GE Healthcare

Horizon 5.x, 8.x, 9.x, & 10.x

Signa® Planned Maintenance

Direction 2203808
Rev 9

Revision History

Date	Rev	Change Description
Jan 25, 2019	9	FMI60936 – Safety Software check in PM
Oct. 30, 2010	8	CAPA 1859293
	7	
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Language Policy

ПРЕДУПРЕЖДЕНИЕ (BG)

Това упътване за работа е налично само на английски език.

- Ако доставчикът на услугата на клиента изиска друг език, задължение на клиента е да осигури превод.
- Не използвайте оборудването, преди да сте се консултирали и разбрали упътването за работа.
- Неспазването на това предупреждение може да доведе до нараняване на доставчика на услугата, оператора или пациента в резултат на токов удар, механична или друга опасност.

警告 (ZH-CN)

本维修手册仅提供英文版本。

- 如果客户的维修服务人员需要非英文版本，则客户需自行提供翻译服务。
- 未详细阅读和完全理解本维修手册之前，不得进行维修。
- 忽略本警告可能对维修服务人员、操作人员或患者造成电击、机械伤害或其他形式的伤害。

警告 (ZH-HK)

本服務手冊僅提供英文版本。

- 倘若客戶的服務供應商需要英文以外之服務手冊，客戶有責任提供翻譯服務。
- 除非已參閱本服務手冊及明白其內容，否則切勿嘗試維修設備。
- 不遵從本警告或會令服務供應商、網絡供應商或病人受到觸電、機械性或其他的危險。

警告 (ZH-TW)

本維修手冊僅有英文版。

- 若客戶的維修廠商需要英文版以外的語言，應由客戶自行提供翻譯服務。
- 請勿試圖維修本設備，除非 您已查閱並瞭解本維修手冊。
- 若未留意本警告，可能導致維修廠商、操作員或病患因觸電、機械或其他危險而受傷。

UPOZORENJE (HR)

Ovaj servisni priručnik dostupan je na engleskom jeziku.

- Ako davatelj usluge klijenta treba neki drugi jezik, klijent je dužan osigurati prijevod.
- Ne pokušavajte servisirati opremu ako niste u potpunosti pročitali i razumjeli ovaj servisni priručnik.
- Zanemarite li ovo upozorenje, može doći do ozljede davatelja usluge, operatera ili pacijenta uslijed strujnog udara, mehaničkih ili drugih rizika.

VÝSTRAHA (CS)

Tento provozní návod existuje pouze v anglickém jazyce.

- V případě, že externí služba zákazníkům potřebuje návod v jiném jazyce, je zajištění překladu do odpovídajícího jazyka úkolem zákazníka.
- Nesnažte se o údržbu tohoto zařízení, aniž byste si přečetli tento provozní návod a pochopili jeho obsah.
- V případě nedodržování této výstrahy může dojít k poranění pracovníka prodejního servisu, obslužného personálu nebo pacientů vlivem elektrického proudu, respektive vlivem mechanických či jiných rizik.

ADVARSEL (DA)

Denne servicemanual findes kun på engelsk.

- Hvis en kundes tekniker har brug for et andet sprog end engelsk, er det kundens ansvar at sørge for oversættelse.
- Forsøg ikke at servicere udstyret uden at læse og forstå denne servicemanual.
- Manglende overholdelse af denne advarsel kan medføre skade på grund af elektrisk stød, mekanisk eller anden fare for teknikeren, operatøren eller patienten.

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 alvorens deze onderhoudshandleiding werd geraadpleegd en begrepen is.
- Indien deze waarschuwing niet wordt opgevolgd, zou het onderhoudspersoneel, de operator of een patiënt gewond kunnen raken als gevolg van een elektrische schok, mechanische of andere gevaren.

WARNING (EN)

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.

HOIATUS (ET)

See teenindusjuhend on saadaval ainult inglise keeles

- Kui klienditeeninduse osutaja nõuab juhendit inglise keelest erinevas keeles, vastutab klient tõlketeenuse osutamise eest.
- Ärge üritage seadmeid teenindada enne eelnevalt käesoleva teenindusjuhendiga tutvumist ja sellest aru saamist.
- Käesoleva hoiatuse eiramine võib põhjustada teenuseosutaja, operaatori või patsiendi vigastamist elektrilöögi, mehaanilise või muu ohu tagajärjel.

VAROITUS (FI)

Tämä huolto-ohje on saatavilla vain englanniksi.

- Jos asiakkaan huoltohenkilöstö vaatii muuta kuin englanninkielistä materiaalia, tarvittavan käännöksen hankkiminen on asiakkaan vastuulla.
- Älä yritä korjata laitteistoa ennen kuin olet varmasti lukenut ja ymmärtänyt tämän huolto-ohjeen.
- Mikäli tätä varoitusta ei noudateta, seurauksena voi olla huoltohenkilöstön, laitteiston käyttäjän tai potilaan vahingoittuminen sähköiskun, mekaanisen vian tai muun vaaratilanteen vuoksi.

ATTENTION (FR)

Ce manuel d'installation et de maintenance est disponible uniquement en anglais.

- Si le technicien d'un client a besoin de ce manuel dans une langue autre que l'anglais, il incombe au client de le faire traduire.
- Ne pas tenter d'intervenir sur les équipements tant que ce manuel d'installation et de maintenance n'a pas été consulté et compris.
- Le non-respect de cet avertissement peut entraîner chez le technicien, l'opérateur ou le patient des blessures dues à des dangers électriques, mécaniques ou autres.

WARNUNG (DE)

Diese Serviceanleitung existiert nur in englischer Sprache.

- Falls ein fremder Kundendienst eine andere Sprache benötigt, ist es Aufgabe des Kunden für eine entsprechende Übersetzung zu sorgen.
- Versuchen Sie nicht diese Anlage zu warten, ohne diese Serviceanleitung gelesen und verstanden zu haben.
- Wird diese Warnung nicht beachtet, so kann es zu Verletzungen des Kundendiensttechnikers, des Bedieners oder des Patienten durch Stromschläge, mechanische oder sonstige Gefahren kommen.

ΠΡΟΕΙΔΟΠΟΙΗΣΗ (EL)

Το παρόν εγχειρίδιο σέρβις διατίθεται μόνο στα αγγλικά.

- Εάν ο τεχνικός σέρβις ενός πελάτη απαιτεί το παρόν εγχειρίδιο σε γλώσσα εκτός των αγγλικών, αποτελεί ευθύνη του πελάτη να παρέχει τις υπηρεσίες μετάφρασης.
- Μην επιχειρήσετε την εκτέλεση εργασιών σέρβις στον εξοπλισμό αν δεν έχετε συμβουλευτεί και κατανοήσει το παρόν εγχειρίδιο σέρβις.
- Αν δεν προσέξετε την προειδοποίηση αυτή, ενδέχεται να προκληθεί τραυματισμός στον τεχνικό σέρβις, στο χειριστή ή στον ασθενή από ηλεκτροπληξία, μηχανικούς ή άλλους κινδύνους.

FIGYELMEZTETÉS (HU)

Ezen karbantartási kézikönyv kizárólag angol nyelven érhető el.

- Ha a vevő szolgáltatója angoltól eltérő nyelvre tart igényt, akkor a vevő felelőssége a fordítás elkészíttetése.
- Ne próbálja elkezdeni használni a berendezést, amíg a karbantartási kézikönyvben leírtakat nem értelmezték.
- Ezen figyelmeztetés figyelmen kívül hagyása a szolgáltató, működtető vagy a beteg áramütés, mechanikai vagy egyéb veszélyhelyzet miatti sérülését eredményezheti.

AÐVÖRUN (IS)

Þessi þjónustuhandbók er aðeins fáanleg á ensku.

- Ef að þjónustuveitandi viðskiptamanns þarfnast annas tungumáls en ensku, er það skylda viðskiptamanns að skaffa tungumálaþjónustu.
- Reynið ekki að afgreiða tækið nema að þessi þjónustuhandbók hefur verið skoðuð og skilin.
- Brot á sinna þessari aðvörun getur leitt til meiðsla á þjónustuveitanda, stjórnanda eða sjúklings frá raflosti, vélrænu eða öðrum áhættum.

AVVERTENZA (IT)

Il presente manuale di manutenzione è disponibile soltanto in lingua inglese.

- Se un addetto alla manutenzione richiede il manuale in una lingua diversa, il cliente è tenuto a provvedere direttamente alla traduzione.
- Procedere alla manutenzione dell'apparecchiatura solo dopo aver consultato il presente manuale ed averne compreso il contenuto.
- Il mancato rispetto della presente avvertenza potrebbe causare lesioni all'addetto alla manutenzione, all'operatore o ai pazienti provocate da scosse elettriche, urti meccanici o altri rischi.

警告 (JA)

このサービスマニュアルには英語版しかありません。

- サービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。
- このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないでください。
- この警告に従わない場合、サービスを担当される方、操作員あるいは患者　さんが、感電や機械的又はその他の危険により負傷する可能性があります。

경고 (KO)

본 서비스 매뉴얼은 영어로만 이용하실 수 있습니다.

고객의 서비스 제공자가 영어 이외의 언어를 요구할 경우, 번역 서비스를 제공하는 것은 고객의 책임입니다.

본 서비스 매뉴얼을 참조하여 숙지하지 않은 이상 해당 장비를 수리하려고 시도하지 마십시오.

본 경고 사항에 유의하지 않으면 전기 쇼크, 기계적 위험, 또는 기타 위험으로 인해 서비스 제공자, 사용자 또는 환자에게 부상을 입힐 수 있습니다.

