



**PERMADUR INDUSTRIES, INC.**

**MAGNETICS DIVISION**

**LOADPOSITIONER DIVISION**

186 ROUTE 206 SOUTH • HILLSBOROUGH, NJ 08844 • (908) 359-9767 • FAX (908) 359-9773



# PERMADUR

## MAGNETIC LIFTING SYSTEM OPERATION AND MAINTENANCE MANUAL

**Model #: Series 714 Plate/Disc/Skeleton Handling  
System w/ 14ea. TP-2000 Permador Lifting  
Magnets on 25' load beam w/4 Part Sling  
Suspension**

**Power Source: 460 VAC Power Supply**

**Serial Number: 003368**

**Original User: UTLX Manufacturing LLC, Houston, TX**

**Ship Date: 5/14 Capacity UPGRADE: 6/16**



**Permador Industries, Inc.**

**186 Route 206 South, P.O. Box 1032  
Somerville, NJ 08876**

**Website: [www.permadur.com](http://www.permadur.com)**

**PH(908)359-9767  
FAX(908)359-9773**

**email: [info@permadur.com](mailto:info@permadur.com)**



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## INTRODUCTION

The Permadur Magnet is a material handling device tool carefully designed to provide efficient operation and maximum safety. Properly utilized and maintained, the working life of this unit is virtually indefinite. As with any heavy material handling device, the utmost caution and respect is recommended. This Operation and Maintenance Manual is intended to instruct and identify the proper application of the Permadur Magnet System. We suggest that you read it thoroughly and review the contents with the magnet operator to assure that your Permadur Magnet System will provide a long, productive, and safe working life.

## OPERATING PRINCIPLE

The Permadur Magnet is an electrically controlled permanent magnet. It requires no continuous source of energy to maintain holding power. "On-Off" control is obtained by controlling the path of the magnetic holding forces generated by the permanent magnetic material. A brief pulse of current from the power source will direct these holding forces either out the bottom of the magnet and into the load, or through the top of the magnet and into an internal steel "Keeper" plate. Once directed, the magnetic lines of force will remain in either the load or keeper without consuming energy until redirected. Power failure has no effect on Permadur Magnet capacity and will not cause loads to be released.



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## PURPOSE

The primary purpose of the Permadrur Plate/Disc/Skeleton Handling System covered by this instruction Manual is to load single plates on to high speed cutting tables and the Offload Disc Parts and Skeleton. The rated capacity of the System is **12,500 lbs. (150"W x 300"L x 7/16"- 9/16"Thick Primary Plate, 13'W x 26'L x 3/4", 137"W x 379"L x .728"Thick, and Upgraded 6/16 to handle 139-7/8"W x 356-15/16"L x .87"Thick Plate)**, with all magnets operating and in full contact with the mild steel plate. Please contact Permadrur if larger and/or heavier lifts are desired.

The Permadrur Lifting Magnet System covered by these operating instructions consists of 14 each Permadrur TP-2000 Lifting Magnets suspended from 14ea. Spring Suspension Assemblies on a 25' load beam.

The Permadrur Lifting Magnet System is equipped with an "On-Off" Safety Indicator Lighting panel, which allows the operator to select which magnets are to be utilized for the lift and to visually confirm proper magnet operation prior to making the lift. Actuation of the "ON" selector switch for each Magnet Row at the main control panel will turn the corresponding red light on verifying that the Magnet Row is intended for use in the lift. Actuation of the ON SYSTEM button on the pushbutton Pendant or Crane Pendant will turn the green lights on at the control panel when the selected magnets have attached to the Plate to be lifted. If the green light does not come on, the magnet is not attached and is not ready for lifting.

This System is suspended by a 4 Part Sling Assembly to support Single Hook Suspension. The Load Beam provides Manual Magnet Crossarm and Magnet movement. The System Controller supports collective offloading of Discs and Skeleton and then individual depositing of same in specific locations.



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## LIMITATIONS

Certain limitations apply to the use of the Permadur Lifting Magnet. These limitations are in part due to the special characteristics of the Permadur Magnet, but generally reflect the operating characteristics of any Lifting Magnet System.

- The Permadur Magnet will not operate unless a minimum of 50% of the area of the magnet poles is in contact with the material being lifted. This is 10" of the TP-2000 pole surface length. This can be multiple pieces as long as they add up to 10".
- The Permadur Lifting Magnet will not release its load unless the tension on the magnets lifting eye is removed and there is sufficient slack in the suspension to allow the magnet lifting eye to drop  $\frac{1}{2}$ ".
- Air gaps can cause severe derating of the lifting magnet (see chart in Lifting Magnet Derating section). Plates to be lifted must be swept clean of debris. Plate variation from flatness across the width of the plate must be less than  $\frac{1}{8}$ " for a 96" plate up to  $\frac{3}{4}$ " Thick. This allowable variation would be reduced linearly for plate of lesser width.
- Do not attempt to lift stacks of plate. This System has been designed to lift only the plate in contact with the Magnet. **Note:** For this application the tack welding of plates will enable two plate lifting.

