

FEC Inc.

**Chapter 9: Troubleshooting**

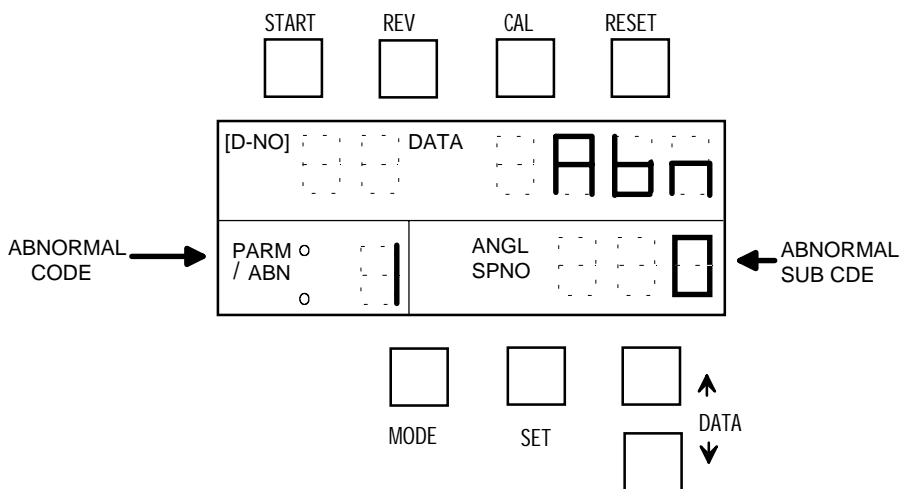
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### 9.1 Abnormal Conditions.

When an abnormal condition is detected, the system halts with the ABNORMAL LED lit. For ease of troubleshooting the nature of the abnormal, the system provides an abnormal code in the [PARM/ABN] display and an abnormal sub-code in the [ANGL.SPNO] display.

wAbnormal code display.

When an Abnormal condition occurs (ABNORMAL LED is lit), depress the [MODE] key several times until the data in the [D-NO] display disappears and the "Abn" message appears in the [DATA] display. At this time the [PARM/ABN] display will be showing an abnormal display code that can help identify the cause of the fault through the use of the following sections.



wAbnormal Sub-code display.

The abnormal sub-code is shown in the [ANGL/SPNO] display. This sub-code can be used in conjunction with the following sections to further narrow down the cause of the fault.

## 9.2 Axis Unit Abnormal Help Screen Explanation

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After the applicable ABNORMAL CODE and ABNORMAL SUB CODE have been identified from the affected Axis unit a review of the following troubleshooting guide will identify the nature of the failure and the recovery method.

Example:

Abnormal code 1 with an Abnormal sub code of 0 can be found immediately following this example as "Code 1-0". The remainder of abnormal codes can be found in numerical order.

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## 9.3 Torque Transducer

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### 9.3.1 code 1-0 TORQUE TRANSDUCER / ZERO VOLTAGE ERROR

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Zero level voltage error during power on initialization.

This abnormal is caused from only 3 items.

1. When the tool transducer is sensing excessive torque due to pressure on the tool body.
2. If the controller or the transducer cable is located in an electric or magnetic noise field.
3. When the torque transducer, transducer (T/D) cable or the controller malfunctions.

RECOVERY:

1. Check that the tool has no external force applied to it.
2. Verify that the cable or controller are not located near any high voltage transient power sources. Relocate as required and reinitialize.
3. Exchange transducer (T/D) cable, tool and/or controller with known working units. Reinitialize the system after each exchange, and make note of any change in the location of the abnormal.
4. Replace the defective component.

### 9.3.2 code 1-1 TORQUE TRANSDUCER / cal VOLTAGE ERROR

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Calibration voltage error during power on initialization.

This abnormal is caused from only 3 items.

1. When the tool transducer is sensing excessive torque due to pressure on the tool body.
2. If the controller or the transducer cable is located in an electric or magnetic noise field.
3. When the torque transducer, transducer (T/D) cable or the controller malfunctions.

