GE Medical Systems

Technical Publication

Direction 5154839
Revision 1

GE HDe & HDx 1.5T LCC Magnet Delivery & Installation

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Important Information

LANGUAGE

WARNING

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

AVERTISSEMENT

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

WARNUNG

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

AVISO

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

ATENÇÃO

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

AVVERTENZA

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

警告

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

注意:

本维修手册仅存有英文本。
非 GEMS 公司的维修员要求非英文本的维修手册时，客户需自行负责翻译。
未详细阅读和完全了解本手册之前，不得进行维修。忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

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Revision History

Rev.	Date	Primary Reason(s) for Change
1	Feb. 2006	Initial Release

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Table of Contents

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1 Damage In Transportation

All packages should be closely examined at time of delivery. If damage is apparent, have notation “damage in shipment” written on all copies of the freight or express bill before delivery is accepted or “signed for” by a General Electric representative or a hospital receiving agent. Whether noted or concealed, damage MUST be reported to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this 14 day period.

- Call 1–800–548–3366 and use option 8.
- Contact your local service coordinator for more information on this process.

2 Overview

The sequence of events involved in magnet delivery, installation and commissioning, along with functions, responsibilities and associated documentation, are shown in Table 1 and Table 2. Mark as complete each function as it is finished.

NOTE: Whenever possible, use the latest releases of the manuals mentioned in this Direction.

Available at http://www.gehealthcare.com/company/docs/siteplanning.html#mr:

- Direction 5143464, *Signa HDe 1.5T Pre-Installation*
- Direction 5159901, *Signa HDx 1.5T Pre-Installation*
- Direction 5159902, *Signa HDx 1.5T TwinSpeed Pre-Installation*
- Direction 5154839, *GE HDe & HDx 1.5T LCC Magnet Delivery & Installation*

Available through your GE Healthcare Field Service Representative:

- Direction 5154839, *GE HDe & HDx 1.5T LCC Magnet Delivery & Installation*
- Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem*
- Direction 2230681, *GEMS Magnet Monitoring Hardware (SHEM) Installation*
- 2301164PRE, *MR Magnet — Safety Requirements*

Table 1: Magnet Siting & Installation Checklist

	Function	Responsibility	Reference Document	Complete
1	Magnet Room Requirements: • Safety (Room Ventilation & Cryogenic Venting) • Magnet Anchoring • Power & Cooling	GE Installation Specialist, Shield Room Vendor & Customer	Direction 5143464, *Signa HDe 1.5T Pre-Installation* [a], **OR** Direction 5159901, *Signa HDx 1.5T Pre-Installation* [a], **OR** Direction 5159902, *Signa HDx 1.5T TwinSpeed Pre-Installation* [a]	Yes? ☐
2	Environmental Steel Survey	GE Installation Specialist	Direction 5143464, *Signa HDe 1.5T Pre-Installation* [a], **OR** Direction 5159901, *Signa HDx 1.5T Pre-Installation* [a], **OR** Direction 5159902, *Signa HDx 1.5T TwinSpeed Pre-Installation* [a]	Yes? ☐
3	Preinstallation Checklist Completed	GE Installation Specialist	Direction 5143464, *Signa HDe 1.5T Pre-Installation* [a], **OR** Direction 5159901, *Signa HDx 1.5T Pre-Installation* [a], **OR** Direction 5159902, *Signa HDx 1.5T TwinSpeed Pre-Installation* [a]	Yes? ☐

Table 1-1: Magnet Siting & Installation Checklist (cont'd)

	Function	Responsibility	Reference Document	Complete
4	Site Delivery Review: • Access & Route • Clearances	GE Field Engineer & Rigger	Direction 5154839, *GE HDe & HDx 1.5T LCC Magnet Delivery & Installation* [a]	Yes? ☐
5	Magnet Delivery	Rigger	Direction 5154839, *GE HDe & HDx 1.5T LCC Magnet Delivery & Installation* [a]	Yes? ☐
6	Magnet Component Checks: • Physical • Electrical	GE Field Engineer	Direction 5154839, *GE HDe & HDx 1.5T LCC Magnet Delivery & Installation* [a]	Yes? ☐
7	Move Magnet to MR Suite	Rigger	Direction 5154839, *GE HDe & HDx 1.5T LCC Magnet Delivery & Installation* [a]	Yes? ☐
8	Magnet Leveling & Bolt-Down	Rigger	Direction 5154839, *GE HDe & HDx 1.5T LCC Magnet Delivery & Installation* [a]	Yes? ☐
Continue with Table 2, Magnet Commissioning Checklist				

[a] Available at http://www.gehealthcare.com/company/docs/siteplanning.html#mr.

Table 2: Magnet Commissioning Checklist

	Function	Responsibility	Reference Document	Complete
From Table 1, Magnet Siting & Installation Checklist				
1	MR Magnet Safety Document 2301164PRE Review & Compliance	GE Field Engineer	2301164PRE, *MR Magnet — Safety Requirements* [b]	Yes? ☐
2	Magnet Conversion to Operating Configuration AND Immediate Vent Installation	GE Field Engineer	Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem* [b], Set-Up and Calibration chapter	Yes? ☐
3	Magnet System Components Installation & Functional Checks: • Cryocooler • MRU • Magnet Monitor	GE Field Engineer	Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem* [b], Set-Up and Calibration chapter	Yes? ☐
4	Magnet Commissioning Checks	GE Field Engineer	Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem* [b], Set-Up and Calibration chapter	Yes? ☐
5	Connect Magnet Monitor	GE Field Engineer	Direction 2230681, *GEMS Magnet Monitoring Hardware (SHEM) Installation* [b]	Yes? ☐
6	Magnet Precool & Fill	GE Field Engineer	Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem* [b], Set-Up and Calibration chapter	Yes? ☐
7	Ramp Magnet	GE Field Engineer	Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem* [b], Set-Up and Calibration chapter	Yes? ☐
8	Shim Magnet	GE Field Engineer	Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem* [b], Set-Up and Calibration chapter, Shim Current Adjustment section, and the LV Shim procedure in *Signa HDx MR Service Methods, System Version 14.x* [b]	Yes? ☐
9	Main Field Adjustment after Ramping	GE Field Engineer	Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem* [b], Set-Up and Calibration chapter	Yes? ☐
Hand Off to System Calibration				

[b] The latest revision of this document is available through your GE Healthcare Field Service Representative.

3 Pre-Delivery Instructions

NOTICE

Make sure ALL site requirements/conditions identified for the magnet in the appropriate site planning manual are met before scheduling magnet delivery. This will prevent installation delays, cryogen loss and resultant ongoing magnet quenches, potential damage, environment-related problems and increased costs.

3.1 GE Field Engineer & Rigger

NOTICE

The magnet has enclosures installed. Pushing upon the magnet enclosures can damage the enclosures and potentially the magnet.

Before magnet delivery, the GE Field Engineer & Rigger **MUST**:

1. Visit the magnet site with the rigging foreman before magnet delivery to plan the move.
2. Caution the rigger that the magnet is extremely fragile. Sudden jolts can damage the magnet. Make riggers aware of the cost of a magnet replacement. This usually promotes more care while handling the magnet.
3. Make sure all roads and paths leading to the magnet room are level and free from obstacles and holes. The rigger will be required to construct platforms where needed.
4. If roller dollies are to be used, have the rigger plan to bring steel plates to place along the delivery route to protect the floor. Refer to the Miscellaneous Equipment/Tools subsection of Section 5, Domestic Magnet Delivery, for rigger-supplied materials.

3.2 GE Installation Specialist & Shield Room Vendor

Before magnet delivery, the GE Installation Specialist & Shield Room Vendor **MUST**:

1. Verify that the magnet room floor recess meets the dimension and location specifications stated in the appropriate Pre-Installation manual (listed in Section 2, Overview) and the site's architectural drawings. Illustration 1 and Illustration 2 are provided for reference.
2. Mark on the magnet room floor where VibroAcoustic Damping Mats will be located if the site is getting VibroAcoustic Damping Option A (M1060MA).

NOTE: VibroAcoustic Damping Option A (M1060MA) provides VibroAcoustic Damping Mats for initial installation. See Section 7, VibroAcoustic Damping Mat Placement. VibroAcoustic Damping Option B (M1060MB) provides VibroAcoustic Damping Mats for installation later.

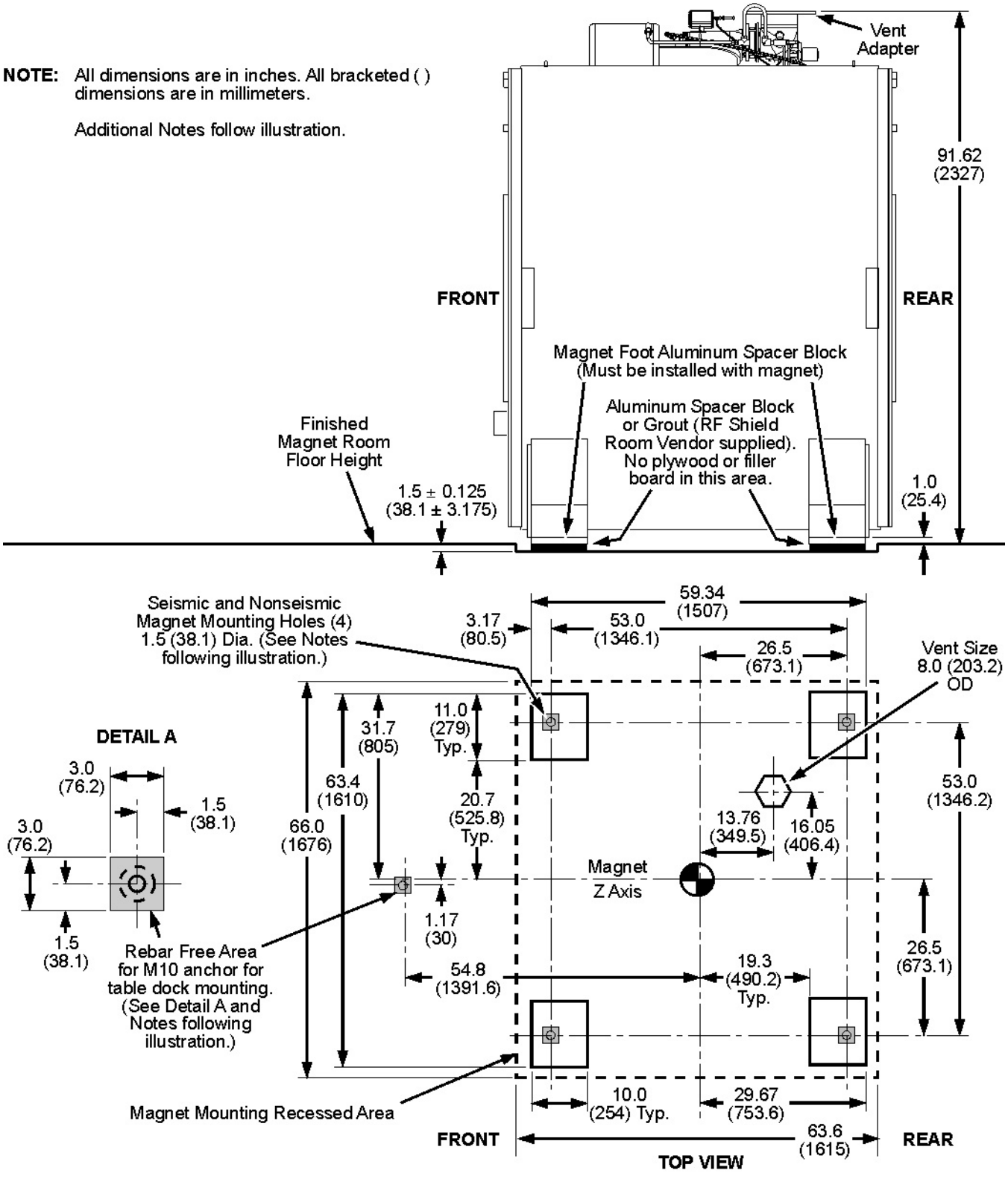
3. Make sure all equipment anchors are located in conformance with the site's architectural drawings and installed and tested per the “Anchor Hardware Requirements for MR Equipment inside RF Shield Room” section of the appropriate Pre-Installation manual.
4. Verify that the vent is located to the specifications stated in the appropriate Pre-Installation manual.
5. At sites choosing to bolt the magnet directly to the building structure, make sure the RF Shield Room Vendor has installed 1.5 ± 0.125 in. (38.1 ± 3.175 mm) thick

aluminum spacer blocks or grout at each magnet foot in conformance with the appropriate Pre-Installation manual.

NOTICE

Review the shipping and handling guidelines in Section 4, International (Air-Sea) Magnet Delivery, or in Section 5, Domestic Magnet Delivery, with the shipper and riggers prior to transporting the magnet. These guidelines must be followed to prevent any potential damage to the magnet during shipping and handling.

Illustration 1: Magnet Loading Pattern, VibroAcoustic Damping Mat Option NOT INSTALLED



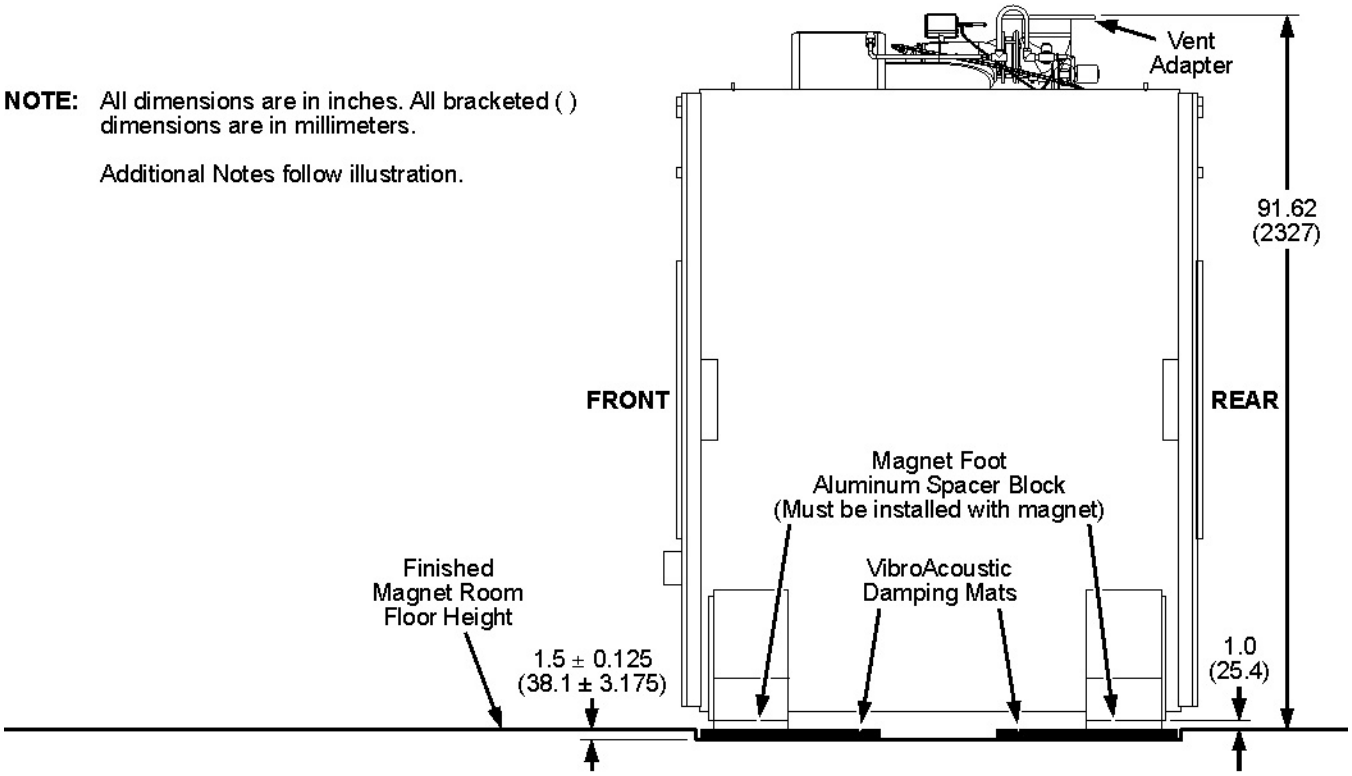
Notes to Illustration 1:

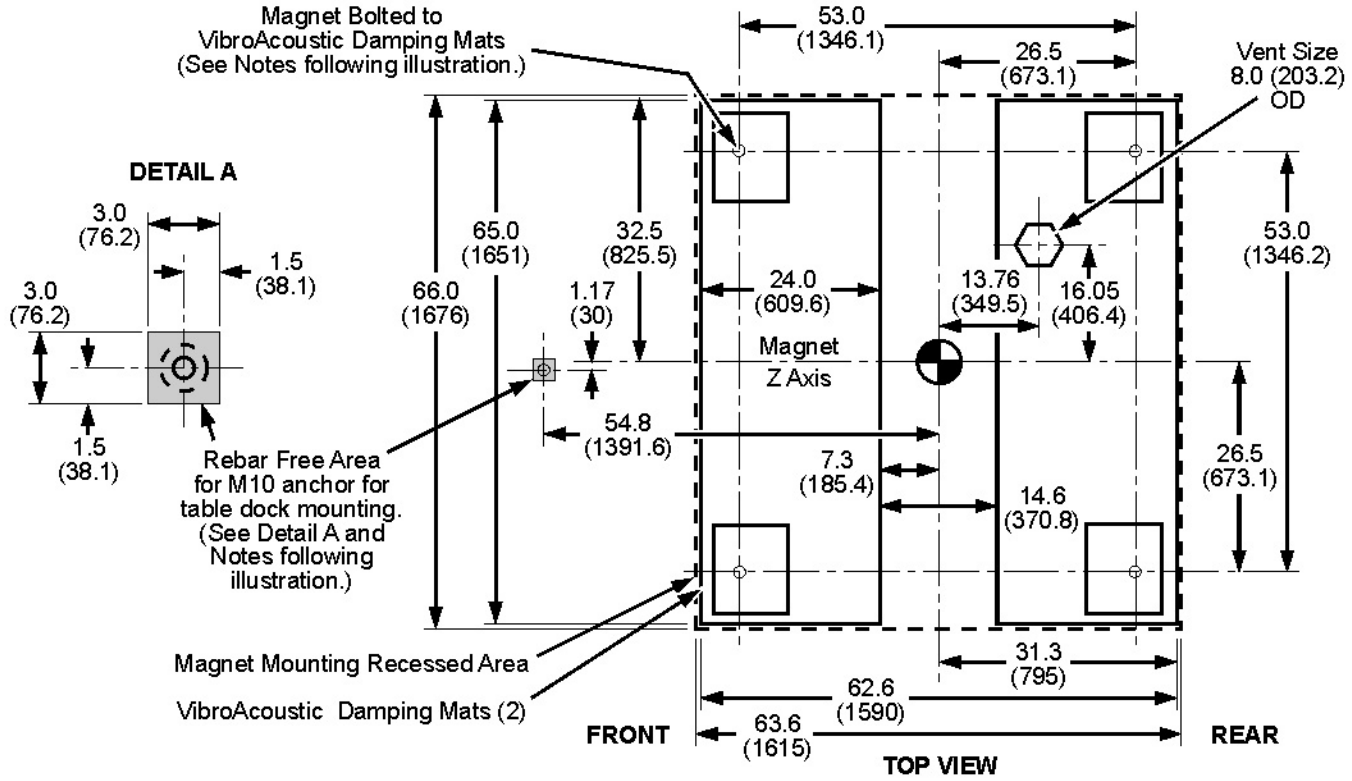
- Lifting Rails are attached to sides of magnet, but not shown in illustration.
- Aluminum leveling plates are not shown.
- Approximate weight (floor loading) of magnet, cryogens, RF/gradient (BRM) body coil and HDe enclosure: 12,606 pounds (5,719 Kg). Source: Direction 5144364, Rev. 1, *Signa EXCITE HDe 1.5T Pre-Installation*.
- Approximate weight (floor loading) of magnet, cryogens, RF/gradient (BRM) body coil and HDx enclosure: 12,826 pounds (5,818 Kg). Source: Direction 5159901, Rev. 1, *Signa EXCITE HDx 1.5T Pre-Installation*.
- Approximate weight (floor loading) of magnet, cryogens, RF/gradient (TRM) body coil and HDx enclosure: 12,826 pounds (5,818 Kg). Source: Direction 5159902, Rev. 1, *Signa EXCITE HDx 1.5T TwinSpeed Pre-Installation*.
- Steel rebar must not be positioned in shaded areas to prevent interference with mounting bolts. See Detail A in Illustration 1; Section 10, Dock Assembly Floor Anchor Installation; and Anchor Hardware Requirements for MR Equipment Inside RF Shield Room in the appropriate Pre-Installation manual.
- For magnet moving dimensions see Section 8, Moving Magnet to MR Suite.

Illustration 2: Magnet Loading Pattern, VibroAcoustic Damping Mat Option INSTALLED

NOTE: All dimensions are in inches. All bracketed ( ) dimensions are in millimeters.

Additional Notes follow illustration.





Notes to Illustration 2:

- Lifting Rails are attached to sides of magnet, but not shown in illustration.
- Aluminum leveling plates are not shown.
- Approximate weight (floor loading) of magnet, cryogens, RF/gradient (BRM) body coil, HDe enclosure and VibroAcoustic Damping Mats: 13,116 pounds (5,949 Kg). Source: Direction 5144364, Rev. 1, *Signa EXCITE HDe 1.5T Pre-Installation*.
- Approximate weight (floor loading) of magnet, cryogens, RF/gradient (TRM) body coil, HDx enclosure and VibroAcoustic Damping Mats: 13,336 pounds (6,049 Kg). Source: Direction 5159901, Rev. 1, *Signa EXCITE HDx 1.5T Pre-Installation*.
- Approximate weight (floor loading) of magnet, cryogens, RF/gradient (TRM) body coil, HDx enclosure and VibroAcoustic Damping Mats: 13,336 pounds (6,049 Kg). Source: Direction 5159902, Rev. 1, *Signa EXCITE HDx 1.5T TwinSpeed Pre-Installation*.
- Steel rebar must not be positioned in shaded areas to prevent interference with mounting bolts. See Detail A in Illustration 2; Section 10, Dock Assembly Floor Anchor Installation; and Anchor Hardware Requirements for MR Equipment Inside RF Shield Room in the appropriate Pre-Installation manual.
- For magnet moving dimensions see Section 8, Moving Magnet to MR Suite.

4 International (Air-Sea) Magnet Delivery

WARNING

POTENTIAL ASPHYXIATION HAZARD
LOSS OF MAGNET VACUUM WILL RESULT IN THE RAPID EXPULSION OF HELIUM GAS, WHICH CAN CAUSE ASPHYXIATION IN ENCLOSED AREAS.
USE EXTREME CAUTION TO NOT CONTACT OR DAMAGE THE VACUUM VESSEL DURING MAGNET TRANSIT OR SITING.

4.1 Shipping and Handling Guidelines

NOTICE

Review all shipping and handling guidelines in Table 3, Table 4 and Table 5 with the Shipper & Riggers prior to transporting the magnet.

These guidelines MUST be followed to prevent any potential damage to the magnet during shipping and handling.

Table 3: In-Transit Lifting/Handling Information

Magnet	Maximum Crated Weight	Maximum Tilt	Forklift Capability
HDe 1.5T LCC	Magnet with TRM Gradient: 14,300 pounds (6,495 kg)[a, b]	30 degrees[c]	Yes
HDx 1.5T LCC			

[a] Magnet with TRM gradient: 14,300 pounds (6,495 kg) comprised of bare magnet: 8550 pounds (3886 kg); TRM body coil: 3000 pounds (1361 kg); gradient supports and HDe/HDx enclosure parts: 290 pounds (132 kg); lifting rails: 260 pounds (118 kg); and shipping crate/pallet: 2200 pounds (998 kg). Source: 5162096IDW, rev. 1.

[b] Magnet with BRM gradient: 13,800 pounds (6,318 kg), comprised of bare magnet: 8550 pounds (3886 kg); BRM-F body coil: 2500 pounds (1134 kg); gradient supports and HDe/HDx enclosure parts: 290 pounds (132 kg); lifting rails: 260 pounds (118 kg); and shipping crate/pallet: 2200 pounds (998 kg). Source: 5162096IDW, rev. 1.

[c] Maximum tilt allowed only when supported by feet for forklift/rigging operations or moving on inclines (base lift).

NOTICE

The magnet CANNOT be shipped by train as serious damage to the magnet's internal suspension system may occur due to the vibration loads introduced by rail systems.

Table 4: Shipping Information

Magnet	Allowable Shipping Modes	Shipping Capability	Maximum Transit Time
HDe 1.5T LCC	Airplane, air ride only trailer or ocean-going ship	Warm or Cold	Cryogen refill[a] for cold shipment = 15 days
HDx 1.5T LCC			

[a] See Section 4.3 below. Access magnet plumbing via the access panel shown in Illustration 3.

Table 5: Maximum Load Information

Magnet	Maximum Longitudinal Load	Maximum Lateral Load	Maximum Vertical Load	Maximum Shock Loads
1.5T HDe LCC	1.2 G	1.5 G	1.5 G	None Allowed
1.5T HDx LCC				

4.2 Equipment & Tools

NOTICE

DO NOT USE A CRANE to lift a magnet that's on a pallet or inside a crate. Crane lifting can only be done using the lifting rails, which are not accessible while the magnet is inside the crate.

