Manual of
Operation and Maintenance
for
Model ZLR Folder-Gluer

S&S

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PREFACE

This manual is designed for use by operating and maintenance personnel.

An exact separation of work for operating and maintenance personnel cannot be defined in detail. In some installations, all operation and maintenance is performed by the same individual. In others, these functions may be separated. Therefore, when using this manual it will be necessary for operating personnel to use specific portions of the maintenance sections to accomplish their work. In other instances, maintenance personnel may find it necessary to use portions of the operation sections.

The following terms are used throughout this manual:

Note

A procedure that is highlighted or calls attention to methods which make the job easier.

CAUTION

Operating procedures and methods, which if not strictly observed, will result in damage to or destruction of equipment.

WARNING

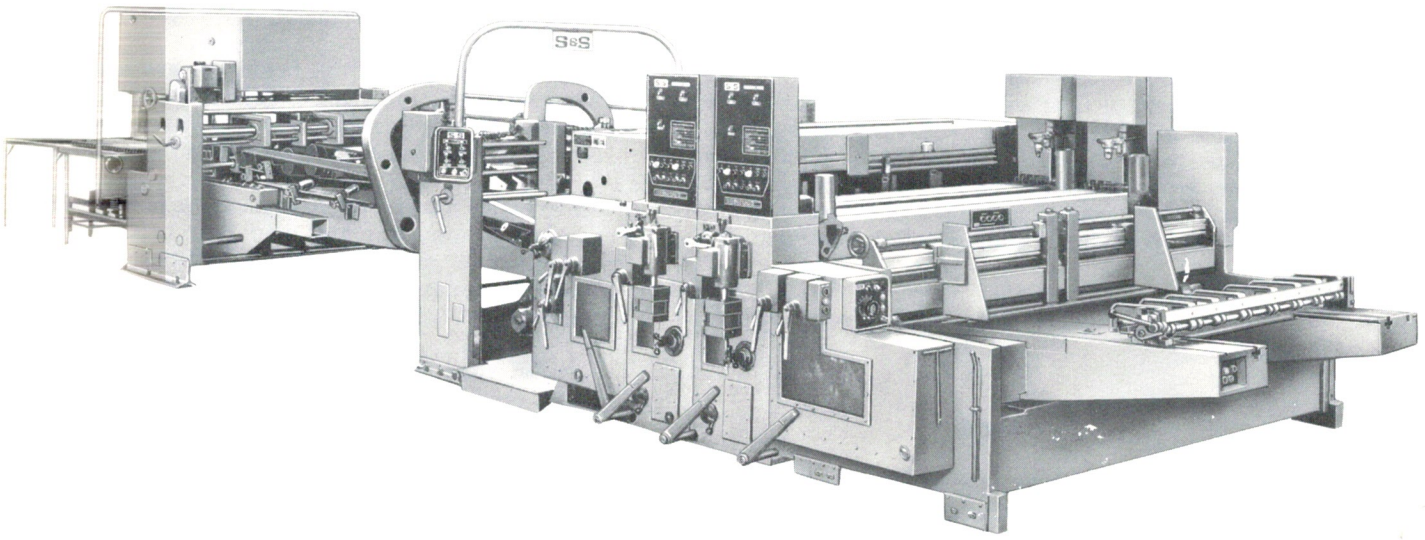
Calls attention to methods, procedures or limits which must be followed precisely to avoid injury to personnel.

All control and switch positions are capitalized throughout this manual. Numbers appearing in parenthesis and accompanied by figure numbers refer to items called out on the specific figure.

Many purchasers order various special controls and components, for the machine, to meet their production or environmental conditions. The procedures for operation and maintenance of these controls and components are covered in this manual.

Should your machine not incorporate such "specials", omit the procedural steps in the instructions pertaining to them. Where a procedure may be accomplished in more than one manner, depending upon the controls and components installed on the machine, both procedures are presented in detail.

Design characteristics of all machines are, for the most part, similar. The photographs in this manual depict a standard machine and not necessarily any one at a particular installation. Sufficient detail is presented to facilitate location of controls and components and for operation and maintenance of the machine.



Model ZLR Folder-Gluer

SECTION I
INTRODUCTION

A. GENERAL

The Model ZLR Folder-Gluer is manufactured by the S&S Corrugated Paper Machinery Co., Inc.

The folder-gluer produces completely finished boxes from sheets directly off the corrugator.

Standard operations performed by the folder-gluer are: feeding, inside lap-gluing, folding, squaring, stacking, and delivery of corrugated boxes in uniform, accurately counted piles ready for tying and shipping. All operations are performed in a fixed sequence.

In addition to the standard operations, the folder-gluer can be equipped to perform printing in one or more colors, creasing and slotting, die-cutting, outside lap-gluing, and taping.

B. SPECIFICATIONS AND CAPACITIES

Blank Sizes: (inches (mm))	
Maximum (direction of paper travel)	50 (1270)
Minimum (direction of paper travel)	12 (305)
Maximum (across width of machine, allowing 1-1/2 inch (38mm) glue lap and 1/4 inch (6mm) trim)	111-3/4 (2838)
Minimum (across width of machine, allowing 1-1/4 inch (32mm) glue lap and no trim)	22-1/4 (565)
Maximum (trays)	50 x 70 (1270 x 1778)
Panel Sizes: (inches (mm))	
Maximum (inside or outside glue lap)	35 x 20 x 35 x 20 (889 x 508 x 889 x 508)
Minimum (inside glue lap)	7 x 3-1/2 (178 x 89)
Minimum (outside glue lap)	7 x 7 (178 x 178)
Maximum Machine Speed	250 boxes per minute 15, 000 boxes per hour
Printing Width (inches (mm))	108 (2743)
Horsepower Requirements:	
Machine without slotter	20
Machine with slotter and creaser	40
Machine with slotter, two flexographic printers and diecutting	60

C. INSTALLATION

CAUTION

Do not attempt installation without the supervision of S&S personnel. The installation of the machine is highly complex.

Figure 1-1 shows the floor space necessary for the installation of the machine and should be used for planning purposes only.

D. FUNCTIONING

The machine begins operating when the start button is pressed. The pile of blanks in the sheet hopper is lowered and the kicker engages the trailing edge of the bottom sheet in the pile.

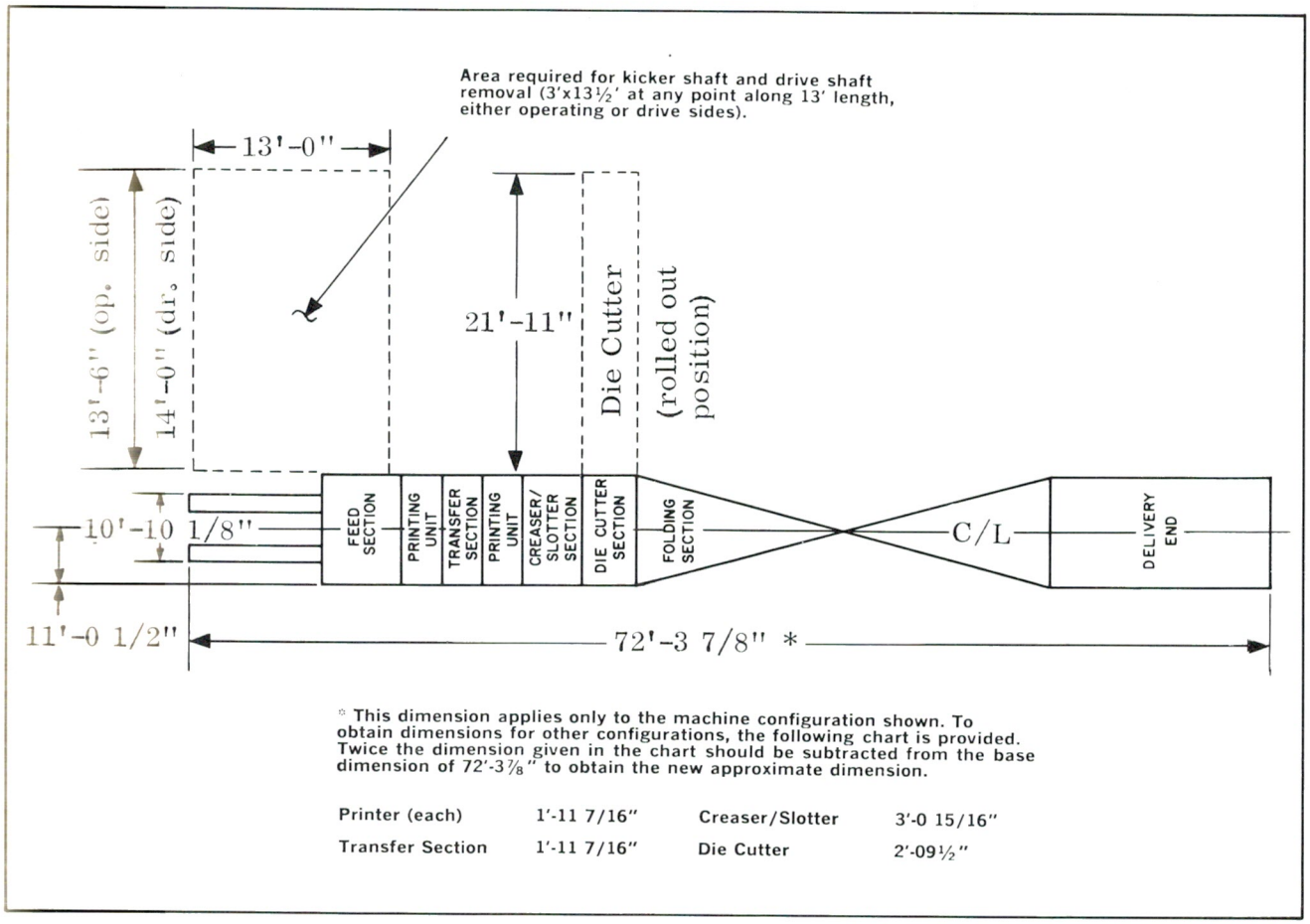


Figure 1-1. Floor Plan

The blank is fed into the nip of the feed rolls and into the first printing unit. The sheet advances through the printing unit, the transfer section (if installed), the second printing unit and then into the creasing and slotting section.

A primary crease is made in the sheet by a Harrison-type creasing wheel running against a plastic insert in the lower creasing wheel. A secondary creasing wheel with V-type profile imparts the desired sharp finish crease.

During the creasing operation, lap crushers, installed on the creaser shafts, crush the portion of the body panel that will mate with the glue lap and crush the glue lap itself.

The sheet then advances into the slotting shafts where it is accurately slotted, trimmed to exact length and the glue lap formed.

All slotting scrap drops onto a conveyor and is transported to the main scrap removal system.

The blank then advances through the die-cutting section and into the folding section.

As it enters the folding section, adhesive is applied to the glue lap. Up folding is performed by the upper folding belt while the sheet is carried forward by a lower belt and pressure rolls. The glue lap is visible at all times.

After the fold is completed, the box is engaged by the gauging rolls, which adjust the gap if it is too wide, and the spring-loaded forming rolls engage the top and bottom surfaces of the folded edges.

After leaving the folding section, the box enters the delivery end receiving hopper. The edges are engaged by spiral lift screws. The first flight of the screws raises the trailing edge of each box quickly to clear the leading edge of the next box entering the receiving hopper.

A cam-actuated roller lifts the center of the trailing edge of the box out of the path of the next box being underfed. As the pile continues to build, spiral lift screws keep the boxes separated from each other to allow for squaring by the reciprocating slapper bar that strikes the trailing edge of the box. Pressure is maintained on the glued lap by a short holddown for bonding.

As the pile builds, it is supported at the leading edge by a motor-driven shaft which runs the full width of the receiving hopper. The shaft accelerates the upward movement of the leading edge of the upper boxes of the pile to ensure that sufficient space is available to accommodate oncoming boxes.

Pile squareness is maintained by the leading edge stop, the short holddown, the action of the slapper bar and by the side guides which also prevent the folded boxes from contacting the lift screw shafts. The uniform pile enables inspection of complete stacks of boxes at one time. It allows for immediate mass comparison of boxes for gap, and slot depth.

Cycling arms push a predetermined number of boxes from the top of the hopper stack. The next pile builds as the pusher arms cycle for the next pushoff. The pushers are driven through an electric clutch that will slip if a jam occurs during the cycle. Rubber brake wheels apply pressure to the blank at the wheel centerline, preventing the top box in the next stack from being carried along, by friction, with the pile being pushed off.

Continuous pressure is applied to the glued lap by a holddown as the pile is pushed onto the telescoping conveyor to a gravity conveyor for bundling or palletizing for shipment.

E. SETUP

Typical flexographic folder-gluer setup operations are performed in various separate activities.

All crew members work simultaneously to set up the machine. In performing a series of independent functions as one machine, and requiring more than one operator, team work is of utmost importance. To become a truly successful operation, crew members must act as a team, they must work together and finally act as one.

Review the jobs that will be run on the machine and the printing plates that will be used. Repair or replace those which are in poor condition to ensure a good start when the machine is placed in operation.

Avoid frequent color changes and caliperchanges. Bunch orders according to color, caliper and size in that order. For maximum productivity start the day with light colors, such as yellow, in the first printing unit, blue in the second. Run all yellow or blue one color jobs of the same caliper first, going up or down in size, then run all yellow and blue two color jobs of the same caliper, all sizes. Change caliper and repeat the procedure until all jobs calling for yellow and/or blue are finished. Next change the yellow to red or the blue to black and run all sizes of one color, black or red, of the same caliper setting. Run two color yellow and black or red and blue etc. etc.

When long stretches of one color work is on the schedule for the machine, use the second printer. In this way only one set of pull collars have to be adjusted.

Even the most efficient plant will develop situations that require disruption of planned work, but every effort should be made to adhere to a prepared schedule in order to achieve maximum productivity.

Refer to the appropriate sections of this manual for detailed setup procedures for specific machine components.

SECTION II
OPENING AND CLOSING MACHINE SECTIONS

A. GENERAL

The machine is of the roll-open type. The feed section of the machine houses the electric motor that performs the work during the opening procedure. The feed section is the only section that is power driven. To open or close any section of the machine other than the feed section, requires that the section or sections to be opened be locked to the feed section. When closing the machine, the feed end will push all sections ahead of it. When the section is opened to a position appropriate for setup or maintenance, the unit can be unlocked from the feed section.

