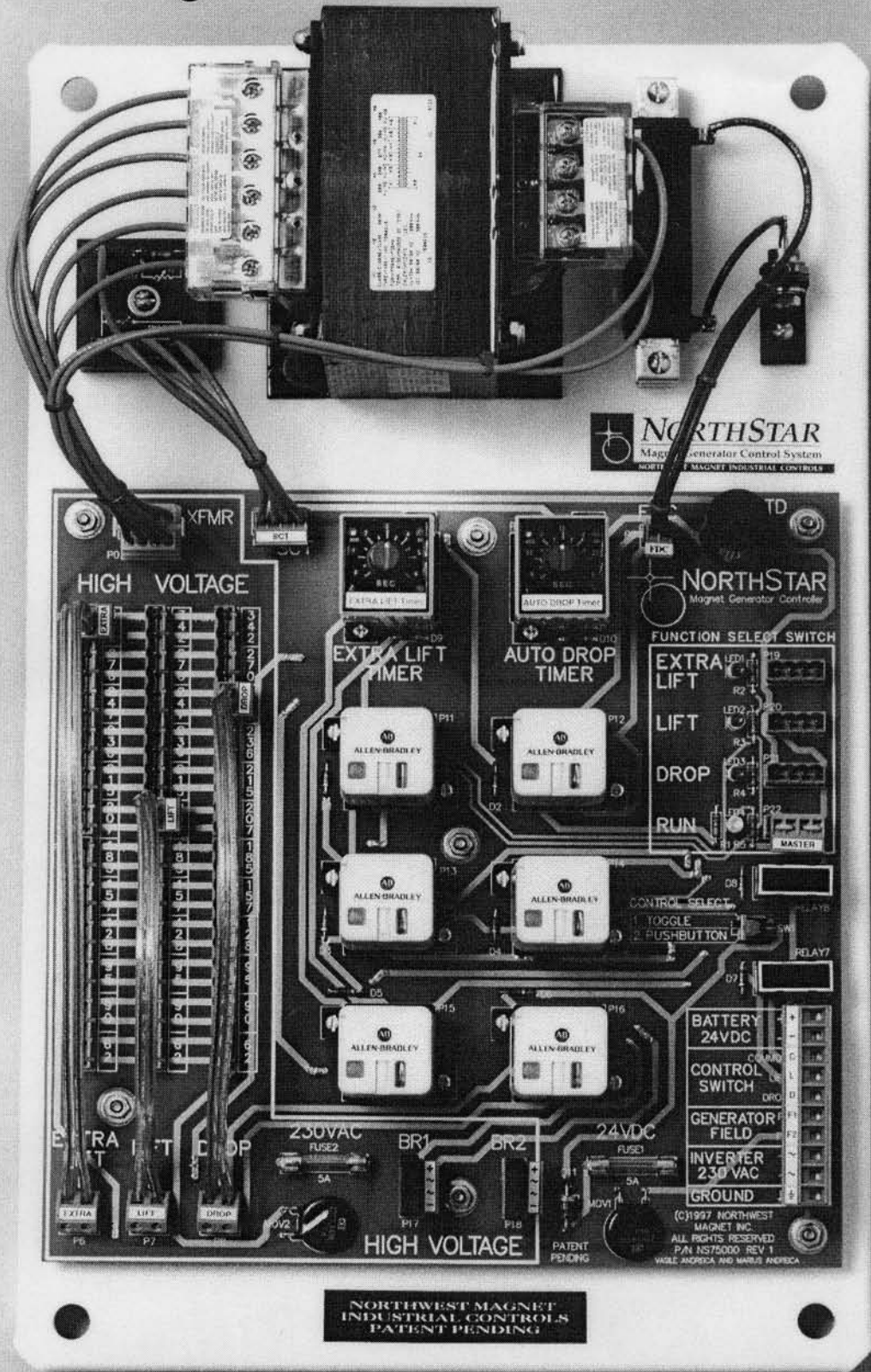


NORTHSTAR

Magnet Generator Controller Manual



NORTHWEST MAGNET INDUSTRIAL CONTROLS

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Thank you for placing your confidence in the NorthStar Magnet Generator Control System.

We're sure you'll find our NorthStar Magnet Generator Controller a significant improvement over conventional controllers in overall convenience and ease of operation. It is a comprehensive solution to expensive maintenance and down time imposed by other magnet controllers. Our goal was to produce a device that would increase productivity and reduce controller maintenance cost and downtime. The NorthStar Control System is the leading edge of magnet generator control technology and will provide a lifetime of trouble free operation.

Please take a few moments to read this Manual. You'll find the time well spent as it will significantly shorten your installation and set-up time. Also, please try out your new controller right away. Make sure it does the job you want it to do. It is important to us that you are totally satisfied.

