**Cuttlefish**

Software, Methods, etc. can be found on the Plexium’s Github site under (<https://github.com/MitchellVHull>).

A word version of this document can be found on Sharepoint at <https://plexiumcom-my.sharepoint.com/:w:/r/personal/mitchell_hull_plexium_com/Documents/Documents/Vendor%20Information/Plexium/Cuttlefish.docx?d=w45a7c368ca4a4e47975a519986638a3b&csf=1&web=1&e=AnMQZ>

**Cuttlefish Setup**

* Set Air Pressure to 1.0 psi.
* Vacuum show be just under 1 ATM to pull to waste.
* Tubing in pinch valve should be in always closed position.
* Open App

**Cuttlefish 2.0 Application**

A computer screen shot of a computer

Description automatically generated

**Quick Start**

1. Double select **worklist** file from [\\nasx\datavol01\Engineering\Cuttlefish\_Protocols](file:///\\nasx\datavol01\Engineering\Cuttlefish_Protocols)
2. Select first line in **worklist box**. You may need to press **List Enabled** (11.) first.
3. Press **start**

**Simple Troubleshooting**

1. Press **stop** to stop the run at any time. Stop simply stops the run after the current step is completed. To continue select the next step in the **worklist box** and press start.
2. After pressing **stop** you will notice that the **stopping** indicator turns red in the **indicator panel**. During normal operation these indicators will be gray.
3. Sometimes **stop** can leave the indicator panel in a red or yellow state. If otherwise working properly the user can reset this panel.
4. For emergency stops use the **motor power switch** immediately followed by the **stop** button. This depowers the motors and they will immediately stop.

**Troubleshooting with Reinitialization**

Bumped cables, electromagnetic interference or other crashes may necessitate a complete restart. If so, it is important to continue where you left of in the worklist. In addition, you’ll need the pinch valves, rotary and tilt positions to be the same.

The rotary valve is especially sensitive to electromagnetic interference. Disconnecting power from the rotary may be necessary. Keep rotary communication cables away from motors and power supplies.

1. Make a note where you need to return after reinitialization.
2. Also note the status of your pinch valve, rotary and tilt positions. These should display after initialization and return each to its state with the 🡪 key.
3. Before starting or returning the lifter to its previous state. **Home** the lifter.
4. Enable the **worklist** selection
5. Use the search tool to search for the correct line and select where you want to continue. Then press **start** to continue running.

**sqd Worklist**

Cuttlefish is controlled by a simple text/worklist file (\*.sqd). All commands are performed sequentially. The user can start the worklist by selecting any line in the worklist box in the center of the Control Pane. Worklist file color schemes for Notepad++ can be found in Github under Misc-Cuttlefish.

The nomenclature for the worklist commands can be confusing due legacy uses. The user will need to accept some non-intuitive descriptions and abbreviations for the command parameters.

**Command Structure for Worklist**

**Rotary valve**

The simplest command. All Rotary commands start with **/2** and end with **R**. Port number is indicated by B followed by the desired port.

Example:

**/2** B1 **R**

Turns rotary location to 1. Port number are 1 – 10.

**Stepper Motors: Peristaltic Pumps and Lifter**

All Stepper motors start with the prefix **/DV** followed by the motor numbers. The software allows a maximum of 8 peristaltic pumps plus one lifter motor, which is always 9. Motors can be run individually (/DV1, /DV2, etc.) or in special combinations: /DV12 🡪 motors 1 & 2; /DV34 🡪 motors 3 & 4. The Cutlet can run all motors at once /DV12345 🡪 motors 1, 2, 3, 4 & 5. Other parameters are **SP**eed, **AC**celeration, **ST**eps and **T**ilt **P**osition (for the Lifter only). All commands must end with **RARD.**

Examples:

**/DV**1 **SP**150 **AC**2000 **ST**9000 **RARD**

Run peri pump 1 at **SP**eed 150, **AC**celeration of 2000 for 9000 **ST**eps.

**/DV**12 **SP**100 **AC**2000 **ST-**9000 **RARD**

Run peri pump 1 & 2 at **SP**eed 100, **AC**celeration of 2000 for 9000 **ST**eps.