B. CONTROLS

1. SECTION LOCK LEVERS.

Each movable section of the machine incorporates a LOCK LEVER (4, 5, 6, Fig. 2-1) to permit it to be disengaged and moved away from the rest of the machine for access to the section for setup, maintenance and cleaning. The LOCK LEVERS are located at the lower end of the operating side frames.

2. OPENING AND CLOSING PANEL.

The panel (1, Fig. 2-2) is located on the operating side frame of the feed section. The panel houses OPEN (2, Fig. 2-2) JOG OPEN (3, Fig. 2-2) and CLOSE (4, Fig. 2-2) pushbuttons which are used for opening and closing the machine.

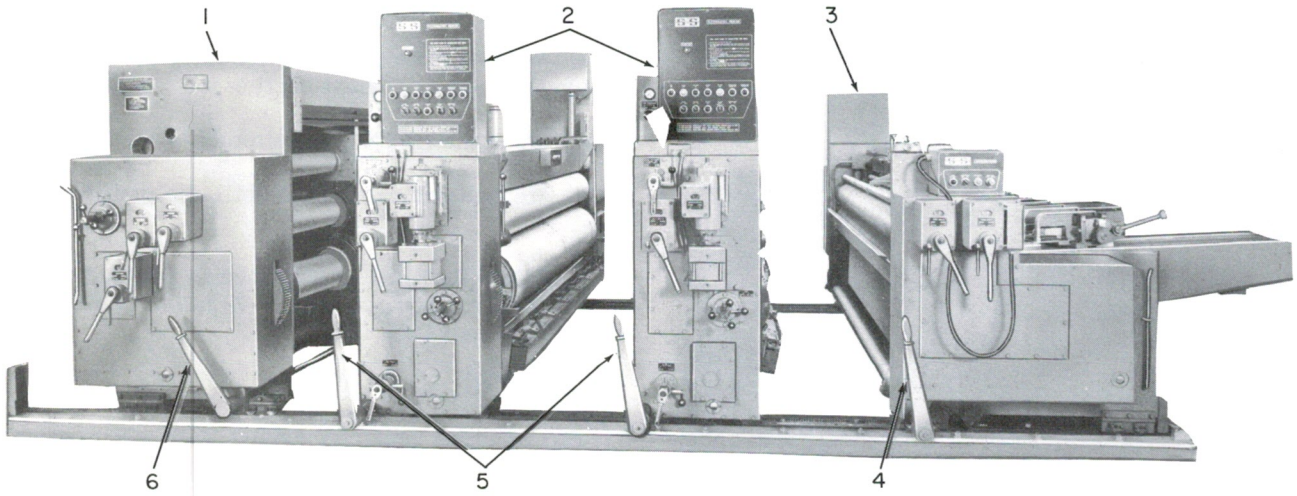
3. ELECTRICAL SAFETY LOCK.

The key-type lock (8, Fig. 2-2) is located on the electrical panel on the feed section operating side. It has two positions, SAFE and READY. The READY position is used when opening or closing the machine. The SAFE position is used whenever the machine is open to prevent accidental closing of the machine sections.

C. OPENING

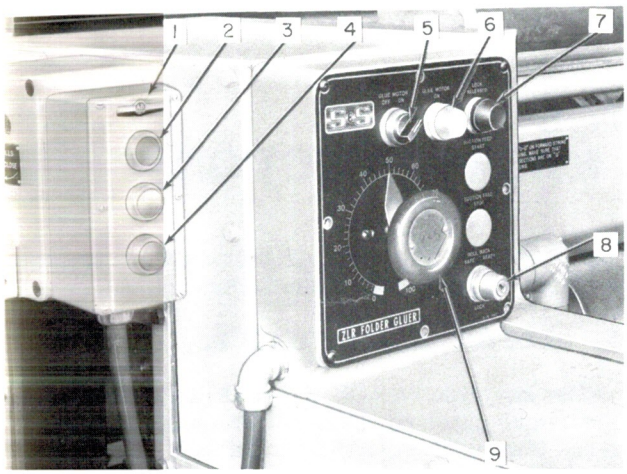
Note

DO NOT OPEN MACHINE UNTIL ZERO MARKS ARE ALIGNED. To align the zero indicators on the feed end of the machine, use the JOG button to move the kicker carriage zero mark in alignment with the zero mark on the feed table on the forward stroke of the carriage. When the zero indicators on the feed end are aligned, the timing wheel zero indicator at the delivery end operating side will be in alignment with the frame pointer.



1. Creaser/Slotter Section
2. Printing Units
3. Feed Section
4. Feed Section Lock Lever
5. Printing Unit Lock Lever
6. Creaser/Slotter Lock Lever

Figure 2-1. Movable Sections and Locks



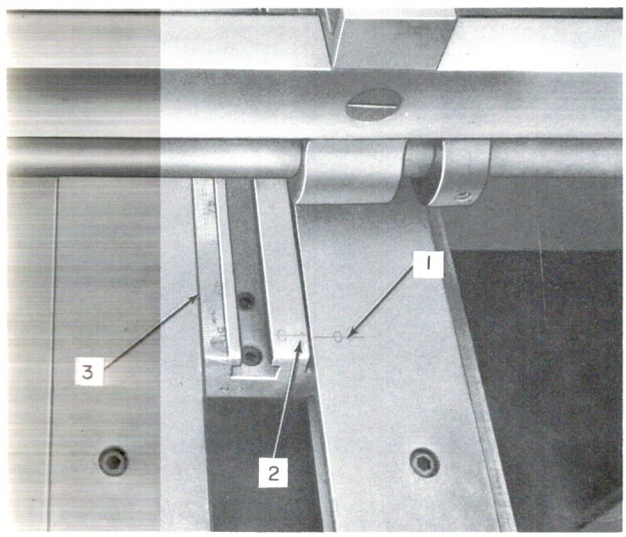
1. Open/Close Panel
2. Open Button
3. Jog Open Button
4. Close Button
5. Glue Idler Motor Selector Switch
6. Glue Motor Light
7. Lock Lamp
8. Electrical Safety Lock
9. Speed Control Rheostat

Figure 2-2. Feed End Electrical Panels

To open one section of the machine, proceed as follows:

1. Make sure that the zero mark on the kicker carriage (2, Fig. 2-3) is aligned with the zero mark on the feed table (1, Fig. 2-3) on its forward stroke.

2. Unlock the section to be moved by turning the LOCK LEVER (Figure 2-1) of that section counterclockwise.



1. Table Zero Index
2. Carriage Zero Index
3. Scale

Figure 2-3. Kicker Table and Carriage Zero Alignment

3. Press the OPEN pushbutton (2, Fig. 2-2) on the electrical panel.

4. When the moving section comes to a halt, place the SAFETY LOCK (8, Fig. 2-2) in the SAFE position and remove the key to prevent accidental closing.

Note

If the OPEN pushbutton is momentarily depressed, the feed end, or any section locked to it, will move two feet (610 mm) away from the stationary section of the machine and stop automatically. This predetermined distance of travel is controlled by a timer. Should it become necessary to stop movement at any time during this two foot travel, the JOG OPEN button may be depressed and then released.

If the JOG OPEN pushbutton is used for opening the sections, the sections will travel until the button is released or the feed end hits a limit switch or physical stop. The roll back creaser/slotter is an exception. This section will only travel two feet. It is equipped with a safety override switch and a physical stop which prevents further travel so that the telescoping shafts, on the drive side of the machine, do not become disengaged.

5. To open the machine at more than one section, proceed as follows:

a. Make sure that the zero mark (2, Fig. 2-3) on the kicker carriage is aligned with the zero mark (1, Fig. 2-3) on the feed table on its forward stroke.

b. Release the LOCK LEVER (Figure 2-1) on the section furthest from the feed end, that is to be rolled back.

c. Push the OPEN pushbutton (2, Fig. 2-2).

d. When the moving sections come to a halt, release the lock of the next section from the feed end.

e. Push the OPEN pushbutton (2, Fig. 2-2).

f. Repeat the procedure until the sections are opened.

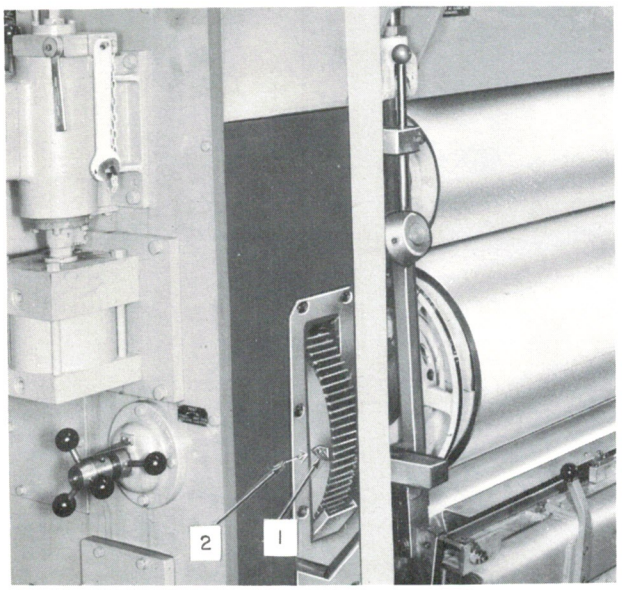
g. When the opening sequence is finished, place the SAFETY LOCK (8, Fig. 2-2) in the SAFE position and remove the key.

D. CLOSING

The machine must be closed with all sections zeroed so that sheets will be in register for subsequent operations such as printing, creasing, slotting and delivery.

The delivery end zero cannot change during a setup. The feed end zero should not change during a setup, unless it is purposely turned over by hand. The slotter section is brought to the zero position after setting the blades. (Refer to Section V.)

The printing units are also equipped with zero indicators. Ensure that after installing printing plates or proof printing, that the print cylinder (clutch engaged) is turned until the indicator on the exposed gear (1, Fig. 2-4) aligns with the frame mark (2, Fig. 2-4).



1. Gear Index 2. Frame Index

Figure 2-4. Timing Markers

This must be done to insure that the gears between units mesh properly upon closing and that the printing plates will print in the proper location on the box blank.

To close the machine, proceed as follows:

WARNING

Prior to closing the machine, ensure that all areas between sections are free of personnel and foreign objects.

1. Place the SAFETY LOCK (8, Fig. 2-2) in the READY position.

2. Press and hold the CLOSE button (4, Fig. 2-2) on the electrical panel.

Note

The feed section will move toward the first printing unit and push it toward the stationary part of the machine.

3. Lock all sections together using the section LOCK LEVERS (Figure 2-1).

Note

The machine cannot be operated until all sections are locked.

4. Place the SAFETY LOCK (8, Fig. 2-2) in the SAFE position and remove the key.

SECTION III
FEED SECTION

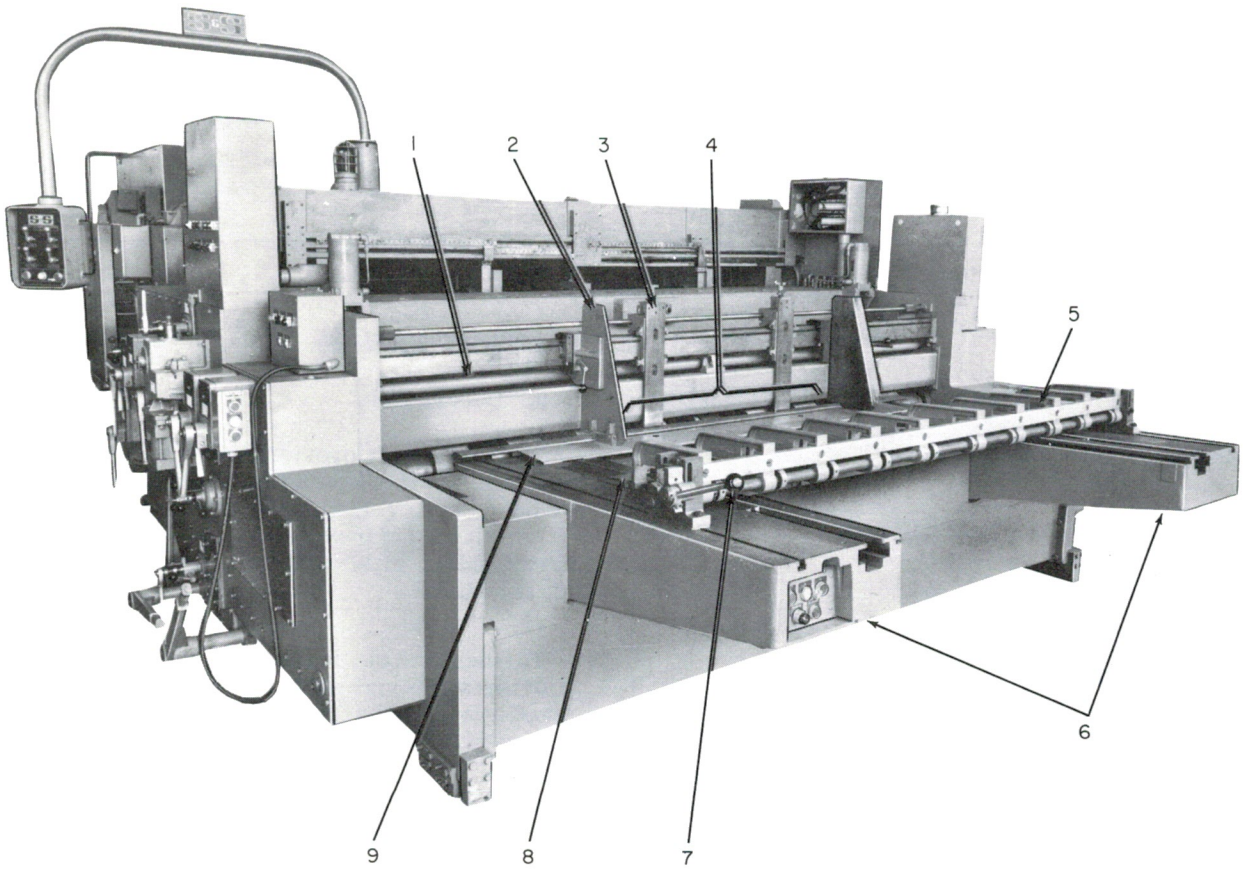
A. GENERAL

The feed section (Figure 3-1) is movable and mounted on rollers that run on a floor mounted track.