Sincerely,

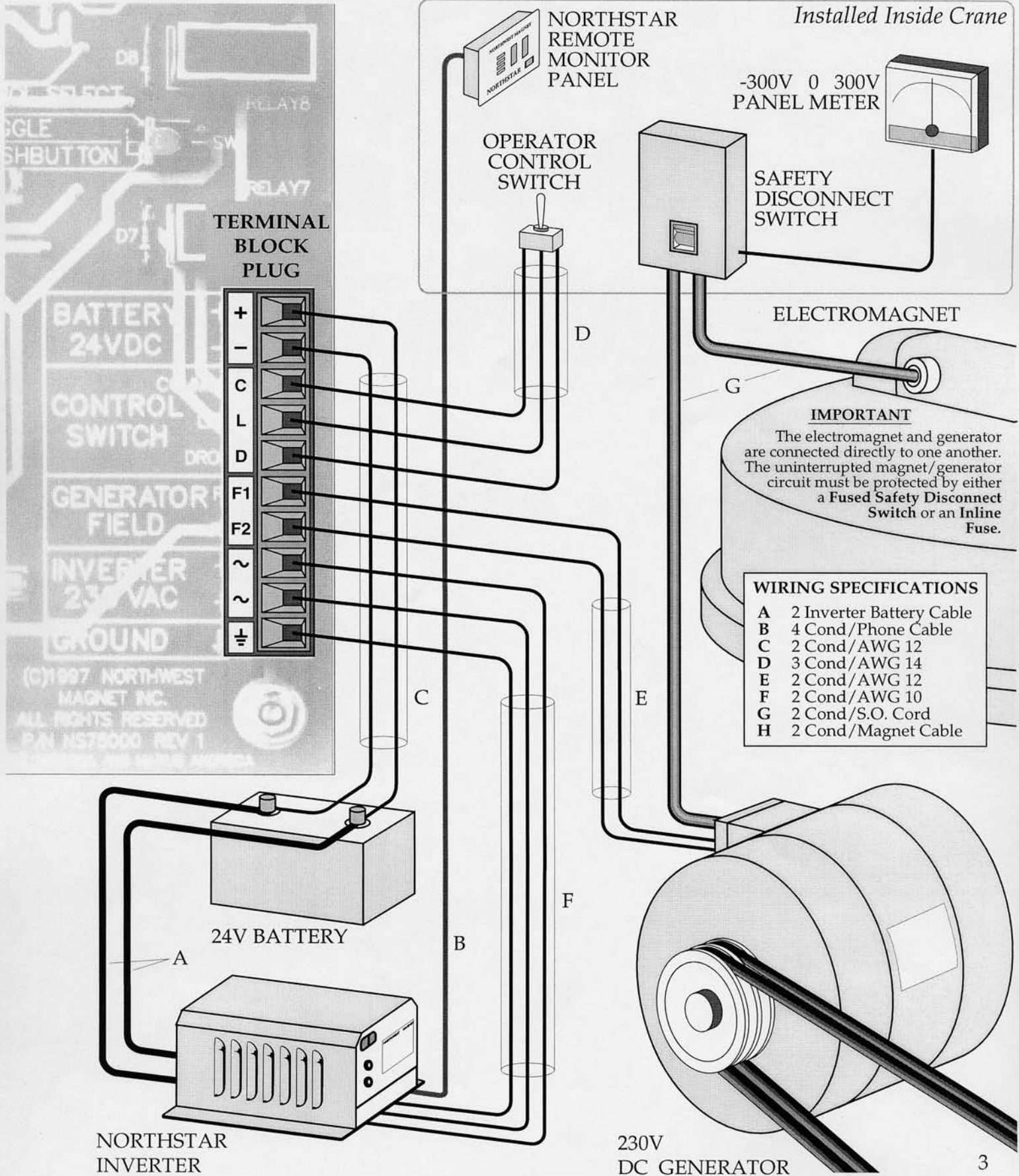


Vasile Andreica,
President, CEO
Northwest Magnet, Incorporated

In the past, using a magnet controller generally meant spending a great deal of time and money trying to keep it running. Conventional magnet controllers are constantly plagued by high voltage/current arcing that causes burnt contactors, insulators, and discharge resistors. High voltage and high current surges can cause costly controller damage and premature magnet failure.

At NORTHWEST MAGNET we have engineered a new concept in magnet generator controllers. Our revolutionary new product is called the NorthStar Magnet Generator Control System. This system eliminates all of the problems associated with conventional controllers and adds a level of functionality never before thought possible. Our control system does not use or need large contactors, varistors, discharge resistors or any other bypass circuitry. In our configuration the magnet circuit is never interrupted, thus eliminating high voltage surges. The control unit uses standard relays, timers and voltage regulating components to control the generator field. The generator acts as an amplifier to create power for the magnet. This system enhances the performance and life of your existing magnet and generator while enabling them to lift up to 30% more material.

The NorthStar's operating process is relatively simple. First, the control supercharges the magnet for a preset Extra Lift period. The Extra Lifting power allows the magnet to lift and hold material more aggressively. After the initial pick, the operating voltage is reduced. The reduced voltage Lift phase keeps the magnet and generator cooler which allows them to operate more efficiently and work longer without compromising lifting capacity. Following each lift, the Auto Drop feature cleans the magnet of magnetically charged material, without operator intervention. A Manual Drop function is also available to remove highly magnetized steel from the magnet. Our new control system offers easy installation, operation and maintenance. The NorthStar Magnet Generator Control System is the new standard in magnet controllers, designed to provide a lifetime of trouble free operation.



