



**B I O** D O T

CM4000 Guillotine Cutting System  
User Guide



## CM4000 Guillotine Cutting System User Guide

This user guide should get you started using your CM4000 Guillotine Cutting System. It is therefore strongly recommended that it be read thoroughly before using the instrument. If you encounter a problem that is not addressed by this user guide or if you are missing any component of your order, please contact us at +1 949-440-3685 or email us at support@biodot.com.

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 UG-CM4000

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**BioDot, Inc**  
 17781 Sky Park Circle  
 Irvine, CA 92614  
 T: +1 949-440-3685  
 F: +1 949-440-3694  
 www.biodot.com

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# OVERVIEW

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## Safety Precautions

You should note the following safety precautions while working with the CM4000:

- **Avoid Spills:** Do not allow fluids to spill on top of the cutter body. Clean up spills on or around the unit immediately: soak up the spill with a lint-free sponge or cloth, and then carefully (adding solution to your cleaning cloth and not the spill area) clean the area with a 70% IPA solution to remove residue and aid in liquid evaporation.
- **Use Proper Power Cord:** To avoid fire hazard, use only the power cord supplied with the unit.
- **Avoid Electric Overload:** To avoid electric shock or fire hazard, do not run this machine on a circuit with a lesser amperage rating.
- **Ground the Machine:** This machine is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding connector must be connected to an approved earth grounded power source.
- **Do Not Operate Without Covers:** To avoid injury or electric shock, do not operate this machine with covers or panels removed.
- **Use Proper Fuse:** To avoid fire hazard, use only fuses that are of the type and rating specified for this machine.
- **Do Not Operate in Wet/Damp Conditions:** To avoid electrical shock, do not operate this machine in wet or damp environments.
- **Do Not Operate in an Explosive Atmosphere:** To avoid injury or fire hazard, do not operate this machine near combustible or explosive chemicals.
- **Do Not Operate Without Guard:** To avoid physical injury, keep all guards in place when operating.

## System Components

On the next few pages, you will find labeled images of the CM4000 system, which you should find useful to review and refer back to as you go through this guide.

## Introduction

The CM4000 is designed to cut lengths of material into strips for use in rapid diagnostic tests. It is a fully automatic card cutter with programmable cut length, which allows it to meet the specifications of each user. It has a hold down bar to ensure quality cut precision and blades that are easy to remove and clean without the need for calibration. Various blade angles are also available to optimize cuts.

## Requirements for Setup

You will need a flat surface that will support the system's weight and dimensions. Please refer to the following table for the CM4000's specifications. You will also need a power source and, if you purchased the anti-static option, a clean, dry, filtered air source.

Property	Specification
Weight	53 lbs
Dimensions	17" x 14" x 10" (l x h x d)

## Instructions for Unpacking

Your system will arrive in one large box, within which you will find the cutter instrument, a hand-held terminal (HHT), a power cord, and any optional components you ordered (for example, an anti-static unit).

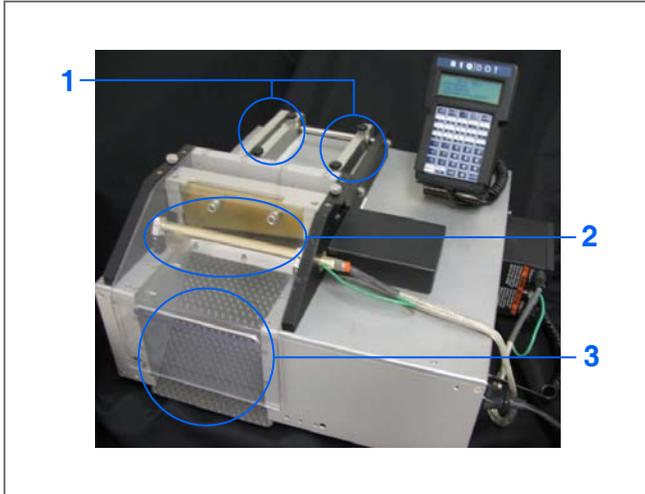
➤ **To unpack your system:**

1. Remove the cutter from the box.



When lifting the cutter from the box, lift it from the bottom. Lifting it by the blade roller housing, dust cover, or other external parts may misalign and damage the unit.

2. Place the cutter on a flat, level surface that will support its weight and size.
3. Remove the power cord, Hand Held Terminal, and other accessory components.



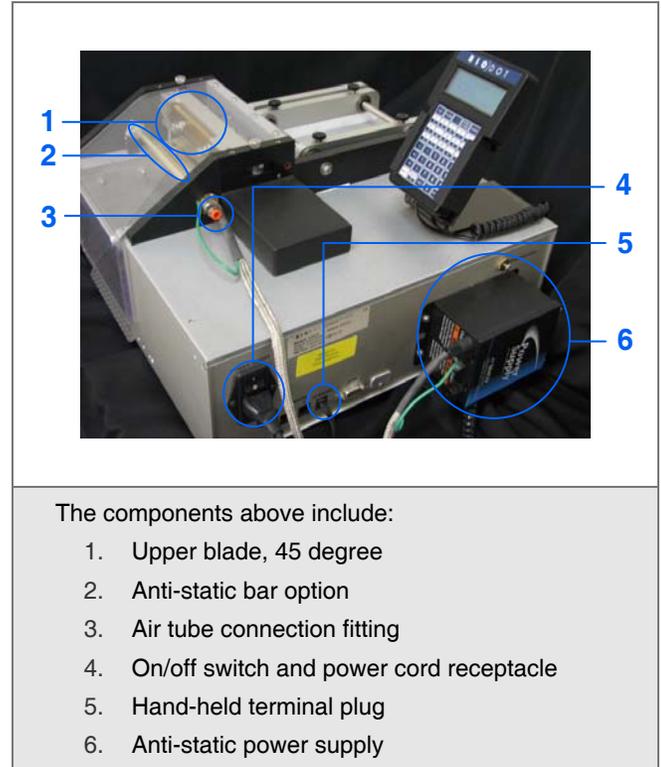
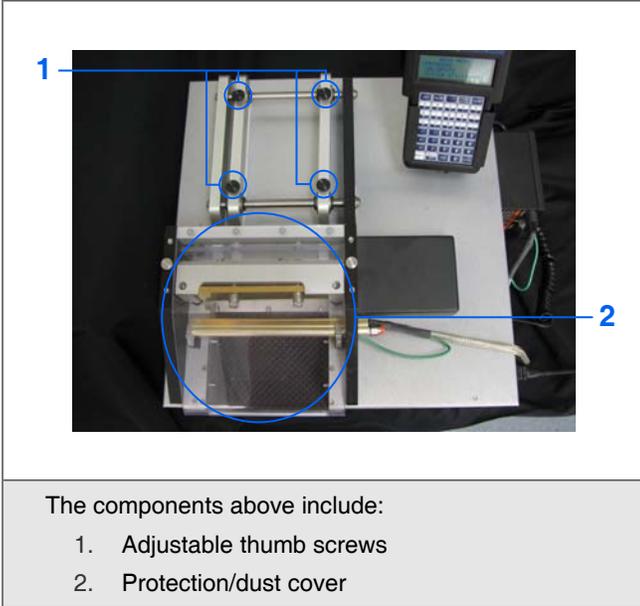
The components above include:

