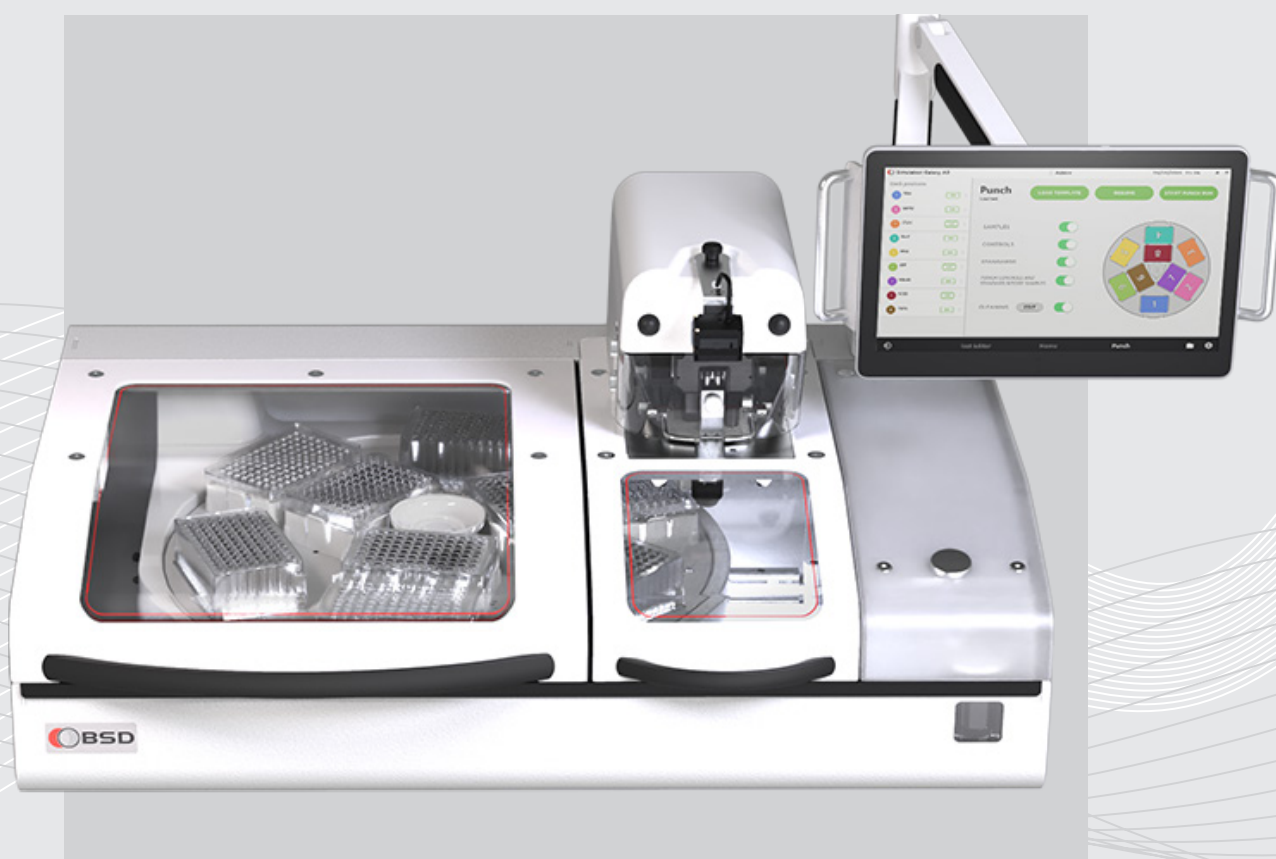


BSD GALAXY A9 USER MANUAL



Revision: C (for software version 2.0.0.0 and above)

Release Date: December 2021

Document Ref: DOC-0-0012

Please complete this section for future reference.

Model Number:

Serial Number:

Date of Purchase

Place of Purchase

Thank you for purchasing a BSD Biosample Punch Instrument. This product is intended for indoor use only. Please read the instructions carefully and follow all safety precautions when using the product.

MANUFACTURER DETAILS



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INTRODUCTION

The BSD Galaxy A9 is the fifth generation of BSD biosample punch instruments. They are computer-controlled, semi-automated punch instruments for use with industry-standard sample collection media. Dried blood, saliva, tissue samples collected on filter paper, or leaf samples, can be punched quickly, efficiently, and accurately into 96-well standard or deep well microtitre (or micro) plates (herein referred to as 'plates') or tubes. For the purposes of these guidelines, your BSD punch instrument will be referred to as a "Punch Instrument".

Intended Use Statement for BSD Punch instruments

All new users should become familiar with this manual before using the punch instrument. The factory has thoroughly tested the punch instrument prior to delivery and the punch instrument has been designed to minimize any risk to the safety of the end-user.

Please read **Section 3: Operational Conditions** and **Section 4: Safety Instructions** prior to installation and use of the punch instrument.

DISCLAIMER

BSD Robotics (hereby referred to as 'the manufacturer'), highly recommends that an authorized technician or field service agent install the BSD punch instrument on site. Please contact your distributor or manufacturer to locate an authorized field service agent in your region.

The manufacturer will not be held responsible for any damages caused to the instrument or for any inaccuracies in the results from the use of the punch instrument if installed incorrectly by non-authorized personnel. Please see full Terms and Conditions, Warranties and EULA for Software at the end of the manual.

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CHAPTER ONE

INSTALLATION & SAFETY

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1 SYMBOLS AND WARNINGS



BIOHAZARD

BIOHAZARD symbol indicates a potential safety risk to the person and wearing of personal protective equipment is recommended.



WARNING

WARNING symbol indicates potentially hazardous situation, if not avoided, could result in personal injury or damage to equipment.



CAUTION

CAUTION symbol indicates potential risk of injury or damage to equipment.



EARTH / GROUND

Connection to electrical safety ground.



NOTE

NOTE icon provides helpful hints and supplementary information.

2 SPECIFICATIONS

EQUIPMENT RATINGS

Input Supply:	100 - 240VAC; 50 - 60 Hz.
Input Current (max.):	4A at 115VAC, 2A at 230VAC
Internal Voltage:	24V DC
Pollution Degree:	2
Installation Category:	II
EMC:	Class A product

INPUT CONNECTIONS

Power supply:	4 pin DIN socket
Footswitch:	¼ in. stereo jack
Host port:	USB B socket
Touchscreen:	USB B socket
Earth cable:	Panel stud

OPERATIONAL CONDITIONS

Environment:	Indoor Use Only
Preventative Maintenance:	Recommended every 6 months.
Operating Temperature:	15°C -35°C (59°F - 95°F)
Humidity:	20% to 80% for punch size ≥ 3.2 mm; 35% to 80% for smaller punch sizes 1.0 to 3.0mm.
Maximum Continuous Use:	2.5 hours (before cooling period)
Length of Cooling Period:	15 minutes

PHYSICAL DIMENSIONS

Width x Depth x Height	575 x 855 x 215* mm (*height does not include hood 165 mm)
Weight	47 kg (103 lbs)
Package Weight	77 kg (170 lbs)
Package Dimension	990 x 730 x 720mm

SYSTEM REQUIREMENTS

Hardware:	Mini PC (ASUS PN60)
Operating System:	Microsoft Windows 10 pro 64 bit
Touchscreen	Touchscreen Monitor
Hard disk space:	500GB SSD (to allow Windows OS and file storage)
Memory:	Min. 8GB RAM

TRANSPORT AND STORAGE

Shipping temperature:	0°C - 40°C (32°F - 104°F)
Storage temperature:	10°C - 40°C (50°F - 104°F)
Humidity:	10% to 80% non-condensing
Storage:	Indoors in a dry, dust-free environment away from direct sunlight

REGULATORY COMPLIANCE

Safety

UL Certificate Number	
Test Standards	
Barcode scanner	IEC 60825-1 class 2, FDA CDRH class II

Electromagnetic Compatibility (EMC)

Test Standards	Europe (CE) EN 61326-1
	FCC part 15 B, FCC
This device complies with part 15 of the FCC rules. Operation is subject to the following to conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.	

Environmental

Management	ISO14001:2015
RoHS	Directive 2011/65/EU, Category 9
WEEE	Category 9

Export

HS Code	854370
---------	--------

3 SAFETY INSTRUCTIONS


The punch instrument has been designed in such a way that any risk to the safety of the user or technician is minimized. However, as with any working instrument, observe basic work-safe practices. Please read and fully understand the following safety instructions prior to installation and use of the instrument.

To prevent fire or shock hazard, the punch instrument must only be operated indoors within the Operational Conditions (as defined in Section 2).



CAUTION: Do not use the instrument to punch any material other than filter paper (unless otherwise approved by the manufacturer). The punching of any different material can significantly damage the punching unit.

3.1 PHYSICAL HAZARDS

Barcode Reader	Do not stare directly into the beam of the integrated barcode reader. Doing so could result in serious or permanent eye damage.
Moving Parts	The punch head moves when the punch instrument is turned on and during all operations. Ensure all covers are closed and fitted (including the clear punch guard) before operating the instrument to prevent the risk of injuries. Keep fingers away from punch head.
Dust Exposure	<div></div> <p>Follow your laboratory's safety protocol when handling and punching samples. Ensure care is taken so users do not inhale or come into direct contact with the accumulated paper dust as a result of punching by wearing personal protective equipment such as gloves, gowns, eye protection, laboratory coats, and masks.</p> <p>At the end of each punching run, any accumulated dust must be removed from the punch instrument and the punch head.</p>
Ionized Air	The ionizer system should only be enabled if the laboratory encounters increase static electricity. The ionizer pump can be turned off in the software settings. Breathing in ionized air may be irritating to the respiratory tract in indoor environments for some people. Avoid inhaling ionized air when opening the card platform cover, or let it dissipate with the cover open before any routine cleaning or inspection.
Lifting Hazard	When moving the punch instrument, it is recommended that two people lift it.

3.2 RISK PRECAUTIONS



A few risk factors have been identified below when using the punch instrument.

Biochemical Assays	Certain tests such as biochemical assays may be affected by ionized air. If that is the case, turn the ionizer pump off for that particular test. The ionizer pump can be turned off in the software settings.
Sample Cross Contamination	A programmable cleaning punch or set of cleaning punches between samples should be performed to prevent sample carry-over from the punch pin.
Removable Punch Head	<p>The punch instrument has a removable punch head. It can be removed easily for maintenance and cleaning.</p> <p>CAUTION: Do not tilt the punch head when removing as the punch pins may slide out. Always ensure that the punch mechanism is level before refitting the punch head.</p>
Vibration Noise	When both the air pump and ionizer pump are working, there is an audible noise from the vibration of the pumps. Either pump may be turned off to reduce the noise, as long as it does not affect the outcome of disk placement in the plates.
Transmission of Vibrations	Position the punch instrument on a separate table away from sensitive instruments such as PCR, ELISA, Autoanalysers.
Repetitive Strain	The instrument is designed for use sitting or standing. If table and chair height is not setup properly, the user may experience discomfort due to prolonged use in the same position. If using the tablet mounted on the instrument, the user should sit on a higher chair so that the screen is within reach.

3.3 CYBER SECURITY

Unauthorized network access may allow access to the software and tampering of saved test files and instrument configuration including export file formats.

The following measures should be implemented during installation and prior to use of the instrument:

1. Assign one or more secure login accounts for Windows access.
2. Provide network security to remove the potential for unauthorized access to the hard drive.
3. Assign a new user account and password for the BSD software immediately after installation.
4. Consider using the barcode pattern matching capabilities of the BSD software to check barcode formats.

4 INSTALLATION

4.1 INSTALLATION CHECKLIST

- ☐ Carefully unpack all equipment from the crate. Remove transit securing cables and padding.
- ☐ Remove protective film from card platform cover and from punch guard cover.
- ☐ Remove foam padding inside plate area.
- ☐ Cut plastic straps on chute unit used to restrain movement during transport (lift cover first).
- ☐ Prepare humidifier bottle.
- ☐ Place waste container in position.
- ☐ Install Touchscreen,

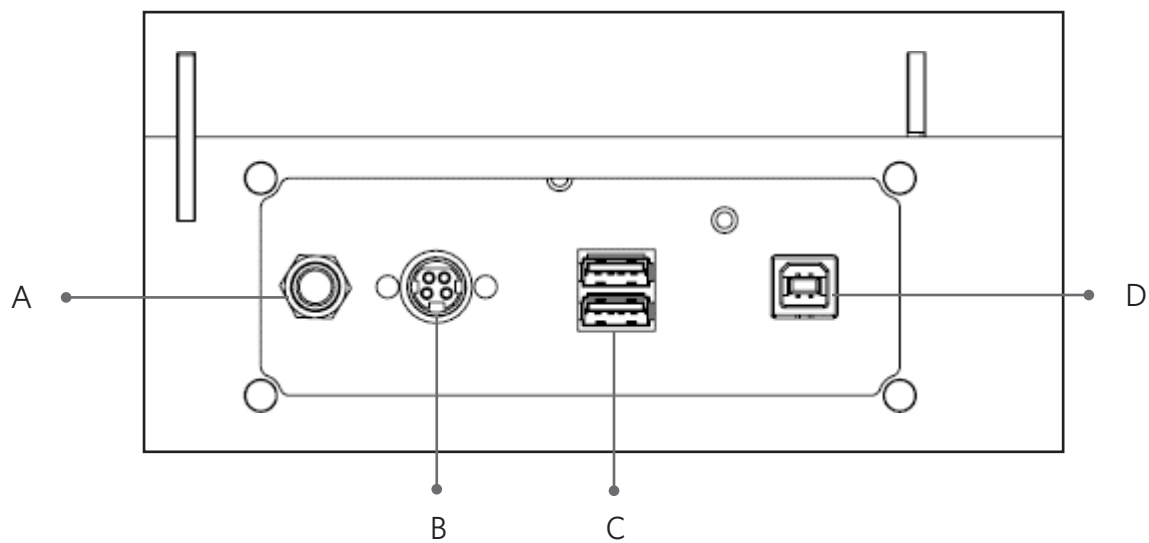


Note: A Microsoft Windows PC with Win 10 OS is required to install the BSD software.

4.2 ACCESSORIES CHECKLIST

- | | |
|---|---|
| <input type="checkbox"/> Software on USB flash drive | <input type="checkbox"/> Earth (grounding) cable |
| <input type="checkbox"/> Sample Barcode Reader, cable and bracket | <input type="checkbox"/> AC/DC Power Adapter and IEC Power Cord |
| <input type="checkbox"/> Footswitch | <input type="checkbox"/> Touchscreen, mini PC and mount, keyboard and mouse, USB network adapter and USB tablet charger cable |
| <input type="checkbox"/> Waste container | <input type="checkbox"/> User manual |
| <input type="checkbox"/> Vacuum pump | <input type="checkbox"/> Tray adaptor |
| <input type="checkbox"/> Certification and documents | <input type="checkbox"/> Service kit |
| <input type="checkbox"/> Chute cleaning brush | |
| <input type="checkbox"/> Water bottle (for humidifier bottle) | |

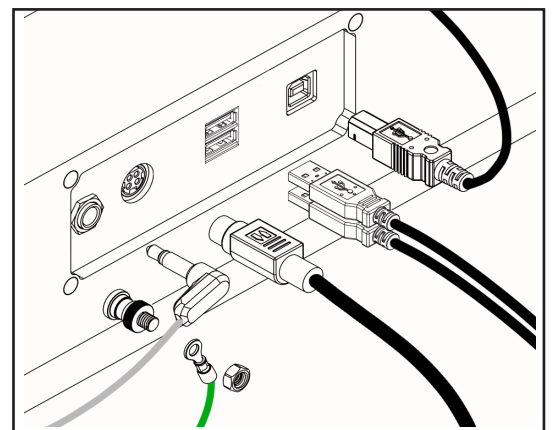
4.3 INPUT CONNECTIONS



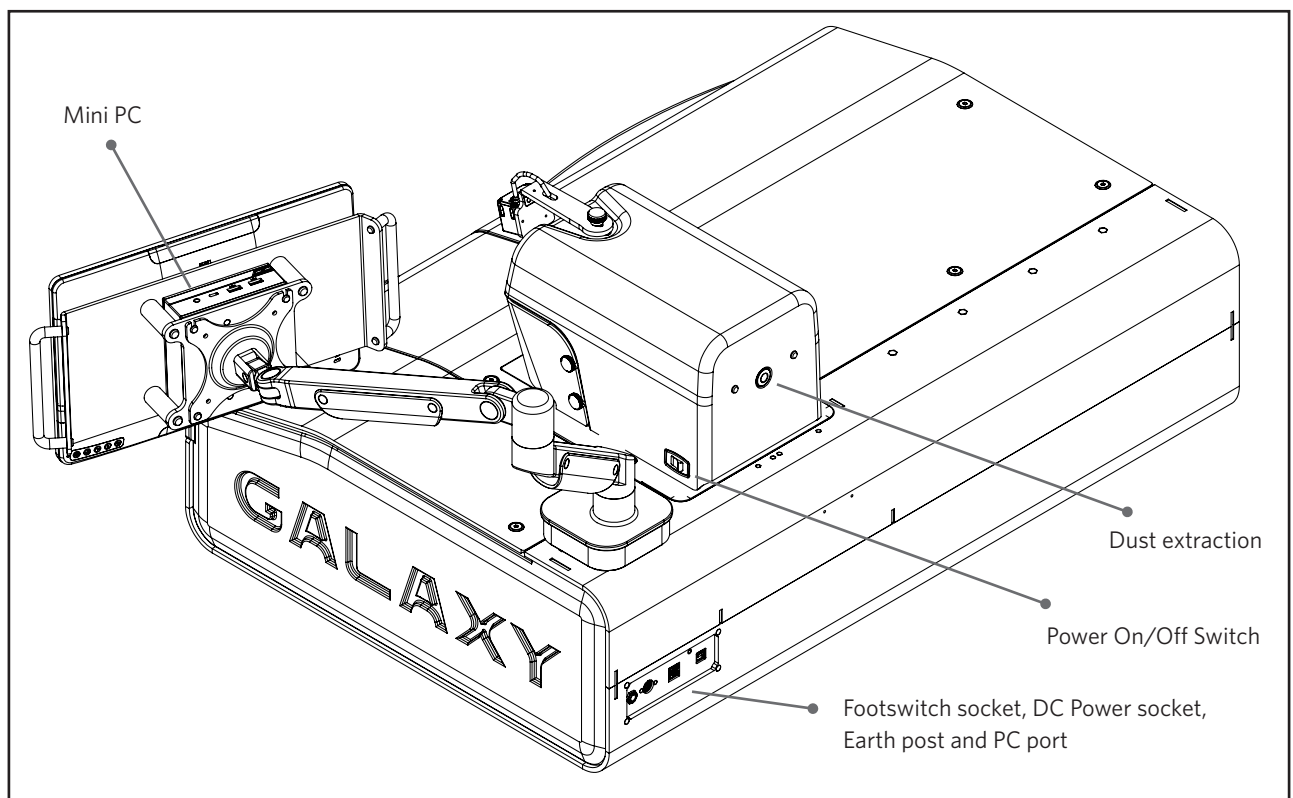
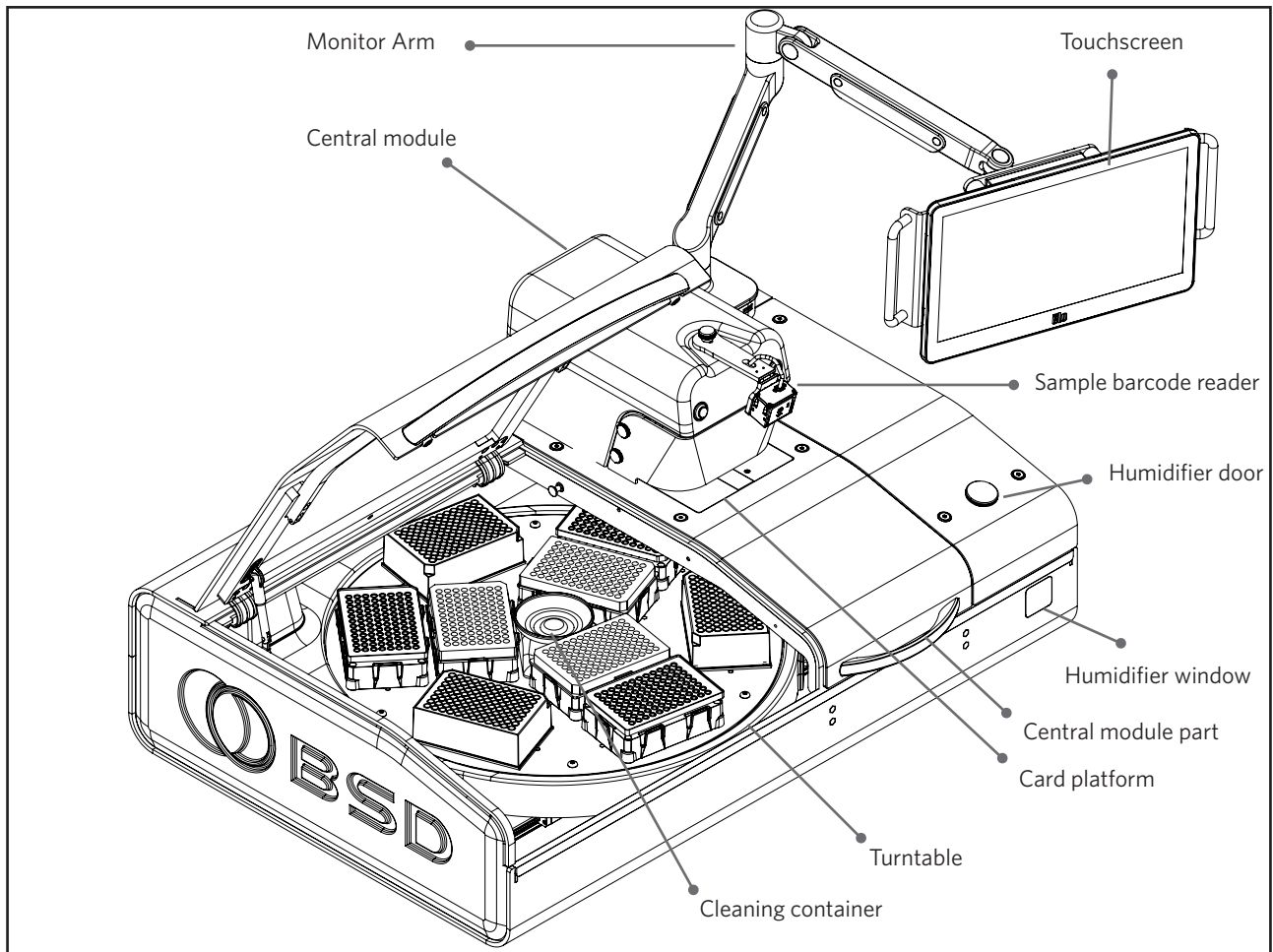
- A Footswitch
- B DC Power IN
- C USB A port
- D External PC port

How to attach earth cable to earth post

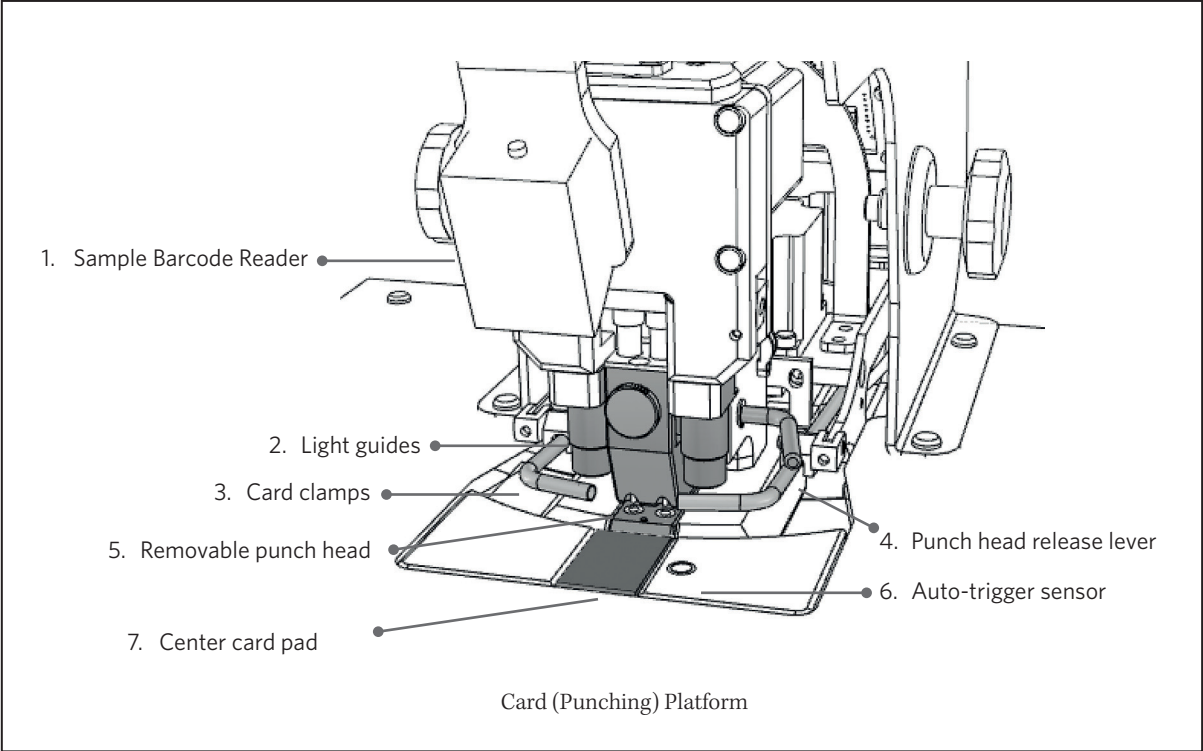
1. Unscrew the nut of earth post.
2. Placing the ring terminal end of the earth cable over the post.
3. Re-fit the nut over the post and tighten.
4. Plug the other end of the cable into the earth point at the power socket or use the adapter supplied.



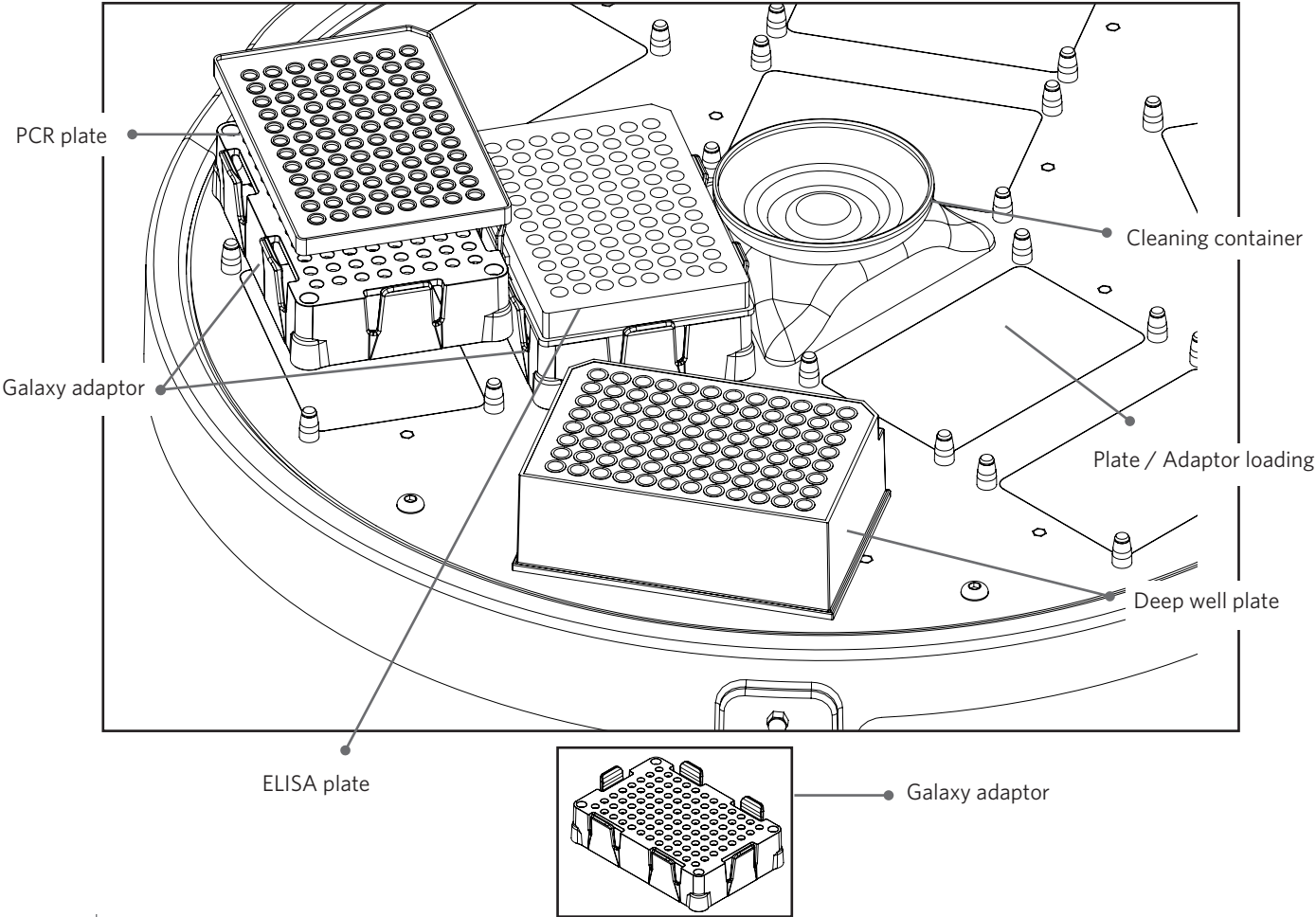
4.4 OVERVIEW OF PARTS



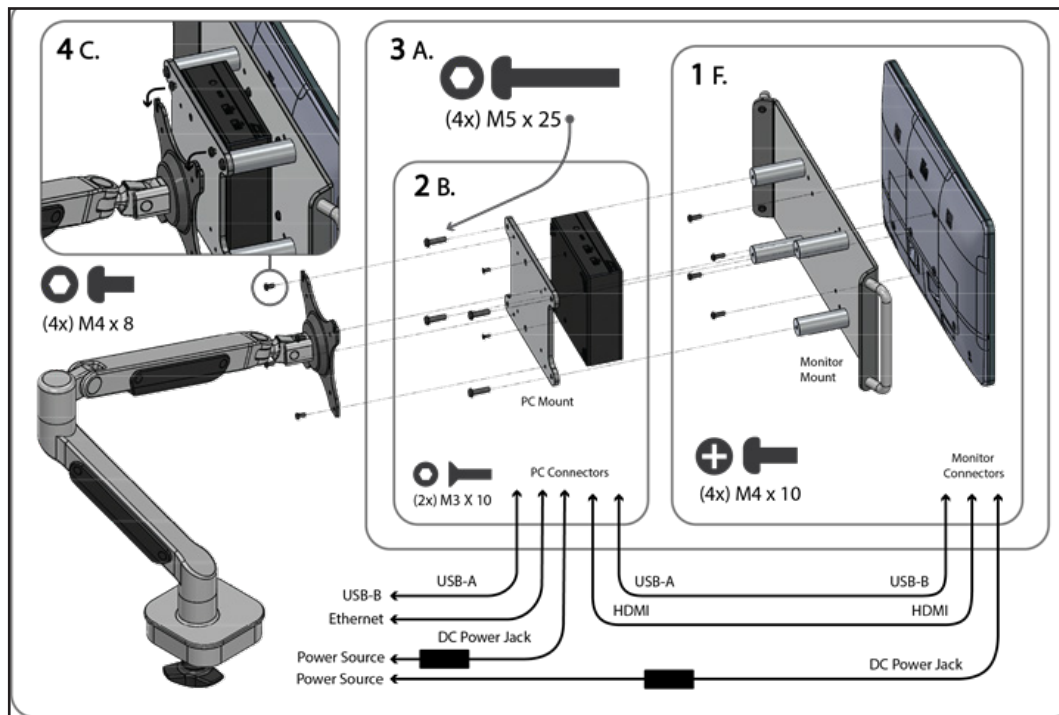
CARD PLATFORM VIEW



TURNTABLE VIEW



4.5 INSTALLING THE TOUCHSCREEN MOUNT, MINI PC & CABLE



Monitor Assembly

- A. Place the monitor screen side down on a flat surface with cardboard protective packaging still under the screen.
- B. Remove the monitor stand using a Phillips screwdriver to access the 100x100mm VESA mounting pattern.
- C. Remove cover panels on the monitor rear side to expose the connectors.
- D. Plug in the HDMI and USB-B to USB-A cable (both cables are 0.5 meter in length) with the USB-B side connected to the monitor.
- E. Connect the power adaptors DC output connector to the monitors input power jack.
- F. To attach the monitor mount to the monitor, screw M4 x 10 screws (4x) into the VESA 100x100mm mounting pattern using a Philip head screwdriver. (Refer to Diagram).

