Troubleshooting - G2 Controls

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# Introduction

The built-in feature of the Reelex troubleshooting program can be an essential tool in troubleshooting many types of issues associated with the equipment. With the troubleshooting program, it is possible to test communication with the DeviceNet system as well as test inputs and outputs associated with the 782-B (REELEX part # BOARD-PC782) input board and PB-24 (REELEX part # RACK-PB-24) output board. Motor control and encoder monitoring is also built into the software, giving the user complete control to test any electrical system within the machine.

# Entering Troubleshooting

There are two main methods used to enter into troubleshooting program:

### Method 1:

1. Ensure machine is in a stopped state, including accumulator and/or payoff.
2. In control cabinet, open monitor/keyboard and press F10 key. This will return to C: prompt.
3. In C: prompt, enter TSHOOT or appropriate troubleshooting program and press Enter.
4. A screen may ask if you wish to bypass Emergency Stop Circuit. Press Y to bypass.
5. You will now be at the main menu of the Troubleshooting Program with four possible options.

### Method 2:

1. With machine stopped, press Emergency Stop button on HMI.
2. Pull Emergency Stop button out and press reset.
3. Before machine resets, go into control cabinet and open monitor/keyboard.
4. Hold F5 key until a column of @ symbols are seen in C: prompt.
5. Input TSHOOT or appropriate troubleshooting program name and press Enter key.
6. A screen may ask if you wish to bypass Emergency Stop Circuit. Press Y to bypass.
7. You will now be at the main menu of the Troubleshooting Program with various options.

| **NOTE:** If error message appears as a bad file name, the troubleshooting program may have been renamed. Input DIR into C: prompt to view files on hard drive, and select TSHOOT.EXE file or look for other applicable file name used for troubleshooting program. |
| --- |

## Menu Selection

When entering Troubleshooting Program, multiple options will be displayed. To enter the desired section, press number associated with section.

D-1500 example below:

| D-1500  1.DeviceNet. Read Input & Control Output:  2.Monitor encoders:  3.Motor control:  4.Read/Write Dio48  Press ESC to Exit: |
| --- |

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# DeviceNet

| **NOTE:** G2 Single-Spindle machines do not use DeviceNet. This section only applies to G2 D-1500 and other machines using DeviceNet. Other features may vary by machine. |
| --- |

#### Devicenet.jpg

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## Reading Inputs

All DeviceNet Inputs can be read in the same manner. There are 8 bits per row, indicating 8 inputs per block within the Node number, and a letter designation for each section. A “0” indicates an OFF condition, and a “1” indicates an ON condition. All sections of the node, including inputs and outputs, are read from RIGHT to LEFT. Bit 1 is the far right placeholder, whereas 128 is the leftmost bit in its respective section. When multiple switches are seen at once, their binary values will be added and displayed in the column to the right of each section. For example, if the left Endform is up and in, a 40 will be displayed.

| Node 1 Inputs (1A)  | **Component** | **Bit Value** | | --- | --- | | Table Left | 1 | | Left Transfer Arm Down | 2 | | Left Endform Arm Down | 4 | | Left Endform Arm Up | 8 | | Left Endform Out | 16 | | Left Endform In | 32 | | Unused | 64 | | Unused | 128 | | Node 2 Inputs (2A)  | **Component** | **Bit Value** | | --- | --- | | Table Right | 1 | | Right Transfer Arm Down | 2 | | Right Endform Arm Down | 4 | | Right Endform Arm Up | 8 | | Right Endform Out | 16 | | Right Endform In | 32 | | Unused | 64 | | Unused | 128 | | Node 3 Inputs (3A)  | **Component** | **Bit Value** | | --- | --- | | Start | 1 | | Stop | 2 | | Speed Up | 4 | | Speed Down | 8 | | Transfer | 16 | | Unused | 32 | | Length Reset | 64 | | Endform On | 128 | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

#### Node 3 Inputs (3B)

| **Component** | **Bit Value** |
| --- | --- |
| Door Open/Close | 1 |

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## Writing Out in Devicenet

| **WARNING:** Procedures should be followed closely to avoid potential damage to equipment. |
| --- |

Like Inputs, the Outputs are read from right to left with binary values, with a sum of values displayed to the right of the respective section row. The Node is broken down into bytes (1A,2A, etc.) and bits.To write to an output, first use the alphanumeric byte designation, followed by a period, then the output you wish to write out to. To turn off all bits in a byte, type the byte section, followed by a 00. See address chart below for details.

