



Troubleshooting Guide

BSD300/Multipuncher

BSD600

BSD700

Quality System Manual

troubleshooting guide - 300.600.700 - bdsm9001(2).doc

Document version: 3

Issue date: 27 January 2006

© Copyright 2006

Microelectronic Systems Pty Ltd
Address:
Unit 17, 18 Hinkler Court
Brendale, QLD 4500,
AUSTRALIA
Telephone: +61 7 3881 1834
Email: support@microelectronics.com.au
Web site: www.bsdrobotics.com

The information in this document is for the sole use of BSD staff. It contains company confidential information. No part of it may be copied, reproduced, translated, or reduced to any electronic medium or machine-readable form, without prior written consent from the BSD General Manager. This document should not be circulated outside BSD without the written consent of the release authority listed below. Where no release authority is listed, from the BSD General Manager's written consent must be obtained before the document is circulated outside BSD.

Change history

Version	Date	Change	Approval No
1.3	16-Dec-04	First release	04015
2	27-Jan-06	Updated into new format	06033
3	8-Aug-17	Updated company details and logo	M.M.

Sidebar can be used to indicate the last changes.

Release authorisation

File name	G:/Qualdocs/Documents/7 Manuals/troubleshooting guide - 300.600.700 - bdsm9001(2).doc
Version	2
Release date	27 January 2006
Release authority	Assistant General Manager
Release approval number	06033

Contents

Title page.....	1
1. Initialisation	4
1.1 General	4
1.2 Punch and Die Set	5
1.3 Chute	7
1.4 Barcode Reader.....	8
2. Operation	8
2.1 General	8
2.2 Punch and Die Set	9
2.3 Chute	13
2.4 Card Clamps	14
2.5 Disk Errors	15
2.6 Auto Trigger	18
2.7 Barcode Reader.....	18
2.8 Targeting Lights	19

1. Initialisation

1.1 General

1.1.1 The instrument does not commence the process of initialisation when the “distribute spots” button is pushed.

Check that;

- (a) the instrument is connected to the power supply and turned on. If not, connect instrument to power supply.
- (b) the communications cable between the computer and the instrument is connected. If not, connect instrument to computer via communications cable.
- (c) the software program indicates the correct port for the instrument connection to the computer. If not, select the correct port.
- (d) the “Test without instrument” button is not pushed. If pushed, restart software.

1.1.2 The unit fails to proceed through its normal initialisation process.

The instrument should always proceed through its initialisation process, whereby the x-motor, y-motor, angle motor, magnitude motor and punch motor all operate in series and in that sequence. Should the instrument stop during Component of this process, check that;

- (a) a harness or connector has not broken (i.e. the instrument stops the initialisation process after moving to the x-axis stop but before reaching the y-axis stop. This might indicate that a break may have occurred in the y-axis harness, or a y-axis connector may have become loose.) If broken, replace/reconnect harness and/or connector.
- (b) the fuse(s) have not blown. If blown, replace fuse(s).
- (c) there is no breakage in the ribbon cable. A break in the “rear” outside wire will result in missed steps at the y-axis motor. A break in the “front” outside wire will cause a failure of the y-axis home sensor. If broken, replace ribbon cable.

1.2 Punch and Die Set

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

***punching cycle* -**

Punch cam (Appendix 1 – Component 7) turns and contacts punch motor mount rocker arm (Appendix 1 – 2).

Punch motor mount rocker arm (Appendix 1 – Component 2) compresses punch spring (Appendix 3 – Component 9) and pushes punch (Appendix 3 – Component 13) downstroke.

Punch (Appendix 3 – Component 13) punches spot.

Punch cam (Appendix 1 – Component 7) on the non-punching side moves upwards and contacts with punch cam stop (Appendix 1 – Component 14).

Punch cam (Appendix 1 – Component 7) returns to rest position, while at the same time, punch spring (Appendix 3 – Component 9) releases and pushes punch (Appendix 3 – Component 13) upstroke to its rest position.

