

# Codonics Virtua Robotic Arm Utility

## Technical Brief

### Overview

This Technical Brief provides instructions for using the Robotic Arm Alignment Utility and Robotic Arm Cycle Test. In Virtua® Version 3.1.1 and later software, these tools are available on the Utilities screen in the Robotic Arm tab.

### Operational Description

The Robotic Arm Utility is used to help assure that the Virtua Medical Disc Publisher's robotic arm is properly calibrated for regular transport of discs from the optical disc bin(s) to the optical drive(s) to the print tray and then the output bin. It is strongly recommended that the Robotic Arm Cycle Test (see page 5) be run upon initial Virtua system installation or after major system repair/transport and if it does not complete successfully, the rest of this calibration process be completed.

**NOTE:** This Utility should only be used by those personnel familiar in its use, since mis-calibration could cause poor performance or damage to the system. The Utility will only be available to users with the Admin role. Contact Codonics Technical Support for additional assistance.

### Prerequisites

The following items are required to complete these service instructions:

- ◆ T10 Torx driver (torque driver recommended)
- ◆ Felt-tip pen
- ◆ Up to 50 optical discs
- ◆ 3.1.1 software or later is installed on Virtua.

**NOTE:** As of Version 3.1.1 software, this Utility cannot be run on Virtua ECO systems. It is expected that this limitation will be removed in an upcoming revision. This Utility will not run on Virtua-1 systems.

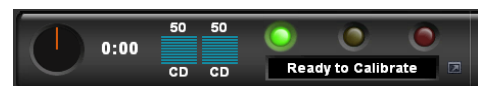
**NOTE:** Check the trays of the optical disc drives for 4 clear Teflon stickers on the drive tray where the optical disc would be placed. If they are not present, contact Codonics Technical Support.

### Calibrating the Robotic Arm

1. Wait for Virtua to finish processing jobs.
2. Go to the Utilities tab and then the Robotic Arm tab.
3. Press the Start button in the Robotic Arm Alignment section to enter calibration mode. Jobs subsequently sent to Virtua will accumulate in the background and will be processed after calibration mode is exited.



4. Wait for the Ready to Calibrate message to display on the dashboard.

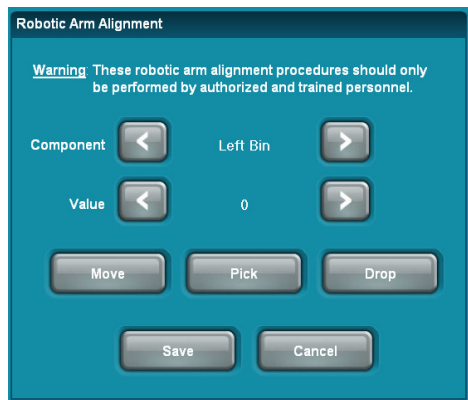


5. At this point the cover to the Recorder can be opened without causing an error condition, to ease viewing of optical disc picking and placement. This situation will persist until the Calibration is either Saved or Cancelled.

**CAUTION:** During the calibration process, the robotic arm can move rapidly. Keep fingers and loose clothing away from the robotic arm, optical drives and print tray since personal injury could result from contact with a moving component.

6. Load five optical discs in each input bin.

7. Select the component to calibrate by pressing the left or right arrow buttons next to **Component**. See each section below for specific instructions for the Optical Drive, Input Bin and Printer Tray.

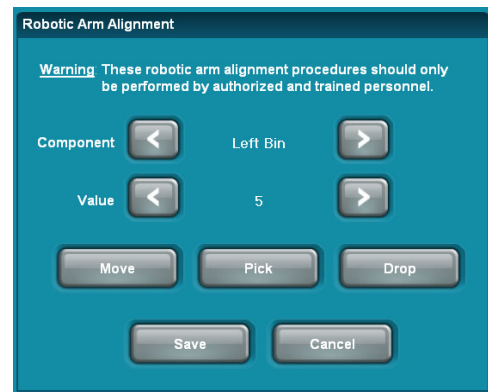


8. Use the movement buttons to move the robotic arm to various components and test their calibration settings.
  - ◆ Press the **Move** button to move the robotic arm to that component. If there is an optical disc on the robotic arm, the robotic arm will lower over the top of the component where it would place an optical disc in the component.
  - ◆ Press the **Pick** button to pick an optical disc from that component. If there is an optical disc on the robotic arm, it will not try to pick another optical disc.
  - ◆ Press the **Drop** button to place an optical disc on the robotic arm into that component. If there is not an optical disc on the robotic arm, it will not try to place an optical disc.
9. Adjust the calibration value until the robotic arm picks and places optical discs in the center of the component. Adjustments other than for Special Components (see below) can only change location right and left.

