Bulletin 1334 3-10 HP
Series B Troubleshooting Guide

Power ON-Indicates input power is connected when illuminated.

Momentary Overload Protection Circuit - When constantly illuminated, indicates an overload condition exceeded (60) seconds - Momentarily illuminated whenever circuit is activated.

Under Voltage Protection - When illuminated, indicates that the Drive has tripped OFF due to an input voltage that is less than 414 volts for a 460V Drive, 373 volts for a 415V Drive or 342 volts for a 380V Drive.

Over Voltage Protection - When illuminated, indicates that the Drive has tripped OFF due to the bus voltage exceeding 760V DC.

"A" Phase Protection Trip - When illuminated, indicates either:
- An Overload Condition Greater Than 200%
- A Shorted "A" Phase Output Transistor
- Section "A" of the Driver Board is Malfunctioning

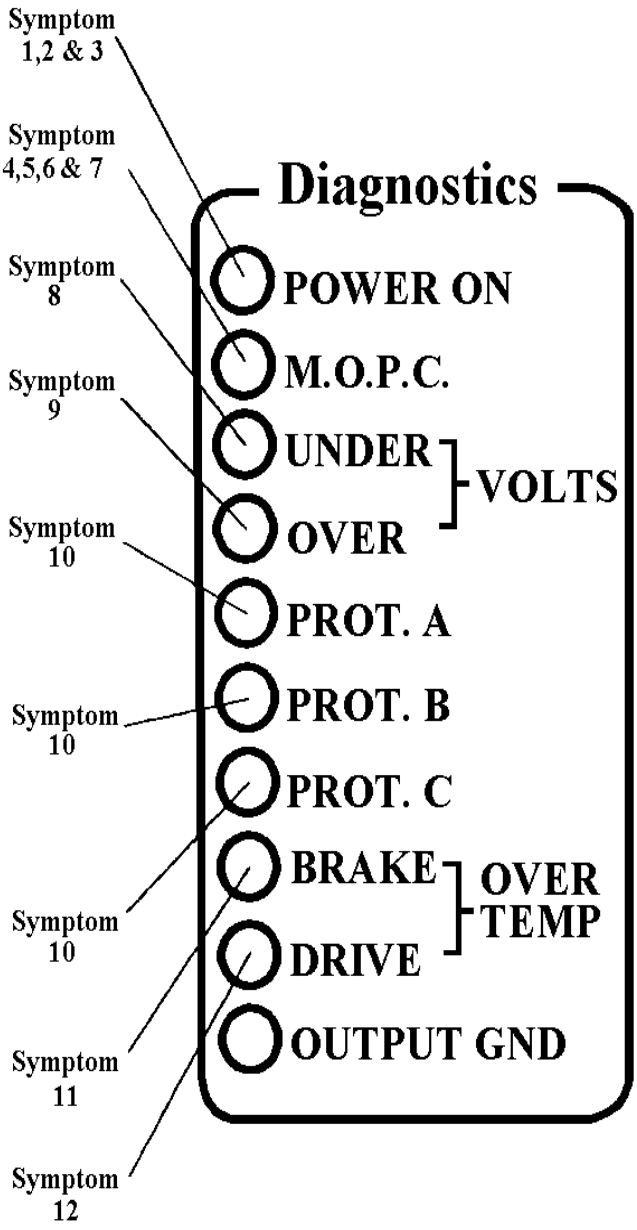
"B" Phase Protection Trip - When illuminated, indicates either:
- An Overload Condition Greater Than 200%
- A Shorted "B" Phase Output Transistor
- Section "B" of the Driver Board is Malfunctioning

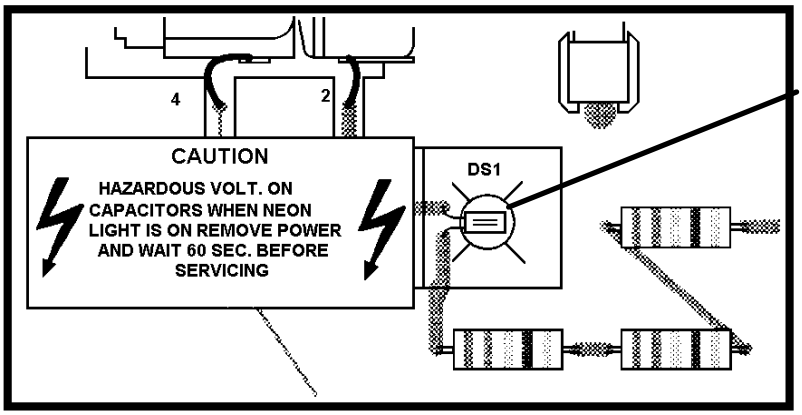
"C" Phase Protection Trip - When illuminated, indicates either:
- An Overload Condition Greater Than 200%
- A Shorted "C" Phase Output Transistor
- Section "C" of the Driver Board is Malfunctioning

