



GE Medical Systems

Technical Publications

Direction 2243897
Revision 3

GE 0.7T *OpenSpeed* Magnet Delivery and Installation

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Operating Documentation

DAMAGE IN TRANSPORTATION

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REV 0, 11/17/2000



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- 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 NICHT ZU RATE GEZOGEN UND VERSTANDEN WURDE.
- WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.

AVISO

- 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 TENHA TENTADO REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.
- O NÃO CUMPRIMENTO DESTA AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.

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.

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- 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。

REVISION HISTORY

REVISION	DATE	PRIMARY REASON FOR CHANGE
REV A	June 30, 2000	
REV 0	August 23, 2000	
REV 1	December 8, 2000	New Coldhead Bracket Mounting; Heater / RTD resistance checks; added International Delivery
REV 2	March 13, 2001	New Section 6 including mounting without Magnet Mounting Plate and revised Coldhead Mounting; revised heater resistance values
REV 3	April 5, 2001	Correction of critical dimension (page 6-13)

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SECTION 1 PRE-DELIVERY INSTRUCTIONS



Make sure ALL site requirements / conditions identified for the magnet in Direction 2241391, Signa OpenSpeed Pre-Installation, are met before scheduling magnet delivery. This will prevent installation delays, cryogen loss and the resultant ongoing magnet quenches, potential damage, environmentally-related problems and increased costs.

1. Visit the magnet site with rigging foreman to plan the move before the magnet is delivered.
2. Caution the rigger that the magnet is fragile. Sudden jolts can damage the magnet. Make riggers aware of the cost of a magnet replacement. This usually promotes more care while handling before the magnet is delivered.



Magnet has enclosures installed and enclosures cannot be pushed upon as damage to the enclosure may result.

3. Make sure all roads and paths leading to the Magnet Room are level and free from obstacles and holes. Rigger will be required to construct platforms where needed.
4. If roller dollies are to be used, have rigger bring steel plates to place along delivery route. Materials to be supplied by the rigger are specified in Subsection 2-1, Equipment / Tools, for domestic deliveries and in Subsection 3-1, Equipment / Tools, for international deliveries.
5. Make sure the the Magnet Mounting Plate is installed on the floor before delivery. Refer to architectural drawings plus Direction 2241391, Signa HFO/I Pre-Installation.
6. Make sure all equipment anchors are located, installed and tested.



Review guidelines with Shipper / Riggers prior to transporting the magnet.

Shipping and handling guidelines are provided in Tables 2-1, 2-2 and 2-3.

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

SECTION 2 - DOMESTIC MAGNET DELIVERY

TABLE 2-1
LIFTING / HANDLING INFORMATION

MAGNET	* MAXIMUM WEIGHT	** MAXIMUM TILT	FORKLIFT CAPABILITY
GE 0.7T	22,000 lbs. (9,979 kg.)	30 deg.	Only with pallet attached

- * Weight includes magnet, poleface, helium, motorshields, gradient coils with cables, hoses, etc. and shipping cage.
- ** Maximum tilt angle off vertical axis is allowed only when supported by feet for forklift / rigging operations or moving on inclines (base lift).



Make sure conditions specified in Tables 2-2 and 2-3 are met to prevent internal damage to magnet. 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 2-2
SHIPPING INFORMATION

MAGNET	ALLOWABLE SHIPPING MODES	SHIPPING CAPABILITY	MAXIMUM TRANSIT TIME
GE 0.7T	Airplane, Air ride only trailer, Boat or ocean going ship	Warm or Cold	Cryogen refill for cold shipment ≈ 30 days (to eliminate magnet precool requirement)

TABLE 2-3
MAXIMUM IMPACT FORCE

MAGNET	MAXIMUM LONGITUDINAL FORCE	MAXIMUM LATERAL FORCE	MAXIMUM VERTICAL FORCE
GE 0.7T	1.2 G	1.5 G	1.5 G

Note

Only tie downs to magnet ring and lifting rails are permitted.

2-1 EQUIPMENT / TOOLS

2-1-1 Crane Lift

TABLE 2-4
CRANE REQUIREMENTS

ITEM	QTY.	CAPACITY / RANGE	FURNISHED BY:	INTENDED USE:
Crane	1	22,000 lbs. (9,979 Kg)	Rigger	Unloading or moving magnet (without pallet)
Spreader Beam	1	22,000 lbs. (9,979 Kg) Total Load Additional data shown in Illustration 2-6	Rigger	Unloading or moving magnet (without pallet)
Straps or Cables	2	22,000 lbs. (9,979 Kg) Total Load Additional data shown in Illustration 2-6	Rigger	Unloading or moving magnet (without pallet)
Sling (strap or cable)	2	2,000 lbs. (907 Kg) work load limit, 6 ft. (1829 mm) min. length	Rigger	Cage removal
Shackle or hook	2	2,000 lbs. (907 Kg) work load limit	Rigger	Cage removal
Wrench	1	Size: 9/16"	Rigger	Cage side removal

2-1 EQUIPMENT / TOOLS (continued)

2-1-2 Miscellaneous Equipment / Tools

TABLE 2-5
MISCELLANEOUS EQUIPMENT / TOOLS FOR MOVING AND CHECKING MAGNET

ITEM	QTY	EQUIPMENT / TOOL REQUIREMENT	RESPONSIBLE	FUNCTION
Magnet System Components Checks	1	Direction 2243897, GE 0.7T OpenSpeed Magnet Delivery and Installation	GE / SYS	Confirm electrical check values
Hydraulic or Toe Jack	4	Must support one end of magnet on 2 jacks or both ends of magnet on 4 jacks Carrying capacity: 12,000 lbs. (5,450 Kg) per jack	Rigger	Raise up magnet for roller dollies or leveling plates
Roller Dollies	2	Carrying capacity: 6,000 lbs. (2,722 Kg) per dolly	Rigger	Moving magnet to Magnet Room
Come-along	1	Pulling capacity: 12,000 lbs. (5,443 Kg)	Rigger	Pull magnet into position
Level	1	24- 36 inches (0.6 - 1 M) long	Rigger	Check magnet level
Torque Wrench and Socket	1	Torque range = 58 to 258 ft. lbs. Deep socket, size dependant on anchor selection	Rigger	Bolt down magnet
Socket Wrench and Sockets	1	3/4" socket size (add sockets for crate removal)	Rigger	Remove 1/2" crate lag screws
Portable Temperature Meter (P/N 2125073)	1	N / A	GE / FE	Check internal temperatures
Digital Volt / Ohm Meter	1	Fluke model 87 or equivalent	GE / FE	Perform magnet electrical checks
Wood Timber	2	4" x 6" x 8'	Rigger	Moving / positioning magnet to Magnet Room
Steel or Aluminum Plate	6	.25" x 18" x 6'	Rigger	Moving magnet to Magnet Room
Pry-bar	2	Length as required to move magnet	Rigger	Moving / positioning magnet in Magnet Room
RuO Temperature Meter (P/N 2171219)	1	N / A	GE	Check second stage & Recondenser temperatures
Adapter Cable for Diode Temperature Meter (P/N 46-301620P1)	1	N / A	GE	Check internal temperatures
Circular or Chain Saw	AR	N / A	Rigger	For cutting wood timbers
Heavy Duty Drill & Drill Bits	AR	N / A	Rigger	To add holes to wood timbers
Min. .50" Dia. Mounting Hardware	AR	N / A	Rigger	For attaching wood timbers to rails
Socket or Wrench	1	15/16"	Rigger	For removing lifting beams

2-2 IN-TRANSIT HANDLING AND SERVICE

2-2-1 Helium Fill

Cryogen depletion occurs in approximately 6 days after coldhead power is removed from a full magnet. The Magnet warms up to liquid nitrogen temperature (77 K) in approximately 30 days. If the coldheads are off for an extended period of time (> 30 days) due to transit, storage or power outage, refill of the Magnet to keep it cold should be considered to eliminate the need to precool it before filling later. Perform helium fill in conformance with magnet service manual Direction 2231934, Set-Up and Calibration, Section 3-4, Liquid Helium Fill.

**WARNING!**

THIS PROCEDURE MUST BE PERFORMED BY QUALIFIED PERSONNEL ONLY. MAKE SURE THE SAFETY PRECAUTIONS LISTED BELOW ARE COMPLETELY FOLLOWED WHEN PERFORMING ANY SERVICE THAT WILL RESULT IN HELIUM EXHAUST FROM THE MAGNET.

LARGE QUANTITIES OF HELIUM GAS WILL DISPLACE OXYGEN IN A CLOSED ROOM. GOOD VENTILATION IS REQUIRED FOR YOUR PERSONAL SAFETY. MAKE SURE THE MAGNET STORAGE AREA IS ADEQUATELY VENTILATED BY OPENING DOORS AND WINDOWS. THE ADDITION OF PORTABLE FANS MAY BE NECESSARY IN CASES OF A SMALL-SIZE ROOM WITH POOR VENTILATION.

SKIN CONTACT WITH LIQUID CRYOGENS WILL CAUSE BURNS. WEAR PROTECTIVE CLOTHING, GLOVES (NONABSORBENT MATERIAL) AND GOGGLES WHEN TRANSFERRING CRYOGENS. MAKE SURE A SECOND PERSON IS PRESENT WHILE SERVICING THE MAGNET IN CASE OF ANY EMERGENCY.

SMOKING IS PROHIBITED IN THE MAGNET AND CRYOGEN STORAGE ROOMS. LIQUID CRYOGENS CAN LIQUIFY ATMOSPHERIC OXYGEN THUS PRODUCING A HIGHLY ENRICHED OXYGEN LIQUID, WHICH IS HIGHLY COMBUSTABLE.

Note

Magnet must be lifted in conformance with requirements shown in Illustrations 2-5 and 2-6 to avoid damage to external components from lifting straps / chains.

2-3 CAGE REMOVAL

Use caution while lifting or sliding protective cage from magnet to avoid serious damage to the magnet components.

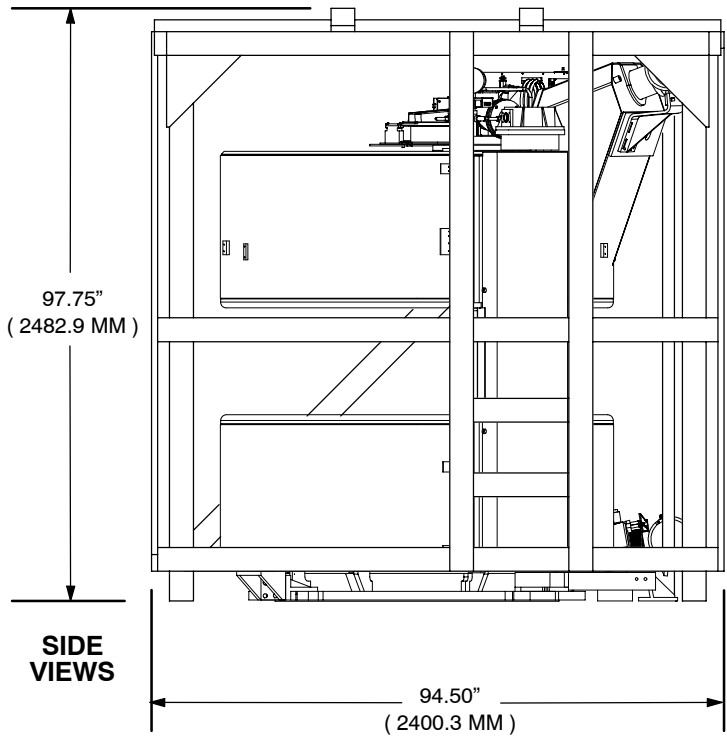
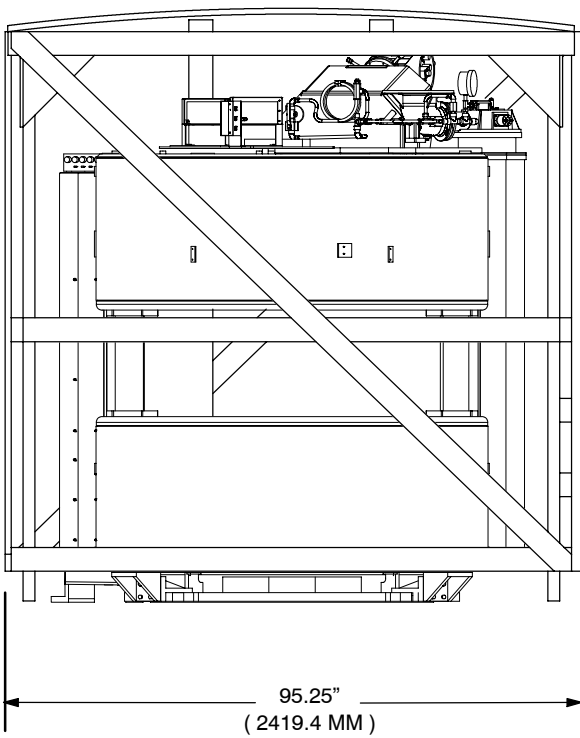
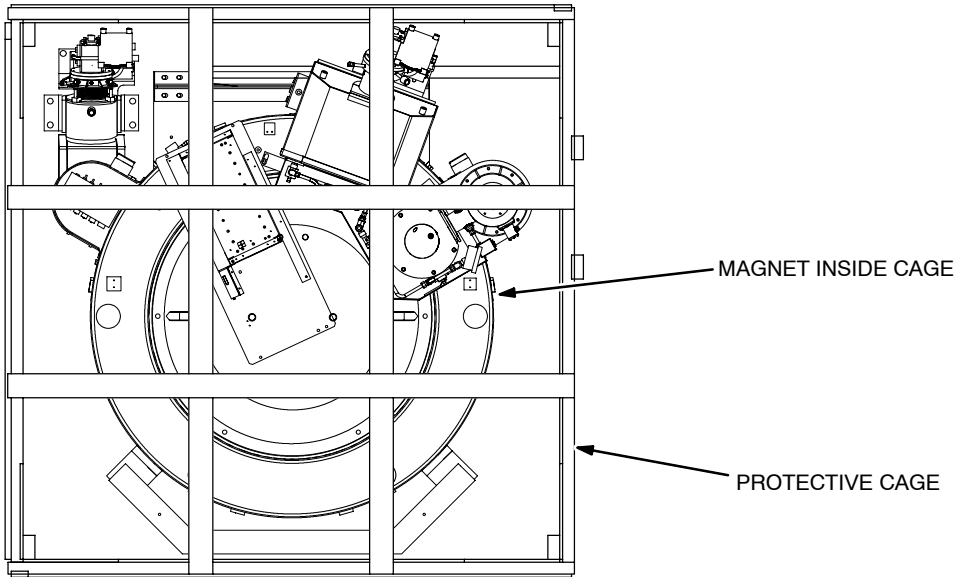
Note

Magnet must be lifted in conformance with requirements shown in Illustrations 2-5 and 2-6 to avoid damage to external components from lifting straps / chains.

1. Loop a lifting strap capable of lifting a minimum 300 pound (136kg) weight through the cage's top frame and securely attach it to crane. See Illustrations 2-3 and 2-4.
2. Remove lag screws and frame from side of cage. Lift cage a minimum of 24 inches (609.6 mm), carefully sliding it away from the magnet at that height, or lift cage a minimum of 24 inches (609.9 mm) above top of magnet, swinging it away to remove. Be careful not to contact magnet with cage during this operation. See Illustration 2-2, 2-3 and 2-4.

2-3 CAGE REMOVAL (continued)

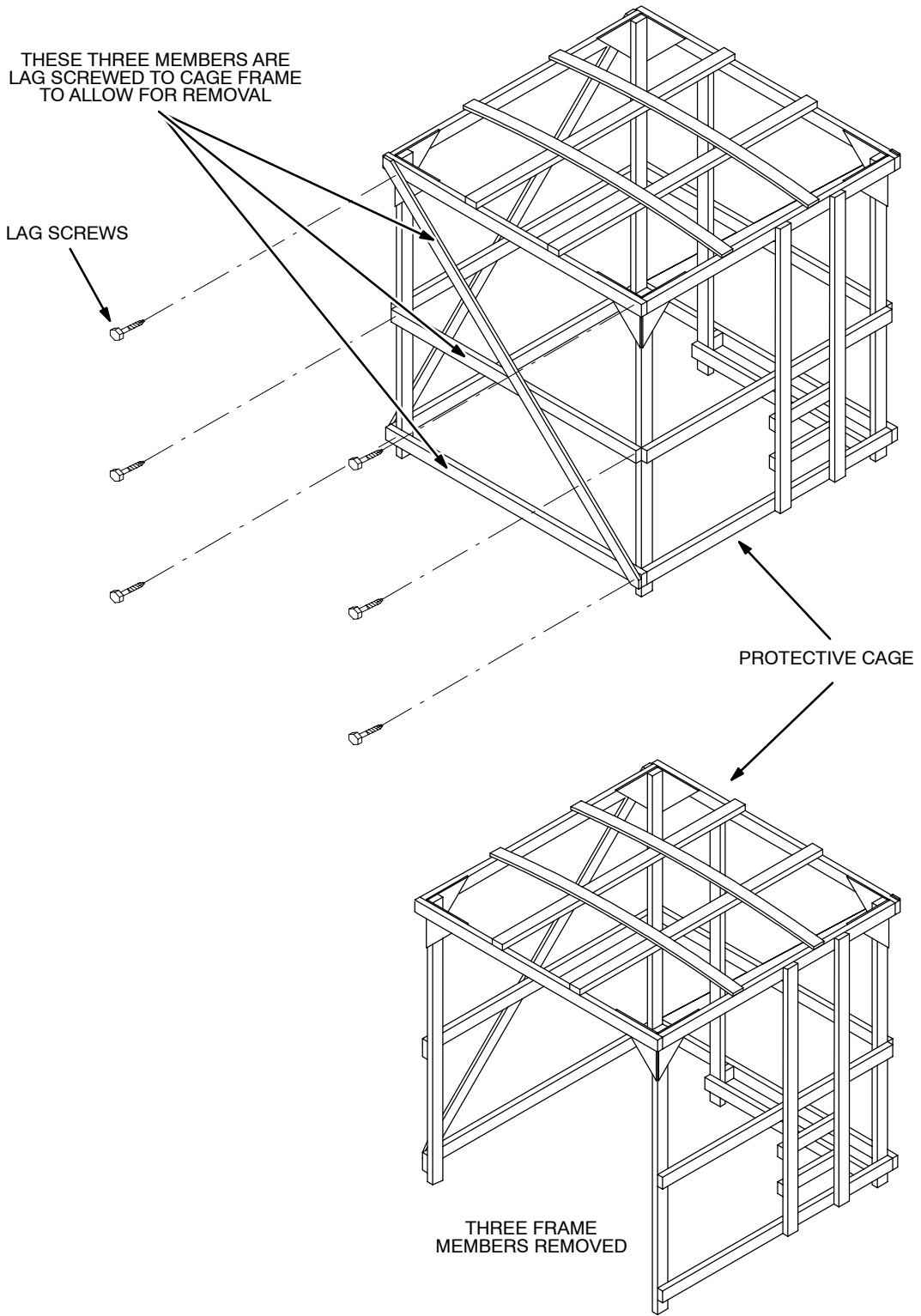
TOP VIEW



SIDE VIEWS

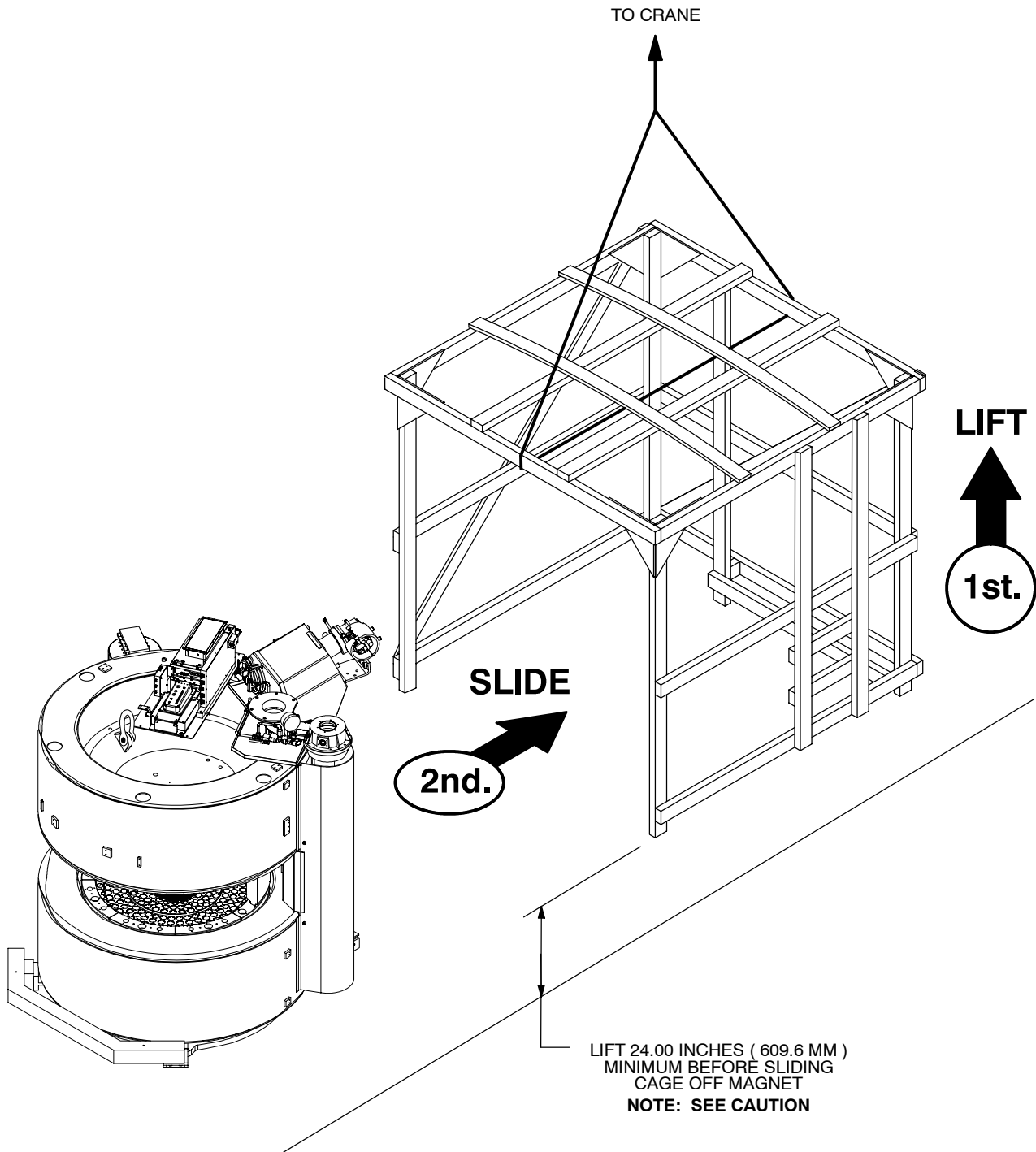
PROTECTIVE CAGE / MAGNET
ILLUSTRATION 2-1

2-3 CAGE REMOVAL (continued)



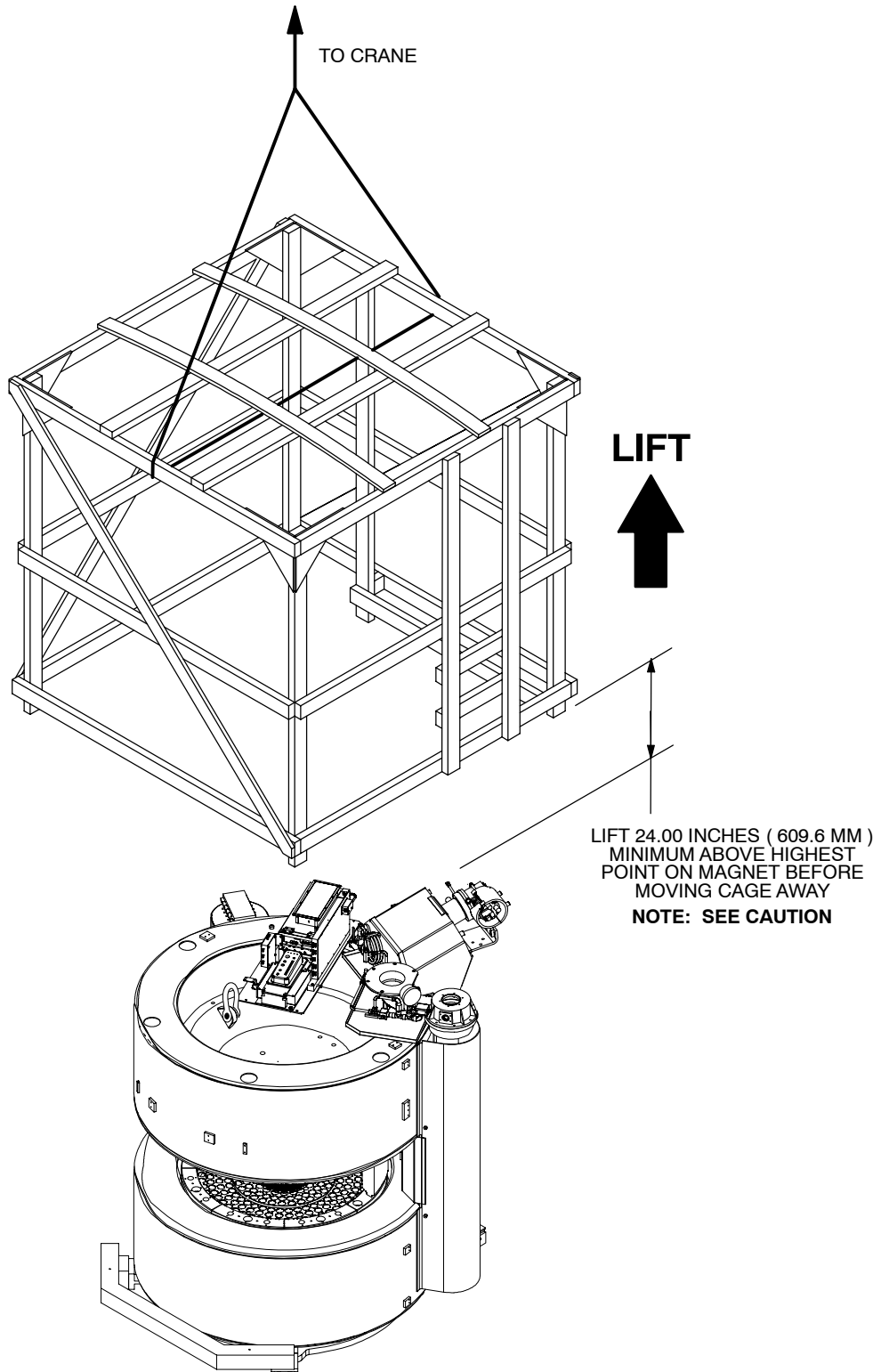
PROTECTIVE CAGE SIDE REMOVAL
ILLUSTRATION 2-2

2-3 CAGE REMOVAL (continued)



PROTECTIVE CAGE REMOVAL WITH SIDE REMOVED
ILLUSTRATION 2-3

2-3 CAGE REMOVAL (continued)



PROTECTIVE CAGE REMOVAL VERTICALLY
ILLUSTRATION 2-4

2-4 UNLOADING / LIFTING MAGNET

Use caution while cutting holes in the plastic bag (wrap) to avoid serious damage to the magnet components.

1. Cut holes in the protective plastic bag (wrap) for access to the lifting shackles. Be careful not to damage magnet components with knife or by pulling on wrap.

Note

Do not remove the protective plastic bag / wrap surrounding magnet until required for installation purposes inside the Magnet Room.

2. Position crane hook / spreader beam centrally over magnet for a vertical lift. See Illustration 2-5.
3. Attach straps / cables to lifting shackles on top of magnet, spreader beam and crane in conformance with Illustrations 2-5 and 2-6.



Carefully control magnet while lifting, moving or lowering. Some rotation / tilting will occur. Lower smoothly onto a flat surface. Avoid impacts, jolts or excessive tilting (as specified in Table 2-1) as magnet damage may result.

