

## Contents of this Manual

This manual contains the following information:

Chapter	Title	Contents
	Preface	Describes the purpose, background, and scope of this manual as well as an overview of this product.
1	Overview	Provides an overview of the features of the 1336 IMPACT drive. Also provides an overview of the 1336 IMPACT hardware.
2	Mounting and Wiring Your 1336 IMPACT Drive	Provides procedures for mounting and wiring 1336 IMPACT drives. This chapter covers the installation information that is common to all drives.
3	Mounting and Wiring Information Specific to Frames A1, A2, A3, and A4	Provides the mounting and wiring information that is specific to frames A1, A2, A3, and A4.
4	Mounting and Wiring Information Specific to Frames B, C, D, E, F, G, and H	Provides the mounting and wiring information that is specific to frames B, C, D, E, F, G, and H.
5	Using the L Option	Provides information for wiring and using the L Option.
6	Starting Up Your System	Provides procedures for starting up your system.
7	Configuring the I/O Communications	Provides information to help you set up and use the inputs and outputs available on the 1336 IMPACT drive.
8	Using SCANport	Provides information to help you use SCANport™.
9	Applications	Provides information about various applications for which you can use the 1336 IMPACT drive.
10	Using the Function Block	Provides information and examples to help you use the provided function block.
11	Parameters	Provides information about the available parameters.
12	Troubleshooting	Explains how to interpret and correct problems with your drive.
13	Understanding the Auto-tuning Procedure	Provides information to help you solve problems that were reported during the motor tune routine.
A	Specifications	Provides specifications and reference tables for the 1336 IMPACT drive.
B	Control Block Diagrams	Provides information to help you better understand the capabilities of your drive.
C	Using the Human Interface Module (HIM)	Provides information to help you use your Human Interface Module (HIM).
D	Derating Guidelines	Provides the derating graphs for the 1336 IMPACT drive.
E	CE Conformity	Provides information regarding CE conformity.
F	Spare Parts Information	Provides information for locating spare parts.



**ATTENTION:** This board contains ESD (electrostatic discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing, or repairing this assembly. Component damage may result if you do not follow ESD control precautions. If you are not familiar with static control procedures, refer to *Guarding Against Electrostatic Damage*, Allen-Bradley Publication 8000-4.5.2, or any other applicable ESD protection handbook.

**ATTENTION:** Only personnel familiar with SCANport devices and associated machinery should plan or implement the installation, start-up, or subsequent troubleshooting of this board. Failure to comply may result in personnel injury and/or equipment damage.


## Related Documentation


The following documents contain additional information concerning related Allen-Bradley products. To obtain a copy, contact your local Allen-Bradley office or distributor. For the National Electrical Code, you may need to contact the publisher.

For:	Read this document:	Document number:
In-depth information on grounding and wiring Allen-Bradley programmable controllers	Allen-Bradley Programmable Controller Grounding and Wiring Guidelines	1770-4.1
A description on how to install a PLC-5 <sup>®</sup> system	PLC-5 Family Programmable Controllers Hardware Installation Manual	1785-6.6.1
A description of important differences between solid-state programmable controller products and hard-wired electromechanical devices	Application Considerations for Solid-State Controls	SGL-1.1
An article on wire sizes and types for grounding electrical equipment	National Electrical Code	Published by the National Fire Protection Association of Boston, MA.
A complete listing of current Allen-Bradley documentation, including ordering instructions. Also indicates whether the documents are available on CD-ROM or in multi-languages.	Allen-Bradley Publication Index	SD499
A glossary of industrial automation terms and abbreviations	Allen-Bradley Industrial Automation Glossary	AG-7.1

## Terms and Abbreviations

The following terms and abbreviations are specific to this product. For a complete listing of Allen-Bradley terminology, refer to the *Allen-Bradley Industrial Automation Glossary*.

