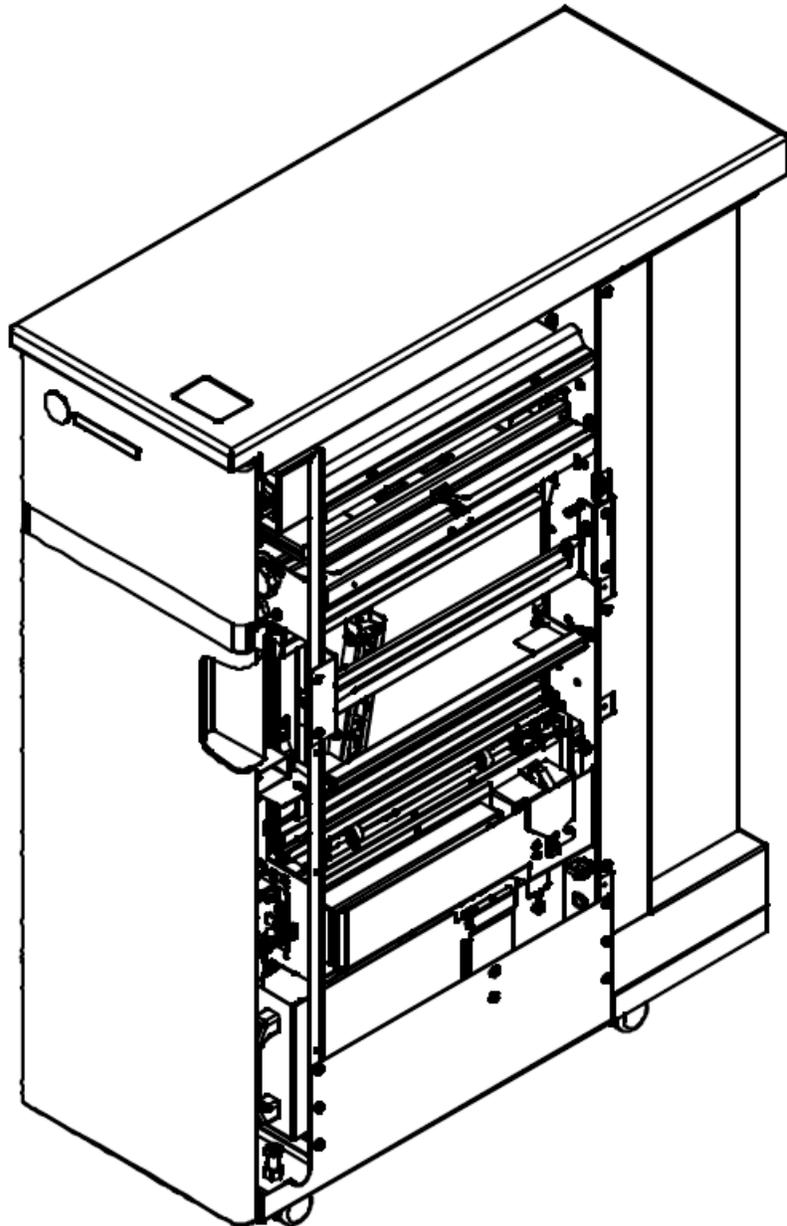


# Sharp SmartPunch™ Pro

## Technical Service Manual



## **Copyright Notice**

### **GBC**

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# 1. Safety

These symbols are used in this documentation alert you to danger or important information.



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**Warning:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious Injury.

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**Warning:** Risk of electrical shock. This warning statement indicates situations where there is a risk of death by electric shock.

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**Caution:** This notice indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

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**Caution:** This notice indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

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**Caution:** Certain components in this product are susceptible to damage from electrostatic discharge. Observe all ESD procedures to avoid component damage.

---

## 2. Introduction

This service manual is provided for use by an authorized service technician for the repair and maintenance of the SmartPunch .

The SmartPunch is an innovative, labor saving solution for punching paper in-line and includes the following design features:

- Maximum productivity saver with punching in-line at the speed of the printer! Does not slow up or stop the print system.
- Quick-change die sets that are self-latching without tools or levers.
- SmartPunch die sets are available in all of the most common hole patterns and include an Identifying Label providing user with the hole pattern and name.
- Convenient storage area for three extra Die Sets located above the sheet bypass.
- Accurate hole punching with consistent alignment.

With each SmartPunch the customer receives a user manual. They are encouraged to keep this manual for future reference. The information contained in the user manual is also helpful to the service technician. Please refer to it for detailed information regarding dies sets, operation or specifications.

### 2.1 Setting the Right Expectations

The following excerpts are copied from sales and marketing literature. This customer expectation information is helpful for the service technician.

## 3. Product Positioning

The SmartPunch provides a flexible, cost effective punching solution for light to medium level production oriented customers.

- Designed for customers that have the need to punch their documents at a maximum of 60-70% of their overall workflow.
- Recommended punching at 300K average and maximum of 500K sheets per month.
- Die Sets will decrease in performance over time based on the types of stocks and weights that are being punched.
- GBC estimates a minimum life of 500K punches per standard die and 4M per heavy duty die set based on punching 75gsm paper.
- Die sets should be regarded as a long-term supply item.

## 4. Long Edge Feed (LEF) Only

The SmartPunch is designed to punch LEF only. **No exceptions.** Attempting to punch a sheet size other than LEF will cause a misfeed.

- Use a colored sheet insert (instead of the tab) in the job workflow for easier tab insertion after the job has been run.

## 5. Die Sets

The SmartPunch is capable of punching a variety of hole-punch patterns by simply changing the Die Set. Die sets can be changed in seconds without tools. The Die Sets currently available are listed in below\*.

### Standard

North America	Europe / Australia
Plastic Comb 19 Hole	Plastic Comb 20 Hole & 21 Hole
WireBind (2 Types) <ul style="list-style-type: none"> <li>• 21 hole WireBind</li> <li>• 32 hole WireBind</li> </ul>	WireBind (2 Types) <ul style="list-style-type: none"> <li>• 23 hole WireBind</li> <li>• 34 hole WireBind</li> </ul>
ColorCoil 44 hole	ColorCoil 47 hole
VeloBind 11 hole	VeloBind 12 hole
3 hole	4 hole
ProClick 32 hole	ProClick 34 hole

\*Custom die patterns are available.

### High Durability (DuraGlide HD™)

North America	Europe / Australia
Plastic Comb 19 Hole	Plastic Comb 21 Hole
-	WireBind 34 hole
ColorCoil 44 hole	-
3 hole	4 hole

## North America/LTR Units

For Plastic Comb Binding choose from:


PB Plastic Bind; Hole Size: 8mm x 2.9mm (0.313" x 0.116") (LxW); Center-to-Center Hole Spacing: 14.3 mm (0.563")

For Twin Loop™ Binding choose from:


W3 Wire; Square; 3 Holes per inch; Hole Size: 4mm x 4mm (0.156" x 0.156") (L x W); Center-to-Center Hole Spacing: 8.5 mm (0.333")


W2 Wire; Rectangle; 2 Holes per inch; Hole Size: 6.4mm x 5.4mm (0.250" x 0.214") (L x W); Center-to-Center Hole Spacing: 12.7 mm (0.500")

For Color Coil™ Binding choose from:


C4 Coil; Round; 4 Holes per inch; Hole Size: 4.4mm (0.174") Diameter; Center-to-Center Hole Spacing: 6.3mm (0.2475")

For Velo® Bind choose from:


VB Velobind®; Round; 1 Hole per inch Hole Size: 3.2mm (0.125") Diameter; Center-to-Center Hole Spacing: 25.4mm (1")

For Looseleaf Binding choose from:

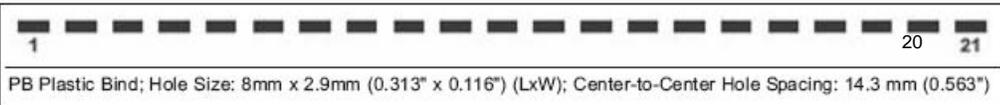

3 Ring Binder; U.S. (Standard Looseleaf Patterns); Hole Size: 8mm (0.316") Diameter

For Proclick® Binding choose from:

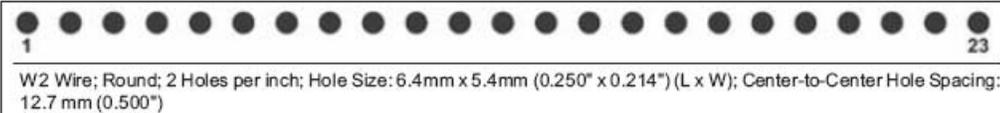
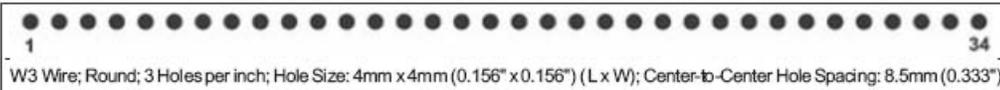

Proclick®; Rectangle; Hole Size: 4.9mm x 5.5mm; 0.196"x0.215" (LxW); Center-to-Center Hole Spacing: 8.5mm (0.333")
Paper Weight: 75gsm to 200gsm (20lb Bond to 110lb Index)

## Europe/Australia A4 Units

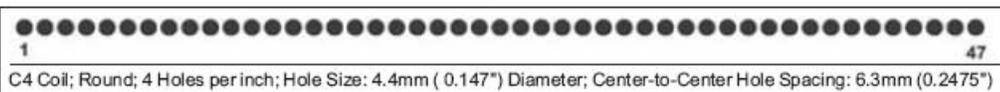
For Plastic Comb Binding choose from:



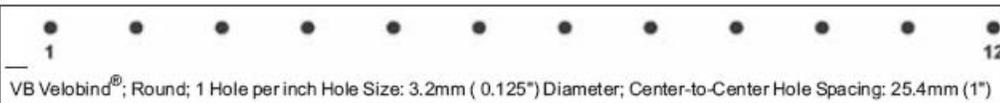
For Twin Loop™ Binding choose from:



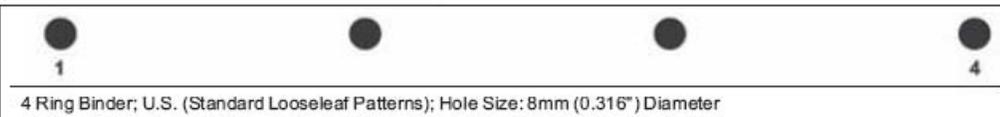
For Color Coil™ Binding choose from:



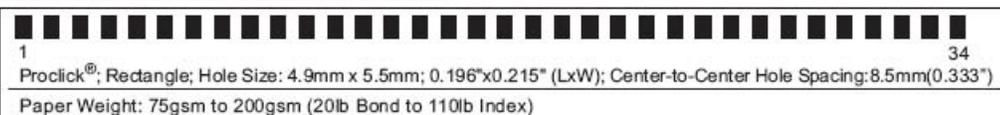
For Velo® Bind choose from:



For Looseleaf Binding choose from:



For Proclick® Binding choose from:



## 6. GBC Sales Contact Information

GBC greatly welcomes the opportunity to connect with our customers at the field level to support a variety of sales activities.

- Support local trade shows or open houses.
- Joint sales calls to add value to selling the printer, SmartPunch Pro and GBC finishing solutions.
- Attend local sales meetings to connect with branch reps.

To get connected with a local GBC sales representative, call:

North America:	Vince Wrzos	+ 1 847-484-3905
Europe/Middle East/Africa:	Viola Pauleit	+ 49 1 743 212 104
Asia Pacific:	Raj Dang	+ 61 2 97 38 41 94

# **Section 1**

## **Maintenance**

This section contains service call initial action procedures, cleaning and maintenance procedures, and service call final action procedures.

### **1.1 Initial Service Action**

At the start of every service call, you should perform the following.

1. If called for a problem, determine the exact nature of the service complaint.
2. Determine the cycle count [1] for the punch system.
3. Estimate the cycle life on the Die Sets. Determine if any of the Die Set life cycles have exceeded 500k sheets (cycles) for Standard Dies and 4M sheets (cycles) for High Durability dies.
4. Determine if the customer uses only one Die Set pattern (style) or if they switch between different patterns.
5. Determine the last time the Die Set was lubricated.
6. Determine the date and cycle count of the last preventative maintenance performed on the punch system.
7. Determine the paper type and quality, especially as it relates to curl and identify if any media changes correlate with the emergence of the customer issue.

## 1.2 Misfeed Service Action

To clear a misfeed, first press the **Stop** button on the printer and then check the printer screen to see the area of the misfeed.

If the misfeed is in the printer or finisher only, follow the information on the screen to clear the misfeed. If the screen shows a misfeed in the punch, follow this sequence.

### To clear a misfeed in the punch:

1. Open the punch cabinet door.
2. Ensure the Chip Bin is not overflowing.
3. Turn punch knob [1] clockwise until the punch is in its home position [2].

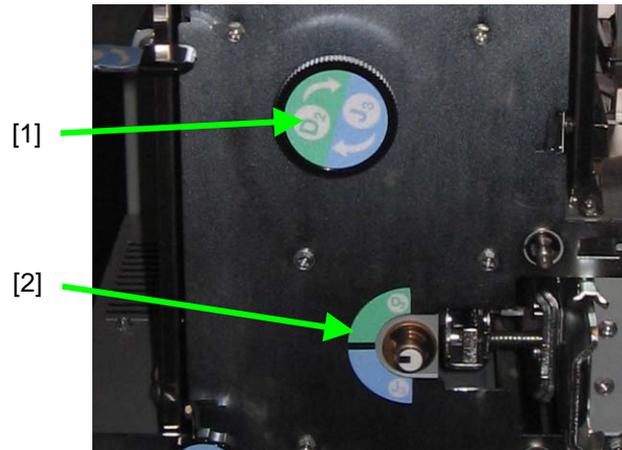
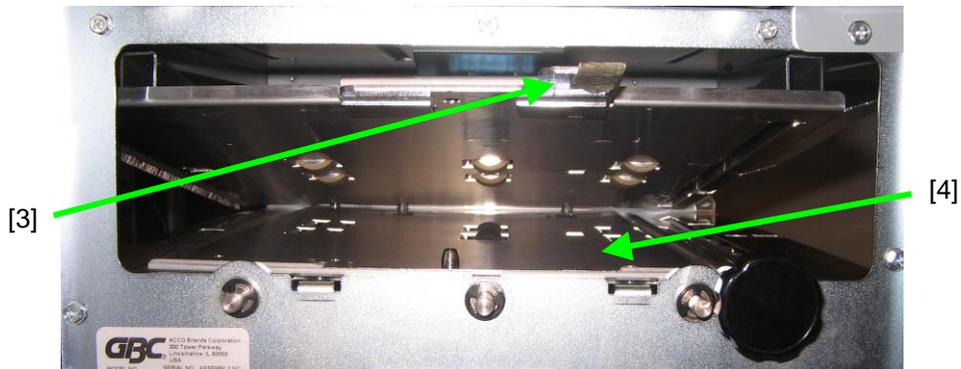


Figure 1.1 Set the Punch to Its Home Position.

4. Open the Bypass panel cover [3] and check for obstructions in the Bypass [4].



5. Ensure the Entrance Guide [5] and diverter [6] are clear.

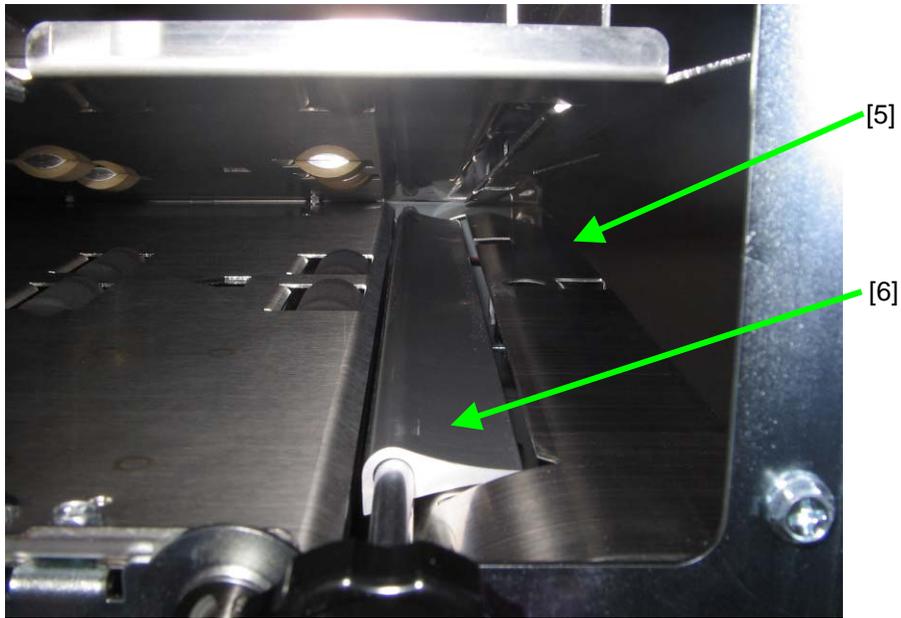


Figure 1.2 Bypass Open, Entrance Side.

6. Open the entrance paper Aligner panel latch [7] and clear obstructions in the Aligner.

7. Open the exit paper Aligner panel latch [8] and clear obstructions in each Aligner.

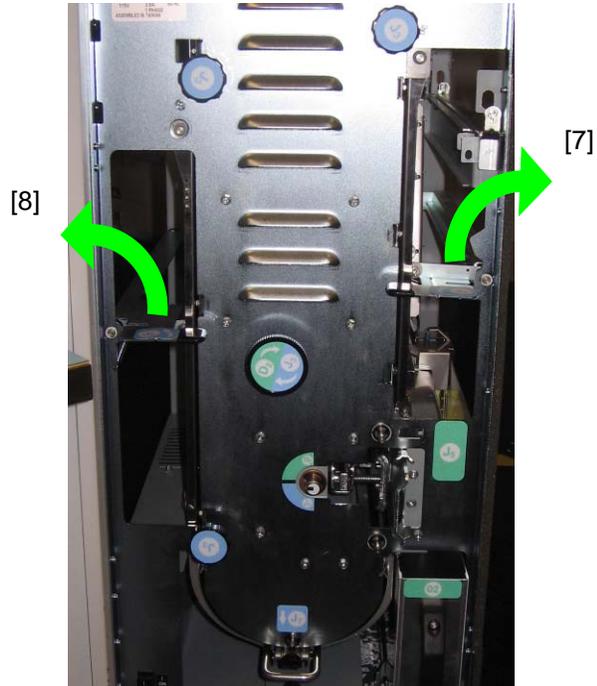


Figure 1.3 Check Paper Path Through the Punch.

8. Open the bottom U-channel by pressing the lever in [9] and lower the U-channel and clear the path.

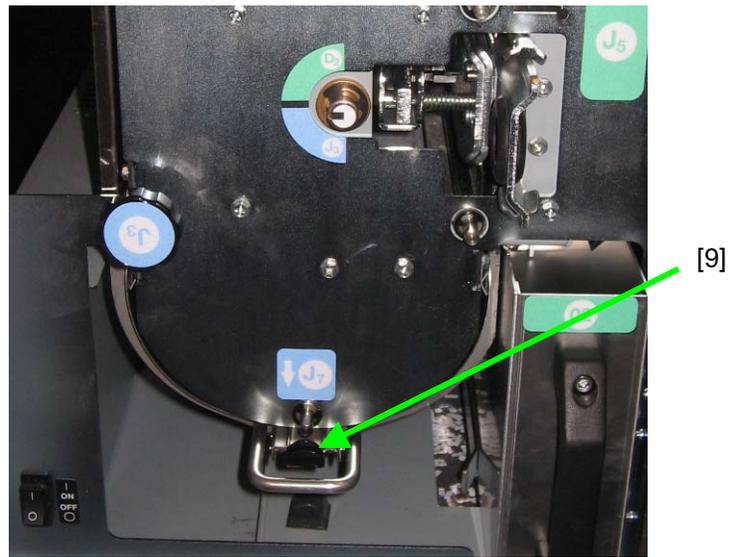


Figure 1.4 Open the Bottom U-Channel.

9. When all the paper is cleared, close the U-channel, Aligner Panels, and Bypass.

10. Shut the cabinet door.

11. Verify on the printer screen that the misfeed has been cleared. If not, repeat the above steps.

12. The printing operation should resume.

## 1.3 Die Set Service

The Die Set assembly is not serviceable other than inspection and periodic lubrication. If a Die Set is at its end of life, it will tend to cause misfeeds due to hanging chips. This is a result of die plate wear, and not pin wear, which cannot be corrected. When this occurs, the Die Set should be replaced with a new one.

### 1.3.1 Die Set Life Expectancy

The SmartPunch Pro standard Die Sets have a minimum life expectancy of 500K cycles (sheets of paper punched). Heavy Duty die sets have a minimum life expectancy of 4M cycles (sheets of paper punched). With periodic lubrication and optimum paper types, life may exceed this number. Variables that affect life expectancy:

- Failure to follow the lubrication schedule or using the incorrect lubricant
- Variety and types of paper being punched
- Cover stocks being punched
- Other environmental conditions

### 1.3.2 Die Set Components

#### 1.3.2.1 Maintainable Components

- Shoulder bolt and spring [1]
- Punch pins [2]
- Felt pad [3]
- Floating pressure bar spring (not shown) See "Floating Pressure Bar Spring Replacement" on page 1.3.2.2.

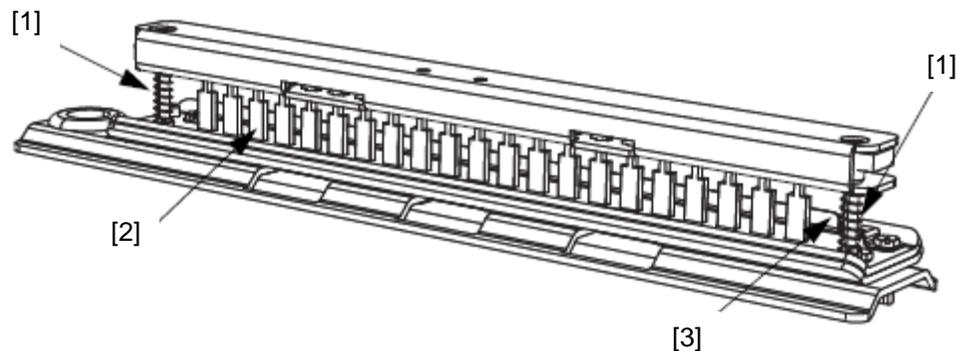
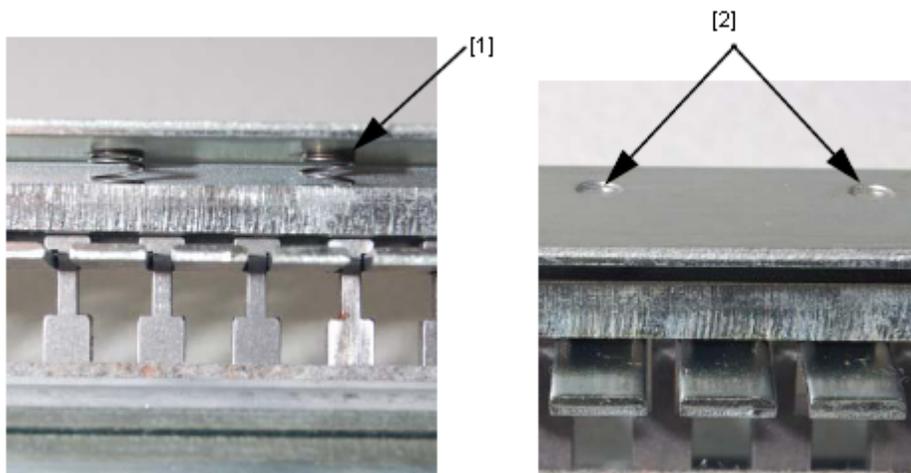


Figure 1.5 Die Set Serviceable Components.

### 1.3.2.2 Floating Pressure Bar Spring Replacement

The Die Sets use springs to hold the top plate above the pressure bar [1]. Detents in the top plate hold the springs in place [2]. Ensure all springs are in place.



1.6 Die Set Floating Pressure Bar Springs.

#### To replace pressure bar springs:

1. Compress the spring and insert between the top bar and pressure bar.
2. Use a flat screwdriver to position the spring so that the detent holds it in place.
3. Compress the top bar to ensure it moves freely and that it returns.

### 1.3.3 Die Set Inspection

#### Inspection Schedule

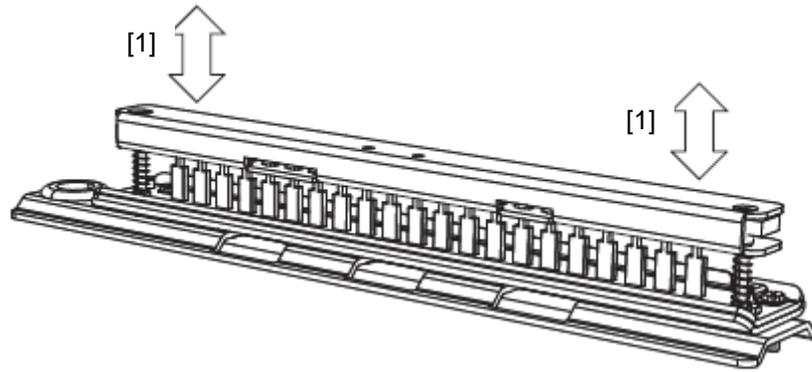
Inspect every 500K cycles or every 4M cycles for Heavy Duty dies

Replace as needed.

#### Procedure

Set the Die Set on a table and press the top plate straight down at both ends at the same time [1] and look for a smooth operation. The top plate and pins should retract fully when you release.

If a Die Set is at its end of life, it will tend to cause misfeeds due to hanging chips. This is a result of die plate wear, and not pin wear, which cannot be corrected. When this occurs, the Die Set should be replaced with a new one.



Reinstall the Die Set into the punch and run several sheets of the customer's paper through the punch. Inspect the holes.

- Holes should be clean and even with no tearing or frayed edges.
- Holes should be punched completely, leaving no chip attached.
- Holes should be straight (no skew) and evenly spaced from the edge of the paper and aligned.

### 1.3.4 Die Set Lubrication

#### Maintenance Schedule

Lubricate Die Set pins every 50K cycles for standard dies and every 250K cycles for Heavy Duty dies.

Lubricate shoulder bolts every 200K cycles for standard dies and every 1M cycles for Heavy Duty dies.

#### Procedure

Inspect the punch pins for signs of wear or mis-alignment. Periodic lubrication extends the life of the Die Sets.

The customer or operator can perform this maintenance between technician inspections.

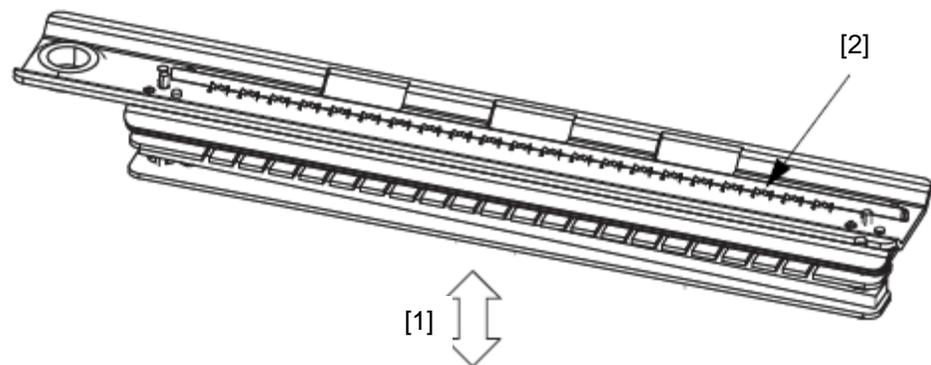


Figure 1.8 Inspect Punch Pins.

**To lubricate standard Die Set pins that do not have felt pads:**

- Depress the Die Set [1] so that the pins protrude from the bottom plate.
- Apply a drop of high quality machine oil to the end of each pin [2].
- Wipe clean, leaving a light coat of oil on them.
- Run the die set to punch 100 sheets or until there is no oil residue around the punched holes.

**To lubricate standard Die Set pins that have felt pads:**

- Lubricate with high quality machine oil.
- Apply oil lightly along the length of the pad, but do not over saturate.
- Do not use spray lubricants because they tend to dry up quickly and leave a sticky residue.
- Run the die set to punch 100 sheets or until there is no oil residue around the punched holes.

**To lubricate Heavy Duty Die Set pins:**

- Lubricate with high quality machine oil.
- Apply the oil to the exposed felt material near the pin or any marked oil hole.
- Do not use spray lubricants because they tend to dry up quickly and leave a sticky residue.
- Run the die set to punch 100 sheets or until there is no oil residue around the punched holes.

**To lubricate shoulder bolts:**

- Lubricate the shoulder bolts and springs [2] using a brush to apply PTFE based grease. Magnalube®-G is an approved grease for this application.
- Make sure the grease coats the bolts.

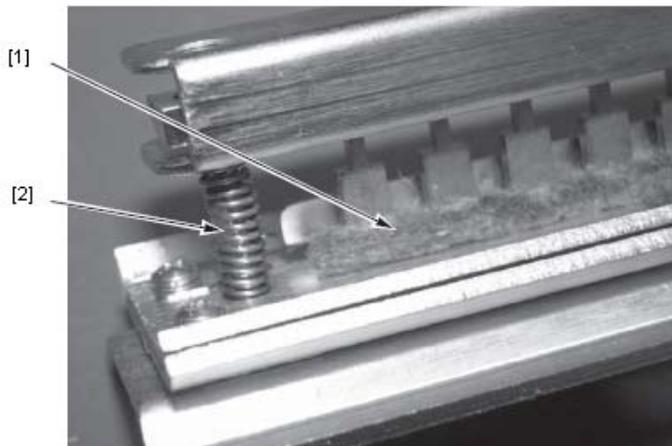


Figure 1.9 Die Set Lubrication Points.

### 1.3.5 Hole Alignment inspection

Inspect the hole alignment on the customer's punched paper. Fold the punched sheet of paper in half [1] and the punched holes should be aligned evenly along the edge and centered between the ends [2]. If the punched holes are not aligned, then the Die Set cradle must be adjusted. For adjustment procedures, see "Centering Punched Holes" on page 3.1.

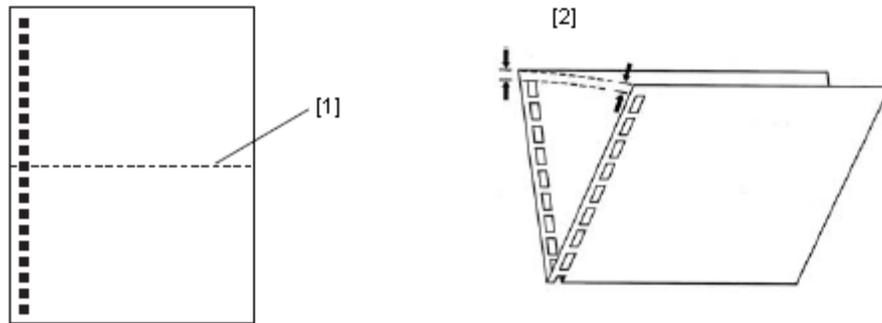


Figure 1.10 Hole Alignment on Finished Sheet.

# 1.4 Inspection, Cleaning, and Lubrication

If operating properly, the SmartPunch Pro will punch the same types of copy paper and cover materials handled by the printer and run at the same speed.

Hole quality will vary between different grades of paper.

The following maintenance should be performed according to the schedule.

**Table 1.2 Maintenance Schedule**

Description	Cycles	Service Classification				See...
		Inspect	Clean	Lubricate	Replace	
Aligner belt (green belt)	5000K	—	X	—	—	Page 1.1.10.2
Aligner idler roller assembly	4000K	—	X	—	—	Page 1.4.10.1
Aligner idler rollers	750K	X	X	—	—	Page 1.17
Aligner Latching mechanisms	750K	X	—	—	—	Page 1.4.15
Back gauge mechanism	3000K	X	X	—	X	Page 1.4.11
Base	750K	—	X	—	—	Page 1.4.5
Clutch, Punch Drive	3000K	X	—	—	—	Page 4.7.2
Die guide	750K	—	X	—	—	Page 1.4.6
Standard Die set	500K	X	—	—	I <sup>a</sup>	Page 1.3
Standard Die set pins	50K	X	—	X	—	Page 1.3.2
Standard Die set shoulder bolts	200K	X	—	X	—	Page 1.3.2
Heavy Duty Die Set	4M	X	—	—	I <sup>a</sup>	Page 1.3
Heavy Duty Die set pins	250K	X	—	X	—	Page 1.3.2
Heavy Duty Die set shoulder bolts	1M	X	—	X	—	Page 1.3.2
Door closing latch	750K	X	—	—	—	Page 1.4.7
Drive rollers	750K	X	X	—	—	Page 1.4.13
Hole alignment	750K	X	—	—	—	Page 1.3.5
Energy Idler Roller	750K	X	X	—	—	Page 1.4.14
Idler rollers	750K	X	X	—	—	Page 1.4.12.1
Optical sensors	750K	—	X	—	—	Page 1.4.16
Paper path, Aligner Panels	750K	X	X	—	—	Page 1.4.10
Paper path, bypass	750K	X	X	—	—	Page 1.4.17
Paper path, punch	750K	X	X	—	—	Page 1.4.18
Punch drive cams	3000K	—	—	X	—	Page 1.4.19
Roller energy drive	4000K	X	X	—	—	Page 1.4.13
Timing belts	750K	X	X	—	—	Page 1.4.20

I<sup>a</sup> Recommended replacement period.

Components should be maintained according to the table above. All components should be replaced on an as needed basis.

## 1.4.1 External Cleaning

The cover may be cleaned with a soft cloth moistened with mild detergent and warm water.

Do not use chemical cleaners or solvents as these may have a harmful effect. Use detergent sparingly to avoid contact with electrical components.



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**Warning:** Make sure you disconnect the SmartPunch Pro from its power source before cleaning. Failure to observe this warning could result in death or serious injury.

---

## 1.4.2 Internal Cleaning

Occasionally remove the covers and remove paper dust and chips. Paper dust can accumulate throughout the punch including around the motor and other electrical components. Use a vacuum cleaner if possible. A small paintbrush can also be used but extreme care should be used around electrical components.

Non-electrical components may be cleaned with alcohol, an approved cleaner, or a soft cloth moistened with mild detergent and warm water. Rollers can be cleaned with alcohol.



---

**Warning:** Make sure you disconnect the SmartPunch Pro from its power source before cleaning. Failure to observe this warning could result in death or serious injury.

---

## 1.4.3 Operational Inspection

Make sure the punch operates smoothly and produces the desired holes in the customer's paper.

## 1.4.4 Internal Inspection

Whenever the cover has been removed for corrective maintenance, visually inspect for defects and problems such as damaged components, loose screws or nuts, abraded wire insulation, loose terminals, etc. Correct any problems before returning the machine to service.

## 1.4.5 Base Cleaning

### Maintenance Schedule

Clean every service call.

### Procedure

Chips and paper dust falls to the bottom of the punch. Clean with a vacuum cleaner each time the machine is serviced. The customer can also do this between the technician's visits.

### 1.4.5.1 Chip Bin

Remove the Chip Bin and empty it. Vacuum out paper chips and dust from the Chip Bin tray [1], especially at the back around the Chip Bin micro switch [2]. The tray has slots to reduce chip build up and they should be attempted to be vacuumed also.

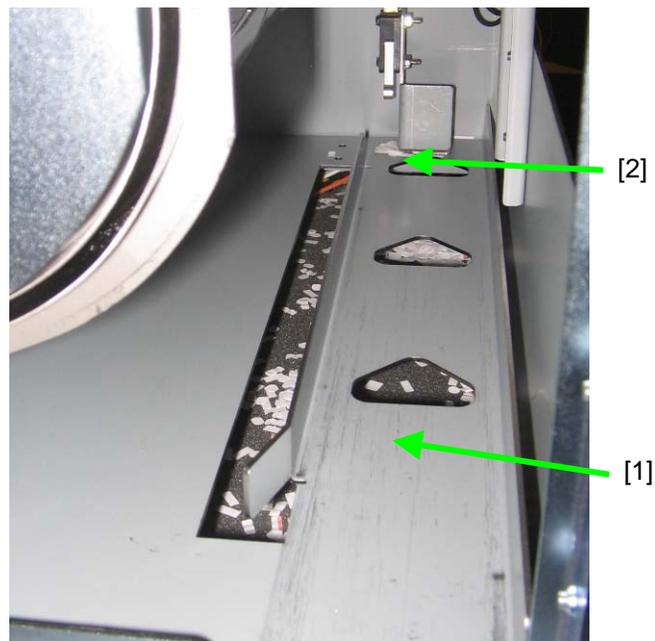


Figure 1.11 Clean Chip Bin Tray.