**NOTE:** Number values within the Robotic Arm Utility described here are different than for the external Recorder Calibration Utility (reference Codonics Part No. 901-218-001).

- ◆ Pressing the right arrow button will increase the value and move the robotic arm to the right as it would appear from the front of the Recorder.

- ◆ Pressing the left arrow button will decrease the value and move the robotic arm to the left as it would appear from the front of the Recorder.



**NOTE:** Components (except for the Special Components) have calibration values between -32 and 32 that adjust the position of the robotic arm.

Six calibration units = ~0.040 in (~1.0 mm)

10. The Robotic Arm Cycle Test (see below) can be used to verify calibration settings.
11. If satisfied with the new calibration settings, press the **Save** button to accept the modified calibration values, exit from calibration mode and resume the normal mode of operation.
12. Otherwise, press the **Cancel** button to discard the modified calibration values, exit from calibration mode and resume the normal mode of operation.

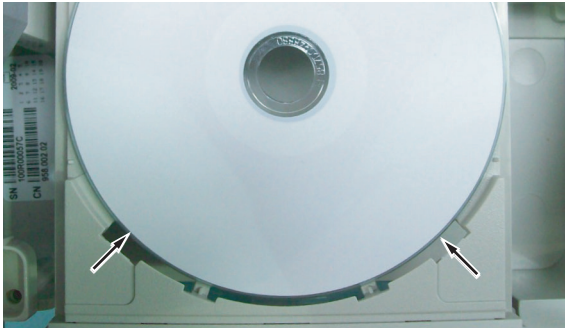
**NOTE:** When resuming normal operation, the software re-initializes the Recorder and clears any remaining optical discs from the drives and printer tray.

## Optical Drive

The following steps define how to calibrate the picking position from the optical drive trays.

1. To place an optical disc onto the robotic arm, press the right arrow button or left arrow button until either **Right Bin** or **Left Bin** appears as the **Component** and then press **Pick**.
2. Press the right arrow button or left arrow button until **Bottom Drive Tray** appears as the **Component**.
3. Press the **Drop** button to have the robotic arm place the optical disc in the bottom optical drive tray.

4. Verify that the robotic arm places the optical disc as shown. The optimal position is to have the edge of the optical disc aligned with the back edge of the opening in the optical drive tray. This biases the optical disc towards the back of the optical drive tray allowing for some additional margin for optical drive tray pull back.



5. If the optical disc position in the optical drive tray is too far in or out, the optical drive position will need to be adjusted. If no adjustment is required, proceed to step 13.

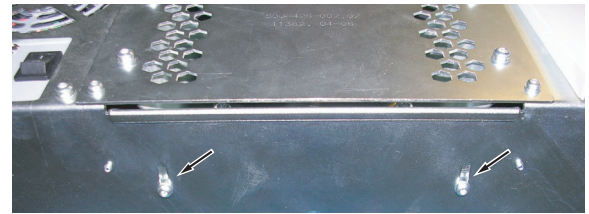
**NOTE:** If the optical disc is too close to the front of the optical drive tray, there is a risk that the optical disc will catch on the plastic lip and be pulled off the robotic arm.

6. Before proceeding with adjusting the bottom optical drive location, it is recommended that the optical disc position in the top optical drive tray be reviewed. Perform steps 1 through 4 on the top optical drive prior to powering off the Recorder (select Top Drive Tray versus Bottom Drive Tray). If the top optical drive requires a different adjustment, note the difference so the appropriate adjustments can be made when the optical drive bay is removed. Mark the location of the drive-bay bracket as shown in step 7 and reference the Virtua-2 optical drive replacement procedure for instructions on how to adjust the location of the top and bottom optical drives. Once the optical drives have been repositioned, repeat steps 1 through 5.
7. If both optical drives need the same adjustment, mark the location of the drive-bay bracket on the chassis using a felt-tip pen at the front of the Recorder as shown.



8. Remove all optical discs and input bins. Shut down power to the Virtua system. Disconnect the USB cable and eSATA cables from the Recorder and switch off the power supply switch on the rear of the Recorder.

9. Remove the two screws and washers securing the back of the drive bay from the underside of the Recorder. Use the Torx driver to remove the two screws and washers securing the drive bay at the front of the Recorder.



