DEXTERIX

Quick Start Guide

Overview

Dexterix is a high performance low cost automation solution for CD/DVD/BD processing.
The compact robot provides automatic disc-changing for the equipment it is attached to, whether it is a regular PC or a specialized manual optical-disc processor such as a duplication tower.
It works both for professionals and for hobbyists, for either short runs or industrial scale disc processing.

The "heart" of the robot is our patented automatic disc-pickup device -the first and only one of its kind in the field.
It engages/releases the disc automatically, without any external electro-mechanical actuation.
The picker flexibly self-adjusts its position to the center of the disc and grips it securely from beneath, ensuring high reliable single-disc pickup. Problems commonly encountered by other disc-picking devices (such as picker-to-disc misalignment, disc dropping during transport or double-disc pickup) are completely eliminated.
The independent functionality of the picker reduces to a minimum the number of components prone to failure and allows for extreme robotic simplicity and increased reliability.

The robot is simply placed on the top of the tower/PC and works like a crane: the pickup device is being raised/lowered using a flexible cable (made of stranded steel wires, nylon coated) and accesses from above the disc drives and the disc stacks placed around.
The crane concept provides versatility; the simple and compact robot works for either large or small capacity systems/configurations alike, allowing for:
-long vertical travel (access as many stacked drives as needed)
-high capacity disc stacks, when needed
-variable number of disc bins, user-adjustable as needed (minimum 2 and up to 8 disc bins, up to 4 on each side)

The robot is simple, reliable, fast, compact and easy to install and to use. A user-friendly single button operation provides intuitive configuration setup and helps aligning the system interactively.
Once placed on the top of the tower the robot needs to be aligned with the drives so it places the disc centrally into the tray. The robot's magnetic bottom provides positive grip to the tower case underneath and secures their relative alignment. Optional interlocking guides can be installed, allowing the robot to be detached and re-attached to the tower in no time whenever needed, preserving the alignment.

Dexterix works with a minimum of 2 and up to 8 disc bins. The user can choose how many and which disc-bins to use, depending on the current job's requirements. There must be at least one bin for blank and one for written discs so one could have a maximum of 7 blank disc bins. Regular 100 CD/DVD disc packaging can be used for stacking the discs. With 7 such 100 disc bins filled with blanks, a maximum of 600 discs can be processed unattended.
For larger scale duplication tasks, bigger capacity disc bins could be used (with 200 disc bins –ordered separately- the robot can process up to 1400 discs unattended). The rejected discs will be placed in front, under the drawers.

A simple, interactive procedure allows positioning the bins to their correct locations within 3 minutes: the robot itself places an alignment indicator on the table where each bin needs to be positioned. The user then simply puts a non-slip bin-supporting ring at each such precisely indicated location. These non-slip ring supports under the disc-bins provide abiding alignment.

Dexterix can be controlled via RS232. At this point, Dexterix can only automate duplicators provided with Wytron controllers. The Wytron controller inside the duplication tower requests the attached robot to change the disc when necessary. With such duplication towers, the robot smartly "knows" where to deliver the written discs to and which bin to bring blank discs from, depending on the bin-configuration selected by user at startup. When all the blank discs in a bin have been written/processed, the robot automatically moves to the next available one, delivering the written discs to the last empty bin.

We have also provided Dexterix with a set of commands allowing specialized applications to control (via RS232 interface) the transport of a disc between any 2 of the 9 possible locations.
Two types of commands -pick up a disc from a certain location and respectively deliver the disc to a certain location- provide all one might need to automatically complete the most complex disc processing tasks.
Please see the "Dexterix' Developer's sheet" for details.

Requirements and General Considerations for choosing the Dexterix-enabled duplication tower

1. At this point, Dexterix can only automate duplicators provided with Wytron controllers. Such duplication tower can be used either with Dexterix (automatic disc change) or manually. The Wytron controller inside the duplication tower requests the attached robot to change the disc when necessary.