BRĪDINĀJUMS (LV)

Šī apkopes rokasgrāmata ir pieejama tikai angļu valodā.

- Ja klienta apkopes sniedzējam nepieciešama informācija citā valodā, klienta pienākums ir nodrošināt tulkojumu.
- Neveiciet aprīkojuma apkopi bez apkopes rokasgrāmatas izlasīšanas un saprašanas.
- Šī brīdinājuma neievērošanas rezultātā var rasties elektriskās strāvas trieciena, mehānisku vai citu faktoru izraisītu traumu risks apkopes sniedzējam, operatoram vai pacientam.

ĮSPĖJIMAS (LT)

Šis eksploatavimo vadovas yra tik anglų kalba.

- Jei kliento paslaugų tiekėjas reikalauja vadovo kita kalba – ne anglų, suteikti vertimo paslaugas privalo klientas.
- Nemėginkite atlikti įrangos techninės priežiūros, jei neperskaitėte ar nesupratote šio eksploatavimo vadovo.
- Jei nepaisysite šio įspėjimo, galimi paslaugų tiekėjo, operatoriaus ar paciento sužalojimai dėl elektros šoko, mechaninių ar kitų pavojų.

ADVARSEL (NO)

Denne servicehåndboken finnes bare på engelsk.

- Hvis kundens serviceleverandør har bruk for et annet språk, er det kundens ansvar å sørge for oversettelse.
- Ikke forsøk å reparere utstyret uten at denne servicehåndboken er lest og forstått.
- Manglende hensyn til denne advarselen kan føre til at serviceleverandøren, operatøren eller pasienten skades på grunn av elektrisk støt, mekaniske eller andre farer.

OSTRZEŻENIE (PL)

Niniejszy podręcznik serwisowy dostępny jest jedynie w języku angielskim.

- Jeśli serwisant klienta wymaga języka innego niż angielski, zapewnienie usługi tłumaczenia jest obowiązkiem klienta.
- Nie próbować serwisować urządzenia bez zapoznania się z niniejszym podręcznikiem serwisowym i zrozumienia go.
- Niezastosowanie się do tego ostrzeżenia może doprowadzić do obrażeń serwisanta, operatora lub pacjenta w wyniku porażenia prądem elektrycznym, zagrożenia mechanicznego bądź innego.

AVISO (PT-BR)

Este manual de assistência técnica encontra-se disponível unicamente em inglês.

- Se outro serviço de assistência técnica solicitar a tradução deste manual, caberá ao cliente fornecer os serviços de tradução.
- Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica.
- A não observância deste aviso pode ocasionar ferimentos no técnico, operador ou paciente decorrentes de choques elétricos, mecânicos ou outros.

ATENÇÃO (PT-PT)

Este manual de assistência técnica só se encontra disponível em inglês.

- Se qualquer outro serviço de assistência técnica solicitar este manual noutro idioma, é da responsabilidade do cliente fornecer os serviços de tradução.
- Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica.
- O não cumprimento deste aviso pode colocar em perigo a segurança do técnico, do operador ou do paciente devido a choques eléctricos, mecânicos ou outros.

ATENȚIE (RO)

Acest manual de service este disponibil doar în limba engleză.

- Dacă un furnizor de servicii pentru clienți necesită o altă limbă decât cea engleză, este de datoria clientului să furnizeze o traducere.
- Nu încercați să reparați echipamentul decât ulterior consultării şi înțelegerii acestui manual de service.
- Ignorarea acestui avertisment ar putea duce la rănirea depanatorului, operatorului sau pacientului în urma pericolelor de electrocutare, mecanice sau de altă natură.

ОСТОРОЖНО! (RU)

Данное руководство по техническому обслуживанию представлено только на английском языке.

- Если сервисному персоналу клиента необходимо руководство не на английском, а на каком-то другом языке, клиенту следует самостоятельно обеспечить перевод.
- Перед техническим обслуживанием оборудования обязательно обратитесь к данному руководству и поймите изложенные в нем сведения.
- Несоблюдение требований данного предупреждения может привести к тому, что специалист по техобслуживанию, оператор или пациент получит удар электрическим током, механическую травму или другое повреждение.

UPOZORENJE (SR)

Ovo servisno uputstvo je dostupno samo na engleskom jeziku.

- Ako klijentov serviser zahteva neki drugi jezik, klijent je dužan da obezbedi prevodilačke usluge.
- Ne pokušavajte da opravite uređaj ako niste pročitali i razumeli ovo servisno uputstvo.
- Zanemarivanje ovog upozorenja može dovesti do povređivanja servisera, rukovaoca ili pacijenta usled strujnog udara ili mehaničkih i drugih opasnosti.

UPOZORNENIE (SK)

Tento návod na obsluhu je k dispozícii len v angličtine.

- Ak zákazníkov poskytovateľ služieb vyžaduje iný jazyk ako angličtinu, poskytnutie prekladateľských služieb je zodpovednosťou zákazníka.
- Nepokúšajte sa o obsluhu zariadenia, kým si neprečítate návod na obluhu a neporozumiete mu.
- Zanedbanie tohto upozornenia môže spôsobiť zranenie poskytovateľa služieb, obsluhujúcej osoby alebo pacienta elektrickým prúdom, mechanické alebo iné ohrozenie.

ATENCION (ES)

Este manual de servicio sólo existe en inglés.

- Si el encargado de mantenimiento de un cliente necesita un idioma que no sea el inglés, el cliente deberá encargarse de la traducción del manual.
- No se deberá dar servicio técnico al equipo, sin haber consultado y comprendido este manual de servicio.
- La no observancia del presente aviso puede dar lugar a que el proveedor de servicios, el operador o el paciente sufran lesiones provocadas por causas eléctricas, mecánicas o de otra naturaleza.

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.

OPOZORILO (SL)

Ta servisni priročnik je na voljo samo v angleškem jeziku.

- Če ponudnik storitve stranke potrebuje priročnik v drugem jeziku, mora stranka zagotoviti prevod.
- Ne poskušajte servisirati opreme, če tega priročnika niste v celoti prebrali in razumeli.
- Če tega opozorila ne upoštevate, se lahko zaradi električnega udara, mehanskih ali drugih nevarnosti poškoduje ponudnik storitev, operater ali bolnik.

DİKKAT (TR)

Bu servis kılavuzunun sadece ingilizcesi mevcuttur.

- Eğer müşteri teknisyeni bu kılavuzu ingilizce dışında bir başka lisandan talep ederse, bunu tercüme ettirmek müşteriye düşer.
- Servis kılavuzunu okuyup anlamadan ekipmanlara müdahale etmeyiniz.
- Bu uyarıya uyulmaması, elektrik, mekanik veya diğer tehlikelerden dolayı teknisyen, operatör veya hastanın yaralanmasına yol açabilir.

Table of Contents

NOTE: Content listed in the remainder of this Table of Contents can also be accessed from the Main PM page.

Chapter 2 – PM Procedures

DATA SHEETS

Chapter 1 – Introduction

Section 1 - Overview

Note: This Direction provides coverage for Signa Horizon 5.x, 8.x, 9.x, & 10.x Systems for both 1.5T and 1.0T magnets. This manual was authored by the field (a group of Zone Support Engineers) and MR Engineering for the field. They are very open to your thoughts and opinions as to what checks should or should not be done on the PM and how often they should be checked. If you have input, submit it through General Electric's QA problem reporting process.

1-1 Description

The Signa Planned Maintenance (PM) Horizon 5.x, 8.x, 9.x, & 10.x Direction 2203808 was developed to use "system access time" as productively as possible. It contains most of the procedures needed, written as PM procedures. Many proven "Time Saving Steps" have been incorporated to reduce the amount of time needed to complete the recommended tasks.

"System access time" is the time the customer makes the system available to General Electric for service. It does not include time spent doing items that can be done while the customer is scanning patients. System access time is EXTREMELY valuable. It must be used to accomplish PM items, FMI's and deferred maintenance.

The recommended PM items require approximately 6.5 hours per bimonthly checklist with a six-list annual schedule. This time estimate includes allowances for certain optional equipment (such as cameras or oxygen monitors), which some sites do not have, or that GE may not have service responsibility for. It does not allow any additional time for customer deferred maintenance or the corrective maintenance of any issues discovered during these Planned Maintenance checks. Additional time should be scheduled (either separately or in conjunction with a PM visit) for corrective maintenance.

The recommended PM items on each list can be completed in any time schedule to best accommodate a customer's individual requirements. Customers wishing the least number of interruptions of their scanning schedule may want GE to perform all checks during a single extended site visit six times per year. Other customers desiring shorter, more frequent site visits by their field engineers may find it advantageous to have a portion of the checks accomplished at each visit. All of the checks for each checklist should be completed within a two-month time frame to ensure best system performance and reliability.

The following are the criteria that were used to determine what procedures to include in this direction:

- Is it a Safety and Regulatory requirement?
- Does it check image quality?
- Is it an operator sensitive item?
- Does it help prevent a failure?
- Is it too invasive?

The maintenance items and periodicity prescribed in these PM schedules represent the current manufacturer's recommendations. Specific customer requirements and/or site environment may necessitate more or less frequent intervals for Planned Maintenance service. An agreement to perform PMs less frequently than these recommendations can be made with customers with the understanding that a reduction of system performance may result.

To further enhance productivity, the PM procedures have been divided into four types: SAFETY AND REGULATORY, IMAGE QUALITY, OTHER (SYSTEM NOT AVAILABLE FOR PATIENT SCANS), and OTHER (SYSTEM AVAILABLE FOR PATIENT SCANS).