The feed section houses the feed tables (6, Fig. 3-1), the kicker (8, Fig. 3-1), the sheet hopper (4, Fig. 3-1), the sheet support (9, Fig. 3-1) and two pairs of feed rolls (Figure 3-2).

B. FUNCTIONING

Blanks are loaded into the sheet hopper (4, Fig. 3-1). The kicker engages the trailing edge of the bottom sheet in the pile and pushes it into the nip of the first set of feed rolls. The feed rolls provide a positive grip on the board and transfers it into the second set of feed rolls which, in turn, feeds the sheet into the next unit.



1. Feed Rolls
2. Side Gauge
3. Front Gauge
4. Sheet Hopper
5. Rear Gauge
6. Feed Tables
7. Pile Feed Interruptor
8. Kicker
9. Sheet Support

Figure 3-1. Feed Section

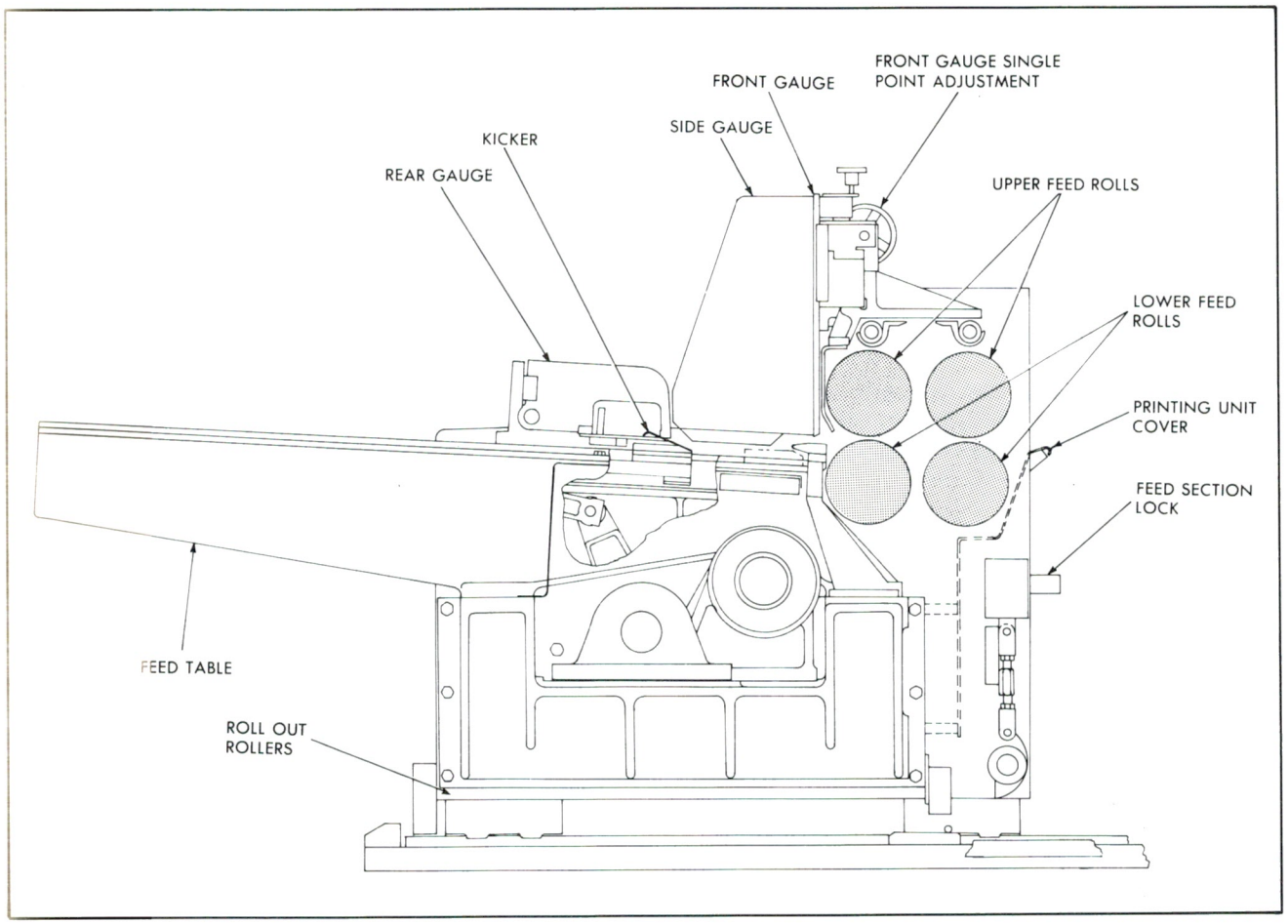


Figure 3-2. Feed Section Cross-Section

C. LUBRICATION

Refer to Figures 3-3 and 3-4 for the frequency, method and points of lubrication on the feed section of the machine.

D. FEED SECTION COMPONENTS

1. FEED TABLES.

a. Description.

Two feed tables (Figure 3-5) are mounted on the feed section of the machine and provide a means of supporting the pile of blanks in the sheet hopper. Each table has two longitudinal slots. The outboard slots (2, Fig. 3-5) are used to support the rear gauge, the inboard slots (1, Fig. 3-5) support the kicker carriages. Each carriage is equipped with a scale which is used to make setups for the sheet length to be run.

b. Controls.

A recessed electrical panel (3, Fig. 3-5) is mounted on the operating side feed table front face. The panel has pushbuttons for starting, jogging, and stopping the main drive.

2. SPRING KICKERS.

a. Description.

The machine is provided with two types of spring kickers. The kickers are interchangeable. The standard kicker (Figure 3-6) is used for short sheets (less than 21-1/2 inches). It employs a conventional arrangement with spring kickers mounted on an aluminum bar.

To improve the feeding of warped board and to provide additional sheet support when feeding long sheets, a Kontour-Kicker (Figure 3-7) is also furnished with the machine. This kicker has individual plates which are hinged and free to follow the feeding arc of the warped sheet. The Kontour-Kicker cannot be used on sheets shorter than 21-1/2 inches.

b. Setup.

Note

Perform the procedure in paragraph c. prior to the following, if it is necessary to switch kickers.

(1) Loosen the kicker plate attaching screws (1, Fig. 3-6).

(2) If using the standard kicker, set the kicker plate so the FRONT of the plate aligns with the dimension on the kicker carriage scale (3, Fig. 2-3) corresponding to the sheet length to be run.

Note

When running blank sizes from 12 to 13-1/8 inches long, set the standard kicker at 13-1/8 inches. This is done to avoid jamming the kicker into the nose bar.

(3) If the warped sheet kicker is to be used on the machine, set the kicker so that the REAR of the kicker lines up with the dimension on the kicker carriage scale (3, Fig. 2-3) corresponding to the sheet length to be run.

Note

The warped sheet kicker cannot be used on blanks with a body depth less than 21-1/2 inches.

(4) After setting the kicker, check the setting with a sample blank. Make any fine adjustments that are needed.

(5) Tighten the kicker plate attaching screws.

c. Interchanging Kickers.

Note

Perform the following procedure only if it is desired to switch kickers.

(1) Remove the kicker plate socket head screws (3, Fig. 3-8) on the operating and drive sides of the plate.

(2) If changing from the standard or flat sheet kicker to the warped sheet kicker, loosen four kicker support locking screws (1, Fig. 3-8) and slide the support (2, Fig. 3-8) forward. Lock the support in position with the locking screws.

(3) Install the warped sheet or Kontour-Kicker plate and secure it with the attaching screws.

EXPLANATION OF SYMBOLS

Symbol	Meaning
	Lubricant is applied by means of the implement depicted within the circular area.
daily weekly  monthly annually	The terms appearing above or below the circular area indicate the frequency of lubrication for the component. The terms are based on a single operating shift of eight hours of machine operation or 40 hours of machine operation per week.
4 	The number appearing on the left of the circular area indicates the item number of the component appearing in the legend that accompanies each figure.
 3	The number appearing on the right of the circular area indicates the lubricant necessary as specified in the table of lubricants appearing with each figure.

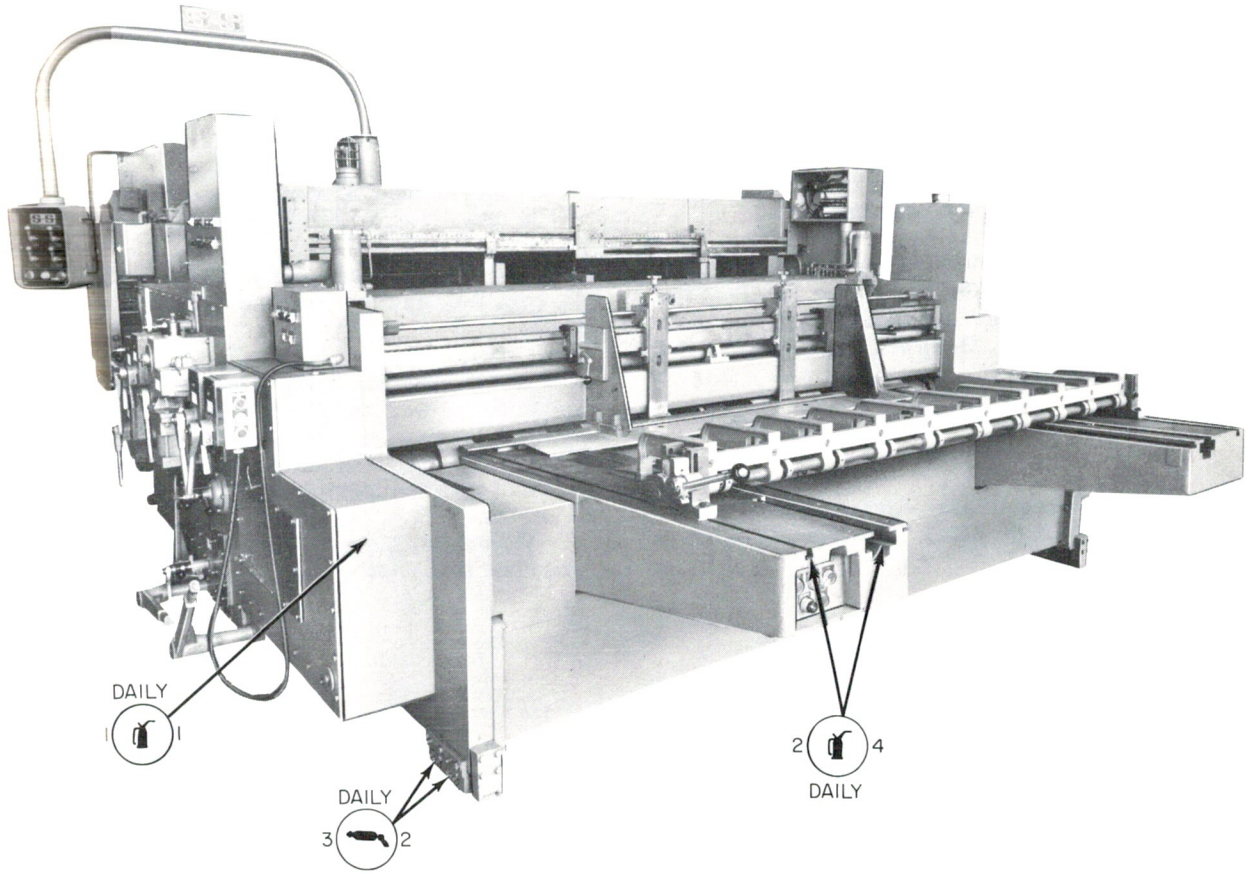
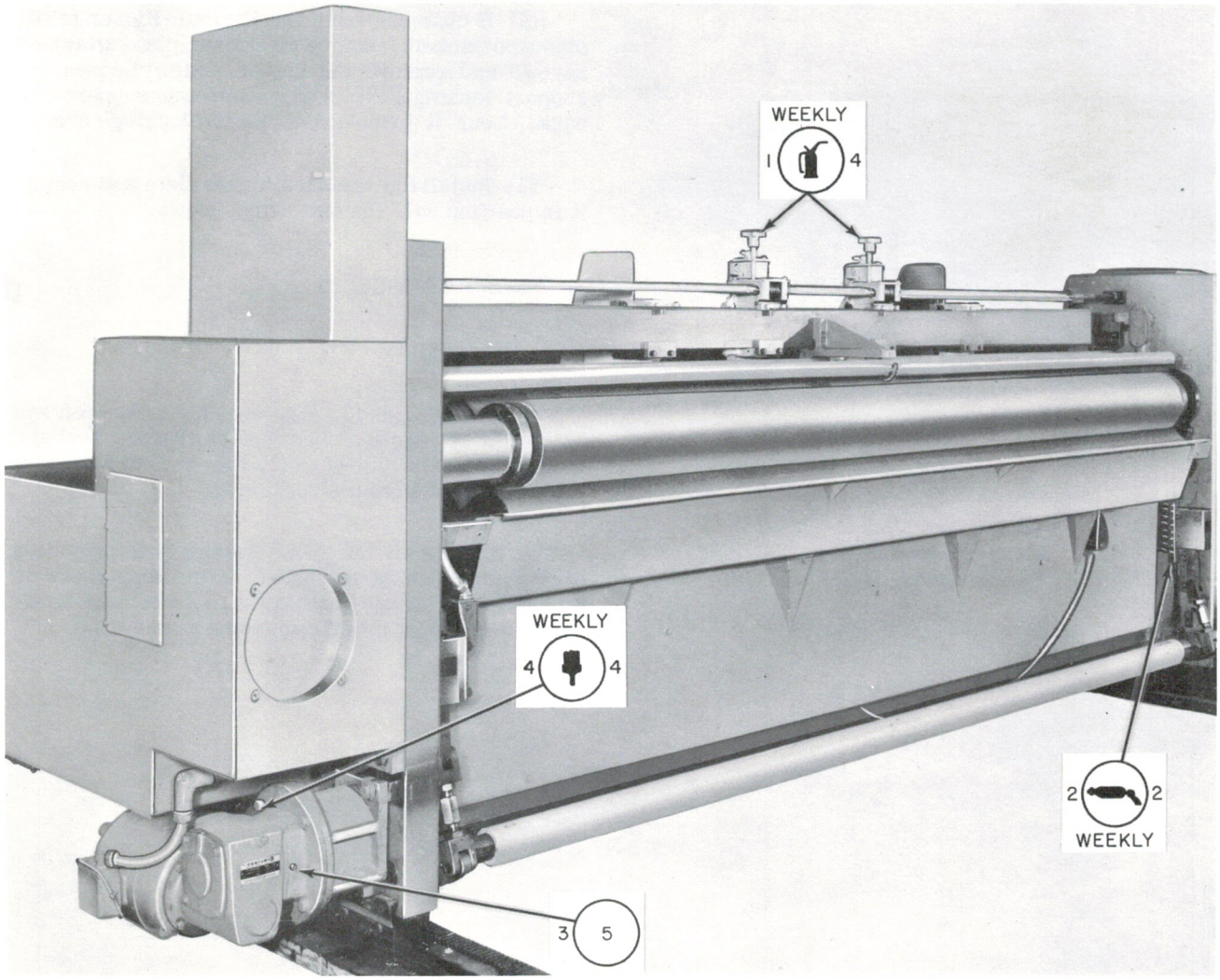