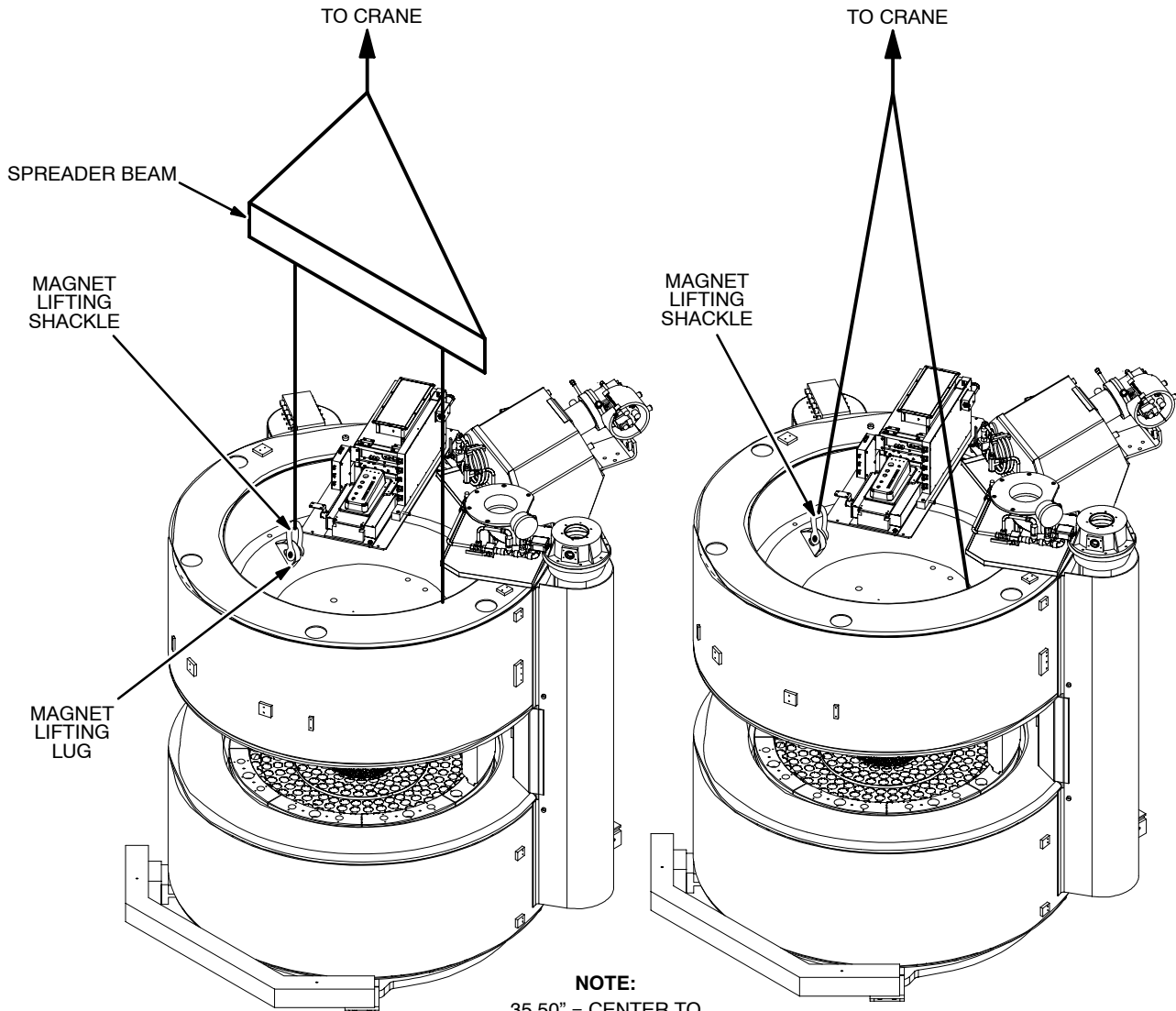
Note

Magnet must be lifted in conformance with requirements shown in Illustrations 2-5 and 2-6 to avoid damage to external components from lifting straps / chains.

4. Lift magnet. Make sure magnet is lowered onto a flat smooth surface.

2-4 UNLOADING / LIFTING MAGNET (continued)

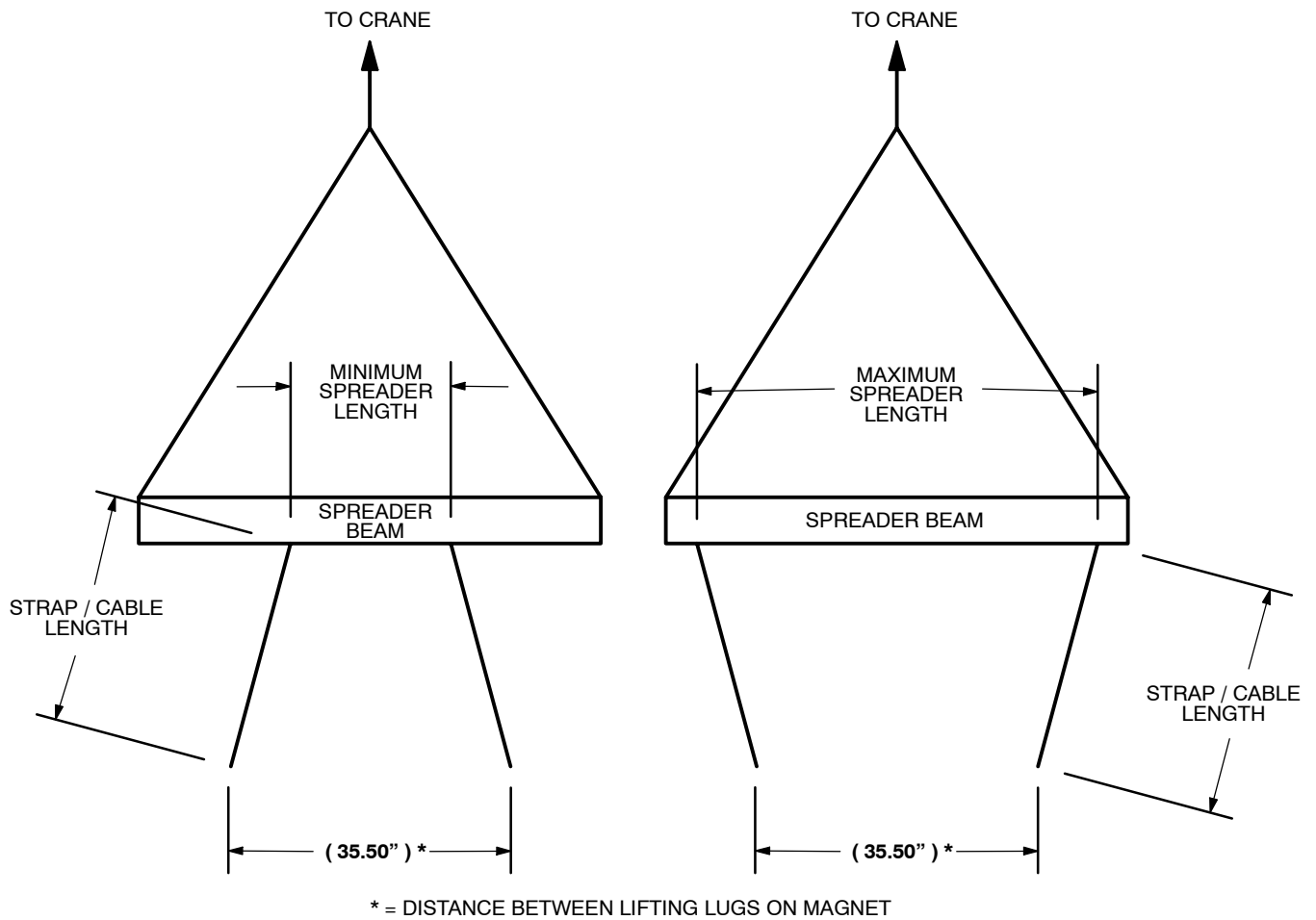
NOTE:
SEE FOLLOWING CHART FOR LENGTHS OF STRAPS / CABLES THAT MAY BE USED TO LIFT MGNET WHILE AVOIDING DAMAGE TO MAGNET COMPONENTS.



NOTE:
35.50" = CENTER TO CENTER OF HOLES IN LIFTING LUGS

CRANE LIFTING MAGNET
ILLUSTRATION 2-5

2-4 UNLOADING / LIFTING MAGNET (continued)



STRAP / CABLE LENGTH (INCHES)	SPREADER LENGTH (INCHES)	
	MINIMUM	MAXIMUM
36.0	18.0	56.0
48.0	12.0	62.0
60.0	6.0	68.0
72.0	0	74.0

NOTE: 72.0" MINIMUM LEGTH FOR LIFTING FROM SINGLE POINT

SPREADER BEAM / CABLE LENGTH REQUIREMENTS

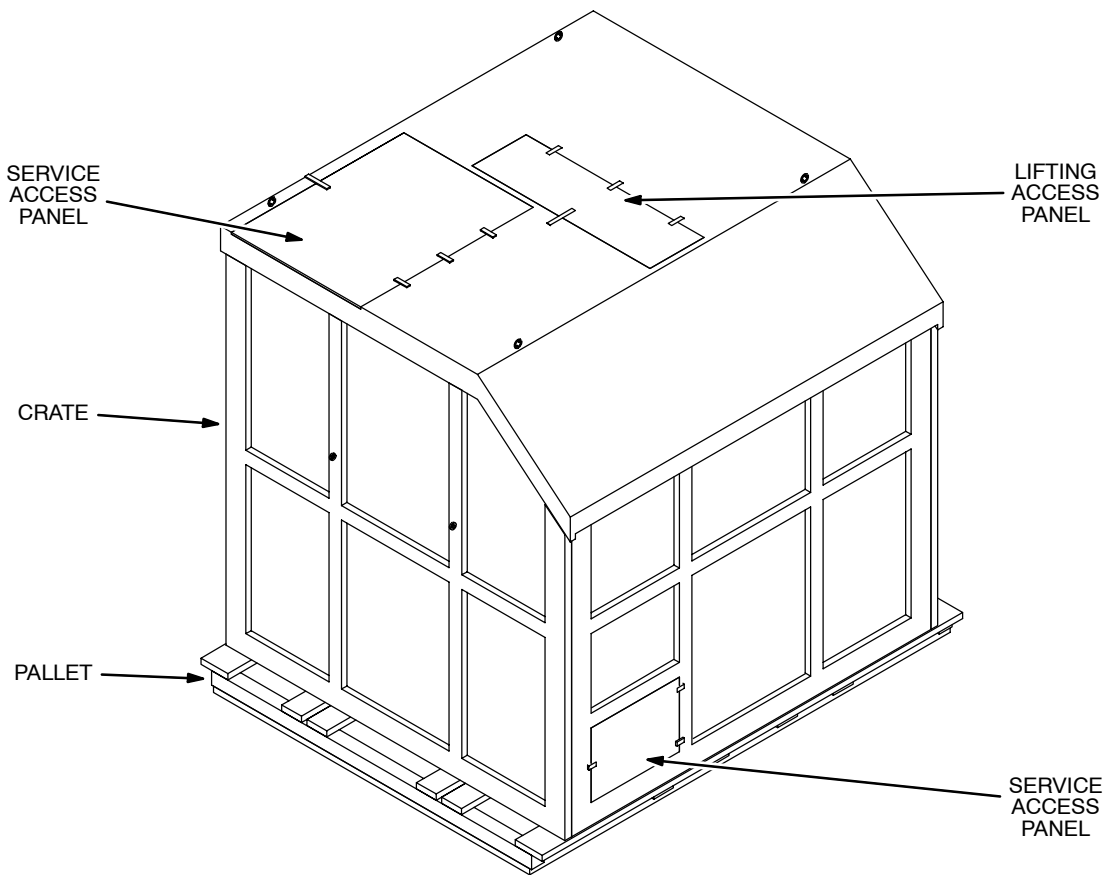
ILLUSTRATION 2-6

SECTION 3

INTERNATIONAL (AIR / SEA) MAGNET DELIVERY

Note

The international shipping crate is shown in Illustration 3-1. Provisions to allow filling and electrical / temperature checks while magnet is still in shipping crate are identified. These enable required service based upon magnet shipping date to be performed in transit.



CRATE / PALLET
ILLUSTRATION 3-1



Review guidelines with Shipper / Riggers prior to transporting magnet.

Shipping and handling guidelines are provided in Tables 3-1, 3-2 and 3-3.

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

TABLE 3-1
LIFTING / HANDLING INFORMATION

MAGNET	* MAXIMUM WEIGHT	** MAXIMUM TILT	FORKLIFT CAPABILITY
GE 0.7T	24,000 lbs. (9,979 kg.)	30 deg.	Only with pallet attached

* Weight includes magnet, poleface, helium, motorshields, gradient coils with cables, hoses, etc. and international shipping crate.

** Maximum tilt angle off vertical axis is allowed only when supported by feet for forklift / rigging operations or moving on inclines (base lift).



Make sure conditions specified in Tables 3-2 and 3-3 are met to prevent internal damage to magnet. 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 3-2
SHIPPING INFORMATION

MAGNET	ALLOWABLE SHIPPING MODES	SHIPPING CAPABILITY	MAXIMUM TRANSIT TIME
GE 0.7T	Airplane, Air ride only trailer, Boat or ocean going ship	Warm or Cold	Cryogen refill for cold shipment ≈ 30 days (to eliminate magnet precool requirement)

TABLE 3-3
MAXIMUM LOAD INFORMATION

MAGNET	MAXIMUM LONGITUDINAL FORCE	MAXIMUM LATERAL FORCE	MAXIMUM VERTICAL FORCE
GE 0.7T	1.2 G	1.5 G	1.5 G

3-1 EQUIPMENT / TOOLS

3-1-1 Forklift / Crane

TABLE 3-4
FORKLIFT / CRANE REQUIREMENTS

ITEM	QTY.	CAPACITY / RANGE	FURNISHED BY:	INTENDED USE:
Forklift	1	24,000 lbs. (10,087 Kg) at 50" (1,270 mm) to load center Minimum fork length: 90" (2,286 mm) Minimum distance between forks: 40" (1,016 mm)	Rigger	Unloading or moving magnet with pallet and crate installed
Crane	1	24,000 lbs. (10,087 Kg)	Rigger	Unloading or moving magnet
Sling (strap or cable)	2	2,000 lbs. (907.2 Kg) work load limit, 6 ft. (1829 mm) min. length	Rigger	Crate removal
Shackle or hook	2	2,000 lbs. (907.2 Kg) work load limit	Rigger	Crate removal
Wrench	1	Size: 9/16" and 3/8"	Rigger	Crate removal

Note

For international shipments lifting straps are already attached to the magnet and are accessible from the top access panel. These straps are to remain attached to the magnet throughout magnet transit.

3-1-2 Miscellaneous Equipment / Tools

TABLE 3-5
MISCELLANEOUS EQUIPMENT / TOOLS FOR MOVING AND CHECKING MAGNET

ITEM	QTY	EQUIPMENT / TOOL REQUIREMENT	RESPONSIBLE	FUNCTION
Magnet System Components Checks	1	Direction 2243897, GE 0.7T OpenSpeed Magnet Delivery and Installation	GE / SYS	Confirm electrical check values
Hydraulic or Toe Jack	4	Must support one end of magnet on 2 jacks or both ends of magnet on 4 jacks Carrying capacity: 12,000 lbs. (5,450 Kg) per jack	Rigger	Raise up magnet for roller dollies or leveling plates
Roller Dollies	2	Carrying capacity: 6,000 lbs. (2,722 Kg) per dolly	Rigger	Moving magnet to Magnet Room
Come-along	1	Pulling capacity: 12,000 lbs. (5,443 Kg)	Rigger	Pull magnet into position
Level	1	24 - 36 inches (0.6 - 1 M) long	Rigger	Check magnet level
Torque Wrench and Socket	1	Torque range = 58 to 258 ft. lbs.; Deep socket, size dependant on anchor selection	Rigger	Bolt down magnet
Socket Wrench and Sockets	1	3/4" socket size (add sockets for crate removal)	Rigger	Remove 1/2" crate lag screws
Portable Temperature Meter (P/N 2125073)	1	N / A	GE / FE	2125073 Check internal temperatures
Digital Volt / Ohm Meter	1	Fluke model 87 or equivalent	GE / FE	Perform magnet electrical checks
Wood Timber	2	4" x 6" x 8'	Rigger	Moving / positioning magnet to Magnet Room
Steel or Aluminum Plate	6	.25" x 18" x 6'	Rigger	Moving magnet to Magnet Room
Pry-bar	2	Length as required to move magnet	Rigger	Moving / positioning magnet in Magnet Room
RuO Temperature Meter (P/N 2171219)	1	N / A	GE	Check second stage & Recondenser temperatures
Adapter Cable for Diode Temperature Meter (P/N 46-301620P1)	1	N / A	GE	Check internal temperatures
Circular or Chain Saw	AR	N / A	Rigger	For cutting wood timbers
Heavy Duty Drill & Drill Bits	AR	N / A	Rigger	To add holes to wood timbers
Min. .50" Dia. Mounting Hardware	AR	N / A	Rigger	For attaching wood timbers to rails

3-2 IN-TRANSIT HANDLING AND SERVICE

3-2-1 In-Transit Helium Fill

Cryogen depletion occurs in approximately 6 days after coldhead power is removed from a full magnet. The magnet warms up to liquid nitrogen temperature (77 K) in approximately 30 days. If the coldheads are off for an extended period of time (> 30 days) due to transit, storage or power outage, refilling the magnet to keep it cold should be considered to eliminate the need to precool it before filling later. Perform helium fill in conformance with magnet service manual Direction 2231934, Set-Up and Calibration, Section 3-4, Liquid Helium Fill.

Note

The service access panel on top of the shipping crate must be opened to refill magnet with liquid helium. See Illustration 3-1.



WARNING!

THIS PROCEDURE MUST BE PERFORMED BY QUALIFIED PERSONNEL ONLY. MAKE SURE THE SAFETY PRECAUTIONS LISTED BELOW ARE FOLLOWED COMPLETELY WHEN PERFORMING ANY SERVICE THAT WILL RESULT IN HELIUM BEING RELEASED FROM THE MAGNET.

LARGE QUANTITIES OF HELIUM GAS WILL DISPLACE OXYGEN IN A CLOSED ROOM. GOOD VENTILATION IS REQUIRED FOR YOUR PERSONAL SAFETY. MAKE SURE THE MAGNET STORAGE AREA IS ADEQUATELY VENTILATED BY OPENING DOORS AND WINDOWS. THE ADDITION OF PORTABLE FANS MAY BE NECESSARY IN CASES OF A SMALL-SIZE ROOM WITH POOR VENTILATION.

SKIN CONTACT WITH LIQUID CRYOGENS WILL CAUSE BURNS. WEAR PROTECTIVE CLOTHING, GLOVES (NONABSORBENT MATERIAL) AND GOGGLES WHEN TRANSFERRING CRYOGENS. MAKE SURE A SECOND PERSON IS PRESENT WHILE SERVICING THE MAGNET IN CASE OF ANY EMERGENCY.

SMOKING IS PROHIBITED IN THE MAGNET AND CRYOGEN STORAGE ROOMS. LIQUID CRYOGENS CAN LIQUIFY ATMOSPHERIC OXYGEN THUS PRODUCING A HIGHLY ENRICHED OXYGEN LIQUID, WHICH IS HIGHLY COMBUSTABLE.

3-2-2 In-Transit Handling with Crane**WARNING!**

DO NOT STAND OR PUT FULL BODY WEIGHT ON TOP OF CRATE TO PREVENT FALLING OFF CRATE OR THROUGH CRATE ROOF.

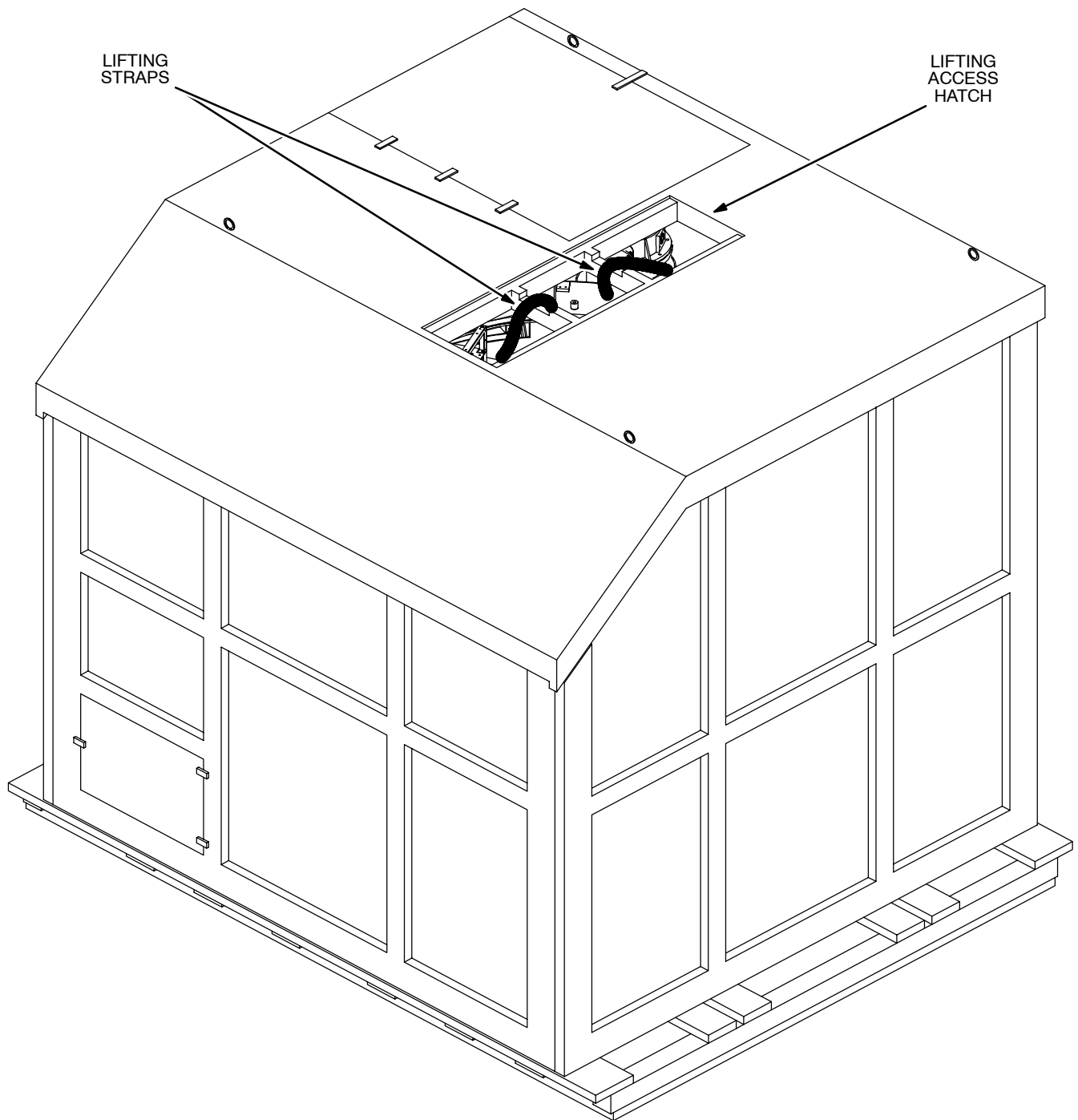
1. Position hook / spreader beam of crane centrally over crate. Refer to Table 3-4 for crane capacity specification.
2. Open hatch labelled "LIFTING ACCESS" on top of crate, revealing two lifting straps attached to lifting shackles on the magnet. See Illustration 3-2.
3. Attach the lifting straps to the crane hook / spreader beam in conformance with Illustration 3-3.

**CAUTION**

Carefully control magnet / crate / pallet package while lifting, moving or lowering. Some rotation / tilting will occur. Lower smoothly. Avoid impacts, jolts or excessive tilting (as specified in Table 3-1) as magnet damage may result.

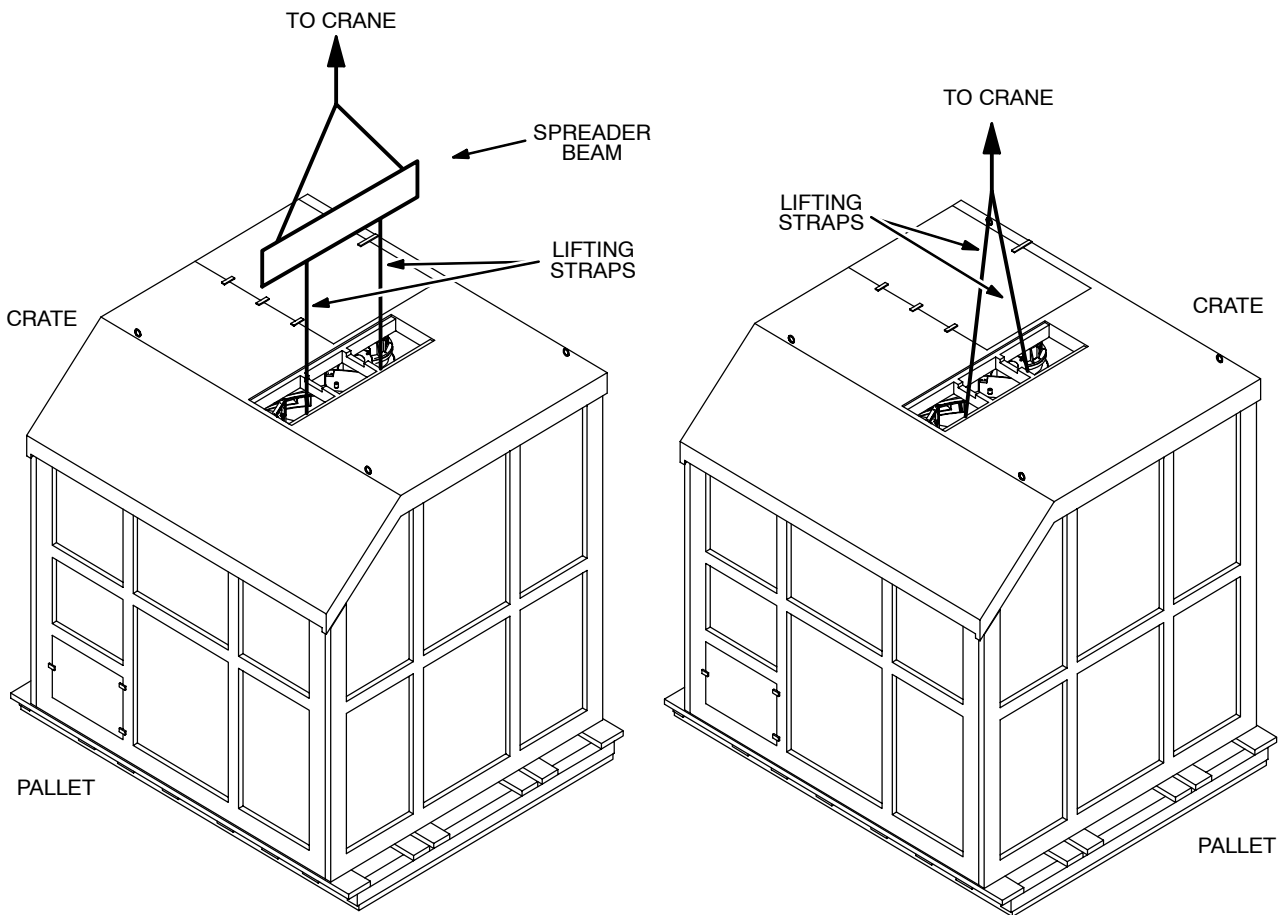
4. Carefully lift the entire magnet / crate / pallet package, controlling the tilt and rotation that will occur. Avoid impacts, jolts or excessive tilting (as specified in Table 3-1). When lowering, ease entire package to rest on a flat, smooth surface. Do not rest magnet / crate / pallet any place that is not flat nor strong enough to support 24,000 pounds (10,087 kg).