Along with the PM Direction, sets of PM Schedule Reports have been developed. The PM Schedule Reports list the items to be accomplished each period. These Reports are included on the CD-ROM, for Horizon 5.x, 8.x, 9.x & 10.x: Direction 21606231-1, *MR Release Signa LX Service Methods*, distributed under Tab 181. Enough system access time should be scheduled to complete all the PM procedures within the two-month time period.

Note: For 11.x: Direction 2333500-1, *MR Release Signa Excite 1.5T Service Methods* (distributed under Tab 181), PM Schedule Reports can be accessed under **Planned Maintenance > Signa Excite 1.5T Planned Maintenance Schedules**.

It is General Electric's contractual obligation to complete all the items on the report(s) for each site having a system and/or magnet service contract. If, for any reason, all the items are not completed, a written explanation for each incomplete item must be provided on the PM report (i.e., not enough system access time, excessive amount of time troubleshooting, excessive amount of FMIs performed, etc.) At the end of the PM, one copy of the completed report will be given to the customer and the other copy will be kept in the Site Log Book. GE will retain the site log book copy for at least one year.

It is highly recommended that users of this direction have completed the first phase of training at the GE Education Center. Although many of the procedures can be performed without this training, it would be very difficult to perform all the PM procedures without a basic understanding of the Signa Horizon 5.x, 8.x, 9.x & 10.x systems.

1-2 Six Times Per Year PM Matrix

The PM matrix shows all the PM procedures and the frequency they should be completed within a 2-month time frame, see schedules A - F. It also shows the type (1 - 4) for each procedure (as described in Section 1-1).

Note: An asterisk (*) indicates that the procedure should be performed during every site visit.

Section 1 - Magnet Room		**Type**	**Visit**					
			A	**B**	**C**	**D**	**E**	**F**
1-1	Check Oxygen Monitor Operation/Installation Date	1	X					
1-2	Inspect Front Cover Cable Take-up	3						X
1-3	Perform Physical Acquisition Controller (PAC) Leakage Current Test	1			X			
1-4	Check Magnet Room RF Integrity with Correlated Noise	3	X		X		X	
1-5	Check Cardiac Gating Cable	1	X		X	X		X
1-6	Check Patient Blower & Filter	3	X	X	X	X	X	X
1-7	Check Pneumatic Patient Alert System	1	X			X		

Section 2 - RF		**Type**	**Visit**					
			A	**B**	**C**	**D**	**E**	**F**
2-1	Check RF Cabinet Fans and Filters	4	X	X	X	X	X	X
2-2	Check Erbtec Blower Output	3	X	X	X	X		
2-3	Perform Power Monitor Functional Checks – RF/PEN Cabinet	1					X	
2-4	Perform Power Monitor Functional Checks – RF/PEN II Cabinet	1					X	
2-5	Perform Power Monitor Functional Checks – RF/PDU Cabinet	1					X	
2-6	Check RF Output Power	1	X	X	X	X	X	X

Section 3 - Patient Handling		Type	Visit					
			A	B	C	D	E	F
3-1	Check Emergency Release of Cradle and Patient Transport	1	X	X	X	X	X	X
3-2	Check Patient Transport Docking and Alignment	3		X		X		X
3-3	Check Patient Transport Casters and Armboard Set Screws & Bumper Strips	1	X	X	X	X	X	X
3-4	Check Patient Transport Caster Locks	1	X			X		
3-5	Check Cradle Longitudinal Drive Clutch	1		X		X		X
3-6	Check Patient Transport Hydraulic Filter	3			X			X
3-7	Clean Lightweight Cradle Wheels	3	X			X		
3-8	Check Foot Pedal Spring Installation Date	3	X					

Section 4 – Gradients		Type	Visit					
			A	B	C	D	E	F
4-1	Check Gradient Cabinet Fans and Filters	4	X	X	X	X	X	X
4-2	Check Eddy Current Compensation	2	X	X	X	X	X	X
4-3	Check Gradient Cable Connections and Support	3		X				
4-4	Check Gradient Calibration	2	X	X	X	X	X	X
4-5	Check Fluid Level and Valve of Heat Exchanger	3	X		X		X	
4-6	Check Water Chiller for Gradient Coil Cooling	3	X		X		X	
4-7	Check Pump Motor Lubrication	3	X					

Section 5 - PDU		Type	Visit					
			A	B	C	D	E	F
5-1	Check Standard PDU Fans and Filters	4		X		X		X
5-2	Check Standard PDU Emergency Off and Stop Circuits/Indicator Lights	1			X			
5-3	Inspect Standard PDU and Power Connections	3			X			
5-4	Check PowerTech and/or Transtector	3	X			X		
5-5	Check Compact PDU Fans and Filters	4		X		X		X
5-6	Check Compact PDU Emergency Off and Stop Circuits/Indicator Lights	1			X			
5-7	Inspect Compact PDU and Power Connections	3			X			
5-8	Check Teal PDU Module in RF/PDU Cabinet Emergency Off and Stop Circuits	1			X			
5-9	Inspect Teal PDU Power Connections	3			X			
5-10	Check PDU Module in ACGD/PDU Cabinet Emergency Off and Stop Circuits	1			X			
5-11	Inspect the ACGD Cabinet PDU Power Connections	3			X			

Section 6A - Computer (Horizon 5.x)		Type	Visit					
			A	B	C	D	E	F
6A-1	Check OC/IC Computer Fans and Clean Air Intake Grills	3	X	X	X	X	X	X
6A-2	Clean OC/IC DAT Drive	4	X	X	X	X	X	X
6A-3	Check OC/IC Console Power Supply Fan	3	X	X	X	X	X	X
6A-4	Clean and Vacuum OC/IC Console Interior	3	X					

Section 6B - Operator Workspace (Release 8.x)		Type	Visit					
			A	B	C	D	E	F
6B-1	Check Computer Fans and Clean Air Intake Grills	3	X	X	X	X	X	X
6B-2	Clean Operator Workstation Mouse & VideoCam Lens	3	X			X		
6B-3	Set SGI System Clock	3	X	X	X	X	X	X

Section 7- General System		Type	Visit					
			A	B	C	D	E	F
7-1	Check System Cabinet Fans and Clean Filters	4	X	X	X	X	X	X
7-2	Check and Delete Error/Message Log/T-Test Files/Save Info	3	X	X	X	X	X	X
7-5	Check Cabinet Inlet Air Temperature	4		X		X		X
7-7	Update Configuration File in Site Log Book	4		X			X	
7-8	Verify PM Completion on Van Equipment (Mobiles Only)	4	X			X		
7-9	Perform Site Restoration - Check DQA Phantom, Remove GE Test Scans, and Check Cabinet Doors and Covers	3	X	X	X	X	X	X
7-10	Check Modem (US Sites ONLY)	3	X	X	X	X	X	X
7-11	Review System Health Report	4	X	X	X	X	X	X
7-12	Check Battery Voltage on MDP (need certified electrician with Arc Flash PPE to perform this task)	3	X			X		

Section 8 - 3M Laser Camera		Type	Visit					
			A	B	C	D	E	F
8-1	Check Laser Camera Fans	3	X	X	X	X	X	X
8-2	Clean and Vacuum Laser Camera Interior	3		X			X	
8-3	Clean Laser Camera Suction Cups	3	X	X	X	X	X	X
8-4	Clean Laser Camera Transport Plate/Docking Unit	3	X	X	X	X	X	X
8-5	Run Laser Camera Cleaning Film	3	X	X	X	X	X	X
8-6	Clean Laser Camera Exterior	4		X			X	
8-7	Check Laser Camera Air Shock Pressure (Mobiles Only)	4		X			X	
8-8	Replace Laser Camera External Docking Unit Switches	3	X			X		

Section 9 – Twin Accessory Cabinet (TAC)		Type	Visit					
			A	B	C	D	E	F
9-1	Filter Replacement	4	X	X	X	X	X	X
9-2	Tip Seal Replacement	3						X
9-3	Clean Inlet Screen	3						X
9-4	Solenoid Valve Replacement	3						X

Section 10 - Magnet and Cryogens		Type	Visit					
			A	B	C	D	E	F
10-1	Check Cryogen Levels (Phone Site for Info)	4	*	*	*	*	*	*
10-2	Calculate Cryogen Boil-Off Rates/Record Compressor Run Times (Phone Site for Info)	4	*	*	*	*	*	*
10-3	Evaluate Cryogen Delivery Schedule (If Applicable)	4	X	X	X	X	X	X
10-4	Evaluate Helium Transfill Efficiency	4	X	X	X	X	X	X
10-5	Verify Cryogen Meter Calibration - GE Magnets	4	X					
10-6	Verify Cryogen Meter Calibration - Oxford Magnets	4	X					
10-7	Inspect Cryogen Vent	1		X				
10-8	Test Magnet Emergency Rundown Unit (ERU)	1	X	X	X	X	X	X
10-9	Inspect Magnet Emergency Rundown Unit (ERU)	1		X				
10-10	Test GE Magnet Rundown Unit (MRU)	1	X	X	X	X	X	X
10-11	Inspect GE Magnet Rundown Unit (MRU)	1		X				
10-12	Check and Empty Collection Bottles (GE S–I and Oxford Magnets Only)	3	X	X	X	X	X	X
10-13	Inspect CTI System (Oxford Mobile Magnets Only)	3		X			X	
10-14	Record Cryostat Pressure and Flowrates (GE Magnets Only)	3	X	X	X	X	X	X
10-15	Inspect Leybold System (Replace Adsorber Every 24,000 Hours) (GE Magnets Only)	3	X		X		X	
10-16	Inspect Balzers System (Replace Adsorber Every 26,000 Hours)(GE Magnets Only)	3	X		X		X	
10-17	Inspect Sumitomo System (Replace Adsorber Every 20,000 Hours)	3	X		X		X	
10-18	Perform Oxford Mobile Specific Inspections	3			X			X
10-19	Inspect Oxford Water Cooled Power Supply Valve	3	X					
10-20	Check/Replace EDM Battery	3	X					
10-21	Change Desiccant Pack Water Flowmeter	3	X		X		X	

Section 11 - PM Assist		Type	Visit					
			A	B	C	D	E	F
11	Software Check for Safety and Planned Maintenance Assist	2	X	X	X	X	X	X

Section 12 - IBIS		Type	Visit					
			A	B	C	D	E	F
12	Installed Base In Spec (IBIS)	2	X	X	X	X	X	X

Section 2 – How to Use This Manual

2-1 Description

This direction is intended to be used with Direction 21606231-1, MR Release Signa LX Service Methods CD ROM. See Illustration 2-1 for an example of a typical Magnet PM checklist (System PM Checklist Reports are similar). The hard copy version of the PM Schedule Reports are to be printed from the CD ROM and should be stored in the Site Log Book. These reports are available on the CD-ROM for Direction 2160623-1, *Signa LX Service Methods*. The PM reports are found under **PM Manual & Schedules > Chapter 1 – Introduction**. Each PM Schedule will list the items to be maintained each month.