Table 6: Crated Magnet Lifting/Handling Information

Item	Equipment Specification/Rating		Furnished By	Intended Use
Forklift	Forklift Capacity:	Magnet with TRM gradient: 14,300 pounds (6,495 kg) at 50 inches (1,270 mm) to load center, minimum	Rigger	Unloading or Moving Magnet, Pallet and Crate Together
		Magnet with BRM gradient: 13,800 pounds (6,318 kg) at 50 inches (1,270 mm) to load center, minimum		
	Minimum Fork Length:	90 inches (2,286 mm)		
	Minimum Distance Between Forks:	40 inches (1,016 mm)		
Crane (On-Site Only)	Total Load:	Magnet with TRM gradient: 14,300 pounds (6,495 kg), minimum	Rigger	Crate Removal and Unloading or Moving Magnet (No Pallet or Crate)
		Magnet with BRM gradient: 13,800 pounds (6,318 kg), minimum		
Two-Legged Cable Bridle/Sling (Lifting Rail to Spreader Beam)	Total Load:	Magnet with TRM gradient: 14,300 pounds (6,495 kg), minimum	Rigger	Crate Removal (optional) and Unloading or Moving Magnet (No Pallet or Crate)
		Magnet with BRM gradient: 13,800 pounds (6,318 kg), minimum		
	Leg Length:	90 inches (2,286 mm) min. (all legs same length)		
	Load per Leg:	Magnet with TRM gradient: 7198 pounds (3265 kg), minimum		
		Magnet with BRM gradient: 6,900 pounds (3,159 kg), minimum		
Two-Legged Cable Bridle/Sling (Spreader Beam to Crane)	Leg Length:	90 inches (2286 mm) min. (all legs same length)	Rigger	Crate Removal (optional) and Unloading or Moving Magnet (No Pallet or Crate)
	Load per Leg:	Magnet with TRM gradient: 14,300 pounds (6,495 kg), minimum		
		Magnet with BRM gradient: 13,800 pounds (6,318 kg), minimum		
Sling (Strap or Cable)	Minimum Length:	72 inches (1,830 mm)	Rigger	Crate Removal
	Work Load Limit:	1 ton (907 kg)		
Shackle or Hook	Work Load Limit:	1 ton (907 kg)	Rigger	Crate Removal

Table 1-6: Crated Magnet Lifting/Handling Information (cont'd)

Wrench	Sizes:	9/16 and 3/8 inches	Rigger	Crate Removal
Note: For handling and lifting magnet outside crate, refer to Section 5, Domestic Magnet Delivery.				

4.3 In-Transit Service

NOTICE

In-transit service must be performed by qualified personnel only and in strict conformance with the Liquid Helium Fill procedure stated in Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem*, and with 2301164PRE, *MR Magnet — Safety Requirements*.

Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem*, and with 2301164PRE, *MR Magnet — Safety Requirements*, are available through your GE Healthcare Field Service Representative.

In-transit helium refill is performed based upon magnet shipping date. The procedure MUST be performed in STRICT conformance with the 'Liquid Helium Fill' procedure in Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem*, and with 2301164PRE, *MR Magnet — Safety Requirements* (included with Direction 2192624). Access the plumbing through the access panel identified in Illustration 3. In-transit the plumbing is configured as in Illustration 4.

In-transit electrical checks are covered in Section 6, Magnet System Checks (by GE Service), later in this manual.

Illustration 3: Crate/Pallet

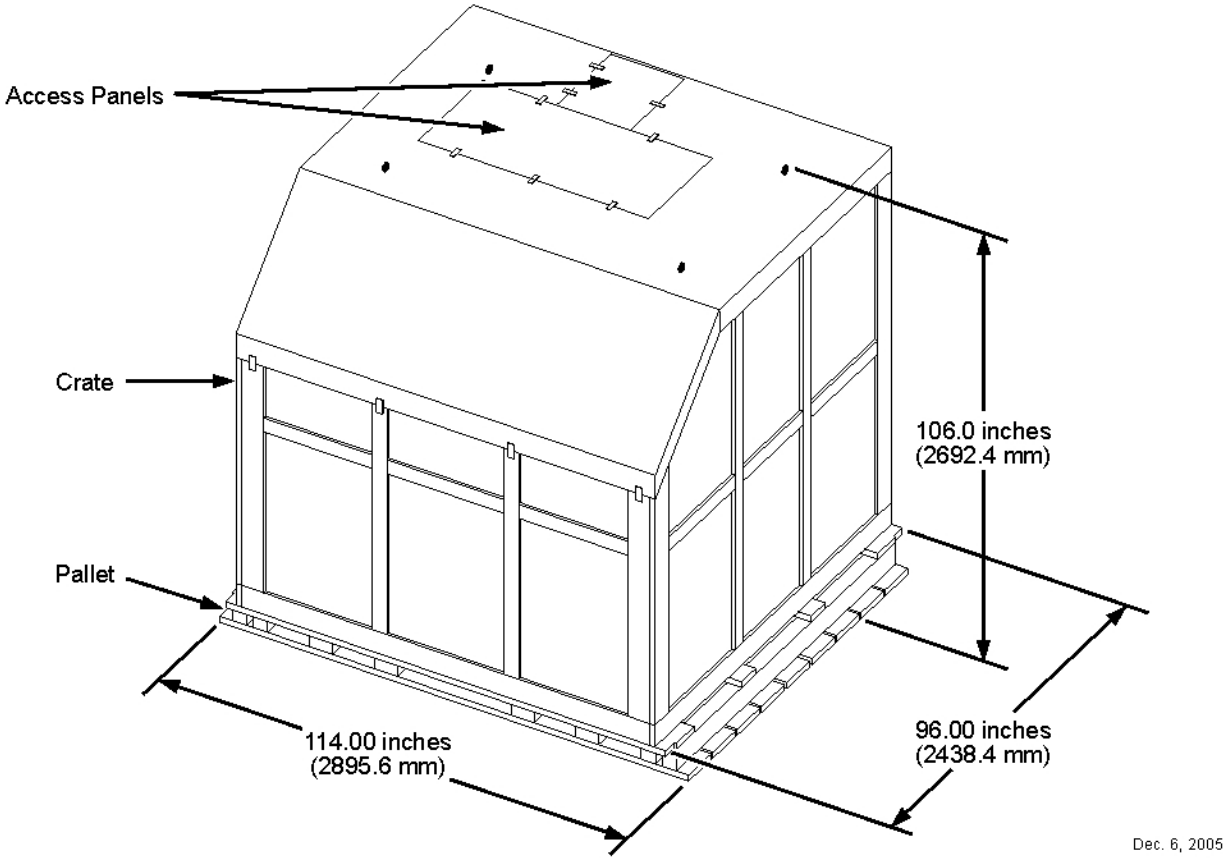
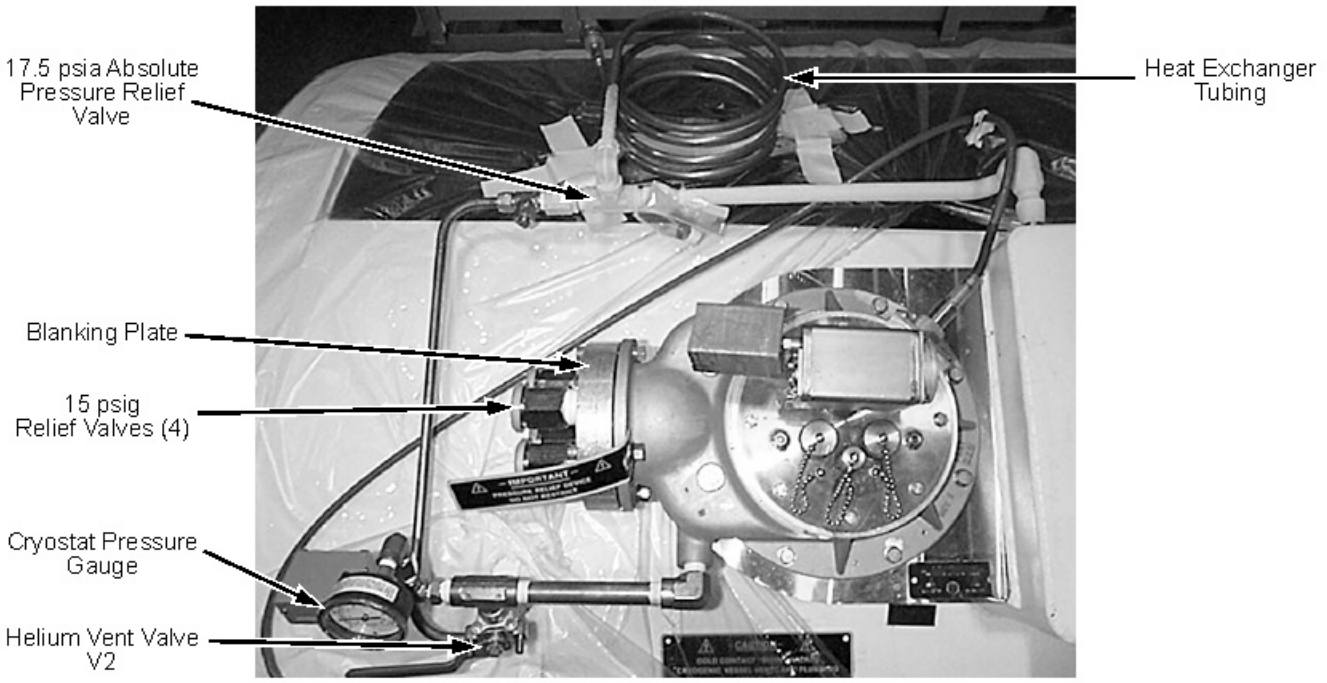
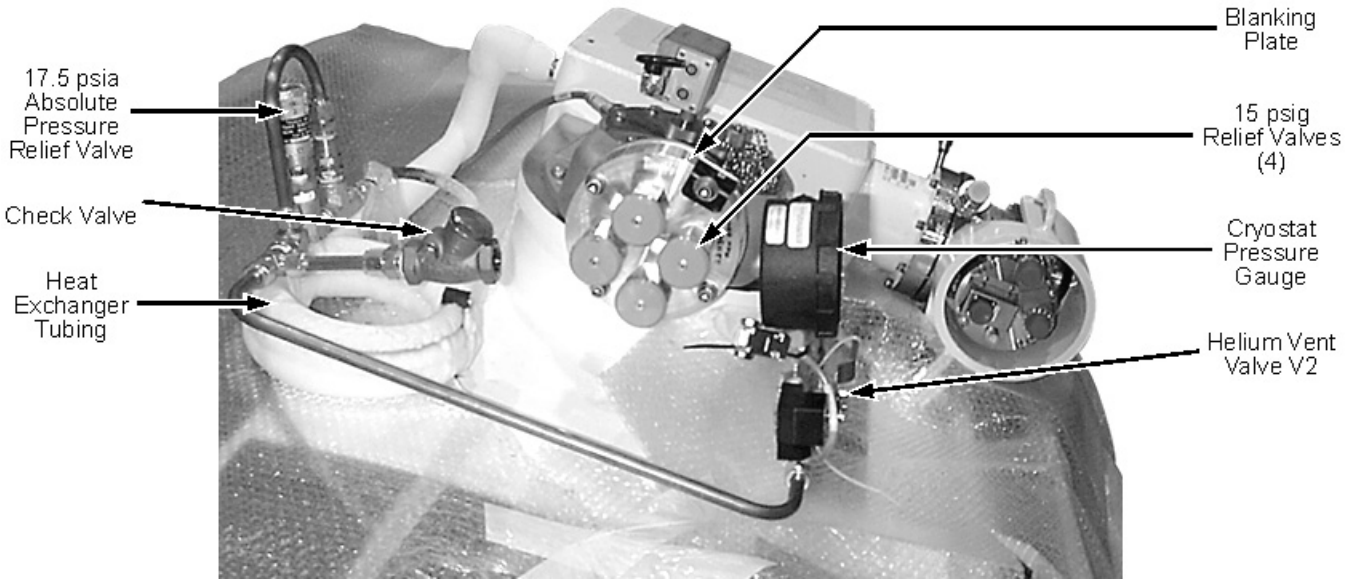


Illustration 4: Magnet Plumbing Inside Top Service Access Panel (International Shipments)

Magnet Assembly 2188846



Magnet Assembly 2243832



4.4 In-Transit Handling

4.4.1 In-Transit Handling with Crane

NOTICE

DO NOT LIFT THE MAGNET/CRATE/PALLET PACKAGE USING A CRANE. Crane lifting can only be done using the lifting rails, which are not accessible while the magnet is inside the crate.

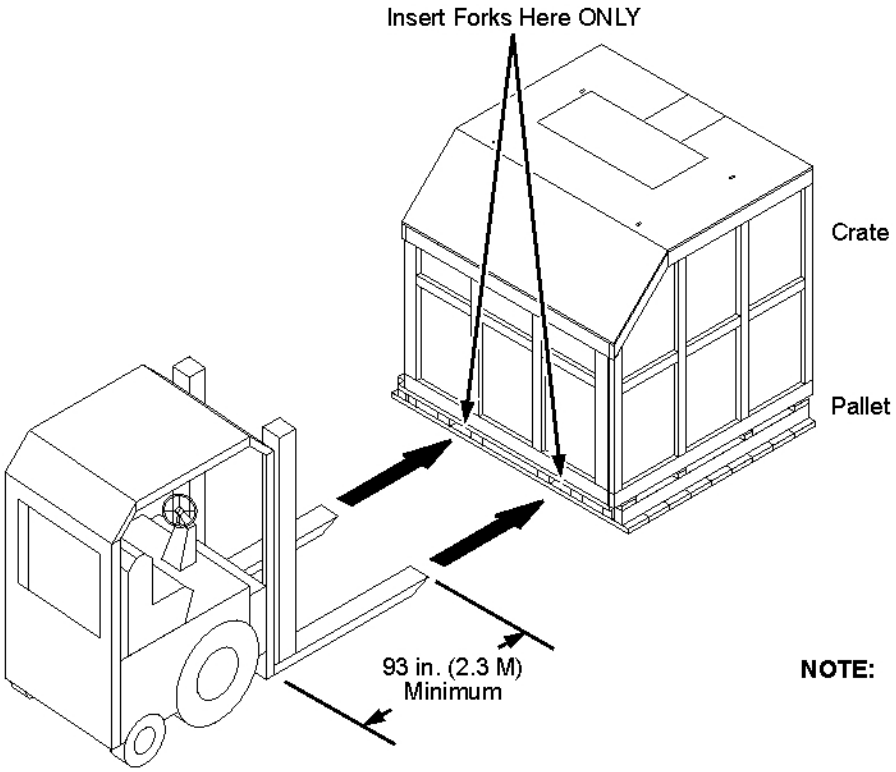
4.4.2 In-Transit Handling with Forklift

NOTICE

Extreme care must be exercised during forklift operations:

- **Forklift must meet the minimum capacity and dimension requirements stated in Table 6.**
- **The magnet MUST be picked up from the sides only and only where shown in Illustration 5.**
- **The magnet MUST be lifted smoothly to avoid impact or jolts to the system which may cause damage to the magnet.**

Illustration 5: Forklift Lifting Points of Magnet/Crate/Pallet Package



NOTE: Magnet crate must be lifted from sides only.

NOTICE

Impacts/jolts to the magnet while lifting/moving/lowering the magnet/crate/pallet package can cause expensive internal magnet damage. Lift/move/lower smoothly. Do not allow the crate/pallet to bump or hit anything forcefully.

Avoid tilting the magnet/crate/pallet package more than the maximum tilt specified in Table 3 as magnet damage may result.

1. Position a forklift meeting the requirements stated in Table 6 beside the magnet crate/pallet as shown in Illustration 5.
2. Carefully insert the forklift forks completely into the holes provided in the long side of the shipping pallet. See Illustration 5.
3. Smoothly lift the crate/pallet with the forklift and move the crate/pallet to the desired location.
4. Lower the entire package to rest on a flat, smooth surface. Do not rest magnet/crate/pallet any place that is not flat nor strong enough to support the magnet/crate/pallet package.

4.5 On Site

4.5.1 Crate Removal

NOTICE

DO NOT LIFT THE MAGNET/CRATE/PALLET PACKAGE USING A CRANE. Crane lifting can only be done using the lifting rails, which are not accessible while the magnet is inside the crate.

Remove the magnet's shipping crate while the magnet/crate/pallet package is on the trailer/transport.

NOTICE

Clearance between magnet and inside of air/sea shipping crate is minimal during shipment. The crate's side panels hinge outwards to increase magnet-crate clearance for crate removal. Damage to the magnet and/or magnet enclosures may result if the crate is removed while the crate's side panels are in their closed (shipping) position or if the crate is disassembled while the magnet is inside the crate.

4.5.1.1 Removal of Subsystem Crates

NOTICE

During this procedure carefully inspect all packaging and contents for damage that may have occurred during shipping. Use the “Damage in Transportation” procedure (Section 1) at the front of this manual to report any damage found.

1. Remove all subsystem crates, except the magnet crate, from the trailer/transport using a crane or forklift. Inspect all crates for visible damage. Use the “Damage in

Transportation" procedure (Section 1) at the front of this manual to report any damage found.

2. Move subsystem crates to a receiving location protected from the weather, preferably close to and at the same level as the MR suite/magnet room.

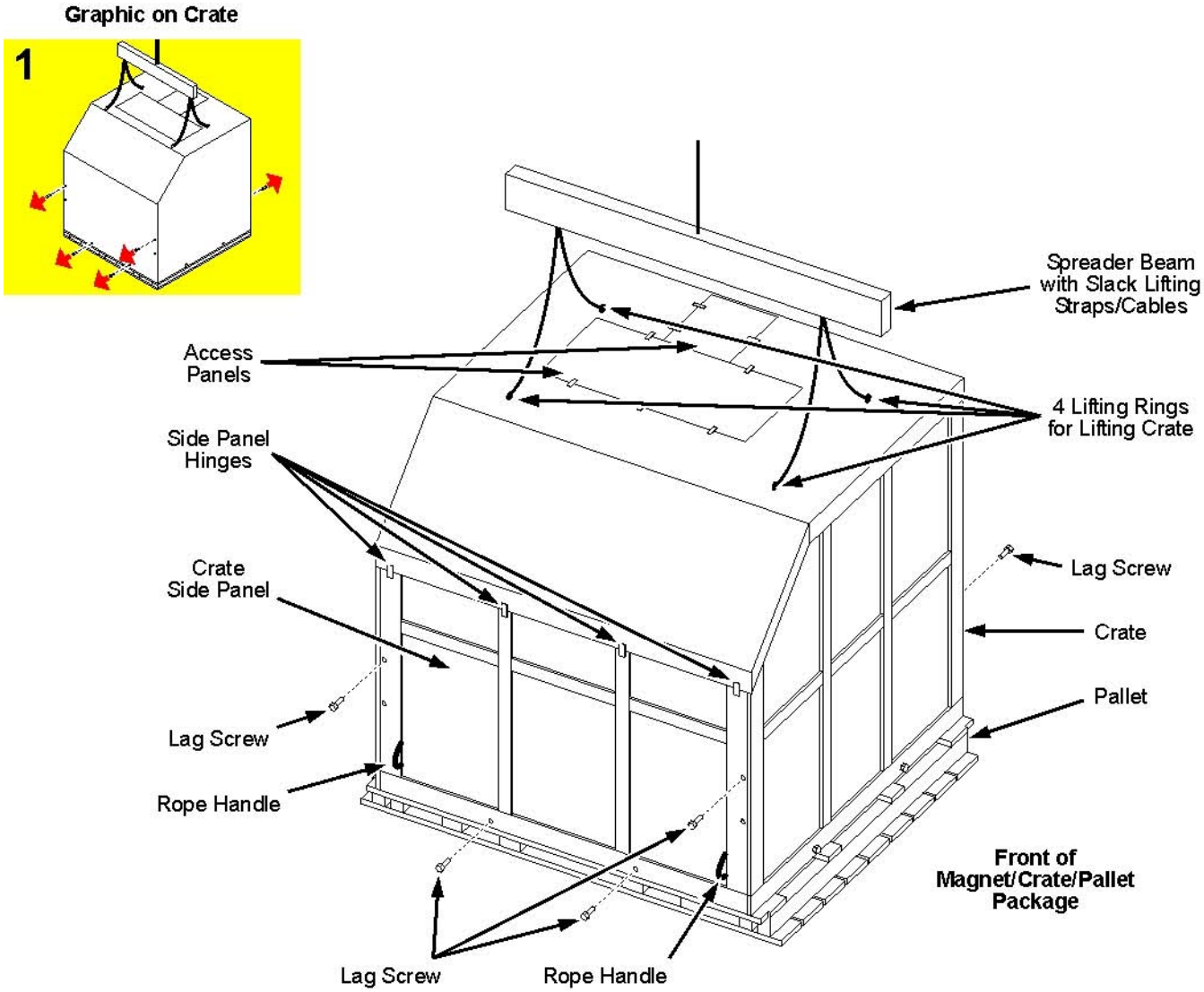
4.5.1.2 Position Crane

NOTICE

Do not remove any lag screws on the crate or pallet until the crane is positioned and the slings/cable bridles are attached to the crate' lifting rings.

1. Position a crane meeting the specifications stated in Table 6 above the center of the crate. Either a hook/shackle and slings or a spreader beam and slings/cable bridles meeting the specifications stated in Table 6 may be used during crate removal.
2. Attach the slings/cable bridles to the lifting rings on top of the crate. See Illustration 6.

Illustration 6: Lag Screw Removal to Open Crate Side Panels



4.5.1.3 Put Crate in Lifting Configuration

1. Remove the lag screws along the lower edges of the crate's left and right side panels that secure those panels to the pallet. See Illustration 6 and graphic '1' on the shipping crate.

NOTE: **DO NOT** remove the lag screws securing the crate's front and back end panels to the pallet until **after** the crate's side panels are secured in their open position.

2. Remove the lag screws securing the crate side panels to the crate end panels. See Illustration 6 and graphic '1' on the shipping crate.

NOTE: **DO NOT** remove the hinges along each crate side panel's upper edge.

3. Pull open the crate's left and right side panels using the each side panel's rope handle. See Illustration 7 and graphic '2' on the shipping crate.

NOTE: The crate's left and right side panels are hinged along their upper edges.

4. Swing outwards the wooden block found inside each vertical corner of the crate. See Illustration 8.
5. Attach the loose end of each block to the adjoining side panel using one of the lag screws removed previously. See Illustration 8.
6. Remove the lag screws along the lower edges of the crate's front and back end panels that secure those panels to the pallet. See Illustration 7 and graphic '2' on the shipping crate.

