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.

8-6-17-1 Preparations

When preparing for the replacement, you must perform the following steps:



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



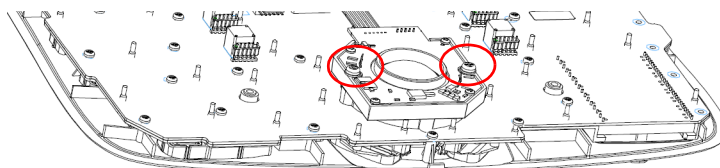
WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
 2. TURN OFF THE BREAKER.
 3. UNPLUG THE VIVID E9.
 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.
- 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 Remove the Trackball

Figure 8-143 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.

8-6-17-3 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.

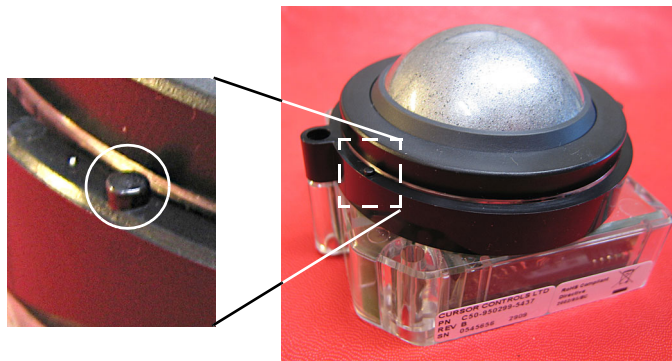


Figure 8-144 Fixing Ring installed for use on the Vivid E9.

- 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, Upper.
- 5.) Install the Operator Panel, Lower.

8-6-18 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.

8-6-18-1 Preparations

When preparing for the replacement, you must perform the following steps:



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



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.
 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
- 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.

8-6-18-2 Encoder Board removal procedure

- 1.) Disconnect the cable to the Encoder Board.
- 2.) Turn the Operator Panel, Lower with the front up.

Figure 8-145 Fixing screws



- 3.) Unscrew and remove 4 screws.
- 4.) Remove the Encoder Board.

8-6-18-3 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.

8-6-19 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.

8-6-19-1 Preparations

When preparing for the replacement, you must perform the following steps:



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



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

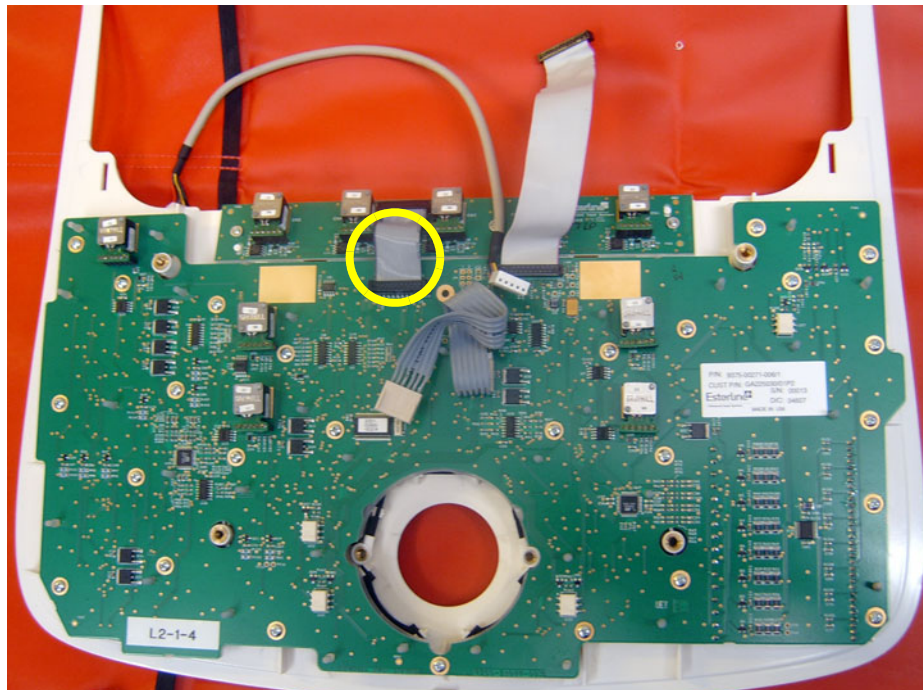
1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
 2. TURN OFF THE BREAKER.
 3. UNPLUG THE VIVID E9.
 4. MAINTAIN CONTROL OF THE POWER PLUG.
 5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.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

8-6-19-2 Lower Switch Board with Elastomer removal

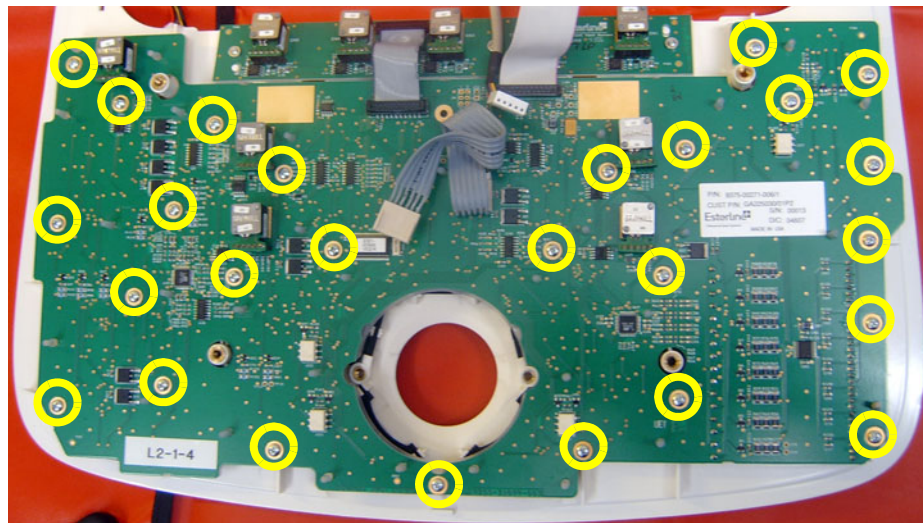
- 1.) Disconnect the cable to the Encoder Board.

Figure 8-146 Lower Switch Board with Elastomer - Trackball already removed.



- 2.) Remove the 26 fixing screws.

Figure 8-147 Lower Switch Board with Elastomer - Trackball already removed.



- 3.) Remove the Lower Switch Board with Elastomer. Store it in an ESD safe place.

8-6-19-3 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.

8-6-20 Lower Bezel replacement

Figure 8-148 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.

8-6-20-1 Preparations

When preparing for the replacement, you must perform the following steps:



WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.



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.
 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
- 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.

8-6-20-2 Remove the Lower Bezel

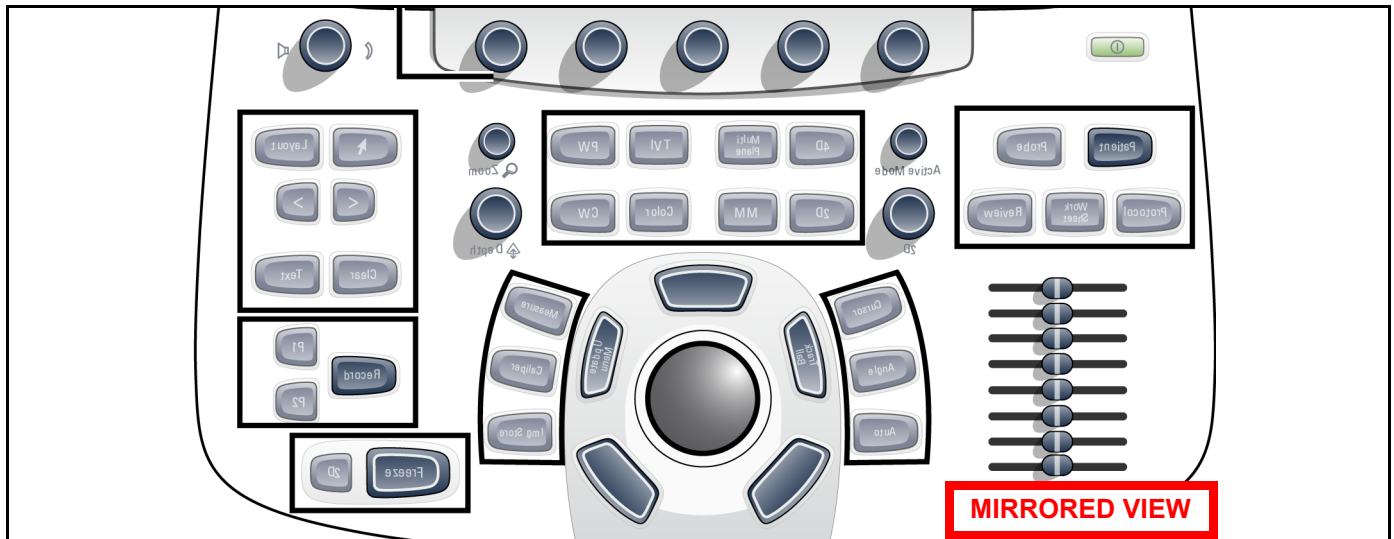
- 1.) Remove all the Switch Cups.
If possible, place them in their relative position on a table, or other place where you can keep them until you start the reinstallation. If you are going to install a new Lower Bezel, you should move the Switch Cups over to the new Lower Bezel, one by one.
- 2.) When done, remove the Lower Bezel.

8-6-20-3 Install the Lower Bezel

- 1.) Install the Switch Cups in the correct positions on the Lower Bezel. Use the mirrored image in [Figure 8-149](#) as a reference.

NOTE: THE ILLUSTRATION BELOW IS A MIRRORED ILLUSTRATION.
USE IT FOR REFERENCE WHEN INSTALLING THE SWITCH CUPS!

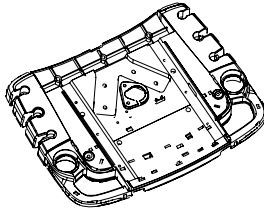
Figure 8-149 Mirrored illustration of the Switch Cups positions



- 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.

8-6-21 Lower Frame Assembly replacement

Figure 8-150 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.

8-6-21-1 Preparations

When preparing for the replacement, you must perform the following steps:



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



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.
 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.

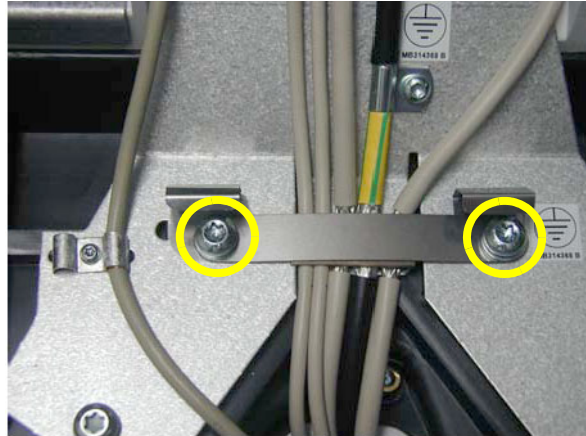
- 1.) Power down the VIVID E9
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the LCD Arm.
- 5.) Remove the Upper Operator Panel/Touch Panel Assembly.
- 6.) Remove the Lower Operator Panel.
- 7.) Remove the Bulkhead Board.
- 8.) Remove Handle Left Top and Handle Right Top.
- 9.) Remove the Palm Rest.
- 10.) Remove the XYZ Buttons Frame.

8-6-21-2 Lower Frame Assembly removal procedure

Follow these steps to remove the Lower Operator Panel Frame:

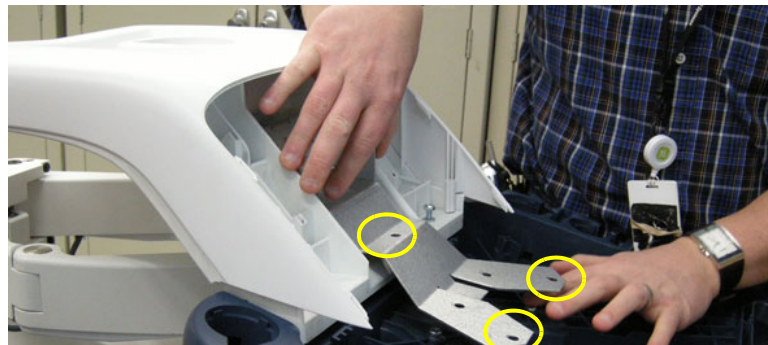
- 1.) Remove the 2 screws securing the Main Cable.

Figure 8-151 Screw placement, Main Cable clamp



- 2.) Remove the 5 remaining screws securing the Bulkhead Bracket.
- 3.) Remove the Bulkhead Bracket.

Figure 8-152 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.

8-6-21-3 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.

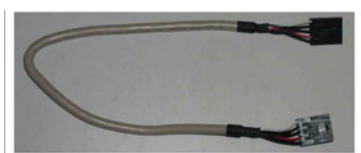
8-6-22 Operator Panel Cable Kit Replacement

8-6-22-1 Overview

The Operator Panel Cable Kit includes three different cables, as illustrated in [Figure 8-153](#).

- 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 8-153 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.


8-6-22-2 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.*
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.
 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.
- 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.

8-6-22-3 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.

8-6-22-4 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.

8-6-22-5 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.

8-6-22-6 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.

8-6-22-7 Disconnect the HV Inverter Cable

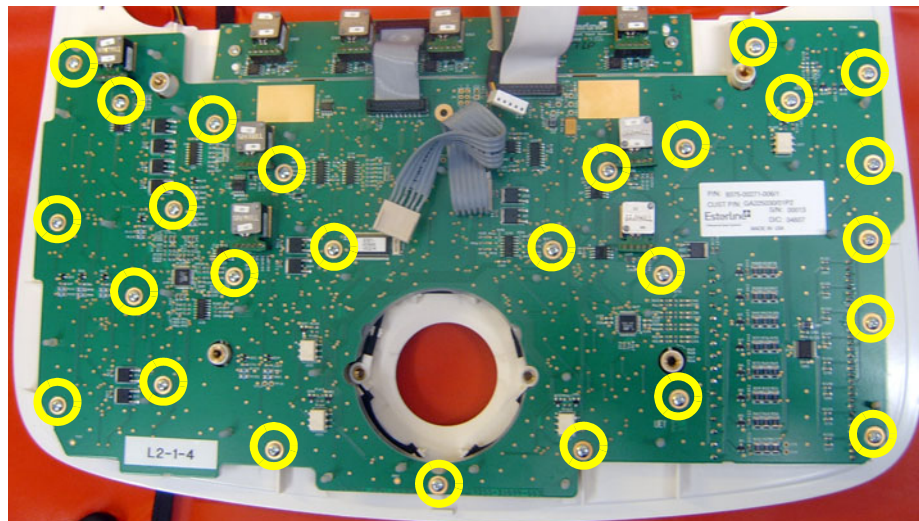
The HV Inverter Cable is the cable between the HV Inverter board and the Main Controller board.

- 1.) Remove the Rear Cover on the Operator Panel, Upper.
- 2.) Disconnect both ends of the cable and remove it.

8-6-22-8 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 8-154 Lower Switch Board with Elastomer - Trackball already removed



8-6-23 Replacing the Alpha-Numeric Keyboard Assembly

8-6-23-1 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.

8-6-23-2 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.***



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.
 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.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.

8-6-23-3 Alphanumeric Keyboard Assembly removal procedure

The Alphanumeric Keyboard is installed on a rail below the Operator Panel.

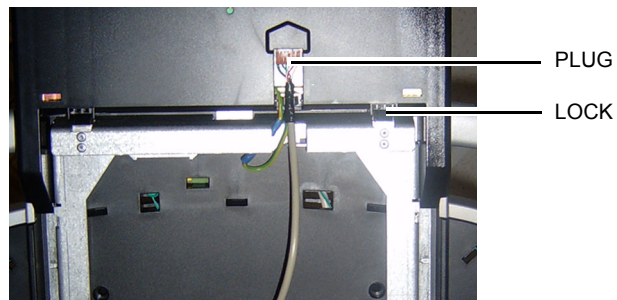
Figure 8-155 Alphanumeric Keyboard



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 8-156 Alphanumeric Keyboard seen from below



8-6-23-3 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 8-156 "Alphanumeric Keyboard seen from below" on page 8-145](#).
- 4.) Move the Alphanumeric Keyboard assembly so it un-gage, then lift it away.

8-6-23-4 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.

8-6-24 Replacing the A/N Keyboard or the A/N Keyboard Enclosure

8-6-24-1 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.

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.

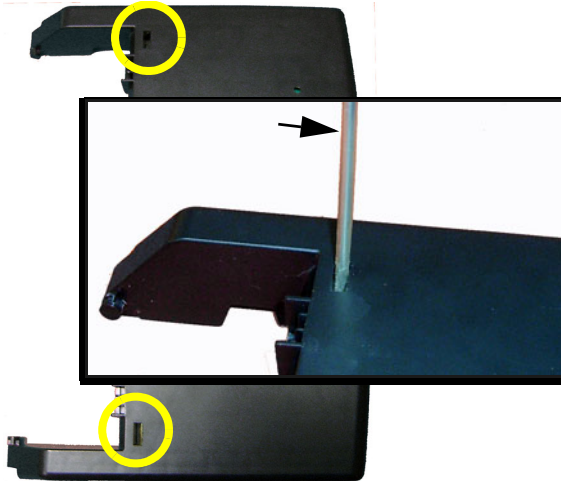
Beware that the Main Power Supply and Back End Processor may be energized even if the power is turned off when the cord is still plugged into the AC Outlet.

- 1.) Power down the VIVID E9.
- 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.

8-6-24-2 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 buy pressing as illustrated with the arrow in the figure below.

Figure 8-157 Release the two tabs

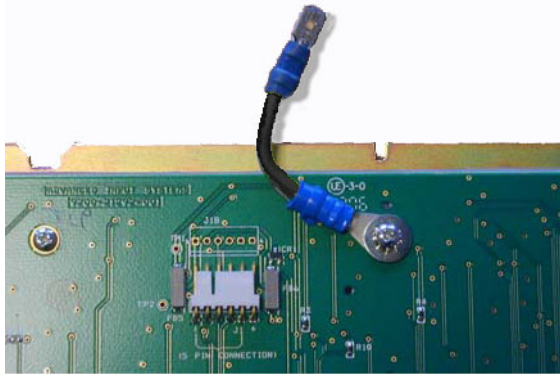


- 3.) Separate the A/N Keyboard Bottom Enclosure from the rest of the A/N Keyboard Assembly.
- 4.) You can now separate the A/N Keyboard from the A/N Keyboard Top Enclosure, by releasing the fixing tabs, one by one, until the parts are separated.

8-6-24-3 Assemble the A/N Keyboard and the A/N Keyboard Enclosure

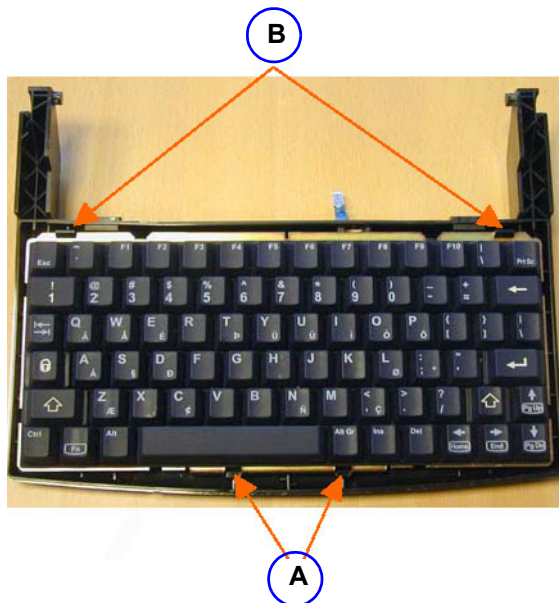
- 1.) If not already done, connect the Ground Cable to the A/N Keyboard, using the current screw and two additional washers (tooth, 3.2mm). Use one washer under and one washer over the cable shoe. (Torque: 2.3 Nm.)

Figure 8-158 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).

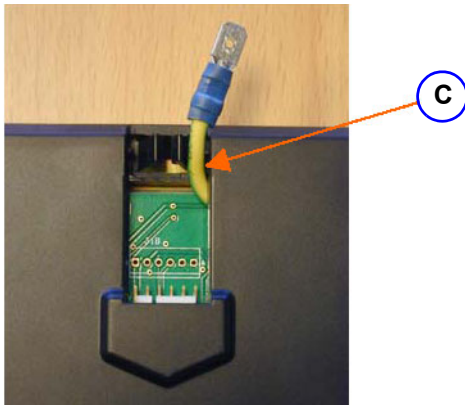
Figure 8-159 Install A/N keyboard into the A/N Keyboard Bottom Enclosure



8-6-24-3 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 8-160 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 8-161 Install A/N Keyboard Top Enclosure



8-6-25 Wagon AN Drawer Sheet Met. Assembly replacement

8-6-25-1 Preparations

When preparing for the replacement, you must perform the following steps:



CAUTION



**ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.
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.**

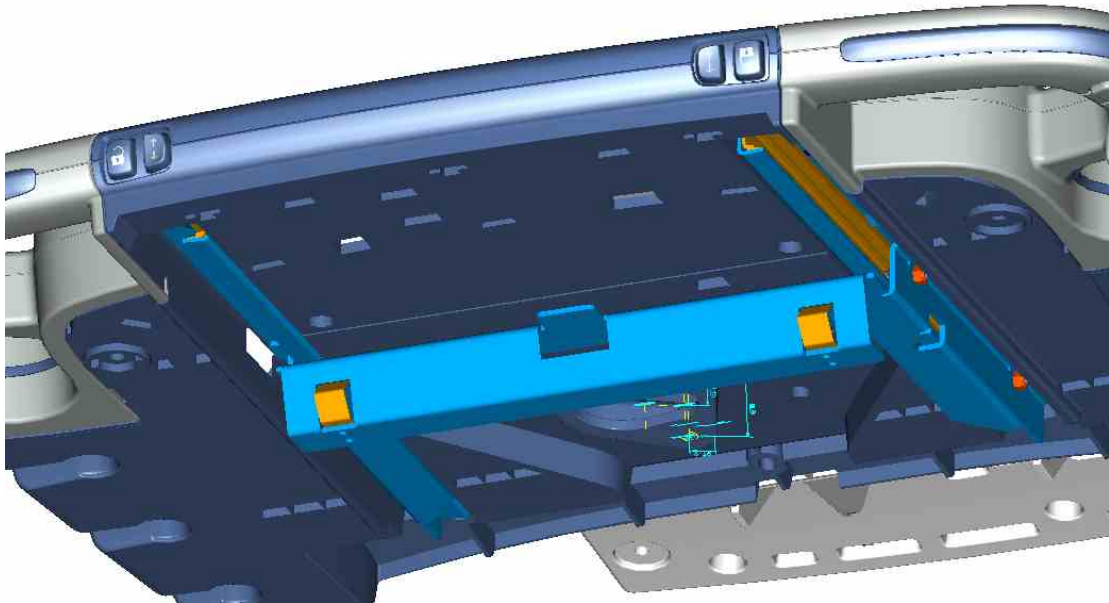
**Beware that the Main Power Supply and Back End Processor may be energized even if the
power is turned off when the cord is still plugged into the AC Outlet.**

- 1.) Power down the VIVID E9.
- 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.

8-6-25-2 Wagon AN Drawer Sheet Met. Assembly removal

The Wagon AN Drawer Sheet Met. Assembly is located below the User Interface.

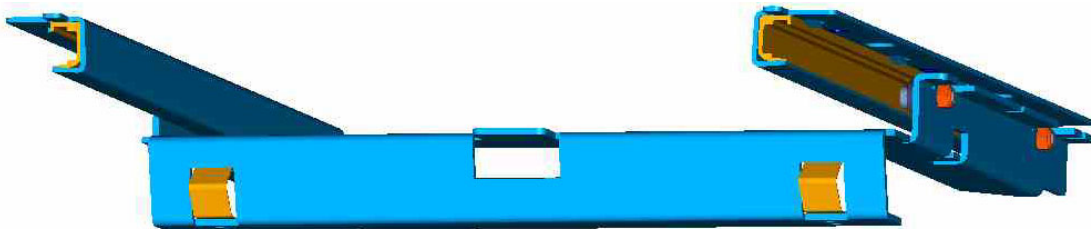
Figure 8-162 Wagon AN Drawer Sheet Met. Assembly



- 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.

8-6-25-3 Wagon AN Drawer Sheet Met. Assy installation

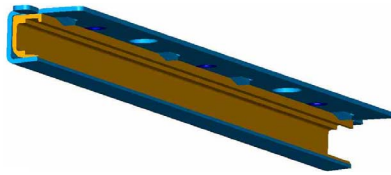
Figure 8-163 The Wagon AN Drawer Sheet Met. Assy.



- 1.) Position the Wagon AN Drawer Sheet Met. Assy below the UI Console as illustrated in [Figure 8-162 "Wagon AN Drawer Sheet Met. Assembly" on page 8-152](#). 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.

8-6-26 J-Rail Assy replacement

Figure 8-164 J-Rail Assy



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.



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

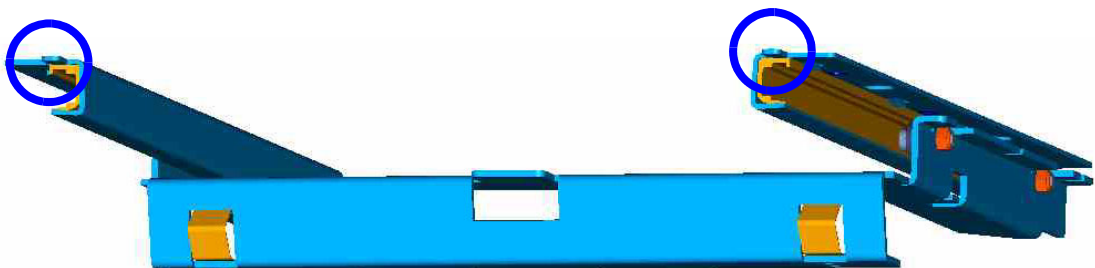
1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

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.
- 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.

8-6-26-2 J-Rail Assy removal

Figure 8-165 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.

8-6-26-3 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 8-162 "Wagon AN Drawer Sheet Met. Assembly" on page 8-152](#). 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.

8-6-27 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.

8-6-27-1 Preparations

When preparing for the replacement, you must perform the following steps:



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



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.
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.

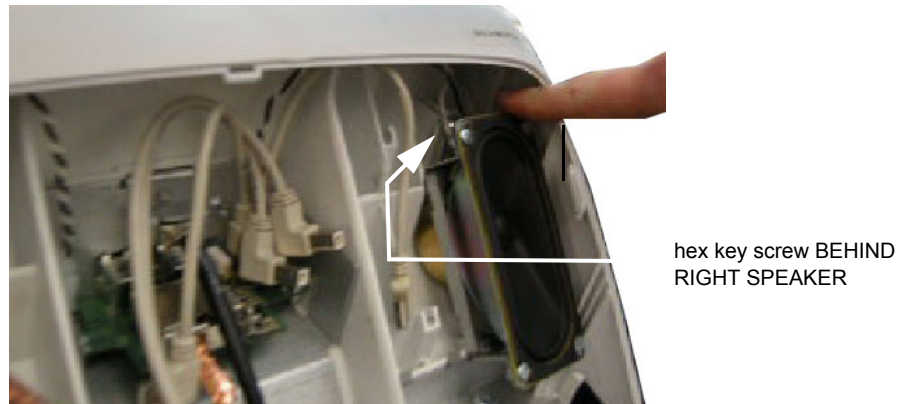
- 1.) Power down the VIVID E9.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Operator Panel, Upper.

8-6-27-2 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 8-166 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.

8-6-27-3 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.

8-6-28 Replacing the Bulkhead Board

The Bulkhead board is located behind the Upper OP Panel/Touch Panel assembly.

8-6-28-1 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.*



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.
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.

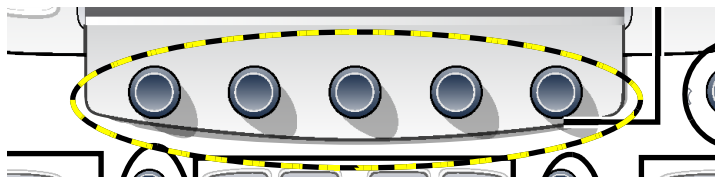
BEWARE THAT THE MAIN POWER SUPPLY AND BACK END PROCESSOR MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF WHEN THE CORD IS STILL PLUGGED INTO THE AC OUTLET.

- 1.) Power down the VIVID E9.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.

8-6-28-1 Preparations (cont'd)

4.) Remove five knobs, see [Figure 8-167](#).

Figure 8-167 Remove five knobs



5.) Remove the Upper OP Panel.

8-6-28-2 Remove the Bulkhead Board

Figure 8-168 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.

8-6-28-3 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).

8-6-29 Bulkhead, Plate, Extended replacement

8-6-29-1 Preparations

When preparing for the replacement, you must perform the following steps:



WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.



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.
 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.
- 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 8-167](#).

Figure 8-169 Remove five knobs

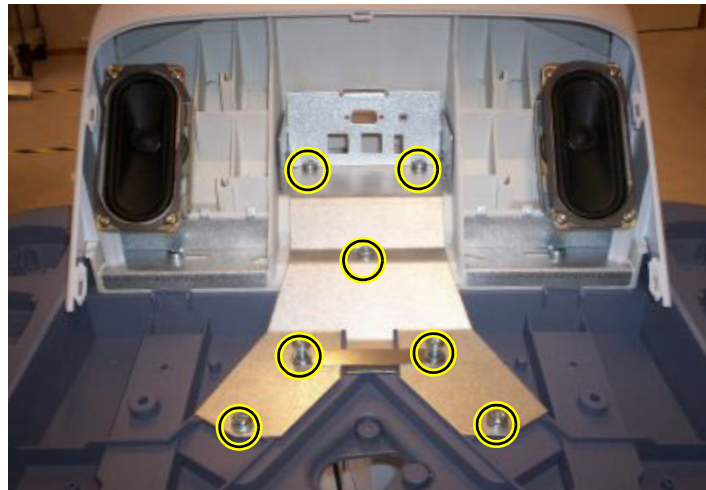


- 5.) Remove the Operator Panel, Upper.
- 6.) Remove the two Speaker Assemblies.
- 7.) Remove the Bulkhead board.
- 8.) Remove the Operator Panel, Lower.

8-6-29-2 Remove the Bulkhead Plate

The Bulkhead Plate is used to secure the Upper UI Frame to the Lower UI Frame.

Figure 8-170 The Bulkhead Plate



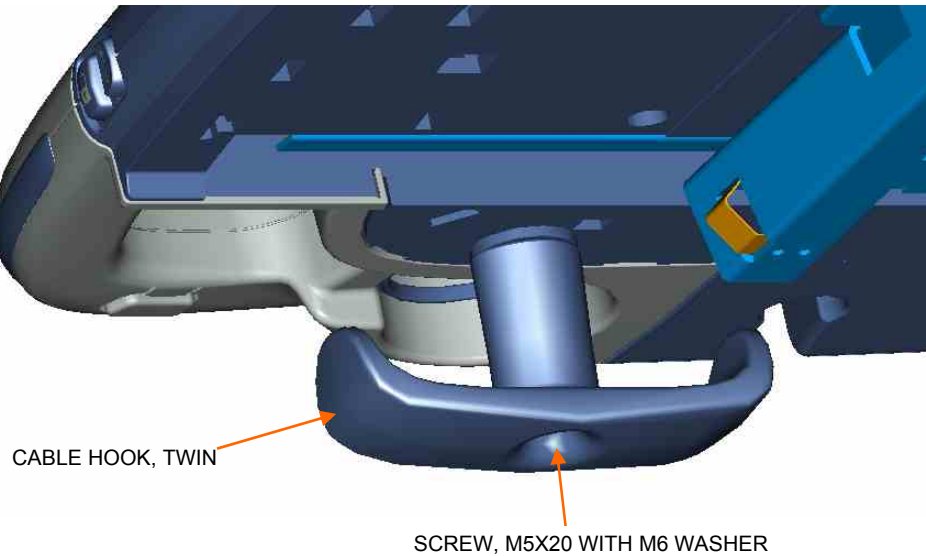
- 1.) Remove the seven fixing screws (see: [Figure 8-170 "The Bulkhead Plate" on page 8-161](#)).
- 2.) Remove the Bulkhead Plate and the Cable Clamp.

8-6-29-3 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 8-170 "The Bulkhead Plate" on page 8-161](#)).
- 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.

8-6-30 Probe Cable Hook Twin replacement

Figure 8-171 Cable Hook, Twin



8-6-30-1 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**.

8-6-30-2 Install the Cable Hook, Twin

- 1.) Position the **Cable Hook, Twin** as shown in [Figure 8-171 "Cable Hook, Twin" on page 8-162](#).
- 2.) Fix it in place by using an M5x20 screw with an M6 washer. Lock-Tite has to be used.
Torque: 50 Ncm (fingertight).

8-6-31 Non-Magnetic Touch Latch replacement

8-6-31-1 Preparations

When preparing for the replacement, you must perform the following steps:



WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.



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.
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.
- 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.

8-6-31-2 Non-Magnetic Touch Latch removal procedure

- 1.) Unscrew two screws.
- 2.) Remove the Non-Magnetic Touch Latch.

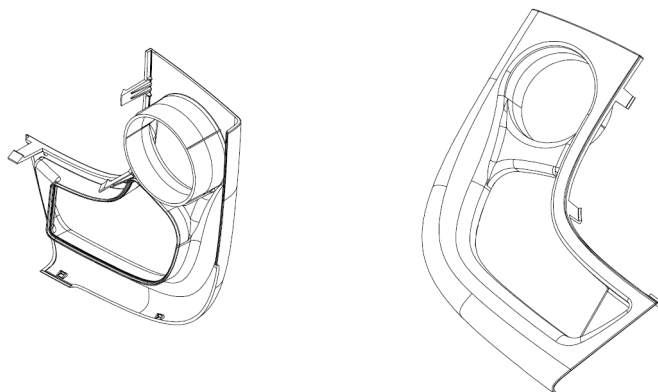
8-6-31-3 Non-Magnetic Touch Latch installation procedure

- 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.

8-6-32 Handle, Left Top / Handle Right Top, replacement

Figure 8-172 Handle, Left, Top



8-6-32-1 Preparations

- 1.) Power down the VIVID E9 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.

8-6-32-2 Handle Left Top / Handle Right Top removal

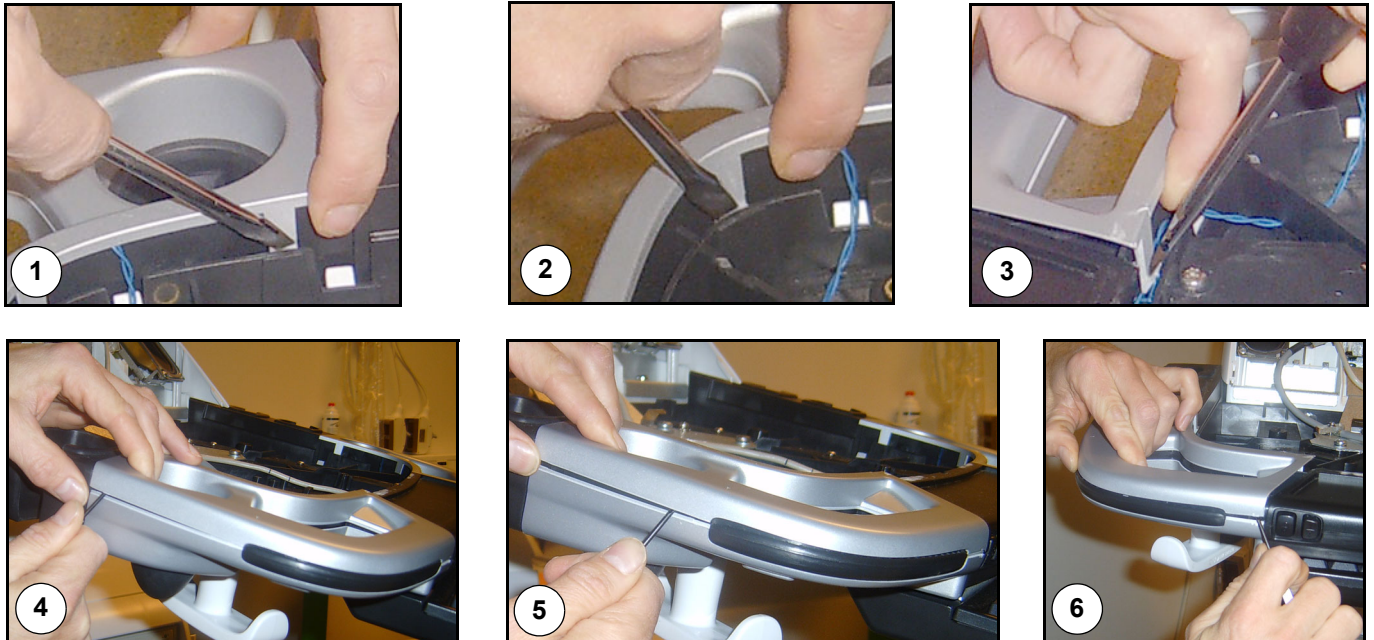
Hatches are used to attach the Handle Left Top and Handle Right Top to the Lower UI.

NOTE: Be careful when doing this procedure. It is easy to break the plastic hatches.

NOTE: The screwdriver positions in [Figure 8-173 "Release Hatches" on page 8-165](#) indicates where the hatches are located.

- 1.) Use a thin screwdriver to release the hatches, one by one as illustrated in [Figure 8-173 "Release Hatches" on page 8-165](#), until you can remove the Handle Left Top or Handle Right Top.

Figure 8-173 Release Hatches



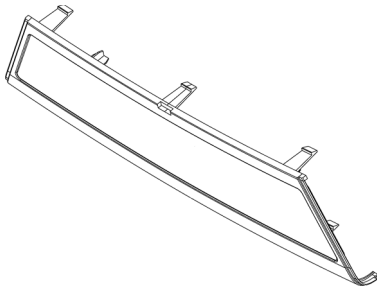
- 2.) Remove the Handle Left Top or Handle Right Top.
- 3.) If needed, repeat the previous steps for the other handle.

8-6-32-3 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.

8-6-33 Palm Rest ASSY replacement

Figure 8-174 The Palm Rest ASSY



8-6-33-1 Preparations

When preparing for the replacement, you must perform the following steps:



WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.



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.
 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
- 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.

8-6-33-2 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.

8-6-33-3 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.

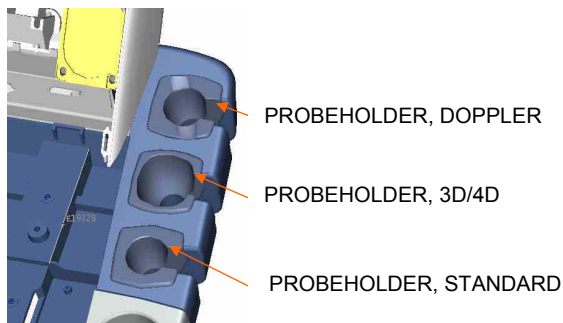
8-6-34 Replacing the Probe Holder Inserts

8-6-34-1 Introduction

The Probe Holder Inserts are soft rubber inserts, used to protect the probes from scratches, when stored on the VIVID E9. 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 8-175 Probe holders (used on both sides)



8-6-34-2 Manpower

One person, 1 minute.

8-6-34-3 Tools

No tools needed.

8-6-34-4 Preparations

- 1.) Disconnect and remove all the probes.
- 2.) Store the probes in a safe place.

8-6-34-5 Removal

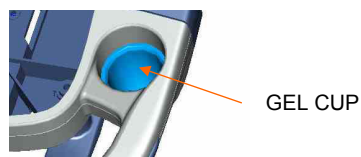
To remove a Probe Holder Insert, grab it and pull or push it upwards.

8-6-34-6 Installation

To install a Probe Holder Insert, place it so it fits one of the probe positions on the side of the Operator Panel.

8-6-35 Replacing the Gel Cup

Figure 8-176 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.

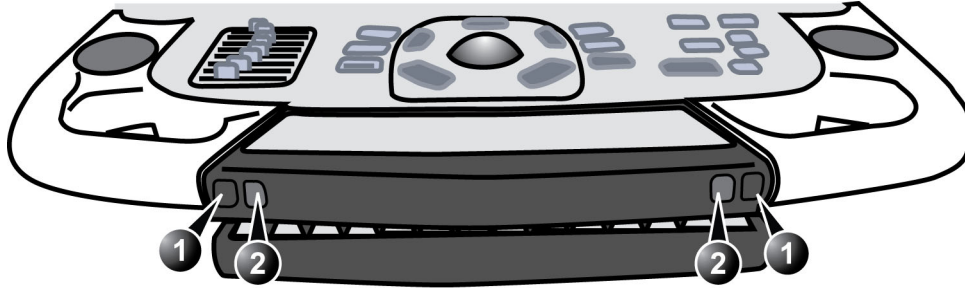
For replacement, see: [8-6-34 "Replacing the Probe Holder Inserts" on page 8-168](#).

8-6-36 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 8-177 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 8-178 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.

8-6-36-1 Preparations

When preparing for the replacement, you must perform the following steps:



WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.



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.
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.
- 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.

8-6-36-2 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.

8-6-36-3 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.

8-6-37 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.

8-6-37-1 Preparations

When preparing for the replacement, you must perform the following steps:



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



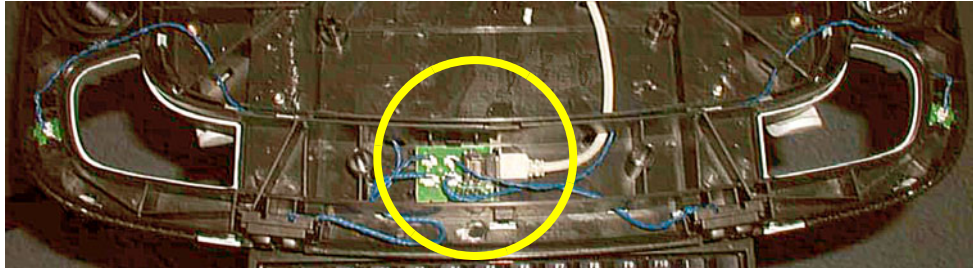
WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
 2. TURN OFF THE BREAKER.
 3. UNPLUG THE VIVID E9.
 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.
- 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.