The following steps describe how to perform PM using this PM Direction and the PM Schedule Reports:

1. The PM Schedule Reports will guide you through the PM Direction. There are six different sets of System PM Schedule Reports (labeled A through F for six times per year). Use the reports in alphabetical order. If sharing tools and test equipment is a problem, start other sites with different lettered reports.

   If GE has the contract for maintaining the magnet and cryogens at the site, Magnet PM Schedule Reports must also be completed. There are six different sets of Magnet PM Schedule Reports (labeled A through F for six times per year). Use these reports in the same way as the System PM Schedule Reports are used.

2. The procedures listed on the PM Schedule Reports are divided into four types:

   TYPE 1 - SAFETY AND REGULATORY

   TYPE 2 - IMAGE QUALITY

   TYPE 3 - OTHER (SIGNA NOT AVAILABLE FOR PATIENT SCANS)

   TYPE 4 - OTHER (SIGNA AVAILABLE FOR PATIENT SCANS)

   Within each type, the procedures are listed by the section number. The first part of the number is the PM Direction tab number. The second part of the number is used to locate the procedure within the tab. (Since the PM Schedule Reports are non-proprietary and the PM Direction is proprietary, page number references are not used.)

3. To find a procedure, do the following:
   a. Note the first part of procedure number.
   b. Open PM Direction to the appropriate numbered tab.
   c. Look at Table of Contents within that tab to locate the page number of procedure.

4. Perform procedure starting on that page.

WARNING!

IF PM PROCEDURE INDICATES FURTHER MAINTENANCE IS REQUIRED, REFER TO THE APPROPRIATE TECHNICAL MANUAL BEFORE PERFORMING ANY FURTHER MAINTENANCE. MANY PROCEDURES REQUIRE POWER TO BE SHUT OFF AND/OR OTHER PRECAUTIONS TO BE TAKEN TO AVOID PERSONAL INJURY OR DAMAGE TO EQUIPMENT.

5. When finished with the procedure, check appropriate box and/or record data on PM Schedule Report.

   Note: Proceed to the appropriate PM Schedule Report in either Section 2-2 or 2-3, and print the schedule for report submittal.

6. Be sure to do Section 7-9, PERFORM SITE RESTORATION, at the end of each site visit.
7. Write any special information (i.e. FMIs performed) in Notes section at end of PM Schedule Report.
8. Every three months (quarterly schedule), make sure all PM items are complete. If they are not prepare a written explanation for each item that was not completed in the Notes section at the end of the PM Schedule Report. When this is completed, sign PM Schedule Report and give copy to customer. Put second copy in Site Log Book. GE will retain the site log book copy for at least one year.

Note: Another important part of performing PMs is to code the dispatch properly. Use Code 12 for sites under warranty and Code 97 for sites on contract. If FMIs and deferred maintenance are performed, split the dispatch and code it accordingly.

2-2 Software Revision Check for Safety, Six Times/Year

PM Check		Comments
Record Applications software version installed on the system		
Record Service pack number installed on the system		
Check compliance of the system Applications Software and Service Pack (Access DOC1667089 (SW Matrix) from the online documentation library) Use the “ePM Form Data” tab to check and assess pass/fail criteria and actions.		
Record Applications Software Revision from MR SW Matrix		
Is the Applications Software Upgrade FMI Type "Safety"?	Yes / No	**Select one of the options below:** Pass Fail FMI being deployed Customer Refused/Postponed
Record Minimum Safety Service Pack from MR SW Matrix (or record "None")		
Is there a safety service pack required per the SW Matrix?	Yes / No	**Select one of the options below:** Pass Fail FMI being deployed Customer Refused/Postponed

2-2 System PM Schedules, Six Times/Year

Site: _____ Month: _____ **SCHEDULE SYS_A**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs Replacement	Needs Repair	Failed
Safety and Regulatory											
Check Oxygen Monitor Operation/Installation Date	1-1										
Check Cardiac Gating Cable	1-5										
Check Pneumatic Patient Alert System	1-7										
Check RF Output Power	2-6										
Check Emergency Release of Cradle and Patient Transport	3-1										
Check Patient Transport Casters, Armboard Set Screws and Bumper Strips	3-3										
Check Patient Transport Caster Locks	3-4										
Image Quality											
Check Eddy Current Compensation	4-2										
Check Gradient Calibration: X	4-4										
Y											
Z											
Check Shim	7-3										
Check SNR	7-4										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Not Available for Patient Scans)											
Check Magnet Room RF Integrity with Correlated Noise	1-4										
Check Patient Blower & Filter	1-6										
Check Erbtec Blower Output	2-2										
Clean Lightweight Cradle Wheels	3-7										
Check Foot Pedal Spring Installation Date	3-8										
Check Fluid Level and Valve of Heat Exchanger	4-5										
Check Water Chiller for Gradient Coil Cooling	4-6										
Check PowerTech and/or Transtector	5-4										
Check OC/IC Computer Fans and Clean Air Intake Grills	6A-1										

Site: _____ Month: _____ **SCHEDULE SYS_A**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs Replacement	Needs Repair	Failed
Check OC/IC Console Power Supply Fan	6A-3										
Clean and Vacuum OC/IC Console Interior	6A-4										
Check Operator Workspace Fans And Clean Air Intake Grills	6B-1										
Clean Operator Workstation Mouse & VideoCam Lens	6B-2										
Set SGI System Clock	6B-3										
Check and Delete Error/Message Log/T-Test Files & Check Date of SaveInfo	7-2										
Perform Site Restoration - Check DQA Phantom, Check Alignment Lights, Remove GE Test Scans, and Check Cabinet Doors and Covers	7-9										
Check Modem	7-10										
Check battery voltage. (Need certified electrician with Arc Flash PPE.)	7-12										
Check Laser Camera Fans	8-1										
Clean and Vacuum Laser Camera Interior	8-2										
Clean Laser Camera Transport Plate/Docking Unit	8-4										
Run Laser Camera Cleaning Film	8-5										
Replace Laser Camera Docking Switches	8-8										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Available for Patient Scans)											
Check RF Cabinet Fans and Clean Filters	2-1										
Check Gradient Cabinet Fans and Filters	4-1										
Check Fluid Level and Valve of Heat Exchanger for Gradient Coil Cooling	4-5										
Check Water Chiller for Gradient Coil Cooling	4-6										
Check System Cabinet Fans and Clean Filters	7-1										
Verify PM Completion on Van Equipment (Mobiles Only)	7-8										
Review System Health Report	7-11										
TAC Filter Replacement	9-1										

Site: _____ Month: _____ **SCHEDULE SYS_A**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Notes: _____

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FSE ID #: _____

Field Service Engineer: _____ Date: _____

Site: _____ Month: _____ **SCHEDULE SYS_B**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Safety and Regulatory											
Check RF Output Power	2-6										
Check Emergency Release of Cradle and Patient Transport	3-1										
Check Patient Transport Casters, Armboard Set Screws and Bumper Strips	3-3										
Check Cradle Longitudinal Drive Clutch	3-5										
Image Quality											
Check Eddy Current Compensation	4-2										
Check Gradient Calibration: X	4-4										
Y											
Z											
Check Shim	7-3										
Check SNR	7-4										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Not Available for Patient Scans)											
Check Patient Blower & Filter	1-6										
Check Erbtec Blower Output	2-2										
Check Patient Transport Docking Alignment	3-2										
Check Gradient Cable Connections and Support	4-3										
Check OC/IC Computer Fans and Clean Air Intake Grills	6A-1										
Check OC/IC Console Power Supply Fan	6A-3										
Check Operator Workspace Fans And Clean Air Intake Grills	6B-1										
Set SGI System Clock	6B-3										
Check and Delete Error/Message Log/T-Test Files & Check Date of SaveInfo	7-2										
Perform Site Restoration - Check DQA Phantom, Check Alignment Lights, Remove GE Test Scans, and Check Cabinet Doors and Covers	7-9										