Check that;

- (a) the punch cam stop (Appendix 1 – Component 14) is not loose from the punch motor mount (Appendix 1 – Component 17). If loose, tighten punch cam stop (Appendix 1 – Component 14), ensuring that the punch cam stop (Appendix 1 – Component 14) is insulated from the punch motor mount (Appendix 3 – Component 17).
- (b) the punch cam stop bush (Appendix 1 – Component 15) is in place, if punch cam stop bush (Appendix 1 – Component 15) is missing, fit.
- (c) the shake-proof washer (Appendix 1 – Component 20) between the punch motor mount (Appendix 1 – Component 17) and punch cam stop (Appendix 1 – Component 14) is in place. If shake-proof washer (Appendix 1 – Component 20) is missing, fit.
- (d) the correct screws (Appendix 1 – Component 5 – 1 X countersunk M4 X 8, (Appendix 1 – Component 4 – 2 X buttonhead M4 X 8) have been used to secure punch motor mount (Appendix 1 – Component 17) to punch die set (Appendix 3 – Component 16). If not, replace with correct screws.

- (e) the correct screws (Appendix 1 – Component 24 - 2 X buttonhead M4 X12) have been used to secure punch motor mount outrigger bearing cover (Appendix 1 – Component 22) to punch motor mount (Appendix 1 – Component 17). If not, replace with correct screws.
- (f) the punch cam stop cable (Appendix 1 – Component 19) is not broken or loose. If broken, re-solder cable to punch cam stop connector (Appendix 1 – Component 19).
- (g) the punch motor earth cable (Appendix 1 – Component 8) is not broken or loose. If broken, re-solder cable to punch motor earth connector (Appendix 1 – Component 8).
- (h) the grub screws (Appendix 1 – Component 13) holding the punch cam (Appendix 1 – Component 7) on the punch motor shaft are not loose. If loose, tighten.
- (i) the punch motor cam (Appendix 1 – Component 7) has been correctly positioned on the motor shaft, so that its bearings (Appendix 1 – Component 1) align correctly with the fingers on the rocker arms (Appendix 1 – Component 2 & 3).
- (j) the grub screw on the punch cap (single punch) is not loose. If loose, tighten.
- (k) the punch (Appendix 3 – Component 13 & 14) has sufficient lubricant. If lubricant is insufficient, clean and lubricate punch and die set (Appendix 3).
- (l) the punch and die set (Appendix 3) is not dirty (the punch and die set requires preventative maintenance every four months). If punch and die set (Appendix 3) is dirty, clean and lubricate punch and die set.
- (m) the punch (Appendix 3 – Component 13) is not stuck in its downstroke position (with the punch cam (Appendix 1 – Component 7) in its rest position). If it is, clean and lubricate punch and die set (Appendix 3).

1.3 Chute

1.3.1 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;

- (a) there is no dirt on the outside surface of the inner chute (Appendix 4 – Component 9). If it is dirty, clean.
- (b) the inner chute (Appendix 4 – Component 9) is screwed in completely. If inner chute (Appendix 4 – Component 9) is not screwed in completely, screw it in completely.
- (c) the inner chute (Appendix 4 – Component 9) is not damaged and bent. If inner chute (Appendix 4 – Component 9) is damaged and/or bent, replace with new inner chute (Appendix 4 – Component 9).
- (d) the gap is not too great between the tray table with tray and the chute (Appendix 4 – Component 10). The correct gap should be approximately 3mm. If gap is not approximately 3mm, adjust tray table height.
- (e) the position of the solenoid (Appendix 4 – Component 11) in the solenoid mount (Appendix 4 – Component 6) is optimum and does not need adjustment. If position is not optimum, adjust.
- (f) there is not a failure with the chute driver board. If the chute driver board has failed, replace with new chute driver board.
- (g) the solenoid hole (Appendix 4 – Component 11), solenoid plunger (Appendix 4 – Component 11) and chute arm pivot (Appendix 4 – Component 7) is clean and not cover with dust. If covered with dust, dismantle, clean and lubricate.

1.4 Barcode Reader

1.4.1 The Barcode Reader does not illuminate.

Check that;

- (a) the barcode reader communications cable is connected to the computer. If not, connect the barcode reader communications cable to the computer.
- (b) the barcode reader is connected to the 5 volt power outlet on the instrument. If not, connect the barcode reader power cable to the instrument.
- (c) the software indicates the correct port for the instrument connection to the computer. If not, input the correct port setting.
- (d) the software has barcoding turned on for plates, samples, standards or/and controls. If not, turn on barcoding for plates, samples, standards or/and controls in software.
- (e) the correct barcode reader is selected in the software. If not, select the correct barcode reader in the software.
- (f) 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.

