



BSD Punchers Troubleshooting Guide

Document No. DOC-0-0028

Revision: A
Issue date: 25 February 2019

REVISION HISTORY

Revision	Date	Author	Comments
A	25-Feb-19	A. Stewart	Original

1 Initialisation

The instrument does not commence the process of initialisation when power is applied to the instrument.

Check that;

1. the instrument is connected to the power supply and turned on. If not, connect instrument to power supply.
2. the cover (card platform) is fully closed.

The instrument doesn't complete its normal initialisation process.

The instrument should always proceed through its initialisation process, whereby the x-motor, y-motor, angle and magnitude motors (if fitted) and punch motor all operate in series and in that sequence. Should the instrument stop during this process, check that:

1. There is no apparent damage to the XY axis and it moves freely from left to right and front to back for the full range of travel.
2. The angle and magnitude motors for the punch head movement move freely from side to side and front to back.
3. The punch pins are level and not protruding into the card slot when the power is off.
4. there is no apparent damage to the black ribbon cable for the XY module.

Advanced Diagnosis

There are indicator LEDs on the main board that can be viewed to check that each home switch is activated briefly during the initialization sequence.

2 Punch and Die (Punch head)

The punch motor does not proceed through a punching cycle correctly.

A normal punching cycles comprises the following actions:

- The software presents a message or button to activate the punch, by footswitch or punch control on touch screen software. At this time the punch head (models with pattern punching) should be positioned to one side to allow the sample to be illuminated with the light targets. The appropriate well should be positioned under the chute.
- The operator presses the footswitch, uses the auto-trigger or presses the punch button (tablet software only).
- The punch motor turns either anti-clockwise (left/small punch) or clockwise (right/large punch) using a cam and rocker arms to translate the rotational movement to linear movement of the punch pin.
- As the punch pin moves down, the punch spring is compressed for the downstroke.
- The punch pin perforates the paper and continues to move through the die plate.
- The non-punching side moves upwards and contacts with punch cam stop.
- The motor returns to the rest position and the cam returns to a level position. At the same time the punch spring expands to return the punch pin to a rest position.
- The disk detector checks for the disk to break the light beam in the chute, indicating that the punched disk has passed from the chute into the plate.
- If the disk detector doesn't detect the disk, another punch cycle is attempted. Still if no detection, a third punch ('strike') is attempted. If there is no disk detected after three strikes then the software signals a punch fail.

Check that;

1. The punch cam stop is not loose from the punch motor mount. If tightening, ensure that the punch cam stop is insulated from the punch motor mount.
2. the punch home cable is not broken or loose.
3. the punch motor earth cable is not broken or loose.
4. the grub screws for the punch motor shaft are not loose.

5. the punch motor cam has been correctly positioned on the motor shaft, so that its bearings align correctly with the fingers on the rocker arms.
6. the grub screw on the punch cap (single punch) is not loose. If loose, tighten.
7. the punch has enough lubricant. If lubricant is insufficient, clean and lubricate punch and die set.
8. the punch and die set is not dirty (the punch and die set requires preventative maintenance every four months). If punch and die set is dirty, clean and lubricate punch and die set.
9. the punch is not stuck in its downstroke position. If it is, clean and lubricate punch and die set.

3 Chute

The chute does not return fully/drop to its “down” position or/and retract to its ‘up’ position upon initialisation, or during a punching cycle.

Check that;

1. there is no dirt on the outside surface of the inner chute.
2. the inner chute is screwed in completely.
3. the inner chute is not damaged, burred or deformed, especially at the end tip.
4. the gap is not too great between the top of plates chute. The correct gap should be approximately 3mm. If gap is not approximately 3mm, adjust tray table height.
5. the position of the solenoid in the solenoid mount is optimum and does not need adjustment.
6. The chute driver board is operational. If the chute driver board has failed, replace with new chute driver board.
7. The chute solenoid plunger moves freely and is not bound internally. If so then dismantle, clean and lubricate.

4 Barcode Reader

The Barcode Reader does not illuminate.

Check that;

1. the barcode reader USB cable is connected to the computer or to the instrument USB port.
2. the software indicates the correct port for the instrument connection to the computer. If not, input the correct port setting.
3. the software has barcoding turned on for plates, samples, standards or/and controls.
4. the correct barcode reader is selected in the software.
5. there is no conflict within the computer hardware between the use of the port allocated to the barcode reader and another computer function. If there is conflict, input the correct port setting.

The Barcode Reader does not recognise the barcodes

Check that:

1. The barcode reader USB is plugged in correctly and the reader beeps when replugged or the instrument is switched on.
2. Windows Device Manager shows the barcode reader is connected as a COM port.
3. The correct COM port for the barcode reader has been configured in the BSD software.
4. The appropriate barcodes (samples, plates, controls, standards) have been enabled in the software.
5. The barcode reader face is clean.
6. the barcodes are at the correct distance to be read (not too close) and not held at an angle which could cause unwanted reflection into the barcode reader

5 Operation

The process is slow

This is usually a symptom of the disk detector or air system not operating correctly. When this occurs, the system waits for a set time period before proceeding to the next spot and this results in a slowing down of the instrument.