## 1.4.6 Die Guide Cleaning

### Maintenance Schedule

Clean every 750K cycles.

### Procedure

Remove the Die Set and clean the guide [1] with a vacuum cleaner.

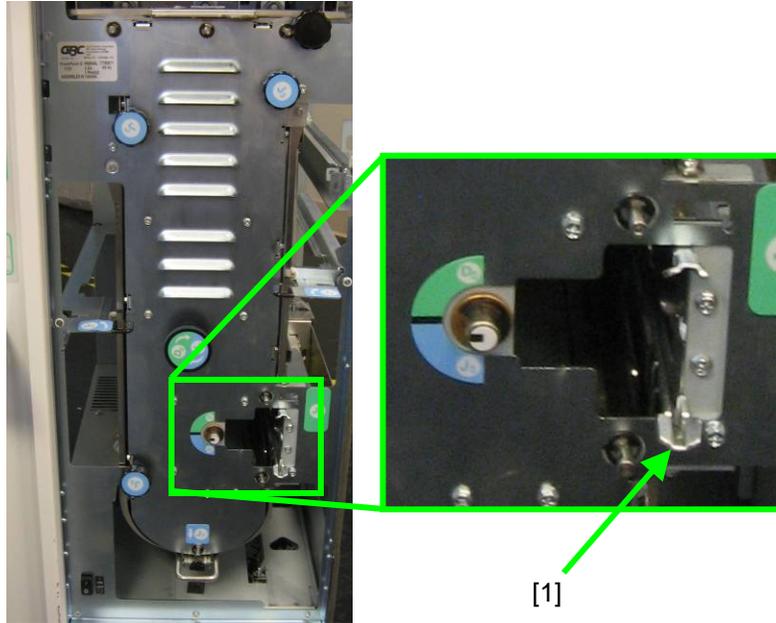


Figure 1.12 Die Guide.

## 1.4.7 Door Latch Inspection

The door latch must hold the door closed and ensure that the switch activation tab is depressing the door switch [1]. The switch tab [2] should press the switch button just so that it is close to bottoming.

### Maintenance Schedule

Inspect every 750K cycles.

### Procedure

- Ensure latch holds door closed.
- Ensure switch is activated when the door is closed.
- To adjust the door latch, see “Door Latch” on page 4.2.1.

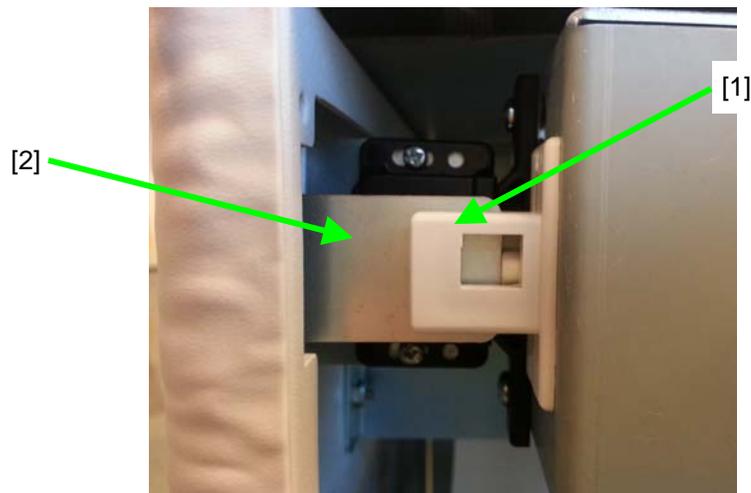


Figure 1.13 Door Switch Tab and Switch.

## 1.4.8 Separating Punch from Printer

Some procedures require separating the SmartPunch Pro from the printer and finisher.

Refer to “Separating the Punch from the Printer” on page 4.1.1.

## 1.4.9 Rear Cover Removal

Some procedures require the removal of the rear cover. Refer to “Removing the Rear Cover” on page 4.1.2.

## 1.4.10 Aligner Inspection and Cleaning

### Maintenance Schedule

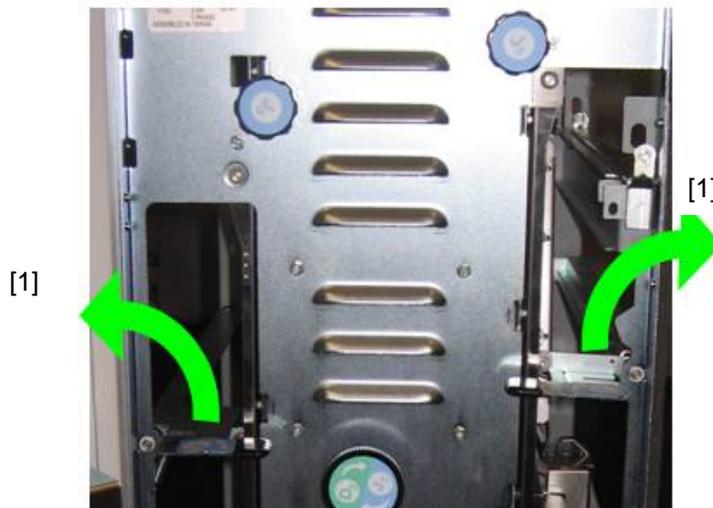
Clean every 750K cycles.

### Procedure

Inspect for worn or damaged parts. Clean with alcohol or a soft cloth moistened with mild detergent and warm water as needed.

### To clean the Aligner Panels:

1. Lift the Aligner latches [1] to open the two panels.



2. Clean all surfaces of the aligners [2], inside and out.

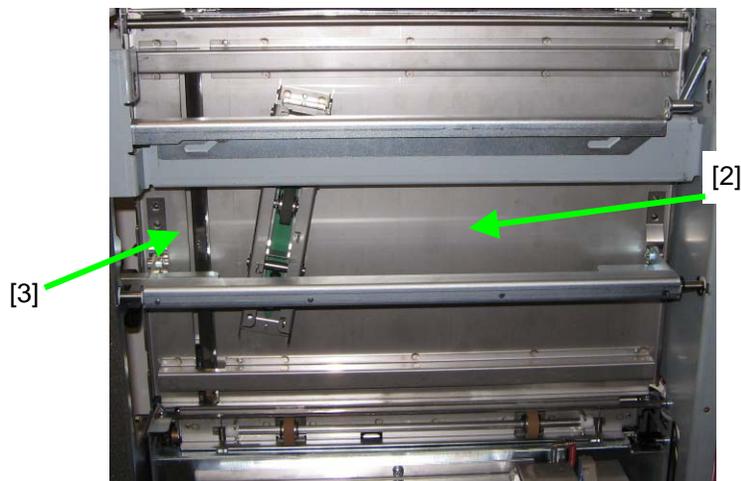


Figure 1.14 Clean Aligner Panel Components (entry aligner shown).

3. Clean paper alignment channels [3].

### 1.4.10.1 Aligner Idler Roller Maintenance

Aligner idler rollers press the paper against the Aligner belts (green belt) and align the paper for punching and exiting. To replace the idler rollers, see “Aligner Idler Roller Removal” on page 4.5.1.

#### Maintenance Schedule

Inspect and clean every 750K cycles.

#### Procedure

- Make sure the aligner rollers are clean.
- Ensure that the idler rollers maintain pressure against the Aligner belt (green belt).
- Inspect for bent or damaged parts.



---

**Warning:** Disconnect the SmartPunch Pro from power and retain the power cord in your possession for your safety. Failure to observe this warning could result in death or serious injury.

---

#### To inspect the aligner idler rollers:

1. Press the bracket [1] of each roller. The roller should move away from the Aligner belt (green belt) drive and then when released, they spring back into place.

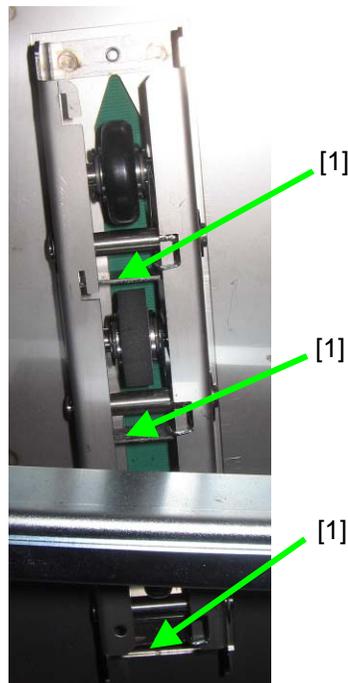


Figure 1.15 Alignment Roller Inspection (rear aligner rollers shown).

2. Ensure the torsion springs [1] are hooked over the bracket [2]. Some brackets may have 2 torsion springs attached. The legs of the springs should be resting on the roller shaft.

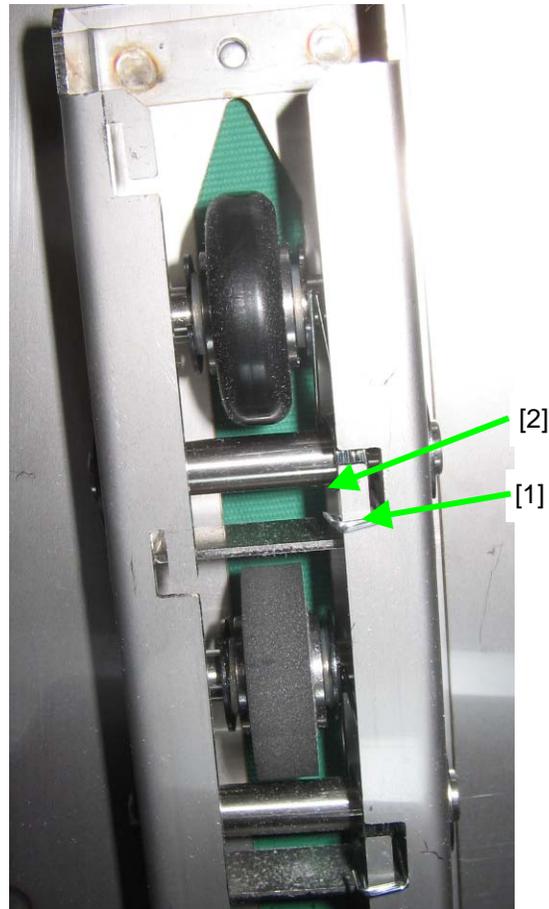


Figure 1.16 Aligner Roller Torsion Spring Hooked on Bracket.

**To clean idler rollers:**

1. Clean the idler rollers with a soft cloth and alcohol.
2. Inspect the idler rollers for wear patterns or grooves. Surface of the foam material rollers should be evenly textured and clean. The surface of the plastic rollers should be smooth and clean.

## 1.4.10.2 Aligner Belt (Green Belt) Maintenance

### Maintenance Schedule

Inspect and clean every 750K cycles.

### Procedure

- Ensure the Aligner belts (green belt) are clean.
- Inspect for frayed edges and wear.

### To clean the Aligner belts (green belt):

1. Clean the Aligner belt (green belt) [1] with a plastic scouring pad.

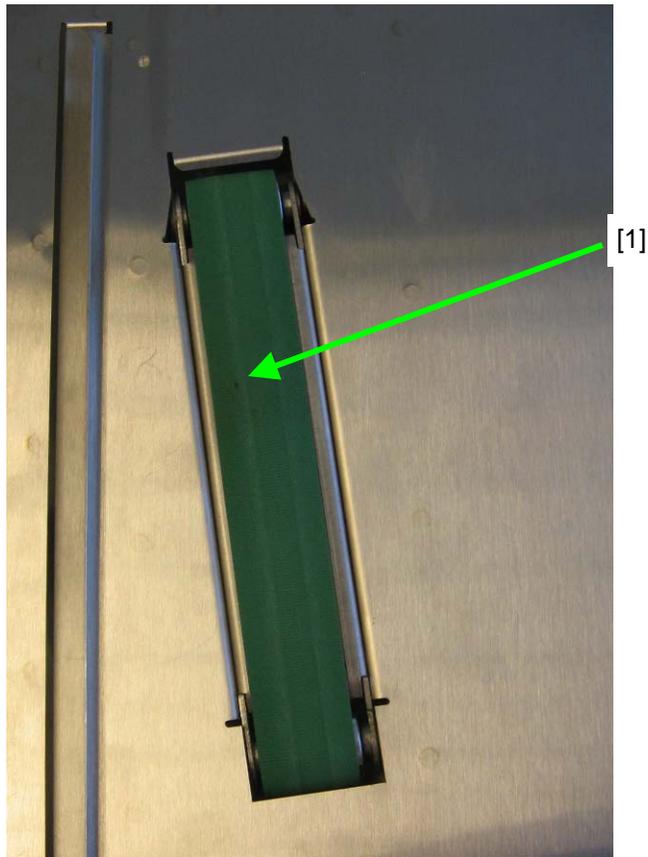


Figure 1.17 Clean Aligner belt (Green Belt).

2. Use the Drive Knob [2] to turn the belt.

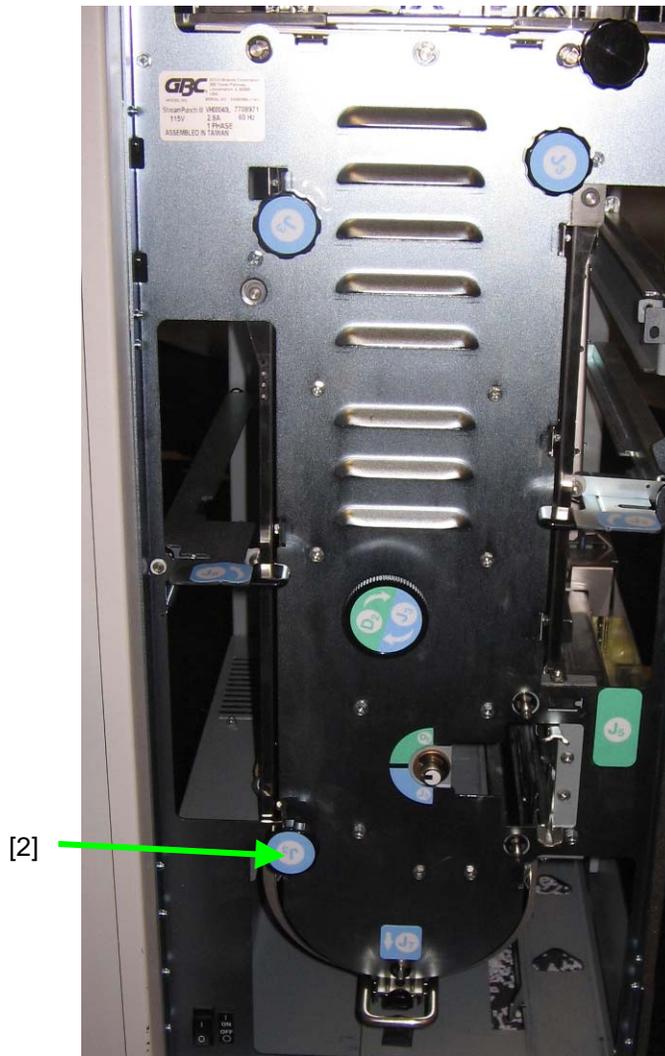


Figure 1.18 Turn Drive Knob.

To adjust or replace the Aligner belt (green belt), see “Aligner Belt (Green Belt) Replacement” on page 4.5.3.

## 1.4.11 Back Gauge Solenoid Inspection and Cleaning

### Maintenance Schedule

Clean every 750K cycles.

### Procedure

- Inspect and ensure the Back Gauge solenoid linkage moves freely. Press linkage down and release [1]. Linkage should return.
- Clean out the solenoid and surrounding area with a vacuum cleaner and canned air [2]. Make sure the solenoid is clean and dry.



---

**Caution:** The surface of the plate and solenoid bracket may be hot. Failure to observe this caution may result in minor or moderate injury.

---

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**Note:** Do not apply lubricants to the solenoid or linkage.

---

To remove and repair the back gauge, see “Back Gauge Assembly” on page 4.6 and “Back Gauge Removal” on page 4.6.1.

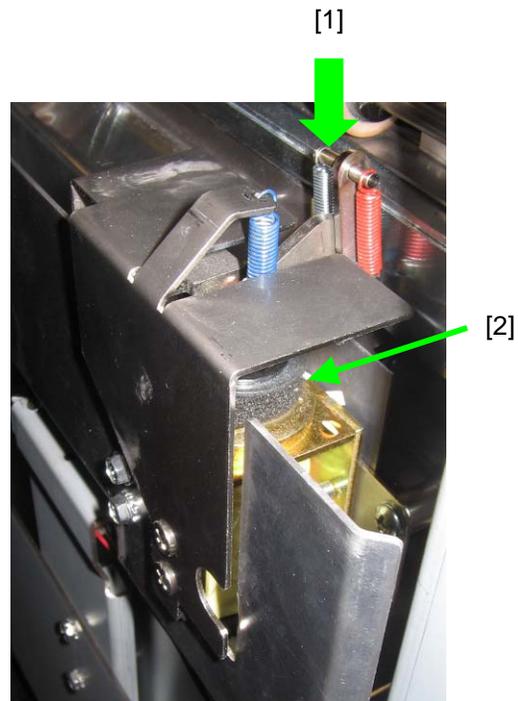


Figure 1.19 Inspect and Clean Back Gauge Solenoid

## 1.4.12 Idler Roller Inspection and Cleaning

Idler rollers press against the drive rollers and move the paper through the bypass [1] or the punch [2].

### Maintenance Schedule

Inspect and clean every 750K cycles.

### Procedure

Inspect rollers for wear patterns or grooves. The roller surface should be even and have a textured surface. Where practical, remove the roller assembly to clean.

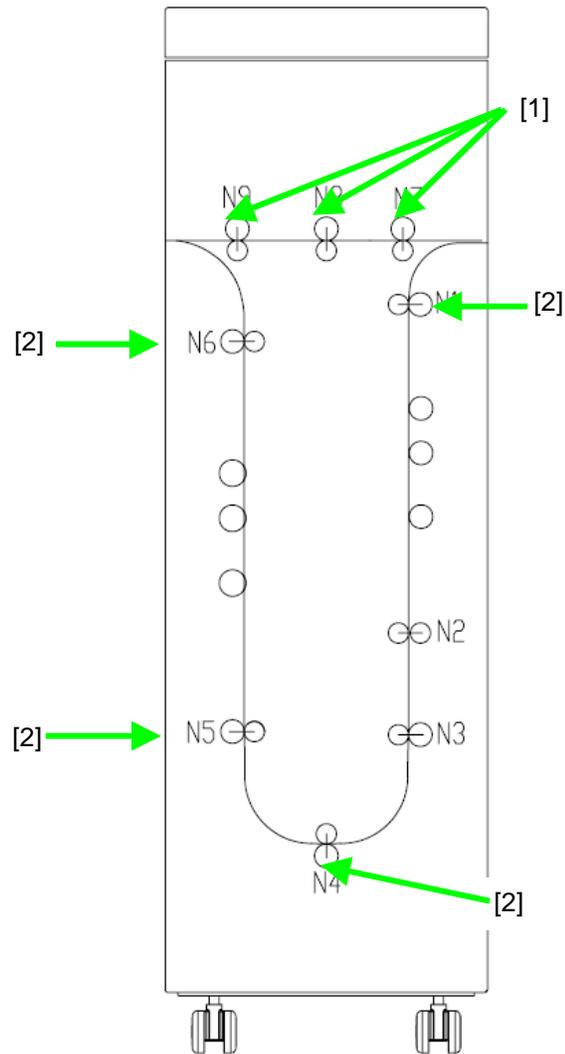


Figure 1.20 Inspect and Clean Idler Rollers.

### 1.4.12.1 Idler Roller Removal and Cleaning

This procedure refers to the idler rollers [3] shown in the previous Illustration that are easily removed as assemblies. The idler rollers that are not easily removed should be cleaned while in the punch. See “Non-Removable Idler Roller Cleaning” on page 1.4.12.2.

---

**Note:** This procedure does not apply to the Aligner panel idler rollers. See “Aligner Idler Roller Maintenance” on page 1.4.10.1.

---

1. Separate the punch from the printer.
2. Disconnect the power.
3. Lift the retaining spring over the end of the idler roller shaft. The illustration shows moving the spring [1] on the bypass plate.

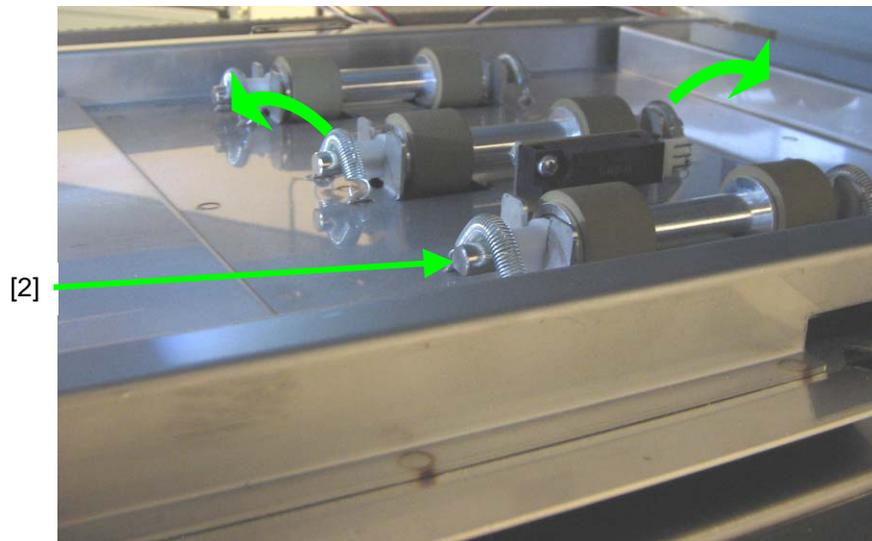


Figure 1.21 Removing Idler Rollers (bypass panel shown).

5. Pull the released shaft end out of the bushing fork [2], releasing the opposite end of the shaft from the other retaining spring.
6. Clean the idler rollers with a soft cloth and alcohol.
7. Ensure the rollers turn freely on the shaft.
8. To install idler roller assemblies reverse the steps.

**Installation Note:**

- The flat surface on the idler roller shaft must face down [3].
- Make sure the flat surface of the nylon bushing aligns in the fork.
- Rollers are non-directional so it does not matter which end goes in each fork.
- After the assembly is in place, gently pull the assembly outward and release to ensure it moves freely in the fork.

### 1.4.12.2 Non-Removable Idler Roller Cleaning

Some idler and the drive rollers, [1] are not easily removed but can be cleaned while in the punch.

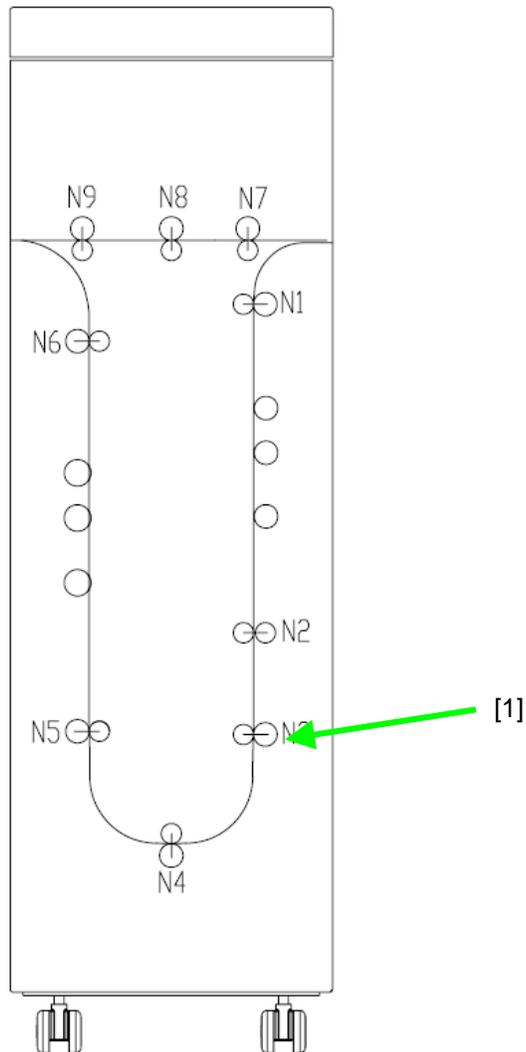


Figure 1.22 Inspect and Clean Idler Rollers.

#### To clean non-removable idler rollers:

1. Separate the punch from the printer.
2. Disconnect the power.
3. Pull out the chip bin to access the punch area idler roller [1]. The idler roller shown can be accessed from behind the backage. The idler roller can be removed when the backage has been removed. See "Backgage Removal" on page 4.6.1.
4. Clean the idler rollers [1] with a soft cloth and alcohol.
5. Use the roller drive [2] knobs to turn the rollers to continue cleaning.

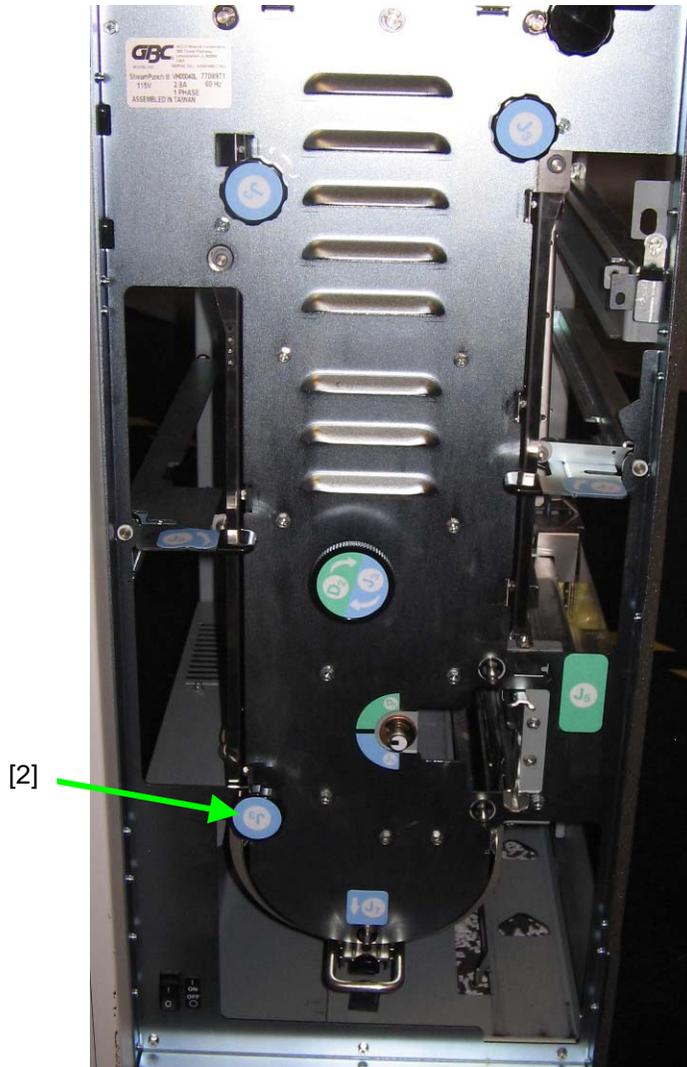


Figure 1.23 Turn Knobs to Clean Rollers.

## 1.4.13 Drive Roller Inspection and Cleaning

Drive rollers are located opposite to the idler rollers.

### Maintenance Schedule

Inspect and clean every 750K cycles.

### Procedure

Inspect for wear patterns or grooves. The roller surface should be even and not glazed.

The drive rollers [1] should be inspected and cleaned when the idler rollers are removed. Where practical, make sure the rollers are clean. Clean with a soft cloth and alcohol. See also “Idler Roller Inspection and Cleaning” on page 1.24. The drive roller pair [2] can be accessed by removing the back gage and idler roller opposite to it. See “Backgage Removal” on page 4.6.1.

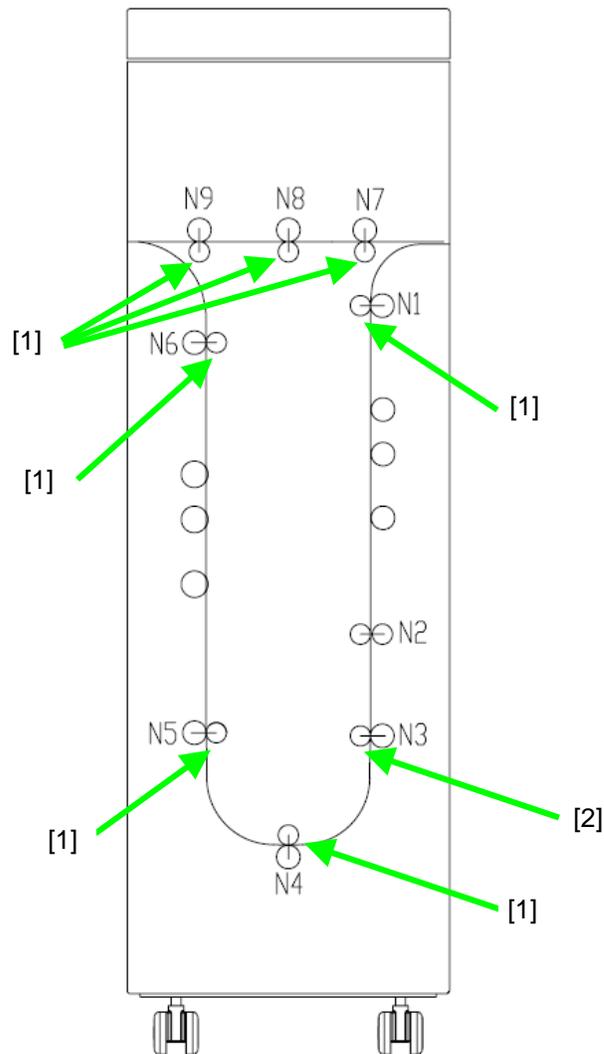


Figure 1.24 Inspect and Clean Drive Rollers.

## 1.4.14 Energy Idler and Drive Rollers

### Maintenance Schedule

Clean every 750K cycles.

### Procedure

#### To clean the Energy Drive Roller:

1. Unhook one retaining spring [1] and then remove the idler roller assembly [2].
2. Rotate and clean the drive rollers [3].



Figure 1.25 Removing Energy Idler Roller

## 1.4.15 Aligner Latch Inspection

Latches [1] on both sides of the punch hold the Aligner Panels in place, which in turn maintains even pressure on the idler rollers.

### Maintenance Schedule

Inspect every 750K cycles.

### Procedure

- Inspect the latches for worn or damaged parts.
- Open and close the latches and ensure they lock into place when closed.
- Ensure the nylon wheel [2] turns freely on its bearing and that it aligns with its locking bracket.



Figure 1.26 Open and Close Aligner Panel Latches.

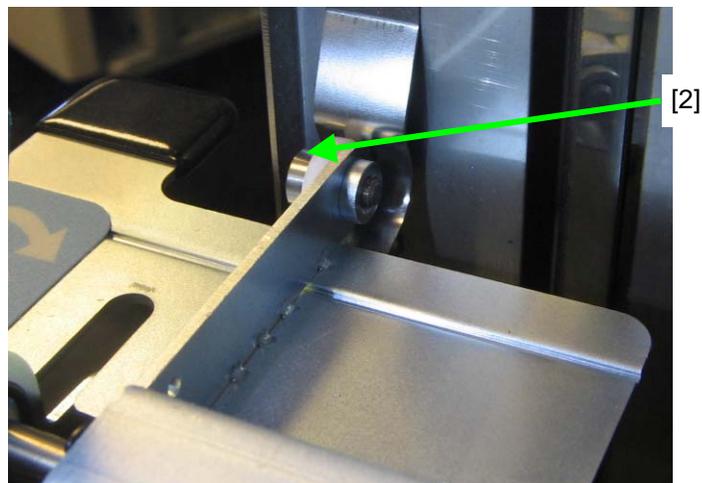


Figure 1.27 Aligner Panel Latch Nylon Wheel.

## 1.4.16 Optical Sensor Cleaning

### Maintenance Schedule

Clean every 750K cycles.

### Procedure

Inspect and clean per the maintenance schedule or as needed.

### Supplies Needed

Canned air or vacuum cleaner

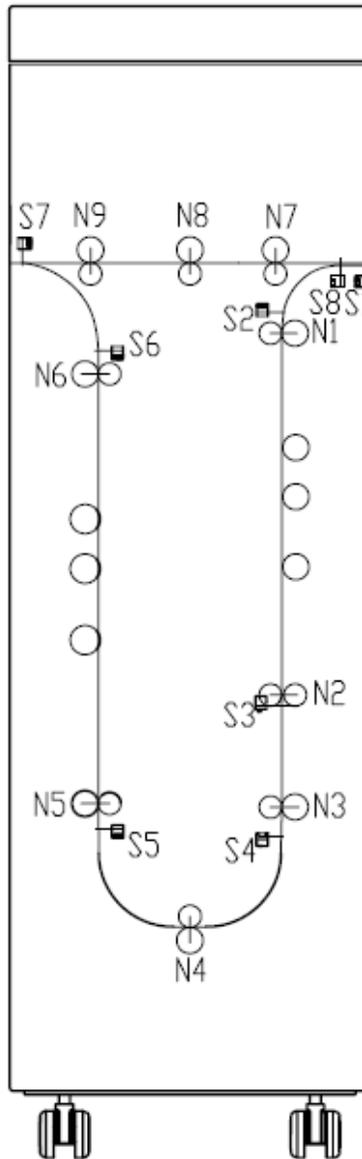


Figure 1.28 Optical Sensor Locations (indicated by S prefix)

Use canned air to blow the debris off each sensor. The illustration shows examples of four sensors [1].

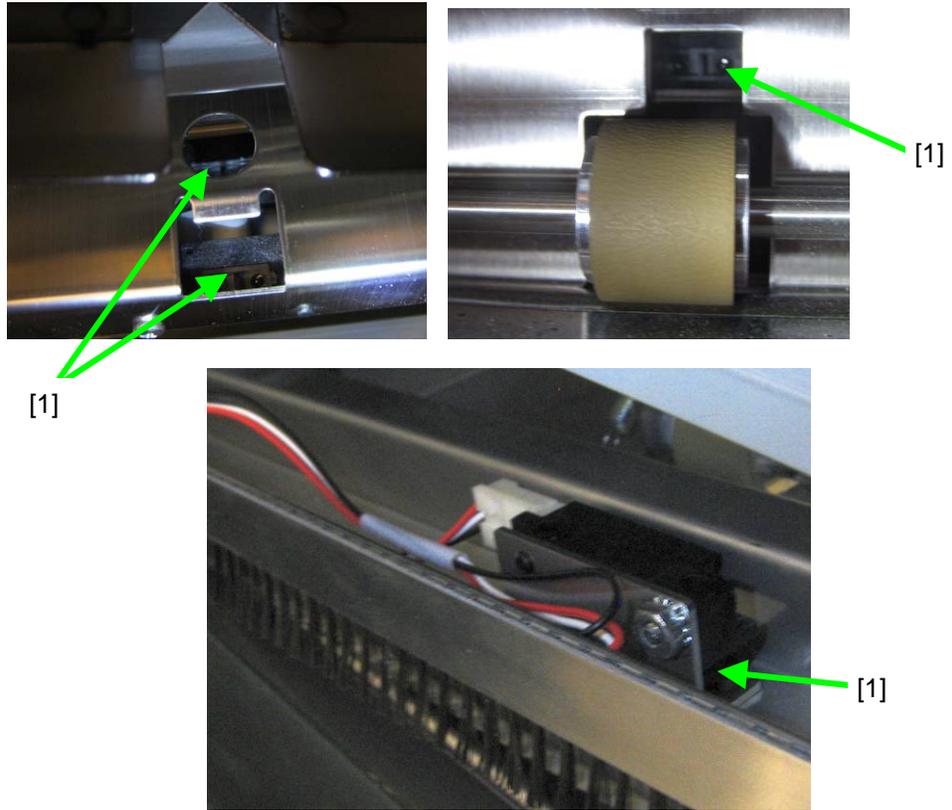


Figure 1.29 Four Optical Sensors.

## 1.4.17 Bypass Paper Path Inspection and Cleaning

### Maintenance Schedule

Clean every 750K cycles.

### Procedure

- Inspect the Bypass panel [1], rollers [2], and entrance guide [not shown] for wear, damage, and obstructions.
- Inspect the rollers for wear patterns or grooves. The surface should be rough and even. Make sure the rollers are clean.
- Clean rollers with a soft cloth and alcohol. See also “Idle Roller Inspection and Cleaning” on page 1.4.12 and “Drive Roller Inspection and Cleaning” on page 1.4.13. Use the drive knobs to turn the rollers.
- Raise the panel and ensure the magnet holds it in open [3]. Inspect the path for obstructions. Clean as needed.
- Close the panel and check that it is flat and that paper will pass under it.
- Ensure the bypass diverter [4] moves freely and returns to the bypass position.

