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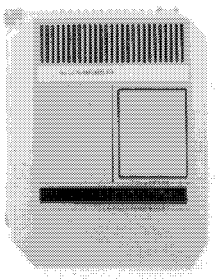
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Instruction Manual

Allen-Bradley Bulletin 1331
Single Phase Adjustable Frequency AC Drive
0.37 - 1.5 KW ($\frac{1}{2}$ - 2 HP) Series C

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IMPORTANT USER INFORMATION

Because of the variety of uses for this equipment and because of the differences between this solid state equipment and electromechanical equipment, the user of and those responsible for applying this equipment must satisfy themselves as to the acceptability of each application and use of the equipment. In no event will Allen-Bradley Company be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The illustrations shown in this manual are intended solely to illustrate the text of this manual. Because of the many variables and requirements associated with any particular installation, the Allen-Bradley Company cannot assume responsibility or liability for actual use based upon the illustrative uses and applications.

No patent liability is assumed by Allen-Bradley Company with respect to use of information, circuits or equipment described in this text.

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The information in this manual is organized in numbered sections. Read each section in sequence and perform procedures when you are instructed to do so. Do not proceed to the next section until your have completed all procedures.

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IMPORTANT USER INFORMATION

WARNING



tells readers about hazards and where people may be injured if procedures are not followed properly.

CAUTION



tells readers where machinery may be damaged or economic loss can occur if procedures are not followed properly.

These reader alerts help you identify:

- The probability and severity of hazards.
- The probability and severity of damage.
- The consequences of improper use.
- How to avoid these consequences.

Hazard alert labels are on the product.



SHOCK HAZARD labels may be located on or inside the drive to alert people that dangerous voltage may be present.



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REPAIR OR REPAIR/EXCHANGE PROCEDURES

The Allen-Bradley Motion Control Division, and the Allen-Bradley Support Division, provide an efficient and convenient method of returning equipment eligible for repair or repair/exchange.

A product service report number is required to return any equipment for repair. This may be obtained from your local Allen-Bradley Distributor or Area Sales/Support Office.

Return any equipment to be repaired to the Area Sales/Support Center nearest you. Be sure to reference the product service report number on the carton and packing slip. Include your company name and address, your repair purchase order number, and a brief description of the problem. This will simplify the processing of your equipment.

A complete listing of Area Sales/Support Centers is available from your local Allen-Bradley Distributor or Sales Office.

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1 PRE-INSTALLATION

Before installing and operating your Bulletin 1331, carefully read this manual and observe all warnings and cautions. Section ***2 DRIVE AND OPTION IDENTIFICATION***, explains the drive rating, type of enclosure, nominal line voltage, phase and frequency, as well as any additional options that were specified. Specifications for all drives including standard controls, adjustment range, diagnostics and environmental qualifications are listed in section ***3 SPECIFICATIONS***.

RECEIVING

Once you have received your drive, careful inspection for shipping damage should be made. Damage to the shipping carton is usually a good indication that it has received improper handling during transit. All damage should be immediately reported to the freight carrier.

Carefully unpack the drive. Save the shipping carton and any packing material for use if return becomes necessary. Verify that the items on the packing list or bill of lading agree with your order.

STORAGE

If the drive will not immediately be installed, it should be stored in a clean, dry area where the ambient temperature is not less than –25°C nor more than +65°C. The drive must not be stored in a corrosive environment nor subject to conditions in excess of the storage environment parameters stated in section ***3 SPECIFICATIONS***.

SHIPPING

The carton and materials that came with your drive have been designed and tested to provide reasonable protection against damage during transit. If you ship the drive to another location, it is recommended that the original shipping carton and packing material be used to protect the drive from damage in transit.

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ELECTROSTATIC DISCHARGE PRECAUTIONS

CAUTION



This assembly contains parts and assemblies that are sensitive to electrostatic discharge. Static control precautions are required when servicing this assembly. Component damage may result if you ignore electrostatic discharge control procedures. If you are not familiar with static control procedures, reference Allen-Bradley Publication 8000-4.5.2, Guarding Against Electrostatic Damage, or any other applicable ESD protection handbook.

Electrostatic discharge generated by static electricity can damage the complimentary metallic oxide semiconductor devices in the drive. It is recommended that you wear an approved resistive type grounding strap that is grounded to the drive when servicing the drive.

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2 DRIVE AND OPTION IDENTIFICATION

The following is an explanation of the catalog numbering system for Bulletin 1331 Single Phase Adjustable Frequency AC Drives and options. The catalog number is coded to identify the drive power rating and can be found on the drive shipping carton.

BULLETIN 1331 DRIVE CATALOG NUMBER

1331	—	A A F10
BULLETIN NUMBER		MODEL

BULLETIN NUMBER

The Allen-Bradley reference number identifying the type or family of products.

MODEL

A group of five characters coded to indicate enclosure, input voltage and the output power rating.

The first character indicates the type of drive enclosure.

A — NEMA Type 1 (IP20)

O — Open Style (IP00)

The second character indicates the input voltage rating of the drive.

A — 208/220/240V AC, 1Phase, 50/60 Hz

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The third, fourth and fifth characters indicate the output ampere rating of the drive.

F05 — 2.3 Amps RMS Output — 0.37 KW ($\frac{1}{2}$ HP) Nominal
F07 — 3.2 Amps RMS Output — 0.56 KW ($\frac{3}{4}$ HP) Nominal
F10 — 4.2 Amps RMS Output — 0.75 KW (1 HP) Nominal
F15 — 6.0 Amps RMS Output — 1.1 KW ($1\frac{1}{2}$ HP) Nominal
F20 — 7.4 Amps RMS Output — 1.5 KW (2 HP) Nominal

OPTION IDENTIFICATION

Bulletin 1331 Options —

1331	—	MOD	—	A1
BULLETIN NUMBER		*MODIFICATION KIT*		*OPTION NUMBER*

A1 — NEMA Type 1 Enclosure Kit for Open Style Drives
F2 — Blank Local Control Panel
F1 — Local Control Panel

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3 SPECIFICATIONS

OPERATING ENVIRONMENT	
TEMPERATURE	Open or NEMA Type 1 Chassis Rating — 0 to +40°C
RELATIVE HUMIDITY	5 to 95% Non-Condensing — All Power Ratings
ALTITUDE	1,000 Meters (3,300 Feet) Maximum Without Derating
VIBRATION	Below 0.5G — 0.8mm Peak-to-Peak Amplitude X-Y-Z Axis
SHOCK	16G Peak for 11mS Duration
NOISE	Showering Arc Transients from 350 to 2,000 Volts
STORAGE ENVIRONMENT	
TEMPERATURE	NEMA Type 1 or Open Chassis Rating — –25 to +65°C
RELATIVE HUMIDITY	5 to 95% Non-Condensing — All Power Ratings
ENCLOSURE	
	Indicated by Catalog Number
	Open Chassis (IP00)
	NEMA Type 1 (IP20)

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3 SPECIFICATIONS

INPUT SPECIFICATIONS

VOLTAGE	208/220/240V AC ±10%
FREQUENCY	48 to 62 Hz
PHASE	1 Phase
RIDE-THRU	Power Loss Ride-Thru of 15mS Minimum
RECTIFIER TYPE	Full Wave Bridge

Suitable for use on a circuit capable of delivering not more than 5000 RMS symmetrical amperes, 230V AC maximum.

