Model M3460D

Diode Sharing Module
For Ride-Thru Applications

Customer Reference Manual

Web: www.bonitron.com ● Tel: 615-244-2825 ● Email: info@bonitron.com

Bonitron, Inc.
Nashville, TN

An industry leader in providing solutions for AC drives.

ABOUT BONITRON

Bonitron designs and manufactures quality industrial electronics that improve the reliability of processes and variable frequency drives worldwide. With products in numerous industries, and an educated and experienced team of engineers, Bonitron has seen thousands of products engineered since 1962 and welcomes custom applications.

With engineering, production, and testing all in the same facility, Bonitron is able to ensure its products are of the utmost quality and ready to be applied to your application.

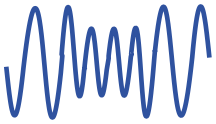
The Bonitron engineering team has the background and expertise necessary to design, develop, and manufacture the quality industrial electronic systems demanded in today's market. A strong academic background supported by continuing education is complemented by many years of hands-on field experience. A clear advantage Bonitron has over many competitors is combined on-site engineering labs and manufacturing facilities, which allows the engineering team to have immediate access to testing and manufacturing. This not only saves time during prototype development, but also is essential to providing only the highest quality products.

The sales and marketing teams work closely with engineering to provide up-to-date information and provide remarkable customer support to make sure you receive the best solution for your application. Thanks to this combination of quality products and superior customer support, Bonitron has products installed in critical applications worldwide.

AC Drive Options

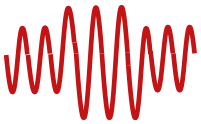
In 1975, Bonitron began working with AC inverter drive specialists at synthetic fiber plants to develop speed control systems that could be interfaced with their plant process computers. Ever since, Bonitron has developed AC drive options that solve application issues associated with modern AC variable frequency drives and aid in reducing drive faults. Below is a sampling of Bonitron's current product offering.

World Class Products



Undervoltage Solutions

Uninterruptible Power for Drives
(DC Bus Ride-Thru)
Voltage Regulators
Chargers and Dischargers
Energy Storage



Overvoltage Solutions

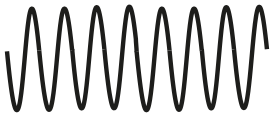
Braking Transistors
Braking Resistors
Transistor/Resistor Combo
Line Regeneration
Dynamic Braking for Servo Drives

Common Bus Solutions

Single Phase Power Supplies
3-Phase Power Supplies
Common Bus Diodes

Portable Maintenance Solutions

Capacitor Formers
Capacitor Testers



Power Quality Solutions

12 and 18 Pulse Kits

Green Solutions

Line Regeneration

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Table of Contents

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1. INTRODUCTION

1.1. WHO SHOULD USE

This manual is intended for use by anyone who is responsible for integrating, installing, maintaining, troubleshooting, or using this equipment.

Please keep this manual for future reference.

1.2. PURPOSE AND SCOPE

This manual is a user's guide for the Model M3460D Diode Sharing Module. It will provide the user with the necessary information to successfully install, integrate, and use the M3460D module in a variable frequency AC drive system.

In the event of any conflict between this document and any publication and/or documentation related to the AC drive system, the latter shall have precedence.

1.3. MANUAL VERSION AND CHANGE RECORD

The part numbering scheme for the M3460D was revised in Rev 01.

CE requirements for the M3460D are met in Rev 02.

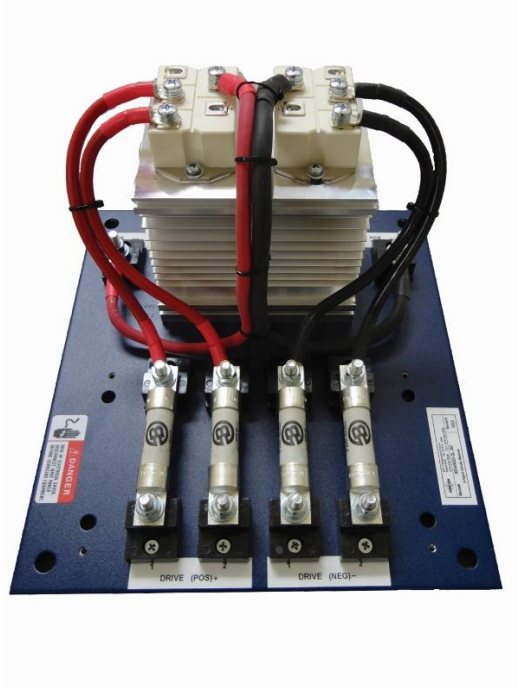
Manual template was updated in Rev 02a.

Section 2, Table 3-1, Table 6-1 were updated and Figure 6-8 was included in Rev 02b.

Updated figure 6-7, and dimensions in table 2-1.

Updated product chassis in revision 02d.

Figure 1-1: Typical M3460D



1.1. SYMBOL CONVENTIONS USED IN THIS MANUAL AND ON EQUIPMENT

	Earth Ground or Protective Earth
	AC Voltage
	DC Voltage
 **DANGER!**	DANGER: Electrical hazard - Identifies a statement that indicates a shock or electrocution hazard that must be avoided.
 **DANGER!**	DANGER: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.
 **CAUTION!**	CAUTION: Identifies information about practices or circumstances that can lead to property damage, or economic loss. Attentions help you identify a potential hazard, avoid a hazard, and recognize the consequences.
 **CAUTION!**	CAUTION: Heat or burn hazard - Identifies a statement regarding heat production or a burn hazard that should be avoided.

2. PRODUCT DESCRIPTION / FEATURES

Bonitron's M3460D Diode Sharing Modules are designed to offer system integrators a low cost solution for using a DC Bus Ride-Thru Module (RTM) with multiple fixed bus Variable Frequency Drives. The modules provide isolation for positive current flow to the drive.

Please see the Application Notes in Section 7 for additional information.