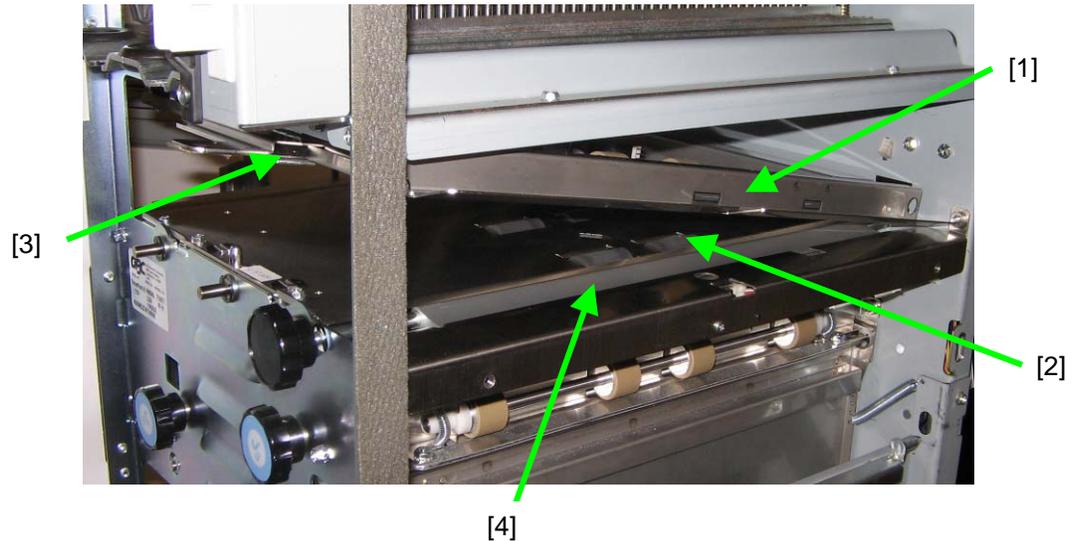


Figure 1.30 Bypass Path Inspection (shown With Bypass Panel Raised).

## 1.4.18 Punch Paper Path Inspection and Cleaning

### Maintenance Schedule

Inspect and clean every 750K cycles.

### Procedure

- Clean as needed.
- Inspect the entire paper path through the punch. Look for wear, damage, and obstructions.
- Inspect the rollers for wear patterns or grooves.
- Open the Aligner Panels [1] and U-channel [2] and make sure there are no obstructions.

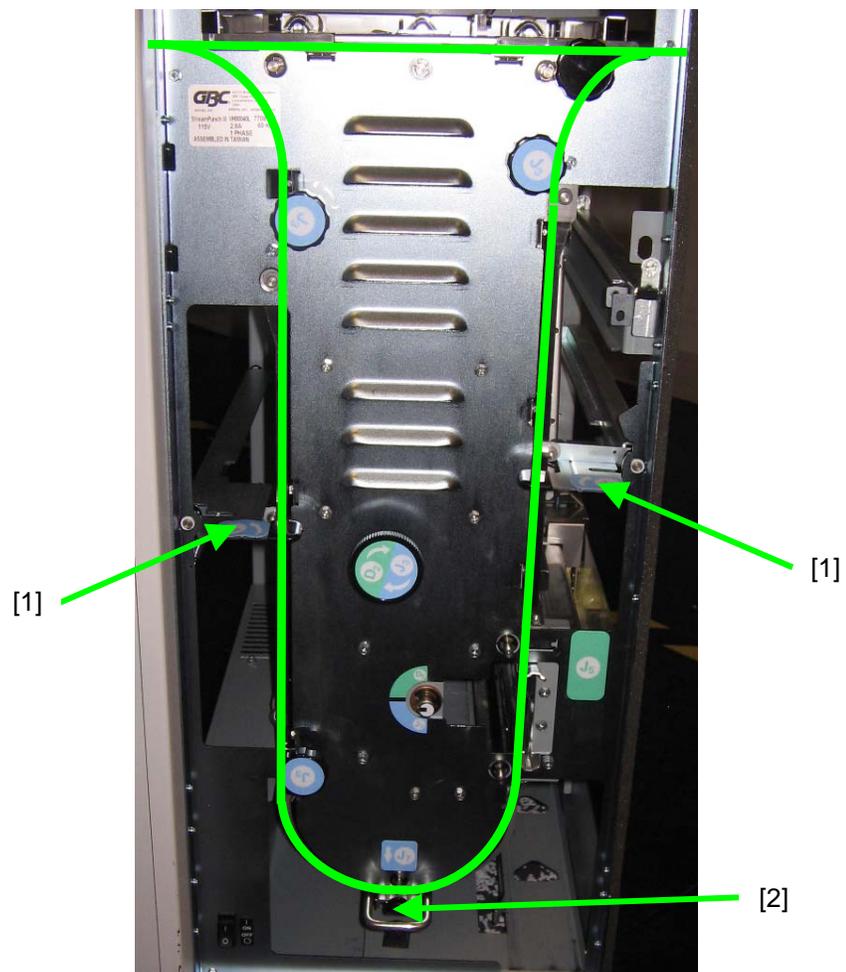


Figure 1.31 Inspect Punch Paper Path.

- Confirm that the latch holds the U-channel tightly in place [3].

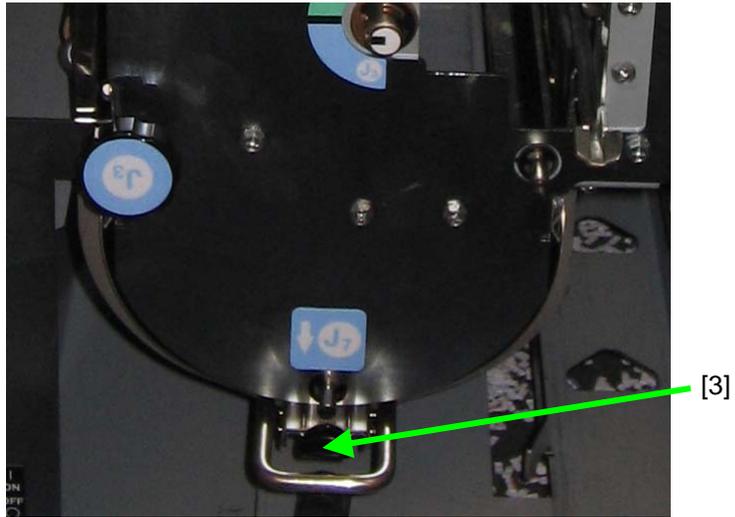


Figure 1.32 Inspect U-Channel Latch.

## 1.4.19 Punch Drive Cam Lubrication

### Maintenance Schedule

Lubricate every 3000K cycles with PTFE based grease. A small brush is recommended to lubricate the cams. Magnalube<sup>®</sup>-G is an approved grease for this application.

### Procedure

The Back Gauge assembly must be removed in order to lubricate the punch cams. To remove see "Backgauge Removal" on page 4.6.1. Better access can be gained to the cams by removing the entire punch module. To remove see "Punch Module Removal" on page 4.7.1.



**Warning:** Disconnect the SmartPunch Pro from its power source before removing the Back Gauge assembly or Punch Module. Failure to observe this warning can result in severe injury or death and damage the punch.

Use a small brush to lubricate the cams [1] in the punch module. Rotate the main punch module knob on the front of the machine or by rotating the main drive pulley to ensure full coating of the cams.

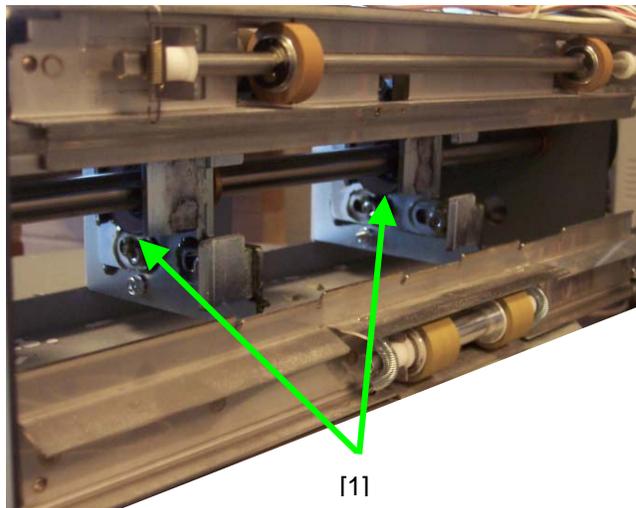


Figure 1.35 Lubricating Punch Module Cams with Backgauge Removed

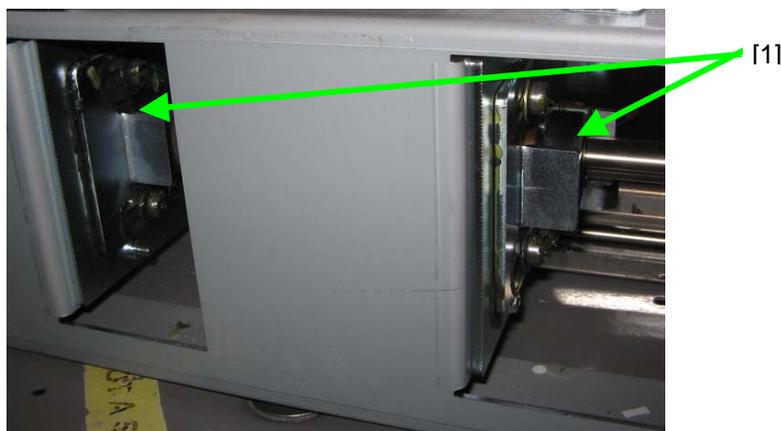


Figure 1.34 Lubricating Punch Module Cams with Punch Module Removed

## 1.4.20 Timing Belt Inspection

### Maintenance Schedule

Inspect every 750K cycles.

### Procedure

Inspect all timing belts [1] for wear, missing teeth, frayed edges, and cracks. For replacement, see “Belt Replacement” on page 4.8.

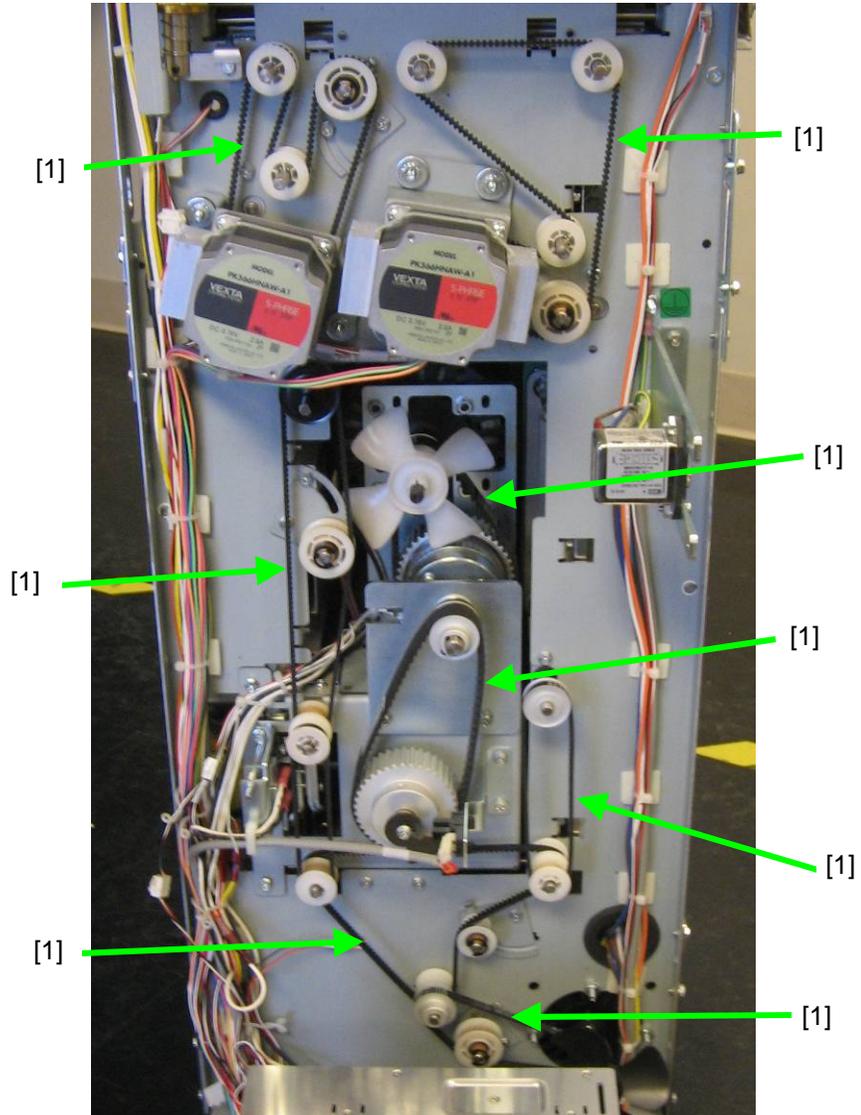


Figure 1.35 Timing Belt Locations.

## 1.5 Final Service Action

This section explains the actions a technician should take at the end of every service call. With each step, verify that the system runs smoothly and misfeed free.

1. Inspect each Die Set visually and lubricate as needed. See “Die Set Lubrication” on page 1.3.4.
2. Using the customer’s primary Die Set pattern, run 200 *simplex* printed test sheets through the punch mode and examine the output for clean hole quality and even hole alignment.
3. Using the customer’s primary Die Set pattern, run 200 *duplex* printed test sheets through the punch mode and examine the output for clean hole quality and even hole alignment.
4. Using any of the customer’s secondary Die Set pattern, run 100 simplex printed test sheets through the punch mode and examine the output for clean hole quality and even hole alignment.
5. Run 100 sheets simplex and 100 sheets duplex through the punch bypass mode.
6. Clean out all paper chips (chad) and paper dust from the chip tray, the bottom of the machine and from the floor around the bottom of the machine. See “Base Cleaning” on page 1.4.5.
7. Explain to the customer the service work that was performed and ensure they are satisfied before you close the call.

# Section 2

## Fault Analysis Procedures

Also called Repair Analysis Procedures, this section contains the basic troubleshooting information that a technician needs to isolate the root cause of a specific symptom.

### 2.1 Troubleshooting

The tables that follow are arranged in order of the normal operational sequence.

#### 2.1.1 General

One of the first rules of troubleshooting is to first understand the normal operating sequence of the machine (see Principle of Operation). Then carefully listen to the key operator's description of the problem or complaint. Follow this by your own visual observation. The cause of the problem can be determined by noting at which point in the operating cycle the problem occurred. To pinpoint the problem to a defective electrical component or mechanical part, use the Troubleshooting Guide and the Electrical Schematic Diagram.

During any service call, it is a good practice to check the cable connections for fit and alignment.

**Table 2.1 General Troubleshooting**

Symptom	Probable Cause	Corrective Action
No indication of power.	Not plugged in	Ensure that power cord is properly connected to the machine as well as the supply voltage. Check the power supplied from the outlet.
No indication of power, unit is plugged in.	Main control board, a minimum of 2 of the 3 LEDs on this board should be lit, if not, board is bad. Display panel or cable. Door not making interlocks. Die Set not making switch Jumper on the main control board is not set to the proper line voltage.	Replace main control board.  Inspect or replace. Inspect or replace. Inspect or replace. Change the jumper to the proper line voltage.

**Table 2.1 General Troubleshooting**

<b>Symptom</b>	<b>Probable Cause</b>	<b>Corrective Action</b>
Machine will not start, READY LED is ON.	Check power supply board LED, if not lit, board is bad. Check main control board LEDs, if a minimum of two of the three are not lit, board is bad. Door is not closed or properly making the interlock.	Inspect cable connections, replace board as needed. Inspect cable connections, replace board as needed.  Inspect and correct.
Paper jam LED is lit; customer or operator has been unable to locate the misfeed.	A small piece of chad or torn paper is blocking a sensor and/or the paper path.	Separate the SmartPunch Pro from the printer and the finisher, clean out the entire paper path.
Paper misfeed, not able to find any large sheets, removed sheets are torn.	Suspect a small piece of paper is hidden somewhere in the paper path.	Run a heavy cover stock through the system by hand. This process may drive any small torn pieces out of the paper path.
Punch does not cycle but punch motor runs at startup.	Punch clutch out of adjustment or defective. Flag sensor/ sensor cable malfunction	Adjust or replace.  Adjust or replace.
Punch motor does not run.	Start capacitor unplugged. AC punch motor connection. Main control board.	Re-connect. Check connection. Replace.
Paper misfeed and/or punch shaft does not return to the home position.	Punch brake is not performing properly.	Adjust or replace.
Paper misfeed and/or punch continues to cycle.	Flag sensor is broken or misaligned.	Adjust or replace.
Paper will not flow through punch path, runs through bypass only.	Divert solenoid malfunction. Transport motor not functioning. Main control board not functioning properly. Stepper motor #1 or #2 is not functioning correctly. Stepper Motor #1 or #2 driver boards are not functioning correctly.	Adjust or replace. Adjust or replace. Check connections, replace. Adjust or replace.  Check connections, replace.
Paper is punched in the middle of the sheet.	Back Gauge (back stop) solenoid is malfunctioning.	Adjust or replace.
Punched holes are not centered.	Die Set positioning bracket is out of adjustment.	Inspect and adjust as required, see adjustment procedure.
Punched holes are not parallel to the edge of the paper.	Back Gauge (back stop) is not functioning properly.	Inspect and adjust as required, see adjustment procedure.
Paper jamming in exit aligner	Paper dust build up on rollers and green belt. Stepper motor connections. Sensor 6 is faulty.	Clean rollers and green belt.  Check connections are correct. Replace.

## 2.1.2 Back Gauge

**Table 2.2 Back Gauge Troubleshooting**

Symptom	Probable Cause	Corrective Action
Deep punch or angled deep punch from leading edge of the paper.	Broken weld on paper stop, Back Gauge paddle. Broken or missing Back Gauge linkage springs.	Replace the unit. See "Back Gauge Paddle" on page 4.6.3. Replace the springs. See "Solenoid Spring Replacement" on page 4.6.2.
Cannot remove the Die Set.	Back Gauge paddle is not in the fully opened position and is contacting the Die Set. Broken weld on paper stop, Back Gauge paddle. Broken or missing linkage spring or springs.  Solenoid plunger stuck.  Solenoid plunger worn.  Punch cam not fully retracted.	Turn the Punch Cycle Knob to ensure the punch drive indicator is lined up with the position indicator. Replace the unit. See "Back Gauge Paddle" on page 4.6.3. Replace the spring. See "Solenoid Spring Replacement" on page 4.6.2. Clean the solenoid. See "Back Gauge Solenoid Inspection and Cleaning" on page 1.4.11. Replace Back Gauge. See "Back Gauge Assembly" on page 4.6. Turn the Punch Cycle Knob to ensure the punch drive indicator is lined up with the position indicator.
Punches occur 2" to 4" into the sheet.	One or more broken or missing linkage springs. Backgage not functioning or connected properly.	Replace springs. See "Solenoid Spring Replacement" on page 4.6.2. Check main control board

## 2.1.3 Die Set

Under normal conditions, the SmartPunch Pro may experience one misfeed in 15000.

Excessive misfeeding, such as one in every 1000, requires servicing. The cause may be the Die Set.

**Table 2.3 Die Set Troubleshooting**

Symptom	Probable Cause	Corrective Action
Excessive misfeeding. Paper does not exit after being punched.	Worn Die Set.  Defective Die Set. Excessive oil on punch pins. Chad and paper dust sticks to the punch pin tip.  Floating pressure bar not retracting.	Replace Die Set if it is worn out. Replace. Clean pins to remove excess oil. Lubricate with approved lubricants only. See "Die Set Lubrication" on page 1.3.4. Replace pressure bar springs when applicable. See "Floating Pressure Bar Spring Replacement" on page 1.3.2.2.

# Section 3

## Output Quality Analysis Procedures

### 3.1 Centering Punched Holes

#### 3.1.1 Die Set Position Cradle Adjustment

The die set position cradle is set in the factory. However, because of the punched hole spacing on the PB/C4 die sets, there is a minimal amount of paper on each edge of the punched paper. The die set position cradle may have to be fine adjusted to center the punched-hole pattern in the paper.

**To adjust the hole alignment:**

1. Fold a punched sheet of paper in half lengthwise and the punched-holes should be aligned. If the punched-holes are not aligned, then the die set cradle must be adjusted to align the punched holes.

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**Note:** The paper path is always constant, if the holes are not centered, you must adjust the die set cradle.

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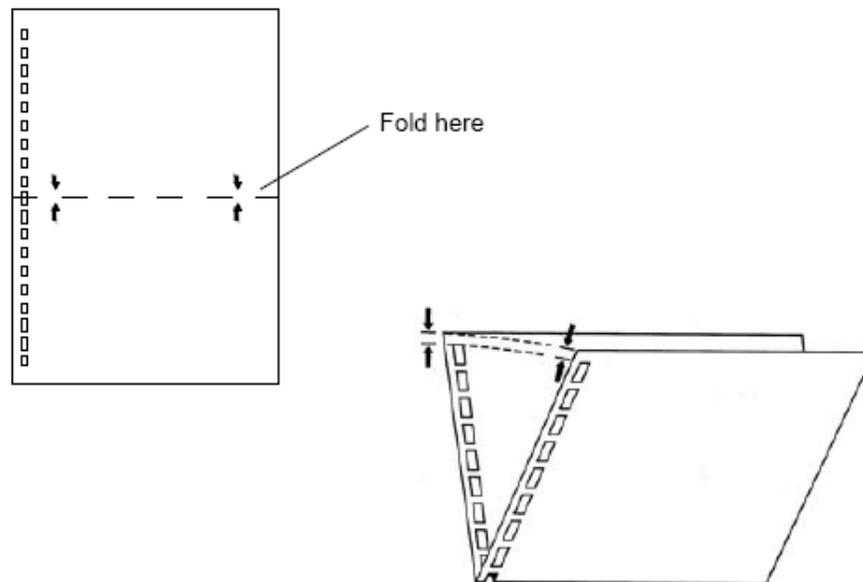


Figure 3.1 Check Hole Alignment.

2. Remove the 9 screws to remove the back cover. See “Removing the Rear Cover” on Page 4.1.2

3. Before adjusting the die set position cradle, first note what direction the die set cradle must move according to the punched paper.
4. Remove the die.
5. Loosen the lock-down screw [1] of the Die Set Position Cradle.

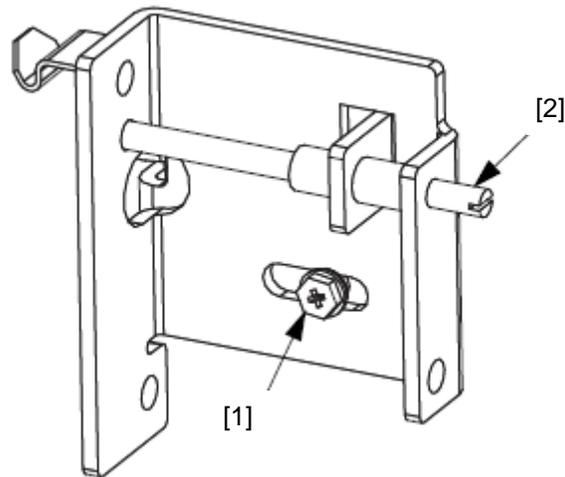


Figure 3.2 Die Set Position Cradle Adjustment.

6. Turn the adjustment screw [2] clockwise or counter-clockwise to move the Die Set Position Cradle.
7. Replace the die and run a few sheets test. Observe the punched paper. Do one of the following.
  - a. If the punched-holes are too close to the rear of the machine, then turn the adjustment screw counter-clockwise.
  - b. If the punched-holes are too close to the front of the machine, then you must turn the adjustment screw clockwise.

---

**Note:** Seven full turns of the adjustment screw result in a 1/4" change in the punched hole position.

---

8. Before tightening the lock-down screw, press downward to [1] tilt, or bias, the assembly towards the bottom of the machine and tighten the lock-down screw [2]. This will ensure positive engagement between the locking lever and the die set.

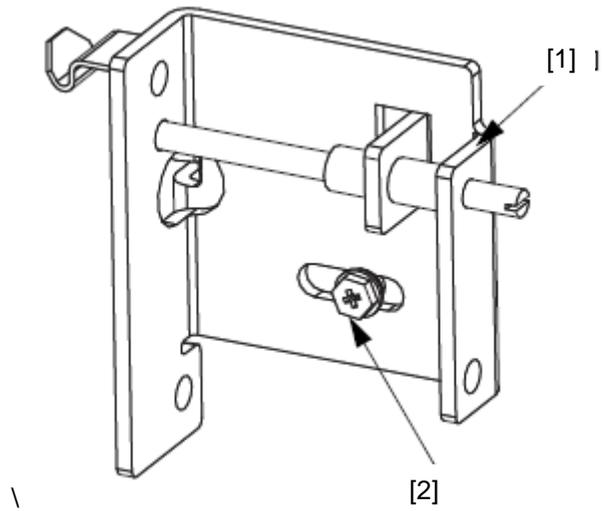


Figure 3.3 Tighten the Lock-Down Screw.

8. Run a test of punched paper and recheck paper alignment. Re-adjust if necessary remembering to remove and replace the die each time.

# Section 4

## Repair and Adjustment Procedures

### 4.1 Preparing the SmartPunch Pro for Service

Most service requires that the SmartPunch Pro be separated from the printer and finisher and the rear cover be removed.



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**Warning:** Disconnect the unit from power and maintain the cord in your possession. Failure to observe this warning can result in injury or electrical shock.

---

#### Procedure

- Unplug the unit from power.
- Disconnect the communication cable.
- Empty Chip Bin.

#### 4.1.1 Separating the Punch from the Printer

- Undock the SmartPunch Pro from the printer by releasing the docking bracket from inside the front door.
- Release the finisher from the SmartPunch Pro by releasing the docking bracket from inside the finisher.

## 4.1.2 Removing the Rear Cover

Separate the punch from the printer and finisher first. Refer to "Separating the Punch from the Printer" on page 4.1.1.

### Procedure

#### Tool Required

- Phillips screwdriver or 1/4" hex head nut driver

#### To remove the rear cover:

1. Remove the 9 screws [1].
2. Slide the rear cover out from under the top cover.

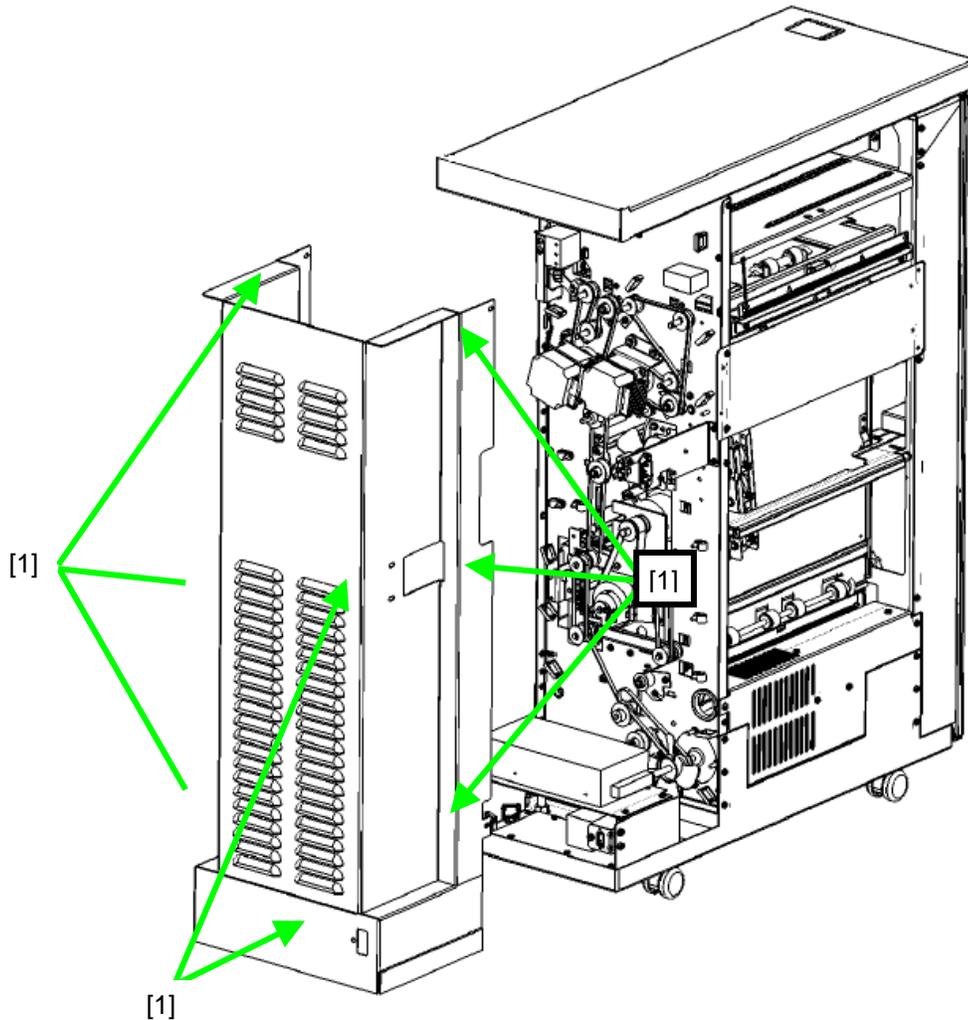


Figure 4.1 Removing Rear Cover.

## 4.2 Door Latch

### Procedure

Ensure the door latch holds the door closed and that the activating bracket tab [1] depresses the door switch [2]. The tab should press the switch button just so that it is close to bottoming out.

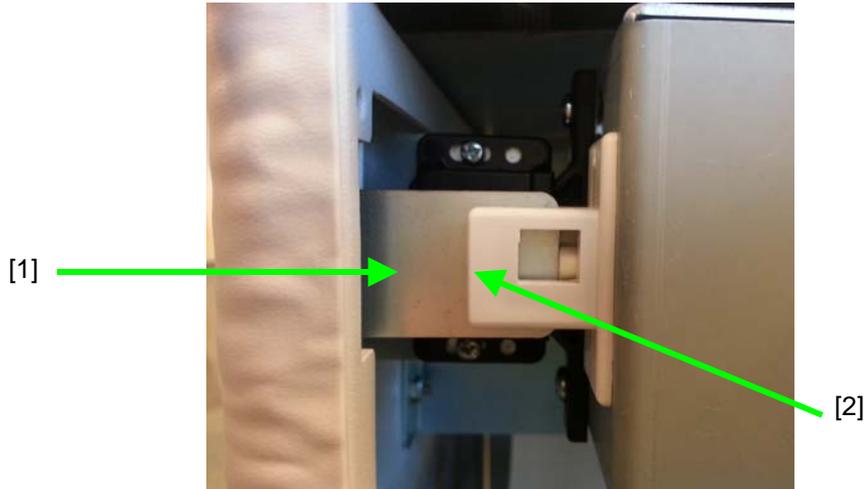


Figure 4.2 Door Latch and Switch.

### 4.2.1 Door Latch Adjustment

**To adjust the door latch:**

1. Open the front door.
2. Loosen the two adjustment screws [1] on the door latch.

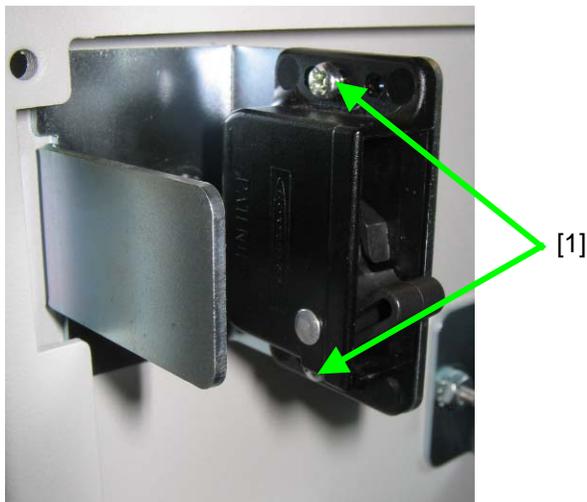


Figure 4.3 Door Latch Adjustment Screws.

3. Do one of the following.

- To move the door in, move the latch towards the front of the door.
- To move the door out, move the latch away from the front of the door.

4. Tighten the 2 screws [1] and close the door.

5. Test its operation.

## 4.2.2 Door Latch and Switch Replacement

To replace the door switch:

1. Open the front door.
2. Remove the 2 mounting bracket screws [1].

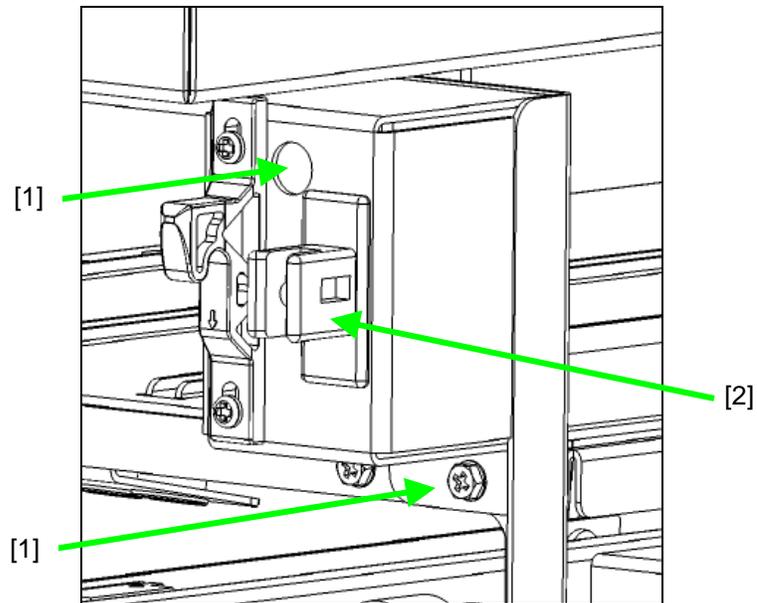


Figure 4.4 Door Switch.

3. Disconnect the wires from the rear of the switch [2].
4. Push the snap-in switch out through the front of the bracket.
5. Replace the switch and reverse the steps for assembly.

## 4.3 Bypass Panel

### Maintenance Schedule

Clean every 750K cycles. Refer to “Bypass Paper Path Inspection and Cleaning” on page 1.4.17.

### Tools Needed

- Phillips screwdriver or 1/4" nut driver
- Flat bladed screwdriver
- Needle nose pliers

### Procedure

Separate the punch from the printer and remove the rear cover. See “Separating the Punch From the Printer” on page 4.1.1. Remove the Rear Cover. See “Removing the Rear Cover” on page 4.1.2.

### 4.3.1 Bypass Panel Removal

#### To remove the Bypass panel:

1. Disconnect the grounding strap by removing the screw on the exit side of the bypass [1].
2. Unplug the exit side sensor at the rear frame [2].

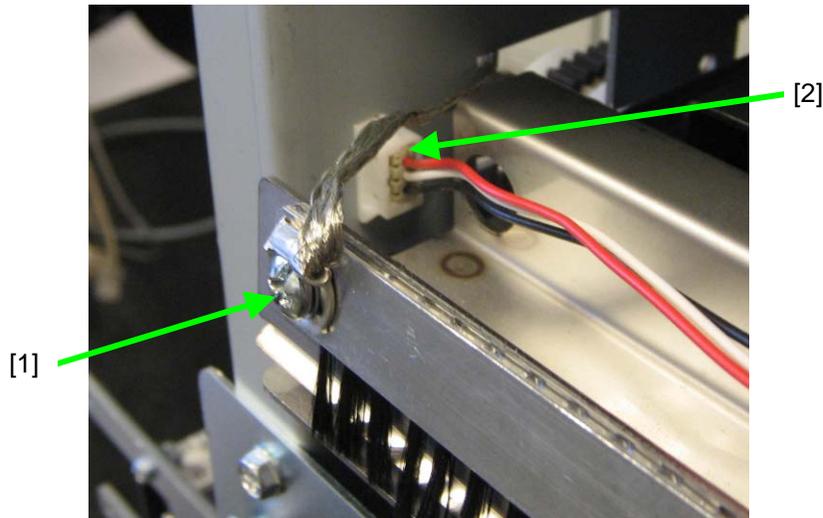


Figure 4.8 Disconnect the Grounding Strap and Unplug the Sensor.