Brake Resistor Over Temperature Protection Trip - When illuminated, indicates excessive brake resistor temperature.

Drive Over Temperature Protection Trip - When illuminated, indicates that the heatsink temperature of the Drive has exceeded the maximum safe operating limit.

Output Ground Fault Protection Trip Indication - NOT Utilized ON 3, 5, 71/2 & 10 HP DRIVES.





Symptom 13

DS1 - Located on Power Distribution Board A2 - When illuminated, indicates that the bus potential is in excess of 42V DC.

IMPORTANT: Drive Fault Trips. Before resetting any fault trip, refer to the following troubleshooting procedures to isolate and correct the fault.

WARNING: Hazardous voltage levels exist on some printed circuit boards and Drive components. If diagnostic LED(s) PROT. A, PROT. B, or PROT. C are lit, hazardous voltages can be present at the output terminals even though the STOP push-button has been depressed. If neon light DS1 on Power Distribution Board A2 is lit, hazardous voltages are present in the Drive cabinet. To guard against personal injury when boards or wires are being disconnected or reconnected, or fuses are being replaced, always remove power to the Drive at the disconnect device, wait (60) seconds, and ensure that DS1 is not lit before servicing. Use a DVM to check for zero volts between pins 11 (+ BUS) & 15 (- BUS) at connector J202 on Power Distribution Board A2.

CAUTION: To Guard Against Equipment Damage When Troubleshooting the Drive, Before Pressing the START Push-button Always:

- Set the Speed Pot or speed reference to MINIMUM.
- Set the FWD/REV Switch (if present), to the proper position.
- Uncouple the motor from its mechanical load.

IMPORTANT: ESD Precautions. ESD (Electrostatic Discharge) generated by static electricity can damage the CMOS devices on various Drive boards. To guard against this type of damage, it is recommended that when circuit boards are removed or installed the following precautions be observed.

- Wear a wrist type grounding strap that is grounded to the Drive chassis.
- DO NOT remove the new circuit board from its conductive wrapper unless a ground strap is worn.
- When removing any circuit board from the Drive, immediately place it in conductive packing material.

Symptom 1: Drive does not start. Amber POWER ON LED is not illuminated.

DIAGNOSTIC PROCEDURE:

Check for possible loss of input line voltage by measuring line voltage between L1, L2 and L3. If voltage is present, measure voltage across Input line fuses F1, F2 and F3. Measure voltage across input primary fuse F4. A voltage reading across any of these fuses indicates an open condition. Before replacing blown fuses complete STEPS 1, 2 & 3.

STEP 1 - Remove input power to the Drive. Before proceeding, wait (60) seconds. DS1, the bus charged neon light on Power Distribution Board A2, should not be lit. Use a DC voltmeter to verify that the DC bus is fully discharged by measuring the voltage between connectors E17 (+ BUS) and E13 (- BUS) on Power Distribution Board A2. Start with the voltmeter on its highest scale (x 1000) and range downward to the lowest voltmeter scale.

STEP 2 - Check Rectifier Assembly 1REC. Unplug connectors E8, E9, E10 & E13 at the Power Distribution Board. Unplug connector 1L-1 at Inductor 1L. With an ohmmeter set on the x1 scale, check the resistance of 1REC at the leads as follows.

OHMMETER		READING
+ LEAD	- LEAD	
1L-1 (1REC +)	E10 (1REC-AC1)	INFINITE
1L-1 (1REC +)	E9 (1REC-AC2)	INFINITE
1L-1 (l REC +)	E8 (1REC- AC3)	INFINITE
E10 (1REC-AC1)	E13 (1REC -)	INFINITE
E9 (1REC-AC2)	E13 (lREC -)	INFINITE
E8 (1REC-AC3)	E13 (1REC -)	INFINITE

If any of the above readings are not as shown, replace Rectifier Assembly 1REC.