Installing your NorthStar Controller

KEY INSTALLATION POINTS

1. Observe proper polarity and input voltage when connecting the battery to the terminal block plug in controller.
2. Always use proper wire and connectors.
3. Keep the components (inside the enclosure) out of the elements and out of direct contact with water. Remember that the unit is a piece of electronics and should be treated accordingly.
4. Mount the unit away from flammable fumes.

LOCATION (Controller Installation)

1. Always mount the unit in a dry area, out of direct contact with water or spray.
2. You may mount the unit horizontally (on a shelf) or vertically (on a wall). It is recommended that the control be mounted vertically.
3. Allow several inches of clearance around the unit.

WARNING: Do not mount the unit in a gasoline powered engine compartment. Diesel engine compartments are acceptable locations, but take precautions to keep dirt and spray off the unit.

IMPORTANT: Your Northwest Magnet NorthStar Magnet Generator Controller should be installed in accordance with accepted practices for installation of industrial control equipment.

WIRING (Refer to the Installation Diagram on pg. 3 for Wiring Specifications)

CONNECTING THE 24V BATTERY (Controller Installation)

Observe the polarity and input voltage when connecting the battery to the controller. **Remember: This is a 24V controller and cannot operate on a 12V or 36V system.** Use a 12 AWG insulated wire to connect the positive battery terminal to terminal 1 on the Terminal Block Plug (labeled +). Connect the negative battery terminal to terminal 2 on the Terminal Block Plug (labeled -). The controller will not operate if the polarity is reversed.

INSTALLING AND WIRING THE CONTROL SWITCH (Controller Installation)

Option 1: TOGGLE CONTROL SWITCH (On/Off/Momentary On)

Install the control switch in the crane so that it is conveniently accessible by the operator. Use a 14 AWG, 3 conductor S.O. Cord (or equivalent) to connect the switch to the control. Connect Switch terminals COMMON, ON and MOMENTARY ON to terminal 3 (labeled C), terminal 4 (labeled L) and terminal 5 (labeled D) respectively, on the Terminal Block Plug.

Option 2: TWO PUSHBUTTON CONTROL SWITCHES

Requires 2 Normal Open Switches. The control switches in the crane should already exist. Use a 14 AWG, 3 conductor S.O. Cord (or equivalent) to connect the switch to the control. Connect a common wire from both Switches to terminal 3 (labeled C) on the Terminal Block Plug. Connect the remaining wires from the LIFT and DROP terminals on the Switches to the Terminal Block Plug at terminal 4 (labeled L) and terminal 5 (labeled D), respectively.

CONNECTING THE GENERATOR FIELD

Observe the polarity and wire size when connecting the controller to the generator field. Use a 12 AWG, 2 conductor S.O. Cord (or equivalent), to connect the generator field leads F1(+) and F2(-) to terminal 6 (F1) and terminal 7 (F2) respectively, on the Terminal Block Plug. The generator will not function properly if the polarity is reversed.

CONNECTING THE INVERTER

Use a 10 AWG, 2 conductor S.O. Cord (or equivalent), to connect the AC output Inverter leads to terminal 8 and terminal 9, on the Terminal Block Plug. This connection is not polarity sensitive.

CONNECTING THE GENERATOR TO THE ELECTROMAGNET

The magnet and generator can be connected directly through a fused Safety Disconnect Switch. Refer to the Safety Disconnect Switch Installation manuals when connecting the generator to the magnet directly. In the event that a Safety Disconnect Switch is not available, the magnet and the generator must be connected through an inline fuse. This protective circuit prevents the magnet and generator from damaging each other in case one fails.

Key NorthStar/Freedom Inverter Installation Points

1. Observe proper polarity when connecting the inverter to the battery.
2. Always use proper wire and connectors, keeping in mind that considerable amperage flows in the DC circuit. Fusing the positive DC cable is required.
3. Keep the inverter out of the elements and out of direct contact with water. Remember that the unit is a piece of electronics and treat it accordingly.
4. Mount the unit as close to the batteries as possible but not in the presence of flammable fumes or in an enclosed battery box.

LOCATION (Inverter Installation)

1. The connectors for the remote control and the chassis ground bonding lug, as well as one option for the AC wires, are located on the bottom of the unit. Be sure to make these connections before bolting the unit down.
2. Always mount the unit in a dry area, out of direct contact with water or spray.
3. You may mount the unit horizontally (on a shelf) or vertically (on a wall). If mounted vertically, you must orient the unit so that the switch and circuit breakers are facing up and the fan and battery cables are facing down.
4. Allow several inches of clearance around the unit and allow for a supply of fresh air to the cooling fan. Do not block any of the vents or louvers.
5. The mounting location should be as close to the batteries as possible. The battery cables can be extended, however each cable must not be over 10 feet in total length.

WARNING: Do not mount the unit in a gasoline powered engine compartment or in an enclosed battery box. Diesel engine compartments are acceptable locations, but take precautions to keep dirt and spray off the unit.

GROUNDING (Inverter Installation)

For safety purposes the chassis of the inverter must be connected to you AC ground system. The chassis ground bonding lug is located on the bottom of the unit. Use an 8 AWG green insulated wire, strip one end and secure it to the chassis ground bonding lug. This wire will connect to the ground in your system, typically the chassis. Make sure the connection is clean and tight. The battery cables are not connected to ground or the chassis of the inverter.