### **WARNING:**

- Do not electric weld on plates in contact with magnets, as they will cause severe and permanent damage to the magnetic field.



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### OPERATING INSTRUCTIONS

- 1) Lift the load beam and wipe all poles clean. Any materials embedded or attached to the magnet poles should be removed.
- 2) Confirm that all Magnets are hanging in Plane ( $\pm 1/16"$ ), to insure proper load sharing between Magnets. Magnet bottom Poles, when Magnet is suspended in the OFF mode, should hang 1" below the bottom of the Load Beam Sit Down Legs to insure slack suspension when System is down on the Load.
- 3) Confirm that the Plate to be handled is within the design parameters of the System: **150"W x 300"L x 7/16"-9/16"Thick Primary Mild Hot Rolled Steel Plate and the resulting 2 Cut Discs and Skeleton.** Secondary Plate: 13'W x 26'L x 3/4"Thick and 137"W x 379"L x .728"Thick Plate and **139-7/8"W x 356-15/16"L x .87"Thick. Maximum Plate Weight; 12,500LBS** (at ambient Temperature). Plate should be supported in a flat, horizontal position.
- 4) Place the center line of the Magnet System on the center line of the plate to be lifted. Magnets Rows should be positioned on the load beam so that they are within 2' of the ends of the plate to be handled. Spacing between magnet rows should not exceed 8'. Magnets Rows #1 & #7, #2 & #6, and #3 & #5 should be positioned equidistant from the center line of the magnet System so that the System and load are balanced. Lower the System until the Magnet lifting poles (bottom of the Magnets) are in contact with the Plate to be lifted. Use all 14 Magnets for handling full plate. **NOTE: Magnets have been positioned from the Factory to specifically address the Primary Plate size of 150" x 300" and the resulting 2ea. Cut Discs and Skeleton**
- 5) Select those Magnet Rows (7ea.) to be used for the lift and move the corresponding Magnet Row selector Switches to the "ON" position at the main control panel. This will illuminate corresponding red lights indicating the Magnet Rows selected for use in the lift. **NOTE: Set all the Magnet Row Selector Switches to the ON position in order to take advantage of the Optional Pushbuttons on the Crane or System Pendant.**
- 6) On the System Pushbutton Pendant select whether the Crane Pushbutton Controls (**CRANE PB**) or Magnet System Pushbuttons (**SYSTEM PB**) will be used to activate the Magnet System.
- 7) Depress the **ON SYSTEM** button on the Crane or System Pendant to activate all the Magnets for Plate Handling.

- 8) Upon activating the **ON SYSTEM** button, observe that the green light is “LIT” for each magnet intended for use. **DO NOT MAKE A LIFT UNTIL THERE IS A CORRESPONDING GREEN LIGHT LIT FOR EVERY RED LIGHT THAT IS “LIT” ON THE SAFETY INDICATOR CONTROL PANEL. THIS INDICATES THAT EVERY MAGNET INTENDED FOR USE (RED LIGHT) HAS ATTACHED TO THE LOAD (GREEN LIGHT).**
- 9) Hold the control button in the “ON” position until the load has cleared the ground. At this time the “ON” button should be released.
- 10) Move the Magnet System and load to their destination and lower the Magnet System until the load has been lowered into place and the load beam is resting on its sit-down legs resulting in a slack suspension, which is required prior to magnet release of load.
- 11) Depress the magnet **OFF SYSTEM** button on the control pendant and hold until all green lights have gone out and the System has been lifted clear of the load.
- 12) If difficulty is encountered in releasing the load, repeat Steps #10 and #11. Contact Permadrur if System does not release load after steps #12.
- 13) To facilitate offloading Discs and/or Skeleton, two additional Control Buttons have been added to the Pendant. **SKEL ON, DISC OFF** enables the operator to release the Discs while retaining the Skeleton. **DISC ON, SKEL OFF** enables the operator to retain the Discs while releasing the Skeleton. Hold the Button until the retained Discs or Skeleton are lifted.