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OUTPUT SPECIFICATIONS

VOLTAGE	Zero to Rated Input Voltage
FREQUENCY	Frequency Ranges of 0-50 Hz, 0-60 Hz, 0-100 Hz or 0-120 Hz
PHASE	3 Phase
CONTINUOUS CURRENT	100% of Rated Output Amps
INTERMITTENT CURRENT	Up to 150% of Rated Output Amps for One Minute
REGULATION	±1% of Selected Maximum Frequency Ambient Temperature Dependent Independent of Load Variations Within the Drive Rating
OVER CURRENT TRIP	200% of Rated Input Current
WAVEFORM	Sine Weighted Pulse Width Modulated
SWITCHING DEVICES	Darlington Power Transistors
EFFICIENCY	90% or Greater at Rated Output Current

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POWER RATING AND RECOMMENDED BRANCH CIRCUIT PROTECTION

MODEL	ENCLOSURE	① NOMINAL KW (HP)	RATED INPUT AMPS	RATED INPUT KVA	RATED OUTPUT AMPS	RATED OUTPUT KVA	② WATTS DISSIPATED	③ ④ RECOMMENDED BRANCH CIRCUIT PROTECTION AMPS
OAFO5	OPEN	0.37 (½)	5.3	1.22	2.3	0.92	70	10
AAFO5	NEMA TYPE 1	0.37 (½)	5.3	1.22	2.3	0.92	70	10
OAFO7	OPEN	0.55 (¾)	7.2	1.66	3.2	1.27	90	15
AAFO7	NEMA TYPE 1	0.55 (¾)	7.2	1.66	3.2	1.27	90	15
OAF10	OPEN	0.75 (1)	9.0	2.07	4.2	1.67	150	15
AAF10	NEMA TYPE 1	0.75 (1)	9.0	2.07	4.2	1.67	150	15
OAF15	OPEN	1.1 (1½)	13.3	3.06	6.0	2.39	250	20
AAF15	NEMA TYPE 1	1.1 (1½)	13.3	3.06	6.0	2.39	250	20
OAF20	OPEN	1.5 (2)	16.0	3.68	7.4	2.95	320	30
AAF20	NEMA TYPE 1	1.5 (2)	16.0	3.68	7.4	2.95	320	30

① The KW (HP) rating shown is for drives supplied from a 220V AC, 60 Hz power line. The limiting factor in the application and use of the Bulletin 1331 drive is the rated output amps of the drive.

② Heat dissipation is estimated and based on operation at the drive rated output amps.

③ Customer supplied branch circuit protection fuse — U.L. Class CC Non-Delay Type Fuse — Bussman KTK-R or equivalent.

④ Customer supplied branch circuit protection circuit breaker — Westinghouse Type C or equivalent.

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3 SPECIFICATIONS

SETTINGS

STARTING TORQUE	Potentiometer Adjustable DC Boost — 20 to 35V DC at 5 Hz Output Frequency
ACCELERATION	Potentiometer Adjustable Drive Acceleration — 1 to 60 Seconds
DECELERATION	Potentiometer Adjustable Drive Deceleration — 1 to 60 Seconds
MAXIMUM FREQUENCY	Potentiometer Adjustable Maximum Frequency — 50 to 100% of Frequency Range
MINIMUM FREQUENCY	Potentiometer Adjustable Minimum Frequency — 0 Hz to 50% of Frequency Range
METER SIGNAL	Potentiometer Adjustable Frequency Meter Calibration
FREQUENCY RANGE	Switch Selectable Frequency Range — 0-50 Hz, 0-60 Hz, 0-100 Hz or 0-120 Hz
STOP MODE	Switch Selectable Stop Mode — Ramp-to-Stop or Coast-to-Stop
FAULT RESET	Switch Selectable Fault Reset — Select Stop to Reset Drive or Cycle Power to Reset Drive

STATUS AND FAULT LEDS

[BUS] Drive Status — Indicates Bus Voltage Is at or Above 50V DC When Illuminated

[RUN] Drive Status — Indicates Drive Is Running When Illuminated

[LV] Drive Fault — Indicates Bus Voltage Is at or Below 220V DC When Illuminated

[OH] Drive Fault — Indicates Heatsink Temperature Is at or Above 100 °C When Illuminated

[OC] Drive Fault — Indicates Output Current Is at or Above 200% of Rated Input Current When Illuminated

[OV] Drive Fault — Indicates Bus Voltage Is at or Above 400V DC When Illuminated

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CONTROL INPUTS

RUN/STOP CONTROL	Local Control Panel Run/Stop Switch or User Supplied Control Switch — Only One Run/Stop Control Source May Command the Drive —
FORWARD/REVERSE CONTROL	Local Control Panel Forward/Reverse Switch or User Supplied Control Switch — Only One Forward/Reverse Control Source May Command the Drive —
SPEED CONTROL	Local Control Panel Speed Potentiometer, User Supplied Potentiometer or User Supplied 0-10V DC Reference — Only One Speed Control Source May Command the Drive —

CONTROL OUTPUTS

FAULT CONTACT OUTPUT	1 N.O., 1N.C. Form-C Fault Contact — 120V AC, 1A Resistive Rating
ANALOG SPEED OUTPUT	Adjustable 0-1mA Output for Local Control Panel Frequency Meter or User Supplied Frequency Meter

CODES

U.L.	All Ratings and Types Are U.L. Listed

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4 INSTALLATION

The Bulletin 1331 must be installed in an area where the following installation and environmental guidelines are met.

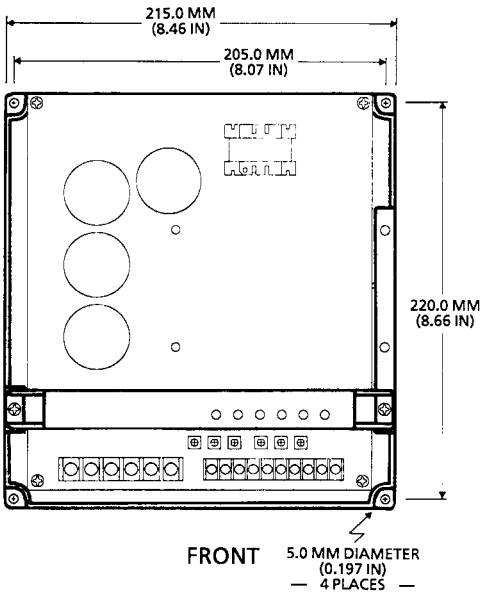
- Cabinet mounting is upright, leaving room for a minimum clearance of (4) inches on the top and bottom and (2) inches on the sides for proper ventilation.
- The drive is easily accessible for maintenance and troubleshooting.
- The rated altitude does not exceed 1,000 meters (3,300 feet).
- Vibration will be within the ratings outlined in section ***3 SPECIFICATIONS***.
- The ambient atmosphere contains no volatile or corrosive gas, vapors or dust.
- The relative humidity is kept to within 95% for all Drive ratings.
- The ambient temperature is kept at a 0 to 40°C rating.

Before actual installation, remove all packing material, wedges or braces from within and around the drive.

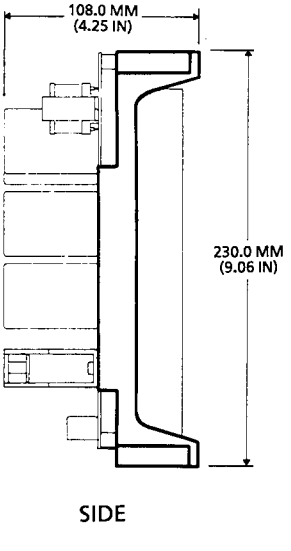
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OPEN CHASSIS— DIMENSIONS IN MILLIMETERS AND (INCHES) — NOMINAL WEIGHTS IN KILOGRAMS AND (POUNDS)

DIMENSIONS



DIMENSIONS



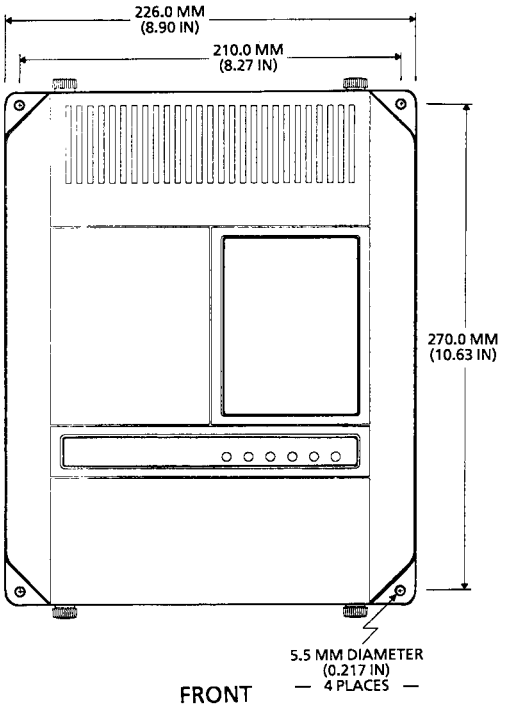
NOMINAL WEIGHTS

.37 AND .55 KW ($\frac{1}{2}$ AND $\frac{3}{4}$ HP)	1.5 KG (3.3 LBS)
.75 KW (1 HP)	1.7 KG (3.7 LBS)
1.1 AND 1.5 KW ($1\frac{1}{2}$ AND 2 HP)	1.9 KG (4.2 LBS)

