

GE Healthcare

# LOGIQ E9

Service Manual



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# ***Important Precautions***

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**WARNING  
(EN)**

THIS SERVICE MANUAL IS AVAILABLE IN ENGLISH ONLY.

- IF A CUSTOMER'S SERVICE PROVIDER REQUIRES A LANGUAGE OTHER THAN ENGLISH, IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE TRANSLATION SERVICES.
- DO NOT ATTEMPT TO SERVICE THE EQUIPMENT UNLESS THIS SERVICE MANUAL HAS BEEN CONSULTED AND IS UNDERSTOOD.
- FAILURE TO HEED THIS WARNING MAY RESULT IN INJURY TO THE SERVICE PROVIDER, OPERATOR OR PATIENT FROM ELECTRIC SHOCK, MECHANICAL OR OTHER HAZARDS.

**AVERTISSEMENT  
(FR)**

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

- SI LE TECHNICIEN DU CLIENT A BESOIN DE CE MANUEL DANS UNE AUTRE LANGUE QUE L'ANGLAIS, C'EST AU CLIENT QU'IL INCOMBE DE LE FAIRE TRADUIRE.
- NE PAS TENTER D'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.

**WARNUNG  
(DE)**

DIESES KUNDENDIENST-HANDBUCH EXISTIERT NUR IN ENGLISCHER SPRACHE.

- FALLS EIN FREMDER KUNDENDIENST EINE ANDERE SPRACHE BENÖTIGT, IST ES AUFGABE DES KUNDEN FÜR EINE ENTSPRECHENDE ÜBERSETZUNG ZU SORGEN.
- VERSUCHEN SIE NICHT, 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 TENHA TENTADO REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.
- O NÃO CUMPRIMENTO DESTA 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 TENHA EFECTUADO REPARAÇÕES NO EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO PREVIAMENTE ESTE MANUAL.
- A INOBSERVÂNCIA DESTA 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 TEENINDUSJUHEK 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 TEENINDUSJUHEKIGA 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 ÉRHETŐ EL.

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

**VIÐVÖRUN  
(IS)**

ÞESSI ÞJÓNUSTUHANDBÓK ER EINGÖNGU FÁANLEG Á ENSKU.

- EF ÞJÓNUSTUADILI 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.

**VÝSTRAHA  
(CS)**

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 TĚTO 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.

**ADVARSEL  
(DA)**

DENNE SERVICEMANUAL FINDES KUN PÅ ENGELSK.

- HVIS EN KUNDES TEKNIKER HAR BRUG FOR ET ANDET SPROG END ENGELSK, ER DET KUNDENS ANSVAR AT SØRGE FOR OVERSÆTTELSE.
- FORSØG IKKE AT SERVICERE UdstyRET MEDMINDRE DENNE SERVICEMANUAL 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.

**WAARSCHUWING  
(NL)**

DEZE ONDERHOUDSHANDLEIDING IS ENKEL IN HET ENGELS VERKRIJGBAAR.

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

**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 DEPANATORULUI, 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.**
- **НЕСОБЛЮЖДЕНИЕ 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 ZAHTEVA 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 ENGLJSKOM JEZIKU.

- AKO KLIJENTOV SERVISER ZAHTIJEVA JEZIK KOJI NIJE ENGLJSKI, 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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Traditional  
Chinese

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**WARNING *Use all Personal Protection Equipment (PPE) such as gloves, safety shoes, safety glasses, and kneeling pad, to reduce the risk of injury.***

For a complete review of all safety requirements, see: [Section 1-4 "Safety considerations" on page 1-16](#) of the latest version of LOGIQ E9 Service Manual.

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# Revision History

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# List of Effected Pages (LOEP)

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2-1 to 2-12	Rev 5	8-1 to 8-226	Rev 5		
3-1 to 3-78	Rev 5	9-1 to 9-98	Rev 5		

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# ***Chapter 1***

## ***Introduction***

---

### **Section 1-1**

#### **Overview**

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

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

## Section 1-2 Service manual overview

### Attention

This manual contains necessary and sufficient information for the Field Service Engineer or Biotech Engineer to maintain and service the system safely. Advanced equipment training may be provided by factory trained Field Service trainers for the agreed-upon time period.

This service manual provides installation and service information for the LOGIQ E9 ultrasound scanning unit. It is divided in 10 chapters as shown below, in [Table 1-1 "Contents in this service manual" on page 1-3](#).

### Indications for Use

The LOGIQ E9 is intended for use by a qualified physician for ultrasound evaluation. Specific clinical applications and exam types include:

- Fetal/Obstetrics
- Abdominal (includes renal, GYN/Pelvic)
- Pediatric
- Small Organ (breast, testes, thyroid)
- Neonatal Cephalic
- Adult Cephalic
- Cardiac (adult and pediatric)
- Peripheral Vascular
- Musculo-skeletal Conventional and Superficial
- Urology (including prostate)
- Transrectal
- Transvaginal
- Transesophageal
- Intraoperative (abdominal, thoracic, vascular and neurosurgical)

### Contraindication

The LOGIQ E9 ultrasound system is not intended for ophthalmic use or any use causing the acoustic beam to pass through the eye.

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

## 1-2-2 Typical users of the “Basic” 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 LOGIQ E9 models covered by this manual

**Table 1-2 LOGIQ E9 Software Configurations and Hardware/Software Compatibility - Upgrade Options**

CONSOLE MODEL NUMBER	DESCRIPTION	SOFTWARE VERSION										
		Phase I				BT2010			BT2011			BT2013
		1.0.3	1.0.4	1.0.5	1.0.6	2.0.3	2.0.4	2.0.5	3.1.0	3.1.1	3.1.2	4 Rev. x.x
5205000	LOGIQ E9, 100-240 VAC	Y	Y	Y	Y	U	U	U	U	U	U	U
5205000-2	LOGIQ E9, 220-240 VAC	Y	Y	Y	Y	U	U	U	U	U	U	U
5205000-3	LOGIQ E9, 100-240 VAC	N	N	N	N	Y	Y	Y	U	U	U	U
5205000-4	LOGIQ E9, 220-240 VAC	N	N	N	N	Y	Y	Y	U	U	U	U
5205000-5	LOGIQ E9, 100-240 VAC	N	N	N	N	N	N	N	N	Y	Y	U
5205000-6	LOGIQ E9, 220-240 VAC	N	N	N	N	N	N	N	N	Y	Y	U
5205000-7	LOGIQ E9, 100-240 VAC	N	N	N	N	N	N	N	N	N	N	Y

### LOGIQ E9 Software Configurations and Hardware/Software Compatibility - Upgrade Options

LOGIQ E9 Software Configurations and Hardware/Software Compatibility - Upgrade Options	
Y	Original
U	Upgrade available
N	Not supported

**Front End Processor** - see: [9-12-2 "Front End Boards Compatible Configurations"](#) on page 9-48.

**Back End Processor** - see: [9-13-1 "Back End Boards Compatible Configurations"](#) on page 9-59.

**NOTE:** When not otherwise specified, the contents of this manual applies to all LOGIQ E9 models.

## **1-2-4      Product description**

---

**1-2-4-1 Overview of the LOGIQ E9 ultrasound scanner**

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

The system provides image generation in B-Mode, Color Doppler, Power Doppler, M-Mode, Color M-Mode, PW and 4D, Tissue Velocity imaging, Volume-Guided Ultrasound and Contrast applications. The fully digital architecture of the LOGIQ E9 unit allows optimal usage of all scanning modes and probe types throughout the full spectrum of operating frequencies.

Signal flows 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.

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

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

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

## Section 1-3 Important conventions

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

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

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

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

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

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

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

Notice 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




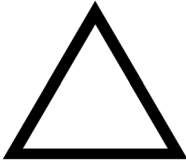

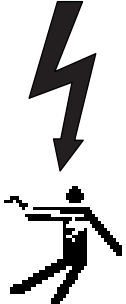








Important information will always be preceded by the exclamation point  contained within a triangle, as seen throughout this chapter. In addition to text, several different graphical icons (symbols) may be used to make you aware of specific types of hazards that could possibly cause harm. Even if a symbol isn't used in this manual, it may be included for your reference.


Table 1-3 Standard hazard icons

DANGER	WARNING	CAUTION
		
BIOLOGICAL	ELECTRICAL	MOVING
		
ACOUSTIC OUTPUT	EXPLOSION	SMOKE / FIRE
		
LASER	HEAT	PINCH
		 or 









## 1-3-2.....Standard hazard icons (cont'd)

**Table 1-4 Standard hazard icons (cont'd)**

RADIATION	“	“
	“	“

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

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

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

### 1-3-3 Product icons

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

**Table 1-6 Product icons 1 of 6**









LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
Identification and Rating Plate 	Manufacturer's name and address	Rear panel
Identification and Rating Plate 	Date of manufacture	Rating Plate
	Serial Number	Rating Plate
	Catalog Number	Rating Plate
Type/Class Label	Used to indicate the degree of safety or protection.	
	United States only Prescription Requirement label	Rear panel
	Authorized European Representative address	Rear panel
	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 BF Applied Part (man in the box with paddle) symbol is in accordance with IEC 60417-5334.	Probe

Table 1-6 Product icons (Continued) 2 of 6








LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
	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
	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.	Rear cover label
	DO NOT push the system. Use the handle to push/pull the system, e.g., DO NOT use the LCD. Failure to do so may cause serious injury or system damage.	Rear of LCD Monitor Rear of On-Board V Nav Stand
	Follow Instructions for Use. "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.	Rear Cover, Rear of LCD Monitor, Miscellaneous Probe Labels
	Follow Instructions for Use. "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.	Rear of particular Main Power Supply
"DANGER - Risk of explosion used in..."	The system is not designed for use with flammable anesthetic gases.	Rear cover console
	The system is not designed for use with flammable anesthetic gases.	Rear of console

Table 1-6 Product icons (Continued) 3 of 6



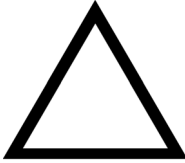




LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
	C-UL Mark Parts Indicates that the product has been tested and approved in UL Laboratories, based on UL and CSA standards, through mutual approval activities.	Rear of LCD Monitor (inside) Footswitch
	This unit carries the CE mark. The LOGIQ E9 unit complies with regulatory requirements of the European Directive 93/ 42/EEC concerning medical devices. It also complies with emission limits for a Group 1, Class B Medical Device as stated in EN 60601-1-2 (IEC 60601-1-2).	Rear of console
	<b>“CAUTION”</b> The equilateral triangle is usually used in combination with other symbols to advise or warn the user.	Various
	<b>“ATTENTION - Consult accompanying documents”</b> is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.  General Warning	Various, Rear Cover, Probe Label
	<b>“Warning - Dangerous Voltage”</b> (the lightning flash with arrowhead in equilateral triangle) is used to indicate electric shock hazards.	Various
	<b>“Mains OFF”</b> Indicates the power off position of the mains power switch.	Rear of system adjacent to MAINS Switch
	<b>“PINCH POINT”</b> Indicates moving parts that may cause injury (such as LCD arm or XYZ Mech)	Various

Table 1-6 Product icons (Continued) 4 of 6


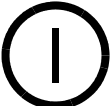
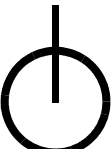




LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
	<p><b>“Mains ON”</b> Indicates the Power ON position of the mains power switch.</p> <p>“ON” Indicates the power on position of the power switch.</p> <p><b>CAUTION</b> <b>THE ON/OFF BUTTON ON THE OPERATOR PANEL DOES NOT ISOLATE MAINS SUPPLY</b></p>	Rear of console
 or 	<p><b>ON/OFF button</b></p> <p><b>CAUTION</b> <b>SYSTEM SHUTDOWN USING THE ON/OFF BUTTON DOES NOT DISCONNECT LOGIQ E9 FROM MAINS VOLTAGE.</b></p> <p>For disconnecting LOGIQ E9 from mains voltage after system shutdown, please set the circuit breaker close to the mains inlet to OFF as described in <a href="#">4-2-4 “Power shut down” on page 4-7.</a></p>	Operating Panel
	<p><b>“Protective Earth”</b> Indicates the protective earth (grounding) terminal.</p>	Used several places inside the system.
	<p><b>“Equipotential”</b> Indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment as described in IEC60601-1.</p>	Rear of console
	<p>Alternating Current symbol is in accordance with IEC 60878-01-14.</p>	Rear Panel, Rating Plate, Circuit breaker label of console and Front Panel (if applicable).
	<p>This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.</p>	<p>Rear of console Rear of LCD Monitor (inside)</p>

Table 1-6 Product icons (Continued) 5 of 6












LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
 LAMP CONTAINS MERCURY, DISPOSE ACCORDING TO STATE/LOCAL LAW. or  LAMP CONTAINS MERCURY, DISPOSE ACCORDING TO STATE/LOCAL LAW. 灯泡含水银，请按当地法律处理。	<p>This product consists of devices that may contain mercury, which must be recycled or disposed of in accordance with local, state, or country laws. (Within this system, the backlight lamps in the monitor display, contain mercury.)</p>	<p>Rear Panel Rear of LCD Monitor (inside)</p>
 <b>ETL Classified</b> <b>MEDICAL EQUIPMENT</b> Intertek 93182	<p>ETL Listing Mark Monogram</p>	<p>Rear Panel</p>
	<p>GOST Symbol. Russia Regulatory Country Clearance.</p>	<p>Rear Panel</p>
	<p>ISO 7010 - P007 Volume Navigation Pacemaker Warning</p>	<p>V Nav Transmitter</p>
	<p>Indicates the presence of hazardous substance(s) above the maximum concentration value. Maximum concentration values for electronic information products, as set by the People's Republic of China Electronic Industry Standard SJ/T11364-2006, include the hazardous substances of lead, mercury, hexavalent chromium, cadmium, polybrominated biphenyl (PBB), and polybrominated diphenyl ether (PBDE). "10" indicates the number of years during which the hazardous substance(s) will not leak or mutate so that the use of this product will not result in any severe environmental pollution, bodily injury, or damage to any assets.</p>	<p>Probe</p>

Table 1-6 Product icons (Continued) 6 of 6

LABEL/SYMBOL	PURPOSE/MEANING	LOCATION
	<p>Indicates the presence of hazardous substance(s) above the maximum concentration value. Maximum concentration values for electronic information products, as set by the People's Republic of China Electronic Industry Standard SJ/T11364-2006, include the hazardous substances of lead, mercury, hexavalent chromium, cadmium, polybrominated biphenyl (PBB), and polybrominated diphenyl ether (PBDE). "20" indicates the number of years during which the hazardous substance(s) will not leak or mutate so that the use of this product will not result in any severe environmental pollution, bodily injury, or damage to any assets.</p>	<p>China Rating Plate</p>
	<p>How to lower LCD prior to transport</p>	<p>Rear of the LCD monitor.</p>
	<p>How to lock Operator Panel prior to transport</p>	<p>Rear of the LCD monitor.</p>
	<p>DO NOT place a finger, hand or any object on the joint of the monitor or monitor arm to avoid injury when moving the monitor and monitor arm.</p>	
	<p>Non-ionizing Electromagnetic Radiation Label</p>	<p>Rear Panel</p>

## Section 1-4 Safety considerations

### 1-4-1 Introduction

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


### 1-4-2 Human safety

- Operating personnel must not remove the system covers.
- Servicing should be performed by authorized personnel only.

Only personnel who have participated in a LOGIQ 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 LOGIQ E9, SOME METAL SURFACES MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD IF TOUCHED, EVEN WHILE IN SHUTDOWN 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 USE ALL PERSONAL PROTECTION EQUIPMENT (PPE) SUCH AS GLOVES, SAFETY SHOES, SAFETY GLASSES, AND KNEELING PAD, TO REDUCE THE RISK OF INJURY.**

 **WARNING EXPLOSION WARNING**  
**DO NOT OPERATE THE EQUIPMENT IN AN EXPLOSIVE ATMOSPHERE.**  
**OPERATION OF ANY ELECTRICAL EQUIPMENT IN SUCH AN ENVIRONMENT CONSTITUTES A DEFINITE SAFETY HAZARD.**

 **WARNING Do Not Substitute Parts or Modify Equipment**  
**Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification of the equipment.**



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



**WARNING**

***When the top console is in its locked position, the gas shock is compressed and stores mechanical energy. During normal operation the top console, the weight of the monitor and the mechanical force of the gas shock are in balance. Take care if/when you activate this gas shock. Personal injury can occur after the panel is removed and the shock pressure is released. Take care when you repair the elevation assembly.***



**WARNING**

***Ensure that the system is turned off and unplugged.***

Wait for at least 20 seconds for capacitors to discharge as there are no test points to verify isolation. The Amber light on the Op Panel On/Off button will turn off.

Beware that the Main Power Supply, Extended Power Shutdown 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**

***Risk of electrical shock, system must be turned off and disconnected from power source. Cord must be controlled at all times.*** 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, Extended Power Shutdown 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**

***Use extreme caution as long as THE LOGIQ E9 is un-stable, not resting on all four Casters.***



**WARNING**

***Tilting the console requires two people in order to avoid injury to service personnel and damage to the equipment.***



**WARNING**

***Use all Personal Protection Equipment (PPE) such as gloves, safety shoes, safety glasses, and kneeling pad, to reduce the risk of injury.***



**WARNING**










***Beware of possible sharp edges on all mechanical parts. If sharp edges are encountered, the appropriate PPE should be used to reduce the risk of injury.***



**WARNING**

***Wear all PPE including gloves as indicated in the chemical MSDS.***

### 1-4-3 Mechanical safety

-  **WARNING** *While the software install procedure is designed to preserve data, you should save any patient data, images, system setups to a DVD or hardcopy before doing a software upgrade.*
-  **WARNING** *PRIOR TO ELEVATING THE 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** *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.*
-  **WARNING** *The system should NOT be moved with the Operator I/O Panel extended. Move the Operator I/O Panel to its centered and locked position. Lower the Operator I/O Panel as much as possible before moving the system.*
-  **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/Upper Console 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.*

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



### CAUTION



LOGIQ E9 WEIGHS 135 KG (298 LB), R3.X AND EARLIER, 140 KG (309 LB), R4.X AND LATER, 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** TO AVOID INJURY OR DAMAGE TO THE MONITOR, MAKE SURE THERE IS NOTHING WITHIN RANGE OF THE LCD BEFORE MOVING THE MONITOR AND MONITOR ARM. THIS INCLUDES PEOPLE AS WELL AS THINGS.



**CAUTION** Ensure that nobody touches the console arm/frogleg when moving the Operator Panel.



**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.

**NOTE:** Special care should be taken when transporting the unit in a vehicle, see [4-2-14-4 "Transporting the unit by vehicle" on page 4-18.](#)

## 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. A separate power outlet with a 20 amp circuit breaker for 120 VAC for 120V area, 7.5 amp circuit breaker for 220-240 VAC for 220/240V area or 15 amp circuit breaker for 100 VAC for Japan.
- 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 LOGIQ 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 Label locations

Refer to the current revision of the LOGIQ E9 Basic User Manual, 5180374-100, Chapter 2.

## 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 LOGIQ 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, DO NOT INSTALL SUBSTITUTE PARTS OR 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:

- 1.) Plan and prepare for shutdown.
- 2.) Shutdown the equipment.
- 3.) Isolate the equipment.
- 4.) Apply Lockout/Tagout Devices.
- 5.) Disconnect the Extended Power Shutdown battery at J3 when working in the BEP.
- 6.) Control all stored and residual energy.
- 7.) Verify isolation.

All potentially hazardous stored or residual energy is relieved.



### **NOTICE** Energy Control and Power Lockout for LOGIQ E9



When servicing parts of the system where there is exposure to voltage greater than 30 Volts:

1. Turn off the scanner.
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. The Amber light on the Op Panel On/Off button will turn off.
5. Disconnect the eps battery at j3 WHEN WORKING IN THE BEP.

Beware that the Main Power Supply, Extended Power Shutdown 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

LOGIQ 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 (TO THE RIGHT OF 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 1-7 Phone numbers for Customer Assistance**

LOCATION	PHONE NUMBER	
USA GE Healthcare - GE Medical Systems Ultrasound & Primary Care Diagnostics, LLC 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	1-262-524-5300
	Application Support	1-262-524-5698
Europe GE Ultraschall Deutschland GmbH & Co. KG Beethovenstrasse 239 Postfach 11 05 60, D-42655 Solingen Germany	Phone: +33 (0) 130-831-300 (General Imaging and Cardiac) +49 (0) 212-2802-652  Fax: +49 (0) 2122-8024-31	
Asia (Singapore) GE Ultrasound Asia Service Department - Ultrasound 298 Tiong Bahru Road #15-01/06 Central Plaza Singapore 168730	Tel: +65 6291-8528  Fax: +65 6291-7006	
Japan Support Center	Phone: 81-426-48-2940 Fax: 81-426-48-2905	

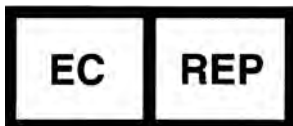


## 1-10-2 System manufacturer

**Table 1-8 System manufacturer**

MANUFACTURER	FAX NUMBER
GE Healthcare - GE Medical Systems Ultrasound and Primary Care Diagnostics, LLC 9900 Innovation Drive Wauwatosa, WI 53226 USA	414-721-3865

**Table 1-9 Authorized Representative**

AUTHORIZED REPRESENTATIVE	TELEPHONE / FAX NUMBER
<p>The location of the CE marking is shown in the Safety chapter of this manual.</p>  <p>Authorized EU Representative European registered place of business: GE Medical Systems Information Technologies GmbH(GEMS IT GmbH) Munzinger Strasse 3, D-79111 Freiburg, GERMANY</p>	<p>+49 761 45 43 -0 / +49 761 45 43 -233</p>

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# ***Chapter 2***

## ***Site preparations***

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### **Section 2-1**

#### **Overview**

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

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

## Section 2-2 General console requirements

### 2-2-1 Console environmental requirements

#### 2-2-1-1 If the LOGIQ E9 is very cold or hot

When unpacking the device, allow the temperature of the device to stabilize before powering up. The following table describes guidelines for reaching operational temperatures from storage or transport temperatures. See: Table 2-1'

**Table 2-1 LOGIQ E9 Acclimate Time**

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

#### 2-2-1-2 Environmental specifications

**Table 2-2 Environmental Specifications for LOGIQ E9 Scanners**

	Operational	Storage	Transport (< 16 hrs.)
Temperature	10° - 35° C (50° - 96° F)	-10° - 50° C (-14° - 122° F)	-10° - 50° C (-14° - 122° F)
Humidity	30% - 80% non-condensing	30% - 80% non-condensing	30% - 80% non-condensing
Pressure	70 - 106 kPa	70 - 106 kPa	70 - 106 kPa
Heat Dissipation	4712 Btu/hour	"	"

#### 2-2-1-3 Cooling

The cooling requirement for the LOGIQ E9 scanner with LCD and onboard peripherals, is up to 4712 Btu/hr. 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/hr demand on the cooling system.

#### 2-2-1-4 Lighting

Bright light is needed for LOGIQ E9 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 LOGIQ E9.

The LOGIQ E9 will function on Voltages from 100-240 Volts and 50 or 60 Hz. However, if using 220 volt power, 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 LOGIQ E9 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 LOGIQ E9 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 LOGIQ E9

In the table below, the electrical specifications for LOGIQ E9 include LCD and on board peripherals.

**Table 2-3 Electrical specifications for the LOGIQ E9**

PART NUMBER	DESCRIPTION	VOLTAGE	TOLERANCES	POWER CONSUMPTION	FREQUENCY
5205000-x	LOGIQ E9, 100-240 VAC	100-240 VAC	+/-10%	1100 W	50/60 Hz

The current drain varies, depending on the mains voltage.

- At 230 VAC, the current may be up to 7.5 A.
- At 100 VAC, the current may be up to 12 A.

### 2-2-2-3 Inrush current

During power on, an inrush circuit prevents the current from increasing above the stated values.

**Table 2-4 Inrush current at different mains voltages**

VOLTAGE	50 Hz	60 Hz
90 VAC	13 A	12 A
110 VAC	9 A	11 A
220 VAC	5.5 A	6 A
264 VAC	6 A	5 A

---

**2-2-2-4 Site circuit breaker**



**CAUTION POWER OUTAGE MAY OCCUR.**  
**THE LOGIQ 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 LOGIQ E9 be readily accessible.

**2-2-2-5 Site power outlets**

A dedicated AC power outlet must be within reach of the LOGIQ E9 without extension cords. Other outlets adequate for the external peripherals, medical and test equipment needed to support this LOGIQ E9 must also be present within 1 m (3.2 ft.) of the LOGIQ E9. Electrical installation must meet all current local, state, and national electrical codes.

**2-2-2-6 LOGIQ E9 power plug**

If the LOGIQ E9 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.

**2-2-2-7 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. Ultrasound machines also generate EMI. The LOGIQ 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 LOGIQ E9 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 2-5 on page 2-5](#) for EMI Prevention tips.


**Table 2-5 EMI prevention/abatement**

EMI RULE	DETAILS
Be aware of RF sources	Keep the LOGIQ E9 at least 5 meters or 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 LOGIQ E9	Poor grounding is the most likely reason a LOGIQ E9 will have noisy images. Check grounding of the power cord and power outlet.
Replace all screws, RF gaskets, covers, cores	After you finish repairing or updating the LOGIQ E9, 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. Loose or missing covers or RF gaskets allow radio frequencies to interfere with the ultrasound signals.
Replace broken RF gaskets	If more than 20% or a pair of the fingers on an RF gasket are broken, replace the gasket. Do not turn on the LOGIQ E9 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 LOGIQ E9. 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	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	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 LCD cables to the frame.

## 2-2-4 Probes environmental requirements

Table 2-6 Environmental Requirements - Probes

	Standard Probes	4D Probes
Operation:	10° to 40° C (50 to 104 °F)	18° to 40° C (64.4 to 104 °F)
Storage:	-10° to 60° C (14 to 140 °F) -10° to 60° C (14 to 140 °F)	-10° to 50 ° C (14 to 122 °F)
Temperatures in degrees Celsius (°C) conversion to degrees F: (°F) = (°C * 9/5) + 32		

 **NOTICE** SYSTEMS AND ELECTRONIC PROBES ARE DESIGNED FOR STORAGE TEMPERATURES OF -10 TO +50 degrees C. or +60 degrees C, DEPENDING ON THE TYPE OF PROBE. WHEN EXPOSED TO LARGE TEMPERATURE VARIATIONS, THE PRODUCT SHOULD BE KEPT IN ROOM TEMPERATURE FOR 10 HOURS BEFORE USE.

Refer to the Table in [section 2-2-1-1 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.

 **CAUTION** HAVE TWO PEOPLE AVAILABLE TO DELIVER AND UNPACK THE LOGIQ E9. ATTEMPTS TO MOVE THE LOGIQ E9 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 LOGIQ E9.
- 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 LOGIQ E9 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 LOGIQ E9 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 LOGIQ E9 will function on Voltages from 100-240 Volts and 50 or 60 Hz. However, if using 220 volt power, 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.*

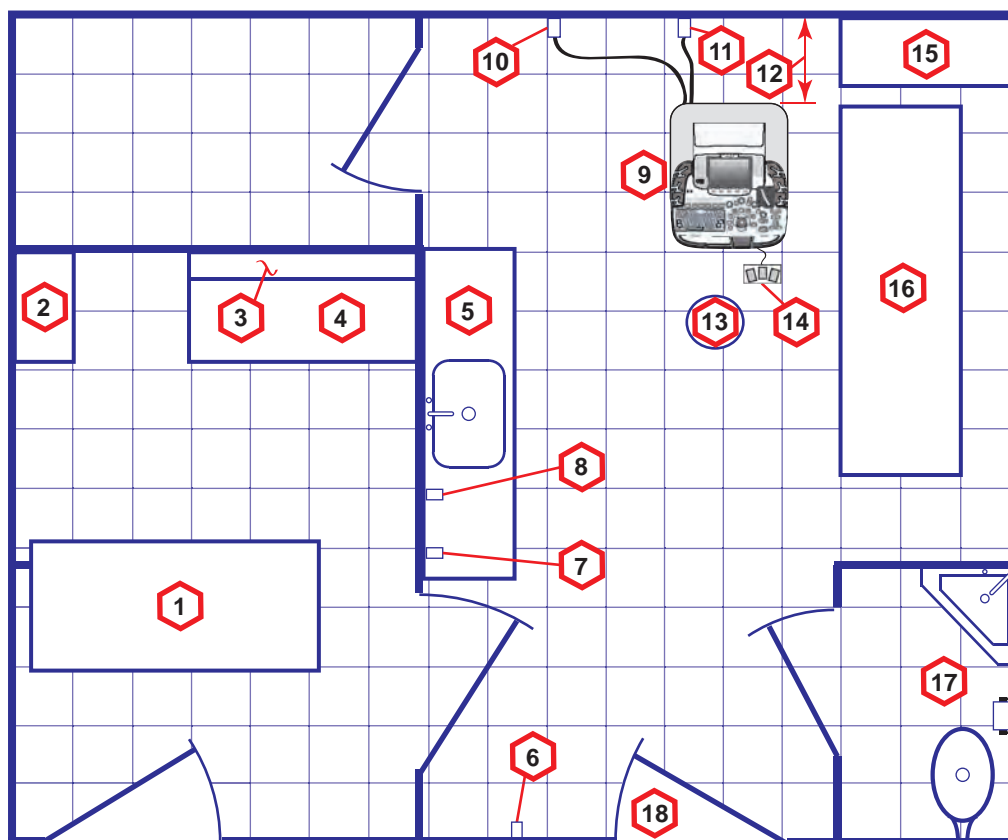
- Dedicated single branch power outlet of adequate amperage (see: [Table 2-5 on page 2-5](#)) meeting all local and national codes which is located less than 2.5 m (8 ft.) from the LOGIQ E9's proposed location
- Door opening is at least 76 cm (30 in) wide.
- Proposed location for LOGIQ E9 is at least 0.46 m (18 inches) from the wall or objects 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 (3.2 ft.) of the LOGIQ E9 to connect cables.
- Power outlets for other medical equipment and gel warmer.
- Power outlets for test equipment within 1 m (3.2 ft.) of LOGIQ E9.
- Clean and protected space to store transducers (in their cases or on a rack).
- Material to safely clean probes (done with a plastic container, never metal).

## 2-3-3 Desirable features

In addition to the Floor Plan Suggestions shown in Figure 2-1 and Figure 2-2, a nearby waiting room and a Receptacle for Bio-hazardous Waste, like used probe sheaths is suggested. Grid represents 305 x 305 mm (1 x 1 foot).

## 2-3-4 Minimal floor plan suggestions

Figure 2-1 Floor Plan Suggestion 4.27 x 5.18 m (14 x 17 foot)

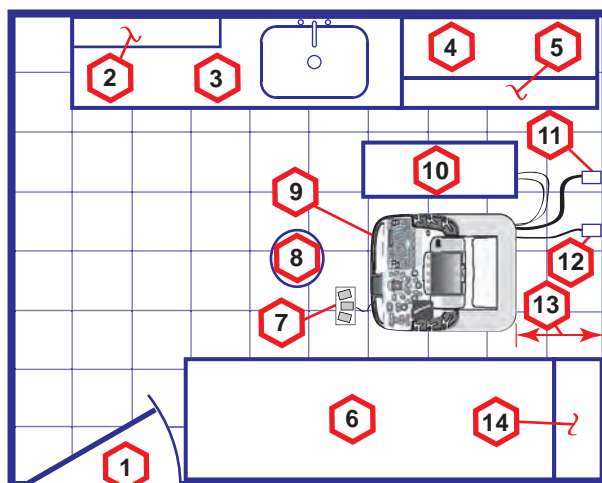


Floor Plan Suggestion 4.27 x 5.18 m (14 x 17 foot) Key

Item	Description	Item	Description
1.	Secretaries or Doctors Desk	2.	File Cabinet
3.	Film Viewer	4.	Counter Top
5.	Counter Top and Sink with hot and cold water	6.	Overhead Lights Dimmer - Dual Level Lighting (bright and dim)
7.	Emergency Oxygen	8.	Suction Line
9.	LOGIQ E9	10.	Dedicated Power Outlet - Circuit Breaker protected and easily accessible
11.	Network Interface	12.	457 mm (18 inches) distance of LOGIQ E9 from wall or objects
13.	Stool	14.	Footswitch
15.	Storage for Linens and Equipment	16.	Examination Table – 1930 x 610 mm (76 x 24 inches)
17.	Lavatory and Dressing Room	18.	Door – at least 762 mm (30 inches)

## 2-3-4.....Minimal floor plan suggestions (cont'd)

Figure 2-2 Floor Plan Suggestion 2.44 x 3.05 m (8 x 10 foot)



Floor Plan Suggestion 2.44 x 3.05 m (8 x 10 foot) Key

Item	Description	Item	Description
1.	Door – at least 762 mm (30 inches)	2.	Film Viewer
3.	Counter Top, Sink with hot and cold water and Supplies Storage	4.	Linen Supply
5.	Probes/Supplies	6.	Examination Table – 1930 x 610 mm (76 x 24 inches)
7.	Footswitch	8.	Stool
9.	LOGIQ E9	10.	External Peripherals
11.	Dedicated Power Outlet - Circuit Breaker protected and easily accessible	12.	Network Interface
13.	457 mm (18 inches) distance of LOGIQ E9 from wall or objects	14.	GE Cabinet for Software and Manuals

## **2-3-5 Networking setup requirements**

### **2-3-5-1 Stand alone scanner (without network connection)**

None.

### **2-3-5-2 Scanner connected to hospital's network**

#### **Supported networks:**

- 10/100/1000 Mbps Ethernet network connection
- Up to 300 Mbps WLAN (option)

### **2-3-5-3 InSite Requirements**

Need internet access available to be able to connect to Insite ExC.

### **2-3-5-4 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 LCD 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.

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

To configure the LOGIQ 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 2-12](#). 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 LOGIQ 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 LOGIQ 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 troubleshooting.

For connectivity setup information, refer to the current revision of the LOGIQ E9 Basic User Manual.

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

Figure 2-3 Worksheet for DICOM Network Information

LOGIQ E9						
Host Name	<input style="width: 95%;" type="text"/>	IP Address	<input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/>	Local Port	<input style="width: 50%;" type="text"/>	
AE Title	<input style="width: 80%;" type="text"/>	Net Mask	<input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/>			
Network Speed	<input style="width: 80%;" type="text"/>	Default Gateway	<input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/>			
DHCP	<input style="width: 30%;" type="checkbox"/>					
<b>DICOM APPLICATION</b>						
	NAME	MAKE/	AE TITLE	IP	PORT	OTHER CONFIGURATION
Store 1	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/>	<input style="width: 25%;" type="text"/>	Raw Data
						Allow Multiframe
Store 2	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/>	<input style="width: 25%;" type="text"/>	Structured Reporting
						Compression
Store 3	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/>	<input style="width: 25%;" type="text"/>	Raw Data
						Allow Multiframe
DICOM Print	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/>	<input style="width: 25%;" type="text"/>	Structured Reporting
						Compression
Worklist	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/>	<input style="width: 25%;" type="text"/>	Vendor: _____
						Print Size: _____
Storage Commit	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/>	<input style="width: 25%;" type="text"/>	Medium: _____
						Copies: _____
DICOM MPPS	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/>	<input style="width: 25%;" type="text"/>	Orientation: _____
						Color _____
Associated Storage AE	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/> . <input style="width: 25%;" type="text"/>	<input style="width: 25%;" type="text"/>	_____
						_____

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# ***Chapter 3***

## ***LOGIQ E9 Setup***

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### **Section 3-1**

#### **Overview**

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

This chapter contains information needed to set up the LOGIQ 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 setup, and how to check and test the unit, probes, and external peripherals for electrical safety are included in this procedure.





## Section 3-2 Setup reminders

### 3-2-1 Average setup time

Table 3-1 Average setup time

DESCRIPTION	AVERAGE SETUP TIME	COMMENTS
UNPACKING THE LOGIQ E9	0.5 HOUR	
SET UP LOGIQ E9 WO/OPTIONS	4 HOURS	DEPENDENT ON THE CONFIGURATION
DICOM NETWORK CONFIGURATION	2 HOURS OR MORE	DEPENDENT ON THE CONFIGURATION
INSTALL INSITE / ILINK	0.5 HOUR	

### 3-2-2 Setup warnings

-  **DANGER** WHEN USING ANY TEST INSTRUMENT THAT IS CAPABLE OF OPENING THE AC GROUND LINE (I.E., METER'S GROUND SWITCH IS OPEN), DON'T TOUCH THE UNIT!
-  **CAUTION** 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. LOGIQ E9 PERFORMANCE AND COOLING REQUIRE THIS.

If the unit is very cold or hot, allow the temperature of the device to stabilize before powering up. The following table describes guidelines for reaching operational temperatures from storage or transport temperatures. See: [2-2-2 "Console environmental requirements" on page 2-2.](#)



### 3-2-2.....Setup warnings (cont'd)



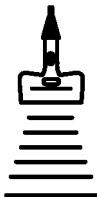
**CAUTION OPERATOR MANUAL(S)**

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



**CAUTION ACOUSTIC OUTPUT HAZARD**

ALTHOUGH THE ULTRASOUND ENERGY TRANSMITTED FROM THE LOGIQ 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 LOGIQ E9.

### 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 Receiving the LOGIQ E9

### 3-3-3-1 Overview

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

### 3-3-3-2 Examine package

Examine package closely at time of delivery.

### 3-3-3-3 Damage in transportation

Follow this procedure if damage is apparent:

**Table 3-2 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"><li>• 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.</li><li>• A transportation company will not pay a claim for damage if an inspection is not requested within this 14 day period.</li></ul>

### 3-3-4 The Tilt and Shock indicators

#### 3-3-4-1 Overview

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

To make it easier to detect if the handling during transportation has been improper, a Tilt or TIPNTELL indicator and a Shock indicator have been attached to the transportation box.

#### 3-3-4-2 Position of the Tilt or TipNTell and Shock indicators

The Tilt and Shock indicators have been attached to the side of the transportation box.

**Figure 3-1 Tilt and Shock indicators**



**Figure 3-2 TIPNTELL indicator and Label**





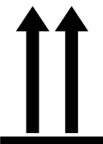



**NOTE:** Before cutting the straps, check the Tilt or TIPNTELL and Shock indicators to make sure they have not been triggered. If triggered, report it to the carrier. If not, then cut the straps around the crate.

### 3-3-4-3 LOGIQ E9 Transportation Box Label

The LOGIQ E9 Transportation Box Label is located on the transportation box.


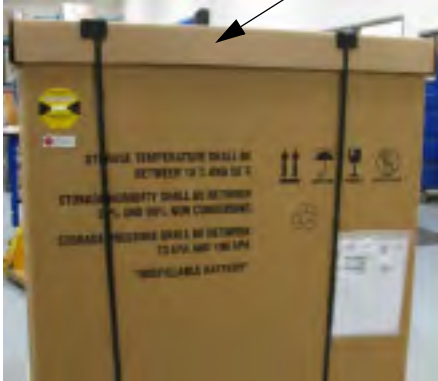
**Figure 3-3 LOGIQ E9 Transportation Box Labeling**

SYMBOL	DEFINITION/COMMENTS	SYMBOL	DEFINITION/COMMENTS
	RECYCLING Recyclable Wood		KEEP DRY (protect from moisture)
	or  RECYCLING China Specific		FRAGILE, Handle with Care
	TOP, UPRIGHT - Transportation and Storage		DO NOT STACK

3-3-5
Unpacking the LOGIQ E9

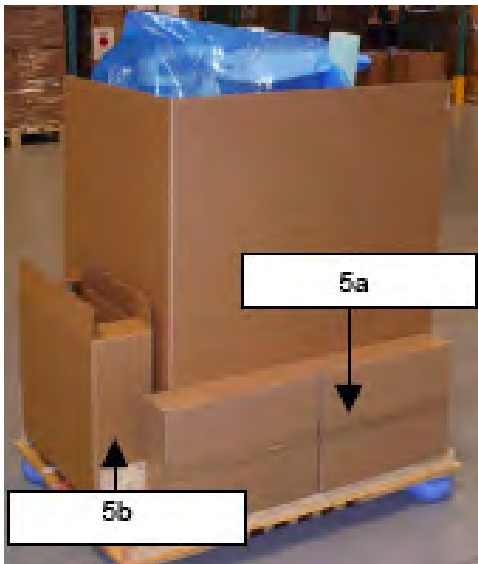

The instruction manual describes the best method for unpacking the LOGIQ E9 ultrasound scanning unit.

Table 3-3      Uncrating Instructions

	Steps	Corresponding Graphic
1.	Before cutting the straps, check Shock and Tilt Tags to make sure they have not been triggered. If damaged, report it to the carrier. If not, then cut the straps around the crate.	
2.	Remove the top cover.	







**Table 3-3     Uncrating Instructions (Continued)**





	Steps	Corresponding Graphic
5.	Remove the a) Probes and b) accessory boxes.	
6.	<p>Remove the L-shaped Cardboard divider.</p> <p><i>Note: Use special care when removing the divider.</i></p>	



**Table 3-3 Uncrating Instructions (Continued)**

	Steps	Corresponding Graphic
7.	Remove the OP panel foam placed between the monitor and probe holders.	
8.	Remove the lower OP panel brace placed between the lower OP panel and the wooden ramp, by moving upward and back. Remove the wooden ramp.	
9.	Attach the wooden ramp to the Pallet Base with Velcro on the rear side of the LOGIQ E9.	
10.	Loosen the tie-down strap at the front of the LOGIQ E9. Push the brass piece to pull back handle, then push brass piece to loosen strap.	

**Table 3-3      Uncrating Instructions (Continued)**

	Steps	Corresponding Graphic
11.	Disconnect the tie-down strap at the rear of the LOGIQ E9.	
12.	<p>Pull the LOGIQ E9 down the Pallet Base ramp.</p> <p><i>Note: Remember to pull in the LOGIQ E9 from the back for safer transportation.</i></p>	
13.	Remove the clear plastic (wrapped around the LOGIQ E9) from the unit.	
14.	Place all of the filling inside the Transportation Box. Close the box, and store the filling for possible future use.	

## Section 3-4

### Packing materials - recycling information

The packing materials for LOGIQ E9 are recyclable:

- The Transportation Box is made of cardboard.
- 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

### Preparing for setup

#### 3-5-1 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.

#### 3-5-2 Physical inspection

Verify that the LOGIQ E9 arrived intact (visual inspection).

If the LOGIQ E9 has been damaged, please refer to "Damage in Transportation" on page [x](#) in the beginning of this manual.

##### 3-5-2-1 LOGIQ E9 voltage settings


See: [3-6-3-1 "Verification of the LOGIQ E9's voltage setting" on page 3-17.](#)

#### 3-5-3 Volume Navigation Stand

To assemble the Volume Navigation Stand, See: [8-15-2 "Assembling or replacing the Roll Stand" on page 8-550](#) or [8-15-4 "On-Board V Nav Stand Option Contents, location and placement of parts" on page 8-559.](#)

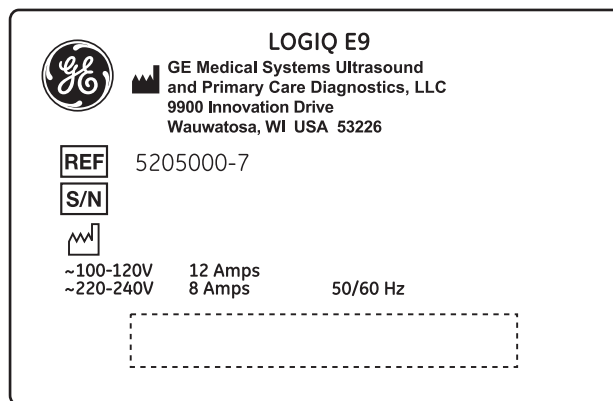
### Figure 3-4 Back Cover Label with ETL Label



GE HEALTHCARE  
9900 INNOVATION DR, WAUWATOSA, WI 53226, USA  
REF MODEL 5205000-3  
SN S/N 102458US7  
MANUFACTURED OCTOBER 2010  
DESC LOGIQ E9 CONSOLE  
100-120V~  
50/60Hz 12 A  
  
CONSOLE 2010-10

**3-5-3-1 Back Cover Label and ETL testing laboratories safety rating label (ETL may not be present)  
(cont'd)**

**Figure 3-6 Rating Plate Label - R4.x.x**



**3-5-4 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 LOGIQ E9 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: [2-2-4 "EMI limitations" on page 2-5](#) for more information about EMI protection.

## Section 3-6 Completing the setup

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

This section describes how to complete the set up of LOGIQ E9.

### 3-6-2 LOGIQ E9 specifications

#### 3-6-2-1 LOGIQ E9 requirements verification

- Verify that the site meets the requirements listed in (see: [Section 2-3 "Facility needs" on page 2-7](#)).
- Verify that the specifications below don't conflict with any on-site conditions.

#### 3-6-2-2 Physical dimensions

The physical dimensions of the LOGIQ E9 unit are summarized in [Table 3-4](#).

**Table 3-4 Physical dimensions of LOGIQ E9 with monitor and peripherals**

PART NUMBER	HEIGHT*	WIDTH	DEPTH	UNIT
5205000, -2, -3, -4, -5, -6	1130	585	830	mm
	44.5	23.03	32.67	Inches
5205000-7	1300	585	830	mm
	51.2	21.9	32.7	Inches

\* Dimensions given with floating keyboard stowed for transport and the LCD Monitor down.

#### 3-6-2-3 Weight with monitor and peripherals

**Table 3-5 Weight of LOGIQ E9 with monitor and peripherals**

PART NUMBER	WEIGHT [KG]	WEIGHT [LBS]
5205000, -2, -3, -4, -5, -6	135	298
5205000-7	140	390

#### 3-6-2-4 Acoustic noise output

Less than 48 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.

### 3-6-3 Electrical specifications



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

#### 3-6-3-1 Verification of the LOGIQ E9'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 on the back of the LOGIQ E9 on lower rear frame of the LOGIQ E9.

#### 3-6-3-2 Electrical specifications for LOGIQ E9

See: Table 2-3 on page 2-3 for the electrical specifications for LOGIQ E9 include LCD and on board peripherals.

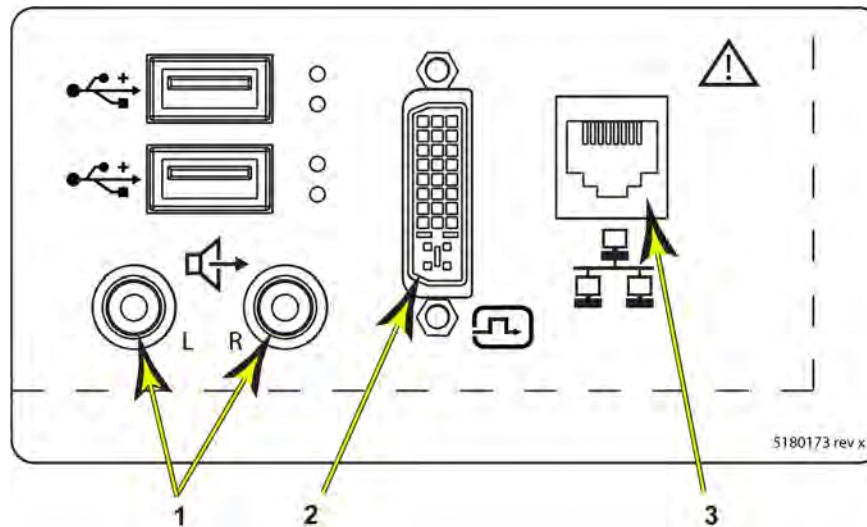
### 3-6-4 Connections on the I/O Rear Panel

**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 LOGIQ 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.*

#### 3-6-4-1 Connect Ethernet

Connect the Ethernet cable to the Ethernet connector (3) on the External I/O (rear side of LOGIQ E9).

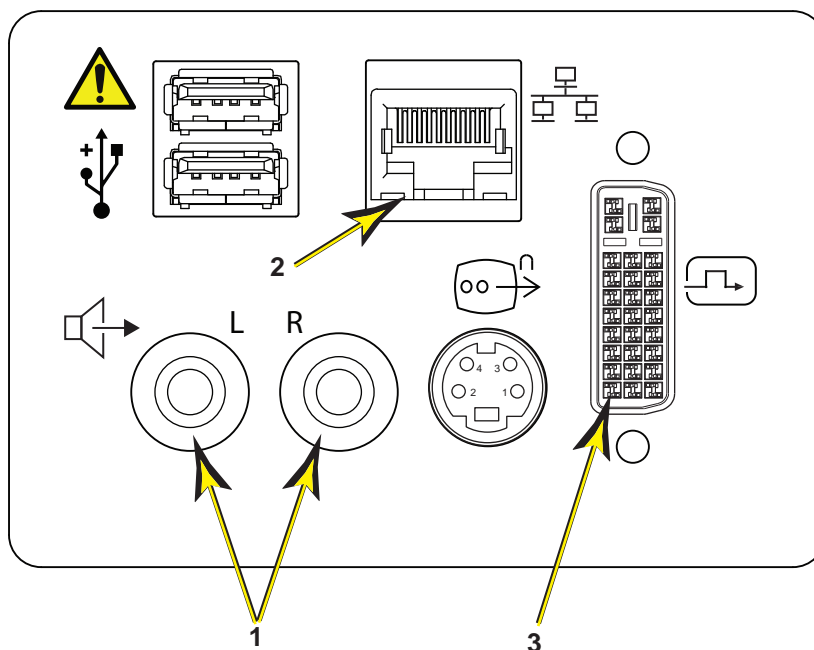
**Figure 3-7 Ethernet, Audio (1) and DVI-I (2) connection for External Monitor on rear side of LOGIQ E9 - R3.x and earlier**





### 3-6-4-1 Connect Ethernet (cont'd)

Figure 3-8 Audio (1), Ethernet (2) and DVI-I (3) connection for External Monitor on rear side of LOGIQ E9 - R4.x



**CAUTION** To avoid breaking the back cover while opening it in order to connect up the network cable, use a flat blade screw driver or plastic card and pull hard to open up the back cover door.

### 3-6-4-2 Connect USB Flash Drive

Refer to the current revision of the LOGIQ E9 Basic User Manual, Chapter 3, Section 7.

## 3-6-5 Connections on the Patient I/O panel

### 3-6-5-1 Connect ECG

Refer to Chapter 10 in the Basic User Manual for more information.

## 3-6-6 Connecting Probes

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

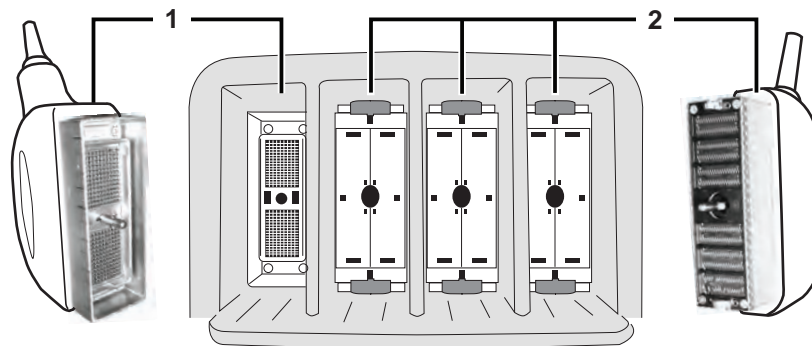
Probes can be connected at any time, whether the unit is on or off.

R3.x and earlier LOGIQ E9s have two types of probe ports: one non-DLP probe port and three DLP probe ports (Figure 3-10). R4.x LOGIQ E9s have one type of probe ports: four DLP probe ports (Figure 3-9).

The non-DLP probe port is compatible with the S1-5, S4-10, 6Tc (TEE probe), and 3CRF probe connectors.

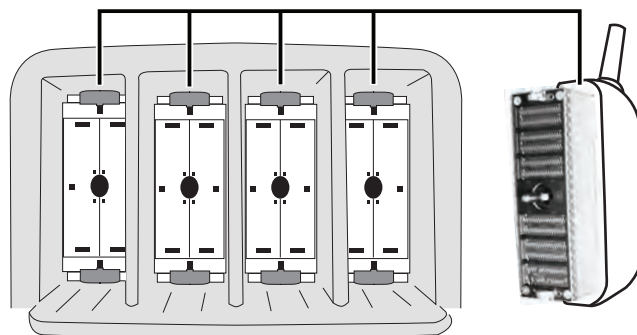
The three DLP probe ports are specific to the LOGIQ E9 probe connectors.

**Figure 3-9 Probe connectors - (1) Non-DLP and (2) DLP Probe Port - R3.x and earlier**



R4.x and later LOGIQ E9s have one type of probe ports: four DLP probe ports (Figure 3-10).

**Figure 3-10 Probe connectors, four DLP Probe Ports - R4.x**



### 3-6-6-2 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.**

- 1.) Before connecting the probe:
  - a.) Perform a visual check of the probe pins and LOGIQ E9 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.



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

### 3-6-6-3 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: [10-6-4 "Cleaning" on page 10-11](#) for cleaning instructions.



**CAUTION REFER TO THE TEE PROBE MANUAL FOR FURTHER INSTRUCTIONS (DIRECTION KZ192871).**

## 3-6-7 Power On/Boot Up

### 3-6-7-1 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** LOGIQ E9 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 LOGIQ E9 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 seconds. When turning OFF the Circuit Breaker, WAIT until the ON/OFF button is no longer lit. The LOGIQ E9 should de-energize completely before turning the circuit breaker ON.

### 3-6-7-2 Detailed Procedure

For a detailed procedure, see: [4-2-3 "Power ON/Boot Up" on page 4-3.](#)

### 3-6-7-3 Connect AC (mains) Power to the LOGIQ E9

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

**NOTE:** *The LOGIQ E9 will function on Voltages from 100-240 Volts and 50 or 60 Hz. However, if using 220 volt power, then a center tapped power source is required (North America Only).*

- 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 3-11 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.

### 3-6-7-4 Switch ON the AC Power to LOGIQ E9

- 1.) Switch ON the Mains Power Circuit Breaker at the rear of the unit. The **ON/OFF** button will become amber.

Figure 3-12 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. The **ON/OFF** button will turn amber. This indicates that there is power to the PS, but the system is OFF.

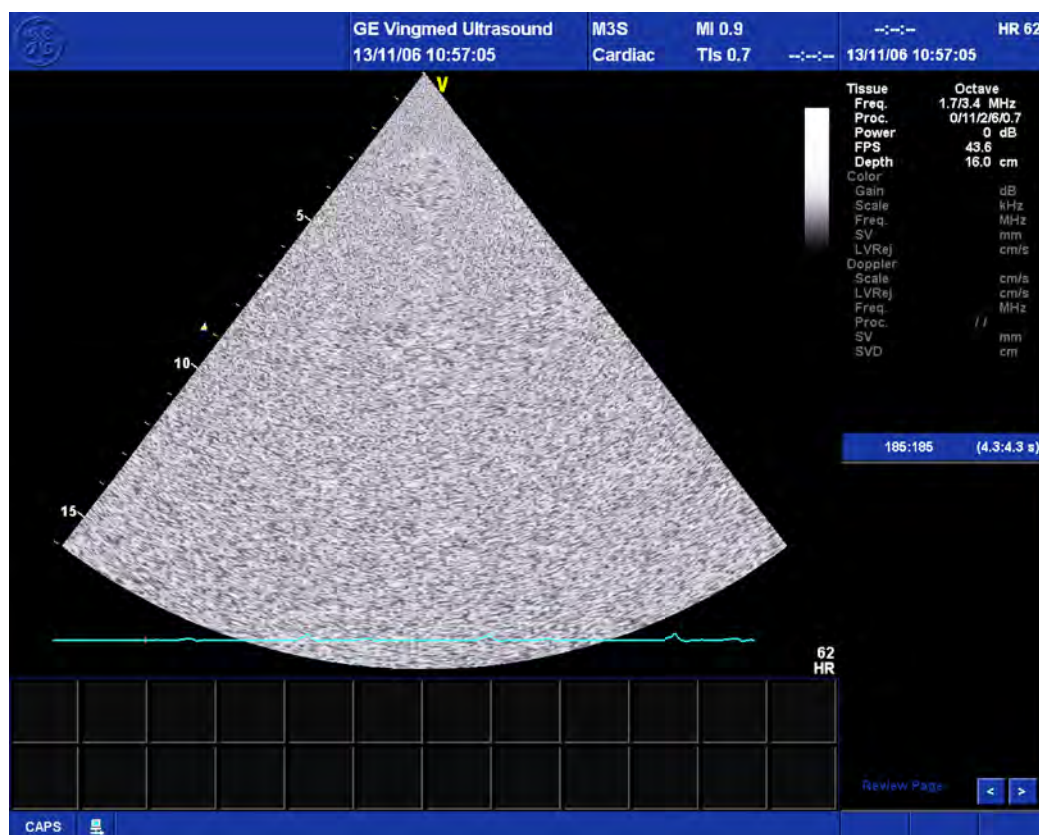
- 2.) Press once on the **ON/OFF** button on the Operator Panel to boot the unit. The **ON/OFF** button will turn green when it is pressed.

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 the LOGIQ E9 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.
- 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.
- 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.

3-6-7-4 Switch ON the AC Power to LOGIQ E9 (cont'd)

Figure 3-13 2D Screen on the display



**NOTE:** Total time used for start-up is typically less than 170 seconds. When using the sleep mode (R2.x.x or later), start-up time is less than 120 seconds. If starting after a power loss or a lock-up, the start-up time may be up to four minutes.

### 3-6-8 Power shut down

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

**Figure 3-14 System - Exit menu - R1.x.x**



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, press the ON/OFF button or Alt F10 to shut down the unit.
- **Cancel**  
Use this button to exit from the System-Exit menu and return to the previous operation.



### 3-6-8.....Power shut down (cont'd)

**Sleep mode** (only available in LOGIQ E9 running R2.x.x and R3.x.x software).

Figure 3-15 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, press the ON/OFF button or Alt F10 to shut down the unit.
- **Cancel**  
Use this button to exit from the System-Exit menu and return to the previous operation.

### 3-6-9 Complete power down

- 1.) Press once on the **ON/OFF** button on the Operator Panel to display the **System - Exit** menu.

**Figure 3-16 Press once on the ON/OFF button**



### 3-6-9.....Complete power down (cont'd)

Figure 3-17 System - Exit menu (R1.x.x)



Figure 3-18 System - Exit menu (R2.x.x and R3.x.x)



- 2.) Select **Shutdown** to do a complete power down of the unit.

The Back End Processor will first turn off the LOGIQ E9 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.



**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 Drive, making the system fail later.

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


---

### 3-6-9.....Complete power down (cont'd)

#### 3-6-9-1 Sleep Mode

Only available in LOGIQ E9 running R2.x.x and R3.x.x software.

Use Sleep Mode when you do a portable exam in order to reduce the time to start up the system. When you use Sleep Mode, it only takes 90 seconds to start up the system versus 2-3 minutes. To activate Sleep Mode, press the **ON/OFF** button and select **Sleep**.

 **NOTICE** For optimum system operation, it is recommended that a full shutdown of the system is performed at least once every 24-hour period. If you shut down the system at the end of the day, no other action is needed.

Before returning a system to the customer, perform the functional checks. See: [Section 4-3 "Functional checks" on page 4-33](#).

## Section 3-7 Configuration

### 3-7-1 Purpose of this section

This section describes how to configure the LOGIQ E9.

### 3-7-2 LOGIQ E9 configuration

For complete instructions, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 16.

#### 3-7-2-1 System Configuration

- Set Device Destinations (see: [4-2-15-5 "Connectivity — Recording Device Destination settings" on page 4-23](#)).
- Set Dataflow (see: [4-2-15-6 "Connectivity — Recording Dataflow settings" on page 4-24](#)).
- Set Buttons (see: [4-2-15-7 "Connectivity — Recording the Print Key Assignments" on page 4-25](#)).
- Set up System Admin (see: [4-2-15-9 "Admin — Recording the Software Option Keys" on page 4-28](#)).
- Set up Users (see: [4-2-15-10 "Admin — Users" on page 4-29](#)).
- Set up Backup management (see: [4-2-15-11 "System — Data Store Management" on page 4-30](#)).
- Set up Peripherals (see: [4-2-15-12 "System — Recording Peripheral settings" on page 4-31](#)).
- Set up Keyboard: language and regional settings. (For complete instructions, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 16.)

### **3-7-3 Optional Peripherals/Peripheral Connection**

#### **3-7-3-1 Approved Internal Peripherals (Optional)**

This list covers the internal peripherals available for LOGIQ E9:

- Printer, Monochrome (Black and White), Digital, SONY.
- Digital Video Recorder (DVR). Refer to the current revision of the LOGIQ E9 DVR Option Installation Manual (5180205-100).
- USB Flash Drive. Refer to the current revision of the LOGIQ E9 User Manual.
- 4D Motor Controller. Refer to the current revision of the LOGIQ E9 Options Manual, Direction 5180288-100.
- Volume Navigation. Refer to the current revision of the LOGIQ E9 Options Manual, Direction 5180409-100.
- WLAN (Wireless LAN R2.x.x or later)
- Patient I/O (ECG Option R2.x.x or later)

#### **3-7-3-2 Approved External Peripherals (Optional)**

The external printers are connected via Ethernet (TCP/IP Network) as DICOM devices.

- DICOM Printers. Connected via Ethernet (TCP/IP Network or WLAN) as DICOM devices.
- USB Printers. Support CANON PIXMA MP610 as report/image printer.
- USB Footswitch

#### **3-7-3-3 Additional Information**

See: [Section 9-15 "Peripherals" on page 9-47](#) for replacement units.

### 3-7-3-4 Printer/DVR Checks

Check that Printer/DVR work as described below:

**Table 3-6 Peripheral Checks**

Step	Task to do	Notes
1.	Press Freeze.	Stops image acquisition.
2.	Press (Print 1), (Print 2), (Print 3) or (Print 4) on the Control Panel	Prints image displayed on the screen on Black and White or Color printer, depending on the key assignment configuration.
3.	Press [VIDEO] icon on the Control Panel.	Brings up the DVR Touch Panel (if the customer has the DVR option).
4.	Press [VIDEO] icon on the Control Panel	Returns to the scanning mode
5.	Press [RECORD] icon on the Control panel.	Starts Recording.
6.	Press [PLAY] icon on the Control panel.	Plays back an examination.
7.	Press [STOP] icon on the Control panel.	Stops recording.

### 3-7-3-5 Turn OFF Power to LOGIQ E9

See: [3-6-8 "Power shut down" on page 3-26.](#)

## 3-7-4 Available Probes

See: [Section 9-18 "Probes" on page 9-63.](#)

## 3-7-5 Software Options Configuration

### 3-7-5-1 Software Option Installation

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

### 3-7-5-2 Installing a Software Option

- 1.) From the Touch Panel, select **Utility -> Admin -> System Admin**
- 2.) Enter the new option key code in the SW Option Key section.

Figure 3-19 System Admin screen, R1.x.x - Add button

The screenshot shows the 'System Admin' screen with tabs for 'System Admin', 'Users', and 'Logon'. The 'Product' field is set to 'Radiology.Ichiro' and the 'HW Number' is empty. In the 'SW Option Key' section, the 'Add' button is circled in yellow. Below it, the 'Enter New Option Key' field is empty, and the 'Installed Option Keys' list contains two entries: 'B77BF-YPS3Q-TXHYA-CHUKN-UNN88' and 'B8LHJ-86A55-9RL75-2AD3U-33J8N'. A 'Remove' button is located to the right of the installed keys. At the bottom, the 'Service' section has a checkbox for 'Enable Automatic Request for Service' which is checked.

Option	Status
CodedContrast	Valid until:01/19/2009
Dicom	Valid until:01/19/2009
Scan Assistant	Valid until:01/19/2009
LOGIQView	Valid until:01/19/2009
OnBoardReporting	Valid until:01/19/2009
TUI	Valid until:01/19/2009
VOCAL_II	Valid until:01/19/2009
VCI-Static	Valid until:01/19/2009
Volume Navigation	Valid until:01/19/2009
True3D	Valid until:01/19/2009
4D	Valid until:01/19/2009

Figure 3-20 System Admin screen, R2.x.x or later- Add button

The screenshot shows the 'System Admin' screen for R2.x.x or later. The 'Product' field is set to 'Radiology.Ichiro' and the 'HW Number' is 'E00549'. In the 'SW Option Key' section, the 'Add' button is circled in yellow. Below it, the 'Enter New Option Key' field is empty, and the 'Installed Option Keys' list contains six entries: 'BGVTA-NYN3Y-8CCWM-MLQRT-ZWBCK', 'BN6MA-VTH73-JWJGN-LGHZN-U2JPW', 'BGVTA-NYN3Y-8CCWM-MLQRT-ZWBCK', 'BGVTA-NYN3Y-8CCWM-MLQRT-ZWBCK', 'BYRAK-HMUEB-T5H95-Y47UW-GBNZZ', and 'BFHSW-EZ9SB-KRSHU-F2TPW-8TSHE'. A 'Remove' button is located to the right of the installed keys. At the bottom, the 'Service' section has a checkbox for 'Enable Automatic Request for Service' which is checked.

Option	Status
CodedContrast	Valid until:01/19/2010
Dicom	Valid until:01/19/2010
Scan Assistant	Valid until:01/19/2010
LOGIQView	Valid until:01/19/2010
OnBoardReporting	Valid until:01/19/2010
TUI	Valid until:01/19/2010
VOCAL_II	Valid until:01/19/2010
VCI-Static	Valid until:01/19/2010
Volume Navigation	Valid until:01/19/2010
True3D	Valid until:01/19/2010
4D	Valid until:01/19/2010
Elastography	Valid until:01/19/2010
TVI	Valid until:01/19/2010
WirelessLAN	Valid until:01/19/2010
AutoIMT	Valid until:01/19/2010
BT 2010	Valid until:01/19/2010

- 3.) Select the **Add** button.

 **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.**

- 4.) Press Save to save the new setting.
- 5.) Restart to save and activate the settings and adjustments you have done so far.



### 3-7-5-2 Installing a Software Option (cont'd)

- 6.) Enter the new option key code in the SW Option Key section.
- 7.) Select the **Add** button.



**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.**

- 8.) Press Save to save the new setting.
- 9.) Restart to save and activate the settings and adjustments you have done so far.

## Section 3-8 Connectivity overview

**NOTE:** *If you are new or unfamiliar to connectivity on the LOGIQ E9, read Chapter 16, Customizing Your System, of the Basic User Manual before you continue with the next descriptions and procedures.*

### 3-8-1 Physical connection

#### 3-8-1-1 Stand-alone LOGIQ E9

No network connection needed.

#### 3-8-1-2 Sneaker Net environment

No network connection needed.

#### 3-8-1-3 Wired Ethernet from LOGIQ E9 to a Workstation

3-8-1-3-1 Direct Cable Connection from the LOGIQ E9 to a Workstation via a Crossover Cable.

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

- 1.) Connect one end of the crossed network cable to the network connector on the LOGIQ E9.
- 2.) Connect the other end to the network connector to the Workstation, see the Workstation Service Manual.

3-8-1-3-2 Connection via a Peer-to-Peer Network

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

3-8-1-3-3 Connection via Hospital Network

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

#### 3-8-1-4 Connection using Wireless Option (R2.x.x or later)

Refer to:

- R2.x.x and R3.x.x, see: [8-6-8-3 "WLAN - Set up and Check" on page 8-142.](#)
- R4.x and later, see: [8-11-23-3 "WLAN Set-up" on page 8-478](#)
- Chapter 5 for theory.
- Chapter 16, Configuring Connectivity of the LOGIQ E9 Basic User Manual.

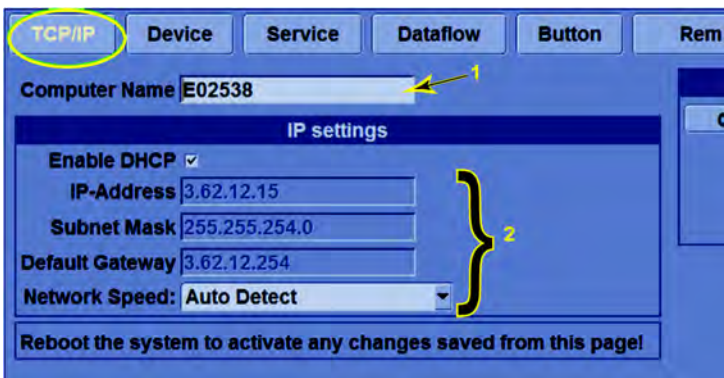
## Section 3-9 Connectivity Setup and Tips

Refer to the LOGIQ E9 Basic User Manual and see: Section ["3-9-1 Setup the LOGIQ E9 for DICOM Communications for R2.x.x Software \(some features only apply to R3.x.x\) \(cont'd\)" on page 3-38](#) for more information.

TOPICS covered in this Section:

### 3-9-1 Setup the LOGIQ E9 for DICOM Communications for R2.x.x Software (some features only apply to R3.x.x)

Table 3-7 Utility -> Connectivity -> TCP/IP screen

	
1.	Enter the LOGIQ E9 computer name. This may be the same as the station name.
2.	<p>Enter the LOGIQ E9 IP address, subnet mask, default gateway and network speed. For automatic assignment of IP address, subnet mask and default gateway, select <b>DHCP</b>.</p> <p><i>NOTE: If possible, set the LOGIQ E9 Network Speed to match that of the Network switch. If in doubt, set it to AutoDetect. Otherwise, transfer times can be two to five times longer, during which the LOGIQ E9 will appear to be locked up. (If the Hard Drive activity light on the front of the console is lit steady or blinks quickly, the LOGIQ E9 is most likely not hung.)</i></p>

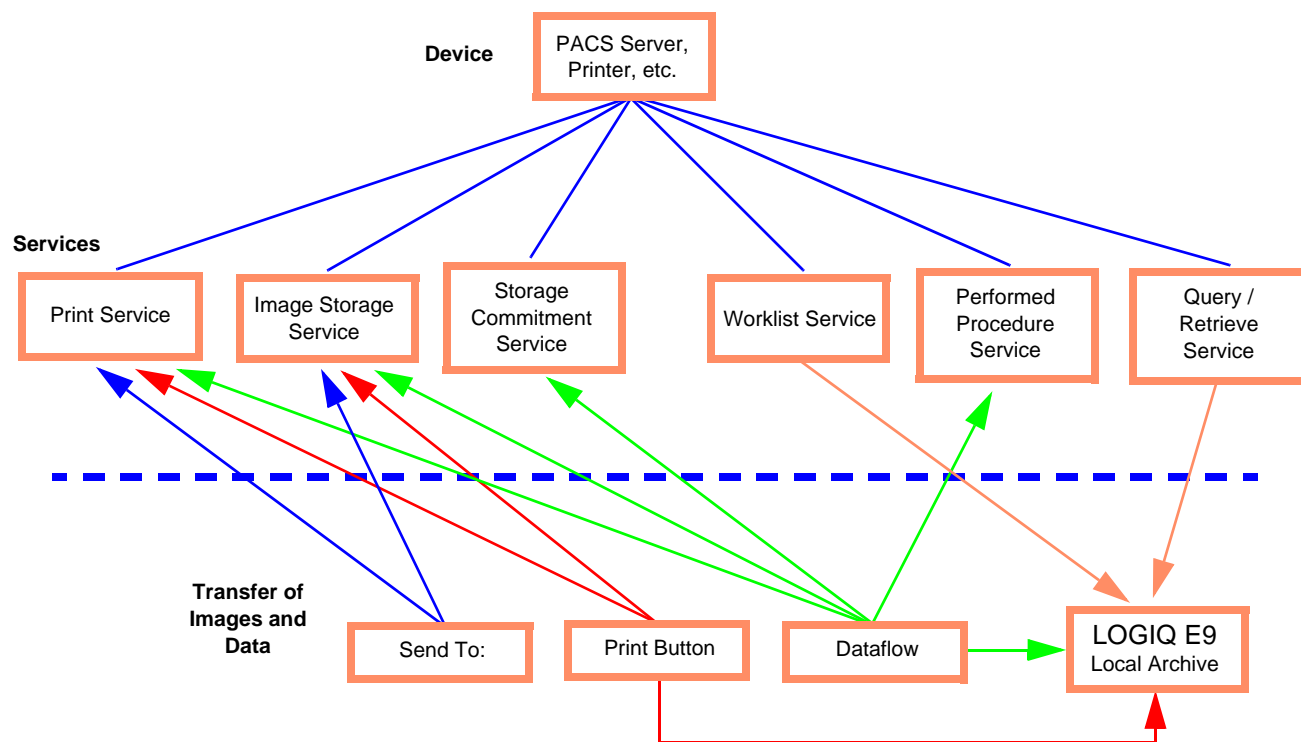
3-9-1 ‘’’’Setup the LOGIQ E9 for DICOM Communications for R2.x.x Software (some features only apply to R3.x.x) (cont’d)

Table 3-8     Utility -> Connectivity -> Device screen

<div></div>	
1.	Select <b>MyComputer</b> .
2.	Assign an AE Title to the LOGIQ E9. (AE stands for Application Entity. DICOM services use this to identify the LOGIQ E9.) AE Title is case-sensitive. This title may contain the Computer Name from the TCP/IP page, if desired.  <i>NOTE: It is NOT recommended to use the factory default. This is not prohibited, but more than one system with the same AE Title can cause confusion.</i>
3.	Edit the Port Number if needed. “ <b>104</b> ” is typical. Save your changes and reboot the system.

## 3-9-2 Devices, Services, Dataflows and Print Buttons

Figure 3-21 Dataflows



A device is a physical unit, separate from the LOGIQ E9, where images and data can be stored and shared. A device provides various services to the LOGIQ E9.

To represent the device on the LOGIQ E9, add it in **Utility -> Connectivity -> Device**.

To represent the services of the device(s) on the LOGIQ E9, add them in **Utility -> Connectivity -> Service**.

Set up Dataflows and Print Buttons to direct images and data to the services.

Use **Utility -> Connectivity -> Dataflow** and **Utility -> Connectivity -> Button**.

A dataflow stores images in the clipboard to the local Hard Disk Drive. When the exam ends, the dataflow sends the images to the services assigned to it. (A Direct Store setting on the dataflow changes this behavior. See: 1.) ["Dataflow" on page 3-48.](#))

A print button sends an image to the services assigned to it whenever pressed. A print button also stores the image locally (to the "clipboard") if "Copy to Dataflow" is assigned to it.

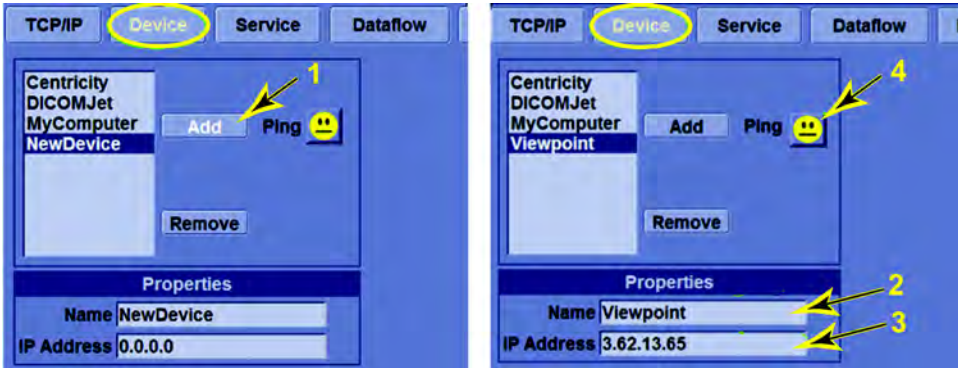


**Send To** (in the Exam View tab) sends an existing exam's images and other data to one service at a time. See: 3.) ["Send To" on page 3-48.](#))

Worklist and Query/Retrieve services transfer data to the LOGIQ E9. See: 3-9-4-5 ["How to Setup and Use a DICOM Worklist Service" on page 3-57](#) and 3-9-4-9 ["How to Setup and Use a DICOM Query/Retrieve \(Q/R\) Service" on page 3-68.](#)

Keep in mind that the settings of a print button that stores an image on the LOGIQ E9 determine the format of the image file stored locally. A service's settings dictate the format of the file that is sent to the service.

### 3-9-3 How to Get the LOGIQ E9 to Recognize another Device on the Network

Table 3-9 Utility -> Connectivity -> Device screen

	
1.	Press <b>Add</b> . The system creates a device called "NewDevice."
2.	Change the name to one of your choosing.
3.	Enter the IP address of the device.
<p style="text-align: center;"><b>Ping / Smiley</b></p> <div style="text-align: center;">   </div>	
4.	<p>Save your changes and then press <b>Ping</b>. A "<b>Smiley Face</b>" indicates successful communication between your LOGIQ E9 and the device. A "<b>Frown</b>" indicates failed communication. Check the following:</p> <ul style="list-style-type: none"> <li>• Is the device running?</li> <li>• Is it connected to the network?</li> <li>• Did you enter the right IP address?</li> </ul>

### **3-9-4      How to Setup and Use a DICOM Image Storage Service**

An Image Storage Service provides a place to store patient and exam data from the LOGIQ E9 and corresponding images. The Image Storage Service, or the device that hosts it, is often called a Patient Archiving and Communication System (PACS).

3-9-4-1 Initial Steps

To setup an Image Storage Service on the LOGIQ E9, follow these steps:

Table 3-10 Initial Steps - Setup an Image Storage Service

R3.x and earlier

R4.x and later



**Table 3-10 Initial Steps - Setup an Image Storage Service**

1.	In <b>Utility</b> -> <b>Connectivity</b> -> <b>Service</b> , from the Destination Device drop-down menu, select the device on which the service resides. (This assumes you have already setup the device in the Device tab in <a href="#">3-9-1 "Setup the LOGIQ E9 for DICOM Communications for R2.x.x Software (some features only apply to R3.x.x)"</a> on page 3-37).
2.	From the <i>Select Service Type to Add</i> drop-down menu, select <b>DICOM Image Storage</b> and press <b>Add</b> .
3.	Change the name of the service to one of your choosing.
4.	Enter the AE Title and Port Number of the service. AE Title is case-sensitive.
5.	<p>Save your changes and press <b>Verify</b>. A Smiley Face indicates successful communication with the service.</p> <p><i>NOTE: If you get a successful Ping (Smiley Face) at the device level but not at the service level, it is possible that the AE Title or Port Number of the service settings are incorrect. Ensure that these are correct then re-verify. Be sure that the service type (Store, Print, etc) is correct and supported by the device.</i></p>

### 3-9-4-2 Properties

Maximum Retries, Retry Interval, and Timeout are used by the Retry protocol when the LOGIQ E9 encounters communication problems with a service:

**Table 3-11 Properties**

Maximum Retries, Retry Interval, Timeout	
<b>Timeout</b>	How many seconds the LOGIQ E9 should attempt to establish communications with the service
<b>Maximum Retries</b>	How many times to attempt to establish communication again in the event of failure
<b>Retry Interval</b>	How many seconds to wait between each retry attempt
Using the values in <a href="#">Table 3-10 "Initial Steps - Setup an Image Storage Service" on page 3-42</a> (which are the default and recommended settings), the LOGIQ E9 will attempt to establish communications for 30 seconds, up to three times (the original attempt and two retries), with a gap between each attempt of 10 seconds.	
<b>Allow Multiframe</b>	<p>When a print button is set to RawDicom Single (see: <a href="#">2.) "Print Button" on page 3-56</a>), and the user presses it while scanning live, it stores a single DICOM frame (bitmap of the image), along with the raw-data of the image. The raw data allows the system to treat this as a multi-frame image (cine clip) because it can regenerate the multiple frames from the raw data when the situation calls for it.</p> <p>One such situation is "Allow Multiframe." It instructs the LOGIQ E9 to generate a multi-frame image to send to the service in the event that the clip was stored via a print button set to RawDicom Single. When the time comes to send the clip to the service, the LOGIQ E9 will generate a multi-frame from the raw data before putting it on the spooler. Such multi-frames are not permanently stored on the LOGIQ E9 local hard drive.</p> <p><i>NOTE: "Allow Multiframe" is relevant only for clips stored via a print button set to RawDicom Single. Images stored with either "Dicom &amp; Multiple" or "RawDicom &amp; Multiple" print button settings are always transferred as multi-frame images, regardless of the setting for "Allow Multiframe."</i></p>
<b>R4.x and later Allow Clips</b>	Loops (RawDicom & Single or DICOM Multiframe file) shall be transferred only if this option is checked. Default state should be checked.
(continued on next page)	

Table 3-11 Properties

<b>Allow Raw Data</b>	<p>This will transfer the raw data of an image, if the image was stored as RawDICOM. Checkmark this when transferring to a service that can interpret GE-proprietary raw image data, such as Centricity. If it is checked when sending to a service that does not support GE raw data, the service may accept the image but ignore the raw data, or may not accept the image.</p> <p><i>NOTE: The LOGIQ E9 stores raw data in a DICOM private tag in an image file. A PACS may delete all private tags, or it may leave them intact, or it may allow configuration in this regard. Keep this in mind if you later want to retrieve raw data images from the service.</i></p>
<b>R4.x and later Allow Enhanced DICOM Objects</b>	Enhanced DICOM objects shall only be transferred if this option is checked. Default state should be unchecked.
<b>R4.x and later Still Image Compression</b>	This compresses still image files prior to sending them to the service.
<b>R4.x and later Clip/Volume Compression</b>	This compresses loops /enhanced DICOM files prior to sending them to the service.
<b>Compression</b>	<p>This compresses image files prior to sending them to the service. Compression takes time, but saves time when the image is transferred. Also, storage space on the service is reduced with compression. Set the compression type to one the service accepts.</p>
<p><b>Compression Formats</b></p> <p><i>NOTE: Determine which compression formats the service accepts. Using an incorrect format will cause problems that can be hard to troubleshoot.</i></p>	
<b>None</b>	No compression occurs.
<b>RLE</b>	Run-length Encoding – compression that does not lose any data that will degrade image quality (so-called “lossless” compression).
<b>JPG</b>	Joint Photographic Experts Group – compression that provides both lossless and lossy (image quality degradation) settings. Select this and a “Quality %” field appears, in which you can select “lossless” or various numeric settings; the higher the setting, the less image data is compressed (bigger image file) and the less image quality is degraded.
<b>JPEG2000</b>	Improved version of JPEG that, compared to JPEG, maintains the same image quality in a smaller image file, or provides better image quality in a file of the same size.
(continued on next page)	

Table 3-11 Properties

<b>Max Framerate</b>	<p>This controls the maximum number of frames per second that are transferred:</p> <ul style="list-style-type: none"> <li>• <b>25, 30</b> – Certain high-frame-rate applications like cardiology can generate very large datasets. Use 25 or 30 to decimate image frames as desired to send no more than 25 or 30 frames per second. This can affect image quality.</li> <li>• <b>Full</b> - no frame rate decimation occurs (frames are not dropped). In radiology, frame rates are typically under 25-30 so Full should be an acceptable setting.</li> </ul>
<b>Color Support</b>	<p>This controls when color appears in images sent to the service:</p> <ul style="list-style-type: none"> <li>• <b>Gray</b> – Regardless of color in the image area, or in annotation (comments, measurements, arrows, body patterns, depth scale, title bar), images sent to the service will be in shades of gray. (In DICOM terms, the Gray setting forces images to be sent in MONOCHROME2 format.)</li> <li>• <b>Color</b> – Even if there is no color in the image area itself, an image sent to the service will still have color, even if only the title bar and depth scale have color. (The Color setting forces images to be sent in RGB format.)</li> <li>• <b>Mixed</b> – If the image area itself has color, an image sent to the service will have color; otherwise, the image will be in shades of gray. (The Mixed setting sends images as is, without conversion.)</li> </ul> <p><i>NOTE: Color is recommended unless the user wants to reduce image storage size. Then, Mixed is suggested.</i></p>
(continued on next page)	
<b>Reopen Per Image</b>	<p>The creates an “association” with the service prior to sending images to it. Think of it as a handshake. When check-marked, “Reopen Per Image” causes the to create an association with the service for each image in a group of images and to release that association after each image is transmitted. When it is unchecked, the creates only one association prior to sending any images, and doesn’t release it until all images have been sent. Reopen Per Image is common for CT or MR, where associations are used to distinguish views (one association for each view). This is not a typical use for Ultrasound. Unless you have a specific reason to create an association for each image, leave this option unchecked.</p>
<b>Enable Structured Reporting</b>	<p>A Structured Report is a non-image DICOM data file that contains measurements and calculations of an exam. If you want to transmit a Structured Report, check <b>Enable Structured Reporting</b>.</p>
(continued on next page)	

Table 3-11 Properties

<b>Key Image Notes</b>	<p>Key Image Notes (KIN) provides a way in DICOM to convey certain information and requests about images in an exam between the and the service. The supports one KIN mode: Image Rejection. Image Rejection indicates which images in a currently-open exam should be deleted.</p> <p>To use Image Rejection, assign the service to a dataflow, and check the <b>Direct Store</b> dataflow setting. When the user scans with this dataflow in an exam, deletes one or more images in the clipboard and ends the exam, the sends a KIN DICOM object to the service. This object lists the images to be rejected. The service either deletes the images or tags them with a label such as "Rejected for Quality Reasons."</p>
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### 3-9-4-3 Sending Images and Data to a DICOM Image Storage Service

The provides three ways to send images and data:

- 1.) Dataflow
- 2.) Print Button
- 3.) Send To

#### 1.) Dataflow

The default setup stores images in its local Hard Disk Drive. A dataflow allows the to send images to other locations as well.

To setup a dataflow, follow these steps:

**Table 3-12 Dataflow**

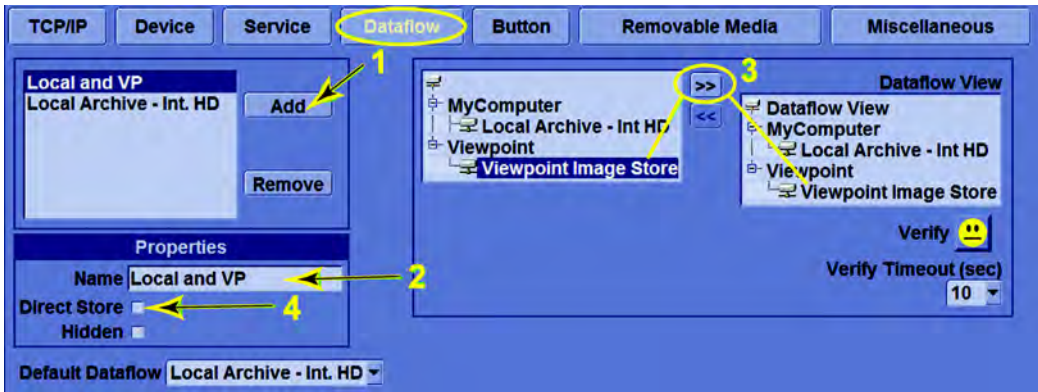
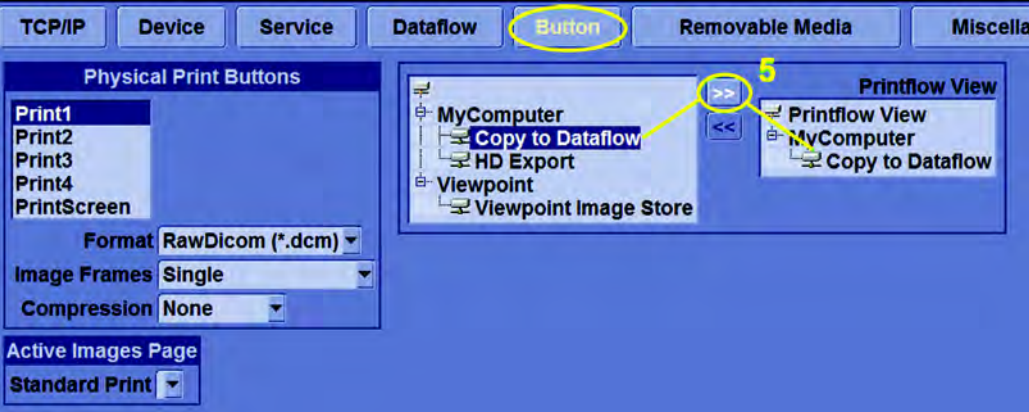
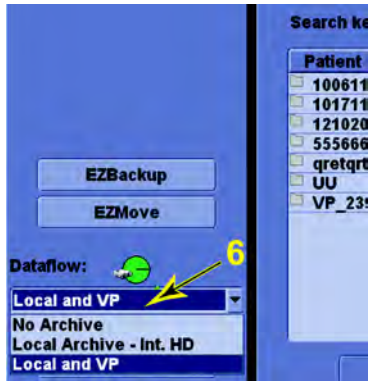
Utility -> Connectivity -> Dataflow screen	
	
1.	Navigate to <b>Utility -&gt; Connectivity -&gt; Dataflow</b> ; press <b>Add</b> . The system creates a dataflow called "NewDataflow."
2.	Change the name to one of your choosing.
3.	Notice the list of available services to the left of the << and >> buttons. Select each DICOM service you want to attach to your dataflow and press >>. This makes it appear in the list on the right, indicating that the service is now assigned to the dataflow.  <i>NOTE: You cannot remove "Local Archive – Int HD" from the dataflow. This guarantees that images will be saved on the local Hard Disk Drive of the and not just transmitted to the service.</i>
4.	Check <b>Direct Store</b> if you want an image generated by a print button to immediately be sent to the dataflow's attached services rather than waiting until the exam is ended for all images.  <i>NOTE: If you plan to generate long cine loops, "Direct Store" is NOT recommended (either on the dataflow or via a Print button directly), because system response may be slow.</i>
(continued on next page)	

Table 3-12 Dataflow

	<p style="text-align: center;">Utility -&gt; Connectivity -&gt; Button</p> 
<p>5.</p>	<p>Navigate to <b>Utility -&gt; Connectivity -&gt; Button</b>, select a print button and add "Copy to Dataflow" to its Printflow View. DO NOT add the DICOM Image Storage Service to the Printflow as you would run the risk of sending each image to the service twice. Set the other parameters of the print button as you choose, using "Print Button Settings" in section <a href="#">Table 3-14 "Print Button Settings" on page 3-51</a> as a guide; but keep in mind that the settings of the service will override the settings of the button for the images sent to the service.</p>
	<p style="text-align: center;">Patient Page - Dataflow Drop-down Menu</p> 
<p>6.</p>	<p>Back on the Patient page, select your dataflow from the drop-down menu. From that point on, pressing your configured print button sends your images to the service(s) added to your dataflow.</p> <p><i>NOTE: Whenever you change the settings of a dataflow, before you use it, select a different dataflow or "No Archive" on the Patient screen, and then reselect the changed dataflow. This forces the to read the modified resource file and implement your changes. If you change the settings of any service to which the dataflow directs traffic, you do not need to reselect it.</i></p>

### 3-9-4-3 Sending Images and Data to a DICOM Image Storage Service (cont'd)

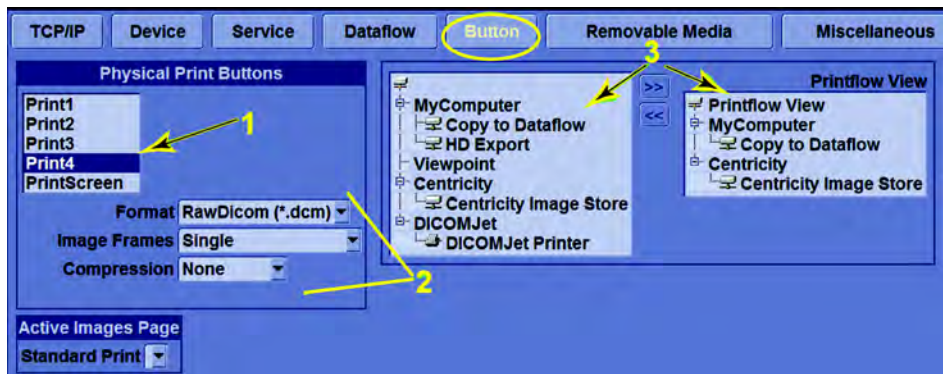
#### 2.) Print Button

The typical use for a print button is to copy to dataflow. However, the print button can be set up for image transfer to a DICOM Image Storage service as a quick way to accomplish “direct store” to that service without having to setup a dataflow. Each image is immediately sent to the service rather than waiting until the exam is ended for all images to be transferred. Another use of this technique is to send existing images directly to a PACS.

**NOTE:** If you plan to generate long cine loops, it is NOT recommended to use “Direct Store” (either on the dataflow or via a print button directly) as the system response may be slow.

To setup a Print Button for this purpose, follow these steps:

**Table 3-13 Print Button Setup**

	
1.	In <b>Utility -&gt; Connectivity -&gt; Button</b> , select one of the “Physical Print Buttons.”
2.	Set Format, Image Frames, and Compression as desired. See: <a href="#">Table 3-14 "Print Button Settings"</a> on page 3-51.
3.	<p>Notice the list of available services to the left of the &lt;&lt; and &gt;&gt; buttons. Select each DICOM service you want to assign to your print button and press &gt;&gt;.</p> <p>(If you don't add “Copy to Dataflow” to the print button's Printflow, you will send images directly to the DICOM service(s) without having them stored permanently on the . With a dataflow, the images are always stored permanently in the database of the .)</p> <p>From this point on, pressing your configured print button immediately places the image on the spooler to be sent to the service(s) assigned to the button.</p> <p><b>NOTE:</b> If you are using a dataflow to which one of your DICOM services is assigned, DO NOT add that same service to a print button. If you do, two copies of each image may be sent to the service with each press of the print button.</p>



### 3-9-4-3 Sending Images and Data to a DICOM Image Storage Service (cont'd)

**Table 3-14 Print Button Settings**

Format	
<b>DICOM</b>	The resulting file contains DICOM data and a bitmap of the image. Use DICOM format to store to DICOM Print devices or to Image Storage services that do not support raw data. Raw DICOM can still be used in these cases, but it is best to uncheck the Allow Raw Data box on the service. This flexibility is why the system defaults to RawDicom (Single) for P1.
<b>RawDicom</b>	The resulting file includes the Raw Data, the DICOM data and a bitmap of the image. Use RawDicom format to store locally to the . This allows for numerous post-processing, non-acquisition actions and for the replay of cine loops without the overhead of storing multiple DICOM frames. (Loops are included in the raw data.) RawDicom can also be used to send to a PACS, such as Centricity and ViewPoint, which supports various degrees of raw data functionality.
<b>M&amp;A</b>	Use this to generate a Structured Report for the measurements and calculations of the exam currently open. See: <a href="#">3-9-4-8 "Structured Reporting" on page 3-66</a> for additional information.
Image Frames	
<b>Single</b>	Stores a single DICOM frame (bitmap of the image). Note that a raw-data loop is still available if used with RawDicom. This format captures the video area. It allows measurements without calibration.
<b>Multiple</b>	Stores multiple DICOM frames (one bitmap for each frame). Select this to either store multiple DICOM frames locally on the or to export cine loops to import elsewhere. This option requires more disk space and takes longer to store images after the print button is pressed. This format captures the image area only. It allows measurements without calibration.
<b>Secondary Capture</b>	Stores a screen capture of a selected area. Select this and another drop-down menu lets you select Image Area, Video Area, or Whole Screen for the capture area. A Secondary Capture contains no calibration data, just pixel data. Thus it requires manual calibration for measurements, if you recall the image on the or review it on the PACS. Measurements without calibration use pixels as the unit.
Independent of the Single, Multiple and Secondary Capture, dual and quad screen images are sent as secondary captures to a PACS. Measurements on these types of images are in pixels.	
Note about "bitmap": Bitmap does not refer to a file in ".bmp" format. The terms "image", "frame", and "bitmap" are interchangeable in a way. For multi-frame images it makes sense to say frame. On the other hand, DICOM is all about images; the image portion of the file (as opposed to the header) is really nothing more than a bitmap or screen capture.	
(continued on next page)	

Table 3-14    Print Button Settings

Compression	<p>Print buttons use the same formats as Compression on the Image Storage Service.</p> <p><i>NOTE: Suppose compression is specified on both a print button and on an image storage service, either assigned to the button or assigned to the dataflow in use. Also, suppose the compression settings are different. At the point the is to send an image generated by the print button to the service, the will first un-compress the compressed version of the print button, and then recompress it using the settings of the service. If the compression of the print button is lossy, the un-compression will not completely restore the original image. Then applying the compression of the service still generates a lossy image. The process of un-compressing and recompressing only has a negative impact on system performance.</i></p> <p><i>In general then, DO NOT use compression on a print key if images it generates end up getting sent to a service; or, IF YOU DO, use the exact same compression on the service.</i></p>
-------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

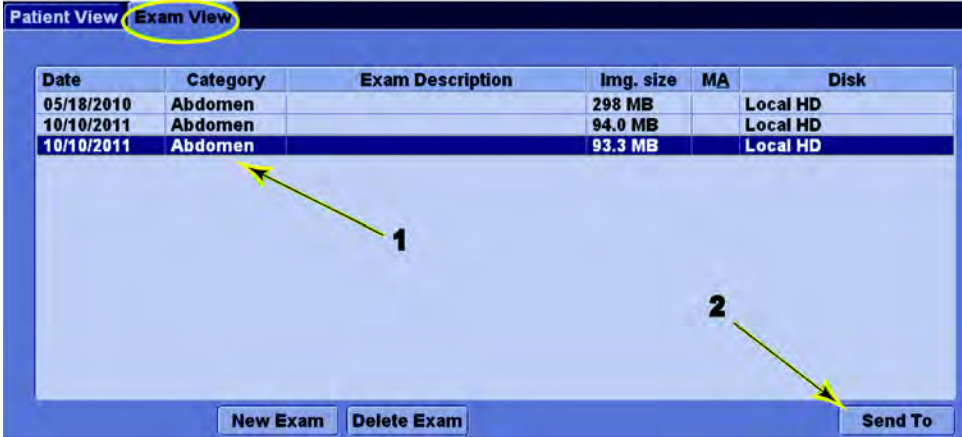

NOTE:    *Print button actions can also be modified per model (abdomen, etc.) by settings in Utility -> Application -> Print Controls. Inspect them when print button behavior differs from expected.*

### 3-9-4-3 Sending Images and Data to a DICOM Image Storage Service (cont'd)

#### 3.) Send To

Use **Send To** to send existing exams to a DICOM service. Follow these steps:

Table 3-15 Send To

	
1.	On the Patient screen, select the desired patient. In the <b>Exam View</b> tab, select the exam to transfer.
2.	Press <b>Send To</b> .
	
3.	A pop-up appears with a drop-down menu. Select any existing service to which images can be sent (typically, DICOM Image Storage and Print services). Select the desired service and press <b>OK</b> .
4.	Press <b>F4</b> to access the DICOM Job Spooler to can confirm successful transmission of the exam.

### 3-9-4-4 How to Setup and Use a DICOM Print Service

A DICOM printer is different from a typical network printer. It understands and accepts image files in DICOM format, and extracts and prints the images within.

#### Print Service Setup

To setup a Print Service on your , follow these steps:

**Table 3-16 Print Service Setup**

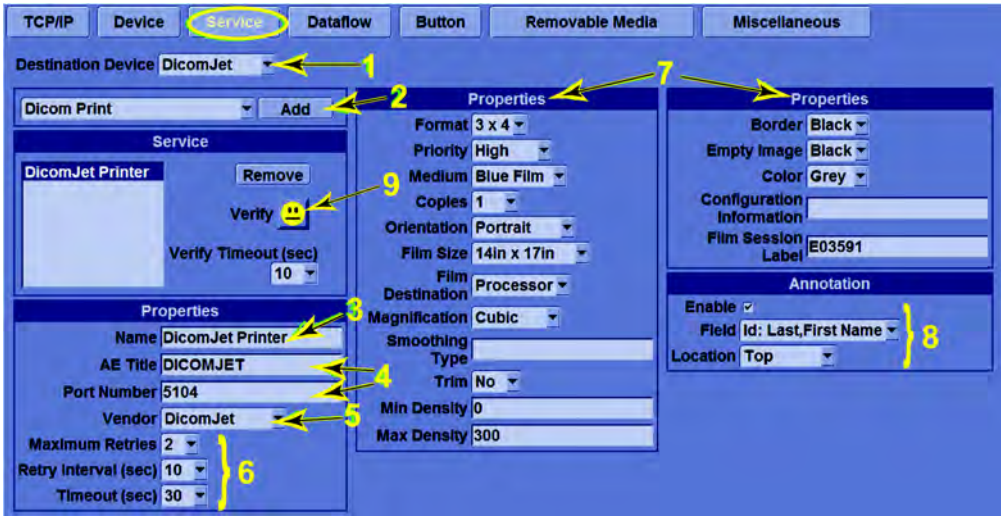
	
1.	In <b>Utility</b> -> <b>Connectivity</b> -> <b>Service</b> , from the Destination Device drop-down menu, select the device on which the service resides. (This assumes you have already setup the device in the Device tab.)
2.	From the Select Service drop-down menu, select <b>DICOM Print</b> and press <b>Add</b> .
3.	Change the name of the service to one of your choosing.
4.	Enter the AE Title and Port Number of the service. AE Title is case-sensitive.
5.	From the Vendor drop-down menu, select the vendor of the service printer. The system adjusts some of the Properties of the printer accordingly.
6.	Maximum Retries, Retry Interval and Timeout have the same use as with DICOM Image Storage Services. See: <a href="#">3-9-4-2 "Properties" on page 3-44</a> .
7.	Set the Properties of the printer as desired. Refer to the operator manual of the printer for preferred or expected settings. The graphic in this Table shows typical settings.
(continued on next page)	

Table 3-16 Print Service Setup

8.	<p>The allows you to annotate each image: check <b>Enable</b>. The Annotation section of the screen expands to let you set parameters for this feature:</p> <p>a.) <b>Field</b>: Combination of patient id, last name, and first name to appear in the annotation</p> <p>b.) <b>Location</b>: one or more of these, depending on the Vendor selected:</p> <ul style="list-style-type: none"><li>• <b>Top</b>: Annotation appears once, at the top of each sheet, whether one or more images are on the sheet</li><li>• <b>Bottom</b>: Annotation appears once, at the bottom of each sheet, whether one or more images are on the sheet</li><li>• <b>Per Image</b>: Annotation appears on each image</li></ul> <p>c.) <b>Format ID and Starting Position</b>: These are available only if the Vendor is "Other." "Other" settings and uses are beyond the scope of this document. Refer to the operator manual of the printer for guidance.</p>
9.	<p>Save your changes and press <b>Verify</b>. A Smiley Face indicates successful communication with the service.</p>

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#### 3-9-4-4 How to Setup and Use a DICOM Print Service (cont'd)

##### Print Service Use

As with a DICOM Image Storage Service, the provides three ways to send images to a Print Service:

- 1.) Dataflow
- 2.) Print Button
- 3.) Send To

The setups and uses are basically the same, except when the Format of the Print Service is set to something other than 1x1. Then, if the Print Service is tied either to a dataflow with Direct Store set, or to a print button, the will hold each image in its spooler until the number of images specified by Format is reached. For example, a Format of 3x4 specifies 12 images per sheet. Until you press the print button 12 times, the sends nothing to the Print Service. If you press the print button 24 times, the sends the images in two batches of 12 each. Any images left on the spooler when you start a new exam or end the patient are sent at that point.

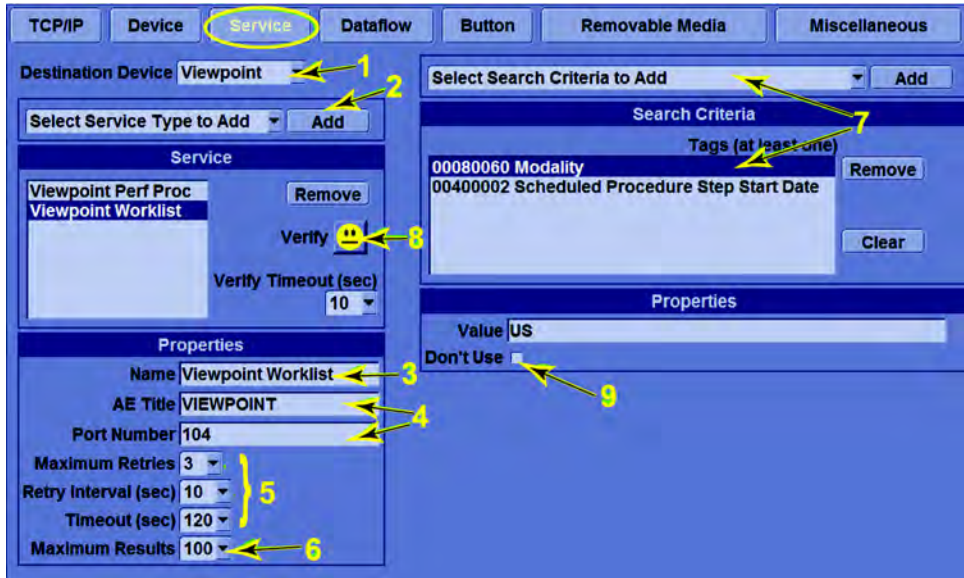
### 3-9-4-5 How to Setup and Use a DICOM Worklist Service

A Worklist provides a repository of data for patients scheduled for an exam. The can query and filter the entries of the Worklist and retrieve one or more of them to create a patient for each with an initial exam.

#### Worklist Setup

To setup a Worklist Service on the , follow these steps:

**Table 3-17 Worklist Setup**

	
1.	In <b>Utility</b> -> <b>Connectivity</b> -> <b>Service</b> , from the Destination Device drop-down menu, select the device on which the service resides. (This assumes you have already setup the device in the Device tab.)
2.	From the Select Service drop-down menu, select <b>DICOM Worklist</b> and press <b>Add</b> .
3.	Change the name of the service to one of your choosing.
4.	Enter the AE Title and Port Number of the service. AE Title is case-sensitive.
5.	Maximum Retries, Retry Interval and Timeout have the same use as with DICOM Image Storage Services. See: <a href="#">3-9-4-2 "Properties" on page 3-44</a> .
6.	Set Maximum Results to the maximum number of results returned. The default and recommended setting is 100.
7.	Search Criteria are filters that restrict the entries returned by a query to those that match all criteria. The provides two defaults: <b>Modality</b> (set to "US" for Ultrasound), and Scheduled Procedure Step Start Date (commonly known as Exam date, and set to today). Modify these or add other criteria as you wish. These define "remote" filtering. See: <a href="#">""Remote" versus "Local" Filtering" on page 3-58</a> .
8.	Save your changes and press <b>Verify</b> . A Smiley Face indicates successful communication with the service.
9.	Select the <b>Don't Use</b> checkbox when you DO NOT want to remotely filter on that search criterion, but still WANT TO keep the tag and its value for future use.



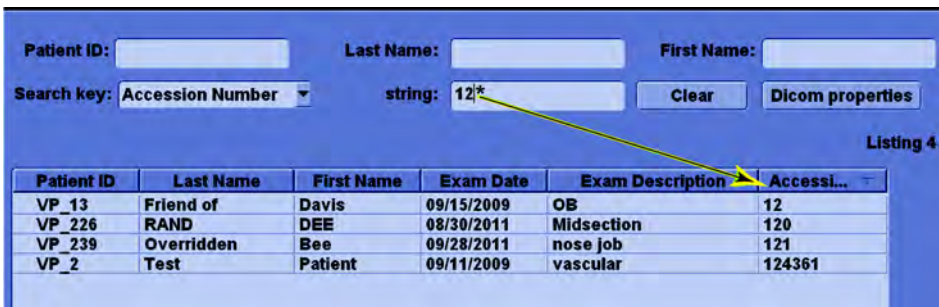
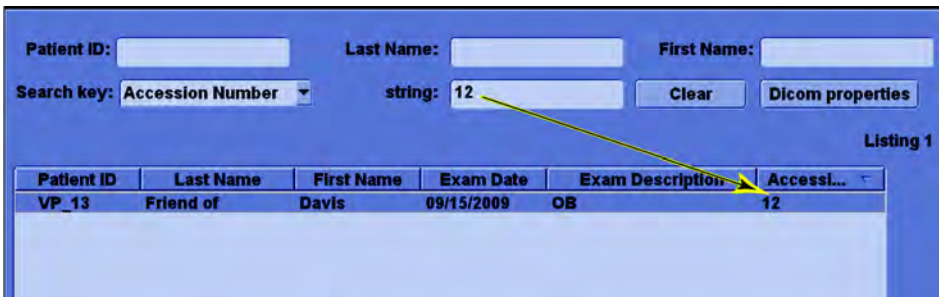
### 3-9-4-5 How to Setup and Use a DICOM Worklist Service (cont'd)

#### “Remote” versus “Local” Filtering

The search criteria you set up in the Utility -> Connectivity -> Service page are used in “remote” filtering. When you press the **Query** button on the Worklist screen, the criteria becomes part of the DICOM message exchange between the and the Worklist service. The service returns only those entries that match all of the search criteria.

In contrast, “local” filtering occurs “on the fly” on the patient data already queried, listed and stored on the . Local filtering occurs every time you enter a value in one of the fields above the list on the Worklist screen, such as Patient ID. The displayed list gets filtered progressively for each selection you make or character you enter. [Table 3-18 “Remote” versus “Local” Filtering](#) illustrates this example: For a Worklist with dozens of entries, select Accession Number as the Search Key and enter “1.” The list is filtered to display only those entries whose Accession Number starts with “1.” Now enter “2” after the “1.” The list is filtered again to display only those entries whose Accession Number starts with “12.”

**Table 3-18 “Remote” versus “Local” Filtering**

Local Filtering - Query Button NOT pressed																																			
 <p>Patient ID: <input type="text"/> Last Name: <input type="text"/> First Name: <input type="text"/>  Search key: Accession Number string: 12* Clear Dicom properties</p> <p>Listing 4</p> <table border="1"> <thead> <tr> <th>Patient ID</th><th>Last Name</th><th>First Name</th><th>Exam Date</th><th>Exam Description</th><th>Accessi...</th></tr> </thead> <tbody> <tr> <td>VP_13</td><td>Friend of</td><td>Davis</td><td>09/15/2009</td><td>OB</td><td>12</td></tr> <tr> <td>VP_226</td><td>RAND</td><td>DEE</td><td>08/30/2011</td><td>Midsection</td><td>120</td></tr> <tr> <td>VP_239</td><td>Overridden</td><td>Bee</td><td>09/28/2011</td><td>nose job</td><td>121</td></tr> <tr> <td>VP_2</td><td>Test</td><td>Patient</td><td>09/11/2009</td><td>vascular</td><td>124361</td></tr> </tbody> </table>						Patient ID	Last Name	First Name	Exam Date	Exam Description	Accessi...	VP_13	Friend of	Davis	09/15/2009	OB	12	VP_226	RAND	DEE	08/30/2011	Midsection	120	VP_239	Overridden	Bee	09/28/2011	nose job	121	VP_2	Test	Patient	09/11/2009	vascular	124361
Patient ID	Last Name	First Name	Exam Date	Exam Description	Accessi...																														
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VP_239	Overridden	Bee	09/28/2011	nose job	121																														
VP_2	Test	Patient	09/11/2009	vascular	124361																														
<p>Local filtering DOES NOT generate any DICOM traffic between the and the service. It acts only upon the list already on the . This local list does not constitute actual patients and exams on the . Creation of patients and exams does not occur until you select one or more entries on the list and press <b>Transfer</b>. But, there is a twist; if you enter a value in one of the fields above the list on the Worklist screen, and then press <b>Query</b>, you are doing “remote” filtering again. The filter comprises the search criteria you set up in the Utility -&gt; Connectivity -&gt; Service page, plus whatever you entered in the field(s) above the list on the Worklist screen.</p>																																			
Remote Filtering - Query Button PRESSED (exact match ONLY)																																			
 <p>Patient ID: <input type="text"/> Last Name: <input type="text"/> First Name: <input type="text"/>  Search key: Accession Number string: 12 Clear Dicom properties</p> <p>Listing 1</p> <table border="1"> <thead> <tr> <th>Patient ID</th><th>Last Name</th><th>First Name</th><th>Exam Date</th><th>Exam Description</th><th>Accessi...</th></tr> </thead> <tbody> <tr> <td>VP_13</td><td>Friend of</td><td>Davis</td><td>09/15/2009</td><td>OB</td><td>12</td></tr> </tbody> </table>						Patient ID	Last Name	First Name	Exam Date	Exam Description	Accessi...	VP_13	Friend of	Davis	09/15/2009	OB	12																		
Patient ID	Last Name	First Name	Exam Date	Exam Description	Accessi...																														
VP_13	Friend of	Davis	09/15/2009	OB	12																														
<p>Continuing the Accession Number example: Enter “12” and press <b>Query</b>. The query returns only exact matches.</p>																																			



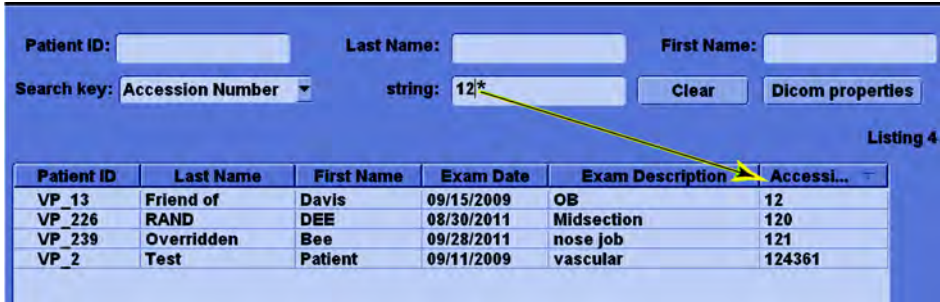
### 3-9-4-5 How to Setup and Use a DICOM Worklist Service (cont'd)

#### “Remote” versus “Local” Filtering (con’t.)

To get partial matching, similar to what local filtering provides, add an asterisk at the end of the string:

**Table 3-19 “Remote” versus “Local” Filtering (con’t.)**

**Remote Filtering - Query Button PRESSED (partial matching)**



The screenshot shows a web-based interface for remote filtering. At the top, there are input fields for Patient ID, Last Name, and First Name. Below these is a 'Search key' dropdown menu set to 'Accession Number' and a 'string' input field containing '12\*'. To the right of the string field are 'Clear' and 'Dicom properties' buttons. A yellow arrow points from the asterisk in the string field to the 'Accession Number' dropdown. Below the search fields is a table with the following data:

Patient ID	Last Name	First Name	Exam Date	Exam Description	Access...
VP_13	Friend of	Davis	09/15/2009	OB	12
VP_226	RAND	DEE	08/30/2011	Midsection	120
VP_239	Overridden	Bee	09/28/2011	nose job	121
VP_2	Test	Patient	09/11/2009	vascular	124361

Listing 4

Some of the remote search keys use special formats:

- A tag that represents a date (example: 00400002 Scheduled Procedure Step Start Date, which is generally called "Exam Date") – three formats:
  - \* A valid single date in format YYYYMMDD (example: 20141112 for November 12, 2014)
  - \* A range of dates separated by a dash (example: 20140902-20141002 for the range September 2, 2014 through October 2, 2014)
  - \* TODAY[x,y], a range around today's date where x represents the number of days before today, and y represents the number of days after today (examples: TODAY[0,0] means today only; TODAY[1,3] means yesterday, today, and the three days after today)
- A tag that represents a person's name, such as 00100010 Patient's Name. A complete name entry has five components separated by carets ( ^ ):
  - \* LastName^FirstName^MiddleName^Prefix^Suffix (Example: Public^John^Q.^Mr.^Jr. for "Mr. John Q. Public Jr.")
- Many non-date tags formed by letters, numbers or both can use the asterisk as a wildcard.
  - \* For example, "M\*" for Patient's Name will return all patients whose last name starts with M. "M" by itself though returns only those patients whose name is exactly "M".
  - \* Exceptions: Patient ID and Modality require an exact match.

### 3-9-4-5 How to Setup and Use a DICOM Worklist Service (cont'd)

#### “Remote” versus “Local” Filtering (con’t.)

The format of the values used for Search Criteria for both Worklist and Query/Retrieve services are defined in the DICOM standard: <http://medical.nema.org/dicom>. Select the latest year available in this folder. Open Part 5: “Data Structures and Encoding”, and examine [Table 3-20 "Dicom Value Representations"](#) . For example, here are the rules for a valid AE Title:

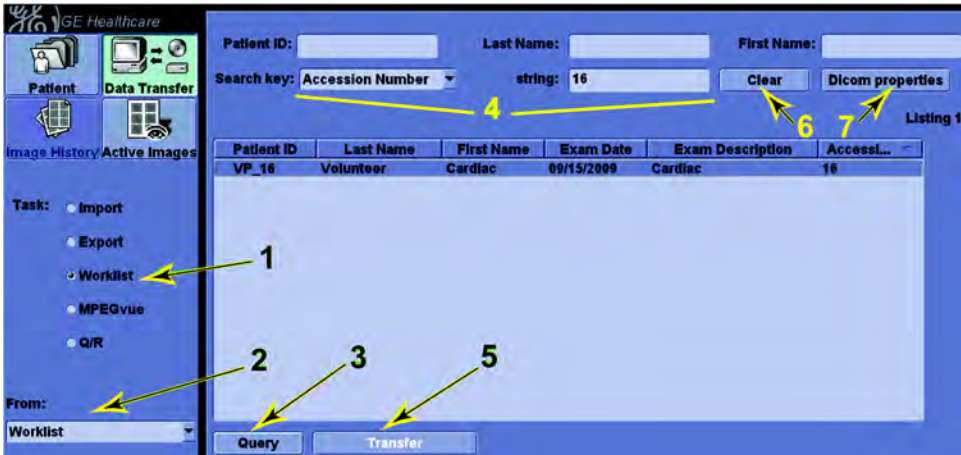
Basically, an AE Title can be up to 16 characters. Leading and trailing spaces are ignored. A title of all spaces is not valid. **These characters are not allowed:** “\”, line feed, form feed, carriage return, and escape.