Mini PC Assembly

- A. Remove Mini PC from packaging box.
- B. Using M3 x 8 countersunk screws (2x) provided, screw into the threaded hole located under PC through the clearance hole on the PC mount. (Refer to Diagram)

Combining Assemblies

- A. Combine monitor assembly and mini-PC assembly by screwing M5 x 25 button head screws (4x) through the PC mount clearance holes and into the 4 pillars located on the monitor mount. Make sure to orient the PC correctly with the power button for the PC facing up. (Refer to Diagram)

Mounting Assembly to Monitor Arm

- A. Place the monitor screen side down on a flat surface with cardboard protective packaging still under the screen.
- B. Remove the monitor stand using a Phillips screwdriver to access the 100x100mm VESA mounting pattern.
- C. Remove cover panels on the monitor rear side to expose the connectors.
- D. Plug in the HDMI and USB-B to USB-A cable (both cables are 0.5 meter in length) with the USB-B side connected to the monitor.
- E. Connect the power adaptors DC output connector to the monitors input power jack.
- F. To attach the monitor mount to the monitor, screw M4 x 10 screws (4x) into the VESA 100x100mm mounting pattern using a Philip head screwdriver. (Refer to Diagram).

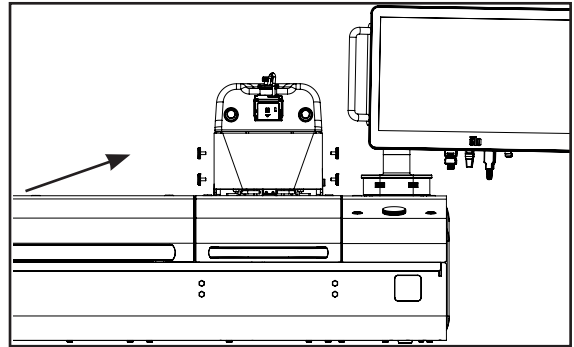
Connectors and Cable Management

- A. Place the monitor screen side down on a flat surface with cardboard protective packaging still under the screen.
- B. Remove the monitor stand using a Phillips screwdriver to access the 100x100mm VESA mounting pattern.
- C. Remove cover panels on the monitor rear side to expose the connectors.
- D. Plug in the HDMI and USB-B to USB-A cable (both cables are 0.5 meter in length) with the USB-B side connected to the monitor.
- E. Connect the power adaptors DC output connector to the monitors input power jack.
- F. To attach the monitor mount to the monitor, screw M4 x 10 screws (4x) into the VESA 100x100mm mounting pattern using a Philip head screwdriver. (Refer to Diagram).

4.6 REMOVING THE PUNCH GUARD

The function of the transparent punch guard is to prevent finger and hand injuries. The punch guard may be removed for cleaning around the punch head or when there is a need to remove the punch head.

To remove the punch guard, loosen the large knobs on either side of the punch guard. Carefully remove the guard.



4.7 REMOVING THE PUNCH HEAD

To access the punch head (always with the instrument switched off), the user must first remove the punch guard.

1. Rotate the center card pad to rotate it to the lower position.
2. Turn release lever 180 degrees towards front.
3. Carefully lift out punch head.



Removing the punch head

To replace the punch head

1. Ensure the release lever is pointing forward (see No. 3 above) and carefully insert punch head into position.
2. With one hand pushing the punch head all the way in, use other hand to turn the lever clockwise to lock the punch head in position. Make sure lever is turned all the way back.
3. Rotate the center card pad back to original position.

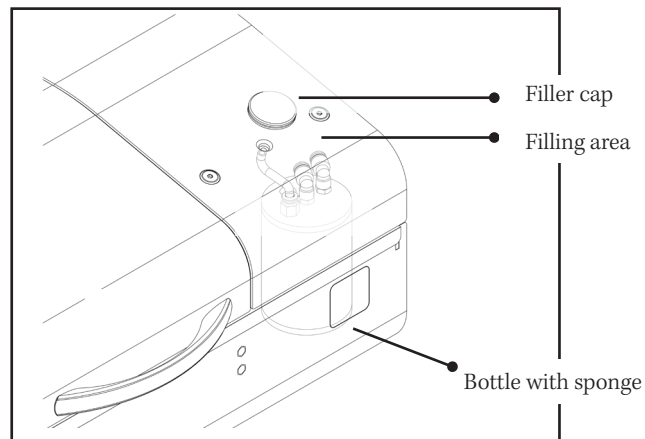
4.8 PREPARE HUMIDIFICATION SYSTEM

The air humidification system aims to minimize the effects of static electricity on punched sample disks.

The sponge in the humidifier bottle must be moistened for the system to work. It is recommended to check and top up water in the sponge regularly.

To moisten the sponge

1. Unscrew the filler cap on top of the lid (it is not attached to any tubing).
2. Fill the bottle with approx. **20ml** of distilled water only (sterile water for molecular testing). Use a pipette, syringe or supplied filler bottle.
3. Wait at least 5 minutes for sponge to fully absorb water. **Do not over fill!** (Max. 25ml)
4. Replace filler cap on the lid.



water bottle

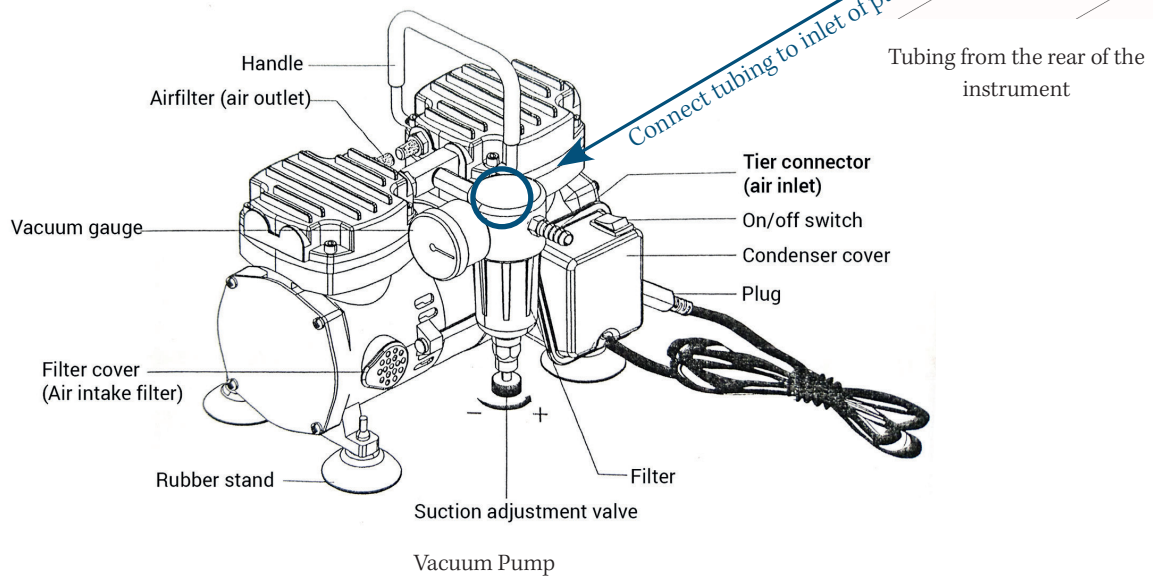


CAUTION: Do not turn on the punch instrument until water is absorbed by sponge.

4.9 DUST EXTRACTION SYSTEM

The BSD Galaxy A9 model is supplied with a dust extraction system. The system helps reduce buildup of filter paper dust created during the punching process. This system includes a vacuum pump with a removable filter. The filter is usually emptied at a preventative maintenance service.

Connect the tubing at the rear of the Puncher to the inlet of the vacuum pump. Switch the vacuum pump on during punch runs.



CHAPTER TWO

BSD STUDIO

SOFTWARE MANUAL

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5 QUICK START GUIDE

1 INSTALL SOFTWARE

Supplied mini PC > Software is installed and ready to use.

End-user/ New PC > If installing the software on an end-user supplied PC, ensure that it is running Windows 10. Run the **Setup.bat** file from the installation folder. Make sure all drivers are installed. Install software registry key (contact seller).


2 START THE PROGRAM

1. Switch on the punch instrument.
2. Double-click on the BSD Studio icon on desktop screen to start program.
3. Type in the username and password below (password is case sensitive)
4. Click OK.

Username	Password
Admin	admin

3 SET PUNCH SIZES

[Go to page 29](#)

1. Press **Settings icon** on the bottom toolbar. 
2. Use the + and - buttons to set left punch size and right punch size.
3. Press the **Close** button to save and close window.

4 SELECT A PROFILE

[Go to page 35](#)

1. On the Home screen, press **SELECT PROFILE** button.
2. Choose a profile to match your BSD instrument model.
3. Press **SELECT**.
4. Select **PROFILE EDITOR** button from the Home screen.
5. In **Hardware settings menu**, select Instrument and Barcode scanner connections.
6. In **Barcode settings menu**, tick to enable scanning of barcodes.
7. Press **Save** before exiting profile editor.

5 CREATE A TEST

Go to page 51

1. Press **Test Editor** button on the bottom toolbar.
2. **Add** > Enter a test name > **Save**.
3. Select the newly created test name from the thumbnails to view platemap.
4. Look through default settings and make any changes.
5. Press **Exit** to save and close window.

6 LOAD A TEST

Go to page 61

1. On the bottom toolbar, select **Punch**.
2. In the left column under **Deck positions**, press **1 Empty** to bring up test selection.
3. Load a test from the drop-down menu.
4. Press the **Close** button to save and close window.
5. Press the green **START PUNCH RUN** button.

7 START PUNCH

Go to page 64

1. Load a test (see Step 6 above).
2. Press **START PUNCH RUN** button.
3. Follow instructions to insert plates into correct positions (if not placed already).
4. Use footswitch or press the **Punch** button to punch a disk into each well.
5. Continue punching until the end of the plate, or end the punch run early by pressing **End Punch** button.

6 SOFTWARE INSTALLATION

6.1 NEW PC INSTALLATION

1. The BSD Studio software must be installed by a windows administrator.
2. Double-click to run the **BSD Setup.bat** file from the installation folder.
3. Follow instructions to insert plates into correct positions (if not placed already).
4. Use footswitch or press the **Punch** button to punch a disk into each well.
5. Continue punching until the end of the plate, or end the punch run early by pressing **End Punch** button.

6.2 BACKUP AND UPGRADING SOFTWARE

1 Backup test files and log files

It is recommended to back up any existing log files, platemaps and images before re-installing the BSD studio software. These files are located in C:\BSD folder by default.

To backup saved test, go to C:\ProgramData\Bsd\Bsd Studio\Plate Filling Sequences and copy that folder to a safe location. For older version (C:\ProgramData\Bsd\Resources\Plate Filling Sequences).

If ProgramData folder is not visible, go to Windows Explorer top toolbar > View Tab > check the box against *File name extensions* and *Hidden items* to display them.

2 Uninstall previous version of BSD Studio

1. Click on the Windows icon on the bottom corner of your desktop.
2. Click on the Settings icon.
3. Find the Apps menu, then scroll down until you find BSD Studio in the list.
4. Click on the app and Uninstall.

3 Delete old program files

After uninstalling the program, the remaining program files on the local drive should be deleted to prevent any conflict with the newer installation.

Locate and delete thesetwo folders:

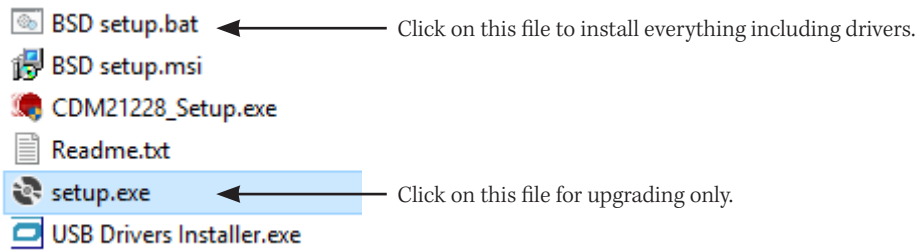
C:\BSD

C:\ProgramData\Bsd

Please be careful not to delete any other programs from your system.

4 Install latest version of BSD Studio

- Obtain the latest software package from BSD Robotics or from your local distributor.
- Double-click and run **setup.exe** to start the installation. (All the drivers and registry key should have been installed already from the previous installation.)
- If this is a fresh installation on a new computer, please run the BSD setup.bat file instead.



5 Start the program

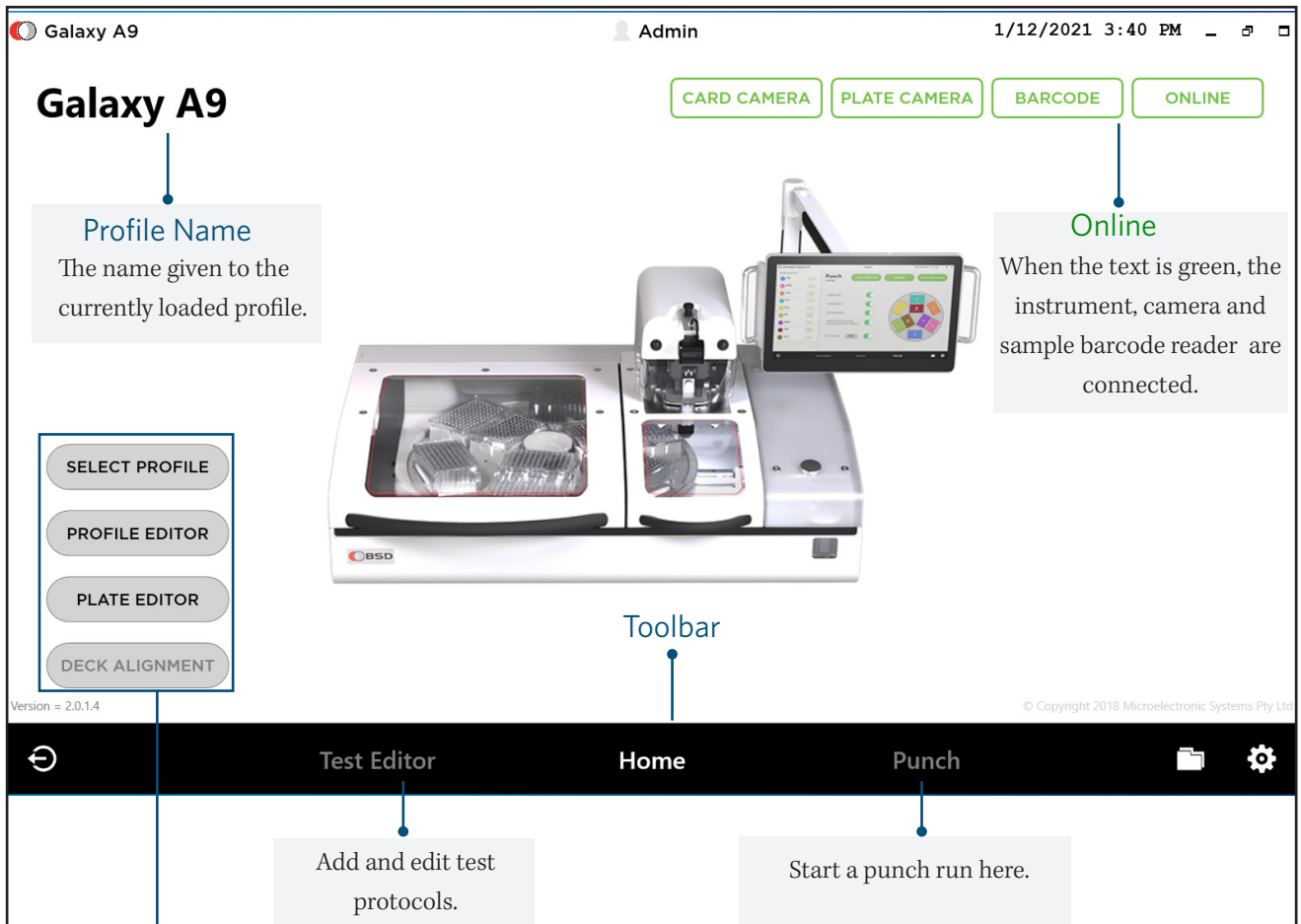
Start the program and login with:

Username: **Admin**

Password: **admin** (password is case sensitive)

7 USER INTERFACE

7.1 HOME SCREEN



SELECT PROFILE

Use this option to quickly switch between existing profiles or simulation mode.

PROFILE EDITOR

Edit profile settings such as enabling barcode scanning, saving of images, output file location, output data fields, and instrument test functions..

PLATE EDITOR

Advance setup to edit plate templates for non-standard plate types.

7.2 THE TOOLBAR

The bottom toolbar provides quick access to the main sections of the software. Here you can easily switch between the Home screen, Test Editor and Punch screen. Also in the toolbar are shortcuts to administrator controls, punch instrument information and folder location to output files.



ADMINISTRATOR CONTROLS

Edit accounts	Edit or create new user accounts, assign access level, change passwords.
Edit access levels	Edit user access / permission levels.
Log console	Log console shows a history of user entry logs, punch run times, and barcode changes.
License Information	Provides instrument serial number, specific license key and expiry date. Once the expiry date is exceeded, the software is no longer able to communicate with the instrument.
About	Provides the version of BSD Studio software currently installed.
Log out	Log out of current user account.
Exit Application	Close and exit program.



SETTINGS

Shows profile name, model, instrument serial number, firmware revision.
Set left and right punch sizes. Toggle air pumps.



FILE EXPLORER

Opens Window Explorer to root folder location of output files, saved images and platemaps. Default location C:\BSD

7.3 SETTINGS

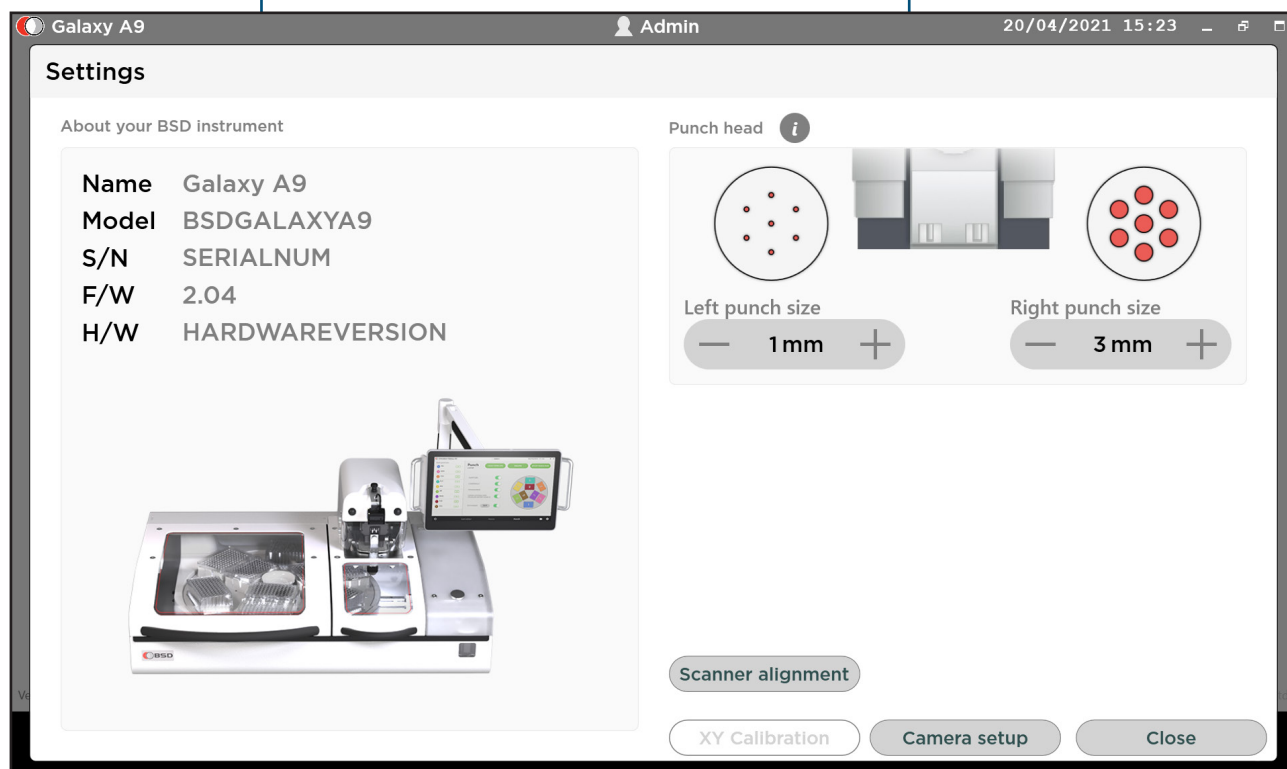
- Click on the gear icon on the toolbar to access the **Setting** screen. 

About your BSD instrument

- Profile Name
- BSD Model
- Serial Number
- Firmware Version
- Hardware Version

Punch Head

Set the left and right punch sizes. Use the + and - buttons to set the size. The punch size configuration must match the delivery document or purchase order. The example below is for a 1.0 and 3.0 mm punch head.

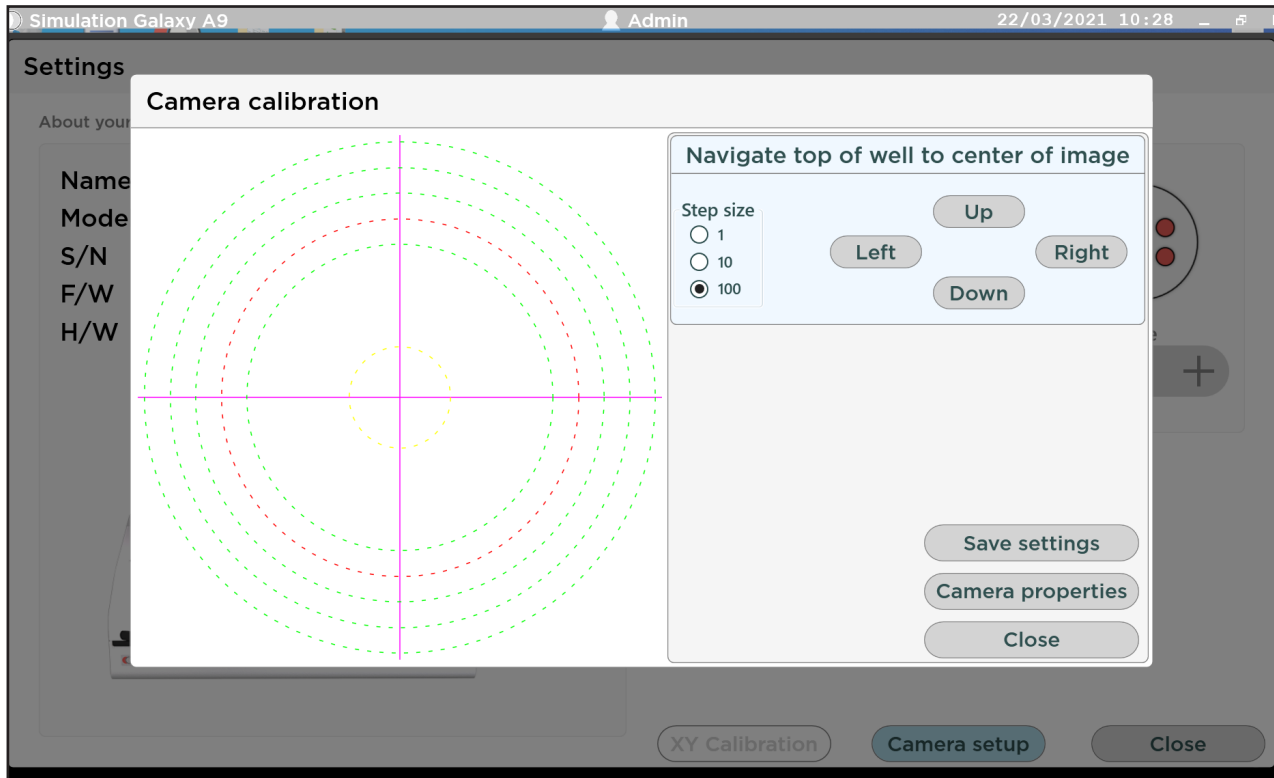


Camera Setup

The camera set up will calibrate the screen offset. Use the camera image on the screen to align the coloured circle to the border of the well A1.

Settings - Camera Setup

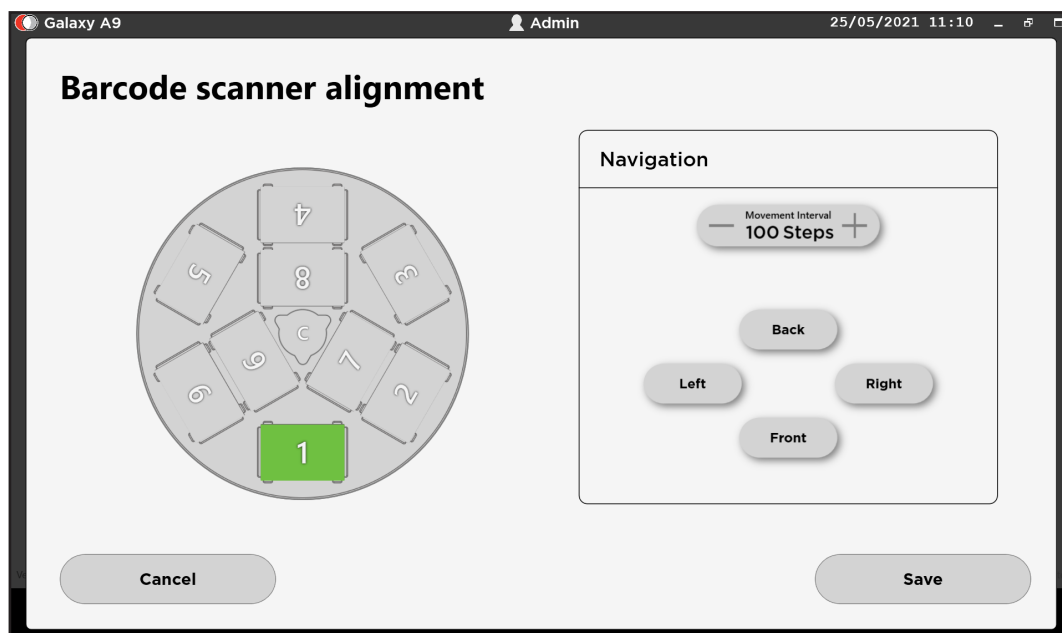
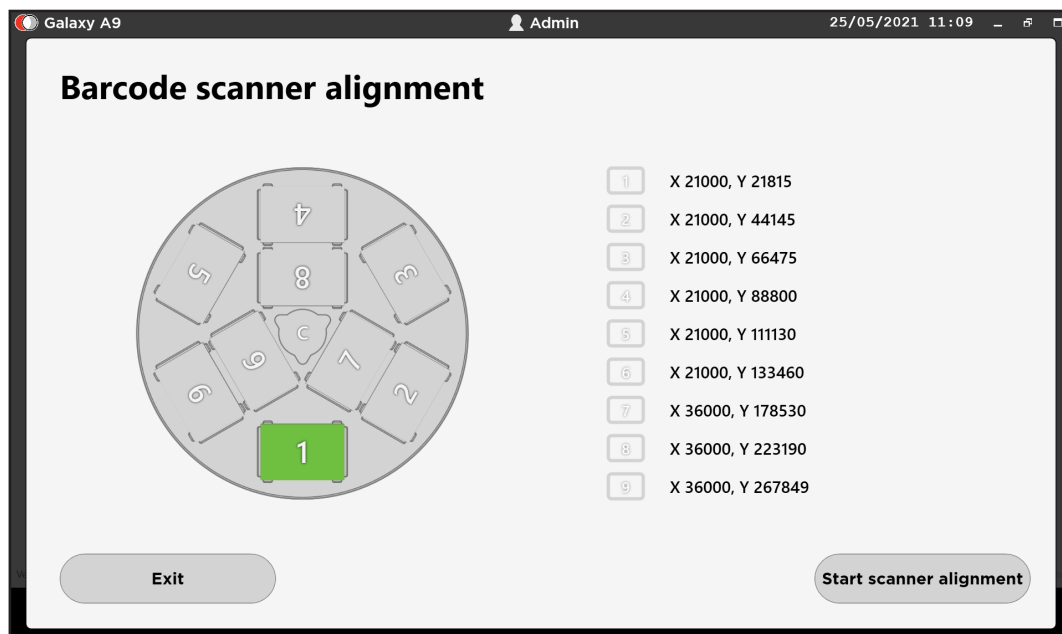
This function will calibrate the camera offset. Using the camera image on the screen to align the coloured circle to the border of the well A1.