IMPORTANT: When replacing Rectifier Assembly 1REC, clean all surfaces. Apply a thin layer of thermal grease (Dow Corning 340) to the back of the assembly. Torque mounting screws to 17-26 in-lbs max.

STEP 3 - With the ohmmeter set on the x100 scale, check Bus Capacitors 2C & 3C for a shorted condition as follows. Disconnect leads to Bus Capacitors 2C & 3C . Connect the (+) POSITIVE lead of the ohmmeter to the (+) POSITIVE terminal of the capacitor. Connect the (-) NEGATIVE lead of the ohmmeter to the (-) NEGATIVE terminal of the capacitor. The ohmmeter should immediately read low, then slowly increase to approximately 20kΩ. A sustained low reading indicates a shorted capacitor that requires replacement.

After completing STEPS 1, 2 & 3, replace blown fuses and reapply input power.

Symptom 2: Drive does not start. Amber POWER ON LED is illuminated. No red fault LEDs are illuminated.

DIAGNOSTIC PROCEDURE:

Check for line out condition at fuse F3 by measuring the AC line voltage from L3 to either L1 or L2 . If voltage is present, measure voltage across F3. A voltage across F3 indicates that it is open and must be replaced. Before replacing F3, perform STEPS 1, 2 & 3 in Symptom 1, then the following nine steps.

STEP 1 - Check precharge circuit fuse F5 for an open condition.

STEP 2 - With input power to the Drive removed at the disconnect device, check that all jumpers on Modulator Logic Board A1 are in their proper position, particularly the VCO/EXT-C jumper and the IFB/XFB jumper.

STEP 3 - With input power to the Drive removed at the disconnect device, check installed options, particularly those with AUTO/MAN selection (both local and remote) Depending upon the options installed the maximum speed pot adjustment R25 or the minimum speed pot adjustment R26 may be ineffective.

- If option N, N4, G2 or G4 is installed, ensure that: The AUTO/MAN switch on the card is set to the MAN mode. A lkΩ, 2W, linear taper speed pot has been properly connected to Terminal Block TB1 between terminals 14, 15 & 16.
- If option G is installed, ensure that the 1kΩ resistor included with the option kit has been installed at Terminal Block TB1 between terminals 14 & 16.
- If option K7 is installed, check for continuity across the Brake Over Temperature circuit at Terminal Block TB1 between terminals 17 & 18.
- If option T, T1, T2 or T3 is installed, check for continuity across the Motor Overload Relay contact circuit at Terminal Block TB1 between terminals 10 &11.

STEP 4 - Check for an open speed pot at Terminal Block TB1. Measure the voltage at Terminal Block TB1 between terminals 14 &16. There should be 3.2V DC. If voltage is 12V DC, the speed pot may be open or there may be an open wire between

the speed pot and terminals 14, 15 & 16. Check for an inoperative speed pot by turning the pot from 0 to 100%. The voltage between terminals 15 &16 should vary from 0 to 3.2V DC. Replace or correct as required.

STEP 5 - Check the voltage between terminals 9 & 11 at Terminal Block TB1.

- If standard START/STOP configuration is used, there should be 90V AC between terminals 9 & 11. If not, the START/STOP circuit is open. Check the START/STOP circuit connections to TB1.

- If field installed 2-wire, 90V AC, RUN/STOP control is used, there should be 90V AC between terminals 9 & 11. If not, the RUN/STOP circuit is open. Ensure that the circuit has been installed as specified.

- If field installed 2-wire, 120V AC, RUN/STOP control is used, there should be 120V AC between terminals 9 & 11. If not, the RUN/STOP circuit is open. Ensure that the circuit has been installed as specified.

STEP 6 - Measure the output voltages in the secondary circuits of Transformer 1T. The following voltages should be present at the Power Distribution Board.

molex connector J204 between pins 4 & 1 14V AC
molex connector J204 between pins 2 & 1 14V AC
molex connector J204 between pins S & 6 15V AC
between connector E1 & molex connector J204, pin 1 90V AC
between connectors E20 & E19 12V AC
between connectors E18 & E19 l 2V AC

If any one voltage is absent, remove input power and check all connections to 1T. If all connections are correct, replace Transformer 1T.