2. Operation

2.1 General

2.1.1 The process is slow

This is usually a symptom of the disk detector 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 (Operates approximately 25% slower than normal).

Check that;

- (a) chute detector cable is connected. If not, connect cable.
- (b) disk detector (Appendix 4 – Component 10) is functioning correctly. If not, replace chute detector assembly (Appendix 4 – Component 10) and/or chute detector PCB.
- (c) the EPROM on the main board hasn't failed. If the EPROM on the main board has failed, replace EPROM and/or mainboard.

2.1.2 Intermittent failure of various components

Check that;

- (a) there are no loose cables/connectors. If there are loose cables/connectors, reconnect.
- (b) there are no broken cables/connectors. If there are broken cables/connectors, reconnect.

2.2 Punch and Die Set

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

Initially;

- (a) Visually check that the disks are not being deposited correctly and are then bouncing out (the effect of static electricity); if so, see Section 2.5.

If not then;

- (b) 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 tray positions and retest.

If problem persists, check that;

- (c) the drive system pulleys, belts, and clamps have not loosened. If loosened, tighten.
- (d) airflow to the air manifold (Appendix 3 – Component 17) 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.
- (e) blockage is not present in the supply tube from the air pump (lint recycled through pump). If blocked, clear the blockage.
- (f) the chute (Appendix 4 – Component 10) fully drops to its “down” position. If not, adjust.
- (g) the y-axis ribbon cable is not broken. If broken, replace with new y-axis ribbon cable.

2.2.2 A very large number of ‘double strikes’ and ‘triple strikes’ occur

Check that;

- (a) the air pump is connected to the instrument. If it is not connected, connect the air pump to the instrument.
- (b) 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.
- (c) there is no blockage in the tubes and air manifold (Appendix 3 – Component 17). If blocked, clear the blockage.
- (d) the humidifier is connected. If not, connect the humidifier to the air pump and instrument.
- (e) there is sufficient water in the humidifier. If not, top up humidifier with water.
- (f) the punch and die set (Appendix 3) is not dirty (the punch and die set requires preventative maintenance every four months). If punch and die set (Appendix 3) is dirty, clean and lubricate punch.

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

There is some provision for alignment of the targeting lights (appendix 3 Component 1 & 15) on the y-axis to correspond with the location of the punched holes.

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

- (a) the punch module and footplate (Appendix 2 – Component 1) can move freely across the crossbeam.
- (b) the grid generator foot retainer (Appendix 2 – Component 9) behind the punch and die section is not too tight onto the grid generator foot (Appendix 2 – Component 1). If it is too tight, loosen grid generator foot (Appendix 2 – Component 9) retainer slightly.
- (c) the angle motor crank bearing (Appendix 2 – Component 4 & 16) and magnitude motor crank bearing (Appendix 2 – Component 4 & 5) are functioning correctly. If not, grease or replace bearings.
- (d) the bearing (Appendix 2 – Component 4 & 18) beneath the footplate is functioning correctly. If not, grease or replace bearing.

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

Check that;

- (a) there is not an alignment error with a component of the punch (Appendix 3 – Component 13), resulting in friction. If there is misalignment, align or replace the component.
- (b) there is no wearing of some components of the punch system (Appendix 3). If some components are worn, replace. Specifically, the cam bearings (Appendix 1 – Component 1 & 7) and rocker arm bearings (Appendix 1 – Component 1, 2 & 3) should be checked.
- (c) there is not a build up of paper dust within the punch (Appendix 3 – Component 13). If punch and die set (Appendix 3) is dirty, clean and lubricate punch.
- (d) the punch (Appendix 3 – Component 13) has sufficient lubricant. If lubricant is insufficient, reapply lubricant.