2.1. RELATED PRODUCTS

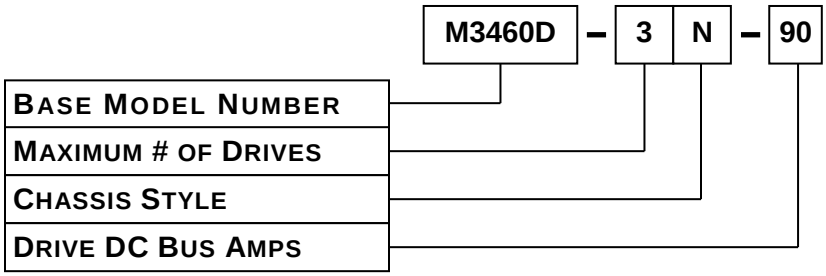
M3460R Ride-Thru Voltage Regulator provides Sag or Full Outage Protection for Variable Frequency Drives.

M3460RD Impedance Module for Sag Ride-Thru Applications.

M3345CBM Common Bus Module.

2.2. PART NUMBER BREAKDOWN

Figure 2-1: Example of M3460D Part Number Breakdown



BASE MODEL NUMBER

The Base Model Number for Ride-Thru Diode Sharing Modules for use with M3460 Booster Modules is M3460D.

MAXIMUM # OF DRIVES

A numeral indicates the Maximum Number of Drives allowed in this configuration.

CHASSIS STYLE

The Chassis Style is determined by the configuration of the module. This is not a selection, but an indicator of the chassis size.

Table 2-1: Chassis Codes

CHX CODE	TYPE AND SIZE (H x W x D)
H	8.5 x 8.5 x 5.5"
J	8.5 x 15.0 x 5.5"
L	13.0 x 12.0 x 8.0"
N	14.0 x 15.0 x 8.0"
P4	15.0 x 24.0 x 8.0"
P6	15.0 x 24.0 x 8.0"

DRIVE DC BUS AMPS

The Drive DC Bus Amps Rating indicates the current rating of each individual drive. This Rating is entered directly into the part number and will be either 2 or 3 digits.

2.3. GENERAL SPECIFICATIONS

Table 2-2: General Specifications Chart

PARAMETER	SPECIFICATION
Voltage	230 VAC, 460 VAC (Please consult with Bonitron regarding special requirements)
Current Input Ratings	85, 170, 255, 340, 425
Current (each output)	Up to 90 amps
Maximum Run Time	4 minutes
Connections	Drive DC bus DC bus to Ride-Thru Module
Fusing	Individual bus connections Common DC bus
Operating Temperature	5°C to 40°C
Storage Temperature	-20ºC to +65ºC
Humidity	Below 90% non-condensing
Atmosphere	Free of corrosive gas and conductive dust

2.4. General Precautions and Safety Warnings

DANGER!

- **High voltages may be present!**
- **Never attempt to service this product without first disconnecting power to and from the unit!**
- **Always allow adequate time for residual voltages to drain before removing the enclosure cover!**
- **FAILURE TO HEED THESE WARNINGS MAY RESULT IN SERIOUS BODILY INJURY OR DEATH!**

CAUTION!

- **Certain components within this product may generate high ambient temperatures during operation.**
- **Always allow ample time for the unit to cool before attempting service on this product.**
- **Before attempting installation or removal of this product, be sure to review all AC drive documentation for pertinent safety precautions.**
- **Installation and/or removal of this product should only be accomplished by a qualified electrician in accordance with National Electrical Code or equivalent regulations.**

ANY QUESTIONS AS TO APPLICATION, INSTALLATION OR SERVICE SAFETY SHOULD BE DIRECTED TO THE EQUIPMENT SUPPLIER.

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3. INSTALLATION INSTRUCTIONS

3.1. PRODUCT INSPECTION

Upon receipt of this product, please verify that the product received matches the product that was ordered and that there is no obvious physical damage to the unit. If the wrong product was received or the product is damaged in any way, please contact the supplier from which the product was purchased.

3.2. SITE SELECTION

- All units require adequate protection from the elements. Open frame modules must be mounted within enclosures of suitable rating for the environment.
- Adequate clearance should be allowed for easy access to terminals. This will facilitate inspection and maintenance.
- Sufficient circulation of clean, dry air should be provided. Ambient temperatures should not exceed +40°C (+104°F) nor be less than 0°C (+32°F) and non-condensing. Ambient air should not be contaminated with harmful chemical vapors or excessive dust, dirt, or moisture.
- The unit will require a minimum clearance of three (3) inches above and below it to allow for proper airflow for cooling. Avoid mounting the unit with its air intake near heat sources.

3.3. MOUNTING

Once the installation site has been selected as outlined above, the unit should be mounted in place.

Mounting holes should be drilled and mounting studs or anchors installed before positioning the Diode Sharing Module. Once the studs or bolts are in place the module can be hung in position. Be sure all mounting hardware is tightened securely.

Refer to Section 6 of this manual to determine the correct mounting dimensions and provisions for the unit.

3.4. WIRING AND CUSTOMER CONNECTIONS

3.4.1. POWER WIRING

WARNING!

Only qualified electricians should perform and maintain the interconnection wiring of this product. All wiring should be done in accordance with National Electrical Code or equivalent regulations.

Wire size should be selected in accordance with local codes, according to the current rating of the braking transistor. In general, the wire type should be selected by the nominal system AC voltage and the current rating of the module.

Table 3-1: Power Wiring Specifications

CHASSIS	TERMINAL	TORQUE
H, J	Ride-Thru terminal +/-	182 lb-in
	Drive terminal +/-	20 lb-in
L, N, P	Ride-Thru terminal +/-	182 lb-in
	Drive terminal +/-	182 lb-in

3.4.1.1. RIDE-THRU CONNECTION

The DC bus input should be connected to the output of the Ride-Thru module.

Make sure that the DC bus connection polarity is correct. Improper polarity connections carry a high risk of damaging drive equipment if energized.