Illustration 7: Securing Crate Side Panels in Open Position

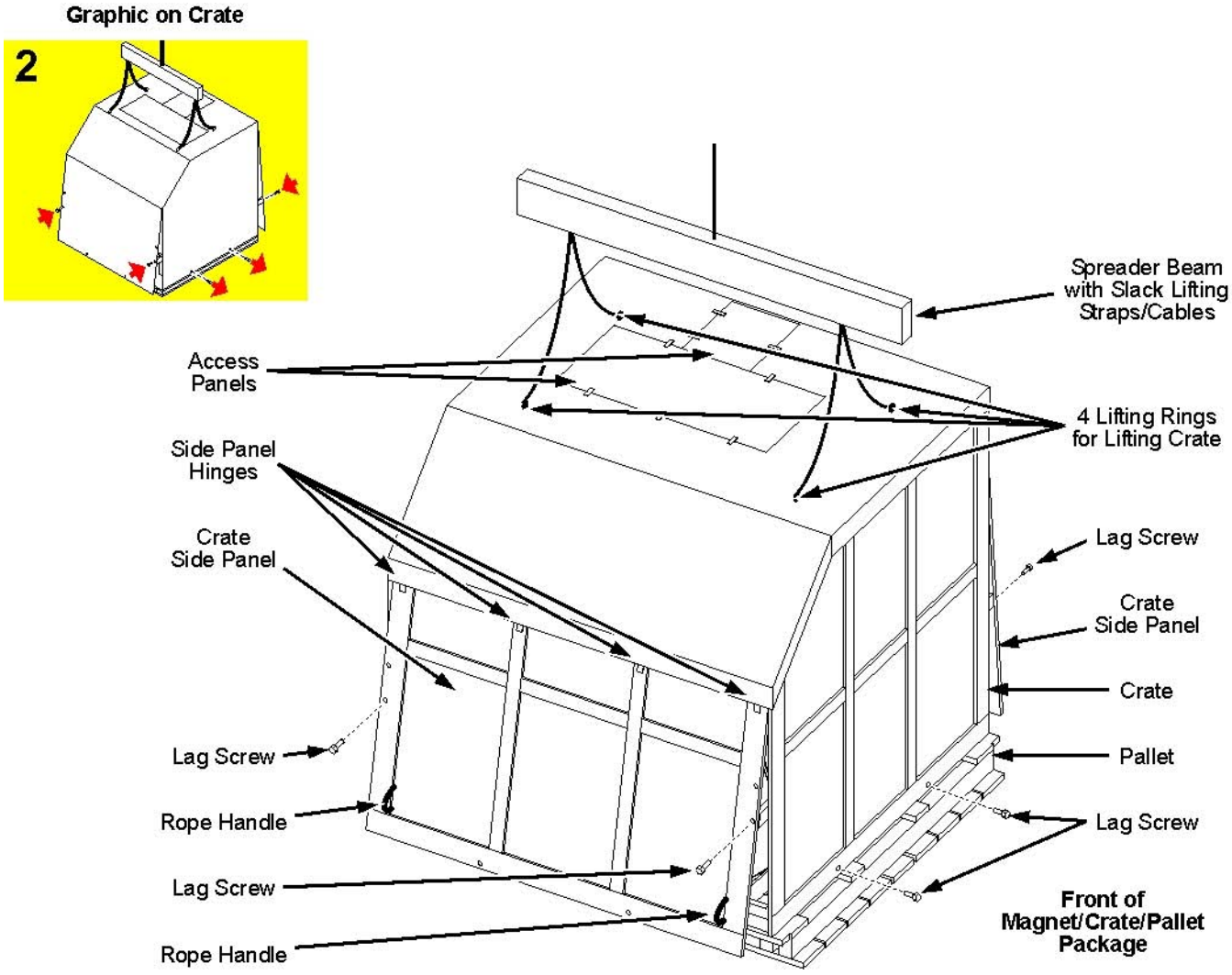
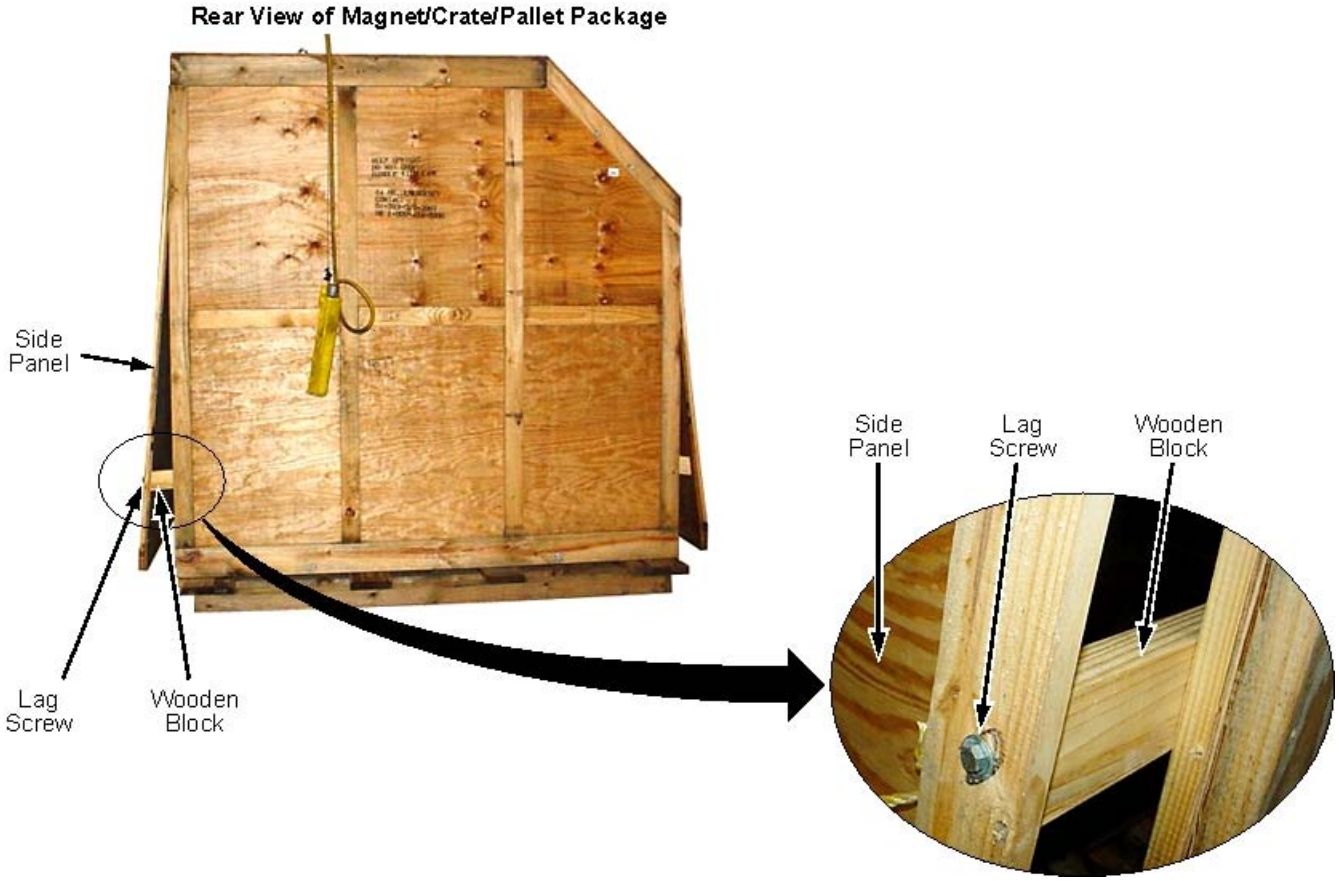


Illustration 8: Air/Sea Shipping Crate with Left & Right Side Panels Raised and Propped Open

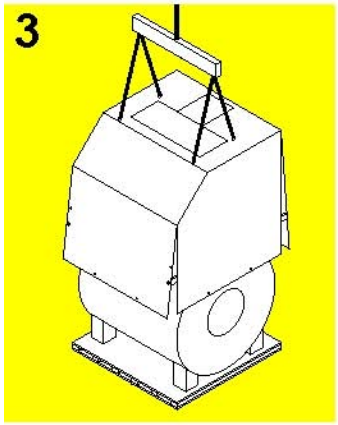


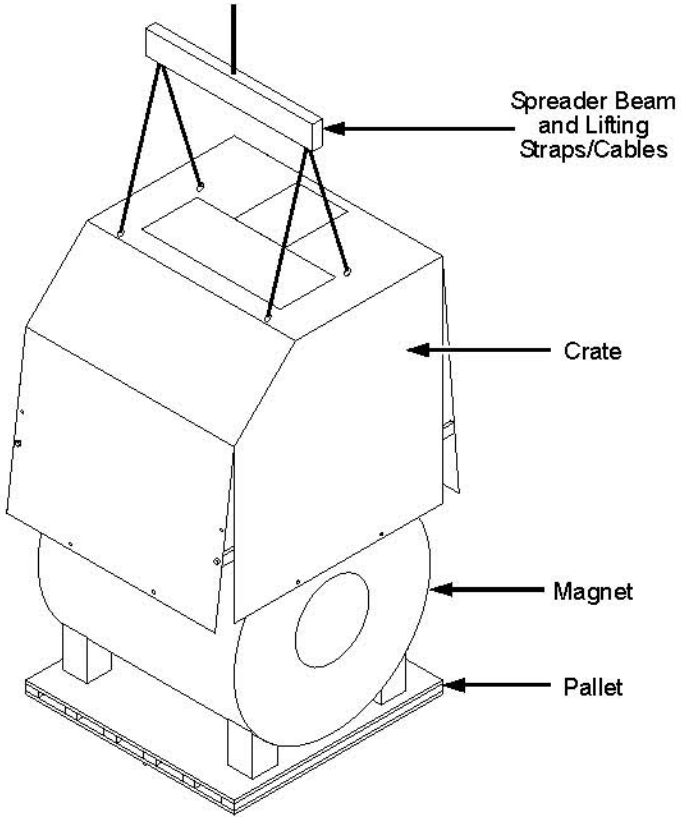
4.5.1.4 Lift Crate Off Pallet

1. Tighten the slings/cable bridles and carefully begin lifting the crate. See Illustration 9 and graphic '3' on the shipping crate. If the crate doesn't remain approximately level, carefully lower the crate and adjust the lifting configuration, then lift the crate again.
2. Crane lift the crate off the magnet's shipping pallet and fully above the magnet. Place the crate in a clear area.

Illustration 9: Crate Lifting Using Crane

Graphic on Crate





NOTE: Use of a spreader beam and cable bridles or slings is shown here. A hook or shackle and slings can also be used.

All equipment used must meet or excede the size and loading specifications stated in this manual.

4.5.2 Removing Magnet from Pallet

WARNING

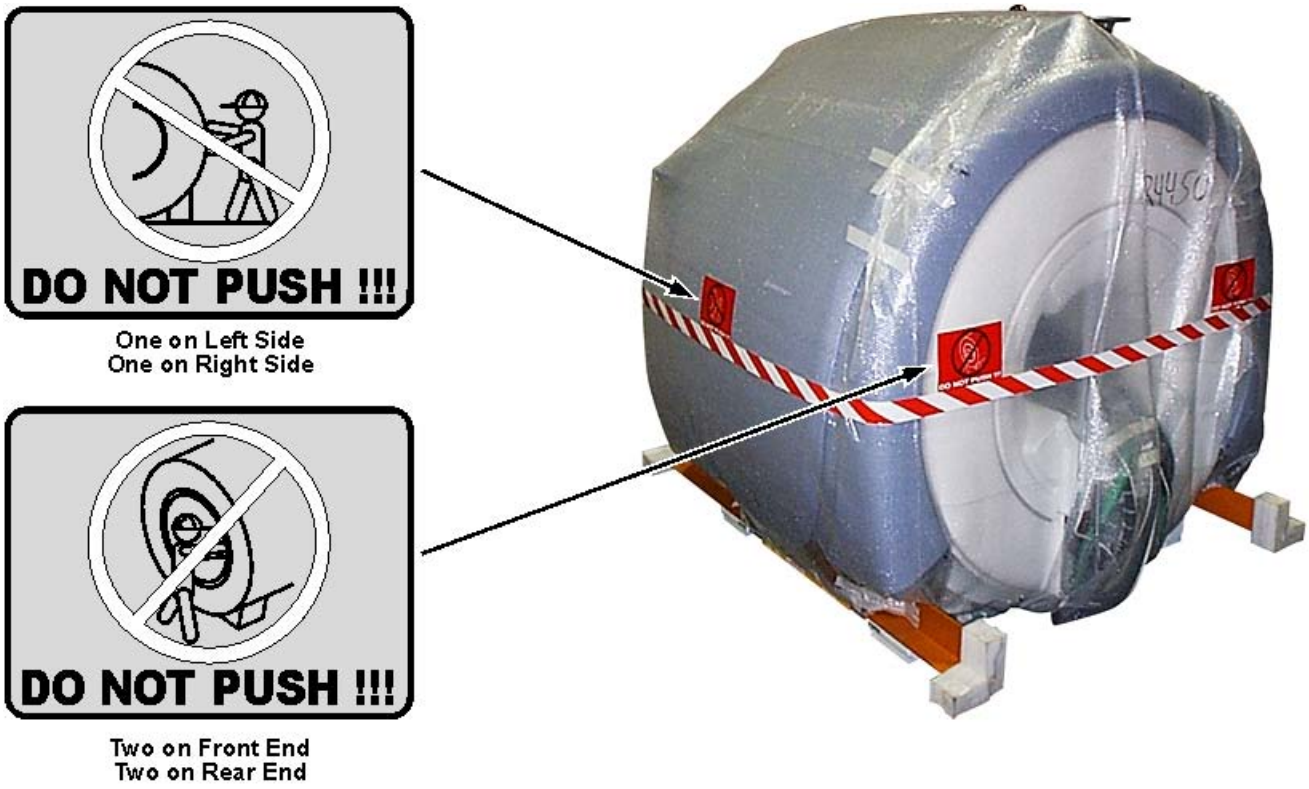
POTENTIAL INJURY HAZARD
PUSHING MAGNET ENCLOSURES MAY RESULT IN BODILY INJURY TO PERSONNEL.
DO NOT PUSH MAGNET ENCLOSURES.

NOTICE

To prevent magnet damage:

- **Do not apply any force to the magnet's enclosures.**
- **Only use equipment/tools meeting the specifications stated in Table 6 to crane lift or forklift the magnet off its shipping pallet.**
- **Before moving magnet to MR Suite, refer to Section 8, Moving Magnet to MR Suite.**

Illustration 10: "Do Not Push" Signs

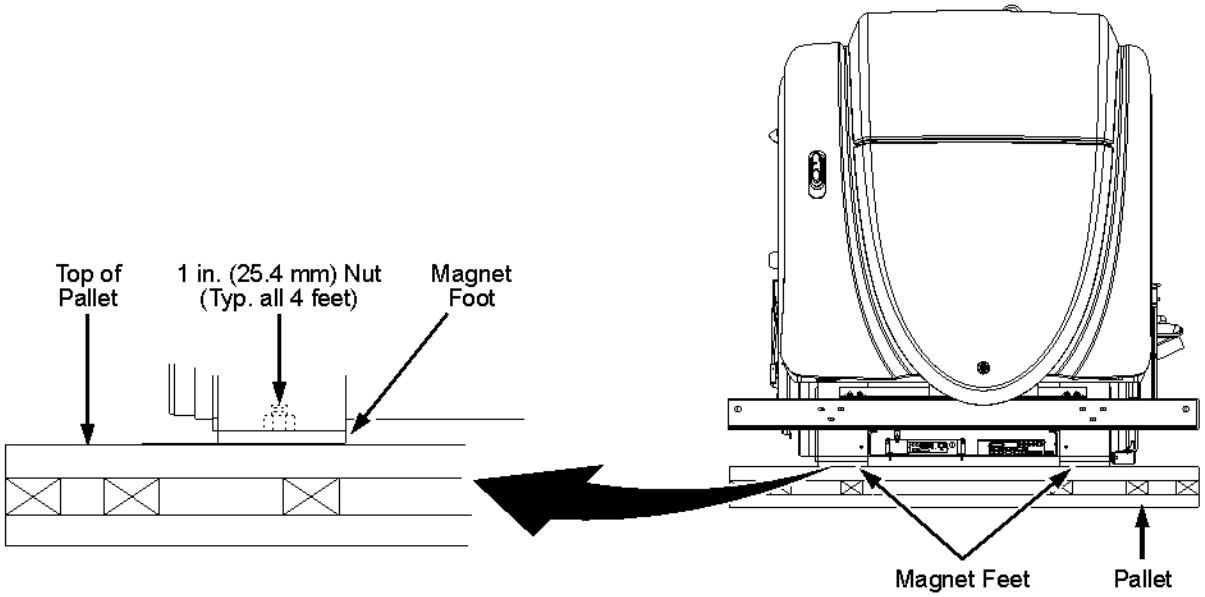


NOTICE

Do not move the magnet to the MR Suite while the magnet is on its shipping pallet.

1. Unbolt and remove the four 1 inch (25.4 mm) nuts securing the magnet to the pallet. See Illustration 11.
2. Rig and lift the magnet off the pallet in conformance with the Forklift Unloading (when using a forklift) or Crane Unloading (when using a crane) subsections of Section 5, Domestic Magnet Delivery.

Illustration 11: Unbolting Magnet from Shipping Pallet



5 Domestic Magnet Delivery

WARNING

POTENTIAL ASPHYXIATION HAZARD
LOSS OF MAGNET VACUUM WILL RESULT IN THE RAPID EXPULSION OF HELIUM GAS, WHICH CAN CAUSE ASPHYXIATION IN ENCLOSED AREAS.
USE EXTREME CAUTION TO NOT CONTACT OR DAMAGE THE VACUUM VESSEL DURING MAGNET TRANSIT OR SITING.

5.1 In-Transit Handling Guidelines

NOTICE

Review all shipping and handling guidelines in Table 7, Table 8 and Table 9 with the Shipper & Riggers prior to transporting the magnet.

These guidelines MUST be followed to prevent any potential damage to the magnet during shipping and handling.

Table 7: In-Transit Lifting/Handling Information

Magnet	Maximum Crated Weight		Maximum Tilt	Forklift Capability
	Magnet with TRM Gradient[a]	Magnet with BRM Gradient[b]		
HDe 1.5T LCC	12,100 pounds (5,497 kg)[a]	11,600 pounds (5,320 kg)[b]	30 degrees[c]	Yes
HDx 1.5T LCC				

[a] Magnet with TRM gradient: 12,100 pounds (5,497 kg) comprised of magnet: 8550 pounds (3886 kg); TRM body coil: 3000 pounds (1361 kg); gradient supports and HDe/HDx enclosure parts: 290 pounds (132 kg); and lifting rails: 260 pounds (118 kg). Source: 5162096IDW, rev. 1.

[b] Magnet with BRM gradient: 11,600 pounds (5,320 kg), comprised of magnet: 8550 pounds (3886 kg); BRM-F body coil: 2500 pounds (1134 kg); gradient supports and HDe/HDx enclosure parts: 290 pounds (132 kg); and lifting rails: 260 pounds (118 kg). Source: 5162096IDW, rev. 1.

[c] Maximum tilt allowed only when supported by feet for forklift/rigging operations or moving on inclines (base lift).

NOTICE

The magnet CANNOT be shipped by train as serious damage to the magnet's internal suspension system may occur due to the vibration loads introduced by rail systems.

Table 8: Shipping Information

Magnet	Allowable Shipping Modes	Shipping Capability	Maximum Transit Time	Comments
HDe 1.5T LCC	Airplane[a], air ride only trailer or ocean-going ship[a]	Warm or Cold	Cryogen refill for cold shipment = 15 days	Only tie downs to magnet feet and lifting rails are permitted.
HDx 1.5T LCC				

[a] Only for crated magnets. See Section 4, International (Air-Sea) Magnet Delivery.

Table 9: Maximum Load Information

Magnet	Maximum Longitudinal Load	Maximum Lateral Load	Maximum Vertical Load	Maximum Shock Loads
1.5T HDe LCC	1.2 G	1.5 G	1.5 G	None Allowed
1.5T HDx LCC				

NOTE: Only tie downs to magnet feet and lifting rails are permitted.

5.2 Equipment & Tools for Domestic Delivery & Magnet Installation

5.2.1 Forklift

Table 10: Forklift Requirements

Item	Qty.	Equipment Specification/Rating		Furnished By	Intended Use
Forklift	1	Forklift Capacity:	Magnet with TRM gradient: 12,100 pounds (5,497 kg) at 50 inches (1,270 mm) to load center, minimum	Rigger	Unloading or Moving Magnet (Without Pallet)
			Magnet with BRM gradient: 11,600 pounds (5,320 kg) at 50 inches (1,270 mm) to load center, minimum		
		Minimum Fork Length:	90 inches (2,286 mm)		
		Minimum Distance Between Forks:	80 inches (2,032 mm)		

5.2.2 Crane Lift

WARNING

POTENTIAL INJURY HAZARD
FAILURE OF EQUIPMENT/TOOLS USED DURING CRANE LIFTING MAY RESULT IN SERIOUS PERSONAL INJURY.
ALWAYS USE LIFTING APPARATUS (CRANE, SPREADER BEAM, ETC.) MEETING THE SPECIFICATIONS STATED IN TABLE 11.

Table 11: Crane Requirements

Item	Qty.	Equipment Specification/Rating		Furnished By	Intended Use
Crane	1	Total Load:	Magnet with TRM gradient: 12,100 pounds (5,497 kg), minimum	Rigger	Unloading or Moving Magnet (Without Pallet)
			Magnet with BRM gradient: 11,600 pounds (5,320 kg), minimum		
Spreader Beam	1	Total Load:	Magnet with TRM gradient: 12,100 pounds (5,497 kg), minimum	Rigger	Unloading or Moving Magnet (Without Pallet)
			Magnet with BRM gradient: 11,600 pounds (5,320 kg), minimum		
		Distance Between Lifting Points, Underside of Spreader Beam	90 inches - 96 inches (2,295 mm - 2438 mm)		

Table 1-11: Crane Requirements (cont'd)

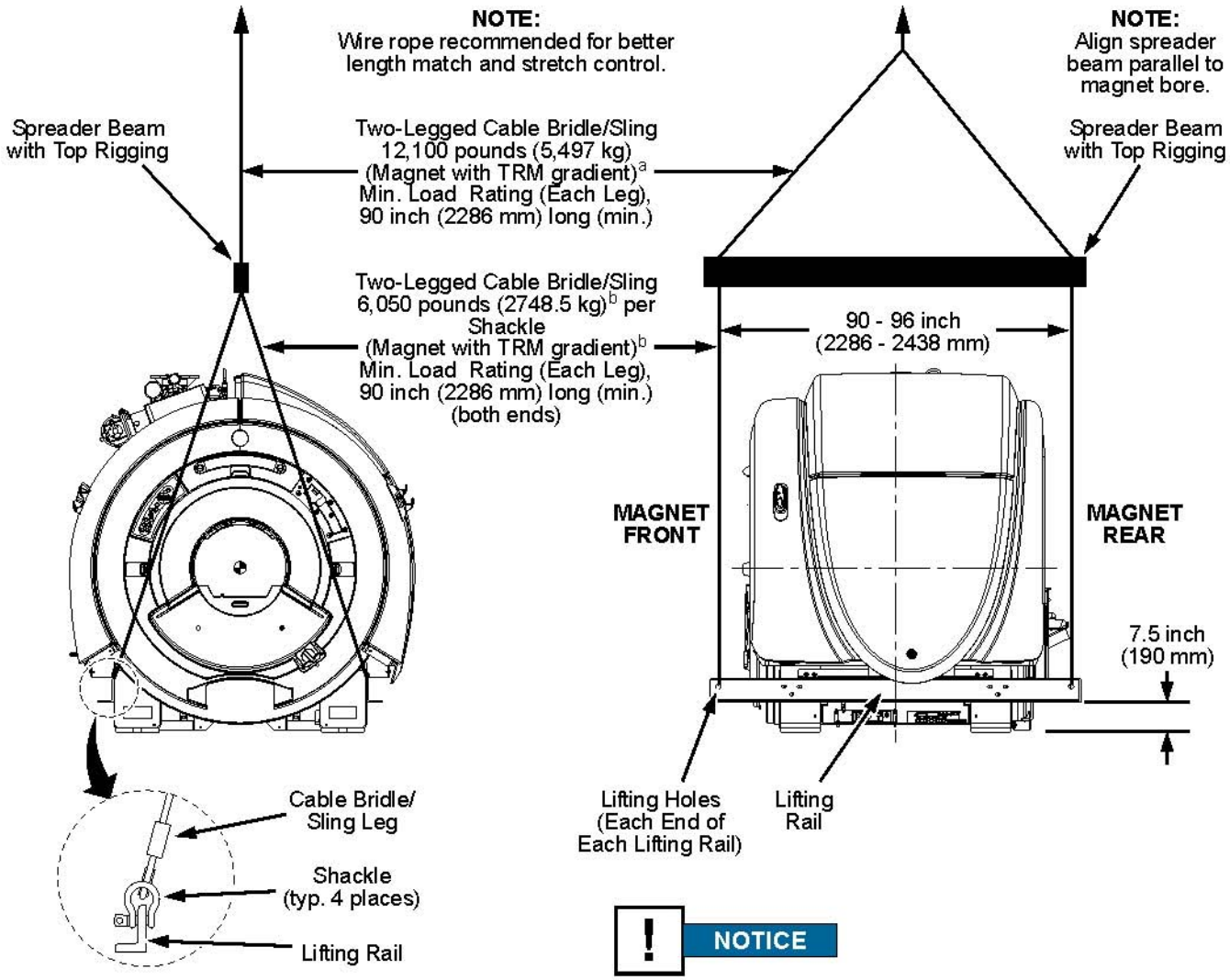
Item	Qty.	Equipment Specification/Rating		Furnished By	Intended Use
Two-Legged Cable Bridle/Sling (Lifting Rail to Spreader Beam)	2	Total Load:	Magnet with TRM gradient: 12,100 pounds (5,497 kg), minimum	Rigger	Unloading or Moving Magnet (Without Pallet)
			Magnet with BRM gradient: 11,600 pounds (5,320 kg), minimum		
		Leg Length:	90 inches (2,286 mm) min. (all legs same length)		
		Load Per Leg:	Magnet with TRM gradient: 6,050 pounds (2748.5 kg), minimum		
			Magnet with BRM gradient: 5,800 pounds (2,660 kg), minimum		
Two-Legged Cable Bridle/Sling (Spreader Beam to Crane)	2	Leg Length:	90 inches (2,286 mm) min. (all legs same length)	Rigger	Unloading or Moving Magnet (Without Pallet)
		Load Per Leg:	Magnet with TRM gradient: 12,100 pounds (5,497 kg), minimum		
			Magnet with BRM gradient: 11,600 pounds (5,320 kg), minimum		
Shackle	4	Pin Diameter:	1 inch (25 mm)	Rigger	Unloading or Moving Magnet (Without Pallet)
		Minimum Work load Limit:	Magnet with TRM gradient: 6,050 pounds (2748.5 kg), minimum		
			Magnet with BRM gradient: 5,800 pounds (2,660 kg), minimum		
Chain Hoist	2	Maximum Length:	90 inches (2,286 mm) (Actual length required to be determined by rigger.)	Rigger	Unloading or Moving Magnet (Without Pallet)
		Minimum Work load Limit:	Magnet with TRM gradient: 6,050 pounds (2748.5 kg), minimum		
			Magnet with BRM gradient: 5,800 pounds (2,660 kg), minimum		

WARNING

POTENTIAL INJURY HAZARDS
TO PREVENT LIFTING CONDITIONS THAT MAY BE HAZARDOUS TO PERSONNEL AND DAMAGING TO THE MAGNET AND EQUIPMENT:

- **MAKE SURE THE LIFTING APPARATUS (CRANE, SPREADER BEAM, ETC.) MEETS THE SPECIFICATIONS STATED IN TABLE 11, CRANE REQUIREMENTS, AND ILLUSTRATION 12, CRANE LIFT CONFIGURATION.**
- **ORIENT SPREADER BEAM PARALLEL TO LIFTING RAILS.**
- **ADJUST LIFTING CABLES/SLINGS AND SPREADER BEAM LIFT POINT TO LEVEL MAGNET BEFORE FULLY LIFTING MAGNET OFF SURFACE.**
- **MAKE SURE THE ENTIRE AREA WHERE LIFTING WILL OCCUR IS FREE OF OBSTRUCTIONS AND UNAUTHORIZED PERSONNEL.**
- **MAKE SURE THE SURFACE ON WHICH THE MAGNET WILL BE PLACED AFTER LIFTING IS FLAT.**
- **DO NOT CRANE LIFT A MAGNET DURING DANGEROUS WEATHER CONDITIONS.**

Illustration 12: Crane Lift Configuration



[a] Magnet with BRM gradient: 11,600 pounds (5,320 kg).

[b] Magnet with BRM gradient: 5,800 pounds (2,660 kg).