This term:	Has the following definition:
bandwidth	Bandwidth is the frequency range from $\omega = 0$ to the point at which the magnitude response of the speed regulator is 0.707 of (or 3db below) its zero frequency (steady-state) value. The bandwidth indicates the rise time or speed of response of the speed regulator. $\omega = 2\pi f$ , where f is Hz or cycles per second.
destination parameter (read and write parameters)	Destination parameters accept data from other parameters. The drive uses this data to perform the desired functions. An example of a destination parameter is <i>Speed Ref 1</i> (parameter 29), which can accept a speed reference from a device such as a PLC. Throughout this manual, the following symbol indicates a destination parameter: Destination parameters may also be called sink parameters. 
display units	Display units are the units that are displayed on the Human Interface Module (HIM). Display units are units such as Hz, volts, and rpm, and are converted to and from drive units by the HIM.
drive units	Drive units are the actual values of the parameters as stored within the drive parameter table. The drive units are converted to display units that are shown on the Human Interface Module (HIM). Drive units may also be called internal units.
EE or E <sup>2</sup>	See non-volatile memory.
frame size	A single-letter designator used to identify the various drive sizes. Frame sizes are frequently referred to instead of the kW or horsepower rating they represent. Refer to Chapter 1, <i>Overview</i> , to determine the frame size for your drive.

This term:	Has the following definition:																																										
links	<p>A link is a software connection between two parameters that lets you transfer data from one parameter to the other. The parameter that provides the information is called the source parameter. The parameter that receives the data is called the destination parameter.</p> <p>The 1336 IMPACT Drive lets you make up to 20 links. You can only program links when the drive is not running. Links are stored in EE and established at power up and/or system reset.</p> <p>There are two types of links:</p> <ul style="list-style-type: none"> <li>• User link — A user link is a software connection that you establish. You can change these links as needed.</li> <li>• Default link — A default link is a software connection between two parameters that is made when the drive is initialized. You can change the default links as needed after initialization. Default links are sometimes called pre-defined links.</li> </ul> <p>The default links are as follows:</p> <table border="0" data-bbox="380 556 1055 840"> <thead> <tr> <th></th> <th style="text-align: center;">Source</th> <th></th> <th style="text-align: center;">To</th> <th></th> <th style="text-align: center;">Destination</th> <th></th> </tr> </thead> <tbody> <tr> <td>SP An In1 Value</td> <td style="text-align: center;">134</td> <td style="text-align: center;">→</td> <td style="text-align: center;">To</td> <td style="text-align: center;">→</td> <td style="text-align: center;">29</td> <td>Speed Ref 1</td> </tr> <tr> <td>An In 1 Value</td> <td style="text-align: center;">96</td> <td style="text-align: center;">→</td> <td style="text-align: center;">To</td> <td style="text-align: center;">→</td> <td style="text-align: center;">31</td> <td>Speed Ref 2</td> </tr> <tr> <td>Motor Speed</td> <td style="text-align: center;">81</td> <td style="text-align: center;">→</td> <td style="text-align: center;">To</td> <td style="text-align: center;">→</td> <td style="text-align: center;">105</td> <td>An Out 1 Value</td> </tr> <tr> <td>Motor Power</td> <td style="text-align: center;">90</td> <td style="text-align: center;">→</td> <td style="text-align: center;">To</td> <td style="text-align: center;">→</td> <td style="text-align: center;">108</td> <td>An Out 2 Value</td> </tr> <tr> <td>Motor Speed</td> <td style="text-align: center;">81</td> <td style="text-align: center;">→</td> <td style="text-align: center;">To</td> <td style="text-align: center;">→</td> <td style="text-align: center;">139</td> <td>SP An Output</td> </tr> </tbody> </table> <p>The links are made from the destination side, and the data transfer occurs in the opposite direction.</p> <p>For additional information about links, refer to Chapter 6, <i>Starting Up Your System</i>.</p>		Source		To		Destination		SP An In1 Value	134	→	To	→	29	Speed Ref 1	An In 1 Value	96	→	To	→	31	Speed Ref 2	Motor Speed	81	→	To	→	105	An Out 1 Value	Motor Power	90	→	To	→	108	An Out 2 Value	Motor Speed	81	→	To	→	139	SP An Output