3. From the rear of the punch, remove one of the E-rings from the Bypass shaft [3].

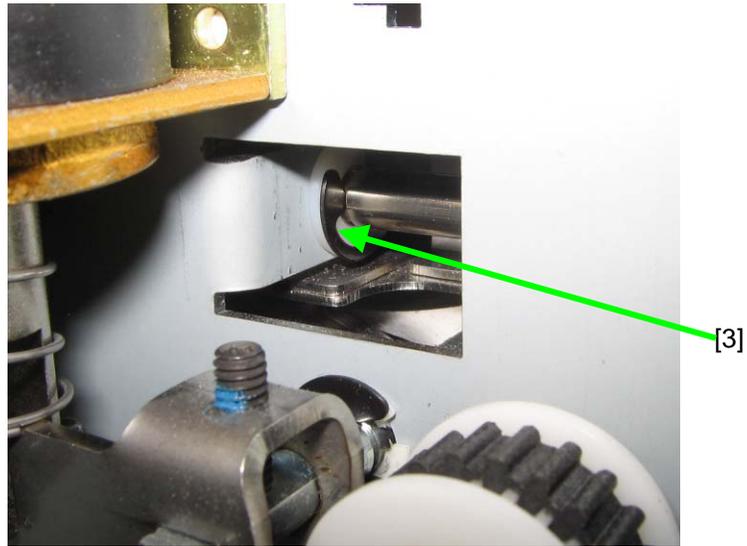


Figure 4.9 Remove E-Ring.

5. Slide the shaft [4] towards the end of the shaft without the E-Ring [5] until the other end of the shaft clears the nylon bushing and bracket.
6. Lift the opposite end of the shaft [6] and slide it out of the Bypass panel in the opposite direction of the removed E-Ring.

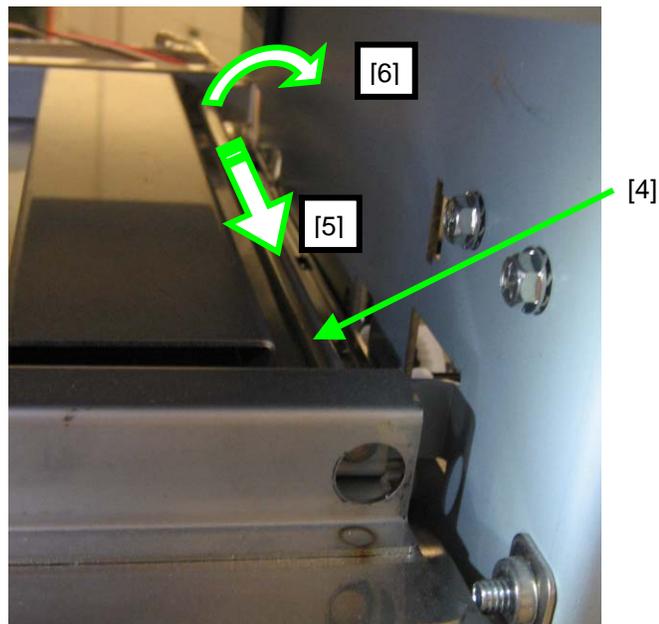


Figure 4.10 Bypass Panel, Shaft, and Rear Frame.

7. Remove the Bypass panel.

8. To install the Bypass panel, reverse the steps.

---

**Installation Note:** Position the Bypass panel so that it is outside the shaft mounting brackets [7]. The nylon bushings [8] go through the mounting brackets, into the Bypass panel [9].

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**Installation Note:** Make sure the nylon bushing is installed so that it protrudes through the mounting bracket of the rear frame into the Bypass panel [9].

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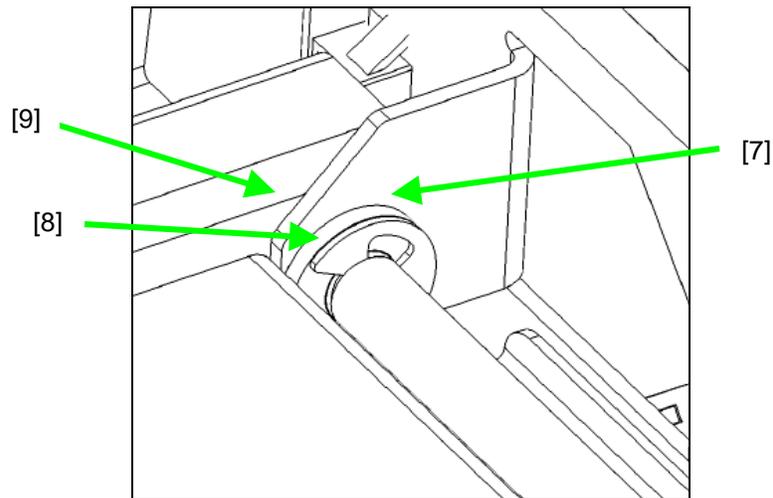


Figure 4.11 Bypass Panel, Shaft & Nylon Bushing Assembly

## 4.3.2 Bypass Idler Roller Replacement

Idler rollers press against the drive rollers and move the paper through the bypass [1]. Rollers can be serviced without removing the Bypass panel.

### Maintenance Schedule

Inspect and clean every 750K cycles. Refer to "Idler Roller Inspection and Cleaning" on page 1.4.12.

### Procedure

Inspect rollers for wear patterns or grooves. The roller surface should be even and have a textured surface. Replace when needed or per the maintenance schedule. Rollers, bushings, and shaft are replaced as one assembly.

### To remove the Bypass idler rollers:

1. Lift the retaining spring [1] over the end of the idler roller shaft.

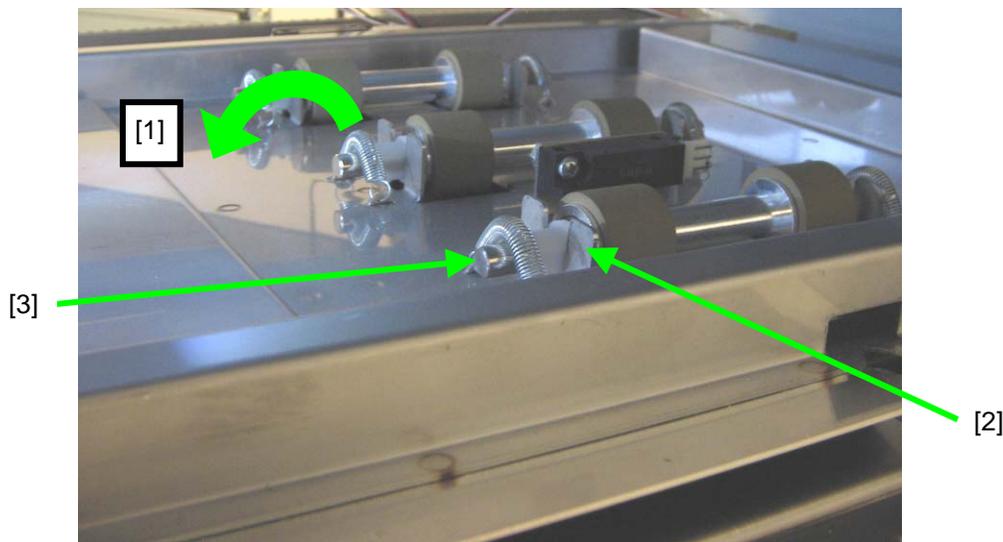


Figure 4.12 Releasing Idler Roller Retaining Spring.

2. Pull the released shaft end out of the bushing fork [2], releasing the opposite end of the shaft from the other retaining spring.

3. To install idler roller assemblies reverse the steps.

### Installation Note:

- The roller shaft has a flat surface which must face down [3].
- Make sure the flat surface of the bushing aligns in the fork.
- Rollers are non-directional so it does not matter which end goes in each fork.
- After the assembly is in place, gently pull the assembly outward and release to ensure it moves freely in the fork.

## 4.3.3 Bypass Drive Roller Replacement

### Maintenance Schedule

Inspect and clean every 750K cycles. Refer to “Drive Roller Inspection and Cleaning” on page 1.4.13.

### Tools Needed

- Phillips screwdriver or 1/4" nut driver
- Flat bladed screwdriver
- Phillips screwdriver
- Retaining ring pliers

### To remove the Bypass drive rollers:

1. Remove the upper bypass panel. See “Bypass Panel Removal” on page 4.3.1.
2. Remove the 6 screws [1] that hold the die storage rack to the front and rear frames.

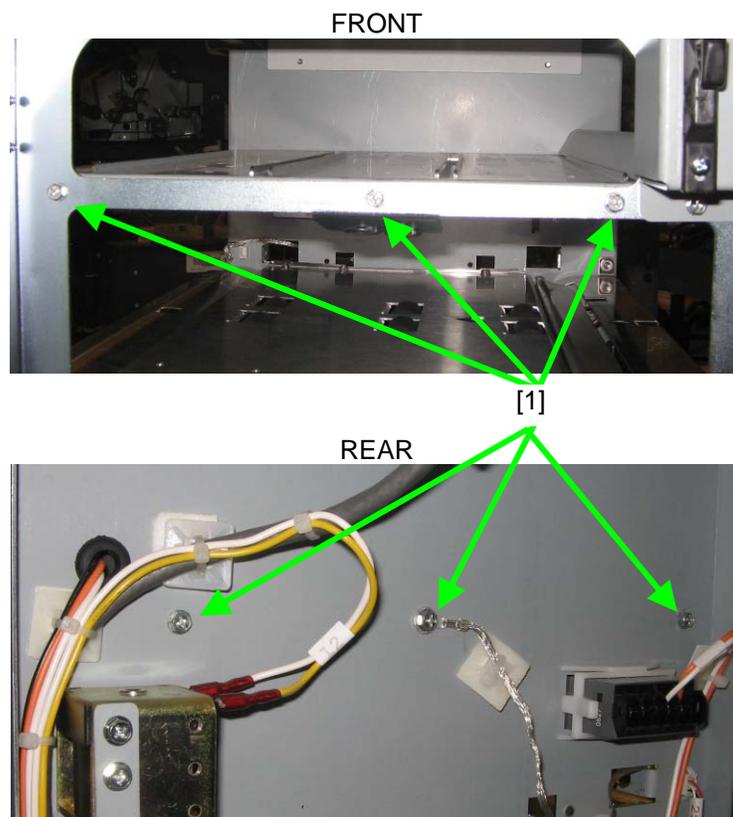


Figure 4.13 Removing the Die Storage Rack Screws

2. Tilt the storage rack up at the exit side so that the 2 cable shield screws [2] can be removed.

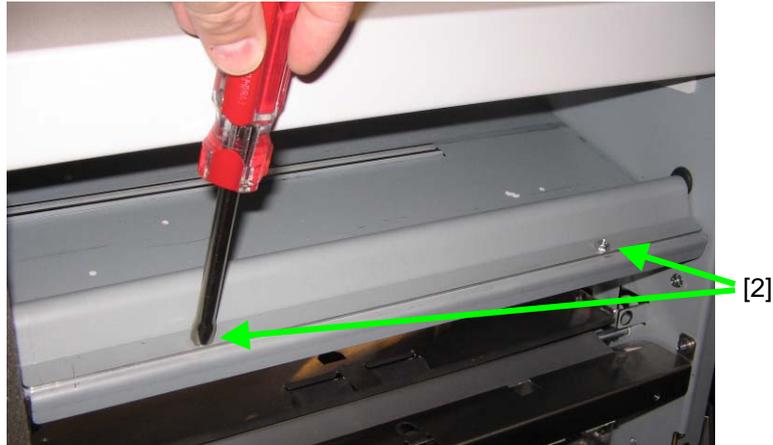


Figure 4.14 Removing the Cable Shield Screws

4. With the cable shield removed, remove the die storage rack being careful not to snag the exposed wires.
5. Remove the 2 hex head screws [3] holding the lower bypass panel to the rear frame and the 2 hex head screws [4] holding the panel down at the front frame.

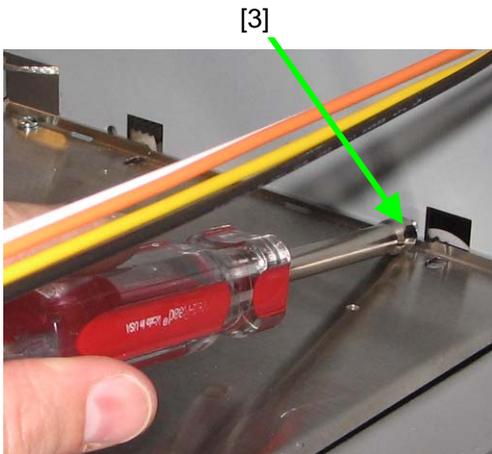


Figure 4.15 Removing the Lower Bypass Screws, Rear

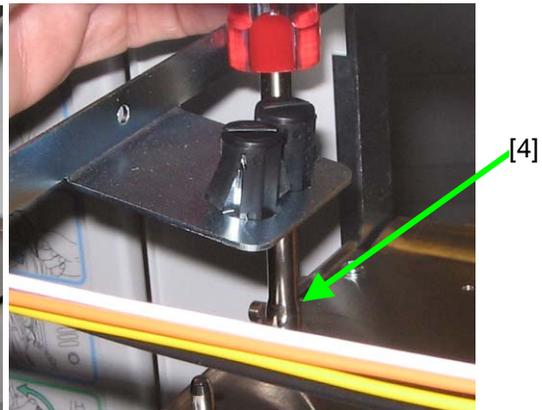


Figure 4.16 Removing the Lower Bypass Screws, Front

6. Remove the 2 Phillips head screws [5] holding the lower bypass panel to exit aligner drive panel. These screws will also need to be removed when removing the Exit Aligner Drive Panel.

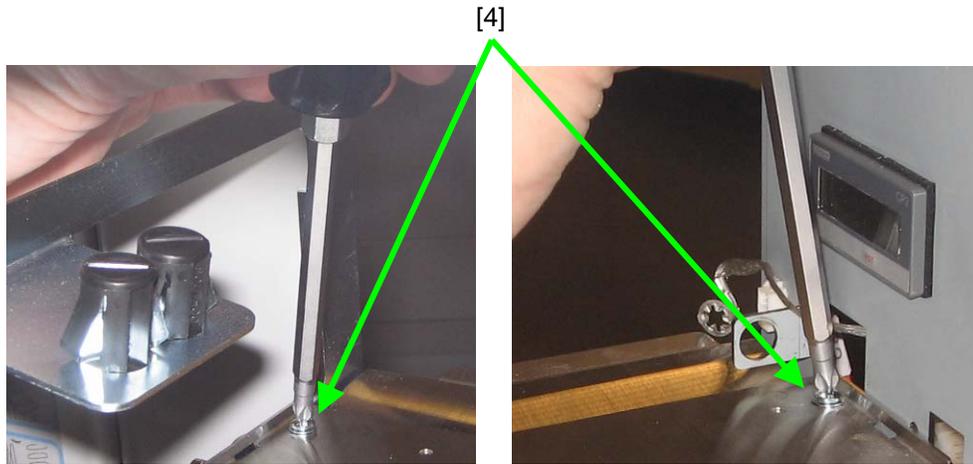


Figure 4.17 Removing the Phillips Head Screws

7. The Lower Bypass Panel can now be removed exposing the rollers.  
8. Loosen the stepper belt idlers [5] and remove the 3 retaining rings [6] and 3 pulleys [7] from the bypass rollers.

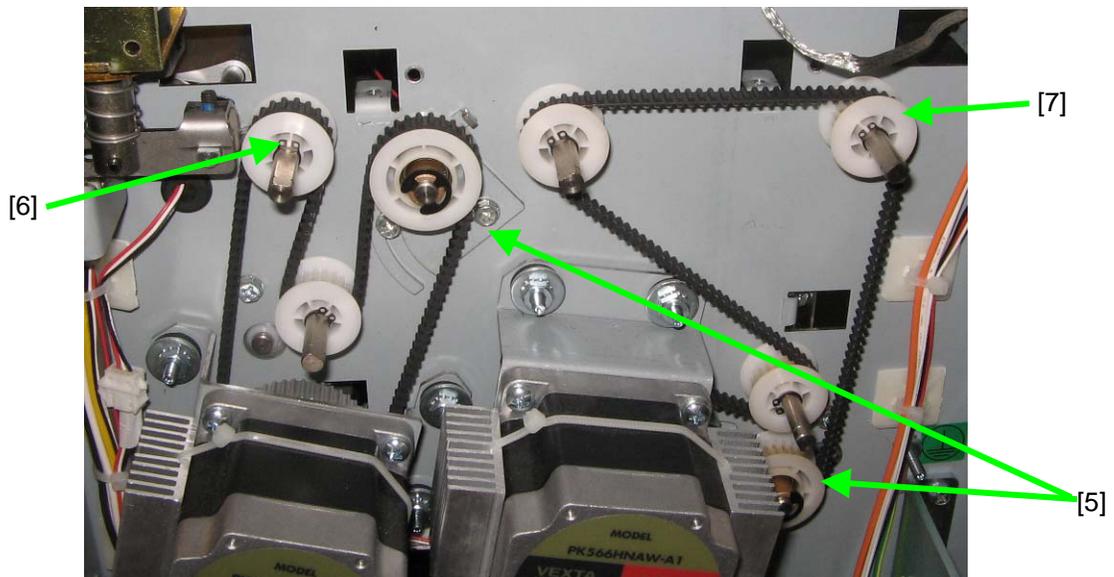


Figure 4.18 Removing the Bypass Pulleys

9. Remove the E-rings [8] from the front of the bypass rollers. The roller assemblies can now be pushed towards the rear of the machine and removed. Take care to hold the bearings when removing the rollers.

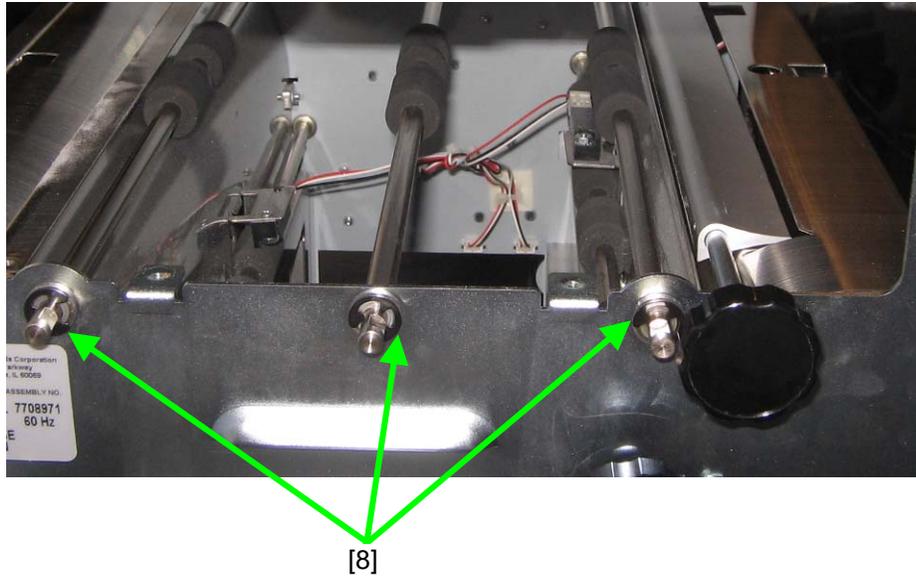


Figure 4.19 Removing the Bypass Drive Rollers

10. Reverse these steps to replace the rollers and Lower Bypass Panel.



---

**Warning:** Take care when replacing the cable shield that covers the wires. Ensure that the wires are not caught under the sheet metal when tightening the screws. Failure to observe this warning can result in injury or electrical shock.

---

## 4.4 Punch Path Idler Roller Replacement

Idler rollers press against the drive rollers and move the paper through the SmartPunch Pro. Most can be serviced without disassembling punch components. Unplug unit and separate from the printer. Refer to “Separating the Punch from the Printer” on page 4.1.1.

### Maintenance Schedule

Inspect and clean every 750K cycles. Refer to “Idler Roller Inspection and Cleaning” on page 1.4.12.

### Procedure

Inspect rollers for wear patterns or grooves. The roller surface should be even and have a textured surface. Replace on an as needed basis. Idler Rollers other than the Aligner panel & Bypass idler rollers are shown in Figure 4.14.

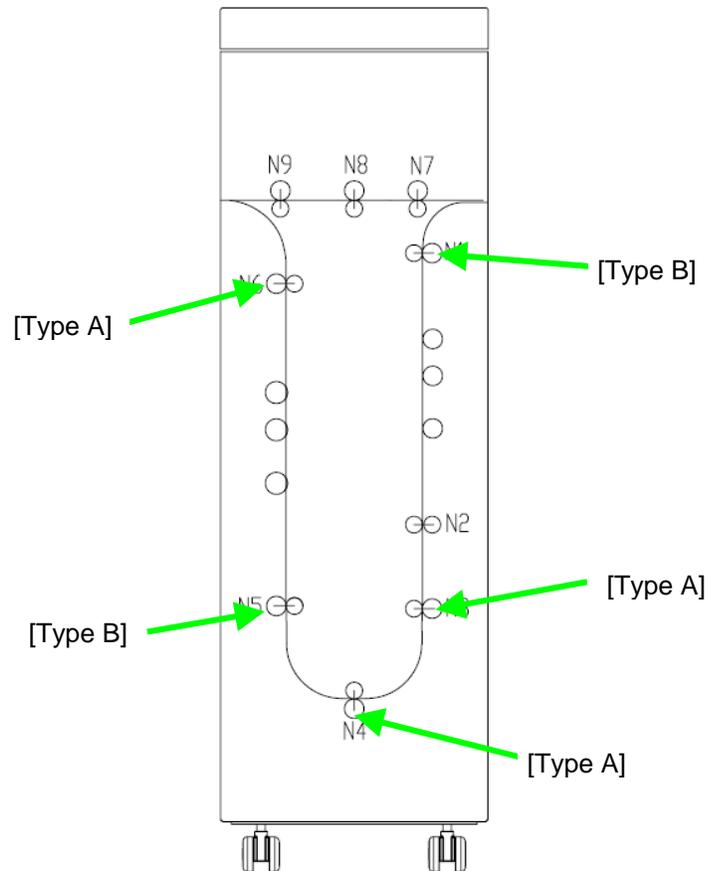


Figure 4.20 Punch Path Idler Roller Locations.

### To remove punch path idler rollers:

There are 2 types of idler roller assemblies in the punch path. Type A are 2 roller assemblies and Type B are 4 roller assemblies. Type A roller are also found in the bypass.

Type A

1. Lift the retaining spring [1] over the end of the idler roller shaft.

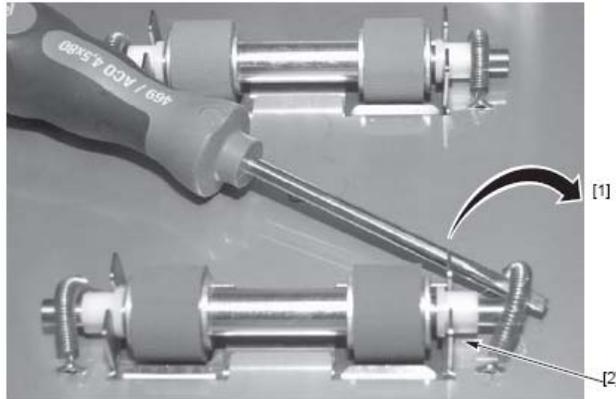


Figure 4.21 Release the Idler Roller Retaining Spring.

2. Pull the released shaft end out of the bushing fork [2], releasing the opposite end of the shaft from the other retaining spring.
3. To install idler roller assemblies reverse the steps.

#### Type B

Follow the same steps to remove Type B rollers.

---

#### ***Installation Note:***

- The roller shaft has a flat surface which must face down. On Type B rollers the springs contact the white bushing which has no flat side.
  - Make sure the flat surface of the bushing aligns in the fork. The bushing flange should be inside the fork face.
  - Rollers are non-directional so it does not matter which end goes in each fork.
  - After the assembly is in place, gently pull the assembly outward and release to ensure it moves freely in the fork.
-

## 4.5 Aligner Panels

The entrance side Aligner panel positions the paper in the Back Gauge for punching. The exit side Aligner panel positions the paper for the finisher. Prior to servicing the Aligner Panels, separate the SmartPunch Pro from the printer. Refer to “Separating the Punch From the Printer” on page 4.1.1.

### 4.5.1 Aligner Idler Roller Removal

#### Procedure

See Aligner Idler Roller Maintenance on page 1.4.10.1 on how to inspect and clean the rollers. Follow these steps if the idler rollers need replacing.

1. Unhook the torsion spring [1] from the bracket.
2. Remove the E-ring [2] from the right side of the idler roller bracket.

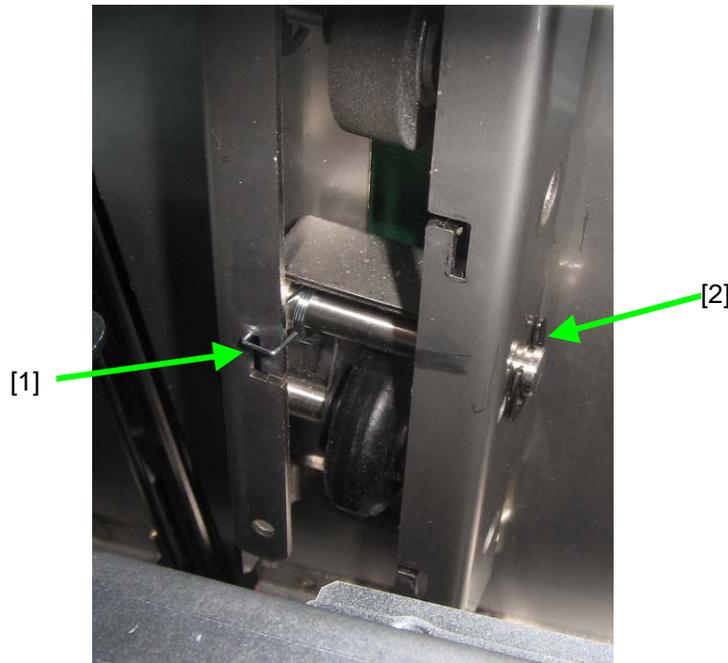


Figure 4.22 Aligner Idler Rollers

3. Slide the shaft out of the bracket and remove the idler roller assembly.
4. Reverse these steps to replace the idler rollers. Ensure the torsion spring is hooked into the bracket and the leg is pushing on the roller shaft at the end of the procedure.

---

**Tip:** All idler rollers need to be removed from the lower opening of the bracket so the lower 2 rollers will need to be removed in order to remove the top roller.

---

---

**Important:** Some idler rollers may use 2 torsion springs. Take note of the roller positions and the number of torsion springs they use.

---

## 4.5.2 Aligner Panel Removal

Removing the Aligner panels provides access to the paper path and the Aligner belt (green belt). The procedure is the same for the entrance and exit Aligner panels except that the exit side has a docking plate instead of a docking bracket, which must be removed first.

**To remove the Aligner panel:**

1. Remove the docking bracket [1].

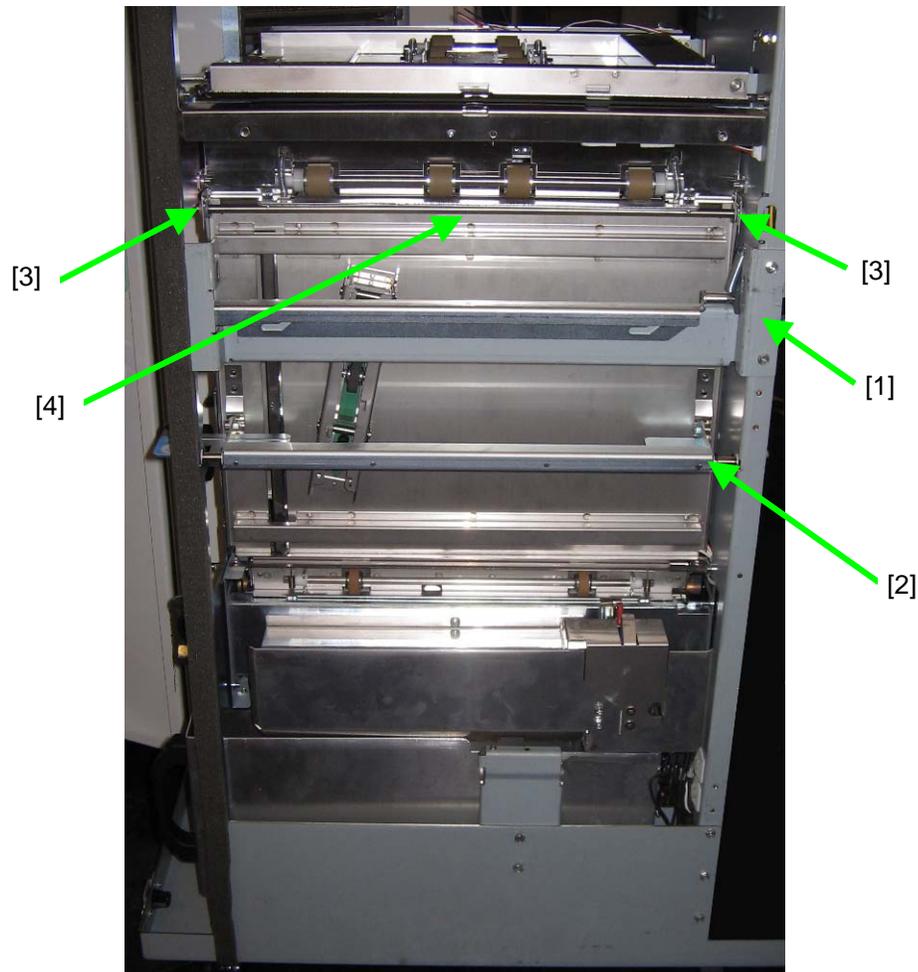


Figure 4.23 Entry Side Aligner Panel.

2. Release the Aligner latch [2].
3. Remove the E-clips from both ends of the Aligner shaft [3].
3. Slide the shaft out the front of the punch [4].

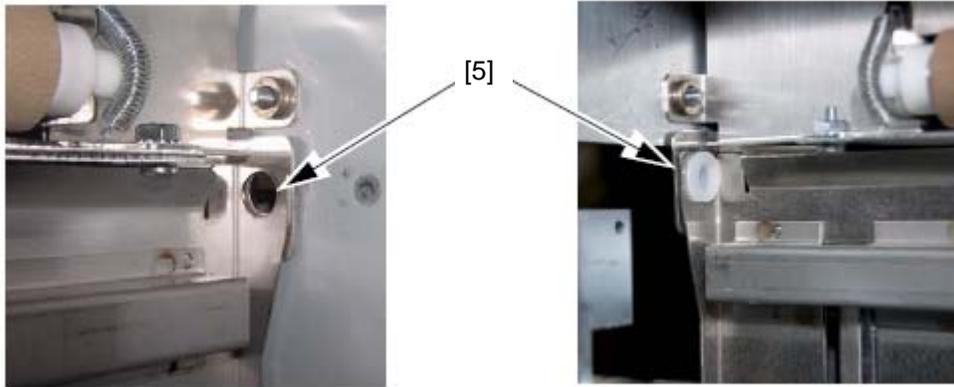


Figure 4.24 Removing Entry Aligner Panel.

4. Remove the shaft nylon bushings [5].
5. Remove the Aligner panel out the front of the punch.
6. Reverse the steps to install the Aligner panel.

## 4.5.3 Aligner Belt (Green Belt) Replacement

### Procedure

Before replacing the Aligner belts (green belt), remove the Aligner panels. See “Aligner Panel Removal” on page 4.5.2. Then follow the procedures below for the entrance side or exit side Aligner belt (green belt) service, “Paper Entrance Side Aligner Belt (Green Belt) Replacement” on page 4.5.3.1 or “Paper Exit Side Aligner Belt (Green Belt) Replacement” on page 4.5.3.3.



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**Caution:** Disconnect the SmartPunch Pro from power and retain the power cord in your possession for your safety. Failure to observe this caution can result in injury.

---

**Tip:** Empty the paper chip bin and replace it. This makes it easier to find small parts that you may drop into the bin.

### 4.5.3.1 Paper Entrance Side Aligner Belt (Green Belt) Replacement

1. Disconnect the entrance sensors wire from the side frame.
2. Remove the 4 screws that secure the front paper chute [1].

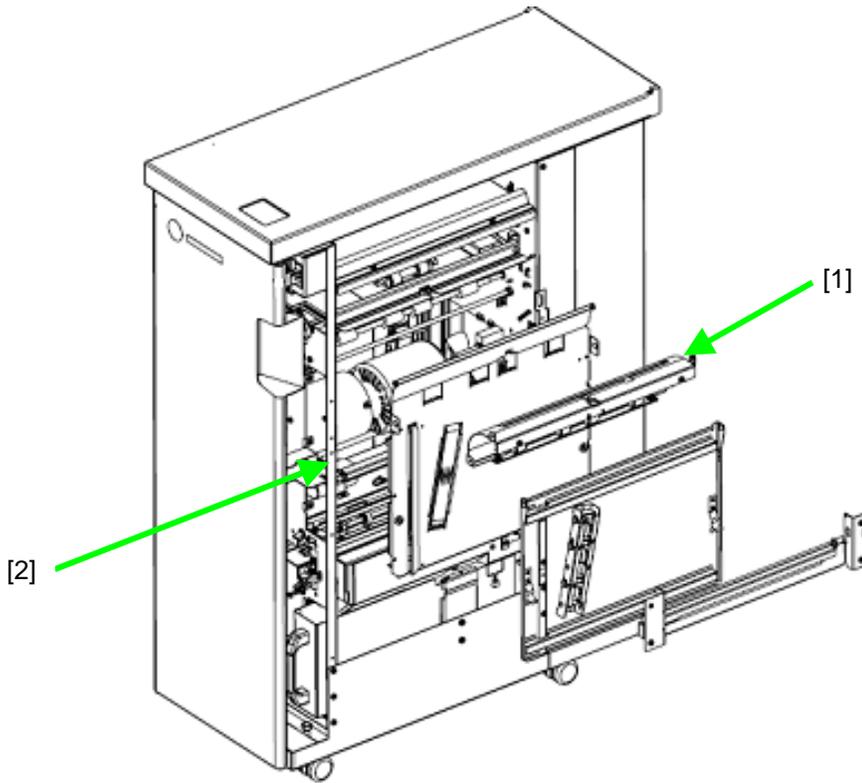


Figure 4.25 Remove 4 Paper Chute Screws.

3. To remove the J2 Latch, Door Latch [2].
  - a. Unhook the spring of the J2 Latch on the right end.
  - b. Remove only one (the one closest to the frame) of the E-rings of the J2 Latch on the left end (front Door side).
  - c. Push the J2 latch in toward the front door until it clears the rear frame.
  - d. Pull the entire J2 latch, door latch out and set it aside.

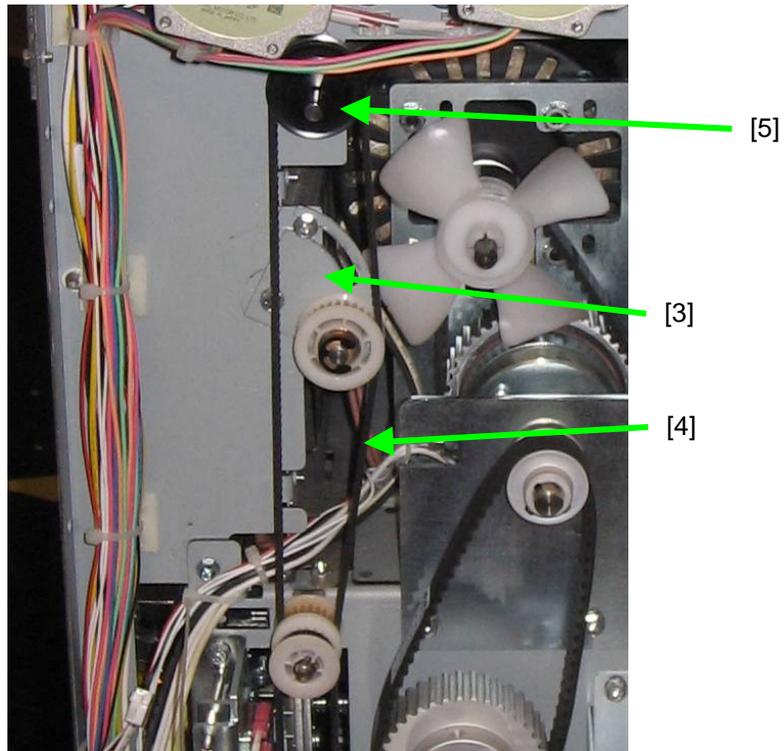


Figure 4.26 Remove the Aligner Drive Belts

4. Loosen the belt idler [3].
5. Remove the belt [4].
6. Remove the rear top pulley [5].
7. Remove the 2 screws revealed behind the pulley holding the bearing block to the frame.

