Dolev 800

Punch System
Technical Manual

IMPORTANT NOTICE

Copyright © 2003 by Creo Inc. All Rights Reserved. Data subject to change without notice.
Part No. 653-00474A
Creo and the Creo logo are trademarks or registered trademarks of Creo Inc. The Creo products mentioned in this document are trademarks or service marks of Creo Inc. and may be registered in certain jurisdictions. Other company and brand, product and service names are for identification purposes only and may be trademarks or registered trademarks of their respective holders.

First edition: January 1994
Second edition: June 2003

Dolev 800 Punch System
Technical Manual

TABLE OF CONTENTS

1 GENERAL

1.1 Overview 1

1.2 Punch System Design and Operation 3

1.2.1 The Punch Sequence 3

1.2.2 Punch System Controls 3

1.2.3 Punch Control Logic 4

1.2.4 Compressed Air Flow Adjustments 5

1.2.5 Punch Assembly Structure 5

1.2.6 Punch Sub-Types 6

2 INSTALLATION

2.1 Off-Site Preparation 1

2.2 Compatibility Verification/Upgrade 2

2.3 Panel Covers Removal 3

2.4 Air Supply System Installation 4

2.5 Punch Assemblies Installation 9

_.Punch Assembly Position Calculation

2.6 Punch Assemblies Final Adjustments 21

_.Overview

_. Film Cassette Positioning

2.7 Air Tube, Slug, Wiring and Speed Adjustments 27

2.8 Repeatability and Registration 31

2.9 Image Offsets Setup 31

2.10 Completion 31

3 MAINTENANCE

3.1 Punch System Service Operations 1

3.1.1 User Service 1

3.1.2 Field Service 1

3.2 Shipping Procedures 1

3.3 Maintenance Drawings 2

3.3.1 Dolev 800 Right Punch Assembly 2

3.3.2 Dolev 800 Left Punch Assembly 5

3.4 Dolev 800 Punch Pneumatic and Control System 8

4 TROUBLESHOOTING

4.1 Punch System Critical Malfunctions 1

A APPENDIX A – DOLEV 800P PUNCHED FILM LAYOUT 1

ABOUT THIS DOCUMENT

The Dolev 800 Punch Technical Manual is intended for use by Creo engineers when installing the Dolev 800 Punch System. The material contained herein includes:

General, Chapter One, describes punch system design and operation, and also provides essential information for ordering the system.

Installation, Chapter Two, details all steps required for preparation, installation and initial testing of the punch system.

Maintenance, Chapter Three, describes routine service operations and includes numerous drawings.

Troubleshooting, Chapter Four, provides a quick reference for problems which may be encountered during routine punch system operation, and their possible causes.

Sample Installation Forms, Appendix A, includes samples of forms used for ordering and installing the punch system.

CONVENTIONS USED IN THIS DOCUMENT

The following text styles or formatting are used throughout this document to assist the reader:

Document references	References to other documents.
Section References	References to other sections of this document.
[Drawing Callout No.**]**	References to numbered product parts which are illustrated in a mechanical drawing.
Software Buttons	Named functions which are activated directly by the user via software.
System Messages	Response or information messages generated by the software or operating system.

1 GENERAL

1.1 Overview

Creo offers a leading edge, customer-defined punch system for the Dolev 800 Imagesetter. The punch system is used by printers to eliminate the need for mounting film to carrier sheets, manual registration and punching. A maximum of 10 punch assemblies can be installed in the film width direction, on the right flange of the Imagesetter drum.

To assist Creo and the customer in the punch system definition, the Punched Film Layout Form (Dwg. 749A8F418) was prepared. The customer and Creo engineer should complete all requested values on this form. Creo then prepares a confirmation drawing for customer approval. This drawing is subsequently used by the Creo engineer during punch system installation. A sample of the drawing appears in Appendix A.

Although filling in the punch definition form is not a pre-requisite for ordering a punch system, the system cannot be installed without the customer-approved confirmation drawing supplied by Creo. Since numerous configurations are available and some restrictions exist (such as minimum hole distances, hole size, and hole placement relative to the exposed area), Creo assists in the punch system definition to ensure that all details regarding the customer's punch system will be transmitted to the local Creo experts.

Creo has two types of punches:

Type 1 – Available from stock, as shown in Figure 1.1

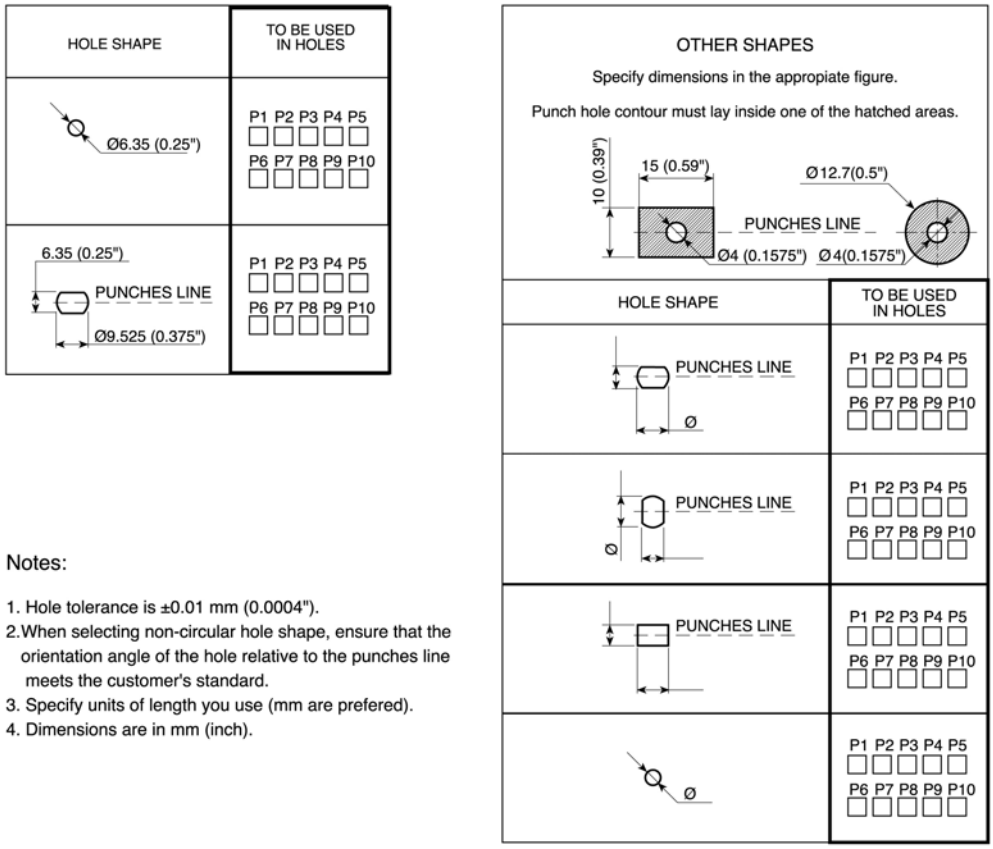


Figure 1-1. Type 1 Punch Holes

Type 2 - Customized punch assemblies, manufactured according to customer definition of hole dimensions. Creo does not encourage this type of punch, since it requires an added logistic process which generally takes a long time to complete. The final punch assembly is exactly the same as for Type 1 punches. Installation is also the same.

1.2 Punch System Design and Operation

The Dolev 800 punch system concept is to punch every hole via an independent assembly. Since film is loaded into the drum without using a tightly restricted path, the punch "jaws" must be well out of the film path during loading. Once film is secured to the drum with the roller and the vacuum, the punch jaws move into place, punch the film, and return to their "out" position. Note that very accurate punch positioning repeatability is required. Accuracy in punch positioning is achieved by using a small pre-loaded miniature linear bearing and by attaching together two hardened mounting surfaces, one round and one plane.

The moving part of the punch assembly is the unit. It can be either at the "out" position or at the "in" (punching) position. The moveable cutting blade of the punch is the rod. Like the unit, it can be either at the out or in positions. Both rod and unit are activated by air cylinders. There are two double-action air cylinders (not spring-activated) per punch assembly. The punch system therefore requires a continuous, external air pressure supply for operation.

After film is punched and before the punch rod moves to out position, the punch assembly ejects spent film slugs from the system. Three blasts of compressed air are used to achieve this. Film slugs are collected into a large black hose, located near the unloading cassette. The user must remove the film slugs from this hose two to four times per month.

1.2.1 The Punch Sequence

The following describes a typical punching sequence:

a. Unit in — Brings the unit into punching position
b. One-second delay — Allows pressure stabilization
c. Rod in — Executes film punch
d. One-second delay — Allows pressure stabilization
e. Three blasts of air — Removes spent film slugs
f. One-second delay — Releases pressure completely
g. Rod out — Rod returns to its out position
h. One-second delay — Allows pressure stabilization
i. Unit out — Unit returns to its out position

1.2.2 Punch System Controls

To perform the punching sequence, the system uses three 12-volt DC valves and, for each punch assembly, three limit switches (a type used widely in the Dolev 800).

The three valves are:

- Unit In/Out Valve
- Rod In/Out Valve
- Slug Out On/Off Valve

The three photo-interrupter indications are:

- Unit In
- Unit Out
- Rod Out

NOTES:

1. The unit in/out and the rod in/out valves are of the same type. The slug out on/off valve is bigger.
2. No pressure level sensor exists.
3. The "rod in" position is detected as "no rod out" state.
4. There is no slug out on/off indication.

Each punch assembly therefore requires five separate air tubes for operation, labeled:

- Unit In
- Unit Out
- Punch Rod In
- Punch Rod Out
- Slug

Additionally, one large tube is required to bring the spent film slugs into the collecting hose.

1.2.3 Punch Control Logic

All punch assemblies are operated in parallel. For example, the "unit in" air tube activates all units. All photo-interrupter readings are performed in parallel, causing the system to wait until the last photo-interrupter reading is correct before performing the next step in the sequence.

NOTES:

1. At least one punch assembly must be fully connected in order for all punch assemblies to operate.
2. The Imagesetter cannot discern how many punch assemblies are installed.
3. To release the Imagesetter from an error condition, you must restart the Imagesetter.

1.2.4 Compressed Air Flow Adjustments

Since the punch assemblies move independently, they operate at different speeds. One of the final adjustments required is to minimize operating speed differences by adjusting the four air flow controllers on each punch assembly. In most cases, only a few adjustments are necessary.

1.2.5 Punch Assembly Structure

Refer to: 1 Dolev 800 Right Punch Assembly, (Figure 3-1, page 2)
1 Dolev 800 Left Punch Assembly, (Figure 3-2, page 7)
Numbers appearing below inside square brackets ([ ]) refer to drawing callouts.

Each punch assembly is comprised of two main elements:

1. Stationary element, including:
    a. Base for punch [25]
    b. Rail [5]
    c. Flow controllers (2 pieces) [10, 13]
    d. Long stroke air cylinder ("Humphrey") [9]
    e. Sensors plate (including 2 photo-interrupters and harness) [1]
    f. Stopper plate (including hardened bushing) [35, 36]

2. Moving element, including:
    a. Punch block and rod [18]
    b. Short stroke pancake cylinder ("Bimba") [26]
    c. Sensor plate for punch (including 1 photo-interrupter) [11]
    d. Flow controller (2 pieces and tubes) [13]
    e. Rail sliding unit [5]
    f. Bracket [8]
    g. Adjustment screw (including hardened ball) [29]
    h. Mouth [33]
    i. Slug tube
    j. Cover for punch [24]

1.2.6 Punch Sub-Types

There are four design sub-types for punch assemblies:

Right	The most common design type; able to punch holes of up to 9.525 mm in diameter.
Left	Mirrors the Right design type. Also able to punch holes of up to 9.525 mm in diameter. Used when a short distance between punches is required. Use of both Left and Right assembly type can sometimes minimize punch hole distances.
Big Right	An enlarged version of the Right design type. It enables hole punch size of up to 15 x 10 mm rectangular.
Big Left	An enlarged version of the Left design type. It enables hole punch size of up to 15 x 10 mm rectangular.

Installation procedures for all design types are identical. Measuring gauges are suitable to all four designs.

Figure 1-2 depicts punch design sub-types in the context of a logistics tree.

Figure 1-3 depicts minimum allowable punch hole distances for the various punch assembly combinations.