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Motor Power	90	→	To	→	108	An Out 2 Value																																					
Motor Speed	81	→	To	→	139	SP An Output																																					
maintained start	<p>With a maintained start, the drive runs as long as you are commanding a start. The drive stops when you remove the start input (for example, if you remove your finger from the start button). This type of start is also referred to as an unlatched start.</p>																																										
mask parameters	<p>Through the SCANport interface, up to six different SCANport adapters and the L Option board can control the 1336 IMPACT drive. With this flexibility, conflicts are inherent. The 1336 IMPACT drive lets you make functional masks. At each port, you can selectively lock out functions such as start, jog, and drive direction as well as many fault interlocks by using mask parameters to select the allowable functions for each port.</p>																																										
momentary start	<p>With a momentary start, the drive continues running until a stop is commanded, even after you remove the start input. This type of start is also referred to as a latched start.</p>																																										
non-volatile memory	<p>Non-volatile memory is data memory in the drive that retains the values of all data even when power is disconnected from the drive. An EE (Electrically Erasable) chip is used for the non-volatile memory to store the drive parameters, links, and user text.</p>																																										
owner parameters	<p>The 1336 IMPACT drive lets one or more control devices or adapters own start, jog, direction, and other control functions. To avoid conflict, some owners are exclusive. For example, only one device can issue a forward direction speed command. Others have multiple control. For example, all devices can jog the drive. Devices can, for example, jog the drive in the forward direction only if the jog mask parameter allows for it.</p>																																										
parameter	<p>A parameter is a memory location used to store drive data. Each parameter is assigned a number and a name.</p>																																										
per-unit numbering	<p>Per-unit numbering is a numbering system that defines a specific numeric value as representing 100% of a particular quantity being measured. The number 4096 is used in many places in the drive to represent one per unit.</p>																																										
precharge	<p>Precharge limits the current into the drive when the incoming power is first applied.</p>																																										
radians per second	<p>Radians per second are the units used to measure bandwidth. <math>\omega = 2\pi f</math>, where f is Hz or cycles per second.</p>																																										
ridethrough	<p>Ridethrough automatically turns off the drive and starts a precharge when a power interrupt occurs. If the power returns within two seconds, the drive automatically starts.</p>																																										
SCANport device	<p>A SCANport device is a generic term that is used to refer to any device that you can connect to the SCANport communications network.</p>																																										
source parameter (read-only parameters)	<p>Source parameters provide realtime information that is available for other devices to use. These devices can include PLC controllers, operator interface devices, and programming terminals. throughout this manual, the following symbol indicates a source parameter: </p>																																										