## OPERATING INSTRUCTIONS

- 1) Lift the load beam and wipe all poles clean. Any materials embedded or attached to the magnet poles should be removed.
- 2) Confirm that all the Magnets are hanging in Plane to insure proper Magnet load sharing.
- 3) Confirm that the load to be handled is within the System design parameters: **150"W x 300"L x 7/16"-9/16"Thick Primary Mild Hot Rolled Steel Plate and the resulting 2 Cut Discs and Skeleton.**  
Secondary Plates: 13"W x 26"L x  $\frac{3}{4}$ " Thick, 137"W x 379"L x .728"Thick and 139-7/8"W x 356-15/16"L x .87"Thick. **Maximum Weight: 12,500 lbs. (at Ambient Temp.)**
- 4) Place the center line of the Magnet System on the center line of the plate to be lifted. Magnet Rows should be positioned on the load beam so that they are within 2' of the ends of the plate to be handled. Spacing between magnet rows should not exceed 8'. Magnet rows #1 & #7, #2 & #6, and #3 & #5 should be positioned equidistant from the center line of the Magnet System, so that the System and load are balanced. Lower the System until the Magnet lifting poles (bottom of Magnets) are in contact with the plate to be lifted. Use all 14 Magnets for handling Full Plate. **NOTE: Magnets have been positioned from the Factory to specifically address the Primary Plate size of 150" x 300" and the resulting 2ea. Cut Discs and Skeleton.**
- 5) Select those magnets rows to be used for the lift and move the corresponding Magnet Row selector switches to the "ON" position at the main control panel. This will illuminate corresponding red lights indicating the magnet rows selected for use in the lift. **NOTE: Set all the Magnet Row Selector Switches to the ON position in order to take advantage of the Optional Pushbuttons on the Crane or System Pendant**
- 6) On the System Pushbutton Pendant select whether the Crane Pushbutton Controls (**CRANE PB**) or Magnet System Pushbuttons (**SYSTEM PB**) will be used to activate the Magnet System.
- 7) Depress the **ON SYSTEM** button on the Crane or System Pendant to activate all the Magnets for Plate Handling.
- 8) Upon activating the **ON SYSTEM** button, observe that the Green light is "LIT" for each magnet in the row(s) intended for use. **DO NOT MAKE A LIFT UNTIL THERE IS A CORRESPONDING TWO GREEN LIGHTS LIT FOR EVERY RED LIGHT THAT IS "LIT" ON THE SAFETY INDICATOR CONTROL PANEL. THIS INDICATES THAT EVERY MAGNET INTENDED FOR USE (RED LIGHT) HAS ATTACHED TO THE LOAD (GREEN LIGHT).**
- 9) Hold the control button in the "ON" position until the load has cleared the ground. At this time the "ON" button should be released.
- 10) Move the Magnet System and load to their destination and lower the Magnet System until the load has been lowered into place and the load beam is resting on its sit-down legs resulting in a slack suspension which is required prior to magnet release of load.
- 11) Depress the **OFF SYSTEM** button on the control pendant and hold until all Green lights have gone out and the System has been removed from the load.
- 12) If difficulty is encountered in releasing the load, repeat Steps #10 and #11. Contact Permadur if System does not release load after steps #12.
- 13) To facilitate offloading Discs and/or Skeleton, two additional control buttons have been added to the Pendant. **SKEL ON, DISC OFF** enables the operator to release the Discs while retaining the Skeleton. **DISC ON, SKEL OFF** enables the operator to retain the Disc while releasing the Skeleton. Hold the button until the retained Discs or Skeleton are lifted.

### PERMADUR Industries, Inc.

186 Route 206 South  
Hillsborough, NJ 08844  
[www.permadur.com](http://www.permadur.com)

PH(800)392-0146  
FAX(908)359-9773  
[info@permadur.com](mailto:info@permadur.com)

# SYSTEM PUSHBUTTON PENDANT





## ON SYSTEM



## DISC ON, SKEL OFF



## SKEL ON, DISC OFF





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## PERMADUR LIFTING MAGNET

### SAFETY CHECKLIST

#### **BEFORE EVERY LIFT.....**

- Clean and deburr magnet faces and clean surface of load.
- Check load weight and dimensions against maximum capacity figure.
- Check for proper positioning of magnets.
- Check that Safety Indicator Light is green for all magnets selected for attachment to load and hold Pendant "ON" button until load is suspended.

#### **DURING EVERY LIFT.....**

- Never carry load over yourself or others.
- Never lift unbalanced loads.
- Never leave suspended loads unattended.

#### **AFTER EVERY LIFT.....**

Hold the pendant "OFF" button until all magnets are removed from the load.

#### **MAINTENANCE.....**

Store Magnet System off the floor either on boards which support all lifting magnets or boards that support the Load Beam Sit Down Legs so that the Magnets are off the floor.