3-2-2 In-Transit Handling with Crane (continued)



LIFTING ACCESS HATCH AND LIFTING STRAPS
ILLUSTRATION 3-2

3-2-2 In-Transit Handling with Crane (continued)



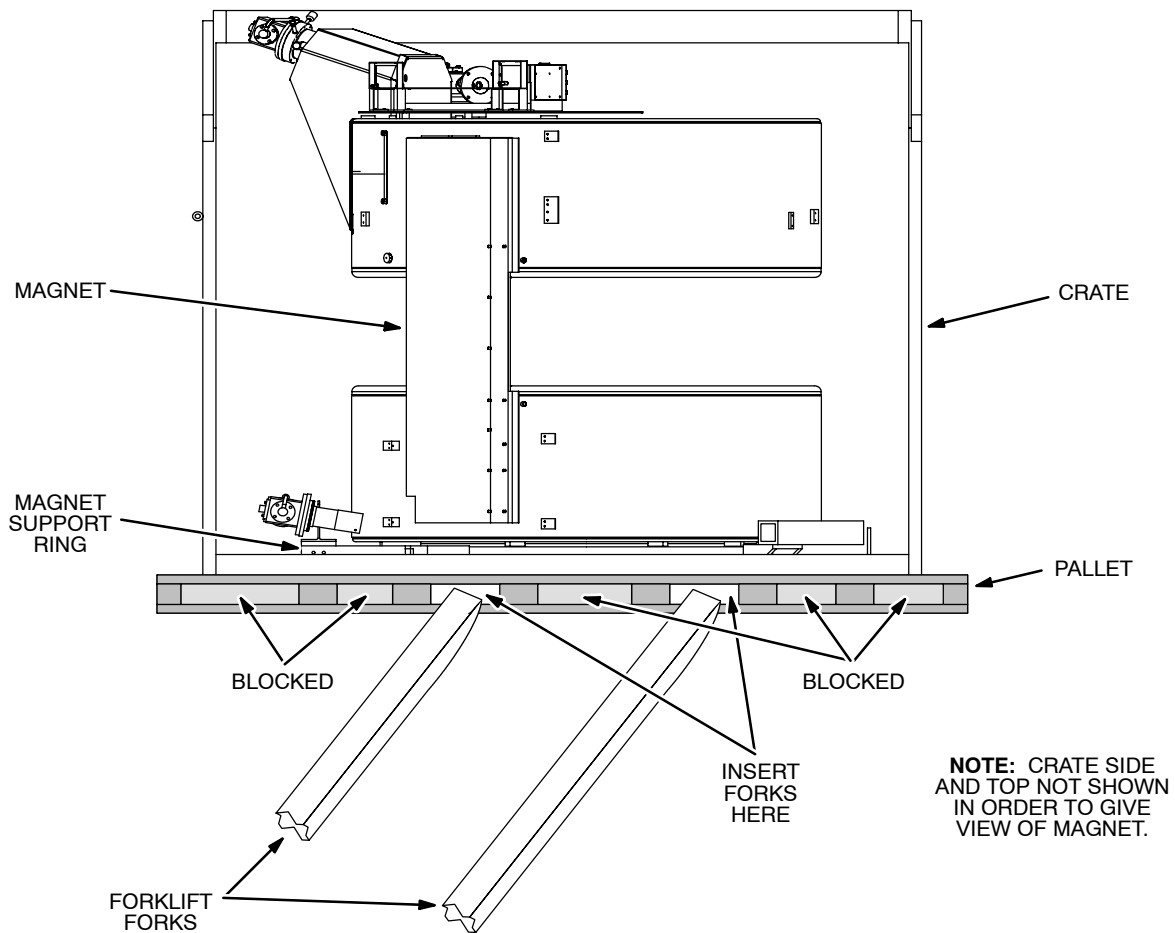
CRANE LIFTING OF CRATE IN-TRANSIT
ILLUSTRATION 3-3

3-2-3 In-Transit Handling with Forklift



It is important to use the proper size forklift and to lift the entire magnet, crate and pallet smoothly to avoid impacts, jolts or excessive tilting (as specified in Table 3-1) which may cause damage to the magnet. Extreme care must be exercised during forklift operations. The magnet pallet must be picked up from the sides only. The forks MUST be fully inserted into correct openings under shipping pallet. Make sure the forklift capacity and fork dimensions meet the specifications stated in Table 3-4.

1. Locate the forklift openings on the side of the shipping pallet. See Illustration 3-4.
2. Extreme care must be exercised during forklift operations. The magnet / crate / pallet package must be picked up from the sides only. Position the forks at the forklift openings on side of pallet and insert carefully. See Illustration 3-4.



LOCATION OF FORKLIFT OPENINGS IN SHIPPING PALLET

ILLUSTRATION 3-4

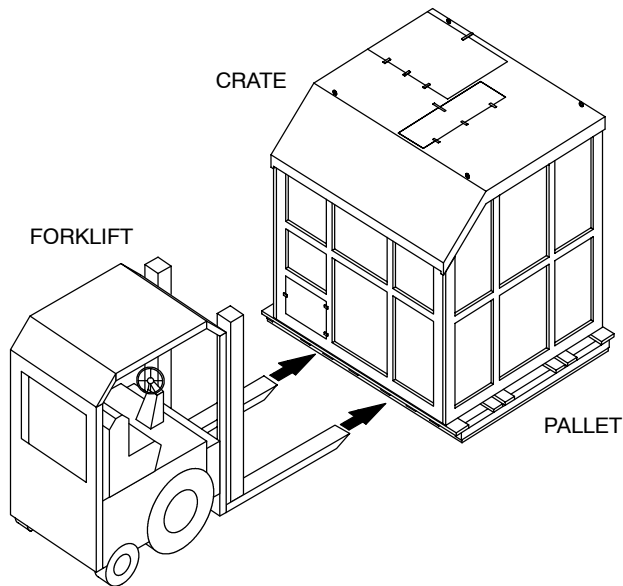
3-2-3 In-Transit Handling with Forklift (continued)

- 3. Carefully drive the forklift until forks are completely inserted into the pallet openings.



Carefully lift, move and lower magnet / crate / pallet package to avoid impacts, jolts or excessive tilting (as specified in Table 3-1) as magnet damage may result.

- 4. Carefully lift the magnet / crate / pallet package and move to desired location. Avoid impacts, jars or excessive tilting (as specified in Table 3-1) to crate / pallet as magnet damage may result. When lowering, ease entire package to rest on a flat, smooth surface strong enough to support 24,000 pounds (10,087 kg).



MAGNET, CRATE AND PALLET

LIFTING CONFIGURATION FOR FORKLIFT

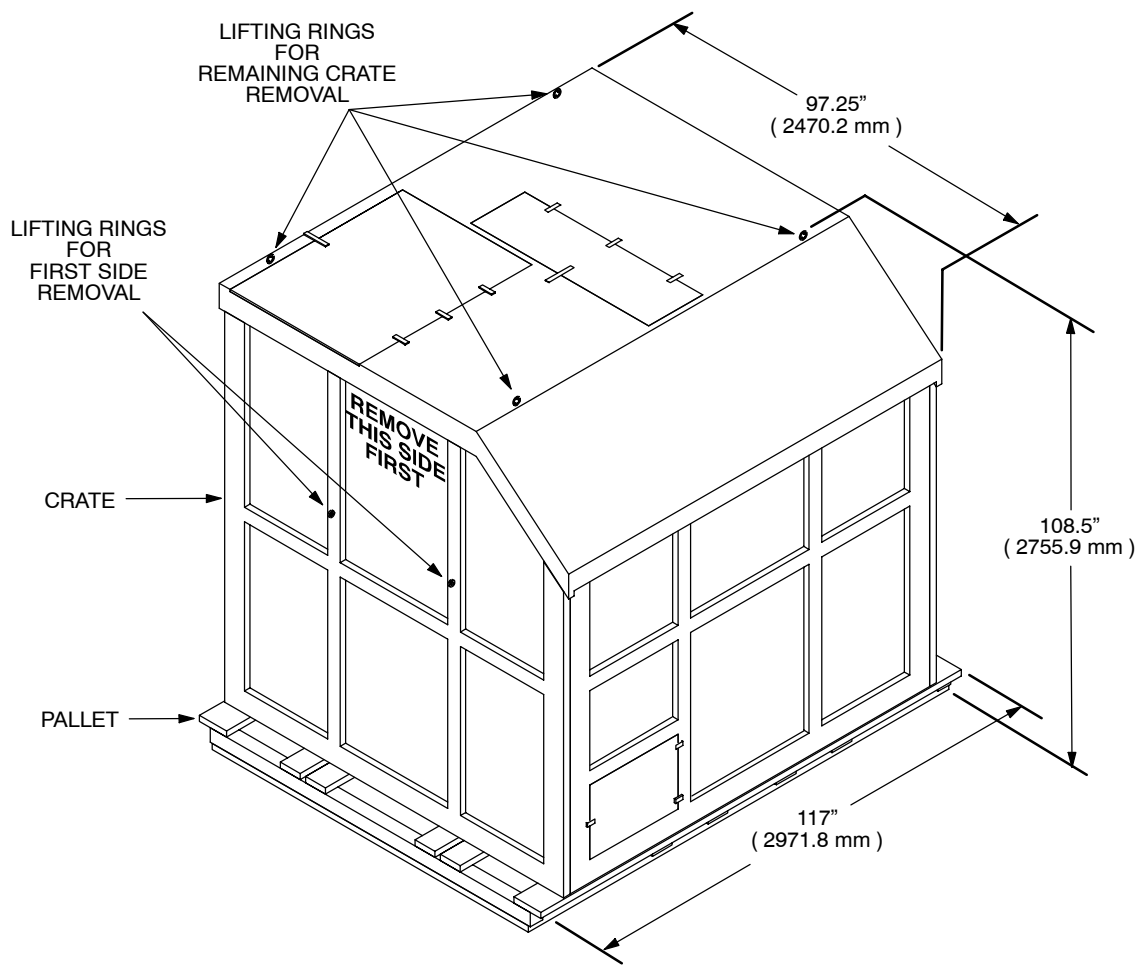
ILLUSTRATION 3-5

3-3 CRATE REMOVAL

IMPORTANT !!!

During this procedure carefully inspect all packaging and their contents for damage that may have occurred during shipping. If any damage is found, follow the procedure found at the front of this manual under **DAMAGE IN TRANSPORTATION**.

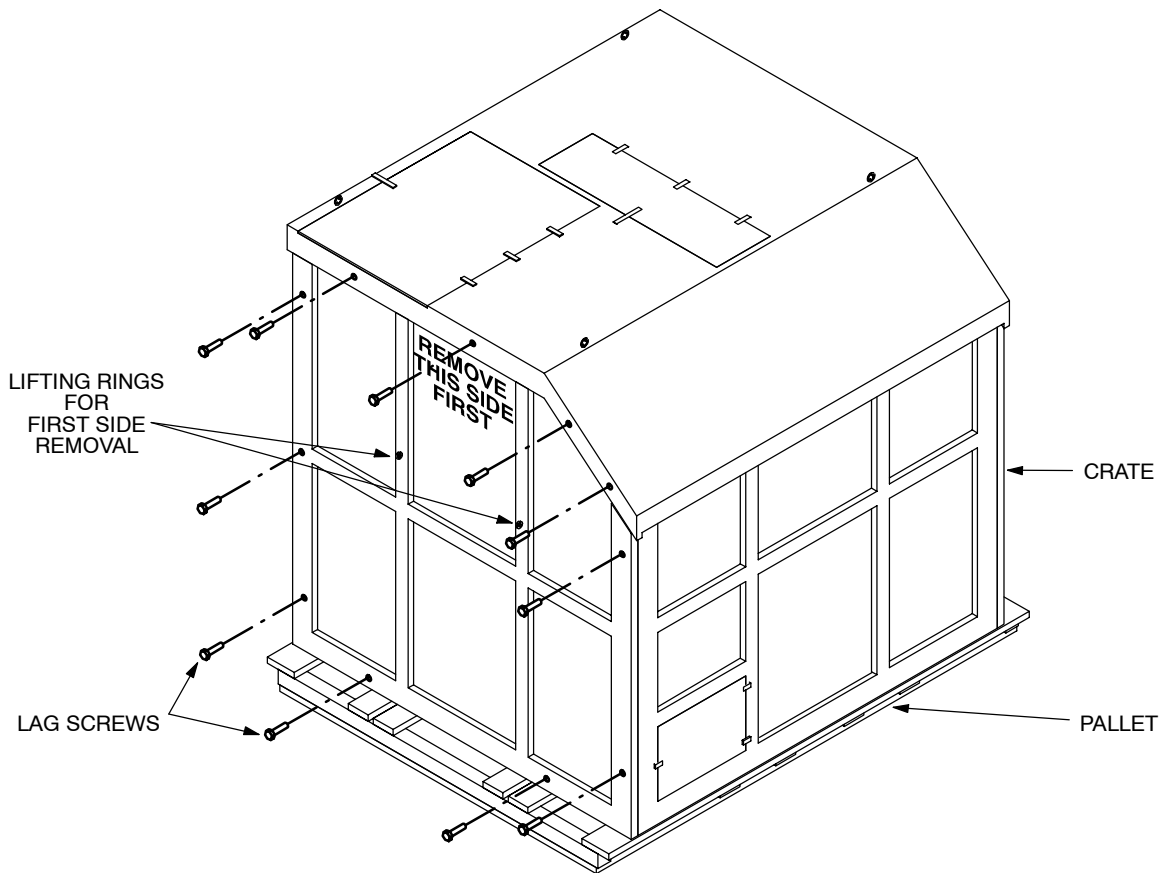
1. Remove all subsystem crates, except the magnet crate, from trailer / transport using a crane or forklift. Inspect all crates for visible damage. Report any damage found according to the "Damage in Transportation" procedure at the front of this manual.
2. Move subsystem crates to a receiving location protected from the weather, preferably close to and at the same level as the examination room.
3. Inspect the crate containing the magnet and identify the crate side marked "REMOVE THIS SIDE FIRST". This designated side is to be removed first. See Illustration 3-6.



INTERNATIONAL SHIPMENT CRATE
ILLUSTRATION 3-6

3-3 CRATE REMOVAL (continued)

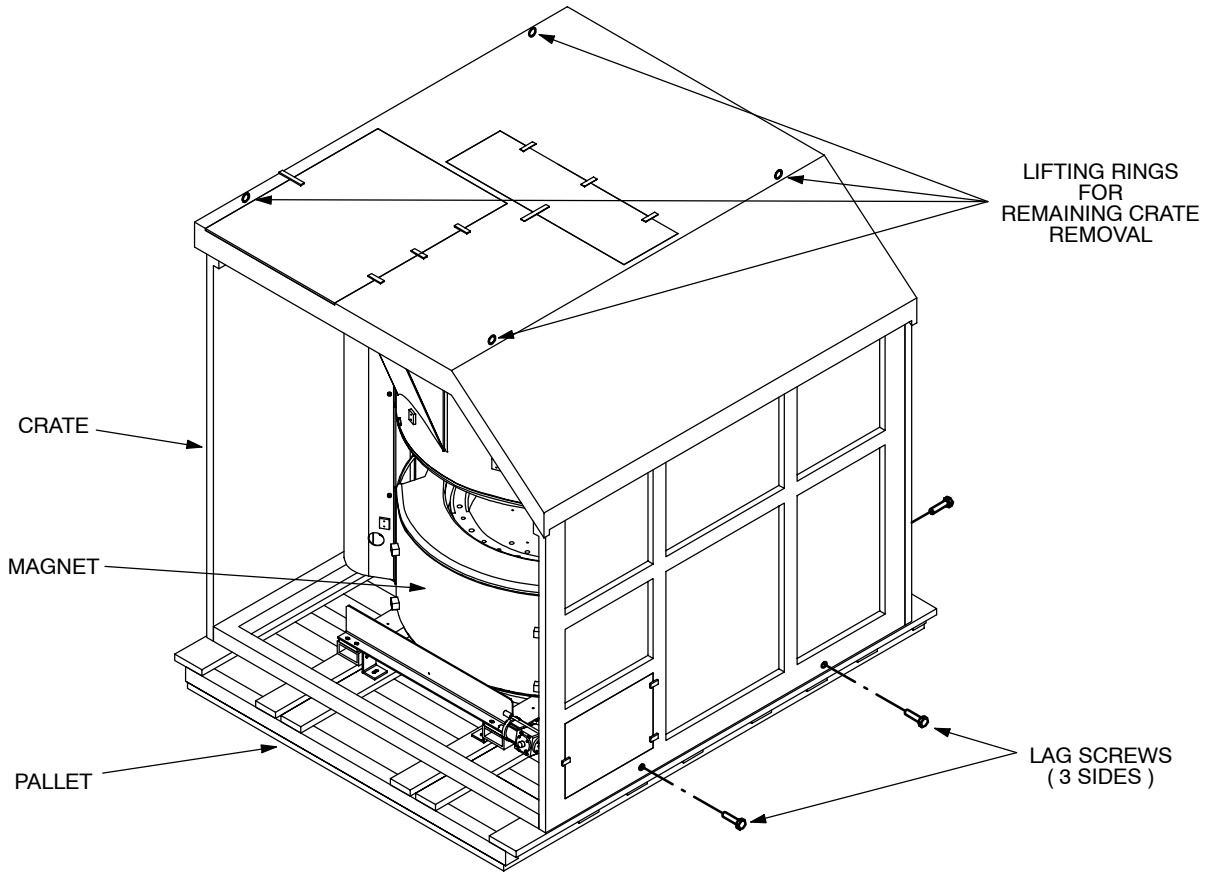
4. Position crane centrally over the side of the crate.
5. Connect the crane to the two lifting rings located on the "REMOVE THIS SIDE FIRST" side of the crate. Use straps / cables and shackles supplied by riggers. Tighten the straps / cable snug.
6. Remove lag screws securing the face of the crate marked "REMOVE THIS SIDE FIRST" See Illustration 3-7.
7. Lift the "REMOVE THIS SIDE FIRST" side of crate with crane and clear from the area.



LAG SCREW REMOVAL, FIRST SIDE
ILLUSTRATION 3-7

3-3 CRATE REMOVAL (continued)

- 8. Remove the lag screws securing the bottoms of the three remaining sides of crate to pallet. See Illustration 3-8.



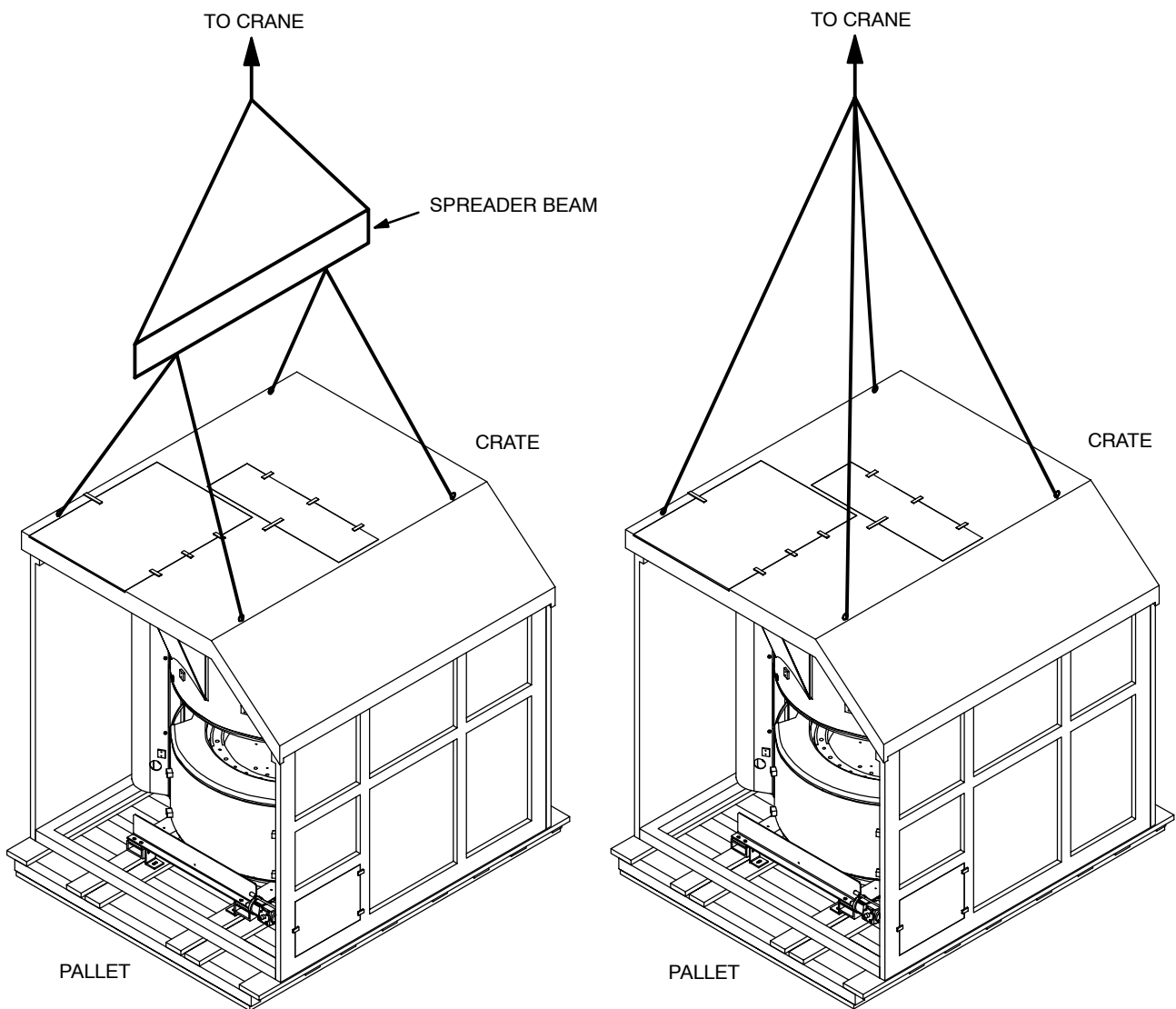
LAG SCREW REMOVAL, REMAINING SIDES
ILLUSTRATION 3-8

3-3 CRATE REMOVAL (continued)

9. Position crane's hook / spreader beam centrally over crate. Refer to Table 3-4 for minimum crane specification.
10. Secure four straps / cables of one-ton (907 Kg) working load capacity each and a minimum six feet (1829 mm) long to the four lifting rings on the crate's top side. Use a one-ton (907 Kg) anchor shackle on each sling.
11. Attach the straps / cables to crane's hook / spreader beam. See Illustration 3-9.
12. Carefully lift crate sides and top straight up and clear of the magnet using crane. Do not let crate scrape or hit magnet. Swing away to remove.

Note

Do not remove the protective plastic bag / wrap surrounding magnet until required for installation purposes inside the Magnet Room.



CRAIN LIFTING CRATE TO REMOVE CRATE TOP

ILLUSTRATION 3-9

3-4 UNLOADING MAGNET AND PALLET

3-4-1 Forklift Method of Unloading



It is important to use the proper size forklift and to lift the magnet / pallet smoothly to avoid impacts, jolts or excessive tilting (as specified in Table 3–1) which may cause damage to the magnet. Extreme care must be exercised during forklift operations. The magnet pallet must be picked up from the sides only. The forks MUST be fully inserted into correct openings under shipping pallet. Make sure the forklift capacity and fork dimensions meet the specifications stated in Table 3–4.

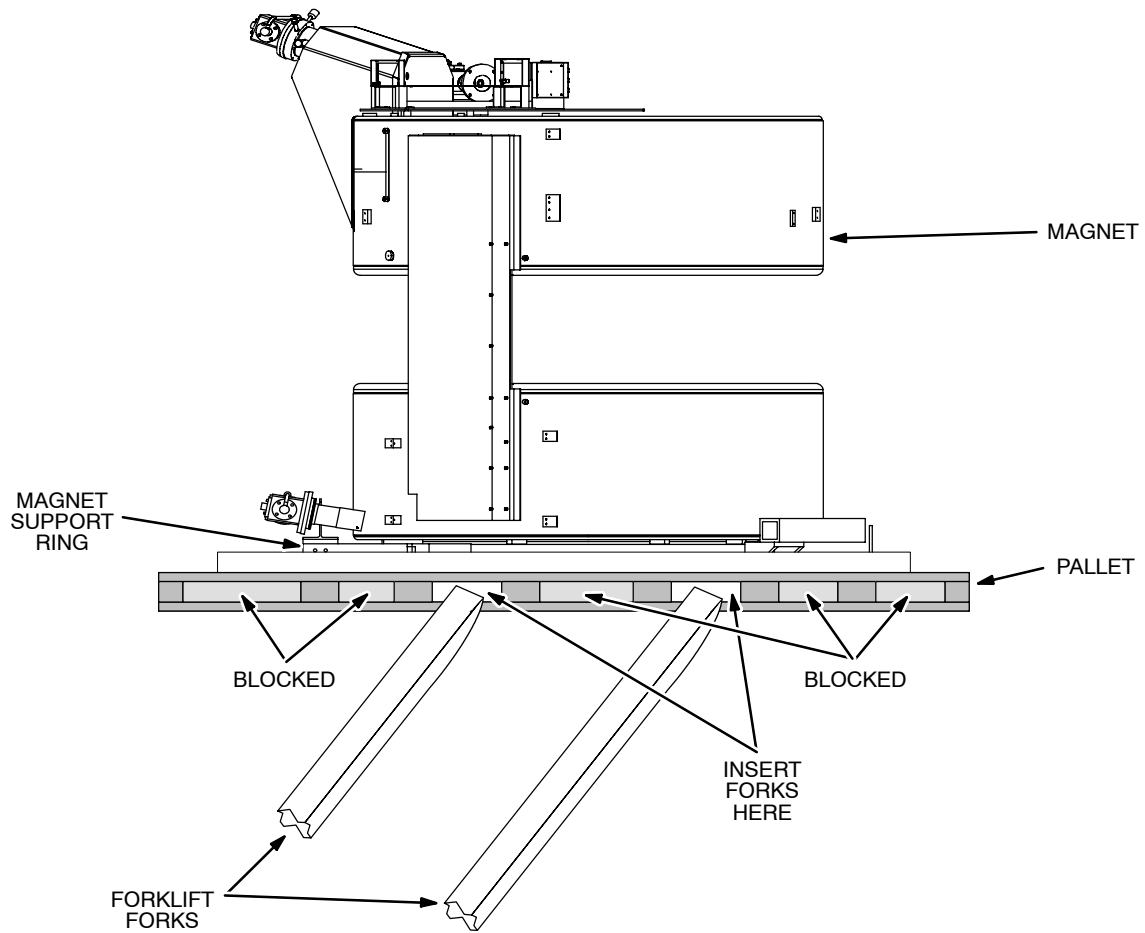
1. Locate the forklift openings on the side of the shipping pallet. See Illustration 3-10.
2. Extreme care must be exercised during forklift operations. The magnet / pallet must be picked up from the sides only. The forks MUST be placed directly under the four (4) brackets attaching magnet to shipping pallet. Position the forks at the forklift openings on side of pallet. See Illustration 3-10.
3. Carefully drive the forklift until forks are completely inserted into the pallet openings, as in Illustration 3-11.



Carefully lift, move and lower magnet / crate to avoid impacts, jolts or excessive tilting (as specified in Table 3–1) as magnet damage may result.

4. Lift magnet / pallet with forklift and move smoothly to desired location. Avoid impact or jars to magnet. When lowering, ease magnet and pallet to rest on a flat, smooth surface.
5. After unloading magnet and pallet, removal of pallet will require a crane.