AC WIRING (Inverter Installation)

Use a screwdriver to remove the 2 screws which secure the AC wiring compartment cover plate. Inside you will see the compartment is divided into 2 sections, one labeled AC INPUT the other labeled AC OUTPUT.

Each compartment contains 3 pigtailed wires: black, white and green. In addition, 6 butt splice connectors in a plastic bag are provided. Only the AC output wires are used to connect to the controller.

Black = Hot or Line White = Neutral Green = Ground

Feed the 3 conductor AC output wire through the strain relief and into the appropriate compartment. You should have about 6 inches of individually insulated black, white and green wire. Strip about 1/4 inch of insulation off each conductor and connect to the Inverter pigtailed wires: Black to black, white to white and green to green. Use the butt splice crimp connectors provided and the proper crimp tool. Carefully and neatly tuck the wires into the AC wiring compartment. Replace the cover plate. Once the above steps are completed the unit can be bolted down.

WARNING !!! Do not connect the incoming AC from any source to the AC output of the inverter. This is known as backfeeding and may damage the unit.

REMOTE CONTROL WIRING (Inverter Installation)

The remote control is supplied with a 20 foot section of telephone cable for connection to the unit. Simply plug one end of the cable into the connector on the bottom of the unit and the other end into the back of the remote control panel. Routing the remote cable away from AC and DC wires will minimize the potential for interference which may affect the LED bar graphs.

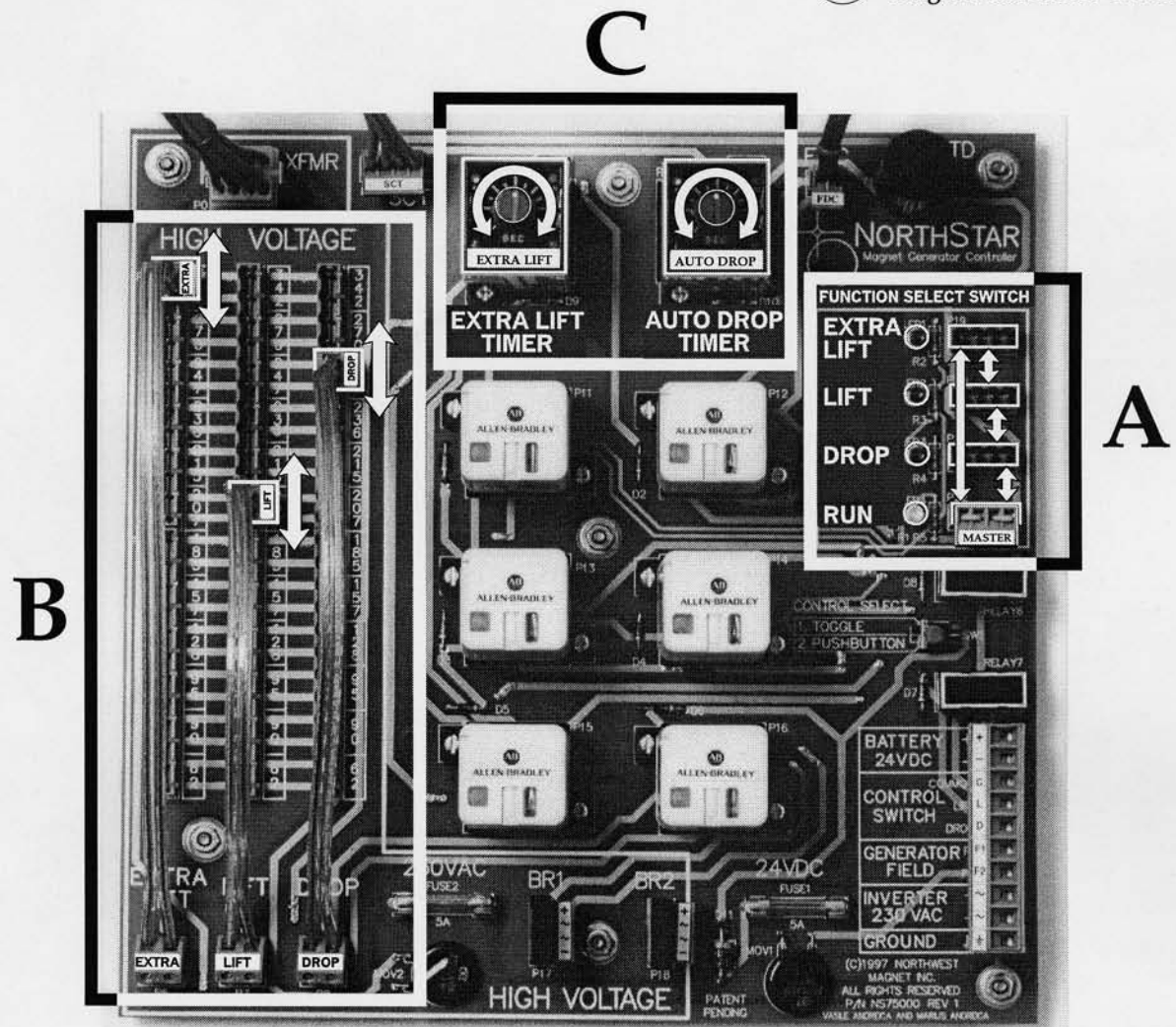
DC WIRING (Inverter Installation)

Two battery cables are provided with the unit. Both are black, the positive cable has a piece of red heat shrink insulation on the end. Keep in mind that high current will pass through the DC wiring. All wires must be properly sized and all connections clean and tight. The negative cable should be connected directly to the negative battery post. The positive battery cable must be fused and connected to the positive battery post. A spark may be generated when the final battery connection is made. This is normal and do not be alarmed, however, do not make the final connection in the presence of flammable fumes.