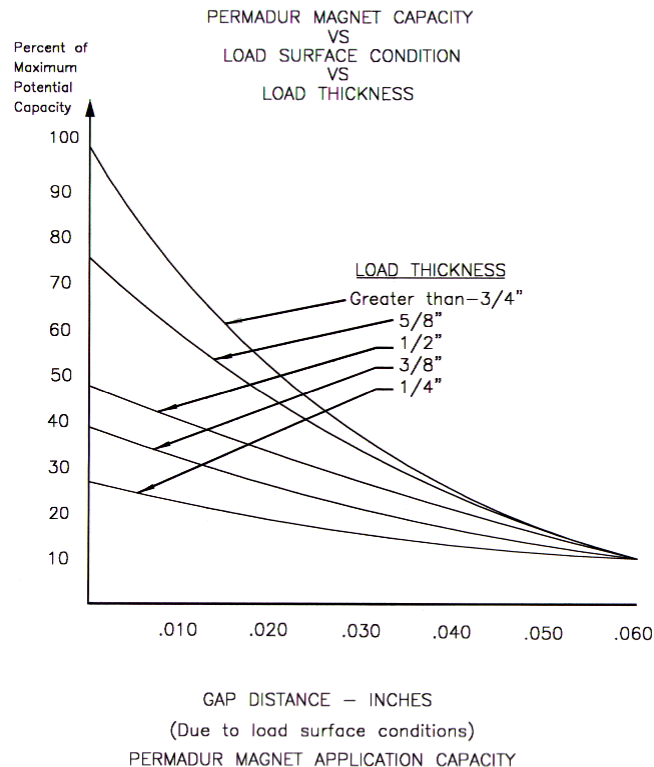


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## LIFTING MAGNET DERATING

The design rated capacity of the Series 714 Permadur System with 14 each TP-2000 Lifting Magnets is 12,500 lbs. (based on largest plate size of 139-7/8" x 356-15/16"x.87" Thick), with all fourteen (4) lifting magnets in full contact with the mild steel plate. Contact Permadur before handling larger or heavier plate sizes.

The Maximum potential capacity of each individual TP-2000 Lifting Magnet is 8000 lbs. on 3/4" Thick Mild Steel with a ground surface finish. The rated capacity of a individual TP-2000 is 2000 lbs. on 3/4" Thick Hot Rolled Steel with a 2 to 1 Safety factor. As part of this Series 714 System, on 3/4" Thick Hot Rolled Steel, each TP-2000 Lifting Magnet is rated at 895 lbs. with greater than 4 to 1 safety factor. Magnets must be positioned via the overhead crane and/or the magnet crossarms to provide Tri-Pole contact of each magnet with all parts to be lifted.

Also refer to the previous LIMITATIONS section prior to magnet system use.



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## INSPECTIONS AND MAINTENANCE

### EVERY LIFT INSPECTION:

- Check that magnet poles are clean and free from burrs. Magnet Poles can generally be cleaned with a brush or broom.
- Check condition of all beam and magnet suspension members.

### DAILY INSPECTION:

- All items for EVERY LIFT INSPECTION.
- Magnet Systems should be placed on wooden supports and magnet pole faces carefully inspected and cleaned to remove any materials imbedded into poles.
- System Safety Lights should be checked and replaced when necessary.
- Check all external wiring for loose connections and insulation damage.
- Check that the suspension assemblies of each magnet provide free operation of magnet (ON/OFF) when system is at rest.
- Check to insure that all magnets are hanging in plane.  $\pm 1/16"$

### QUARTERLY INSPECTION:

- All items for DAILY INSPECTION.
- Inspect all internal electrical connections for loosening, corrosion, insulation, and damage.
- Check System Power Supply for proper input voltage to controller (460VAC).
- Check System Controller for proper ON/OFF voltage (approx. 18VDC) to each Magnet.
- Check Magnet Coils for proper resistance (3.75Ohms) and grounds.
- Check for proper Proximity Switch operation.

### ANNUAL INSPECTION:

- All items for QUARTERLY INSPECTION.
- Load test of magnet unit.





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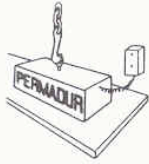
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## FIELD LOAD TEST

- 1) Review INSPECTION AND MAINTENANCE section.
- 2) Clean Magnet poles of burrs and debris as they will derate total lifting capacity.
- 3) Insure that all the Magnets are hanging in Plane  $\pm 1/16"$  to promote proper load sharing between Magnets.
- 4) Use a Plate of maximum length (356-15/16") and width (139-7/8") and **125% (1-1/8")** the thickness of maximum recommended Plate size. Solid Plate must be used for this Test, not a stack of plate welded together. Lifting this Plate will demonstrate that the System meets and exceeds ASME B30.20-1999 Specifications for Below-the-Hook Equipment Safety Factor.
- 5) Lift this plate 2"-3" per normal operating procedure. **Do not** suspend load over personnel or machinery.
- 6) Record date and results of test.