STEP 7 - Measure all logic power supply output voltages at the Power Distribution Board. The following voltages should be present at molex connector J203 with respect to Drive common, J203, pin 8. If any one voltage is absent, replace Power Distribution Board A2.

J203, pin 1 - 17V DC
J203, pin 5 + 17V DC
J203, pin 6 14V AC
J203, pin 7 + 1l to + 13V DC (nominal)
J203, pin 9 + 1l to + 13V DC (nominal)

STEP 8 - Measure contactor K1 supply voltage at Power Distribution Board A2. There should be + 9 to + 15V DC between pins 7 & 10 at molex connector J203. There should also be + 9 to + 15V DC between points 3 & 4 at the contactor. If 9 to 15 volts is measured and K1 is not picked-up, the contactor may be inoperative. If inoperative, replace the Power Distribution Board.

STEP 9 - Check pin 10 at molex connector J203 with respect to pin 8, Drive common. If a TTL level "0" is not measured, replace Modulator Logic Board A1.

Symptom 3: Precharge cycle excessively long or not complete. Amber POWER ON LED may or may not be illuminated.

DIAGNOSTIC PROCEDURE:

The DC bus precharge cycle should be completed within (5) seconds after input line power is applied to the Drive. Check precharge circuit fuse F5 for an open condition first, then perform the following three steps.

STEP 1 - Check Rectifier Assembly 1REC and Bus Capacitors 2C S 3C as specified in STEPS 1, 2 & 3, symptom 1.

STEP 2 - Check for an inoperative K1 Contactor. Measure contactor coil supply voltage at Power Distribution Board A2. There should be + 9 to + 15V DC between pins 7 & 10 at molex connector J203. There should also be + 9 to + 15V DC between points 3 & 4 at the contactor. If 9 to 15 volts is measured and K1 is not picked-up, the contactor may be inoperative. If inoperative, replace the Power Distribution Board.

STEP 3 - Check pin 10 at molex connector J203 with respect to pin 8, Drive common. If a TTL level "0" is not measured, replace Modulator Logic Board A1.

Symptom 4: Drive trips on momentary overloads causing phase protection indication. M.O.P.C. circuit not functioning properly. Red M.O.P.C. fault LED is not illuminated.

DIAGNOSTIC PROCEDURE:

IMPORTANT: If the Drive will not restart or reset after a fault trip always check fuse F5 for an open condition. Replace if necessary.

With the motor rotor locked and boost set to zero, adjust the ACCEL RATE setting, switch S1 on Modulator Logic Board A1, to 1.2 Hz/Sec. Set the operator speed pot or speed reference to zero. After completing the above, start the Drive and slowly increase the speed while monitoring the output motor current on any phase using a true RMS reading clamp on ammeter. The M.O.P.C. LED should light when the current reaches a nominal value of 150%. If the M.O.P.C. LED does not light, use an oscilloscope to check for a pulsed waveform at the following pins on connector J113 of the Modulator Logic Board with respect to Drive common.

Pin 5 - ϕA Driver Signal
Pin 16 - ϕB Driver Signal
Pin 27 - ϕC Driver Signal

If pulse signals that go to a TTL level "0" are not present, replace Driver Board A3. If pulse signals are present on all (3) sections of the Driver Board, replace Modulator Logic Board A1. Return the boost and accelerate adjustments to their normal settings.

Symptom 5: Drive starts momentarily then trips off or Drive trips off during normal operation. Red M.O.P.C. fault LED is illuminated.

DIAGNOSTIC PROCEDURE:

IMPORTANT: If the Drive will not restart or reset after a fault trip, always check fuse F5 for an open condition. Replace if necessary.

An illuminated M.O.P.C. LED indicates that the Drive has tripped off due to a nominal 150% overload condition which has exceeded the (60) second time period.

IMPORTANT: During acceleration or start-up (breakaway), it is normal for the M.O.P.C. LED to illuminate momentarily. This merely indicates that a momentary overload current of 150% has been sensed and that the M.O.P.C. circuit has been activated. The LED will also flash momentarily when AC line power is first applied. If the M.O.P.C. LED is constantly activated during start-up (breakaway), or if there is excessive LED activity at low frequency operation, less DC boost must be used.

Symptom 6: Motor does not return to full set speed after stalling. Red M.O.P.C. fault LED is illuminated.