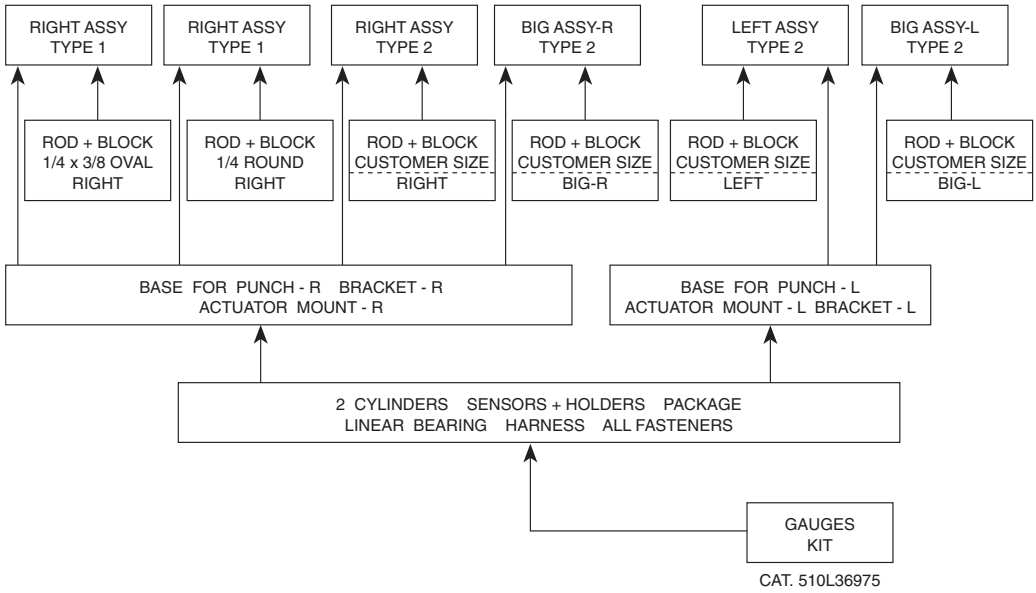


Figure 1-2. Punch Assembly Logistics Tree

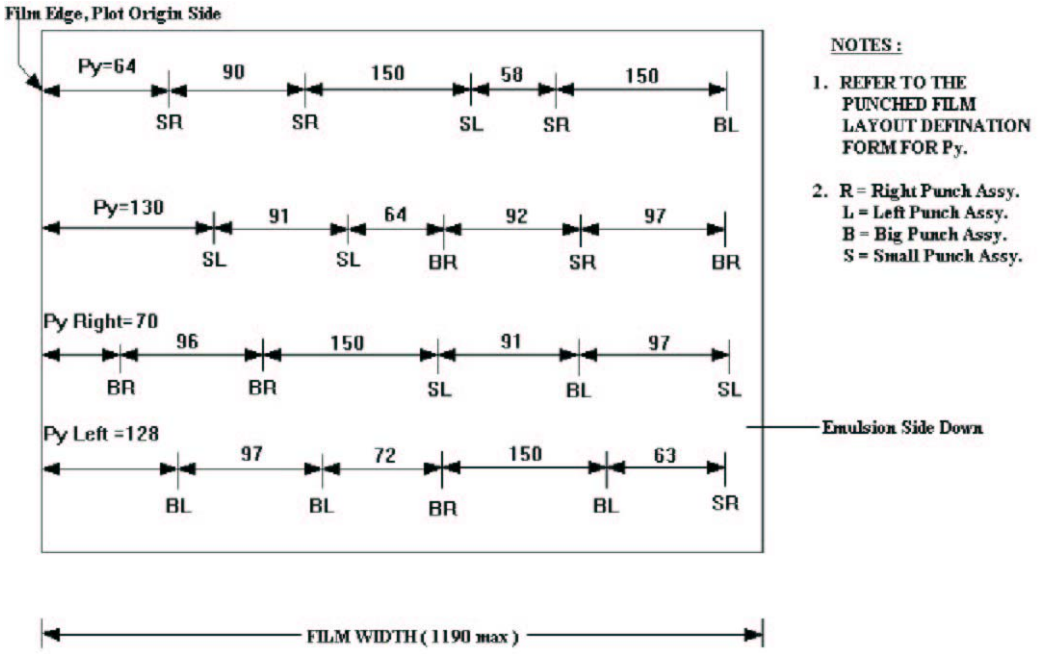


Figure 1-3. Minimum Punching Distances

2 INSTALLATION

The punch system installation procedures include the following activities. The time estimate for each activity is also given:

	ACTIVITY	DURATION
1.	Host software and hardware compatibility verification, and hardware upgrade.	1/2 hour
2.	Compressed air supply system installation.	1 to 2 hours
3.	Machine covers removal.	1 hour
4.	Punch assemblies installation.	6 hours
5.	Punch assemblies final adjustment.	3 to 4 hours
6.	Compressed air tube and slug system installation, electrical wire final routing, and final speed adjustments.	2 to 3 hours
7.	Repeatability and registration test plots.	1 to 2 hours
8.	Image offsets setup in accordance with customer-approved layout.	1 hour
9.	Machine covers re-installation.	1 to 2 hours
10.	Repeatability and registration final test plot.	1/2 hour

2.1 Off-Site Preparation

Each Punch Kit should contain a customer-approved layout, a custom installation drawing and a complete parts list.

1. Considerable time can be saved by performing the following steps at the Creo office, *prior to* traveling to the customer site.

2. Check the punch order thoroughly. Ensure that all ordered items are present and are *exactly* the proper assemblies. Hand-label the punches as P1, P2, and so on, according to the labeling of the punch holes in the customer-approved layout.

3. Identify the punch assemblies according to their description, as in the following examples:

PUNCH ASSY 5x9 OVAL-R	Right design; hole shape is 5 x 9 mm oval.
PUNCH ASSY 12.7 ROUND-BIG	Big design; hole shape is a 12.7 round hole.
PUNCH ASSY 1/4" x 3/8" OVAL-90◦ ROT-L	Left design; hole shape is a 1/4" x 3/8" oval, rotated 90 degrees.

The suffix **R**, **L** or **B** in the punch hole labeling (P2L, P5B, etc.) refers to the design sub-type, *i.e.*, Right, Left or Big.

4. If the customer ordered a non-standard punch assembly, spare parts should also be present in the kit: one spare punch for every three or less punch assemblies of the same hole shape.

5. Proceed with the installation *only* if you have all required punch assemblies according to the layout. Do not change anything in the layout without first consulting the Creo specialist. Changes in the layout may cause problems during installation, resulting in excessive work.

6. Except for Steps 1 and 2 of Section 2.5, *Punch Assemblies Installation*, all subsequent activities must be performed at the customer site.

2.2 Compatibility Verification/Upgrade

Refer to: Dolev 800 latest Software Version Release Document, according to the model of your machine. (See Techplanet, Dolev 800, Downloads.)

1. Check that the latest Dolev 800 software version is loaded.
2. Ensure that the correct plotter workflow update is loaded.
3. Turn off the Imagesetter.

NOTE: Do not perform any NVM updates prior to punch installation. Required updates will be performed later.

2.3 Panel Covers Removal

1. Turn off the Imagesetter.

2. Remove the following cover panels:
   a. Two side doors
   b. Two internal side light covers
   c. Upper back cover

CAUTION: Do not open the Standard Controller electronics crate. This installation does not require access to this crate. Working with an open electronics crate may result in damage to the Imagesetter!

3. Prepare a clean space large enough to accommodate the top cover of the Imagesetter. Select a place where the cover is unlikely to be scratched or otherwise damaged.

4. Unfasten the five screws securing the top cover to the main frame. The accompanying figure depicts all screw locations.

5. Unfasten the grounding cable at the left side of the cover.

6. Open the upper door.

CAUTION:
1. Two men are needed for top cover handling.
2. A lateral movement is required before lifting the cover upward.
3. The cover is made of fragile polyurethane.

7. Lift off the top cover and place it in the prepared clear space.

2.4 Air Supply System Installation

Refer to: **Figure 2-1**. Air Pressure Inlet Connector
Figure 2-2. Air Pressure Inlet Panel

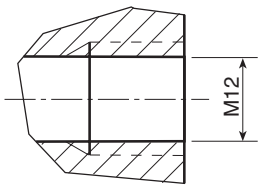
1. Turn off the Imagesetter.

2. Ensure that the customer has prepared a 7 atm (100 psi) compressed air pressure line. If a compressor line was prepared, check that its ratings are:

   - 7 - 10 atm (100 - 140 psi) minimum
   - Vessel volume of 20 liters (approximately 5 U.S. gallons)
   - Compressed air volume discharge rate of 3.6 m^3/h (2 cfm) minimum

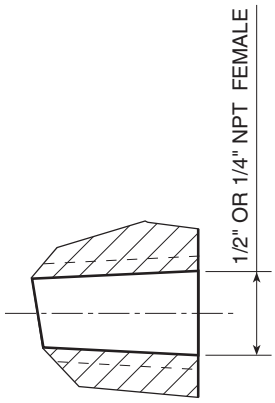
3. Check that the compressor outlet connector mates properly with the Dolev 800 air supply system inlet connector. Connector details and options are depicted in 1 Do not activate the air compressor yet.

WARNING: Connector Option 3, depicted in the accompanying figure, can be used *temporarily* for direct connection to a rubber tube. However, this alteration should be avoided after the installation! Connect to Option 3 only as a last resort.



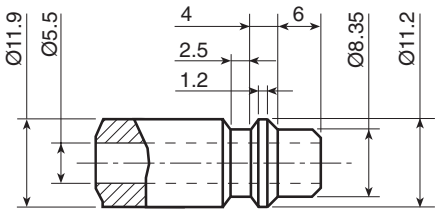
STANDARD M12 FEMALE THREAD

OPTION 1



STANDARD 1/2" NPT FEMALE CONNECTOR

OPTION 2



QUICK INDUSTRIAL CONNECTOR

OPTION 3

NOTES:

1. DIMENSIONS ARE IN mm.
2. DO NOT SCALE DRAWING.
3. CUSTOMER SHOULD PREPARE MATING CONNECTOR TO ONE OF THESE OPTIONS.

Figure 2-1. Air Pressure Inlet Connector

4. If you have not done so already, remove the lower back cover.

5. Remove the false pressure inlet panel located near the vacuum muffler. It is secured by three 8/32-inch bolts. Refer to Figure 2-1

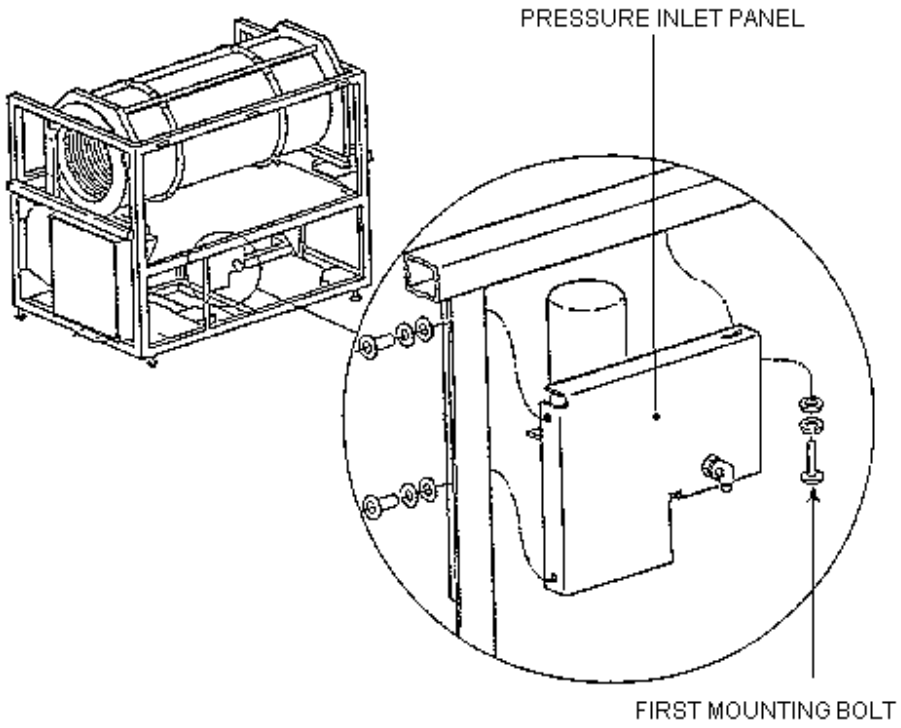


Figure 2-2. Air Pressure Inlet Panel

6. Locate the three cable connector plugs tied to the frame. They are labeled: PUNCH, UNIT IN, and JAM OUT ON.

7. Take the Pneumatic and Control Unit from the punch kit and insert the above three connectors into their matching valve connectors on the Unit as follows:

IMAGESETTER CABLE LABEL	PANEL PRESSURE VALVE LABEL
PUNCH	P
UNIT IN	U
JAM OUT ON	SLUG

NOTE: On some machines the cables are labelled incorrectly. Should you receive a PUNCH ... STUCK error message when first operating the punch system, try rerouting the cables. No damage will result. You will need to restart the Imagesetter in order to release the software from this error condition. Review current FCOs for additional details regarding this problem.

8. Remove the stopper plug from the pressure inlet elbow on the Pneumatic and Control Unit by applying even pressure on the red ring encircling the plug and pulling outward. Insert one 8 mm orange tube edge into the pressure inlet elbow.