RECOVERY:

1. Check that the tool has no external force applied to it.
2. Verify that the cable or controller are not located near any high voltage transient power sources. Relocate as required and reinitialize.
3. Exchange transducer (T/D) cable, tool and/or controller with known working units. Reinitialize the system after each exchange, and make note of any change in the location of the abnormal.
4. Replace the defective component.

### 9.3.3 Code 1-2 TORQUE TRANSDUCER / ZERO check ERROR

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Zero level voltage error during a fastening start input.

This abnormal is caused from only 3 items.

1. When the tool transducer is sensing excessive torque due to pressure on the tool body.
2. If the controller or the transducer cable is located in an electric or magnetic noise field.
3. When the torque transducer, transducer (T/D) cable or the controller malfunctions.

RECOVERY:

1. Check that the tool has no external force applied to it.
2. Verify that the cable or controller are not located near any high voltage transient power sources. Relocate as required and reattempt the fastening start input.
3. Exchange transducer (T/D) cable, tool and/or controller with known working units. Input the start signal after each exchange, and make note of any change in the location of the abnormal.
4. Replace the defective component.

### 9.3.4 code 1-3 TORQUE TRANSDUCER / selfcheck cal ERROR

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Calibration voltage error during a fastening start input.

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This abnormal is caused from only 3 items.

1. When the tool transducer is sensing excessive torque due to pressure on the tool body.
2. If the controller or the transducer cable is located in an electric or magnetic noise field.
3. When the torque transducer, transducer (T/D) cable or the controller malfunctions.

RECOVERY:

1. Check that the tool has no external force applied to it.
2. Verify that the cable or controller are not located near any high voltage transient power sources. Relocate as required and reattempt a fastening start input.
3. Exchange transducer (T/D) cable, tool and/or controller with known working units. Input the start input after each exchange, and make note of any change in the location of the abnormal.
4. Replace the defective component.

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### **9.3.5 code 1-4 TORQUE TRANSDUCER / started on ZERO ERROR condition**

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The start signal was input while a Zero voltage abnormal condition existed.

RECOVERY:

1. Interlock the PLC circuit to disable the start signal during an existing abnormal condition.
2. Follow the <ZERO VOLTAGE ERROR>(CODE 1-0) abnormal help procedure.

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### **9.3.6 code 1-5 TORQUE TRANSDUCER / started on cal ERROR condition**

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The start signal was input while a Cal voltage abnormal condition existed.

RECOVERY:

1. Interlock the PLC circuit to disable the start signal during an existing abnormal condition.
2. Follow the <CAL VOLTAGE ERROR>(CODE 1-1) abnormal help procedure.

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### **9.3.7 code 1-6 TORQUE TRANSDUCER / selfcheck ZERO ERROR**

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Zero level voltage error during power on initialization.

This abnormal is caused from only 3 items.

1. When the tool transducer is sensing excessive torque due to pressure on the tool body.
2. If the controller or the transducer cable is located in an electric or magnetic noise field.
3. When the torque transducer, transducer (T/D) cable or the controller malfunctions.

RECOVERY:

1. Check that the tool has no external force applied to it.
2. Verify that the cable or controller are not located near any high voltage transient power sources. Relocate as required and reinitialize.
3. Exchange transducer (T/D) cable, tool and/or controller with known working units. Reinitialize the system after each exchange, and make note of any change in the location of the abnormal.
4. Replace the defective component.

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## 9.4 Preamplifier / Tool EEPROM

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### 9.4.1 code 3-0 preamplifier / tool eeprom error

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Communications error between the tool preamplifier and the controller.

This abnormal is caused from only 2 items.

1. If the controller or the transducer cable is located in an electric or magnetic noise field.
2. When the torque transducer, transducer (T/D) cable or the controller malfunctions.