2.2.5 Punch has jammed.

Check that;

- (a) the punch (Appendix 3 – Component 13) has sufficient lubricant. If not, apply lubricant.
- (b) the punch and die set (Appendix 3) is not dirty. If punch and die set (Appendix 3) is dirty, clean and lubricate punch.
- (c) there is not a loose grub screw (Appendix 1 – Component 13) connecting the cam (Appendix 1 – Component 7) on the motor shaft. If it is loose, tighten.
- (d) there is not a loose grub screw on the punch cap (single punch). If it is loose, tighten.
- (e) the correct screws (Appendix 1 – Component 5 – 1 X countersunk M4 X 8, (Appendix 1 – Component 4 – 2 X buttonhead M4 X 8) have been used to secure punch motor mount (Appendix 1 – Component 17) to punch die set (Appendix 3 – Component 16). If not, replace with correct screws.
- (f) the correct screws (Appendix 1 – Component 24 - 2 X buttonhead M4 X12) have been used to secure punch motor mount outrigger bearing cover (Appendix 1 – Component 22) to punch motor mount (Appendix 1 – Component 17). If not, replace with correct screws.
- (g) the punch motor cam (Appendix 1 – Component 7) has been correctly positioned on the motor shaft, so that its bearings (Appendix 1 – Component 1) align correctly with the fingers on the rocker arms (Appendix 1 – Component 2 & 3).

2.2.6 There is excess shudder of the punch motor assembly during punching

Check that;

- (a) the grid generator footplate retainer (Appendix 2 – Component 9) is flush on the footplate (Appendix 2 – Component 1). If not, adjust the grid generator footplate retainer (Appendix 2 – Component 9).

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

Check that;

- (a) the grid generator footplate retainer (Appendix 2 – Component 9) is not too tight on the footplate (Appendix 2 – Component 1). If not, adjust the grid generator footplate retainer (Appendix 2 – Component 9).

2.2.8 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;

- (a) the small punch (Appendix 3 – Component 13) is not jamming. If it is, clean and lubricant punch and die set (Appendix 3).
- (b) there is sufficient lubricant on the small punch (Appendix 3 – Component 13). If not, apply lubricant.
- (c) the small punch (Appendix 3 – Component 13) is not dirty. If it is dirty, clean and lubricant punch and die set (Appendix 3).

2.3 Chute

2.3.1 Chute does not drop and raise fully

Check that;

- (a) there is no dirt on the outside surface of the inner chute (Appendix 4 – Component 9). If it is dirty, clean.
- (b) the inner chute (Appendix 4 – Component 9) is screwed in completely. If inner chute (Appendix 4 – Component 9) is not screwed in completely, screw it in completely.

- (c) the inner chute (Appendix 4 – Component 9) is not damaged and bent. If inner chute (Appendix 4 – Component 9) is damaged and/or bent, replace with new inner chute (Appendix 4 – Component 9).
- (d) the gap is not too great between the tray table with tray and the chute (Appendix 4 – Component 10). The correct gap should be approximately 3mm. If gap is not approximately 3mm, adjust tray table height.
- (e) the position of the solenoid (Appendix 4 – Component 11) in the solenoid mount (Appendix 4 – Component 6) is optimum and does not need adjustment. If position is not optimum, adjust.
- (f) there is not a failure with the chute driver board. If the chute driver board has failed, replace with new chute driver board.
- (g) the solenoid hole (Appendix 4 – Component 11), solenoid plunger (Appendix 4 – Component 11) and chute arm pivot (Appendix 4 – Component 7) is clean and not cover with dust. If covered with dust, dismantle, clean and lubricate.

2.4 Card Clamps

2.4.1 The card moves while being punched

Check that;

- (a) the card is being held by both clamps during the punching operation. If not, adjust card clamps lower.
- (b) the card clamps at the rear have not been fouled by the air tubes/cabling. If fouled by air tubes/cabling, clear obstruction.
- (c) 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.

2.4.2 The card is not easily inserted for punching

Check that;

- (a) the clamps are not set too low. If set too low, adjust card clamps higher.

2.5 Disk Errors

2.5.1 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;

- (a) there is no build-up of condensation in the inner chute (Appendix 4 – Component 9).
- (b) the humidifier is not operating in normal humidity conditions.
- (c) 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.
- (d) the inner chute (Appendix 4 – Component 9) is clean. If not, remove inner chute (Appendix 4 – Component 9) and clean.
- (e) the humidifier is connected. If not, connect the humidifier to the air pump and instrument.
- (f) there is sufficient water in the humidifier. If not, top up humidifier with water.

