

GE Healthcare

T2100 Treadmill Service Manual

2021403-120 Revision F



T2100 Treadmill
English
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Publication Information

The information in this manual applies only to T2100 Treadmill product codes SK2 and SM9. It does not apply to earlier product versions. Due to continuing product innovation, specifications in this manual are subject to change without notice.

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The document part number and revision are at the bottom of each page. The revision identifies the document's update level. The revision history of this document is summarized in the following table.

Revision	Date	Comments
A	21 November 2012	Initial release of this manual.
B	21 November 2012	Update Item type in MR94954
C	24 April 2014	Updates to Chapter 8 <i>Parts List</i> , Chapter 1, <i>Introduction</i> , and Appendix A, <i>Technical Specifications</i> to comply with RoHS requirements and height changes.
D	17 July 2014	Updates to Chapter 8 <i>Parts List</i> with additional part numbers to comply with RoHS.
E	12 April 2016	The following was updated: <ul style="list-style-type: none">• Part list of AC Power Cords• Compliant Cables table with new power cables• Part number for the Commutation Firmware update• Commutation error was added to Troubleshooting with directions to replace the drive motor.• Updated FRU descriptions.
F	29 November 2016	Updated the handrails.

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To access Original Equipment Manufacturer (OEM) manuals, go to the device manufacturer's Web site.

Service Manual Language Information

WARNING (EN)	This service manual is available in English only. <ul style="list-style-type: none">• If a customer's service provider requires a language other than English, it is the customer's responsibility to provide translation services.• Do not attempt to service the equipment unless this service manual has been consulted and is understood.• Failure to heed this warning may result in injury to the service provider, operator, or patient, from electric shock, mechanical or other hazards.
ПРЕДУПРЕЖДЕНИЕ (BG)	Това упътване за работа е налично само на английски език. <ul style="list-style-type: none">• Ако доставчикът на услугата на клиента изиска друг език, задължение на клиента е да осигури превод.• Не използвайте оборудването, преди да сте се консултирали и разбрали упътването за работа.• Неспазването на това предупреждение може да доведе до нараняване на доставчика на услугата, оператора или пациент в резултат на токов удар или механична или друга опасност.

Service Manual Language Information (cont'd.)

<p>警告 (ZH-CN)</p>	<p>本维修手册仅提供英文版本。</p> <ul style="list-style-type: none"> • 如果维修服务提供商需要非英文版本，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人员，操作员或患者造成触电、机械伤害或其他形式的伤害。
<p>警告 (ZH-TW)</p>	<p>本維修手冊只提供英文版。</p> <ul style="list-style-type: none"> • 如果客戶的維修人員有英語以外的其他語言版本需求，則由該客戶負責提供翻譯服務。 • 除非您已詳閱本維修手冊並了解其內容，否則切勿嘗試對本設備進行維修。 • 不重視本警告可能導致維修人員、操作人員或病患因電擊、機械因素或其他因素而受到傷害。
<p>UPOZORENJE (HR)</p>	<p>Ove upute za servisiranje dostupne su samo na engleskom jeziku.</p> <ul style="list-style-type: none"> • Ukoliko korisnički servis zahtijeva neki drugi jezik, korisnikova je odgovornost osigurati odgovarajući prijevod. • Nemojte pokušavati servisirati opremu ukoliko niste konzultirali i razumjeli ove upute. • Nepoštivanje ovog upozorenja može rezultirati ozljedama servisnog osoblja, korisnika ili pacijenta prouzročeni električnim udarom te mehaničkim ili nekim drugim opasnostima.
<p>VAROVÁNÍ (CS)</p>	<p>Tento provozní návod existuje pouze v anglickém jazyce.</p> <ul style="list-style-type: none"> • V případě, že externí služba zákazníkům potřebuje návod v jiném jazyce, je zajištění překladu do odpovídajícího jazyka úkolem zákazníka. • Nesnažte se o údržbu tohoto zařízení, aniž byste si přečetli tento provozní návod a pochopili jeho obsah. • V případě nedodržování této varování může dojít k poranění pracovníka prodejního servisu, obslužného personálu nebo pacientů vlivem elektrického proudu, respektive vlivem mechanických či jiných rizik.
<p>ADVARSEL (DA)</p>	<p>Denne servicemanual findes kun på engelsk.</p> <ul style="list-style-type: none"> • Hvis en kundes tekniker har brug for et andet sprog end engelsk, er det kundens ansvar at sørge for oversættelse. • Forsøg ikke at servicere udstyret medmindre denne servicemanual har været konsulteret og er forstået. • Manglende overholdelse af denne advarsel kan medføre skade på grund af elektrisk, mekanisk eller anden fare for tekniker, operatøren eller patienten.
<p>WAARSCHUWING (NL)</p>	<p>Deze service manual is alleen in het Engels verkrijgbaar.</p> <ul style="list-style-type: none"> • Indien het onderhoudspersoneel een andere taal nodig heeft, dan is de klant verantwoordelijk voor de vertaling ervan. • Probeer de apparatuur niet te onderhouden voordat deze service manual geraadpleegd en begrepen is. • Indien deze waarschuwing niet wordt opgevolgd, zou het onderhoudspersoneel, de gebruiker of een patiënt gewond kunnen raken als gevolg van een elektrische schok, mechanische of andere gevaren.

Service Manual Language Information (cont'd.)

<p>HOIATUS (ET)</p>	<p>Käesolev teenindusjuhend on saadaval ainult inglise keeles.</p> <ul style="list-style-type: none"> • Kui klienditeeninduse osutaja nõuab juhendit inglise keelest erinevas keeles, vastutab klient tõlketeenuse osutamise eest. • Ärge üritage seadmeid teenindada enne eelnevalt käesoleva teenindusjuhendiga tutvumist ja sellest aru saamist. • Käesoleva hoiatuse eiramine võib põhjustada teenuseosutaja, operaatori või patsiendi vigastamist elektrilöögi, mehaanilise või muu ohu tagajärjel.
<p>VAROITUS (FI)</p>	<p>Tämä huolto-ohje on saatavilla vain englanniksi.</p> <ul style="list-style-type: none"> • Jos asiakkaan huoltohenkilöstö vaatii muuta kuin englanninkielistä materiaalia, tarvittavan käännöksen hankkiminen on asiakkaan vastuulla. • Älä yritä korjata laitteistoa ennen kuin olet varmasti lukenut ja ymmärtänyt tämän huolto-ohjeen. • Mikäli tätä varoitusta ei noudateta, seurauksena voi olla huoltohenkilöstön, laitteiston käyttäjän tai potilaan vahingoittuminen sähköiskun, mekaanisen vian tai muun vaaratilanteen vuoksi.
<p>CẢNH BÁO (VI)</p>	<p>Tài Liệu Hướng Dẫn Sửa Chữa chỉ có bản tiếng Anh.</p> <ul style="list-style-type: none"> • Nếu các đơn vị cung cấp dịch vụ cho khách hàng yêu cầu một ngôn ngữ nào khác tiếng Anh, thì khách hàng sẽ có trách nhiệm cung cấp các dịch vụ dịch thuật. • Không được sửa chữa thiết bị trừ khi đã tham khảo và hiểu Tài liệu Hướng dẫn Sửa chữa. • Không tuân thủ những cảnh báo này có thể dẫn đến các tổn thương cho người thực hiện sửa chữa, người vận hành hay bệnh nhân, do sốc điện, các rủi ro về cơ khí hay các rủi ro khác.
<p>WARNUNG (DE)</p>	<p>Diese Serviceanleitung ist nur in englischer Sprache verfügbar.</p> <ul style="list-style-type: none"> • Falls der Kundendienst eine andere Sprache benötigt, muss er für eine entsprechende Übersetzung sorgen. • Keine Wartung durchführen, ohne diese Serviceanleitung gelesen und verstanden zu haben. • Bei Zuwiderhandlung kann es zu Verletzungen des Kundendiensttechnikers, des Anwenders oder des Patienten durch Stromschläge, mechanische oder sonstige Gefahren kommen.
<p>ΠΡΟΕΙΔΟΠΟΙΗΣΗ (EL)</p>	<p>Το παρόν εγχειρίδιο σέρβις διατίθεται στα αγγλικά μόνο.</p> <ul style="list-style-type: none"> • Εάν το άτομο παροχής σέρβις ενός πελάτη απαιτεί το παρόν εγχειρίδιο σε γλώσσα εκτός των αγγλικών, αποτελεί ευθύνη του πελάτη να παρέχει υπηρεσίες μετάφρασης. • Μην επιχειρήσετε την εκτέλεση εργασιών σέρβις στον εξοπλισμό εκτός εάν έχετε συμβουλευτεί και έχετε κατανοήσει το παρόν εγχειρίδιο σέρβις. • Εάν δεν λάβετε υπόψη την προειδοποίηση αυτή, ενδέχεται να προκληθεί τραυματισμός στο άτομο παροχής σέρβις, στο χειριστή ή στον ασθενή από ηλεκτροπληξία, μηχανικούς ή άλλους κινδύνους.

Service Manual Language Information (cont'd.)

<p>FIGVELMEZTETÉS (HU)</p>	<p>Ez a szerviz kézikönyv kizárólag angol nyelven érhető el.</p> <ul style="list-style-type: none"> • Ha a vevő szerviz ellátója angoltól eltérő nyelvre tart igényt, akkor a vevő felelőssége a fordítás elkészítése. • Ne próbálja elkezdni használni a berendezést, amíg a szerviz kézikönyvben leírtakat nem értelmezték és értették meg. • Ezen figyelmeztetés figyelmen kívül hagyása a szerviz ellátó, a működtető vagy a páciens áramütés, mechanikai vagy egyéb veszélyhelyzet miatti sérülését eredményezheti.
<p>ADVÖRUN (IS)</p>	<p>Þessi þjónustuhandbók er eingöngu fánleg á ensku.</p> <ul style="list-style-type: none"> • Ef að þjónustuveitandi viðskiptamanns þarfnast annars tungumáls en ensku, er það skylda viðskiptamanns að skaffa tungumálþjónustu. • Reynið ekki að afgreiða tækið nema þessi þjónustuhandbók hefur verið skoðuð og skilin. • Brot á að sinna þessari aðvörun getur leitt til meiðsla á þjónustuveitanda, stjórnanda eða sjúklingi frá raflosti, vélrænum eða öðrum áhættum.
<p>PERINGATAN (ID)</p>	<p>Manual servis ini hanya tersedia dalam bahasa Inggris.</p> <ul style="list-style-type: none"> • Jika penyedia jasa servis pelanggan memerlukan bahasa lain selain dari Bahasa Inggris, merupakan tanggung jawab dari penyedia jasa servis tersebut untuk menyediakan terjemahannya. • Jangan mencoba melakukan servis terhadap perlengkapan kecuali telah membaca dan memahami manual servis ini. • Mengabaikan peringatan ini bisa mengakibatkan cedera pada penyedia servis, operator, atau pasien, karena terkena kejutan listrik, bahaya mekanis atau bahaya lainnya.
<p>AVVERTENZA (IT)</p>	<p>Il presente manuale di manutenzione è disponibile soltanto in Inglese.</p> <ul style="list-style-type: none"> • Se un addetto alla manutenzione richiede il manuale in una lingua diversa, il cliente è tenuto a provvedere direttamente alla traduzione. • Si proceda alla manutenzione dell'apparecchiatura solo dopo aver consultato il presente manuale ed averne compreso il contenuto. • Il non rispetto 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.
<p>警告 (JA)</p>	<p>このサービスマニュアルは英語版しかありません。</p> <ul style="list-style-type: none"> • サービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。 • このサービスマニュアルを熟読し、十分に理解をした上で装置のサービスを行ってください。 • 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が、感電や機械的又はその他の危険により負傷する可能性があります。
<p>경고 (KO)</p>	<p>본 서비스 지침서는 영어로만 이용하실 수 있습니다.</p> <ul style="list-style-type: none"> • 고객의 서비스 제공자가 영어 이외의 언어를 요구할 경우, 번역 서비스를 제공하는 것은 고객의 책임입니다. • 본 서비스 지침서를 참고했고 이해하지 않는 한은 해당 장비를 수리하려고 시도하지 마십시오. • 이 경고에 유의하지 않으면 전기 쇼크, 기계상의 혹은 다른 위험으로부터 서비스 제공자, 운영자 혹은 환자에게 위해를 가할 수 있습니다.

Service Manual Language Information (cont'd.)

<p>ECKEPTY (KK)</p>	<p>Бұл қызмет көрсету бойынша нұсқаулығы тек ағылшын тілінде қолжетімді.</p> <ul style="list-style-type: none"> • Тұтынушының қызмет провайдері ағылшын тілінен басқа тілдегі нұсқаны талап етсе, аудару бойынша қызметтерімен қамтамасыз ету тұтынушы жауапкершілігінде болуы тиіс. • Бұл қызмет көрсету бойынша нұсқаулығын назарға алып, түсінбегенше, жабдыққа қызмет көрсетуден бас тартыңыз. • Бұл ескертуді елемей қызмет провайдері, оператор немесе емделушінің электр шоғынан, механикалық немесе басқа қауіптер нәтижесінде жарақат алуына әкелуі мүмкін.
<p>BRĪDINĀJUMS (LV)</p>	<p>Šī apkalpotāju rokasgrāmata ir pieejama tikai angļu valodā.</p> <ul style="list-style-type: none"> • Ja apkalpošanas sniedzējam nepieciešama informācija citā, nevis angļu, valodā, klienta pienākums ir nodrošināt tās tulkošanu. • Neveiciet aprīkojuma apkopi, neizlasot un nesaprotot apkalpotāju rokasgrāmatu. • Šī brīdinājuma neievērošana var radīt elektriskās strāvas trieciena, mehānisku vai citu risku izraisītu traumu apkopes sniedzējam, operatoram vai pacientam.
<p>ĮSPĖJIMAS (LT)</p>	<p>Šis eksploatavimo vadovas yra prieinamas tik anglų kalba.</p> <ul style="list-style-type: none"> • Jei kliento paslaugų tiekėjas reikalauja vadovo kita kalba - ne anglų, numatyti vertimo paslaugas yra kliento atsakomybė. • Nemėginkite atlikti įrangos techninės priežiūros, nebent atsižvelgėte į šį eksploatavimo vadovą ir jį supratote. • Jei neatkreipsite dėmesio į šį perspėjimą, galimi sužalojimai dėl elektros šoko, mechaninių ar kitų paslaugų tiekėjui, operatoriui ar pacientui.
<p>ADVARSEL (NO)</p>	<p>Denne servicehåndboken finnes bare på engelsk.</p> <ul style="list-style-type: none"> • 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.
<p>OSTRZEŻENIE (PL)</p>	<p>Niniejszy podręcznik serwisowy dostępny jest jedynie w języku angielskim.</p> <ul style="list-style-type: none"> • Jeśli dostawca usług klienta wymaga języka innego niż angielski, zapewnienie usługi tłumaczenia jest obowiązkiem klienta. • Nie należy serwisować wyposażenia bez zapoznania się i zrozumienia niniejszego podręcznika serwisowego. • Niezastosowanie się do tego ostrzeżenia może spowodować urazy dostawcy usług, operatora lub pacjenta w wyniku porażenia elektrycznego, zagrożenia mechanicznego bądź innego.
<p>AVISO (PT-BR)</p>	<p>Este manual de assistência técnica só se encontra disponível em inglês.</p> <ul style="list-style-type: none"> • Se o serviço de assistência técnica do cliente não for GE, e precisar de outro idioma, será da responsabilidade do cliente fornecer os serviços de tradução. • Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica. • O não cumprimento deste aviso pode por em perigo a segurança do técnico, operador ou paciente devido a choques elétricos, mecânicos ou outros.

Service Manual Language Information (cont'd.)

<p>AVISO (PT-PT)</p>	<p>Este manual técnico só se encontra disponível em inglês.</p> <ul style="list-style-type: none"> • Se a assistência técnica do cliente solicitar estes manuais noutra idioma, é da responsabilidade do cliente fornecer os serviços de tradução. • Não tente reparar o equipamento sem ter consultado e compreendido este manual técnico. • O não cumprimento deste aviso pode provocar lesões ao técnico, ao utilizador ou ao paciente devido a choques eléctricos, mecânicos ou outros.
<p>AVERTISMENT (RO)</p>	<p>Acest manual de service este disponibil numai în limba engleză.</p> <ul style="list-style-type: none"> • Dacă un furnizor de servicii pentru clienți necesită o altă limbă decât cea engleză, este de datoria clientului să furnizeze o traducere. • Nu încercați să reparați echipamentul decât ulterior consultării și înțelegerii acestui manual de service. • Ignorarea acestui avertisment ar putea duce la rănirea depanatorului, operatorului sau pacientului în urma pericolelor de electrocutare, mecanice sau de altă natură.
<p>ПРЕДУПРЕЖДЕНИЕ (RU)</p>	<p>Настоящее руководство по обслуживанию предлагается только на английском языке.</p> <ul style="list-style-type: none"> • Если сервисному персоналу клиента необходимо руководство не на английском, а на каком-то другом языке, клиенту следует обеспечить перевод самостоятельно. • Прежде чем приступать к обслуживанию оборудования, обязательно обратитесь к настоящему руководству и внимательно изучите изложенные в нем сведения. • Несоблюдение требований данного предупреждения может привести к тому, что специалисты по обслуживанию, операторы или пациенты получат удар электрическим током, механическую травму или другое повреждение.
<p>UPOZORENJE (SR)</p>	<p>Ovo servisno uputstvo je dostupno samo na engleskom jeziku.</p> <ul style="list-style-type: none"> • Ako klijentov serviser zahteva neki drugi jezik, klijent je dužan da obezbedi prevodilačke usluge. • Ne pokušavajte da opravite uređaj ako niste pročitali i razumeli ovo servisno uputstvo. • Zanemarivanje ovog upozorenja može dovesti do povređivanja serviser, rukovaoca ili pacijenta usled strujnog udara, ili mehaničkih i drugih opasnosti.
<p>VAROVANIE (SK)</p>	<p>Tento návod na obsluhu je k dispozícii len v angličtine.</p> <ul style="list-style-type: none"> • Ak zákazníkovi poskytovateľ služieb vyžaduje iný jazyk ako angličtinu, poskytnutie prekladateľských služieb je zodpovednosťou zákazníka. • Nepokúšajte sa o obsluhu zariadenia skôr, ako si neprečítate návod na obsluhu a neporozumiete mu. • Zanedbanie tohto varovania môže vyústiť do zranenia poskytovateľa služieb, obsluhujúcej osoby alebo pacienta elektrickým prúdom, mechanickým alebo iným nebezpečenstvom.
<p>OPOZORILO (SL)</p>	<p>Ta servisni priročnik je na voljo samo v angleškem jeziku.</p> <ul style="list-style-type: none"> • Če ponudnik storitve stranke potrebuje priročnik v drugem jeziku, mora stranka zagotoviti prevod. • Ne poskušajte servisirati opreme, če tega priročnika niste v celoti prebrali in razumeli. • Če tega opozorila ne upoštevate, se lahko zaradi električnega udara, mehanskih ali drugih nevarnosti poškoduje ponudnik storitev, operater ali bolnik.

Service Manual Language Information (cont'd.)

<p>ADVERTENCIA (ES)</p>	<p>Este manual de servicio sólo existe en inglés.</p> <ul style="list-style-type: none"> • Si el encargado de mantenimiento de un cliente necesita un idioma que no sea el inglés, el cliente deberá encargarse de la traducción del manual. • No se deberá dar servicio técnico al equipo, sin haber consultado y comprendido este manual de servicio. • La no observancia del presente aviso puede dar lugar a que el proveedor de servicios, el operador o el paciente sufran lesiones provocadas por causas eléctricas, mecánicas o de otra naturaleza.
<p>VARNING (SV)</p>	<p>Den här servicehandboken finns bara tillgänglig på engelska.</p> <ul style="list-style-type: none"> • Om en kunds servicetekniker har behov av ett annat språk än engelska ansvarar kunden för att tillhandahålla översättningstjänster. • Försök inte utföra service på utrustningen om du inte har läst och förstår den här servicehandboken. • Om du inte tar hänsyn till den här varningen kan det resultera i skador på serviceteknikern, operatören eller patienten till följd av elektriska stötar, mekaniska faror eller andra faror.
<p>UYARI (TR)</p>	<p>Bu servis kılavuzunun sadece İngilizcesi mevcuttur.</p> <ul style="list-style-type: none"> • Eğer müşteri teknisyeni bu kılavuzu İngilizce 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.
<p>ЗАСТЕРЕЖЕННЯ (UK)</p>	<p>Дане керівництво з сервісного обслуговування постачається виключно англійською мовою.</p> <ul style="list-style-type: none"> • Якщо сервісний інженер потребує керівництво іншою мовою, користувач зобов'язаний забезпечити послуги перекладача. • Не намагайтеся здійснювати технічне обслуговування даного обладнання, якщо ви не читали, або не зрозуміли інформацію, надану в керівництві з сервісного обслуговування. • Недотримання цього застереження може призвести до травмування сервісного інженера, користувача даного обладнання або пацієнта внаслідок електричного шоку, механічного ушкодження або з інших причин невірної обслуговування обладнання.
<p>CẢNH BÁO (VI)</p>	<p>Tài Liệu Hướng Dẫn Sửa Chữa chỉ có bản tiếng Anh.</p> <ul style="list-style-type: none"> • Nếu các đơn vị cung cấp dịch vụ cho khách hàng yêu cầu một ngôn ngữ nào khác tiếng Anh, thì khách hàng sẽ có trách nhiệm cung cấp các dịch vụ dịch thuật. • Không được sửa chữa thiết bị trừ khi đã tham khảo và hiểu Tài liệu Hướng dẫn Sửa chữa. • Không tuân thủ những cảnh báo này có thể dẫn đến các tổn thương cho người thực hiện sửa chữa, người vận hành hay bệnh nhân, do sốc điện, các rủi ro về cơ khí hay các rủi ro khác.

Contents

1 Introduction

Manual Information	15
Intended Audience	15
Manual Purpose	15
Document Conventions	15
Regulatory and Safety Information.....	16
Safety Conventions	16
Safety Hazards.....	17
Classification of Medical Device	20
EMI/EMC/RF Safety Information	20
Responsibility of the Manufacturer.....	21
Responsibility of the Purchaser/Customer.....	21
Product and Packaging Information.....	22
Equipment Identification.....	28
Product Label	28
Serial Number Format.....	29
Product Codes	29
Service Information.....	30
Service Requirements	30
Additional Assistance.....	30
Related Documents.....	30

2 Equipment Overview

General Description	31
Intended Use	31
ON/OFF Switch.....	31
Emergency Stop Switch (ESTOP)	31
Walking Belt	31
Drive Controller System	32
Elevation System	32
Bed Assembly	32
Electronic Assembly.....	32
Side View.....	33
Rear View	34
Connection Panel.....	35

3 Installation

Tools Required.....	37
Safe Handling Guidelines	37
Installation Checklist	38
Electrical Safety Tests	39

AC Line Voltage Test	39
200 to 240 VAC, 50/60 Hz	39
Equipment Assembly.....	39
Pre-Assembly Inspection.....	40
Install Handle Set.....	40
Install Emergency Stop Switch.....	42
Power Cord and Plug	43
Ground Continuity Test.....	43
Connect Controlling Devices	44
Secure the Cables	45
Check Walking Belt Tension and Tracking	45
Check Emergency Stop Switch.....	45
Self-Calibration	45
Check T2100 Treadmill Level	47
Performing Leakage Tests	47
Leakage Test Diagrams	48
Test #1.....	48
Test #2.....	48
Functional Checkout	49
Functional Checklist.....	49
Double-Check Handles	52
4 Maintenance	
Introduction	53
Recommended Maintenance	53
Required Tools and Supplies.....	53
Inspection and Cleaning	54
Visual Inspection.....	54
Exterior Cleaning	54
Interior Cleaning.....	54
Walking Belt Tracking And Tension Adjustment	54
When To Adjust	54
Walking Belt Tension Adjustment	55
Walking Belt Tracking Adjustment	55
5 Theory of Operation	
Power Board (PCB) Theory.....	58
General Description.....	58
Precautions.....	58
Initial Board Conditions.....	58
Power Input Requirements	58
Power Distribution/Isolation.....	58
Power Inlet, Drive Power Outlet & Mains.....	58
Power Supplies.....	58
Local Ride-Through Power.....	59
Processor Board Connectors.....	59
Isolation Transformer.....	59
Elevation Relays	59
Elevation Sensor.....	59
ESD and EMI Compatibility.....	59
Power Board Input/Output Signal Requirements.....	60
Processor Board (PCB) Theory.....	63
General Description.....	63
Power Distribution.....	63

	Clock Generator	63
	Reset Generator	64
	Processor Circuitry	64
	Analog Inputs	64
	RS-232/422 Interfaces.....	65
	ESD and EMI Compatibility.....	65
	Isolation	65
	Operation	65
	Self-Calibration	66
	ESTOP.....	66
	Precautions.....	66
	Processor Board Power Input Requirements	66
	Processor Board Input/Output Signal Requirements	67
	Drive Controller Theory.....	70
	General Description.....	70
	Phases and Power Switches.....	70
	Motor Torque.....	71
	Motor Speed.....	71
	Electrical Requirements	71
6	Troubleshooting	
	Quickcheck Items.....	73
	Speed and Elevation Table.....	73
	Emergency Stop Switch Verification	74
	ON/OFF Switch.....	74
	Burn-In Mode	74
	Activating Burn-In	75
	Visual Inspection.....	76
	Power Down.....	77
	T2100 Treadmill Diagnostic Utility (TDU).....	78
	Overview of the TDU Application Interface	78
	TDU Application Error Definitions.....	79
	Download the TDU	80
	Launch TDU and Retrieve Event and Error Logs	81
	TDU Error Log Date and Time Information.....	81
	TDU Troubleshooting Tables and Status LEDs	82
	Processor Board Status LEDs.....	83
	TDU Troubleshooting Table	84
	Drive Controller Status LED	93
	TDU Troubleshooting Table for Drive Controller	94
	Power Supply Voltage Checks and Fuses	100
	Processor Board Voltage Checks	100
	Power Board Voltage Checks.....	101
	Power Board Fuse Locations	103
7	FRU Replacement	
	FRU Replacement Procedures	105
	Required Tools and Supplies.....	105
	Treadmill Shutdown.....	105
	Leakage Tests	106
	Shroud Removal	106

	Location of Major Sub-Assemblies	107
	Front Roller Replacement.....	108
	Rear Roller Replacement.....	110
	Walking Belt and Board Replacement.....	111
	Walking Belt Replacement Instructions	111
	Walking Board Replacement Instructions	112
	Drive Motor Replacement	113
	Drive Belt Replacement and Adjustments.....	116
	Replace the Drive Belt	116
	Drive Belt Adjustments	117
	Elevation Motor Replacement.....	119
	Drive Controller Assembly	121
	Drive Controller Replacement Procedure	121
	Drive Controller X1 PIN Descriptions	121
	Elevation Potentiometer Replacement	122
	Elevation Potentiometer Harness Assembly Replacement	123
	PCBs and Power Supply Replacement.....	128
8	Parts List	
	Field Replaceable Units	131
A	Technical Specifications	
	Performance Specifications	135
	Physical Specifications.....	135
	Power/Environmental Specifications	136
	Safety	136
	Environmental.....	137
B	Electromagnetic Compatibility (EMC)	
	Electromagnetic Emissions	140
	Electromagnetic Immunity.....	140
	Electromagnetic Immunity.....	141
	Separation Distance.....	143
	Exceptions.....	144

Compliant Cables 145

1

Introduction

This chapter provides general information required for the proper use of the system and this manual. Familiarize yourself with this information before using the system.

Manual Information

This section provides information for the correct use of this manual.

Keep this manual with the equipment at all times and periodically review it. You should request training assistance from GE Healthcare, if needed.

Intended Audience

This manual is intended for the person who uses, maintains, or troubleshoots this equipment.

Manual Purpose

This manual supplies technical information for service representatives and technical personnel so they can maintain the equipment to the assembly level. Use it as a guide for maintenance and electrical repairs considered field repairable. Where necessary the manual identifies additional sources of relevant information and/or technical assistance.

Document Conventions

This manual uses the following conventions.

Typographical Conventions

Convention	Description
Bold Text	Indicates keys on the keyboard, text to enter, or hardware items such as buttons or switches on the equipment.
<i>Italicized-Bold Text</i>	Indicates software terms that identify menu items, buttons or options in various windows.
CTRL+ESC	Indicates a keyboard operation. A plus (+) sign between the names of two keys indicates that while holding the first key, you should press and release the second key. For example, Press CTRL+ESC means to press and hold the CTRL key and then press and release the ESC key.