NOTICE

DO NOT CRANE LIFT CRATED/PALLETTED MAGNET. Crated/palletted magnets must be handled in conformance with the International (Air/Sea) Magnet Delivery section of this manual.

5.2.3 Miscellaneous Equipment & Tools

Table 12: Miscellaneous Equipment & Tools

Item	Equipment/Tool Requirement	Responsible	Function
Hydraulic or Toe Jack	Must support one end of magnet on two jacks or both ends of magnet on 4 jacks. Total load: • 12,100 pounds (5,497 kg) min. for magnet with TRM gradient • 11,600 pounds (5,320 kg) min. for magnet with BRM gradient	Rigger	Raise magnet for roller dollies or leveling plates
Roller Dollies	Total load for all dollies combined: • 12,100 pounds (5,497 kg) min. for magnet with TRM gradient • 11,600 pounds (5,320 kg) min. for magnet with BRM gradient	Rigger	Moving magnet to magnet room
Level	24 inch - 36 inch (610 mm - 915 mm) length	Rigger	Level the magnet
Magnet Leveling Kit	46-260888G4	Rigger	Level the magnet
Magnet Boltdown/Seismic Kit	Apply sufficient torque to provide 2,500 pounds (1,134 kg) clamping force per anchor. Torque requirements to be supplied by screen room vendor.	Shield Room Vendor	Bolt down magnet
Torque Wrench and Socket	Torque range: 58 ft-lbs - 258 ft-lbs. Deep socket, size dependant on anchor selection	Rigger	Bolt down magnet
Socket Wrench and Sockets	3/4 inch socket (add sockets for crate removal)	Rigger	Remove 1/2 inch crate lag screws
Magnet Interface Drawing	5162096IDW	GE Installation Specialist	Identify magnet dimensions & features
Pre-Delivery Information Package	N/A	GE	Aid in magnet installation
Portable Temperature Meter	2125073	GE Field Engineer	Check internal temperatures
Digital Volt/Ohm Meter	Fluke model or equivalent	GE Field Engineer	Perform magnet electrical checks
Magnet System Components Checks: Section 6, Magnet System Checks (by GE Service)	N/A	GE Field Engineer	Confirm electrical check values
Wood Timber	4 inch x 6 inch x 8 foot (100 mm x 150 mm x 2.5 M)	Rigger	Moving/positioning magnet to magnet room
Steel Plate	18 inch x 6 foot, .50 inch min. thickness (500 mm x 2 M, 6.5 mm min. thickness)	Rigger	Moving magnet to magnet room
Pry-Bar	Length as required to move magnet	Rigger	Moving/positioning magnet to magnet room
RuO Temperature Meter	2171219	GE	Check Coldhead second stage & recondenser temperatures
Adapter Cable for Diode Temperature Meter	N/A	GE	Check internal temperatures
Circular or Chain Saw	N/A	Rigger	For cutting wood timbers

Table 1-12: Miscellaneous Equipment & Tools (cont'd)

Heavy Duty Drill & Drill Bits	N/A	Rigger	To add holes to wood timbers
Min. .50 inch (12.7 mm) Dia. Mounting Hardware	N/A	Rigger	For attaching wood timbers to rails

5.3 In-Transit Service

NOTICE

In-transit service must be performed by qualified personnel only and in strict conformance with the Liquid Helium Fill procedure stated in Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem*, and with 2301164PRE, *MR Magnet — Safety Requirements*.

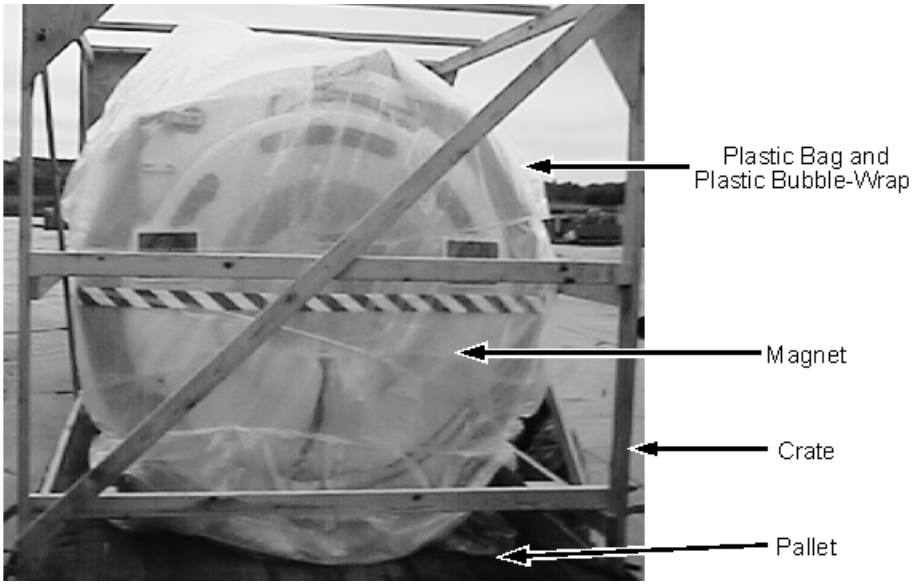
Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem*, and with 2301164PRE, *MR Magnet — Safety Requirements*, are available through your GE Healthcare Field Service Representative.

In-transit helium refill is performed based upon magnet shipping date. The procedure MUST be performed in STRICT conformance with the 'Liquid Helium Fill' procedure in Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem*, and with 2301164PRE, *MR Magnet — Safety Requirements* (included with Direction 2192624).

In-transit electrical checks are covered in Section 6, Magnet System Checks (by GE Service), later in this manual.

5.4 Removal of Shipping Cage and Protective Packaging

Illustration 13: Domestic Shipping Configuration



NOTICE

Care must be taken not to scrape or hit the sides of the magnet.

The magnet is shipped inside plastic bubble-wrap and a separate outer plastic bag. The bubble-wrap should be left intact until the magnet is anchored in the magnet room. Care must be taken in removing the plastic bag to avoid damage to various magnet components.

1. Remove the shipping cage from the magnet using a crane. Either list the cage straight up, or unbolting the boards on one end of the cage and moving the cage away from the magnet in the other direction.
2. Remove the outer plastic bag.

5.5 Unloading the Magnet

WARNING

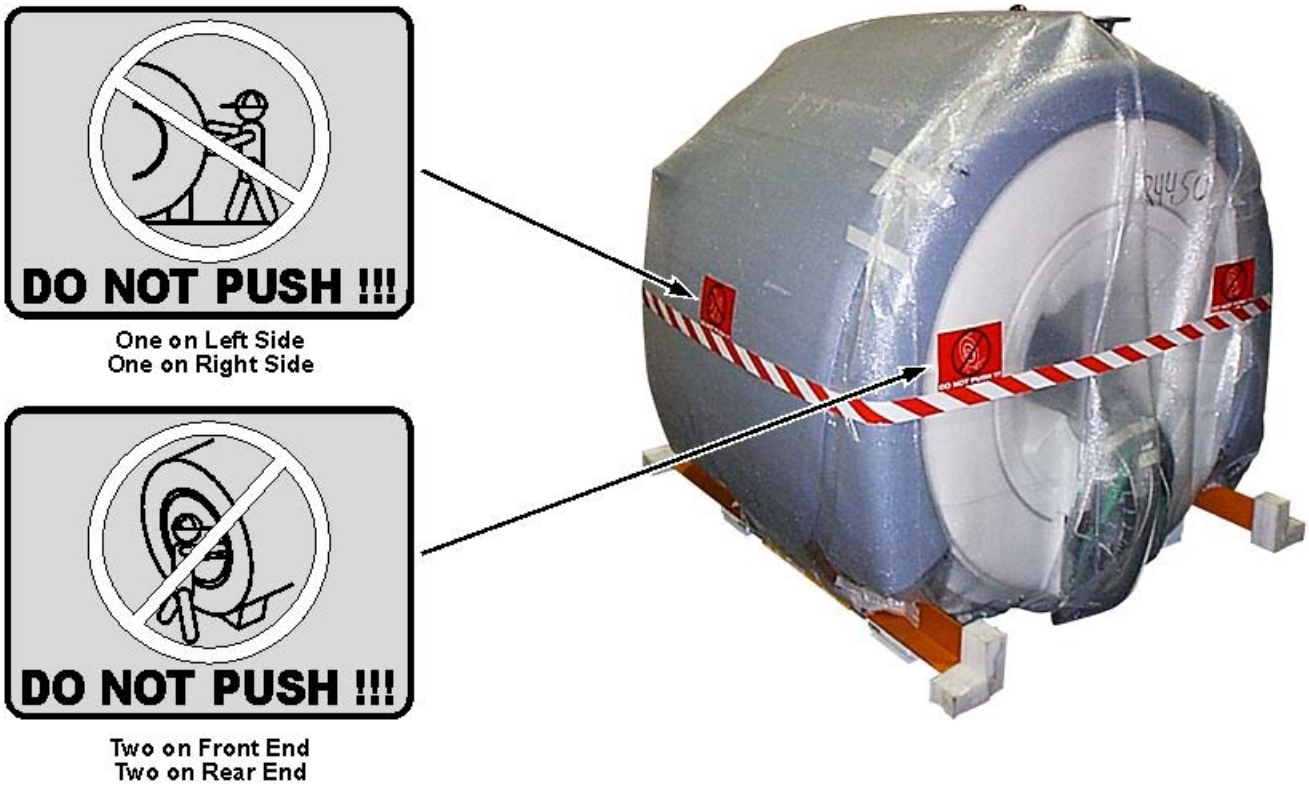
POTENTIAL INJURY HAZARD
PUSHING MAGNET ENCLOSURES MAY RESULT IN BODILY INJURY TO PERSONNEL.
DO NOT PUSH MAGNET ENCLOSURES.

NOTICE

To prevent magnet damage:

- **Do not apply any force to the magnet's enclosures.**
- **Only use equipment/tools meeting the specifications stated in Table 11 to crane lift or in Table 10 to forklift the magnet off its shipping pallet.**
- **Before moving magnet to MR Suite, refer to Section 8, Moving Magnet to MR Suite.**

Illustration 14: "Do Not Push" Signs



5.5.1 Unloading with Forklift

NOTICE

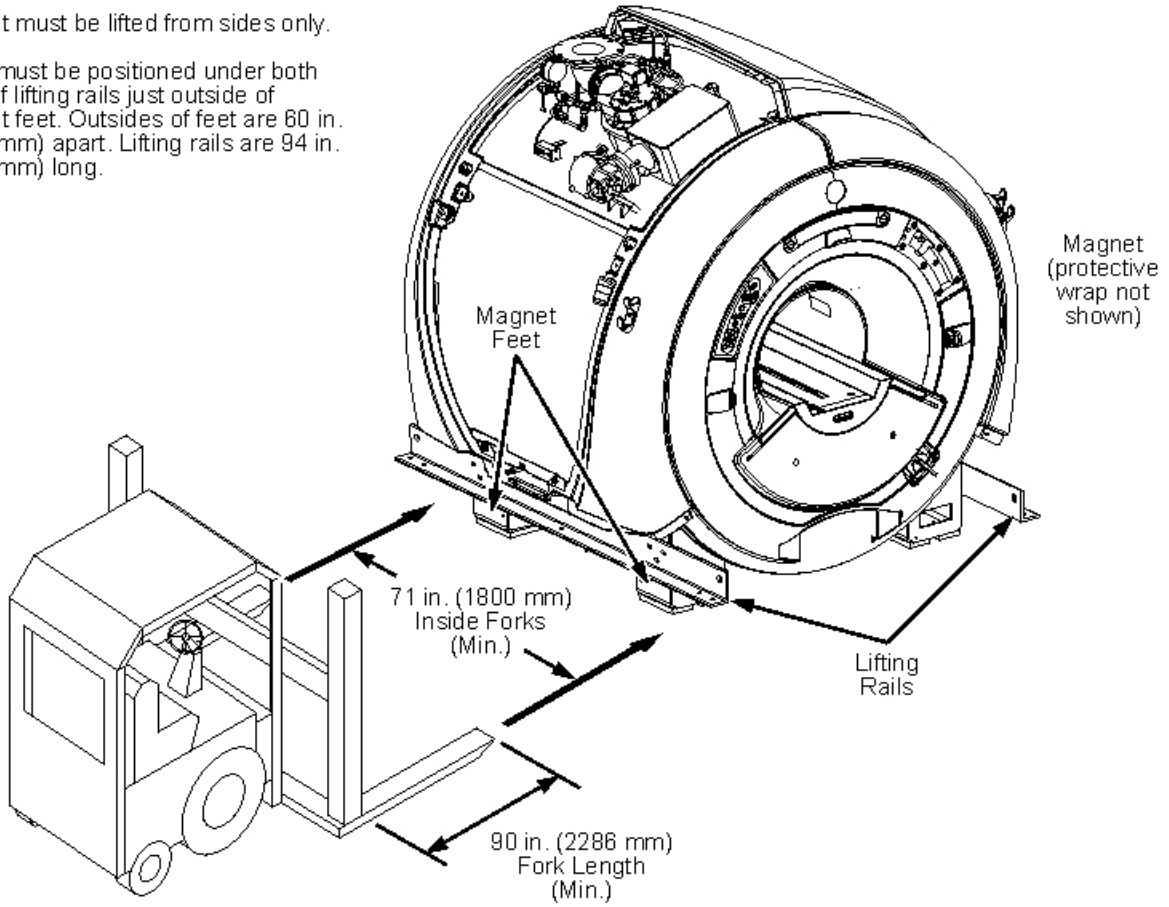
Extreme care must be exercised during forklift operations:

- **Forklift must meet the minimum capacity and dimension requirements stated in Table 10.**
- **The magnet MUST be picked up from the sides only. The forks must be placed under the lifting rails as indicated in Illustration 15.**
- **The magnet MUST be lifted smoothly to avoid impact or jolts to the system which may cause damage to the magnet.**

Illustration 15: Forklifting under Lifting Rails

NOTE: Magnet must be lifted from sides only.

Forks must be positioned under both ends of lifting rails just outside of magnet feet. Outsides of feet are 60 in. (1525 mm) apart. Lifting rails are 94 in. (2388 mm) long.



NOTICE

Forklift forks can damage the magnet enclosure. Use protective padding around the forks.

NOTICE

Impacts/jolts to the magnet while lifting/moving/lowering the magne can cause expensive internal magnet damage. Lift/move/lower smoothly. Do not allow the magnet to bump or hit anything forcefully.

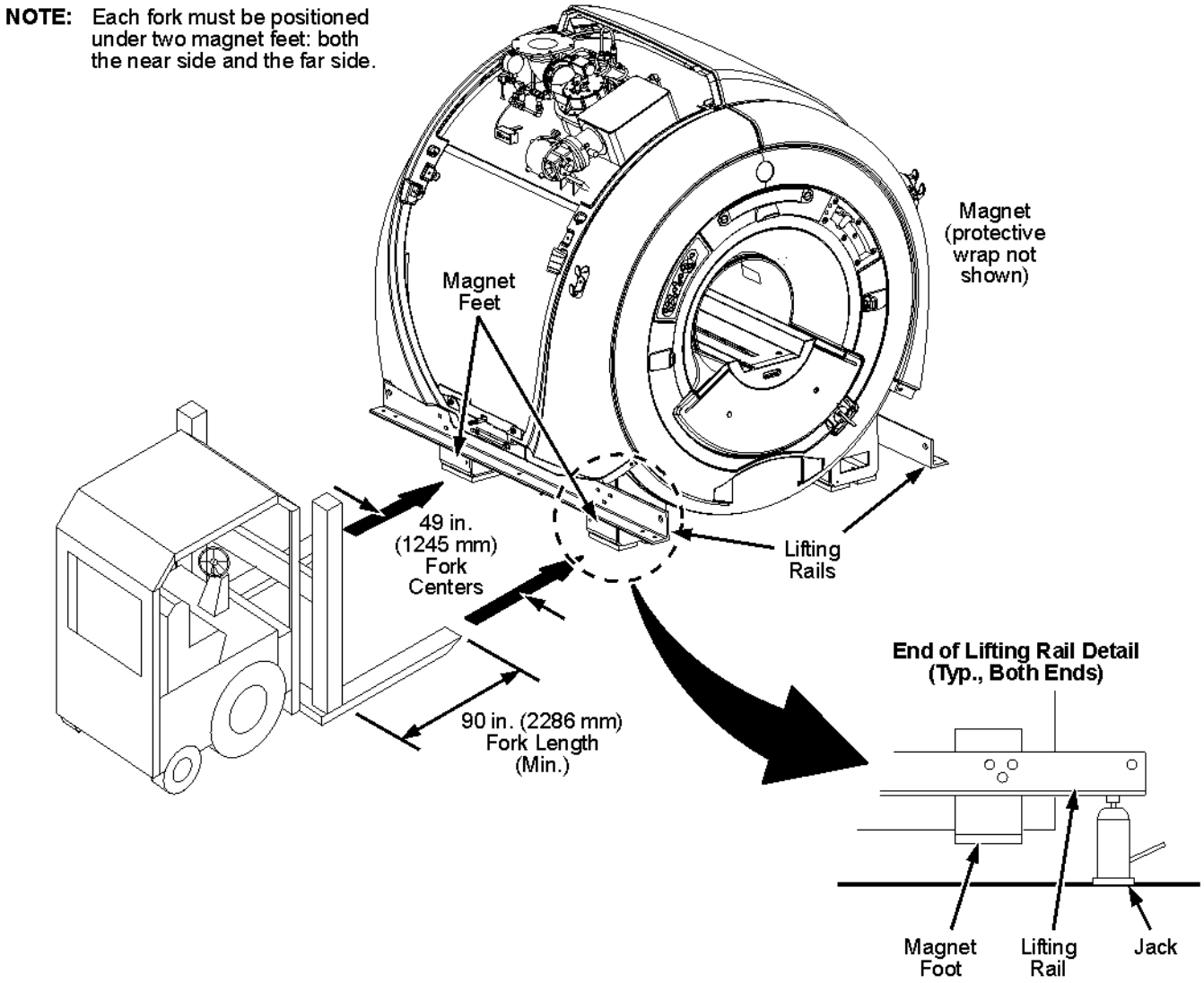
Avoid tilting the magnet more than the maximum tilt specified in Table 7 as magnet damage may result.

1. Position a forklift meeting the specifications stated in Table 10 at the side of the magnet and facing the magnet. Locate the forks under the lifting rails to the outside of the magnet feet as indicated in Illustration 15.
2. Wrap the full length of each fork with protective padding material to prevent damage to the magnet's enclosure.
3. Carefully drive the forklift until the forks are completely under both lifting rails in the areas shown in Illustration 15.

4. Lift the forks to right below the lifting rails, adjust the distance between forks so that padded forks lightly touch the enclosure and then finish raising the forks to the lifting rails.
5. Lift the magnet with the forklift.
6. Smoothly move the magnet to the desired location and carefully lower to rest on a flat surface.

NOTE: Consult Illustration 16 if the forklift forks must be placed under the magnet feet.

Illustration 16: Forklifting under Magnet Feet



5.5.2 Unloading with Crane

NOTICE

DO NOT CRANE LIFT A MAGNET THAT'S ON A PALLET OR INSIDE A CAGE OR CRATE. Crane lifting can only be done using the lifting rails, which are not accessible while the magnet is inside a cage or crate. See Section 4, International (Air-Sea) Magnet Delivery, for lifting a crated/palletted magnet.

Section 5.5.2 is for crane lifting a magnet directly from a truck to nearby ground.

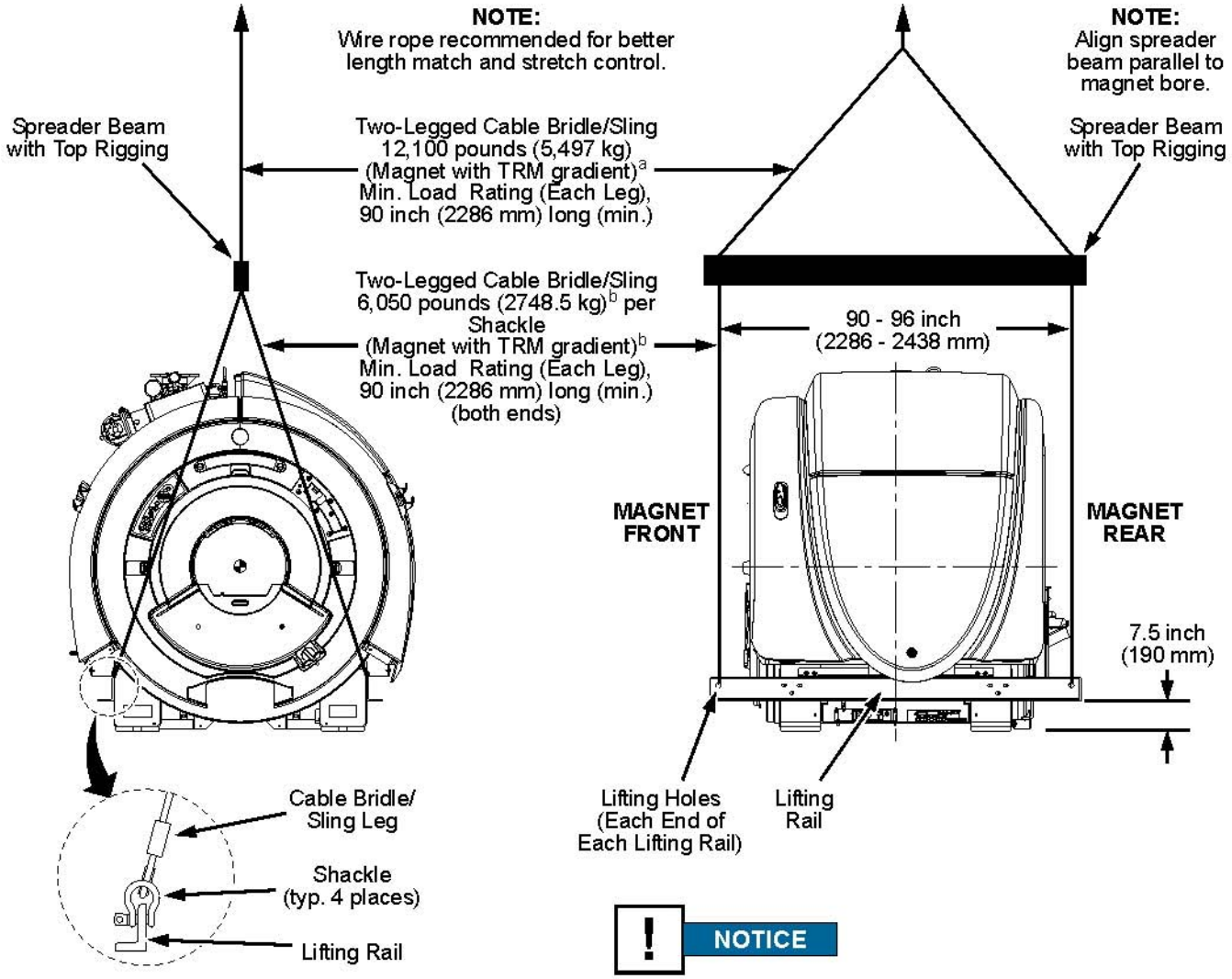
Consult Section 5.5.3, Crane Lift through Raised Opening in Exterior Wall, before beginning any lifting operation from a truck to a raised opening in a building's exterior wall.

WARNING

POTENTIAL INJURY HAZARDS
TO PREVENT LIFTING CONDITIONS THAT MAY BE HAZARDOUS TO PERSONNEL AND DAMAGING TO THE MAGNET AND EQUIPMENT:

- **MAKE SURE THE LIFTING APPARATUS (CRANE, SPREADER BEAM, ETC.) MEETS THE SPECIFICATIONS STATED IN TABLE 11, CRANE REQUIREMENTS, AND ILLUSTRATION 17, CRANE LIFT CONFIGURATION DURING UNLOADING.**
- **ORIENT SPREADER BEAM PARALLEL TO LIFTING RAILS.**
- **ADJUST LIFTING CABLES/SLINGS AND SPREADER BEAM LIFT POINT TO LEVEL MAGNET BEFORE FULLY LIFTING MAGNET OFF SURFACE.**
- **MAKE SURE THE ENTIRE AREA WHERE LIFTING WILL OCCUR IS FREE OF OBSTRUCTIONS AND UNAUTHORIZED PERSONNEL.**
- **MAKE SURE THE SURFACE ON WHICH THE MAGNET WILL BE PLACED AFTER LIFTING IS FLAT.**
- **DO NOT CRANE LIFT A MAGNET DURING DANGEROUS WEATHER CONDITIONS.**

Illustration 17: Crane Lift Configuration During Unloading



[a] Magnet with BRM gradient: 11,600 pounds (5,320 kg).

[b] Magnet with BRM gradient: 5,800 pounds (2,660 kg).

NOTICE

DO NOT CRANE LIFT CRATED/PALLETTED MAGNET. Crated/palletted magnets must be handled in conformance with the International (Air/Sea) Magnet Delivery section of this manual.

NOTICE

Impacts/jolts to the magnet while lifting/moving/lowering the magnet can cause expensive internal magnet damage. Lift/move/lower smoothly. Do not allow the magnet to bump or hit anything forcefully.

1. Make sure no obstructions are in the area where lifting will occur and that a flat surface is available to position the magnet after lifting.
2. Position the hook of a crane and spreader beam meeting the specifications stated in Table 11 centrally over the magnet to ensure a vertical lifting force on the lifting cables/slings. See Illustration 17.
3. Attach the rigging to the lifting cables/slings at each end of the magnet. See Illustration 17.

4. Begin lifting the magnet. If the magnet doesn't remain close to level, carefully lower the magnet and adjust the lifting configuration, then lift the magnet again.
5. Smoothly move the magnet to the desired location and carefully lower to rest on a flat surface.