8-6-37-2 Button IF Board removal procedure

Figure 8-179 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.

8-6-37-3 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 XY Mechanism replacement

8-7-1-1 Preparations

When preparing for the replacement, you must perform the following steps:



WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.



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.
 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.
- 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.

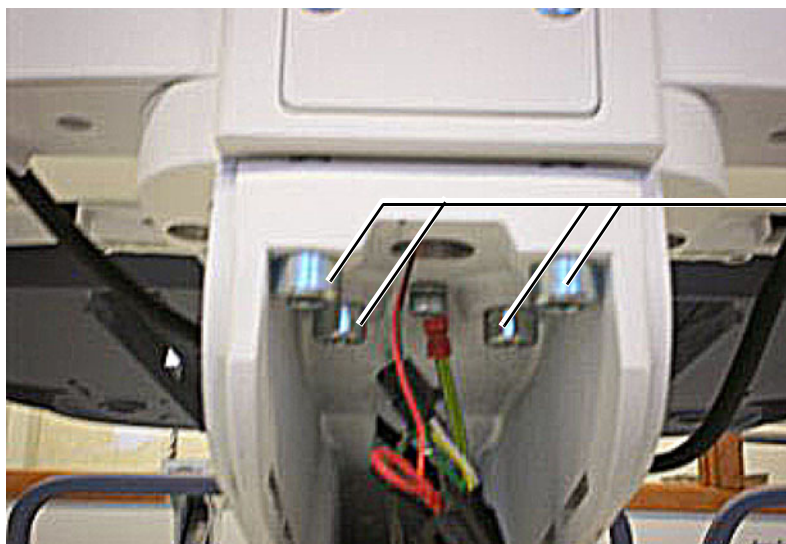
8-7-1-2 XY Mechanism removal procedure

Figure 8-180 Operator Panels have been removed



NOTE!
MAIN CABLE IS NOT SHOWN IN
THIS PICTURE.

Figure 8-181 Remove screws for the XY (Frogleg) mechanism



REMOVE FOUR (4X) SCREWS

- 1.) From the rear side of the VIVID E9, 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.

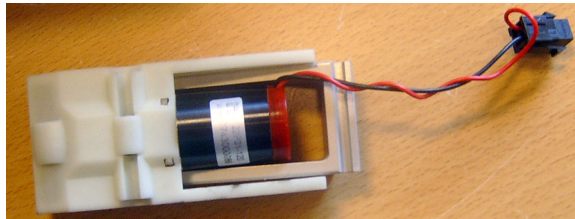
NOTE: Ensure that Bumper Z enters the slide at the back, before tighten the screws.

- 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.
(Ref. Chapter 4).

8-7-2 XY Brake Assy replacement

Figure 8-182 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.



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.
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 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 is fully shut down. This will remove tension from the brake shoes and allow for much easier brake assembly removal.*

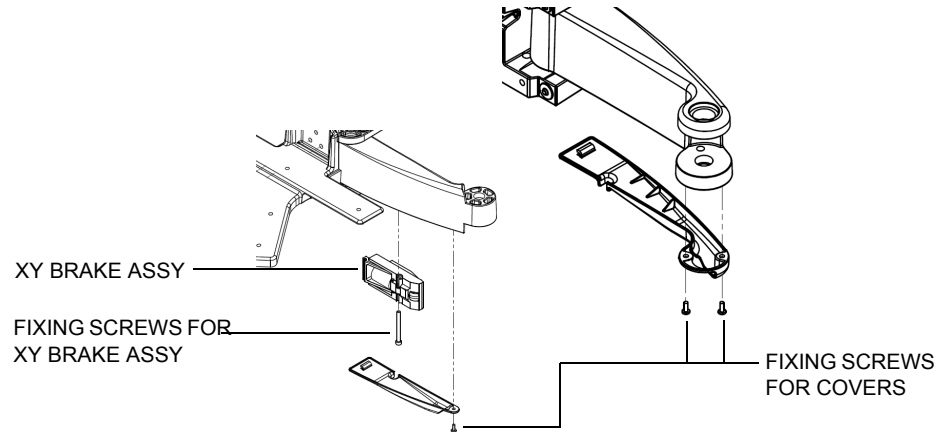
- 2.) Power down the VIVID E9.
- 3.) Disconnect the Mains Power Cable from the wall outlet.
- 4.) Disconnect all probes and external I/O cabling.

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:

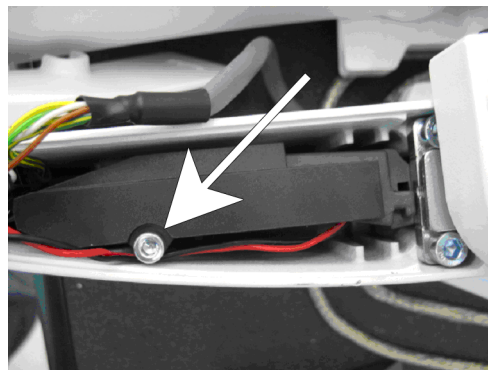
- 1.) Unscrew and remove the screw(s) that fix the cover to the leg.

Figure 8-183 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.

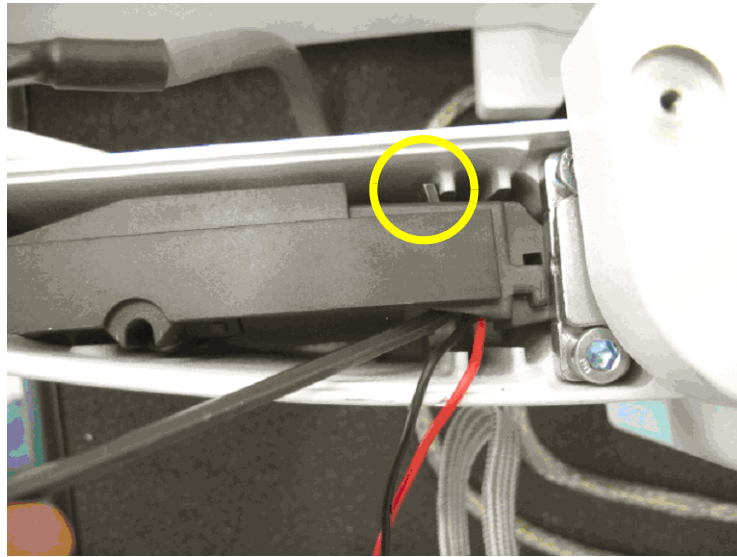
Figure 8-184 XY Brake Retaining Screw



- 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 8-185. BE CAREFUL not to pinch the brake motor wires. See: [Figure 8-186 "XY Brake Allen wrench placement - reference" on page 8-179.](#)

8-7-2-2 XY-Brake Assy removal procedure (cont'd)

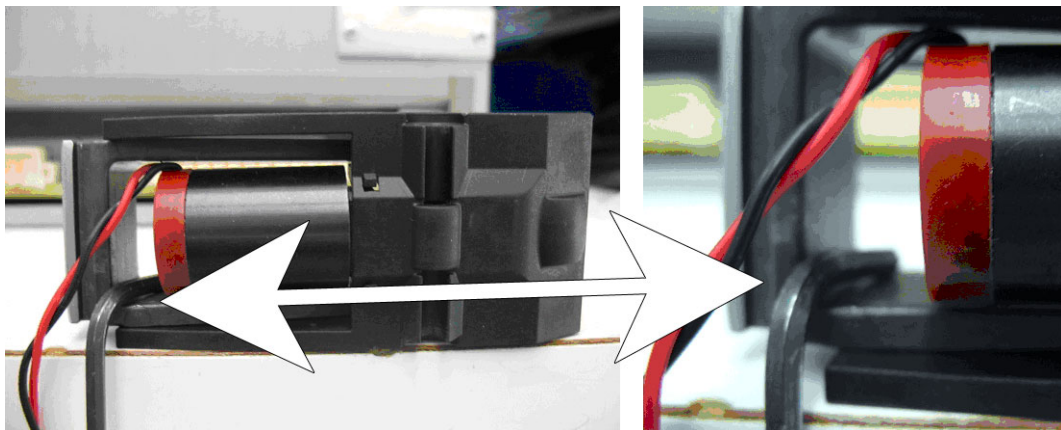
Figure 8-185 XY Brake Removal



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 8-186 shows the XY brake removed and demonstrates placement of the Allen wrench.

Figure 8-186 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 to 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, release the console's XY mechanism by inserting a screwdriver into the release point and pressing until release.

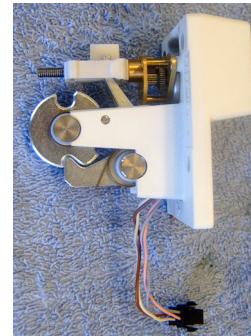
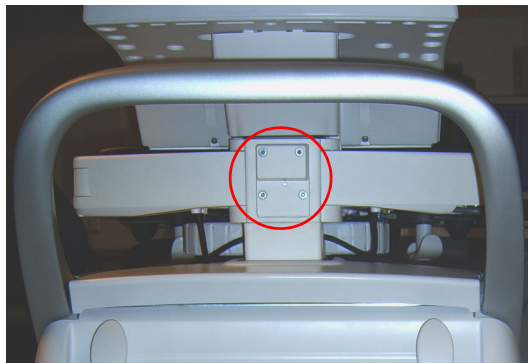
Figure 8-187 XY mechanism release



8-7-3-2 XY Park Lock removal

- 1.) Remove four screws.

Figure 8-188 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 8-189 Z-Mechanism



8-7-4-1 Preparations

When preparing for the replacement, you must perform the following steps:



WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.



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.
 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.

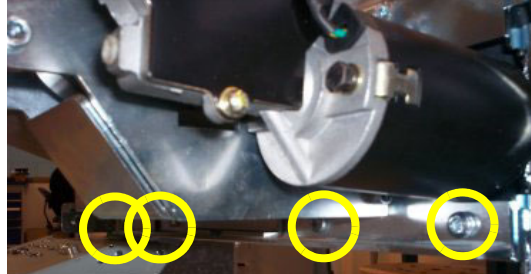
- 1.) Power down the VIVID E9.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the LCD Rear Cover.
- 5.) Remove the LCD Monitor assembly.
- 6.) Remove the LCD Arm assembly.
- 7.) Remove the Operator Panel, Upper.
- 8.) Remove 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 8-190 Remove four (4x) screws



- 2.) Remove four (4x) screws.

Figure 8-191 Remove four (4x) screws



- 3.) Lift the Z-Mechanism away.

Figure 8-192 Lift the Z-Mechanism away.

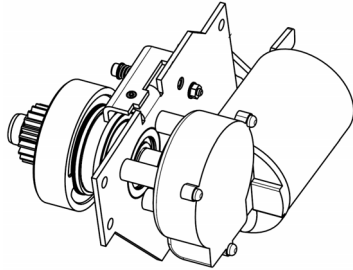


8-7-4-3 Z-Mechanism installation procedure

- 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 8-193 Drive Gear Assembly



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.



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.
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.
- 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 Rear Cover.
- 6.) Remove the Top Cover.

8-7-5-2 Drive Gear Assembly removal procedure

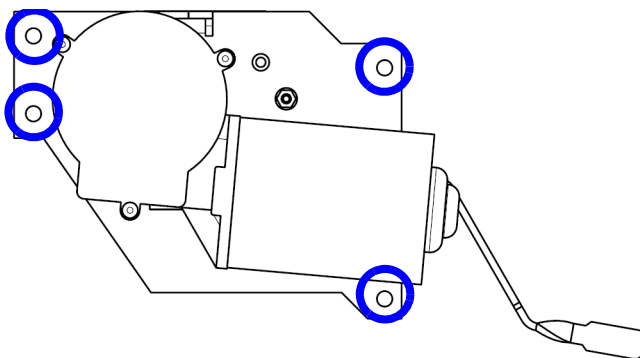
Figure 8-194 Drive Gear Assembly location



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 8-195 Remove four screws

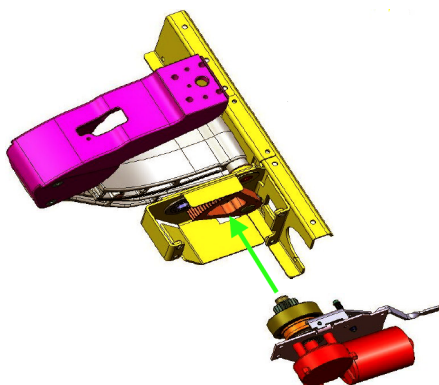


- 3.) Pull the unit away. You may need to either operate the Z-release lever when pulling, or move the Top Console slightly up or down to make the wheel disengage from the gear.

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 8-196 Install the Drive Gear Assembly



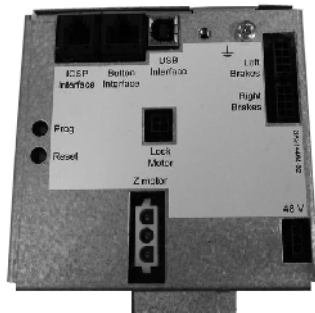
- 2.) Install the four (4x) fixing screws with washers. (M6 x 16, Torque: 9,5 Nm.)

8-7-5-3 Drive Gear Assembly installation procedure (cont'd)

- 3.) Connect the cable from the motor to the XYX 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.

8-7-6 XYZ Control Assembly replacement

Figure 8-197 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.



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

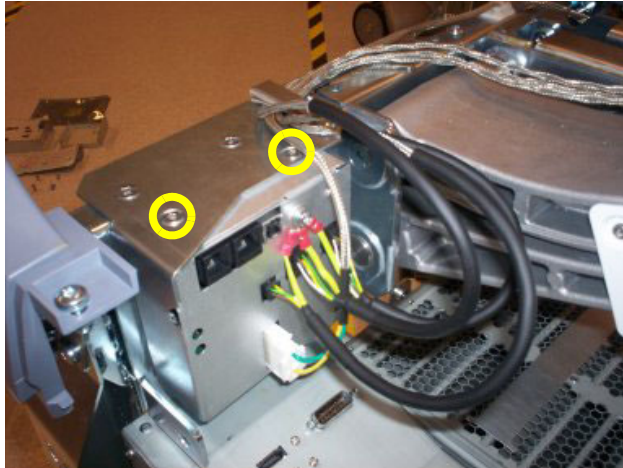
1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
 2. TURN OFF THE BREAKER.
 3. UNPLUG THE VIVID E9.
 4. MAINTAIN CONTROL OF THE POWER PLUG.
 5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- 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.
- 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 8-198 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.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) 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 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 has two air filters which need to be cleaned. The top air filter is located on the back of the VIVID E9 below the power cord and the bottom air filter is located underneath the VIVID E9.

Follow these steps to remove and clean the rear filter and the “handle type” bottom filter.

Table 8-5 Removing and cleaning filters, sheet 1 of 3

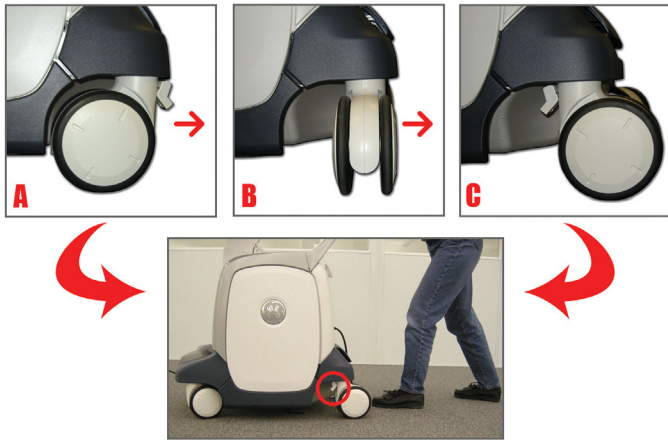

	Steps	Corresponding Graphic
1.	<p>Power down the VIVID E9 before removing the filters to prevent any loose or knocked-off debris from entering the Fan Tray.</p> <p>Walk the VIVID E9 forward until the caster is in position to access the filter handle. The right side, rear caster must be in-line and away from the VIVID E9.</p>	
2.	<p>Lock the Brakes.</p>	

Table 8-5 Removing and cleaning filters, (cont'd) sheet 2 of 3

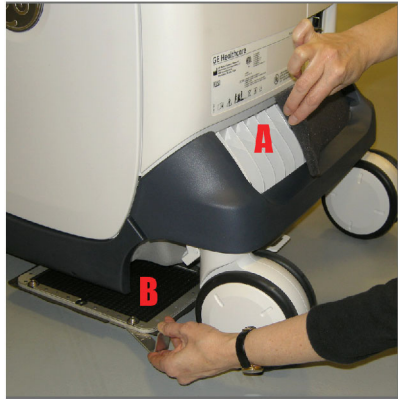



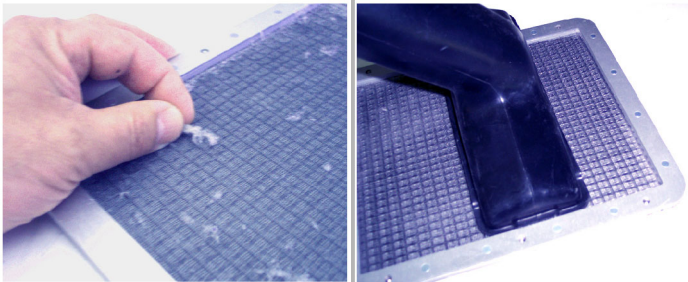
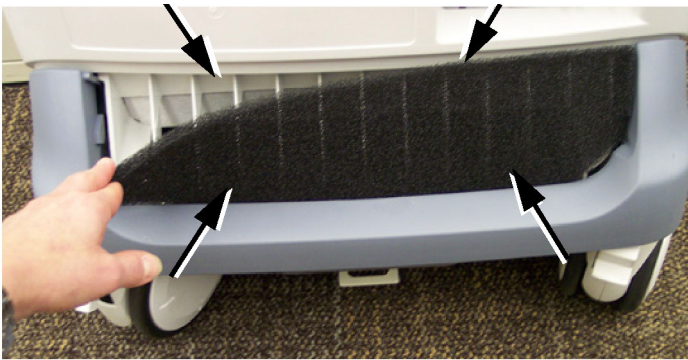

	Steps	Corresponding Graphic
3.	Filter Locations	
	A. Rear Filter - Remove the Cover and then remove the filter.	
	B. Bottom Filter - Remove the Filter Assembly by lowering the handle. <i>NOTE: The handle for the bottom filter is located in the same location for both Filter Assemblies.</i>	
4.	Clean the Rear Filter after it is removed by removing excess lint or dust from the soiled side; or vacuum if necessary.	


Table 8-5 Removing and cleaning filters, (cont'd) sheet 3 of 3


	Steps	Corresponding Graphic
5.	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.	
6.	Reinstall the rear filter and tuck the edges of the filter under the Rear Bumper and Rear Cover. Reinstall Filter Cover.	
7.	Reinstall Bottom Filter by positioning the filter under the VIVID E9 and placing the handle into the stowed position. The filter will be drawn to the filter mounting magnets.	

8-8-3 Rear Air Filter replacement

8-8-3-1 Preparations

When preparing for the replacement, you must perform the following steps:

**CAUTION**



ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.
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
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Remove the Filter Cover.

8-8-3-2 Filter removal procedure

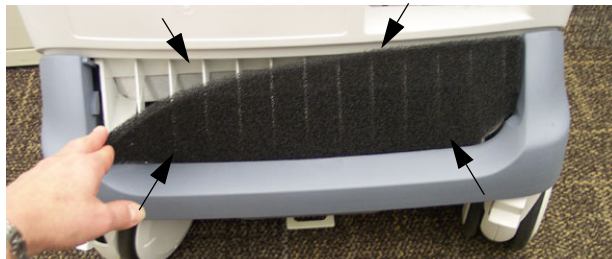
Grab the Filter and remove it.

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 8-199 Tuck Filter behind Rear Bumper and Rear edges

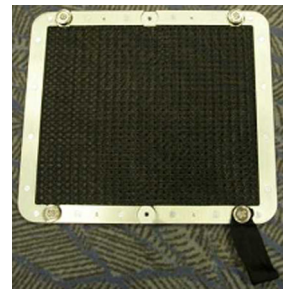


- 3.) Install the Filter Cover.

8-8-4 Bottom “nylon strip” Air Filter replacement

8-8-4-1 Overview

Figure 8-200 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.

8-8-4-2 Preparations

 **CAUTION** Lock the VIVID E9's wheels prior to removing/cleaning the air filter. This prevents the VIVID E9 from moving unexpectedly.

- 1.) Power down the VIVID E9.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Kneeling down on the right side of the VIVID E9 enables you to access the air filter tab.
- 4.) Locate the tab extending from the air filter on the bottom of the VIVID E9.

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 8-201 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.

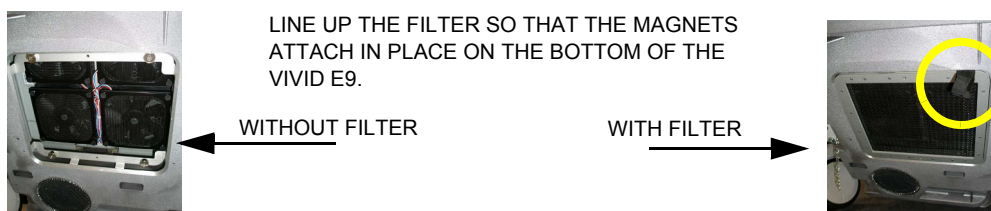
After cleaning the filter by rinsing with water, allow it to dry completely before re-installing.

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. Align it in position (see: the tab in [Figure 8-202](#)). The magnets will help to position it correct.

Figure 8-202 VIVID E9 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.



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.
 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
- 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 8-203 Fan Assembly removal



8-8-5-3 Fan Assembly installation procedure

Follow these steps to install the Fan Assembly:

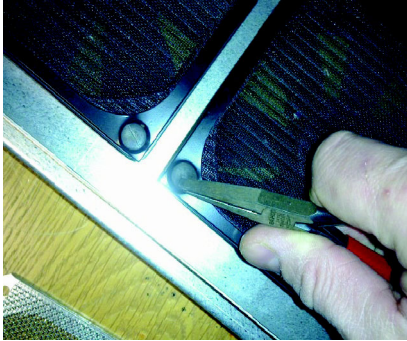
- 1.) Align the Fan Assembly with the rails in the frame and push it into position.
- 2.) Install the Card Rack Cover.
- 3.) Install the thumb screws of the Card Rack Cover.
- 4.) Connect the PCIe express cable to the GFI board connector.

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.

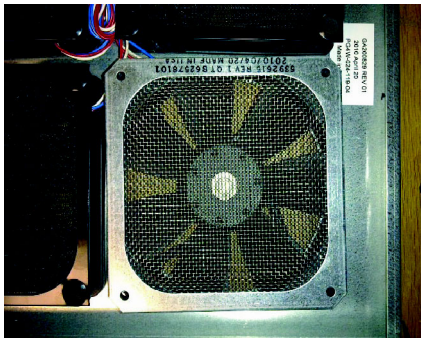
Figure 8-204 Remove Rubber Bushings



8-8-6-2 Install the new Fan Screen and Fan Screen Frame

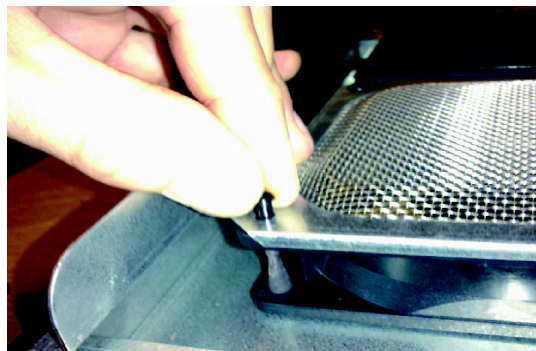
- 1.) Place the new fan screen and fan screen frame ontop of the fan.

Figure 8-205 New Fan Screen and Fan Screen Frame ontop of the fan



- 2.) Place the rivet bushing into the frame screen hole.

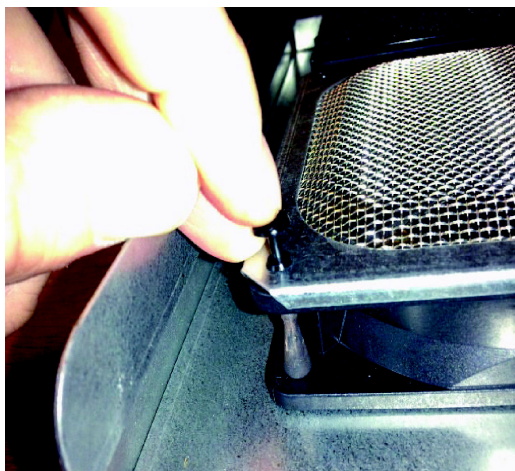
Figure 8-206 New Fan Screen and Fan Scree Frame ontop of the fan



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.

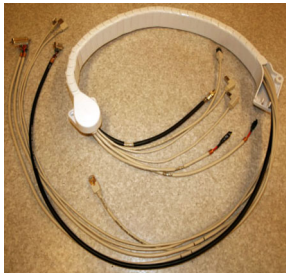
Figure 8-207 Hold the frame screen firmly down onto the fan



- 4.) Press the rivet pin firmly down to secure the fan screen.
- 5.) Install the Fan Drawer back into the VIVID E9.

8-8-7 Main Cable replacement

Figure 8-208 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.*



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.
 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.
- 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 8-167](#).

Figure 8-209 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.

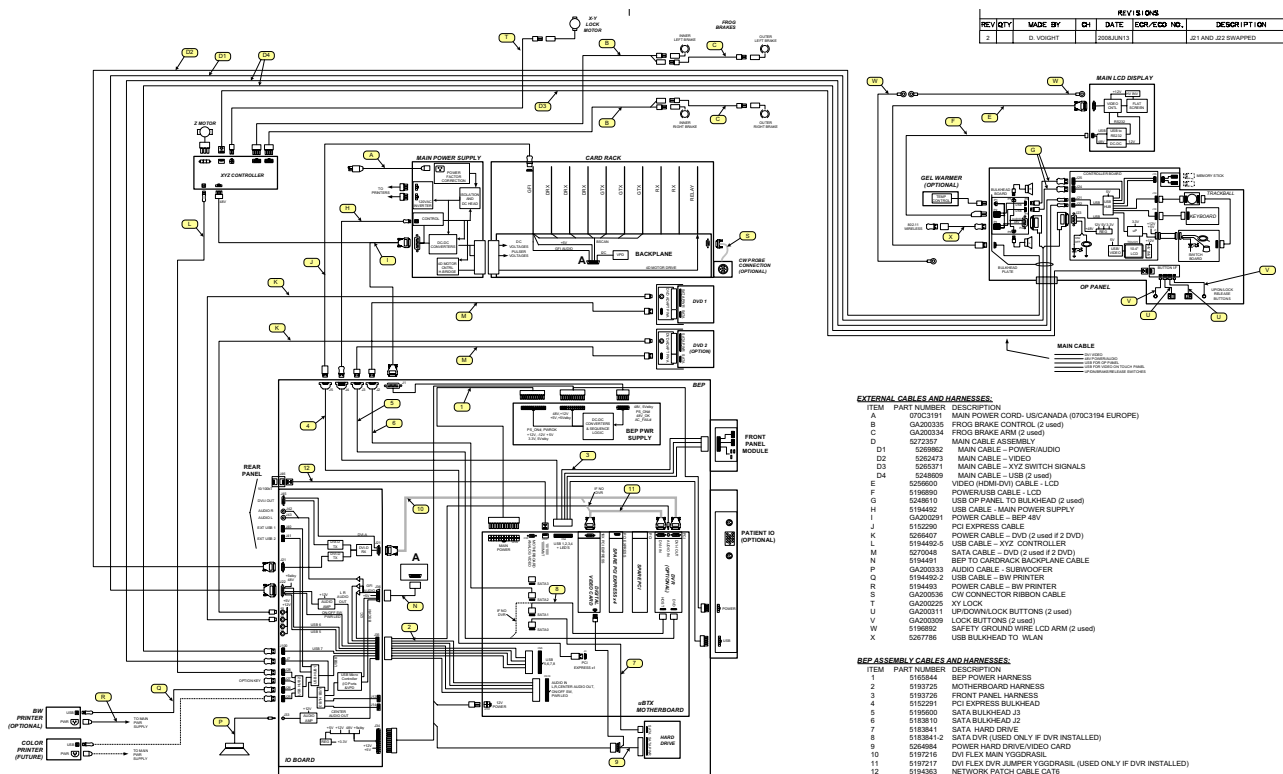
8-8-7-2 Main Cable removal procedure (cont'd)

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.

8-8-7-3 Main Cable installation procedure

Figure 8-210 VIVID E9 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.
- 12.) Verify that the XYZ functions operate as they should.
- 13.) Power down VIVID E9.
- 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.*



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.
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.

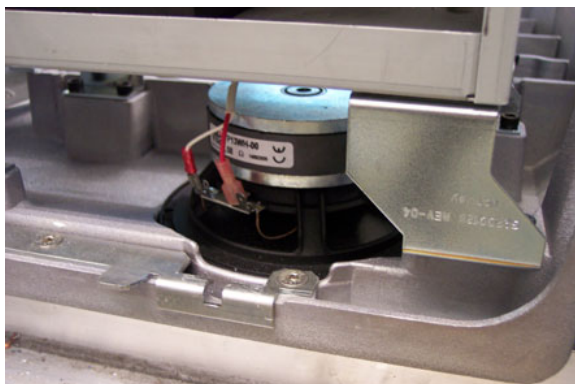
- 1.) Power down the VIVID E9
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Left Side Cover.
- 5.) Remove the BEP.

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 8-211 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.
- 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.*
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.
 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
- 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.

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.



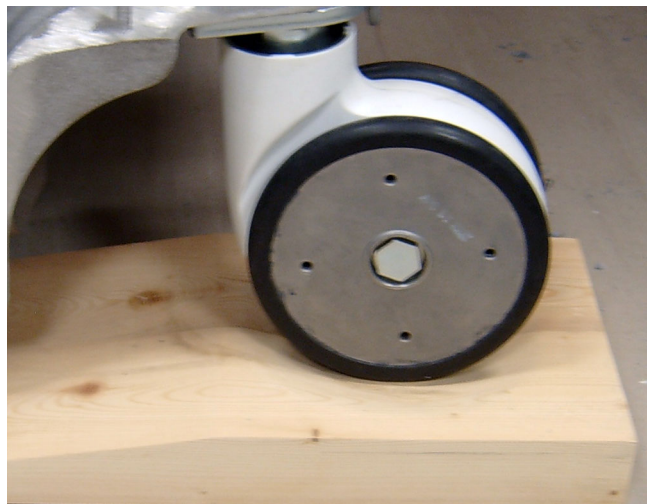
WARNING *PRIOR TO ELEVATING SCANNER, VERIFY THAT THE FLOATING OPERATOR PANEL IS LOCKED IN ITS LOWEST, PARKING POSITION.*



WARNING *USE EXTREME CAUTION AS LONG AS VIVID E9 IS UN-STABLE, NOT RESTING ON ALL FOUR CASTERS.*

- 4.) Pull the VIVID E9 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 8-212](#).

Figure 8-212 Pull VIVID E9 backwards up the board incline



- 6.) Activate the brakes.
- 7.) The VIVID E9 is now nearly balanced between one Front and one Rear Caster.
- 8.) Make the VIVID E9 rest on both Front Casters and lift the Rear Caster. Put the Wooden Wedge under the chassis. This will stabilize the VIVID E9 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 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 8-209](#), but now using the Bevel Edged board and the Wooden Wedge on the other side of the VIVID E9.
- 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.



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.
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
- 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

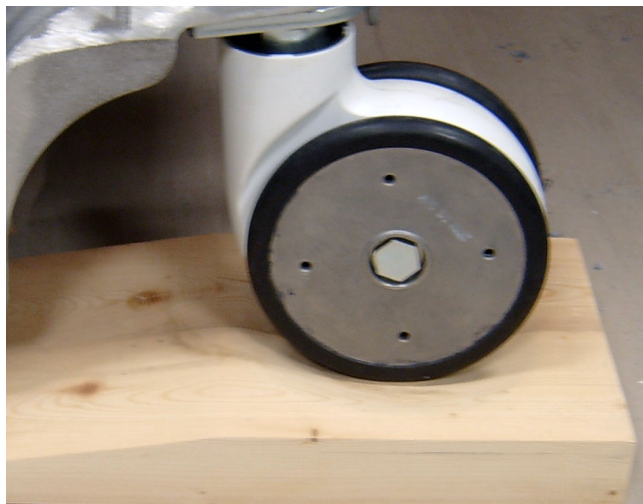
- 1.) Turn Front Casters so they are pointing forwards.
- 2.) Activate Direction Lock.
- 3.) Put the Bevel Edged Board on the floor.

 **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 IS UN-STABLE, NOT RESTING ON ALL FOUR CASTERS.*

- 4.) Pull the VIVID E9 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 8-212](#).

Figure 8-213 Pull VIVID E9 backwards up the board incline



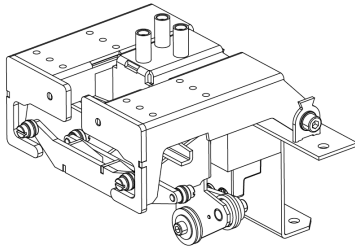
- 6.) The VIVID E9 is now nearly balanced between one Front and one Rear Caster.
- 7.) Make the VIVID E9 rest on both Rear Casters and lift the Front Caster.
- 8.) Put the Wooden Wedge under the chassis. This will stabilize the VIVID E9 with one Front Caster free from the floor.
- 9.) Unscrew and remove 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 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 8-212](#), but now using the Bevel Edged board and the Wooden Wedge on the other side of the VIVID E9.
- 6.) Install the Foot Rest Cover.

8-9-3 Pedal Mechanism replacement

Figure 8-214 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.



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

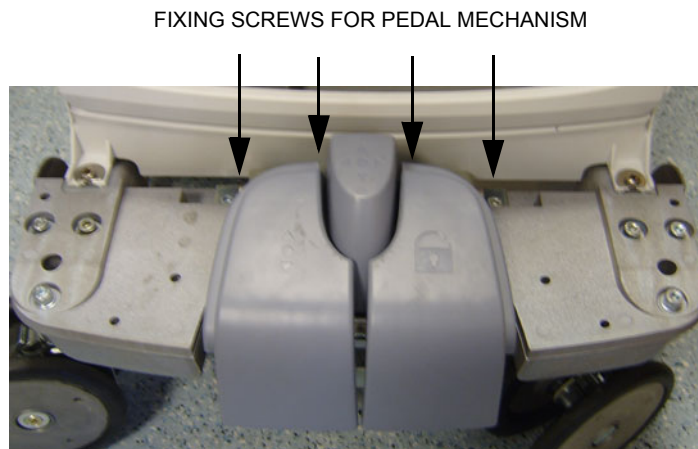
1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
 2. TURN OFF THE BREAKER.
 3. UNPLUG THE VIVID E9.
 4. MAINTAIN CONTROL OF THE POWER PLUG.
 5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
- 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
- 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 8-215 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 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 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 Top Cover.
- 6.) Install the Foot Rest Bumper.

8-9-4 Brake Pedal replacement



WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.



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.
 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
- 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 8-216](#) 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.
Please refer to [8-9-4 "Brake Pedal replacement" on page 8-216](#) 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.*



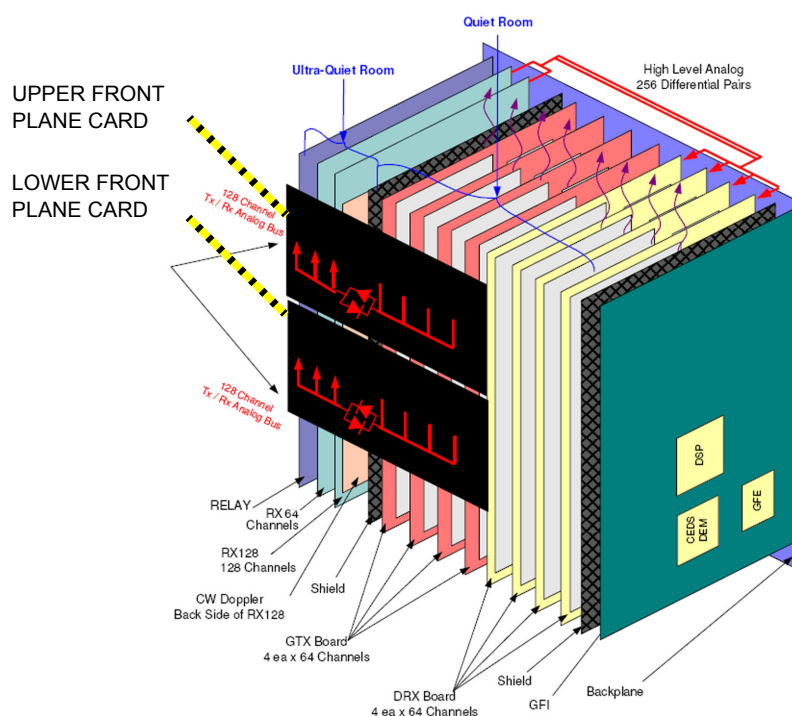
1. ALWAYS CONNECT YOURSELF, VIA AN ARM-WRIST STRAP, TO THE ADVISED ESD CONNECTION POINT LOCATED ON THE REAR OF THE SCANNER (NEAR THE POWER CONNECTOR).
2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.

 **WARNING** *RISK OF ELECTRICAL SHOCK, VIVID E9 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).

Figure 8-216 Cards in Front End rack



NOTE: The number of each card type depends on VIVID E9 model card version (P/N) and installed options.

Table 8-6 FEP Cards per VIVID E9 sheet 1 of 2

CARD POSITION	ABBREVIATION	CARD NAME	TOTAL NUMBER OF CARDS PER SYSTEM			
			BT'09	BT'11		BT'12
			SW v108.x.x	SW v110.0.0 to v110.1.3	SW v110.1.4 (or higher)	SW v112.0.x
1	RLY	RELAY BOARD	1x	1x	1x	1x
2	GRX64	ANALOG RECEIVER BOARD	1x	1x	1x	1x
3	GRX128	ANALOG RECEIVER BOARD	1x	1x	1x	1x
4	GTX-TLP192	TRANSMITTER BOARD	NOT USED	NOT USED	1x	1x
5	GTX-TLP3	TRANSMITTER BOARD	4x	NOT USED	NOT USED	NOT USED
6	GTX-TLP3	TRANSMITTER BOARD		3x	NOT USED	NOT USED
7	GTX-TLP3	TRANSMITTER BOARD			NOT USED	NOT USED
8	GTX-TLP3	TRANSMITTER BOARD			NOT USED	NOT USED
9	DRX	EMPTY	NOT USED	NOT USED	NOT USED	NOT USED

Table 8-6 FEP Cards per VIVID E9 (cont'd) sheet 2 of 2

CARD POSITION	ABBREVIATION	CARD NAME	TOTAL NUMBER OF CARDS PER SYSTEM			
			BT'09	BT'11		BT'12
			SW v108.x.x	SW v110.0.0 to v110.1.3	SW v110.1.4 (or higher)	SW v112.0.x
9	DRX	DIGITAL RECEIVER BOARD	3x	3x	3x	3x
10	DRX	DIGITAL RECEIVER BOARD				
11	DRX	DIGITAL RECEIVER BOARD				
12	GFI	GLOBAL RADIO FREQUENCY INTERFACE	1x	1x	1x	1x
N/A	FRONT PLANE / XD BUS FOR GTX-TLP3	THE FRONT PLANE BOARDS CONNECT TO THE BACK OF THE RELAY BOARD, THE GTX BOARD(S) AND THE GRX BOARDS	2x	2x	NOT USED	NOT USED
	FRONT PLANE / XD BUS FOR GTX-TLP192		NOT USED	NOT USED	2x	2x

NOTE: The number of each card type depends on VIVID E9 model card version (P/N) and installed options.

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.*



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.
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.



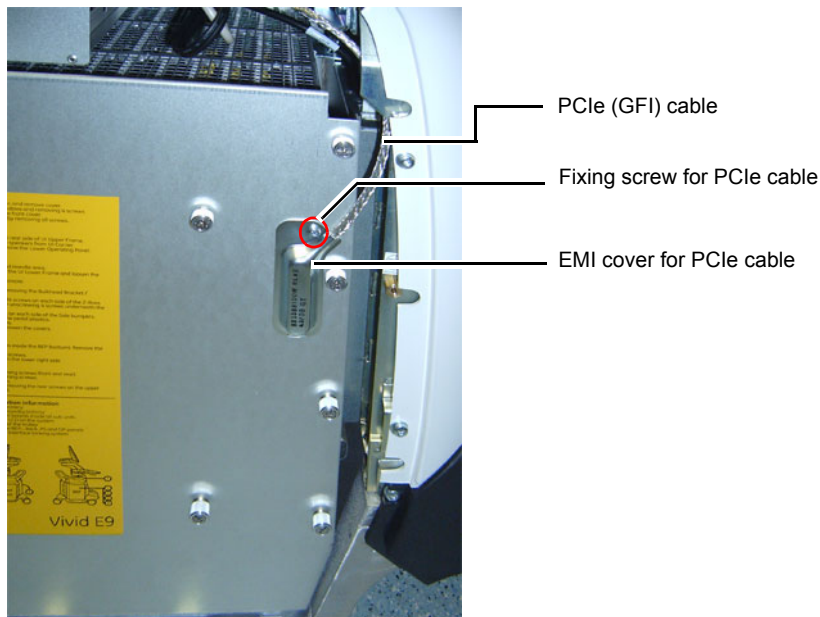
WARNING *RISK OF ELECTRICAL SHOCK, VIVID E9 MUST BE TURNED OFF. AVOID ALL CONTACT WITH ELECTRICAL CONTACTS, CONDUCTORS AND COMPONENTS. ALWAYS USE NON-CONDUCTIVE HANDLES DESIGNED FOR THE REMOVAL AND REPLACEMENT OF ESD SENSITIVE PARTS. ALL PARTS THAT HAVE THE POTENTIAL FOR STORING ENERGY MUST BE DISCHARGED OR ISOLATED BEFORE MAKING CONTACT.*

- 1.) Power down the VIVID E9
- 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

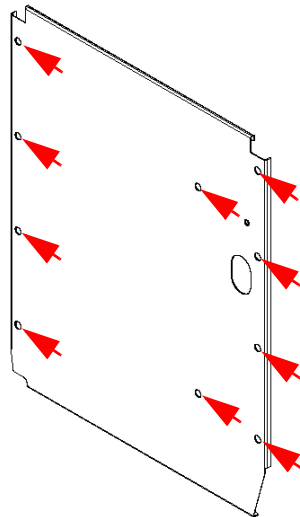
An EMI cover is used to ground the PCIe (GFI) cable to the FEP cover.