TABLE OF LUBRICANTS

Symbol	Classification	Description of Lubricant
1	AGMA NO. 3	AGMA SPEC. #252. Highly refined mineral gear oil; non-foaming, non-corrosive, non-separating. Viscosity index 60 or greater.
2	NLGI NO. 2	Lithium soap grease.
3	MOLYKOTE BR-2	Molybdenum disulfide grease.
4	AGMA NO. 1	Light oil per AGMA SPEC. #252 (described above).
5	PER MANUFACTURER'S RECOM-MENDATIONS	

Item No.	Description
1	Gear case (operating and drive sides)
2	Kicker slides (operating and drive sides)
3	Roller assemblies (operating and drive sides)

Figure 3-3. Feed Section Lubrication, Front View



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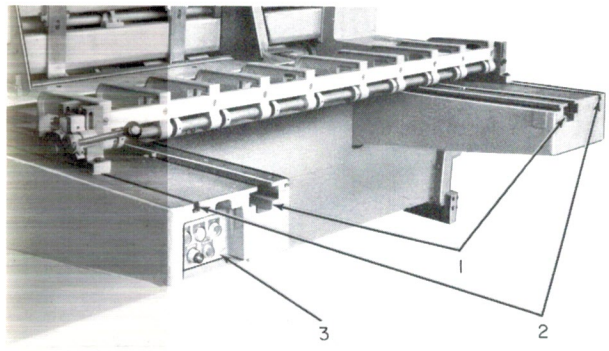
4	AGMA NO. 1	Light oil per AGMA SPEC #252 (described above).
5	PER MANUFACTURER'S RECOMMENDATIONS	

Item No.	Description
1	Front gauges (operating and drive sides)
2	Manifolds (operating and drive sides)
3	Roll out motor
4	Chain (clean, lubricate and tension check)

Figure 3-4. Feed Section Lubrication, Rear View



1. Inboard Slots
2. Outboard Slots
3. Electrical Panel

Figure 3-5. Feed Tables

(4) If changing from the Kontour-Kicker to the standard kicker, remove the kicker plate attaching screws and remove the kicker plate. Loosen the support locking screws and slide the support bar back. Lock it in position with the locking screws.

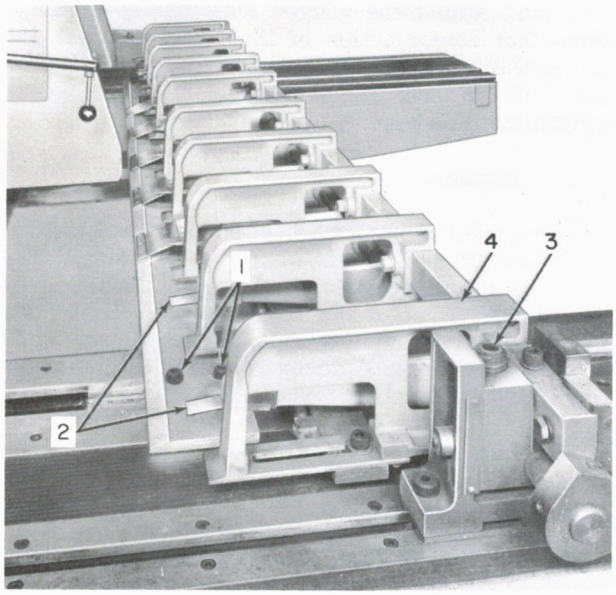
(5) Install the standard kicker plate and secure it in position with the attaching screws.

3. FRONT GAUGES.

a. Description.

The front gauges (3, Fig. 3-1) form the feed end of the sheet hopper. The gauges (Figure 3-9) are mounted on cam followers (1, Fig. 3-9) to facilitate their movement from side to side.

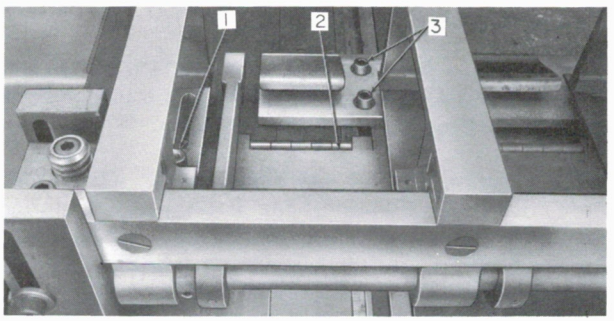
The purpose of the front gauges is to provide a wall against which the sheets in the hopper can be stacked squarely and they also serve to prevent feeding of two blanks into the machine at one time.



1. Locking Screws
2. Ledges
3. Up/Down Adjustment
4. Rear Gauge

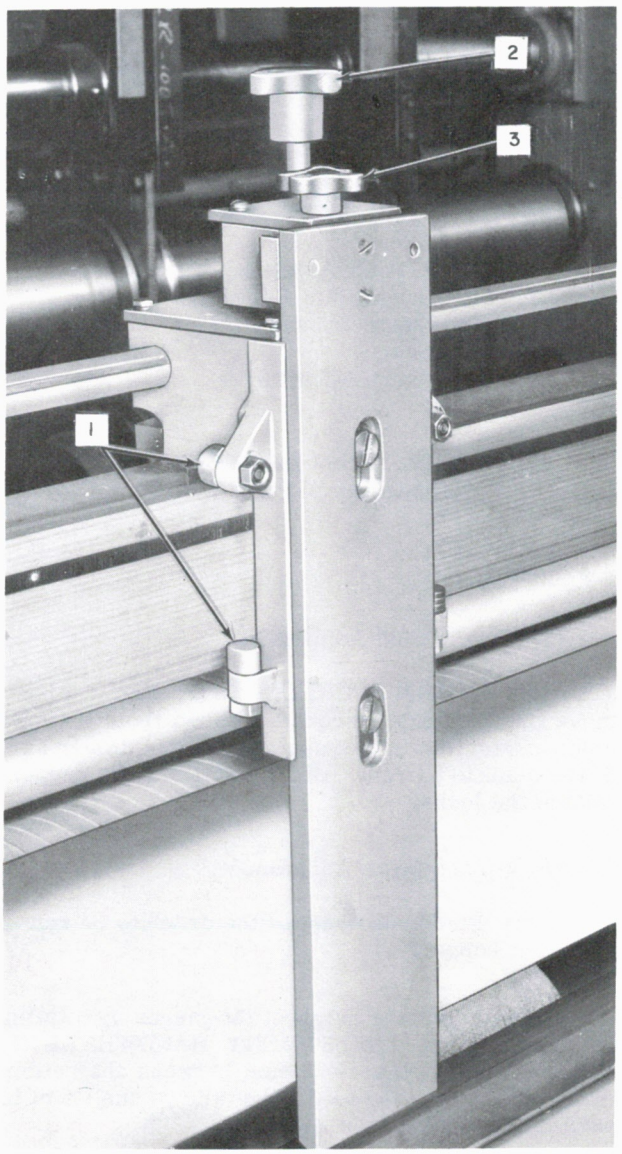
Figure 3-6. Standard Spring Kicker and Rear Gauge

Figure 3-7. Kontour-Kicker



1. Kicker Support Locking Screws
2. Support
3. Kicker Plate Socket Head Screws

Figure 3-8. Interchanging Kickers



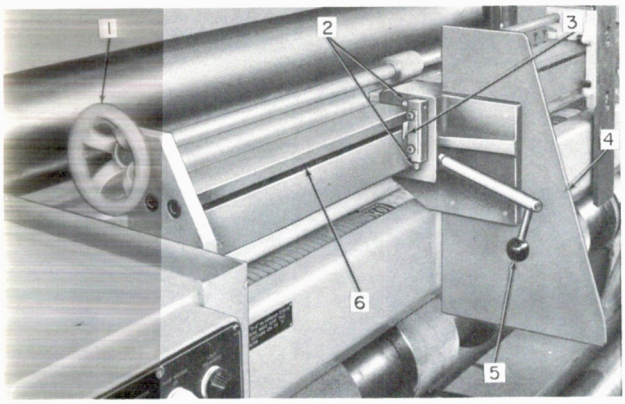
1. Cam Followers 2. Lateral Lock
3. Vertical Adjustment

Figure 3-9. Front Gauge

b. Controls.

Each gauge is equipped with a LATERAL LOCK (2, Fig. 3-9) to hold it in position after the gauge has been set for the blank to be run.

Each gauge has an individual VERTICAL ADJUSTMENT (3, Fig. 3-9) for raising or lowering the gauge to suit special conditions. In addition, the front gauge assembly is equipped with an up and down SINGLE POINT ADJUSTMENT (1, Fig. 3-10) for caliper settings.



1. Single-Point Adjustment Handwheel
2. Side Gauge Cam Followers
3. Side Gauge Pointer
4. Side Gauge
5. Side Gauge Lock Lever
6. Scale

Figure 3-10. Front Gauge Single-Point Adjustment and Side Gauge

c. Setup.

(1) Side to Side Adjustment.

Loosen the ADJUSTING LOCKS (2, Fig. 3-9) and move the front gauges equally distant from the machine centerline and spaced within the dimensions of the blank to be run. After positioning the gauges, tighten the locks.

(2) Up and Down Adjustment.

(a) Place one sheet of the order to be run in the sheet hopper.

(b) Adjust the height of the gauges by rotating the single point ADJUSTMENT HANDWHEEL (1, Fig. 3-10) until the clearance between the bottom of the gauges and the feed ledge allows one sheet to pass freely beneath the gauges.

(c) Place a second sheet on top of the first, to ensure that it does not pass under the front gauges.

(d) Adjust the gauges individually if it appears that conformation of the sheet against the gauges warrants one gauge higher than the other or move one or both gauges to a more advantageous position on the sheet.

d. Operation.

During operation, the sheet hopper must continuously be filled with sheets for processing. The height of the pile in the sheet hopper should never exceed the height of the front gauges. If the pile height exceeds the height of the front gauges, hesitation in feeding will occur resulting in mistiming of the flow of the sheet through the machine.

4. SIDE GAUGES.

a. Description.

The side gauges (4, Fig. 3-10) form the sides of the sheet hopper. The gauges are mounted on cam followers (2, Fig. 3-10) to facilitate their movement from side to side. A scale (6, Fig. 3-10) on the feed section brace is provided to allow for proper alignment of the gauges for the width of board to be run. The purpose of the side gauges is to provide a means of placing the board to be processed on the centerline of the machine.

b. Controls.

Each gauge is equipped with a LOCK LEVER (5, Fig. 3-10) to hold it in position after setting.

c. Setup.

(1) Loosen the SIDE GAUGE LOCKS (5, Fig. 3-10).

(2) Move the operating side gauge (4, Fig. 3-10) to a point one-half the width of the sheet plus the glue lap. Read the dimension on the cross brace scale (6, Fig. 3-10).

(3) Move the drive side gauge to a point one-half the width of the sheet plus 1/8 inch clearance. If sheets have been cut correctly at the corrugator, this will allow a minimum of 1/4 inch trim.

(4) Keep the sheets tight against the operating side gauge. If sheets are short (no trim allowance), it may be possible to run with a shorter glue lap. Less than 1/4 inch trim may not cut.

Note

Blanks that are to be trimmed should be gauged against the operating side gauge. Blanks that are short, irregular in width or pretrimmed, should be gauged against the drive side gauge. In this way, any shortness in blank size will be taken on the glue lap and not on the box size.

(5) Lock the gauges in position using the SIDE GAUGE LOCKS (5, Fig. 3-10).

5. REAR GAUGE ASSEMBLY.

a. Description.

The rear gauge assembly (4, Fig. 3-6) is positioned at the rear of the sheet hopper and consists of a series of upright sections and ledges. The purpose of the rear gauge assembly is to guide the blanks in the sheet hopper into proper alignment for feeding.

b. Controls.

The assembly incorporates a HEIGHT ADJUSTMENT (3, Fig. 3-6) used in conjunction with the Kontour-Kicker and a PILE FEED INTERRUPTER (7, Fig. 3-1). The interrupter is used to raise the trailing edge of the pile of blanks in the sheet hopper so the kicker will not feed sheets. It is used to stop, start or interrupt the feeding of blanks whenever necessary.

c. Setup.

(1) Loosen the rear gauge assembly locking screws (1, Fig. 3-6) and move the rear gauge assembly back or ahead to the appropriate size of the sheets.

(2) Place a small handful of sheets of the order to be run in the sheet hopper and adjust the rear gauge so that the sheets rest on the ledges.

(3) Place a sheet of the order to be run vertically between the sheets in the hopper and the rear gauge. Push the gauges tight against the sheet.

(4) Tighten the rear gauge assembly locking screws (1, Fig. 3-6).

6. SHEET SUPPORTS.

a. Description.

Three sheet supports (9, Fig. 3-1) are supplied with the machine for use with varying sheet lengths. A support (see the following chart) is mounted beneath the leading edge nose piece in the sheet hopper and provides additional means of supporting the pile of sheets in the hopper and helps prevent buckling when feeding.

b. Setup.

Install the appropriate sheet support beneath the nose piece at the leading edge of the sheet hopper. Refer to the following chart.