9. Attach the Pneumatic and Control Unit temporarily to the main frame using only one of its three mounting three bolts. This bolt is marked as the First Mounting Bolt in 1 During installation, the unit can be pivoted on this bolt for easier access to tube connections.

10. Connect the other end of the 8 mm orange tube to the outlet on the pressure regulator side.

11. Leaving the five plugs inserted in their ports on the Pneumatic and Control Unit, activate 7 atm (100 psi) of air pressure and check for air leakage. If there are no leaks, proceed to the next step.

    Disconnect the air pressure if you hear a hissing sound from any point along among the tubes, or if a tube pulls free of its connector. Recheck all connections. Tubes are removed from their plugs by pressing evenly around the surface of the red inlet ring at the base of the plug, and pulling the tube out.

12. Once the air pressure routing is free of leaks, deactivate the air pressure and remove the five remaining plugs from their ports on the Pneumatic and Control Panel.

13. Locate the five blue tubes located near the two vacuum valves and insert them into the Pneumatic and Control Unit ports as follows:

TUBE LABEL	VALVE PORT LABEL
SLUG	SLUG
PUNCH ROD OUT	P-OUT
PUNCH ROD IN	P-IN
UNIT OUT	U-OUT
UNIT IN	U-IN

14. Activate 7 atm (100 psi) of air pressure to the Imagesetter and verify that the entire air pressure system is opaque. Repair any leakage found.

15. Reset the air pressure regulator to 6.5 atm (92 psi).

16. Deactivate the air pressure.

2.5 Punch Assemblies Installation

Refer to: Figure 2-3 Dolev 800 Punch Ruler
Figure 2-4 Punch Assembly Parts
Figure 2-5 Installing the Slide and Ruler Gauges
Figure 2-6 Punch Adjustment Gauge Position
Figure 2-7 Punch Adjustment Gauge Detail
Figure 2-8 Punch-to-Film Radial Distance
Figure 2-8 Assembly Air Tube Connections

This is the main part of the punch installation. The complexity and duration of this part depends mostly on the following aspects:

- The number of punch assemblies being installed.
- The distance between punch assemblies on the flange.
- The required accuracy of the punch hole distances.

HINT: Preparing materials at the Creo office will save 1 to 2 hours of work in the field. Refer to Section 0, *Off-Site Preparation*.60

Additionally, Punch Unit position calculations (Steps 1 and 2) may also be performed off-site, further reducing time in the field.

Punch Assembly Position Calculation

1. Using the Dolev 800P punch ruler (Cat. No. 270I36891), prepare an accurate schema for each punch assembly location on the right flange.

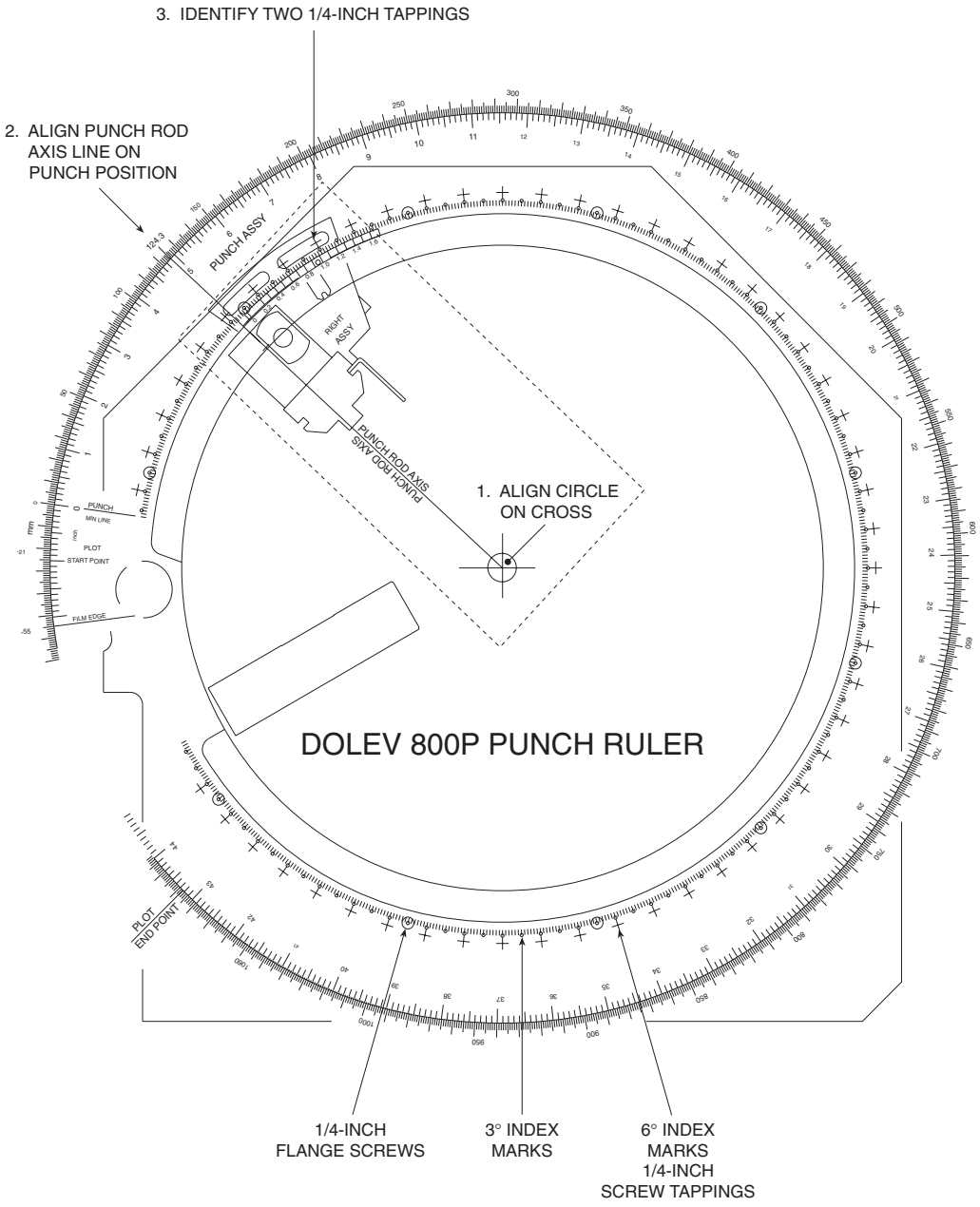
   Refer to 3 The punch ruler consists of:

   - Millimeters/inch scales
   - 6° index ("+" markings)
   - 3° index ("°" markings)
   - 0.5° index (smallest hatch markings on the inner ruler circumference)

   The "+" markings correspond to locations of the 1/4-inch screw tappings on the right drum flange, used to secure the punch assemblies.

   a. Prepare the ruler by clipping off the punch assembly outlines from either side of the drawing. These outlines are used to simulate placement of the punch assemblies on the flange. Note that these outlines represent either

Right or Big punches. To simulate a Left punch, simply flip the Right outline over and use its backside.



NOTE: SMALLEST MARKINGS AT 0.5° INTERVALS.

Figure 2-3. Dolev 800 Punch Ruler

b. Referring to the exact specifications in the customer-approved layout, position the appropriate punch sub-type (Right, Left or Big) in its specified location on the ruler.

   i. The lower endpoint of the Punch Rod Axis indicator line (the end inside the small circle) should be trapped to the center of the cross hair circle inside at the ruler's center.

   ii. The upper endpoint of the Punch Rod Axis indicator line is used to locate the punch at its exact location on the circular millimeters/inch ruler. Note that the ruler's origin falls at the punch minimum line marking, and not at the film edge.

c. After positioning the punch assembly on the punch ruler, examine the schema and count the number of 0.5° divisions between the Punch Rod Axis and the nearest 3° index mark. *Write this number next at the current punch assembly location on the schema.* It will be used during installation.

2. If you have an early version of laptop computer, from your laptop computer, run the RULER.EXE application.

   a. At the Enter Distance... prompt, type in the punch hole distance from the film edge, reduced by 50 mm.

   b. Enter the current punch assembly sub-type at the Right/Left prompt; type **R** for a Right or Big sub-type, and **L** for a Left sub-type.

   c. Write the RULER application output (a number between 0.0 and 1.7 mm) on the schema.

   d. Repeat the RULER calculation for each of the punch assemblies.

Punch Assembly Installation

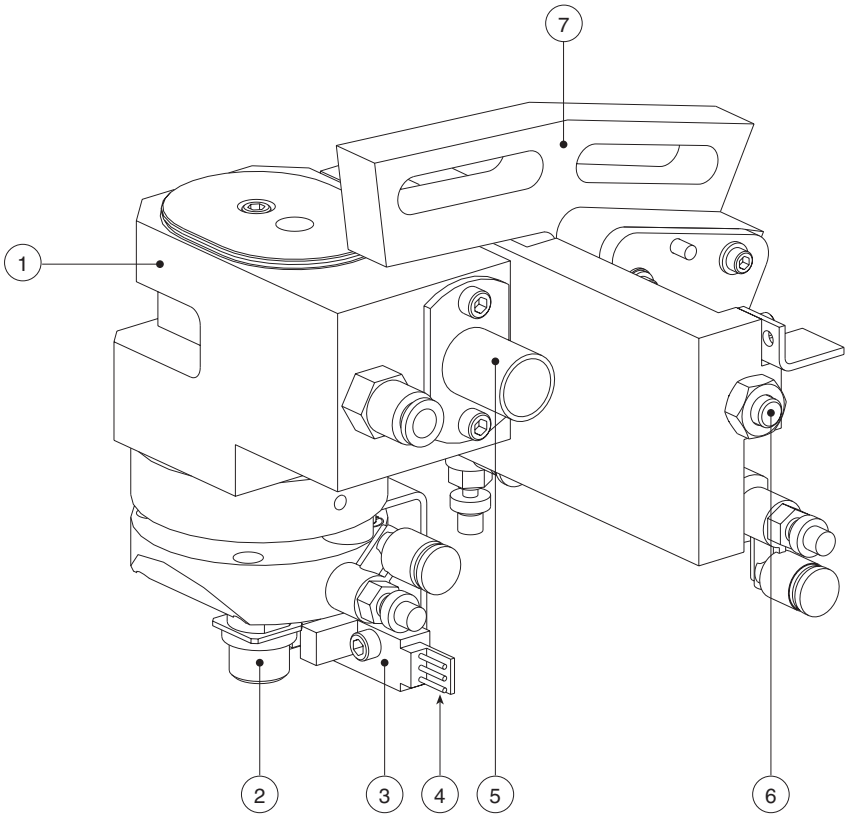
Punch assembly parts which are relevant to installation are depicted in Figure 2-4.

3. Turn on the Imagesetter and load 1180 mm of medium or large film. The film will remain in place throughout the Assembly installation.

NOTES:

1. The order of punch assembly installation impacts significantly on the visibility for Step f, below. A counter-clockwise order, starting from the last punch, is usually ideal.
2. Pay particular attention to the adjustments performed in Steps g-j. Later corrections to punch assembly placement are tedious.
3. You will need a strong light to perform the punch unit radial distance adjustment, Step f, below.
4. Always move the punch assembly *slowly* to prevent a collision at the UNIT IN position. If a hard collision occurs, damage to the hardened mounting surfaces may result.

CAUTION: Do not open by mistake any of the eleven 1/4-inch screws which are used to attach the right flange to the Imagesetter drum (Refer to Figure 2-3)



1. PUNCH ROD BLOCK
2. PUNCH ROD
3. PUNCH ROD IN/OUT PHOTO-INTERRUPTER SENSOR
4. J1 CONNECTOR
5. PUNCH MOUTH
6. PUNCH UNIT ADJUSTING SCREW
7. PUNCH UNIT BASE BRACKET

Figure 2-4. Punch Assembly Parts

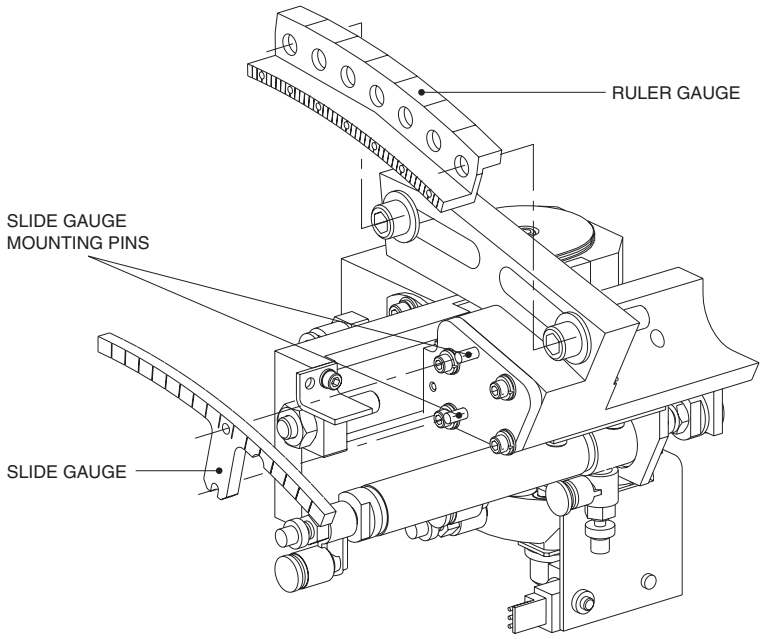
a. Referring to the schema you have prepared, identify the two 1/4-inch screw tappings on the right flange of the Imagesetter that will be used to secure each of the punch assemblies. Use the two outermost tappings.

b. Install the punch assembly by its base bracket, using two 2-1/4-inch x 1.25-inch screws, with lock washers and washers. Tighten the screws only partially, to allow manual adjustment of the assembly to its final position.