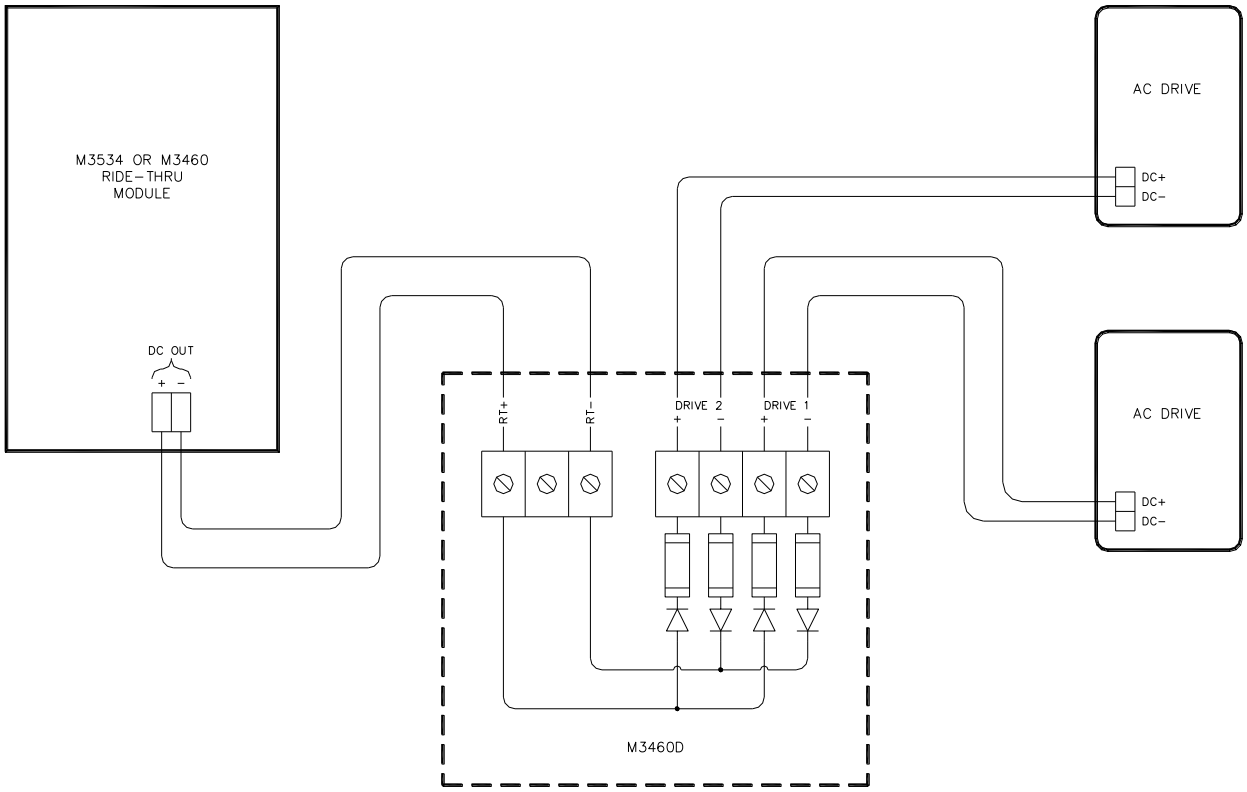
3.4.1.2. DRIVE CONNECTION

Some drives have a connection to an internal braking transistor. Do **NOT** use this connection. Connect **only** to the DC bus terminals. See the operation manual for your drive.

Make sure that the DC bus connection polarity is correct. Improper polarity connections carry a high risk of damaging drive equipment if energized.

3.5. TYPICAL CONFIGURATIONS

Figure 3-1: Typical Field Wiring for M3460 Booster System



4. OPERATION

4.1. FUNCTIONAL DESCRIPTION

The Diode Sharing Module isolates the DC bus connections of multiple drives to keep from generating circulation currents in the AC bridges of the drives. This ensures that the input bridges of each drive do not supply power to other drives in the network, or allow circulating currents between drives. These currents can cause bridge overheating and damage to the drives.

4.2. FEATURES

These modules can come with integral fusing for systems that require added protection of the DC bus.

4.3. STARTUP

4.3.1. PRE-POWER CHECKS

Ensure that all connections are tight, DC bus polarity is correct, and that the drives are connected to the proper terminals. Check for exposed conductors that may lead to inadvertent contact or shorting. Ensure that the current rating of the module is suitable for the application.

4.3.2. STARTUP PROCEDURE AND CHECKS

- Check the DC Bus at the RT+ and RT- links, and make sure the polarities are correct.
- Check each drive + and – connection, and make sure they are correct.
- Cross connection of the drive busses can cause catastrophic damage to the drives or the Ride-Thru Module.
- Make sure the incoming line voltage is within tolerance of the drive system and the diode sharing module.
- Apply power to the drive system.
- Load the drive system and check for circulating currents between the drives using a clamp on ammeter at the drive + and – terminals. This current should be zero unless the drives are being supplied by the Ride-Thru Module.

4.4. OPERATIONAL ADJUSTMENTS

There are no adjustments necessary to these modules.

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5. MAINTENANCE AND TROUBLESHOOTING

Repairs or modifications to this equipment are to be performed by Bonitron approved personnel only. Any repair or modification to this equipment by personnel not approved by Bonitron will void any warranty remaining on this unit.

5.1. TROUBLESHOOTING

5.1.1. CIRCULATING CURRENTS BETWEEN DRIVES

Make sure the connections are correct between the drives and the Ride-Thru Module. If one drive is connected to the Ride-Thru Module input, circulating currents can occur.

5.1.2. HEATSINK GETS EXCESSIVELY HOT OR DRIVES DO NOT BEHAVE PROPERLY DURING NORMAL OPERATING CONDITIONS

Make sure that the connections are correct. Heat can be caused by circulating currents between the drives.
Make sure the Ride-Thru Module is not operating in the BOOST mode during normal conditions. See the Ride-Thru manual for more information on that equipment.

5.1.3. GROUND FAULTS

When using a diode isolation module with several drives and a single Ride-Thru, some drives may trip on ground faults depending on the ground fault sensing scheme and sensitivity. If this occurs, a separate ground fault detector on each motor output may be needed.