Support Part No.	Sheet Length Range
1-ZLR-226 (4 inches long)	17-22 inches (flat kicker) 25-30 inches (Kontour-Kicker)
1-ZLR-227 (9 inches long)	22-29 inches (flat kicker) 30-37 inches (Kontour-Kicker)
1-ZLR-228 (16 inches long)	29-50 inches (flat kicker) 37-50 inches (Kontour-Kicker)

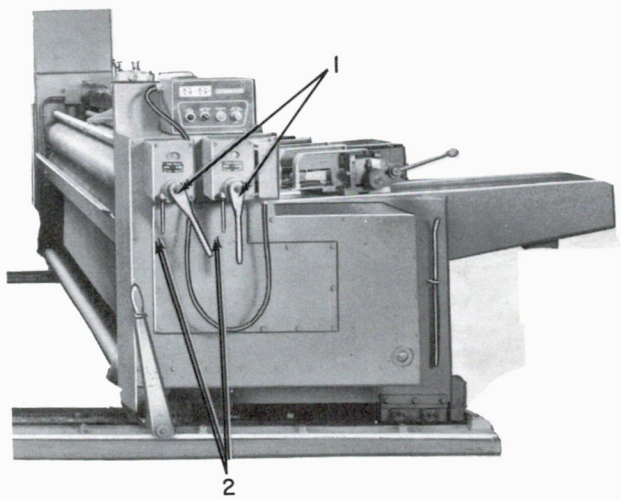
7. FEED ROLLS.

a. Description.

Two pairs of feed rolls (1, Fig. 3-1) are provided in the feed section of the machine. The lower rolls are knurled while the upper ones are rubber covered. The purpose of the feed rolls is to provide positive feeding of the board into the next section of the machine.

b. Controls.

Each upper feed roll is provided with an UP/DOWN ADJUSTMENT (1, Fig. 3-11) and an indicator for setting the gap between the rolls for the caliper of board to be run. A LOCK (2, Fig. 3-11) is provided on each adjustment to secure the setting.



1. Up/Down Adjustment
2. Lock

Figure 3-11. Feed Section, Operating Side

c. Setup.

(1) Rotate the feed roll ADJUSTMENT LOCKS (2, Fig. 3-11) to unlock the adjustments.

(2) Using the UP/DOWN ADJUSTMENT RATCHETS (1, Fig. 3-11) set the appropriate dimensions on the caliper indicators for the caliper of board to be run.

(3) Secure the adjustments using the LOCKS.

E. PREVENTIVE MAINTENANCE

Use the following table as a guide for performing maintenance. The table outlines inspection periods recommended for various components on the feed section.

Note

Do not use air hoses for cleaning. Removal of dust by vacuum is preferred.

Component	Inspection Period	Remarks
Front Gauge Bar	Daily **Note** Do not get oil on the bar.	Remove any accumulation of paper dust. Check to ensure that the front and side gauges roll freely. Stone or file any nicks, scratches or dents.
Kicker Carriage	Daily	Oil the kicker carriage in at least six of the holes provided on each carriage. Apply the oil in the area of most use.
	Weekly	Check the carriage T-slot keys for ease of movement in the carriage slots. File or stone any rough or nicked portions of the keys or slots.
	Monthly	Check for carriage slide block wear and play. Vertical clearance must not exceed 0.010 inch. Lateral clearance must not exceed 0.025 inch. Refer to paragraph F.3.
Spring Kickers	Weekly	Check the spring kickers for damage, looseness or breakage. Replace all damaged and loose parts.
Handles, Knobs and Wrenches	Weekly	Replace any broken or missing handles, knobs or wrenches.
Locks	Monthly	Check for wear and tightness. Replace all worn parts. Tighten as required.
Feed Rolls	Six Months	Check for wear. Refer to paragraph F.1.
Kicker Link Bearing and Wear Plates	Six Months	Check for wear. Refer to paragraph F.5.

F. MAINTENANCE

1. CHECKING FEED ROLL WEAR.

Feed roll wear will be more evident at the center of the roll than at the ends because most of the work processed through the machine is less than full width. See Figure 3-12.

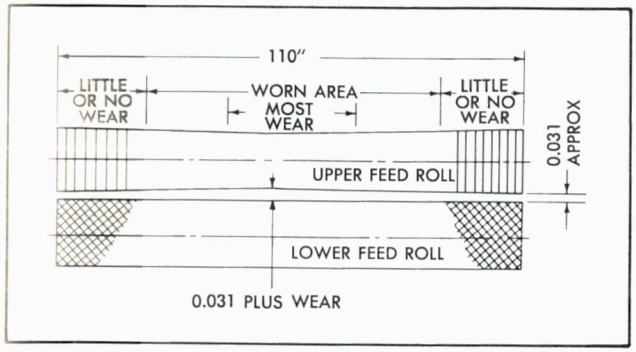


Figure 3-12. Feed Roll Wear

When feed roll wear is excessive, it can cause slippage, poor registration or crushing on some areas of the box blank.

Check both upper feed rolls for wear as follows:

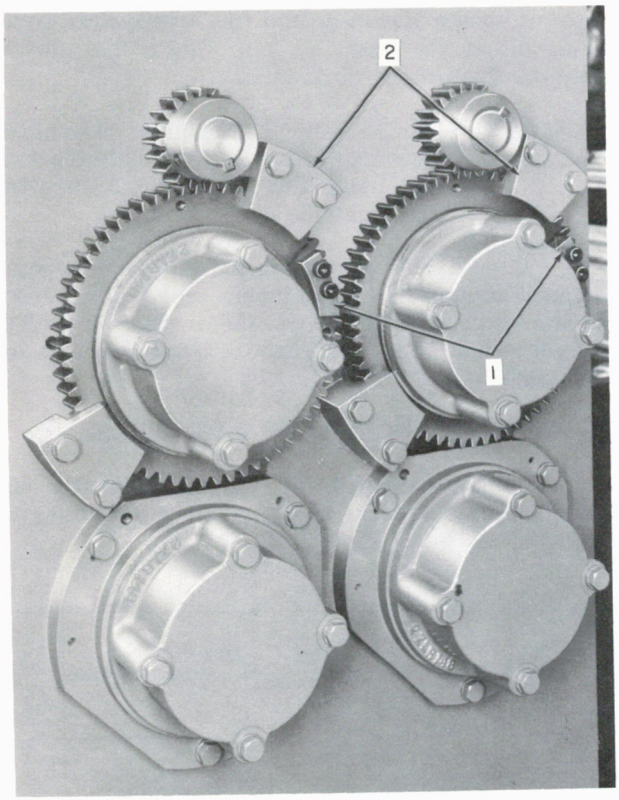
a. Using the feed roll UP/DOWN adjustment (1, Fig. 3-11), close the gap between the feed rolls until the feed roll stop, (1, Fig. 3-13) contacts the gib (2, Fig. 3-13).

b. Place two strips of paper of known thickness between the feed rolls, at the extreme ends. See Figure 3-14.

c. Insert feeler gauges between the strips of paper so that there is a firm steady drag on the gauge as it is removed.

d. Record the feeler gauge thickness used.

e. Move the strips of paper approximately 15 inches toward the center of the roll. Repeat step c. adding feeler gauge thickness as required to obtain the same drag as in step c.



1. Feed Roll Stop 2. Gib

Figure 3-13. Feed Roll Adjustment

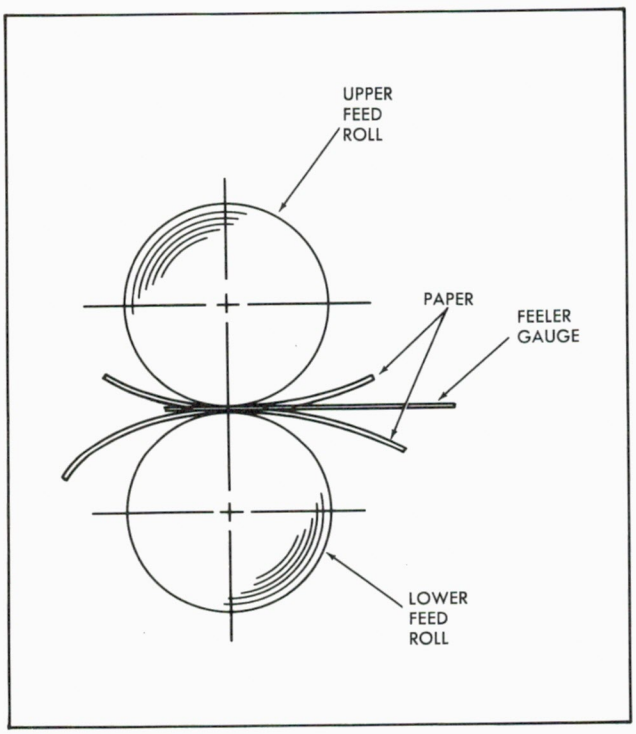


Figure 3-14. Checking Feed Roll Drag

f. Repeat step e. at various places along the length of the roll to determine the largest feeler gauge thickness required.

g. To determine the amount of wear on the diameter of the feed roll, subtract the thinnest feeler gauge thickness (obtained in step c.) from the maximum gauge thickness (obtained from steps e. and f.) and multiply by two.

h. Subtract the figure obtained in step g. from 7.270 inches, the diameter of a new feed roll.

i. If the diameter obtained in step h. is not less than 7.145 inches, the roll can be removed and refinished. If the diameter obtained in step h. is less than 7.145 inches, the roll must be removed and recovered.

j. If the roll is refinished to a new diameter, refer to paragraph 2.

2. FEED ROLL STOP ADJUSTMENT.

The diameter of a new upper feed roll is 7.270 inches. The feed roll adjustment is provided with a stop on the drive side of the machine to prevent the upper (rubber covered) roll from contacting the lower (knurled) roll.

The stop is positioned so that a clearance of approximately 0.031 inch exists between the upper and lower rolls when they are adjusted as close as possible to each other.

When the feed roll diameter is reduced because of wear or refinishing, the feed roll stop must be repositioned so that the rolls can be brought sufficiently close together for proper feeding.

The location of the stop and the holes provided in the gear to facilitate repositioning of the stop are shown in Figure 3-15. The holes in the gear are 10 degrees apart. The holes in the stop are spaced differently from each end of the stop to permit reversing the stop to obtain adjustments in five degree increments.

To determine the stop position to use (clearance between the feed rolls) for any feed roll diameter less than 7.270 inches and greater than 7.145 inches, proceed as follows:

a. Subtract the minimum allowable feed roll diameter (7.145 inches) from the worn or refinished feed roll diameter.

EXAMPLE: 7.232 inches (worn or refinished diameter)
7.145 inches (minimum diameter)
0.087 inches

b. Subtract one-half the difference (from step a.) from the distance given in the following chart so that the remainder is close to 0.031 inches.

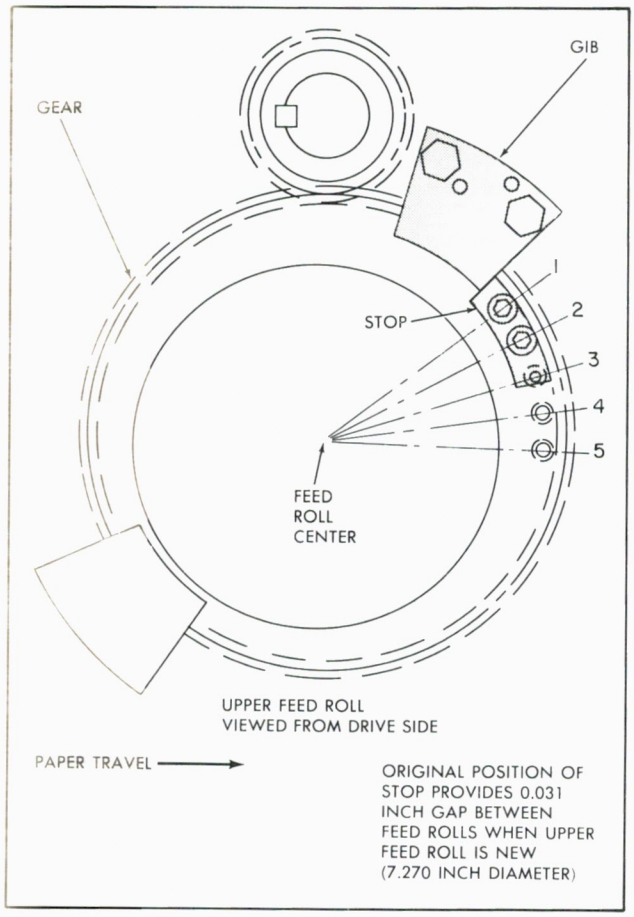


Figure 3-15. Feed Roll Stop Location

EXAMPLE:

1/2 difference from step a. $= \frac{0.087}{2} = 0.044$ inch

0.080 inch (from chart) minus 0.044 inch = 0.036 inch

Minimum Feed Roll Diameter (inches)	Stop Location	Distance Between Upper and Lower Feed Rolls (inches)
	SHORT SIDE	
7.145	Holes 1 and 2	0.093
7.145	Holes 2 and 3	0.069
7.145	Holes 3 and 4	0.051
7.145	Holes 4 and 5	0.036
	LONG SIDE	
7.145	Holes 1 and 2	0.108
7.145	Holes 2 and 3	0.080
7.145	Holes 3 and 4	0.059
7.145	Holes 4 and 5	0.044

c. Relocate the stop into the appropriate holes using either the short or long side of the stop to maintain the proper clearance.

EXAMPLE: For the sample dimensions used in the previous examples, relocate the stop into holes 2 and 3 (Figure 3-15) using the long side of the stop.

d. When a roll is worn to the minimum recommended diameter of 7.145 inches, use holes 4 and 5 on the gear with the short side of the stop against the gib to maintain a clearance of 0.036 inch between the upper and lower feed rolls.

3. CHECKING KICKER CARRIAGE WEAR.

The kicker carriages are guided laterally and vertically by micarta blocks sliding on steel gibs and guides. See Figure 3-16.

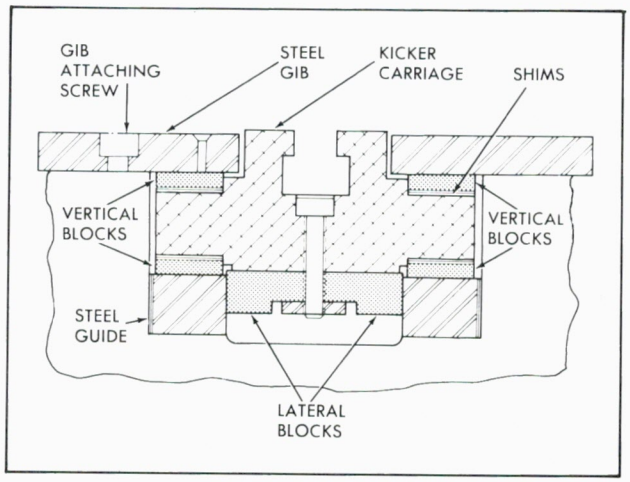


Figure 3-16. Checking Kicker Carriage Wear

Wear and play will develop between the gibs and guides and blocks.