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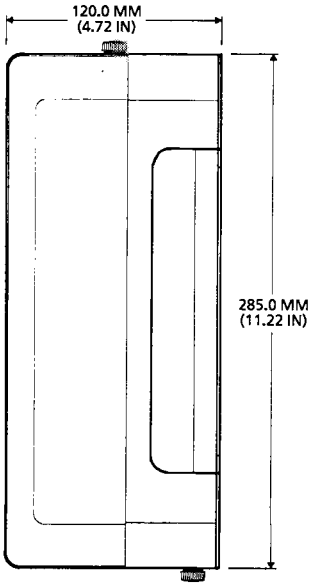
NEMA TYPE 1 — DIMENSIONS IN MILLIMETERS AND (INCHES) — NOMINAL WEIGHTS IN KILOGRAMS AND (POUNDS)

DIMENSIONS



FRONT

DIMENSIONS

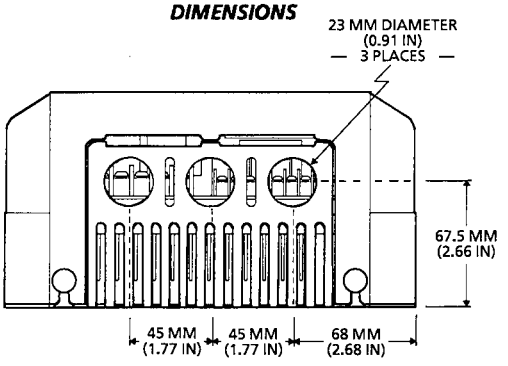


SIDE

NOMINAL WEIGHTS

.37 AND .55 KW ($\frac{1}{2}$ AND $\frac{3}{4}$ HP)	2.5 KG (5.5 LBS)
.75 KW (1 HP)	2.7 KG (5.9 LBS)
1.1 AND 1.5 KW ($1\frac{1}{2}$ AND 2 HP)	2.9 KG (6.4 LBS)

DIMENSIONS



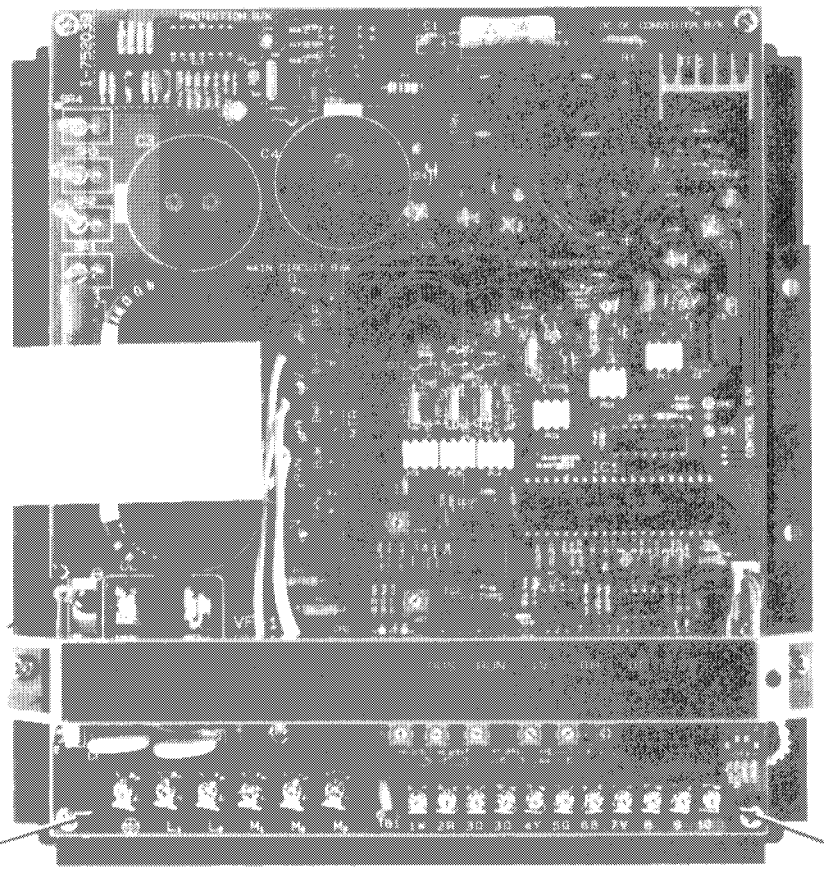
BOTTOM

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5 WIRING



POWER TERMINAL BLOCK
PAGE 21

CONTROL TERMINAL BLOCK TB1
PAGE 23

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IMPORTANT

1) The National Electrical Code requires that a circuit breaker or fusible disconnect switch be provided in the drive branch circuit. The standard Bulletin 1331 does not provide this requirement. Selection of a branch circuit breaker or fusible disconnect must be based on the drive input current rating.
2) The National Electrical Code requires that motor overload protection be provided in the motor branch circuit. The standard Bulletin 1331 drive does not provide this requirement.

   Eutectic alloy or bi-metal overload relays can be utilized to provide running over current protection. Due to the reduced cooling capacity of motors running at low speed (full load), overload relays typically can not provide accurate protection against overheating below 50% of base speed.

   Refer to article 430 of the National Electrical Code and any additional local codes for specific requirements and additional information.

The National Electrical Code and local regulations govern the installation and wiring of the Bulletin 1331. All input and output power wiring, control wiring and conduit for NEMA Type 1 drives must be brought through the the drive conduit entry holes at the bottom of the enclosure. Connections for all drives must be made as shown in the following sections and in accordance with the drive nameplate data and National Electrical Code requirements.

WARNING



The voltage of the incoming line to the drive must match the drive input rating. Verify the drive rating by referring to the input voltage listed on the drive nameplate. If the incoming line voltage is out of this tolerance, equipment may be damaged or not operate.

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All signal wiring must be run separate from power or control wiring. Verify that shielded cable and/or conduit is used if indicated on any interconnection diagram or in the following sections. If shielded cable is required, shields must be grounded at the drive end only — either one of the terminals marked **3O** at Control Terminal Block **TB1**. The other end must be insulated and left floating to prevent it from coming into contact with ground.

Nearby relays, solenoids, or brake coils can produce electrical noise transients and cause erratic drive behavior. Transient suppression networks must be added across the coils of these devices. Since most start up difficulties result from incorrect wiring, every precaution should be taken to assure that the wiring is as indicated on the diagrams.

WARNING



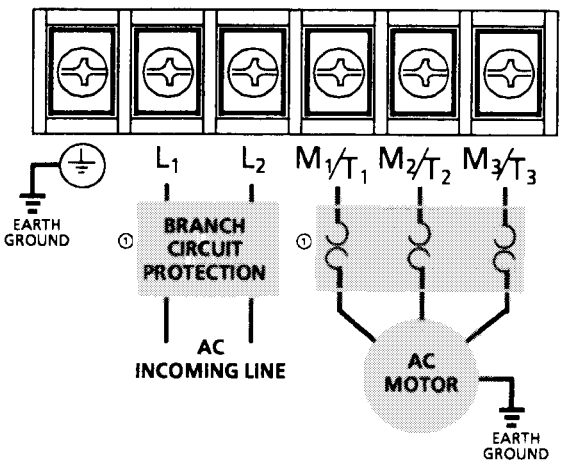
1) Any disconnecting means wired to the output of the drive must be interlocked with the drive control circuit to de-energize the drive if opened during drive operation. If not properly interlocked, the drive will continue to produce output voltage into an open motor circuit causing a potential shock hazard. A hard wired auxiliary contact from the disconnect device must be wired in series with the run signal at terminal **6** on Control Terminal Block **TB1**.
2) The run/stop control circuitry in the Bulletin 1331 contains solid state components. If hazards due to accidental contact with moving machinery or unintentional flow of liquid, gas or solids exist, an additional hard wired contingency stop circuit is required. A device that removes AC input power when a contingency stop is initiated can be used. When AC input power is removed there will be a loss of inherent regenerative braking and the motor will coast-to-stop. An auxiliary braking method may be required. Refer to codes and standards applicable to your particular system for specific requirements and additional information.