Figure 8-217 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 8-218 FEP Cover's fixing screws



- 5.) Remove the FEP Cover.

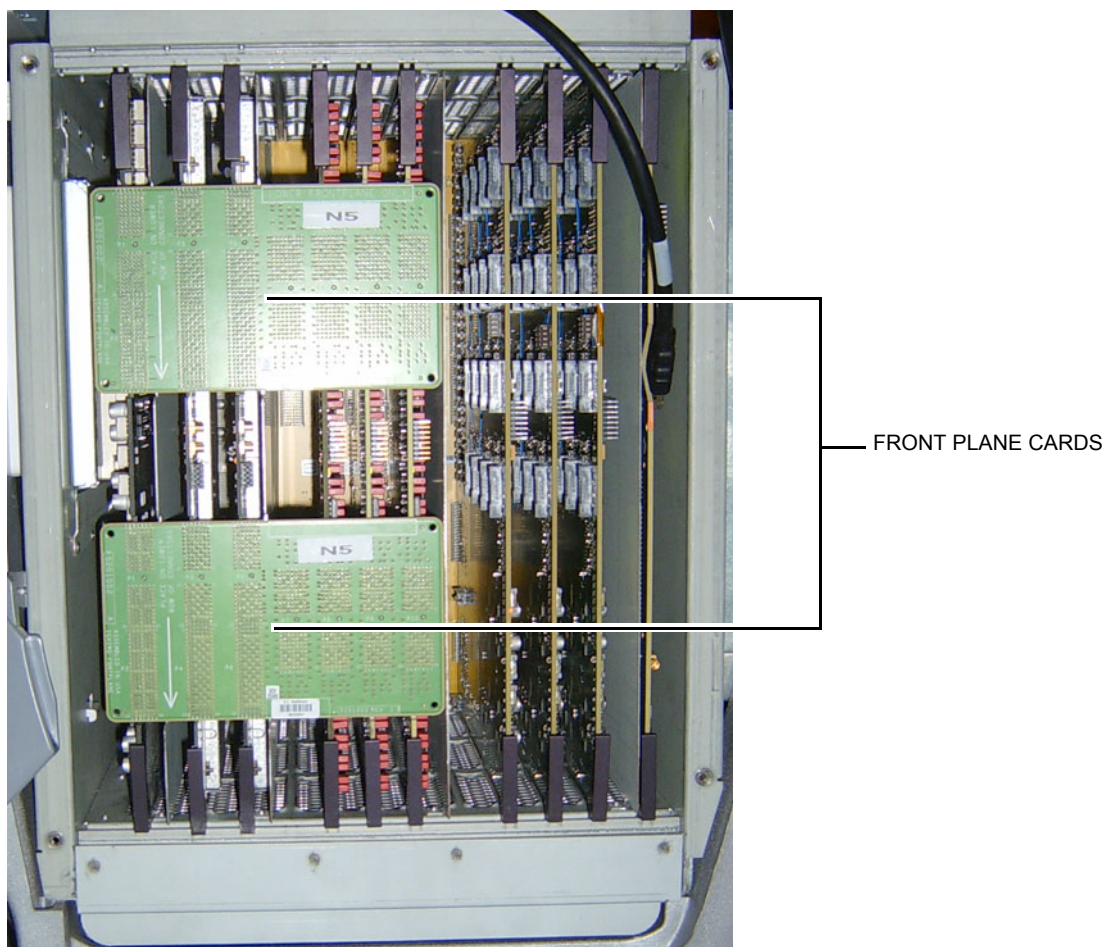
8-10-2-3 FEP Cover installation procedure

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 8-219 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.



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.
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 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.




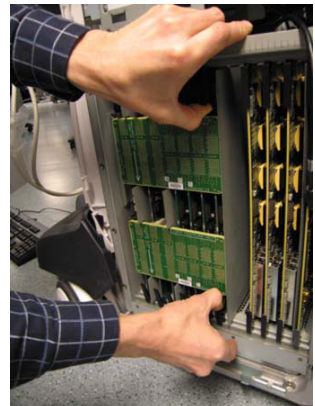

WARNING PRIOR TO REMOVING THE CARD RACK BOARDS, THE LEDS ON THE END OF EACH BOARD SHOULD BE UNLIT, TO INDICATE BOARDS ARE UNPOWERED.


- 1.) Power down the VIVID E9
- 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:

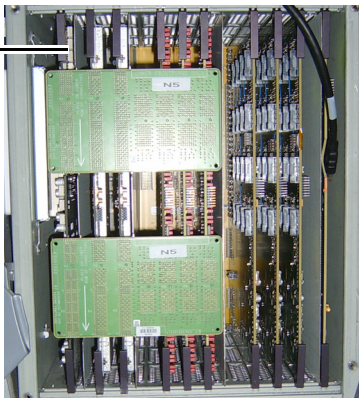
NOTE: *The silk print on the two cards say "Lower Frontplane only" This statement is from an earlier design, and is not valid anymore.*

- 1.) Install the GRLY 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 8-220 Relay Board location

RELAY BOARD



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.



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.
 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 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
- 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 Calibration and adjustments

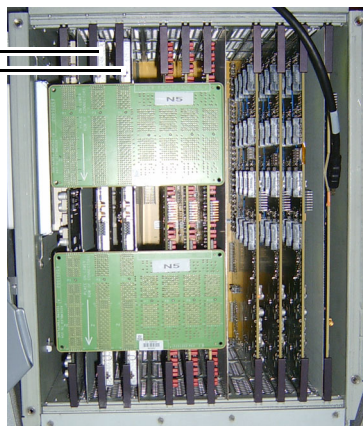
Calibrate the Front End A/D converters as described in:

- [Section 6-6 "DC Offset Calibration \(Front End Alignment\)" on page 6-11.](#)

8-10-5 Receiver Board (GRX) replacement

Figure 8-221 GRX Boards location

GRX BOARDS



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.



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.
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 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
- 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

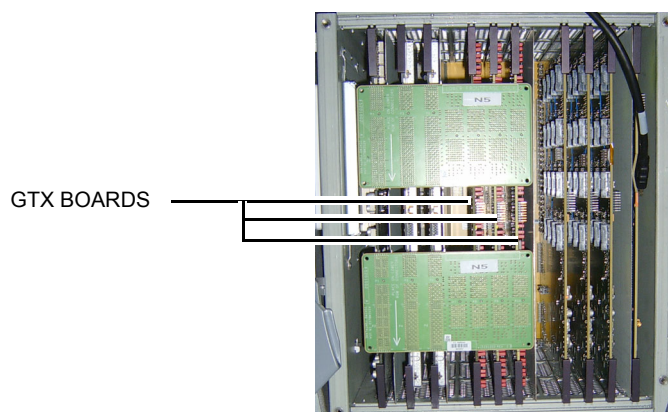
8-10-6-1 Overview

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 8-222 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.



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.
 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 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
- 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.*



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.
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 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
- 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:

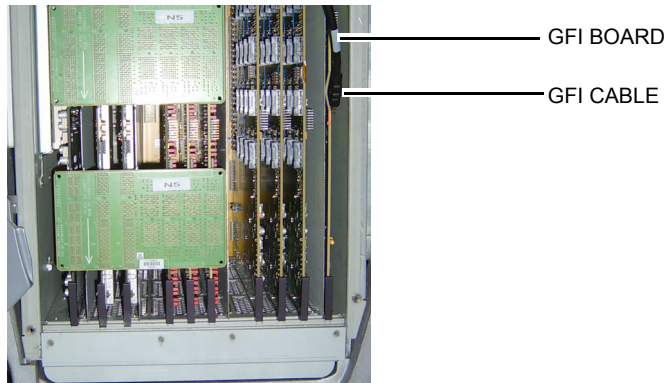
- 1.) Carefully align the DRX Board with the rails and push it in till it is seated in the Back Plane connectors.
- 2.) Install the DRX Shield.
- 3.) Install the FEP Cover and fasten it with its fixing screws.
- 4.) Plug in the PCIe (GFI) Cable.
- 5.) Install the cover for the PCIe cable.
- 6.) Install 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 8-223 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.



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.
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 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
- 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.](#)



WARNING ENERGY CONTROL AND POWER LOCKOUT FOR VIVID E9.



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.
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.*



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.
 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'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.) 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.
- 6.) Disconnect the **Mains Power Cable** from the wall outlet.
- 7.) Disconnect **all probes**.
- 8.) Remove the **Side Covers**.
- 9.) Remove the **Top Cover**.
- 10.) 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.
- 11.) For easier access in the next steps, remove the VIVID E9'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 8-224 Printer Bracket (BEP6)

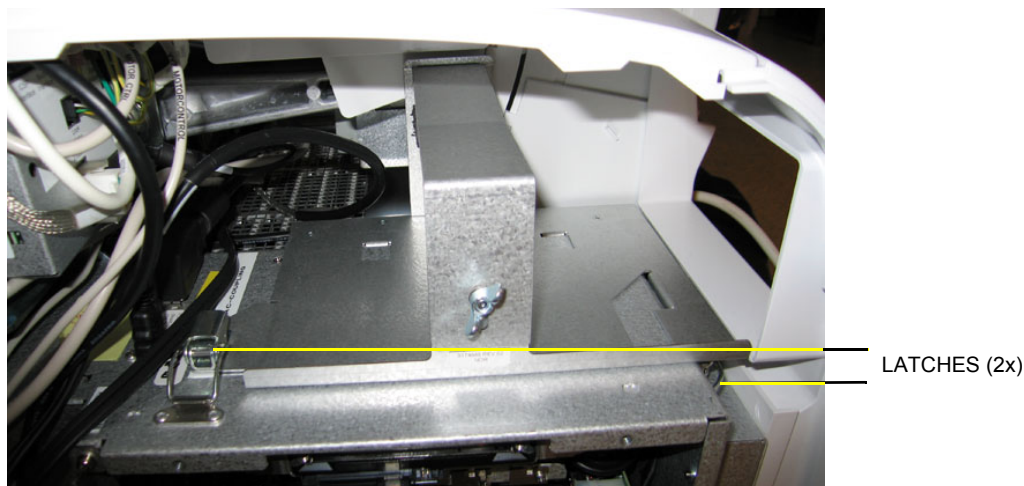
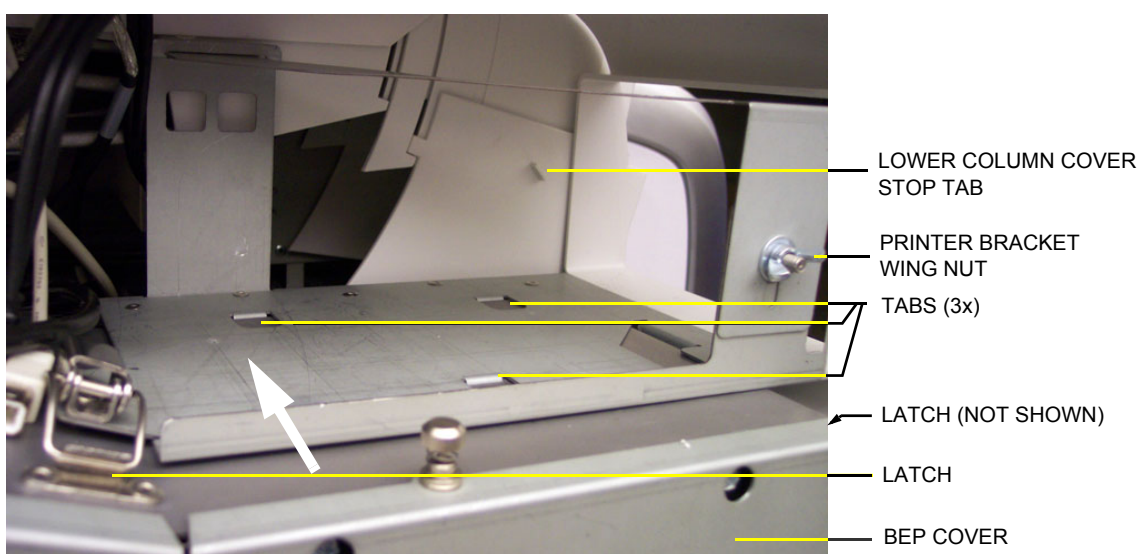


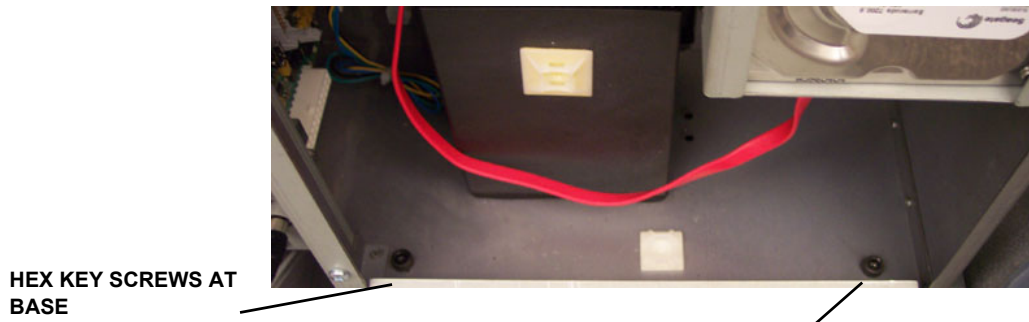
Figure 8-225 Printer Bracket (first version for BEP5)



8-11-1-3 Back End Processor (BEP) removal procedure (cont'd)

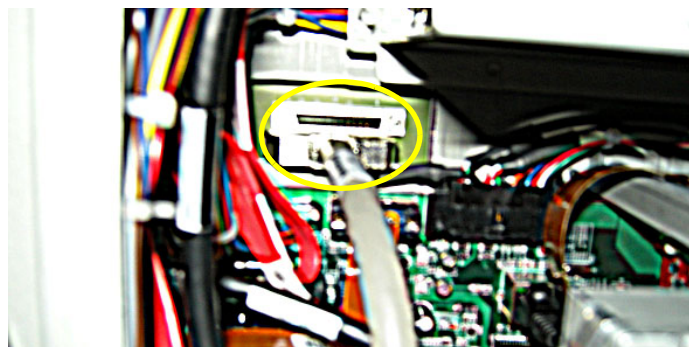
- 4.) Tilt the Front Cover forward just until the Column Cover Stop Tabs clear.
- 5.) Lift the Lower Column Cover.
- 6.) Push the printer bracket toward the FEP approximately 1.3 cm (1/2 inch) to free the 3 tabs from the BEP. Push in the direction of the white arrow in [Figure 8-225](#).
- 7.) Remove 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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 8-226 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 8-227 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 8-305](#).
- 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 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.
- c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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'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.*



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

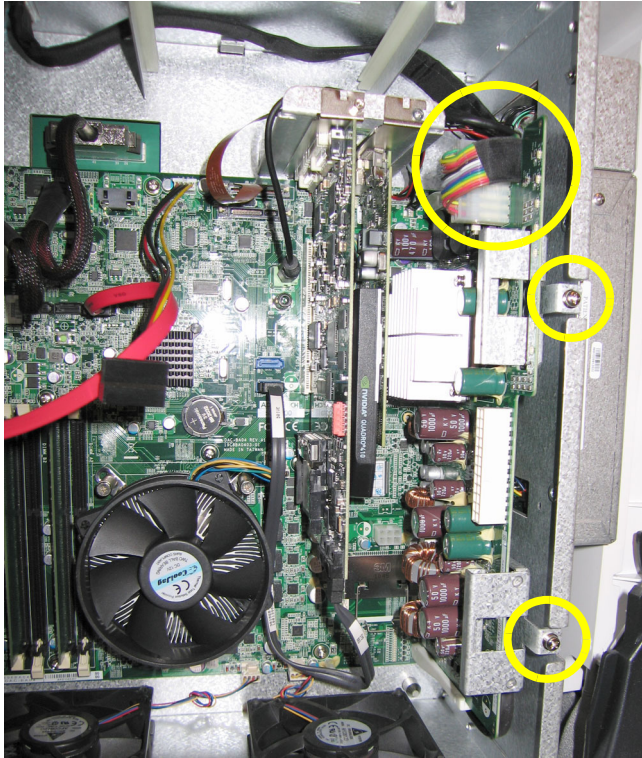
1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
2. TURN OFF THE BREAKER.
3. UNPLUG THE VIVID E9.
4. MAINTAIN CONTROL OF THE POWER PLUG.
5. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE, AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.

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.
- 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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 8-228 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 8-228 - 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 8-253.](#)

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.

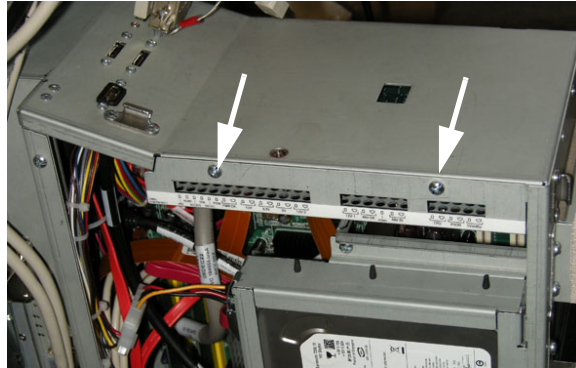
- a.) Insert the base of the BEP Cover inside the base of the BEP.
Be sure the bottom lip of the BEP Cover rests inside the BEP.
- b.) Tilt the top of the BEP Cover toward the VIVID E9.
- c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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:

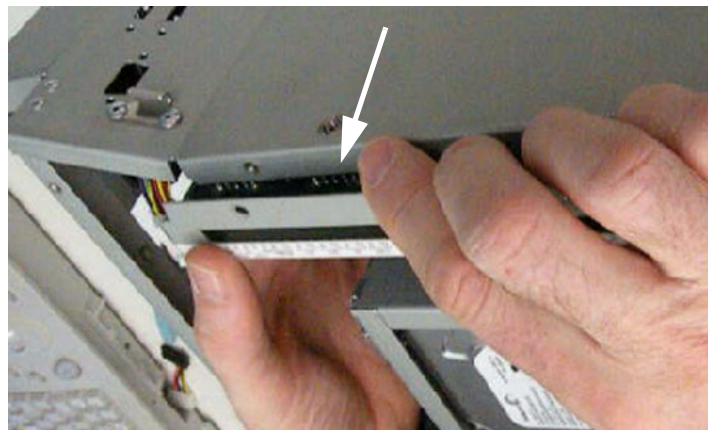
- 1.) Remove the two screws on the Power Supply.

Figure 8-229 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 8-230 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 8-255.](#)

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.
- c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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.***
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.
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's TCP/IP 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)

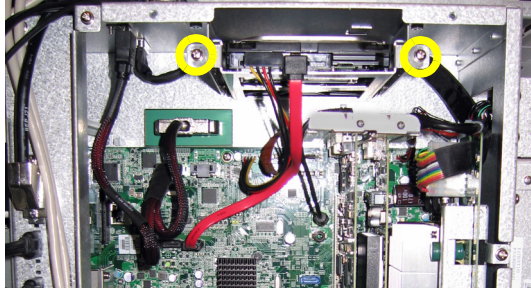
- 3.) If possible, wipe the HDD partitions as described here: Reload the system software from DVD.
Select A: to overwrite all content on HDD.
- 4.) Power down the VIVID E9.
- 5.) Disconnect the Mains Power Cable from the wall outlet.
- 6.) Disconnect all external cables (probes, ECG, physio, ethernet, audio, video, USB).
- 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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:

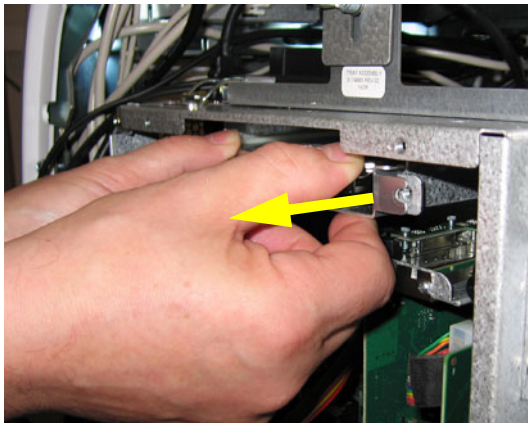
- 1.) Disconnect the cables connecting the HDD.
- 2.) Remove the two screws that secures the HDD Bracket to the BEP's frame.

Figure 8-231 BEP6 HDD screws



- 3.) Get hold of the HDD assembly, see figure below, and pull it out.

Figure 8-232 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.
- c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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.
- 8.) Install the System software and the Application software.
- 9.) Enter the VIVID E9'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 8-261](#).

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 8-233 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 8-234 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.
- c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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.
- 9.) Install the System software and the Application software.
- 10.) Enter the VIVID E9'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

BT'12 scanners:

These Graphics Adapters may be used, depending on the VIVID E9 model and BEP model:

- BT'12 with BEP6 with 4D: Nvidia Quadro 410
- BT'12 with BEP6 without 4D: Video Bypass Board
- BT'12 with BEP5 with 4D: Nvidia Quadro 2000D
- BT'12 with BEP5 without 4D: Prolink Add 2 card

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'11 scanners:

These Graphics Adapters are used, depending on the VIVID E9 BT'11 model.

- BT'11 with 4D: Nvidia Quadro FX1800 or Nvidia Quadro 2000D
- BT'11 without 4D: Prolink Add 2 card

BT'09 scanners:

These Graphics Adapters have been installed on VIVID E9 BT'09:

- ATI Fire GL V7200
- Nvidia Quadro FX1800
- Repaired scanners may have Nvidia Quadro 2000D

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.*



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.
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.

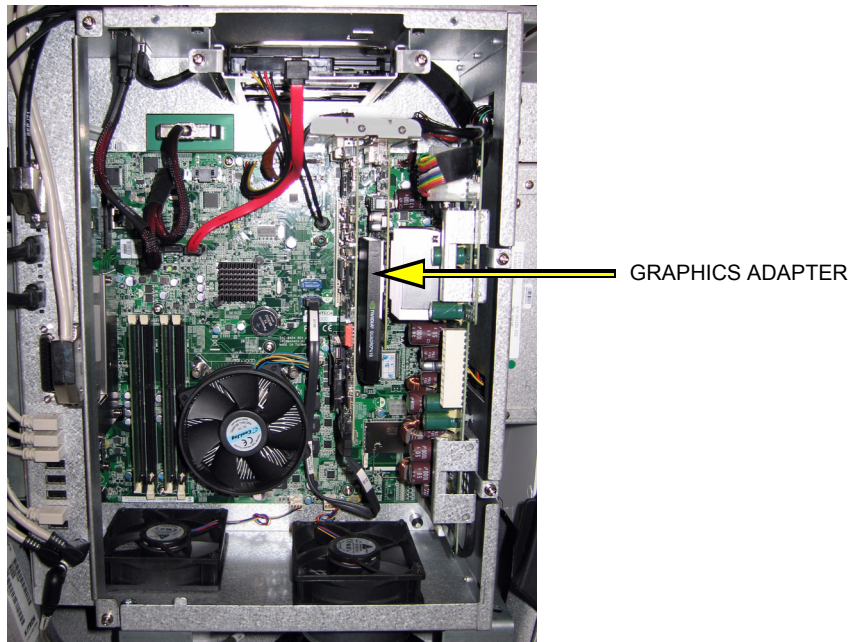
8-11-4-3 Preparations - BEP5/BEP6

When preparing for the removal, or replacement, of a Graphical Adapter, you must perform the following steps:

- 1.) Power down the VIVID E9.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes.
- 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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 8-265.](#)
 - for BEP5, continue with:
[8-11-4-8 "Removing the Graphics Adapter from the BEP5" on page 8-269.](#)

8-11-4-4 Removing the Graphics Adapter from the BEP6

Figure 8-235 Graphics Adapter position in BEP6

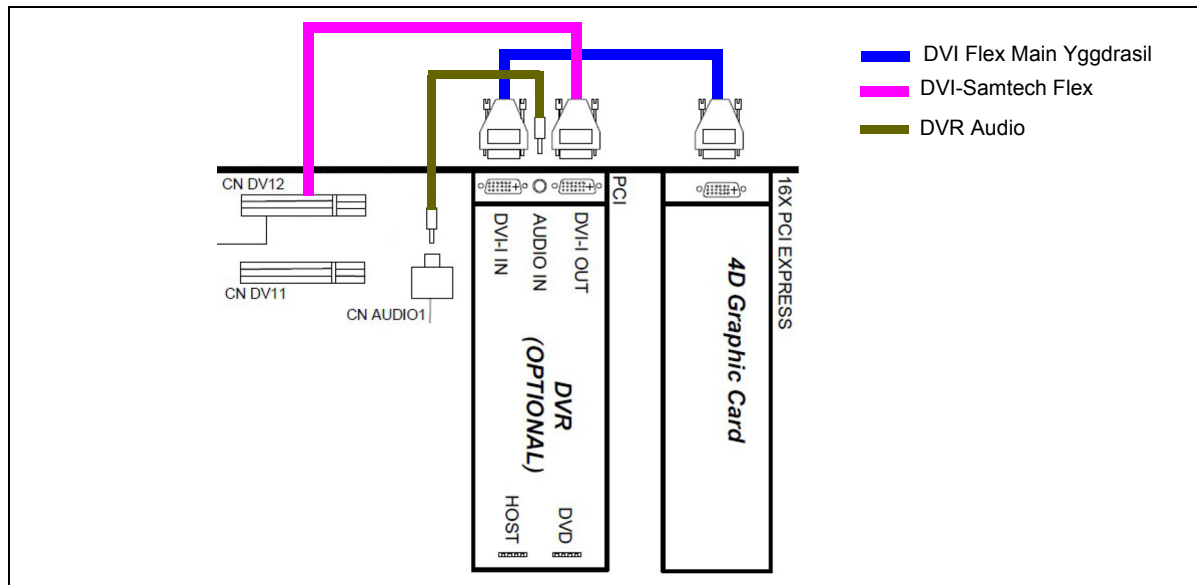


- 1.) Remove the HDD to get easier access in the rest of the procedure.
- 2.) Unscrew the fixing screws from the connector at top of the Graphics Adapter.
 - If DVR is installed: the flex between the Graphics Adapter and the DVR board uses finger screws.
 - Without DVR: the flex from the motherboard is fixed with Hex screws.
- 3.) Disconnect the plug.
- 4.) Remove the fixing screw for the Graphics Adapter.
- 5.) Pull out the Graphics Adapter.

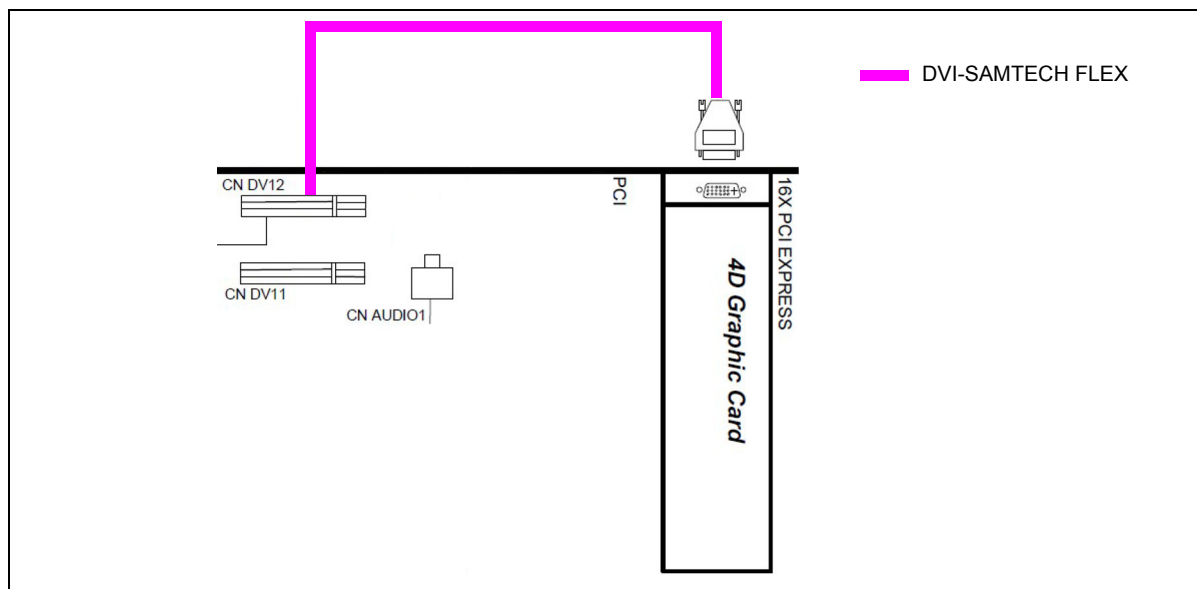
8-11-4-5 Installing the Graphics Adapter in the BEP6

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.
- c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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.

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.
 - c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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.

8-11-4-8 Removing the Graphics Adapter from the BEP5

To get access, you may remove the Hard Disk Drive (HDD).

Follow these steps to remove the HDD:

- 1.) Remove the screw that secures the HDD bracket. Save it for reinstallation later.
- 2.) Swing the HDD bracket out.
- 3.) Disconnect the two cables from the HDD.

Figure 8-236 Remove fixing screw, disconnect cables



1. Fixing screw for HDD bracket.
2. Two cables to the HDD

Follow these steps to remove the Graphics Adapter:

- 1.) Disconnect the cable(s) from the Graphics Adapter.

Table 8-7 Disconnect the cables from the Graphics Adapter - BEP5

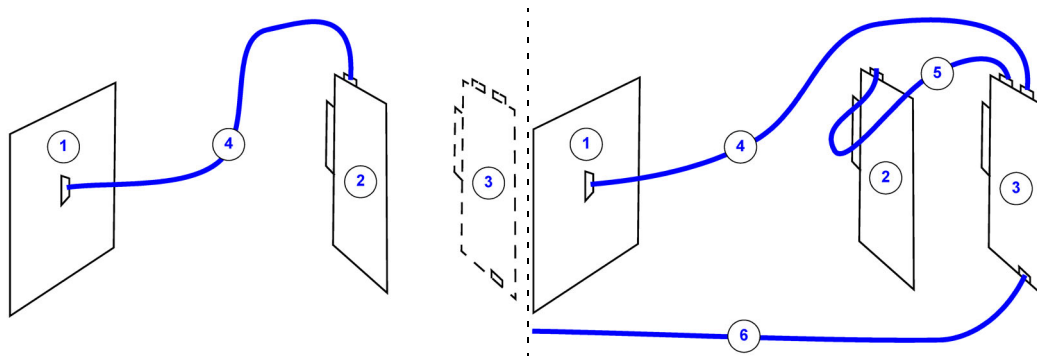
Graphics Adapter	Without DVR	With DVR
Prolink Add2 card	<ul style="list-style-type: none"> • Disconnect the DVI Out cable 	<ul style="list-style-type: none"> • Disconnect the DVI Flex, Main cable
ATI FireGL V7200	<ul style="list-style-type: none"> • Disconnect the extra Power cable • Disconnect the DVI Out cable 	<ul style="list-style-type: none"> • Disconnect the extra Power cable • Disconnect the DVI Flex, Jumper ("Z" cable)
Nvidia Quadro 2000D and Nvidia Quadro FX1800	<ul style="list-style-type: none"> • Disconnect the DVI Out cable 	<ul style="list-style-type: none"> • Disconnect the DVI Flex, Main cable

NOTE: Newer VIVID E9 units have a locking mechanism on the connector on the BEP's motherboard.

- 2.) If a locking mechanism is installed on the connector on the BEP's motherboard, push the plastic slider down to release the Graphics Adapter.
- 3.) Unplug and remove the Graphics Adapter. Store it in an ESD safe place.

8-11-4-8-1 Cables for the Prolink Add2 card

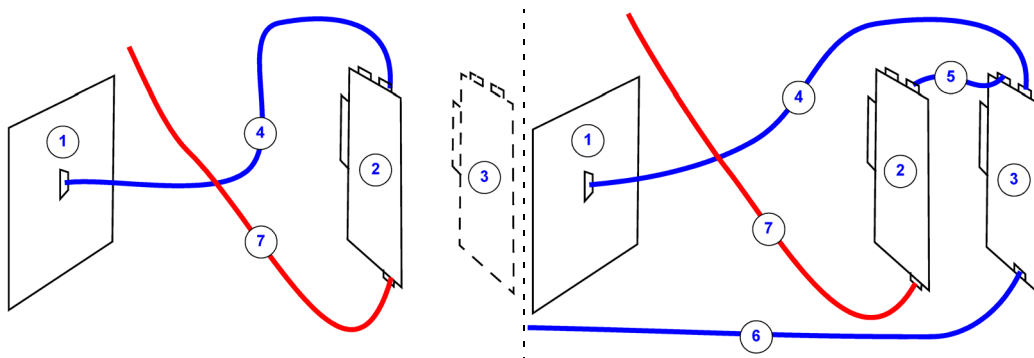
Figure 8-237 Cables on the Prolink Add2 card



1. I/O Unit
2. Graphics Adapter (Add2)
3. DVR Board (stipulated position to the left, installed to the right)
4. DVI Out cable
5. DVI Flex Main cable
6. SATA cable (Don't disconnect in this procedure)

8-11-4-8-2 Cables for the ATI FireGL V7200 card - BEP5

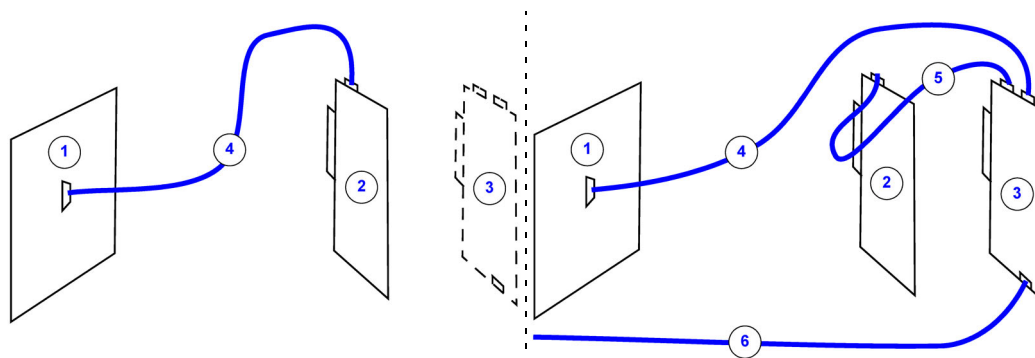
Figure 8-238 Cables on the ATI FireGL V7200 card - BEP5



1. I/O Unit
2. Graphics Adapter (ATI FireGL V7200)
3. DVR Board (stipulated position to the left, installed to the right)
4. DVI Out cable
5. DVI Flex Jumper (X cable)
6. SATA cable (Don't disconnect in this procedure)
7. Extra Power cable for the ATI FireGL V7200 card

8-11-4-8-3 Cables for the Nvidia Quadro FX1800 / Nvidia Quadro 2000D - BEP5

Figure 8-239 Cables on the Nvidia Quadro FX1800 / Nvidia Quadro 2000D card - BEP5



1. I/O Unit
2. Graphics Adapter (Nvidia Quadro FX1800 / Nvidia Quadro 2000D)
3. DVR Board (stipulated position to the left, installed to the right)
4. DVI Out cable
5. DVI Flex Main cable
6. SATA cable (Don't disconnect in this procedure)

8-11-4-9 Installing the Graphics Adapter in the BEP5

Follow these steps to install the new Graphics adapter:

- 1.) Plug in the new Graphics adapter.
- 2.) If a locking mechanism is installed on the connector on the BEP's motherboard, pull the plastic slider up to fix the Graphics adapter in position.
- 3.) Connect the cables to the Graphics adapter.

Table 8-8 Connect the cables to the Graphics Adapter - BEP5

Graphics Adapter	Without DVR	With DVR
Prolink Add2 card	• Connect the DVI Out cable	• Connect the DVI Flex, Main cable
ATI FireGL V7200	• Connect the extra Power cable • Connect the DVI Out cable	• Connect the extra Power cable • Connect the DVI Flex, Jumper ("Z" cable")
Nvidia Quadro FX1800	• Connect the DVI Out cable	• Connect the DVI Flex, Main cable
Nvidia Quadro 2000D	• Connect the DVI Out cable to the connector closest to the motherboard.	• Connect the DVI Flex, Main cable to the connector closest to the motherboard.

- 4.) Connect the two cables to the HDD.
- 5.) Swing the HDD bracket back in position and fix it with the screw you removed earlier.
- 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.
- c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at the top of the BEP Cover.
- 7.) Install the Left Side 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.*



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.
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.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes.
- 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at the top of the BEP Cover.
 - b.) Tilt the top of the **BEP Cover** away from the **BEP**.
 - c.) Set the **BEP Cover** aside.

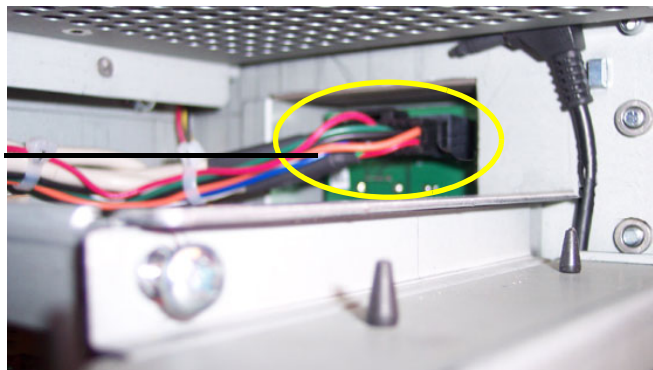
NOTE: BEP5: Remove the HDD to get better access.
Ref.: [8-11-3 "Hard Disk Drive \(HDD\) replacement" on page 8-256](#).

- 3.) **BEP6 only:** Remove the Graphics Adapter to get better access.
- 4.) **BEP5:** Disconnect the cables at the back of the Front Module.
BEP6: Disconnect the Front Module Cable from the motherboard.

NOTE: See [8-11-3 "Hard Disk Drive \(HDD\) replacement" on page 8-256 for more information](#).

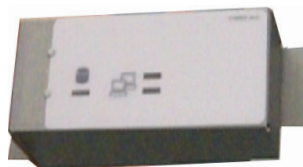
Figure 8-240 Front Module cable placement (BEP5 illustrated)

FRONT MODULE CABLES
FROM INSIDE BEP



- 5.) Remove the two screws securing the Front Module to the BEP frame.

Figure 8-241 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 8-242 Lip on the Front Module



- 2.) Install the two screws securing the Front Module to the BEP frame.
- 3.) **BEP6:** Connect the Front Module Cable to the connector on the motherboard.
BEP5: Connect the cables to the Front Module.
- 4.) **BEP5 only:** Install the HDD (if removed).
- 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.
- c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at the top of the BEP Cover.
- 6.) Replace the Side Cover.
- 7.) Install the BEP.
- 8.) Connect the Mains Power Cable to the wall outlet.
- 9.) Power up the VIVID E9.

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.



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.
 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.



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 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" on page 8-4.](#)

8-11-6-3 Preparations

When preparing for the replacement, you must perform the following steps:

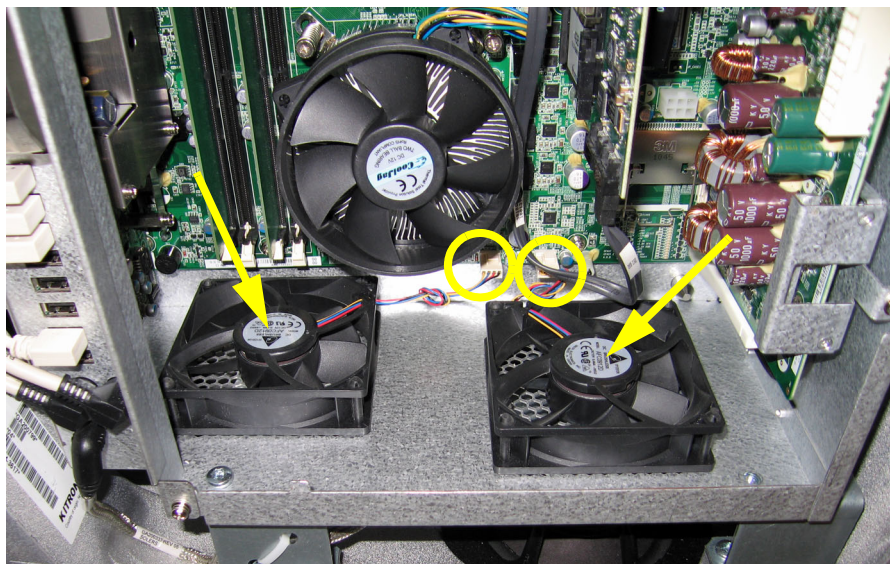
- 1.) Power down the VIVID E9.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes.
- 4.) Remove the Left Side Cover.
- 5.) Remove the **BEP Cover**.
 - a.) Loosen the BEP Cover's fixing screw(s).
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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 8-38.](#)
- [8-11-1 "Back End Processor \(BEP\) replacement" on page 8-244.](#)

8-11-6-4 Back End Processor Fan removal

Figure 8-243 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 8-243](#).)
- 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 8-243 "BEP replaceable fans" on page 8-277.](#))
- 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 excissive thin rubber from the rubber fastner.
- 6.) Plug in the fan's plug to the connector on the motherboard.
- 7.) Install the BEP in the VIVID E9.
- 8.) You may want to power up the VIVID E9 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 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.
- c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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 before you start to replace the cable.

- 1.) Power down the VIVID E9.
- 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.
- 6.) Install all the cables to the BEP.
- 7.) Install the **BEP Cover**.
- 8.) Install the **B/W Printer**.
- 9.) Install the VIVID E9 **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.
- 2.) Disconnect the **Mains Power Cable** from the wall outlet.
- 3.) Disconnect all probes.
- 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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.)

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.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes.
- 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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.)

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 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.
- 2.) Disconnect the **Mains Power Cable** from the wall outlet.
- 3.) Disconnect all probes.
- 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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.)

Related information:

- [4-2-2 "Power shut down" on page 4-8.](#)
- [8-5-2 "Side Covers replacement" on page 8-38.](#)

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.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes.
- 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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.)