1. Material guide rails
2. Anti-static option
3. Material exit chute



The components above include:

1. Material guide
2. Speed control
3. Protection/dust cover



## INSTALLATION

### Setting up Your System

➤ To set up your system:

1. Verify that the main power switch, located on the back of the unit, is off.
2. Remove the button head screw from the gearbox breather hole in the rear panel.



Do not tip the cutter once this screw has been removed or the oil in the gearbox will spill.

3. Plug the supplied spiral cord (RJ11) in to the hand-held terminal. Connect the other end of the cable to the hand-held terminal plug on the side of the cutter (labeled "Terminal").



The ports labeled "Network 1, 2" are for factory use only.

4. Plug the power cord into a grounded power source. Plug the other end of the cable in to the power cord receptacle on the side of the cutter.
5. Turn the power on.



Make sure that the protection/dust cover is in the closed position. The instrument will not operate if it is open.

6. Press ENTER on your hand-held terminal to display the main menu.
7. Place the material (your "master" card) that you want to cut between the material guide rails.
8. Adjust the width of the guides as necessary using the guide thumbscrews.



Custom applications may have a stationary material guide system.

9. Adjust the upper roller so that the card can be presented to the drive rollers and indexed properly without loss of positioning or creating too much pressure across the strips. To do this, turn the thumb screws on either side of

the protection/dust cover—turn them clockwise to lift the roller and counter clockwise to lower it.

10. Use the left and right arrow keys on the hand-held terminal to rotate the rollers in order to move the material back and forth.
11. Feed material through the blades until it shows slightly beyond the front cutting surface of the lower blade.
12. Use the PARK/HOME key to toggle the blade position so that the material is trimmed flush with the lower blade. This ensures that the first piece of the cutting cycle is of the desired length. (If you have a leading edge sensor, this step isn't necessary.)
13. If the length of your cut material exceeds 4 inches, install the supplied material feed output station in front of the cutting blade. Also, select indexed cutting mode for cut lengths greater than 25 mm.

The CM4000 (standard configuration) is now ready to be programmed for a cutting job. If you purchased accessory components, continue with the next section for installation instructions. If you did not, you can skip to the section "Operation."

## Installation of Optional Components

This section provides a discussion on how to install accessory components, if you purchased them.

### Anti-Static Option

The anti-static option reduces static charge buildup and also assists in moving cut material down the exit chute. The anti-static bar is pre-assembled on your cutting module (if you purchased it). If you opt to connect the air line to aid in moving cut strips down the exit chute, that will require some assembly.

#### ➤ To activate the air on your anti-static option:

1. Attach one end of the supplied airline to the ¼" tubing fitting on the side of the anti-static bar (pictured to the left) on the top of the cutter.
2. Attach the other end of the airline to a source of compressed air. If a small compressor is used it should be capable of delivering a minimum of 1 SCFM air flow. Use an airflow control to adjust upward or downward to improve performance. If factory air is used instead, an airflow control will be required to limit flow.
3. Plug in the electrical connector on the air compressor to an electrical outlet.

- Turn the air compressor power switch to "on." To turn the compressor off, turn the switch to "off" or unplug the cable from the electrical outlet.



The anti-static option will be activated by the program as configured by your hand-held terminal. The anti-static option will turn off if the cutter cover is lifted or the cutter power switch is turned off.

## Leading Edge/Target Index Sensor Options

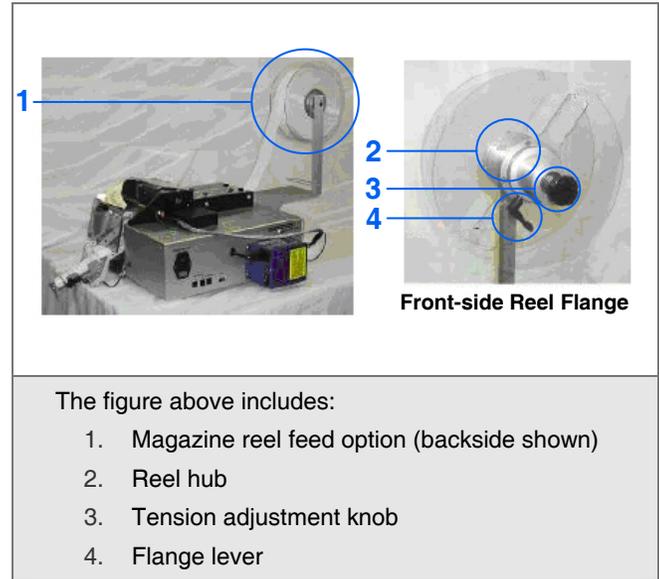
The leading edge sensor or target index sensor options on the CM4000 are factory pre-assembled on your equipment if you have ordered them. No assembly is required.

## Reel Feed Option

The reel feed option is pre-assembled on your cutting module if ordered.

### ➤ To place your roll material onto the magazine feed option:

- Take off the front side of the acrylic reel (front-side Reel Flange) by opening the black flange lever Insert and fit the roll material onto the inner hub of the acrylic reel.



- Re-install the side of the acrylic reel onto the reel-assembly.
- Tighten the reel by using the black flange lever and the tension adjustment knob.



The figure above shows the Strip Guide with Bottle Holder Option.