Your Wytron controller manual duplication tower needs to have the RS232 (serial communication interface) module installed and the DB9 connector available on the rear. If your tower doesn't have this connector pre-installed and Dexterix came with the module instead, you need to plug it into the COM2 port of the duplication controller. On Wytron controller's setup menu, set the "Autoloader" option to "Classic".
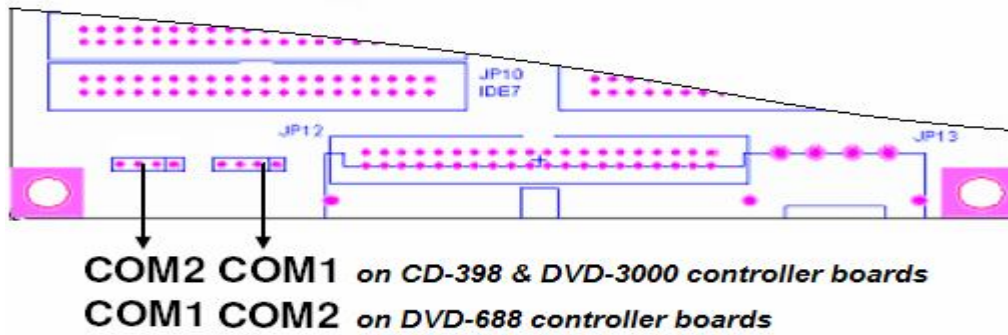

2. The tower must be less than 8" (20 cm) wide in order to allow placing all 8 disc bins

3. Dexterix should be placed on the flat-leveled top of the manual duplication tower. Dexterix' bottom is magnetic. The tower case should be ferrous. If the tower case is made of non-ferrous material, the top of the tower must be covered with a sheet of self adhesive non-magnetized, magnetically receptive material (We can supply this article separately)

4. Duplication tower must be placed on a flat, horizontal plane. It has to be stable and its trays must be perfectly aligned vertically. This is important, disc placement accuracy depending on it.

We optionally provide an alignment kit for this, consisting of leveling feet for the tower case and a micro twin-plumb, specifically adapted to check and adjust the trays vertical alignment easily.

5. The trays of the drives have to open widely and need to be hook-less, allowing the disc to travel freely on vertical axis and lay down correctly into the tray (depending on the type of drives used, one may need to cut off the disc retainers, although this is not always necessary). When open, all drive trays must be aligned along a common line. Open all the trays (using the drive's eject button) and check this alignment before attempting to bundle Dexterix with the tower. We usually recommend/provide Pioneer drives, customized to open their trays completely, all the same.
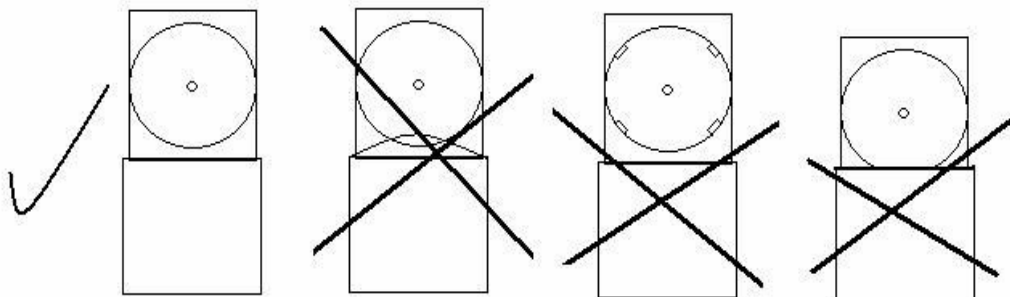
6. One may expect best performance when using Dexterix in conjunction with a 4-8 targets tower provided with a hard-drive, wherein all its drives are identical writers (no reader).

Such a system is able to duplicate unattended multiple masters/different number of copies. For this feature, set the "Load nonblank disc" option on Wytron's menu to "Yes".

During the duplication process, whenever the controller detects a non-blank disc in one of the drives, it automatically transfers the content of this CD or DVD master to the hard disc drive in the tower. The controller then loads and records blank discs, until it detects another master. When a new master is detected, it loads its content onto the hard disc and continues to record the new content onto the following blank discs.