Related information:

- [4-2-2 "Power shut down" on page 4-8.](#)
- [8-5-2 "Side Covers replacement" on page 8-38.](#)

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.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes.
- 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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 8-38.](#)
- [8-11-1 "Back End Processor \(BEP\) replacement" on page 8-244.](#)

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.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes.
- 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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.)

Related information:

- [4-2-2 "Power shut down" on page 4-8.](#)
- [8-5-2 "Side Covers replacement" on page 8-38.](#)

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.
- 2.) Disconnect the **Mains Power Cable** from the wall outlet.
- 3.) Disconnect **all probes**.
- 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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.)

Related information:

- [4-2-2 "Power shut down" on page 4-8.](#)
- [8-5-2 "Side Covers replacement" on page 8-38.](#)

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**

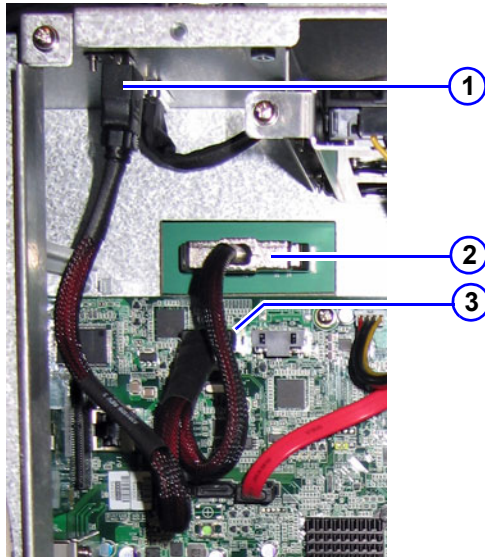
When preparing for the replacement, you must perform the following steps:

- 1.) Power down the VIVID E9.
- 2.) Disconnect the **Mains Power Cable** from the wall outlet.
- 3.) Disconnect **all probes**.
- 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 8-244 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.*



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.
 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.

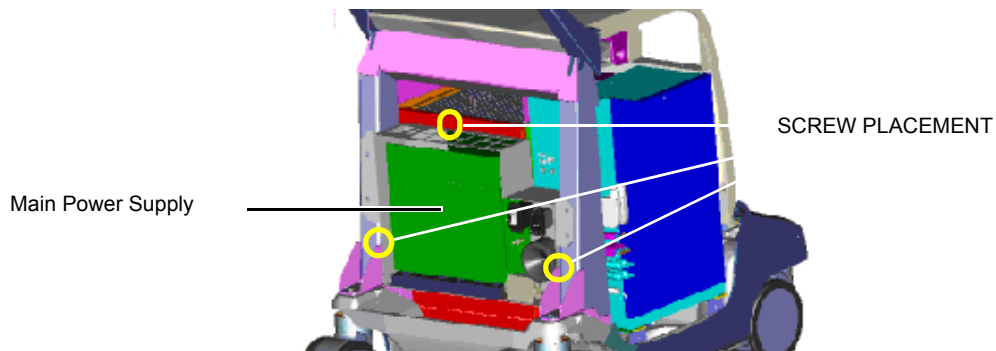
When preparing for the replacement, you must perform the following steps:

- 1.) Power down the VIVID E9
- 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.

8-12-1-1 Main Power Supply removal procedure

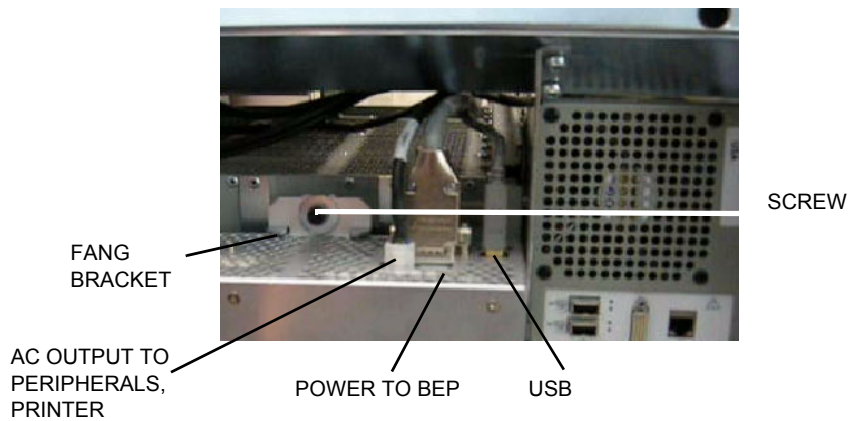
Follow these steps to remove the Main Power Supply:

Figure 8-245 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 8-246 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.

8-12-1-2 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 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 8-247 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.) Install the Rear Cover.
- 7.) Install the Filter Cover.
- 8.) Install the Top Cover.
- 9.) 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.*



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.
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.
- 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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:

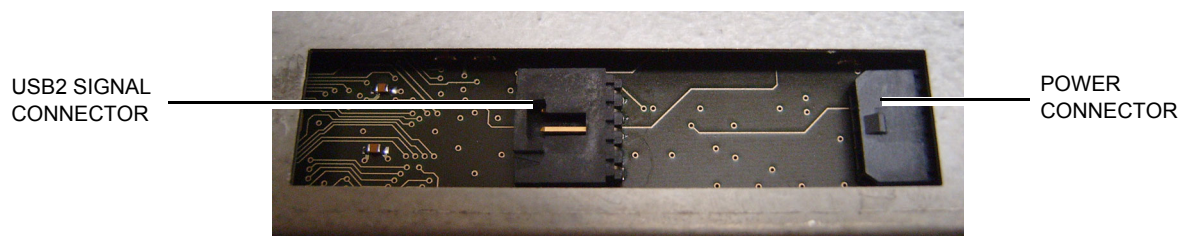
- 1.) Inside the BEP there is an opening for the Power and USB cables to the Patient I/O module. Disconnect the Power cable connector and the USB cable connector from the Patient I/O module.
- 2.) Remove one screw inside the BEP.
- 3.) Remove the two fastening screws on the Patient I/O module's mounting 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 8-248 Power and USB connectors (rear side of Patient I/O)



- 3.) **BEP5 only:** Install one screw inside the BEP.
- 4.) Install two fastening screws on the mounting bracket.
- 5.) **BEP6 Only:** Install the BEP6 Power Board Assembly.

8-13-1-3 Patient I/O 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.
 - c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at the top of the BEP Cover.
- 7.) Install the Left Side Cover, see [8-5-2-3 "Side Covers installation" on page 8-40](#).

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.*

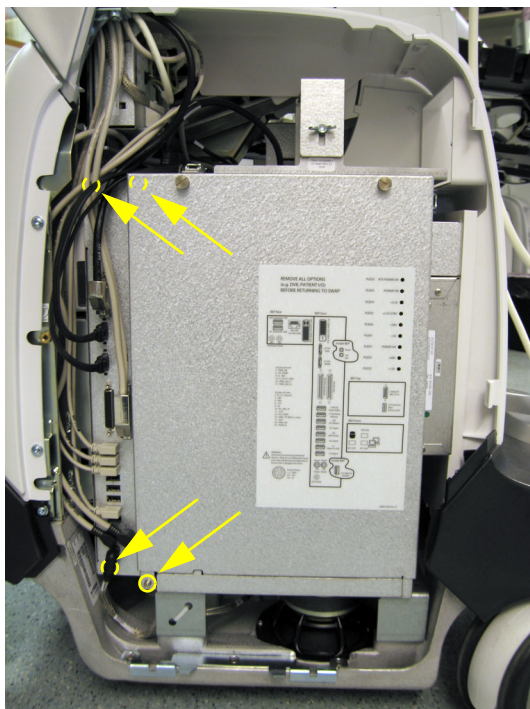


WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:

1. FOLLOW LOCK OUT/TAG OUT PROCEDURES.
 2. TURN OFF THE BREAKER.
 3. UNPLUG THE VIVID E9.
 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.
 - 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.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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 8-249 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.

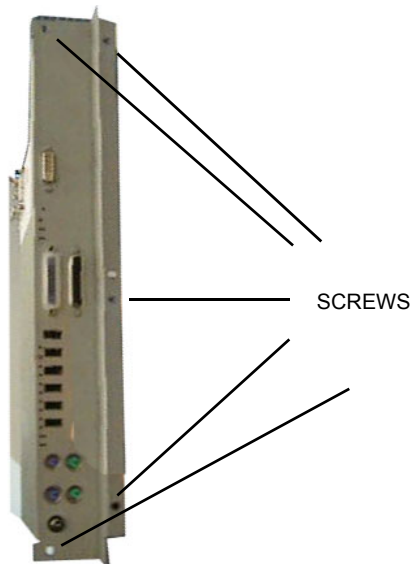
- a.) Insert the base of the BEP Cover inside the base of the BEP.
Be sure the bottom lip of the BEP Cover rests inside the BEP.
- b.) Tilt the top of the BEP Cover toward the VIVID E9.
- c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at the top of the BEP Cover.
- 6.) Install the Left Side Cover.

8-13-2-4 BEP5 I/O Board Assembly removal

Follow these steps to remove the BEP5 I/O Board Assembly:

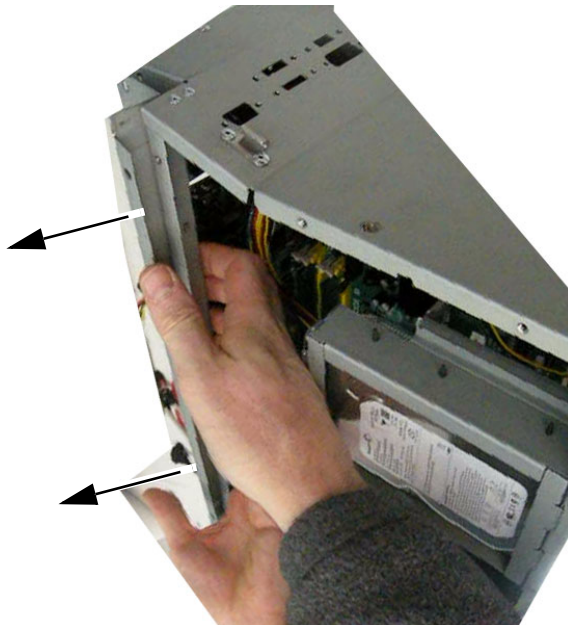
- 1.) Disconnect the cables inside the BEP that connect to the I/O.
 - Flat cable from the Video (Graphics) board.
- 2.) Remove the five screws connecting the I/O to the BEP.

Figure 8-250 BEP5 I/O Board Assembly's screw placement



- 3.) Reach inside the BEP frame to pull the I/O Board Assembly out of the BEP.

Figure 8-251 Remove the BEP5 I/O Board Assembly



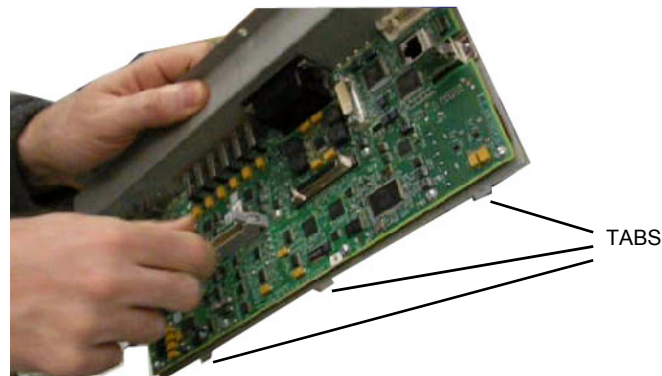
- 4.) Set the I/O Board Assembly aside.

8-13-2-5 BEP5 I/O Board Assembly installation procedure


Follow these steps to install the BEP5 I/O Board Assembly:

- 1.) Guide the BEP5 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.

Figure 8-252 I/O board tabs



- 3.) Install the five screws connecting the I/O Board to the BEP.
- 4.) Reconnect the cables inside the BEP to the I/O Board.
 - Flat cable from the Video (Graphics) board.
- 5.) Reconnect the I/O cabling.
- 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.
 - c.) Install the fixing screw(s) for the BEP Cover:
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at the top of the BEP Cover.
- 7.) Install the Left Side Cover.

Section 8-14 Peripherals replacement

8-14-1 DVD R/W drive replacement

The VIVID E9 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.



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.
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.

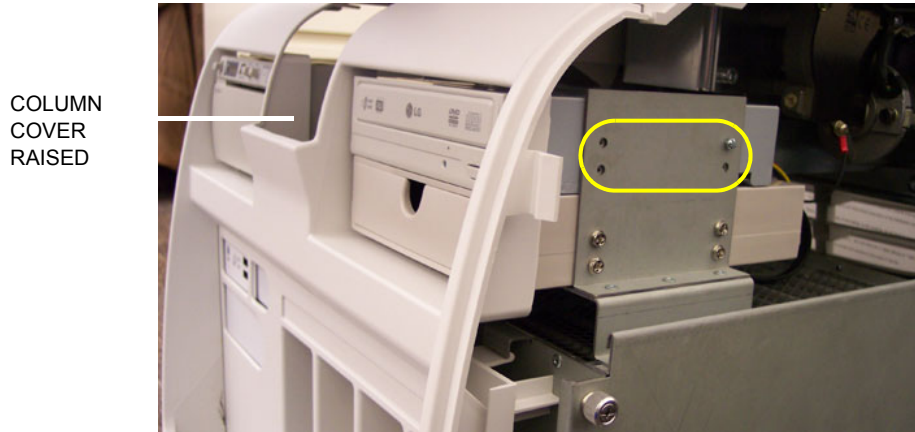
- 1.) Power down the VIVID E9.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes and external I/O cabling.
- 4.) Remove the Side Covers.
- 5.) Remove the Top Cover.

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 8-253 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.
- 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. 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 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.***



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.
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:

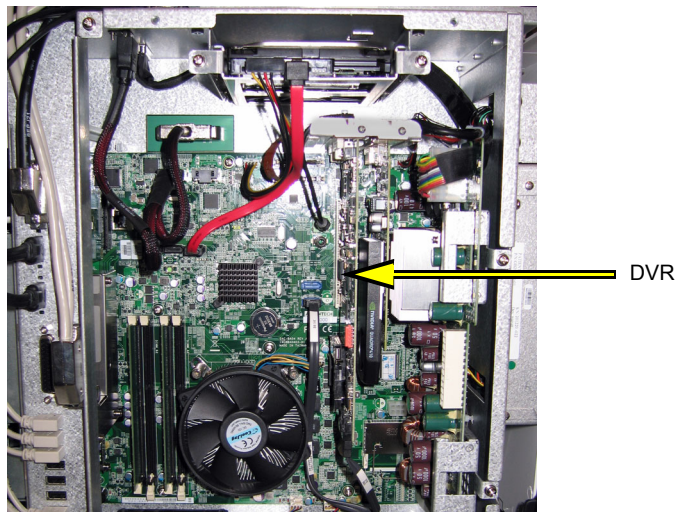
- 1.) Power down the VIVID E9.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes.
- 4.) Remove the Left Side Cover.
- 5.) Remove the **BEP Cover**.
 - a.) Loosen the BEP Cover's fixing screw(s).
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at 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 8-307.](#)
- [8-14-2-4 "BEP5 - Digital Video Recorder removal procedure" on page 8-308.](#)

8-14-2-3 BEP6 - Digital Video Recorder removal procedure

Figure 8-254 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:

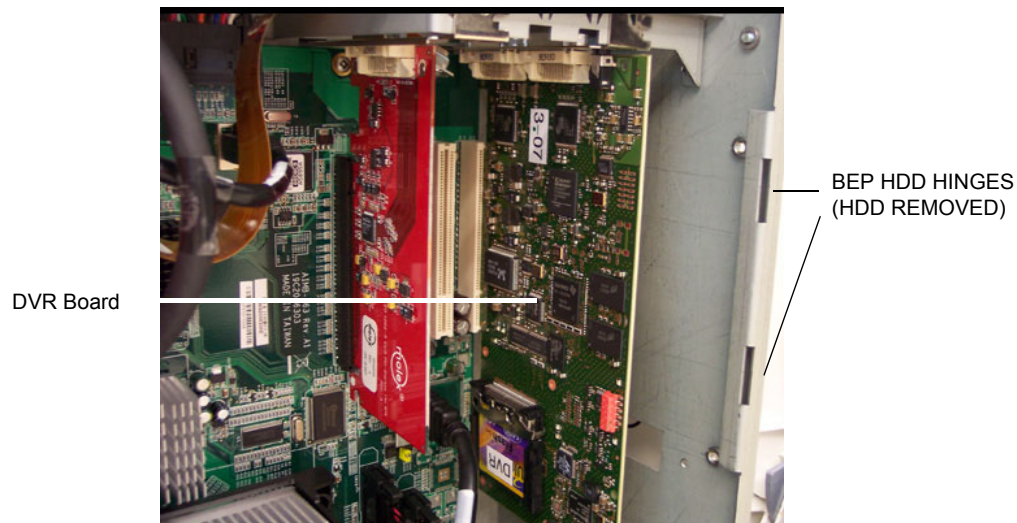
- [8-14-2-5 "BEP6 - Digital Video Recorder installation procedure" on page 8-309.](#)

8-14-2-4 BEP5 - Digital Video Recorder removal procedure

Follow these steps to remove the Digital Video Recorder from a BEP5:

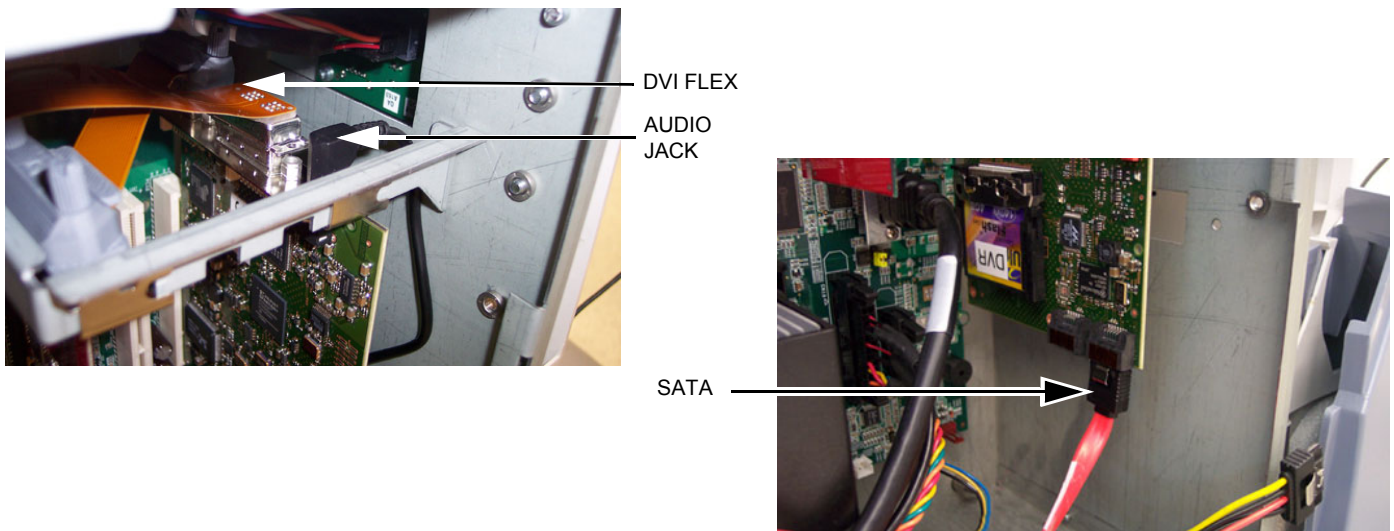
- 1.) Locate the DVR Board behind the HDD.

Figure 8-255 DVR Board (BEP5)



- 2.) Disconnect the audio jack, SATA, DVI flex cables where they attach to the DVR Board.

Figure 8-256 DVR Cables (BEP5)



- 3.) Remove the DVR Board from the motherboard slot.

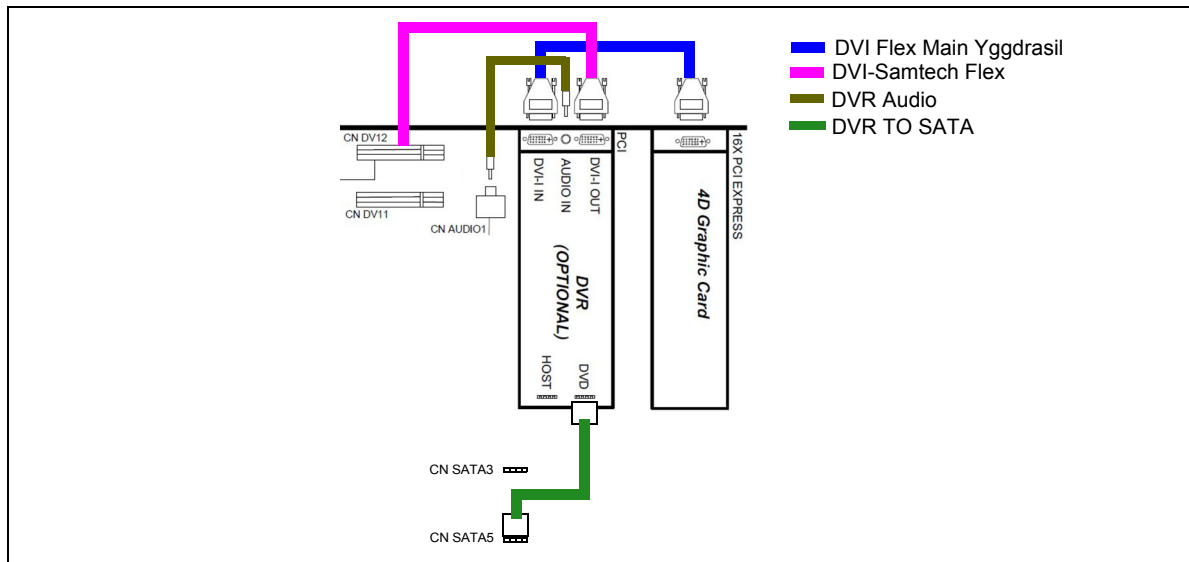
Next:

- [8-14-2-6 "BEP5 - Digital Video Recorder installation procedure" on page 8-311.](#)

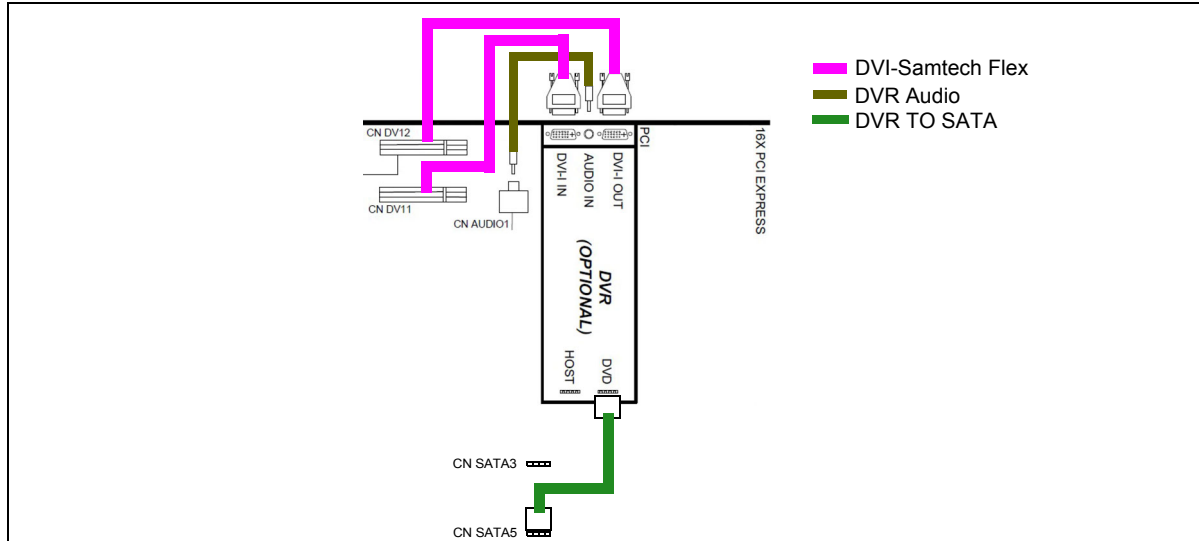
8-14-2-5 BEP6 - Digital Video Recorder installation procedure

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 with 2D:



- 4.) Install the fixing screws you removed earlier.
- 5.) Install the HDD.

8-14-2-5 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.
 - c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at the top of the BEP Cover.
- 7.) Install the Left Side Cover.

8-14-2-6 BEP5 - Digital Video Recorder installation procedure

Follow these steps to install the Digital Video Recorder:

- 1.) Seat the (new) DVR Board in the correct slot.
- 2.) Connect the cables to the DVR Board.
- 3.) Install the HDD (if removed).
- 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.
- c.) Install the fixing screw(s) for the BEP Cover:
 - On BEP6 there are two finger screws on the top of the BEP Cover.
 - On newer BEP5 there are three Phillips screws, one on the top and one on each side of the BEP Cover.
 - On older BEP5 there is one finger screw at the top of the BEP Cover.
- 5.) Install the Left Side Cover.

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.



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.
 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.

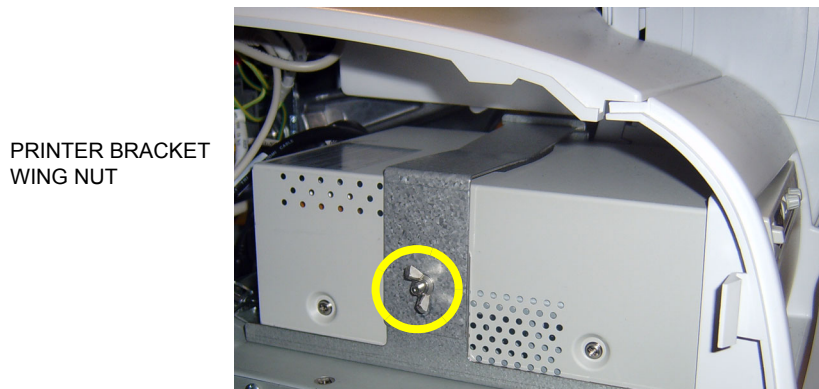
- 1.) Power down the VIVID E9.
- 2.) Disconnect the Mains Power Cable from the wall outlet.
- 3.) Disconnect all probes.
- 4.) Remove the Left Side Cover.

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 8-257 Black & White Digital Graphic Printer



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.
- 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.

8-14-5 Color Video Printer Replacement

8-14-5-1 Preparations



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



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.
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.

8-14-5-2 Color Video Printer removal

- If you are going to move the VIVID E9 to another location:
 - 1.) Switch off the power on the printer.
 - 2.) Disconnect the USB cable from the VIVID E9.
- 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 3 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'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.
- 2.) Disconnect the **Mains Power Cable** from the wall outlet.
- 3.) Disconnect **all probes**.
- 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:

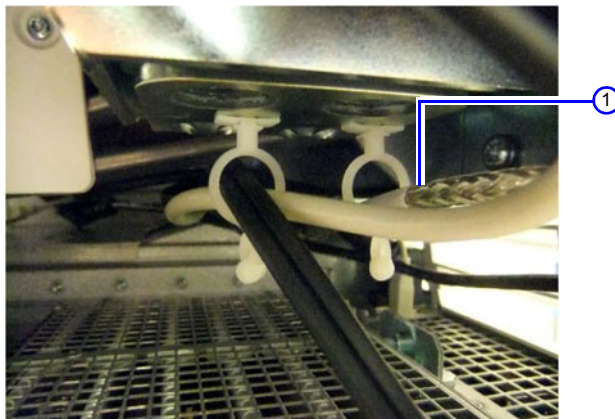
- 1.) Disconnect the GFI PCIe Cable from the top of the BEP.
- 2.) Disconnect the GFI PCIe Cable from the GFI board as described in these steps:
 - a.) On the Front End Card Rack, remove the cover for the GFI PCIe Cable connector.
 - b.) Unplug the GFI PCIe Cable.
- 3.) Loosen the GFI PCIe Cable from 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 8-258](#).

Figure 8-258 GFI PCIe Cable secured with cable clip



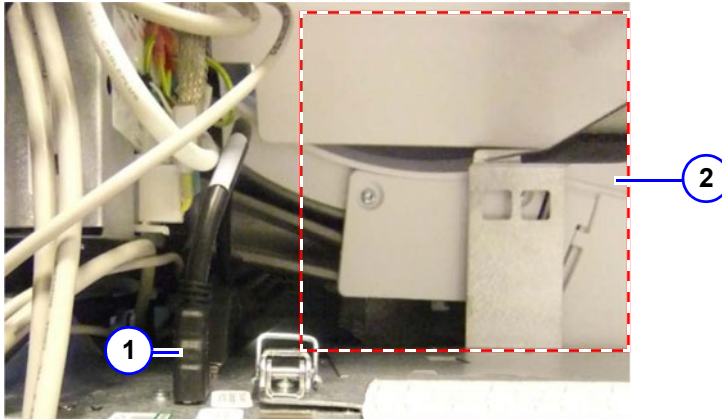
1. GFI PCIe Cable secured with cable clip.

- 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 8-259](#), as there is a risk that the Z Mechanism damage the cable.

Figure 8-259 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**.

Chapter 9

Renewal parts

Section 9-1 Overview

9-1-1 Contents in this chapter

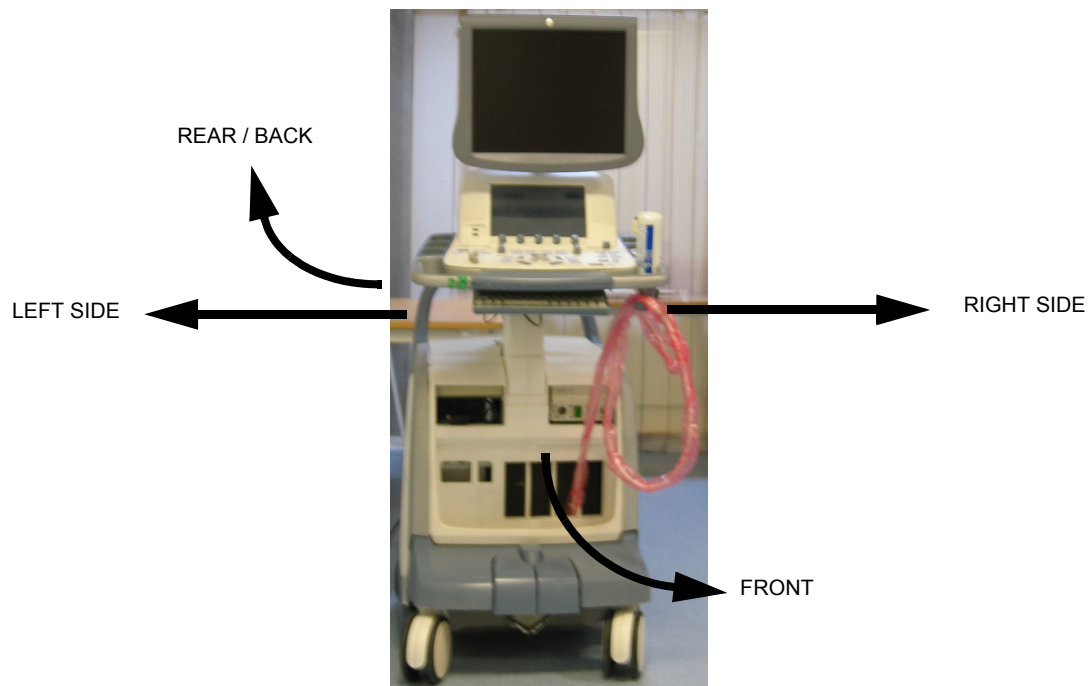
9-1	Overview	9-1
9-2	Definitions of Left, Right, Front and Back	9-2
9-3	List of Abbreviations	9-3
9-4	VIVID E9 models and hardware/software compatibility	9-4
9-5	Software for VIVID E9	9-6
9-6	Covers and Bumpers	9-15
9-7	Top Console parts	9-18
9-8	XYZ parts	9-50
9-9	Main Console parts	9-52
9-10	Casters (Wheels) parts	9-54
9-11	Front End Processor (FEP) Card Rack parts	9-56
9-12	Back End Processor (BEP) Spare Parts	9-60
9-13	Main Power Supply	9-64
9-14	I/O modules	9-65
9-15	Peripherals for VIVID E9	9-66
9-16	Mains Power Cables - VIVID E9	9-71
9-17	Internal Cables - VIVID E9	9-72
9-18	ECG cables - VIVID E9	9-91
9-19	Labels VIVID E9	9-92
9-20	Physio TX Parts	9-92
9-21	Options - VIVID E9	9-93
9-22	Product Manuals for VIVID E9	9-97

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.

Figure 9-1 Definition of Left, Right, Front and Back of VIVID E9



Section 9-3 List of Abbreviations

Table 9-1 List of Abbreviations

ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
3D	THREE DIMENSIONAL (SEE RT3D and 4D)	FRU N	NON STOCK PART
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: 5-9-2 "Introduction" on page 5-52.	MBD	MOTHERBOARD
BEPY2	SEE DESCRIPTION IN: 5-9-2 "Introduction" on page 5-52.	OP	OPERATOR PANEL
BEPY3	SEE DESCRIPTION IN: 5-9-2 "Introduction" on page 5-52.	PC	PERSONAL COMPUTER (Back End Processor)
BEP5	SEE DESCRIPTION IN: 5-9-2 "Introduction" on page 5-52.	PCle	PCI Express
BEP6	SEE DESCRIPTION IN: 5-9-2 "Introduction" on page 5-52.	PS	POWER SUPPLY
CRU	CUSTOMER REPLACEABLE UNIT	PWA	PRINTED WIRE ASSEMBLY
CTRL	CONTROL	PWR	POWER
CW	CONTINUOUS DOPPLER	QTY	QUANTITY USED PER VIVID E9
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.
FRU Y	REPLACEMENT PART	XFRMR	TRANSFORMER

Section 9-4 VIVID E9 models and hardware/software compatibility

Table 9-2 VIVID E9 Models and Hardware/Software Compatibility sheet 1 of 2

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(s)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO
GA000940	Vivid E9 100-230V 4D Expert Option - 17" LCD	GA200824 VE9 Card Rack Complete with MLA16, 4D TEE backplane, 192 RX channels and one TX card with 192 channels	GB200001 BEP6 w/4D	v104.3.4 (or higher)	v112.0.7 or higher	v112.1.x
			GB200003 BEP5 w/4D Nvidia Quadro 2000D	v104.3.3 (or higher)	v112.0.x or higher	v112.1.x
						v112.1.x
						v112.1.x
GA000950	Vivid E9 100-230V 4D Expert Option - 19" LCD		GA200890 BEP5 w/4D Nvidia	v104.3.x	v112.0.x or higher	v112.1.x
			GB200001 BEP6 w/4D	v104.3.4 (or higher)	v112.0.7 or higher	v112.1.x
			GB200003 BEP5 w/4D Nvidia Quadro 2000D	v104.3.3 (or higher)	v112.0.x or higher	v112.1.x
			GA200890 BEP w/4D Nvidia	v104.3.x	v112.0.x or higher	v112.1.x
GB000040	Vivid E9 100-230V BT12 Pro Configuration - 17" LCD	GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.4 (or higher)	v112.1.0 or higher	v112.1.x
GB000050	Vivid E9 100-230V BT12 Pro Configuration - 19" LCD					v112.1.x
GA000945	Vivid E9 100-230V 2D - 17" LCD		GB200002 BEP6 wo/4D	v104.3.x	v112.0.6 or higher	v112.1.x
			GA200900 BEP5 wo/4D	v104.3.x	v112.0.x or higher	v112.1.x
GA000955	Vivid E9 100-230V 2D - 19" LCD		GB200002 BEP6 wo/4D	v104.3.x	v112.0.6 or higher	v112.1.x
			GA200900 BEP5 wo/4D	v104.3.x	v112.0.x or higher	v112.1.x

Table 9-2 VIVID E9 Models and Hardware/Software Compatibility (cont'd) sheet 2 of 2

MODEL NUMBER	DESCRIPTION	FRONT END PROCESSOR CARD RACK	BACK END PROCESSOR	SYSTEM SOFTWARE VERSION(S)	APPLICATION SOFTWARE VERSION(S)	CAN BE UPGRADED TO
GA000810	VIVID E9 100-230V 4D Expert Option - 17" LCD	GA200824	GB200001 BEP6 w/4D	v104.3.x	v110.1.12	v112.1.x
			GA200890 or GA200800 BEP5 w/4D Nvidia		v110.1.x	
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.2.x v104.1.x	v110.0.x	
GA000815	VIVID E9 100-230V 4D Expert Option - 19" LCD	VE9 Card Rack Complete with MLA16, 4D TEE backplane and 192 RX channels	GB200001 BEP6 w/4D	v104.3.x	v110.1.12	v112.1.x
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.3.2	v110.1.x	
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.3.2	v110.1.x	
			GA200890 or GA200800 BEP5 w/4D Nvidia	v104.2.x v104.1.x	v110.0.x	
GA000830	VIVID E9 100-230V 2D - 17" LCD	GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.x	v110.1.12	v112.1.x
			GA200900 or GA200805 BEP5 wo/4D		v110.1.x	
GA000835	VIVID E9 100-230V 2D - 19" LCD	GA200804 VE9 Card Rack Complete w. MLA4	GB200002 BEP6 wo/4D	v104.3.x	v110.1.12	v112.1.x
			GA200900 or GA200805 BEP5 wo/4D		v110.1.x	
			GA200900 or GA200805 BEP5 wo/4D	v104.2.x v104.1.x	v110.0.x	
GA000100	VIVID E9, 100-230 VAC (with 4D)	GA200744	GA200890, GA200800 or 5145000-10 BEP5 w/4D	v104.0.x	v108.x.x	v112.1.x
		GA200035				v112.1.x NOTE! Hardware update or box (console) swap required.