Convention	Description
<space>	Indicates that you must press the spacebar. When instructions are given for typing a precise text string with one or more spaces, the point where you must press the spacebar is indicated as <space>. This ensures that the correct number of spaces is inserted in the correct positions within the literal text string. The purpose of the < > brackets is to distinguish the command from the literal text within the string.
Enter	Indicates that you must press the Enter or Return key on the keyboard. Do not type Enter .
>	The greater than symbol, or right angle bracket, is a concise method to indicate a sequence of menu selections. For example, the statement "From the main menu, select System > Setup > Options to open the Option Activation window" replaces the following: <ol style="list-style-type: none"> 1. From the main menu, select System to open the System menu. 2. From the System menu, select Setup to open the Setup menu. 3. From the Setup menu, select Options to open the Option Activation window.

Illustrations

All illustrations in the manual are provided as examples only. Depending on system configuration, screens in the manual may differ from the screens on your system.

All patient names and data are fictitious. Any similarity to actual persons is coincidental.

Notes

Notes provide application tips or additional information that, while useful, are not essential to the correct operation of the system. They are called out from the body text through a flag word and indentation, as follows:

NOTE:

The tip or additional information is indented below the **NOTE** flag word.

Regulatory and Safety Information

This section provides information about the safe use and regulatory compliance of this device. Familiarize yourself with this information and read and understand all instructions before attempting to use this device. The system software is considered medical software. As such, it was designed and manufactured to the appropriate medical regulations and controls. Any exceptions are noted in the Compliance Information - Exceptions section.

NOTE:

Disregarding the safety information provided is considered abnormal use of this device and could result in injury, loss of data, and void any existing product warranties.

Safety Conventions

A **Hazard** is a source of potential injury to a person, property, or the system.

This manual uses the terms DANGER, WARNING, CAUTION, and NOTICE to point out hazards and to designate a degree or level of seriousness. Familiarize yourself with the following definitions and their significance.

Definitions of Safety Conventions

Safety Convention	Definition
DANGER	Indicates an imminent hazard, which, if not avoided, will result in death or serious injury.
WARNING	Indicates a potential hazard or unsafe practice, which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a potential hazard or unsafe practice, which, if not avoided, could result in moderate or minor injury.
NOTICE	Indicates a potential hazard or unsafe practice, which, if not avoided, could result in the loss or destruction of property or data.

Safety Hazards

The following messages apply to the system as a whole. Specific messages may also be provided elsewhere in the manual.

WARNING:

ELECTRIC SHOCK— This is a class I device protected against electrical shock. The device is a type B applied part in accordance to IEC 60601-1:2005.

To avoid the risk of electric shock, this equipment must only be connected directly to a supply mains with protective earth. Do not use extension cords and/or multiple receptor devices, such as power strips.

WARNING:

DEFIBRILLATOR PRECAUTIONS — SERIOUS INJURY OR DEATH COULD RESULT Do not come into contact with patients or unit during defibrillation.

WARNING:

BODILY INJURY

Indicates the presence of mechanical parts that can result in pinching, crushing, or other bodily injury.

To avoid risk of bodily injury, keep away from moving parts. Disconnect power before reaching into area or servicing.

WARNING:

ACCIDENTAL SPILLS — If liquids enter a device, take the device out of service and have it checked by a service technician before it is used again.

To avoid electric shock or device malfunction, liquids must not be allowed to enter the device.

WARNING:

EQUIPMENT MALFUNCTION — Replace only with the same type and rating of fuse.

WARNING:

EQUIPMENT MALFUNCTION — No modification of this equipment is allowed.

WARNING:

EXPLOSION HAZARD — Flammable anesthetic vapors or liquids can cause explosions.

Do NOT use in the presence of flammable anesthetic vapors or liquids.

WARNING:

PERSONAL INJURY HAZARD — To avoid injury, follow physicians' or qualified health care providers' instructions carefully during use of the equipment.

WARNING:

ENTANGLEMENT HAZARD— To avoid injury, keep hands, hair, jewelry, loose clothing and patient cables away from moving parts.

WARNING:

STUMBLE HAZARD — To avoid injury to patient, operate the treadmill with 185 cm (72 in) of clearance at the rear (end opposite the motor).

WARNING:

SHOCK HAZARD — Improper use of this device presents a shock hazard. Strictly observe the following warnings. Failure to do so may endanger the lives of the patient, the user, and bystanders.

To reduce the risk of electric shock do NOT remove cover (or back). Refer servicing to qualified personnel.

When disconnecting the device from the power line, remove the plug from the wall outlet first, before disconnecting the cable from the device. Otherwise there is a risk of coming in contact with line voltage by inadvertently introducing metal parts in the sockets of the power cord.

Devices may be connected to other devices or to parts of systems only after making certain that there is no danger to the patient, the operators, or the environment as a result. Standards IEC 60601-1-1/EN60601-1-1 must be complied with in all cases.

WARNING:

LIFTING HAZARD — The treadmill is too heavy to lift, lower or move safely by one person. Serious bodily injury or damage to the treadmill may result.

A minimum of two people are required when lifting, lowering or moving the treadmill.

WARNING:

STUMBLE HAZARD — Rapid changes in treadmill speed and/or grade during a stress test may result in injury.

DO NOT rapidly change treadmill speed and/or grade during a stress test.

WARNING:

TREADMILL CHANGES — DO NOT place feet under the treadmill during operation or while decreasing the treadmill grade to avoid injury.

WARNING:

STUMBLE HAZARD — While the emergency stop switch is depressed or not present or when power is not applied to the treadmill the walking belt is not locked.

The walking belt in this condition is allowed to move which could cause a person to lose balance and fall if they are standing on the belt. The risk of belt movement is increased with higher treadmill grades or inclines.

CAUTION:

STUMBLE HAZARD — The emergency stop switch is a safety device for use only in emergency situations to stop the treadmill. The walking belt will stop quickly.

Once stopped and while the switch is depressed, the treadmill walking belt will not lock to allow for removal of foreign objects.

CAUTION:

TRIP AND ENTANGLEMENT HAZARD — Do not route cables in a way that they may present a stumbling hazard.

Do not route cables underneath the equipment.

For safety reasons, all connectors for patient cables and leadwires are designed to prevent inadvertent disconnection, should someone pull on them.

For devices installed above the patient, adequate precautions must be taken to prevent them from dropping on the patient.

CAUTION:

TRIP HAZARD — Route the AC Power cable away from moving parts and out of any potential walking areas minimizing the potential for tripping.

An AC power cable caught in moving parts could cause injury to the user and equipment.

CAUTION:

PERSONAL INJURY — Do not use the treadmill without proper footwear as injury to feet may result.

Always wear proper footwear when using the treadmill.

CAUTION:

EQUIPMENT MALFUNCTION — Before connecting the device to the power line, check that the voltage and frequency ratings of the power line are the same as those indicated on the unit's label. If this is not the case, do not connect the system to the power line until you adjust the unit to match the power source.

This equipment is suitable for connection to public mains as defined in CISPR 11.

CAUTION:

SUPERVISED USE — This equipment is intended for use under the direct supervision of a licensed health care practitioner.

Make sure all users are under the direct supervision of a licensed health care practitioner.

Classification of Medical Device

The device is classified as follows, according to IEC 60601-1:

Medical Device Classifications

Category	Classification
Type of protection against electrical shock	Class I
Degree of Protection Against Electrical Shock	Type B applied part
Degree of protection against harmful ingress of water	IPx0 Ordinary equipment (enclosed equipment without protection against ingress of water)
Degree of safety of application in the presence of a flammable anesthetic mixture with air or with oxygen or with nitrous oxide	Equipment is not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or with nitrous oxide
Method(s) of sterilization or disinfection recommended by the manufacturer	Not applicable
Mode of operation	The Elevation motor is not rated for continuous operation. A one minute elevation ON time should be followed by a ten minute OFF time. In normal operation, the treadmill elevation motor operates for much less than 1 minute at a time. All other parts of the treadmill (including the belt drive motor) are rated for continuous operation, and do not have an ON/OFF duty cycle requirement.

EMI/EMC/RF Safety Information

This system is designed and tested to comply with applicable regulations regarding EMC and must be installed and put into service according to the EMC information stated in the Electromagnetic Compatibility appendix of the Service and/or Operator's manual. Changes or modifications to this system not expressly approved by GE Healthcare could cause EMC issues with this or other equipment. Mains power should be a standard commercial or hospital environment.

Before installing or using the device or system, be aware of the proximity of known RF sources, such as the following:

- Radio and TV stations
- Portable and mobile RF communication devices (cell phones, two-way radios)
- X-ray, CT, or MRI devices

These devices are also possible sources of interference as they may emit higher levels of electromagnetic radiation.

WARNING:

EQUIPMENT MALFUNCTION/INTERFERENCE — Use of portable phones or other radio frequency (RF) emitting equipment near the system may cause unexpected or adverse operation.

Do not use portable phones or other electronic equipment that may emit radio frequency (RF) near this system.

WARNING:

EQUIPMENT MALFUNCTION/INTERFERENCE — Do not use the equipment or system adjacent to, or stacked with, other equipment.

If adjacent or stacked use is necessary, test the equipment or system to verify normal operation in the configuration in which you are using it.

WARNING:

ACCESSORIES/COMPONENTS — Adding accessories or components, or modifying the medical device or system, may result in increased EMISSIONS or decreased IMMUNITY of the device or system.

Use the following resources for more information on EMI/EMC and RF concerns:

- The Supplies and Accessories Reference Guide for your system
- Qualified GE Healthcare or approved third-party personnel
- The Electromagnetic Compatibility appendix in your system service or operator's manual

NOTE:

Compliance provides reasonable protection against radio-frequency interference. However, there is no guarantee that interference will not occur in a particular installation. You can tell whether this device or system is causing interference by turning it off. If the interference stops, it was most likely caused by the device or system.

Responsibility of the Manufacturer

GE Healthcare is responsible for the safety, reliability, and performance of hardware supplied by GE Healthcare only if the following conditions are met:

- Assembly operations, extensions, readjustments, modifications, or repairs are performed by persons authorized by GE Healthcare.
- The electrical installation of the room where the device is used complies with the requirements of the appropriate local, state, and other government regulations.
- The equipment is used in accordance with the instructions for use.

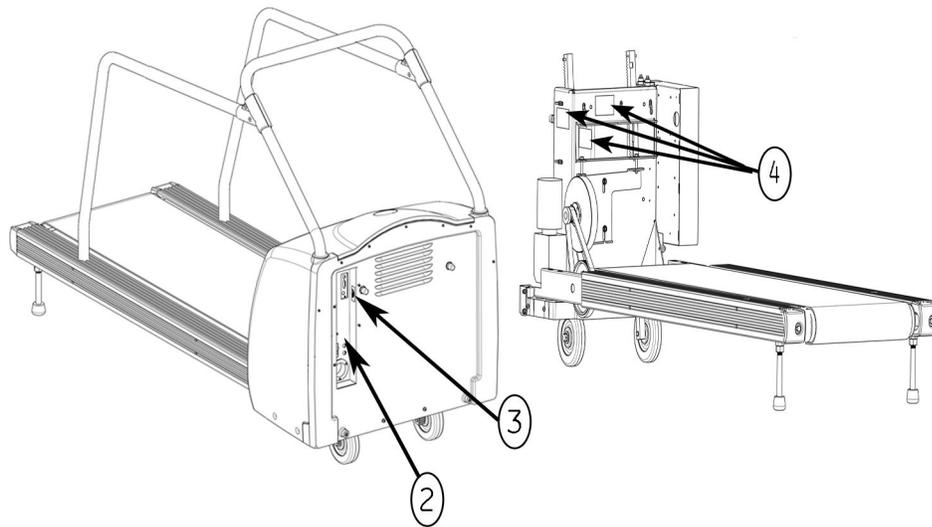
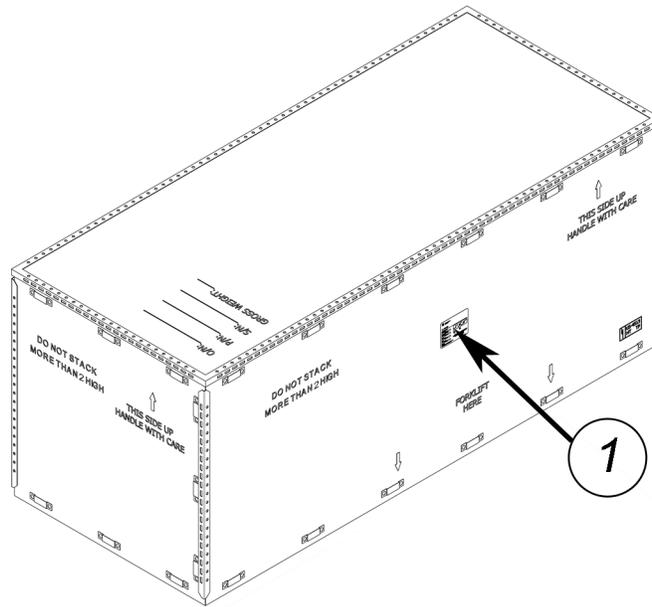
Responsibility of the Purchaser/Customer

The customer is responsible for providing appropriate desks, chairs, electrical wall outlets, network connections, and analog phone lines, and for locating any of the system components described in this manual in compliance with all local, state, and national codes.

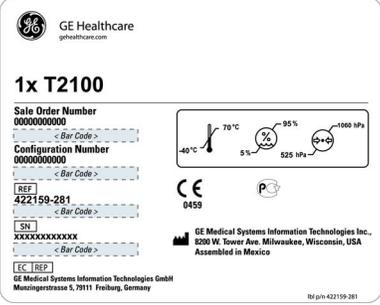
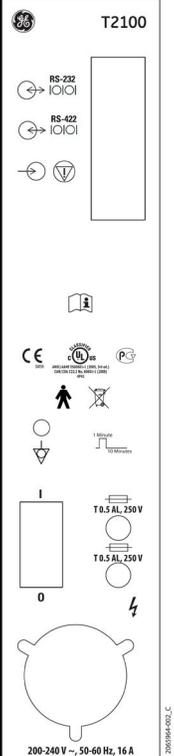
Product and Packaging Information

This section identifies the following:

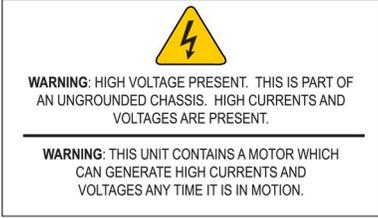
Hardware Label Locations



Label Descriptions on Hardware and Packaging

Item	Label	Description
1		<p>Located on the wooden crate, the shipping label contains the following information:</p> <ul style="list-style-type: none"> • Product description • Sales order number • Configuration number • Model number • Serial number • Storage conditions • Regulatory compliance • Country of Origin • EC Representative information
2		<p>Located on the rear connector panel, this label contains the cautionary, disposal, and regulatory information. See the “Symbol Descriptions” on page 24 for more information on the symbols.</p>

Label Descriptions on Hardware and Packaging (cont'd.)

Item	Label	Description
3	 <p>REF <Product Part Number> <Product Description> SN <Serial Number> <Barcode> GE MEDICAL SYSTEMS INFORMATION TECHNOLOGIES, INC. 8200 WEST TOWER AVE MILWAUKEE, WISCONSIN USA</p>	Located inside the connector panel compartment, this label uniquely identifies this unit. See the "Product Label" on page 28 for detailed information.
4	 <p>WARNING: HIGH VOLTAGE PRESENT. THIS IS PART OF AN UNGROUNDED CHASSIS. HIGH CURRENTS AND VOLTAGES ARE PRESENT.</p> <p>WARNING: THIS UNIT CONTAINS A MOTOR WHICH CAN GENERATE HIGH CURRENTS AND VOLTAGES ANY TIME IT IS IN MOTION.</p>	Located on the panel above the drive motor, the Warning labels contain information about the presence of high voltage.

Symbol Descriptions

The following symbols may appear on the device or its packaging. Familiarity with these symbols assists in the safe use and disposal of the equipment. For equipment symbols not shown, refer to the original equipment manufacturers (OEM) manuals.

Symbols are used to convey warnings, cautions, prohibitions, mandatory actions, or information. Any hazard symbol on your device or packaging with markings in color indicates there is certain danger and is a warning. Any hazard symbol on your device or packaging that is in black and white indicates a potential hazard and is a caution.

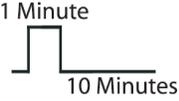
Symbol Descriptions

Symbol	Description
	<p>CAUTION:</p> <p>CONSULT ACCOMPANYING DOCUMENTS</p> <p>There may be specific warnings or precautions associated with the device that are not otherwise found on the label.</p> <p>Consult the accompanying documentation for more information about safely using this device.</p>
	<p>Consult Instructions for Use</p> <p>Consult the operating instructions.</p>

Symbol Descriptions (cont'd.)

Symbol	Description
	<p>WARNING: ELECTRIC SHOCK Indicates the presence of hazardous energy circuits or electric shock hazards.</p> <p>To reduce the risk of electric shock hazards, do not open this enclosure. Refer servicing to qualified personnel.</p> <p><i>As a warning sign, this symbol is identified by a yellow background, black triangular band, and a black symbol.</i></p>
	Dangerous voltage.
	Type B applied part complying with IEC 60601-1.
	Alternating current (AC)
	Equipotentiality (This is the ground lug.)
	<p>Protective Earth (ground) Identifies the terminal of a protective earth (ground) electrode or any terminal that is intended for connection to an external conductor for protection against electric shock in case of a fault.</p>
	<p>Waste Electrical and Electronic Equipment (WEEE) Indicates this equipment contains electrical or electronic components that must not be disposed of as unsorted municipal waste but collected separately.</p> <p>Contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.</p>

Symbol Descriptions (cont'd.)

Symbol	Description
	<p>Duty Cycle</p> <p>The Elevation motor is not rated for continuous operation. A one minute elevation ON time should be followed by a ten minute OFF time. In normal operation, the treadmill elevation motor operates for much less than 1 minute at a time.</p>
	<p>Temperature Limits</p> <p>Indicates the upper and lower temperature limits for the transportation and handling of this package. They are indicated next to the upper and lower horizontal lines.</p>
	<p>Atmospheric Limits</p> <p>Indicates the upper and lower barometric pressure limitations for the transportation and handling of this package. They are indicated next to the upper and lower horizontal lines.</p>
	<p>Humidity Limits</p> <p>Indicates upper and lower humidity limits for the transportation and handling of this package. They are indicated next to the upper and lower horizontal lines.</p>
	<p>Manufacturer Name and Address</p> <p>Indicates the name and address for the manufacturer of this device.</p>
	<p>Date of Manufacture (Year-Month)</p> <p>Indicates the original manufacture date for this device.</p>
	<p>Serial Number</p> <p>Indicates the manufacturer's serial number.</p>
	<p>Catalog or Orderable Part Number</p> <p>Indicates the manufacturer's catalog or part number.</p>
	<p>Authorized Representative in the European Community</p> <p>Indicates the name and address of the authorized representative in the European Community for this device.</p>

Symbol Descriptions (cont'd.)

Symbol	Description
IPxy	<p>IP Code (Ingress Protection Rating) Classifies and rates the degree of protection provided against the intrusion of solid objects (such as body parts like hands and fingers, dust, accidental contact), and fluids. The first numeral (x) represents the degree of protection against the ingress of solid objects. The second numeral (y) represents the degree of protection against the ingress of liquids</p>
	Input/Output
	Input
	Fuse
O O	Serial Interface
	Emergency Stop
	<p>Mass of the Machinery Configuration For machinery presenting hazards due to its mobility: this symbol expresses mass of the machinery configuration in kilograms.</p>
	General symbol for recovery/recyclable
T 0.5AL, 250V	Time Lag, 0.5 Amp, Low breaking capacity, 250 Vac rated fuse

Symbol Descriptions (cont'd.)

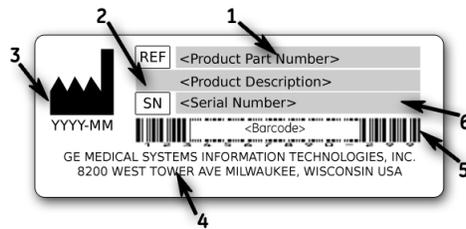
Symbol	Description
	Medical General medical equipment as to electrical shock, fire and mechanical hazards only in accordance with ANSI/AAMI ES 60601-1 (2005, 3rd ed.), CAN/CSA C22.2 No. 60601-1 (2008).
	CE Mark Indicates the device or product conforms with applicable EU (European Union) directives.
	PCT (GOST-R) Mark Indicates the device or product conforms with applicable Russian technical and safety standards specified by GOST

Equipment Identification

The Equipment Identification tag that contains the Product Code and Serial Number is located on the lip of the connection panel (on the back of the T2100 Treadmill).

Product Label

The product label is laid out in the following format. Depending on the product, the label may vary slightly in format, but it contains the same information.

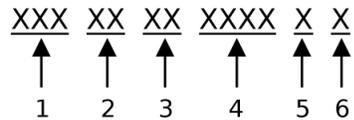


Product Label Format

Item	Description
1	Product part number
2	Product description
3	Date of manufacture in YYYY-MM format
4	Manufacturer name and address
5	Product bar code
6	Device serial number (See "Serial Number Format" on page 29 for more information.)

Serial Number Format

Each device has a serial number that uniquely identifies it and provides important information. You need the product code and the entire serial number before servicing or requesting support for your product. The serial number format is shown in the following illustration:



Serial Number Format

Item	Name	Description
1	Product Code	Three-letter code that uniquely identifies the product line. See "Product Codes" on page 29 for more information.
2	Year Manufactured	Two-digit code identifying the year the device was manufactured. Values range from 00 to 99 For example: 00 = 2000, 04 = 2004, 05 = 2005 (and so on).
3	Fiscal Week Manufactured	Two-digit code identifying the week the device was manufactured. Values range from 01 to 52. GE Healthcare's fiscal weeks correspond to the calendar week. For example, 01 = first week in January.
4	Product Sequence	Four-digit number identifying the order in which this device was manufactured. Values range from 0001 to 9999.
5	Manufacturing Site	One-letter code identifying the site where the device was manufactured. For example, F = Milwaukee, N = Freiburg, P = Bangalore
6	Miscellaneous Characteristic	For example, P = device is a prototype, R = device was refurbished, U = device was upgraded to meet the specifications of another product code, A= device is in production.

Product Codes

The product code identifies specific system platforms.

You can identify the product code using the serial number listed on the product label located in one of the following places:

- On the product label attached to the device.
- On the product label provided with the application CD.

For software application systems, you can view the serial number by launching the system application and clicking **Help > About**.

For information on launching the application, refer to the service or operator's manual for this system.

Service Information

This section provides information pertaining to the maintenance and servicing of the system. Familiarize yourself with this information before requesting service from GE Healthcare or its authorized representatives.

Service Requirements

Refer equipment servicing to GE Healthcare authorized service personnel only. Any unauthorized attempt to repair equipment under warranty voids that warranty.

It is the user's responsibility to report the need for service to GE Healthcare or to one of their authorized agents.

Failure on the part of the responsible individual, hospital, or institution using this equipment to implement a satisfactory maintenance schedule may cause undue equipment failure and possible health hazards.

Regular maintenance, irrespective of usage, is essential to ensure that the T2100 Treadmill will always be functional when required.

Technical specifications describing the equipment can be found in the *T2100 Treadmill Operator's and Service Manuals* shipped with your system.

Additional Assistance

GE Healthcare maintains a trained staff of application and technical experts to answer questions and respond to issues and problems that may arise during the installation, maintenance, and use of this system.

Contact your local GE Healthcare representative to request additional assistance.

Related Documents

The following documents provide additional information that may be helpful in the installation, configuration, maintenance, and use of this system.

Documents Related to the T2100 Treadmill Service Manual

Part Number	Document Title
2065578-002	<i>T2100 Treadmill Operator's Manual</i>
2021403-119	<i>Treadmill Uncrating Instructions</i>

2

Equipment Overview

General Description

Standard features include the emergency stop (**ESTOP**) switch, a full handrail set, and a 60-inch walking surface. Designed for simplified serviceability, the T2100 Treadmill has fewer moving parts than other treadmills, built-in self-calibration, and replaceable assemblies.

Intended Use

The T2100 Treadmill is intended for use with any one of the several GE Healthcare exercise testing systems for administering a controlled exercise load during a diagnostic stress test.

ON/OFF Switch

When turning the T2100 Treadmill ON/OFF switch to the OFF position, there is a period of approximately 1 second when the remaining power cycles through the system. The T2100 Treadmill will not power up until all remaining power has cycled through the system. After placing the ON/OFF switch to the OFF position, wait approximately 1 second before turning the ON/OFF switch to the ON position.

Emergency Stop Switch (ESTOP)

The emergency stop switch (**ESTOP**) is intended for emergency situations where immediately stopping the T2100 Treadmill is required to deliver appropriate emergency care to the patient or health care provider, as implied by the *American Heart Association "Guidelines for Clinical Exercise Testing Laboratories"* (1995). It is not intended for routinely stopping the T2100 Treadmill.

NOTE:

The **ESTOP** switch cable must be plugged into the T2100 Treadmill connection panel for the T2100 Treadmill to operate. If the **ESTOP** is not installed, the T2100 Treadmill will not operate.

Walking Belt

With the ON/OFF switch in the OFF position (or with power cord disconnected), the T2100 Treadmill walking belt can revolve freely in either direction. With the ON/OFF

switch in the ON position but the T2100 Treadmill not running, the T2100 Treadmill walking belt is locked in both directions.

Press the emergency stop switch (**ESTOP**) and the T2100 Treadmill promptly stops but the walking belt can still revolve (allowing for removal of foreign objects).

After the **ESTOP** button is released, the walking belt enters an unlocked state for 20 seconds, after which the walking belt is locked in both directions.

Drive Controller System

The 3 HP brushless, continuous DC motor is controlled by a separate control box and connects directly to the front roller with a drive belt. A 15-pound flywheel, attached to the motor's drive shaft, keeps "footfall" variance to a minimum. An "adjustment plate" above the motor mounting bracket contains two vertical bolts for adjusting the drive belt tension.

The T2100 Treadmill can accommodate a weight capacity up to 450 lbs.

Elevation System

The elevation system uses a rack and pinion operation to raise and lower the T2100 Treadmill rather than jack screws and chains. The elevation motor attaches to a small gearbox that connects to the pinion shaft. The upper- and lower-limit switches are mounted on a fixed block in contact with a rack, making them easy to reach and adjust. Replacing the elevation motor only requires the removal of the three mounting bolts and detaching the motor from the pinion shaft coupling.

Bed Assembly

The one-piece bed assembly, with side rails and struts bolted together, enables quick belt and bed replacement for field service personnel.

Electronic Assembly

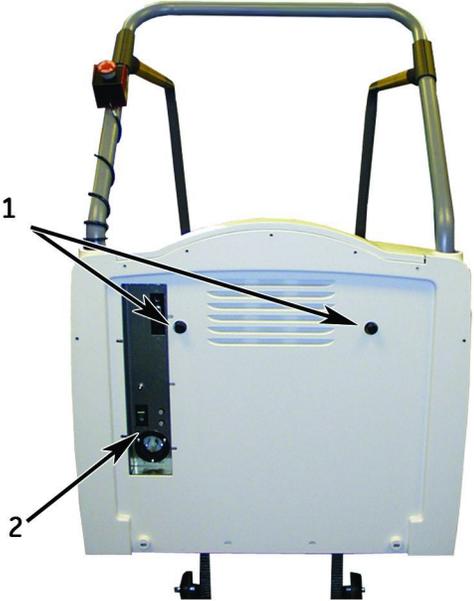
An isolated "electronics box" (e-box) contains the power supply PCB, control PCB, +24 V power supply, and an EMI Filter. The box is accessible with the shroud removed and contains parts that can be replaced in the field.

Side View



Item	Description
1	Handrails
2	Emergency Stop (ESTOP)
3	Shroud
4	Elevation racks and wheels
5	Level adjusting feet
6	Walking belt

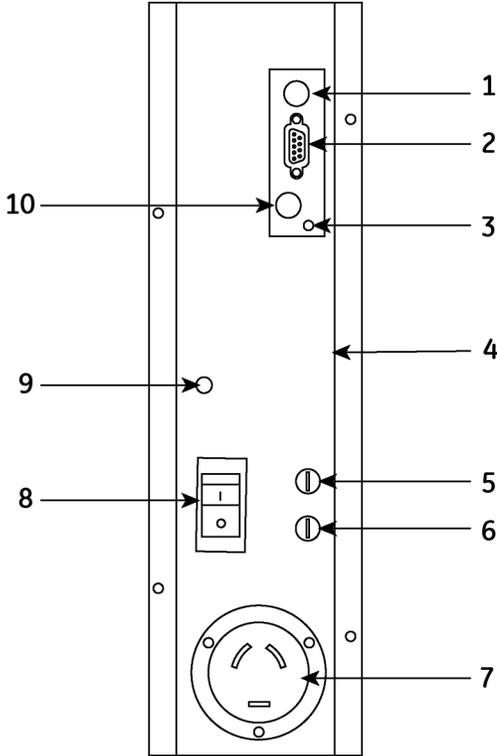
Rear View



Item	Description
1	Standing feet For support when standing the T2100 Treadmill upright on this end.
2	Connection Panel

Connection Panel

The following illustration describes the connectors on the connection panel of the T2100 Treadmill, and identifies the general location of the serial number.