5.2. TECHNICAL HELP – BEFORE YOU CALL

If possible, please have the following information when calling for technical help:

- Serial number of unit
- Name of original equipment supplier
- Brief description of the application
- Drive and motor hp or kW
- The line to line voltage on all 3 phases
- The DC bus voltage
- KVA rating of power source
- Source configuration Wye/Delta and grounding

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6. ENGINEERING DATA

6.1. RATINGS CHARTS

Table 6-1: M3460D Diode Ratings

PART NUMBER	NOMINAL HP		NUMBER OF DRIVES	DRIVE AMPS	CONT. CURRENT RATING	PEAK HEATSINK RATING	FUSES
	230V	460V					
M3460D-3H-10	3	5	3	10	30 A	30 W	ATM-10
M3460D-6J-10	3	5	6	10	30 A	60 W	ATM-10
M3460D-3H-30	10	20	3	30	30 A	90 W	A60Q30
M3460D-6J-30	10	20	6	30	30 A	180 W	ATM-30
M3460D-2L-60	20	40	2	60	50 A	120 W	FWP-60
M3460D-3L-60	20	40	3	60	50 A	180 W	FWP-60
M3460D-4P4-60	20	40	4	60	100 A	240 W	FWP-60
M3460D-6P6-60	20	40	6	60	100 A	360 W	FWP-60
M3460D-2N-90	30	60	2	90	100 A	180 W	FWP-100
M3460D-3N-90	30	60	3	90	100 A	270 W	FWP-100
M3460D-2P2-200	100	200	2	200	200 A	560 W	FWP-200

6.2. WATT LOSS

Watt losses listed are figured at full load. Losses occur and heat is generated only when the Ride-Thru is active. Ensure that enclosure cooling is adequate based on the duty cycle of the attached Ride-Thru Module. Maximum duty cycle for M3460 Diode Sharing Modules is 1%.

Table 6-2: M3460D Watt Loss

PART NUMBER	CONT. HEATSINK RATING	PEAK HEATSINK RATING	WATT LOSS
M3460D-3H-10	30 W	30 W	84W
M3460D-6J-10	30 W	60 W	84W
M3460D-3H-30	30 W	90 W	84W
M3460D-6J-30	30 W	180 W	84W
M3460D-2L-60	50 W	120 W	140W
M3460D-3L-60	50 W	180 W	140W
M3460D-4P4-60	100 W	240 W	280W
M3460D-6P6-60	100 W	360 W	280W
M3460D-2N-90	100 W	180 W	280W
M3460D-3N-90	100 W	270 W	280W