10. Adjust the drive bay location using the pen line as a reference. Use the Torx driver to torque the screws securing the front of the drive bay to approximately 6 in-lbs (0.68 Nm).

**NOTE:** Keep the screws securing the back of the drive bay loose to allow for further adjustment.

11. Install the input bins and load five optical discs in each. Reconnect the USB cable and eSATA cables to the Recorder and switch on the power supply switch on the rear of the Recorder. Power up the Virtua system.
12. Repeat steps 1 through 5.
13. If the optical disc position is too far left or right, adjust the Bottom Drive Tray calibration value to move the robotic arm left and right. Reselect the Pick or Move button to verify the new location.

**NOTE:** If unable to achieve center, bias the optical disc towards the right of center.

**NOTE:** As a final check, it is recommended to move the robotic arm to another location and return back to the bottom optical drive. Complete a final check of optical disc location by selecting the Drop button on the Bottom Drive Tray component. Having the robotic arm move from and back to the calibration location ensures the robotic arm has accurately read the encoder position.

**NOTE:** Press Pick button to remove the optical disc from the bottom optical drive before proceeding to the next step.

14. Press the right arrow button or left arrow button until Top Drive Tray appears as the Component.

15. Press the **Drop** button to have the robotic arm place the optical disc in the top optical drive tray.
16. Verify that the robotic arm is placing the optical disc as shown in step 4. If calibration is needed, perform steps 5 through 13 on the top optical drive.

### **Input Bin**

The following steps define how to calibrate the picking position from the input bins.

1. Press the right arrow button or left arrow button until **Left Bin** appears as the Component.
2. Press the **Move** button to have the robotic arm hold the optical disc at the top of the bin.
3. If the optical disc position is too far left or right, adjust the value to move the robotic arm right and left. Reselect the **Move** button to verify the new location.
4. Press the **Drop** button to drop the optical disc into the left bin.
5. Press the **Pick** button and carefully watch the optical disc position relative to the bottom of the bin. If the optical disc is not centered, average the optimal top and bottom position for the final bin calibration setting.

**NOTE:** As a final check, it is recommended to move the robotic arm to the right bin and then back to the left bin. Complete a final check of optical disc location by selecting the **Move** button corresponding to **Left Bin**.

6. Repeat steps 1 through 5 on the right bin.

### **Printer Tray**

The following steps define how to calibrate the picking position from the printer tray.

1. Press the right arrow button or left arrow button until **Printer Tray** appears as the Component.
2. Press the **Drop** button to have the robotic arm place the optical disc in the printer tray.

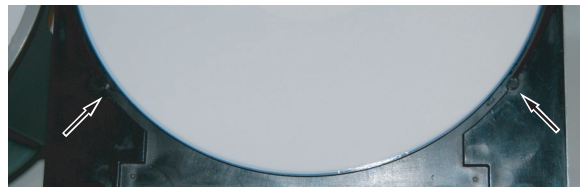
**NOTE:** Pressing the **Move** button will lower the robotic arm and hold the optical disc in the printer tray.

3. If the optical disc position is too far left or right, adjust the calibration value to move the robotic arm right and left. Reselect the **Pick** or **Move** button to verify the new location.

**NOTE:** If unable to achieve center, bias the optical disc towards the right of center.

**NOTE:** As a final check, it is recommended to move the robotic arm to the right bin and then back to the printer tray. Complete a final check of optical disc location by selecting the **Drop** button corresponding to **Printer Tray**.

4. If the optical disc position is too far forward in the printer tray and coming close to the two disc stops (shown below), this could indicate that the printer tray is being pulled back by the disc tab retention spring. If the printer tray is pulling back, the optical discs could become dislodged when the printer tray is retracted. Please contact Codonics Technical Support for further instruction.



**NOTE:** Another way to check for printer tray pull back is to manually pull the printer tray all the way out and let go. No pull back should be observed.

## **Special Component Calibration**

### **Pick Depth**

Setting the **Pick Depth** changes the depth that the robotic arm presses into the current component when picking an optical disc. It uses calibration values between -50 (deep pick, high pick force) and 50 (shallow pick, low pick force).

**CAUTION:** Setting the **Pick Depth** value too low could damage the optical disc, robotic arm, or optical drive by applying too much robotic arm force. Setting the calibration value to less than -20 is not recommended. Contact Codonics Technical Support if a lower value is required.