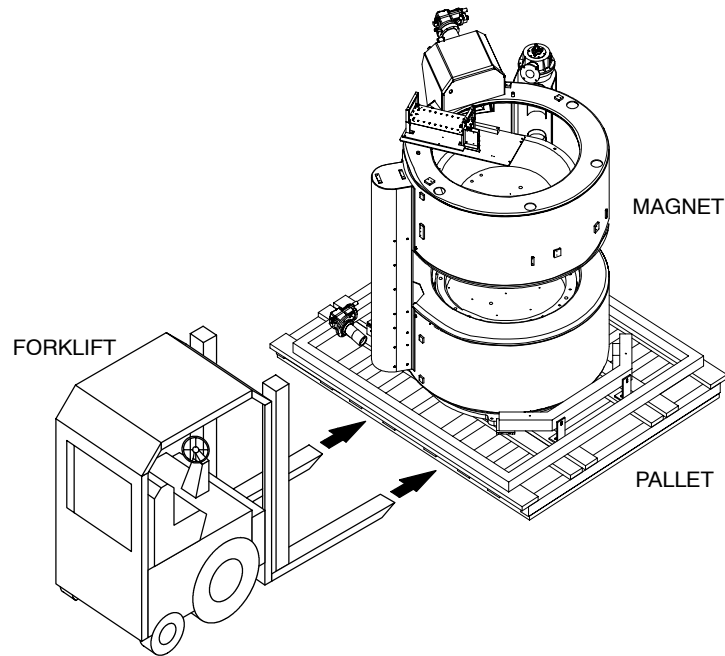
3-4-1 Forklift Method of Unloading (continued)



LOCATION OF FORKLIFT OPENINGS IN SHIPPING PALLET

ILLUSTRATION 3-10

3-4-1 Forklift Method of Unloading (continued)



LIFTING CONFIGURATION, FORKLIFT TO MAGNET ON PALLET
ILLUSTRATION 3-11

3-4-2 Crane Method of Unloading



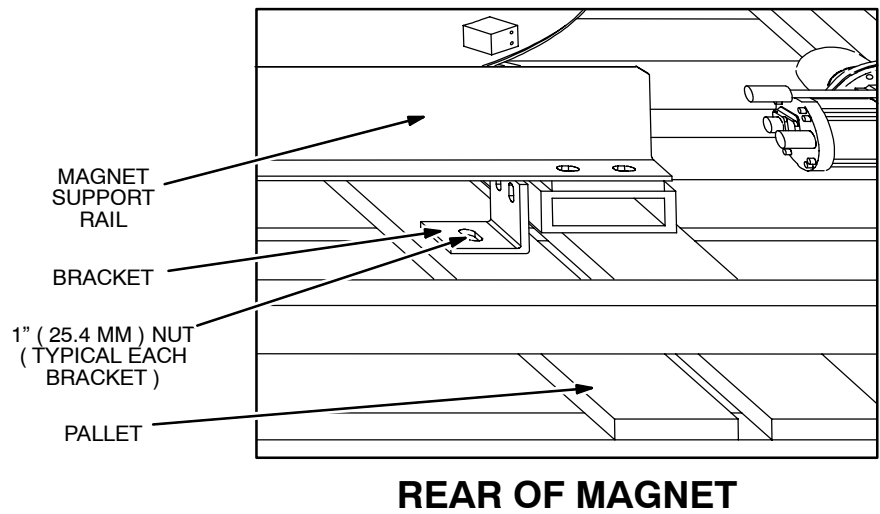
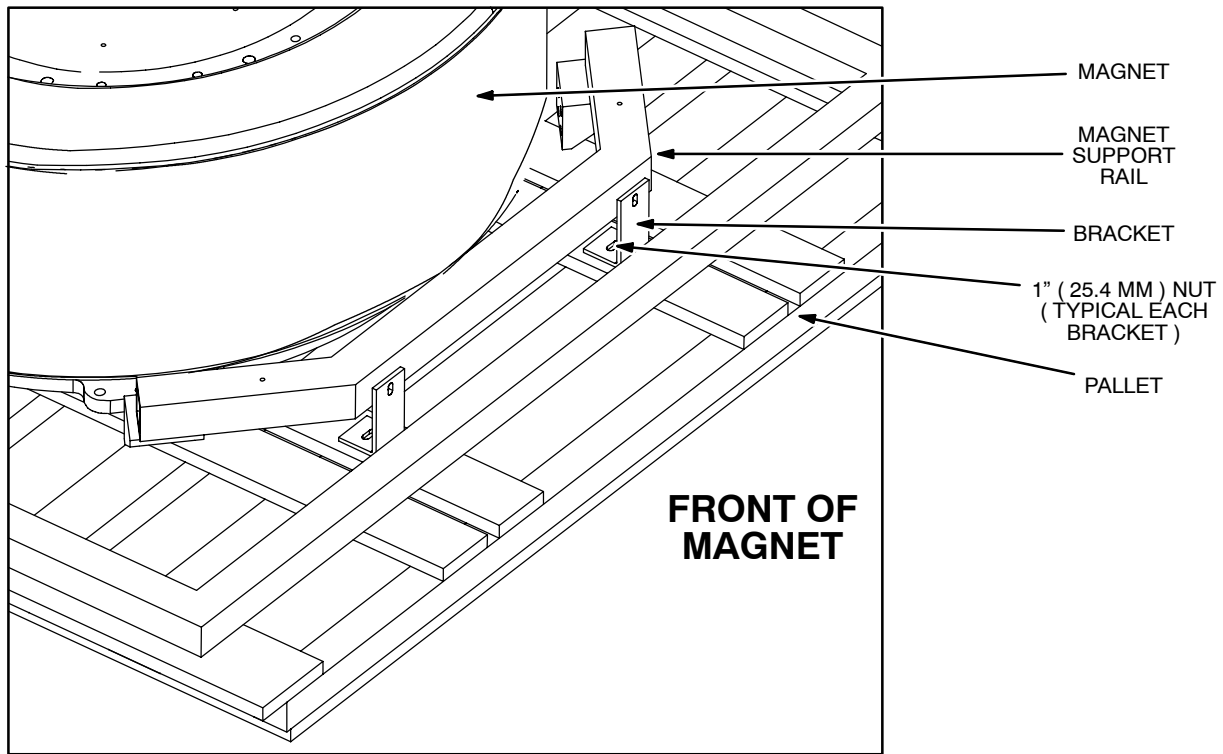
Pallet MUST be removed from magnet prior to any magnet lift operations, to allow for magnet transport / moving using dollies / jacks.

1. Unbolt and remove the four 1 inch (25.4 mm) nuts which secure the pallet to the magnet. See Illustration 3-12. For rigging / lifting details, refer to Section 2.

Note

Do not remove the protective plastic bag / wrap surrounding magnet until required for installation purposes inside the Magnet Room.

3-4-2 Crane Method of Unloading (continued)



MAGNET MOUNTING ON SHIPPING PALLET
ILLUSTRATION 3-12

3-4-2 Crane Method of Unloading (continued)

2. Position crane hook / spreader beam centrally over magnet for a vertical lift. See Illustration 3-13.
3. Attach straps from lifting shackles on top of magnet to the crane hook / spreader beam in conformance with Illustrations 3-13.



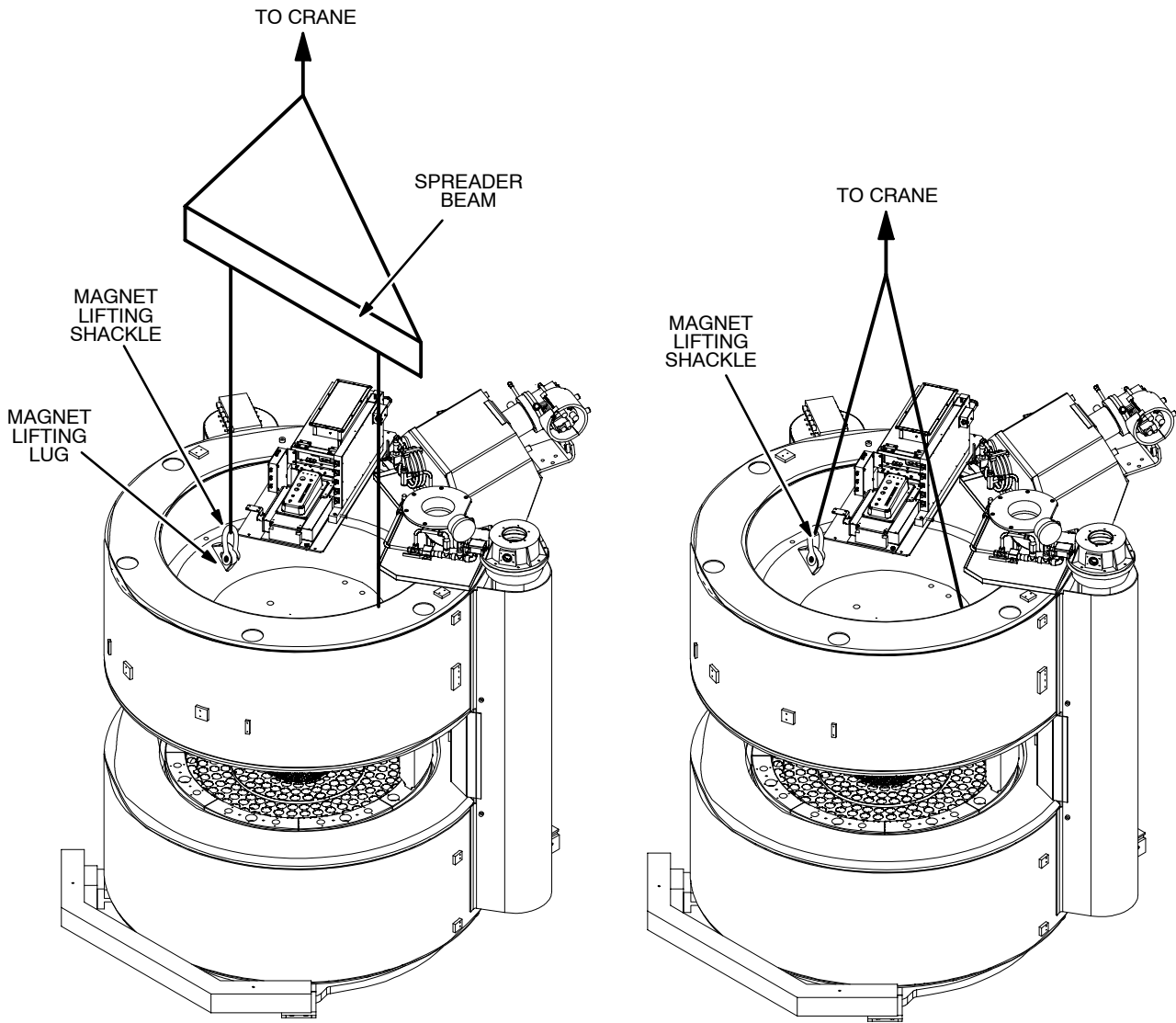
Carefully control magnet while lifting, moving or lowering. Some rotation / tilting will occur. Lower smoothly onto a flat surface. Avoid impacts, jolts or excessive tilting (as specified in Table 3-1) as magnet damage may result.

Note

Magnet must be lifted in conformance with requirements shown in Illustrations 3-13 to avoid damage to external components.

4. Lift magnet. When lowering, ease magnet to rest on a flat, smooth surface.

3-4-2 Crane Method of Unloading (continued)



NOTE:
USE LIFTING STRAPS PRE-ATTACHED TO MAGNET 35.5" APART.
DO NOT ANGLE LIFTING STRAPS OUTWARDS FROM MAGNET AS COMPONENT DAMAGE MAY RESULT.

CRANE LIFTING MAGNET
ILLUSTRATION 3-13

SECTION 4

MAGNET SYSTEM COMPONENT CHECK

(BY GE SERVICE)

IMPORTANT !!!

It is important to establish if any damage was sustained by the magnet or the system components before unloading from the truck / carrier. Report any damage found in compliance with the "Damage in Transportation" note on the back side of the Service Manual Title Page. Do not unload the magnet until the Physical and Electrical Checks have been passed (Sections 4-1 and 4-3).

Report any missing components to the person identified on the Magnet Components Bill of Material.

Report all problems found to the Regional Magnet & Cryogenics (MAC) Team Leader.

4-1 PHYSICAL INSPECTION

Note

Shipment of magnet system components to the installation site may occur as a complete system or 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 which contains the Bill of Materials for the magnet system delivered. Check that all identified boxes are present.
2. Inspect the magnet for physical damage and icing / condensation on the body.

Note

Because of the higher boiloff of helium gas through the vertical penetration on internationally shipped magnets, some frost on the vertical penetration is normal. Domestic shipments should only experience minimal frost at the relief valve plumbing.

3. If abnormal frosting / icing on the body of the magnet has occurred, follow the instructions under "IMPORTANT" above.

4-2 INVENTORY CHECK

1. Check the contents of each box delivered against its packing list when the boxes are brought into the MR Suite.
2. Report any missing component to the person identified on the Magnet Components Bill of Material.

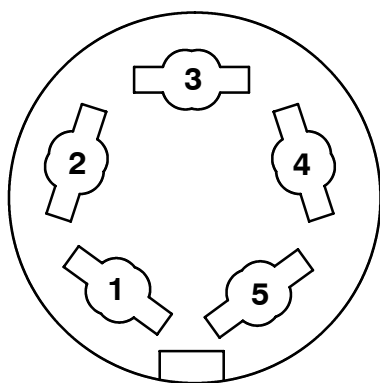
4-3 ELECTRICAL CHECKS

4-3-1 MAGNET COIL / SWITCH HEATER CHECKS

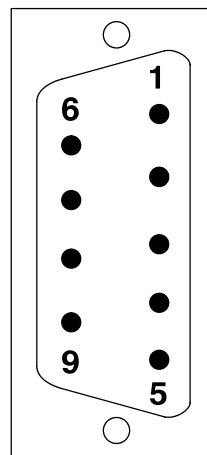
IMPORTANT !!!

Magnet circuits resistance, provided in Table 4-1, are for a cold magnet (4.2K). If any resistances are outside the range displayed in the table, check magnet diode temperature. If the magnet is warm, re-check resistances when the magnet is filled with helium. Report any cold resistances outside the range given in Table 4-1 or open circuits on a “warm” magnet to the regional Magnet & Cryogenics (MAC) Team Leader before unloading and installing the magnet.

1. Perform the magnet circuit resistance checks identified in Table 4-1 using a digital meter across the identified connector pins. See Illustration 4-1. Record results in Table 4-1 and compare with the allowable range given in the table.
2. Perform heater and RTD Resistance checks identified in Table 4-2 and 4-3 (Illustrations 4-2 and 4-3). Make sure resistance values are within the specified range. Report problems found to MAC Team Leader.



J303



P304

CONNECTOR PIN LOCATIONS
ILLUSTRATION 4-1

4-3-1 MAGNET COIL / SWITCH HEATER CHECKS (continued)

TABLE 4-1
MAGNET CIRCUITS RESISTANCE CHECKS COLD (4K)

MAIN COILS

FUNCTION	CONNECTOR	PIN #	RESISTANCE (OHMS)	
			TYPICAL RANGE	MEASURED
MAIN COIL	INSTRUMENT CONNECTOR BOX	+ -		
	P304-1	1 - 5	1 - 4	
	P304-2	1 - 5	1 - 4	

MAIN COIL SWITCH HEATERS

FUNCTION	CONNECTOR	PIN #	RESISTANCE (OHMS)	
			TYPICAL RANGE	MEASURED
MAIN COIL SWITCH HEATERS	INSTRUMENT CONNECTOR BOX	+ -		
1	P304 - 1	2-6	21 - 25	
2	P304 - 2	2-6	21 - 25	

BO COIL SWITCH HEATERS

FUNCTION	CONNECTOR	PIN #	RESISTANCE (OHMS)	
			TYPICAL RANGE	MEASURED
B0 SWITCH HEATER	INSTRUMENT CONNECTOR BOX	+ -		
1	P304 - 1	4 - 9	8 - 12	
2	P304 - 2	4 - 9	8 - 12	

MRU HEATER

FUNCTION	CONNECTOR	PIN #	RESISTANCE (OHMS)	
			TYPICAL RANGE	MEASURED
MAIN SWITCH HEATER	INSTRUMENT CONNECTOR BOX	+ -		
1	J303	1 - 2	21 - 25	
2	J303	3 - 4	21 - 25	

4-3-2 HEATER RESISTANCE CHECKS

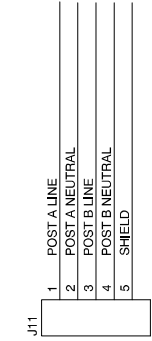
Note

The following table applies to both primary and redundant circuits with connectors attached to the Heater / RTD Connector Box. Resistance values apply at room temperature (70° F). Temperature fluctuations will cause resistance values to change. The Heater / RTD Connector Box is located on top the left magnet post, as viewed from the magnet’s front. The red heater cables are on the front of the box and have twist-on connectors.

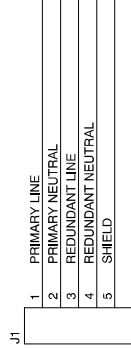
TABLE 4-2
HEATER RESISTANCE CHECKS

HEATER	CONNECTOR	PINS	RESISTANCE VALUE - OHMS
POSTS CONNECTOR (POST A & POST B)	J10	1 - 2	190 - 200
		3 - 4	
BOTTOM RING HEATER CONNECTOR	J1	1 - 2	45.6 - 52.0
		3 - 4	
BOTTOM CENTER HEATER CONNECTOR	J1	1 - 2	91.2 - 103.0
		3 - 4	
TOP RING HEATER CONNECTOR	J1	1 - 2	45.6 - 52.0
		3 - 4	
TOP CENTER HEATER CONNECTOR	J1	1 - 2	91.2 - 103.0
		3 - 4	
TCU HEATER CABLE CONNECTOR	J1	A - B	45.6 - 50.4
		C - D	91.2 - 100.8
		E - F	
		G - H	
		J - K	
		L - M	45.6 - 50.4

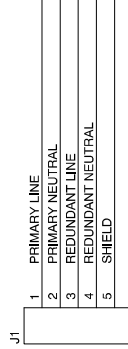
4-3-2 HEATER RESISTANCE CHECKS (continued)



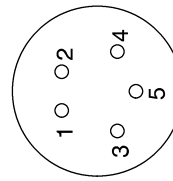
POSTS CONNECTOR



BOTTOM RING HEATER CONNECTOR

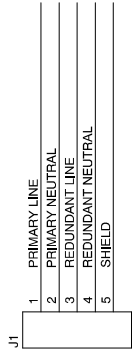


BOTTOM CENTER HEATER CONNECTOR

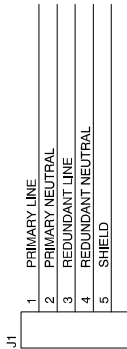


1. PRIMARY LINE
2. PRIMARY NEUTRAL
3. REDUNDANT LINE
4. REDUNDANT NEUTRAL
5. SHIELD

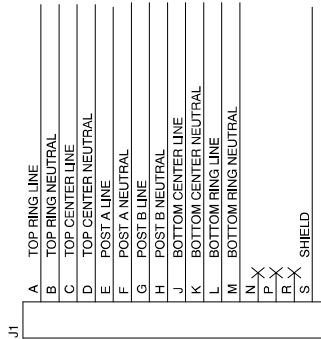
PLUG ASSEMBLY
PIN LAYOUT



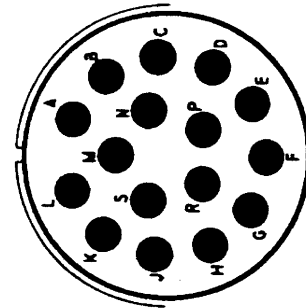
TOP RING HEATER CONNECTOR



TOP CENTER HEATER CONNECTOR



TCU HEATER CABLE CONNECTOR



16 PIN PLUG

HEATER RESISTANCE CHECKS
ILLUSTRATION 4-2

4-3-3 RTD RESISTANCE CHECKS

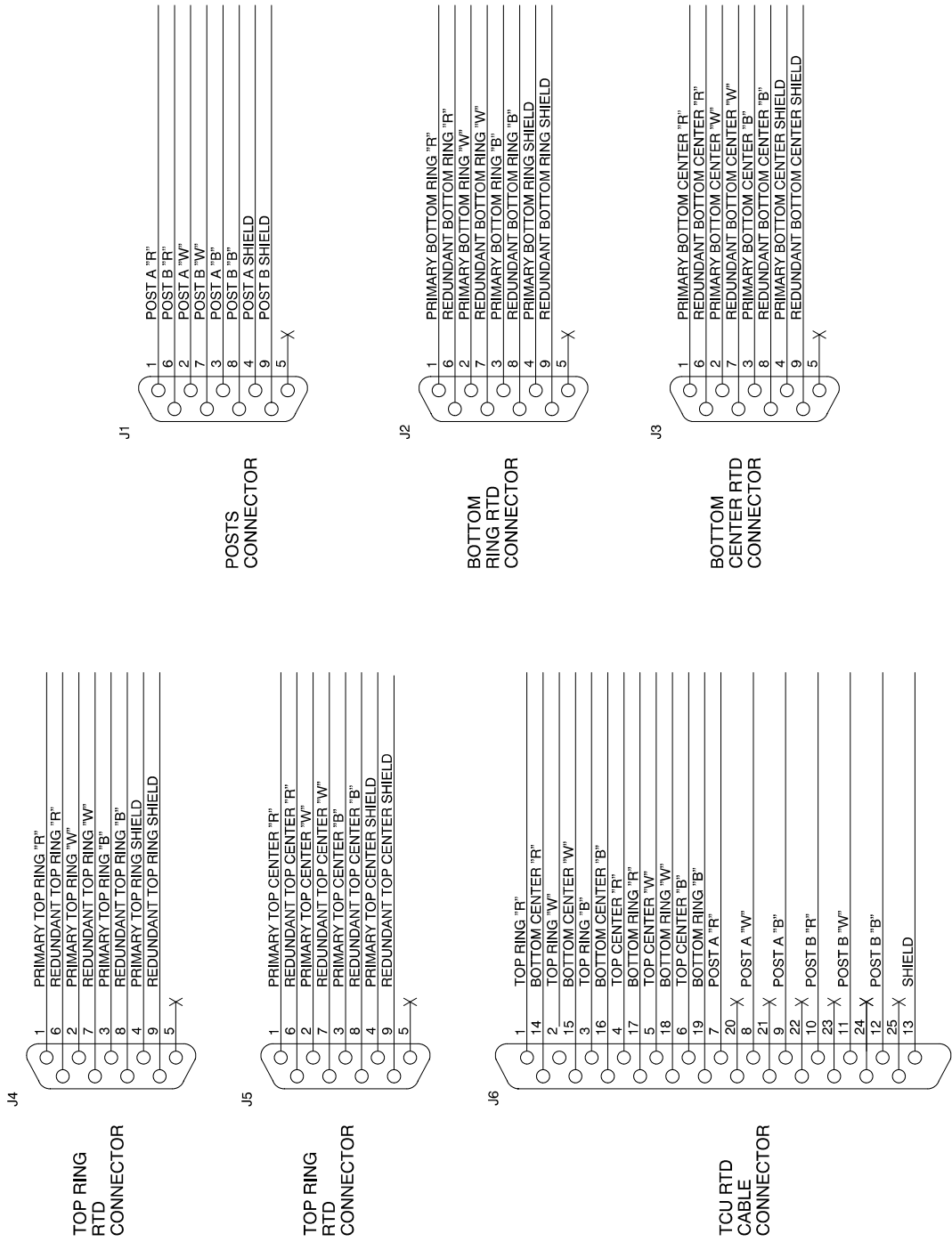
Note

The following table applies to both primary and redundant circuits with connectors attached to the Heater / RTD Connector Box. Resistance values apply at room temperature (70° F). Temperature fluctuations will cause resistance values to change. The Heater / RTD Connector Box is located on top the left magnet post, as viewed from the magnet’s front. The white RTD cables are on the rear of the box and have 9-pin sub-D connectors.

TABLE 4-3
RTD RESISTANCE CHECKS

RTD	CONNECTOR	PINS	RESISTANCE VALUE - OHMS
POSTS CONNECTOR	J1	1 - 2	108 - 110
		6 - 7	
BOTTOM RING RTD CONNECTOR	J2	1 - 2	
		6 - 7	
BOTTOM CENTER RTD CONNECTOR	J3	1 - 2	
		6 - 7	
TOP RING RTD CONNECTOR	J4	1 - 2	
		6 - 7	
TOP CENTER RTD CONNECTOR	J5	1 - 2	
		6 - 7	

4-3-3 RTD RESISTANCE CHECKS (continued)



RTD RESISTANCE CHECKS
ILLUSTRATION 4-3

SECTION 5 - MOVING MAGNET TO MR SUITE

IMPORTANT !!!

Make sure that Magnet Mounting Plate has been installed in Magnet Room and that magnet orientation is determined prior to moving magnet.



WARNING!

DO NOT APPLY ANY FORCE TO FIBERGLASS COVERS ON TOP, SIDES AND ENDS OF MAGNET.

DO NOT APPLY FORCE TO THE SINGLE-STAGE COLDHEAD SHOWN IN ILLUSTRATIONS 5-1, 5-2 AND 5-3.

USE LIFTING STRAPS / CABLES AS SHOWN TO LIFT MAGNET (REFER TO SECTION 2-4).

Note

Identify the magnet location in the Magnet Room and check all clearances along the magnet delivery route before magnet delivery. See Illustrations 5-1 and 5-2.

1. Use the Lifting Rails pre-installed on the magnet for jacking to raise the magnet load points for roller dolly installation. Use shims / plates when rolling magnet with roller dolly over door thresholds and other inclines. See Illustrations 5-3.

Note

Roller dollies are recommended for moving magnet into the Magnet Room as shown in Illustration 5-3. If roller dollies are used, place steel floor plates along the magnet delivery route, as well as over door thresholds and other inclines.

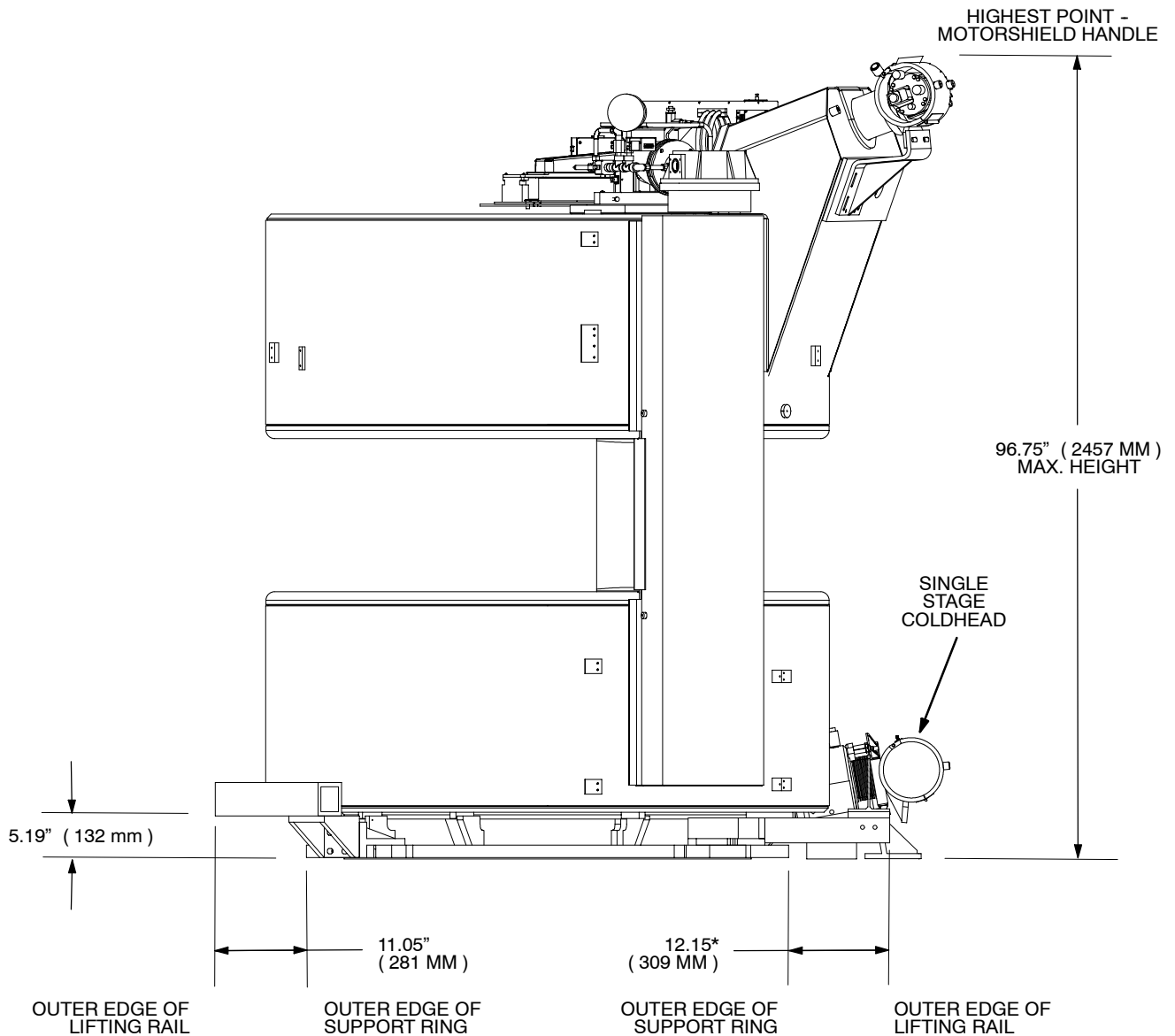
2. Move magnet to Magnet Room. If using a motorized tow vehicle, attach straps / cables / chains to Lifting Rails with shackles. Do not apply any loads to any enclosure cover parts nor allow straps / cables / chains to scrape enclosure cover parts.