WARNING!!! The inverter is not DC reverse polarity protected. Be very careful to connect negative and positive correctly, otherwise damage will result.

BATTERY CABLE FUSING (Inverter Installation)

A fuse is required by the National Electrical Code to protect the positive battery cable. The fuse must be installed in the positive battery cable, within 18 inches of the battery. Recommended fuse: Littlefuse Class T JLLN 300 Amp.



- A Set the **EXTRA LIFT FUNCTION** by moving the master function select plug to the Extra Lift set position.
- B Move the Extra Lift voltage select plug to adjust the generator output voltage. Move the voltage select plug up to increase the voltage, or down to decrease the voltage. Adjust the plug until the 250V to 300V Extra Lift voltage is achieved. Do not exceed 300V, as this will overload the control.
- A After setting, return the master function select plug to the RUN position.
- C Set the Extra Lift Timer to the desired setting (3 to 6 seconds) required to magnetize and lift the material.
- A Set the **LIFT FUNCTION** by moving the master function select plug to the Lift set position.
- B Move the Lift voltage select plug to adjust the generator output voltage. Move the voltage select plug up to increase the voltage, or down to decrease the voltage. Adjust the plug until the 190V to 230V Lift voltage is achieved. Do not exceed 250V, as this will overheat and damage the magnet and generator.
- A After setting, return the master function select plug to the RUN position.

- A** Set the **AUTO DROP FUNCTION** by moving the master function select plug to the Auto Drop set position.
- B** Move the Auto Drop voltage select plug to adjust the generator output voltage. Move the voltage select plug up to increase the voltage, or down to decrease the voltage. Adjust the plug until the 150V to 250V Auto Drop voltage is achieved. Do not exceed 250V, as this will overheat and damage the magnet and generator.
- A** After setting, return the master function select plug to the RUN position.
- C** Set the Auto Drop Timer to 0.25 seconds and test the Auto Drop Function with some scrap. Increase the time until metal falls off cleanly. A longer time setting will not necessarily produce a cleaner drop. Take note that as the Auto Drop voltage is increased, the Auto Drop time becomes more critical and should be reduced accordingly.

The Lift operations are made up of Extra Lift and Lift Cycles.

The **EXTRA LIFT OPERATION** (for lifting scrap) begins when the Operator Control Switch is switched to the Lift position. The duration of the Extra Lift Cycle (0 to 6 seconds) is set by the Extra Lift Timer (C). The output voltage (250V to 300V) is set by the Extra Lift Voltage Select Lead (B). This cycle enables the magnet to lift and hold up to 30% more.

The **LIFT OPERATION** (for carrying/moving scrap) follows the Extra Lift Cycle and continues as long as the Operator Control Switch remains in the Lift position. The output voltage (190V to 230V) during the Lift cycle is set by the Lift Voltage Select Lead (B). By operating at a reduced voltage, the magnet and generator operate more efficiently at a cooler temperature. This increases the life and duty cycle of the magnet.