Note

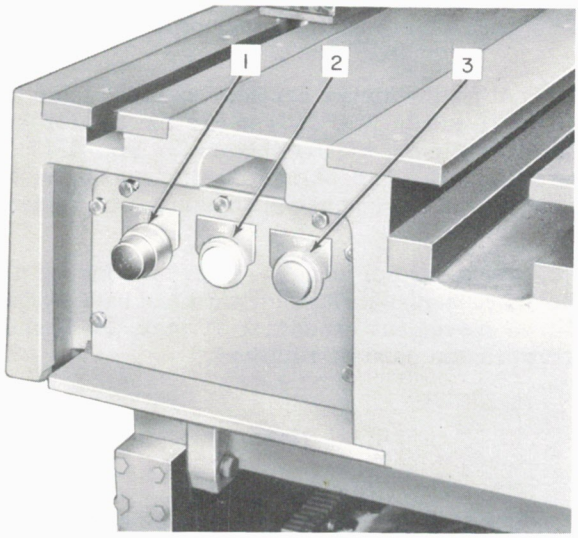
Lack of daily lubrication will accelerate micarta block wear.

To check the clearance between the gibs and guides and blocks, in an up and down direction, proceed as follows:

a. Using the JOG button (2, Fig. 3-17), move the carriages to their extreme rearward position.

b. Using a 0.010 inch feeler gauge, check the vertical clearance between the gibs and blocks at the front and rear of the kicker carriages.

c. If the vertical clearance exceeds 0.010 inch, the micarta blocks must be shimmed or replaced.



1. Start Button
2. Jog Button
3. Stop Button

Figure 3-17. Feed End Running Controls

Note

Any number of shims may be added to provide a running clearance between the gibs and blocks of not less than 0.002 inch. However, should the number of shims added cause the heads of the countersunk attaching screws to protrude or be level with the block surface, the block must be replaced. Refer to paragraph 4.

d. Check the clearance between the lateral micarta blocks and the steel guides using a 0.025 inch feeler gauge.

e. If the clearance exceeds 0.025 inch, replace the lateral blocks. Refer to paragraph 4.

4. REPLACING KICKER CARRIAGE MICARTA BLOCKS.

Note

Use the following procedure for adding shims or replacing micarta blocks.

a. Remove the gib attaching screws. See Figure 3-16. Remove the gibs.

b. Raise the kicker carriage assembly.

c. Remove the block attaching screws. Remove the block and shims.

d. Install new blocks, where required, using the appropriate number of shims to obtain a 0.002 inch running clearance.

e. Lower the kicker carriage assembly and install the gibs.

5. CHECKING KICKER LINKAGE WEAR.

Kicker carriages move forward and rearward by means of a linkage arrangement. The wear points in the linkage are the bearing and gibs in the drive link (Figure 3-18) and the oilite bushings in the carriages and connecting links (Figure 3-18).

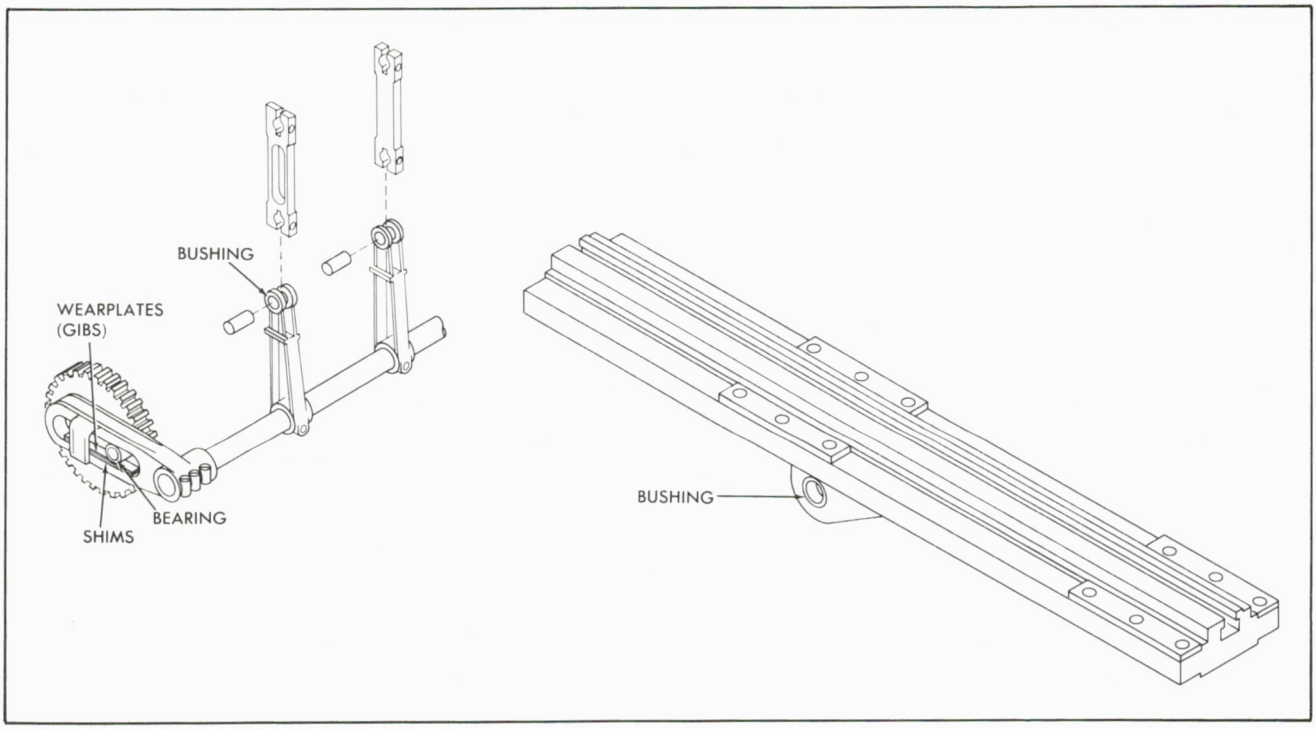


Figure 3-18. Kicker Linkage

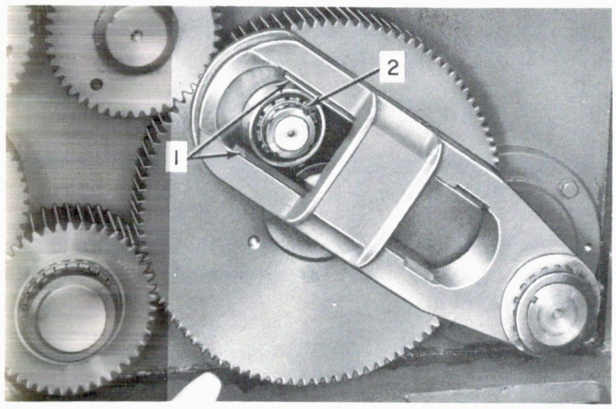
Gibs and bearing wear will cause a banging noise as the kicker comes to the end of its forward stroke.

Note

The noise is more evident at high speed.

To check for bearing or gib wear, proceed as follows:

a. Remove the inspection plate on the gearbox on the operating side of the machine. See Figure 3-19.



1. Gibs 2. Bearing

Figure 3-19. Checking Linkage Wear

b. Using a 0.010 inch feeler gauge, check the clearance between the gibs (1, Fig. 3-19) and the OD of the bearing (2, Fig. 3-19) at several places along the length of the gibs.

c. If the clearance between the gibs and bearing exceeds 0.010 inch at any point, or if banging becomes evident, replace the bearing and gibs.

d. When a new bearing and new gibs are to be installed, the gibs must be shimmed to provide a 0.0015 inch clearance along the entire length of the gibs.

6. CHECKING KICKER LINKAGE BUSHING WEAR.

Kicker linkage bushing wear can cause skewed or crooked feeding of sheets. This results from one carriage lagging behind the other on the forward stroke of the kicker.

To check for bushing wear, proceed as follows:

a. Align the kicker carriage and feed table zero marks (1 and 2, Fig. 2-3) on the forward stroke of the kicker using the JOG button (2, Fig. 3-17). If the zero marks do not align simultaneously, bushing wear is evident and the bushing must be replaced.

b. As a further check, remove the kicker plate and move each carriage forward and back by hand. If free movement exceeds 1/16 inch, the bushings are worn and must be replaced.

Note

Play in the carriages can also be caused by worn bushings and gibs. If when checking for bushing wear, the bearing is at the point of most wear on the gibs, jog the machine to reposition the bearing at a different location and check bushing wear again.

G. TROUBLESHOOTING

Refer to the following chart for a listing of operating difficulties which may be encountered and the standard procedures to correct them.

The chart is divided into two parts; finished box troubles and operating troubles. Operating troubles are defined as those that are caused by improper setup or malfunction of a machine component. Finished box troubles are defined as those resulting in improper assembly of the box when inspected at the delivery end of the machine.

To use the chart properly, determine if the trouble is operational or shows up as a result of box inspection at the delivery end. Turn to that part of the chart concerned and locate the symptom encountered. Check the possible causes of the difficulty. When the trouble is located, refer to the chart to determine how the difficulty may be remedied.

To isolate electrical difficulties, refer to the wiring diagrams and schematics supplied with the machine.

FEED SECTION-BOX TROUBLES

Symptom	Cause	Remedy
Boxes not Square	Kicker feeding crooked	Readjust the kicker.
	Insufficient or excessive hopper clearances	Check all gauge settings to ensure blanks are free in hopper.
	Feed Roll 1. Scrap buildup	 Remove built-up scrap.

FEED SECTION-BOX TROUBLES (CONT)

Symptom	Cause	Remedy
	2. Worn	Check for uneven wear.
	3. Insufficient pressure	Reset gap for caliper of board to be run.
	4. Wear in linkage mechaism	Replace worn parts.
All Slots Out of Register	Feed roll gap improperly set	Readjust the feed roll gap.
Slot Variations at Different Speeds	Feed roll gap improperly set	Readjust feed roll setting.
	Warped blanks	Remove warped blanks from the sheet hopper.
	Excessive number of blanks in sheet hopper	Decrease the number of blanks in the sheet hopper.
	Insufficient hopper clearance	Check all hopper gauge settings.
	Sheets buckling	Use sheet supports provided.
Box Creased or Slotted Crooked	Kicker askew	Readjust the kicker mechanism.
	Blanks feeding incorrectly	Check all hopper gauge adjustments.
	Feed rolls set improperly	Readjust the feed rolls.
Variations in Printing Register	Feed end setup incorrect	Check the feed end setup. Check all hopper adjustments and settings. Check all gap settings.
Poor Definition of Printing	Feed rolls crushing board	Readjust the feed roll for the caliper of board to be run.
FEED SECTION - OPERATING TROUBLES		
Feeding Double Blank	Front gauge adjustment	Readjust the gauges to permit feeding of only one blank at a time.
Kicker Jamups	Spring kicker ledges engaging more than one blank	Apply tape to buildup height of spring.
	Boxes buckling because of weakness at corrugated score	Use sheet supports. Do not score too deeply, if possible.
	Hopper gauges improperly adjusted	Check all feed end gauge adjustments.
Panel Folding Incorrectly	Kicker out of square	Readjust setting.
Blanks Enter Delivery End Askew	Kicker mechanism askew	Readjust the kicker mechanism.
	Front gauge adjustment	Check the gauge height and readjust, if necessary.

SECTION IV
FLEXOGRAPHIC PRINTING UNIT

A. GENERAL

The machine can be equipped with one or more printing units (Figure 4-1). A printing unit is required for each color to be printed. Each unit is movable, being mounted on rollers (Figure 4-2) that run on floor mounted tracks.

Each printing unit consists of a print cylinder (Figure 4-2), an impression cylinder (Figure 4-2), an anilox (ink) roll (Figure 4-2), an ink return duct (Figure 4-2), an ink metering system, a running register, a pair of pull rolls (Figure 4-2) and an ink circulating system (Figure 4-2A). Each unit incorporates a proof printing arrangement and a foot switch for jogging the print cylinder.

B. FUNCTIONING

The ink circulating system feeds ink to the trough formed by the doctor blade and ink roll and floods the roll with ink. As the ink roll rotates, the doctor blade wipes off excess ink from the roll leaving only the ink in the roll cells. The printing plate, on the print cylinder, contacts the ink roll and is coated with ink from the cells. As the blank passes between the impression cylinder and the printing plate, the ink on the plate is transferred to the underside of the blank. (See Figure 4-2.)