Note

If there are turns in the delivery route, adjust roller dollies to appropriate positions to negotiate turns. The height can be reduced by putting roller dollies under Lifting Rails.

3. If there is not enough vertical clearance for the magnet to clear headers or doorways, call the MAC Team representative. The height can also be reduced by putting roller dollies under the lifting rails.
4. Identify table end of magnet before moving into Magnet Room. Continue with Section 6, Magnet Mounting.

SECTION 5 - MOVING MAGNET TO MR SUITE (continued)

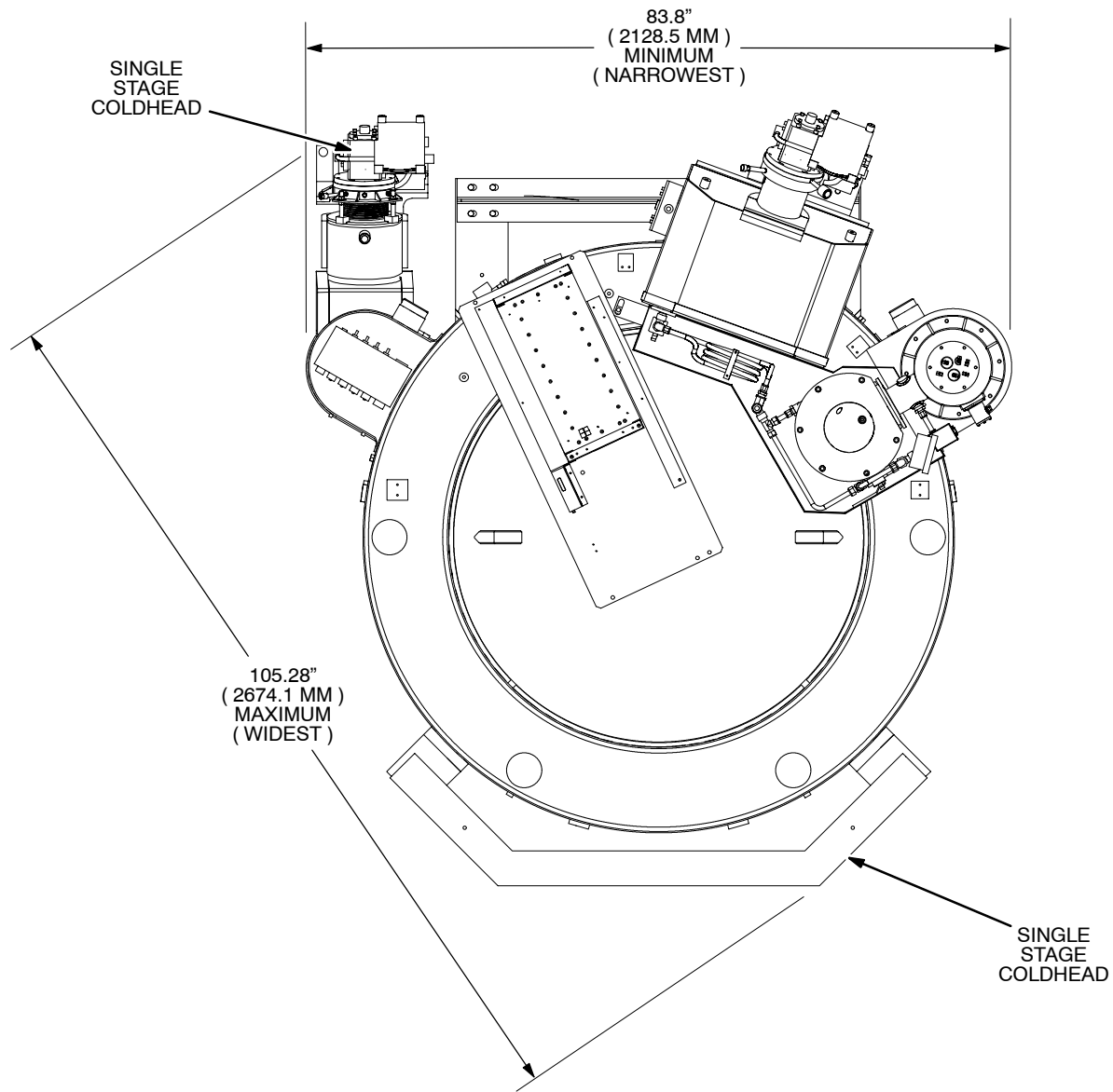


MAGNET CLEARANCES
ILLUSTRATION 5-1

Note

Minimum height for service clearance is 102.68 inches (2608.1 mm). This clearance is needed for ramp lead, shim lead and fill line installation.

SECTION 5 - MOVING MAGNET TO MR SUITE (continued)

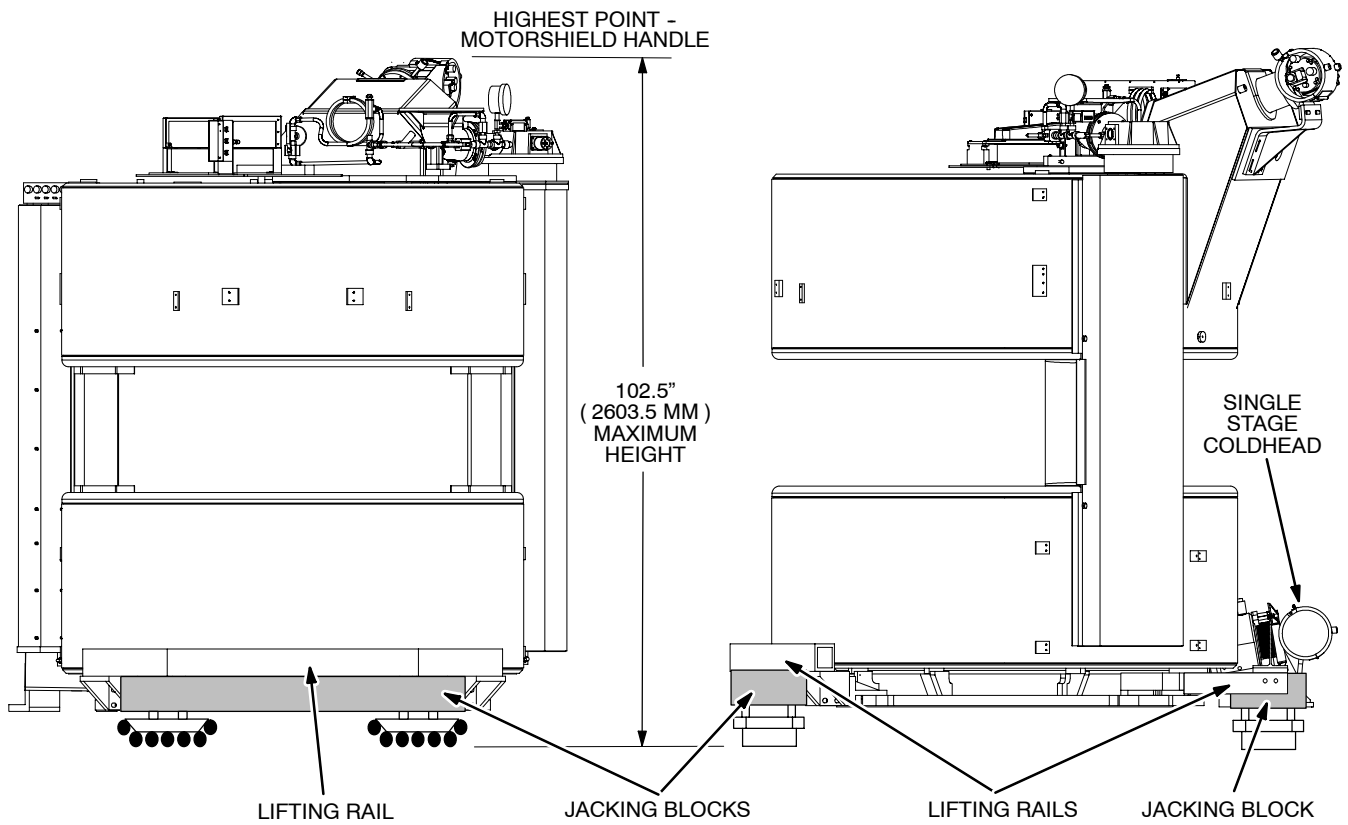


MINUMUM / MAXIMUM MAGNET DIMENSIONS
ILLUSTRATION 5-2

SECTION 5 - MOVING MAGNET TO MR SUITE (continued)

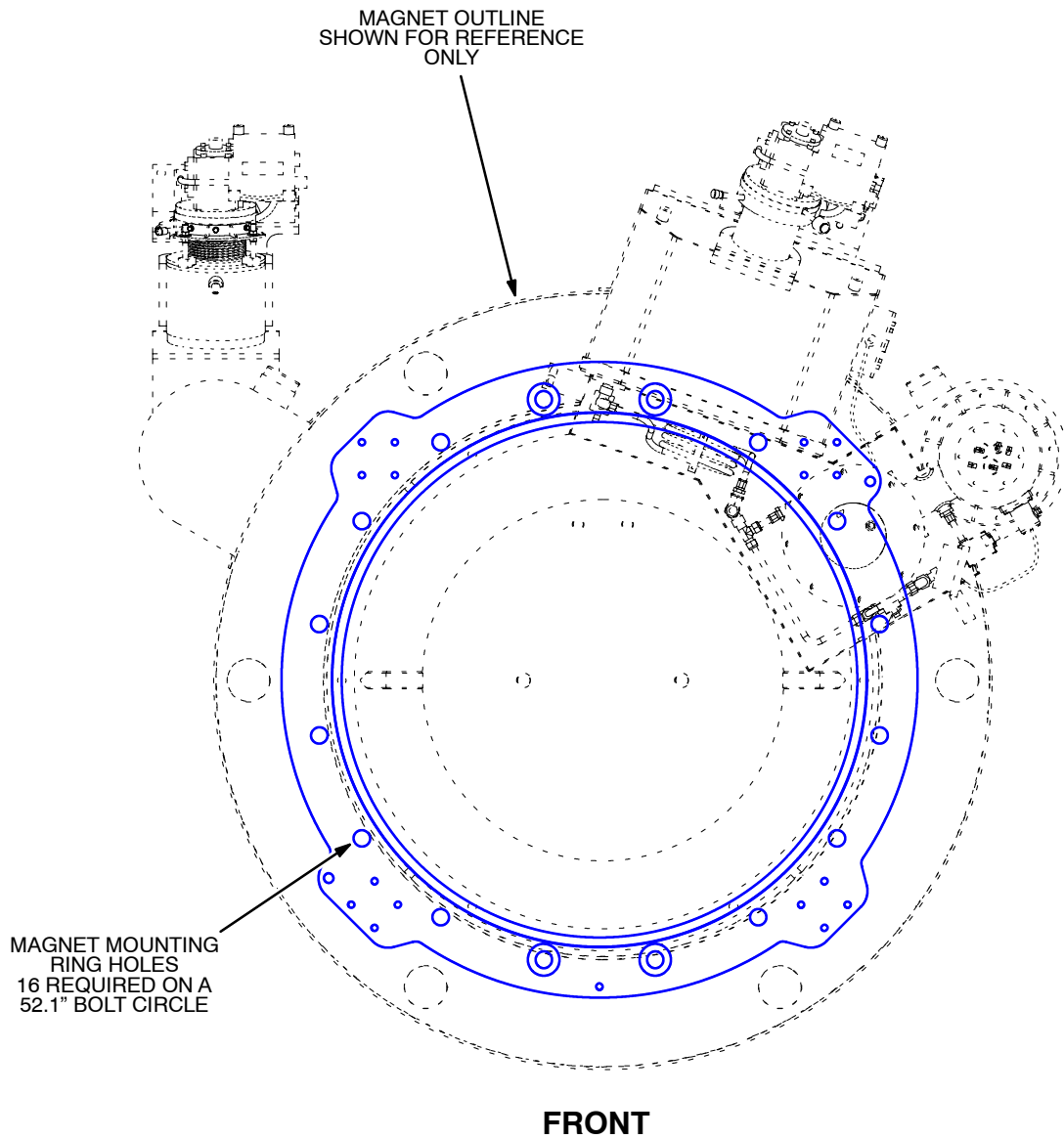


Keep magnet level at all times. Uneven jacking of corners could result in magnet shifting on jacks.



MAGNET WITH ROLLER DOLLIES ATTACHED
ILLUSTRATION 5-3

SECTION 5 - MOVING MAGNET TO MR SUITE (continued)



MAGNET MOUNTING RING
ILLUSTRATION 5-4

SECTION 6 - MAGNET MOUNTING

6-1 MAGNET MOUNTING, SITES USING MAGNET MOUNTING PLATE

6-1-1 Introduction

If determination has been made to utilize the Magnet Mounting Plate, bolt-down of the Magnet Support Ring through isolator pads and of the Coldhead Bracket to the concrete floor is required to minimize image artifacts generated by magnet vibration.

IMPORTANT !!!

Verify that the Magnet Mounting Plate has been installed in accordance with Direction 2268297, GE 0.7T OpenSpeed Magnet Mounting Plate Installation, before beginning to mount the magnet.

Make sure the Magnet Mounting Plate is properly installed in the magnet room, that all floor anchor holes in the plate are properly RF-taped and that all components in the Magnet Mounting Kit (2270347) are present before initiating this procedure. Refer to Direction 2268297, GE 0.7T OpenSpeed Magnet Mounting Plate Installation, for Magnet Mounting Plate configuration and installation.

Note

Do not remove protective plastic bag / wrap surrounding magnet until required for installation purposes.



APPROPRIATE PERSONAL PROTECTION EQUIPMENT SUCH AS SAFETY GLASSES, SAFETY SHOES AND LEATHER GLOVES MUST BE WORN WHEN PERFORMING MAGNET MOUNTING TASKS TO MINIMIZE RISK OF PERSONAL INJURY.

6-1-2 Magnet Mounting Kit 2270347-2

Kit 2270347-2 consists of:

ITEM	PART NO.	DESCRIPTION	QTY
1	2266741	LOCATING PIN, .75 IN. DIA. X 3.12 IN. LONG	1
2	2266741-2	LOCATING PIN, .75 IN. DIA. X 2.12 IN. LONG	1
3	2224726-5	STN. STEEL HEX HD. SCREW, M20-2.5 X 120 MM	8
4	46-294167P38	HARD FIBER WASHER, M20	8
5	2287102	ALUMINUM WASHER, SPECIAL	8
6	2286466	ALUMINUM PAD, FRONT	1
7	2286466-2	ALUMINUM PAD, REAR	1
8	2286466-3	ALUMINUM PAD, LEFT AND RIGHT	2
9	2267987-2	ANCHOR STUD, .62-UNC	4
10	2286065	BELLOWS ANCHOR BRACKET	1
11	46-318508P23	HEX HD. SCREW, M10-1.5 X 40 MM	3
12	46-318936P3	NUT, M10	3
13	46-252635P23	PLAIN WASHER, .375 IN.	6
14	46-281162P11	LOCKWASHER, .375 IN.	3
15	2286066	CONDUCTIVE PAD	1
16	46-294151P7	LUBRICATING AND ANTI-SEIZE COMPOUND	1

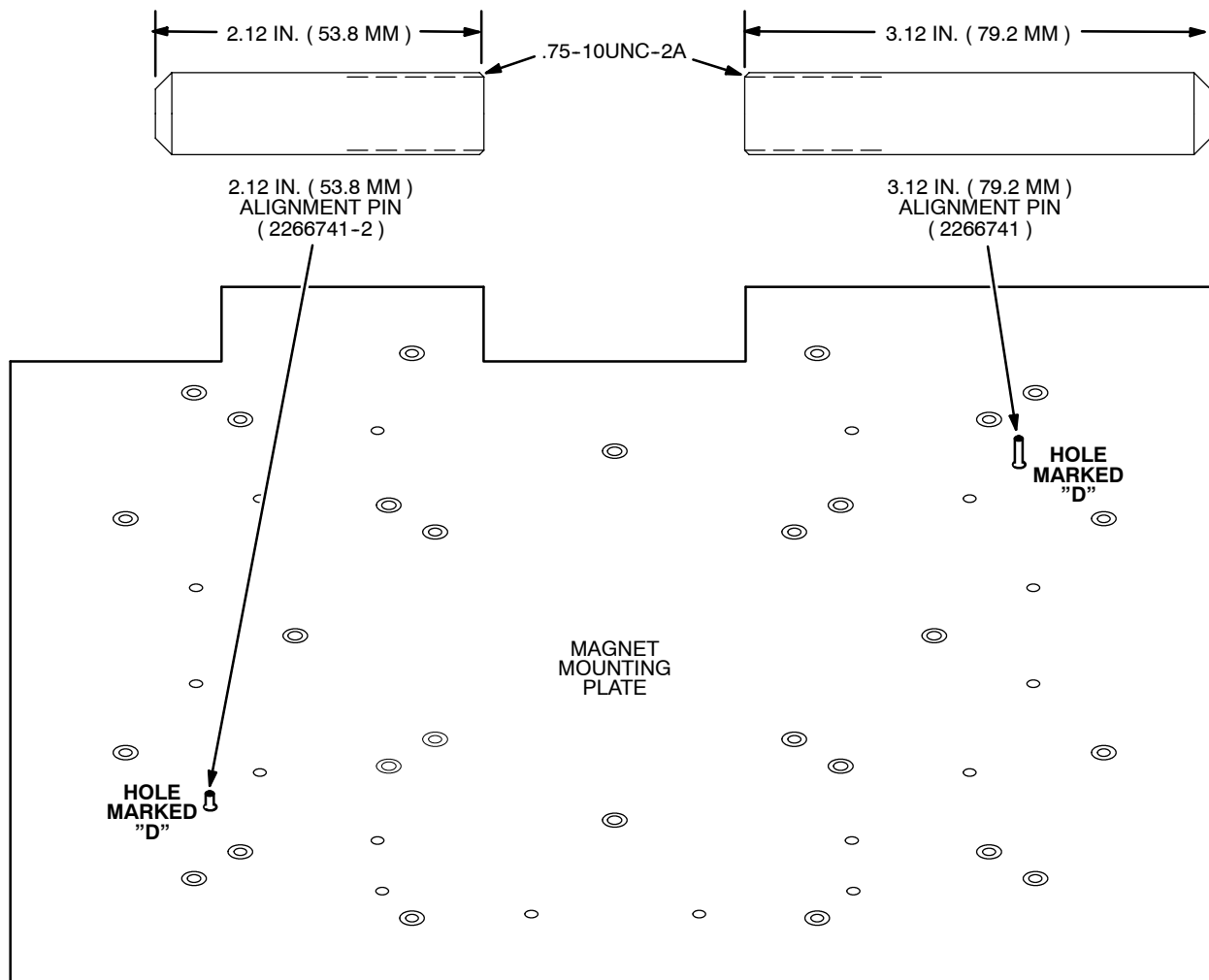
6-1-3 Mounting Magnet (With Magnet Mounting Plate)

1. Make sure all holes used during Mounting Plate installation have been covered with RF tape in accordance with Direction 2268297, GE 0.7T OpenSpeed Magnet Mounting Plate Installation. Vacuum the two holes marked "D" and clean the plate surface around them with isopropyl alcohol.

Note

Failure to vacuum holes, clean the plate surface and cover unused holes with RF tape can result in spike noise problems.

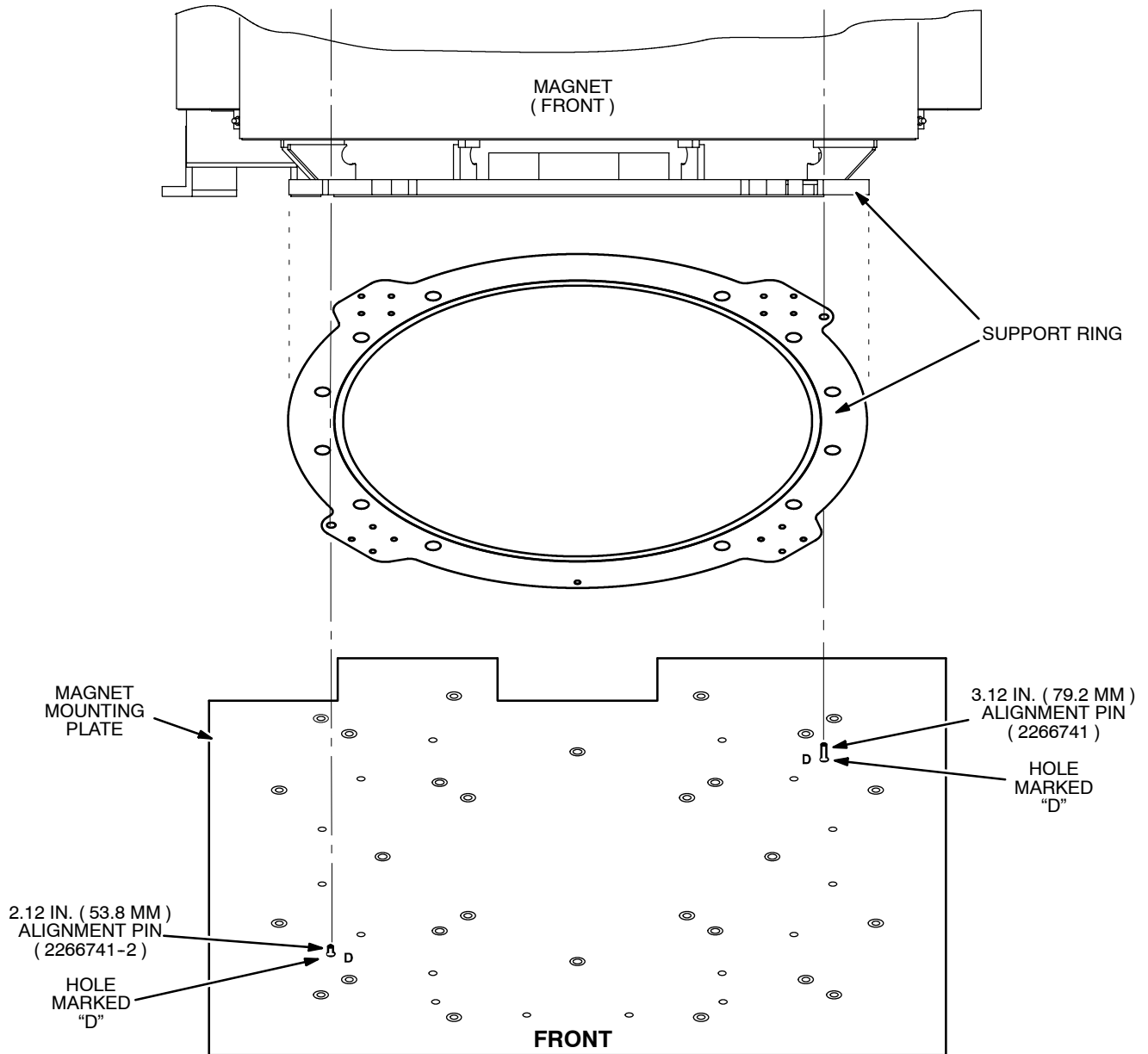
2. Insert the 3.12 inch (79.2 mm) and 2.12 inch (53.8 mm) alignment pins (2266741 and 2266741-2, respectively) into magnet alignment pin holes marked "D" on Magnet Mounting Plate and fully thread into tapped holes. See Illustration 6-1.



MOUNTING PLATE ALIGNMENT PIN INSTALLATION
ILLUSTRATION 6-1

6-1-3 Mounting Magnet (With Magnet Mounting Plate) (continued)

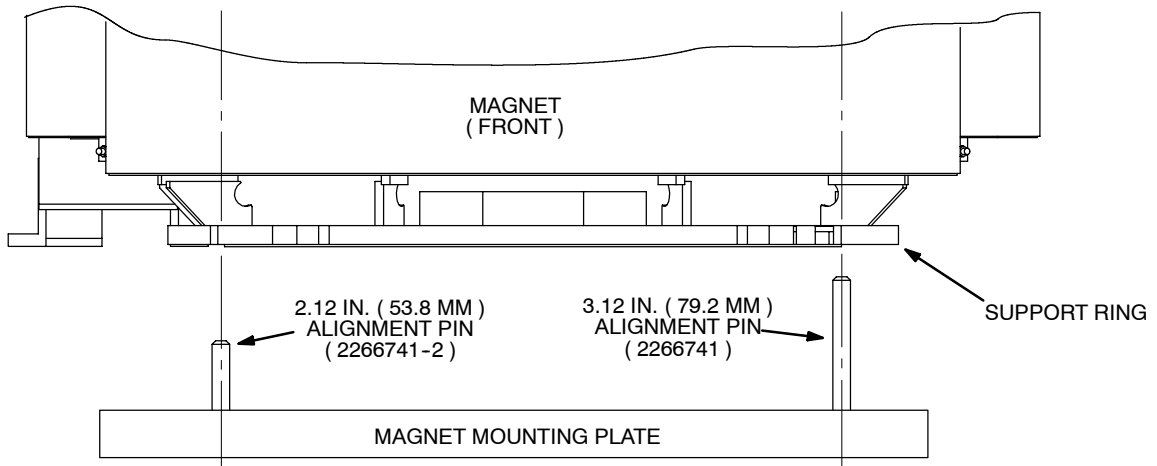
- 3. Move magnet into position over mounting plate, keeping the Magnet Support Ring 6 inches (150mm) above the plate. Make sure magnet orientation is correct using the vent location as a guide. See Illustration 6-2.



ALIGNMENT PIN LOCATIONS
ILLUSTRATION 6-2

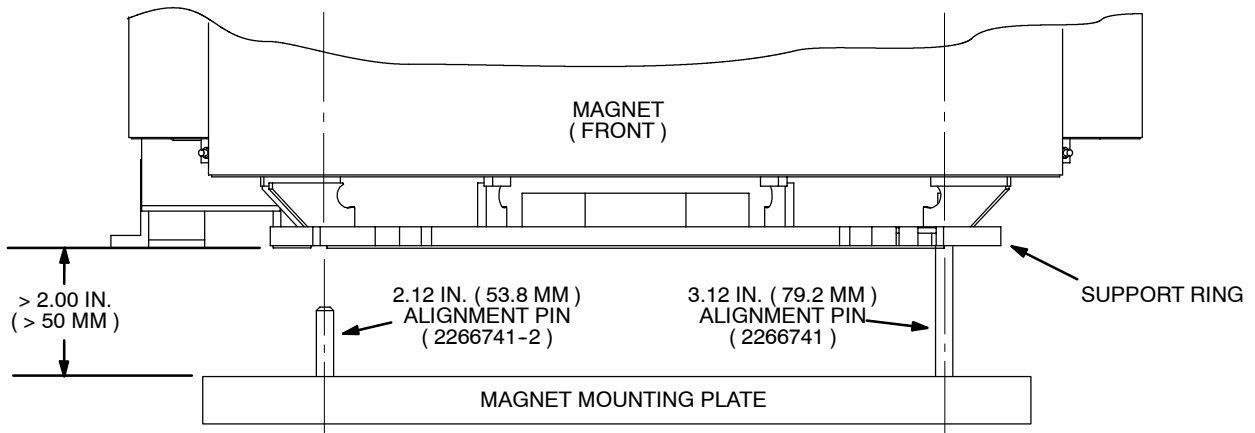
6-1-3 Mounting Magnet (With Magnet Mounting Plate) (continued)

4. Align rear right alignment hole in support ring to the 3.12 inch (79.2 mm) alignment pin. Slowly lower magnet uniformly to just engage pin into support ring hole. Magnet Support Ring now should be 2+ inches (50+ mm) above the mounting plate. See Illustrations 6-3 and 6-4.