This allows multiple titles to be duplicated in one duplication session without interruption. When multiple titles are duplicated in one job, care should be taken to not mix the titles when unloading the bins.

The first master content disc should be placed on the top of the discs in the bin that is first accessed by the robot. This allows the master disc to be the first disc that is loaded when the duplication operation is started.

The pickup device hangs and travels vertically, like a plumb. In order for Dexterix to reliably automate duplicators with 6 drives or more, the tower's verticality must be carefully adjusted. The higher the tower is, the tighter the tower's verticality requirement.

Tip: Despite the common beliefs, the hourly throughput of an automated duplicator is not proportional to the number of drives. This is especially true when using faster writers and lower amount of data, where the writing session is shorter. The explanation resides in the drawback of synchronous writing: the tower stalls during disc changing period, namely all its writers are waiting until the last drive loaded with a disc. The higher the tower is, the longer it takes to load/unload all the discs, even when done manually. Dexterix is one of the fastest autoloaders on the market, compensating somehow this drawback. The hourly throughput of an 11 writers system is only about 15% bigger than that of an 8 writers system, but such an 11 drives tower takes longer to unload/reload and is more prone to vertical misalignment than the smaller ones.

What's inside the box?

Inside the box you will find: the robot, the RS232 module/cable, the positioning drum, eight bin-supporting rings, eight spacers, the power supply and this manual. The bins are not provided. Regular disc packages ("cake boxes") are to be used.

The RS232 module/cable
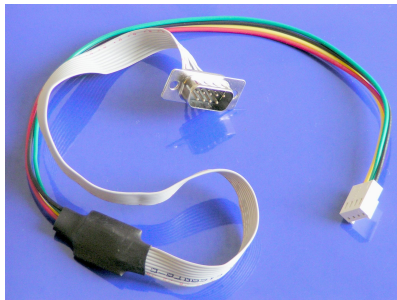
This electronic module/cable assembly is the interface between the Wytron controller and robot. The DB9 (RS232) connector should be installed at the rear of the tower, while the other end should be connected to the controller's COM2 port.

When Dexterix comes bundled with a duplication tower as a complete duplication system, the module is already installed inside the tower.

When Dexterix is to be controlled by custom applications rather than a Wytron controller, this item is not used and not supplied

The positioning drum
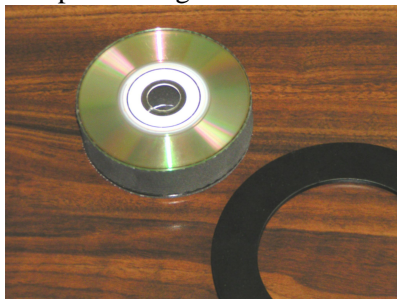
This 8cm diameter device is used during the interactive bin positioning procedure. The robot picks it from an open drive-tray and delivers it precisely to the location where the bin is to be positioned.

The drum's bottom side is covered with non-slip material, preventing it from slipping onto the table. It should be gently cleaned using a wet cloth before performing the positioning procedure. (regular tap water should be used)

The bin-supporting rings
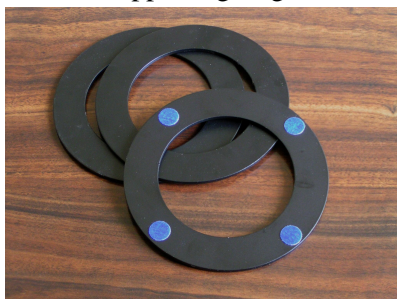
Eight such metal rings come with each robot, one for each bin. They are 121mm diameter and mate the bottom of many types of CD "cake boxes". The bottom side is provided with non-slip bumpers made of a high-tech washable material with remarkable gripping properties, preventing the rings from slipping onto the table. (the bumper side must face the tabletop)
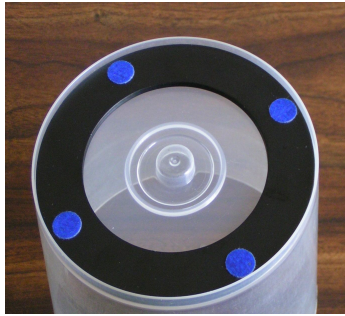
Before placing the rings on the table, the bumpers should be gently cleaned using a wet cloth. (regular tap water should be used)