### 3-9-4-5 How to Setup and Use a DICOM Worklist Service (cont'd)

#### Worklist Use

Follow these steps for Worklist Use:

**Table 3-20 Worklist Use**

Worklist Display	
	
1.	From the Patient screen, press <b>Worklist</b> . The Data Transfer screen appears with Worklist selected as the Task.
2.	In the <b>From:</b> drop-down menu, select the Worklist to query.
3.	Press <b>Query</b> . The displays a list of all entries in the Worklist that meet the criteria set in both the Utility -> Connectivity -> Service page and on this Worklist screen.
4.	To filter this list further, enter (more) values in Patient ID, Last Name, etc. This provides local filtering. It DOES NOT generate more query requests to the Worklist service.
5.	Select one or more entries from the list and press <b>Transfer</b> . The creates initial patient and exam data for each entry. If you transferred a single entry, the returns to the Patient screen with the patient and new exam selected.
The Worklist screen provides a couple of other controls:	
6.	<b>Clear:</b> This clears all local filters and restores the list to the last actual Query.
7.	<b>Dicom properties:</b> This button displays some DICOM tags for the currently selected entry.

3-9-4-6

How to Setup and Use a DICOM MPPS (Modality Performed Procedure Step) Service

A DICOM Performed Procedure, also known as Modality Performed Procedure Step (MPPS), is a way to inform your billing system that an ultrasound procedure has been completed and can be billed.

A typical setup has your Worklist Service handle MPPS communications. For example, you can retrieve today's scheduled exams and report completed exams to the same system.

To set up MPPS on the , follow these steps:

Table 3-21    Setup and Use a DICOM MPPS

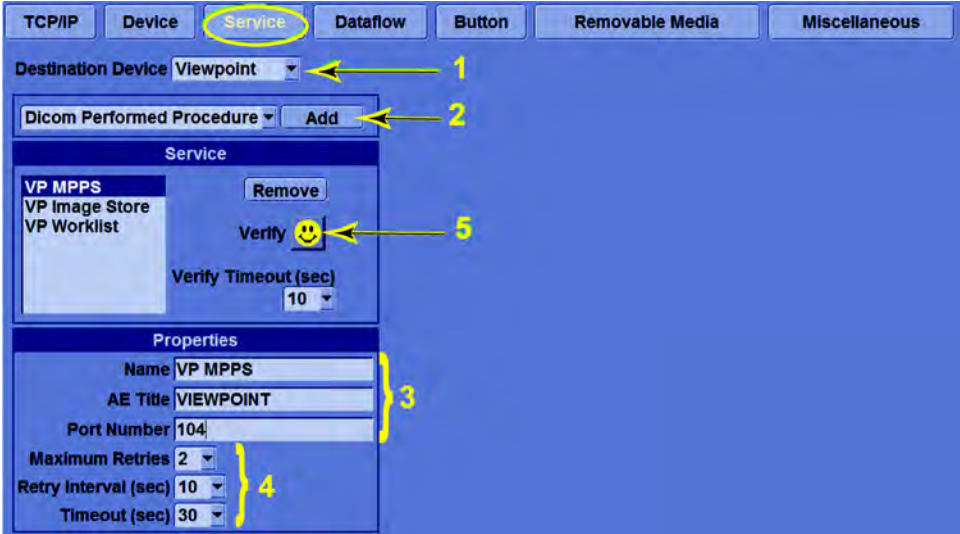

<div>Utility -&gt; Connectivity -&gt; Service</div> 	
1.	In <b>Utility -&gt; Connectivity -&gt; Service</b> , from the Destination Device drop-down menu, select your Worklist device.
2.	From the drop-down menu of services, select <b>Dicom Performed Procedure</b> and press <b>Add</b> .
3.	Provide a name, set the AE Title and Port Number for your Worklist service. AE Title is case-sensitive.
4.	Maximum Retries, Retry Interval and Timeout have the same use as with DICOM Image Storage Services. See: <a href="#">3-9-4-2 "Properties" on page 3-44</a> .
5.	Save your changes and press <b>Verify</b> . A Smiley Face indicates successful communication with the service.
(continued on next page)	

Table 3-21 Setup and Use a DICOM MPPS

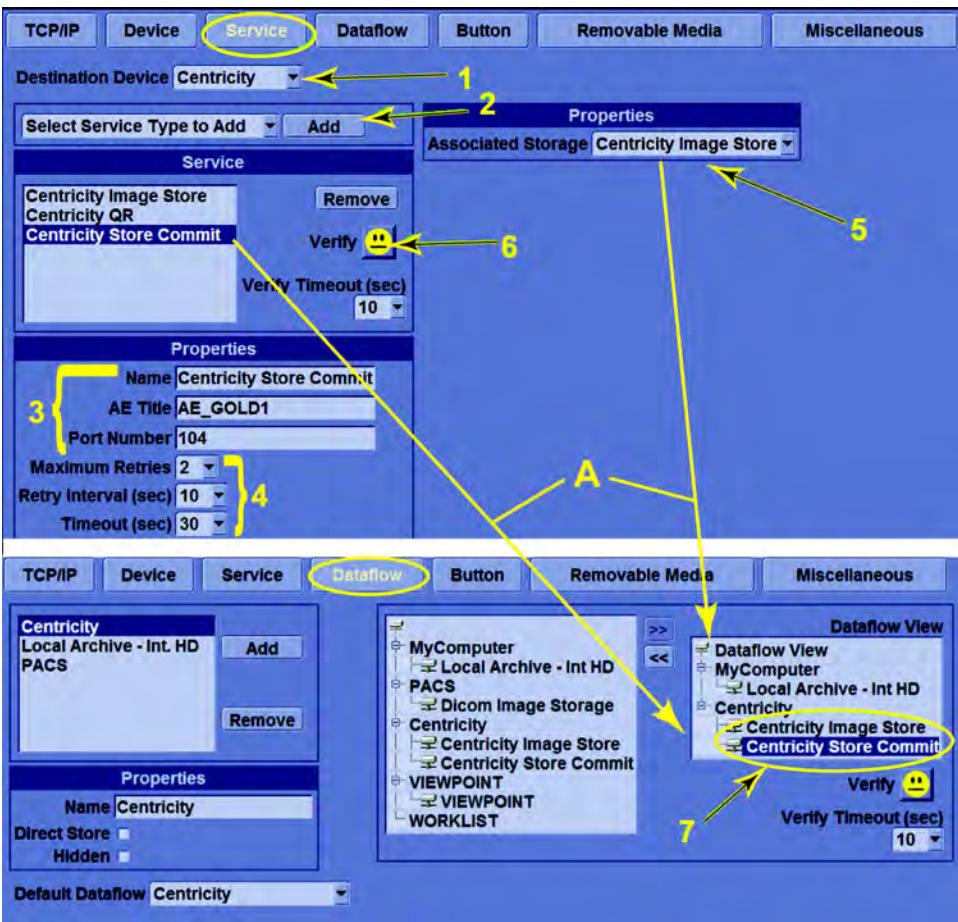
Dataflow tab - MPPS added	
	
6.	<p>In the <b>Dataflow</b> tab, add your MPPS service to the same dataflow that handles your DICOM Image Storage service.</p> <p>To set up MPPS on the server end, refer to the documentation of the Worklist service.</p> <p>From this point on, from the perspective of the user, MPPS works quietly in the background. It handles completed exams, abandoned exams, and empty exams with no input or monitoring required from the user.</p>

### 3-9-4-7 How to Setup and Use a DICOM Storage Commitment Service

DICOM Storage Commitment enables the to obtain a commitment from the image storage service that images have been stored. With this commitment, you may choose to delete the images from the .

To set up Storage Commitment on the , follow these steps:

**Table 3-22 DICOM Storage Commitment Service Setup and Use**

 <p>The screenshot shows two panels of the GE HealthCare service setup interface. The top panel is the 'Service' tab, and the bottom panel is the 'Dataflow' tab. In the 'Service' tab, the 'Destination Device' is 'Centricity'. The 'Select Service Type to Add' dropdown is open, showing 'Centricity Image Store', 'Centricity QR', and 'Centricity Store Commit'. The 'Add' button is highlighted. The 'Properties' section shows 'Associated Storage' set to 'Centricity Image Store'. The 'Verify' button is highlighted with a smiley face icon. The bottom panel shows the 'Dataflow' tab. The 'Dataflow View' shows a tree structure with 'Centricity Image Store' and 'Centricity Store Commit' highlighted. The 'Verify' button is also highlighted in the bottom panel.</p>	
1.	In <b>Utility -&gt; Connectivity -&gt; Service</b> , from the Destination Device drop-down menu, select your Image Storage server.
2.	From the drop-down menu of services, select <b>Dicom Storage Commitment</b> and press <b>Add</b> .
3.	Provide a name, set the AE Title and Port Number for your Image Storage service.
4.	Maximum Retries, Retry Interval and Timeout have the same use as with DICOM Image Storage Services. See: <a href="#">3-9-4-2 "Properties" on page 3-44</a> .
5.	For Associated Storage, select the name of your Image Storage service.
6.	Save your changes and press <b>Verify</b> . A Smiley Face indicates successful communication with the service.
(continued on next page)	



**Table 3-22 DICOM Storage Commitment Service Setup and Use**

7. In the **Dataflow** tab, add your Storage Commitment service to the same dataflow that handles your Image Storage service.

Storage Commitment includes “reverse negotiation” with the receiving end – the Image Storage service. Basically, the receiver needs to know the AE Title, IP address and Port Number of the . Refer to the documentation of the Image Storage service for setting up Storage Commitment.

*NOTE: The Store Commit and its Associated Storage (A) MUST BE in the same Dataflow!*

### DICOM Job Spooler - STC identified

DICOM JOB SPOOLER							
#	Last Name	Patient ID	Destination	Type	Contents	Status	Error
3	Test	TestStoreCommit	Centricity Store Commit	STC	1	Done	
2	Test	TestStoreCommit	Centricity Image Store	Storage	1	Done	

To confirm a successful Storage Commitment, press **F4** to inspect the spooler after you send images to the Image Storage service. An entry of:

- Type: STC
- Contents: Value equals the number of images stored, plus one if a Structured Report was sent.
- Status: “Done” or “Success”
- Error: no indications

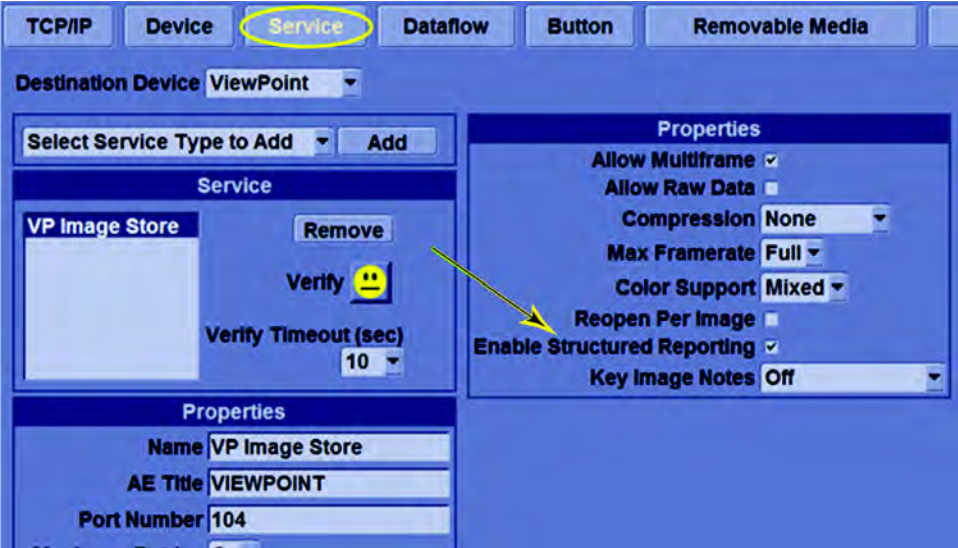
confirms a successful storage commitment.

3-9-4-8      **Structured Reporting**

Structured Reporting provides for transmission of exam measurements and calculations in a separate non-image file. It is not a service in itself, but is a feature of some DICOM Image Storage services, and is always associated with one. The service must be able to interpret and display the data in the Structured Report. Refer to the documentation of the Image Storage service documentation for Structured Reporting.

**Table 3-23    Structured Reporting**

Utility -> Connectivity -> Service - Enable Structured Reporting checked

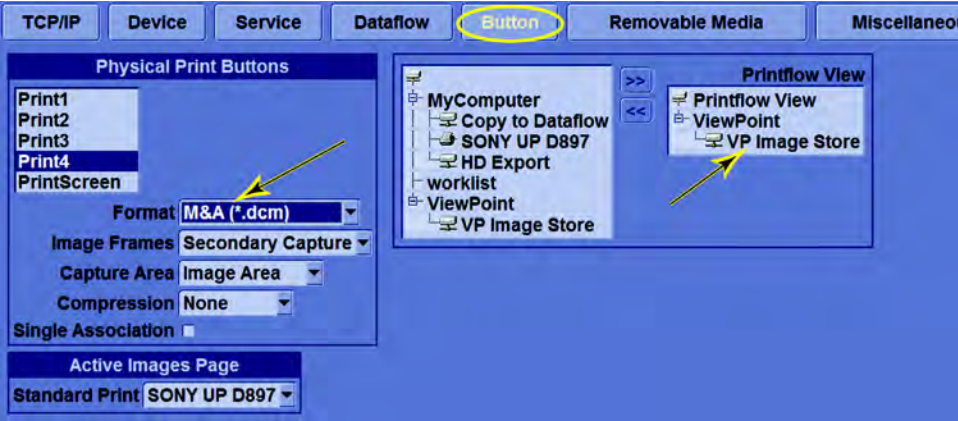


To enable Structured Reporting for an Image Storage service, go to the set-up screen for that service in Utility -> Connectivity -> Service, check the **Enable Structured Reporting** box and press **Save**.

From that point on, the sends a Structured Report at the end of an exam with measurements.

(continued on next page)

**Sending Structure Report**





**Table 3-23    Structured Reporting**

A Structured Report can be sent for the measurements and calculations of the currently-open exam via a Print button. Add the Image Storage service to the Printflow setting of that button and set the Format for that button to "M&A." Take measurements in an exam and press the Print button. The generates a Structured Report and sends it to the Image Storage service.

The does not store Structured Report files. Instead, when called upon, it conveys the measurements and calculations to the service via the DICOM message exchange between them.

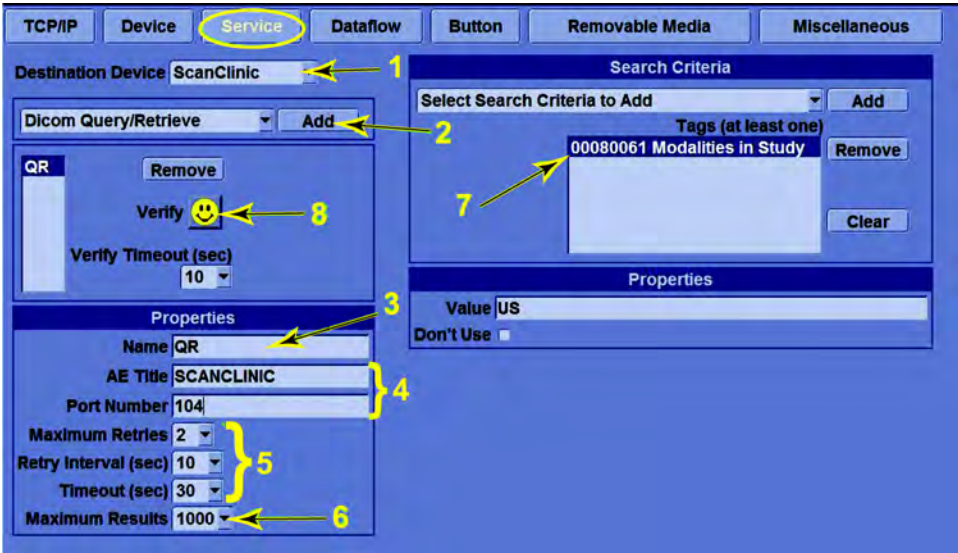
### 3-9-4-9 How to Setup and Use a DICOM Query/Retrieve (Q/R) Service

A Q/R service retrieves patients' data and corresponding exams from a PACS. The can query the service for exams belonging to patients that match search attributes. The can then retrieve the exams from the service and store them in the local archive.

#### Q/R Service Setup

Follow these steps for Q/R Service Setup:

**Table 3-24 Q/R Service Setup**

	
1.	In <b>Utility -&gt; Connectivity -&gt; Service</b> , from the Destination Device drop-down menu, select the device on which the service resides. (This assumes you have already setup the device in the Device tab.)
2.	From the Select Service drop-down menu, select <b>Dicom Query/Retrieve</b> and press <b>Add</b> .
3.	Change the name of the service to one of your choosing.
4.	Enter the AE Title and Port Number of the service. AE Title is case-sensitive.
5.	Maximum Retries, Retry Interval and Timeout have the same use as with DICOM Image Storage Services. See: <a href="#">3-9-4-2 "Properties" on page 3-44</a> .
6.	Set Maximum Results to the maximum number of results returned.
7.	Search Criteria are essentially the same as with Worklists. The concepts of "Remote" and "Local" queries are also the same. See: <a href="#">""Remote" versus "Local" Filtering" on page 3-58</a> .
8.	Save your changes and press <b>Verify</b> . A Smiley Face indicates successful communication with the service.  <i>NOTE: In many cases, the Q/R service allows a to query its patient data, but will not allow actual transfer of exams/images without some level of authorization. Typically, the service needs to know the AE Title, IP address, and Port Number of the . Refer to the documentation of the Q/R service.</i>
(continued on next page)	

### 3-9-4-9 How to Setup and Use a DICOM Query/Retrieve (Q/R) Service (cont'd) Q/R Service Use

Follow these steps for Q/R Service Use:

**Table 3-25 Q/R Service Use**

	<p>1. From the Patient screen, press <b>Data Transfer</b>. The Data Transfer screen appears. Select <b>Q/R</b> as the Task.</p>
	<p>2. In the <b>From:</b> drop-down menu, select the Q/R service to query.</p>
	<p>3. Press <b>Query</b>. The displays a list of all patients in the Q/R service that meet the criteria set in both the Utility -&gt; Connectivity -&gt; Service page and on this Q/R screen.</p>
	<p>4. To filter this list further, enter (more) values in Patient ID, Last Name, etc.</p> <p><i>NOTE: This provides local filtering; it DOES NOT generate more query requests to the Q/R service, unless you press the Query button again.</i></p>
	<p>5. Select one or more entries (patients or individual exams) from the list and press <b>Transfer</b>. The retrieves the patients and their exams and stores them on its local hard drive. These patients are available on the patient screen. You can view their exams and images, and create new exams for them.</p> <p>Each patient entry in the list indicates the number of series (exams) available for retrieval (5a). To retrieve all of them, double-click anywhere in the row, or single-click the row and press the Transfer button. To retrieve individual exams, single-click on the entry's folder icon (5b). This displays a list of the exams. Double-click the exam you want to retrieve, or Ctrl-click and Shift-click to select more than one and then press <b>Transfer</b>.</p>
	<p>6. During the transfer, the Transfer button changes to "Cancel". Press it to return control to the before all selected patients download. Example: If you selected 5 patients to transfer, but pressed <b>Cancel</b> while the third one was transferring, Patients 1 and 2 have been retrieved and will remain on the . Patients 4 and 5 will not be retrieved. As for Patient 3, cancellation depends on when you pressed Cancel during its transfer; a partial cancellation may occur: the patient's data transfers, but not its images.</p>

### 3-9-4-9 How to Setup and Use a DICOM Query/Retrieve (Q/R) Service (cont'd)

#### Q/R Support for Volume Navigation

V Nav (Volume Navigation) combines 3D images from other modalities (CT, MR, etc.) with Ultrasound scanning. Use Q/R to load non-Ultrasound images into the .

The supports retrieval of these non-US image types:

- MR (Magnetic Resonance)
- CT (Computed Tomography)
- PT (Positron Emission Tomography)
- XA (X-Ray Angio)
- MG (Digital Mammography)

Use filter “00080061 Modalities in Study” to retrieve non-US images. To filter on more than one modality, separate each by a “\” (backslash). For example, “US\MR\CT\PT\XA\MG” returns entries for all modalities supported by the .

#### Basic Use with V Nav

This guide is not intended to cover V Nav extensively. However, here are the initial steps:

**Table 3-26 Q/R Support for Volume Navigation**


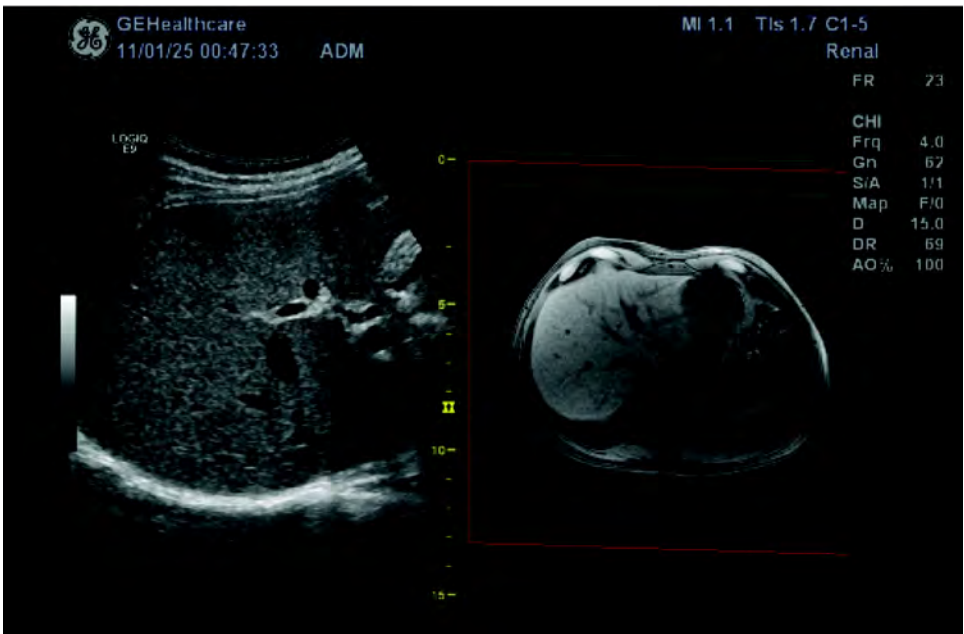
Image History Display	
	
1.	Query and retrieve the non-US study from PACS.
2.	Create a new exam for this patient.
3.	Press the <b>V Nav</b> key located above the keyboard on the operator panel.
4.	On the Touch Panel, press <b>Load</b> ; select <b>From Database</b> from the pop-up menu.
5.	An Image History page displays on the screen. Select any desired image in the non-US series and press <b>Review</b> .
(continued on next page)	


Table 3-26 Q/R Support for Volume Navigation

Scan Screen	
	
6.	The displays the scan screen, prompts you to confirm the patient data set selected, and displays the non-US volume on the right side of the screen.
7.	To scroll through the dataset, press the <b>Scroll Z</b> Trackball button. Use the Trackball to scroll through the dataset to find the area of interest.
8.	When done, press <b>Scroll Z</b> again. You are now scanning live on the left side of the screen with your reference view on the right screen.

### 3-9-4-10 Spooler

The DICOM Job Spooler shows all current and recent outgoing jobs performed by the . Outgoing jobs involve objects sent to a remote service: images, Structured Reports, and Key Image Notes sent to a PACS; print jobs to a DICOM printer; Storage Commitment to a PACS; and Modality Performed Procedure Step to a Worklist service. They do not include incoming objects – namely, Worklist and Q/R queries and transfers.

**Table 3-27 Spooler**

Dicom Job Spooler Display								
								
<p>Toggle <b>F4</b> on the keyboard to alternately display and hide the Spooler.</p> <p>The columns in the DICOM JOB SPOOLER display:</p> <ul style="list-style-type: none"> <li>• <b>#</b> – job number</li> <li>• <b>Last Name and Patient ID</b> – patient data</li> <li>• <b>Destination</b> – name of service receiving the objects</li> <li>• <b>Type</b> – object type: “Storage” for images, Structured Reports, and Key Image Notes; “STC” for Storage Commitment; “MPPS” for Modality Performed Procedure Step</li> <li>• <b>Contents</b> – number of objects being sent</li> <li>• <b>Status</b> – Pending, Active, Hold, Done or Success, Failed</li> <li>• <b>Error</b> – populated if the transfer fails</li> <li>• <b>Information</b> – may contain general information</li> </ul> <p>The buttons in the DICOM JOB SPOOLER display:</p> <ul style="list-style-type: none"> <li>• <b>Refresh</b> – Refresh the status of jobs on the spooler</li> <li>• <b>Delete...</b> – Select one or more jobs on the spooler and press <b>Delete...</b> to delete them. A pop-up asks you to confirm your choice. (Successful jobs get deleted automatically after several minutes.)</li> <li>• <b>Resend</b> – Select a single job and press <b>Resend</b> to send it to its original destination. If you select more than one job, the Resend button is disabled.</li> <li>• <b>Send To...</b> – Select a single job and press <b>Send To...</b> to send the job to any image storage or print service set up on the LOGIQ E9. A pop-up presents a list of these services. If more than one job is selected, the Send To... button is disabled.</li> <li>• <b>Hide</b> – Same as <b>F4</b>: return to scan screen</li> <li>• <b>Select All</b> – Selects all jobs in the list</li> </ul> <p><i>NOTE: Data for a service, such as IP address, AE Title and Port #, become part of the job. If any are incorrect, the job fails. If you correct the error, do not use <b>Resend</b> to try to send the job again. The job file is not updated with the correct data and it will fail to transfer. Instead, return to the Exam View tab, press <b>Send To...</b> and select the service or press "Send To" on the Spooler Display. This replaces the old job file with one that has the correct data.</i></p>								
(continued on next page)								



### 3-9-4-10 Spooler (cont'd)

#### Common Error Messages

No connection established - check network and log file: This usually indicates a bad or missing network connection OR incorrect IP Address, AE Title, or Port # between the and service.

The remote system was not able to interpret the image information - check log file: This indicates an issue with the image or patient data, such as a missing Patient ID.

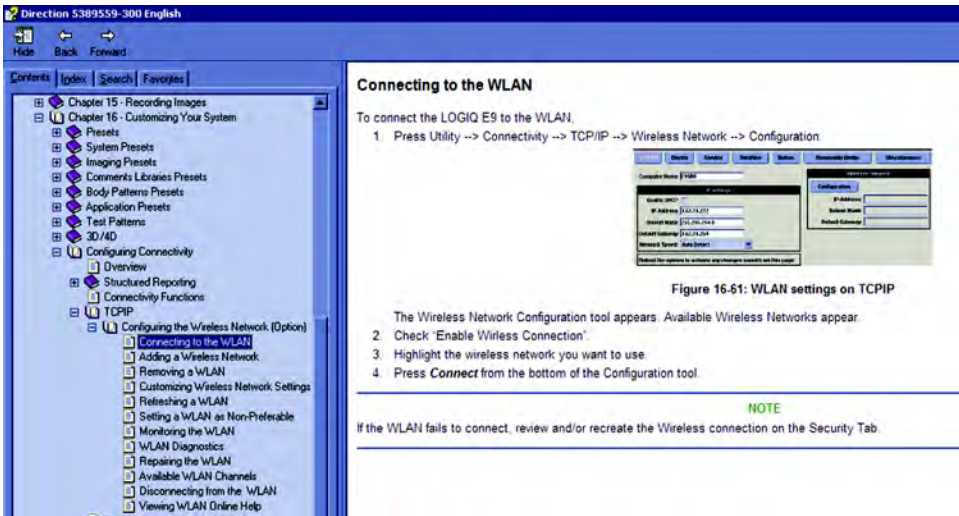
The remote service is out of resources: For example, the PACS has no more storage space.

### 3-9-4-11 Wireless

Configuring a Wireless network is beyond the scope of this guide. Both the User and Service manuals cover Wireless setup in detail. In particular, for setting up the WLAN, refer to the latest revision of the Basic User Manual, Chapter 16, Configuring the Wireless Network (Option). (Available via the "Help" F1 key on the keyboard.)

Table 3-28 Wireless

**"Help" F1 Key Display**



**Connecting to the WLAN**

To connect the LOGIQ E9 to the WLAN,

1. Press Utility --> Connectivity --> TCP/IP --> Wireless Network --> Configuration.

Figure 16-61: WLAN settings on TCP/IP

The Wireless Network Configuration tool appears. Available Wireless Networks appear.

2. Check "Enable Wireless Connection".
3. Highlight the wireless network you want to use.
4. Press **Connect** from the bottom of the Configuration tool.

**NOTE**

If the WLAN fails to connect, review and/or recreate the Wireless connection on the Security Tab.

*NOTE: When both wired and wireless are enabled, the chooses wired.*

3-9-4-12    **Network “Sniffer”**

The includes a network sniffer, Wireshark, that displays network traffic between the and other devices. Its output can be saved in files. It is useful for debugging connectivity issues. Usually only DICOM traffic is . Follow these steps:

**Table 3-29    Network “Sniffer”**

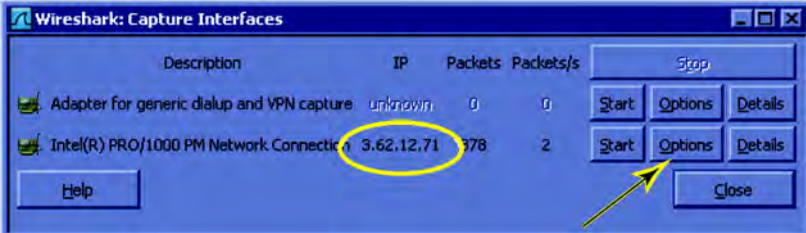
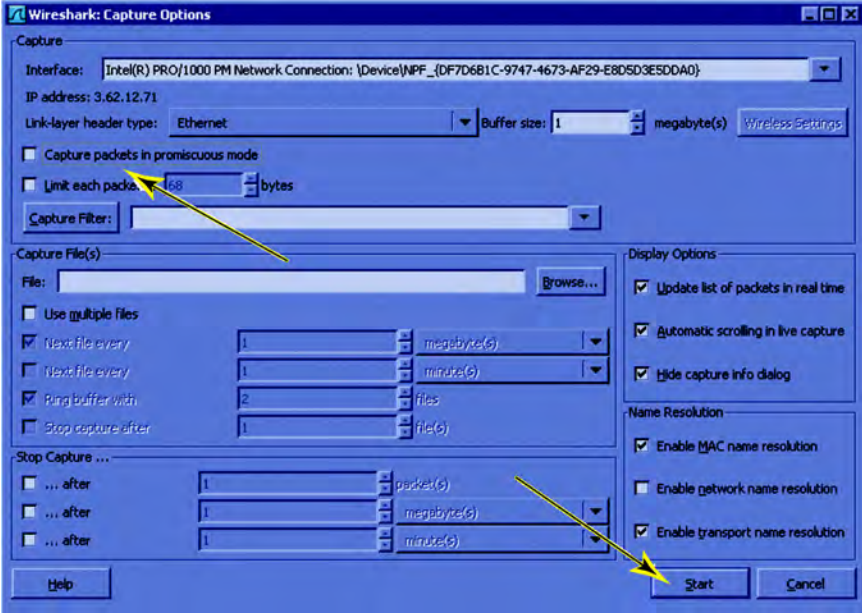
<div><div>Wireshark: Capture Interfaces</div><div></div></div>	
1.	Press <b>Alt-N</b> to display Wireshark.
2.	In <b>Capture/Interfaces</b> press <b>Options</b> on the interface that corresponds to the IP address.
<div><div>Wireshark: Capture Options</div><div></div></div>	
3.	Make sure "Capture packets in promiscuous mode" is unchecked. Press <b>Start</b> .
(continued on next page)	



Table 3-29 Network “Sniffer”

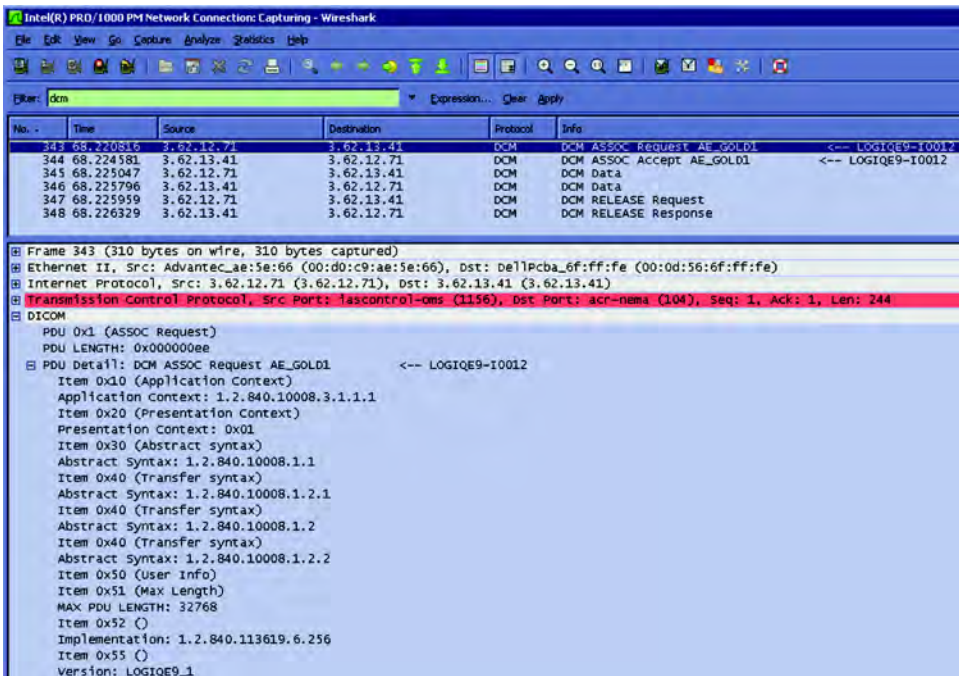
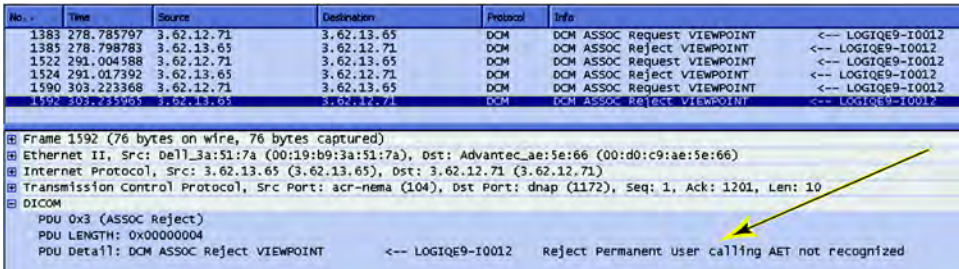
Network Connection: Capturing Wireshark	
	
4.	<p>In the "Filter" bar, enter "dcm" or "dicom." (Which one Wireshark accepts, depends on its version. Wireshark will indicate whether it accepts one or the other by turning the Filter background green.) Press <b>Apply</b>.</p> <p>Once Wireshark displays DICOM traffic, select an individual line and expand the DICOM tree in the lower frame to view DICOM-specific data.</p>
Wireshark Info column	
	
<p><b>Capture Restart</b> clears the current traffic display, in preparation for the next DICOM exchange.</p> <p>In the Wireshark Info column, entries with “Reject” or “Abort” definitely indicate issues. For example, the above exchange occurred when the tried to send an exam to Viewpoint, but Viewpoint did not have the correct AE Title for the .</p>	
(continued on next page)	

Table 3-29 Network “Sniffer”

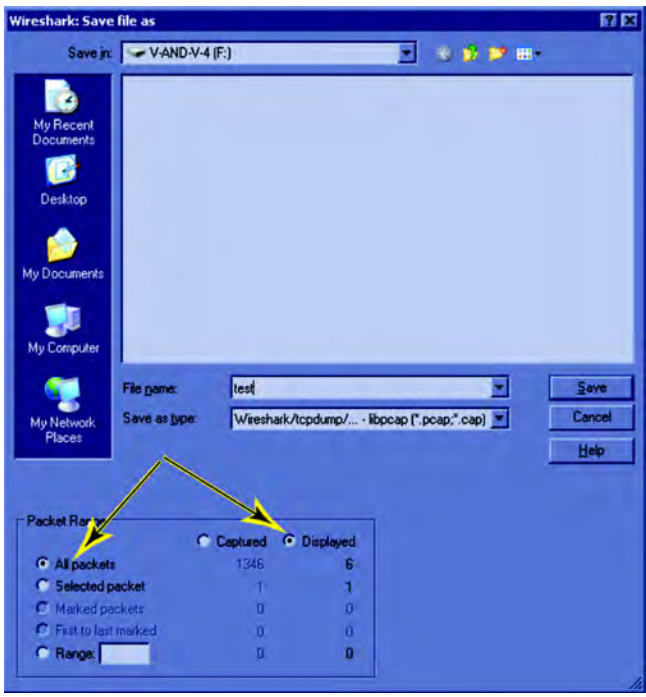
Encoded Value in the “Status” tag					
No. -	Time	Source	Destination	Protocol	Info
6675	356.009475	3.62.12.71	3.62.13.65	DCM	DCM Continuation[Unreassembled P
6676	356.009479	3.62.12.71	3.62.13.65	DCM	DCM Continuation[Unreassembled P
6677	356.009485	3.62.12.71	3.62.13.65	DCM	DCM Continuation[Unreassembled P
6689	356.198122	3.62.13.65	3.62.12.71	DCM	DCM Data
6690	356.229305	3.62.12.71	3.62.13.65	DCM	DCM RELEASE Request
6691	356.229543	3.62.13.65	3.62.12.71	DCM	DCM RELEASE Response
Frame 6689 (210 bytes on wire, 210 bytes captured)					
Ethernet II, Src: Dell_3a:51:7a (00:19:b9:3a:51:7a), Dst: Advantec_ae:5e:66 (00:d0:c9:ae:5e:66)					
Internet Protocol, Src: 3.62.13.65 (3.62.13.65), Dst: 3.62.12.71 (3.62.12.71)					
Transmission Control Protocol, Src Port: acr-nema (104), Dst Port: vchat (1168), Seq: 418, Ack: 534944					
[Reassembled TCP Segments (156 bytes): #6686(12), #6689(144)]					
DICOM					
PDU 0x4 (Data)					
PDU LENGTH: 0x00000096					
PDU Detail: DCM Data					
DATA LENGTH: 0x00000092					
Context 0x5 (1.2.840.10008.1.2.1)					
Flags 0x3 (Command, last Fragment)					
(0000,0000) 4 Group Length 0x84 (132)					
(0000,0002) 1c Affected class 1.2.840.10008.5.1.4.1.1.3.1\000					
(0000,0100) 2 Command Field 0x8001 'C-STORE-RSP'					
(0000,0120) 2 Resp Message ID 0x1b (27)					
(0000,0800) 2 Data Set (0x0101 means no data set present) 0x101 (257)					
(0000,0900) 2 Status 0x10 ''					
(0000,1000) 30 Affected Instance UID 1.2.840.113619.2.256.896736845414.1316037586.91\000					

Other times, however, the actual reason for an issue is often encoded in innocuous-looking entries near the end of the exchange. For example, the above situation involved the attempting to send an image to Viewpoint directly via a print button, without a patient id. Viewpoint’s “C-STORE-RSP” message to the indicated, by an encoded value in the “Status” tag, that it did not store the image.

(continued on next page)

Table 3-29 Network “Sniffer”

**Wireshark: Save file as**



To save the network traffic currently displayed, stop the capture and press **File / Save As**. In the pop-up, select a destination drive or folder, name the file, select both “All packets” and “Displayed” under Packet Range, and press **Save**.

This saves the DICOM traffic in a file with suffix “.pcap”, which can be analyzed by Wireshark or a similar network sniffer.

## Section 3-10 Setup paperwork

**NOTE:** During and after setup, 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 information is available during the operation and service of the complete system.


### 3-10-1 User 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.

### 3-10-2 Product Locator Card

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

**Figure 3-22 Product Locator Card (Example)**

		Mailing Address GE Medical Systems Product Locator File P.O. Box 414 Milwaukee, WI 53201-0414			
DESCRIPTION		FDA	MODEL		REV SERIAL
PREPARE FOR ORDERS THAT DO NOT HAVE A LOCATOR INSTALLATION REPORT  SYSTEM ID NUMBER  <b>INSTALLATION</b>		OCP	BS	ORD	DATE (MO-DA-YR)
		DIST.-COUNTRY	ROOM		EMPLOYEE NO.
		CUSTOMER NO.			
		DESTINATION - NAME AND ADDRESS			
		ZIP CODE			

LOGIQ E9

1. Must match System ID	3. Must show IP addresses for the server selected	5. Must be DISABLE, unless a proxy server is provided by the hospital
2. Must be PILOT or PRODUCTION	4. Recommended to filter *.zip	

---

# **Chapter 4**

## **Functional Checks**

---

### **Section 4-1**

#### **Overview**

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


This chapter provides procedures for quickly checking major functions of the LOGIQ E9 scanner and diagnostics instructions using the built-in service software.

##### **4-1-2 Special Equipment required**

- An empty (blank) DVD-R disk
- At least one probe (ideally you should check all the site probes used by the system.)  
For available probes, see: [Section 9-18 "Probes" on page 9-63.](#)
- ECG Harness:
  - CABLE ECG MARQ. AHA/AMERICA, P/N:164L0025
  - LEADWIRES ECG MARQ. AHA/AMERICA, P/N: 164L0027


## 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.

 **NOTICE** Energy Control and Power Lockout for LOGIQ E9

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

1. TURN OFF THE SCANNER.
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. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
5. DISCONNECT THE EPS BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PC N3 WHEN WORKING IN THE BEP. BEWARE THAT THE MAIN POWER SUPPLY, EPS OR CHARGEBOARD AND BEP MAY BE ENERGIZED EVEN IF THE POWER IS TURNED OFF IF THE CORD IS STILL PLUGGED INTO THE AC OUTLET.



### 4-2-1 Overview

Some procedures are used more often than other. The intention with this section is to keep the most used procedures in one place.

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

### 4-2-2-1 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.

#### 4-2-2-2 Connect AC (mains) Power to the LOGIQ E9

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

**NOTE:** *The LOGIQ E9 will function on Voltages from 100-240 Volts and 50 or 60 Hz. However, if using 220 volt power, then a center tapped power source is required.*

- 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.



#### 4-2-2-3 Turn Unit ON

- 1.) Switch ON the Mains Power Circuit Breaker at the rear of the unit. The **ON/OFF** button will become amber.

**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. The **ON/OFF** button will remain amber.

- 2.) Press once on the **ON/OFF** button on the Operator Panel to boot the unit. The **ON/OFF** button will turn green when it is pressed.

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.
- 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.
- 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.

4-2-2-3

Turn Unit ON (cont'd)

Figure 4-3 2D Screen on the display



*NOTE: Total time used for start-up is typically 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.*

### 4-2-3 Power shut down

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

**Figure 4-4 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, to shut down the unit.
- **Cancel**  
Use this button to exit from the System-Exit menu and return to the previous operation.

### 4-2-3 Power shut down (cont'd)

- **Sleep Mode R2.x.x and R3.x**

Use this button to reduce the boot up time (is less than 120 seconds). Intended to help on portable studies.




Sleep saves all Memory content, in the Hard drive and shuts down. When booting up, memory content is restored from HDD. This feature is not a substitute of a regular shutdown. The system should be shutdown completely at least once a day to prevent performance issues.

**Figure 4-5 Sleep Mode**




#### 4-2-3-1 Complete Power Down

Table 4-1 Power Down the LOGIQ E9

	Steps	Corresponding Graphic
1.	<p>Power down the system and disconnect the mains power cable from the wall outlet.</p> <p>Press once on the <b>ON/OFF</b> button on the Operator Panel to display the <b>System - Exit</b> menu. When you switch off the unit, the system performs an automatic shutdown sequence.</p>	<p><b>Press once on the ON/OFF button</b></p> 
2.	<p>Select <b>Shutdown</b> to do a complete power down of the LOGIQ E9.</p> <p>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.</p> <p>Next, it starts to shut down itself. The time to shutdown the LOGIQ E9, including the Back End Processor, may vary from 10 seconds up to approximately 1 minute.</p> <p>The last thing that shuts down is the light on the Operator Panel, indicating that you can continue with the next step.</p> <p><i>NOTE: Sleep Mode only available in LOGIQ E9 running R2.x.x and R3.x.x software.</i></p>	
<p> <b>NOTICE</b></p> <p>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 Drive, making the system fail later.</p> <p>Switch off the Mains Power Circuit Breaker, located on the rear of the LOGIQ E9. This will cut power distribution within the unit.</p> <p>Unplug the unit.</p>		

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

The system Top Console can be freely moved in all directions (if the power is on or if the mechanism is not locked in position prior to powering down the system). The vertical displacement of the Top Console is motor driven. The control buttons are located around the handles.

 **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.

Power on the LOGIQ E9 before performing the following steps.

**Figure 4-6 Top Console adjustment controls: Lock (1), Up/Down (2)**



1. Lock button: unparking and sideways displacement of the console.
2. Up/Down button: raising/lowering the console.

To raise/lower the Top Console

- 1.) Press and hold down the **Up/Down** button (Figure 4-6, button 2) accordingly to raise or lower the Top Console.
- 2.) Release the button when the Top Console is at the desired height.

##### 4-2-4-1 To unlock the Top Console

- 1.) Press and hold down the **Lock and brake release** button(s) (Figure 4-6, 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).

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

- 1.) Press and hold down the **Lock and brake release** button(s) (Figure 4-6, button 1) while pushing the Top Console in the locked position.
- 2.) Release the button(s).

##### 4-2-4-3 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 4-6, button 1) and move the Top Console in any direction.
- 2.) Release the button when the Top Console is at the desired height.

##### 4-2-4-4 To move the Top Console if Power is OFF

To manually release the console's XY-mechanism (frogleg) if the power is OFF, see: [Section 6-5 "Operator Panel movement" on page 6-9](#).

## 4-2-6 LCD Monitor Positions and Lock

Figure 4-7 LCD Monitor Position and Lock - R3.x and earlier

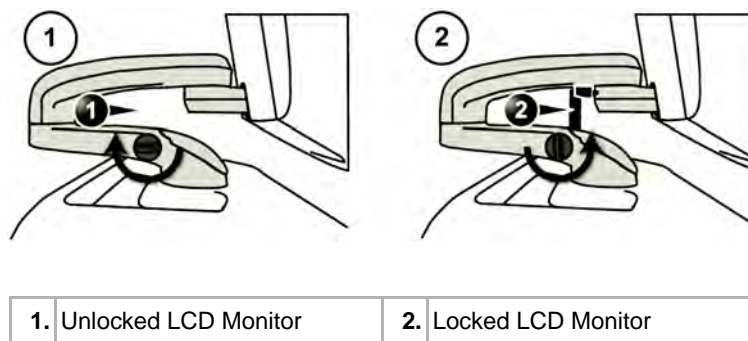
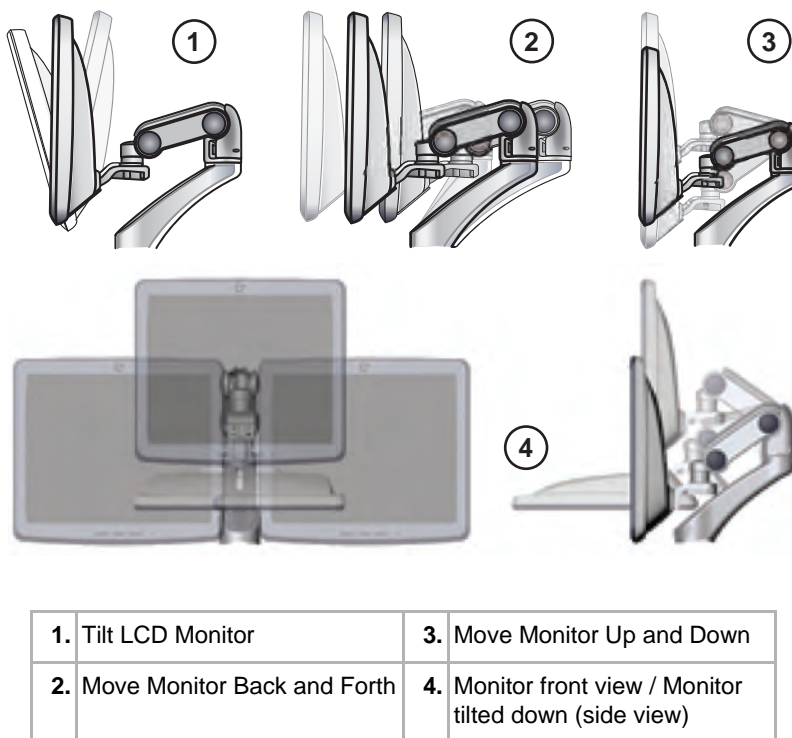


Figure 4-8 LCD Monitor Positions - R4.x



When the LCD Arm Lock is down, verify the LCD Monitor can move up/down (vertically) and left/right (horizontally).

**NOTE:** The LCD Monitor can move approximately 100 mm (3.94 inches) vertically and 250 mm (9.84 inches) horizontally.

**4-2-5-1 To unlock the LCD Monitor**

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

**4-2-5-2 To lock the LCD Monitor**

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

**4-2-5-3 LCD Monitor position for Transport**

Lock Arm and tilt LCD Monitor down.



## **4-2-6 Removable Media**

Refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 16 to perform the following tasks:

- Using Removable Media
- Labeling Removable Media
- Formatting Removable Media
- Verifying Removable Media

## **4-2-7 Archiving and Loading Presets**

### **4-2-7-1 Loading Presets from removable media**

For information, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 16.

## **4-2-8 Space Management**

Refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 16 to perform the following tasks:

- Configuring the Disk Management Function
- Setting the Disk Management Schedule
- Configuring Data Management Settings
- Configuring Destination Device Setting
- Running the Disk Management Function
- Starting Disk Management Manually

## **4-2-9 Backup**

For information, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 16.

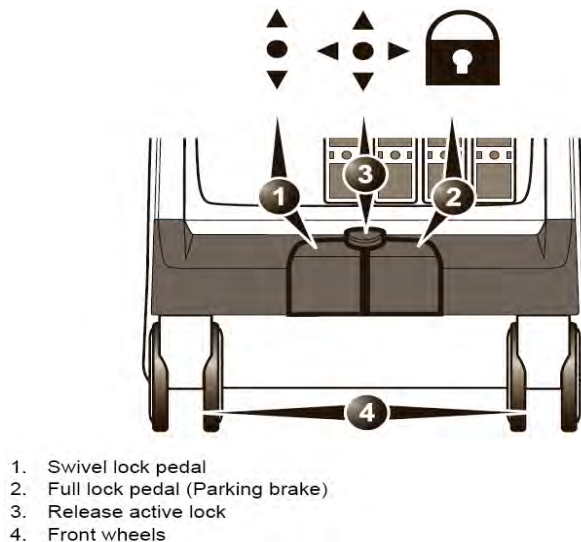
## 4-2-10 Moving and Transporting the LOGIQ E9

### 4-2-10-1 The Casters (Wheels) control

The wheels of the LOGIQ E9 are controlled by the pedals located between the front wheels of the LOGIQ E9.

Examine the wheels frequently for defects to avoid breaking or jamming.

**Figure 4-8 Pedals**



- 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.

### 4-2-10-2 To prepare the LOGIQ E9 to be moved

- 1.) If not locked, move the keyboard console and LCD monitor to the park position (see: [4-2-4 "Top Console position adjustment" on page 4-10](#) and [4-2-5 "LCD Monitor Positions and Lock" on page 4-11](#)).
- 2.) Turn the system off, including the circuit breaker (see: [4-2-3 "Power shut down" on page 4-7](#)), and remove the plug from the wall.
- 3.) Disconnect all cables linking the LOGIQ E9 to any off-board peripheral devices and network.
- 4.) Secure the LOGIQ E9's power cable.
- 5.) Place all probes in the probe holder. Ensure that the probe cables do not protrude from the LOGIQ E9 or interfere with the wheels.
- 6.) Ensure that no loose items are left on the LOGIQ E9.
- 7.) Fold down the monitor.
- 8.) Unlock the brake.

#### 4-2-10-3 To ensure safety while moving the LOGIQ E9

- 1.) Ensure that the keyboard console and LCD monitor are in locked position (see: [4-2-4 "Top Console position adjustment" on page 4-10](#) and [4-2-5 "LCD Monitor Positions and Lock" on page 4-11](#)).



**WARNING** *Do not move the LOGIQ E9 if the keyboard console and LCD Monitor are in free position. Ensure that the hands of the patient and user 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 LOGIQ E9 using cables or probe connectors. Take extra care while moving the LOGIQ E9 on inclines.
- 3.) Ensure that the LOGIQ E9 does not strike the walls or door frames.
- 4.) Ensure that the pathway is clear.
- 5.) Move the LOGIQ E9 slowly and carefully.



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

- 6.) Use two or more persons to move the LOGIQ E9 over long distances or on inclines.

#### 4-2-10-4 Transporting the LOGIQ E9 by vehicle

Take extra care when transporting the LOGIQ E9 by vehicle. In addition to the moving precautions listed on [4-2-10-3 "To ensure safety while moving the LOGIQ E9" on page 4-15](#), follow the procedure described below.

- 1.) If not locked, move the keyboard console and LCD monitor to the park position (see: [4-2-4 "Top Console position adjustment" on page 4-10](#) and [4-2-5 "LCD Monitor Positions and Lock" on page 4-11](#)).



**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.

#### 4-2-10-5 Setting up at a new location

- 1.) When the unit is in place at a new location, lock the wheel brakes.
- 2.) Follow the set up procedure described in [Section 3-6 "Completing the setup" on page 3-15](#).

## 4-2-11 Recording important settings and parameters



**NOTICE** An error or power loss may occur during the software loading.  
Always keep a paper record of the settings for the LOGIQ E9. Verify that it is current before starting a software load!

### 4-2-11-1 Overview

See the following pages to record data.

These subsections include descriptions for recording/setting up data for the following screens.

With the system Powered On, follow the procedures below to document basic system information and back up Presets, and if required, Patient Archive and Patient Images prior to software load.

- Utility -> Connectivity
  - TCP/IP (see: [4-2-11-2 "Connectivity — Recording the TCP/IP settings" on page 4-17](#))
  - Device (see: [4-2-11-4 "Connectivity — Recording the AE Title and Port settings" on page 4-19](#))
  - Misc (see: [4-2-11-8 "Connectivity — Recording Miscellaneous settings" on page 4-23](#))
- Utility -> Admin
  - System Admin (see: [4-2-11-9 "Admin — Recording the Software Option Keys" on page 4-25](#))

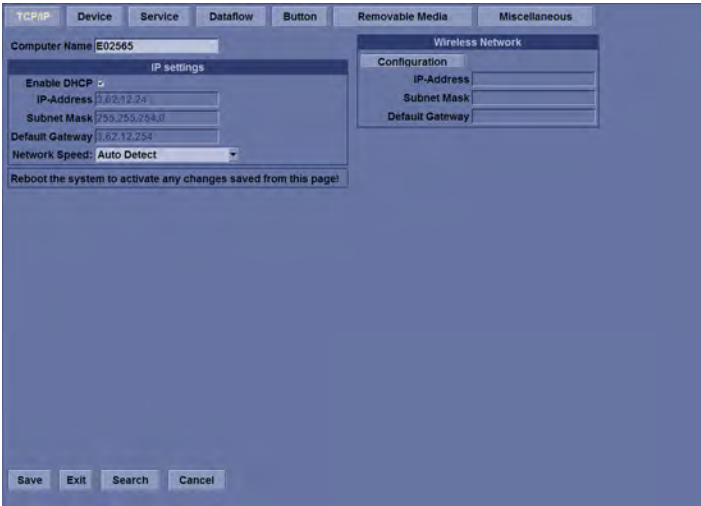
These subsections include descriptions for recording/setting up data for the following screens. Hardcopy forms are provided here for convenience, but content will be included if selected during Backup process.

- Utility -> Connectivity
  - [4-2-11-5 "Connectivity — Recording Device Destination settings" on page 4-20](#)Service (see: [4-2-11-5 "Connectivity — Recording Device Destination settings" on page 4-20](#)).
  - Dataflow (see: [4-2-11-6 "Connectivity — Recording Dataflow settings" on page 4-21](#)).
  - Buttons (see: [4-2-11-7 "Connectivity — Recording the Print Key Assignments" on page 4-22](#)).
  - Removable Media (see: [4-2-11-6 "Connectivity — Recording Dataflow settings" on page 4-21](#)).
- Utility -> Admin
  - Users (see: [4-2-11-10 "Admin — Users" on page 4-26](#))
- Utility -> System
  - Backup/Restore (see: [4-2-11-11 "System — Data Store Management" on page 4-27](#)).
  - Peripherals (see: [4-2-11-12 "System — Recording Peripheral settings" on page 4-28](#)).
  - About (see: [4-2-11-13 "System — Recording software and hardware versions" on page 4-29](#)).
  - General, Record Region, Language and Regional Options. See the latest revision of the LOGIQ E9 Basic User Manual, Chapter 16.

4-2-11-2      **Connectivity — Recording the TCP/IP settings**

1.) From the Touch Panel, select **Utility -> Connectivity -> TCP/IP**.

**Figure 4-9    TCP/IP settings**



2.) Record all settings in [Table 4-2 "Record settings from TCP/IP screen"](#) on page 4-17.

**Table 4-2      Record settings from TCP/IP screen**

PARAMETER	VALUE			
COMPUTER NAME				
IP SETTINGS				
IP ADDRESS				
SUBNET MASK				
DEFAULT GATEWAY				
NETWORK SPEED				

4-2-11-3     **Connectivity — WLAN**

1.) From the Touch Panel, select **Utility -> Connectivity -> WLAN**.

**Figure 4-10 WLAN settings**



2.) Record all settings in [Table 4-3 "Record settings from WLAN screen" on page 4-18](#).

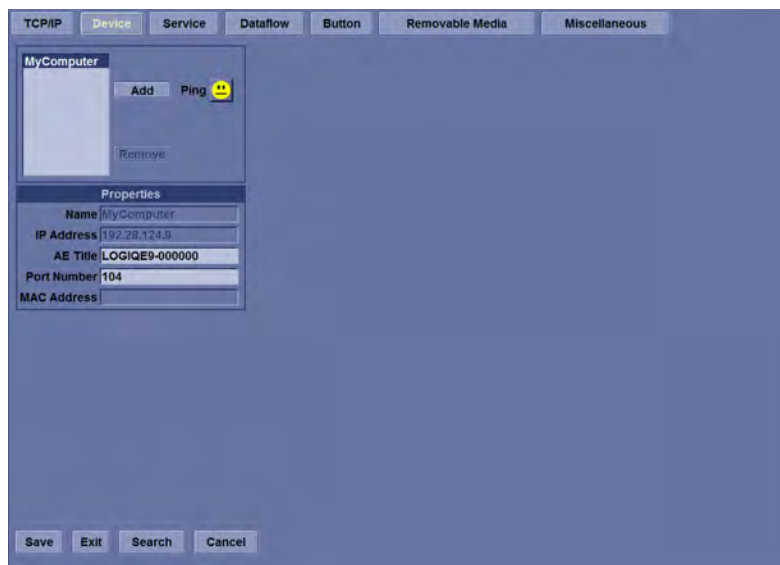
**Table 4-3     Record settings from WLAN screen**

PARAMETER	VALUE
NETWORK NAME (SSID)	
NETWORK AUTHENTICATION	
DATA ENCRYPTION	
NETWORK KEY	
KEY INDEX	
Specify Yes/No to "The Key is Provided Automatically"	
IEEE 802.1x AUTHENTICATION INFORMATION	
EAP TYPE	

#### 4-2-11-4 Connectivity — Recording the AE Title and Port settings

- 1.) From the Touch Panel, select **Utility** -> **Connectivity** -> **Device**.
- 2.) Select **My Computer** in the List of Devices, if not already selected.

**Figure 4-11 Device settings**



- 3.) Record all settings in [Table 4-4 "Record settings for My Computer from Device screen" on page 4-19](#).

**Table 4-4 Record settings for My Computer from Device screen**

PARAMETER	VALUE
AE TITLE	
PORT NO	
MACC ADDRESS	

- 4.) Record all settings in [Table 4-5 "Record settings for each device listed in Device table" on page 4-19](#).

**Table 4-5 Record settings for each device listed in Device table**

NAME	IP ADDRESS

- 4-2-11-5
- Connectivity — Recording Device Destination settings
- 1.) From the Touch Panel, select **Utility -> Connectivity -> Service**.

Figure 4-12 Service settings



- 2.) Record all settings in [Table 4-6 "Record settings from Service screen" on page 4-20](#) for each Destination Device and Service.

Table 4-6      Record settings from Service screen

DESTINATION DEVICE	PROPERTIES





4-2-11-7      **Connectivity — Recording the Print Key Assignments**

- 1.) From the Touch Panel, select **Utility -> Connectivity -> Buttons**.

**Figure 4-14    Button settings**



- 2.) Record all settings in [Table 4-8 "Record settings from Button screen" on page 4-22](#).

**Table 4-8      Record settings from Button screen**

PARAMETER	FORMAT	IMAGE FRAMES	COMPRESSION	COMPRESSION QUALITY	PRINTFLOW VIEW
PRINT1					
PRINT2					
PRINT3					
PRINT4					
PRINTSCREEN					

## 4-2-11-8 Connectivity — Recording Miscellaneous settings

- 1.) From the Touch Panel, select **Utility -> Connectivity -> Miscellaneous**.

**Figure 4-15 Miscellaneous settings**



- 2.) Record all settings in [Table 4-9 "Record settings from Miscellaneous screen" on page 4-24](#).

4-2-11-8 Connectivity — Recording Miscellaneous settings (cont'd)

Table 4-9 Record settings from Miscellaneous screen

Patient/Exam Menu Options	Setting	Print and Store Options	Setting
Use birthdate		P[1-4] Key Sound	
Auto search for patient		Store Dual as DICOM Only	
Automatic generation of patient ID		Dual When Color Support is Mixed	
After [End Current Patient], go to:		Store Multiframe for Sec Capture Loops	
Keep Search String		Enable Smart Capture Area	
Worklist Auto Query		Store 2D (B-Mode) Loop with Timeline Data	
Show BBT		Patient List Print - Font Size	
Double-click on patient list to start:		DICOM Multi-frame image resolution	
Detail Mode		Show progress bar while storing image	
Export to USB HDD: Create DICOMDIR		Image Order Scheme	
Automatic Disable Patient Data		Columns in examination listing	
Remember cursor position on Transfer Screen		Enable Other ID	
Patient/Exam Message Option		Validation Format	
Request acknowledge of End Exam action			
Warn image store without patient			
Warn register to No Archive			
Warn image store to Read Only dataflow			
Warn video titles exist in the internal storage			
Columns in examination listing			
Date   Category   Exam Description   Img. size   M&A   Disk			

#### 4-2-11-9 Admin — Recording the Software Option Keys

- 1.) From the Touch Panel, select **Utility -> Admin -> System Admin**.

**Figure 4-16 System Admin settings**

Option	Status
CodedContrast	Valid until:01/19/2009
Dicom	Valid until:01/19/2009
Scan Assistant	Valid until:01/19/2009
LOGIQView	Valid until:01/19/2009
OnBoardReporting	Valid until:01/19/2009
TUI	Valid until:01/19/2009
VOCAL II	Valid until:01/19/2009
VCI-Static	Valid until:01/19/2009
Volume Navigation	Valid until:01/19/2009
True3D	Valid until:01/19/2009
4D	Valid until:01/19/2009

- 2.) Record the S/W Option Key(s) - alphanumeric string(s) - from the Installed Option Keys field in [Table 4-10 "Software Option Keys" on page 4-25](#).



**WARNING** *Make sure that the Software Option Keys (alphanumeric passwords) have been recorded correctly. If the key is incorrect, you will not be able to log on after the SW installation has been completed. The password is case sensitive. Hyphens must also be recorded. There may be more than one password.*

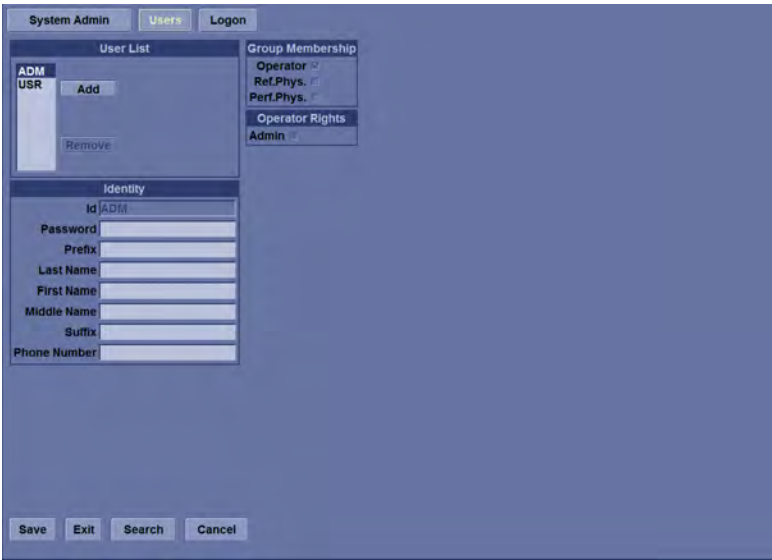
**Table 4-10 Software Option Keys**

SW OPTION KEYS

4-2-11-10 Admin — Users

- 1.) From the Touch Panel, select **Utility -> Admin -> System Admin**.

Figure 4-17 Users settings



- 2.) Record all settings in [Table 4-11 "Record settings from Users screen"](#) on page 4-26.

Table 4-11 Record settings from Users screen

USER ID	PREFIX	LAST NAME	FIRST NAME	GROUP MEMBERSHIP	OP RIGHTS

## 4-2-11-11 System — Data Store Management

- 1.) Select **Utility -> System -> Backup/Restore**.

**Figure 4-18 Backup/Restore settings**

- 2.) Record all settings in [Table 4-12 "Record settings from Backup/Restore screen" on page 4-27](#).

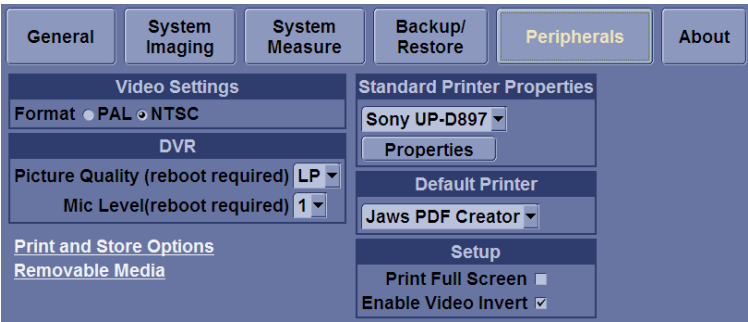
**Table 4-12 Record settings from Backup/Restore screen**

	MOVE FILES OLDER THAN IN (DAYS)	REMINDER DIALOG INTERVAL DAYS	MEDIA	CAPACITY
EZMove				
EZBackup				

4-2-11-12    **System — Recording Peripheral settings**

1.) Select **Utility -> System -> Peripherals**.

**Figure 4-19    Peripherals settings**



2.) Record Video Settings Format, DVR model, and Network printer model in [Table 4-13 "Record settings from Peripheral screen" on page 4-28](#).

**Table 4-13    Record settings from Peripheral screen**

PARAMETER	VALUE
VIDEO SETTINGS FORMAT	___PAL    ___NTSC
DVR PICTURE QUALITY	
MIC LEVEL	
STANDARD PRINTER	
DEFAULT PRINTER	
SETUP	
ERASE VIDEO DATA AFTER BURNING IS COMPLETE. (not pictured)	



#### 4-2-11-13 System — Recording software and hardware versions

- 1.) From the Touch Panel, select **Utility -> System -> About**.

**Figure 4-20 Hardware/Software information**



- 2.) Record software and hardware versions in [Table 4-14 "Record Software and Hardware versions" on page 4-29](#).

**Table 4-14 Record Software and Hardware versions**

DESCRIPTION	RECORD VERSIONS
APPLICATION SW VERSION	
APPLICATION SW PART NUMBER	
SYSTEM SW VERSION (IMAGE REV)	
SYSTEM SW (IMAGE) PART NUMBER	

## Section 4-3 Functional checks

### 4-3-1 Overview

After setting up the system, performing an upgrade, or replacing hardware, perform all appropriate functional tests before returning a system to the customer.

### 4-3-2 Preparation

Turn on power to LOGIQ E9. For detailed description, see: [4-2-2 "Power ON/Boot Up" on page 4-3.](#)

### 4-3-3 Basic Controls

#### 4-3-3-1 Trackball Area

Different functions can be assigned to the trackball depending of the current active mode. The Trackball area consist of:

- The Trackball: used as a cursor control in acquisition mode, scrolling control in freeze and as a selection tool (like a mouse cursor) in post-processing mode.
- Three SELECT keys (identical): Perform the selected control or highlighted menu item.
- The TRACKBALL key: Toggles between the available trackball function assignments displayed in the Status bar.
- The update menu key: enables quick access to image related functions from a pop-up menu.

#### 4-3-3-2 Other Controls

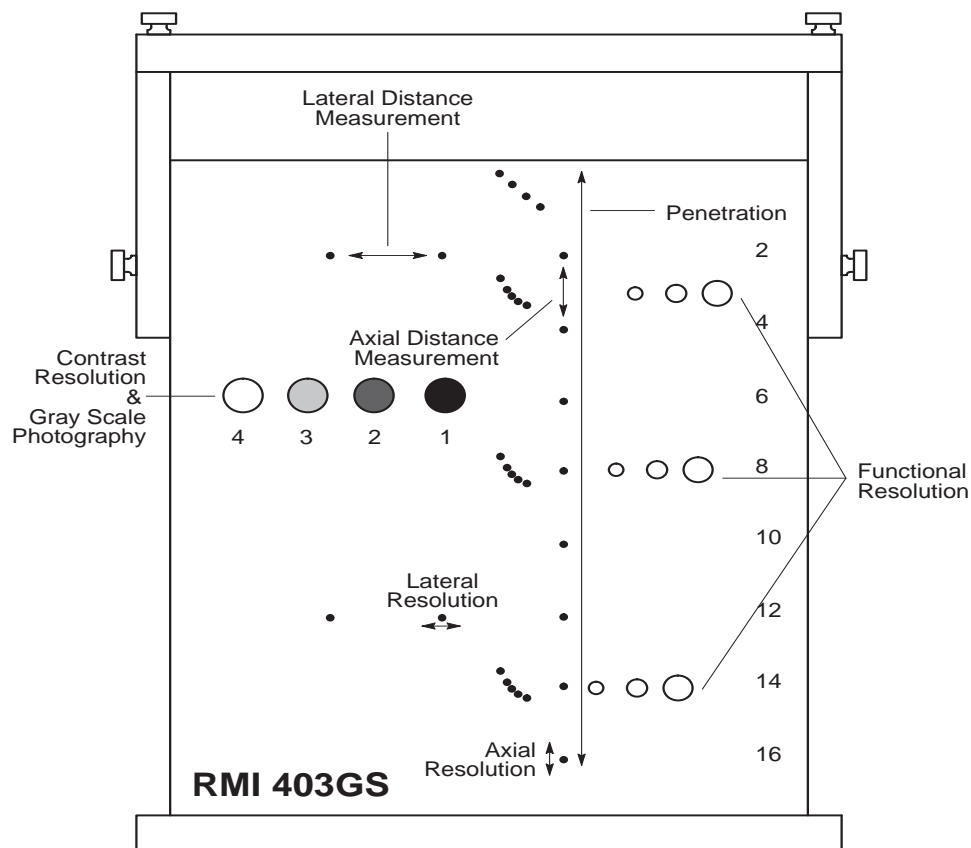
Other controls are located on separate keys (knobs and buttons) or groups of keys on the Operator Panel.

## 4-3-4 Performance Tests

### 4-3-4-1 Recommended Test Phantoms (optional)

GE Healthcare recommends the RMI 430GS phantom (optional), but it is not required. It is the most current phantom (optional) recommended to our field service personnel and provides the necessary targets and extended life necessary for consistent system testing.

**Figure 4-21 Performance tests**



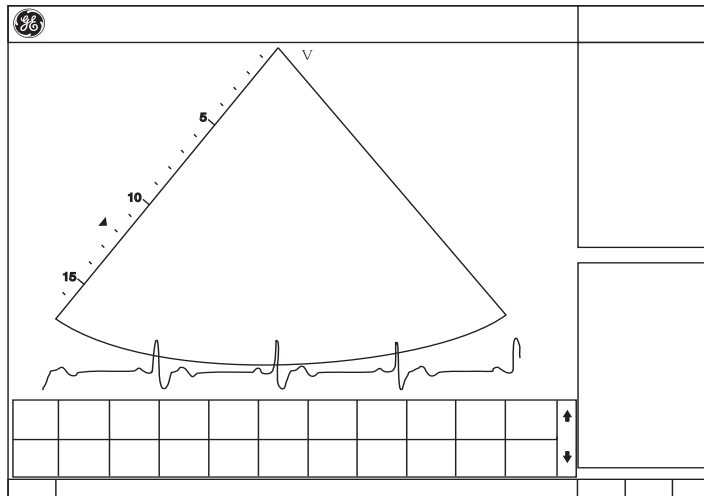
## 4-3-5 B-Mode Checks

For information on the system's different modes as well as expected results, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 5.

### 4-3-5-1 Introduction

The B-mode is the system's default mode.

**Figure 4-22 B-mode Screen Example**



Depending on probe availability, choose the preset application shown below. The LOGIQ E9 probes are ONLY approved for use for the applications listed in the table below.

#### **For R4.x.x or later, IQC preset for Service is available.**

Image Quality Check (IQC) is intended to facilitate Image Quality checks during Quality Assurance Evaluations. Quality Assurance tests are used to determine whether a scanner is providing the same level of performance year after year.

By using the same settings year after year, this ensures that the data collection is consistent, independently of who performs the test.

This preset only includes fundamental settings for B-Mode.

Processing modes like SRI, Harmonics, etc., are turned off.

To do an Image Quality Check (IQC):

- 1.) Activate IQC via **Utility** -> **Imaging Preset Manager** -> **Category** (select the Category first).
- 2.) Click on the plus sign in front of IQC for Service.
- 3.) Assign IQC to a Touch Panel key by using the right arrow key.
- 4.) Map the IQC to the location you want it to appear on the Touch Panel.
- 5.) Select **Model** -> **IQC**.

### 4-3-5-2 Probe Indications for Use

See On-line Help or Chapter !7 of the Basic User Manual.

#### 4-3-5-3 Preparations

Use a phantom (optional) when doing these tests.

- 1.) Connect one of the probes, to the scanner's active probe connector.
  - see: ["Connecting Probes" on page 3-19](#) for info about connecting the probes.
  - For available probes, see: [Section 9-18 "Probes" on page 9-63](#).
- 2.) Turn ON the scanner.

The B-Mode window is displayed (default mode).
- 3.) If needed, adjust the Display's Brightness and Contrast setting (see: [Section 6-3 "LCD Monitor adjustments" on page 6-2](#)).



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

- 1.) Press **B-MODE** on the Operator Panel to access B-Mode.
- 2.) These Image Controls are used to optimize the B-Mode picture:
  - 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 control to optimize imaging in the blood flow regions and make a cleaner, less noisy image.
  - Use **Reject** controls to reduce noise in the image.

#### 4-3-5-4 Checks

- Check Width, Focus, Framerate, Frequency  
The results of these adjustments must be verified on the B-Mode sector on the screen.
- Check Up/Down, Left/Right, B Color Maps and Cineloop  
The results of these adjustments must be verified on the B-Mode sector on the screen.
- Check Gain, TGC and Depth
- Check B-Mode Soft Menu Controls
- Check Compress, Contour, Reject and Tilt
- Check Power and Dynamic Range

## 4-3-6 M-Mode Checks

For information on the system's different modes as well as expected results, the Basic User Manual or User Guide will familiarize you with image optimization for **B-Mode**, **M-Mode**, **Color Flow**, and **Doppler**.

**Table 4-15 B/M-Mode Functions**

Control	Description
Power Output (Acoustic Power)	Optimizes image quality and allows user to reduce beam intensity. 10% increments between 0-100%. Values greater than 0.1 are displayed
Dynamic Range	Controls how echo intensities are converted to shades of gray, thereby increasing the adjustable range of contrast.
Focus Number and Position	Increases the number of transmit focal zones or moves the focal zone(s) so that you can tighten up the beam for a specific area. A graphic caret corresponding to the focal zone position(s) appears on the right edge of the image.
Rejection	Selects a level below which echoes will not be amplified (an echo must have a certain minimum amplitude before it will be processed).
Frame Average	Temporal filter that averages frames together. This has the effect of presenting a smoother, softer image.
Colorize	Enables gray scale image colorization. To deactivate, reselect a Gray Map.
Gray Map	Determines how the echo intensity levels received are presented as shades of gray.
Rotation (Up/Down)	Rotates the image by selecting the value from the pop up menu.
Frequency	Multi Frequency mode lets you downshift to probe's next lower frequency or shift up to a higher frequency.
Frame Rate/Resolution	Optimizes B-Mode frame rate or spatial resolution for the best possible image.
Sweep Speed	Changes the speed at which the timeline is swept.

### 4-3-6-1 Preparations

Use a phantom (optional) when doing these tests.

- 1.) Connect one of the probes, to the scanner's active probe connector.
  - see: ["Connecting Probes" on page 3-19](#) for info about connecting the probes.
  - For available probes, see: See On-line Help or Chapter !7 of the Basic User Manual.
- 2.) Turn ON the scanner.

### 4-3-6-2 Checks

- Check Horizontal Sweep, Frequency, and Focus
- Check Compress, Reject, Power and Dynamic Range

## **4-3-7 System CFM and PWD Checks**

### **4-3-7-1 Introduction**

For information on the system's different modes as well as expected results, the Basic User Manual or User Guide will familiarize you with image optimization for **B-Mode**, **M-Mode**, **Color Flow**, and **Doppler**.

For complete information, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 5.

### **4-3-7-2 Preparations**

Use a phantom (optional) when doing these tests.

- 1.) Connect one of the probes, to the scanner's active probe connector.
  - see: ["Connecting Probes" on page 3-19](#) for info about connecting the probes.
  - For available probes, see: [Section 9-18 "Probes" on page 9-63](#).
- 2.) Turn ON the scanner.

### **4-3-7-3 Color Mode Checks**

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

For information, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 5.

### **4-3-7-4 Color B-Mode**

For information, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 5.

### **4-3-7-5 Color M-Mode**

For information, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 5.

- Check Horizontal Sweep, PRF, Baseline, and Invert
- Check Variance, Color Maps and Cineloop
- Check Sample Volume
- Check Frequency and Acoustic Power
- Adjust ROI

#### 4-3-7-6 PW/CW Doppler Mode Checks

For information on the system's different modes, the Basic User Manual or User Guide will familiarize you with image optimization for **B-Mode**, **M-Mode**, **Color Flow**, and **Doppler**.

Doppler is 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 B-Mode picture for navigation purpose and then add Doppler.

For information, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 5.

#### 4-3-7-7 Preparations

- 1.) Connect one of the probes to the scanner.
- 2.) See: [3-6-7 "Connecting Probes" on page 3-19](#) for info about connecting the probes. 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.

#### 4-3-7-8 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.



## 4-3-8 Tissue Velocity Imaging (TVI) Checks

### 4-3-8-1 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.

### 4-3-8-2 Preparations

- 1.) Connect one of the probes, to the scanner's left-most probe connector.
  - See: [3-6-7 "Connecting Probes" on page 3-19](#) 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** key to be able to select between Position and Size controls.*

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

### 4-3-8-3 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.*

### 4-3-9 Contrast checks

For a basic functional check of the system's different modes as well as expected results, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 5.

### 4-3-10 Basic Measurements

*NOTE: The following instructions assume that you first scan the patient and then press Freeze.*

#### 4-3-10-1 Check Distance and Tissue Depth Measurement

- 1.) Press Measure once to display an active caliper.
- 2.) Move the TRACKBALL to position the active caliper at the start point (distance) or the most anterior point (tissue depth).
- 3.) Press Set to fix the start point.
- 4.) The system fixes the first caliper and displays a second active caliper.
- 5.) Move the TRACKBALL to position the second active caliper at the end point (distance) or the most posterior point (tissue depth).
- 6.) Press Set to complete the measurement.

The system displays the distance or tissue depth value in the measurement results window.

*NOTE: Before you complete a measurement:*

- To toggle between active calipers, press **MEASURE**.
- To erase the second caliper and the current data measured and start the measurement again, press **CLEAR** once.

*NOTE: To rotate through and activate previously fixed calipers, turn Cursor Select.*

*NOTE: After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press Clear.*

#### 4-3-10-2 Check Circumference/Area (Ellipse) Measurement

- 1.) Press Measure once to display an active caliper.
- 2.) Move the Trackball to position the active caliper.
- 3.) Press Set to fix the start point.
- 4.) The system fixes the first caliper and displays a second active caliper.
- 5.) Move the Trackball to position the second caliper.
- 6.) Turn the Ellipse control; an ellipse with an initial circle shape appears.

*NOTE: Be careful not to press the Ellipse control as this activates the Body Pattern.*

- 7.) Move the Trackball to position the ellipse and to size the measured axes (the calipers).
- 8.) To increase the size, turn the Ellipse control in a clockwise direction. To decrease the size, turn the Ellipse control in a counterclockwise direction.
- 9.) To toggle between active calipers, press Measure.
- 10.) Press Set to complete the measurement.
- 11.) The system displays the circumference and area in the measurement results window.

*NOTE: Before you complete a measurement:*

- *To erase the ellipse and the current data measured, press Clear once. The original caliper is displayed to restart the measurement.*
- *To exit the measurement function without completing the measurement, press Clear again.*

#### 4-3-10-3 Worksheets

Measurement/Calculation worksheets are available to display and edit measurements and calculations. There are generic worksheets as well as Application specific worksheets. The worksheets are selected from the Measurement Touch Panel.

#### 4-3-10-4 Report Pages

Measurements/Calculations that are included on the worksheet can also be displayed on Report Pages. Report Pages can be customized to meet the appropriate needs of the user.

### 4-3-11 Multi Image Checks

For information on the system's different modes as well as expected results, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 5.

### 4-3-12 Backup and Restore Database, Preset Configurations and Images

For information, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 5.

### 4-3-13 Software Configuration Checks

**Table 4-16 Software Configuration Checks**

Step	Task to do	Notes
1.	Verify Date and Time is correct	
2.	Verify that Location (Hospital Name) is correct	
3.	Verify Language settings are correct	
4.	Verify assignment of Printer Keys	
5.	Verify all of the customer's options are set up correctly	Demo Option strings turn on all options for a limited period of time. Do Not leave a demo Option string in a unit when it is sold to a customer.

## 4-3-14 Probe/Connectors Checks

**NOTE:** Probes can be connected at any time, whether the unit is ON or OFF.

### 4-3-14-1 To Connect a Probe

- 1.) Place the probe's carrying case on a stable surface and open the case.
- 2.) Carefully remove the probe and unwrap the probe cable.
- 3.) DO NOT allow the probe head to hang free. Impact to the probe head could result in irreparable damage.
- 4.) Turn the connector locking handle counterclockwise.
- 5.) Align the connector with the probe port and carefully push into place.
- 6.) Turn the connector locking handle clockwise to secure the probe connector.
- 7.) Carefully position the probe cable in the probe cord holder spot so it is free to move, but not resting on the floor.



### CAUTION TAKE THE FOLLOWING PRECAUTIONS WITH THE PROBE CABLES:

- KEEP AWAY FROM THE WHEELS
- DO NOT BEND
- DO NOT CROSS CABLES BETWEEN PROBES

**Table 4-17 Probe and Connectors Checks**

Step	Task	Expected Result(s)
1.	Select the appropriate connected probe from the probe indicators on the Touch Panel.	The probe activates in the currently-selected operating mode. The probe's default settings for the mode and selected exam are used automatically.
2.	Launch the application. To change application without changing the current probe, press <b>THE DESIRED MODE</b> on the Operator Panel.	The selected application starts.
3.	Verify no missing channels	All channels is functioning.
4.	Verify there's no EMI/RFI or artifacts specific to the probe.	No EMI/RFI or artifacts.
5.	Test the probe in each active connector slot., see: <a href="#">3-6-7 "Connecting Probes" on page 3-19</a>	It will display pictorial data each time
6.	Do a leakage test on the probe, see: <a href="#">Section 10-8 "Electrical Safety Tests" on page 10-14</a>	It passes the test.
7.	Repeat this procedure for all available probes.	

### 4-3-14-2 ECG

Select **Preset**, Select **Cardiac**, Select **Scan**.

If you do not see: the ECG line, select the **ECG** tab, you should see selection on touch screen for DISPLAY ECG, select and press. You should then see the line.

Plug in the ECG cables with nothing attached, so you pick up noise, the line should display noise.

## **4-3-15      Peripherals Checks**

See: [Table 3-6 "Peripheral Checks" on page 3-30.](#)

## **4-3-16 Cineloop Check**

For complete information, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 5.

### **4-3-16-1 To Activate CINE**

- 1.) Press Freeze, then roll the Trackball to activate CINE.
- 2.) To start CINE Loop playback, press Run/Stop. To stop CINE Loop playback, press Run/Stop.

### **4-3-16-2 To Omit Images**

- 1.) Roll the Trackball to the frame you want to delete and press Omit Image.

### **4-3-16-3 To Restore Images**

- 1.) To undo deleting an image from the CINE Loop, press Restore Image.

### **4-3-16-4 To Move Quickly to Start/End Frame**

- 1.) Press First to move to the first CINE frame.
- 2.) Press Last to move to the last CINE frame.

### **4-3-16-5 To Start Frame/End Frame**

- 1.) Turn the Start Frame dial to the left to move to the beginning of the CINE Loop. Turn the dial to the right to move forward through the CINE Loop.
- 2.) Turn the End Frame dial to the right to move to the end of the CINE Loop. Turn the dial to the left to move backward through the CINE Loop.

### **4-3-16-6 To Adjust the CINE Loop Playback Speed**

- 1.) Turn the Loop Speed dial right/left to increase/decrease the CINE Loop playback speed.

### **4-3-16-7 To Move through a CINE Loop Frame By Frame**

- 1.) Turn Frame by Frame to move through CINE memory one frame at a time.

### **4-3-16-8 Checks**

- Check Left Marker, Right Marker, Cycle Select and Number of Cycles
- Check First, Last Cycle, Select all
- Adjust Scroll and Cine Speed

#### **4-3-17      Back End Processor checks**

- If all the previous tests have been passed successfully, the Back End Processor is most likely OK.
- See: Service Platform.
- If the system seems to be operating erratically, please refer to ["Diagnostics/Troubleshooting" on page 7-1.](#)



## 4-3-18 Mechanical Function Checks

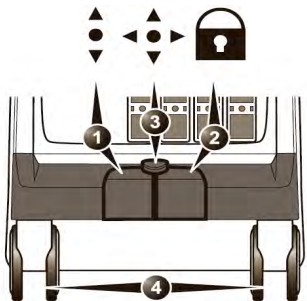
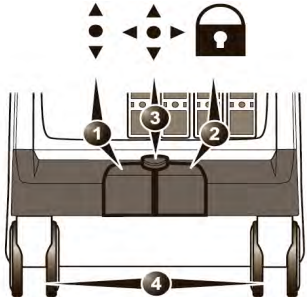
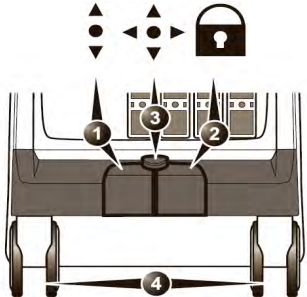
### 4-3-18-1 Alphanumeric Keyboard and Display Platform (Console) Checks

See: 7-5-24-1 "Keyboard" on page 7-104.

### 4-3-18-2 Brakes and Direction Lock Checks

Check that the brakes and direction locks function as described below.

**Table 4-18 Brakes and Direction Lock Checks**

	Steps	Corresponding Graphic
1.	<p>Press the left pedal (1), this:</p> <p>Releases the brake and engages the locked wheel direction.</p> <p>You may need to move the system around a little to get the wheels to lock into the locked direction.</p>	 <p>1. Swivel lock pedal 2. Full lock pedal (Parking brake) 3. Release active lock 4. Front wheels</p>
2.	<p>Press the right pedal (2) this:</p> <p>Engages the brakes in full lock.</p>	 <p>1. Swivel lock pedal 2. Full lock pedal (Parking brake) 3. Release active lock 4. Front wheels</p>
3.	<p>Press the middle pedal (3), this:</p> <p>Engages swivel lock.</p>	 <p>1. Swivel lock pedal 2. Full lock pedal (Parking brake) 3. Release active lock 4. Front wheels</p>

#### 4-3-18-3 Operator I/O Movement - LCD

Check that the monitor functions as described below

**Table 4-19 19" LCD Display Platform Maneuverability Checks**

Step	Task	Note(s)
1.	Tilt Forward/Back	Use both hands, one at the top of the LCD and one at the bottom, to rotate the screen forward and back.
2.	Move Left/Right	Use both hands, one at the lower left handle hold of the LCD and one at the lower right handle hold, to adjust the screen left and right.

See: [4-2-5 "LCD Monitor Positions and Lock" on page 4-11.](#)

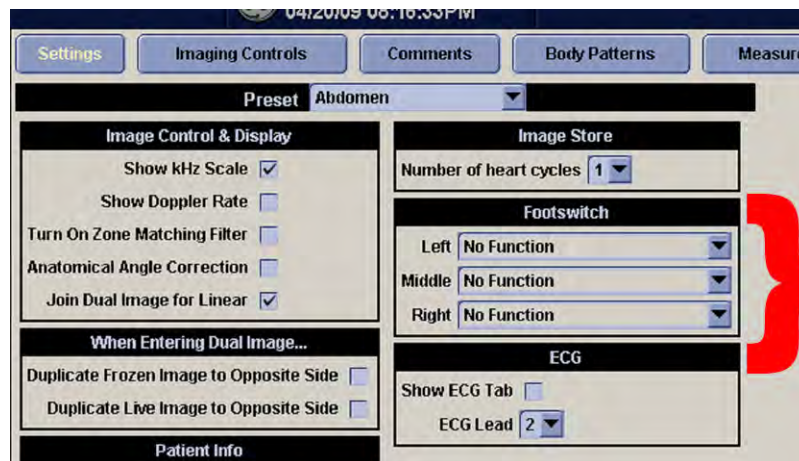
#### 4-3-18-4 Operator Console Movement (XY)

See: [4-2-4 "Top Console position adjustment" on page 4-10.](#)

#### 4-3-18-5 Footswitch

- 1.) Plug in the footswitch.
- 2.) Select **Utility** -> **Application**.  
You should see the footswitch programming options for Left Middle Right switches.
- 3.) Program them all for Freeze.
- 4.) Then Scan and use each pedal to freeze and unfreeze to be sure each works.

**Figure 4-23 Footswitch Function Checks**



#### 4-3-18-6 WLAN

- R2.x.x or R3.x.x, see: [8-6-8-3 "WLAN - Set up and Check" on page 8-142](#)
- R4.x.x or later, see: [8-11-23-3 "WLAN Set-up" on page 8-478](#)

## Section 4-4 Application Turnover Check List

Complete these checks before returning the scanner to customer for use:

### 4-4-1 Software Configuration Checks

Table 4-20 Software Configuration Checks

STEP	TASK	CHECK (✓)			
1.	Check Date and Time setting				
2.	Check that Location (Hospital Name & Department) is correct				
3.	Check Language settings				
4.	Check assignment of Printer Keys	P1	P2	P3	P4
5.	Check that all of the customer's options are correctly installed				

## Section 4-5 Power supply test and adjustments

### 4-5-1 Power Supply Test Procedure

Run the System Voltage test. Refer to [7-5-21-4 "System" on page 7-69](#).

## Section 4-6 3D/4D and Volume Navigation Functional Check

For complete information, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapters 5 and 6.

## Section 4-7 Site Log

**Table 4-21 Site Log**[illegible]

**Table 4-21 Site Log (Continued)**

[illegible]

**Table 4-21 Site Log (Continued)**

[illegible]

**Table 4-21 Site Log (Continued)**

[illegible]

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# Chapter 5

## Components and Functions (Theory)

### Section 5-1 Overview

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

This chapter explains LOGIQ E9's ultrasound system concepts, component arrangement, and subsystem functions. It also describes the Power Distribution System. Refer to the Basic User Manual for more information.

**Table 5-1 LOGIQ E9 Software Configurations and Hardware/Software Compatibility - Upgrade Options**

CONSOLE MODEL NUMBER	DESCRIPTION	SOFTWARE VERSION										
		Phase I				BT2010			BT2011			BT2013
		1.0.3	1.0.4	1.0.5	1.0.6	2.0.3	2.0.4	2.0.5	3.1.0	3.1.1	3.1.2	4 Rev. x.x
5205000	LOGIQ E9, 100-240 VAC	Y	Y	Y	Y	U	U	U	U	U	U	U
5205000-2	LOGIQ E9, 220-240 VAC	Y	Y	Y	Y	U	U	U	U	U	U	U
5205000-3	LOGIQ E9, 100-240 VAC	N	N	N	N	Y	Y	Y	U	U	U	U
5205000-4	LOGIQ E9, 220-240 VAC	N	N	N	N	Y	Y	Y	U	U	U	U
5205000-5	LOGIQ E9, 100-240 VAC	N	N	N	N	N	N	N	N	Y	Y	U
5205000-6	LOGIQ E9, 220-240 VAC	N	N	N	N	N	N	N	N	Y	Y	U
5205000-7	LOGIQ E9, 100-240 VAC	N	N	N	N	N	N	N	N	N	N	Y

#### LOGIQ E9 Software Configurations Key

LOGIQ E9 Software Configurations Key	
Y	Original
U	Upgrade available
N	Not supported

**Front End Processor** - see: [9-12-2 "Front End Boards Compatible Configurations"](#) on page 9-48

**Back End Processor** - see: [9-13-1 "Back End Boards Compatible Configurations"](#) on page 9-59

## **Section 5-2**

### **LOGIQ E9 description**

#### **5-2-1 Purpose of this section**

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

#### **5-2-2 Introduction**

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

The LOGIQ E9 provides image generation in B-Mode, Color Doppler, Power Doppler, M-Mode, PW, 4D, Harmonic Imaging, and Contrast imaging applications. The fully digital architecture of the LOGIQ E9 ultrasound system allows optimal usage of all scanning modes and probe types throughout the full spectrum of operating frequencies.

### 5-2-3 LOGIQ E9 general description

LOGIQ 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.

### 5-2-4 LOGIQ E9 Overall block diagram

#### GFI Configuration

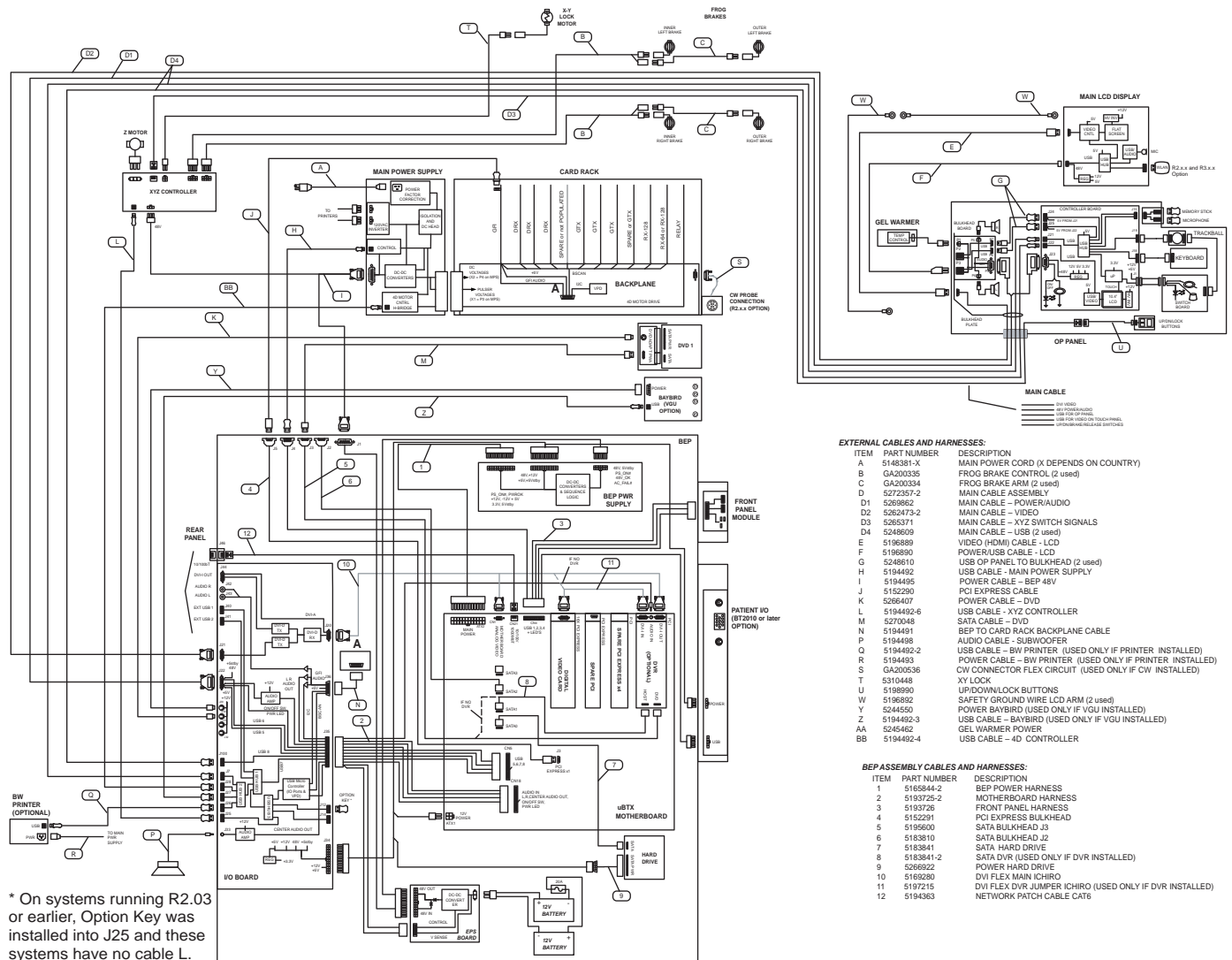
Overall block diagram includes the following sections:

- Main Power Supply
- Front End Card Rack, with:
  - GRLY(1) - Global Relay Board
  - GRX (2) - Receiver Boards (GRX64 & GRX128)
  - CW (0) - Note: supported on R2.x.x and later.
  - GTX (3) - Transmitter Boards (64 channels each, in this configuration). Note: some illustrations show that there are four boards; this is for illustration purposes only.
  - DRX (3) - Digital Receiver Boards (64 channels each, in this configuration). Note: some illustrations show that there are four boards; this is for illustration purposes only.
  - GFI (1) -
- Back End Processor (BEP), with:
  - BEP Power Supply
  - I/O Board
  - HDD -- 160GB Hard Drive
  - ADD Video Card for DVI
  - DVR Card (Optional)
  - Front Panel LEDs, etc.
- Volume Navigation (V Nav) Bay of Birds Assembly
- CD/DVD
- Operator Console Assembly, with:
  - LCD Monitor
  - Upper Operator Panel Assembly
  - Lower Operator Panel Assembly
  - Bulkhead
  - Gel Warmer (Optional) which can be placed on the left or right-hand side of the console
  - TV Probe Holder (Optional) which can be placed on the left or right-hand side of the console
- XYZ Controller Assembly
- Z-Axis Motor Assembly

## 5-2-4 LOGIQ E9 Overall block diagram (cont'd)

CW is supported for R2.x.x or later. The CW circuitry is found on the CW version of the GRX128 board.

Figure 5-1 LOGIQ E9 Block diagram - GFI configuration (BEP5.x)



## 5-2-4 LOGIQ E9 Overall block diagram (cont'd)

### MRX

Overall block diagram includes the following sections:

- Main Power Supply
- Front End Card Rack, with:
  - GRLY(1) - Global Relay Board
  - MRX (1) - Receiver Board with and without CW
  - GTX (3) - Transmitter Boards (64 channels each, in this configuration). Note: some illustrations show that there are four boards; this is for illustration purposes only. Back End Processor (BEP), with:
- Back End Processor (BEP), with:
  - BEP Power Supply
  - I/O Board
  - HDD -- 160GB Hard Drive
  - ADD Video Card for DVI
  - DVR Card (Optional)
  - Front Panel LEDs, etc.
- Volume Navigation (V Nav) Bay of Birds Assembly
- CD/DVD
- Operator Console Assembly, with:
  - LCD Monitor
  - Upper Operator Panel Assembly
  - Lower Operator Panel Assembly
  - Bulkhead
  - Gel Warmer (Optional) which can be placed on the left or right-hand side of the console
  - TV Probe Holder (Optional) which can be placed on the left or right-hand side of the console
- XYZ Controller Assembly
- Z-Axis Motor Assembly

**Table 5-2 New Card Rack configuration for MRX**

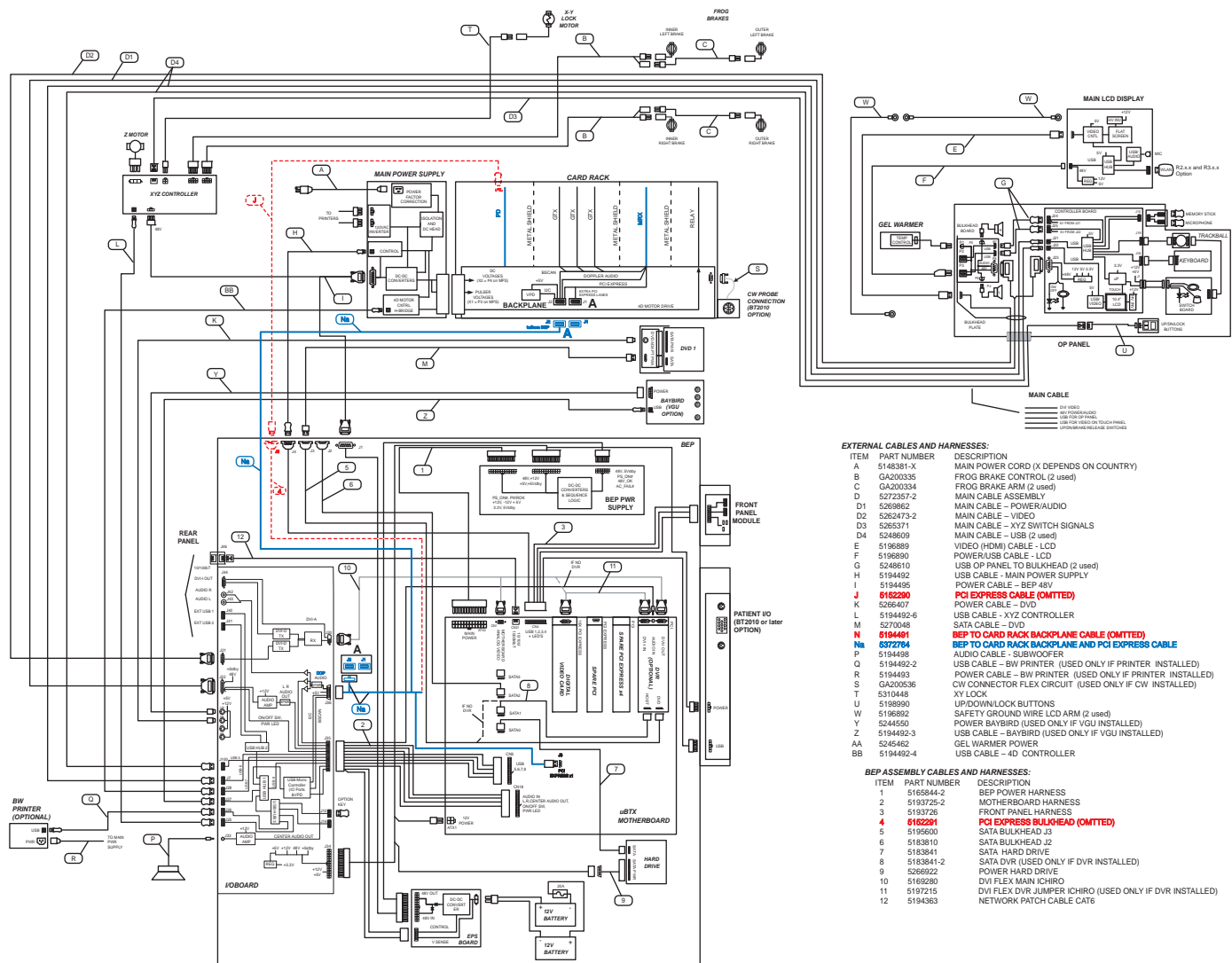
New Part	Replaces	Comments
MRX	DRXs GRXs GFI	MRX Board combines the functionality of the Digital Receiver Boards (DRXs), Analog Receiver Boards (GRXs) and the Global Front End Interface (GFI)
Power Distribution (PD)	Function of power distribution previously supplied from DRX Boards.	Power Distribution Board replaces all power supplies previously present in DRX and GRX Boards, plus the Monitoring circuitry for the Card Rack Fan control.
Backplane	Backplane	Change for MRX compatibility
Front Plane	Front Plane	Change for MRX compatibility

## 5-2-4 LOGIQ E9 Overall block diagram (cont'd)

CW is supported for R3.x.x and later. The CW circuitry is found on the MRX Board.

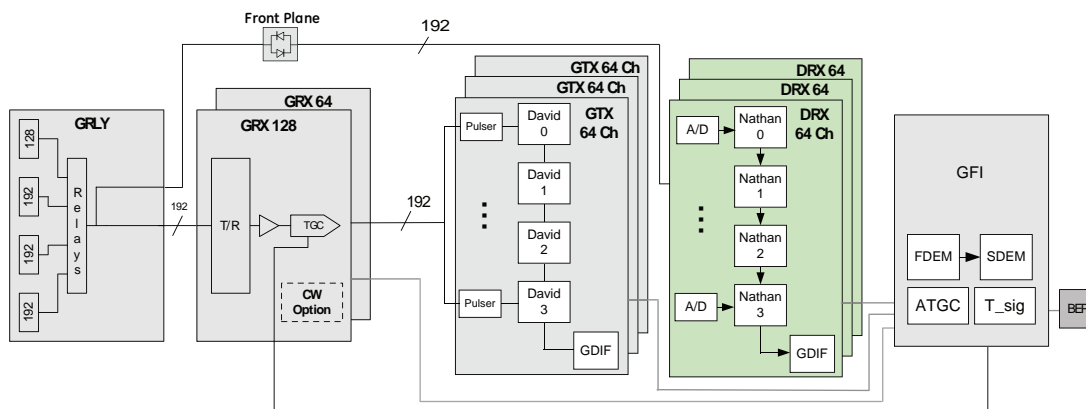
**NOTE:** *Figure 5-4 "LOGIQ E9 Signal Flow - MRX" on page 5-8 is identified in color to simplify the differences between R2.x.x and earlier (or GFI configuration) and R3.x.x and later (MRX). Red represents GFI configuration and blue represents MRX. The Card Rack only shows MRX.*

Figure 5-2 LOGIQ E9 Block diagram - MRX (BEP5.x)



## 5-2-5 Signal flow overview

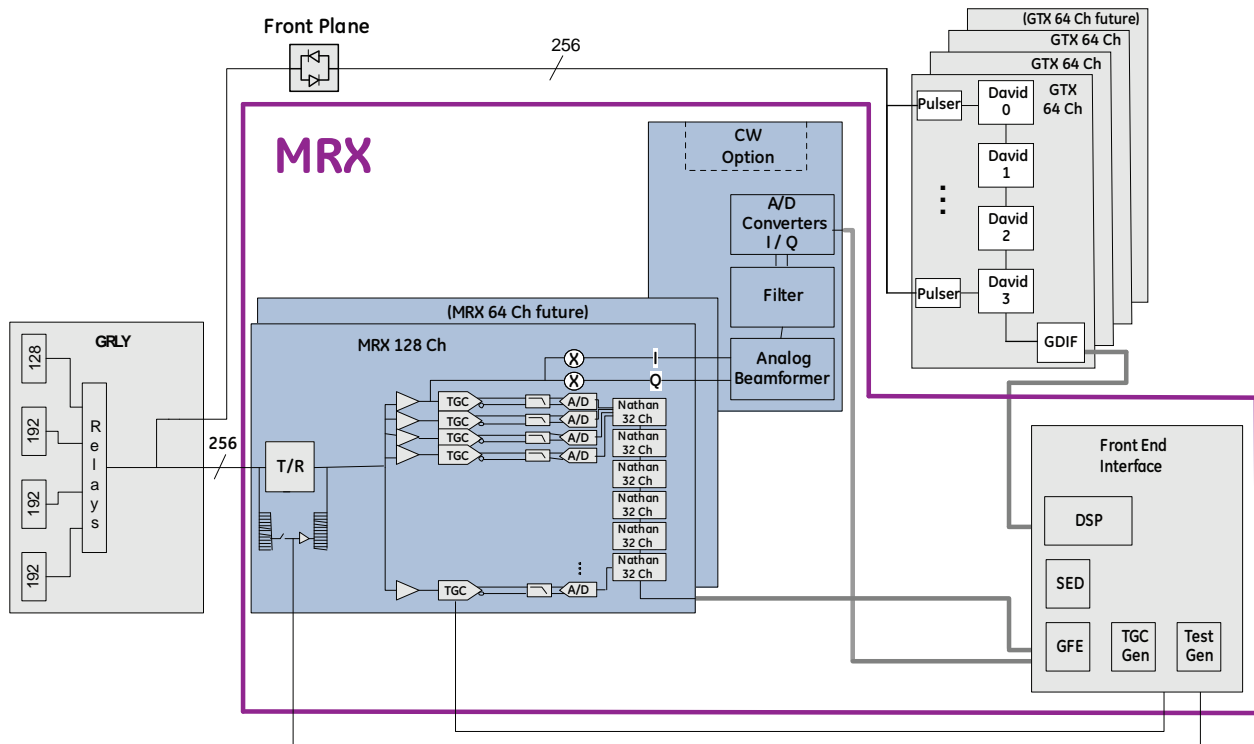
Figure 5-3 LOGIQ E9 Signal Flow - GFI Configuration



Weak ultrasound echoes from body structures and blood cells are received by the probes and routed via the Relay board and the XD bus to the RX board. The RX board 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.

## 5-2-5 Signal flow overview (cont'd)

Figure 5-4 LOGIQ E9 Signal Flow - MRX



The MRX Board combines the functionality of the Receiver Boards (DRX and GRX) and the GFI. Weak ultrasound echoes from body structures and blood cells are received by the probes and routed via the Relay board and the XD bus to the MRX board. The MRX board amplifies the ultrasound signal and connects it with an A/D converter to the digital domain. The digital signals are then further processed on the MRX boards.



## 5-2-6 LOGIQ E9's Operating Modes

### 5-2-6-1 B-Mode

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 B-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 (B-Mode) (B-Mode) cross-section is a sector, depending on the particular transducer used. B-mode can be used in combination with any other mode.

#### 5-2-6-1-1 Harmonic Imaging

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. LOGIQ E9's high performance Harmonic Imaging provides superb detail resolution and penetration, outstanding contrast resolution, excellent acoustic clutter rejection and an easy to operate user interface for switching into Harmonic 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 B-Mode (2D (B-Mode)) image quality without introducing a contrast agent.

### 5-2-6-2 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 (B-Mode) (B-Mode) image for spatial reference. The 2D (B-Mode) (B-Mode) image has a graphical line (M-line) superimposed on the 2D (B-Mode) (B-Mode) image indicating where the M-mode beam is located.

### 5-2-6-3 Color Flow 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

A real-time two-dimensional cross-section image of blood flow is displayed. The 2D (B-Mode) (B-Mode) 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 (B-Mode) (B-Mode) 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 (B-Mode) (B-Mode) and Spectral Doppler modes.

5-2-6-3-1 Power Doppler

A real-time two dimensional cross-section of blood flow is displayed. The 2D (B-Mode) (B-Mode) 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 (B-Mode) (B-Mode) 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 (B-Mode) (B-Mode) and Spectral Doppler modes as well as with 4D mode.

5-2-6-4 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 (B-Mode) (B-Mode) 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 (B-Mode) (B-Mode) and Color Flow modes.

5-2-6-5 Continuous Wave (CW) Doppler

Continuous Wave Doppler systems use two crystals, one to send and one to receive the echoes.

The transmitter inputs a continuous sinusoidal wave. The receiver detects the shift.

An audible sound is created and recorded by either an analog recorder or spectral analyzer. Spectral analysis separates the signal into individual components and assigns a relative importance.

The benefits of CW Doppler include high sensitivity to low velocities and detection of high velocities without aliasing. Although CW Doppler cannot distinguish between the sending and receiving signals or extraneous echoes, nor does CW Doppler produce a precise image like Pulsed Wave Doppler.

5-2-6-6 Other Modes

4D: The LOGIQ E9 Ultrasound System may be used to acquire multiple, sequential 2D (B-Mode) (B-Mode) images which can be combined to reconstruct a three dimensional image. These 4D images are useful in visualizing three-dimensional structures, and in understanding the spatial or temporal relationships between the images in the 2D (B-Mode) (B-Mode) sequence. The 4D image is presented using standard visualization techniques, such as surface or volume rendering.

For more information on Volume Navigation and Contrast Imaging, refer to the Basic User Manual.

#### 5-2-6-6-1 4D Data Collection and Reconstruction

2D (B-Mode) (B-Mode) gray scale images may be reconstructed. The acquisition of volume data sets is performed by sweeping 2D (B-Mode) (B-Mode)-scans with special transducers (called 4D-transducers) designed for the 2D (B-Mode)-scans and the 4D-sweep.

Images are spatially registered, using internal probe position sensing and a position control to ensure geometric accuracy of the 4D data.

2D (B-Mode) ultrasound imaging modes are used to view a two dimensional cross-sections of parts of the body. For example in 2D (B-Mode) gray scale imaging, a 2 dimensional cross-section of a 3-dimensional soft-tissue structure such as the heart is displayed in real time. Typical, the user of an ultrasound machine manipulates the position and orientation of this 2D (B-Mode) cross-section in real time during an ultrasound exam.

By changing the position of the cross-section, a variety of views of the underlying structure are obtained, and these views can be used to understand a 3-dimensional structure in the body.

To complete survey a 3-dimensional structure in the body, it is necessary to collect 2D (B-Mode) images which span a volume containing the structure. One way is to sweep the imaging cross-section by translating it in a direction perpendicular to the cross-section. Another example method is to rotate the cross section about a line contained in the cross section. The LOGIQ E9 Ultrasound System uses the automated so called C-Scan for the motion perpendicular to automated B-scan. Once a representative set of 2D (B-Mode) cross-sections are obtained, standard reconstruction techniques can be used to construct other 2D (B-Mode) cross-sections, or to view the collection of the cross-sections as a 4D images.

#### 5-2-6-6-2 4D Image Presentation

The basic technique for 4D image presentation is to combine the 2D (B-Mode) cross-sections into an image which represents how the volume of the data would appear from a particular viewing direction. The mathematics behind this feature is called 4D-rendering. Such combined images are called projections, because the data from the volume is projected onto a flat 2-dimensional surface, e.g. the ultrasound system display. This technique can be applied to any 2D (B-Mode) ultrasound mode.

Several techniques can be used to aid the human observer in understanding the resulting 2D (B-Mode) image as a representation of a three-dimensional object. One is to rotate the volume of data, and present the resulting sequence of 2D (B-Mode) projections to the observer. The changing direction of observation helps the observer to separate the features in the volume according to their distance from the observer.

#### 5-2-6-7 Volume Navigation

Using a position sensor attached to the probe, Volume Navigation Fusion (V Nav) lets you import a pre-acquired Ultrasound, CT or MR DICOM volume dataset and register it to the live Ultrasound image. As a result, you can view live Ultrasound scanning simultaneously with the corresponding multi-planar reformatted (MPR) slice from the pre-acquired dataset.

In addition, you can use V Nav as a type of “GPS” positioning marker to track an anatomy of interest.

V Nav is available in B-Mode, Color Flow, PDI, and Contrast Modes; it is not available while in 3D/4D or when timeline modes are active. Biopsy capability is available while in V Nav.

#### Contrast Imaging

The LOGIQ E9 is designed for compatibility with commercially available Ultrasound contrast agents. Because the availability of these agents is subject to government regulation and approval, product features intended for use with these agents may not be commercially marketed nor made available before the contrast agent is cleared for use. Contrast related product features are enabled only on ultrasound systems for delivery to an authorized country or region of use. It is not currently approved for use in the United States.

## **Section 5-3**

### **Top Console with LCD monitor and Operator Panel**

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

The purpose of this section is to give you an overview of LOGIQ E9's Top Console and to tell you how it function.

#### **5-3-2 Transporting LOGIQ E9**

The Top Console must be locked into the lower, center (X/Y) position before transporting the LOGIQ E9. The LCD Monitor must be in its flipped down position. And the rear wheel brake must be set. Refer to the Basic User Manual (Direction 5180374-100) for more information.

### 5-3-3 Top Console description

The Top Console includes:

- LCD monitor
- Operator Panel with;
  - An On/Off switch
  - ATouch Panel Screen and a Control Panel with controls for manipulating the picture quality and for use in Measure & Analyze (M&A)
  - An alphanumeric keyboard (QWERTY keyboard).
  - Trackball
  - XYZ Control, e.g., frogleg controls and lock to move the Top Console left/right, forward/backward, and up/down.
- speakers for stereo sound output (used during Doppler scanning/replay)

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

The Top Console can be moved up/down (Z-axis), sideways to the left and to the right (X-axis) and back and forth (Y-axis). The XYZ Mechanism is commonly referred to as the frogleg.