ALIGNMENT PINS ARE ENLARGED AND LENGTHENED FOR CLARITY

ALIGN MAGNET WITH LONGER ALIGNMENT PIN
ILLUSTRATION 6-3

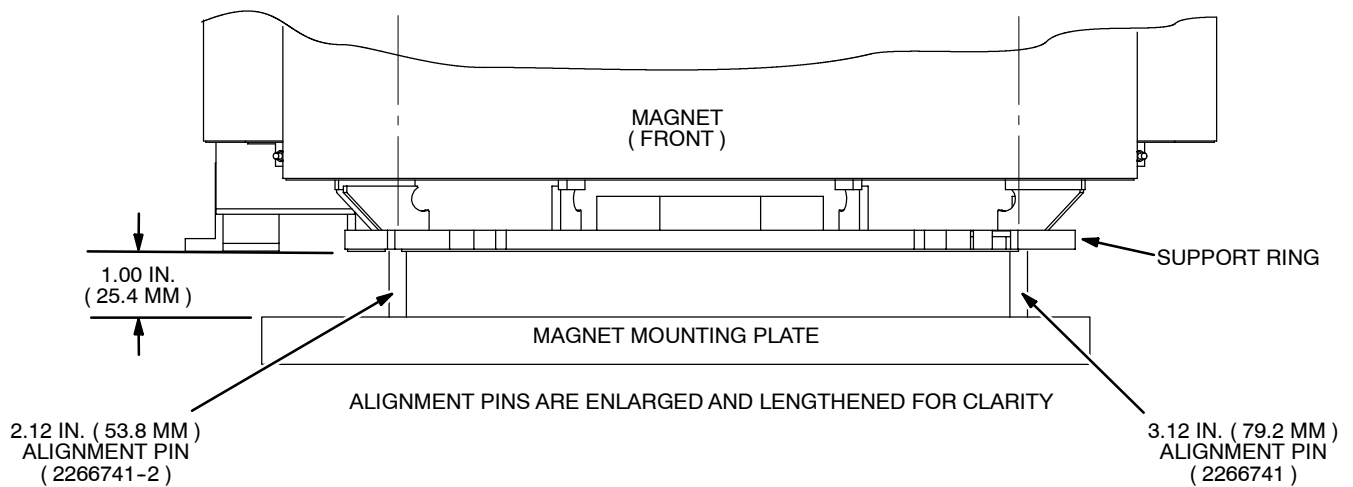


ALIGNMENT PINS ARE ENLARGED AND LENGTHENED FOR CLARITY

LONGER ALIGNMENT PIN ENGAGEMENT
ILLUSTRATION 6-4

5. Rotate magnet slowly on the engaged 3.12 inch (79.2 mm) alignment pin until the second alignment pin hole in the support ring is directly over the 2.12 inch (53.8mm) alignment pin.
6. Slowly lower the magnet uniformly until both alignment pins are engaged. Maintain a uniform gap between the mounting plate and Magnet Support Ring pad cut-out of 1.0 to 1.3 inches (25.4 to 33.0 mm). See Illustration 6-5.

6-1-3 Mounting Magnet (With Magnet Mounting Plate) (continued)



SHORTER ALIGNMENT PIN ENGAGEMENT
ILLUSTRATION 6-5

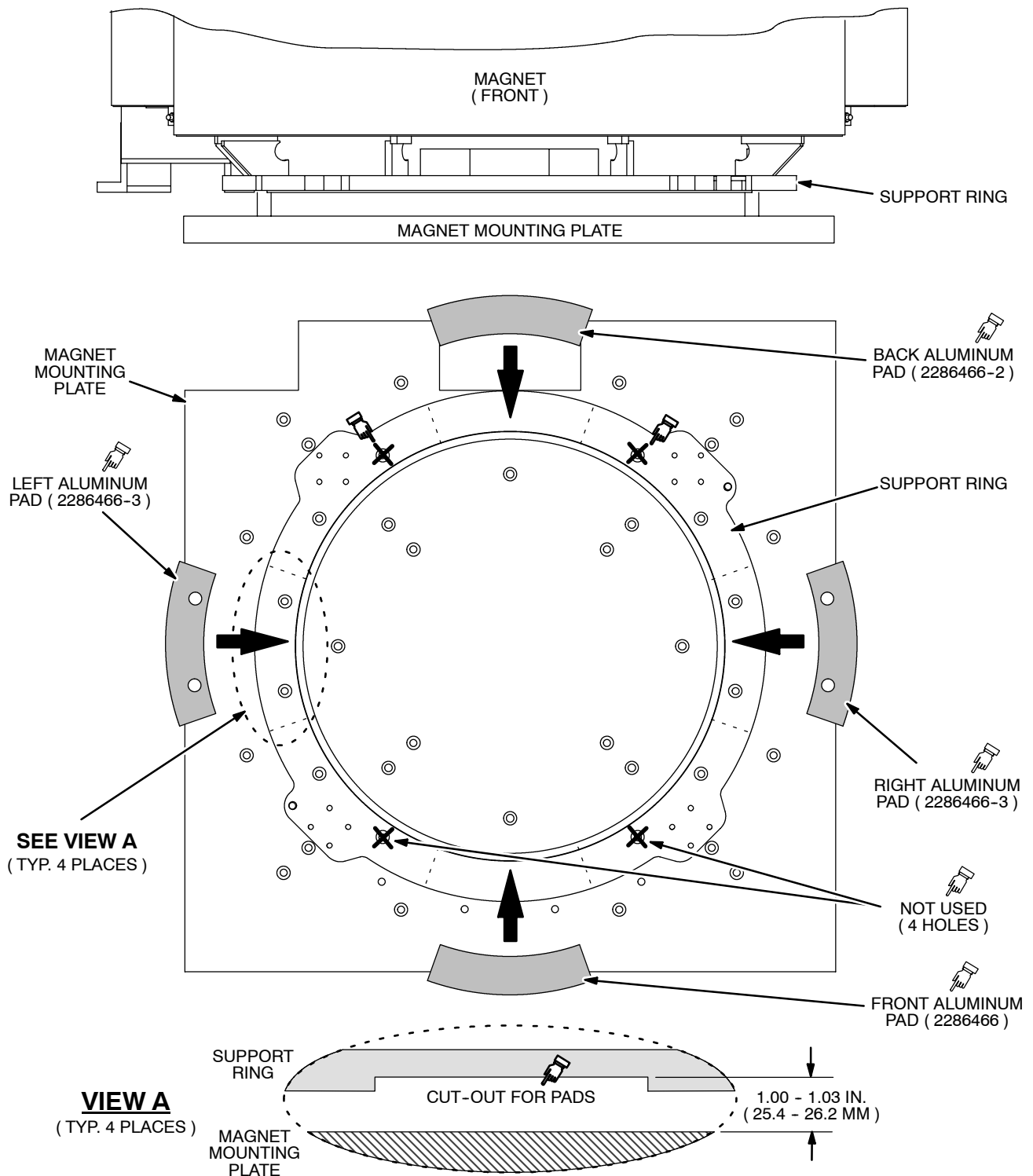
7. Insert the four aluminum pads (Front, Back, Left and Right) into the cut-out slots in the Magnet Support Ring. See Illustration 6-6.
8. Slowly lower the magnet uniformly onto the pads. Once the magnet is fully down on the pads, remove the alignment pins.
9. Insert eight M20 magnet mounting bolts, each with a hard fiber and an aluminum washer, into the mounting holes in the support ring left / right sides and thread into the mating tapped holes "A" in the Magnet Mounting Plate. See Illustration 6-7.

NOTE

The two front and the two rear "A" holes on the Magnet Support Ring are not used. See Illustration 6-6.

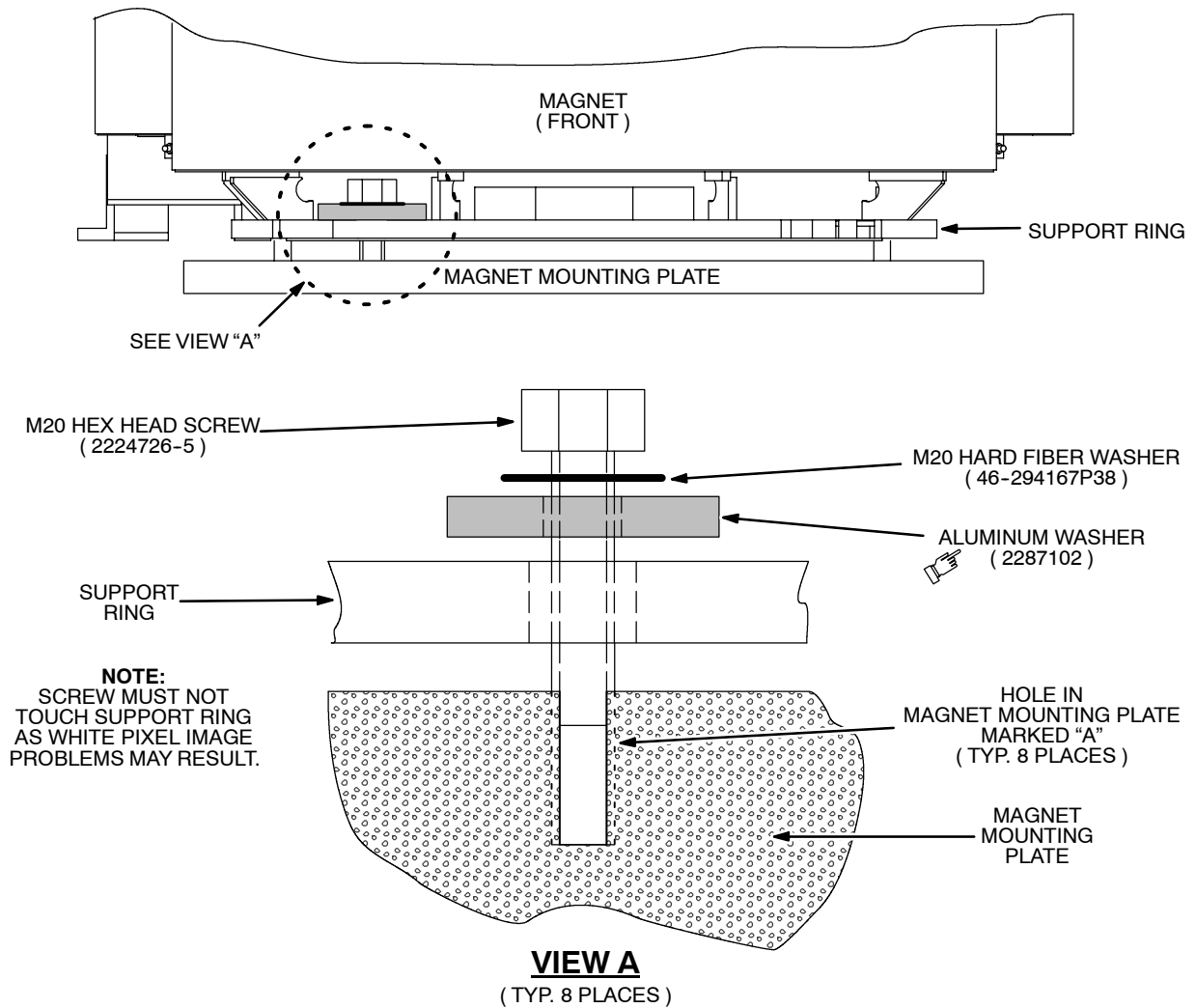
10. Hand tighten each M20 bolt snug into the tapped hole, then tighten to 100 in-lb (11.3 N-m) with a torque wrench.

6-1-3 Mounting Magnet (With Magnet Mounting Plate) (continued)



INSTALLATION OF MOUNTING PADS
ILLUSTRATION 6-6

6-1-3 Mounting Magnet (With Magnet Mounting Plate) (continued)



INSTALLATION OF MAGNET MOUNTING BOLTS
ILLUSTRATION 6-7

6-2 MOUNTING MAGNET, SITES NOT USING MAGNET MOUNTING PLATE

6-2-1 Introduction

If determination has been made NOT to utilize the Magnet Mounting Plate, bolt-down of the Magnet Support Ring, on foam isolator pads, and of the Coldhead Bracket to the concrete floor is required to minimize image artifacts generated by magnet vibration.

Note

Do not remove protective plastic bag / wrap surrounding magnet until required for installation purposes.

IMPORTANT !!!

- **Make sure the floor meets the requirements specified in Table 6-1 before mounting magnet.**
- **Make sure the Magnet Mounting Hole Template is properly located and taped to floor in conformance with this procedure before drilling holes in concrete sub-floor. Proper positioning is required to prevent misalignment of magnet with the patient table, magnet vent and cable trough.**
- **RF shield requirements for magnet room must be measured and met in conformance with Section 6-2-3, RF Shield Room Requirements**

TABLE 6-1
FLOOR REQUIREMENTS FOR MAGNET AND COLDHEAD MOUNTING AREA

FLOOR REQUIREMENTS	SPECIFICATION
FLATNESS / LEVELNESS OVER MOUNTING AREA	0.08 IN. (2 MM)
MINIMUM CONCRETE DEPTH	18 IN. (457 MM) INTEGRAL WITH ROOM
FLOOR SURFACE	CONTINUOUS COPPER PLATE RF SHIELD OVER CONCRETE SUB-FLOOR. NO FINISHED FLOOR MATERIAL. NO COMPOSITE RF SHIELD MATERIAL.
REBAR / METAL REINFORCEMENT	NO REBAR / METAL WITHIN 8 IN. (203 MM) DEPTH OF FLOOR SURFACE
ISOCENTER MARKING	ISOCENTER CROSSHATCH CLEARLY MARKED ON FLOOR.



APPROPRIATE PERSONAL PROTECTION EQUIPMENT SUCH AS SAFETY GLASSES, SAFETY SHOES AND LEATHER GLOVES MUST BE WORN WHEN PERFORMING MAGNET MOUNTING TASKS TO MINIMIZE RISK OF PERSONAL INJURY.

6-2-2 Magnet Mounting and Floor Preparation Kits

Tools / Equipment

Contractor supplied items:

ITEM	DESCRIPTION	QTY.
1	RESISTANCE METER: • ANALOG D'ARSONVAL METER • MEGGER INSULATION TESTER	1
2	0.75 IN. (19 MM) CHUCKED HAMMER DRILL WITH DEPTH GAUGE	1
3	0.5 IN. (12.7 MM) MASONRY BIT	1
4	1.0 IN. (25.4 MM) MASONRY BIT	1
5	2 POUND (1 KG) HAMMER	1
5	VACUUM CLEANER WITH NOZZLE ATTACHMENT	1
6	WRENCHES (AS REQUIRED)	
7	ISOPROPYL ALCOHOL, LINT-FREE CLOTH RAGS AND RUBBER GLOVES	
8	LEATHER GLOVES, SAFETY SHOES AND SAFETY GLASSES / GOGGLES	

Magnet Mounting Kit 2270347

ITEM	PART NO.	DESCRIPTION	QTY
1	2180498-4	LOCATING PIN, M20 X 88 MM	2
2		NOT USED	
3	2224726-5	STN. STEEL HEX HD. SCREW, M20-2.5 X 120 MM	12
4	46-294167P38	HARD FIBER WASHER, M20	12
5	2274122	FOAM WASHER PAD, 3.25 IN. O.D. X .80 IN. I.D.	12
6	2274072	FRONT FOAM MOUNTING PAD	1
7	2274072-2	BACK FOAM MOUNTING PAD	1
8	2274072-3	LEFT AND RIGHT FOAM MOUNTING PAD	2
9	2267987-2	ANCHOR STUD, .62-UNC	4
10	2286065	BELLOWS ANCHOR BRACKET	1
11	46-318508P23	HEX HD. SCREW, M10-1.5 X 40 MM	3
12	46-318936P3	NUT, M10	3
13	46-252635P23	PLAIN WASHER, .375 IN.	6
14	46-281162P11	LOCKWASHER, .375 IN.	3
15	2286066	CONDUCTIVE PAD	1
16	46-294151P7	LUBRICATING AND ANTI-SEIZE COMPOUND	1

Floor Preparation Anchor Kit 2295763

ITEM	PART NO.	DESCRIPTION	QTY
1	2294577	MAGNET SUPPORT RING MOUNTING TEMPLATE	1
2	2295359-2	M20 FLUSH EXPANSION ANCHOR SLEEVE	10
3	2295359	M10 FLUSH EXPANSION ANCHOR SLEEVE	4
4	46-252065P140	M20 ANCHOR SETTING TOOL, MANUAL, HSD-G	1
5	46-252065P139	M10 ANCHOR SETTING TOOL, MANUAL, HSD-G	1
6	46-318068P1	BRONZE WOOL, 4 - 5 IN. X 12 IN. MIN. (100 - 130 MM X 300 MM MIN.)	3
7	46-258218P4	RF TAPE, 3 IN. X 18 YD. (76.2 MM X 16.5 M), ROLL	1

6-2-3 RF Shield Room Requirements

Overview and Background Information

All GE MR systems require an RF enclosure which is commonly called a RF-Shielded Magnet Room. RF signals from sources outside of the magnet room are attenuated so they do not interfere with the MR system. Likewise, the RF signals produced by the MR scanner are kept from interfering with other RF devices. This RF quiet environment is necessary for the MR system to produce quality images.

RF-Shielded Magnet Rooms come in a variety of shapes and sizes but all feature a total RF shield produced by one continuous ground plane. This is achieved by making the walls, floor, doors and ceiling out of an electrically conductive material such as copper, aluminum, brass, or steel. All the room components (walls, floor, ceiling, etc.) must be electrically bonded together to form one solid, common ground plane. Once this is established the ground plane is then tied to earth ground to create the RF Shield. This ground point is known as the PRIMARY ground. The primary grounding technique works well for any battery powered devices that may be operated within a RF-Shielded Magnet Room. Devices requiring facility power or the introduction of facility power into the magnet room requires a change in the primary grounding technique for the RF-Shielded Magnet Room. The RF-Shielded Magnet Room must now be grounded back to the facility power ground.

The addition of water systems or other grounds required by the national electrical code will cause the RF-Shielded Magnet Room ground impedance to be ZERO ohms. These additional grounds that connect the outside of the RF-Shielded Magnet Room to earth grounds are called SECONDARY grounds. It is the secondary grounding that needs to be controlled. If the secondary ground introduces any current to the RF Shield, indicating the RF Shield is a better ground path than the secondary ground, then the current can set up electrical fields on the surface of the RF Shield which may cause image artifacts.

The equipment anchors generally penetrate through the floor of the RF-Shielded Magnet Room because the RF floor is embedded at or near the finished floor. With this in mind the hardware used to anchor the equipment will be either a bolt or a stud. When this hardware penetrates the RF Shield it must be in full contact with the shield, thereby preventing RF leaks at the point of penetration. In this case, the anchoring hardware may be in direct electrical contact to the anchored equipment. The anchoring device that penetrates through the RF floor must be isolated from ground. If it should come in contact with rebar or wire mesh and this in turn is contacting building steel, then a secondary ground has been established and needs to be corrected.

RF-Shielded Magnet Rooms that have the RF Shield greater than 4 inches (100 mm) below the finished floor in the room will allow the anchor to be installed without penetrating the shield and thereby have no issues with secondary grounding.

6-2-3 RF Shield Room Requirements (continued)**Electrical Isolation**

Magnet mounting anchor hardware must not provide a secondary ground path for the RF-Shielded Magnet Room. A secondary ground may occur by having the anchor come in contact with steel rebar, wire mesh or structural steel in the floor. Ideally the ground impedance between the anchor and earth ground should be greater than 1000 ohms. This may not be possible due to moisture conditions in the concrete or the soil beneath the concrete. Therefore, the following requirements for ground isolation shall be observed:

1. A ground isolation test must be performed on each electrically conductive anchor and stud.
 - A. If the result is greater than 1000 ohms on each stud, then record the resulting measurement and give documentation to GE Medical Systems Installation Specialist.
 - B. If the result is less than 1000 ohms but greater than 100 ohms, contact the GE Medical Systems Installation Specialist and review process and site conditions.
 - C. If the result is less than 100 ohms, then it is very likely the anchor has made contact to steel rebar or wire mesh. In this case the steel in the floor will need to be removed or the anchors will need to be relocated in an alternate position. In either case, the GE Medical Systems Installation Specialist must be notified and a retest performed after the corrective action is taken.
2. The test results must be recorded by RF Shield Room vendor and the information forwarded to the GE Medical Systems Installation Specialist for the customer's record file.

Electrical Isolation Measurement Method

Prior to attaching the primary ground and installing any power outlets, room lights, water supplies, etc. into the RF-Shielded Magnet Room, a ground isolation test is performed between the room's ground plane and earth ground.

This measurement should be greater than 1000 ohms. Measurement results may appear lower for RF-Shielded Magnet Rooms located below or at grade level. This is caused by a capacitive voltage between the RF-Shielded Magnet Room and earth ground setup by the measuring meter's DC voltage.

For RF-Shielded Magnet Rooms with a resistance reading less than 1000 ohms the following method should be used to determine if the low resistance reading is caused by this capacitive effect:

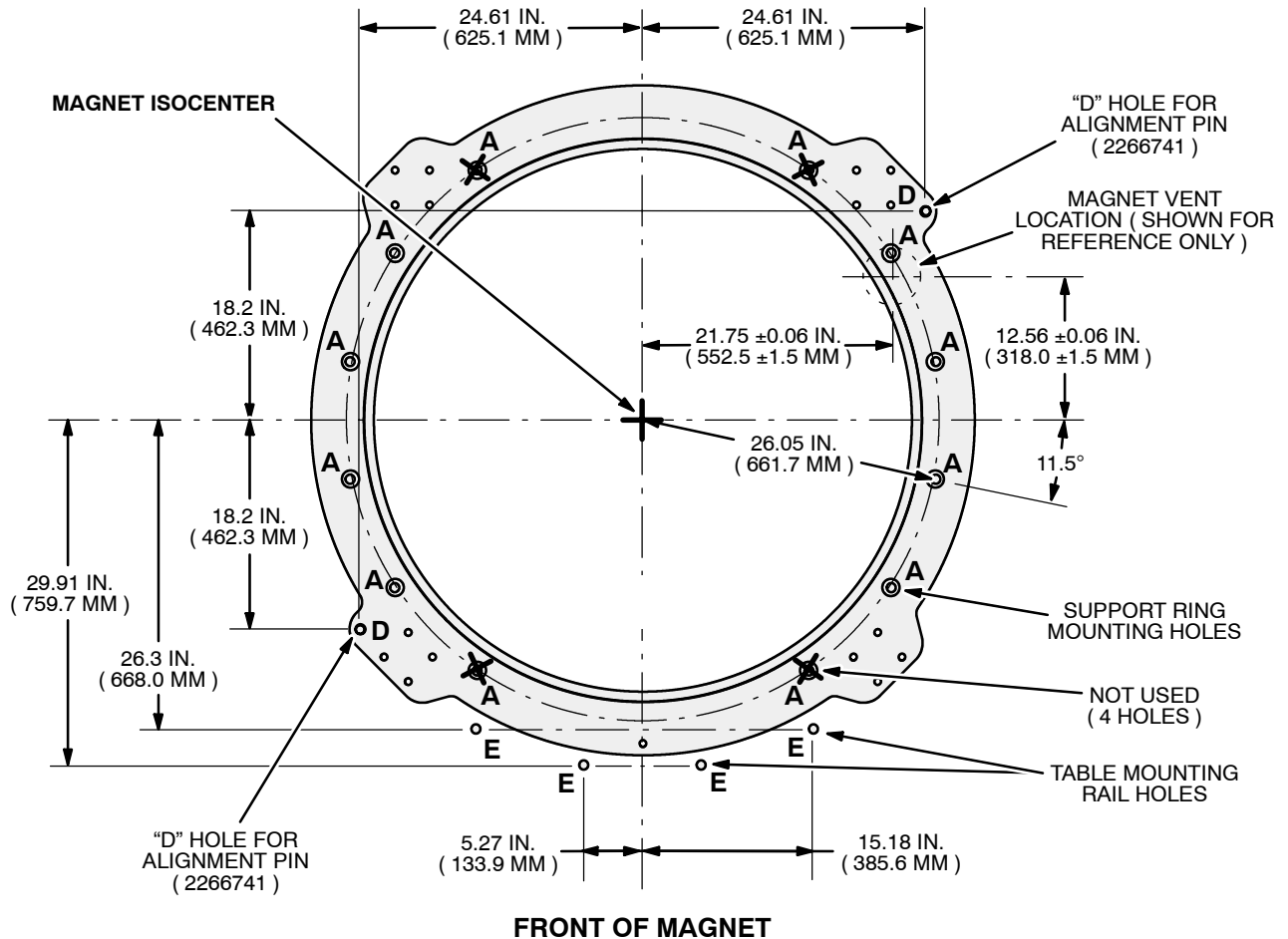
- Use a Megger Insulation Tester capable of reading values < 1000 ohms to most accurately make the measurement. An analog meter with a D'Arsonval meter movement may be used if a Megger isn't available.
- After making the measurement reverse the leads and watch for the measurement to start high and decrease to a lower resistance value. This change in measurement verifies the capacitive effect.
- In this case the peak measurement is the approximate resistance between the RF-Shielded Magnet Room and earth ground.

Note

For any special case where the magnet mounting is isolated from the RF Shield (RF Shield position below concrete) the magnet will require grounding to the RF Shield.

6-2-4 Floor Preparation With Hole Template

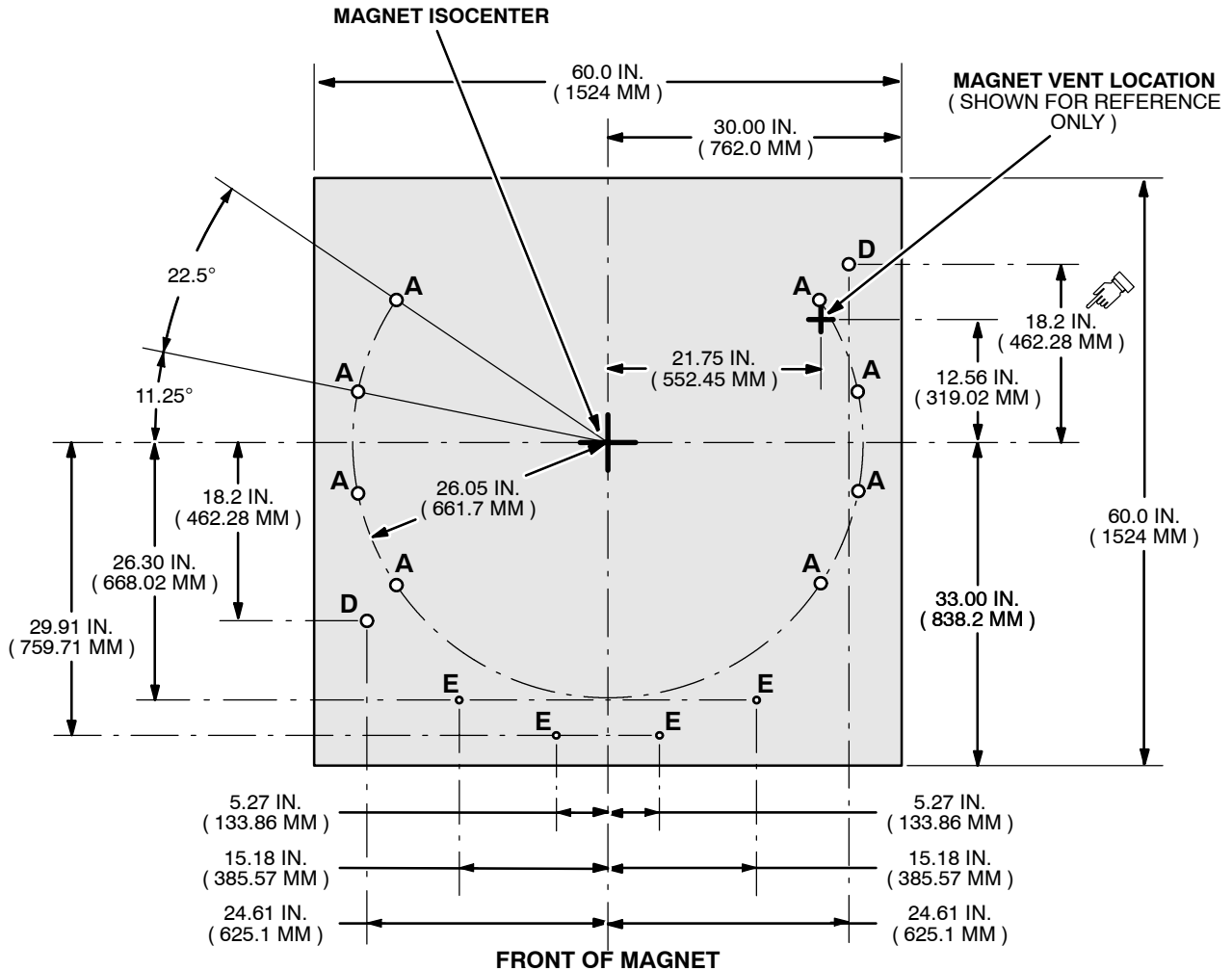
1. Identify the magnet's isocenter. Mark the floor with a crossmark at that point.
2. Locate and crossmark the two "D" hole positions with respect to the isocenter and the magnet's front. Illustration 6-8 shows dimensions from the isocenter to all important support ring holes and to the magnet vent location (for reference).