1. Use the camera image on the screen, align the well A1 to to one of the coloured circle by using the Up/Down/ Left/ Right buttons.
2. Adjust the camera if required.
3. Press the save settings button once you are happy with the alignment.
4. Close.

Settings - Scanner Alignment

This function will align the internal plate barcode scanner to be able to adjust to the point which read the plate barcode. The correct location of plate barcode is explained in Appendix 4.



1. Select the plate that is subject to be aligned for the plate barcode scanner.
2. Select scanner alignment.
3. Align the plate with barcode reader by using the Up/Down/ Left/ Right buttons.
4. Save settings.
5. Close.


8 USER ACCOUNTS


8.1 CREATE NEW USER



The default password should be changed after first log in for security purposes.

To create a new user account or to change a password,

1. Select the left icon on the bottom toolbar. 
2. Select **Edit accounts**.
3. Add or edit user names and passwords as required.
4. Assign an access level from the drop-down list.
5. Press Done.

 BSD600 Ascent A2
 Admin

Add new user

USERNAME

PASSWORD

CONFIRM PASSWORD

ACCESS LEVEL

User Accounts

Name	Password	Access	Last Login
Admin	*****	Admin	1/12/2020 10:50:41 PM
User1	*****	Level 1	

Edit User Accounts

Note: A user account without Administrator access will not be able to see all the Administrator Controls menu when logged in as a user.

8.2 USER ACCESS LEVELS

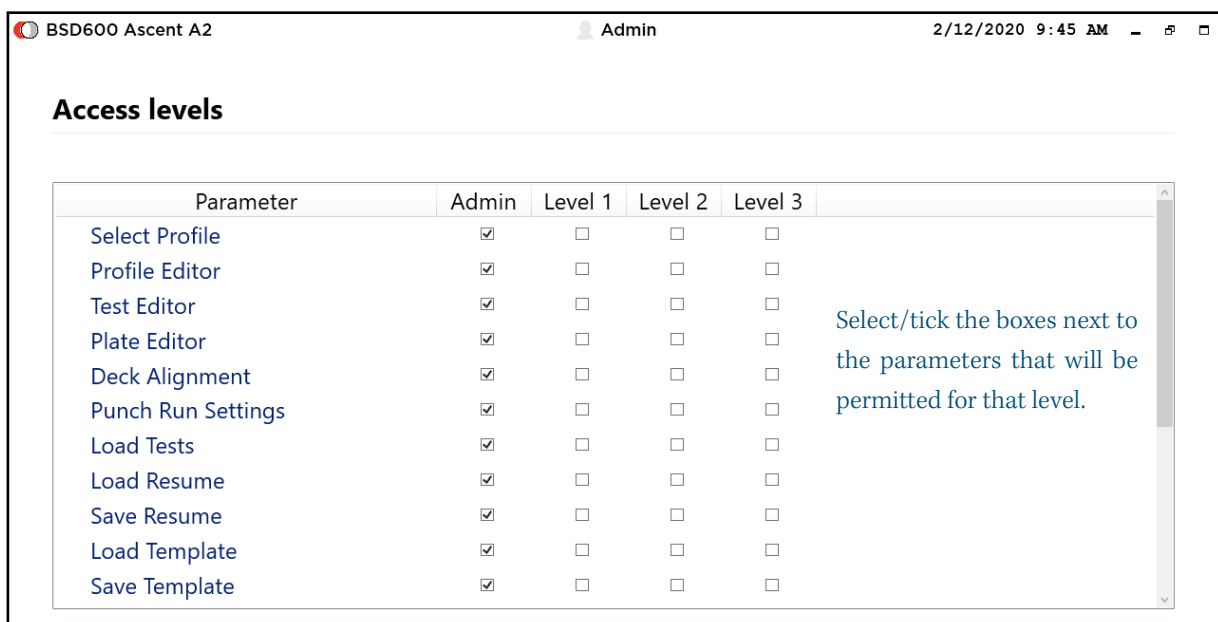
For security reasons, an Administrator (or laboratory supervisor) may want to set different user access levels when operating the punch instrument. Besides Administrator access, three other levels of access are available for configuration and by default all their parameters are unselected. The laboratory management may want different users to be able to use specific features of the software, hence, this features provide the ability to restrict access to certain software features and provide a streamlined process for laboratory personnel aims to reduce the risk of processing errors and provides overall control of access. Administrator has access to all software configurations and test protocols.

Levels 1 to 3 can be configured by selecting the boxes next to the parameters that are allowed for that specific access level.

Edit access level

To edit an access level.

1. Select Administrator Controls icon on bottom left on toolbar.
2. Select Edit access levels.
3. Under the column of Level 1 (2 or 3), check the boxes next to the parameters to allow user access to.
4. Move scroll bar on right to see the full range of access levels.
5. Press Done to save and exit.



Access levels not configured - default setup

Example: Setting Level 1 access

In the example below, Level 1 will be configured to have the lowest access to the software functions compared to the Administrator level which normally has full access. For this level, the user will only be able to load a test or an existing template (group of tests), start a punch or resume from a previously saved punch run. The user will also be able to save a partial punch run.

Access levels					
Parameter	Admin	Level 1	Level 2	Level 3	
Plate Editor	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Deck Alignment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Punch Run Settings	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Load Tests	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Load Resume	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Save Resume	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Load Template	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Save Template	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Well Editing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Enforce Strict Barcodes	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Change Sample Barcode	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Level 1 access parameters selected

By default the software is first installed, all parameters are enabled for the Admin level only.

Access Parameters Explained

PARAMETER	PERMITTED ACTIONS WHEN ENABLED
Select Profile	Allows changing the puncher profile from the Home screen.
Profile Editor	Allows adding and creating new puncher profiles.
Test Editor	Allows tests to be edited, created or deleted.
Plate Editor	Plate type templates may be created or edited.
Alignment	Enables the deck alignment function to align the plate.
Punch Run Settings	At the start of a punch run, allows punching of Samples, Controls, Standards and Cleaning punches to be turned on or off.
Load Tests	Prior to starting a punch run, allows tests to be selected for punching; otherwise the test selection may be chosen by loading a saved template.
Load Resume	Allows the user to open and resume a partially complete punch run by clicking the resume button to resume a saved test.
Save Resume	Enables the user to save a partial punch run.
Load Template	Prior to a punch run the user can load a saved template.
Save Template	Allows punch templates to be created and saved by exiting at the start of a punch run.
Well Editing	During punching allows the user to double-click on a well to make changes to the well settings including number of punches.
Enforce Strict Barcodes	See below. It is recommended to leave unchecked for Administrator level access.
Change Sample Barcode	Allows sample barcodes to be changed during a punch run.
Change Plate Barcode	Allows plate barcodes to be changed during a punch run.
Change Punches	Allows the number of punches to be changed for a well during a punch run.
Skip Well	The user can skip over a well or sample during a punch run. The well can then be re-enabled and punched later in the punch run.
Re-punch	Re-punches the previously punched sample adding an extra punch for each configured punch in each well.
Go to sample	Jump to a specific well in the test. Punching will continue from the new well.

8.3 ENFORCE STRICT BARCODES

Enforce Strict Barcodes is a very useful function to prevent unwanted modification of sample and plate barcodes, skipping barcode entries, scanning of duplicate barcodes.

- Barcode fields cannot be empty or duplicated.
- If plate barcodes are not valid then a punch run cannot proceed.
- If a sample barcode is invalid then the sample cannot be punched.
- Plate and sample barcodes must match the barcode patterns for the test (found in Test Editor > Plate information > Barcode matching string), and also within the barcodes settings tab of the Profile Editor.

9 PROFILE EDITOR

The Profile Editor lets the user save a 'profile' associated with a particular instrument model and its saved settings. This provides different users the ability to setup their own profile with preferred settings. Different profiles may be created from the original profile (for the same instrument) using the Save As button, to allow the user to make quick changes - such as a profile with plate camera enabled and another profile with camera disabled.

9.1 CREATE OR EDIT A PROFILE

Editing an existing profile

From the Home screen

- Press the **Profile Editor** button.

Profile Editor - Hardware settings

Hardware settings | Barcode settings | Output file settings | Output file contents | General settings | Image settings | Punch settings | Advanced settings | Instrument settings

Profile name: Galaxy A9

Instrument model: BSD Galaxy A9

☒ Enable plate validation camera

☒ Enable card imaging system

☒ Enable card clamps

☒ Enable barcode scanner

☒ Enable plate barcode scanner

Instrument connection: Port: USB Serial Port (COM5)

Sample barcode scanner: Port: Opticon Reader (COM6)

Plate barcode scanner: Port: Opticon Reader (COM7), Type: Internal

Setup card imaging system

Camera selection

COM port drivers

Profile settings

1. Select **Create new profile** button.
2. Type in a new name for profile and select puncher model type.
3. Press OK.



Notes:

Using Create new profile button will require re-alignment of the instrument. If you want to create a new profile with the currently selected profile settings, use the Save as button instead to create a new profile with all setting duplicated including deck alignment settings.

The parameters on this screen will look slightly different depending on the BSD instrument model.

Load a Simulation profile to practise loading, punching tests and viewing output files.

Galaxy A9 Admin 19/01/2021 09:40

Profile Editor - Hardware settings

- Hardware settings
- Barcode settings
- Output file settings
- Output file contents
- General settings
- Image settings
- Punch settings

Profile name: Galaxy A9

Instrument model: BSD Galaxy A9

Instrument connection: Port: USB Serial Port (COM7)

☒ Enable plate camera

☒ Enable sample card camera

☒ Enable card clamps

When 'Enable barcode scanner' is left unchecked, only instrument port displays.

Galaxy A9 Admin 19/01/2021 09:41

Profile Editor - Hardware settings

- Hardware settings
- Barcode settings
- Output file settings
- Output file contents
- General settings
- Image settings
- Punch settings
- Advanced settings

Profile name: Galaxy A9

Instrument model: BSD Galaxy A9

Instrument connection: Port: USB Serial Port (COM7)

☒ Enable plate camera

☒ Enable sample card camera

☒ Enable card clamps

☒ Enable barcode scanner

Plate/Sample barcode scanner: Port: Opticon Reader (COM0)

When 'Enable barcode scanner' is left unchecked, only instrument port displays.

Galaxy A9 Admin 16/11/2021 9:25 AM

Profile Editor - Hardware settings

- Hardware settings
- Barcode settings
- Output file settings
- Output file contents
- General settings
- Image settings
- Punch settings
- Advanced settings
- Instrument settings

Profile name: Galaxy A9

Instrument model: BSD Galaxy A9

Instrument connection: Port: USB Serial Port (COM5)

☒ Enable plate validation camera

☒ Enable card imaging system

☒ Enable card clamps

☒ Enable barcode scanner

☒ Enable plate barcode scanner

Sample barcode scanner: Port: Opticon Reader (COM6)

Plate barcode scanner: Port: Opticon Reader (COM7), Type: Internal

Checking the 'Enable optional plate barcode scanner' will bring up an additional scanner port. Only check this option if your instrument has a second barcode scanner installed.

Editing an existing profile

1. From the home screen press PROFILE EDITOR.
2. In the Profile Editor on the Hardware settings screen, make sure the Profile Name displays the profile to be modified.
3. Review all associated settings and make changes as required.
4. Select **Save As** and type in a new profile name.

Deleting a profile

1. In the Profile Editor, press **Delete a profile** button.
2. Select a profile to delete.
3. Press **Delete**.
4. Press **Save**.

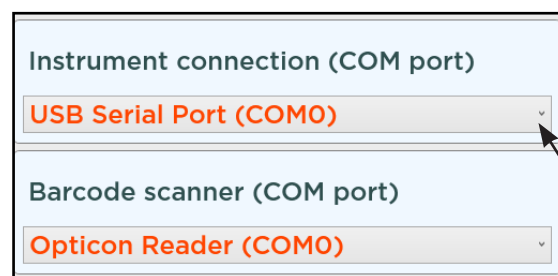
Switching profile

1. In the Home screen, press the Select Profile button.
2. Choose a different profile from the list.
3. Press **Select**.

9.2 COMMUNICATIONS (COM) PORT

The punch instrument and barcode scanner have their own communications (COM) port. If the text is highlighted in red (see below), it means it was configured to a previous COM port or that there is no connection. Check that all cables are connected and the instrument is switched on.

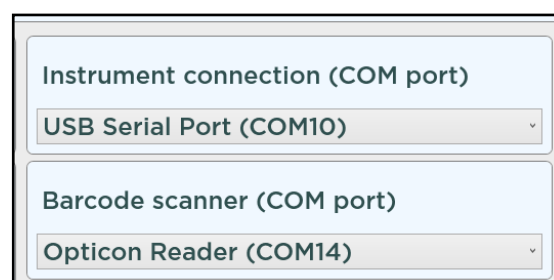
1. Click on the little arrow near the red text to bring up the drop-down menu.
2. Choose a COM port available from the list (not 0).
3. Repeat for the barcode scanner COM port.
4. Press **Save**.



Incorrect COM ports

The next time you enter the Profile Editor the correct COM ports will be displayed in black.

Check the COM posts using Windows Device Manager to check connections and statud in the Ports section.



Correct COM ports displayed

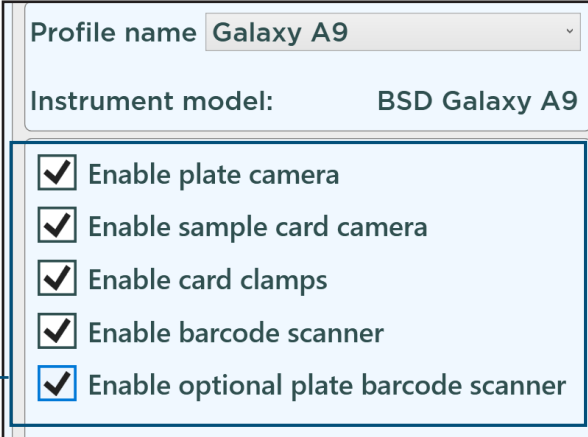
9.3 PROFILE SETTINGS - MODULES

Modules

Each of the tabbed menu in the left column have various modules. A module is a software component that focus on one area of functionality.

Where applicable, a module may be disabled (for example the plate camera).

Modules



Profile name **Galaxy A9**

Instrument model: **BSD Galaxy A9**

- ☒ Enable plate camera
- ☒ Enable sample card camera
- ☒ Enable card clamps
- ☒ Enable barcode scanner
- ☒ Enable optional plate barcode scanner

Enable Plate Camera

If your instrument is equipped with a plate camera, enable this option. For faster punch times, the plate camera may be disabled if images are not required. The software and deck alignment will still work with the plate camera disabled.

Enable Card Clamps

The card clamps are on by default. They help hold down the card while it is being punched. If disabled, the card clamps will no longer restrict card movement.

Enable Barcode Scanner

Enables the supplied Opticon sample barcode scanner.

Note: User will still have to go into Barcode settings (see next section) to enable of sample barcode entries.

Enable Optional Plate Barcode Scanner

Enables the use of a second barcode scanner for reading plate barcodes. This will bring up a separate COM port number.

If this is left disabled, the installed barcode scanner may be used for both scanning of sample and plate barcodes (provided they can be positioned under the scanner to be read).

Note: Once the barcode reader hardware settings are configured, the scanning functions can be enabled (see next module).

Type: Internal

The BSD Galaxy A9 is equipped with an internal plate barcode reader.

Type: Handheld

Externally connected USB handheld barcode scanner that does not require the use of a COM port.

Camera System

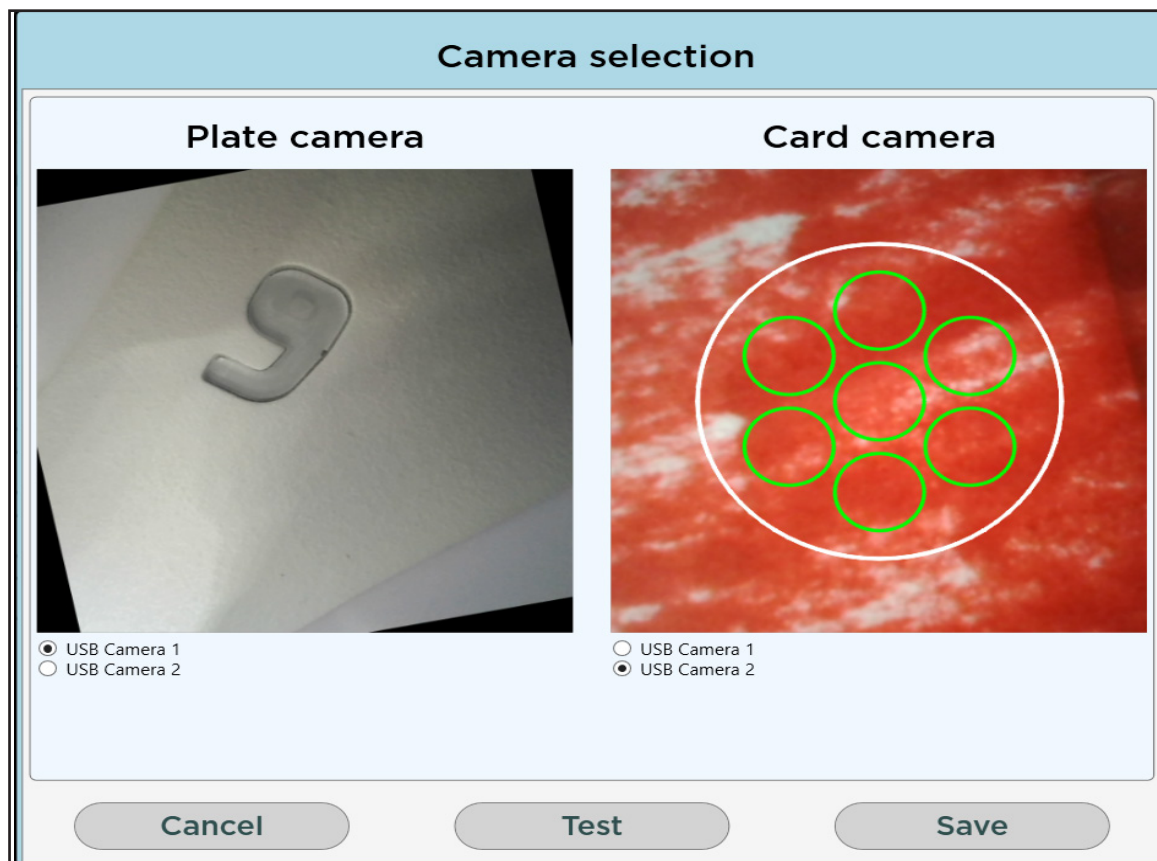
The BSD Galaxy A9 is equipped with two cameras: A plate validation camera and a card imaging system camera. The Plate validation camera provides a live overview of before/after well images of punching samples. This will help to maximise control and minimise the need for manual inspection of punched samples. The card imaging system helps the user to visually monitor the perforation area of the sample card on the screen.

To enable the use of both cameras, they will need to be enabled in the current profile being used. Go to Profile editor: Hardware settings: Check the “Enable plate validation camera” checkbox to enable taking images of the plate wells. Check the “Enable card imaging system” checkbox to enable the card camera.

After changing the above-mentioned options and/or after changing any of the USB camera or puncher USB ports, go to “Camera selection” and verify the correct camera is selected for each option selected.

Camera Selection

For each configured camera a Radio button appears below each image. Select a Radio button and press the “Test” button. After a short delay you will see the configured camera video stream appearing in the appropriate image box. When cameras are configured correctly, press the “Save” button the save camera selection information to the profile.



Camera Imaging System

The card imaging system help the user to find the best location of punching. The system is to automatically check and vet that each punch site is valid before punching. When the card imaging system function is chosen, the software optimizes the number of required punches and the surface available from the bloodspot and indicates on the screen only the discs that it can perforate as a green disc. When the punch command proceeds, all discs indicated on the camera image are perforated.


If all the discs cannot be perforated from the same spot, the exciting punch will need to perforate from next blood spot on the same sample card. The bloodspot detection allows to activate or turn off automatic bloodspot detection. If you deactivate it, the perforation system operates in non-colour restricted mode.

Some of the benefits of using the card imaging system include:

- ▶ Blood spot detection. Can be enabled/disabled/configured during a punch run or within the Profile editor. When enabled, only valid areas of the sample will be punched.
- ▶ Customised punch patterns.
- ▶ Option to save before/after sample card images of both sample/cleaning punches. Images are time stamped and show sample details including sample barcode, well id, plate number deck position as well as punch success. (spot detected)



Card imaging system



Punch side setup
☒ Left punch ☐ Right punch

Camera settings
 Bloodspot detection settings

Maximum punch count

Left punch

7

Right punch

4

Spacing (mm)

0.55

0.50

Sample size (mm)

13.00

Image scaling

1.7125

Exclusion zone (mm)

0.00

☒ Enable bloodspot detection

☒ Save images
☐ Save cleaning punch images
☐ Show interim images

Set defaults

Cancel

Save

Punch Side Setup	Left/Right punch radio buttons selects camera image of either Left or Right punch pattern.
Camera Settings Button	Press to open Windows USB Camera dialog.
Bloodspot Detection Settings Button	Open screen to configure Bloodspot detection parameters.
Maximum Punch Count	The maximum number of punches that fit within the sample card punch area.
Spacing	The spacing in milli meters between each punch and the sample card punch area.
Sample Size	The available punch area on the sample card. Normally indicated by a circle printed on the card.
Image Scaling	This value needs to be adjusted to make the White circle on the image match with the sample size.
Exclusion Zone	This value sets a zone limit from the detected bloodspot edge where the punch needs to be within to be valid.
Enabling Bloodspot Detection	This activates the colour detection of bloodspot. A Green circle indicates a valid punch area while a Red circle indicates an invalid punch area.
Save Images	An image containing punch data and before/after punch images will be saved to the Images folder.
Save Cleaning Punch Images	Option to also save the cleaning punch before/after images to the Images folder.
Show Interim Images	Will show punch progress as the sample is being punched. A small delay in sample punch time as punch head needs to be moved to accommodate moving the camera above the sample card in order to take the image.

Bloodspot Detection

Hue

Can be thought of as a description of color. (Red Blue Green) The range of hue used is from 0 – 180. The center value is set to the middle of the required color while the width allows for broadening the range either side of the selected center value. Towards either end of the spectrum the width will automatically wrap. A center value of 3 and width of 10 will give a colour range of 173 – 13.

To adjust, place a typical sample underneath the camera. Set width around to a value of 3 or 4 and adjust the center value until the circles all turn Green. Increase the Width to allow a broader range of samples.

Saturation

Is defined as the purity, strength or dominance of the color.

Value

Describes the overall intensity to how light or dark the color is.

Blur

A filter used to remove/soften the effects of small Black or White dots or other imperfections that may occur on a sample card or a camera image. The filter is applied before bloodspot detection processing takes place.

Morph

A filter used to remove small imperfections during the bloodspot detection process.

Enable Bloodspot
Detection

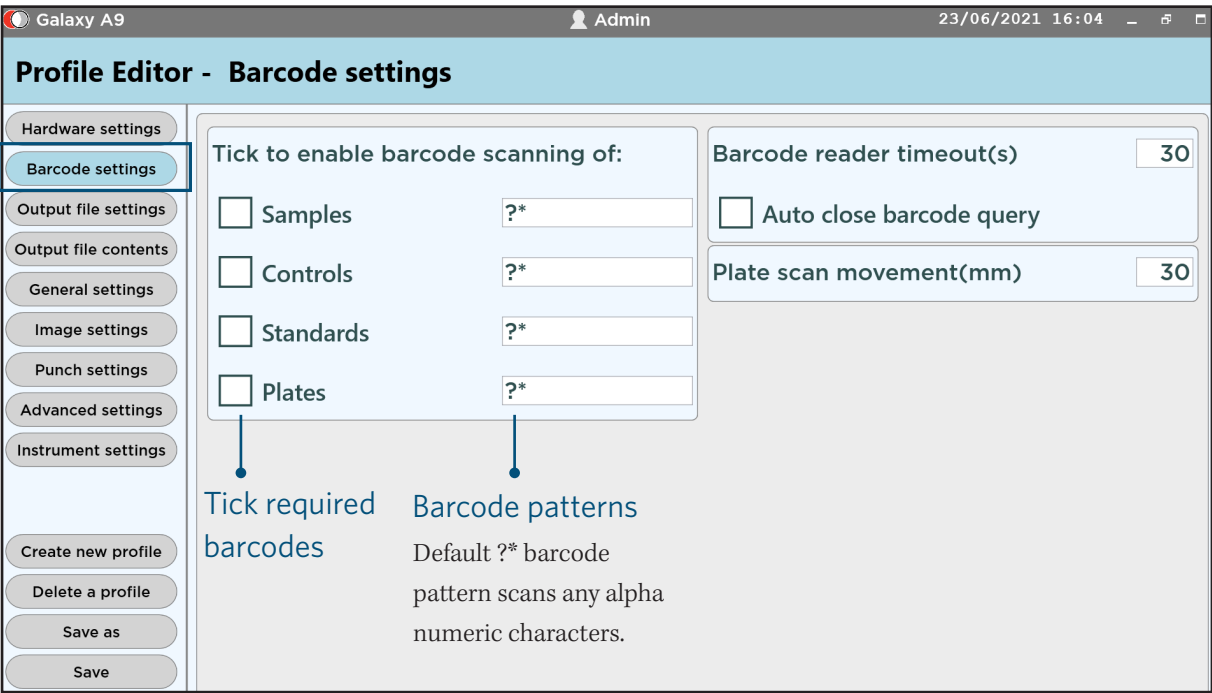
Check this option to detect a valid sample underneath the selected punch area. Disabling this option will just show the punch area on the sample.

9.4 BARCODE SETTINGS

When using barcodes in your tests:

- 1. Tick the boxes against the name: Samples, Controls and/or Standards type to enable barcode scanning for that type.
- 2. Check the box next to Plates to allow scanning of plate barcode (or manual entry of barcode).
- 3. Press **Save**.

Barcode patterns are used for barcode validation and traceability. Any barcode scanned **MUST** match the pattern specified for that type of barcode. See **Appendix 1 - Barcode Patterns** for examples.



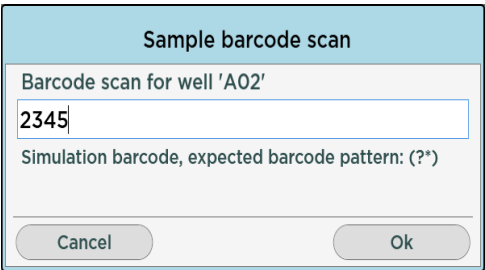
Barcode settings

Barcode reader timeout

Change the value here (measured in seconds) for how long the sample barcode reader should stay active during each scan.

Auto close barcode query

Tick this box to remove barcode confirmation popup box after scanning barcode during punch (see right image).



Barcode confirmation box

Plate scan movement

Change the value here (measured in mm) for how much the deck should move during plate barcode scanning.

9.5 OUTPUT FILE SETTINGS

In the Output file settings screen set the folder location where output files are saved by the software (see below).

The screenshot shows the 'Profile Editor - Output file settings' window. On the left is a sidebar with buttons for 'Hardware settings', 'Barcode settings', 'Output file settings' (highlighted), 'Output file contents', 'General settings', 'Image settings', 'Punch settings', 'Advanced settings', 'Instrument settings', 'Create new profile', 'Delete a profile', 'Save as', 'Save', and 'Exit'. The main area contains the following settings:

- Output folder:** C:\BSD (with a 'Browse' button)
- File extension:** CSV (dropdown menu)
- File encoding:** UTF-8 (dropdown menu)
- File format:** Individual test files (dropdown menu)
- File naming convention:** Date (dropdown menu)
- ☒ **Save platemaps on completion**
- ☐ **Print platemaps on startup** ☐ **Show printer dialog**
- ☐ **Enable output file processing**
 - Process to run: (text field) (with a 'Browse' button)
 - Parameter options: Single output file (dropdown menu)
- ☒ **Create BSD Integrator output files**
 - ☒ **Process each plate individually**
 - ☐ **Run Silent**
 - Default template: NONE (dropdown menu)
- ☐ **Create temp log file**

Output settings

Output folder

To view or change the location of this folder, click **Browse** and choose a new location.

File extension

Click the drop-down menu to select .csv / .xml/ .dat or .txt format.

File format

Choose from Individual test files or a Single file per test run when you have two tests. Choose Individual plates files to split the output file of multiple plates in a single test.

File naming convention

Choose the format for automatic output file naming.

Automatically save platemaps on completion of run

This option saves the platemaps in the output directory. A platemap identifies the different sample types and their well positions on the plate, by grid reference. Barcodes and labels are also stored in platemaps.

Enable output file processing

When enabled, at the end of a punch run an external application is automatically called using a command line, similar to the Windows command prompt. Only an *.exe or *.bat file can be run. The parameter options allow the external application to run once from a single output file or to be called multiple times for each output files that is created from the punch run.

Create temp log file

By default, temp log files are deleted when a punch run is completed. If this function is enabled, do not open the temp log file whilst the punch run is in progress or it may affect the saving of the final output file.