RECOVERY:

1. Verify that the cable or controller are not located near any high voltage transient power sources. Relocate as required and reinitialize the system.
2. Exchange transducer (T/D) cable, tool and/or controller with known working units. Reinitialize the system after each exchange, and make note of any change in the location of the abnormal.
3. Replace the defective component.

### 9.4.2 code 3-1 preamplifier / tool type error

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The connected tool type does not match the tool type programmed into the controller connected to that tool. This error may occur in the multi tool type application or when controllers are replaced and not reprogrammed with the correct configuration.

RECOVERY:

1. Verify the tool type name from the tool identification tag
2. Compare the tool tag name with the setup value. Refer to section 7.3.6.

### 9.4.3 code 3-2 preamplifier / started without tool connected

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The start signal was applied while a <Tool is not connected> abnormal condition existed.

RECOVERY:

1. Interlock the PLC circuit to disable the start signal during an existing abnormal condition.
2. Follow the <TOOL IS NOT CONNECTED>(CODE 3-3) abnormal help procedure.

### 9.4.4 code 3-3 preamplifier / tool is not connected

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Communications error between the tool preamplifier and the controller.

This abnormal is caused from only 3 items.

1. The transducer cable is not connected
2. If the controller or the transducer cable is located in an electric or magnetic noise field.
3. When the torque transducer, transducer (T/D) cable or the controller malfunctions.

RECOVERY:

1. Verify that the transducer cable is connected
2. Verify that the cable or controller are not located near any high voltage transient power sources. Relocate as required and reinitialize the system.
3. Exchange transducer (T/D) cable, tool and/or controller with known working units. Reinitialize the system after each exchange, and make note of any change in the location of the abnormal.
4. Replace the defective component.

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## 9.5 System Memory / Tool EEPROM

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### 9.5.1 code 4-0 system memory error / tool eeprom write error

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Communications error between the tool preamplifier and the controller.

This abnormal is caused from only 2 items.

1. If the controller or the transducer cable is located in an electric or magnetic noise field.
2. When the torque transducer, transducer (T/D) cable or the controller malfunctions.

RECOVERY:

1. Verify that the cable or controller are not located near any high voltage transient power sources. Relocate as required and reinitialize the system.
2. Exchange transducer (T/D) cable, tool and/or controller with known working units. Reinitialize the system after each exchange, and make note of any change in the location of the abnormal.
3. Replace the defective component.

### 9.5.2 code 4-1 system memory error / tool eeprom read error

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Communications error between the tool preamplifier and the controller.

This abnormal is caused from only 2 items.

1. If the controller or the transducer cable is located in an electric or magnetic noise field.
2. When the torque transducer, transducer (T/D) cable or the controller malfunctions.

RECOVERY:

1. Verify that the cable or controller are not located near any high voltage transient power sources. Relocate as required and reinitialize the system.
2. Exchange transducer (T/D) cable, tool and/or controller with known working units. Reinitialize the system after each exchange, and make note of any change in the location of the abnormal.
3. Replace the defective component.

### 9.5.3 code 4-2 system memory error / power on ram check error

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Verification error while reading/writing the controller RAM.

This abnormal is caused from only 2 items.

1. If the controller is located in an electric or magnetic noise field.
2. When the controller malfunctions.

RECOVERY:

1. Verify that the controller is not located near any high voltage transient power sources. Relocate as required and reinitialize the system.
2. Exchange the controller with known working unit. Reinitialize the system after the exchange.

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## 9.6 Servo Amplifier Response / Encoder

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### 9.6.1 code 5-0 servo amplifier reply error / no reply from encoder

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The controller is trying to turn the tool assembly, but is not receiving any angle count back from the encoder to indicate that the tool is actually turning.

This abnormal is caused from only 4 items.

1. The motor cable is damaged or not connected
2. If the encoder cable is damaged.
3. When the encoder, motor, or the controller malfunctions.
4. If there is excessive binding in the fastener, transmission, or the spindle assembly.