Item	Description
1	RS232 Serial Port
2	RS422 Serial Port
3	Calibration Button
4	The serial number sticker is affixed to the right inside lip of the connection panel.
5	Reference designator F3 T0.5AL, 250V GE part number 1910-012
6	Reference designator F5 T0.5AL, 250V GE part number 1910-012
7	AC Power Connection 200-240V, 50-60Hz
8	ON/OFF Switch
9	Equipotential (ground lug)
10	Emergency Stop Switch Connection

3

Installation

Tools Required

To install the T2100 Treadmill, you will need the following tools:

- Multi-meter
- Standard hand-tools
- T-bar allen wrench (included with T2100 Treadmill)
- Carpenter's level
- 15 mm (9/16") socket wrench

NOTE:

See ["Required Tools and Supplies"](#) on page 105 for a complete list of tools required for maintenance of the T2100 Treadmill.

Safe Handling Guidelines

The T2100 Treadmill ships preset with an approximate 2% grade. This slight elevation provides for free wheel movement and prevents the shroud from scraping the floor.

If you are moving the T2100 Treadmill after it has been in operation, use the controlling equipment to set the grade to approximately 7%. Then remove power and disconnect all cables to the T2100 Treadmill before moving the unit.

NOTE:

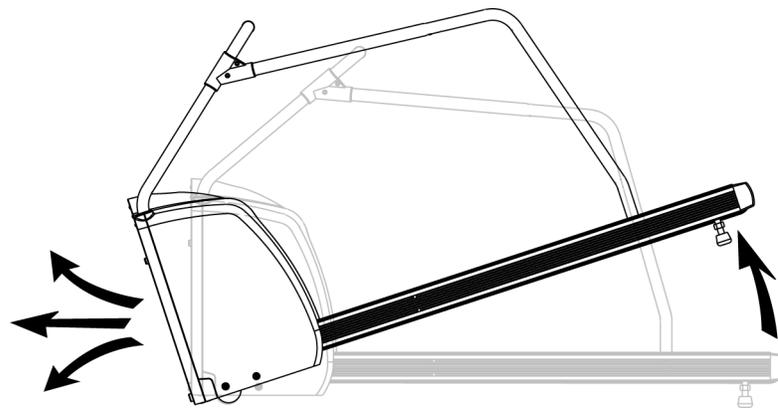
We recommend the T2100 Treadmill not be placed on carpet or carpet tile floors as a final location, as continual movement of the wheels may eventually damage the carpet and possibly the T2100 Treadmill.

WARNING:

INJURY OR DAMAGE. The T2100 Treadmill is too heavy to lift, lower or move safely by one person. Serious bodily injury or damage to the T2100 Treadmill may result.

A minimum of two people are required when lifting, lowering or moving the T2100 Treadmill.

1. Lift the end of the bed assembly to about knee height, keeping knees bent and back straight as you lift.
2. Rotate the T2100 Treadmill in the direction you want to go (the T2100 Treadmill will pivot on its wheels) and push forward.



3. When you have maneuvered the T2100 Treadmill into its new location, gently lower the end of the bed assembly to the floor.

Installation Checklist

The Installation Checklist is provided as a guide for the field engineer when installing a T2100 Treadmill. Follow the procedures in this instruction in the order that they are written and appear.

As you complete each item, check it off in the list below.

- [“Electrical Safety Tests” on page 39](#)
- Assemble the T2100 Treadmill:
 - [“Pre-Assembly Inspection” on page 40](#)
 - [“Install Handle Set” on page 40](#)
 - [“Install Emergency Stop Switch” on page 42](#)
- [“Power Cord and Plug” on page 43](#)
- [“Ground Continuity Test” on page 43](#)

- “Connect Controlling Devices” on page 44
- “Check Emergency Stop Switch” on page 45
- “Check Walking Belt Tension and Tracking” on page 45
- “Secure the Cables” on page 45
- “Self-Calibration” on page 45
- “Check T2100 Treadmill Level” on page 47
- “Performing Leakage Tests” on page 47
- “Functional Checkout” on page 49
- “Double-Check Handles” on page 52

Electrical Safety Tests

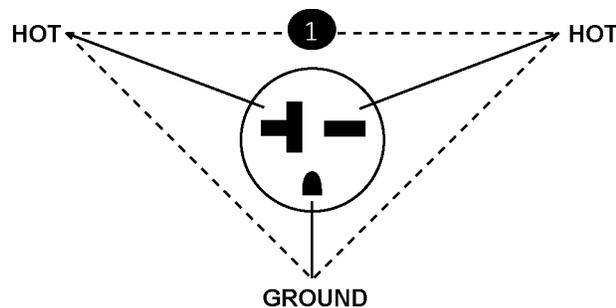
AC Line Voltage Test

This test verifies that the wall outlet supplying power to the equipment is properly wired. For international wiring tests, refer to the internal standards agencies of that particular country.

200 to 240 VAC, 50/60 Hz

Use a digital voltmeter set to measure at least 300 VAC to check the voltages of the NEMA 6-20R AC wall outlet (U.S. only, or applicable international connection; dedicated circuit recommended). If the measurements are significantly out of range, have a qualified electrician repair the outlet. The voltage measurements should be:

200 to 240 nominal VAC between the two "hot" contacts.



NOTE:

For proper and safe operation of the T2100 Treadmill, ensure the power source is clean. See [“Power/Environmental Specifications” on page 136](#) for more details.

Equipment Assembly

The T2100 Treadmill ships completely assembled except for the handle set and the emergency stop switch.

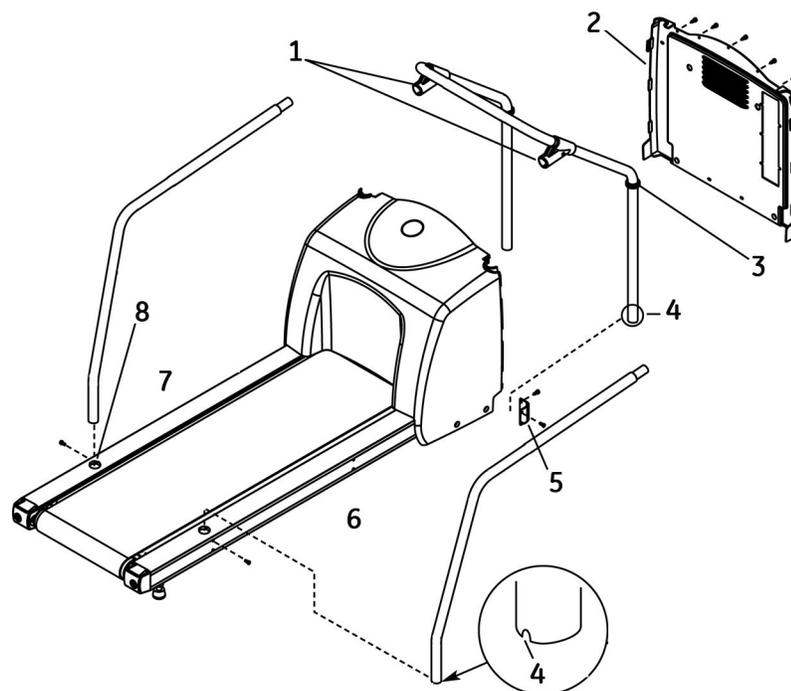
As recommended by the *American Heart Association Exercise Standards (Special Report, Vol 82, No 6)*, the T2100 Treadmill should have front and side rails installed

for patients to steady themselves. An emergency stop switch must be visible and readily accessible. Attach the handle set and emergency stop switch BEFORE applying power to the unit.

Pre-Assembly Inspection

1. If connected, disconnect the power cord from the rear connector panel.
2. Remove the screws on the shroud back and remove the back panel and visually inspect the following:
 - a. Drive Belt – The drive belt is correctly adjusted at the factory, but may have changed during shipping. Before operating the T2100 Treadmill, verify the tension of the drive belt. See [“Drive Belt Adjustments” on page 117](#) for proper tension tolerances.
 - b. Drive Motor Mount– Verify that the mounting bolts are securely tightened.
 - c. Harnesses – Verify that all wiring harnesses are securely attached.
 - d. Elevation Rack – Verify that no obstructions are present in the elevation racks.

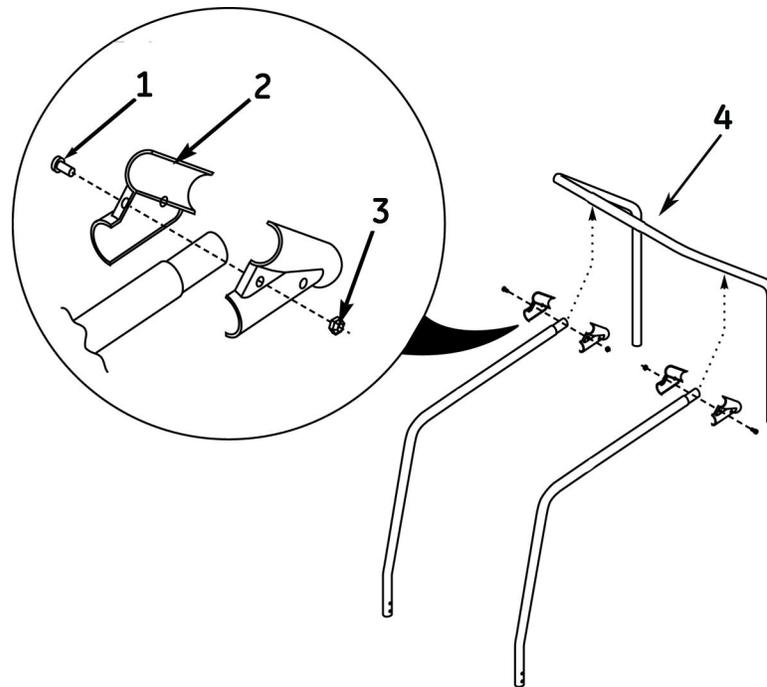
Install Handle Set



Item	Description
1	T-Brackets
2	Shroud Back
3	Grommet
4	Notch A notch designates the right side handrail from the left side handrail.

Item	Description
5	Front Handrail Mounting Bracket
6	Right Side
7	Left Side
8	Side Rail Mounting Hole

1. Remove the screws on the shroud back and remove the back panel.
2. Install the two grommets on the front rail assembly.
3. Place the front handrail into the metal mounting brackets on the front corners of the shroud. Using the supplied Allen wrench and four bolts, secure the handrail to the brackets.



Item	Description
1	Bolt On both the left and right side rails.
2	T-Bracket
3	Nut On both the left and right side rails.
4	Align the side rails to the pre-drilled guide holes in the front rails

4. Place the side rails into the side mounting holes and screw in the two bolts on each side. See item 4 in the drawing at the beginning of this section for designation of right side and left side handrails.
5. Attach the side rails to the front rail with the mated T-brackets. Tighten the two T-bracket bolts with the Allen wrench.

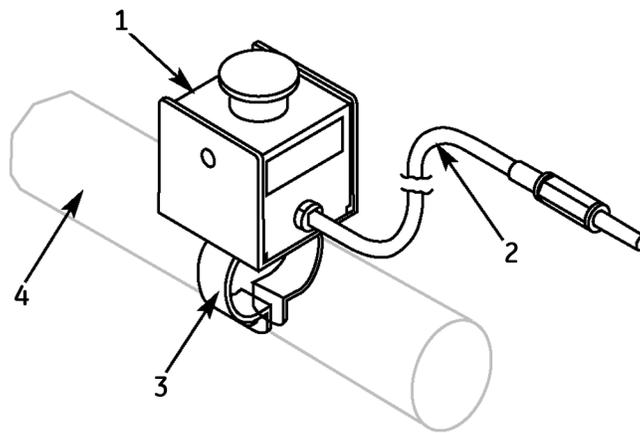
6. Make sure all screws and bolts are seated properly and no sharp edges are present.
7. Reassemble the shroud and align the grommets properly.

Install Emergency Stop Switch

NOTE:

The emergency stop switch must be installed and the **ESTOP** cable plugged in to the T2100 Treadmill connection panel for the T2100 Treadmill to operate. If the **ESTOP** is not installed, the T2100 Treadmill will not operate.

1. Attach the two clamp pieces to the assembled, latching **emergency stop** switch.



Item	Description
1	Emergency Stop Switch Assembly
2	Cable
3	Clamp
4	Handrail

2. Position the clamps around the T2100 Treadmill front handrail and secure with the supplied screw and nut. The emergency stop switch can be mounted in different locations and positions based on customer preference.
3. Connect the cable from the emergency stop switch to the connection on the T2100 Treadmill's rear connector panel. (See ["Connection Panel"](#) on page 35 for connection locations.)
4. Use the cord clips to attach the cable along the front handrail and secure the excess cable.

Power Cord and Plug

Verify the power cord being used with the treadmill is good:

- Verify that the line, neutral, and ground conductors are properly connected to the power cord plug and are not short-circuited. Rewire and tighten these, or replace the power cord, as necessary.
- Failure of the power cord strain relief is very common. Often times users of the equipment pull on the power cord itself, rather than the power cord plug, to unplug the unit from a wall receptacle. If in doubt, test for continuity through each conductor of the power cord connector and plug.
- Perform the [“Ground Continuity Test” on page 43](#) or test method that is required by your Country/Local governing safety organization. For international power cords, refer to the internal standards agencies of that particular country.
- Inspect the power cord, perform safety tests upon receipt of the equipment, per the recommended maintenance frequency (See [“Recommended Maintenance” on page 53.](#)), and each time the unit is serviced.
For reference, the following is a list of recommended international wall-side plug standards for use with unterminated international power cords PN 408930-002 and 408930-004.

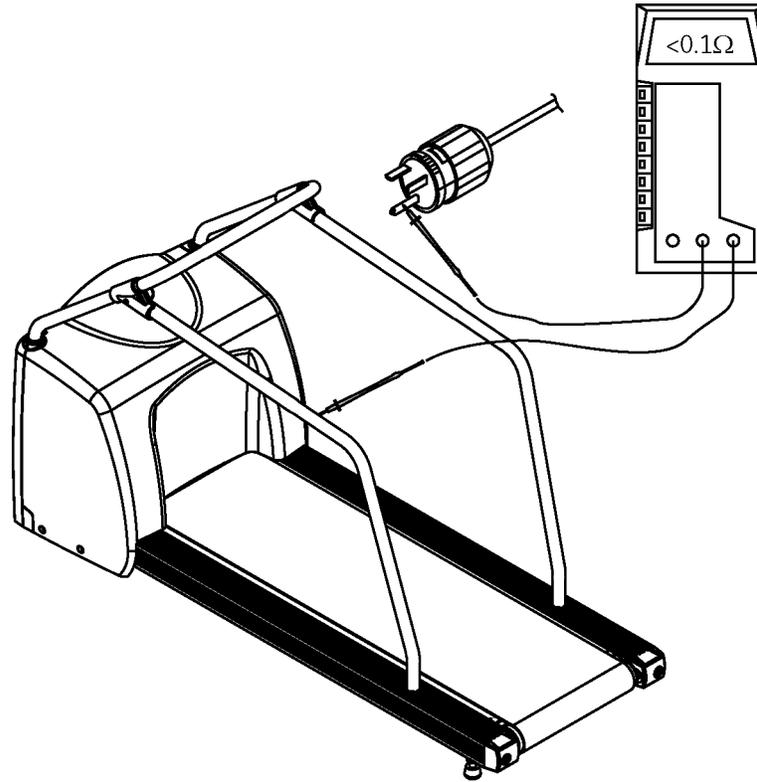
Country	Standard	Amperage
Italy	CEI 236-16	16 A
Switzerland	SEV 1011	16 A
Israel	SI 32	16 A
India/South Africa	SANS 164-1	16 A

Ground Continuity Test

This test verifies that there is continuity (less than 100 mΩ resistance) between all the exposed metal surfaces, which have the potential to become energized, and the ground prong on the mains AC power cord. Look for an exposed metal screw, or, if the

metal surfaces are anodized or painted, scrape off a small area in an inconspicuous area on the aluminum casting, for the probe to make direct contact with the metal.

1. Connect the AC power cord to the T2100 Treadmill.
2. Use a digital multimeter to check all the metal surfaces of the equipment as illustrated below. Make adjustments for any resistance in the test leads.



If the measurements are significantly out of range, check for breaks in the power cord or in the internal connections within the unit.

Connect Controlling Devices

1. Attach the appropriate controller cable from the stress system. Use the supplied interface cable to connect the T2100 Treadmill to the host (for example the CASE).

NOTE:

The CASE and MAC 5000ST is connected to the RS 232 Serial Port.

NOTE:

On the CASE system, connect the T2100 Treadmill interface cable in one of the following ports: COM 1, COM 2, COM C or COM D. The CASE RSS modem requires the use of either COM 1 or COM 2. Move the T2100 Treadmill interface cable to COM C or COM D only as necessary.

2. Verify that the emergency stop switch is connected.
3. Connect the AC power cord.
4. Turn the T2100 Treadmill ON/OFF switch to the On position.
5. Turn the controlling device ON/OFF switch to the On position.

Secure the Cables

Tie down cables to ensure they do not get caught in the wheels or the elevation racks.

Check Walking Belt Tension and Tracking

Operate the walking belt at various speeds and verify that it tracks evenly down the center of the walking board. If not, adjust the walking belt tracking. See [“Walking Belt Tracking And Tension Adjustment”](#) on page 54.

Check Emergency Stop Switch

1. Manually control the speed of the T2100 Treadmill from the controlling device. With the belt moving at a relatively high speed, press the **emergency stop** switch. The T2100 Treadmill belt will stop promptly but the belt will not lock, allowing for removal of foreign objects. To release the switch, turn the button 1/4 turn.
2. Use the controlling equipment to terminate the exercise session and turn off the T2100 Treadmill.

Self-Calibration

The T2100 Treadmill has a built-in self-calibration routine.

WARNING:

INJURY TO PERSON. Keep hands, hair, jewelry, and loose clothing away from moving parts.

Do not place feet under T2100 Treadmill during elevation changes. Otherwise, serious injury could result.

WARNING:

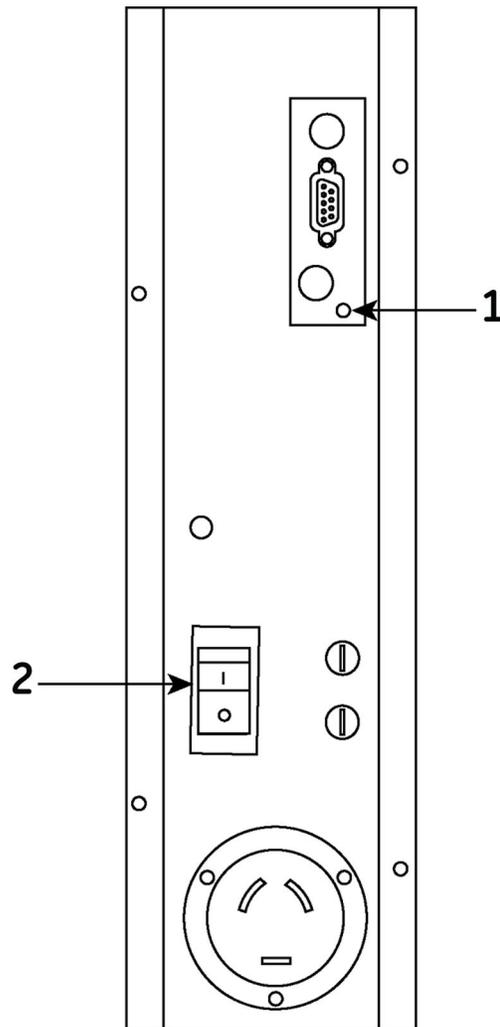
INJURY TO PERSON. During the self-calibration process the T2100 Treadmill will elevate to its maximum grade. Make sure you monitor the site at all times.

Make sure there are no customers or patients on or near the T2100 Treadmill during self-calibration.

To activate the self-calibration routine, do the following:

1. Remove controlling device (CASE) cable or turn off the controlling device.
2. Unlock the **emergency stop** switch.
3. Connect the AC power cord on the T2100 Treadmill to the wall outlet.

4. Press and hold in the **Calibration** button.



Item	Description
1	Calibration Button
2	ON/OFF Switch

5. Turn the T2100 Treadmill ON/OFF switch to the On position.
6. Continue to hold the Calibration button until the T2100 Treadmill starts changing elevation.

NOTE:

Hold the Calibration button for at least 4 seconds. May be up to 25 seconds only for a T2100 processor board that has never been calibrated.

This initiates the self-calibration routine.

7. Wait for the self-calibration routine to complete. When the elevation and the walking belt have completely stopped (approx. 2 minutes), the self-calibration is finished.

Self-Calibration Routine

- a. The T2100 Treadmill checks the functionality of the elevation limit switches and the potentiometer by rising to the maximum height limit switch.
- b. The T2100 Treadmill sets the elevation parameters by descending to the minimum height limit switch and then rising again to the maximum height limit switch.
- c. The T2100 Treadmill descends to 10% grade and revolves the walking belt at 3.2 km/h (2 mph) for 30 seconds.
- d. The T2100 Treadmill stops the walking belt and the grade stops at 10%.

Check T2100 Treadmill Level

NOTE:

Before you check the T2100 Treadmill level, make sure that it has been moved to its final destination.

1. Use the controlling equipment to verify the T2100 Treadmill elevation is 0.0%.
2. Check the T2100 Treadmill level with a carpenter's level.
3. If the T2100 Treadmill is uneven, adjust the feet at the rear of the T2100 Treadmill until it is level.
4. If you cannot level the T2100 Treadmill safely, move it to another location.

Performing Leakage Tests

The leakage tests are safety tests to ensure that the equipment poses no electrical health hazards. Use the table below to determine which tests apply to the unit under test and the maximum allowable leakage currents. For international leakage limits, refer to the internal standards agencies of that particular country.

If the unit under test fails the leakage tests, do not allow the customer to use the equipment. Call Tech Support for assistance.

GE Healthcare recommends that you perform these tests:

- Before applying power for the first time
- Whenever internal assemblies are serviced

NOTE:

The accuracy of the leakage tests depends on a properly-wired wall outlet. Do not proceed until you verify the integrity of the power source.

WARNING:

Total system leakage current must not exceed 300 microamperes.

Table 1. Leakage Tests and Maximum Allowable Leakage Currents

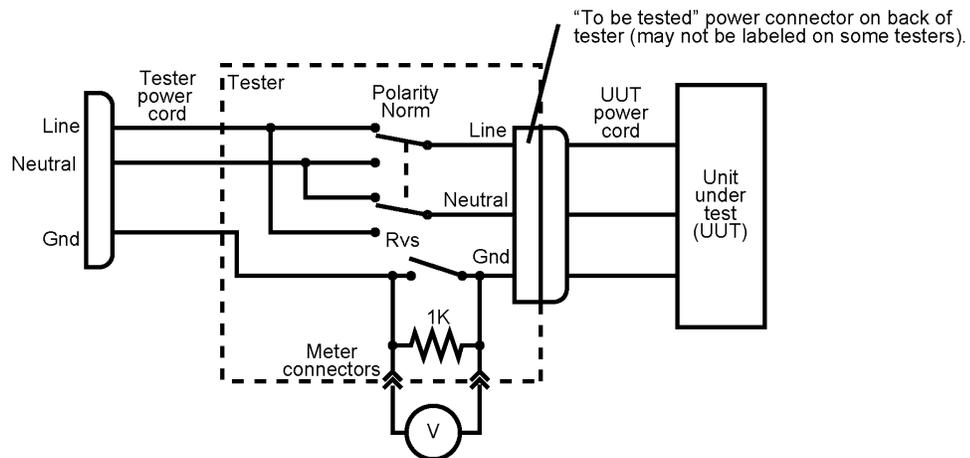
Test	Maximum Current (μA)
1 Ground-wire-leakage-to-ground	Gnd open = 1000
2 Chassis-leakage-to-ground	Gnd open = 500 Gnd closed = 100

Leakage Test Diagrams

These diagrams show only a representation of how a typical leakage current tester functions. Follow the instructions provided with the leakage current tester that you use.

Test #1

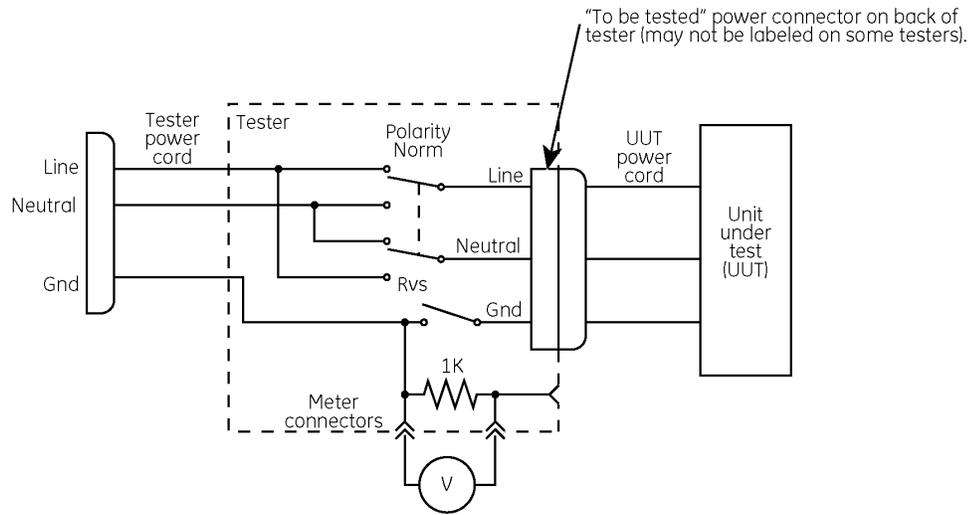
Ground-Wire-Leakage-to-Ground



Test #2

Chassis-Leakage-to-Ground (Exposed Chassis)

Make sure the UUT is in the ON state.



Functional Checkout

Functional Checklist

Perform each of the functional checkout procedures below and verify that the T2100 Treadmill passes each procedure before operating this treadmill.

Procedure	Indicate Pass/Fail	If Failed, perform the following:	Indicate Pass/Fail
AC Power Check. See "AC Line Voltage Test" on page 39.		Contact site electrician to correct.	
Ground Continuity Test. See "Ground Continuity Test" on page 43.		Contact site electrician to correct.	
Check Power Up - Turn on T2100 Treadmill <ul style="list-style-type: none"> Is the outlet tight in the wall? Does the plug feel tight when inserted into the outlet? 		Verify that the ESTOP is connected. The T2100 Treadmill will not power up if the ESTOP is not connected. Contact site electrician to correct. Contact site electrician to correct.	
Check Calibration			

Procedure	Indicate Pass/Fail	If Failed, perform the following:	Indicate Pass/Fail
<p>Can the unit elevate?</p> <p>Can the walking belt move with power?</p> <p>Speed check at 2 m.p.h. (3.2km/h) = 10 revs in 38 seconds. (Adhere a piece of tape to the walking belt and count 10 revs of the tape in 38 seconds.)</p> <p>Is the walking belt tracking evenly down the center of the walking board?</p> <p>Check the walking belt tightness. Get on the T2100 Treadmill and try to stop the belt at a slow speed with your feet, holding onto the handrail.</p>		<ol style="list-style-type: none"> 1. Initiate the self-calibration procedure. See "Self-Calibration" on page 45. 2. Follow the troubleshooting procedure error code 0x03 in "TDU Troubleshooting Table" on page 84. <ol style="list-style-type: none"> 1. Is the Emergency Stop Switch locked? If yes, unlock. 2. Initiate the self-calibration procedure. See "Self-Calibration" on page 45. 3. Follow the troubleshooting procedure for error code 0x02 in "TDU Troubleshooting Table" on page 84. <p>Initiate the self-calibration procedure. See "Self-Calibration" on page 45.</p> <p>Adjust belt tracking. See "Walking Belt Tracking Adjustment" on page 55.</p> <p>Adjust the belt tension. See "Walking Belt Tension Adjustment" on page 55.</p>	
<p>Check T2100 Treadmill Level</p> <p>Is the unit level and stable?</p> <p>Is the floor under the unit smooth and no loose tiles?</p>		<p>If unit is not level, adjust.</p> <p>Relocate the T2100 Treadmill.</p>	
<p>Check the drive belt tension and tracking.</p> <p>See "Drive Belt Adjustments" on page 117 for specific tension and tracking tolerances.</p>		<ol style="list-style-type: none"> 1. Adjust the drive belt tension and tracking. See "Drive Belt Adjustments" on page 117. 2. Call tech support. 	