## Common Techniques Used in this Manual

The following conventions are used throughout this manual:

- Bulleted lists provide information, not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.
- *Italic* type is used for parameter and chapter names.



*This type of paragraph contains tips or notes that have been added to call attention to useful information.*

<i>file:</i> Control
<i>group:</i> Speed Reference

This information is provided as a navigational tool. Use this information to locate parameters in the file/group structure. For example, to access a parameter in this section, you would first locate the *Control* file and then the *Speed Reference* group.

## Allen-Bradley Support

Allen-Bradley offers support services worldwide, with over 75 Sales/Support Offices, 512 authorized Distributors and 260 authorized Systems Integrators located throughout the United States alone, plus Allen-Bradley representatives in every major country in the world.

### Local Product Support

Contact your local Allen-Bradley representative for:

- sales and order support
- product technical training
- warranty support
- support service agreements

### Technical Product Assistance

If you need to contact Allen-Bradley for technical assistance, please review the information in the *Troubleshooting* chapter first. If you are still having problems, then call your local Allen-Bradley representative.

**Notes:**

## Overview

### Chapter Objectives

Chapter 1 provides an overview of your 1336 IMPACT drive.

This topic:	Starts on page:
An overview of the provided features	1-1
A description of the frame designators	1-4
A hardware overview	1-5

### What Features Does the 1336 IMPACT Drive Provide?

The 1336 IMPACT AC drive is a microprocessor-controlled digital AC drive with the following features:

- standard: 0.37 to 485 kW (0.5 to 650 hp) at 0 – 250 Hz constant torque  
configured: 522 to 597 kW (700 to 800 hp) at 0 – 250 Hz constant torque
- high-performance digital speed loop
- microprocessor-controlled, field-oriented current loop
- simplified programming through the use of a parameter table that features data entries in engineering units with English descriptions
- user-friendly interface with easy commissioning and set up
- non-volatile parameter storage
- extensive diagnostics, including both logic board and power structure tests
- 32 entry fault queue and 32 entry warning queue with markers for clear fault and power up and with time stamps
- enclosed construction
- multiple communication interfaces for SCANport™ access
- complete encoder interface through the L Option board (quadrature A, A NOT, B, B NOT with encoder supply + 12V)
- two 12-bit resolution analog inputs for ±10V
- two 12-bit resolution analog outputs for ±10V
- one 12-bit resolution 4 – 20mA input
- one 12-bit resolution 4 – 20mA output
- 5 or 12V DC pulse input
- bumpless speed/torque control
- programmable output contacts (relay)
- function blocks
- flux braking, DC braking, and bus regulation
- DC hold
- 200/400% motor curve

- S-Curve
- autostart (auto restart, power up start)
- start and stop dwells
- analog input filters
- process trim
- fast flux up
- 2/3 wire control
- feedback filters (light, heavy, lead/lag, and notch)
- Flying Start

### **Options**

The 1336 IMPACT drive provides the following options:

- DriveTools™, which is PC Windows™ based programming software compatible with the 1336 IMPACT drive and also other Allen-Bradley 1336 and 1395 products
- dynamic braking
- AC motor contactor
- L Option board with or without an encoder interface
- Human Interface Module (HIM)
- Graphics Programming Terminal (GPT)
- gateway modules (Bulletin 1203 communications modules)

### **Protective Features**

The 1336 IMPACT drive uses the following protective measures:

- programmable motor overload protection ( $I^2T$ ) investigated by UL to comply with NEC Article 430
- inverter overload protection (IT)
- overspeed detection, even when operating as a torque follower
- programmable stall detection
- peak output current monitoring to protect against excessive current at the output due to a phase-to-ground or phase-to-phase short
- ground fault monitoring
- DC bus voltage monitoring to protect against undervoltage or overvoltage conditions
- power structure heatsink temperature monitoring
- motor overspeed
- internal voltage reflection reduction mechanism

## How Do I Read the Catalog Number?

Knowing your catalog number for the 1336 IMPACT drive, can help you sort out what options you have, as well as helping you communicate this information to the Allen-Bradley support personnel. The catalog numbers all have the following form:

1336E First Position Bulletin Number	AQ Second Position Voltage	F05 Third Position Nominal HP Rating	AA Fourth Position Enclosure Type	EN Fifth Position Language	mods Sixth Position Options			
Letter	Voltages	Code	kW (HP)	Code	Type	Code	Language	
AQ	200–240VAC or 310VDC	F05	0.37 (0.5)	AA	NEMA 1 (IP20)	EN	English/English	
BR	380–480VAC or 513±620VDC	F07	0.56 (0.75)	AE	NEMA 1 (IP20)/ EMC 0.37–45 kW  (0.5–60 HP) only <sup>2</sup>	FR	English/French	
CW	500–600VAC or 775VDC	F10	0.75 (1)			ES	English/Spanish	
		F15	1.2 (1.5)			DE	English/German	
		F20	1.5 (2)	AF	NEMA 4 (IP65) <sup>2</sup>	IT	English/Italian	
		F30	2.2 (3)	AJ	NEMA 12 (IP54) <sup>2</sup>	PT	English/ Portuguese	
		F50	3.7 (5)	AN	Open (IP00)			
		F75	5.5 (7.5)					
		F100	7.5 (10)					
or								
A	200–240VAC	007	5.5 (7.5)					
B	380–480VAC	010	7.5 (10)					
BP	380–480VAC (F Frame)	015	11 (15)					
BX	Special Rating	020	15 (20)					
C	500–600VAC	025	18.5 (25)					
Q	310VDC	030	22 (30)					
R	513–620VDC	040	30 (40)					
RX	Special Rating	050	37 (50)					
W	775VDC	060	45 (60)					
		075	56 (75)					
		100	75 (100)					
		125	93 (125)					
		150	112 (150)					
		200	149 (200)					
		250	187 (250) <sub>1</sub>					
		300	224 (300) <sub>1</sub>					
		350	261 (350) <sub>1</sub>					
		400	298 (400) <sub>1</sub>					
		450	336 (450) <sub>1</sub>					
		500	373 (500) <sub>1</sub>					
		600	448 (600) <sub>1</sub>					
		650	485 (650) <sub>1</sub>					
		700C	522 (700) <sub>1</sub>					
		800C	597 (800)					