- Date
- Date + Time
- Plate barcode
- Plate barcode + date
- Profile name + date
- User defined

File Encoding

Unicode Transformation Format is a family of standards for encoding the Unicode character set into its equivalent binary value. By choosing the 8 or 16 character the users have a standardized means of encoding the characters with the minimal amount of space based on the LIMS and expected output file. If you will write in English so that with only rare exceptions all characters can be represented in a byte by UTF-8, then it would save space to use UTF-8. On the other hand: if you are writing in Thai or Korean or Arabic or Greek or Russian or Hebrew (etc.) then none of the characters you need will be a byte in UTF-8. They will all be escaped and then multiple bytes. In such a case it would certainly be more space saving to use UTF-16.

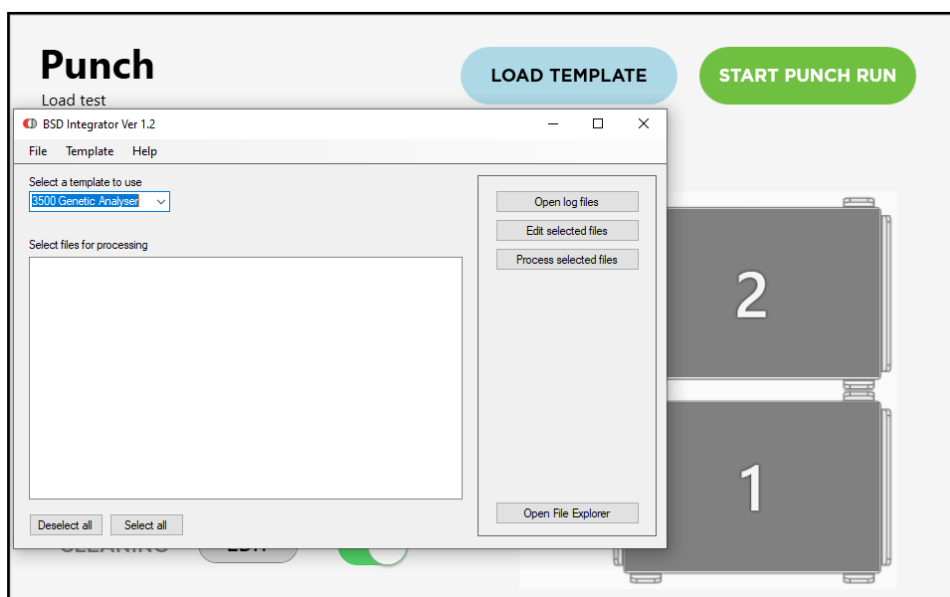
Create BSD Integrator output file

This feature enables the user to convert output files after each punch run for subsequent processing using the BSD Integrator software application such as Masslynx.

On completion of a punch run, all available data is saved to the Integrator Logs folder ready for processing by the BSD Integrator software. Templates created by the user within the BSD Integrator describe how to process the data. The data from the punch run can be processed by one, or multiple templates to produce one or more customized output files for each punch run.

An option, Process Each Plate Individually, can be selected to create separate custom output files for each plate within a multiple-plate punch run. This feature allows the output file to be accessed as each plate is completed to minimise subsequent workflow delays.

When the Silent option is selected, the Integrator application will process the output files according to selected Templates without user interaction and will automatically close on completion. If not selected, the Integrator application will automatically open to allow user interactive when the punch run is complete.



Using BSD Integrator software to generate the output file compatible with the downstream analytical instrument. EX: Masslynx in non-silent mode.



NOTE: Please note this is not a standard inclusion of the BSD Studio software and is a separate purchasable product.

9.6 OUTPUT FILE CONTENTS

Output files contain log data which are created by the software from each test run. The structure of data stored in an output file can be comprised of headers and columns of data that contain information fields produced during the test run. The structure can be customised by making selections to specify the inclusion and format of headers, the order of column fields, details of the delimiting and end of line characters in the text file and content of the punch sequence.

Profile Editor - Output file contents

Hardware settings
Barcode settings
Output file settings
Output file contents
General settings
Image settings
Punch settings
Advanced settings
Instrument settings

Create new profile
Delete a profile
Save as
Save
Exit

Column fields

Excluded fields
Date
Time

Included fields
Date Time
Test Name
Plate Number
Plate Barcode
Plate Type
Sample Barcode
Sample Label

Include header: Yes
Filter individual well data: No filter applied
Sort order: Well ID by Test
Linefeed character: CRLF
Column delimiter: Comma

☐ Include cleaning punches
☐ Include disabled wells
☐ Include unpunched wells

Log file settings

Example output file with default settings

```
LabA2,Admin,20190514,2
Date Time,Test Name,Plate No.,Plate Barcode,Plate Type,Sample Label,Sample Barcode,Sample Type,Fill Order,Grid Ref, ...
14/05/2019 7:40:51 PM,testname,1,,96 Well,,,Sample,1,A01,,,1,1,1,0,true,Admin
14/05/2019 7:40:53 PM,testname,1,,96 Well,,,Sample,2,B01,,,1,1,1,0,true,Admin
14/05/2019 7:40:54 PM,testname,1,,96 Well,,,Sample,3,C01,,,1,1,1,0,true,Admin
```

Column Fields

All fields listed in the right column are saved in the output files.

- ▶ Scroll through the list to see more fields.
- ▶ To **remove** certain fields from the output file, click the **left facing arrow** to move that field name to the left column. Fields in the Excluded fields column will not be saved (see below).
- ▶ The order in which the Included fields are saved here is the order in which it will display in the output file.
- ▶ To re-order the fields, clear the right column first and move fields across in order that is required.

Excluded fields
Plate No.
Plate Type
Sample Label
Total Punches
Comment
Left Punch
Right Punch
Spot Detected

Included fields
Test Name
Plate Barcode
Sample Barcode
Sample Type
Fill Order
Grid Ref
DeckPositionNumber

Fields removed

Fields to keep

Column Fields Explained

PARAMETER	PERMITTED ACTIONS WHEN ENABLED
Date	A date field. e.g. 22/10/10.
Time	A time field. e.g. 11:26:06.
Date Time	Full date and time of each punched well. e.g. 21/10/19 14:20:31.
Test Name	Name of the test created in the Test Editor.
Plate Number	Plate number in the test.
Plate Barcode	Typed or scanned plate barcode at the beginning of a punch run.
Plate Type	e.g. 96 well type or 48 well type.
Sample Label	An optional well identifier label.
Sample Barcode	Scanned barcode of each sample card.
Sample Type	Sample / Standard / Control or Liquid Control
Fill Order	The order in which the wells are punched / filled.
Grid Reference	The absolute position or location of the well in the plate. e.g. A06
Comment	Include well comments changed during a punch run.
Status	Contains error logs.
Deck Position	1 = Front, 2 = Back
Total Punches	Number of left and right punches combined.
Left Punch	Number of left punches performed.
Right Punch	Number of right punches performed.
Punch Size	Punch size of punches performed.
Disk Detected	TRUE = spot detected; FALSE = no spot detected.
User ID	ID of current logged in user.



TIP: To change the date and time format in the output files, go to:

- Windows settings > Time & Language > Region > Additional Date, Time & Regional settings > **Change date, time or number formats.**

Include Header

☒ **Yes**
☐ **No**
☐ **Test barcode**
☐ **Test name**
☐ **Test comment**

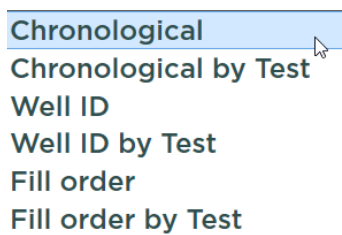
- Include all the selected fields in a one line header.
- No header.
- A barcode assigned to the test in the Test Editor.
- The name of the test.
- A comment for the test entered in the Test Editor.

Filter individual well data

☒ **No filter applied**
☐ **By well ID**

- Save each punch as a separate line in output file, even when there are multiple punches for the same well
- Removes all punch data except the very last punch for each punched well (or sample). This is useful if punching multiple disks into a single well with only one output line protinted, per well.

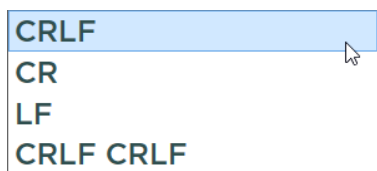
Sort Order



- ▶ Data is not sorted. The line entries follows how the test was punched.
- ▶ Data is grouped by test name; order of entries follow how the test was punched.
- ▶ Sorted by grid reference.
- ▶ Sorted by grid reference; grouped by test name.
- ▶ Sorted by fill order of the wells.
- ▶ Sorted by fill order; grouped by test name.

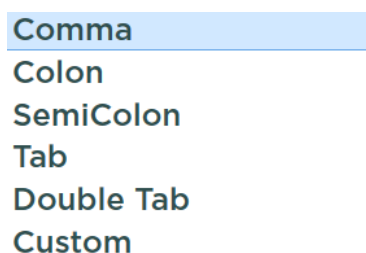
Linefeed character

These are non-printable characters that are added to the end of each line of the text file. Normally these characters are not visible in a text editor or excel spreadsheet. CRLF is the default setting.



- ▶ Carriage return linefeed.
- ▶ Carriage return.
- ▶ Linefeed.
- ▶ Carriage return linefeed - carriage return linefeed (2 times)

Column delimiter



The character which separates each field in the log entry.
The default is a comma (,).

Include Cleaning Punches

The cleaning punch line is disabled by default. When ticked, the output file will include all cleaning punches as line within the output file. This can be useful to retain record of how the punch run was executed including the sequence of cleaning punches.

Include Disabled Wells

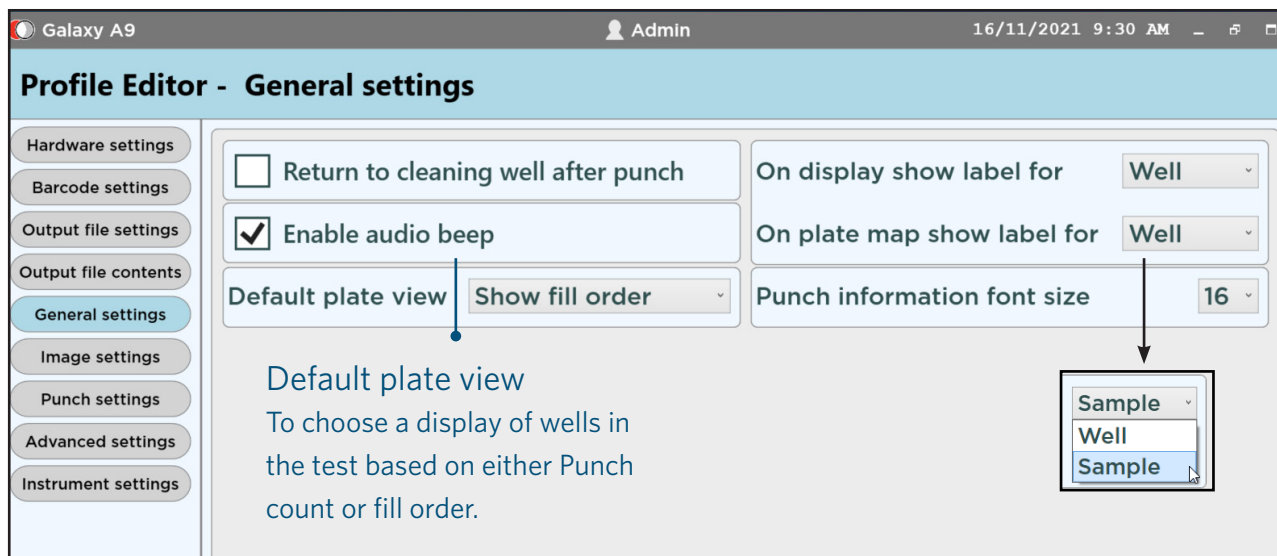
If ticked, disabled wells will be printed in the log file status as “Well disabled”.

Include Unpunched Wells

If ticked the log file will also contain lines for each of the empty wells in the plate. these are recorded in the file as “well empty” in the status without any entry in the barcode filed. The status field needs to be included to use this feature.

Remember to save any changes before exiting Profile Editor.

9.7 GENERAL SETTINGS



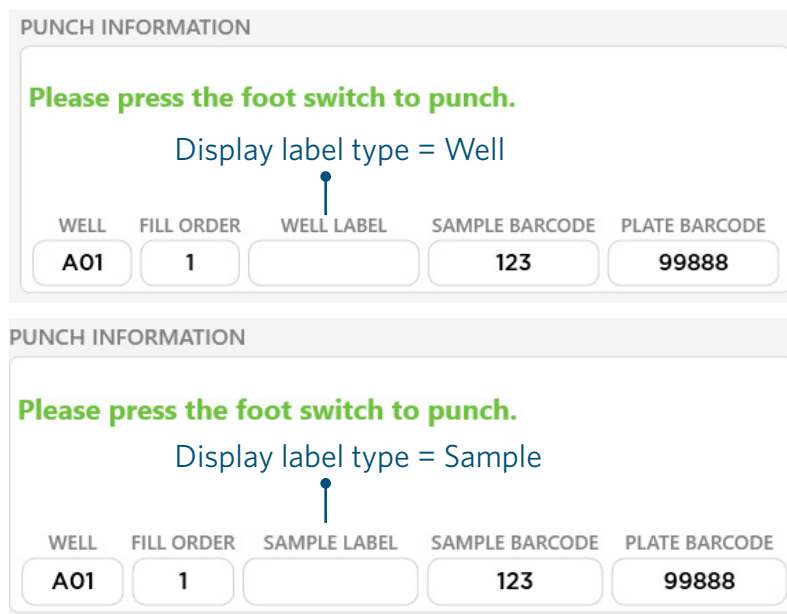
Return to cleaning well after punch

The deck moves to the cleaning well position after each sample. If left unchecked, the deck remains at the last punched position until the next command. The intention of this feature is to prevent unwanted paper dust falling from the chute into a well when the punch run is idle.

On display show label for

In the punch screen, there is a field display for a “Well Label” if specified (see below images). The user has the choice to either use “Well Label” or “Sample Label” based on the preference.

- Next to Display label type > Choose either **Well** or **Sample**.

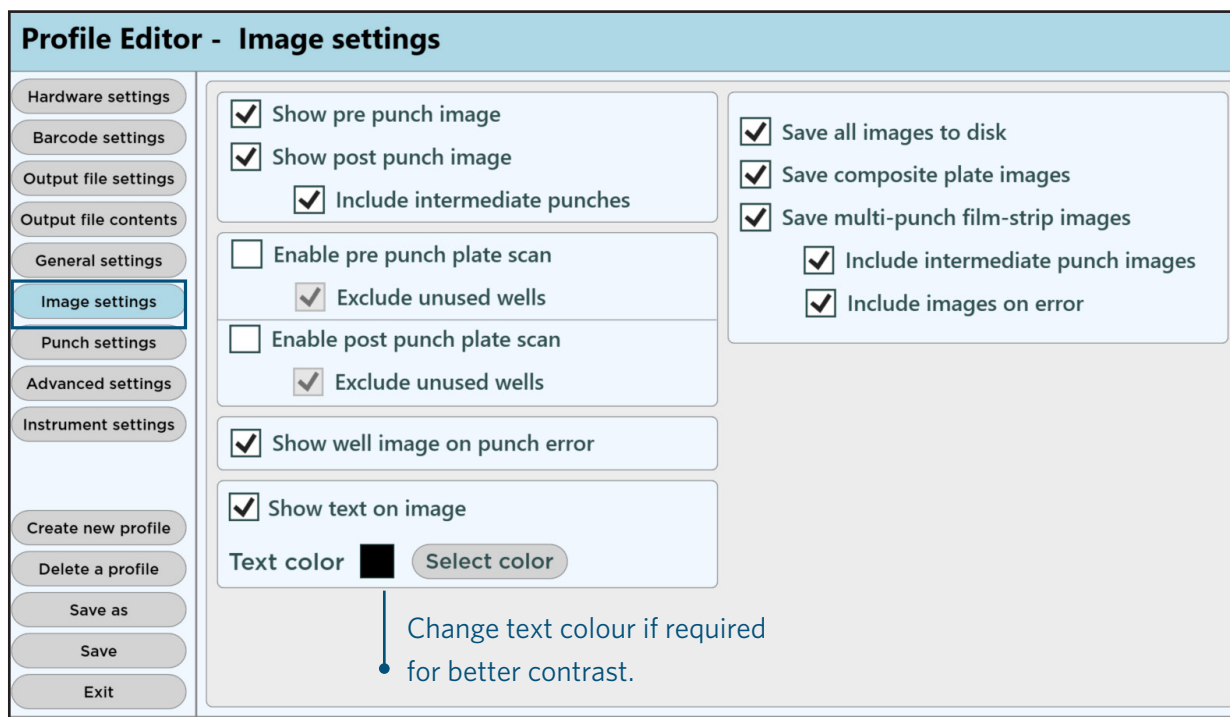


On plate map show label for

Similar to the punch screen display, there is an option to display either well labels or sample labels on the plate maps.

- Next to Plate label type > Choose either **Well** or **Sample**.

9.8 IMAGE SETTINGS



Save all images to disk

When ticked the image displayed from the plate validation camera will be saved to the drive. Unticking this options means that no image files will be saved.

Save composition plate images

This option create two composite images of each well that are stitched-together as punch run progresses. One image is created for the empty well images and a second image shows the well after punching. This image format is compact and documents the punch run in two images.

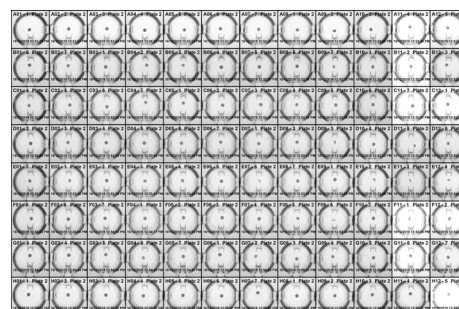
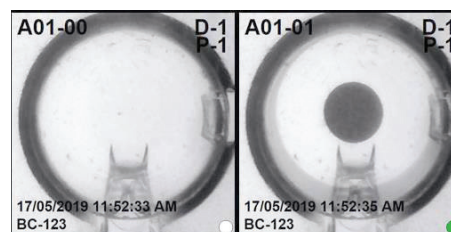


Plate images

Save multi-punch film-strip images

This option is useful when multiple disk are punch into the wells and you want to record the well image after each punch. The film strip image will show the well starting with empty and progressing until the last punch is completed for the well. This option will save one “film strip” image for each punched well.



Well film strip images. Also a before/after image.

Create Pre/Post punching images

This option will only show before (empty well) and after punching images of each well (no intermediate punches).

Enable Pre/Post punch plate scan

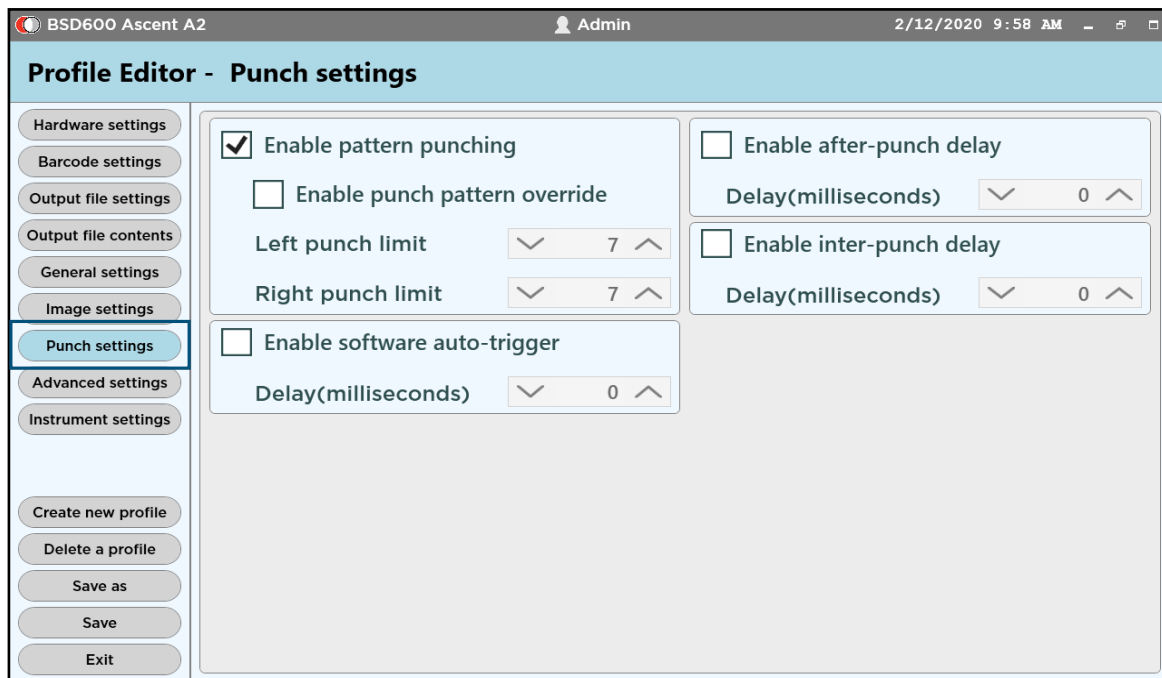
These options will scan the whole plate before and after punch.

Show well image on punch-error

Image will be taken of the well even when a punch error occurs. Ticking this option means those images are not saved.

9.9 PUNCH SETTINGS

The punch settings module contains hardware-related setting for the punch pattern sequence and the timing of the punching operations. Enabling these modules will override the default settings set in the Test Editor and the punch pattern during the punch run. This module provides control over the punch settings.



Enable pattern punching (grid generator)



PROFILE TYPE
DEPENDENT

For punch instruments with pattern punching, disabling this module will fix the punch head position so that it will not move side to side while punching. This can be useful when punching from thinner materials that may crumple or distort when the punch head moves.

Enable punch pattern override



PROFILE TYPE
DEPENDENT

The punch pattern override is useful in the event when the sample to be punched does not fully cover the area highlighted by the light targeting pattern. For example, if 6 wells per sample is set for a test, having an override of 3 punch limit will punch 3 disks, then wait for the operator to reposition the sample, and continue to punch the remaining 3 disks.

Enable software auto-trigger

If punching multiple wells per sample and/or multiple punches per well (configured in the Test Editor), enabling this module will automatically punch a series of punches. The time between each software auto-trigger punch is set using the inter-punch delay setting.

Enable inter-punch delay



PROFILE TYPE
DEPENDENT

This feature adds a time delay between punches during punching. Useful for allowing additional time for the sample to fall into the plate.

Enable after-punch delay

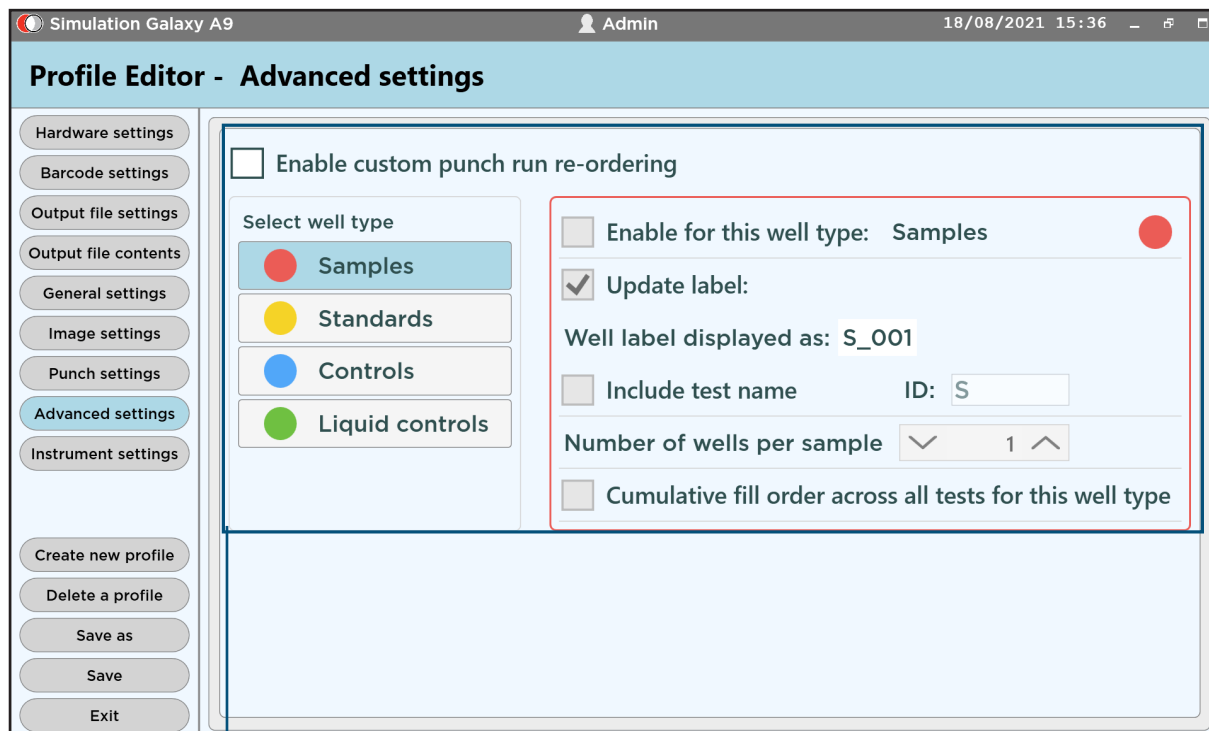


PROFILE TYPE
DEPENDENT

The after-punch delay adds an additional delay after each punch before the next punch or any deck movement occurs. This may be of benefit when you experience jumping disks and/or are working with light punch paper or with leaf samples.

9.10 ADVANCED SETTINGS

The Advanced settings module contains override functions that override the settings in the Test Editor (Not default setting). Enabling these modules will override the default settings set in the Test Editor and the punch pattern during the punch run.



Advanced settings in Profile Editor


Enable punch run re-ordering

This advanced setting allows automatic well re-ordering of both well labels and fill orders for each test as they are loaded for the test run. This function automatically arrange the fill orders and labelling for samples, standards and controls in the test runs, across all the test. This ensure a more cohesive workflow even when individual tests have different settings in the test editor, for example the number of wells to punch for each sample can be unified across all the test, and the fill ordering can be arranged to complete one plate before starting the next. Enabling this function will override previously configured Test Editor settings.

See Appendix 3 for an example and further descriptions.

9.11 INSTRUMENT SETTINGS

The functions in this module allow testing of the movable parts of the instrument for routine operational checks. The speed setting allow customisation to suit specific workflow requirements, for example slower deck speeds may suit punching into plates containing liquids. Lower speed also makes the movements smoother. The pump speed setting allow audible noise reduction when the instrument is not punching. The deck and punch speeds, and pump control speeds should only be changed by a supervisor or service technician. Changing the humidifier pump speed may result in too little or too much airflow through the chute and could result either increased static electricity effects or in disk blowing out of the wells.

Home deck	Moves the deck to the home position.	 PROFILE TYPE DEPENDENT
Toggle chute	Moves the chute up and down. This is useful for checking chutes alignment with wells in the plate.	
Toggle card clamps	Moves the card clamps up and down.	
Left cleaning punch	Activates left cleaning punch.	
Right cleaning punch	Activates right cleaning punch.	
Deck movement test	Move the deck on X and Y axis.	
Head movement test	Move the head to the left and right.	

Remember to save any changes before exiting Profile Editor.

Set Ionizer Pump

This function controls the Ionizer pump speed when the instrument is switched on.

Enable Ionizer Pump Control and set the preferred Ionizer pump speed during the test run.

Ionizer settings

☐ Enable ionizer

☐ Enable On/Off cycling of ionizer

On time(seconds):

▼

30

▲

Off time(seconds):

▼

180

▲

Cancel

Set defaults

Ok

Set Humidifier Pump

This function controls the Humidifier pump speed when the instrument is switched on.

Enable Humidifier Pump Control and set the preferred Humidifier pump speed during the test run.

Humidifier pump test

Select speed

30

▼

Cancel

Set-up Auto-trigger

This function enables the Auto-trigger function and allows the user to set the preferred Auto-trigger function delay.

Auto trigger settings

☐ Enable auto trigger

Select trigger delay(milliseconds):

▼

1500

▲

Cancel

Ok

Set Deck Speed

This function enables the Deck speed control settings and allows the user to set the preferred X-axis and Y-axis speed.

Deck speed settings

☐ Enable deck speed control

Select X-axis speed

▼

1000

▲

Select Y-axis speed

▼


1000

▲

Done

Test

Save to puncher

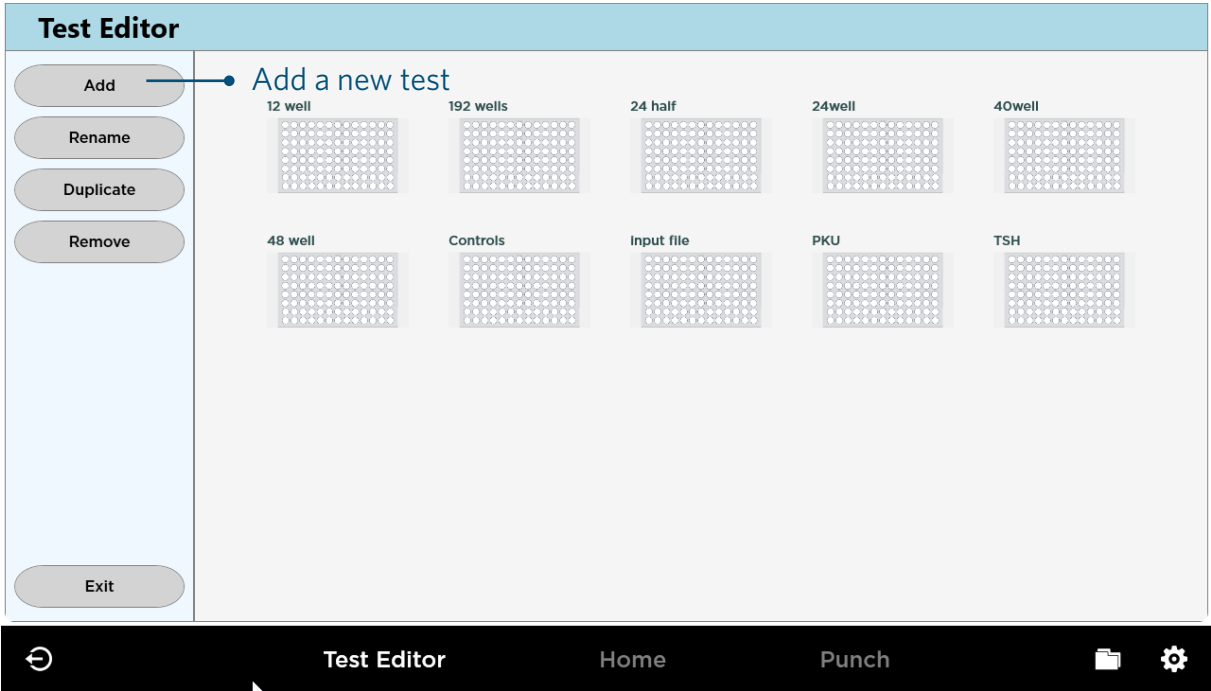


Note: The enabled module should be unticked after each movement change has been tested and set.