Procedure	Indicate Pass/Fail	If Failed, perform the following:	Indicate Pass/Fail
Check Emergency Stop (ESTOP) Switch		<ol style="list-style-type: none"> If belt does not stop, make sure emergency stop switch is connected to back of the T2100 Treadmill. Call tech support. 	
Check Handles Refer to "Double-Check Handles" on page 52.		Tighten handle fasteners.	
Communicate with Host Can Host control elevation and speed?		<ol style="list-style-type: none"> Check that interface cable is properly connected. Replace interface cable. Use the T2100 Treadmill Diagnostic Utility (TDU) to help troubleshoot the problem. See "T2100 Treadmill Diagnostic Utility (TDU)" on page 78. 	
Noise and Vibration Vibration Rattling or Growling Thumping		<p>See "Location of Major Sub-Assemblies" on page 107 to identify these assemblies.</p> <ol style="list-style-type: none"> Check drive belt and walking belt tension. See "Walking Belt Tracking And Tension Adjustment" on page 54. Check for loose bolts and broken welds. Check the fly wheel. Check the drive pulley on motor. Make sure the roller assembly bolts are tight. <ol style="list-style-type: none"> Check for loose bolts. Check lithium grease on elevation racks. Check drive motor and elevation motor. <p>Check drive belt and walking belt tension. See "Walking Belt Tracking And Tension Adjustment" on page 54 .</p>	

Procedure	Indicate Pass/Fail	If Failed, perform the following:	Indicate Pass/Fail
Squealing or Grinding		1. Check drive motor and elevation motor.	
Squeaking		2. Check elevation rack.	
Rhythmic Rubbing		1. Check for split walking board. 2. Check drive motor and elevation motor. Check that walking board is level to the top surface of the rollers.	
Leakage Test		Request Biomed to perform Leakage Test.	
Was leakage test performed by Biomed and did it pass?		See "Equipment Assembly" on page 39.	

Double-Check Handles

Check to make sure all handles are secure. Verify that all screws on the handles are fastened securely.

4

Maintenance

Introduction

Recommended Maintenance

A regular equipment maintenance program helps prevent unnecessary equipment and power failures and also reduces possible health hazards.

To help you establish a systematic maintenance routine, GE Healthcare recommends that you periodically perform the maintenance and test procedures described in this manual, including:

- User to perform daily:
 - “Visual Inspection” on page 54
 - “Exterior Cleaning” on page 54
- Recommended six-month routine maintenance checks and test procedures performed by qualified technical personnel:
 - “Walking Belt Tension Adjustment” on page 55
 - “Walking Belt Tracking Adjustment” on page 55
 - “Self-Calibration” on page 45
 - Check the handles and tighten the fasteners.
- On a monthly basis test the **emergency stop** switch.

NOTE:

Unless you have an Equipment Maintenance Contract, GE Healthcare does not in any manner assume the responsibility for performing the recommended maintenance procedures. The sole responsibility rests with the individual or institution using the equipment. GE Healthcare service personnel may, at their discretion, follow the procedures provided in this manual during visits to the equipment site.

Required Tools and Supplies

See “Required Tools and Supplies” on page 105 for a complete list of tools.

Inspection and Cleaning

Visual Inspection

Regularly inspect the AC power cord and all other cords and cables for fraying or other damage. Perform safety tests on any repaired cords.

Inspect all plugs, cables and connectors for bent prongs or pins. Verify that all cords, socketed components, and connectors are securely seated.

Inspect the following for excessive wear or damage:

- Walking belt
- Drive belt
- Handrail and hardware

Exterior Cleaning

Turn the T2100 Treadmill system off. Clean the exterior surfaces with a clean, soft cloth and a mild dishwashing detergent diluted in water. Wring out the excess water from the cloth and take care not to drip solutions on the e-box connections and ports. (Use antiseptic cleaner on the handrails and walking belt.) Avoid contact with open vents, plugs or connectors. Dry the surfaces with a clean cloth or paper towel.

Interior Cleaning

Complete any pre-service procedures prior to opening the unit or performing any interior cleaning. Clean the unit as needed, but at least once per month.

Walking Belt Tracking And Tension Adjustment

WARNING:

Keep hands, hair, jewelry, and loose clothing away from moving parts.

When To Adjust

The T2100 Treadmill walking-belt tension is set at the factory. However, you should test the belt tracking every time the T2100 Treadmill is moved. Run the T2100 Treadmill for several minutes with no one exercising. If the belt tracks to one side or the other, then you must adjust the belt tracking.

It is not unusual for the T2100 Treadmill belt to move slightly off center while a person with a heavy gait is exercising. A properly adjusted belt re-centers itself when the person steps off the T2100 Treadmill. If the belt does not re-center, check the T2100 Treadmill level and adjust the belt tracking as described.

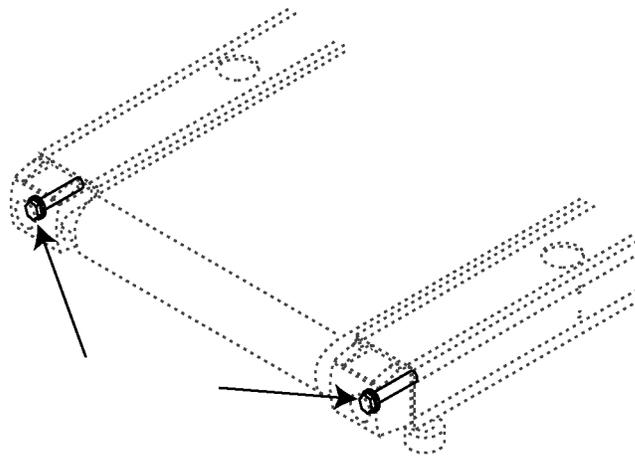
Walking Belt Tension Adjustment

1. Use the controlling equipment to set the walking belt speed to 3 – 5 km/h (2 – 3 mph).
2. Hold on to the handrails, mount the T2100 Treadmill, and begin walking at a normal pace.
3. Hold on to the handrails tightly and step harder and heavier onto the walking belt, adding more pressure and weight.

NOTE:

The belt tension should be just enough to keep the belt from slipping.

4. Adjust the tension bolts until the walking belt does not slip.



Arrows point to location of tension screws.

Walking Belt Tracking Adjustment

1. Use the controlling equipment to set the walking belt speed to 7 – 8 km/h (4 – 5 mph).
2. To correct a belt that tracks to the right, turn the right pulley adjustment screw **CLOCKWISE** in 1/8-turn increments until the belt tracks in the center. Wait 2 or 3 minutes between each 1/8-turn to allow the belt position to stabilize.

To correct a belt that tracks to the left, turn the left pulley adjustment screw **CLOCKWISE** in 1/8-turn increments until the belt tracks in the center. Wait 2 or 3 minutes between each 1/8- turn to allow the belt position to stabilize.

NOTE:

Make adjustments to the pulley screws in small increments.

Over-adjustments and repeated tightening of the screws can cause too much tension on the belt.

3. If either adjustment in step 2 results in an over-adjustment of the belt tracking, loosen the pulley screw that was tightened and wait several minutes for the T2100 Treadmill belt position to stabilize. Then tighten the other pulley adjustment screw.

Maintenance

4. Increase the speed to 16 – 19 km/h (10 – 12 mph) and verify that the belt continues to track in the center.
5. Check the walking belt tension again to verify that it has not been loosened when adjusting the tracking. See [“Walking Belt Tension Adjustment” on page 55](#).

Power Board (PCB) Theory

General Description

The power board and processor board function together as part of the e-box to control the T2100 Treadmill. The power board contains the following:

- Mains components
- Isolation transformer
- Elevation and drive interface circuitry
- Interface to processor board

Precautions

Handling of this power board or harness should be done by qualified service personnel observing customary EST protections procedures.

Initial Board Conditions

The power board initial conditions are all at 0V.

Power Input Requirements

The T2100 Treadmill is used on single phase AC. The specific power ratings are 200-240VAC, 50-60 Hz, 16A.

Power Distribution/Isolation

The power board receives 200 to 240VAC power (nominal 220V). The isolation transformer supplies 12V to two switching regulators. The switching regulators supply +5V to both the isolated side and the non-isolated side of the processor board. Bypass caps are distributed across the board to minimize EMI and power supply noise.

Power Inlet, Drive Power Outlet & Mains

The power comes in on the terminal block, gets fused and filtered, and is distributed to the isolation transformer, out to the drive system and to a +24V power supply. Externally accessible T 0.5AL fuses are provided for the control portion of the circuitry. A 2.5 Amp internal fuse is dedicated to protecting the +24V power supply. The 20 Amp internal fuses are for the drive section and are intended to protect the wiring from major faults within the drive system. Spacings for creepage and isolation are critical in this whole section.

Power Supplies

There are two identical power supplies. One is for the microcontroller power and the serial link, the other is for signal interface to the control drive. The isolated serial link supply provides 5-volt power to operate a manual controller and the control circuitry on the processor board.

Unregulated power for the isolated power comes from the center tapped isolation transformer, the non-isolated power comes from the 24V power supply. These are both fed through the full-wave bridge to the switching regulator.

The switching regulator is a step-down, buck PWM-type that switches at about 100 KHz. It also has an internal current limit of 4 amps. The 5-volt regulators are configured to produce about 5.1 volts.

Local Ride-Through Power

Located on the power board are 3 Ultracapacitors. They are fed by the isolated switching power supply. These capacitors provide 3.3 Farads of capacitance that give the processor board power to logically power down activities in case of a loss of power to the T2100 Treadmill.

Processor Board Connectors

The power board has two connectors that directly interface with the processor board. The first, a 3-pin power connector provides +12V Unregulated power, +5V isolated power and isolated ground to the control side of the processor board. The 10-pin ribbon cable provides a signal interface 24V power, as well as +5V non-Isolated power and a non-isolated ground connection.

Isolation Transformer

The isolation transformer provides isolation for the secondary. The 220 VAC primary is stepped down and isolated from the 12V (CT) secondary. The secondary provides +12V unregulated power for a 5-volt switching supply.

Elevation Relays

A direction control and an enable relay control the elevation motor. A change in direction should only occur when the elevation motor is stopped. The enable relay is disabled by the normally-closed limit switches at the end of travel to prevent damage to the motor. The LIMIT* signal goes low when a limit switch is activated in a particular direction.

Elevation Sensor

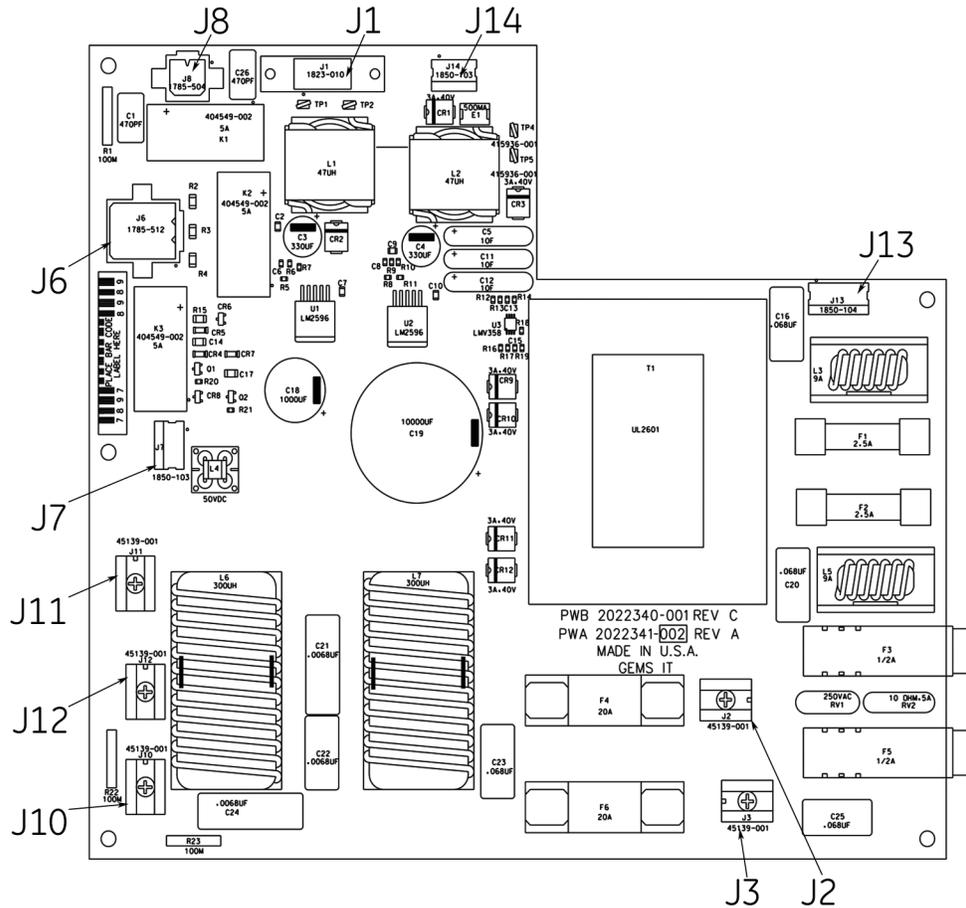
The elevation sensor is a 5-turn pot that is coupled to the elevation rack. The voltage on pin 2 should be proportional to elevation. That is, low voltage should be low elevation, increasing voltage should indicate increasing elevation. During self-calibration, the offset and gain remain in software memory. Initially, the limit switch positions are the reference for self-calibration. Once the offset and gain are adjusted, the pot position determines the elevation.

ESD and EMI Compatibility

The I/O connectors on the power board have current-limiting resistors, zener diodes, or filtering capacitors wherever possible to prevent EMI from escaping the board. These components also limit rise-time and voltages which may come from ESD or other noise sources.

Power Board Input/Output Signal Requirements

See the following illustration for location of the J PINs.



J1 10-Pin Ribbon Between Power Board and Processor Board

PIN #	NAME	TYPE	IN/OUT	FREQ	COMMENT
J1-1	+5.1V	PWR	OUT	DC	Digital Power Supply
J1-2	DGND	COM	OUT	DC	Digital Ground Supply
J1-3	EN_ELEV	LOGIC	IN	PULSE	Elevation Enable Control
J1-4	DGND	COM	OUT	DC	Digital Ground Supply
J1-5	LIMIT*	LOGIC	OUT	PULSE	Limit Switch Feedback
J1-6	DGND	COM	OUT	DC	Digital Ground Supply
J1-7	ELEV_FB	A	OUT	DC	Pot Elevation Feedback
J1-8	DGND	COM	OUT	DC	Digital Ground Supply

J1 10-Pin Ribbon Between Power Board and Processor Board (cont'd.)

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J1-9	UP/DOWN*	LOGIC	IN	PULSE	Elevation Direction Controls
J1-10	+24V	PWR	IN	DC	Digital Power Supply

J2, J3 Power in from EMI Filter

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J2-1	LINE	PWR	IN	50-60 Hz	Line Power In
J3-2	LINE	PWR	IN	50-60 Hz	Line Power In

J6 Elevation Motor Power Cable

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J6-1	220V_UP	PWR	OUT	50-60 Hz	Power Up Elevation
J6-2	NC	NC			NC
J6-3	220V_DN	PWR	OUT	50-60 Hz	Power Down Elevation
J6-4	220V_UP	PWR	OUT	50-60 Hz	Power Up Elevation
J6-5	NC	NC			NC
J6-6	220V_DN	PWR	OUT	50-60 Hz	Power Down Elevation
J6-7	NC	NC			NC
J6-8	NC	NC			NC
J6-9	NC	NC			NC
J6-10	220V_ELEV	PWR	OUT	50-60 Hz	220V Power to Motor

J6 Elevation Motor Power Cable (cont'd.)

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J6-11	NC	NC			NC
J6-12	GND	COM	OUT	DC	Elevation Ground

J2, J3 Power in from EMI Filter

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J7-1	+5VQ	PWR	OUT	DC	Quiet Power to Pot
J7-2	ELEV_FB	A	IN/OUT	DC	Pot Elevation Feedback
J7-3	QGND	GND	OUT	DC	Quiet Ground to Pot

J8 Limit Switch Feedback Cable

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J8-1	LIMIT PULSE	PULSE	IN	DC	Normally Closed
J8-2	LIMIT PULSE	PULSE	IN	DC	Normally Closed
J8-3	HIGH_LIMIT_SWITCH	PULSE	IN	DC	High Limit Switch
J8-4	LOW_LIMIT_SWITCH	PULSE	IN	DC	Low Limit Switch

J10, J11, J12 AC Power to Drive Controller

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J10-1	GND	COM	OUT	DC	Ground
J11-1	LINE	PWR	OUT	50-60 Hz	Line Power Out
J12-1	LINE	PWR	OUT	50-60 Hz	Line Power Out

J13 AC Power to +24V Power Supply

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J13-1	LINE	PWR	OUT	50-60 Hz	Line Power Out
J13-2	NC	NC			NC

J13 AC Power to +24V Power Supply (cont'd.)

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J13-3	NC	NC			NC
J13-4	LINE	PWR	OUT	50-60 Hz	Line Power Out

J14 Power Cable to Processor Board

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J14-1	+5V ISO	PWR	OUT	DC	ISO Power Supply
J14-1	ISOGND	COM	OUT	DC	ISO Ground Supply
J14-1	+VUNREG	PWR	OUT	DC	ISO Power Supply

Processor Board (PCB) Theory

General Description

The processor board and power board function together to control the T2100 Treadmill. The processor board contains the following:

- Micro-controller CPU circuitry (MC9S12DG128)
- Flash Memory (calibration/history data)
- Temperature sensor
- Serial control links
- I/O circuitry

The I/O circuitry receive inputs from a stress system controller along with feedback from the T2100 Treadmill sensors to control the elevation and drive relays located on the power board.

Power Distribution

The processor board receives two sources of 5-volt power from the power board: an isolated supply, and a non-isolated supply. Bypass caps distributed across the board minimize EMI and power supply noise.

Clock Generator

A 16.00 MHz oscillator in a colpitts configuration is used to provide the processor clock. This configuration creates a small amplitude (1 V_{p-p}) sinusoid mounted on a DC bias level to minimize EMI.

Reset Generator

The reset/watchdog/power-loss signal generator will reset the CPU if any of the five conditions below occur:

1. Upon receipt of the "BREAK" signal for more than 3.3 seconds over the host serial port, the 100K/0.33uF RC will discharge sending a low level at the MR* input and creating the RESET* signal.
2. If the 5V (+/- 2%) supply falls below 4.55, RESET* will be activated.
3. If the CPU fails to reset the watchdog timer before 1.6 seconds, the RESET* will be activated. The Firmware has the watchdog control task separated from the other systems tasks through its real time operating system (RTOS) to help guarantee that all tasks are running.
4. If the **ESTOP** plug is disconnected from the jack mounted on the processor board a RESET* signal will be generated.
5. Manual reset.

Processor Circuitry

The MC9s12DG128 runs at 16 MHz with an internal bus clock of 8 MHz. Its code is stored in the 128 KB Flash EPROM. The MC9s12DG128 addresses its memory internally. The processor handles all the I/O, including two serial channels, 4 analog inputs, and digital inputs and outputs to control the T2100 Treadmill grade, speed, calibration and **ESTOP** processes.

Analog Inputs

Ratiometric Inputs

Elevation feedback (from the pot), +5.1V ISO ref, VUNREG ref are designed to take ratiometric voltages referenced to +5.1V ISO as inputs to the processor.

Temperature Sensor

The processor monitors temperature and saves peak temperature in EEROM data storage for use by field service. The sensor outputs 10mV/deg C. The OPAMP provides a gain of 4.92. The MC9s12DG128 ADC will produce the following output:

- In hardware

$$\text{ADC value} = \text{Temp(deg C)} * 10\text{mV/deg C} * \text{GAIN} * [256(\text{max ADC counts})/\text{VREF}]$$
- In firmware
 - Readout temp = (ADC value) * 4 / 10
 - For example:
 - At 25 degrees Celsius

$$\text{ADC value} = 25 * 0.01 * 4.92 * 256 * /5.1 = 62 \text{ (Dec)}$$

$$\text{Readout temp} = 62 * 4 / 10 = 24.8$$
 - At 100 degrees Celsius

$$\text{ADC value} = 100 * 0.01 * 4.92 * 256 * /5.1 = 247 \text{ (Dec)}$$

$$\text{Readout temp} = 247 * 4 / 10 = 98.8$$

RS-232/422 Interfaces

The LTC1334 serves as the Host to IFC board transceiver. It translates the RS422/232 serial protocol voltage levels to TTL levels. The MAX489 is the transceiver for the processor board to drive communication. It translates RS422 signals to proper TTL levels.

ESD and EMI Compatibility

The connectors on this board have current limiting resistors and filtering capacitors on almost every signal to prevent EMI from escaping this board. These components also limit rise-time and voltages which may come from ESD or other noise sources.

Isolation

The drive serial communication circuit, drive, and elevation control signals share a common ground that may be attached to the chassis. The Host serial communication, **ESTOP** connection, calibration button, and control circuitry are all placed on isolated power. This ground allocation separates the micro controller ground from the chassis ground by using opto-couplers allowing at least 4KVAC without breakdown and double isolation for 250 VAC.

Operation

The processor board's main task is to monitor the proper T2100 Treadmill operation by testing selected variables from the system. In case of any variable operating out of specs, the firmware will first detect the event, then log it, and finally stop any further operation. For speed control, the processor board will act as a translator between the host and the drive system. For elevation control, the board will act as a controller by providing proper calibration and by handling elevation increment/decrement commands received via the host serial port.

Start-Up Sequence

Immediately after power-up, the processor board will start a self-test procedure where the following subsystems are tested: internal RAM, board temperature, external serial flash memory, host communication, drive communication, control signals, elevation, power supply, **ESTOP**, and calibration. If any of the above tests result in an abnormal condition, the processor board will stop any further operation and will log the condition on its external flash memory. After all subsystems are determined to be operating properly, the processor board will enter in a standby state until a serial command is received from the host. The processor board will wait until the host sends a belt start command "B<CR>" to start operations. After receiving the belt start command, the board will enable the drive by activating the D_DRIVE_EN signal on J2. After this action, the drive will be activated and in standby state. At this moment elevation and speed control commands can be sent to the processor board.

Elevation Control

The elevation control process works as follows: The host will send an elevation command "GXXX0<CR>" to the processor board, the micro controller will interpret this data in order to enable the elevation subsystem by asserting EN_ELEV signal on J9 and, based on the actual elevation status, assert/de-assert the UP/DOWN* signal on J9 until the requested elevation is achieved. The elevation range is from 0 to 25% grade.

Speed Control

The host will send a speed command "SXXX0<CR>" to the processor board, the firmware in the micro controller will translate this command into a data frame, It will enable the drive if it is not already enable at this moment, and will send the frame through its drive serial interface. The drive will interpret the data frame and will answer with data ACK or NACK depending on the transmission condition. The speed range is 0 to 13.5 MPH.

Self-Calibration

Press and hold the Calibration push-button (located on the connection panel). Power up the treadmill and continue to hold the Calibration button until the T2100 Treadmill starts to elevate.

NOTE:

Hold the Calibration button for at least 4 seconds. May be up to 25 seconds only for a T2100 processor board that has never been calibrated.

ESTOP

In order to operate the T2100 Treadmill, the **ESTOP** plug must be attached to its receptacle on the processor board. Failure to perform this action will initiate a RESET* sequence on the microcontroller disabling any further power up sequence. Verify that the **ESTOP** switch is not activated. Failure to verify this condition will cause the T2100 Treadmill to not operate.

Precautions

The board must be powered before signals are applied to it.

The circuitry is static sensitive. Therefore, when removing or installing boards, the power should be Off.

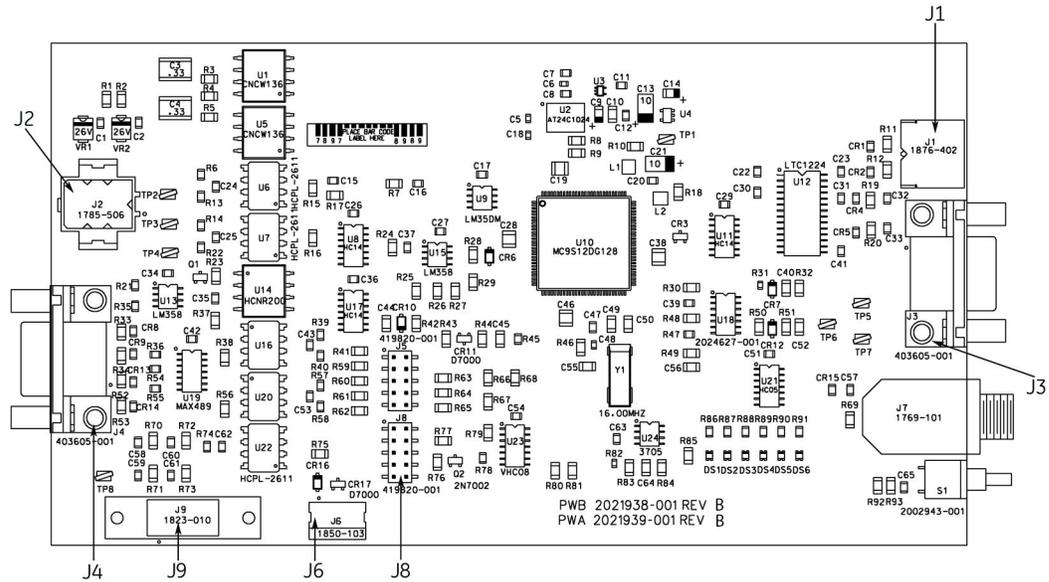
Processor Board Power Input Requirements

Power Supply Input Requirements

Voltage	Nominal Voltage	Test Range	Max Current	Ripple p-p	Max Rating	Isolated?
+5V ISO	+5.1 VDC +/- 2%	+/- 5%	200 mA	100 mV	5.5 V	Yes
+VUNREG	+11.5 VDC unreg	NA	500 mA	NA	13.0 V	Yes
+5V DIG	+5.1 VDC +/- 2%	+/- 5%	100 mA	100 mV	5.5 V	No
+24V	+24 VDC +/- 2%	+/- 5%	600 mA	100 mV	25 V	No

Processor Board Input/Output Signal Requirements

See the following illustration for location of the J PINs.



J1 Host miniDIN Connector

PIN #	NAME	TYPE	IN/OUT	FREQ	COMMENT
J1-1	NC	NA	NA	NA	NA
J1-2	NC	NA	NA	NA	NA
J1-3	RXLO	RS422	IN	9600bps	Host RS422 Serial Comm
J1-4	ISOGND	COM	OUT	DC	ISO GND Supply
J1-5	TXLO	RS422	OUT	9600bps	Host RS422 Serial Comm
J1-6	RXHI	RS422	IN	9600bps	Host RS422 Serial Comm

J1 Host miniDIN Connector (cont'd.)

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J1-7	NC	NA	NA	NA	NA
J1-8	TXHI	RS422	OUT	9600bps	Host RS422 Serial Comm

J2 Drive Signals Connector

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J2-1	GND_24V	COM	IN	DC	+24V Digital Gnd Supply
J2-2	+24V	PWR	IN	DC	+24V Digital Power Supply
J2-3	GND_24V	COM	OUT	DC	+24V Digital Gnd Supply
J2-4	D_DRIVE_EN	LOGIC	OUT	PULSE	Drive Enable Signal
J2-5	GND_24V	COM	OUT	DC	+24V Digital Gnd Supply
J2-6	D_ESTOP*	LOGIC	OUT	PULSE	Deceleration eStop Signal

J3 Host DB-9 Connector

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J3-1	ISOGND	COM	OUT	DC	ISO GND Supply
J3-2	+5V ISO	PWR	OUT	DC	ISO Power Supply
J3-3	NC	NA	NA	NA	NA
J3-4	RXLO	RS422	IN	9600bps	Host RS422 Serial Comm
J3-5	RXHI	RS422	IN	9600bps	Host RS422 Serial Comm
J3-6	+VUNREG	PWR	OUT	DC	ISO Power Supply
J3-7	ISOGND	COM	OUT	DC	ISO Gnd Supply

J3 Host DB-9 Connector (cont'd.)