HOLE LOCATIONS IN MAGNET SUPPORT RING
ILLUSTRATION 6-8

6-2-4 Floor Preparation With Hole Template (continued)

3. Place the mylar Magnet Support Ring Mounting Template (2278835) shown in Illustration 6-9 on the floor and oriented with the magnet isocenter, the "D" marks on the floor and the magnet's front facing.
4. Tape template to the floor.
5. Mark floor through all holes marked "A" and "E" on the template.



MAGNET SUPPORT RING MOUNTING TEMPLATE (2294577)
ILLUSTRATION 6-9

6-2-4 Floor Preparation With Hole Template (continued)



SAFETY GLASSES MUST BE WORN WHILE DRILLING / CLEANING THE ANCHOR HOLES AND WHILE INSTALLING ANCHORS TO PREVENT MATERIAL GETTING INTO YOUR EYES.

- 6. If drilling through RF shield material, pre-cut the copper to minimize tearing.
- 7. Insert bit and set depth gauge on hammer drill for holes “D” on Table 6-2. See Illustration 6-10.
- 8. Drill holes with a hammer drill of the sizes and depths specified in Table 6-2 through the holes marked “D” on the template. See Illustration 6-10.

IMPORTANT !!!

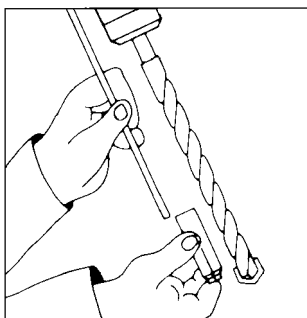
Drill holes ONLY deep enough for top of anchor to be flush with floor surface. Otherwise magnet mounting bolts may not be long enough.

- 9. Repeat Steps 6 and 8 for the template holes marked “A” and “E” using the appropriate values in Table 6-2.

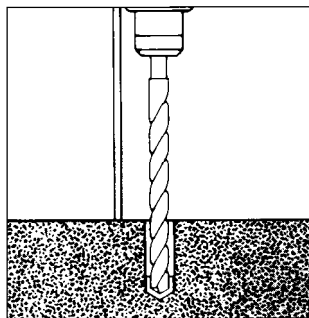
TABLE 6-2
“A” AND “E” HOLE SIZES

HOLE MARK	USED FOR	QUANTITY	DROP-IN ANCHOR P/N	THREAD	HOLE / BIT DIAMETER	GAUGE DEPTH SETTING*	SETTING TOOL P/N
A	BOLT MAGNET SUPPORT RING TO FLOOR	8	2295359-2	M20	1.0 IN. (25.4 MM)	3.2 IN. (82.2 MM)*	46-252065P140
D	LOCATION PINS	2	2295359-2	M20	1.0 IN. (25.4 MM)	3.2 IN. (82.2 MM)*	46-252065P140
E	BOLT TABLE RAIL TO FLOOR	4	2295359	M10	0.5 IN. (12.7 MM)	1.6 IN. (41.0 MM)*	46-252065P139

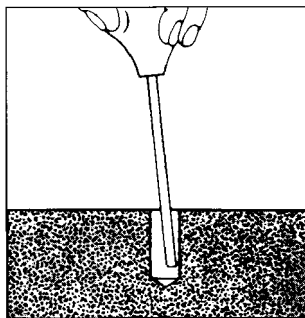
* Depth gauge settings shown are 0.05 inch (1.3 mm) more than anchor due to template thickness. **Do not overdrill.**



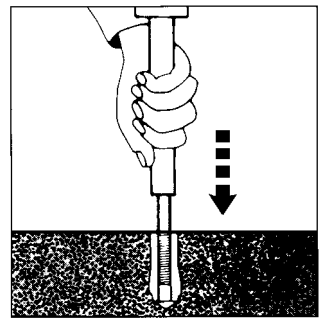
STEP 6. ADJUST GAUGE SO THAT ANCHOR WILL BE FLUSH WITH THE CONCRETE SURFACE WHEN INSTALLED



STEP 8. HAMMER DRILL HOLE.



STEP 11. CLEAN HOLE.

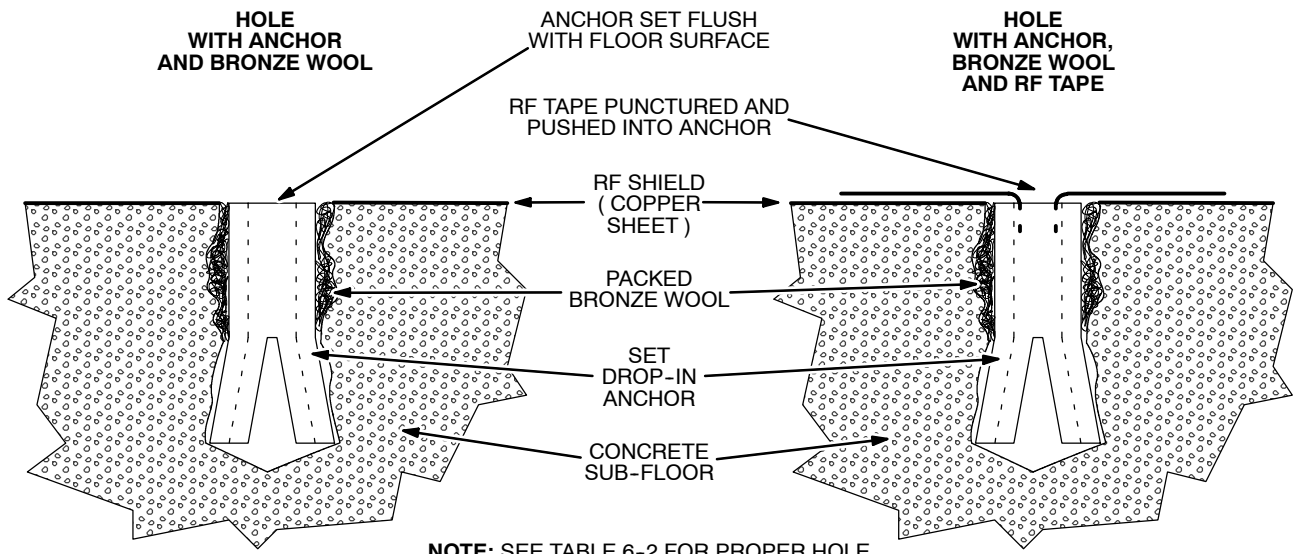


STEP 12. INSTALL ANCHOR USING PROPER SETTING TOOL INDICATED IN TABLE 6-2. SETTING TOOL TO BE DRIVEN INTO ANCHOR UNTIL SETTING TOOL SHOULDER MEETS TOP OF ANCHOR.

PROPER DROP-IN ANCHOR INSTALLATION
ILLUSTRATION 6-10

6-2-4 Floor Preparation With Hole Template (continued)

10. Lift template and set aside for reference.
11. Clean each hole with vacuum cleaner and extension hose. See Illustration 6-10.
12. Install drop-in anchors using a 2 pound (1 kg) hammer and the proper-sized setting tool indicated for each hole in Table 6-2. Drive setting tool into anchor until shoulder of setting tool meets top of anchor. See Illustration 6-10. Make sure top of anchor is flush with floor surface.
13. Vacuum each hole. Clean with isopropyl alcohol any exposed RF shield material surrounding each hole.
14. Check each installed anchor for gaps surrounding it. Firmly pack full with bronze wool all gaps found. See Illustration 6-11.



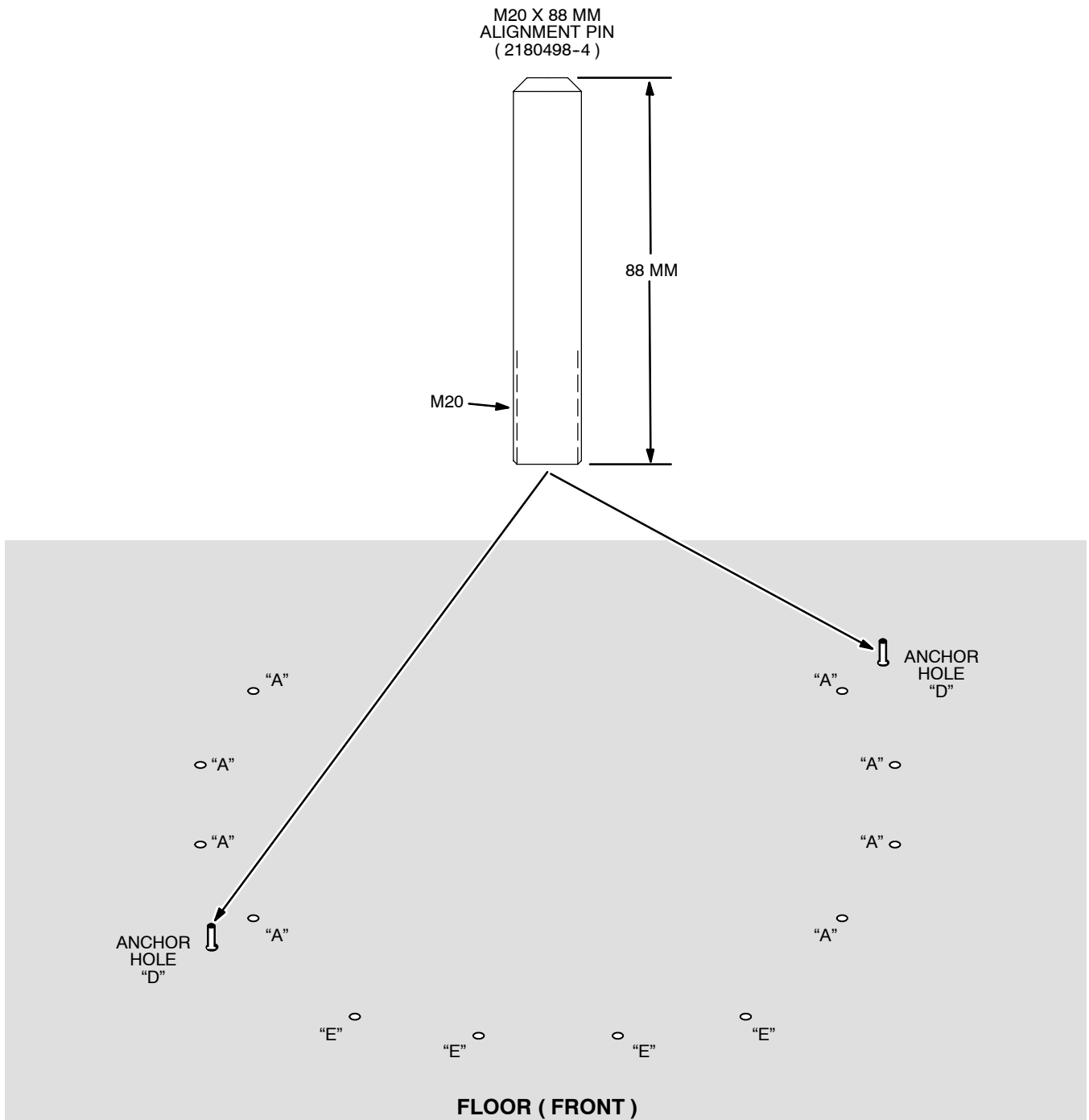
NOTE: SEE TABLE 6-2 FOR PROPER HOLE DEPTH FOR EACH ANCHOR SIZE USED.

RF SHIELDING AROUND DROP-IN ANCHORS
ILLUSTRATION 6-11

15. Cover each anchor with a 3 inch (76 mm) square piece of RF tape (46-258218P4) as shown in Illustration 6-11.
16. Make an X-shaped cut in the RF tape directly over the anchor's hole and push the cut flaps down into the anchor. See Illustration 6-11. The bronze wool packing and the RF tape will ensure RF integrity.

6-2-5 Mounting Magnet

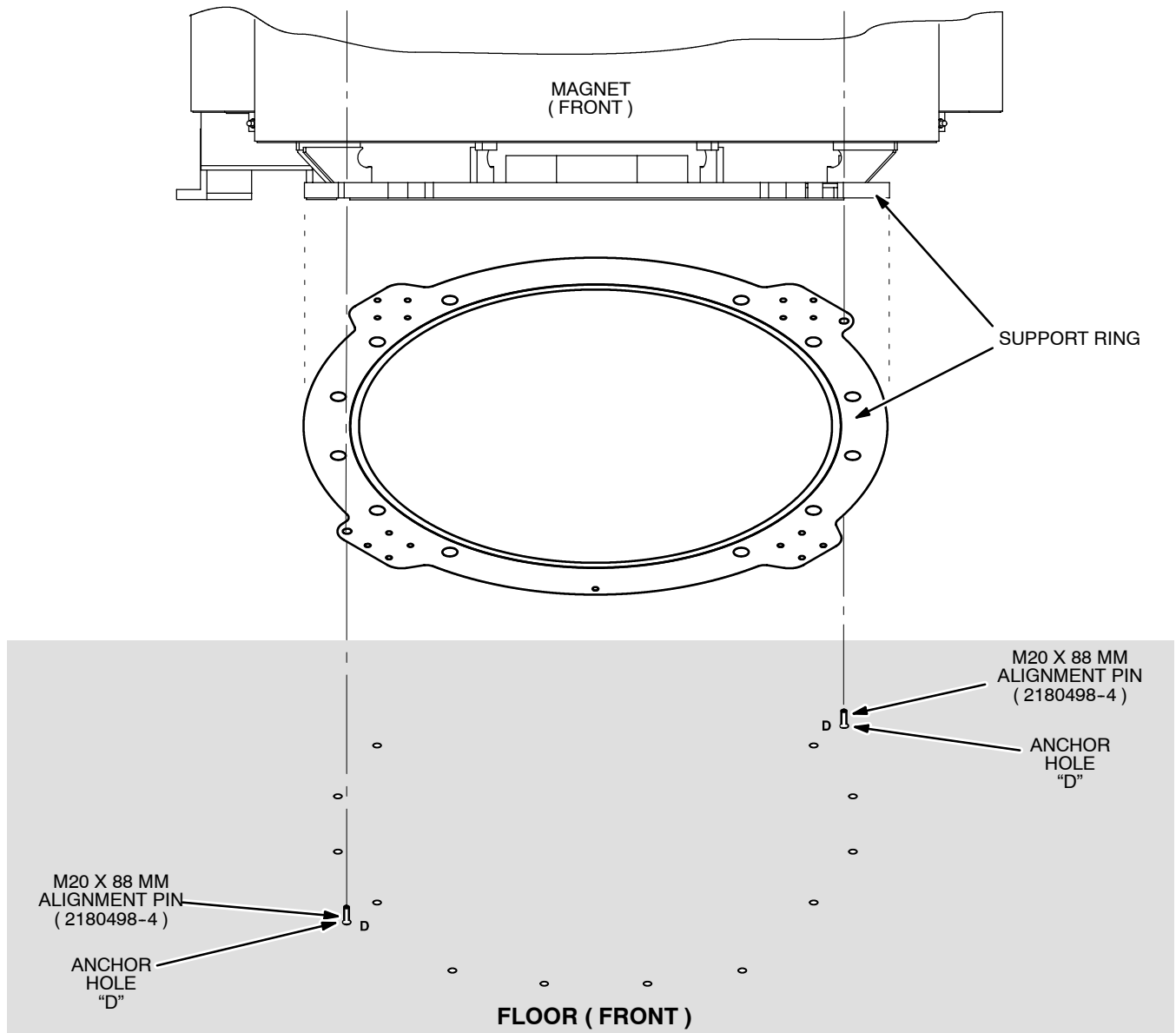
1. Screw a M20 x 88 mm locating pin (2180498-4) into each "D" anchor location. See Illustration 6-12.



ALIGNMENT PIN INSTALLATION
ILLUSTRATION 6-12

6-2-5 Mounting Magnet (continued)

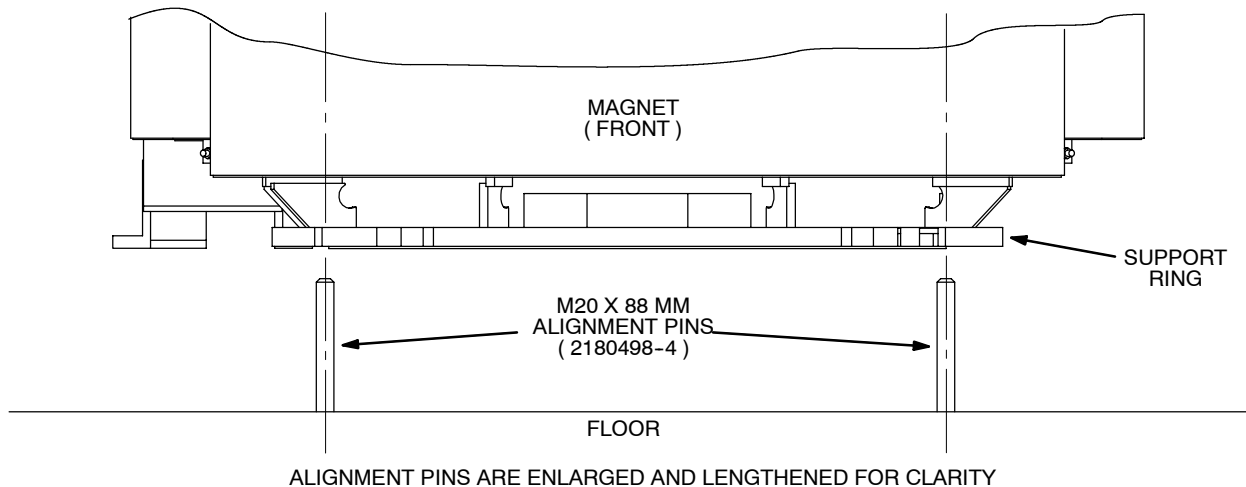
- 2. Move magnet into position over the locating pins, keeping the Magnet Support Ring 6 inches (150 mm) above the floor. Make sure magnet orientation is correct using the vent location as a guide.



ALIGNMENT PIN LOCATIONS
ILLUSTRATION 6-13

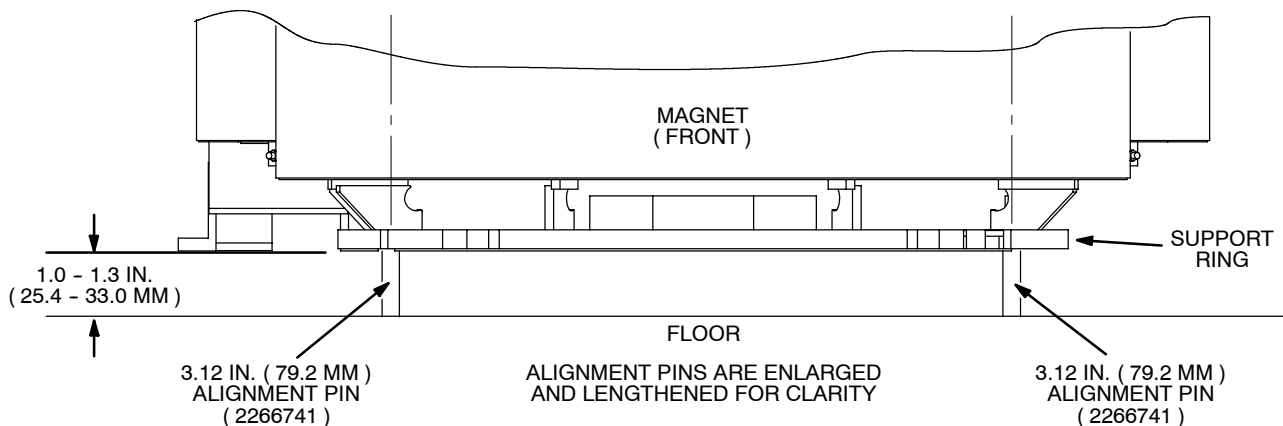
6-2-5 Mounting Magnet (continued)

- Align the alignment holes in the support ring to the M20 x 88 mm alignment pins. Slowly lower magnet uniformly to engage both pins into corresponding support ring holes. See Illustrations 6-13 and 6-14.



ALIGN MAGNET WITH ALIGNMENT PINS
ILLUSTRATION 6-14

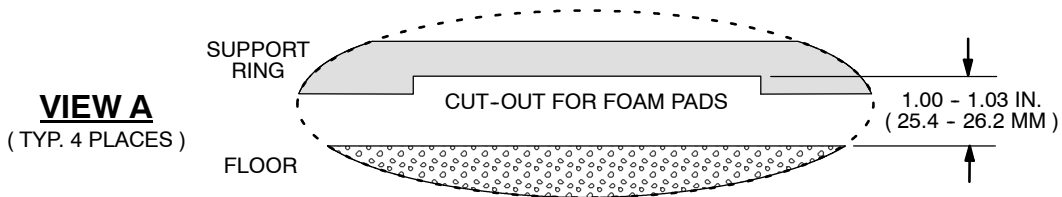
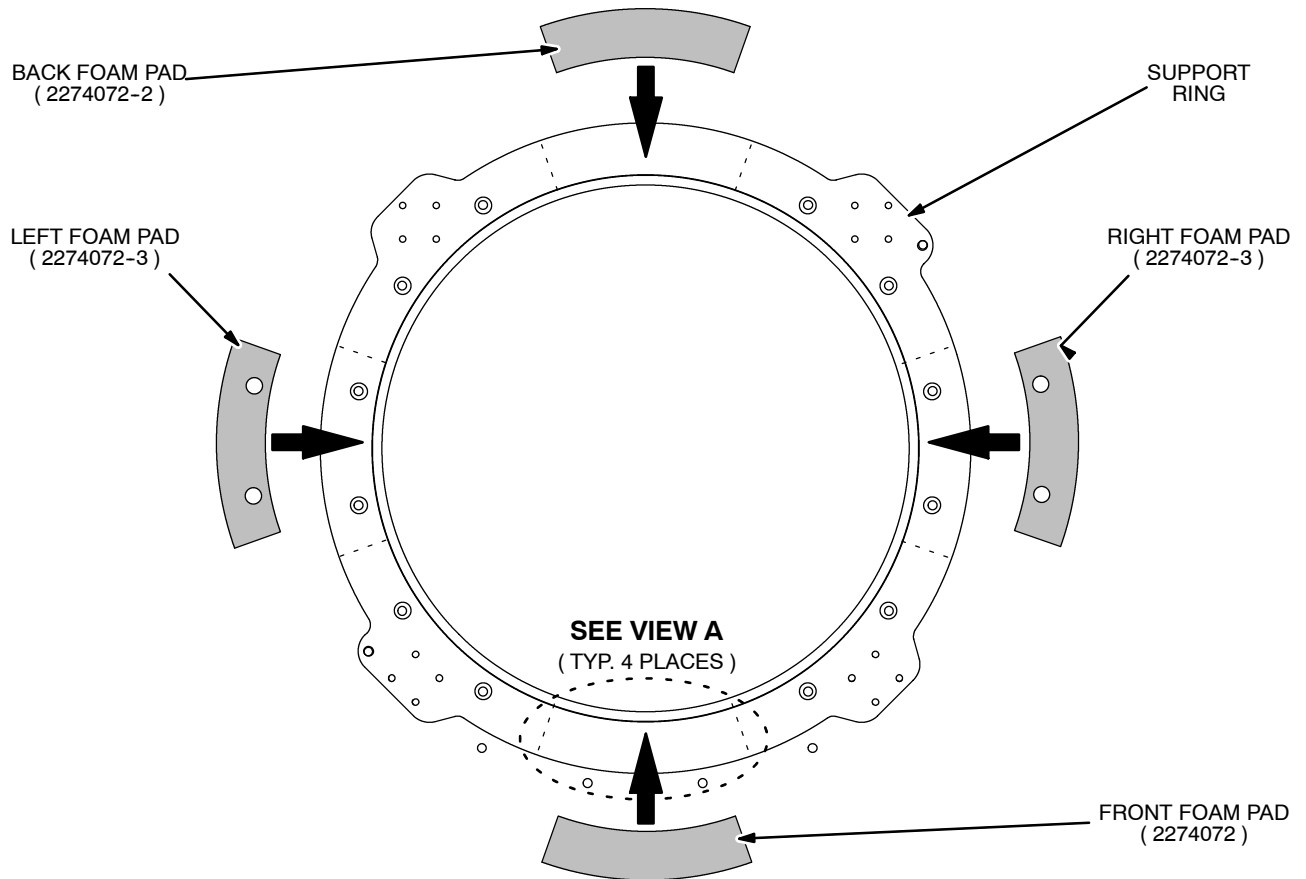
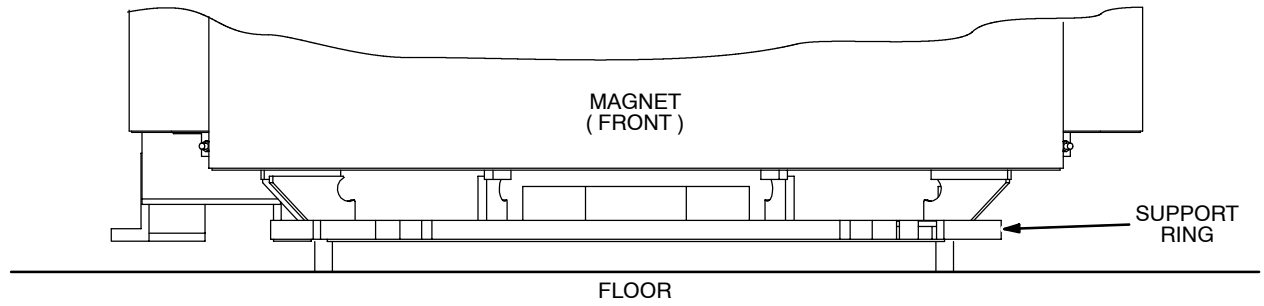
- Stop lowering the magnet when the gap between the floor and the Magnet Support Ring pad cut-out is uniformly 1.0 - 1.3 inch (25.4 - 33.0 mm). See Illustration 6-15.



MAGNET HEIGHT FOR PAD INSERTION
ILLUSTRATION 6-15

- Insert the four foam isolator pads (Front, Back, Left and Right) into the cut-out slots in the Magnet Support Ring. See Illustration 6-16.
- Slowly lower the magnet uniformly onto the pads. Once the magnet is fully down on the pads, remove the alignment pins.

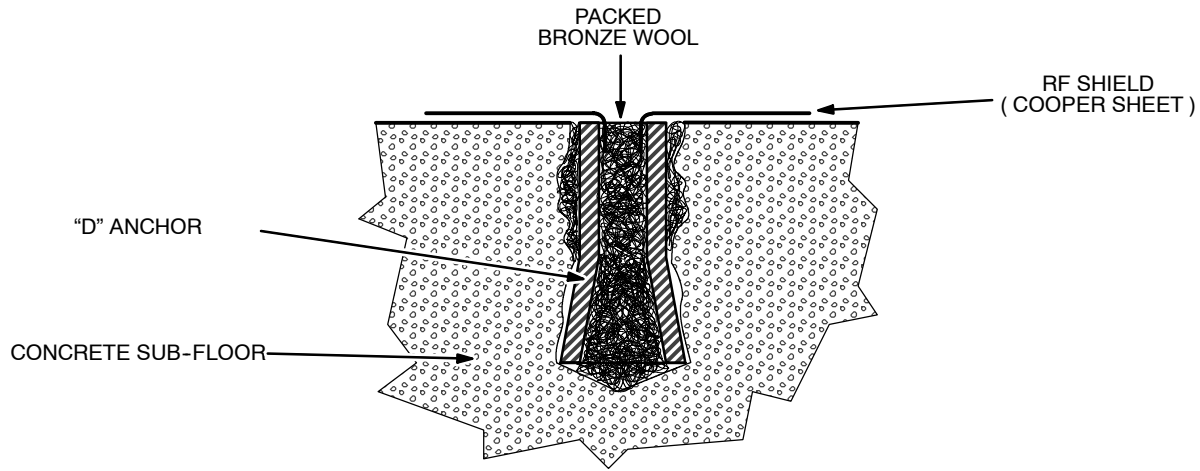
6-2-5 Mounting Magnet (continued)



INSTALLATION OF FOAM MOUNTING PADS
ILLUSTRATION 6-16

6-2-5 Mounting Magnet (continued)

- 7. Pack the "D" anchor holes with bronze wool. Tamp the wool tight using a bolt pushed through the alignment pin hole in the Magnet Support Ring. See Illustration 6-17.