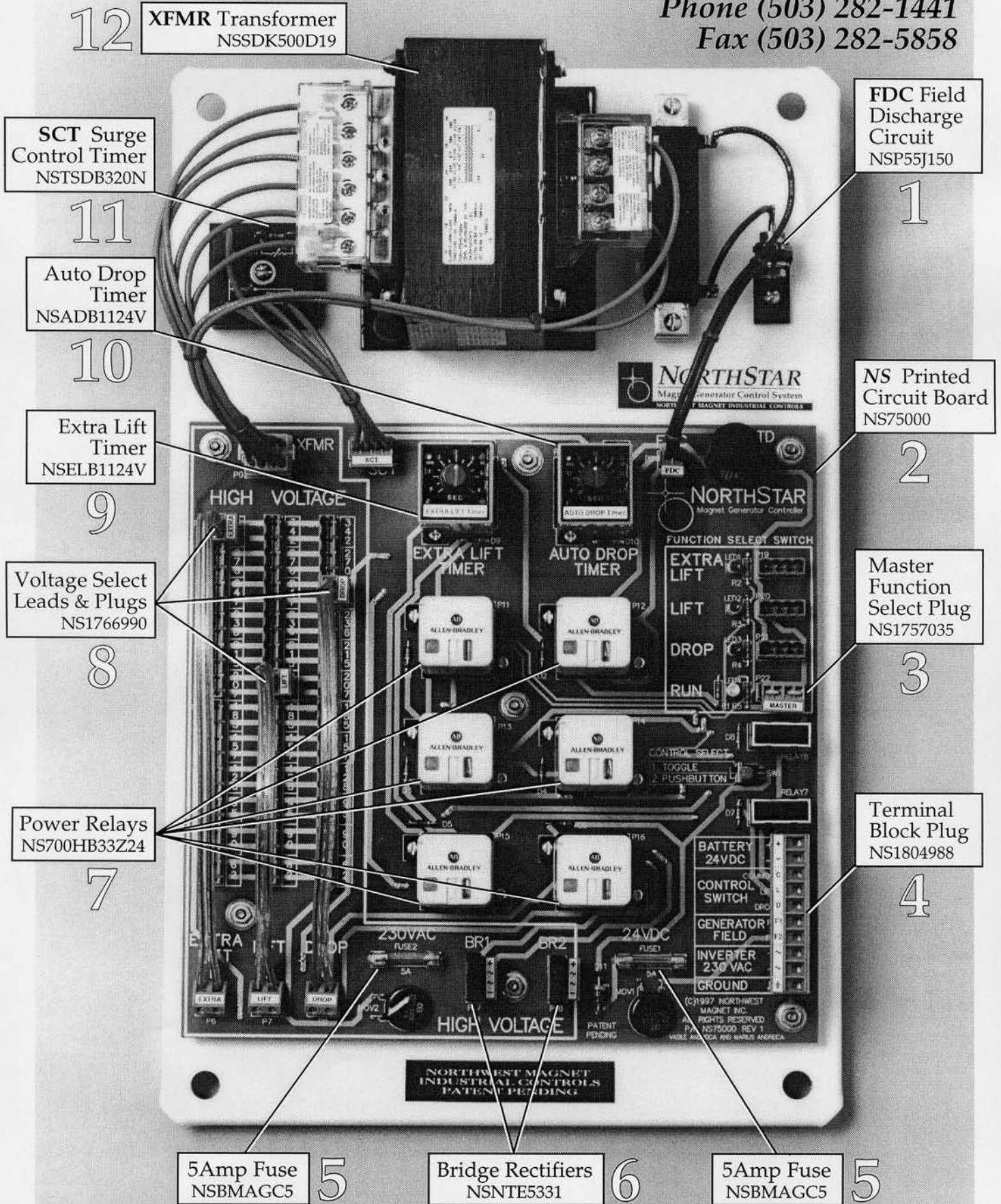
The Drop Operations are made up of Auto Drop and Manual Drop Cycles.

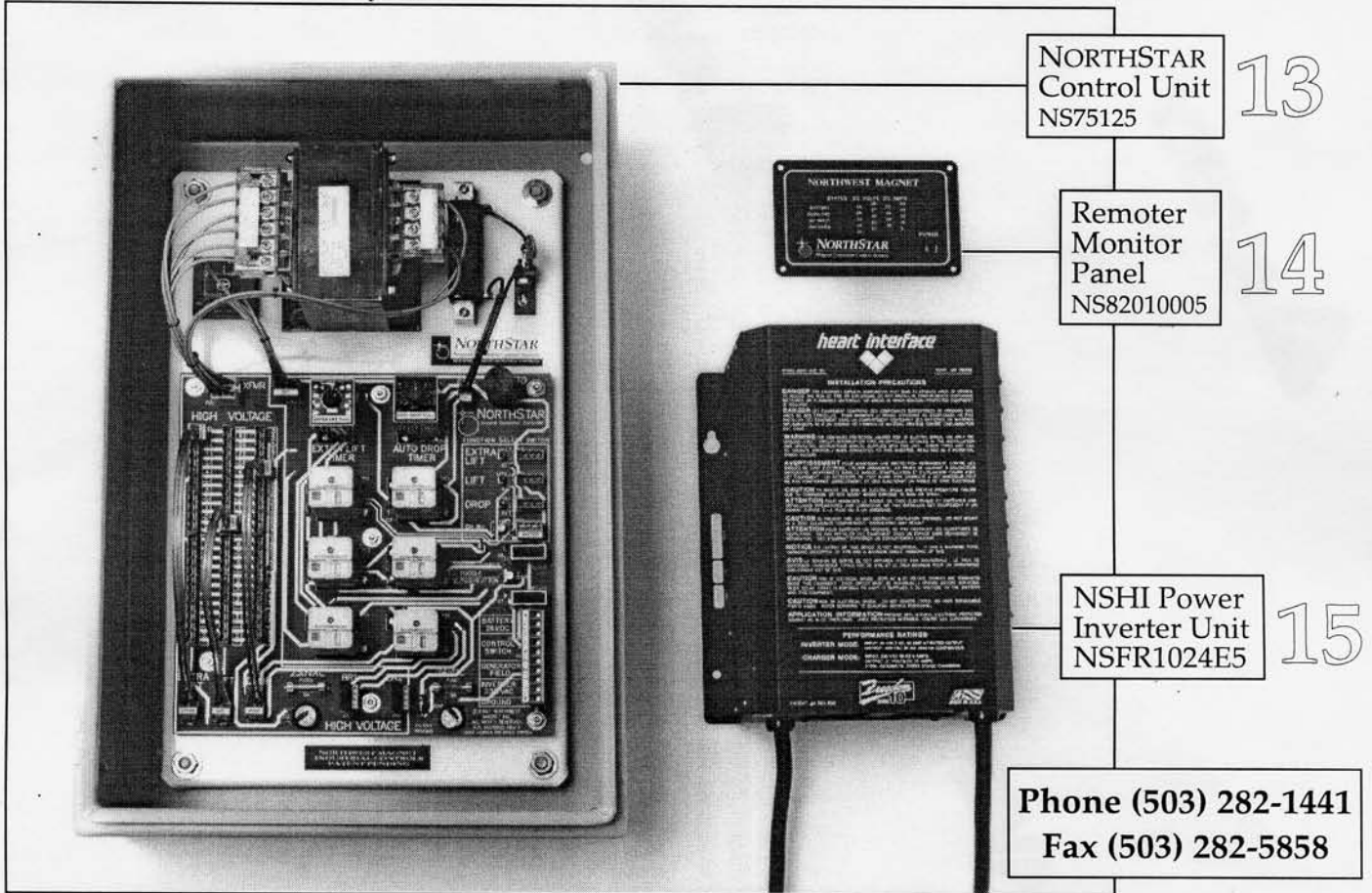
The **AUTO DROP OPERATION** follows the Lift cycle. It begins when the operator control switch is moved from the Lift position to the Off position. The duration of the Auto Drop cycle (0.5 to 2 seconds) is set by the Auto Drop Timer (C). The output voltage (100V to 250V) is set by the Drop Voltage Select Lead (B). Appropriate settings of the Auto Drop Timer and the Drop Voltage allow for consistent, clean drops without operator intervention.