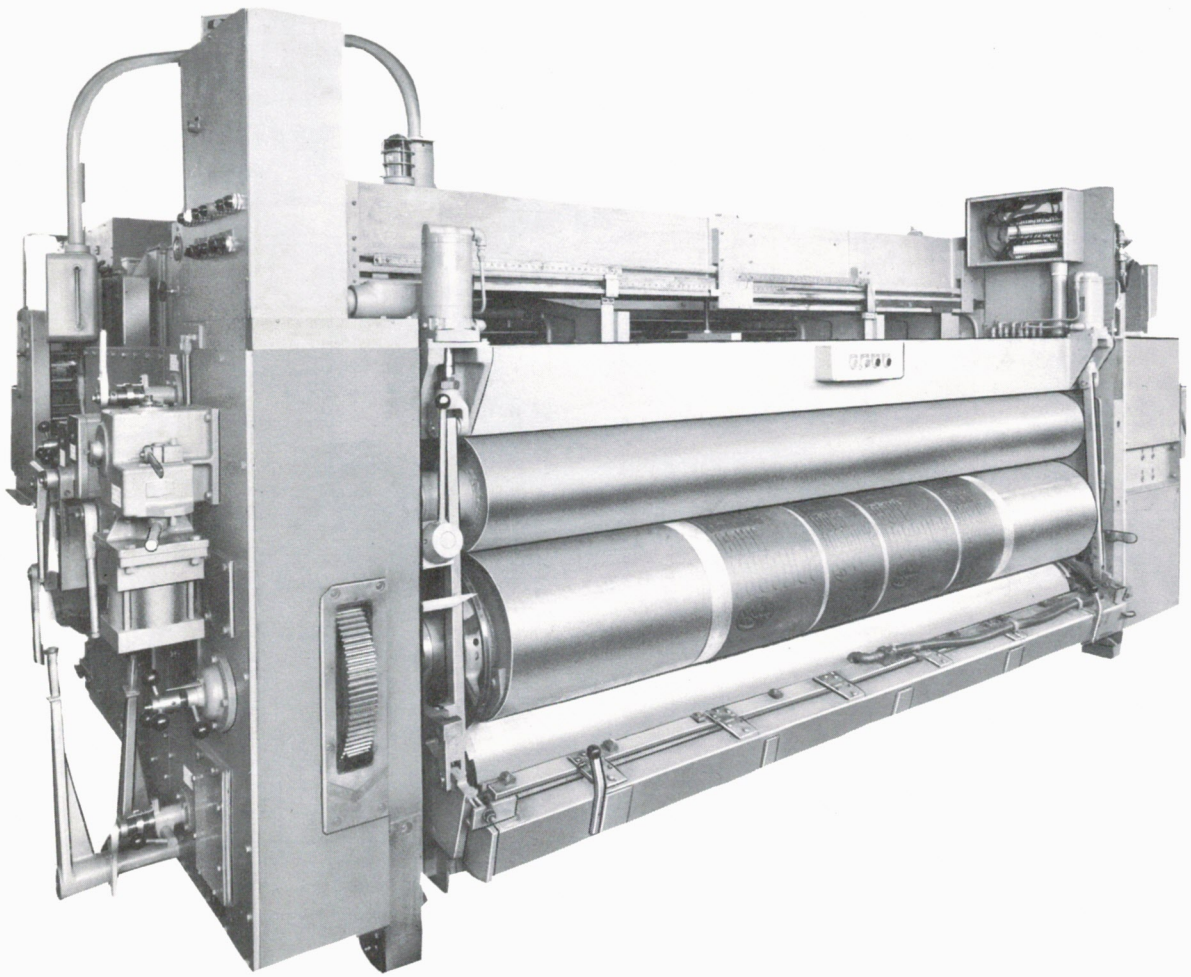


Figure 4-1. Flexographic Printing Unit

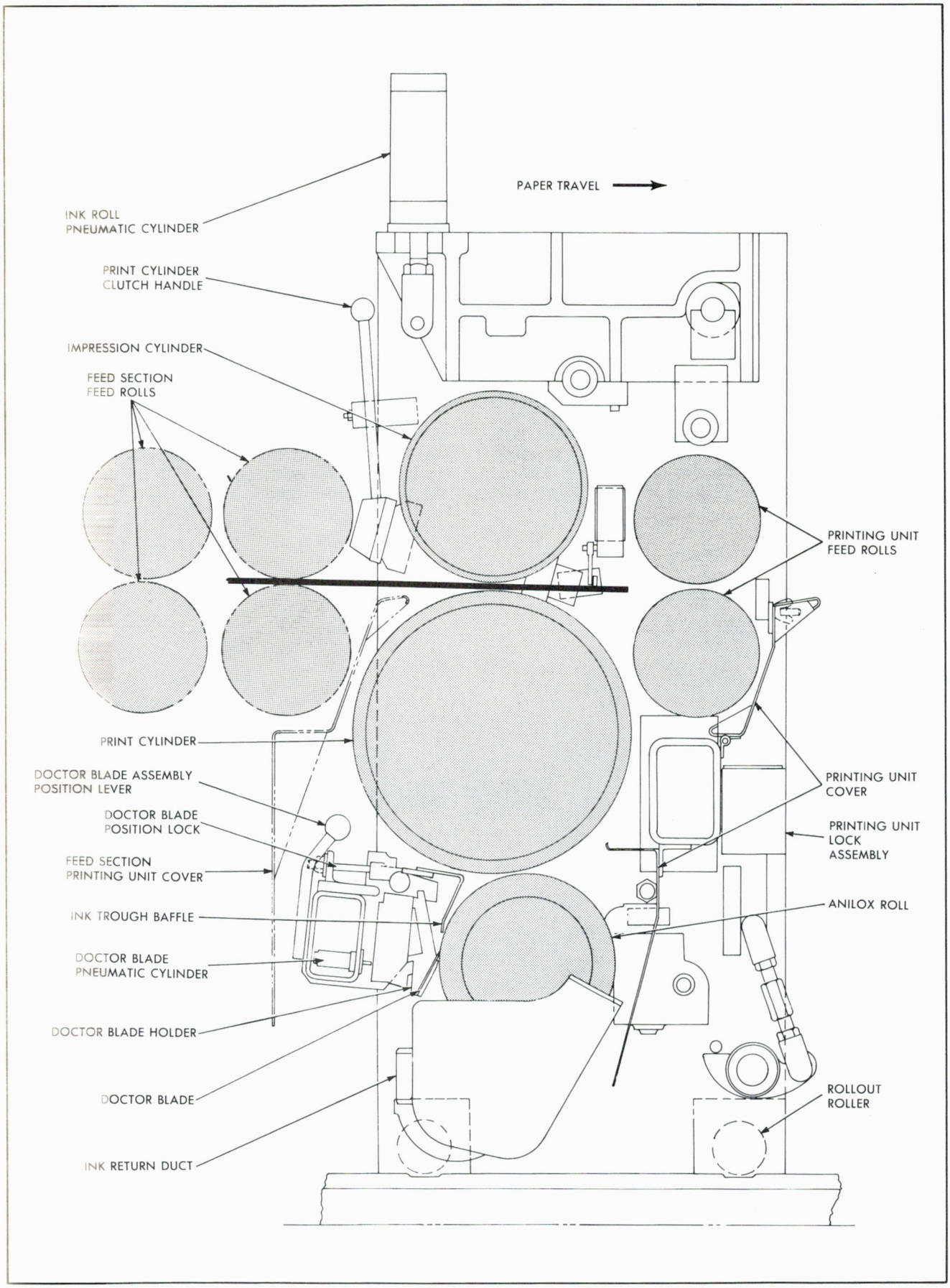


Figure 4-2. Printer Cross-Section

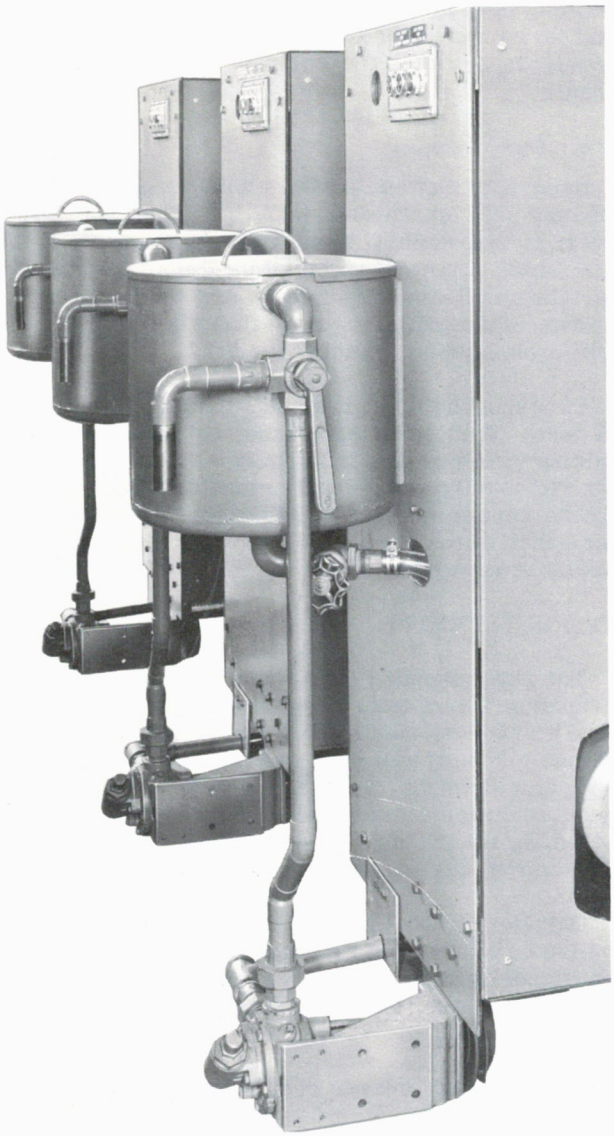


Figure 4-2A. Ink Circulating System

C. PRINTING PLATES

1. GENERAL.

A basic specification for printing plates represents a consensus of industry opinion today as far as flexographic printing plates are concerned. Specifications for flexographic printing plates have not been established over a long period of time, but represent the result of the latest experimental work done by the manufacturers of flexographic printers.

2. HARDNESS.

Hardness, or durometer, of the plate should be 20 to 25 on the Shore A scale. Soft plates enable lighter grades of board to be run with good printing. The plates should be the same durometer throughout as a general rule. However, it is possible to use multi-durometer plates to achieve a higher degree of print definition. Use 20 durometer for solids, 30 durometer for light print and half tones.

3. THICKNESS.

Plate caliper should be one quarter inch or whatever the thickness the print cylinder diameter was machined for, plus or minus 0.0015 inch within a plate and plus or minus 0.003 inch plate to plate. Height of the printing plates should be the same throughout. It is not necessary to add thickness for differences in types of printing.

4. RELIEF.

Generally, a shallow plate relief will contribute substantially to good quality printing. A shallow relief provides greater support for the elements of the printing plate, especially for fine line printing It also reduces the tendency of haloing and filling in. However, if low relief plates are to be used on oil ink printer slotters as well as the flexo press, they may fill in. In such cases standard relief plates should be adhered to.

5. MATERIALS.

Plate materials can be natural rubber or synthetic rubber of the Buna N type. The plate compound can be verified from code or packing slips.

6. BEVEL.

Bevel should be sufficient to produce a straight, sharp, clean print.

7. CHECKING PLATES AS RECEIVED.

Upon receipt, plates should be inspected visually for any apparent defects, such as surface waves, mottling, pin holes, tears, excess cupping or handling damage. Coding should be checked, and mechanical aids, such as center marks and jig lines noted.

Proofs are furnished with the plates. Plates, as well as proofs, should be checked for reading matter. The proofs can be checked for register and bleed. In many cases, only a proof made when the plates were mounted in the curve will adequately show all defects. This will provide some degree of assurance that the printing on the box will be good.

8. CARE AND STORAGE.

Care of the printing plates is important to good quality printing. Printing plates should be washed as often as practical while mounted on the machine. An average figure is one washing for every ten thousand boxes. This is not a complete washup of the machine, only a cleaning of the printing plate surface with a wet cloth to remove any dirt, dust or other foreign particles. Leaving such foreign matter on the plate will interfere with good printing and may cause excessive plate wear. Plates should be washed as soon as possible after a job is finished. It is a lot easier to remove wet flexo ink than dry ink.

Proper care of printing plates off the machine is just as important as on the machine. Plates that have been run should never be laid flat in storage. They should always be hung. Also, sharp objects should not be laid on them, nor should they be set down where they could be walked on or otherwise damaged.

D. PRINTING INKS

1. GENERAL.

Water-base flexographic ink is the only type of ink recommended for use on S&S flexographic printing units. Water-base inks are reducible in water when wet but insoluble when dry. Water is the only fluid recommended for general cleaning of printing plates, ink rolls, ink pans and doctor blades. Water base inks are formulated to meet the requirements of specific customers for a particular set of specifications. These specifications involve processing conditions, as well as end-production conditions.

Conditions affecting ingredients of an ink include: wet and dry rub resistance; resistance to heat, light, and various chemical reagents; printing qualities; drying rate; viscosity; shade, and strength. They depend on the maintenance of a delicate balance among various ingredients for their physical characteristics and stability.

For these reasons, never mix water-base inks produced by different manufacturers or even by the same manufacturer. Ink formulated by different suppliers will differ widely in their ingredients. Inks formulated by the same manufacturer will differ when mixed in different batches.

2. RECOMMENDATIONS FOR HANDLING.

a. Ink Containers.

Flexographic inks are packed and shipped in kits of five-gallon capacity and in 30- and 50-gallon drums. Ink containers are specially lined to prevent any undesirable reaction between the ink and the metal container.

Ink returned from the press for storage should be stored in these specially lined containers or in non-metallic containers with airtight covers. Such containers should be absolutely clean. Keep all ink containers covered tightly and sealed with pressure-sensitive tape until the ink is to be used.

b. Storage.

Storage areas and ink mixing rooms should be chosen carefully. Care should be taken that conditions remain as originally desired. Storage areas must be dry, well ventilated, and fireproof. An ideal storage area will have a year-round temperature of 70 degrees.

Temperatures above 70 degrees may affect the evaporation rate of the liquid portion of the ink, but they will not affect the runnability of the ink. If printing is to be performed at much higher temperatures, care must be taken during the running of the orders to see that the color of the ink does not change.

c. Used Inks.

Used inks that are inactive for a long period will become unfit for use and should be discarded. However, it is possible, when color is not critical, to mix some small quantities of used ink together, or to mix small amounts into colors which are more active. If the old ink is more than six months old it will probably be unsuitable for use.

Care must be taken to avoid mixing different types of inks. Particular care must be taken to avoid mixing press return ink with new ink, as the older ink will usually contain contaminants from the press. These contaminants will adversely affect the performance of the new ink. The ink should be filtered before it is stored.

3. INK VISCOSITY.

The recommended ink viscosity for all S&S flexographic printers is 25 seconds, number 2 Zahn cup, or 15 seconds, number 3 Zahn cup, at 75°F. Ink at this viscosity will have good flow characteristics and color strength. For quality printing of all types, good coverage on large solids and consistent color strength, the ink must be run at the viscosity formulated for by the ink manufacturer.

Only flexographic inks of the water-base type must be used. Small additions of water have a great affect on viscosity and color strength. Therefore, any dilution of the ink should be done gradually and carefully.

Low viscosity ink can result in a condition called pinholing, which is visible, under close inspection, as small holes in a solid printed area. In addition, it affects the color strength of the ink and appears on the box as a shade of the original ink color.

Ink is sometimes purchased, from the manufacturer, in a press-ready condition. Press-ready inks must not be diluted by the addition of water. They must be used as received, after stirring for a few moments. Ink that is not press-ready must be stirred, checked for temperature and diluted, as necessary, by the addition of water, to a viscosity of not less than 35 seconds. After 30 minutes of circulation in the ink system, the viscosity should again be checked and carefully adjusted, if necessary, to the proper running viscosity.

Periodic viscosity checks should be made during long runs and if printed coverage is small. Ink viscosity will increase as solvents evaporate from the ink.