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## PERMADUR MAGNET REPAIR PROCEDURE

(CONTACT PERMADUR PRIOR TO STARTING AS THIS MAY VOID WARRANTY)

- 1) Detach lifting magnet from load beam by removing shackles.
- 2) Mark and disconnect coiled cord from lifting magnets at junction box on magnet.
- 3) Move load beam away from magnet to be repaired.
- 4) Mark and disconnect magnet coil wires from terminal board in magnet junction box. Straighten wires so that they can be pulled thru hole in magnet junction box when housing is removed.
- 5) Match mark lifting eyes, drive out roll pins, and remove lift eyes and rubber bellows.
- 6) Remove button head socket head screws from sides of housing. Spacer block and steel guards will drop out when all screws are removed from each side. Note configuration for re-assembly.
- 7) Carefully lift housing from magnet making sure coil lead wires feed through control box handle.
- 8) Mark top keeper plate orientation relative to magnet coil leads for proper re-installation as keeper may not be symmetrical.
- 9) Examine space between top of magnet sandwich and underside of keeper plate to determine what is preventing keeper from coming down.
- 10) Make a temporary reconnection of magnet control wires in coiled cord to magnet coil wires. Depress "OFF" button in pendant to see if problem still exists. If so, depress "ON" button and lift top keeper away from top of Magnet. Replace springs according to current red/blue spring arrangement. Replace top keeper in same orientation as it was when removed. **DO THIS BY HOLDING FORM TOP WITH LIFT EYES. DO NOT PUT FINGERS BETWEEN TOP KEEPER AND TOP OF MAGNET.**
- 11) Test that magnet is operational by depressing "OFF" button in pendant control and observe that top keeper moves down into contact with top of magnet sandwich. Press "ON" button to see that keeper moves up freely.



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## REPAIR PROCEDURE (CONT.)

- 12) Replace housing, spacers, guards, etc., with keeper in "UP" position. Be careful to pull coil wires through hole in magnet control box without damage.
- 13) Re-connect magnet and test.



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## How does a *PERMADUR* Electroperm Magnet work?

### PERMADUR PERMANENT MAGNET OPERATION

#### STEP 1

##### APPLYING MAGNET

Lower magnet to desired position on load. Load will not "jump" as magnetic field is stored in internal keeper.

#### STEP 2

##### ATTACHING MAGNET

Depress momentary "On" button and hold until internal keeper moves away from top of magnet. Release "On" button. Magnetic holding power has now been transferred from internal keeper to load by the pulse of power. No continuous current is required to maintain hold force.

#### STEP 3

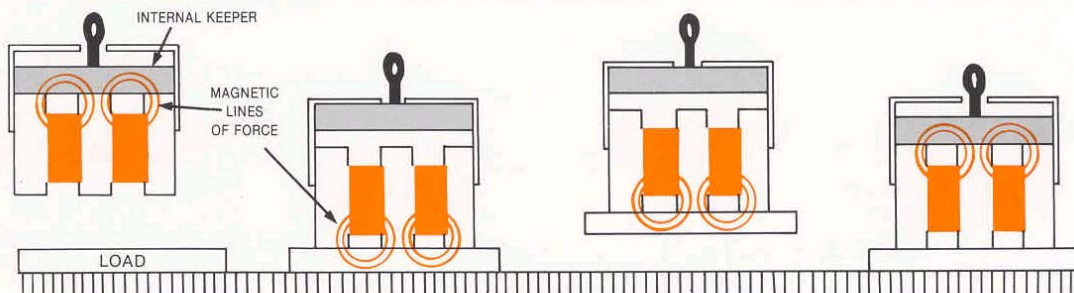
##### MOVING LOAD

Move load to desired location — **SAFE-LOAD FEATURE** — magnet cannot release suspended load even if "Off" button is accidentally depressed because keeper supports load and magnet weight and cannot return to top of magnet to absorb magnet holding power until tension is removed.