DIAGNOSTIC PROCEDURE:

The load torque is exceeding the torque capability of the Drive. Check for problems with the mechanical load. If the mechanical load checks out, try increasing the DC boost. If this does not correct the condition, consult your nearest Allen-Bradley Area Sales/Support Center for application assistance.

IMPORTANT: If a 150% continuous overload current demand exists, the motor will ramp down to a stalled condition and remain there until the overload condition no longer exists**.** If however the overload condition is sustained for (60) seconds, the Drive will trip and illuminate the M**.**O**.**P**.**C**.** LED on the Diagnostic Display Panel**.**

Symptom 7: Red M**.**O**.**P**.**C**.** Fault LED is illuminated during DECEL or at (0) Hz**.**

DIAGNOSTIC PROCEDURE:

Boost voltage set too high**.** Decrease the boost voltage by setting the DC boost switch lower and/or set the Decel switch to provide a slower ramp**.**

Symptom 8: Drive starts momentarily then trips off or Drive trips off during normal operation**.** Red UNDER VOLTS fault LED is illuminated**.**

DIAGNOSTIC PROCEDURE:

IMPORTANT: If the Drive will not restart or reset after a fault trip, always check fuse F5 for an open condition**.** Replace if necessary**.**

An illuminated UNDER VOLTS LED indicates that Drive has tripped off due to an input line voltage that is less than:

- 414V AC at the 460V AC Tap on Transformer 1T
- 373V AC at the 415V AC Tap on Transformer 1T (50 Hz Input Power)
- 342V AC at the 380V AC Tap on Transformer 1T (50 Hz Input Power)

STEP 1 **-** Check input primary fuse F4 for an open condition**.**

STEP 2 **-** Check the input voltage to Transformer 1T by measuring the voltage between connectors E11 & E12 on Power Distribution Board A2**.** If proper voltage is present, replace Modulator Logic Board A1**.**

Symptom 9: Drive starts momentarily then trips off or Drive trips off during normal operation or deceleration**.** Red OVER VOLTS fault LED is illuminated**.**

DIAGNOSTIC PROCEDURE:

An illuminated OVER VOLTS LED indicates that the Drive has tripped off due to a bus voltage greater than 760V DC**.** Three conditions can cause an over voltage trip**.**

- Excessively High Input Voltage
- DC Boost Set too High
- Deceleration Rate too High for the Motor/Load Inertia

STEP 1 **-** Check the input line voltage across each phase at L1, L2, and L3**.** The voltage should not be greater than 506V AC**.**

STEP 2 **-** If trip occurred during deceleration, check the position of the NORM/DEC HOLD jumper on the Modulator Logic Board**.** The jumper should be set to the DEC HOLD position**.** Monitor LED CR53 FREQ HOLD on the Modulator Logic Board**.** During deceleration, with the NORM/DEC HOLD jumper in the DEC HOLD position, the LED should light before an overvoltage trip occurs**.** If the LED lights, decrease the DECEL RATE, the DC BOOST, or both**.** If the LED does not light, replace the Modulator Logic Board

STEP 3 **-** If the Drive trips out on over voltage during deceleration and a slower decel ramp is not acceptable, consult your nearest Allen**-**Bradley Area Sales/Support Center**.**

Symptom 10: Drive starts momentarily then trips off or Drive trips off during normal operation**.** Red PROT**.** A, PROT**.** B, or PROT**.** C fault LED is illuminated**.**

DIAGNOSTIC PROCEDURE:

IMPORTANT: If the Drive will not restart or reset after a fault trip, always check fuse F5 for an open condition. Replace if necessary.

An illuminated A, B or C phase protection LED indicates:

- An output overcurrent condition greater than 200% due to either:

  1.) An output phase-to-phase short (Drive output, motor windings, or wiring to the motor).
  2.) An output overcurrent condition greater than 200% due to an output phase-to ground short.

  In either case, remove input power to the Drive at the disconnect device. Disconnect the motor leads from the Drive at Terminal Block TB2. Reapply power to the Drive and give the Drive a START command. If the Drive can be operated without a phase protect trip occurring, the problem is in either the wiring to the motor or the motor itself. A ground fault can be found using an ohmmeter between the wiring to the motor and ground. Find the cause and correct it before reconnecting the motor leads to the Drive and reapplying power. A shorted motor winding is harder to detect because of the low resistance of the motor windings. Substitute a known, good motor for the suspected bad motor. Connect the substitute motor to the Drive output terminals and try running the Drive. If successful operation of the Drive and substitute motor is achieved, then the problem most likely is the motor originally connected to the Drive.