   Position the punch assembly *exactly* as seen on the schema, relative to its two 2-1/4-inch screws. This will make later adjustments easier.

For purposes of rough placement, the arced surfaces of the drum and the punch assembly base should coincide. Refer to 8

c. Install the two punch assembly adjustment gauges: the slide (Cat. No. 282B36308) and the ruler (Cat. No. 282B36307). Refer to 5



Note the position of the semi-circular guide hole on the slide gauge. For Right punch types, the guide hole should be on the right; for Left punch types the guide hole should be on the left.

When placing the ruler gauge on the 2-1/4-inch screw heads, hold it firmly for an accurate reading.

Position Adjustments

Figure 2-5. Installing the Slide and Rule Gauges

NOTE:

1. The left edge of the slide gauge corresponds to the Punch Rod Axis depicted on your schema.
2. The small holes on the ruler gauge correspond to the 3◦ index marks on your schema. The ruler index marks represent 0.5◦ increments.

d. Ruler and slide gauge positions when making punch adjustments are depicted in Figure 2-6. Rotate the punch assembly (and with it the slide gauge) away from the 3° ruler gauge reference by the same number of 0.5° index divisions as calculated in the prepared schema (Step 1c). *Be sure to refer to the same 3°index mark as shown in the schema.*

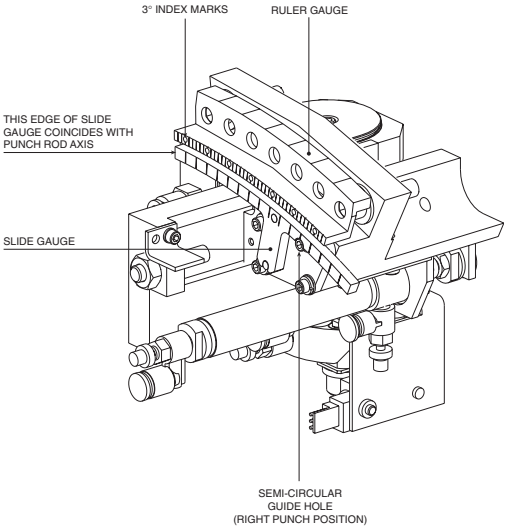


Figure 2-6. Punch Adjustment Gauge Position

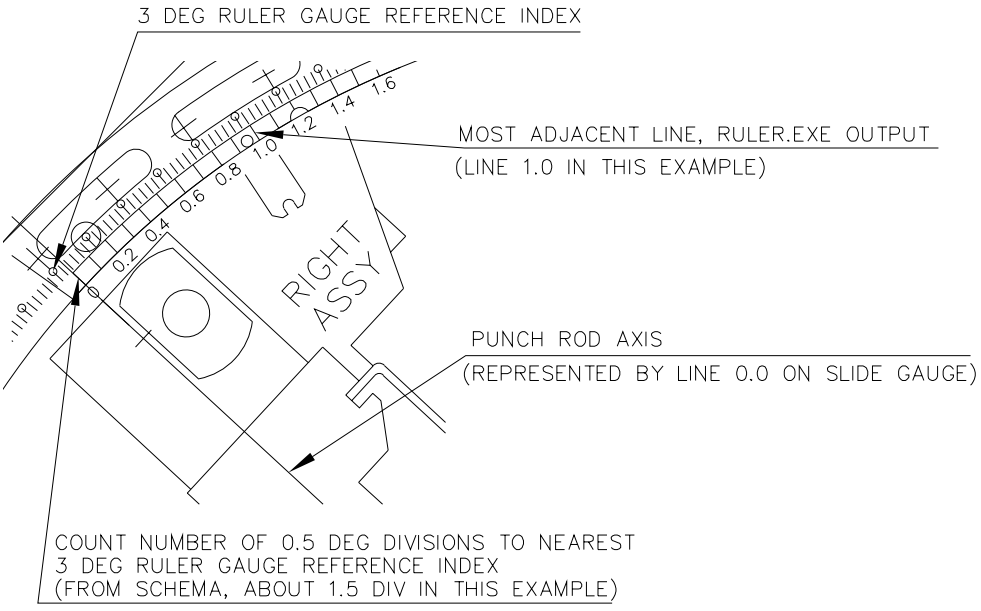


Figure 2-7. Punch Adjustment Gauge Detail

e. Rotate the punch assembly until the slide gauge line number (the output obtained from the RULER application) coincides with some line on the ruler gauge. If Step d was done correctly, the required rotation will be less than two ruler gauge 0.5° divisions.

f. Set the punch rod to the OUT position. Moving the assembly back and forth manually, adjust the punch radial distance to effect a smooth interface between the punch cutting blade and the film edge. On contact, the cutting surface should "lick" the film, without bending it. Refer to Figure 2-8

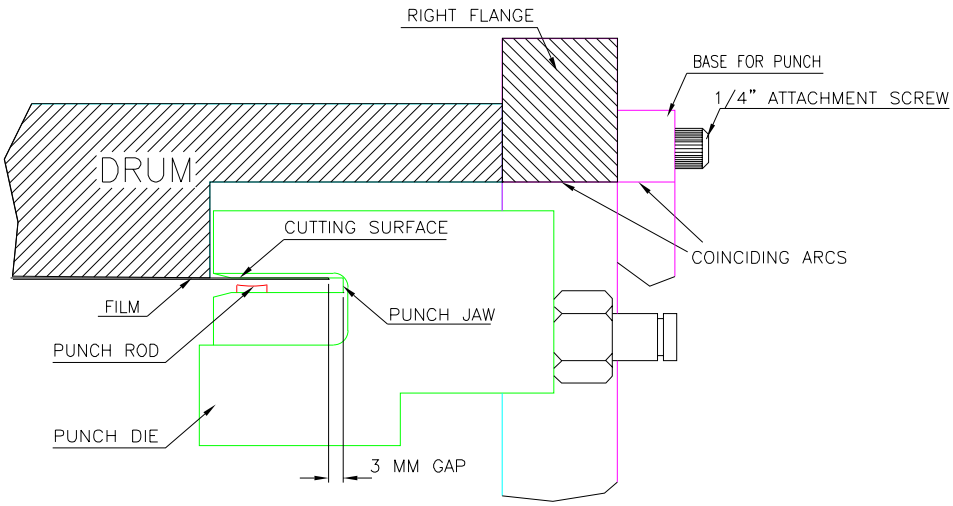


Figure 2-8. Punch-to-Film Radial Distance

HINTS:

1. Direct a bright light into the drum from the opposite end of the Imagesetter to make inspection of the punch-to-film distance easier.
2. It is good practice to *manually* push each punch rod towards the film. If the film does not move, then radial distance is correct.

It may happen that the punch jaw collides with the film edge at the UNIT IN position. In such a case, change roughly the unit IN position by rotating the adjusting screw clockwise. (Refer to Figure 2-4) Remember to re-tighten the securing nut after doing so.

g. Adjust the punch assembly angular orientation to assure that the punch rod axis is directed towards the drum center. To achieve the best angle, simply verify that there is a uniform gap between arcs of the slide gauge and the ruler gauge.

h. Repeat the previous four steps until all the punch assembly positioning requirements are met. Lock down the two 2-1/4-inch screws of the punch assembly. Check punch assembly positioning again after final locking.

NOTE: Do not hesitate to tighten the two 2-1/4-inch x 1.25-inch screws to the end.

i. Repeat Steps d-k for the remaining punch assemblies.

Air Hose Installation

4. Disconnect the air pressure.

5. Examine the air pressure manifold (attached to the main frame). It contains five blue 6 mm air tubes routed together. At 180 mm intervals, you will find five "T" junctions, blocked with five plugs. Choose the junctions nearest to each of the punch assemblies and unplug its five plugs. A total of five times the number of punch assemblies should be unplugged.

   Manifold air tubes are labeled in two places:

   - Near the metal junction group
   - Near the operating panel

6. Connect each punch assembly to its junction with the five black air tubes supplied for each punch assembly, as depicted in 8 When inserting the air tubes to the punch unit, hold it firmly to minimize loads on the linear bearing. Make sure the black air tubes do not interfere with any moving part on the Imagesetter. Manually move the optics carriage to its end position to ensure it does not collide with any air hoses.

NOTE: The UNIT IN air flow controller rotational orientation is important. After attaching the air tube, rotate the controller toward the assembly adjusting screw (upper orientation) to prevent any collisions with moving parts during the punch sequence.

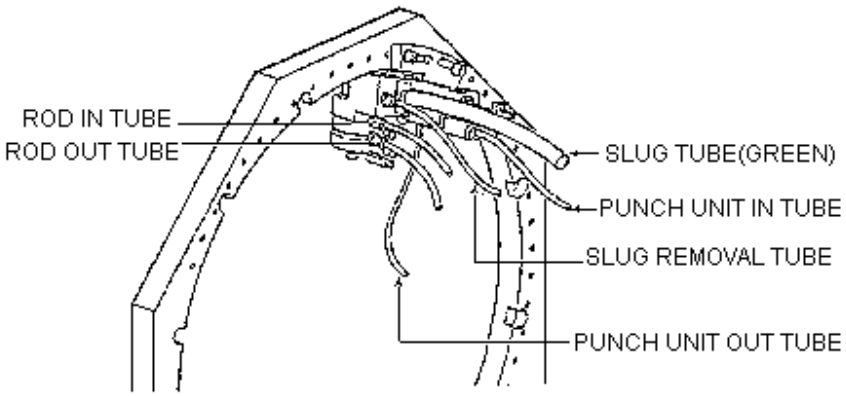


Figure 2-9. Assembly Air Tube Connections

7. Connect the opposite ends of the five black hoses to the appropriate air tube on the chosen "T" junction. Each blue air tube is labeled by function.

   Air tube functionality is the same at upper and lower horizontal branches, *i.e.*, the upper tube of the upper branch is connected to the upper tube of the lower branch, etc.

   Note that final air tube routing, including cutting of the tubes to their optimal length, will be done later.

Electrical Harness Installation

8. Open the punch system electrical harness assembly located near the blue air tubes. It contains ten harnesses, each ending with two Molex connectors. Each harness has a different length and is labeled by punch assembly number. (Punch 1, Punch 2, etc.)

   Determine which punch assembly has the easiest access. Choose the harness which connects to this unit, and connect the harness. *Leave all other harnesses unconnected.*

9. Activate the air pressure. Be sure that the pressure regulator it is set to 6.5 atm (92 psi). Disconnect the air pressure immediately if you should hear any loud air leakage. Such leakage may occur if you have made the wrong tubing connections.

Trial Punch Sequence

10. Carefully inspect the punch assemblies for the following conditions:
    - All units should be at the OUT position.

- All punch rods should be at the OUT position.
- No air leakage — not even a small leakage — should be occurring.
- No tube or wire should be stressed, stretched or warped.

If air leakage should occur, isolate the source. When tightening air fittings, remember to hold the assembly firmly, to minimize loads on the linear bearing.

11. Unload the film from the Imagesetter.

12. Set the following NVM parameters:

PARAMETER	TABLE OPTION	OLD VALUE	NEW VALUE
Plotter Type	Factory Tables > Plotter Setting	DOLEV800C	DOLEV800PC
Punch Mode	Factory Tables > Plotter Description	0	1
Punch Offset	Factory Tables > Plotter Description		0

13. Check again to ensure that the air pressure is set to 6.5 atm (92 psi) and that no obstructions lie in the travel path of the punch assemblies. Only one punch assembly should be connected to the electrical harness.

14. Restart the Imagesetter. No error messages should appear on the operator display panel. Possible error messages include: PUNCH UNIT STUCK or STARTUP FAILED.

15. Enter the punch utilities menu on the display panel and run the **Punch Sequence** option. Check that all punch assemblies are working correctly.

    If the system is not working and an error message appears, check the connecting harness and ensure it is routed properly (Refer to the Note in Step 7). Check that NVM parameters have been entered correctly. You will need to restart the Imagesetter in order to release the software from its error condition.