The **MANUAL DROP OPERATION** is used to remove remaining magnetized material from the magnet that was not removed during the Auto Drop Cycle. This cycle begins when the Operator Control switch is moved from the Off position to the Drop position and should only be held until the material falls away from the magnet.

Replacement Parts

Phone (503) 282-1441
Fax (503) 282-5858





ITEM	PART NUMBER	DESCRIPTION	PRICE
1	NSP55J150	FDC Field Discharge Circuit	275.
2	NS75000 Complete	Printed Circuit Board (Complete)	3,450.
	NS75000 Basic	Printed Circuit Board (Basic PCB)	2,816.
3	NS1757035	Master Function Select Plug	20.
4	NS1804988	Terminal Block Plug	60.
5	NSBMAGC5	5 Amp Fuses (Box of 10)	10.
6	NSNTE5331	Bridge Rectifier Module	55.
7	NS700HB33Z24	Power Relays	45.
8	NS1766990	Voltage Select Leads and Plugs (Set of 3)	72.
9	NSELB1124V	Extra Lift Timer	125.
10	NSADB1124V	Auto Drop Timer	125.
11	NSTSDB320N	SCT Surge Control Timer	225.
12	NSSDK500D19	XFMR Transformer Assembly	495.
		XFMR Transformer Only	395.
13	NS75125	NORTHSTAR Controller	4,500.
14	NS82010005	Remote Monitor Panel	295.
15	NSFR1024E5	Power Inverter Unit	1,295.
	NS300VDCPM	300V DC Panel Meter	225.

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Initial Recommendations:

Check the fuses (and replace if necessary).

Replace bridge rectifiers in the event that the control does not operate.

Check to see that all components and plugs are in position and plugged in securely.

Problem	Possible Cause	Solution
Magnet does not Lift (No LIFT)	Bridge Rectifier BR1 Battery Inverter is turned OFF Open Magnet to Generator Circuit Relays P13 & P15 Field Discharge Circuit (FDC) Operator Control Switch Terminal Block Fuses & Suppressor Lift Voltage Setting	Replace Bridge Rectifier BR1 Check Battery Polarity, Voltage & Connections Reset Overloads & Turn Inverter ON Check Safety Disconnect Switch Replace Relays P13 & P15 Replace Field Discharge Circuit (FDC) Replace Operator Control Switch Replace TB1 & TB8 Fuses & Suppressor S1 Adjust Lift Voltage Setting (Page 8)
"Weak" Magnet (No EXTRA LIFT)	Extra Lift Timer Relay Relay 3L Extra Lift Voltage Setting	Adjust or Replace Extra Lift Timer Relay Replace Relay 3L Adjust Extra Lift Voltage Setting (Page 8)
Magnet will not Drop (No AUTO DROP)	Bridge Rectifier BR2 Auto Drop Timer Relay Relays P12, P14 & P16 Auto Drop Voltage Setting	Replace Bridge Rectifier BR2 Adjust or Replace Auto Drop Timer Relay Replace Relays P12, P14 & P16 Adjust Auto Drop Voltage Setting (Page 9)
Resistor is HOT	Field Discharge Circuit (FDC)	Replace Field Discharge Circuit (FDC)

If you have a problem with your NorthStar Magnet Generator Control system or have any questions regarding its use, contact our customer service center. Please notify us as soon as the problem is detected. You may void your warranty or cause unnecessary damage to the equipment if you try to repair the problem yourself.

In the event that the problem cannot be corrected on location, we recommend that you return the defective product to us. We will inspect it to determine whether the defect is under warranty. If it is, we will replace it or repair it free of charge. If the product is found to be in good working condition or is no longer under warranty, the customer will be billed for the inspection, repairs, and replacement parts.

Shipping Instructions:

- Make sure that the problem is found in the item that you send us and not elsewhere in the system. If we receive components that are in good working condition, a service fee will be charged to cover the cost of inspection and return shipment.
- Include your name, address, telephone number and proof of purchase.
- Include a note describing the symptoms and operating conditions at the time the problem arose.