Code	Description
<b>Human Interface Module, IP 20 (NEMA Type 1)</b>	
HAB	Blank — No functionality
HAP	Programmer Only
HA1	Programmer/Controller w/Analog Pot
HA2	Programmer/Controller w/Digital Pot
<b>Human Interface Module, IP 65/54 (NEMA Type4/12)</b>	
HJP	Programmer Only
HJ2	Programmer/Controller w/Digital Pot
<b>Communication Options</b>	
GM1	Single Point Remote I/O
GM2	RS–232/422/485, DF1, & DH485
GM5	DeviceNet™
<b>Control Interface Options</b>	
L4	TTL Contact
L7E	TTL Contact & Encoder Feedback
L5	24VAC/DC
L8E	24VAC/DC & Encoder Feedback
L6	115VAC
L9E	115VAC & Encoder Feedback

1 G frame drives in enclosed construction and all H frame drives are supplied only through the Configured Drives Program.

2 D – G frame drives in IP 65 (NEMA Type 4) and IP 54 (NEMA Type 12) configurations are supplied through the Configured Drives Program.

Note: BPR indicates F frame roll-in units



## What is a Frame Designator?

Allen-Bradley uses frame designators to identify the various sizes of drives. Throughout this manual, the frame sizes are frequently referred to instead of the kW or horsepower rating.

The following frame sizes are currently available for the 1336 IMPACT drive:

If your drive falls into this three-phase drive rating <sup>1</sup> :			Then your frame reference is:
200 – 240V	380 – 480V	500 – 600V	
0.37 – 0.75 kW 0.5 – 1 hp	0.37 – 1.2 kW 0.5 – 1.5 hp	—	A1
1.2 – 1.5 kW 1.5 – 2 hp	1.5 – 2.2 kW 2 – 3 hp	—	A2
2.2 – 3.7 kW 3 – 5 hp	3.7 kW 5 hp	—	A3
—	5.5 – 7.5 kW 7.5 – 10 hp	0.75 – 3.7 kW 1 – 10 hp	A4
5.5 – 11 kW 7.5 – 15 hp	5.5 – 22 kW 15 – 30 hp	5.5 – 15 kW 15 – 20 hp	B
15 – 22 kW 20 – 30 hp	30 – 45 kW 40 – 60 hp	18.5 – 45 kW 25 – 60 hp	C
30 – 45 kW 40 – 60 hp	45 – 112 kW 60 – 150 hp	56 – 93 kW 75 – 125 hp	D
56 – 75 kW 75 – 125 hp	112 – 187 kW 150 – 250 hp	112 – 224 kW 150 – 300 hp	E
—	224 – 336 kW 300 – 450 hp	—	F
—	224 – 448 kW 300 – 600 hp	224 – 448 kW 300 – 600 hp	G
—	522 – 597 kW 700 – 800 hp	522 – 597 kW 700 – 800 hp	H

<sup>1</sup> kW and hp are constant torque.

