Your controller's MotionBASIC® program needs to be stopped in order to extract fault information with MotionPRO™. **STOP your machine first.** Connect the communication cable to serial D (J1) development port located on the system module.

**WARNING:** DO NOT connect the MotionPRO™ communications cable to J2 or J3 serial ports. This can cause damage to the ORION serial port or your computer port.

There are two ways to start the communications program MotionPRO™:

**DOS:** type MPRO<Enter> at the DOS prompt.

This batch file starts the Hypertext On-Line Help System and, MotionPRO™.

**Windows:** Click on one of these icons. MotionPRO Only MotionPRO & Hypertext

Log on to the controller by using the <F10> key. " F10 " will STOP your process instantly! By pressing the <Alt> key with one of the letter keys, a command will be automatically typed. The troubleshooting Alt key is ... <Alt>c> ... for Fault status. The following example shows the fault status after a machine has experienced a product jam problem.

In TALK mode, after typing <Alt>c> the following is displayed:

```
# 1911: Axis fault in line 12345
# [7] FAULT @, AXISFLT @, AFAULT @ (AXISFLT @),, ALARM @ (AXISFLT @)
# [2] 2 17
```

The first line provides the ERROR code, error message, and the program line number where the error occurred. The second line prints the fault information.

```
AXISFLT @ .................... [2] .... Motor number two caused the failure.
AFAULT @ (AXISFLT @) ........ 2 .... See Servodrive ALARM @
ALARM @ (AXISFLT @) ........ 17 .... Motor Overload for an E-Series drive.
```

If detailed reference information is needed, use the UP ARROW to reprint the second line, move the cursor under each ORMEC variable, then use Hypertext <Alt>c> for ON-LINE HELP.

```
<Alt>c> # ... Will attempt to clear faults. You must enter a MODE@ value #.
```

**FAULTr@ .... Unit Fault Code.** Set of current fault(s) with a motion controller.

- **Code**
  - 1: RAM Checksum Error
  - 2: Battery Failure
  - 3: Not used
  - 4: Internal Error
  - 5: Axis Module Failure
  - 6: E-Stop Input Open
- **Fault Condition**
  - 7: Axis Fault
  - 8: Machine Fault
  - 9: String Space Fault
  - 10: MotionCARD Fault
  - 11: Not used
  - 12: Security Key Fault

**ORION Fault Codes**

<table>
<thead>
<tr>
<th>Code</th>
<th>Fault Condition</th>
<th>Code</th>
<th>Fault Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
<td>7</td>
<td>Encoder Overspeed</td>
</tr>
<tr>
<td>1</td>
<td>Position Error &gt; Max</td>
<td>8</td>
<td>MotionDATA Error</td>
</tr>
<tr>
<td>2</td>
<td>See Servodrive ALARM@</td>
<td>9</td>
<td>Hi Axis Loop Rate</td>
</tr>
<tr>
<td>3</td>
<td>Encoder Ch-A Open</td>
<td>10</td>
<td>Hi Pacer Loop Rate</td>
</tr>
<tr>
<td>4</td>
<td>Encoder Ch-B Open</td>
<td>11</td>
<td>No MotionDATA</td>
</tr>
<tr>
<td>5</td>
<td>Command Overspeed</td>
<td>12</td>
<td>Command Buffer Overflow</td>
</tr>
<tr>
<td>6</td>
<td>Pacer Overspeed</td>
<td></td>
<td>901-999 are DSP Software Faults</td>
</tr>
</tbody>
</table>

**ALARM@ .... Current servodrive alarm code.**

- **DE & D - SERIES**
  - No Drive Alarms ................ 0 - 7 ....... Normal operation
  - Drive Unplugged .................. 10 ...... Drive Unplugged
  - Drive Overcurrent ............... 11 ...... Drive Overcurrent
  - Uncoded Alarm .................... 12 ...... Drive CB Tripped
  - Regeneration Fault ............... 13 ...... Regeneration Fault
  - Hi Main DC Voltage ............... 14 ...... Hi Main DC Voltage
  - Motor Overspeed  .................. 15 ...... Motor Overspeed
  - Uncoded Alarm .................... 16 ...... Lo Main DC Voltage
  - Motor Overload ................... 17 ...... MotorOverload

- **E - SERIES**
  - No Drive Alarms .................. 0 - 7 ...... Normal operation
  - Drive Unplugged .................. 10 ...... Drive Unplugged
  - Drive Overcurrent ............... 11 ...... Drive Overcurrent
  - Uncoded Alarm .................... 12 ...... Drive CB Tripped
  - Drive Current Output Fault ...... 13 ...... Drive Current Output Fault
  - High Bus Voltage Fault          14 ...... High Bus Voltage Fault
  - OverTemp or RMS Current Limit   15 ...... Uncoded Alarm
  - Drive Overcurrent & Motor Moving 16 ...... Alarms 12 and 14
  - Overcurrent & Motor Motioning  ... 17 ...... Alarms 13 and 14