The spacers
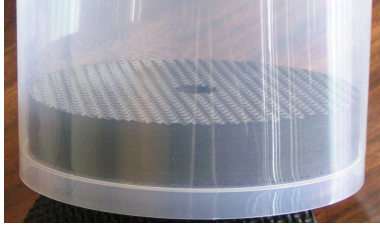
Eight such rubber foam spacers come with each robot, one for each bin.
A spacer needs to be placed inside each bin, at the bottom, providing clearance for the disc-pickup device

About the bins to be used

The bottom of the bins ("cake boxes") must mate nicely with the bin-supporting rings, which are 121mm diameter. The bottom of the bin should look like the one in the picture.

Set up

Prior to setting up and aligning the robot, place the duplicator tower on a flat tabletop that is stable.
Use an accurate level instrument to adjust the table's horizontality. Check the drive trays vertical alignment.

Dexterix utilizes a single button operation system that allows the user to set up the robot in an intuitive way. Each of the 9 marginal LED lights represents a location where discs can be transported to and from. The front most LED represents the duplicator's drive trays and the other eight LEDs, four on each side, represent the disc bins that may be used.
The 10th LED, located centrally, in front of the control button, is the Menu LED. The Menu LED will change color every three seconds when the control button is kept depressed, cycling through the 4 possible Dexterix operating modes. Each Menu LED color signifies a different mode, as follows:

1. Menu LED Green – Configuration Mode; you may select the disc bin configuration.
2. Menu LED Red – Positioning Mode; you may position the bins or the robot
3. Menu LED Orange – Demo Mode; Dexterix moves discs without communicating with the tower.
4. Menu LED Off (No light) – Dexterix is in Ready Mode, waiting for commands from the tower.

To select an operating mode, release the button when the color of the Menu LED corresponds with the desired mode. Each operating mode is explained below:

Menu LED Green (Configuration Mode)
This mode allows you to choose the number and location of the disc bins you are going to use for the automated disc duplication. To enter the Configuration Mode keep the control button depressed until the Menu LED turns green, then release it. Dexterix enters this mode by default on power up.

Once in Configuration Mode, each subsequent click of the button will select a certain configuration of disc bins. Dexterix can work with various numbers of blank disc bins, ranging from 1 up to 7. You may choose the desired configuration depending upon the number of discs to be processed (the number of bins used) and the amount of available space around your duplication tower.
The LED colors will indicate where the disc bins will be placed. The surrounding green lights represents the blank disc bins, the orange LED shows where the rejected discs will be delivered to and the red light represents the processed disc bin (place an empty bin here). By default, the rejected discs will be placed in front of the tower, under the drawers. There's no need to place a bin there.