2.5.2 Errors occur where disks are found inside the chutes

Check that;

- (a) there is no build-up of condensation in the inner chute (Appendix 4 – Component 9).
- (b) the humidifier is not operating in normal humidity conditions.
- (c) the inner chute (Appendix 4 – Component 9) is clean. If not, remove inner chute (Appendix 4 – Component 9) and clean.

- (d) the humidifier is connected. If not, connect the humidifier to the air pump and instrument.
- (e) there is sufficient water in the humidifier. If not, top up humidifier with water.
- (f) the airflow rate to the punch is correct. If not, slowly increase/decrease the airflow rate to progressively reduce punching errors.
- (g) blockage is not present in the supply tube from the air pump (lint recycled through pump). If blocked, clear the blockage.
- (h) the punch and die set (Appendix 3) 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 (Appendix 3).
- (i) the stuck disks do not have ragged edges. If so, check the status of the punch and die set (Appendix 3) and replace if necessary.

2.5.3 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;

- (a) the air hoses are connected to the air pump and punch instrument. If not, connect air pump to humidifier to instrument.
- (b) the airflow rate to the punch is correct. If not, adjust air flow rate from air pump.
- (c) the humidifier is connected. If not, connect air pump to humidifier to instrument.
- (d) there is sufficient water in the humidifier. If not, top up humidifier with water.
- (e) that, with the outer chute (Appendix 4 – Component 10) in the “up” position”, the gap between the bottom of the outer chute (Appendix 4

– Component 10) and the top of the plate is approximately 3mm. If not, adjust tray height.

2.5.4 Disk detector not detecting disks

Check that;

- (a) the sensor holes of outer chute assembly (Appendix 4 – Component 10) are not clogged. If clogged, clean sensor holes with brush and compressed air.
- (b) the wires/cable crimps are not loose in the connector and/or the board. If loose, tighten connection.
- (c) the disk detector board is functioning (check that the “off” light is not illuminated). If not, replace disk detector board.
- (d) the solder on wire/cable is not broken on the outer chute assembly (Appendix 4 – Component 10). If broken, replace with new outer chute assembly (Appendix 4 – Component 10).
- (e) the diodes have not moved on the outer chute assembly (Appendix 4 – Component 10). If moved, replace with new outer chute assembly (Appendix 4 – Component 10).

2.5.5 There are excess ‘furs’ on punched disks

Check that;

- (a) the punch and die set (Appendix 3) is not worn. If worn, replace with new punch and die set (Appendix 3).

2.5.6 The Cleaning Strike is not progressing through the chute

Check that;

- (a) the punch and die set (Appendix 3) is not worn. If worn, replace with new punch and die set (Appendix 3).
- (b) the operator is using manila folder material for the cleaning strike. If not, use manila folder material for cleaning strike.

- (c) there is a sufficient water level in the humidifier. If not, top up humidifier with water.
- (d) the air flow rate from the air pump is correct. If not, adjust air flow rate from air pump.
- (e) the air hoses are connected to the air pump and instrument. If not, connect hoses from air pump to humidifier to instrument.
- (f) the humidifier is connected. If not, connect air pump to humidifier to instrument.
- (g) the inner chute (Appendix 4 – Component 9) is not dirty. If it is dirty, remove inner chute (Appendix 4 – Component 9) and clean.
- (h) See also Section 2.5.1 and Section 2.5.2.

2.6 Auto Trigger

2.6.1 The Auto Trigger is not sensing a card

Check that;

- (a) the Auto Trigger cables are connected to the instrument. If not, connect the cables from the instrument to the Auto Trigger.
- (b) the Auto Trigger Sensor is clean. If not, clean Auto Trigger Sensor.
- (c) that the Auto Trigger senses the card. If not, adjust the Auto Trigger sensitivity.

2.7 Barcode Reader

2.7.1 The Barcode Reader does not recognise the barcodes

Check that;

- (a) the barcode reader is clean. If not, clean barcode reader.
- (b) the barcodes are at the correct distance to be read. If not, educate operator about the correct distance.

- (c) the correct type of barcode has been configured in the software. If not, input correct barcode type in software.
- (d) 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 a conflict, change port setting on software or change port on computer.