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POWER TERMINAL BLOCK

IMPORTANT

1) Verify that induction motor windings are properly connected and agree with the drive output voltage rating.
2) For multimotor operation the combined total of motor full load current must not exceed the continuous rated output current of the drive.
3) A ground terminal has been provided on the Bulletin 1331 that must be connected to earth ground or the ground of the building electrical system. The motor frame must also be connected to earth ground. Refer to the motor manufacturer's guidelines for specific details.
4) The maximum wire size the Power Terminal Block will accept is 12 AWG. Torque all terminal screws to 8KG-CM (7 IN-LBS).



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The Power Terminal Block is a six position terminal block mounted on the lower left portion of the drive. All input and output power connections are marked.

The Bulletin 1331 does not provide protection against input power short circuits. Recommendations for branch short circuit protection are provided in section ***3 SPECIFICATIONS***.

⏚ This terminal is connected to earth ground or the ground of the building electrical system. The motor frame should also be connected to earth ground. Refer to the motor manufacturer's guidelines for specific details.

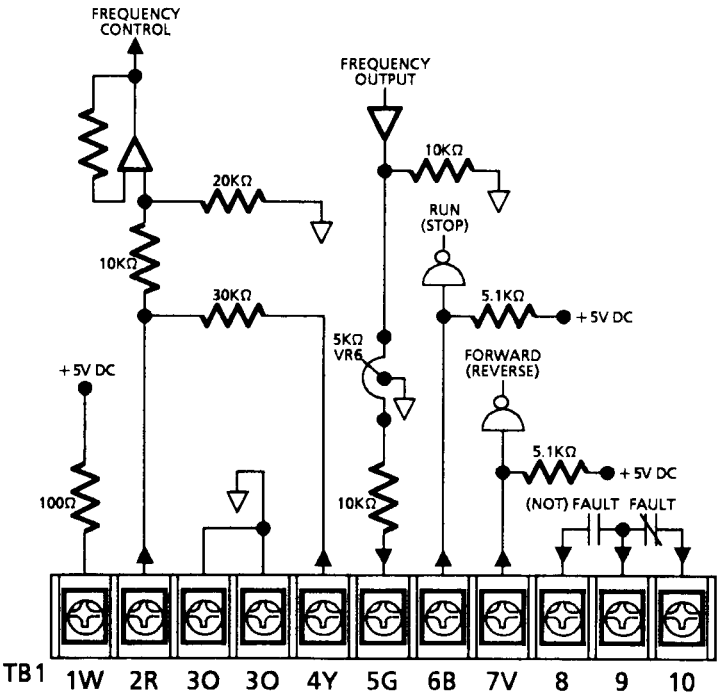
L_1 L_2 Connect these terminals to a branch circuit protected 1∅ AC input. Verify that the incoming power matches the voltage specified for your drive in section ***3 SPECIFICATIONS***.

M_1/T_1 M_2/T_2 M_3/T_3 Connect the motor leads to these terminals.

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CONTROL TERMINAL BLOCK TB1

Control Terminal Block **TB1** is an eleven position terminal block mounted on the lower right portion of the drive. All input and output connections are marked. An additional code has been added to indicate wire colors for the Local Control Panel — **1W** (white), **2R** (red), **3O** (orange), **5G** (green), **6B** (blue), and **7V** (violet). The maximum wire size the Control Terminal Block will accept is 16 AWG. Torque all terminal screws to 5KG-CM (4.5 IN-LBS).



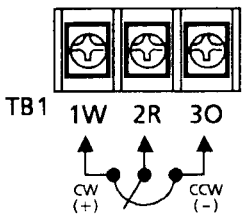
1W — Potentiometer High
2R — Potentiometer Wiper
3O — Logic Common
3O — Logic Common
4Y — 0-10V DC Input Input
5G — 0-1mA Frequency Output
6B — Run/Stop Input
7V — Forward Reverse Input
8 — Fault Signal Output
9 — Fault Signal Output
10 — Fault Signal Output

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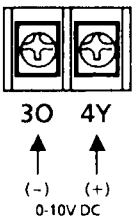
If the Local Control Panel is installed, the Bulletin 1331 is capable of operating without additional connections to TB1. If required, external operator elements may replace the Local Control Panel to provide remote control. Several additional control functions and status outputs are also available for customer use at TB1.

CONTROL TERMINAL BLOCK TB1 — SPEED CONTROL

10KΩ Potentiometer Control Input
— 5V DC Internal Source —



0-10V DC Control Input
— 40KΩ Drive Impedance —



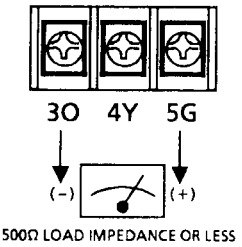
IMPORTANT

Only one form of speed control may be connected to the Bulletin 1331, either a 10kΩ Potentiometer Control Input or a 0-10V DC Control Source.

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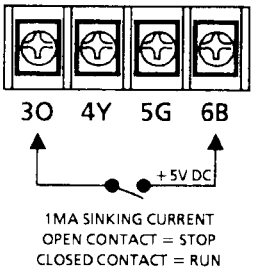
CONTROL TERMINAL BLOCK TB1 — ANALOG METER OUTPUT

0-1mA Analog Meter Output



CONTROL TERMINAL BLOCK TB1 — RUN/STOP INPUT

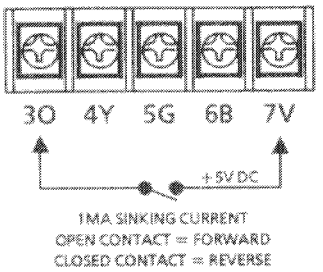
Run/Stop Control Input
— 5V DC Internal Source —



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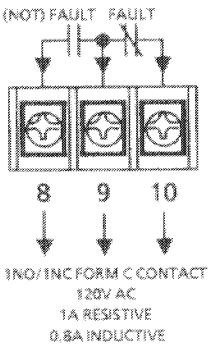
CONTROL TERMINAL BLOCK TB1 — FORWARD/REVERSE INPUT