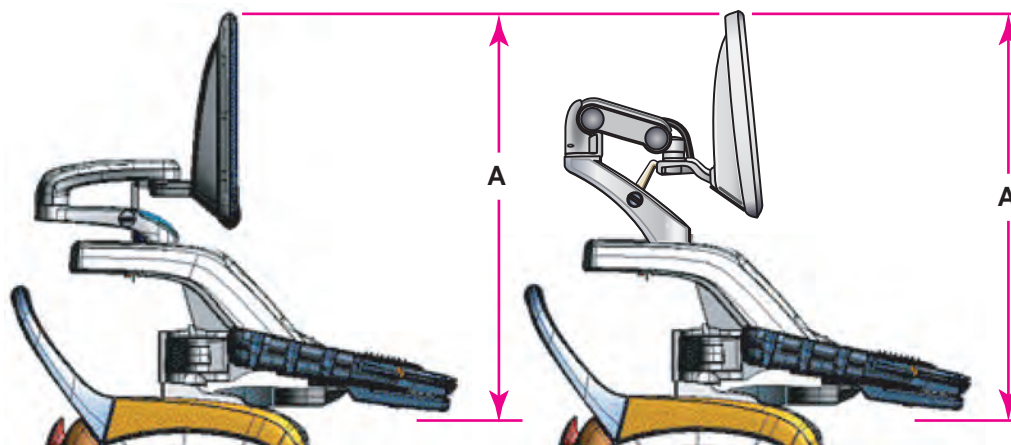
The up/down movement of the console is motor driven. The control buttons for the electrical motor are centered between the handles. A gas spring inside the LOGIQ E9 counterbalances the Z-axis (vertical) movement, lessening the load the Z motor must move.

The brakes used for locking the console's X and Y movement are all operated by electrical motors

#### 5-3-3-1 Top Console's location in the LOGIQ E9

The Top Console is located on the top of the LOGIQ E9, and includes the Main LCD monitor, the Monitor Arm, the Operator Panel with the Touch Screen, Speakers, an alphanumeric keyboard, and frogleg controls.

**Figure 5-5 Top Consoles location (A) - early and late production shown**



## 5-3-4 Operator Panel

### 5-3-4-1 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 and frogleg controls.

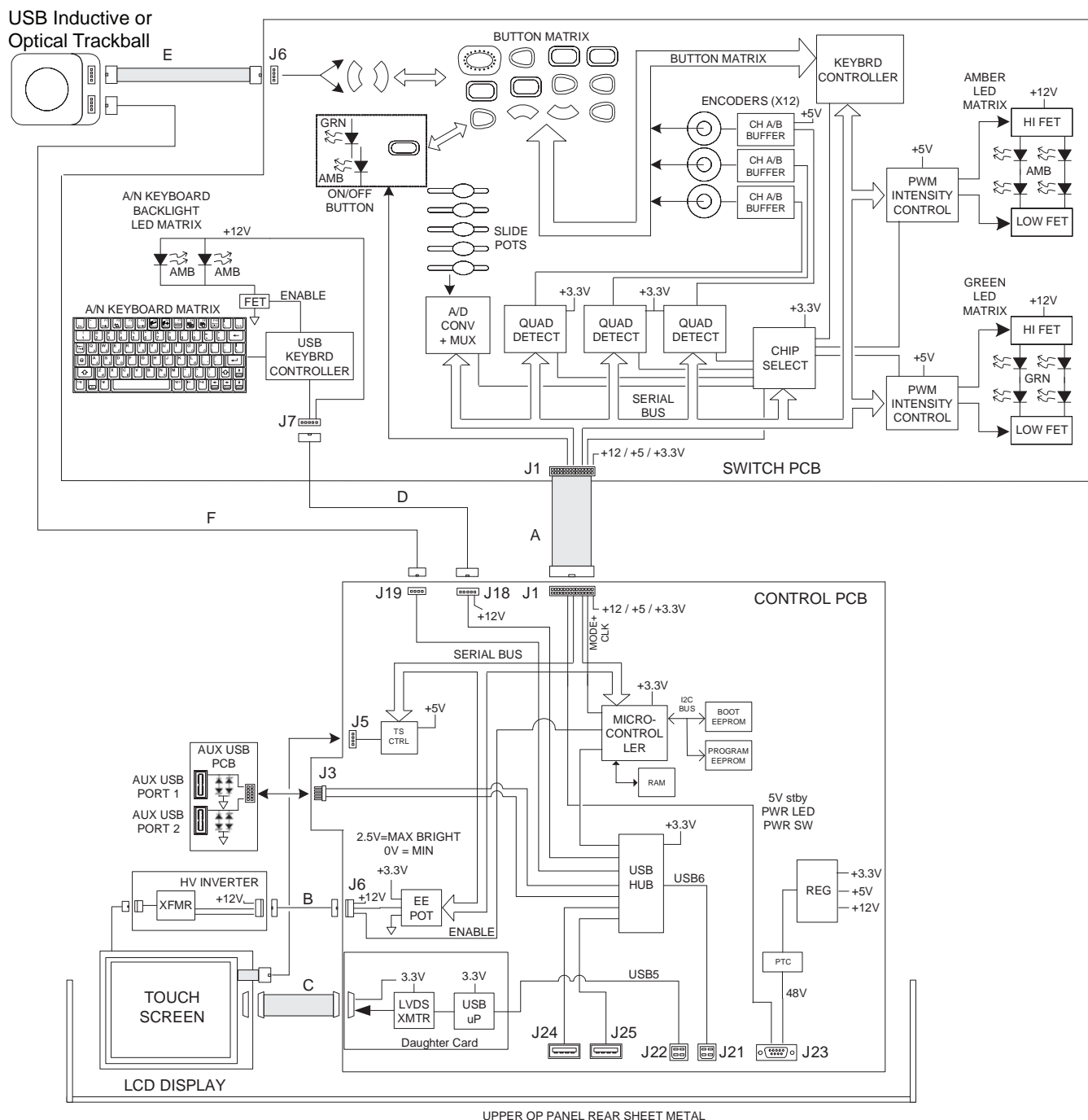
Figure 5-6 Operator Panel



- 1.) Probe and Cord Holder
- 2.) USB Ports (2)
- 3.) Measurement Selection Menu and Joystick controls
- 4.) Keyboard
- 5.) Feature Keys: Elastography, Volume, Navigation, Loop View, Contrast
- 6.) Modes (B, M, CF, PDI, PW, CW, TVi) /Gain/XYZ Controls for 3D/4D Mode
- 7.) TGC
- 8.) Trackball, Trackball Keys, Pointer, Measure, Comment, Body Pattern, Clear, Zoom, 3D/4D, P1
- 9.) L/R, Start/Stop, Freeze
- 10.) Steer/Width/Depth/Reverse
- 11.) Auto
- 12.) P2, P3, P4
- 13.) Frogleg Controls (XYZ Mechanism)

### 5-3-4-2 Operator Panel Block Diagram

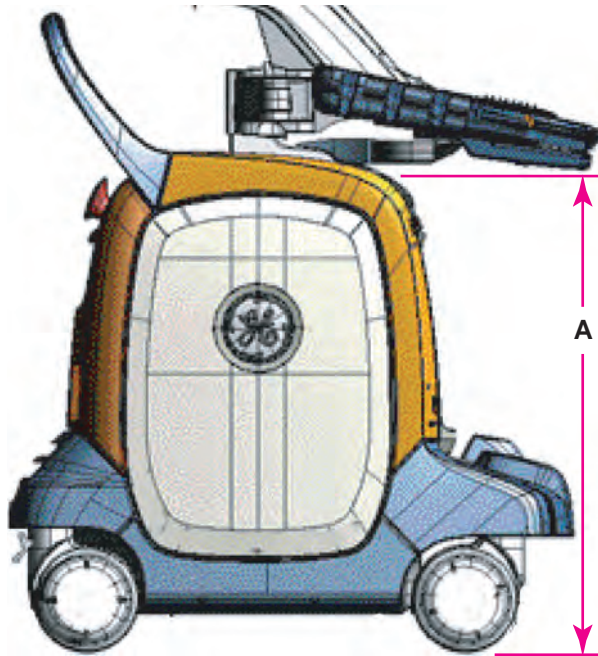
Figure 5-7 Operator Panel Block Diagram



## Section 5-4 Main Console

### 5-4-1 Main Console description

Figure 5-8 Main Console location (A)



The Main Console hosts the:

- Patient HDD and Network Indicators
- Front End Card Rack
- Back End Processor (BEP)
- Optional B/W printer
- DVD Recorder (card in BEP) Option
- DVD player
- Power Supply (Main Power)
- 4D Motor Controller Option
- Volume Navigation Option
- 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 LOGIQ E9. The other parts, listed above, are mounted to the frame. The outside of the Main Console is covered with plastic covers.



## **Section 5-5**

### **Air Flow control**

#### **5-5-1 General description**

The Air Flow Control includes the following components: Air cooling fans located at the bottom of the LOGIQ E9.

#### **5-5-2 Location in the LOGIQ E9**

There are two filters. One located on the rear of the LOGIQ E9 and one located beneath the air cooling fans at the bottom of the LOGIQ E9. Refer to Chapter 8 for more information.

## **Section 5-6**

### **Casters and Brakes description**

The front brake is used for everyday use; the back brake is ONLY used to transport the LOGIQ E9. Refer to Chapter 8 for more information.

## Section 5-7 Power distribution

### 5-7-1 Purpose of this section

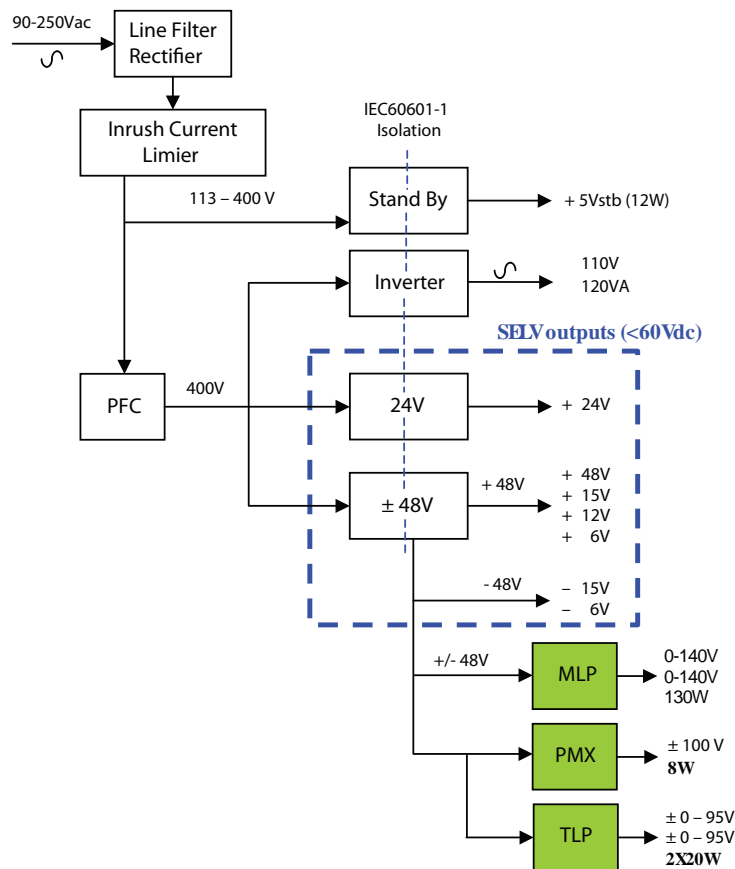
The power distribution within the LOGIQ E9 is described in this section.

### 5-7-2 Main Power Supply

#### 5-7-2-1 General description

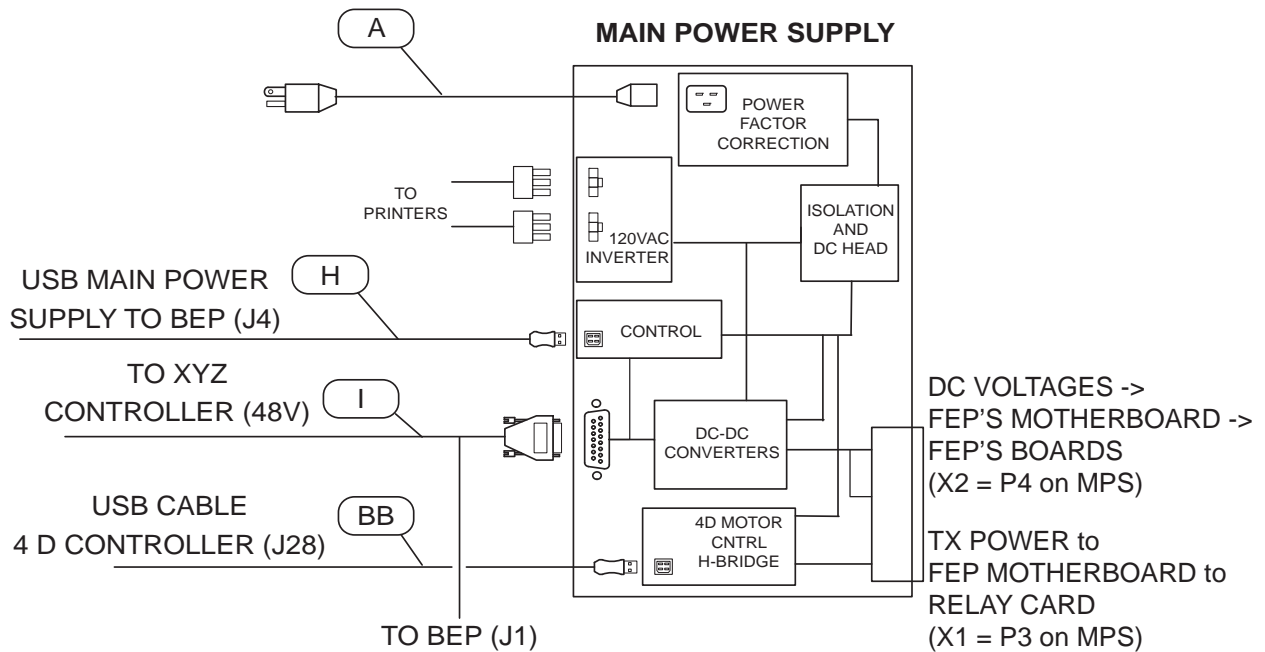
The Main Power Supply's main task is to galvanically isolate the scanner from the on-site Mains Power System and to supply the various internal subsystems with AC or DC power.

**Figure 5-9 Main Power Supply**



### 5-7-2-1 General description (cont'd)

Figure 5-10 Power Supply Block Diagram



Power from the wall outlet (100 to 240 VAC, 50/60 Hz) is connected to the Main Power Supply. The Main Power Supply delivers the needed voltages to the rest of the LOGIQ E9:

- Internal Printer (110 VAC)
- Front End Rack (DC power with several voltages)
- Front End Rack (TSV1 and TSV2 for the transmitters)
- Front End Rack (PMXVOUT for the probe channel multiplexers)
- Back End Processor

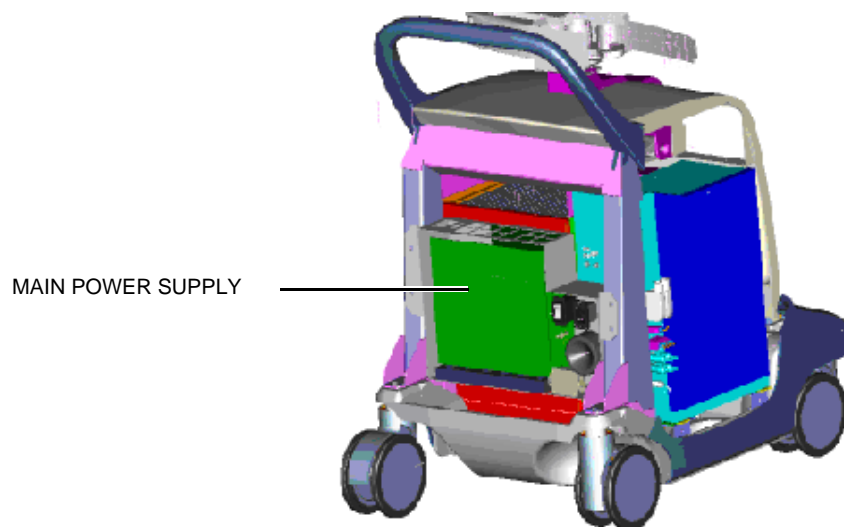
An inrush current limiter reduce the peak input current when the LOGIQ E9 is switched on. An EMI filter helps to reduce EMI to acceptable levels.

The mains cord has plugs in both ends. A female plug connects to the scanner and a male plug to the wall outlet.

Fuses are located inside the power supply (only to be replaced by the manufacturer).

### 5-7-2-1 General description (cont'd)

Figure 5-11 Main Power Supply



### 5-7-2-2 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. Fan speed is controlled by the power supply.

### 5-7-2-3 Input

Mains Power, 100 VAC or 240 VAC, 50/60 Hz

Figure 5-12 L1 - Mains IN connector



## 5-7-3 Power Up Sequence Description

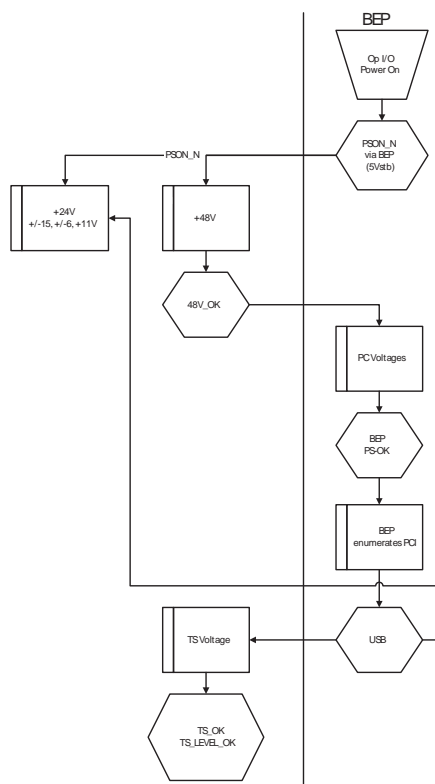
### 5-7-3-1 Overview

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

- 1.) Switch AC Breaker to ON position
- 2.) Press the ON button on the Operator Panel
- 3.) BEP power-up

### 5-7-3-2 AC Breaker to ON position

Figure 5-13 Power On Sequence



- 1.) BEP, powered by 5Vstb, detects contact of Power-On Button.
- 2.) BEP sends PS\_ON\_N low to the Main Power supply.
- 3.) Main Power supply powers up +48V.
- 4.) Main Power supply powers up +24V,  $\pm 15V$ ,  $\pm 6V$ , +11V.
- 5.) Main Power supply provides 48V\_OK as soon as +48V is within specification.
- 6.) BEP Power supply Provides PC voltages from +48V.
- 7.) BEP enumerates PCI. (note that GFI DSP, or MRX DSP and PCI Express bridge must be powered before BEP enumerates PCI).
- 8.) BEP application software controls +24V,  $\pm 15V$ ,  $\pm 6V$ , +11V via USB (RackPower 0x6A).
- 9.) BEP application software controls TSV1 and TSV2 via USB (SetTxPS 0x68).
- 10.) Main Power supply provides TS\_OK and TS\_LEVEL\_OK output signals to GFI or MRX.

## 5-7-4 Power Down Sequence description

### 5-7-4-1 Overview

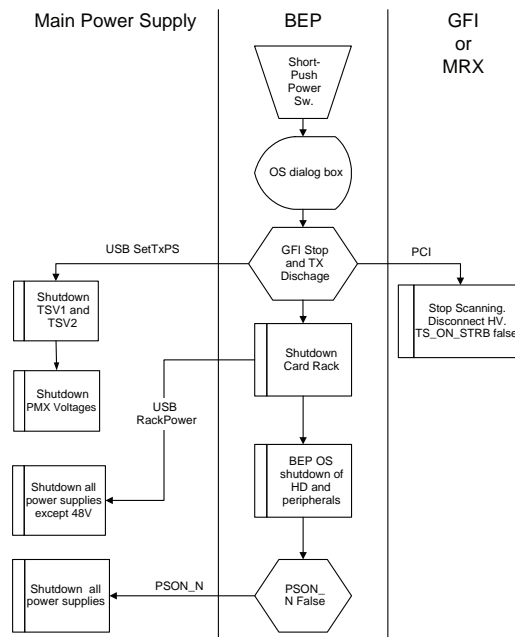
There are three possible scenarios for Power Down of the LOGIQ E9:

- Power Down - normal power down (short push)
- Enforcement Power Down (long push)
- Power Loss

Each of the scenarios are described below.

### 5-7-4-2 Power Down

Figure 5-14 Power Down Sequence



- 1.) BEP detects short-term contact of Power Switch.
- 2.) BEP OS dialog box prompts user for power down.
- 3.) BEP, via PCI express, commands the GFI or MRX to stop scanning, disconnect TX circuits from TS, stop strobe TS\_ON\_STRB.
- 4.) BEP, via USB, commands Power Supply to shutdown TSV1 and TSV2 (SetTxPS 0x68).
- 5.) Controller turns OFF PMX voltages.
- 6.) BEP, via USB, commands Power Supply to shutdown card rack (RackPower 0x6A).
- 7.) BEP OS performs shutdown.
- 8.) BEP sends PSON\_N high to Power Supply.
- 9.) Controller turns OFF TS voltages.
- 10.) Controller TS\_OK output signal goes low.
- 11.) Controller turns OFF PMX voltages.
- 12.) Controller turns OFF voltages +/-15, +/-6, +11V, +24V.
- 13.) Controller turns OFF +48V.
- 14.) Controller output 48V\_OK goes low.

## **Section 5-8**

### **Cables for LOGIQ E9**

Please refer to:

- [Section 9-16 "Mains Power Cables" on page 9-50](#)
- [Section 9-17 "Internal Cables" on page 9-52](#)

## **Section 5-9**

### **Probes description**

See [Section 9-18 "Probes" on page 9-63](#).

## Section 5-10

### Product manuals

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

*NOTE: Dates on screenshots are represented in MM/DD/YYYY format throughout the manual. Information on how to change the LOGIQ E9's date can be found in Customizing Your System, Chapter 16 in the LOGIQ E9 User Manual/User Guide.*

#### 5-10-1 User documentation

- LOGIQ E9 User Manual/User Guide
- LOGIQ E9 Advanced Reference Manual
- Release Notes
- eDOCs CD (contains all user manuals and translations and the Basic Service Manual)

#### 5-10-2 Service documentation

- LOGIQ E9 Basic Service Manual
- LOGIQ E9 Unpacking/Packing Procedure
- LOGIQ E9 Option Manuals



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# ***Chapter 6***

## ***Service Adjustments***

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### **Section 6-1**

#### **Overview**

#### **6-1-1 Purpose of this chapter**

This section describes how to adjust the scanner.

## **Section 6-2**

### **LCD Monitor adjustments**

#### **6-2-1 Purpose of this section**

This section describes how to adjust the LCD monitor for optimal performance.

#### **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

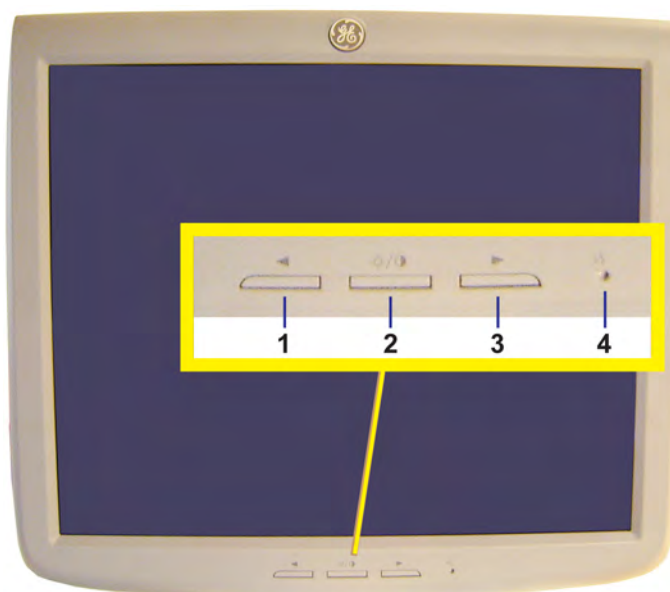
The monitor adjustment is done via three controls (buttons) on front of the monitor.

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

Under special light conditions, you may want to adjust the LCD screen's backlight intensity.

Factory default Intensity is: 100%.

**Figure 6-1** LCD adjustment buttons - see [Table 6-2 "Advanced LCD Adjustments" on page 6-5](#) for feature descriptions



For complete information, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 16 for R3.x.x.

To obtain different test patterns for B/W or color adjustments, press Utility in the Touch Panel and select Test Patterns.

## 6-2-4 LCD Adjustment Procedure

**Table 6-1 Recommended LCD Settings**

Room Condition	Contrast	Brightness
Dark Room for Radiology/Cardiology	85	35
Dim Room for Radiology/Cardiology	90	55
Bright Room	100	100
Factory Settings	100	60

### 6-2-4-1 Brightness

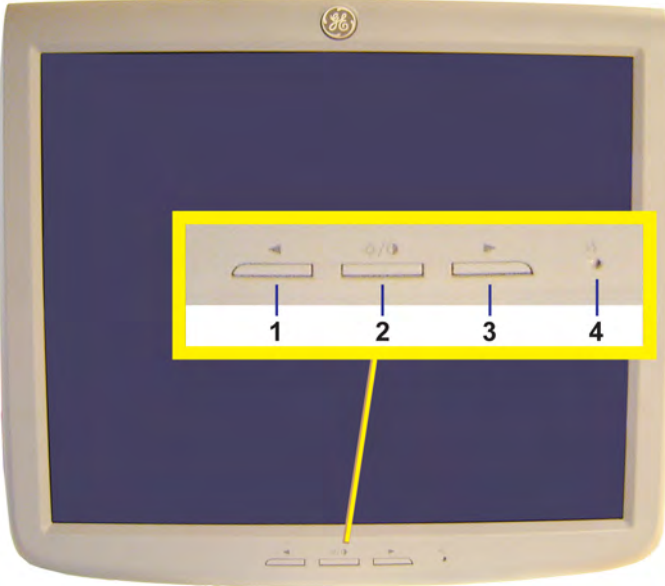
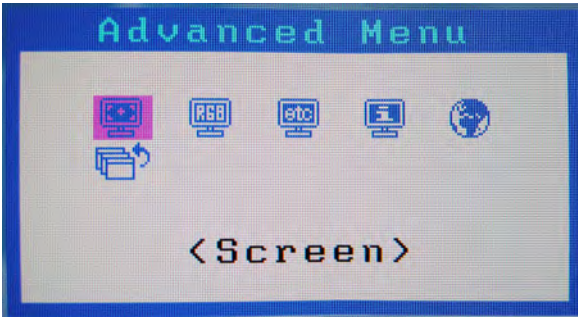
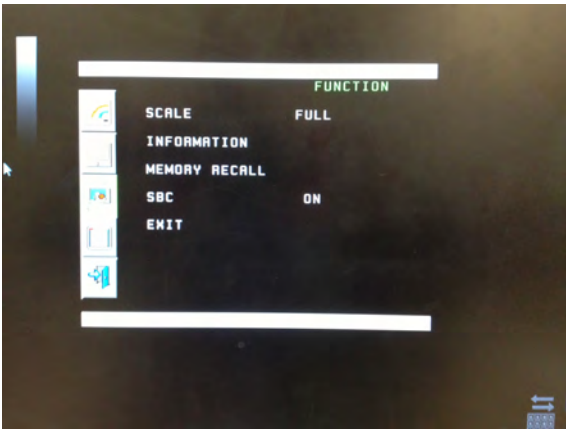
- To reduce the brightness, press the left arrow button. A popup box with the current brightness setting will be displayed on the screen.
- To increase the brightness, press the right button.
- Push the mode button once to remove the popup box from the screen and save the current values.

### 6-2-4-2 Contrast

Use the recommended LCD settings. The contrast is adjusted by the LOGIQ E9 software, when selecting scanning modes and doing scanning adjustments. Changing the monitor's contrast settings in one mode will influence the picture quality in other modes.

## 6-2-5 Advanced LCD Adjustments

Table 6-2 Advanced LCD Adjustments

Steps	Corresponding Graphic
<p>1. <i>NOTE: DO NOT adjust these settings unless necessary!</i></p> <p>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.</p> <p><b>Menu on LCD original version:</b></p> <ul style="list-style-type: none"> <li>• &lt; Screen &gt;</li> <li>• &lt; Color &gt;</li> <li>• &lt; Others &gt;</li> <li>• &lt; Information &gt;</li> <li>• &lt; Language &gt;</li> <li>• &lt; Exit &gt;</li> </ul> <p>1 Left 2 Mode 3 Right 4 Microphone</p> <p><b>Menu on LCD V2</b></p> <ul style="list-style-type: none"> <li>• &lt; picture &gt;</li> <li>• &lt; OSD &gt;</li> <li>• &lt; Function &gt;</li> <li>• &lt; Exit &gt;</li> </ul> <p>1 Left 2 Mode 3 Right 4 Microphone</p> <p>On the LCD V2 Monitor menu, you will find the sub-menus shown.</p>	<p><b>LCD Adjustment Buttons</b></p>  <p><b>LCD Controls Advanced Menu</b></p>  

## 6-2-5 Advanced LCD Adjustments (cont'd)

Use the right button to select any of the menu items. The details for the original LCD monitor are described below:

- The **Screen** sub-menu:
  - Not used on this LCD screen.
- The **Color** sub-menu has the following choices:
  - Color: Brightness: (%)
  - Color: Contrast: (%)
  - K: Color temperature. Factory setting
  - Gamma: Factory setting
  - Gain: Retain Factory settings R (%), G (%), B (%)
  - Reset: Reset all LCD Color settings to factory default.
  - Return: Return to the Advanced Menu.
- The **Others** sub-menu has the following choices:
  - Screen Size: Adjust screen size.
  - Menu Position: Adjust the menu's position.
  - Reset: Reset all position settings.
  - Return: Return to the Advanced Menu.
- The **Information** sub-menu is divided in two:

First part:

  - Input Signal
  - fH: Retain Factory settings (kHz)
  - fV: Retain Factory settings (Hz)

Second part:

  - (The monitor's part number)
  - Usage Time xxx H (counts the monitor usage in hours)
- The **Language** sub-menu:

This sub-menu has several language choices. Factory setting: English.

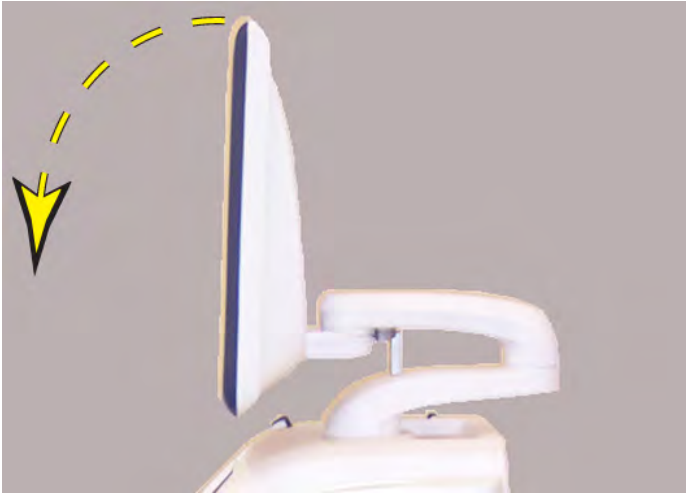
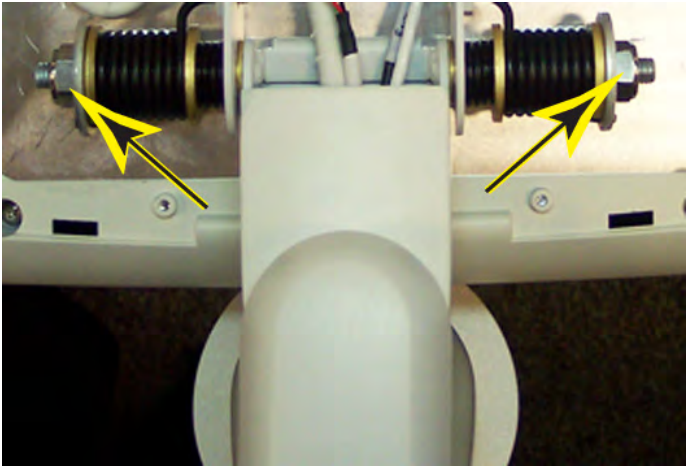
## 6-2-5 Advanced LCD Adjustments (cont'd)

Use the right button to select any of the menu items. The details are described below:

- The **Screen** sub-menu:  
Not used on this LCD screen.
- The **Color** sub-menu has the following choices:
  - Color: Brightness: (%)
  - Color: Contrast: (%)
  - K: Color temperature. Factory setting
  - Gamma: Factory setting
  - Gain: Retain Factory settings R (%), G (%), B (%)
  - Reset: Reset all LCD Color settings to factory default.
  - Return: Return to the Advanced Menu.
- The **Others** sub-menu has the following choices:
  - Screen Size: Adjust screen size.
  - Menu Position: Adjust the menu's position.
  - Reset: Reset all position settings.
  - Return: Return to the Advanced Menu.
- The **Information** sub-menu is divided in two:  
First part:
  - Input Signal
  - fH: Retain Factory settings (kHz)
  - fV: Retain Factory settings (Hz)Second part:
  - (The monitor's part number)
  - Usage Time xxx H (counts the monitor usage in hours)
- The **Language** sub-menu:  
This sub-menu has several language choices. Factory setting: English.

6-2-5-1 LCD Arm and LCD Monitor range of motion Adjustment procedure

Table 6-3 LCD Arm and LCD Monitor range of motion Adjustment - R3.x and earlier

Steps		Corresponding Graphic
1.	<p><i>NOTE: If the monitor is not level, see: <a href="#">8-6-3-2 "LCD Monitor installation - R3.x and earlier" on page 8-105</a> to level the monitor.</i></p>	<p>LCD in vertical position</p>  <p>LCD Hinge Nuts</p> 



## Section 6-3 DC Offset Calibration

### 6-3-1 Introduction

The DC offset calibration 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.

### 6-3-2 When to do a DC Offset Calibration

Do DC Offset Calibration:

- when installing a new LOGIQ E9
- after software has been updated or replaced
- when DRX board(s) or a MRX board has been interchanged
- when a DRX board(s) or a MRX board has been replaced
- when the Back End Processor has been replaced

#### 6-3-2-1 DC Calibration Procedure

- 1.) Disconnect all connected probes.
- 2.) Power on the LOGIQ E9.
- 3.) On the Touch Panel, select **Utility** -> **Service** to access CSD.
- 4.) Log in as GE Service, enter current password
- 5.) Select **Diagnostics** tab.
- 6.) Select **Service** -> **Diagnostics**.
- 7.) Select the “+” before **Service Diagnostics** folder to open the list of choices.
- 8.) Select the “+” before **Analog Receive** to open the test choices for the analog receiver.
- 9.) Select **DC Offset Calibration** and then follow the on-screen instructions.

Section 6-4

Operator Panel movement

6-4-1

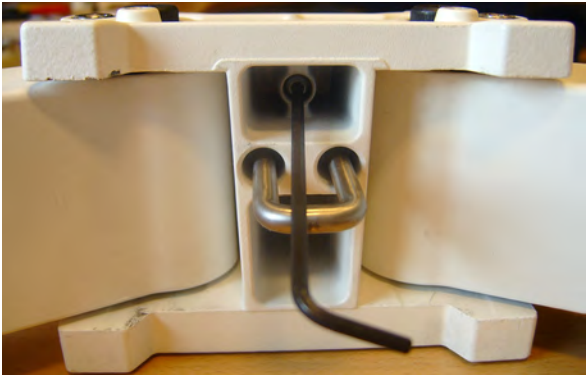
Purpose of this section

The Operator Panel movement within the LOGIQ E9 is described in this section.

6-4-2

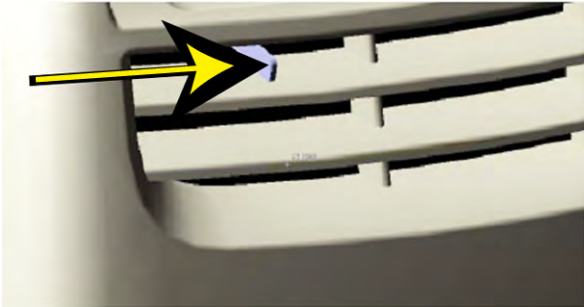

Adjusting the XY Locking Mechanism

Table 6-4     Adjusting the XY Locking Mechanism

Steps		Corresponding Graphic
1.	<p>This procedure is intended to adjust the locking mechanism for the XY Assembly.</p> <p>Locate hex screw behind the XY Assembly to adjust it correctly.</p> <p>Use a 3 mm hex tool to adjust. Rotating the screw clockwise will tighten and rotating the screw counterclockwise will loosen the lock.</p> <p>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.</p> <p><i>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. You may try 1/2 turn adjustments, but the console may be too tight or have too much slack.</i></p>	<div>XY Adjustment for Operator Panel</div> 

## 6-4-3 Adjusting the Z Mechanism

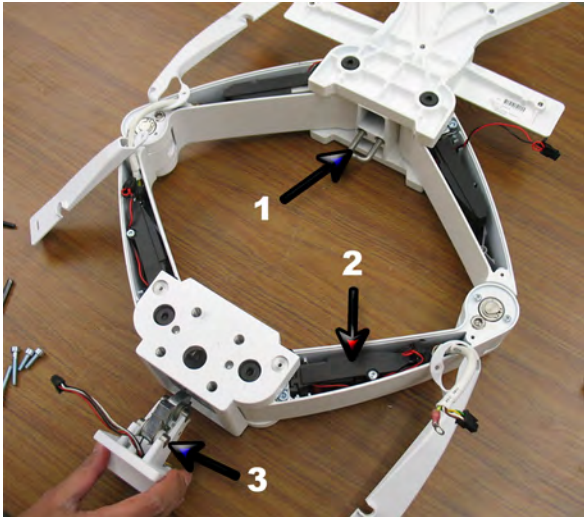
Table 6-5 Adjusting the Z Mechanism

Steps	Corresponding Graphic
<p>1. There are no adjustments for the OP vertical movement.</p> <p>The Z mechanism can be manually repositioned in the event the drive gear is disconnected or has failed.</p> <p>Push and hold the lever toward the center of the device, and the OP can be adjusted vertically.</p>	<p><b>Z Mechanism Manual adjustment lever</b></p> 
<p> <b>WARNING</b> <i>Operator console can drop unexpectedly when the mechanism is released.</i></p>	

## 6-4-4 XY Manual Release for Lock and Brake Mechanism and Adjustment


### 6-4-4-1 XY Lock and Brake Mechanism Parts

Table 6-6 XY Lock and Brake Mechanism Parts

Items	Corresponding Graphic
<p>1 U-bolt</p> <p>2 Brakes (one inside each of the 4 XY arms)</p> <p>3 Park Lock (engages U-bolt)</p>	<p><b>XY Lock and Brake Mechanism Parts</b></p> 

6-4-4-2      XY Manual Release for Lock and Brake Mechanism

Table 6-7      XY Manual Release for Lock and Brake Mechanism

Steps		Corresponding Graphic
1.	<p>This procedure is intended to release and adjust the XY mechanism.</p> <p>Use a small tipped screwdriver and press in until a "click" or the release, releases. Some force may be required if the lock adjustment is too tight.</p>	<p><b>XY Manual Release for Lock and Brake Mechanism</b></p> 

### 6-4-4-3 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:

**Table 6-8 XY Manual Release for Lock and Brake Mechanism**


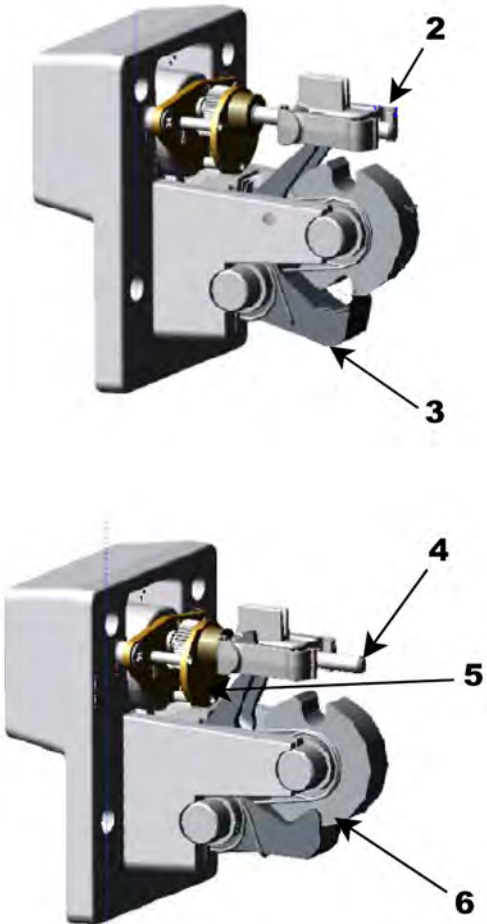
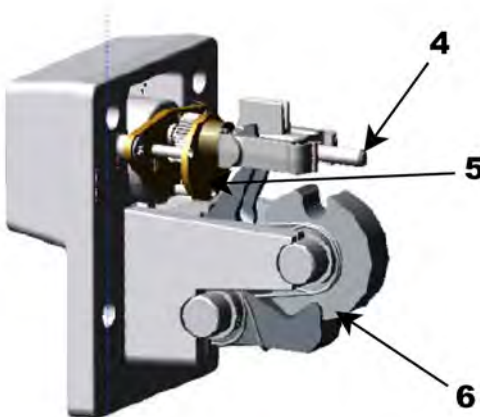
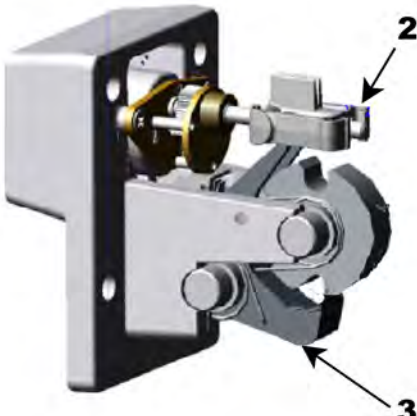
Steps	Corresponding Graphic
<p>1. Release the lock manually. See <a href="#">Table 6-7 "XY Manual Release for Lock and Brake Mechanism"</a> on page 6-12.</p> <p>Remove the four screws (1).</p>	<p><b>Park Lock screws</b></p>  <p>The graphic consists of two parts. The top part is a 3D CAD model of a grey mechanical assembly. It shows four screws, each labeled with a black '1' and an arrow pointing to it. The bottom part is a photograph of the same assembly. A person's hand is shown holding a white plastic component that has been removed from the main assembly, revealing internal wiring and mechanical parts. The background of the photo is a wooden surface.</p>
<p> <b>NOTICE</b> <i>DO NOT pull the park lock out, the power cable is fragile, guide it</i></p>	

Table 6-8     XY Manual Release for Lock and Brake Mechanism

Steps		Corresponding Graphic
2.	If park lock nut, (2) and park lock lever (3) are in these positions., the lock will not engage. (This occurred in some earlier systems.) The nut and retainer did not return to the "charged" mode after unlock.	<p>Park Lock WILL NOT engage when in these positions</p> 

### Table 6-8 XY Manual Release for Lock and Brake Mechanism

Steps	Corresponding Graphic
<p>3. Rotate the threaded lead screw on the actuator, <b>(4)</b> counterclockwise until the lock nut is barely touching the bearing housing <b>(5)</b> of the threaded lead screw and the two plastic springs just touch, but do not deform. Make sure the lever is loose and engages with the lock wheel, <b>(6)</b>, as shown.</p>          <p>Before reassembling the lock assembly, make sure the nut, <b>(2)</b> and lever <b>(3)</b> are in the position, as shown.</p>	<p style="text-align: center;"><b>Park Lock WILL NOT engage when in these positions</b></p>  <p style="text-align: center;"><b>Adjustment Set</b></p> 

## 6-4-5 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.

## 6-4-6 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.

For R4, at shutdown, a message will appear ONLY if the Operator Panel is not parked. This message tells the user that the Operator Panel is not parked.

The user can proceed to park the Operator Panel or to leave it un-parked.

Notice that ONCE the user selects shutdown in the Monitor, the 2 buttons (Z-motion and XY-motion) are disabled. The brakes on the XY mechanism are released the XY movement is free but the Z-motion is disabled. If the user wants to adjust the Z mechanism after shutdown, they will need to use the handle in the back of the unit.

**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.*



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## **Section 6-5**

### **Direction Lock and Brake adjustments**

There are no adjustments for the Direction Lock or the brakes.

## **Section 6-6**

### **Adjust time-out for DICOM servers**

When portable (off-line), use minimum time-out and no retries or it will affect shutdown speed.

The absolute value of the magnetic distortion reading ("1-2 Distortion") should be consistently less than 1 mm, especially since the transducer is held steady in one location. It is also important that the reading is not cycling quickly between values such as continuously looping from -0.2 to 0.6. The environmental quality for both sensor 1 and sensor 2 should be in the green range, preferably at 6 or 7 bars.

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# ***Chapter 7***

## ***Diagnostics/Troubleshooting***





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### **Section 7-1 Overview**

#### **7-1-1 Purpose of Chapter 7**

This section 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.

## 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 LOGIQ E9, SOME METAL SURFACES MAY BE WARM ENOUGH TO POSE A POTENTIAL HEAT HAZARD IF TOUCHED, EVEN WHILE IN SHUT DOWN MODE.*
-  **WARNING** *IF A LOGIQ E9 IS ENERGIZED, AND THE FRONT PROCESSOR (CARD CAGE) COVER IS REMOVED, THE VOLTAGE TEST POINTS POSE A POTENTIAL SHOCK HAZARD.*
-  **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**

### **Gathering Troubleshooting Data**

#### **7-3-1 Purpose of this Section**

Problem images and system data (logs) can be acquired at the device or through remote diagnostics (InSite ExC). These data can be used to perform service at the device, or can be sent back to the manufacturer for analysis.

## 7-3-2 Collecting Vital System Information

The following information is necessary to properly analyze data or images being reported as a malfunction or being returned to the manufacturer:

*NOTE: This information is normally collected with the Alt+D or Gather Logs utility.*

- Product Name = LOGIQ E9

From the **Utility** -> **System** -> **About** screen:

### **Applications Software**

- Software Version
- Software Part Number
- Build View
- Build Date

### **System Base Image Software**

- Base Image Revision
- Image Part Number
- Image Date

### 7-3-3 Collecting a Screen Capture with Logs

If the system malfunctions, press the Alt+D keys simultaneously. This Alt+D function is available at all times, and collects a screen capture of the image monitor, user-defined presets, and the following logs:

- Keyboard Shadow Log
- Error Logs
- Crash Log
- Vital Product Data
- DICOM Logs
- Windows Event Logs
- Diagnostic Logs
- Service Logs

For a detailed list of Service Logs captured, see: [7-3-4 "Capturing Service Logs with ALT+D" on page 7-7](#).

Figure 7-1 ALT+D Dialog Box

System Problem Reporting

Export stored reports

Description of issue :  
Address the following :  
1) Date and time of occurrence  
2) Sequence of events leading to issue  
3) Is this repeatable ?  
Address the following, as applicable :  
4) Imaging mode, probe, preset/application  
5) Media brand, speed, capacity, type (eg. CD-R, DVD+RW, etc.)  
6) Save secondary image capture, cine loop, 4D multi volume loop

☐ System lockup (application has been restarted after problem)  
Please include the date and times when the problem occurred.

Destination: CD / DVD Recordable (G:)

Store Cancel

When Alt+D is pressed, a menu box opens. Enter the following information:

- System ID serial number.
- Software version.
- System Date and time of occurrence.
- Sequence of events leading to issue.
- Is the issue repeatable?
- Imaging mode, probe, preset/application.
- Media brand, speed, capacity, type.
- Select the Destination (storage media or Service directory for remote viewing through InSite ExC) and click the Store button.

### 7-3-3 Collecting a Screen Capture with Logs (cont'd)

**NOTE:** For Application SW R3.x.x or later, the Service Directory is no longer located under the export folder, it is located in d:\ root directory (d:\service).

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

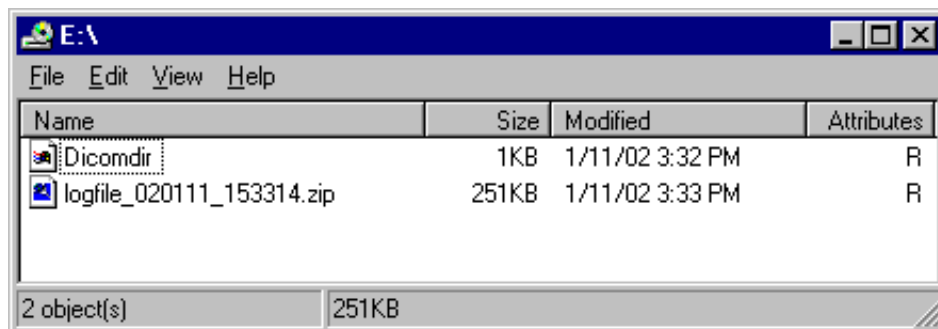
**NOTE:** To save to a CD/DVD you **MUST** select CD/DVD Recordable as the destination device, otherwise the data is written to the default Export/Service directory on the hard drive. The Export/Service directory is only used for InSite ExC. It is not intended for images or report storage use.

For CD/DVD; the system will automatically format if you insert an unformatted disk, gather logs and write it out to the disk.

The subsequent file is compressed and time stamped. The screen capture is a bitmap which eliminates the possibility of artifacts from compression.

Double check the media that you made to ensure it contains at least two files. An example is shown in [Figure 7-2 "Example of Zipped Trouble Image and Logs File" on page 7-6.](#)

**Figure 7-2 Example of Zipped Trouble Image and Logs File**



**NOTE:** In R2.x.x or later, the name of the file includes the name of the system:  
log\_93448US9\_090910\_101235.ziplog\_computerName\_YYMMDD\_HHMMSS.zip.

#### 7-3-3-1 Marking Log files

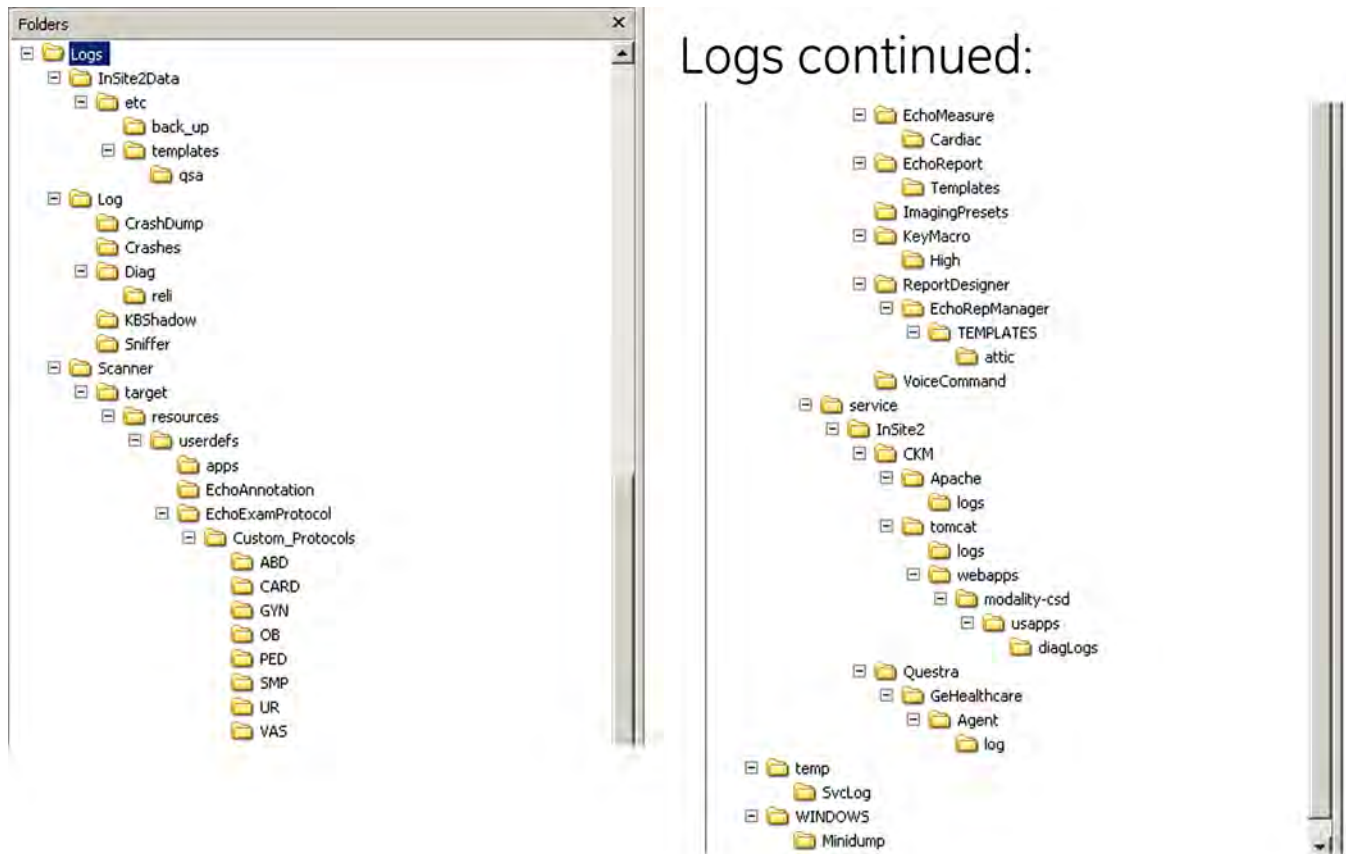
If a customer is experiencing issues during operations, the event can be marked and logged by pressing Alt+1 or Alt+2 when they occur. When Alt+1 or Alt+2 are pressed, a marker is placed in the log to aid log analysis.



### 7-3-4 Capturing Service Logs with ALT+D

The following is a list of the Service logs captured during an ALT+D log capture:

### Figure 7-3 Capture Service Example



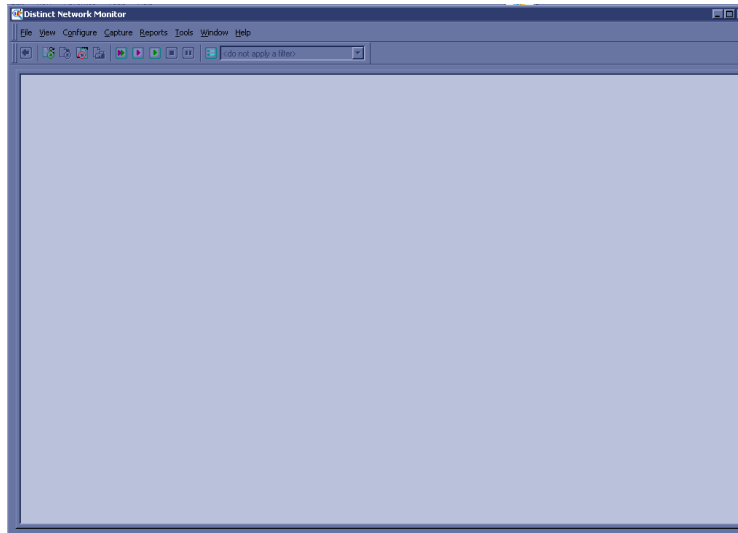
### 7-3-5 Capturing Network Logs with Network Sniffer (Software R1.x.x)

A sniffer monitors network traffic and allows you to capture network data without redirecting or altering it.

Launch the network sniffer application one of the following two ways:

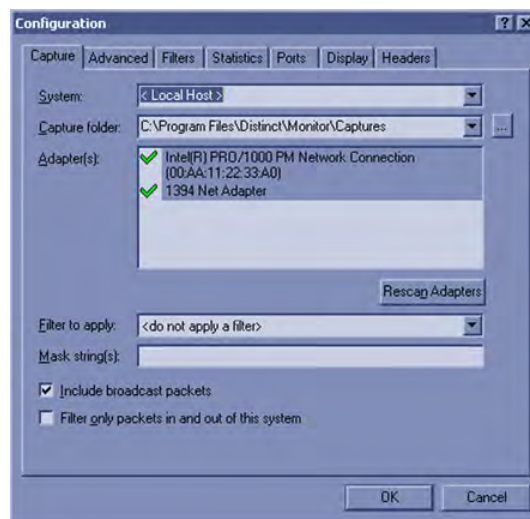
- 1.) On the Regular Scan Screen, press Alt+N. This launches the network sniffer application.
- 2.) Select Configure on the Distinct Network Monitor Window.

**Figure 7-4 Distinct Network Monitor Window**



- 3.) Click on Capture Settings after selecting the Configuration pull-down menu.
- 4.) The Configuration screen opens.

**Figure 7-5 Configuration Screen**



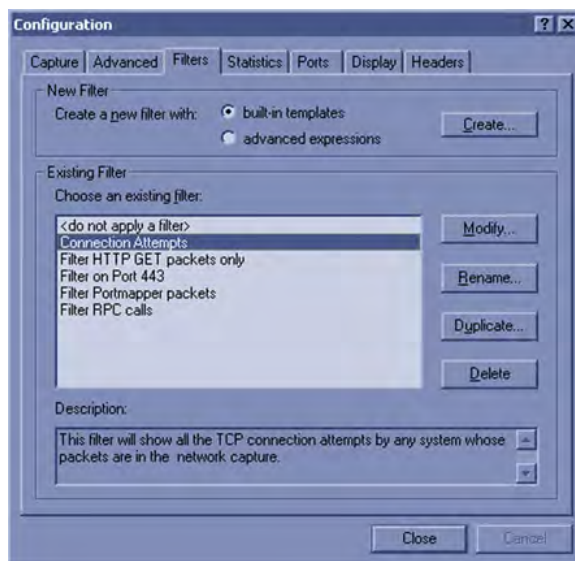
### 7-3-5 Capturing Network Logs with Network Sniffer (Software R1.x.x) (cont'd)

**NOTE:** Steps 5 - 12 describe how to filter the data so that you only record this system's network activity.

*If you prefer, you may skip the filter section and start the data capture now. If you do, you will capture all network activity, not just this system's.*

- 5.) On the Configuration screen (Figure 7-6 "Configuration - Filters Tab" on page 7-9), select the Filters tab
- 6.) In the New Filter section confirm "built-in templates" is selected, then click Create.

**Figure 7-6 Configuration - Filters Tab**

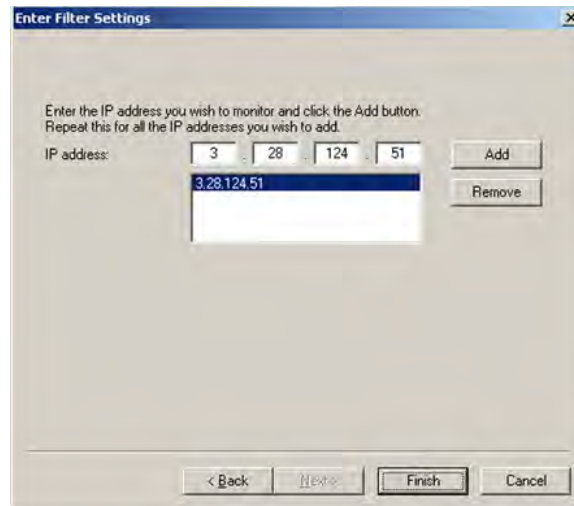


### 7-3-5 Capturing Network Logs with Network Sniffer (Software R1.x.x) (cont'd)

- 7.) On the Select Filter Task screen, select "Show only IP packets FROM/TO one or more IP addresses", then select Next.

The Enter Filter Settings screen opens.

**Figure 7-7 Enter Filter Settings**

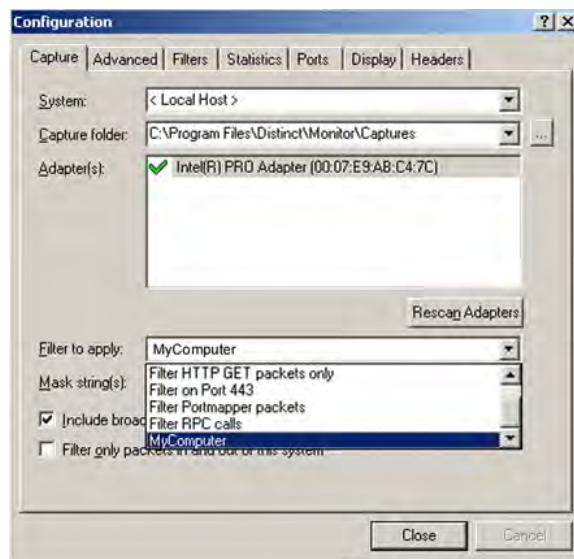


- 8.) Enter the IP address you wish to monitor, and click the Add button (). Repeat this step for all IP addresses you wish to add, then select Finish.  
The Enter Filter Settings screen closes.
- 9.) On the Configuration Screen, select the Capture Tab ([Figure 7-8 "Capture Tab on Configuration Screen" on page 7-11](#)).

### 7-3-5 Capturing Network Logs with Network Sniffer (Software R1.x.x) (cont'd)

10.) In the Filter to Apply field, select "My Computer".

**Figure 7-8 Capture Tab on Configuration Screen**



11.) Select Close. The Configuration screen closes.

12.) On the Distinct Network Monitor Screen, select Capture > Packets and Statistics (Play).

**NOTE:** The Network Sniffer will now collect data until you select Capture > Stop.

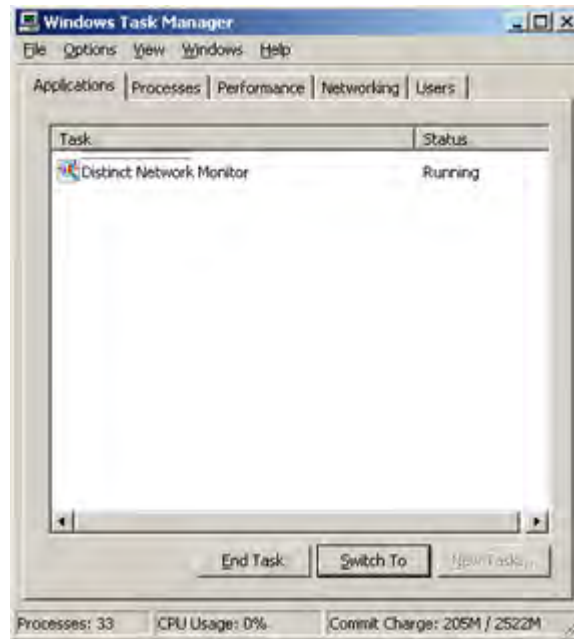
13.) Double-click on the Go Ichiro icon to start the system application.

14.) Perform the DICOM transaction you want to troubleshoot (such as Worklist Query, Send to PACS, etc.). Perform the function several times to ensure the data is captured in the sniff.

### 7-3-5 Capturing Network Logs with Network Sniffer (Software R1.x.x) (cont'd)

- 15.) When the transaction finishes (or fails), select Ctrl+Alt+Del to open Task Manager. Select Exit to close the application and return to Windows. Then open Windows Task Manager to open the Distinct Network Monitor screen.

**Figure 7-9 Capture Tab on Configuration Screen**



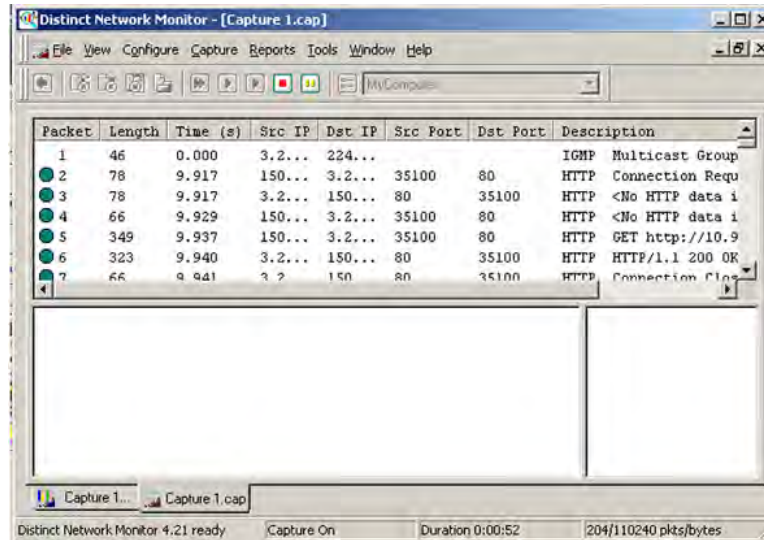
- 16.) From the Task Manager Applications tab, select Distinct, and then select the Switch To button. The Distinct Network Monitor screen opens.

### 7-3-5 Capturing Network Logs with Network Sniffer (Software R1.x.x) (cont'd)

17.) On the Distinct Network Monitor screen (Figure 7-4 "Distinct Network Monitor Window" on page 7-8), select Capture > Stop.

After stopping the data collection, a screen similar to Figure 7-11 "Save As Capture File dialog box" on page 7-13 opens

Figure 7-10 Capture Data Sample

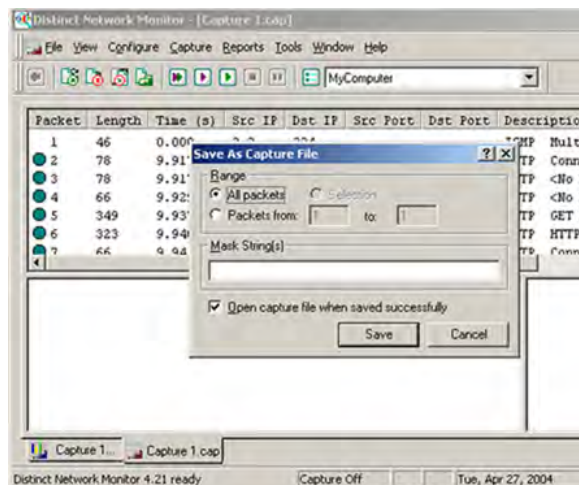


18.) Select File > Save As. Enter the file name "d:\log\Sniffer\MyLog".

19.) Select Save.

20.) On the Save As Capture File dialog (Figure 7-11), select Save.

Figure 7-11 Save As Capture File dialog box



21.) Check the d:\log\Sniffer directory. At a minimum, there should be the following two files: MyLog.cap, MyLog.num.

22.) Copy the files to media, or ask the OLC to upload the files if the system has remote connectivity.



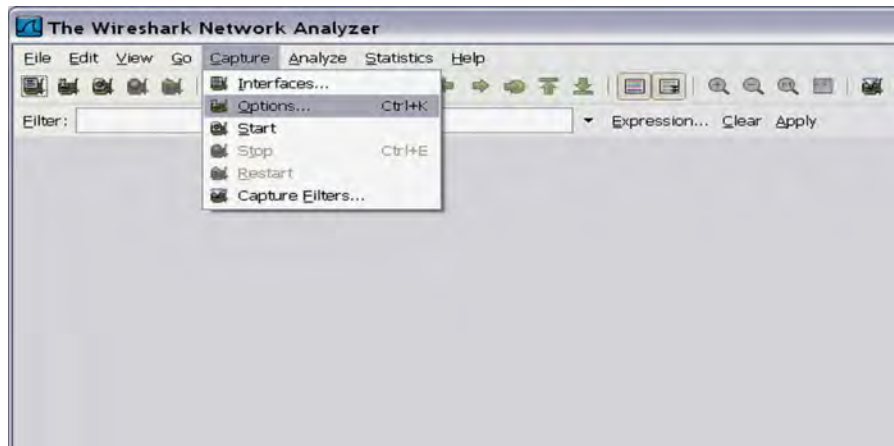
## 7-3-6 Capturing Network Logs with Network Sniffer (Software R2.x.x or later)

Wireshark is a new network sniffer program that replaces Distinct in R2.x.x or later. Functionality is similar from previous software.

Logs collected should be stored under d:/log/Sniffer folder to ensure they form part of general log collection Alt+D or Collect Log.

- 1.) Press Alt+N.
- 2.) On the network sniffer screen, select **Capture -> Options**.

Figure 7-12 Network Sniffer Screen

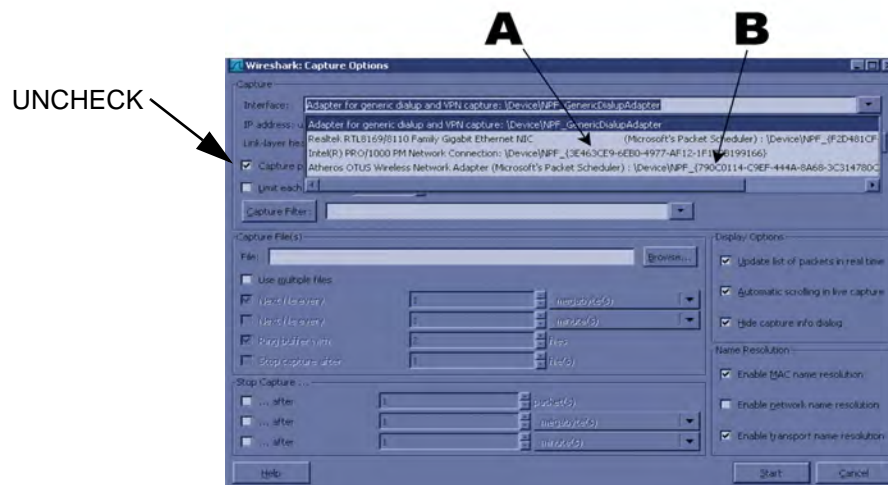


- 3.) Select the interface that will be receiving packets (Network card **A** or Wireless **B**).

**NOTE:** Remember, if the device has a DVR, it will show up in the list. Select either Intel Network connection or the Wireless network adapter.

If you are working with a Wireless connection, you must uncheck the "Capture packets in promiscuous mode"; the wireless option does not support this mode.

Figure 7-13 Sniffer Captions Options





### 7-3-6 Capturing Network Logs with Network Sniffer (Software R2.x.x or later) (cont'd)

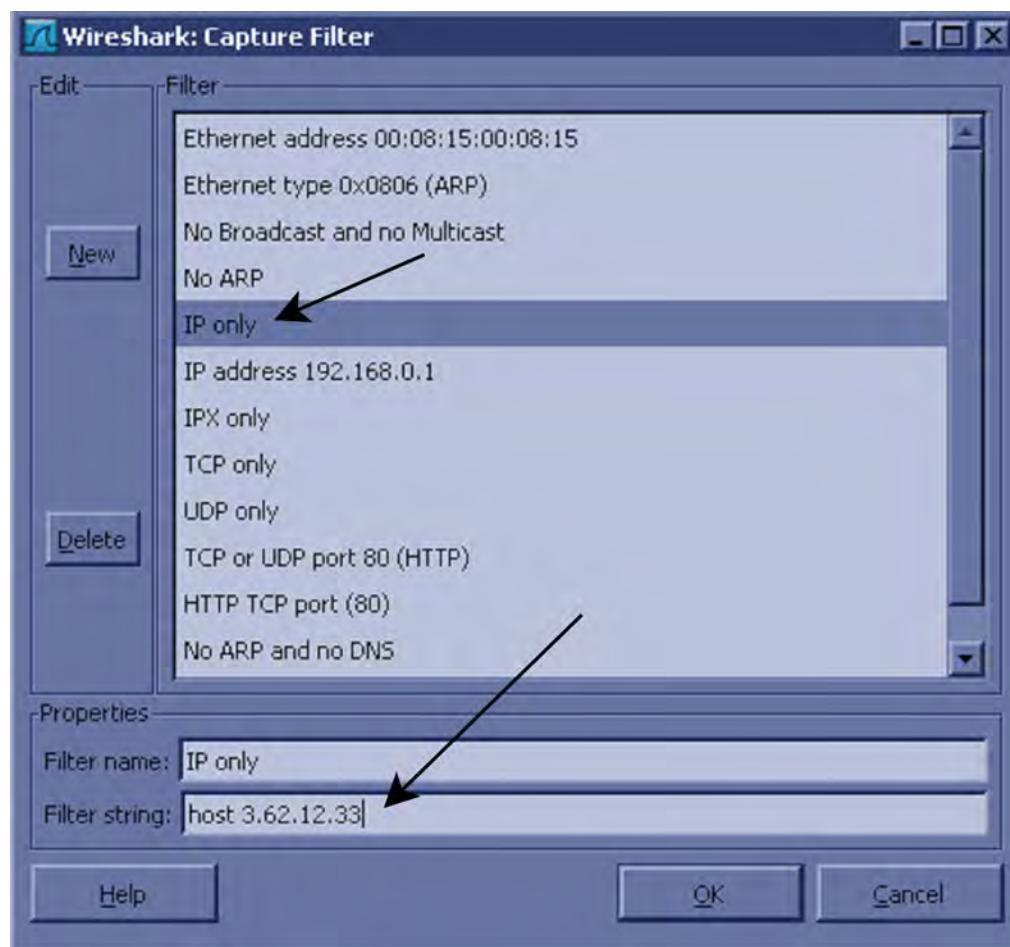
Use filters to limit the captured data. Filter by IP or by IP and port number.

By IP only: press on Capture Filter.

4.) Select IP only.

Use the IP address of the Scanner or the one from the DICOM device under test, on the Filter string field, using the following syntax: (example) host 3.62.12.33 as shown in [Figure 7-14 "Capture Filter IP Only"](#) on page 7-15, press **OK**.

**Figure 7-14 Capture Filter IP Only**

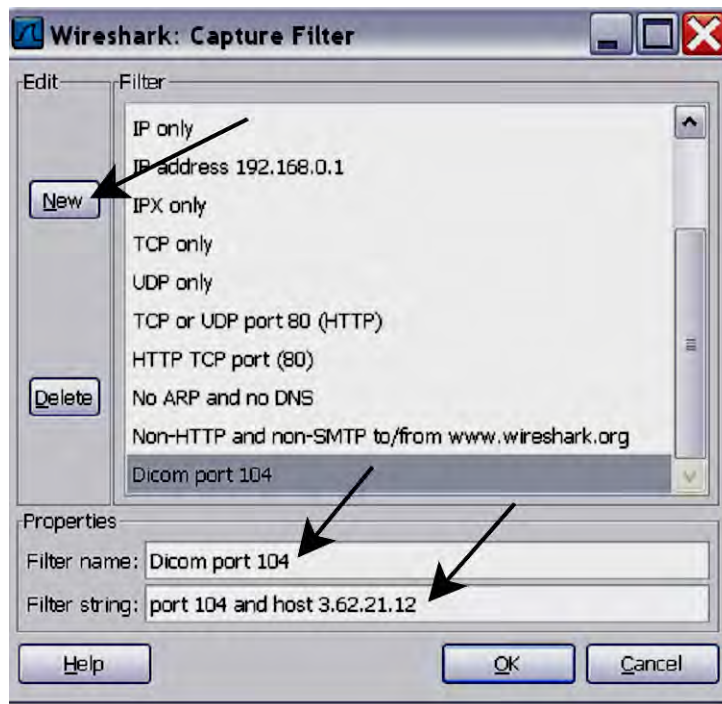


### 7-3-6 Capturing Network Logs with Network Sniffer (Software R2.x.x or later) (cont'd)

By IP and port: Select Capture filter.

- 5.) Select New.
- 6.) Edit name for example DICOM port 104.
- 7.) Enter the string with the following syntax: port xxx and host yy.yy.yy.yy, where xxx is the port number of "My Computer" in the scanner and yy.yy.yy.yy is the IP address of the device under test (PACS,server, etc).
- 8.) Press **OK**.

**Figure 7-15 Sniffer Capture Filter IP and Port**

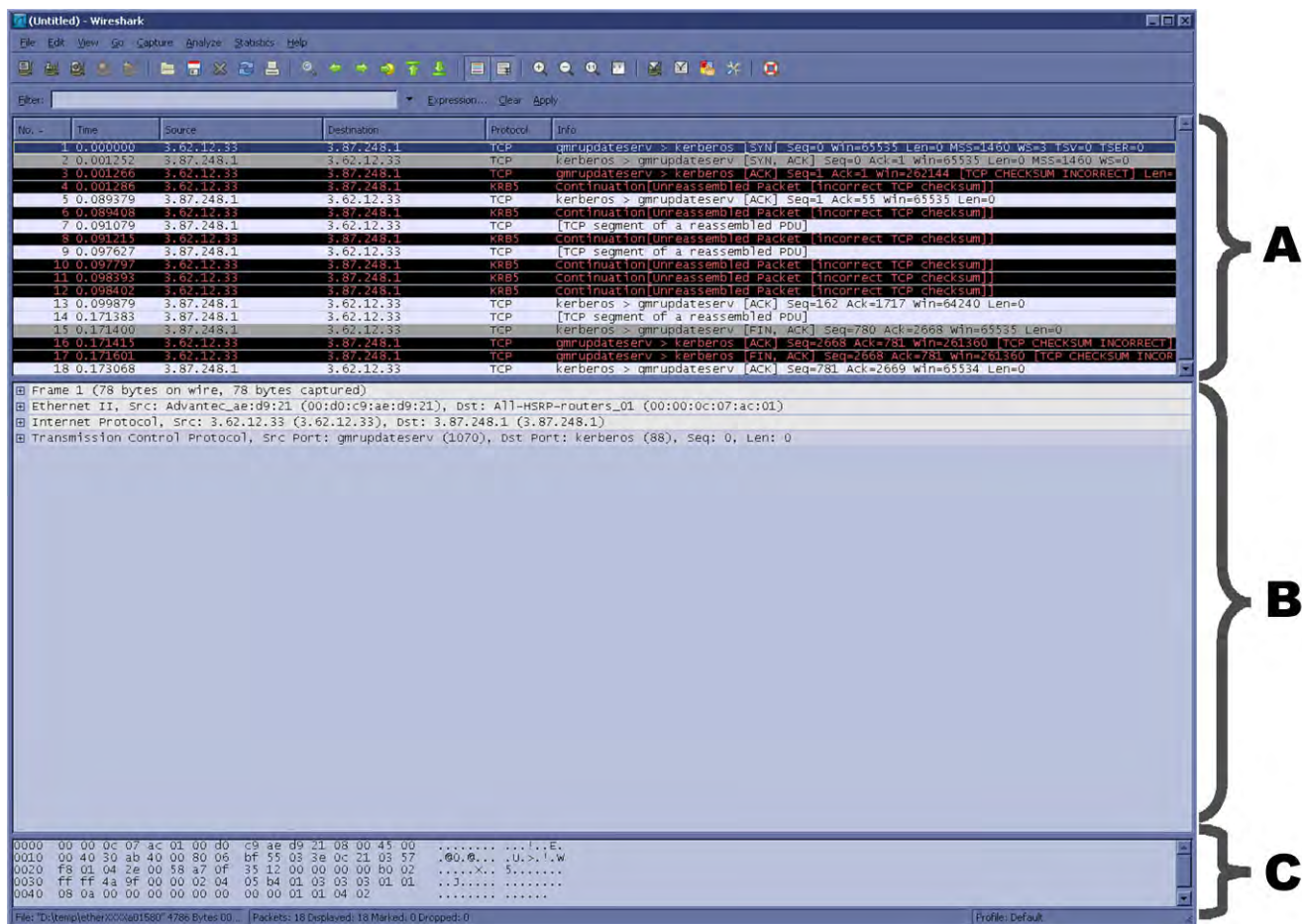


- 9.) Select Start.
- 10.) Minimize network sniffer window and initiate communication to the DICOM device (eg. send images to the storage device or query Worklist).

## 7-3-6 Capturing Network Logs with Network Sniffer (Software R2.x.x or later) (cont'd)

11.) Press Alt+N to restore Sniffer window and observe the network activity.

Figure 7-16 Sniffer Window and Network Activity



- A.) "Packet List" pane - the packet list pane displays all the packets in the current capture file. Each line in the packet list corresponds to one packet in the capture file.
- B.) "Packet Details" pane - shows the current packet (selected in the "Packet List" pane) in a more detailed form. This pane shows the protocols and protocol fields of the packet selected in the "Packet List" pane.
- C.) "Packet Bytes" pane - The packet bytes pane shows the data of the current packet (selected in the "Packet List" pane) in a hexdump style.

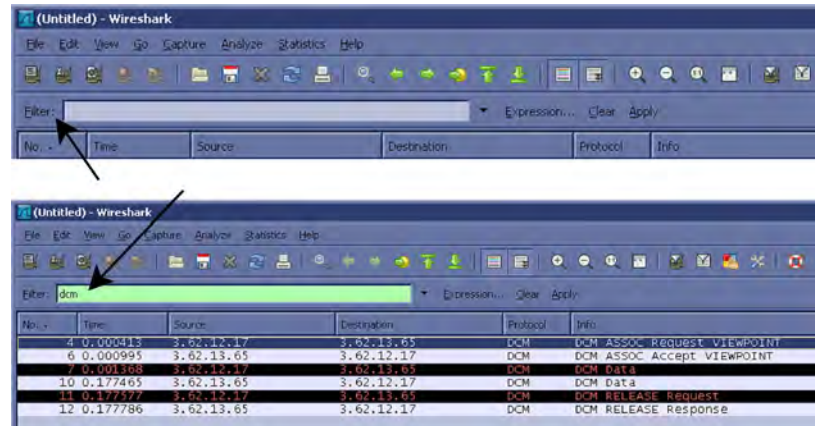
## 7-3-6 Capturing Network Logs with Network Sniffer (Software R2.x.x or later) (cont'd)

In addition to the pre capture filter, use the Filter tool on the screen to filter what is displayed.

Filter the DICOM packets, since they are the most probable for the troubleshooting.

12.) Type “dcm” and press **Apply**. The display should filter all DICOM packets, filtering out image data.

Figure 7-17 Filter Tool Display

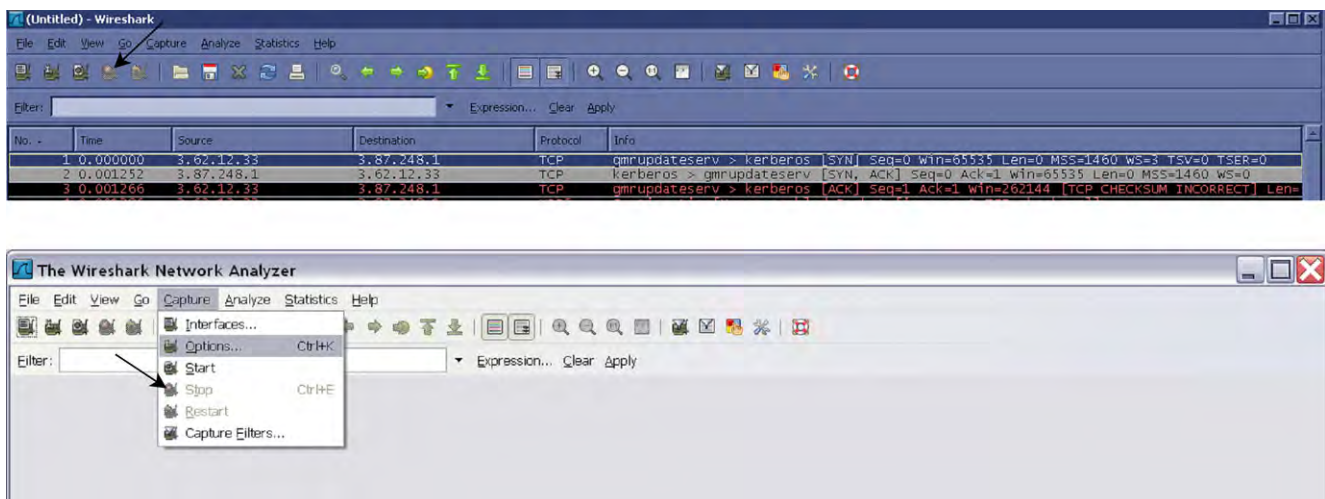


13.) Select Capture > Stop. Or, select the icon in the task bar to stop the capture.

14.) Select File > Save As. Enter the file name d:\log\Sniffer\MyLog. (MyLog can be changed to the name of your preference).

Wireshark uses the libpcap (\*.pcap, \*.cap) file format as the default format to save captured packets. (If you need to open this file with D-Trace or DVTK, the capture can be re-saved in NA Sniffer Windows format).

Figure 7-18 Select Capture Stop Icon



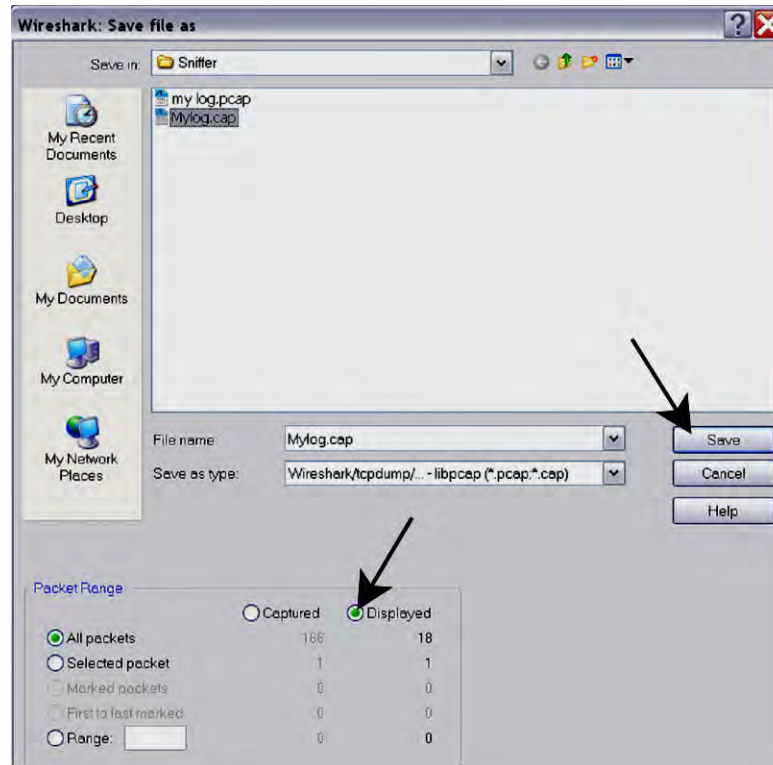
### 7-3-6 Capturing Network Logs with Network Sniffer (Software R2.x.x or later) (cont'd)

15.) Select Displayed. This will save only the filtered values rather than the entire capture.

16.) Select SAVE.

If you perform Alt+D or Gather Logs, these sniffer logs will be included in the zip file.

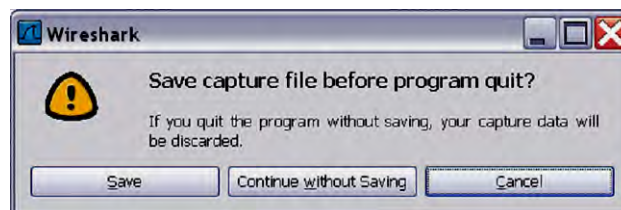
Figure 7-19 Select Capture Display



17.) Exit the sniffer application by clicking on the X in the upper right corner.

18.) If you have already performed Save as, you can continue without saving and quit the program. Make sure you have saved your data before exiting the program.

Figure 7-20 Save Capture Data Question





## Section 7-4 Screen Captures

### 7-4-1 Purpose of this Section

To capture screen images that can be used for diagnostic and troubleshooting purposes.

### 7-4-2 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\service\image (R2.x.x or earlier) or in d:\service\image (R3.x.x or later) directory using both the JPEG (.jpg) and raw DICOM (.dcm) formats.

The InSite ExC 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.

### 7-4-3 To Capture a Screen Image Using the Shortcut

With the desired image displayed on the screen, press Ctrl and PrtSc (print screen) keys simultaneously.

If you want to compress or delete them:

- 1.) From the touchpanel, select **Utility -> Service -> Utilities -> Common Utilities -> Image Compress & Delete Utilities**. [7-5-25-13 "Image Compress & Delete Utility" on page 7-111](#).
- 2.) Select the checkbox for the image(s) you want to save, compress or delete.
- 3.) Select Compress or Delete Files, whatever function is desired.

A compressed file of the images is stored in d:\export (R2.x.x or earlier) or in d:\service (R3.x.x or later). 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 (R2.x.x or earlier) or in d:\service\image (R3.x.x or later).

## Section 7-5 Common Service Desktop

### 7-5-1 Purpose of this Section

This section describes the features of the Common Service Desktop (CSD).

*NOTE: To run diagnostics, you should detach all probes.*

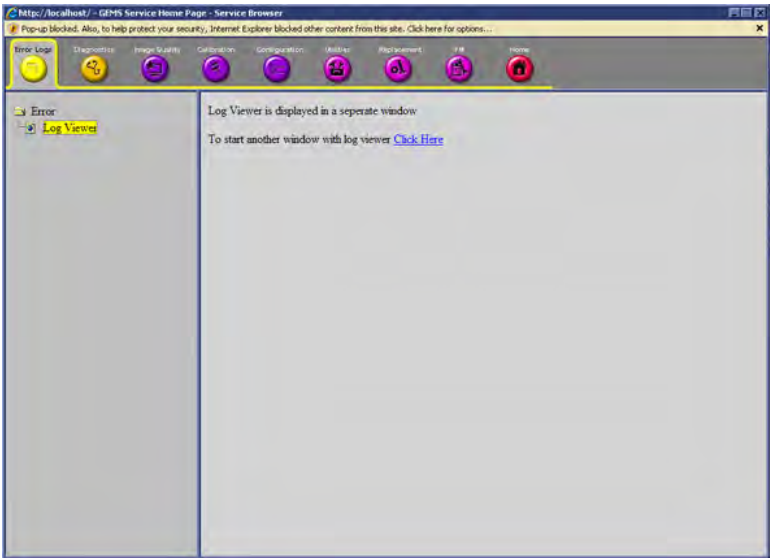
*NOTE: Reboot the system after performing any diagnostics before returning the system to customer use.*

*NOTE: When using the Common Service Desktop do **NOT** minimize any of the Common Service Desktop windows. If you minimize them they end up in the lower left corner of the screen behind the Service Desktop Manager window and cannot be restored.*

7-5-2      Error Logs

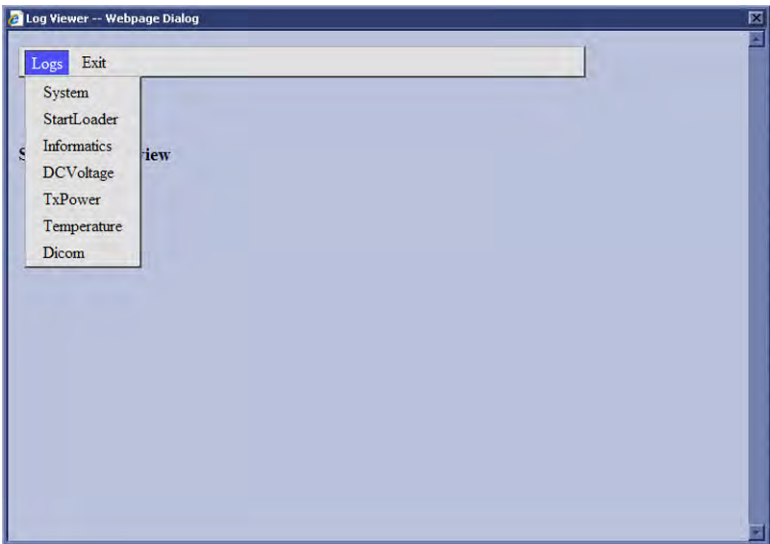
- 1.) From the Log Viewer page click the Click Here link.

Figure 7-21    Error Logs - Log Viewer



- 2.) Select the log you wish to view.

Figure 7-22    Log Viewer - Log Options



NOTE:      Informatics is no longer present for R4.x and later.



## 7-5-2 Error Logs (cont'd)

Features of the log viewer include:

- Plot logs and pages using the Utilities menu.
- Text search using the Search menu.
- Color-coded log entries to identify severity levels:
  - Green: A Level 3 severity indicates that the parameter is within 0% - 50% of specified tolerance.
  - Orange/brown: A Level 2 severity indicates that the parameter is 50% - 100% of specified tolerance.
  - Red: A Level 1 severity indicates that the parameter is out of specification.

Figure 7-23 Log Viewer - Sample Page



The screenshot shows a web browser window titled "Log Viewer -- Webpage Dialog" with the URL "http://localhost/service/LogViewerWrapper.html". The browser has a menu bar with "Logs", "Utilities", "Search", and "Exit". Below the menu bar are navigation links: "Previous Page", "Next Page", "Last Page", "Refresh", and a "Get Page:" button. The "Page Number: 1" is displayed. The main content is a table with the following columns: "TimeStamp", "ErrorLevel", "Package", and "ErrorMessage". The table contains 20 log entries with various error levels (Error, Debug, Info) and packages (GcViewer.PluginLib, ScUdt.Genetic, GcViewer.SpatialFilter, EScan.View, HandleEvent -A-, UserEventLog, ifmgr, EchoConfig, PCBE.UserResources, PCBE.ProcessMemory, PCBE.SystemMemory, EchoStatusBar). The error messages include details about frame grid sizes, input frame locations, and system resource usage.

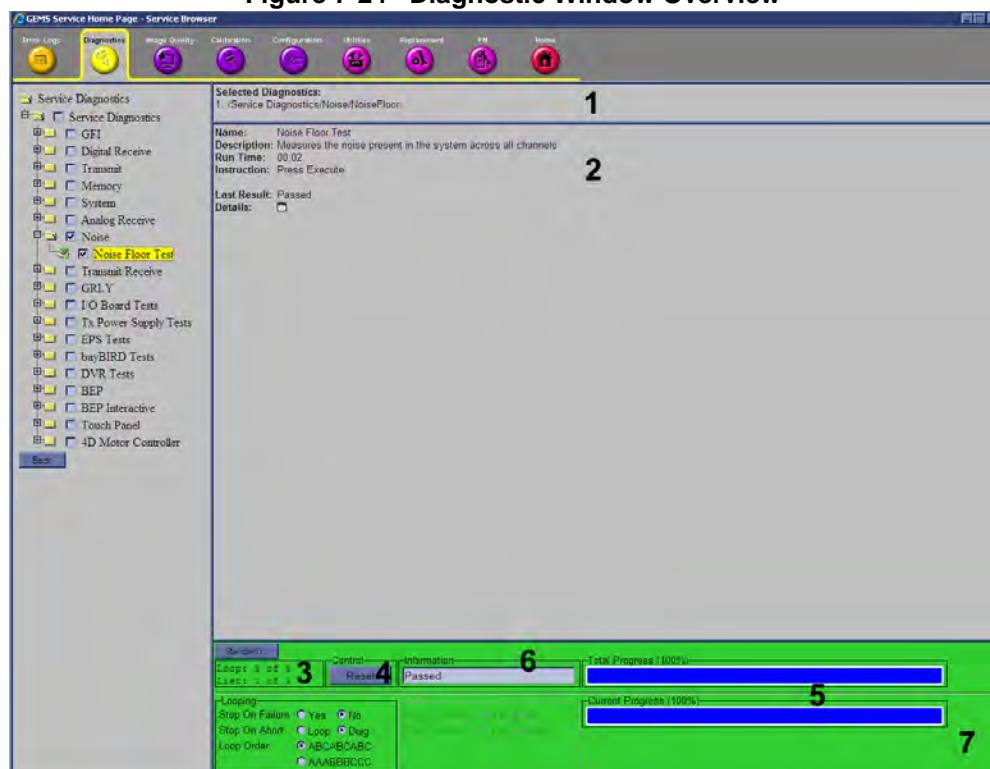
TimeStamp	ErrorLevel	Package	ErrorMessage
Friday, Jan 25 15:53:46,2008	Error	GcViewer.PluginLib	GcUdtFrameHandle::CreateFrame - Wrong frame gridSize: IPointValue : illegal cast in ScVariant expected: IPointValue : illegal cast in ScVariant
Friday, Jan 25 15:53:46,2008	Error	ScUdt.Genetic	Udt::Frame::checkSize: checkSize: this=1C2E6FD8, GeomError fsize=150822, usedSize=148470
Friday, Jan 25 15:53:46,2008	Debug	GcViewer.PluginLib	(EncoderWrap) Musashi Frame Name 29
Friday, Jan 25 15:53:46,2008	Error	GcViewer.SpatialFilter	GetInputFrame - Could not find input frame at time 62.651953
Friday, Jan 25 15:53:46,2008	Error	ScUdt.Genetic	Udt::Frame::checkSize: checkSize: this=1C2E6FD8, GeomError fsize=150822, usedSize=148470
Friday, Jan 25 15:53:46,2008	Debug	EScan.View	GV- GetP(100004_AoTgcPotsi)- StringValue : 0.09804
Friday, Jan 25 15:53:46,2008	Info	EScan.View	ESStatus(0,Live): SetActive RunState("Freeze") Modes ("2D") Probe("cla_4C") Appl("Abdomen")
Friday, Jan 25 15:53:45,2008	Info	HandleEvent -A-	localId = 1
Friday, Jan 25 15:53:45,2008	Info	UserEventLog	Activating package: Scanner.
Friday, Jan 25 15:53:45,2008	Info	ifmgr	EventLog: EchoTouchpanelPck(3), ButtonID_Utility (1311), (long)1, (BSIR)OFF
Friday, Jan 25 15:53:45,2008	Info	EchoConfig	Clear remove list 0
Friday, Jan 25 15:53:45,2008	Info	HandleEvent -A-	localId = 2
Friday, Jan 25 15:53:45,2008	Info	UserEventLog	Deactivating package: EchoConfig.
Friday, Jan 25 15:53:45,2008	Info	HandleEvent -A-	localId = 81
Friday, Jan 25 15:53:45,2008	Info	UserEventLog	ButtonPress: name=ContrastBut, value=0
Friday, Jan 25 15:51:46,2008	Debug	PCBE.UserResources	GDI Object Count = 2285, UserObjectCount = 1915, Total = 4200
Friday, Jan 25 15:51:46,2008	Debug	PCBE.ProcessMemory	PgFltCount: 132908, PeakWkSet(KB): 236560, WkSet (KB): 236352, PgFile(KB): 468964, PeakPgFile(KB): 469500
Friday, Jan 25 15:51:46,2008	Debug	PCBE.SystemMemory	AvailVirt percentLoad AvailPhys (Kbytes), - 2057408, 55,457520
Friday, Jan 25 15:46:52,2008	Info	ifmgr	15:46:52 HandleEvent: EchoTouchpanelPck(3), ButtonID_Service(1201), (long)0, (long)0(4161) 32922.9ms )
Friday, Jan 25 15:46:52,2008	Info	ifmgr	EventLog: EchoTouchpanelPck(3), ButtonID_Service (1201), (long)0, (long)0
Friday, Jan 25 15:46:52,2008	Error	EchoStatusBar	Dialog timed out before Service Thing Browser started

## 7-5-3 Diagnostics Window Overview

- 1.) Instructions Frame
  - Displays either test-specific text or the default instructions.
- 2.) Status Frame
  - Initially displays the last known status for a selected diagnostic. Once the diagnostic starts, the frame displays the "current" status of all test results. Also see: [Figure 7-26 "Details Link on Diagnostic Window" on page 7-26](#) for more current status data reporting.
  - The Status Frame also contains the user interface elements used for Diagnostic Control and Operator Feedback.
- 3.) Loop Count
  - This is an editable text field that only accepts numeric values of 4 digits or less. When the switch is configured as an "execute" switch and pressed, the loop count field will be queried to determine the number of times to execute the diagnostic.
- 4.) Execute Button
  - This switch has two modes - each with appropriate text:
  - Execute - to start the diagnostic
  - Abort - to stop a diagnostic
- 5.) Progress Indicator
  - Displays a graphical progress indicator for the user.
- 6.) Short Text Message
  - Displays brief messages about the test's progress during execution.
- 7.) Status Frame Background Color
  - Initially gray, the Status Frame background color changes upon completion of a diagnostic to indicate completion status.
  - Code Status Fail = Red
  - Code Status Pass = Green
  - Code Status Abort = Yellow

## 7-5-3 Diagnostics Window Overview (cont'd)

Figure 7-24 Diagnostic Window Overview



The Service Diagnostics windows have some advanced features.

**NOTE:** The Loop Count field must have a value of 2 or greater to activate the Advanced features.

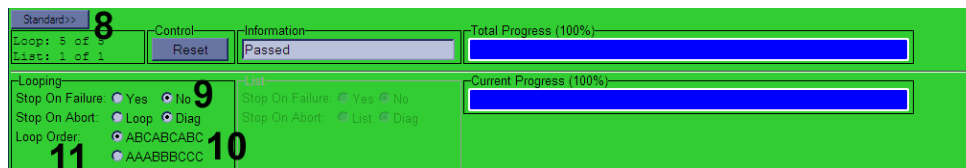
- 8.) This button toggles between Standard and Advanced mode. The window below shows the advanced features.
- 9.) Select the choice for Stop On Failure for the Looping and List sections:
  - Yes = the test will abort at the first failure
  - No = the test will complete even if there are failures
- 10.) Select the choice for Stop On Abort for the Looping and List sections:
  - List = the list will abort when you click the Abort button
  - Loop = the looping will abort when you click the Abort button
  - Diag = the diagnostic test will abort when you click the Abort button

### 7-5-3 Diagnostics Window Overview (cont'd)

11.) Select the Loop Order:

- ABCABCABC = Runs the selected diagnostics as one group and runs each group for the number of loops specified.
- AAABBBCCC = Runs the selected diagnostics one at a time for the maximum loop value then proceeds to the next diagnostic.

**Figure 7-25 Advanced Features of Service Diagnostic Windows**



Some diagnostic windows that verify the tolerance of known values compile the test data and display it in a table. You can access this data through the Details links.

12.) Click the Details icon to open the Details window.

13.) Click the See Details link to compile the Details data.

14.) The table displays the compiled detail data.

**Figure 7-26 Details Link on Diagnostic Window**

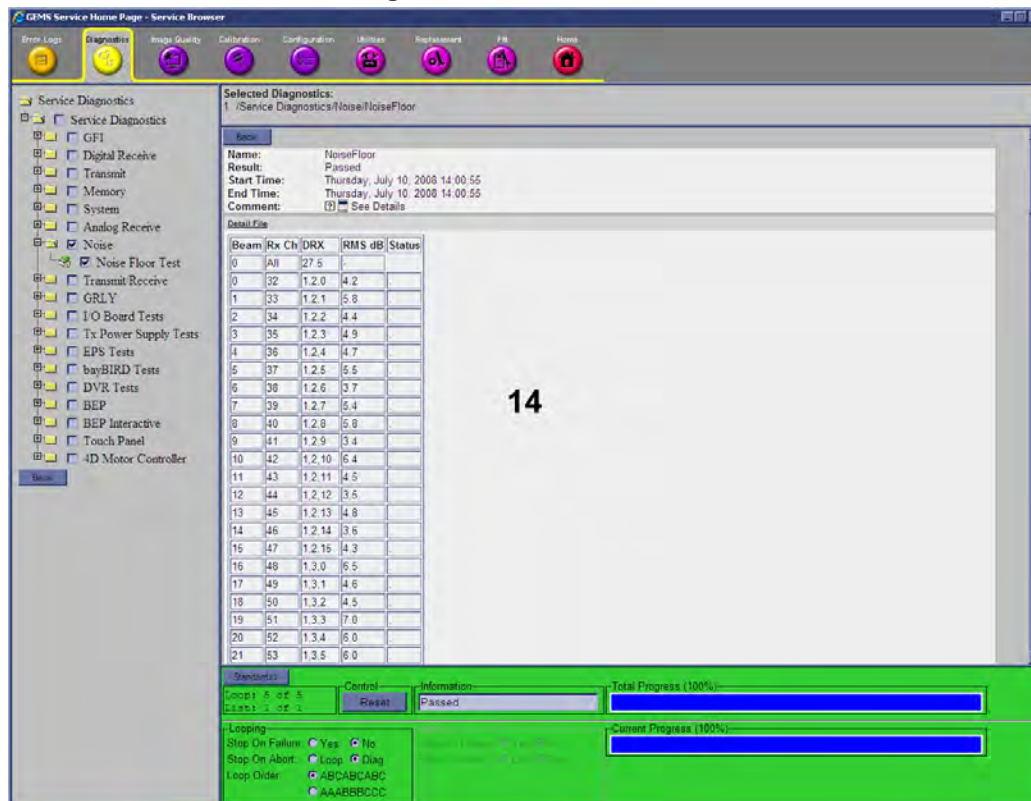


## 7-5-3 Diagnostics Window Overview (cont'd)

Figure 7-27 Details Window



Figure 7-28 Details Table



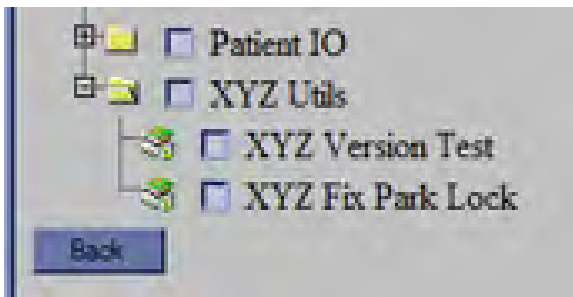
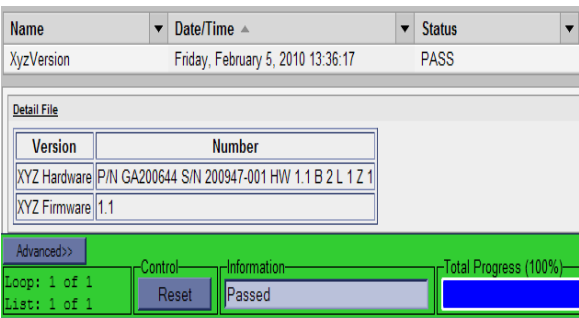
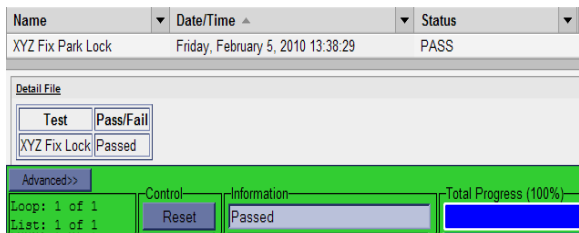
#### **7-5-4 Diagnostic Utility Freezes Up/Times Out**

If the diagnostic utility has timed out (freezes up, will no longer run) you have to close the Common Service Desktop and launch it again. This may occur when issues with the scanner cause the diagnostic utility to fail completion of an executed test.

#### **7-5-5 Diagnostic Symptom Guide**

Use this Diagnostic Symptom Table to help match a symptom with the possible diagnostic test.

Table 7-1 Testing the XY Control

	Steps	Corresponding Graphic
1.	<p><b>XYZ Utilities Folder (XYZ Utils)</b></p> <p>Access Common Service Desktop as GE Service. Select Diagnostics tab.</p> <p>At the end of the list of available Service Diagnostics, you will find the XYZ Utils (XYZ Utilities) Folder.</p> <p>XYZ Utils provides two different tests: XYZ Version Test XYZ Fix Park Lock</p>	
2.	<p><b>XYZ Version Test</b></p> <p>Run the <b>XYZ Version Test</b>.</p> <p>The system will retrieve the Hardware and Firmware versions as follows and will show status PASS.</p> <p><i>NOTE: The version displayed in the illustration may not match the one in the field. The pass status will indicate that the system can read the device.</i></p>	
3.	<p><b>XYZ Fix Park Lock</b></p> <p>Run the <b>XYZ Fix Park Lock Test</b>.</p> <p>The system will release (Undock) the OP Panel and reset the position of the park lock. You will hear the motor moving, releasing the console. The status should show Passed.</p>	

## **7-5-6      OP Panel Utilities - Op Panel Interface**

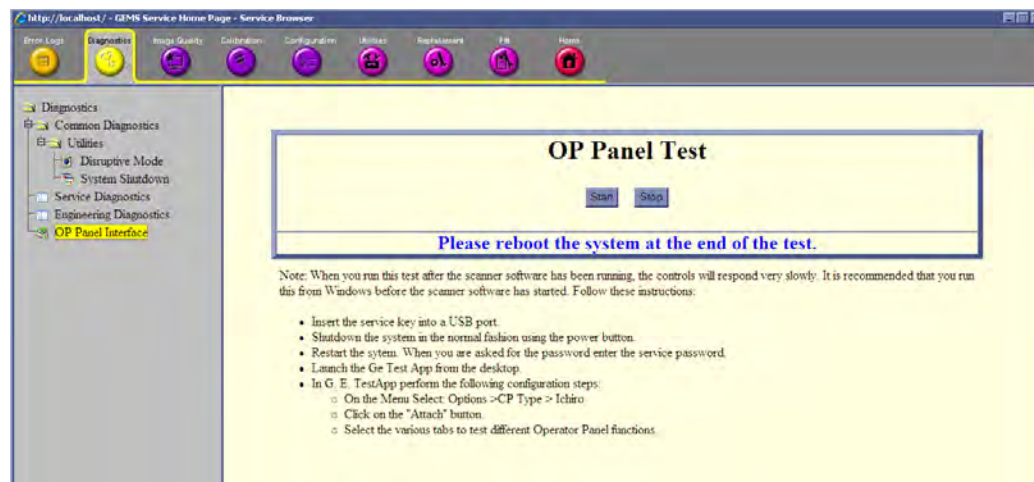
The Operator Panel functionality can be tested using a program (GE Test App) available through the Service Platform.



## 7-5-7 Launching the Op Panel Test

- 1.) Log onto the Service Platform, and select the Diagnostics tab. See: Figure 7-29.

Figure 7-29 Diagnostics Tab

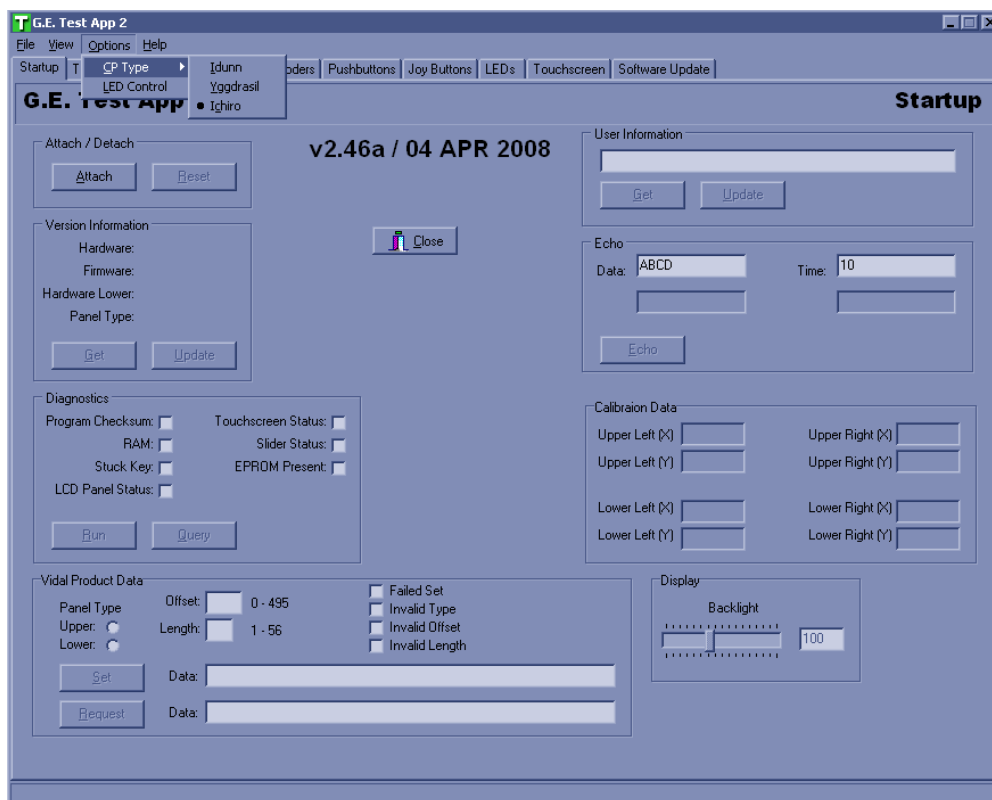


- 2.) Locate the Op Panel Test under I/O Devices > Op Panel Utilities > Op Panel Interface.
- 3.) Select Start to launch the GE Test App.

An hour glass displays on the Service Platform window. The GE Test App window is hidden behind the Service Platform window.
- 4.) When the hour glass displays, minimize the Service Platform window to reveal the GE Test App window. See: [Figure 7-30 "Select System Type" on page 7-32](#).
  - a.) To minimize, move the cursor to the "-" minus icon at upper right hand corner of the window.
  - b.) Press the Set key.

## 7-5-7 Launching the Op Panel Test (cont'd)

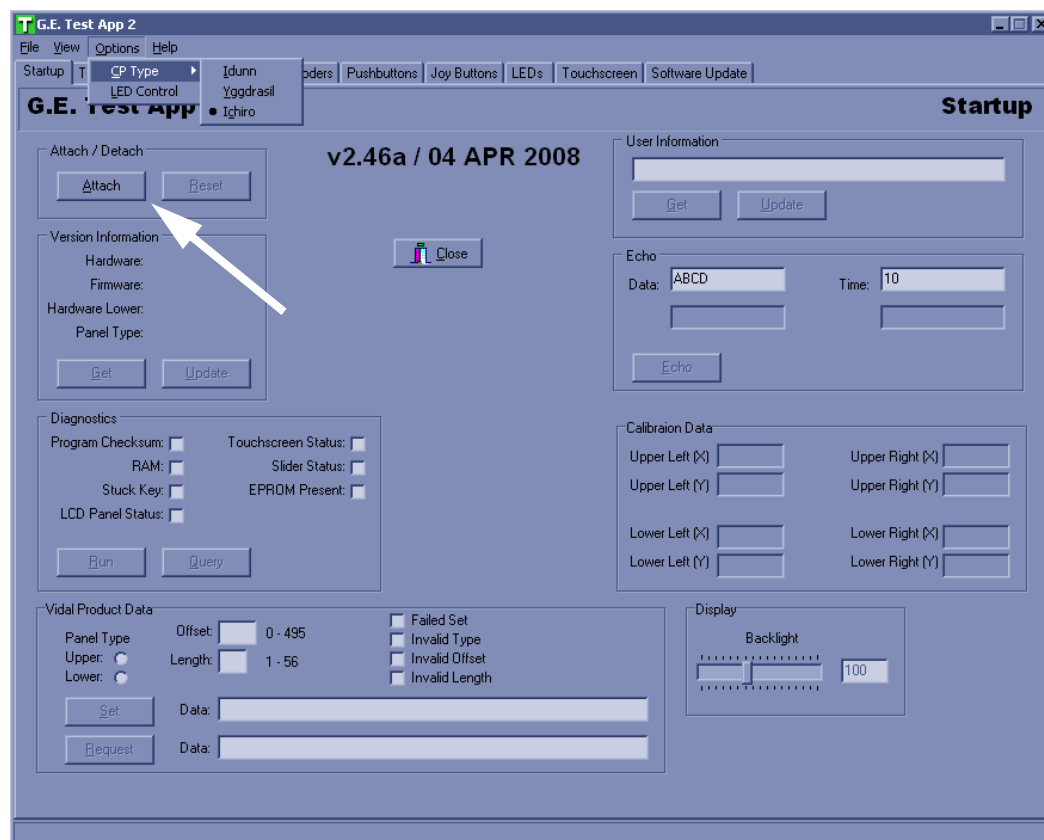
Figure 7-30 Select System Type



- 5.) On the Startup tab, select the Attach button to connect the Op Panel to the test interface. The other buttons on the Startup tab will now be active. See: Figure 7-31 and [Figure 7-32 "Attach and GE Test App Startup Tab - Detach and Other Buttons Active"](#) on page 7-34.