**/DV**9 **SP**350 **AC**2000 **TP**230000 RARD

Run Tilter (tilter is always 9) at **SP**eed 350, **AC**celeration of 2000 until it reaches the 230,000 **T**aught **P**osition

**Individual Pinch Valves**

Pinch Valves are usually controlled by Routines (see below). This is recommended. However they can be controlled individually. Current Pinch Valves are label 2 (top), 3(bottom) and 14(air line). All Pinch Valves start with **/PN** followed by the valve number, the **P**o**W**er (1 = activated, -1 = deactivated) and finally **RARD**.

Example:

**/PN**14 **PW**1 **RARD**

Activates Pinch valve 14

**/PN**3 **PW-**1 **RARD**

Deactivates Pinch valve 3

**Routines**

Frequently used pinch valve combinations and the Homing command for the Lifter are initiated through routines (see **COMMANDS**).

**Miscellaneous**

Miscellaneous commands (i.e. Input, Warnings, etc.) are described under **ALL COMMANDS**.

**ALL COMMANDS**

|  |  |  |  |
| --- | --- | --- | --- |
| **Command** | **Parameter** | **Operand Range** | **Command Description** |
| B<integer> | Rotary Pump Position | 1 - 10 | Move to valve port with shortest path independently of the current valve position. Clockwise/incremental direction preferred |
| DV<numbers> | Motor Number(s) | 1, 2, 3, 4, 5, 12, 34, 1234, 12345, 9 | Numbers 1 – 8 control the Peristaltic Pumps while 9 is reserved for the lifter motor. Only listed ranges are allowed. |
| SP<integer> | Motor Speed | 50 – 350 | Higher and lower speeds may be attainable depending on Cuttlefish type, but this is not recommended. |
| AC<integer> | Motor Acceleration | 10 – 10,000 | Higher and lower speeds may be attainable depending on Cuttlefish type, but this is not recommended. 2,000 suffices for most applications. |
| ST<integer> | Motor Steps | 1 – 20,000 | Number of stepper motor steps. For the peristaltic pump 10,000 steps correspond to about 2.25 mLs. |
| TP<integer> | Lifter Taught Position | 0 – 230,000 | 0 is home position, 230, 000 is maximum forward tilt. The lifter uses an encoder for exact positioning. |
| PN<integer> | Pinch Valve | 2, 3, 14 | Indicates Pinch valve |
| PW<integer> | Power/Activate/Open | 1, -1 | 1 = Activate Pinch Valve; -1 Deactivate Pinch Valve |
| /ROUTINE ALL\_OFF RARD | Pinch Valves | None | Deactivates All Pinch Valves (Closed Position) |
| /ROUTINE ALL\_ON RARD | Pinch Valves | None | Activates All Pinch Valves (Open Position) |
| /ROUTINE BOTTOM\_OPEN\_ONLY RARD | Pinch Valves | None | Activates Bottom Pinch valve only (closes all other valves) |
| /ROUTINE TOP\_OPEN\_ONLY RARD | Pinch Valves | None | Activates Top Pinch valve only (closes all other valves) |
| /ROUTINE BLOW\_TOP RARD | Pinch Valves | None | Opens Air and Top Pinch Valves to pressurize top waste line |
| /ROUTINE HOME\_LIFTER RARD | Lifter | None | Homes the Lifter |
| [MESSAGE1]<text> | Misc | Any Text | Prints Message to Large Message Space |
| [MESSAGE2]<text> | Misc | Any Text | Prints Message to Second Message Space |
| [SOUND]<mp3 file> | Misc | mp3 file name | Plays mp3 if in root file directory |
| [TALK1] | Misc | Any Text | Speaks (Talk1 group) Specific group can be muted in application |
| [TALK2] | Misc | Any Text | Speaks (Talk2 group )Specific group can be muted in application |
| [USERINPUT]<text> | Misc | Any Text | Popup for user information. Information will be writen to all log files. |
| [WAITFORSECONDS](<n>) | Misc | number | Activates incubation timer for n number of seconds |
| [WAITFORUSER] | Misc | Any Text | Prompts user with information and waits for "OKAY" |