Forward/Reverse Control Input
— 5V DC Internal Source —



CONTROL TERMINAL BLOCK TB1 — FAULT CONTACT OUTPUTS

Fault Contact Outputs
— Faulted and Power Off State Shown —

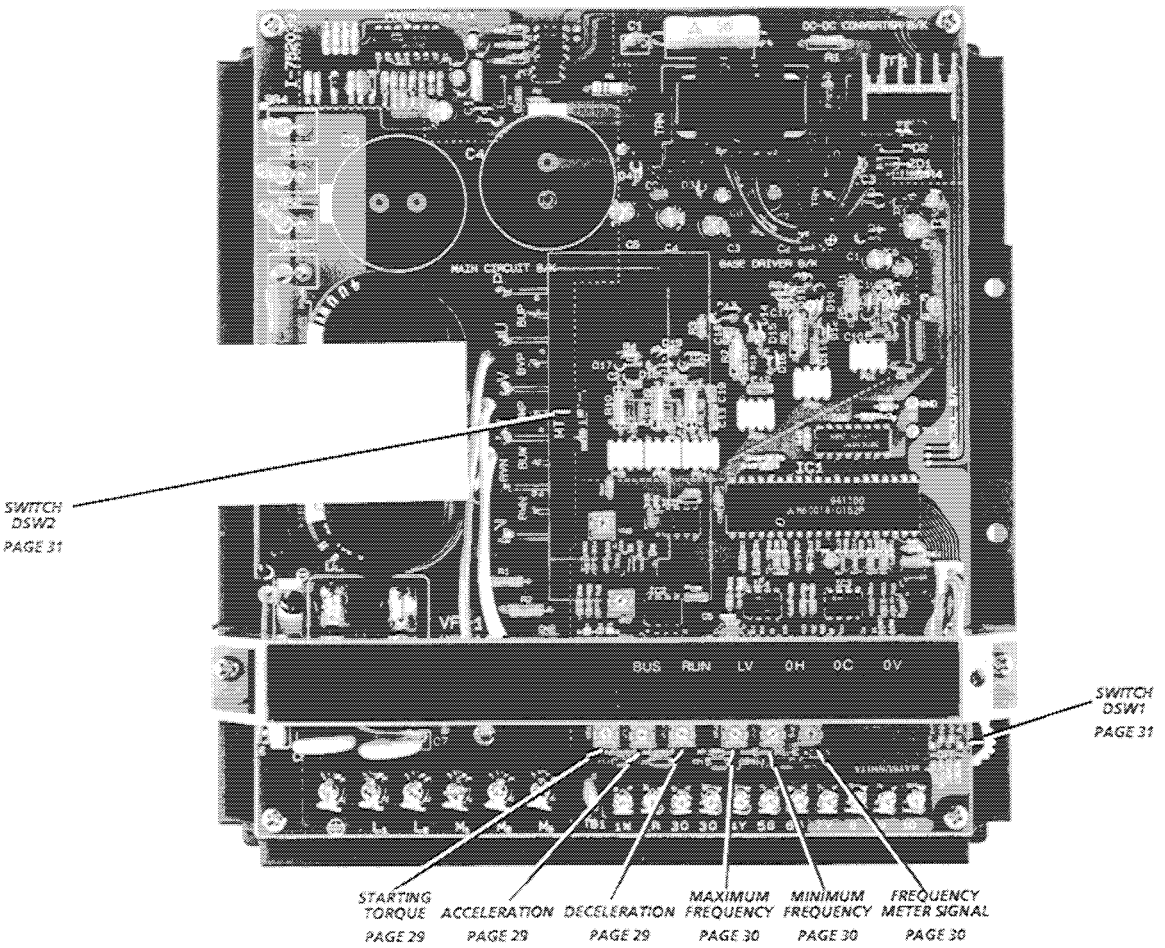


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6 ADJUSTMENTS



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6 ADJUSTMENTS

Six potentiometers may be adjusted from the minimum — fully counterclockwise (CCW) — to the maximum — fully clockwise (CW) position. It is recommended that all six be initially adjusted to the minimum position. Identification and graduation marks are provided on each potentiometer.

CAUTION



Six Bulletin 1331 potentiometers are provide for customer use. All remaining potentiometers have been factory set and sealed and must not be readjusted. Readjustment of these potentiometers may cause damage to the motor or drive.

STARTING TORQUE — ADJUSTABLE FROM 20 TO 35V DC AT 5 HZ



The boost potentiometer adjusts the output voltage at low frequencies to increase or decrease motor starting torque. The lower the boost, the less starting torque. The higher the boost, the greater the starting torque. Generally the best DC boost setting is the lowest setting that will consistently start the load.

ACCELERATION — ADJUSTABLE FROM 1 TO 60 SECONDS



The acceleration potentiometer adjusts the time required for the drive to accelerate from zero speed to the maximum speed set by the **MAX** potentiometer.

DECELERATION — ADJUSTABLE FROM 1 TO 60 SECONDS



The deceleration potentiometer adjusts the time required for the drive to decelerate from maximum speed to the minimum speed set by the **MIN** potentiometer.

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MAXIMUM FREQUENCY — ADJUSTABLE FROM 50 TO 100% OF FREQUENCY RANGE



The maximum frequency potentiometer sets the maximum speed the drive will produce depending upon the setting of DSW1. The **MAX** potentiometer will then set a sub-limit anywhere from 50 to 100% of the frequency set by DSW1.

MINIMUM FREQUENCY — ADJUSTABLE FROM 0 HZ TO 50% OF FREQUENCY RANGE



The minimum frequency potentiometer sets the minimum speed the drive will produce depending upon the setting of DSW1. While the **MAX** potentiometer sets a sub-limit anywhere from 50 to 100% of the frequency set by DSW1, the **MIN** potentiometer sets a minimum speed anywhere from zero to 50%. Below ~0.5 Hz, the Bulletin 1331 will turn off and no longer produce an output frequency or voltage.

FREQUENCY METER SIGNAL — ADJUSTABLE FROM ZERO TO 1mA



The meter signal potentiometer adjusts the meter signal output to permit calibration of various frequency ranges and meter loads.

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6 ADJUSTMENTS

Five DIP switches are used for the remaining Bulletin 1331 adjustments. Two of the DIP switches located at **DSW1** work in combination with the single DIP switch at **DSW2** to set the operating frequency range of the drive. The remaining two DIP switches at **DSW1** set the drive stopping and fault reset modes.

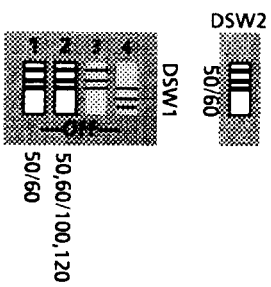
CAUTION

Use a non-conductive plastic tool to set switches. Never set switches using a ball point pen or pencil. Switches contaminated with conductive debris may cause erratic drive behavior.

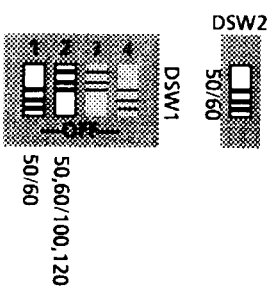
FREQUENCY RANGE — DSW1 (SWITCHES 1 AND 2) AND DSW2

Switches **1** and **2** at **DSW1** in combination with **DSW2** set the operating frequency range of the drive —

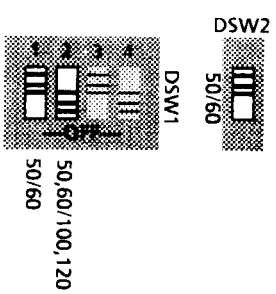
For 0-50 Hz



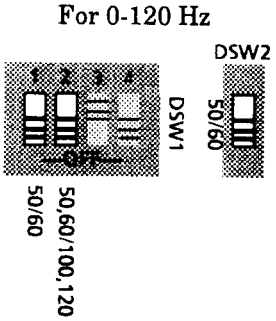
For 0-60 Hz



For 0-100 Hz



For 0-120 Hz

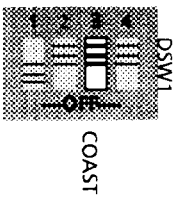


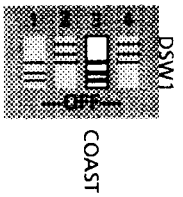
The maximum frequency set by the **MAX** potentiometer can never exceed the maximum frequency set by switch **2**. Below ~0.5 Hz, the Bulletin 1331 will turn off and no longer produce an output frequency or voltage.

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STOP MODE — DSW1 (SWITCH 3)

Switch 3 sets the stopping mode of the motor —

Either ramp-to-stop 

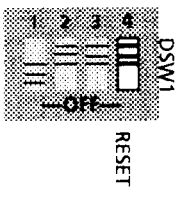
or coast-to-stop. 

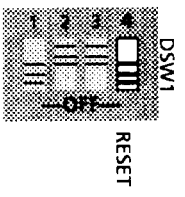
When ramp-to-stop is selected the motor will decelerate to a stop in the time set by the **DEC.** potentiometer.

When coast-to-stop is selected the motor will coast to a stop independent of the time set by the **DEC.** potentiometer.

FAULT RESET — DSW1 (SWITCH 4)

Switch 4 sets how the drive may be reset after a fault trip —

Either by cycling power 

or by a stop command followed by a run command. 