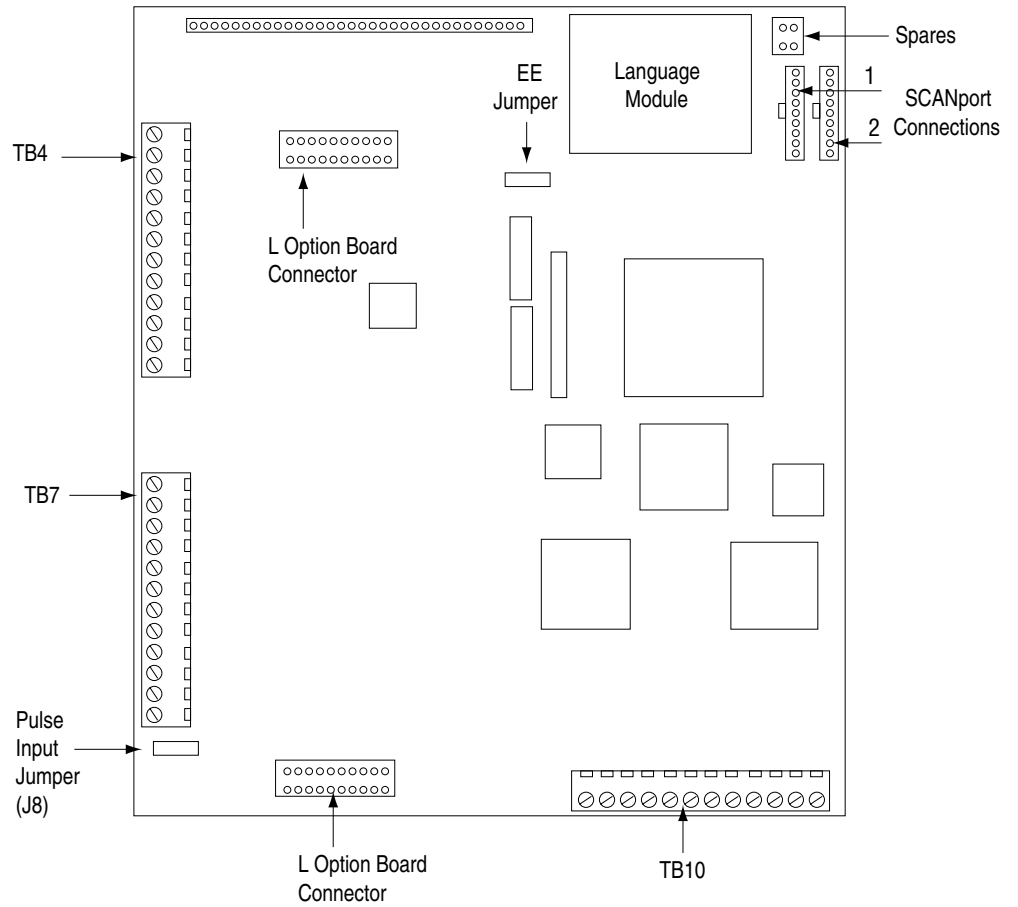
Once you have determined your frame reference, write it here: \_\_\_\_\_

You can disregard information that is specific to other frame references.