6.3. DIMENSIONS AND MECHANICAL DRAWINGS

Figure 6-1: Typical "H" Chassis

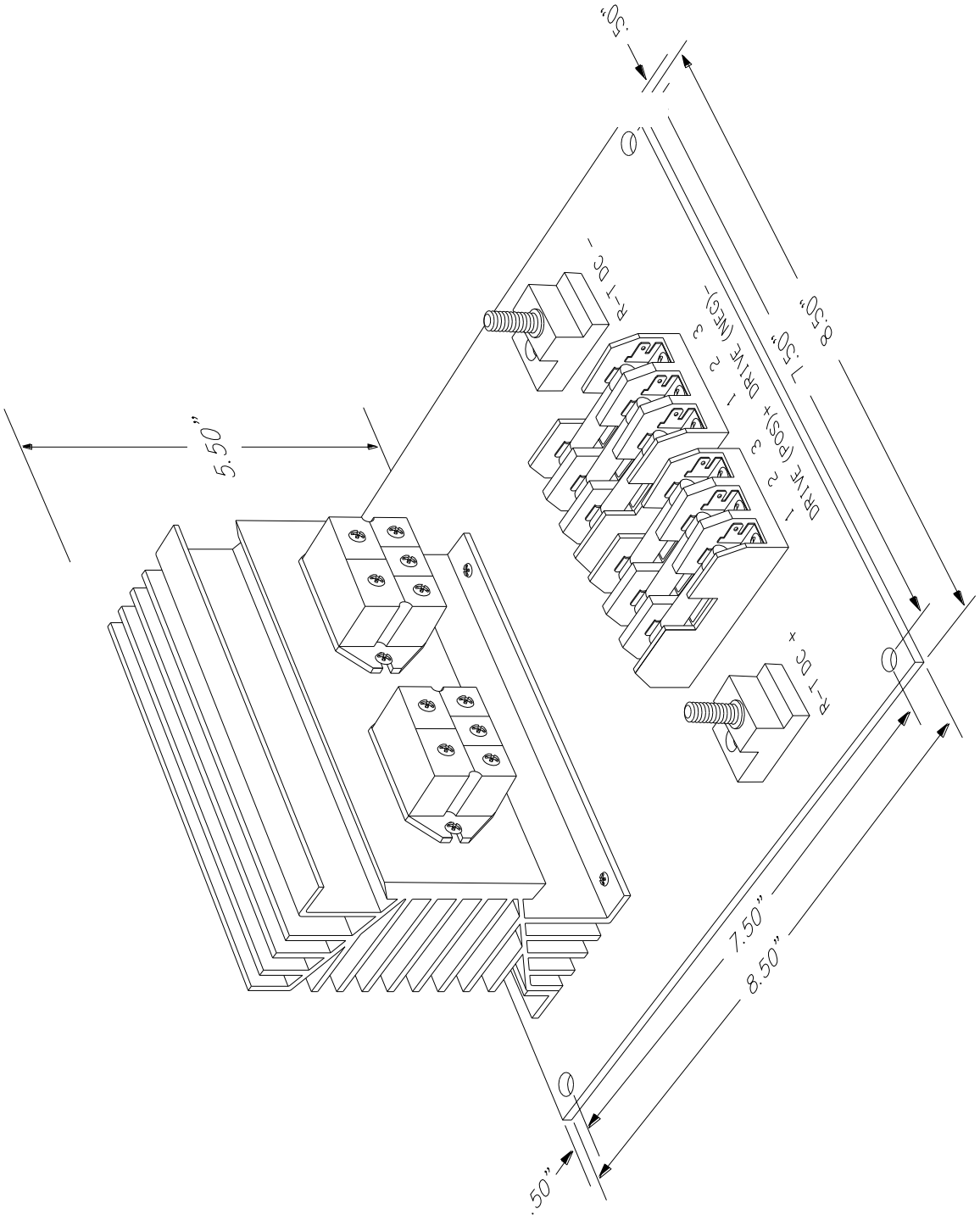


Figure 6-2: Typical "J" Chassis

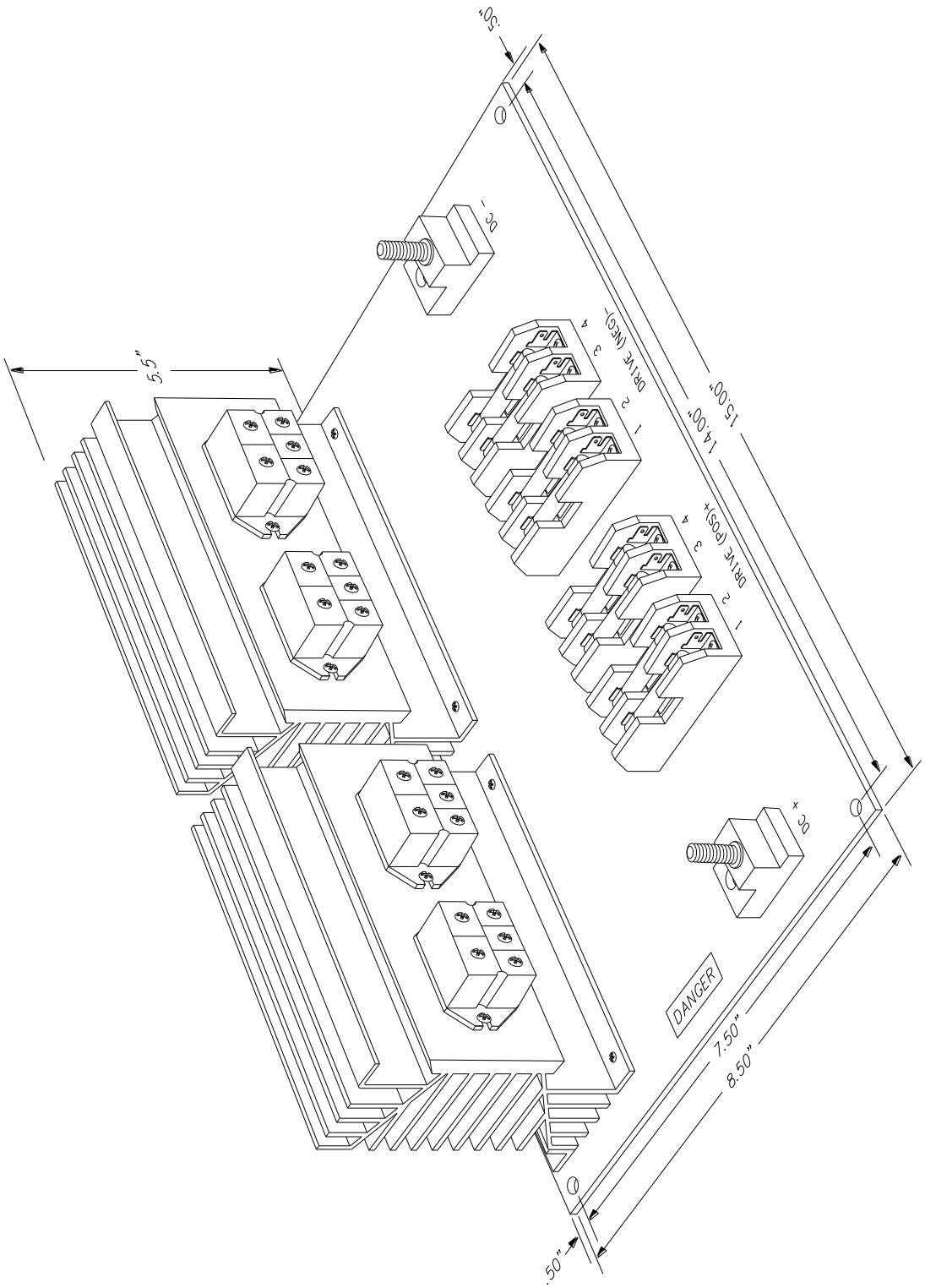


Figure 6-3: Typical "L" Chassis