Check that;

1. The chute detector cable is connected. If not, connect cable.
2. disk detector is functioning correctly. If not, replace chute detector assembly
3. (older models) the EPROM on the main board is fully inserted and hasn't failed.

Intermittent failure of various components

Check that;

1. there are no loose cables/connectors. If there are loose cables/connectors, reconnect.
2. there are no broken cables/connectors. If there are broken cables/connectors, reconnect.

The instrument does not punch to the correct wells, or the disks miss the wells

Initially;

1. Visually check that the disks are not being deposited correctly and are then bouncing out (the effect of static electricity).

If not then;

2. reset the instrument to allow both axis to find their 'home' position and check that the chute fully covers the well in its "down" position. If not, adjust coordinates of plate positions and retest.

If problem persists, check that;

3. the drive system pulleys, belts, and clamps have not loosened. If loosened, tighten.
4. airflow to the air manifold is set properly - too high a setting can cause spots to blow out of the intended well, too low of a setting can cause a spot to be "carried over" to a later well. If not set properly, adjust.

5. A blockage is not present in the supply tube from the air pump (lint recycled through pump). If blocked, clear the blockage.
6. the chute fully drops to its “down” position. If not, adjust.
7. the XY axis black ribbon cable is not damaged.

An excessive number of ‘double strikes’ and ‘triple strikes’ occur

Check that;

1. the air pump is connected to the instrument. If it is not connected, connect the air pump to the instrument.
2. the airflow rate to the punch is correct. Slowly increase the airflow rate to progressively reduce the level of double and triple strikes. Too much air will lead to a scenario, as per 3. below.
3. there is no blockage in the tubes and air manifold. If blocked, clear the blockage.
4. the humidifier is connected. If not, connect the humidifier to the air pump and instrument.
5. there is sufficient water in the humidifier bottles. If not, top up humidifier with water.
6. the punch and die set is not dirty (the punch and die set requires preventative maintenance every four months).

The unit does not punch precisely where the targeting lights are located.

There is some provision for alignment of the light guides.

With the unit **turned off**, check that;

1. the punch module and footplate can move freely across the crossbeam.
2. the grid generator foot retainer behind the punch and die section is not too tight onto the grid generator foot. If it is too tight, loosen grid generator foot retainer slightly.
3. the angle motor crank bearing and magnitude motor crank bearing are functioning correctly. If not, grease or replace bearings.
4. the bearing beneath the footplate is functioning correctly. If not, grease or replace bearing.

The punch does not punch through a card easily on the first attempt, but 'stutters' when punching.

Check that;

1. there is not an alignment error with a component of the punch, resulting in friction. If there is misalignment, align or replace the component.
2. there is no wearing of some components of the punch system. If some components are worn, replace. Specifically, the cam bearings and rocker arm bearings should be checked.
3. there is no build-up of paper dust within the punch. If punch and die set is dirty, clean and lubricate punch.
4. the punch has sufficient lubricant. If lubricant is insufficient, reapply lubricant.

Punch has jammed.

Check that;

1. the punch has sufficient lubricant. If not, apply lubricant.
2. the punch and die set is not dirty. If punch and die set is dirty, clean and lubricate punch.
3. there is not a loose grub screw connecting the cam on the motor shaft. If it is loose, tighten.
4. there is not a loose grub screw on the punch cap (single punch). If it is loose, tighten.
5. the punch motor cam (as been correctly positioned on the motor shaft, so that its bearings align correctly with the fingers on the rocker arms.

There is excess shudder of the punch motor assembly during punching

Check that;

1. the grid generator footplate retainer is flush on the footplate. If not, adjust the grid generator footplate retainer.

There is difficulty in the horizontal movement of the punch motor assembly

Check that;

1. The grid generator footplate retainer (if fitted) is not too tight on the footplate.

The large spot punches when attempting to punch small spots

This is usually a symptom of the small punch sticking down in the die hole very briefly, and then under the force of the spring, quickly pushing upwards, and forcing the cam and rocker arm over, thus pushing down on the alternate side of the punch set.

Check that;

1. The test has been correctly configured (punch settings).
2. The small punch is not jamming. If it is, clean and lubricant punch and die set.
3. There is sufficient lubricant on the small punch.
4. The small punch is not dirty.

Chute does not drop and raise fully

Check that;

1. there is no dirt on the outside surface of the inner chute
2. The inner chute is screwed in completely.
3. The inner chute is not damaged or bent.
4. The gap is not too great between the top of the plate and the chute. The correct gap should be approximately 3mm. If gap is not approximately 3mm, adjust tray table height.
5. The position of the solenoid in the solenoid mount is optimum and does not need adjustment.
6. There is not a failure with the chute driver board. If the chute driver board has failed, replace with new chute driver board.
7. The solenoid plunger and chute arm pivot move freely with power off and are not bound by dust or from wear.