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J3-8	TXLO	RS422	OUT	9600bps	Host RS422 Serial Comm
J3-9	TXHI	RS422	OUT	9600bps	Host RS422 Serial Comm

J4 Drive DB-9 Connector

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J4-1	NC	NA	NA	NA	NA
J4-2	RX-	RS422	IN	9600bps	Drive RS422 Serial Comm
J4-3	TX-	RS422	OUT	9600bps	Drive RS422 Serial Comm
J4-4	NC	NA	NA	NA	NA
J4-5	DGND	COM	OUT	9600bps	Digital Gnd Supply
J4-6	NC	NA	NA	NA	NA
J4-7	TX+	RS422	OUT	9600bps	Drive RS422 Serial Comm
J4-8	RX+	RS422	IN	9600bps	Drive RS422 Serial Comm
J4-9	NC	NA	NA	NA	NA

J6 Isolated Power Input Connector

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J6-1	+5V ISO	PWR	IN	DC	ISO Power Supply
J6-2	ISOGND	COM	IN	DC	ISO Gnd Supply
J6-3	+VUNREG	PWR	IN	DC	ISO Power Supply

J8 BDM Connector

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J8-1	BKGND	LOGIC	IN/OUT	9600bps	uC Serial Comm
J8-2	NC	NA	NA	NA	NA
J8-3	NC	NA	NA	NA	NA

J8 BDM Connector (cont'd.)

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J8-4	+5V ISO	PWR	OUT	DC	ISO Power Supply
J8-5	RST*	LOGIC	IN	PULSE	uC Reset Signal
J8-6	ISOGND	COM	OUT	DC	ISO GND Supply

J9 Power Board to Processor Board Connector

PIN #	NAME	TYPE	IN/ OUT	FREQ	COMMENT
J9-1	+5.1V	PWR	IN	DC	Digital Power Supply
J9-2	DGND	COM	IN	DC	Digital Gnd Supply
J9-3	EN_ELEV	LOGIC	OUT	PULSE	Elevation Enable Control
J9-4	DGND	COM	IN	DC	Digital Gnd Supply
J9-5	LIMIT*	LOGIC	IN	PULSE	Limit Switch Feedback
J9-6	DGND	COM	IN	DC	Digital Gnd Supply
J9-7	ELEV_FB	ANA	IN	DC	Pot Elevation Feedback
J9-8	DGND	COM	IN	DC	Digital Gnd Supply
J9-9	UP/DOWN*	LOGIC	OUT	PULSE	Elevation Direction Ctrl
J9-10	+24V	PWR	OUT	DC	Digital Power Supply

Drive Controller Theory

General Description

A brushless DC motor consists of permanent magnets that create a static magnetic field and electromagnets that, when energized, provide motion. The magnets attach to a shaft to form a rotor with an even number of magnetic poles. One or more electromagnets are wound on a laminated steel stator to form the motor phases. Typically, brushless DC motors have four, six, or eight magnetic poles with three winding phases.

With multiple motor phases, there is always one of the phases that can be energized to provide rotational torque-regardless of the rotor position with respect to the stator. Energizing the phases in the proper sequence and polarity provides constant unidirectional torque. Transistors have replaced brushes to accomplish phase switching. Sensors determine the rotor position and turn on the correct motor phase.

Phases and Power Switches

The most common arrangement of phases and power switches is the three-phase, Y-connected windings with six power switches. Each phase consists of two windings in series, spaced 120 electrical degrees apart. Each phase can be energized in either direction by turning on two of the six power devices. This arrangement of switches

and motor windings is identical to an AC motor drive. The number of electrical cycles per mechanical revolution is equal to the number of rotor poles divided by two.

Motor Torque

To control motor torque, it is necessary to control the current through the motor windings since torque is directly proportional to motor current. Rapidly switching the power devices on and off limits the effective voltage applied to the motor winding. Using a feedback loop, a voltage command controls the motor current. This is called the current loop or inner loop of the drive.

Motor Speed

Control of motor torque is only half of the motor control process, since the ultimate goal of a motor drive is to provide an adjustable motor speed. The simplest speed control loop consist of a summing junction to determine the difference between the desired motor speed and the actual motor speed, along with a gain block that feeds into the current loop. The current loop may be considered a single block with voltage as an input and motor current as an output. The overall feedback loop is called the velocity loop or outer loop of the drive. While this system controls motor speed, it cannot control the exact motor speed since some error signal is required to drive the current loop. The actual motor speed is dependent on the speed command, the load, the error gain, and the characteristics of the motor itself.

Adding an integrator to the error amplifier allows exact speed control. Any speed error results in an output from the integrator that builds with time and causes an output to the current loop. This loop, therefore, will seek zero speed error. This is the type of velocity loop used in the T2100 Treadmill drive.

Electrical Requirements

The two black wires that exit the side of the enclosure supply power to the drive. The power source should be single phase, 200–240VAC, 50–60Hz, 16A.

Maximum input current is 16A.

Fuses should be FLM 20A SLO only. Substituting a different fuse type may cause a fire or safety hazard.

The orange wire from the side of the enclosure is connected to the sheetmetal enclosure and should be connected to the designated terminal on the power terminal block. Do not connect this wire to the T2100 Treadmill frame which would cause a safety hazard.

The motor wires exit through the flexible conduit on the left side of the enclosure. These wires carry the pulsed 320V to the motor. Be sure to observe proper phasing when connecting these wires. The drive will not operate with incorrect phasing.

NOTE:

If the motor is disconnected, do not let the motor wires short to each other or any other point. If it rotates, the motor will function as a generator, and it may be damaged or cause a shock hazard. The drain wire should be connected to the motor frame. Make sure this connection is secure.

6

Troubleshooting

Quickcheck Items

Speed and Elevation Table

Use the quickcheck chart below to identify the probable causes for problems relating to stops and hesitations for elevation, speed, and a combination of elevation and speed.

Speed and Elevation	Elevation Only	Speed Only
Both speed and elevation stops.	Elevation hesitates or seeks, and/or stops the T2100 Treadmill during an elevation change.	T2100 Treadmill belt hesitates or stops.
<ul style="list-style-type: none"> • Low input voltage. Verify power source meets requirements. • Defective drive controller • Defective power board or processor board. • Defective elevation potentiometer (when treadmill stops during an elevation change). • Defective treadmill ON/OFF switch breaker (tripping). <ol style="list-style-type: none"> 1. Check the DS6 LED on the processor board. See “Processor Board Status LEDs” on page 83. 2. Run the “T2100 Treadmill Diagnostic Utility (TDU)” on page 78 and see the “TDU Troubleshooting Tables and Status LEDs” on page 82. 	<ul style="list-style-type: none"> • Defective elevation potentiometer. • Misadjusted limit switches. • Excess rack grease affecting limit switches and or elevation potentiometer. <ol style="list-style-type: none"> 1. Check the DS6 LED on the processor board. See “Processor Board Status LEDs” on page 83. 2. Run the “Processor Board Status LEDs” on page 83 and see the “TDU Troubleshooting Tables and Status LEDs” on page 82. 	<ul style="list-style-type: none"> • Defective drive controller • Lack of wax on walking board. Check both walking board and walking belt. (Especially when the parts have not been replaced for 3 or more years. • Low input voltage. Verify power source meets requirements. <ol style="list-style-type: none"> 1. Check the DS6 LED on the processor board. See “Processor Board Status LEDs” on page 83 2. Run the “Processor Board Status LEDs” on page 83 and see the “TDU Troubleshooting Tables and Status LEDs” on page 82.

Emergency Stop Switch Verification

Verify that the emergency stop switch is installed and connected. The emergency stop switch (**ESTOP**) must be installed for the T2100 Treadmill to operate. If the **ESTOP** is not installed, the T2100 Treadmill will not operate.

ON/OFF Switch

When turning the T2100 Treadmill ON/OFF switch to the OFF position, there is a period of approximately 1 second when the remaining power cycles through the system. The T2100 Treadmill will not power up until all remaining power has cycled through the system. After turning OFF the T2100 Treadmill, wait approximately 1 second before turning the ON/OFF switch back ON.

Burn-In Mode

Burn-in mode is a repetitive cycle of elevation calibration and walking belt revolutions. It can be helpful when attempting to replicate an intermittent problem for troubleshooting.

Activating Burn-In

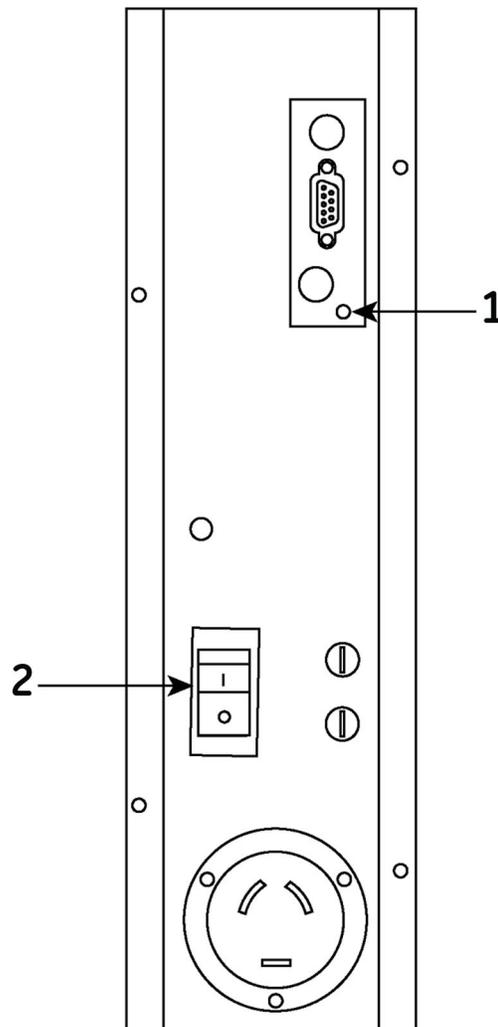
WARNING:

INJURY TO PERSON. During the burn-in process the T2100 Treadmill will reach maximum elevation and speed in a repetitive cycle until power is removed. Make sure you monitor the site at all times.

Make sure there are no customers or patients on or near the T2100 Treadmill during burn-in.

To activate the burn-in mode, do the following:

1. Remove controlling device (for example, CASE) cable or turn off the controlling device.
2. Unlock the **emergency stop** switch.
3. Connect the AC power cable on the T2100 Treadmill to the wall outlet.
4. Press and hold in the **Calibration** button.



Item	Description
1	Calibration Button
2	ON/OFF Power Switch

5. Turn the T2100 Treadmill ON/OFF switch to the On position.
6. Continue to hold the Calibration button until the T2100 Treadmill starts changing elevation.

NOTE:

Hold the Calibration button for at least 4 seconds. May be up to 25 seconds only for a T2100 processor board that has never been calibrated.

This initiates the self-calibration routine.

NOTE:

The burn-in mode can only be activated while the T2100 Treadmill is performing a self-calibration.

7. Press the **Calibration** button again as soon as the T2100 Treadmill gets to the maximum height limit switch (maximum 30 seconds) and hold until the T2100 Treadmill elevation starts changing again (maximum 2 seconds). This initiates the burn-in mode. The self-calibration routine must finish before the burn-in mode starts.

Self-Calibration Routine

1. The T2100 Treadmill checks the functionality of the elevation limit switches and the potentiometer by rising to the maximum height limit switch.
2. The T2100 Treadmill sets the elevation parameters by descending to the minimum height limit switch and then rising again to the maximum height limit switch.
3. The T2100 Treadmill descends to 10% grade and revolves the walking belt at 3.2 km/h (2 mph) for 30 seconds.

Burn-In Routine

1. The T2100 Treadmill elevates to 25°.
2. The T2100 Treadmill elevates to 0°.
3. The T2100 Treadmill elevates to 10°.
4. The T2100 Treadmill elevates to 12.5°.
5. The T2100 Treadmill activates the walking belt. The walking belt goes from 0 to 21.7 km/h (13.5 mph) in increments of .8 km/h (0.5 mph) every 7.5 seconds.
6. After reaching 21.7 km/h (13.5 mph) the walking belt coasts to a stop and the elevation lowers to 0°.
7. The burn-in routine repeats until power is removed from the T2100 Treadmill.

Visual Inspection

A thorough visual inspection of the equipment can save time. Small things—disconnected cables, foreign debris on circuit boards, missing hardware, loose component—can frequently cause symptoms and equipment failures that may appear to be unrelated and difficult to track.

Take the time to make all of the recommended visual checks (see the visual inspection chart on the next page) before starting any detailed troubleshooting procedures.

CAUTION:

Before performing any maintenance or repair on the equipment, take precautions against electrostatic discharge damage.

CAUTION:

Improper repair methods can damage the PCB assemblies even further.

Only qualified service personnel with the proper equipment should attempt to repair PCBs.

Power Down

Set the treadmill's ON/OFF switch to OFF (0). Disconnect the power cord from the AC wall outlet.

WARNING:

Unplug the unit before performing the following procedure.

Visual Inspection Chart

Area	Look for the following problems:
I/O Connectors and Cables	<ul style="list-style-type: none"> • Fraying or other damage • Bent prongs or pins • Cracked housing • Loose screws in plugs • Check that each terminal on the X1 connector is tightened securely. See "Drive Controller X1 PIN Descriptions" on page 121 for torque requirements.
Fuses	Type and rating. Replace as necessary. See "Power Board Fuse Locations" on page 103 .
Interface Cables	<ul style="list-style-type: none"> • Excessive tension or wear • Check for loose connections • Check that each terminal on the X1 connector is tightened securely. See "Drive Controller X1 PIN Descriptions" on page 121.
Circuit Boards	<ul style="list-style-type: none"> • Moisture, dust, or debris (top and bottom) • Loose or missing components • Burn damage or smell of over-heated • Socketed components not firmly seated • PCB not seated properly in edge connectors • Solder problems: cracks, splashes on board, incomplete feed through, prior modifications or repairs

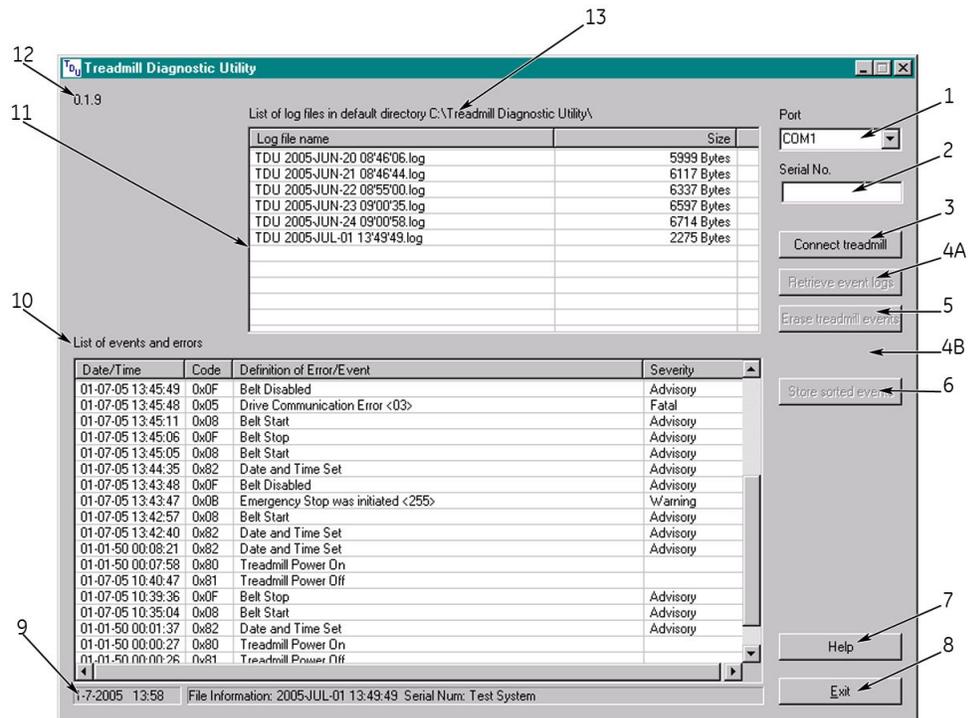
Visual Inspection Chart (cont'd.)

Area	Look for the following problems:
Ground Wires/Wiring	<ul style="list-style-type: none"> Loose wires or ground strap connections Faulty wiring Wires pinched or in vulnerable position
Mounting Hardware	Loose or missing screws or other hardware, especially fasteners used as connections to ground planes on PCBs
Power Source	<ul style="list-style-type: none"> Faulty wiring, especially AC outlet. See “AC Line Voltage Test” on page 39. Circuit not dedicated to system (Power source problems can cause static discharge, resetting problems, and noise)

T2100 Treadmill Diagnostic Utility (TDU)

The TDU can be installed on an FE laptop, PC, or a CASE system and is used as an interface to retrieve error and event logs stored in the T2100 Treadmill flash memory. These event and error logs are used to help troubleshoot problems, and identify historical trends. See [“TDU Troubleshooting Tables and Status LEDs” on page 82](#) for diagnostic scenarios using TDU’s error and event codes.

Overview of the TDU Application Interface



Item	Description
1	Port – Serial communication port selection. (COM1 is the default port.)
2	Serial No. – Text field for manual input of the serial number which is only for documentation in the log file. (Instead of the serial number, an optional 16-digit text can be entered.)
3	Connect treadmill – A connection to the T2100 Treadmill will be established. This must be done before you can download a log file. The T2100 Treadmill characteristics (Type, Version, ...) are shown in the status line when the connection is done. For your PC/Laptop the connection will be released when the TDU is closed. The scratch file TDU Dwnld.txt in default directory will be created or overwritten.
4A/4B	4A: Retrieve event logs – Initiates the download of the T2100 Treadmill event memory. After downloading the scratch file TDU Dwnld.txt contains all rough data. Subsequently a text file will be created with a unique file name built of date and time and the extension .log . 4B: Stop – Only available while retrieving event logs. The process will stop and a log file will be created with the events that have been received.
5	Erase treadmill events – The T2100 Treadmill events will be erased in the device flash. All previous events stored are lost. The power up time, belt time, and elevation time are reset.
6	Store sorted event – Creates an additional log file with the events as sorted in the List of events and errors . The sort criteria is documented in the log file. The filename remains with the addition sorted .
7	Help – Shows this help file.
8	Exit – Exits the TDU. For your PC/Laptop the connection will be closed.
9	Status line – Displays current date and time, and status of the TDU utility.
10	List of events and errors – This list shows all events in a log file in a formatted form. By clicking the column header the list can be sorted accordingly. See "TDU Error Log Date and Time Information" on page 81 for a description of the TDU timestamp.
11	List of log files in the default directory – This list shows all log files in the default directory. You can double-click a log file to show its content in the List of events and errors . All log files must have the file extension .log . Log file names can be modified by the user, for example, for a better allocation, but the extension must be kept.
12	Version – Displays the currently operating version of the TDU.
13	Identifies the default directory where the log files are stored.

TDU Application Error Definitions

TDU Error	Error Definition
Default directory does not exist	The directory C:\Treadmill Diagnostic Utility does not exist and could not be created. The directory needs to be created manually.
Log file is empty	The selected log file is empty. Open the log file with an ascii text editor such as notepad to verify.

TDU Error	Error Definition
Log file is inconsistent	The selected log file does not contain valid data or the log file has become corrupt. Open the log file with an ascii text editor such as notepad to view the log.
Open File Error	A text file could not be opened. If the TDU was connecting or starting to retrieve from the T2100 Treadmill, the scratch file TDU Dwnld.txt could not be opened. If the TDU was viewing an event log or done retrieving from the T2100 Treadmill the log, the log file could not be opened. Verify the file exists in the default TDU directory.
Open COM Error	The selected COM port could not be opened. Verify a different application is not using the COM port. Restart the host system if the issue remains.
COM Error	Data can not be sent or received over the selected COM port. If the error continues to appear, restart the host system.
Treadmill not responding	The TDU is not receiving data from the T2100 Treadmill. Verify the T2100 Treadmill is powered on and connected to the correct COM port. If the error continues to appear, power cycle the T2100 Treadmill and restart the host system.
Download failed due to max. repetitions	The TDU received too many events with bad checksums over the serial cable. Verify the serial cable is fully inserted. If the error continues to appear, power cycle the T2100 Treadmill and restart the host system.
Download is inconsistent	The scratch file TDU Dwnld.txt contains invalid data or the file has become corrupt. Open the file with an ascii text editor such as notepad to view the data. The event log may have to be retrieved again.

Download the TDU

The TDU application is available for download from GE service support portals. Follow the instructions below to access the nearest service portal.

NOTE:

Customers can call Technical Support to receive the utility via email.

1. Create a directory folder **C:\Treadmill Diagnostic Utility** and download the **TDU.exe** and **TDU Help.pdf** into that directory. The TDU files can be downloaded from:
 - Service Support Central Link – http://supportcentral.ge.com/products/sup_products.asp?prod_id=20335
Software Library > Non-Invasive Cardiology > Resting/Stress
 - EMEA Service Web Site – <http://194.45.46.5/>

Software > Software Download > Cardiology > Stress Systems > T2100

Launch TDU and Retrieve Event and Error Logs

- The TDU can be launched by running the **TDU.exe** file from the **C:\Treadmill Diagnostic Utility** directory, or right-click the **TDU.exe** and select **Send To > Desktop** (create shortcut) to create a shortcut.
 - For laptop/PC – Connect an RS232 DB9 cable (pn 700609-002) to the serial port on the FE laptop and the DB9 connector on the T2100 Treadmill, and launch TDU.
 - For CASE – Make sure the CASE is connected to the T2100 Treadmill using the standard RS232 DB9 interface cable (pn 700609-002), and launch TDU.
- Select the COM Port that the T2100 Treadmill is connected to.

NOTE:
TDU defaults to COM1, but can be changed to use any COM port in the Port drop-down list. Change the COM port assignments so TDU is configured with an available port.
- Enter the T2100 Treadmill serial number, or other identifying text (up to 16 digits).
- Click **Connect treadmill**.
Communication between the TDU and the T2100 Treadmill is established.
- Click **Retrieve event logs**.
The latest log file is loaded into the List of log files panel. (Also, all existing log files in the **C:\Treadmill Diagnostic Utility** are displayed.)
- Double-click the log file name (in the top panel) and view the list of events and errors (in the bottom panel).

TDU Error Log Date and Time Information

Date/Time	Code	Definition of Error/Event
01-07-05 13:45:49	0xCF	Belt Disabled
01-07-05 13:45:48	0x05	Drive Communication Error <03>
01-07-05 13:45:11	0x08	Belt Start
01-07-05 13:45:06	0xCF	Belt Stop
01-07-05 13:45:05	0x08	Belt Start
01-07-05 13:44:35	0x82	Date and Time Set
01-07-05 13:43:48	0xCF	Belt Disabled
01-07-05 13:43:47	0x08	Emergency Stop was initiated <255>
01-07-05 13:42:57	0x08	Belt Start
01-07-05 13:42:40	0x82	Date and Time Set
01-01-50 00:08:21	0x82	Date and Time Set
01-01-50 00:07:58	0x80	Treadmill Power On
01-07-05 10:40:47	0x81	Treadmill Power Off
01-07-05 10:39:36	0xCF	Belt Stop
01-07-05 10:35:04	0x08	Belt Start
01-01-50 00:01:37	0x82	Date and Time Set
01-01-50 00:00:27	0x80	Treadmill Power On
01-01-50 00:00:26	0x81	Treadmill Power Off

1-7-2005 13:58 File Information: 2005JUL-01 13:49:49 Serial N

Item	Description
1	Treadmill exits Host Synchronized Mode
2	Treadmill in Host Synchronized Mode
3	Treadmill enters Host Synchronized Mode
4	Treadmill powered ON in Default Mode

When the T2100 Treadmill is manufactured, or whenever the event log (flash memory) is erased, the system date and time (SDT) is set to January 1, 2050, 0:00:00 and is then stored into the flash memory. When power is applied to the T2100 Treadmill, the SDT is set to the saved SDT in the flash memory. While power is applied, the system updates the SDT every second. When the power is lost, the updated SDT is saved back to the flash memory. Therefore, the SDT is also the total power-up date and time, which is always relative to the initial date and time of January 1, 2050, 0:00:00.

The SDT is used when logging events in two different modes, the **Default Mode** and the **Host Synchronized Mode**.

Default Mode

When the T2100 Treadmill ON/OFF switch is turned to the ON position, the T2100 Treadmill will always initialize in the **Default Mode**. When an event is logged while the system is in this mode, the event will be date and time stamped with the total power-up date and time.

Host Synchronized Mode

When the T2100 Treadmill receives a valid date and time from a host device, such as CASE v6 or the TDU, the T2100 Treadmill will enter the Host Synchronized Mode. The T2100 Treadmill will stay in this mode until power is lost to the T2100 Treadmill. While in this mode, the system keeps track of the number of seconds that pass since the date and time were received from the host. When an event is logged while the system is in this mode, the event will be date and time stamped with a date and time relative to what was sent by the host.

NOTE:

When the T2100 Treadmill enters the **Host Synchronized Mode**, the **Date and Time Set** event is stored with a date and time relative to the power-up date and time. This event can be used to see how the following events with actual dates and times chronologically fit in regards to the power-up date and time. In addition, the date and time of the events can be used to match up with specific stress tests.

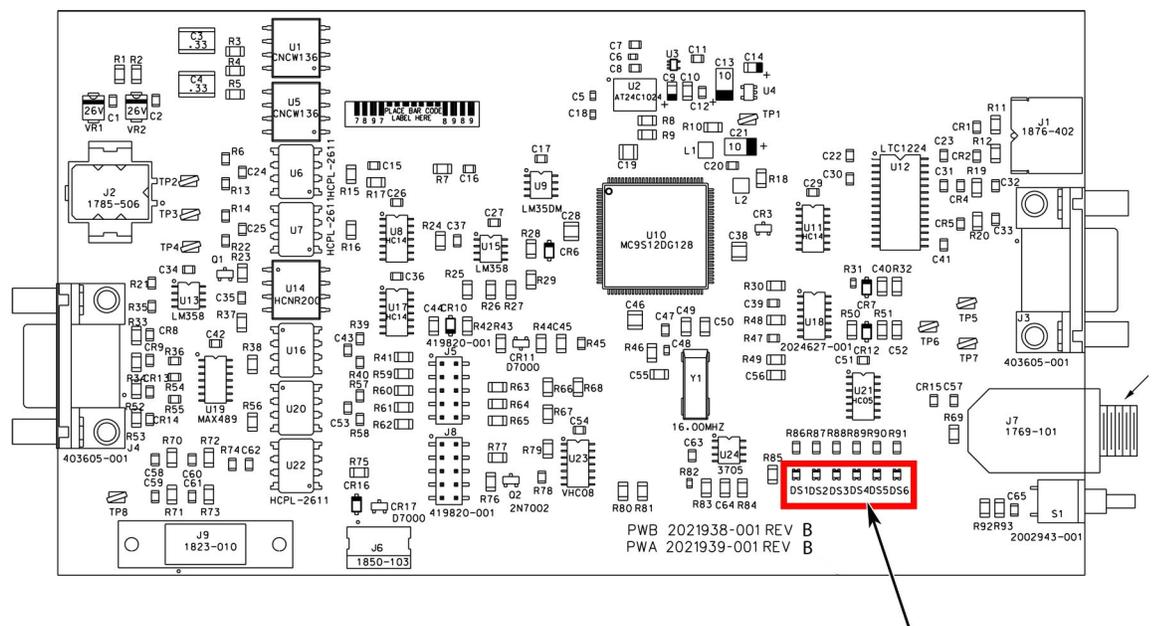
TDU Troubleshooting Tables and Status LEDs

See the following tables to aid in troubleshooting problems identified by the status LEDs, or reported in the TDU event and error codes.

Processor Board Status LEDs

Remove the shroud and e-box cover to view the processor board status LEDs.

- When power is applied to the e-box, the LEDs will turn on very quickly in sequence, starting at DS6 and going to DS1.
- If self-calibration has never been performed, the LEDs will stay on until the self-calibration routine is performed.
- If self-calibration has been performed, the LEDs will all turn off and then behave as described in the table below.
- When power is removed from the e-box, all LEDs will turn on until the system has completed the shutdown routines.



Arrow points to Status LEDs

LED Status	Name	Description
DS1	Elevation/Calibration	This LED toggles on or off every 500ms if an elevation error has occurred. When the elevation error is cleared, the LED is off. During calibration this LED will turn on, and when a limit switch is reached the LED will flash rapidly for 100ms.
DS2	Drive/Burn-In	This LED toggles on or off every 500ms if a drive error has occurred. When the drive error is cleared, the LED is off. Also, the LED will turn on when burn-in is activated. During the burn-in cycle, the LED will flash rapidly for 100ms every time the belt speed increases.