16. If punch units or punch rods are moving too quickly or too slowly, adjust the air flow controllers. Note that final air flow adjustment is performed later.

17. When the first punch assembly is operating smoothly, connect the other punch assemblies to their respective electrical harnesses. It is recommended to test the **Punch Sequence** (Step 15) after connecting *each* of the punch assemblies.

Trial Inspection

18. Load 1180 mm of film into the Imagesetter and perform a **Punch Sequence**. Unload the film and check the punch holes for the following general characteristics:

    - No mismatch in punch hole type order.
    - Correct distances between punch holes, as specified in the customer-approved layout. (Use the customer's pinbar as reference.)
    - Correct distance between the first punch (P1) and the film edge (dimension *Py* on the Punched Film Layout Form).
    - Hole surface quality:
      - Smooth edge
      - No sign of scratches around the holes on either side of the film
      - No sign of plucking around the holes
    - Check for oil marks on the film around the punch holes. If stains appear, clean the punch assembly intensively and check that the air system filter and dryer are connected.

    In the event of punch hole placement problems, return to the punch assembly installation procedure and make all necessary corrections. Be sure to readjust affected units for *all* placement dimensions (radial distance, orientation angle, etc.) If you must move more than one punch assembly, choose carefully the units to reinstall, taking into consideration both ease of access and minimum adjustment.

NOTE: In the event a substantial difference exists in punch hole distance between the customer's pinbar and the customer-approved punch layout, consult with the Creo specialist.

2.6 Punch Assemblies Final Adjustments

Refer to: Figure 2-4 Punch Assembly Parts
Figure 2-10 Punch Hole Linearity Dimensions
Figure 2-11 Linearity Indicator Holder
Figure 2-12 Final Plot Check
Figure 2-13 Locking the Assembly Adjusting Screw

This section describes final alignment of punch holes. It assumes that the punch sequence operates satisfactorily, and that punch hole distances are correct. You will need to perform several plots during this procedure. Most time will be spent on peripheral activities such as cover and gauge placement and removal, plotting, film development, and measurement of results.

Overview

Punch holes should be co-linear within 0.01 - 0.02 mm. The best method for testing compliance to this requirement is use of an accurate digital measuring table. If such a table is available, a plotted and punched film sheet is simply measured and punch hole locations are subsequently adjusted directly.

Since such measuring tables are generally not available at the customer site, a second method is used which produces acceptable results. This method involves plotting of a calibration grid which is used as reference for linearity. This method ignores image bow, which may be up to 30 microns. When the distances from the punch holes to the grid lines are measured, it is easy to determine how each punch assembly adjustment screw should be moved. When adjustments are complete, the final punching line should be parallel to the image within 0.2 mm. The procedures following describe use of this method.

An indirect adjustment method entails mounting the punched film onto the customer's pinbar and observing the mating quality of the pins to the holes. However, this "eyeball" method lacks accurate feedback for making subsequent punch assembly adjustments.

Film Cassette Positioning

1. Attach the medium and large film rollers to the right flange of the cassettes.

2. Attach the medium and large cassettes to the right wall of the loading system.

3. Load large film and measure the width of film which extrudes, unsupported, from the right drum interior. Take several measurements from different loaded films for maximum accuracy.

   Repeat this procedure for the medium film cassette.

4. Compare the various measurements. The unsupported film width for both medium and large films should be from 25 to 28 mm. In case of a larger dimension, attach the correct film roller to the cassette's left flange.

   Instruct the customer to install the film roller in the same way that it is loaded now, including the way the cassette is loaded into the loading system. Check the results.

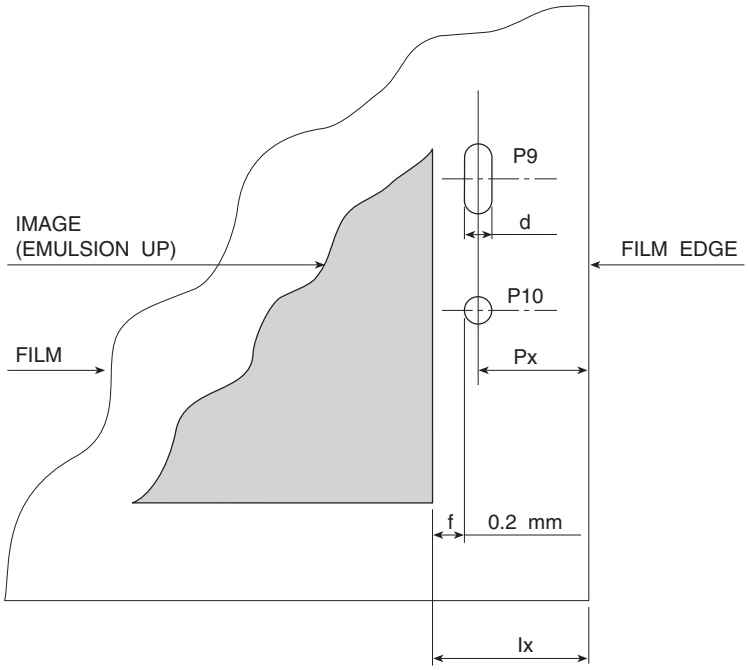
Punch Hole Linearity Adjustment

5. Prepare the Imagesetter for plotting:
   - Install the covers (without screws)
   - Load film into the cassette
   - Prepare the film processor
   - Activate the air pressure

6. Prepare a calibration plot file. Use one of the following methods:
   - Create a line of 20 microns in thickness along the film height direction, located in the vicinity of the punch holes; or
   - Use the **Plot Grid** option from the Tools package. Specify a Height Offset value of 754, with all remaining fields at that default values.

7. Plot the calibration file, specifying **Yes** to the Punch option, with a known offset. Process the plotted film.

8. Examine the processed film. Measure the dimensions depicted in 10 Compare them to the customer's Punched Film Layout Form:
   a. Distance from the film edge to the punch hole center (*Px* dimension for every punch hole); and
   b. Distance from the plotted line to the film edge.



Px = PUNCH HOLE CENTER TO FILM EDGE
Ix = IMAGE EDGE TO FILM EDGE
d = PUNCH HOLE DIAMETER
f = 0.2 mm (OPTIMAL VALUE)

Figure 2-10. Punch Hole Linearity Dimensions

Plot and measure at two films for highest accuracy.

9. Refer to the customer-approved punch layout and calculate the corrections necessary for *Px* at each punch. Write down these values for reference in later steps. Be careful not to confuse punch holes.

10. If the *f* dimension is not between 0.2 and 1 mm, an adjustment in plot Height Offset will be necessary. If so, calculate the correction necessary in the plot Height Offset by using the following example:

Given: *I*x = 17.9 mm (measured from film edge)
Px = 12 mm (specified in layout)
d = 6.35 mm (punch hole diameter, specified in layout)
f = 0.2 mm (optimal value for manual microscope measurement)
current height offset = 10 mm

Then: $new\ height\ offset = current\ height\ offset + Ix - Px - {}^{d}/_{2} - f$

$$12.525 = 10 + 17.9 - 12 - {}^{6.35}/_{2} - 0.2$$

If the new height offset calculates to a negative number, change the plotted image file to compensate, perform a new plot, and measure *I* again.

11. Install the linearity indicator holder (Cat. No. 290B36736) on the first punch assembly, as depicted in 11

Remove the punch mouth (Refer to 4) from the assembly by loosening its two #6 securing screws, and replace its with the indicator holder. (The securing holes

are slotted to allow quick removal. There is no need to remove the screws.)

12. Using the punch utilities on the control panel, perform a UNIT IN movement.

13. Install the indicator gauge into its place in the holder. Refer to 11 The indicator tip should rest on the punch assembly base. Reset the indicator gauge to zero.

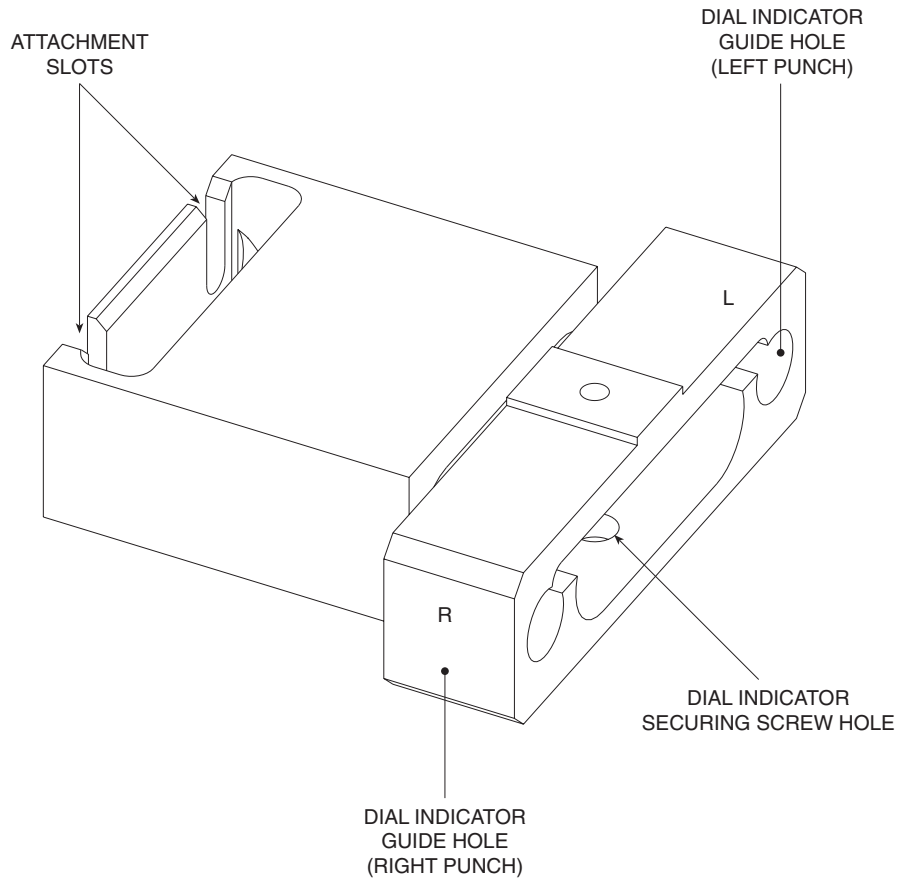


Figure 2-11. Linearity Indicator Holder

14. Loosen the punch assembly adjusting screw. (Refer to 4) Slowly rotate the adjusting screw (thereby changing the UNIT IN position) until the indicator reading is identical to the value calculated in Step 9. Be sure to lock the 1/4-inch securing nut following the adjustment.

CAUTION:

1. When adjusting the 1/4-inch securing nut, hold the punch assembly firmly to minimize loads on the linear bearing.
2. Do not perform a UNIT IN/OUT with the indicator installed. This may damage the indicator's delicate mechanism.

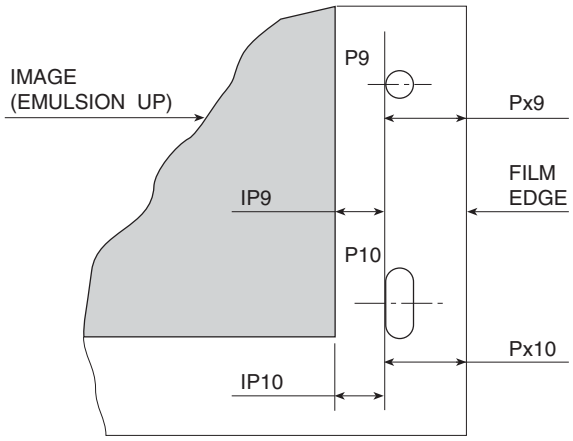
15. Remove the indicator and perform UNIT OUT.

16. Repeat Steps 11-14 for all punch assemblies. When completed, perform UNIT OUT and return to the Standby prompt in the Imagesetter operating panel.

Final Values Check

17. Plot the calibration file once again. When requested as part of the plot dialog, specify the new Height Offset calculated in Step 10.

18. Using a ruled microscope, measure all *IP* distances, as specified in 12 Microscope resolution accuracy should be within 0.02 mm.



Perform at least one plot on large film and one plot on medium film.

Figure 2-12. Final Plot Check

NOTE:

19. Check that *Px*1 through *Px*10 are identical to their corresponding *Px* values in the punch layout. Allow a maximum tolerance of 2 mm.

20. Check *IP*1 through *IP*10. The maximum allowed variation in *IP* is 20 microns. Repeat Steps 11 through 17 should the variation exceed this value.

21. Once all measured *Px* and *IP* values are acceptable, proceed with an inspection of the mating quality of the punched film on the customer's pinbar.