Section 9-5 Software for VIVID E9

9-5-1 Overview

This section includes overview for the following software:

9-5-2	BT'12 Software (Application Software Version 112)	9-6
9-5-3	BT'11 Software (Application Software Version 110)	9-9
9-5-4	BT'09 Software (Application software v108.x.x)	9-13

9-5-2 BT'12 Software (Application Software Version 112)

9-5-2-1 System Software used for BT'12

Table 9-3 System Software used for BT'12

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
System Software						
1.	VIVID E9 SYSTEM SOFTWARE (BEP6)	GB200015	SYSTEM SOFTWARE INSTALLATION DVD (GHOST) FOR BEP6. LATEST SYSTEM SOFTWARE (2012 SEP 14): v104.3.4	1	N	Y
2.	VIVID E9 SYSTEM SOFTWARE (BEP5)	GA200895	SYSTEM SOFTWARE INSTALLATION DVD (GHOST) LATEST SYSTEM SOFTWARE (2012 AUG 17): v104.3.3	1	N	N
3.	Vivid E9 System software Spare Part	GA200895-04	Vivid E9 System software v.104.3.3 for BEPY1 (BEP5)	1	N	Y
4.	Vivid E9 System software Spare Part	GA200895-03	Vivid E9 System software v.104.3.2 for BEPY1 (BEP5)	1	N	Y
5.	Vivid E9 System software Spare Part	GA200895-02	Vivid E9 System SW 104.3.1 for BEPY1 (BEP5)	1	N	Y
6.	Vivid E9 System software Spare Part	GA200895-01	Vivid E9 System SW 104.3.0 for BEPY1 (BEP5)	1	N	Y

9-5-2-2 Application Software used for BT'12

Table 9-4 Application Software used for BT'12

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
7.	VIVID E9 APPLICATION SOFTWARE (M4)	GA200965	APPLICATION SOFTWARE INSTALLATION CD, LATEST APPLICATION SOFTWARE (2012 DEC 10): v112.1.0 The CD is labeled Version 112 Revision 1.0	1	N	N
8.	VIVID E9 APPLICATION SOFTWARE v.112.1.1	GA200965-11	APPLICATION SOFTWARE INSTALLATION CD (v.112.1.1) The CD is labeled Version 112 Revision 1.1	1	N	Y
9.	VIVID E9 APPLICATION SOFTWARE v.112.1.0	GA200965-10	APPLICATION SOFTWARE INSTALLATION CD (v.112.1.0) The CD is labeled Version 112 Revision 1.0	1	N	Y
10.	VIVID E9 APPLICATION SOFTWARE v.112.0.7	GA200965-09	APPLICATION SOFTWARE INSTALLATION CD (v.112.0.7) The CD is labeled Version 112 Revision 0.7	1	N	Y
11.	VIVID E9 APPLICATION SOFTWARE v.112.0.6	GA200965-08	APPLICATION SOFTWARE INSTALLATION CD (v.112.0.6) The CD is labeled Version 112 Revision 0.6	1	N	Y
12.	VIVID E9 APPLICATION SOFTWARE v.112.0.3	GA200965-07	APPLICATION SOFTWARE INSTALLATION CD (v.112.0.3) The CD is labeled Version 112 Revision 0.3	1	N	Y
13.	VIVID E9 APPLICATION SOFTWARE v.112.0.2	GA200965-06	APPLICATION SOFTWARE INSTALLATION CD (v.112.0.2) The CD is labeled Version 112 Revision 0.2	1	N	Y

9-5-2-3 Software Patches and Miscellaneous Software used for BT'12

Table 9-5 Software Patches and Miscellaneous Software used for BT'12

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
Software Patches						
1.	Vivid E9 and EchoPAC PC MS Security Patch	GA200973-01	<p>FOR THE FOLLOWING SYSTEM SOFTWARE VERSION:</p> <ul style="list-style-type: none"> • v104.3.x <p>The patches must be installed after the installation of system software and application software.</p> <p>This security patch CD includes the following patches:</p> <ul style="list-style-type: none"> • MS11-006 Vulnerability in Windows Shell Graphics Processing Could Allow Remote Code Execution. • MS11-019 Vulnerabilities in SMB Client Could Allow Remote Code Execution. • MS11-020 Vulnerability in SMB Server Could Allow Remote Code Execution. . <p>(Updated 2011-SEP-01)</p>	1	N	Y
	Vivid E9 and EchoPAC PC MS Security Patch	GA200973-02	<p>FOR THE FOLLOWING SYSTEM SOFTWARE VERSION:</p> <ul style="list-style-type: none"> • v104.3.x <p>The patches must be installed after the installation of system software and application software.</p> <p>This security patch CD includes the following patches:</p> <ul style="list-style-type: none"> • MS11-006 Vulnerability in Windows Shell Graphics Processing Could Allow Remote Code Execution. • MS11-020 Vulnerability in SMB Server Could Allow Remote Code Execution. • MS11-042 Vulnerabilities in Distributed File System could allow remote code execution • MS11-043 Vulnerabilities in SMB Client Could Allow Remote Code Execution. <p>(Updated 2011-SEP-13)</p>	1	N	Y
Miscellaneous Software						
2.	BEP5 BIOS Load CD Release, version A563E121	GA200725	FOR VIVID E9 - BEP5	1	N	Y
3.	SET SERIAL NUMBER	GA200649	Latest version (2012 MAY 04): v1.4, GA200649 REV. 05	1	N	Y
4.	PRINTER INSTALLER	GA200652	<p>Printer Driver Installer CD.</p> <p>Latest version per 2012AUG07: GA200652 REV.5.</p> <p>For Installation instructions, see: Printer Driver Installation Manual, Direction Number GA294652 (use the latest revision)</p>	1	N	Y
5.	Firmware for Sony Optiarc AD-7240S	GA200948	Latest version per 2011 JAN.10: v.1.0.4.	1	N	Y

9-5-3 BT'11 Software (Application Software Version 110)

9-5-3-1 System Software used for BT'11

Table 9-6 System Software used for BT'11

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
System Software						
1.	VIVID E9 SYSTEM SOFTWARE	GA200895	SYSTEM SOFTWARE INSTALLATION DVD (GHOST) (Delivered with new VIVID E9s.) Latest version: (2012 AUG 17): v104.3.3 For use with Application Software v110.1.x	1	N	N
2.		GA200895-04	Vivid E9 System software v.104.3.3 for BEPY1 (BEP5)	1	N	Y
3.		GA200895-03	Vivid E9 System software v.104.3.2 for BEPY1 (BEP5)	1	N	Y
4.		GA200895-02	Vivid E9 System SW 104.3.1 for BEPY1 (BEP5)	1	N	Y
5.		GA200895-01	Vivid E9 System SW 104.3.0 for BEPY1 (BEP5)	1	N	Y
6.	VIVID E9 SYSTEM SOFTWARE	GA200840	SYSTEM SOFTWARE INSTALLATION DVD (GHOST) (Was delivered with new VIVID E9s.) Latest version: (2011 SEP. 02): v104.2.0	1	N	N
7.		GA200840-02	Service Part: VIVID E9 System software v.104.2.0	1	N	Y
8.	VIVID E9 SYSTEM SOFTWARE	GA200360	SYSTEM SOFTWARE INSTALLATION DVD (GHOST) For use with Application Software v110.0.x) (Was delivered with new VIVID E9s.) Latest version: (2011 SEP.02): v104.0.2	1	N	N
9.		GA200360-01	Service Part: Vivid E9 System Software v.104.0.0	1	N	Y
10.		GA200360-02	Service Part: Vivid E9 System Software v.104.0.1	1	N	Y
11.		GA200360-03	Service Part: Vivid E9 System Software v.104.0.2	1	N	Y

9-5-3-2 Application Software used for BT'11

Table 9-7 Application Software used for BT'11

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
Application Software						
1.	VIVID E9 APPLICATION SOFTWARE (M4 and later)	GA200956	APPLICATION SOFTWARE INSTALLATION CD. (Delivered with new VIVID E9s with GTX192 board.) Latest version (2012 MAY 04): v110.1.11	1	N	N
2.		GA200956-01	Service Part: Application software v.110.1.0	1	N	Y
3.		GA200956-02	Service Part: Application software v.110.1.1	1	N	Y
4.		GA200956-03	Service Part: Application software v.110.1.3	1	N	Y
5.		GA200956-04	Service Part: Application software v.110.1.4	1	N	Y
6.		GA200956-05	Service Part: Application software v.110.1.5	1	N	Y
7.		GA200956-06	Service Part: Application software v.110.1.7	1	N	Y
8.		GA200956-07	Service Part: Application software v.110.1.8	1	N	Y
9.		GA200956-08	Service Part: Application software v.110.1.10	1	N	Y
10.		GA200956-09	Service Part: Application software v.110.1.11	1	N	Y
11.		GA200956-10	Service Part: Application software v.110.1.12 (Supports BEP6)	1	N	Y
12.	VIVID E9 APPLICATION SOFTWARE (M3)	GA200845	APPLICATION SOFTWARE INSTALLATION CD, (Was delivered with new VIVID E9s.) Latest version: (2011 SEP.02): v110.0.2.	1	N	N
13.		GA200845-05	Service Part: Application software v.110.0.2	1	N	Y

9-5-3-3 Software Patches used for BT'11

Table 9-8 Software Patches used for BT'11

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
Software Patches						
1.	Vivid 7, Vivid E9 and EchoPAC PC MS Security Patch	FC200821-11	<p>FOR THE FOLLOWING SYSTEM SOFTWARE VERSIONS:</p> <ul style="list-style-type: none"> • v104.1.x • v104.2.x <p>The patches must be installed after the installation of system software and application software.</p> <p>WINDOWS PATCHES INCLUDED: MS08-067, MS09-001, MS09-22, MS10-007, MS10-020, KB967715, MS10-046, MS10-054 (Updated 2011SEP.01)</p>	1	N	Y
2.	Vivid E9 and EchoPAC PC MS Security Patch	GA200973-01	<p>FOR THE FOLLOWING SYSTEM SOFTWARE VERSIONS:</p> <ul style="list-style-type: none"> • v104.3.x <p>The patches must be installed after the installation of system software and application software.</p> <p>This security patch CD includes the following patches:</p> <ul style="list-style-type: none"> • MS11-006 Vulnerability in Windows Shell Graphics Processing Could Allow Remote Code Execution. • MS11-019 Vulnerabilities in SMB Client Could Allow Remote Code Execution. • MS11-020 Vulnerability in SMB Server Could Allow Remote Code Execution. . <p>(Updated 2012MAY04)</p>	1	N	Y
	Vivid E9 and EchoPAC PC MS Security Patch	GA200973-02	<p>FOR THE FOLLOWING SYSTEM SOFTWARE VERSIONS:</p> <ul style="list-style-type: none"> • v104.3.x <p>The patches must be installed after the installation of system software and application software.</p> <p>This security patch CD includes the following patches:</p> <ul style="list-style-type: none"> • MS11-006 Vulnerability in Windows Shell Graphics Processing Could Allow Remote Code Execution. • MS11-020 Vulnerability in SMB Server Could Allow Remote Code Execution. • MS11-042 Vulnerabilities in Distributed File System could allow remote code execution • MS11-043 Vulnerabilities in SMB Client Could Allow Remote Code Execution. <p>(Updated 2012MAY04)</p>	1	N	Y

9-5-3-4 Miscellaneous Software used for BT'11

Table 9-9 Miscellaneous Software used for BT'11

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
Miscellaneous Software						
1.	BEP5 BIOS Load CD Release, version A563E121	GA200725	FOR VIVID E9 - BEP5	1	N	Y
2.	SET SERIAL NUMBER	GA200649	Latest version per 2010.11.03: v1.2, GA200649 REV. 3	1	N	Y
3.	PRINTER INSTALLER	GA200652	Printer Driver Installer CD. Latest version per 2012AUG07: GA200652 REV.5. For Installation instructions, see: Printer Driver Installation Manual, Direction Number GA294652 (use the latest revision)	1	N	Y
4.	Firmware for Sony Optiarc AD-7240S	GA200948	Latest version per 2011 JAN.10: v.1.0.4.	1	N	Y

9-5-4 BT'09 Software (Application software v108.x.x)

9-5-4-1 System Software and Application Software used for BT'09

Table 9-10 System Software and Application Software used for BT'09

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
System Software						
1.	VIVID E9 SYSTEM SOFTWARE	GA200360	System software installation DVD (GHOST). Software version v104.0.x. (Was delivered with new VIVID E9s.) Latest system software version: v104.0.2 (Updated 2011 SEP. 02)	1	N	N
2.		GA200360-01	Service Part: Vivid E9 System Software v.104.0.0	1	N	Y
3.		GA200360-02	Service Part: Vivid E9 System Software v.104.0.1	1	N	Y
4.		GA200360-03	Service Part: Vivid E9 System Software v.104.0.2	1	N	Y
Application Software						
5.	VIVID E9 APPLICATION SOFTWARE	GA200355	Application software installation CD, (Was delivered with new VIVID E9s.) • Application software version: v108.1.12 was used on FMI 76114. • v108.1.13 introduced for use with XP Service Pack 3 See below for latest patch(es). (Updated 2011 SEP. 02)	1	N	N
6.		GA200355-01	Service Part: Application software v.108.0.0	1	N	Y
7.		GA200355-03	Service Part: Application software v.108.1.2	1	N	Y
8.		GA200355-04	Service Part: Application software v.108.1.4	1	N	Y
9.		GA200355-05	Service Part: Application software v.108.1.5	1	N	Y
10.		GA200355-06	Service Part: Application software v.108.1.6	1	N	Y
11.		GA200355-08	Service Part: Application software v.108.1.9	1	N	Y
12.		GA200355-09	Service Part: Application software v.108.1.11	1	N	Y
13.		GA200355-10	Service Part: Application software v.108.1.12	1	N	Y
14.		GA200355-11	Service Part: Application software v.108.1.13	1	N	Y

9-5-4-2 Software Patches and Miscellaneous Software used for BT'09

Table 9-11 Software Patches and Miscellaneous Software used for BT'09

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
Software Patches						
15.	Windows Vulnerability Patches	FC200821-11	FOR THE FOLLOWING SYSTEM SOFTWARE VERSIONS: • v104.0.x The patches must be installed after the installation of system software and application software. WINDOWS PATCHES INCLUDED: MS08-067, MS09-001, MS09-22, MS10-007, MS10-020, KB967715, MS10-046, MS10-054 (Updated: 2011 SEP.01)	1	N	Y
16.	Patch for 108.1.6	GA200814-01	Install this patch after application software v108.1.6 has been installed. Updates the VIVID E9 to software v108.1.8.	1	N	N
Miscellaneous Software						
17.	BEP5 BIOS Load CD Release, version A563E121	GA200725	FOR VIVID E9 - BEP5	1	N	Y
18.	SET SERIAL NUMBER	GA200649	Latest version per 2010.NOV.03: v1.2, GA200649 REV. 3	1	N	Y
19.	PRINTER DRIVER INSTALLER	GA200652	Printer Driver Installer CD. Latest version per 2012AUG07: GA200652 REV.5. For Installation instructions, see: Printer Driver Installation Manual, Direction Number GA294652 (use the latest revision)	1	N	N

Section 9-6 Covers and Bumpers



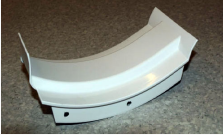



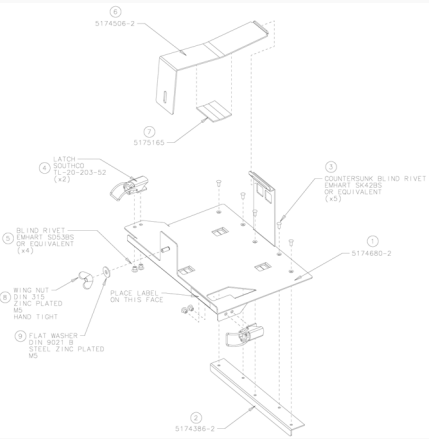
Table 9-12 COVERS - VIVID E9 sheet 1 of 3

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 9-12 COVERS - VIVID E9 (cont'd) sheet 2 of 3

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	TBD	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




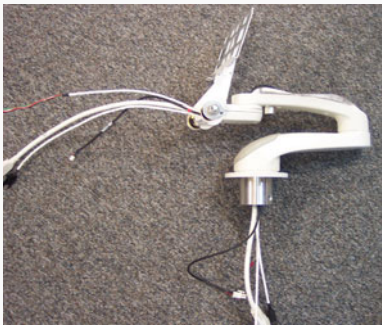
Table 9-12 COVERS - VIVID E9 (cont'd) sheet 3 of 3

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.	BW PRINTER FILLER BOX	5309088	USED ON UNITS WITHOUT INTERNAL B/W PRINTER	1	N	Y
21.	DRIVE BAY STORAGE BOX	5267580-2	USED ON UNITS WITHOUT DVR OPTION	1	N	Y
22.	PRINTER TRAY FOR BEP 6	5174885-2		1	N	Y

Section 9-7 Top Console parts

9-7-1 LCD Monitor parts

Table 9-13 LCD parts

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
17 INCH MONITOR AND PARTS						
1.	LCD MONITOR 17"	GA200550	17 INCH LCD MONITOR 	1	N	Y
2.	LCD ARM FOR 17" LCD	5199125		1	N	Y
19 INCH MONITOR AND PARTS						
3.	LCD MONITOR 19"	5198551	19 Inch LCD Monitor for VIVID E9 	1	N	Y
4.	LCD ARM FOR 19" LCD	5183750		1	N	Y

9-7-2 Operator Panel (OP) parts

9-7-2-1 OP-5 parts

Table 9-14 OP-5 parts sheet 1 of 2





ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
OPERATOR PANEL LOWER 5						
1.	OPERATOR PANEL, LOWER 5	GB200030	 <p>This is the latest version of the Operator Panel, Lower.</p> <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).</p> <p>This part is backward compatible.</p>	1	N	N
2.	Operator Panel Lower Bezel.	GB200024	<p>For OP-5 ONLY:</p> 	1	N	N

Table 9-14 OP-5 parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
3.	Laser Trackball Assembly.	GB200017	<p>For OP-5: On this new 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	N

9-7-2-2 OP-4 parts

Table 9-15 OP-4 parts sheet 1 of 2




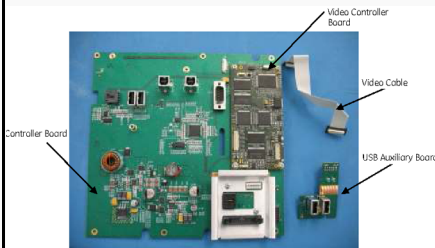


ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
OPERATOR PANEL UPPER 4						
1.	OPERATOR PANEL, UPPER 4	GA200865	 <p>Replaces GA200822, GA200720 and GA200365</p>	1	N	Y
2.	UPPER BEZEL	GA200437	 <p>This part is compatible with all OP versions.</p>	1	N	Y
3.	Frame w/LCD and TouchScreen	5207000-39		1	N	Y
4.	Main board, Video board, Video Cable, USB Aux Board	5207000-50	Replaces 5207000-40 when it becomes obsolete.	1	N	Y
5.		5207000-40	 <p>Controller Board, Video Controller Board, Video Cable, USB Auxiliary Board</p>			

Table 9-15 OP-4 parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
6.	OP Cable Kit 2	5207000-46	For details, see: 9-7-5 "Operator Panel Cable Kit for Vivid E9 and Logiq E9" on page 9-34.	1	N	Y
7.	USB Connector Board for Upper OP- Panel	5207000-41		1	N	Y
OPERATOR PANEL LOWER 4						
8.	OPERATOR PANEL, LOWER 4	GA200953	 Phased out of manufacturing late October 2012. Use GB200030 as the replacement.	1	N	Y

9-7-2-3 OP-3 parts

Table 9-16 OP-3 parts sheet 1 of 3




ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
OPERATOR PANEL UPPER 3						
1.	OPERATOR PANEL, UPPER 3	GA200822 OBSOLETE	 <p>OBSOLETE. Use GA200865 as the replacement.</p>	1	N	Y
2.	UPPER BEZEL	GA200437	 <p>This part is compatible with all OP versions.</p>	1	N	Y
3.	Frame w/LCD and TouchScreen	GA200439	 <p>GA200439 is going obsolete. When unavailable, order GA200865 (Operator Panel, Upper 4)</p>	1	N	Y
4.	OPERATOR PANEL CABLE KIT	GA200446	<p>For kit details, see: 9-7-5 "Operator Panel Cable Kit for Vivid E9 and Logiq E9" on page 9-34. If GA200446 is unavailable, order 5207000-46.</p>	1	N	Y

Table 9-16 OP-3 parts(cont'd) sheet 2 of 3

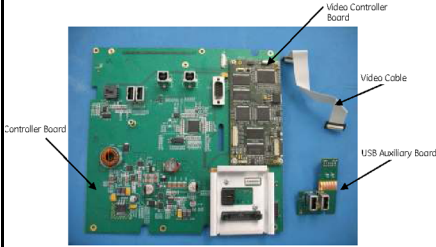
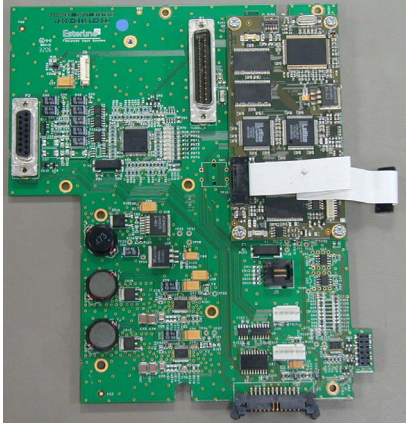
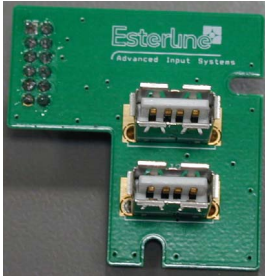

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
5.	Main board, Video board, Video Cable, USB Aux Board	5207000-50	Replaces 5207000-40 when it becomes obsolete.	1	N	Y
6.		5207000-40	 <p>May be used as a replacement for 5207000-30 on OP-3. Install with the old video cable on OP-3.</p>			
7.	Main Ctrl Bd. w/USB Video Bd. & Cable	5207000-30	 <p>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
8.	USB Connector Board 2	GA200717	 <p>If unavailable, you may use 5207000-40 and 5207000-41, but install with the old video cable.</p>	1	N	Y

Table 9-16 OP-3 parts(cont'd) sheet 3 of 3

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
OPERATOR PANEL LOWER 3						
9.	OPERATOR PANEL, LOWER 3	GA200823 OBSOLETE	 <p>OBSOLETE. Use GA200953 as the replacement.</p>	1	N	Y

9-7-2-4 OP-2 specific parts

Table 9-17 OP-2 specific parts sheet 1 of 2



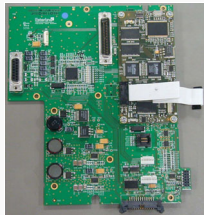
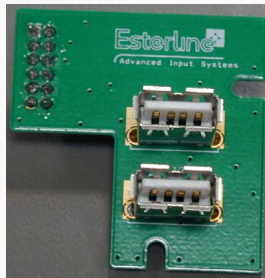

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
OPERATOR PANEL UPPER 2						
1.	OPERATOR PANEL, UPPER 2	GA200720 OBSOLETE	 <p>OBSOLETE. Use GA200865 as the replacement.</p>	1	N	Y
2.	UPPER BEZEL	GA200437	 <p>This part is compatible with all OP versions.</p>	1	N	Y
3.	Main Controller Board With USB Board and Cables 2	GA200718 OBSOLETE	 <p>OBSOLETE. Use 5207000-40 as the replacement. Note: Use the old LCD cable.</p>	1	N	Y
4.	USB Connector Board 2	GA200717		1	N	Y
OPERATOR PANEL LOWER 2						

Table 9-17 OP-2 specific parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
5.	OPERATOR PANEL, LOWER 2	GA200755 OBSOLETE	 <p>OBSOLETE. Use GA200953 or GB200030 as the replacement.</p>	1	N	Y

9-7-2-5 OP 1 specific parts

Table 9-18 OP-1 specific parts sheet 1 of 2




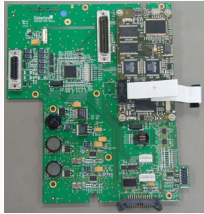
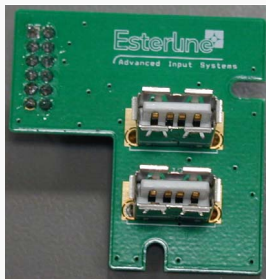
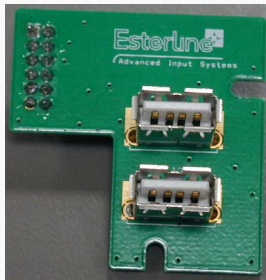
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	OPERATOR PANEL, UPPER	GA200365 OBSOLETE	 <p>OBSOLETE. Use GA200865 as the replacement.</p>	1	N	Y
2.	UPPER BEZEL	GA200437	 <p>This part is compatible with all OP versions.</p>	1	N	Y
3.	OPERATOR PANEL, LOWER 1	GA200394		1	N	Y
4.	Main Controller Board With USB Board and Cables	GA200448 OBSOLETE	 <p>OBSOLETE. Use 5207000-40 as the replacement. Note: Use the old LCD cable. NOTE! GA200448 is compatible with the USB Connector Board models, GA200441 and GA200717.</p>	1	N	Y

Table 9-18 OP-1 specific parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
5.	USB Connector Board 2	GA200717	 <p>NOTE! This board is compatible with both GA200448 and GA200718.</p>	1	N	Y
6.	USB Connector Board	GA200441	 <p>NOTE! This board is only compatible with GA200442</p>	1	N	Y

9-7-3 Top Console PCBs

Table 9-19 Top Console PCBs sheet 1 of 3

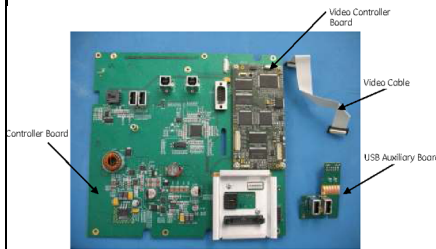

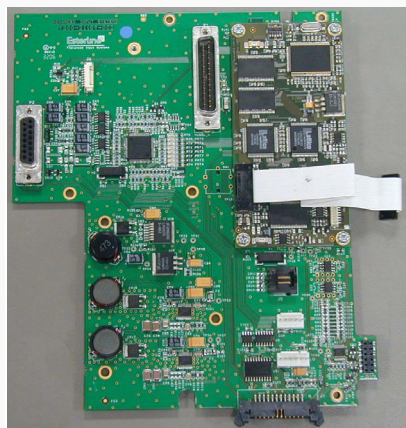
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
PCB FRUs on the Upper OP						
1.	Main board, Video board, Video Cable, USB Aux Board	5207000-50	Replaces 5207000-40 when it becomes obsolete.	1	N	Y
2.	Main board, Video board, Video Cable, USB Aux Board	5207000-40	 <p>For OP-4. May be used as a replacement for 5207000-30 on OP-3. Install with the old video cable on OP-3.</p>	1	N	Y
3.	USB Connector Board for Upper OP Panel	5207000-41		1	N	Y
4.	Main Ctrl Bd. w/USB Video Bd. & Cable	5207000-30	 <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 9-19 Top Console PCBs (cont'd) sheet 2 of 3

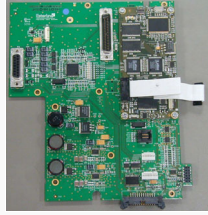

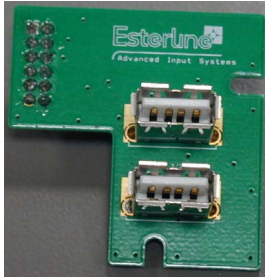
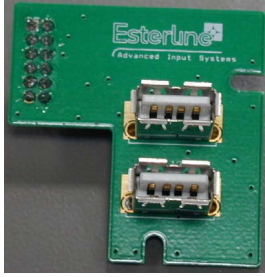
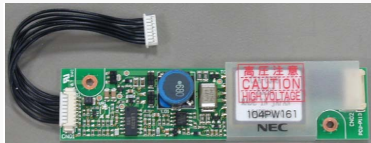
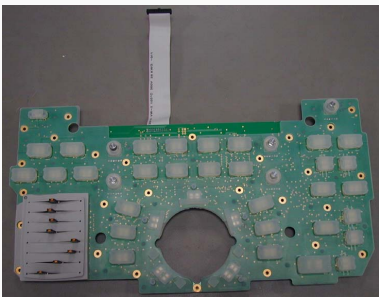


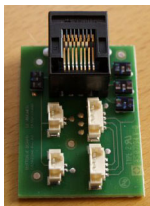
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
5.	Main Controller Board With USB Board and Cables 2	GA200718 OBSOLETE	 <p>OBSOLETE. Use 5207000-40 as the replacement. Note: Use the old LCD cable.</p>	1	N	Y
6.	Main Controller Board With USB Board and Cables	GA200448 OBSOLETE	 <p>OBSOLETE. Use 5207000-40 as the replacement. Note: Use the old LCD cable. NOTE! GA200448 is compatible with the USB Connector Board models, GA200441 and GA200717.</p>	1	N	Y
7.	USB Connector Board 2	GA200717	 <p>NOTE! This board is compatible with both GA200448 and GA200718.</p>	1	N	Y
8.	USB Connector Board	GA200441	 <p>NOTE! This board is only compatible with GA200442</p>	1	N	Y

Table 9-19 Top Console PCBs (cont'd) sheet 3 of 3

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
9.	HIGH VOLTAGE INVERTER BOARD WITH CABLE	GA200442		1	N	Y
PCB FRUs on the Lower OP						
10.	Lower Switch Board with Elastomer	GA200440		1	N	Y
11.	Encoder Board	GA200443		1	N	Y
12.	Encoder w. Push Button	066E2306	 Replaces GA200447.	5	N	Y
13.	BUTTON IF BOARD ASSY	GA200286		1	N	Y

9-7-4 Trackball parts

Table 9-20 Trackball parts

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	LASER TRACKBALL	GA200742	<p>For OP-2 and later</p> <ul style="list-style-type: none"> • Complete Laser Trackball with connector for USB interface. • Trackball Switch Cable - for connecting the switches located around the Trackball to the USB interface. • Screws/washers for fixing the Trackball to the Lower Operator Panel. 	1	N	Y
2.	Dust Gasket and Fixing Ring for <u>Laser</u> Trackball, Vivid E9.	GA200971	<p>For OP-2 and later</p>  <p>NOTE! THESE PARTS ARE NOT COMPATIBLE WITH THE INDUCTIVE TRACKBALL USED ON OP-1.</p>	1	N	Y
3.	INDUCTIVE TRACKBALL	GA200682	<p>For OP-1 GA200682 replaces GA200444.</p> 	1	N	Y
4.	INDUCTIVE TRACKBALL	GA200444 OBSOLETE	<p>For OP-1 Obsolete. Use GA200682</p> 	1	N	N

9-7-5 Operator Panel Cable Kit for Vivid E9 and Logiq E9

Table 9-21 Operator Panel Cable Kit for Vivid E9 and Logiq E9 sheet 1 of 2




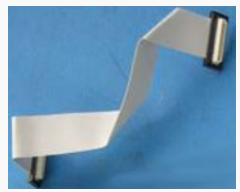







ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Operator Panel Cable Kit for VIVID E9 and LOGIQ E9 (OP Cable Kit 2)	5207000-46	<ul style="list-style-type: none"> OP Cable Kit 2 is for use with GA200865 (Upper OP Panel 4). OP Cable Kit 2 can also be used for GA200822 (Upper OP Panel 3) as a second choice if GA200446 is unavailable. 	1	N	Y
			Trackball USB Cable For connection between Trackball and Main Controller Board. 			
			Trackball Switch Cable (First version) For connecting the switches located around the Trackball to the USB interface. 			
			Trackball Switch Cable (Second Version) For connecting the switches located around the Trackball to the USB interface. 			
			USB Video Board Flex Cable (New type - CMO display) For connection between the USB Video Board and the LCD Display. (Connectors in opposite direction). 			
			USB Video Board Flex Cable (Old type - NEC display) For connection between the USB Video Board and the LCD Display. (Connectors in same direction) 			
			HV Inverter Cable For connection between the HV Inverter Board and the Main Controller Board. 			
			Not Used for VIVID E9 			
			Cable tie (2x) For fixing Trackball USB Cable. (Not Illustrated).			

Table 9-21 Operator Panel Cable Kit for Vivid E9 and Logiq E9 (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
2.	OPERATOR PANEL CABLE KIT	GA200446	<p>Trackball USB Cable For connection between Trackball and Main Controller Board.</p>  <p>USB Video Board Flex Cable (Old) For connection between the USB Video Board and the LCD Display. (Connectors in same direction)</p>  <p>HV Inverter Cable For connection between the HV Inverter Board and the Main Controller Board.</p> 	1	N	Y
3.	CABLE, A/N KEYBOARD, USB & 12V	GA200368		1	N	Y

9-7-6 Button Kits and Knobs

Table 9-22 Button Kits and Knobs sheet 1 of 7

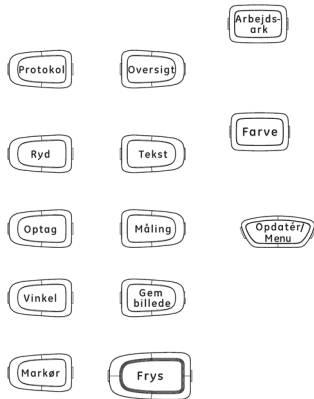
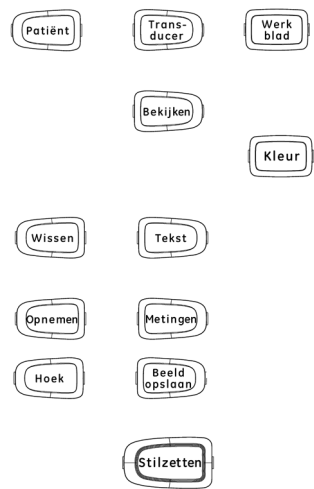
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Button Kit, Danish	066E3230		1	N	Y
2.	Button Kit, Dutch	066E3231		1	N	Y

Table 9-22 Button Kits and Knobs (cont'd) sheet 2 of 7

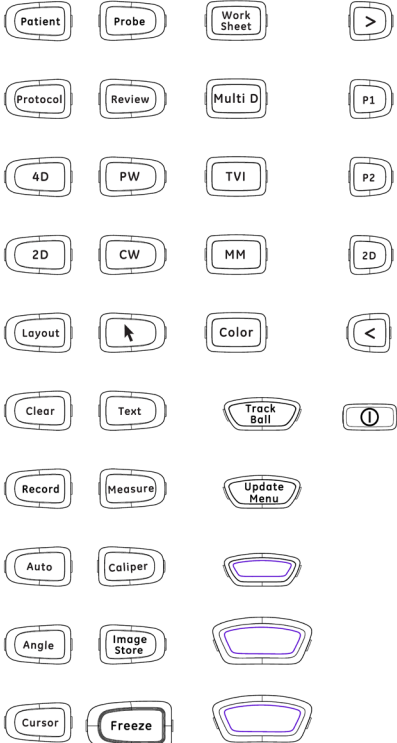
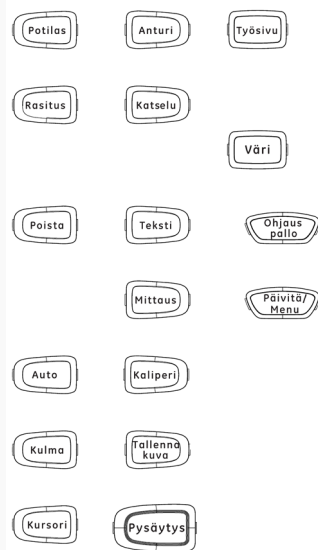
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
3.	Button Kit, Universal English	066E3221		1	N	Y
4.	Button Kit, Finnish	066E3229		1	N	Y

Table 9-22 Button Kits and Knobs (cont'd) sheet 3 of 7

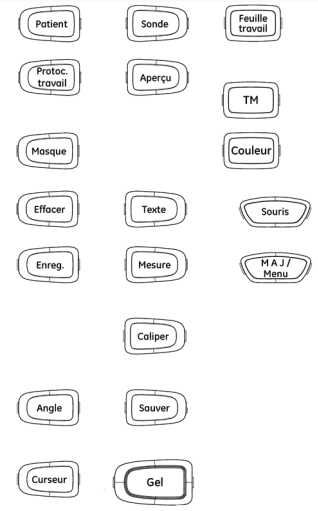
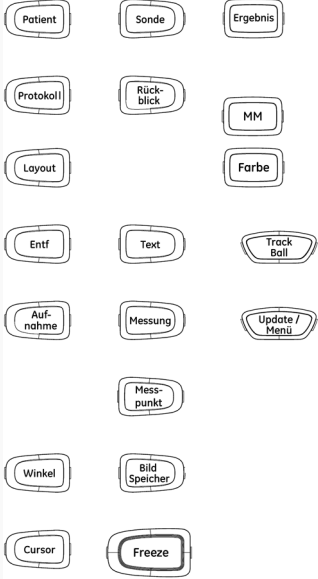
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
5.	Button Kit, French	066E3222	 <p>Diagram showing the components of the French button kit. The buttons are arranged in a grid and labeled with French text: Patient, Sonde, Feuille travail, Protoc. travail, Aperçu, TM, Masque, Couleur, Effacer, Texte, Souris, Enreg., Mesure, MAJ / Menu, Caliper, Angle, Sauver, Curseur, and Gel.</p>	1	N	Y
6.	Button Kit, German	066E3223	 <p>Diagram showing the components of the German button kit. The buttons are arranged in a grid and labeled with German text: Patient, Sonde, Ergebnis, Protokoll, Rückblick, MM, Layout, Farbe, Entf, Text, Track Ball, Aufnahme, Messung, Update / Menu, Messpunkt, Winkel, Bild Speicher, Cursor, and Freeze.</p>	1	N	Y

Table 9-22 Button Kits and Knobs (cont'd) sheet 4 of 7

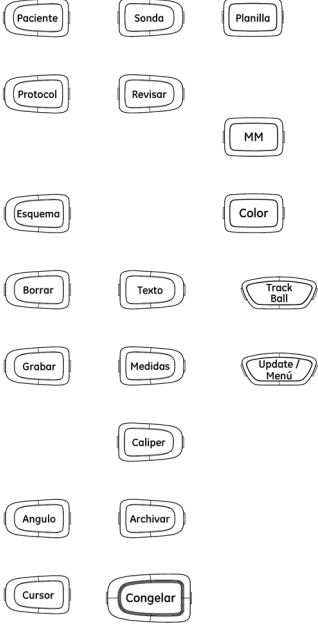
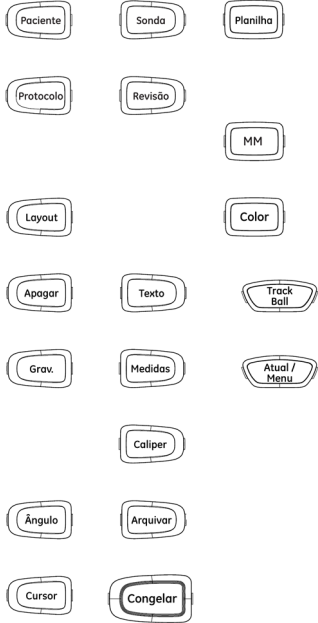
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
7.	Button Kit, Spanish	066E3224		1	N	Y
8.	Button Kit, Portuguese	066E3225		1	N	Y

Table 9-22 Button Kits and Knobs (cont'd) sheet 5 of 7

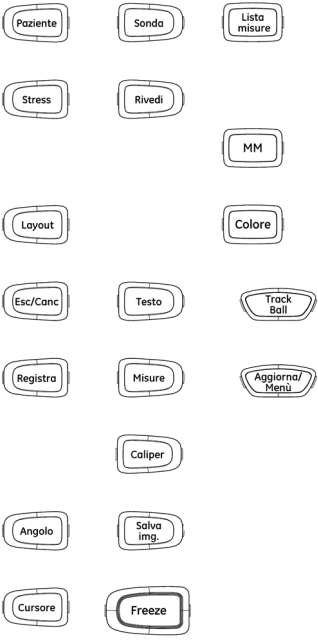
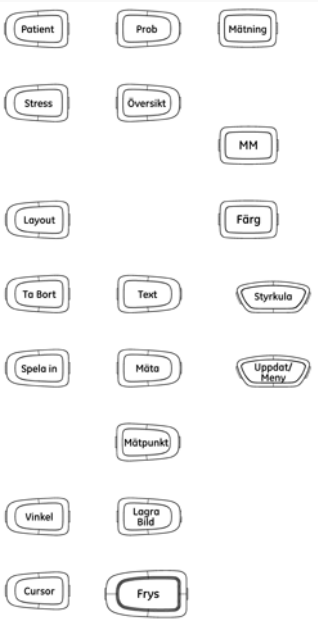
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
9.	Button Kit, Italian	066E3226		1	N	Y
10.	Button Kit, Swedish	066E3227		1	N	Y

Table 9-22 Button Kits and Knobs (cont'd) sheet 6 of 7

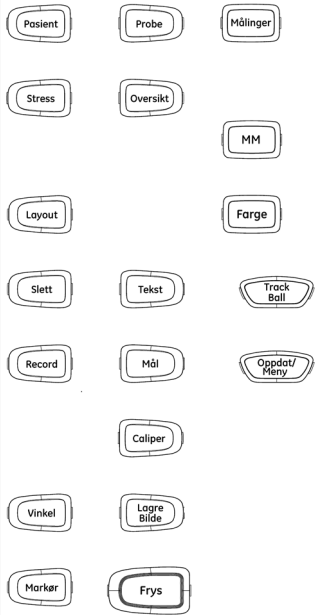
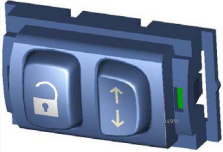
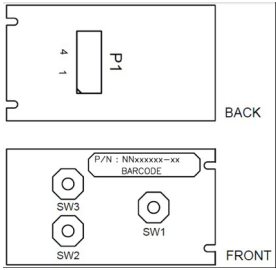

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
11.	Button Kit, Norwegian	066E3228		1	N	Y
12.	BUTTON FRAME, UI ASSY	GA200270	<p>SWITCHES ASSY FOR XY CONTROL</p>  <p><i>This ASSY includes the following parts:</i></p> <ul style="list-style-type: none"> • Up-Down Button Board: GA200285 • Button, XY-Break • Button, Z-Lift • Bracket, Buttons 	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 9-22 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	<p>KNOB KIT FOR OP</p> 	1	Y	Y

9-7-7 Common Top Console parts

The parts listed below can be used on all VIVID E9 systems.