### Strip Guide with Bottle Holder Option

The strip guide with bottle holder option is factory pre-assembled on your equipment if you ordered it. No assembly is required.



The strip guide with bottle holder assembly is installed such that the system must be set up to allow the bottle holder to hang over the edge of a flat surface.

## OPERATION

### Operating Your Cutter Via Hand-Held Terminal

This section outlines the process by which you will operate your instrument via hand-held terminal (HHT), including an overview of the keys and interface and instructions for navigating the menu, running a program, and editing a program. In this section, you will need a measuring instrument with a metric scale and (practice) material to optimize the cut.

#### Introduction to the Hand-Held Terminal

The following is a list of the HHT keys and what they do:

- **Go:** Runs active programs.
- **Abort:** Terminates a running program.

- **Pause:** Pauses a running program and gives you the choice to either abort the program (by pressing ABORT) or continue it (by pressing Go).
- **Park/Home:** Used to alternately raise/lower the blade, which allows you to perform a cut manually. When the cutter is turned on, the blade will move to and rest in the raised position. Pressing the PARK/HOME key once will move the blade to the lowered position. Pressing it a second time will raise the blade.



The protection/dust cover must be in place for the park/home feature to work.

- **Up/Down:** Navigates the HHT menus.
- **Esc:** Takes you out of one screen to the previous screen.
- **Enter:** Selects a menu item or enters inputted data (to enter a typed value into a data field).
- **Numeric keys:** Used for data entry.



The figure above shows the hand-held terminal.

- **Left and Right Arrow Keys:** Allow you to “jog,” or manually move the material forward and backward on the cutter. The left arrow moves the material towards the back of the instrument, away from the blade. The right arrow moves the material towards the front of the instrument, past the blade.

## Navigating the Main Menu

The Main Menu is displayed when you power on your instrument. To scroll between sections use the keypad up and down arrows. To open a section, use the ENTER key. To exit a section or subsection use the Esc key.

Each menu consists of three elements:

- A menu title at the top of the screen
- One or more menu items (menu items may be edit fields, toggle fields, action functions, or submenu gateways)
- A menu selector ( > ) in the far left column of the screen (the selector points to the selected menu item)

The actions controlled in each of the main menu subsections are summarized as follows (please see Appendix A for more information):

- **Programs:** Used to create, edit, select (activate), and delete cutting programs.
- **Calibrate:** Used to calibrate the length of the cut. Also used to calibrate the edge sensor (if applicable).
- **System Utilities:** Used to configure optional components.

- **Configuration:** Used to configure the settings (speed, etc.).
- **Data Storage:** Used to group a set of Programs within a named folder. The second part of this section is used to Save Data. As programs are created and edited, scroll to this section and Enter to save changes. If the instrument is powered off before data is saved, all changes are lost.
- **System Info:** Displays information about your instrument.

## Blade Control

Blade speed control is available on standard (non-pneumatic) cutting modules only.

### ➤ To adjust the cutting rate:

- Turn the speed control clockwise to increase the cutting rate. Turn it counterclockwise to reduce the cutting rate.

### ➤ To review a sample program:

1. From the main menu, navigate to PROGRAMS, and then press ENTER.
2. Select a demo program by pressing ENTER to put a check next to it.

3. Press Esc to return to the main menu.
4. Navigate to the PROGRAM menu.
5. Navigate to the EDIT PROGRAM submenu.
6. Find the demo program you selected and open it by pressing ENTER.



You will not be editing the pattern at this time. The purpose of entering the demo program through the EDIT menu item is to review the program's parameters to acquaint yourself with how a program is written and what each value does to control the operation of the system.

## Running a Sample Program

### ➤ To start a cutting cycle:

1. From the main menu, navigate to the PROGRAMS submenu.
2. Navigate to the SELECT PROGRAM option.

3. Select a program to run and put a check next to it by pressing ENTER. (You should still have a program selected from the steps to review a sample program above).
4. Press Go.



To stop the program at any time, press ABORT.

## Calibrating the Cut Length

### ➤ To calibrate cut length:



The unit has been calibrated for 5mm cut lengths, unless otherwise specified.

1. Cut and measure a length of material by running a program.
2. On the HHT, select the CALIBRATE menu item.
3. On the CALIBRATE submenu, select LENGTH CALIBRATE.
4. Key in your desired length and press ENTER.

5. Key in the actual length and press ENTER.

For example, set the program cut length to 5 mm and cut two pieces. At the DESIRED LENGTH prompt enter 5 mm, measure the second piece and enter this value at the ACTUAL LENGTH prompt. Run the test again, and verify that the new cut piece is equal to the program “Length.”

6. Once the desired length is obtained, save the configuration data:
  - a. Return to the main menu (by pressing Esc).
  - b. Navigate to the DATA STORAGE submenu.
  - c. Select SAVE DATA.



If you purchased leading edge or target sensor options, refer to the reference manual for instructions on calibration.

### Creating a New Program

- To create a new program, first enter the name of the program:

1. Navigate to the PROGRAMS menu.

2. Select CREATE PROGRAM.
3. Type in a program name, and press ENTER.
4. Immediately save this name:
  - a. Press the ESC key to return to the main menu.
  - b. Navigate to the DATA STORAGE menu.
  - c. Select Save PROGS/CONFIG.

- Now make changes to the default parameters of the program:

1. Navigate to the PROGRAMS menu.
2. Select EDIT PROGRAM.
3. Select the program you just created and press ENTER.
4. Save the data you entered:
  - a. Press ESC to return to the main menu.
  - b. Navigate to the DATA STORAGE menu.
  - c. Select SAVE PROGS/CONFIG.

# MAINTENANCE

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## Overview

Maintenance of your CM4000 includes cleaning, preventative maintenance, and blade sharpening procedures. The maintenance schedule depends largely on your operating conditions and should be scheduled as needed.

### General Cleaning

Regular cleaning is the key to proper maintenance. Lint and surface contaminants will build up over time with consistent use, and unchecked buildup of these contaminants can be harmful to the unit. In addition to regular cleaning, maintenance of the CM4000 system should include

monitoring for component surface wear, development of burrs on the blade, and build-up of adhesives and other surface contaminants.

The following tasks should be performed as needed:

- Remove loose dust on the outside of the cutter with a damp, lint free cloth, and remove any hard to reach debris with a vacuum or pressurized air nozzle. You can

use a low percentage (up to 50%) isopropyl solution for more efficient cleaning.