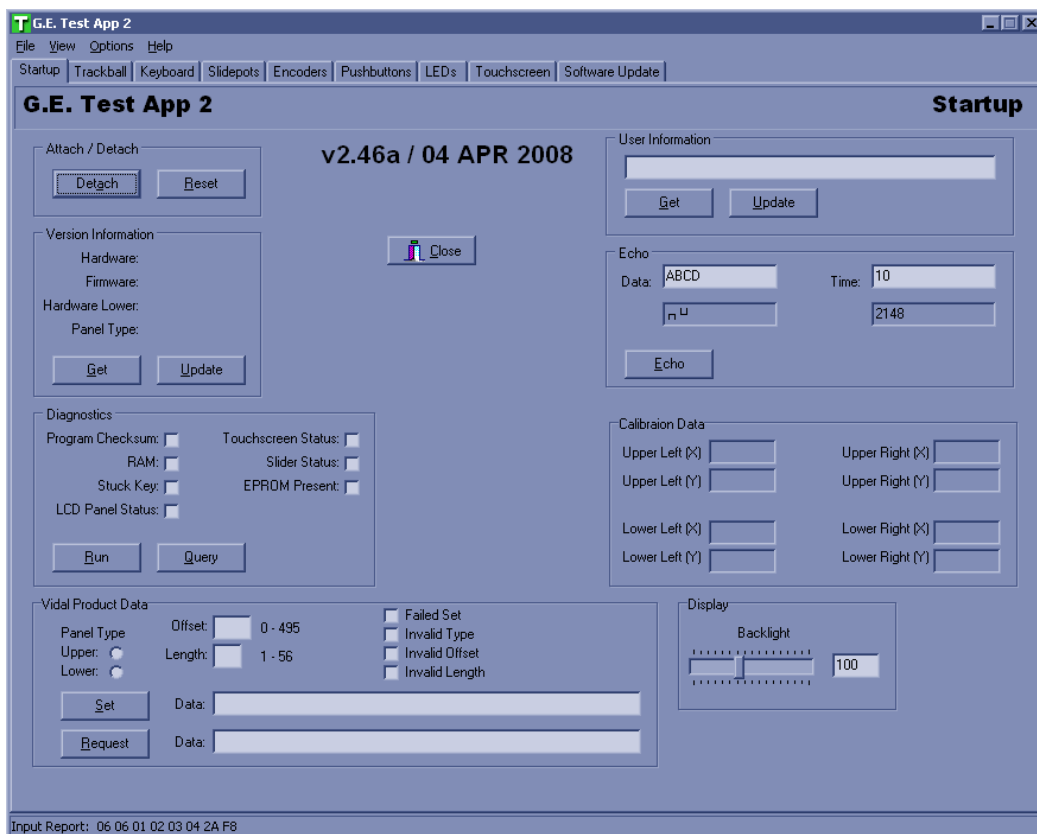
## 7-5-7 Launching the Op Panel Test (cont'd)

Figure 7-31 Attach and GE Test App Startup Tab - Attach Button Active



## 7-5-7 Launching the Op Panel Test (cont'd)

Figure 7-32 Attach and GE Test App Startup Tab - Detach and Other Buttons Active



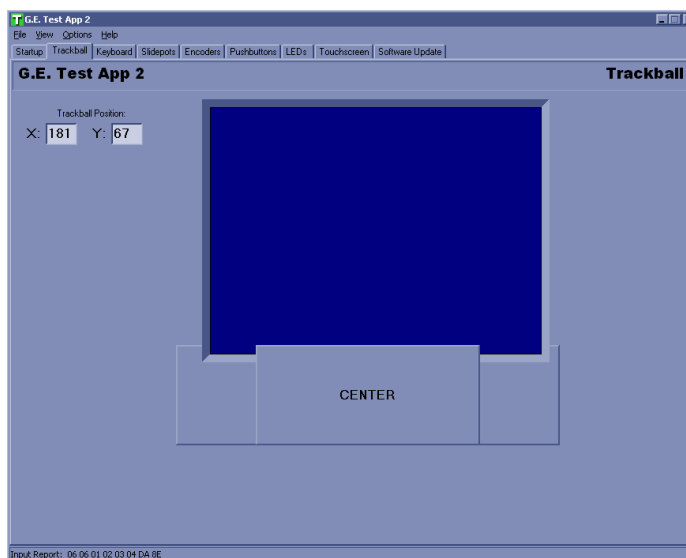
6.) Select the tabs to test the various features of the Op Panel.

## 7-5-8 Trackball Tab

Test the trackball functionality by moving the pointer over the blue box. See: Figure 7-33. Verify that the X and Y position are updated as the pointer is moved.

Test the Left and Right select buttons by pressing each button on the op panel. Verify that the corresponding button is highlighted when each button is pressed. See: Figure 7-33.

**Figure 7-33 Trackball Tab**



## 7-5-9 Keyboard Tab

Test the keyboard functionality by typing on the keyboard. Verify that the corresponding key is highlighted when each key is pressed. See: Figure 7-34.

**NOTE:** The keyboard test **does not** give an indication when the Print Screen button is pressed.

Figure 7-34 Keyboard Tab

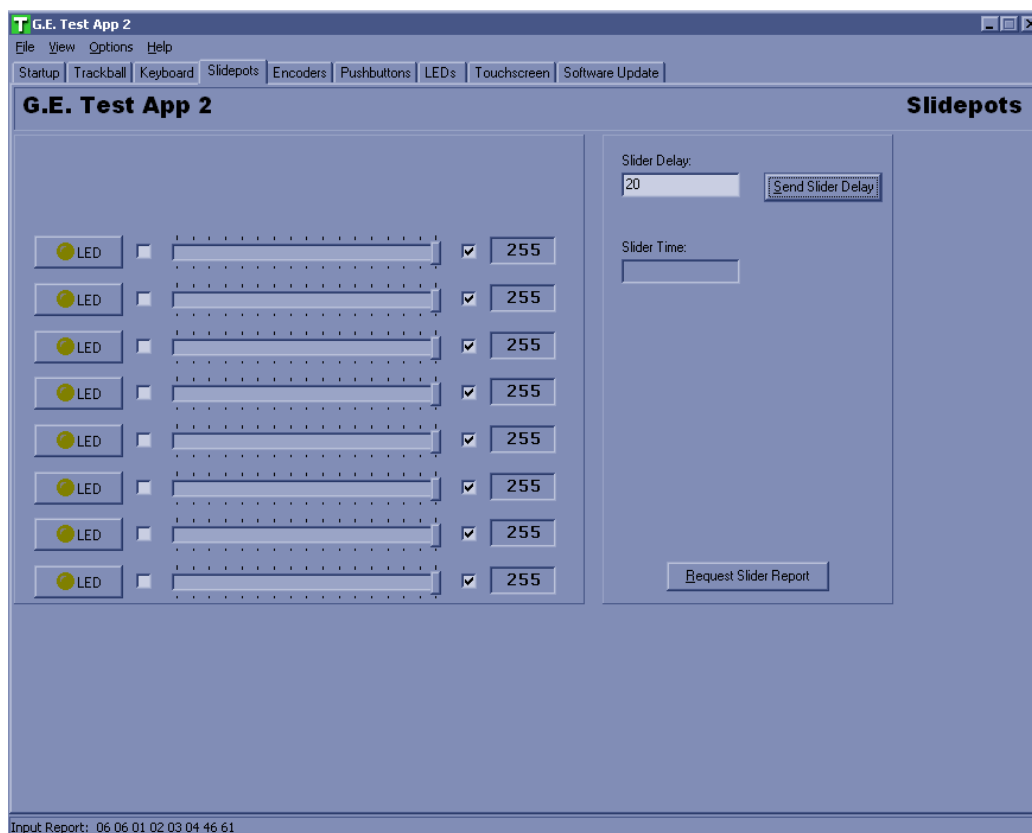


## 7-5-10 Slidepots Tab

Test the slidepot (TGC) functionality by moving each slidepot through its range. See: Figure 7-35. Verify that the visual and numeric position of the slide pot are updated as the slide pot is moved.

Test the LED for each slide pot by pressing on the LED buttons. See: Figure 7-35. Visually verify the LED functionality on the upper operator panel.

Figure 7-35 Slidepots Tab

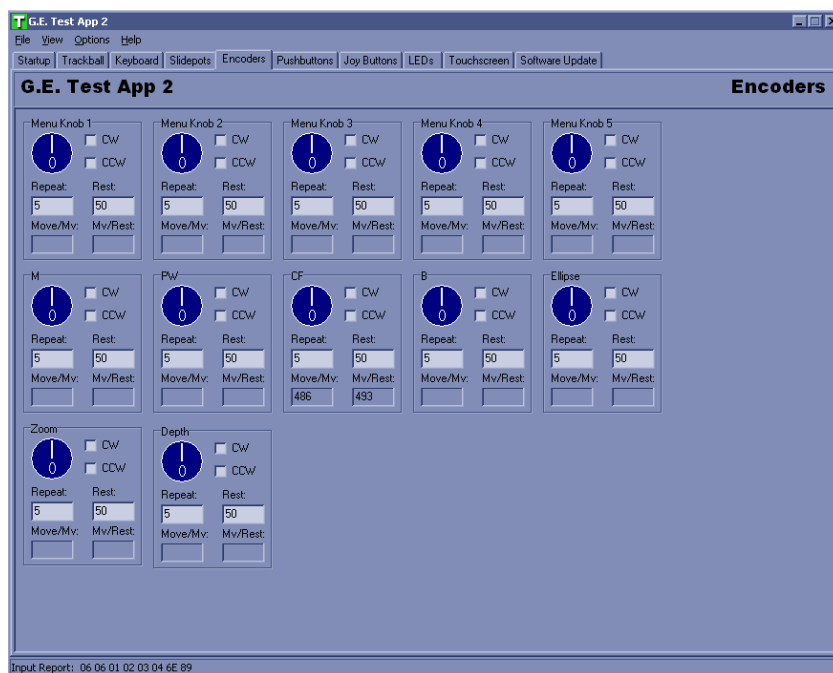


## 7-5-11 Encoders Tab

Test the encoder functionality by rotating each encoder knob. See: Figure 7-36. Verify that the position is updated as the encoder is moved.

Test the encoder button selection function by pressing each knob on the op panel. Verify that the corresponding knob is highlighted when each knob is pressed. See: Figure 7-36.

**Figure 7-36 Encoders Tab**

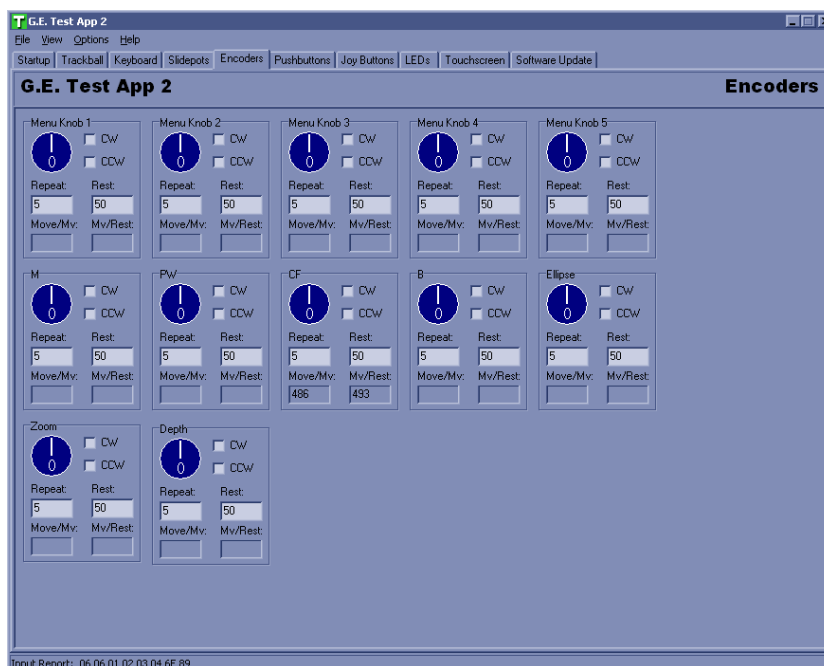




## 7-5-12 Pushbuttons Tab

Test the pushbutton functionality by pressing each button on the operator panel. Verify that the corresponding pushbutton is highlighted when each button is pressed. See: Figure 7-37.

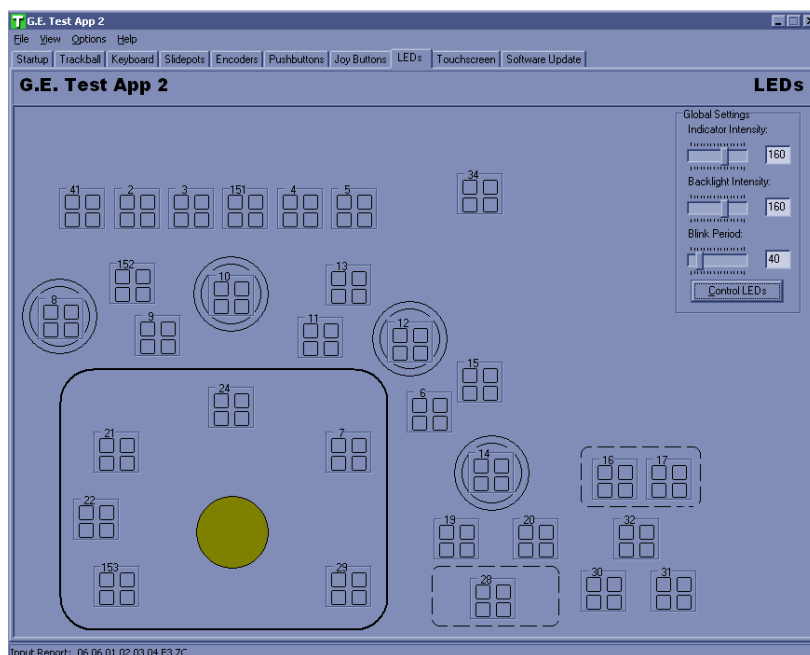
**Figure 7-37 Pushbuttons Tab**



## 7-5-13 LEDs Tab

Test the LED functionality by selecting each button or knob on the GE Test App. See: Figure 7-38. Verify that the corresponding LED is illuminated when each button or knob is selected.

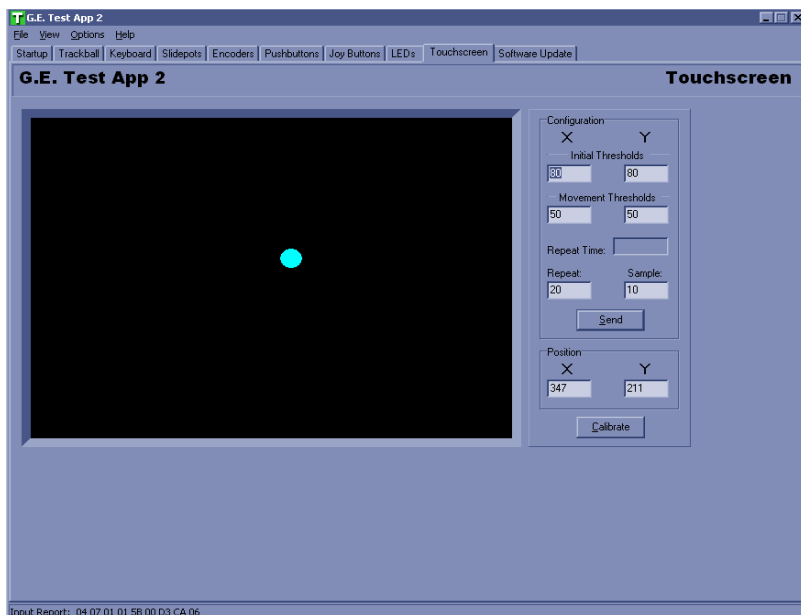
Figure 7-38 LEDs Tab



## 7-5-14 Touchscreen Tab

Test the touchscreen functionality by pressing on the touch screen of the upper operator panel. Verify that the press is indicated in the black window by a highlighted circle. See: Figure 7-39.

Figure 7-39 Touchscreen Tab



## 7-5-15 Ending the Program

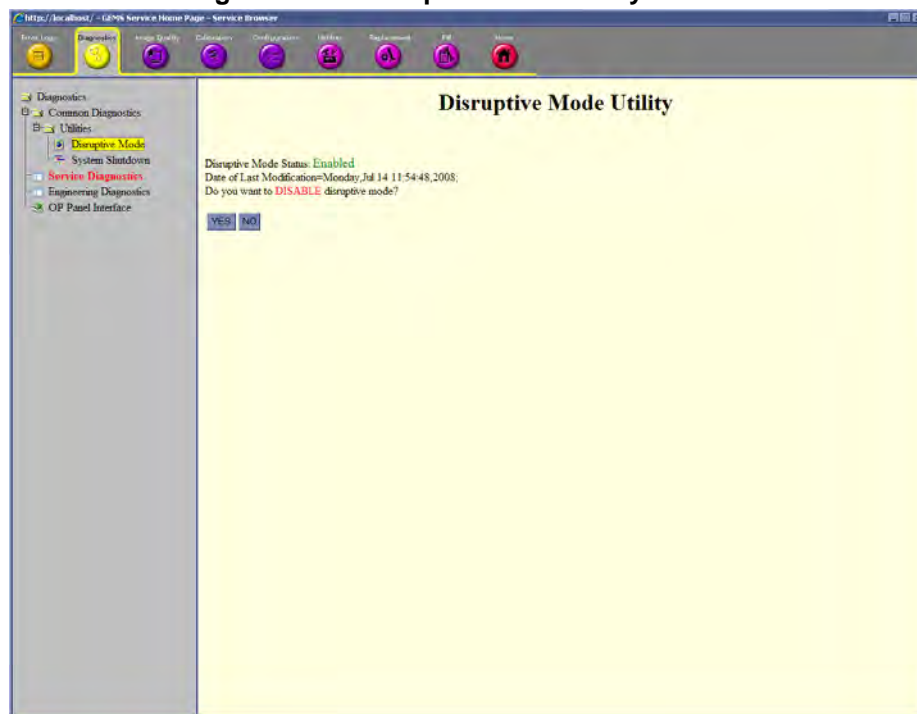
- 1.) When you have finished testing the Op Panel, close the GE Test App.
- 2.) In the Service Platform window, click on the Stop button.
- 3.) Close the Service Platform window.
- 4.) Shutdown the system and reboot.

## 7-5-16 Diagnostics - Common Diagnostics

### 7-5-16-1 Disruptive Mode

The customer enables this feature by choosing "Disruptive Mode" and confirming "Yes", before a GE Service FE can access the customer's ultrasound scanner remotely. "Disruptive Mode" can be requested remotely by the service technician or OLC, or it can be selected by the customer directly on the scanner or workstation.

Figure 7-40 Disruptive Mode Utility Window



## 7-5-17      **Diagnostics for Service Diagnostics**

. Also for [7-5-21-15 "Diagnostics Window Overview - R3.x.x and later"](#) on page 7-95

### 7-5-17-1      **Digital Receive**

See: [7-5-3 "Diagnostics Window Overview"](#) on page 7-24 for a description of the looping and list features.

Symptoms:

- Intermittent general problems (communication between DRX and GFI)
  - Image artifacts - pixilated/jagged edges
- 1.) Select the **Digital Receive** checkbox to run all the tests, or select the individual subtests to run only the selected tests.
  - 2.) Enter the desired Loop Count (numeric value of 4 digits or less).
  - 3.) Click Execute to run the test(s).

### 7-5-17-1 Digital Receive (cont'd)

Tests the signal path from the DRX to the GFI to the BEP. Also tests for latency signals of the DRX or Nathan to the GFI.

#### **Name: FDEMOD Signal Test**

Description: Signal path test starting from the Fixed Demod on the GFI

Run Time: 00:03

If this test failed:

- 1.) Replace the PCIe cable.
- 2.) If GFI test above fails, replace the GFI board.
- 3.) Replace the BEP.

#### **Name: DRX High Speed Bit Error**

Description: High Speed Bit Error Test on the DRX

Run Time: 00:03

If this test failed:

- 1.) Swap DRX boards to determine if the failure point changes as the boards are moved.
- 2.) Replace any failed DRX boards.
- 3.) Interface to GFI may be cause of the failure. See: [7-5-17-3 "GFI" on page 7-50](#).

#### **Name: DRX IF FPGA Test**

Description: Signal path test starting from IF FPGA on DRX boards

Run Time: 00:03

If this test failed:

- 1.) Swap DRX boards to determine if the failure point changes as the boards are moved.
- 2.) Replace any failed DRX boards.
- 3.) Interface to GFI may be cause of the failure. See: [7-5-17-3 "GFI" on page 7-50](#).

#### **Name: DRX ASIC Test**

Description: Digital Signal path tests sourced from output of Nathan ASIC

Run Time: 00:03

- 1.) Swap DRX boards to determine if the failure point changes as the boards are moved.
- 2.) Replace any failed DRX boards.
- 3.) Interface to GFI may be cause of the failure. See: [7-5-17-3 "GFI" on page 7-50](#).

## 7-5-17-1 Digital Receive (cont'd)

### **Name: DRX Signal Path Test (this test provides the most coverage on the DRX)**

Description: Digital signal path sourced from input to Nathan. Does not test ADC. Sends simulated data across the signal path.

Run Time: 00:03

If this test failed:

- 1.) Swap DRX boards to determine if the failure point changes as the boards are moved.
- 2.) Replace any failed DRX boards.
- 3.) Interface to GFI may be cause of the failure. See: [7-5-17-3 "GFI" on page 7-50](#).

### **Name: Nathan Channel Repeater Test**

Description: Tests the functionality of the Nathan channel repeater. Looks for latency signal communication issues analog signal path.

Run Time: 00:05

If this test failed:

- 1.) Swap DRX boards to determine if the failure point changes as the boards are moved.
- 2.) Replace any failed DRX boards.

### **Name: Nathan Alignment Test**

Description: Output TVG of Nathan with system configured for max number of MLAs supported by system. Verifies the alignment (16 identical samples in a row) of IF to GFI.

Run Time: 00:05

If this test failed:

- 1.) Swap DRX boards to determine if the failure point changes as the boards are moved.
- 2.) Replace any failed DRX boards.

### **Name: Nathan Input TVG Alignment Test**

Description: Input TVG of Nathan with system configured for max number of MLAs supported by system. (Internal and external test modes of Nathan.)

Run Time: 00:05

If this test failed:

- 1.) Swap DRX boards to determine if the failure point changes as the boards are moved.
- 2.) Replace any failed DRX boards.

**7-5-17-1 Digital Receive (cont'd)**

**Name: Nathan MLA Data Alignment Test**

Description: Output TVG of Nathan with system configured for max number of MLAs supported by system. Each MLA gain is set differently to detect MLA ordering problems. Verifies the alignment (16 identical samples in a row) of IF to GFI.

Run Time: 00:05

If this test failed:

- 1.) Swap DRX boards to determine if the failure point changes as the boards are moved.
- 2.) Replace any failed DRX boards.



### 7-5-17-2 Memory

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of the looping and list features.

Symptoms:

- Intermittent Problems
- Communication Problems

- 1.) Select the **Memory** checkbox to run all the tests, or select the individual subtests to run only the selected tests.
- 2.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 3.) Click Execute to run the test(s).

## 7-5-17-2 Memory (cont'd)

Assesses the general state of the system. Tests the integrity of memory and communication of the described boards. Tests all of the on-board memory, including registers. The utility fills the memory with data, retrieves the data, and compares it to the original data.

### **Name: GFI Memory Access Test**

Description: Tests the internal and external RAM of the GFI Board.

*NOTE: There may be multiple board dependencies causing this test to fail. Also, see the FDEMOD Signal Test, [7-5-17-1 "Digital Receive" on page 7-43](#).*

Run Time: 00:01

If this test failed:

- 1.) Replace the GFI board.

### **Name: DRX IF FPGA Memory Test**

Description: Tests memory of Interface FPGAs on the DRX boards

*NOTE: Also run the DRX Memory Test (next test below) for a full range of testing capacity.*

Run Time: 00:01

If this test failed:

- 1.) Replace the failed DRX board.

### **Name: DRX Memory Test**

Description: Tests the memory of the Nathan ASICs on the DRX Boards.

Run Time: 00:01

If this test failed:

- 1.) Replace the failed DRX board.

---

**7-5-17-2 Memory (cont'd)**

**Name: GTX IF FPGA Memory Test**

Description: Tests memory of Interface FPGAs on the GTX boards

*NOTE: Also run the GTX Memory Test (next test below) for a full range of testing capacity.*

Run Time: 00:01

If this test failed:

- 1.) Replace the failed GTX board.

**Name: GTX Memory Test**

Description: Tests memory of the David ASICs on the GTX Board

Run Time: 00:01

If this test failed:

- 1.) Replace the failed GTX board.

**7-5-17-3 GFI**

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of the looping and list features.

Symptoms:

- TGC Problems
- Doppler Audio Problems
- Image Artifacts
- Intermittent Instability

- 1.) Select the **GFI** checkbox to run all the tests, or select the individual subtests to run only the selected tests.
- 2.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 3.) Click Execute to run the test(s).

**7-5-17-3 GFI (cont'd)**

**Name: GFI Swept Demodulator Test**

Description: Performs a signal path test of the swept demodulator FPGA on the GFI

Run Time: 00:05

If this test failed:

- 1.) Replace the GFI board.

**Name: GFI Swept Demodulator Engineering Test (Not used in the field)**

**Name: GFI Front End Interface Test**

Description: Test that the GFI can access Front End cards

Run Time: 00:06

If this test failed:

- 1.) Replace the GFI board.
- 2.) If the diagnostic identifies problems with other boards, run tests on those boards also.
- 3.) Replace any other failed boards as identified by the diagnostics for those boards.

**Name: GFI Analog Test**

Description: Tests the analog circuitry of the GFI Board.

*NOTE: Used for test purposes only. There may not be any symptoms displayed by the system.*

Run Time: 00:03

If this test failed:

- 1.) Also run the Analog RX Tests (high, medium, low gain) for a complete test of the GFI gain.  
See: [7-5-17-8 "Analog Receive" on page 7-58.](#)
- 2.) Replace the GFI board.

**Name: GFI Memory Access Test**

Description: Tests the internal and external RAM of the GFI Board. (Same as the GFI Memory Test)

Run Time: 00:01

If this test failed:

- 1.) Replace the GFI board.

**7-5-17-3 GFI (cont'd)**

**Name: GFE Access Test**

Description: Reads the version of the GFE FPGA

Run Time: 00:01

If this test failed:

- 1.) Replace the GFI board.

**Name: Relay LVDS Test**

Description: Tests the LVDS connection between the GFI interface and the GRLY

Run Time: 00:02

If this test failed:

- 1.) Swap GFI boards and/or GRLY board to determine which board has failed.
- 2.) Replace the failed board.

**Name: GFI Fan Test**

Description: Test Front End card rack fan control and fan speed measurements

Run Time: 00:40

If this test failed:

- 1.) Check fan drawer in Front End Card Rack. Verify connection with backplane. Replace defective fan.
- 2.) Replace GFI board.

**Name: GFI GTX Test**

Description: Test communication with the GTX Board. (Same as the GFI Memory Test)

Run Time: 00:03

If this test failed:

- 1.) Based on failure information, replace the failed GTX or swap the GTX boards to isolated failure.

**Name: GFI Fixed Demod Test**

Description: GFI Fixed Demodulator signal path test. (Similar to the FDEMOD test with a slight variation on how the test is run.)

Run Time: 00:03

If this test failed:

- 1.) Replace the GFI board.

#### 7-5-17-4    **System**

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of the looping and list features.

Symptoms:

- High temperature reports on the Home page.
- Temperature specifications are out of tolerance.
- Voltage specifications are out of tolerance.

- 1.) Select the **System** checkbox to run all the tests, or select the individual subtests to run only the selected tests.
- 2.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 3.) Click Execute to run the test(s).

---

**7-5-17-4 System (cont'd)**

**NOTE:** *You can also view temperature logs in the System Health Information section of the Home page. These logs may help identify a trend or subsystem where temperature and voltage have been high, low, or erratic.*

**Name: System Temperature Test**

Description: Compares all system temperatures to their specified values

Run Time: 00:01

If temperature specifications are out of tolerance:

- 1.) The system should not be in a small enclosed space with other equipment that generates a lot of heat. Move the system away from walls and other equipment.
- 2.) Clean or replace any dirty fan filters.
- 3.) Replace the fan tray beneath the card rack if the tachometer readings are slow.
- 4.) Check the fan on the BEP and replace the fan if it is not working.
- 5.) Replace the GFI board if none of the above fixes the temperature problems.

**Name: System Voltage Test**

Description: Compares all system voltages to their specified values

Run Time: 00:01

If any system is out of tolerance:

- 1.) Check the voltage test points on the system boards.
- 2.) Replace the system boards that are out of tolerance.
- 3.) Check the power supply.
- 4.) Replace the power supply if it is out of tolerance.

**Name: FPGA Versions**

Description: Displays the version for all of the FPGAs

Run Time: 00:01

If this test failed:

- 1.) If the test fails to read every FPGA version, check the connection between the Host and the GFI board. Replace the GFI board.
- 2.) If the test fails to read the DRX IF FPGA version, check the DRX boards.
- 3.) If the test fails to read the GTX IF FPGA version, check the GTX boards.



#### 7-5-17-5 Noise

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of the looping and list features.

Symptoms:

- Image artifacts
- Image noise
- Poor image quality
- Missing image channels

- 1.) Select the **Noise** checkbox or the individual subtest to run the test.
- 2.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 3.) Click Execute to run the test.

---

**7-5-17-5 Noise (cont'd)**

**Name: Noise Floor Test**

Description: Measures the noise floor of the System. The entire system is required for this diagnostic. The noise floor is calculated from IQ data received without a signal source.

Run Time: 00:02

- 1.) See: [7-5-27 "Noise" on page 7-119](#) for information on minimizing environmental noise. If the problem continues:
- 2.) Try a new probe (channels in the probe may be faulty). If the problem continues:
- 3.) Run the tests for [7-5-17-8 "Analog Receive" on page 7-58](#).

**7-5-17-6 Transmit**

**Name: GTX High Speed Bit Error Test**

Description: High Speed Bit Error Test on the GTX

Run Time: 00:03

If this test failed:

- 1.) Swap GTX boards to determine if the failure point changes as the boards are moved.
- 2.) Replace any failed GTX boards.
- 3.) Interface to GFI may be the cause of the failure. See: [7-5-17-3 "GFI" on page 7-50](#).

**Name: Tx P6 Illegal Waveform Test**

Description: Transmits an illegal waveform and checks the error registers.

Run Time: 03:21

If this test failed:

- 1.) Swap GTX boards to determine if the failure point changes as the boards are moved.
- 2.) Replace any failed GTX boards.
- 3.) Interface to GFI may be the cause of the failure. See: [7-5-17-3 "GFI" on page 7-50](#).

## 7-5-17-7 Transmit/Receive

### Name: T/R Channel Test

Description: Transmit and Receive Channel Test. Transmits on one at a time and received on one channel at a time using an open probe connector.

Run Time: 00:03

If this test failed:

- 1.) Swap front-plane boards to determine if the failure point changes as the boards are moved.
- 2.) Swap DRX boards to determine if the failure point changes as the boards are moved. Replace any failed DRX board.
- 3.) Run Analog Receive Tests from section [7-5-17-8 "Analog Receive" on page 7-58](#).
- 4.) Replace GRX boards.
- 5.) Replace GRLY.

**NOTE:** Tx Rx Chain Test Tx1  
Tx Rx Chain Test Tx2  
*These tests will be removed from the Service Diagnostics folder. They will remain in the Engineering Diagnostics folder.*

**NOTE:** GRLY folder  
GRLY Receive Test conn 1  
GRLY Receive Test conn 2  
GRLY Receive Test conn 3  
GRLY Receive Test conn 4  
*These tests will be removed from the Service Diagnostics folder. They will remain in the Engineering Diagnostics folder.*

**7-5-17-8    Analog Receive**

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of the looping and list features.

Symptoms:

- Image artifacts - channel failure/noise
- 1.) Select the **Analog Receive** checkbox to run all the tests, or select the individual subtests to run only the selected tests.
  - 2.) Enter the desired Loop Count (numeric value of 4 digits or less).
  - 3.) Click Execute to run the test(s).

### 7-5-17-8 Analog Receive (cont'd)

Tests the signal path from the GFI to the backplane (GTX) to the GRX.

#### **Name: DC Offset Calibration Utility**

**NOTE:** *The DC Offset Calibration Utility diagnostic MUST be run when the DRX boards are replaced or moved. See: [Section 6-4 - DC Offset Calibration](#).*

Description: Measures and corrects for the DC offset of the ADCs on the DRX.

Run Time: 00:02

Run this utility to calibrate the correct DC offset after replacing or moving DRX boards. A popup message alerts the user to run this utility after DRX boards have been replaced or moved.

#### **Name: Analog RX Test (High Gain)**

Description: Signal path test of the GRX boards with a TGC set to high (peak) gain. Failures could be channel in DRX boards, Nathan, GRX to DRX communication.

Run Time: 00:02

If this test failed:

- 1.) Swap DRX boards to determine if the failure point changes as the boards are moved.

**NOTE:** *A block of 8 dead channels indicates a failed DRX board.*

- 2.) Replace any failed boards.
- 3.) Replace GRX boards (these cannot be swapped as one is 64 channel and one is 128 channel).

#### **Name: Analog RX Test (Medium Gain)**

Description: Signal path test of the GRX boards with a TGC set to medium gain.

Run Time: 00:02

If this test failed:

- 1.) Swap DRX boards to determine if the failure point changes as the boards are moved.

**NOTE:** *A block of 8 dead channels indicates a failed DRX board.*

- 2.) Replace any failed boards.
- 3.) Replace GRX boards (these cannot be swapped as one is 64 channel and one is 128 channel).

**7-5-17-8     Analog Receive (cont'd)**

**Name: Analog RX Test (Low Gain)**

Description: Signal path test of the GRX boards with a TGC set to low gain.

Run Time: 00:02

If this test failed:

- 1.) Swap DRX boards to determine if the failure point changes as the boards are moved.

*NOTE:     A block of 8 dead channels indicates a failed DRX board.*

- 2.) Replace any failed boards.
- 3.) Replace GRX boards (these cannot be swapped as one is 64 channel and one is 128 channel).

### 7-5-17-9 Analog CW

#### Analog Continuous Wave (CW) Doppler Tests.

Under Service Diagnostics / Analog CW.

INPUT > a sine wave generated on the GFI test vector generator and injected on the GRX board(-s).

OUTPUT > The signal passes through the analog Doppler circuitry of the GRX board and into the GFI.

The test input signal is a sine wave generated on the GFI test vector generator (TVG) and injected on the GRX board (-s). The setup of the analog Doppler is done through a 512-bit setup word. The output signal from the GRX will depend on the Doppler setup. For example the frequency will be determined by the frequency of the signal in and the Mixer clock setup.

The signal passes through the analog Doppler circuitry of the GRX board and into the GFI. The GFE is setup to receive CW data and the GFI processing in bypass mode.

The level is adjusted with the TSIG\_GAIN and IQ\_GAIN parameters to avoid saturation through the GRX Doppler circuit.

### 7-5-17-9 Analog CW (cont'd)

The 3-term Blackman-Harris window function is used for the analog CW tests. The input frequency is 2.521 MHz for a number of the tests and with the Mixer clock at 2.5 MHz; a Doppler frequency at 21 kHz should result. To be able to find such low frequencies a vector is acquired that enables the Fast Fourier Transform (FFT) of 16K samples (I-data) or 8K (I- & Q-data). This will give bin spacing of approximately 3 kHz (8K samples) and 1.5 kHz (16K samples).

The following tests will run with probes connected to the scanner, but it is recommended to disconnect all probes before running diagnostics. Only connect a probe or test connector if instructed for a specific test.

#### **Name: Service Diagnostics / Analog CW / GRX aCW Dual Channel**

For each channel pair, a signal is set up with  $f_0=2.521$  MHz, the Band Pass (BP) filter at 3.1 MHz and a mixer frequency of 2.5 MHz. The dither and Pedof probe inputs are disabled. The Doppler channel pairs are measured for the parameters: fdop, spectrum peak, RMS, SNR and THD. This is calculated for I & Q data separately.

Disconnect all probes before running diagnostics.

Run Time: 00:05

If this test fails:

1.) Verify the following tests pass:

- GFI Tests
- Analog Receive Tests

If these tests pass, and the GRX aCW Dual Channel test fails:

2.) Replace the CW GRX board.

#### **Name: Service Diagnostics / Analog CW / GRX aCW Beam Forming**

A sum of sine waves with the same frequency, but different phase, gives a sine wave output where the amplitude is a function of the different phase settings.

The test uses small overlapping groups (4 channels) where the channel pairs have different phase settings. Any amplitude deviation detected in this test, should indicate that there is something wrong with phase setup. For each subtest, a signal is set up with  $f_0=2.521$  MHz, the BP filter at 3.1 MHz and a mixer frequency of 2.5 MHz. The dither and Pedof probe inputs are disabled. The parameters tested are: fdop, spectrum peak, RMS and SNR on the I-data.

Are the probes connected? The test will run with probes connected to the scanner, but it is recommended to disconnect all probes before running diagnostics.

Run Time: 00:05

1.) Verify the following tests pass:

- GFI Tests
- Analog Receive Tests

If these tests pass, and the GRX aCW Beam Forming test fails:

2.) Replace the CW GRX board.



### 7-5-17-9 Analog CW (cont'd)

#### **Name: Service Diagnostics / Analog CW / GRX aCW IQ Symmetry**

For each subtest, a signal is setup with  $f_0=2.521$  MHz, the BP filter at 3.1 MHz and a mixer frequency of 2.5 MHz. The dither and Pedof probe inputs are disabled. The number of sub-test, with identical setup, is by default, eight. For the I/Q- symmetry test, the DC-component and RMS value for both the I- and Q-part of the data set are measured. The symmetry quality measurement for this test is calculated from the RMS values for each sub-test.

Are the probes connected? The test will run with probes connected to the scanner, but it is recommended to disconnect all probes before running diagnostics.

Run time: 00:05

1.) Verify the following tests pass:

- GFI Tests
- Analog Receive Tests

If these tests pass, and the GRX aCW IQ Symmetry test fails:

2.) Replace the CW GRX board.

#### **Name: Service Diagnostics / Analog CW / GRX aCW Mixer Clock Sync**

For the Mixer Clock Sync test, a signal is set up with  $f_0=2.521$  MHz, the BP filter at 3.1 MHz and a mixer frequency of 2.5 MHz. The dither and Pedof probe inputs are disabled. The test enables one channel pair, plus each of the other channel pairs per sub test, one at the time. The parameters to test for are fdop, spectrum peak, RMS and SNR on the I-data.

Are the probes connected? The test will run with probes connected to the scanner, but it is recommended to disconnect all probes before running diagnostics.

Run Time: 00:05

1.) Verify the following tests pass:

- GFI Tests
- Analog Receive Tests

If these tests pass, and the GRX aCW Mixer Clock Sync test fails:

2.) Replace the CW GRX board.

#### **Name: Service Diagnostics / Analog CW / GRX aCW BP Filter / Mixer Clk**

In the Band Pass Filter / Mixer Clock Test, for each channel pair, a signal is set up with combinations of input signal frequency, Band Pass (BP) filters and mixer frequencies. The dither and Pedof probe inputs are disabled. The Doppler channel pairs are measured for the parameters: fdop, spectrum peak, RMS on I-data.

Are the probes connected? The test will run with probes connected to the scanner, but it is recommended to disconnect all probes before running diagnostics.

Run Time: 00:08

1.) Verify the following tests pass:

- GFI Tests
- Analog Receive Tests

If these tests pass, and the GRX aCW BP Filter / Mixer Clk test fails:

2.) Replace the CW GRX board.

**7-5-17-9 Analog CW (cont'd)**

**Name: Service Diagnostics / Analog CW / GRX aCW Post Mixer Gain**

For each subtest, a signal is set up with  $f_0=2.521$  MHz, the BP filter at 3.1 MHz and a mixer frequency of 2.5 MHz. The dither and Pedof inputs are disabled. The TSIG\_GAIN parameter is set to give -26.1 dB gain. The test is run by setting up the four different IQ\_GAIN parameter settings that corresponds to the 4 post mixer gain setting of 0 dB, -4 dB, -8 dB and -12 dB. The RMS and RMS attenuation between the four mixers gain settings on both I- and Q-data are tested.

Are the probes connected? The test will run with probes connected to the scanner, but it is recommended to disconnect all probes before running diagnostics.

Run Time: 00:05

1.) Verify the following tests pass:

- GFI Tests
- Analog Receive Tests

If these tests pass, and the GRX aCW Post Mixer Gain test fails:

2.) Replace the CW GRX board.

**Name: Service Diagnostics / Analog CW / GRX aCW Doppler LPF**

For the Low Pass Filter test, Doppler test frequencies, both in the filter pass band and the stop band are set up. The mixer clock frequency is set to 2.5 MHz and the band pass filter to 3.1 MHz. The dither and Pedof inputs are disabled. The LP-filter 3 dB frequency will typically be at about 40 kHz. The following parameters are tested: fdop, spectrum peak and RMS both in the I- and Q-data.

Are the probes connected? The test will run with probes connected to the scanner, but it is recommended to disconnect all probes before running diagnostics.

Run Time: 00:05

1.) Verify the following tests pass:

- GFI Tests
- Analog Receive Tests

If these tests pass, and the GRX aCW Doppler LPF test fails:

2.) Replace the CW GRX board.

### 7-5-17-9 Analog CW (cont'd)

#### **Name: Service Diagnostics / Analog CW / GRX aCW Dither Injection**

A signal is injected in the dither input and result in the received I/Q data is checked. The test signal generator is used for signal injection where the input signal is  $f_0=2.521$  MHz, the BP filter at 3.1 MHz and a mixer frequency of 2.5 MHz. The dither input is enabled for this test, while the Pedof inputs are disabled. The DITHER\_GAIN parameter values are set to 0, 1, 2 and 3. The parameter values corresponds to Dither gain of 0 dB, -7 dB, -19 dB and -30 dB respectively. The RMS and the RMS attenuation between the different gain settings in both I- and Q-data are tested.

Are the probes connected? The test will run with probes connected to the scanner, but it is recommended to disconnect all probes before running diagnostics.

Run Time: 00:05

1.) Verify the following tests pass:

- GFI Tests
- Analog Receive Tests

If these tests pass, and the GRX aCW Dither Injection test fails:

2.) Replace the CW GRX board.

#### **Name: Service Diagnostics / Analog CW / GRX aCW Pedof**

In the test, the two center frequencies of 2 MHz and 6 MHz are verified. These frequencies are set by switching the Pedof band pass filter. The GFI test signal generator is used to input sine waves. The Pedof test signal input is enabled. The dither and Pedof probe inputs are disabled. Sub tests using combinations of input signal frequency, Pedof band pass filter settings, mixer clock frequency, test signal gain, and IQ gains are run.

Parameters tested: fdop, spectrum peak, RMS, SNR and THD on both I- & Q-data. With this test the Pedof (SD probe) CW path on the GRX board is tested.

The aCW Pedof Test will only be run on the CW64 board.

Are the probes connected? The test will run with probes connected to the scanner, but it is recommended to disconnect all probes before running diagnostics.

Run Time: 00:05

1.) Verify the following tests pass:

- GFI Tests
- Analog Receive Tests

If these tests pass, and the GRX aCW Pedof test fails:

2.) Replace the CW GRX board.

**7-5-17-9 Analog CW (cont'd)**

**Name: Service Diagnostics / Analog CW / GRX ADC Digital LVDS**

For the Analog-to-Digital Converter Digital Low-Voltage Differential Signaling test, the digital link from the Doppler ADC and to the GFI board is verified. To verify signal integrity, the ADC is set up to continuously transmit a predefined bit-pattern. Both I- and Q-data are acquired and each sample value is tested. Port 0 on the PCA9554 I2C register on the GRX board is used to turn the ADC test pattern on/off. The test signal generator on GFI is disabled for this test.

Are the probes connected? The test will run with probes connected to the scanner, but it is recommended to disconnect all probes before running diagnostics.

Run Time: 00:05

1.) Verify the following tests pass:

- GFI Tests
- Analog Receive Tests

If these tests pass, and the GRX ADC Digital LVDS test fails:

2.) Replace the CW GRX board.

**Name: Service Diagnostics / Analog CW / GRX Mixer Phase Setup**

This test utilizes a PCA9554 I2C register on the GRX board. All phase bits are set to one in the analog Doppler setup data, before reading back from the I2C register and test bits 6 and 7 in the returned byte. Next, all zeroes are sent to the analog Doppler, read back again and bits 6 and 7 appear in the returned byte. The test passes if the bits of interest in the read back byte match the phase values that were setup. Bit 6 and 7 are the last bits in the two shift register chains and if the correct value were read, the chains must be intact. The test signal generator on GFI is disabled for this test.

Are the probes connected? The test will run with probes connected to the scanner, but it is recommended to disconnect all probes before running diagnostics.

Run Time: 00:05

1.) Verify the following tests pass:

- GFI Tests
- Analog Receive Tests

If these tests pass, and the GRX Mixer Phase Setup test fails:

2.) Replace the CW GRX board.

### 7-5-17-10 I/O Board Tests

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of the looping and list features.

Symptoms:

- Intermittent Problems
- Popup messages warning of system voltage problems - I/O Board Pwr Supply Test
- System comes up in simulator mode - run I/O Board GFI Voltage Test
- Unable to run diagnostics
- No doppler audio/system audio/general audio sounds - run I/O Board Audio Test
- No display on the monitor

- 1.) Select the **I/O Board Tests** checkbox to run all the subtests, or select the individual subtests to run only the selected tests.
- 2.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 3.) Click Execute to run the test(s).

---

**7-5-17-10 I/O Board Tests (cont'd)**

**Name: I/O Board Pwr Supply Test**

NOTE: Description: Compares all local I/O Board voltages to their specified values.

Run Time: 00:01

If this test failed:

- 1.) Replace the I/O Board.

**Name: I/O Board GFI Voltage Test**

Description: Compares all voltages on the GFI to their specified values. The GFI may not be working, therefore the BEP cannot communicate with the Front End.

Run Time: 00:01

If this test failed:

- 1.) Verify that the BEP to Backplane cable is properly connected and/or swap the cable with a known good cable. If the problem continues:
- 2.) Run the GFI tests to determine if the GFI is faulty. See: [7-5-17-3 "GFI" on page 7-50](#).

**Name: I/O Board GFI Temperature Test**

Description: Reads temperature sensors on the GFI board and compares the values against specified limits.

Run Time: 0:05

If this test failed:

- 1.) Verify that the BEP to Backplane cable is properly connected and/or swap the cable with a known good cable. If the problem continues:
- 2.) Check the Front End card rack cooling fans.
- 3.) Run the GFI Tests to determine if the GFI is faulty. See: [7-5-17-3 "GFI" on page 7-50](#).

**Name: I/O Board Self Test**

Description: The processor on the I/O Board performs a check of its basic functions.

Run Time: 00:01

If this test failed:

- 1.) Verify that the BEP to Backplane cable is properly connected and/or swap the cable with a known good cable. If the problem continues:
- 2.) Replace the I/O Board.

---

**7-5-17-10 I/O Board Tests (cont'd)**

**Name: I/O Board Loop Back Test**

Description: Basic test of the USB communications with the I/O Board

Run Time: 00:01

If this test failed:

- 1.) Verify that the USB cable/connections are properly connected. If the problem continues:
- 2.) Swap the USB cable/device with a known working cable/device. If the problem continues:
- 3.) Replace the I/O Board.

**Name: I/O Board Audio Test**

Description: Test all the audio channels on the I/O board.

Run Time: 00:03

If this test failed:

- 1.) Verify that the BEP to Backplane cable is properly connected and/or swap the cable with a known good cable. If the problem continues:
- 2.) Run the GFI tests on [7-5-17-3 "GFI" on page 7-50](#) to verify that the GFI is working correctly. If the GFI board is OK and the problem continues:
- 3.) Replace the I/O Board.

---

**7-5-17-10 I/O Board Tests (cont'd)**

**NOTE:** *The following Video tests can be used when the Touch Panel and the keys on the control panel are on/illuminated, but the monitor does not come on.*

**Name: Video Status (Manufacturing)**

Description: Tests if the I/O can detect a primary, secondary monitor and mother board video signal.

Run Time: 00:01

If this test failed:

- 1.) Verify that the BEP to Backplane cable is properly connected and/or swap the cable with a known good cable. If the problem continues:
- 2.) Swap monitors with a known working monitor. If the problem continues:
- 3.) Replace the monitor.

**Name: Video Status (Service)**

Description: Tests if the I/O can detect the primary monitor and the mother board video signal.

Run Time: 00:01

If this test failed:

- 1.) Verify that the BEP to Backplane cable is properly connected and/or swap the cable with a known good cable. If the problem continues:
- 2.) Swap monitors with a known working monitor. If the problem continues:
- 3.) Replace the monitor.



#### 7-5-17-11 Tx Power Supply Test

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of the looping and list features.

Symptoms:

- System will not scan
- Interrupted scanning
- Scan unexpectedly stops

- 1.) Select the **Tx Power Supply Test** checkbox to run all the subtests, or select the individual subtests to run only the selected tests.
- 2.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 3.) Click Execute to run the test(s).

---

**7-5-17-11 Tx Power Supply Test (cont'd)**

**Name: TxPs Control Test**

Description: Transmit Power Supply Control Test (Verifies the voltage points are within specifications)

Run Time: 00:10

If this test failed:

- 1.) Replace the power supply

**Name: TxPs Watchdog Test**

Description: Transmit Power Supply GFI Watchdog Test (Tests that the power supply watchdog is working)

Run Time: 00:07

If this test failed:

- 1.) Replace the power supply

**Name: TxPs Alarm Test**

Description: Transmit Power Supply Alarm Test (Tests the fault detection of power supply)

Run Time: 00:04

If this test failed:

- 1.) Replace the power supply

**Name: TxPs Keep Alive Test**

Description: Transmit Power Supply Keep Alive Test (Tests the communication between BEP and power supply and fault detection)

Run Time: 00:07

If this test failed:

- 1.) Replace the power supply

---

**7-5-17-12 EPS (Extended Power Shutdown) or CB (ChargeBoard used in BEP6) Tests**

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of the looping and list features.

Symptoms:

- System shuts down immediately after power loss/interruption
- 1.) Select the **Extended Power Shutdown Tests** checkbox to run all the tests, or select the individual subtests to run only the selected tests.
  - 2.) Enter the desired Loop Count (numeric value of 4 digits or less).
  - 3.) Click Execute to run the test(s).

---

**7-5-17-12    EPS (Extended Power Shutdown) or CB (ChargeBoard used in BEP6) Tests (cont'd)**

**Name: Extended Power Shutdown Detection Test**

Description: Extended Power Shutdown Detection Test (Verifies the BEP can communicate with the Extended Power Shutdown through the I/O board)

Run Time: 00:03

If this test failed:

- 1.) Run the I/O board tests: see: [7-5-17-10 "I/O Board Tests" on page 7-67](#).
- 2.) Replace the I/O board if there are any problems. If the I/O board tests are OK:
- 3.) Replace the Extended Power Shutdown.

**Name: Extended Power Shutdown Voltage Test**

Description: Extended Power Shutdown Voltage Test (Tests the specified voltages of the Extended Power Shutdown)

Run Time: 00:05

If this test failed:

- 1.) Run the I/O board tests: see: [7-5-17-10 "I/O Board Tests" on page 7-67](#).
- 2.) Replace the I/O board if there are any problems. If the I/O board tests are OK:
- 3.) Replace the Extended Power Shutdown.

**Name: Extended Power Shutdown Load Test**

**NOTE:**    *Run this test with only one (1) loop. Do not run multiple loops on this test. Each loop will cause the battery to discharge power, requiring a longer time to recharge after the test.*

Description: Extended Power Shutdown Load Test (tests the battery load capacity)

Run Time: 00:30

If this test failed:

- 1.) Replace the Extended Power Shutdown battery

**Name: Extended Power Shutdown Charge State Test**

Description: Reads the charge state of the Extended Power Shutdown unit and displays it.

Run Time: 00:06

If this test failed:

- 1.) Run the I/O board tests. See: [7-5-17-10 "I/O Board Tests" on page 7-67](#).
- 2.) Replace the I/O Board if there any problems. If the I/O Board tests are OK:
- 3.) Replace the Extended Power Shutdown board and the battery pack.

### 7-5-17-13 bayBIRD Tests

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of the looping and list features.

Symptoms:

- 3D triangulation position is off/wrong
- V Nav Issues/poor tracking

**NOTE:** *RF/EMI interference may also cause conditions of these symptoms. See: [2-2-4 "EMI limitations" on page 2-5](#).*

- 1.) Select the **bayBIRD Tests** checkbox to run all the tests, or select the individual subtests to run only the selected tests.
- 2.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 3.) Click Execute to run the test(s).

**7-5-17-13    bayBIRD Tests (cont'd)**

Sensor 4 added for DriveBay2+ 3D Tracking System, introduced in R4.

---

**7-5-17-13    bayBIRD Tests (cont'd)**

**Name: Run All Tests**

Description: Runs all of the tests that are in the box

Run Time: 00:24

If this test failed:

- 1.) Run subsequent tests as identified in the failed test results

**Name: Sensor 1**

Description: Runs the tests for Sensor 1

Run Time: 00:21

If this test failed:

- 1.) Move the sensor (transducer) to a different port. If the transducer fails, replace the transducer.
- 2.) If the problem still persists, replace the bayBIRD.

**Name: Sensor 2**

Description: Runs the tests for Sensor 2

Run Time: 00:21

If this test failed:

- 1.) Move the sensor (transducer) to a different port. If the transducer fails, replace the transducer.
- 2.) If the problem still persists, replace the bayBIRD.

**Name: Sensor 3**

Description: Runs the tests for Sensor 3

Run Time: 00:21

If this test failed:

- 1.) Move the sensor (transducer) to a different port. If the transducer fails, replace the transducer.
- 2.) If the problem still persists, replace the bayBIRD.

**Name: Sensor 4 (R4 and bayBird2+)**

Description: Runs the tests for Sensor 4

Run Time: 00:21

If this test failed:

- 1.) Move the sensor (transducer) to a different port. If the transducer fails, replace the transducer.
- 2.) If the problem still persists, replace the bayBIRD.

**7-5-17-13 bayBIRD Tests (cont'd)**

**Name: Transmitter**

Description: Runs the tests for Transmitter

Run Time: 00:21

If this test failed:

- 1.) If the problem still persists, replace the bayBIRD.

**Name: System**

Description: Runs the tests for System

Run Time: 00:25

- 1.) If the problem still persists, replace the bayBIRD.

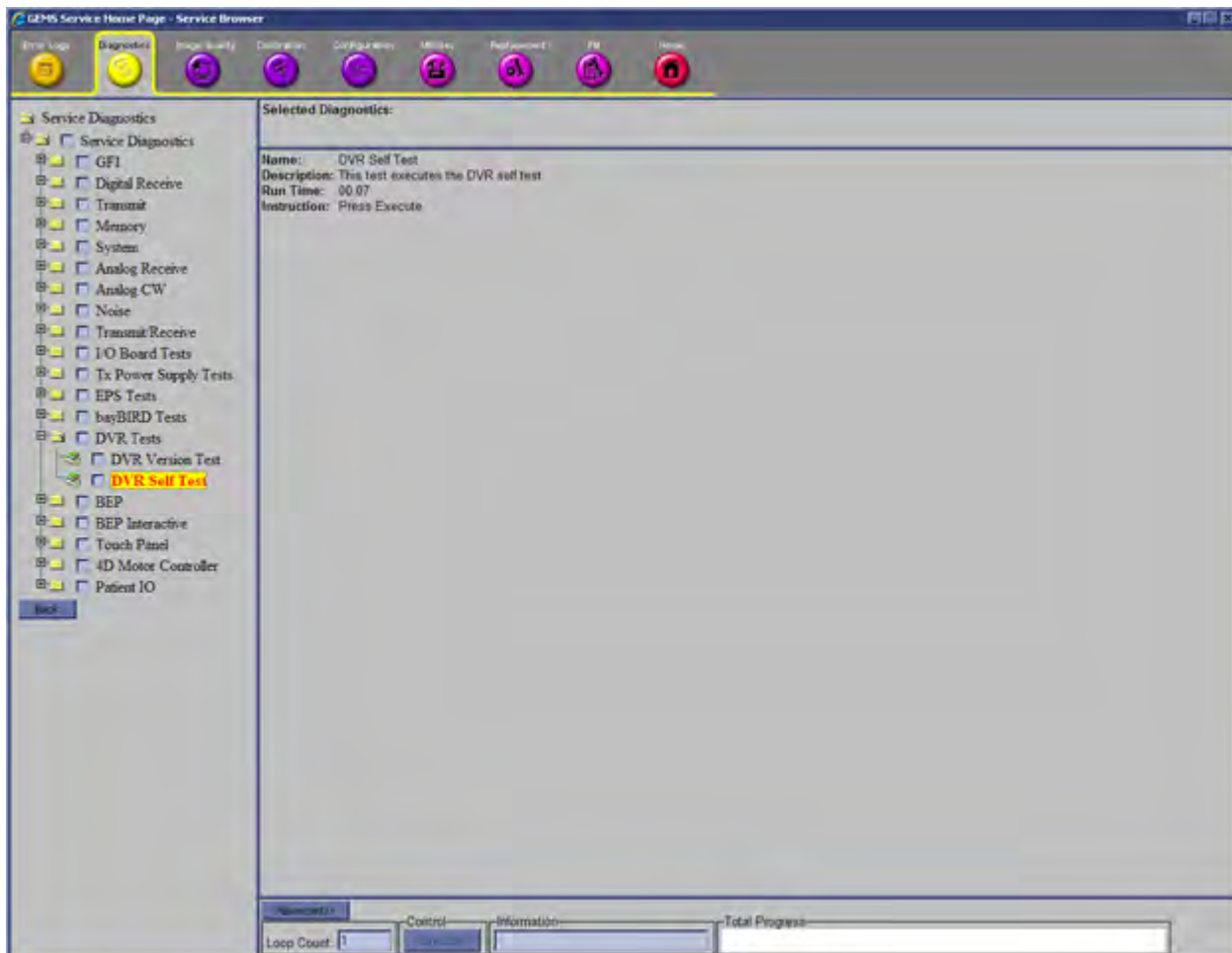


---

7-5-21-20    Digital Receive (cont'd)

## 7-5-18 DVR Test

Figure 7-41 DVR Test Screen



### Name: DVR Version Test

Description: Reads the current version of the DVR board if installed

Run Time: 00:01

- 1.) If fails, re-seat board and run DVR self test
- 2.) If problem persists, replace DVR Board

### Name: DVR self Test

Description: This test executes a self test of the DVR Board if installed

Run Time: 00:07

- 1.) If fails, re-seat board
- 2.) If problem persists, replace DVR Board

**Diagnostics - BEP** For Diagnostic differences, see [7-5-20 "Diagnostics - BEP Interactive Tests - R4.x and later"](#) on page 7-91.

### 7-5-18-1 Essential Tests

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of this window's features.

Runs tests on essential functions of the BEP. This is a good starting point for isolating issues that may originate from the BEP. The test results are displayed in the Status portion of the window.

Run Time: About 2 minutes.

- 1.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 2.) Click the Execute button.
- 3.) Failed tests may have another diagnostic test that can help isolate the failure, or will indicate which part to replace. For:
  - PCI Bus configuration
  - CMOS memory
  - CPU - run [7-5-18-3 "System Board" on page 7-83](#)
  - RAM - run [7-5-18-9 "Memory" on page 7-89](#)
  - Hard Drive status and Random Seek - run [7-5-18-4 "Hard Disk Drive Surface Scan" on page 7-84](#) and run [7-5-18-5 "Hard Disk Drive Quick Test" on page 7-85](#)
  - Network Interface (loopback only) - run [7-5-18-7 "Network Adapter" on page 7-87](#)

### 7-5-18-2 Essential Tests differences in R4 and later

Essential test in R4 has two versions:

- Essential test: Complete test, same as R3 or earlier  
Essential test, No network: same test, except it does not run the network tests for wired or wireless connection.

### 7-5-18-3 System Board

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of this window's features.

Runs tests on essential functions of the PC Mother Board. The test results are displayed in the Status portion of the window.

Run Time: About 1 minute.

- 1.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 2.) Click the Execute button. If there are any failures:
- 3.) Check the Motherboard Harness. Swap with a known good harness. If the problem continues:
- 4.) Replace the Motherboard. If the problem continues:
- 5.) Replace the BEP.

#### 7-5-18-4 Hard Disk Drive Surface Scan

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of this window's features.

Runs tests on essential functions of the Hard Disk Drive. The test results are displayed in the Status portion of the window. This test can take a long time to complete. For a quick test to determine if there are possible problems with the Hard Disk Drive, run

[7-5-18-5 "Hard Disk Drive Quick Test" on page 7-85](#) before running this test.

The following tests are performed on your hard drive to ensure the Hard Disk Drive controller and the drive mechanism are working correctly. The disk surface itself is also checked.

- Drive Status - Hard Disk Drive heads are moved from track 0 to the maximum track one track at a time.
- Random Seek - Hard Disk Drive heads are moved randomly several hundred times.
- Surface Scan - This test scans for surface defects on the Hard Disk Drive.

Run Time: May take over an hour.

- 1.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 2.) Click the Execute button. If there are any failures:
- 3.) Replace the Hard Disk Drive.

#### 7-5-18-5 Hard Disk Drive Quick Test

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of this window's features.

Runs an overview set of tests on essential functions of the Hard Disk Drive. The test results are displayed in the Status portion of the window. Run this test before running the [7-5-18-4 "Hard Disk Drive Surface Scan" on page 7-84](#).

Run Time: May take about 6 minutes.

- 1.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 2.) Click the Execute button. If there are any failures:
- 3.) Defragment the Hard Disk Drive. See: [7-5-25-10 "Disk Defragmenter" on page 7-109](#). If the problem continues:
- 4.) Run the [7-5-18-4 "Hard Disk Drive Surface Scan" on page 7-84](#). If the problem continues:
- 5.) Replace the Hard Drive.

#### 7-5-18-6 Video Card

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of this window's features.

Runs a test on essential functions of the Video Card. The test results are displayed in the Status portion of the window.

This diagnostic tests your system's video capabilities. This involves testing the video memory with 18 patterns, testing your graphics acceleration, and text output. You will see these tests being performed on your monitor.

You can cancel this test at any time by hitting the Escape (Esc) key.

The following tests are performed on your monitor:

- Memory - Video memory is tested by filling the video buffer with 18 test patterns, one pattern at a time. The tests will fill the entire screen with a single color.
- Data Transfer - This tests the graphics acceleration part of your video controller. These tests will appear on your screen as black and white concentric squares and rectangles of various sizes and colors. If errors are detected, the locations of the problems are displayed.
- Text Output - This test prints a text string in random sizes and colors to tests your video device driver and video controller.

Run Time: May take about 10 minutes.

- 1.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 2.) Click the Execute button.
- 3.) Replace the Video Card if there are any errors. If the problem continues:
- 4.) Replace the BEP.



---

**7-5-18-7 Network Adapter**

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of this window's features.

Runs a test on essential functions of the Network Interface. The test requires the system to be connected to a network. The test results are displayed in the Status portion of the window.

This test gives the current status of the network and provides the option to restart the network components in the BEP.

- 1.) Enter the desired Loop Count (numeric value of 4 digits or less).

Click the Execute button.

#### **7-5-18-8     Network Adapter Diagnostic Changes for R4**

Network Adapter Test is split into 2 folders:

- Network Adapter - see: Table 7-117 on page 7-156 and Table 7-118 on page 7-157
- Network Adapter Reliability - see: Table 7-119 on page 7-158 and Table 7-120 on page 7-159

Each folder contains separate tests for Wired and Wireless Adapters.

**7-5-18-9 Memory**

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of this window's features.

Runs a test on essential functions of the Memory. The test results are displayed in the Status portion of the window.

- 1.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 2.) Click the Execute button.
- 3.) Replace the BEP if any tests fail.

## 7-5-19 Diagnostics - BEP Interactive Tests

**Table 7-2 BEP Interactive Test Description Table**

Test	Description
<b>AVI playback</b>	Tests playing back an AVI file.
<b>CD-R test</b>	Tests writing and reading to a CDR
<b>CD-RW</b>	Not supported - Tests writing and reading data to a CD-ROM
<b>DVD-R</b>	Tests writing and reading data to a DVD-R disk
<b>DVD-RDL</b>	Not supported - Tests writing and reading to a DVD-R double layer disk
<b>DVD-RW</b>	Not supported - Tests writing and reading a DVD-RW disk
<b>DVD+R</b>	Not supported - Tests writing and reading to DVD+R media.
<b>DVD+RDL</b>	Not supported - DVD+R double layer
<b>DVD+RW</b>	Not supported - DVD+RW read write test
<b>DVD_RAM</b>	Not supported - DVD RAM read and write test
<b>DVD READONLY</b>	Not supported - DVD RAM read and write test
<b>Keyboard</b>	N/A
<b>Microphone</b>	N/A
<b>Monitor</b>	Monitor test patterns
<b>Trackball</b>	N/A
<b>Sound</b>	Generates sounds for testing the speakers
<b>USB Ports</b>	Lists USB Devices

## 7-5-20 Diagnostics - BEP Interactive Tests - R4.x and later

Interactive tests in R4 and later have been reduced. Tests that are not supported are no longer listed.

**Table 7-3 BEP Interactive Test Description Table**

Test	Description
<b>AVI playback</b>	Tests playing back an AVI file.
<b>CD-R test</b>	Tests writing and reading to a CDR
<b>DVD-R</b>	Tests writing and reading data to a DVD-R disk
<b>DVD READONLY</b>	Not supported - DVD RAM read and write test
<b>Keyboard</b>	N/A
<b>Microphone</b>	N/A
<b>Monitor</b>	Monitor test patterns
<b>Trackball</b>	N/A
<b>Sound</b>	Generates sounds for testing the speakers
<b>USB Ports</b>	Lists USB Devices

If you want to run these tests, it is recommended to run on a DOS prompt instead of CDS. This test will take approximately 70 seconds.

- Insert the service ky
- Exit from the scanner software and exit to Windows
- Start a DOS prompt
- Insert a blank DVD-R into the drive
- Enter the command:  
`cd %insite_home%\PCDoctor\bin`  
`pcd run --file scripts\dvdminusr.xml`

There is another test with a CD-R disk. It is not recommended because it takes over 30 minutes. If you want to run the CD-R test, enter the command:

```
pcd run --file scripts\cdr.xml-R
```

**7-5-20-1    Keyboard**

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of this window's features.

- 1.) Click the Execute button on the Keyboard window. The PC-Doctor Keyboard Test opens.
- 2.) Select your keyboard type from the drop-down menu. Usually the default choice is the correct one.
- 3.) Click the Start button.
- 4.) Press each key on the system's keyboard once and make sure the corresponding keys on-screen are removed from view.
  - Click the Pass button if all the keys are removed from the PC-Doctor Keyboard Test.
  - Click the Fail button if any key is not removed from the on-screen keyboard. Failed keys may be damaged and you may have to have your keyboard repaired or replaced.
  - Click the Abort button to exit the test.
- 5.) The test status is displayed in the Current Status portion of the window.

---

**7-5-20-1 Keyboard (cont'd)**

**Footswitch Tests**

Under Service Diagnostics / BEP Interactive/ Keyboard

INPUT > Press left, middle or right footswitch keys.

OUTPUT > Keys will be registered as follows:

- Left Footswitch = Left Windows + F10
- Middle Footswitch = Left Windows + F11
- Right Footswitch = Left Windows + F12

**7-5-20-2    Mouse (Trackball)**

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of this window's features.

Runs a test on essential functions of the Trackball. The test results are displayed in the Status portion of the window.

- 1.) Enter the desired Loop Count (numeric value of 4 digits or less).
- 2.) Click the Execute button.
- 3.) Verify the signal cable is connected securely.
- 4.) Clean the Trackball. If the problem continues:
- 5.) Replace the Trackball.



### 7-5-20-3 Audio (Sound)

See: [7-5-3 "Diagnostics Window Overview" on page 7-24](#) for a description of this window's features.

- 1.) Click the Execute button at the bottom of the screen. Wait approximately 30 seconds for the first test screen to open.
- 2.) Click Left Front and Right Front buttons to test your speakers. You should hear a recorded message from each speaker.
- 3.) Click on the Beep button. You should hear a low "beep" from your PC.
- 4.) If all work, click the Pass button. Click the Close button.
- 5.) Do not perform the Microphone Interactive Test. Click the Close button.
- 6.) To test the WAV sound reproduction, click Left Channel, Right Channel, or Both Channels to test your speakers. You should hear a guitar chord.
- 7.) Click on the Beep button. You should hear a low "beep" from your PC.
- 8.) Click the Close button.
- 9.) When you return to the Audio Test screen, click the Abort button.
- 10.) After closing the Service screen, you may see a Runtime Error screen(s). Close the screen(s).
- 11.) Before returning the system to the customer, always remember to reboot.
- 12.) If no sound is produced in these tests, choose the More Info button in the Audio Test dialog box for information about possible causes and solutions.

## **7-5-21 Touch Panel**

### **7-5-21-1 Calibration**

*NOTE: Always try TP calibration verification before attempting to calibrate. [7-5-21-2 "Calibration Verification" on page 7-97.](#)*

To do a Touchscreen Calibration, follow the directions on the Touchscreen. As each of the cross-hairs appear, touch them with your finger or a pencil eraser.

*NOTE: You MUST hold your finger on the cross-hair until it moves to the next location. If you just tap the calibration cross-hair, there is a good chance your calibration will be corrupt.*

**7-5-21-2 Calibration Verification**

The Start Touchscreen Verification brings up a grid. Each time you touch the screen a small red dots appears where you touch, this will indicate that the calibration is correct and you do not need to re-calibrate.

If the red dots do not show up at the touched places, you need to run the Touch Panel calibration. To terminate the verification, move the trackball pointer into the grid and press the set key.

---

## 7-5-22      4D Motor Controller

**NOTE:**      *This test requires a 4D probe be connected to the system. This test requires a 4D probe to be connected to the system.*

### **Name: Presence Test**

Description: This test detects the presence of the 4D Motor Controller.

Run Time: 00:01

If this test failed:

- 1.) Verify USB connection between the Host and the Main Power Supply.
- 2.) Verify 4D Motor Controller connections in Main Power Supply.
- 3.) Replace 4D Motor Controller.

### **Name: Version Test**

Description: Displays the 4D Motor Controller version number.

Run Time: 00:01

If this test failed:

- 1.) Verify USB connection between the Host and the Main Power Supply.
- 2.) Verify 4D Motor Controller connections in Main Power Supply.
- 3.) Replace 4D Motor Controller.

## 7-5-22 4D Motor Controller (cont'd)

### **Name: Static 3D Test**

Description: Performs a basic static 3D scan using the RAB2-5 probe connected in probe socket 4.

Run Time: 00:11

If this test failed:

- 1.) Verify an RAB2-5 probe is connected to probe socket 4 (right-most probe socket).
- 2.) Verify the correct probe icon appears on the touch panel.
- 3.) Verify there is no red arrow in the icon indicating that no 4D Motor Controller was detected. Re-run the 4D Motor Controller Presence Test in this case.
- 4.) Replace the 4D Motor Controller board.

### **Name: 4D Test**

Description: Performs a basic 4D scan using the RAB2-5 probe connected in probe socket 4.

Run Time: 00:11

If this test failed:

- 1.) Verify an RAB2-5 probe is connected to probe socket 4 (right-most probe socket).
- 2.) Verify the correct probe icon appears on the touch panel.
- 3.) Verify there is no red arrow in the icon indicating that no 4D Motor Controller was detected. Re-run the 4D Motor Controller Presence Test in this case.
- 4.) Replace the 4D Motor Controller board.

## **7-5-23 Patient I/O Tests**

Under Service Diagnostics / Patient I/O.

This procedure provides a basic test of the ability of the system to start and stop the acquisition of data from the Patient I/O Module to the Host via the GFI.

INPUT > The connection of ECG leads, PHONO (PCG) or AUX is optional.

OUTPUT > The results display information about the signal data acquired from the ECG input to the Patient I/O Module. The information includes the minimum signal value, maximum signal value and mean signal value.

If this test fails:

1.) Run GFI tests

If GFI is ok:

2.) Replace Patient I/O module

If this test passes and there are still issues with poor or no ECG trace, replace ECG leads.

---

## **7-5-24 Configuration**

### **7-5-24-1 Software Options Interface**

Use this window to add, delete, and view details for software options.

- Add = Click the Add button to enter a new Software Option Key.
- Delete = Select a Software Option Key and click the Delete button to remove a Software Option Key.
- Details = Select a Software Option Key and click the Details button. A table at the bottom of the screen displays information for Hardware ID, Product Code, Version, Options Serial Number, and Key Life.
- Refresh = Click the Refresh button to update the list after adding or deleting Software Option Keys.

**7-5-24-2 InSite ExC Agent Configuration**

- Device Name = LE9\_<the serial number>
- CRM Name = may be different in different countries (poles) (equivalent to the System ID)
- Enter the appropriate data for the InSite ExC configuration and click the Submit Changes button.

*NOTE: If data is missing from any required fields the form will refresh and the required fields will be identified by red labels when you click Submit Changes.*

- Click the Reset Form button to clear the current data.



## **7-5-25      Utilities - Common Utilities**

### **7-5-25-1      Event Log Viewer**

1.) Select the log you wish to view:

- Application link = an event log relative to application events
- System link = an event log relative to system events
- Log Name = enter the Log Name you want to view and click the View button

**7-5-25-2 Disruptive Mode**

Allows you to enable or disable disruptive mode troubleshooting. If you are accessing through InSite ExC, this can only be enabled with the customer/operator confirmation.

**7-5-25-3 Disk Usage**

View capacity and usage statistics for the different disk drives.

**7-5-25-4 IP Configuration**

View Windows IP configuration and LAN connection data.

**7-5-25-5 Network Status**

View data for active network connections.

**7-5-25-6 Windows Services**

View the Windows Services that are started and running. A Windows Service is a computer program that has been automatically started and is running in the background on the computer.

**7-5-25-7    User Accounts**

View the user accounts that have been given access to this system.

**7-5-25-8    Shared Resources**

This screen displays all shared network resources on this system.

**7-5-25-9 System Shutdown**

System Shutdown gives you the ability to Restart or Shutdown the system when using Virtual Console Observation from a remote computer.

*NOTE: Retain Disruptive Mode checkbox:*

- *MUST be checked if you are working from a remote computer.*  
*Should be unchecked if you are working locally on the scanner.*

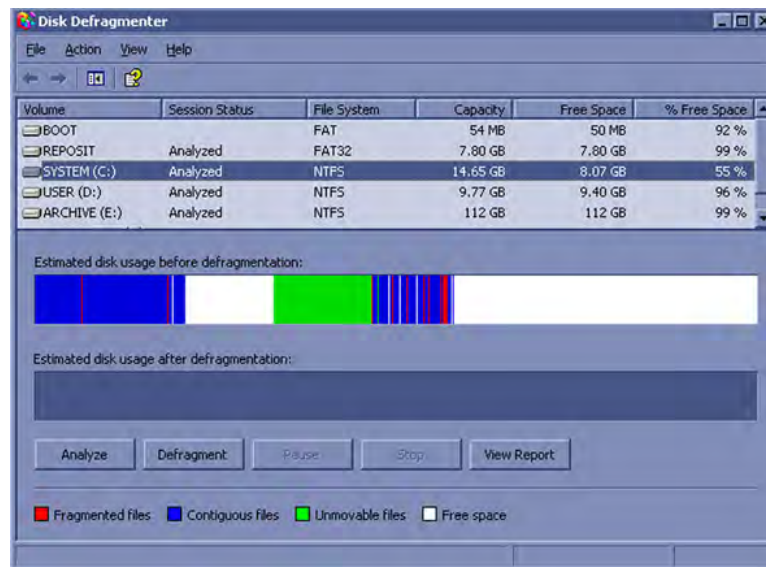
## 7-5-25-10 Disk Defragmenter

Disk fragmentation can reduce the amount of disk space available, and slow computing speed. Use the disk defragmenter to restore optimum disk space and speed performance.

**NOTE:** System performance can be significantly reduced while the Disk Defragmenter is running.

- 1.) Select the Volume (drive) you want to defragment, or analyze for fragmentation.
  - Click the Defragment button to defragment the selected volume.
  - Click the Analyze button to generate an Analysis Report that identifies any files that require de-fragmenting. Continue with step 2 below.

**Figure 7-42 Disk Defragmenter Window**



**NOTE:** The Disk Defragmenter Window may hide behind the service browser.

- 2.) Select the file(s) you wish to defragment and click the Defragment button on the Analysis Report window.



**7-5-25-11 Gather Logs Utility**

Click the Gather Logs button to prepare them for retrieval by the On Line Center. The logs are compressed into a .zip file and the filepath and file name is displayed on the window.

If the application is not running, logs can be gathered using the Gather Logs shortcut on the Windows desk top.

**7-5-25-12 Image Viewer Utility**

The Image Viewer Utility lists the availability of images for export. This example shows no images available for export.



**7-5-25-13 Image Compress & Delete Utility**

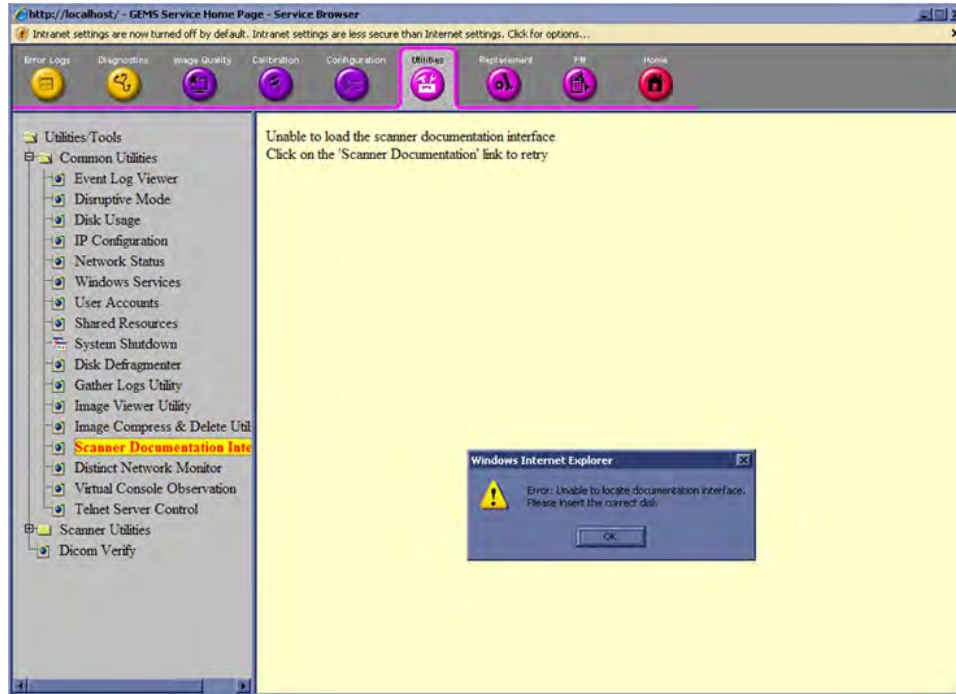
Select the images you want to compress or delete. This example shows no images available at this time.

- Compress Files = compresses images into a .zip file.
- Delete Files = deletes the images from the image Export/Service directory.

#### 7-5-25-14 Scanner Documentation Interface

Use this to view the user and service documentation for the system. You need to have your documentation disk inserted in the drive in order to open it. Otherwise you will see the message displayed in [Figure 7-43 "Scanner Documentation Interface Window"](#) .

**Figure 7-43 Scanner Documentation Interface Window**



**7-5-25-15 Distinct Network Monitor R1.x.x**

The Distinct Network Monitor has a sniffer that monitors network traffic and allows you to capture network data without redirecting or altering it.

For directions on how to configure the sniffer go to ["Capturing Network Logs with Network Sniffer \(Software R1.x.x\)"](#) on page 7-8.

LOGIQ E9 R2.x.x or later Distinct was replaced by Wireshark. This menu is no longer available. Use Alt+N to open the sniffer application.

**7-5-25-16 Virtual Console Observation (VCO)**

VCO is used by a remote service technician or the Online Center (OLC) to access and modify all scanner settings and programs on the customer's ultrasound scanner.

**7-5-25-17 Telnet Server Control**

Telnet Server must be running to allow remote access to the DOS command prompt window. Click the Start button to run Telnet Server.

*NOTE: Telnet Server is a Windows service that runs in the background. Stop Telnet Server when you are not using it to perform a service action. It can slow the system down if left running in the background.*

## **7-5-26      Utilities - Scanner Utilities**

### **7-5-26-1      DICOM Verify**

This utility provides an easy way to verify DICOM connectivity between the scanner and DICOM devices on the network.

- 1.) Enter AE Title, IP Address, and Port values of the DICOM device.
- 2.) Check the Loop checkbox to repeat the operation, or leave it unchecked to perform the operation once.
- 3.) Click the Verify button to see the results.
- 4.) Uncheck the Loop checkbox to stop the operation.

**7-5-26-2 Replacement**

Field is not populated on the LOGIQ E9.

**7-5-26-3**     **PM**

Field is not populated.



## **7-5-27 Noise**

Ultrasound machines are susceptible to Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the air or wiring. They also generate EMI. 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.

When talking to the customer, try to gather as much information as possible about the conditions when the noise appear:

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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 the LOGIQ E9. It also includes instructions for installing and re-installing the software.


## Section 8-2


### Warnings and important information

#### 8-2-1 Purpose of this section

This section includes important information. Read it before doing any of the procedures in this chapter.

#### 8-2-2 Warnings

**NOTICE** Energy Control and Power Lockout for LOGIQ E9




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

1. TURN OFF THE SCANNER.
2. UNPLUG THE SYSTEM.
3. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EXTENDED POWER SHUTDOWN OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.
4. MAINTAIN CONTROL OF THE SYSTEM 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, Extended Power Shutdown or ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.

When the BEP door is open, the Extended Power Shutdown circuit board or ChargeBoard is exposed. When working inside the BEP, remove the battery cable from the Extended Power Shutdown or ChargeBoard to prevent accidental short circuit of the 24V of the battery that can damage the Extended Power Shutdown or ChargeBoard circuitry.

 **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.***

## 8-2-2.....Warnings (cont'd)



**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.*



*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**

These replacement procedures require two persons:

- Casters Replacement

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

## 8-2-5 Tools needed for servicing LOGIQ E9

In addition to the standard tools listed in [Section 10-5 "Tools required" on page 10-5](#), the following tools (TORX bits or drivers) are needed to service the LOGIQ E9. If the torque is not indicated with the procedure, hand tighten the screws/nuts.

**Table 8-1 Tools used for servicing LOGIQ E9**

TOOL TYPE	TOOL SIZE
TORX	BIT # TX-10
	BIT # TX-15
	BIT # TX-20
	BIT # TX-25
	BIT # TX-30*
	BIT # Tx-45*
FLAT BLADE SCREWDRIVER	1/4 inch or 6 mm
PHILLIPS SCREWDRIVER	PH1
	PH2
	PH3
HEX KEY	5 mm
	8 mm
	10 mm
OPEN END WRENCH	5 mm
	10 mm
	3/16 inch
TORQUE WRENCH	Up to 81 Nm (59.7 lbf-ft)**
ADJUSTABLE WRENCH	152 mm (6 inches) long
PRY BAR	approximately 18 inches overall (457 mm)
<p>* 90 degree "L" is suggested. A full set of 90 degree "L" Torx wrenches are recommended.</p> <p>** Heavy mechanical parts may need a specific torque. Each procedure will indicate the torque needed.</p>	

## Section 8-3

### Definitions of Left, Rear / Back, Right and Front

Figure 8-1 illustrates what is the Left Side (1), Rear / Back (2), Right Side (3), and Front (4) of the LOGIQ E9.

**Figure 8-1 Definitions of Left, Rear / Back, Right and Front**





## **Section 8-4**

### **Loading / Reloading / Upgrading the Software**

#### **8-4-1 Purpose of this section**

This section describes how to install and/or reinstall software on LOGIQ E9.

## 8-4-2 LOGIQ E9 models versus software requirement

**Table 9 LOGIQ E9 Software Configurations and Hardware/Software Compatibility - Upgrade Options**

CONSOLE MODEL NUMBER	DESCRIPTION	SOFTWARE VERSION										
		Phase I				BT2010			BT2011			BT2013
		1.0.3	1.0.4	1.0.5	1.0.6	2.0.3	2.0.4	2.0.5	3.1.0	3.1.1	3.1.2	4.x
5205000	LOGIQ E9, 100-240 VAC	Y	Y	Y	Y	U	U	U	U	U	U	U
5205000-2	LOGIQ E9, 220-240 VAC	Y	Y	Y	Y	U	U	U	U	U	U	U
5205000-3	LOGIQ E9, 100-240 VAC	N	N	N	N	Y	Y	Y	U	U	U	U
5205000-4	LOGIQ E9, 220-240 VAC	N	N	N	N	Y	Y	Y	U	U	U	U
5205000-5	LOGIQ E9, 100-240 VAC	N	N	N	N	N	N	N	N	Y	Y	U
5205000-6	LOGIQ E9, 220-240 VAC	N	N	N	N	N	N	N	N	Y	Y	U
5205000-7	LOGIQ E9, 100-240 VAC	N	N	N	N	N	N	N	N	N	N	Y

### LOGIQ E9 Software Configurations and Hardware/Software Compatibility - Upgrade Options

LOGIQ E9 Software Configurations and Hardware/Software Compatibility - Upgrade Options	
Y	Original
U	Upgrade available
N	Not supported

**Front End Processor** - see: [9-12-2 "Front End Boards Compatible Configurations"](#) on page 9-48.

**Back End Processor** - see: [9-13-1 "Back End Boards Compatible Configurations"](#) on page 9-59.

## 8-4-3 Tools provided with the LOGIQ E9 or as part of an upgrade

- CD with LOGIQ E9 System software
- CD with LOGIQ E9 Application software

If a patch software CD has been included:

- CD with a Patch for LOGIQ E9  
Verify that the software is current. Updated software may be available.

#### 8-4-4 Space management - moving all images



**NOTICE** In order to complete a successful restore of the Patient Database, if needed, the images must be moved away from *LOGIQ 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 could be lost.

Refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 3 to perform the following tasks:

- Configure the Disk Management Function
- Set the Disk Management Schedule
- Configure Data Management Settings
- Configure Destination Device Setting
- Run the Disk Management Function
- Start Disk Management Manually

## 8-4-5 Backing up the Patient Archive and System Configurations

For information, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 3.

## 8-4-6 Loading the Software

### 8-4-6-1 Manpower

One person, 60 minutes.

### 8-4-6-2 Tools

- Software CDs

### 8-4-6-3 Overview

The Hard Disk Drive on LOGIQ E9 is divided into five partitions.

*NOTE: The Hard Disk Drive on LOGIQ E9 has three visible partitions (two partitions are hidden).*

**Table 8-1 Use of the Partitions**

DRIVE LETTER	LABEL
C:	SYSTEM
D:	USER
E:	ARCHIVE

When installing (and reinstalling) software, you get the choice to either replace all the contents on the Hard Disk Drive, or only install the software on the C: partition. If you chose to replace all the contents on the Hard Disk Drive, all stored data, including all set-up data will be lost. It is considered to be the best practice to always move images away from the Hard Disk Drive, do backup of databases etc. and record important configuration data on paper before starting a software load or reload, as described earlier in this section.

The software is delivered on two CDs, one for the system software (which is technically a DVD) and one for the LOGIQ E9 application software. In some cases, a third CD with a software patch, may also be included. A software patch CD is used when a few new files should be installed or changed, but the changes do not require a complete software load.

When installing the software, start with the system software, then the application software and if included, install the patch software at the end. This is described in detail over the next pages.

#### 8-4-6-4 Loading the System Software

**NOTE:** System Software may also be referred to as the Base Image or Ghost.



**WARNING** *WHILE THE SOFTWARE INSTALL PROCEDURE IS DESIGNED TO PRESERVE DATA, YOU SHOULD SAVE ANY PATIENT DATA, IMAGES, SYSTEM SETUPS AND CUSTOMER PRESETS TO CD, DVD OR HARDCOPY BEFORE DOING A SOFTWARE UPGRADE*

Before the System Software Load, you must perform the following steps:

- contact the customer to allow enough lead time to back up the system.
- be sure no images are in the clipboard or opened exams.
- review troubleshooting section to collect information for future analysis if you are troubleshooting loss of image or patient data.
- disconnect the system from the network and remove all transducers from the system.
- be sure all USB devices (printers only) are connected and turned on (except for USB Flash Drives). If a printer is plugged in at this time, it is automatically installed.
- save all Service Presets if you are connected to InSite to restore remote connectivity after something is completed.
- save all User Presets.

**NOTE:** After a full or partial system software load, confirm the Windows automatic Daylight Saving Time feature is turned off (**Utility -> System -> General -> Date/Time -> Time Zone tab -> Automatically Adjust Clock** checkbox). Be sure the system and DVR date, time and time zone are set correctly.

**NOTE:** System and Application software disables the Run window normally accessed from **Start -> Run**, and the mouse right-click (left set key) feature.

#### 8-4-6-5 System Software Load

- 1.) Turn on the system.
- 2.) Turn on all digital peripherals.

**NOTE:** R.2.x.x or later: If Wireless LAN option is installed. Collect Wireless LAN information as well. See: [4-2-15-3 "Connectivity — WLAN R2.x.x" on page 4-21](#). Also, if WLAN is using WPA-2 security and requires user name and password to access the network, you need to contact the IT department to obtain this data since it will be lost during reload.

- 3.) Record the system's TCPIP settings (IP Address, Computer Name, Subnet Mask, Default Gateway, Network Speed) from the **Utility -> Configuration -> TCPIP** page. You will add these settings back to the system in the System Checkout section after the install.  
For a convenient form, see: [4-2-15-2 "Connectivity — Recording the TCP/IP settings" on page 4-20](#) and [4-2-15-4 "Connectivity — Recording the AE Title and Port settings" on page 4-22](#).
- 4.) Record the system's installed Option strings from the **Utility -> Admin -> System Admin** page.  
This step is precautionary in the event the software load has issues. For a convenient form, see: [4-2-15-9 "Admin — Recording the Software Option Keys" on page 4-28](#).

#### 8-4-6-5 System Software Load (cont'd)

- 5.) Perform a Backup from the **Utility -> System -> Backup/Restore** page. You should back up the Patient Archive images, Report Archive, User-Defined Configuration (Customer Presets), and Service settings. You will perform a Restore after the install.

For a full Base load, this step is mandatory.

For a C: Partition load, this step is precautionary in the event the software load has issues. The data should transfer over for a C: Partition load.

See: the latest revision of the LOGIQ E9 Basic User Manual, Chapter 3.

- 6.) Confirm with customer that all patient data has been archived. If not, perform the archive.
- 7.) Insert the applicable LOGIQ E9 System Software disk into the DVD drive.
- 8.) Properly power down the System. Depress the ON switch and select "**Shutdown**" on the window.
- 9.) Wait until the LCDs on the Operator Panel are switched off and the ON switch has turned amber.
- 10.) Power ON the System.

The scanner boots from the Software disk and displays a load warning message.

**Figure 8-2 System Software load warning message**

```
****WARNING * WARNING * WARNING * WARNING * WARNING * WARNING ****

THIS PROCEDURE MAY RESULT IN COMPLETE PATIENT DATA LOSS IF NOT USED CORRECTLY! PLEASE READ
THE OPTIONS BELOW CAREFULLY BEFORE PROCEEDING.

This process is NOT REVERSIBLE and should NOT be stopped once started! DO NOT power off the
system until the process has completed. It will take less than 10 minutes to load the drive.
If this process is stopped for some reason, you will have to run it again to completion or
else the system will not work.

If you want to proceed with this process press the "Enter" key to continue with option
selection.

...or...

Remove the disk from the Optical drive and Press "CTRL-C" now to exit and power cycle your
system to restart it without overwriting your disk drive's current contents.

Press any key to continue...
```

#### 8-4-6-5 System Software Load (cont'd)

11.) Press any key to continue; or to abort, remove the disk from the drive and press CTRL-C.

The System Software Load Instruction window displays.

**Figure 8-3 System Software load instruction (R1x.x)**

```
Please select ONE of the following options for loading the LOGIQ E9
"Base System Software Load Image" onto your system:

[1] Load the complete disk - All existing data will be lost.
    NOTE: APPLICATION SOFTWARE WILL NEED TO BE INSTALLED WHEN THIS PROCEDURE
          HAS COMPLETED. ALL PATIENT DATA (IF ANY) WILL BE DESTROYED!

[2] Load the bootable C: partition only - Patient data is NOT lost.
    NOTE: DO NOT USE THIS OPTION ON A BRAND NEW SYSTEM. IT IS
          INTENDED FOR RECOVERY OF A SYSTEM THAT WILL NOT BOOT UP.
          APPLICATION SOFTWARE WILL NEED TO BE INSTALLED WHEN THIS
          PROCEDURE HAS COMPLETED. ALL PATIENT DATA IS PRESERVED.

[3] Exit to the A:\ prompt.

Please make your selection from the above choices (1, 2, 3):
```

**Figure 8-4 System Software load instruction (R2.x.x)**

```
Please select ONE of the following options for loading the LOGIQ E9
"Base System Software Load Image" onto your system:

[1] Load the complete disk - All existing data will be lost.
    NOTE: APPLICATION SOFTWARE WILL NEED TO BE INSTALLED WHEN THIS PROCEDURE
          HAS COMPLETED. ALL PATIENT DATA (IF ANY) WILL BE DESTROYED!

[2] Load the bootable C: and repository Z: partitions only - Patient data is NOT lost.
    NOTE: DO NOT USE THIS OPTION ON A BRAND NEW SYSTEM. IT IS
          INTENDED FOR RECOVERY OF A SYSTEM THAT WILL NOT BOOT UP.
          APPLICATION SOFTWARE WILL NEED TO BE INSTALLED WHEN THIS
          PROCEDURE HAS COMPLETED. ALL PATIENT DATA IS PRESERVED.

[3] Exit to the A:\ prompt.

Please make your selection from the above choices (1, 2, 3):
```



**NOTICE** If you select [1] in the next step, ALL existing software and data will be erased. If backup has not been performed as described earlier in this manual, all data like Patient Database, System Configuration and User Configurations (Customer Presets) will be lost.

#### 8-4-6-5 System Software Load (cont'd)

12.) Choose one of the following:

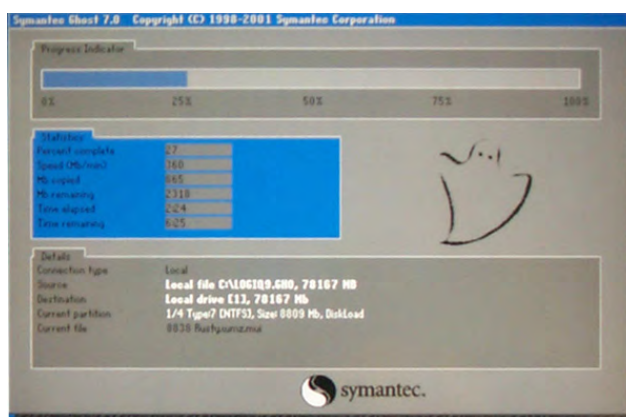
- a.) Select **[1] ONLY** if a **[2]** update cannot be used: Selecting **[1]** performs a complete LOGIQ E9 software installation. (All data will be erased.)
- b.) Select **[2]** to update/re-install the software on the C:\ partition. (Only data on the C:\ partition will be erased. This will keep Patient Archive and Presets intact.) On R2.x.x or later, C:\ and Z:\ partitions will be reloaded. Archive and presets are not affected.
- c.) Select **[3]** to Exit. (The procedure exits without software load.)

Depending on the choice, a message displays explaining choice again. This is the last warning message prior to software load. Press CTRL-C to abort.

With choice **[1]** or **[2]**, the Software loader program launches.

The Norton Ghost window displays.

Figure 8-5 Norton Ghost window



**WARNING** *Do not interrupt the software loading at any time.*

13.) Wait for the software installation to complete. (Typical installation time: 5-10 minutes). Status bar on the screen indicates progress.

The Base Load Complete message displays. See NOTICE below.

Figure 8-6 Base Load Complete message

If there are no error messages listed above, the "Base System Software Load Image" process has successfully completed. You will now need to load the "Application Software" onto your system.

Please remove the CDROM from the drive, power cycle the system and then continue with the "Application Software" load procedure.



**NOTICE** **DO NOT proceed with the Application Software load yet.**

DO NOT insert the Application disk into the DVD drive until you have completed all the remaining directions in this section. If you insert media in the drive beforehand, the drives will not remap correctly.



#### 8-4-6-5 System Software Load (cont'd)

14.) Remove the base load disk.

**NOTE:** *If you do not remove the disk, the base load process repeats when the system boots up.*

15.) Restart the System using Ctl+Alt+Del.

When the system reboots, it automatically logs on to start checking hardware. This is a normal process.

**NOTE:** *If the system does not reboot, press and hold down the Power On/Off button (button turns amber).*

16.) Allow the hardware checking process to run to completion.

**NOTE:** ***Do NOT touch the system during this process. Activating the keyboard, mouse or front panel could corrupt the installation. While the script is running, several windows or dialog boxes appear on the screen. At times it may look like the system is unresponsive.***

17.) Wait for the "System Settings Change" window asking "Do you want to restart your computer now?" to display, approximately 1-2 minutes after the desktop is displayed.

**Figure 8-7 System Settings Change dialog box - Restart Windows Message**



18.) Select "Yes" (see: [Figure 8-7](#)) to restart.

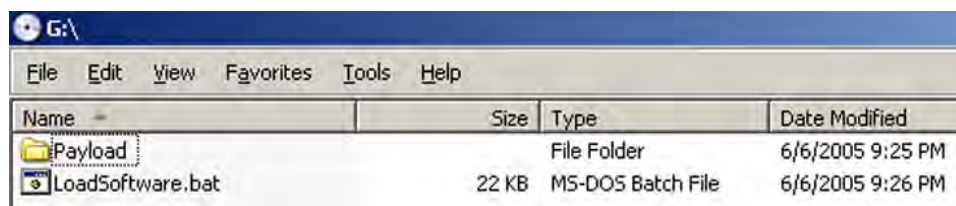
**NOTE:** *In R2.x.x, a DOS window will display, that times out and automatically reboots the system. You can wait or select "Yes" to restart.*

19.) Wait until all drivers are installed automatically and the reboot is complete.

#### 8-4-6-6 Loading the Application Software

- 1.) Insert the applicable disk labelled LOGIQ E9 *Application SW*.
- 2.) Wait about 30 seconds.  
A window opens (see: [Figure 8-8](#)) showing the contents of the drive.
- 3.) Double-click on LoadSoftware.bat to load the software.

**Figure 8-8 LoadSoftware.bat File**

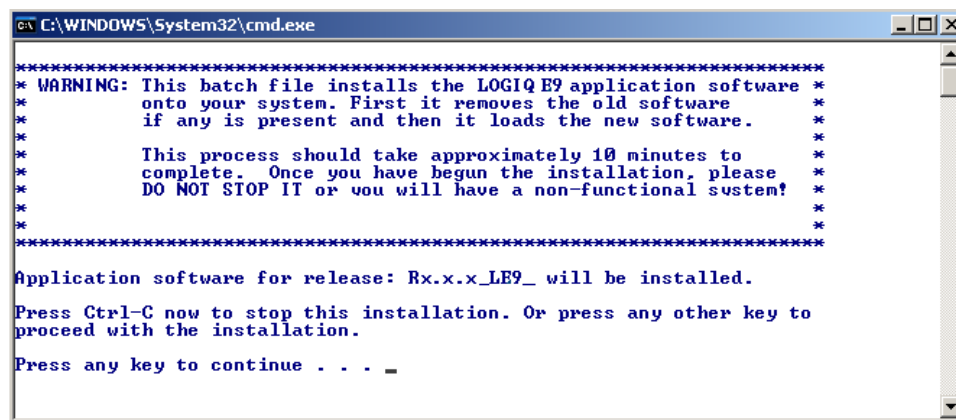


- 4.) If the pop-up window in [Figure 8-8](#) does not open in a minute, perform steps A - C below.
  - A.) From the Desktop, select **"My Computer."**
  - B.) Double-click the G:\ drive to open the pop-up window in above.
  - C.) Double-click on LoadSoftware.bat to load the software.

**NOTE:** *If the base image does not match the part number and revision of the approved base image, then the system notifies you of the required base image needed and does not run the software.*

A Command window similar to the example shown in [Figure 8-9](#) opens.

**Figure 8-9 Command Window (Note: Window will reflect actual software version instead of "Rx.x.x")**



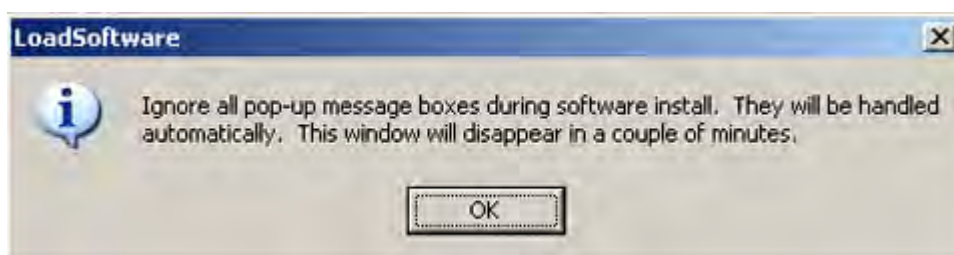
#### 8-4-6-6 Loading the Application Software (cont'd)

5.) As indicated, press any key to continue.

The process is completely automated and provides you with several status messages, including the message in Figure 8-10 (LoadSoftware Information Window).

**NOTE:** When the LoadSoftware Information Window displays asking you to select **OK**, do nothing. This window closes automatically.

**Figure 8-10 LoadSoftware Information Window - Do not select OK**



6.) Wait while the software loads (approximately 7-8 minutes). Do not interrupt process.



**WARNING** Do not interrupt the software loading at any time.

After software load is complete, the system reboots.

After the reboot, the System installs the Service Platform.

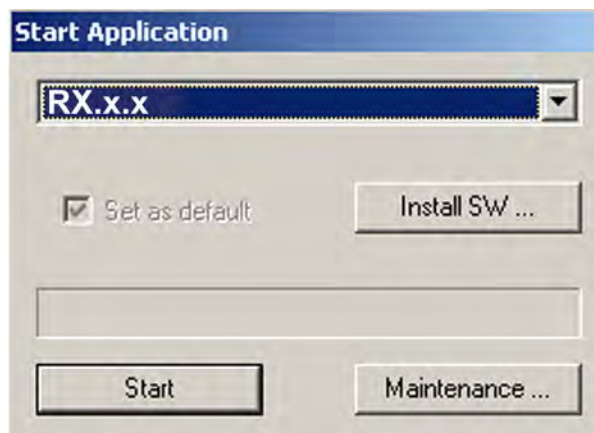


**NOTICE** Do not try to prevent the reboot. If you do, you may end up with hyper threading turned off. If hyper threading is turned off, the system responds slower than expected.

If hyper threading turns off, you must perform the re-ghost and application software load again.

**NOTE:** After the Service Platform installs, and during the second reboot, you may get some error messages about processes not starting because the workstation is shutting down. If present, these messages are normal and should be ignored. After the Service Platform reboot, the Start Application window displays.

**Figure 8-11 Start Application window (Note: Window will reflect actual software version instead of "Rx.x.x")**



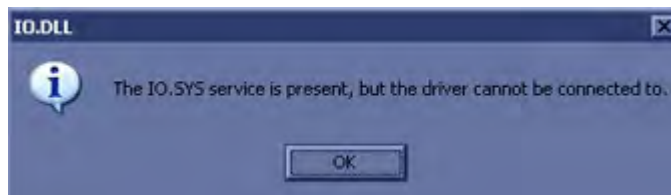
#### 8-4-6-6 Loading the Application Software (cont'd)

- 7.) Remove the applications disk from the DVD drive.
- 8.) From the Start Applications window, select **"Start"** (if the CD is still in the tray; otherwise, the system starts up automatically).

The System powers down and reboots.

The first time the application loads after a SW reload, you may see: the error shown in [Figure 8-12 "SW Reload Error Message" on page 8-18](#). Select **OK** and reboot the system.

**Figure 8-12 SW Reload Error Message**

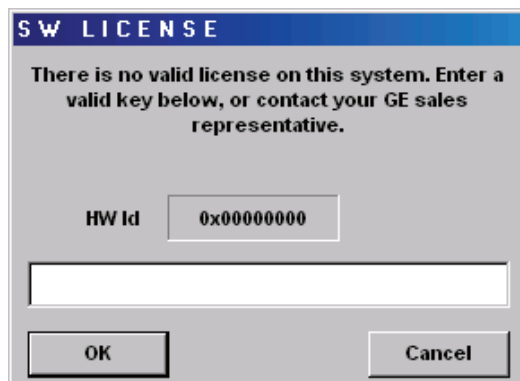


During the reboot process, the system *may* prompt for the Basic Option string (valid license) (see: [Figure 8-13 "Enter Option String" on page 8-18](#)).

If the Basic Option string is not saved in the Option Dongle, or if this is a software upgrade, the SW License window may open.

**NOTE:** *If only the title bar is visible in the lower left corner of the monitor, double-click the SW License title bar to expand the window.*

**Figure 8-13 Enter Option String**



**NOTE:** *All systems must have at least the Basic Option string for the software to run. Any single Option String may enable multiple options (i.e. Basic).*

**NOTE:** *If the system does not display an image or a good image when you boot up, Do Not troubleshoot it as a problem yet. Continue with this install.*

- 9.) Update the Vital Product Data (VPD) information.

Proper Vital Product Data coding is essential to proper system function and optimization. For information on updating VPD, see: [8-4-7-2 "Verify and Update Vital Product Data" on page 8-25](#).

#### 8-4-6-7 Loading Software Patches

If a CD with software patches is included, load the CD, restart the LOGIQ E9 and follow the instructions.

#### 8-4-6-8 Verifying the software versions

- 1.) From the Touch Panel, select **Utility** -> **System** -> **ABOUT**.
- 2.) Verify software and hardware versions as recorded in [Table 4-15 "Record Software and Hardware versions" on page 4-32](#).

#### 8-4-6-9 Verifying the software option key settings

*NOTE: Software Option Dongles are software version dependant. If a new software version has been installed, follow installation instructions for that software. Usually, new software option strings are needed. When reinstalling the same software, the Software Option Strings should be reused.*

- 1.) From the Touch Panel, select **Utility** -> **Admin** -> **System Admin**.
- 2.) Verify that the Software Option String(s) (alphanumeric strings) in the S/W Option Dongle section is (are) the same as recorded in [Table 4-11 "Software Option Keys" on page 4-28](#).
- 3.) If needed, enter any new or missing option key string(s) in S/W Option Key field and select **Add**.

#### 8-4-6-10 Verifying the TCP/IP settings

- 1.) From the Touch Panel, select **Utilities** -> **Connectivity** -> **TCP/IP**.
- 2.) Verify that all settings on the TCP/IP screen match those recorded in [Table 4-3 "Record settings from TCP/IP screen" on page 4-20](#).
- 3.) Select **"SAVE SETTINGS."**
- 4.) Select **OK** to continue.
- 5.) Reboot system.


#### 8-4-6-11 Verifying the AE Title and Port settings

- 1.) From the Touch Panel, select **Utilities** -> **Connectivity** -> **Device**.
- 2.) Verify that all settings on the Device settings screen match those recorded in [4-2-15-4 "Connectivity — Recording the AE Title and Port settings" on page 4-22](#).
- 3.) Select **"SAVE SETTINGS."**
- 4.) Select **OK** to continue.

#### 8-4-6-12 Restoring Patient Archive and System Configurations

For complete instructions, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 16.

- 1.) From the Touch Panel, select **Utility** -> **System** -> **Backup/Restore**.
- 2.) On the Restore screen, select as needed:
  - Patient archive to restore the patient archive images.
  - Report archive
  - System configuration to restore all System Settings/User Defined Configuration (Presets), OR
  - One or several system configuration items to restore parts of the System Settings and User Defined Configuration (Presets), see: [Figure 4-21 "Backup/Restore settings" on page 4-30](#).
- 3.) Select the appropriate Source Device.

 **CAUTION** The Restore procedure will **OVERWRITE** the existing data on the local harddrive. Make sure to select the correct source device.

- 4.) If restore is done from a backup on a removable media, insert the media in the drive.
- 5.) Select **Restore Now**.

Depending on the selection, one or two Restore confirmation windows are displayed:
- 6.) Ensure that the correct source is selected, and select **OK**.

The selected items are copied to the systems. If items from the System Configuration are restored the system needs to be rebooted. The Reboot system window is displayed.
- 7.) Select **OK** to reboot the system, and verify the Customer Presets are working properly.

#### 8-4-6-13 Verifying the Video and DVR settings

- 1.) Select **Utility** -> **System** -> **Peripherals**.
- 2.) Verify Video Settings Format as recorded in [Table 4-14 "Record settings from Peripheral screen" on page 4-31](#).

Correct the selection if needed.
- 3.) Verify DVR model as recorded in [Table 4-14 "Record settings from Peripheral screen" on page 4-31](#).

Correct the selection if needed.
- 4.) Format a DVD, and backup Customer Presets to confirm proper DVD/DVR write functionality.

#### 8-4-6-14 Functional Checks

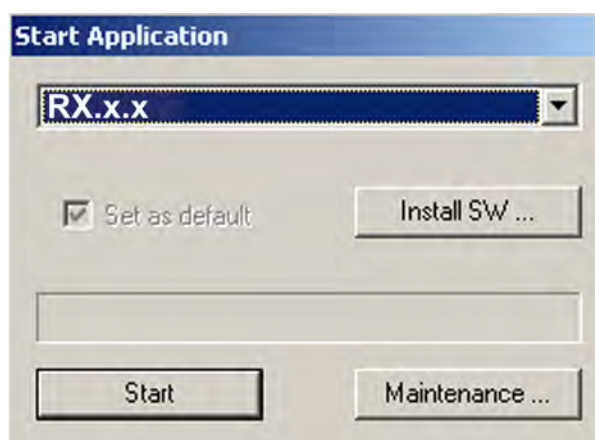
Perform the functional checks to confirm the system is operational before returning the system to the customer.

#### 8-4-7 Loading the Application Software Only

Use this procedure to update application software only.

- 1.) Place the LOGIQ E9 Application Software DVD in the CD/DVD Drive, while the system is running.
- 2.) Reboot the system. The Start Application window displays.

**Figure 8-14 Start Application window (window will reflect actual software version instead of “Rx.x.x”)**

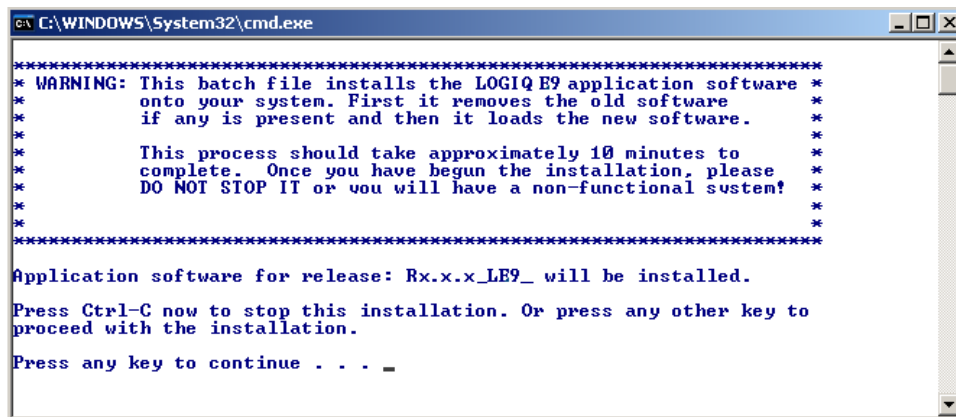


- 3.) Select **"Install SW."** Press **OK** on the Start Loader message and then press **OK** on the New System Software message. A Command window similar to the example shown in [Figure 8-15 "Command Window" on page 8-22](#) opens.

## 8-4-7 Loading the Application Software Only (cont'd)

Figure 8-15 Command Window

1.)

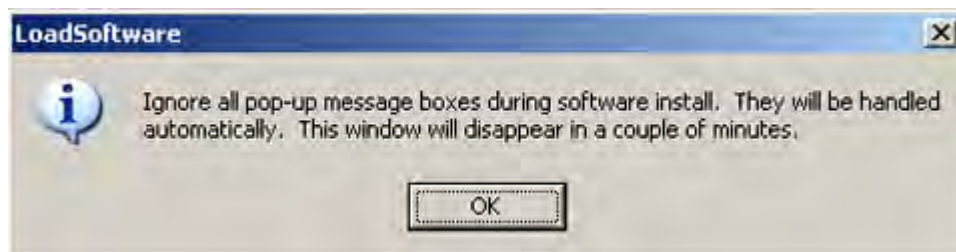


**NOTE:** The window reflects the actual software version instead of "R6.0.6EP1\_L9\_", as shown above.


4.) As indicated, press any key to continue.

**NOTE:** When the LoadSoftware Information Window displays asking you to select **OK**, do nothing. This window closes automatically.


Figure 8-16 LoadSoftware Information Window - Do not select OK



5.) Wait while the software loads (approximately 7-8 minutes). Do not interrupt this process and ignore any errors.

**WARNING**  **Do not interrupt the software load at any time.**

After the software load is complete, the system reboots.

**NOTICE**  Do not try to prevent the reboot.

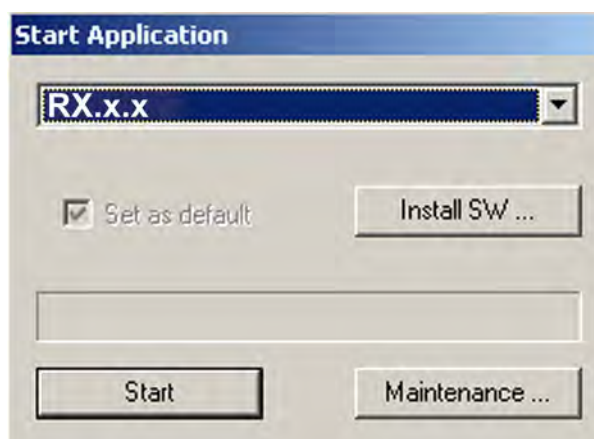


## 8-4-7 Loading the Application Software Only (cont'd)

After the reboot, the Start Application window displays.

- 6.) Remove the LOGIQ E9 Applications Software DVD from the DVD drive.
- 7.) Store the application disks with the system.
- 8.) Remove and destroy the previous Application software version disks.

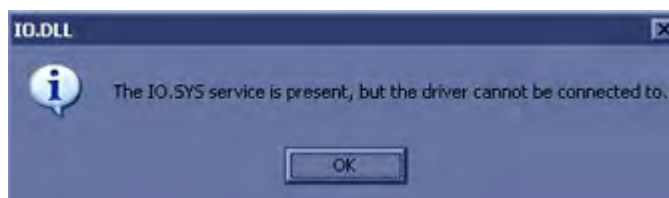
**Figure 8-17 Start Application window (window will reflect actual software version instead of "Rx.x.x")**



- 9.) From the Start Application window, select **"Start."**

The first time the application loads after a SW reload, you may see: the error shown in Figure 8-29, "SW Reload Error Message." Select **OK** and reboot the system.

**Figure 8-18 SW Reload Error Message**



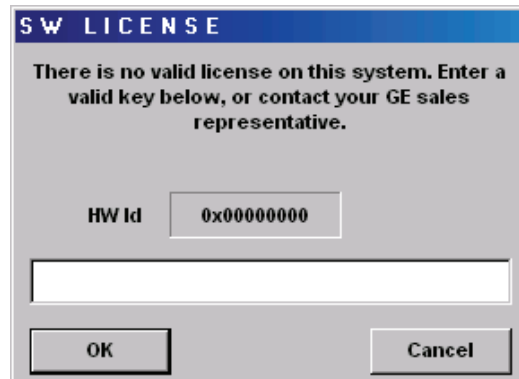
During the reboot process, the system may prompt for the Basic Option string (valid license) (see: [Figure 8-19 "Enter Option String" on page 8-24.](#)

If the Basic Option string is not saved in the Option Dongle, or if this is a software upgrade, the SW License window may open.

**NOTE:** *If only the title bar is visible in the lower, left corner of the monitor, double-click the SW License title bar to expand the window.*

## 8-4-7 Loading the Application Software Only (cont'd)

Figure 8-19 Enter Option String



**NOTE:** All systems must have at least the Basic Option string for the software to run. Any single Option String may enable multiple options (i.e., Basic).  
R2.x.x requires basic plus BT2010 option String.  
Demo Option strings turn on all options for a limited period of time. Do Not leave a demo Option string in a unit when it is sold to a customer.

### 8-4-7-1 Verifying the software versions

- 1.) From the Touch Panel, select **Utility** -> **System** -> **About**.
- 2.) Verify the software version. Ensure that the software version shown on the screen matches the disk label.

---

**8-4-7-2      Verify and Update Vital Product Data**

It is essential that Vital Product Data (VPD) is verified or updated after any hardware change to the Back End Processor (BEP) or Front End Processors.

*NOTE:      NOTE: Failure to properly program Vital Product Data could cause adverse affects on system operation and image quality.*

## **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 LOGIQ E9.

---

## **8-5-2 Side Covers replacement**

### **8-5-2-1 Manpower**

One person, 5 minutes per Side Cover

### **8-5-2-2 Tools**

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

### **8-5-2-3 Preparations**

When preparing for the replacement, 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.

**Follow these links if you need more information:**



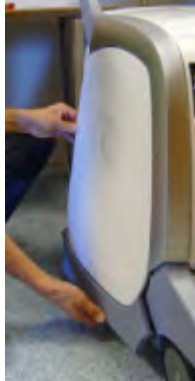

- [4-2-4 "Power shut down" on page 4-7.](#)

## 8-5-2-4 Side Covers removal

**NOTE:** Whenever the left Side Cover is removed, clear the BEP Fan(s) intake(s) of any debris.

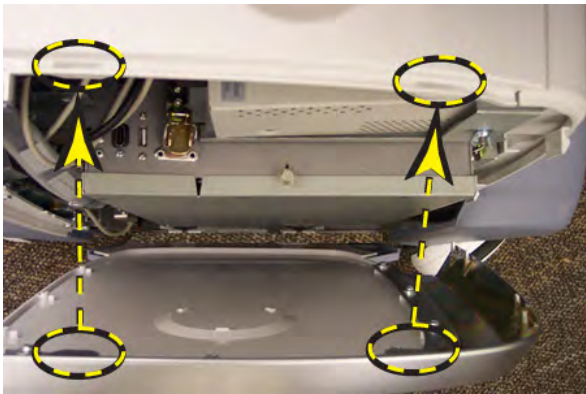
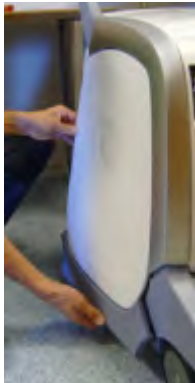
**NOTE:** When removing or installing the right side cover on a LOGIQ E9 with the On-board V Nav Stand, the cover is removed and installed in the same manner, except the rear portion of the cover must be placed behind the stand.