- Send all repair items to: NORTHWEST MAGNET, INC.
 Attn. Repair Department
 508 N. Tillamook Street
 Portland, OR. 97227

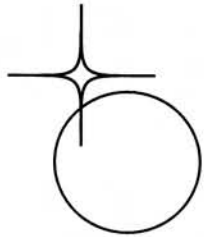
Customer Service: Phone (503) 282-1441 Fax (503) 282-5858

Warranty

This product is warranted against defects in material and workmanship for a period of one year from the date of shipment to the initial user. During the warranty period, Northwest Magnet Incorporated will, at its option, either repair or replace products which prove to be defective. However, if no defect is found in a returned item, a service charge will be made.

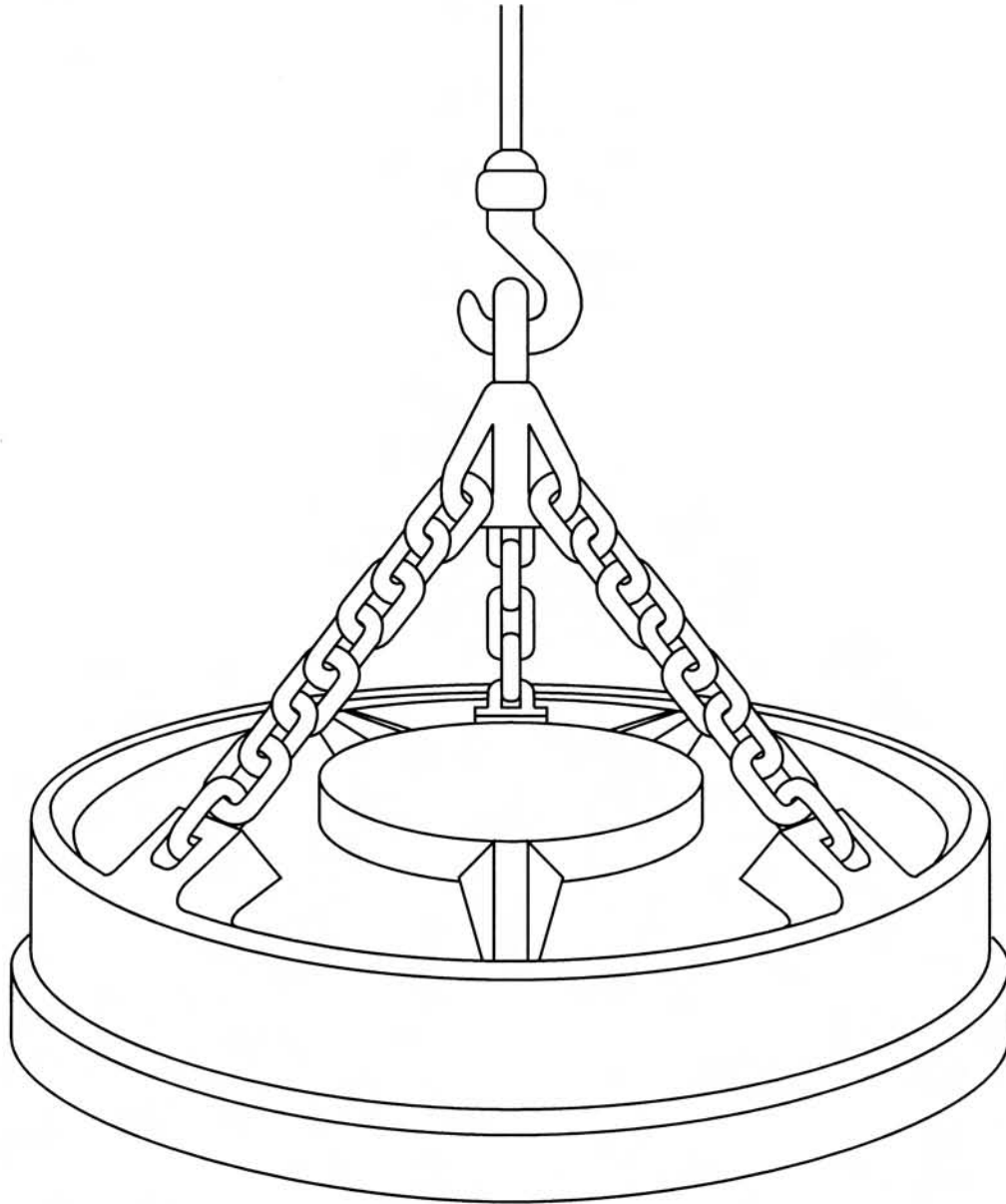
This warranty shall not apply to defects resulting from improper use, physical damage or inadequate maintenance by the Buyer. No other warranty is expressed or implied. Northwest Magnet Incorporated specifically disclaims the implied warranty of fitness for a particular purpose.

The remedies provided herein are the Buyer's sole and exclusive remedies. Northwest Magnet Incorporated shall not be liable for any direct, indirect, special, incidental or consequential damages, whether based on contract, tort, or any other legal theory.



NORTHSTAR

Magnet Generator Control System



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A Division of Northwest Magnet, Inc.

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Portland, Oregon 97227

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