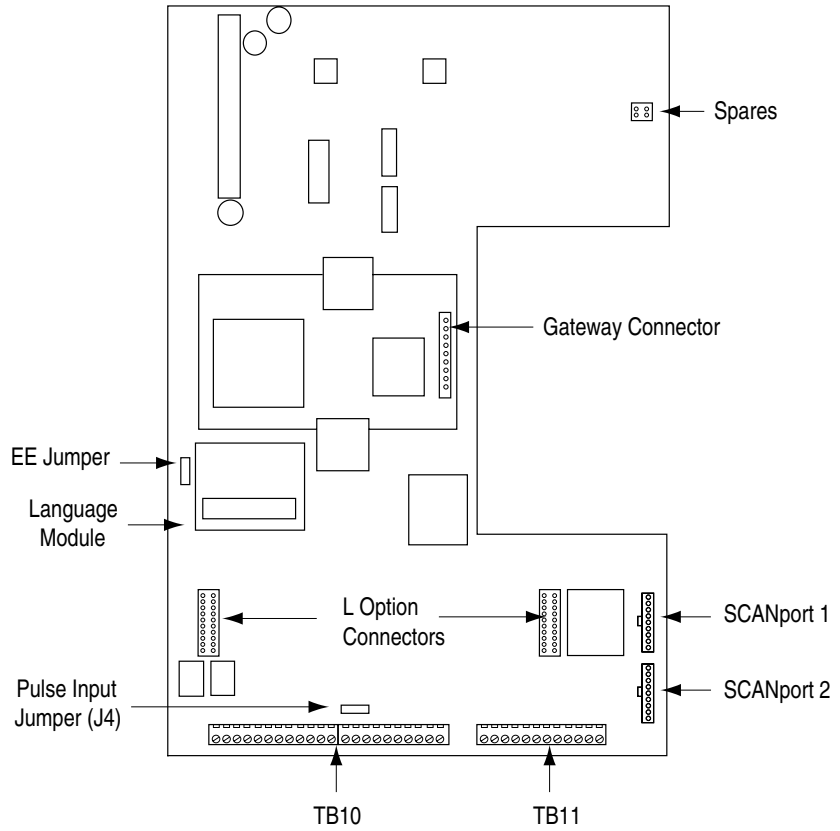
# Hardware Overview

Figures 1.1 and 1.2 show where the terminal blocks and L Option connectors are located.

**Figure 1.1**  
**Control Board for Frames A1, A2, A3, and A4**



**Figure 1.2**  
**Control Board for All Other Frames**



**Where Do I Go From Here?**

The installation and mounting instructions for your 1336 IMPACT drive are provided in Chapter 2, *Mounting and Wiring Your 1336 IMPACT Drive*. Some information is frame specific. For frame-specific information, refer to the appropriate chapter:

<b>If your drive frame reference is:</b>	<b>Then go to:</b>
A1, A2, A3, or A4	Chapter 3
B, C, D, E, F, G, or H	Chapter 4

## Mounting and Wiring Your 1336 IMPACT Drive

### Chapter Objectives

Chapter 2 provides information so that you can install your 1336 IMPACT drive.

This topic:	Starts on page:
Before mounting your drive	2-2
Input Fuses and Circuit Breakers	2-5
Mounting your drive	2-10
Grounding your drive	2-14
Wiring the power	2-17
Hard wiring your I/O	2-21
Connecting your gateway	2-24
Installing an interface board	2-25
Connecting the power to the drive	2-25
Disconnecting the drive output	2-27
Starting and stopping the motor	2-27
Electrical interference — EMI/RFI	2-28

**Important:** Some of the mounting and wiring information is specific to the individual frame sizes. This information is identified in this chapter, but is located in the following chapters:

Information for this frame size:	Is provided in:
A1, A2, A3, or A4	Chapter 3
B, C, D, E, F, G, or H	Chapter 4

If you do not know what your frame size is, please refer to Chapter 1, *Overview*.



**ATTENTION:** The following information is merely a guide for proper installation. The National Electric Code (NEC) and any other governing national, regional, or local code will overrule this information. Allen-Bradley cannot assume responsibility for the compliance or noncompliance to any code, national, local, or otherwise, for the proper installation of this drive or associated equipment. A hazard of personal injury and/or equipment damage exists if codes are ignored during installation.

## Before Mounting Your Drive

Before mounting your drive, consider the following:

- what tools and equipment you need to mount your drive
- the distance between the motor and the drive
- the distance between the drive and other surfaces

**Important:** Before you mount your drive, you need to thoroughly read and understand the information presented in this chapter. You should take every precaution to complete the wiring as instructed.

### Required Tools and Equipment

At a minimum, you will need the following tools and equipment to mount your drive:

- a small regular screw driver
- a medium phillips screw driver
- a box end wrench or socket set
- wire strippers

### Distance Between the Motor and the Drive

If the distance between the motor and the drive requires long motor cables, you may need to add an output reactor or cable terminators to limit voltage reflections at the motor. The following tables show the maximum length cable allowed for various installation techniques.

Values shown in Table 2.A are for 480V nominal input voltage and drive carrier frequency of 2 kHz. Consult factory regarding operation at carrier frequencies above 2 kHz. Multiply values by 0.85 for high line conditions. For input voltages of 380, 400 or 415V AC, multiply the table values by 1.25, 1.20 or 1.15, respectively.

Values shown in Table 2.B are for nominal input voltage and drive carrier frequency of 2 kHz. Consult factory regarding operation at carrier frequencies above 2 kHz. Multiply values by 0.85 for high line conditions.

If these tables indicate that your motor cables are not over the maximum cable length for your motor, you probably do not need a terminator or output reactor.