Site: _____ Month: _____ **SCHEDULE SYS_B**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Check Modem	7-10										
Check Laser Camera Fans	8-1										
Clean and Vacuum Laser Camera Interior	8-2										
Clean Laser Camera Suction Cups	8-3										
Clean Laser Camera Transport Plate/Docking Unit	8-4										
Run Laser Camera Cleaning Film	8-5										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Available for Patient Scans)											
Check RF Cabinet Fans and Clean Filters	2-1										
Check Gradient Cabinet Fans and Filters	4-1										
Check Fluid Level and Valve of Heat Exchanger for Gradient Coil Cooling	4-5										
Check Water Chiller for Gradient Coil Cooling	4-6										
Check Water Chiller Pump Motor Lubrication	4-7										
Check Standard PDU Fans and Filters	5-1										
Check Compact PDU Fans and Filters	5-5										
Clean OC/IC DAT Drive	6A-2										
Check System Cabinet Fans and Clean Filters	7-1										
Check Cabinet Inlet Air Temperature	7-5										
Check PM Supplies	7-6										
Update Configuration File in Site Logbook	7-7										
Review System Health Report	7-11										
Clean Laser Camera Exterior	8-6										
Check Laser Camera Air Shock Pressure (Mobiles Only)	8-7										
TAC Filter Replacement	9-1										

Site: _____ Month: _____ **SCHEDULE SYS_B**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Notes: _____

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FSE ID #: _____

Field Service Engineer: _____ Date: _____

Site: _____ Month: _____ **SCHEDULE SYS_C**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Safety and Regulatory											
Perform Physical Acquisition Controller (PAC) Leakage Current Test	1-3										
Check Cardiac Gating Cable	1-5										
Check RF Output Power	2-6										
Check Emergency Release of Cradle and Patient Transport	3-1										
Check Patient Transport Casters, Armboard Set Screws and Bumper Strips	3-3										
Check PDU Emergency Off and Stop Circuits/Indicator Lights	5-2, 5-6, 5-8 or 5-10										
Image Quality											
Check Eddy Current Compensation	4-2										
Check Gradient Calibration: X	4-4										
Y											
Z											
Check Shim	7-3										
Check SNR	7-4										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Not Available for Patient Scans)											
Check Magnet Room RF Integrity with Correlated Noise	1-4										
Check Patient Blower & Filter	1-6										
Check Erbtec Blower Output	2-2										
Check Patient Transport Hydraulic Filter	3-6										
Check Fluid Level and Valve of Heat Exchanger	4-5										
Check Water Chiller for Gradient Coil Cooling	4-6										

Site: _____ Month: _____ **SCHEDULE SYS_C**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Inspect PDU Power Connections	5-3, 5-7, 5-9 or 5-11										
Check OC/IC Computer Fans and Clean Air Intake Grills	6A-1										
Check OC/IC Console Power Supply Fan	6A-3										
Check Operator Workspace Fans And Clean Air Intake Grills	6B-1										
Set SGI System Clock	6B-3										
Check and Delete Error/Message Log/T-Test Files & Check Date of SaveInfo	7-2										
Perform Site Restoration - Check DQA Phantom, Check Alignment Lights, Remove GE Test Scans, and Check Cabinet Doors and Covers	7-9										
Check Modem	7-10										
Check Laser Camera Fans	8-1										
Clean Laser Camera Suction Cups	8-3										
Clean Laser Camera Transport Plate/Docking Unit	8-4										
Run Laser Camera Cleaning Film	8-5										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Available for Patient Scans)											
Check RF Cabinet Fans and Clean Filters	2-1										
Check Gradient Cabinet Fans and Filters	4-1										
Check Fluid Level and Valve of Heat Exchanger for Gradient Coil Cooling	4-5										
Check Water Chiller for Gradient Coil Cooling	4-6										
Check Water Chiller Pump Motor Lubrication	4-7										
Clean OC/IC DAT Drive	6A-2										
Check System Cabinet Fans and Clean Filters	7-1										
Review System Health Report	7-11										
TAC Filter Replacement	9-1										

Site: _____ Month: _____ **SCHEDULE SYS_C**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Notes: _____

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FSE ID #: _____

Field Service Engineer: _____ Date: _____

Site: _____ Month: _____ **SCHEDULE SYS_D**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Safety and Regulatory											
Check Cardiac Gating Cable	1-5										
Check Pneumatic Patient Alert System	1-7										
Check RF Output Power	2-6										
Check Emergency Release of Cradle and Patient Transport	3-1										
Check Patient Transport Casters, Armboard Set Screws and Bumper Strips	3-3										
Check Patient Transport Caster Locks	3-4										
Check Cradle Longitudinal Drive Clutch	3-5										
Image Quality											
Check Eddy Current Compensation	4-2										
Check Gradient Calibration: X	4-4										
Y											
Z											
Check Shim	7-3										
Check SNR	7-4										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Not Available for Patient Scans)											
Check Patient Blower & Filter	1-6										
Check Erbtec Blower Output	2-2										
Check Patient Transport Docking Alignment	3-2										
Clean Lightweight Cradle Wheels	3-7										
Check PowerTech and/or Transtector	5-4										
Check OC/IC Computer Fans and Clean Air Intake Grills	6A-1										
Check OC/IC Console Power Supply Fan	6A-3										
Check Operator Workspace Fans And Clean Air Intake Grills	6B-1										
Clean Operator Workstation Mouse & VideoCam Lens	6B-2										

Site: _____ Month: _____ **SCHEDULE SYS_D**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Set SGI System Clock	6B-3										
Check and Delete Error/Message Log/T-Test Files & Check Date of SaveInfo	7-2										
Perform Site Restoration - Check DQA Phantom, Check Alignment Lights, Remove GE Test Scans, and Check Cabinet Doors and Covers	7-9										
Check Modem	7-10										
Check battery voltage. (Need certified electrician with Arc Flash PPE.)	7-12										
Check Laser Camera Fans	8-1										
Clean Laser Camera Suction Cups	8-3										
Clean Laser Camera Transport Plate/Docking Unit	8-4										
Run Laser Camera Cleaning Film	8-5										
Replace Laser Camera Docking Switches	8-8										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Available for Patient Scans)											
Check RF Cabinet Fans and Clean Filters	2-1										
Check Gradient Cabinet Fans and Filters	4-1										
Check Fluid Level and Valve of Heat Exchanger for Gradient Coil Cooling	4-5										
Check Water Chiller for Gradient Coil Cooling	4-6										
Check Water Chiller Pump Motor Lubrication	4-7										
Check Standard PDU Fans and Filters	5-1										
Check Compact PDU Fans and Filters	5-5										
Clean OC/IC DAT Drive	6A-2										
Check System Cabinet Fans and Clean Filters	7-1										
Check Cabinet Inlet Air Temperature	7-5										
Verify PM Completion on Van Equipment (Mobiles Only)	7-8										
Review System Health Report	7-11										
TAC Filter Replacement	9-1										

Site: _____ Month: _____ **SCHEDULE SYS_D**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Notes: _____

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FSE ID #: _____

Field Service Engineer: _____ Date: _____

Site: _____ Month: _____ **SCHEDULE SYS_E**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Safety and Regulatory											
Perform Power Monitor Functional Checks	2-3 – 2-5										
Check RF Output Power	2-6										
Check Emergency Release of Cradle and Patient Transport	3-1										
Check Patient Transport Casters, Armboard Set Screws and Bumper Strips	3-3										
Image Quality											
Check Eddy Current Compensation	4-2										
Check Gradient Calibration: X	4-4										
Y											
Z											
Check Shim	7-3										
Check SNR	7-4										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Not Available for Patient Scans)											
Check Magnet Room RF Integrity with Correlated Noise	1-4										
Check Patient Blower & Filter	1-6										
Check Fluid Level and Valve of Heat Exchanger	4-5										
Check Water Chiller for Gradient Coil Cooling	4-6										
Check Pump Motor Lubrication	4-7										
Check OC/IC Computer Fans and Clean Air Intake Grills	6A-1										
Check OC/IC Console Power Supply Fan	6A-3										
Check Operator Workspace Fans And Clean Air Intake Grills	6B-1										
Set SGI System Clock	6B-3										
Check and Delete Error/Message Log/T-Test Files & Check Date of SaveInfo	7-2										

Site: _____ Month: _____ **SCHEDULE SYS_E**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Perform Site Restoration - Check DQA Phantom, Check Alignment Lights, Remove GE Test Scans, and Check Cabinet Doors and Covers	7-9										
Check Modem	7-10										
Check Laser Camera Fans	8-1										
Clean and Vacuum Laser Camera Interior	8-2										
Clean Laser Camera Suction Cups	8-3										
Clean Laser Camera Transport Plate/Docking Unit	8-4										
Run Laser Camera Cleaning Film	8-5										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Available for Patient Scans)											
Check RF Cabinet Fans and Clean Filters	2-1										
Check Gradient Cabinet Fans and Filters	4-1										
Clean OC/IC DAT Drive	6A-2										
Check System Cabinet Fans and Clean Filters	7-1										
Update Configuration File in Site Logbook	7-7										
Review System Health Report	7-11										
Clean Laser Camera Exterior	8-6										
Check Laser Camera Air Shock Pressure (Mobiles Only)	8-7										
TAC Filter Replacement	9-1										