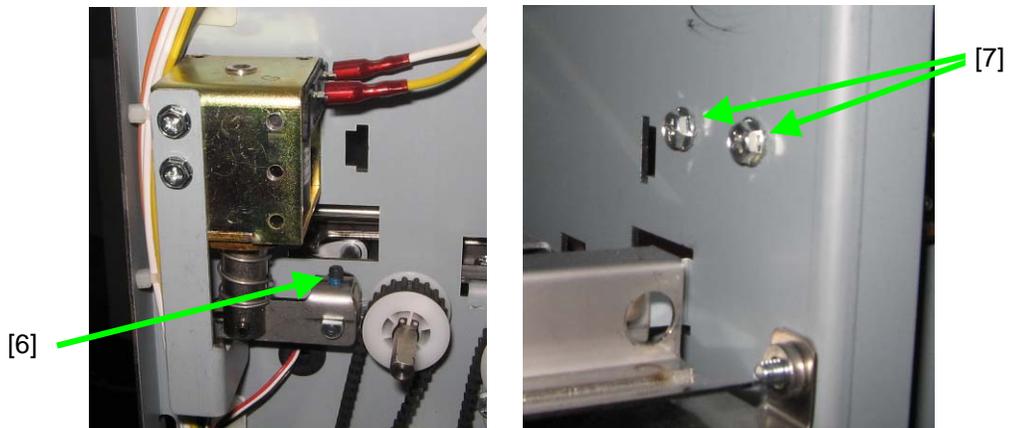


Figure 4.27 Removing the Diverter Solenoid.

8. Loosen the set screw from the solenoid link [6].

9. Remove the solenoid assembly from the rear frame by removing the two screws from the inside of the rear frame [7].
10. Remove the solenoid assembly from the shaft and let it hang.
11. Remove the 2 E-Rings and the knob of the Entrance Diverter assembly, slide the Diverter out and set it aside.

The Aligner is the large sheet metal assembly that contains the Aligner belt (green belt) and Aligner.

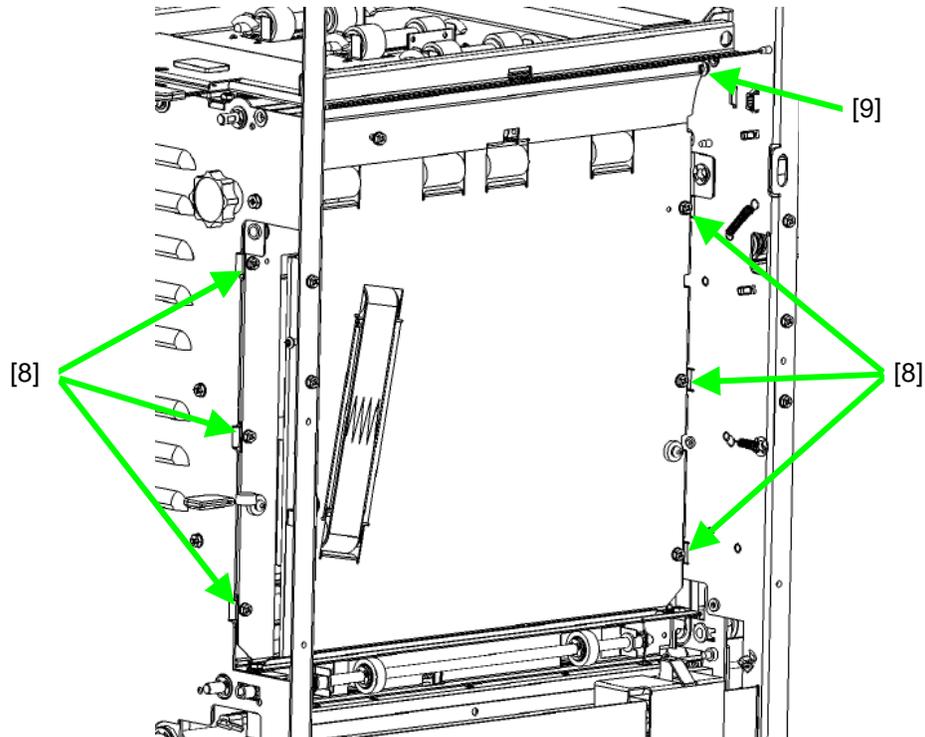


Figure 4.28 Remove the Aligner Drive

12. Remove the 6 screws that secure the face of this assembly [8].
13. Remove or loosen the 2 screws that locate in the positioning washers of the aligner panel [9].
14. Gently pull the top of the panel so that the sensor can be disconnected.
15. Pull and walk the entire sheet metal assembly of the Paper Guide Aligner assembly forwards, up and outward. Ensure the drive stub shaft is clear of the rear frame while removing the panel.



**Caution:** As you pull the assembly out, disconnect the sensor harness behind the assembly as soon as you are able to reach it. Failure to observe this notice may damage the wiring.

16. Remove the Aligner belt (green belt) assembly by removing the 4 screws [10]. The flex shaft can be removed from the bearing block at this stage, but it is recommended to leave the flexible shaft attached to the aligner roller assembly, unless it is being replaced.

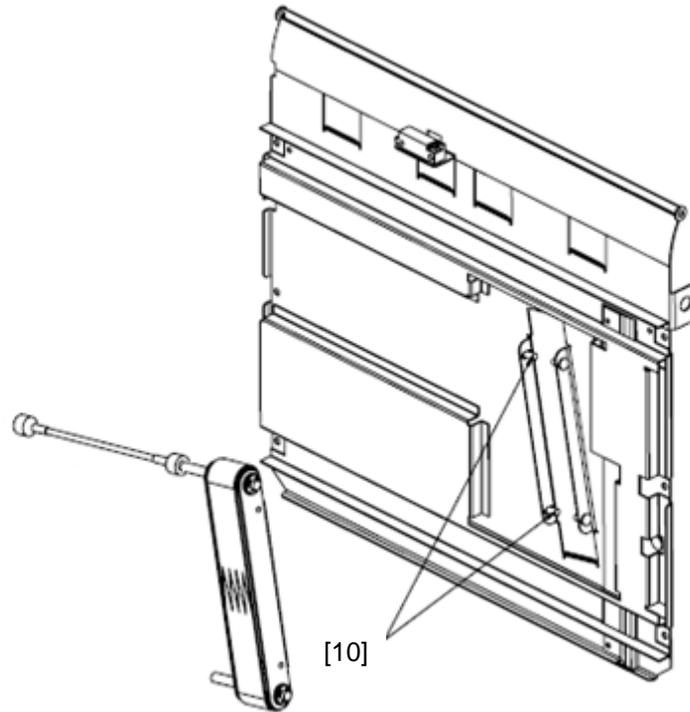


Figure 4.29 Removing the Aligner belt (green belt).

### 4.5.3.2 Replacing the Aligner Belt (Green Belt)

1. Stretch the new Belt onto the Aligner Roller assembly [1], green side out. Rotate the Shaft [2] to confirm that the belt tracks properly.

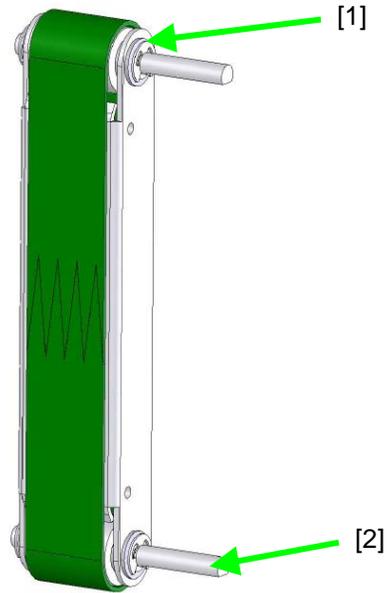


Figure 4.30 Replacing the Aligner belt (green belt).

2. Slide the Aligner into place, loosely attach the 4 Pan Head Screws with the 4 Lock Washers and do the following.
  - a. Check that the metal surface of the Aligner Roller assembly is flush with the Sheet Metal surface of the Paper Guide. A 12" metal ruler works well to check this adjustment. Slip the ruler under the Aligner belt (green belt) and press it flat against the two surfaces.
  - b. Adjust the Aligner and snug the screws when perfectly flush.

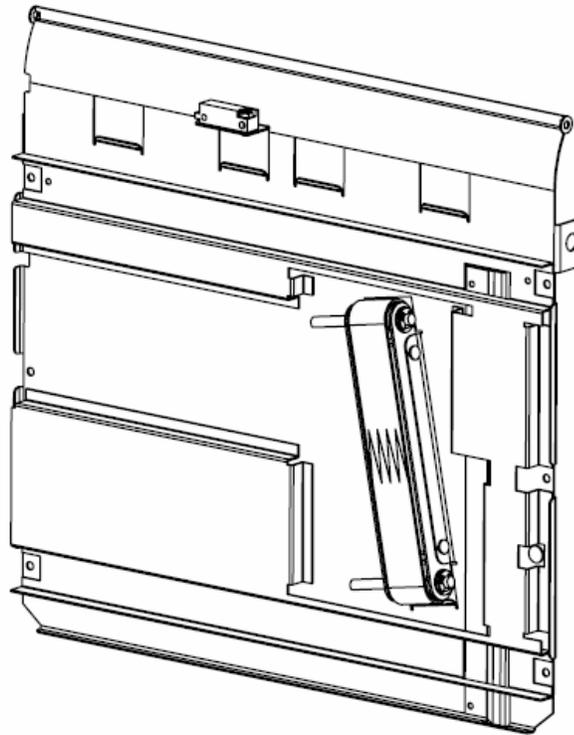


Figure 4.31 Aligner belt (green belt) in the Aligner.

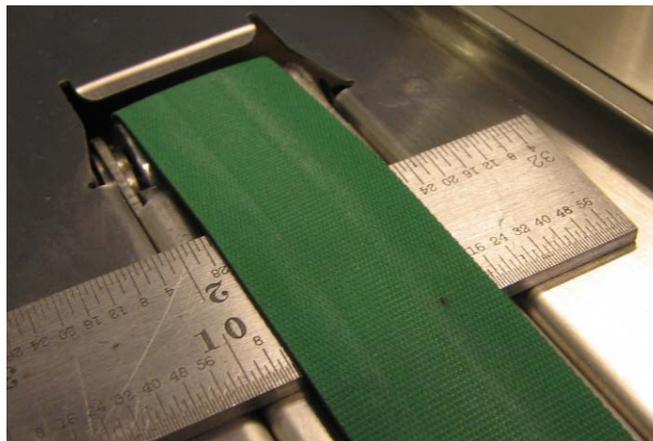


Figure 4.32 Setting the Aligner Belt Assembly

**To install the Paper Guide assembly into the SmartPunch Pro:**

Reverse the steps as listed for removal taking care to ensure the following.

1. As you slide the Paper Guide assembly into place, do the following.
  - a. Hook up the Sensor Harness to the Sensor on the back.
  - b. Lift it up slightly to clear the lower Transition Paper Guide.
  - d. Be sure that the bearing block shaft protrudes out of the hole of the rear frame.
  - e. *Loosely* secure the aligner panel in place with 3 screws on the left and 3 on the right.
  - g. *Loosely* install the 2 top screws.
  - h. Once all 8 mounting screws have been properly started go back and tighten them.

### 4.5.3.3 Paper Exit Side Aligner Belt (Green Belt) Replacement

1. Remove only one (the one closest to the frame) of the E-Rings of the J5 latch on the right end (front door side).
2. Push the J5 latch in toward the front door until it clears the rear frame.
3. Pull the entire J5 Latch, door latch out and set it aside.
4. Remove the Rear Aligner Idler Paper Guide assembly as described in "Aligner Panel Removal on page 4.6.1.

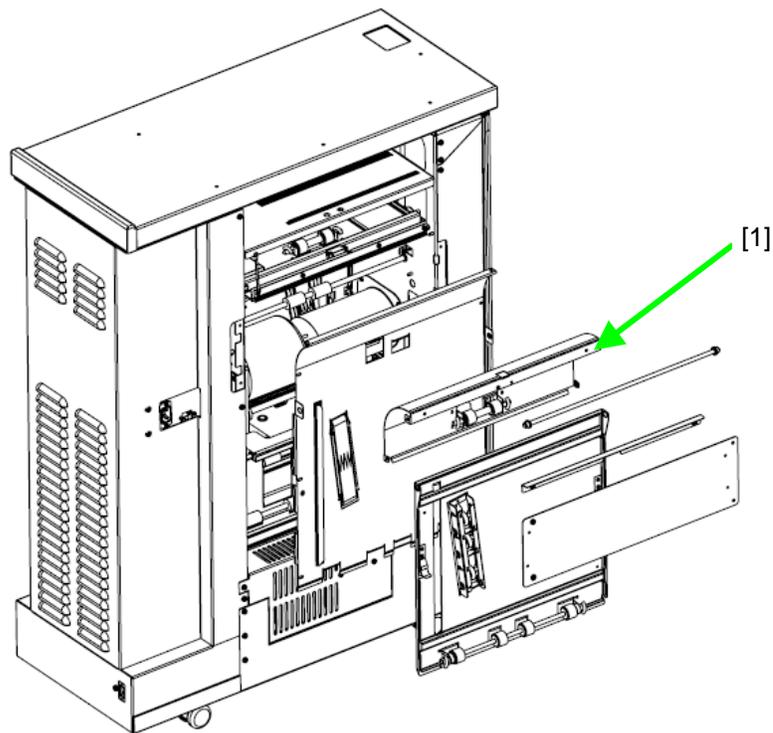


Figure 4.33 Removing Exit Aligner.

5. Remove the 4 screws (2 rear and 2 front) of the curved sheet metal Exit Paper Guide assembly [1].
6. Pull the entire sheet metal Exit Paper Guide assembly out, set aside.

The Aligner is the large sheet metal assembly that contains the Aligner belt (green belt).

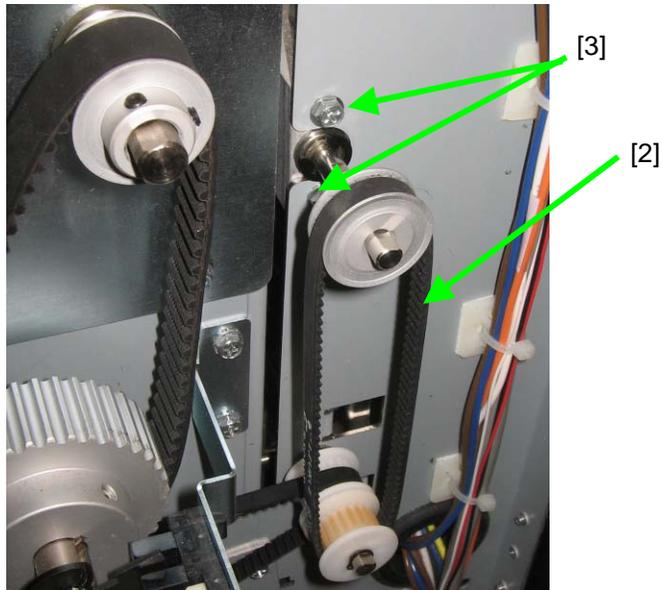


Figure 4.34 Removing the Aligner Drive Belt

7. Walk the belt off of the Aligner Pulley at the rear [2]. The pulleys can be removed if needed.

8. Remove the 2 screws that hold the block to the frame [3]. The coupler is now loose and the rear panel can be removed.

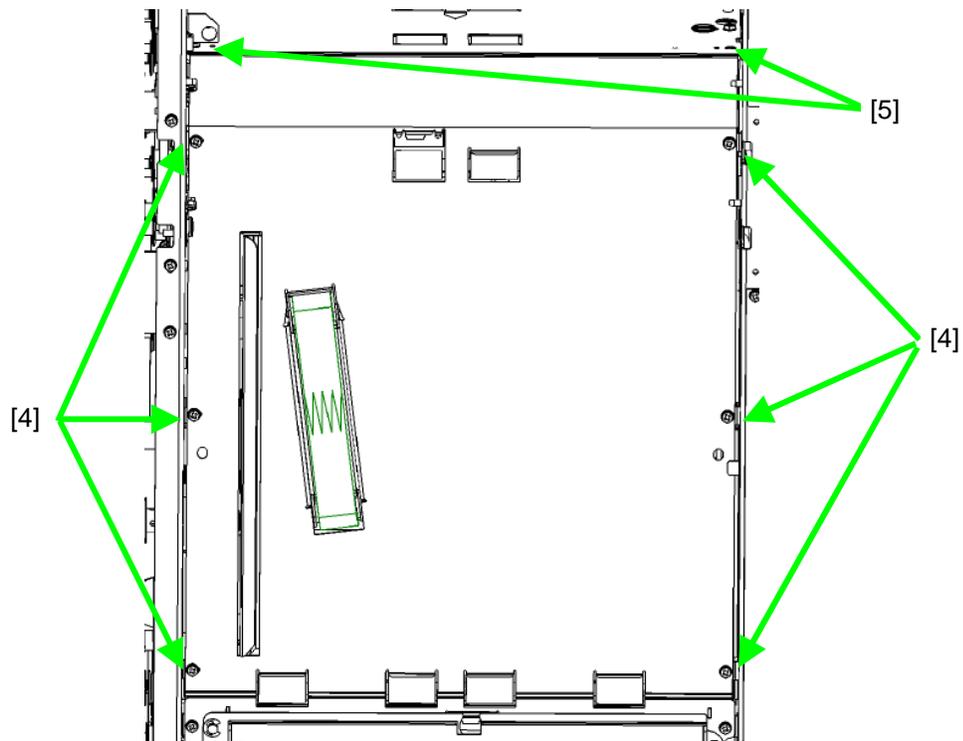


Figure 4.35 Remove the Aligner Drive Panel

9. Remove the 6 screws that secure the face of this assembly [4].

10. Remove the 2 screws that secure this assembly to the lower bypass panel [5]. See Bypass Drive Roller Replacement on Page 4.3.3 on how to access these screws.
11. Gently pull the top of the panel so that the sensor can be disconnected.
12. Pull the entire sheet metal assembly up and outward. The latch stop tab on the front frame may need to be bent slightly in order to get the panel out.

---

**Caution:** Handle the helical coupling carefully so it does not get damaged.

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**Caution:** As you do this, disconnect the sensor harness behind the assembly as soon as you are able to reach it. Failure to do this can damage the unit.

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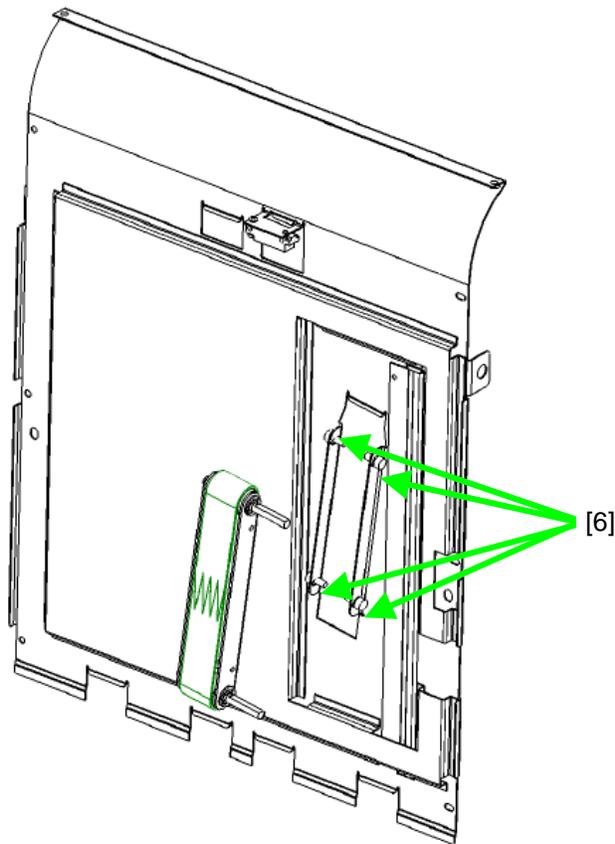


Figure 4.36 Removing the Aligner Belt (Green Belt).

13. Remove the Aligner belt (green belt) Aligner Roller assembly by removing the 4 screws [6].

---

**Note:** Leave the Coupler attached to the bearing block stub shaft unless it is being replaced.

---

14. See “Replacing the Aligner Belt (Green Belt)” on page 4.5.3.2 for details on how to replace the green belt.

When installing the Paper Guide assembly into the SmartPunch Pro, reverse the steps above and note the following:

1.
  - a. As you slide the Paper Guide assembly into place:
    - Hook up the Sensor Harness to the Sensor on the back.
    - Lift it up slightly to clear the lower Transition Paper Guide.
    - Ensure the sensor bracket is not damaged or bent.
    - Be sure that the stub shaft of the bearing block protrudes into the slot on the rear frame.
  - b. Visually check all around the mounting area of the Paper Guide assembly and that the sensor harness is properly connected.
  - c. *Loosely* secure it in place with 3 screws on the left and 3 on the right.
  - d. *Loosely* install the 2 top screws on the lower bypass panel.
  - e. Once all 8 mounting screws have been properly started go back and tighten them.

## 4.6 Back Gauge Assembly

The Back Gauge assembly pauses the paper just as the edge has entered the die set. Working properly, the sheet will pause only long enough for the holes to be punched correctly. The Back Gauge assembly also controls the paper chad falling into the chad bin, significantly reducing the amount of that could flow through the paper path. Some chad falls outside the chad bin and should be cleaned up with a vacuum cleaner during each servicing.



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**Warning:** Disconnect the SmartPunch Pro from its power source before removing the Back Gauge assembly. Failure to observe this warning can result in severe injury or death and damage the punch.

---

### Procedure

Remove Back Gauge assembly to clean and service the solenoid or to replace the Back Gauge. This procedure also allows the removal of the Punch Module.

To repair or replace the Back Gauge, separate the SmartPunch Pro from the printer and finisher and then remove the rear cover. See "Preparing the SmartPunch Pro for Service" on page 4.1.

### Tools Required

- Phillips screw driver or 1/4" nut driver
- Diagonal wire cutter

## 4.6.1 Back Gauge Removal

To remove the Back Gauge assembly:

1. Turn the Punch Cycle knob [1] so that the punch drive indicator [2] lines up the position indicator.

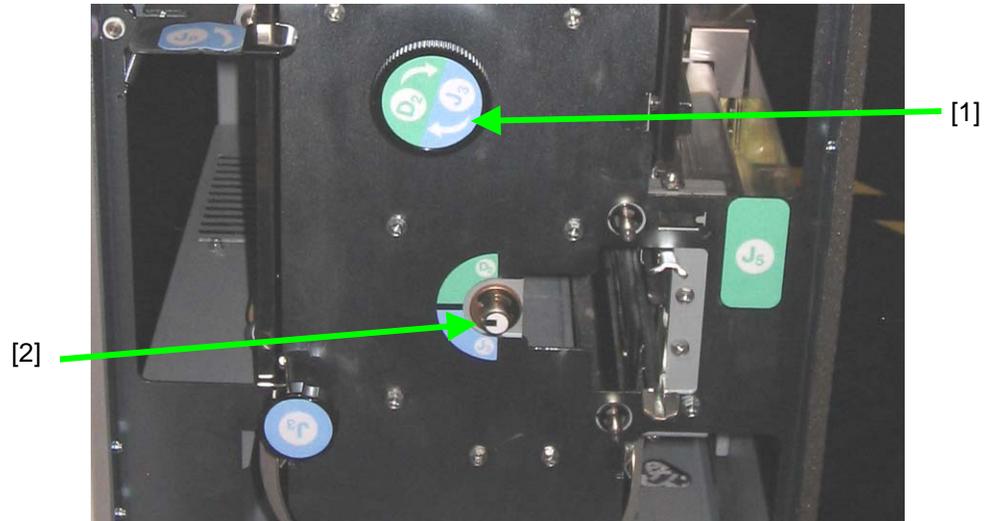


Figure 4.37 Punch Cycle Knob and Drive Indicator.

2. Remove the Die Set and Chip Bin.
3. Remove the Chip Deflector Plate [3].

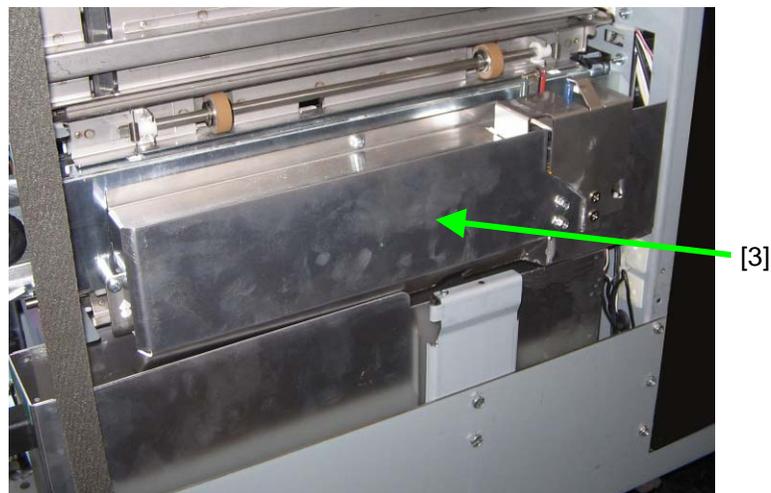


Figure 4.38 Remove Chip Deflector Plate

3. Remove the two Die Set Chip Brush bracket screws [4].

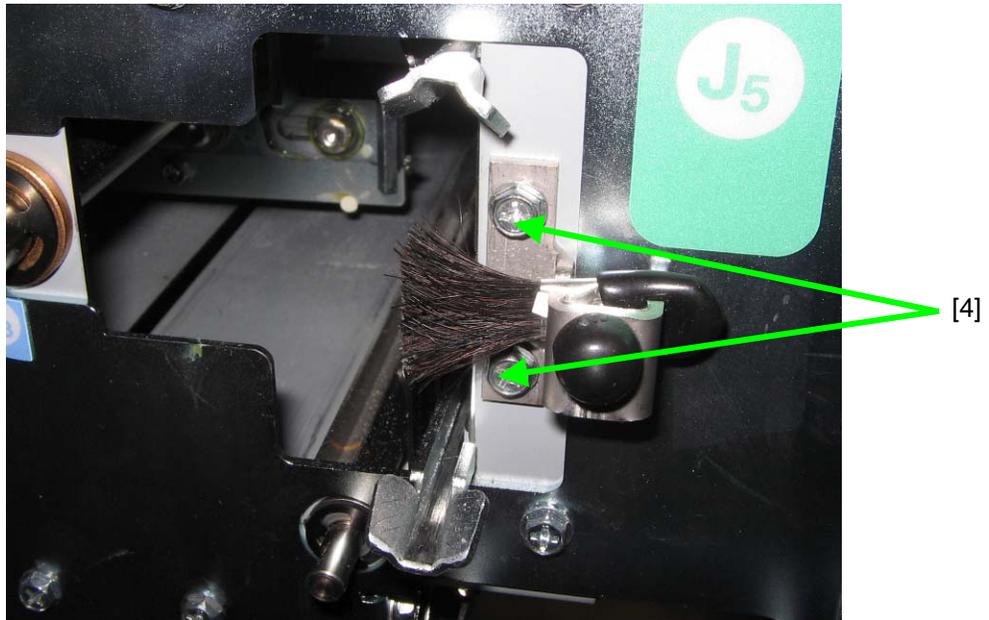


Figure 4.39 Die Set Chip Brush Bracket.

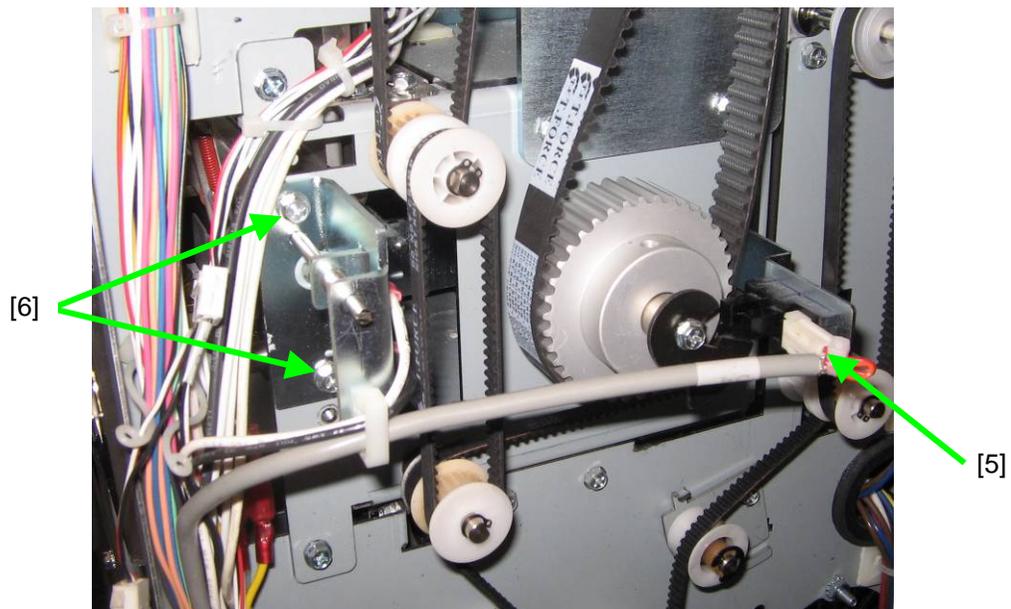


Figure 4.40 Die Set Adjustment Bracket and Drive Flag Sensor Connection.

5. On the rear of the punch, unplug the drive flag sensor connector [5].

6. Remove the 2 Die Set Adjustment Bracket screws [6] and pull the bracket aside.

6. Remove the 2 Back Gauge rear mounting screws [7].

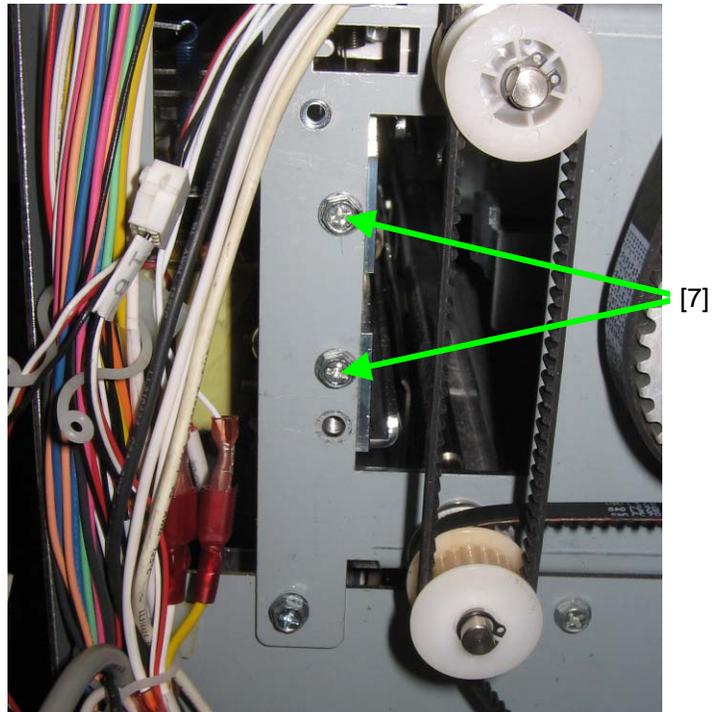


Figure 4.41 Rear Back Gauge Mounting Screws.

7. Disconnect the Back Gauge connector from the control board [8].



Figure 4.42 Back Gauge Solenoid Connector on the Control Board.

9. Cut wire harness ties or release wire clamps as needed to free the solenoid wires.

10. Cut the 2 harness ties or release clamp holding wires on rear frame [9].

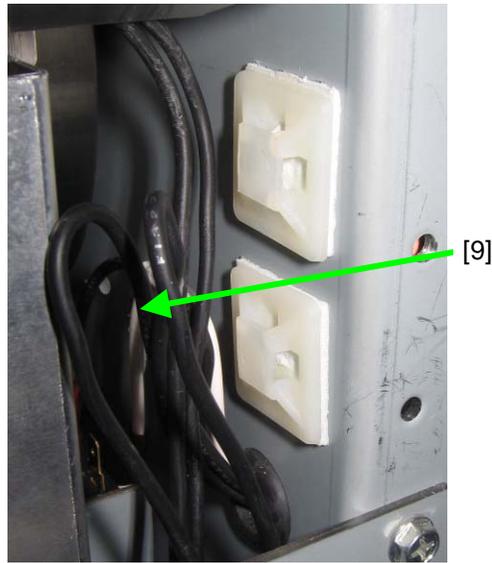


Figure 4.43 Backgage Wires on Rear Frame.

11. Remove the grommet from the frame [10].

---

**Note:** If you are not replacing the Back Gauge or are removing it for access to the Punch Module, it is not necessary to pull the wire through the hole in the frame. The Back Gauge can be set aside.

---

12. Feed the connector through the hole in the frame and the grommet separately [11].

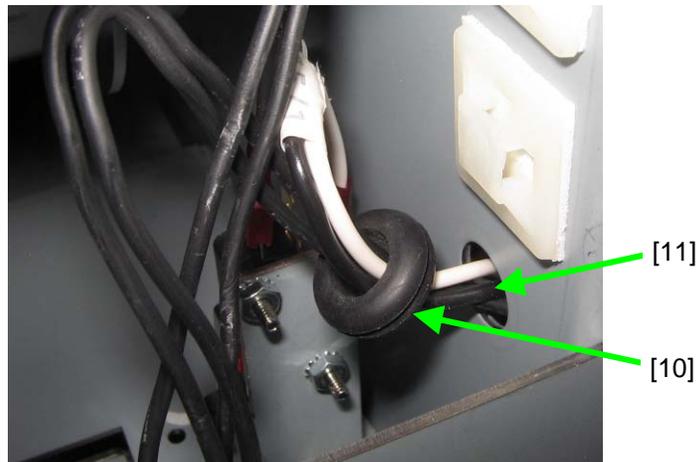


Figure 4.44 Hole Through Frame and Grommet.

13. Gently slide the Back Gauge assembly to the rear of the punch [12] so that it extends through the slot [13] and clears the wiring harness [14].

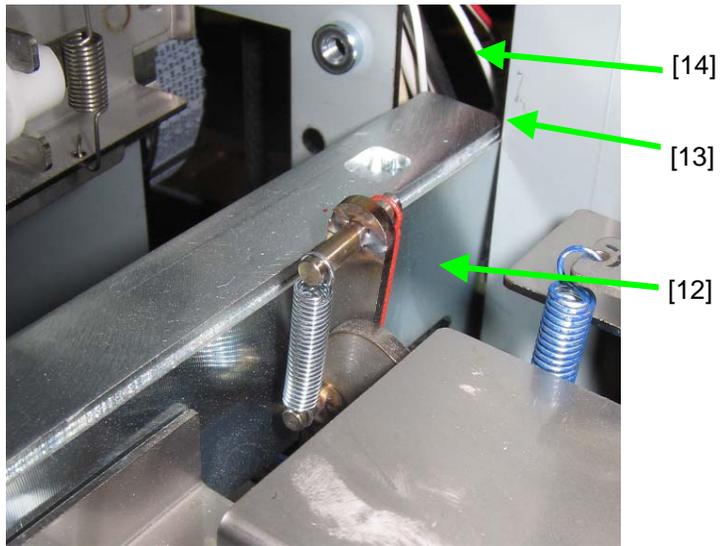


Figure 4.45 Sliding Back Gauge Towards Rear of Punch.



---

**Caution:** Do not damage the wires in the wiring harness. Failure to observe this precaution may damage the wiring.

---

14. Make sure the left end of the Back Gauge clears the opening on the front of the punch [15] and pull it out [16] in the direction shown.

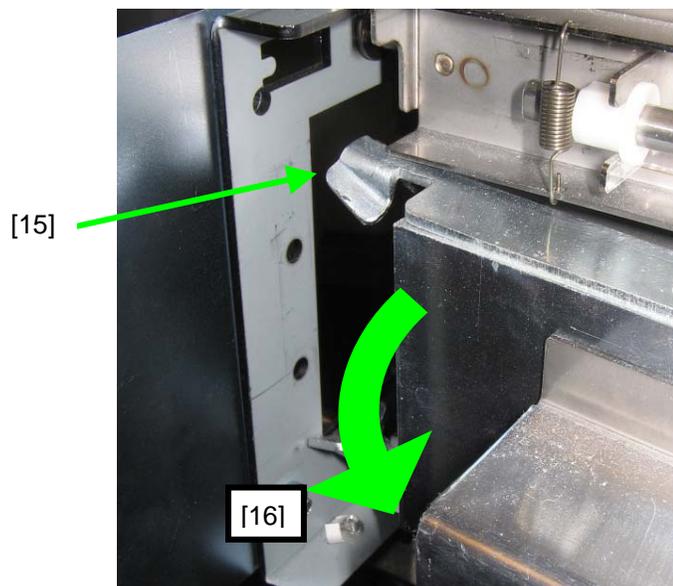


Figure 4.46 Pulling Back Gauge Out Toward Entrance Side of the Punch.

15. Remove the Back Gauge and rail as an assembly.
16. To install the Back Gauge, reverse these steps.

### 4.6.1.1 Testing

**To test the Back Gauge:**

1. Install a Die Set.
2. Rotate the punch drive knob to ensure the drive and cams turn easily.
3. Test for proper hole alignment to the paper edge by doing the following.
  - a. Run 1 page at a time.
  - b. Run 2 pages at a time.
  - c. Run 10 pages at a time.
  - d. Run 50 pages at a time.

## 4.6.2 Solenoid Spring Replacement

### Procedure

Replace broken or missing springs. The springs are color coded and must be in the correct locations.