- Remove adhesive buildup on the blades and rollers with a cotton swab and a solvent such as Acetone or alcohol.
- Clean the leading edge sensor (if your instrument has one) with a cotton swab saturated with isopropyl, and dry it by blowing it with clean, dry air.

### Blade Maintenance

After prolonged use, the cutter blades will start becoming dull. The number of cuts made, the speed of the cuts, and the nature of the material being cut influences how fast the blades become dull. Abnormal or accelerated wear may be a symptom of incorrect blade adjustment.

The procedures in this section explain how to replace cutter blades, which includes:

- Removal
- Replacement and installation
- Alignment
- Sharpening

The procedures are for a direct replacement of a blade set, but there are also guidelines for sharpening old blades. If you are changing to another degree of blade (45° to a 75°) you will need to readjust the jam and alignment setscrews in the blade alignment section.

Contact us if you need further assistance or parts.



A skilled technician should perform the following procedure. Physical injury could occur if great care is not taken.



**BLADE HAZARD:** Keep hands clear while operating. Lock out power before servicing. Do not reach around guards.

## Blade Removal

### ➤ To remove the cutter blades:

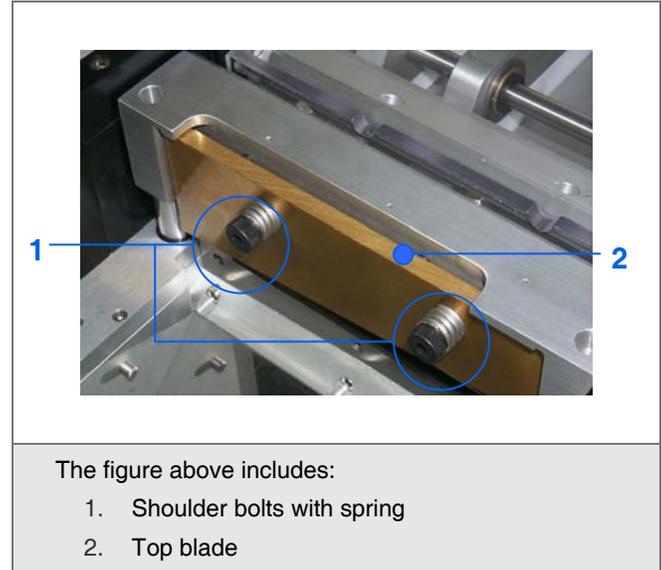
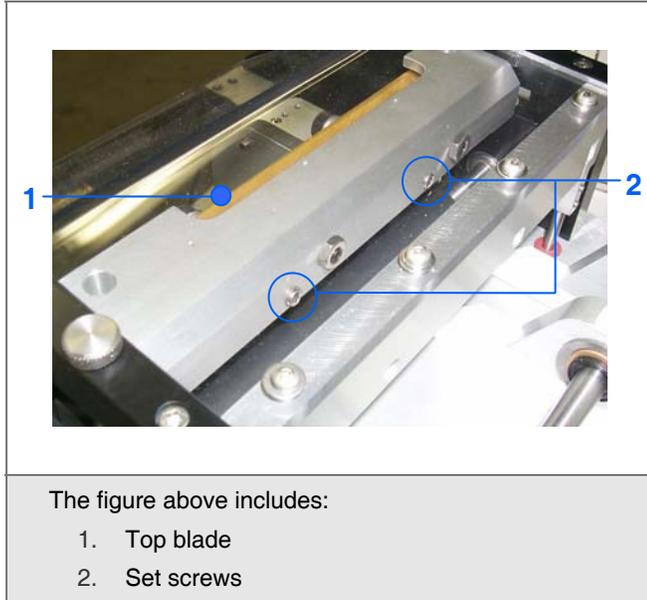
1. Press the PARK / HOME key on the HHT to put the blade in the up position.
2. Turn off the unit.

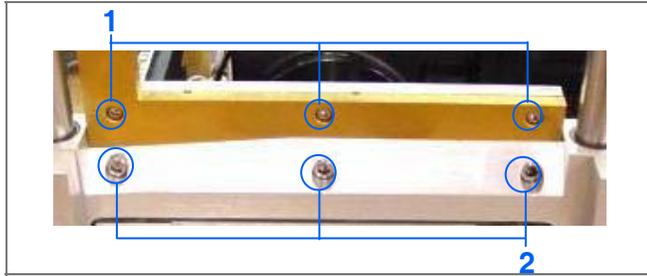
3. Disconnect the power cord and raise the protective cover.
4. Remove the upper blade assembly by first removing the two screws holding the upper blade assembly to the two vertical stainless steel rods. Lift the assembly off.



The upper blade is sharp. Be careful handling all cutter blades.

5. Loosen and remove the two shoulder bolts and springs. Remove the upper blade and retain the hardware.
6. Loosen and remove the three 8-32 lower screws holding the lower blade assembly in place and retain the hardware. Lift the lower blade assembly out.





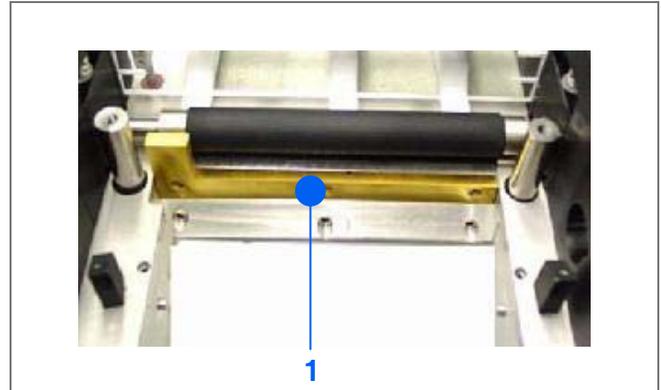
The figure above includes:

1. 4-40 screws
2. 8-32 screws

7. Once you have removed the lower blade assembly, notice that the top of the card guide bar on the rear of the lower blade is flush or just a little above the top of the lower blade.
8. Remove the remaining three screws and remove the card guide bar.



If your cutter has the optional edge detection, you will need to loosen three 4-40 screws on the lower blade for the card guide bar assembly before lifting the assembly out.