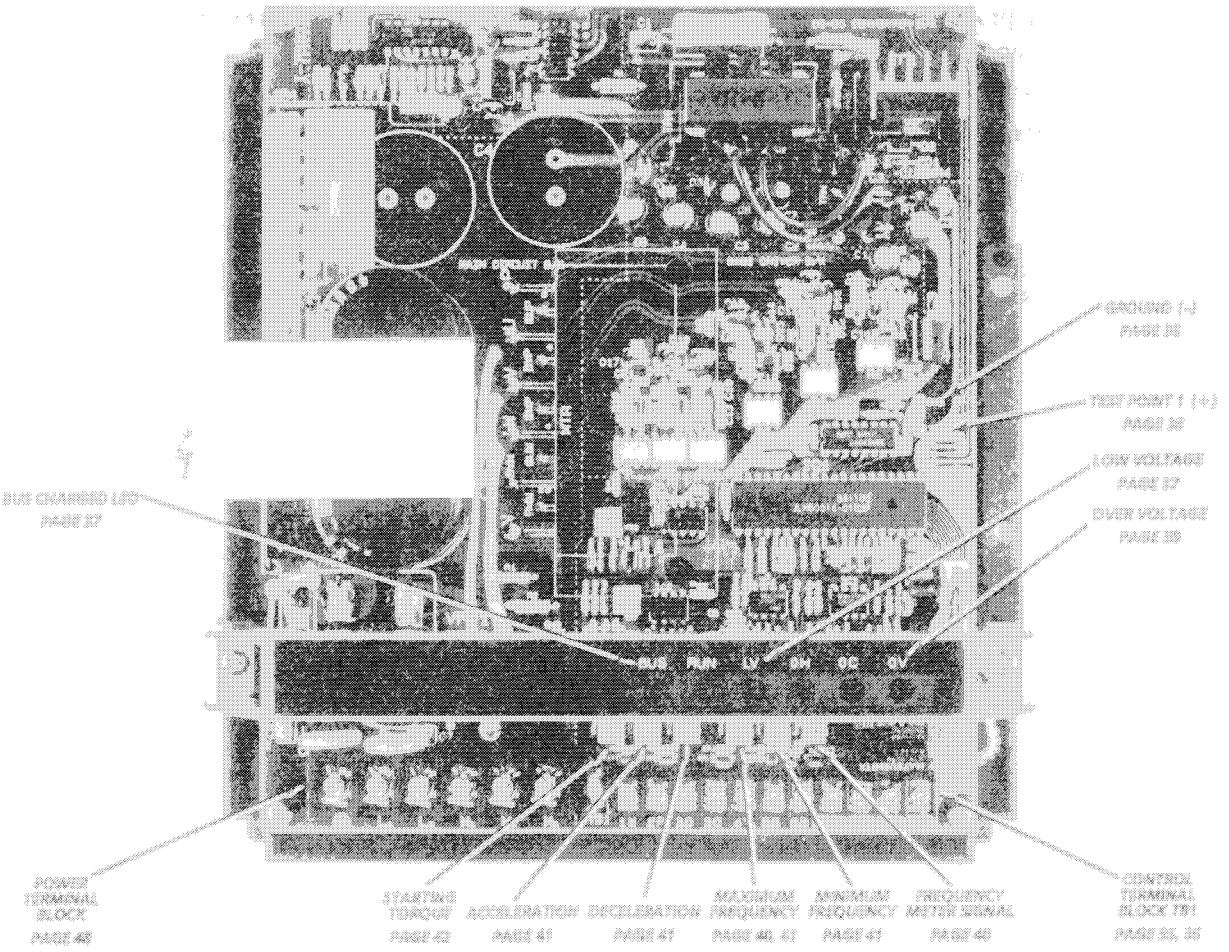
In either case, the Bulletin 1331 may always be reset by cycling power.

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7 START UP PROCEDURE



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7 START UP PROCEDURE

The following start up procedure requires you to monitor the drive output frequency. The drive output frequency can be determined by one of the following methods.

- A digital frequency meter connected to test points **TP1** (+) and **GND** (–) at the drive.
- An analog meter connected at the frequency meter output — Terminals **3** and **5** of Control Terminal Block **TB1**.
- A hand-held tachometer at the motor shaft.

WARNING



Power must be applied to the drive with the cover removed to perform certain start up procedures. Voltages on many components are at incoming line potential or bus voltage. To avoid electric shock hazard or damage to equipment, do not touch any drive component other than those specified in the start up procedure.

WARNING



Become familiar with the equipment and read through the wiring, start up and adjustment sections before attempting to perform the start up procedure. Adjustments may be required to meet specific load characteristics or operator preferences.

Exercise extreme care when performing any task on the drive. Failure to do so may result in injury due to electric shock or equipment damage.

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IMPORTANT

If you can not complete a procedure, refer to section ***8 MAINTENANCE AND TROUBLESHOOTING*** immediately. Do Not Proceed — Determine the cause of the problem and correct the problem first, then return to your start up procedure.

IMPORTANT

Remote run/stop circuits may be connected to terminal **6B** at Control Terminal Block **TB1**. Verify that all circuits are in a de-energized state before applying power.

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7 START UP PROCEDURE

STEP 1 — CHECK YOUR WIRING AND PRELIMINARY ADJUSTMENTS

With all power to the drive removed and locked out, remove the drive cover.

Verify that the incoming AC power, motor and control interconnections are made in accordance with section *5 WIRING*.

Verify that all adjustment potentiometers and dip switches are initially set as described in section *6 ADJUSTMENTS*. Final adjustments to drive potentiometers and dip switches will be performed later in this section.

STEP 2 — PERFORM AN INITIAL POWER UP CHECK

If a forward/reverse switch is connected, set it to forward.

Set the drive run/stop input to stop, the drive frequency command to zero or minimum, and the MIN potentiometer fully counterclockwise to the minimum setting.

Apply input power to the drive. If the BUS LED is not illuminate. If either the LV or OV LEDs are illuminated, refer to section *8 MAINTENANCE AND TROUBLESHOOTING* to correct the problem before proceeding.

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STEP 3 — CALIBRATE YOUR FREQUENCY METER UNDER NO-LOAD CONDITIONS

If a meter is connected to terminals 3 and 5 at Control Terminal Block TB1, the FM potentiometer is used to adjust the output frequency signal as follows.

STEP 3A — Remove power from the drive. Wait until the BUS LED is no longer illuminated and the bus is fully discharged, then disconnect the motor at the Power Terminal Block. Set the MAX potentiometer fully CW to the maximum setting and the forward/reverse switch (if present) to forward.

STEP 3B — Reapply power to the drive. Set the frequency command to 10-20% speed, then set the drive to run. If the frequency meter does not deflect in the correct direction, stop the drive and remove power from the drive. Wait until the BUS LED is no longer illuminated and the bus is fully discharged. Reverse the meter leads.

STEP 3C — Increase the drive frequency to maximum and adjust the FM potentiometer to obtain a meter reading corresponding to the drive maximum frequency set by DSW1 and DSW2.

STEP 4 — CHECK YOUR DIRECTION OF MOTOR ROTATION UNDER NO-LOAD CONDITIONS

With power removed from the drive and the motor connected at the Power Terminal Block, set the frequency command to zero. If a forward/reverse switch is connected, set it to forward. Apply power to the drive and set the drive to run. Slowly increase the frequency until the motor just begins to rotate.

If the motor rotates in the wrong direction, stop the drive and remove power from the drive. Wait until the BUS LED is no longer illuminated and the bus is fully discharged. Switch two of the motor leads at the Power Terminal Block.

Check for correct rotation by repeating the procedure. If a forward/reverse switch is connected, set it to reverse and check again for correct reverse rotation by repeating the procedure.

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7 START UP PROCEDURE

STEP 5 — ADJUST YOUR MAXIMUM FREQUENCY UNDER NO-LOAD CONDITIONS

Set the frequency command to zero and the **MAX** frequency potentiometer fully CCW to the minimum setting. Apply power to the drive and set the drive to run.

Observe the motor while slowly increasing motor frequency to maximum.

Monitor the output frequency and adjust the **MAX** potentiometer to the required maximum output frequency.

STEP 6 — ADJUST YOUR MINIMUM FREQUENCY UNDER NO-LOAD CONDITIONS

With power applied and the drive still running, set the frequency command to zero.