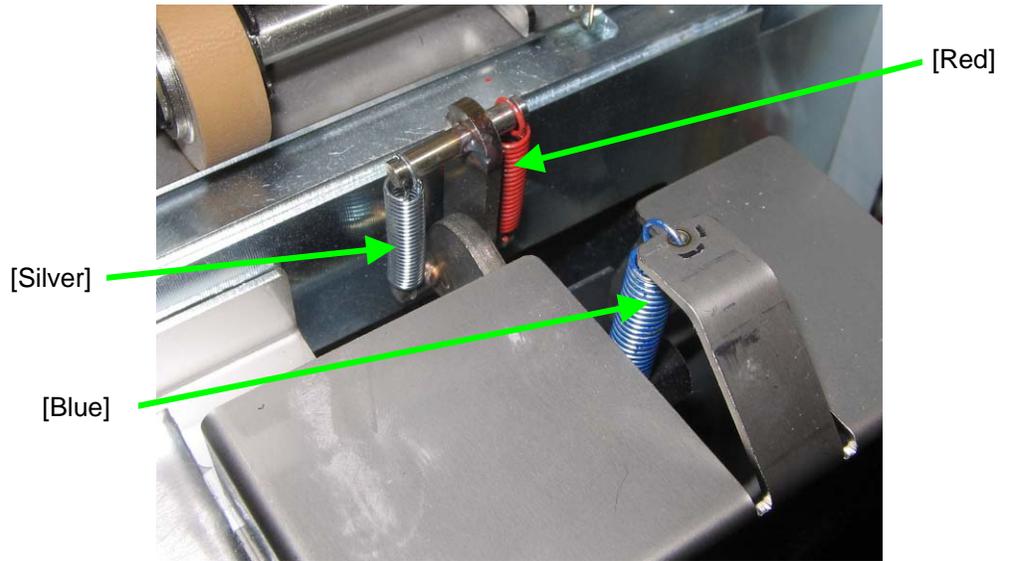


Figure 4.47 Back Gauge Solenoid Springs.

### 4.6.3 Back Gauge Paddle

#### Procedure

Deep or angled deep punches may be caused by a broken weld on the Paddle [1] shaft. Inspect the Paddle and press down on it while holding the linkage to keep the linkage from moving. If the paddle moves [2], replace the Back Gauge assembly.

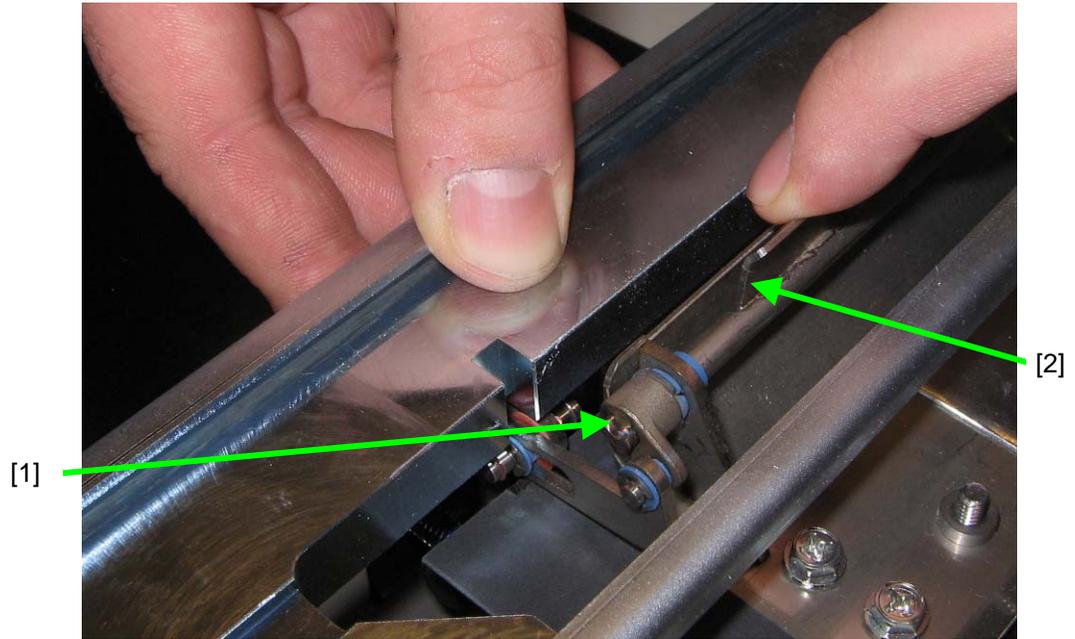


Figure 4.48 Testing for Broken Paddle Weld.

## 4.7 Punch Module

### 4.7.1 Punch Module Removal

The Back Gauge assembly must be removed before removing the Punch Module. See “Back Gauge Assembly” on page 4.6.

#### Tools Required

- Phillips screw driver or 1/4" nut driver
- Diagonal wire cutter
- Retaining ring pliers
- 5/64" Allen Wrench

#### To remove the Punch Module:

1. Remove the Back Gauge assembly.
2. Use an Allen wrench to remove the Punch Cycle knob [1].
3. Remove the 4 Punch Module retaining screws from the front panel [2].

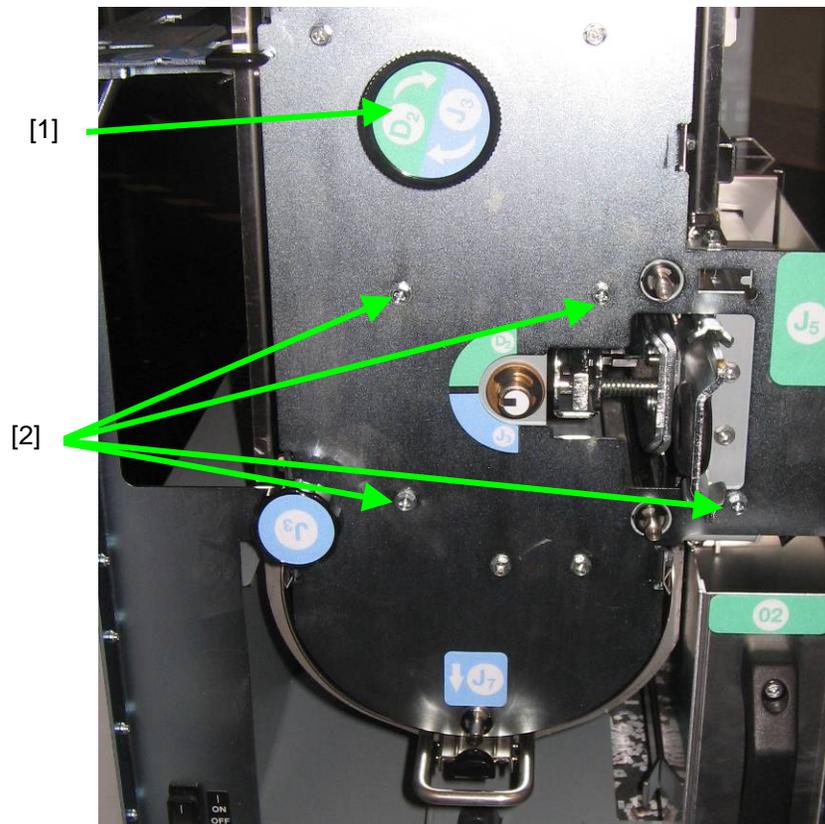


Figure 4.49 Knob and Punch Module Front Retaining Screws.

4. Cut the cable ties or unclip the cable clamps on the left wiring harness [3] to free the Punch Module wiring.

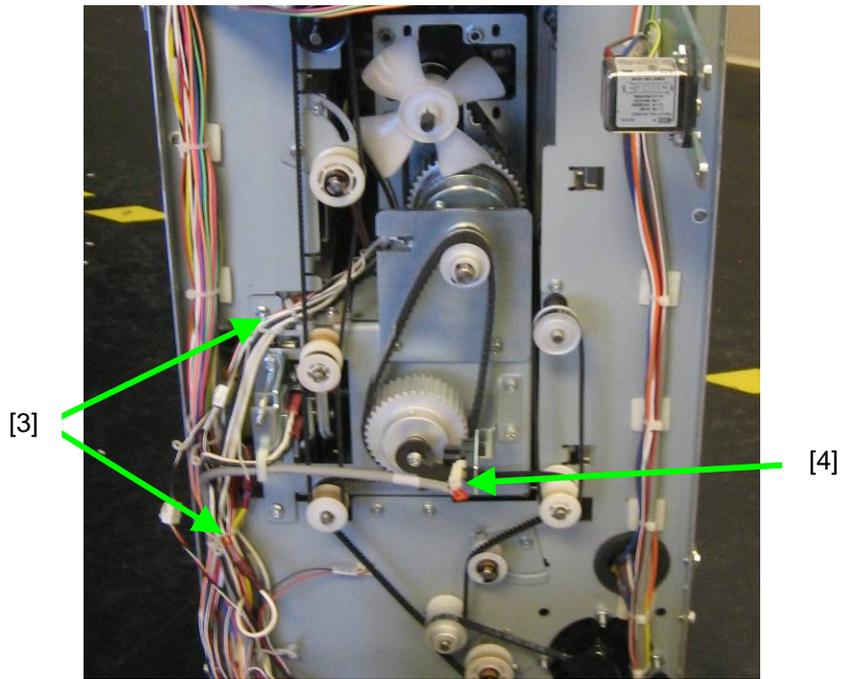


Figure 4.50 Wiring Harness at Rear of Punch.

5. Unplug the punch sensor cable [4] from the punch sensor, if not already removed.

6. Remove the belts in the order shown in Figure 4.52.

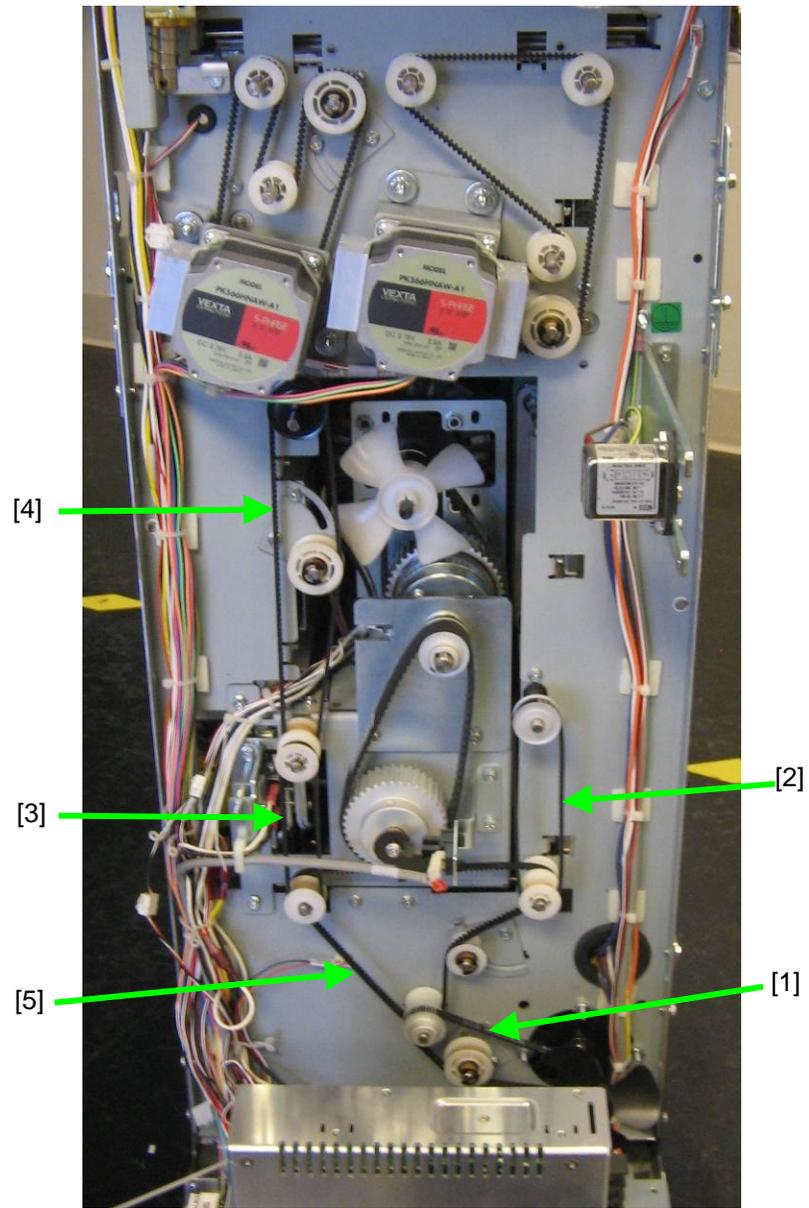


Figure 4.51 Order of Belt Removal.

7. Remove the two rear Punch Module screws [5].

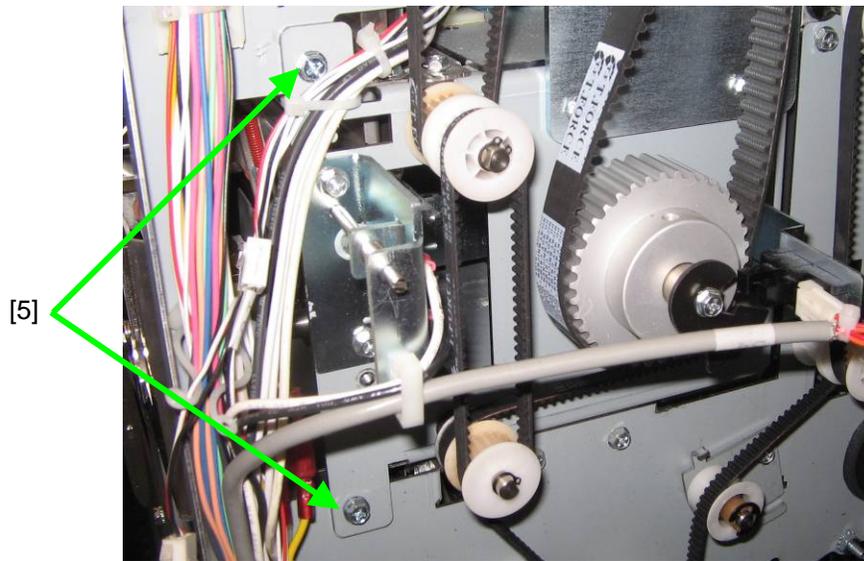


Figure 4.52 Punch Module Retaining Screws on Rear of Punch.

8. Remove the 4 power supply screws [6].

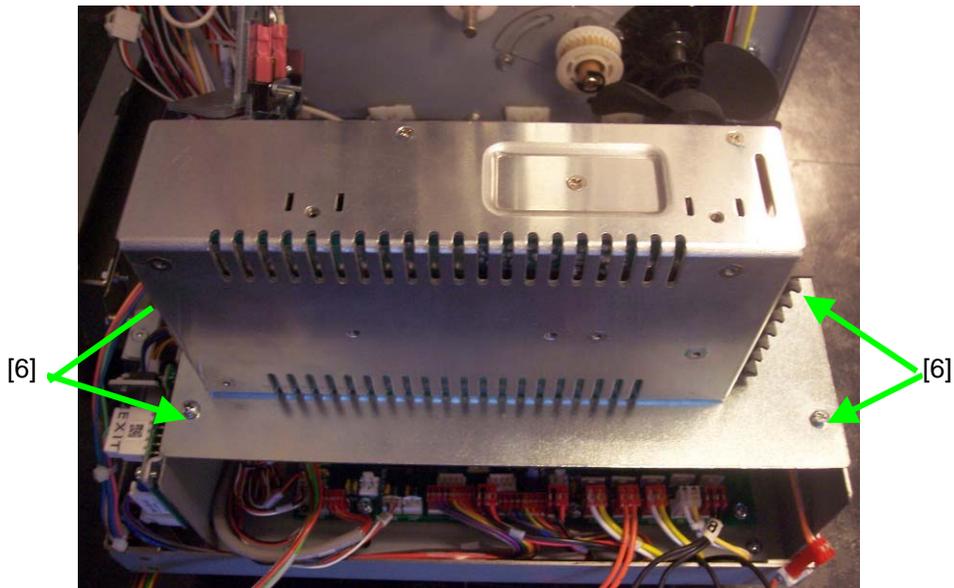


Figure 4.53 Power Supply.

9. Cut wire harness ties as needed to release the punch wiring. If the punch module is being removed for service then all wire ties/ cable clamps do not need to be released. Proceed with removing the punch module and detach the cable clamps when required.

10. Unplug the punch connector [6] from the control board if the punch module is being fully removed.

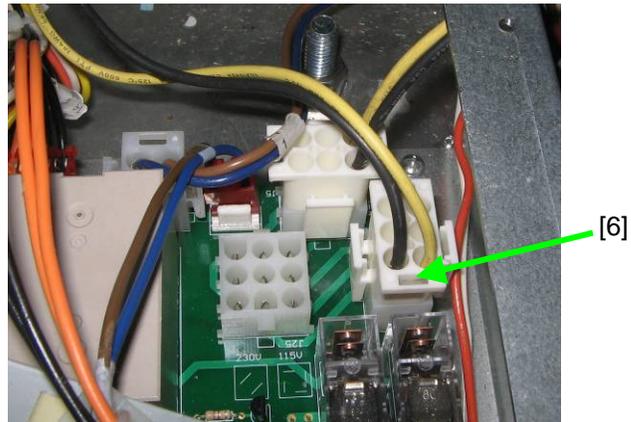


Figure 4.54 Punch Connector on Control Board.

11. Carefully slide the Punch Module out the back of the punch. Ensure that the wiring harness does not get caught or prevent removal of the module. The punch module can be rested just before full removal from the main frame or rested on a low object if performing maintenance tasks.

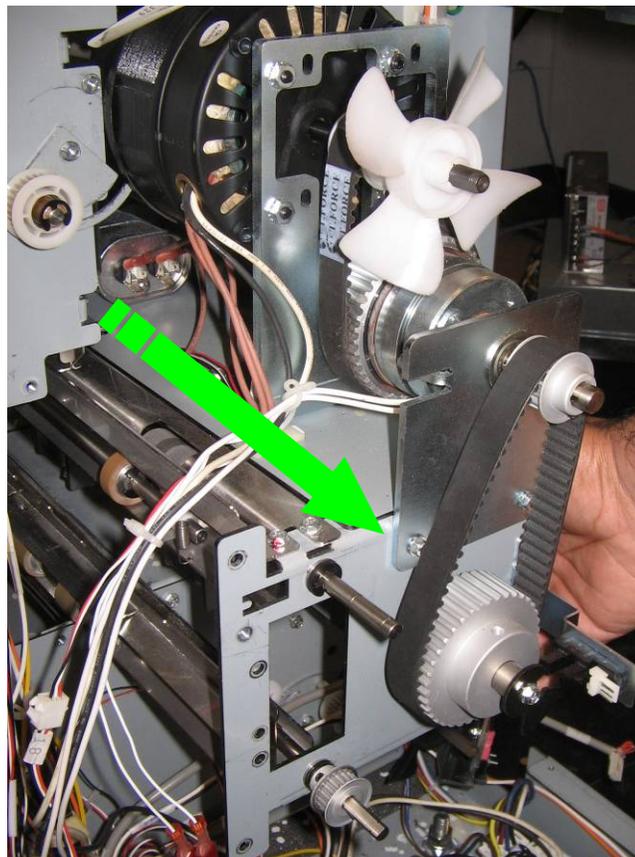


Figure 4.55 Removing the Punch Drive Module.

## 4.7.2 Clutch Replacement

### Procedure

Replace if clutch is malfunctioning.

---

**Note:** The clutch can be removed without removing the Punch Module.

---

### Tools Required

- Phillips screwdriver or 1/4" nut driver
- Hex wrench, 5/64"

### To remove the clutch:

1. Unplug the punch flag sensor connector [1].

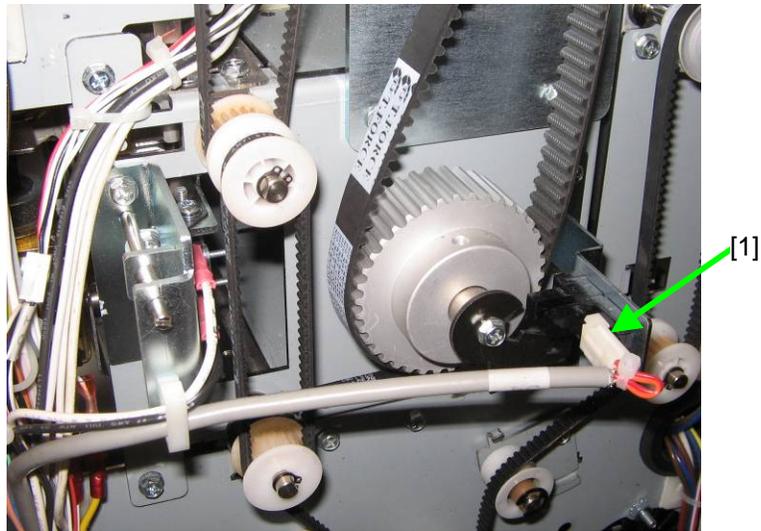


Figure 4.56 Flag Sensor Connector on Rear of the Punch.

2. Slide the fan [2] off the shaft.

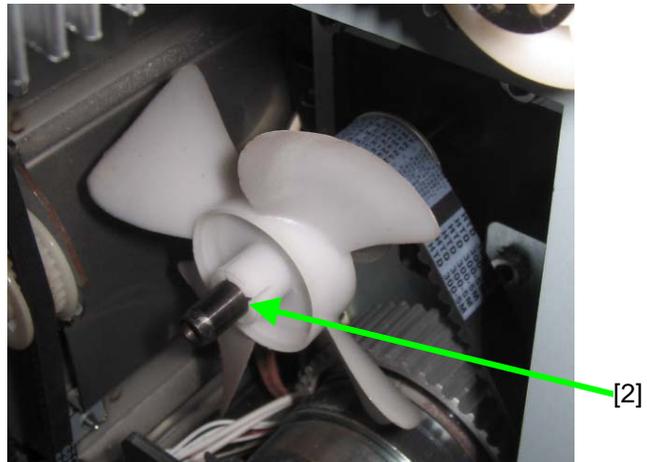


Figure 4.57 Punch Motor Fan.

**Installation Note:** When installing the fan, be sure to align the flat of the fan hub with the flat on the shaft. Make sure the hub is facing away from the motor and that the fan does not hit the belt [3].

3. Remove the lower drive belt [4].

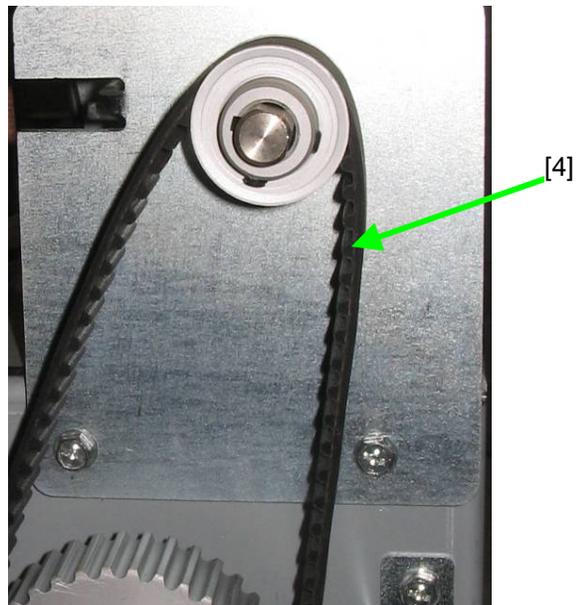


Figure 4.58 Punch Drive Belt.

4. Loosen the 2 pulley socket head set screws [5].
5. Remove the pulley and its shaft key [6].

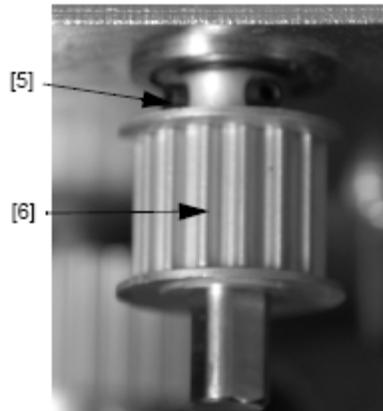


Figure 4.59 Drive Upper Pulley.

5. Remove the 2 clutch bracket screws [7].

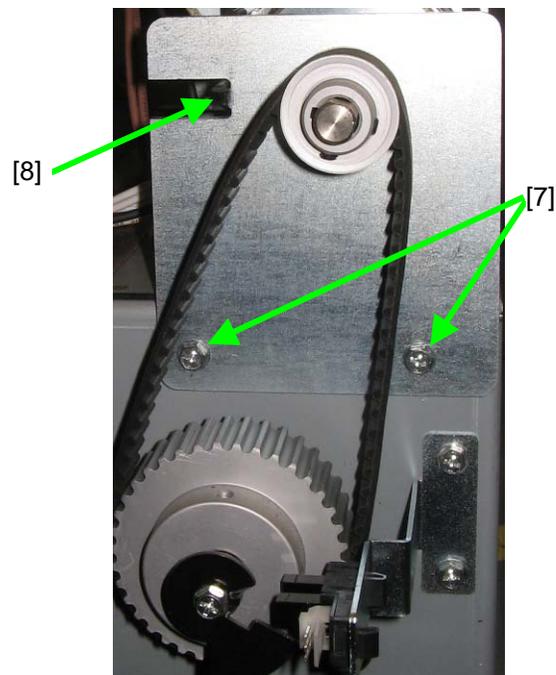


Figure 4.60 Clutch Bracket.

**Installation Note:** When installing the clutch bracket, ensure that the fork of the clutch engages the tab on the bracket [8].

7. Loosen the 2 clutch socket head set screws [9], slide the clutch [10] off the shaft, and remove the shaft key [11].

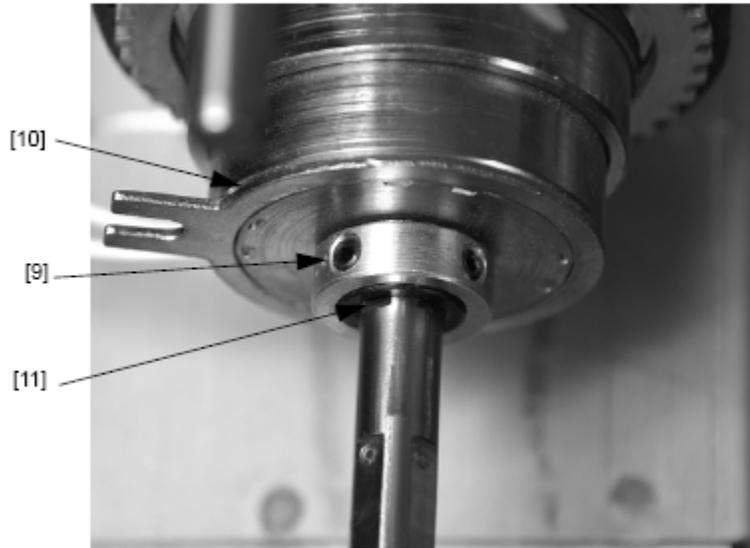


Figure 4.61 Punch Clutch.

8. Cut wire ties or release the cable clamps as needed and unplug the clutch cable plug [12] from the control board connector J9.



Figure 4.62 Punch Clutch Connector on the Control Board.

- Slide the back portion of the clutch [13] off the shaft.  
The motor drive belt [14] can be removed at the same time.

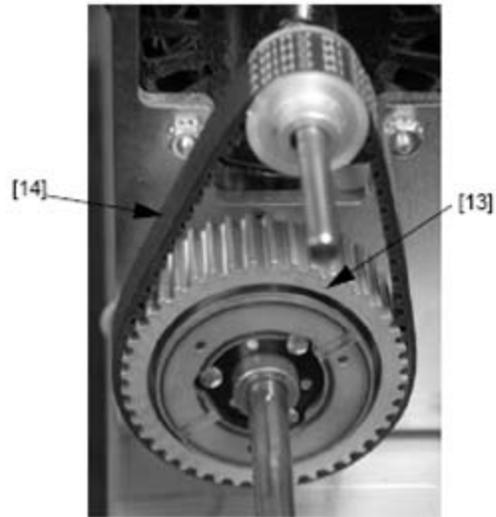


Figure 4.63 Drive Belt and Back Portion of Clutch.

- To install the clutch, reverse these steps.

**Installation Note:** When installing the clutch, be sure to install the shaft key. Press the clutch against the drive gear plate. While pressing the clutch against the plate, tighten the 2 set screws. The assembly does not require a gap between the clutch and clutch plate.

## 4.7.3 Punch Module Brake Replacement and Adjustment

### Procedure

To replace the brake, first remove the clutch and related drives. See “Clutch Replacement” on page 4.7.2. The brake must be adjusted while on drive shaft. To adjust the brake, see “Punch Module Brake Adjustment” on page 4.7.3.2.

### Tools Needed

- Feeler gage, 0.010" (0.25mm)
- Hex wrenches, 0.05" and 3/32"
- Flat blade screwdriver
- Pliers

### 4.7.3.1 Punch Module Brake Replacement

To replace the brake:

1. Remove the 4 socket head set screws [1].
2. Loosen the 2 set screws [2] until the brake pad [3] slides freely on the shaft.

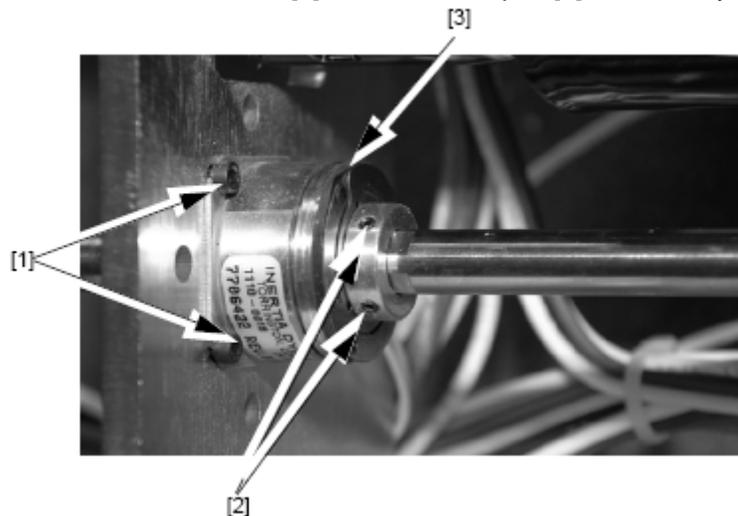


Figure 4.64 Brake Assembly and Drive Shaft.

**Installation Note:** When installing the brake, ensure that the 2 set screws engage the flats on the shaft. To adjust the brake, see “Punch Module Brake Adjustment” on page 4.7.3.2.

3. Remove the E-Ring at the opposite end of the shaft [4].
4. Slide the shaft out of the bearing bracket, away from the clutch end.
5. Slide the brake assembly off the shaft.

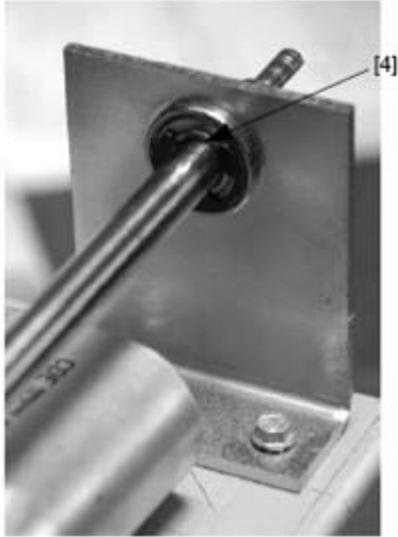


Figure 4.65 Shaft E-Ring.

6. To install the brake assembly, reverse these steps.

### 4.7.3.2 Punch Module Brake Adjustment

#### Procedure

The brake can be adjusted without removing the brake from the shaft. The gap between the brake and the pad is 0.010" (0.25mm).

#### To adjust the brake:

1. Loosen the 2 set screws [1] until the brake pad slides freely on the shaft.

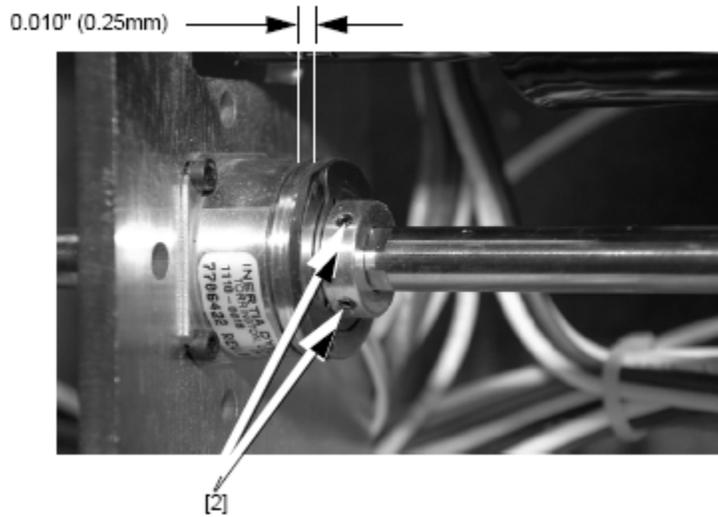


Figure 4.66 Brake Assembly Gap Adjustment.

2. Use a 0.010" (0.25mm) feeler gage to set the gap between the brake and the brake pad.
3. Tighten the 2 set screws [2] and check the gap.

## 4.7.4 Punch Module Motor Replacement

### Procedure

Replace motor when it malfunctions.

### To replace the Punch Module motor:

1. Cut any wire ties or release any cable clamps as necessary to release the motor wires.
2. Unplug motor wire connections from the capacitor [1].

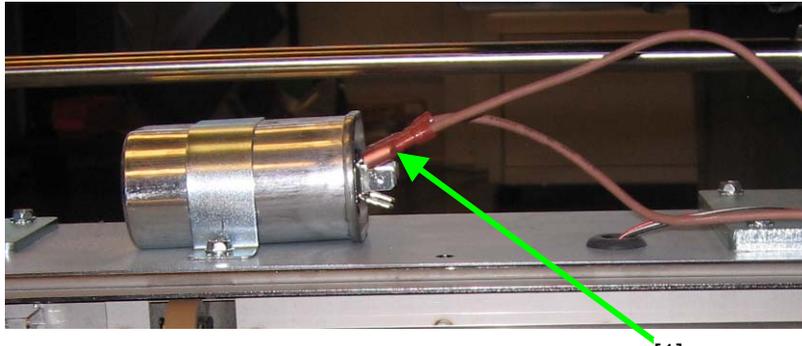


Figure 4.67 Punch Capacitor. [1]

3. Slide the fan off the shaft.

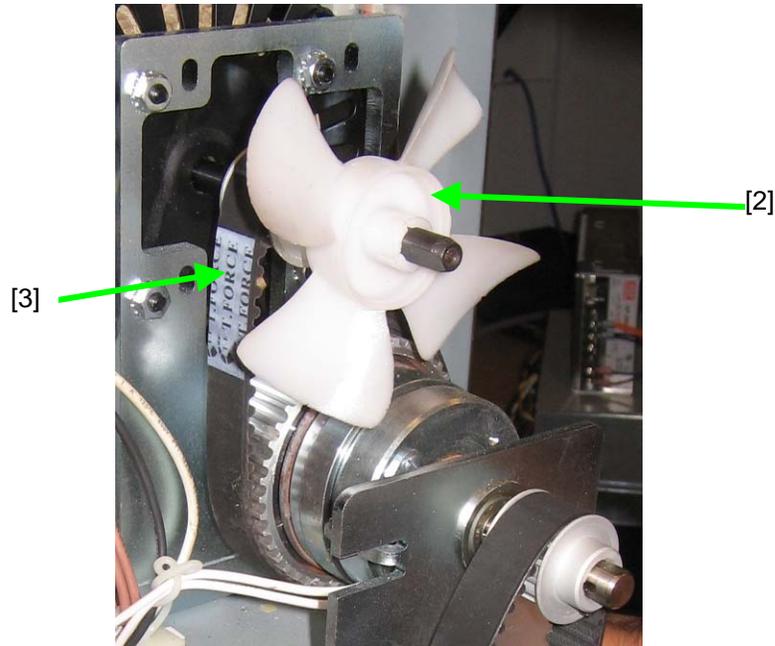


Figure 4.68 Punch Motor Fans.

**Installation Note:** When installing the fan, be sure to align the flat of the fan hub with the flat on the shaft. Make sure the hub is facing away from the motor and that the fan does not hit the belt [3].