#### STEP 4

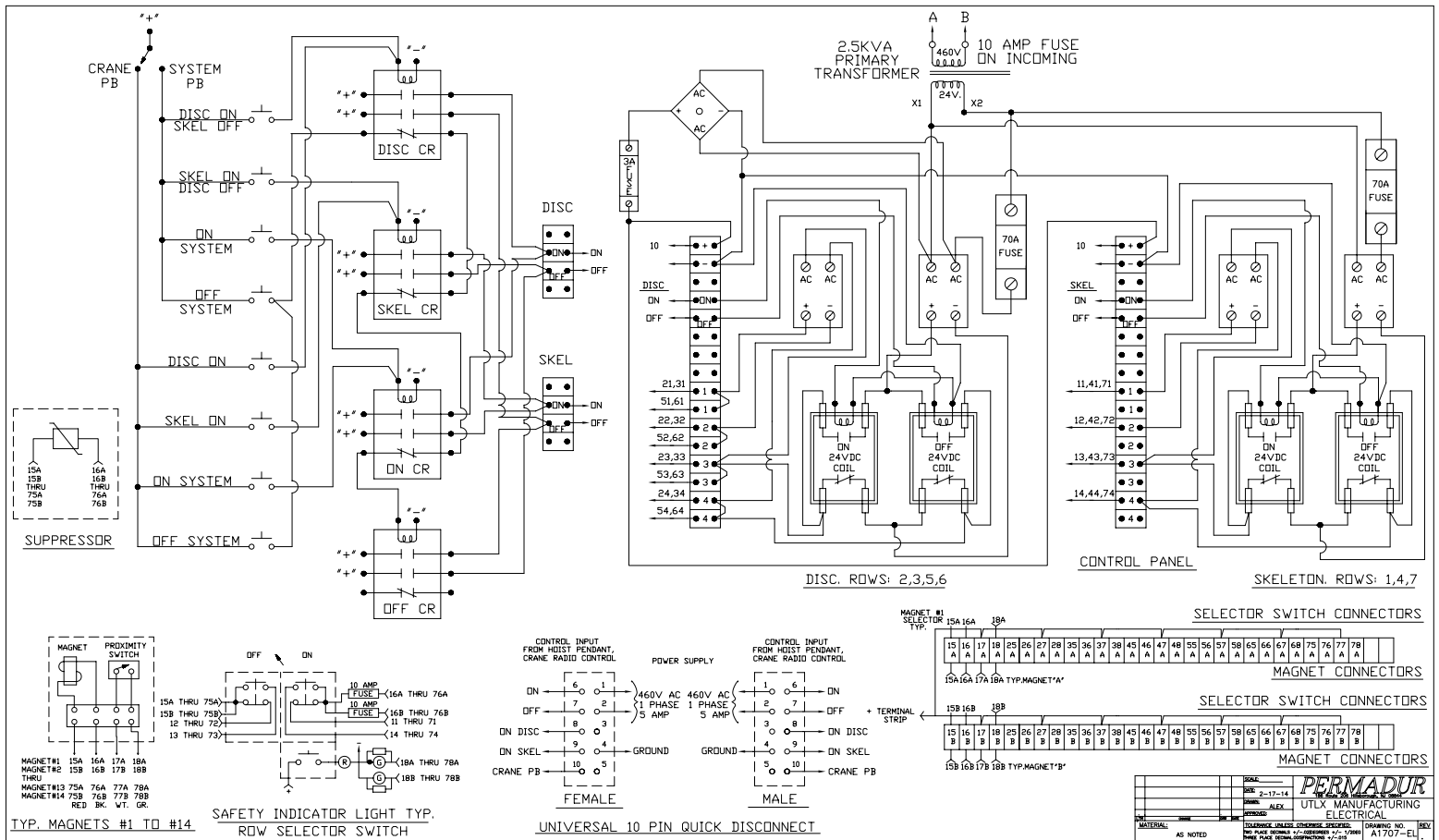
##### RELEASING LOAD

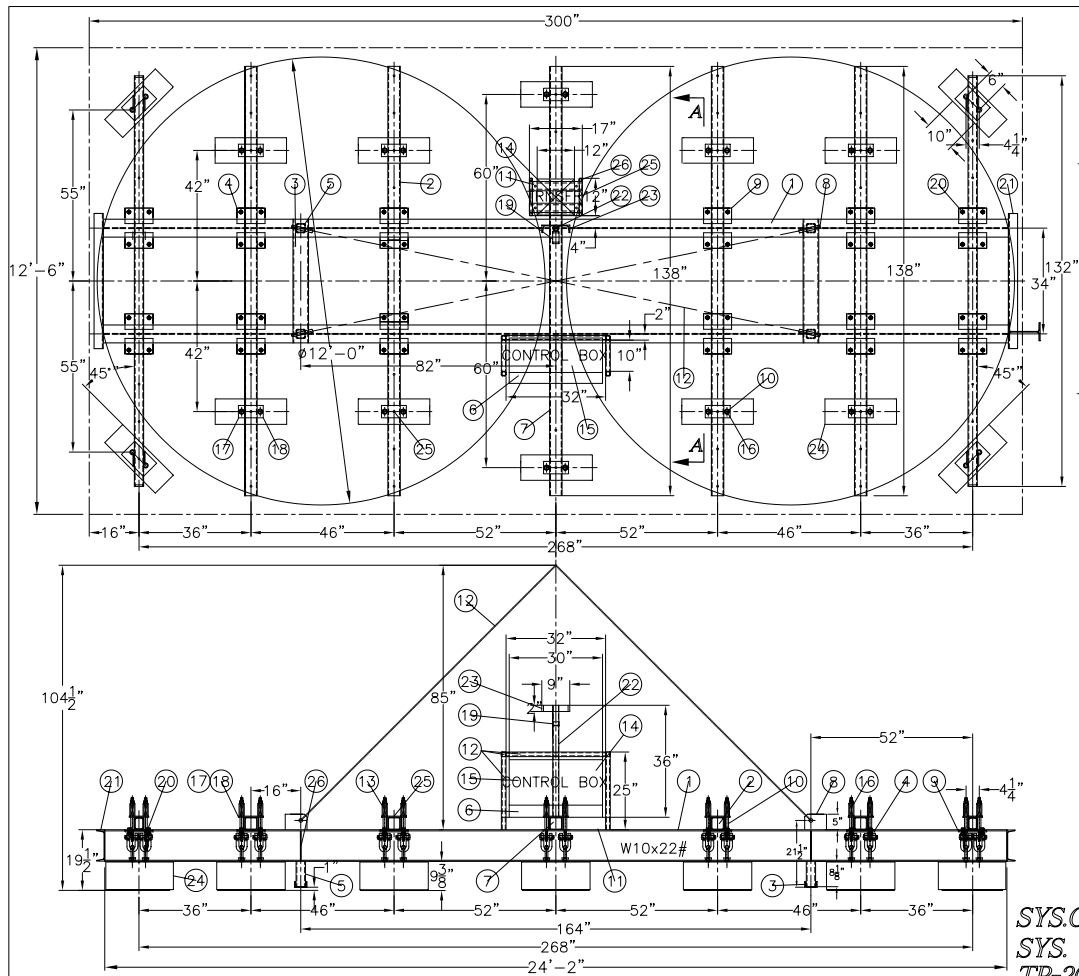
Lower load into place until magnet suspension is slack. Depress "Off" button until internal keeper returns to top of magnet to absorb magnetic holding power, releasing load.



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P/N	BILL OF MATERIALS	QTY
1	MAIN BEAM W10x22#x24'-2"LG.	2
2	CROSS TUBING 4"x4"x1/4"x138"LG.	4
3	LEG CHANNEL C4x5.4#x38"LG.	2
4	CLAMP PL.HRF.5/16"x2 1/2"x9"LG.	24
5	LEG TUBING 3"x3"x1/4"x8 1/8"LG.	24
6	EL.BOX SUPPORT L.2"x3"x1/4"x32"LG.	2
7	CENTRAL TUBING 4"x4"x1/4"x138"LG.	1
8	LIFTING LUG HRF.1 1/2"x6"x7"LG.	4
9	CLAMP PL. HRF. 1/2"x5"x9"LG.	24
10	1/4 SCHEDULE 40 PIPE 4"LG.	28