Table 9-23 Other Common Top Console parts sheet 1 of 7

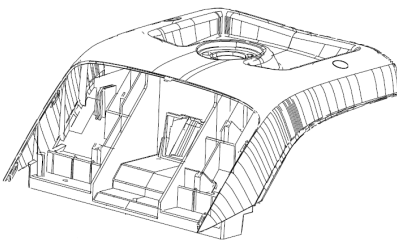

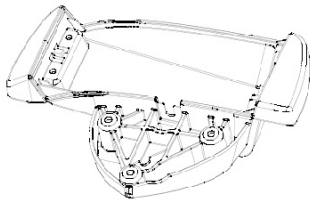
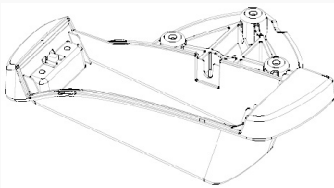
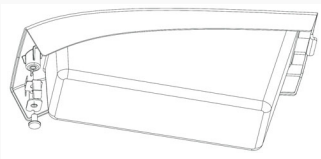
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	FRAME UI UPPER ASM	GA200392		1	N	Y
2.	USB Socket Cover	5207000-54		1	N	Y
3.	LEFT SUPPORT ASSEMBLY	5307245	Options holder 	1	N	Y
4.	RIGHT SUPPORT ASSEMBLY	5307243	Options holder 	1	N	Y
5.	TRAY UNIT ASSEMBLY	5307236		2	N	Y

Table 9-23 Other Common Top Console parts (cont'd) sheet 2 of 7

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 ^w /LCD and TouchScreen	5207000-39		1	N	Y
9.	Frame w/LCD and TouchScreen	GA200439	GA200439 is going obsolete. 			
10.	LOWER BEZEL	GA200438		1	N	Y

Table 9-23 Other Common Top Console parts (cont'd) sheet 3 of 7

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 9-23 Other Common Top Console parts (cont'd) sheet 4 of 7

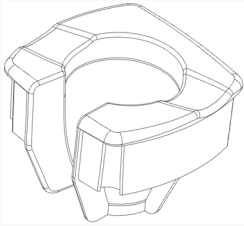
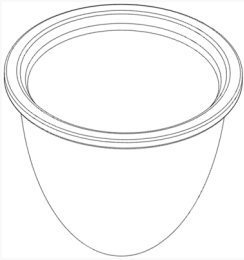


ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
16.	PROBEHOLDER SOFTINSERT DOPPLER	GA307074	 <p>PROBEHOLDER INSERT FOR DOPPLER (PEDOF) PROBE</p>	1	Y	Y
17.	GEL CUP	GA307239		1	Y	Y
18.	SOFT INSERT GEL CUP	GA307676		1	Y	Y
19.	A/N KEYBOARD ENCLOSURE	GA200683	<p>The A/N Keyboard Encloser includes these parts:</p> <ul style="list-style-type: none"> - A/N Keyboard Enclosure, Bottom - A/N Keyboard Enclosure, Top - Cable GND, A/N keyboard 	1	N	Y

Table 9-23 Other Common Top Console parts (cont'd) sheet 5 of 7

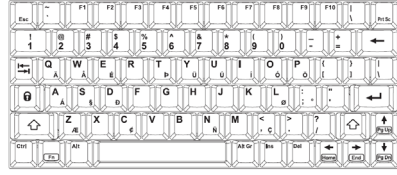


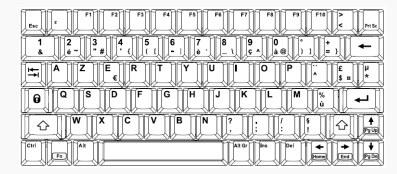
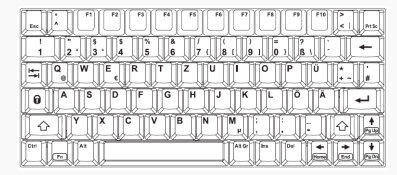
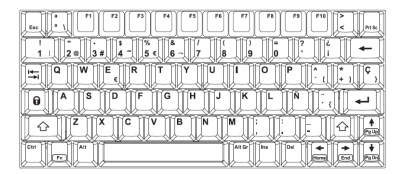

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
20.	A/N Keyboard, Universal	066E3201		1	N	Y
21.	A/N Keyboard, Danish	066E3210		1	N	Y
22.	A/N Keyboard, Dutch	066E3211		1	N	Y
23.	A/N Keyboard, French	066E3202		1	N	Y
24.	A/N Keyboard, German	066E3203		1	N	Y
25.	A/N Keyboard, Spanish	066E3204		1	N	Y
26.	A/N Keyboard, Italian	066E3206		1	N	Y

Table 9-23 Other Common Top Console parts (cont'd) sheet 6 of 7



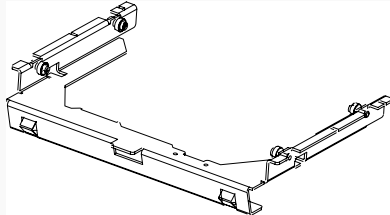
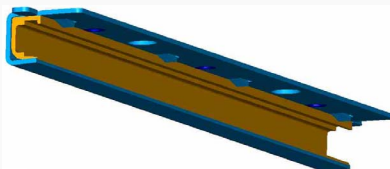

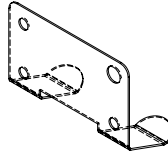
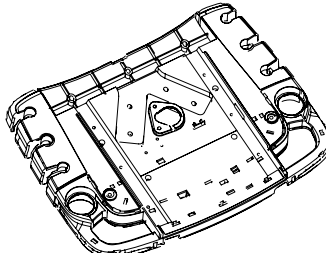

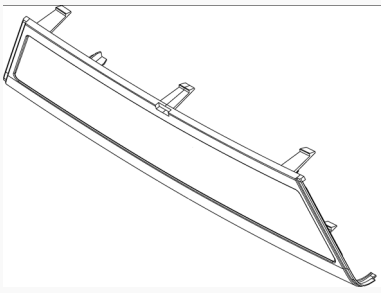
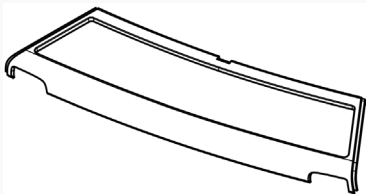
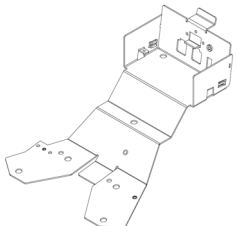
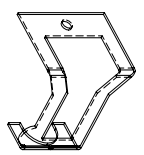
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
27.	A/N Keyboard, Swedish	066E3207		1	N	Y
28.	A/N Keyboard, Norwegian	066E3208		1	N	Y
29.	WAGON AN DRAWER SHEET MET. ASSY	GA200304		1	N	Y
30.	J-RAIL + LINING (J-RAIL ASSY)	GA200544		2	N	Y
31.	NON-MAGNETIC TOUCH LATCH, PR-21P	080X1424		2	N	Y
32.	SPRING AN LATCH	GA307643		1	N	Y
33.	LOWER FRAME ASSEMBLY	GA200358		1	N	Y

Table 9-23 Other Common Top Console parts (cont'd) sheet 7 of 7

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
34.	Lower Frame Assembly Complete	GA200450	BOTTOM VIEW 	1	N	Y
35.	PALM REST ASSY	GA200605	PALM REST + PALM REST PAD 2 	1	N	Y
36.	PALM REST	GA307063	 PALM REST PAD	1	N	Y
37.	Bulkhead, Plate, Extended	GA307059		1	N	Y
38.	BRACKET, LOCK HDMI 2	GA307624		1	N	Y

Section 9-8 XYZ parts

Table 9-24 XYZ parts sheet 1 of 2

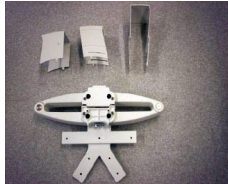
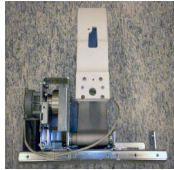
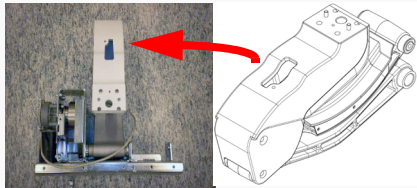
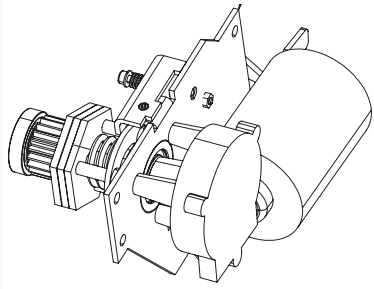
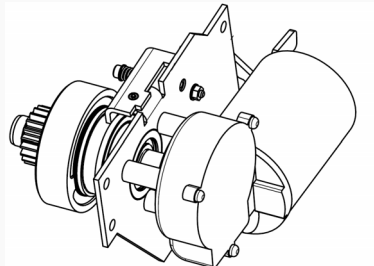
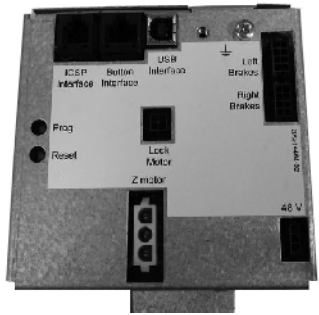
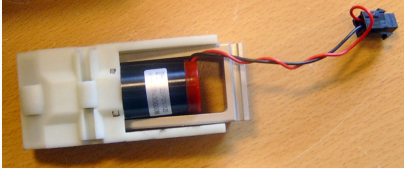
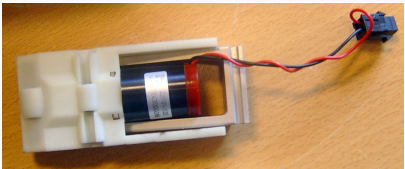
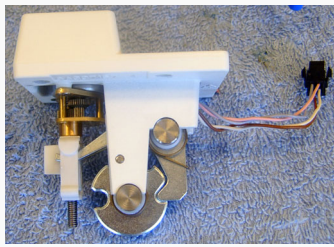
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	XY MECHANISM	GA200946	<p>"FROG LEG"</p> <p>Replaces GA200036</p> <p><i>NOTE! This part requires that either the XYZ controller, Part Number GA200795 or Part number GA200994, is installed.</i></p>	1	N	Y
2.	XY MECHANISM	GA200036	<p>"FROG LEG"</p> 	1	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
6.	DRIVE GEAR ASSEMBLY	GA200177		1	N	Y

Table 9-24 XYZ parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
7.	XYZ Controller Module	GA200994	<p>To be introduced in manufacturing in September or October 2012</p> <p>Will be phased in as Service Part when old parts become unavailable.</p> <p>May replace both GA200795 and GA200644</p> 	1	N	Y
8.	XYZ CONTROL ASM	GA200795	<p>Replaces GA200644</p> <p>Can be used with both GA200036 and GA200946.</p>	1	N	Y
9.	XYZ CONTROL ASM	GA200644		1	N	Y
10.	XY BRAKE ASSY	GA200952	 <p>Replaces GA200535</p> <p>NOTE! This part requires that the new XYZ controller, Part Number GA200795, is installed.</p>	4	N	Y
11.	XY BRAKE ASSY	GA200535	 <p>Can be used with both GA200036 and GA200946.</p>	4	N	Y
12.	PARK LOCK	GA200161	<p>XY Park Lock</p> 	1	N	1

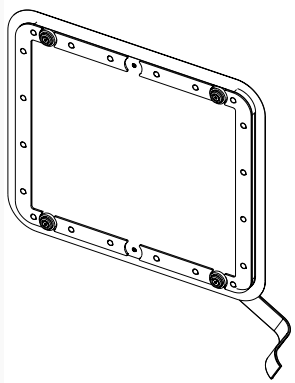



Section 9-9

Main Console parts

Table 9-25 Main Console parts sheet 1 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	BACK END PROCESSOR PARTS	SEE: Section 9-12 "Back End Processor (BEP) Spare Parts" on page 9-60				
2.	FRONT END PROCESSOR PARTS	SEE: Section 9-11 "Front End Processor (FEP) Card Rack parts" on page 9-56				
3.	CASTERS	SEE: Section 9-10 "Casters (Wheels) parts" on page 9-54				
4.	COVERS	SEE: Section 9-6 "Covers and Bumpers" on page 9-15				
5.	BULKHEAD BOARD ASSY	GA200290				

Table 9-25 Main Console parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
10.	AIR FILTER ASSEMBLY	5316340-2	DUST FILTER WITH HANDLE, LOCATED AT BOTTOM OF VIVID E9. 5316340-2 REPLACES GA200828 	1	N	Y
		GA200828	DUST FILTER WITH NYLON STIP, LOCATED AT BOTTOM OF VIVID E9 GA200828 REPLACES 5316340 			
		5316340				
11.	FILTER DUST REAR	GA307351		1	Y	Y
12.	CABLE MAIN - Top Console	5272357		1	N	Y

Section 9-10 Casters (Wheels) parts

Table 9-26 Casters (Wheels) parts sheet 1 of 2

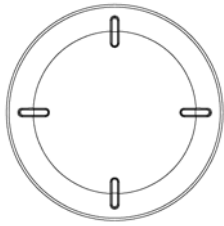
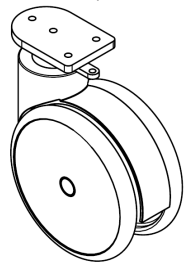
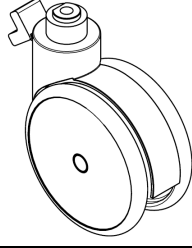
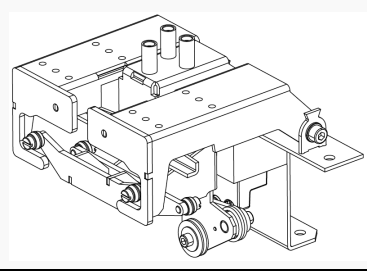


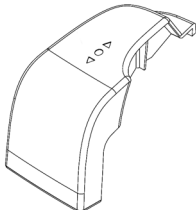
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Wheel cap for VE9 casters GA200245 and GA200246	GA307888	Replacement CAP with snap-on locks 	8	N	Y
2.	CASTERS, FRONT W/BRAKE AND LOCK	GA200245	FRONT CASTERS (FRONT WHEELS) 	2	N	Y
3.	CASTERS, REAR SIVIWEL AND BRAKE	GA200246	REAR CASTERS (REAR WHEELS) 	2	N	Y
4.	PEDAL MECHANISM ASSEMBLY	GA200070		1	N	Y
5.	PEDAL BRAKE	GA307052		1	N	Y

Table 9-26 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'11/BT'12 with 2D

NOTE: For use in VIVID E9 with Part Number GA000830, GA000835, GA000945 and GA000955.

Table 9-27 Front End Processor Card Rack parts - BT'11/BT'12

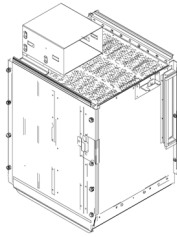
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	VE9 CARDRAK WITH BACKPLANE	GA200813	VIVID E9 Card Rack 	1	N	Y
2.	GRLY v2	GA200695		1	N	Y
3.	GRX64	GB200025	<i>NOTE! This board will be phased into production and phased in as a Service Part when GA200300 becomes unavailable.</i> RECEIVER BOARD, 64 CHANNELS, WITHOUT ANALOG DOPPLER	1	N	Y
4.	GRX64	GA200300	RECEIVER BOARD, 64 CHANNELS, WITHOUT ANALOG DOPPLER	1	N	Y
5.	GRX128 WITH CW	GB200020	<i>NOTE! This board will be phased into production and phased in as a Service Part when GA200105 becomes unavailable.</i> RECEIVER BOARD, 128 CHANNELS, WITH ANALOG DOPPLER	1	N	Y
6.	GRX128 WITH CW	GA200105	RECEIVER BOARD, 128 CHANNELS, WITH ANALOG DOPPLER	1	N	Y
7.	GTX-TLP192	GA200726	TRANSMITTER BOARD, 192 CHANNELS REQUIRES: FRONT PLANE P/N: GA200760	1	N	Y
8.	GTX - TLP 3.0	GA200625	TRANSMITTER BOARD, 64 CHANNELS	3	N	Y
9.	FRONT PLANE	GA200760	USE TOGETHER WITH GTX-TLP192, P/N: GA200726 (USED IN BOTH UPPER AND LOWER POSITION)	2	N	Y
10.	FRONT PLANE / XD BUS	5201002	FRONTPLANE USED IN BOTH UPPER AND LOWER POSITION. THE MARKING ON THE CARD IS FOR AN EARLIER DESIGN.	2	N	Y
11.	DRX5 BOARD MLA4 VERSION	5301040-5	DIGITAL RECEIVER BOARD 4 MLA DO NOT MIX WITH 5301040-4	3	N	Y

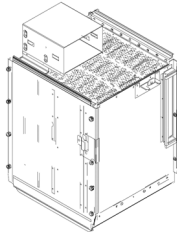
Table 9-27 Front End Processor Card Rack parts - BT'11/BT'12

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
12.	DRX3 BOARD MLA4 VERSION	5301040-4	DIGITAL RECEIVER BOARD 4 MLA DO NOT MIX WITH 5301040-5	3	N	Y
13.	GFI 2	5161631	RADIO FREQUENCY INTERFACE	1	N	Y

9-11-2 Front End Processor Card Rack - BT'11/BT'12 with 4D Expert Option

NOTE: For use in VIVID E9 with Part Number GA000810, GA000815, GA000940 and GA000950.

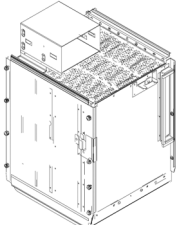
Table 9-28 Front End Processor Card Rack parts - BT'11/BT'12

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	VE9 CARDRACK WITH BACKPLANE	GA200813	Backwards compatible. 	1	N	Y
2.	GRLY v2	GA200695		1	N	Y
3.	GRX64	GB200025	NOTE! This board will be phased into production and phased in as a Service Part when GA200300 becomes unavailable. RECEIVER BOARD, 64 CHANNELS, WITHOUT ANALOG DOPPLER	1	N	Y
4.	GRX64	GA200300	RECEIVER BOARD, 64 CHANNELS, WITHOUT ANALOG DOPPLER	1	N	Y
5.	GRX128 WITH CW	GB200020	NOTE! This board will be phased into production and phased in as a Service Part when GA200105 becomes unavailable. RECEIVER BOARD, 128 CHANNELS, WITH ANALOG DOPPLER	1	N	Y
6.	GRX128 WITH CW	GA200105	RECEIVER BOARD, 128 CHANNELS, WITH ANALOG DOPPLER	1	N	Y
7.	GTX-TLP192	GA200726	TRANSMITTER BOARD, 192 CHANNELS Requires Front Plane P/N: GA200760	1	N	Y
8.	GTX - TLP 3.0	GA200625	TRANSMITTER BOARD, 64 CHANNELS	3	N	Y
9.	FRONT PLANE	GA200760	USE TOGETHER WITH GTX-TLP192, P/N: GA200726 (USED IN BOTH UPPER AND LOWER POSITION)	2	N	Y
10.	FRONT PLANE / XD BUS	5201002	FRONTPLANE USED IN BOTH UPPER AND LOWER POSITION. THE MARKING ON THE CARD IS FOR AN EARLIER DESIGN.	2	N	Y
11.	DRX5 MLA16	5301160-5	DIGITAL RECEIVER BOARD 16 MLA	3	N	Y
12.	GFI 2	5161631	RADIO FREQUENCY INTERFACE	1	N	Y

9-11-3 Front End Processor Card Rack - BT'09

NOTE: For use in VIVID E9 with Part Number GA000100

Table 9-29 Front End Processor Card Rack BT'09 parts

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	VE9 CARD RACK WITH BACKPLANE	GA200813	Backwards compatible. BT09 need new software version V108.1.6. 	1	N	Y
2.	GECKO RELAY BOARD (GRLY)	GA200695	Backwards compatible. BT09 Need new SW (released V108.1.6) Replacement for GA200630	1	N	Y
		GA200714	RELAY BOARD Replacement for GA200630			Y
		GA200630	RELAY BOARD			Y
3.	GRX64	GB200025	NOTE! This board will be phased in as a Service Part when GA200300 becomes unavailable. RECEIVER BOARD, 64 CHANNELS, WITHOUT ANALOG DOPPLER	1	N	Y
4.	GRX64	GA200300	RECEIVER BOARD, 64 CHANNELS, WITHOUT ANALOG DOPPLER	1	N	Y
5.	GRX128 WITH CW	GB200020	NOTE! This board will be phased in as a Service Part when GA200105 becomes unavailable. RECEIVER BOARD, 128 CHANNELS, WITH ANALOG DOPPLER	1	N	Y
6.	GRX128 WITH CW	GA200105	RECEIVER BOARD, 128 CHANNELS, WITH ANALOG DOPPLER	1	N	Y
7.	GTX - TLP 3.0	GA200625	TRANSMITTER BOARD, 64 CHANNELS	4	N	Y
8.	FRONT PLANE / XD BUS	5201002	FRONTPLANE USED IN BOTH UPPER AND LOWER POSITION. THE MARKING ON THE CARD IS FOR AN EARLIER DESIGN.	2	N	Y
9.	DRX5 MLA16	5301160-5	Backwards compatible. Requires software V108.1.8 or later. Replaces 5301160-4.	3	N	Y
	DRX3 WITH NEW POWER SUPPLY MODULES FOR MLA16	5301160-3	DIGITAL RECEIVER BOARD 16 MLA Supports all software versions.			Y
10.	GFI 2	5161631	RADIO FREQUENCY INTERFACE	1	N	Y

Section 9-12 Back End Processor (BEP) Spare Parts

There are two main families of BEPs used on the VIVID E9; BEP5 and BEP6.

9-12-1 Content in this section

9-12-2	BEP6 Spare Parts	9-60
9-12-3	BEP5 Spare Parts	9-62

9-12-2 BEP6 Spare Parts

Table 9-30 BEP6 Spare Parts sheet 1 of 2





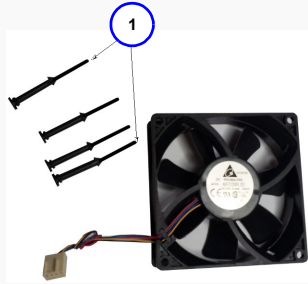
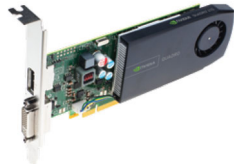

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	BEP6.0 WITHOUT 4D	GB200002	BACK END PROCESSOR - BEP6 (without 4D) System software requirement: v104.3.4 (or higher)	1	N	Y
2.	BEP6.0 SIDE IO BOARD ASSEMBLY	5433408-1		1	N	Y
3.	BEP 6.0 POWER BOARD ASSEMBLY	5433408-20		1	N	Y
4.	BEP6.0 FRONTIO ASSEMBLY WITHOUT USB PORTS	5433408-41		1	N	Y
5.	BEP6.X HDD ASSEMBLY - SPARE PART	5433408-50		1	N	Y

Table 9-30 BEP6 Spare Parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
6.	Fan Bottom	5433408-70	 <p>1 - FOUR (4x) MOUNTS INCLUDED</p>	2	N	Y
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 ByPass 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 9-79				

9-12-3 BEP5 Spare Parts

Table 9-31 BEP5 Spare Parts sheet 1 of 2



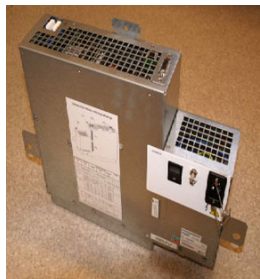
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	BEP without 4D - 2	GA200900	BACK END PROCESSOR Software requirement: v110.0.0 and higher Replaces GA200805	1	N	Y
2.	BEP without 4D	GA200805	BACK END PROCESSOR Used on BT'11 VIVID E9s with "2D" Software requirement: v110.0.0 and higher	1	N	Y
3.	BEP COMPLETE	5145000-10	BACK END PROCESSOR Used on BT'09 VIVID E9s Software requirement: v108.0.0 and higher	1	N	Y
4.	GRAPHICS ADAPTER	066E0361	NVIDIA Quadro 2000D  Used on VIVID E9s with 4D. System Software requirement: v104.3.3 or higher. This card will be phased in as a replacement for 066E0360, when 066E0360 goes obsolete.	1	N	Y
		066E0360	NVIDIA Quadro FX 1800 Graphics Adapter Used on VIVID E9s with 4D as replacement for 066E0339. 			
5.	PROLINK ADD card for PCI Express 16X for ATX	5323903	Used on VIVID E9 systems with 2D	1	N	Y
6.	BEP5 BIOS Load CD Release, version A563E121	GA200725	FOR VIVID E9	1	N	Y
7.	Seagate ST250DM0000 250GB HDD	5215286-3	Hard Disk Drive For ALL BEP5. Replaces 5215286-2 when it becomes unavailable.	1	N	Y
8.	SERIAL HARD DRIVE	5215286-2	Hard Disk Drive For 5145000-10, GA200800 and GA200805.	1	N	Y

Table 9-31 BEP5 Spare Parts (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
9.	Yggdrasil BEP IO Assembly 2	GA200878	I/O ASSEMBLY For use with: GA200890, GA200900 and GB200003.	1	N	Y
10.	Yggdrasil BEP IO Assembly	5321212	I/O ASSEMBLY For 5145000-10, GA200800 and GA200805.	1	N	Y
11.	Yggdrasil BEP Cover with Gaskets	GA200897	For GA200890, GA200900 and GB200003	1	N	Y
12.	YGGDRASIL BEP COVER	5266155	For 5145000-10, GA200800 and GA200805.	1	N	Y
13.	BEP FRONT PANEL ASSEMBLY WITHOUT USB, YGG	GA200873	For GA200890, GA200900 and GB200003	1	N	Y
14.	BEP FRONT PANEL ASSEMBLY WITHOUT USB, FREY	5301222-3	For 5145000-10, GA200800 and GA200805.	1	N	Y
15.	RJ-45 Coupler and Flange Category 6	5176472-2	For all BEPs	1	N	Y
16.	BEP Power Supply, Vivid E9	GA200876	For GA200890, GA200900 and GB200003	1	N	Y
17.	GE CUSTOM POWER SUPPLY BOARD	5393800-2	For 5145000-10, GA200800 and GA200805.	1	N	Y
18.	Digital Video Recorder Circuit Board	5135840	OPTION May be used on all BEPs	1	N	Y
19.	BEP Fan	5198607	 For all BEPs	1	N	Y
20.	SHOCK MOUNT - HARD DRIVE	5267412	 For all BEPs	1	N	Y
21.	DVI FLEX, MAIN, YGGDRASIL BEP	5197216	 For all BEPs	1	N	Y
22.	BEP CMOS Battery (BIOS BATTERY)	2404028-7		1	N	Y

Section 9-13 Main Power Supply

Table 9-32 Main Power Supply

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Main power supply Vivid E9	GA200730-03	Replaces GA200730	1	N	Y
2.	Vivid E9 Main Power Supply	GA200730	Replaces GA200004 Note! A 2-minute wait might be necessary for a certain restart	1	N	Y
3.	POWER LV SUPPLY	GA200004	MAIN PS - FOR CARDIAC 	1	N	Y

Section 9-14

I/O modules

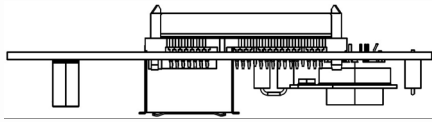
Table 9-33 I/O Parts

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	PATIENT IO	GB200010	Replaces GA200240.	1	N	Y
2.	PATIENT IO	GA200240	PATIENT IN/OUT	1	N	Y
3.	BEP6.0 SIDE IO BOARD ASSEMBLY	5433408-1	I/O ASSEMBLY For: GB200001 and GB200002.	1	N	Y
4.	BEP I/O BOARD	GA200878	I/O ASSEMBLY For GA200890, GA200900 and GB200003.	1	N	Y
5.	BEP I/O BOARD	5321212	I/O ASSEMBLY For GA200800 and GA200805.	1	N	Y

Section 9-15 Peripherals for VIVID E9


9-15-1 DVD drives

Table 9-34 DVD drives

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	DVD Drive SATA Sony Optiarc AD-7280S-0B	066E0855	Replaces 066E0854	1 or 2	N	Y
2.	DVD Drive SATA Sony Optiarc AD-7260S	066E0854	Replaces 066E0850			
3.	DVD Drive SATA Sony Optiarc AD-7240S-0B	066E0850	Replaces 066E0700			
4.	DVD Drive SATA LG GH20NS15	066E0700				
5.	DVD Interface Board	5301204		1	N	Y

9-15-2 Printer, Internal

Table 9-35 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 9-36 Printer, External - USB sheet 1 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Mitsubishi Digital Color Printer CP30D for Vivid E9 to Japan	GA100986	Kit with printer, USB cable, mains power cable for Japan, printer driver software and installation manual for printer drivers. For Japan	1	N	N

Table 9-36 Printer, External - USB (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
2.	Mitsubishi Digital Color Printer CP30D	066E2963	Spare Part (printer) For Japan	1	Y	Y
3.	Mitsubishi Digital Color Printer CP30DW-Z for Vivid E9	GA100987	Kit with printer, USB cable, mains power cables (several types), printer driver software and installation manual for printer drivers. All other countries (Not for Japan)	1	N	N
4.	Mitsubishi Digital Color Printer CP30DW-Z	066E2964	Spare Part (printer) All other countries (Not for Japan)	1	Y	Y
5.	Color Video Printer UP-D25MD for Vivid E products	GA100964 066E2956	SONY UP-D25MD DIGITAL GRAPHIC COLOR PRINTER - USB, EXTERNAL (REPLACES SONY UP-D23MD)	1	Y	Y
6.	COLOR VIDEO PRINTER UP-D23MD FOR VIVID E PRODUCTS	GA100677 066E2958 OBSOLETE	SONY UP-D23MD DIGITAL GRAPHIC COLOR PRINTER - USB, EXTERNAL (OBSOLETE FROM FACTORY)	1	Y	Y
7.	CABLE, POWER 1XX VAC	070C3561		1	Y	Y
8.	MAINS CABLE 3P HP PN DM293A #ABJ,JAP	070C1502				
9.	MAINS CABLE 3P HP PN DM293A #AB2 CHI	070C1501				
10.	COLOR PAPER UPC21L SONY	CAT# E70151SA	COLOR PAPER, LARGE A6	1	N	N

9-15-4 Printers, Network

Table 9-37 Printer, Color, Network sheet 1 of 2






ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	COLOR PRINTER HP OFFICEJET PRO 8000 100-240V	EY100153		1	N	Y
	SPARE PART:	066E0427	Color Printer HP Officejet Pro 8000 100-240V CB092A			
2.	HP Laser Jet Pro 400 color M451	066E3023	Replaces 066E0428. 	1	N	Y

Table 9-37 Printer, Color, Network (cont'd) sheet 2 of 2

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
3.	HP COLOR LASERJET CP2025n Printer 220-240V SPARE PART:	066E0428 OBSOLETE		1	N	Y
4.	HP COLOR LASERJET CP2025n Printer 100-127V SPARE PART:	EY100148 066E0429				
5.	HP OFFICEJET PRO K5400 KIT SPARE PART: HP OfficeJet Pro K5400dn	EQ100158 066E0426	Replaced by EY100153 / 066E0427 	1	Y	Y
6.	COLOR LASER PRINTER 100-127 VAC, ASSEMBLY -SPARE PART:	066E0418 OBSOLETE	OBSOLETE Replaced by: EY100149 / EY100148 / 066E0428 / 066E0429 	1	Y	Y
7.	COLOR LASER PRINTER 220-240 VAC, ASSEMBLY -SPARE PART:	EP100912/ FD100237 066E0419 OBSOLETE			Y	

9-15-5 Digital Video Stream Recorder

Table 9-38 Digital Video Stream Recorder

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Digital Video Stream Recorder (OPTION)	GB200048	Plug-in board for BEP5 and BEP6 + DVD Recorder + Cables	1	N	Y
		GA200859	Plug-in board for the BEP5 + DVD Recorder	1	N	Y
		GA200614	Plug-in board for the BEP5 + DVD Recorder	1	N	Y
2.	DVD Assembly for Vivid E9	GA200618	DVD drive + bracket (part of GA200614)	1	N	Y
3.	DVR Board	See: Section 9-12 "Back End Processor (BEP) Spare Parts" on page 9-60. Digital Video Disc Recorder - Board is installed in BEP				
4.	Cable - DVD Power, FREY	Cable K, See: 9-17-6 "Back End Processor (BEP) cables" on page 9-79				


9-15-6 USB Flash Card

Table 9-39 USB Flash Card (USB Drive)

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
3	USB Flash Drive 2 GB (USB 2.0) The following model have been approved for use with VIVID E9: - USB Memory Key 2GB (Transcend)	066E0751 OBSOLETE	USB FLASH CARD (USB Flash Drive 2 GB USB 2.0) (OBSOLETE) Replaced: - Kingston DataTraveler Elite 256 MB - Sandisk Cruzer Micro 256 MB - Twin MOS K24-256MB Mobile Disk III - JMTek	1	Y	Y



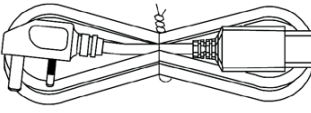



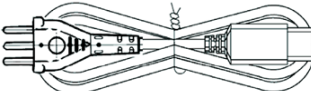
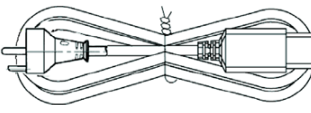
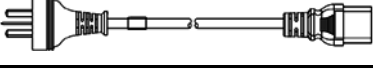
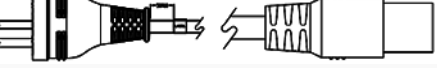

9-15-7 USB Hard Drive 2TB with RAID1

Table 9-40 USB Hard Drive 2TB with RAID1

ITEM	Part Name	Part Number	Description	QTY	CRU	FRU
1.	External USB hard disk with RAID1 data protection mirrored hard disk.	EY100147		1	N	N
2.	USB Hard Drive 2TB with RAID1 NDUR-2T-K	066E0661		1	N	Y
3.	Hard Drive 3,5 inch 1TB SATA for IOMEGA NDUR-1T-HD	066E0662	<p>3.5 inch 1 TBytes SATA HDD</p> <p>This is one of the 1TB hard disk drives installed inside the cabinet.</p> <p>For more information, see: "Iomega Ultramax Desktop Hard Drive Installation Manual", Direction Number: EY194147</p>	2	N	Y

Section 9-16 Mains Power Cables - VIVID E9

Table 9-41 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

9-17-1 Cable Harness

Table 9-42 Cable Harness sheet 1 of 2


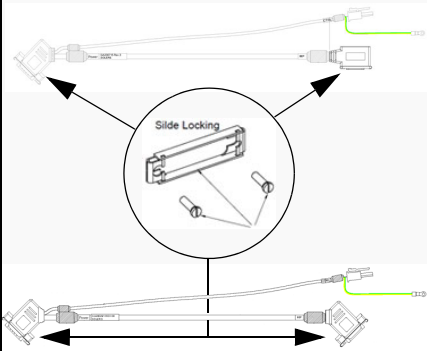



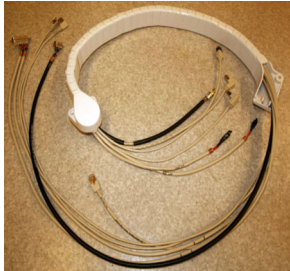
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	CABLE HARNESS UPDATED WITH NEW DVD SOLUTION	GA200075		1	N	Y
CONTENT IN GA200075						
2.	CABLE, XY-LOCK	GA200225	CABLE T (XYZ CONTROLLER - LOCK MOTOR) 	1	N	Y
3.	CABLE POWER-CONTROLLER-BEP FOR VIVID E9	GA200715	CABLE I (J1 - MAIN POWER SUPPLY - XYZ 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 9-42 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 • 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

9-17-2 Top Console Cables

Table 9-43 VIVID E9 Top Console cables sheet 1 of 2

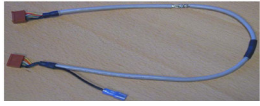




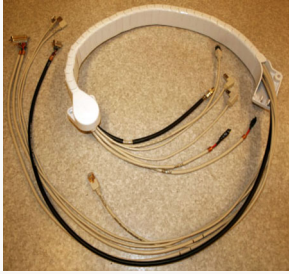
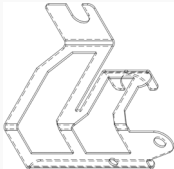
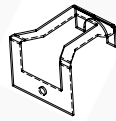




ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
14.	CABLE AN KEYBOARD	GA200368	J18 - KEYBOARD. USB and 12V 	1	N	Y
15.	OPERATOR PANEL CABLE KIT	GA200446	 TRACKBALL USB CABLE  USB VIDEO BOARD FLEX CABLE  HV INVERTER CABLE	1	N	Y
16.	Cable, A/N Keyboard, USB & 12V	GA200368		1	N	Y
17.	CABLE MAIN	5272357	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
18.	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 9-43 VIVID E9 Top Console cables sheet 2 of 2 (cont'd)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
19.	BRACKET, LOCK HDMI 2	GA307624	TO FIX THE LCD HDMI CONNECTOR TO THE BULKHEAD BACKSIDE. 	1	N	Y
20.	CABLE, USB OP-BULKHEAD	5248610	CABLE G USB (short cable inside the UI) (J24 - P7), (J25 - P8)	2	N	Y
21.	CABLE, XYZ UP/DOWN	GA200311	CABLE U UP/DOWN/LOCK BUTTONS 	2	N	Y
22.	LCD Monitor Arm Cable Kit	GA200668	- Powerd_USB_cable_frey - L9 19" LCD Video Cable	1	N	Y
23.	Powerd_USB_cable_frey	5196890		1	N	Y
24.	L9 19" LCD Video Cable	5256600		1	N	Y


9-17-3 XYZ Controller cables

Table 9-44 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 9-45 Main Power Supply cables

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	MAINS POWER CABLE	See: Section 9-16 "Mains Power Cables - VIVID E9" on page 9-71				
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

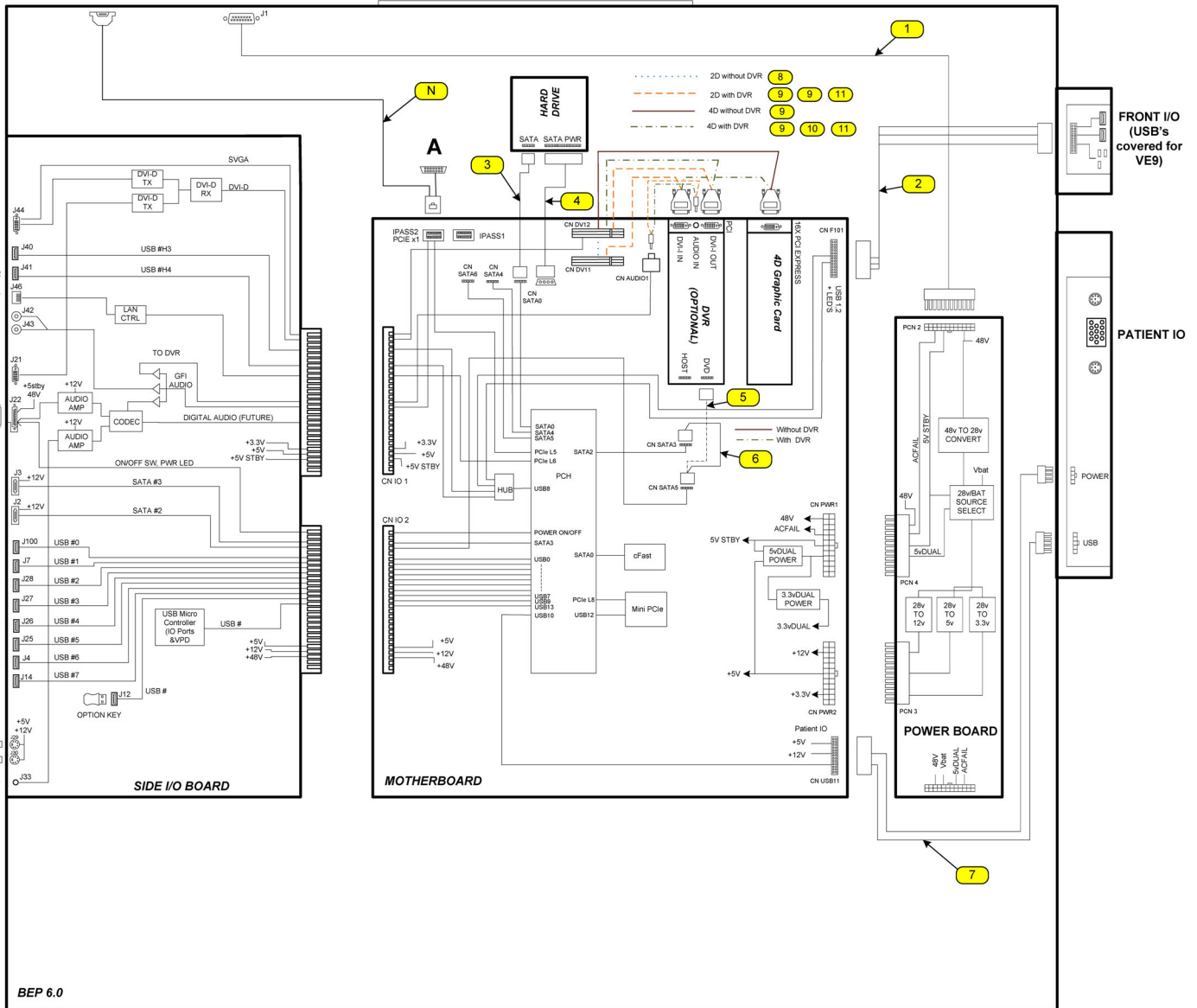
Table 9-46 Front End Processor (FEP) cables

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

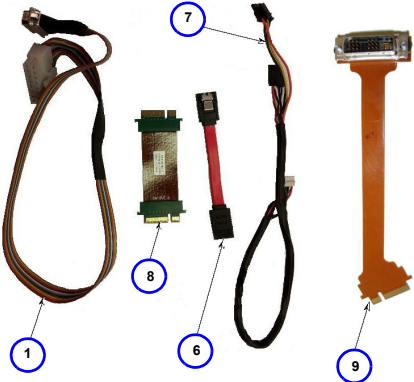
9-17-6-1 BEP6 cables

Figure 9-2 BEP6 internal cables



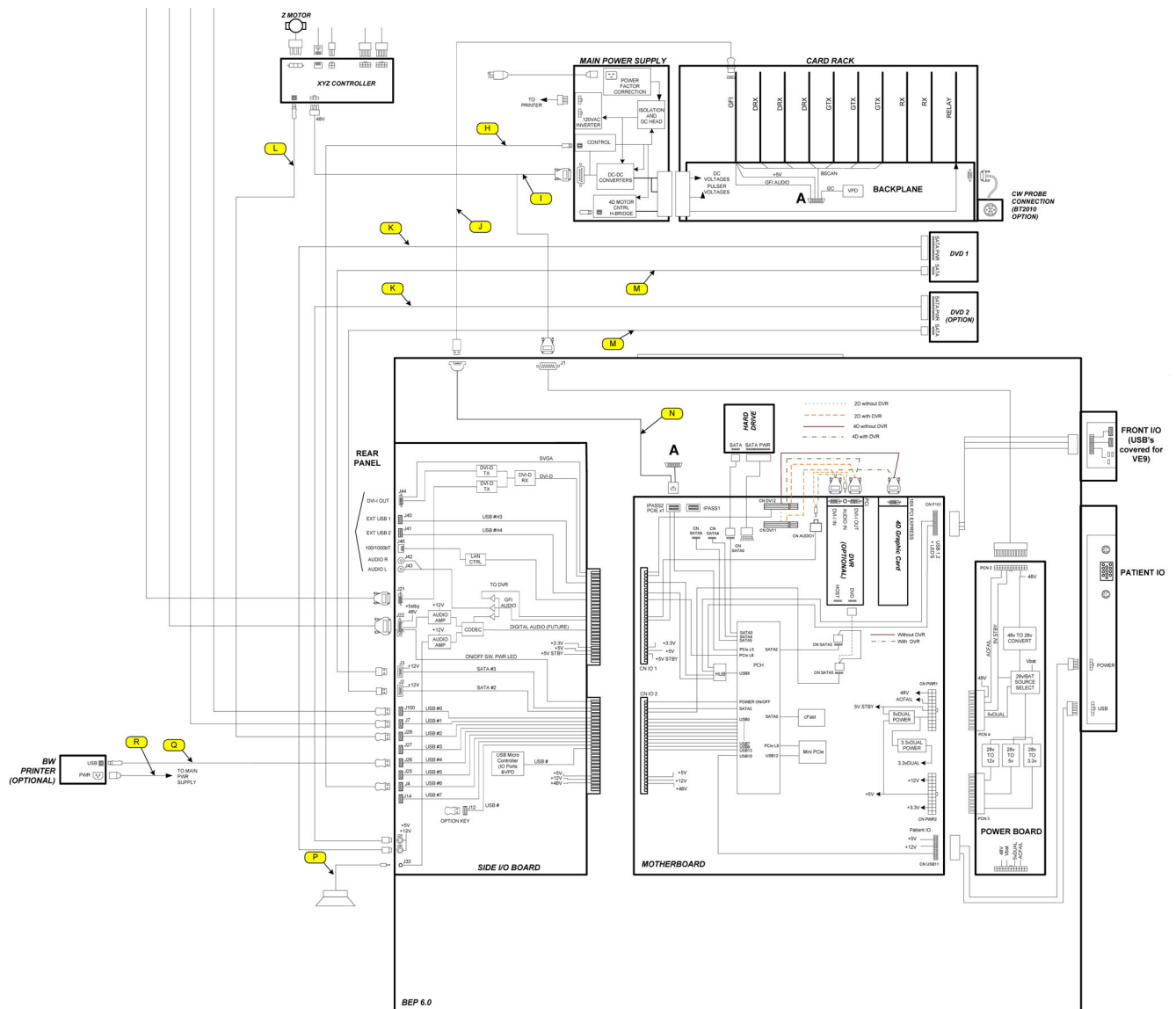
9-17-6-1 BEP6 cables (cont'd)

Table 9-47 BEP6 Internal Cables

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	USED ONLY IF DVR IS INSTALLED.	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
N.	Refer to: Table 9-48 "BEP6 External Cables and Harnesses" on page 9-82.					