4. Loosen the 2 socket head set screws [4] on the pulley and slide the pulley and belt off the shaft.

5. Remove the motor mounting 4 nuts [5].

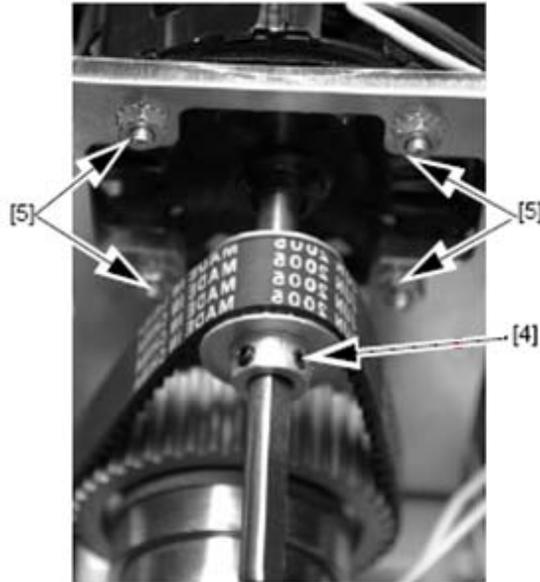


Figure 4.69 Motor Pulley and Mounting Nuts.

6. Remove the motor.

7. To install the motor, reverse these steps.

#### 4.7.4.1 Punch Module Motor Drive Belt Replacement

##### Procedure

Replace the belt when it is frayed, missing teeth, or worn out.

##### To replace the Punch Module drive belts:

1. With the fan removed from the shaft, work the belt [1] off the clutch gear [2].

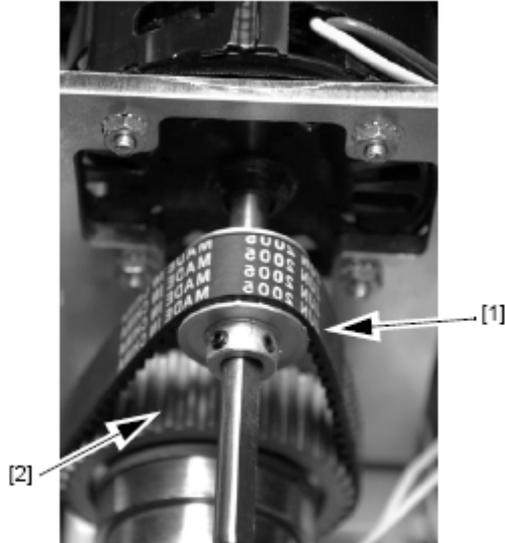


Figure 4.70 Motor Pulley and Belt.

2. Install a new belt by looping it over the motor pulley and then work it onto the clutch gear. The belt requires no adjustment. It should have slight deflection when pressed.

## 4.7.5 Punch Module Drive Roller Replacement

### Procedure

Inspect for wear patterns or grooves. The roller surface should be even and not glazed. Replace when the rollers exhibit these conditions.

### Tools Required

- Phillips screw driver or 1/4" nut driver
- Flat bladed screwdriver
- Needle nose pliers

With the Punch Module out of the machine, the punch entrance side [1] and exit [2] drive rollers can be cleaned or replaced.

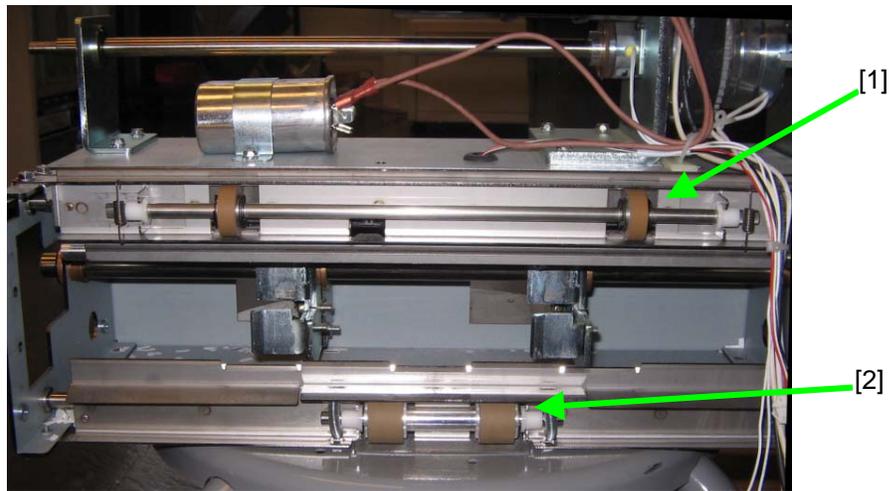


Figure 4.71 Punch Entrance and Exit Rollers.

### 4.7.5.1 Entrance Rollers

To replace the Punch entrance drive rollers:

1. Unhook the retaining springs [1] then remove the idler roller assembly [2].
2. Unplug the sensor located inside the punch module [3].

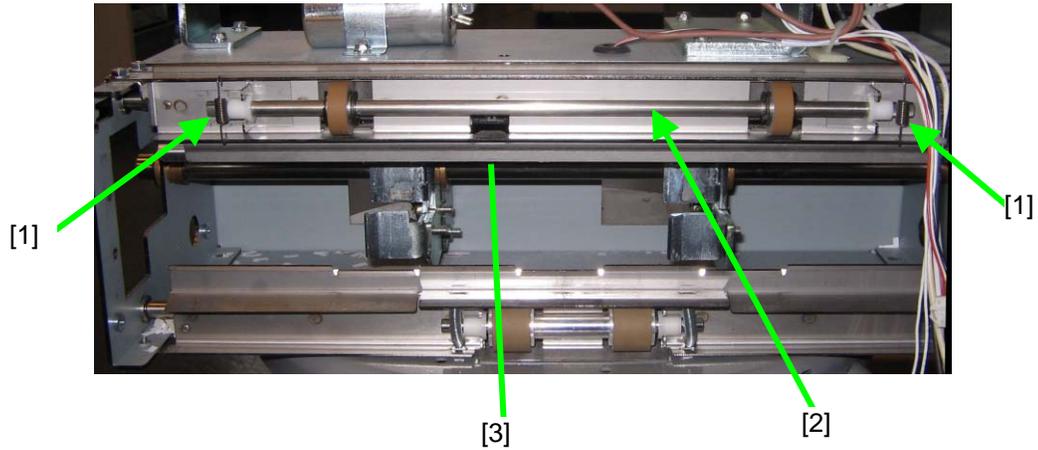


Figure 4.72 Punch Entrance Rollers.

3. Remove the 2 screws at each end of the drive roller assembly [4]. It is recommended not to remove the idler roller bracket from the punch module.
4. Remove the E-Ring at the end of the drive roller shaft [5].

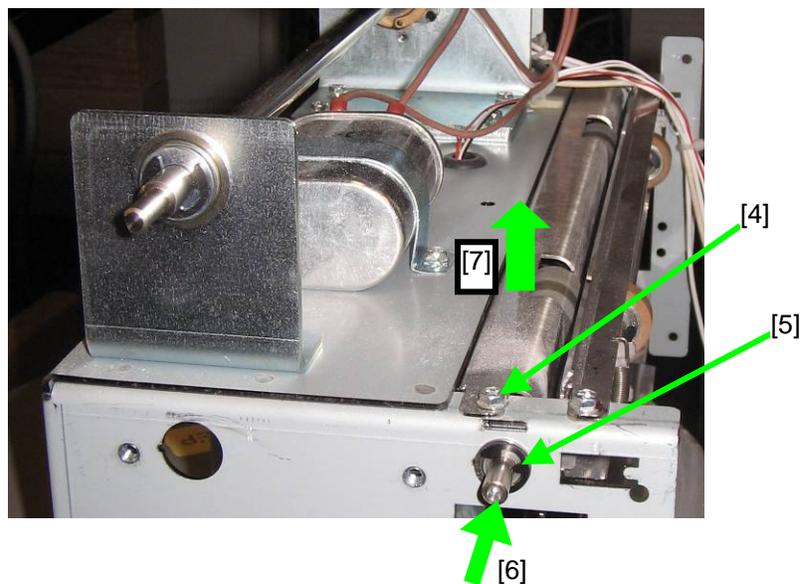


Figure 4.73 Remove Entrance Drive Roller Shaft E-Ring.

5. Slide the drive roller shaft and bracket towards the opposite end of the Punch Module [6] so that the end of the shaft clears the bearing at the end where you removed the E-Ring [5].
6. Lift the drive roller and bracket out of the Punch Module [7].
7. Remove the sensor.
8. Remove the drive roller shaft. The roller may need to be lightly compressed against the sheet metal to disassemble it.
9. To install the drive roller, reverse these steps.

### 4.7.5.2 Exit Rollers

To replace the Punch exit drive rollers:

1. Move one retaining spring [1] to the side and then remove the idler roller assembly [2].
2. Remove the 2 screws at each end of the idler roller assembly [3].

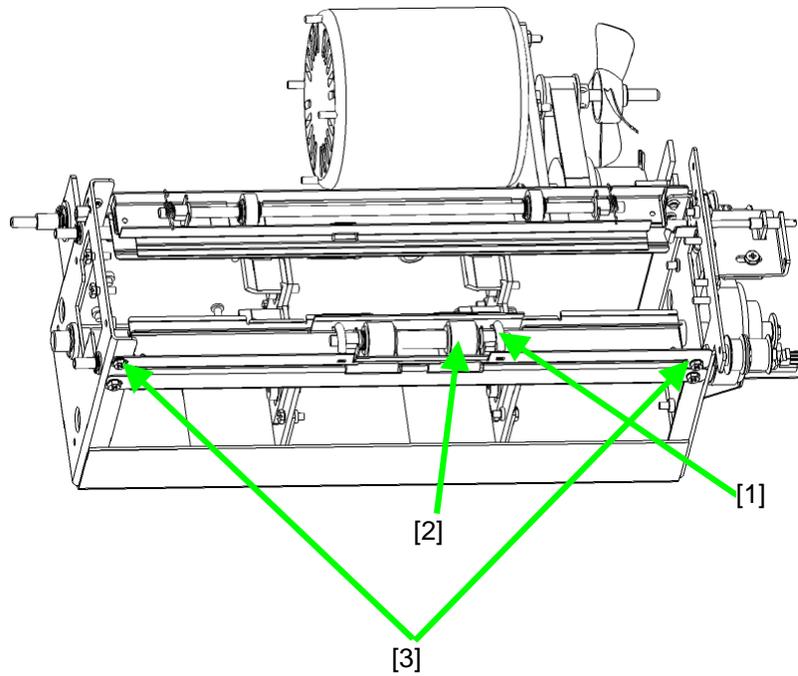


Figure 4.74 Remove Exit Roller.

3. Remove the E-Ring at the end of the drive roller shaft [4].

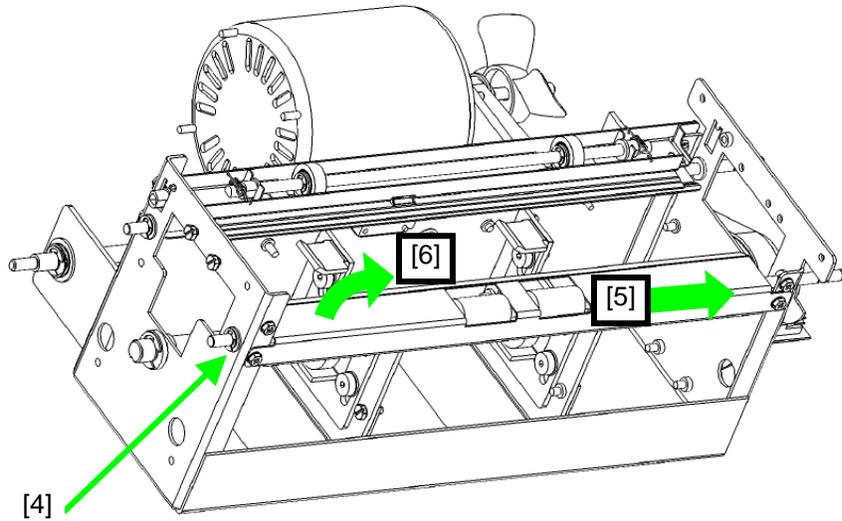


Figure 4.75 Remove Exit Drive Roller Shaft E-Ring.

4. Slide the drive roller shaft and bracket towards the opposite end of the Punch Module [5] so that the end of the shaft clears the bearing at the end where you removed the E-Ring [4].
5. Lift the drive roller and bracket out of the Punch Module [6].
6. Remove the drive roller shaft. The roller may need to be lightly compressed against the sheet metal to disassemble it.
7. To install the drive roller, reverse these steps.

## 4.8 Belt Replacement

### Procedure

Inspect all timing belts for wear, missing teeth, frayed edges, and cracks. The belts should be slightly loose with approximately 1/4" (6 mm) deflection. Belts that are too loose will not drive properly and belts that are too tight can wear out prematurely or damage their driven components.



Figure 4.76 Typical Belt Deflection.

### To replace belts:

1. Loosen the screws of the 3 belt idlers [1].

**Installation Note:** When setting the belt tension, adjust the belt idlers so that the belt has approximately 1/4" (6 mm) of deflection.

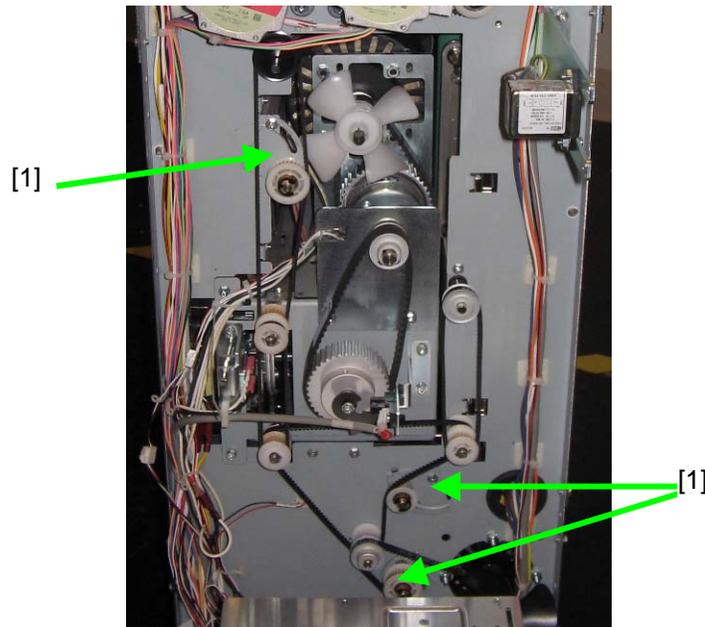


Figure 4.77 Belt Idler Locations.

2. Remove the belts in order as shown in Figure 4.84.

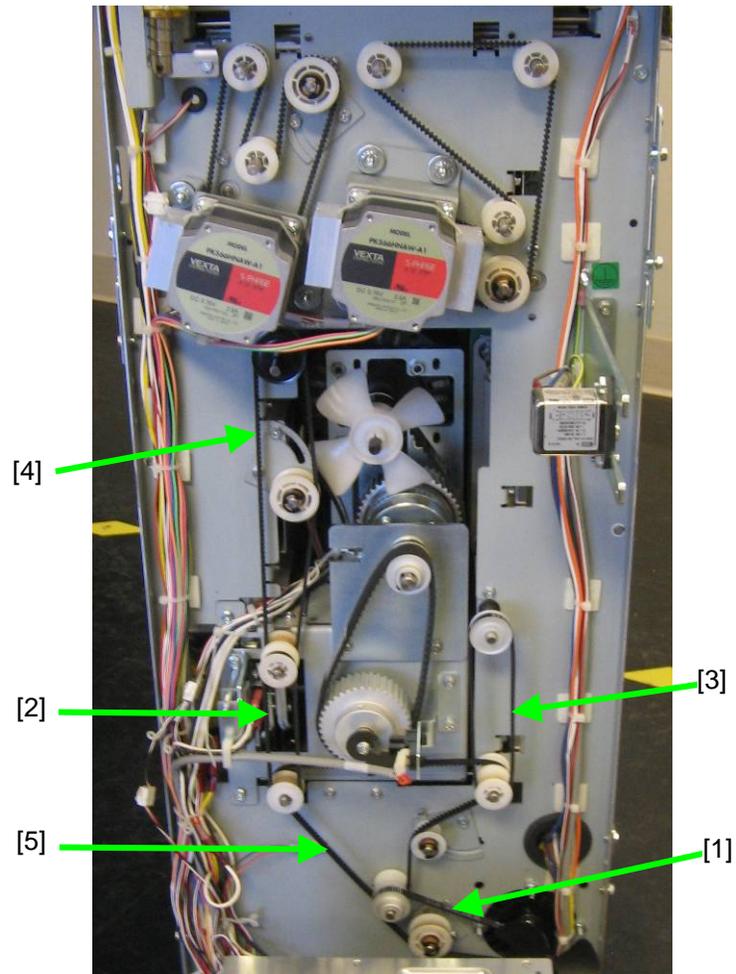


Figure 4.78 Order of Belt Removal.

3. To install and adjust the tension of the belts, reverse these steps.

# Section 5

## General Procedures

### 5.1 SmartPunch Pro Firmware Update Procedure

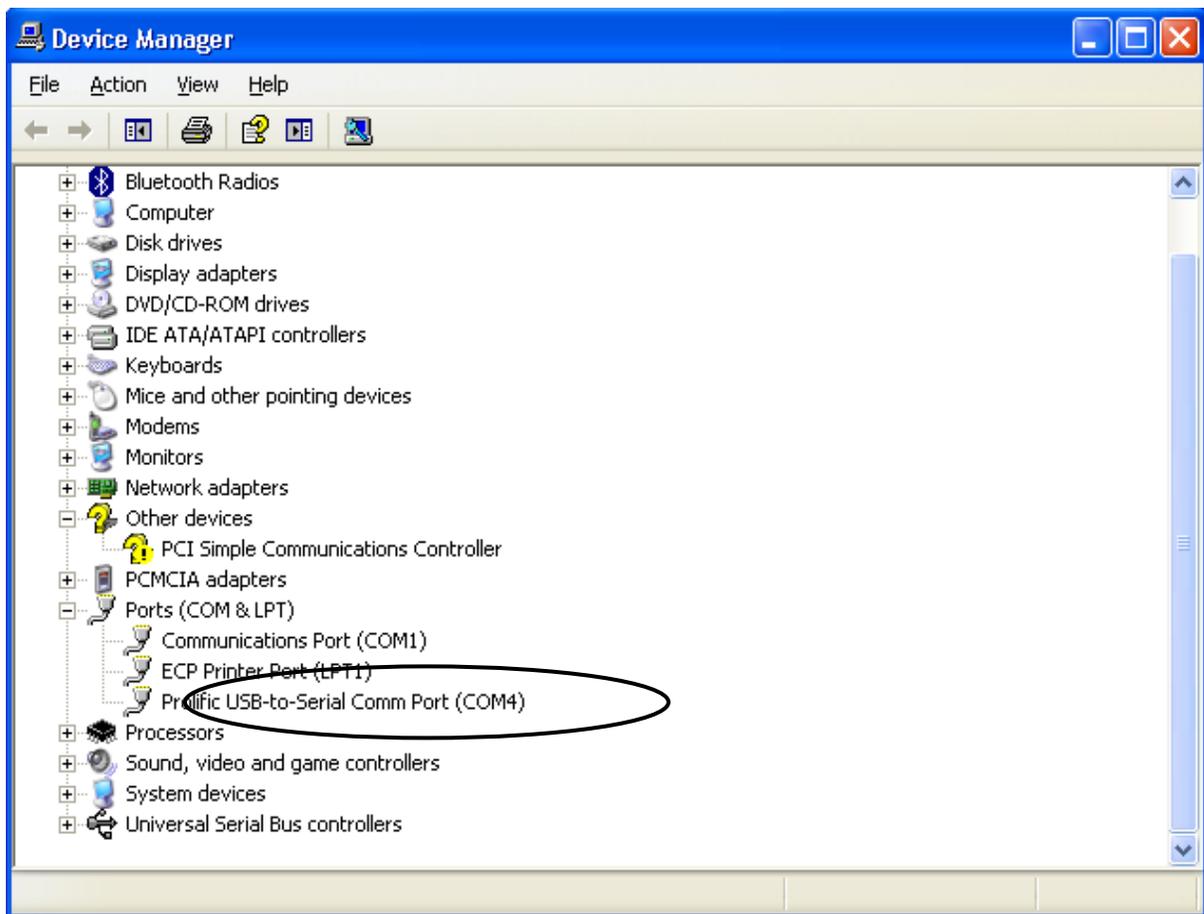
Tools Required\*:

1. USB to DB9 Serial Port Adapter cable.
2. DB9 female to DB9 female null modem crossover cable.
3. PC with USB port and HyperTerminal or Tera Term (v3.1.3 or later) software.
4. New firmware for installation.

\* Items 1 & 2 can be obtained as a kit from the SmartPunch Pro parts catalog.

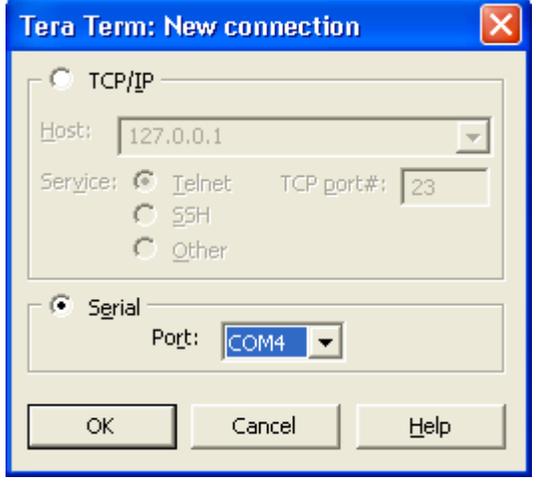
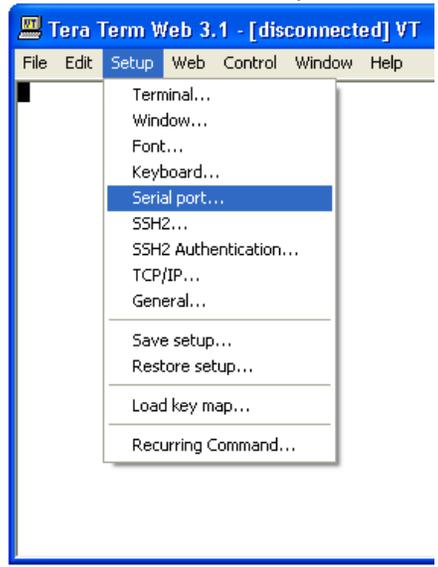
Upgrade Procedure:

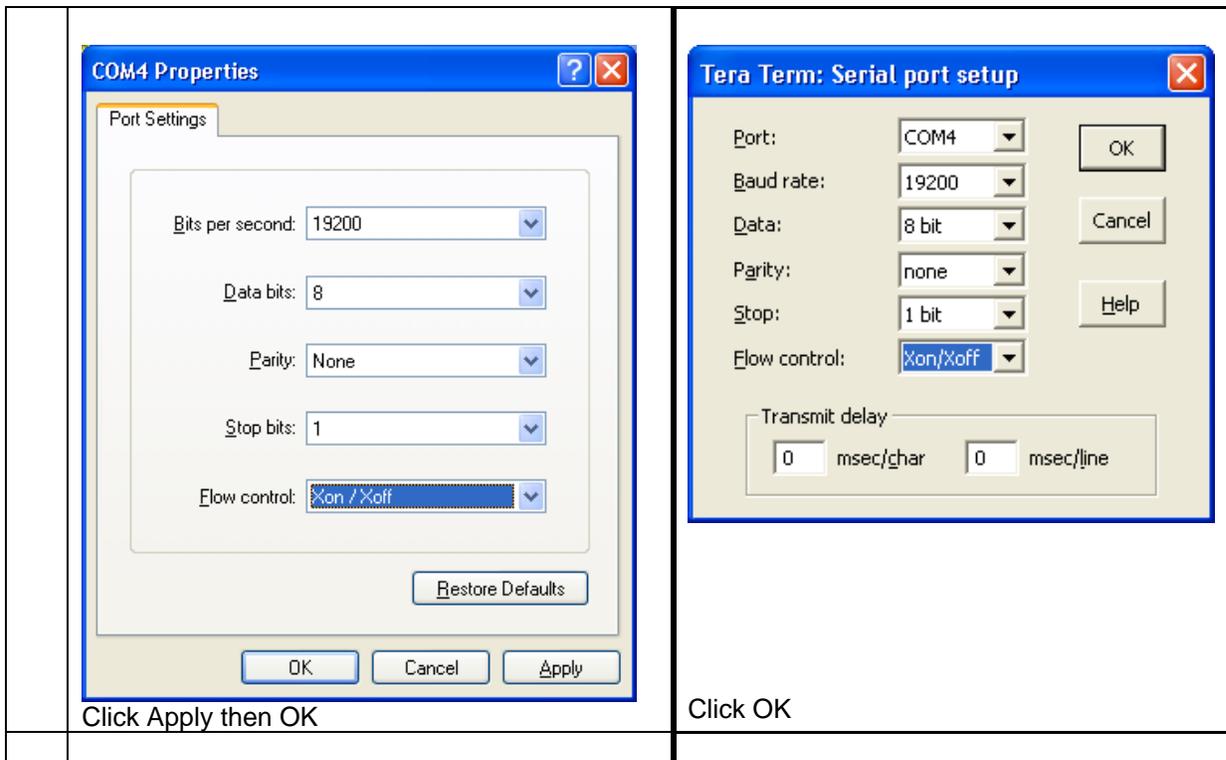
- 1) Attach the male end of the 'USB to DB9 Serial Adapter' to one end of the null modem cable.
- 2) Connect the USB adapter to the computer and after installing the USB adapter driver software, open the windows Device Manager tab on your system as shown below. Expand the Ports (COM & LPT1) settings to determine which COM port the USB to Serial Port Adapter is using and make a note of it.



- 3) Ensure the SmartPunch Pro is powered off.
- 4) Remove the plastic cover from the 9 pin connector on the back of the SmartPunch Pro and connect the other end of the null modem cable to this 9 pin connector.

- 5) Turn on the SmartPunch Pro.
- 6) Launch Windows Application **Hyper Terminal** or **Tera Term**. Hyper Terminal is typically accessed through Programs>Accessories>Communications>HyperTerminal and is pre-installed on Windows 95/98, NT, 2000 and XP. Tera Term is a free emulation client that works on Windows 95/98, 2000, 2003, XP, Vista & 7. Use version 3.1.3 or later, which can be downloaded from <http://www.ayera.com/teraterm/>.  
Follow the steps below depending on the application used.

	HyperTerminal	Tera Term																				
7)	<p>When the following screen appears, input any name in the Name Box, choose the default icon (Red and Yellow Telephone) and click OK.</p> 	<p>When the following screen appears select the Serial radio button and change the port to the one noted in step 2).</p> 																				
8)	<p>When the following screen appears change the port to the one noted in step 2).</p> 	<p>When the following screen appears, select Serial Port from the Setup menu.</p> 																				
9)	<p>Change to the following settings:</p> <table border="0"> <tr><td>Bits per second</td><td>19200</td></tr> <tr><td>Data Bits</td><td>8</td></tr> <tr><td>Parity</td><td>None</td></tr> <tr><td>Stop Bits</td><td>1</td></tr> <tr><td>Flow Control</td><td>Xon / Xoff</td></tr> </table>	Bits per second	19200	Data Bits	8	Parity	None	Stop Bits	1	Flow Control	Xon / Xoff	<p>Change to the following settings:</p> <table border="0"> <tr><td>Bits per second</td><td>19200</td></tr> <tr><td>Data Bits</td><td>8</td></tr> <tr><td>Parity</td><td>None</td></tr> <tr><td>Stop Bits</td><td>1</td></tr> <tr><td>Flow Control</td><td>Xon / Xoff</td></tr> </table>	Bits per second	19200	Data Bits	8	Parity	None	Stop Bits	1	Flow Control	Xon / Xoff
Bits per second	19200																					
Data Bits	8																					
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Stop Bits	1																					
Flow Control	Xon / Xoff																					
Bits per second	19200																					
Data Bits	8																					
Parity	None																					
Stop Bits	1																					
Flow Control	Xon / Xoff																					



10) After pressing <ENTER> the following text should appear in the session window:

```

Bootloader Ver.: A1
Begin downloading .hex file or enter a command listed below in <>:
<G>o execute the new downloaded code or display code <V>ersion
BOOTLOADER>

```

	HyperTerminal	Tera Term
11)	<p>Uploading firmware:</p> <p>a) From the Hyper Terminal Task bar select: Transfer&gt;Send Text File.</p> <p>b) Navigate to the folder that contains the file to boot load. Typing *.hex in file box will list the hex files in that folder.</p> <p>c) Select the appropriate SmartPunch Pro firmware file named *_Boot.hex</p>	<p>Uploading firmware:</p> <p>a) From the Tera Term menu select: File&gt;Send File.</p> <p>b) Navigate to the folder that contains the file to boot load. Typing *.hex in file box will list the hex files in that folder.</p> <p>c) Select the appropriate SmartPunch Pro firmware file named *_Boot.hex</p>
12)	<p>Once the Open button is selected, the HyperTerminal screen will start to upload the latest firmware version.</p> <pre> BOOTLOADER&gt; Downloading ... 0xF00000 ← </pre> <div data-bbox="683 1627 854 1734" style="border: 1px solid black; padding: 2px; width: fit-content;"> <p>This number increments during upload</p> </div>	<p>Once the Open button is selected, the screen below will appear and the Bytes transferred number will increment as the latest version firmware uploads.</p> 

13) Once complete the screen will show the following.

```
Successful download of SmartPunch Professional  
Ver.: 01.01  
Begin downloading .hex file or enter a command listed below in <>:  
<G>o execute the new downloaded code or display code <V>ersion  
BOOTLOADER>
```

14) Press "V" (Upper Case) to verify the firmware version number.

```
BOOTLOADER>V  
StreamPunch Professional  
Ver.: 01.01  
BOOTLOADER>
```

15) Once the upgraded version has been verified, shut off the SmartPunch Pro, disconnect the Null Modem cable, and turn on the SmartPunch Pro.

## 5.2 Principle of Operation

The SmartPunch Pro is a machine that punches various die set hole patterns into single sheets of paper. The punch has two paper paths.

- The bypass section.
- The punch path.

The bypass moves the paper from the printer to the finisher without punching holes. The punch path routes the paper from the printer through the punch to be punched and then routes the paper to the finisher.

The SmartPunch Pro consists of several input and output devices to operate the machine functions. The system intelligence is a Microchip micro-controller PIC18F6520. The I/O devices are listed in the tables below.

Refer to the electrical wiring information, when reading the following material. Also refer to Section 6.

### 5.2.1 Inputs

**Table 5.1 Input Devices**

Input	Type	Function
Sensor 1	Optical	Sheet speed measurement, misfeed detect
Sensor 2	Optical	Stepper 1 control, Sheet speed measurement, misfeed detect
Sensor 3	Optical	Punch mechanism control, Backstop control, misfeed detect
Sensor 4	Optical	misfeed detect at entrance of U-Channel
Sensor 5	Optical	misfeed detect at exit of U-Channel
Sensor 6	Optical	Stepper 2 Control, misfeed detect
Sensor 7	Optical	Exit sensor, misfeed detect
Sensor 8	Optical	Bypass sensor, Sheet speed measurement, misfeed detect
Sensor 9	Optical Vane	Monitors rotation of punch mechanism, Controls clutch and brake
Sensor 10	Optical	Chip tray full detection
Switch 2A	Mechanical	Interlock Voltage, no machine movement if door is open
Switch 2B	Mechanical	Door open signal
Switch 3	Mechanical	Chip tray switch
Switch 4	Mechanical	Die Set switch
Jumper	Connector	LTR/A4 selection
Port	Connector	Firmware upload

## 5.2.2 Outputs

**Table 5.2 Output Devices**

Output	Type	Function
Diverter	DC Solenoid	Diverts paper from bypass to punch sections
Brake	DC Brake	Stops the punch mechanism, keeps it in correct position
Clutch	DC Clutch	Clutches the punch mechanism to drive through paper
Backstop	DC Solenoid	Provides stop for paper to rest against during punching
Transport	AC Motor	Provides paper movement through machine
Punch	AC Motor	Provides power to punch the paper
Stepper 1	PWM Signal	Controls Stepper Motor 1
	Winding	On /Off signal for stepper holding current
Stepper 2	PWM Signal	Controls Stepper Motor 2
	Winding	On /Off signal for stepper holding current
LED 1	Power	On: Indicates 24 VDC power is present
LED 2	Power	On: Indicates 24 VDC Interlock power is present
LED 3	Power	On: Indicates 5 VDC power is present
Counter	Electronic counter	Counts number of punch cycles

## 5.2.3 Printer Communication

**Table 5.3 Printer Communication Devices**

Device	Type	Function
Punch	Input	Printer turns on Punch enabled mode
Motor	Input	Printer turns on SmartPunch Pro Motor MT-C3 & VC-1
Jam/ Door Open	Output	Punch signals a misfeed or the door is open (no operation allowed)
Tray/Die	Output	Punch indicates tray or die set missing (bypass only allowed)
Motor	Input	Printer turns on SmartPunch Pro motor BC-3 only

## 5.2.4 Stepper #1 Control

If punch is not enabled, the SmartPunch Pro will run in bypass mode (no punching). The printer will turn on both stepper motors. The time is measured for the leading edge of the first sheet to pass from sensor 1 to sensor 8. Knowing the distance between sensors and the time it takes for the sheet to pass both sensors, we can determine the speed of the paper. The time is compared to a list and Stepper 1 and stepper 2 are adjusted to closely match the incoming speed.

If the punch is enabled, the backstop is raised, the brake is engaged, and both the transport and punch motors are started. Also, the divert solenoid is activated to direct the sheets into the punch path. As above, the input speed is measured, this time using Sensor 1 and 2. Stepper 1 is adjusted to meet the measured input speed; Stepper 2 is accelerated to the speed of the exit aligner. Sensor 2 now delays for a time period based on the input speed to ensure that the sheet has cleared the printer exit roller. After this delay, stepper 1 accelerates the sheet to match the transport speed. 19 msec after the sheet's trailing edge passes sensor 2, Stepper 1 is decelerated to match the previously measured input speed.

## 5.2.5 Punch Control

The punch cycle begins 20 msec after the leading edge of the sheet reaches Sensor 3. The brake is released, and the clutch is engaged. Sensor 9 now looks for the leading edge of its flag, and when seen, the clutch is disengaged, and the backstop is lowered. When the trailing edge of the flag is seen, the brake is engaged. When Sensor 3 sees the trailing edge of the sheet, the backstop is raised.

## 5.2.6 Stepper #2 Control

24 msec after the leading edge of the sheet passes Sensor 6, Stepper 2 is decelerated to match the measured input speed from the printer. When the trailing edge of the sheet passes Sensor 6, Stepper 2 is accelerated to match the speed of the exit aligner.

## 5.3 Paper Flow

Paper bypasses [1] the Punch or it flows through the Punch [2].

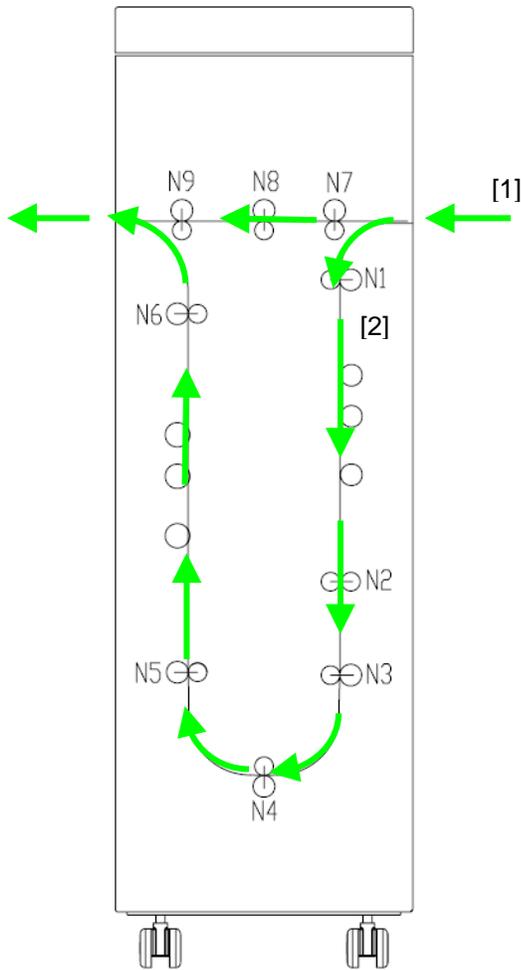


Figure 5.1 Paper Flow as Viewed From the Front.

## 5.4 Specifications

Refer to the User Manual. If any discrepancy exists, the User Manual specifications are to be considered the most current.