When writing to outputs, it is recommended to have movable surfaces such as Endforms in a proper starting position. The best to start with, is having both Endforms down and out, and the Table on the left side. This is necessary to be able to safely pressurize the back side of cylinders prior to moving them in their desired direction.

For example, when starting from the down and out position, it is necessary to write out to down and out first. This provides back pressure to the cylinders to avoid slamming the Endforms in or up. This is also true of the Table when writing to move the Table left or right.

To turn on Wire Clamp, write out 1A.01 then press Enter. To turn off Wire Clamp, write a 1A.00 then press Enter.

| **WARNING:** Transfer arms are only able to start from a neutral resting position, and should never be held one way or another, as this may cause damage to the equipment or injury to any person holding the transfer arms. |
| --- |

| Node 1 Outputs (1A)  | **Component** | **Bit Address** | | --- | --- | | Wire Clamp | 1A.01 | | Oiler On | 1A.02 | | Guard Lock | 1A.04 | | Node 1 Outputs (1B)  | **Component** | **Bit Address** | | --- | --- | | Left Endform In | 1B.01 | | Left Endform Out | 1B.02 | | Left Endform Up | 1B.04 | | Left Endform Down | 1B.08 | | Left Guarding Open | 1B.16 | | Left Guarding Closed | 1B.32 | | Node 1 Outputs (1C)  | **Component** | **Bit Address** | | --- | --- | | Left Transfer Arm Up | 1C.16 | | Left Transfer Arm Down | 1C.32 | | Left Cutter In | 1C.64 | | Left Cutter Out | 1C.128 | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

| Node 2 Outputs (2B)  | **Component** | **Bit Address** | | --- | --- | | Right Endform In | 2B.01 | | Right Endform Out | 2B.02 | | Right Endform Up | 2B.04 | | Right Endform Down | 2B.08 | | Right Guarding Open | 2B.16 | | Right Guarding Closed | 2B.32 | | Node 2 Outputs (2C)  | **Component** | **Bit Address** | | --- | --- | | Right Transfer Arm Up | 2C.16 | | Right Transfer Arm Down | 2C.32 | | Right Cutter In | 2C.64 | | Right Cutter Out | 2C.128 | | Node 2 Inputs (2D)  | **Component** | **Bit Address** | | --- | --- | | Traverse Table Right | 2D.04 | | Traverse Table Left | 2D.08 | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

| Node 3 Outputs (3A)  | **Component** | **Bit Address** | | --- | --- | | Red Tower Light | 3A.01 | | Yellow Tower Light | 3A.02 | | Green Tower Light | 3A.04 | | Blue Tower Light | 3A.08 | | Tower Buzzer | 3A.16 | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

To return to menu, press ESC key.

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# Monitor Encoders

| **NOTE:** Encoder screen is read-only. |
| --- |

## Manual Encoder Monitoring

The monitor encoder allows the user the ability to check encoder counts for Spindle(s), as well as the Traverse, without the need to have a motor enabled. This allows the ability to rotate Spindles and Traverse by hand at any desired speed and direction to manually check encoder count to ensure there are no issues with the encoders or encoder couplings. Encoders will count from 0-719 for a total of 720 pulses

Spindle encoders will count up when rotated in a clockwise direction (if using a D-1500, Spindle 2 will count up in the CCW direction). One revolution = 360 pulses.

The Traverse will typically count up when gearbox is rotating in a clockwise direction, when viewed from the left side of the machine looking to the right. This will be when the connecting rod is toward the top of the Traverse arm assembly, moving outward. One revolution = 720 pulses.

To return to menu screen, press ESC.

| ENCODERS  Press ESC to Exit  Spindle: 361 Traverse: 20 Dancer Accumulator Reference: 4095 |
| --- |

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# Motor Control

| **WARNING: Ensure motors are clear without obstruction before enabling.** |
| --- |

## Motor Control Menu

Section three allows for motor control through the Digital-to-Analog circuit, as well as simultaneously monitoring its respective encoder. The motor control page is broken down into multiple sections depending on the machine model.