**Table 8-1 Side Covers removal**

	Steps	Corresponding Graphic
1.	<p><b>NOTE:</b> The removal procedure is easier if the rear lock is released first, and then the front lock.</p> <p>The Side Covers are “clicked” on to the LOGIQ E9 with two locks, located at the lower end of the cover.</p> <p><b>1a.</b> Push a #1 phillips screwdriver into the rectangular hole in the Side Bumper until it reaches the lock mechanism.</p> <p><b>1b.</b> Push the handle on the screwdriver downwards to release the lock.</p>	<p><b>1a</b></p>  <p><b>1b</b></p> 
2.	<p>Lift the cover backwards and up to remove it from the system. Repeat steps for the opposite side.</p> <p>Set cover in a safe place.</p>	 <p><b>LOGIQ E9 with Covers and Side Cover removed</b></p> 

8-5-2-5 Side Covers installation

Table 8-2 Side Covers Installation

	Steps	Corresponding Graphic
1.	<p><i>NOTE: If the left Side Cover was removed, MAKE SURE to clear the BEP Fan(s) intake(s) of any debris, before installing the cover.</i></p> <p>Align tabs at the top inside of the Side Cover with the slots on the Top Cover.</p> <p>Place the top edge of the Side Cover so it hooks onto the Top Cover.</p>	
2.	<p>Align and squeeze the front edge of the side cover to latch it into place.</p> <p>Position the Side Cover side lock first.</p> <p>Position the Side Cover front lock.</p> <p>Align and squeeze the bottom front of the side cover to latch it into place.</p> <p>Position the Side Cover rear lock, lifting up the rear tab and guiding it into place.</p> <p>Align and squeeze the bottom rear of the side cover to latch it into place. Repeat steps for the opposite side.</p>	

#### 8-5-2-6 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

#### 8-5-2-7 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Connect cables and Probes you removed earlier
- 2.) Power up the system to verify that it operates as intended.

#### 8-5-2-8 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction **5180263-100**, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-3 Side Covers replacement Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-15	Probe/Connectors Checks	
4-3-6	B-Mode Checks	
4-3-8	System CFM and PWD Checks	
4-3-20	Mechanical Function Checks	
4-3-20-2	Brakes and Direction Lock Checks	



## 8-5-3 Top Cover replacement

### 8-5-3-1 Manpower

One person, 15 minutes.

### 8-5-3-2 Tools

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

### 8-5-3-3 Preparations

When preparing for the replacement, 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 Side Covers.

**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-2 "Side Covers replacement" on page 8-27.](#)

### 8-5-3-4 Top Cover removal

- 1.) Remove the two screws that secure the Top Cover.

**Figure 8-20 Top Cover Screw placement (seen from above)**



- 2.) Remove the Top Cover and gently pull back and up.

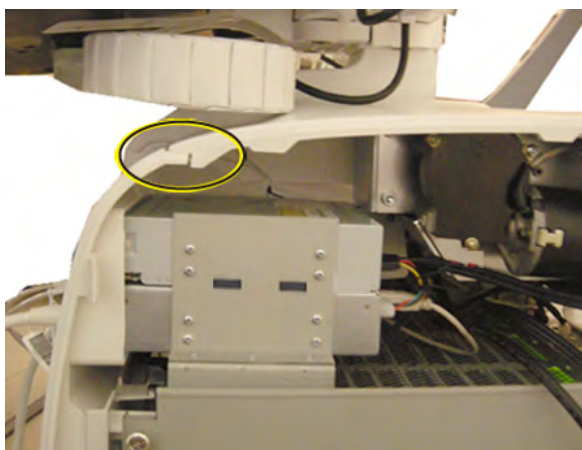
### 8-5-3-5 Top Cover installation

- 1.) Remove the two screws reinstalled to avoid damage to the Rear Handle.
- 2.) Position the Top Cover onto the Front Cover at the four hooks.

**Figure 8-21 Hook Top Cover onto Front Cover (seen from front)**



**Figure 8-22 Hook Top Cover onto Front Cover (seen from side)**



- 3.) Install and tighten the two Phillips screws.

## 8-5-4 Foot Rest Bumper replacement

### 8-5-4-1 Manpower

One person, 15 minutes.

### 8-5-4-2 Tools

No additional tools required.

### 8-5-4-3 Preparations

When preparing for the replacement, 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.

**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)

### 8-5-4-4 Foot Rest Bumper removal

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.

**Figure 8-23 Side Latch for Foot Rest Bumper**



**8-5-4-5      Foot Rest Bumper installation**

- 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.

---

## **8-5-5 Front Cover replacement**

### **8-5-5-1 Manpower**

One person, 15 minutes.

### **8-5-5-2 Tools**

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

### **8-5-5-3 Preparations**

When preparing for the replacement, 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 Side Covers.
- 5.) Remove Top Cover.
- 6.) Remove the Foot Rest Bumper.

**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-2 "Side Covers replacement" on page 8-27.](#)
- [8-5-3 "Top Cover replacement" on page 8-31.](#)
- [8-5-4 "Foot Rest Bumper replacement" on page 8-33.](#)

#### 8-5-5-4 Front Cover removal

- 1.) Unscrew the two Phillips screws that fix the Front Cover Assembly to the chassis.

**Figure 8-24 Screw placement, Front Cover**



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

**NOTE:** *The Front Cover Assembly is made of two pieces. See: Figure 8-24.*

#### 8-5-5-5 Front Cover installation

- 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 Phillips screws. See: Figure 8-24.
- 4.) Install the Foot Rest Bumper.
- 5.) Install the Top Cover.
- 6.) Install the Side Covers.

## **8-5-6 Filter Cover replacement**

### **8-5-6-1 Manpower**

One person, 15 minutes.

### **8-5-6-2 Tools**

No tools are needed to replace the filter cover.

### **8-5-6-3 Preparations**

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

- 1.) Power down the system
- 2.) Disconnect the mains power cable from the wall outlet.

**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)

### **8-5-6-4 Filter Cover removal**

- 1.) Gently pull the Filter Cover out and away from the System.

**Figure 8-25 Remove the Filter Cover**



### **8-5-6-5 Back Filter Cover installation**

- 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.

---

## 8-5-7 Rear Cover replacement

**NOTE:** *If the V Nav On-Board Stand Option is present on the LOGIQ E9, the Option must be removed to remove the Rear Cover. See:*  
[8-12-3 "Parts Reference - On-board V Nav Stand" on page 8-217.](#)

### 8-5-7-1 Manpower

One person, 15 minutes.

### 8-5-7-2 Tools

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

### 8-5-7-3 Preparations

When preparing for the replacement, 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 Rear Bumper.
- 5.) Remove both Side Covers.
- 6.) Remove Filter Cover at rear.
- 7.) Remove Filter.

**Follow these links if you need more information:**

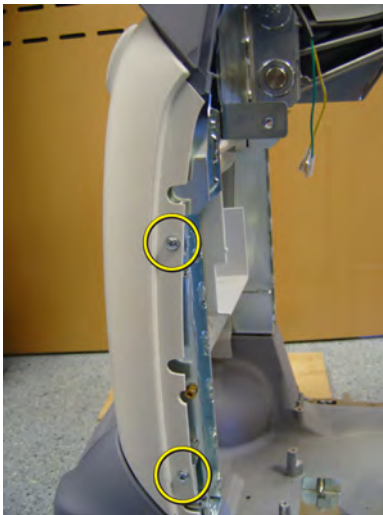
- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-2 "Side Covers replacement" on page 8-27.](#)
- [8-5-6 "Filter Cover replacement" on page 8-37.](#)
- [8-7-2 "Rear Filter and "handle type" Bottom Filter replacement / cleaning" on page 8-114.](#)



**8-5-7-4 Rear Cover removal**

- 1.) Remove the two Phillips screws on each side of the Rear Cover.
- 2.) Lift the Rear Cover away.

**Figure 8-26 Rear Cover fixing screws**



### 8-5-7-5 Rear Cover installation

- 1.) Position the lower edge of the Rear Cover into place on the rear of the system frame.
- 2.) Tilt the top edge of the Rear Cover toward the system frame.  
Be sure the manual release handle of the Z Mechanism extends through the air vent on the Rear Cover.

**Figure 8-27 Z Mechanism manual release handle**



- 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.
- 6.) Inspect the Filter, and clean in necessary.
- 7.) Install the Filter.
- 8.) Install the Filter Cover
- 9.) Re-install the V Nav On-Board Stand if present.

#### 8-5-7-6 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

#### 8-5-7-7 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Connect cables and Probes you removed earlier
- 2.) Power up the system to verify that it operates as intended.

#### 8-5-7-8 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction , Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-4 Rear Cover replacement Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-15	Probe/Connectors Checks	
4-3-6	B-Mode Checks	
4-3-8	System CFM and PWD Checks	
4-3-20	Mechanical Function Checks	
4-3-20-2	Brakes and Direction Lock Checks	

---

## **8-5-8 Door, I/O Panel replacement**

### **8-5-8-1 Manpower**

One person, 15 minutes.

### **8-5-8-2 Tools**

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

### **8-5-8-3 Preparations**

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

- 1.) Power down the system
- 2.) Disconnect the mains power cable from the wall outlet.

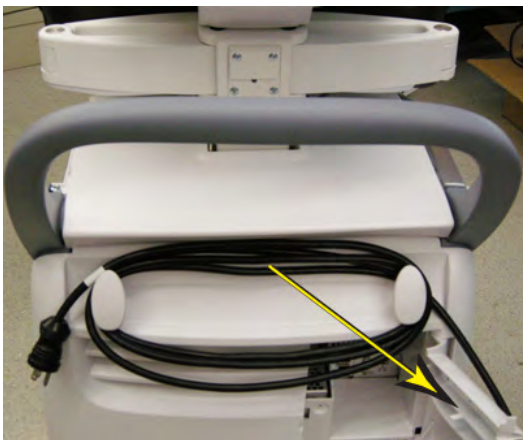
**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)

#### 8-5-8-4 Door, I/O Panel removal

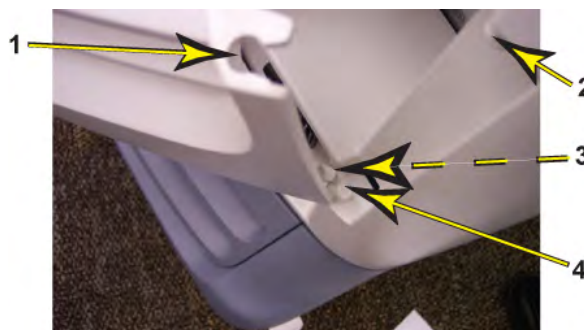
- 1.) At the back of the system, push a four, flat blade screwdriver into the rectangular hole, next to the Door, I/O panel until it reaches the lock mechanism.
- 2.) Push the handle on the screwdriver to the left to release the lock.

**Figure 8-28 Door, I/O Panel**



- 3.) Open the Door, I/O Panel.
- 4.) Hold the Door, I/O Panel near the upper hinge (1), and pop hinge out and away from the upper hinge post (2) on the Rear Cover.

**Figure 8-29 Hinge placement on Door, I/O Panel**



#### 8-5-8-5 Door, I/O Panel installation

- 1.) Place the Door, I/O Panel into position by sliding lower hinge (3) onto lower hinge post (4).
- 2.) Pop the upper hinge into place onto the upper hinge post.

## 8-5-9 Rear Bumper replacement

### 8-5-9-1 Manpower

One person, 15 minutes.

### 8-5-9-2 Tools

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

### 8-5-9-3 Preparations

When preparing for the replacement, 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 Side Covers.
- 5.) Remove Rear Cover.

**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-2 "Side Covers replacement" on page 8-27.](#)
- [8-5-7 "Rear Cover replacement" on page 8-38.](#)

### 8-5-9-4 Rear Bumper removal

- 1.) Remove the two screws securing the Rear Bumper.
- 2.) Remove Bumper.

**Figure 8-30 Left screw placement for Rear Bumper**



### 8-5-9-5 Rear Bumper installation

- 1.) Place the Rear Bumper into position
- 2.) Install the two screws to secure the Rear Bumper.

## 8-5-10 LCD Monitor V2 Arm Assembly Covers replacement

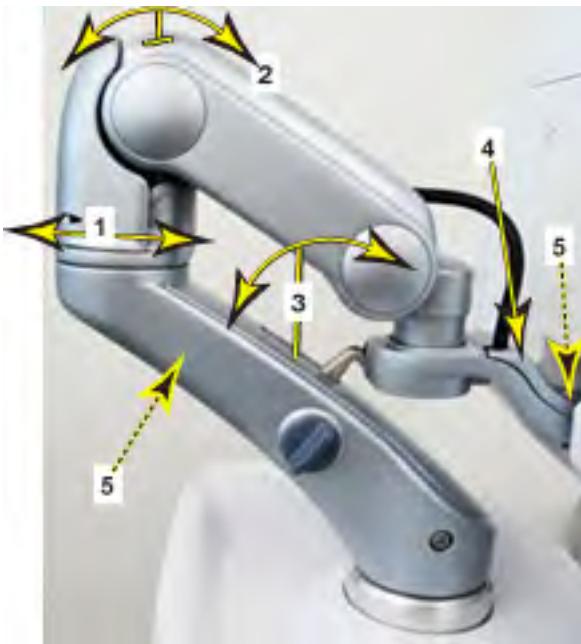
**Table 8-5 Manpower / Time and Tools**

Manpower / Time	Tools
One person / 15 minutes	Refer to: 8-2-5 "Tools needed for servicing LOGIQ E9" on page 8-5.

**Table 8-6 Preparations and Preparation Links**

Preparations - you must perform the following steps
<ol style="list-style-type: none"> <li>1. Power down the system.</li> <li>2. Move the User Interface (Top Console) to its lower position.</li> <li>3. Disconnect the mains power cable from the wall outlet and all Probes and External I/O Cabling.</li> </ol>
<b>Preparation Links ():</b> <a href="#">4-2-4 "Power shut down" on page 4-7.</a>

**Table 8-7 LCD Monitor V2 Arm Assembly Covers removal and installation**

Steps	Corresponding Graphic
<ol style="list-style-type: none"> <li>1. Remove Arm Assembly Covers.   The Rear (1) and Upper (2) LCD Arm Covers snap into place and removed, in the direction shown. The Upper Cover must be installed before the Rear Cover.   The Rear (1) snaps into place pushing forward and removed pulling back.   The Upper (2) snaps into place at the rear, after the front guides are inserted into place. The Upper can be removed, by tilting forward.   The Lower Cover (3) and LCD Bracket Cover (4) are secured with screws (5). After the front guide of the Lower Cover is inserted into place, the cover can be secured. To remove, remove the screw and tilt forward. The arm must be released and the upper arm clear.   The LCD Bracket Cover (4) seats in position.</li> </ol>	<p><b>Illustration shows direction and sequence covers should be removed</b></p> 

**8-5-10-1 Calibration and adjustments**

No calibrations or adjustments are needed after this part replacement.

**8-5-10-2 Verification**

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Connect cables and Probes you removed earlier
- 2.) Power up the system to verify that it operates as intended.
- 3.) LCD Arm and LCD Monitor movement functions in all directions without the covers loosening.

**8-5-10-3 Functional Checks**

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-8 LCD Monitor V2 Arm Assembly Covers replacement Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-15	Probe/Connectors Checks	
4-3-20	Mechanical Function Checks	
4-3-20-2	Brakes and Direction Lock Checks	



## 8-5-11 Rear Handle replacement

### 8-5-11-1 Manpower

One person, 15 minutes.

### 8-5-11-2 Tools

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

### 8-5-11-3 Preparations

When preparing for the replacement, 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 Side Covers.
- 5.) Remove the Rear Cover.
- 6.) Remove the Top Cover.

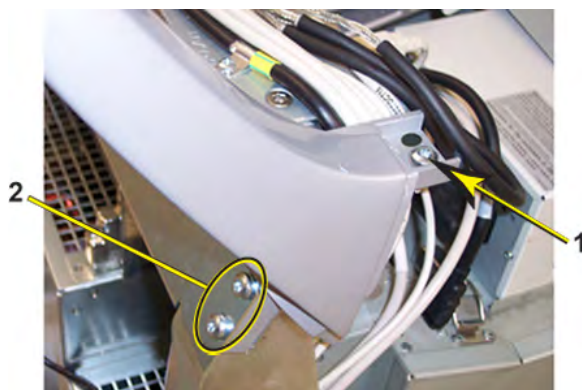
**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-2 "Side Covers replacement" on page 8-27.](#)
- [8-5-7 "Rear Cover replacement" on page 8-38.](#)
- [8-5-3 "Top Cover replacement" on page 8-31.](#)

### 8-5-11-4 Rear Handle removal

- 1.) Remove the two upper screws (1), one on each side.
- 2.) Remove the four hexcap screws (2), two on each side.

**Figure 8-31 One Phillips and two hexcap screws on each side (left side illustrated)**



- 3.) Lift the Rear Handle away.

#### 8-5-11-5 Rear Handle installation

- 1.) Install the Rear handle in position so the fastening holes are flush with the holes in the frame.
- 2.) Install the two screws for the Rear Handle (torque 3 Nm {2.2 lbf-ft}).
- 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.

#### 8-5-11-6 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

#### 8-5-11-7 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

#### 8-5-11-8 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-9 Rear Handle replacement Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-15	Probe/Connectors Checks	
4-3-6	B-Mode Checks	
4-3-8	System CFM and PWD Checks	
4-3-20	Mechanical Function Checks	
4-3-20-2	Brakes and Direction Lock Checks	

## 8-5-12 Bulkhead Cover replacement

### 8-5-12-1 Manpower

One person, 15 minutes.

### 8-5-12-2 Tools

No tools are needed to replace the Bulkhead Cover.

### 8-5-12-3 Preparations

When preparing for the replacement, 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.

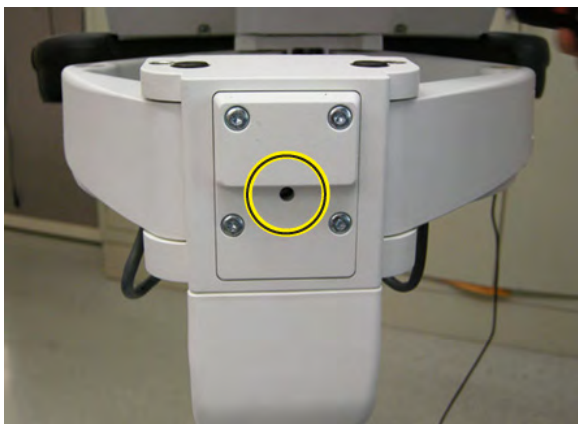
**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)

### 8-5-12-4 Bulkhead Cover removal

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

**Figure 8-32 XY / Frogleg mechanism release**



8-5-12-4 Bulkhead Cover removal (cont'd)

Figure 8-33 Bulkhead Cover



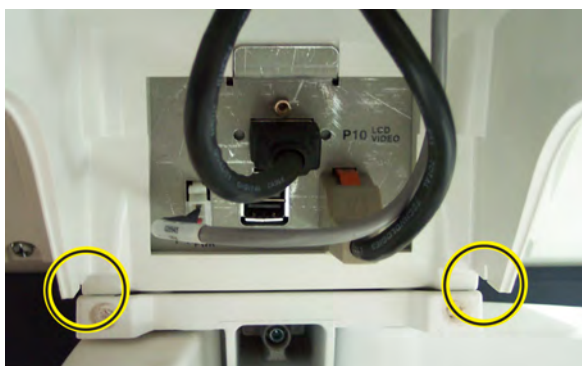
- 2.) Use thumbs to press upper lock tabs toward the front of the system to release the top of the Bulkhead Cover.

Figure 8-34 Upper lock tabs (placement on Bulkhead Cover)



- 3.) Pull the Bulkhead Cover away from the system.

Figure 8-35 Bulkhead Cover Tabs (cover removed)



#### 8-5-12-5 Bulkhead Cover installation

- 1.) Position the Bulkhead Cover, tucking any cables within the cover to avoid pinching the cables.
- 2.) Install lower tab locks first, and then upper tab locks.
- 3.) Replace the Bulkhead Cover.

#### 8-5-12-6 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

#### 8-5-12-7 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

#### 8-5-12-8 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-10 Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-15	Probe/Connectors Checks	
4-3-6	B-Mode Checks	
4-3-8	System CFM and PWD Checks	
4-3-20	Mechanical Function Checks	
4-3-20-2	Brakes and Direction Lock Checks	

## **Section 8-6**

### **Replacing Top Console Parts**

#### **8-6-1 Purpose of this section**

This section describes how to replace the Top Console parts.

## 8-6-2 LCD Monitor assembly replacement

There are two types of Monitors:

- Original LCD Monitor (P/N 5167953)
- LCD Monitors used in R4 original consoles, LCD Monitor V2 (5392293-21, used in R4.x and later production)



For LCD Monitor V2 (LCD and Arm Assembly used in R4.x and later production), see: [Table 8-16 "LCD Monitor V2 removal \(used in R4.x and later production\)" on page 8-58.](#)

**Table 8-11 Manpower / Time and Tools**

Manpower / Time	Tools
One person / 15 minutes	Refer to: <a href="#">8-2-5 "Tools needed for servicing LOGIQ E9" on page 8-5.</a>

**NOTE:** *If the device is equipped with WLAN option, Velcro will be required to ensure proper installation of the reinstalled WLAN dongle.*

**Table 8-12 Preparations and Preparation Links**

Preparations - you must perform the following steps	
 <p><b>NOTICE</b></p> 	<p>Energy Control and Power Lockout for LOGIQ E9</p> <p>WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</p> <ol style="list-style-type: none"> <li>1. TURN OFF THE SCANNER.</li> <li>2. UNPLUG THE SYSTEM.</li> <li>3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</li> <li>4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.</li> <li>5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.</li> </ol> <p>Beware that the Main Power Supply, Extended Power Shutdown or ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.</p>
<ol style="list-style-type: none"> <li>1. Power down the system.</li> <li>2. Move the User Interface (Top Console) to its lower position.</li> <li>3. Disconnect the mains power cable from the wall outlet and all Probes and External I/O Cabling.</li> </ol>	
<p><b>Preparation Links (if you need more information):</b></p> <p><a href="#">4-2-4 "Power shut down" on page 4-7.</a></p>	

## 8-6-2 LCD Monitor assembly replacement (cont'd)

**NOTE:** New labels have been added to the LCD rear cover to meet the IEC 60601-1 compliance requirements. When replacing the LCD Monitor on a LOGIQ E9 console, make sure that if the LCD back cover labels are on the console, the labels are on the replacement FRU. This will ensure there is no confusion between the labels on the console and the labels described in the User and Service Documentation.


**Table 8-13 LCD Rear Cover Labels**

Console	FRU	Action
Console is third edition compliant: labels <b>ARE ON</b> the LCD Monitor Cover	FRU <b>DOES NOT</b> have the new labels on the LCD Cover.	The original VESA cover with new labels should be used on the replacement Monitor to maintain compliance of the console.
Console is pre-third edition compliant and the new labels <b>ARE NOT</b> on the LCD Monitor Cover.	FRU <b>HAS</b> the new labels on the LCD Monitor Cover.	The original VESA cover on the console should be used on the replacement LCD Monitor. The new labels <b>ARE NOT</b> described in the User and Service Documentation.

### 8-6-2-1 LCD Monitor removal - R3.x and earlier

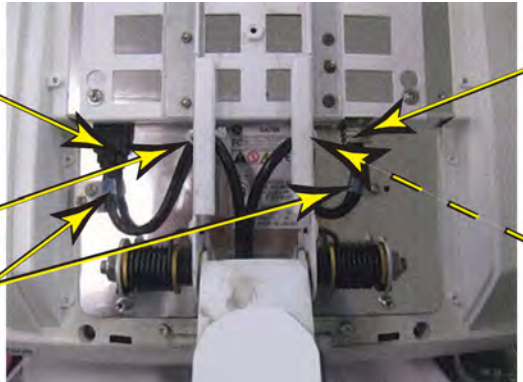
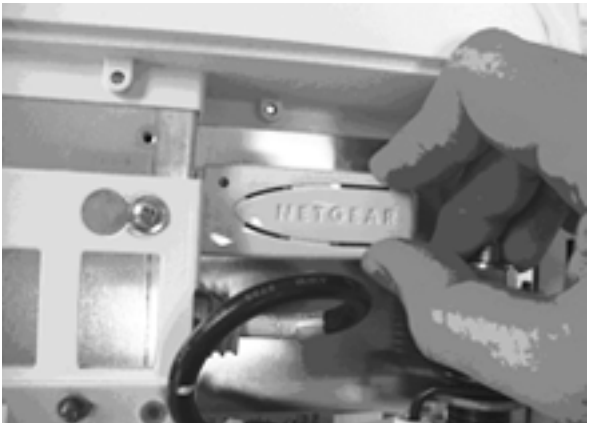
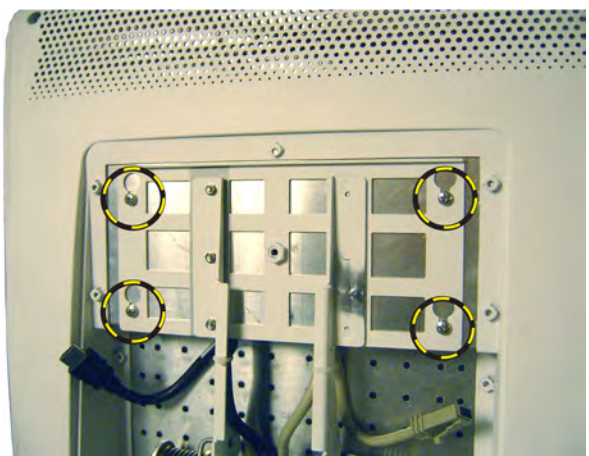
A cover at the rear side of the LCD Monitor assembly covers the two cables to the monitor. To get access to the cable connectors, remove the Cable Cover.

**Table 8-14 LCD Monitor removal - R3.x and earlier**

Steps	Corresponding Graphic
<p>1. For easy access, tilt the LCD Monitor forward to horizontal position.</p> <p>Unscrew the fixing screw on the rear side of the LCD Monitor assembly.</p> <p>Remove the Monitor Cables Cover.</p> <p>Lift the cover away and place it in a safe place.</p>	<p><b>Monitor Cables Cover Screw and Monitor tilted forward</b></p> 


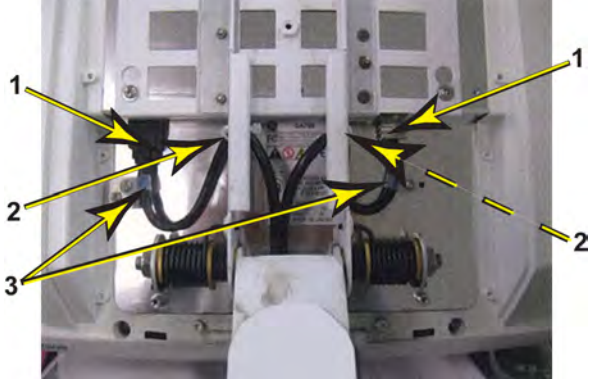


**Table 8-14 LCD Monitor removal - R3.x and earlier**


Steps	Corresponding Graphic
<p>2. Disconnect the cables to the Monitor.</p> <p><i>NOTE: If you are replacing any cables (1), you will also need to remove two additional tie-wraps (2) at the bracket.</i></p> <p>Remove the clamps (3).</p> <p><i>NOTE: If the device is equipped with the WLAN option, remove the WLAN dongle and transfer it to the new monitor.</i></p> <p>To remove the dongle, slightly lift up the end to disengage the Velcro, then pull the dongle out of the USB port.</p>	<p><b>LCD Monitor Cables and Clamps</b></p>  <p><b>WLAN Dongle removal</b></p> 
<p>3. Tilt the monitor back to vertical position. Lock the monitor back into place vertically.</p> <p>Loosen the four screws by turning each screw between one half and one turn counter-clockwise. You don't need to remove the screws.</p> <p>Lift the LCD Monitor assembly upwards until you can lift it away from the Monitor Bracket.</p> <p>Place the LCD Monitor on a clean and safe surface.</p>	<p><b>LCD Monitor fixing screws</b></p> 

8-6-2-2 LCD Monitor installation - R3.x and earlier

Table 8-15 LCD Monitor installation - R3.x and earlier

Steps	Corresponding Graphic
<p>1. <i>NOTE: To ensure the LCD Monitor is installed level with the system and before tightening the four screws:</i></p> <p><b>MAKE SURE:</b></p> <ul style="list-style-type: none"> <li>- the system is on a level surface,</li> <li>- the wheels are in-line,</li> <li>- the LCD Monitor Arm Lock is LOCKED.</li> </ul> <p>Check that the system is level.</p> <p>Install the LCD Monitor assembly on the Monitor Bracket. Verify that all four fixing screws have engaged in their slots.</p> <p>Place a level on the monitor (as shown).</p> <p>Tighten the four screws.</p> <p><i>NOTE: If a level is not available, make sure the Monitor is as square as possible with the system, visually.</i></p>	
<p>2. Tilt the monitor to horizontal position.</p> <p>Connect the cables (1).</p> <p>If the cables were replaced the tie-wraps (2) and cable clamps (3), if present.</p> <p>Reinstall WLAN dongle, if device is equipped with option.</p> <p><i>NOTE: It is important to reapply a piece of the "loop" portion of Velcro to the WLAN dongle when it is reinstalled into the new monitor.</i></p>	<p><b>LCD Monitor Cables and Clamps</b></p> 

**Table 8-15 LCD Monitor installation - R3.x and earlier**

Steps	Corresponding Graphic
<p>3. Install the Monitor Cables Cover and fasten it with the fixing screw.</p> <p><i>NOTE: If the replacement FRU DOES NOT have the new labels on the LCD Cover, the original VESA cover with new labels should be used on the replacement Monitor to maintain compliance of the console. See: <a href="#">Table 8-13 "LCD Rear Cover Labels" on page 8-54.</a></i></p>	
<p>4. Perform Functional Checks. See: <a href="#">8-6-2-5 - Calibration and adjustments</a>, <a href="#">8-6-2-6 - Verification</a> and <a href="#">8-6-2-7 "Functional Checks" on page 8-62.</a></p>	

8-6-2-3

LCD Monitor V2 removal (used in R4.x and later production)

A cover at the rear side of the LCD Monitor assembly covers the cable to the monitor. To get access to the cable connector, remove the Cable Cover.

Table 8-16 LCD Monitor V2 removal (used in R4.x and later production)


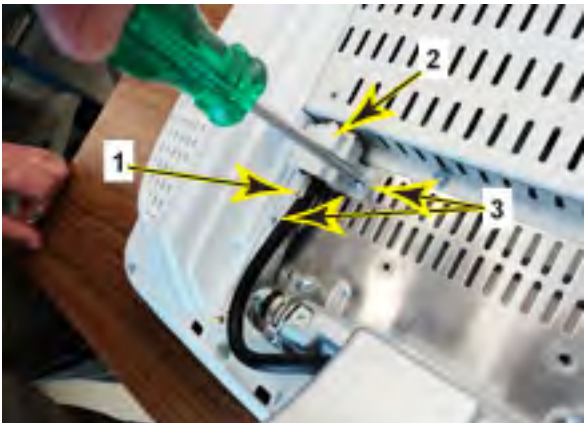



Steps		Corresponding Graphic
1.	Remove the LCD Cable Cover fixing screws.	
2.	<p>The LCD Cable to LCD is secured to the LCD with a retaining screw (1), an EMC shielded retainer (2) and two phillips screws (3).</p> <p>Remove the screws and retainer.</p> <p>Disconnect the Cable from the LCD.</p>	


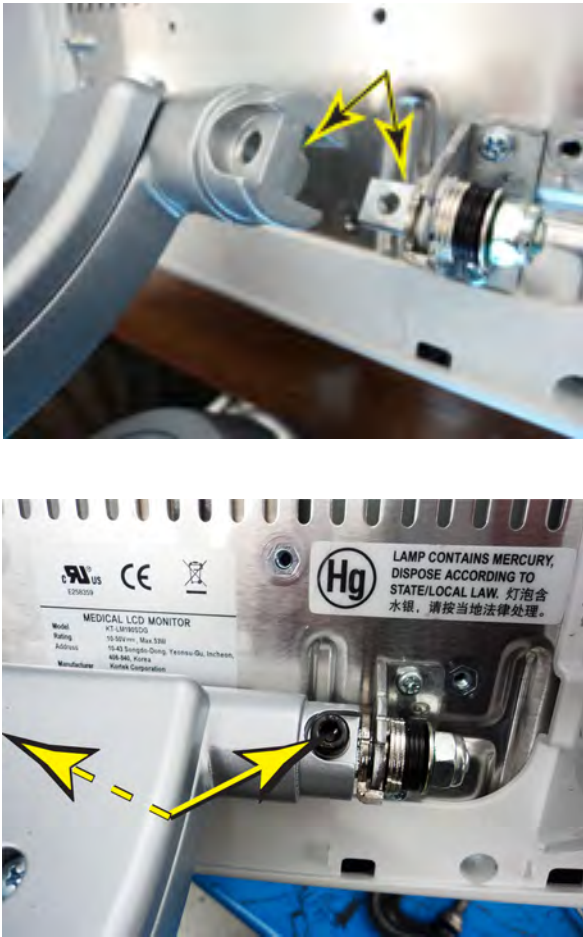
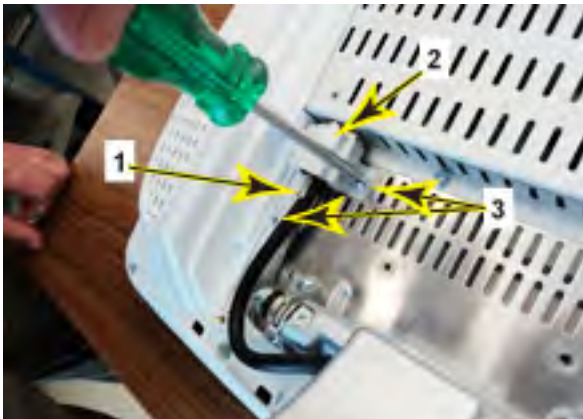
Table 8-16 LCD Monitor V2 removal (used in R4.x and later production)

Steps	Corresponding Graphic
<p>3.  <b>WARNING</b> <b>WHEN REMOVING THE LCD FROM THE ARM, KEEP THE LCD ARM ASSEMBLY IN THE LOCKED POSITION. THE SPRINGS TO SUPPORT THE LCD CAN CAUSE THE ARM TO SPRING OPEN CAUSING SEVERE PERSONAL INJURY AND PROPERTY DAMAGE.</b></p>	
<p>4. Keep the LCD supported and remove the two M5x20 screws and spring “lock” washers which mount the LCD to the Arm Assembly.</p>	

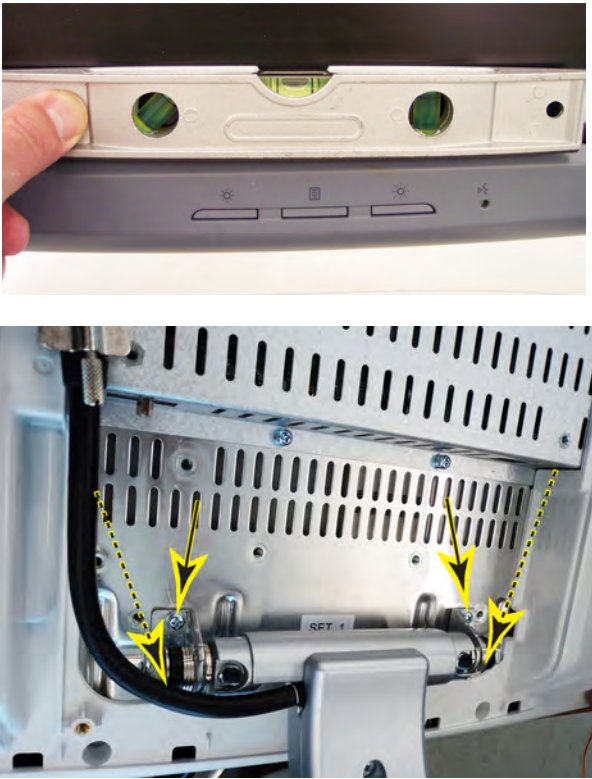


8-6-2-4 LCD Monitor V2 installation (used in R4.x and later production)

Table 8-17 LCD Monitor V2 installation (used in R4.x and later production)

Steps	Corresponding Graphic
<p>1.  <b>WARNING</b> <b>WHEN INSTALLING THE LCD TO THE ARM, KEEP THE LCD ARM ASSEMBLY IN THE LOCKED POSITION. THE SPRINGS TO SUPPORT THE LCD CAN CAUSE THE ARM TO SPRING OPEN CAUSING SEVERE PERSONAL INJURY AND PROPERTY DAMAGE.</b></p> <p>Keep the LCD supported and mate the flat surfaces of the LCD Arm to the flat surfaces of the LCD mounts.</p> <p>Install the LCD Arm Assembly to the LCD with the two M5x20 screws and spring “lock” washers removed. Torque: 9.8 Nm (7.2 lbf-ft {86.7 lbf-in}).</p>	
<p>2. The LCD Cable to LCD is secured to the LCD with a retaining screw (1), an EMC shielded retainer (2) and two phillips screws (3).</p> <p>Remove the screws and retainer, if present or re-install the Cable into LCD and tighten the screw (1).</p> <p>Install the retainer and secure with the two M4X12 screws (3).</p>	

**Table 8-17 LCD Monitor V2 installation (used in R4.x and later production)**

Steps	Corresponding Graphic
<p>3. <i>NOTE: To ensure the LCD Monitor is installed level with the system and before re- installing the LCD Back Cover:</i></p> <p><b>MAKE SURE:</b></p> <ul style="list-style-type: none"> <li>- the system is on a level surface,</li> <li>- the wheels are in-line,</li> <li>- the LCD Monitor Arm Lock is LOCKED.</li> </ul> <p>Check that the system is level.</p> <p>Place a level on the monitor (as shown).</p> <p>Tighten the four screws, torque: 160 Ncm {14.2 lbf-in}).</p> <p><i>NOTE: If a level is not available, make sure the Monitor is as square as possible with the system, visually.</i></p> <p>Re-install the LCD Cable Cover and fixing screws.</p>	

**8-6-2-5 Calibration and adjustments**

Refer to [Section 6-3 "LCD Monitor adjustments" on page 6-2](#) for LCD Monitor calibration instructions.

**8-6-2-6 Verification**

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws that you removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

**8-6-2-7 Functional Checks**

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-18 LCD Monitor assembly replacement Functional Checks**

See Section	Functional Check	Debrief Script
<a href="#">4-2-3</a>	<a href="#">Power ON/Boot Up</a>	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<a href="#">4-2-4</a>	<a href="#">Power shut down</a>	
<a href="#">4-3-6</a>	<a href="#">B-Mode Checks</a>	
<a href="#">4-3-8</a>	<a href="#">System CFM and PWD Checks</a>	
<a href="#">6-3-5</a>	<a href="#">LCD Adjustment Procedures</a>	





## 8-6-3 WLAN replacement - R2.x and R3.x only

**Table 8-19 Manpower / Time and Tools**

Manpower / Time	Tools
One person / 15 minutes	Refer to: <a href="#">8-2-5 "Tools needed for servicing LOGIQ E9" on page 8-5</a> <ul style="list-style-type: none"> <li>• Appropriate PPE</li> <li>• ESD</li> </ul>

**Table 8-20 Preparations and Preparation Links**

	Preparations - you must perform the following steps
 <b>NOTICE</b>  	<p>ENERGY CONTROL AND POWER LOCKOUT FOR LOGIQ E9 WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</p> <ol style="list-style-type: none"> <li>1. TURN OFF THE SCANNER.</li> <li>2. UNPLUG THE SYSTEM.</li> <li>3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</li> <li>4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.</li> <li>5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.</li> </ol> <p>Beware that the Main Power Supply, Extended Power Shutdown or ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.</p>
<ol style="list-style-type: none"> <li>1. Select <b>Utility -&gt; Connectivity -&gt; TCP/IP -&gt; Wireless Network -&gt; Configuration</b></li> <li>2. As a precautionary step: <ol style="list-style-type: none"> <li>a. Document all the information regarding configuration of the WLAN.</li> <li>b. Select the <b>Properties</b> tab.</li> <li>c. Record the following information (provided by the Customer site IT): <ol style="list-style-type: none"> <li>i. Network Name (SSID)</li> <li>ii. Network Authentication</li> <li>iii. Data Encryption</li> <li>iv. Network Key</li> <li>v. Key Index</li> <li>vi. Specify Yes/No to "The Key is Provided Automatically"</li> <li>vii. IEEE 802.1x Authentication information</li> <li>viii. EAP type</li> </ol> </li> <li>d. Press Close.</li> </ol> </li> <li>3. Power down the system.</li> <li>4. Move the User Interface (Top Console) to the lowest position.</li> <li>5. Disconnect the mains power cable from the wall outlet and all Probes and External I/O Cabling.</li> </ol>	
<b>Preparation Links ():</b> <a href="#">4-2-4 "Power shut down" on page 4-7.</a>	

### 8-6-3-1 WLAN removal



**NOTE:** It is not necessary to remove the LCD Monitor or the LCD Arm.

**Table 8-21 WLAN**


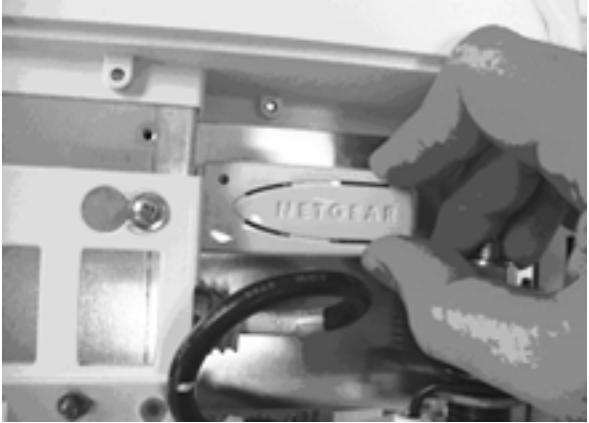
Steps	
1.	Remove the rear cover of LCD monitor.  For easy access, tilt the LCD Monitor forward to horizontal position.  <i>NOTE: You CANNOT fully remove the cover unless the LCD is tilted forward to the horizontal position.</i>
2.	To remove the dongle, slightly lift up the end to disengage the Velcro, then pull the dongle out of the USB port.

### 8-6-3-2 WLAN installation

**Table 8-22 WLAN installation**

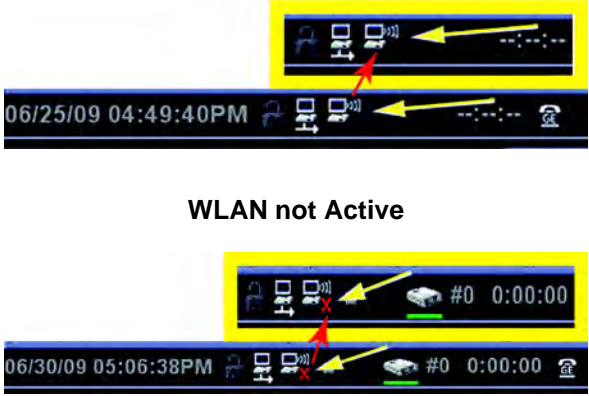
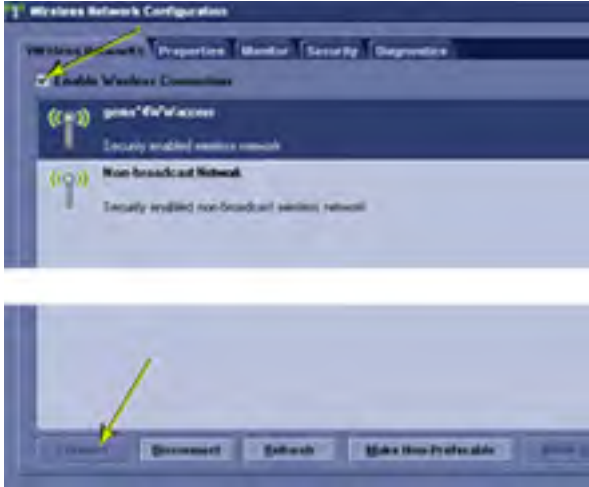
Steps		Corresponding Graphic
1.	<p>NETGEAR USB dongle WN111 is identified with the following markings:</p> <p>Remove the dongle from the Factory packaging.</p> <p>Remove the plastic cover from the dongle and discard.</p> <p>Remove the Velcro pieces from the Factory packaging.</p> <p>Discard all other items included in the dongle packaging, only the dongle and Velcro are required.</p>	
2.	<p>Choose a piece of Velcro with the Hook "gender" (rigid piece). Remove the adhesive protection strip and attach this portion of the Velcro to the dongle on the side WITHOUT the LED, at the orientation and location as shown.</p> <p>The outer edges of the Velcro have no hooks. Attach the Velcro at this orientation, to prevent covering up the vent holes. DO NOT cover the vent holes.</p> <p>Align the Velcro where the flat starts to curve (1).</p>	

**Table 8-22 WLAN installation**

Steps	Corresponding Graphic
<p>3. Attach the opposite piece of the Velcro to the “hook” side and remove the adhesive protection strip, if the loop side of Velcro is not present in the monitor.</p> <p><i>NOTE: If this is a replacement WLAN dongle, you do not need to attach this opposite piece of Velcro if the opposite piece is already attached to the LCD.</i></p>	<p><b>WLAN with opposite piece of Velcro attached</b></p> 
<p>4. Install the WLAN dongle into the USB port; lifting slightly, to prevent the adhesive from attaching before the dongle is installed.</p> <p>Once installed, push on the end of the dongle, to adhere the adhesive.</p> <p><i>NOTE: To remove the dongle, slightly lift up the end to disengage the Velcro, then pull the dongle out of the USB port.</i></p>	<p><b>WLAN Dongle installed</b></p> 
<p>5. Reinstall the LCD monitor cover. Reboot the system.</p>	

8-6-3-3 WLAN - Set up and Check

Table 8-23 WLAN - Set up and Check

Steps	Corresponding Graphic
<p>1. All configuration parameters should have been kept and the WLAN should start working right away. If it does not, check configuration.</p> <p>For setting up the WLAN, refer to the latest revision of the LOGIQ E9 Basic User Manual, Chapter 16.</p> <p>When the WLAN is active, an icon appears in the status bar to indicate whether the WLAN is installed or disconnected.</p>	<p><b>WLAN Active</b></p>  <p><b>WLAN not Active</b></p>
<p>2. Select <b>Utility -&gt; Connectivity -&gt; TCP/IP -&gt; Wireless Network -&gt; Configuration</b>.</p> <p>If enabled, Available Wireless Networks appear.</p> <p>If not connected:</p> <ul style="list-style-type: none"> <li>• Highlight the wireless network you want to use.</li> <li>• Click <b>"Connect"</b> at the bottom of the "Configuration" tool.</li> </ul> <p>To check WLAN is working properly, ping/verify a device in the network, query WL or Send an image.</p>	<p><b>Configuration Tool Screen</b></p> 

#### 8-6-3-4 Functional Test

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.


**Table 8-24 WLAN replacement instructions Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-6	B-Mode Checks	
4-3-8	System CFM and PWD Checks	
4-3-11	Basic Measurements	

## **8-6-4      Probe Holder Insert replacement**

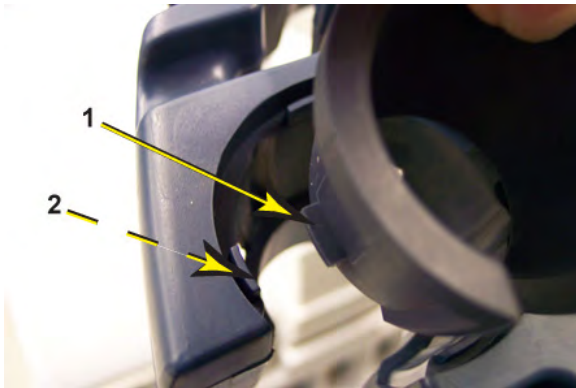
#### 8-6-4-1 Probe Holder Insert removal

**Table 8-25 Probe Holder Insert removal**

Steps		Corresponding Graphic
1.	Carefully pull the flexible Probe Holder Insert out of the lower UI frame. Large (1) and small (2) soft, Probe Holder Inserts.	<p><b>Probe Holder placement</b></p> 
2.	To remove the dongle, slightly lift up the end to disengage the Velcro, then pull the dongle out of the USB port.	

#### 8-6-4-2 Probe Holder Insert installation

**Table 8-26 Probe Holder Insert installation**

Steps		Corresponding Graphic
1.	Install the flexible Probe Holder Insert into the lower UI frame. Be sure the hooks (1) and tabs (2) fit properly and the Probe Holder fits snugly.	<p><b>Probe Holder placement</b></p> 

8-6-5

OP Panel Knobs replacement

8-6-5-1

Operator Panel Knobs removal

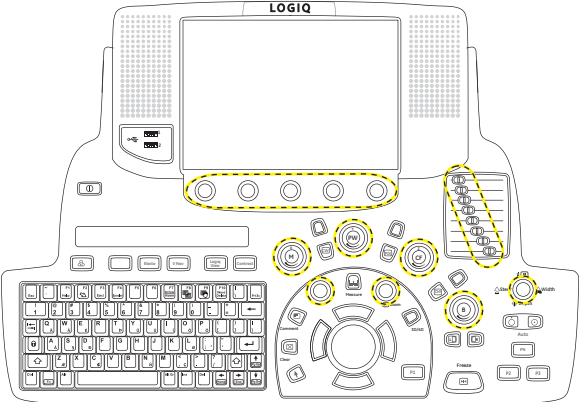
Table 8-27    Operator Panel Knobs removal

Step	
1.	Carefully pull the knobs, one by one, to remove them.

8-6-5-2

Operator Panel Knobs installation

Table 8-28    Operator Panel Knobs installation

Steps		Corresponding Graphic
1.	<p><i>NOTE: The Operator Panel knobs are concentric knobs, the center shaft has a D shape. Replace the outer knobs first then the inner ones.</i></p> <p>Install the knobs, one by one in their respective positions.</p>	<p><b>OP Panel Knobs</b></p> 

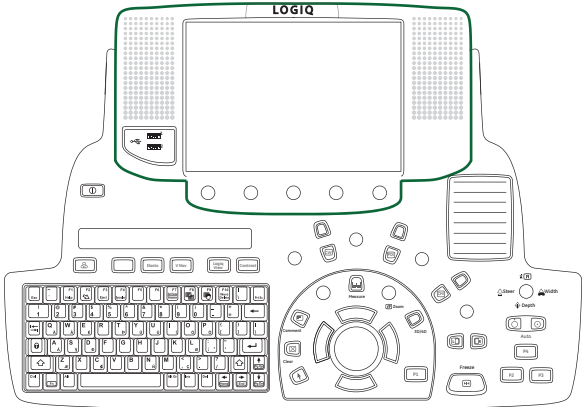





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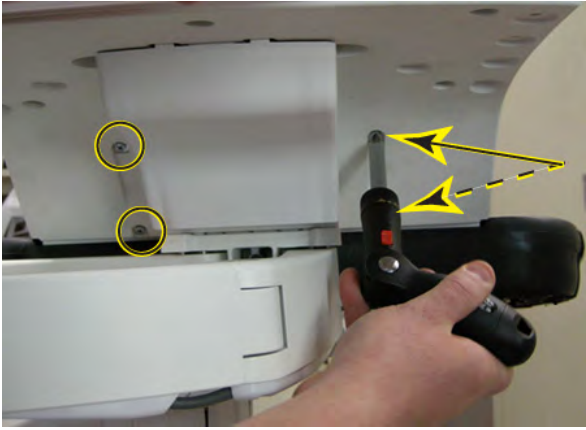

**8-6-6      Upper Operator Panel / Touch Panel Assembly replacement**

8-6-6-1 Upper OP Panel/Touch Panel Assembly removal

Table 8-29 Upper OP Panel/Touch Panel Assembly removal

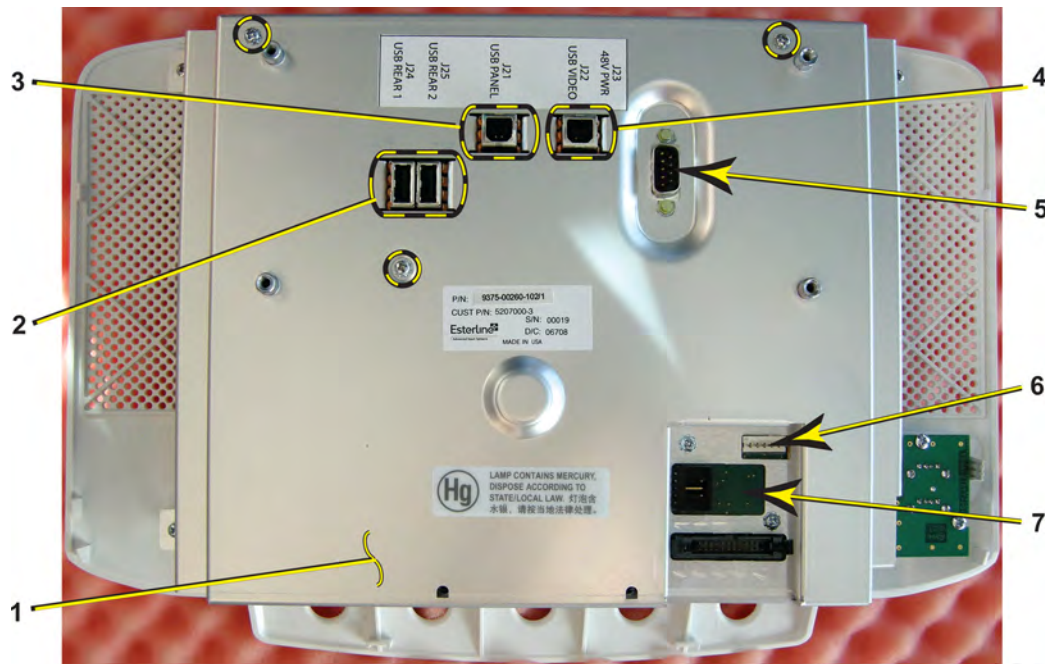
Steps		Corresponding Graphic
1.	Make sure that the OP Panel is in its uppermost position, with the LCD out of the way:	<div><b>OP Panel/Touch Panel Assembly</b></div> 
2.	Remove the five OP Panel Knobs.	
<div> <b>NOTICE</b></div> <p>Failure to remove the five OP Panel Knobs first, could cause damage to the knob shafts.</p>		
3.	At the rear of the system, release the frogleg mechanism for the console 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.	<div><b>XY / Frogleg mechanism release</b></div> 

**Table 8-29 Upper OP Panel/Touch Panel Assembly removal**

Steps	Corresponding Graphic
<p>4. Remove the four screws with washers from the rear of the console.</p>	<p><b>Back Cover of the Upper OP Panel/Touch Panel Assembly, Screws and Washers</b></p> 
<p>5. <i>NOTE: Make sure the five OP Panel Knobs have been removed.</i></p> <p>Lift the Upper OP Panel/Touch Panel assembly slightly from the bottom, and then tilt the top toward the front of the system. There are tabs at the bottom of the Touch Panel Assembly. Pull straight up on these tabs.</p> <p><i>NOTE: For better access, swing the LCD Monitor to the side.</i></p>	<p><b>Removing the Upper OP Panel/Touch Panel Assembly</b></p> 
<p>6. Disconnect the cables at the back of the Upper OP Panel/Touch Panel Assembly (see: <a href="#">Figure 8-36 on page 8-74</a>).</p>	

## 8-6-6-1 Upper OP Panel/Touch Panel Assembly removal (cont'd)

Figure 8-36 Upper OP Panel/Touch Panel assembly cable placement



- |                                 |                               |
|---------------------------------|-------------------------------|
| 1 Lower OP Panel                | 5 Power - ON/OFF LOGIC to BEP |
| 2 USB - OUT to Bulkhead Board   | 6 AN Keyboard USB and Power   |
| 3 USB - Video from BEP          | 7 USB - Trackball             |
| 4 USB - Upper OP Panel from BEP |                               |

**NOTE:** The spacers (circled) on the back of the Upper Op Panel are not included with early FRUs (these will be added to FRUs after product release). So, if you have to swap an Upper Op Panel, take the spacers off of the old Op panel and swap them into the new one. If they are on so tightly that you cannot take them off using your fingers, use a pair of pliers and rotate them back and forth to work them off. These spacers prevent the Op panel from working past its mounting surface and getting "sucked" too far into the upper frame, causing the Op panel to get twisted and causing problems.

## 8-6-6-2 Upper OP Panel/Touch Panel Assembly installation

Table 8-30 Upper OP Panel/Touch Panel Assembly installation

Steps	Corresponding Graphic
1.	
Connect the cables to the Operator Panel, Upper.	
<p> <b>NOTICE</b></p> <p>Do not stretch on the Ribbon Cable. If stretched, the connector on Operator Panel, Lower may break, resulting in a malfunction.</p>	


- |                                                                                         |                                                                                            |
|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| 1 Ribbon Cable from the Operator Panel, Lower                                           | 5 Bulkhead Board USB Cable 2 (from bulkhead position furthest from the OP) in position J25 |
| 2 Trackball Cable from the Operator Panel, Lower                                        | 6 USB Cable 1 (part of Main Cable) in position J21                                         |
| 3 A/N Cable from the A/N Keyboard                                                       | 7 USB Cable 2 (part of Main Cable) in position J22                                         |
| 4 Bulkhead Board USB Cable 1 (from bulkhead position closest to the OP) in position J24 | 8 Power/On-Off switch (part of Main Cable) in position J23                                 |



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

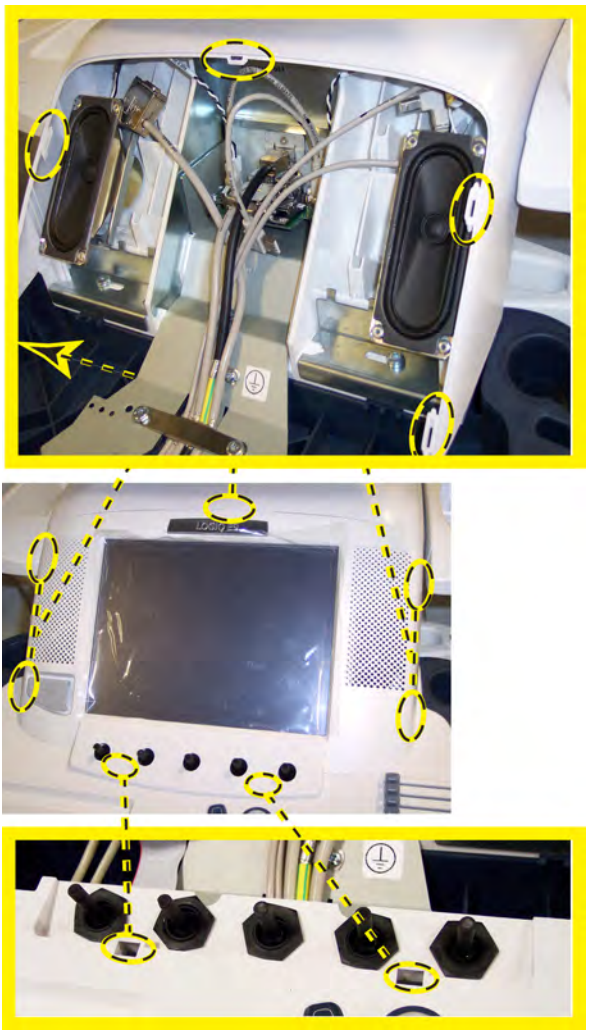

8-6-6-2 Upper OP Panel/Touch Panel Assembly installation (cont'd)

Table 8-31 Upper OP Panel/Touch Panel Assembly installation (cont'd)

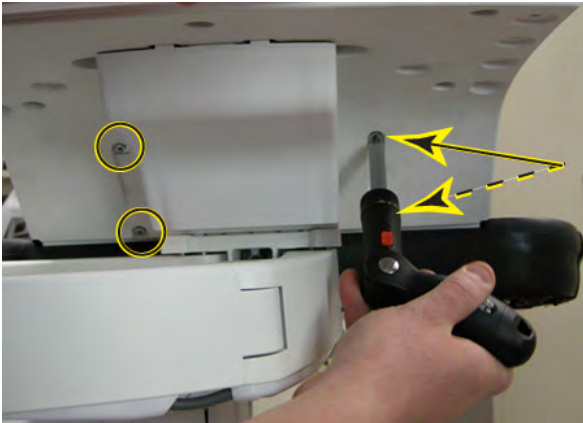

Steps		Corresponding Graphic
2.	<div>Attach the cables to the Upper OP Panel/Touch Panel Assembly before installing it to the system.</div> <div>9 - Power - ON/OFF (from BEP)</div> <div>10 - USB - Upper OP Panel (from BEP)</div> <div>11 - USB - Video (from BEP)</div>	<div>Cables to Upper OP</div> <div></div>



**Table 8-31 Upper OP Panel/Touch Panel Assembly installation (cont'd)**

Steps	Corresponding Graphic
<p>4. Install the Upper OP Panel/Touch Panel Assembly into the Frame UI Upper. Be sure the Upper OP Bezel alignment tabs are positioned, correctly into the slots in the Lower OP Bezel and Frame UI Upper Cover.</p>	<p><b>Upper OP Panel/Touch Panel Assembly alignment tabs and slots</b></p> 
<p> <b>NOTICE</b></p> <p>Be careful not to pinch any of the cables when installing the Upper OP Panel/Touch Panel Assembly.</p>	

**Table 8-31 Upper OP Panel/Touch Panel Assembly installation (cont'd)**

Steps	Corresponding Graphic
<p>5. Install the four screws to the Back Cover from behind.</p>	<p><b>Back Cover of the Upper OP Panel/Touch Panel Assembly, Screws and Washers</b></p> 
<p>6. Install the five OP Panel Knobs.</p>	



### 8-6-6-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

### 8-6-6-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

### 8-6-6-5 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-32 Upper Operator Panel / Touch Panel Assembly installation Functional Checks**



See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-6	B-Mode Checks	
4-3-8	System CFM and PWD Checks	
4-3-11	Basic Measurements	
7-5-25-2	Touch Panel Calibration Verification	
7-5-21-11	I/O Board Tests	

## 8-6-7 Alphanumeric (A/N) Keyboard replacement

Table 8-33 replacement Manpower / Time and Tools

Manpower / Time	Tools
One person / 15 minutes	<ul style="list-style-type: none"> <li>Refer to: <a href="#">8-2-5 "Tools needed for servicing LOGIQ E9" on page 8-5</a></li> <li>Keytop removal tool</li> </ul>

Table 8-34 Preparations and Preparation Links

Preparations - you must perform the following steps	
 <b>NOTICE</b> 	<p>Energy Control and Power Lockout for LOGIQ E9 WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</p> <ol style="list-style-type: none"> <li>1. TURN OFF THE SCANNER.</li> <li>2. UNPLUG THE SYSTEM.</li> <li>3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</li> <li>4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.</li> <li>5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.</li> </ol> <p>Beware that the Main Power Supply, Extended Power Shutdown or ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.</p>
<ol style="list-style-type: none"> <li>1. Power down the system.</li> <li>2. Disconnect the mains power cable from the wall outlet and all Probes and External I/O Cabling.</li> </ol>	
<p><b>Preparation Links (if you need more information):</b>  <a href="#">4-2-4 "Power shut down" on page 4-7</a></p>	

8-6-7-1 Alphanumeric Keyboard assembly removal

Table 8-35 Alphanumeric (A/N) Keyboard removal


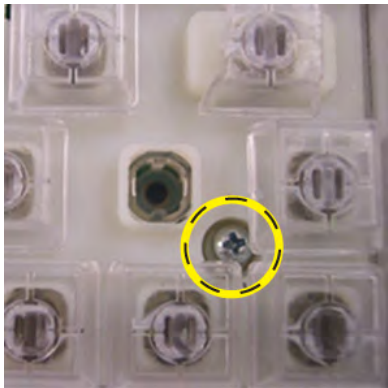

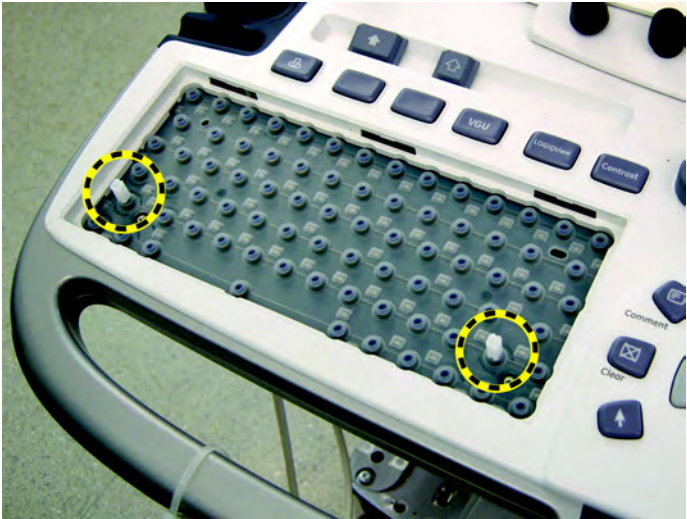
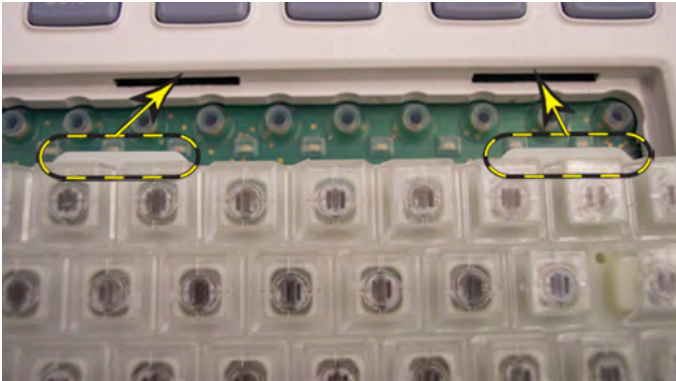
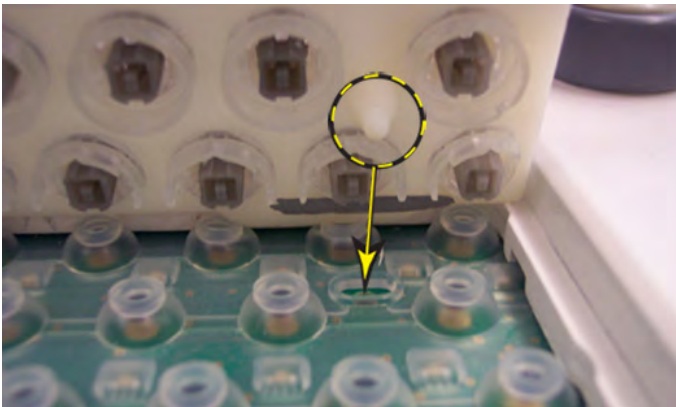
Steps	Corresponding Graphic
<p>1. The Alphanumeric Keyboard Assembly is installed in the Lower Operator Panel.</p> <p>Remove the two shift keys (cap lock arrows), using the key removal tool [the MacGyver keycap removal tool will work as well, e.g., a paperclip] to expose the screws that secure the keyboard to the Lower Operator Panel.</p> <p><i>NOTE: If the keycap plunger does not come off with the key, you have to reinstall it.</i></p>	<p style="text-align: center;"><b>Keycap Tool</b></p>  <p style="text-align: center;"><b>Keyboard Mounting Screw</b></p> 
<p> <b>NOTICE</b></p> <p><b>To avoid damaging the keytops, use a small Phillips screwdriver to remove the keyboard screws.</b></p>	
<p>2. Remove the Alphanumeric Keyboard screws (M3 x 8).</p>	

Table 8-35    Alphanumeric (A/N) Keyboard removal

Steps		Corresponding Graphic
3.	<p><i>NOTE: Ensure that the elastomer actuator (white spacers) do not get separated from the shift keys when you remove the keys. The new keyboard keys will include these actuators. So remove these if they get left over when removing the shift keys.</i></p> <p>Using both hands, lift up on the Keyboard space bar. The Alphanumeric Keyboard assembly tabs will act like a hinge</p> <p>Slide the Alphanumeric Keyboard assembly out and away from the tabs.</p> <p>Remove the Alphanumeric Keyboard screws (M3 x 8).</p>	<div>Elastomer Actuators on Keyboard Assembly</div> 

8-6-7-2 Alphanumeric Keyboard assembly installation

Table 8-36 Alphanumeric (A/N) Keyboard installation

Steps	Corresponding Graphic
<p>1. Guide the Alphanumeric Keyboard assembly tabs into the slots.</p> <p>Lower the Alphanumeric Keyboard, making sure the plastic “fingers” seat into the board.</p>	<p><b>Alphanumeric Keyboard Assembly tabs</b></p> 
<p>2. Lower the Alphanumeric Keyboard, making sure the plastic “fingers” seat into the board.</p>	<p><b>Alphanumeric Keyboard plastic “fingers”</b></p> 
<p>3. Install the two screws.</p>	
<p>4. Install the keytops.</p>	

### 8-6-7-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

### 8-6-7-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws that you removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

### 8-6-7-5 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-37 Alphanumeric Keyboard assembly replacement Functional Checks**



See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-6	B-Mode Checks	
4-3-8	System CFM and PWD Checks	
4-3-11	Basic Measurements	
4-3-20-1	Alphanumeric Keyboard and Display Platform (Console) Checks	
7-5-21-11	I/O Board Tests	
	Calibration	

## 8-6-8 Lower Operator Panel (OP) replacement

**Table 8-38 Manpower / Time and Tools**

Manpower / Time	Tools
One person / 15 minutes	<ul style="list-style-type: none"> <li>Refer to: <a href="#">8-2-5 "Tools needed for servicing LOGIQ E9" on page 8-5</a></li> <li>Keytop removal tool</li> </ul>



**Table 8-39 Preparations and Preparation Links**

Preparations - you must perform the following steps	
 <b>NOTICE</b> 	<p>Energy Control and Power Lockout for LOGIQ E9 WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</p> <ol style="list-style-type: none"> <li>1. TURN OFF THE SCANNER.</li> <li>2. UNPLUG THE SYSTEM.</li> <li>3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</li> <li>4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.</li> <li>5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.</li> </ol> <p>Beware that the Main Power Supply, Extended Power Shutdown or ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.</p>
<ol style="list-style-type: none"> <li>1. Power down the system.</li> <li>2. Disconnect the mains power cable from the wall outlet and all Probes and External I/O Cabling.</li> <li>3. Remove Upper OP Panel/Touch Panel Assembly in order to remove the Lower Op Panel.</li> </ol>	
<p><b>Preparation Links (if you need more information):</b></p> <ul style="list-style-type: none"> <li>• <a href="#">4-2-4 "Power shut down" on page 4-7</a></li> <li>• <a href="#">8-6-6 "Upper Operator Panel / Touch Panel Assembly replacement" on page 8-71</a></li> </ul>	



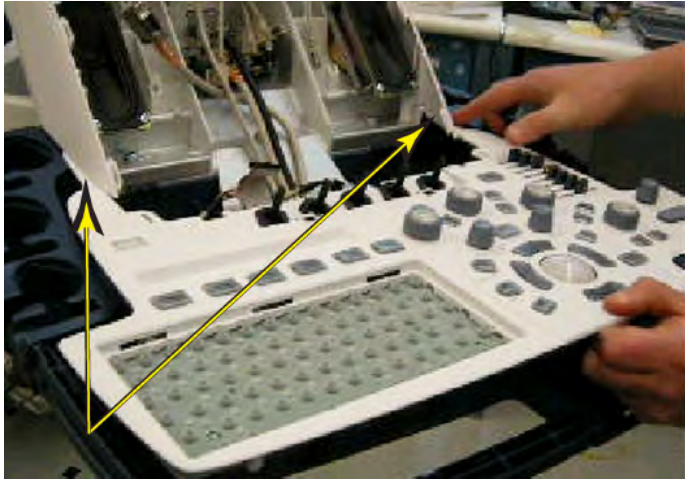
8-6-8-1 Lower Operator Panel (OP) removal

Table 8-40 Lower Operator Panel (OP) removal

Steps	Corresponding Graphic
<p>1. Keep XY / Frogleg mechanism in a released state and the console extended to gain access to the screws in the next step. The screws are available from the underside of the OP Panel Lower Frame.</p>	<p><b>Frogleg mechanism released and console extended</b></p> 
<p>2. Remove the five longer, and the three shorter screws (closest to front) that secure the Lower Operator Panel to the Lower Operator Panel Frame Assembly.</p> <p>Access the screws from beneath the Lower OP Panel Frame Assembly.</p>	<p><b>Screw placement, Lower OP Panel Frame Assembly (shown) to Lower OP Panel</b></p> 
<p>3. Remove the Alphanumeric Keyboard screws (M3 x 8).</p>	

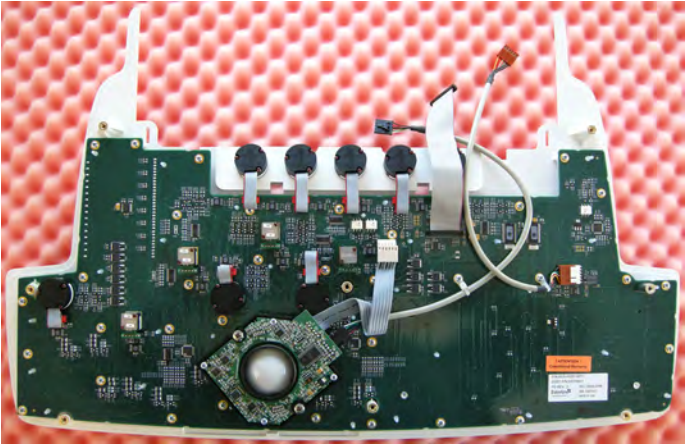


**Table 8-40 Lower Operator Panel (OP) removal**

Steps		Corresponding Graphic
4.	<p>Holding the front edge, gently flex the Lower OP Panel up until the Trackball Assembly just clears the Lower OP Panel Frame Assembly handle.</p> <p>Pull the Lower OP Panel out and away from the Lower OP Panel Frame Assembly.</p> <p>Store it on an ESD safe place.</p>	<p><b>Flex points on Lower OP Panel (when the front edge is lifted)</b></p> 

8-6-8-2      Lower Op Panel Board replacement

Table 8-41    Lower Op Panel Board replacement

Steps		Corresponding Graphic
1.	<p>To replace the Lower Op Panel Board, remove all the knobs from the control board before removing it (Mode knobs, TGC Slide Pots, Alpha-numeric keyboard, Body Pattern, Zoom, and Depth joystick encoder knobs). For the Mode knobs, ensure that these stay intact. There are d-ring inserts in to spots in the Mode keys -- DO NOT let these come apart.</p> <p>Remove all the knobs.</p> <p><i>NOTE: The two encoders near the trackball have different knobs than the other six locations. These knobs have taller ribs inside, so they sit higher up on the shaft. This position prevents the knob from hitting the “puffy” feature on the bezel.</i></p> <p>Turn the board over, face down.</p> <p>Remove the Trackball.</p> <p>Remove the power and USB cables. These cables are anchored to a screw, so you’ll need to remove the screw first.</p>	<p>Lower Op Panel Board - face down</p> 

**Table 8-41 Lower Op Panel Board replacement**

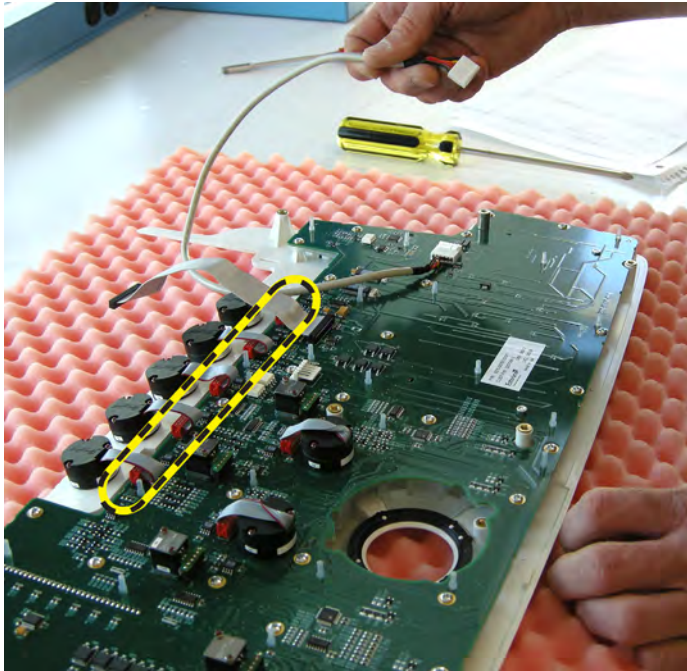
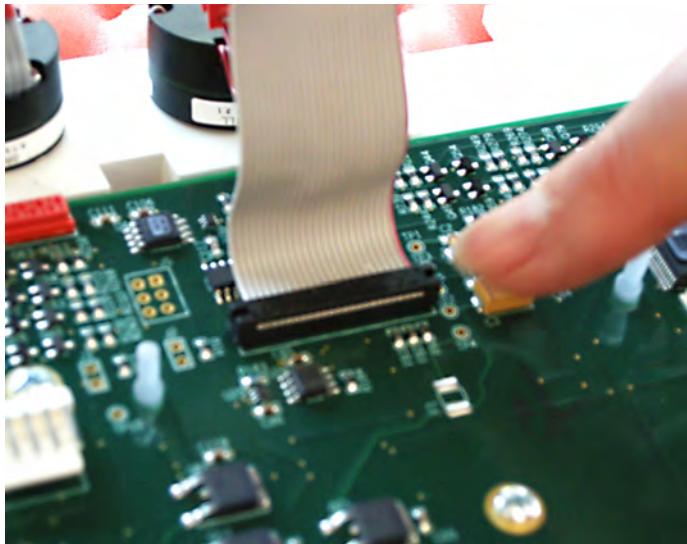
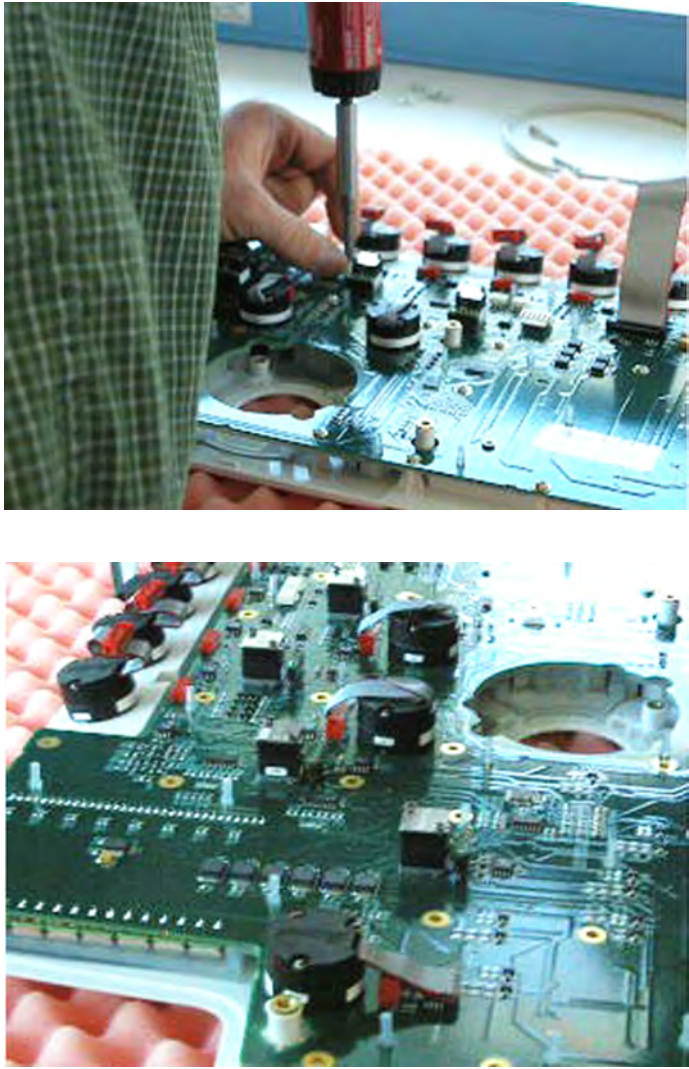
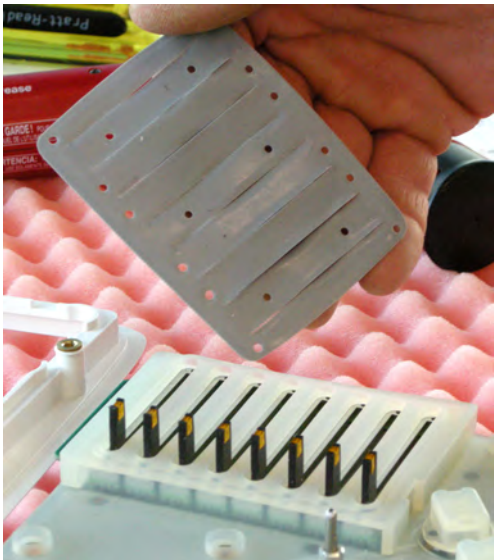
Steps	Corresponding Graphic
<p>2. Detach the five joystick encoder cables that stick through the Upper OP I/O.</p>	<p><b>Joystick Encoder Cables</b></p> 
<p>3. DO NOT remove the flat <b>J1</b> cable that is attached to the Lower Op Panel Board.</p>	<p><b>J1 Cable attached</b></p> 

Table 8-41 Lower Op Panel Board replacement

Steps		Corresponding Graphic
4.	<p>Unscrew the 34 screws.</p> <p>Slowly and carefully lift the board away from the Lower Op Panel Bezel. IF any of the keycap holders are upset, reset them. DO NOT drop the Lower Op Panel Bezel because you will have to replace all of the keycap holders.</p>	<p>Lower Op Panel Board - screws</p> 

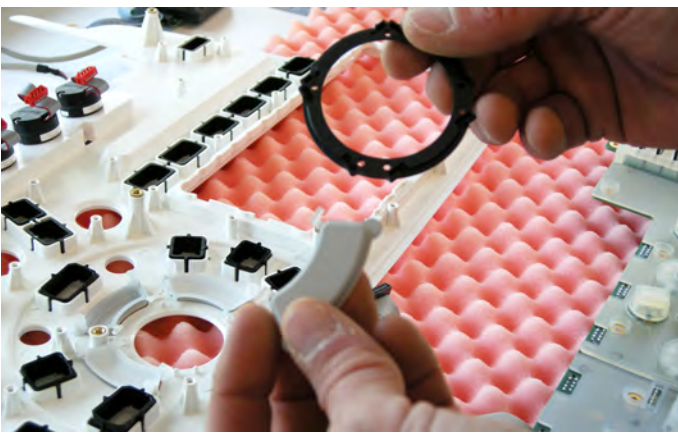


**Table 8-41 Lower Op Panel Board replacement**

Steps	Corresponding Graphic
<p>5. Remove the TGC dust gasket. The gasket is included with the complete Lower Panel and the Lower Panel Circuit Board.</p>	<p><b>TGC Dust Gasket</b></p> 


#### 8-6-8-2-1 ~~Lower Bezel Replacement~~

**Table 8-42 Lower Bezel Replacement**

Steps	Corresponding Graphic
<p>1. Remove and transfer keycap and carriers over to the new Lower Bezel.</p> <p>Remove and transfer Encoders to the new Lower Bezel.</p> <p>Remove and transfer the Trackball ring of keys parts to the new Lower Bezel.</p>	<p><b>Ring of Keys Parts</b></p> 

## 8-6-8-2-2 Touch Panel Joystick Encoder Replacement

### Table 8-43 Touch Panel Joystick Encoder Replacement

Steps		Corresponding Graphic
1.	From the front of the Lower Bezel, remove the hex nut from the Joystick Encoder.	<p><b>Encoder Hex Nuts</b></p> 

8-6-8-2-3 Depth-Type Joystick Encoder Replacement

**Table 8-44 Depth-Type Joystick Encoder Replacement**

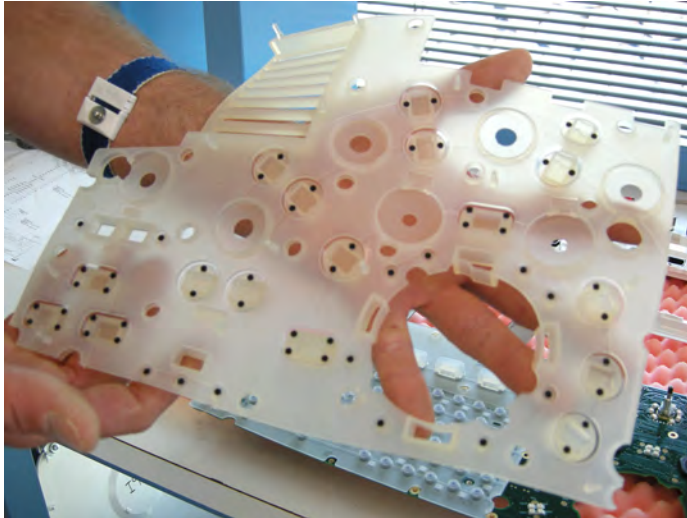
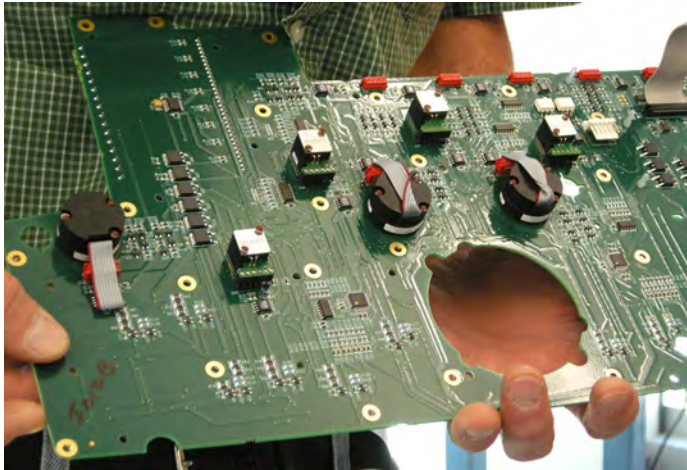
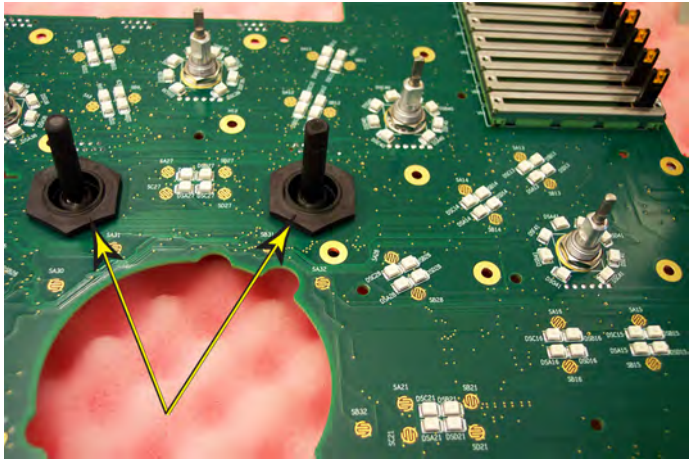
Steps	Corresponding Graphic
<p>1. Remove the elastomer covering from the Lower Bezel.</p>	<p><b>Elastomer Cover</b></p> 
<p>2. Flip the board over.  Detach the cable.  Flip the board over again.</p>	<p><b>Bottom of Board</b></p> 

Table 8-44    Depth-Type Joystick Encoder Replacement

Steps		Corresponding Graphic
3.	Remove the hex nut.	<div>Joystick Encoder Nuts (top view of board)</div> 

8-6-8-2-4 Mode Encoder Replacement

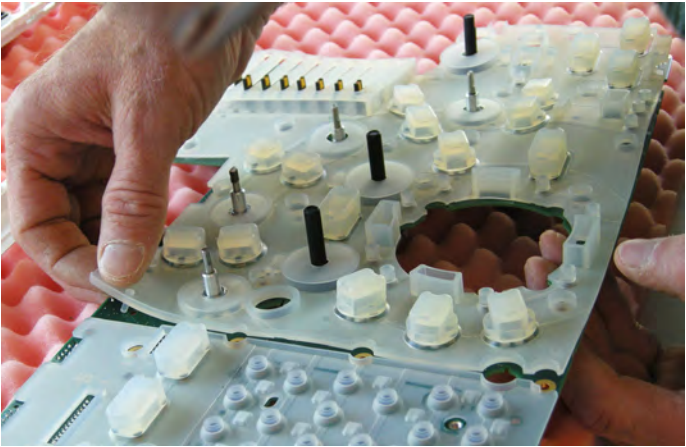
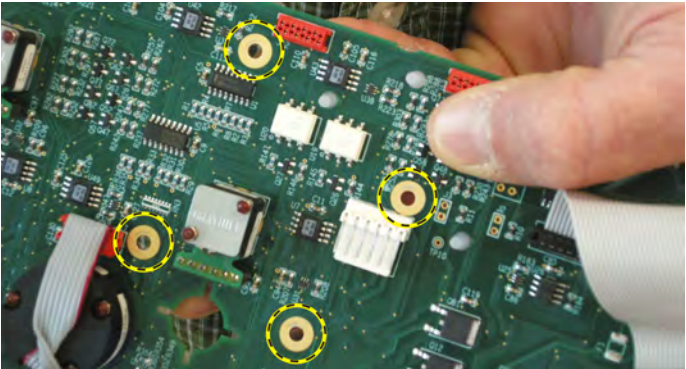
Table 8-45    Mode Encoder Replacement

Step	
1.	<div>These encoders plug into the headers on the board; so remove the nut from the top side and pull out the encoder from the bottom side.</div> <div>NOTE: The elastomer is on the top side.</div>

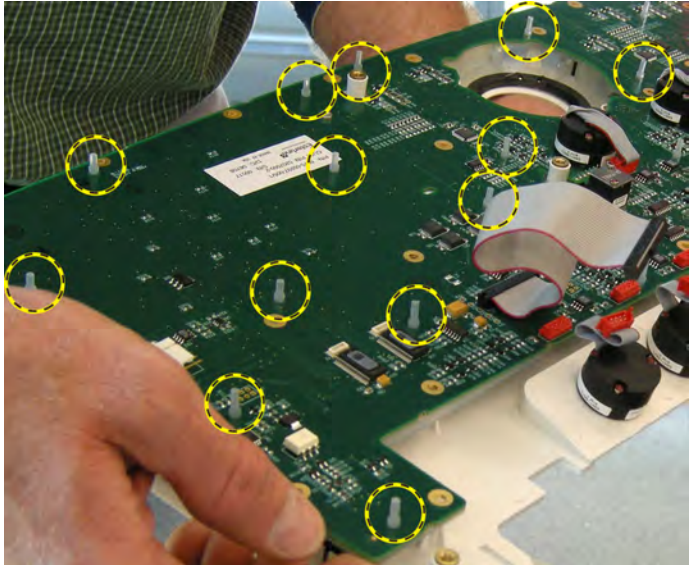



8-6-8-2-5 ~~XXXXXX~~ Elastomer Lower Op Panel Replacement

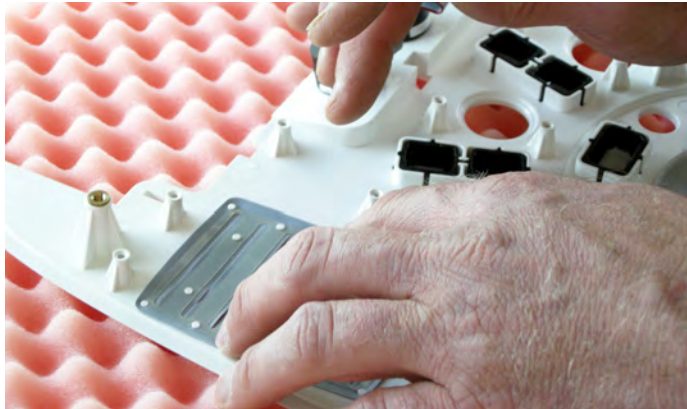
Table 8-46 Elastomer Lower Op Panel Replacement

Steps		Corresponding Graphic
1.	Align the elastomer guides.	<div>Elastomer</div> <div></div> <div>Elastomer Guides - bottom view</div> <div></div>

**Table 8-46 Elastomer Lower Op Panel Replacement**

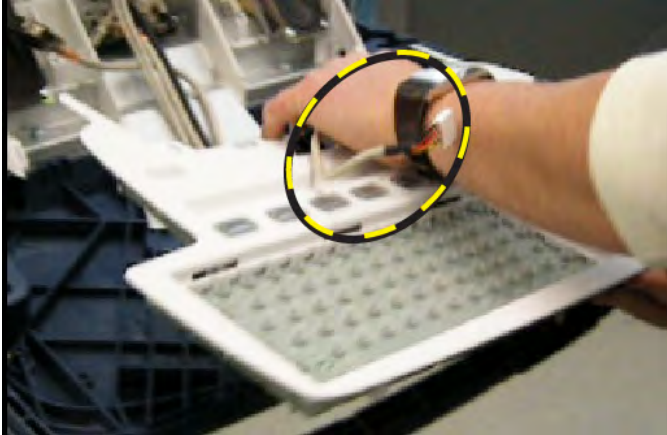
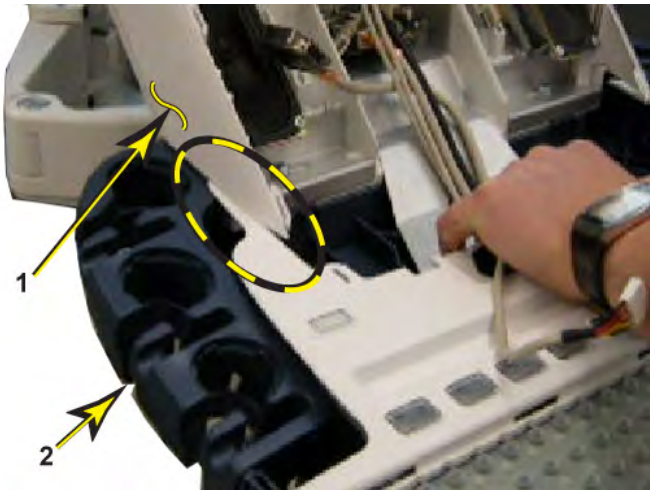
Steps	Corresponding Graphic
<p>2. On the bottom side of the Lower Bezel, pull through the elastomer guides until they lock in.</p> <p>Double check that all 16 elastomer guides (anchors) are pulled through all the way, or else it will not seat properly.</p> <p>Install the Trackball.</p> <p>Reattach the Power and USB cables.</p>	<p><b>Elastomer Guides - top view (not all elastomer anchors are identified)</b></p> 
<p>3. When replacing the Lower Op Panel Bezel:</p> <ul style="list-style-type: none"> <li>• Make sure that carriers, buttons, knobs are all in place before setting the Lower Op Panel Board on top of the Lower Bezel.</li> <li>• Ensure that the board is flat on top of the bezel. Put a few screws in, then flip it over to make sure none of the buttons are 'cocked,' or out of place.</li> <li>• Replace the remaining screws.</li> <li>• Replace the TGC dust gasket. The clear, plastic backing must be facing down when the bezel is installed. (The clear, plastic backing should be facing up from this view.)</li> </ul>	<p><b>Lower Op Panel Board and Lower Bezel</b></p> 

**Table 8-46 Elastomer Lower Op Panel Replacement**

Steps		Corresponding Graphic
4.	Replace the TGC dust gasket. The clear, plastic backing must be facing down when the bezel is installed. (The clear, plastic backing should be facing up from this view.)	<p><b>TGC Dust Gasket to Lower Bezel</b></p> 

8-6-8-3 Lower Operator Panel installation

Table 8-47 Lower Operator Panel installation

Steps	Corresponding Graphic
<p>1. While holding the Lower OP Panel, be sure to maintain control of the three OP Panel cables so that they come up and over the top of the Lower OP Panel.</p>	<p><b>Cables over top of Lower OP Panel</b></p> 
<p>2. <i>NOTE: Edge tips described are fragile. DO NOT lift or bend the Lower OP Panel Assembly sharply, or the edge tips may break.</i></p> <p>Slide the left and right Lower OP Panel edge tips carefully between the Upper OP Panel Frame (1 - white) and the Lower OP Panel Frame (2 - blue).</p> <p>Begin to slide the Lower OP Panel into its compartment while making sure the Trackball Assembly just clears the Lower OP Panel Frame Assembly handle.</p>	<p><b>Left edge tip of Lower OP Panel Assembly</b></p> 
<p>3. Place the Lower OP Panel into its compartment.</p> <p>Install the Upper OP Panel/Touch Panel assembly.</p> <p>Install the eight screws that affix the Lower OP Panel assembly to the Lower OP Panel Frame Assembly.</p> <p>Be sure the three shorter screws are installed at the front (see: <a href="#">Table 8-40 "Lower Operator Panel (OP) removal" on page 8-86</a>).</p>	

#### 8-6-8-4 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

#### 8-6-8-5 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws that you removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

#### 8-6-8-6 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-48 Lower Operator Panel (OP) replacement Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-6	B-Mode Checks	
4-3-8	System CFM and PWD Checks	
4-3-11	Basic Measurements	
4-3-20-1	Alphanumeric Keyboard and Display Platform (Console) Checks	
7-5-21-11	I/O Board Tests	



## 8-6-9 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, a Gel Warmer, or a Storage Tray. The system can support one Left Options Holder and one Right Options Holder at the same time. A Right Options Holder comes standard with the system, with the Gel Warmer (48V).

### 8-6-9-1 Manpower

One person, 15 minutes.

### 8-6-9-2 Tools

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

### 8-6-9-3 Preparations

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



#### **NOTICE** Energy Control and Power Lockout for LOGIQ E9



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

1. TURN OFF THE SCANNER.
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. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.

Beware that the Main Power Supply, Extended Power Shutdown or ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.

- 1.) Power down the system.
- 2.) Disconnect the mains power cable from the wall outlet.
- 3.) If the Options Holder is supporting the Gel Warmer, remove the Gel Warmer first ([8-6-10 "Gel Warmer replacement" on page 8-104.](#)).
- 4.) Separate and remove the Storage Tray or Transvaginal Probe Holder from the Options Holder, if applicable.

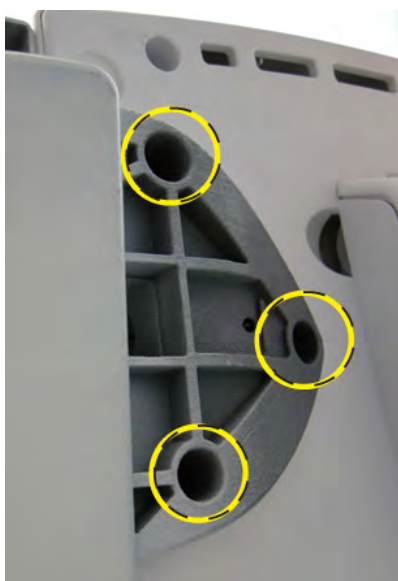
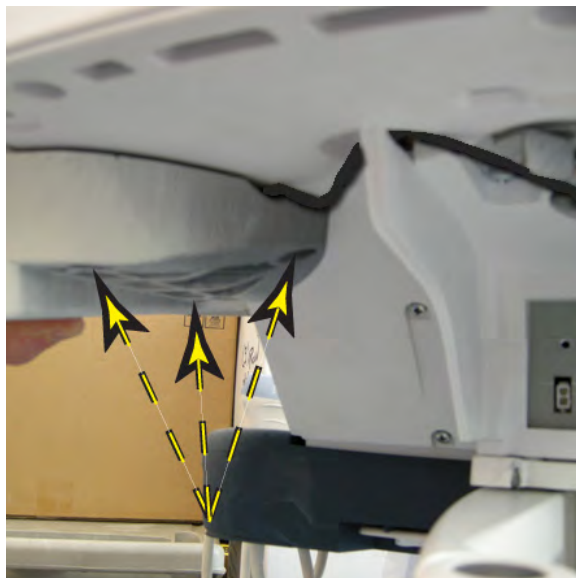
#### **Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-6-10 "Gel Warmer replacement" on page 8-104.](#)
- [8-6-11 "Storage Tray / Transvaginal Probe Holder replacement" on page 8-108.](#)
- [8-6-11 "Storage Tray / Transvaginal Probe Holder replacement" on page 8-108.](#)

#### 8-6-9-4 Options Holder removal

- 1.) From underneath the Upper Console, remove the three screws securing the Options Holder.

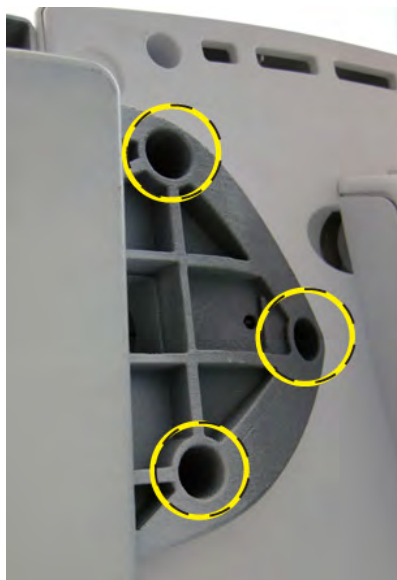
**Figure 8-37 Screws, underneath upper console - gel warmer and option tray shown**



- 2.) Remove the Options Holder from the Upper Console.

8-6-9-5 Options Holder installation

Figure 8-38 Screw locations



- 1.) If this Options Holder will be supporting a Gel Warmer, place the Gel Warmer in the Options Holder first and then install the Gel Warmer to the Options holder.

*NOTE: Be sure the Gel Warmer cable fits in the cable channels and is not pinched.*

- 2.) Position the Options Holder in place.

*NOTE: Be sure the Gel Warmer cable fits in the cable channels and is not pinched.*

- 3.) Install the three screws securing the Options Holder.
- 4.) Install the Storage Tray or Transvaginal Probe Holder to the Options Holder, if applicable.



#### 8-6-9-6 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

#### 8-6-9-7 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.
- 4.) If a Gel Warmer is installed in the Options Holder, see: additional Verification and Functional Checks for Gel Warmer (see: [8-6-10 "Gel Warmer replacement" on page 8-104](#)).

#### 8-6-9-8 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-49 Options Holder / Left or Right Support replacement Functional Checks**

See Section	Functional Check	Debrief Script
<a href="#">4-2-3</a>	<a href="#">Power ON/Boot Up</a>	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
<a href="#">4-2-4</a>	<a href="#">Power shut down</a>	
<a href="#">4-3-15</a>	<a href="#">Probe/Connectors Checks</a>	
<a href="#">4-3-6</a>	<a href="#">B-Mode Checks</a>	
<a href="#">4-3-8</a>	<a href="#">System CFM and PWD Checks</a>	
<a href="#">4-3-20</a>	<a href="#">Mechanical Function Checks</a>	
<a href="#">4-3-11</a>	<a href="#">Basic Measurements</a>	
<a href="#">4-3-20-2</a>	<a href="#">Brakes and Direction Lock Checks</a>	

## 8-6-10 Gel Warmer replacement

### 8-6-10-1 Manpower


One person, 15 minutes.


### 8-6-10-2 Tools

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

### 8-6-10-3 Preparations

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

**NOTICE** Energy Control and Power Lockout for LOGIQ E9



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

1. TURN OFF THE SCANNER.
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. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.

Beware that the Main Power Supply, Extended Power Shutdown or ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.

- 1.) Power down the system.
- 2.) Disconnect the mains power cable from the wall outlet.

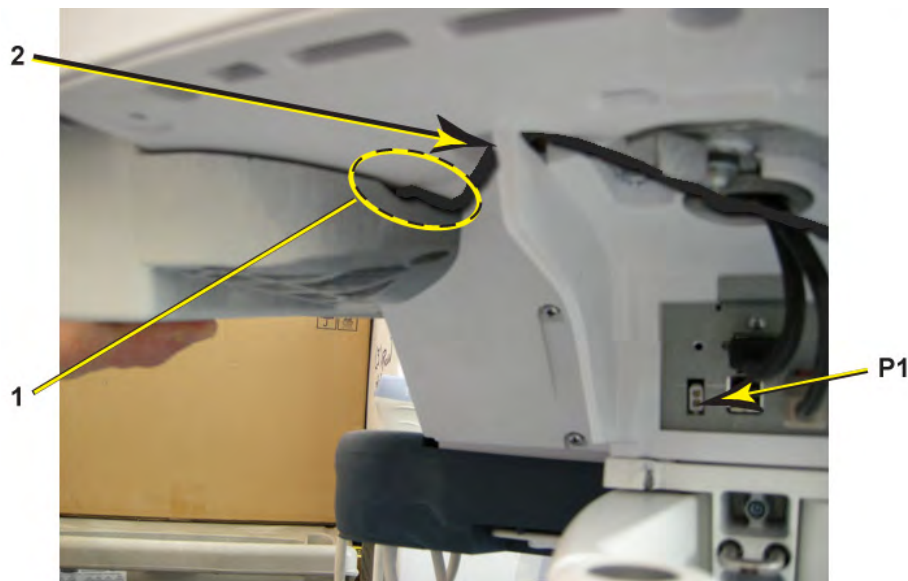
**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)

#### 8-6-10-4 Gel Warmer removal

- 1.) Remove the Bulkhead Cover.
- 2.) Disconnect the Gel Warmer cable from (P1) on the back of the bulkhead.
- 3.) The Gel Warmer cable is routed through the cable channel (1) and the lower frame support (2). Pull the Gel Warmer cable through the lower frame cable support to free the cable.

**Figure 8-39 Gel Warmer Cable placement**



- 4.) Remove the Options Holder ([8-6-9 "Options Holder / Left or Right Support replacement" on page 8-100](#)).

**Figure 8-40 Options Holder removed, with Gel Warmer in place**



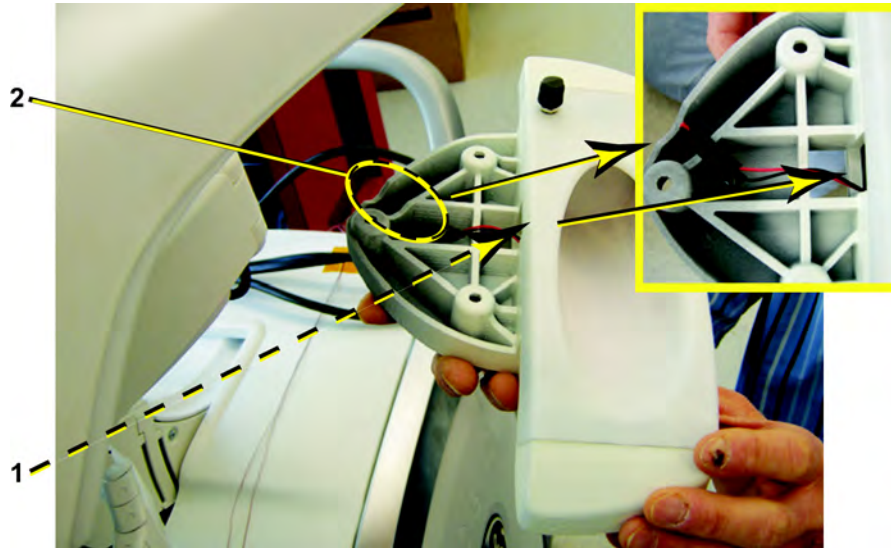
- 5.) Remove the two screws at the Gel Warmer base.
- 6.) Lift the Gel Warmer out of the Options Holder.

#### 8-6-10-5 Gel Warmer installation

- 1.) Place the Gel Warmer in the Options Holder, routing the cable through the cutout (1) between the Options Holder and Gel Warmer and through the cable channel (2).

**NOTE:** Be careful not to pinch wires.

**Figure 8-41 Options Holder removed, with Gel Warmer in place**



- 2.) Install the two screws at the Gel Warmer base, securing the Gel Warmer to the Options Holder (Torque: 3 Nm {2.2 lbf-ft}).
- 3.) Install the Options Holder.
- 4.) Route the Gel Warmer cable through the lower frame cable support.
- 5.) Connect the Gel Warmer cable to the bulkhead.
- 6.) Replace the Bulkhead Cover.

#### 8-6-10-6 Calibration and adjustments

Temperature is preset to its highest level: 38 degrees C (+/-2 degrees C). It is recommended to retain default setting.

User can turn dial to adjust the temperature to its lowest level: 32 degrees C (+/-2 degrees C).

#### 8-6-10-7 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.
- 4.) Place a closed bottle of gel, applicator end first, in the gel warmer. Verify warmer is operational.

#### 8-6-10-8 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-50 Gel Warmer replacement Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-15	Probe/Connectors Checks	
4-3-6	B-Mode Checks	
4-3-8	System CFM and PWD Checks	
4-3-20	Mechanical Function Checks	
4-3-11	Basic Measurements	
4-3-20-2	Brakes and Direction Lock Checks	

## 8-6-11 Storage Tray / Transvaginal Probe Holder replacement

The Storage Tray and Transvaginal Probe Holder rests inside the Options Holder base part and are interchangeable. They can also replace the Gel Warmer. See: [8-6-10 "Gel Warmer replacement" on page 8-104](#) and [8-6-12 "Replacing the Gel Warmer with a Storage Tray or TV/TR Probe Holder" on page 8-110](#).

Follow this procedure for replacement, or replacing a tray with a Probe Holder or a Probe Holder with a tray.

### 8-6-11-1 Storage Tray / Transvaginal Probe Holder removal

- 1.) Locate the two prongs below the tray or Probe Holder.

**Figure 8-42 Locate the two prongs**



- 2.) Squeeze the two prongs together, then lift the tray or Probe Holder off the system.

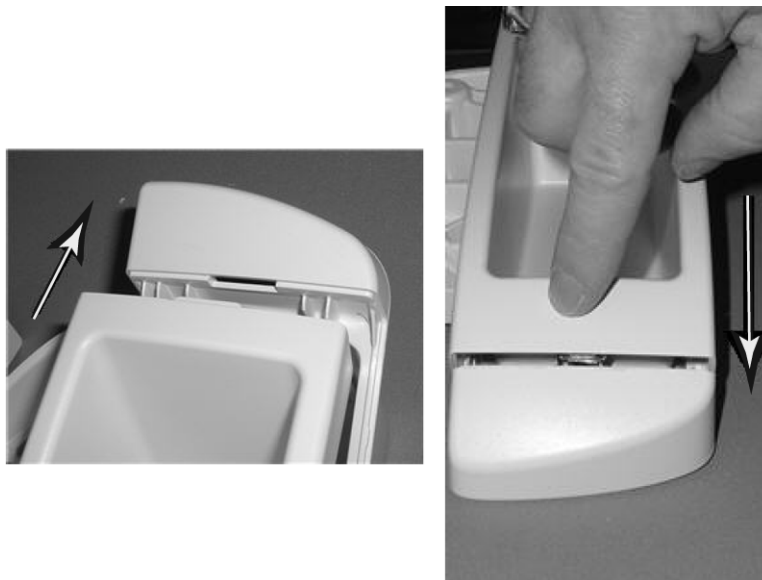
**Figure 8-43 Squeeze the two prongs**



**8-6-11-2 Storage Tray / Transvaginal Probe Holder installation**

- 1.) Seat the tray or Probe Holder tab into the options holder base and snap into place.

**Figure 8-44 Seat and snap into place**



## 8-6-12 Replacing the Gel Warmer with a Storage Tray or TV/TR Probe Holder

Follow these instructions when removing the gel warmer and replacing it with a Storage Tray or a TV/TR Tray.

### 8-6-12-1 Gel Warmer removal

Before starting this procedure, see: [8-6-10 "Gel Warmer replacement" on page 8-104](#).

- 1.) Remove the Gel Warmer.
- 2.) Seat the tray tab into the options holder base and snap into place. See: [Figure 8-44 "Seat and snap into place" on page 8-109](#).

**Figure 8-45 TV/TR Probe Holder installed**





## **8-6-13 Probe Cable Hooks replacement**

### **8-6-13-1 Manpower**

One person, 15 minutes.

### **8-6-13-2 Tools**

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

### **8-6-13-3 Probe Cable Hook removal**

1.) Unscrew the fastening screw.

The screw may be locked with Lock-Tite, so you may need to apply a little extra force.

**Figure 8-46 Screw placement, Probe Cable Hook**



2.) Remove the Cable Hook.

### **8-6-13-4 Probe Cable Hook installation**

1.) Position the Probe Cable Hook (Figure 8-46).

2.) Fix it in place by using an M5x20 screw with an M6 washer. Lock-Tite has to be used.  
Torque: 50 Ncm (0.37 lbf-ft or 4.4 lbf-in) (fingertight).

### 8-6-13-5 Probe Cable Hooks Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-51 Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-15	Probe/Connectors Checks	
4-3-6	B-Mode Checks	
4-3-8-3	Color Mode Checks	
4-3-8-6	PW/CW Doppler Mode Checks	
4-3-17	Peripherals Checks	
4-2-14-1 and 4-3-20-2	The Casters (Wheels) control and Brakes and Direction Lock Checks	
4-2-5	Top Console position adjustment	

## **Section 8-7**

### **Main Console parts replacement**

#### **8-7-1 Purpose of this section**

This section describes how to replace the replaceable parts in the Main Console

## 8-7-2 Rear Filter and “handle type” Bottom Filter replacement / cleaning

### 8-7-2-1 Manpower

One person, 15 minutes.

### 8-7-2-2 Tools

No tools are needed to replace the filter.

### 8-7-2-3 Preparations

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

- 1.) Power down the system.
- 2.) Disconnect the mains power cable from the wall outlet.
- 3.) Remove the Filter Cover.

**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-6 "Filter Cover replacement" on page 8-37.](#)

Clean the air filters to ensure that a clogged filter does not cause the system 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 LOGIQ E9 has two air filters which need to be cleaned. The top air filter is located on the back of the LOGIQ E9 below the power cord and the bottom air filter is located underneath the LOGIQ E9.

**Table 8-52 Removing and Cleaning Filters**

	Steps	Corresponding Graphic
1.	<p>Power down the system before removing the filters to prevent any loose or knocked-off debris from entering the Fan Tray.</p> <p>Walk the LOGIQ 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 LOGIQ E9.</p>	

**Table 8-52 Removing and Cleaning Filters**


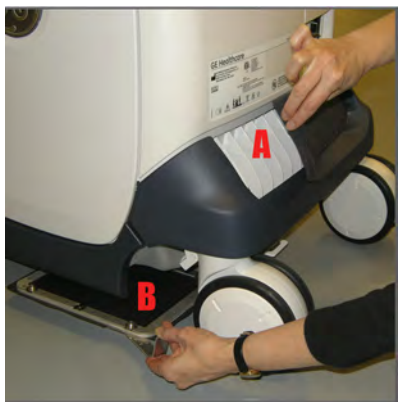


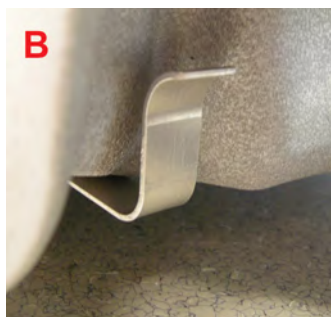

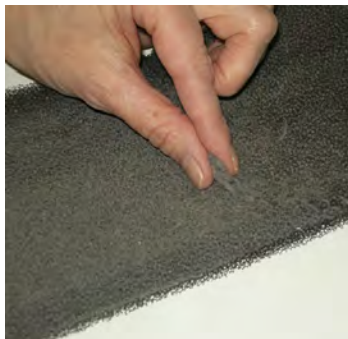

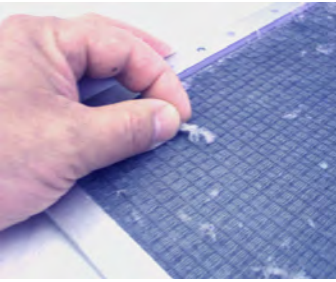
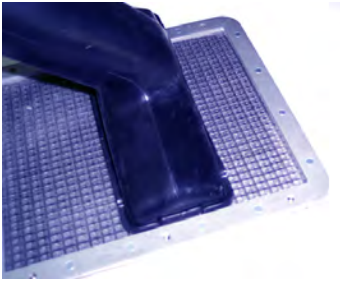
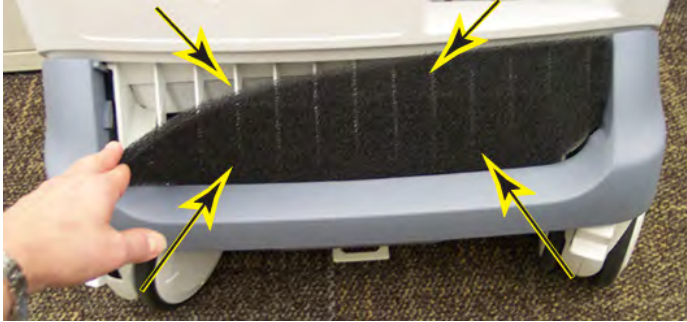


	Steps	Corresponding Graphic
2.	Lock the Brakes.	

Table 8-52 Removing and Cleaning Filters

	Steps	Corresponding Graphic	
3.	Filter Locations		
	<b>A. Rear Filter</b> - Remove the Cover and then remove the filter.		
	<b>B. Bottom Filter</b> - 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 8-52 Removing and Cleaning Filters**

	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 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 system and placing the handle into the stowed position. The filter will be drawn to the filter mounting magnets.		



## 8-7-3 Bottom Filter installation (looped type strap)

### 8-7-3-1 Removal Process with Looped Strap

Figure 8-47 Bottom Filter Looped Strap (located in wheel well)



- 1.) Locate the looped strap on the right hand side of the LOGIQ E9, which can be viewed through the right rear wheel well.
- 2.) Insert the first and second fingers of your right hand through the filter removal loop.
- 3.) Using the first and second fingers of the your hand, lever down on the filter removal loop and the fingers of the right hand.