RECOVERY:

1. Verify that the motor cable is connected and not damaged.
2. Connect all spare tool cables to the existing tool.
3. Exchange tool and/or controller with known working units. Reinitialize the system after exchanges, noting any change in the location of the abnormal.
4. Inspect and correct any binding in the spindle assembly, transmission or fasteners.

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## 9.7 Servo Type

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### 9.7.1 code 6-0 servo type error / servo type mismatch

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The servo amplifier does not match the connected motor type.

Verify the servo type tag with the motor type tag.

There are 4 type of servo amplifiers (controllers) available.

Servo	Tool Type
AXIS 103	DFT-051M1,DFT-101M1,DFT-201M1,DFT-401M1
AXIS 105	DFT-201M2,DFT-401M2,DFT-601M3,DFT-801M3 DFT-132M3,DFT-202M3,DFT-302M3
AXIS 110	DFT-401W4,DFT-502M4,DFT-802M4,DFT-802W4
AXIS 120	DFT-153N1,DFT-203N1,DFT-403N1

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## 9.8 Power voltage / Inside Power Supply

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### 9.8.1 code 7-0 power voltage error / inside power supply abnormal

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The controller internal power supply circuit is not working properly.

This abnormal is caused from only 3 items.

1. The controller internal power supply has failed
2. If the environment temperature is more than 113 degrees Fahrenheit ( 45 degree centigrade ) without any air flow.
3. Source voltage is very close to the limit (253 volts ac) and the environment temperature is also close to the limit.

RECOVERY:

1. Replace the controller
2. Provide additional cooling to the enclosure.
3. Verify and correct the source voltage as required.

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## 9.9 Servo Amplifier / Encoder cable

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### 9.9.1 code 8-0 servo amplifier error / encoder cable is broken

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The controller can not detect the presence of an encoder.

This abnormal is caused from only 2 items.

1. If the encoder cable is damaged or disconnected.
2. When the encoder or the controller malfunctions.

RECOVERY:

1. Connect the spare encoder cable to the existing tool.
2. Exchange tool and/or controller with known working units. Reinitialize the system after each exchange, and make note of any change in the location of the abnormal.
3. Replace the defective component.

### 9.9.2 code 8-1 servo amplifier error / over current

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Over current or servo type mismatch.

The servo amplifier does not match the connected motor type. Verify the servo type tag with the motor type tag.

There are 4 type of servo amplifiers (controllers) available.

Servo	Tool Type
AXIS 103	DFT-051M1,DFT-101M1,DFT-201M1,DFT-401M1
AXIS 105	DFT-201M2,DFT-401M2,DFT-601M3,DFT-801M3
AXIS 110	DFT-132M3,DFT-202M3,DFT-302M3
AXIS 120	DFT-401W4,DFT-502M4,DFT-802M4,DFT-802W4 DFT-153N1,DFT-203N1,DFT-403N1

### 9.9.3 code 8-2 servo amplifier error / encoder abnormal

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The controller can not detect the presence of an encoder.

This abnormal is caused from only 2 items.

1. If the encoder cable is damaged or disconnected.
2. When the encoder or the controller malfunctions.

RECOVERY:

1. Connect the spare encoder cable to the existing tool.
2. Exchange tool and/or controller with known working units. Reinitialize the system after each exchange, and make note of any change in the location of the abnormal.
3. Replace the defective component.

### 9.9.4 code 8-3 servo amplifier error / servo is over heated

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The controller Servo circuit is not working properly.

This abnormal is caused from only 3 items.

1. The controller servo drive circuit has failed
2. If the environment temperature is more than 113 degrees Fahrenheit(45 degree centigrade) without any air flow.
3. Source voltage is very close to the limit (253 volts ac) and the environment temperature is also close to the limit.

RECOVERY:

1. Replace the controller
2. Provide additional cooling to the enclosure.
3. Verify and correct the source voltage as required.

### 9.9.5 code 8-4 servo amplifier error / encoder is over heated

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The controller Encoder circuit is not working properly.

This abnormal is caused from only 3 items.