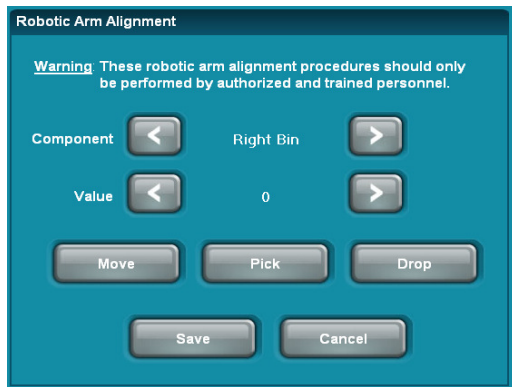
**NOTE:** This setting rarely needs to be adjusted. If the disc is being picked correctly, it is recommended to leave the current setting, typically between 0 and -10.

**NOTE:** Number values within the Robotic Arm Utility described here are different than for the external Recorder Calibration Utility (reference Codonics Part No. 901-218-001).

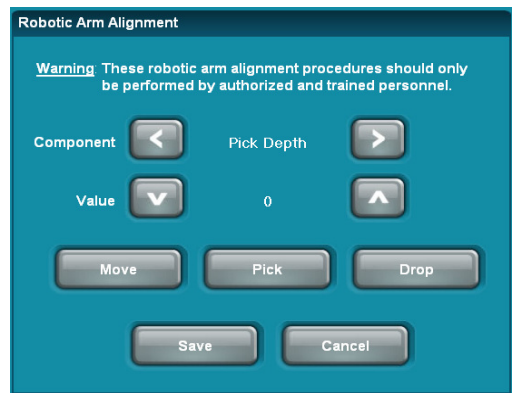


To calibrate the Pick Depth component:

1. Select the Right Bin component and Move the robotic arm to that position.



2. Select the Pick Depth component.



Press the Pick button. Watch the robotic arm body and note how much it is lifting up on the top guide rail. The optimal setting is to apply enough force to lift the weight of the robotic arm assembly, but not enough to push against the top guide rail. Hearing the stepper motor get overloaded can also indicate too much force. Too much force can also increase the chance of two discs being picked.

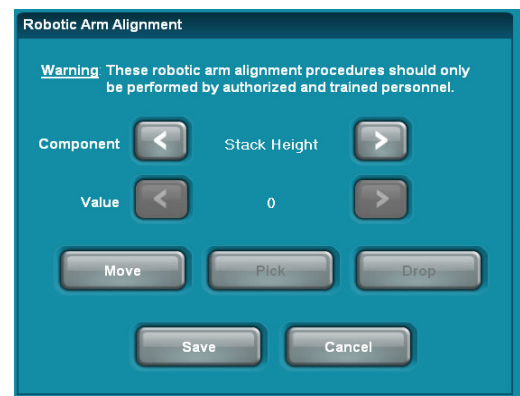
3. Adjust the value.
  - ◆ Press the down arrow button to make the value more negative, moving the sensor trigger position up and increasing the pick depth/pick force.
  - ◆ Press the up arrow button to make the value more positive, moving the sensor trigger position down and decreasing the pick depth/pick force.
4. Use the Drop and Pick button to view how forcefully the robotic arm presses into that component; adjust the force using Step 3 until satisfied.

5. Repeat step 1 through 4 on the left input bin and the final calibration setting should be the highest value between the left and right input bin.

## Stack Height

The Stack Height component calibrates the robotic arm's internal setting of the height of a single optical disc in each input bin. It uses this setting to estimate the height of up to 50 optical discs in that bin. To calibrate the Stack Height component:

1. Place one optical disc in each input bin.
2. Select the Stack Height component.



3. Press the Move button and the robotic arm will perform the calibration process.

Once this calibration has been set, the Stack Height calibration setting cannot be stopped or reverted by pressing the cancel button.

## Drive Height and Print Tray Height

**NOTE:** This setting only applies to the 82C-series and 83C-series Virtua Recorders.

**CAUTION:** Performing the steps below without a disc in the component being calibrated will incorrectly calibrate the component and put it into a state where it cannot be calibrated from the GUI.

1. Open the top cover and place a folded piece of paper or card stock in the optical sensor as shown in the following image. This will allow access to the drives and print tray while the cover is open.

**CAUTION:** The robotic arm will move with the top cover sensor disabled. Keep hands, hair, and loose clothing clear of robotic arm when in motion.



2. Verify the User Interface shows a status of "Ready", indicating that the sensor is disabled.
3. Use the Component Arrows to navigate to "Top Drive Height".
4. Manually open the top drive and place a single disc in the tray.
5. Press the MOVE button on the user interface. The arm will move down and measure the height of a single disc in the drive.
6. Remove the disc and close the top drive.
7. Repeat steps 2 through 5 substituting "Top Drive Height" for "Bottom Drive Height" and "Print Tray Height".