10 TEST EDITOR

Before running a punch protocol, at least one test needs to be available for loading. In the BSD software a 'Test' is a combination of a plate map, number of punches, and how the punches are placed (the 'fill order'). A test consist of a plate (or plates) and a test name. The Test Editor can be accessed from the bottom toolbar.

10.1 CREATE A TEST



Test Editor menu

1. In the Tests Editor, press the **Add** button.
2. Enter a name for the new test.
3. Select a plate type that best matches the type of plate being used.
4. Select a fill pattern (blank or pre-filled).
5. Press **Save**.
6. Click on the newly created test to view and make changes.

Note: Only letters, numbers and spaces are allowed in the name of the test. Symbols will not be accepted.

Create new test

Enter name for new test

Number of plates

1

Select plate type

96 Well

Select fill pattern

Full

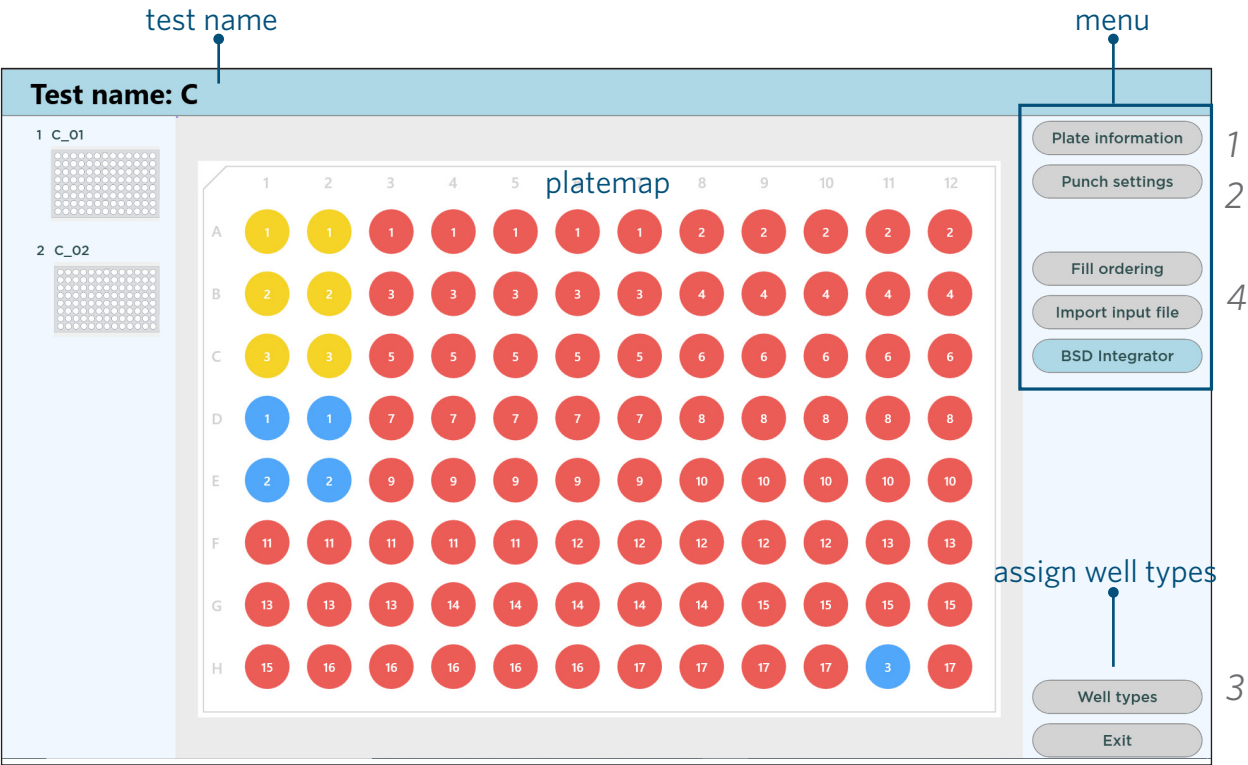
Cancel

Save

10.2 RENAME, REMOVE OR DUPLICATE TEST

- ▶ Press the **Rename** button to bring up a box to enter in a new name for test.
- ▶ Press the **Duplicate** button to bring up a box to duplicate a test.
- ▶ Press the **Remove** button and click on the cross to remove individual tests.

10.3 MODIFY A TEST



Overview of Test Editor

1 Plate information

The Plate information menu allows a barcode to be entered for that specific test. Leave as default if plate barcode will be scanned later.

The text that is entered here as a comment will also show for the plate when it is clicked at the start of a punch run. It can be useful to add some words as a reminder for the analyst regarding details of the assay, or any special steps needed.

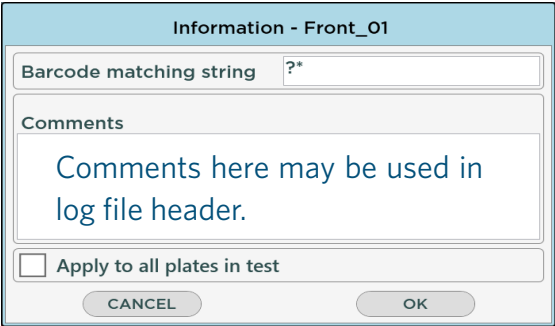
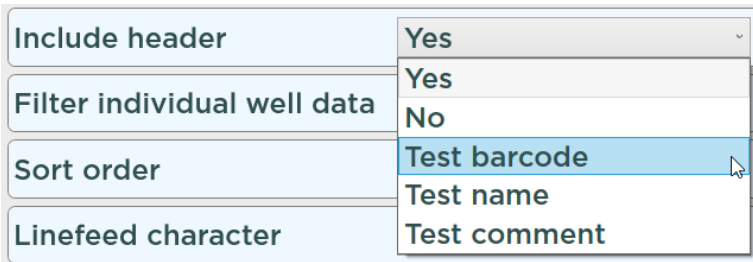


Plate information

The plate barcode or comments may be used as a log file header (refer back to Section 9.5 Output file settings).



Profile Editor > Log file settings

2 Punch settings

The Punch Settings menu allows the user to set the number of punches to take from each sample, or control, or standard. BSD punch instruments normally have two punch sizes and the number of each size can be individually set. The sizes displayed come from settings in the Setting screen (gear symbol).

- ▶ If using the smaller punch size, set values in the left column.
- ▶ If using the larger punch size, set values in the right column.
- ▶ A value of “0” will not punch that sample type.

Set how many disks to punch into each well (based on sample types)

3 Well types

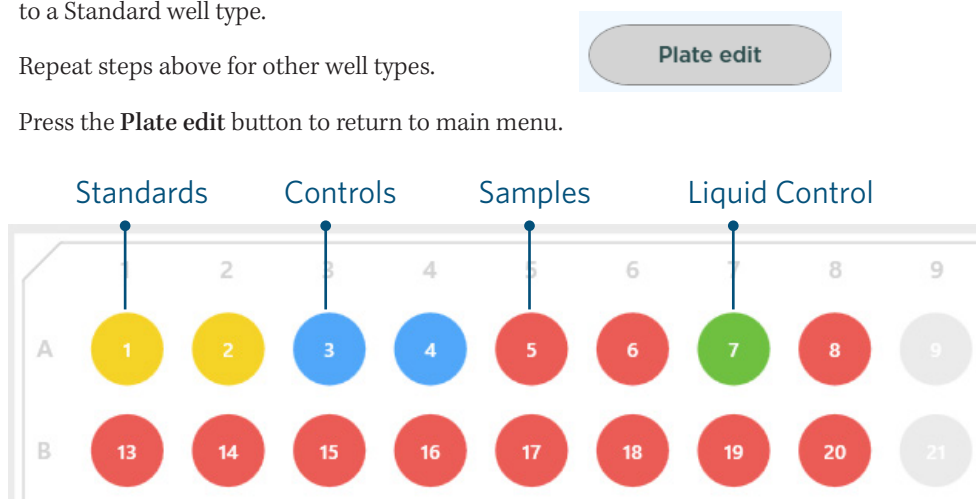
Well types available are: Samples, Standards, Controls and Liquid Controls and Unused. By default all wells are Samples (in red). Both the Liquid Control and Unused settings mean no disk will be punched into the well.

To assign a different well type:

1. Press the **Well types** button.
2. Activate the Standard (yellow label) button.
3. In the platemap, click on each well to convert the well to a Standard well type.
4. Repeat steps above for other well types.
5. Press the **Plate edit** button to return to main menu.

Press →

	Samples	red
	Standards	yellow
	Controls	blue
	Liquid control	green
	Unused	grey



Example of different well types assigned.

10.4 FILL ORDERING

The fill ordering function is a tool that can be used to quickly make changes to the plate filling sequence. After making selection of the options, clicking the reorder button will execute changes to the filling sequence according to the settings. In this way the fill ordering function can be used to successively arrange the fill orders for different well types to suit your workflow. For example, samples could be arranged with a vertical fill order and controls with a horizontal fill order.

Well reordering tool

Wells per sample ▾ 1 ▲

Start fill order ▾ 1 ▲

Fill start position

☒ Top left

☐ Top right

☐ Bottom left

☐ Bottom right

Fill direction

☒ Horizontal

☐ Vertical

Re-order well types

☒ Samples ☐ Standards ☐ Controls ☐ Liquid Controls

☒ Empty wells

Cancel

Reorder

Fill ordering menu

- Wells per sample

▶ Wells per sample
- Start position number

▶ Start position number
- Fill start position

▶ Fill start position
- Fill direction

▶ Fill direction
- Re-order well types

▶ Re-order well types

Re-order well types

Each of the different well types may be reordered (change filling sequence) separately from each other so that they start with a different number.

To reorder each well type separately,;

1.

Go to **Fill Ordering**.
2.

Check the corresponding box next to the well type, and leave the rest unchecked.
3.

Press **Reorder** button.

Re-order well types

☐ Samples ☐ Standards ☒ Controls ☐ Liquid Controls

☐ Empty wells

Cancel

Reorder

Check the box next to the well type to reorder.

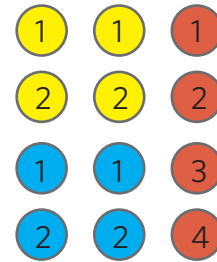
EXAMPLE

The arrangement of the fill orders shown on the right was configured using:

Standards = 2 wells per sample; horizontal fill.

Controls = 2 wells per sample; horizontal fill.

Samples = 1 well per sample; vertical fill.



Note: The reorder method step will have to be performed a few times to get the desired fill orders for all the well types.

Re-order well types

☐ Samples ☒ Standards ☐ Controls ☐ Liquid Controls

☐ Empty wells

Cancel Reorder

Re-order well types

☐ Samples ☐ Standards ☒ Controls ☐ Liquid Controls

☐ Empty wells

Cancel Reorder

Re-order well types

☒ Samples ☐ Standards ☐ Controls ☐ Liquid Controls

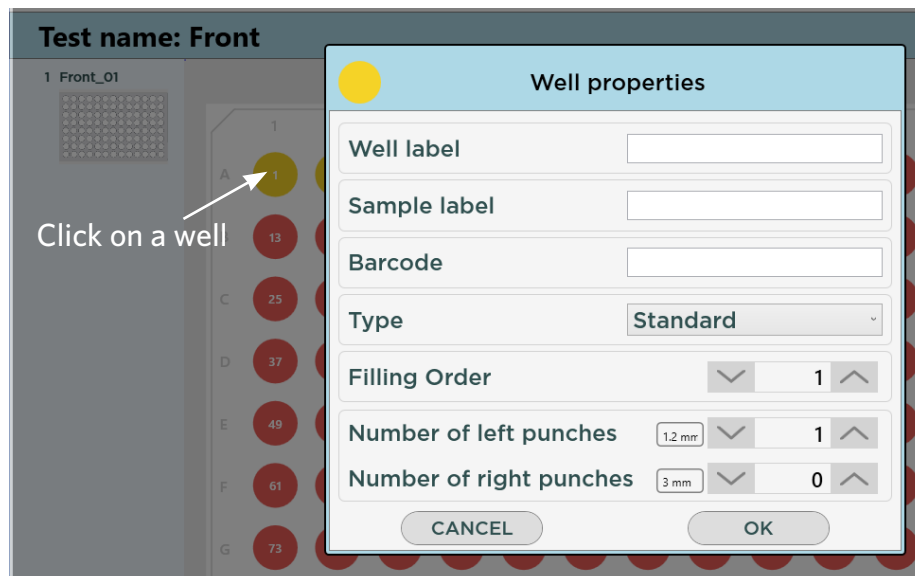
☐ Empty wells

Cancel Reorder

See Appendix 2 for more examples.

Well properties

- ▶ Click on any well to bring up Well properties.
- ▶ The top three empty fields may be pre-filled or left blank.
- ▶ The bottom half of the window shows the current assigned well type, it's fill order, and punch size. These settings may be modified here.



Well properties

10.5 NAMING OF STANDARDS AND CONTROLS

To assign custom name to standard and control wells,

1. Click on a well to bring up the **Well Properties** (see above image).
2. Type in a custom name next to **Well label**.
3. Press OK.

10.6 INPUT FILES

The Input (or worklist) files may be imported to a test to determine the punch filling order. Worklists may be imported from a LIMS system or can be created by the user with a text editor, such as Notepad. The main purpose of an input file is to specify the barcodes for each well in the test.

The barcodes are then checked with those scanned by the barcode reader. The user has the option to skip a card if the correct card is not available for punching. If a card is skipped the corresponding well is also skipped and will not contain any disks. Processing will then continue from the next card in the input file. The barcodes are also checked for duplicates.

- ▶ In Test Editor, press the **Import Input File** button.
- ▶ Check the Load input file checkbox.
- ▶ Locate your *.txt file and click **OK**.
- ▶ To import different import files each time when punching, check the prompt for input file checkbox, and click **OK** without locating your *.txt file.
- ▶ The program will prompt you to select an input file when you begin punching.
- ▶ If the input file format is not appropriate, an error message will appear.

Input File Example

The Input file contains two components, the Plate Data and the Well Data. The files can be created by the user with a text editor in .txt format.

Plate Data

Well Data

```
Small Punch Per Well Sample;3
Large Punch Per Well Sample;3
Comment;Comment for all
Plate barcode;ANY*
Well ID;Plate Number;Barcode
A01;1;BARCODE1
A02;1;BARCODE2
A03;1;BARCODE3
B01;1;BARCODE4
B02;1;BARCODE5
B03;1;BARCODE6
C01;1;BARCODE7
C02;1;BARCODE8
C03;1;BARCODE9
C04;1;BARCODE10
C05;1;BARCODE11
C06;1;BARCODE12
```

Well Data
Field Names

input-file.txt

Plate Data

Plate data is optional, and defines the settings applied for the plate(s). Each line consists of a key (a field name) – value pair separated by semicolons (;) or commas (,).

FIELD NAME	DESCRIPTION
Small Punch Per Well Sample	The number of smaller punches required for each Sample well *equivalent to the left punch count.
Large Punch Per Well Sample	The number of larger punches required for each Sample well *equivalent to the right punch count.
Small Punch Per Well Control	The number of smaller punches required for each Control well *equivalent to the left punch count.
Large Punch Per Well Control	The number of larger punches required for each Control well *equivalent to the right punch count.
Small Punch Per Well Standard	The number of smaller punches required for each Standard well *equivalent to the left punch count.
Large Punch Per Well Standard	The number of larger punches required for each Standard well *equivalent to the right punch count.
Small Punch Per Well Liquid Control	The number of smaller punches required for each Liquid Control well *equivalent to the left punch count.
Large Punch Per Well Liquid Control	The number of larger punches required for each Liquid Control well *equivalent to the right punch count.
Well Per Sample	The number of wells per sample for Sample wells (1 by default).
Well Per Control	The number of wells per sample for Control wells (1 by default).
Well Per Standard	The number of wells per sample for Standard wells (1 by default).
Well Per Liquid Control	The number of wells per sample for Liquid Control wells (1 by default).
Comments	Any comments for all plates/a specified plate.
Plate Barcode	Plate barcode patterns used when evaluating the scanned barcode. “?” is set by default.



NOTE: Comments and Plate Barcode can be specified for an individual plate by specifying the target plate number within parameters following the field name, e.g. Comments(1);Any comments for Plate 1 sets the comment “Any comments for Plate 1” to Plate 1.

Well Data

Well Data comes after the Plate Data to define the settings for each well. The first line is columns (field names), and the following lines are rows that define the values corresponding to the fields. Fields and values are separated by semicolons (;) or commas (,). One line is required for one well. Fields other than the Plate Number and the Well ID are optional; however empty values cannot be accepted for any fields.

FIELD NAME	REQUIREMENT	DESCRIPTION
Plate Number	Required	Plate number in the test.
Well ID	Required	Same as grid reference. Consists 1 letter and 2 digits (e.g. A01).
Barcode	Optional	Barcode of the sample.
Well Type	Optional	Can be selection from Well Type Options (below). Sample is set by default if the column is not given.
Left Punch	Optional	Number of left punches required.
Right Punch	Optional	Number of right punches required.
Well Label	Optional	Additional information for the well.
Sample Label	Optional	Additional information for the sample.

NOTE: Make sure that there is no blank line at the end of the input file.

Input File Example

(Plate 1)

BEFORE INPUT FILE

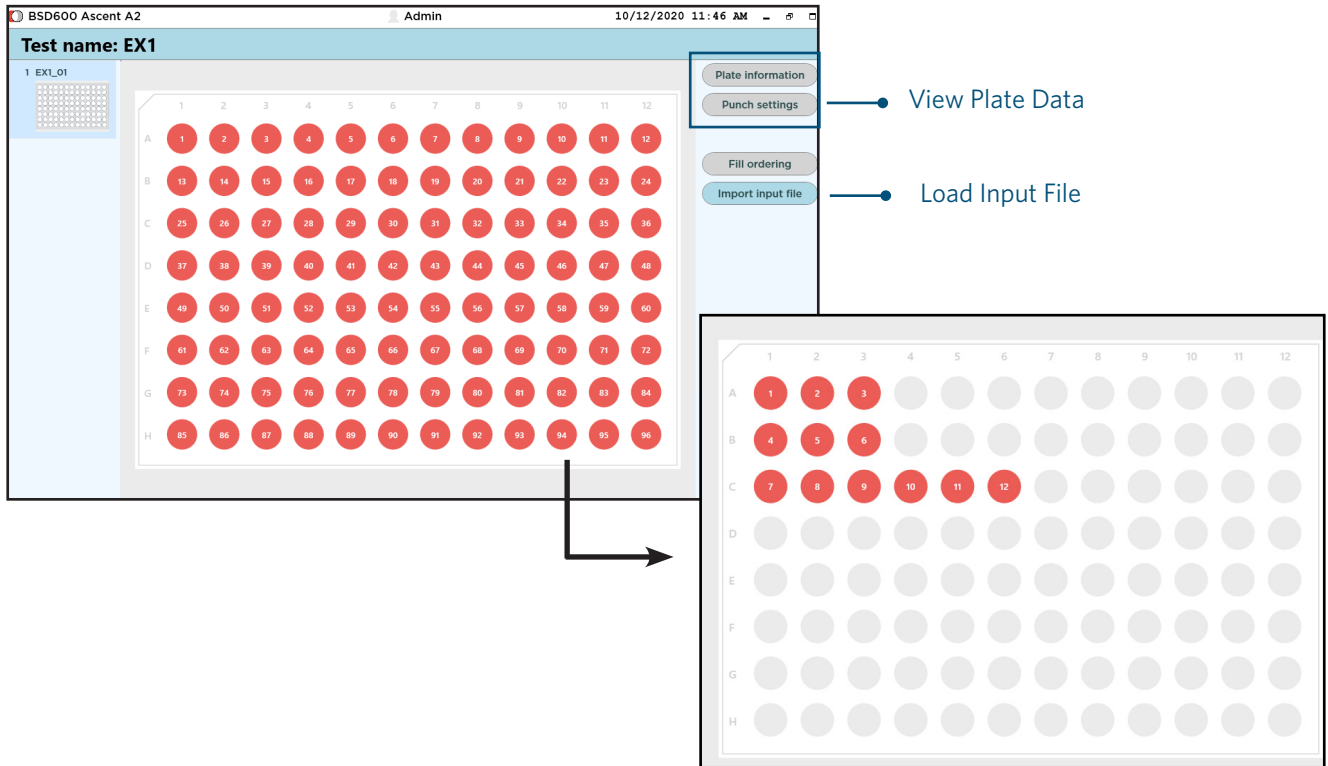


PLATE DATA AFTER INPUT FILE LOADED

Information - EX1_01

Barcode matching string **ANY***

Comments
Comment for all

☐ Apply to all plates in test

CANCEL OK

Punch settings

Sample
 1 mm 3 3 mm 3

Standard
 1 mm 1 3 mm 0

Control
 1 mm 1 3 mm 0

CANCEL OK

10.7 BSD Studio Integrator

The BSD Studio Integrator plugin provides the flexibility for the user to be able to choose the desired template from the BSD integrator for the specific test. Dependent on the number of selected templates, the BSD Studio Integrator provides different output files suited to specific applications.

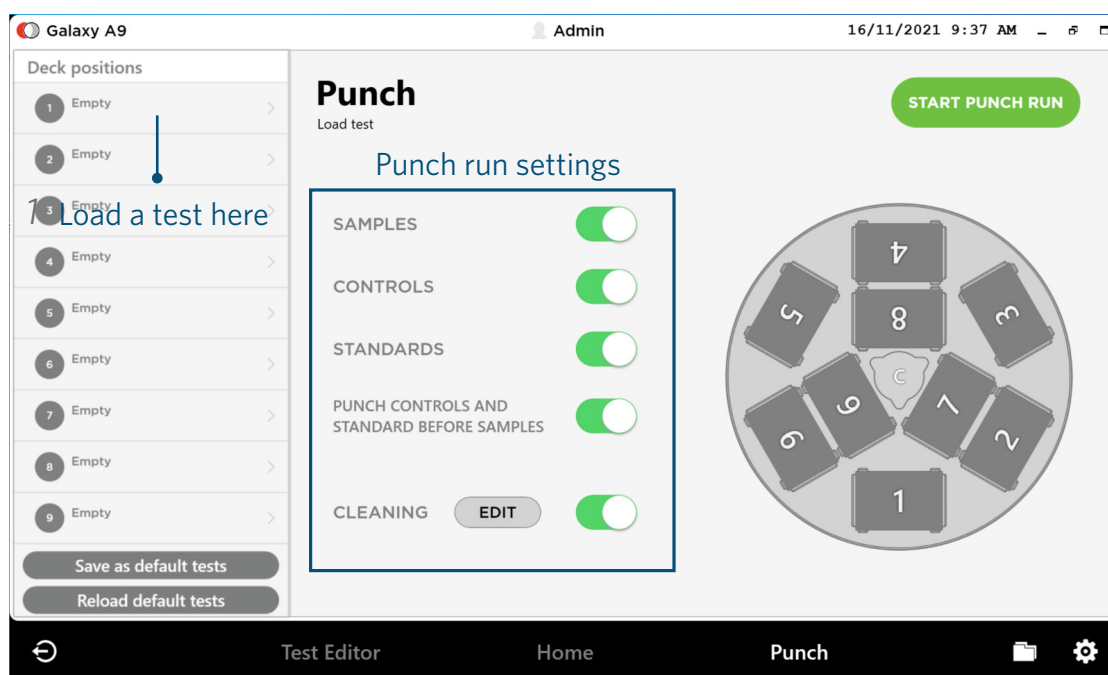


11 PUNCH

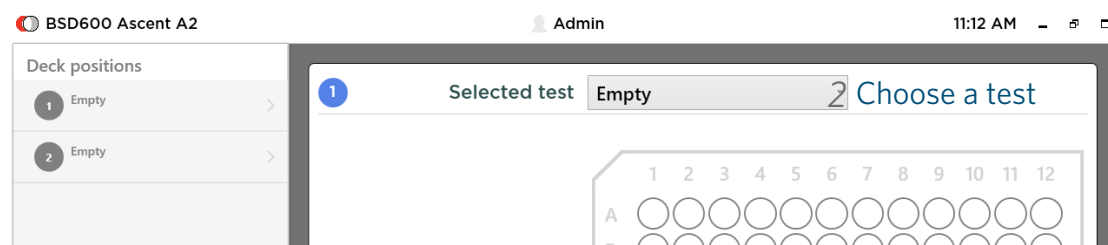
Once the instrument profile settings have been configured, the deck positions are calibrated, and a test or tests are created, proceed to the PUNCH menu, located on the bottom toolbar.

11.1 LOADING A NEW TEST

1. Select an **Empty** plate from the left column (see image below).
2. Choose a test from the drop-down menu.
3. Check that test configurations are correct.
4. Close screen.



Loading a test.



Choose a predefined test from the list.

1

Selected test

Plate123

3

Plate name

Plate123_01

Test comments

Punches per well

1 mm

1

1 mm

1

1 mm

1

3 mm

0

3 mm

0

3 mm

0

Test enabled

☒

4

Close

	1	2	3	4	5	6	7	8	9	10	11	12
A	1	1	1	9	17	25	33	41	49	57	65	73
B	2	2	2	10	18	26	34	42	50	58	66	74
C	1	1	3	11	19	27	35	43	51	59	67	75
D	2	2	4	12	20	28	36	44	52	60	68	76
E			5	13	21	29	37	45	53	61	69	77
F			6	14	22	30	38	46	54	62	70	78
G			7	15	23	31	39	47	55	63	71	79
H			8	16	24	32	40	48	56	64	72	80

Test selected.

Well D02

Change well label

Change sample label

Change barcode

Edit comment

Change punches

Disable well

Go to sample

Inspect well

Well information

Cancel

Well properties

Double-click on any well to view or edit any labels, barcode or comments. Note that the assigned well types cannot be changed in this screen.

Well Information

Clicking on the Well Information button will bring up the current information of that specific well.

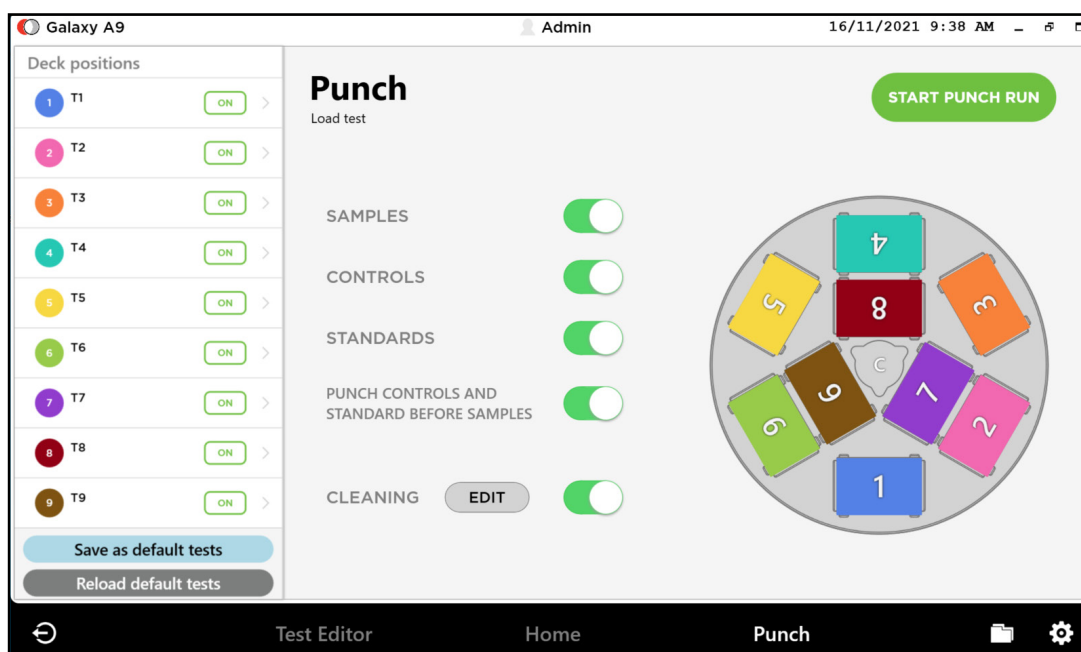
Note: This information is updated during the punch run (i.e. barcode will be scanned in, total punches will be recorded).

Well information - G06	
Parameter	Value
Grid reference	G06
Barcode	
Well label	
Sample label	
Comment	
Status	
Well type	Sample
Fill order	31
Total punches	0/1
Right punches	0/0
Left punches	0/1
Plate number	1
Deck position	0
OK	

Well information of G06 well (before punching)

Load the rest of the tests

- Repeat the steps above to load subsequent plate/s, by clicking on another “Empty” slot in the left column.



Nine tests loaded (in BSD Galaxy A9 profile).

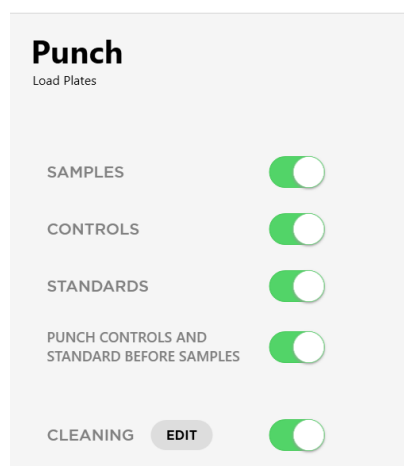
Save as default tests

This feature aims to assist laboratories that have a routine set number of tests for daily operation, saving time and offering speed of operation. User simply selects the preferred tests on the deck positions and press Save as default tests button. This allows the user to turn on the software with the default tests loaded and ready to run. If the selected test has been changed in the test editor, the user will need to reload the default tests to be up to date.