5.5.3 Crane Lift through Raised Opening in Exterior Wall

WARNING

POTENTIAL SERIOUS INJURIES
SERIOUS INJURIES AND MAGNET/EQUIPMENT DAMAGE ARE POSSIBLE WHEN MOVING A MAGNET THROUGH A RAISED OPENING IN AN EXTERIOR WALL. DO NOT BEGIN UNTIL:

- **A COMPLETE WALK-THROUGH OF THE CRANE LIFT PROCESS HAS BEEN PERFORMED PRIOR TO THE ACTUAL EVENT TO MAKE SURE ALL PROCESS DETAILS HAVE BEEN COVERED.**
- **ALL NECESSARY EQUIPMENT IS ON SITE AND HAS BEEN INSPECTED FOR SAFETY AND LOAD RATINGS.**
- **ALL NECESSARY PERSONNEL ARE TRAINED AND READY.**

NOTICE

Rigger is responsible for actual equipment/procedure used to lift and move a magnet through a raised opening in an exterior wall. The following EXAMPLE procedure only outlines the concept of one method.

5.5.3.1 Preparation

WARNING

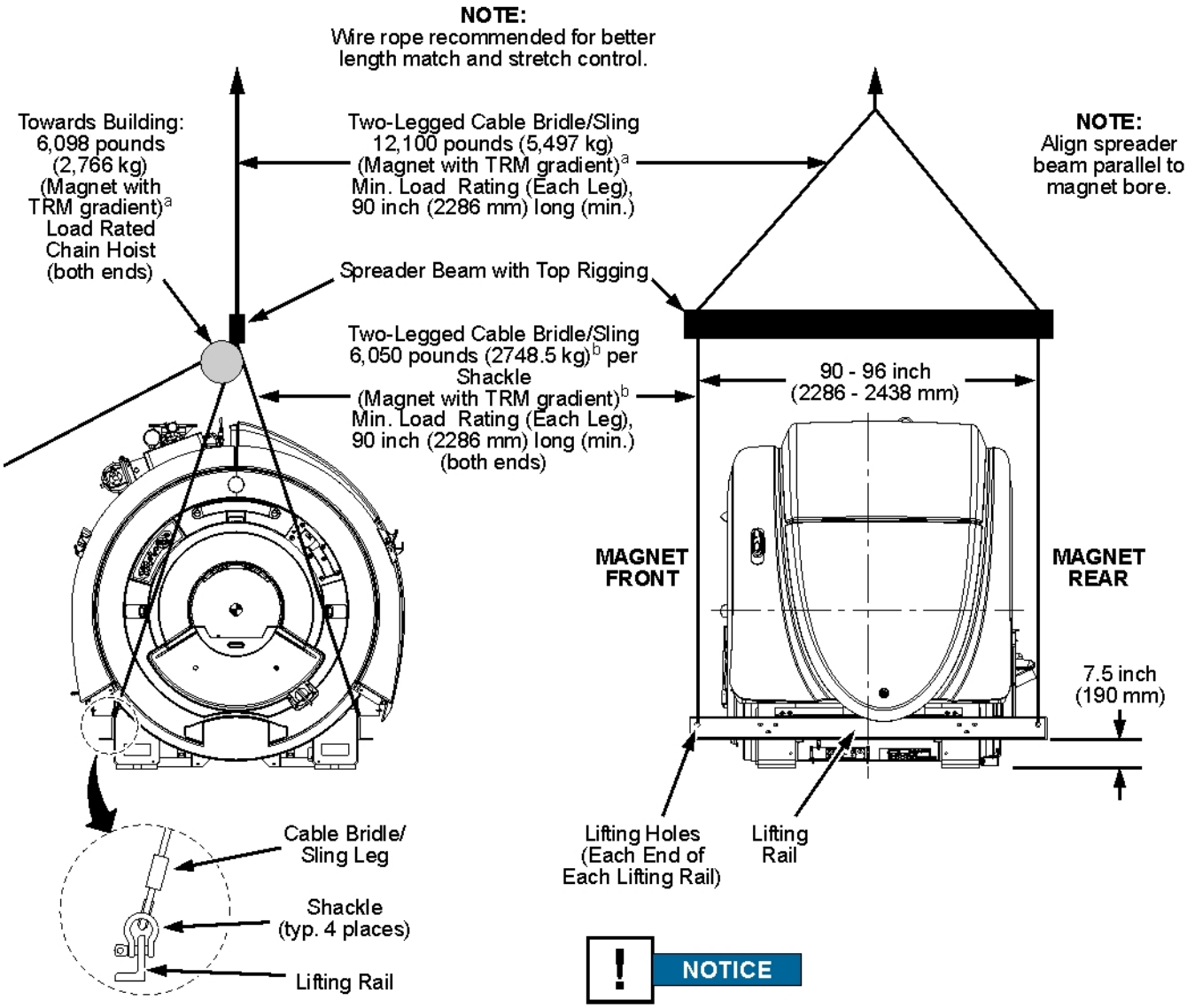
POTENTIAL INJURY HAZARDS
TO PREVENT LIFTING CONDITIONS THAT MAY BE HAZARDOUS TO PERSONNEL AND DAMAGING TO THE MAGNET AND EQUIPMENT:

- **MAKE SURE THE LIFTING APPARATUS (CRANE, SPREADER BEAM, ETC.) MEETS THE SPECIFICATIONS STATED IN TABLE 11, CRANE REQUIREMENTS, AND ILLUSTRATION 18, CONFIGURATION FOR CRANE LIFT THROUGH RAISED OPENING.**
- **ORIENT SPREADER BEAM PARALLEL TO LIFTING RAILS.**
- **ADJUST LIFTING CABLES/SLINGS AND SPREADER BEAM LIFT POINT TO LEVEL MAGNET BEFORE FULLY LIFTING MAGNET OFF SURFACE.**
- **MAKE SURE THE ENTIRE AREA WHERE LIFTING WILL OCCUR IS FREE OF OBSTRUCTIONS AND UNAUTHORIZED PERSONNEL.**
- **MAKE SURE THE SURFACE ON WHICH THE MAGNET WILL BE PLACED AFTER LIFTING IS FLAT.**
- **DO NOT CRANE LIFT A MAGNET DURING DANGEROUS WEATHER CONDITIONS.**

NOTICE

The lifting hooks of the spreader beam MUST be located as shown in Illustration 18. The magnet can be lifted by a crane which meets the specifications listed in Table 11. Failure to follow these requirements can result in serious damage to the magnet.

Illustration 18: Configuration for Crane Lift through Raised Opening



[a] Magnet with BRM gradient: 11,600 pounds (5,320 kg).

[b] Magnet with BRM gradient: 5,800 pounds (2,660 kg).

NOTICE

DO NOT CRANE LIFT CRATED/PALLETTED MAGNET. Crated/palletted magnets must be handled in conformance with the International (Air/Sea) Magnet Delivery section of this manual.

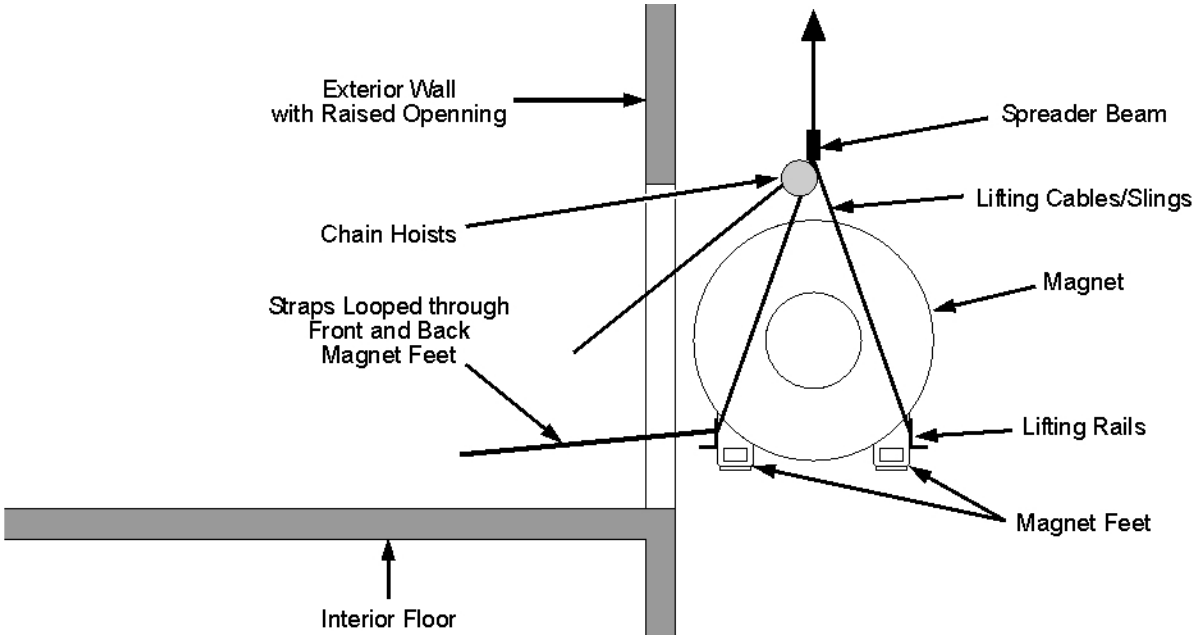
1. Verify that the opening is **at least** 96 inches (2440 mm) wide and 102 inches (2590 mm) tall, minimum. The magnet should pass through the opening side-first without hitting the opening. A larger opening will both make the operation easier and make accidental magnet damage less likely.

2. Position the hook of a crane and spreader beam meeting the specifications stated in Table 11 centrally over the magnet to ensure a vertical lifting force on the lifting cables/slings. See Illustration 18.
3. Rig the magnet with chain hoists towards the building, lifting cables/slings away from the building and a spreader beam as in Illustration 18.
4. Attach lifting straps to both ends of the lifting rail to face towards the building. See Illustration 18.

5.5.3.2 Initial Lifting

1. Begin lifting the magnet. If the magnet doesn't remain close to level, carefully lower the magnet and adjust the lifting configuration, then lift the magnet again.
2. Crane lift the magnet to the height of the opening. Use the lifting cables/slings and chain hoist to guide the magnet. See Illustration 19.

Illustration 19: Lift to Raised Opening



5.5.3.3 Starting Magnet Through Raised Opening

WARNING

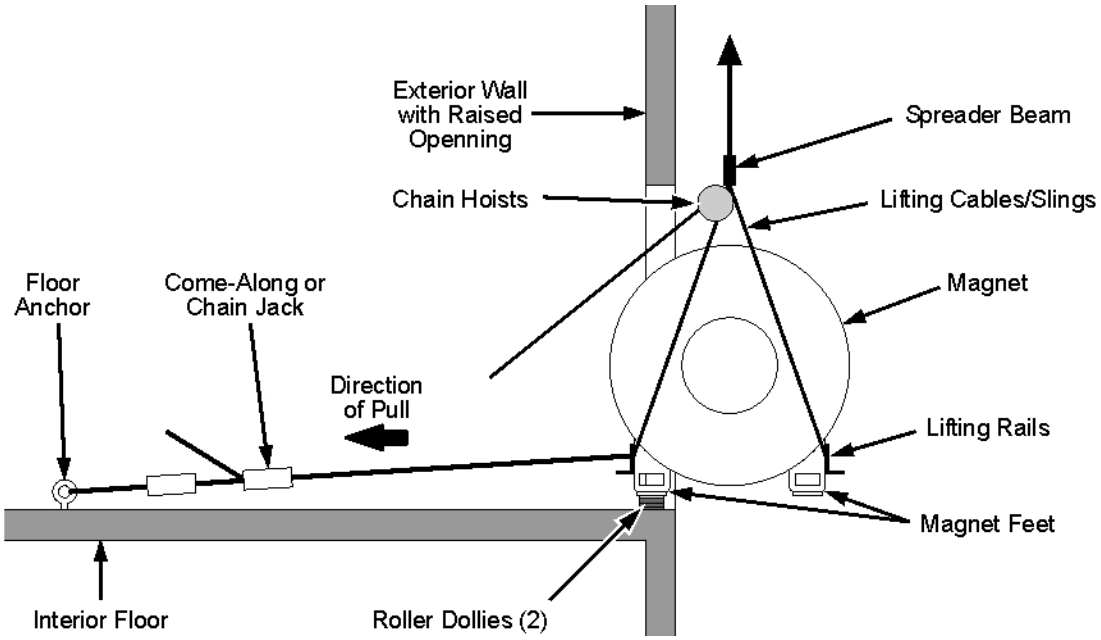
POTENTIAL SERIOUS INJURY HAZARD
SERIOUS INJURIES AND MAGNET/EQUIPMENT DAMAGE ARE POSSIBLE IF CRANE AND CHAIN HOIST OPERATION ARE NOT CAREFULLY COORDINATED.

1. Pull the magnet through the opening far enough to place roller dollies under the front and back magnet legs as in Illustration 20.
2. Connect straps between the magnet feet and a come-along or chain jack as in Illustration 20.
3. Begin pulling the magnet through the opening using the come-along while:

- The chain hoist operator(s) carefully lengthen the chain hoist connections to the magnet in small and easy increments.
- The crane operator raises the lifting cable connections to the magnet a matching amount.

NOTE: Make immediate but careful adjustments to bring magnet back to level whenever magnet starts becoming unlevel.

Illustration 20: Starting Magnet Through Raised Opening



5.5.3.4 Bringing Magnet Inside Raised Opening

NOTICE

Do not disconnect the chain hoists or the lifting cables/slings until the magnet is completely and safely on the floor.

1. Place a second roller dolly under the magnet's other legs when these are fully over the floor. See Illustration 21.
2. When the magnet is safely on the floor, detach the chain hoists and lifting cables/slings. See Illustration 22.

Illustration 21: Placing Second Pair of Roller Dollies

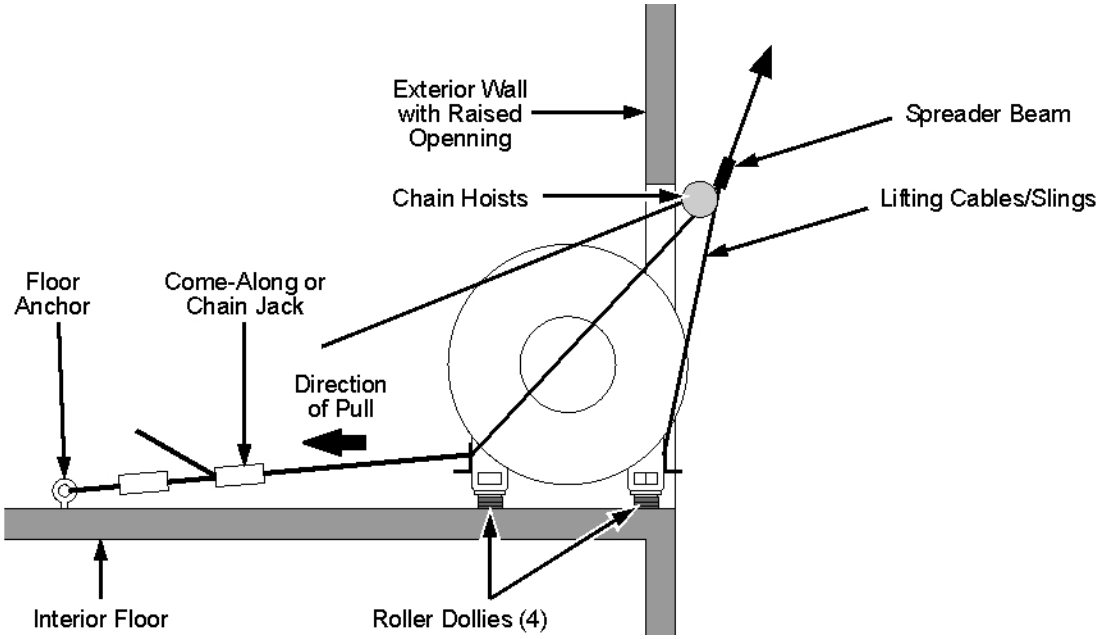
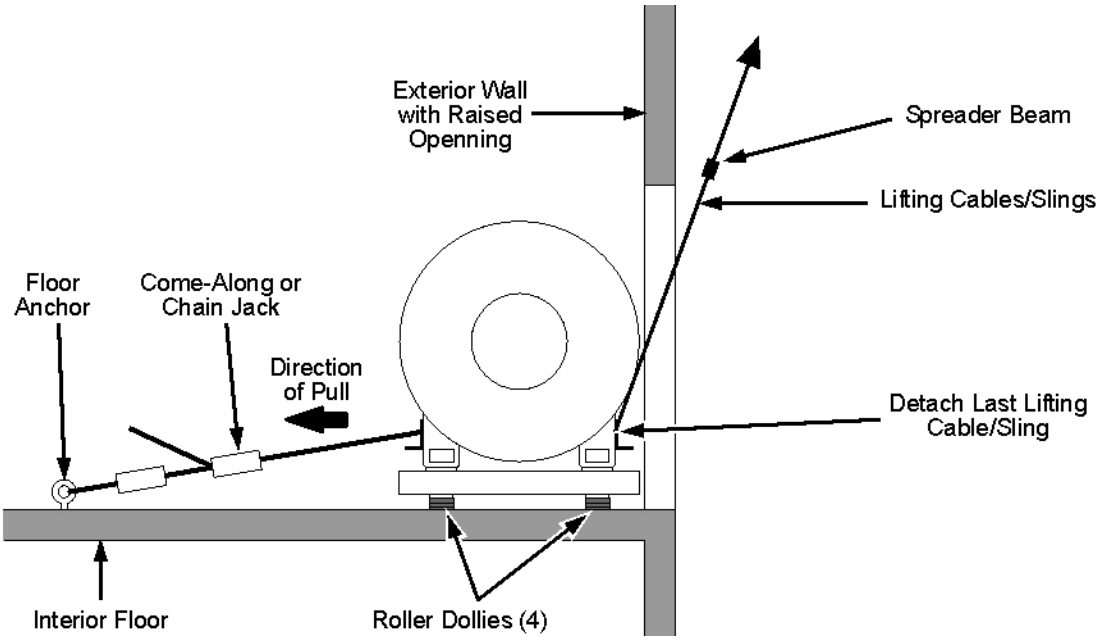


Illustration 22: Magnet on Raised Surface



6 Magnet System Checks (by GE Service)

6.1 Physical Inspection

Shipment of magnet system components to the installation site may occur as a complete system or as a drop shipment of major system components. Verify that all required magnet system components are present at the site to assure a complete and timely installation.

1. Locate the Pre-Delivery Information Package shipped with the magnet. It contains the Bill of Material for the magnet system delivered. Check that all boxes indicated are present.
2. Check the contents of each box against its packing list when the boxes are brought into the MR Site.
3. Inspect the magnet for physical damage and icing/condensation on the body. If no problem found, unload magnet.

NOTE: Because of the higher boil-off and helium gas flow through the Vertical Penetration on international shipments, some frost on the Vertical Penetration may be normal during periods when the Coldhead has been shut off.

4. If icing or condensation are present on the exterior or the bore of the magnet, check the liquid helium level before unloading. Refer to the Set-Up and Calibration chapter's 'Magnet Monitor Installation' subsection in Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem*. The occurance of icing needs to be understood before filling magnet with helium.

6.2 Electrical Checks

NOTICE

It is important to establish if any damage was sustained by the magnet or its system components during delivery or if any components are missing. This will result in the fast, proper follow-up of any problems and a timely installation.

NOTICE

All superconducting coils measured must be cold (4.2K) for the resistance values shown in Table 13, Table 14 and Table 15 to be accurate.

1. Make sure the Shim Lead is engaged. If needed, re-engage the Shim Lead in conformance with the Set-Up and Calibration chapter's 'Shim Lead Engagement and Disengagement' section in Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem*.
2. Locate the connector pins using Table 13, Table 14, Table 15 and Illustration 23.

NOTE: See the Schematics & Interconnects chapter's 'Magnet System Wiring' subsection in Direction 2192624, *GE 1.5T & 1.0T LCC Active Shield Magnet and Cryogens Subsystem*, for wiring diagrams.

3. Use a digital meter to measure the resistance across the identified connector pins.
4. Measure the resistances and record, under “Measured”, Main Coil resistances in Table 13, S/C Shim Coil resistances measured on the Shim Lead in Table 14 and

S/C Shim Coil resistances measured on the Shim Lead Pigtail Cable in Table 15. Compare measured resistances to the “Typical” values listed.

5. Perform the checks identified in Table 16. If any problems are found, the Shim Lead can be retracted to isolate shorts from the Shim Coils.
6. Report any damage found in conformance with the Section 1, Damage In Transportation, in the front of this manual.
7. Report all problems found to the regional Magnet & Cryogenics (MAC) Team Leader.

NOTE: During normal operation the Shim Lead Assembly will be in the disengaged position, rotated counterclockwise until assembly locks into position.

Illustration 23: Connector Pinouts

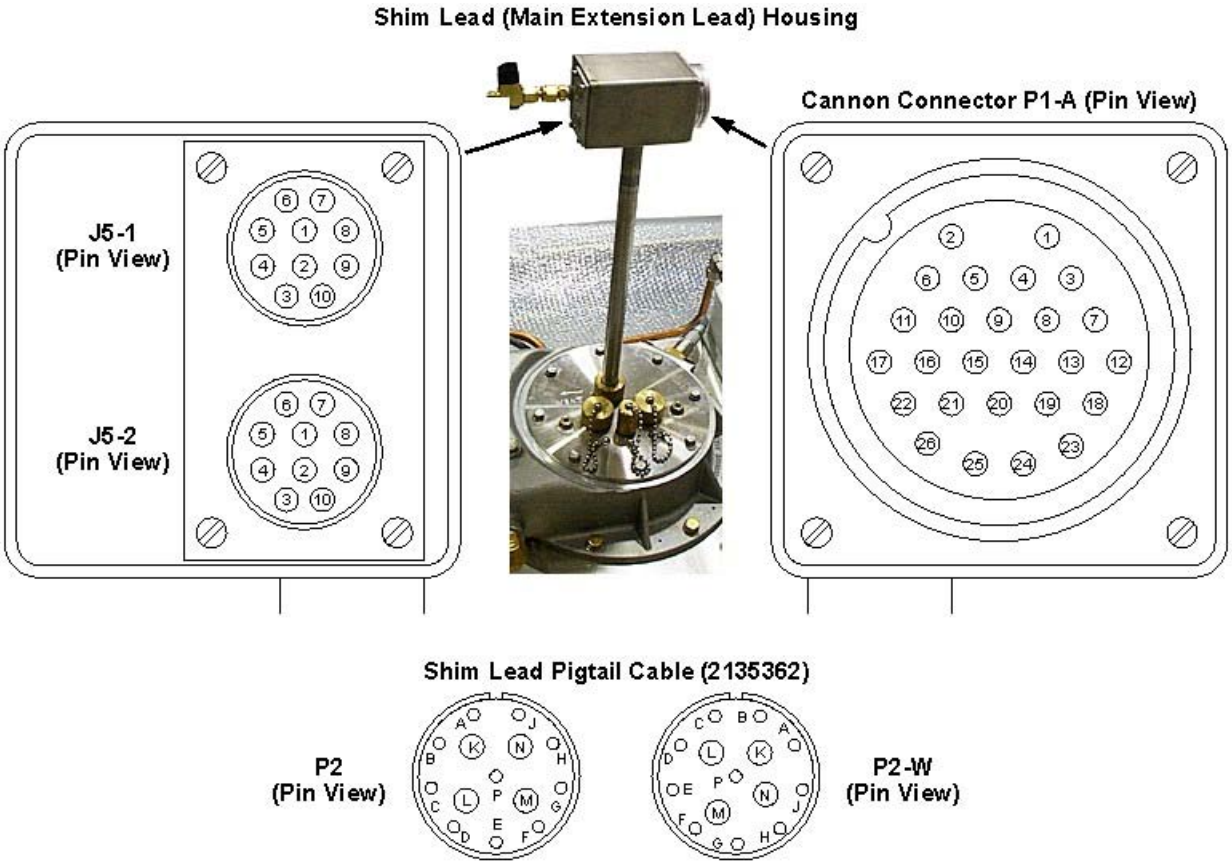


Table 13: Main Coil Resistance Checks, Cold (4.2K)

Connector	Pins	Resistance (Ohms)	
	+, -	Typical	Measured
Main Coil Power Lugs	+, -	< 6	
J5-1 on Shim Lead	9, 10	< 6	

Table 14: Superconducting Shim Coil Resistance Checks, Cold (4.2K), Measured on Shim Lead

Function		Connector	Pins	Resistance (Ohms)	
Shim PS Setting	Shim Coil Circuit		+, -	Typical	Measured
AX1	Z1	P1-A	1, 19	0.3 - 0.5	
AX2	Z2		2, 20		
AX3	Z3		3, 21		
AX4	Z4		4, 22		
AX5	Z5		5, 23		
AX6	Z6		6, 24		
T1-1	C31		13, 23		
T1-2	C11+		16, 19		
T1-3	C22+		14, 21		
T1-4	C11-		17, 20		
T1-5	C22-		15, 22		
T1-6	C33		18, 24		
T2-1	S31		11, 23		
T2-2	S11+		9, 19		
T2-3	S22+		7, 21		
T2-4	S11-		10, 20		
T2-5	S22-		8, 22		
T2-6	S33		12, 24		
S/C Switch Heaters Main Switch		J5-1 or J5-2	1, 2	22 - 27	
Axial Shims			5, 6	27 - 33 *or* 22 - 28*	
Transverse 1			7, 6	8 - 10	
Transverse 2			8, 6		
* New switch configuration incorporated around R216 and Q063.					