D-1500 example:

| Motor Controls  1. Left Spindle Motor 2. Right Spindle Motor 3. Traverse Motor 4. Pressure Regulator D/A  Press ESC to Exit |
| --- |

## Writing D/A Values and Enabling Motor Drives

Each motor can be controlled and enabled separately. First, select which motor is to be written to by pressing the number associated with it.

| Spindle  Enter reference 0-4095: 2048 = 0v ref  E <enter> = Exit |
| --- |

Here, a value can be written to the D/A to create a reference for the motor drive. A value between 0 and 4095 can be written, with 0 being full speed in the reverse direction and a reference of approximately −10VDC, and a 4095 being full speed in the forward direction with a reference of approximately +10VDC.

If a 2048 is written, a 0 reference will be written to stop motor rotation. Generally, every 1VDC of reference is every 205 written to the D/A. Values given are close estimates, and may fluctuate slightly depending on motor drive tune. See chart below.

| **NOTE:** For single spindle machines, use the left spindle motor option for moving the spindle. |
| --- |

### D/A Reference Chart

| D/A Forward Direction   | **Reference** | **D/A Value** | | --- | --- | | 1VDC | 2253 | | 2VDC | 2458 | | 3VDC | 2663 | | 4VDC | 2868 | | 5VDC | 3072 | | 6VDC | 3277 | | 7VDC | 3481 | | 8VDC | 3686 | | 9VDC | 3891 | | 10VDC | 4095 | |  | D/A Reverse Direction   | **Reference** | **D/A Value** | | --- | --- | | −1VDC | 1843 | | −2VDC | 1638 | | −3VDC | 1433 | | −4VDC | 1229 | | −5VDC | 1024 | | −6VDC | 819 | | −7VDC | 614 | | −8VDC | 410 | | −9VDC | 205 | | −10VDC | 0 | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

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### Entering Reference Values

Once the desired reference is written, press Enter. A prompt will now display for Enabling and Disabling the drive.

| Ref = 2048  Enable hit < E > Encoder 204 Disable hit < D > Change Ref Return < B >  Left Spindle Enabled |
| --- |

Press E to enable the drive for the desired D/A reference. The encoder for the enabled motor can also be viewed.To disable the drive, Press D. If a different reference is to be used, press B to return back to write a different reference.

| Ref = 2048  Enable hit < E > Encoder 204 Disable hit < D > Change Ref Return < B >  Drive Disabled Off |
| --- |

To navigate back to the main troubleshooting menu, return to the reference value input prompt, press E for exit, then press Enter.

| **WARNING: Pressing E will cause the selected motor to move. Ensure motors are clear to move.** |
| --- |

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# Read/Write IO

Section four allows reading inputs on the 782B input board, as well as writing to outputs on the PB-24 output board.

Inputs and outputs have an alphanumeric designation that is required to view or write to. This section of inputs and outputs is also read and written in binary values. This is a good source for checking if certain inputs are being recognized by the computer, and to confirm the ability for the computer to write an output to the PB-24 to turn on desired outputs.

| Status of opto-coupled I/O boards  OUT A0-- 0 0 0 0 0 1 1 1 7 IN B0-- 0 0 0 0 0 0 0 0 0 OUT A1-- 0 0 0 0 0 0 0 0 0 IN B0-- 0 0 0 0 0 0 0 0 0 OUT A2-- 0 0 0 0 0 0 0 0 0 IN B0-- 0 0 0 0 0 0 0 0 0  OUT PORT  PORT 0  VALVE 7 |
| --- |

## 

## Reading Inputs

Section 4 inputs are those being used by the 782B circuit board. This board is located in the front of the control cabinet inside the left door. This is the smaller green rectangular board with 24 red LEDs. When a switch is closed, a 1 should be seen in the correct location with the correct value on the Input side of the I/O screen, as well as the associated red LED illuminated on the 782B input board. If multiple inputs are on at once, the total binary value will be displayed to the right of their associated block

Inputs are broken down into 3 “B” blocks, B0, B1, and B2.