11	TRNSF. SUPPORT C3x4.1#x17"LG.	2
12	4 PARTS SLING SUSPENSIONS	1
13	SPRING #9-2016-26 SUSPENSION	28
14	2.5KVA TRANSFORMER	1
15	C16C30 CONTROL BOX	1
16	1 1/4 SCHEDULE 40 PIPE 4 1/4"LG.	28
17	SUSPENSION HRF.4"x1/2"x8"LG.	28
18	SUSPENSION HRF.4"x3/8"x2"LG.	28
19	CHAIN CHANNEL C4x5.4#x2"LG.	1
20	A325 3/4"DIA. BOLT, NUT, L/W	48
21	END CHANNEL C10x15.3#x40"LG.	2
22	CHAIN PIPE 1 1/2" Sch.40x36"LG.	1
23	CHAIN CHANNEL C9x13.4#x2"LG.	1
24	TP-2000 LIFTING MAGNET W10"SUSP.	14
25	A325 5/8"DIA. BOLT, NUT, L/W	14
26	CLUSSET HRF.3/8"x3"x0 3/8"LG.	4
27	TRNSF. TUBING 1.5"x1.5"x1/8"x137"x45deg.	4
28	TRNSF. TUBING 1.5"x1.5"x1/8"x137"x45deg.	2
29	BOX TUBING 1.5"x1.5"x1/8"x25"x45deg.	4
30	BOX TUBING 1.5"x1.5"x1/8"x137"x45deg.	2
31	BOX TUBING 1.5"x1.5"x1/8"x32"LG.	1