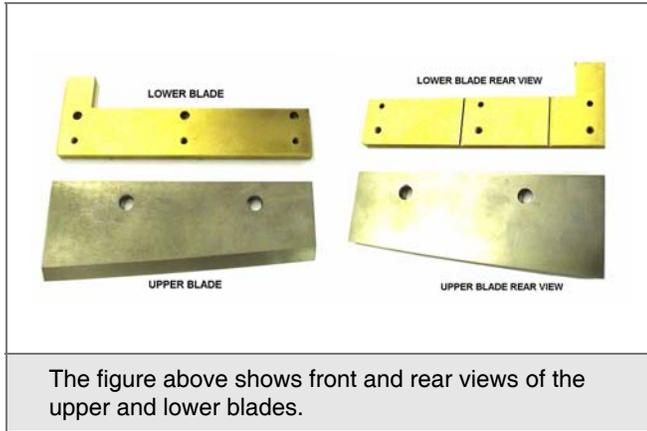
The figure above includes:

1. Edge detection

### Blade Replacement and Installation

➤ To replace and install cutter blades:

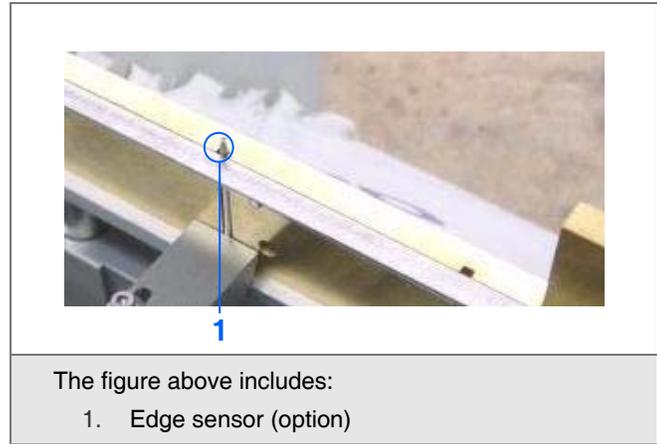
1. Acquire the new upper and lower blades. These blades have different angles and features so be sure you are installing the correct revision.



The figure above shows front and rear views of the upper and lower blades.

 These blades are very sharp, handle with extreme care. Physical injury can occur.

2. Start with the lower blade:
  - a. Attach the card guide bar to the lower blade with the retained hardware. Be sure that the card guide bar top surface is flush with the top of the lower blade or just above before tightening the three screws. If you have Edge Detection, leave the screws loose enough to slide the two pieces over the sensor



The figure above includes:

1. Edge sensor (option)

before tightening. The tip of the sensor should be even with or just a little lower than the tops of the card guide and lower blade.

 Do not damage the tip of the sensor.

- b. Insert the lower blade assembly into the lower blade assembly holder, and install the remaining three screws and tighten.

- c. Check your work to be sure all heights are correct and that all screws are tight.
3. Continue with the upper blade:
- a. Install upper blade holder on the stainless steel rods and press down. Install the two screws and tighten.
  - b. Press and hold the new upper blade firmly against the lower blade. Insert the two shoulder bolts with associated springs.
  - c. Tighten shoulder bolts until springs are compressed.
  - d. Back up the shoulder bolts  $\frac{1}{2}$  turn each, and tighten the jam setscrews on the back of the blade holder. If the setscrews on the rear of the blade holder have not been moved, then just tighten the shoulder bolts and springs without backing off the  $\frac{1}{2}$  turn.
  - e. Check your work.
  - f. Close the guard, power up the unit, and set the speed to low.
  - g. Try cutting a card. If your cut is clean and straight continue with your previous settings. If your cut is frayed then you will need to readjust the alignment of your blades, as discussed in the next section.

## Blade Alignment

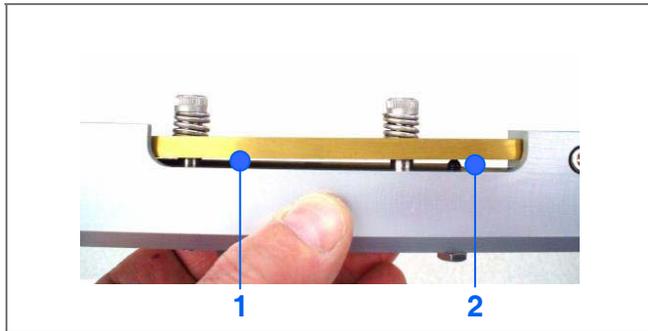
Keeping the blades in the proper position relative to each other will lengthen the life of the blades. You should adhere to the blade setting procedure in this section every time you remove the blades. Pay close attention to steps 8 and 9. Blades with compound angles of more than  $45^\circ$  will use a  $\frac{1}{4}$  turn instead of a  $\frac{1}{2}$  turn.



All clockwise and counter-clockwise references are performed facing the blade assembly. If you are only changing the upper blade, it may not be necessary to loosen or adjust any of the setscrews unless you are changing to a blade with a different degree. Simply remove the shoulder bolts and springs and replace the blade, and then reinstall the shoulder bolts and springs and tighten. Make a test cut. If the cut is ragged then follow the procedure in this section to realign the blades.



Blades are very sharp. Use great care in handling cutter blades.



The figure above includes:

1. .094" height
2. .118" height

➤ To align the cutter blades:

1. Press the PARK / HOME key on the HHT to set the blade at its down position.
2. Turn off the power.
3. Raise the protective cover.
4. Press firmly against the upper blade and unscrew and remove the two shoulder bolts using a 5/32" Allen wrench. Remove the springs and retain.
5. Loosen and remove the jam nuts on the two pivot setscrews with a 3/8" end wrench. Back off the left and right hand setscrews with your fingers so that they are no longer in contact with the upper blade.
6. Either remove and replace the blade or proceed to the next step.
7. Place the blade back into position, if removed, and insert and tighten the shoulder bolts without the springs. This will allow the blade to be supported while allowing the user to more easily feel the adjustments made in the following steps.
8. Adjust the blade by pressing on the left hand face of the upper blade and holding it firmly against the lower blade. Turn the left-hand (facing the blade) pivot setscrew counter-clockwise until it just contacts the upper blade. Repeat the same process for the right-hand pivot setscrew.
9. Remove the shoulder screws and the blade.
10. Close the protective cover and turn on the power.
11. Press ENTER and then PARK / HOME to raise the blade.
12. Turn off the power.
13. Raise the protective cover.