Monitor the output frequency and adjust the **MIN** potentiometer to the required minimum output frequency.

STEP 7 — ADJUST YOUR ACCEL AND DECEL RATES UNDER NO-LOAD CONDITIONS

With power applied and the drive still running, set the frequency command to minimum. Monitor the time it takes the drive to accelerate to maximum frequency. If the time is not acceptable, adjust the **ACC.** potentiometer.

- To increase the acceleration time — Turn the **ACC.** potentiometer CW
- to decrease the acceleration time — Turn the **ACC.** potentiometer CCW

Set the frequency command to maximum. Monitor the time it takes the drive to decelerate to minimum frequency. If the time is not acceptable, adjust the **DEC.** potentiometer.

- To increase the deceleration time — Turn the **DEC.** potentiometer CW
- to decrease the deceleration time — Turn the **DEC.** potentiometer CCW

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STEP 8 — ADJUST YOUR STARTING TORQUE

The **BOOST** potentiometer is used to set the starting torque that will be applied to the motor. To be properly adjusted, the following procedure must be performed with the motor connected and under full load conditions.

With power removed from the drive, set the frequency command to the normal operational setting and the **BOOST** potentiometer fully CCW to the minimum setting. If a forward/reverse switch is connected, set it to the normal operational position. Apply power to the drive, set the drive to run and monitor the starting performance of the motor.

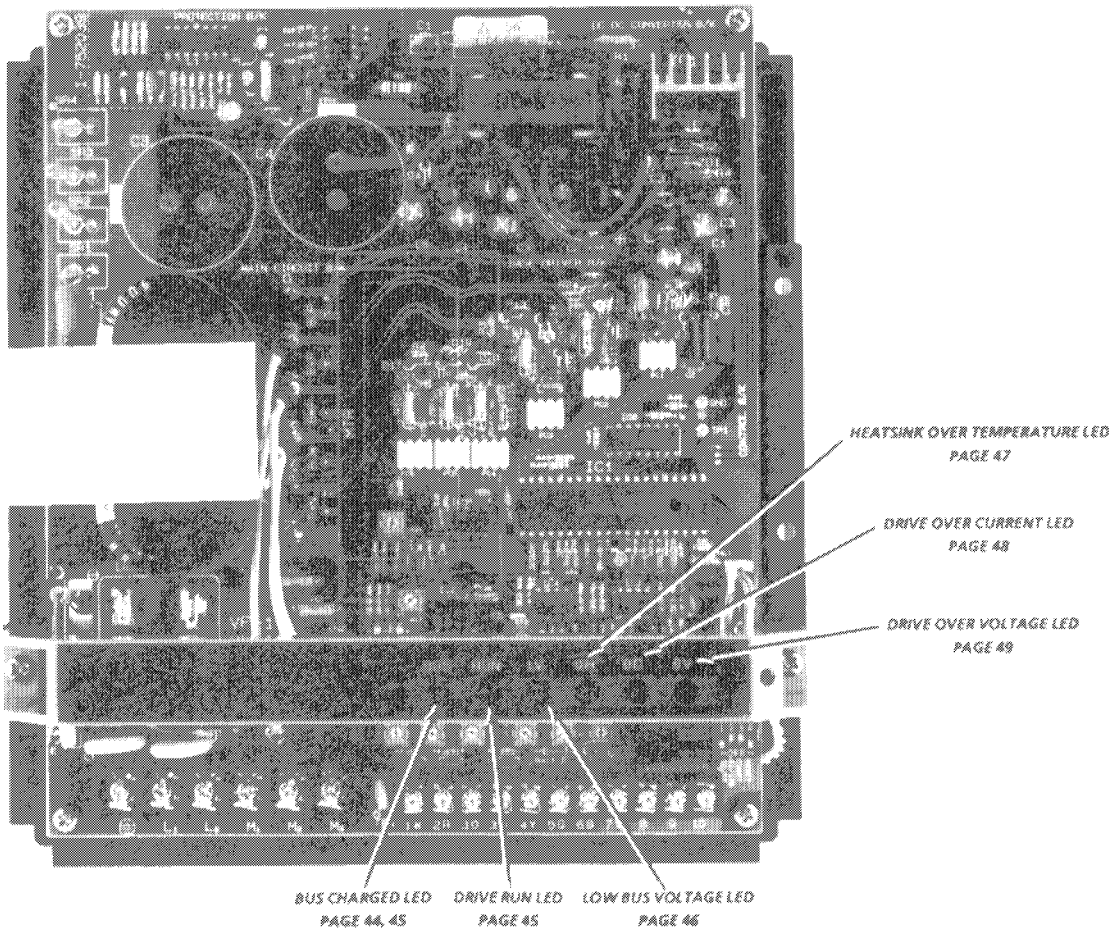
If the motor stalls or has difficulty in starting the load, slightly increase the **BOOST** potentiometer setting.

Repeat this procedure until the lowest setting of the **BOOST** potentiometer is found that will consistently start the motor under full load conditions.

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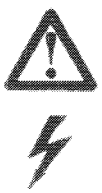
MAINTENANCE

The Bulletin 1331 is convection cooled by air flowing over the heat sink fins. Air flow must never be restricted. Heat sink fins or enclosure vents must never become obstructed with dirt or foreign matter. Periodically inspect and clean the drive only after removing all power. Do not use aromatic or petroleum based solvents to clean plastic parts of the drive.

TROUBLESHOOTING

Six status and fault LEDs are provided on the Bulletin 1331 as a troubleshooting guide. The following charts indicate drive malfunctions and the approved procedures for correcting these malfunctions.

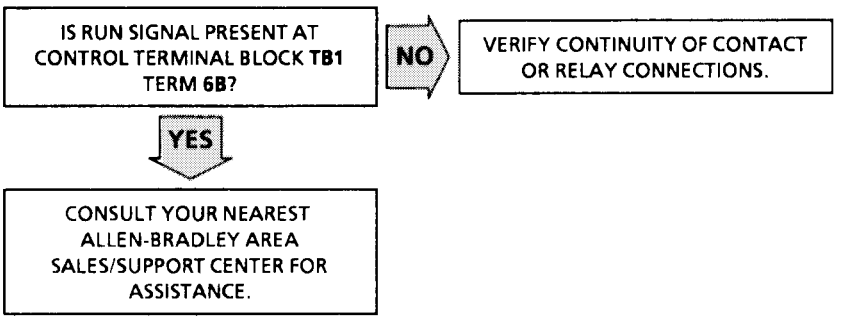
WARNING



Power must be applied to the drive with the cover removed to perform certain troubleshooting procedures. Voltages on many components are at incoming line potential or bus voltage. To avoid electric shock hazard or damage to equipment, do not touch any drive component other than those specified in the troubleshooting procedure.

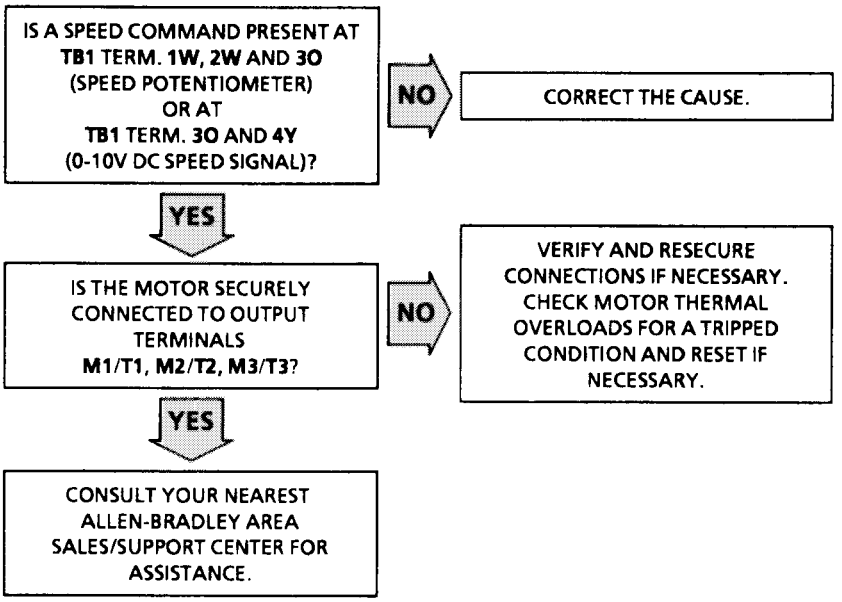
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MOTOR DOES NOT RUN — BUS LED IS ILLUMINATED — NO OTHER LEDS ARE ILLUMINATED