**ALARM@ .... Axis Fault Code.**

Diagnostics determined at the DSP level.

```
0 None
1 Position Error > Max
2 See Servodrive ALARM@
3 Encoder Ch-A Open
4 Encoder Ch-B Open
5 Command Overspeed
6 Pacer Overspeed
```

**AXIS.FLT1@ . First Servo in the System that Faulted.**

- **Fault Condition**
  - Encoder Overspeed
  - MotionDATA Error
  - Hi Axis Loop Rate
  - Hi Pacer Loop Rate
  - No MotionDATA
  - Command Buffer Overflow

- **Code**
  - 7: Encoder Overspeed
  - 8: MotionDATA Error
  - 9: Hi Axis Loop Rate
  - 10: Hi Pacer Loop Rate
  - 11: No MotionDATA
  - 12: Command Buffer Overflow

**ALARM@ .... Current servodrive alarm code.**

- **DE & D - SERIES**
  - No Drive Alarms ................ 0 - 7 ....... Normal operation
  - Drive Unplugged .................. 10 ...... Drive Unplugged
  - Drive Overcurrent ............... 11 ...... Drive Overcurrent
  - Uncoded Alarm .................... 12 ...... Drive CB Tripped
  - Regeneration Fault ............... 13 ...... Regeneration Fault
  - Hi Main DC Voltage ............... 14 ...... Hi Main DC Voltage
  - Motor Overspeed  .................. 15 ...... Motor Overspeed
  - Uncoded Alarm .................... 16 ...... Lo Main DC Voltage
  - Motor Overload ................... 17 ...... MotorOverload

- **E - SERIES**
  - No Drive Alarms .................. 0 - 7 ...... Normal operation
  - Drive Unplugged .................. 10 ...... Drive Unplugged
  - Drive Overcurrent ............... 11 ...... Drive Overcurrent
  - Uncoded Alarm .................... 12 ...... Drive CB Tripped
  - Drive Current Output Fault ...... 13 ...... Drive Current Output Fault
  - High Bus Voltage Fault          14 ...... High Bus Voltage Fault
  - OverTemp or RMS Current Limit   15 ...... Uncoded Alarm
  - Drive Overcurrent & Motor Moving 16 ...... Alarms 12 and 14
  - Overcurrent & Motor Movinging  ... 17 ...... Alarms 13 and 14
ORION ... System Module

5x7 Status Display  After initialization, the ORION Status display will print the MotionBASIC® Version and installed MBX's. Once a user program starts execution, the display will be blank. When a user program terminates normally, the display will revert back to the Direct Mode startburst. If a user program terminates due to an error and enters direct mode, the program stop led will be on and the display shows the pertinent error code. Example: "E", "1", "3", "1", "1", "1", "..." for ERROR 1911 Axis fault.

Status LEDs when lit indicates the following:
- Watchdog OK ....... Green ..... Motherboard Processor is alive, flashes 1/sec.
- E-Stop OK ....... Green ......... 24 Volts is present at Terminal Block TB8 E-Stop.
- No Fault ....... Green ......... The controller has no faults. FAULT# = 0
- +24 VDC ....... Yellow ......... Power is present at TB8 +24 and referenced to RTN.
- MXB1 & MXB2 ....... Yellow / Yellow. MotionBASIC® Extensions, Under MBX control.
- MotionKEY Error ....... Red ......... MotionKEY is missing or insufficient credits.
- Program Stopped ....... Red ......... Motion BASIC® program not running. In Direct Mode.

PC Card™ ATA  The required system card (right slot) can contain all the system executable programs, MotionBASIC® Extensions (MBX), user MotionBASIC® program, and data files. Optional PC Card™ #2 (left slot) is used for storing user MotionBASIC® program & data files. When the Green LED is ON or Flashing, it indicates that the controller is accessing the PC Card™. Do not remove card when the LED is ON.

FILES ............ Display names of files currently stored on the PC Card™ #1.
FILES "23", "24" ....... Display all files stored in the root dir on PC Card™ #2.
AUTOLOAD.BAS .... File name which is designated to automatically load into the controller from the disk on power up. Allowed on PC Card™ #2 ONLY.
PB1 LOAD.BAS .... File loaded into the controller from the PC Card™ if the PB1 button is held pressed during power up. PB1 LOAD.BAS on PC Card™#2 will always OVERWRITE an existing PB1 LOAD.BAS on the System Card.