14. With a marker, draw a line on the top of each setscrew.
15. Turn the left hand set screw  $\frac{1}{2}$  (for  $45^\circ$  or less blade angle; use  $\frac{1}{4}$  turn if greater than  $45^\circ$ ) counter-clockwise to extend it.
16. Turn the right hand setscrew  $\frac{1}{2}$  (for  $45^\circ$  or less blade angle; use  $\frac{1}{4}$  turn if greater than  $45^\circ$ ) clockwise to retract it.
17. Hold each setscrew and reinstall the jam nuts while holding the setscrew in place. Insert a  $\frac{3}{32}$ " Allen wrench into the back of one of the setscrews and tighten the nut with a  $\frac{3}{8}$ " end wrench. Repeat the process for the other setscrew.



The factory setting (standard  $45^\circ$  blade) for the left hand setscrew from the face of the aluminum top assembly to the end of the setscrew is .118". The right hand setscrew distance is .094". This dimension will change depending on blade angle. If calipers are available, this is a better way to set the upper blade assembly.

18. With a  $\frac{1}{8}$ " Allen wrench, loosen the jam setscrews a  $\frac{1}{4}$  turn (clockwise).

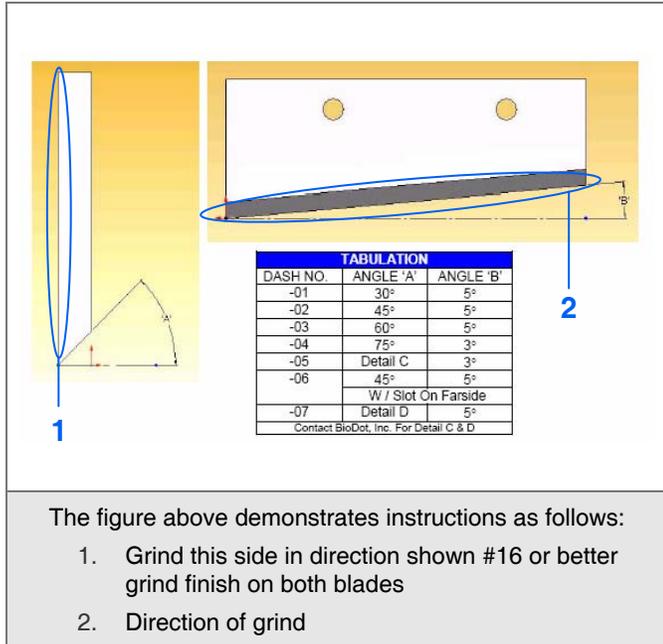
19. Place the springs back on to the shoulder bolts and install the blade. Compress the springs by screwing in each shoulder bolt until tight. Unscrew the bolts  $\frac{1}{2}$  turn, and then screw the jam setscrews in until they tighten against the shoulder bolts to secure the blade.
20. Close the protective cover, turn on the power, and press the ENTER key.
21. Cut a few strips to check your work. If the cut is nice and clean then proceed with your run. If the cut is ragged or is tearing, then you either need new blades or you need to readjust the upper blade. Return to step 9 and repeat the process until you achieve a clean cut.

### Blade Sharpening

Use the following for the repair and sharpening of your used blades. Wrap and store all reconditioned blades in a safe dry place.



We have many blade angles to choose from. Be sure to check your sales order to determine the correct angle for your upper blade to be ground to. The standard blade is  $45^\circ$ . The lower blade will be ground square to the face.



The figure above demonstrates instructions as follows:

1. Grind this side in direction shown #16 or better grind finish on both blades
2. Direction of grind

## Spare Parts

The following spare parts are considered consumables and may need to be replaced periodically. For pricing information, please contact BioDot customer service.

Part Description	Part Number
45 degree blade	6008-0021-02
Blade, shear with sensor groove	6008-0020-02

## Optional Components

Part Description	Part Number
Leading Edge Sensor	6008-A006
Target Sensor	6008-A010
Anti-Static Assembly	6008-A007
Reel Feed	6009-A004
Bottle Collection	6008-A026
45 deg Blade	6008-0021102
60 deg blade	6008-0021-03
Air Compressor	6035-A090/91

# TROUBLESHOOTING

## Problem

The unit does not power up (display not lit, no menu displayed).

The motor does not move when a cycle has been started, and a “BLADE TIMEOUT” error is signaled.

The blade moves, but a “BLADE TIMEOUT” error is signaled.

## Possible Solutions

- Ensure that power switch is in ON position.
- Ensure that the unit is plugged into an approved earth grounded power source.
- Check fuses; replace if necessary. Use 3AG 7A 313 SLO-BLO fuses BioDot part number 1017-0015.
- Check that the protective cover is closed.
- Check for obstructions in the cutter mechanism.
- **Non-pneumatic cutters:** The blade is moving too slow for the programmed blade time-out period. Increase the blade speed via the blade speed control and/or increase the value for the blade time-out (see section on creating a cutting program).



BLADE SPEED CONTROL

- **Pneumatic cutters:** Check that the compressed air supply is connected. Increase the airflow to the unit, should now set to about 80 PSIG.

# SPECIFICATIONS

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## Property

Power and Air Requirements

Dimensions

Accuracy

Weight (Excluding options)

Operating Speed

## Specifications

- 120/240 VAC, 50/60 Hz, 2A  
For pneumatic models and anti-static blower: air source of 80 PSIG (6.3 Kg/cm<sup>2</sup>): Must be clean, dry air at constant pressure.
- Width: 17 in (433 mm)
- Height: 10 in (254 mm)
- Depth: 10 in (254 mm)
- +/- .25 mm of cut length; or .05% of cut length (for cut lengths greater than 500 mm)
- 53 lbs
- Up to 240 cuts/minute

# APPENDIX A: HAND-HELD TERMINAL MENU STRUCTURE

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This appendix provides a reproduction of the tree structure (hierarchy) for the menus that you will navigate as you use your HHT to operate your instrument. The menu structure is hierarchical. Each level is represented differently, as follows:

➔ **THIS ARROW REPRESENTS THE OPTIONS DISPLAYED ON THE MAIN MENU (TOP LEVEL)**

⇨ THIS ARROW REPRESENTS THE SECONDARY LEVEL SUB MENUS.