Three examples are shown below:
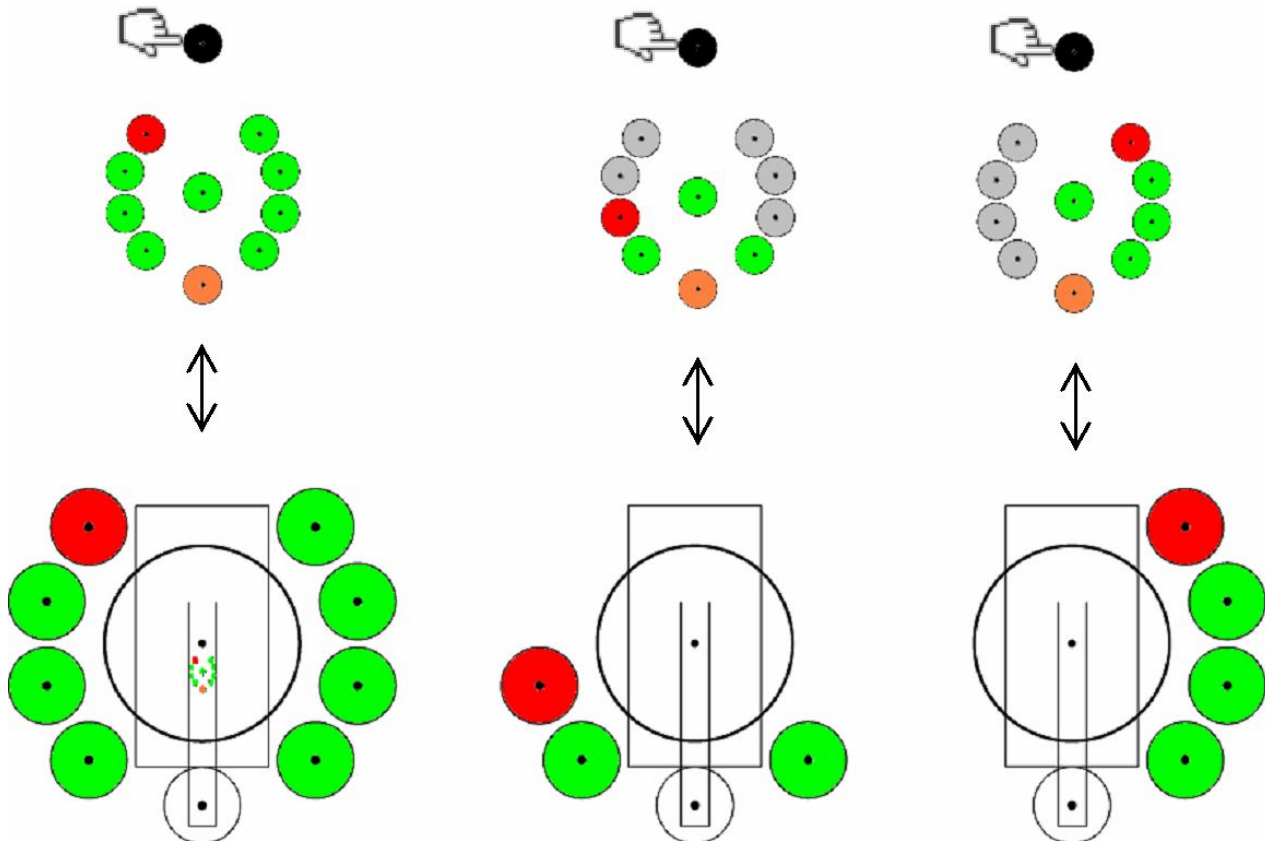
Note: The bins represented in green are filled with blank discs. The red one must be empty.

Menu LED Red (Positioning Mode)
This mode allows you to align the robot with the tower as well as to position the disc bins corresponding to the selected configuration.

To enter the Positioning Mode, hold the button depressed until the Menu LED turns red, and then release the button. Each subsequent click will cause one of the surrounding LEDs to turn orange, corresponding to the position to be aligned (either align Dexterix with respect to the tower's drives when the front-most LED is orange, or position one of the disc-bins when its corresponding LED is orange).

Aligning Dexterix With Respect to the Tower
This should be the first step performed, *before positioning the bins*.
Make sure the top of the tower and Dexterix' bottom are free of dust/foreign particles. Place Dexterix evenly on the top of the tower, with the arm aligned with the center front of the drive tower.
Eject a drive tray using the drive's eject button and place a regular disc into the open tray.

With the Menu LED set to red (Positioning Mode), click the control button repeatedly until the front-most LED (representing the drive trays) turns orange.

After 4 seconds the robot will pick up the disc in the open drive tray and move it up and down continuously. As it does so, carefully slide Dexterix on the top of the tower, until the robot is positioned so that the disc is placed centrally into the drive tray. When correctly aligned, the disc lays down perfectly into the tray.
To confirm that the tower is vertically aligned, perform this alignment check on each drive by opening the drive tray one at a time and make sure that the disc is placed in the center of the open tray. Adjust the duplicator's verticality if necessary. Tip: when the drives are aligned and the tower is vertical, it would be enough to align the

robot with respect to the bottom-most drawer. However, make sure you check the disc placement in each tray before proceeding to the bins positioning.