11.2 PUNCH STANDARDS AND CONTROLS

Before starting the punch run, toggle the buttons to enable or disable punching of Samples, Standards, Controls and/or Cleaning Punch. (These well types have been defined in the test already).

- Toggle types of wells you want punched.

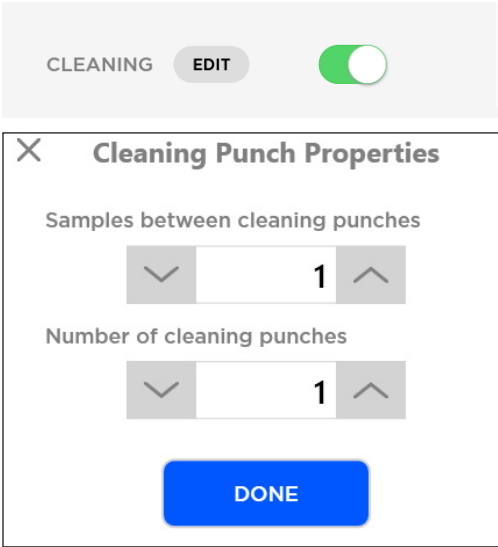


11.3 CLEANING PUNCH

Cleaning punch are disks that will be discarded. A cleaning punch is usually performed using clean filter paper such as Whatman 903 after each sample, to reduce cross-contamination into the next sample.

To edit Cleaning Punch settings,

- 1. Toggle the button to enable Cleaning Punch.
- 2. Select the **Edit** button in the Punch screen.
- 3. Use the arrow buttons to choose how many cleaning punches are required.
- 4. Set how many samples between cleaning.
- 5. Click **Done**.



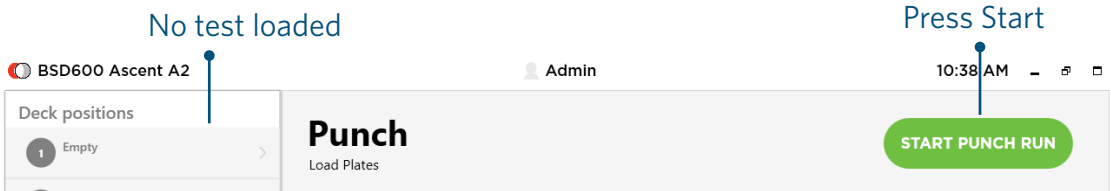
Set cleaning punches

11.4 START PUNCH

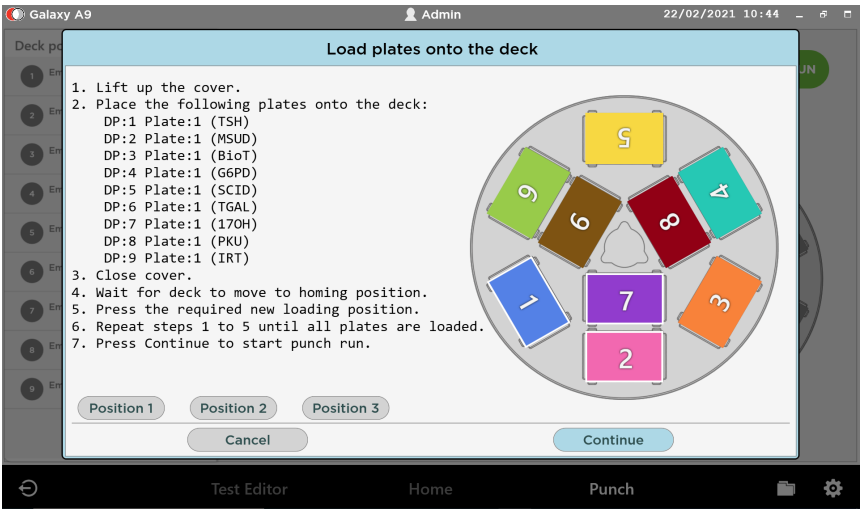
After tests have been loaded,

- Press the **START PUNCH RUN** button in the top right corner.

Note: If you try to click on the **START PUNCH RUN** button without any test plates loaded, you will be asked to load new tests.



Follow the instructions on the popup window. It is important to wait for the internal calibration and deck movements to stop before continuing.



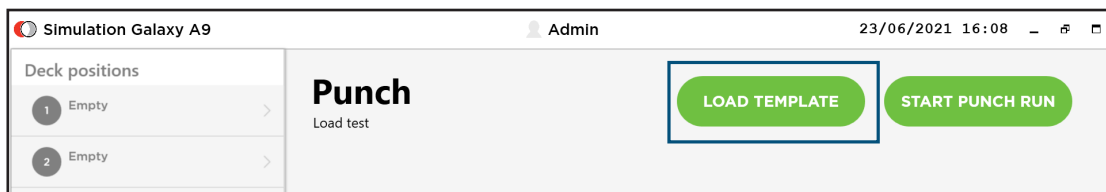
Follow instructions and wait for all movements to stop before continuing.

- Press Scan barcodes to scan plate barcodes or to manually enter them in.
- Click Continue to proceed.

11.5 LOADING A SAVED TEMPLATE

User may choose to load a previously saved punch template (or test groups) to save time. See Section 11.9 on how to save punch templates.

- ▶ Press **LOAD TEMPLATE** button.
- ▶ Select a saved test from the list.
- ▶ Press **Done**.



The LOAD TEMPLATE button only appears if there are saved test groups.

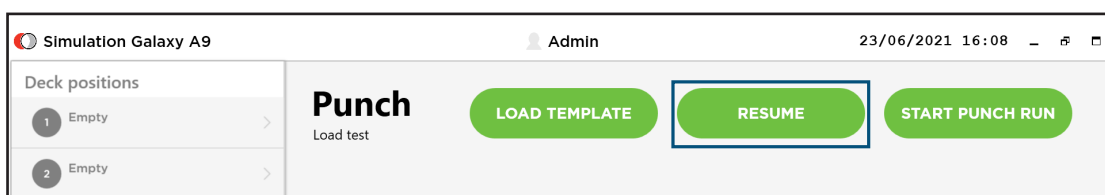
Delete a saved template

- ▶ Press **LOAD TEMPLATE** button.
- ▶ Right-click or long press (Touch screen) on the saved template name.
- ▶ Select **Yes** to delete template.

11.6 RESUME A SAVED PUNCH RUN

Punch runs that are ended before all punches are complete can be saved for later resumption. This is useful if not all samples are available at the time of punching and the plate can be filled with several punch runs.

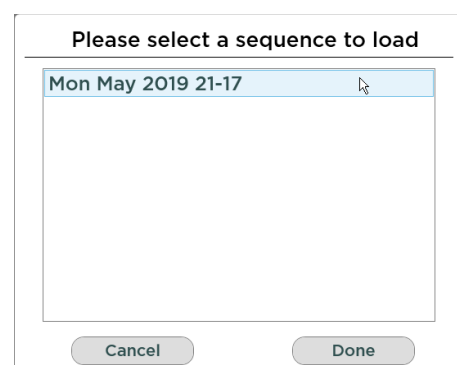
- ▶ Press **RESUME** button to continue a saved punch run.



Press RESUME to continue a saved punch run.

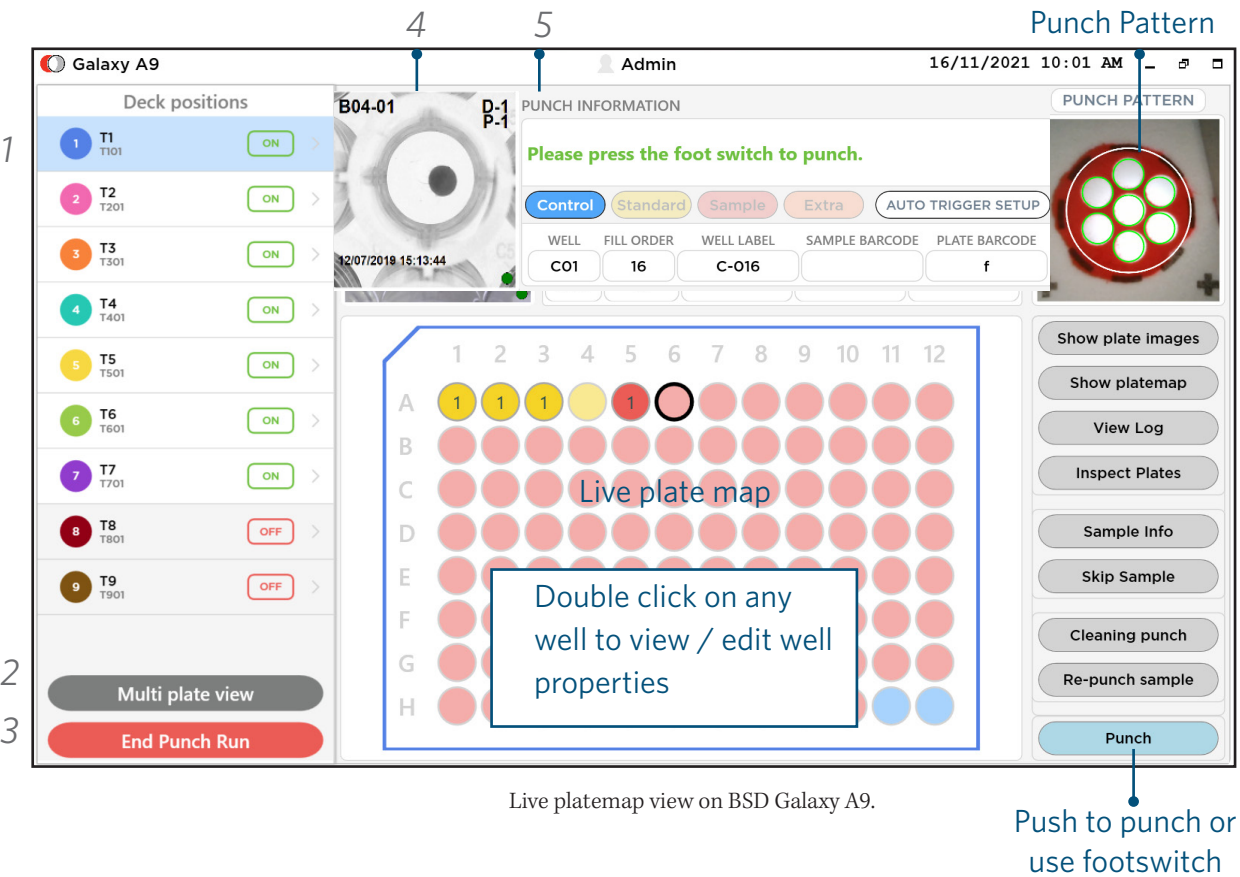
Delete a saved partial punch run

- ▶ Press **RESUME** button.
- ▶ Select the test.
- ▶ Right-click or long press (Touch screen) to delete test sequence.



11.7 LIVE PLATEMAP OVERVIEW

The live platemap view will give a real-time progress of the test/s being punched. The plate validation camera (if enabled) will show each well before the punch and after during the progress of punching.

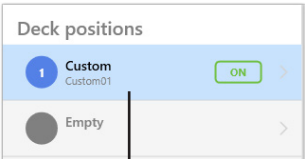


1 Preview tests

The Deck positions column displays the list of tests loaded for the current punch run. Click on a test name to preview the configurations of that test (see next page for examples).

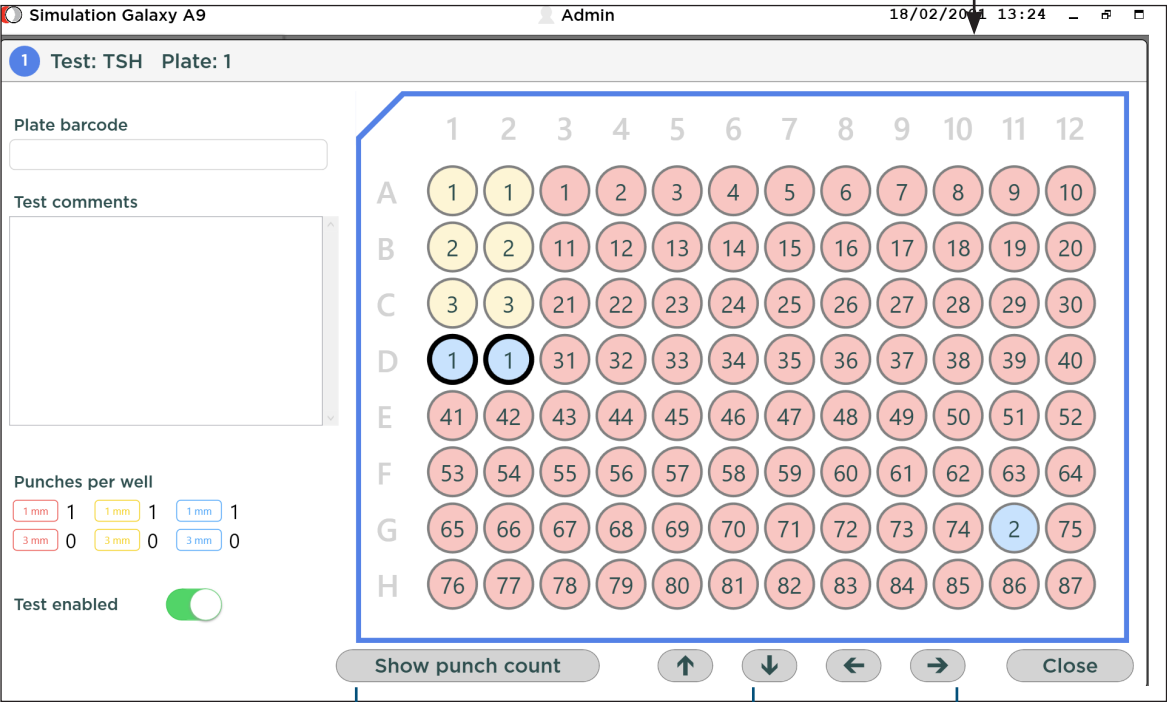
Preview loaded tests

- ▶ Click on the test name listed under Deck positions to bring up test preview window (see below).



The first window that appears will show the fill order of wells.

- ▶ Click on the **SHOW PUNCH COUNT** button to switch display to show the total punch count of punched wells.

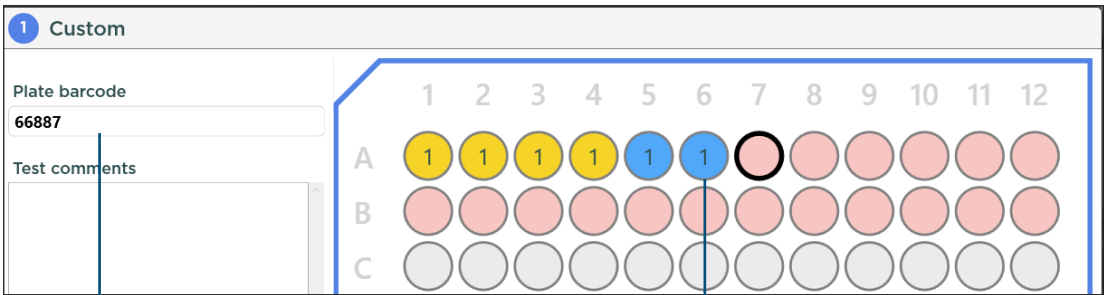


Fill order shown for selected test.

Press this button to toggle between Show punch count and Show fill order.

Use the Next or Previous buttons to cycle through the tests loaded.

Use this button to see different plates in the same test.



Show punch count window. Wells without any numbers are yet to be punched.

Plate barcode

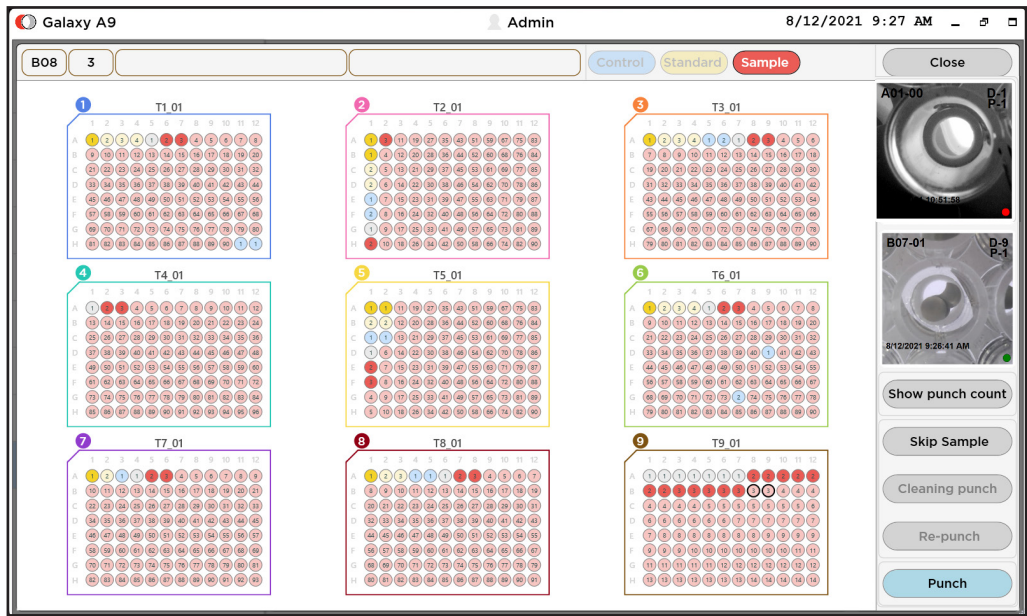
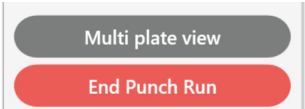
Click on plate barcode field to edit plate barcode.

Well properties

Double-click on any well to view or edit any labels, barcode or comments. Note that the assigned well types cannot be changed in this screen.

2 Multi plate view

Multi plate view provide the full overview of 9 plate in real time. The user can view the next punching position of all 9 plate in this page.

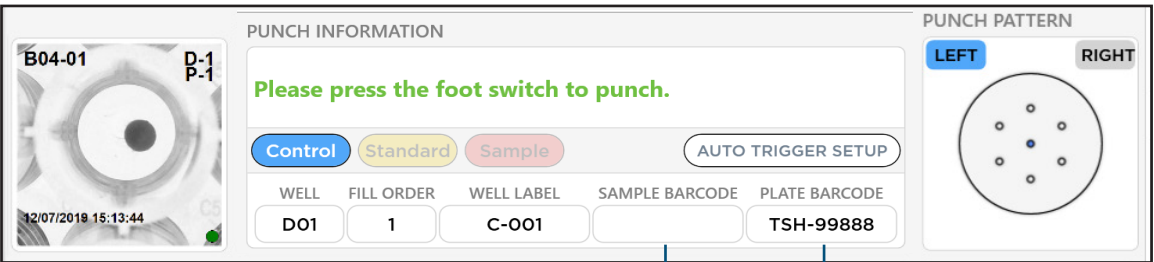


3 End Punch run

To end the current punch run, press **End Punch Run**. If the punch run is incomplete, an option will be provided to save the partially completed punch run (See Section 11.10).

4 Punch Information

This area displays the next action required from the user (shown in green text). It also displays the next Well (grid ref), Fill Order, Well Label (or Sample Label), Sample Barcode and Plate Barcode.



Barcodes may be changed during punch run

- Well
The grid reference of the next sample.
- Fill Order
The fill order of the next sample. If punch run re-ordering is enabled in **Profile Editor > Advanced settings**, this will override the fill order set in the Test Editor for that test.
- Well Label
A label entered into Well properties (see Section 7) or a prefix generated from the automatic punch re-ordering process.

5 Well Camera

Shows the current well that the camera is positioned above. As the punching progresses, the image will update with disks deposited in the corresponding wells. Text may be saved on each photo with: well ID, well label, deck position number, date and time stamp, and barcode (if enabled).

Colour dots:

- white = pre-punch
- green = successful punch
- red = failed punch

Notes:

- If it is a cleaning punch, no image will be shown.
- Well images will look different depending on types of plates used.



PROFILE TYPE
DEPENDENT



Punch Information

Sample Barcode

Before punching each sample, a sample barcode box will pop up (see below) asking to scan the next sample barcode.



Note: This extra confirmation window may be disabled in **Profile > Barcode settings > Auto close barcode query.**

Sample barcode scan



The Sample Barcode and Plate Barcode entries may be changed during a punch run by clicking on the field under the barcode heading. These changes will be reflected in the output file from that particular well / fill order onwards.

Plate Barcode

The plate barcode is usually scanned before starting the punch run. During a punch run, the plate barcode may be changed if required. This is done by clicking on the plate barcode name and typing in a new barcode (or scanning with a HID handheld scanner). If this is changed mid-punch, the output file will reflect the change from that particular Well / fill order onwards.

Administrators may disable any of these changes to Sample or Plate barcodes by **Enforcing Strict Barcodes** in Access Levels.

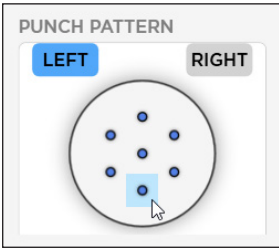
11.8 PUNCH PATTERN

The diagram here identifies which punch head is being used (left or right), and the punch pattern being used in the current test.

Shrink Pattern

In the event that the substance on the sample card is not large enough to be covered by the light targeted pattern, the user can “shrink” the pattern.

- ▶ Click on one of the shaded disks to reduce the light target of the pattern by one light.
- ▶ Use a touch screen stylus to help select the punch pattern.



Galaxy A9 punch pattern

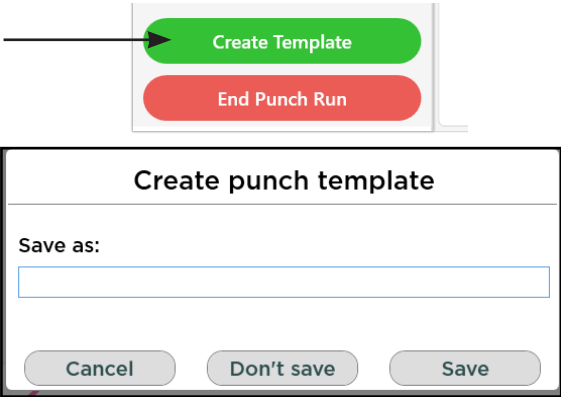
11.9 SAVING A PUNCH TEMPLATE


A BSD punch template is a complete collection of settings that can be stored to make routine workflow easy. The template combines profile settings, preloads the tests and enables the analyst to simply start the software, load the plates on the deck and then start punching, knowing that everything is set as per normal.

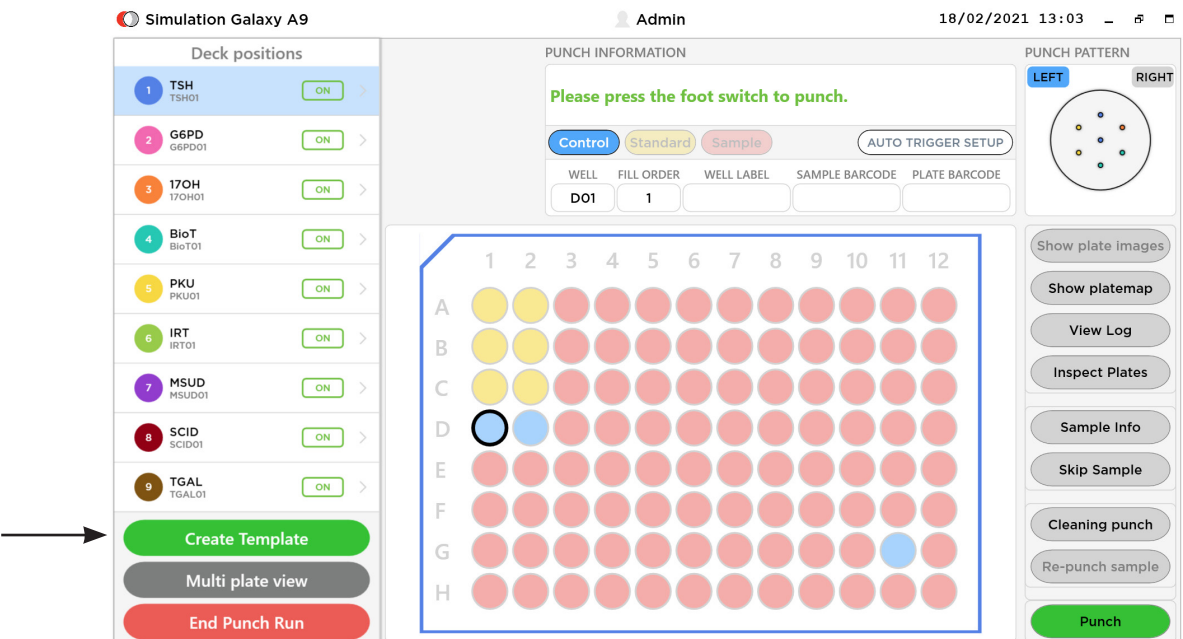
After pressing START PUNCH button, but before the first disk is punched,

- ▶ Press the CREATE TEMPLATE button.

A popup box will appear asking to save the template.



 Note: If a test has been changed in the Test Editor, the saved template does not update with the new changes. Please re-create the template.

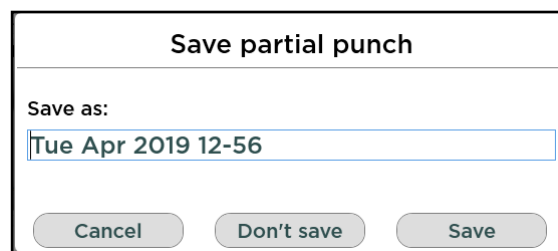


11.10 SAVING AN INCOMPLETE PUNCH RUN

After punch has started, the current test sequence may be saved to be continued at a later date.

A popup box will appear asking to save the punch.

- ▶ Press **END PUNCH RUN**.
- ▶ Save it with the assigned date or create a custom name.



A dialog box titled "Save partial punch". It contains a "Save as:" label followed by a text input field containing "Tue Apr 2019 12-56". Below the input field are three buttons: "Cancel", "Don't save", and "Save".

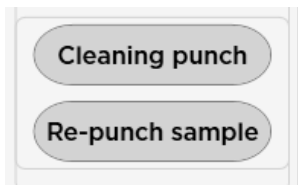
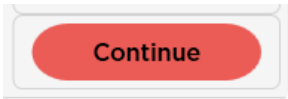

11.11 OTHER PUNCH FUNCTIONS



- | | |
|-------------------|---|
| Show plate images | Brings up a window showing pre and post punch images to compare. |
| Show platemap | Brings up a window showing the platemap and fill orders of all wells. |
| View log | Brings up a detailed table showing completed punches and all the fields associated with that sample. This log is not the final output file. Log file fields are customized in the Profile Editor > Log Settings. |
| Inspect plates | <p>This function will suspend the punch run and move the plate deck towards the front of the instrument, for the user to examine the plate.</p> <ul style="list-style-type: none"> ▶ Use the Left or Right buttons to move the plate deck. |

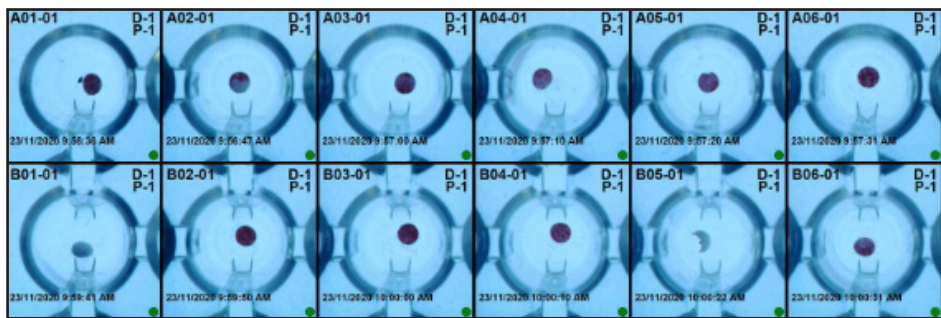


- | | |
|-------------|---|
| Sample Info | <p>Sample info will show details of the next sample in line to punch. View details such as well ID, fill order and status - "Loaded" or "Pending".</p> <ul style="list-style-type: none"> ▶ Press Sample Info button. |
| Skip Sample | <p>Should you wish to discard a sample during the punch run,</p> <ul style="list-style-type: none"> ▶ Press Skip Sample button. <p>See Section 11.15 for more information about Skip Sample and Disable Sample options.</p> |

	Cleaning punch	A cleaning punch may be performed at anytime during the punch run.
	Re-punch sample	Re-punches the previous well and adds another disk to that well.
	Continue	The Continue button will appear between Standards, Controls and Samples. Otherwise the green Punch button will display.
	Punch	Press the Punch button or use the footswitch to punch next well.

11.12 SHOW PLATE IMAGES

The SHOW PLATE IMAGES button brings up a screen to show punched wells in the current test. Here you can use the Zoom button, check pre-punch vs post-punch images. Press Done to exit screen.