⇒ THIS ARROW REPRESENTS THE TERTIARY LEVEL SUB MENUS.

➔ **PROGRAMS MENU**

This menu allows the selection, edit, creation, and deletion of programs used during the cutting cycle. The unit has been programmed at the factory with a TEST protocol. You can delete this TEST program after initially inspecting the unit.

⇨ SELECT PROGRAM

The SELECT PROGRAM menu allows you to switch between the programs that are currently stored in memory. The active program will be indicated with a check mark and will run when you press the Go key. To switch between programs, use the up and down arrows, and then press the ENTER key.

- ⇒ **EDIT PROGRAM**                      The **EDIT PROGRAM** menu allows you to work with the following menus:
- ⇒ **NAME:**                                      The name of the program (i.e., “Sample 1”).
  - ⇒ **LENGTH (MM):**                              The length of piece cut in millimeters.
  - ⇒ **PIECES:**                                      The total number of pieces to be cut.
  - ⇒ **BOTTLES:**                                      Optional field: The total number of bottles to be run.
  - ⇒ **SPEED (MM/S):**                              Material index speed between cuts (in millimeters per second).
  - ⇒ **ACC (MM/S<sup>2</sup>):**                              The acceleration of the rollers.
  - ⇒ **BLADE: CONTINUOUS / PAUSED**                      A toggle field that selects the blade mode. There are two choices:
    - **CONTINUOUS** for continuous blade cut mode.
    - **PAUSED** for paused blade cut mode. In **PAUSE** mode, the blade runs one cycle, waits for the indexing/material feed to complete, and repeats the process until the specified number of pieces has been reached.
  - ⇒ **EDGE: ENABLED / DISABLED**                      Optional field: A toggle field that selects the optional edge detector.

- ⇒ TARGET
 

Optional field: Selects the target index detector. There are two choices selected by pressing ENTER:

  - ENABLE activates the edge detector. If enabled the index length is set by detection of the target.
  - DISABLE turns the edge detector off. If disabled the length must be inserted by the operator
  
- ⇒ ANTI-STATIC
 

Optional field: If enabled, it turns the device on at the beginning of a run and off at the end.
  
- ⇒ REMOTE-GO
 

Optional field: If enabled, it waits for a high input (usually controlled by another device) or else no action is taken. When enabled the operator is not required to enter the number of pieces to be cut.
  
- ⇒ DANCER
 

Optional field: If enabled, the operation is paused until the dancer up sensor is on. A fault condition is true if either the dancer low sensor goes high or the dancer up sensor exceeds the dancer timeout value.
  
- ⇒ CHUTE FULL
 

Optional field: If enabled, this sensor is checked for a full condition. Upon full condition the equipment waits until condition is cleared before resuming.
  
- ⇒ BOTTLE
 

Optional field: If enabled, the machine expects a bottle to be present during each bottle fill cycle then replaced.

## ⇒ CREATE PROGRAM

This menu option allows you to create and name a program. You can name a program using the alphanumeric keys. Pressing the ENTER key saves the name.



You must save the program before turning the power off or it will be deleted. Refer to the section on DATA STORAGE.

## ⇒ DELETE PROGRAM

This menu option allows you to delete a selected program. The terminal will display a message confirming the option to delete program (see The Menu Hierarchy). Pressing, Go will delete the selected program. Pressing, ABORT allows you to cancel this option, causing the active menu to be displayed.

## ➔ CALIBRATE PROGRAM MENU

Use this menu to make fine adjustments to the material cut length. In addition, if an optional edge or target sensor has been installed, you will be able to calibrate and edit this option. For units equipped with the optional leading edge sensor or target sensor, the calibrate menu is also used to adjust the positioning of membrane for the first cut.



The unit has been calibrated for 5 mm cut lengths, unless otherwise specified. You must recalibrate for the cut length being cut and also, if applicable, the edge sensor or target sensor.

## Calibrating Cut Length

The stepper motor rotation-to-distance conversion factor may be adjusted if it appears as if the cut lengths are not correct. You must first cut and measure a length of material. Longer sample lengths are preferable as they help to reduce the effects of measurement errors. The screen will then display the following sequence:

“DESIRED LENGTH (mm)?”      Enter the value to match the programmed cut length.

“ACTUAL LENGTH (mm)?”      Enter the value to match the measured cut length.

For example, set the program cut LENGTH to 5 mm and cut 2 pieces. At the “DESIRED LENGTH?” prompt enter 5 mm, measure the second piece, and enter this value at the “ACTUAL LENGTH?” prompt. Run the test again, and verify that the new cut piece is equal to the program “LENGTH.”

If an adjustment is still necessary then repeat the previous steps. Once the desired length is obtained, the configuration data must be saved (refer to the section on the DATA STORAGE menu).

## Calibrating the Sensors

For units with the optional leading edge sensor or optional target sensor, one more menu item will appear in the CALIBRATE menu:

⇒ EDGE CALIBRATE

This menu item allows fine adjustments between the membrane sensor and the edge of the cut blade. This is used to modify and to check the positioning of the membrane to the edge of the cut blade.

➤ To calibrate the positioning of the membrane to the cut blade, perform the following steps:

1. Place the membrane between the capstan rollers so that the capstan will move the membrane.
2. Select Edge Calibrate from the Calibrate menu. The capstan should begin moving the membrane slowly toward the cut blade. When the membrane is over the membrane sensor (a small hole near the cut blade), the capstan will then pause. The following message will display: “ADJUST OFFSET (mm)?” Measure the distance that the material needs to move in order to reach the blade, and enter this value. A positive value will move the material forward, and a negative value will move the material backward.

Now, whenever EDGE CALIBRATE is selected the material will move toward the cut blade by the value that has been entered at this prompt. This process can be repeated as necessary.

3. When the membrane has stopped, it should be positioned right against the blade, ready for cutting. If the cutter does not position the material exactly perpendicular to the blade after calibration, measure this error and repeat step 2, correcting for the error in the Adjust Offset field.