Serial Ports D = MotionPRO™ Development, 1 = SRL1, 2 = SRL2
WARNING: DO NOT connect the MotionPRO™ communications cable to J2 or J3 serial ports. This can damage the ORION serial port or your computer port.

Sending Serial ....... Yellow ......... Transmitting a character on serial port.
Receiving Serial ....... Yellow ..... Receiving a character on serial port.
OK to Transmit ....... Green ......... Handshake from other devices has been established.
Ready to Receive ....... Green ......... Handshake from ORION.

E-Stop - (TB8 E-Stop) ORION controllers include an E-Stop monitor input, which is indicated by a green "E-Stop OK" LED above. For normal operation, Emergency Stop input power (+12 to +24VDC or 12 to 24VAC, referenced to TB8-RTN) is applied to TB8 E-Stop input. It is recommended that the input be interlocked with the servodrive main power auxiliary contact. Should that current be interrupted, the "E-Stop OK" LED will go off, causing a controller fault error. Error #1910: "E-Stop OK" Input Open.

No Fault - INTERLOCK (TB8 - No Fault, pins 4&5) ORION controllers have a "No Fault relay", located on the system module. This relay is an isolated "normally-open" output contact. As long as there are No Fault conditions in the controller (LED is ON), the relay will be energized, holding the output contact closed. The power to the No Fault relay is also hardware interlocked with both the E-Stop monitor input and Watchdog circuitry. It is recommended that the No Fault relay be interlocked in series with the main contactor coil. To re-energize this relay after a fault, "E-Stop OK" and "No Fault" LED’s must be ON. <Alt> <C-/> will attempt to clear faults. See Troubleshooting using MotionPRO™. The "No Fault" LED is only an indicator and tells you the contact should be closed.

ORION ... Digital Signal Processor ... DSP

DSP Axis A # = DSP rotary switch # 2 + 1.  DSP Axis B # = Axis A # + 1
Cycle power if you change the DSP axis rotary switch, this will update AXIS.LIST@.
PRINT AXIS.LIST@ will identify all of the servo axes found in the system at power-up.
Note: axis A number will be ODD, axis B number is EVEN.

DSP LEDs - when lit, indicates the following:
- DSP OK ....... Green ......... DSP card is operating properly. No software or internal faults.
- MDATA ....... Green ......... MotionDATA - DSP is receiving MotionDATA communications.
- DENB ....... Green ......... Drive Enabled - Axis torque is enabled for the respective axis.
- SEN ....... Yellow ......... Sensor hardware (ASEN or BSEN) is asserted (conducting current)
- EXTZ ....... Yellow ...... External ZREF sensor is asserted (conducting current) on the respective axis.
- Hardware Travel Limit Forward / Reverse. LED ON when there is an error, axis motion is prohibited.
- HTLE ....... Red ......... External limit switch is asserted (conducting current)
- HTLR ....... Red ......... Home Limit switch is asserted (conducting current)
- Warning: DO NOT connect the MotionPRO™ communications cable to J2 or J3 serial ports. This can damage the ORION serial port or your computer port.

ORION ... Discrete Input / Output board
Connecting External Field Power Supply at TB2
The ORION model number indicates if it has an internal field power supply or not. The letter "F" = Internal Field Supply. The letter "X" = NONE
WARNING: If ORION has an internal 24VDC power supply, DO NOT connect another 24VDC supply to pins (+24, RTN) on TB2 or TB8

Discrete I/O Point - DIO@((number)) number of the I/O point.
Read Input ............ PRINT DIO@((number)) Zero=OFF, minus one (-1)=ON
Clear a Latched Input ....... DIO@((number))=OFF
Write Output ............ DIO@((number))=ON or OFF or set time in milliseconds.
Configure I/O point ....... IO_MODE@=letter letters are: 1 = input, O = output, (for any point)
R = rising, F = falling (Only the first 16 points)

Trace Fuses  On the Discrete I/O board is a Fuse Test socket "F1" and spare holder. The below list of fuses are PRE-FUSED by the circuit board trace. DO NOT USE A REPLACEMENT FUSE UNLESS THE TRACE IS OPENED!
Discrete I/O board: .... "F2" .... Extended Input /Output, +5VDC power source.
System module trace fuses are located on the solder side (back) of board.
System module: "F1" .... +5 VDC test at Interlock TB8 pin 7(+5) and pin 8 (R5)
System module: "F2" .... E-Stop (12 to 24VAC) or(+12 to +24VDC) monitor voltage.
System module: "F3" .... +24 VDC test at Interlock TB8 pin 1(+24) and pin 3 (RTN)
The replacement fuse is Wickman 250V, 4 Amps. Part # 19370-062K