**NOTE:** If the unit has been incorrectly calibrated without a disc in the tray, it can no longer be calibrated from the User Interface. Use the following steps to restore functionality.

### Calibration using the BravoComm Utility

The steps below provide a means to manually calibrate the pick height for the print tray and DVD drives. This process may be required if the pick height calibration on the GUI was attempted without a disc in the print tray or DVD drive tray.

**NOTE:** A Windows™ compatible keyboard and mouse with USB cables are required for this procedure.

1. Connect a USB mouse and keyboard.
2. Minimize the UI (Windows +D).
3. Open Windows Explorer (Windows + E).
4. Using Windows Explorer, navigate to **C:\opt**
5. Copy **codburn.yes** and paste in the same folder. This will create a file called **Copy of codburn.yes** or something similar.

6. Rename the resulting copy to **codburn.pause.yes** (this keeps CodBurn from interfering with us running the BravoComm.exe command)
7. Open a command prompt by pressing Windows + R, then typing **cmd** in the Windows Run dialog box.
8. Type **cd c:\opt\BravoPro\_Commands** to navigate to the proper directory.
9. If not already done, open the top cover and disable the top cover open sensor as described in the previous section.
10. Run the following commands to calibrate the Pick Heights:
  - ◆ **Calibrate the Printer Height:** Place a disc in the print tray and type **BravoComm.exe -n 171** at the command prompt.
  - ◆ **Calibrate the Top Drive Height:** Open the top drive, place a disc in the drive tray and type **BravoComm.exe -n 172** at the command prompt.
  - ◆ **Calibrate the Bottom Drive Height:** Open the bottom drive, place a disc in the drive tray and type **BravoComm.exe -n 173** at the command prompt.
11. Delete **C:\opt\codburn.pause.yes**
12. Bring back the Virtua GUI with Windows + Shift + M

### Running the Robotic Arm Cycle Test

The Robotic Arm Cycle Test moves optical discs between all of the Virtua components so that the correctness of calibration can be viewed. Place no more than 50 optical discs into one bin (the maximum for one bin) in the Virtua system so that the progress of the testing can be easily monitored. To prevent potential confusion after the test, use a single variety of optical discs. The use of new optical discs is not necessary.

Ideally, allow the Recorder to move 50 optical discs from the right bin to the left bin and then back to the right bin without mishandling errors to verify that calibration is correct. This self test will take approximately 50 minutes to complete.

**NOTE:** The Recorder cover should be closed for this test. Problems during the test may require opening the cover to correct the situation and any optical discs within the drives will be cleared before resuming the test.

1. To begin the test, press the **Start** button in the **Robotic Arm Cycle Test** section. A **Robot Test Running** message and flashing green light will display on the dashboard. A yellow light will be indicated if one input bin is empty.

The test will continue until the user presses the Cancel button to stop the test.



**NOTE:** When resuming normal operation, the software re-initializes the Recorder and clears any remaining optical discs from the drives and printer tray.

2. If additional calibration is required, follow the above calibration process until satisfied. Re-run the Robotic Arm Cycle Test (step 1).
3. If the optical drives have been moved (reference the Optical Drive section, Steps 6 through 12), proceed to Step 4. Otherwise, Virtua will be functional at this point.

**NOTE:** Since waiting jobs may have accumulated within Virtua during the calibration process, assure that the correct variety of optical discs is placed into the appropriate input bin afterwards to prevent subsequent delays due to incorrect media selection.

4. Remove the optical discs and input bins.
5. Power down the Virtua system.
6. Disconnect the USB cable and eSATA cables from the Recorder and switch off the power supply switch on the rear of the Recorder.
7. Use the Torx driver to torque the screws securing the back of the drive bay to approximately 6 in-lbs (0.68 Nm).
8. Install the Recorder on the Controller by reconnecting the USB cable and eSATA cables to the Recorder and switch on the power supply switch on the rear of the Recorder.
9. Power up the Virtua system.
10. Complete a final verification by burning a couple of study discs.

## Technical Support

If problems occur during calibration, contact Codonics Technical Support between the hours of 8:30AM and 5:30PM EST (weekends and U.S. holidays excluded).

Phone: 440-243-1198  
Email: support@codonics.com  
Website: www.codonics.com

*Get it all with just one call*  
**1-800-444-1198**

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