Locking the Punch Assemblies

22. When positioning of all punch units is completed, lock the adjusting screw securing nuts of each assembly into place by applying Loctite. The locking material should be applied in two places along the adjusting screw, as depicted in Figure 2-13

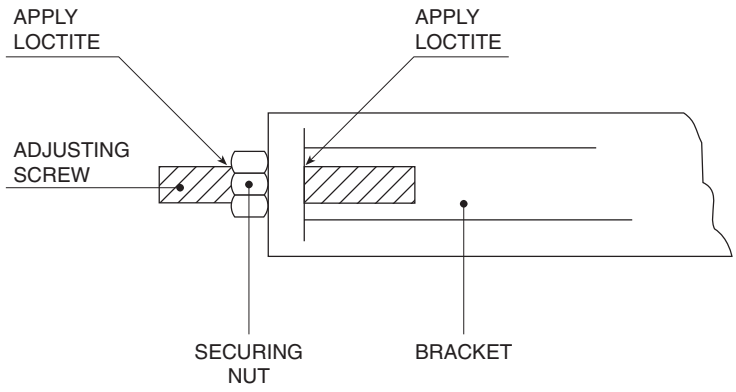


Figure 2-13. Locking the Assembly Adjusting Screw

23. Add all installation paperwork (*e.g.*, Punch Film Layout Forms, Customer-approved Layout, Order List, etc.) to the on-site Dolev technical folder. Be sure to include handwritten calculations.

This completes the final adjustment of the punch system. You should now plot some actual customer files to observe the overall registration quality of the Imagesetter.

2.7 Air Tube, Slug, Wiring and Speed Adjustments

Refer to: Figure 2-14 Waste Slug Tube Routing

1. Deactivate the air pressure supply to the Imagesetter.

Air Tube Routing

2. Perform final routing of the black air tubes for all punch assemblies. Use the following guidelines:
   - The UNIT IN/OUT tubes are stationary. Route these tubes shortly, without bending and in alignment with their natural curvature.
   - The punch rod IN/OUT and slug air tubes move during the punch sequence. Route them together when the punch assemblies are at their OUT position. Carefully check for freedom of movement by moving the punch units manually from their OUT to IN positions and back again. Ensure that these units are not interfering with any of the photo-interrupters.
   - Air tubes should be free of stretching.
   - Air tubes should not interfere with any moving parts of the Imagesetter.
   - Do not tie any air tube. Simply cut them to their final length and poke them into place.

3. Activate the air pressure to Imagesetter.

4. Restart the Imagesetter and ensure proper operation of all punch assemblies.

5. Set up the Imagesetter as follows:
   a. Air pressure level is 1 atm (14 psi).
   b. Top cover, rear upper cover and right door are removed.
   c. All but one punch assembly are electrically disconnected.
   d. All punch mouths are removed from the punch assemblies.
   e. All punch assemblies are at their OUT position.
   f. No film is loaded.
   g. Optics carriage is at its END position.
   h. The Imagesetter is completely cleaned of slugs, short black tubes, cable ties, lost fasteners, tools, etc.

6. Install the black 38 mm waste slug collection tube.

   a. Locate and remove the black tape attached to the internal lower right light cover (under the loading motor on the standard controller side of the Imagesetter). This tape covers a 38 mm hole in the cover, which is used to support the end of the collection tube.

   b. Install the end cap of the 38 mm black hose into the uncovered hole. Twist the tube 2-3 turns so that it fits inside the cavity next to the standard controller. The open end of the collection tube should be oriented upward, toward the punch assemblies.

NOTE: On some machines, you will need to attach the special adaptor plate, supplied with the pneumatic system kit, to the internal light cover.

7. On a clean space, organize all punch assembly mouths, along with their screws, green "garden hose" air tubes, L-shaped black fittings, T-shaped black fittings, and cable ties. Also have available the tube cutter (supplied with the Pneumatic Control System).

8. Insert completely each of the punch mouths into a separate 120 mm long green air tube.

9. Insert partially (up to 10 mm deep) each of the L-shaped black fittings into the other end of the 120 mm green air tubes.

10. Install the punch mouths on the various punch assemblies.

11. Route the green air tubes using from one to three circular branches around the drum axis. The following figure provides a typical tube routing example. Since there are numerous punch system configurations, there is no specific, straightforward model for routing slug system tubing. It is acceptable to route identical punch systems in different ways. However, the follow rules and guidelines exist for routing:

    - Arrange the green air tubes so that three tubes will arrive to the single black 38 mm waste slug collection tube.
    - Use the natural curvature of the green tubing. Don't attempt to force the tubing against its nature.
    - Ensure that the air tubing is fresh, *i.e.,* soft and flexible. Otherwise, an excessive force will be applied to the linear bearing, reducing repeatability and registration quality.
    - Ensure likewise that the air tube routing is such that it applies the minimum load on linear bearings.

- Avoid applying excess force on the linear bearing while insert the air tubes.
- The air tubing should be inserted a minimum of 20 mm over the black plastic fittings.
- Do *not* use grease when inserting the fittings into the air tubes.
- The air tubes should not come into contact with any stationary part during UNIT IN/OUT operation.
- Use the absolute minimum of union T- or L-shaped fittings.

WARNING: Do not perform a UNIT IN when the optics carriage is at its end position. The punch assemblies can collide with the carriage. Instead, always move the punch units manually.

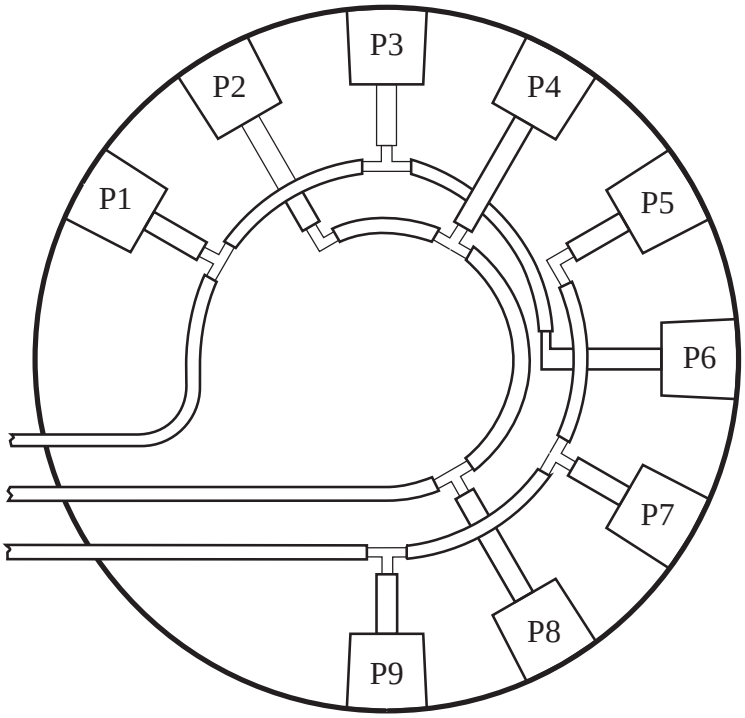


Figure 2-14. Waste Slug Tube Routing

Plan ahead before performing air tube routing. It is difficult to disconnect the hoses from the various fittings.

12. Route the free ends of the green air tubes into the single black 38 mm slug collection tube. A maximum of three green tubes will fit inside this tube. The green air tubing should extend 100 to 150 mm into the fat collection tube.

13. Reset the air pressure to 6.5 atm (92 psi) and perform several loading and film punching sequences. Check for smooth operation of the punch system. Ensure also that all film slugs are ejected well into the collection cavity.

Electrical Wiring

14. Connect and route all unconnected electrical wires for each punch:

    a. the PUNCH ROD IN photo sensor connector
    b. the UNIT IN/OUT photo sensor connectors

    Tie together the three moving black air tubes with the moving wires of each punch unit. Do the same to the stationary black air tubes and the stationary branch of wires. Cable ties are supplied with the punch system kit.

15. Adjust the air flow controllers for each of the punch assemblies:

    a. Loosen the securing nut for each valve on the assembly.
    b. Rotate the air flow adjusting screw for each valve.
        - Clockwise rotation reduces the air flow.
        - Counter-clockwise rotation increases the air flow.
    c. Tighten the securing nut for the adjusted valve.

    Air flow is adjusted ideally when the following conditions are met:

    - All punch UNITS arrive together to their IN/OUT positions within 0.5 seconds.
    - All punch RODS arrive together to their IN/OUT positions within 0.3 seconds.
    - UNIT IN/OUT stroke is from 0.8 to 1.3 seconds long.
    - ROD IN/OUT stroke is from 0.4 to 0.6 seconds long.

    It is recommended that you use the Diagnostics module to determine operating cycle times. Each operation is displayed, including its execution times. An experienced engineer can adjust the system manually in a few moments.

    Note that flow controllers control only the air flow *exhausted* from their cylinder.

2.8 Repeatability and Registration

1. Perform several test plots. Choose from the customer's flat files and plot all four separations. Check the registration quality. Use the imprinted registration marks to ensure that registration is better than 30 microns.

2. Examine the output films for scratches around the punch holes on both sides of the film.

3. Examine the films for oil marks around the punch holes. Run the punch rod in and out several times to get rid of oil marks.

4. Check that the film is completely free from ripples when it is mounted on the customer's pinbar.

5. Perform two identical plots and compare them for differences.

6. Perform two additional plots of the same file; the first plot using air pressure of 6.5 atm, and the second plot using 5.5 atm. Check for imaging repeatability relative to the punch holes. In all cases, registration should be within 30 microns.

2.9 Image Offsets Setup

1. Prepare and plot a file which resembles the customer-approved layout.

2. Pass this film throughout a typical customer application. Be convinced the customer has got what he/she needs.

3. Inform the customer about the available plot options relevant to the punch system operation.

2.10 Completion

1. Reinstall all covers and the on-line processor, if present.

2. Make a test plot to ensure the Imagesetter is free of light leaks.

3. Repeat the procedures outlined in Section 0, Repeatability and Registration, to ensure that the top cover re-installation did not affect the punch system.

REMINDER: Add all installation paperwork (*e.g.,* Punch Film Layout Forms, Customer-approved Layout, Order List, etc.) to the on-site Dolev technical folder. Be sure to include handwritten calculations.

3 MAINTENANCE

3.1 Punch System Service Operations

The following sections list routine service operations for correct maintenance of the punch system.

3.1.1 User Service

1. Cleaning the film slug hose (2 to 4 times per month).
2. Maintaining the incoming air pressure at 6 to 7 atm (92 ± 8 psi).

3.1.2 Field Service

1. Same service operations as described in *User Service*, above.
2. Ensure that the air system in not leaking.
3. Ensure that all punch system tubes and wires are correctly routed with no danger of becoming stuck, as described in Section 0, *Punch System Critical Malfunctions*.
4. Ensure that punch units are moving at reasonable speeds. Use diagnostics to check speed limits for every operation.
5. Perform a punch sequence, counting the outcoming film slugs. These must match the number of punch assemblies present.
6. Check overall punch repeatability and registration.
7. Ensure that the film slug removal process is fluent. If necessary, clean the punch blocks of any stray slugs.
8. Ensure that optical carriage movement is not obstructed in any way.

3.2 Shipping Procedures

NOTE: The punch system is designed for shipping separately.

1. If the Imagesetter must be shipped, lock the individual punch units to their OUT positions using cable ties. Place a clear label regarding the locked status on the two internal side covers. *Operating a blocked punch system may spoil its calibration adjustments.*

2. Release the cable ties from the punch units before any subsequent operation of the system.

3.3 Maintenance Drawings

The drawings included in this section are intended to assist the Creo service engineer to identify critical parts of the punch system.