Table 15: Superconducting Shim Coil Resistance Checks, Cold (4.2K), Measured on Shim Lead Pigtail Cable

Function		Connector	Pins	Resistance (Ohms)	
Shim PS Setting	Shim Coil Circuit		+, -	Typical	Measured
AX1	Z1	P2	A*, (K,L)	0.3 - 0.6	
AX2	Z2	P2-W			
AX3	Z3	P2	B, (M,N)		
AX4	Z4	P2-W			
AX5	Z5	P2	C, P		
AX6	Z6	P2-W			
T1-1	C31	P2	D, P		
T1-2	C11+		F, (K,L)		
T1-3	C22+		G, (M,N)		
T1-4	C11-	P2-W	F, (K,L)		
T1-5	C22-		G, (M,N)		
T1-6	C33		D, P		
T2-1	S31	P2	E, P		
T2-2	S11+		H, (K,L)		
T2-3	S22+		J, (M,N)		
T2-4	S11-	P2-W	H, (K,L)		
T2-5	S22-		J, (M,N)		
T2-6	S33		E, P		

* New switch configuration incorporated around R216 and Q063.

Table 16: Shim Lead Checks

Type of Check	P1A Connector Pins on Shim Lead		Pigtail Connectors[a]		Acceptable Range	Measured
	From	To	From	To		
Checks for Lead to Lead Shorts	19	20	P2 (K,L)	P2-W (K,L)	> 16K Ohms	
		21		P2 (M,N)	> 16K Ohms	
		22		P2-W (M,N)	> 16K Ohms	
		23		P2 (P)	> 16K Ohms	
		24		P2-W (P)	> 16K Ohms	
	20	21	P2-W (K,L)	P2 (M,N)	> 16K Ohms	
		22		P2-W (M,N)	> 16K Ohms	
		23		P2 (P)	> 16K Ohms	
		24		P2-W (P)	> 16K Ohms	
	21	22	P2 (M,N)	P2-W (M,N)	> 16K Ohms	
		23		P2 (P)	> 16K Ohms	
		24		P2-W (P)	> 16K Ohms	
	22	23	P2-W (M,N)	P2 (P)	> 16K Ohms	
		24		P2-W (P)	> 16K Ohms	
	23	24	P2 (P)	P2-W (P)	> 16K Ohms	
Checks for Lead to Ground Shorts	19	Ground[b]	P2 (K,L)	Ground	> 16K Ohms	
	20		P2-W (K,L)		> 16K Ohms	
	21		P2 (M,N)		> 16K Ohms	
	22		P2-W (M,N)		> 16K Ohms	
	23		P2 (P)		> 16K Ohms	
	24		P2-W (P)		> 16K Ohms	

[a] Paired pins inside parenthesis are interconnected inside the pigtail connector. Thusly “P2 (K,L) to P2-W (K,L)” means “Connector P2, pins K and/or L, to Connector P2-W, pins K and/or L.”

[b] Ground defined as Shim Lead Cover.

7 VibroAcoustic Damping Mat Placement

This section is for sites receiving VibroAcoustic Damping Option M1060MA. Install the mats before moving the magnet to the magnet room.

CAUTION

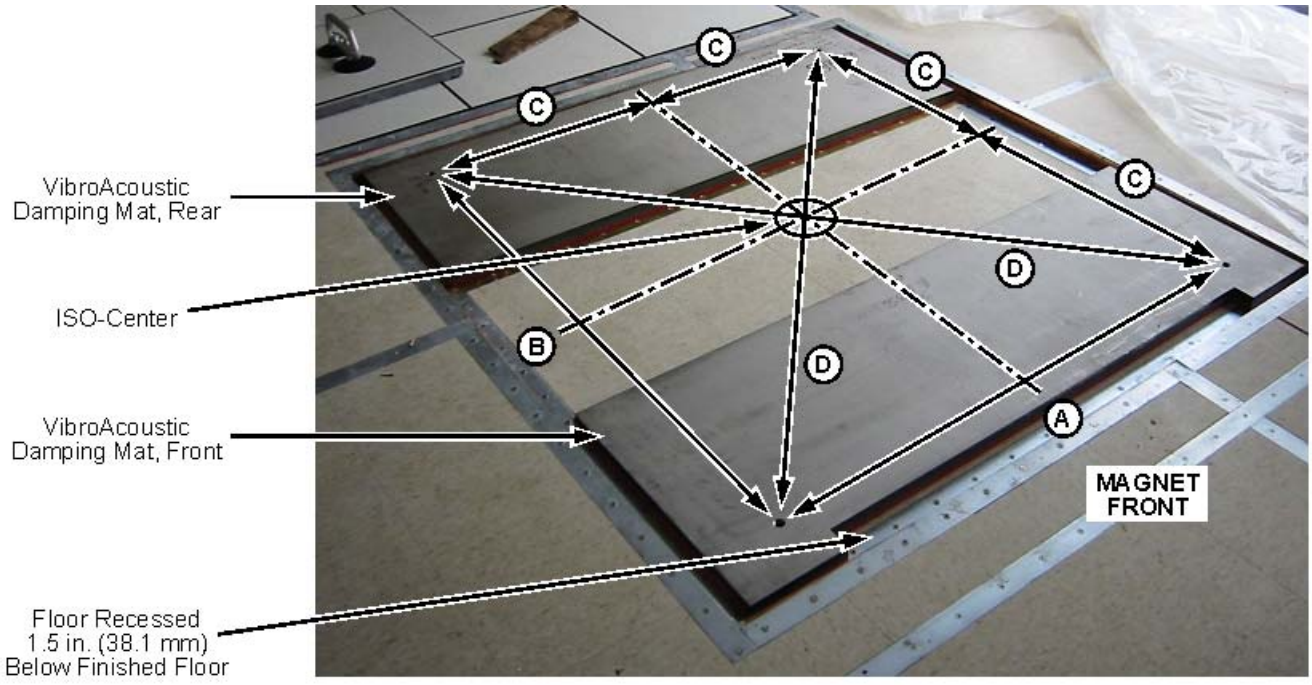
Heavy Object
Each VibroAcoustic Damping Mat weighs ~250 pounds (~105 kg). Lifting VibroAcoustic Damping Mats without mechanical assistance or at least four people can result in personal injury.
Do not lift/move mats without mechanical assistance or at least four people.

Table 17: VibroAcoustic Damping Option A (M1060MA)

Quantity	Description
2	VibroAcoustic Damping Mat, one labelled “FRONT” and one labelled “REAR”
4	3 inch x 3 inch (76.8 mm x 76.8 mm) Aluminum Washers[a]
4	0.75-10 x 2.5 inch Stainless Steel Studs[a]
4	0.75-10 Stainless Steel Nuts[a]
4	Stainless Steel Flat Washers[a]
[a] For anchoring magnet to VibroAcoustic Damping Mats in Section 9, Magnet Leveling, Foot Shimming and Bolt Down.	

1. Verify that VibroAcoustic Damping Option A (M1060MA) contains the parts listed in Table 17.
2. Remove any debris from the magnet room floor recess.
3. Lift and move the VibroAcoustic Damping Mat labelled “FRONT” into the magnet room floor recess with the stainless steel surface facing up. Position the mat across the front of the recess with the mat's cut-out facing the magnet's front and the two .75-10 threaded holes 26.5 inch (678.4 mm) from the magnet's iso-center in both the front-to-back and left-to-right directions. See Illustration 24.
4. Lift and move the VibroAcoustic Damping Mat labelled “REAR” into the magnet room floor recess with the stainless steel surface facing up. Position the mat across the rear of the recess with the two .75-10 threaded holes 26.5 inch (678.4 mm) from the magnet's iso-center in both the front-to-back and left-to-right directions. See Illustration 24.
5. Verify that the gaps between each VibroAcoustic Damping Mats and the recess edges are ~0.5 inch (~12 mm).

Illustration 24: Positioning VibroAcoustic Damping Mats



Dimensions	
A	53 in. (1356.8 mm) Left-Right
B	53 in. (1356.8 mm) Front-Back
C	26.5 in. (673.1 mm)
D	74.95 in. (1903.8 mm) Diagonal

8 Moving Magnet to MR Suite

WARNING

POTENTIAL ASPHYXIATION HAZARD
LOSS OF MAGNET VACUUM WILL RESULT IN THE RAPID EXPULSION OF HELIUM GAS, WHICH CAN CAUSE ASPHYXIATION IN ENCLOSED AREAS.
USE EXTREME CAUTION TO NOT CONTACT OR DAMAGE THE VACUUM VESSEL DURING MAGNET TRANSIT OR SITING.

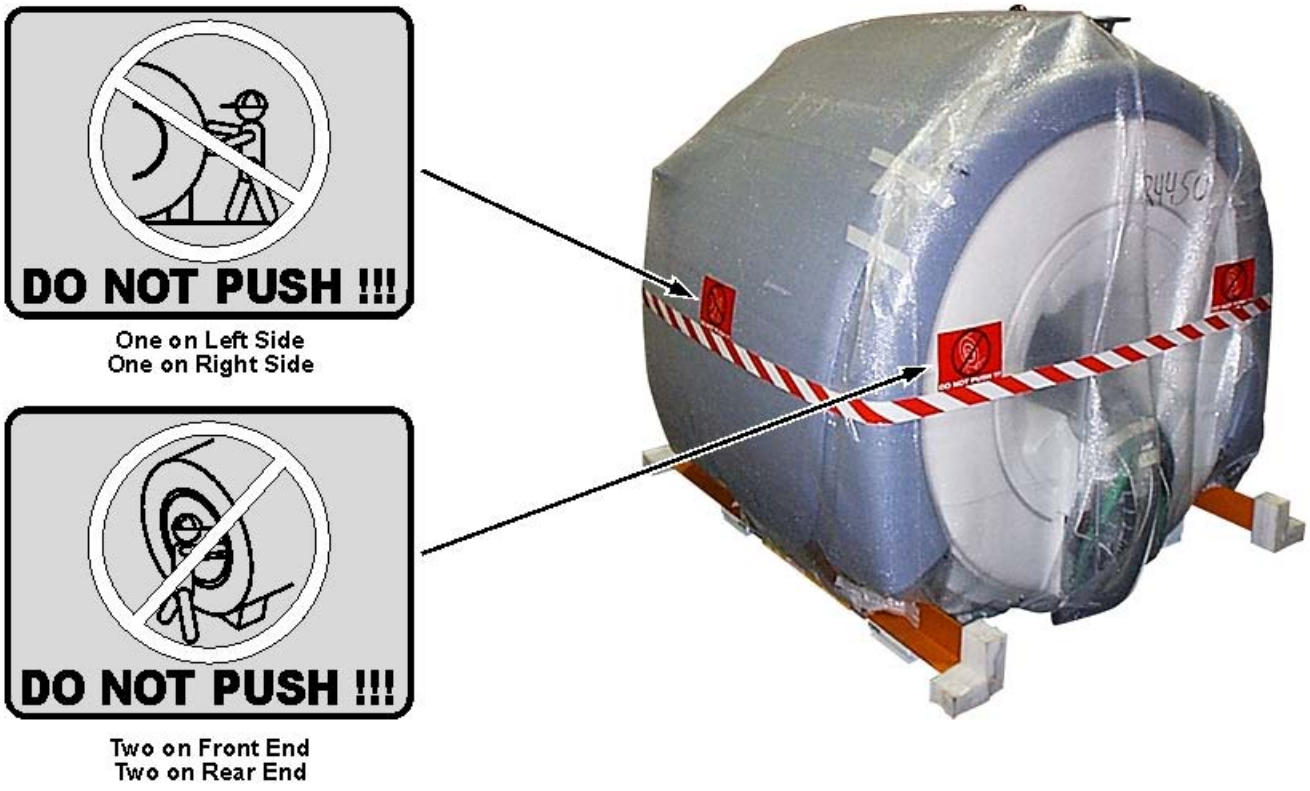
WARNING

POTENTIAL INJURY HAZARD
PUSHING MAGNET ENCLOSURES MAY RESULT IN BODILY INJURY TO PERSONNEL.
DO NOT PUSH MAGNET ENCLOSURES.

NOTICE

To prevent magnet damage do not apply any force to the magnet's enclosures.

Illustration 25: "Do Not Push" Signs



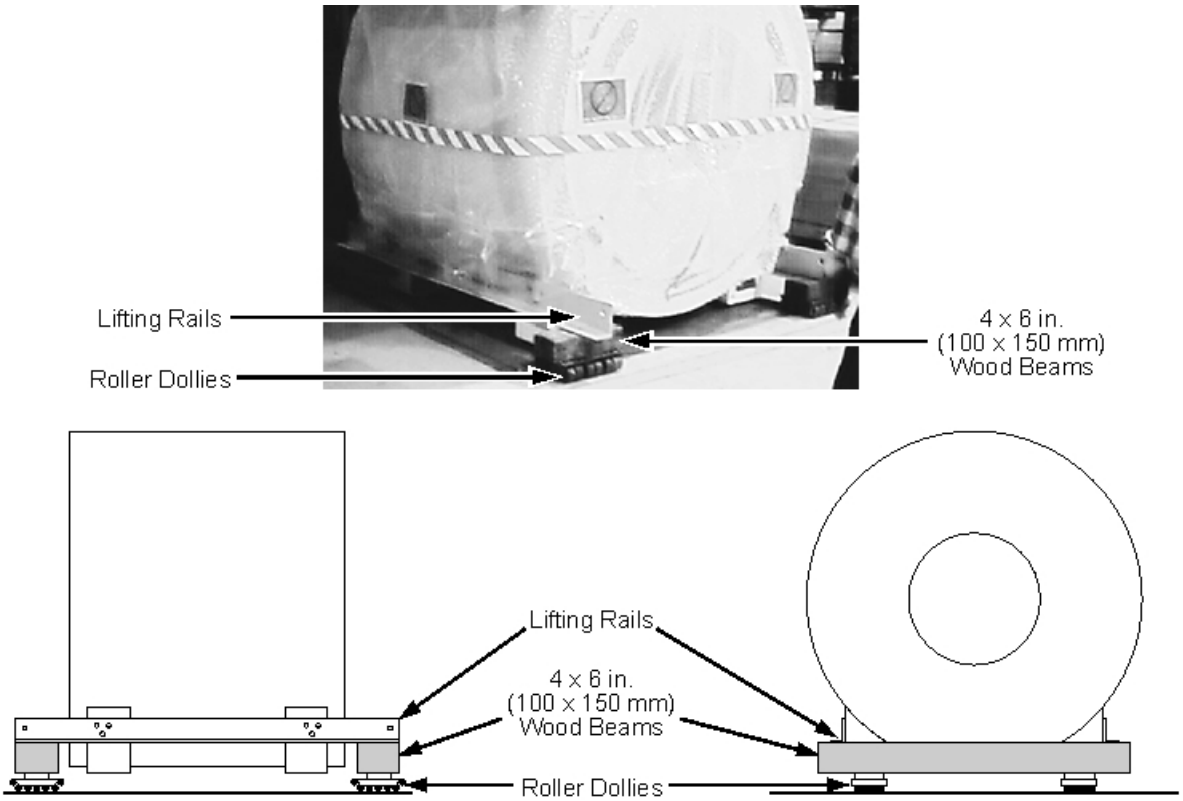
⚠ WARNING

POTENTIAL INJURY HAZARD
TO PREVENT PERSONAL INJURY OR MAGNET DAMAGE REFER TO SECTION 5, DOMESTIC MAGNET DELIVERY, BEFORE MOVING THE MAGNET USING FORKLIFT OR CRANE.

8.1 Introduction

Once the magnet has been moved to the building using crane or forklift — covered in Section 5, Domestic Magnet Delivery — it needs to be moved to the magnet room. Roller dollies in the arrangement shown in Illustration 26 are recommended for moving the magnet inside a building. Place steel floor plates along the magnet delivery route when using roller dollies.

Illustration 26: Magnet on Roller Dollies



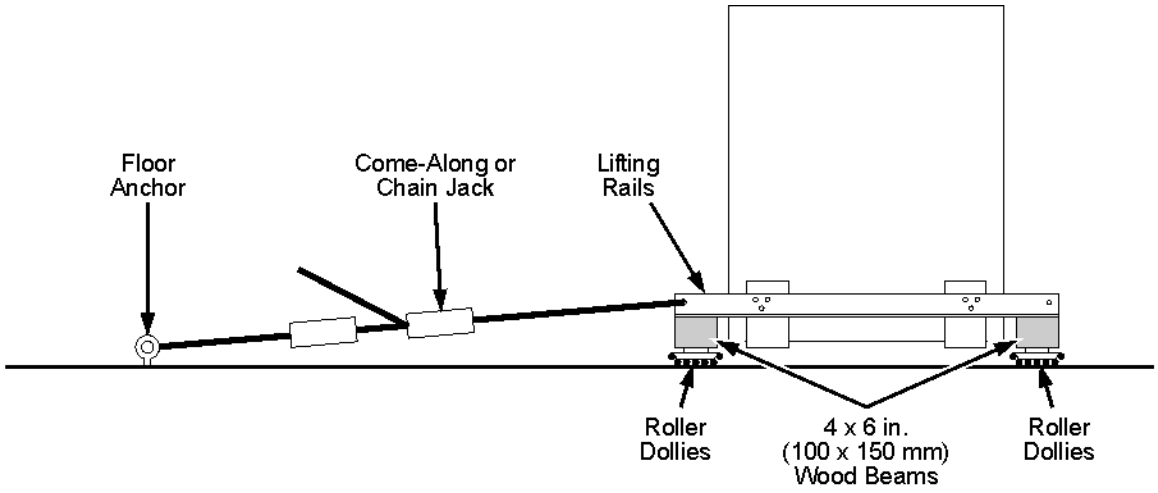
There are many methods to help move the magnet, including the use of a motorized tow vehicle, a come-along or a chain jack. Any cables, chains or straps used must be attached to the lifting rails.

NOTE: Use of a come-along or chain jack is shown in Illustration 27.

NOTICE

Any floor anchors used must not penetrate the RF Shield!

Illustration 27: Using a Come-Along or Chain Jack

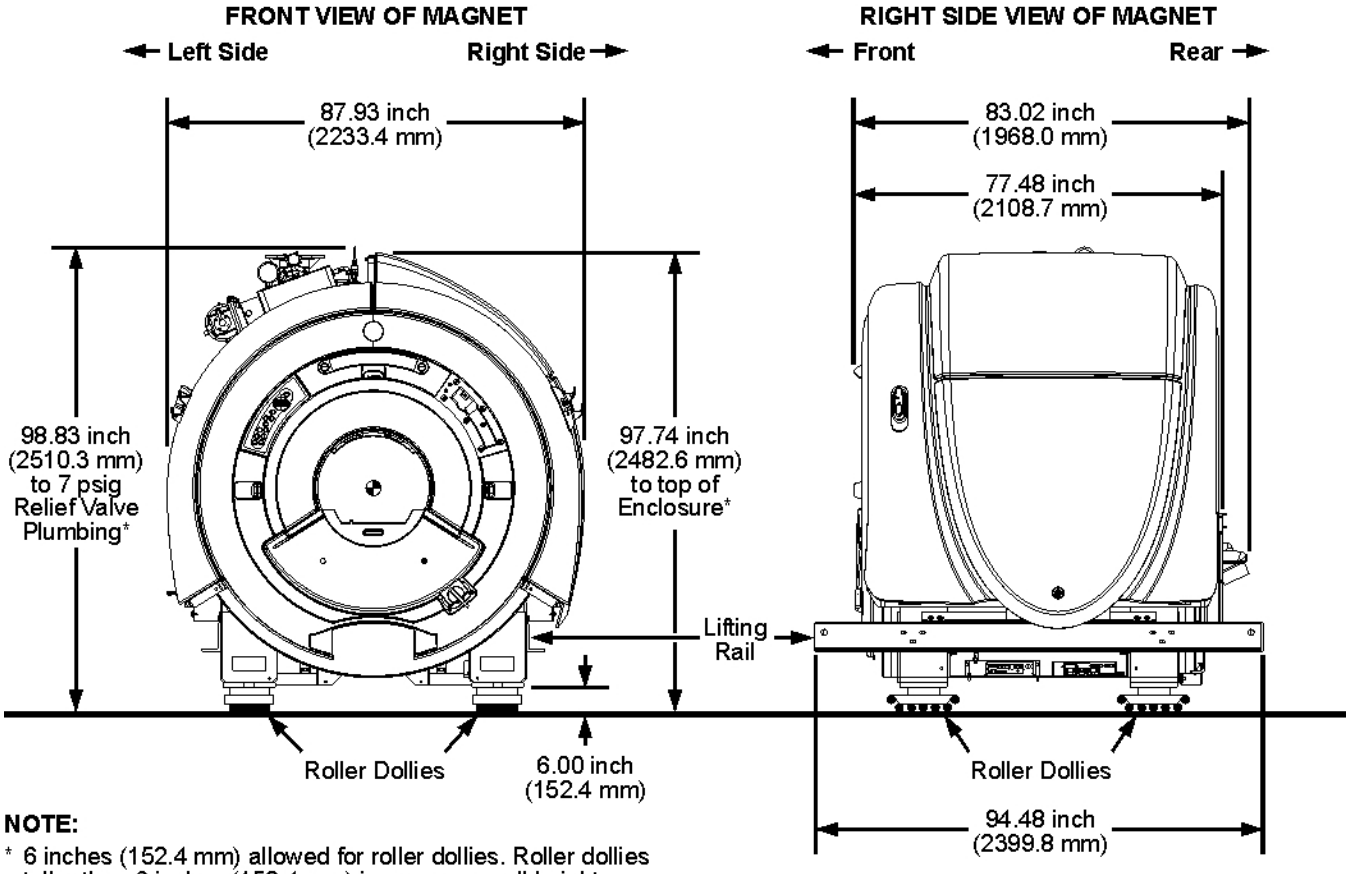


8.2 Moving the Magnet

8.2.1 Preparations

1. Verify magnet front-rear orientation relative to the magnet room's front and rear.
2. Check all clearances along the route the magnet will move to the magnet room. Compare those clearances with Illustration 28.
3. Compare the dimensions of the magnet on the moving fixtures being used with the clearances measured along the magnet delivery route. If the minimum overhead clearance will be less than the 100.3 inches (2617 mm) the magnet requires, the 1 inch (25 mm) spacer plate can be removed from the magnet feet. The height can also be reduced by putting the moving fixtures directly under the lifting rails.

Illustration 28: Clearance Dimensions, Magnet with Roller Dollies Attached



NOTE:

* 6 inches (152.4 mm) allowed for roller dollies. Roller dollies taller than 6 inches (152.4 mm) increase overall height.

Minimum height for service clearance is 105 inches (2667 mm). This clearance is needed for Main Lead Extensions, Shim Lead and fill line installation.

Source: 5162096IDW rev.1.

8.2.2 Moving the Magnet: To the MR Suite

CAUTION

Potential Personal Injury
Uneven jacking of the magnet's corners could result in the magnet shifting on the jacks, which could lead to personal injury or magnet damage.
Keep the magnet level at all times during any jacking operation.

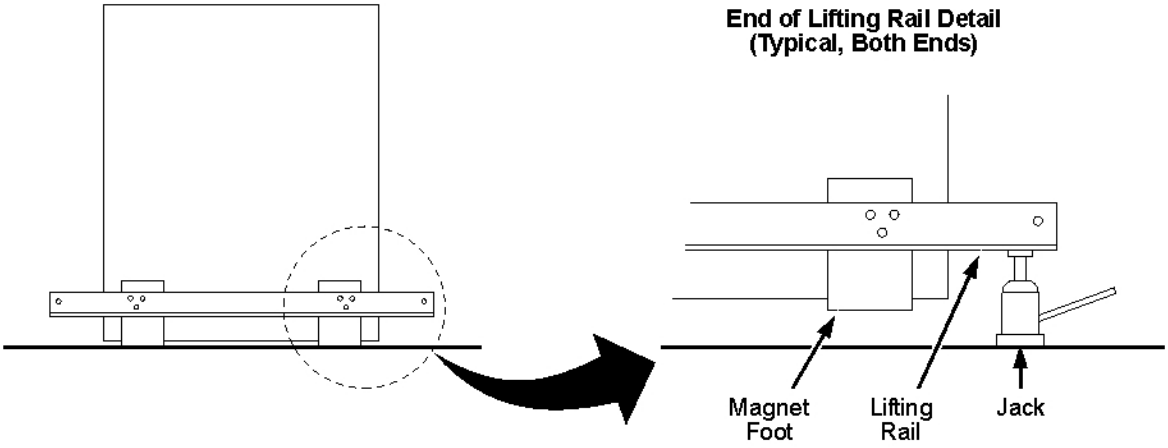
NOTICE

Do not apply any loads to any enclosure cover parts nor allow straps/cables/chains to scrape enclosure cover parts.

1. If raising the magnet is required, use jacks placed entirely under the lifting rails as in Illustration 29.
2. Move the magnet to the magnet room. If using a motorized tow vehicle, attach cables, chains or straps to the magnet's lifting rails with shackles.

NOTE: Place steel floor plates as needed to protect floors.