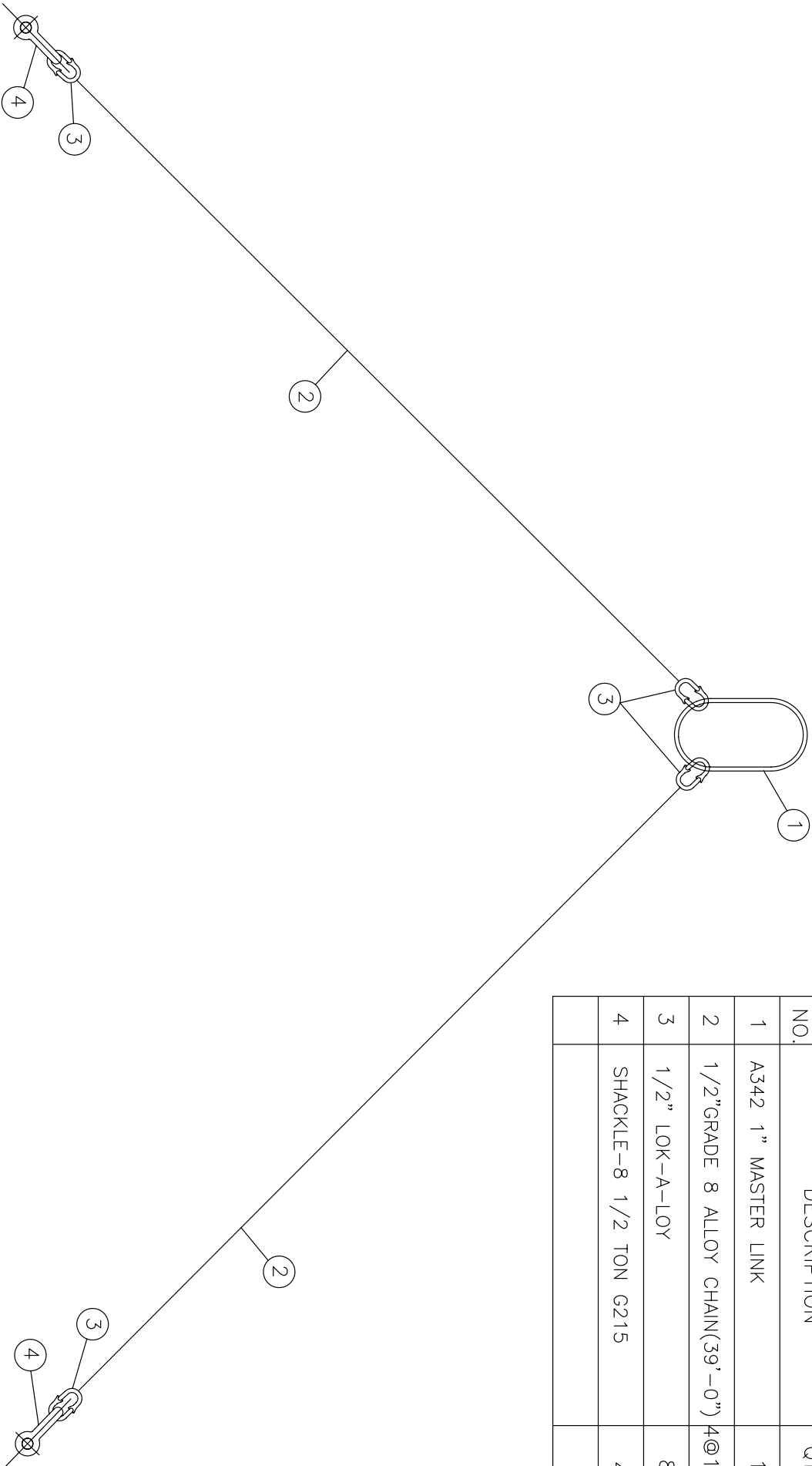
  

VIEW 'A-A'	VIEW 'B-B'

SYS.CAP. -11500#		PERMADUR	
SYS. WT. -8700#		186 ST. 304 304L VALLEYBORO, NJ 08841	
TP-2000-QTY-14		UTLX Manufacturing	
		DRAWING NO.1 REV	
		A1707-LB	

ITEM NO.	DESCRIPTION	QTY.
1	A342 1" MASTER LINK	1
2	1/2"GRADE 8 ALLOY CHAIN(39'-0") 4@117"	
3	1/2" LOK-A-LOY	8
4	SHACKLE-8 1/2 TON G215	4



4 PART SLING SUSPENSION

SCALE: _____	DATE: 2-25-14	186 RIZOE SOUTH, HILLSBOROUGH, NJ 08844
DRAWN: ALEX	APPROVED: _____	PERMADUR
UTLX	SLING SUSPENSION	UTLX
MATERIAL: AS NOTED	TOLERANCE: UNLESS OTHERWISE SPECIFIED: TWO PLACE DECIMALS +/- 1/32nds	DRAWING NO. A1707-SS
CHANGE: _____	REV: _____	REV: _____