9-17-6-1 BEP6 cables (cont'd)

Figure 9-3 BEP6 External Cables



9-17-6-1 BEP6 cables (cont'd)

Table 9-48 BEP6 External Cables and Harnesses sheet 1 of 3


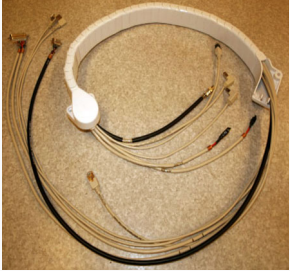

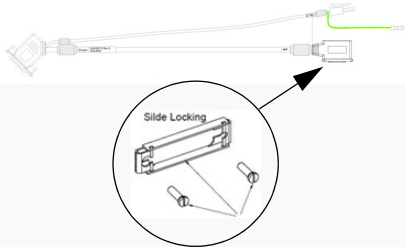
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
A	MAIN POWER CORD	5148381-X	X DEPENDS ON COUNTRY. For illustrations, see: Section 9-16 "Mains Power Cables - VIVID E9" on page 9-71.	1	Y	Y
B	FROG BRAKE CONTROL	GA200335	CABLE B (XYZ CONTROLLER - INNER FROG BRAKES)	2	N	Y
C	FROG BRAKE ARM	GA200334	CABLE 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 9-48 BEP6 External Cables and Harnesses (cont'd) sheet 2 of 3

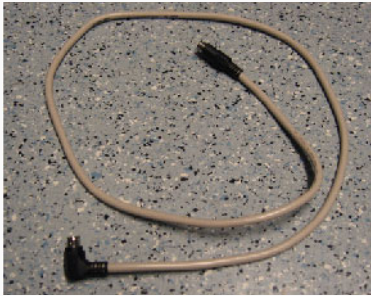

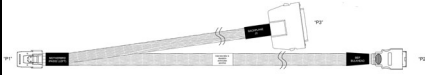
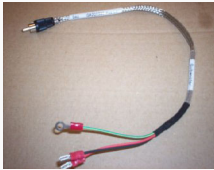
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
J	CABLE-PCI EXPRESS ON HDMI, BEP-CARDRACK, FREY	5152290	PCI EXPRESS CABLE	1	N	Y
K	CABLE - DVD POWER FULLY SHIELDED	5266407	POWER CABLE, DVD CABLE K (J30 - DVD 1) (J29 - DVD 2) 	1 or 2	N	Y
L	CABLE - USB BEP TO XYZ MOTOR CONTROLLER	5194492-6	USB CABLE – 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 9-48 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

9-17-6-2 BEP5 cables

Table 9-49 Back End Processor (BEP) cables sheet 1 of 4




ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
I/O BOARD						
1.	AUDIO CABLE -SUBWOOFER	GA200333	CABLE P (J33 - SUBWOOFER) 	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.	MAIN CABLE - POWER AUDIO	SEE MAIN CABLE	CABLE D1 [PART OF MAIN CABLE] (J21 - OP PANEL)	1	N	N
5.	MAIN CABLE - VIDEO	SEE MAIN CABLE	CABLE D2 [PART OF MAIN CABLE] (J22 - OP PANEL)	1	N	N
BEP						
1.	PC2GFI CARD CABLE	5152290	CABLE J PCI EXPRESS CABLE (J5 - GFI)	1	N	Y
2.	CABLE USB A-B HIGH SPEED	5194492-2	CABLE H (J4 - MAIN POWER SUPPLY)	1	N	Y

Table 9-49 Back End Processor (BEP) cables sheet 2 of 4 (cont'd)



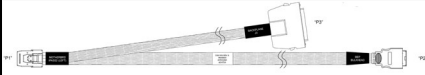


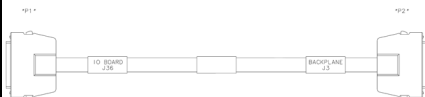
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
3.	SATA CABLE - DVD 2	5270048	<p>CABLE M (J3 - DVD 2)</p> 	1	N	Y
4.	SATA CABLE - DVD 1	5270048	<p>CABLE M (J2 - DVD 1)</p> 	1	N	Y
5.	CABLE BEP 6	5391509		1	N	Y
6.	CABLE USB-BEP6-MAIN POWER SUPPLY	5194492-8				
7.	POWER CABLE - BEP 48V	5194495	<p>CABLE I (J1 - MAIN POWER SUPPLY - XYZ CONTROLLER)</p> 	1	N	Y
8.	BEP - BACKPLANE CABLE	5194491	<p>CABLE N</p> 	1	N	Y

Table 9-49 Back End Processor (BEP) cables sheet 3 of 4 (cont'd)


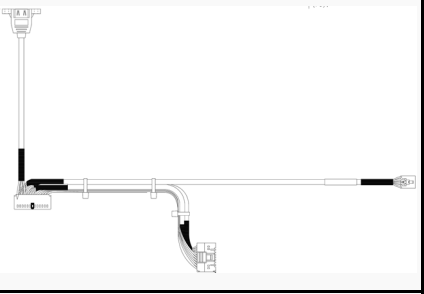
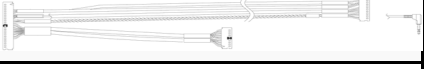
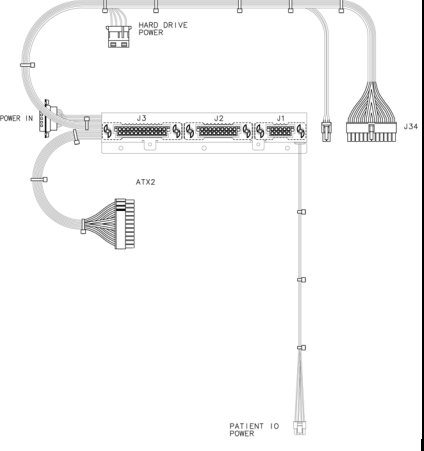
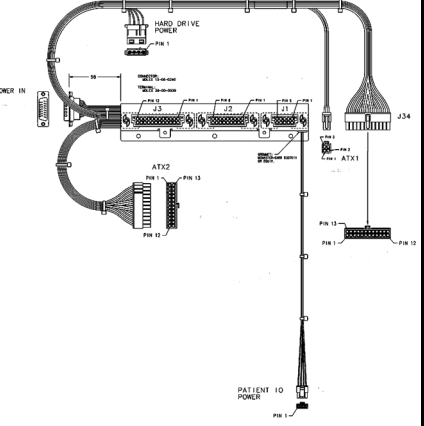
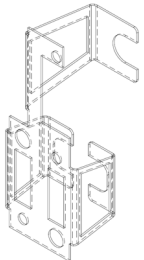
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
9.	CABLE-PCI EXPRESS OVER HDMI BULKHEAD MOUNT	5152291		1	N	Y
10.	HARNESS, BEP FRONT PANEL, ICHIRO	5193726		1	N	Y
11.	HARNESS, BEP MOTHERBOARD- IOBOARD, YGGDRASIL IMPROVED AUDIO	5193725-3		1	N	Y
12.	Harness-BEP Power, Ygg	GA200886	For GA200890, GA200900 and GB200003 	1	N	Y
13.	HARNESS - BEP POWER FREY	5165844	For GA200800 and GA200805 	1	N	Y

Table 9-49 Back End Processor (BEP) cables sheet 4 of 4 (cont'd)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
14.	Bracket, Lock BEP Top Connectors	GA200984		1	N	Y

9-17-7 Peripherals Cables

Table 9-50 Peripherals Cables

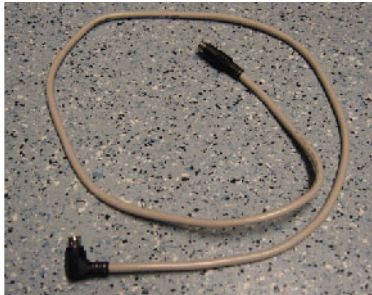
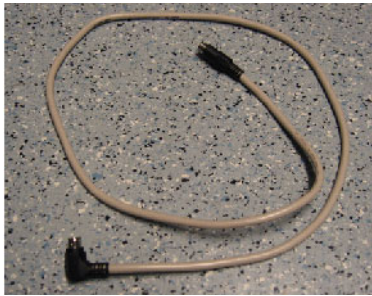






ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	POWER CABLE - BW PRINTER	5194493	CABLE R (MAIN POWER SUPPLY - BW PRINTER)	1	N	Y
2.	POWER CABLE - DVD	5266407	CABLE K (J30 - DVD 1) 	1	N	Y
3.	POWER CABLE - DVD	5266407	CABLE K (J29 - DVD 2) 	1	N	Y
4.	SATA CABLE - DVD	5270048	CABLE M (J2 - DVD 1) 	1	N	Y

Table 9-50 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

Table 9-51 ECG Cables

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
1.	CABLE ECG MARQ. AHA / AMERICA	164L0025		1	Y	Y
2.	CABLE ECG MARQ. IEC / EU + AS	164L0026		1	Y	Y
3.	LEADWIRES ECG MARQ. AHA / AMERICA	164L0027		1	Y	Y
4.	LEADWIRES ECG MARQ. IEC/EU+AS	164L0028		1	Y	Y

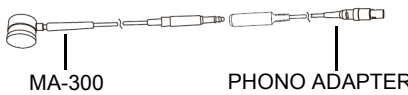
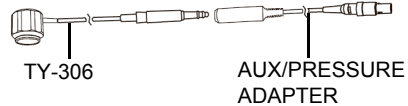
Section 9-19 Labels VIVID E9

Table 9-52 Vivid E9 Name Labels

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	Vivid E9 Nameplate, Gold, Upper OP Panel	GA314811	New for BT'11	1	N	Y
2.	Vivid E9 Nameplate, Periwinkle, Upper OP Panel	GA314992	For Pro configuration		N	Y
3.	Vivid E9 Nameplate, Bronze, Upper OP Panel	GA314812	New for BT'11		N	Y
4.	Vivid E9 Nameplate, Silver, Upper OP Panel	5255315	BT09		N	N

Section 9-20 Physio TX Parts

Table 9-53 Physio TX Parts

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	PCG MICROPHONE MA-300HDS WITH ADAPTER.	GB200036	Replaces FD20036	1	Y	Y
2.	KIT, HEART MICROPHONE MA300 AND ADAPTER	FD200036	 <p>MA-300 PHONO ADAPTER</p>	1	Y	Y
3.	KIT, PULSE PRESSURE TRANSDUCER TY306 AND ADAPTER	FD200037	 <p>TY-306 AUX/PRESSURE ADAPTER</p>	1	Y	Y

Section 9-21 Options - VIVID E9

9-21-1 Options - VIVID E9 - BT'12, application software v112.x

Table 9-54 Options - VIVID E9 - BT'12, application software v112.x sheet 1 of 2



ITEM	PART NAME	CAT # or PART NUMBER	COMMENTS
ADVANCED OPTIONS			
1.	LVO CONTRAST IMAGING	H45561MY	
2.	VASCULAR CONTRAST	H45561MZ	
3.	AFI PRODUCTIVITY PACKAGE	H45561GX	
4.	IMT	H45561GY	
5.	Stress	H45561NC	
6.	LV Mass Only	H45561NA	
7.	4D Strain and LV Mass	H45561NB	
8.	Auto 2D EF	H45561ND	
9.	Rodent	H45561NE	
10.	4V Enable	H45561RJ	
11.	Advanced Qscan Imaging (rev non-J)	GA200891	
12.	Advanced Qscan Imaging (rev J)	GA200892	
OTHER			
13.	Tri-pedal USB Footswitch	H46732LF 5380960	<p>This part will be introduced as a replacement for H4910FT / 5331575.</p> 
14.		H4910FT 5331575	 <p>Going Obsolete from GE.</p>

Table 9-54 Options - VIVID E9 - BT'12, application software v112.x (cont'd) sheet 2 of 2

ITEM	PART NAME	CAT # or PART NUMBER	COMMENTS
15.	DVR Option for Vivid E9.	H45551NS/ GB200048	<p>Includes parts for installing DVR into both BEP5 and BEP6.</p> <p>KIT INCLUDES:</p> <ul style="list-style-type: none"> • Digital Video Recorder Circuit Board (5135840) • DVI Flex, DVR jumper, Yggdrasil BEP (5197217) • DVI Flex, Main, Yggdrasil BEP (5197216) • Cable - DVD Power fully shielded (5266407) • Cable - DVD eSATA fully shielded (5270048) • DVD Assembly for VIVID E9 (GA200618) • Label, DVR (GA314384) • Flex Cable - DVI to SAMTEC Video Jumper (5428990) • Cable - DVR Audio BEP6 (5435462) • SATA Cable - DVR to BEP6 MB (5439827-2)
16.	DVR option VIVID E9 (For BEP5)	GA200859	<p>KIT INCLUDES:</p> <ul style="list-style-type: none"> • Digital Video Recorder Circuit Board (5135840) • DVI Flex, DVR jumper, Yggdrasil BEP (5197217) • DVI Flex, Main, Yggdrasil BEP (5197216) • Cable - DVD Power fully shielded (5266407) • Cable - DVD eSATA fully shielded (5270048) • DVD Assembly for VIVID E9 (GA200618) • Label, DVR (GA314384) • Installation procedure, Digital Video Stream Recorder option (GA294614)

9-21-2 Options - VIVID E9 - BT'11, application software v110.x

Table 9-55 Options - VIVID E9 - BT'11, application software v110.x

ITEM	PART NAME	CAT # or PART NUMBER	COMMENTS
ADVANCED OPTIONS			
1.	LVO CONTRAST IMAGING	H45561MY	
2.	VASCULAR / ABDOMINAL CONTRAST	H45561MZ	
3.	AFI PRODUCTIVITY PACKAGE	H45561GX	
4.	IMT	H45561GY	
5.	Stress	H45561NC	
6.	LV Mass Only	H45561NA	
7.	4D Strain and LV Mass	H45561NB	
8.	Auto 2D EF	H45561ND	
9.	Rodent	H45561NE	
10.	4V Enable	H45561RJ	
11.	Advanced Qscan Imaging (rev non-J)	H45561RK	
12.	Advanced Qscan Imaging (rev J)	H45561RL	
OTHER			
13.	DVR Option for Vivid E9.	H45551NS/ GB200048	Includes parts for installing DVR into both BEP5 and BEP6. KIT INCLUDES: <ul style="list-style-type: none"> • Digital Video Recorder Circuit Board (5135840) • DVI Flex, DVR jumper, Yggdrasil BEP (5197217) • DVI Flex, Main, Yggdrasil BEP (5197216) • Cable - DVD Power fully shielded (5266407) • Cable - DVD eSATA fully shielded (5270048) • DVD Assembly for VIVID E9 (GA200618) • Label, DVR (GA314384) • Flex Cable - DVI to SAMTEC Video Jumper (5428990) • Cable - DVR Audio BEP6 (5435462) • SATA Cable - DVR to BEP6 MB (5439827-2)
14.	Digital video stream recorder option	GA200614	KIT INCLUDES: <ul style="list-style-type: none"> - Digital Video Recorder Circuit Board (5135840) - DVI Flex, DVR jumper, Yggdrasil BEP (5197217) - Cable - DVD Power fully shielded (5266407) - Cable - DVD eSATA fully shielded (5270048) - DVD Assembly for VIVID E9 (GA200618) - Label, DVR (GA314384) - Installation procedure, Digital Video Stream Recorder option (GA294614)

9-21-3 Options - VIVID E9 - BT'09, application software v108.x

Table 9-56 Options - VIVID E9 - BT'09, application software v108.x

ITEM	PART NAME	CAT #	COMMENTS
ADVANCED OPTIONS			
1.	LVO CONTRAST IMAGING	H45551DA	
2.	VASCULAR / ABDOMINAL CONTRAST	H45551DB	
3.	ADVANCED QSCAN MAGING	H45551DC	STRAIN + TISSUE SYNC IMG
4.	ADVANCED QSCAN MAGING Rev. J	H45551DD	STRAIN + TISSUESYNCEIMG (FOR JAPAN)
QUANTITATIVE ANALYSIS PACKAGES			
5.	IMT - INTIMA MEDIA THICKNESS	H45551NN	
6.	AFI - AUTOMATED FUNCTION IMAGING	H45551NP	
NETWORK OPTIONS			
7.	DICOM CONNECTIVITY PACKAGE	H45551NR	
OTHER			
8.	DVR option VIVID E9	GA200859	KIT INCLUDES: - Digital Video Recorder Circuit Board (5135840) - DVI Flex, DVR jumper, Yggdrasil BEP (5197217) - DVI Flex, Main, Yggdrasil BEP (5197216) - Cable - DVD Power fully shielded (5266407) - Cable - DVD eSATA fully shielded (5270048) - DVD Assembly for VIVID E9 (GA200618) - Label, DVR (GA314384) - Installation procedure, Digital Video Stream Recorder option (GA294614)
9.	Digital video stream recorder option	GA200614	KIT INCLUDES: - Digital Video Recorder Circuit Board (5135840) - DVI Flex, DVR jumper, Yggdrasil BEP (5197217) - Cable - DVD Power fully shielded (5266407) - Cable - DVD eSATA fully shielded (5270048) - DVD Assembly for VIVID E9 (GA200618) - Label, DVR (GA314384) - Installation procedure, Digital Video Stream Recorder option (GA294614)

Section 9-22 Product Manuals for VIVID E9

9-22-1 Overview

Contents in this section:

- [9-22-2 "Product manuals for BT'12" on page 9-97](#)
- [9-22-3 "Product manuals for BT'11" on page 9-99](#)
- [9-22-4 "Product manuals for BT'09" on page 9-101](#)
- [9-22-5 "Probes Documentation" on page 9-103](#)

9-22-2 Product manuals for BT'12

NOTE: The User manuals and the Service manual (PDF files) are located on the VIVID E9 Online Manual Multi language CD, Part Number: GA200960. Paper copies may be ordered from GE.

Table 9-57 Product Manuals for VIVID E9 (BT'12) sheet 1 of 2

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	BT12 Vivid E9 User manual - Bulgarian	GA092901		1	N	N
2.	BT12 Vivid E9 User manual - Croatian	GA092903		1	N	N
3.	BT12 Vivid E9 User manual - Czech	GA092904		1	N	N
4.	BT12 Vivid E9 User manual - Danish	GA092905		1	N	N
5.	BT12 Vivid E9 User manual - Dutch	GA092906		1	N	N
6.	BT12 Vivid E9 User manual - English	GA092907		1	N	N
7.	BT12 Vivid E9 User manual - Estonian	GA092908		1	N	N
8.	BT12 Vivid E9 User manual - Finnish	GA092909		1	N	N
9.	BT12 Vivid E9 User manual - French	GA092910		1	N	N
10.	BT12 Vivid E9 User manual - German	GA092911		1	N	N
11.	BT12 Vivid E9 User manual - Greek	GA092912		1	N	N
12.	BT12 Vivid E9 User manual - Hungarian	GA092913		1	N	N
13.	BT12 Vivid E9 User Manual - Indonesian	GA092988		1	N	N
14.	BT12 Vivid E9 User manual - Italian	GA092914		1	N	N
15.	BT12 Vivid E9 User manual - Japanese	GA092915		1	N	N
16.	BT12 Vivid E9 User manual - Korean	GA092916		1	N	N
17.	BT12 Vivid E9 User manual - Latvian	GA092917		1	N	N
18.	BT12 Vivid E9 User manual - Lithuanian	GA092918		1	N	N
19.	BT12 Vivid E9 User manual - Norwegian	GA092919		1	N	N
20.	BT12 Vivid E9 User manual - Polish	GA092920		1	N	N
21.	BT12 Vivid E9 User manual - Portuguese	GA092921		1	N	N
22.	BT12 Vivid E9 User manual - Romanian	GA092922		1	N	N

Table 9-57 Product Manuals for VIVID E9 (BT'12) (cont'd) sheet 2 of 2

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
23.	BT12 Vivid E9 User manual - Russian	GA092923		1	N	N
24.	BT12 Vivid E9 User manual - Serbian	GA092924		1	N	N
25.	BT12 Vivid E9 User manual - Slovak	GA092925		1	N	N
26.	BT12 Vivid E9 User Manual - Slovenian	GA092989		1	N	N
27.	BT12 Vivid E9 User manual - Spanish	GA092926		1	N	N
28.	BT12 Vivid E9 User manual - Swedish	GA092927		1	N	N
29.	BT12 Vivid E9 User manual - Turkish	GA092928		1	N	N
30.	BT12 Vivid E9 Reference manual - English	GA092929	REFERENCE MANUAL, ENGLISH	1	N	N
31.	Remote Software Download and Installation manual	GB094004	English	1	N	N
SERVICE MANUALS						
1.	VIVID E9 UNPACKING/PACKING PROCEDURE, ENGLISH	GB050018	For carton box	1	N	N
2.	VIVID E9 UNPACKING/PACKING PROCEDURE, ENGLISH	GA050318	For wooden box	1	N	N
3.	VIVID E9 SERVICE MANUAL, ENGLISH	GA091568		1	N	N
4.	Printer Driver Installation Manual	GA294652		1	N	N

9-22-3 Product manuals for BT'11

NOTE: The User manuals and the Service manual (PDF files) are located on the VIVID E9 Online Manual Multi language CDPart Number: GA200790. Paper copies may be ordered from GE.

Table 9-58 Product Manuals for VIVID E9 (BT'11) sheet 1 of 2

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	VIVID E9 USER MANUAL, ENGLISH	GA092761		1	N	N
2.	VIVID E9 USER MANUAL, GERMAN	GA092762		1	N	N
3.	VIVID E9 USER MANUAL, FRENCH	GA092763		1	N	N
4.	VIVID E9 USER MANUAL, ITALIAN	GA092764		1	N	N
5.	VIVID E9 USER MANUAL, SPANISH	GA092765		1	N	N
6.	VIVID E9 USER MANUAL, PORTUGUESE	GA092766		1	N	N
7.	VIVID E9 USER GUIDE, SWEDISH	GA092769		1	N	N
8.	VIVID E9 USER GUIDE, NORWEGIAN	GA092770		1	N	N
9.	VIVID E9 USER GUIDE, DANISH	GA092771		1	N	N
10.	VIVID E9 USER MANUAL, JAPANESE	GA092767		1	N	N
11.	VIVID E9 USER MANUAL, CHINESE, SIMPLIFIED	GA092768		1	N	N
12.	VIVID E9 USER GUIDE, POLISH	GA092772		1	N	N
13.	VIVID E9 USER GUIDE, FINNISH	GA092773		1	N	N
14.	VIVID E9 USER GUIDE, GREEK	GA092774		1	N	N
15.	VIVID E9 USER GUIDE, RUSSIAN	GA092775		1	N	N
16.	VIVID E9 USER GUIDE, DUTCH	GA092776		1	N	N
17.	VIVID E9 USER GUIDE, HUNGARIAN	GA092777		1	N	N
18.	VIVID E9 USER GUIDE, SLOVAK	GA092778		1	N	N
19.	VIVID E9 USER GUIDE, ROMANIAN	GA092779		1	N	N
20.	VIVID E9 USER GUIDE, CZECH	GA092780		1	N	N
21.	VIVID E9 USER GUIDE, LATVIAN	GA092781		1	N	N
22.	VIVID E9 USER GUIDE, LITHUANIAN	GA092782		1	N	N
23.	VIVID E9 USER GUIDE, TURKISH	GA092783		1	N	N
24.	VIVID E9 USER GUIDE, ESTONIAN	GA092784		1	N	N
25.	VIVID E9 USER GUIDE, KOREAN	GA092785		1	N	N
26.	VIVID E9 USER GUIDE, SERBIAN	GA092786		1	N	N
27.	VIVID E9 USER GUIDE, BULGARIAN	GA092787		1	N	N
28.	VIVID E9 USER GUIDE, CROATIAN	GA092788		1	N	N
29.	VIVID E9 USER REFER. MANUAL	GA092789	REFERENCE MANUAL, ENGLISH	1	N	N

Table 9-58 Product Manuals for VIVID E9 (BT'11) (cont'd) sheet 2 of 2

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
30.	Remote Software Download and Installation manual	GB094004	English	1	N	N
SERVICE MANUALS						
1.	VIVID E9 UNPACKING/PACKING PROCEDURE, ENGLISH	GA050318		1	N	N
2.	VIVID E9 SERVICE MANUAL, ENGLISH	GA091568		1	N	N

9-22-4 Product manuals for BT'09

NOTE: The User manuals and the Service manual (PDF files) are located on the VIVID E9 Online Manual Multi language CD, Part Number: GA200635. Paper copies may be ordered from GE.

Table 9-59 Product Manuals for VIVID E9 (BT'09) sheet 1 of 2

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
1.	VIVID E9 UNPACKING/PACKING PROCEDURE, ENGLISH	GA050318		1	N	N
2.	VIVID E9 SERVICE MANUAL, ENGLISH	GA091568		1	N	N
3.	Printer Driver Installation Manual	GA294652		1	N	N
4.	VIVID E9 USER MANUAL, ENGLISH	GA092404		1	N	N
5.	VIVID E9 USER MANUAL, GERMAN	GA092405		1	N	N
6.	VIVID E9 USER MANUAL, FRENCH	GA092406		1	N	N
7.	VIVID E9 USER MANUAL, ITALIAN	GA092407		1	N	N
8.	VIVID E9 USER MANUAL, SPANISH	GA092408		1	N	N
9.	VIVID E9 USER MANUAL, PORTUGUESE	GA092409		1	N	N
10.	VIVID E9 USER MANUAL, JAPANESE	GA092410		1	N	N
11.	VIVID E9 USER MANUAL, CHINESE, SIMPLIFIED	GA092411		1	N	N
12.	VIVID E9 USER MANUAL, SWEDISH	GA092412		1	N	N
13.	VIVID E9 USER MANUAL, NORWEGIAN	GA092413		1	N	N
14.	VIVID E9 USER MANUAL, DANISH	GA092414		1	N	N
15.	VIVID E9 USER MANUAL, POLISH	GA092415		1	N	N
16.	VIVID E9 USER MANUAL, FINNISH	GA092416		1	N	N
17.	VIVID E9 USER MANUAL, GREEK	GA092417		1	N	N
18.	VIVID E9 USER MANUAL, RUSSIAN	GA092418		1	N	N
19.	VIVID E9 USER MANUAL, DUTCH	GA092419		1	N	N
20.	VIVID E9 USER MANUAL, HUNGARIAN	GA092420		1	N	N
21.	VIVID E9 USER MANUAL, SLOVAK	GA092421		1	N	N
22.	VIVID E9 USER MANUAL, ROMANIAN	GA092422		1	N	N
23.	VIVID E9 USER MANUAL, CZECH	GA092423		1	N	N
24.	VIVID E9 USER MANUAL, LATVIAN	GA092424		1	N	N
25.	VIVID E9 USER MANUAL, LITHUANIAN	GA092425		1	N	N
26.	VIVID E9 USER MANUAL, TURKISH	GA092426		1	N	N
27.	VIVID E9 USER MANUAL, ESTONIAN	GA092427		1	N	N
28.	VIVID E9 USER MANUAL, KOREAN	GA092428		1	N	N
29.	VIVID E9 USER MANUAL, SERBIAN	GA092615		1	N	N
30.	VIVID E9 USER MANUAL, BULGARIAN	GA092616		1	N	N

Table 9-59 Product Manuals for VIVID E9 (BT'09) (cont'd) sheet 2 of 2

ITEM	NAME	PART NUMBER	DESCRIPTION	QTY	CRU	FRU
31.	VIVID E9 USER REFER. MANUAL	GA092429	REFERENCE MANUAL, ENGLISH	1	N	N

9-22-5 Probes Documentation

9-22-5-1 6VT-D Probe Care Cards

Table 9-60 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

9-22-5-2 6T/6T-RS/6Tc/6Tc-RS/6Tv/9T/9T-RS Probe Care Cards

Table 9-61 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

9-22-5-3 TEE Probes User Manuals

Table 9-62 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

9-22-5-4 TEE Probe Accessories User Manual

Table 9-63 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

9-22-5-5 Intraoperative Probes User's Manuals

Table 9-64 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

Chapter 10

Care & maintenance

Section 10-1 Overview

10-1-1 Periodic maintenance inspections

It has been determined by engineering that your VIVID E9 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 and peripherals. These procedures are intended to **maintain the quality** of the VIVID E9'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	10-20
10-7	When there's too much leakage current	10-32

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.

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.

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. 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 should be serviced and outlines items requiring special attention.

NOTE: *It is the customer's responsibility to ensure the VIVID E9 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 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 for an average patient load (10-12 per day) and not use it as a primary mobile unit 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
Endocavity 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
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, please refer to:
[8-2-5 "Tools needed for servicing VIVID E9" on page 8-4.](#)

Section 10-5 System maintenance

10-5-1 Preliminary checks

The preliminary checks take about 15 minutes to perform.

Refer to the VIVID E9 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">• Turn the VIVID E9 power on and verify that all fans and peripherals turn on.• Watch the displays during power up to verify that no warning or error messages are displayed.
3.	Probes	Verify that the VIVID E9 properly recognizes all probes.
4.	Displays	Verify proper display on the monitor and touch panel.
5.	Presets	Backup all Customer Presets to 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 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 if available). Check the basic system controls that affect this mode of operation.
4.	M-Mode	Verify basic M-Mode operation. Check the basic 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: 10-5-2-2 "Peripheral/option checks" on page 10-8.

10-5-2-2 Peripheral/option checks

If any peripherals or options are not part of the VIVID E9 configuration, the check can be omitted.

Refer to the User Manual for a list of approved peripherals/options.

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.	ECG	Verify basic operation with customer
6.	Footswitch	Verify that the footswitch is functioning as programmed. Clean as necessary.

10-5-3 Input Power

10-5-3-1 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.
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.

10-5-4 Physical inspection


Table 10-6 Physical Checks

Step	Item	Description
1.	Labeling	Verify that all VIVID E9 labeling is present and in readable condition. .
2.	Scratches & Dents	Inspect the console for dents, scratches or cracks.
3.	Covers	Where applicable, 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: 10-5-3-1 "Mains cable inspection" on page 10-8.
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"> • Check all wheels and casters for wear and verify operation of foot brake, to stop the VIVID E9 from moving, and release mechanism. • Check all wheel locks and wheel swivel locks for proper operation.
7.	Op Panel	Inspect keyboard and control panel. Record any damaged or missing items.
8.	Probe Holders	Inspect the Probe Holders for cracks or damage.
9.	Op Panel Movement	<ul style="list-style-type: none"> • Verify ease of Operator Panel (Operator Control Panel) movement in all acceptable directions. • Ensure that it latches in position as required.
10.	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"> • swivelling the screen to the left and to the right • folding the screen to the locked position • release and adjustment backwards and forwards • can be adjusted in the up/down positions.
12.	Monitor Light	Check for proper operation of any monitor lighting, if available.
13.	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.
14.	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.
15.	Power and System Status Indicators	Check for proper operation of all Power and System Status Indicators.

10-5-5 Cleaning

10-5-5-1 General cleaning

Frequent and diligent cleaning of the VIVID E9 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 [Table 10-7 "VIVID E9 System - General Cleaning" on page 10-10](#).
- Do not use any solutions or products not listed in the VIVID E9 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 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 cabinet, or in the probe connection receptacle.
- Prior to cleaning, turn OFF power to the VIVID E9 and disconnect the mains cable.

Table 10-7 VIVID E9 System - General Cleaning sheet 1 of 3

Step	Item	Description
1.	LCD Cabinet	<ul style="list-style-type: none"> • On a weekly basis, moisten a soft, non-abrasive folded cloth or sponge with a mild, general purpose, non-abrasive soap and water solution. Do not use any solution containing abrasive powder or strong chemicals such as, acid or alkaline. • Squeeze excess liquid from the cloth/sponge, then wipe down the top, front, back and both sides of the unit. Do not spray any liquid directly onto the unit! • Rinse the cloth/sponge with clean running water and wipe the unit surfaces again. • Use a dry, soft, lint-free cloth to dry the unit surfaces. Wait for the unit surfaces to dry completely. • In the event that any stubborn stains remain, remove them with a soft, dust-free cloth on which a small quantity of isopropyl rubbing alcohol has been absorbed, as described below for cleaning the Keyboard.
2.	LCD Display and Touch screen	<ul style="list-style-type: none"> • On a weekly basis, gently wipe the LCD Display with a dry, soft, lint-free non-abrasive folded cloth such as cotton, or use lens paper. • Wipe or dust the screen gently with a soft, dry cloth. If the stain remains, moisten a soft, lint-free cloth with water or a 50-50 mixture of isopropyl alcohol and water that does not contain impurities. Wring out as much of the liquid as possible then wipe the LCD Display again. Do not let any liquid drip into the computer!

Table 10-7 VIVID E9 System - General Cleaning (cont'd) sheet 2 of 3

Step	Item	Description
3.	Control Panel	<p>Clean the Control Panel on a weekly basis.</p> <p>ONLY use the following cleaners on the VIVID E9 Operator Panel:</p> <ul style="list-style-type: none"> • Palmolive Dishwashing Liquid (manufactured by Colgate-Palmolive) • Sani Wipes Alcohol-free (manufactured by Micorgen Inc.) • T-Spray II (manufactured by Pharmaceutical Innovations, Inc.) <p>To clean the operator control panel:</p> <ul style="list-style-type: none"> • Turn off the power to the VIVID E9. • Moisten a soft, non-abrasive folded cloth or sponge with a mild, general purpose, non-abrasive soap and water solution or general purpose disinfectant. • Do not use any solution containing abrasive powder or strong chemicals such as, acid or alkaline. • Squeeze excess liquid from the cloth/sponge. • Gently wipe the surface of the Control Panel. • Use a cotton swab to clean around keys or controls. • Use a toothpick to remove solids from between keys and controls. • Rinse the cloth/sponge with clean running water and wipe the Control Panel again. • Use a dry, soft, lint-free cloth to dry the Control Panel. Wait for the Control Panel surface to dry completely.
4.	Keyboard	<ul style="list-style-type: none"> • Clean the keyboard as described (above) for cleaning the Control Panel. <p><i>NOTE: In the event that disinfection is required or any stubborn stains remain, absorb a small quantity of isopropyl rubbing alcohol on a soft, dust-free cloth.</i></p> <ul style="list-style-type: none"> • Wipe the surface of the keycaps with the cloth, making sure that no liquid drips on or between the keys. • Allow to dry.
5.	Trackball	<ul style="list-style-type: none"> • For cleaning instructions, ref chapter 4.
6.	Probe Holders	<p>Clean the probe holders with warm water and a damp cloth to remove all traces of gel.</p> <p>(Soaking may be required to remove excess gel).</p>
7.	System Cabinet	<p>On a weekly basis, moisten a soft, non-abrasive folded cloth or sponge with a mild, general purpose, non-abrasive soap and water solution.</p> <p>Do not use any solution containing abrasive powder or strong chemicals such as acid or alkaline.</p> <p>Squeeze excess liquid from the cloth/sponge, then wipe down the top, front, back and both sides of the unit.</p> <p>Do not spray any liquid directly onto the unit!</p> <ul style="list-style-type: none"> • Rinse the cloth/sponge with clean running water and wipe the unit surfaces again. • Use a dry, soft, lint-free cloth to dry the unit surfaces. • Wait for the unit surfaces to dry completely. <p><i>NOTE! In the event that disinfection is required or any stubborn stains remain, remove them with a soft, dust-free cloth on which a small quantity of isopropyl rubbing alcohol has been absorbed, as described above for cleaning the Keyboard.</i></p>
8.	DVD - CDRW Drive	<ul style="list-style-type: none"> • Clean the drive head and media with the vendor-supplied cleaning kit. • Advise the user to repeat this often, to prevent future problems. • CDs must be stored away from dust and cigarette smoke. Do not use alcohol or benzene to clean the CD drive.
9.	Peripherals	<p>Clean the peripherals in accordance with the respective manufacturer's directions.</p>
10.	Air Filters	<p>Clean the unit's air filters to ensure that a clogged filter does not cause the unit to overheat and reduce system performance and reliability.</p> <p>A message is displayed on screen on a regular basis to remind the user about the need to clean the filters.</p> <p>Please refer to: 10-5-5-2 "Air Filter cleaning" on page 10-13 for instructions.</p>

Table 10-7 VIVID E9 System - General Cleaning (cont'd) sheet 3 of 3

Step	Item	Description
11.	TEE Probes	<p>To clean the handle:</p> <ul style="list-style-type: none"> - Use a cloth or towel only lightly moistened with cleaner/ disinfectant (as recommended in TEE Probe Care Card). - Avoid too much moisture on the cloth/ towel. - To remove residual chemicals wipe the handle with a cloth or towel lightly moistened with clean water. - Dry with clean cloth or towel. <p>To clean the cable:</p> <ul style="list-style-type: none"> - Use a cloth or towel only lightly moistened with cleaner/ disinfectant (as recommended in TEE Probe Care Card). - Avoid too much moisture on the cloth/ towel as this may cause cleaning fluids to flow along the cable and into the connector/ handle. - Always clean the cable from the connector towards the middle of the cable. - Hold the connector higher than the cable to avoid that cleaning fluids flows along the cable and into the connector. - Use the same technique when cleaning the cable from the handle side. - To remove residual chemicals follow the same prosedure as above but use a cloth or towel lightly moistened with clean water. - Wipe off moisture with a cloth or towel and place the probe in a TEE Storage Rack and let it dry for 30 min.

10-5-5-2 Air Filter cleaning



CAUTION Be sure to lock the wheels before cleaning the air filters to avoid injury by any unexpected movement of the VIVID E9.

DO NOT operate the unit without the air filters in place.

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 8-190](#)
or
- [8-8-3 "Rear Air Filter replacement" on page 8-194](#)
- [8-8-4 "Bottom “nylon strip” Air Filter replacement" on page 8-196](#)

10-5-6 Probe maintenance

10-5-6-1 Probe related checks

Table 10-8 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 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 properly recognizes all probes.

10-5-6-2 Basic probe care

The VIVID E9 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 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.

10-5-6-3 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.

10-5-6-4 Cleaning probes

Follow these steps to clean the probes:

- 1.) Disconnect the probe from the unit.
- 2.) Remove the coupling gel by wiping the probe lens with a soft cloth.
- 3.) Wipe the probe and cable with a soft cloth moisten in a warm soap and water solution (<80 °F / 27 °C).
- 4.) Wipe the probe and cable with a soft cloth moisten in clean water (<80 °F / 27 °C) until all soap is removed.
- 5.) Wipe dry with a soft towel.

10-5-6-5 Cleaning TEE probes

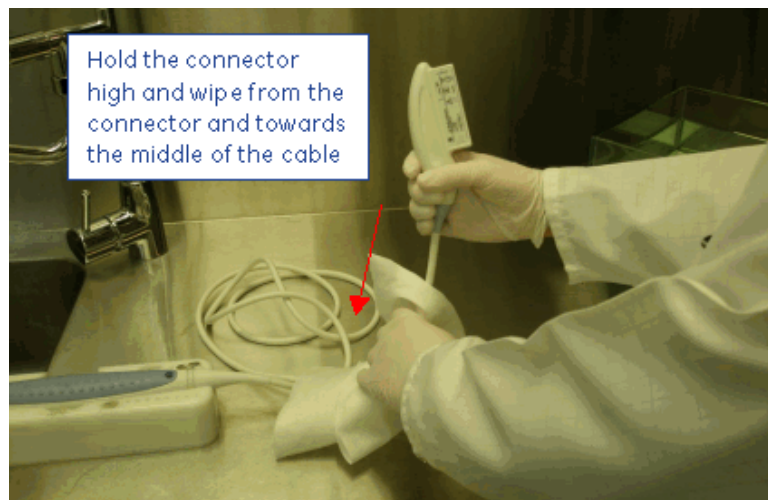
To clean the handle:

- Use a cloth or towel only lightly moistened with cleaner/ disinfectant (as recommended in TEE Probe Care Card).
Avoid too much moisture on the cloth/ towel.
- To remove residual chemicals wipe the handle with a cloth or towel lightly moistened with clean water.
- Dry with clean cloth or towel.

To clean the cable:

- Use a cloth or towel only lightly moistened with cleaner/ disinfectant (as recommended in TEE Probe Care Card).
- Avoid too much moisture on the cloth/ towel as this may cause cleaning fluids to flow along the cable and into the connector/ handle.
- Always clean the cable from the connector towards the middle of the cable.
- Hold the connector higher than the cable to avoid that cleaning fluids flows along the cable and into the connector.
- Use the same technique when cleaning the cable from the handle side.
- To remove residual chemicals follow the same prosedure as above but use a cloth or towel lightly moistened with clean water.
- Wipe off moisture with a cloth or towel and place the probe in a TEE Storage Rack and let it dry for 30 min.

Figure 10-1 Cleaning cable



10-5-6-5 Cleaning TEE probes (cont'd)

To clean the connector:

In normal TEE Probe use, the cleaning of the connector should be unnecessary. If cleaning is absolutely necessary:

- 1.) Use a cloth or towel with only the smallest amount of cleaner/ disinfectant to wipe the connector.
- 2.) Avoid the connector pin area.
- 3.) Wipe off residual chemicals with a cloth or towel lightly moistened with clean water.
- 4.) Dry with clean cloth or towel.
- 5.) To remove residual chemicals follow the same procedure as above, but use a cloth or towel lightly moistened with clean water.
- 6.) Wipe off moisture with a cloth or towel and place the probe in a TEE Storage Rack and let it dry for 30 min.

10-5-6-6 Disinfecting probes

In order to provide users with options in choosing a germicide, GE Healthcare routinely reviews new medical germicides for compatibility with the materials used in the transducer housing, cable and lens. Although a necessary step in protecting patients and employees from disease transmission, liquid chemical germicides must also be selected to minimize potential damage to the transducer.

Refer to the **Probe Care Card** enclosed in the probe case, or to:
http://www.gehealthcare.com/user/ultrasound/products/probe_care.html
for the latest list of compatible cleaning solutions and disinfectants.

The probe should not be exposed to the germicide longer than specified to achieve the desired effect.

Do NOT soak or saturate probes with solutions containing alcohol, bleach, ammonium chloride compounds. In addition TE probes **must not** be immersed in solutions containing hydrogen peroxide.