Illustration 29: Jacking the Lifting Rails



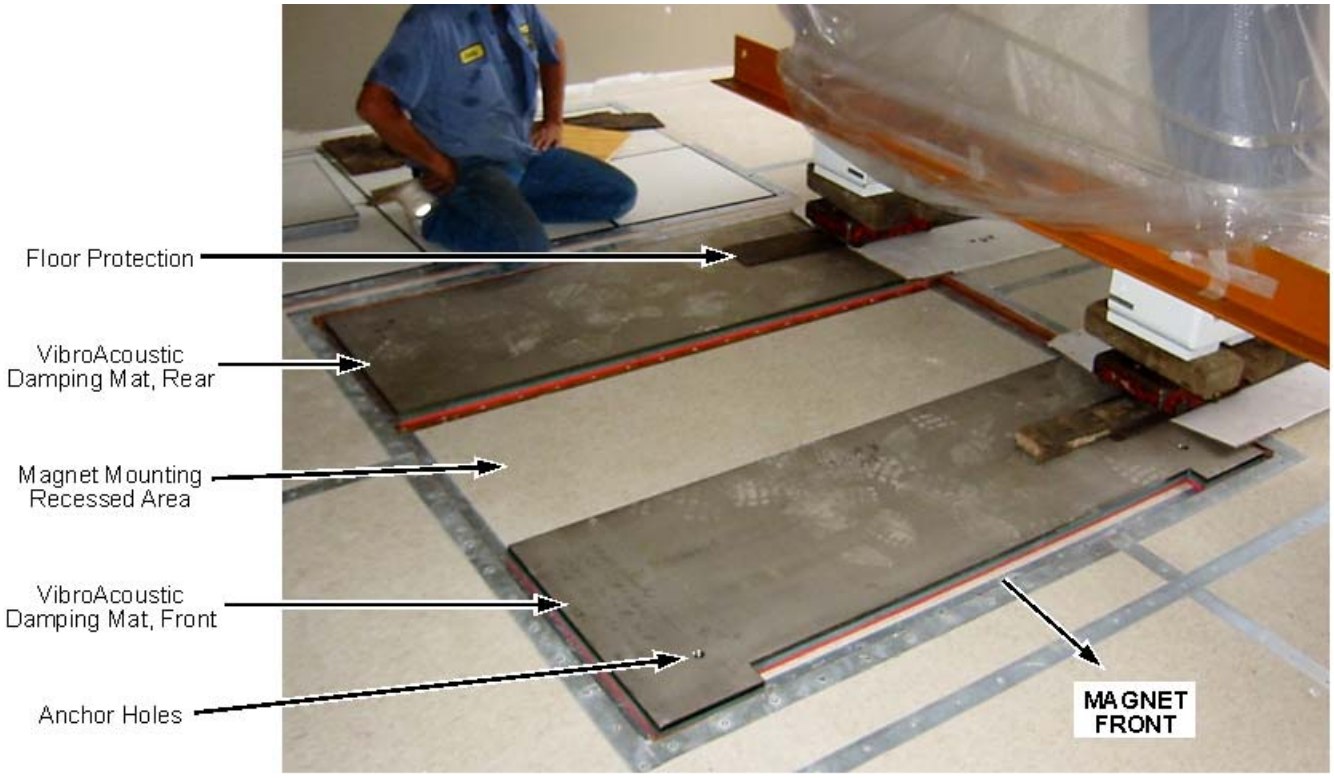
8.2.3 Moving the Magnet: Inside the MR Suite

NOTICE

- **Make sure the holes in the magnet feet align (centered ±0.125 in.; ±3 mm) over the anchor stud holes in VibroAcoustic Damping Mats.**
- **Make sure the magnet's Vent Adapter aligns with to the RF Room's cryogen vent. Vent location is specified in the appropriate Pre-installation manual.**

1. Cover the magnet room floor using steel plates from the magnet room entrance to the magnet's final position. Make sure to protect the edge of any floor recess. See Illustration 30.
2. Move the Magnet to align the through holes in the Magnet feet to the anchor holes in the VibroAcoustic Damping Mats or spacer material inside the magnet mounting recess area. Make sure the magnet vent aligns with to the RF Room vent.

Illustration 30: Moving Magnet onto VibroAcoustic Damping Mats



NOTE:
Moving magnet into position from the side is shown. Magnet can also be moved into position from front to back.

8.2.4 Lowering the Magnet into Position

⚠ CAUTION

Potential Personal Injury
Uneven jacking of the magnet's corners could result in the magnet shifting on the jacks, which could lead to personal injury or magnet damage.
Keep the magnet level at all times during any jacking operation.

1. Jack the magnet up sufficiently at the 2 lifting rails (4 corners) and remove the moving fixtures.
2. Slowly lower the magnet onto the magnet room floor/spacers/VibroAcoustic Damping Mats. Release pressure simultaneously in both jacks on one end of the magnet until that end is 1 inches - 2 inches (25 mm - 50 mm) lower than the opposite end. Then simultaneously lower both jacks on the other end 1 inches - 2 inches (25 mm - 50 mm). Repeat lowering the magnet end to end until all feet are on the floor, correctly located on the anchor holes.

9 Magnet Leveling, Foot Shimming and Bolt Down

9.1 Equipment & Tools

- A two-foot (500 mm) carpenter's level in good condition (no sharp edges/corners, dents, bumps, cracks or loose bubble vile)
- Tape measure
- Hammer and wood driving block
- Torque wrench
- Magnet Leveling Kit 46-260888G4, containing the parts listed in Table 18.
- Mounting hardware included in VibroAcoustic Damping Option A (M1060MA):
  - 3 x 3 inch (76.8 x 76.8 mm) Aluminum Washers
  - 0.75-10 x 2.5 inch Stainless Steel Studs
  - 0.75-10 Stainless Steel Nuts
  - Stainless Steel Flat Washers

Table 18: Magnet Leveling Kit 46-260888G4

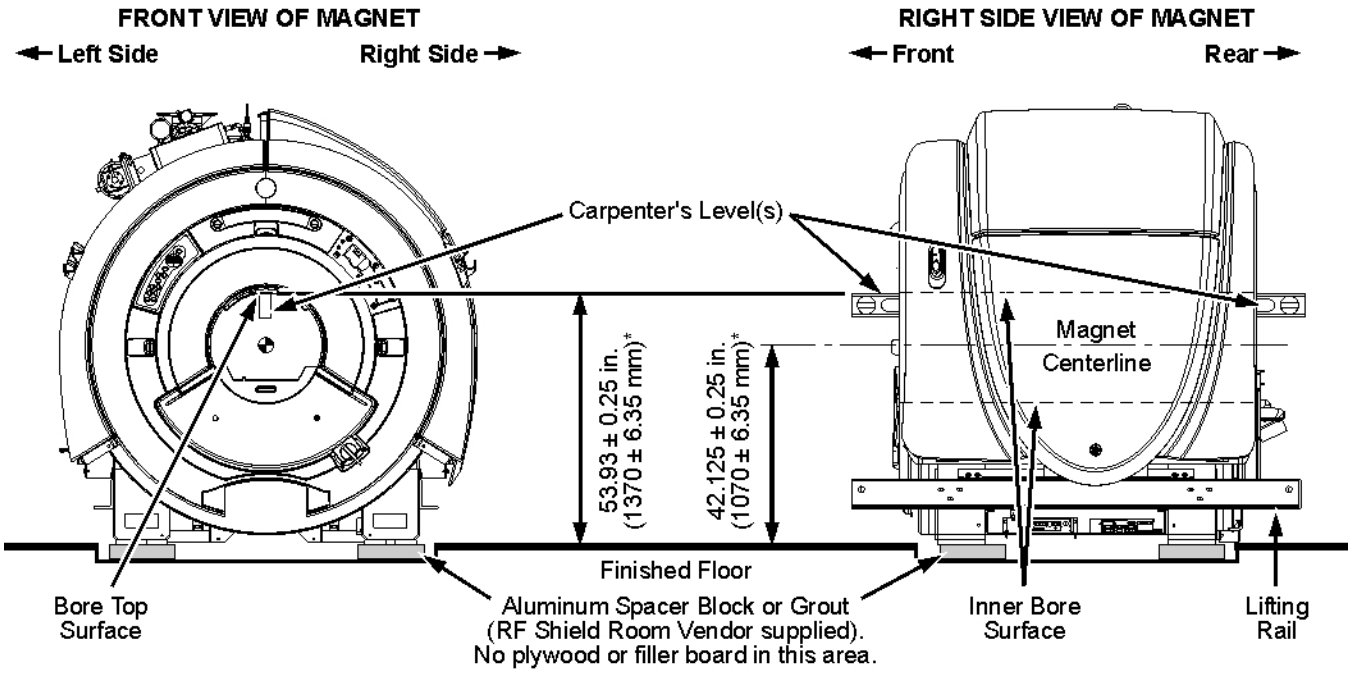
Quantity	Part Number	Description
12	2213945	Leveling Shim, 0.062 In. (1.57 mm) Thick
8	2213945-2	Leveling Shim, 0.020 In. (0.51 mm) Thick
24	2180016	Contact Shim, 6.00 x 6.00 x .020 Inches Thick (152 x 152 x 0.51 mm)
16	2180016-2	Contact Shim, 6.00 x 6.00 x .032 Inches Thick (152 x 152 x 0.81 mm)
8	2180016-3	Contact Shim, 6.00 x 6.00 x .040 Inches Thick (152 x 152 x 1.0 mm)
4	2180016-4	Contact Shim, 6.00 x 6.00 x .063 Inches Thick (152 x 152 x 1.6 mm)

9.2 Magnet Height Check

1. The magnet bore iso-center should be 42.125 in. ± 0.25 in. (1070 mm ± 6.35 mm) above the finished floor. To check magnet height:
   a. Hold a two-foot (500 mm) carpenter's level against the magnet bore upper surface as in Illustration 31.
   b. The measurement from the **finished** floor to the **top** of the magnet bore should be 53.93 in. ± 0.25 in. (1370 mm ± 6.35 mm) at both the front and back of the magnet
2. If the height of magnet bore iso-center above the finished floor is not within tolerance:
   - Too low: Have the RF Shield Room Vendor raise the magnet using non-compressible (e.g., aluminum) spacers, grout or similar shimming material. Then recheck height.
   - Too high: Have the finished floor raised to achieve the specified height.

NOTE: The RF Shield Room Vendor is responsible to make the depth of the magnet mounting recess area equal to the height of the VibroAcoustic Damping Mats.

Illustration 31: Checking Magnet Height, Magnet without Bridge Installed



NOTE:

* Dimensions to **finished** floor.

VibroAcoustic Damping Mat floor recess shown without mats installed.

9.3 Magnet Leveling

NOTICE

Check & adjust magnet bore iso-center height above the finished floor in conformance with Section 9.2 before leveling the magnet.

9.3.1 Magnet without Bridge Installed

1. Position the carpenter's level across the magnet's front end bell for side-to-side magnet leveling. See Illustration 32.
2. If the level's bubble is not between the scribe lines:
   a. Jack up the magnet foot on the lower side.

NOTE: Jacking the lift rail is covered in Section 8, Moving Magnet to MR Suite.

   b. Insert the appropriate thickness of aluminum shim plates.
   c. Recheck side-to-side levelness.
   d. Continue this step until the magnet is level side-to-side.
3. Position the level on the inner bore surface of the magnet for end-to-end magnet leveling. See Illustration 32. Make sure the level is centered along the magnet's z-axis.
4. If the level's bubble is not between the scribe lines:
   a. Jack up the magnet feet (one at a time) on the lower end.

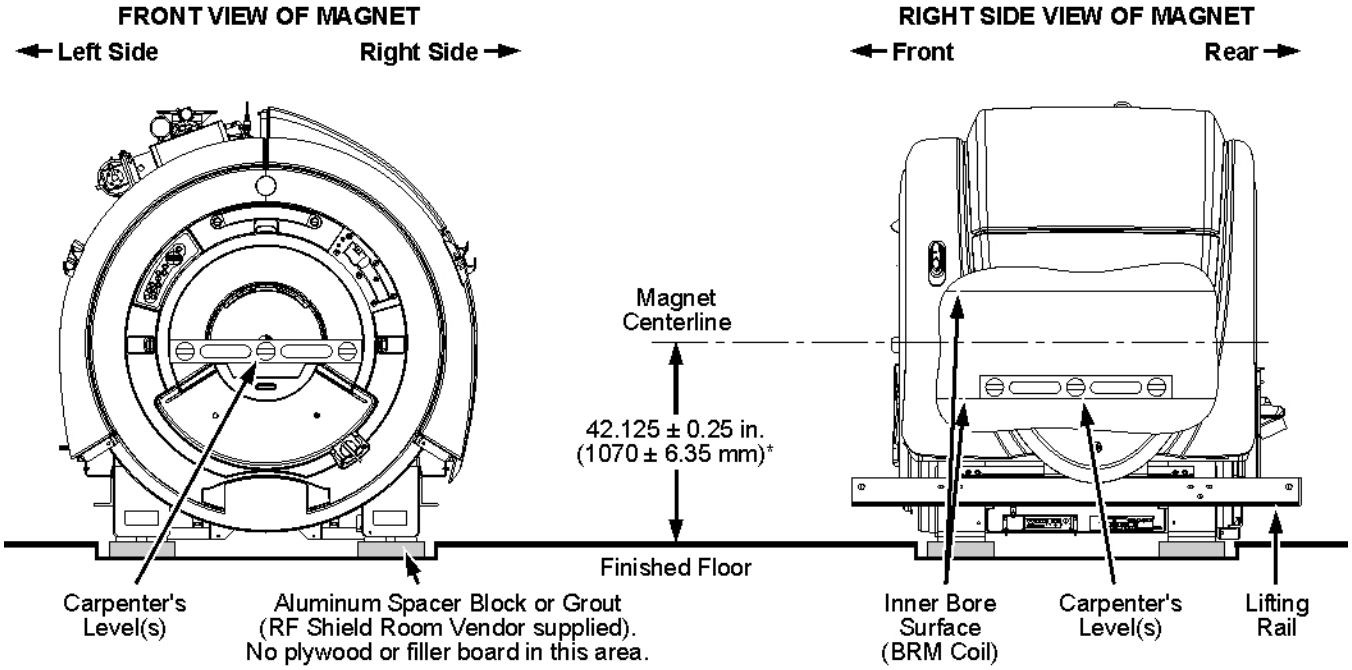
b. Insert the appropriate thickness of aluminum shim plates under both feet.

c. Recheck end-to-end levelness.

d. Recheck magnet height in conformance with Section 9.2, Magnet Height Check.

e. Repeat this step until the magnet is level end-to-end and its height is within tolerance.

Illustration 32: Checking Magnet Levelness, Magnet without Bridge Installed



NOTE:

* Dimensions to **finished** floor.

VibroAcoustic Damping Mat floor recess shown without mats installed.

9.3.2 Magnet with Bridge Installed

1. Position the carpenters level across the bridge's front end for side-to-side magnet leveling. See Illustration 33.
2. If the level's bubble is not between the scribe lines:

   a. Jack up the magnet foot on the lower side.

NOTE: Jacking the lift rail is covered in Section 8, Moving Magnet to MR Suite.

   b. Insert the appropriate thickness of aluminum shim plates.

   c. Recheck side-to-side levelness.

   d. Continue this step until the magnet is level side-to-side.

3. Position the level on the bridge's flat inner surface as in Illustration 34 for end-to-end magnet leveling.
4. If the level's bubble is not between the scribe lines:

a. Jack up the magnet feet (one at a time) on the lower end.

b. Insert the appropriate thickness of aluminum shim plates under both feet.

c. Recheck end-to-end levelness.

d. Recheck magnet height in conformance with Section 9.2, Magnet Height Check.

e. Repeat this step until the magnet is level end-to-end and its height is within tolerance.

5. Recheck side-to-side levelness at both ends and the middle of the magnet. Add further shims (using the same procedure) as required to establish the magnet is level end-to-end and side-to-side.

Illustration 33: Checking Side-to-Side Levelness, Magnet with Bridge Installed

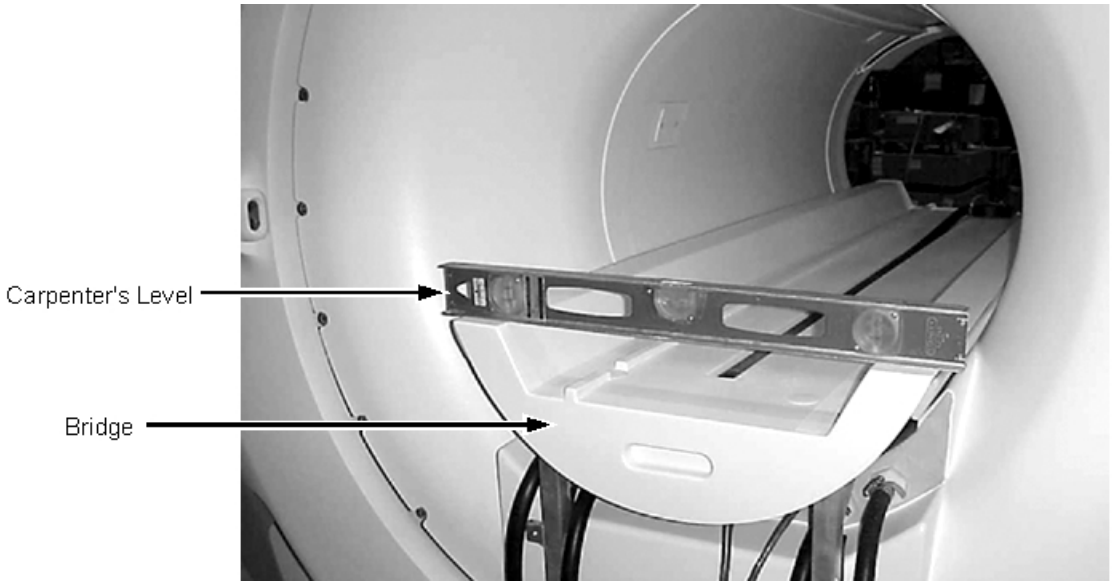
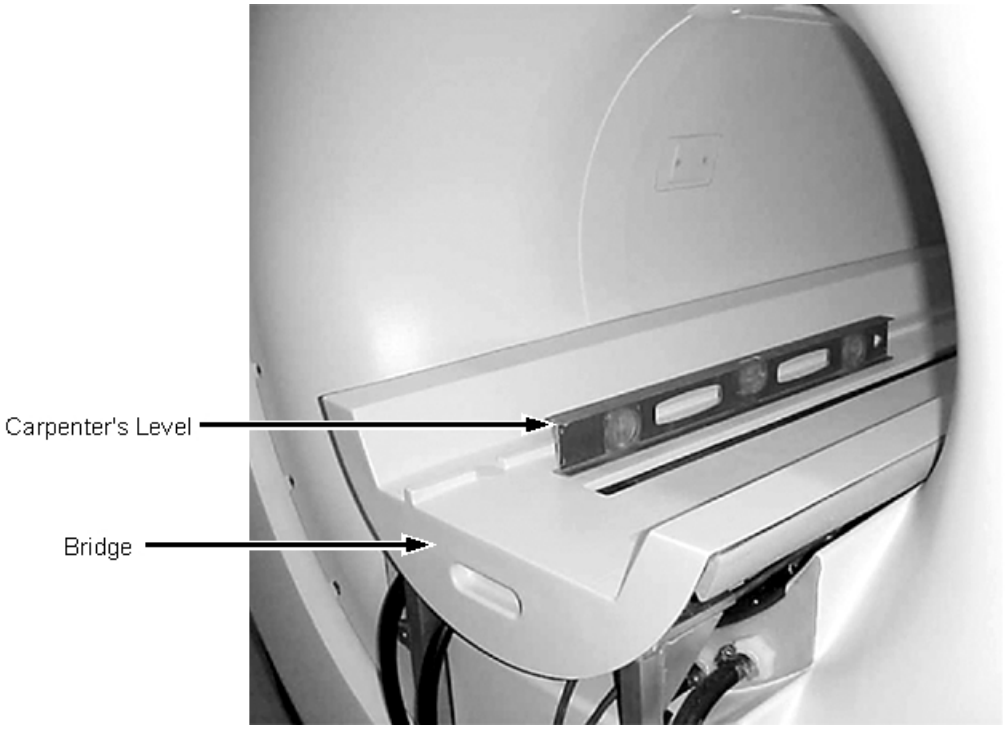


Illustration 34: Checking End-to-End Levelness, Magnet with Bridge Installed



9.4 Magnet Anchoring

NOTICE

Complete contact between the bottom of the magnet feet and the floor is important to minimizing magnet motion/vibration, which cause image problems.

⚠ CAUTION

Potential Personal Injury
Contact shims have sharp edges which can cause personal injury.
Always tape shim edges to the floor surface.

1. After leveling is completed, anchor the magnet to the floor.
   - At sites where the magnet installs onto VibroAcoustic Damping Mats, anchor the magnet to the mats using the four 3 inch x 3 inch (76.8 mm x 76.8 mm) aluminum washers, four 0.75-10 x 2.5 inch Stainless Steel Studs, four Stainless Steel Flat Washers and four 0.75-10 Stainless Steel Nuts provided with the mats. Use a torque wrench to tighten to a clamping force of 2,500 pounds ± 200 pounds (1135 kg ± 91 kg). See Illustration 35.
   - At sites where the magnet does **not** install onto VibroAcoustic Damping Mats, anchor the magnet in conformance with Illustration 36. Magnet anchoring hardware and 1.5 in. (38.1 mm) thick aluminum spacer block or grout are provided by the RF Shield Room Vendor. Use a torque wrench to tighten to a clamping force of 2,500 pounds ± 200 pounds (1135 kg ± 91 kg).

NOTE: Clamping force is determined from the torque specifications stated in the instructions for commercially available anchors. Clamping must be achieved in conformance with the appropriate Pre-Installation manual.

2. Check for any gaps between the magnet feet and the floor around the perimeter of all four magnet feet. Wedge aluminum contact shims between the magnet feet and the leveling shims/floor to completely fill any gaps found. Use hammer and wooden block to firmly tap shims into position. Make sure all gaps are eliminated on the four magnet feet. See Illustration 37.

NOTE: Typically, .020 inch (.51 mm) contact shims are used unless large gaps exist. This will provide the maximum surface contact with the feet. Shims may be staggered and overlapped to accommodate the geometry of the gap.