The card moves while being punched

Check that;

1. the card is being held by both clamps during the punching operation. If not, adjust card clamps lower.
2. the card clamps at the rear have not been fouled by the air tubes/cabling. If fouled by air tubes/cabling, clear obstruction.

3. the card has not been inserted too far into the card slot by the operator. If inserted too far into card slot, educate operator not to insert card beyond card clamp pivots.

The card is not easily inserted for punching

Check that;

1. the clamps are not set too low. If set too low, adjust card clamps higher.

6 Punching Errors

Punching errors occur where disks are located above the chute system, and immediately below the air manifold

This will typically occur if the airflow is too high, causing turbulence in the chute, or if the air pump and humidifier has been left running while the unit is not operating, leading to a build-up of condensation in the chute. This condensation build-up can also occur if the humidifier is operated when lab humidity levels are “normal” (e.g. >45%).

Check that;

1. there is no build-up of condensation in the inner chute.
2. the instrument is not operating in excessive humidity conditions (> 80%).
3. the airflow rate to the punch is correct. If not, slowly decrease the airflow rate to progressively reduce punching errors. Reducing the airflow by too much will result in an increasing number of double and triple strikes.
4. the inner chute is clean. If not, remove inner chute and clean.
5. the humidifier is connected. If not, connect the humidifier to the air pump and instrument.
6. there is sufficient water in the humidifier. If not, top up humidifier with water.

Punching errors occur and disks are found inside the chute

Check that;

1. there is no build-up of condensation in the inner chute.
2. There is obvious air flow from the air pump to the punch and no sounds of air leaks from air tubes or fittings.

3. the humidifier is operating in normal humidity conditions (ie there is not excessive humidity in the laboratory).
4. the inner chute is clean.
5. there is sufficient water in the humidifier. If not, top up humidifier with water.
6. the airflow rate to the punch is correct. If not, slowly increase/decrease the airflow rate to progressively reduce punching errors.
7. blockage is not present in the supply tube from the air pump (lint recycled through pump). If blocked, clear the blockage.
8. the punch pins may have been over-lubricated, leading to a residue of lubricant left on the disk. If it is over- lubricated, clean and sparingly lubricate punch and die set.

Disks are 'jumping' out of wells

This is a symptom of a static electricity issue. Usually, this static electricity is brought to the system in the plate. Some plate types are particularly susceptible. While the humidifier system will be effective in low humidity situations (e.g. 40% relative humidity or below) in removing static electricity from the sample card and specifically punched disks, some treatment of highly charged plates may be useful.

Check that;

1. the air hoses are connected to the air pump and punch instrument. If not, connect air pump to humidifier to instrument.
2. the airflow rate to the punch is correct. If not, adjust air flow rate from air pump.
3. the humidifier is connected. If not, connect air pump to humidifier to instrument.
4. there is sufficient water in the humidifier. If not, top up humidifier with water.
5. that, with the outer chute in the "up" position", the gap between the bottom of the outer chute and the top of the plate is approximately 3mm. If not, adjust tray height.
6. Check the deck (tray table) alignment.

The disk detector is not detecting punches

Check that;

1. the sensor holes of the outer chute assembly appear free of foreign material. If clogged, clean sensor holes with brush or compressed air.

2. The wires to the outer chute don't appear damaged.
3. Punches are actually falling from the chute during punching.

Advanced diagnosis

There are internal LEDs that show the disk detection "test" signal and "detect" signals.

The Cleaning punches are not falling through the chute

Check that;

1. An appropriate material (example Whatman 903 paper) is being used. Do not use copy paper or other office products such as manila folders which will cause excessive wear on the punch and die.
2. Inspect the punched disks and check for furry edges which may indicate the punch and die is worn.
3. There is a sufficient water in the humidifier bottles.
4. There is obvious air flow rate from the air pump and no noticeable air leaks from the air fittings or bottles.
5. The inner chute is clean.

7 Auto Trigger

The Auto Trigger is not sensing a card

Check that;

1. The auto trigger is turned on.
2. For older models - the Auto Trigger cables are connected to the instrument. If not, connect the cables from the instrument to the Auto Trigger.
3. The Auto Trigger Sensor (located on the card platform) is clean and free of ink and dried fluids.

Advanced diagnosis:

There is an internal LED to check that the card is sensed. The circuitry has an adjustment for card sensitivity.

8 Light Targeting

The unit does not punch from precisely where the targeting lights indicate

With the unit **turned off**, check that;

1. the punch motor and punch mount and footplate can move freely across the crossbeam.
2. the angle and magnitude movement of the punch head (side to side and front to back) move freely.
3. The light guide assembly is tightly fitted to the punch head.

If one or more lights don't show, then the problem could be a faulty light guide.