- Deceleration of an inertia type motor load at too high a value of DC boost or too fast a DECEL rate.

  Under the right conditions, the motor can appear as a short circuit to the Drive. With excessive DC boost applied, the motor can saturate, resulting in a peak current in excess of 200% causing a phase protect trip. Decrease the DC BOOST, the DECEL RATE or both.

- Excessive DC boost causing a phase protection trip during acceleration.

  Excessive DC boost can cause a phase protection trip to occur during acceleration of the Drive and motor due to saturation of the motor windings. If reducing the DC boost setting eliminates the phase protection trip but does not produce sufficient torque to enable the motor to accelerate the load, consult your nearest Allen-Bradley Area Sales/Support Center for application assistance.

Reset the Drive by giving it a STOP command followed by a START command. If proper operation cannot be obtained without the reoccurrence of a phase protect trip and you have eliminated the preceding possibilities, the problem is most likely caused by one of the following.

- A shorted output transistor in one of the Power Switching Modules.
  Phase "A" 1Q
  Phase "B" 2Q
  Phase "C" 3Q
  Perform the following four steps to isolate and correct the problem.

- A malfunctioning Driver Board.
  Phase "A" Section A of the Driver Board
  Phase "B" Section B of the Driver Board
  Phase "C" Section C of the Driver Board
  Perform the following four steps to isolate and correct the problem.

- A malfunctioning Driver Board causing an output power Switching Module to be ON when it shouldn't be.
  Phase "A" Section A of the Driver Board
  Phase "B" Section B of the Driver Board
  Phase "C" Section C of the Driver Board
  Perform the following four steps to isolate and correct the problem.

- A malfunctioning Modulator Logic Board causing an abnormal Drive output voltage waveform. Perform the following four steps to isolate and correct the problem.

STEP 1 - Remove input power to the Drive. Before proceeding, wait (60) seconds. DS1, the bus charged neon light on Power Distribution Board A2, should not be lit. Use a DC voltmeter to verify that the DC bus is fully discharged by measuring the voltage between connectors E17 (+ BUS) and E13 (- BUS) on Power Distribution Board A2. Start with the voltmeter on its highest scale (x1000) and range downward to the lowest voltmeter scale.

STEP 2 - Check for a shorted output transistor module for the indicated phase as follows. Unplug connectors ES, E6, E7 & E13 at the Power Distribution Board. Unplug the molex connector for the indicated phase at the Driver Board (J302A, B or C). With an ohmmeter set on the x1 scale, measure the resistance between the collector and emitter of both upper and lower power switching transistors at molex connector J302A, B or C as follows.

OHMMETER		READING
+ LEAD	- LEAD	
J302, pin 1 (C1)	J302, pin 6 (E1)	INFINITE
J302, pin 6 (C2)	J302, pin 13 (E2)	INFINITE

With an ohmmeter set on the x1 scale, measure the resistance between the collector and base of both upper and lower power switching transistors at molex connector J302A, B or C as follows.

OHMMETER		READING
+ LEAD	- LEAD	
J302, pin 1 (C1)	J302, pin 5 (B1)	INFINITE
J302, pin 6 (C2)	J302, pin 12 (B2)	INFINITE

- If a collector to base short is found in either the upper or lower power switching transistor, replace the module.
- If either transistor has a collector to base short, replace the module and the Driver Board.

IMPORTANT: When replacing power switching modules, clean all surfaces. Apply a thin layer of thermal grease (Dow Corning 340) to the back of each module. Torque mounting screws to 17-26 in-lbs max.

STEP 3 - Before reconnecting the motor, reapply input power to the Drive and ensure that the Drive operates properly in the manual operating mode. Depending upon the options installed, switch to MANUAL control if required. No diagnostic LEDs should be illuminated. If satisfactory operation is achieved, reconnect the motor and check operation again. If satisfactory operation is not achieved, replace the Modulator Logic Board.

STEP 4 - Once proper operation is achieved in the manual mode, depending on the options installed, check operation in the auto or normal operating mode. If the Drive is not functioning properly in the normal mode, check all Modulator Board jumper settings and input signals to the option cards. If satisfactory operation is not achieved, replace the Modulator Logic Board.