1. the controller encoder circuit has failed
2. If the environment temperature is more than 113 degrees Fahrenheit(45 degree centigrade) without any air flow.
3. Source voltage is very close to the limit (253 volts ac) and the environment temperature is also close to the limit.

RECOVERY:

1. Replace the controller
2. Provide additional cooling to the enclosure.
3. Verify and correct the source voltage as required.

### 9.9.6 code 8-5 servo amplifier error / over source voltage

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The controller internal power supply circuit is not working properly or the input voltage is above the maximum limit.

This abnormal is caused from only 2 items.

1. The controller internal power supply has failed
2. Source voltage is very close to the limit (253 volts ac) and the environment temperature is also close to the limit.

RECOVERY:

1. Replace the controller
2. Provide additional cooling to the enclosure.
3. Verify and correct the source voltage as required.

### **9.9.7 code 8-6 servo amplifier error / source voltage abnormal**

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The controller internal power supply circuit is not working properly or the input voltage is above the maximum limit.

This abnormal is caused from only 2 items.

1. The controller internal power supply has failed
2. Source voltage is very close to the limit (253 volts ac) and the environment temperature is also close to the limit.

RECOVERY:

1. Replace the controller
2. Provide additional cooling to the enclosure.
3. Verify and correct the source voltage as required.

### **9.9.8 code 8-7 servo amplifier error / over load ( i square T)**

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The duty cycle of the fastening application is too severe for this size of tool, or for the parameters currently setup.

RECOVERY:

1. Try to increase the amount of time allocated for fastening and slow down the fastening speed of the tool.
2. If the problem remains, a larger tool assembly may be required for this application. Please contact FEC.

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## 9.10 Preset Error

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### 9.10.1 code 9-0 preset error / reverse speed does not exist

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The reverse speed preset is not setup or the wrong parameter number has been selected by the PLC.

RECOVERY:

1. Verify that the parameter number that is being selected by the PLC is configured in the controller.
2. Check that the reverse speed preset is not <0> or out of the specified speed range of the tool.

### 9.10.2 code 9-1 preset error / insufficient preset data

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The fastening presets are not setup or the wrong parameter number has been selected by the PLC.

RECOVERY:

1. Verify that the parameter number that is being selected by the PLC is configured in the controller.
2. Check that the fastening presets are not <0> or out of the specified range for the tool.

### 9.10.3 code 9-2 preset error / system abnormal 1

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The system controller experienced an internal processing error.

This abnormal is caused from only 2 items.

1. If the controller is located in an electric or magnetic noise field.
2. When the controller malfunctions.

RECOVERY:

1. Verify that the controller is not located near any high voltage transient power sources. Relocate as required and reinitialize the system.
2. Exchange the controller with known working unit. Reinitialize the system after the exchange.

### 9.10.4 code 9-3 preset error / system abnormal 2

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The system controller experienced an internal processing error.

This abnormal is caused from only 2 items.

1. If the controller is located in an electric or magnetic noise field.
2. When the controller malfunctions.

RECOVERY:

1. Verify that the controller is not located near any high voltage transient power sources. Relocate as required and reinitialize the system.
2. Exchange the controller with known working unit. Reinitialize the system after the exchange.

### 9.10.5 code 9-4 preset error / system abnormal 3

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The system controller experienced an internal processing error.

This abnormal is caused from only 2 items.

1. If the controller is located in an electric or magnetic noise field.
2. When the controller malfunctions.

RECOVERY:

1. Verify that the controller is not located near any high voltage transient power sources. Relocate as required and reinitialize the system.
2. Exchange the controller with known working unit. Reinitialize the system after the exchange.

**WARNING: DO NOT CONNECT OR DISCONNECT CABLES OR OTHER SYSTEM COMPONENTS WITH POWER APPLIED.**

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## 9.11 AFC1100 Axis Unit Fastening Faults and Causes

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### 9.11.1 Accept Conditions

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THE ACCEPT LED will light for the three following reasons:

1. THE RESET input is active on either the front panel or via a PLC input, and the reset condition (ZERO LEVEL) of the TRANSDUCER is within acceptable limits.
2. THE CAL input is active on either the front panel or via a PLC input, and the calibration condition (CAL LEVEL) of the transducer is within acceptable limits.
3. THE previous fastening was completed within all preset limits (TORQUE, ANGLE, 1st RATE, 2nd RATE, and TIME).