LED Status	Name	Description
DS3	Temperature	This LED toggles on or off every 500ms if a temperature warning occurs. The LED turns on and stays on if a temperature error occurs. The LED will be off when the internal temperature is within the normal operating limits.
DS4	Communication	This LED toggles on or off every 200ms while the microcontroller is receiving commands over the serial cable. If a command is not received after 500ms, the LED turns off. If a communication timeout occurs (no communication after 4 seconds anytime the belt is enabled), the LED turns on and stays on until a command is received.
DS5	Emergency Stop	This LED toggles on and off every 500ms while the system is monitoring the emergency stop line. When the emergency stop button is pressed or the ESTOP command is received, the LED turns on and stays on until 20 seconds after the emergency stop button is released.
DS6	Heartbeat	This LED toggles on or off every second when power is applied to the e-box. If power is applied and there is no heartbeat: <ol style="list-style-type: none"> 1. Verify the ESTOP switch is correctly installed. 2. Check the fuses. 3. Check the power test points for +24v and +5v. If all the items above are working correctly, the problem is not in the e-box.

TDU Troubleshooting Table

Determine the error codes being reported by TDU and use the table below to help troubleshoot the cause, and identify the repair. Some TDU event/error codes also have detail descriptions breaking out specific causes within the event/error code.

TDU Event / Error Code	Status	Definition and Detail Description	Check These Items
0x00	Fatal (Halts Current Operation)	Memory Error: Indicates the flash memory was busy when the microcontroller lost power	Check the validity of the event log. Download multiple copies of the event log and check for additional memory errors or corrupt data. Erase the event log if corrupt data is found, or additional memory errors occur.
0x02	Fatal (Halts Current Operation)	Belt Error	<p>Measures the drive motor RPM.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Check for loose wiring and connections between the drive controller and the drive motor. 3. Check the terminal connections on the X1 connector on the drive controller. See “Drive Controller X1 PIN Descriptions” on page 121. 4. Check the power board and processor board test points verify they are operating within the test range. See “Power Supply Voltage Checks and Fuses” on page 100. 5. Swap the drive controller with a known working one. (If the problem persists...) 6. Replace the processor board. See “PCBs and Power Supply Replacement” on page 128.

TDU Event / Error Code	Status	Definition and Detail Description	Check These Items
0x03	Fatal (Halts Current Operation)	<p>Elevation Error:</p> <ul style="list-style-type: none"> • <00> During calibration, the potentiometer feedback did not change while the elevation motor was running. • <01> During calibration, the limit switch was detected as set before and after the motor started, and the potentiometer feedback changed. • <02> During calibration, the potentiometer reached maximum or minimum and the limit switch was not reached. • <03> During calibration, the potentiometer feedback for the maximum and minimum limits were too close together. • <04> During calibration, a timeout occurred waiting for the limit switch to be reached. • <05> During normal operation, the potentiometer feedback did not change while the motor was running. 	<p>Checks the elevation racks and elevation system.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Inspect the elevation racks for any obstruction/foreign objects lodged between the gear teeth. 3. Check the elevation racks for any apparent damage to the gear teeth, or bending of the racks. 4. Check the elevation drive shaft (between the elevation racks) for damage or bending. 5. Check for loose wiring and connections between the elevation motor and the e-box. 6. Check the power board and processor board test points verify they are operating within the test range. See “Power Supply Voltage Checks and Fuses” on page 100. 7. Check for damage to the elevator capacitor. 8. Replace the elevation potentiometer with a known working POT. (If the problem persists...) 9. Replace the elevation motor with a known working motor. (If the problem persists...) 10. Replace the processor board. See “PCBs and Power Supply Replacement” on page 128.

TDU Event / Error Code	Status	Definition and Detail Description	Check These Items
0x04	Fatal (Halts Current Operation)	Over Temperature Error (*C) <XX> (where XX equals the temperature in Celsius)	<p>The ambient temperature inside the e-box has reached 65° C (149° F).</p> <ol style="list-style-type: none"> 1. Remove power from the T2100 Treadmill and allow to cool off. 2. Power up the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 3. Check the power board and processor board test points and verify they are operating within the test range. See “Power Supply Voltage Checks and Fuses” on page 100. 4. Verify appropriate operating environment, 10°C to 40°C (50°F to 104°F) 5. Replace the processor board. See “PCBs and Power Supply Replacement” on page 128.

TDU Event / Error Code	Status	Definition and Detail Description	Check These Items
0x05	Fatal (Halts Current Operation)	<p>Communication Error:</p> <ul style="list-style-type: none"> • <01> Could not check for drive errors. • <02> Could not check for drive axis errors. • <03> Could not read the belt speed from the drive. • <11> Invalid error bit pattern while checking for drive errors. • <12> Invalid error bit pattern while checking for drive axis errors. • <13> Invalid speed detected while reading belt speed from drive. • <255> Command not received from host within 4 seconds while the belt was enabled. 	<p>Communication error between the processor board and the drive controller, or the processor board and the host.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Check for loose wiring and connections between the drive controller and the e-box. 3. Check for loose wiring and connections between the treadmill and the host. 4. Check the terminal connections on the X1 connector on the drive controller. See “Drive Controller X1 PIN Descriptions” on page 121. 5. Check the power board and processor board test points and verify they are operating within the test range. See “Power Supply Voltage Checks and Fuses” on page 100. 6. Replace the drive controller with a known working drive controller. (If the problem persists...) 7. Replace the processor board. See “PCBs and Power Supply Replacement” on page 128.

TDU Event / Error Code	Status	Definition and Detail Description	Check These Items
0x06	Fatal (Halts Current Operation)	Over-voltage	<p>Measures power into the T2100 Treadmill.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Check the fuses. See “Power Board Fuse Locations” on page 103. 3. Check the power board and processor board test points and verify they are operating within the test range. See “Power Supply Voltage Checks and Fuses” on page 100. 4. Replace the processor board. See “PCBs and Power Supply Replacement” on page 128.

TDU Event / Error Code	Status	Definition and Detail Description	Check These Items
0x07	Fatal (Halts Current Operation)	Under-voltage: <ul style="list-style-type: none"> • <00> Under-voltage detected while system still operating. • <255> Under-voltage caused system to shut down while the belt was enabled, or while the elevation motor was active. 	Measures power into the T2100 Treadmill. <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This error logs each time the treadmill is powered off. This may be an isolated incident.) 2. Check the fuses. See “Power Board Fuse Locations” on page 103. 3. Check the power board and processor board test points and verify they are operating within the test range. See “Power Supply Voltage Checks and Fuses” on page 100. 4. Monitor AC power into the T2100 Treadmill. Watch for inadequate power supply. 5. Replace the power board. See “PCBs and Power Supply Replacement” on page 128. 6. Replace the processor board. See “PCBs and Power Supply Replacement” on page 128.
0x08	Warning	Belt Start	Not an error. Indicates the belt was started at this time.

TDU Event / Error Code	Status	Definition and Detail Description	Check These Items
0x09	Warning	<p>Lower elevation limit reached:</p> <ul style="list-style-type: none"> • <00> Not an error – occurred during calibration. • <01> Error – occurred during normal operation. 	<p>Indicates that the elevation system extended beyond the upper elevation limit.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Initiate the self-calibration feature. 3. Check the elevation potentiometer. See “Elevation Potentiometer Replacement” on page 122. 4. Replace the elevation potentiometer.
0x0a	Warning	<p>Upper elevation limit reached:</p> <ul style="list-style-type: none"> • <00> Not an error – first occurrence during calibration. • <01> Not an error – second occurrence during calibration. • <02> Error – occurred during normal operation. 	<p>Indicates that the elevation system extended beyond the upper elevation limit.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Initiate the self-calibration feature. 3. Check the elevation potentiometer. See “Elevation Potentiometer Replacement” on page 122. 4. Replace the elevation potentiometer.
0x0b	Warning	<p>Emergency stop was initiated:</p> <ul style="list-style-type: none"> • <00> Stop command initiated from CASE. • <255> Stop command initiated from the ESTOP button 	<p>Emergency stop is engaged (or has been engaged). May be useful in determining if a “sudden stop” occurred because the emergency switch was engaged.</p> <p>Disengage the emergency stop.</p>

TDU Event / Error Code	Status	Definition and Detail Description	Check These Items
0x0c	Warning	Temperature Warning (*C)<XX> (where XX equals the temperature in Celsius)	<p>The ambient temperature inside the e-box has reached 55° C (131° F). The T2100 Treadmill still operates correctly, but this warning indicates that something is causing the temperature to rise to near-fatal levels. (65° C is fatal.)</p> <ol style="list-style-type: none"> 1. Remove power from the T2100 Treadmill and allow to cool off. 2. Power up the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 3. Check the power board and processor board test points and verify they are operating within the test range. See “Power Supply Voltage Checks and Fuses” on page 100. 4. Replace the power board and/or processor board if they are not operating within the test range.
0x0d	Advisory	Self Calibration	Not an error. Indicates self calibration was initiated.
0x0F	Advisory	Belt Stop	Not an error. Indicates the belt was stopped at this time.
0x80	—	Power On	The treadmill was powered on.
0x81	—	Power Off	The treadmill was powered off.
0x82	Advisory	Time Set	The date and time were set.
0x83	Advisory	Event Log Read	The event log was successfully read.
0xEE	Advisory	Event Log Erased	The event log was erased.

Drive Controller Status LED

The drive controller fault status LED is located underneath the X6 connector on the Drive Controller. Remove the shroud to view the LED.



Arrow points to the Drive Controller fault status LED

LED Status	Description
Solid Green	Drive enabled, normal operation.
Flashing Green	Firmware download in progress.
Solid Red	Drive is disabled, but no errors are latched.
Alternating Red/Green Flashing	Undervoltage warning (no AC power to the X1 connector), but no errors are latched.
LED is OFF	Check the 24 VDC control circuit supply is connected correctly to the X2 connector and is powered on.
Flashing Red	<p>Powerbase fault or error(s) present. The number of flashes indicates which error has occurred. For example, to display error 3 (overcurrent trip), the LED flashes 3 times at 0.1 second intervals, followed by a 0.5 second pause. The sequence is repeated continuously.</p> <p>If multiple errors occur at the same time, the lowest numbered error code will be flashed. For example, a MicroFlex which has tripped on both feedback error (code 5) and over-current error (code 3) will flash error code 3. If the drive is already displaying an error code when a new error with a lower code occurs, the drive will start flashing the new code. Note that undervoltage trip does not appear in the table because it is already indicated by the green/red flashing state. If an undervoltage trip occurs in conjunction with another error, the drive will flash the code of the additional error.</p> <p>See the troubleshooting table below for the event/error code and it's corresponding red flashing LED.</p>

TDU Troubleshooting Table for Drive Controller

Determine the error codes being reported by TDU and use the table below to help troubleshoot the cause and identify the repair.

TDU Event / Error Code	Number of Red LED Flashes	Definition	Check These Items
0x10	1	DC bus over-voltage trip	<p>Indicates the DC Bus voltage has exceeded the overvoltage level.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Verify that the AC power supply voltage is correct. See “AC Line Voltage Test” on page 39. 3. Verify that the voltage check test points on the power and processor control boards are within the test range. See “Power Supply Voltage Checks and Fuses” on page 100. 4. Determine if any TDU Troubleshooting Table errors are also being reported, and if so, follow the troubleshooting procedure for the reported errors. 5. Replace the drive controller.
0x11	2	IPM (Intelligent Power Module) trip	<p>The IPM has detected an internal overcurrent, short circuit, over temperature or under voltage fault.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Determine if any TDU Troubleshooting Table errors are also being reported, and if so, follow the troubleshooting procedure for the reported errors. 3. Replace the drive controller.

TDU Event / Error Code	Number of Red LED Flashes	Definition	Check These Items
0x12	3	Over-current trip	<p>Indicates Current has exceeded 300% of Drive Rated Current.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Check the motor cables and drive controller connections for short circuits. 3. Determine if any TDU Troubleshooting Table errors are also being reported, and if so, follow the troubleshooting procedure for the reported errors. 4. Replace the drive controller.
0x13	4	Feedback trip	<p>Indicates loss of encoder/resolver feedback and may indicate that the feedback cable has become detached, one of the signals has broken, or noise is present.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Check the wiring in the Feedback cable. 3. Check the cable screens. 4. Check for damage to the encoder, under the motor cap. 5. Determine if any TDU Troubleshooting Table errors are also being reported, and if so, follow the troubleshooting procedure for the reported errors. 6. Replace the drive controller.

TDU Event / Error Code	Number of Red LED Flashes	Definition	Check These Items
0x14	5	Feedback trip	<p>Indicates loss of encoder/resolver feedback and may indicate that the feedback cable has become detached, one of the signals has broken, or noise is present.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Check the wiring in the Feedback cable. 3. Check the cable screens. 4. Check for damage to the encoder, under the motor cap. 5. Determine if any TDU Troubleshooting Table errors are also being reported, and if so, follow the troubleshooting procedure for the reported errors. 6. Replace the drive controller.
0x15	6	Motor overload (I2t) trip	<p>The motor overload current protection algorithms have exceeded their limit and disabled the drive. (The motor/drive can run with demand currents greater than their rated value for a period of time; after that time the drive will either trip or automatically foldback the demand current.)</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Confirm that the motor is not overloaded or stalling. 3. Determine if any TDU Troubleshooting Table errors are also being reported, and if so, follow the troubleshooting procedure for the reported errors. 4. Replace the drive controller.

TDU Event / Error Code	Number of Red LED Flashes	Definition	Check These Items
0x16	7	Over-temperature trip	<p>The ambient temperature of the drive controller has exceeded the trip level, or the Motor overtemperature trip input has been activated.</p> <ol style="list-style-type: none"> 1. Allow the unit to cool. 2. Increase ventilation and reduce ambient temperature. 3. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 4. Determine if any TDU Troubleshooting Table errors are also being reported, and if so, follow the troubleshooting procedure for the reported errors. 5. Replace the drive controller.
0x17	8	Drive overload (It) trip	<p>The drive overload current protection algorithms have exceeded their limit and disabled the drive. (The motor/drive can run with demand currents greater than their rated value for a period of time; after that time the drive will either trip or automatically foldback the demand current.)</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Confirm that the motor is not overloaded or stalling. 3. Verify connections to braking resistor are not damaged. 4. Determine if any TDU Troubleshooting Table errors are also being reported, and if so, follow the troubleshooting procedure for the reported errors. 5. Replace the drive controller.

TDU Event / Error Code	Number of Red LED Flashes	Definition	Check These Items
0x18	9	Following error trip	<p>Position or velocity following error. Following errors could be caused by a badly tuned drive controller/motor, especially at high acceleration and deceleration rates where the following error will typically be greater. Following error could also be the caused by encoder/resolver loss.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Confirm that the motor is not overloaded or stalling. 3. Determine if any TDU Troubleshooting Table errors are also being reported, and if so, follow the troubleshooting procedure for the reported errors. 4. Replace the drive controller.
0x19	10	Error input triggered	<p>Indicates a user-defined condition has been activated and generated an error.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Determine if any TDU Troubleshooting Table errors are also being reported, and if so, follow the troubleshooting procedure for the reported errors. 3. Replace the drive controller

TDU Event / Error Code	Number of Red LED Flashes	Definition	Check These Items
0x1a	11	Phase search error	<p>The drive controller has a pre-charge circuit which must activate after power-up before the drive controller can be enabled. If the drive controller is enabled before this, then the error occurs. The error could also indicate the loss of one or more of the input phases.</p> <ol style="list-style-type: none"> 1. Powercycle the T-2100 Treadmill and monitor the T-2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Determine if any TDU Troubleshooting Table errors are also being reported, and if so, follow the troubleshooting procedure for the reported errors. 3. Replace the drive controller.
0x1b	12	Other error	<p>Other error code includes four possible drive faults including: drive power base fault, drive over-temperature fault, drive dynamic break overload fault or commutation loss error.</p> <ol style="list-style-type: none"> 1. Measure the resistance of the dynamic break resistor. Replace if out of specification. 2. Verify input voltage to the treadmill is within range. 3. Power-cycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 4. Replace the drive controller and drive motor.
0x1c	N/A	Unknown error code	<p>Indicates an unknown condition has generated an error.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Determine if any TDU Troubleshooting Table errors are also being reported, and if so, follow the troubleshooting procedure for the reported errors. 3. Replace the drive controller.

TDU Event / Error Code	Number of Red LED Flashes	Definition	Check These Items
0x1d	Flashing Red and Green	DC Bus Undervoltage Trip	<p>Indicates the DC Bus voltage has fallen below the undervoltage level.</p> <ol style="list-style-type: none"> 1. Powercycle the T2100 Treadmill and monitor the T2100 Treadmill for reoccurrence of this error. (This may be an isolated incident.) 2. Verify that the AC power supply voltage is correct. See “AC Line Voltage Test” on page 39. 3. Verify that the voltage check test points on the power and processor control boards are within the test range. See “Power Supply Voltage Checks and Fuses” on page 100. 4. Determine if any TDU Troubleshooting Table errors are also being reported, and if so, follow the troubleshooting procedure for the reported errors. 5. Replace the drive controller.

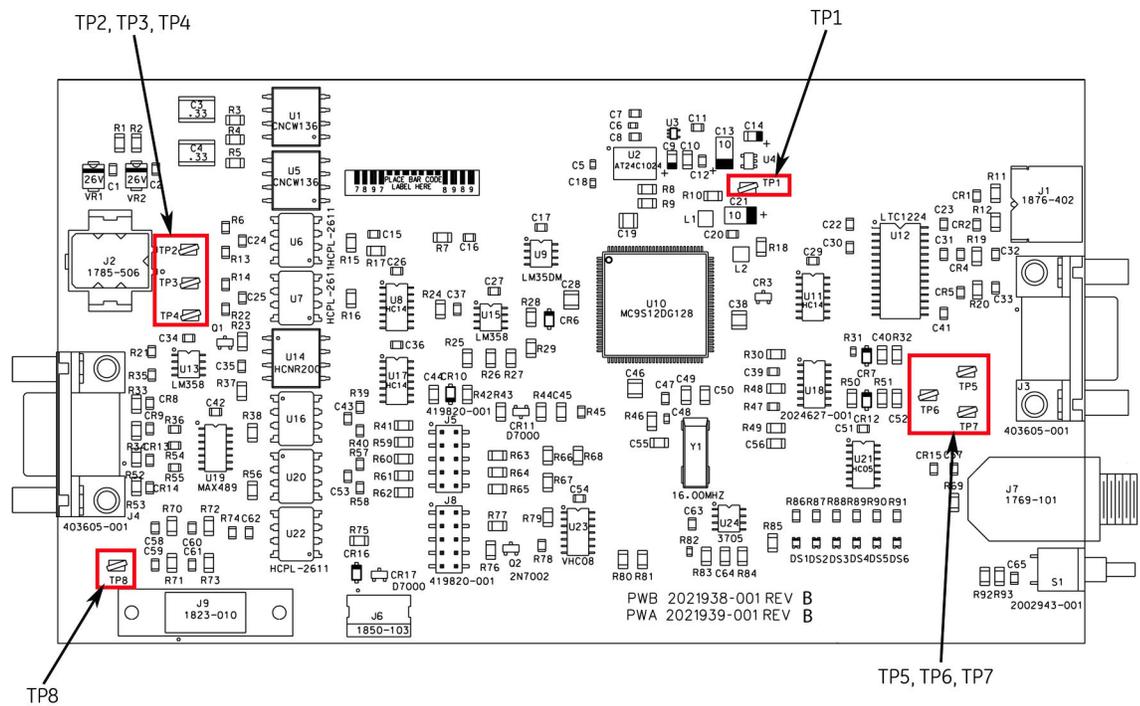
Power Supply Voltage Checks and Fuses

With the power on, remove the side panel on the electronics box to measure the system’s supply voltages as stated below. Remove the shroud and e-box cover to view the LEDs and fuses.

Processor Board Voltage Checks

Signal Name	Nominal value	Test range	Test point	Reference
+5V_ISO	+5.1 VDC	+/- 5%	TP6	ISOGND TP7
+3.3V_ISO	+3.3 VDC	+/- 5%	TP1	ISOGND TP7
+VUNREG	+11.5 VDC	+/- 5%	TP5	ISOGND TP7
+5.1V	+5.1 VDC	+/- 5%	TP8	DGND TP4
+24V	+24 VDC	+/- 5%	TP2	GND_24V TP3
Also verify that U15, pin 8, has 8.2 VDC (+/- 5%)				

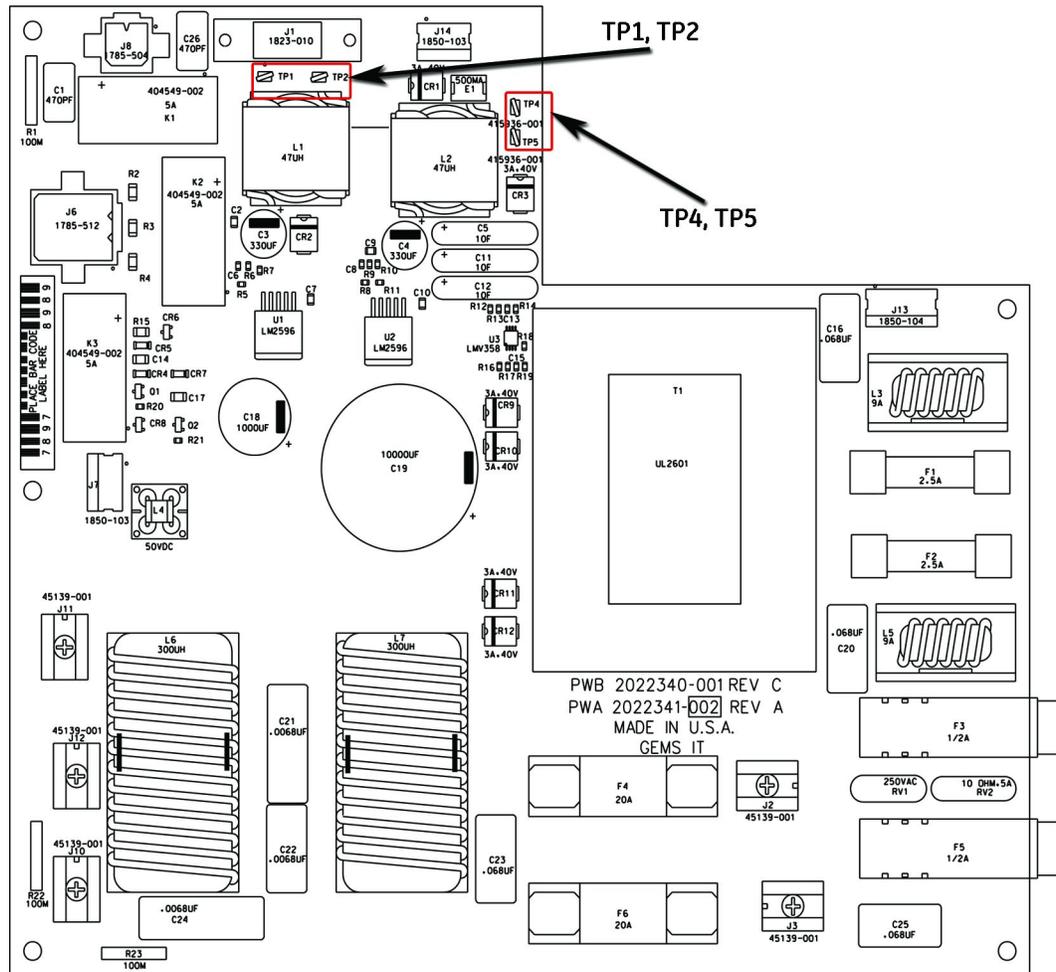
Processor Board Voltage Check Test Points



Power Board Voltage Checks

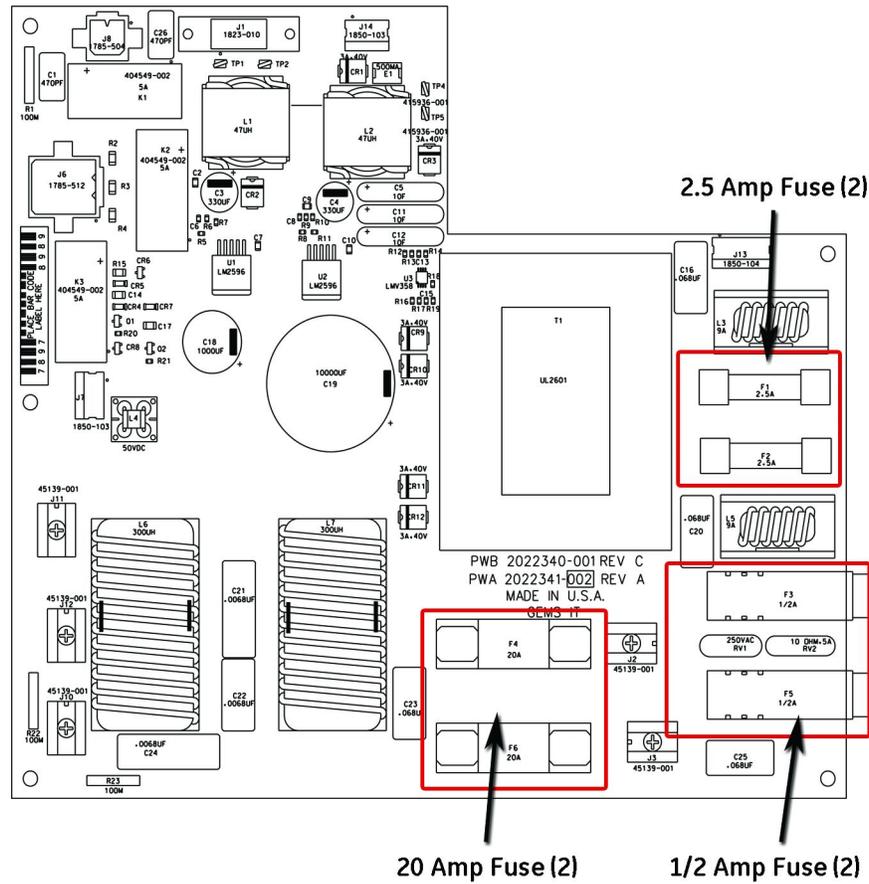
Power Type	Signal Name	Nominal value	Test range	Test point	Reference
ISO Power	+5V_ISO	5.1V	+/- 5%	TP5	ISOGND TP4
Non-Isolated Power	DGND	5.1V	+/- 5%	TP1	DGND TP2

Power Board Voltage Check Test Points



Power Board Fuse Locations

The 20A and 2.5A fuses are located on the power board. Remove the cover of the e-box to access and change these fuses. The 1/2A fuses are accessed at the connector panel on the back of the T2100 Treadmill.



7

FRU Replacement

FRU Replacement Procedures

Required Tools and Supplies

To maintain and repair the T2100 Treadmill, you will need the following:

- Standard hand tools, including:
 - Socket and Driver set – 9 mm (3/8") or 12 mm (1/2") drive, including extensions and 9 mm (3/8"), 11 mm (7/16"), 12 mm (1/2"), 14 mm (9/16") sockets
 - Wrench set – with opposite "box" and "open" ends in 9 mm (3/8"), 11 mm (7/16"), 12 mm (1/2"), 14 mm (9/16")
 - Screwdrivers – small and medium size "flat" tip and "Phillips" tip
 - Needle nose pliers
 - Crescent Wrench/Channel Locks – 40 mm (1 1/2") minimum
 - Hex Key set – 3 mm (1/8"), 4 mm (5/32"), 6 mm (1/4")
 - Carpenter's level
- Digital Voltage Ohm Meter (DVOM)
- Leakage current tester PN MT-1216-01 (for 120 V), PN MT-1216-02 (for 240 V), or equivalent
- CASE Treadmill Interface cable PN 700609-002
- Antiseptic cleaner
- Dust remover (compressed air)

Treadmill Shutdown

This procedure shall be performed prior to replacing any Treadmill FRUs.

- Stop the treadmill by using the controlling device or emergency stop switch when appropriate.
- Place the ON/OFF switch to the OFF **(O)** position.
- Disconnect from supply mains by unplugging power cord from wall and T2100.

Leakage Tests

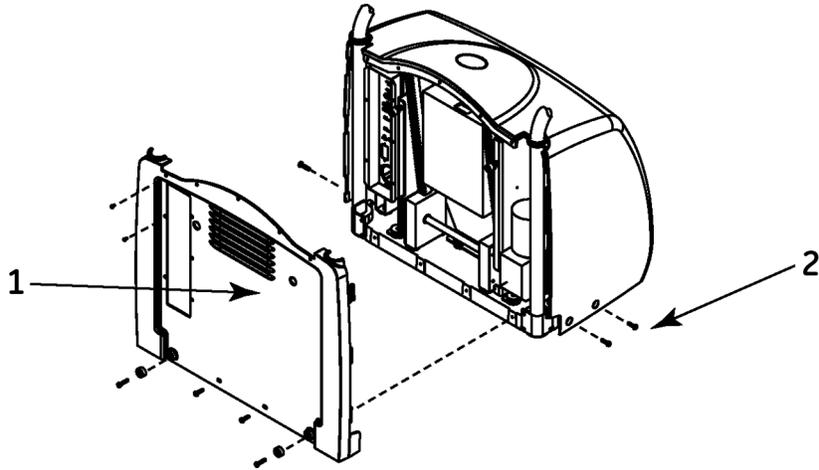
GE Healthcare recommends that you perform the electrical leakage tests whenever internal assemblies are serviced.