Figure 8-48 Placement of Fingers in Looped Strap



**NOTE:** This action will prevent your fingers from being struck by the filter when you remove it and it pops loose.



8-7-3-1 Removal Process with Looped Strap (cont'd)

**Figure 8-49 Filter removed**



4.) Remove the filter from the frame.

**NOTE:** *The filter frame will clear your fingers as you remove the filter.*

**Figure 8-50 Bottom View to show Removing the Filter**



**WARNING** *Tilting the system is NOT a recommended method for the removal of the filter. The bottom view in Figure 8-50 is only for illustrative purposes.*

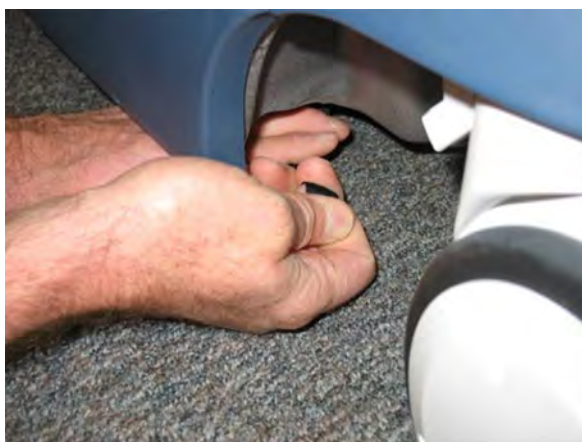
### 8-7-3-2 Removal Process with Non-loop Type Strap

**Figure 8-51 Non-loop Type Strap**



- 1.) Locate the strap on the right hand side of the LOGIQ E9, which can be viewed through the right rear wheel well.

**Figure 8-52 Fingers Holding Strap**



- 2.) Grasp the filter removal strap with the thumb and index finger of your right hand.

**8-7-3-2 Removal Process with Non-loop Type Strap (cont'd)**

- 3.) Using the first and second fingers of your left hand, lever down on the filter removal strap.

**Figure 8-53 Placement of Fingers Around Strap**



**NOTE:** *This action will prevent your fingers from being struck by the filter when you remove it and it pops loose.*

**Figure 8-54 Removing Filter Frame**



- 4.) Remove the filter from the frame.

**NOTE:** *The filter frame will clear your fingers as you remove the filter.*

### 8-7-3-2 Removal Process with Non-loop Type Strap (cont'd)

Figure 8-55 Bottom View for Removing the Filter



 **WARNING** *Tilting the system is NOT a recommended method for the removal of the filter. The bottom view in Figure 8-55 is only for illustrative purposes.*

#### 8-7-3-2-1 ~~WARNING~~ Cleaning the bottom filter

The bottom filter is held in place with magnets. To clean the bottom air filter,

- 1.) You need to kneel down on the floor to access the bottom filter. Locate the piece of cloth extending from the air filter on the bottom of the LOGIQ E9.
- 2.) You need two hands to remove this filter. One hand is used to pull on the piece of cloth that extends from the filter and the other hand is used to wedge a finger just under a corner of the filter. In this step, firmly take hold of the piece of cloth that extends from the filter.
- 3.) Position your other hand at a corner of the filter and wedge a finger between the filter and the bottom of the LOGIQ E9.
- 4.) Pull down on the filter with the finger that is wedged between the filter and the LOGIQ E9 while pulling on the piece of cloth that extends from the filter at the same time to remove the filter.
- 5.) Clean this filter with soap and water, or vacuum clean.
- 6.) Reposition the filter at the bottom of the LOGIQ E9.

## Section 8-8 Casters and Brakes replacement

### 8-8-1 Rear Casters replacement

#### 8-8-1-1 Manpower

Two people, 15 minutes.

#### 8-8-1-2 Tools

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

*NOTE:*

#### 8-8-1-3 Preparations

When preparing for the replacement, 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 both Side Covers.
- 5.) Remove the Rear Bumper.
- 6.) Remove the Rear Cover.

**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-2-4 "Side Covers removal" on page 8-28.](#)
- [8-5-9 "Rear Bumper replacement" on page 8-44.](#)
- [8-5-7 "Rear Cover replacement" on page 8-38.](#)

#### 8-8-1-4 Rear Casters removal

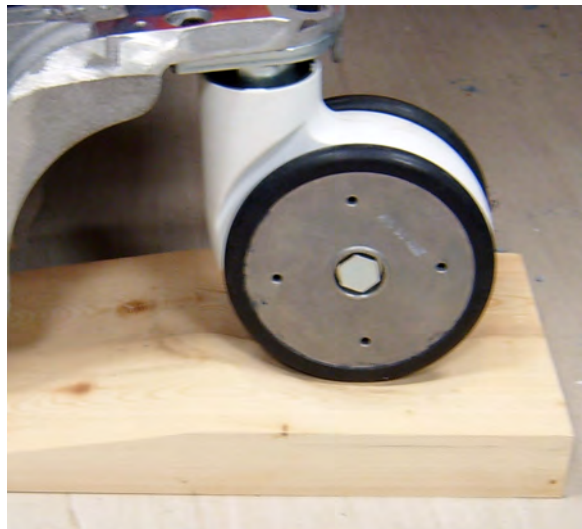
- 1.) Turn Front Casters so they are pointing forwards.
- 2.) Activate Direction Lock.
- 3.) Put the Bevel Edged Board on the floor.

 **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 LOGIQ E9 is un-stable, not resting on all four Casters.*

- 4.) Pull the system 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 8-56](#).

**Figure 8-56 Pull system backwards up the board incline**



- 6.) Activate the brakes.
- 7.) The system is now nearly balanced between one Front and one Rear Caster.
- 8.) Make the LOGIQ E9 rest on both Front Casters and lift the Rear Caster. Put the Wooden Wedge under the chassis. This will stabilize the LOGIQ 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.

#### 8-8-1-5 Rear Casters installation

- 1.) Loose the bolt before putting on the ramp.
- 2.) Align the Caster, mounting it flat and toward the back.
- 3.) Position the Caster so it align with the hole for the fixing bolt.
- 4.) Install the fixing bolt (M12 X 40 mm). Use a 10 mm HEX key, torque: 81 Nm (59.7 lbf-ft).
- 5.) Remove the Wooden Wedge.
- 6.) Roll the system off the Bevel Edged Board.
- 7.) To replace the other Rear Caster, repeat all the steps, starting from [8-8-1-4 "Rear Casters removal" on page 8-124](#), but now using the Bevel Edged board and the Wooden Wedge on the other side of the system.
- 8.) Install the Rear Cover.
- 9.) Install the Rear Bumper.
- 10.) Install the Side Covers.

---

## **8-8-2 Front Casters replacement**

### **8-8-2-1 Manpower**

One person, 15 minutes.

### **8-8-2-2 Tools**

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

### **8-8-2-3 Preparations**

When preparing for the replacement, 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 both Side Covers.
- 5.) Remove the Foot Rest Bumper.

**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-2-4 "Side Covers removal" on page 8-28.](#)
- [8-5-4 "Foot Rest Bumper replacement" on page 8-33.](#)



#### 8-8-2-4 Front Casters removal

- 1.) Turn Front Casters so they are pointing forwards.
- 2.) Activate Direction Lock.
- 3.) Put the Bevel Edged Board on the floor.



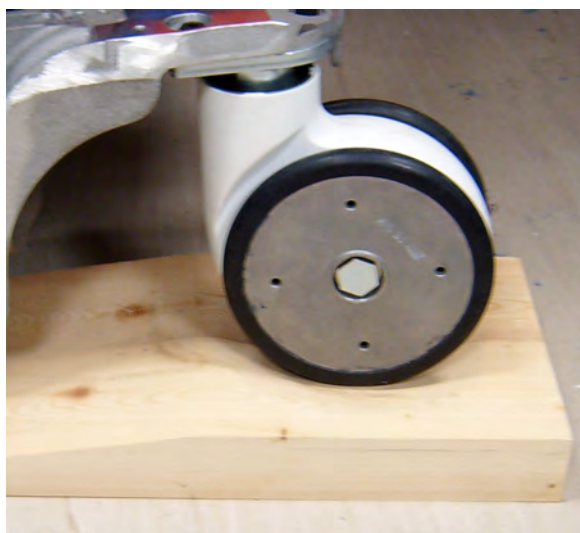
**WARNING** *Prior to elevating scanner, verify that the floating Operator Panel is locked in its lowest, parking position.*



**WARNING** *Use extreme caution as long as LOGIQ E9 is un-stable, not resting on all four Casters.*

- 4.) Pull the system 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 8-56](#).

**Figure 8-57 Pull system backwards up the board incline**



- 6.) The system is now nearly balanced between one Front and one Rear Caster.
- 7.) Make the LOGIQ E9 rest on both Rear Casters and lift the Front Caster.
- 8.) Put the Wooden Wedge under the chassis. This will stabilize the LOGIQ E9 with one Front Caster free from the floor.
- 9.) Unscrew and remove the fixing screws (T-45) for the Front Caster that is free from the floor. Save the screw for later use.
- 10.) Remove the Caster.
- 11.) Disconnect the lock by unscrewing the hex nut that holds it to the rod.

**8-8-2-5 Front Casters installation**

- 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 (15.1 lbf-ft).
- 3.) Remove the Wooden Wedge.
- 4.) Roll the system off the Bevel Edged Board.
- 5.) To replace the other Front Caster, repeat all the steps from [8-8-2-4 "Front Casters removal" on page 8-127](#), but now using the Bevel Edged board and the Wooden Wedge on the other side of the system.
- 6.) Install the Foot Rest Cover.

## **Section 8-9**

### **BEP (Back End Processor) parts replacement**

#### **8-9-1 Purpose of this section**

This section describes how to replace the BEP itself and the service parts inside the BEP.

## 8-9-2 BEP replacement - R3.x and earlier





*NOTE: BEP replacement requires a software reload.*

**Table 8-53 Manpower / Time and Tools**

Manpower / Time	Tools
One person / 1 hour if all options are installed plus the time it takes to load the software, excludes travel time	Refer to: <a href="#">8-2-5 "Tools needed for servicing LOGIQ E9" on page 8-5.</a>

## 8-9-2.....BEP replacement - R3.x and earlier (cont'd)

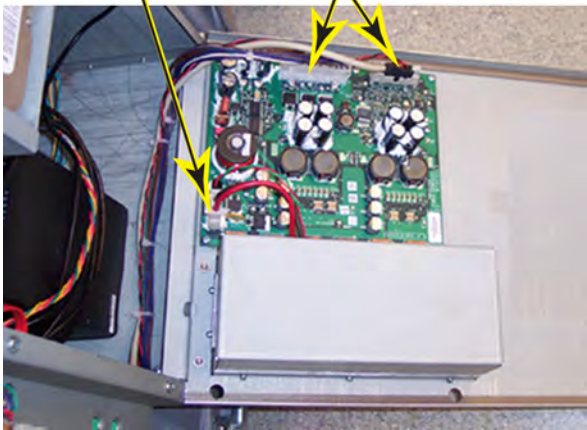
Table 8-54 Preparations and Preparation Links

Preparations - you must perform the following steps	
 <b>WARNING</b>  	<p><b>DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.</b></p> <ol style="list-style-type: none"> <li><b>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).</b></li> <li><b>2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.</b></li> </ol>
 <b>NOTICE</b>  	<p>Energy Control and Power Lockout for LOGIQ E9</p> <p>When servicing parts of the system where there is exposure to voltage greater than 30 Volts:</p> <ol style="list-style-type: none"> <li>1. Turn OFF and unplug the system.</li> <li>2. Maintain control of the system power plug.</li> <li>3. 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.</li> <li>4. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.</li> </ol> <p>Beware that the Main Power Supply, Extended Power Shutdown and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.</p>
<ol style="list-style-type: none"> <li>1. Record the system's TCPIP settings and installed Option strings.</li> <li>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.</li> <li>3. Raise the Top Console to the highest position.</li> <li>4. Power down the system.</li> <li>5. Disconnect the mains power cable from the wall outlet and all Probes, and External I/O Cabling.</li> <li>6. Remove the left Side Cover only, unless the Top Cover is removed to increase access to BEP top cables; then remove the right Side Cover.</li> <li>7. Remove the printer.</li> <li>8. Release the two clips holding the printer bracket to the top of the BEP.</li> <li>9. Gently slide the printer bracket back towards the center of the system to remove the printer bracket.</li> </ol>	
<p><b>Preparation Links (if you need more information):</b></p> <ul style="list-style-type: none"> <li>• <a href="#">4-2-4 "Power shut down" on page 4-7</a></li> <li>• <a href="#">8-4-6 "Loading the Software" on page 8-10</a></li> <li>• <a href="#">8-5-2 "Side Covers replacement" on page 8-27</a></li> <li>• <a href="#">8-5-3 "Top Cover replacement" on page 8-31</a></li> <li>• <a href="#">8-11-6 "Digital Graphic Printer replacement" on page 8-203</a></li> <li>• <a href="#">8-11-7 "Printer Bracket replacement" on page 8-205</a></li> </ul>	

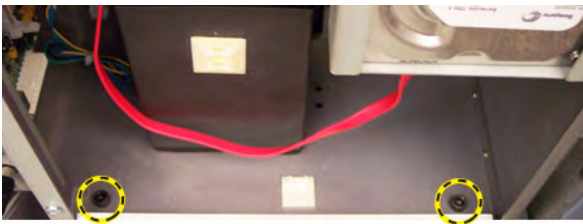

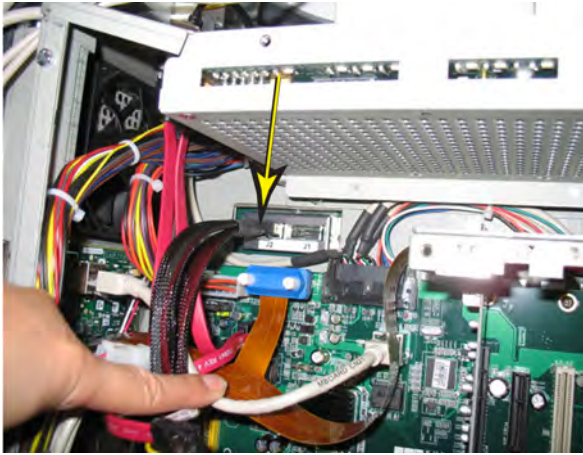
## 8-9-2.....BEP replacement - R3.x and earlier (cont'd)

### 8-9-2-1 BEP removal - R3.x and earlier

Table 8-55 BEP removal - R3.x and earlier

Steps	Corresponding Graphic
<p><b>⚠ WARNING</b></p> <p>When you return the used BEP to your local parts organization, make sure you remove <b>ALL PATIENT DATA</b> 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.</p> <p>Before you dispose of the hard drive, make sure you remove <b>ALL PATIENT DATA</b> 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.</p>	
<p><b>⚠ CAUTION</b></p> <p>When the BEP door is open, the Extended Power Shutdown circuit board is exposed. When working inside the BEP, remove the battery cable form J3 on the Extended Power Shutdown. Otherwise, the 24V battery will be exposed. If you drop a tool or a screw on the Extended Power Shutdown, you could short the battery. Permanent damage will be done if this happens.</p>	
<p><i>NOTE: Some cables in the BEP have a locking latch. Make sure to slide the locking latch towards you and pull the connector to the left to release.</i></p>	
1.	Disconnect all I/O cables and all cables at the top of the BEP. See: Figure 8-167 on page 8-383.
2.	Loosen the thumb screw or screws at the top of the BEP cover that attach the cover to the BEP. Tilt the top of the BEP cover away from the BEP.
3.	<p>Disconnect:</p> <ul style="list-style-type: none"> <li>the battery cable from <b>J3</b> on the EPS (Extended Power Shutdown) Board.</li> <li>the cables (<b>1</b>) connecting the EPS to the BEP.</li> </ul> <p>Place the BEP cover aside.</p> <div> <p><b>inside of BEP Cover, EPS and cables</b></p>  </div>

**Table 8-55 BEP removal - R3.x and earlier**

Steps	Corresponding Graphic
<p>4. Remove the two 5 mm HEX key screws at the inside base of the BEP.</p>	<p><b>BEP Base HEX key screws</b></p> 
<p>5. Reach inside the BEP to disconnect the BEP to Backplane cable from <b>J3</b> on a GFI Configuration.</p> <p>Release the lock connector for the BEP to Backplane cable, <b>J2</b> (left) on a MRX Configuration. Keep the cable to transfer to the replacement BEP.</p>	<p><b>BEP Cable to Backplane J3 of GFI Configuration (views inside the BEP)</b></p>  <p><b>BEP Cable to Backplane, J2 (left) of MRX Configuration</b></p> 
<p>6. Slide:</p> <ul style="list-style-type: none"> <li>the entire BEP away from the system approximately one inch, then finish removing the printer bracket.</li> <li>the entire BEP out of chassis and remove the BEP from the system.</li> </ul>	

**Table 8-55    BEP removal - R3.x and earlier**

Steps		Corresponding Graphic
7.	Remove the following parts from the BEP, if present (to reinstall in the replacement BEP): <ul style="list-style-type: none"><li>• DVR Card</li><li>• Flex Jumper Cable</li><li>• SATA cable (which goes between the DVR and Motherboard)</li><li>• Patient I/O filler</li><li>• Patient I/O module</li><li>• Option Dongle</li><li>• Printer Bracket</li></ul>	



8-9-2-2 BEP installation - R3.x and earlier

Table 8-56 BEP installation - R3.x and earlier

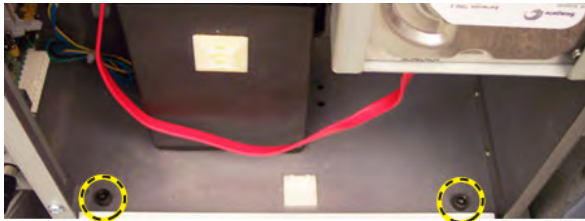

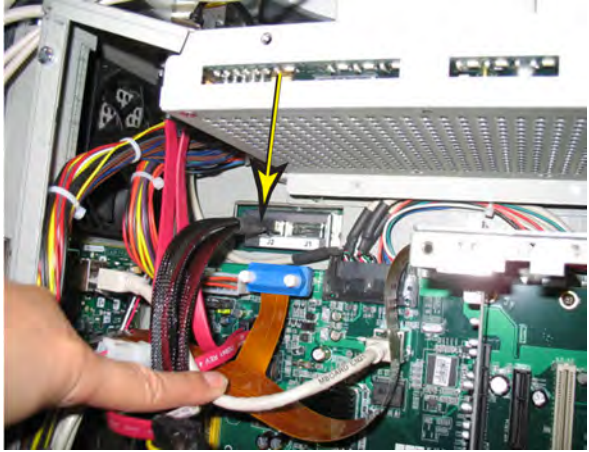


Steps		Corresponding Graphic
1.	Reinstall the following parts from the BEP that was replaced (all that were present): <ul style="list-style-type: none"> <li>• DVR Card</li> <li>• Flex Jumper Cable</li> <li>• SATA cable (which goes between the DVR and Motherboard)</li> <li>• Patient I/O filler</li> <li>• Patient I/O module</li> <li>• Option Dongle</li> <li>• Printer Bracket</li> </ul>	
2.	Slide the BEP into the left side of the chassis frame.	
3.	Install the two HEX key screws at the inside base of the BEP (Torque: 10 Nm {7.4 lbf-ft}).	

Table 8-56 BEP installation - R3.x and earlier

Steps	Corresponding Graphic
<p>4. Reach inside the BEP and connect:</p> <ul style="list-style-type: none"> <li>• the BEP cable to the Backplane <b>J3</b> on a GFI Configuration.</li> <li>• the BEP cable to Backplane <b>J2</b> (left) on a MRX Configuration.</li> </ul>	<p><b>BEP Cable to Backplane J3 of GFI Configuration (views inside the BEP)</b></p>  <p><b>BEP Cable to Backplane, J2 (left) of MRX Configuration</b></p> 
<p>5. NOTE: If you DO NOT reconnect the internal BEP cable to the Backplane, the system will power up but WILL NOT scan or WILL LAUNCH into simulator mode.</p>	
<p>6. Insert the bottom lip of the BEP cover inside the base of the BEP.</p>	
<p>7. Connect the Battery cable to <b>J3</b> on the EPS and EPS to BEP cables to the EPS.</p>	
<p>8. MAKE SURE all cables are clear of the BEP Cover and tilt the top of the BEP cover toward the BEP.</p>	
<p> <b>NOTICE</b></p> <p>Be careful not to pinch any of the cables when installing the BEP cover.</p>	
<p>9. Tighten the thumb screw or screws at the top of the BEP cover that attach the cover to the BEP.</p>	

**Table 8-56 BEP installation - R3.x and earlier**

Steps	Corresponding Graphic
10. 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 three 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.	
11. Lower the lower Column Cover. Make sure the Column Cover is behind the printer bracket.	
12. Position the Front Cover to engage the Column Cover stop tabs.	
13. Latch the two latches that clamp the printer bracket to the top of the BEP.	
14. Slide the Black and White printer into the printer bracket and connect the cables to the back of the printer.	
15. Tighten the printer bracket wing nut to secure the printer.	
16. Connect all cables at the top of the BEP and all I/O cables. See: Figure 8-167 on page 8-383.	
17. Replace the covers.	
18. Reinstall Baseload and Application software.	
19. Enter the system's TCPIP settings and Option strings.	
20. Restore the Patient Archive images, Report Archive, User-Defined Configuration (Customer Presets), and Service settings.	
21. Perform Functional Checks. See: <a href="#">8-9-3-3 - Calibration and adjustments</a> , <a href="#">8-9-3-4 - Verification</a> and <a href="#">8-9-3-5 "Functional Checks"</a> on page 8-146.	

## 8-9-3 BEP replacement - R4.x and later

**NOTE:** BEP replacement requires a software reload.





If the battery does not come installed in the BEP FRU, see [8-9-9 "BEP Battery Pack replacement - R4.x and later"](#) on page 8-170 to install / transfer the battery into the new BEP.

**Table 8-57 Manpower / Time and Tools**

Manpower / Time	Tools
One person / 1 hour if all options are installed plus the time it takes to load the software, excludes travel time	Refer to: <a href="#">8-2-5 "Tools needed for servicing LOGIQ E9"</a> on page 8-5.



## 8-9-3.....BEP replacement - R4.x and later (cont'd)

Table 8-58 Preparations and Preparation Links



Preparations - you must perform the following steps	
 <b>WARNING</b>  	<p><b>DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.</b></p> <ol style="list-style-type: none"> <li><b>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).</b></li> <li><b>2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.</b></li> </ol>
 <b>NOTICE</b>  	<p>Energy Control and Power Lockout for LOGIQ E9</p> <p><b><i>When servicing parts of the system where there is exposure to voltage greater than 30 Volts:</i></b></p> <ol style="list-style-type: none"> <li><b>1. Turn OFF and unplug the system.</b></li> <li><b>2. Maintain control of the system power plug.</b></li> <li><b>3. 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.</b></li> <li><b>4. DISCONNECT THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. this should be done whenever the bep is open and the chargeboard is exposed and changing parts.</b></li> </ol> <p>Beware that the Main Power Supply, ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.</p>
<ol style="list-style-type: none"> <li>1. Record the system's TCPIP settings and installed Option strings.</li> <li>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.</li> <li>3. Raise the Top Console to the highest position.</li> <li>4. Power down the system.</li> <li>5. Disconnect the mains power cable from the wall outlet and all Probes, and External I/O Cabling.</li> <li>6. Remove the left Side Cover only, unless the Top Cover is removed to increase access to BEP top cables; then remove the right Side Cover.</li> <li>7. Remove the printer.</li> <li>8. Release the two clips holding the printer bracket to the top of the BEP.</li> <li>9. Gently slide the printer bracket back towards the center of the system to remove the printer bracket.</li> </ol>	
<p><b>Preparation Links (if you need more information):</b></p> <ul style="list-style-type: none"> <li>• <a href="#">4-2-4 "Power shut down" on page 4-7</a></li> <li>• <a href="#">8-4-6 "Loading the Software" on page 8-10</a></li> <li>• <a href="#">8-5-2 "Side Covers replacement" on page 8-27</a></li> <li>• <a href="#">8-5-3 "Top Cover replacement" on page 8-31</a></li> <li>• <a href="#">8-11-6 "Digital Graphic Printer replacement" on page 8-203</a></li> <li>• <a href="#">8-11-7 "Printer Bracket replacement" on page 8-205</a></li> </ul>	

8-9-3-1 BEP removal

Table 8-59 BEP removal - R4.x and later

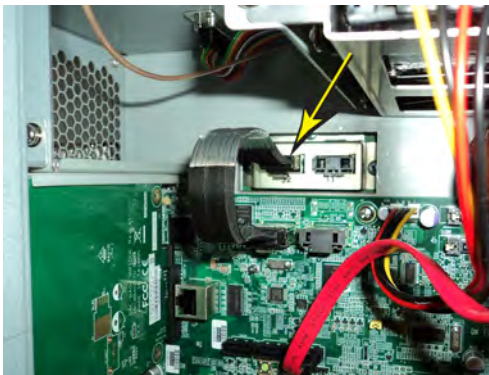
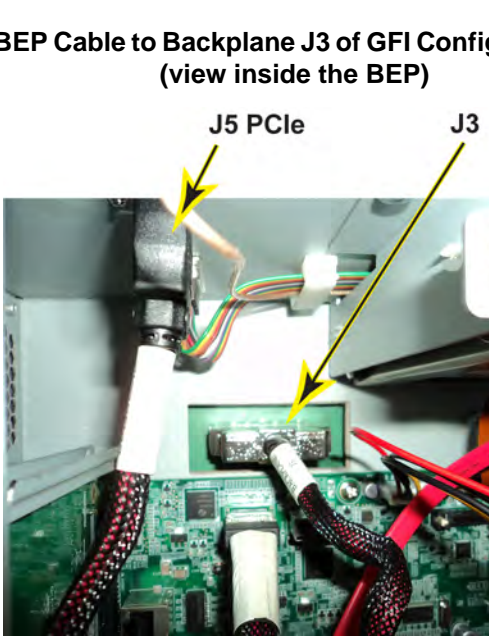
Steps	Corresponding Graphic
<p> <b>WARNING</b></p> <p>When you return the used BEP to your local parts organization, make sure you remove <b>ALL PATIENT DATA</b> from the hard drive, given that the hard drive is still functional. In some countries, you may be required to delete all software from the disk before returning the BEP to the parts warehouse. Follow your local policies.</p> <p>Before you dispose of the hard drive, make sure you remove <b>ALL PATIENT DATA</b> 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.</p>	
<p> <b>CAUTION</b></p> <p>When the BEP door is open, the ChargeBoard is exposed. When working inside the BEP, remove the battery cable from PCN1 on the ChargeBoard. Otherwise, the 24V battery will be exposed. If you drop a tool or a screw on the Extended Power Shutdown or ChargeBoard, you could short the battery. Permanent damage will be done if this happens.</p>	
<p><b>NOTE:</b></p> <p><i>You cannot power up the unit with the cables detached. The system will power up without the battery pack, but the cables on the cover must be attached.</i></p> <p><i>Some cables in the BEP have a locking latch. Make sure to slide the locking latch towards you and pull the connector to the left to release.</i></p>	
1.	Disconnect all I/O cables and all cables at the top of the BEP. See: Figure 8-169 on page 8-388.
2.	Loosen the thumb screws or screws at the top of the BEP cover, or the three screws that attach the cover to the BEP. Tilt the top of the BEP cover away from the BEP.

**Table 8-59 BEP removal - R4.x and later**

Steps	Corresponding Graphic
<p>3. <i>NOTE: All the connectors to the CB (ChargeBoard) must be "unlocked" to remove.</i></p> <p>Disconnect:</p> <ul style="list-style-type: none"> <li>• the battery cable from <b>PCN1</b> on the CB (ChargeBoard).</li> <li>• the CB to the PB (PowerBoard) cable from <b>PCN2</b>.</li> </ul> <p>Place the BEP cover aside.</p>	<p><b>BEP6 CB cables</b></p>  <p><b>PCN2</b></p> <p><b>PCN1</b></p>
<p>4. Remove the two 5 mm HEX key screws at the inside base of the BEP.</p>	<p><b>BEP Base HEX key screws</b></p> 



**Table 8-59 BEP removal - R4.x and later**

Steps	Corresponding Graphic
<p>5. Release the lock connector for the BEP to Backplane cable, <b>J2</b> (left) on a MRX Configuration.</p>       <p>Or, the Backplane cable, <b>J3</b> (right) and <b>J5</b> PCIe to the Card Rack on a GFI Configuration, using a BEP6. Keep the cable to transfer to the replacement BEP.</p>	<p style="text-align: center;"><b>BEP Cable to Backplane, J2 - BEP6</b></p>  <p style="text-align: center;"><b>BEP Cable to Backplane J3 of GFI Configuration (view inside the BEP)</b></p> 
<p>6. Slide:</p> <ul style="list-style-type: none"> <li>• the entire BEP away from the system approximately one inch, then finish removing the printer bracket.</li> <li>• the entire BEP out of chassis and remove the BEP from the system.</li> </ul>	
<p>7. Remove the following parts from the BEP, to reinstall in the replacement BEP:</p> <ul style="list-style-type: none"> <li>• Option Dongle</li> <li>• Printer Bracket</li> <li>• BackPlane to BEP cable</li> <li>• Wireless Card and Antennas, if present)</li> <li>• Patient I/O, if present)</li> <li>• S Video Card, if present)</li> </ul>	



8-9-3-2 BEP installation

Table 8-60 BEP installation



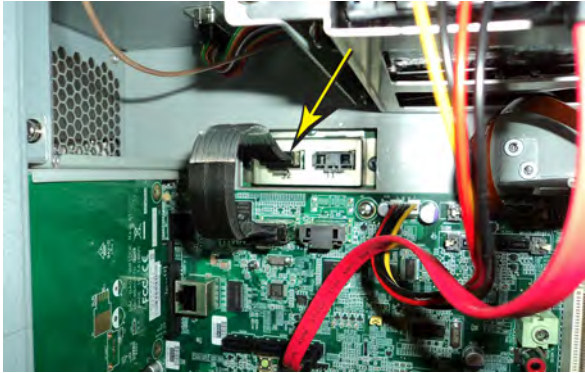
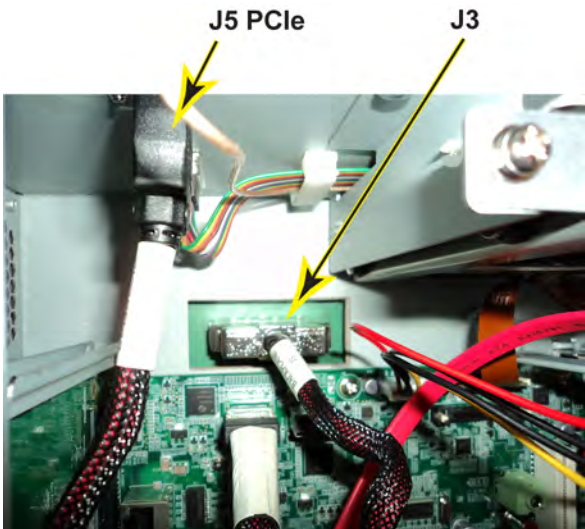

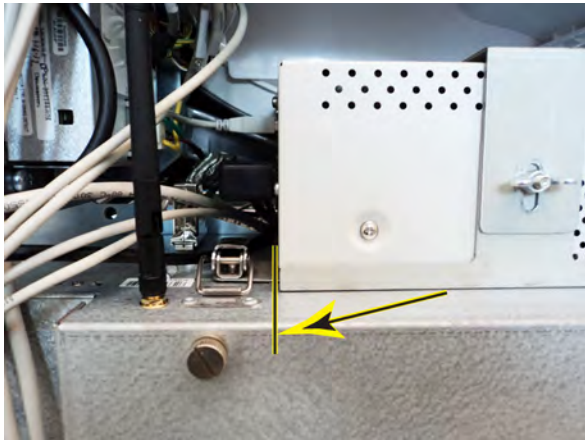
Steps	Corresponding Graphic
<p>1. Disconnect:</p> <ul style="list-style-type: none"> <li>• the battery cable from <b>PCN1</b>.</li> <li>• the CB to PB cable from <b>PCN2</b>.</li> </ul> <p>Place the BEP cover aside.</p>	<p><b>BEP6 CB cables</b></p> <p><b>PCN2</b></p>  <p><b>PCN1</b></p>
<p>2. Re-install the following parts into the replacement BEP:</p> <ul style="list-style-type: none"> <li>• Option Dongle</li> <li>• Printer Bracket</li> <li>• BackPlane to BEP cable</li> <li>• Wireless Card and Antennas, if present)</li> <li>• Patient I/O, if present)</li> <li>• S Video Card, if present)</li> </ul>	
<p>3. Slide the BEP into the left side of the chassis frame.</p>	
<p>4. Install the two HEX key screws at the inside base of the BEP (Torque: 10 Nm {7.4 lbf-ft}).</p>	

Table 8-60 BEP installation

Steps	Corresponding Graphic
<p>5. Reach inside the BEP and connect the BEP cable to the Backplane <b>J2</b> (left) on a MRX Configuration.</p> <p>MAKE sure the BEP Cable to the Backplane for BEP6 is installed as shown. DO NOT twist.</p> <p>Or, the Backplane cable, <b>J3</b> (right) and <b>J5</b> PCIe to the Card Rack on a GFI Configuration, using a BEP6.</p>	<p><b>BEP Cable to MRX Backplane, J2</b></p>  <p><b>BEP Cable to Backplane J3 of GFI Configuration (view inside the BEP)</b></p> 
<p>6. NOTE: If you DO NOT reconnect the internal BEP cable to the Backplane, the system will power up but WILL NOT scan or WILL LAUNCH into simulator mode.</p>	
<p>7. Insert the bottom lip of the BEP cover inside the base of the BEP.</p>	
<p>8. Connect the battery cable to <b>PCN1</b> and the CB to PB cable to <b>PCN2</b> on the CB. Make sure the cable connectors are "locked" into place on the CB connections.</p>	
<p>9. MAKE SURE all cables are clear of the BEP Cover and tilt the top of the BEP cover toward the BEP.</p>	
<p> <b>NOTICE</b></p> <p>Be careful not to pinch any of the cables when installing the BEP cover.</p>	
<p>10. Tighten and secure the thumb screws or screws at the top of the BEP cover, or the three screws that attach the cover to the BEP.</p>	

**Table 8-60 BEP installation**

Steps		Corresponding Graphic
11.	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 three 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.	
12.	Lower the lower Column Cover. Make sure the Column Cover is behind the printer bracket.	
13.	Position the Front Cover to engage the Column Cover stop tabs.	
14.	Latch the two latches that clamp the printer bracket to the top of the BEP.	
15.	Slide the Black and White printer into the printer bracket and connect the cables to the back of the printer.	<p><b>Printer aligned with printer bracket</b></p> 
16.	Tighten the printer bracket wing nut to secure the printer.	
17.	Connect all cables at the top of the BEP and all I/O cables .	
18.	Replace the covers.	
19.	Reinstall Baseload and Application software.	
20.	Enter the system's TCPIP settings and Option strings.	
21.	Restore the Patient Archive images, Report Archive, User-Defined Configuration (Customer Presets), and Service settings.	
22.	Perform Functional Checks. See: <a href="#">8-9-3-3 - Calibration and adjustments</a> , <a href="#">8-9-3-4 - Verification</a> and <a href="#">8-9-3-5 "Functional Checks"</a> on page 8-146.	

### 8-9-3-3 Calibration and adjustments

Calibrate the Front End as described in: [Section 6-4 "DC Offset Calibration" on page 6-8.](#)

### 8-9-3-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws that you removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

### 8-9-3-5 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-61 BEP replacement Functional Checks**

See Section	Functional Check	Debrief Script
<a href="#">4-2-3</a>	<a href="#">Power ON/Boot Up</a>	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
<a href="#">4-2-4</a>	<a href="#">Power shut down</a>	
<a href="#">4-3-15</a>	<a href="#">Probe/Connectors Checks</a>	
<a href="#">4-3-6</a>	<a href="#">B-Mode Checks</a>	
<a href="#">4-3-8</a>	<a href="#">System CFM and PWD Checks</a>	
<a href="#">4-3-20</a>	<a href="#">Mechanical Function Checks - internal and external</a>	
	Perform a 4D sweep	
	Diagnostics	






- 1.) Check/Set Date, Time, and Timezone, and set the Preset Region accordingly.
- 2.) Reconnect to the network.
- 3.) If the system was connected to InSite ExC, restore the service settings backed up prior to the base load. Reboot and verify remote connectivity.
- 4.) Confirm Patient Archive images, Report Archive, User Defined Configuration (Customer Presets), and Service settings are restored.
- 5.) Format a DVD, and backup Customer Presets to confirm proper CD/DVD write functionality.

## 8-9-4.....BEP I/O Board Assembly fYd UWa Ybh! F ( '1 UbX`YUf`JYf

Table 8-62 Manpower / Time and Tools

Manpower / Time	Tools
One person / 15 minutes	Refer to: <a href="#">8-2-5 "Tools needed for servicing LOGIQ E9" on page 8-5.</a>

Table 8-63 Preparations and Preparation Links

Preparations - you must perform the following steps	
 <b>WARNING</b>	<b>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.</b>
 <b>WARNING</b> 	<b>DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.</b> <b>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).</b> <b>2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.</b>
 <b>NOTICE</b> 	<b>Energy Control and Power Lockout for LOGIQ E9</b> <b>WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</b> <b>1. TURN OFF THE SCANNER.</b> <b>2. UNPLUG THE SYSTEM.</b> <b>3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</b> <b>4. 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.</b> <b>5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS IS EXPOSED AND CHANGING PARTS.</b> <b>Beware that the Main Power Supply, Extended Power Shutdown and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.</b>
<b>1. Power down the system.</b> <b>2. Disconnect the mains power cable from the wall outlet and all Probes, and External I/O Cabling.</b> <b>3. Remove Left Side cover.</b>	
<b>Preparation Links (if you need more information):</b> <ul style="list-style-type: none"> <li>• <a href="#">4-2-4 "Power shut down" on page 4-7</a></li> <li>• <a href="#">8-5-2 "Side Covers replacement" on page 8-27</a></li> </ul>	

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8-9-4-1 BEP I/O Board removal

Table 8-64 BEP I/O Board removal

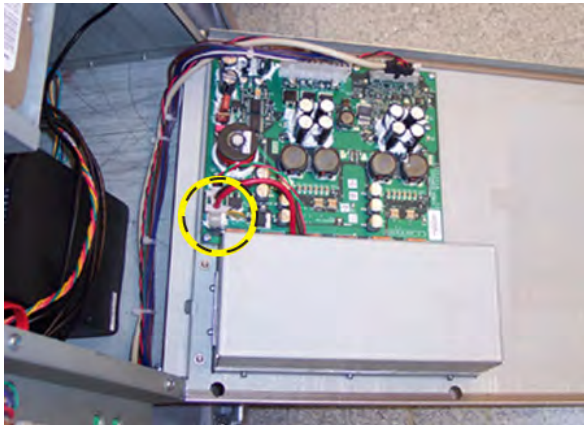


Steps		Corresponding Graphic
1.	Loosen the thumb screw or screws at the top of the BEP cover that attach the cover to the BEP. Tilt the top of the BEP cover away from the BEP.	
2.	Disconnect the battery cable connecting to <b>J3</b> on the EPS.	<b>EPS Battery connection (J3)</b> 
3.	Disconnect the cables inside the BEP that connect to the I/O.	
4.	Remove the HDD. See: <a href="#">8-9-6-2 "HDD installation" on page 8-160</a> . <i>NOTE: DO NOT forget to remove the metal tabs holding the cables to the hard drive.</i>	
5.	Remove all cables connected to the I/O Board and the Option Dongle.	
6.	Remove the plug from J35 connector on the I/O Board.	
7.	Remove the cable from J36. Squeeze from the base of the connector to release the cable.	
8.	Remove the plug from J20 by grabbing the metal connector (not the flex cable) and wiggling to gently remove.	
9.	Remove J46 network cable. Remember to release the tab to disconnect.	
10.	Remove the five screws connecting the I/O to the BEP.	<b>BEP I/O Board screw placement</b> 
11.	Gently slide the I/O Board out. Be careful to allow room for external connectors to slip past the back of the BEP. <i>NOTE: Remember there is still a connected cable at the base of the I/O Board.</i>	
12.	Slide out the I/O Board approximately 2 inches.	
13.	Gently tip out the top of the I/O Board.	
14.	Carefully remove the I/O Board until you can access the connector labeled J34.	

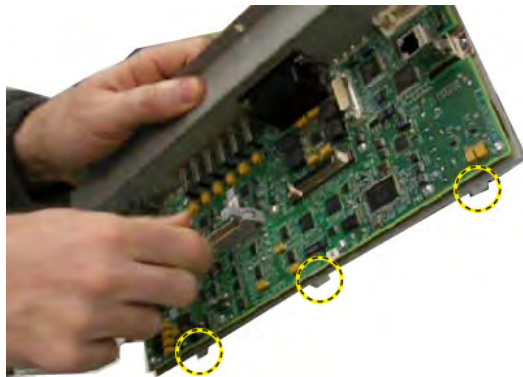

Table 8-64 BEP I/O Board removal

Steps		Corresponding Graphic
2.	Reach inside the BEP frame to pop the I/O Board toward you.	
2.	Set the I/O Board aside.	



8-9-4-2 BEP I/O Board installation

Table 8-65 BEP I/O Board installation






Steps		Corresponding Graphic	
1.	Guide the I/O Board into the BEP frame.		
2.	<p>Be sure the three tabs on the end of the I/O fit into the three slots in the back of the BEP frame.</p> <p>You will need to press in on the right side of the I/O cover while pulling out on the left side of the cover.</p> <p>You may need to seat the lower tab first and work up to the top</p>		
2.	Loosely insert all five screws before tightening them.		
3.	Re-install the cables in the reverse order from when they were removed, following the markings and re-install the Option Dongle.		
4.	Re-install the HDD.		
5.	Reconnect the I/O cabling.		
6.	Connect the Battery cable to <b>J3</b> on the EPS.		
7.	Make sure all cables are clear of the BEP Cover and tilt the top of the BEP cover toward the BEP.		
<div> <b>NOTICE</b></div> <p>Be careful not to pinch any of the cables when installing the BEP cover.</p>			
8.	Tighten and secure the thumb screw(s) at the top of the BEP cover that attach the cover to the BEP.		
9.	Replace the side cover.		
10.	Perform Functional Checks. See: <a href="#">8-9-5-3 - Calibration and adjustments</a> , <a href="#">8-9-5-4 - Verification</a> and <a href="#">8-9-5-5 "Functional Checks"</a> on page 8-156.		

## 8-9-5 BEP Side I/O Board Assembly replacement - R4.x and later

Table 8-66 Manpower / Time and Tools

Manpower / Time	Tools
One person / 15 minutes	Refer to: <a href="#">8-2-5 "Tools needed for servicing LOGIQ E9" on page 8-5.</a>

Table 8-67 Preparations and Preparation Links

Preparations - you must perform the following steps	
 <b>WARNING</b>	<b>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.</b>
 <b>WARNING</b> 	<b>DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.</b> <b>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).</b> <b>2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.</b>
 <b>NOTICE</b> 	<p>Energy Control and Power Lockout for LOGIQ E9</p> <p>WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</p> <ol style="list-style-type: none"> <li>1. TURN OFF THE SCANNER.</li> <li>2. UNPLUG THE SYSTEM.</li> <li>3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</li> <li>4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.</li> <li>5. DISCONNECT THE CHARGEBOARD BATTERY AT PCN1 ON THE CHARGEBOARD WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE CHARGEBOARD IS EXPOSED AND CHANGING PARTS.</li> </ol> <p>Beware that the Main Power Supply, ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.</p>
<ol style="list-style-type: none"> <li>1. Power down the system.</li> <li>2. Disconnect the mains power cable from the wall outlet and all Probes, and External I/O Cabling.</li> <li>3. Remove Left Side cover.</li> </ol>	
<b>Preparation Links (if you need more information):</b> <ul style="list-style-type: none"> <li>• <a href="#">4-2-4 "Power shut down" on page 4-7</a></li> <li>• <a href="#">8-5-2 "Side Covers replacement" on page 8-27</a></li> </ul>	

8-9-5-1 BEP Side I/O Board removal

Table 8-68 BEP Side I/O Board removal




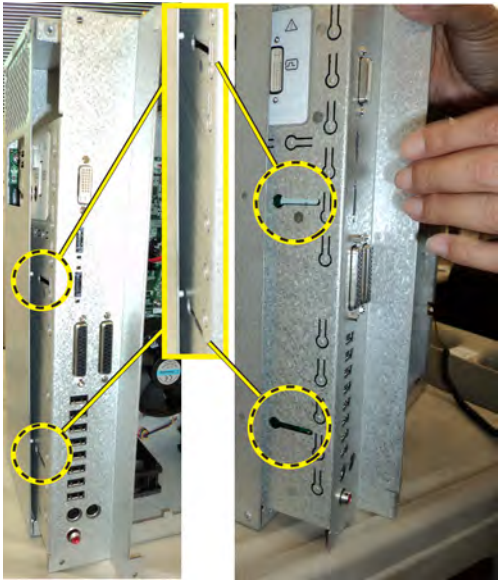
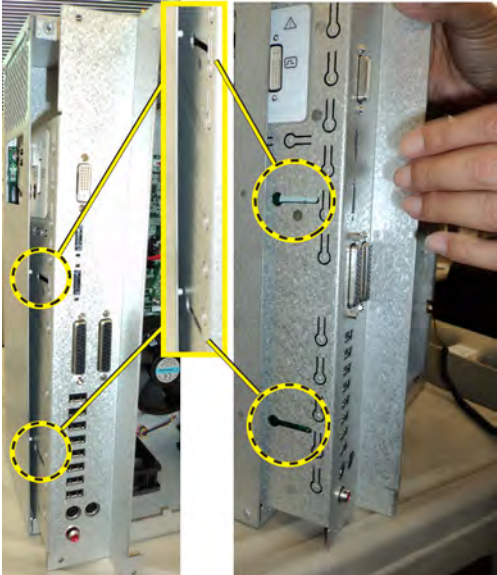

Steps	Corresponding Graphic
1. Disconnect all I/O cables and all cables at the top of the BEP. See: Figure 8-59 on page 8-137.	
2. Loosen the thumb screws or screws at the top of the BEP cover, or the three screws that attach the cover to the BEP. Tilt the top of the BEP cover away from the BEP.	
3. Disconnect: <ul style="list-style-type: none"> <li>the battery cable from <b>PCN1</b>.</li> <li>the CB to PB cable from <b>PCN2</b>.</li> </ul> Place the BEP cover aside.	<p><b>BEP6 CB cables</b></p> <p><b>PCN2</b></p>  <p><b>PCN1</b></p>
4. Remove the Option Dongle, on the I/O Board, inside the BEP.	<p><b>Option Dongle</b></p> 

Table 8-68    BEP Side I/O Board removal

Steps		Corresponding Graphic
5.	Remove the four Phillips screws securing the Side I/O Board to the BEP frame.	
6.	Slowly and carefully pull the I/O Board out of the BEP, making sure to avoid hitting components and circuit pins on both sides of the Board. Pay attention to the installation guide pins and the slots in the bracket that need to be clear as I/O Board and bracket are removed.	<p><b>I/O Board installation guides and slots</b></p> 
7.	Set the I/O Board aside.	

8-9-5-2 BEP Side I/O Board installation

Table 8-69 BEP Side I/O Board installation

Steps	Corresponding Graphic
<p>1. Slowly and carefully slide in the replacement I/O Board into the BEP, making sure to avoid hitting components and circuit pins on both sides of the board.</p> <p>Pay attention on the guides pins (on the BEP frame and the slots on the I/O Board), the guide pins need to be inserted into the slots. Guide the I/O Board into the BEP frame.</p>	<p><b>I/O Board installation guides and slots</b></p> 
2.	Re-install the four screws and tighten securely.
3.	Re-install the Option Dongle.
4.	Reconnect the I/O cabling.
5.	Connect the battery cable to <b>PCN1</b> and the CB to PB cable to <b>PCN2</b> on the CB. Make sure the cable connectors are "locked" into place on the CB connections.
6.	Make sure all cables are clear of the BEP Cover and tilt the top of the BEP cover toward the BEP.
<p> <b>NOTICE</b></p> <p>Be careful not to pinch any of the cables when installing the BEP cover.</p>	
7.	Tighten and secure the thumb screws or screws at the top of the BEP cover, or the three screws that attach the cover to the BEP.
8.	Replace the side cover.
9.	Perform Functional Checks. See: <a href="#">8-9-5-3 - Calibration and adjustments</a> , <a href="#">8-9-5-4 - Verification</a> and <a href="#">8-9-5-5 "Functional Checks"</a> on page 8-156.

**8-9-5-3 Calibration and adjustments**

No calibrations or adjustments are needed after this part replacement.

**8-9-5-4 Verification**

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws that you removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

**8-9-5-5 Functional Checks**

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-70 Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-15	Probe/Connectors Checks	
4-3-6	B-Mode Checks	
4-3-8	System CFM and PWD Checks	
4-3-20	Mechanical Function Checks	







## 8-9-6 BEP HDD (Hard Disk Drive) replacement - R3.x and earlier

Table 8-71 Manpower / Time and Tools

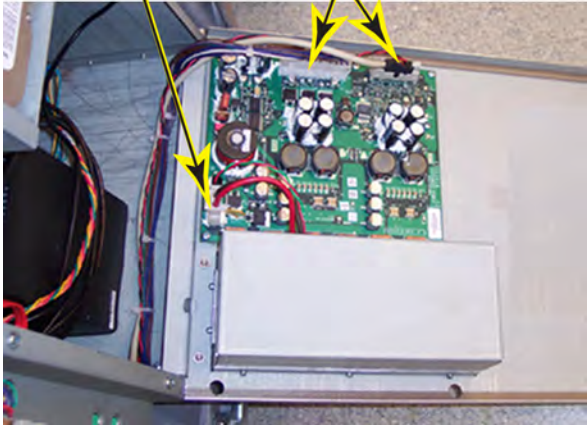

Manpower / Time	Tools
One person / 30 minutes 60 minutes Software Load	Refer to: <a href="#">8-2-5 "Tools needed for servicing LOGIQ E9" on page 8-5.</a>

Table 8-72 Preparations and Preparation Links

Preparations - you must perform the following steps	
 <b>WARNING</b> 	<p><b>DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.</b></p> <ol style="list-style-type: none"> <li><b>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).</b></li> <li><b>2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.</b></li> </ol>
 <b>NOTICE</b> 	<p>Energy Control and Power Lockout for LOGIQ E9</p> <p>WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</p> <ol style="list-style-type: none"> <li>1. TURN OFF THE SCANNER.</li> <li>2. UNPLUG THE SYSTEM.</li> <li>3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</li> <li>4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.</li> <li>5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS IS EXPOSED AND CHANGING PARTS.</li> </ol> <p>Beware that the Main Power Supply, Extended Power Shutdown and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.</p>
<ol style="list-style-type: none"> <li>1. Record the system's TCPIP settings and installed Option strings.</li> <li>2. Power down the system.</li> <li>3. Back up the Patient Archive images, Report Archive, User-Defined Configuration (Customer Presets), and Service settings. You will perform a Restore after the install.</li> <li>4. Disconnect the mains power cable from the wall outlet and all Probes.</li> <li>5. Remove Left Side cover.</li> </ol>	
<p><b>Preparation Links (if you need more information):</b></p> <ul style="list-style-type: none"> <li>• <a href="#">8-4-6 "Loading the Software" on page 8-10</a></li> <li>• <a href="#">4-2-4 "Power shut down" on page 4-7</a></li> <li>• <a href="#">8-5-2 "Side Covers replacement" on page 8-27</a></li> </ul>	


8-9-6-1 HDD removal

Table 8-73 HDD removal

	Steps	Corresponding Graphic
1.	Loosen the thumb screw or screws at the top of the BEP cover that attach the cover to the BEP. Tilt the top of the BEP cover away from the BEP.	
2.	Disconnect: <ul style="list-style-type: none"><li>the battery cable from <b>J3</b> on the EPS (Extended Power Shutdown) Board.</li><li>the cables (<b>1</b>) connecting the EPS to the BEP.</li></ul> Set the BEP cover aside.	<p>inside of BEP Cover, EPS and cables</p> 
3.	Remove the screw that secures the HDD bracket.	




**Table 8-73 HDD removal**

	Steps	Corresponding Graphic
4.	<p>Swing the HDD bracket out.</p> <p>Disconnect the cables connecting the HDD.</p> <p>Lift the bracket up, freeing the BEP / HDD hinge tabs from the slots.</p>	<p><b>HDD hinge tabs</b></p> 

8-9-6-2 HDD installation

Table 8-74 HDD installation





Steps		Corresponding Graphic
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.	Insert the base of the BEP cover at the base of the BEP.  Be sure the bottom lip of the BEP cover rests inside the BEP.	
6.	Connect the Battery cable to <b>J3</b> on the EPS and EPS to BEP cables to the EPS.	
7.	Make sure all cables are clear of the BEP Cover and tilt the top of the BEP cover toward the BEP.	
 <b>NOTICE</b> Be careful not to pinch any of the cables when installing the BEP cover.		
8.	Tighten and secure the thumb screw(s) at the top of the BEP cover, or the three screws that attach the cover to the BEP.	
9.	Replace the side cover.	
10.	Power up the system.	
11.	Reinstall the Baseload and Application Software.	
12.	Enter the TCPIP settings and Option strings for the LOGIQ E9.	
13.	Restore the Patient Archive images, Report Archive, User-Defined Configuration (Customer Presets), and Service settings.	
14.	Perform Functional Checks. See: <a href="#">8-9-7-3 - Calibration and adjustments</a> , <a href="#">8-9-7-4 - Verification</a> and <a href="#">8-9-7-5 "Functional Checks"</a> on page 8-165.	

## 8-9-7 BEP HDD replacement - R4.x and later

Table 8-75 Manpower / Time and Tools

Manpower / Time	Tools
One person / 30 minutes 60 minutes Software Load	Refer to: <a href="#">8-2-5 "Tools needed for servicing LOGIQ E9" on page 8-5.</a>

Table 8-76 Preparations and Preparation Links

Preparations - you must perform the following steps	
 <b>WARNING</b> 	<p><b>DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.</b></p> <ol style="list-style-type: none"> <li><b>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).</b></li> <li><b>2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.</b></li> </ol>
 <b>NOTICE</b> 	<p>Energy Control and Power Lockout for LOGIQ E9</p> <p>WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</p> <ol style="list-style-type: none"> <li>1. TURN OFF THE SCANNER.</li> <li>2. UNPLUG THE SYSTEM.</li> <li>3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</li> <li>4. WAIT FOR AT LEAST 20 SECONDS FOR CAPACITORS TO DISCHARGE AS THERE ARE NO TEST POINTS TO VERIFY ISOLATION. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.</li> <li>5. DISCONNECT THE CHARGEBOARD BATTERY AT PCN1 ON THE CHARGEBOARD WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE CHARGEBOARD IS EXPOSED AND CHANGING PARTS.</li> </ol> <p>Beware that the Main Power Supply, ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.</p>
<ol style="list-style-type: none"> <li>1. Record the system's TCPIP settings and installed Option strings.</li> <li>2. Power down the system.</li> <li>3. Back up the Patient Archive images, Report Archive, User-Defined Configuration (Customer Presets), and Service settings. You will perform a Restore after the install.</li> <li>4. Disconnect the mains power cable from the wall outlet and all Probes.</li> <li>5. Remove Left Side cover.</li> </ol>	
<p><b>Preparation Links (if you need more information):</b></p> <ul style="list-style-type: none"> <li>• <a href="#">8-4-6 "Loading the Software" on page 8-10</a></li> <li>• <a href="#">4-2-4 "Power shut down" on page 4-7</a></li> <li>• <a href="#">8-5-2 "Side Covers replacement" on page 8-27</a></li> </ul>	

8-9-7-1 HDD removal

Table 8-77 HDD removal


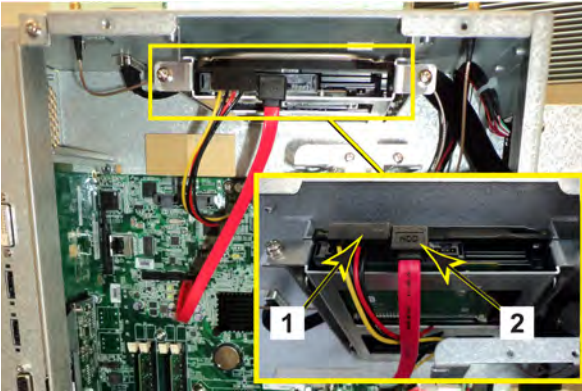
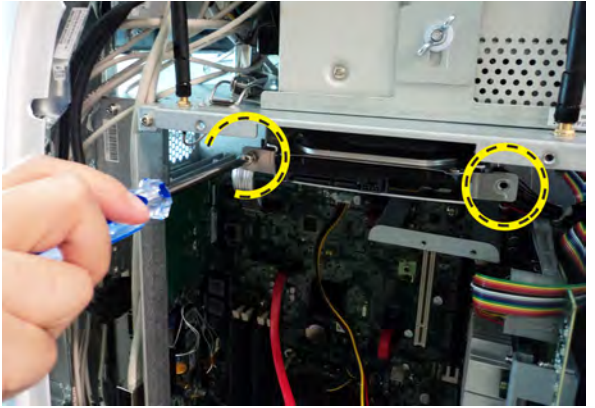

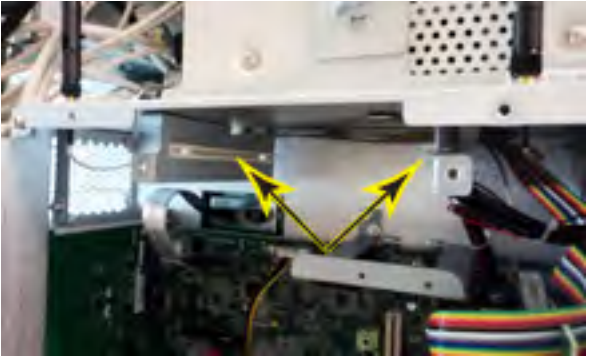

	Steps	Corresponding Graphic
1.	Loosen the thumb screws or screws at the top of the BEP cover, or the three screws that attach the cover to the BEP. Tilt the top of the BEP cover away from the BEP.	
2.	Disconnect the battery from <b>PCN1</b> on the the CB (ChargeBoard).	<p><b>BEP6 CB cables</b></p> <p><b>PCN2</b></p>  <p><b>PCN1</b></p>
3.	Disconnect HDD Power cable (1) and SATA cable (2).	<p><b>HDD cable connections</b></p> 

Table 8-77 HDD removal

	Steps	Corresponding Graphic
4.	Remove the two Phillips screws securing the HDD and Bracket to the BEP frame.	<p><b>HDD mounting screws</b></p> 
5.	<p>Pull/slide the HDD out of the BEP, and Bracket to the BEP frame. Slight force may need to be applied since the HDD fits tightly into the BEP motherboard.</p> <p>Note the HDD installation guides.</p>	<p><b>HDD removal</b></p>  <p><b>HDD installation guides</b></p> 

8-9-7-2 HDD installation

Table 8-78 HDD installation

Steps		Corresponding Graphic
1.	Slide the replacement HDD and bracket into the guides. Continue to install the HDD and bracket into the BEP until it seats into the motherboard.	
2.	Re-installed the two Phillips screws to secure the HDD and bracket to the BEP frame. Hand Tighten.	
3.	Connect the power and SATA cables to the HDD.	
4.	Connect the battery cable to <b>PCN1</b> on the CB.	
5.	Make sure all cables are clear of the BEP Cover and tilt the top of the BEP cover toward the BEP.	
 <b>NOTICE</b> Be careful not to pinch any of the cables when installing the BEP cover.		
6.	Tighten and secure the thumb screws or screws at the top of the BEP cover, or the three screws that attach the cover to the BEP.	
7.	Replace the side cover.	
8.	Power up the system.	
9.	Reinstall the Baseload and Application Software.	
10.	Enter the TCPIP settings and Option strings for the LOGIQ E9.	
11.	Restore the Patient Archive images, Report Archive, User-Defined Configuration (Customer Presets), and Service settings.	
12.	Perform Functional Checks. See: <a href="#">8-9-7-3 - Calibration and adjustments</a> , <a href="#">8-9-7-4 - Verification</a> and <a href="#">8-9-7-5 "Functional Checks"</a> on page 8-165.	

### 8-9-7-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

### 8-9-7-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws that you removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

### 8-9-7-5 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-79 Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-15	Probe/Connectors Checks	
4-3-6	B-Mode Checks	
4-3-8	System CFM and PWD Checks	
4-3-20	Mechanical Function Checks	










## 8-9-8 BEP Battery Pack replacement - R3.x and earlier

Table 8-80 Manpower / Time and Tools

Manpower / Time	Tools
One person / 15 minutes	Refer to: <a href="#">8-2-5 "Tools needed for servicing LOGIQ E9" on page 8-5.</a>

Table 8-81 Preparations and Preparation Links

Preparations - you must perform the following steps	
 <b>WARNING</b>	<b>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.</b>
 <b>WARNING</b> 	<b>DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.</b> <b>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).</b> <b>2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.</b>
 <b>WARNING</b> 	<b>THE WASTE OF ELECTRICAL AND ELECTRONIC EQUIPMENT MUST NOT BE DISPOSED AS UNSORTED MUNICIPAL WASTE AND MUST BE COLLECTED SEPARATELY.</b> <b>CONTACT THE MANUFACTURER OR OTHER AUTHORIZED DISPOSAL COMPANY TO DECOMMISSION YOUR EQUIPMENT.</b>
 <b>NOTICE</b> 	<b>Energy Control and Power Lockout for LOGIQ E9</b> <b>WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</b> <b>1. TURN OFF THE SCANNER.</b> <b>2. UNPLUG THE SYSTEM.</b> <b>3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</b> <b>4. 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.</b> <b>5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS IS EXPOSED AND CHANGING PARTS.</b> <b>Beware that the Main Power Supply, Extended Power Shutdown and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.</b>

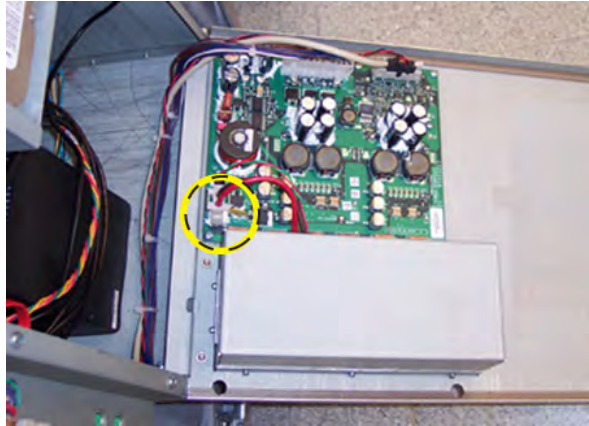



**Table 8-81 Preparations and Preparation Links**

Preparations - you must perform the following steps
<ol style="list-style-type: none"><li>1. Power down the system.</li><li>2. Disconnect the mains power cable from the wall outlet and all Probes.</li><li>3. Remove Left Side cover.</li></ol>
<b>Preparation Links (if you need more information):</b> <ul style="list-style-type: none"><li>• <a href="#">4-2-4 "Power shut down" on page 4-7</a></li><li>• <a href="#">8-5-2 "Side Covers replacement" on page 8-27</a></li></ul>


8-9-8-1 BEP Battery Pack removal

Table 8-82 removal

	Steps	Corresponding Graphic
1.	Loosen the thumb screws or screws at the top of the BEP cover that attach the cover to the BEP. Tilt the top of the BEP cover away from the BEP.	
2.	<p>Disconnect the battery cable connecting to <b>J3</b> on the EPS.</p> <p>Position the cable connector into the opening of the battery cavity, so the cable and battery can be easily removed.</p> <p>Close BEP door and secure closed.</p>	<p><b>EPS Battery connection (J3)</b></p> 
3.	<p>Remove the four screws to the Battery Cover on the BEP cover.</p> <p>Remove the Battery Pack Cover.</p>	<p><b>BEP Cover, BEP Battery Pack Cover screws</b></p> 
4.	Remove the stabilizing foam strip beside the battery pack.	
5.	Remove the BEP Battery Pack.	

8-9-8-2 BEP Battery Pack installation

Table 8-83 installation

	Steps	Corresponding Graphic
1.	Route the battery cable through the cable opening into the BEP and position the BEP Battery Pack into place.	
2.	Install the stabilizing foam strip beside the Battery Pack.	
3.	Install the Battery Pack Cover and the four screws that secure the Battery Pack Cover to the BEP cover. Tighten screws securely.	
4.	Loosen the thumb screws or screws at the top of the BEP cover that attach the cover to the BEP. Tilt the top of the BEP cover away from the BEP.	
5.	Connect the Battery cable to <b>J3</b> on the EPS.	
6.	Make sure all cables are clear of the BEP Cover and tilt the top of the BEP cover toward the BEP.	
 <b>NOTICE</b> Be careful not to pinch any of the cables when installing the BEP cover.		
7.	Tighten and secure the thumb screw(s) at the top of the BEP cover, or the three screws that attach the cover to the BEP.	
8.	Replace the side cover.	
9.	Perform Functional Checks. See: <a href="#">8-9-9-3 - Calibration and adjustments</a> , <a href="#">8-9-7-4 - Verification</a> and <a href="#">8-9-9-5 "Functional Checks"</a> on page 8-174.	








**NOTE:** ALL batteries **MUST BE** recycled or disposed of in accordance with local, state, or country laws.

## 8-9-9 BEP Battery Pack replacement - R4.x and later

Table 8-84 Manpower / Time and Tools

Manpower / Time	Tools
One person / 15 minutes	Refer to: <a href="#">8-2-5 "Tools needed for servicing LOGIQ E9" on page 8-5.</a>

Table 8-85 Preparations and Preparation Links


Preparations - you must perform the following steps	
 <b>WARNING</b>	<b>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.</b>
 <b>WARNING</b> 	<b>DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS.</b> <b>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).</b> <b>2. FOLLOW GENERAL GUIDELINES FOR HANDLING OF ELECTROSTATIC SENSITIVE EQUIPMENT.</b>
 <b>WARNING</b> 	<b>THE WASTE OF ELECTRICAL AND ELECTRONIC EQUIPMENT MUST NOT BE DISPOSED AS UNSORTED MUNICIPAL WASTE AND MUST BE COLLECTED SEPARATELY.</b> <b>CONTACT THE MANUFACTURER OR OTHER AUTHORIZED DISPOSAL COMPANY TO DECOMMISSION YOUR EQUIPMENT.</b>
 <b>NOTICE</b> 	<b>Energy Control and Power Lockout for LOGIQ E9</b> <b>WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</b> <b>1. TURN OFF THE SCANNER.</b> <b>2. UNPLUG THE SYSTEM.</b> <b>3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</b> <b>4. 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.</b> <b>5. DISCONNECT THE CHARGEBOARD BATTERY AT PCN1 ON THE CHARGEBOARD WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE CHARGEBOARD IS EXPOSED AND CHANGING PARTS.</b> <b>Beware that the Main Power Supply, ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.</b>

**Table 8-85 Preparations and Preparation Links**

Preparations - you must perform the following steps
<ol style="list-style-type: none"><li>1. Power down the system.</li><li>2. Disconnect the mains power cable from the wall outlet and all Probes.</li><li>3. Remove Left Side cover.</li></ol>
<b>Preparation Links (if you need more information):</b> <ul style="list-style-type: none"><li>• <a href="#">4-2-4 "Power shut down" on page 4-7</a></li><li>• <a href="#">8-5-2 "Side Covers replacement" on page 8-27</a></li></ul>


8-9-9-1 Battery Pack replacement

Table 8-86 removal

	Steps	Corresponding Graphic
1.	Loosen the thumb screws or screws at the top of the BEP cover, or the three screws that attach the cover to the BEP. Tilt the top of the BEP cover away from the BEP.	
2.	Disconnect the battery from <b>PCN1</b> on the  Position the cable connector into the opening of the battery cavity, so the cable and battery can be easily removed.  Close BEP door and secure closed.	<b>BEP6 CB cables</b>
3.	Remove the four screws to the Battery Cover on the BEP cover.  Remove the Battery Pack Cover.	<b>BEP Cover, BEP Battery Pack Cover screws</b>  A photograph of the BEP6.1 cover, which is a metal plate with a grid of small holes. Four screws are highlighted with yellow dashed circles: two at the top and two at the bottom. A label on the right side of the plate reads "BEP6.1", "E9", and "KSE0010158".
4.	Remove the stabilizing foam strip beside the battery pack.	
5.	Remove the BEP Battery Pack.	

8-9-9-2 BEP Battery Pack installation

Table 8-87 installation

	Steps	Corresponding Graphic
1.	Route the battery cable through the cable opening into the BEP and position the BEP Battery Pack into place.	
2.	Install the battery stabilizer strips beside the Battery Pack.	
3.	Install the Battery Pack Cover and the four screws that secure the Battery Pack Cover to the BEP cover. Tighten screws securely.	
4.	Loosen the thumb screws or screws at the top of the BEP cover that attach the cover to the BEP. Tilt the top of the BEP cover away from the BEP.	
5.	Connect the battery cable to <b>PCN1</b> on the CB.	
6.	Make sure all cables are clear of the BEP Cover and tilt the top of the BEP cover toward the BEP.	
 <b>NOTICE</b> Be careful not to pinch any of the cables when installing the BEP cover.		
7.	Tighten and secure the thumb screws at the top of the BEP cover, or the three screws that attach the cover to the BEP.	
8.	Replace the side cover.	
9.	Perform Functional Checks. See: <a href="#">8-9-9-3 - Calibration and adjustments</a> , <a href="#">8-9-7-4 - Verification</a> and <a href="#">8-9-9-5 "Functional Checks"</a> on page 8-174.	

**NOTE:** ALL batteries **MUST BE** recycled or disposed of in accordance with local, state, or country laws.

### 8-9-9-3 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

### 8-9-9-4 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws that you removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

### 8-9-9-5 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-88 Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-15	Probe/Connectors Checks	
4-3-6	B-Mode Checks	
4-3-8	System CFM and PWD Checks	
4-3-20	Mechanical Function Checks	



## **Section 8-10**

### **Main Power Supply parts replacement**

#### **8-10-1 Purpose of this section**

This section describes how to replace the Main Power Supply and components and to service parts.

## 8-10-2 Main Power Supply replacement

**NOTE:** If installed, remove the 4D motor controller and install in replacement Power Supply.

### 8-10-2-1 Manpower



One person, 30 minutes.

### 8-10-2-2 Tools

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

### 8-10-2-3 Preparations

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



**NOTICE** Energy Control and Power Lockout for LOGIQ E9

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

1. TURN OFF THE SCANNER.
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. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.

Beware that the Main Power Supply, Extended Power Shutdown or ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.

- 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 both Side Covers.
- 5.) Remove the Top Cover.
- 6.) Remove the Rear Bumper.
- 7.) Remove the Rear Cover.

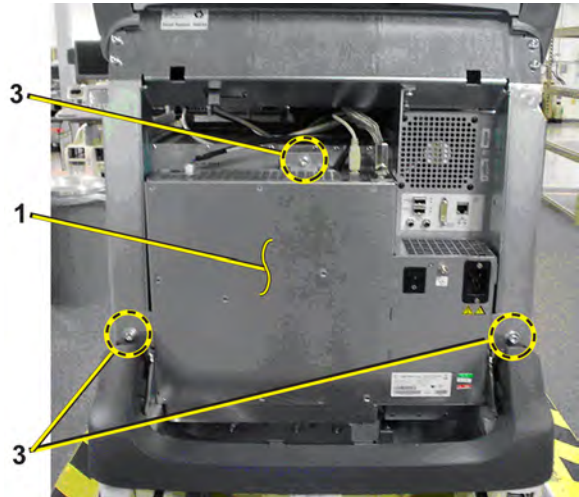
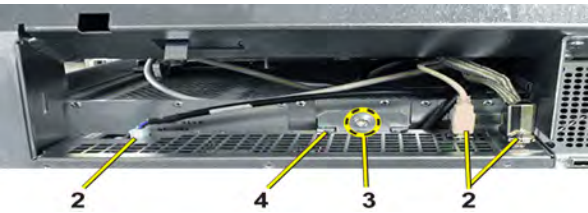
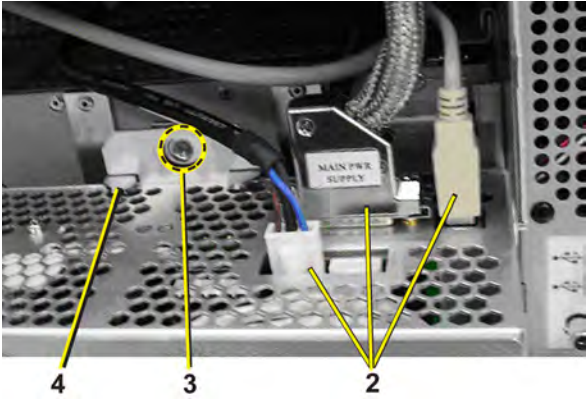
**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-2 "Side Covers replacement" on page 8-27.](#)
- [8-5-3 "Top Cover replacement" on page 8-31.](#)
- [8-5-7 "Rear Cover replacement" on page 8-38.](#)
- [8-10-4 "4D Motor Controller \(4D MC\) replacement" on page 8-186.](#)

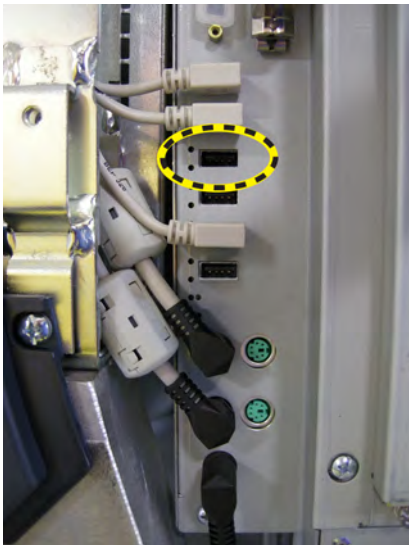

8-10-2-4 Main Power Supply removal

NOTE: This procedure addresses the two types of Main Power Supplies (Cherokee/Mitra and Lambda) used in the LOGIQ E9.

Table 8-89 Main Power Supply (PS) removal

	Steps	Corresponding Graphic
1.	<p>To remove Main PS (1):</p> <p>NOTE: The mounting of a Cherokee/Mitra PS and Lambda PS are the same. The PS connectors are in different locations.</p> <p>NOTE: When the system is in standby, the Lambda PS will be warm. This is normal for a Lambda PS.</p> <p>Disconnect the Mains PS Cable and all cables (2) - AC Output to Peripherals, Printer, Power to BEP and USB on top of the Main PS.</p> <p>Remove the three screws (3) that secure the Main PS using a 5 mm Allen wrench.</p> <p>Ease the Main PS away from the fang bracket (4).</p> <p>Pull/slide the entire Main PS backwards until the connectors to the Card Cage/ Backplane are unseated.</p> <p>NOTE: If the 4D MC option is installed, proceed to Step 2. If not proceed to Step 3.</p>	<p><b>Main PS and mounting</b></p>  <p>(Cherokee/Mitra) PS connectors</p>  <p>(Lambda) PS connectors</p> 

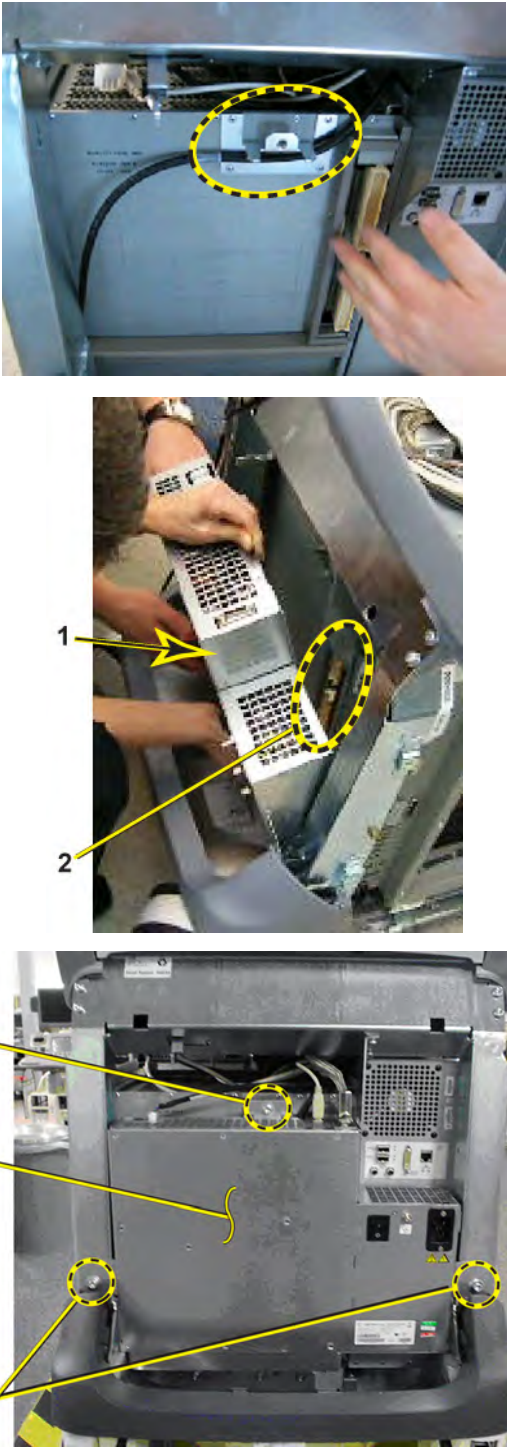
**Table 8-89 Main Power Supply (PS) removal**

	Steps	Corresponding Graphic
2.	<p>If the 4D MC option is installed, disconnect the USB Cable from J28 on the BEP. The 4D MC will also have to be transferred to the replacement PS. See Section 8-10-4 "4D Motor Controller (4D MC) replacement" on page 8-186.</p>	
3.	<p>Ease the PS away from the fang bracket.</p> <p>Pull/slide the entire PS backwards until the connectors to the Card Cage/Backplane are unseated.</p> <p>Lift the PS away.</p>	


8-10-2-5 Main PS installation

NOTE: If the 4D MC option was installed, make sure to reinstall the option into the new replacement PS.

Table 8-90 Main PS installation

	Steps	Corresponding Graphic
1.	<p>Make sure the GFI PCle cable is routed behind the Main PS fang. GFI Configuration only. MRX does not use this cable.</p> <p>Slide the Main PS (1) forward to seat the connectors (2) on the Card Cage.</p> <p>Engage the tab onto the Fang (see Step 1).</p> <p>Install the three screws (3) that secure the Main PS using a 5 mm Allen wrench (Torque: 10 Nm {7.4 lbf-ft}).</p>	

**Table 8-90 Main PS installation**

	Steps	Corresponding Graphic
2.	Reconnect the Mains PS Cable and all cables - AC Output to Peripherals, Printer, Power to BEP and USB on top of the Main PS.	<p>(Cherokee/Mitra) PS connectors</p>  <p>(Lambda) PS connectors</p> <p>PCIe Cable routed between Card Cage and Targa (right side view).</p>
3.	Install the Rear Cover, Top Cover and Side Covers.	



## 8-10-3 Main Power Supply Fan Assembly replacement

**NOTE:** *This procedure only applies to Cherokee/Mitra Main Power Supplies. The fan assembly for Lambda Power Supplies is not serviceable.*

### 8-10-3-1 Manpower

One person, 45 minutes.

### 8-10-3-2 Tools

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

### 8-10-3-3 Preparations

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



#### **NOTICE** Energy Control and Power Lockout for LOGIQ E9



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

1. TURN OFF THE SCANNER.
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. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.

Beware that the Main Power Supply, Extended Power Shutdown or ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.

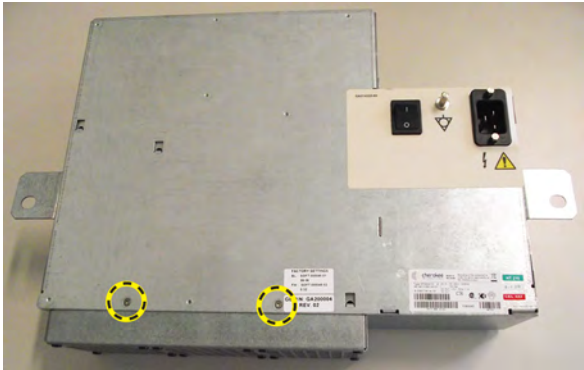

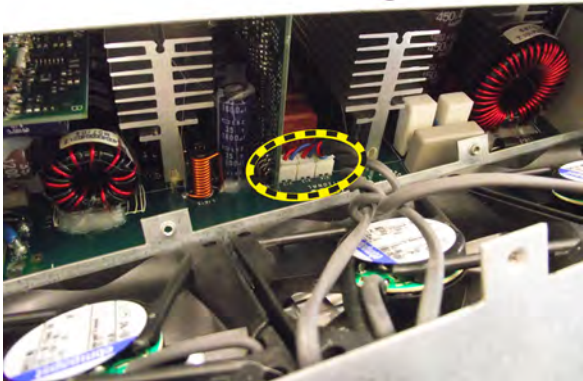
- 1.) Power down the system
- 2.) Disconnect the mains power cable from the wall outlet.
- 3.) Disconnect all Probes and External I/O Cabling.
- 4.) Remove both Side Covers.
- 5.) Remove the Top Cover.
- 6.) Remove the Rear Bumper.
- 7.) Remove the Rear Cover.
- 8.) Remove the Main Power Supply.

#### **Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-2 "Side Covers replacement" on page 8-27.](#)
- [8-5-3 "Top Cover replacement" on page 8-31.](#)
- [8-5-7 "Rear Cover replacement" on page 8-38.](#)
- [8-10-2 "Main Power Supply replacement" on page 8-176.](#)

8-10-3-4 Main Power Supply Fan Assembly removal

Table 8-91 Main Power Supply Fan Assembly Removal

	Step	Corresponding Graphic
1.	<p>Remove the Main Power Supply.</p> <p>Remove the five screws (Torx T10 screw head) securing the Fan Assembly to the PS. DO NOT discard the screws.</p> <p>Slide the Fan Assembly away from the PS.</p>	<p>Rear view of the PS</p>  <p>Inside view of the PS</p> 
2.	<p>Disconnect the Fan Assembly connectors (three white plastic connectors) from the PS to remove the assembly.</p>	



8-10-3-4 Main Power Supply Fan Assembly removal (cont'd)

Table 8-92 Installing the replacement Fan Assembly

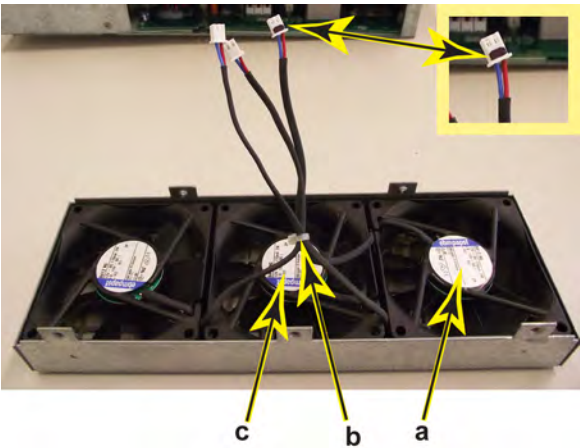


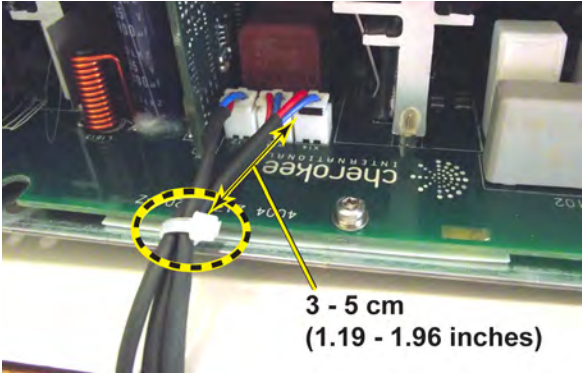
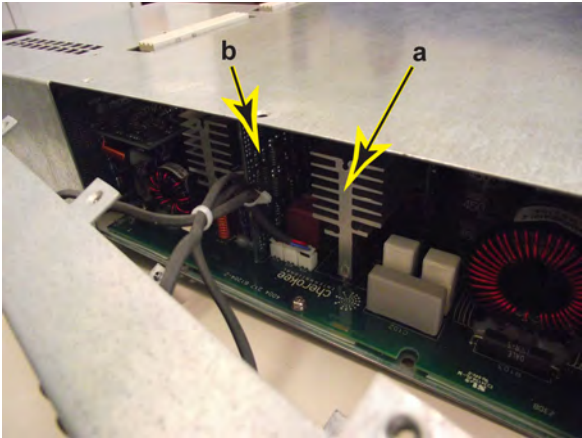

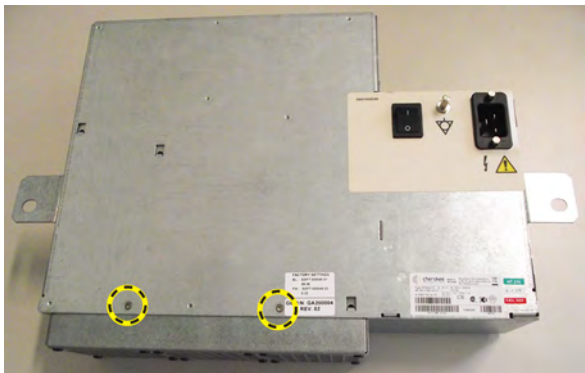
	Step	Corresponding Graphic
1.	<p>Prepare the replacement Fan Assembly for installation.</p> <p>Identify the connector for fan 1 (a). Fan 1 connector is identified with a black marking. Fan 1 (a) is the fan on the right side of the Fan Assembly (as shown).</p> <p>If there are no tie wraps attached, attach a tie wrap (b) to the connector cables to position the cables in the center of Fan 2 (c). Trim the end of the tie wrap.</p> <p><i>NOTE: The tie wraps are necessary to position the cables between the heatsink and the module when the Fan Assembly is placed into the PS.</i></p>	
2.	<p>Position the Fan Assembly under the PS (as shown), to ease connecting the connectors to the PS.</p> <p>Connect the Fan Assembly connectors to PS the fan terminals:</p> <p><i>NOTE: Fan 1 must be connected to the terminal labeled X14 (circled). Terminal X14 supplies the voltage to the stand-by fan (Fan 1) and also the regular operating voltage to Fan 1, once the system is turned on.</i></p> <ul style="list-style-type: none"> <li>• Fan 2 or 3 to the terminals labeled X12 or X13</li> <li>• Fan 1 to terminal labeled X14</li> </ul>	 

Table 8-92    Installing the replacement Fan Assembly

	Step	Corresponding Graphic
3.	If a tie wrap is not attached, attach a second tie wrap. Position the tie wrap 3 to 5 cm (1.19 to 1.96 inches) from the end of the cable sleeves. Trim the end of the tie wrap.	
4.	Position the wire tied cables between the heatsink (a) and the module (b) before placing the Fan Assembly into the PS.	

**Table 8-92 Installing the replacement Fan Assembly**

	Step	Corresponding Graphic
5.	Reinstall the five screws, removed earlier to secure the Fan Assembly to the Power Supply (PS).	<p><b>Inside view of the PS</b></p>  <p><b>Rear view of the PS</b></p> 

## 8-10-4 4D Motor Controller (4D MC) replacement

**NOTE:** This procedure addresses the 4D MC replacement for the two types of Main Power Supplies (Cherokee/Mitra and Lambda) used in the LOGIQ E9

### 8-10-4-1 Manpower


One person, 15 minutes.

### 8-10-4-2 Tools

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

### 8-10-4-3 Preparations

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



**NOTICE** Energy Control and Power Lockout for LOGIQ E9

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

1. TURN OFF THE SCANNER.
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. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.

Beware that the Main Power Supply, Extended Power Shutdown or ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.

- 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 Side Covers.
- 5.) Remove the Rear Cover and Identify the Main Power Supply.
- 6.) Remove the Main Power Supply.
- 7.) Disconnect the USB cable from J28 on the BEP I/O board if the 4D Motor Controller is present.





**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7](#)
- [8-5-2 "Side Covers replacement" on page 8-27](#)
- [8-5-7 "Rear Cover replacement" on page 8-38](#)
- [8-10-2 "Main Power Supply replacement" on page 8-176](#)

8-10-4-4 4D Motor Controller removal

8-10-4-4-1 Identifying the Main Power Supply (PS)

Table 8-93

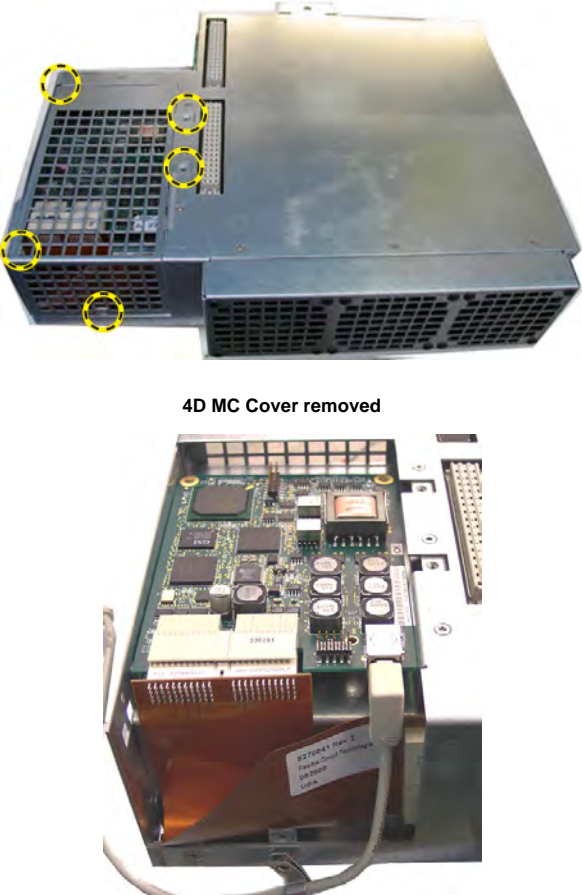
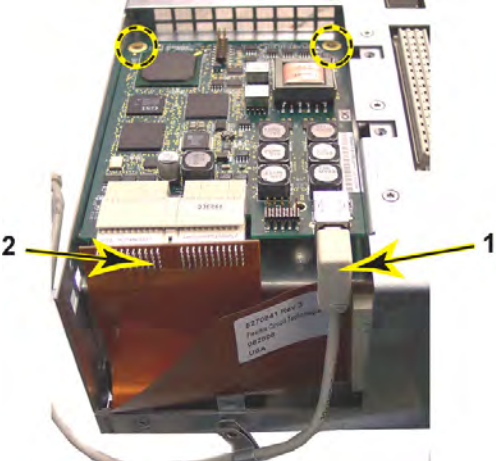
Cherokee/Mitra PS	Lambda PS
<p>PS Label (rear, bottom of PS - earlier and current production labels shown)</p>  <p>PS connectors (top of PS)</p> 	<p>PS Label (rear, bottom of PS)</p>  <p>PS connectors (top of PS)</p> 



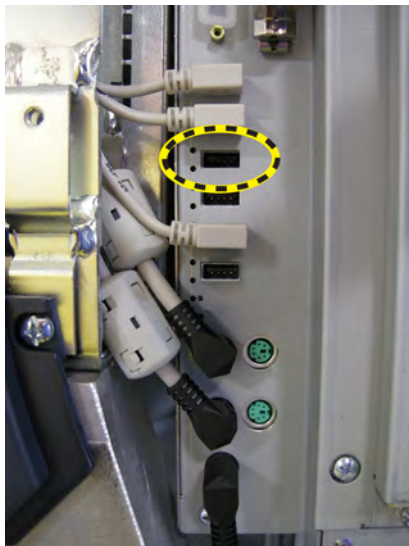
8-10-4-4-2      4D MC Replacement for Cherokee/Mitra PS

NOTE:      *Discard any removed components in the appropriate manner.*

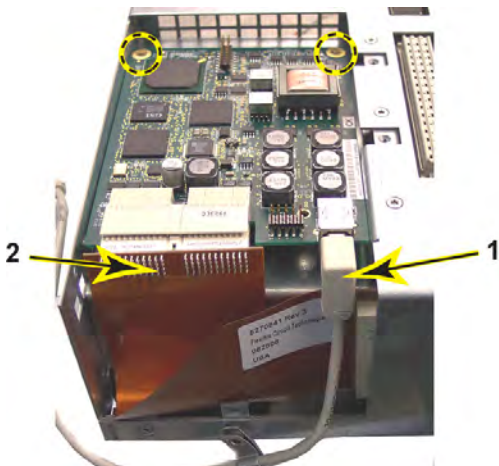

**Table 8-94    4D MC Removal for Cherokee/Mitra PS**

	Steps	Corresponding Graphic
1.	<p>Locate the 4D Motor Controller on the back of the Main PS.</p> <p>Remove the five screws (circled) securing the 4D MC Cover to the Main PS.</p> <p>Slide cover off to access the 4D MC.</p>	 <p>4D MC Cover removed</p>
2.	<p>Disconnect the USB Cable (1) and the Flex Cable (2) from the PS. DO NOT pull from the ribbon to remove. Only pull from the connector.</p> <p>Remove two screws (circled) and slide the board away to remove the 4D Motor Controller.</p> <p>NOTE: The replacement 4D MC includes a new Flex Cable, two USB Cables and a P-clamp.</p>	



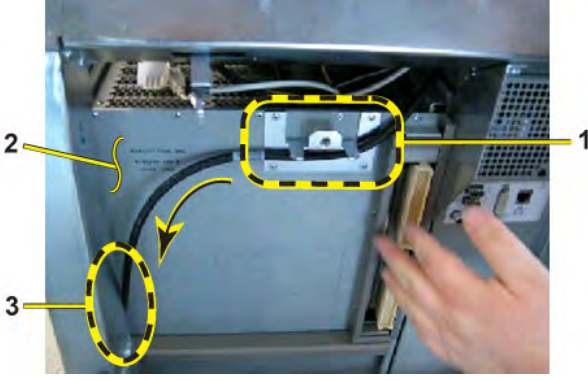
**Table 8-94 4D MC Removal for Cherokee/Mitra PS**

	Steps	Corresponding Graphic
3.	<p>Disconnect the USB Cable from J28 on the BEP.</p> <p>Discard all the removed components.</p>	

**Table 8-95 4D MC Reinstallation for Cherokee/Mitra PS**

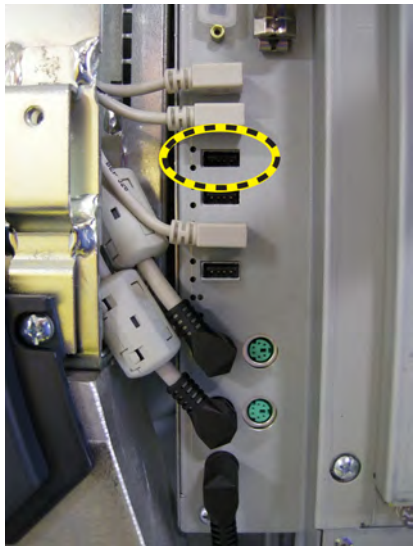
	Steps	Corresponding Graphic
1	<p><i>NOTE: Before installing the 4D MC, write down the part number, service number and revision. These will be used later to update VPD.</i></p> <p>Guide the 4D MC into its location in the Main PS and install the two screws (circled) supplied with the replacement.</p> <p>Make sure the Flex Cable to the Controller Card lies behind the Flex Cable from the Main PS as shown.</p> <p>Connect the Flex Cable (2) to the Main PS and 4D MC.</p> <p><i>NOTE: The replacement 4D MC includes a two USB Cables, the shorter USB Cable must be used for a Cherokee/Mitra PS.</i></p> <p>Connect the shorter USB Cable (1) to the 4D MC.</p>	
<p> <b>NOTICE</b></p> <p>Use care when connecting the Flex Cable to the connectors. The connectors are fragile and will be damaged if not installed properly.</p>		

**Table 8-95 4D MC Reinstallation for Cherokee/Mitra PS**

	Steps	Corresponding Graphic
2.	<p>Attach the new 4D MC Cover and route the USB Cable as shown.</p> <p>Use the P-Clamp, Screw and Washer supplied with the 4D MC replacement to secure the USB Cable to the PS.</p>	
4.	<p>Install the five screws (circled) to secure the 4D MC Cover to the Main PS. Make sure the P-Clamp for the 4D MC USB Cable is not twisted. It should be aligned with the Main PS.</p>	
5.	<p>Check that the GFI PCIe Cable is behind the Main PS fang (1). GFI Configuration only. MRX does not use this cable.</p> <p>Put the Main PS into position so it will be ready to be mounted.</p> <p>Feed the USB cable from the Main PS, between the BEP and the Targa frame and then feed the USB cable through the gap prior to fastening the Main PS to the Targa frame.</p> <p>Check that the GFI PCIe cable between the rear of the Card Cage (2) and the Targa frame (3).</p> <p><i>NOTE: If applicable; only on GFI Card Rack configuration.</i></p>	 <p><b>Side view of the PCIe Cable routed between the Card Cage and Targa.</b></p>

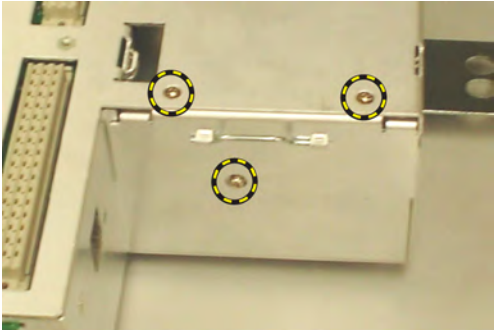
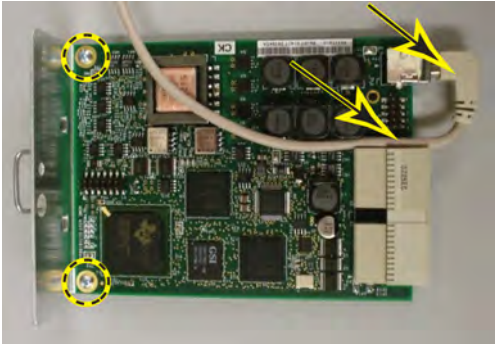
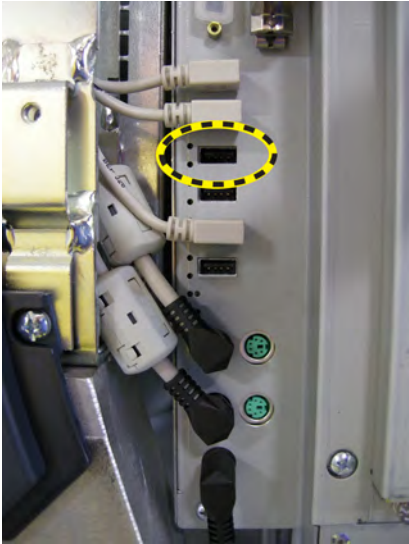


**Table 8-95 4D MC Reinstallation for Cherokee/Mitra PS**

	Steps	Corresponding Graphic
6.	Connect the USB Cable from the 4D MC to J28 on the BEP.	
7.	<p>Install the Main Power Supply.</p> <p>Install the rear Cover.</p> <p>Install the Side Covers.</p> <p>Record VPD information for 4D Motor Controller. For information on updating VPD, see: <a href="#">8-4-7-2 "Verify and Update Vital Product Data" on page 8-25.</a></p>	

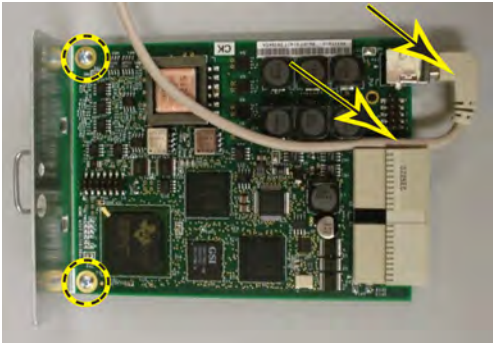
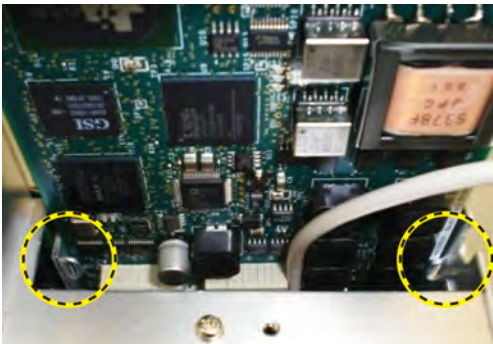
8-10-4-4-3      4D MC Replacement for Lambda PS

Table 8-96      4D MC Replacement for Lambda PS

	Steps	Corresponding Graphic
1.	<p>Locate the 4D MC Cover on the back of the Main PS.</p> <p>Remove the three screws from the 4D MC Cover. DO NOT discard. Gently slide the 4D MC Cover and the 4D MC out of the PS.</p>	
2.	<p>Remove the two screws (circled) that secure the 4D MC to the 4D MC Cover. Discard. Note how the 4D MC USB Cable is routed for installation.</p>	
3.	<p>Disconnect the USB Cable from J28 on the BEP.</p>	

8-10-4-4-4 4D MC Reinstallation for Lambda PS

**Table 8-97 4D MC Reinstallation for Lambda PS**

	Steps	Corresponding Graphic
1.	<p>Install the two screws (circled), supplied with the replacement 4D MC to secure the 4D MC to the 4D MC Cover.</p> <p><i>NOTE: The replacement 4D MC includes a two USB Cables, the longer USB Cable must be used for a Lambda PS.</i></p> <p>Connect the long USB Cable to the 4D MC. Route the cable as shown.</p>	
2.	<p>Insert the 4D MC and cover into the PS, along the mounting rails (circled).</p> <p><i>NOTE: There are four mounting rails, two at the top (circled) and two in the bottom. Make sure all are aligned to ensure the 4D MC connects to the Lambda PS. The 4D MC connects directly to the Lambda PS.</i></p>	

**Table 8-97 4D MC Reinstallation for Lambda PS**

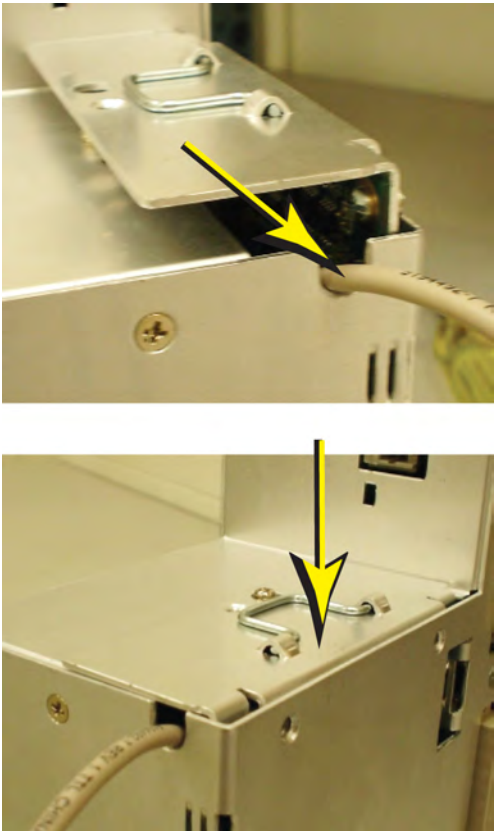

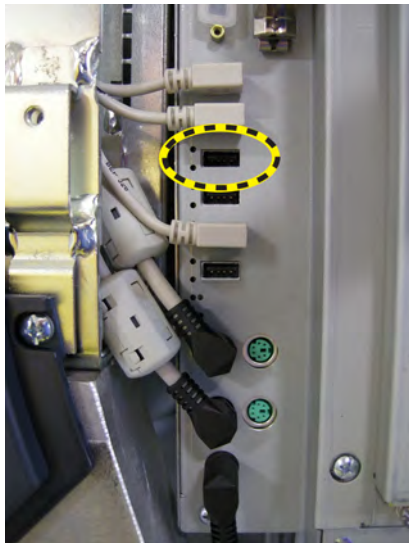
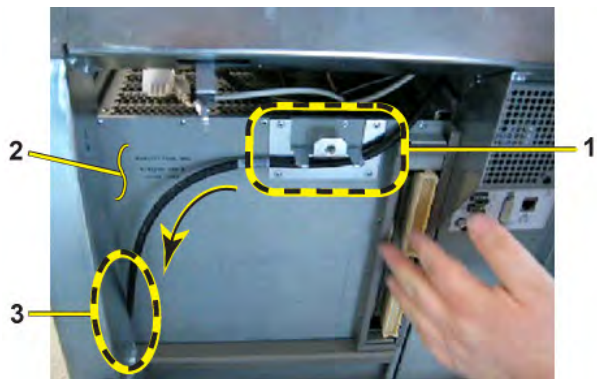
	Steps	Corresponding Graphic
3.	<p>Route the USB Cable through the slot in the PS.</p> <p>Firmly, but gently push on the 4D MC Cover until it is seated in place (connected) to the PS.</p> <p>Make sure the USB Cable is still in the correct position.</p> <p>Reinstall the three 4D MC Cover screws.</p>	
4.	<p>Put the Main PS into position so it will be ready to be mounted.</p> <p>Route the USB cable between the Targa frame and the BEP.</p>	

Table 8-97 4D MC Reinstallation for Lambda PS

	Steps	Corresponding Graphic
6.	Connect the USB Cable from the 4D MC to J28 on the BEP.	
7.	<p>Check that the GFI PCIe Cable is behind the Main PS fang (1).</p> <p>Put the Main PS into position so it will be ready to be mounted.</p> <p>Feed the USB cable from the Main PS, between the BEP and the Targa frame and then feed the USB cable through the gap prior to fastening the Main PS to the Targa frame.</p> <p>Check that the GFI PCIe cable between the rear of the Card Cage (2) and the Targa frame (3).</p> <p><i>NOTE: If applicable; only on GFI Card Rack configuration.</i></p>	 <p><b>Side view of the PCIe Cable routed between the Card Cage and Targa.</b></p>
7.	<p>Install the Rear Cover and Side Covers.</p> <p>Record VPD information for 4D Motor Controller. For information on updating VPD, see: <a href="#">8-4-7-2 "Verify and Update Vital Product Data" on page 8-25.</a></p>	

## **Section 8-11**

### **Peripherals replacement**

#### **8-11-1      Purpose of this section**

Follow the instructions in this section to replace peripherals.

## 8-11-2 Internal Peripherals overview

- Refer to: [Section 3-7-4 "Optional Peripherals/Peripheral Connection" on page 3-29.](#)

## 8-11-3 DVD R/W drive replacement

### 8-11-3-1 Manpower


One person, 15 minutes.


### 8-11-3-2 Tools

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

### 8-11-3-3 Preparations

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


**NOTICE** Energy Control and Power Lockout for LOGIQ E9




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


1. TURN OFF THE SCANNER.
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. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.

Beware that the Main Power Supply, Extended Power Shutdown or ChargeBoard and BEP may be energized even if the power is turned OFF if 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 (TO THE RIGHT OF 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.***

- 1.) Power down the system.
- 2.) Disconnect the mains power cable from the wall outlet.
- 3.) Disconnect all Probes and External I/O Cabling.



### 8-11-3-3 Preparations (cont'd)

- 4.) Remove the Side Covers.
- 5.) Remove the Top Cover.

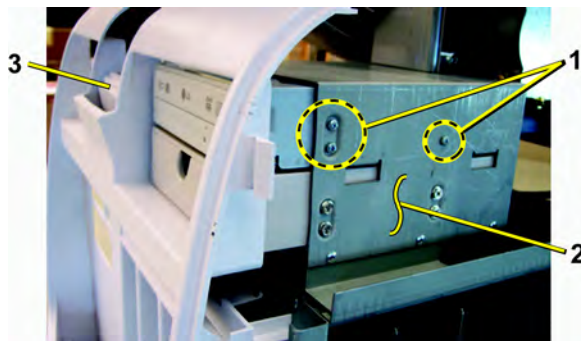
**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-2 "Side Covers replacement" on page 8-27.](#)
- [8-5-3 "Top Cover replacement" on page 8-31.](#)

### 8-11-3-4 DVD R/W drive removal

- 1.) Raise the console height to the highest level.
- 2.) Remove screws (1) securing the right side of the DVD Drive to the DVD / V Nav, Bay Bird bracket (2).
- 3.) Tilt the Front Cover forward just until the Column Cover stop tabs clear.
- 4.) Raise the Column Cover (3) to access and remove any screws securing the left side of the DVD drive to the DVD / V Nav, Bay Bird bracket.

**Figure 8-58 DVD Drive Screw placement, right side DVD drive to the DVD / V Nav bracket**



### 8-11-3-5 DVD R/W drive installation

- 1.) Slide the DVD drive into position.
- 2.) Seat the DVD Interface Board Bracket to the DVD Drive.
- 3.) Install the four screws to secure the DVD drive to the DVD Interface Board Bracket.
- 4.) Install the screws to secure the DVD drive to the DVD / V Nav, Bay Bird Bracket.
- 5.) Return the Column Cover to proper position.
- 6.) Install the Covers.



#### 8-11-3-6 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

#### 8-11-3-7 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Connect cables and Probes you removed earlier.
- 2.) Power up the system to verify that it operates as intended.
- 3.) Insert and play DVD to confirm proper operation of the DVD drive.

#### 8-11-3-8 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction **5180263-100**, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-98 DVD R/W drive replacement Functional Checks**

See Section	Functional Check	Debrief Script
<a href="#">4-2-3</a>	<a href="#">Power ON/Boot Up</a>	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
<a href="#">4-2-4</a>	<a href="#">Power shut down</a>	
<a href="#">4-3-15</a>	<a href="#">Probe/Connectors Checks</a>	
<a href="#">4-3-20</a>	<a href="#">Mechanical Function Checks</a>	
<a href="#">10-8-3</a>	<a href="#">Grounding continuity</a>	
<a href="#">10-8-4</a>	<a href="#">Chassis Leakage Current Test</a>	

#### 8-11-4 Digital Video Recorder (DVR) replacement

See: [8-11-20 "DVR \(Digital Video Recorder\) replacement - R3.x and earlier" on page 8-459](#) or [8-11-21 "DVR replacement - R4.x and later" on page 8-463](#).

## 8-11-5 DVD Storage Tray replacement

### 8-11-5-1 Manpower

One person, 15 minutes.

### 8-11-5-2 Tools

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

### 8-11-5-3 Preparations

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



#### **NOTICE** Energy Control and Power Lockout for LOGIQ E9

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

1. TURN OFF THE SCANNER.
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. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.

Beware that the Main Power Supply, Extended Power Shutdown or ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.



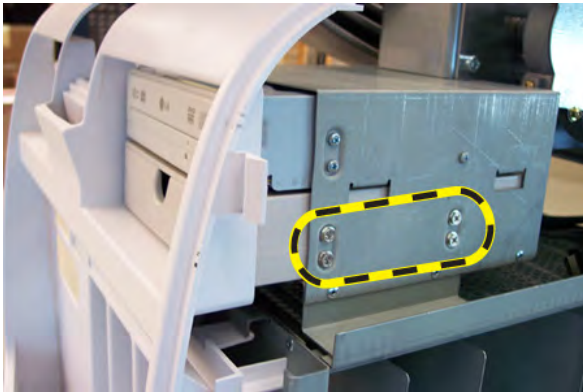
- 1.) Power down the system.
- 2.) Disconnect the mains power cable from the wall outlet.
- 3.) Disconnect all Probes and External I/O Cabling.
- 4.) Remove the Side Covers.
- 5.) Remove the Top Cover.
- 6.) Remove the DVD drive.

#### **Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-2 "Side Covers replacement" on page 8-27.](#)
- [8-5-3 "Top Cover replacement" on page 8-31.](#)
- [8-11-3 "DVD R/W drive replacement" on page 8-197.](#)

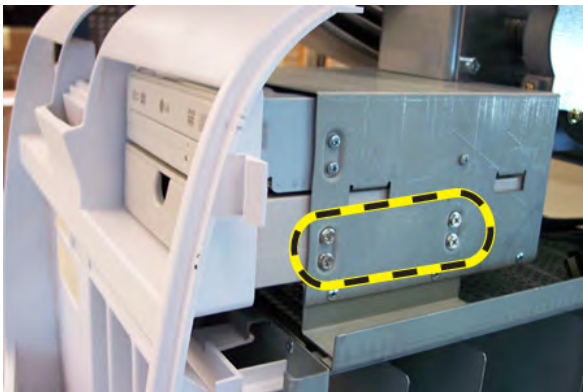
8-11-5-4 DVD Storage Tray removal

Table 8-99 DVD Storage Drawer removal

	Steps	Corresponding Graphic
1.	Remove the four screws securing the storage drawer to the LOGIQ E9. Discard the screws and drawer in the appropriate manner.	

8-11-5-5 DVD Storage Tray installation

Table 8-100 Storage Drawer Installation

	Steps	Corresponding Graphic
1.	Slide the Storage Drawer into the System.  Secure the Storage Drawer to the LOGIQ E9 with the four supplied screws.	

#### 8-11-5-6 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

#### 8-11-5-7 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws that you removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

#### 8-11-5-8 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-101 Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-15	Probe/Connectors Checks	
4-3-6	B-Mode Checks	
4-3-8	System CFM and PWD Checks	
4-3-20	Mechanical Function Checks	
4-3-20-2	Brakes and Direction Lock Checks	

## 8-11-6 Digital Graphic Printer replacement

### 8-11-6-1 Manpower

One person, 15 minutes.

### 8-11-6-2 Tools

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

### 8-11-6-3 Preparations

When preparing for the replacement, 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.
- 4.) Remove the Left Side Cover.

**Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-2 "Side Covers replacement" on page 8-27.](#)

### 8-11-6-4 Black and White Digital Graphic Printer removal

- 1.) Disconnect the cables from the back of the printer.
- 2.) Loosen the printer bracket wing nut that secures the printer.

**Figure 8-59 Black and White Digital Graphic Printer - wing nut**



- 3.) Slide the printer out.

### 8-11-6-5 Black and White Digital Graphic Printer installation

- 1.) Slide the printer into the printer bracket until the face is flush with the system.
- 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.

#### 8-11-6-6 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

#### 8-11-6-7 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Connect cables and Probes you removed earlier.
- 2.) Power up the system to verify that it operates as intended.
- 3.) Test the Print Keys to confirm they function as they did before.
- 4.) Perform a test print.

#### 8-11-6-8 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-102 Black and White Digital Graphic Printer replacement Functional Checks**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Leakage Current measured at (record the value) and meets allowable limits. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-15	Probe/Connectors Checks	
4-3-20	Mechanical Function Checks	
10-8-3	Grounding continuity	
10-8-4	Chassis Leakage Current Test	

## 8-11-7 Printer Bracket replacement

### 8-11-7-1 Manpower

One person, 15 minutes.

### 8-11-7-2 Tools

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

### 8-11-7-3 Preparations

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



#### **NOTICE** Energy Control and Power Lockout for LOGIQ E9



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

1. TURN OFF THE SCANNER.
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. THE AMBER LIGHT ON THE OP PANEL ON/OFF BUTTON WILL TURN OFF.
5. DISCONNECT THE EPS (EXTENDED POWER SHUTDOWN) BATTERY AT J3, OR THE BATTERY FROM THE CHARGEBOARD AT PCN1 WHEN WORKING IN THE BEP. THIS SHOULD BE DONE WHENEVER THE BEP IS OPEN AND THE EPS OR CHARGEBOARD IS EXPOSED AND CHANGING PARTS.

Beware that the Main Power Supply, Extended Power Shutdown or ChargeBoard and BEP may be energized even if the power is turned OFF if the cord is still plugged into the AC Outlet.

- 1.) Power down the system.
- 2.) Disconnect the mains power cable from the wall outlet.
- 3.) Disconnect all Probes.
- 4.) Remove the Side Covers.
- 5.) Remove the Top Cover.
- 6.) Remove the Black and White printer.

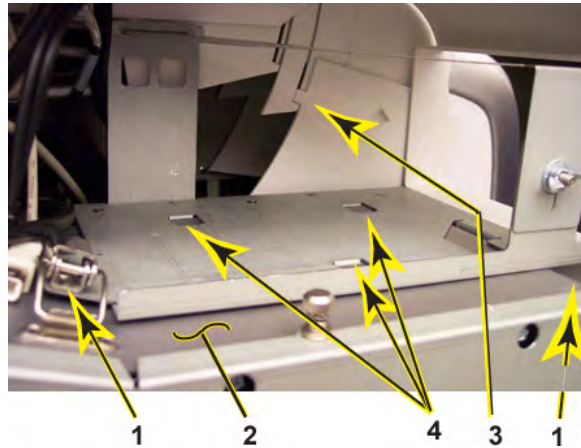
#### **Follow these links if you need more information:**

- [4-2-4 "Power shut down" on page 4-7.](#)
- [8-5-2 "Side Covers replacement" on page 8-27.](#)
- [8-5-3 "Top Cover replacement" on page 8-31.](#)
- [8-11-6 "Digital Graphic Printer replacement" on page 8-203.](#)

#### 8-11-7-4 Printer Bracket removal

- 1.) Raise the console height to the highest level.
- 2.) Unlatch the two latches (1) that clamp the printer bracket to the top of the BEP (2).
- 3.) Tilt the Main Console Front Cover forward just until the lower Column Cover stop tabs (3) clear.
- 4.) Lift the Column Cover Assembly.
- 5.) Push the printer bracket toward the Card Cage approximately 1/2 inch to free the three tabs (4) from the BEP.