### 9.11.2 Torque Reject Conditions

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THE TORQUE Reject LED will light for the following reasons:

1. THE ZERO Level is outside acceptable limits.
2. THE CAL Level is outside acceptable limits.
3. THE final fastening torque is not between the LOW and HIGH TORque limits set in the PARAMETERS.
  - 4a. A "RED" TORque Reject LED on the AXIS unit indicates a HIGH TORque reject, which can normally be attributed to excessive speed (crashing). IN ANGLE Control this may be caused by increased friction or reduced joint compression.
  - 4b. aN "ORANGE" TORque Reject LED on the AXIS unit indicates a LOW TORque reject, which was caused by the failure of one or more of the other preset limits (ANGLE, Time, 1st RATE, or 2nd RATE). IN ANGLE Control this may be caused by reduced friction or increased joint compression.

### 9.11.3 ANGLE REJECT conditions

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THE ANGLE Reject LED will light for the following reasons:

1. A "REd" ANGLE Reject LED on the AXIS unit indicates a HIGH ANGLE reject. THIS type of reject is caused when the degrees of rotation the fastener turns after sensing the Snug torque is in excess of the preset HIGH Angle limit as specified in the PARAmeters. MAY cause a LOW TORQUE reject.

CAUSES: EXCESSive lubrication, thread obstacle, excessive joint compression.

2. AN "ORANGE" ANGLE display LED on the AXIS unit indicates a LOW ANGLE reject. THIS type of reject is caused when the degrees of rotation the fastener turns after sensing the Snug torque is below the preset LOW Angle limit as specified in the PARAmeters.

CAUSES: REDUCed lubrication, thread obstacle, reduced joint compression.

### 9.11.4 TIME REJECT conditions

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THE TIME Reject LED will light for the following reasons:

1. A "RED" Time Reject LED on the AXIS unit indicates a Final step Time Reject.
2. An "ORANGE" Time Reject LED on the AXIS unit indicates a 1st step Time Reject. May cause a LOW TORQUE Reject.

CAUSES:

1. THE amount of time specified in the Parameters is insufficient.
2. THE socket did not engage the fastener properly.
3. THE fastener did not engage the workpiece properly.
4. THE socket is split or damaged.

### 9.11.5 TORQUE RATE REJECT conditions

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Torque Rate (RATE) is defined as the change in torque divided by the change in degrees of rotation (ANGLE) during a specific interval.

#### 1ST RATE

1. A "RED" 1ST RATE Reject LED on the AXIS unit indicates that the Torque Rate, as measured from Threshold (THR) to 1st TORque, is above the high limit specified in the PARameters. May cause a LOW TORque Reject.
2. AN "ORAnge" 1ST RATE Reject LED on the AXIS unit indicates that the Torque Rate, as measured from THR to 1st TORque, is below the low limit specified in the Parameters. MAY cause a LOW Torque Reject.

#### 2ND RATE

1. A "RED" 2ND RATE Reject LED on the AXIS unit indicates that the Torque Rate, as measured from 1st TORque to CROSSOVER RATE 2 Torque, is above the high limit specified in the Parameters. May cause a LOW TORQUE REJECT.
2. AN "ORANGE" 2ND RATE Reject LED on the AXIS unit indicates that the torque RATE, as measured from 1st TORque to CROSSOVER RATE 2 Torque, is below the low limit specified in the PARameters. MAY cause a LOW TORQUE REJECT.

CAUSES of HIGH RATE Rejects:

Reduced lubrication, thread obstacle, reduced joint compression.

CAUSES of LOW RATE Rejects:

EXcessive lubrication, thread obstacle, excessive joint compression.