2.8 Targeting Lights

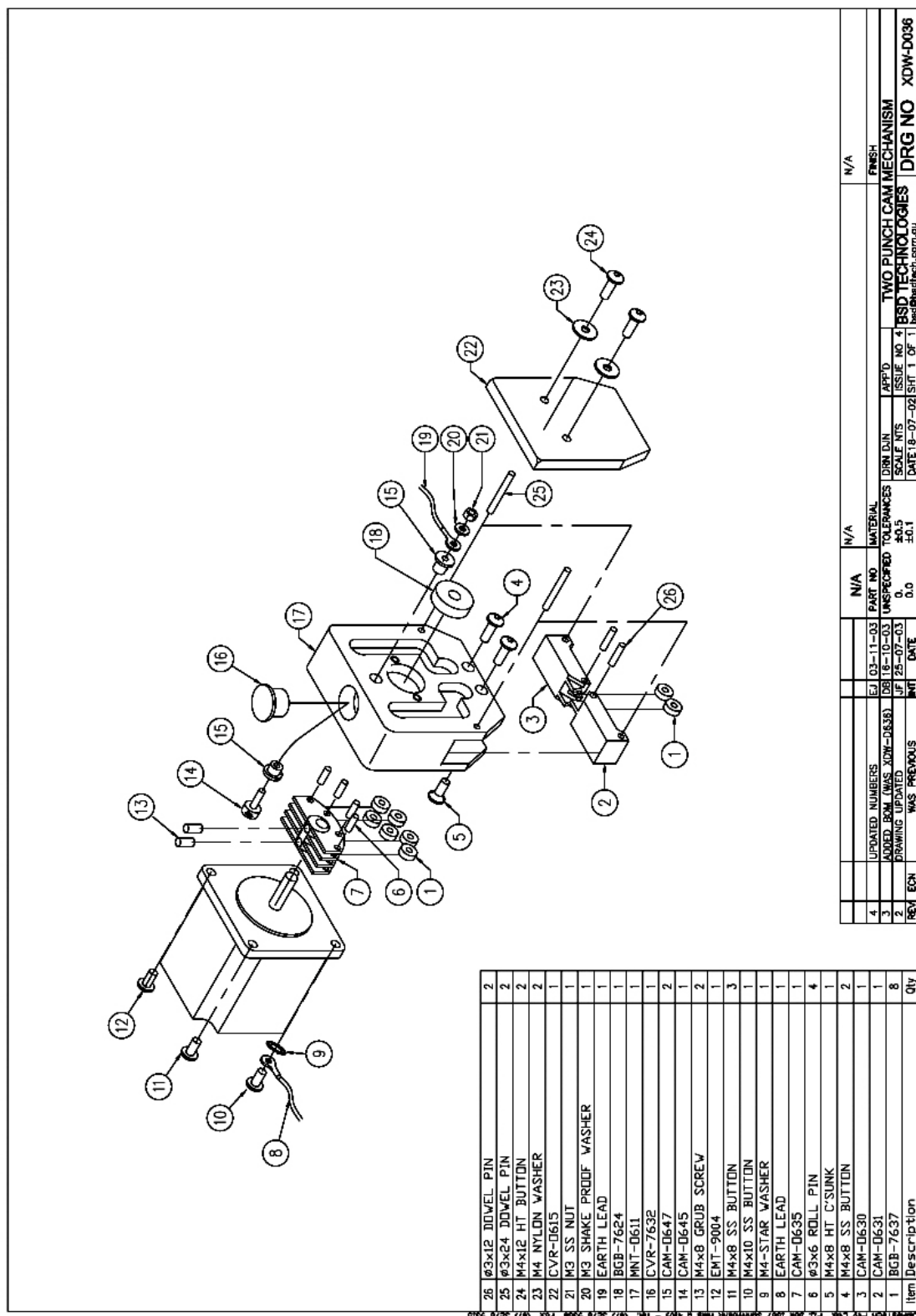
2.8.1 The unit does not punch from precisely where the targeting lights are located

There is some provision for alignment of the targeting lights (Appendix 3 – Component 1 & 15) on the y-axis to correspond with the location of the punched holes.