3.3.1 Dolev 800 Right Punch Assembly

Parts List

Drawing (refer to Figure 3-1)
Catalog No. 507D35979

Ref. Desig.	Creo Part No.	Description
	507C38074	DLV-800 PUNCH BASKET-R
	280A35269	PUNCH BLOCK ROUND 1/4"-R

Drawing (refer to Figure 3-1)
Catalog No. 507C38074 (DLV-800 Punch Basket-R)

Ref. Desig.	Creo Part No.	Description
	203A10030	MINI CABLE TIE 140MM
	203A10050	STNDR.CABLE TIE 170MM
	344C70100	ELBOW,BARBED,PLASTIC OD=16mm
	344D70100	"T"FITTING FOR HOSE OD=16mm
	344F10142	TUBE,SOFT,BLK.OD=4,ID=2.5MM
	344F70050	HOSE,PVC,REINFORCED,ID=12.5mm
	380A09160	SOC HD CAP ST1/4-20*1 1/4"
	382A07006	FLAT WASHER STST #6L
	382A16001	FLT WASH.ST 1/4*.265*9/16*.049
	382D17002	SPRING L/W STST 1/4"(MED)
1	290B36137A	2 SENSORS PLATE TYPE II
2	380A01032	SOC HD CAP STST 4-40*5/16"
3	382D04000	SPRING L/W ST ST #4
4	382A05000	FLAT WASHER STST #4
5	360A20047	LINEAR WAY-MINIATURE TYPE
7	382D08000	SPRING L/W ST ST #6
8	281B36076	BRACKET-TYPE 2-R
9	347N90000	AIR CYL.0.5"BORE 2"STROKE
10	347M20012	CONTROL VALVE ELB.D=4,10-32UNF

11	280B36008A	SENSOR PLATE FOR PUNCH
12	138A10210	PHOTO INTERRUPTER IR
13	347M20027	CONTROL VALVE STR.D=4,10-32UNF
15	380A10060	SOC HD CAP STST 5/16-24x1/2"
16	380A03121	SOC HD CAP STST 6-32*7/8"
17	290A35263	MUSHROOM
18	280A36324	ROD 1/4"+BLOCK 1/4"ROUND-R
19	381A06002	HEX NUT STST10-32*1/8"
20	290A35413	BEAD
21	280A36135	ACTUATOR MOUNT-TYPE 2-R
22	380A03041	SOC HD CAP STST 6-32*3/8"
23	382A07001	FLAT WASHER STST #6S
24	280B35264A	COVER FOR PUNCH
25	282B36077	BASE FOR PUNCH - TYPE 2-R
26	347F40200	AIR CYLIND.D.A.1 1/16"B,1/4STR
27	280B36136	FLAG-TYPE 2
28	381A08001	HEX NUT STST1/4-28*7/32"
29	290B35937A	BUSHING INSTALTION II
30	344B80050	FITTING,TUBE,1/8NPT MALE D=4mm
31	380A54030	SOC HD CAP ST M3-0.5X4mm
32	280A35406	NOZZLE
33	290B35409	MOUTH
34	343A21030	O-RING ID=1.549" OD=1.750"
35	280A36253	STOPPER-TYPE 2
36	290B26647	2ND MIRROR BUSHING
37	280B36007	T PLATE
38	381A03000	HEX NUT STST#6-32*3/32"
39	343A01000	O-RING BUNA-N ID=.176 OD=.316"
40	359Q01010	NEEDLE ROLLER 3X11.8MM
42	504B36278	PUNCH ADAPTOR HARNESS

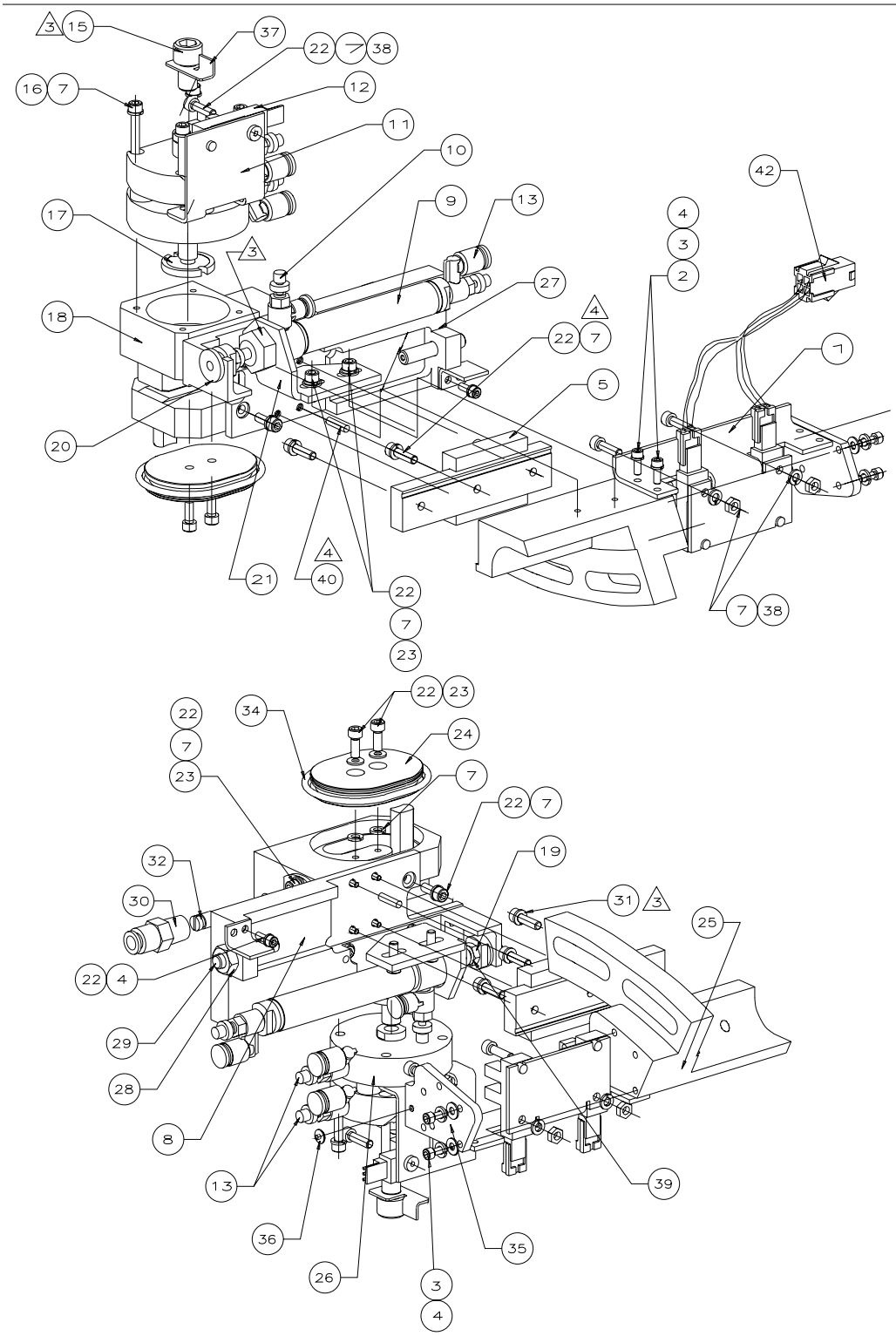


Figure 3-1. Dolev 800 Right Punch Assembly

3.3.2 Dolev 800 Left Punch Assembly

Parts List

Drawing (Refer to Figure 3-2)
Catalog No. 507D32959 – Punch Assy 1/4" round-L

Ref. Desig.	Creo Part No.	Description
	507C38075	DLV-800 PUNCH BASKET-L
	280A36191	PUNCH BLOCK 1/4" ROUND-L

Drawing (Refer to Figure 3-2)
Catalog No. 507C38075 DLV-800 Punch Basket-L

Ref. Desig.	Creo Part No.	Description
	203A10030	MINI CABLE TIE 140MM
	203A10050	STNDR.CABLE TIE 170MM
	344C70100	ELBOW,BARBED,PLASTIC OD=16mm
	344D70100	"T"FITTING FOR HOSE OD=16mm
	344F10142	TUBE,SOFT,BLK.OD=4,ID=2.5MM
	344F70050	HOSE,PVC,REINFORCED,ID=12.5mm
	380A03061	SOC HD CAP STST 6-32*1/2"
	380A09160	SOC HD CAP ST1/4-20*1 1/4"
	382A07006	FLAT WASHER STST #6L
	382A16001	FLT WASH.ST 1/4*.265*9/16*.049
	382D17002	SPRING L/W STST 1/4"(MED)
1	290B36137A	2 SENSORS PLATE TYPE II
2	380A01032	SOC HD CAP STST 4-40*5/16"
3	382D04000	SPRING L/W ST ST #4
4	382A05000	FLAT WASHER STST #4
5	360A20047	LINEAR WAY-MINIATURE TYPE
7	382D08000	SPRING L/W ST ST #6
8	291B36271	BRACKET-TYPE 2-L
9	347N90000	AIR CYL.0.5"BORE 2"STROKE

10	347M20012	CONTROL VALVE ELB.D=4,10-32UNF
11	280B36008A	SENSOR PLATE FOR PUNCH
12	138A10210	PHOTO INTERRUPTER IR
13	347M20027	CONTROL VALVE STR.D=4,10-32UNF
15	380A10060	SOC HD CAP STST 5/16-24x1/2"
16	380A03121	SOC HD CAP STST 6-32*7/8"
17	290A35263	MUSHROOM
18	280A36323	ROD 1/4"+BLOCK 1/4"ROUND-L
19	381A06002	HEX NUT STST10-32*1/8"
20	290A35413	BEAD
21	290A36073	ACTUATOR MOUNT-L
22	380A03041	SOC HD CAP STST 6-32*3/8"
23	382A07001	FLAT WASHER STST #6S
24	280B35264	COVER FOR PUNCH
25	280B35940	BASE FOR PUNCH-L
26	347F40200	AIR CYLIND.D.A.1 1/16"B,1/4STR
27	280B36136	FLAG-TYPE 2
28	381A08001	HEX NUT STST1/4-28*7/32"
29	290B35937A	BUSHING INSTALTION II
30	344B80050	FITTING,TUBE,1/8NPT MALE D=4mm
31	380A54030	SOC HD CAP ST M3-0.5X4mm
32	280A35406	NOZZLE
33	290B35409	MOUTH
34	343A21030	O-RING ID=1.549" OD=1.750"
35	280A36253	STOPPER-TYPE 2
36	290B26647	2ND MIRROR BUSHING
37	280B36007	T PLATE
38	381A03000	HEX NUT STST#6-32*3/32"
39	343A01000	O-RING BUNA-N ID=.176 OD=.316"
40	359Q01010	NEEDLE ROLLER 3X11.8MM
42	504B36278	PUNCH ADAPTOR HARNESS