See “Performing Leakage Tests” on page 47.

Shroud Removal

To remove the T2100 Treadmill shroud for the internal visual inspection or for service:

- Disconnect the power cord from the rear connector panel.
- Remove the screws on the shroud back and remove the back panel.
- Remove the 2 bolts on each side of the shroud.
- Lift off the shroud.

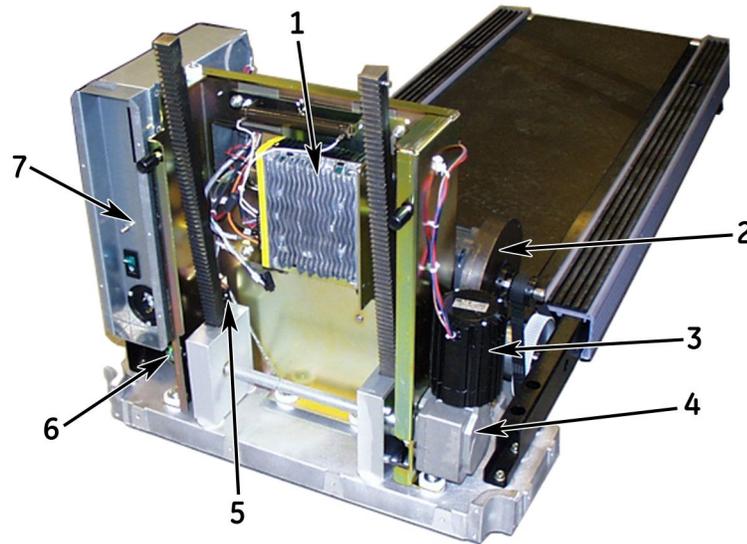


Item	Description
1	Back Panel
2	Shroud Side Bolts

Location of Major Sub-Assemblies

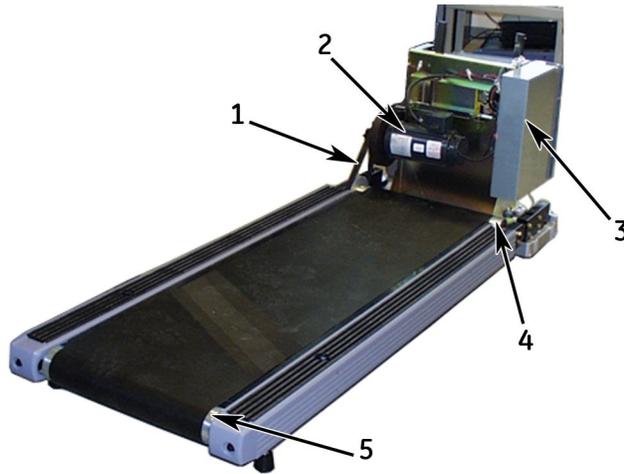
WARNING:

ELECTRICAL SHOCK. Electrical shock hazard between chassis ground and isolated (“floating”) ground when power is applied. Unplug the unit from the power source before proceeding.



Item	Description
1	Drive Controller
2	Flywheel
3	Elevation Motor
4	Worm Gear
5	Elevation Limit Switch

Item	Description
6	Elevation Port Located under the electronics box.
7	Electronics Box (e-box) Connector Panel

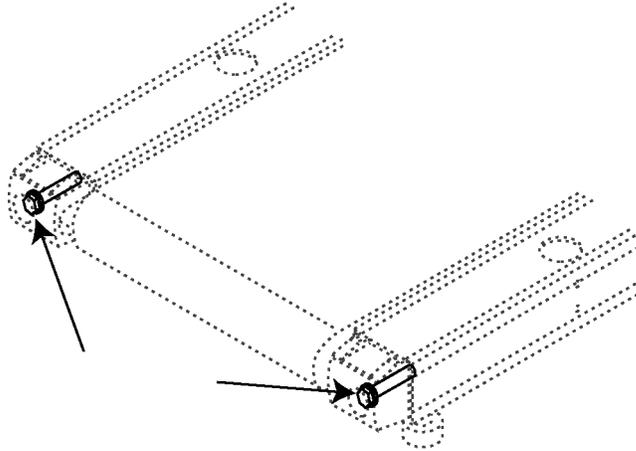


Item	Description
1	Belt for the walking belt drive
2	Drive Motor
3	Electronics Box (e-box)
4	Front roller
5	Rear roller

Front Roller Replacement

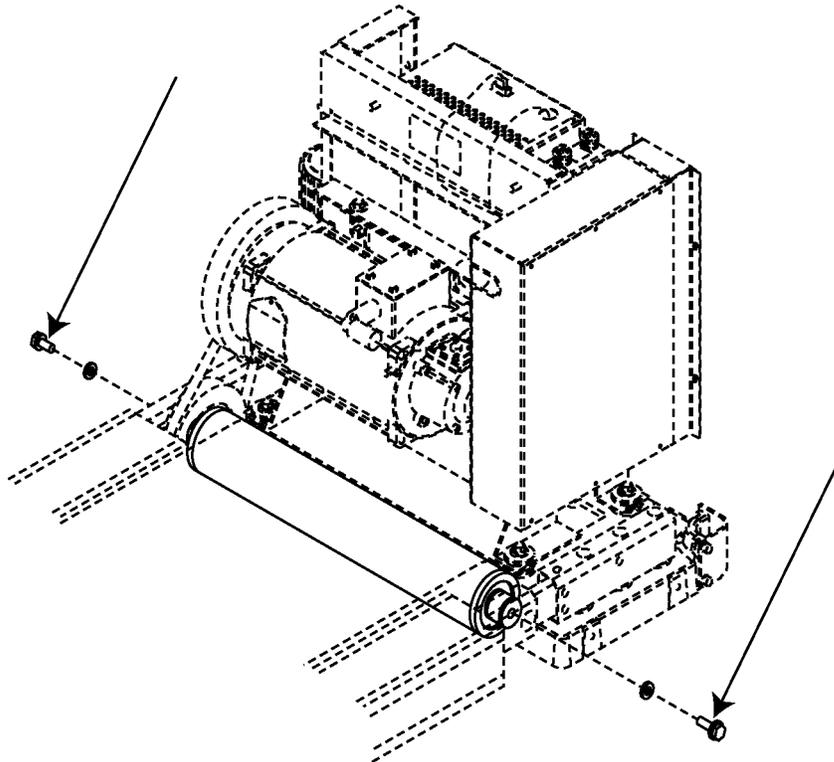
1. Turn the ON/OFF switch to the OFF position, disconnect the power cord from the wall outlet, and remove the shroud.
2. Loosen the drive belt and remove it from the sprocket. See [“Drive Motor Replacement” on page 113](#) for steps relative to loosening the drive belt.

- Loosen the walking belt tension screws on the end of the T2100 Treadmill.



Arrows point to location of tension screws.

- On the drive-belt side of the T2100 Treadmill, remove the 3 bolts fastening the walking belt drive gear to the roller.
- Locate the roller bolt access hole. Remove the 9/16 inch bolt (one of two that holds the roller in position).



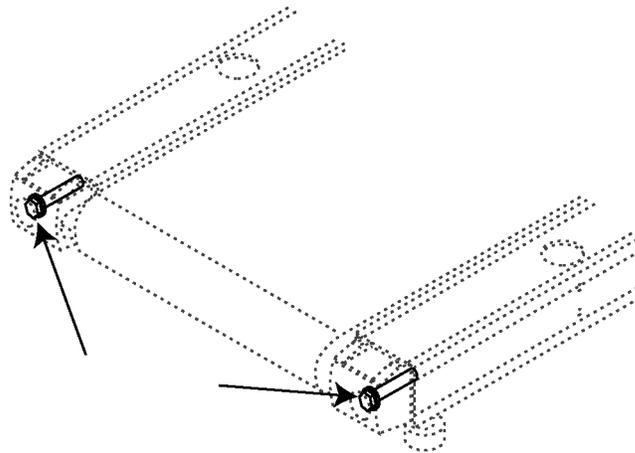
Arrows point to location of roller bolts.

- While supporting the free end of the roller, remove the 9/16 inch bolt on the opposite side of the T2100 Treadmill.
- Remove the drive belt gear.
- Lift the roller up and slide it out of the belt.

9. Install the new roller in reverse order, and then adjust the drive belt tension and tracking. See [“Drive Belt Adjustments” on page 117](#) and [“Adjust Drive Belt Tracking” on page 118](#).
10. Adjust walking belt tension and tracking. See [“Walking Belt Tension Adjustment” on page 55](#).
11. Calibrate the T2100 Treadmill. See [“Self-Calibration” on page 45](#).

Rear Roller Replacement

1. Turn the ON/OFF switch to the OFF position and disconnect the power cord from the wall outlet.
2. Remove the walking belt tension screws on the end of the T2100 Treadmill and remove the end caps.



Arrows point to location of tension screws.

3. Locate the roller bolt access holes and remove the 9/16 inch bolt from one side.
4. While supporting the free end of the roller, remove the 9/16 inch bolt on the opposite side of the T2100 Treadmill.
5. Lift the roller up and slide it out of the belt.
6. Install the new roller in reverse order, and then adjust the walking belt tracking and tension. See [“Walking Belt Tension Adjustment” on page 55](#).
7. Calibrate the T2100 Treadmill. See [“Self-Calibration” on page 45](#).

Walking Belt and Board Replacement

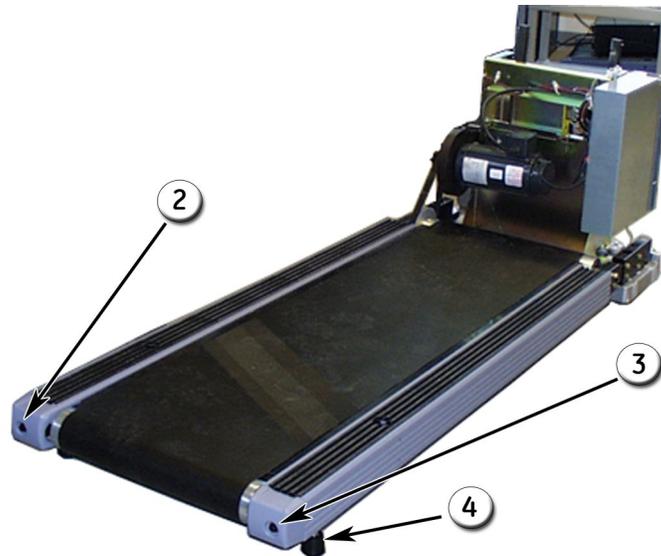
Walking Belt Replacement Instructions

1. Turn the ON/OFF switch to the OFF position, disconnect the power cord from the wall outlet, and remove the shroud.

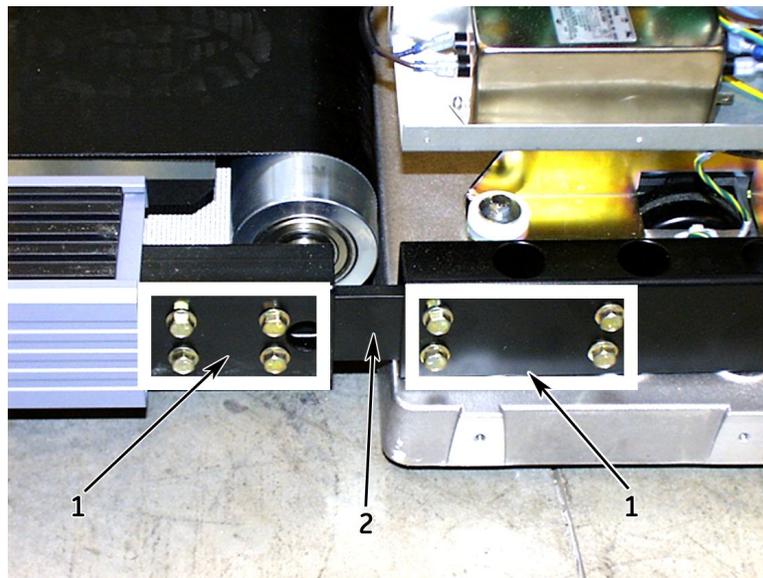
NOTE:

You do not have to remove either roller to replace the belt.

2. Loosen the tension bolt on the left end cap.
3. Remove the tension bolt and the right end cap.
4. Loosen the keeper nut on the right foot, and unscrew and remove the right foot.



- On the front right side of the T2100 Treadmill, remove the eight, 1/2 inch bolts that hold the frame's sliding bracket in place.



Item	Descriptions
1	Sliding Bracket Bolts (4 on each side)
2	Sliding Bracket

- Slide the bracket left, into the frame.

NOTE:

Do not worry if the bracket slides in too far. During reassembly you can lift the back end of the T2100 Treadmill and the bracket will slide back where you can reach it.

- Slide the belt between the rear and front roller, removing the belt from the rear roller first.
- Replace the walking board before installing a new walking belt. See [“Walking Board Replacement Instructions” on page 112](#).

NOTE:

The wax material on the walking board acts as a lubricant for the belt. We recommend that you replace the walking board every time you put on a new walking belt to ensure the belt absorbs the required amount of lubricant.

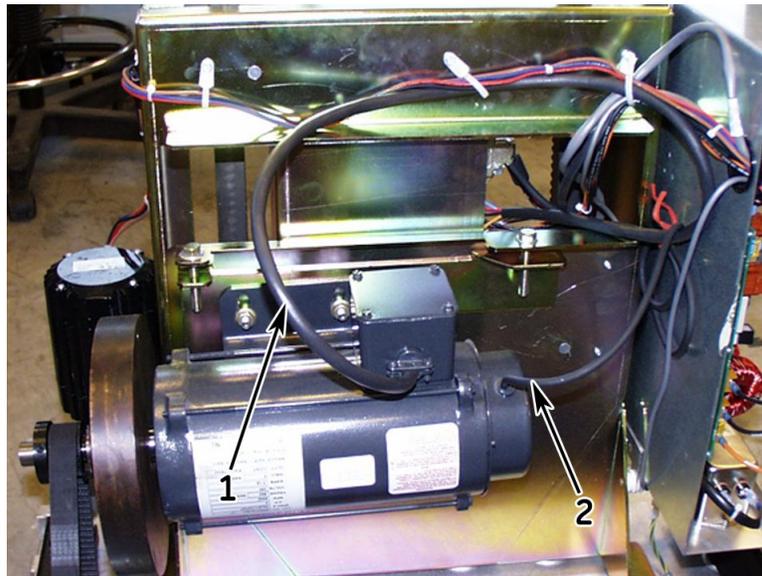
Walking Board Replacement Instructions

- Remove the walking belt as instructed in the previous steps.
- Remove the eight, 5/32 inch Allen-head, counter-sunk screws from the top of the walking board. (The fastening nuts on the underside of the T2100 Treadmill are welded in place.)
- Lift the walking board off the T2100 Treadmill.

4. Place the new walking board on the T2100 Treadmill with the beveled edges facing down, towards the rollers.
5. Secure the new walking board to the bed assembly with the 8 Allen-head screws.
6. Replace the walking belt. Use the reverse order used to remove the walking belt as described in [“Walking Belt Replacement Instructions”](#) on page 111.
7. Adjust the walking belt tracking and tension. See [“Walking Belt Tension Adjustment”](#) on page 55.
8. Calibrate the T2100 Treadmill. See [“Self-Calibration”](#) on page 45.

Drive Motor Replacement

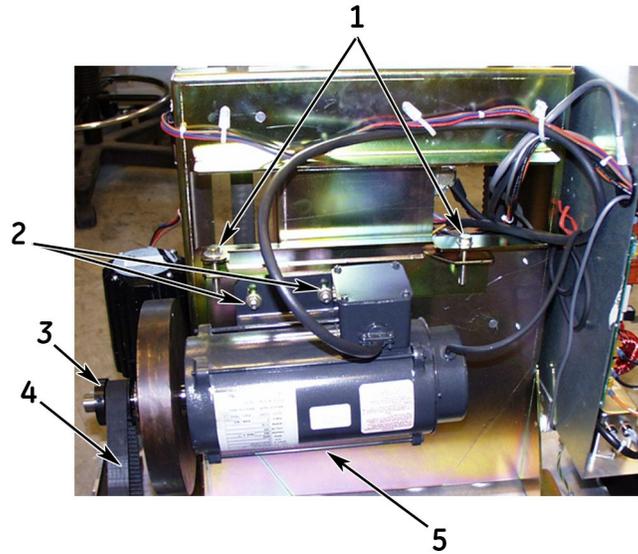
1. Turn the ON/OFF switch to the OFF position, disconnect the power cord from the wall outlet, and remove the shroud.
2. Unplug the motor control cable from the drive controller.
3. Unplug the motor power cable from the drive controller.
4. Unscrew the wires from the X1 connector that lead to the motor. See [“Drive Controller X1 PIN Descriptions”](#) on page 121.
5. Cut any plastic retaining straps.



Item	Description
1	Motor Power Cable
2	Motor Control Cable

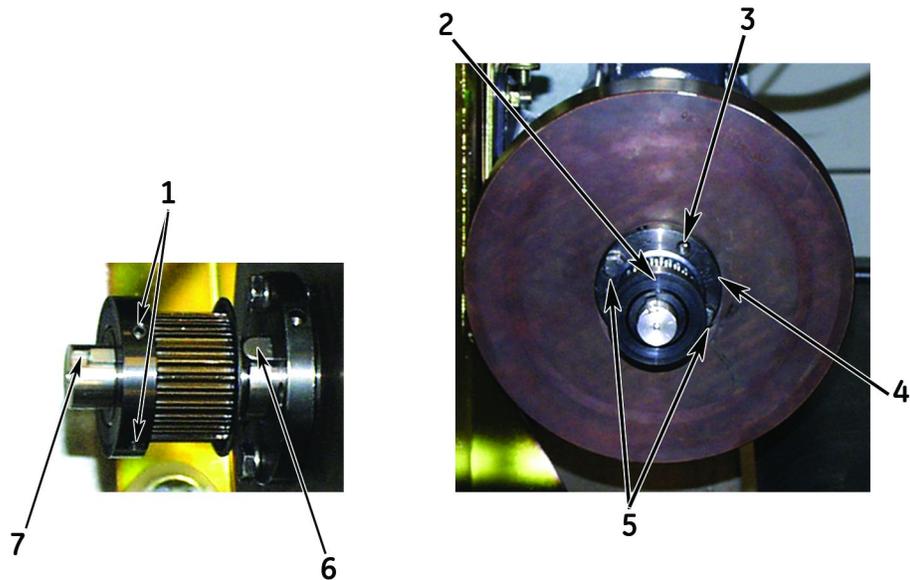
6. Loosen the 4 motor mounting bolts, but DO NOT remove them.

7. Lower the motor using the 2 drive belt tension adjustment bolts until the drive belt can be removed from the sprocket.



Item	Description
1	Drive Belt Tension Adjustment Bolts
2	Upper Motor Mounting Bolts (2)
3	Sprocket
4	Drive Belt
5	Lower Mounting Bolts (2 under the motor)

8. Remove the 2 set screws from the sprocket collar, and remove the collar.



Item	Description
1	Sprocket Collar Set Screws (2)
2	Hub Fastening Bolts (2 points)
3	Screw-Out Dodge Connection (2 points)
4	Hub
5	Sprocket Collar
6	Hub Key
7	Sprocket Collar Key

9. Remove the sprocket key and remove the sprocket.
10. Remove the hub fastening bolts and using your fingers screw the bolts into the screw-out dodge connection points until they make contact with the flywheel.
11. Alternate between each bolt, slowly turning each bolt approximately 1/16th turn until the hub can be removed.

NOTE:

The hub is machined to a tight tolerance with the motor shaft. DO NOT attempt to force the hub by turning the bolts too far at one time.

12. Remove the hub when it is loose of the motor shaft.
13. Remove the hub key and the flywheel.

NOTE:

The flywheel weighs 15 lbs. (6.8 k)

14. Remove the 4 motor mounting bolts and carefully remove the motor.

NOTE:

The drive motor weighs 33 lbs. (15 k)

15. Swap motors and reassemble in reverse order following the note below when installing the hub and flywheel.

NOTE:

The flywheel is balanced and if installed 180° off will cause vibration when in operation. Match up the mark on the flywheel with the mark on the hub for the proper position of installation.

16. When the new drive motor is installed, adjust the drive belt tension and tracking. See [“Drive Belt Adjustments” on page 117](#) and [“Adjust Drive Belt Tracking” on page 118](#).
17. Calibrate the T2100 Treadmill. See [“Self-Calibration” on page 45](#).

Drive Belt Replacement and Adjustments

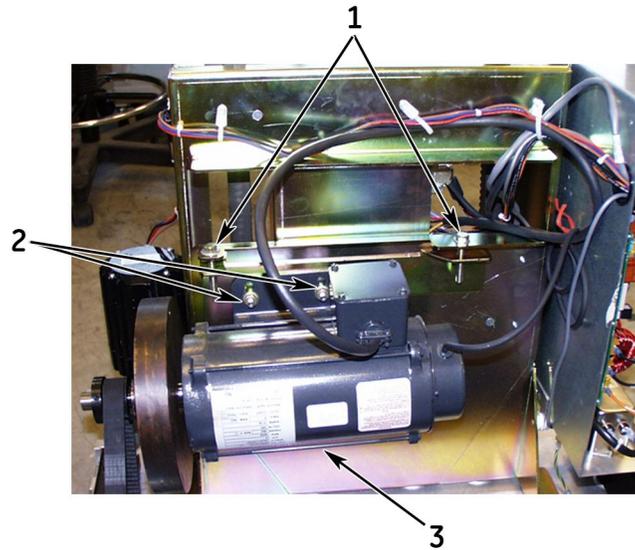
Replace the Drive Belt

1. Turn the ON/OFF switch to the OFF position, disconnect the power cord from the wall outlet, and remove the shroud.
2. Remove the front roller as described in [“Front Roller Replacement” on page 108](#).
3. Loosen the 4 motor mounting bolts and use the 2 drive belt adjustment bolts to lower the motor and loosen the drive belt tension.
4. Remove the old belt and replace with a new belt.
5. Replace the front roller and adjust the drive belt tension. See [“Adjust Drive Belt Tension” on page 117](#).

Drive Belt Adjustments

Adjust Drive Belt Tension

1. There are two drive belt tension adjustment bolts above the DC motor. Tighten these 1/2-inch bolts to adjust the drive belt tension (clockwise to tighten).

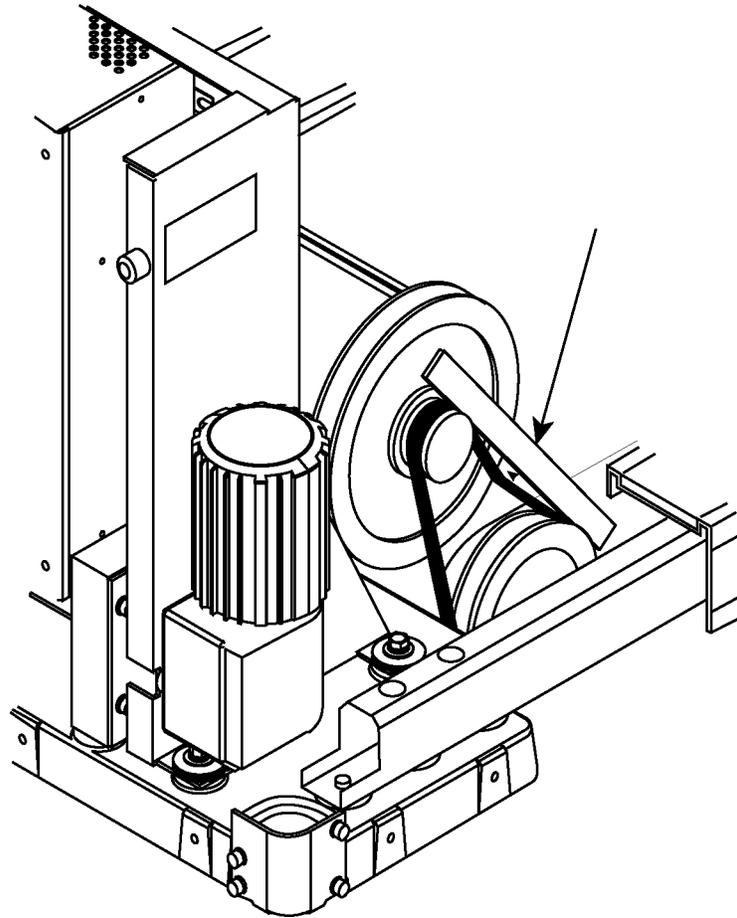


Item	Description
1	Drive Belt Adjustment Bolts (2)
2	Upper Motor Mounting Bolts (2)
3	Lower Motor Mounting Bolts (2) (Located under the motor.)

CAUTION:

Excessive tension on the drive belt is not necessary and will cause undue stress on the motor shaft with the possibility of damaging the motor. Use the illustration below as a guideline to properly adjust the tension of the drive belt.

2. Fine tune the belt tension with the adjustment bolts so that you can push the belt in approximately 1/2 inch on one side.



At the arrow, apply firm pressure to the belt midway between the pulleys, distance must be approximately 1/2 inch between the top of the belt and the top of the straight edge.

3. Tighten the 4 motor mounting bolts when the drive belt tension is correct and adjust the drive belt tracking. See [“Adjust Drive Belt Tracking” on page 118](#).

Adjust Drive Belt Tracking

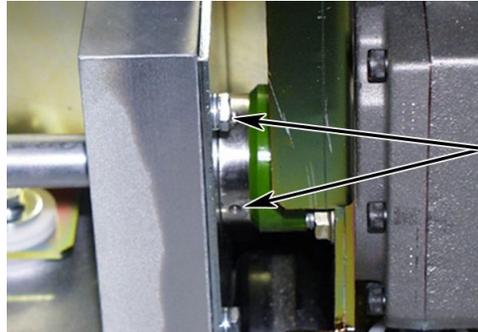
The motor should be mounted at a slight angle so the belt meshes quietly with the sprockets. The side with the drive belt should be slightly lower than the other side. See the photo in [“Adjust Drive Belt Tension” on page 117](#). Notice the drive belt adjustment bolts, and how the left adjustment is slightly lower than the right adjustment.

Because of this design, the drive belt will always track to the left side of the top sprocket (and this is normal) but should track down the middle of the lower sprocket. If the drive belt tracks off center on the lower sprocket, adjust the position of the top

sprocket until the drive belt tracks in the center of the lower sprocket. When the drive belt is tracking correctly, calibrate the T2100 Treadmill. See [“Self-Calibration” on page 45](#).

Elevation Motor Replacement

1. Use the controlling equipment to elevate the T2100 Treadmill approximately 6 inches (15 cm), and until the set screws on the elevation shaft collar are accessible.

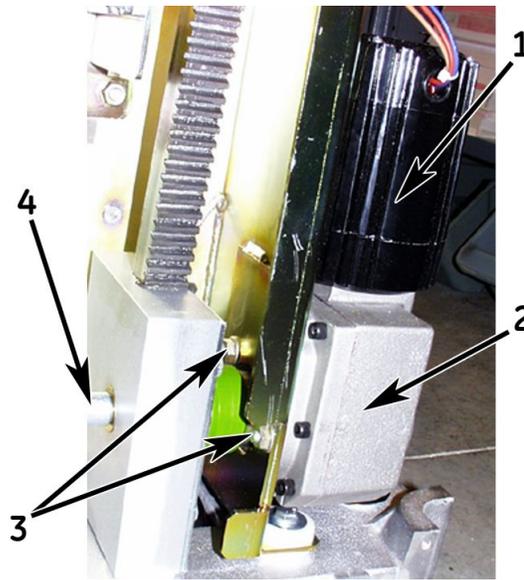


Arrows point to the location of the two elevation shaft collar set screws.

NOTE:

It is important to raise the T2100 Treadmill to give access to an elevation motor mounting bolt later in this procedure.

2. Turn the ON/OFF switch to the OFF position, disconnect the power cord from the wall outlet, and remove the shroud.
3. Remove the elevation shaft collar set screws.
4. Remove the elevation potentiometer (under the electronics box). See [“Potentiometer Removal Guidelines” on page 126](#).
5. Disconnect the elevation motor power cable plug and jumpers at the electronics box and remove all tie wraps on the cable.
6. Place the T2100 Treadmill on its side so the elevation motor is on top.
7. Remove the two visible mounting bolts on the elevation motor.