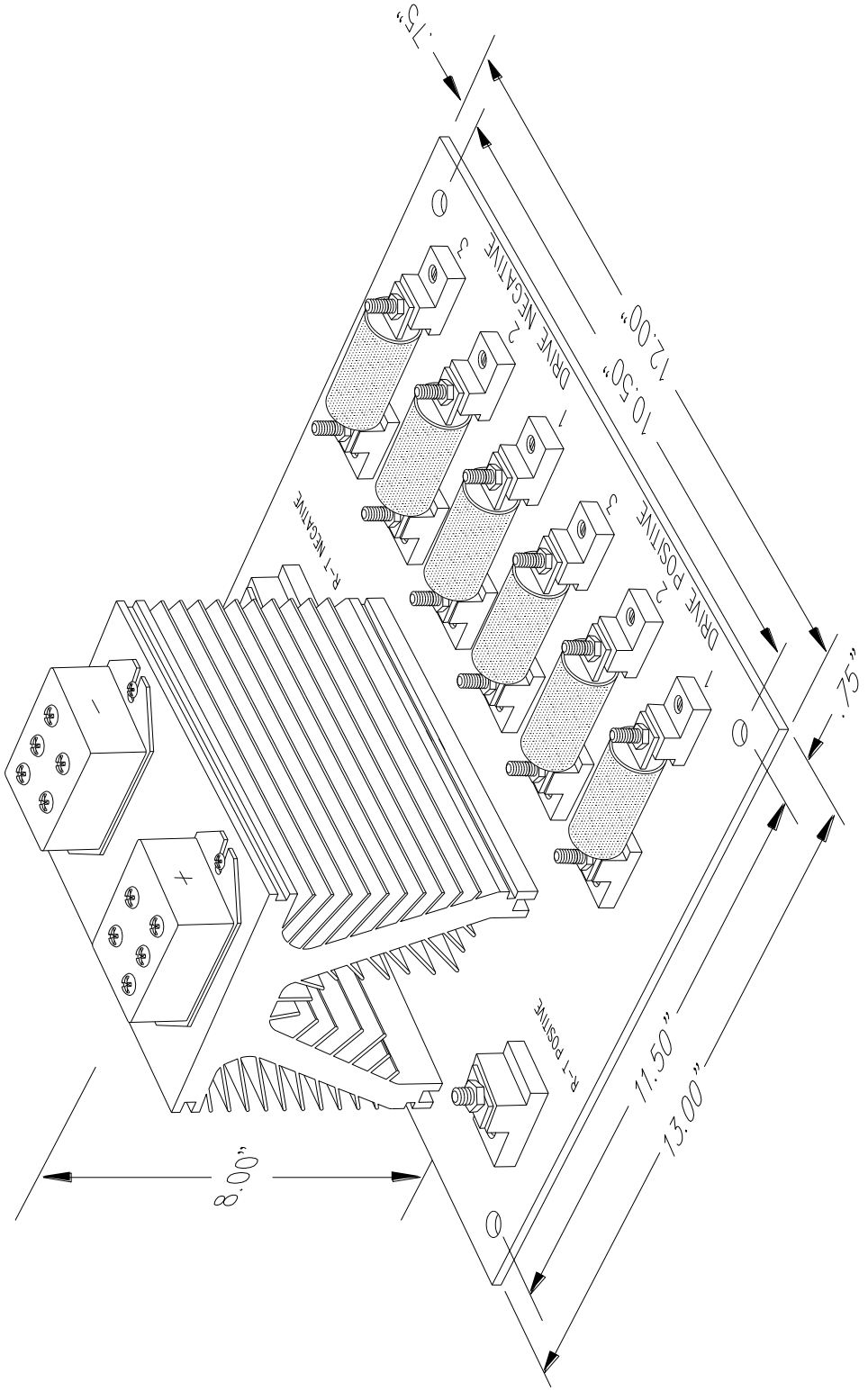


Figure 6-4: Typical "N" Chassis

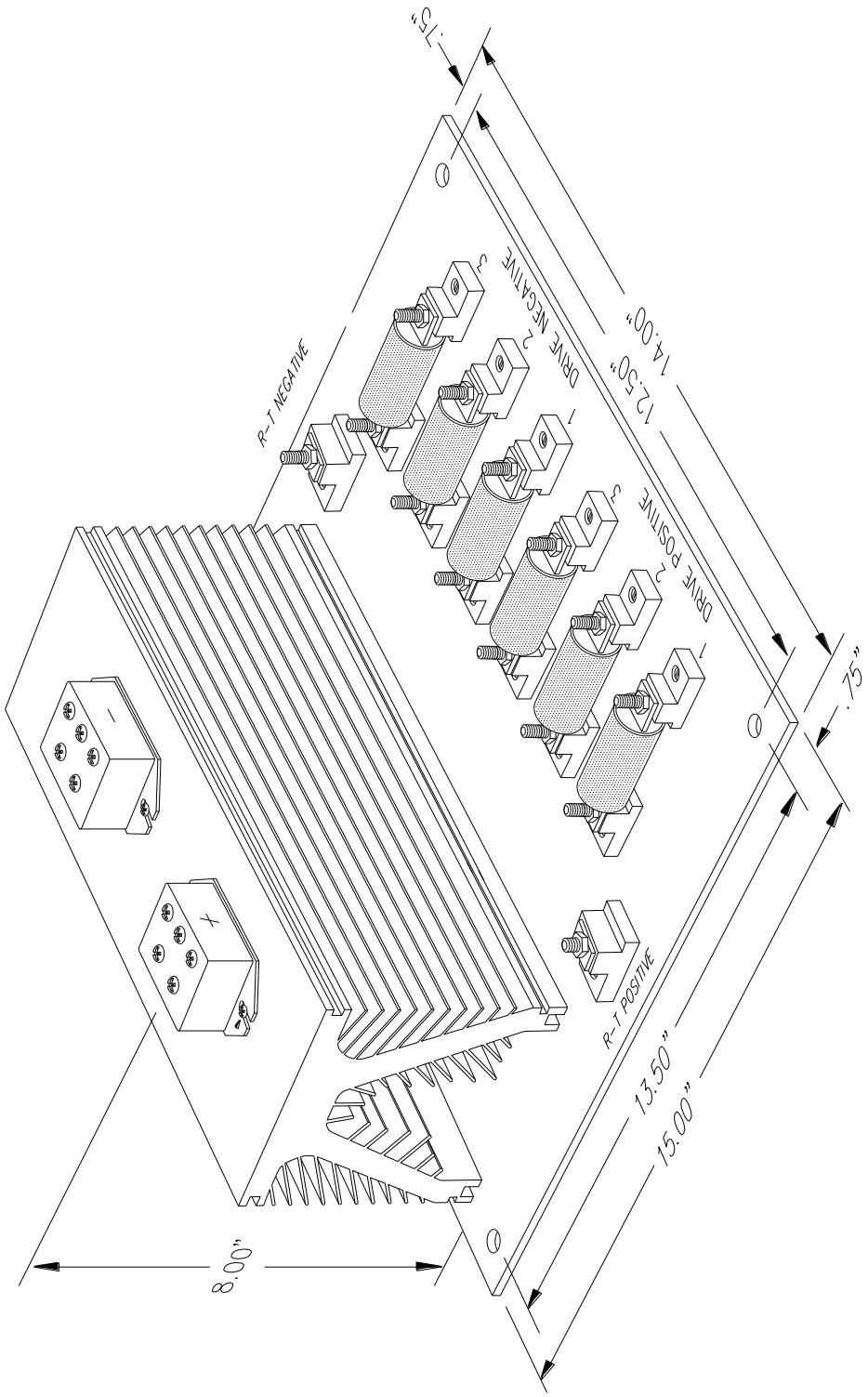


Figure 6-5: Typical "P4" Chassis

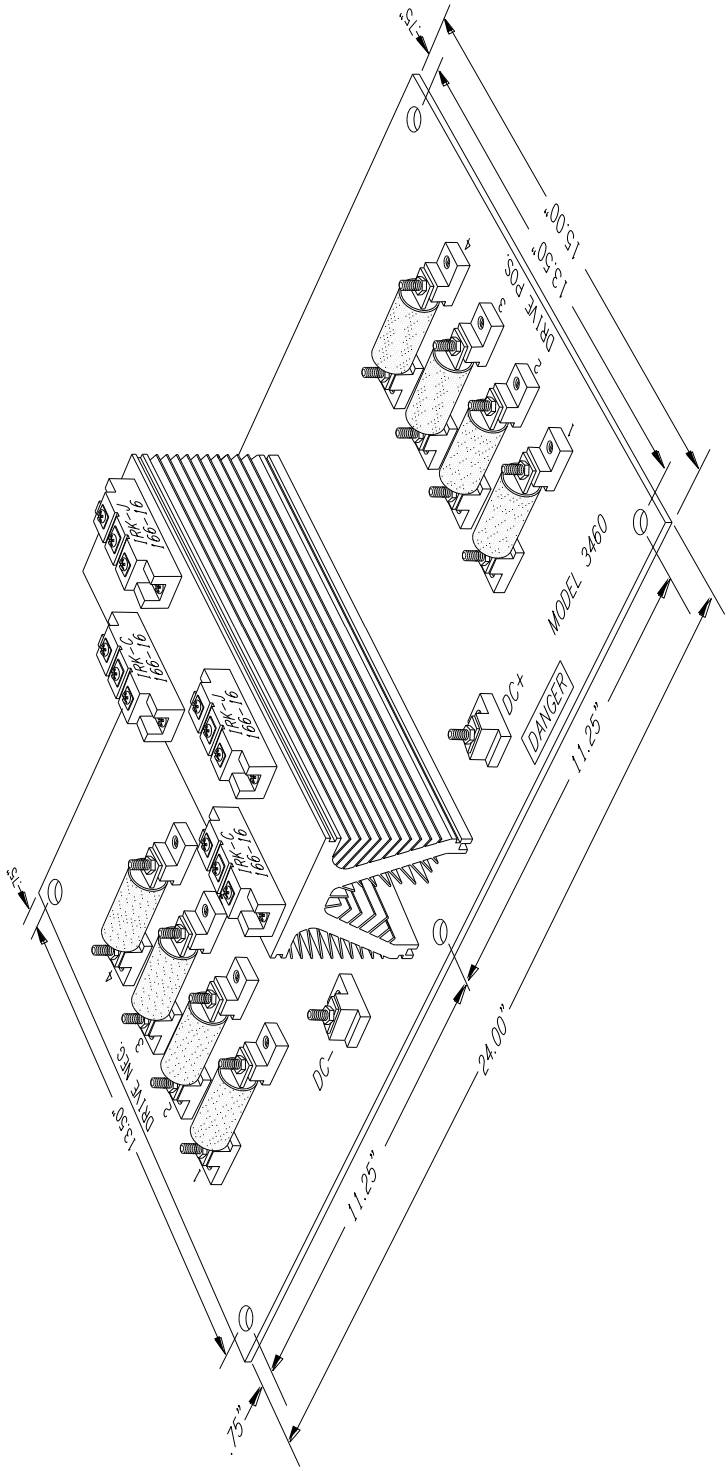