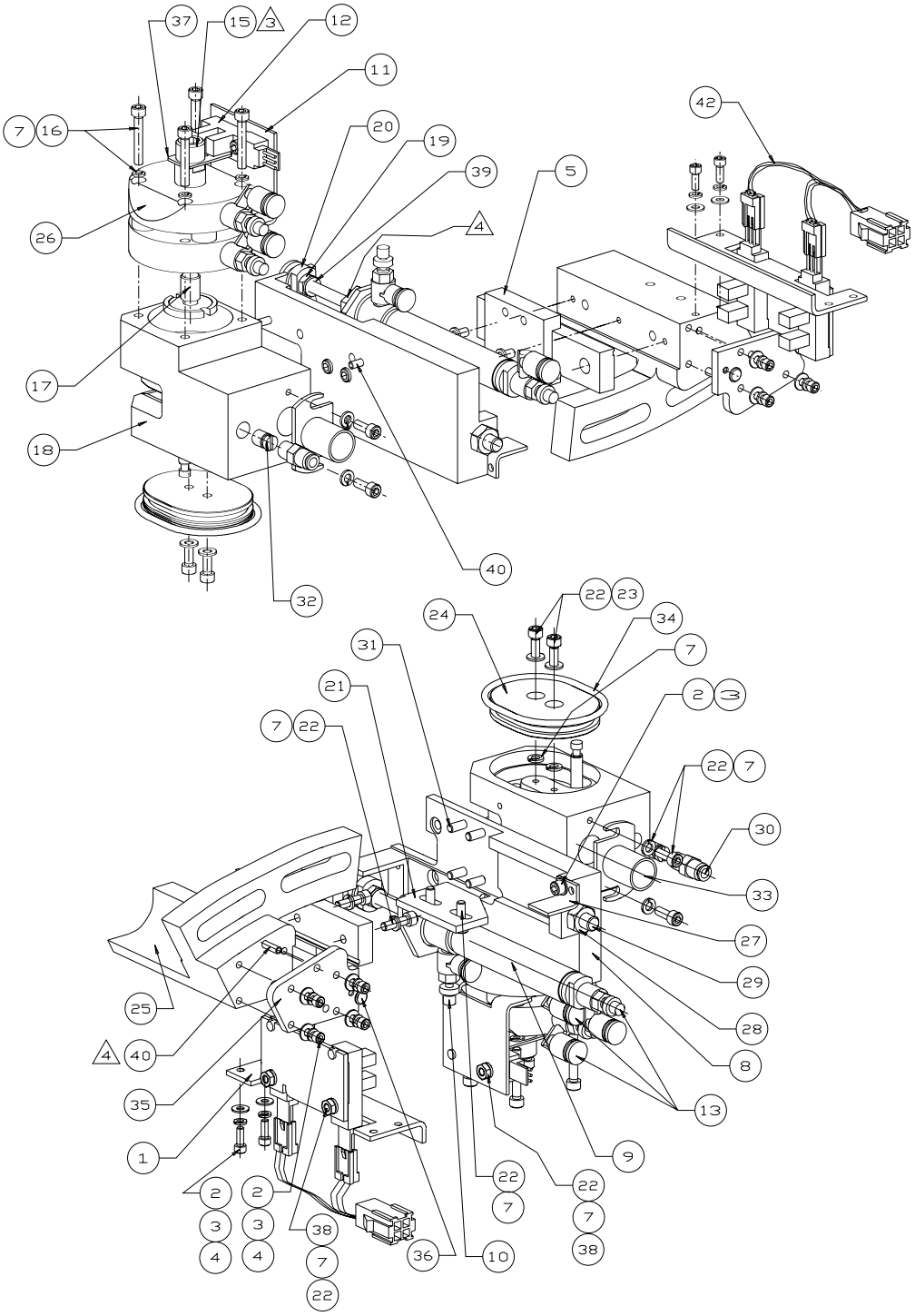


Figure 3-2. Dolev 800 Left Punch Assembly

3.4 Dolev 800 Punch Pneumatic and Control System

Parts List

Drawing (Refer to figure 3-3)
Catalog No. 507D35978

Ref. Desig.	Creo Part No.	Description
	391A60432	CARTON COVER 460X330
	328F314.01FA	PNEUMATIC CONTROL SYS.
1	382D11000	SPRING L/W ST ST #8
2	382A10000	FLAT WASHER STST #8S
3	380J05040	PHIL PAN HD STST 8-32*3/8"
4	344B57005	PLUG,M6
5	344B81000	FITTING STRAIGHT 1/4-6
6	504B36331	SLUG-SOL WIRING ASSY
7	344B81015	FITTING,STRAIGHT 1/4NPT M. 8mm
8	344F10133	HOSE ORANGE OD=8 ID=5mm POLYUR
9	344D58010	"T"UNION FIT.D1=8 D2=6 D3=8 mm
10	344F10131	HOSE BLUE OD=6,ID=4mm POLYURE.
11	344C58010	ELBOW,UNION D=8
12	281A35694A	PRESSURE INLET PANEL
13	344B58010	PLUG,M8
14	347N22100	FILTER+REGULATOR+LUBRICATOR
15	344B81010	REDUCER-NIPPLE 1/2NPT-1/4NPT
16	342A10100	AIR FILTER/DRYER 1/2" NPT
17	347N02006	QUICK CONN.1/4"NPT MALE,STST.
18	290A36949	ADAPTOR 1/2 NPT M-1/4 NPTF
19	344B80000	FITTING STRAIGHT 1/8-6
20	347M72010	SOL.VALVE SPR.RET,4WAY,12V,1/8
21	344B81020	PLUG 1/4 NPT,MALE
22	344G80010	MANIFOLD,2 PORTS 1/8" NPT
23	280B36231	TUBE COVER
24	344F10120	HOSE PLASTIC BLACK ID=1-1/2"
25	395A20000	TUBE CUTTER,BLUE
26	290B38710	ADAPTOR 1/4" NPT-M12
27	270I36891	DOLEV 800P PUNCH RULER
28	381A05001	HEX NUT STST#8-32*7/64"

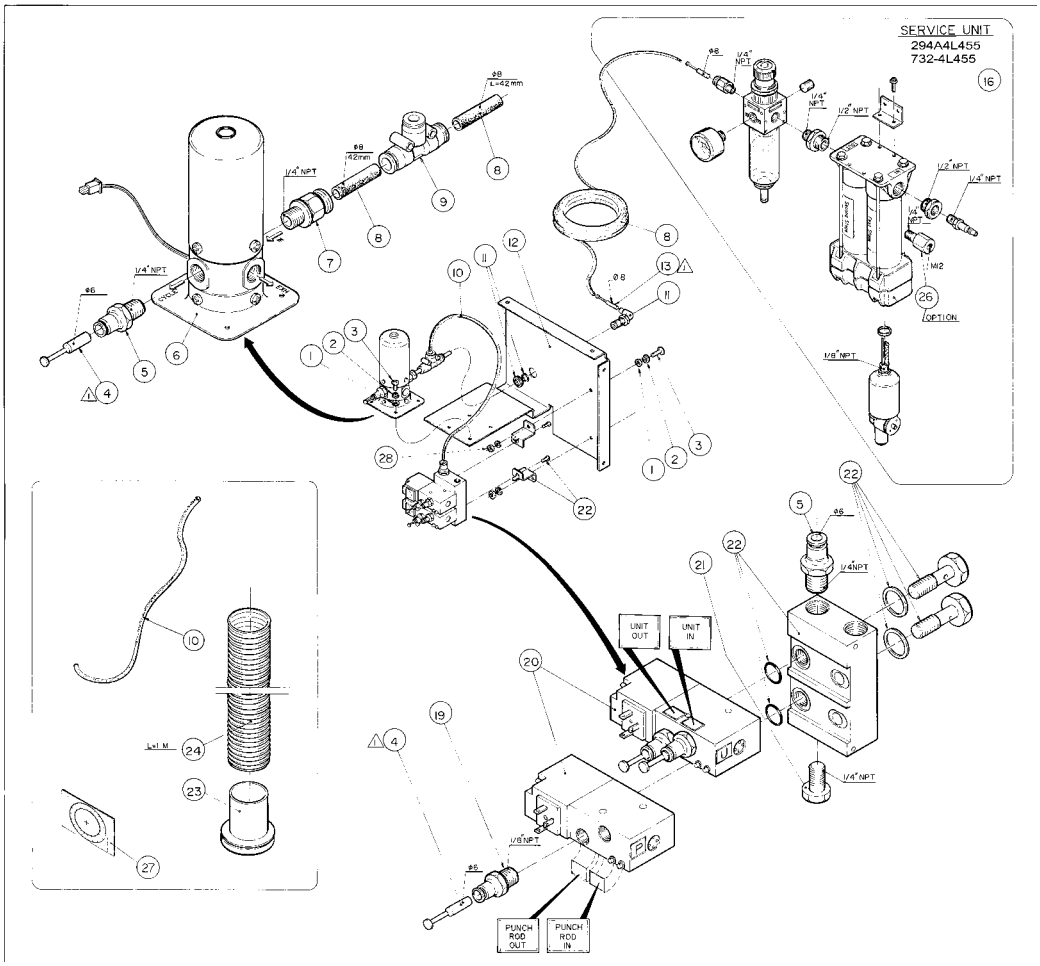


Figure 3-3. Dolev 800 Punch Pneumatic and Control System

4 TROUBLESHOOTING

4.1 Punch System Critical Malfunctions

The following table describes potential malfunctions of the Dolev 800 Punch System, as well as possible results or consequences to the Imagesetter.

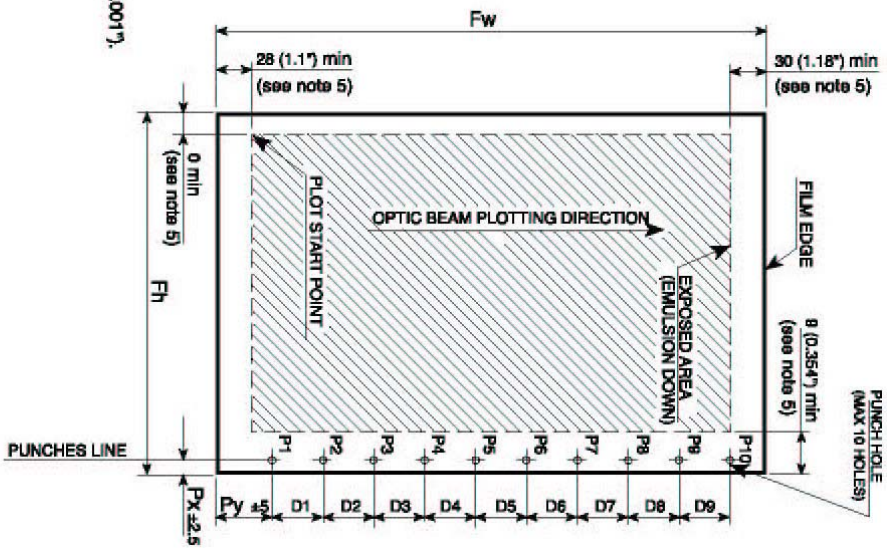
SITUATION/REASON	POSSIBLE DAMAGES TO THE IMAGESETTER
Compressed air flowing freely into the dark area. Reasons: 1) Air leakage 2) Slug Out "on" operation while punch rod is at its out position.	1) Optical devices contamination by oil drops contained in the air. 2) Clean sliding surfaces will become oiled, altering their mechanical movement characteristics. 3) Surfaces touching the film will be oiled, transferring the oil to the film and to other film handling devices.
Punch assembly is moving before the punch rod is entirely withdrawn to its out position.	1) Film crash. 2) Poor punch hole quality. 3) Film emulsion fragments might contaminate optical lenses and sliding surfaces.
Film slug collecting hose is full or disconnected.	A massive flood of slugs in the dark area. May cause severe damage to all optomechanical devices.
Air pressure below 6 atmospheres (85 psi).	1) Punch system will work improperly, causing error messages such as "punch unit stuck." This prevents the Imagesetter from plotting. 2) During a plot, punch units must be at their out home position, otherwise, a collision may occur between the optical carriage and one of the punches, or the Imagesetter may not perform the plot. 3) Film slugs may not be evacuated from the punch assembly. Cleaning of a blocked punch may require a service call.
Film slugs are locked in the punch assembly.	Poor punch hole quality, if at all.
Air pressure above 8 atmospheres (112 psi).	1) Punch assembly motion may be to quick, causing accelerated wear of the calibrated mounting surfaces, and spoiling the overall punch system accuracy and repeatability. 2) Plastic fittings may explode. Note that these

SITUATION/REASON	POSSIBLE DAMAGES TO THE IMAGESETTER
	fittings are the weakest link in the pneumatic system.
Air tube or electrical cable is incorrectly routed and is stuck in the dynamic optic assembly when the optical carriage is near to its end position.	1) Severe damage to the dynamic optics, lead screw, or stepper motor. 2) Air leakage. 3) Electrical low-voltage short.
First punch assembly (P1) with unchamfered head ("Bimba") which is less than 67 mm from the film edge.	1) Severe damage to the dynamic optics, lead screw, or stepper motor. 2) Image distortion in the last 15 mm of plot.

A APPENDIX A – Dolev 800P Punched Film Layout Form

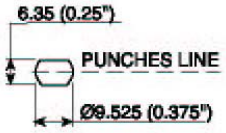
LAYOUT TABLE

NAME	MEANING	MIN VALUE	CUSTOMER'S VALUE	MAX VALUE
Fw	Film width	450 (17.7")		1180 (46.45"
Fh	Film height	254 (10")		883 (34")
Px	Hor. distance from film edge to punching line	6 (0.236")		18 (0.83") see note 11
Py	Vert. distance from film edge to hole P1	50 (1.97") see notes 4,11		–
D1	Distance from hole P1 to hole P2	94 (3.7") see notes 6,7 and 8		–
D2	Distance from P2 to P3			
D3	Distance from P3 to P4			
D4	Distance from P4 to P5			
D5	Distance from P5 to P6			
D6	Distance from P6 to P7			
D7	Distance from P7 to P8			
D8	Distance from P8 to P9			
D9	Distance from P9 to P10			
–	Negative/Positive Image	–		–



Notes:

1. Be sure to fill table according to film emulsion side.
2. Maximum deviation from punches line for each hole is 0.01mm (0.0004").
3. The parallelism of punches line to the image is within 0.25mm (0.01").
4. The repeatability of plot start point relative to punch holes is within 0.03mm (0.001").
5. These dimensions are user controlled.
6. Distance can be reduced to 60mm (2.36") by using mirrored units. Use the DOLEV 800P punch ruler to verify punch system validity.
7. Ignore excessive holes.
8. Tolerance for D1 - D9 is ±0.2 (0.008"), not accumulative.
9. Specify units of length you use (mm are prefered).
10. Dimensions are in mm (inch). 11. For holes bigger than ϕ9.5 (3/8"), Px max = 13 (1/2"), Py min = 55 (2.2").

HOLE SHAPE	TO BE USED IN HOLES
	P1 P2 P3 P4 P5 P6 P7 P8 P9 P10
	P1 P2 P3 P4 P5 P6 P7 P8 P9 P10

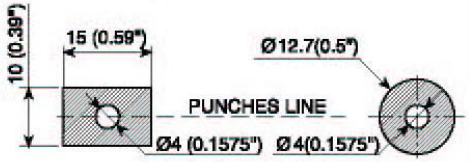
Notes:

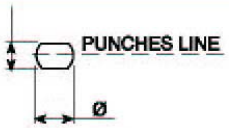
1. Hole tolerance is ±0.01 mm (0.0004").
2. When selecting non-circular hole shape, ensure that the orientation angle of the hole relative to the punches line meets the customer's standard.
3. Specify units of length you use (mm are prefered).
4. Dimensions are in mm (inch).

OTHER SHAPES

Specify dimensions in the appropiate figure.

Punch hole contour must lay inside one of the hatched areas.



HOLE SHAPE	TO BE USED IN HOLES
	P1 P2 P3 P4 P5 P6 P7 P8 P9 P10
	P1 P2 P3 P4 P5 P6 P7 P8 P9 P10
	P1 P2 P3 P4 P5 P6 P7 P8 P9 P10
	P1 P2 P3 P4 P5 P6 P7 P8 P9 P10