Notes: _____

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FSE ID #: _____

Field Service Engineer: _____ Date: _____

Site: _____ Month: _____ **SCHEDULE SYS_F**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Safety and Regulatory											
Check Cardiac Gating Cable	1-5										
Check RF Output Power	2-6										
Check Emergency Release of Cradle and Patient Transport	3-1										
Check Patient Transport Casters, Armboard Set Screws and Bumper Strips	3-3										
Check Cradle Longitudinal Drive Clutch	3-5										
Image Quality											
Check Eddy Current Compensation	4-2										
Check Gradient Calibration: X	4-4										
Y											
Z											
Check Shim	7-3										
Check SNR	7-4										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Not Available for Patient Scans)											
Inspect Front Cover Cable Take Up	1-2										
Check Patient Blower & Filter	1-6										
Check Erbtec Blower Output	2-2										
Check Patient Transport Docking Alignment	3-2										
Check Patient Transport Hydraulic Filter	3-6										
Check OC/IC Computer Fans and Clean Air Intake Grills	6A-1										
Check OC/IC Console Power Supply Fan	6A-3										
Check Operator Workspace Fans And Clean Air Intake Grills	6B-1										
Set SGI System Clock	6B-3										
Check and Delete Error/Message Log/T-Test Files & Check Date of SaveInfo	7-2										

Site: _____ Month: _____ **SCHEDULE SYS_F**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Perform Site Restoration - Check DQA Phantom, Check Alignment Lights, Remove GE Test Scans, and Check Cabinet Doors and Covers	7-9										
Check Modem	7-10										
Check Laser Camera Fans	8-1										
Clean Laser Camera Suction Cups	8-3										
Clean Laser Camera Transport Plate/Docking Unit	8-4										
Run Laser Camera Cleaning Film	8-5										
Tip Seal Replacement	9-2										
Clean Inlet Screen	9-3										
Solenoid Valve Replacement	9-4										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Available for Patient Scans)											
Check RF Cabinet Fans and Clean Filters	2-1										
Check Gradient Cabinet Fans and Filters	4-1										
Check Fluid Level and Valve of Heat Exchanger for Gradient Coil Cooling	4-5										
Check Standard PDU Fans and Filters	5-1										
Check Compact PDU Fans and Filters	5-5										
Clean OC/IC DAT Drive	6A-2										
Check System Cabinet Fans and Clean Filters	7-1										
Check Cabinet Inlet Air Temperature	7-5										
Review System Health Report	7-11										
TAC Filter Replacement	9-1										

Notes: _____

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FSE ID #: _____

Field Service Engineer: _____ Date: _____

2-3 Magnet PM Schedules, Six Times/Year

Site: _____ Month: _____ **SCHEDULE MAG_A**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Safety and Regulatory											
Test Magnet Emergency Rundown Unit (ERU)	10-8										
Test GE Magnet Rundown Unit (MRU)	10-10										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Not Available for Patient Scans)											
Check and Empty Collection Bottles (GE S-I and Oxford Magnets Only)	10-12										
Record Cryostat Pressure and Flowrates (GE Magnets Only)	10-14										
Inspect Leybold System (Replace Adsorber Every 24,000 Hours) (GE Magnets Only)	10-15										
Inspect Balzers System (Replace Adsorber Every 26,000 Hours) (GE Magnets Only)	10-16										
Inspect Sumitomo System (Replace Adsorber Every 20,000 Hours)	10-17										
Inspect Oxford Water Cooled Power Supply Valve	10-19										
Check/Replace EDM Battery	10-20										
Change Desiccant Pack In Water Flowmeter	10-21										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Available for Patient Scans)											
Check Cryogen Levels (Phone Site for Info)	10-1										
Calculate Cryogen Boil-Off Rates/Record Compressor Run Times (Phone Site for Info)	10-2										
Evaluate Cryogen Delivery Schedule (If Applicable)	10-3										
Evaluate Helium Transfill Efficiency	10-4										
Verify Cryogen Meter Calibration	10-5 & 10-6										

Site: _____ Month: _____ **SCHEDULE MAG_A**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Notes: _____

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FSE ID #: _____

Field Service Engineer: _____ Date: _____

Site: _____ Month: _____ **SCHEDULE MAG_B**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Safety and Regulatory											
Inspect Cryogen Vent	10-7										
Test Magnet Emergency Rundown Unit (ERU)	10-8										
Inspect Magnet Emergency Rundown Unit (ERU)	10-9										
Test GE Magnet Rundown Unit (MRU)	10-10										
Inspect GE Magnet Rundown Unit (MRU)	10-11										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Not Available for Patient Scans)											
Check and Empty Collection Bottles (GE S-I and Oxford Magnets Only)	10-12										
Inspect CTI System (Oxford Mobile Magnets Only)	10-13										
Record Cryostat Pressure and Flowrates (GE Magnets Only)	10-14										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Available for Patient Scans)											
Check Cryogen Levels (Phone Site for Info)	10-1										
Calculate Cryogen Boil-Off Rates/Record Compressor Run Times (Phone Site for Info)	10-2										
Evaluate Cryogen Delivery Schedule (If Applicable)	10-3										
Evaluate Helium Transfill Efficiency	10-4										

Notes: _____

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FSE ID #: _____

Field Service Engineer: _____ Date: _____

Site: _____ Month: _____ **SCHEDULE MAG_C**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Safety and Regulatory											
Test Magnet Emergency Rundown Unit (ERU)	10-8										
Test GE Magnet Rundown Unit (MRU)	10-10										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Not Available for Patient Scans)											
Check and Empty Collection Bottles (GE S-I and Oxford Magnets Only)	10-12										
Record Cryostat Pressure and Flowrates (GE Magnets Only)	10-14										
Inspect Leybold System (Replace Adsorber Every 24,000 Hours) (GE Magnets Only)	10-15										
Inspect Balzers System (Replace Adsorber Every 26,000 Hours) (GE Magnets Only)	10-16										
Inspect Sumitomo System (Replace Adsorber Every 20,000 Hours)	10-17										
Perform Oxford Mobile Specific Inspections	10-18										
Change Desiccant Pack In Water Flowmeter	10-21										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Available for Patient Scans)											
Check Cryogen Levels (Phone Site for Info)	10-1										
Calculate Cryogen Boil-Off Rates/Record Compressor Run Times (Phone Site for Info)	10-2										
Evaluate Cryogen Delivery Schedule (If Applicable)	10-3										
Evaluate Helium Transfill Efficiency	10-4										

Notes: _____

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FSE ID #: _____

Field Service Engineer: _____ Date: _____

Site: _____ Month: _____ **SCHEDULE MAG_D**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Safety and Regulatory											
Test Magnet Emergency Rundown Unit (ERU)	10-8										
Test GE Magnet Rundown Unit (MRU)	10-10										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Not Available for Patient Scans)											
Check and Empty Collection Bottles (GE S-I and Oxford Magnets Only)	10-12										
Record Cryostat Pressure and Flowrates (GE Magnets Only)	10-14										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Available for Patient Scans)											
Check Cryogen Levels (Phone Site for Info)	10-1										
Calculate Cryogen Boil-Off Rates/Record Compressor Run Times (Phone Site for Info)	10-2										
Evaluate Cryogen Delivery Schedule (If Applicable)	10-3										
Evaluate Helium Transfill Efficiency	10-4										

Notes: _____

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FSE ID #: _____

Field Service Engineer: _____ Date: _____

Site: _____ Month: _____ **SCHEDULE MAG_E**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Safety and Regulatory											
Test Magnet Emergency Rundown Unit (ERU)	10-8										
Test GE Magnet Rundown Unit (MRU)	10-10										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Not Available for Patient Scans)											
Check and Empty Collection Bottles (GE S-I and Oxford Magnets Only)	10-12										
Inspect CTI System (Oxford Mobile Magnets Only)	10-13										
Record Cryostat Pressure and Flowrates (GE Magnets Only)	10-14										
Inspect Leybold System (Replace Adsorber Every 24,000 Hours) (GE Magnets Only)	10-15										
Inspect Balzers System (Replace Adsorber Every 26,000 Hours) (GE Magnets Only)	10-16										
Inspect Sumitomo System (Replace Adsorber Every 20,000 Hours)	10-17										
Change Desiccant Pack In Water Flowmeter	10-21										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Available for Patient Scans)											
Check Cryogen Levels (Phone Site for Info)	10-1										
Calculate Cryogen Boil-Off Rates/Record Compressor Run Times (Phone Site for Info)	10-2										
Evaluate Cryogen Delivery Schedule (If Applicable)	10-3										
Evaluate Helium Transfill Efficiency	10-4										

Notes: _____

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FSE ID #: _____

Field Service Engineer: _____ Date: _____

Site: _____ Month: _____ **SCHEDULE MAG_F**

System ID#: _____ Dispatch/Job #: _____

Field Service Engineer: _____

Procedure	Sec. No.	Tool Serial #	Pass	Cleaned	Adjusted	Replaced	Repaired	Needs Adjustment	Needs replacement	Needs Repair	Failed
Safety and Regulatory											
Test Magnet Emergency Rundown Unit (ERU)	10-8										
Test GE Magnet Rundown Unit (MRU)	10-10										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Not Available for Patient Scans)											
Check and Empty Collection Bottles (GE S-I and Oxford Magnets Only)	10-12										
Record Cryostat Pressure and Flowrates (GE Magnets Only)	10-14										
Perform Oxford Mobile Specific Inspections	10-18										
Other (Signa Horizon 5.x, 8.x, 9.x & 10.x Available for Patient Scans)											
Check Cryogen Levels (Phone Site for Info)	10-1										
Calculate Cryogen Boil-Off Rates/Record Compressor Run Times (Phone Site for Info)	10-2										
Evaluate Cryogen Delivery Schedule (If Applicable)	10-3										
Evaluate Helium Transfill Efficiency	10-4										

Notes: _____

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FSE ID #: _____

Field Service Engineer: _____ Date: _____

Section 3 – Site Log Book

Each site should have a log book to help maintain a central filing system for PM Schedule Reports and Data Sheets completed for the system. Certain historical information (such as magnet superconducting shim data) should always be kept in the log book. The following is a list of items that should be kept in the log book:

- PM Schedule Reports
- System Log:
  - Written log of actions taken
  - Configuration file Data Sheets
- System Performance Data:

  System and Subsystem Data Sheets
- Magnet and Cryogens Data:
  - Cryogen Log
  - Shield Cooler Log
  - Magnet and Cryogen Data Sheets

Section 4 – Tools and Test Equipment

4-1 Signa Horizon 5.x, 8.x, 9.x & 10.x Tools & Test Equipment

4-1-1 Standard Tools

Table 4-1 lists standard tools and test equipment needed to perform Signa PM Horizon 5.x, 8.x, 9.x & 10.x procedures. Items shown in the table should always be kept on site.