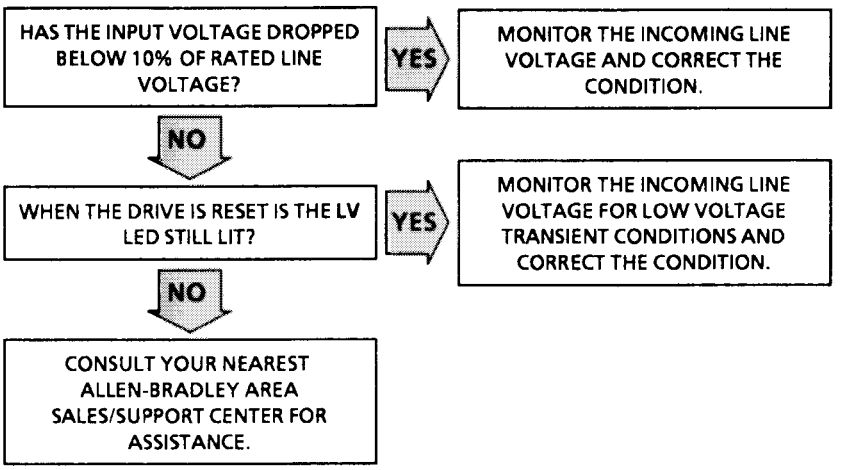
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MOTOR DOES NOT RUN — BUS AND RUN LEDS ARE ILLUMINATED — NO OTHER LEDS ARE ILLUMINATED



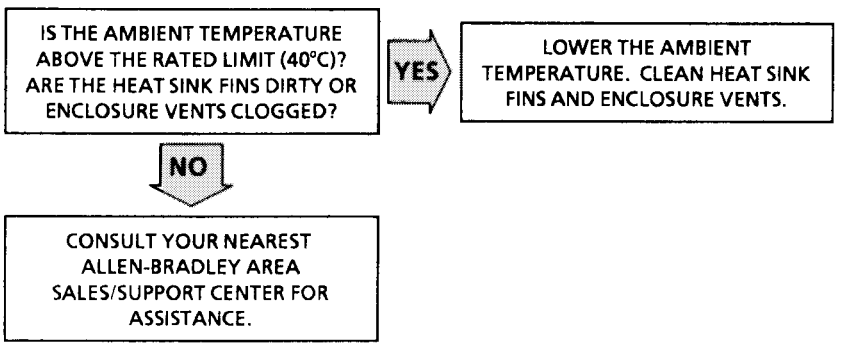
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MOTOR DOES NOT RUN CONTINUOUSLY — LV LED IS ILLUMINATED — BUS VOLTAGE IS AT OR BELOW 220V DC



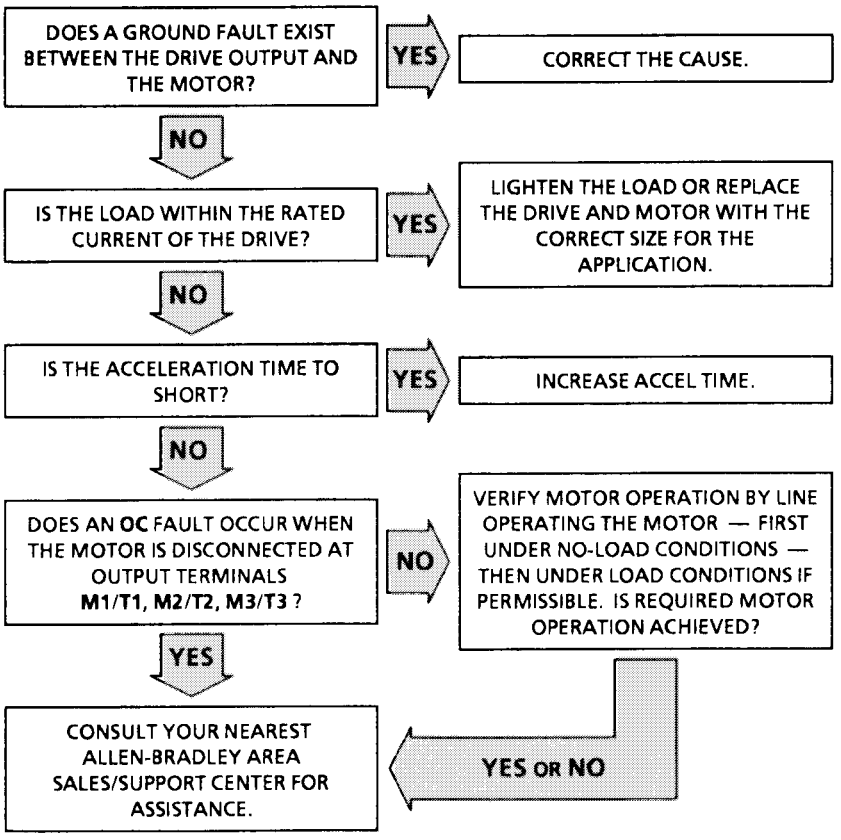
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MOTOR DOES NOT RUN CONTINUOUSLY — OH LED IS ILLUMINATED — HEATSINK TEMPERATURE IS AT OR ABOVE 100°C



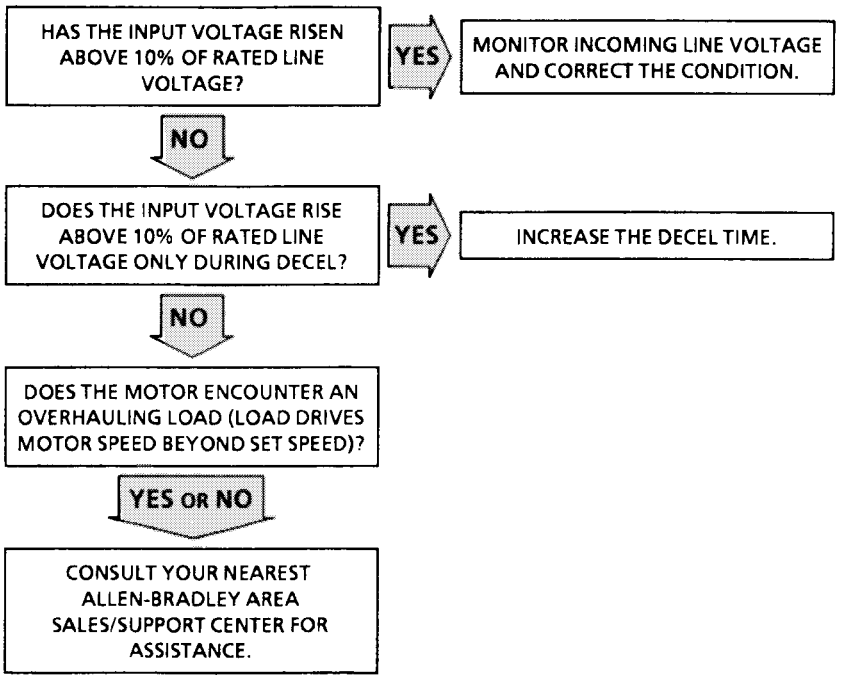
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MOTOR DOES NOT RUN CONTINUOUSLY – OC LED IS ILLUMINATED – OUTPUT CURRENT IS AT OR ABOVE 200% OF RATED INPUT CURRENT



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MOTOR DOES NOT RUN CONTINUOUSLY — OV LED IS ILLUMINATED — BUS VOLTAGE IS AT OR ABOVE 400V DC



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PUBLICATION 1331-5.0 — NOVEMBER, 1992
SUPERSEDES MARCH, 1990 AND PUB. 1331-5.0 DU1

P/N 135578

Printed in U.S.A.

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