RF SHIELDING AROUND DROP-IN ANCHORS
ILLUSTRATION 6-17

- 8. Insert eight M20 magnet mounting bolts, each with a hard fiber and a foam washer, into the mounting holes in the support ring and thread into the mating anchors "A" in the floor. See Illustration 6-18.

Note

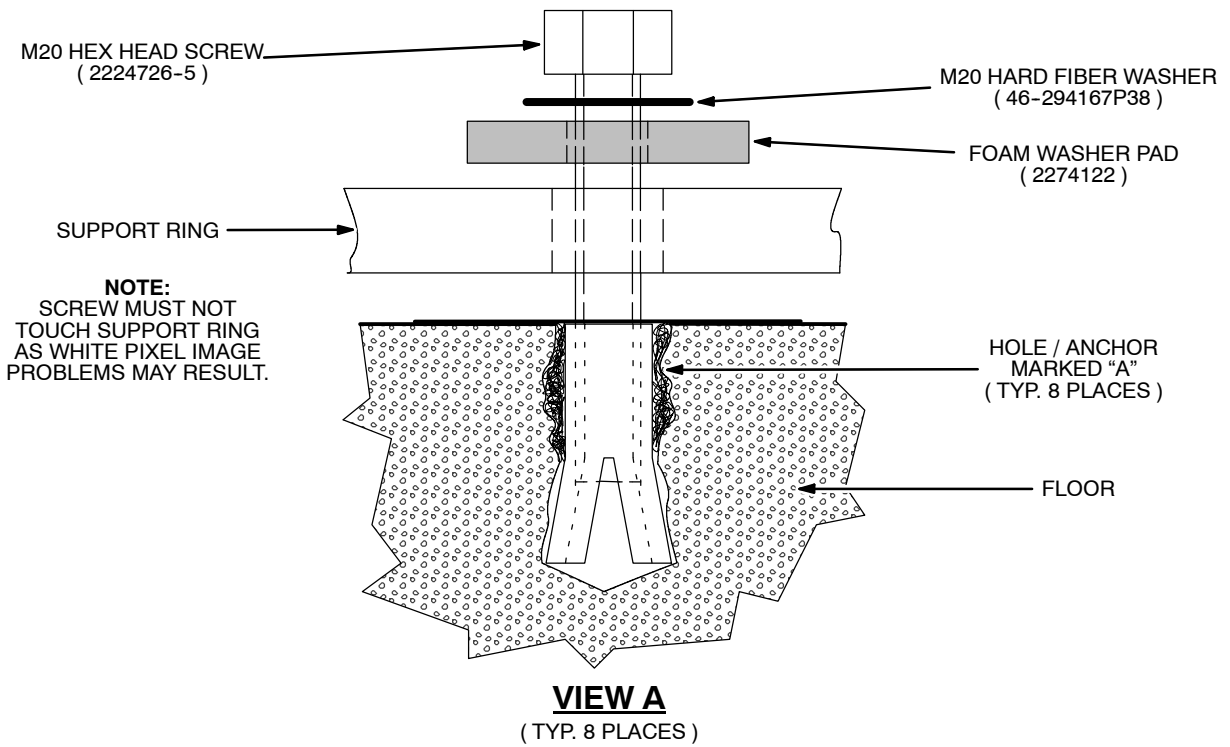
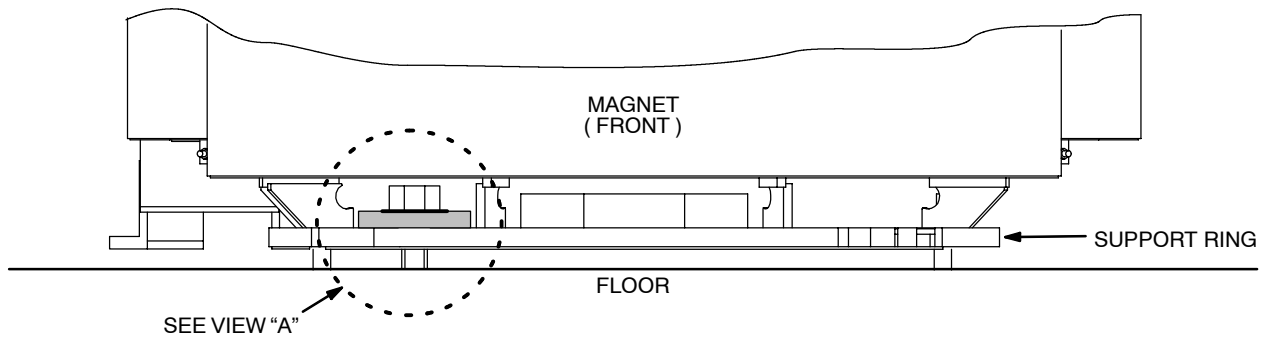
Make sure magnet mounting bolts do not touch the support ring as white pixel problems could result during imaging.



Do not tighten M20 bolts more than one full turn to prevent over-compression of the foam washers. Make sure bolts are not in contact with Magnet Support Ring as imaging problems may result.

- 9. Hand tighten each M20 bolt snug into the tapped hole, then tighten one additional turn with a wrench.

6-2-5 Mounting Magnet (continued)



INSTALLATION OF MAGNET MOUNTING BOLTS
ILLUSTRATION 6-18

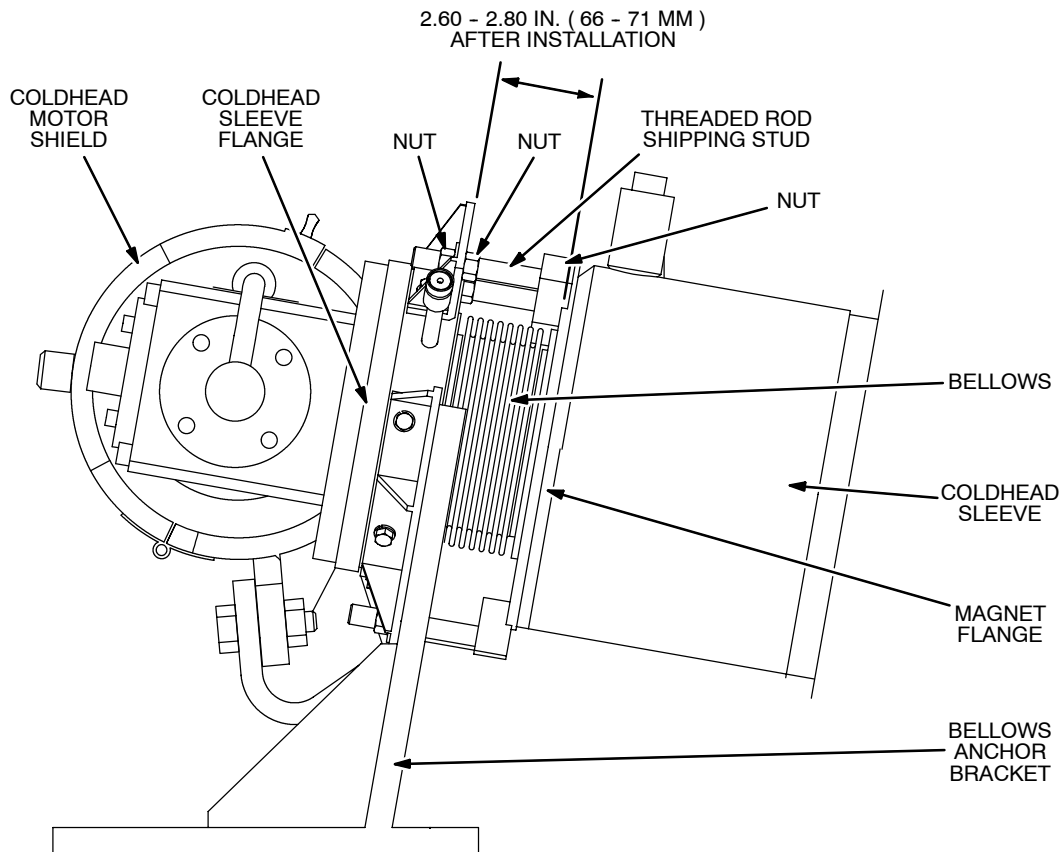
6-3 COLDHEAD MOUNTING

Tools / Equipment

ITEM	DESCRIPTION	QTY.
1	RULER WITH 1 MM (.04 IN.) DIVISIONS	1
2	0.75 IN. (19 MM) CHUCKED HAMMER DRILL WITH DEPTH GAUGE	1
3	0.625 IN. (15.9 MM) MASONRY BIT	1
4	2 POUND (1 KG) HAMMER	1
5	WRENCHES (AS REQUIRED)	
6	LEATHER GLOVES, SAFETY SHOES AND SAFETY GLASSES / GOGGLES	

Procedure

1. Check length of Coldhead Bellows between magnet and Coldhead Sleeve Flange at each of the threaded rod shipping studs shown in Illustration 6-19. Bellows length should be between 2.72 inches (69.0 mm) and 2.78 inches (70.6 mm) with a maximum length variation of 0.08 inches (2.0 mm) over the full circumference.
2. Adjust the threaded rod shipping studs between magnet and Coldhead Sleeve Flange if required to obtain dimensions in Step 1. Make sure nuts are retightened if any adjustments are made.
3. Make sure Coldhead Motor Shield does not touch Coldhead Motor over full 360 degree perimeter. Adjust Motor Shield Bracket if necessary to eliminate contact. See Illustration 6-19.



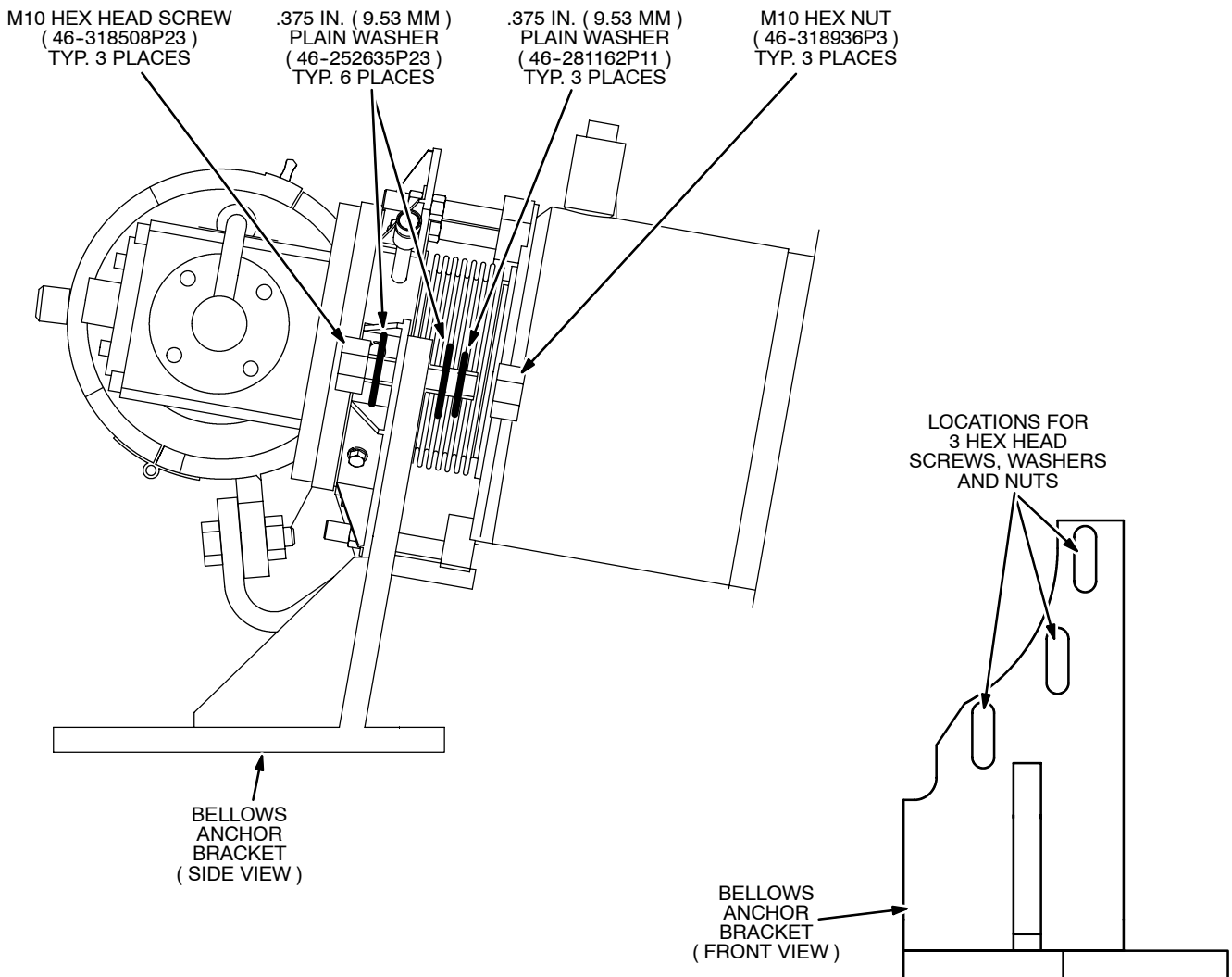
COLDHEAD SLEEVE BELLEWS ADJUSTMENT
ILLUSTRATION 6-19

6-3 COLDHEAD MOUNTING (continued)



ANY CONTACT OF COLDHEAD MOTOR SHIELD TO COLDHEAD MOTOR WILL CAUSE IMAGE PROBLEMS.

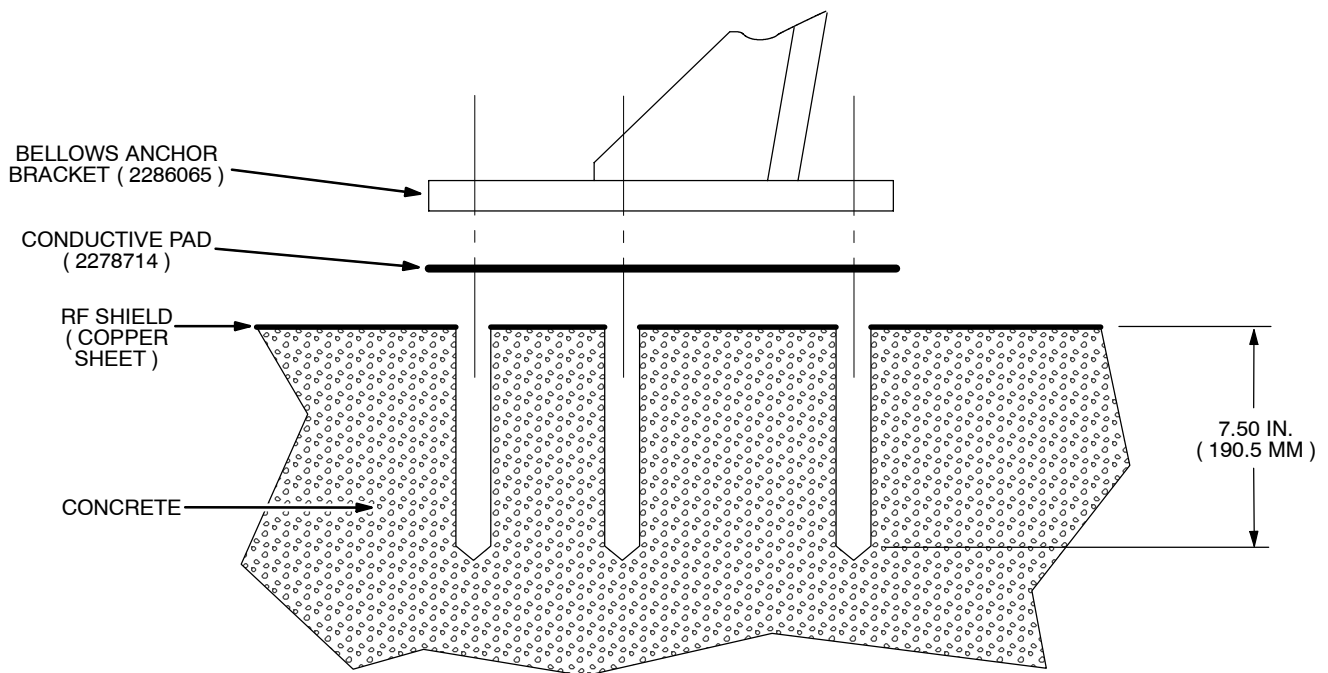
- 4. Mount Bellows Anchor Bracket onto Coldhead Bracket using a bolt, washer, lockwasher and nut in each of the three slotted vertical holes. See Illustration 6-20. Make sure Bellows Anchor Bracket is flush with concrete surface and that the Coldhead Bellows maintains correct lengths per Step 1. Readjust threaded rod shipping studs between magnet and Coldhead Sleeve Flange if required to maintain dimensions and obtain a flush mount.



BELLOWS ANCHOR BRACKET INSTALLATION TO MAGNET ILLUSTRATION 6-20

6-3 COLDHEAD MOUNTING (continued)

5. Mark bracket hole centers and circumferences on RF Copper Shield. Remove Bellows Anchor Bracket. Cut smooth 0.62 inch (15.7 mm) circular holes in the RF Copper Shield.
6. Center punch through the three RF Copper Shield holes matching hole locations in the concrete below. Drill three 0.62 inch (15.7 mm) holes 7.5 inches (190.5 mm) deep into the concrete. Make sure the RF Copper Shield is not torn. Vacuum clean each hole.
7. Place Conductive Pad (2278714) on th RF Copper Shield with holes in pad aligned with the anchor stud holes in floor. See Illustration 6-21.
8. Place Bellows Anchor Bracket over Concductive Pad aligned with the anchor stud holes. See Illustration 6-21.



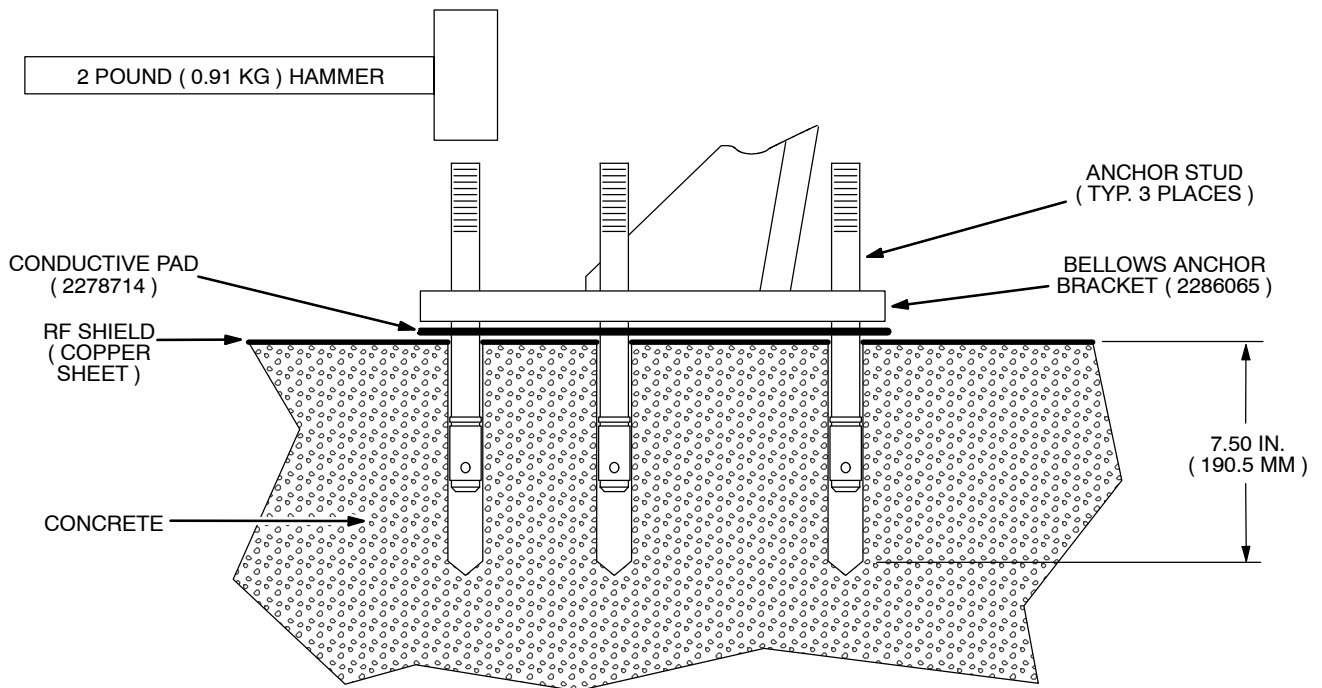
PLACING BELLOWS ANCHOR BRACKET ON CONDUCTIVE PAD AND CONCRETE FLOOR
 ILLUSTRATION 6-21

6-3 COLDHEAD MOUNTING (continued)



Hammer anchor studs carefully to avoid damage to studs.

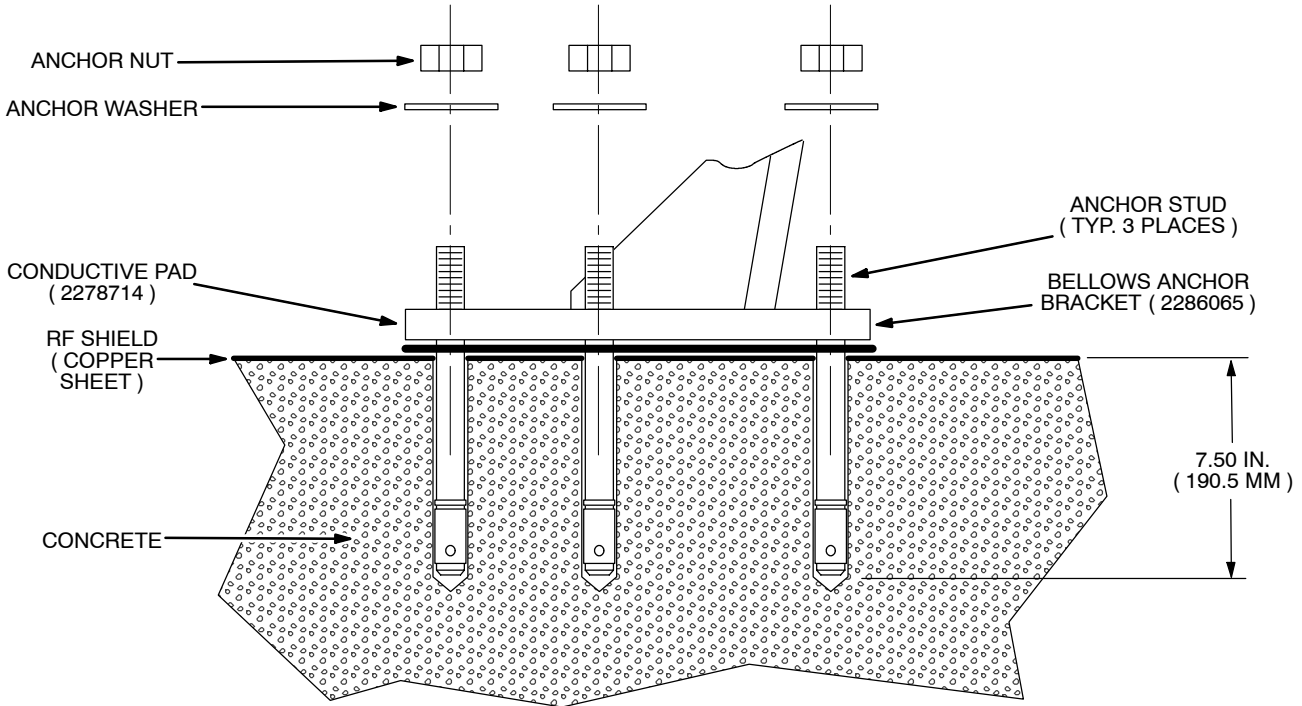
- 9. Fully install in each hole an Anchor Stud (2267987-2) using a 2 pound (1 kg) hammer. See Illustration 6-22.



COLDHEAD BRACKET ANCHOR STUD INSTALLATION
ILLUSTRATION 6-22

6-3 COLDHEAD MOUNTING (continued)

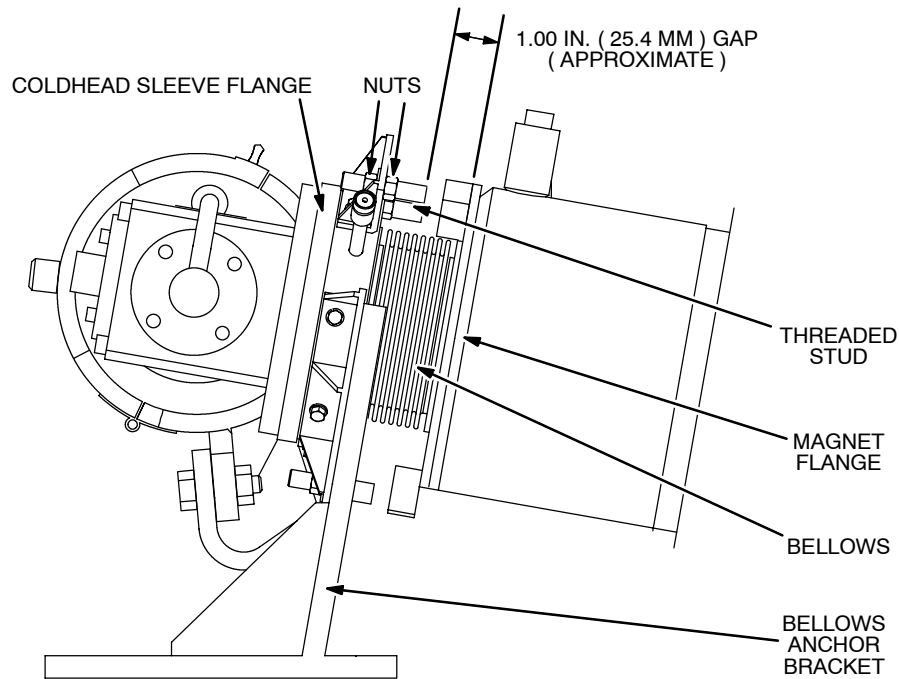
10. Loosely assemble washers and nuts onto anchor studs. See Illustration 6-23.



COLDHEAD BRACKET WASHER / NUT INSTALLATION
ILLUSTRATION 6-23

11. Install thru-bolts, washers and lockwashers onto Bellows Anchor Bracket and Coldhead Bracket. Make sure Bellows Anchor Bracket is fully seated on Conductive Pad. Then tighten bolts and nuts assembled in slotted holes of Coldhead Bracket base to flatten the lock washers.
12. Tighten nuts on anchor studs to 90 foot-pounds (121 N-M).
13. Loosen nuts on threaded rod shipping studs and back studs away from Coldhead Sleeve Flange approximately 1 inch (25.4 mm). Lock studs in place on Coldhead Sleeve Flange by tightening nuts against flange. See Illustration 6-24.
14. Recheck Coldhead Bellows length around its circumference to determine if final dimensions set in Step 1 are within 2.60 - 2.80 inches (66 mm - 71 mm).

6-3 COLDHEAD MOUNTING (continued)



COLDHEAD SLEEVE BELLOWS ADJUSTMENT
ILLUSTRATION 6-24



ALWAYS FULLY SUPPORT SINGLE-STAGE COLDHEAD DURING INSTALLATION, EITHER WITH SHIPPING STUDS OR FULLY-INSTALLED MOUNTING BRACKET. LACK OF SUPPORT MAY CAUSE DAMAGE TO OPENSPEED CRYOSTAT.

15. If the final setting is outside of requirements, re-engage the three threaded rod shipping studs, loosen all bolts on the bracket base and readjust bellows length by readjusting the shipping studs. Tighten bolts and reset studs in conformance with Step 12.

IMPORTANT !!!

To prevent image problems there must be no vibration transmitted from Coldhead to Coldhead Sleeve.

16. Turn off the Cryocooler. but leave the Shield Cooler running. Check for vibration on the magnet by placing a hand on the Coldhead Sleeve. See Illustration 6-19. If any vibration is present, recheck the following and readjust as required:
 - Motor shield contact (step 3)
 - Bellows length (step 14)
 - All bracket hardware tight