This procedure takes at most five minutes, but it should be performed with special attention and care, since the subsequent accuracy of the disc placement depends on it.
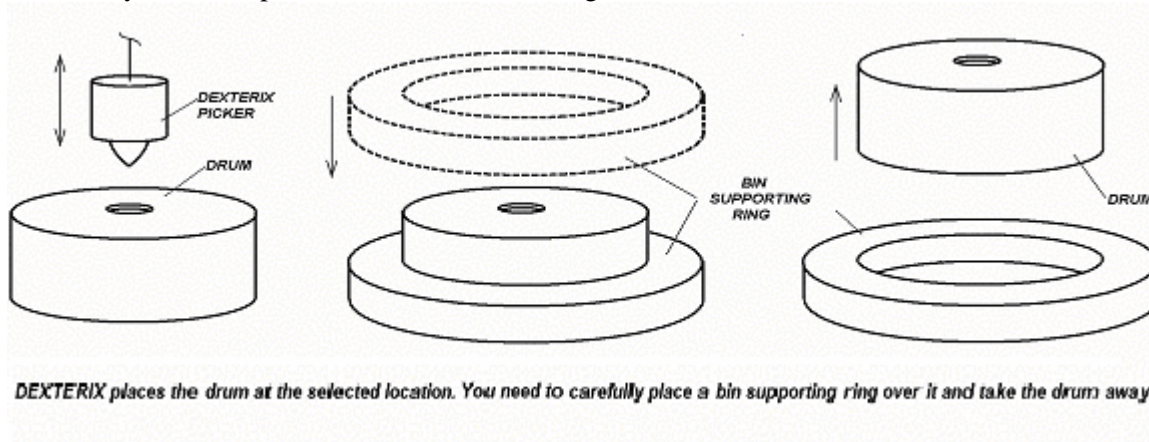
Placing the bins

This procedure should be performed *after aligning the robot with respect to the tower*.

Locate the positioning drum that is included with Dexterix and place the drum into an open drive tray.

With the Menu LED set to red (Positioning Mode), click the control button repeatedly until the LED that corresponds to the bin that you wish to align turns orange, then stop clicking.

Four seconds later, Dexterix will pick up the positioning drum from the tray, carry and precisely place it to the selected location on the tabletop and stop. You should then transfer a bin-supporting ring over the drum, take the drum away, and then place a disc bin over the ring.

DEXTERIX places the drum at the selected location. You need to carefully place a bin supporting ring over it and take the drum away

Note: It is important to not move the drum when placing the ring over it. Use both hands: reach one hand through the ring to hold the drum in place while pushing the ring down over the drum with the other hand. Subsequently hold the ring in place while lifting the drum away with the other hand.

Once the ring set in place, put the disc bin over it: Lay the bin on to the ring as shown in the pictures and then gently slide the bin laterally until it clicks in place over the ring underneath. The bin weight helps keeping the ring in place.

Remember to place a foam spacer disc (included) inside every disc bin.

Repeat this procedure until each bin of the selected configuration is positioned correctly.

The whole bin-positioning procedure takes at most three minutes.

Note: When loading or unloading the disc bins, care should be taken to not move the positioning rings. If for any reason a positioning ring is moved, simply re-position that particular ring by repeating the procedure above for that

bin only. However, if the Dexterix relative position to the tower or the tower itself was moved, it may become necessary to reposition all the bins.

Tip for easy loading the disc bins
Prior to placing blank discs in the bins, the discs should be fanned while still on the spindle to ensure that none of the discs are stuck together. The easiest way to place blank media into the bins:
-place a stack of blank discs on a spindle with the recording side facing up. Leave room for one of the foam spacers provided, then put a spacer on the top of the stack on the spindle.
-cover the spindle with the bin ("cake box"), flip the assembly upside down and remove the spindle. The discs should then be in the bin with the recording side facing down

Congratulations! You successfully completed the Dexterix setup! The bins are on their places, the robot is aligned and ready to work!