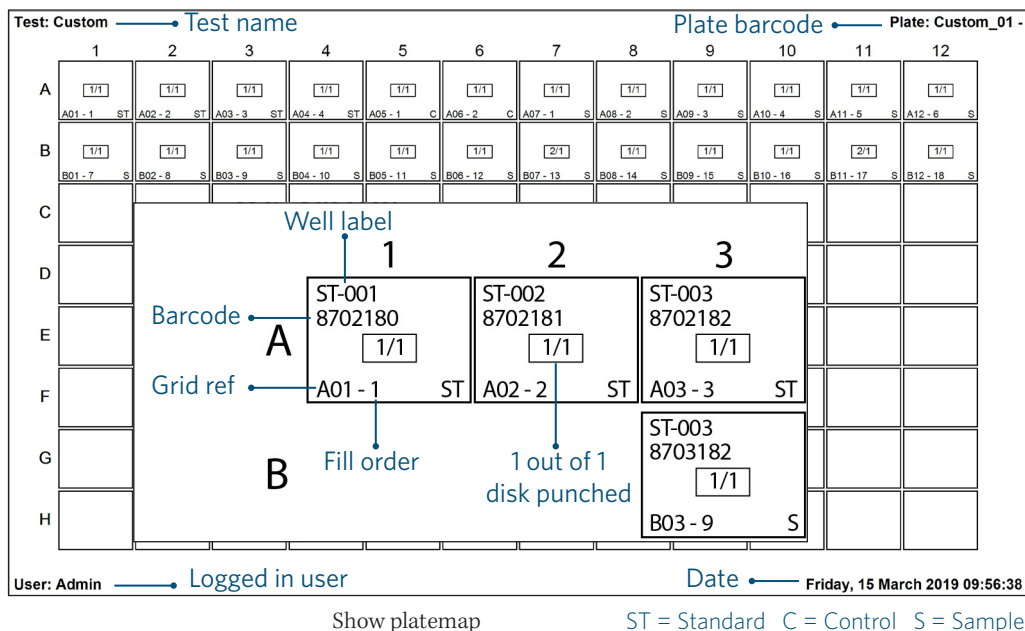
Show plate images (zoomed)

These images are saved to the directory in C:\BSD\images. To configure how these images are saved, go to **Profile Editor > Image Settings**.

11.13 SHOW PLATEMAP

The platemap is useful in identifying the fill orders of the wells and which wells have been punched. Other useful information are: well labels, barcodes, well IDs, no. of disk punched, and type of well.

See an example below.



11.14 VIEW LOG AND OUTPUT FILES

The View Log screen is useful to see the progress of punching in a similar way to a punch output file, only in real time. Please note that the View Log Screen content does not correspond to the output log file.

TestId	DeckPosition	Plate	PlateBarcode	GridRef	WellType	WellLabel	SampleBarcode	FillOrder	TotalPunches	LeftPunches	RightPunches	SpotDetected	Comment
Custom 1	0			A05	Control			1	1	0	1	✓	
Custom 1	0			A06	Control			2	1	0	1	✓	
Custom 1	0			A01	Standard			1	1	0	1	✓	
Custom 1	0			A02	Standard			2	1	0	1	✓	
Custom 1	0			A03	Standard			3	1	0	1	✓	
Custom 1	0			A04	Standard			4	1	0	1	✓	
Custom 1	0			A07	Sample			1	1	0	1	✓	
Custom 1	0			A08	Sample			2	1	0	1	✓	
Custom 1	0			A09	Sample			3	1	0	1	✓	
Custom 1	0			A10	Sample			4	1	0	1	✓	
Custom 1	0			A11	Sample			5	1	0	1	✓	
Custom 1	0			A12	Sample			6	1	0	1	✓	
Custom 1	0			B01	Sample			7	1	0	1	✓	
Custom 1	0			B02	Sample			8	1	0	1	✓	

View log

Output File

Once a punch run is completed, locate the output file saved to the directory specified in the Profile Editor. The filename of each log file will be created as per settings in the Profile Editor. By default it can be found in C:\BSD\logs

- Click on the folder icon on the bottom toolbar to open the folder directory.



11.15 SKIP SAMPLE

At times a sample card may not be available or suitable for punching during a punch run. In this case the Skip Sample feature can be used to skip past punching a sample.

Please note there is a difference between samples and wells if the test is programmed so that one sample is punched into more than one well.

Select skip sample option
To skip to the next sample press the 'Skip sample' button. To disable the wells in the current sample and skip to the next sample, press the 'Disable sample' button.
<div> <div>Cancel</div> <div>Disable sample</div> <div>Skip sample</div> </div>

Disable sample

Marks the sample as disabled, and skips any unpunched disks that may have been configured for that sample. It will proceed to load the next sample.

Note: A disabled well may be re-enabled during the punch run by long press (or double-click) on the disabled well. To see disabled wells in the log file, in **Profile Editor > Log file settings > Tick "Include disabled wells"**.

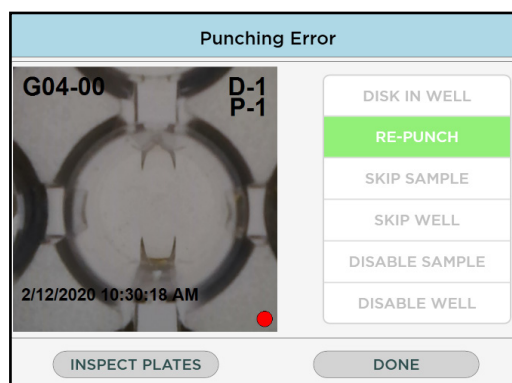
Skip sample

The Skip sample button will skip that well (or multiple wells) in that sample, and proceed to punch the next sample.

Note: If a test is resumed with a skipped sample well, the punch will load starting from the skipped well first. To see skipped wells in the log file, in **Profile Editor > Log file settings > Tick "Include unpunched wells"**.

11.16 PUNCH ERRORS

After pressing the punch button, footswitch or auto-trigger, the punch sequence makes up to three punch attempts to punch the sample. During the sequence the system checks for a disk to pass through the chute to determine that the punch was successful. If the disk detector fails to detect that a disk has passed through the chute after an attempt is made to punch a disk, the system will pause and a prompt will appear on the screen (see below).



Punch errors screen

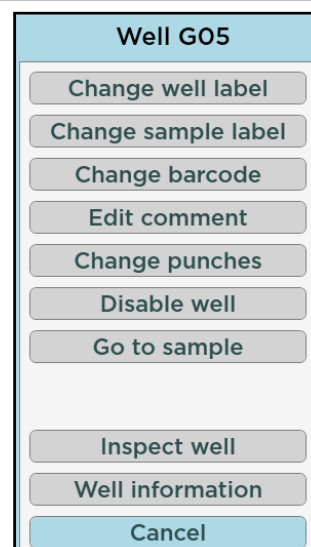
- Choose an option from the list and click Done.

Each of these options will write a comment to the output file.

11.17 WELL PROPERTIES

While in the live plate view during a punch run, the user can click on an individual well to change its properties. These well properties may be changed:

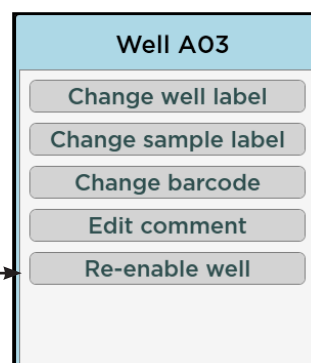
- Change well label
- Change barcode
- Edit a comment
- Change punches - edit the number of punches in that well
- Disable well - disables the sample
- Go to sample - start punching from that well onwards. (Only works on Sample type wells.)



Re-enable a skipped well

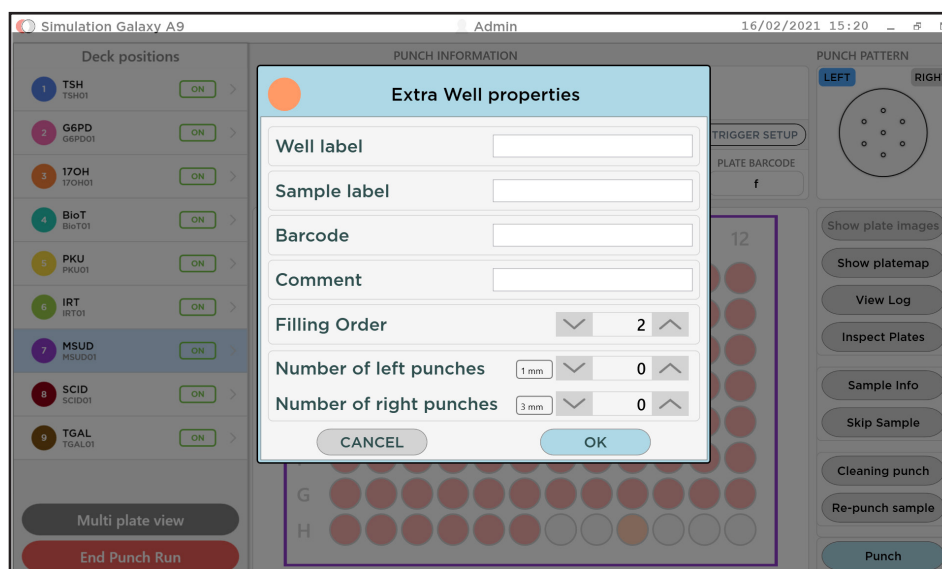
To re-enable a disabled well during a punch run, long press or double-click on the disabled well (shaded grey).

- Click on **Re-enable well** button.



11.18 EXTRA WELL

There is a situation that a user may need to re-punch one of the samples in the empty well for more control or the laboratory receives an emergency sample which needs to be added to the workload. The extra well functions provides an extra well in the test (if there is an unused well).

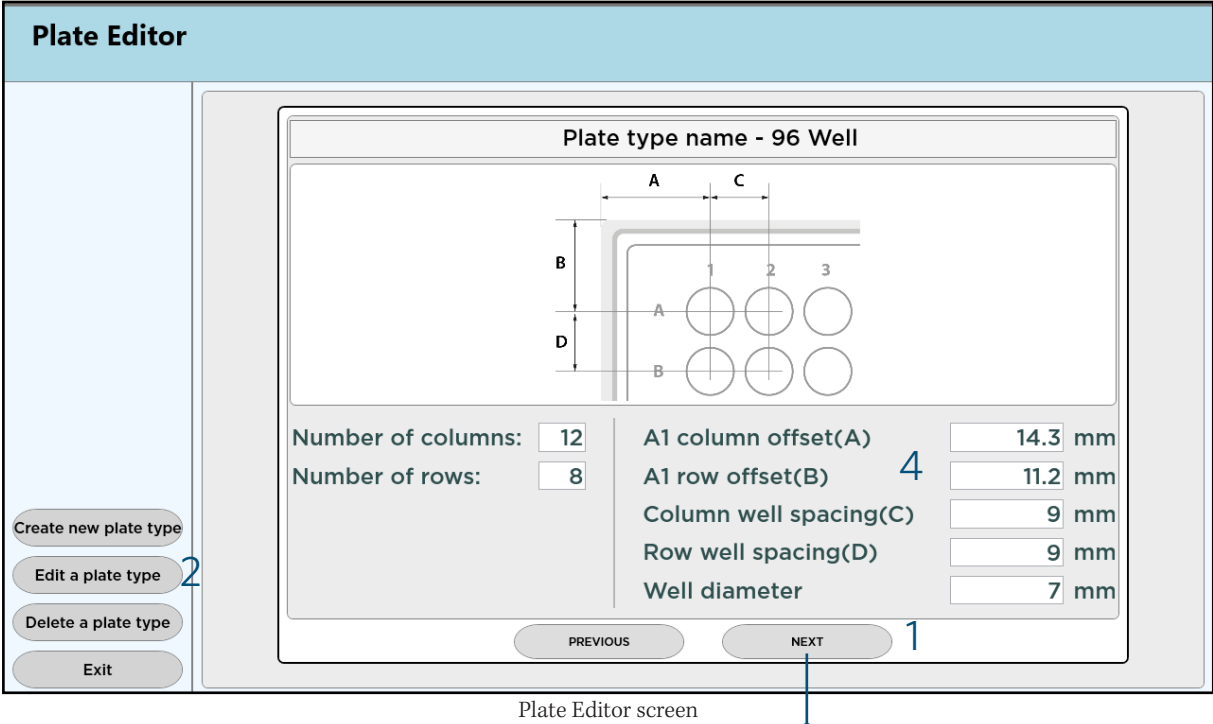


- Click on the unused well
- In the extra well properties choose the number of punches
- Press OK

12 PLATE EDITOR

The Plate Editor allows a supervisor to adjust the measurements of a particular plate template, especially if the plate is non-standard.

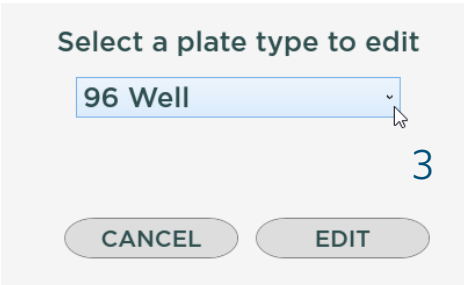
Several plate templates have been added - 12 well, 24 well, 40 well, 48 well, 96 well, 192 well and 384 well.



Browse through plate types

Edit a plate type

1. Use the **NEXT** or **PREVIOUS** button to browse to the desired plate type, e.g. 96 well.
2. Press **Edit a plate type** button.
3. Choose a plate type from the drop-down list and press **EDIT**.
4. Edit the offset and spacing values in the right column. Press **OK**.



It is not recommended to delete any of the default plate templates as it may affect tests that have already been created using these templates.

APPENDIX 1 - BARCODE PATTERNS

Any barcode scanned must match the pattern for that type of barcode.

For example, if the Control barcode pattern is: `CONTROL001`

Then the barcode of ALL controls scanned MUST be “CONTROL001” for the program to proceed.

A number of special or wildcard characters are allowed in the patterns. These are listed below:

- ? Match any individual character.
- # Match any numeric character (0 ... 9)
- @ Match any alphanumeric character (A...Z, a...z , 0...9)
- & Match any alpha character (A..Z, a...z)
- {...} Match with any character from a set of characters (Example: {ABC123})
- * Match with zero or more characters. If the asterisk “*” is at the end of the pattern, it means match all characters to the end of the barcode.
- \ Match the character immediately after the backslash “\” literally.
e.g. \? means match a “?” character, and not just any character.
e.g. \# means match a “#” character, and not a numeric character.

The default pattern is `?*` which means that the barcode must contain at least one character.

Example barcode patterns using Wildcard characters

Example	Pattern Description
#####	Match any barcode that contains five digits
&&&*	Match any barcode that must contain 3 alpha characters followed by any other characters. This would match with a barcode like “ABC00000Z”.
C#####-###	Match any barcode starting with “C” followed by 6 digits, then a “-”, followed by three digits. This would match with a barcode like “C000000-123”
222@###A10##	Match any barcode starting with “222” followed by an alphanumeric character followed by three digits followed by “A10” followed by two digits. This would match with a barcode like “222Z123A1002”.
A{01}#####Z	Match any barcode starting with “A” followed by either “0” or “1” followed by 6 digits followed by “Z”. This would match with a barcode like “A1000000Z”
A*Z	Match any barcode starting with “A” and ending in “Z”. This would match with “AZ”, “A000001Z”, “A123Z”, “AtestnameZ”.
A\#####\#Z	Match any barcode starting with “A#” followed by six digits, followed by “#Z”. This would match with a barcode like “A#123456#Z”.

Table 1 - Barcode pattern wildcards

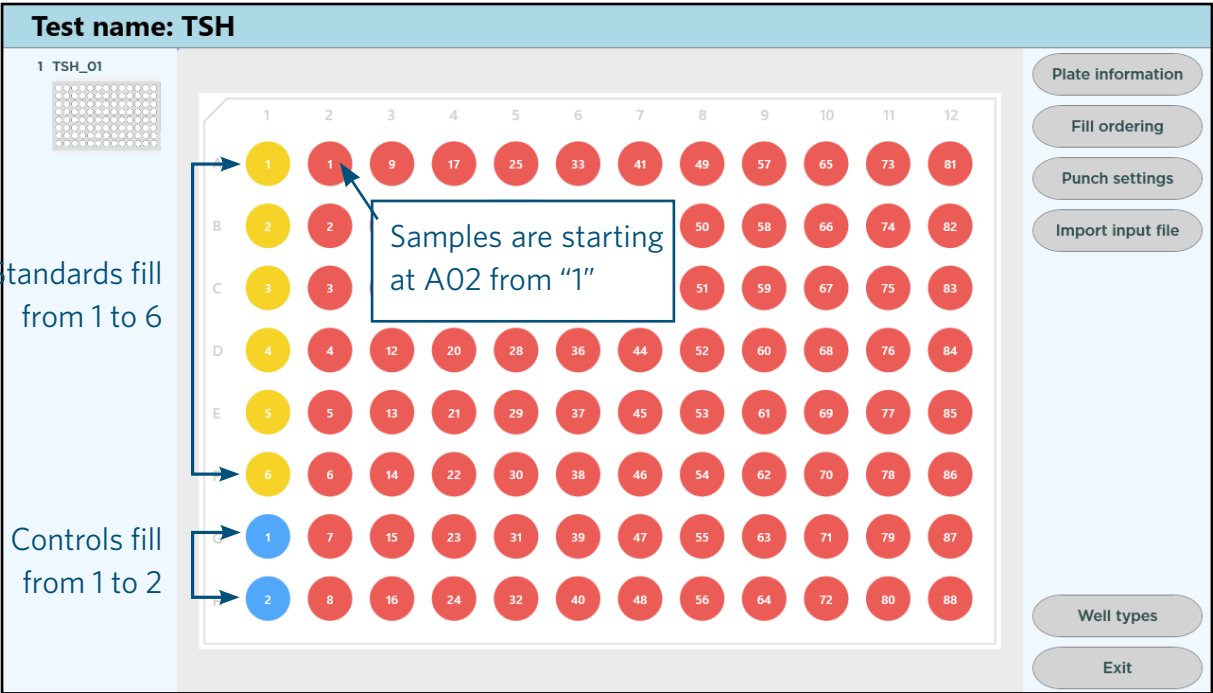
If a plate barcode validation pattern is defined in the Test Editor, it will take both plate patterns into consideration when evaluating the scanned plate barcode. Leaving the default “?” matching pattern in the Profile’s plate barcode settings is recommended.

The only exception is the Samples barcode pattern, which is not defined in the Test Editor and always take their validation pattern from the Samples barcode pattern from the Profile Editor.

APPENDIX 2 - RE-ORDERING TESTS

This section describes how to create two different tests that will be loaded in the same punch run. Each test has different fill orders for their standards and controls, but the same fill order for the Sample well types.

The aim of this exercise is to re-create the platemaps show below for two tests biochemical tests each with standards and controls that are specific to the assays. The two tests will receive punches from the same sample cards but use different cards for standards and controls.



TSH test platemap with 6 standards and 2 controls



PKU test platemap with 4 standards and 2 controls

CREATE NEW TEST 'TSH'

Assign 1 punch to each well type

Click on a well types first, then click on the platemap.

1. Follow instructions on Section 10.1 to create a new test named "TSH".
2. Press **Fill ordering** > **Fill direction** > Vertical > OK.
3. Press **Punch settings** > Assign a value of "1" to each Sample, Standard and Control > OK.

Assign well types

1. Press **Well types** > press **Standards** > Start clicking on the first 6 wells in the platemap to convert them to Standards.
2. Press **Controls** > Click on the next 2 wells to make them Controls.
3. Press **Plate edit** button to return to main screen.

By default, the Samples are numbered from 1 to 96 in a 96-well plate. After converting some wells to Standards and Control type wells, a user may want to re-order (or re-number) the fill order of wells.

Re-ordering Control wells

Re-order Control wells

To re-order the Controls:

1. Press **Fill ordering**
2. **Re-order well types** > Tick the box next to the Controls.
3. Untick the rest.
4. Press OK.

The platemap will update and re-order the Controls fill order.

Re-ordering Sample wells

Re-order Sample wells

To re-order the Samples:

1. Press **Fill ordering**
2. **Re-order well types** > Tick the box next to the Samples.
3. Untick the rest.
4. Press OK.

The platemap will update the Samples fill order.

CREATE SECOND TEST 'PKU'

Repeat the same steps as in previous page to create a second test and name it "PKU". Instead of having 6 Standards, this time only set to 4 Standards and 2 Controls.

As the TSH and PKU tests use different Standards and Controls, we want their fill order to be different from each other.

Re-order Standard wells

1. Press **Fill ordering**.
2. **Start position** > Set to "7".
3. **Re-order well types** > Tick Standards only.
4. Press OK.

The screenshot shows the 'Well reordering tool' dialog box. At the top, 'Wells per sample' is set to 1 and 'Start fill order' is set to 7. Under 'Fill start position', 'Top left' is selected. Under 'Fill direction', 'Vertical' is selected. In the 'Re-order well types' section, the 'Standards' checkbox is checked and circled in blue. Other checkboxes for 'Samples', 'Controls', 'Liquid Controls', and 'Empty wells' are unchecked. 'Cancel' and 'Reorder' buttons are at the bottom.

Re-ordering Standard wells to start from '7'

Re-order Control wells

1. Press **Fill ordering**.
2. **Start position** > Set to "3".
3. **Re-order well types** > Tick Controls only.
4. Press OK.

The screenshot shows the 'Well reordering tool' dialog box. 'Wells per sample' is 1 and 'Start fill order' is 3. 'Top left' is selected for 'Fill start position' and 'Vertical' for 'Fill direction'. In the 'Re-order well types' section, the 'Controls' checkbox is checked and circled in blue. 'Samples', 'Standards', 'Liquid Controls', and 'Empty wells' are unchecked. 'Cancel' and 'Reorder' buttons are at the bottom.

Re-ordering Control wells to start from '3'

Re-order Sample wells

1. Press **Fill ordering**.
2. **Start position** > Set to "1".
3. **Re-order well types** > Tick Samples only.
4. Press OK.

The screenshot shows the 'Well reordering tool' dialog box. 'Wells per sample' is 1 and 'Start fill order' is 1. 'Top left' is selected for 'Fill start position' and 'Vertical' for 'Fill direction'. In the 'Re-order well types' section, the 'Samples' checkbox is checked and circled in blue. 'Standards', 'Controls', 'Liquid Controls', and 'Empty wells' are unchecked. 'Cancel' and 'Reorder' buttons are at the bottom.

Re-ordering Sample wells to start from '1'

APPENDIX 3 - PUNCH RUN RE-ORDERING

This advanced setting is found in the Profile Editor. It allows automatic punch run re-ordering of both **WELL LABELS** and **FILL ORDERS** for each test as they are loaded, immediately before a punch run is started.

For example, take the two tests created below with default fill orders. They are both numbered 1 to 96 sequentially. The aim of this exercise is to re-order (or re-number) the controls and samples in the TSH test to start from “1”; and re-order all the numbers in the PKU test.

	1	2	3	4	5	6	7	8	9	10	11	12
A	1	9	17	25	33	41	49	57	65	73	81	89
B	2	10	18	26	34	42	50	58	66	74	82	90
C	3	11	19	27	35	43	51	59	67	75	83	91
D	4	12	20	28	36	44	52	60	68	76	84	92
E	5	13	21	29	37	45	53	61	69	77	85	93
F	6	14	22	30	38	46	54	62	70	78	86	94
G	7	15	23	31	39	47	55	63	71	79	87	95
H	8	16	24	32	40	48	56	64	72	80	88	96

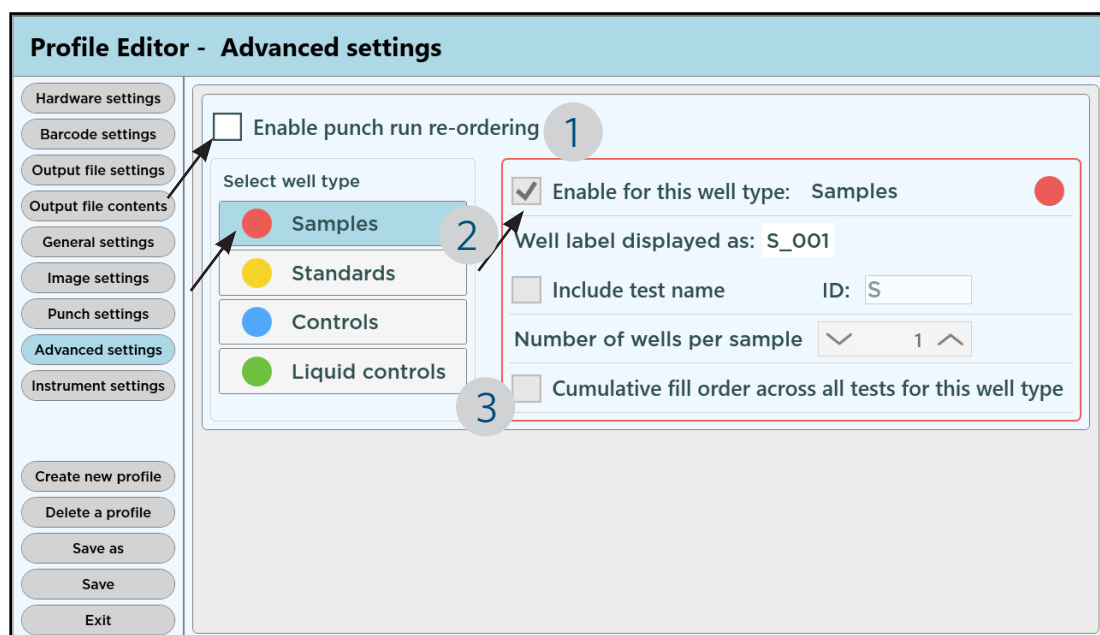
Test 1 - TSH

	1	2	3	4	5	6	7	8	9	10	11	12
A	1	9	17	25	33	41	49	57	65	73	81	89
B	2	10	18	26	34	42	50	58	66	74	82	90
C	3	11	19	27	35	43	51	59	67	75	83	91
D	4	12	20	28	36	44	52	60	68	76	84	92
E	5	13	21	29	37	45	53	61	69	77	85	93
F	6	14	22	30	38	46	54	62	70	78	86	94
G	7	15	23	31	39	47	55	63	71	79	87	95
H	8	16	24	32	40	48	56	64	72	80	88	96

Test 2 - PKU

1 How to re-order well types with Advanced Settings

1. Go to Profile Editor > Advanced settings > Tick **Enable punch run re-ordering** (see below).



Advanced settings - Punch run re-ordering

2. Under **Select Well Type**, highlight **Samples** and tick **Enable for this well type: Samples**.
3. Untick “Cumulative fill order across all tests...”

Enabling the cumulative fill order across all tests will make each test start from number “1” for that well type. When this box is left unticked, the fill order resets for the next plate.

4. Next select the **Standards** box.
5. Check that Standards is Enabled.
6. Tick “Cumulative fill order across all tests ...”

The screenshot shows the 'Standards' configuration panel. On the left, under 'Select well type', the 'Standards' option (yellow circle) is selected, indicated by a blue highlight and a circled '4'. On the right, the 'Enable for this well type: Standards' checkbox is checked, indicated by a circled '5'. Below it, 'Well label displayed as: ST_001' is shown. The 'Include test name' checkbox is unchecked, and the 'ID' field contains 'ST'. The 'Number of wells per sample' is set to '1'. At the bottom, the 'Cumulative fill order across all tests for this well type' checkbox is checked, indicated by a circled '6'.

This setting will make the Standards in the PKU test start from “7”.

7. Repeat steps 4 to 6 above for Controls.

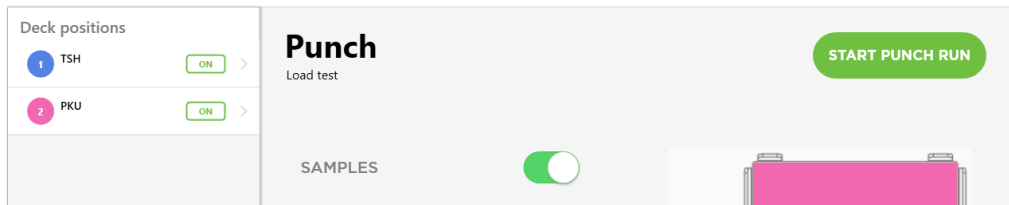
The screenshot shows the 'Controls' configuration panel. On the left, under 'Select well type', the 'Controls' option (blue circle) is selected, indicated by a blue highlight and a circled '7'. On the right, the 'Enable for this well type: Controls' checkbox is checked, indicated by a blue circle. Below it, 'Well label displayed as: C_001' is shown. The 'Include test name' checkbox is unchecked, and the 'ID' field contains 'C'. The 'Number of wells per sample' is set to '1'. At the bottom, the 'Cumulative fill order across all tests for this well type' checkbox is checked, indicated by an arrow.

This setting will make the Controls in the TSH test start from “1”, and the Controls in the PKU test start from “4”.

SAVE AND EXIT PROFILE EDITOR

2 Load tests and start punch

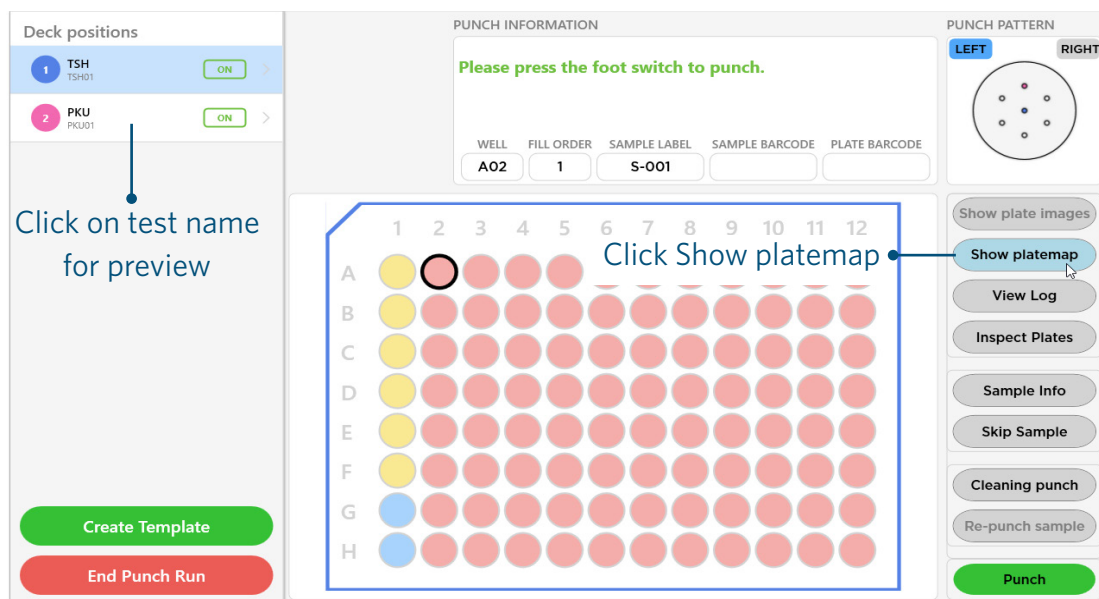
Once the Advanced Settings for punch run re-ordering has been set, load the two tests TSH and PKU and press **START PUNCH RUN**.