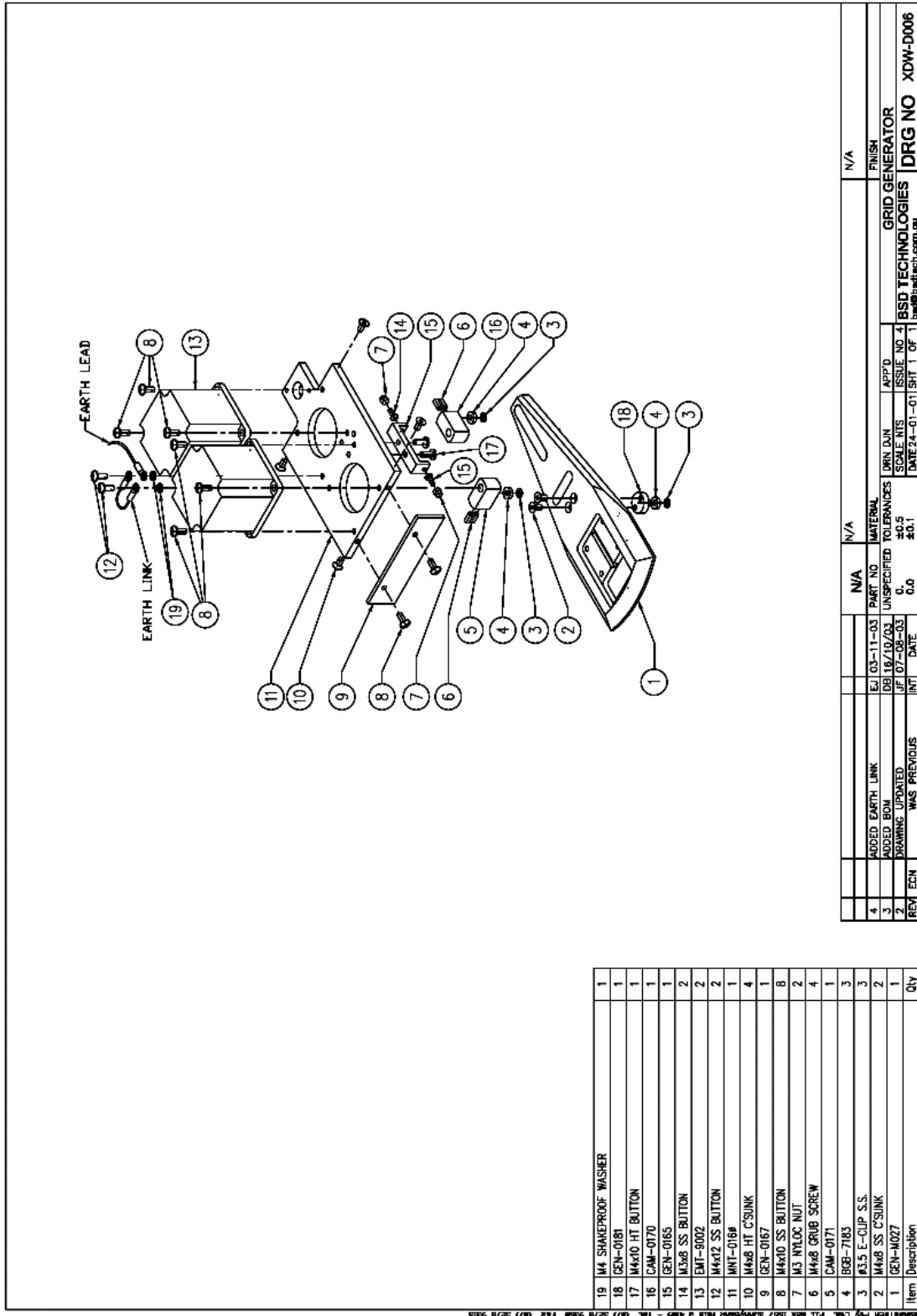
With the unit **turned off**, check that;

- (a) the punch motor and punch mount and footplate can move freely across the crossbeam.
- (b) the grid generator foot retainer (Appendix 2 – Component 9) behind the punch and die section is not too tight onto the grid generator foot (Appendix 2 – Component 1). If it is too tight, loosen grid generator foot retainer (Appendix 2 – Component 9) slightly.
- (c) the angle motor crank bearing (Appendix 2 – Component 4 & 16) and magnitude motor crank bearing (Appendix 2 – Component 4 & 5) are functioning correctly. If not, grease or replace bearings.
- (d) the bearing under the centre of the footplate (Appendix 2 – Component 4 & 18) is functioning correctly. If not, grease or replace bearings.