TABLE 4-1
SIGNA HORIZON 5.x, 8.x, 9.x, & 10.x STANDARD TOOLS AND TEST EQUIPMENT

ITEM	PART NUMBER	COMMENTS
SPT Phantom Cart Kit For 1.5T & 1.0T	2133388 (1.5T & 1.0T)	Shipped with system
Daily Quality Assurance (DQA III) Phantom	2131027-2	Shipped with system
Body TLT Phantom (See Note) *	46-287903G1	Shipped with system
Head TLT Phantom (See Note) *	46-287900G1	Shipped with system
Universal Phantom HolderNiCl, 100mm Sphere Phantoms *	46-328383P1 46-317586G1	Shipped with system
Non–Magnetic Tools Kit	46-282239G1 (Metric) 46-282240G1 (English)	Obtain from GPO
* These phantoms are shipped with each system, and they belong to the customer.		

4-1-2 Special Tools

Certain Signa PM Horizon 5.x, 8.x, 9.x & 10.x procedures require special tools and test equipment that should be obtained before the procedure is started. Table 4-2 shows special tools and test equipment needed and the procedures they are used with.

TABLE 4-2
SIGNA HORIZON 5.x, 8.x, 9.x, & 10.x SPECIAL TOOLS AND TEST EQUIPMENT

PROCEDURE NO.	TOOL/TEST EQUIPMENT	PART NO.
1-3 & 1-4	Oxygen Monitor Calibration Kit or Newer Oxygen Monitor Calibration Kit (Aerosol Can) Aerosol Calibration Adapter	46-317271G1 2173689 2173691
1-6	Microguard Meter (MG-5) with Adapters for Cardiac Leads or Dale 600 or 600E Safety Analyzer	46-194427P16 46-328406G1
1-12 & 8-6	Thermometer of Temperature Probe	-
2-3, 2-4 & 2-5	RF Measurement Kit Power Remote Monitoring Kit Magnetic Scope Shield RF Cable Test Kit 50 Ohm, 200 Watt, 30 dB Attenuator RF Wattmeter (with elements) 100mHz Scope Tektronix 468 or equivalent	46-317724G1/G2 46-320557G1 46-317725G10 46-255816G1 46-255837P10 46-265498G1 46-183029P61 P64
3-3 & 3-4	Torque Wrench Socket Driver 19mm Socket (Lightweight Patient Transport Only) Non–Ferrous Straightedge (such as an Aluminum Cabinet Leg)	46-194427P255 46-307811P1--
3-6	Longitudinal Drive Force Gauge	46-307500P1
6-5, 7-2 & 10-2	Small Vacuum Cleaner	-
8-5	Small Sample Test (SST) Kit or Universal SST Kit	46-287357G1/G2 46-320383G1/G2

4-2 Magnet Tools and Test Equipment

Table 4-3 lists tools and test equipment required for Magnet and Cryogen procedures

TABLE 4-3
MAGNET TOOLS AND TEST EQUIPMENT

TOOL/TEST EQUIPMENT	PART NO.	TOOL/TEST EQUIPMENT	PART NO.
Standard Set of Hand Tools	–	Feeler Gauge	–
Non–Magnetic Metric Tool Kit	46-282239G1	Aeroquip Fitting Wrenches (supplied with compressor)	–
Non–Magnetic English Tool Kit	46-282240G1	Two–Stage Regulator (0-3000/0-400 psig)	46-294009P1
Digital Voltmeter (DVM)	–	Charging Line	46-271114G1
Ohmmeter	–	Aeroquip Bleed Fittings (supplied with compressor)	–
Ammeter	–	Balzers Oil Charging Hose with Small Aeroquip Fitting	–
Two Plexiglass Disks (for covering helium fill port and current probe port)	–	Balzers Repair Kit	46-306830G3
Flashlight	–	Helium Flow Gauge Assembly	46-265387G1
Heat Gun (14 amp, 500°F)	–	Cryogen Safety Kit (gloves, face shield, glasses)	46-271137G1
Copper Tube	–	Non–Magnetic Helium Tank Regulator and Flex Hose	46-306734G1
Gas Line	–	Non–Magnetic Helium Cylinder Cart	46-306717G1
Cylinder of Helium Gas (certified pure 99.9995%)	–	Magnet Service Tool Power Supply	46-260703G1
Plexiglass (with a hole just large enough for a tube to pass through)	–	Shim Service Tool Power Supply	46-260777G2
Thermometer (30 - 120°F range)	–	Coldhead/Compressor Installation/Maintenance Kit	46-281088G3
Lakeshore Diode Temperature Current Source Meter	46-317543G1	Helium Tank	46-306734G1
Cryogenic Thermometer Kit	46-265269G1	Pump Kit	46-294047G1
Water Flow Meter Kit	46-294052G1	RUO Sensor Kit	2171620
Water Flow Gauge	–	Helium Calibration Box	46-265286G2

Section 5 – Safety

5-1 Magnetic Field Considerations

The magnetic field strength used in MR is extremely strong. This field is three-dimensional; therefore, magnetic field precautions must be taken on the floors above and below the magnet as well as the surrounding space on the same level.

The following precautions MUST be adhered to prevent danger to persons and equipment:

- Post WARNING signs outside the 5 gauss zone alerting personnel with cardiac pacemakers, neurostimulators, and other biostimulation devices of the affect of the magnetic field on these devices.
- Post WARNING signs at the termination point of the magnet cryogenic vent alerting personnel to the sudden discharge of freezing gases and small objects.
- Post SECURITY signs outside the exam room alerting personnel of high magnetic field and not to bring ferromagnetic objects into the exam room.
- Do not bring ferromagnetic objects (e.g. tools, pens, tape measures, steel-toe shoes, vacuum pumps, laptop, etc.) into the exam room. Large metal objects must not be brought near the outside walls of the exam room. Refer to the appropriate Pre-Installation Manual, Section 2, room layouts, for equipment proximity limits.
- Non-digital watches and magnetic-coded credit cards can be destroyed if taken near the magnet.
- Magnetic tapes can be erased, recording heads magnetized, and camera shutters ruined by strong magnetic fields.
- Only non-magnetic cylinders and dewars must be used when transferring cryogens into an energized magnet.

5-2 Cryogens

Liquid helium and liquid nitrogen are odorless, colorless, and non-toxic. They are at extremely low temperatures (liquid helium = 4.2K (-452°F) and liquid nitrogen = 77.6K (-320°F)) and will cause severe burns if the liquids come in contact with skin. It is important to wear protective clothing and gloves which are non-absorbent so that any spillage will run off and not be trapped against the skin.

Contact of liquid cryogens or gas with the eyes can cause severe frostbite. Protect eyes with safety goggles or a face shield.

Gaseous helium and nitrogen displace air without warning and can cause rapid asphyxiation and even death if there is not sufficient ventilation.

- Always MAKE SURE the oxygen monitor (for systems so equipped) is functioning properly prior to transferring any cryogens.
- If the alarm mode of the oxygen monitor is activated, immediately determine the cause.
- If ventilation is a problem, CORRECT THE SITUATION. Make sure the oxygen monitor is reading a safe level before entering the affected area and continuing with service procedures.
- Always store gas cylinders and cryogen dewars in a well-ventilated area.

Rooms in which cryogen liquids are stored and handled must be designated non-smoking areas. The extreme low temperatures of liquid helium and nitrogen cause oxygen from the air to liquify on cold surfaces (e.g. on transfer tubes) and increase its local concentration. There is a potential fire danger if grease or oil come in contact with these surfaces since they are combustible substances.

If you are in the exam room and a quench occurs follow these basic rules:

- Remain calm; do not panic.
- Turn on the exhaust fan for the scan room (if not automatically turned on by the oxygen monitor).
- If door is being held shut by pressure, open; if necessary, break the window to relieve pressure in the exam room.
- Open the scan room door, prop it open, and exit the room immediately.
- If the door still cannot be opened, exit through the window.
- If all else fails, stay near the floor. This is where the oxygen is located.
- Do **not** re-enter the exam room until the oxygen monitor indicates a safe level.

5-3 Oxygen Monitor

Note: Beginning March 1, 1994, the Oxygen Monitor is no longer delivered with any GE MR Systems. Oxygen Monitors will still be available as an accessory from GE Medical Systems through Diagnostics Imaging Accessories (DIA).

The oxygen monitor sensor element should be replaced every six to twelve months. They are shipped in transparent air-tight packages, and should be inspected upon receipt. The cells contain a strong caustic potassium solution. If the cell membrane is punctured, do not open the package.

5-4 High Voltages

The plate voltage used by high power vacuum tube amplifiers is the most dangerous hazard found in the RF Subsystem. Lethal potentials are present in the amplifiers and their power supplies during operation.

Interlock switches are provided on the covers of power supply and amplifier decks to minimize the danger of electrocution, however, they should never be taken for granted.

All circuit breakers on the rear of the RF Cabinet must be OFF and tagged and cabinet power cords must be unplugged before opening any modules containing high voltage circuitry. Allow at least 10 minutes for filter capacitors to discharge before removing any module covers for service.