Item	Description
1	Elevation Motor (The elevation and wormgear box are combined as one unit.)
2	Wormgear Box
3	Location of mounting bolts. A third bolt is under the rubber coupling.
4	Elevation Shaft

8. Remove the third mounting bolt under the rubber coupling.

NOTE:

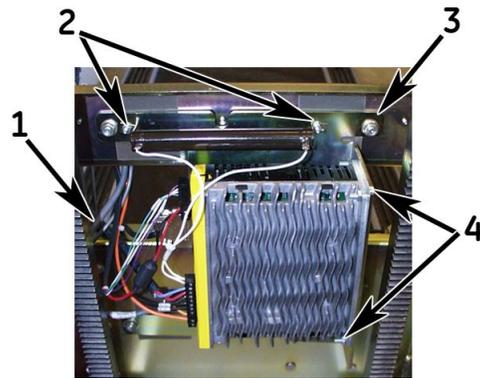
If the third mounting bolt is difficult to remove, you may have to remove the wheel to provide adequate access to the third mounting bolt.

9. Remove the elevation motor from its coupling.
10. Replace with a new motor in reverse order. Follow these guidelines.
 - a. Use a dab of lithium grease to hold the key in the motor shaft keyway, line up the keyway with the coupling's key slot, and slowly turn the elevation shaft until the two mate.
 - b. See "[Potentiometer Installation Procedure](#)" on page 123 for procedures when installing the potentiometer.
11. Replace the tie wraps for the elevation motor wiring harness.
12. Calibrate the T2100 Treadmill. See "[Self-Calibration](#)" on page 45.

Drive Controller Assembly

Drive Controller Replacement Procedure

1. Turn the ON/OFF switch to the OFF position, disconnect the power cord from the wall outlet, and remove the shroud.
2. Remove the 2 resistor mounting nuts.
3. Disconnect all connectors from the drive controller.
4. Remove the 4 nuts from the drive controller mounting bracket and remove the mounting bracket and drive controller from the T2100 Treadmill.
5. Remove the 4 nuts from the drive controller fastening points.
6. Remove the drive controller and replace with a new drive controller in reverse order.

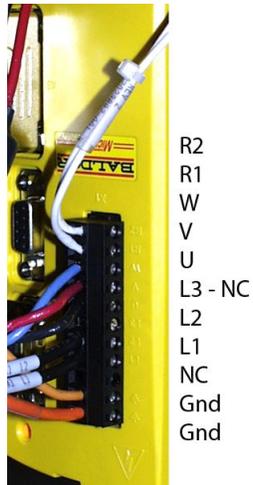


Item	Description
1	Connectors (plugs)
2	Resistor Mounting Nuts
3	Drive Controller Mounting Bracket There are two (2) mounting nuts on top and two (2) under the drive controller.
4	Drive controller fastener points four (4)

7. Calibrate the T2100 Treadmill. See [“Self-Calibration”](#) on page 45.

Drive Controller X1 PIN Descriptions

Follow this diagram when wiring the X1 connection. Tighten each terminal to a torque of 0.5–0.6Nm (4.4–5.3 lb-in).



PIN	Description
R2 & R1	White wires going to the resistor. These wires can be inverted.
W	Blue wire going to the drive motor.
V	Red wire going to the drive motor.
U	Black wire going to the drive motor.
L3	Not used.
L2	Black wire going to the L2 terminal on the power board.
L1	Black wire going to the L1 terminal on the power board.
NC	Not used.
Gnd	Orange-Yellow wire earth/ground going to the motor. Can be inverted with the other Gnd.
Gnd	Orange wire earth/ground going to the ground terminal on the power board. Can be inverted with the other Gnd.

Elevation Potentiometer Replacement

Replace the Elevation Potentiometer Harness on T2100 Treadmills experiencing elevation hesitation and seeking problems or a faulty T2100 Treadmill stop condition during an elevation change.

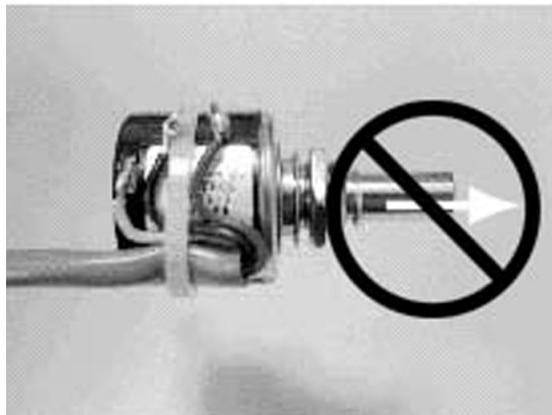
Elevation Potentiometer Harness Assembly Replacement

1. Lower T2100 Treadmill to 0% grade.
2. Turn the ON/OFF switch to the OFF position, disconnect the power cord from the wall outlet, and remove the shroud.
3. Remove old potentiometer harness assembly. See [“Location of Major Sub-Assemblies” on page 107](#).

CAUTION:

DO NOT apply any pulling force to the potentiometer shaft. If this does occur, the entire potentiometer harness will require replacement.

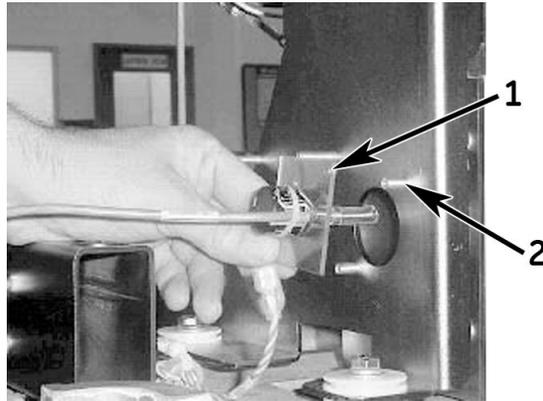
The potentiometer is susceptible to damage resulting from an axial pulling force on the shaft (see figure).



Potentiometer Installation Procedure

1. Remove the nut and washer from the potentiometer.
2. Attach the mounting plate to the potentiometer and secure with the washer and nut provided.
3. Attach the plastic coupling tube to the potentiometer to approximately 1/3rd of the coupling tube length, such that there is sufficient length remaining to attach to the elevation shaft. Do not press the tubing on any farther than it needs to. We want to avoid pulling the tubing off the shaft if it is pressed on too far (see caution statement).
4. While looking at the shaft end of the potentiometer, rotate the shaft CCW until it stops. Then rotate the shaft 1–2 turns CW.
5. Attach the harness assembly to the unit by guiding the potentiometer (with tube attached) through the clearance hole in the chassis tower. Make sure the harness assembly is oriented such that the mounting plate holes are in general alignment with the threaded stand-offs. This must be done in order to maintain the 1–2 turns established in Step 4. Also be sure that the cables are toward the rear of the T2100 Treadmill. Attach the tube far enough on to the

elevation shaft such that the mounting plate is within 1/16 inch or less of the threaded stand-offs.



Item	Description
1	Mounting Plate Hole
2	Threaded Standoff

6. Secure the mounting plate with the appropriate screws.
7. Connect the other end of the harness to the Control PCB as required.
8. Power on the unit and run calibration to ensure proper operation of elevation system.
9. Test the T2100 Treadmill using the CASE system (or other controlling device) to ensure the T2100 Treadmill is capable of reaching its lower and upper limits. Confirm that the requested vs. actual elevation (as reported by the following CASE application screen example) match at 0% grade and at 25% grade. If the actual elevation does not reach 25% grade, the 1–2 turns preset established in

Step 4 may have been altered during Step 5. See the “Potentiometer Removal Guidelines” below.



Manually increase the elevation to a 25% grade and confirm that the 25.0 is displayed.

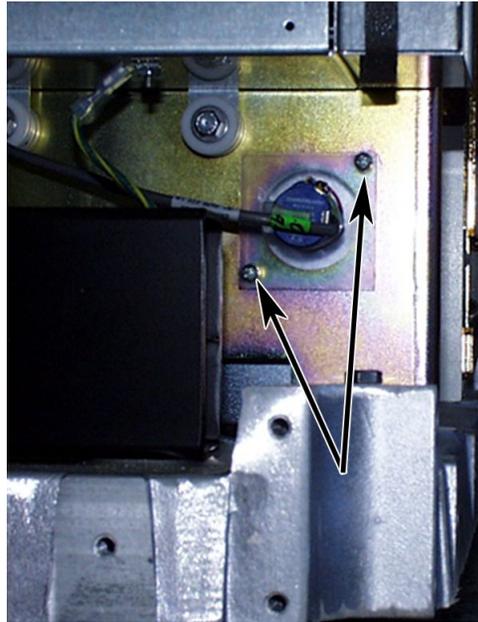
10. Re-assemble the remaining components to complete the overall T2100 Treadmill assembly.

Potentiometer Removal Guidelines

NOTE:

If it is necessary to remove the potentiometer with the intention of reinstallation, please follow these guidelines to reduce the risk of damage to the potentiometer.

1. Remove the two mounting plate screws.



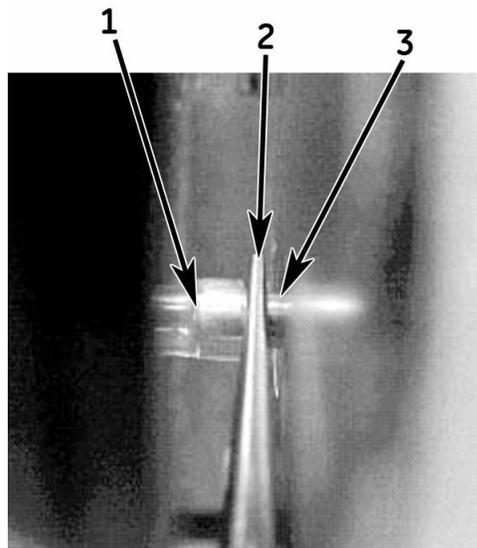
Arrows are pointing to the location of the mounting plate screws.

CAUTION:

DO NOT apply any pulling force to the potentiometer shaft. If this does occur, the entire potentiometer harness will require replacement. The potentiometer is susceptible to damage if axial pulling forces are applied to the shaft. Do not attempt to remove the potentiometer by grabbing the potentiometer and pulling it off.



2. Use a long, thin needle nose pliers and place on the elevation shaft, behind the coupling tube.



Item	Description
1	Coupling Tube
2	Needle Nose Pliers
3	Elevation Shaft

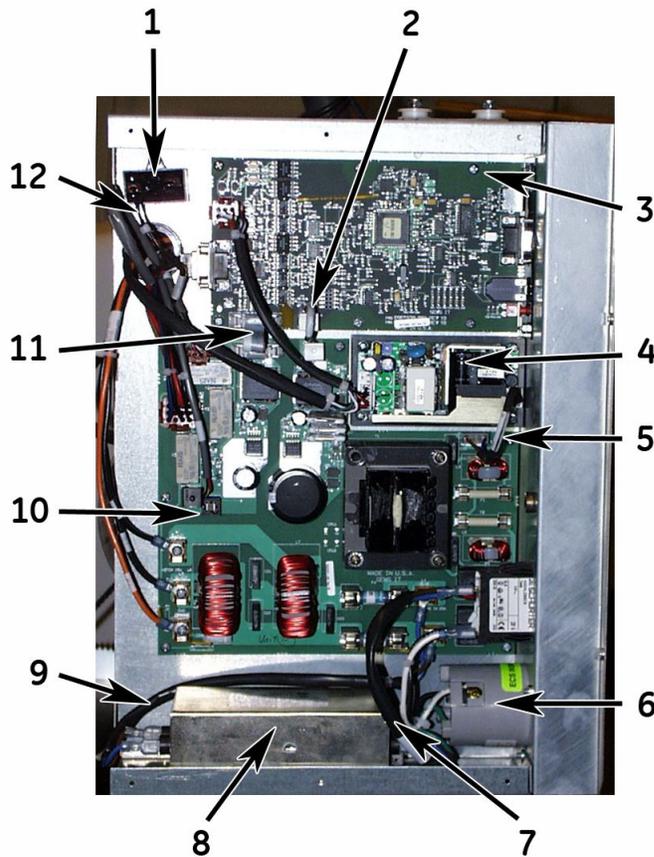
3. Gently push the tube to the left to remove it from the elevation shaft.

NOTE:

If needle-nose pliers are not available, a standard slotted screwdriver can be used to work the coupling tube off the elevation shaft.



PCBs and Power Supply Replacement



Item	Description
1	Elevation Capacitor
2	Power to Processor PCB Harness
3	Processor PCB/Service and Host I/F PCB
4	Power Supply

Item	Description
5	Power PCB to 24V Power Supply Harness
6	Power-In Harness
7	Switch to Filter Harness
8	EMI Filter
9	Filter to Power PCB Harness
10	Power PCB
11	Ribbon Cable from Power PCB to Processor PCB
12	Elevation Cap Harness

NOTE:

Electrostatic discharge can harm the PCB boards and power supply. The following guidelines help protect the PCB boards and power supply from ESD damage.

- Keep the new PCB boards and power supply in their anti-static bags until they are ready to be installed.
- Discharge any static charge you may have built up before handling the PCB boards and power supply. (Touch a metal surface to discharge a spark.)
- Handle the PCB boards and power supply by their edges. Do not touch the semi-conductor components.

1. Turn the ON/OFF switch to the OFF position, disconnect the power cord from the wall outlet, and remove the shroud.
2. Remove the e-box cover.
3. Disconnect any wiring harnesses/connections.
4. Unscrew the mounting screws.
5. Reconnect any wiring harnesses/connections.
6. Replace the e-box cover and the shroud.
7. Calibrate the T2100 Treadmill. See [“Self-Calibration” on page 45](#).

8

Parts List

Field Replaceable Units

Below is a table identifying the field replaceable units (FRUs) and their part numbers.

NOTE:

The drive motor, sprocket, and flywheel should be ordered together whenever replacing either of these FRUs. They are fitted with tight machined tolerances and may be difficult to disassemble.

GE Part Number	Description
2023710-003	FRU Motor 3HP Brushless Hardwired Encoder (see note above) This is the walking belt drive motor.
2023254-001	Sprocket (see note above)
2023253-001	Flywheel (see note above)
2026182-006	FRU Assy T2100 Microflex Drive RoHS with PARAM and Firmware Commutation Update
88380-007	Emergency Stop Switch (ESTOP)
700338-002	Harness, Elevation Limit Switch
2023887-004	FRU Braking Resistor & Harness ROHS Compliant
2023446-004	Harness Drive to Interface RS422 ROHS Compliant
2023442-003	24Volt Distribution Harness/Drive/ESTOP ROHS Compliant
2026180-001	Shroud with T2100 label (front)
2026390-001	Shroud Cover with service label (rear)
2083695-002	FRU PCB Treadmill Power 3rd Edition ROHS (located in the e-box) NOTE: This service FRU includes 2083695-001 board.
2083693-003	FRU PCB T2100 Treadmill Processor RoHS (located in the e-box) NOTE: This service FRU includes 2086393-001 board.
2066830-002	FRU Power Supply 24V (located in the e-box)

Parts List

GE Part Number	Description
2023445-001	Power PCB to 24V Power Supply Harness (located in the e-box)
2023441-001	Ribbon Cable from Power PCB to Processor PCB (located in the e-box)
2024974-001	Power to Processor PCB Harness (located in the e-box)
2024413-001	Elevation Cap Harness (located in the e-box)
2024412-001	Filter to Power PCB Harness (located in the e-box)
2015553-001	EMI Filter (located in the e-box)
408934-001	Switch to Filter Harness (located in the e-box)
410570-001	Elevation Capacitor (located in the e-box)
408935-002	Power-In Harness (located in the e-box)
1910-012	FUSE, 0.5 Amp, Time lag, Low breaking capacity, 250Vac rated fuse, F3, F5
2023406-002	FUSE 13/32 FLM 20 Amp SLOW F4, F6
420824-001	FUSE SB, 2.5 Amp, 250Volt F1, F2
700609-002	RS 232 Interface Cable (for CASE, CS, or Cardisoft connection to T2100 Treadmill; and T2100 Treadmill connection to TDU on laptop)
2007918-001	RS 232 Interface Cable (for MAC5000ST and MAC5500ST
408890-001	Elevation Motor
408895-001	Roller Assy Front
408896-001	Roller Assy Rear
408913-001	Belt, drive
2023183-003	Harness, Elevation Pot, T2100 ROHS Compliant
56944-009	Walking Board with Wax
3602-009	Belt, walking
2061990-001	Wheel Phenolic 6 x 1.5 W (Product Code SK2)
4704-001	Wheel 3.25OD (Product Code SM9)
2060851-001	Foot Treadmill Frame (Product Code SK2)
408915-001	Foot Treadmill Frame (Product Code SM9)
2062795-001	Bolt Shldr 0.375 in. OD x 0.25 in. long, Allen Head (Product Code SK2)
2060852-001	Rack STL 10P 14.5° Press (Product Code SK2)
408897-001	Rack STL 10P 14.5° Press (Product Code SM9)

GE Part Number	Description
2061723-001	Rack STL 10P 14.5° Press-No Notches (Product Code SK2)
408897-002	Rack STL 10P 14.5° Press-No Notches (Product Code SM9)
2019790-003	FRU KIT HANDRAIL ALL METAL T2000/T2100 FULL

AC Power Cords

GE Part Number	Description
408930-003	Power Cable (U.S. Only)
408930-004	Power Cable International (unterminated)
408930-005	Power Cable (EURO Schuko style)
2028038-013	Power Cable (China CCC)

Parts List



Technical Specifications

Performance Specifications

Item	Specification
Maximum Rated Load	204 kg (450 lbs)
Belt Speed Range	0.0 to 22.0 km/h at 220 VAC by 0.1 km/h increments or 0.0 to 13.5 mph at 220 VAC by 0.1 mph increments
Belt Speed Tolerance	1.6 km/h; ± 0.16 km/h (1 mph; ± 0.1 mph)
Belt Speed Acceleration/ Deceleration	Approximately 0.8 km/h/s (0.5 mph/sec)
Belt Motor	2.24 kW (3.0 hp)
Elevation Motor	0.10 kW (0.13 hp)
Elevation Range	0.0 to 25 % grade by 0.1 % increments
Elevation Range Increase/Decrease	0.73 \pm 0.1 % grade per second at 50 Hz 0.85 \pm 0.1 % grade per second at 60 Hz
Maximum Leakage Current	100 μ A, chassis to ground
Interface	Either RS-232 port or RS-422 serial port, 9600 baud
Host Device Requirements	The host device shall minimally meet IEC 60950
Mode of Operation	The Elevation motor is not rated for continuous operation. A one minute elevation ON time should be followed by a ten minute OFF time. In normal operation, the treadmill elevation motor operates for much less than 1 minute at a time. All other parts of the treadmill (including the belt drive motor) are rated for continuous operation, and do not have an ON/OFF duty cycle requirement.

Physical Specifications

Item	Specification
Weight	182.8 kg (403 lbs)
Walking Area	45.7 cm x 152.4 cm (18 x 60 in)

Item	Specification
Floor Space Required	81 x 390 cm (32 x 154 in) 390 cm (153.5 in) = 205 cm (80.7 in) for treadmill + 185 cm (72.8 in) of clearance
Walking Surface Height	26 cm (10.2 in) (Product Code SK2) 14.0 cm (5.5 in) (Product Code SM9)
Handrail Height Above Walking Surface	Front: 101.6 cm (40 in) Side: Maximum 88.9 cm (35 in) at the front descending at a 5 ° angle to 81.3 cm (32 in)
Ceiling Height (minimum)	270 cm (106 in)

Power/Environmental Specifications

Item	Specification
Power Requirements	200 to 240 VAC, 50 – 60 Hz, single-phase, 20 amperes, NEMA 6-20 R wall socket (U.S. only, or applicable international connection; dedicated circuit recommended)
Power Consumption	1540 watts (5254 BTU), 16 amperes

Safety

Item	Specification
Certification	UL/cUL classified
Type of Protection Against Electrical Shock	Class I
Degree of Protection Against Electrical Shock	Type B applied part
Degree of Protection Against Ingress of Liquids	IPx0 Ordinary equipment (enclosed equipment without protection against ingress of water).
Handling of Disposable Supplies and Other Consumables	Use only parts and accessories manufactured or recommended by GE Medical System Information Technologies. Follow manufacturer's instructions for use for disposable/consumable product. Follow local environmental guidelines concerning the disposal of hazardous materials (for example, lead acid batteries).
Patient Leakage Current	100/10 µA (AC/DC) in normal condition 500/50 µA (AC/DC) in single fault condition

Item	Specification
Maintenance Frequency	Test the stop switch assembly monthly. Recommended user daily visual inspection and cleaning. Recommended six-month routine maintenance checks and test procedures performed by qualified technical personnel.
Repair Guidelines	Calibration instructions, equipment descriptions, and all other service information to repair those parts of the equipment designated as field repairable by qualified technical personnel are available in the service manual.

Environmental

Item	Specification
Operating Conditions	
Ambient temperature	10 °C to 40 °C (50 °F to 104 °F)
Relative humidity	15 % to 90 % RH non-condensing
Maximum operating altitude	3000 m (9,842.5 ft)
Storage/Transport Conditions	
Temperature range	-40 °C to 70 °C (-40 °F to 158 °F)
Relative humidity	5 % to 95 % RH non-condensing
Atmosphere pressure	525 hPa to 1060 hPa (394 mmHg to 795 mmHg)



Electromagnetic Compatibility (EMC)

Changes or modifications to this system not expressly approved by GE Healthcare can cause EMC issues with this or other equipment. This system is designed and tested to comply with applicable regulation regarding EMC and must be installed and put into service according to the EMC information stated in this appendix.

WARNING:

Use of portable phones or other radio frequency (RF) emitting equipment near the system may cause unexpected or adverse operation.

WARNING:

The equipment or system should not be used adjacent to, or stacked with, other equipment. If adjacent or stacked use is necessary, the equipment or system should be tested to verify normal operation in the configuration in which it is being used.

Electromagnetic Emissions

The *T2100 Treadmill* is intended for use in the electromagnetic environment specified below. The customer or user of the *T2100 Treadmill* should assure that it is used in such an environment.

Guidance and manufacturer's declaration – electromagnetic emission

Emissions Test	Compliance	Electromagnetic Environment – Guidance
RF emissions (Radiated) 30 MHz to 1,000 MHz IEC 60601-1-2 EN 55011(CISPR11)	Group 1 Class A	Group 1 use The <i>T2100</i> uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions (Conducted) 150 KHz to 30 MHz IEC 60601-1-2 EN 55011(CISPR11)	Group 1 Class A	Class A use The <i>T2100 Treadmill</i> is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic Emissions 2nd – 40th Harmonic IEC 60601-1-2 EN 55011(CISPR11)	Class A	The <i>T2100 Treadmill</i> is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Voltage fluctuations/ Flicker emissions IEC 60601-1-2 EN/IEC 61000-3-3	Complies (Pass)	

Electromagnetic Immunity

The *T2100 Treadmill* is intended for use in the electromagnetic environment specified below. The customer or user of the *T2100 Treadmill* should assure that it is used in such an environment.

Guidance and manufacturer's declaration – electromagnetic immunity

Immunity Test	Compliance Test level	Compliance level	Electromagnetic Environment – Guidance
Electrostatic discharge (ESD) IEC 60601-1-2 EN 61000-4-2	± 2/4/6 kV indirect ± 2/4/6 kV direct ± 2/4/8 kV air	± 2/4/6 kV indirect ± 2/4 kV direct ± 2/4/8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst (EFT) IEC 60601-1-2 EN 61000-4-4	± 2 kV for power supply lines ±1 kV for input/output lines	± 2 kV for power supply lines ±1 kV for input/output lines	Mains power should be that of a typical commercial or hospital environment.
Fast Transient Surge (FTS) IEC 60601-1-2 EN/IEC 61000-4-5	± 500V/1 kV differential mode ± 2 kV common mode	± 500V/1 kV differential mode ± 2 kV common mode	Mains power should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 60601-1-2 EN/EC 61000-4-11	<5% U_t (>95% dip in U_t) for 0.5 cycles <40% U_t (>60% dip in U_t) for 5 cycles <70% U_t (>30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 s	<5% U_t (>95% dip in U_t) for 0.5 cycles <40% U_t (>60% dip in U_t) for 5 cycles <70% U_t (>30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 s	Mains power should be that of a typical commercial or hospital environment. If the user requires continued operation during power mains interruptions, it is recommended that power be supplied from an applicably rated uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 60601-1-2 EN/IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristics of a typical location in a typical commercial or hospital environment.
NOTE: U_t is the a.c. mains voltage prior to application of the test level.			

Electromagnetic Immunity

The T2100 Treadmill is intended for use in the electromagnetic environment specified below. The customer or user of the T2100 Treadmill should assure that it is used in such an environment.

Guidance and manufacturer's declaration – electromagnetic immunity

Immunity Test	Compliance Test level	Compliance Level	Electromagnetic Environment – Guidance
Conducted RF IEC 60601-1-2 EN/IEC 61000-4-6	3 Vrms 150 KHz to 80 MHz @ 2 Hz mod.	3 V rms	Portable and mobile RF communications equipment should be used on closer to any part of the [equipment or system], including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.17\sqrt{P}$
Radiated RF IEC 60601-1-2 EN/IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz @ 2 Hz mod.	3 V /m	$d = 1.17 \sqrt{P}$ 80 MHz to 800 MHz $d = 2.33 \sqrt{P}$ 800 MHz to 2.5 GHz

Guidance and manufacturer’s declaration – electromagnetic immunity (cont'd.)

Immunity Test	Compliance Test level	Compliance Level	Electromagnetic Environment – Guidance
			<p>where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey ^a should be less than the compliance level in each frequency range. ^b</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 
<p>NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.</p>			
<p>NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by reflection from structures, objects, and people.</p>			
^a	<p>Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, and electromagnetic site survey should be considered. If the measured field strength in the location in which the T2100 is used exceeds the applicable RF compliance level above, the T2100 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the T2100.</p>		
^b	<p>Over the frequency range 150 KHz to 80 MHz, field strengths should be less than V1 V/m.</p>		

Separation Distance

This table provides the recommended separation distances between portable and mobile RF communications equipment and the T2100 Treadmill.

The T2100 Treadmill is intended for use in the electromagnetic environment on which radiated RF disturbances are controlled. The customer or the user of the T2100 Treadmill can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the T2100 Treadmill as recommended below, according to the maximum output power of the communications equipment.

Recommended Separation Distances

Rated maximum output power of transmitter in watts W	Separation distance (meters) according to frequency of transmitter		
	150 kHz to 80 MHz $d = [3.5/V1] \sqrt{P}$	80 MHz to 800 MHz $d = [3.5/E1] \sqrt{P}$	800 MHz to 2.5 GHz $d = [7/E1] \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.2	1.2	2.3
10	3.7	3.7	7.4
100	11.7	11.7	23.3

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (w) according to the transmitter manufacturer.

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

Exceptions

EMC Exception(s) Disclosure

Type	Exception	Electromagnetic Environment Guidance
Electrostatic discharge (ESD)	For direct discharges to the exposed communication ports on the back panel, compliance only up to the level of +/- 4 kV	Do not expose the rear connection panel of the T2100 Treadmill to any source of direct electrostatic discharge while in operation. Communication ports on back panel are accessed during installation and not during normal usage.
Electrical fast transient/ burst (EFT)	None	N/A
Fast Transient Surge (FTS)	None	N/A

EMC Exception(s) Disclosure (cont'd.)

Type	Exception	Electromagnetic Environment Guidance
Voltage dips, short interruptions and voltage variations on power supply input lines	None	N/A
Power frequency (50/60 Hz) magnetic field	None	N/A
Conducted RF	None	N/A
Radiated RF	None	N/A

Compliant Cables

NOTICE:

The use of cables and transducers other than those specified may result in increased emissions or decreased immunity performance of the equipment or system.

The following table lists cables and transducers with which GE Healthcare claims EMC compliance.

NOTE:

Any supplied cables and transducers that do not affect EMC compliance are not included.

Part Number	Description	Maximum Cable/Cord Lengths
408930-003	Power Cable (U.S. Only)	3 m/10 ft
408930-004	Power Cable International (unterminated)	3 m/10 ft
408930-005	Power Cable (EURO Schuko style)	3 m/10 ft
2028038-013	Power Cable (China CCC)	3 m/10 ft
700609-002	RS232 Communication Cable	6 m/20 ft
400073-001	RS422 Communication Cable	6 m/20 ft
88380-007	ESTOP Cable	3 m/10 ft



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