Menu LED orange (Self Demo Mode)
When the Menu LED is orange, Dexterix will go into a self demo mode. In this mode the robot does not communicate with the tower but it continuously moves discs to and from the bins to an open drive tray in the tower. When performing the Self Demo Mode, a drive tray must be left open. To select this mode, keep the button depressed until the Menu LED turns orange, and then release it. About 5 seconds later, Dexterix will begin picking up discs from the first available blank disc bin, placing them into the open tray, picking them up from this same tray and moving them to the empty disc bin. When all discs have been completed, Dexterix will reverse the process and continue on indefinitely.
Note: Align the robot with the tower and place the bins before running the Self Demo Mode.

Menu LED off - No Light (Ready Mode)
When the Menu LED is off, Dexterix is in Ready Mode and awaits commands from the duplication tower. Configuration and positioning procedures must be completed before attempting to run any duplication task.

Starting a duplication job

1. Connect the communication cable from Dexterix to the RS232 connector on the back of the duplication tower.
2. Turn on power to Dexterix by connecting its power adaptor to an appropriate power outlet (use only the power adaptor supplied, otherwise the robot may be damaged and the warranty voided). The front-most LED on Dexterix will be solid green after power-on. Allow up to 20 seconds for the robot to perform its startup tests. Once the startup tests have completed, the LEDs indicating the default disc bins configuration will turn on (the last configuration Dexterix worked with). By default, the Menu LED turns green after power-on. This means Dexterix is in Configuration Mode, allowing the user to change the bin configuration if necessary.
3. Make sure that the Menu Led on Dexterix is green, and then turn ON the power for the duplication tower and wait till the duplicator controller performs its startup tests. As part of the Wytron controller startup, the tower will eject and retract each drive tray, one by one. Wait until the Wytron controller has reached its ready state.
4. Press and hold the control button on Dexterix until the Menu LED turns off (Ready Mode). This means Dexterix is ready to communicate with the tower and will change the discs as requested by the Wytron controller. Now you may start the automated duplication process.
5. Verify that the blank discs are in the bins and that the master content disc is on the top of the first bin to be accessed by the robot. This first bin to be accessed will be located next to the empty bin. When ready to proceed, press the Go button on the controller in the duplicator tower. The automatic duplication system will then load the master-content onto the hard disc drive and then proceed with the duplication of the blank discs. The discs from the first bin to be accessed will be placed into the empty bin after they are recorded. After the first bin is empty, this process continues, progressing from each bin to the next until all discs have been duplicated. In the event any discs are defective they will be placed in front of the duplicator, under the drive trays.

Startup short-form

1)-IF NOT ALREADY DONE, place the robot above the tower evenly, with the wires facing back
2)-connect the communication cord from Dexterix to the tower
3)-power up the robot (plug in the power adaptor) and wait until the front-most LED turns orange (5-15 seconds)
4)-turn on the duplication tower; wait until Ready
5)- IF NEEDED, change the bin configuration (Menu LED green, click until the desired configuration reached; green marginal LEDs are for blank bins, the red LED is for the empty bin – that is where the first processed discs will be delivered)
6)- IF NOT ALREADY DONE, align the robot with the tower:
       -place a disc into an open tray
       -select the trays within Positioning Mode (press the button until Menu LED turns red, release it, then click until the front-most position selected)
       -align the robot; repeat for all the trays; adjust tower's verticality if necessary
7)- IF NOT ALREADY DONE, position the bins:
       -place the positioning drum into an open tray
       -select the desired bin to be positioned within Positioning Mode (press the button until Menu LED turns red, release it, and then click until the desired position selected). Within 5 seconds Dexterix will take and bring the drum to the selected location
       -carefully place the ring over the drum and take the drum away
       -place the disc bin over the ring (don't forget to put a disc spacer inside the bin, at the bottom)
       -repeat the previous steps for all the bins within the selected bin configuration
8)-turn the robot into Ready Mode (keep the button depressed until the Menu LED turns off)
9)-start the duplication process

Notes:

-When powering ON the duplication tower and during its startup, Dexterix Menu LED must be green. Make sure you put Dexterix in Ready mode (Menu LED off) before attempting to start duplication.
-Use only the power adaptor supplied! Otherwise the robot may be damaged and warranty voided.
-The non-slip pads of the positioning rings must be kept clean. Wipe them gently with a lint free wet tissue before placing them onto the tabletop. Don't use any detergent or solvents.
-The robot's case may be cleaned using mild detergents. Don't use abrasives or solvents.
-Dexterix is designed to run in a clean office-like environment, at room temperature. Extreme temperatures might prevent the robot from functioning properly. Keep Dexterix away from direct sunshine exposure. Dusty environment or lint might clog the disc-pickup device.
-Keep the disc-picker holding wire free of greasy substances. Attempts to bend the wire in sharp angles might incur permanent deformation and impair the robot.
-Never attempt to forcibly separate a disc from the picker. If such an action ever required, allow the picker to disengage the disc by itself: with the picker hanging free on its wire, gently bump its tip upwards from beneath.
-Clean both the top of the tower and the bottom of the robot before placing Dexterix on. Foreign particles under the robot could prevent Dexterix to fully adhere to the tower case, impairing the alignment.

Optional Accessories
- Alignment kit: leveling feet for the tower case and a micro twin-plumb, specifically adapted to check and adjust the trays vertical alignment easily
- Magnetic receptive sheeting: self adhesive, non-magnetized, rubber-based ferrous sheet that the magnets will stick to. Such sheeting must be laid on the top of the tower case, under Dexterix, when the case is made of aluminum or other non-ferrous material.
- Guides: once the robot aligned with the tower, these guides can be glued on the top of the tower, mating the recesses on the bottom of the robot. They allow the user to remove/re-attach the robot to the tower without having to perform the robot-tower aligning procedure each time

For latest news and further information about Dexterix, please visit www.dextimus.com

For software/dedicated application developers, Dexterix may be provided on demand with a set of commands allowing one to control (via RS232 interface) the transport of a disc between any 2 of the 9 possible locations. Two types of commands are provided: for picking up a disc from a certain location and respectively for delivering the disc to a certain location. After completing the operation required by each such a command, Dexterix answers back with an "ok" if successfully or respectively "not ok", if the operation failed. The controlling software should wait for and evaluate the answer, and then send the subsequent command accordingly.
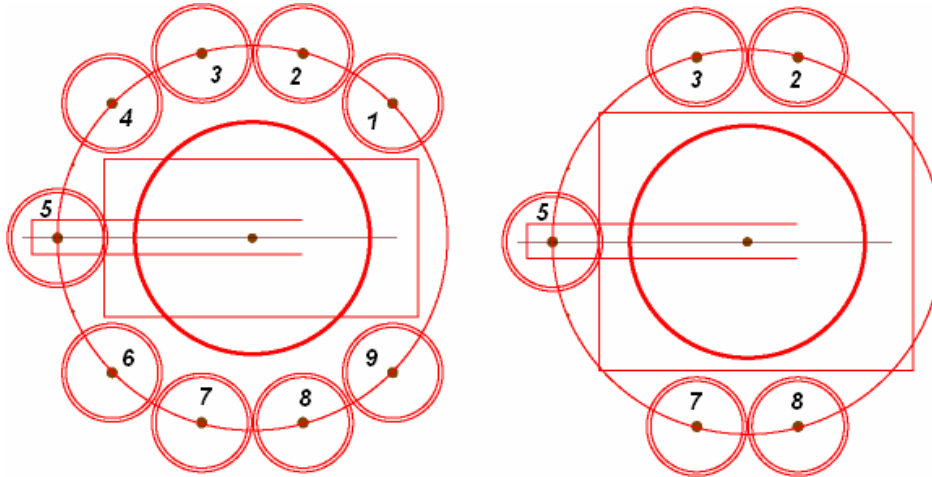
With the command set provided, each location may be either a disc bin or a processing unit tray.
When controlling Dexterix from such a customized application, if not all 8 possible bin locations are required the master equipment may be wider than a regular disc duplication tower case.
(The right side figure above shows an example where locations 1,4,6 and 9 are not used)
Please see the "Dexterix' Developer's sheet" for details about controlling the robot externally, for custom applications.