Always assume that a circuit is “hot” until proven otherwise. High voltage circuitry should be discharged by shorting to ground and across terminals of floating power supplies before being touched. Do not rely on bleeder resistors to discharge capacitors. While they will eventually reduce voltages to safe levels, bleeder circuits have time constants as long as several minutes to limit heat dissipation during normal operation.

5-5 RF Fields

General Electric Company policy specifically prohibits service personnel from using any part of their body for a phantom or dummy load while testing the power amplifier or related components in the RF Subsystem.

This restriction protects the service person from inadvertent overexposure to heating effects of high energy RF fields which could occur while servicing with certain safety features bypassed or otherwise disabled. Exercise good common sense about continuous normal scanning over long periods of time.

5-6 OSHA Lockout/Tagout Requirements

5-6-1 Scope

This standard covers the servicing and maintenance of machines and equipment in which the unexpected energization or start up of the machine or equipment could cause injury to employee.

5-6-2 Application

This standard applies to the control of energy during servicing and/or maintenance of machines or equipment.

5-6-3 Exceptions

Minor adjustments and other minor service activities, which take place during normal operation, are not covered by this standard if they are routine, repetitive, and integral to the use of the equipment for operation, provided the work is performed using alternative measures which provide effective protection.

This standard does not apply to work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or start up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing or maintenance.

5-6-4 Purpose

Require employers to establish a program and utilize procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization start up or release of stored energy in order to prevent injury to employee.

5-6-5 General Application

If an energy isolating device is not capable of being locked out, a tagout device shall be utilized. The tagout device shall be attached at the same location that the lockout device would have been attached.

5-6-6 Definitions

- Energy Isolating Device - Mechanical device that physically prevents the transmission or release of energy i.e.; manually operated electrical circuit breaker or disconnect switch.
- Energy Source - Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
- Lockout - Placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed. It is also necessary to attach a tagout device to the lockout device.
- Lockout Device - A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position.
- Tagout - Placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.
- Tagout Device - A prominent warning device, such a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.
- Lockout/Tagout - If an energy isolating device is not capable of being locked out, the employer's energy control program shall utilize a tagout system.

5-6-7 Energy Control Procedure

Procedures shall be developed, documented, and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this section.

The procedures shall clearly and specifically outline the scope, purpose, authorization, rules and techniques to be utilized for the control of hazardous energy, and the means to enforce compliance.

5-6-8 Application of Control

The established procedure for the application of energy control shall cover the following:

1. Preparation for shutdown.
2. Machine or equipment shutdown.
3. Machine or equipment isolation.
4. Lockout or tagout devise application.
5. Verification of isolation.

Basic Rule - All equipment shall be locked out or tagged to protect against accidental or inadvertent operation when such operation could cause injury to personnel.

5-6-9 MR Lockout of Signa Horizon 5.x, 8.x, 9.x & 10.x Systems

Most Signa Horizon 5.x, 8.x, 9.x & 10.x Subsystems receive power from the Standard, Compact, or Teal Power Distribution Unit (PDU) through a dedicated bank of circuit breakers located behind a lockable door. Therefore, to electrically isolate a cabinet, Field Service Engineers need only set the appropriate circuit breaker in the Standard, Compact, or Teal PDU to OFF and lock the door.

Note: Some Signa Horizon 5.x, 8.x, 9.x & 10.x, 1.5T Upgrades use Standard PDUs. Standard PDUs are Lockout compatible due to the upgrade and can be locked out and tagged.

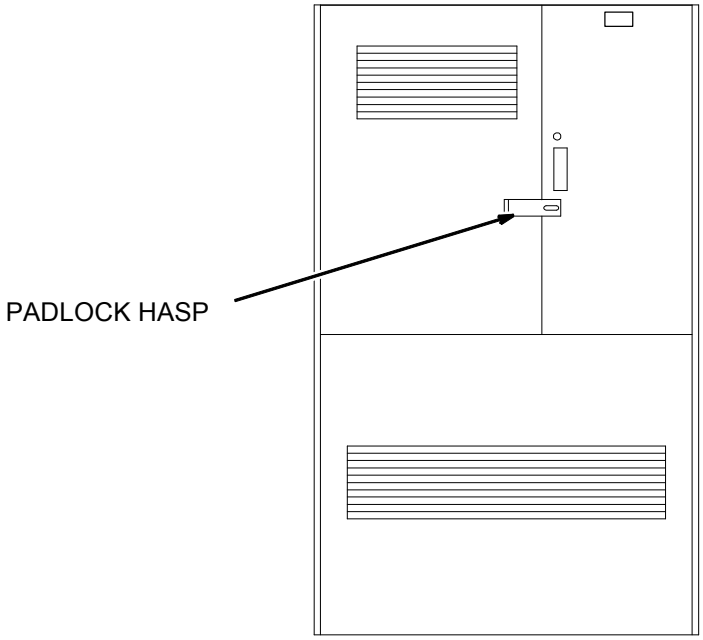
The Mains Disconnect Control supplies power to the PDU. If power to PDU must be turned off, the Mains Disconnect Control must be shut down and locked out.

WARNING!

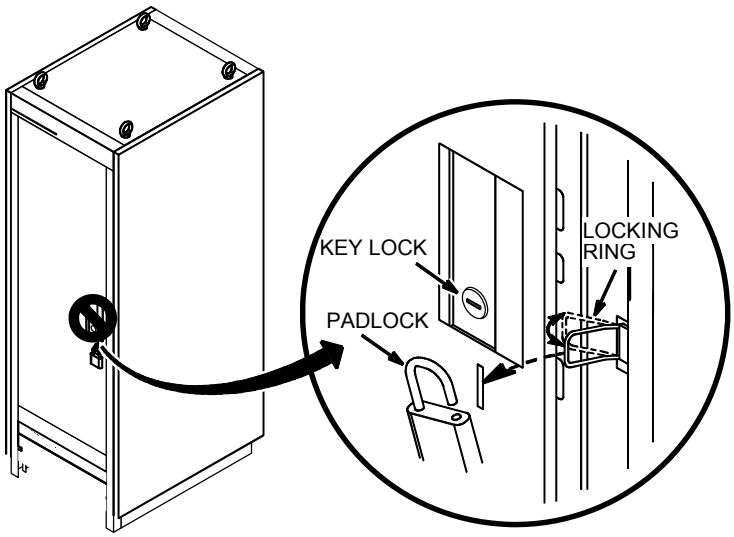
DO NOT USE THE KEY LOCK ON THE STANDARD OR COMPACT PDU DOOR. THE LOCK IS A COMMON LOCK WITH MULTIPLE KEYS AVAILABLE AND DEFEATS THE OSHA REQUIREMENT OF ONE LOCK-ONE KEY.

Perform the following procedure for locking the Standard (See Illustration 5-1), Compact PDU (See Illustration 5-2), or Teal (RF/PDU) (See Illustration 6-3):

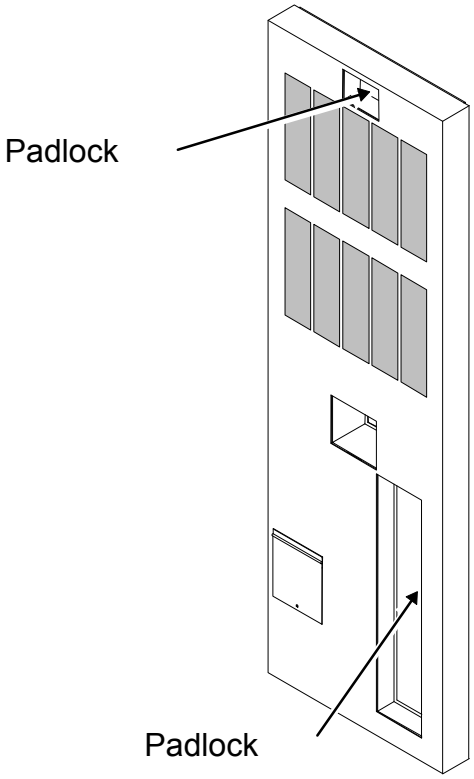
1. Open front door of Standard, Compact PDU, or RF/PDU and turn OFF appropriate circuit breaker.
2. Rotate locking ring outwards (Compact PDU).
3. Close door while guiding locking ring through door slot below key lock (Compact PDU).
4. Use a padlock through the locking ring (Compact) or hasp (Standard and RF/PDU) on outside of door to lock PDU Cabinet. On the RF/PDU cabinet, use a padlock through the hasp on the plexiglass door to lock access to the circuit breakers.
5. Tag the padlock(s).



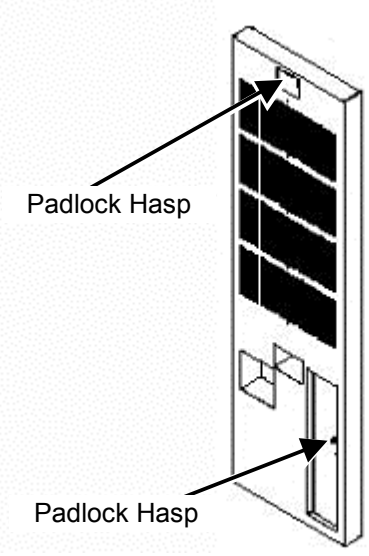
STANDARD PDU
ILLUSTRATION 5-1



COMPACT PDU
ILLUSTRATION 5-2



TEAL RF/PDU CABINET FRONT COVER
ILLUSTRATION 5-3



GRADIENT/PDU CABINET FRONT COVER
ILLUSTRATION 5-4

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