Figure 6-6: Typical "P6" Chassis

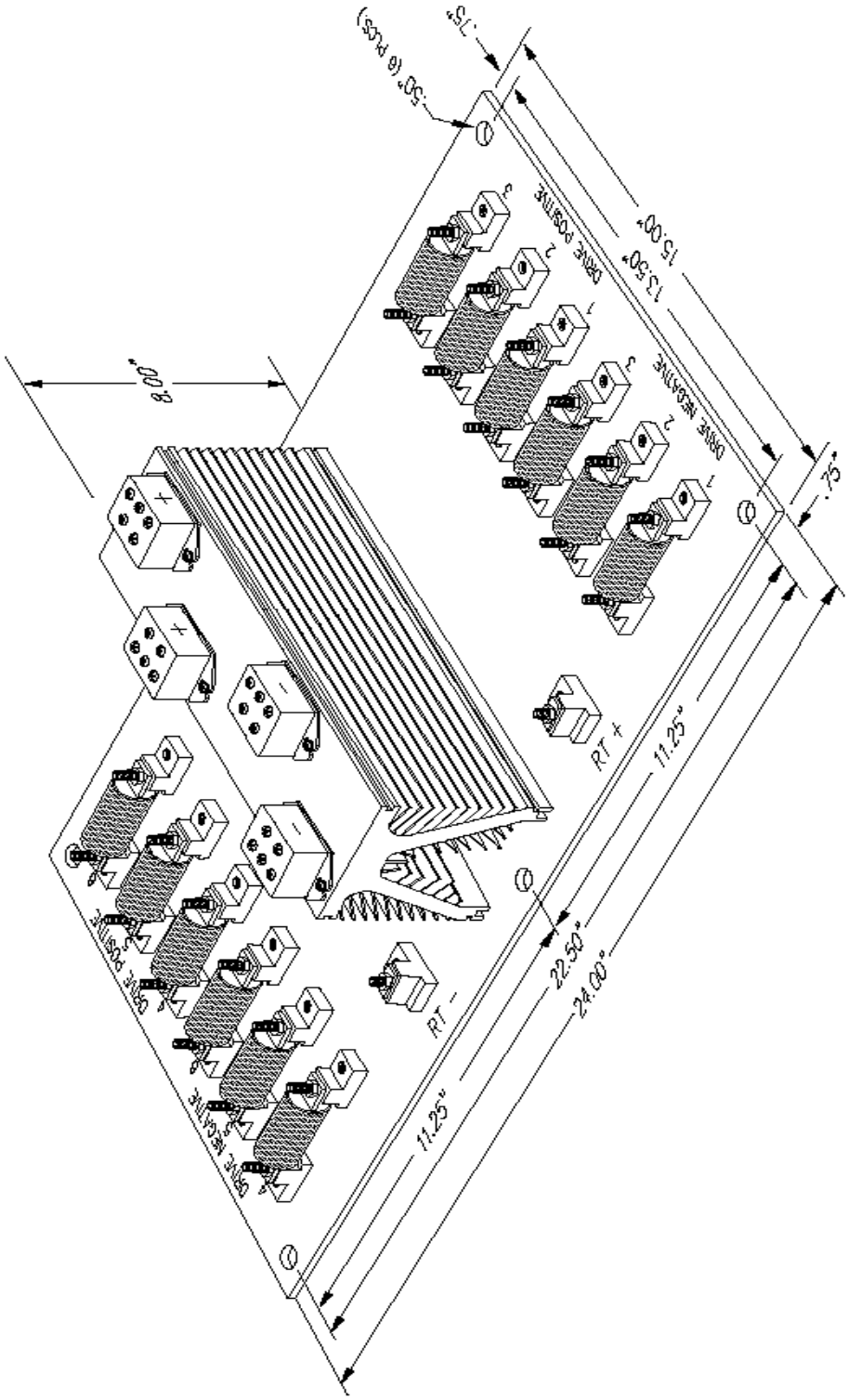


Figure 6-7: Typical "P2" Chassis

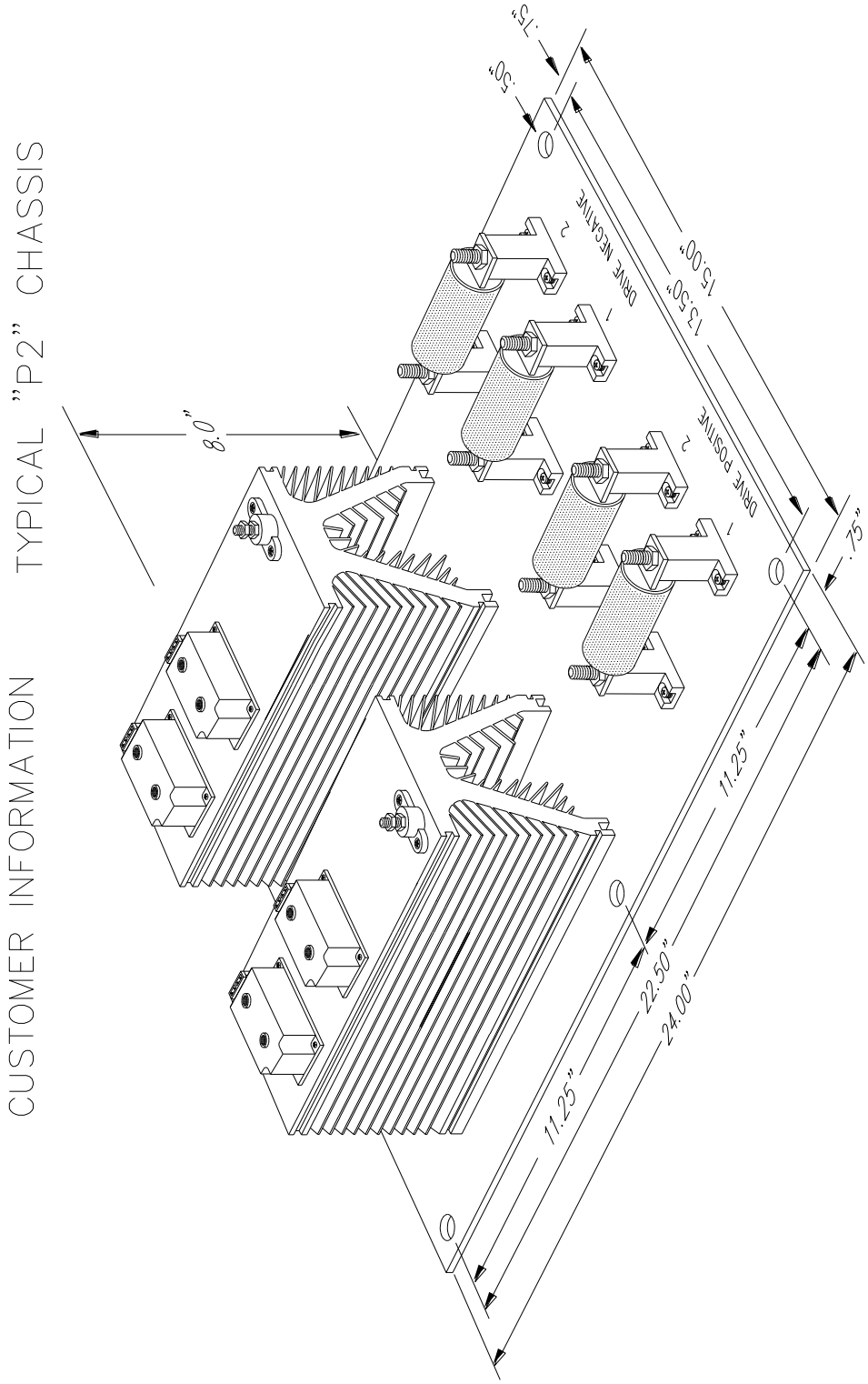
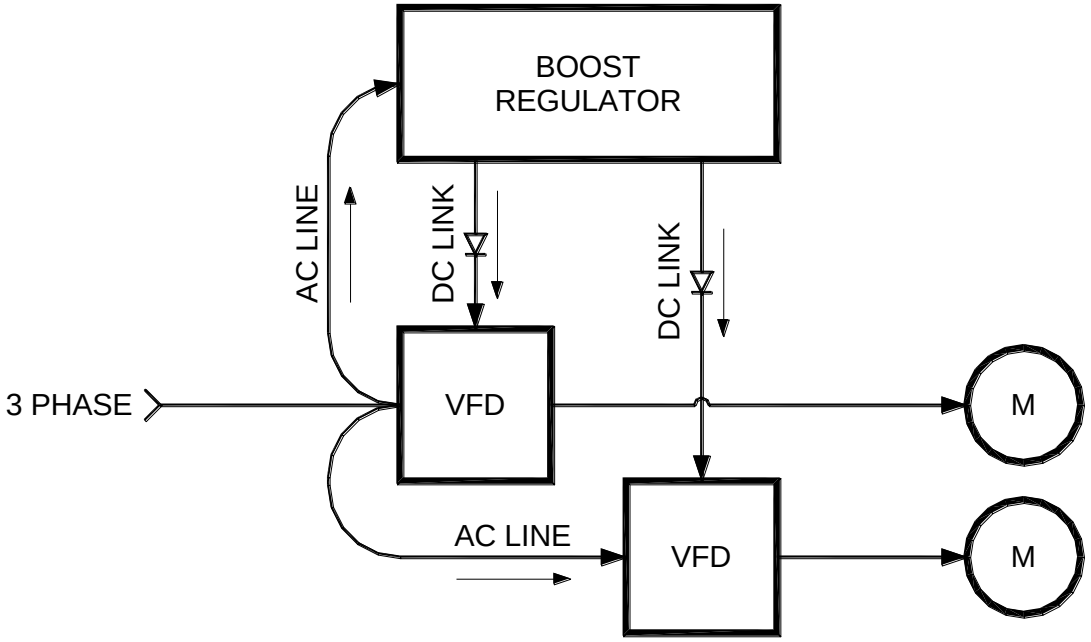


Figure 6-8: Block Diagram Example of a Ride-Thru / Diode Application



2 SECOND, 50% SAG PROTECTION FOR EQUIVALENT DRIVES
WITH EQUAL LOADS USING DC BOOSTER AND DIODE ISOLATION

NOTES

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