For example, if after calibration the membrane is still overhanging the cut blade by 0.2 mm, then select EDGE CALIBRATE, and enter -0.2 when the “ADJUST OFFSET (mm)?” prompt is displayed. Then use the EDGE CALIBRATE menu item to recheck the calibration (and re-adjust the offset as necessary).

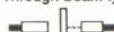
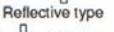
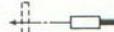
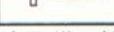
4. Once the final calibration has been set, use Save Progs/Config in the Data Storage menu (refer to the section on the Data Storage menu) to save the calibration permanently. The absolute value of the edge detector calibration is now listed in the Configuration menu, in the Edge field.

### Sensor Adjustment

To adjust the sensitivity of the sensors, follow the manufacturer’s procedure, shown in the following figure. Use an air gun or compressed air can to blow out the sensor holes located on the front panel. This is necessary to ensure the adjustment is accurate. Note that material that is thin or opaque may not be initially sensed.

## ADJUSTMENT

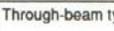
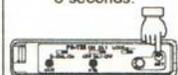
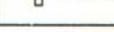
### Setting sensitivity

No.	Configuration	Indications	Procedure
1	Through-beam type  Reflective type 		With the target in place, press the SET pushbutton once. The yellow LED lights.
2	Through-beam type  Reflective type 		With the target removed, press the SET pushbutton. The yellow LED goes out and setting is complete. If the sensitivity cannot be set because the difference between the received light quantity in procedures (1) and (2) is too small, green LED flashes for approx. 2 seconds.
3	Through-beam type  Reflective type 		Check sensor operation.

Procedures (1) and (2) can be reversed to set the sensitivity.

### Setting the sensitivity to maximum

When a reflective sensor is used for long distance detection or a through-beam sensor is used for detection in an unstable environment, follow the procedure given below to set the sensitivity to maximum.

No.	Configuration	Indications	Procedure
1	Through-beam type  Reflective type 	Hold down for 3 seconds.    LED flashes.	With the target removed for a reflective sensor, or with the target in place for a through-beam sensor, hold the SET pushbutton down for 3 seconds. When the yellow LED lights and it begins to flash, setting is complete. When a reflective sensor is used for detection and there is a background object, set the sensitivity to the highest level possible where the background object will not be detected.
2	Through-beam type  Reflective type 		Check sensor operation.

## → SYSTEM UTILITIES MENU

This submenu allows you to inspect inputs or immediately affect outputs.

- ⇒ CAPSTAN                                      This submenu allows you to toggle the action of the capstan.
- ⇒ ANTI STATIC                                      This submenu allows you to toggle the action of the anti-static device.
- ⇒ SLITTER ON                                      Optional field: This is an action item that turns on the rotation of the lower slitting blade
- ⇒ SLITTER OFF                                      Optional field: This is an action item that turns off the rotation of the lower slitting blade
- ⇒ WATCH INPUTS                                      This item displays the state of all of the CPU inputs:
  - 0 = Inactive
  - 1 = Active
  - Press Esc to exit.

## → CONFIGURATION MENU

This menu contains information relevant to the various movement functions of the rollers. There are two types of fields under this menu: those that are specific to the active program (reflected data that was entered in the PROGRAM menu), and those that control cutter functions that occur before/after a program run commences.

- ⇒ SPEED (MM/SEC)                                      The indexing speed of the rollers in millimeters per second. Note that this is also the jog speed, the speed of manual backward or forward roller movement, and is controlled by the jog keys (left and right arrow keys).
- ⇒ ACC (MM/SEC<sup>2</sup>)                                      The acceleration of the rollers to the desired speed (mm/sec<sup>2</sup>).

- ⇒ **TIMEOUT (MSEC)**      The amount of time in milliseconds that a single cut cycle is allowed to take before a blade time-out is declared. A blade time-out helps prevent damage to the instrument (e.g., if material feeds incorrectly and blocks the cutting mechanism), and signals the user that there is something interfering with the cut cycle. When setting the value of the blade time-out, the blade-speed control should be taken into consideration.
- ⇒ **BACKUP (MM)**      The distance the material backs up after the blade has reached the down position (PARK) before it goes up (HOME).
- ⇒ **STRIP OUT (MM)**      Distance the material is indexed after program has completed the number of cuts desired.
- ⇒ **EDGE (MM)**      Optional field: Shown only on cutters with an edge sensor installed, this field changes automatically after the edge sensor is calibrated and shows the absolute value of the calibration (the distance the material must move past the sensor to be exactly perpendicular to the blade (refer to Calibrating the Sensors under the section on the CALIBRATE PROGRAM MENU).
- ⇒ **SLITTER (%)**      Optional field: The percentage of total output voltage to the optional inline slitter.
- ⇒ **DELAY (MSEC)**      Optional field: This delay is associated with the optional inline slitter. Once the Go button is pressed, the slitter is given the output voltage and the delay is executed before the cutter operation continues.

## ➔ DATA STORAGE MENU

This menu allows the storage and retrieval of data into and out of memory. All data that is entered into menu fields is stored in the cutters working memory, which is lost when power is removed. All data should therefore be transferred to non-volatile memory by saving, where it will remain until overwritten. Any changes made must be saved or they will be lost when the cutter power is removed.

⇒ SAVE PROGS/CONFIG

Activating this menu item saves the selected program and all cutter configurations to non-volatile memory. This information is automatically transferred to working memory upon power up. The display will inform you that the system is saving the programs and configurations (see Menu Hierarchy). It will then read “DONE,” and will revert back to the active menu. The information will not change upon turning the cutter off. Any information that was in the working memory is saved into this file.

⇒ LOAD PROGS/CONFIG

Activating this menu item will load all saved programs and cutter configurations. The display will inform you that the system is loading the programs and configuration (see Menu Hierarchy). Again, it will read “DONE,” and will revert back to the active menu.



The loaded file overwrites any information that was in working memory.

## ➔ SYSTEM INFO MENU

Most information that is considered a constant during the operation of the cutter is located under this menu. Number of pieces cut can be cleared from the “cut total.” The items in this menu are provided for reference purposes. All data items in this menu are classed as configuration data, excluding the cut total and the clear-cut total function. (Refer to the section on DATA STORAGE).

⇒ SERIAL #

The serial number of the cutting module CM4000.

⇒ FIRMWARE

The version number of the firmware.

⇒ BDLIB

The version number for the BioDot library.