Symptom 11: Drive starts momentarily then trips off or Drive trips off during normal operation. Red BRAKE OVER TEMP. fault LED is illuminated. (Used only when equipped with the Dynamic Brake Option).

DIAGNOSTIC PROCEDURE:

IMPORTANT: If Drive will not restart or reset after a fault trip, always check fuse F5 for an open condition. Replace if necessary.

An illuminated BRAKE OVER TEMPERATURE LED indicates an excessive brake resistor assembly temperature. This condition is normally caused by either excessive braking or a deceleration rate too high for the motor/load inertia. When the Dynamic Brake Option is used, it is recommended that the NORM/DEC HOLD jumper be set to the DEC HOLD position.

If neither of the above is true, check for:
- Open Precharge Fuse F5 and/or Shorted Brake Transistor 4Q

- Malfunctioning Brake Resistor Thermal O.L. (2TAS on Brake Resistor Assembly)
- Poorly Ventilated Resistor Enclosure

Check and repair as required.

IMPORTANT: To reset a Brake Over Temperature Trip:

1. Remove input power to the Drive at the disconnect device.
2. Wait a few minutes to allow the O.L. heater and brake resistor to cool down.
3. Open the conduit box on the resistor cage assembly. Manually reset Thermal O.L. Relay 2TAS by depressing the plunger until a reset "click" is either heard or felt.
4. Reapply power to the Drive at the disconnect device.
5. Reset the Drive by giving it a STOP command followed by a START command.

Symptom 12: Drive starts momentarily then trips off or Drive trips off during normal operation. Red DRIVE OVER TEMP. fault LED is illuminated.

DIAGNOSTIC PROCEDURE:

IMPORTANT: If the Drive will not restart or reset after a fault trip, always check fuse F5 for an open condition. Replace if necessary.

An illuminated DRIVE OVER TEMPERATURE LED indicates that the Drive has tripped off due to an over temperature condition. Allow Drive to cool down for approximately (15) minutes before restarting. After restarting, if over temperature condition occurs again, check for the following conditions.

- Ambient Temperature that Exceeds the Drive Rating. Measure the ambient temperature surrounding the Drive.
- Heat Flow Obstruction within the Heat Sink Assembly. Visually inspect for unobstructed spacing between fins. Clean if necessary.
- Thermal Overloading Caused by Duty Cycle Demands Exceeding 100% of Current Over an Extended Period of Time. Using an AC clamp on ammeter, measure the motor current over an extended period of time.

IMPORTANT: Clamp on type amp probes and current transformers are frequency sensitive. Inaccurate current readings at frequencies other than 60 Hz may be observed. It is recommended that a true RMS reading clamp on ammeter he used.

- Malfunctioning Temperature Sensor 1TAS. If all of the above conditions have been checked and the problem still remains, replace Temperature Sensor 1TAS.

IMPORTANT: When replacing Temperature Sensor 1TAS, clean all surfaces. Apply a thin layer of thermal grease (Dow Corning 340) to the back of the sensor. Torque mounting screws to 2.6-3.0 in-lbs max.

Symptom 13: Bus voltage does not discharge within (60) seconds when input power is removed. Neon light DS1 on Power Distribution Board A2 is illuminated.

DIAGNOSTIC PROCEDURE:

After input power is removed, the bus voltage should discharge to 42V DC in approximately (60) seconds. If the discharge cycle is not taking place, check to see if resistor 2R or 3R has opened. If neither resistor is open, check for open wiring between the resistors and Bus Capacitors 2C & 3C. If all wiring is correct, replace Power Distribution Board A2. If either resistor is open, replace and reapply input power.

IMPORTANT: When replacing resistor 2R or 3R, clean all surfaces. Apply a thin layer of thermal grease (Dow Corning 340) to the back of the resistor. Torque mounting screws to 2.6-3.0 in-lbs Max.

Check for proper bus discharge cycle**.** Measure the DC voltage between connectors E17 (**+** BUS) and E13 (**-** BUS) on Power Distribution Board A2**.** After approximately (60) seconds the voltage should be below 42 volts**.** If discharge cycle is still not taking place and/or either resistor opens again, replace Power Distribution Board A2**.**