### Single Spindle Machines

| **NOTE:** The following apply to single spindle machines such as D-750, RS1 and X290. |
| --- |

| Inputs (B0)  | **Component** | **Bit Address** | | --- | --- | | Sparker/Lump Relay | B0.04 | | Sequential Print | B0.08 | | Payoff Ready/ Crash Relay | B0.32 | | Guarding Closed & Locked(Optional) | B0.64 | | Key Inserted(Optional) | B0.128 | | Inputs (B1)  | **Component** | **Bit Address** | | --- | --- | | Stop | B1.01 | | Start | B1.02 | | Length Reset | B1.04 | | Increase Speed | B1.08 | | Decrease Speed | B1.16 | | Emergency Stop Pushed | B1.32 | | Jog | B1.64 | | Endform On/Off | B1.128 | | Inputs (B2)  | **Component** | **Bit Address** | | --- | --- | | Moveable Bar(Optional) | B2.01 | | Open/Close Guarding(Optional) | B2.02 | | Motor Overloads | B2.04 | | Screen Lockout(Optional) | B2.08 | | Endform IN switch | B2.16 | | Endform OUT switch | B2.32 | | Endform UP switch | B2.64 | | Endform DOWN switch | B2.128 | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

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### Dual Head Machines

| **NOTE:** The following apply to dual spindle machines such as D-1500. |
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| Inputs (B0)  | **Component** | **Bit Address** | | --- | --- | | Spindle 1 Pickup | B0.01 | | Traverse Pickup | B0.02 | | Spindle 2 Pickup | B0.04 | | Sequential Input | B0.08 | | Sparker Input | B0.16 | | Payoff Crash Relay | B0.32 | | Inputs (B1)  | **Component** | **Bit Address** | | --- | --- | | Spooler Stop | B1.01 | | Spooler Start | B1.02 | | Spooler Length Reset | B1.04 | | Unused | B1.08 | | Unused | B1.16 | | Emergency Stop Reset | B1.32 | | Inputs (B2)  | **Component** | **Bit Address** | | --- | --- | | Unused | B2.01 | | Unused | B2.02 | | Motor Overloads | B2.04 | | Guarding Doors | B2.08 | | Right Floor Mat | B2.16 | | Left Floor Mat | B2.32 | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

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## Writing Outputs

Section 4 Outputs are the outputs being utilized by the PB-24 opto relay output board. This is the longer and narrow board with 24 red opto relays with red LED status indicators. When an output is written, the red LED will be illuminated, as well as a 1 in the corresponding location on the computer monitor on the output side. Like the inputs, the outputs that are written to will be summed and the total will be displayed in binary to the right of the output block. A maximum of 255 can be written to turn all bits on in each section, even if not all bits are being utilized. If multiple outputs are required to be turned on at once, add the total amount in binary and use that number with the corresponding block.

To write to and turn on an output, type the address given below and press Enter. To turn off any outputs that have been turned on, type the desired block designation, followed by a .00

For example, if both the Run Light and the Run Relay are to be turned on at once, an A0.20 is to be written. To turn both off, type A0.00 and press Enter.

PB-24 Outputs are separated into 3 “A” blocks, A0, A1, and A2.

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### Single Spindle Machines

| **NOTE:** The following apply to single spindle machines such as D-750, RS1 and X290. |
| --- |

| Outputs (A0)  | **Component** | **Bit Address** | | --- | --- | | Run Light | A0.04 | | Run Relay | A0.16 | | Traverse Enable | A0.64 | | Spindle Enable | A0.128 | | Outputs (A1)  | **Component** | **Bit Address** | | --- | --- | | Endform IN | A1.01 | | Endform OUT | A1.02 | | Endform UP | A1.04 | | Endform DOWN | A1.08 | | DUMP Valve | A1.16 | | Oiler | A1.32 | | Open/Close Guarding Door(Optional) | A1.64 | | Lock D-750 Guarding(Optional) | A1.128 | | Outputs (A2)  | **Component** | **Bit Address** | | --- | --- | | Not Used | N/A | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

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| Dual Head MachinesOutputs (A0)  | **Component** | **Bit Address** | | --- | --- | | Run Light | A0.04 | | Run Relay | A0.16 | | Spindle 2 Enable | A0.32 | | Traverse Enable | A0.64 | | Spindle 1 Enable | A0.128 | | Outputs (A1)  | **Component** | **Bit Address** | | --- | --- | | Dump Valve | A1.08 | | Outputs (A2)  | **Component** | **Bit Address** | | --- | --- | | Spooler Enable | A2.128 | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

|  | | **NOTE:** The following apply to dual spindle machines such as D-1500. | | --- |  | **NOTE:** For further D-1500 Output options, use Devicenet section of troubleshooting. | | --- | |
| --- | --- | --- | --- |

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