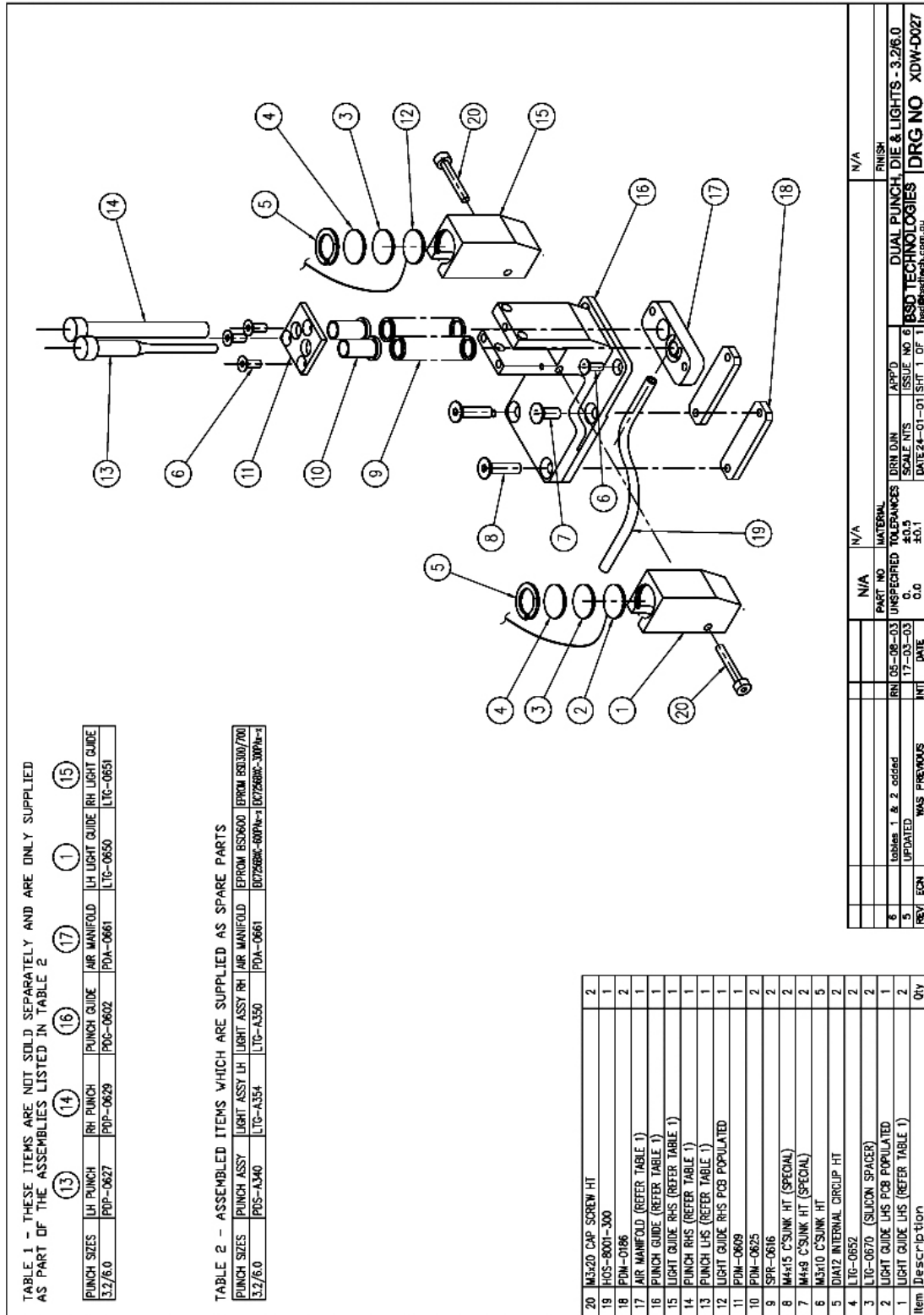
Appendix 1



Appendix 2



Appendix 3



Appendix 4