Load tests and start punch run.

3 Show fill order with platemap or test preview

Before punching, use the **Show platemap** button or click on the test name to look at the new fill orders.



Tests loaded - press Show platemap button

Notice how the platemap below shows the punch run re-ordering that was set up in the Profile Editor > Advanced Settings. This fill order is now different to the one originally created in the Test Editor (which was numbered sequentially 1,2,3,4, etc.).

Test: TSH												Plate: TSH_01 -											
	1	2	3	4	5	6	7	8	9	10	11	12											
A	ST-001	S-001	S-009	S-017	S-025	S-033	S-041	S-049	S-057	S-065	S-073	S-081											
	A01 - 1 ST	A02 - 1 S	A03 - 9 S	A04 - 17 S	A05 - 25 S	A06 - 33 S	A07 - 41 S	A08 - 49 S	A09 - 57 S	A10 - 65 S	A11 - 73 S	A12 - 81 S											
B	ST-002	S-002	S-010	S-018	S-026	S-034	S-042	S-050	S-058	S-066	S-074	S-082											
	B01 - 2 ST	B02 - 2 S	B03 - 10 S	B04 - 18 S	B05 - 26 S	B06 - 34 S	B07 - 42 S	B08 - 50 S	B09 - 58 S	B10 - 66 S	B11 - 74 S	B12 - 82 S											
C	ST-003	S-003	S-011	S-019	S-027	S-035	S-043	S-051	S-059	S-067	S-075	S-083											
	C01 - 3 ST	C02 - 3 S	C03 - 11 S	C04 - 19 S	C05 - 27 S	C06 - 35 S	C07 - 43 S	C08 - 51 S	C09 - 59 S	C10 - 67 S	C11 - 75 S	C12 - 83 S											
D	ST-004	S-004	S-012	S-020	S-028	S-036	S-044	S-052	S-060	S-068	S-076	S-084											
	D01 - 4 ST	D02 - 4 S	D03 - 12 S	D04 - 20 S	D05 - 28 S	D06 - 36 S	D07 - 44 S	D08 - 52 S	D09 - 60 S	D10 - 68 S	D11 - 76 S	D12 - 84 S											
E	ST-005	S-005	S-013	S-021	S-029	S-037	S-045	S-053	S-061	S-069	S-077	S-085											
	E01 - 5 ST	E02 - 5 S	E03 - 13 S	E04 - 21 S	E05 - 29 S	E06 - 37 S	E07 - 45 S	E08 - 53 S	E09 - 61 S	E10 - 69 S	E11 - 77 S	E12 - 85 S											
F	ST-006	S-006	S-014	S-022	S-030	S-038	S-046	S-054	S-062	S-070	S-078	S-086											
	F01 - 6 ST	F02 - 6 S	F03 - 14 S	F04 - 22 S	F05 - 30 S	F06 - 38 S	F07 - 46 S	F08 - 54 S	F09 - 62 S	F10 - 70 S	F11 - 78 S	F12 - 86 S											
G	C-001	S-007	S-015	S-023	S-031	S-039	S-047	S-055	S-063	S-071	S-079	S-087											
	G01 - 1 C	G02 - 7 S	G03 - 15 S	G04 - 23 S	G05 - 31 S	G06 - 39 S	G07 - 47 S	G08 - 55 S	G09 - 63 S	G10 - 71 S	G11 - 79 S	G12 - 87 S											
H	C-002	S-008	S-016	S-024	S-032	S-040	S-048	S-056	S-064	S-072	S-080	S-088											
	H01 - 2 C	H02 - 8 S	H03 - 16 S	H04 - 24 S	H05 - 32 S	H06 - 40 S	H07 - 48 S	H08 - 56 S	H09 - 64 S	H10 - 72 S	H11 - 80 S	H12 - 88 S											

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Test TSH platemap with wells re-ordered

Test: PKU												Plate: PKU_01 -											
	1	2	3	4	5	6	7	8	9	10	11	12											
A	ST-007	S-003	S-011	S-019	S-027	S-035	S-043	S-051	S-059	S-067	S-075	S-083											
	A01 - 7 ST	A02 - 3 S	A03 - 11 S	A04 - 19 S	A05 - 27 S	A06 - 35 S	A07 - 43 S	A08 - 51 S	A09 - 59 S	A10 - 67 S	A11 - 75 S	A12 - 83 S											
B	ST-008	S-004	S-012	S-020	S-028	S-036	S-044	S-052	S-060	S-068	S-076	S-084											
	B01 - 8 ST	B02 - 4 S	B03 - 12 S	B04 - 20 S	B05 - 28 S	B06 - 36 S	B07 - 44 S	B08 - 52 S	B09 - 60 S	B10 - 68 S	B11 - 76 S	B12 - 84 S											
C	ST-009	S-005	S-013	S-021	S-029	S-037	S-045	S-053	S-061	S-069	S-077	S-085											
	C01 - 9 ST	C02 - 5 S	C03 - 13 S	C04 - 21 S	C05 - 29 S	C06 - 37 S	C07 - 45 S	C08 - 53 S	C09 - 61 S	C10 - 69 S	C11 - 77 S	C12 - 85 S											
D	ST-010	S-006	S-014	S-022	S-030	S-038	S-046	S-054	S-062	S-070	S-078	S-086											
	D01 - 10 ST	D02 - 6 S	D03 - 14 S	D04 - 22 S	D05 - 30 S	D06 - 38 S	D07 - 46 S	D08 - 54 S	D09 - 62 S	D10 - 70 S	D11 - 78 S	D12 - 86 S											
E	C-003	S-007	S-015	S-023	S-031	S-039	S-047	S-055	S-063	S-071	S-079	S-087											
	E01 - 3 C	E02 - 7 S	E03 - 15 S	E04 - 23 S	E05 - 31 S	E06 - 39 S	E07 - 47 S	E08 - 55 S	E09 - 63 S	E10 - 71 S	E11 - 79 S	E12 - 87 S											
F	C-004	S-008	S-016	S-024	S-032	S-040	S-048	S-056	S-064	S-072	S-080	S-088											
	F01 - 4 C	F02 - 8 S	F03 - 16 S	F04 - 24 S	F05 - 32 S	F06 - 40 S	F07 - 48 S	F08 - 56 S	F09 - 64 S	F10 - 72 S	F11 - 80 S	F12 - 88 S											
G	S-001	S-009	S-017	S-025	S-033	S-041	S-049	S-057	S-065	S-073	S-081	S-089											
	G01 - 1 S	G02 - 9 S	G03 - 17 S	G04 - 25 S	G05 - 33 S	G06 - 41 S	G07 - 49 S	G08 - 57 S	G09 - 65 S	G10 - 73 S	G11 - 81 S	G12 - 89 S											
H	S-002	S-010	S-018	S-026	S-034	S-042	S-050	S-058	S-066	S-074	S-082	S-090											
	H01 - 2 S	H02 - 10 S	H03 - 18 S	H04 - 26 S	H05 - 34 S	H06 - 42 S	H07 - 50 S	H08 - 58 S	H09 - 66 S	H10 - 74 S	H11 - 82 S	H12 - 90 S											

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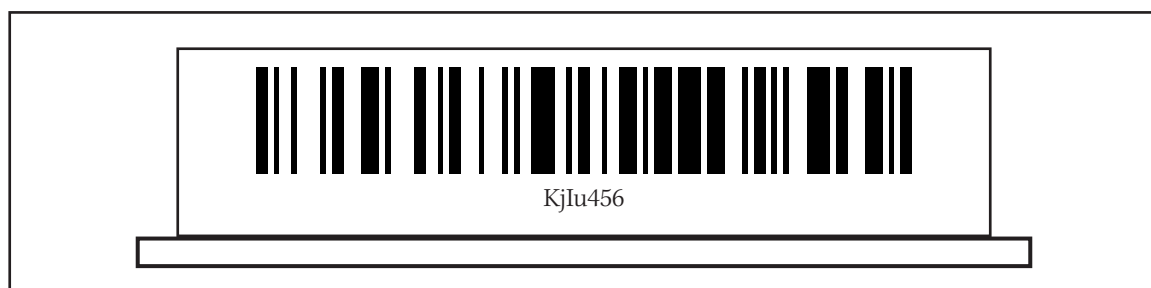
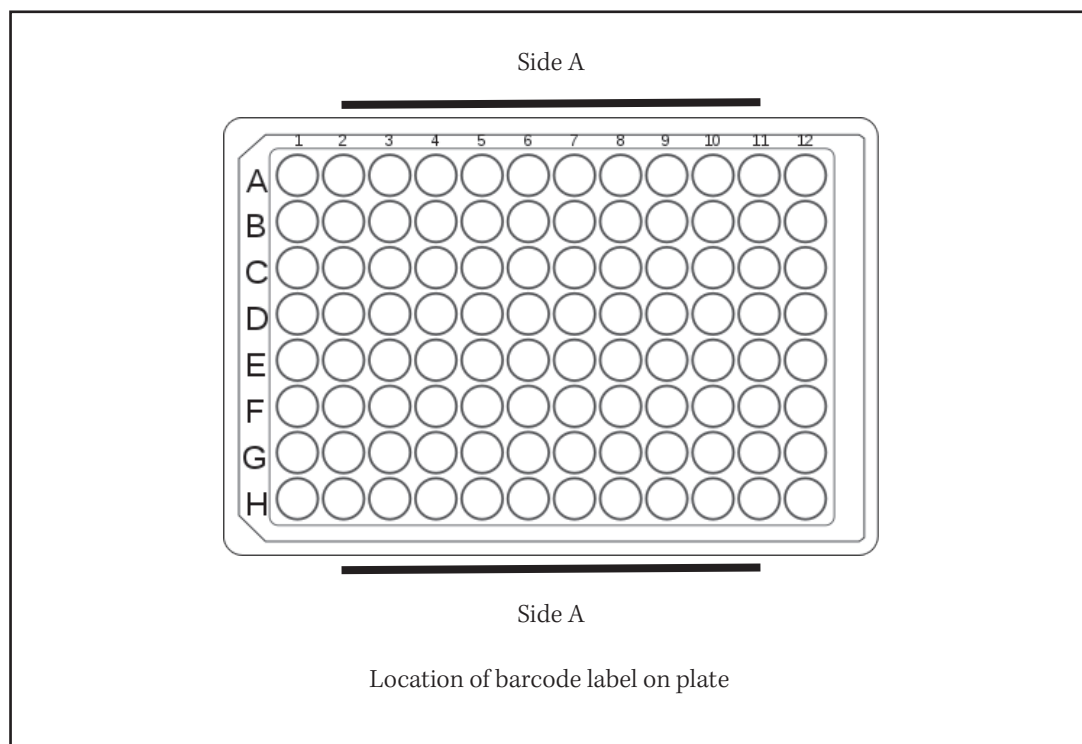
Test PKU platemap with wells re-ordered

APPENDIX 4 - PLATE BARCODE LOCATION

The BSD Galaxy A9 instruments provide accurate sample punching and are equipped with the internal plate barcode reader to simplify sample tracking and streamline laboratory workflows. The barcode label must be centred and parallel to the edge of the plate and must not protrude above or below the edge of the plate.

Barcode label must meet the following specifications:

- The barcode label must be centered and parallel to the edge of the plate.
- The barcode label must not protrude above or below the edge of the plate.
- The barcode label must fit on side A of the plate as shown in the image below.



Position of barcode label on side A of plate

CHAPTER THREE

CLEANING & MAINTENANCE

CONTENTS

<i>SECTION 13.</i>	CLEANING AND MAINTENANCE	93
<i>SECTION 14.</i>	TROUBLESHOOTING	96

13 CLEANING AND MAINTENANCE

13.1 GENERAL CLEANING

General cleaning of the punch instrument is essential for long term performance. Daily cleaning of the work area around the instrument, the chute, die plate and the punch head is recommended in order to remove the paper dust that may have accumulated as a result of the punching process. A general purpose alcohol solution suitable for laboratory use is acceptable.



CAUTION: Care should be taken to avoid direct contact with paper dust resulting from biological samples by wearing protective gloves.

Periodically dust the external surfaces of the punch instrument (such as punch hood and card platform cover) using a soft damp cloth to remove normal atmospheric build up of dust.



WARNING: Do not allow water or any liquids to come into contact with any of the electrical connectors, power leads, or communication leads.

TIP: Using a dust extraction system will greatly minimize the amount of residual dust around the punching area.

The punch instrument does not require any oiling as part of general routine cleaning. This will be performed during a preventative maintenance service by an authorized field service agent.

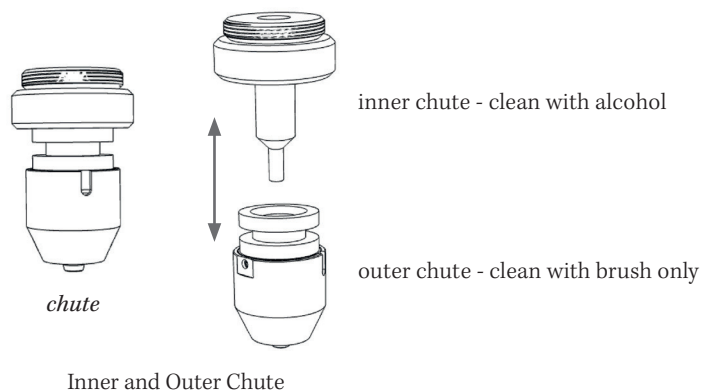
Preventative Maintenance

The manufacturer recommends that the punch instrument should be serviced at 6 monthly intervals by an authorized field service personnel. Please contact manufacturer or your distributor for your closest BSD service provider.

13.2 CLEANING CHUTE AND PUNCH MECHANISM

For optimum performance, clean the chute and punch mechanism daily. The main function of the chute is to direct the punched sample disk into the collection well below. Sometimes disks may be lodged in the chute and will need to be removed.

The chute consists of an inner and outer component (see below) and they must be cleaned separately. There is a disk detector inside the outer chute.

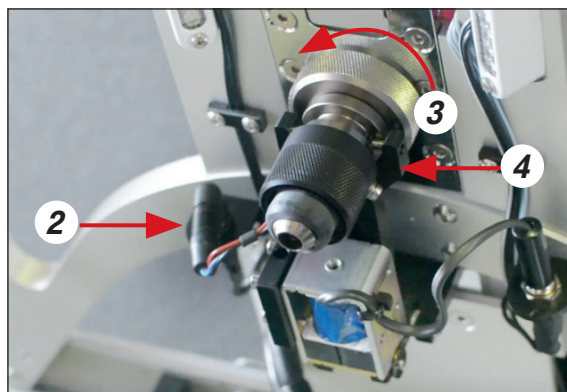


Removing the Chute:

1. Switch instrument OFF and open front cover to access the chute.
2. Unplug the connector **carefully** from the connector plug mount located to the left of the chute assembly (see below). Do not pull on the chute cables.
3. Unscrew the inner chute by turning it counter-clockwise direction.
4. Push down the chute lifting lever arm that is supporting the chute with one hand, whilst the other hand carefully removes it from lever arm.



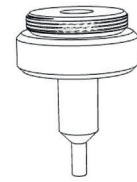
CAUTION: The inner chute slides easily out from the outer chute.
DO NOT DROP either chute.



Removing the chutes

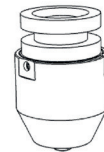
Cleaning Inner Chute:

1. Clean the inside and outer surfaces of the inner chute with cotton buds sprayed with **100% ethanol**. It is not recommended to use a lesser grade ethanol mix as it may leave a watery residue after the ethanol has evaporated.
2. Use a can of compressed air to blow through the chute.



Cleaning Outer Chute:

1. Use a can of compressed air to blow through the openings.
2. Using the supplied brush, gently clean the lower section of the outer chute to remove any paper dust.
3. Repeat Step 1 as necessary.



WARNING: DO NOT clean outer chute with alcohol. No liquids should be used on the outer chute or damage to electronic sensors may occur.

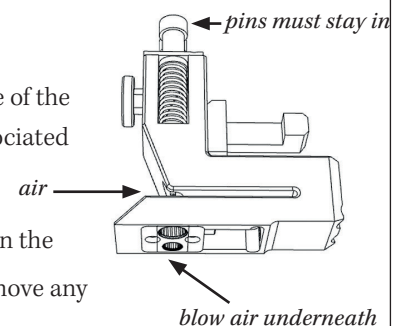


Re-assemble the Chutes:

1. Place inner chute into outer chute.
2. Push down chute lifting lever arm. While still holding it down, slide in the chutes.
3. Screw the inner chute back in position by turning in clockwise direction.
4. Plug in the chute connector.

Cleaning Around the Punch Mechanism:

1. Remove the punch head. (See Section 5.8.)
2. Using a can of compressed air, blow through the holes on the underside of the manifold to remove any build-up of lint on and around the die and associated parts.
3. With the compressed air, direct a strong flow of air horizontally between the punch guide and die (i.e. the gap where sample cards are placed) to remove any paper dust.
4. Insert the punch head back into position and lock in place.



CAUTION: The pins on top slide easily if the punch head is tipped. **DO NOT DROP** the pins or the whole punch mechanism may need to be replaced.

14 TROUBLESHOOTING

14.1 HARDWARE TROUBLESHOOTING

14.1.1 Touchscreen monitor will not turn on

TOPIC	TOUCHSCREEN WILL NOT TURN ON
Steps/Questions	Is the touchscreen connected to power using the tablet power adaptor? Are the plugs on the touchscreen fully inserted? Did you try pressing the button on the touchscreen to enable power?
Answers	Sometimes it does take some time for the tablet to respond to the power button. This topic is covered in the user manual page 18.

14.1.2 Instrument is not connected to the network

TOPIC	THE INSTRUMENT IS NOT CONNECTED TO A NETWORK
Steps/Questions	Check the connection of the ethernet adaptor at the right-hand side of the enclosure, to the USB port.
Answers	This topic is covered in the user manual page 18.

14.1.3 Instrument is not turning on

TOPIC	THE INSTRUMENT IS NOT TURNING ON
Steps/Questions	Confirm if the power adaptor is connected to the back of the enclosure.
Answers	Usually, this kind of situation happens with the power adaptor is connected to a power strip. Check if this is connected to power and turned on at the wall.

14.1.4 Instrument makes noise when powered on

TOPIC	THE INSTRUMENT IS NOT CONNECTED TO A NETWORK
Steps/Questions	Is the noise coming from the punching module or the plate deck?
Answers	After identifying the source of the noise, continue with one of the following two topics.

14.1.5 Plate deck crashes during initialization

TOPIC	PLATE DECK CRASHES DURING INITIALIZATION
Steps/Questions	<p>Is the inside of the enclosure free of all objects except the microplates? Check if it is crashing with a plate, if so confirm if the plate is properly placed into the tray.</p> <p>Is there a gap of at least 2mm between the end of the chute and the top of the plates when loaded? Verify if the deck height needs to be adjusted.</p> <p>Check if it is crashing with the cleaning container, if so adjust the position.</p> <p>Check if it is crashing when the deck is moving from the front to the rear of the instrument. If so, verify the flag of the sensor for the “Y” axis, is it crashing with the sensor? If so, contact BSD technical support for further instructions.</p>
Answers	A crashing problem is usually related to incorrectly placed plates.

14.1.6 Punch module is crashing during initialization

TOPIC	PUNCH MODULE IS CRASHING DURING INITIALIZATION
Steps/Questions	Check if the punch head is properly installed into the punching module.
Answers	<p>This situation happens when the punch head is not fully at the back-end position of the punch motor.</p> <p>This topic is covered in the user manual page 19.</p>

14.1.7 Punch mechanism is not punching

TOPIC	THE INSTRUMENT IS NOT TURNING ON
Steps/Questions	Verify if the outer chute is correctly connected, unplug it, and plug it back in.
Answers	Please make sure to connect properly the outer chute after removing it. See user manual page 95.

14.1.8 Punched disks are not falling into programmed wells

TOPIC	DISKS ARE NOT FALLING INTO PROGRAMMED WELLS
Steps/Questions	<p>Verify if there is something blocking the chutes, clean them. Is the plate aligned? Perform a deck alignment if required.</p> <p>Is there water in the humidifier bottle?</p> <p>Is the bottle cap properly tightened?</p> <p>Are the blue tubings properly connected to the humidifier bottle?</p> <p>Can you hear an air whisper coming up from the punch head?</p> <p>Check the configuration in the profile, are the pumps for the ionizer and humidifier enabled? If so, check the configuration.</p>
Answers	<p>There are several factors that may contribute to this problem, but usually, it is caused by static electricity. Effective control of the relative humidity of the laboratory may also help to reduce these situations.</p> <p>This topic is covered in the user manual pages 20 and 95.</p>

14.1.9 Outer chute is not toggling

TOPIC	OUTER CHUTE IS NOT TOGGLING
Steps/Questions	<p>Is there something blocking the chute?</p> <p>Got to Profile Editor > Instrument Settings, and click the button “Toggle Chute”, is it working?</p>
Answers	<p>Contact BSD technical support to receive further instructions.</p> <p>This topic is covered in the user manual page 94.</p>

14.1.10 Punched disks are not being detected

TOPIC	THE INSTRUMENT IS NOT TURNING ON
Steps/Questions	<p>Verify if there is something blocking the chutes, clean them.</p> <p>Check if the outer chute is properly connected and it is in the back-end position.</p>
Answers	<p>When the outer chute is not fully pushed into its female connector, there may be some detection errors. See user manual page 94.</p>

14.2 CONFIGURATION TROUBLESHOOTING

14.2.1 Certain features are not available in the software

TOPIC	SOME OF THE FEATURES ARE NOT SHOWING IN THE SOFTWARE
Steps/Questions	Please check what account was used to log in and what permissions are set for that account. Does the profile name match the instrument model e.g. BSD Galaxy A9?
Answers	Different accounts can be configured with limited user permissions. This topic is covered in the user manual page 39.

14.2.2 Images are not being stored in the computer

TOPIC	IMAGES ARE NOT BEING STORED IN THE COMPUTER
Steps/Questions	Check the profile configuration in Image Settings section.
Answers	This topic is covered in the user manual page 51.

14.2.3 Card clamps are not working properly

TOPIC	CARD CLAMPS ARE NOT WORKING PROPERLY
Steps/Questions	Check the configuration of the profile you are using, is the instrument hardware enabled for the Card Clamps option? Is the card clamps solenoid working? Can you hear it? Does the profile name match the instrument model e.g. BSD Galaxy A9?
Answers	This problem is related to the activation of the card clamps hardware in the Profile Editor. This topic is covered in the user manual page 36.

14.2.4 Light targeting is not working when punching

TOPIC	THE RED LED LIGHT GUIDES ARE NOT WORKING WHEN PUNCHING
Steps/Questions	Does the profile name match the instrument model?
Answers	When the correct model is not selected, there are some functions that will not work due to the different hardware of each puncher model. This topic is covered in the user manual page 36.

14.2.5 Punch module is not moving and remains static

TOPIC	PUNCH MODULE IS NOT MOVING OVER THE CARD, THE PUNCH HEAD REMAINS IN A STATIC POSITION
Steps/Questions	Does the profile name match the instrument model e.g. BSD Galaxy A9?
Answers	When the correct model is not selected, there are some functions that will not work due to the different hardware of each puncher model. This topic is covered in the user manual page 36.

14.2.6 Barcode reader is not scanning

TOPIC	BARCODE READER IS NOT READING MY SAMPLES/PLATE/STANDARD/CONTROL BARCODES
Steps/Questions	Check the profile configuration in Barcodes Settings section.
Answers	You need to check the boxes of the sample types you want the instrument to read the barcode. This topic is covered in the user manual page 44.

14.2.7 Barcode query is not closing

TOPIC	THE BARDOCE QUERY IS NOT CLOSING AFTER READING THE BARCODE
Steps/Questions	Check the profile configuration in Barcode settings.
Answers	Enable the option "Auto close barcode query". This topic is covered in the user manual page 44.

14.2.8 Multiple punching is not working

TOPIC	I HAVE A BSD GALAXY A9 AND I HAVE A TEST CREATED TO PUNCH MULTIPLE/SEVERAL DISKS FROM THE SAME SAMPLE, BUT THE PUNCHER IS ONLY PUNCHING ONE DISK PER ACTIVATION
Steps/Questions	Go to Profile Editor > Punch Settings, check if the box "Enable Punch Override" is activated.
Answers	Record the SN of your puncher and contact BSD technical support for instructions to restore your correct configuration according to the punch sizes of your instrument. This topic is covered in the user manual page 52.

14.2.9 Camera images are not showing wells

TOPIC	THE CAMERA IMAGES ARE NOT SHOWING THE WELLS
Steps/Questions	Is at least one plate loaded on the deck and in the correct position? Is the camera enabled in the Profile Editor? Have you completed the Deck Alignment?
Answers	This topic is covered in the user manual page 36.

14.2.10 Barcode query is not closing

TOPIC	THE PUNCHER PRODUCES NOISE WHEN IT IS NOT IN USE
Steps/Questions	Check if the vacuum pump is on. Go to Profile Editor > Instrument Settings and enable the pump control option for Ionizer and Humidifier.
Answers	When you are not using the punch instrument, you can turn the vacuum pump off, this will reduce the noise considerably. Also, the air pumps can be set in Low or Off, for the idle speed. This topic is covered in the user manual page 55.

14.2.11 Misalignment of the plate deck

TOPIC	THE PUNCHER IS CORRECTLY ALIGNED AT THE BEGINNING OF THE PUNCH RUN BUT DURING ITS PROGRESS, IT STARTS TO LOSE THAT ALIGNMENT TO THE RIGHT/LEFT/FRONT/BACK
Steps/Questions	Go to Plate Editor section and check the values in fields "C" and "D" of the plate type you are using in your protocols.
Answers	A small variation of the values on fields C and D may affect the alignment of the plate during the progress of a run. Be careful when modifying those values. Please contact BSD technical support for further instructions and advice. This topic is covered in the user manual page 82.

14.3 SOFTWARE TROUBLESHOOTING

14.3.1 Restarting the BSD Studio software

TOPIC	CUSTOMER CANNOT RECALL HOW TO START THE SOFTWARE
Steps/Questions	Is there an icon on the screen that show BSD Studio? Did you double tap to start the software? Can you try restarting the Tablet PC (start menu - power button restart)?
Answers	The software might be already running in the background, check the Windows task bar to see if the BSD logo is showing already. Close that application and start again.

14.3.2 Instrument presents as offline

TOPIC	THE SOFTWARE SHOWS THE INSTRUMENT IS OFFLINE
Steps/Questions	Is instrument connected to Tablet PC properly? Is the instrument powered on and you can see the plate backlighting is on? Does the profile name match the instrument model e.g. BSD Galaxy A9?
Answers	This topic is covered in the user manual page 36.

14.3.3 Software shows the barcode reader is not connected

TOPIC	THE SOFTWARE SHOWS THE BARCODE READER IN RED (NO CONNECTED)
Steps/Questions	Is the instrument powered on and you can see the plate backlighting is on? Is the barcode reader enabled in the Profile Editor? Is the correct COM port setting selected for the barcode reader? Does the profile name match the instrument model e.g. BSD Galaxy A9?
Answers	This may happen during the initial creation of the profile, please reboot the system and it will solve that situation. This topic is covered in the user manual pages 36 and 38.

14.3.4 Software shows incorrect punch sizes

TOPIC	The software shows me the wrong size of punch sizes
Steps/Questions	Select the gear icon in the right bottom corner of the software and check the sizes currently configured.
Answers	Update the correct sizes in the Settings section. This topic is covered in the user manual page 29.

14.3.5 Software does not accept duplicate barcodes

TOPIC	The software doesn't accept duplicated barcodes at all
Steps/Questions	Go to Edit Access Level section and disable the option for Enforce Strict Barcodes.
Answers	This topic is covered in the user manual page 35.

GLOSSARY

Chute	The chute consists of an inner and outer component. The main function of the chute is to direct the punched sample disk into the collection well below.
Cleaning Punch	An extra disk or disks punched into the waste container. This sample is discarded.
Deck	The area upon which plates are loaded. The BSD600 deck allows two plates to be loaded - in Position 1 and Position 2.
Disk	A circular portion that is punched from the sample.
Disk detection	The disk detector system works to ensure the integrity of the punching process. There are sensors located in the lower section of the outer chute to detect each disk as it passes through the chute.
Dust extraction system	The main function is to reduce filter paper dust created during the punching process. The system consists of a vacuum pump with a removable filter. The vacuum pump is powered separately to the punch instrument.
Fields	In a database table, a field is a data structure for a single piece of data. Log data can be organized into fields (e.g. grid ref). Fields make up the columns in the log file.
Humidification system	Humidified air is pumped through the punch and chute, creating a positive air flow to assist in the reliable transport of paper disks into the plate below. The air pump is controlled by the software and can be turned off when not in use.
Ionizer system	Aims to neutralize static by preventing adhesion of punched disks to nearby surfaces. The bar nozzle floods the plate area with ionized air. The ionized air does not pass through the punch or chute. The ionizer pump can be turned off.
Light targeting system	Light guides mounted on either side of the punch mechanism illuminate a light pattern to allow the user to identify the precise locations (of possible punch sites) on the sample media to be punched.
Log file	The log file contains data created by the software from each test run. The structure and order of the data depends on the selected fields.
Module	A module is a software component that focus on one area of functionality.
Output file	Each punch run saves an output file in the set directory. An output file contains log data from the punched test.

Plate	Refers to a standard 96-well microtitre plate.
Platemap	A platemap identifies all the different sample types and where they occur on the plate, by grid reference and fill order.
Sample media	The fibre medium containing the sample. (e.g. Whatman FTA cards, filter paper, Bode collectors, Guthrie cards, indicating paper, or biological materials such as plant or tissue samples.)
Skip sample	Skips all the wells in the current sample. The skipped sample may be re-punched again if the test is resumed at another time.
Spot	A dried blood spot on a filter paper media.
Tube	PCR tube
Well	A sample well within a microplate or microtitre plate.
Well ID	Same as grid reference. The absolute positioning of the well on the plate, e.g. C12.
Well label	An additional identifier or prefix assigned to the well type.
Well disabled	A well on the platemap has been disabled.
Well type	The default well type is a Sample. Other well types are Standard (ST), Control (C) and Liquid Control (LC).

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