3. Tape the shim edges to the floor surface with duct tape. See Illustration 37.

Illustration 35: Magnet Anchoring at VibroAcoustic Damping Mat Sites

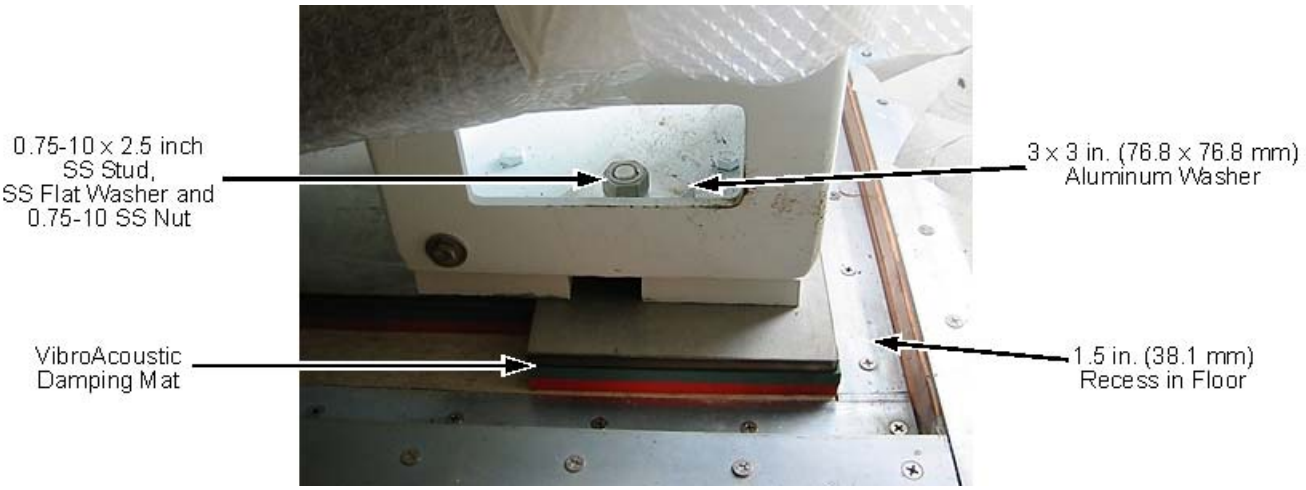
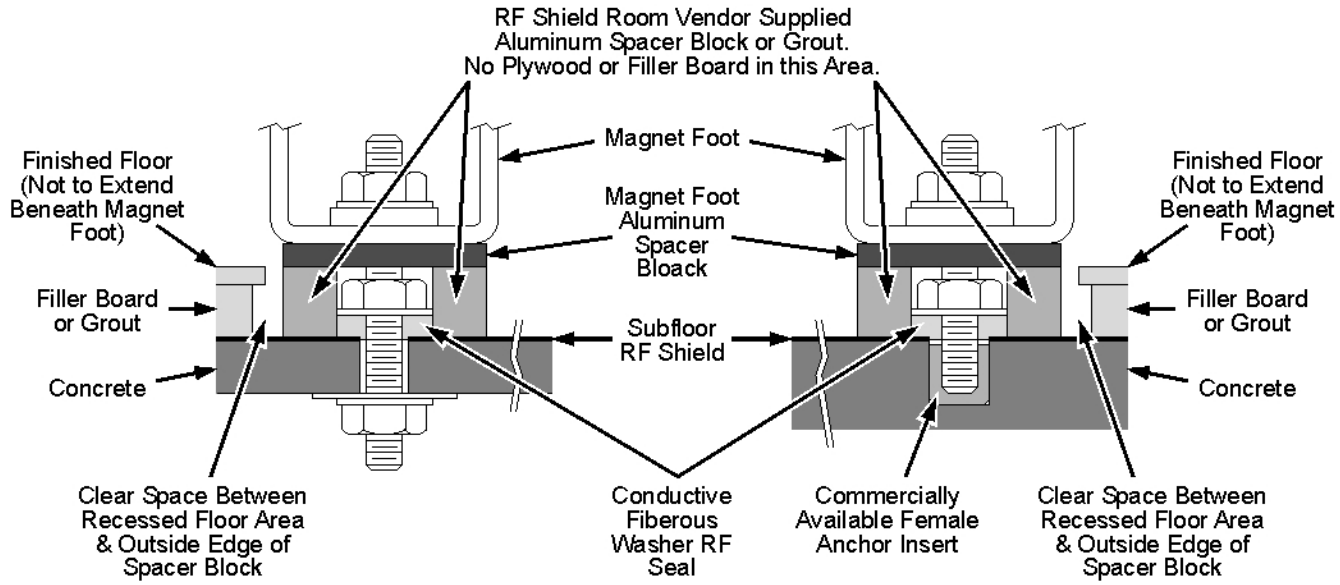
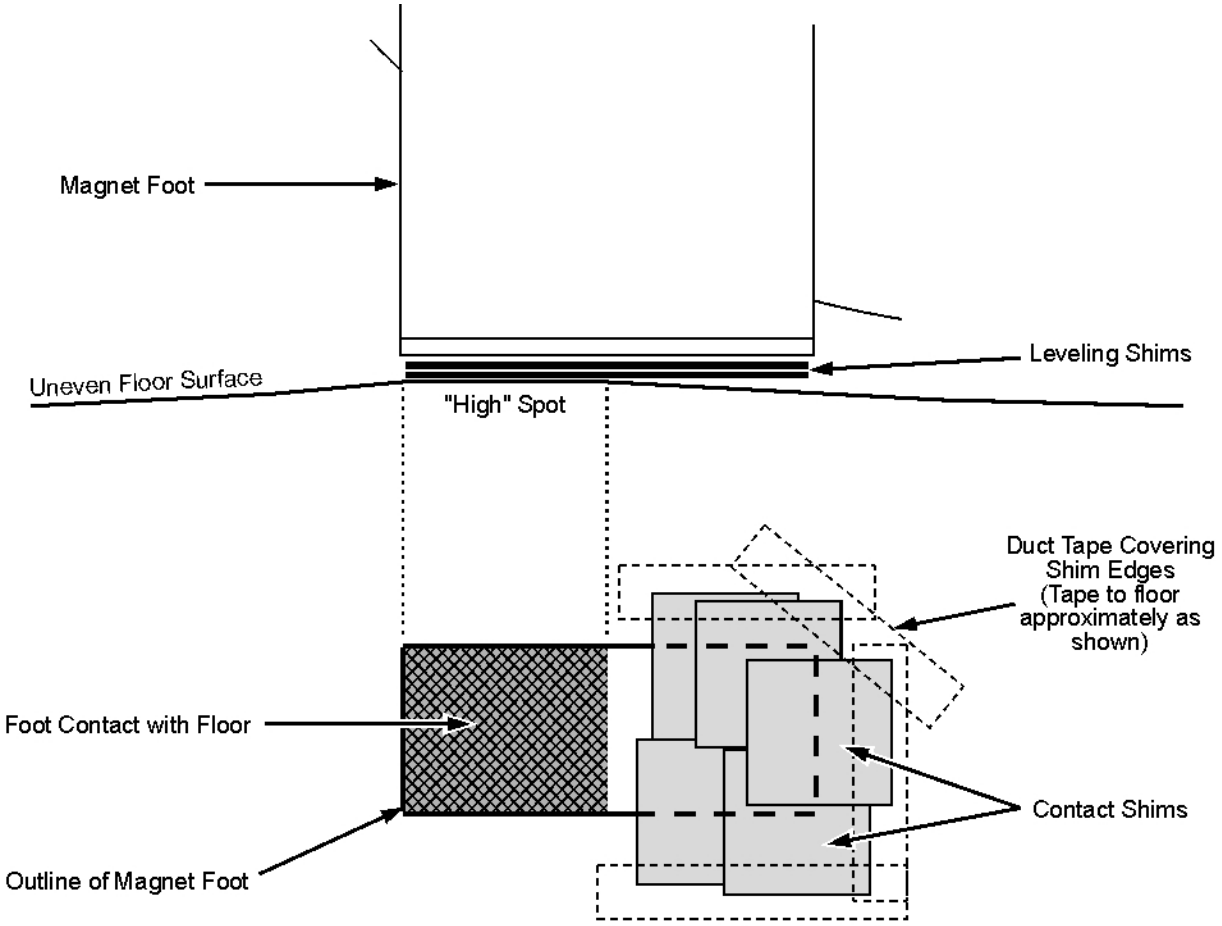


Illustration 36: RF Shield Room Anchor Details



NOTE: For sites with RF Shield on top of subfloor, the RF Shield needs to be recessed to the concrete level to provide a proper RF Seal.

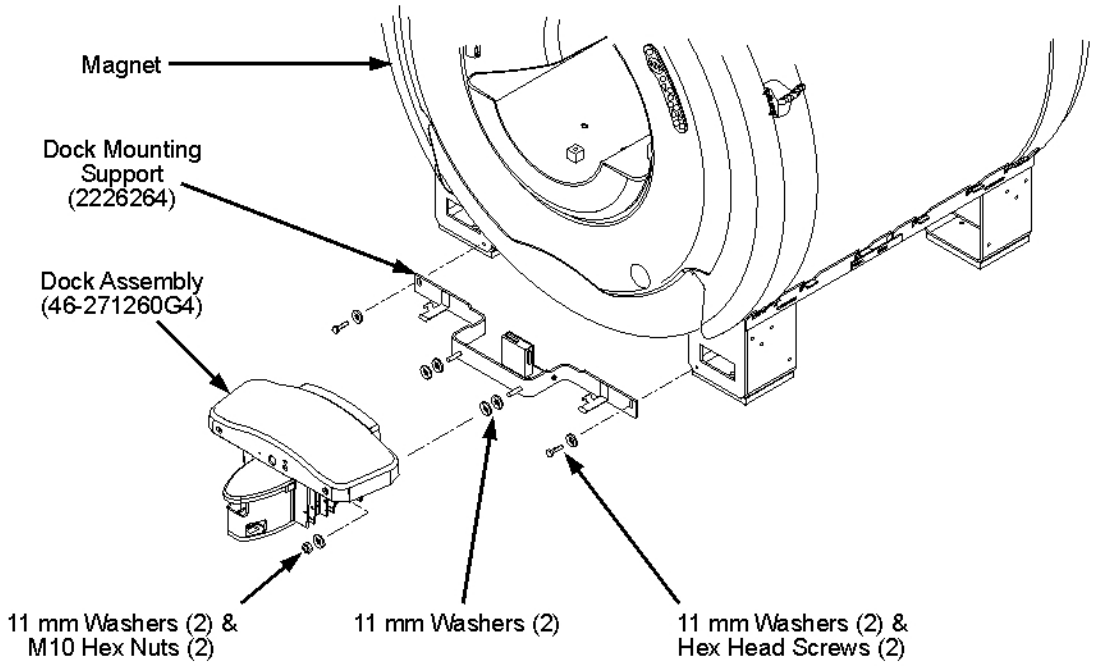
Illustration 37: Typical Shim Arrangement for Gap Fill



10 Dock Assembly Floor Anchor Installation

10.1 Attachment to Magnet

Illustration 38: Attaching Mounting Support & Dock Assembly to Magnet



WARNING

POTENTIAL PROJECTILE HAZARD!
DOCK CONTAINS FERROMAGNETIC MATERIAL.
DO NOT INSTALL OR ADJUST DOCK INSTALLATION WHILE MAGNET IS RAMPED.

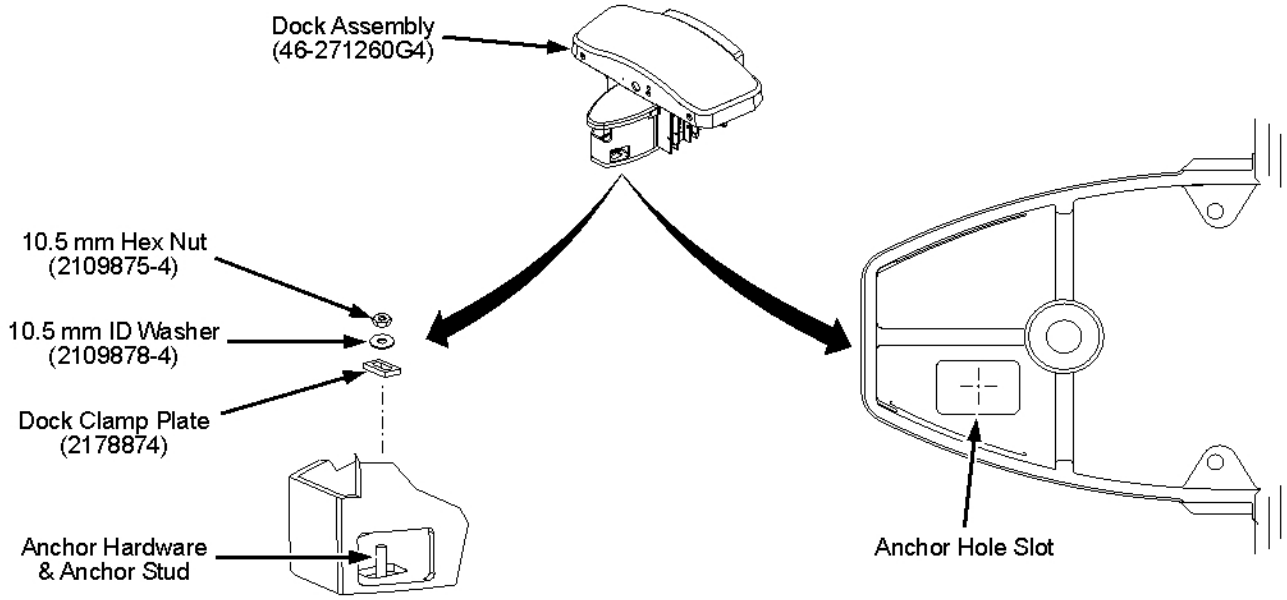
1. Fasten the Dock Mounting Support (2226264) to the magnet using the 11 mm inside diameter washers and the hex head screws supplied with the support. Apply Loctite 242 as required. See Illustration 38.
2. Slip two 11 mm washers onto each middle stud on the Dock Mounting Support as in Illustration 38.

NOTE: Add or remove washers between the Dock Mounting Support and Dock Assembly if alignment adjustments are required when installing the table.

3. Slide the Dock Assembly (46-271260G4) onto the Mounting Support studs.
4. Secure the Dock Assembly to the Dock Mounting Support using two 11 mm washers and two M10 hex nuts on each stud. See Illustration 38.

10.2 Attachment to Floor

Illustration 39: Attaching Mounting Support & Dock Assembly to Floor



NOTICE

Make sure floor anchor does NOT short to ground!

1. Using the Dock Assembly as a template, mark the anchor location in the center of the anchor hole slot. See Illustration 39.
2. Unfasten the M10 hex nuts and washers installed in Section 10.1, Step 4. Remove the Dock Assembly.

NOTE: The floor anchor stud installation in the following step is to be done by the **RF Room vendor/mechanical contractor**.

3. Drill a hole in the floor and install anchor hardware and stud. Tighten the stud to torque specification.
4. Verify that the anchor is not shorted to ground. Make corrections as necessary.
5. Reinstall the Dock Assembly using the M10 hex nuts and washers. Apply Loctite 242 as necessary.
6. Fasten the Dock Assembly to the floor using a Dock Clamp Plate (2178874), a 10.5 mm I.D. washer (2109878-4) and a 10 mm hex nut (2109875-4). Apply Loctite 242 as required.
7. Make any final adjustments needed when the table is installed.

11 Shim Lead Bracket Kit Installation

NOTE: The Shim Lead Bracket Kit (2217622) is shipped with each mobile/translocatable magnet as a separate part of the shipping collector. It is to be installed on the magnet prior to set-up and commissioning of the magnet.

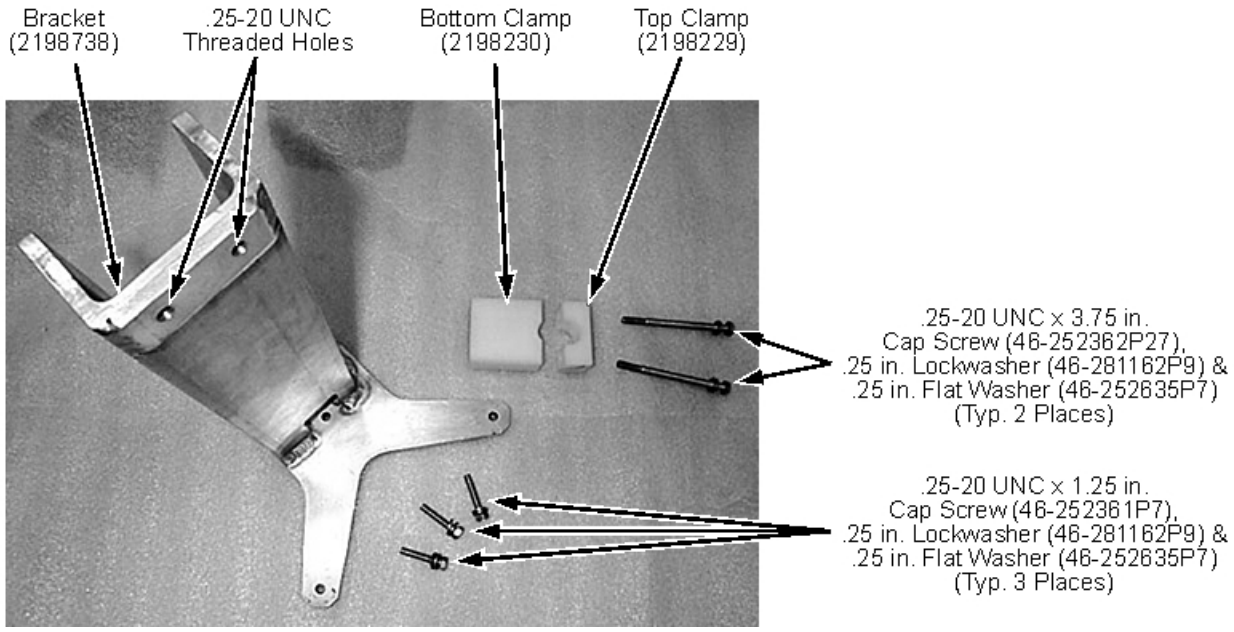
11.1 Introduction

The Shim Lead Bracket Kit (2217622) is provided for GE 1.5T & 1.0T Active Shield Magnets that are used in a mobile environment only. The items listed in Table 19 and shown in Illustration 40 are furnished as part of the kit. This kit provides stability (by preventing excess vibration) to the Shim Lead Assembly when it is transported in the disengaged position.

Table 19: Shim Lead Bracket Kit 2217622

Quantity	Part Number	Description
1	2198738	Bracket
1	2198229	Top Clamp
1	2198230	Bottom Clamp
2	46-252362P27	Cap Screw, .25-20 UNC x 3.75 In.
3	46-252361P7	Cap Screw, .25-20 UNC x 1.25 In.
5	46-281162P9	Lockwasher, .25 In. Dia.
5	46-252635P7	Flat Washer, .25 In. Dia.

Illustration 40: Shim Lead Bracket Kit 2217622

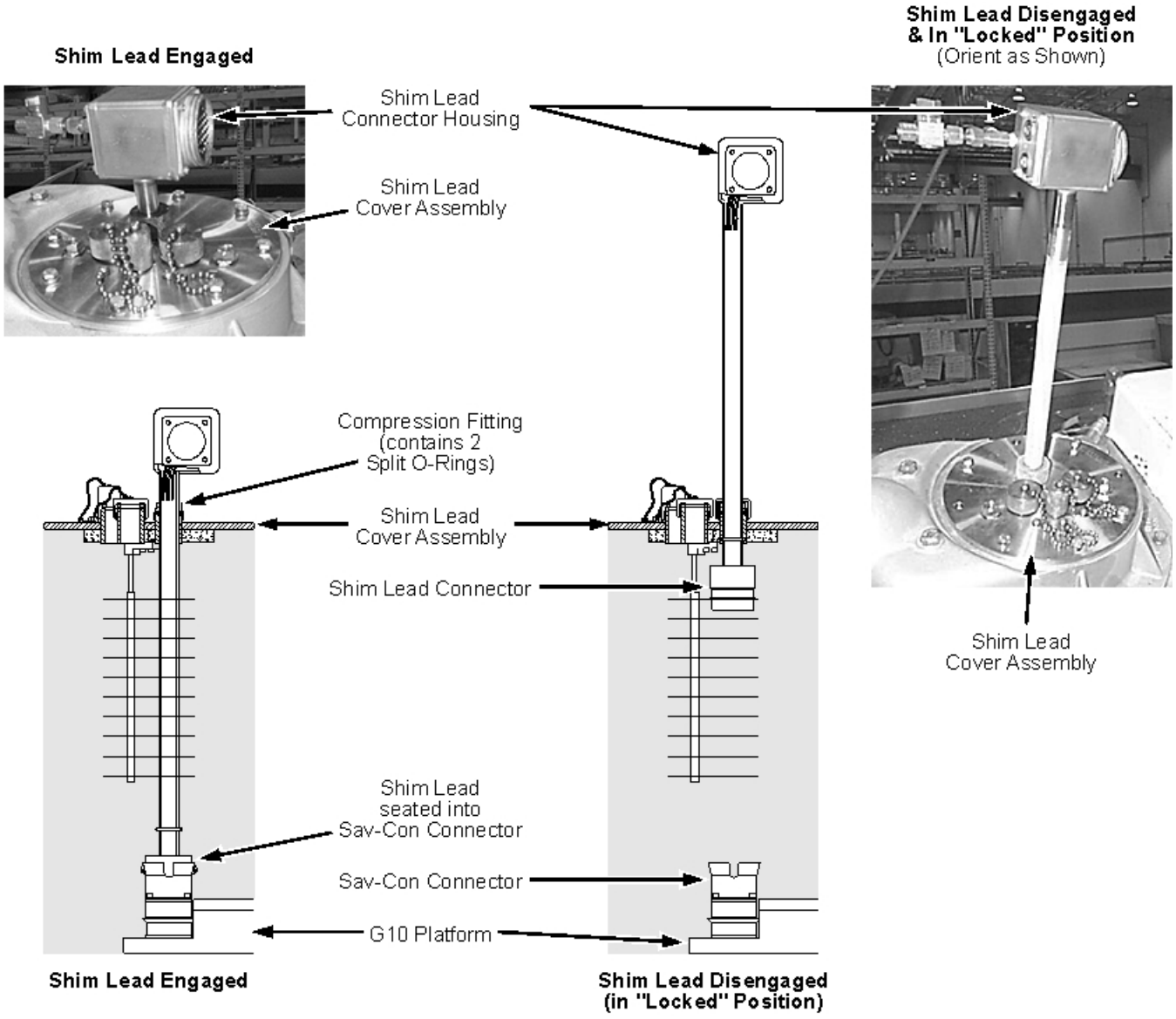


11.2 Shim Lead Disengagement

NOTE: The Shim Lead Assembly must be fully disengaged before the Shim Lead Bracket Kit can be installed. Use the following steps to disengage the Shim Lead properly.

1. Remove ice around the Shim Lead Assembly and Shim Lead compression fitting, if any, using a heat gun.
2. Loosen the Shim Lead compression fitting. See Illustration 41.
3. Pull up firmly from underside of the Shim Lead Connector Housing until the Shim Lead Assembly unseats.
4. When Shim Lead Assembly has been pulled to its highest position, where it cannot be raised any higher, rotate the Shim Lead Connector Housing counterclockwise (CCW) until the assembly “locks” into position. See Illustration 41.
5. Hand retighten the Shim Lead compression fitting.
6. The Shim Lead Bracket Kit can now be installed to stabilize the disengaged Shim Lead Assembly.

Illustration 41: Shim Lead Disengagement



11.3 Bracket Installation

1. Loosen and remove the three .25-20 UNC cap screws, lockwashers and flatwashers in the Shim Lead Cover Plate from locations shown in Illustration 42.
2. Position the Bracket as shown in Illustration 42. Align holes in the Bracket with the holes in the Shim Lead Cover Plate.
3. Install three .25-20 UNC x 1.25 inch long cap screws, lockwashers and flatwashers provided in Shim Lead Bracket Kit through the holes in the Bracket base into the holes in the Shim Lead Cover Plate. See Illustration 42. Tighten the cap screws.

NOTE: The Shim Lead Assembly must be fully disengaged and locked in position before the Bracket Kit's top and bottom clamps can be installed.

4. Install the Bracket's top and bottom clamps using the two .25-20 UNC x 3.75 inch cap screws, .25 inch lockwashers and .25 inch flatwashers provided in the kit. The cap screws are threaded into .25-20 UNC holes in the upper section of the bracket. See Illustration 40. Orientation of these items is shown in Illustration 43.

Illustration 42: Bracket Installation

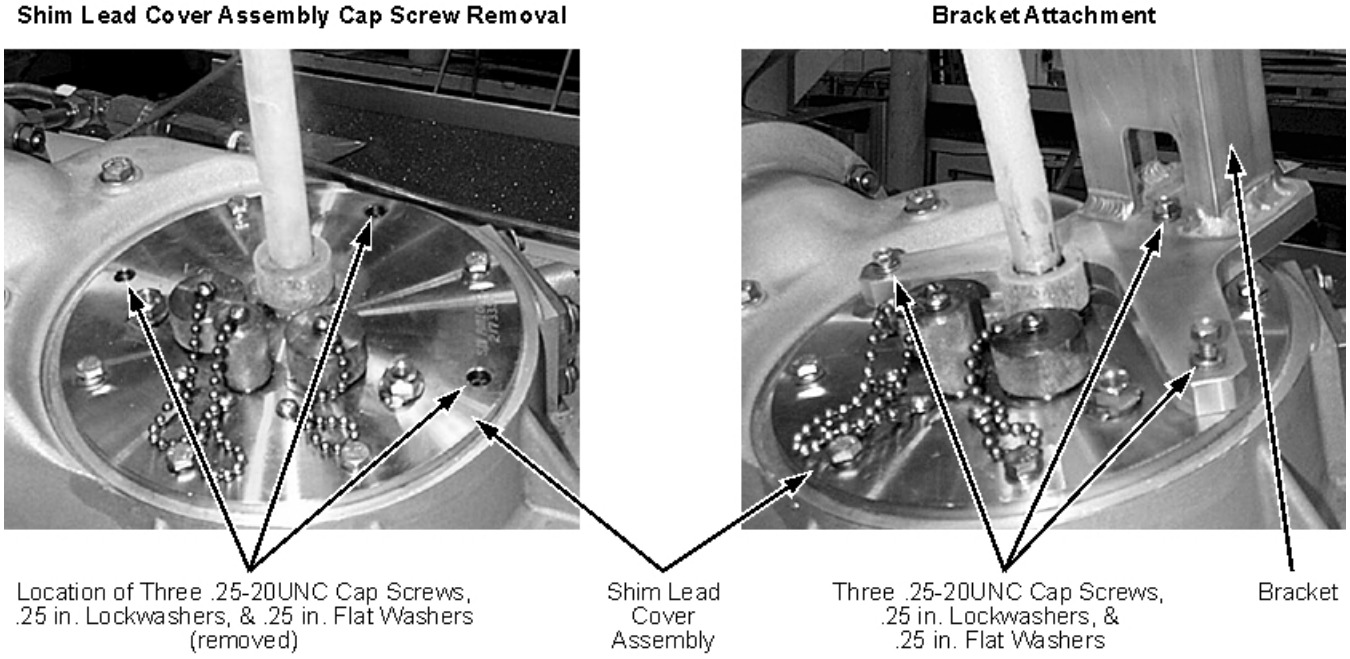
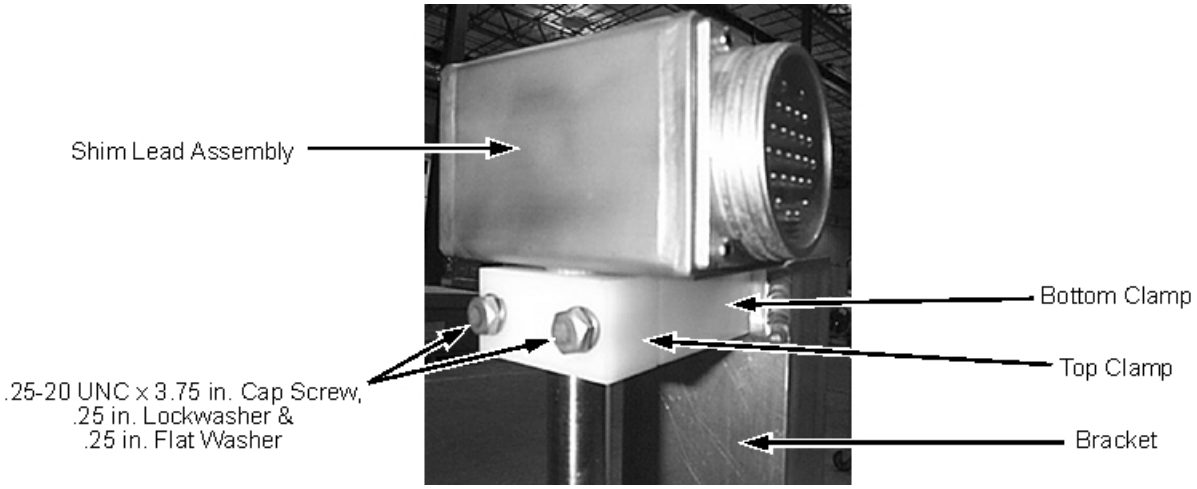


Illustration 43: Top & Bottom Clamp Installation



GE MEDICAL SYSTEMS

GE MEDICAL SYSTEMS - AMERICAS: FAX 262.312.7434
3000 N. GRANDVIEW BLVD., WAUKESHA, WI 53188 U.S.A.

GE MEDICAL SYSTEMS - EUROPE: FAX 33.1.40.93.33.33
PARIS, FRANCE

GE MEDICAL SYSTEMS - ASIA: FAX 65.291.7006
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