**Table 5.4.1 Punch Mode**

Paper weight	Plain*	20lb bond – 80lb cover (75gsm – 216gsm)
	Coated*	24lb bond – 80lb cover (90gsm – 216gsm)
Sheet size	Letter configuration	279 ±0.75 x 216 ±0.75mm
	A4 configuration	297 ±0.75 x 210 ±0.75mm

\* Maximum 200gsm for ProClick dies

**Table 5.4.2 Bypass Mode**

Paper weight	16lb bond – 110lb cover (64gsm – 300gsm)
Transparency weight	5 - 10 mil
Maximum bypass sheet size	13" x 19.2" (330 x 488mm)
Minimum bypass sheet size	6.5" x 5.5" (165 x 140mm)

**Table 5.4.3 Power Supply**

	<b>115V Machine</b>	<b>230V Machine</b>
Voltage	115 VAC	230 VAC
Cycles	60 Hertz	50 Hertz
Amps	2.6 Amps	1.3 Amps

**Table 5.4.4 Environmental**

Normal operating temperature	15degC – 30 degC	
Normal operating humidity	25% - 80%	
Sound emissions (measured to ISO7779)	Punch	Maximum of 75dBA
	Bypass	Maximum of 70dBA

**Table 5.4.5 Physical**

Punch unit size	12" (305mm) W x 38.5" (978mm) H x 28.5" (724mm) D
Weight	154Lbs (70kg) unpackaged 256Lbs (116kg) packaged

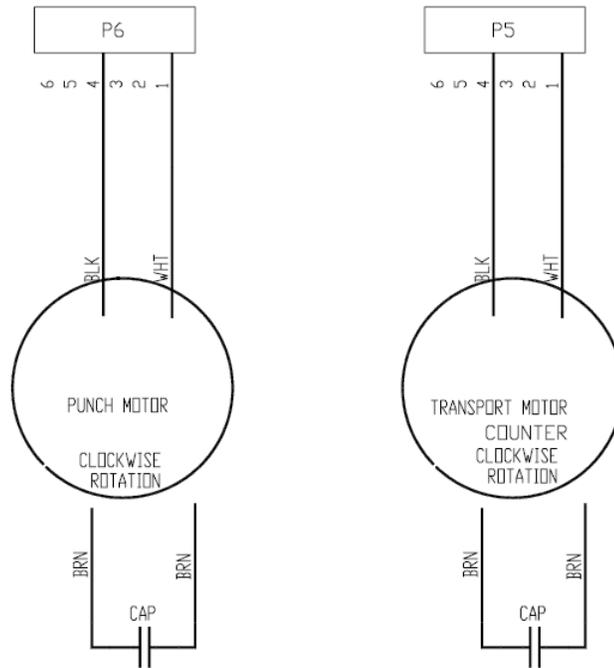
## 5.5 Glossary of Terms

These terms are common to the punch and bindery industry.

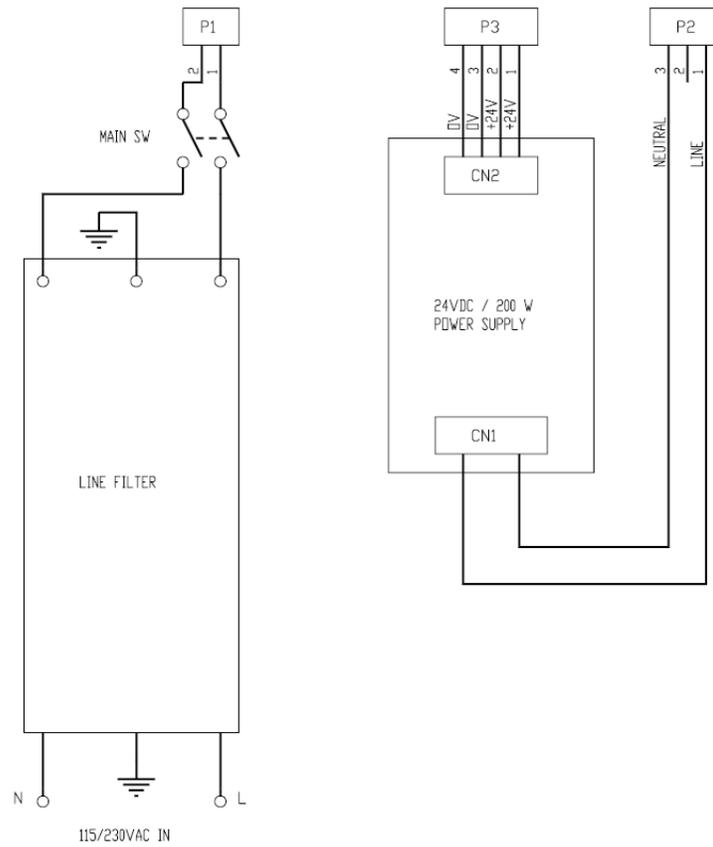
<b>Cerlox</b>	The trade name GBC uses for its Plastic Binding
<b>Color coil</b>	A plastic coil that looks like a spring which is threaded through round holes punched in the document then the ends are cut off and crimped. The holes are either 4:1 or 5:1 (4 holes per inch or 5 holes per inch). This type of bind lays flat and even folds around for easy handling of the document.
<b>Flush-cut covers</b>	Cover stock that is the same size as the paper contents and has round corners.
<b>Plastic binding</b>	The name used to describe GBC's most common binding method. The 19 and 21 rectangular hole, Plastic Comb type.
<b>ProClick</b>	A plastic element that snaps together. This style requires holes that appear to be the same as Twin Loop but are actually slightly larger. The larger holes enable correct operation of the ProClick Pronto finishing device.
<b>Tabbing (hanging chad)</b>	Tabbing or hanging chad is when a hole is not punched cleanly through the material leaving a piece of paper hanging from the edge. This condition occurs when a die set is worn and will usually result in misfeeds.
<b>Twin loop</b>	Looped wire element that is fed into square or round holes in the document in a similar fashion to Plastic Binding. The holes are either 2:1 or 3:1 (2 holes per inch or 3 holes per inch). It is then squeezed together or crimped to create an attractive bind that lays flat.
<b>Velobind</b>	A heat seal plastic bind that is best known for its security and its attractive look. It is most often used in the Legal market for its security feature.



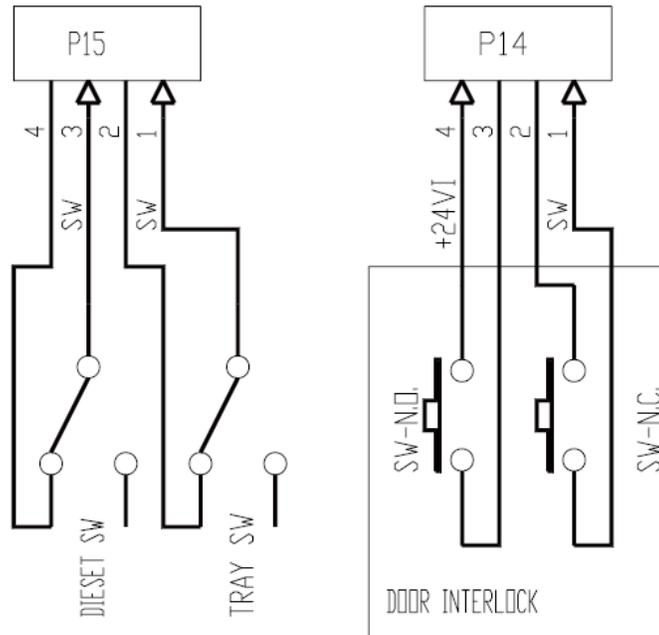
## 6.1 Punch and Drive Motors



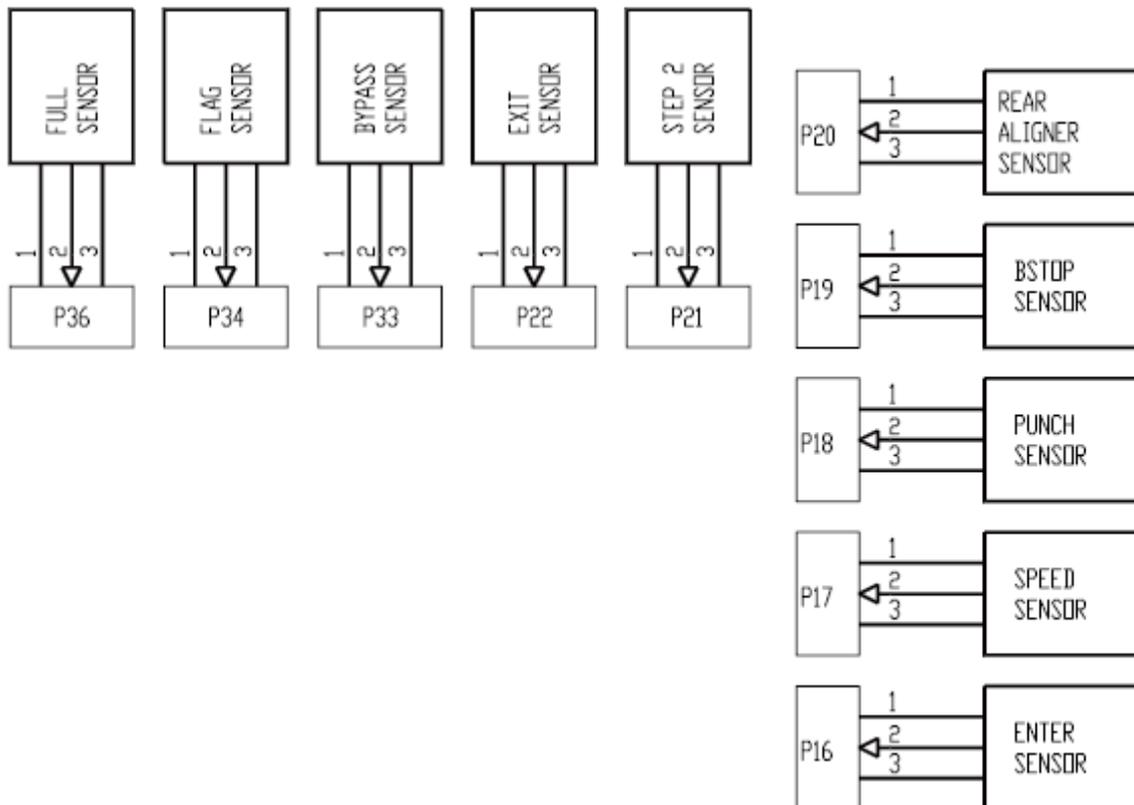
## 6.2 Switch and Power Supply



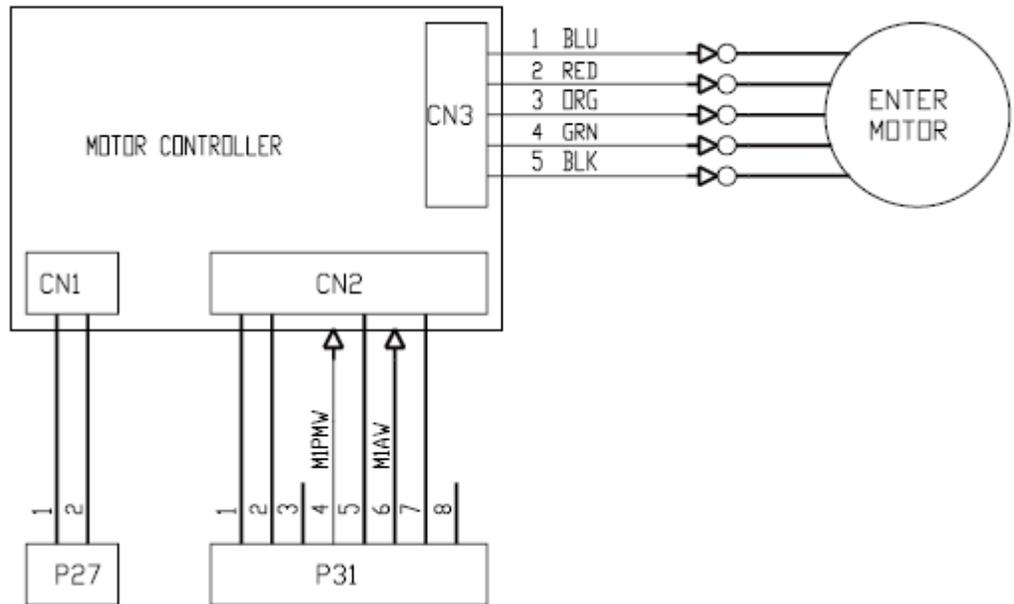
## 6.3 Die Set, Tray, and Door Interlock



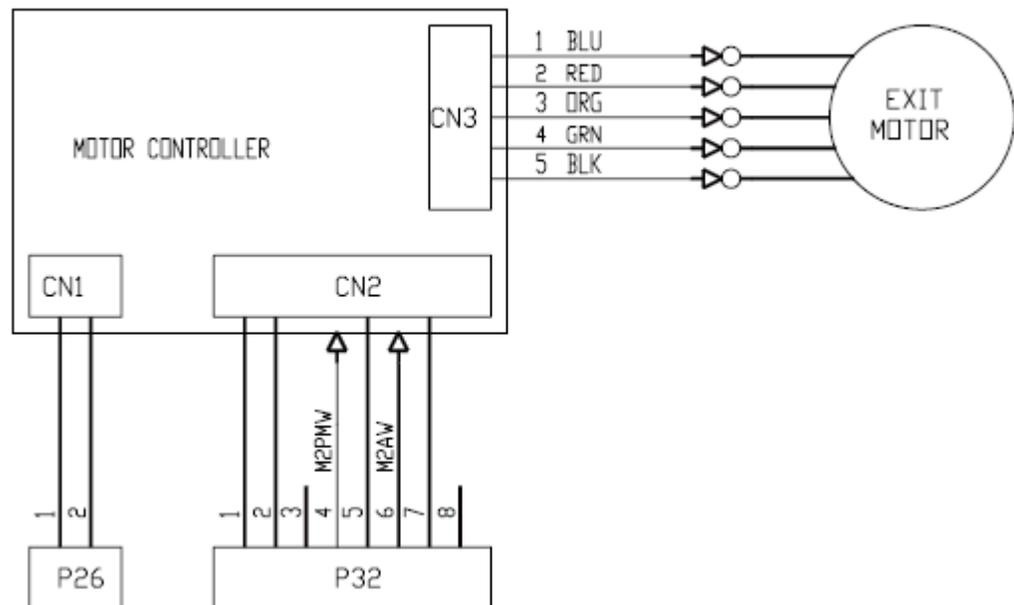
## 6.4 Sensors



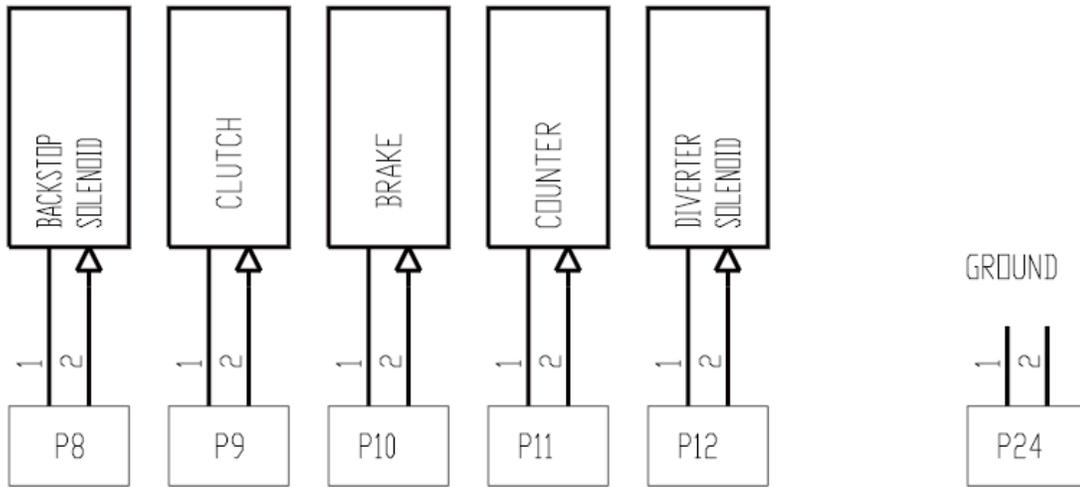
## 6.5 Entrance Motor



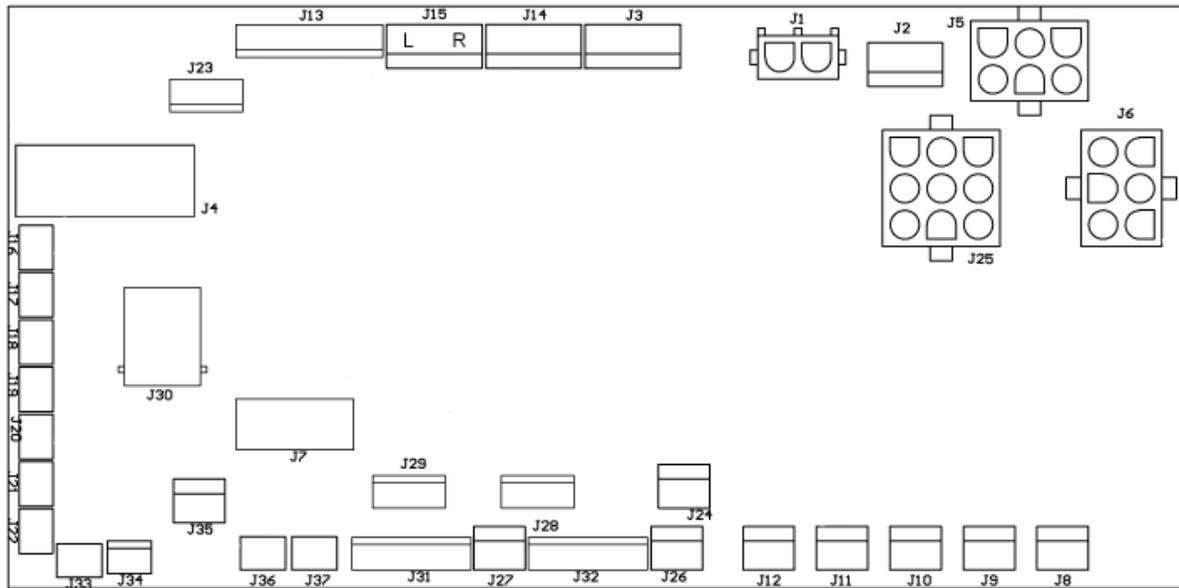
## 6.6 Exit Motor



## 6.7 Solenoids, Clutch, Brake, Counter, and Ground



## 6.8 Control Board Layout



CONNECTOR	DESCRIPTION	SHARP NUMBER
J1	MAIN AC POWER SWITCH CABLE	OPT7706752///
J2	24V PSU – AC POWER CABLE	OPT7708550///
J3	24V PSU – DC POWER CABLE	OPT7708551///
J4	COMMUNICATION CABLE, INTERNAL	OPT7708936///
J5	TRANSPORT MOTOR	HARD WIRED
J6	PUNCH MOTOR	HARD WIRED
J7	CABLE, DIP SWITCH	OPT7710425///
J8	BACKGAGE	HARD WIRED
J9	PUNCH CLUTCH CABLE	OPT7706769///
J10	BRAKE CABLE	OPT7706768///
J11	CABLE, COUNTER	OPT7708552///
J12	DIVERTER SOLENOID CABLE	OPT7706766///
J13	DISPLAY OVERLAY CABLE	OPT7706772///
J14	DOOR INTERLOCK CABLE	OPT7706764///
J15 Left	CHIP TRAY HOME SWITCH CABLE	OPT7706770///
J15 Right	DIESET HOME SWITCH CABLE	OPT7706771///
J16	ENTER SENSOR CABLE	OPT7706757///
J17	SPEED SENSOR CABLE	OPT7706758///
J18	PUNCH SENSOR CABLE	OPT7706759///
J19	BACKSTOP SENSOR CABLE	OPT7706760///
J20	BACKSTOP SENSOR CABLE	OPT7706760///
J21	STEP 2 SENSOR CABLE	OPT7706776///
J22	EXIT SENSOR CABLE	OPT7706761///
J23	CABLE, BOOT LOADER	OPT7712821///
J26, J27		Part of OPT7706779///
J31	STEPPER MOTOR CONTROLLER CABLE	OPT7706779///
J32	STEPPER MOTOR CONTROLLER CABLE	OPT7706779///
J33	BYPASS SENSOR CABLE	OPT7706777///
J34	PUNCH FLAG SENSOR CABLE	OPT7706762///
J36	PUNCH SENSOR CABLE	OPT7706759///
J37	JUMPER, A4 (A4/50Hz UNITS ONLY)	OPT7712685///
Other		
	SENSOR CABLE ASSEMBLY (SENSOR TO REAR FRAME)	OPT7706763///
	S3 SENSOR CABLE ASSEMBLY (SENSOR TO REAR FRAME)	OPT7714290///

# Section 6

## Installation and Set Up

### 1 Recommendations and Pre-requisites

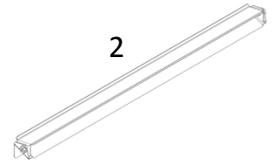
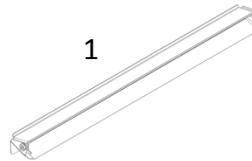
- You will need the installation kit provided with the SmartPunch Pro unit, which can be found in the main carton.

### 2 Unpacking

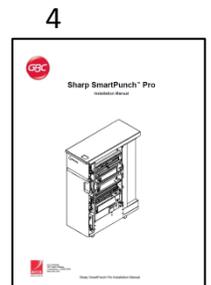
- Inspect the outside of the package for shipping damage. If there is evidence of shipping damage, contact the shipping carrier immediately.
- Remove the punch from its shipping carton. Three people are recommended, one lifting at the casters while two lift at the top cover. DO NOT lift using the front door panel.
- Retain the smaller accessory box; it contains parts required for correct installation of the SmartPunch Pro. See below for content details.
- Inspect for any concealed damage to the unit. If there is evidence of concealed shipping damage, contact the shipping carrier immediately.
- Remove all shipping tape from doors and levers.

#### Installation Kit Contents

Item	Description	Qty
1	Long Entrance Guide	1
2	Short Entrance guide	1
3	Communication Cable Assembly	1
4	Installation Manual	1
5	Soundfoam Gasket Type 1	2
6	Soundfoam Gasket Type 2	4
7	Cable tie <sup>1</sup>	5
8	Power Cord <sup>2</sup>	1
9	User Manual	1
10	Left Docking Bracket	1
11	Right Docking Bracket	1
12	M4x10mm Long Thread Forming Screw	4
13	Hex Head #8-32 Machine Screw	4

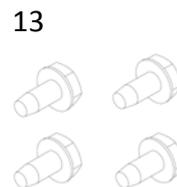
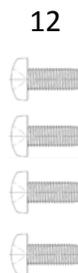
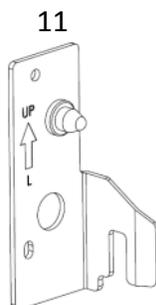
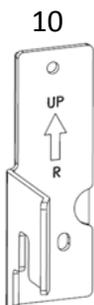
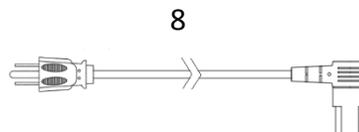
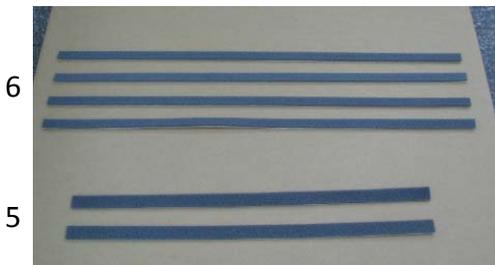


Includes 2 x M4x6 long screws for assembly



<sup>1</sup>Item image not shown

<sup>2</sup>Item may differ from image shown for other countries



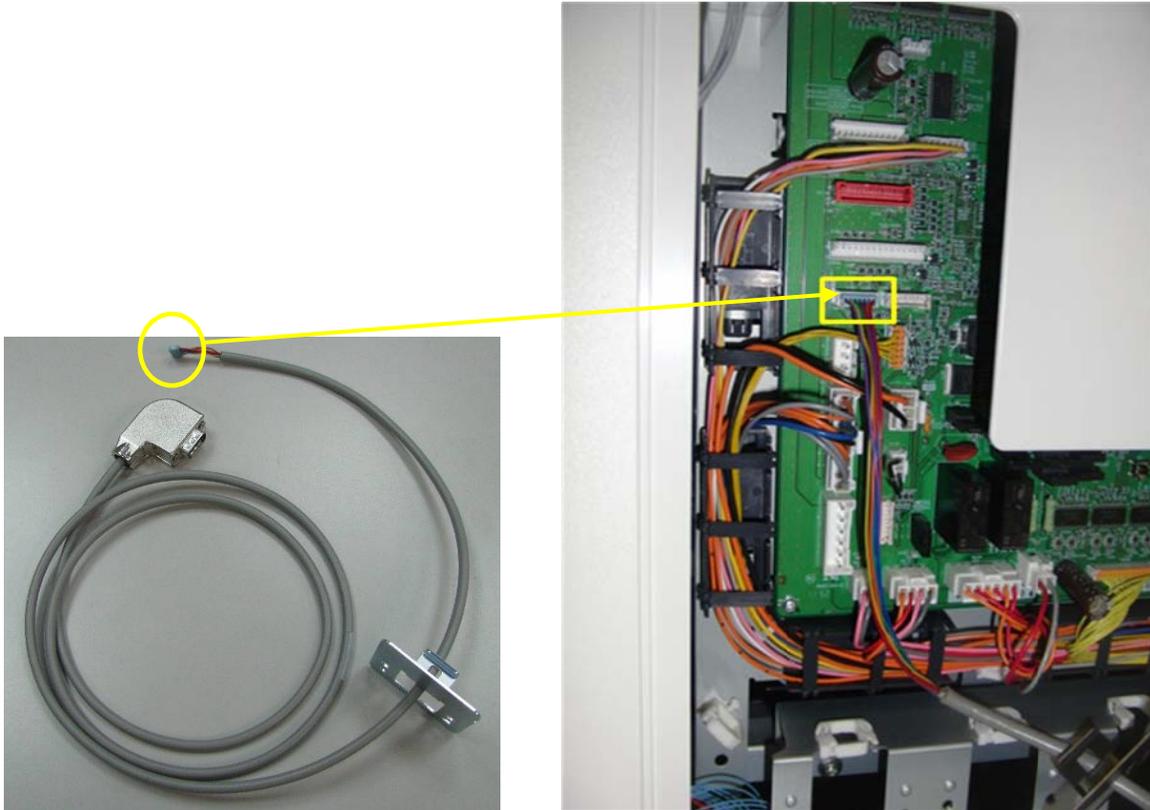
### 3 Cable Connections and Paper guides

Review the table below to identify which section of the guide to refer to install the SmartPunch Pro

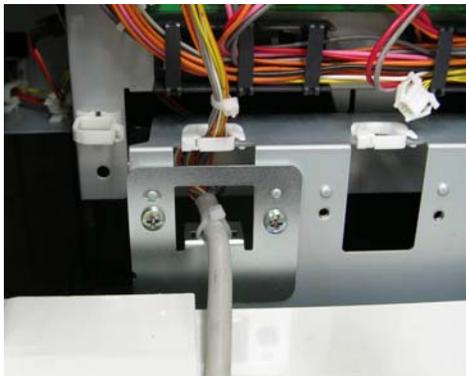
Section	Device upstream to SmartPunch Pro
3.1	MX-CF11 Inserter (or) MX-ST10 High Capacity Stacker
3.2	MX-RB18 Curl correction unit

#### 3.1 Cable connections

a) i) Remove the finisher rear cover and plug the 7 pin communication cable to CN145 on the finisher board. The communication cable, Item 3, is provided in the Installation kit of SmartPunch Pro. (Finisher to SmartPunch Pro cable P/N OPT7712585)



a) ii) Attach the bracket tied to the communication cable with the 2 M4x6mm long screws provided with the communication assembly.

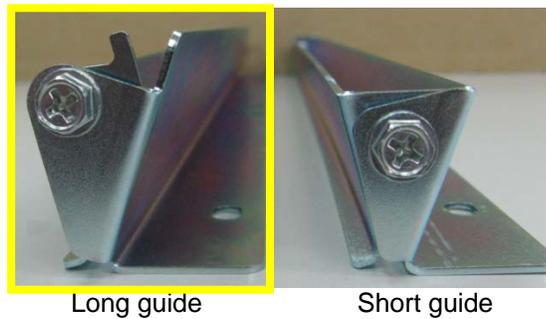


a)iii) Plug the free end of the cable from step a) into the right side of the SmartPunch Pro.



b) Plug the appropriate power cord into the side of the machine next to the communication connector. The exact location can be seen in the above picture. Insert the plug into the power supply socket.

c)i) There are two entrance paper guides provided with the SmartPunch Pro. Use the longer paper guide measuring about 31mm (in paper flow direction) when used in conjunction with Inserter MX-CF11 or High Capacity Stacker MX-ST10. When connecting to the MX-CF11 follow the procedure in d) below before installing the paper guide. Otherwise, install the paper guide, using the size #8 screws provided, to the lower entrance guide of the SmartPunch Pro.

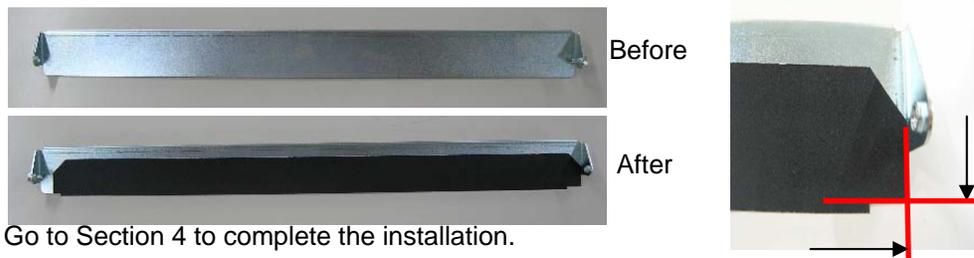


Go to Section 4 to complete the installation.

d)i) Remove the screws from both ends.



d)ii) Attach the black Mylar from the MX-CF11 parts kit to the lower bracket at the reference edge shown in the image. Once complete re-assemble the bracket for installation.

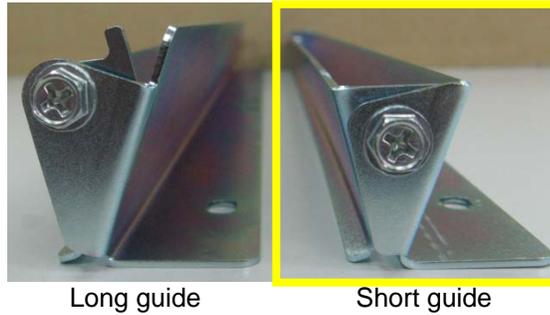


Go to Section 4 to complete the installation.

### 3.2 Cable connections

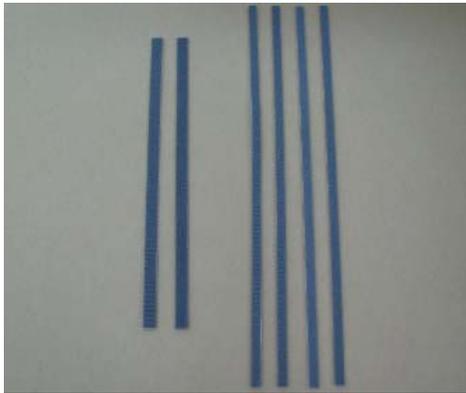
Follow the same steps as in 3.1 a, b.

c) There are two entrance paper guides provided with the SmartPunch Pro. Use the shorter paper guide measuring about 24mm (in paper flow direction) when used in conjunction with Curl correction unit MX-RB18. Install the paper guide, using the size #8 screws provided, to the lower entrance guide of the SmartPunch Pro.

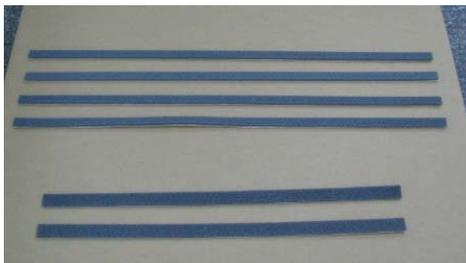


Go to Section 4 to complete the installation.

### 4. Installing the Sound Deadening Foam



Supplied with the SmartPunch Pro, you will find six strips of sound deadening foam that are shipped loose for field installation. These are not attached at the factory to avoid compression and/or damage during shipping.



To install, simply peel the back off to reveal the adhesive using the following steps as a reference.

#### 4.1 Paper Exit Side (Finisher Side)



Apply one of the two shorter strips to the Top cover. Align it so that

- a. the short edge of the foam lines up with the rear edge of the Top cover and
- b. the long edge of the foam lines up with the bottom edge of the Top cover.

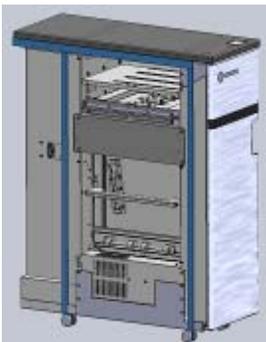


Apply one of the four longer strips to the side of the rear cover. Align it so that:

- a. the long edge of the foam lines up with the edge of the rear cover and
- b. the short edge of the foam touches the horizontal sound foam in the top.

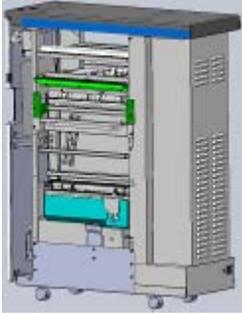


Apply another longer strip to the side cover. Align it so that the long edge of the foam is in line with the end of the horizontal foam.



Exit side complete

## 4.2 Paper Entrance Side (Main Unit Side)



Apply the remaining short strip to the Top cover. Align it so that

- a. the short edge of the foam lines up with the rear edge of the Top cover and
- b. the long edge of the foam lines up with the bottom edge of the Top cover.



Apply one of the two remaining long strips to the side of the rear cover. Align it so that:

- a. the long edge of the foam lines up with the edge of the rear cover and
- b. the short edge of the foam touches the horizontal sound foam in the top.



Apply the last remaining long strip to the left side of the main unit side of the SmartPunch Pro along the flange of the front frame touching the horizontal foam on the top.

## 5. Docking Bracket Installation



The docking brackets are shipped in a separate bag along with size M4x10 mounting screws (not shown).

### MX-ST10 High Capacity Stacker



Install as shown with the bracket marked "R" on the right side facing you as you look at the exit side of the upstream device (pictures shown). Install the bracket marked "L" on the left side facing you. Both brackets should be oriented with the arrow facing up.

### MX-RB18 Curl Correction Unit



### MX-CF11 Inserter



The docking bracket(s) provided with the finisher should be attached to the downstream side of the SmartPunch Pro with (4) M4x10 size screws.

## 6. Leveling & Height Adjustment

### 6.1 Height Setting

No height adjustment of the SmartPunch Pro is required, for an installation site with a level floor. If the floor is uneven then it is recommended to set the level of the SmartPunch Pro using the upstream device as a reference.

### 6.2 Adjusting the Casters

a)



Using a 9/16" (15mm) open ended wrench, loosen the jam nut(s) situated on the caster stud inside of the machine.

b)



Using the 9/16" (15mm) wrench, rotate the caster stems to change the height.

Re-tighten the jam nuts once the correct height is achieved.

### 6.3 Fixing the Lock Lever

Once the SmartPunch Pro has been leveled and the correct height set, push it so the front and rear frames are outside the docking brackets. Push the lock lever in and use an #8-32 to secure in place.



## 7. Final Steps

### 1.1 Main Unit & Finisher Firmware

Confirm that the main unit and finisher have the latest firmware installed. Firmware can be obtained by contacting Sharp service.

### 1.2 Setting the Dip Switch

SmartPunch Pro unit is fitted with a dip-switch and the setting should be changed depending on the main unit it is attached to. The dip-switch is located next to the firmware upload connector on the rear cover. Set the dip-switch per the table below.

Main Unit	Dip Switch Setting							
	1	2	3	4	5	6	7	8
MX-M904, MX-M1054, MX-M1204	OFF	OFF	OFF	OFF	ON	ON	ON	ON

### 1.3 Enabling the Punch Icon



The power switch for the SmartPunch Pro can be found on the front frame on the lower left corner (shown left). Turn the SmartPunch Pro on before the main unit.

The Punch icon (shown right) will appear automatically if the connections are made correctly and the power is cycled.



## 7.4 Functional Test

Functional test the SmartPunch Pro system

- Check to ensure that the paper chip tray is securely in place.
- Check to ensure that a die set is installed properly and that any extra die sets are securely stored in the die storage area. The die is inserted as shown and should be pushed smoothly and firmly until it clicks into place.



Inserting the die



Die storage area

- Run a small test job in “Bypass” mode. Check to ensure that the job is not punched and bypasses properly.
- Run a small job with punch enabled. Check the punched holes of the job.
- Run each die set to punch 100 sheets or until there is no oil residue around the holes.