Low-level disinfection

- After cleaning, the probe and cable may be wiped with a tissue sprayed with a recommended disinfectant.


Use additional precautions (e.g. gloves and gown) when decontaminating an infected probe.

High-level disinfection

High-level Disinfection destroys vegetative bacteria; lipid & non-lipid viruses, fungi and, depending highly on time of contact, is effective on bacterial spores. This is required for endocavity (TV, TR, TE) probes after contact with mucosal membrane.

- 1.) Prepare the germicide solution according to the manufacturer's instructions.

NOTE: Follow the manufacturer's instructions for storage, use and disposal of the disinfection solution.

 **WARNING** **USE ONLY GERMICIDES THAT ARE LISTED IN THE PROBE CARE CARD ENCLOSED WITH THE PROBE. IN ADDITION, REFER TO THE LOCAL / NATIONAL REGULATIONS. DO NOT STEAM AUTOCLAVE OR SUBJECT THE PROBE TO ETHYLENE OXIDE (ETO).**

- 2.) Place the cleaned dried probe in contact with the germicide for the time duration specified by the manufacturer.

 **WARNING** **DO NOT IMMERSE THE PROBE IN LIQUID BEYOND THE LEVEL SPECIFIED FOR THAT PROBE.**

NEVER IMMERSE THE PROBE CONNECTOR OR PROBE ADAPTERS IN LIQUID.

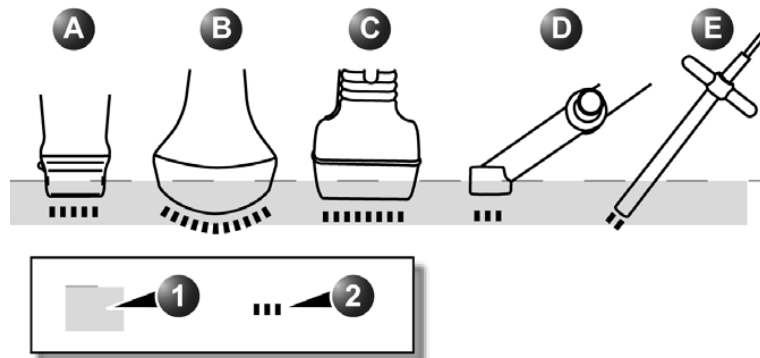
THE PROBE SHOULD NOT BE EXPOSED TO THE GERMICIDE LONGER THAN SPECIFIED TO ACHIEVE THE DESIRED EFFECT.

DO NOT SOAK OR SATURATE PROBES WITH SOLUTIONS CONTAINING ALCOHOL, BLEACH, AMMONIUM CHLORIDE COMPOUNDS OR HYDROGEN PEROXIDE.

10-5-6-6 Disinfecting probes (cont'd)

Figure 10-2 Probe immersion levels

- A. 3V-D, 4V-D, M5S-D, 6S-, 12S-D
B. 4C-D
C. 9L-D, 11L-D, ML6-15-D
D. 2D (P2D)
E. 6D (P6D)
1. Fluid level
2. Contact face with patient environment



NOTE: For the 13L probe, please refer to the User's Manual for Intraoperative Probes, Direction Number: KX192055.

- 3.) Rinse the part of the probe which was in contact with the germicide according to the germicide manufacturer's instructions.
- 4.) Wipe dry with a soft towel or air dry the probe.



WARNING CREUTZFELD-JAKOB DISEASE

NEUROLOGICAL USE ON PATIENTS WITH THIS DISEASE MUST BE AVOIDED. IF A PROBE BECOMES CONTAMINATED, THERE IS NO ADEQUATE DISINFECTING MEANS.

Section 10-6 Electrical Safety Tests



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



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.
 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.



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.

Prior to initiating any electrical test, the VIVID E9 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 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.



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.
 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 10-9 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 CF Applied Parts (sink leakage)	On and Off	Closed	0.05



Table 10-10 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)	Open	0.5
Type CF Applied Parts	On (transmit)	Open	0.05
Type CF Applied Parts (sink leakage)	On and Off	Closed	0.05

* **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:

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 Outlet Test - Wiring Arrangement - USA & Canada

Test all outlets in the area for proper grounding and wiring arrangement by plugging in the neon outlet tester and noting the combination of lights that are illuminated. Any problems found should be reported to the hospital immediately and the receptacle should not be used.

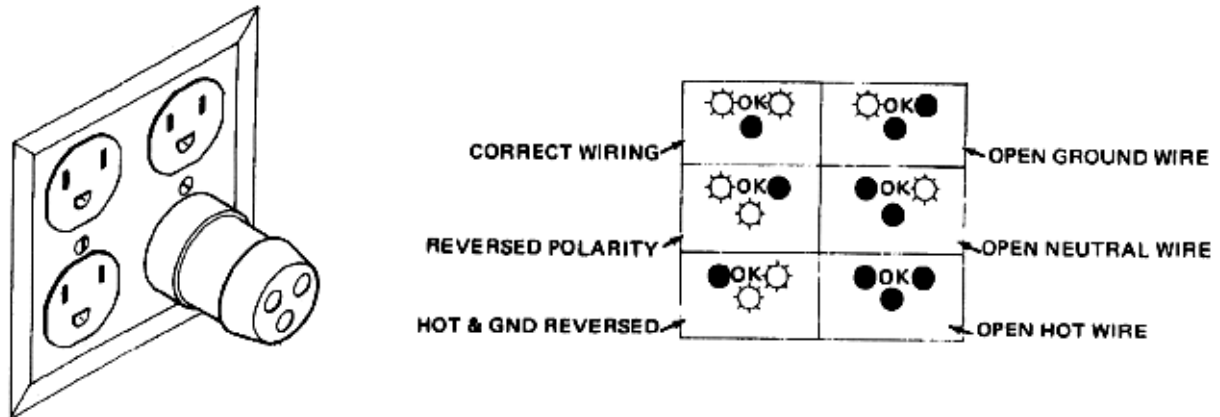


Figure 10-3 Typical Alternate Outlet Tester

NOTE: No outlet tester can detect the condition where the Neutral (grounded supply) conductor and the Grounding (protective earth) conductor 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.

10-6-4 Grounding Continuity

CAUTION 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.

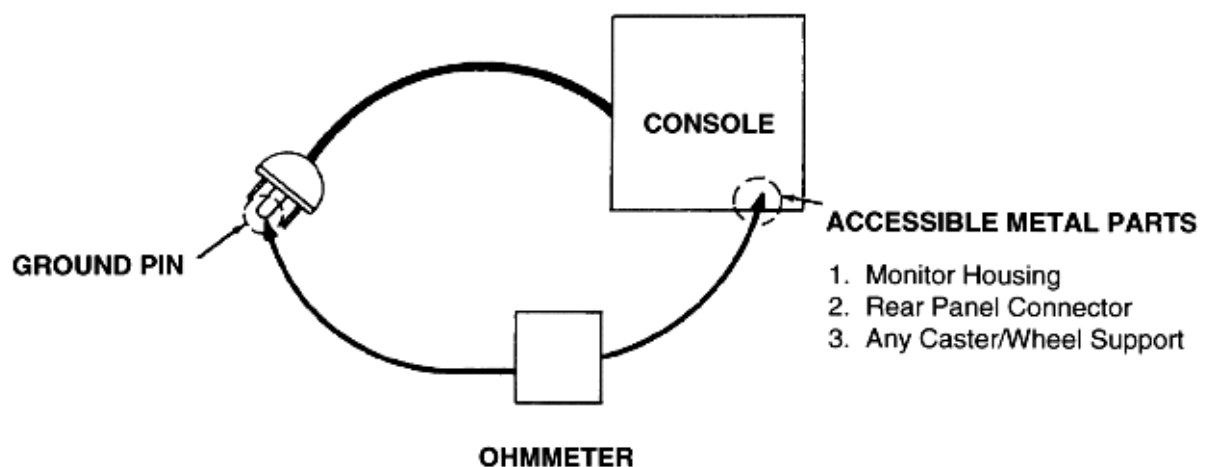


Figure 10-4 Ground Continuity Test

10-6-5 Chassis Leakage Current Test



CAUTION Electric Shock Hazard. When the meter's ground switch is OPEN, don't touch the VIVID E9!



CAUTION Equipment damage possibility. Never switch the Polarity and the status of Neutral when the VIVID E9 is powered ON. Be sure to turn the VIVID E9 power OFF before switching them using the POLARITY switch and/or the NEUTRAL switch. Otherwise, the VIVID E9 may be damaged.

10-6-5-1 Definition

This 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 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 10-9 on page 10-22](#),
or:
- [Table 10-10 on page 10-22](#),
as applicable.

Record the highest reading.

10-6-5-2 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 10-9 on page 10-22](#),
or:
- [Table 10-10 on page 10-22](#),
as applicable.


Record the highest reading of current.

When using the Microguard or a similar test instrument, its power plug may be inserted into the wall outlet and the equipment under test is plugged into the receptacle on the panel of the meter. This places the meter in the grounding conductor and the current flowing from the case to ground will be indicated in any of the current ranges.

The maximum allowable limit for chassis source leakage is shown in:

- [Table 10-9 on page 10-22](#), or
- [Table 10-10 on page 10-22](#),
as Chassis/Enclosure Leakage.

10-6-6 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.

10-6-6-1 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 10-9 on page 10-22](#),
or:
- [Table 10-10 on page 10-22](#),
as applicable.

For each combination the operating controls, such as the lead switch, should be operated to find the worst case condition.

10-6-6-2 Generic Procedure

Measurements should be made under the test conditions specified in:

- [Table 10-9 on page 10-22](#),
or:
- [Table 10-10 on page 10-22](#),
as applicable.

For each combination, the operating controls such as the lead switch should be operated to find the worst case condition.

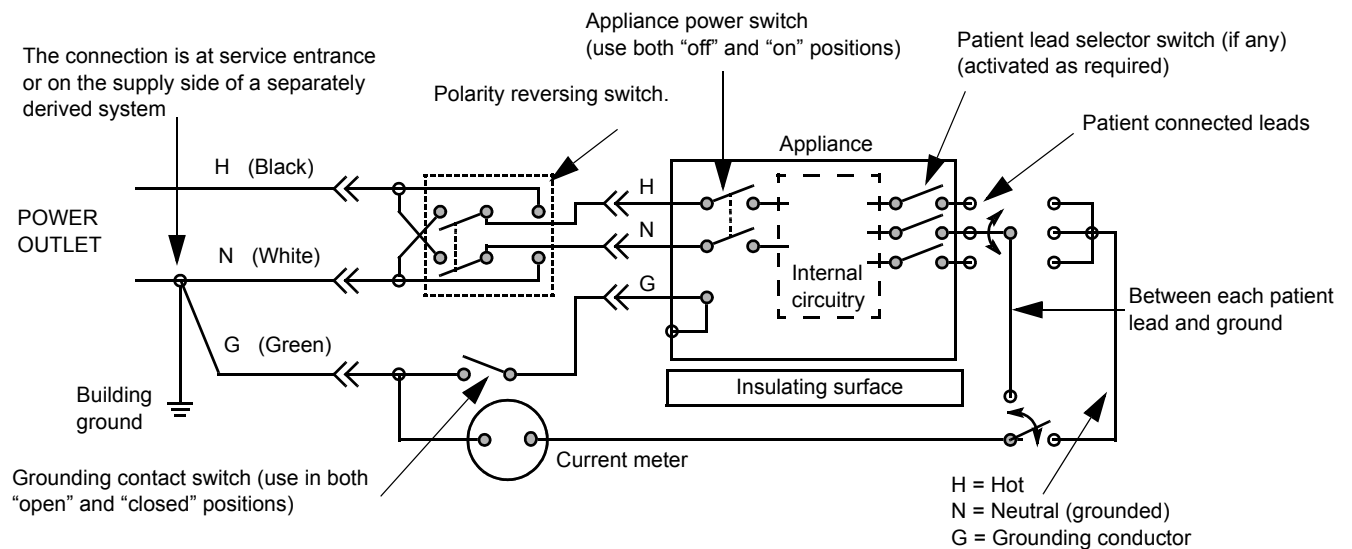


Figure 10-5 Test Circuit for Measuring Patient Lead Leakage

10-6-7 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 10-9 on page 10-22](#),
or:
- [Table 10-10 on page 10-22](#),
as applicable.

Record the highest leakage current measured.

10-6-8 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.

10-6-8-1 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.

10-6-8-2 Generic procedure on probe leakage current

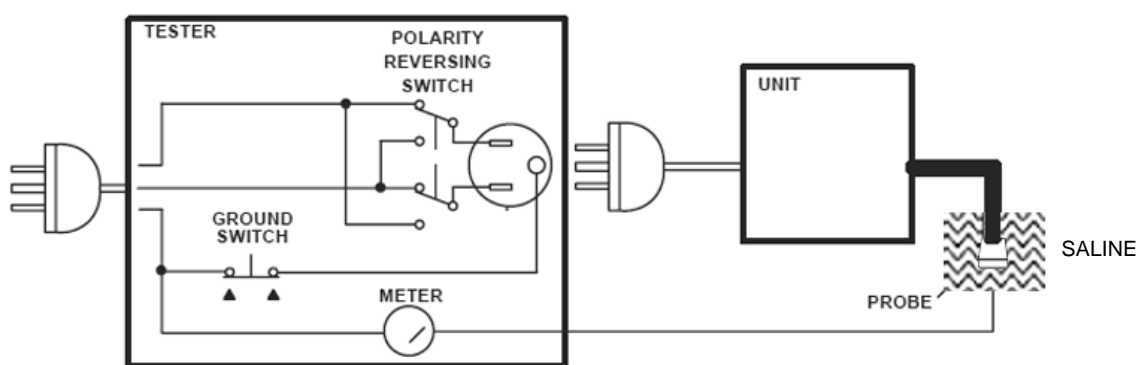
The most common method of measuring probe leakage is to partly immerse the probe into a saline bath while the probe is connected to the ultrasound system and active. This method measures the actual leakage current resulting from the transducer RF drive.

Measurements should be made under the test conditions specified in:

- [Table 10-9 on page 10-22](#),
or:
- [Table 10-10 on page 10-22](#),
as applicable.

For each combination, the probe must be active to find the worst case condition.

Figure 10-6 Set Up for Probe Leakage Current




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.

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: The Saline solution is a mixture of water and salt. The salt adds free ions to the water, making it conductive. Normal saline solution is 0.9% salt and 99.1% water. If ready-mixed saline solution is not available, a mixture of 1 quart or 1 liter water with 9 or more grams of table salt, mixed thoroughly, will substitute.

 **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.**

10-6-8-2 Generic procedure on probe leakage current (cont'd)

Follow these steps to test each probe for leakage current:

- 1.) Turn the VIVID E9 unit OFF.
- 2.) Plug the unit's mains power cord into the test meter, and plug the test meter into the tested AC wall outlet.
- 3.) Plug the Chassis Ground Probe (saline probe) into the test meter's "CHASSIS" connector.
- 4.) Connect the ultrasound probe to be tested to the VIVID E9 unit.
- 5.) Put the saline probe and the ultrasound probe's probe face (imaging area of the probe) into the saline bath.



CAUTION 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 the ISO TEST switch is depressed.

- 6.) Power ON the VIVID E9 unit.
- 7.) After the VIVID E9 unit has completed the boot process, select the probe to be tested so it is the active probe.
- 8.) Depress the LIFT GROUND rocker switch and record the highest current reading.
- 9.) Follow the test conditions and test limits described in:
 - [Table 10-9 on page 10-22](#),
 - or:
 - [Table 10-10 on page 10-22](#),
 - as applicable for every probe.

The test passes when all readings measure less than the stated limits.



CAUTION Equipment damage possibility. Never switch the Polarity or the status of the Neutral when the Ultrasound unit is powered on.

Power off the Ultrasound unit, 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.

Measurements should be recorded for each probe under the set of test conditions specified in:

- [Table 10-9 on page 10-22](#),
- or:
- [Table 10-10 on page 10-22](#),
- as applicable.

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.

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 and if situation can not be corrected, submit a Safety Failure Report to document the VIVID E9 problem. Remove the VIVID E9 from operation.

10-7-6 ECG Fails

Inspect cables for damage or poor connections

INDEX

Numerics

2D mode 5-15
 controls 4-38
47CFR Part 18 1-34
4D imaging 5-16

A

abbreviations
 list of abbreviations 9-3
about
 firmware version 4-26
 HW version 4-26
 probes 4-26
 software version 4-26
 system version 4-26
acclimate time 3-2
 if system is very cold or hot 2-2
acoustic noise level 3-20
adjust
 position of top console 4-11
 timeout for DICOM servers 6-17
admin
 backup 4-27
 disk management 4-27
 restore 4-28
 system admin 4-29
 users 4-28
air filter
 cleaning 10-13
air flow
 components 5-25
 control 5-25
 software control 5-25
air pressure limits 2-2
alphanumeric keyboard configuration 3-33
Alt+B 7-4
Alt+D 7-4, 7-15
Alt+E 7-4
Alt+Q 7-4
Alt+S 7-4
ARFS
 automatic request for service 5-7
audio
 is missing 7-7
automatic request for service
 ARFS 5-7
average setup time 3-2

B

back end processor
 bi-directional signals 5-65
 block diagram 5-54
 cables 9-79
 description 5-52, 5-55
 expansion slots on motherboard 5-62
 fan
 replacement 8-276
 front module replacement 8-273
 front panel 5-55
 input DC voltages 5-63
 input signals 5-64
 issue 7-6
 CD/DVD
 drive failures 7-6
 image CD/DVD not read 7-6
 location 5-53
 motherboard expansion slots 5-62
 parts replacement 8-244
 power supply replacement 8-251
 replacement 8-244
 signal flow and processing 5-52
 spare parts 9-60
 theory 5-52
 top and side connections 5-58
Back, Front, Left, and Right
 definition 9-2
backlight adjustment 6-5
backlight and blue tint
 adjustment 6-6
backplane
 description 5-50
backup
 patient archive and system configurations 8-10
beep codes 5-62
BEP
 bi-directional signals 5-65
 block diagram 5-54
 description 5-52, 5-55
 expansion slots on motherboard 5-62
 fan
 replacement 8-276
 front module replacement 8-273
 front panel 5-55
 I/O board 5-74, 5-94
 block diagram 5-92, 5-94
 input DC voltages 5-63
 input signals 5-64
 internal storage devices 5-76
 LEDs

- on the BEP front 5-66
- on the BEP's face 5-67, 5-68
- location 5-53
- outputs 5-65
- power supply 5-69
 - block diagram 5-70
- replacement 8-244
- reset from hang 7-2
- signal flow and processing 5-52
- spare parts 9-60
- theory 5-52
- top and side connections 5-58
- BEP5 5-52
- BEP6 5-52
- BEPY3 5-52
- BIOS
 - beep codes 5-62
- black & white digital graphic printer 5-96
 - replacement 8-312
- block diagram 5-13
 - Vivid E9 5-10
- bookmark 7-4
- boot up 4-4
- bottom air filter replacement 8-196
- brake pedal replacement 8-216
- brakes check 4-51
- brightness adjustments on monitor 6-2
- bulkhead cover replacement 8-70
- bulkhead, plate, extended
 - replacement 8-160
- bumpers
 - replacement 8-38
- button IF board assembly replacement 8-172
- buttons frame UI assy replacement 8-170

C

- cable harness 9-72
- cable hooks replacement 8-56
- cables
 - back end processor 9-79
 - card rack 9-78
 - ECG 9-91
 - front end processor 9-78
 - internal 9-72
 - main power supply 9-77
 - mains power 9-71
 - peripherals 9-89
 - top console 9-74
 - XYZ controller 9-76
- calibration
 - touch screen 6-10
- capture
 - a screen image 7-12

- card rack
 - spare parts 9-56
- care and maintenance 10-1
- casters
 - and brakes
 - description 5-26
 - replacement 8-208
 - checks 4-51
 - control 4-17
 - spare parts 9-54
- CD/DVD
 - drive failures 7-6
- center speaker (woofer)
 - replacement 8-205
- certified electrical contractor statement (for USA Only) -x
- change
 - AE Title 3-43
 - port number (Port No.) 3-43
- chassis leakage current test 10-25
- checks
 - preliminary checks 10-6
- cital system information 7-10
- cleaning 10-10
 - trackball
 - from the outsides 4-31
 - remove OP to get access 4-32
- cold
 - if unit is very cold 2-2
- collect
 - trouble image with logs 7-11
 - vital system information 7-10
- Color Doppler mode 5-15
- Color Flow mode 5-15
- Color M mode 4-41
- color mode
 - checks 4-40
 - overview 4-42
- color printer 3-36
 - external (option) 5-97
- color video printer
 - installation 3-49
 - replacement 8-314
- column cover assembly replacement 8-62
- common service desktop interface 5-100
- compatibility 3-41
 - hardware/software compatibility 9-4
- complete power down 4-9
- completing the setup 3-20
- compliance 1-34
- components and functions 5-1
- configuration 3-27
- connect
 - AC (mains) power 4-5
 - Ethernet 3-22

- heart microphone (phono) 3-23
- phono 3-23
- probes 3-24
- pulse pressure transducer 3-23
- USB flash card 3-22
- connected (InSite) 5-8
- connection
 - between scanner and DICOM server on a network 3-40
 - between ultrasound scanner and EchoPAC PC 3-40
- connections
 - on the external IO 3-22
 - on the Patient I/O panel 3-23
- connectivity
 - additional outputs 4-21
 - dataflow 4-20
 - formats 4-22
 - overview 3-40
 - recording the TCP/IP settings 4-23
 - setup 3-41
 - tools 4-22
- console
 - environmental requirements 2-2
 - general requirements 2-2
- contact
 - GE 5-100
- contact information 1-35
- contents
 - in this service manual 1-2
- control panel
 - see 'operator panel' 5-21
- control panel (Operator Panel) 5-21
- conventions 1-6
 - used in this manual 1-6
- cooling 2-3
- copyrights -xi
- covers
 - replacement 8-38
- covers under XY motors replacement 8-67
- Ctrl+PrintScreen 7-4, 7-12
- customer
 - provided prerequisite 8-9
- customer assistance 1-35
 - phone numbers 1-35

D

- damage in transportation -x, 3-6
- dangerous procedure warnings 1-32
- data management
 - moving all images 8-10
- date and time adjustments 3-28
- DC Offset calibration 6-11
- definitions of Left, Right, Front and Back 8-5

- department name 3-27
- depth of ultrasound scanner 3-20
- description 5-9
- DHCP setup 3-44
- diagnostics/troubleshooting 7-1
- DICOM
 - adjust timeout for DICOM servers 6-17
 - DICOM option preparations requirements 2-12
 - job spooler 7-4
 - worksheet for DICOM network information 2-13
- Digital Receiver board 5-44
- digital receiver board
 - replacement 8-239
- digital video recorder
 - checks 4-49
- DVR
 - setup 3-35
 - select offline mode 3-35
- digital video recorder (DVR) 5-96
- digital video stream recorder
 - replacement 8-305
 - spare parts 9-69
- direction lock
 - check 4-51
- disconnect probe 3-25
- disruptive
 - access via InSite 5-8
- door, IO panel replacement 8-54
- DOT
 - US Department of Transportation 1-33
- down/up
 - release handle 4-13
- drive gear assembly replacement 8-185
- DRX
 - troubleshooting hints 5-46
- DVD drive 5-96
 - replacement 8-303
 - spare parts 9-66
- DVR
 - checks 4-49
 - spare parts 9-69

E

- ECG cables 9-91
- eject device 7-4
- electrical
 - requirements 2-4
 - safety 1-15
 - safety tests 10-20
 - specifications 3-21
- electrical contractor statement (for USA Only) -x
- electrical tests
 - grounding continuity 10-24

electromagnetic compatibility (EMC) 1-34
electronics description 5-12
electrostatic discharge (ESD)
 prevention 1-34
EMC
 electromagnetic compatibility 1-34
EMI 1-34
 limitations 2-7
 prevention/abatement 7-22
 different location 7-23
 different power outlet 7-22
 different system 7-22
 disconnect external cables 7-23
 protection 3-19
encoder board replacement 8-130
enter location 3-27
environmental requirements
 probes 2-8
equipment required for functional checks 4-2
error
 high system temperature error 7-2
errors
 omissions and errors -x
ESD
 electrostatic discharge 1-34
Ethernet 5-98
 connection 3-22
examine all packages 3-5
exit
 from InSite ExC 5-8
external color printer (option) 5-97
external data storage 3-36
external I/O
 connections 3-22
external peripherals 3-36, 3-37
 description 5-97
 footswitch 3-36

F

facility needs 2-9
fan
 fan assembly replacement 8-198
FAQ
 Frequently Asked Questions 7-2
FEP
 Front End Processor 5-27
 front end processor
 spare parts 9-56
filter
 bottom
 cleaning 8-197
 cleaning 10-13
 rear filter cover replacement 8-51

foot rest bumper replacement 8-45
footswitch 3-36, 5-97
forced power downpower
 forced power down 5-87
frame UI upper
 replacement 8-119
Frequently Asked Questions 7-2
front casters replacement 8-211
front cover replacement 8-47
Front End
 interface board (GFI) 5-47
front end
 alignment 6-11
 when to do? 6-11
 alignment, when to do 6-11
 card rack 5-27
 cover replacement 8-221
 description 5-27
 front end processor cables 9-78
 front end processor cards
 overview 5-27
 front end processor parts replacement 8-218
 parts overview 8-219
 processor 5-27
front module replacement 8-273
front plane
 description 5-43
 replacement 8-224
Front, Back, Left and Right
 definition 9-2
functional checks 10-7
 2D mode (B mode) checks 4-37
 and general procedures 4-1
 back end processor checks 4-47
 cineloop check 4-46
 color mode checks 4-40
 Doppler mode checks 4-42
 ECG check 4-45
 M mode checks 4-39
 preparation 4-37
 probes/connectors check 4-44
 tissue velocity imaging (TVI) checks 4-43

G

gather troubleshooting data 7-10
general
 cleaning 10-10
 procedures 4-3
 recommendations 7-21
general procedures
 and functional checks 4-1
GFI board replacement 8-241
Global Service User Interface (GSUI) 5-101

graphics adapter 5-76
 replacement 8-262
grounding continuity 10-24
GSUI

 Global Service User Interface 5-101
GTX board
 description 5-32

H

handle, left top / handle right top, replacement 8-164
hard disk drive replacement 8-256
hardware/software compatibility 9-4
hazard icons 1-7
HDD
 replacement 8-256
heat dissipation 2-2
height of ultrasound scanner 3-20
high system temperature error 7-2
high voltage inverter board with cable
 replacement 8-116
hospital and department name 3-27
hot
 if unit is very hot 2-2
how often should maintenance be performed? 10-3
human safety 1-11
humidity limits 2-2

I

I/O assembly replacement 8-298
I/O modules
 spare parts 9-65
icons 1-6
 product icons 1-8
 standard hazard icons 1-7
IEC60601-1-2
 2001 1-34
if unit is very cold or hot 2-2
iLinq 5-100
 interactive platform features 5-100
image artifacts
 caused by front end boards 7-5
image CD/DVD not read 7-6
image data loss 7-7
important conventions 1-6
important precautions
 language policy -i
initiate a request for service (RFS) 5-6
input and output (I/O) modules
 description 5-88
InSite ExC
 definitions 5-8
 description 5-4

 icon 5-4, 6-11
 menu 5-4
 requirements 2-12
 status 5-5
installation 3-1
 color video printer 3-49
 warnings 3-2
intermittent problems 7-6
 back end processor
 issue
 system halt errors 7-6
internal cables 9-72
internal peripherals 3-36, 5-96
introduction to this manual 1-1
IO board 5-74

J

J-rail assembly replacement 8-153

K

keeping records 10-2
 periodic maintenance 10-2
knobs for encoders and slidepots replacement 8-122

L

label
 at AC mains inlet and circuit breaker 1-20
 disassembly nester 1-31
 labels locations 1-16
 labels on the BEP 1-30
 on AC power supply (main power supply) 1-20
 on external I/O 1-19
 on front of LCD monitor 1-16
 on rear cover 1-21
 detailed descriptions 1-26
 on rear of LCD monitor 1-16
 on Upper OP panel 1-17
labels
 near connectors on front 1-18
 on DVD units 1-19
 on top of console 1-17
language
 select online manual language 3-30
 select user interface language 3-29
language policy -i
LCD
 brightness and contrast
 adjustment 6-6
LCD monitor position adjustment 4-14
leakage current
 limits 10-22

- leakage current
 - too much! 10-32
 - LEDs
 - on the DRX board
 - The GDIF status display 5-46
 - The Nathan field 5-45
 - on the GFI board 5-49
 - on the GRX board 5-42
 - on the GTX board 5-36, 5-37
 - on the rear panel 5-75
 - on the Relay Board 5-40
 - Left, Right, Front and Back
 - definition 9-2
 - legal notes -xi
 - lighting 2-3
 - list of abbreviations 9-3
 - list of effected pages
 - (revision) -xii
 - load or reload software
 - when to... 8-12
 - loading
 - application software 8-23
 - software patches 8-37
 - system software 8-17
 - location
 - enter location 3-27
 - lock
 - the LCD monitor 4-14
 - the top console 4-11
 - lock ups 7-6
 - lockout/tagout (LOTO) 1-33
 - log
 - site log 4-52
 - Logoff 4-8
 - logon as 'adm' 3-32, 4-15
 - logs
 - add bookmark 7-4
 - LOTO
 - lockout/tagout 1-33
 - lower bezel replacement 8-135
 - lower frame assembly replacement 8-138
 - lower switch board with elastomer replacement 8-132
 - lower/raise the top console 4-11
- M**
- M mode 5-15
 - checks 4-39
 - main cable cover replacement 8-65
 - main cable replacement 8-202
 - main console 5-24
 - description 5-24
 - parts replacement 8-190
 - spare parts 9-52
 - main controller board replacement 8-108
 - Main LCD and Touch Screen backlight adjustments 6-5
 - main power supply 5-77
 - block diagram 5-78
 - cables 9-77
 - parts replacement 8-292
 - spare parts 9-64
 - temperature control 5-79
 - mains cable
 - inspection 10-8
 - mains power cables 9-71
 - mains voltage rating 3-21
 - maintenance
 - how often? 10-3
 - schedule 10-3
 - manpower
 - when two persons are needed 8-3
 - manpower and time requirements
 - site preparations 2-8
 - manual overview 1-2
 - manuals 9-97
 - mass with monitor and peripherals 3-20
 - mechanical
 - functions checks 4-51
 - safety 1-13
 - medical waste
 - regulated 1-33
 - minimal floor plan suggestion 2-11
 - model designations 1-6
 - models covered by this manual 1-3
 - motherboard (BEP)
 - expansion slots 5-62
 - move
 - the floating top console 4-11
 - the top console up or down when power is OFF 4-13
 - the top console when power is OFF 4-12
 - moving and transporting the ultrasound scanner 4-17
- N**
- network
 - connectivity
 - troubleshooting 7-8
 - setup requirements
 - InSite requirements 2-12
 - network printers 5-98
 - networking setup requirements 2-12
 - no audio 7-7
 - no verify 7-9
 - no video on LCD display 7-7
 - noise
 - troubleshooting 7-21
 - non-disruptive (access via InSite) 5-8
 - non-magnetic touch latch replacement 8-163

not connected (InSite) 5-8

NTSC

video format selection 3-33

NTSC video format selection 3-33

O

Octave imaging 5-15

off-board peripherals 3-36, 3-37

omissions and errors -x

on site configuration 3-38

on-board peripherals 3-36

on-boardperipherals 5-96

operating modes 5-15

Operator Panel 5-21

block diagram 5-22

operator panel

audio is missing 7-7

cable kit replacement 8-141

no audio 7-7

no video on LCD display 7-7

upper installation 8-101

wrong key activated on the touch panel 7-7

optional peripherals

peripherals connection 3-36

Options 9-93

options

holder, left or right support replacement 8-121

setup 3-49

software options setup 3-38

options checks 10-8

OSHA lockout/tagout requirements (USA) 1-33

outlet test

wiring arrangement (USA and Canada) 10-24

overview

this manual 1-2

P

packing materials

recycling information 3-16, 3-17

PAL

video format selection 3-33

PAL video format selection 3-33

palm rest assembly replacement 8-166

patient data loss 7-7

Patient I/O

Physio 5-88

patient I/O assembly

replacement 8-295

pedal

dir lock replacement 8-217

mechanism replacement 8-214

release replacement 8-217

pedals 4-17

periodic maintenance inspections 10-1

peripheral checks 10-8

peripherals

cables 9-89

checks 4-47

connection 3-36

descriptions 5-96

external

peripherals 3-36

external peripherals 3-37

internal 5-96

internal peripherals 3-36

replacement 8-303

spare parts 9-66

phased and linear array probes 5-30

phone numbers for customer assistance 1-35

physical

inspection 10-9

physical dimensions 3-20

physical inspection 3-19

Physio

Patient I/O 5-88

Physio TX parts 9-92

place bookmark in logs 7-4

plate connectors w/guide replacement 8-49

power

connect AC power 4-5

power loss 5-87

power on/boot up 4-4

switch on the unit 4-6

power distribution 5-77

Power Doppler 5-16

power down 4-8, 4-9

power down sequence 5-86

power shut down 4-8

power stability requirements 2-6

power transients 2-6

voltage dop-out 2-6

power transients 2-6

power up

sequence 5-82

voltage setting verification 3-21

preliminary checks 10-6

preparations

requirements

DICOM 2-12

prepare the unit to be moved 4-17

preparing for setup 3-19

prerequisite

provided by customer 8-9

printer

checks 4-47

external

- USB
 - spare parts 9-66
- internal
 - spare parts 9-66
- network
 - spare parts 9-67
- printer queues
 - view 4-48
- printer service
 - setup and test 4-48
- printers
 - network printers 5-98
- probe
 - cable hook twin replacement 8-162
 - care 10-14
 - checks 10-14
 - disconnect probe 3-25
 - leakage current 10-30
 - maintenance 10-14
 - recognition 7-7
- probes
 - connect 3-24
 - disconnecting 4-45
 - environmental requirements 2-8
 - phased and linear probes 5-30
 - returning/shipping 1-33
- product
 - description 1-5
 - icons 1-8
 - manuals 9-97
- product locator installation card 3-51
- product manuals 5-99
- puls pressure transducer
 - connect 3-23
- Pulsed (PW) Doppler 5-16
- purchaser responsibilities 2-9
- PW Doppler 5-16
- PW/CW Doppler mode checks 4-42

Q

- quality assurance 10-2
 - periodic maintenance 10-2
- quality test screen 7-4
- QWERTY keyboard 5-17

R

- raise/lower the top console 4-11
- rear bumper replacement 8-59
- rear cover replacement 8-52
- rear filter replacement 8-194
- rear handle replacement 8-60
- receiver and transmitter

- subsystem 5-29
- receiver and transmitter signal control 5-31
- Receiver Board 5-41
- receiver board
 - replacement 8-232
- Receiver Board (GRX) 5-41
- receiver signal path 5-30
- receiving and unpacking the equipment 3-3
- receiving the ultrasound scanner 3-5
- recording important settings and parameters 4-19, 8-11
- recycling information
 - packing materials 3-16, 3-17
- regulated medical waste 1-33
- Relay Board (RLY) 5-38
- relay board (RLY)
 - replacement 8-229
- release top console when power is unavailable 7-3
- reloading software
 - from repository 8-13
- remote archive's network information
 - setup 3-47
- renewal parts 9-1
- repair parts
 - returning/shipping 1-33
- replace
 - back end processor 8-244
 - BEP 8-244
 - BEP fan
 - fan
 - BEP fan replacement 8-276
 - BEP parts 8-244
 - center speaker (woofer), replace
 - subwoofer 8-205
 - graphics adapter 8-262
 - trackball 8-128
- replace woofer 8-205
- replacement procedures 8-1
- replacing the
 - alpha-numeric (A/N) keyboard 8-144
 - bulkhead board 8-157
 - covers and bumpers 8-38
 - frame w/LCD and touch screen 8-104
 - gel cup 8-169
 - LCD arm assembly 8-85
 - LCD cables 8-89
 - LCD monitor assembly 8-73
 - operator panel, lower 8-124
 - operator panel, upper 8-98
 - probe holder inserts 8-168
 - speaker assembly 8-155
 - XYZ parts 8-174
- request for service (RFS) 5-6
- required facility needs 2-10
- requirements verification 3-20

reset
 BEP from a hang 7-2
returning/shipping probes and repair parts 1-33, 8-3
revision history
 for this manual -xii
RFS
 request for service 5-6
Right, Left, Front and Back
 definition 9-2

S

safety
 considerations 1-11
 electrical safety 1-15
 human safety 1-11
 mechanical safety 1-13
 precaution messages 1-6
safety considerations -x
safety test
 overview 10-21
safety tests 10-20
saline solution
 definition 10-30
scanner
 block diagram 5-13
 description 5-9
 models and hardware/software compatibility 9-4
scanner models
 versus software requirement 8-7
screen captures 7-12
select
 video format, PAL or NTSC 3-33
service adjustments 6-1
service interface
 access authorization 5-102
service login
 to Global Service User Interface 5-101
service manual overview 1-2
service platform 5-100
service safety considerations -x
service screen 4-30
 setup 3-32
setup
 after software loading 8-37
 and test a printer service 4-48
 DHCP 3-44
 digital vide recorder (DVR) 3-35
 select offline mode 3-35
 options 3-49
 paperwork 3-50
 reminders 3-2
 warnings 3-2
shock and tilt indicators 3-4

shortcut keys 7-4
Shutdown 4-8
side bumpers replacement 8-44
side covers replacement 8-38
signal flow overview 5-11
site
 circuit breaker 2-5
 log 4-52
 power outlets 2-5
 preparations 2-1
 requirements
 desirable features 2-11
sneaker net 3-40
software 9-6
 options 3-49
 reload
 from recovery console 8-14
 software options setup 3-38
 updates 5-4
software/hardware compatibility 9-4
spare parts
 back end processor 9-60
 BEP 9-60
specifications 3-20
stand-alone product 3-40
standard hazard icons 1-7
subwoofer replacement 8-205
suggested room with EchoPAC PC and ultrasound
 scanner 2-11
switch off the unit 4-8
switch on the unit 4-6
system
 configuration 3-27
 configuration and software 5-12
 doesn't send 7-9
 halt errors 7-6
 history 9-4
 maintenance 10-6
 requirements verification 3-20
 settings 4-25
 settings screen 3-27
 setup 3-1
 specifications 3-20
 temperature is too high 7-20
 test 4-25
system manufacturer
 contact information 1-36
systems
 covered by this manual 1-3

T

TCP/IP
 setup screen 3-42

Tcpip
 setup screen 3-42
temperature control
 main power supply 5-79
temperature limits 2-2
test a printer service 4-48
test images 6-7
theory 5-1
tilt and shock indicators 3-4
time (and date) adjustments 3-28
time and manpower requirements
 site preparations 2-8
timeout
 for DICOM servers 6-17
tissue velocity imaging 5-16
tools
 for trackball cleaning 4-32
 needed for servicing the ultrasound scanner 8-4
 provided with scanner 8-9
top console 5-17
 block diagram 5-20
 cables 9-74
 description 5-17
 parts replacement 8-73
 position adjustment 4-11
 release without power 7-3
 spare parts 9-18
top cover replacement 8-41
touch panel
 not responding 7-7
touch screen
 calibration 6-10
trackball
 cleaning procedure
 from the outside 4-31
 remove OP to get access 4-32
 install after cleaning 4-36
 remove for cleaning 4-34
trademarks -xi
translation policy -i
transmitter
 signal path 5-29
transmitter and receiver
 signal control 5-31
 subsystem 5-29
transmitter board
 description 5-32
 replacement 8-235
transportation
 damage -x
transportation box label
 carton box 3-9
 wooden box 3-8
transporting the unit by vehicle 4-18

trouble image with logs 7-11
troubleshooting 7-15
 gathering troubleshooting data 7-10
 general recommendation 7-21
 hints
 DRX 5-46
 network connectivity 7-8
 noise troubleshooting 7-21
 system temperature is too high 7-20
 tips 7-4
turn unit ON 4-6
TX board
 description 5-32
TX Physio parts 9-92
TX/RX
 subsystem 5-29
typical users of the
 “Basic” service manual 1-2

U

ultrasound scanner description 5-9
unable to scan 7-16
unit power plug 2-5
units of measure 3-31
unlock
 LCD monitor 4-14
 top console 4-11
unpacking the equipment 3-3
up/down
 release handle 4-13
upgrading
 application software, application software
 upgrade 8-33
upper bezel replacement 8-118
US Department of Transportation (DOT) 1-33
USB
 connector board replacement 8-113
 device(s) stopped working 7-19
USB distribution 5-59
USB Flash Card 9-69
USB flash card 5-97
 connection 3-22
 replacement 8-313
USB harddrive 2TB with RAID1 5-98
user interface
 select language 3-29

V

VCO
 virtual console observation 5-8
verifications
 after software re-load 8-37

verify
 customer order 3-19
 no verify 7-9
vertical movement fails 7-17
video
 printer checks 4-47
 select PAL or NTSC format 3-33
video format
 PAL or NTSC 3-33
view
 windows printer queues 4-48
virtual console observation (VCO) 5-8
voltage
 drop-out 2-6
 settings verification 3-21

W

wagon AN drawer sheet met. assembly
 replacement 8-151
warnings 10-2, 10-21
weight (see 'mass') 3-20
wheels
 checks 4-51
 control 4-17
 spare parts 9-54
when there's too much leakage current 10-32
when to load or reload the software 8-12
why do maintenance 10-2
width of ultrasound scanner 3-20
windows
 printer queues 4-48
woofer replacement 8-205
worksheet for DICOM network information 2-13
wrong key activated on the touch panel 7-7

X

XD BUS (front plane)
 replacement 8-224
XD bus boards
 description 5-43
XY brake assembly replacement 8-177
XY mechanism replacement 8-174
XY park lock replacement 8-181
XYZ
 spare parts 9-50
XYZ controller assembly
 replacement 8-188
XYZ controller cables 9-76
XYZ mechanism
 adjustments 6-12

Z

Z mechanism
 move up/down without power 4-13
 replacement procedure 8-182
Z movement fails 7-17

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GE Medical Systems, a General Electric Company, going to market as GE Healthcare.
GE Vingmed Ultrasound AS
P.O.Box: 141
N-3191 HORTEN
NORWAY
www.gehealthcare.com