Figure 8-60 Printer Bracket



- 6.) Remove the printer bracket from the BEP.

#### 8-11-7-5 Printer Bracket installation

- 1.) Position 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 three 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.
- 2.) Lower the lower Column Cover.
- 3.) Position the Main Console Front Cover to engage the lower Column Cover stop tabs.
- 4.) Latch the two latches that clamp the printer bracket to the top of the BEP.
- 5.) Slide the Black and White printer into the printer bracket and connect the cables to the back of the printer.
- 6.) Tighten the printer bracket wing nut to secure the printer.
- 7.) Connect the printer cables.
- 8.) Replace the covers.



#### 8-11-7-6 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

#### 8-11-7-7 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Verify that all screws that you removed earlier have been installed.
- 2.) If finished, connect cables and Probes removed earlier.
- 3.) Power up the system to verify that it operates as intended.

#### 8-11-7-8 Functional Checks

Perform the following functional checks to confirm the system is operational before returning the system to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**Table 8-103 Printer Bracket replacement Functional Checks**

See Section	Functional Check	Debrief Script
4-2-2	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.
4-2-3	Power shut down	
4-3-15	Probe/Connectors Checks	
4-3-5	B-Mode Checks	
4-3-7	System CFM and PWD Checks	
4-3-18	Mechanical Function Checks	

## Section 8-12

### V Nav Roll Stand and/or On-Board Stand Installation and/or Replacement

The purpose of this section is to describe assembly or replacement of the Roll Stand and/or the V Nav On-board Stand.

**NOTE:** These instructions can be used to service an existing LOGIQ E9 that has a V Nav Roll Stand or an On-Board V Nav Stand, or to install these options.



**NOTE:** Be sure the wheels on the Roll Stand are not locked and move the Roll Stand slowly, with caution to avoid tip over. DO NOT move with the arm extended.

**NOTE:** The Roll Stand basket is designed to hold the transmitter, which weighs about five pounds (2.27 kg). DO NOT overload the basket.

**Table 8-104 Manpower / Time and Tools**

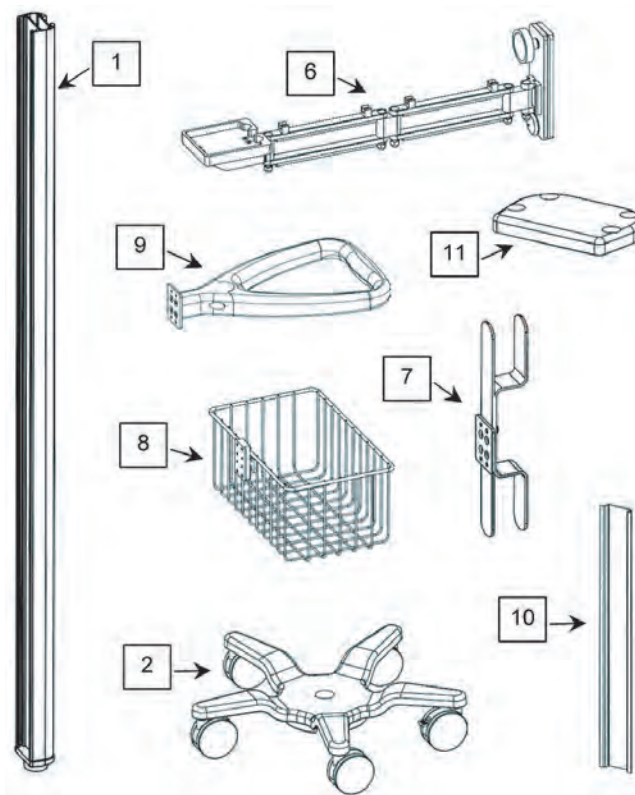
Manpower / Time	Tools
One person / 30 minutes	Refer to: <a href="#">8-2-5 "Tools needed for servicing LOGIQ E9" on page 8-5</a>

**Table 8-105 Preparations and Preparation Links**

Preparations - you must perform the following steps	
 <p><b>NOTICE</b></p> 	<p>Energy Control and Power Lockout for LOGIQ E9 WHEN SERVICING PARTS OF THE SYSTEM WHERE THERE IS EXPOSURE TO VOLTAGE GREATER THAN 30 VOLTS:</p> <ol style="list-style-type: none"> <li>1. TURN OFF THE SCANNER.</li> <li>2. UNPLUG THE SYSTEM.</li> <li>3. MAINTAIN CONTROL OF THE SYSTEM POWER PLUG.</li> </ol>
<ol style="list-style-type: none"> <li>1. Power down the LOGIQ E9.</li> <li>2. Move the User Interface (Top Console) to its lower position.</li> <li>3. Disconnect the mains power cable from the wall outlet and all Probes and External I/O Cabling.</li> <li>4. Remove any Tray Assembly, Probe Holder or Gel Warmer from the right side of the console. Any of these features MUST BE MOVED to the left side of the console before this option is installed. None of these features can be installed on the right side of the console with this option.</li> <li>5. Remove the Right Side Cover</li> </ol>	
<ul style="list-style-type: none"> <li>• <a href="#">4-2-4 "Power shut down" on page 4-7</a></li> <li>• <a href="#">8-5-2 "Side Covers replacement" on page 8-27</a></li> </ul>	

## 8-12-1 Parts Reference - Roll Stand

Figure 8-61 Volume Navigation Roll Stand Installation Kit - See [Table 8-106 "Volume Navigation Roll Stand Installation Kit - Parts Reference"](#) on page 8-210 for item description



## 8-12-1 Parts Reference - Roll Stand (cont'd)

The following parts and hardware are included with this installation kit (hardware not shown):

**Table 8-106 Volume Navigation Roll Stand Installation Kit - Parts Reference**

Item #	Description	Quantity
1	Roll Stand Post, 60 inches	1
2	Roll Stand Base with 21-lb. Counterweight	1
3	5/16-18 x 1 inch Hex Head Cap Screw (HHCS)	1
4	5/16 Flat Washer	1
5	5/16 Split Lock Washer	1
6	GE Volume Navigation Arm	1
7	Cord Loop Hook	1
8	Utility Basket	1
9	Handle	1
10	Track Cover, 12 inches	3
11	Cover Plate	1
not shown	1/4-20 x 3/8 inch Socket Head Cap Screw (SHCS)	4
not shown	1/2 inch Socket Wrench	1
not shown	3/16 inch Hex Wrench	1
not shown	3/32 inch Hex Wrench	1
not shown	1/8 inch Hex Wrench	1

## 8-12-2 Assembling or replacing the Roll Stand

Use these instructions to assembled or replace the Roll Stand.

- 1.) Insert the post in the base. The locator pin ensures correct alignment.

**Figure 8-62 Post into Base - (1) 5/16 fLAT Washer, (2) 5/16 Lock Washer, (3) 5/16-18 x 1 inch Screw - Roll Stand only**

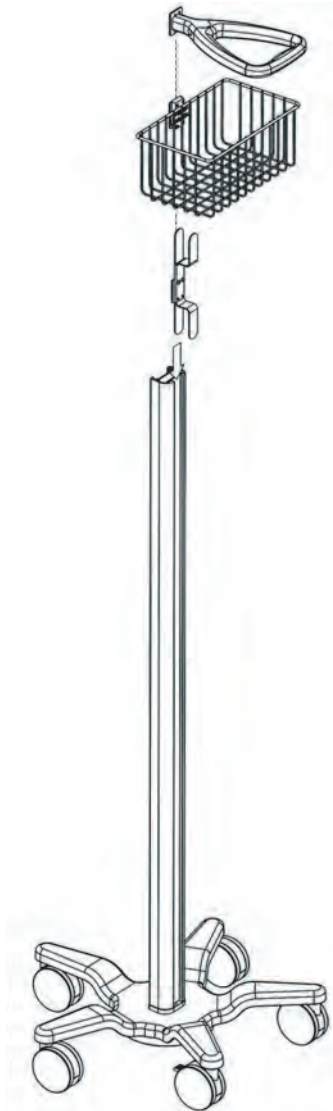


- 2.) Using the 1/2 inch socket wrench provided, fasten the post to the base with the hardware shown.

## 8-12-2 Assembling or replacing the Roll Stand (cont'd)

- 3.) Slide the cord loop hook, basket and handle into the rear channel in the order shown.

**Figure 8-63 Post Assembly**

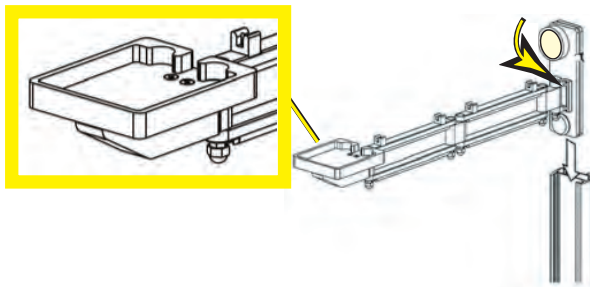


- 4.) Using the hex wrenches provided, tighten all of the set screws in each accessory to secure the position in the track.
  - a.) Tighten the top four set screws with the 3/32 inch hex wrench.
  - b.) Tighten the center four set screws with the 1/8 inch hex wrench.
  - c.) Tighten the bottom two set screws with 3/32 inch hex wrench.

## 8-12-2 Assembling or replacing the Roll Stand (cont'd)

5.) Loosen the knob slightly, guide the arm into the channel and move it to the mounting position.

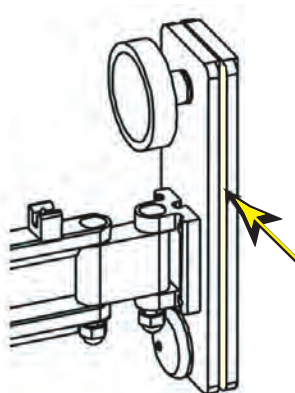
**Figure 8-64 Loosening Knob**



**NOTE:** Make sure the Transformer Support Platform (larger view) in [Figure 8-64 "Loosening Knob" on page 8-213](#) is installed in the UP position.

**NOTE:** The channel fits between the front and rear slide plates.

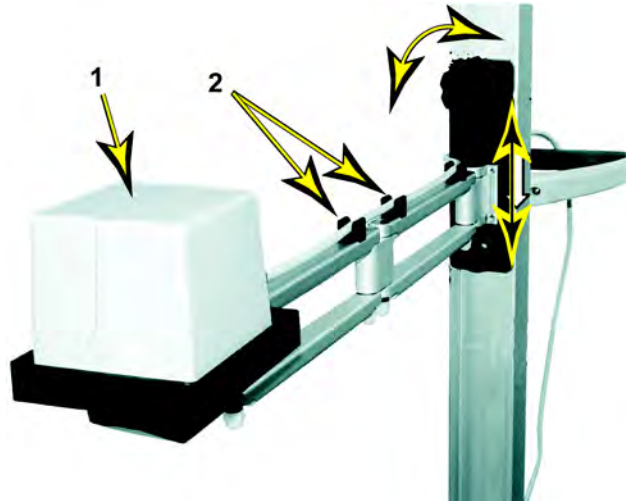
**Figure 8-65 Channel Location**



## 8-12-2 Assembling or replacing the Roll Stand (cont'd)

- 6.) Tighten the knob to lock the arm into position.
- 7.) Mount the transmitter (1) on the arm and route the cable through the cable clips (2) on the top side of the arm.

Figure 8-66 Cable Clips - Roll Stand only



- 8.) While supporting the arm (loaded with the transmitter), slowly loosen the knob which allows the arm to gradually move down the channel.

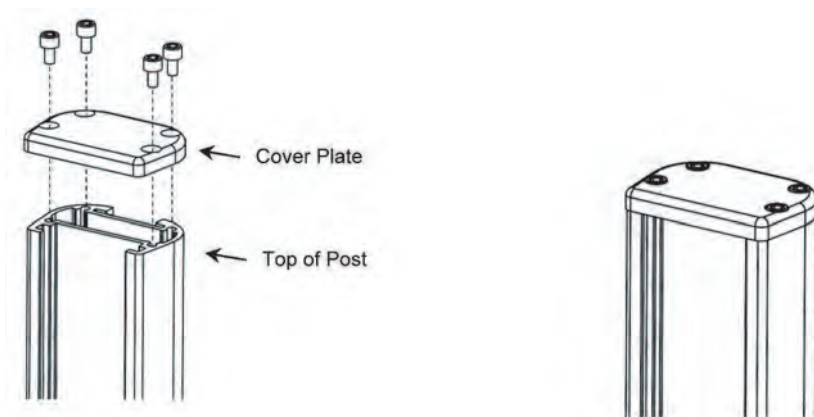
**NOTE:** The arm must move down the channel very slowly when the knob is loosened, and it must move easily upward when the lifting arm is in the channel. If the arm free-falls or will not move, follow the adjustment procedure, see: [8-12-6 "Adjusting Tension on Sliding Mechanism" on page 8-224](#).



## 8-12-2 Assembling or replacing the Roll Stand (cont'd)

- 9.) Using the 3/16 inch hex wrench provided, fasten the cover plate to the top of the post with four (4) 1/4-20 x 3/8 inch SHCS as shown.

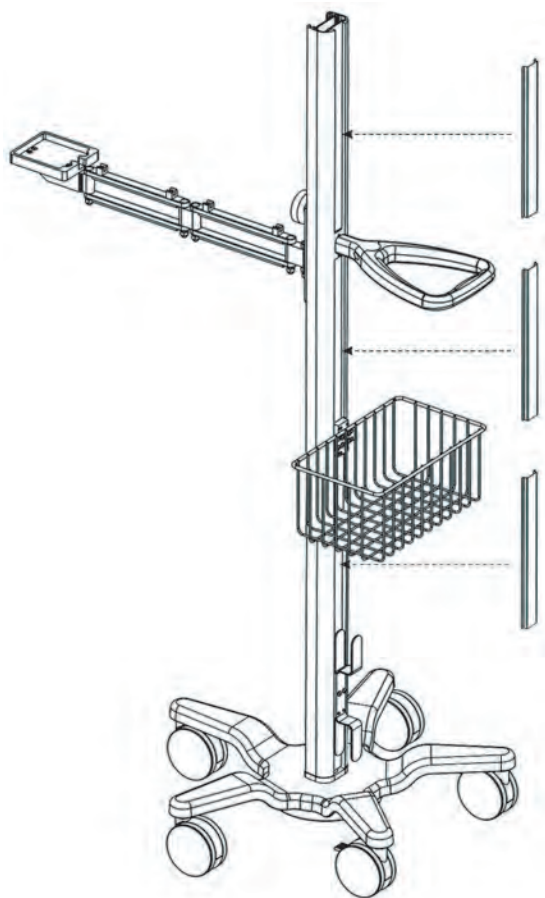
Figure 8-67 Cover Plate Installation



## 8-12-2 Assembling or replacing the Roll Stand (cont'd)

10.) Snap the three Rear Track Covers into place in locations shown.

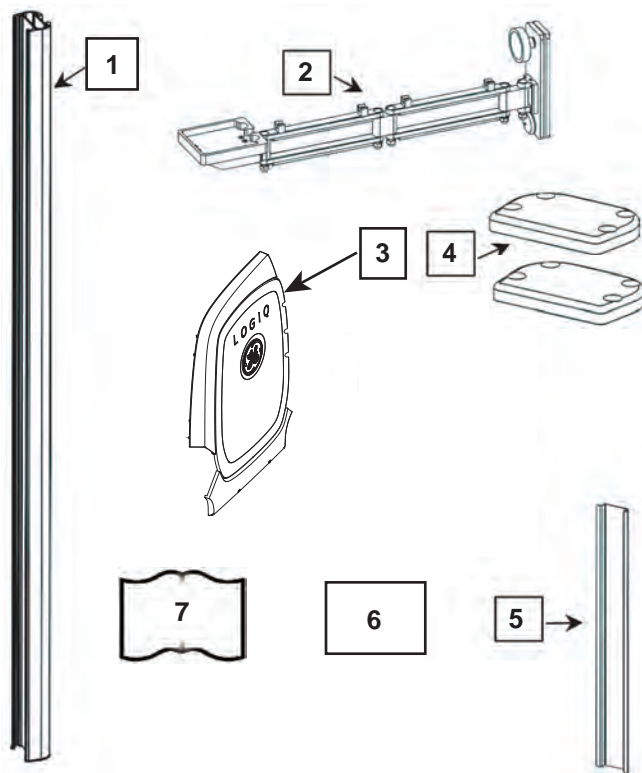
**Figure 8-68 Rear Track Covers Installation**



### 8-12-3 Parts Reference - On-board V Nav Stand

Use these instructions to assembled or replace the Roll Stand.

Figure 8-69 Volume Navigation On-Board V Nav Stand Installation Kit - See [Table 8-107 "On-Board V Nav Stand Installation Kit description"](#) on [page 8-218](#) for item description



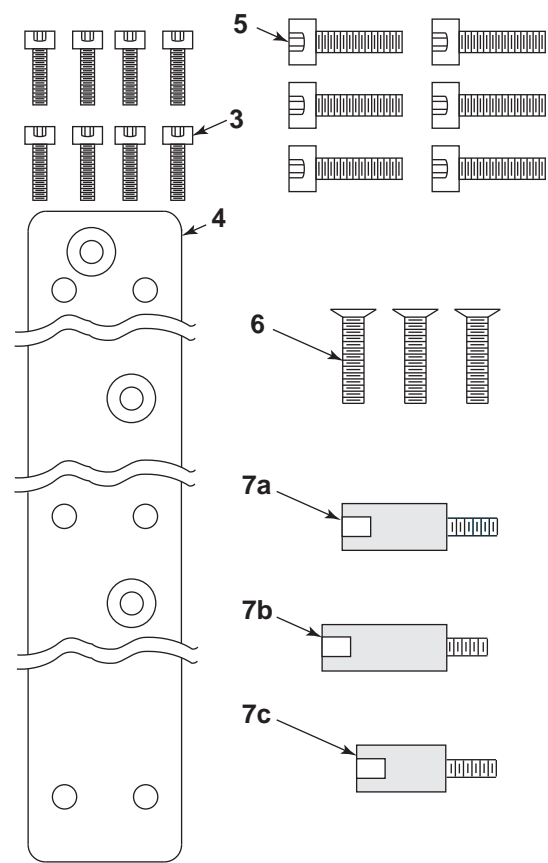
8-12-3      **Parts Reference - On-board V Nav Stand (cont'd)**

The following parts and hardware are included with this installation kit:

**Table 8-107    On-Board V Nav Stand Installation Kit description**

Item #	Description	Qty
1	Stand Post	1
2	GE Volume Navigation Arm	1
3	Right Side Cover	1
4	Cover Plate - top and bottom	2
5	Track Cover	1
6	Stand Post Mounting Hardware See:	1
7	5451571-100 LOGIQ E9 LOGIQ™ 7 DVD Installation Instructions	1

**Figure 8-70    Stand Post Mounting Hardware**



## 8-12-3 Parts Reference - On-board V Nav Stand (cont'd)

**Table 8-108 Stand Post Mounting Hardware description**

Item #	Description	Qty
3	Socket Head Cap Screw (SHCS) for Cover Plate	8
4	V Nav Arm Stand to LOGIQ E9 Mounting Plate	1
5	Socket Head Cap Screw (SHCS) to mount Stand Post to Mounting Plate	6
6	Screws to mount the Mounting Plate	3
7a-7c	V NAV Stand Post Stand-off Fastener to Targa - long/top, medium/center and short/bottom	1 each (3 total)

**NOTE:** *Item numbers match items as listed in  
[Table 8-109 "Reference for assembling Option to LOGIQ E9" on page 8-220.](#)*

8-12-4

On-Board V Nav Stand Option Contents, location and placement of parts

Table 8-109 Reference for assembling Option to LOGIQ E9

Option Contents	Corresponding Graphic
<div><div><div>1. V Nav Arm Stand Post</div><div>2. Cover Plate</div><div>3. Socket Head Cap Screw (SHCS) - (x4) for Cover Plate</div><div>4. V Nav Arm Stand to LOGIQ E9 Mounting Plate</div><div>5. Socket Head Cap Screw (SHCS) - (x6) to mount Stand Post to Mounting Plate</div><div>6. Screws - (x3) to mount the Mounting Plate</div><div>7a. V NAV Stand Post Stand-off Fastener to Targa - long/top - (x1)</div><div>7b. V NAV Stand Post Stand-off Fastener to Targa - medium/center - (x1)</div><div>7c. V NAV Stand Post Stand-off Fastener to Targa - short/bottom - (x1)</div><div>8. LOGIQ E9 Targa (not part of the kit)</div><div>9. access hole to Item 5 (in stand post)</div><div>10. Cover Plate groove (in stand post) - Cover Plate not shown</div><div>11. Tension/Sliding Mechanism (in stand)</div></div><div><div>NOTE: Before Item 7b can be installed, the Grounding Plug installed MUST BE removed.</div></div></div>	<div><div>Illustration shown without the rear cover</div><div><div></div><div></div></div></div>

## 8-12-5 Assembling or replacing the On-Board V Nav Stand

For reference of assembly, parts location and parts identification, see:  
[Table 8-109 "Reference for assembling Option to LOGIQ E9" on page 8-220.](#)

**Table 8-110 Option Installation to LOGIQ E9**


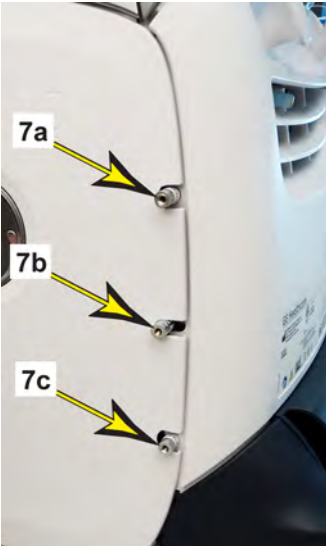
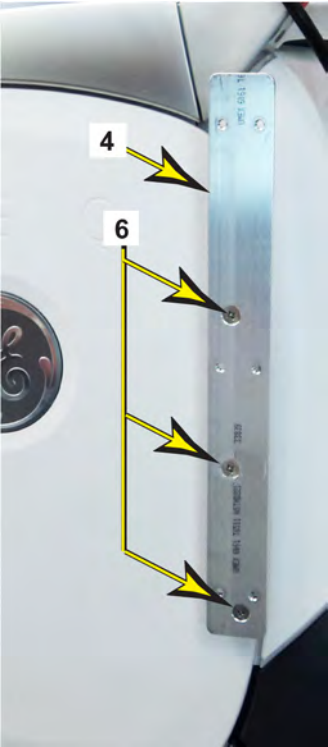

Steps	Corresponding Graphic
<p>1. Remove Grounding Plug (center) and the Rear Cover mounting screws.</p>	
<p>2. Install the V NAV Stand Post Stand-off Fasteners (<b>7a-7c</b>) to Targa, short in the bottom and long in the top. Tighten securely.</p> <p><i>NOTE: The Rear Cover mounting flange should not get pinched by the Stand-off Fasteners. Two of the Stand-off Fasteners will fit in the holes in the cover and hold the cover in place after they are installed.</i></p>	

Table 8-110 Option Installation to LOGIQ E9

Steps		Corresponding Graphic
3.	Attach Mounting Plate (4) to Stand-off Fasteners with the three screws (6). Tighten securely.	
4.	<p><i>NOTE: The bottom cover plate should be installed first, see Step 7.</i></p> <p>The Stand Post Mounting Plate seats in a cut out channel, at the base off the post.</p>	<p><b>V Nav Arm Stand Mounting Plate channel</b></p> 



**Table 8-110 Option Installation to LOGIQ E9**



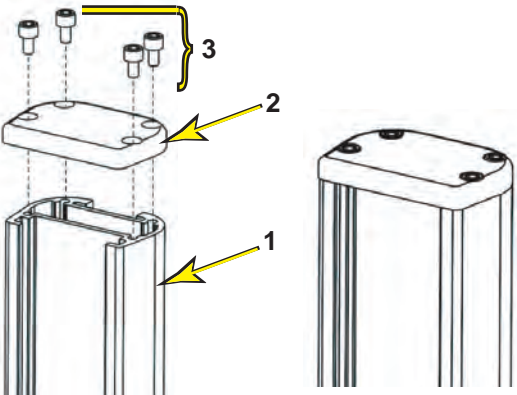
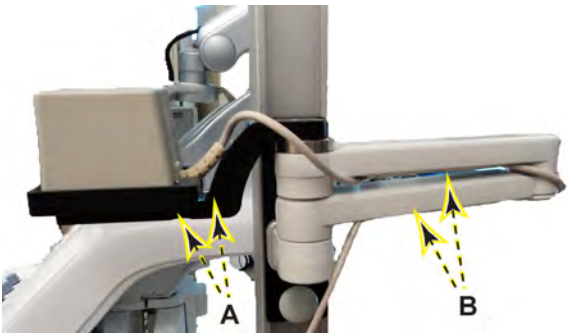
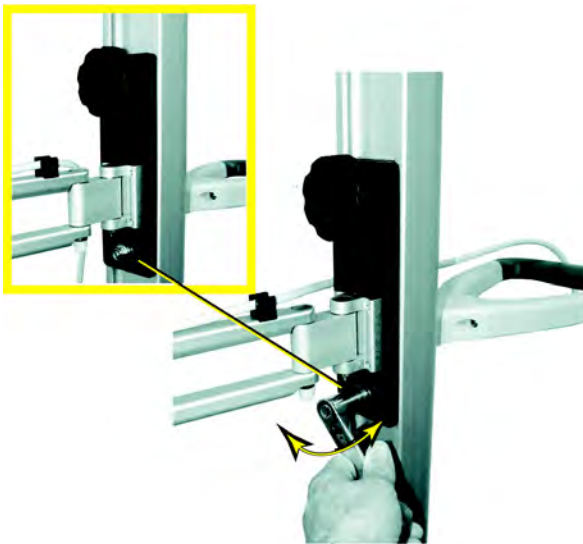
Steps	Corresponding Graphic
<p>5. Position the Arm Stand Post (1) onto the Stand Mounting Plate (4). Install two of the six screws (5), at the top first. DO NOT tighten completely. Install the remaining screws loosely.</p> <p>Tighten in a sequence. Top front, bottom rear and center. Then the remaining, in a sequence. Torque: 9.8 Nm (7.2 lbf-ft {86.7 lbf-in}).</p>	
<p>6. Insert the Track Cover into the Track Cover groove and slide it the lowest position to cover the Stand mounting access holes.</p>	
<p>7. Fasten the Cover Plate (2) to the top of the post (1) with the four SHCS (3) as shown. Repeat step for the bottom Cover Plate, if not previously installed.</p>	

Table 8-110 Option Installation to LOGIQ E9

Steps	Corresponding Graphic
<p>8. Mount the transmitter and tighten the transmitter mounting screws (<b>A</b>) on the arm and route the cable through the cable management channels (<b>B</b>), in the underside of the arms. The arm is showed in the stowed position.</p> <p>While supporting the arm (loaded with the transmitter), slowly loosen the knob which allows the arm to gradually move down the channel.</p> <p><i>NOTE: The arm must move down the channel very slowly when the knob is loosened, and it must move easily upward when lifting. If the arm free-falls or will not move, follow the adjustment procedure, see: <a href="#">8-12-6 "Adjusting Tension on Sliding Mechanism"</a> on page 8-224.</i></p>	

## 8-12-6 Adjusting Tension on Sliding Mechanism

Table 8-111 Adjusting Tension on Sliding Mechanism

	Steps	Corresponding Graphic
1.	<p>Remove the plastic bolt cap from the lower tension nut.</p> <p>The clamping knob must be unlocked while making this adjustment. Using the 1/2 inch socket wrench, loosen or tighten the tension nut for the desired tension.</p>	<p><b>Plastic Bolt Cap for tension nut and Unlocking Clamping Knob</b></p> 

## 8-12-7 Calibration and adjustments

No calibrations or adjustments are needed after this part replacement.

## 8-12-8 Verification

Perform the following steps to verify that the product is functioning as intended after this replacement:

- 1.) Connect cables and Probes you removed earlier
- 2.) Power up the LOGIQ E9 to verify that it operates as intended.

## 8-12-9 Functional Checks

Perform the following functional checks to confirm the LOGIQ E9 is operational before returning the LOGIQ E9 to the customer.

If all are successful, include the following debrief script: LOGIQ E9 Service Manual, Direction 5180263-100, Rev 5. Equipment passed all required checks and is ready for use.

**NOTE:** *Be sure to inform the customer that the On-Board V Nav Stand SHOULD NOT be used to push the LOGIQ E9.*

**Table 8-112 Side Covers Functional Checks from the**

See Section	Functional Check	Debrief Script
4-2-3	Power ON/Boot Up	LOGIQ E9 Service Manual, Direction 5180263-100, Rev. 5.. Equipment passed all required checks and is ready for use.
4-2-4	Power shut down	
4-3-20	Mechanical Function Checks	
4-3-20-2	Brakes and Direction Lock Checks	


## 8-12-10 Routine Maintenance

- 1.) Periodically inspect all fasteners associated with the mounting system. Tighten them as necessary for optimal operation and safety.

*NOTE: DO NOT overtighten any fasteners.*

## 8-12-11 Cleaning the Mounting Assembly

- 1.) The mounting assembly may be cleaned with most mild, non-abrasive solutions commonly used in the hospital environment (e.g., diluted bleach, ammonia, or alcohol solutions).
- 2.) The surface finish will be damaged permanently by strong chemicals and solvents such as acetone and trichloroethylene.
- 3.) Do not use steel wool or other abrasive material to clean the mounting assembly.
- 4.) The damage caused by the use of unapproved substances or processes will not be covered by warranty. It is recommended to testing any cleaning solution on a small area of the mounting assembly, that is not visible, to verify compatibility.
- 5.) Never submerge the roll stand nor allow liquids to enter the mounting assemblies. Wipe any cleaning agents off of the mounting assembly immediately, using a water-dampened cloth. Dry all mounting assemblies thoroughly after cleaning.

 **CAUTION** THE COMPANY MAKES NO CLAIMS REGARDING THE EFFICACY OF THE LISTED CHEMICALS OR PROCESSES AS A MEANS FOR CONTROLLING INFECTION. CONSULT YOUR HOSPITAL'S INFECTION CONTROL OFFICER OR EPIDEMIOLOGIST. TO CLEAN OR STERILIZE MOUNTED INSTRUMENTS OR ACCESSORY EQUIPMENT, REFER TO THE SPECIFIC INSTRUCTIONS DELIVERED WITH THOSE PRODUCTS.

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# ***Chapter 9***

## ***Renewal Parts***

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### **Section 9-1**

#### **Overview**

#### **9-1-1 Purpose of this chapter**

This chapter gives you an overview of the available Spare Parts for LOGIQ E9. In addition, upgrade kits and probes that may be used on LOGIQ E9, is listed

## Section 9-2

### Definitions of Left, Rear / Back, Right and Front

Figure 9-1 illustrates what is the Left Side (1), Rear / Back (2), Right Side (3), and Front (4) of the system.

**Figure 9-1 Definition of Left, Right, Front and Back of LOGIQ E9**



## Section 9-3 List of Abbreviations

**Table 9-1 List of Abbreviations**

ABBREVIATIONS	DESCRIPTION
3D	THREE DIMENSIONAL (See <a href="#">RT3D</a> and 4D)
4D	FOUR DIMENSIONAL IS THE SAME AS THREE DIMENSIONAL + REALTIME
ACP	AC CONTROLLER (AC POWER)
ACT	AC TRANSFORMER
ASSY	ASSEMBLY
BEP	BACK END PROCESSOR
CTRL	CONTROL
EXT.	EXTERNAL
FRU Y	REPLACEMENT PART
FRU N	NON STOCK PART
I/O	INPUT/OUTPUT
INT	INTERNAL
LCD	LIQUID CRYSTAL DISPLAY
OP	OPERATOR PANEL
PC	PERSONAL COMPUTER (Back End Processor)
PS	POWER SUPPLY
PWA	PRINTED WIRE ASSEMBLY
QTY	QUANTITY USED PER SCANNER
RT3D	REAL TIME THREE DIMENSIONAL (Same as 4D)
RX	RECEIVER
TX	TRANSMITTER
XFRMR	TRANSFORMER
CW	CONTINUOUS DOPPLER
ECG	ELECTRO CARDIO GRAPHY

## Section 9-4

### Parts list groups

**Table 9-2      Parts List Groups**

TABLE NO.	DESCRIPTION	PAGE NUMBER
Table 9-3	LOGIQ E9 Software Configurations and Hardware/Software Compatibility	9-5
Table 9-4	LOGIQ E9 Software	9-6
Table 9-9	Covers - LOGIQ E9 (not all covers listed are identified in Figure 9-2 on page 9-9)	9-9
Table 9-10	Top Console parts	9-32
Table 9-14	XYZ Mechanism parts	9-32
Table 9-16	Main Console parts	9-35
Table 9-18	Casters (Wheels) parts	9-37
Table 9-19	Card Rack parts	9-39
Table 9-25	Back End Processor parts for R3.x and earlier	9-52
Table 9-28	Power Supply parts	9-60
Table 9-29	Printer	9-64
Table 9-30	Digital Video Disc (DVD) parts	9-66
Table 9-32	Mains Power Cables	9-68
Table 9-33	Top Console cables	9-71
Table 9-34	XYZ Motor/Brake Control cables	9-73
Table 9-35	Main Power Supply cables	9-74
Table 9-36	Card Rack cables	9-77
Table 9-37	Back End Processor (BEP) Internal Cables BEP5.x (R3.x and earlier)	9-81
Table 9-39	Back End Processor (BEP) External Cables	9-84
Table 9-41	Supported Probes (not including Japan Probes)	9-86
Table 9-42	Options	9-90



## Section 9-5 LOGIQ E9 Models and hardware/software compatibility

**Table 9-3 LOGIQ E9 Software Configurations and Hardware/Software Compatibility**

CONSOLE MODEL NUMBER	DESCRIPTION	SOFTWARE VERSION										
		Phase I				BT2010			BT2011			BT2013
		1.0.3	1.0.4	1.0.5	1.0.6	2.0.3	2.0.4	2.0.5	3.1.0	3.1.1	3.1.2	4 Rev. x.x
5205000	LOGIQ E9, 100-240 VAC	Y	Y	Y	Y	U	U	U	U	U	U	U
5205000-2	LOGIQ E9, 220-240 VAC	Y	Y	Y	Y	U	U	U	U	U	U	U
5205000-3	LOGIQ E9, 100-240 VAC	N	N	N	N	Y	Y	Y	U	U	U	U
5205000-4	LOGIQ E9, 220-240 VAC	N	N	N	N	Y	Y	Y	U	U	U	U
5205000-5	LOGIQ E9, 100-240 VAC	N	N	N	N	N	N	N	N	Y	Y	U
5205000-6	LOGIQ E9, 220-240 VAC	N	N	N	N	N	N	N	N	Y	Y	U
5205000-7	LOGIQ E9, 100-240 VAC	N	N	N	N	N	N	N	N	N	N	Y

### LOGIQ E9 Software Configurations Key

LOGIQ E9 Software Configurations Key	
Y	Original
U	Upgrade available
N	Not supported

**Front End Processor** - see: [9-12-2 "Front End Boards Compatible Configurations"](#) on page 9-48

**Back End Processor** - see: [9-13-1 "Back End Boards Compatible Configurations"](#) on page 9-59

## Section 9-6 Software

**Table 9-4 LOGIQ E9 Software**

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	LOGIQ E9 Application Software, R1.0.3	5193239-4	See <a href="#">Table 9-5 "R1.0.x Software Matrix" on page 9-7</a>	1	Y
2.	LOGIQ E9 Application Software, R1.0.4	5193239-5			
3.	LOGIQ E9 Application Software, R1.0.5	5193239-6			
4.	LOGIQ E9 Application Software, R1.0.6	5193239-8			
5.	LOGIQ E9 System Software	5135124-20			
6.	LOGIQ E9 Application Software, R2.0.3	5193239-12	See <a href="#">Table 9-6 "R2.0.x Software Matrix" on page 9-7</a>	1	Y
7.	LOGIQ E9 Application Software, R2.0.4	5193239-13			
8.	LOGIQ E9 Application Software, R2.0.5	5193239-16			
9.	LOGIQ E9 System Software	5135124-30			
10.	LOGIQ E9 BIOS Blaster CD	5212471	For BEP with Extended Power Shutdown motherboard (5145000-2) reset replaced by 5212471-1	1	Y
11.	LOGIQ E9 BIOS Blaster CD	5212471-1	Compatible with all configurations with BEP P/N 5145000-x	1	Y
12.	LOGIQ E9 Application Software, R3.1.0	5193239-18 Obsoleted by FMI 70209	See <a href="#">Table 9-7 "R3.x Software Matrix" on page 9-8</a>	1	Y
13.	LOGIQ E9 Application Software, R3.1.1	5193239-21 Obsoleted by FMI 70209			
14.	LOGIQ E9 Application Software, R3.1.2	5193239-22			
15.	LOGIQ E9 Base Image Load	5390139			
16.	LOGIQ E9 Application Software, R4.x	5454367	See <a href="#">Table 9-8 "R4.x Software Matrix" on page 9-8</a>		
17.	LOGIQ E9 Base Image Load, BEP6.1	5437603			
18.	Ichiro R4 BEP 6.1 BIOS	5439364	Compatible with BEP6 5380000-1	1	Y

## Section 9-6 Software (cont'd)

**Table 9-5 R1.0.x Software Matrix**

Breakthrough	Application Software Version	Application Part Number	BEP 5145000-2 Base Load Part Number
LOGIQ E9 (Phase I)	R 1.0.3 (Initial Production Release)	5193239-4	5135124-20
	R 1.0.4 (Full Production release. Included in FMI 70201 for Installed Base)	5193239-5	
	R 1.0.5 (Support for DVR option)	5193239-6	
	R 1.0.6 (Minor improvement for usability and Cost reduction DRX 3.1 P/N 5301040-4 and Backplane P/N GA200685 boards support)	5193239-8	

**Table 9-6 R2.0.xSoftware Matrix**

Breakthrough	Application Software Version	Application Part Number	BEP 5145000-2 Base Load Part Number
LOGIQ E9 (BT10)	R2.0.3 (Initial Production Release, also included in FMI 70205)	5193239-12	5135124-30
	R 2.0.4 (Full Production Release, Support the relocation of the Option Dongle and connection of the USB Cable from the BEP to the XYZ Controller. Relocation of the Option Dongle and connection of the USB Cable from the BEP to the XYZ Controller, also included in FMI 70206 with R 2.0.4.)	5193239-13	
	R 2.0.5 (V Nav Needle Tracker Upgrade)	5193239-16	

## Section 9-6      Software (cont'd)

**Table 9-7      R3.x Software Matrix**

CONSOLE MODEL NUMBER	APPLICATION SOFTWARE VERSION	APPLICATION SOFTWARE PART NUMBER	BEP 5145000-2 BEP 5145000-3 BASE LOAD PART NUMBER
5207000 (GFI) 5207000-2 (GFI) 5207000-3 (GFI) 5207000-4 (GFI) 5207000-5 (MRX) 5207000-6 (MRX)	R3.1.2	5193239-22	5390139

**Table 9-8      R4.x Software Matrix**

CONSOLE MODEL NUMBER	APPLICATION SOFTWARE VERSION	APPLICATION SOFTWARE PART NUMBER	R4 BEP BASE LOAD PART NUMBER
5207000-7	Version 4 Rev. 1.0*	5454367	5437603

**NOTE:**      For R4 and later the Application Version changes nomenclature, due to new Regulatory Requirements. For example: Software Version R4.1.0, now will read Version 4 Rev. 1.0.

## Section 9-7 Covers and Bumpers

Figure 9-2 Covers - LOGIQ E9

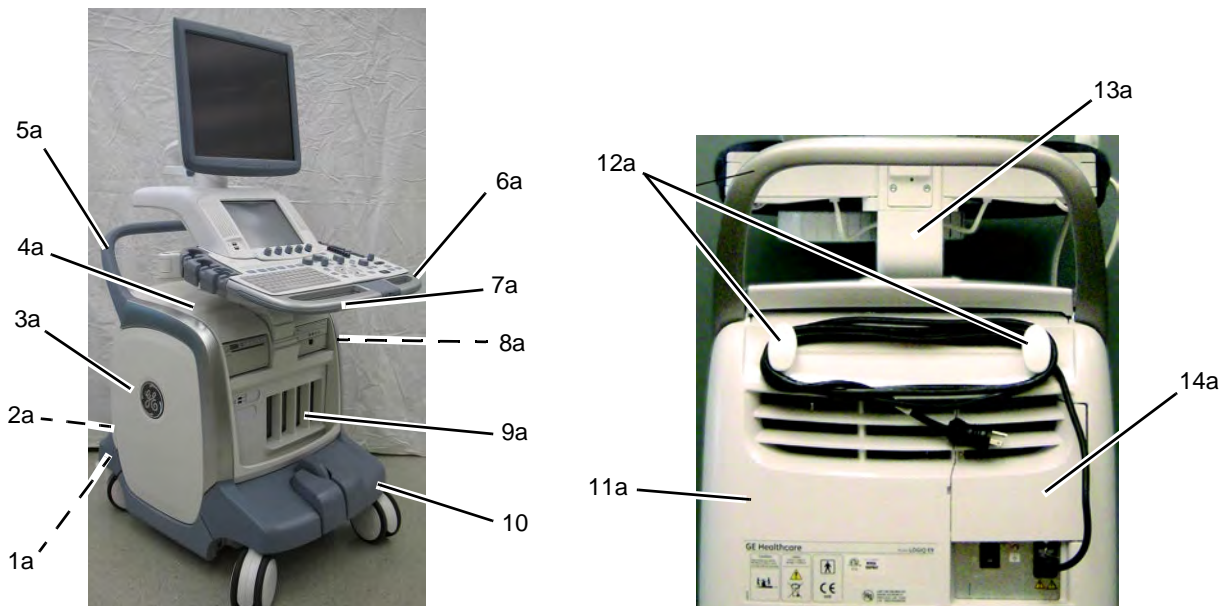


Table 9-9 Covers - LOGIQ E9 1 of 7 (not all covers listed are identified in Figure 9-2 on page 9-9)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1a	Bumper Rear	GA307008-2		1	Y
2a	Filter Cover	GA307515-2		1	Y

Table 9-9 Covers - LOGIQ E9 (Continued) 2 of 7 (not all covers listed are identified in Figure 9-2 on page 9-9)



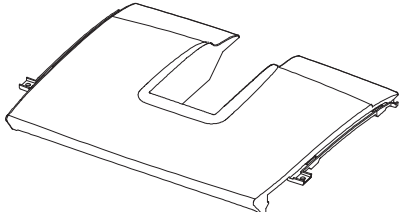
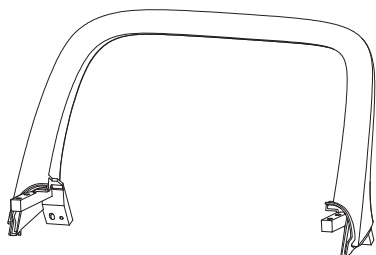
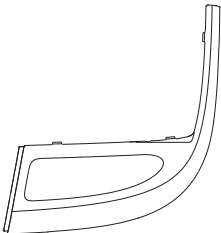
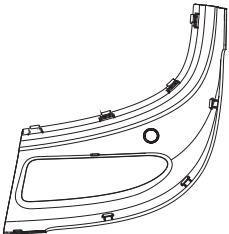
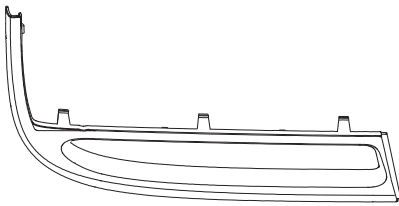
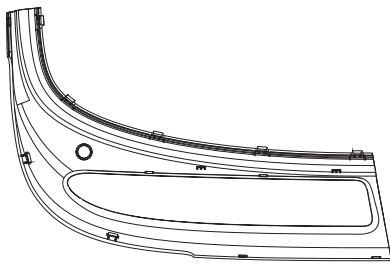
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
3a	Cover Left Assembly	5168069 OBSOLETE	Replaced by 5337050	1	Y
	Cover Left Assembly with Logo	5337050		1	Y
4a	Cover Left Assembly with Sapphire Logo	Future		1	Y
5a	Top Cover	GA307023	Top Cover 	1	Y
6a	Handle Rear	GA307029-2		1	Y

Table 9-9 Covers - LOGIQ E9 (Continued) 3 of 7 (not all covers listed are identified in Figure 9-2 on page 9-9)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
7a	Cover, Handle Right Top	5178793		1	Y
	Cover, Handle Right Lower	5178474		1	Y
8a	Cover, Handle Left Top	5178193		1	Y
	Cover, Handle Left Lower	5178242		1	Y

**Table 9-9 Covers - LOGIQ E9 (Continued) 4 of 7 (not all covers listed are identified in Figure 9-2 on page 9-9)**


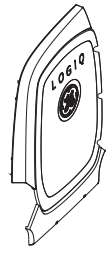

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
9a	Cover Right Assembly	5168550 OBSOLETE	Right Side Cover Assembly Replaced by 5337049	1	Y
	Cover Right Assembly with Logo	5337049	Right Side Cover Assembly 	1	Y
	Cover Right Assembly with Slots On-board V Nav Stand	5436706		1	Y
10a	Cover Right Assembly with Sapphire Logo	Future	Right Side Cover Assembly 	1	Y



Table 9-9 Covers - LOGIQ E9 (Continued) 5 of 7 (not all covers listed are identified in Figure 9-2 on page 9-9)

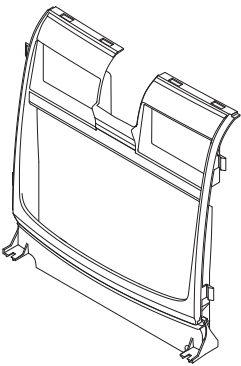
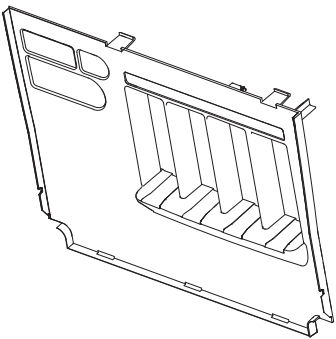
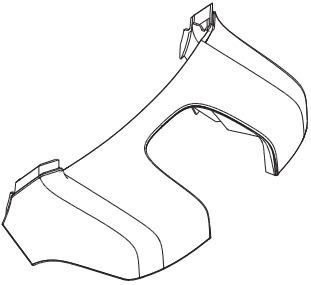
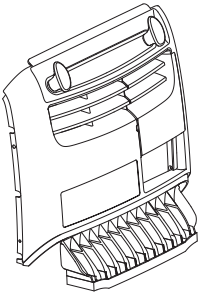
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
11a	Cover Front	GA307022		1	Y
	Plate Cover, Plate Connectors with Guide	GA307056		1	Y
12a	Footrest Bumper	5311121		1	Y
13a	Rear Cover Assembly	GA200232	Rear Cover Assembly 	1	Y

Table 9-9 Covers - LOGIQ E9 (Continued) 6 of 7 (not all covers listed are identified in Figure 9-2 on page 9-9)

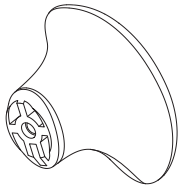
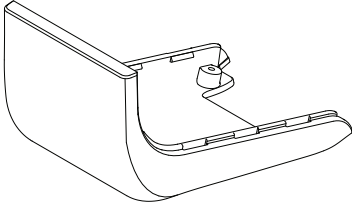
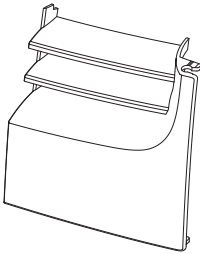
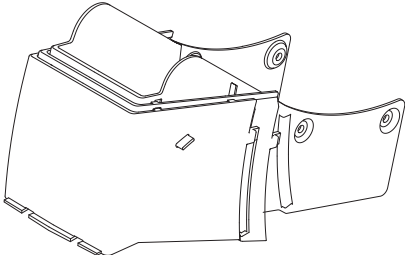
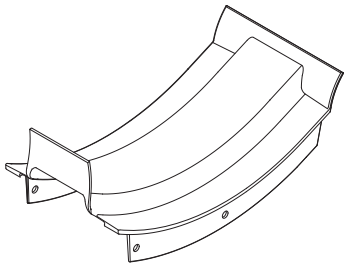
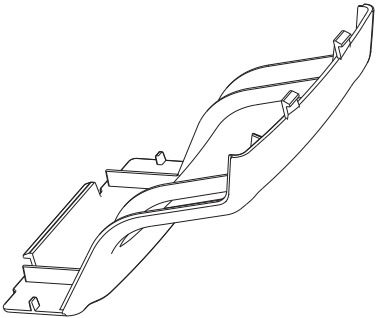
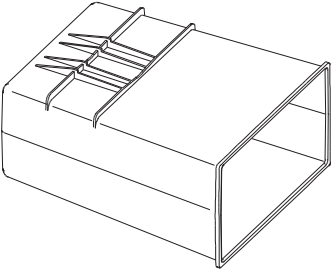
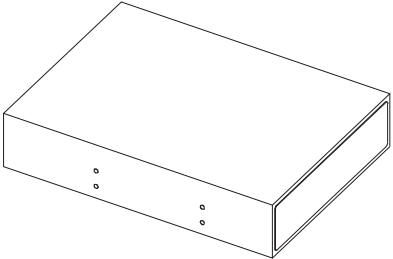
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
14a	Cable Hook	GA307047		2	Y
15a	Bumper Boss Z Outer	GA307188		1	Y
16a	Door, I/O Panel	GA307046		1	Y
Not labeled	Column Cover Assembly	GA200359		1	Y
	Cover, Main Cable	GA307192		1	Y

Table 9-9 Covers - LOGIQ E9 (Continued) 7 of 7 (not all covers listed are identified in Figure 9-2 on page 9-9)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
Not labeled	Bulkhead Cover	GA307061		1	Y
	Black and White Printer Filler Storage	5309088		1	Y
	Drive Bay Storage Drawer	5267580-2		1	Y

## Section 9-8

### Top Console parts

**NOTE:** Sub-FRUs for the Operator Panel have been created to provide additional sub-assemblies in the event the entire Operator Panel does not require to be replaced. Refer to the Operator Panel FRUS and for sub-FRU servicing options, see: [Table 9-12 "Operator Panel Compatible Configurations" on page 9-31.](#)

**Table 9-10 Top Console parts 1 of 14**

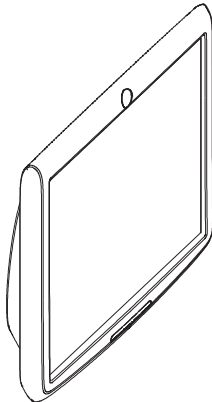
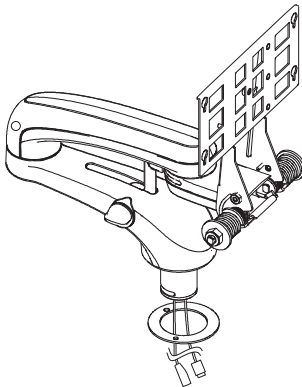
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	19" LCD Monitor 5205000-6 and earlier consoles	5167953		1	Y
2.	LCD Arm with Cable 5205000-6 and earlier consoles	5183750		1	Y

Table 9-10 Top Console parts 2 of 14 (Continued)

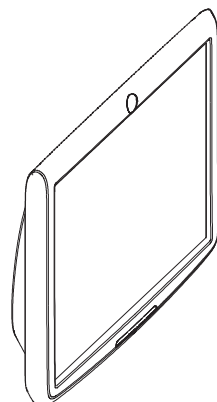

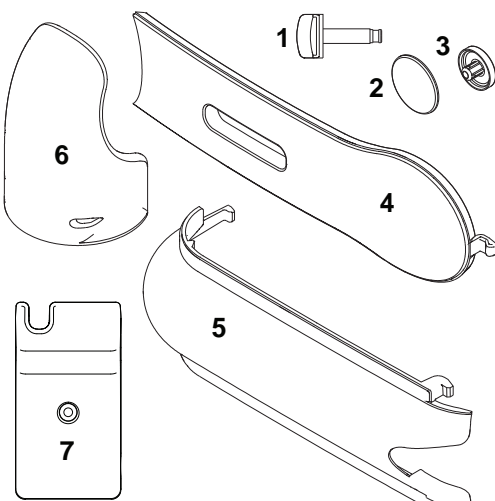
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
3.	19" LCD Monitor V2 5205000-7 and later consoles LOGIQ E9 R4 or Upgraded	5392293-21		1	Y
4.	LCD Arm with Cable LOGIQ E9 R4 and later consoles	5415182-20		1	Y
5.	LOGIQ E9 LCD Arm Adapter Spare Kit	5455428	Used on 5415182-20 Arm	1	Y
6.	LCD Arm Plastic Covers 5205000-7 and later consoles	5408089	<p>Contains:</p> <p>1. knob for lock (x1), 2. second Arm Cap (x4).  3. third Arm Cap (x1), 4. first Arm Cover (x1)  5. second Arm Cover (x1), 6. second Axis Cover (x1)  7. third Arm Cover (x1)</p> 	1	Y

Table 9-10 Top Console parts 3 of 14 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
7.	LCD Mount Lock Assembly	GA200302		1	Y
8.	Frame with LCD and TouchScreen	GA200439 OBSOLETE	Replaced by 5207000-33 See table 9-9	1	Y
9.	Frame with LCD and TouchScreen	5207000-39	Replaces GA200439. See <a href="#">Table 9-12 "Operator Panel Compatible Configurations"</a> on page 9-31 		
10.	Operator Panel Assembly, Upper	5207000-3 OBSOLETE	Replaced by 5207000-33	1	Y
11.	Operator Panel Assembly, Upper	5207000-13 OBSOLETE	Replaced by 5207000-33 Included GA200717 Aux. USB Connector board and GA200718 Main Controller board.	1	Y
12.	Operator Panel Assembly, Upper	5207000-23 OBSOLETE	Replaced by 5207000-33 5207000-23 replaced 5207000-3, 5207000-12 and 5207000-17. Included GA200717 Aux. USB Connector board and GA200718 Main Controller board. Capacitors changed to address false USB overcurrent trip.	1	Y
13.	Operator Panel Assembly, Upper	5207000-33	Replaced by 43 See <a href="#">Table 9-12 "Operator Panel Compatible Configurations"</a> on page 9-31.	1	Y

Table 9-10 Top Console parts 4 of 14 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
14.	Operator Panel Assembly, Upper	5207000-43	Replaces 5207000-33 See <a href="#">Table 9-12 "Operator Panel Compatible Configurations"</a> on page 9-31. 	1	Y
15.	High Voltage Inverter Board with Cable (Upper Operator Panel)	GA200442		1	Y
16.	Upper Bezel	5207000-15		1	Y
17.	USB Cover - Operator Panel	5207000-54		1	Y
18.	TGC Slide Pots Dust Gasket	5207000-55		1	Y

Table 9-10 Top Console parts 5 of 14 (Continued)

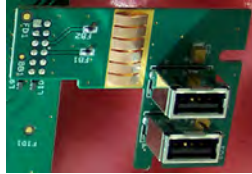


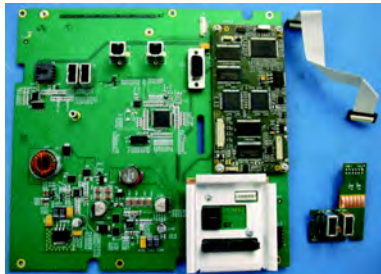
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
19.	USB Connector Board (Upper Operator Panel)	GA200441	To become obsolete. If unavailable, order GA200717	1	Y
20.	USB Connector Board (Upper Operator Panel)	5207000-41	See: <a href="#">Table 9-12 "Operator Panel Compatible Configurations"</a> on page 9-31. 	1	Y
21.	USB Connector Board with longer pins (Upper Operator Panel)	GA200717	Use with GA200717 for connection improvement. GA200717 can be used with GA200448, but will not improve connection. 	1	Y
22.	Main Ctrl. Board w. USB Video Bd. and Cable (Upper Operator Panel)	GA200448		1	Y
23.	Main Ctrl. Board w. USB Video Bd. and Cable (Upper Operator Panel)	GA200718	Use only with USB Connector Board GA200717. (GA200441 will not work) Replaced by 5207000-30	1	Y
24.	Main Ctrl. Board w. USB Video Bd. and Cable (Upper Operator Panel)	5207000-30 OBSOLETE	Has USB over current fix. (Replaces GA200718)	1	Y
25.	Main Ctrl. Board with USB Video Board and Cable (Upper Operator Panel)	5207000-40	Replaces 5207000-30 Also includes 5207000-41 USB Auxiliary Board See <a href="#">Table 9-12 "Operator Panel Compatible Configurations"</a> on page 9-31.	1	Y
26.	Main Ctrl. Board with USB Video Board and Cable (Upper Operator Panel)	5207000-50		1	Y



Table 9-10 Top Console parts 6 of 14 (Continued)

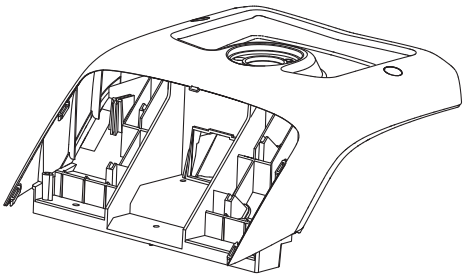
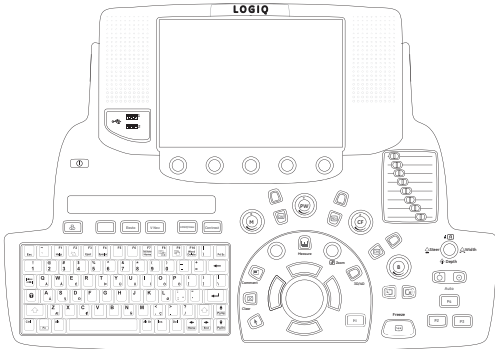
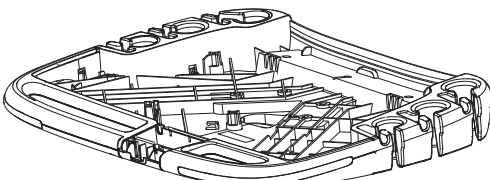
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
27.	Frame UI Upper Assembly	GA200392		1	Y
28.	Operator Panel Assembly, Lower	5207000-2 OBSOLETE	Replaced by 5207000-12	1	Y
29.	Operator Panel Assembly, Lower with Improved Trackball	5207000-12 OBSOLETE	Replaced by 5207000-32	1	Y
30.	Operator Panel Assembly, Lower Without Trackball	5207000-32 OBSOLETE	Remove existing trackball from removed lower panel and install into the new assembly. (Second opinion required.) To become obsolete. If unavailable, order 5207000-42	1	Y
31.	Operator Panel Assembly, Lower Without Trackball	5207000-42	Obsolete replaced by 5207000-52	1	Y
32.	Operator Panel Assembly, Lower Without Trackball	5207000-52	Similar to 5207000-42 except includes VALOX Bezel Replaced by 5207000-62 See <a href="#">Table 9-12 "Operator Panel Compatible Configurations" on page 9-31</a>	1	Y
33.	Operator Panel Assembly, Lower Without Trackball	5207000-62	See <a href="#">Table 9-11 "New Lower Op Panel FRUs Compatible Configurations" on page 9-30</a>	1	Y
34.	Operator Panel Assembly, Lower Without Trackball	5207000-72 See <a href="#">Table 9-11 "New Lower Op Panel FRUs Compatible Configurations" on page 9-30</a>	Same as -62 Plus BFlow Key Top 	1	Y
35.	Operator Panel Frame Assembly, Lower	5195937		1	Y
36.	Inductive Trackball	GA200444 OBSOLETE	Replaced by 5207000-5	1	Y

Table 9-10 Top Console parts 7 of 14 (Continued)

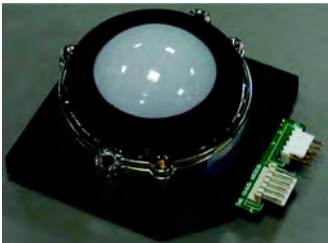

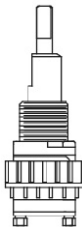
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
37.	Improved Inductive Trackball	5207000-5	To become obsolete. If unavailable, order 5341631 	1	Y
38.	Optical Trackball	5341631	Replaced 5207000-5 	1	Y
39.	Concentric Encoder	2404652-19	for Operator Panel 	4	Y
40.	Joystick Encoder	5207000-17 OBSO	for Operator Panel	8	Y
41.	Joystick Encoder	5207000-29	Replaces 5207000-17 	8	Y
42.	Lower Operator Panel Main-board	5207000-18	Obsolete replaced by 5207000-28	1	Y

Table 9-10 Top Console parts 8 of 14 (Continued)

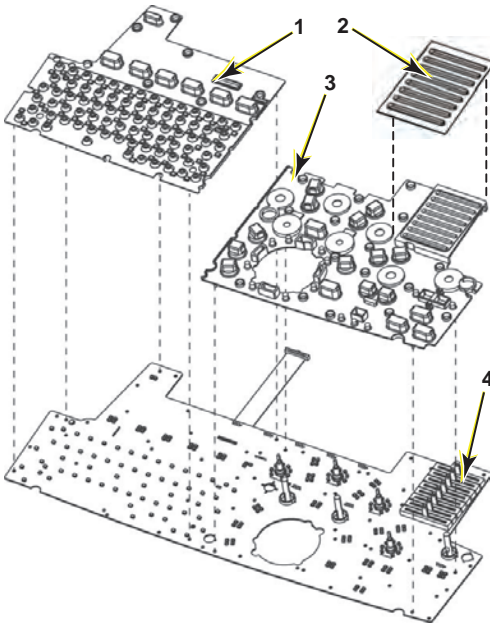
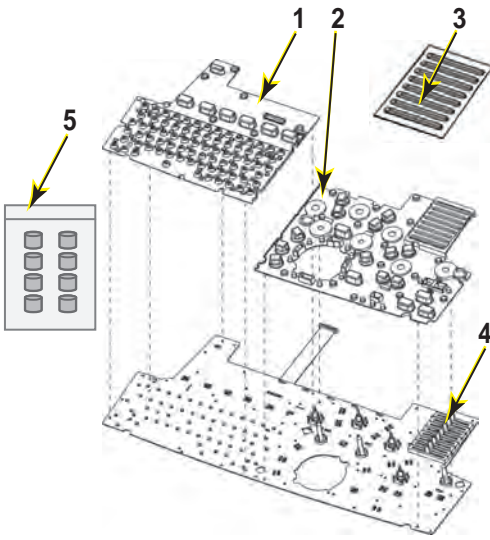
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
43.	Lower Operator Panel Main-board (improved)	5207000-28	Includes 1 - Left Elastomer, 2 - 5207000-55 - TGC Slide Pots Dust Gasket, 3 - Right Elastomer, and 4 - Switch PCB (version with reduced LED number) Replaced by 520700-38 	1	Y
44.	LE9 Lower Circuit Board for OP Panel - Bourns Slide Pots - spare part only	5207000-38 See: Table 9-11 "New Lower Op Panel FRUs Compatible Configurations" on page 9-30	Includes 1. Left Elastomer, 2. Right Elastomer, 3. Slide Pot Gasket, 4. Switch, PCB and 5. BOURNS compatible Slide Pot knobs (x8) 	1	Y
45.	Lower Bezel	5207000-11	Obsolete replaced by 5207000-14	1	Y

Table 9-10 Top Console parts 9 of 14 (Continued)

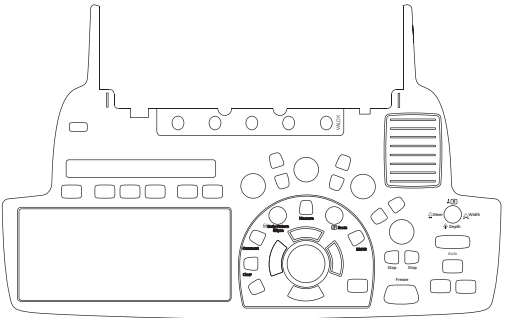
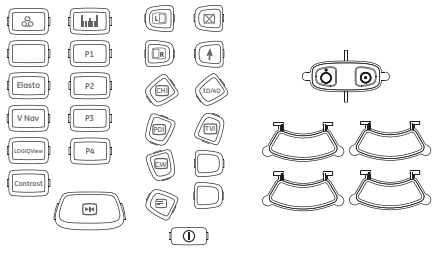
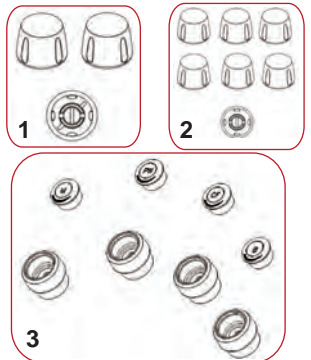
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
46.	Lower Bezel VALOX	5207000-14 See: Table 9-11 "New Lower Op Panel FRUs Compatible Configurations" on page 9-30	 1 Y		
47.	Key Cap Kit	5207000-10 OBSO	for Operator Panel Replaced by 5207000-24	1	Y
48.	Button Cap Kit	5207000-16 OBSO	Replaced by 5207000-24 Includes keycaps for options in R2.x.x or later	1	Y
49.	Button Cap Kit includes BFlow key	5207000-24		1	Y
50.	Knob Kit, Slide Pot Knob Kit, Mode Select Knob Kit	5207000-7	Obsolete kit was split in two kits 5207000-8 and -9 See Table 9-11 "New Lower Op Panel FRUs Compatible Configurations" on page 9-30	1	Y
51.	LE9 Rotary Knob Kit - spare part only	5207000-8 See Table 9-11 "New Lower Op Panel FRUs Compatible Configurations" on page 9-30	Includes: 1. Joystick knobs (near trackball) (x2), 2. Joystick knobs (for other locations on Op Panel) (x4) 3. Mode Select knobs: Outer knobs (x4), Mode specific insert (x4) 	1	Y

Table 9-10 Top Console parts 10 of 14 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
52.	LE9 TGC Slide Pot Knob Kit - Spare Part only Knobs for ALPHA and for BOURNS version slide pots	5207000-9 See Table 9-11 "New Lower Op Panel FRUs Compatible Configurations" on page 9-30	<p><b>Details of illustration:</b>  <b>P/N 5207000-9 "A"</b>            1. Friction Fit  <b>2. ALPHA Slide Pot</b>  <b>P/N 5207000-9 "B"</b>            3. Snap Fit  <b>4. BOURNS Slide Pot</b></p> <p>5207000-9 "A" VS. "B"</p>	1	Y
53.	Button Frame UI Assembly (XYZ Button Replacement)	GA200270-2		1	Y
54.	Probeholder Soft Insert Large (x4)	5189615		1	Y
55.	Probeholder Soft Insert Small (x2)	5189156		4	Y

Table 9-10 Top Console parts 11 of 14 (Continued)

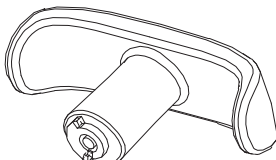

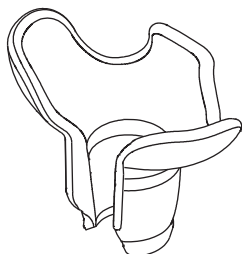
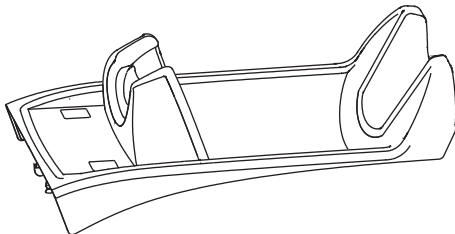

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
56.	Probe Cable Hook Twin	GA307069		1	Y
57.	Probeholder Insert LOGIQ (for small probes)	H4911P only available as a catalog	Probeholder Insert for small probes like S4210 and L8-18I 	1	N
58.	4D Probeholder	5307472		1	Y
59.	TVTR Probe Holder Assembly	5306880	To become obsolete. If unavailable, order 5306880-2	1	Y
60.	TVTR Probe Holder Assembly	5306880-2		1	Y
61.	Gel Warmer Unit	5245350 OBSOLETE	Replaced by 5245350-2	1	Y
62.	Gel Warmer Unit	5245350-2	Replaced by 5245350-10	1	Y
63.	Gel Warmer Unit	5245350-10		1	Y

Table 9-10 Top Console parts 12 of 14 (Continued)


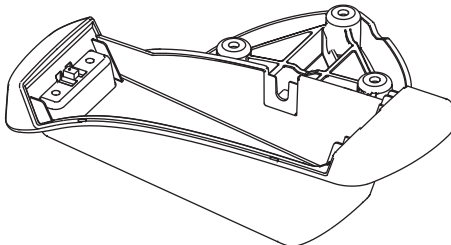
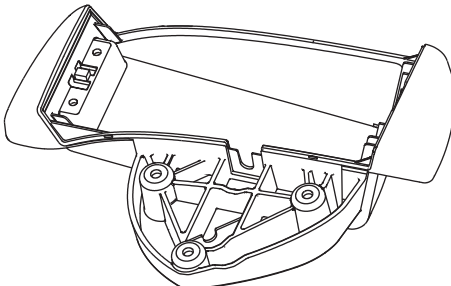
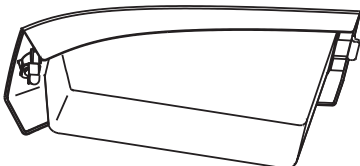
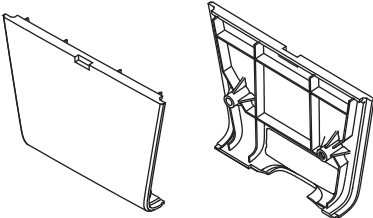
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
64.	Gel Warmer Knob Replacement Kit	5322780		1	Y
65.	Right Support Assembly	5307243	Options Holder 	1	Y
66.	Left Support Assembly	5307245	Options Holder 	1	Y
67.	Tray Unit Assembly	5307236 OBSOLETE	Replaced by 5307236-2	1	Y
68.	Tray Unit Assembly	5307236-2		1	Y
69.	Cover, Palm Rest	5178069		1	Y
70.	Speaker Assembly	5265030	Replaced by GA200743	2	Y

Table 9-10 Top Console parts 13 of 14 (Continued)

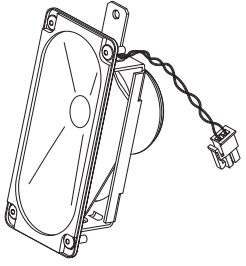
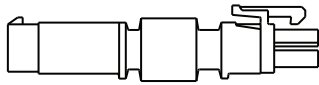

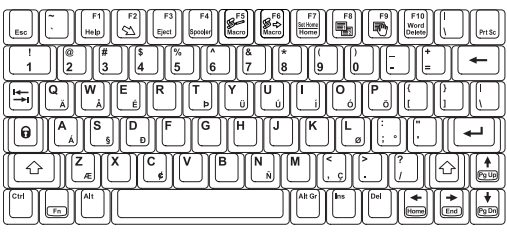
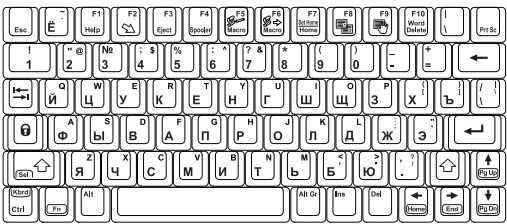

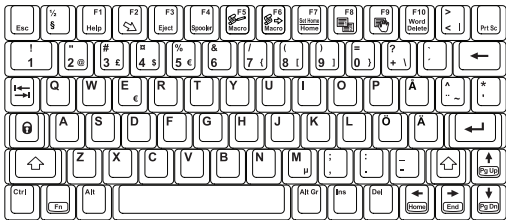
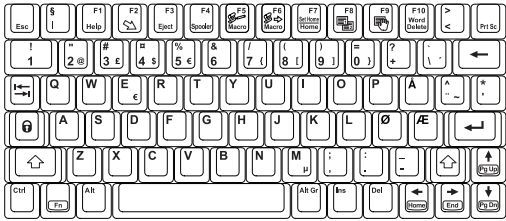
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
71.	Speaker Assembly	GA200743	Replaces 5265030 	2	Y
72.	Cable - Audio High Pass	5460780		2	Y
73.	Operator Panel Cable Kit	GA200446 5207000-46	Replaced by 5207000-40	1	Y
74.	Operator Panel Cable Kit Kit includes: A - Trackball USB Cable B1 and B2 - Trackball Switch Cables C1 and C2 USB Video Board Flex Cables D - HV Inverter Cable E - A/N Keyboard USB Cable	5207000-46	Replaces GA200446 	1	Y
75.	A/N Keyboard (English)	5207000-4	Alphanumeric Keyboard 	1	Y
76.	A/N Keyboard (Russian)	5207000-20		1	Y



Table 9-10 Top Console parts 14 of 14 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
77.	A/N Keyboard (Greek)	5207000-21		1	Y
78.	A/N Keyboard (Swedish)	5207000-22		1	Y
79.	A/N Keyboard (Norwegian)	5207000-26		1	Y

## Section 9-8 Top Console parts (cont'd)

**Table 9-11 New Lower Op Panel FRUs Compatible Configurations**

Part Name	Description / Comments	New Part Number	Replaces Part Number(s)	Compatibility
LE9 Lower Op Panel w BOURNS slide pots - no trackball	<b>Lower Op Panel with BOURNS Slide Pots</b>	5207000-62 5207000-72*	5207000-52** 5207000-42	Backward compatible
	Part includes: • Lower Bezel - Valox • BOURNS TGC Slide Pots and knobs			
Lower Bezel LE9 - Valox	<b>Lower Bezel – Valox</b>	5207000-14	5207000-11	Backward compatible
LE9 Lower Circuit Board for OP Panel - Bourns Slide Pots - spare part only	<b>Lower Circuit Board for OP Panel (including the BOURNS Slide Pots)</b>	5207000-38	5207000-28	Backward compatible Includes the new knobs for the new TGC Slide Pots.
	Part includes: • 1 Left Elastomer • 1 Right Elastomer • 1 Slide Pot Gasket • 1 Switch, PCB • 8 BOURNS knobs compatible with BOURNS Slide Pots See: FRU image for contents.			
LE9 Rotary Knob Kit - spare part only	<b>Rotary Knob Kit - Spare Part only</b>	5207000-8	5207000-7***	Backward compatible
	Kit includes: • 2 Joystick knobs (near trackball) • 6 Joystick knobs (for other locations on Op Panel) • 4 Mode Select knobs See: FRU image for contents.			
LE9 TGC Slide Pot Knob Kit - Spare Part only Knobs for ALPHA and for BOURNS version slide pots.	<b>TGC Slide Pot Knob Kit - Spare Part only</b>	5207000-9	5207000-7***	Backward compatible
	Includes: • Knobs for ALPHA (old style) Slide Pot • Knobs for BOURNS (new style) Slide Pot • Instruction Sheet See: FRU image for contents.			

\*5207000-72 will be ready with R4.x production.

\*\*5207000-52 is similar to 5207000-42 but includes the new Valox Bezel.

\*\*\*5207000-7 was separated into two kits, one kit for the TGC Slide Pots and another kit for the Rotary knobs.

## Section 9-8 Top Console parts (cont'd)

**Table 9-12 Operator Panel Compatible Configurations**

Operator Panel Compatible Configurations			
If replacing:	Operator Panel 5207000-23		Operator Panel 5207000-33
Operator Panel FRU	Option 1	Option 2	Option 1
Upper Bezel	Order 5207000-15 Upper Bezel	N/A	Order 5207000-15 Upper Bezel
Main Ctrl. Board with USB Video Board and Cable	Order 5207000-30 Upper Operator Panel	Order 5207000-40 or 50 Main Ctrl. Board with USB Video Board and Cable, install with old video cable	Order 5207000-40 or -50 Main Ctrl. Board with USB Video Board and Cable
LCD and Frame	Order GA200439 Frame with LCD and TouchScreen	Order 5207000-33 or -43 If not in stock	Order 5207000-39
Aux USB Board	Order GA200441	Order 5207000-40 or -50 install with old video cable	Order 5207000-41
OP Cable Kit	Order GA200446	Order 5207000-46	Order 5207000-46
High Voltage Inverter Board with Cable	Order GA200442	N/A	Order GA200442
Dust Gasket for TGC pots - Lower OP	Order 5207000-55	N/A	Order 5207000-55

**Table 9-13 LOGIQ E9 New Lower Op Panel FRUs Compatible Configurations**

LOGIQ E9 New Lower Op Panel FRUs Compatible Configurations			
If replacing:	Operator Panel 5207000-23		Operator Panel 5207000-33
Operator Panel FRU	Option 1	Option 2	Option 1
Upper Bezel	Order 5207000-15 Upper Bezel	N/A	Order 5207000-15 Upper Bezel
Main Ctrl. Board with USB Video Board and Cable	Order 5207000-30 Upper Operator Panel	Order 5207000-40 Main Ctrl. Board with USB Video Board and Cable, install with old video cable	Order 5207000-40 Main Ctrl. Board with USB Video Board and Cable
LCD and Frame	Order GA200439 Frame with LCD and TouchScreen	Order 5207000-33	Order 5207000-39
Aux USB Board	Order GA200441	Order 5207000-40, install with old video cable	Order 5207000-41
OP Cable Kit	Order GA200446	Order 5207000-46	Order 5207000-46
High Voltage Inverter Board with Cable	Order GA200442	N/A	Order GA200442
Dust Gasket for TGC pots - Lower OP	Order 5207000-55	N/A	Order 5207000-55

## Section 9-9 XYZ Mechanism parts

For XY Mech Brakes and Brake Motor FRUs Compatibility, see:  
[Table 9-15 "XY Mech Brakes and Brake Motor FRUs Compatibility Chart" on page 9-34](#)

**Table 9-14 XYZ Mechanism parts**

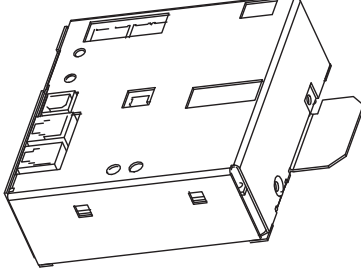
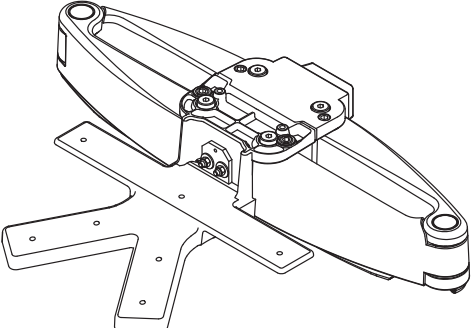
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	XYZ Control ASM	GA200041 OBSOLETE	Replaced by GA200644	1	Y
2.	XYZ Control ASM	GA200644	Replaced by 5429346	1	Y
3.	XYZ Control ASM	5429346	See <a href="#">Table 9-15 "XY Mech Brakes and Brake Motor FRUs Compatibility Chart" on page 9-34.</a>	1	Y
4.	LOGIQ E9 R4 XYZ Motor Controller	5440179	<p>Supports new LCD Monitor introduced with R4.x consoles. See <a href="#">Table 9-15 "XY Mech Brakes and Brake Motor FRUs Compatibility Chart" on page 9-34</a></p> 	1	Y
5.	XY Mechanism	GA200036	Replaced by GA200946	1	Y
6.	XY Mechanism	GA200946	<p>Replaces GA200036 See <a href="#">Table 9-15 "XY Mech Brakes and Brake Motor FRUs Compatibility Chart" on page 9-34.</a></p> 	1	Y

Table 9-14 XYZ Mechanism parts

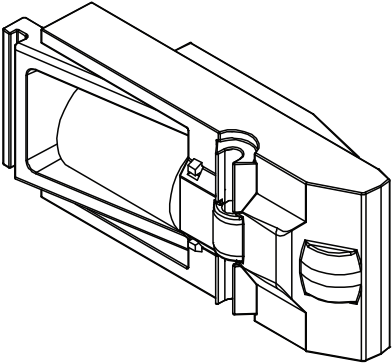
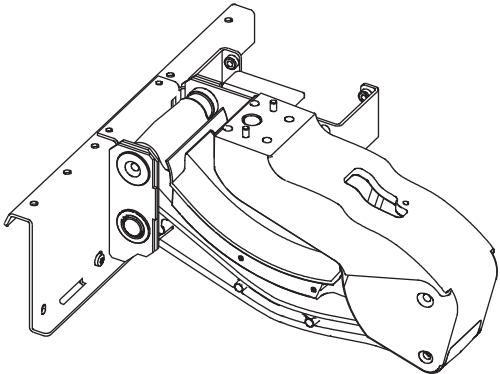
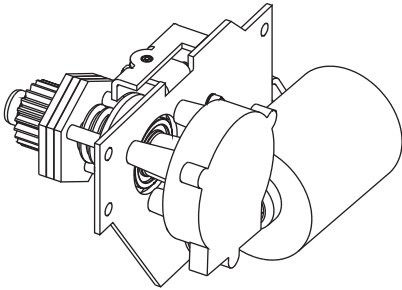


ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
7.	XY Brake Assembly	GA200952	Replaces GA200535 	2	Y
8.	Z-Mechanism	GA200039	Use 5958000	1	Y
9.	Z-Mechanism Assembly	5958000		1	Y
10.	Drive Gear Assy	GA200177	Use 5396884	1	Y
11.	Drive Gear Assy	5396884	See <a href="#">Table 9-15 "XY Mech Brakes and Brake Motor FRUs Compatibility Chart"</a> on page 9-34. 	1	Y
12.	Cable, XYZ Switch Board	5198990		1	Y
13.	Cable - USB, BEP to XYZ Motor Controller	5194492-6	Compatible with R2.0.4 or later. 	1	Y

Table 9-14 XYZ Mechanism parts

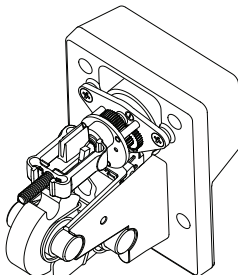
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
14.	Park Lock	GA200161		1	Y

Table 9-15 XY Mech Brakes and Brake Motor FRUs Compatibility Chart

New P/N	Description	Replaces	Compatibility	Solution / Comments
GA200946	XY Mechanism	GA200036	Backward compatible	If replacing this part, it is recommended for better performance to check the installed XYZ Motor Controller and update it to 5429346 if 5429346 is not installed yet.
5429346	LOGIQ E9 XYZ Motor Controller with O-ring Detection	GA200644 GA200795	No. Only compatible with P/N GA200946 - XY Arm Assembly, and P/N GA200952 - XY brake Motor Assembly	N/A
5440179	LOGIQ E9 XYZ Motor Controller with O-ring Detection	5429346	Supports new LCD Monitor introduced with R4.x consoles	Use this FRU if the LCD Arm and Monitor are the new version for R4.x and later, due to the changes in weight of the new LCD Arm and Monitor.
GA200952	XY Brake Mechanism Assembly	GA200535	Backward compatible	If replacing this part, it is recommended for better performance to check the installed XYZ Motor Controller and update it to 5429346 if 5429346 is not installed yet.  <i>NOTE: 5429346 is ONLY compatible with P/N GA200946 XY Mech.</i>

**NOTE:** LOGIQ E9 console models 5205000-4 and earlier:

*It is recommended to have the system running R2.0.4 or later Application Software and the XY USB Cable installed to allow the system to release the XY Brakes at shutdown if the console is not locked.*

*If replacing the new FRUs on a system that is not running R2.0.4 or later, order the Late Request Plan for FMI 70206 - R2.0.4 Software Upgrade and XYZ USB Cable Update in SN70443A - Closed FMIs on LOGIQ™ E9, LOGIQ™ 9 and LOGIQ™ 700 Consoles.*

## Section 9-10

### Main Console parts

**Table 9-16 Main Console parts 1 of 2**

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Back End Processor Parts	See <a href="#">Section 9-13 "Back End Processor (BEP) parts"</a> on page 9-52			
2.	Front End Processor Parts	See <a href="#">Section 9-12 "Card Rack parts"</a> on page 9-39			
3.	Casters	See <a href="#">Section 9-11 "Casters (Wheels) parts"</a> on page 9-37			
4.	Covers	See <a href="#">Section 9-7 "Covers and Bumpers"</a> on page 9-9			
5.	Bulkhead Board Assembly	GA200290			

Table 9-16 Main Console parts 2 of 2 (Continued)

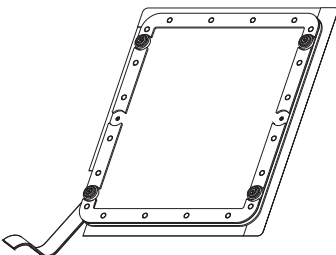
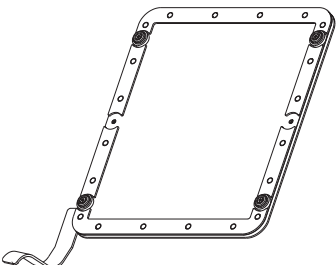


ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
10.	Air Filter Assembly (Bottom)	5316340-2	Refer to Table 9-17 to identify the correct FRU. 	1	Y
11.	Air Filter Assembly (Bottom)	5391493	Refer to Table 9-17 to identify the correct FRU. 	1	Y

Table 9-17 Identifying Base Casting for proper Bottom Air Filter Assembly

Base Casting	Identification
<b>Smooth on inside surface</b> 	Base casting identified with smooth surface requires 5316340-2 Filter Assembly.
<b>Cross-hatching on inside surface</b> 	Base casting identified with cross-hatching requires 5391493 Filter Assembly.



## Section 9-11 Casters (Wheels) parts

Table 9-18 Casters (Wheels) parts 1 of 2

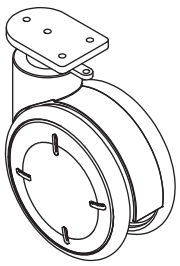
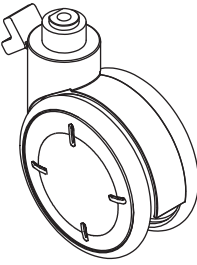

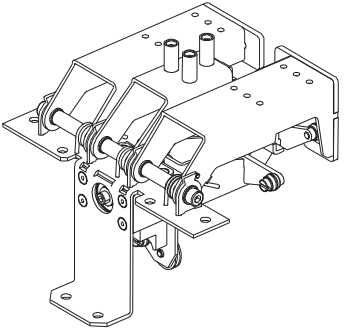
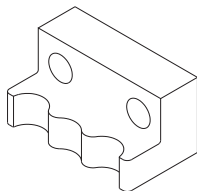
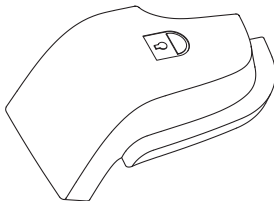
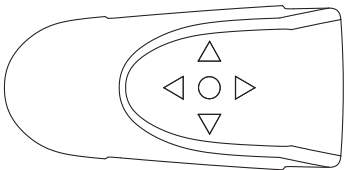
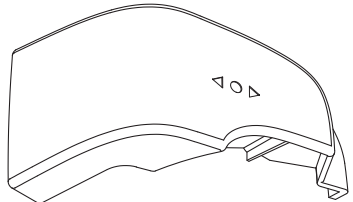
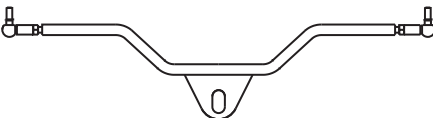
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Front Casters	GA200245	Front Casters (Front Wheels), front w/brake and lock 	2	Y
2.	Rear Casters	GA200246	Rear Casters (Rear Wheels), rear swivel only 	2	Y
3.	Wheel Change Kit Rear Caster Replacement Tool	FC200829			
4.	Pedal Mechanism	5311911		1	Y

Table 9-18 Casters (Wheels) parts 2 of 2 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
5.	Cam, Pedal POM (Polyoxymethylene), Ichiro	5311753		1	Y
6.	Cover Brake Pedal	GA307052		1	Y
7.	Cover Pedal Release	GA307053		1	Y
8.	Cover Pedal Direction Lock	GA307054		1	Y
9.	Caster Brake-Lock Release Assembly	5312180		1	Y

## Section 9-12

### Card Rack parts

For Card Rack compatible configurations, see:  
[9-12-1 "DRX Boards Compatible Configurations" on page 9-47.](#)

For Front End Boards compatible configurations, see:  
[9-12-2 "Front End Boards Compatible Configurations" on page 9-48.](#)

For GTX Boards compatible configurations, see:  
[9-12-3 "GTX Boards Compatible Configuration" on page 9-51.](#)

**Table 9-19 Card Rack parts 1 of 9**

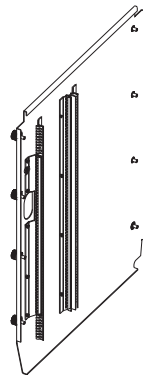
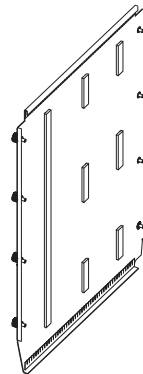
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Card Cage Front Cover Assembly	5245458		1	Y
2.	Card Cage Front Cover Assembly - MRX	5245458-2		1	Y

Table 9-19 Card Rack parts 2 of 9 (Continued)

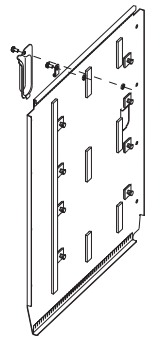
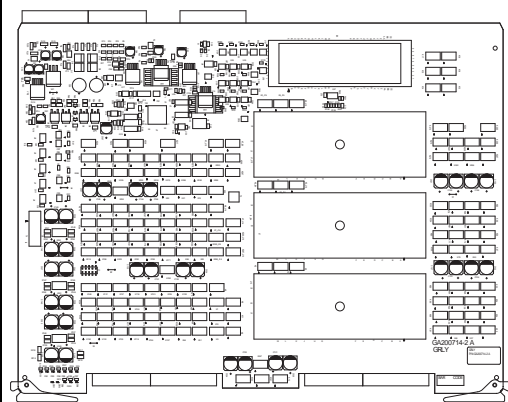
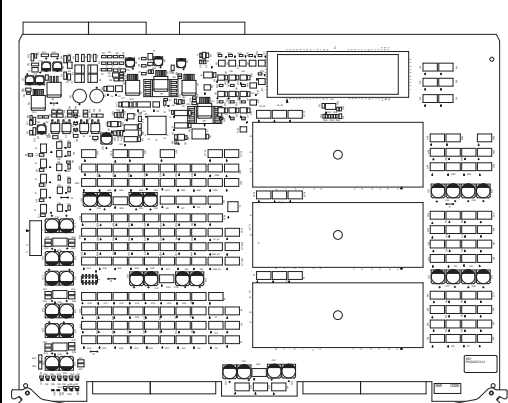
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
3.	Card Cage Front Cover Assembly MRX R4 consoles	5245458-3	With plate cover on GRLY side for future applications 	1	Y
4.	GRLY	GA200630	Replaced by GA200714-3.	1	Y
5.	GRLY	GA200714	Replaced by GA200714-3.	1	Y
6.	GRLY	GA200714-2	Replaced GA200630 and GA200714 LOGIQ E9 only. 	1	Y
7.	GRLY with new DLP Connectors	GA200714-3		1	Y

Table 9-19 Card Rack parts 3 of 9 (Continued)

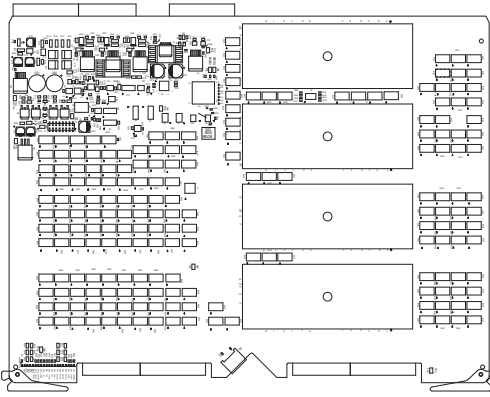
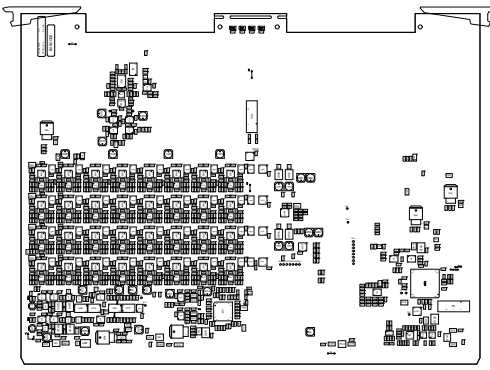
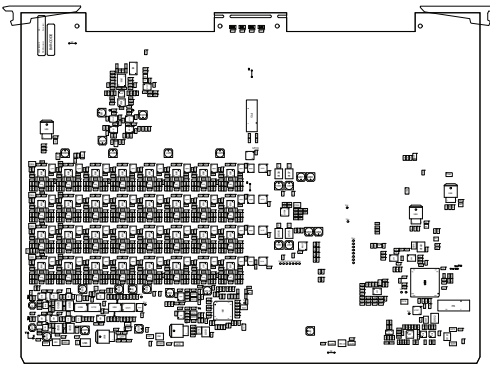
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
8.	GRLY R4.x or later	5441000		1	Y
9.	GRX64 without CW	GA200300		1	Y
10.	GRX 128ch without CW	GA200295		1	Y

Table 9-19 Card Rack parts 4 of 9 (Continued)

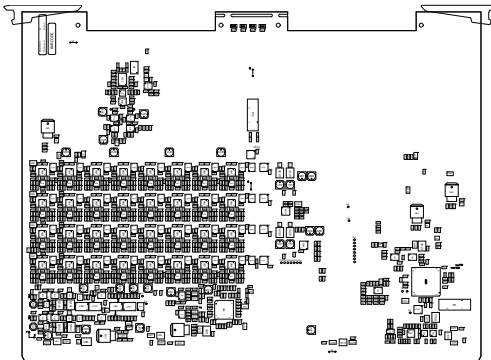
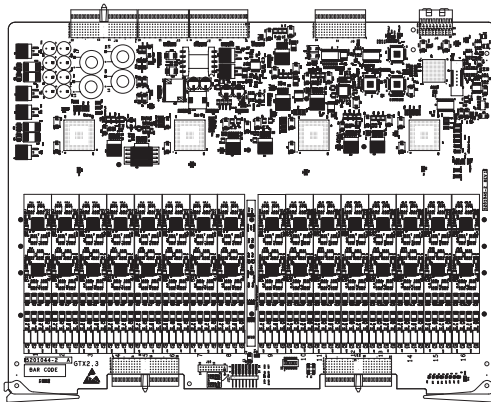
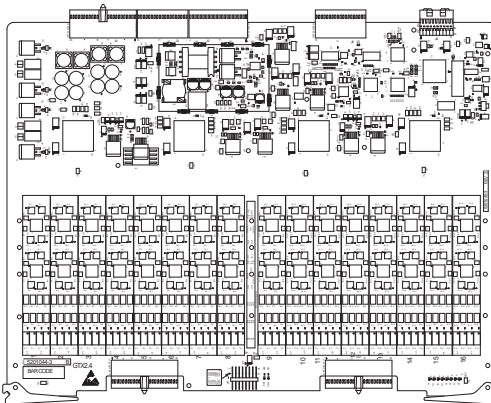
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
11.	GRX 128ch with CW (R2.x.x or later)	GA200105	Part of CW option 	1	Y
12.	GTX 2.3	5201044-2	See <a href="#">Table 9-24 "GTX Boards Compatible Configurations"</a> on page 9-51. 	3	Y
13.	GTX 2.4 with CW Resistor (R1.0.6 or later)	5201044-3	Replaced by 5201044-5. Part of CW option	3	Y
14.	GTX with P6B Pulser Asic with CW Resistor (R1.0.6 or later)	5201044-5	Part of CW option See <a href="#">Table 9-24 "GTX Boards Compatible Configurations"</a> on page 9-51. 	3	Y

Table 9-19 Card Rack parts 5 of 9 (Continued)

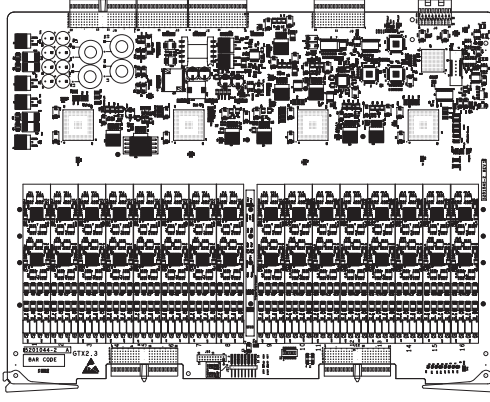
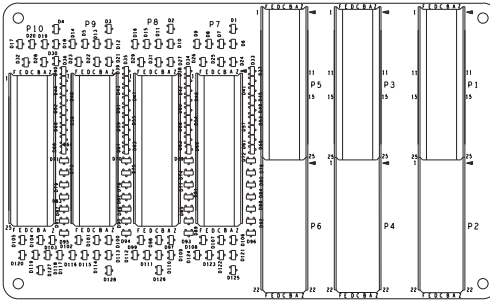
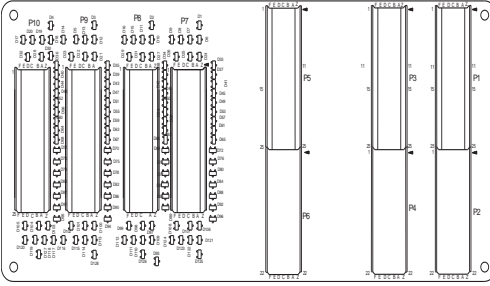
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
15.	GTX 2.3 with CW Resistor (R1.0.6 or later)	5201044-4	<p>Part of CW option See <a href="#">Table 9-24 "GTX Boards Compatible Configurations"</a> on page 9-51.</p> 	3	Y
16.	Front Plane / XD BUS	5201002		2	Y
17.	Front Plane - MRX	5393912		1	Y

Table 9-19 Card Rack parts 6 of 9 (Continued)

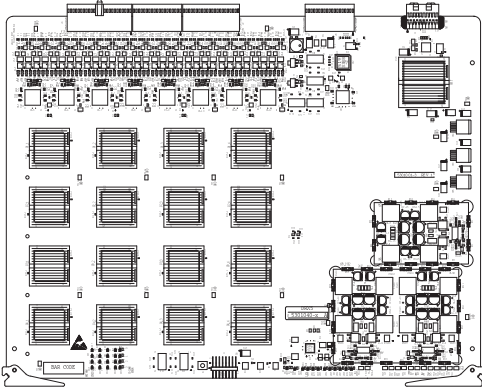
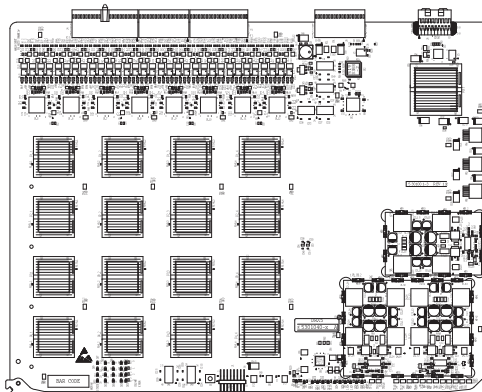
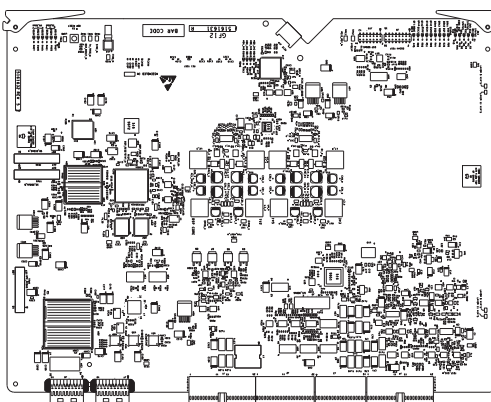
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
18.	DRX 3	5301040-3	<p>See Table 9-20 "DRX Boards Compatible Configurations - 5205000-4 and earlier consoles" on page 9-47.</p> 	3	Y
19.	DRX 3.1 (R1.0.6 or later)	5301040-4 OBSOLETE	<p>Replaced by 5301040-5</p> <p>See Table 9-20 "DRX Boards Compatible Configurations - 5205000-4 and earlier consoles" on page 9-47 for DRX compatibility.</p>	3	Y
20.	DRX 5 (R1.0.6 or later)	5301040-5	<p>See Table 9-20 "DRX Boards Compatible Configurations - 5205000-4 and earlier consoles" on page 9-47 for DRX compatibility.</p> 	3	Y
21.	GFI 2	5161631		1	Y



Table 9-19 Card Rack parts 7 of 9 (Continued)

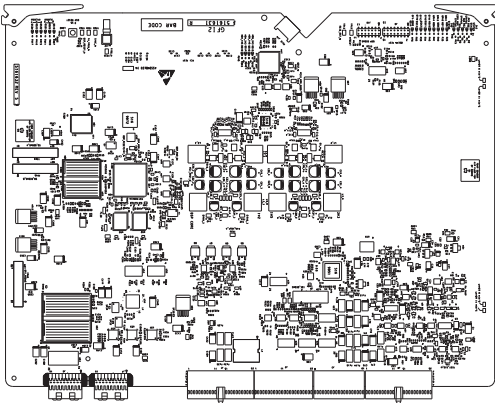
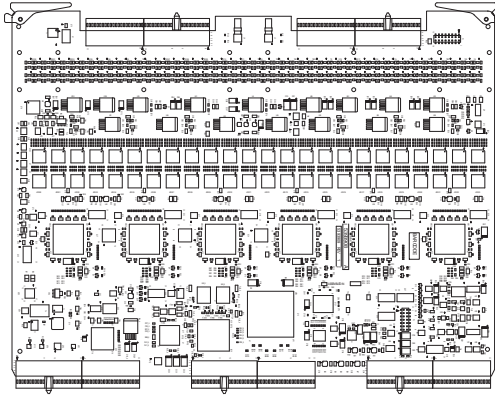
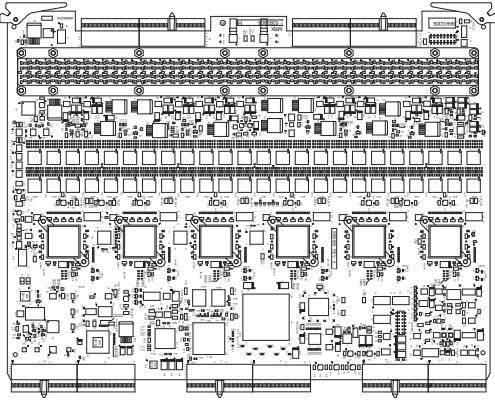
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
22.	GFI 2 with B Flow	5161631-2	See Table 9-23 "Front End Boards Compatible Configurations" on page 9-50 	1	Y
23.	MRX CW	5393908	See Table 9-23 "Front End Boards Compatible Configurations" on page 9-50. 	1	Y
24.	MRX non CW (R3.1.1 or later)	5393908-2	Replaced by 5393908-4 See Table 9-23 "Front End Boards Compatible Configurations" on page 9-50.	1	Y
25.	MRX non CW (R3.1.2 or later)	5393908-4	Replaces by 5393908-2 See Table 9-23 "Front End Boards Compatible Configurations" on page 9-50. 	1	Y

Table 9-19 Card Rack parts 8 of 9 (Continued)

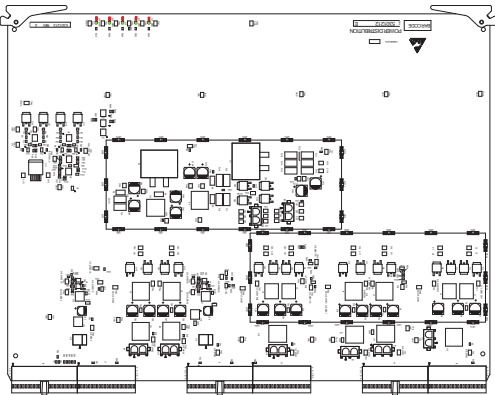
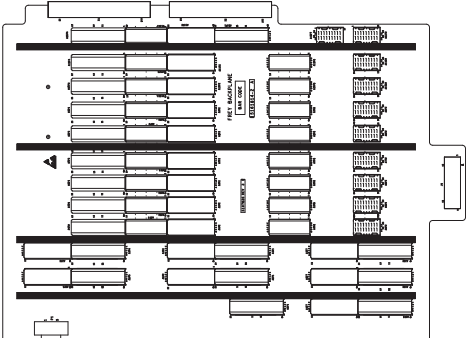
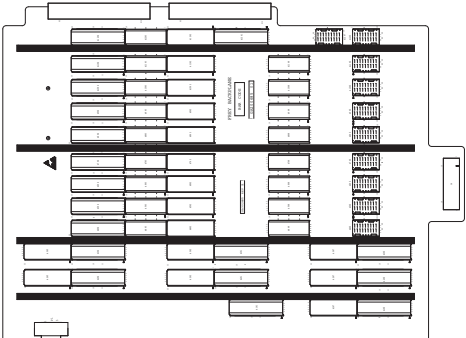
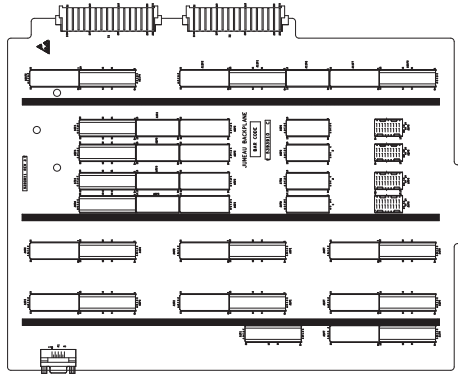
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
26.	Power Distribution Panel - MRX	5301212-2	<p>See Table 9-23 "Front End Boards Compatible Configurations" on page 9-50.</p> 	1	Y
27.	BP (Backplane)	5161814-2		1	Y
28.	BP (Backplane) (R1.0.6 or later)	GA200685		1	Y

Table 9-19 Card Rack parts 9 of 9 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
29.	BP (Backplane) - MRX	5393910	<p>See Table 9-23 "Front End Boards Compatible Configurations" on page 9-50.</p> 	1	Y
30.	Plate Connectors with guide	See Table 9-9 - Covers - LOGIQ E9 (not all covers listed are identified in Figure 9-2 on page 9-9)			
31.	4D Motor Control	See Table 9-28 - Power Supply parts			

## 9-12-1 DRX Boards Compatible Configurations

Table 9-20 DRX Boards Compatible Configurations - 5205000-4 and earlier consoles

DRX Boards Compatible Configurations				
	DRX1 (slot 1)	DRX2 (slot 2)	DRX3 (slot 3)	DRX4 (slot 4)
Option 1	Not populated	5301040-3	5301040-3	5301040-3
Option 2	Not populated	5301040-4/5	5301040-4/5	5301040-4/5

**NOTE:** Compatibility charts only show parts that have any compatibility dependencies. Parts not listed are assumed to be compatible with all configurations.

## Section 9-12 Card Rack parts (cont'd)

### 9-12-2 Front End Boards Compatible Configurations

Also see ["9-12-2 Front End Boards Compatible Configurations \(cont'd\)"](#) on page 9-50.

**Table 9-21 Front End Boards Compatible Configurations**

Front End Boards Compatible Configurations								
Minimum Software version required	R1.x.x	R4	R1.x.x	R1.0.6	R1.x.x	R1.x.x	R2.x.x	
MODEL NUMBER / DESCRIPTION	GFI2 5161631	GFI2 with B Flow 5161631-2	DRX3 5301040-3	DRX3.1 5301040-4 DRX5 5301040-5	GRX64 GA200300	GRX128 GA200295	GRX128 w/CW* GA200105	
5205000 LOGIQ E9 100-240 VAC	C	C	C	C	C	C	C*	
5205000-2 LOGIQ E9 220-240 VAC	C	C	C	C	C	C	C*	
5205000-3 LOGIQ E9 100-240 VAC	C	C	C	C	C	C	C	
5205000-4 LOGIQ E9 220-240 VAC	C	C	C	C	C	C	C	
5205000-5 LOGIQ E9 100-240 VAC	N	N	N	N	N	N	N	
5205000-6 LOGIQ E9 220-240 VAC	N	N	N	N	N	N	N	
5205000-7 LOGIQ E9 100-240 VAC	N	N	N	N	N	N	N	
(continued)								
Minimum Software version required	R1.0.6	R1.0.6	R1.0.6	R1.x.x	R1.x.x	R1.x.x	R1.x	R4.x
MODEL NUMBER / DESCRIPTION	GTX2.4* 5201044-3	GTX2.4* 5201044-4	GTX2.4* 5201044-5	GRLY GA200630	GRLY GA200714	GRLY GA200714-2	GRLY GA200714-3	R4 GRLY 5441000
5205000 LOGIQ E9 100-240 VAC	C*	C*	C*	C	C	C	C	C**
5205000-2 LOGIQ E9 220-240 VAC	C*	C*	C*	C	C	C	C	C**
5205000-3 LOGIQ E9 100-240 VAC	C	C	C	C	C	C	C	C**
5205000-4 LOGIQ E9 220-240 VAC	C	C	C	C	C	C	C	C**
5205000-5 LOGIQ E9 100-240 VAC	C	C	C	N	N	C	C	C**
5205000-6 LOGIQ E9 220-240 VAC	C	C	C	N	N	C	C	C**
5205000-7 LOGIQ E9 100-240 VAC	C	C	C	N	N	N	C	C

\* Required for CW Option

\*\* Requires R4 or later Upgrade

**NOTE:** Compatibility charts only show parts that have any compatibility dependencies. Parts not listed are assumed to be compatible with all configurations.

## 9-12-2 Front End Boards Compatible Configurations (cont'd)

**Table 9-22 Front End Boards Compatible Configurations**

Front End Boards Compatible Configurations (cont'd)								
Minimum Software version required	R1.x.x	R3.x.x	R3.x.x	R3.1.0	R3.1.1	R3.1.2 and later	N/A	N/A
MODEL NUMBER / DESCRIPTION	FP 5201002	FP MRX 5393912	PD 5301212-2	MRX 5393908	MRX 5393908-2	MRX 5393908-4	Card Cage Front Cover Assembly 5245458 GFI	Card Cage Front Cover Assembly-MRX 5245458-2
5205000 LOGIQ E9 100-240 VAC	C	N	N	N	N	N	C	N
5205000-2 LOGIQ E9 220-240 VAC	C	N	N	N	N	N	C	N
5205000-3 LOGIQ E9 100-240 VAC	C	N	N	N	N	N	C	N
5205000-4 LOGIQ E9 220-240 VAC	C	N	N	N	N	N	C	N
5205000-5 LOGIQ E9 100-240 VAC	N	C	C	C	C	C	N	C
5205000-6 LOGIQ E9 220-240 VAC	N	C	C	C	C	C	N	C
5205000-7 LOGIQ E9 100-240 VAC	N	C	C	C	C	C	N	C
(continued)								
Minimum Software version required	R4.x.x	R3.x.x	R1.x.x	R1.0.6	R1.x.x	R2.x.x	R2.x.x	
MODEL NUMBER / DESCRIPTION	Card Cage Front Cover Assembly-MRX 5245458-3	BP MRX 5393910	BP 5161814-2	BP GA200685	MPS 5205052-2	MPS 5205052-3	MPS Mitra 5205052-4	MPS Lambda 5205054
5205000 LOGIQ E9 100-240 VAC	N	N	C	C	C	C	C	N
5205000-2 LOGIQ E9 220-240 VAC	N	N	C	C	C	C	C	N
5205000-3 LOGIQ E9 100-240 VAC	N	N	C	C	C	C	C	C
5205000-4 LOGIQ E9 220-240 VAC	N	N	C	C	C	C	C	C
5205000-5 LOGIQ E9 100-240 VAC	C	C	N	N	N	C	C	C
5205000-6 LOGIQ E9 220-240 VAC	C	C	N	N	N	C	C	C
5205000-7 LOGIQ E9 100-240 VAC	C	C	N	N	N	C	C	C

## 9-12-2 Front End Boards Compatible Configurations (cont'd)

**Table 9-23 Front End Boards Compatible Configurations**

Front End Boards Compatible Configurations (cont'd)							
Minimum Software version required	R4.x.x	R4.x.x	R4.x.x				
MODEL NUMBER / DESCRIPTION	MPS Alpha 5205052-5	MPS Mitra 5205052-6	MPS Lambda 5205054-3				
5205000 LOGIQ E9 100-240 VAC	C	C	N				
5205000-2 LOGIQ E9 220-240 VAC	C	C	N				
5205000-3 LOGIQ E9 100-240 VAC	C	C	C				
5205000-4 LOGIQ E9 220-240 VAC	C	C	C				
5205000-5 LOGIQ E9 100-240 VAC	C	C	C				
5205000-6 LOGIQ E9 220-240 VAC	C	C	C				
5205000-7 LOGIQ E9 100-240 VAC	C	C	C				

**NOTE:** Compatibility charts only show parts that have any compatibility dependencies. Parts not listed are assumed to be compatible with all configurations.

### 9-12-2-1 LOGIQ E9 Front End Boards Compatible Configurations Key

LOGIQ E9 Front End Boards Compatible Configurations Key	
N	Not supported
C	Compatible

## Section 9-12 Card Rack parts (cont'd)

### 9-12-3 GTX Boards Compatible Configuration

*NOTE: It is recommended to replace like for like GTX Boards. If stock of a particular board is not available, use this table to ensure the correct combination of GTX Boards are installed in the system:*

*GTX "numbers" use 1, 2, 3 and 4 as nomenclature in VPD, but 0 (zero), 1, 2 and 3 are used as nomenclature in diagnostics. In this Table, 1, 2, 3 and 4 nomenclature is used to identify board, based on location in the Card Rack.*

**Table 9-24 GTX Boards Compatible Configurations**

System configuration		GTX1 (Slot 1)	GTX1 (Slot 2)	GTX1 (Slot 3)	GTX1 (Slot 4)	Minimum Software
Non-CW	GRX - P/N GA200295	Not populated	P/N 5201044-2*			R 1.0.3 R 1.0.4 R 1.0.5
			P/N 5201044-2, 5201044-3**, 5201044-5 or 5201044-4			R 1.0.6
	MRX - P/N 5393908-2		P/N 5201044-3** or 5201044-5			R3.1.1 or later
	MRX - P/N 5393908-4					R3.1.2 or later
CW	GRX - P/N GA200105		P/N 5201044-3, 5201044-4 or 5201044-5			R2.x or later
	MRX - P/N 5393908		P/N 5201044-3** or 5201044-5			R3.1.2 or later

\* If replacing P/N 5201044-2 and there is no stock, order P/N 5201044-3 and the Late Request Plan for FMI 70206 - R2.0.4 Software Upgrade and XYZ USB Cable Update in SN70443A – Closed FMIs on LOGIQ™ E9, LOGIQ™ 9 and LOGIQ™ 700 Consoles.

\*\* 5201044-3, Rev. D or later are recommended. If P/N 5201044-3 is not available, use P/N 5201044-5. P/N 5201044-5 can be substituted with P/N 5201044-5.

## Section 9-13 Back End Processor (BEP) parts

There are two main families of BEPs used on the LOGIQ E9; BEP5.x supported in R3.x and earlier and BEP6.x supported in R4 and later. See [Table 9-25 "Back End Processor parts for R3.x and earlier" on page 9-52](#) and [Table 9-26 "Back End Processor parts for R4.x" on page 9-56](#).

For Back End Boards compatible configurations, see [9-13-1 "Back End Boards Compatible Configurations" on page 9-59](#).

**Table 9-25 Back End Processor parts for R3.x and earlier 1 of 4**



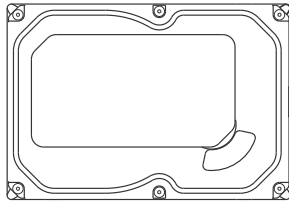
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	BEP with Extended Power Shutdown R2.x.x and earlier	5145000-2		1	Y
	BEP with Extended Power Shutdown - MRX	5145000-3		1	Y
2.	Hard Drive	5215286-2		1	Y
3.	BEP PS	5393800-2	Replaced by 5393800-3	1	Y



Table 9-25 Back End Processor parts for R3.x and earlier 2 of 4 (Continued)

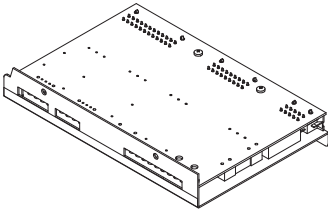
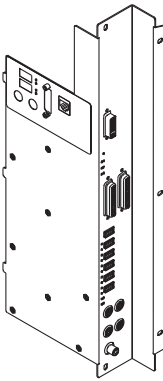
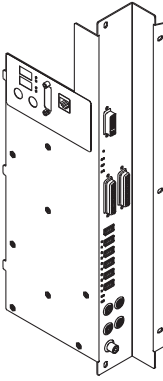
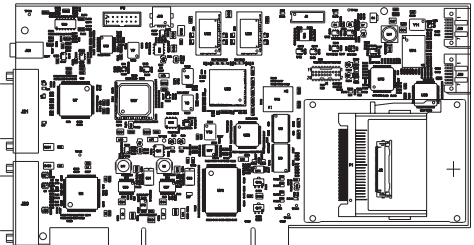
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
4.	BEP PS	5393800-3		1	Y
5.	BEP I/O Board	5141000-3		1	Y
6.	BEP I/O Board - MRX	5321212		1	Y
7.	DVR Board	5135840		1	Y

Table 9-25 Back End Processor parts for R3.x and earlier 3 of 4 (Continued)

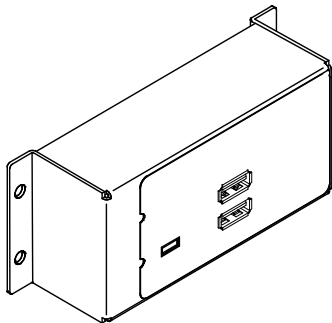
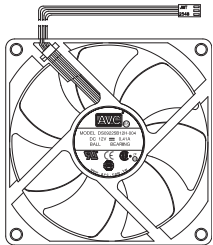
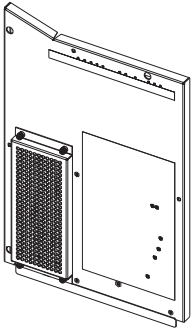
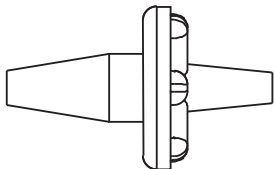
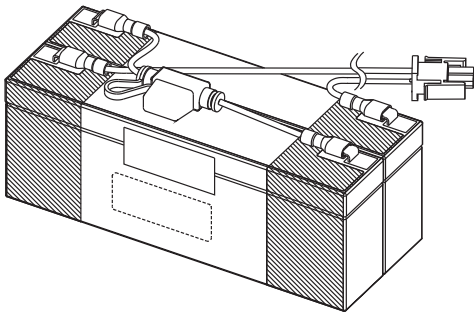
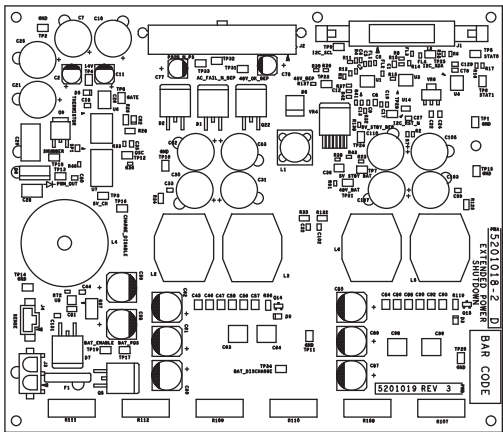

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
8.	Front Module	5301222-3		1	Y
9.	BEP Fan	5198607		1	Y
10.	BEP Cover with Battery Tray	5270660		1	Y
11.	Shock Mount HD	5267412		6	Y

Table 9-25 Back End Processor parts for R3.x and earlier 4 of 4 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
12.	Battery Pack Assembly	5262021		1	Y
13.	BIOS Battery	2404028-7		1	1
14.	Extended Power Shutdown Assembly	5201018-2		1	Y
15.	All BEP cables	See Section 9-17-5 - Back End Processor (BEP) cables			
16.	HDD Wipe Tool Kit	5329420	CD Tool plus instructions	1	Y
17.	Option Dongle	5265980		1	Y

## Section 9-13 Back End Processor (BEP) parts (cont'd).

Table 9-26 Back End Processor parts for R4.x 1 of 3






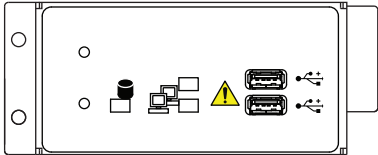
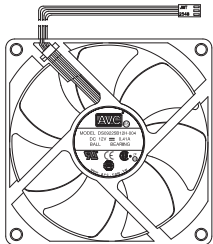


ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	BEP 6.1 LOGIQ E9 Ichiro R4.x	5380000-1		1	Y
2.	BEP6.X HDD Assembly Ichiro - Spare Part	5433408-50		1	Y
3.	BEP6.X PowerBoard Assembly - Spare Part	5433408-21		1	Y

Table 9-26 Back End Processor parts for R4.x 2 of 3 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
4.	BEP6.1 ChargeBoard Assembly Ichiro - Spare Part	5433408-30		1	Y
5.	BEP6.X Video ByPass Board Ichiro - Spare Part	5433408-90		1	Y
6.	BEP6.X Front IO Assembly Ichiro - Spare Part	5433408-40		1	Y
7.	BEP6.X Bottom Fan Assembly Ichiro - Spare Part	5433408-70		2	Y

**Table 9-26 Back End Processor parts for R4.x 3 of 3 (Continued)**

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
8.	BEP6.1 SideIO Board Assembly - Spare Part	5433408-2		6	Y
9.	BEP6.1 Battery Assembly Ichiro - Spare Part	5433408-60		1	Y
10.	BIOS Battery	2404028-7		1	1
11.	All BEP cables	See Section 9-17-5 - Back End Processor (BEP) cables			
12.	HDD Wipe Tool Kit	5329420	CD Tool plus instructions	1	Y
13.	Option Dongle	5265980		1	Y
14.	DVR and S-Video Options, see Table 9-42 "Options" on page 9-90				

## Section 9-13 Back End Processor (BEP) parts (cont'd)

### 9-13-1 Back End Boards Compatible Configurations

See 9-13-1-1 "LOGIQ E9 Back End Boards Compatible Configurations Key" on page 9-59.

**Table 9-27 Back End Boards Compatible Configurations**

Back End Boards Compatible Configurations						
Minimum Software	R1.x.x	R1.x.x	R3.x.x	R3.x.x	R4.x	
MODEL NUMBER / DESCRIPTION	BEP 5145000-2	I/O Board 5141000-3	BEP - MRX 5145000-3	I/O Board - MRX 5321212	BEP6 5380000-1	Side I/O Board 5433408-2
5205000 LOGIQ E9 100-240 VAC	C	C	N	N	C*	C*
5205000-2 LOGIQ E9 220-240 VAC	C	C	N	N	C*	C*
5205000-3 LOGIQ E9 100-240 VAC	C	C	N	N	C*	C*
5205000-4 LOGIQ E9 220-240 VAC	C	C	N	N	C*	C*
5205000-5 LOGIQ E9 100-240 VAC	N	N	C	C	C*	C*
5205000-6 LOGIQ E9 220-240 VAC	N	N	C	C	C*	C*
5205000-7 LOGIQ E9 100-240 VAC	N	N	N	N	C	C

\* Requires R4 or later Upgrade

**NOTE:** Compatibility charts only show parts that have any compatibility dependencies. Parts not listed are assumed to be compatible with all configurations.

#### 9-13-1-1 LOGIQ E9 Back End Boards Compatible Configurations Key

LOGIQ E9 Back End Boards Compatible Configurations Key	
N	Not supported
C	Compatible

## Section 9-14 Main Power Supply parts

Table 9-28 Power Supply parts 1 of 3

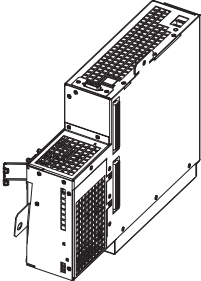
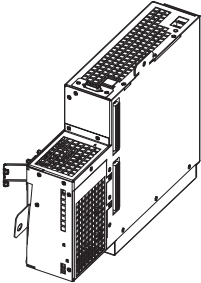
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	MAIN Power Supply	5205052 OBSOLETE	Replaced by 5205052-2	1	Y
2.	MAIN Power Supply	5205052-2	<p>Main PS 100V-240V. Used on non-CW systems.</p> 	1	Y
3.	Alpha MAIN Power Supply (R1.06 or later)	5205052-3	<p>If no stock use 5205052-4 Replaced by 5205052-4</p>	1	Y
4.	MAIN Power Supply no HUB. (R1.06 or later)	5205052-4	<p>Main PS 100V-240V. Compatible with CW Option Same as 5205052-3 without a USB hub.</p> 	1	Y
5.	Alpha Main power supply (R4 or later)	5205052-5	This version is same as 5205052-3 with new Firmwave for R4 compatibility	1	Y
6.	Alpha Main power supply no HUB (R4 or later)	5205052-6	Same as 5205052-4 with new firmware for R4 compatibility	1	Y
7.	Fan Assembly, MAIN Power Supply	5205052-99	<p>Compatible with 5205052-x only</p> 	1	Y



Table 9-28 Power Supply parts 2 of 3 (Continued)

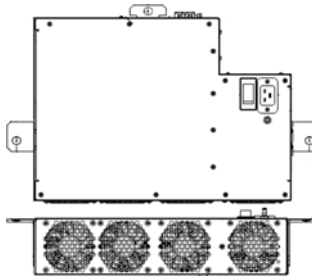
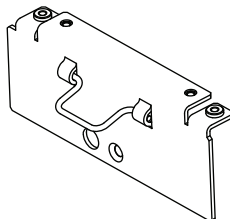
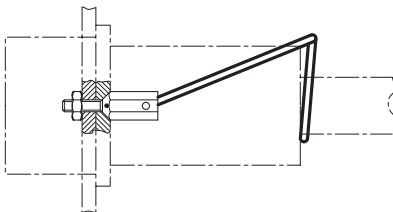
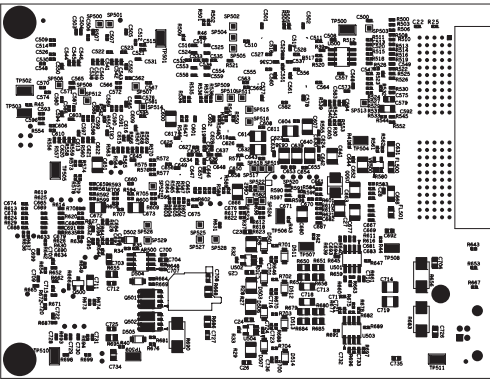
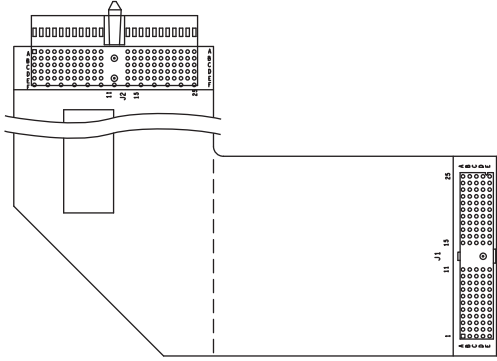
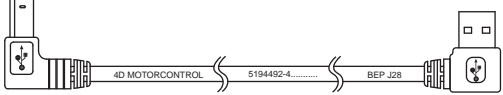

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
8.	MAIN Power Supply (Lambda)	5205054	<p>Console models 5205000-3 or later.</p> 	1	Y
9.	Main Power Supply Lambda (R4 or later)	5205054-3	<p>Consoles 5205000-7 or later</p>	1	Y
10.	Cover - 4D MC Cover for Lambda PS	5405085		1	Y
11.	AC Clamp	5370335	<p>AC Clamp with two screws. Discard screws, washers and nuts.</p> <p>Not used with Argentina, Australia, Brazil, India and South Africa Power Cords.</p> <p>For these countries the proper Clamp is included in the Power Cord FRU.</p> <p>Used on Power Cords 5148381, -2, -3, -4, -5, -7, -8.</p> 	1	Y
12.	4D Motor Control	5171810	<p>Board</p> 	1	Y

Table 9-28 Power Supply parts 3 of 3 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
13.	4D Flex Cable	5270841		1	Y
14.	USB Cable 4D Motor Controller (Cherokee/Mitra PS)	5194492-4		1	Y
15.	USB Cable 4D Motor Controller (Lambda PS)	5194492-7		1	Y

## Section 9-15 Peripherals

For Peripherals compatible configurations, see  
[9-15-3 "Peripherals Compatible Configurations" on page 9-67](#).

## 9-15-1 Printers

Table 9-29 Printer 1 of 2

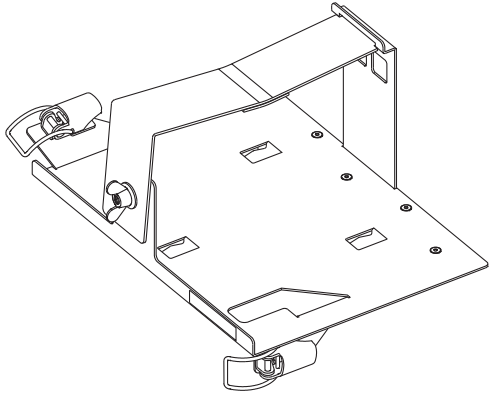
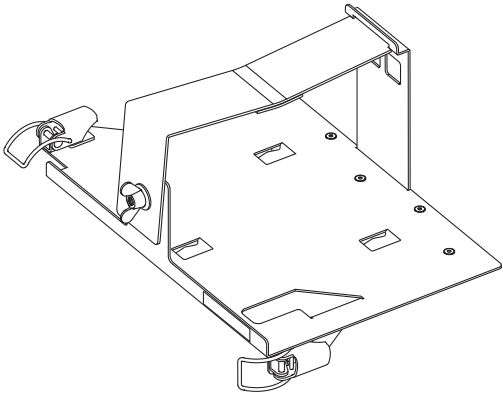


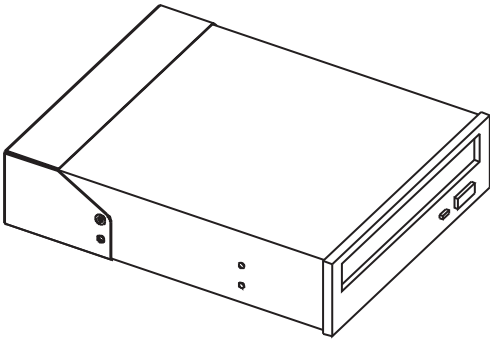
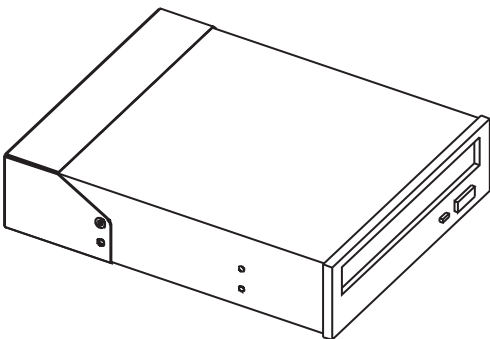
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	B/W Printer Bracket R3.x and earlier	5174885		1	Y
1.	Printer Tray for BEP6.x	5174885-2		1	Y
2.	UPD-897 Sony BW printer	5171608		1	Y
3.	USB Cable - BW Printer	Cable Q, See <a href="#">Table 9-40 "Peripherals Cables" on page 9-84</a>		1	Y
4.	Power Cable - BW Printer	Cable R, See <a href="#">Table 9-40 "Peripherals Cables" on page 9-84</a>		1	Y
5.	Report Printer - Canon Pixma MP610	Note: This model no longer available.		1	Y
6.	Report Printer - HP470	KTZ300182	See <a href="#">Table 9-31 "Peripherals Compatible Configurations" on page 9-67</a>	1	Y
7.	Color Printer UPD 23MD	2401985		1	Y
8.	Color Printer UPD 55MD	5116559		1	Y
9.	Color Printer UPD 25MD	5389822	Compatible with R3.x.x and later.	1	Y

Table 9-29 Printer 2 of 2 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
10.	USB Cable for External Printer	5315370		1	Y

## 9-15-2 Digital Video Disc (DVD) Drive

Table 9-30 Digital Video Disc (DVD) parts

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	DVD-CDRW Drive Assembly 5205000-5 and earlier consoles	5305921	Power and SATA separate cables 	1	Y
1.	LE9 DVD Drive ASSEMBLY - R4	5305921-2	Power SATA in one cable 	1	Y

## Section 9-15      **Peripherals** (cont'd)

### 9-15-3      **Peripherals Compatible Configurations**

**Table 9-31      Peripherals Compatible Configurations**

Peripherals Compatible Configurations		
Minimum Software	R3.x.x	R3.x.x
MODEL NUMBER / DESCRIPTION	UPD25 5389822	HP470
5205000 LOGIQ E9 100-240 VAC	C	C
5205000-2 LOGIQ E9 220-240 VAC	C	
5205000-3 LOGIQ E9 100-240 VAC	C	
5205000-4 LOGIQ E9 220-240 VAC	C	
5205000-5 LOGIQ E9 100-240 VAC	C	
5205000-6 LOGIQ E9 220-240 VAC	C	
5205000-7 LOGIQ E9 100-240 VAC	C	

#### 9-15-3-1      **LOGIQ E9 Peripherals Compatible Configurations Key**

LOGIQ E9 Peripherals Compatible Configurations Key	
N	Not supported
C	Compatible

## Section 9-16 Mains Power Cables

Table 9-32 Mains Power Cables 1 of 2

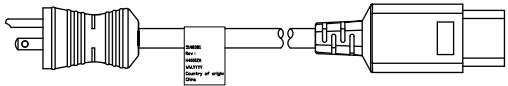
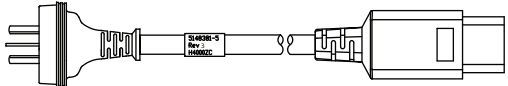
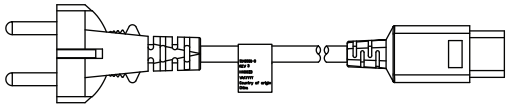
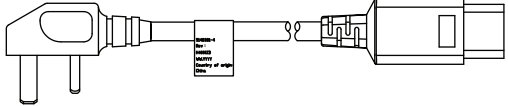
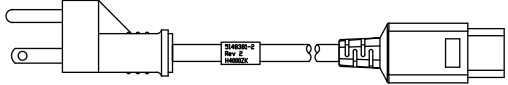
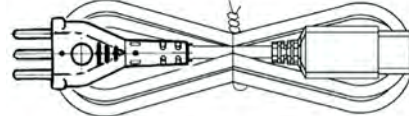
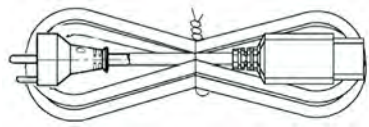
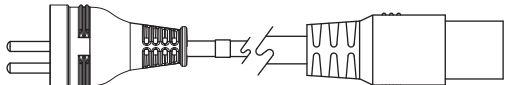
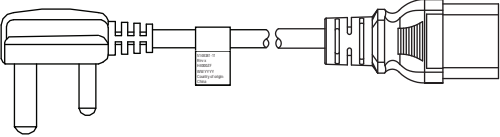
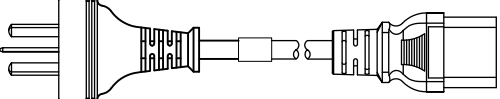
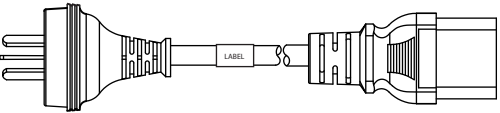

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	MAINS Power Cable - North America	5148381		1	Y
2.	MAINS Power Cable - China	5148381-5		1	Y
3.	MAINS Power Cable - Europe	5148381-3		1	Y
4.	MAINS Power Cable - UK/Ireland	5148381-4		1	Y
5.	MAINS Power Cable - Japan	5148381-2		1	Y
6.	MAINS Power Cable - Switzerland	5148381-7		1	Y
7.	MAINS Power Cable - Denmark	5148381-8		1	Y
8.	MAINS Power Cable - Israel	5322309		1	Y

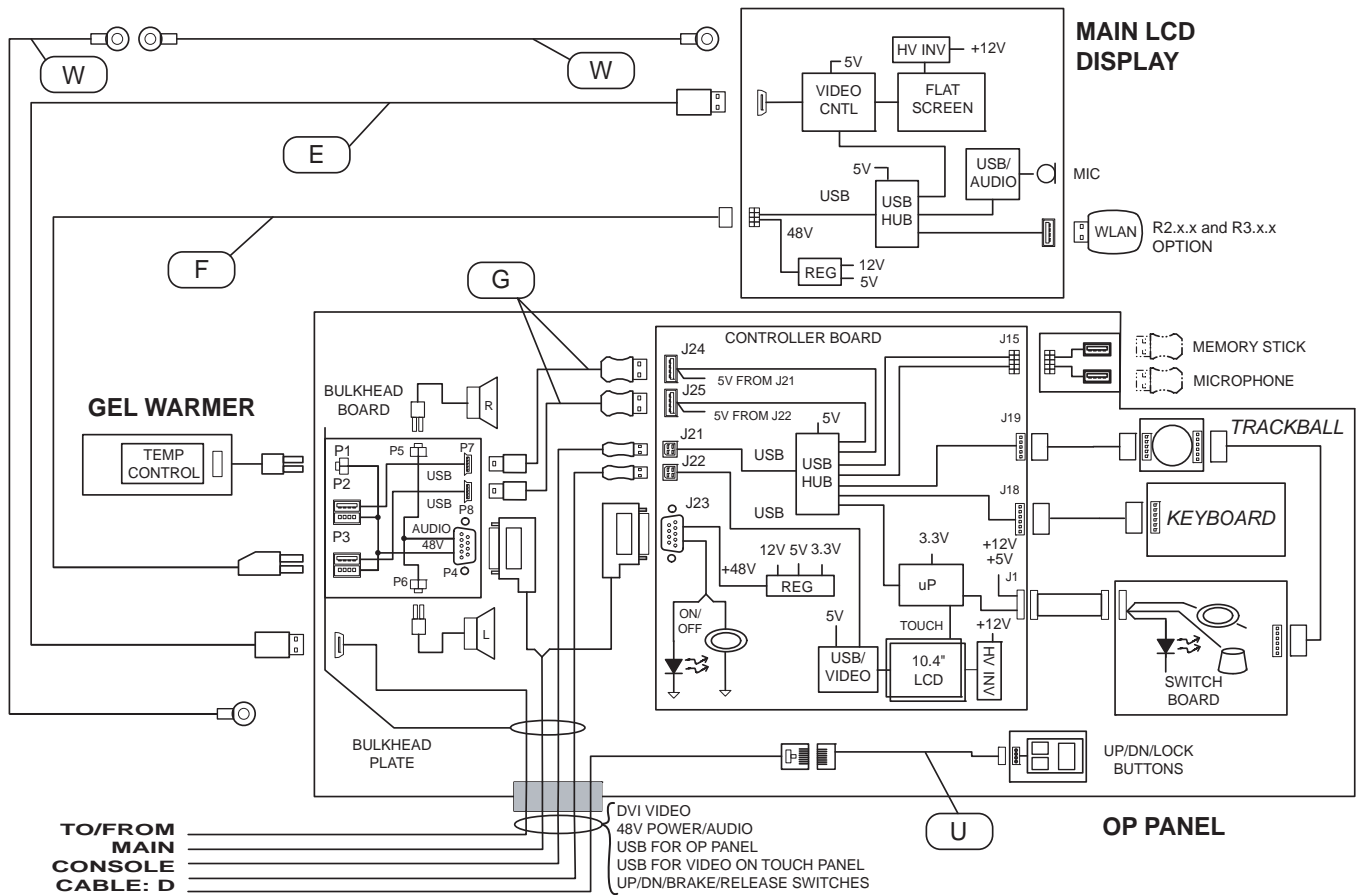


Table 9-32 Mains Power Cables 2 of 2 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
9.	MAINS Power Cable - India and South Africa	5323270	Includes AC Clamp. 	1	Y
10.	MAINS Power Cable - Argentina	5323275	Includes AC Clamp. 	1	Y
11.	MAINS Power Cable - Australia	5327624	Replaced by 5323129	1	Y
12.	MAINS Power Cable - Australia (orange cord)	5323129	Includes AC Clamp. 	1	Y
13.	MAINS Power Cable - Brazil	5412975	Includes AC Clamp. 	1	Y

## 9-17-1 Top Console Cables

### Figure 9-3 Top Console cable diagram - R3.x and earlier



## 9-17-1 Top Console Cables (cont'd)

Figure 9-4 Top Console cable diagram - R4.x and later

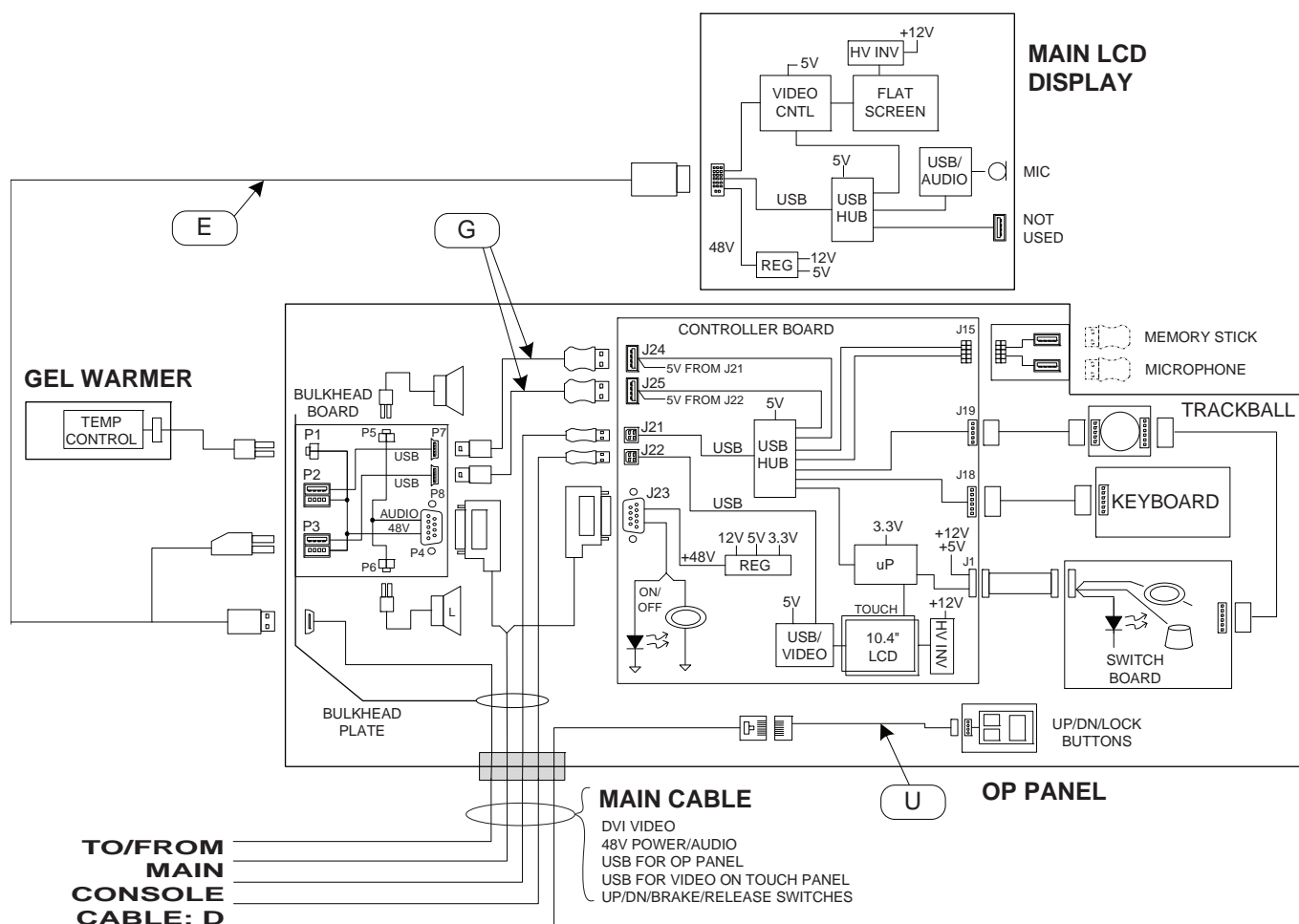


Table 9-33 Top Console cables 1 of 2

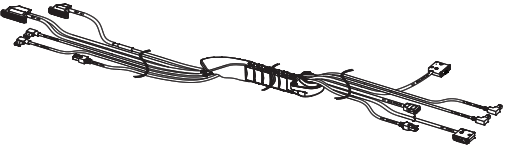
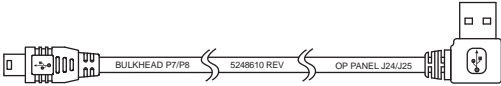

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	MAIN Cable Harness	5272357-2	<p>Cable D,</p> <ul style="list-style-type: none"> <li>• D1 - Power/Audio (BEP &gt; Operator Panel)</li> <li>• D2 - DVI Video (BEP &gt; Operator Panel)</li> <li>• D3 - XYZ (Operator Panel &gt; Motor/Brake Operator Panel XYZ)</li> <li>• D4 - USB (BEP &gt; Operator Panel) (2 used)</li> </ul> 	1	Y

Table 9-33 Top Console cables 2 of 2 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
2.	Cable, USB Operator Panel-Bulkhead	5248610	Cable G USB (short cable inside the UI) (J24 - P7), (J25 - P8) 	2	Y
3.	Gel Warmer Power	5245462	Cable AA 	1	Y

## 9-17-2 XYZ Controller cables

Figure 9-5 XYZ Controller cables

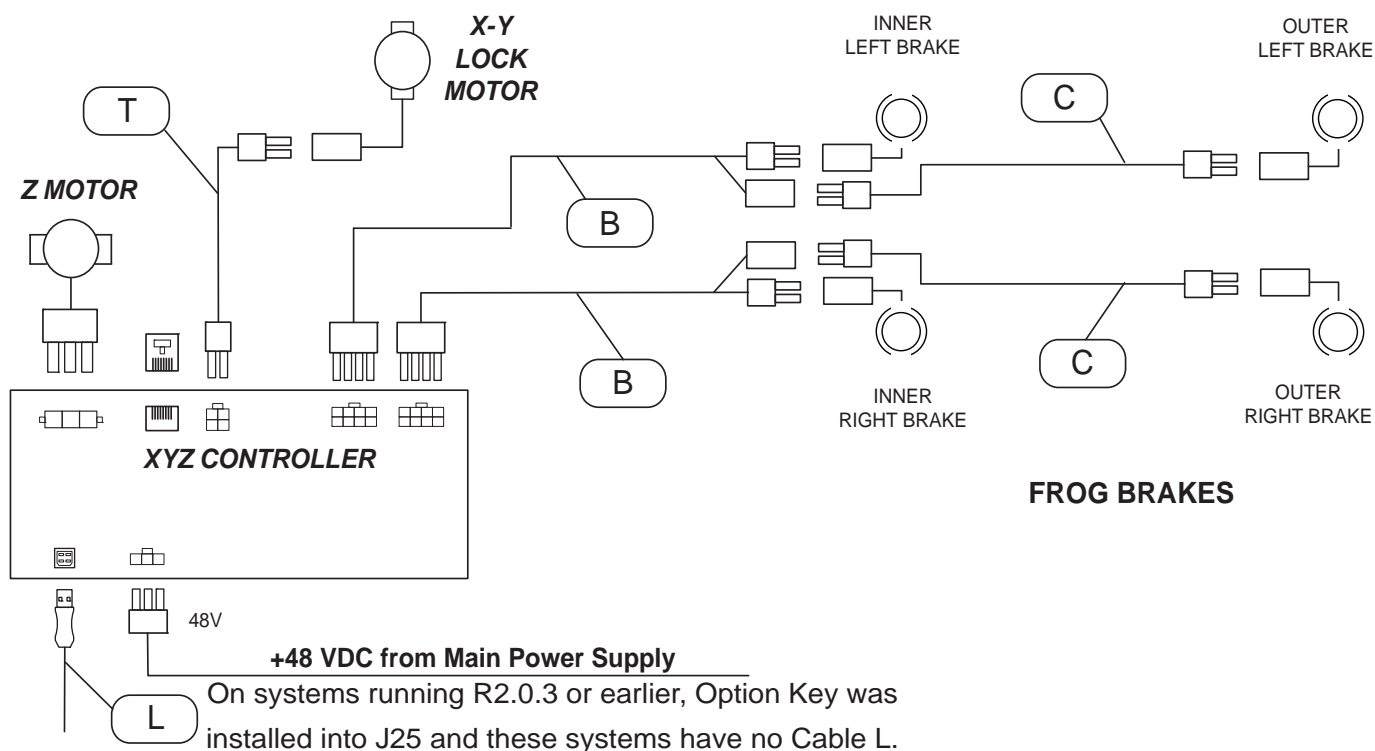
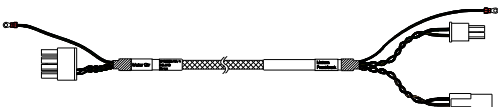

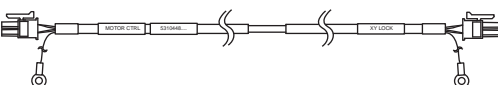


Table 9-34 XYZ Motor/Brake Control cables

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Frog Brake Control	GA200335	Cable B (XYZ Motor Brake Control > Frog Brakes) 	2	Y
2.	Cable, Power Cable - BEP 48V	Cable B, See <a href="#">Table 9-35 "Main Power Supply cables" on page 9-74</a>			
3.	Cable, Power Cable - BEP 48V	Cable I, See <a href="#">Table 9-35 "Main Power Supply cables" on page 9-74</a>			
4.	Cable, BEP to XYZ Motor Controller	5194492-6	Cable L, USB Cable (J25 - XYZ Controller) 	1	Y
5.	Cable, XY-Lock	5310448	Cable T, XY Lock 	1	Y

## 9-17-3 Main Power Supply cables

Figure 9-6 Main Power Supply cables

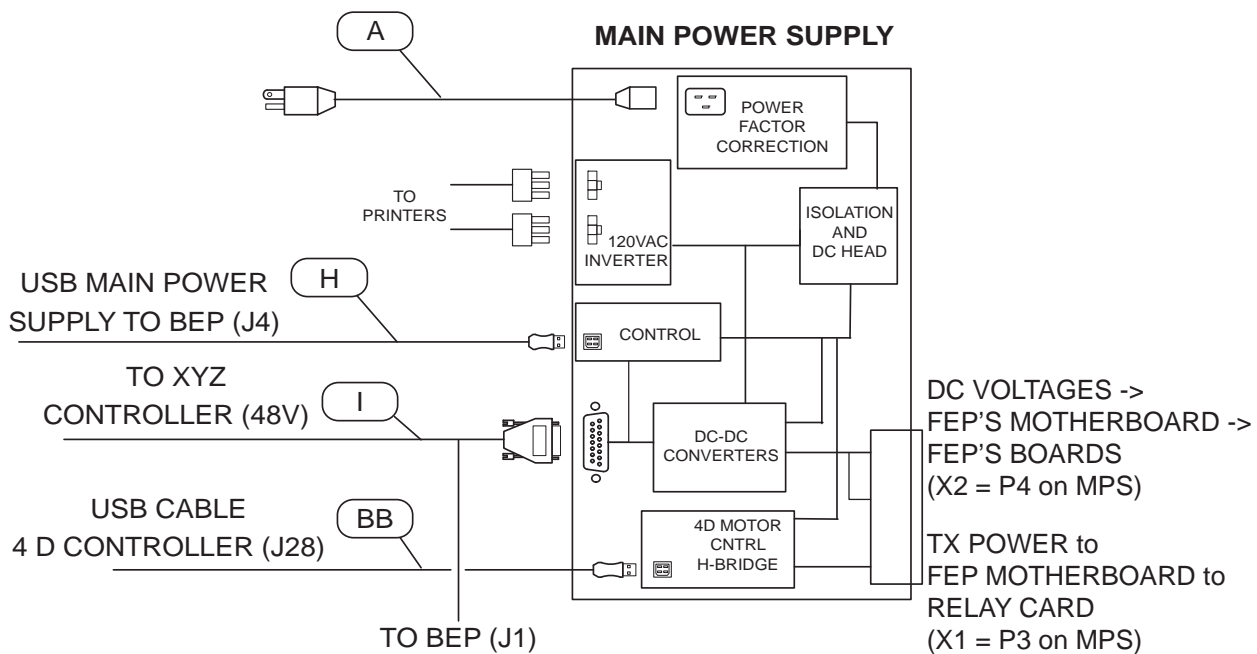


Table 9-35 Main Power Supply cables 1 of 2

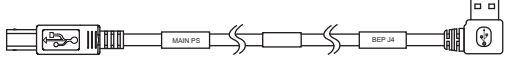

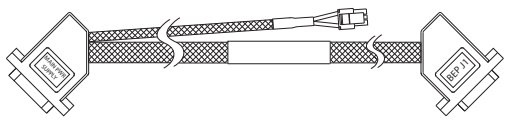
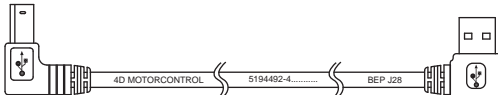
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Cable, Main Power Cable	Cable A, See <a href="#">Section 9-16 "Mains Power Cables" on page 9-68</a>			
2.	Cable, USB Cable - BEP5 to Main Power Supply	5194492	Cable H (J4 - Main Power Supply) 	1	Y
3.	Cable - USB, BEP6 to Main Supply, FREY	5194492-8	Cable H (J4 - Main Power Supply) 	1	Y
4.	Cable, Power Cable - BEP 48V	5194495	Cable I (J1 - Main Power Supply - XYZ Controller) 	1	Y
5.	Cable, AC Power Cable - BW Printer	Cable R, See <a href="#">Table 9-40 "Peripherals Cables" on page 9-84</a>			
6.	Cable, Brake Arm Left Right	See <a href="#">Table 9-34 "XYZ Motor/Brake Control cables" on page 9-73</a>		1	Y
7.	Cable, Brake Arm Controller	See <a href="#">Table 9-34 "XYZ Motor/Brake Control cables" on page 9-73</a>		1	Y

Table 9-35 Main Power Supply cables 2 of 2 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
8.	Cable, USB cable to 4D MC	5194492-4	<p>Cable BB (J28 - Main Power Supply - 4D MC)</p> 	1	Y

## 9-17-4 Card Rack cables

Figure 9-7 Card Rack cables (GFI configuration)

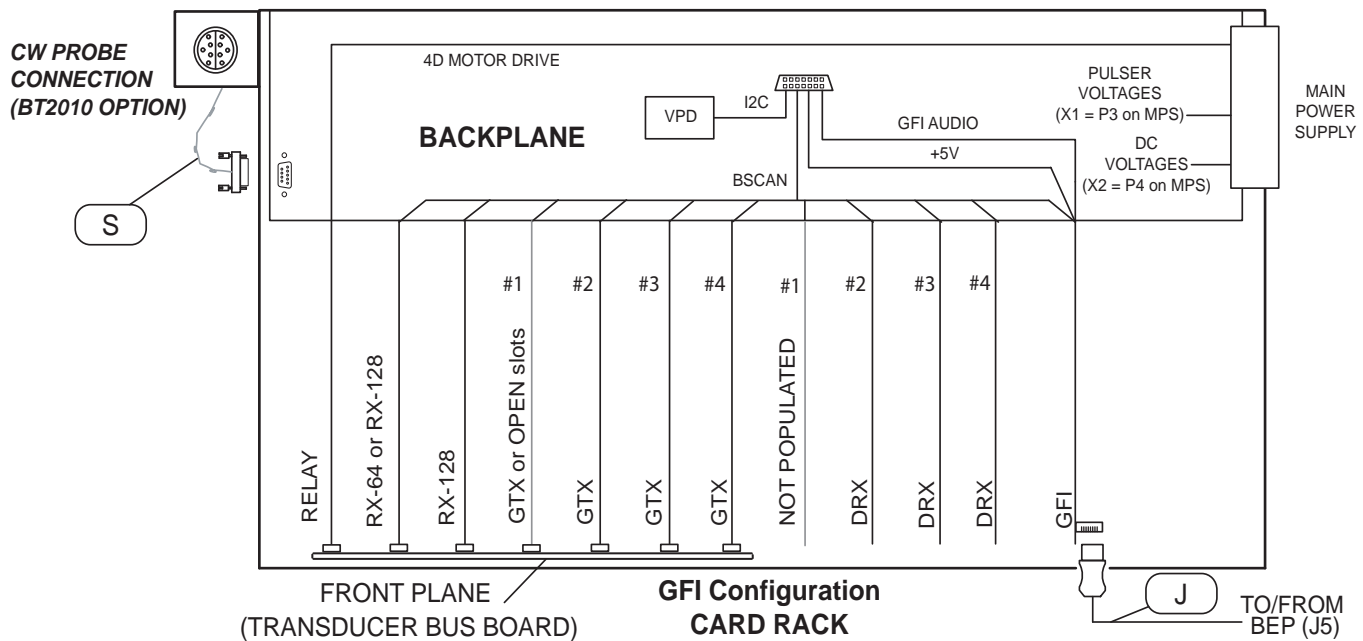


Figure 9-8 Card Rack cables - MRX

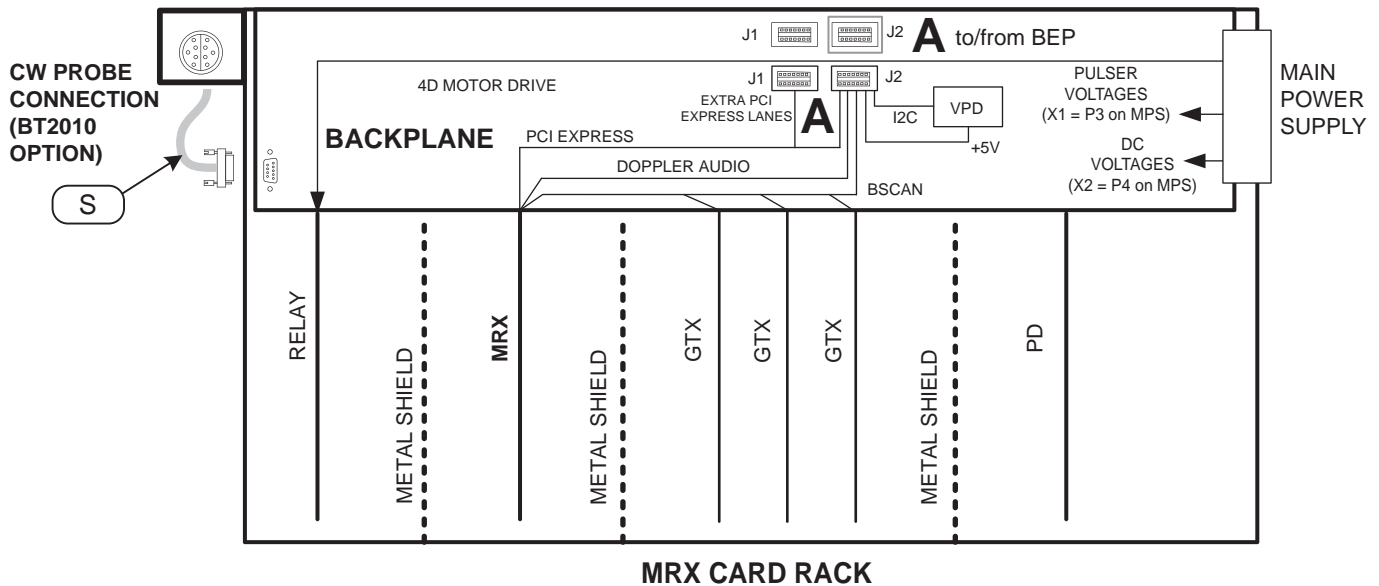
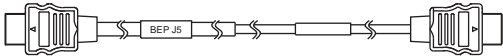
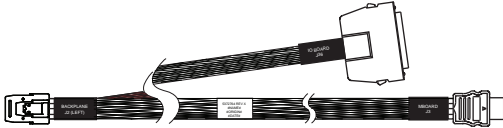
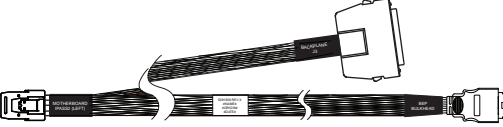

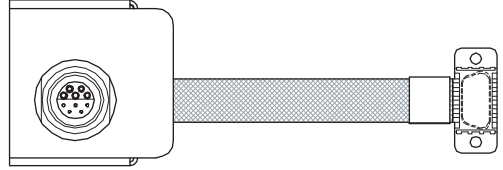




Table 9-36 Card Rack cables

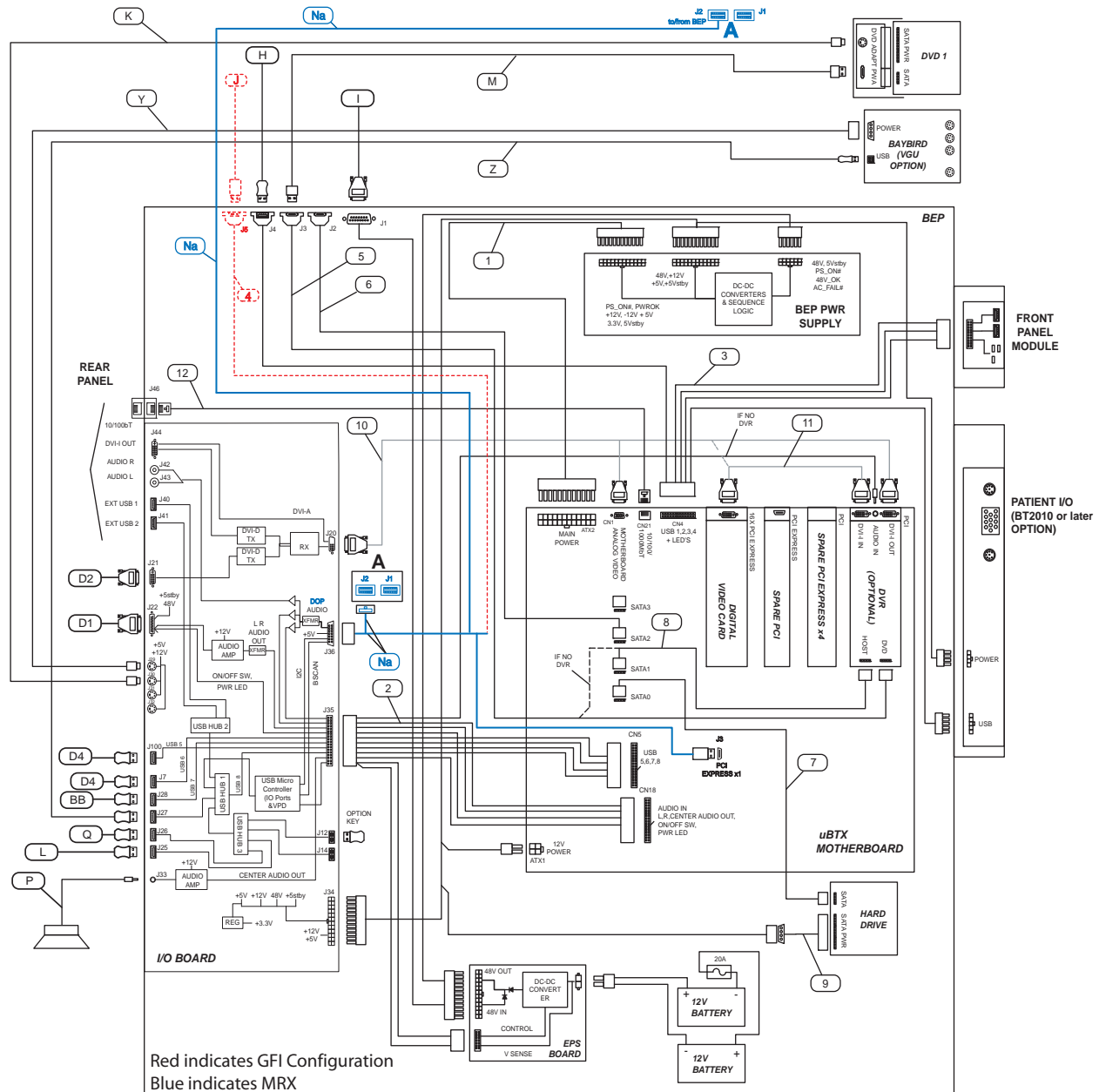
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Cable, PC2GFI Card R3.x and earlier	5152290	Cable J PCI Express (PCIe) (GFI to BEP-J5) 	1	Y
2.	Cable, BEP to Card Rack BackPlane and PCI Express - MRX R3.x and earlier	5372764	Cable Na 	1	Y
3.	Cable - BEP6 to Phase 1 Version Backplane GFI R4.x and later	5391509		1	Y
4.	Cable - iPASS BEP6 to MRX Backplane - LE9 R4.x and later	5431486	Cable J 	1	Y
5.	Cable, Doppler MBD to Adapter (CW Cable, R2.x.x)	GA200536	Cable S Part of CW option 	1	Y



## 9-17-5 Back End Processor (BEP) cables (cont'd)

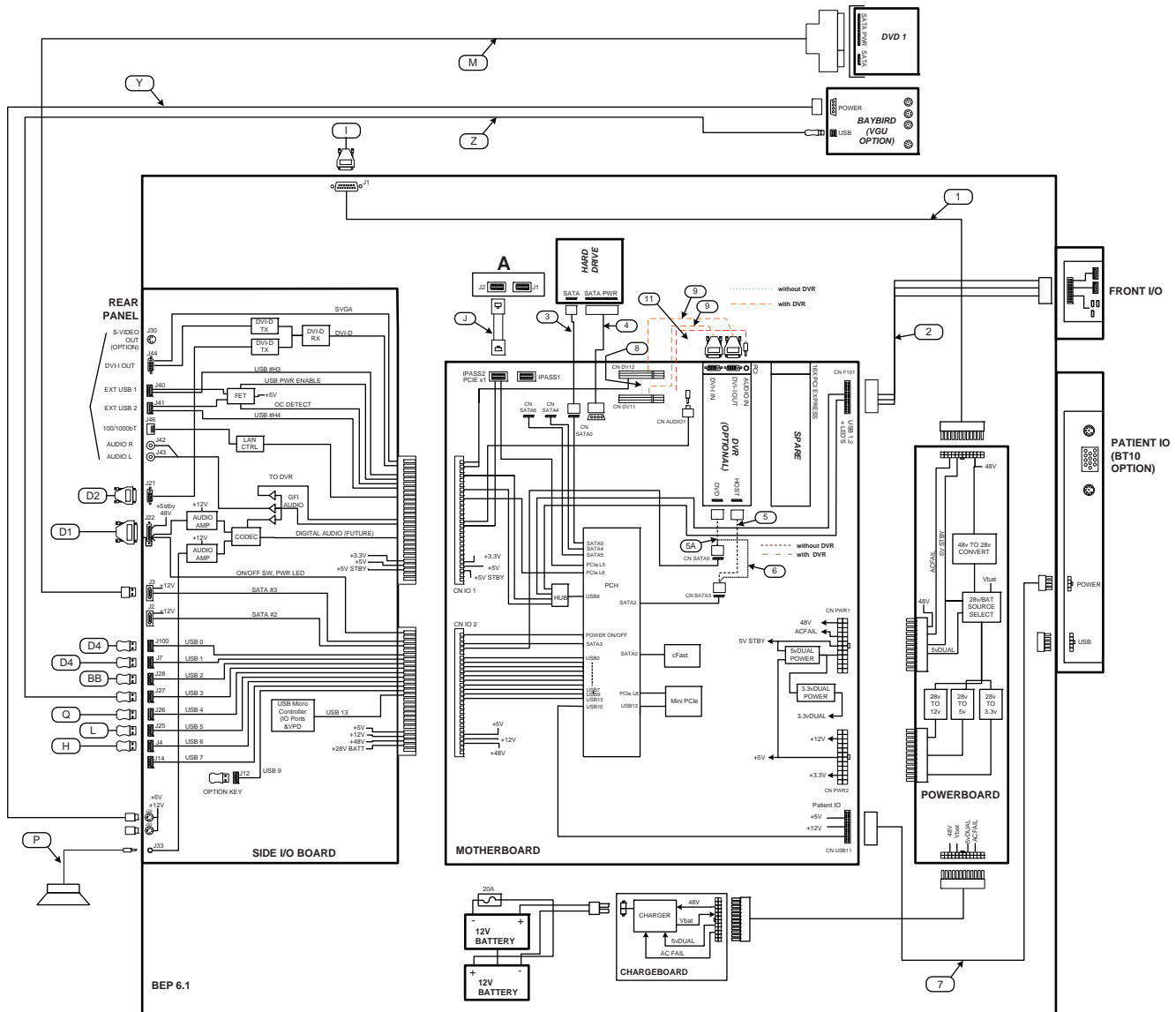
**NOTE:** *Figure 9-10 "Back End Processor (BEP) cables - BEP5.x (MRX, R3.1.2 and later)" on page 9-79 is identified in color to simplify the differences between R2.x.x and earlier and R3.x.x and later (MRX). Red represents R2.x.x and blue represents R3.x.x (MRX).*

**Figure 9-10 Back End Processor (BEP) cables - BEP5.x (MRX, R3.1.2 and later)**



9-17-5 Back End Processor (BEP) cables (cont'd)

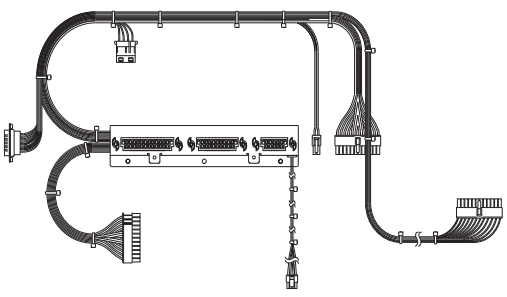
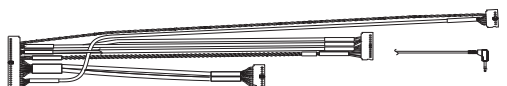
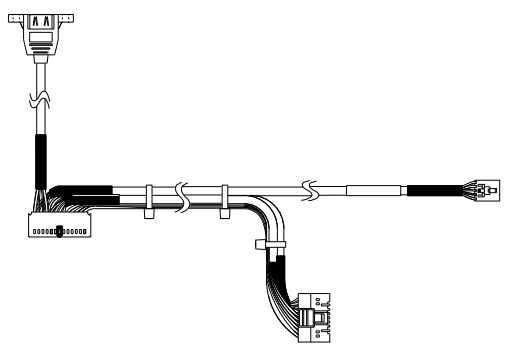
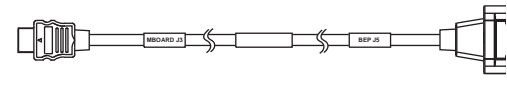
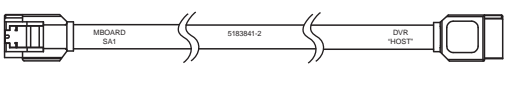
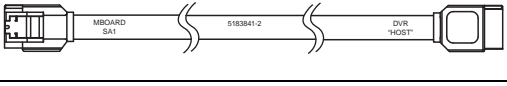
Figure 9-11 Back End Processor (BEP) cables - BEP6.x (R4.x and later)



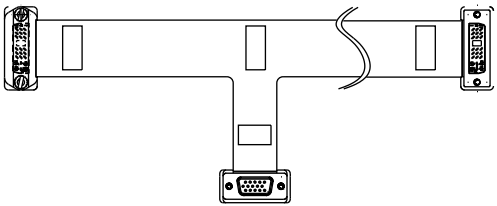
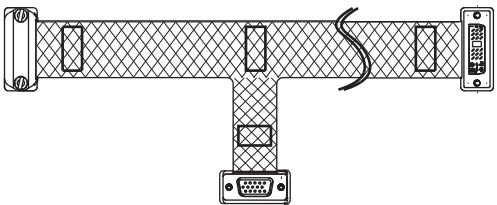
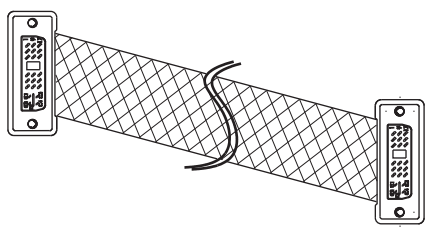
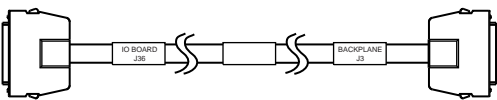
### 9-17-5 Back End Processor (BEP) cables (cont'd)

There are two main families of BEPs used on the LOGIQ E9; BEP5.x supported in R3.x and earlier and BEP6.x supported in R4 and later. See [Table 9-37 "Back End Processor \(BEP\) Internal Cables BEP5.x \(R3.x and earlier\)" on page 9-81](#) and [Table 9-38 "Back End Processor \(BEP\) Internal Cables BEP6.x \(R4.x and later\)" on page 9-82](#).

**Table 9-37 Back End Processor (BEP) Internal Cables BEP5.x (R3.x and earlier) 1 of 2**

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Cable, Harness, BEP Power With Extended Power Shutdown	5165844-2	<p>Cable 1</p> 	1	Y
2.	Cable, Motherboard Harness	5193725-2	<p>Cable 2</p> 	1	Y
3.	Cable, Front Panel Harness	5193726	<p>Cable 3</p> 	1	Y
4.	Cable, PCI express bulkhead R3.x and earlier	5152291	<p>Cable 4</p> 	1	Y
5.	Cable, SATA Cable - DVR R3.x and earlier	5183841-2	<p>Cable 8</p> 	1	Y
6.	cable-powered eSATA to 15-7 DVD Cable, SATA Cable - DVR R3.x and earlier	5431110	<p>Cable 8</p> 	1	Y



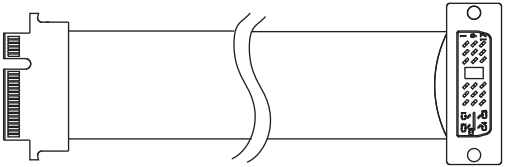
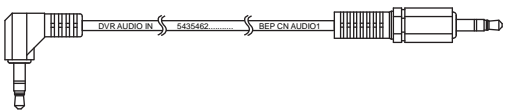
**Table 9-37 Back End Processor (BEP) Internal Cables BEP5.x (R3.x and earlier) 2 of 2**

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
7.	DVI FLEX Video	5169280	<p>Cable 10</p> 	1	Y
8.	DVI FLEX Cable with Shielding (for DVR Option)	5169280-2	<p>Cable 10</p> 	1	Y
9.	DVI FLEX, DVR Jumper to BEP	5197215-2	<p>Cable 11</p> 	1	Y
10.	Cable, BEP to Backplane Cable	5194491	<p>Cable N</p> 	1	Y

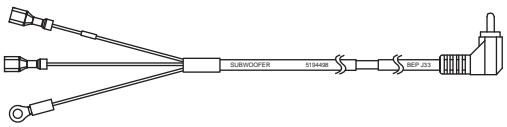
**Table 9-38 Back End Processor (BEP) Internal Cables BEP6.x (R4.x and later) 1 of 2**

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Cable Kit R4.x	5433408-80	<p>Kit includes:</p> <ul style="list-style-type: none"> <li>HDD SATA</li> <li>HDD Power</li> <li>PowerBoard to ChargeBoard</li> <li>PatIO (ECG) Power/USB</li> <li>SATA Jumper</li> <li>Video Jumper</li> <li>Main Power Supply to PowerBoard Ribbon Cable</li> </ul>	1	Y
2.	Cable, BEP to Card Rack BackPlane and PCI Express - MRX and GFI R4.x and later	See <a href="#">Table 9-36 "Card Rack cables"</a> on page 9-77.			

**Table 9-38 Back End Processor (BEP) Internal Cables BEP6.x (R4.x and later) 2 of 2**

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
3.	SATA Cable - BEP6 MB to DVR	5439827	Cable 5 	1	Y
4.	SATA Cable - DVR to BEP6 MB	5439827-2	Cable 5A 	1	Y
5.	Flex Cable - DVI to SAMTEC Video Jumper	5428990	Cable 9 	2	Y
6.	Cable - DVR Audio BEP6	5435462	Cable 11 	1	Y

**Table 9-39 Back End Processor (BEP) External Cables**

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Cable, USB A-B High Speed	Cable H, See <a href="#">Table 9-35 - Main Power Supply cables</a>			
2.	Cable, Power Cable - BEP 48V	Cable I, See <a href="#">Table 9-35 - Main Power Supply cables</a>			
3.	Cable, PC2GFI Card	Cable J, PCIe Express Cable See <a href="#">Table 9-36 - Card Rack cables</a>			
4.	Cable - DVD Power, FREY	Cable K, See <a href="#">Table 9-40 - Peripherals Cables</a>			
5.	Cable, USB - XYZ Controller	Cable L, See <a href="#">Table 9-34 - XYZ Motor/Brake Control cables</a> (J28 - BEP to XYZ Controller) USB Cable			
6.	Cable, SATA Cable - External to DVD	Cable M, See <a href="#">Table 9-40 - Peripherals Cables</a>			
7.	Cable, Audio Cable - BEP to Subwoofer	5194498	Cable P (J33 - SUBWOOFER) 	1	Y
8.	Cable, USB - BW Printer	Cable Q, See <a href="#">Table 9-40 - Peripherals Cables</a>			
9.	Cable, V Nav, Baybird Power	Cable Y, See <a href="#">Table 9-42 - Options</a>			
10.	Cable, V Nav, USB BEP to BayBird	Cable Z, See <a href="#">Table 9-42 - Options</a>			

9-17-6      Peripherals Cables

Figure 9-12 Peripherals Cables (R4.x and later DVD shown in Figure 9-13)

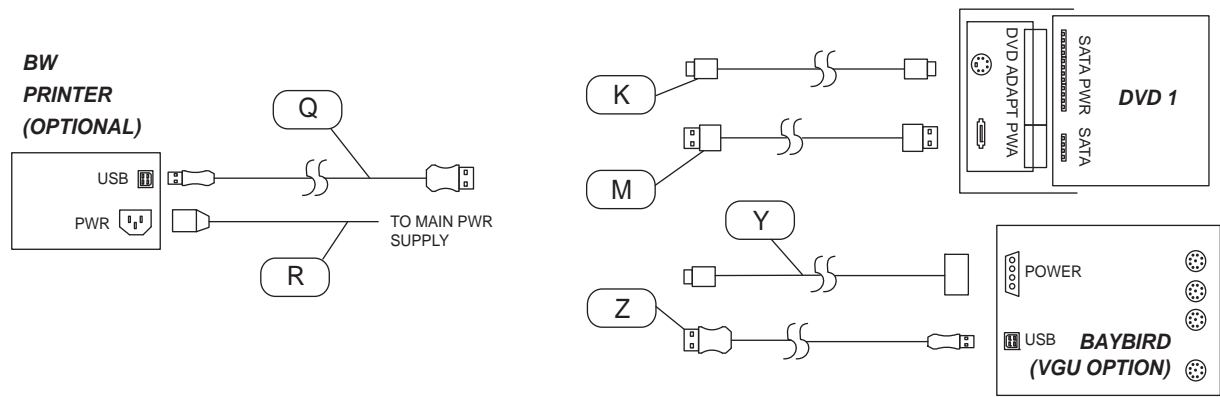


Figure 9-13 DVD - R4.x and later

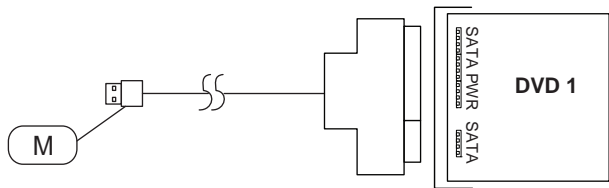


Table 9-40    Peripherals Cables


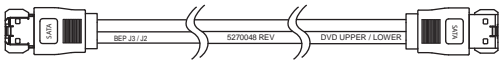
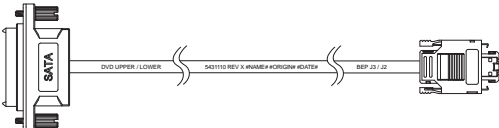
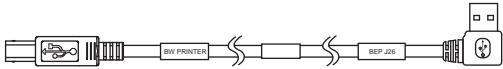
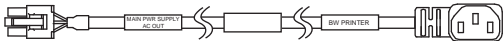
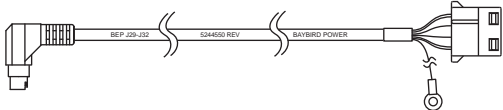
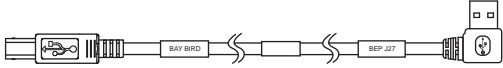
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	Cable, DVD POWER, FREY	5266407	Cable K (J30 - DVD 1) 	1	Y
2.	Cable, SATA Cable - EXTERNAL TO DVD	5270048	Cable M (J3 - DVD 1) 	1	Y
3.	Cable-powered eSATA to 15-7 DVD	5431110	Cable M (J3 - DVD 1) 	1	Y



Table 9-40 Peripherals Cables

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
4.	Cable, USB Cable - BW PRINTER	5194492-2	Cable Q (J26 - BW Printer) 	1	Y
5.	Cable, Power Cable - BW PRINTER	5194493	Cable R AC Power BW Printer 	1	Y
6.	Cable, V Nav, Baybird power	5244550	Cable Y 	1	Y
7.	Cable - V Nav, USB BEP to BayBird	5194492-3	Cable Z 	1	Y
8.	Ferrites (used in DVR Option)	5324370		2	Y

## Section 9-18 Probes

Table 9-41 Supported Probes (not including Japan Probes) 1 of 4

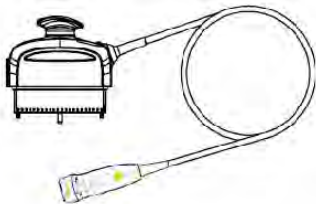
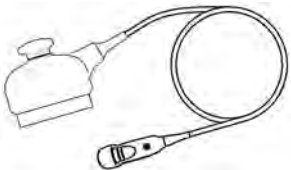
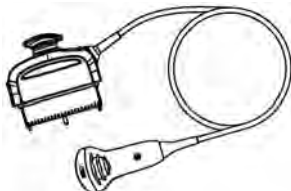
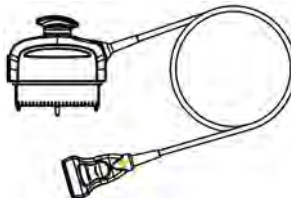

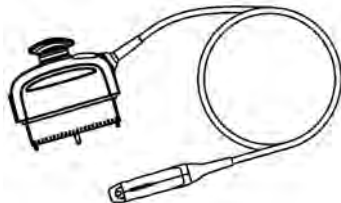
PROBES	CATALOG NUMBER	PART NUMBER	COMMENTS
M4S-D	H40442LN	5224357	1.5 - 4.3 MHz 
3CRF	H40442LP	5196216	Micro-convex for biopsy 
M6C-D	H40432LM	5182312	
9L-D	H40442LM	5212849	
11L-D	H40432LN	5410800	
ML6-15-D	H40452LG	5410769	

Table 9-41 Supported Probes (not including Japan Probes) 2 of 4 (Continued)

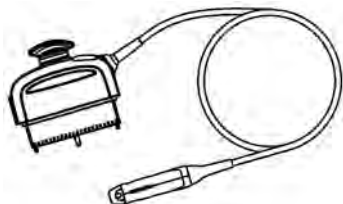




PROBES	CATALOG NUMBER	PART NUMBER	COMMENTS
L8-18: Linear Transducer (R2.x.x)	H40452LL	5410798	
S4-10 Sator Transducer (R2.x.x)	H4908SN	5336208	
S4-10-D Transducer (R4.x and later)	H45302LA	5394804	
RSP6-16-D	H48651MR	KTZ157046	
RIC5-9-D	H48651MS	KTZ157043	
RNA5-9-D	H48651MY	KTZ156994	
RAB2-5-D	H48651MN	KTZ157037	

Table 9-41 Supported Probes (not including Japan Probes) 3 of 4 (Continued)

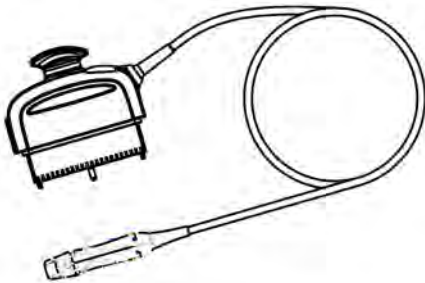



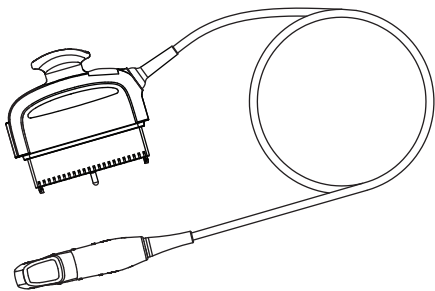
PROBES	CATALOG NUMBER	PART NUMBER	COMMENTS
C1-5-D	H40452LE	5409287	
S1-5	H4908SC	5269878	
S1-5D (R4.x and later)	H4913SD	5438302	
IC5-9-D	H40442LK	5212417	
RAB 4-8 4D Curved Array Probe (R2.x.x)	H4865IPM	KTZ157038	
M5S-D (R2.x.x)	H45551NH	GE-3MIX	
P2D 2MHz CW Pencil Probe (R2.x.x)	H4830JE	TE100024	
P6D 6MHz CW Pencil Probe (R2.x.x)	H4830JG	TQ100002	
6Tc Multi-plane Cardiac TEE Probe (R2.x.x)	H455512D	KN100105	
6S-DLP Phase Array Pediatric Probe	H45021RR	47236955	

Table 9-41 Supported Probes (not including Japan Probes) 4 of 4 (Continued)

PROBES	CATALOG NUMBER	PART NUMBER	COMMENTS
C2-9-D	H40462LN	5405254	
RAB6-D (R4.x and later)	H48681MG	KTZ302502	
C-1-6D	H40472LT	5428393	

## Section 9-19 Options

For Options Compatible configurations, See [9-19-1 "Options Compatible Configurations" on page 9-93.](#)

**Table 9-42 Options 1 of 3**



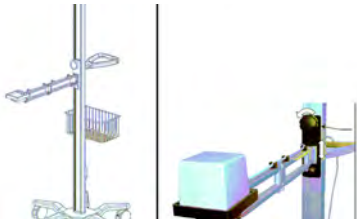
ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
1.	V Nav, Drive Bay 3D Tracking System Electronics Unit R3.x and earlier	5168286-20		1	Y
2.	DriveBay2 (System Electronics Unit) R4.x and Later	5459862		1	Y
3.	V Nav, Drive Bay 3D Tracking System Single 8mm Sensor Assembly	5168286-25	Replaced by 5168286-30	2	Y
4.	V Nav, Drive Bay 3D Tracking System Dual 8mm Sensor Assembly	5168286-30		2	Y
5.	eTRAX Needle Sensor Spare Part (Needle Tracking Option) R2.0.5 or later	5408134			
6.	VirtuTRAX Sensor Spare Part (Virtual Tracking Option) R2.0.5 or later	5416625			
7.	V Nav, Drive Bay 3D Tracking System Mid Range Transmitter Assembly	5457453		1	Y
8.	Drive Bay 2 Flat Transmitter	5437445		1	Y
9.	Cable, V Nav, Baybird Power	Cable Y, See <a href="#">Table 9-40 - Peripherals Cables</a>			
10.	Cable, V Nav, USB BEP to BayBird	Cable Z, See <a href="#">Table 9-40 - Peripherals Cables</a>			
11.	Stand for Tru3D Transmitter	5268740		1	Y
12.	V Nav Transmitter Stand Handles	5268740-30		1	Y
13.	V Nav Transmitter Stand Arm	5268740-10		1	Y
14.	V Nav Transmitter Stand Wheels (set of 5)	5268740-20		1	Y
15.	On Board VNav Stand Pole with mounting hardware	5451260		1	Y
16.	On Board VNav Stand arm spare part	5456232		1	Y

Table 9-42 Options 2 of 3 (Continued)


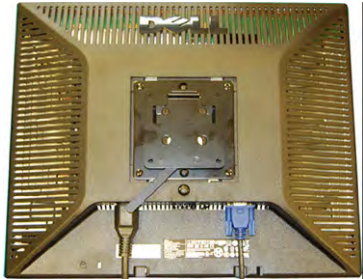


ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
17.	CW Board (GRX) (R2.x.x)	See <a href="#">Table 9-19 - Card Rack parts</a>			
18.	CW Adapter (R2.x.x)	See <a href="#">Table 9-36 - Card Rack cables</a>			
19.	Patient I/O (ECG Module) (R2.x.x)	GA200240		1	Y
20.	ECG Cables AHA Style (R2.x.x)	164L0025	Americas	1	Y
21.	Lead Wires ECG AHA (R2.x.x)	164L0027	Americas	1	Y
22.	ECG Cables, Short IEC (R2.x.x)	2304616	Europe and Asia (includes 164L0026 and 164L0028)	1	Y
23.	ECG Cables, IEC (R2.x.x)	2304615	Europe and Asia (includes 164L0026 and lead wire, port "B1")	1	Y
24.	ECG Cable IEC, Short (R2.x.x)	164L0026	Part of 2304616	1	Y
25.	Lead Wires IEC, Short (R2.x.x)	164L0028	Part of 2304616	1	Y
26.	USB Footswitch R2.x.x and later	H46732LF		1	Y
27.	WLAN Dongle R2.x.x and R3.x.x	5340249		1	Y
28.	External Display (LCD) (R2.x.x)	KTZ220525		1	Y
29.	BEP6.x Wireless Parts Spare Part	5433408-110		1	Y
30.	DVI Cable for External Display (R2.x.x)	KTZ220527		1	Y
31.	Transformer for External Display (R2.x.x)	KTZ220714		1	Y
32.	Wall Mount Kit for External Display (R2.x.x)	KTZ220526		1	Y

Table 9-42 Options 3 of 3 (Continued)

ITEM	PART NAME	PART NUMBER	DESCRIPTION	QTY	FRU
33.	DVI-I to SVGA adapter for External Display (R2.x.x)	5347051		1	Y
34.	Advanced Digital Video Converter	2412280		1	Y
35.	5V Medical Grade Adapter	2421169		1	Y
36.	BEP6.x Scan Converter Board (S-Video Option)	5433408-120		1	Y



## Section 9-19 Options (cont'd)

### 9-19-1 Options Compatible Configurations

See 9-19-1-1 "LOGIQ E9 Options Compatible Configurations Key" on page 9-93.

**Table 9-43 Options Compatible Configurations**

Options Compatible Configurations									
MODEL NUMBER DESCRIPTION	R1.x.x	R1.x.x	R1.x.x	R2.x.x	R2.x.x	R2.x.x	R2.x.x**	R4.xx	R4
	4D MC	VNAV	DVR	CW*	Patient I/O*	Footswitch	WLAN Dongle	WLAN BEP6	BEP6 Scan* Converter
5205000 LOGIQ E9 100-240 VAC	C	C	C	C	C	C	C	C	C*
5205000-2 LOGIQ E9 220-240 VAC	C	C	C	C	C	C	C	C	C*
5205000-3 LOGIQ E9 100-240 VAC	C	C	C	C	C	C	C	C	C*
5205000-4 LOGIQ E9 220-240 VAC	C	C	C	C	C	C	C	C	C*
5205000-5 LOGIQ E9 100-240 VAC	C	C	C	C	C	C	C	C	C*
5205000-6 LOGIQ E9 220-240 VAC	C	C	C	C	C	C	C	C	C*
5205000-7 LOGIQ E9 100-240 VAC	C	C	C	C	C	C	NL	C	C*

\* These options have additional hardware requirements depending on the console model.

\*\* WLAN Dongle is not supported on R4 or later.

**NOTE:** Compatibility charts only show parts that have any compatibility dependencies. Parts not listed are assumed to be compatible with all configurations.

#### 9-19-1-1 LOGIQ E9 Options Compatible Configurations Key

LOGIQ E9 Options Compatible Configurations Key	
N	Not supported
C	Compatible

## Section 9-20 Hardware Kit

Hardware Kit for LOGIQ E9 (includes two boxes with hardware) See Figure 9-14 and Figure 9-16. See Figure 9-15 and Figure 9-17 to identify and keep the kit organized.

**Figure 9-14 Box 1 of 5310019 Kit**



## Section 9-20 Hardware Kit (cont'd)

Use this Figure 9-15 to help identify contents of the Hardware Kit, Box 1 and keep them organized.

**Figure 9-15 Box 1 of 5310019 Kit, contents and organization**

46-311804P1 5  FLAT WASHER 3.2X7X.5 ZP ST  Bulkhead Board assy	46-311804P5 5  FLAT WASHER 5.3X10X1 ZP ST  Cable Hook (2); Bumper Rear (2); Cover rear Assembly (4)	46-311804P7 5  FLAT WASHER 6.4X12.5X1.6 ZP ST  Bracket Rear Handle(4); Cover Top(2)	46-312358P27 5  M3 X 0.5 X 6MM FREEDRIV zinc plated pan head machine screw  DVD Assembly	46-312358P28 5  M3 X 0.5 X 8MM FREEDRIV zinc plated pan head machine screw  Bulkhead Board assy	46-312358P29 5  M3 X 0.5 X 10MM FREEDRIV zinc plated pan head machine screw  Gel warmer	46-312358P36 5  M4 X 0.7 X 6MM FREEDRIV zinc plated pan head machine screw  Bracket – Patient IO filler; XYZ Motor Controller
46-312358P37 10 M4 X 0.7 X 8MM FREEDRIV zinc plated pan head machine screw Bracket, CW Filler(2); EMI COVER - PCI EXPRESS CABLE(1); BEP door(3)	46-312358P38 5 M4 X 0.7 X 10MM FREEDRIV zinc plated pan head machine screw  Filter bracket(4); Column cover assembly(4); Z- Mechanism(2)	46-312358P39 5 M4 X 0.7 X 12MM FREEDRIV zinc plated pan head machine screw  Subwoofer cable P- Clamp.	46-312358P52 10 M5 X 0.8 X 16MM FREEDRIV zinc plated pan head machine screw Cable Hook(2); Bumper Rear(2); Cover rear Assembly(4); LCD Mount Lock Assy(2)	46-312358P54 5 M5 X 0.8 X 25MM FREEDRIV zinc plated pan head machine screw  Supports, gel warmer and tray	46-312358P63 5 M6 X 1 X 16MM FREEDRIV zinc plated pan head machine screw  Cover Top(2); Cover Front(2)	46-328417P13 5 SCREW HEXAGON SOCKET 6 MM 16 MM ZINC PLATED, STEEL  Cardrack
46-328417P14 5 SCREW HEXAGON SOCKET 6 MM 20 MM ZINC PLATED, STEEL  Cardrack	46-328425P2 5 NUT HEXAGON 6 MM  Castor Brake Lock- Release Assembly	46-328430P2 5 WASHER PLAIN - NORMAL 4.3 MM 9 MM ZINC PLATED, STEEL  Filter bracket(4); Z- Mechanism(2)	46-328430P4 5 WASHER PLAIN - NORMAL 10.5 MM 20 MM ZINC PLATED, STEEL  Plate Support Rear Caster(2); Targa Weldment(2)	46-328431P2 5 WASHER PLAIN - LARGE 6.4 MM 18 MM ZINC PLATED, STEEL  BEP(2); MPS(3); Cardrack	46-328432P3 10 WASHER LOCK - SPRING 6.1 MM 11.8 MM ZINC PLATED, SPRING STEEL  BEP(2); MPS(3); Cardrack	1009-M4P2C013-29 5 SCREW - PHILLIPS PAN HEAD TAPPING 3.9 X 13  PALM REST
5255446-47 5  SCREW - PHILLIPS PAN HEAD SHEET METAL DIA 4.8MM, LENGTH 19MM  FOOTREST ASSEMBLY	5255446-49 5  SCREW - PHILLIPS PAN HEAD SHEET METAL DIA 4.8MM, LENGTH 25MM  SPEAKER ASSEMBLY	5255446-50 5  SCREW - PHILLIPS PAN HEAD SHEET METAL DIA 4.8MM, LENGTH 32MM  FOOTREST ASSEMBLY	5255446-53 5  SCREW - PHILLIPS PAN HEAD SHEET METAL DIA 4.8MM, LENGTH 50MM  FOOTREST ASSEMBLY	5260747-36 5 M4 X 0.8 X 12MM, ZINC PLATED TORX PAN HEAD MACHINE SCREW  P Clamp(1); P Clamp(1)	5260747-46 5 M5 X 0.8 X 8MM, ZINC PLATED TORX PAN HEAD MACHINE SCREW  Z- Mechanism (1)	5260747-49 5 SCREW - M5 X 16 PAN HEAD MACHINE HEXALOBULAR - TORX  MAIN CABLE ASSEMBLY
5260747-61 10 SCREW - M6 X 16 PAN HEAD MACHINE HEXALOBULAR - TORX  Plate Targa Support(10); Bracket Rear Handle(4); MAIN CABLE ASSY(1); Z- Mechanism(6)	5260747-62 5 SCREW - HEXALOBULAR PAN HEAD, M6 x 20mm  Bulkhead Plate, Extended	5260747-63 5 M6 X 0.8 X 25MM, ZINC PLATED TORX PAN HEAD MACHINE SCREW  Clamp, Cable Main(2);	5260747-64 5 SCREW - M6 X 30 PAN HEAD MACHINE HEXALOBULAR - TORX  Z- Mechanism(4); Castor Brake Lock-Release Assembly(1)	5260747-67 1 M6 X 0.8 X 45MM, ZINC PLATED TORX PAN HEAD MACHINE SCREW  Plate Washer Frame(2); Bulkhead Plate, Extended(1)	5260747-73 10 SCREW - M8 X 20 PAN HEAD MACHINE HEXALOBULAR - TORX  Strap Hook(4); Front Casters(6); Pedal Mechanism Assembly(4)	



Section 9-20

Hardware Kit (cont'd)

Use this Figure 9-17 to help identify contents of the Hardware Kit, Box 2 and keep them organized.

Figure 9-16 Box 2 of 5310019 Kit



## Section 9-20 Hardware Kit (cont'd)

Use this Figure 9-17 to help identify contents of the Hardware Kit, Box 2 and keep them organized.

**Figure 9-17 Box 1 of 5310019 Kit, contents and organization**

5261210-26 5 SCREW - M4 X 8 FLATHEAD MACHINE HEXALOBULAR - TORX  Bracket, main cable mount	5261210-27 5 SCREW - M4 X 10 FLATHEAD MACHINE HEXALOBULAR - TORX  Handle Rear	5261210-48 5 SCREW - M6 X 16 Flathead Machine HEXALOBULAR - TORX Card Rack Mount to Base(3), Bracket Lock Cover Side(6), Clamp Frame Main Cable(3)	5272065-26 5 SCREW - M6 X 16 SOCKET HEAD CAP FULLY THREADED  BEP(2); MPS(3)	5272065-35 5 SCREW - M8 X 30 SOCKET HEAD CAP FULLY THREADED  Z- Mechanism	5272065-44 5 SCREW - M10 X 40 SOCKET HEAD CAP SCREW FULLY THREADED  Plate Support Rear Caster(2); Targa Weldment(2)
5304275-4 5 WASHER, TOOTHED LOCK EXTERNAL, M4  Subwoofer (1); P Clamp(1), P Clamp(1), XYZ Motor Controller(2)	5304275-5 1 WASHER, TOOTHED LOCK EXTERNAL, M5  Z- Mechanism	5304516 5 WASHER, FRONT COVER  Cover, Front	5311602 2 WASHER, OD 10mm, ID 6.5mm  Castor Brake Lock- Release Assembly	GA307528 5 Washer 20-6.5 - 1mm  Castor Brake Lock- Release Assembly	GA307531 5 Washer POM Bearing Rod  Castor Brake Lock- Release Assembly
46-312358P38 5 M4 X 0.7 X 10MM FREEDRIV zinc plated pan head machine screw  OP Panel Lower	46-312358P42 5 M4 X 0.7 X 25MM FREEDRIV zinc plated pan head machine screw  OP Panel Lower	46-312358P45 5 M4 X 0.7 X 40MM FREEDRIV zinc plated pan head machine screw  OP panel Upper	46-328430P2 5 WASHER PLAIN - NORMAL 4.3 MM Ø MMZINC PLATED, STEEL  OP panel Upper	5323655 5 Spacer - op panel  OP panel Upper	N9409HR 5 SCREW TP  19inch LCD monitor
2134817 1 WASHER, FLAT, NYLON, M4  Extended Power Shutdown Assembly	46-253327P30 10 SCREW MACH PAN HE 6-32 X .500 LG. MS51957-30  Motherboard, CPU	46-312348P2 5 NUT, M4 X 0.7 HEX WITH LOCK WASHER ZINC PLATED  HARNES - BEP- POWER	46-312358P27 5 M3 X 0.5 X 6MM FREEDRIV zinc plated pan head machine screw  Extended Power Shutdown Assembly	46-312358P30 5 M3 X 0.5 X 12MM FREEDRIV zinc plated pan head machine screw Cable connectors	46-312358P36 5 M4 X 0.7 X 6MM FREEDRIV zinc plated pan head machine screw BEP Frit Pnl Assy(2); Brkt, HD Pocket(1); BEP IO Bd(5); BEP Power Supply(2)
5212259 5 Plastic snap rivet, Black Hole 4.1-4.2mm Thickness 4.5-5.5mm  BEP Fan	5310032 1 NYLON M4 X 35 PAN HEAD PHILLIPS MACHINE SCREW  Extended Power Shutdown Assembly				

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# Chapter 10

## Care & Maintenance

### Section 10-1 Overview

#### 10-1-1 Purpose of Chapter 10

This chapter describes Care and Maintenance on the Ultrasound system and peripherals. These procedures are intended to maintain the quality of the Ultrasound system's performance. Read this chapter completely and familiarize yourself with the procedures before performing a task

#### 10-1-2 Periodic maintenance inspections

It has been determined by engineering that your Ultrasound 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.

**Table 10-1 Contents in Chapter 10**

Section	Description	Page Number
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10-3	Maintenance Task Schedule	10-2
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10-5	Using a Phantom	10-9
10-6	Electrical Safety Tests	10-9
10-7	When There's Too Much Leakage Current...	10-26



**DANGER** THERE ARE SEVERAL PLACES ON THE BACKPLANE, THE AC DISTRIBUTION, AND DC DISTRIBUTION THAT ARE DANGEROUS. BE SURE TO DISCONNECT THE SYSTEM POWER PLUG AND SWITCH OFF 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 SYSTEM UNLESS ALL BOARD COVERS AND FRAME PANELS ARE SECURELY IN PLACE, TO ENSURE OPTIMAL SYSTEM PERFORMANCE AND COOLING. WHEN COVERS ARE REMOVED, EMI MAY BE PRESENT.

## 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 Equipment Quality Check (EQC and IQC), see: [10-7-6 "Ultrasound Equipment Quality Check \(EQC and IQC\)" on page 10-27](#), provides the customer with documentation that the Ultrasound system 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 Ultrasound system.

### 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 Ultrasound system. 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 care & maintenance tasks be performed?

The Care and Maintenance task schedule specifies how often your Ultrasound System should be serviced and outlines items requiring special attention.

**NOTE:** *It is the customer's responsibility to ensure the Ultrasound System care and 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 Ultrasound 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 Ultrasound System for an average patient load and not use it as a primary mobile Ultrasound system which is transported between diagnostic facilities.

**NOTE:** *If conditions exist which exceed typical usage and patient load, then it is recommended to increase the periodic maintenance frequencies.*

Please refer to the Customer Care Schedule in the service manual for the Ultrasound System unit for correct the maintenance care schedule.



## Section 10-4 System maintenance

### 10-4-1 Preliminary checks

The preliminary checks take about 15 minutes to perform. Refer to the Ultrasound system user documentation whenever necessary.

**Table 10-2 System preliminary checks**

Step	Item	Description
1.	Ask and Listen	Ask the customer if they have any problems or questions about the equipment.
2.	Paperwork	Fill in the top of the EQC inspection form. Record all probes and Ultrasound system options.
3.	Power up	<ul style="list-style-type: none"> <li>• Turn the Ultrasound system power on and verify that all fans and peripherals turn on.</li> <li>• Watch the displays during power up to verify that no warning or error messages are displayed.</li> <li>• Where applicable, confirm that the battery is charged. If no AC Input present, use the internal battery.</li> </ul>
4.	Probes	Verify that the Ultrasound system properly recognizes all probes.
5.	Displays	Verify proper display on the monitor and touch panel (where present).
6.	InSite	Where applicable, for Warranty and Contract Customers only: <ul style="list-style-type: none"> <li>• Verify that InSite is functioning properly.</li> <li>• Ensure two-way remote communications.</li> </ul>
7.	Review Error Logs	Where applicable, Error Logs can be reviewed via system diagnostics.
8.	Diagnostics	Optional.
9.	Presets	Backup all Customer Presets to an appropriate media.
10.	Image Archive	Back up the Image Archive onto appropriate media.

## 10-4-2 “Standard” GE Tool Kit in the USA

The following is a description of the “Standard” GE tool kit in the USA. Not all tools are required for PMs.

**Table 10-3 Overview of GE-1 Tool Kit Contents**

Tool ID	Description	Tool ID	Description
9-45358	Pliers Retaining Ring	9-XL9971MM	Xcelite-hex Blade 1.27mm
9-4078	Scribe	9-XL9972MM	Xcelite-hex Blade 1.5mm
9-44572	Wrench Open End 3/8 - 7/16	9-XL9973MM	Xcelite-hex Blade 2 mm
9-44579	Wrench Open End 1/2 - 9/16	9-XL9974MM	Xcelite-hex Blade 2.5mm
9-44579	Wrench Open End 1/2 - 9/16	9-XL9975MM	Xcelite-hex Blade 3mm
9-45385	Pliers, Arc Joint 7 inch	9-XL9976MM	Xcelite-hex Blade 4mm
9-45378	Pliers, Slip Joint	9-XL9977MM	Xcelite-hex Blade 5mm
9-4518	Pliers, Long Nose, Miniature	9-XL991CM	Handle
9-4518	Pliers, Long Nose, Miniature	C2356E	Screw starter - Kedman Quick Wedge
9-44776	Ignition Wrench Set, 10 pc.	BLBO	Box - 18 Compartment
9-44601	Wrench, Adj., 4 inch	DWL4283T	Box - 5 Compartment
9-4151	Screwdriver, Blade, Stubby	9-41322	Pickup Tool, Claw type
9-41421	Screwdriver, Blade, Pocket clip	9-6757	6 pc Needle File Set
9-41594	Screwdriver, Blade 1/8 in. x 4 in.	9-9487	Utility Knife
9-41581	Screwdriver, Blade 3/16 in. x 4 in.	9-45341	Pliers Vice Grip 10 inch
9-39451	20' Steel Tape, locking Spring load	9-3001	Xacto Pen Knife
9-GH807	Ratchet, Offset, Slotted	9-HT62002	Solder Aid, Fork and Hook
68-412	Ratchet, Offset, Philips	9-4099	Mirror, Round, Telescoping
9-GH130	Tapered Reamer	9-GH3001	Steel Rule Decimal 6 inch
9-41584	Screwdriver, slotted 1/4 in.X 6 in.	9-GH300ME	Steel Rule Metric 6 inch
9-4118	Screwdriver, Philips #2, Stubby	9-XL9920	Xcelite-hex Blade.050 inch
9-41293	Screwdriver, Philips #0	9-XL9921	Xcelite-hex Blade 1/16 inch
9-41294	Screwdriver, Philips #1	9-XL9922	Xcelite-hex Blade 5/16 inch
9-41295	Screwdriver, Philips #2	9-XL9923	Xcelite-hex Blade 3/32 inch
9-46677	Hex Keys, 20 pc., Metric	9-XL9924	Xcelite-hex Blade 1/8 inch
9-34701	1/4 in. Standard.Socket set (19 pc)	9-XL9925	Xcelite-hex Blade 5/32 inch
9-43499	1/2 inch Socket 1/4 inch drive	9-XL9926	Xcelite-hex Blade 3/16 inch
9-4355	Flex Spinner	9-XL99764	Xcelite-hex Blade 7/64
9-43523	Breaker	9-XL99964	Xcelite-hex Blade 9/64
9-43531	6 inch Ext.	9-XLM60	Mini-screwdriver kit
9-65283	Case 8.5 in. x 4.5 in. x 2 in. Deep	9-45072	Pliers 6 inch Diagonal
9-46696	Hex Keys	9-XL100X	Wire Stripper/Cutter 5 inch - 100X

**Table 10-3 Overview of GE-1 Tool Kit Contents (Continued)**

Tool ID	Description	Tool ID	Description
9-39829	Torpedo Level, Magnetic	9-XL87CG	Pliers - very fine needle nose-87CG
9-38461	Hammer, Ball Peen, 4 oz	9-WEWDT-07	Weller-Soldering-Replacement Tip(1)
9-4280	Universal Joint 1/4 inch	9-WS175-E	Wiss - Surgical Scissors
9-WEW60P3	Weller - Soldering Iron, 3 wire	KH174	Hemostat 5 inch Straight
9-WECT5B6	Weller - Soldering Iron Tip	KH175	Hemostat 5 inch curved
9-WEWDP12	Weller - Desoldering Pump	9-Z9480121	Alignment tool (red)
93383	Flashlight Mini-Mag Lite (AAA Bat.)		
9-GH408	Tweezers		
21576	Brush - Bristle		
9-4516	Pliers 4 1/4 inch Diagonal		

**Table 10-4 Overview of GE-2 Tool Kit Contents**

GE-2 Sears Kit (#99034)			
Tool ID	Description	Tool ID	Description
9-45381	Pliers, Arc Joint 9 1/2 inch	9-44067	Socket 1 1/16 in. for 1/2 in. drive
9-45092	Pliers, Linesman 8 1/2 inch	9-42679	Socket 10MM Hex for 1/2 in. drive (2273333)
9-42882	Punch, Pin 3/32 inch	9-44262	Extension 10 inch for 1/2 in. drive (2273405)
9-42884	Punch, Pin 5/32 inch	9-4258	3/8 inch to 1/2 inch Adapter
9-42886	Punch, Pin 1/4 inch	9-34374	3/8 inch Metric Socket Set - 12 PT
9-42973	Cold Chisel 1/2 inch	9-44311	16mm Socket 12 pt.
9-GH77	Center Punch Automatic	9-33485	Metal Socket Tray
9-GH890	File Handle, Adj.	9-33484	Metal Socket Tray
9-31276	File, Round, Bastard 8 inch	9-33484	Metal Socket Tray
9-31277	File, Half Round, Bastard 8 inch	9-52068	Tap and Drill Set
9-31263	File, Flat Mill 8 inch	9-52722	#6 Tap
21045C	Close Quarter Saw	9-52723	#8 Tap
9-44604	Wrench, Adj 10 inch		High Speed Drill Set
9-41587	Screwdriver 5/16 inch x 8 inch		#36 Drill
9-41586	Screwdriver, Stubby 5/16 inch		#29 Drill
9-GH19512	Countersink 1/2 inch	9-44046	3/8 inch Socket Set
9-44741	12 PC Combination Wrench Set		

### 10-4-3 Functional checks

The functional checks take about 60 minutes to perform. Refer to the Ultrasound system user documentation whenever necessary.

### 10-4-4 System checks.

**Table 10-5 System functional checks**

Step	Item	Description
1	B-Mode	Verify basic B-Mode (2D) operation. Check the basic Ultrasound system controls that affect this mode of operation.
2	CF-Mode	Verify basic CF-Mode (Color Flow Mode) operation. Check the basic Ultrasound system controls that affect this mode of operation.
3	Doppler Modes	Where applicable, verify basic Doppler operation (PW and CW if available). Check the basic Ultrasound system controls that affect this mode of operation.
4	M-Mode	Verify basic M-Mode operation. Check the basic Ultrasound system controls that affect this mode of operation.
5	3D Mode	Where applicable, verify basic 3D Mode operation. Check the basic system controls that affect this mode of operation.
6	RealTime 4D Mode	Where applicable, verify basic RealTime 4D Mode operation. Check the basic system controls that affect this mode of operation.
7	Basic Measurements	Check Distance and Tissue Depth Measurement.
8	Probe Elements	Perform an Element Test on each probe to verify that all the probe elements and system channels are functional.
9	Applicable Software Options	Verify the basic operation of all optional modes. Check the basic system controls that affect each options operation.
10	System Diagnostic	Perform the Automatic Tests.
11	Transmit/Receive	Use the Visual Channel Utility on the 12L probe to verify that all system xmit/recv channels are functional.
12	Operator Panel test	Perform the Operator Panel Test Procedure.
13	Keyboard	Do the interactive keyboard test.
14	Touch Panel	Where applicable, verify basic Touch Panel display functions.
15	Monitor	Verify basic monitor display functions.
16	Peripherals	See: 'Peripheral/option checks' on page 4-8.

## 10-4-5 Peripheral/option checks

If any peripherals or options are not part of the system configuration, the check can be omitted

**Table 10-6 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 programed. Clean as necessary.

## 10-4-6 Mains cable inspection

**Table 10-7 Mains Cable Inspection, As Appropriate**

Step	Item	Description
1	Unplug cord	Disconnect the mains cable from the wall and Ultrasound system.
2	Inspect	Inspect it and its connectors for damage of any kinds.
3	Verifyr	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.

## 10-4-7 Optional diagnostic checks

To complete the Ultrasound System checks, view the error logs and run desired diagnostics.

## 10-4-8 View the logs

- 1.) Review the Ultrasound system error log for any problems.
- 2.) Check the temperature log to see if there are any trends that could cause problems in the future.

## 10-4-9 Physical inspection

**NOTE:** These features may not be present on all Ultrasound systems.

**Table 10-8 Physical checks**

Step	Item	Description
1	Labeling	Verify that all Ultrasound system labeling is present and in readable condition.
2	Scratches & Dentst	Inspect the exterior 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: 'Mains cable inspection' on page 4-8.
5	External I/O	Check all connectors for damage.
6	Wheels and Brakes	<ul style="list-style-type: none"> <li>• Where applicable, check all wheels and casters for wear and verify operation of foot brake, to stop the Ultrasound system from moving, and release mechanism.</li> <li>• Where applicable, check all wheel locks and wheel swivel locks for proper operation.</li> </ul>
7	Control Panel Movement	<ul style="list-style-type: none"> <li>• Where applicable, verify ease of Operator Panel (Operator Control Panel) movement in all acceptable directions.</li> <li>• Where applicable, ensure that the Control panel latches in position as required.</li> </ul>
8	Control Panel Lighting	Check for proper operation of all operator panel and TGC lights.
9	LCD	<p>Inspect the LCD Display for scratches and bad pixels. Verify proper operation of Contrast and Brightness controls. Where applicable, confirm that the LCD arm allows:</p> <ul style="list-style-type: none"> <li>• swivelling the screen to the left and to the right</li> <li>• folding the screen to the locked position</li> <li>• release and adjustment backwards and forwards</li> <li>• can be adjusted in the up/down positions.</li> </ul> <p>Note: LCD Arm movement may vary and is not applicable to all Ultrasound systems.</p>
10	Monitor Light	Check for proper operation of any monitor lighting, if available.
11	Cables and Connectors	Check all internal cable harnesses and connectors for wear and secure connector seating. Pay special attention to probe strain or bend reliefs.
12	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.
13	Control Panel	Inspect alphanumeric keyboard and Operator Panel. Record any damaged or missing items.
14	Probe Holders	Where applicable, inspect the Probe Holders for cracks or damage.
15	Power and System Status Indicators	Check for proper operation of all Power and System Status Indicators.
16	Battery	Where applicable, check that the battery is not damaged, does not leak, does not emit an odor, and is not deformed or discolored. Observe all warnings and cautions for battery handling, recharging, storing, and/or disposal,

#### **10-4-10      Cleaning**

Refer to the User Manual for the Ultrasound console for instructions.

#### **10-4-11      Air filter cleaning**

Refer to the User Manual for the Ultrasound console for instructions.

#### **10-4-12      Probe maintenance**

Refer to the Ultrasound System User Manual, or the probe's User Manual/Probe Care Card for probe maintenance, checks, cleaning, and disinfecting instructions.

### **Section 10-5 Using a Phantom**

The use of a Phantom is not required during Preventive Maintenance. Customer may use it as part of their Quality Assurance Program tests.

### **Section 10-6 Electrical Safety Tests**

#### **10-6-1      Overview**

*NOTE: For all instructions in the "Electrical safety tests" section in case of using a UPS (uninterruptible power supply) the terms outlet, wall outlet, AC wall outlet and power outlet refer to the AC power outlet of the UPS. In case of further available AC (or DC) power outlets at the same used UPS, these must remain unused i.e. not connected to any other devices.*

The following topics and measurements are covered in this subsection:

- 'Safety test overview' on page 10-10
- 'Leakage current limits' on page 10-11
- 'Grounding continuity' on page 10-13
- 'Chassis leakage current test' on page 10-14
- 'Isolated patient lead (source) leakage—lead to ground' on page 10-17
- 'Isolated patient lead (source) leakage—lead to lead' on page 10-18
- 'Isolated patient lead (sink) leakage-isolation test' on page 10-21
- 'Probe leakage current test' on page 10-22

## 10-6-2 Safety test overview

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 Ultrasound system.


These tests may refer to particular safety analyzer equipment as an example. Always consult the manufacturer's user manual of the Safety Analyzer that will be used to perform the tests.

Prior to initiating any electrical test, the Ultrasound system 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 Ultrasound system or individual probes which fail any portion of the safety test.**

**NOTE:** *For all instructions in the "Electrical safety tests" section in case of using a UPS (uninterruptible power supply) the terms outlet, wall outlet, AC wall outlet and power outlet refer to the AC power outlet of the UPS. In case of further available AC (or DC) power outlets at the same used UPS, these must remain unused i.e. not connected to any other devices.*

 **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 Ultrasound system under test MUST NOT be connected to other electrical equipment. Remove all interconnecting cables and wires. The Ultrasound system 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.**



### 10-6-3 Leakage Current Limits

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 (100-120 or 230-240).



**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 Ultrasound system operation on 100-120 Volt mains (US/Canada/Japan)**

Leakage Current Test	System Power	Lift Ground/ PE Conductor	Limit mA
Chassis/Enclosure Leakage	On and Off	Open	0.3
Type BF and 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 Ultrasound system operation on 230-240 Voltmains**

Leakage Current Test	System Power	Lift Ground/ PE Conductor	Limit mA
Chassis/Enclosure Leakages	On	Open and Closed	0.5
Type BF Applied Parts	On (transmit)	Open	0.01
Type CF Applied Parts	On (transmit)	Open	0.05
Type CF Applied Parts (sink leakage)	On and Off	Closed	0.05

**NOTE:** Leakage current limits for Ultrasound system operation on 230-240 Volt mains



**Table 10-11 ISO (on Dale 600) and Mains Applied (on Dale 601) Limits\***

Probe Type	Measurement
BF	5.0 mA
CF	0.05 mA

\*ISO (on Dale 600) and Mains Applied (on Dale 601) 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.

## 10-6-3 Leakage Current Limits (cont'd)

**Table 10-12 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.	

## 10-6-4 Grounding continuity

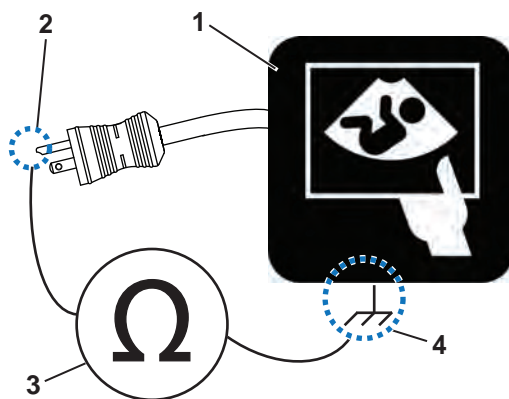


**CAUTION Electric Shock Hazard. The patient must not be contacted to the equipment during this test**

Measure the resistance from the third pin of the attachment plug to the exposed protectively - earthed metal parts of the case. The ground wire resistance should be less than **0.2** ohms.

Reference the procedure in the IEC60601-1.


**Figure 10-1 Ground Continuity Test**



1. Ultrasound System	3. Ohmmeter
2. Ground Pin	4. Accessible Metal Parts (chassis - non-earth ground, unprotected surface)

## 10-6-5 Chassis leakage current test

 **CAUTION** Electric Shock Hazard. When the meter's ground switch is OPEN, don't touch the Ultrasound system!

 **CAUTION** Equipment damage possibility. Never switch the Polarity and the status of Neutral when the Ultrasound system is powered ON. Be sure to turn the Ultrasound system power OFF before switching them using the POLARITY switch and/or the NEUTRAL switch. Otherwise, the Ultrasound system may be damaged.

### 10-6-5-1 Definition

Also known as Enclosure Leakage current test, 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 testing meter is connected to parts of the equipment, easily contacted by the user or patient.

Measurements should be made under the test conditions specified in:

- Table 10-9 on page 10-11
- Table 10-10 on page 10-11 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 10-11
- Table 10-10 on page 10-11. Record the highest reading of current.
  - 1.) Connect Safety analyzer to wall AC power outlet.
  - 2.) Plug the equipment under test power cable into the receptacle on the panel of the meter.
  - 3.) Connect the meter to an accessible metal surface of the scanner using the cable provided with the meter.
  - 4.) Select the Chassis or Enclosure leakage function on the meter.

**NOTE:** Consult the manufacturer's user manual of the Safety Analyzer.

- 5.) Test opening and closing the ground with the scanner on and off as indicated in Table 10-9 or Table 10-10 as applicable.

**NOTE:** Consult the manufacturer's user manual of the Safety Analyzer that will be used to perform the tests. The maximum allowable limit for chassis source leakage is shown in:

- Table 10-9 on page 10-11
- Table 10-10 on page 10-11 as Chassis/Enclosure Leakage.

## 10-6-6 Data sheet for enclosure/chassis leakage current

Table 10-13 on page 10-16 shows a typical format for recording the enclosure/chassis leakage current.

Measurements should be recorded from multiple locations for each set of test conditions.

The actual location of the test probe may vary by Ultrasound system.

**NOTE:** *Values in italics font are given as examples only. Record all data in the Electrical safety tests log.*

**Table 10-13 Typical data format for recording enclosure/chassis leakage**

Unit under test _____		Date of test: _____			
Test Conditions		Measurement/Test Point Location			
System Power	Grounding/PE	Rear Panel	Lower Frame	Probe Connector	Main Handle
Off	Closed				
Off	Open				
On	Closed				
On	Open				

**NOTE:** *Values in italics font are given as examples only.*

## 10-6-7 Isolated patient lead (source) leakage-lead to ground



**CAUTION** Equipment damage possibility. Never switch the Polarity and the status of Neutral when the system is powered ON. Be sure to turn the system power OFF before switching them using the POLARITY switch and/or the NEUTRAL switch. Otherwise, the system may be damaged.

### 10-6-7-1 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 10-11
- Table 10-10 on page 10-11 as applicable.

For each combination the operating controls, such as the lead switch, should be operated to find the worst case condition.

10-6-7-2    **Generic Procedure**

- 1.) Connect Safety analyzer to wall AC power outlet.
- 2.) Plug the equipment under test power cable into the receptacle on the panel of the meter.
- 3.) Connect the ECG cable to the scanner and the Patient leads to the analyzer.
- 4.) Select the Patient lead leakage function on the meter.

NOTE:    *Consult the manufacturer's user manual of the Safety Analyzer.*

- 5.) Test opening and closing the ground with the scanner on and off as indicated in Table 10-9 or Table 10-10 as applicable.

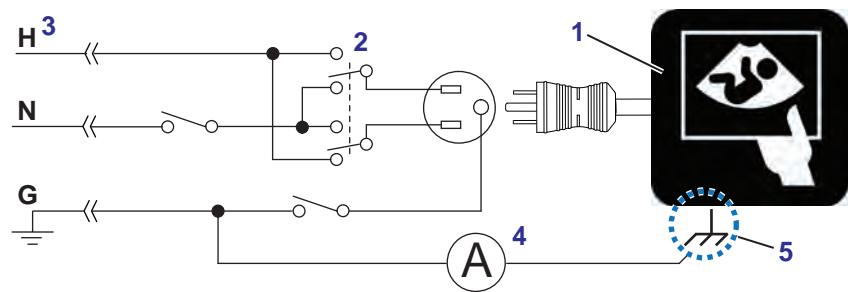
NOTE:    *Consult the manufacturer's user manual of the Safety Analyzer that will be used to perform the tests.*

Measurements should be made under the test conditions specified in:

- Table 10-9 on page 10-11
- Table 10-10 on page 10-11 as applicable.

For each combination, the operating controls, such as the lead switch, should be operated to find the worst case condition.

**Figure 10-2    Set Up for Test of Earth Leakage Current, UL60601-1/IEC 60601-1 Clause 19**



1. Ultrasound System	4. Leakage Test Meter (Ammeter)
2. Polarity Reversing Switch	5. Accessible Metal Parts (chassis - non-earth ground, unprotected surface)
3. Power Outlet - Color of Power Outlet Cable:	
USA and Canada - H - Hot, Black N - Neutral, White G - Ground, Green or Green-yellow	Others - H - Hot, Brown N - Neutral, Blue G - Ground, Green-yellow



## **10-6-8 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 10-11
- Table 10-10 on page 10-11 as applicable. Record the highest leakage current measured.

### 10-6-8-1 Lead to lead leakage test record

Table 10-15 on page 10-24 shows a typical format for recording the patient lead to lead leakage current.

- Table 10-9 on page 10-11
- Table 10-10 on page 10-11 as applicable.

Measurements should be recorded from each lead combination under each set of test conditions specified in:

Record all data on the EQC inspection certificate. Also known as Patient Auxiliary Current

- 1.) Connect Safety analyzer to wall AC power outlet
- 2.) Plug the equipment under test (Scanner) power cable into the receptacle on the panel of the meter.
- 3.) Connect the ECG cable to the scanner and the Patient leads to the analyzer
- 4.) Select the Lead to lead or Patient Auxiliary leakage function on the meter


**NOTE:** Consult the manufacturer's user manual of the Safety Analyzer

- Test opening and closing the ground with the scanner on and off as indicated in Table 10-9 or Table 10-10 Typical data format for recording patient lead to lead leakage

Unit under test _____		Date of test: _____			
Test Conditions		Patient Lead or Combination Measured			
System Power	Grounding/PE	RA-LA	Lower Frame	LA-LL	LL-RA
System Off	Closed				
System On (Transmit)	Open				

**NOTE:** Values in *italics font* are given as examples only.

### 10-6-9 Isolated patient lead (sink) leakage-isolation test

 **CAUTION** Line voltage is applied to the ECG leads during this test. To avoid possible electric shock hazard, the Ultrasound system being tested must not be touched by patients, users or anyone while the ISO TEST switch is depressed. When the meter's ground switch is OPEN, don't touch the Ultrasound system!

### 10-6-9-1 Isolated lead (sink) leakage test record

Table 10-14 on page 10-21 shows a typical format for recording the isolated patient lead sink leakage current.

Measurements should be recorded for the full lead combination under each set of test conditions specified in:

- Table 10-9 on page 10-11
- Table 10-10 on page 10-11 as applicable.

Record all data on the Inspection Certificate.

**Table 10-14 Typical data format for recording isolated lead (sink) leakage**

Unit under test _____		Date of test: _____	
Test Conditions		Patient Lead	
System Power		Grounding/PE	RA+LA+LL
On		Closed	
Off		Closed	

**NOTE:** *Values in italics font are given as examples only.*

- 1.) Connect Safety analyzer to wall AC power outlet
- 2.) Plug the equipment under test power cable into the receptacle on the panel of the meter.
- 3.) Connect the ECG cable to the scanner and the Patient leads to the analyzer
- 4.) Select the Lead isolation or main applied function on the meter

**NOTE:** *Consult the manufacturer's user manual of the Safety Analyzer*

- Test opening and closing the ground with the scanner on and off as indicated in Table 10-9 or Table 10-10 as applicable

**NOTE:** *Consult the manufacturer's user manual of the Safety Analyzer*

10-6-10     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.

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.*

10-6-10-1     Generic Procedure on Probe Leakage Current

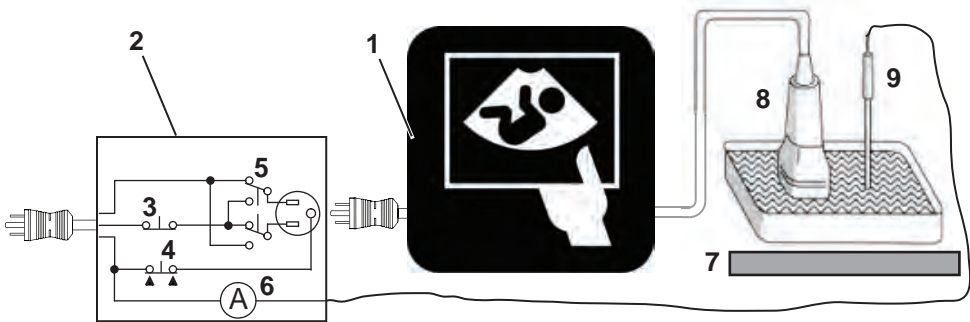
The most common method of measuring probe leakage is to partly immerse the probe into a saline bath while the probe is connected to the Ultrasound system and active. This method measures the actual leakage current resulting from the transducer RF drive.

Measurements should be made under the test conditions specified in:

- Table 10-9 on page 10-11
- Table 10-10 on page 10-11 as applicable.

For each combination, the probe must be active to find the worst case condition.

Figure 10-3 Set Up for Probe Leakage Current



1. Ultrasound System	4. Ground Switch	7. Isolator
2. Tester	5. Polarity Reversing Switch	8. Ultrasound Probe
3. Neutral Switch	6. Meter	9. Saline Probe

10-6-10-1 Generic Procedure on Probe Leakage Current (cont'd)

Figure 10-4 Test set with meter



**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.



**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 doing the test.

### 10-6-10-1 Generic Procedure on Probe Leakage Current (cont'd)

Follow the test conditions and test limits described in:

- Table 10-9 on page 10-11
- Table 10-10 on page 10-11 as applicable for every probe.

Keep a record of the results with other hard copies of maintenance data using Table 10-15 on page 10-24


 **CAUTION** Equipment damage possibility. Never switch the Polarity or the status of the Neutral when the Ultrasound system is powered on. Power off the Ultrasound system, allow the stored energy to bleed down, and turn the circuit breaker off BEFORE switching the POLARITY switch and/or the NEUTRAL switch on the leakage meter to avoid possible power supply damage

Table 10-15 on page 10-24 shows a typical format for recording ultrasound probe source leakage current.

- Table 10-9 on page 10-11
- Table 10-10 on page 10-11 as applicable.

**NOTE:** Values in *italics font* are given as examples only.

**Table 10-15 Typical data format for recording probe (source) leakage**

Unit under test _____		Date of test: _____			
Test Conditions		Probe as measured in saline bath			
System Power	Grounding/PE	4C	i12L	TS	E8C
Off	Closed				
Off	Open				
On	Closed				
On	Open				

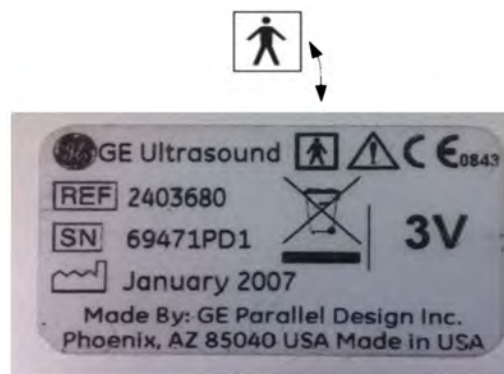
## 10-6-11 Mains on applied part

**NOTE:** *Mains Applied refers 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.*

Mains on applied part is one of the described leakage current tests applicable for probes (Ref: IEC60601-1). This is to be performed with the probe disconnected from the Ultrasound system. Apply mains voltage over the insulation barrier. (Between protective earth on the probe connector, and an electrical anode in saline solution. The patient applied part of the probe is immersed into the saline solution.) Measure current flowing in the circuit. = leakage current.

As a minimum, tests according to IEC60601-1 must be performed once a year. The requirements for Body Floating (BF) have to be applied for TEE and Trans thorax probes bearing the symbol for safety class BF.

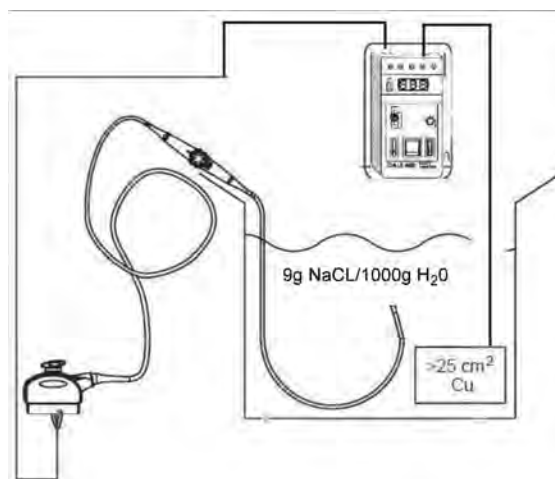
The symbol for BF is indicated on the probe connector label below:



**Figure 10-5 GE Probe Connector Label example**

Where applicable, a typical test setup of non-TEE Probes can be as illustrated in: "Set Up for Probe Leakage Current" on page 10-22

A typical test setup for TEE probes could be as indicated below:



**WARNING** *The handle of the TEE probes must not be immersed*

The test passes when the reading measure less than the values in: Table 10-11 on page 10-11.

## 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.

Where applicable, 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 another probe to isolate if the fault lies with the probe or the scanner.

**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 an 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 Ultrasound 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.

Where applicable, in the case of using a UPS (uninterruptible power supply), perform the tests in the "Electrical Safety tests" section without using the UPS (i.e. directly connect the Ultrasound system to the AC wall outlet). If this leads to a pass result, the specific UPS must no longer be used.



---

**10-7-4-1 New Unit**

If the leakage current measurement tests fail on a new Ultrasound system and if situation can not be corrected, submit a Safety Failure Report to document the Ultrasound system problem. Remove Ultrasound system from operation

**10-7-5 ECG Fails**

Inspect cables for damage or poor connections.

**10-7-6 Ultrasound Equipment Quality Check (EQC and IQC)**

Download and use the latest version of these forms. They can be retrieved from MyWorkshop.

- EQC -- Refer to DOC0929340 in MyWorkshop

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