Note

All viscosity readings must be made at 75°F since viscosity varies greatly with changes in temperature.

4. INK FOAMING.

All flexographic inks will foam due to constant churning and circulation. Foaming will occur more readily when the ink supply is low. If the printed area of the box is very light or printing suddenly starts missing, check for a foaming condition. When this condition exists, add more ink to the reservoir to increase the ink supply if it is low and add defoamer to the ink.

E. LUBRICATION

Refer to Figures 4-3 and 4-4 for the frequency, methods and points of lubrication on the printing unit.

F. PRINTING UNIT COMPONENTS

1. PRINT CYLINDER.

a. Description.

The purpose of the printing cylinder is to provide a means of mounting the printing plate. In addition, in conjunction with the impression cylinder and pull rolls, it facilitates feeding the blanks through the printing unit.

Printing plates (3, Fig. 4-5) are mounted directly on the print cylinder (1, Fig. 4-5). The cylinder can be machined to accept any conventional plate-mounting system such as the Matthews, Dorr Rapi-Die or Inland systems. The system cannot be changed at a later date without replacement of the cylinder.

b. Controls.

(1) Clutch Handle.

The print cylinder is equipped with a clutch. A CLUTCH HANDLE (2, Fig. 4-5), located inboard of the operating side frame of each printing unit. It is used to engage or disengage the cylinder drive mechanism to allow rotation of the cylinder by hand when printing plates are to be installed.

EXPLANATION OF SYMBOLS

Symbol	Meaning
	Lubricant is applied by means of the implement depicted within the circular area.
daily weekly  monthly annually	The terms appearing above or below the circular area indicate the frequency of lubrication for the component. The terms are based on a single operating shift of eight hours of machine operation or 40 hours of machine operation per week.
4 	The number appearing on the left of the circular area indicates the item number of the component appearing in the legend that accompanies each figure.
 3	The number appearing on the right of the circular area indicates the lubricant necessary as specified in the table of lubricants appearing with each figure.

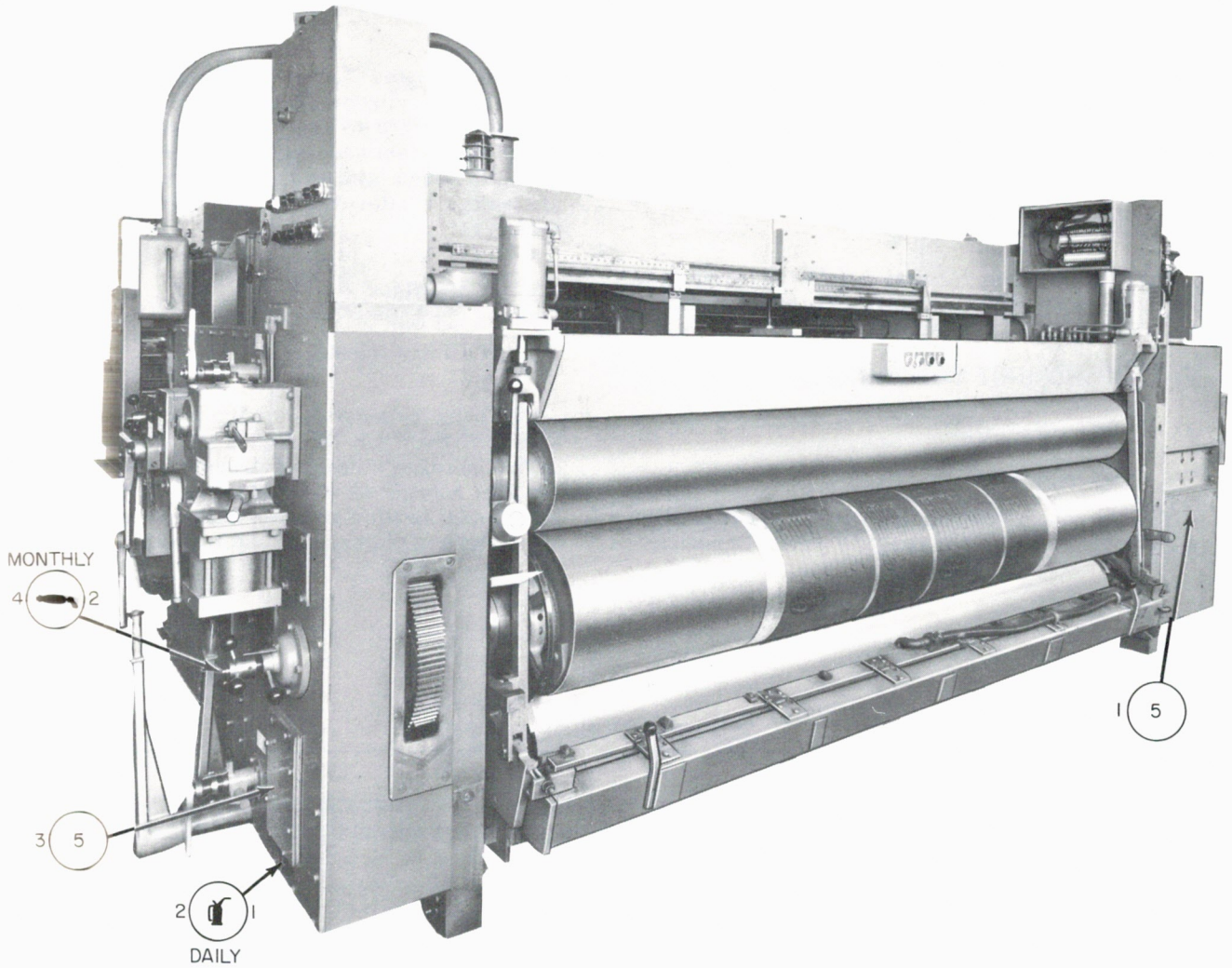
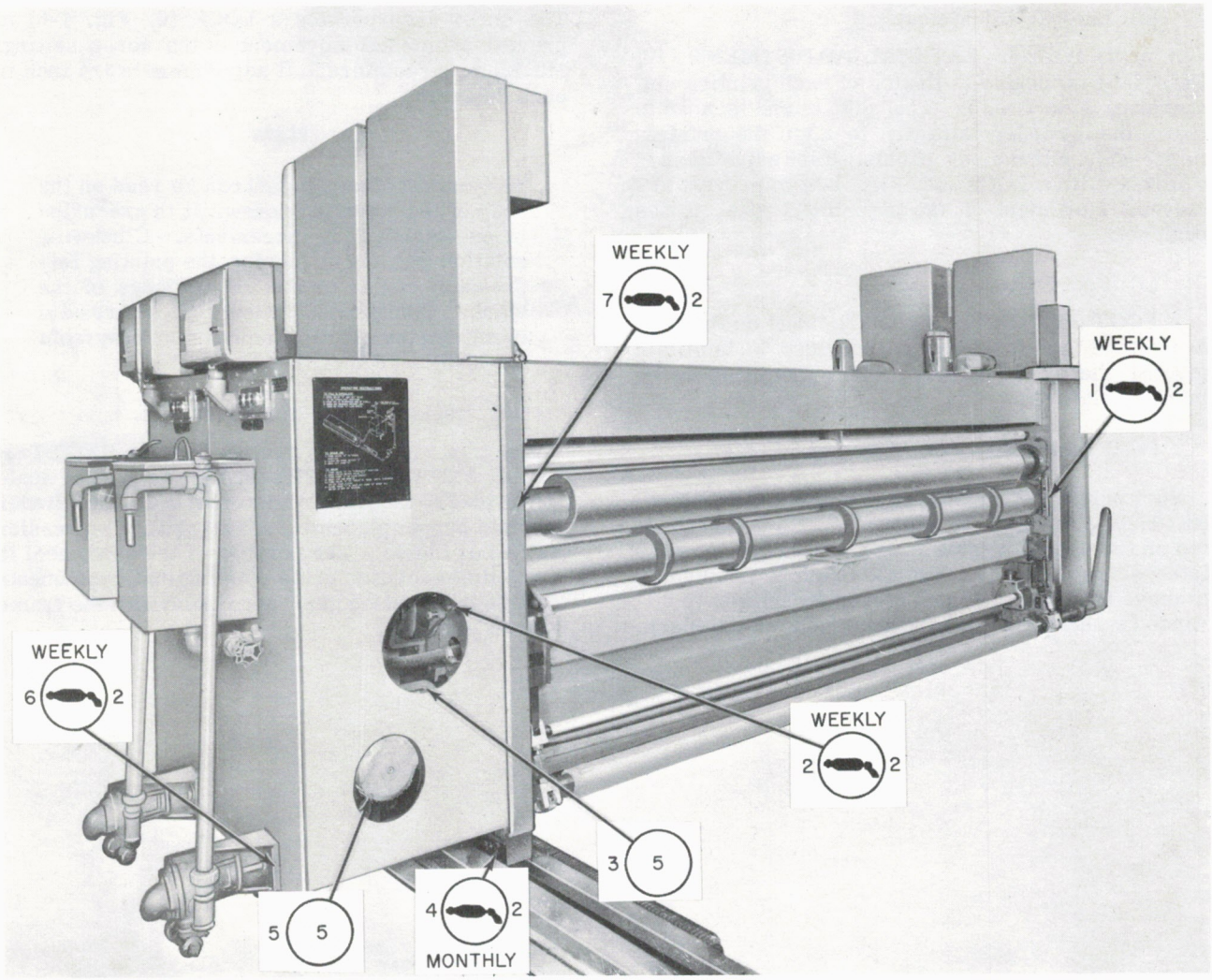


TABLE OF LUBRICANTS

Symbol	Classification	Description of Lubricant
1	AGMA NO. 3	AGMA SPEC. #252. Highly refined mineral gear oil; non-foaming, non-corrosive, non-separating. Viscosity index 60 or greater.
2	NLGI NO. 2	Lithium soap grease.
3	MOLYKOTE BR-2	Molybdenum disulfide grease.
4	AGMA NO. 1	Light oil per AGMA SPEC. #252 (described above).
5	PER MANUFACTURER'S RECOM-MENDATIONS	

Item No.	Description
1	Ink circulator motor
2	Gear case
3	Maxitorq clutch
4	Print cylinder running register

Figure 4-3. Flexographic Printer Lubrication, Front View



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3	MOLYKOTE BR-2	Molybdenum disulfide grease.
4	AGMA NO. 1	Light oil per AGMA SPEC. #252 (described above).
5	PER MANUFACTURER'S RECOM-MENDATIONS	

Item No.	Description
1	Manifold (operating and drive sides)
2	Lower feed roll cap
3	Formsprag clutch
4	Roller assemblies (operating and drive sides)
5	Ink roll idler motor
6	Ink circulator pump support and shaft
7	Frame fittings (8 places)

Figure 4-4. Flexographic Printer Lubrication, Rear View

(2) Lateral Adjustment.

A print cylinder LATERAL ADJUSTMENT (12, Fig. 4-6) is located at the top of each printing unit operating side frame. The adjustment is used to move the cylinder laterally to align the printing impression with the box panels. Each adjustment is equipped with a LOCK (13, Fig. 4-6) to prevent accidental movement of the adjustment after it has been set.

(3) Foot Switch.

A FOOT SWITCH (1, Fig. 4-7), hung on the back end of the feed section, is provided to facilitate jogging the print cylinder when installing large printing blankets.

(4) Running Register Adjusting Screws.

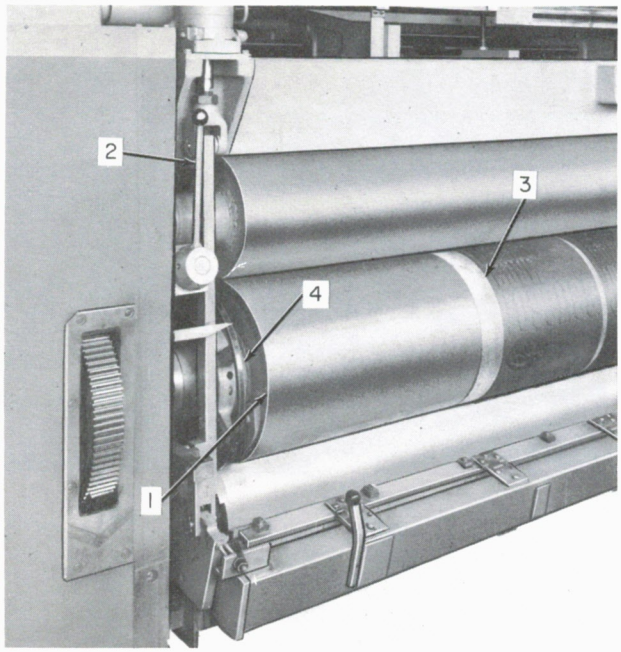
Each printing cylinder is equipped with a RUNNING REGISTER ADJUSTING SCREW (7, Fig. 4-6) located on the operating side frame. The running register screw is used, while the machine is running, to move the print cylinder circumferentially to advance or retard the printing placement on the blank. The screw incorporates a LOCK (6, Fig. 4-6) to prevent accidental movement of the screw setting. Maximum circumferential adjustment is 3/4 inch in each direction.

Note

The amount of adjustment can be read on the body of the adjusting screw. It is graduated in one-eighth inch increments. Clockwise rotation results in moving the printing impression closer to the leading edge of the blank. Counter-clockwise rotation results in moving the printing impression away from the leading edge of the blank.

(5) Register Scale and Handwheel.

The print cylinder is equipped with a REGISTER SCALE AND HANDWHEEL (4, Fig. 4-5). The scale is provided to facilitate registering the print cylinder to obtain proper placement of the printing impression on the box blank. The purpose of the handwheel is to facilitate rotation of the printing unit components to align the exposed gear zero mark with the frame zero index mark.



1. Print Cylinder
2. Clutch Handle
3. Printing Plate
4. Register Scale and Handwheel

Figure 4-5. Print Cylinder and Clutch

c. Switches.

The running register clutch handle is in contact with a limit switch when the machine is in operation. When the register clutch handle is opened for setup purposes, the switch opens and the machine will not run and cannot be jogged.

d. Setup.

(1) Open the machine, to gain access to the printing unit or units, as outlined in Section II.

(2) Release the print cylinder CLUTCH HANDLE (2, Fig. 4-5) to disengage the print cylinder.

(3) Zeroing Running Register.

(a) Unlock the running register LOCK LEVER (6, Fig. 4-6).

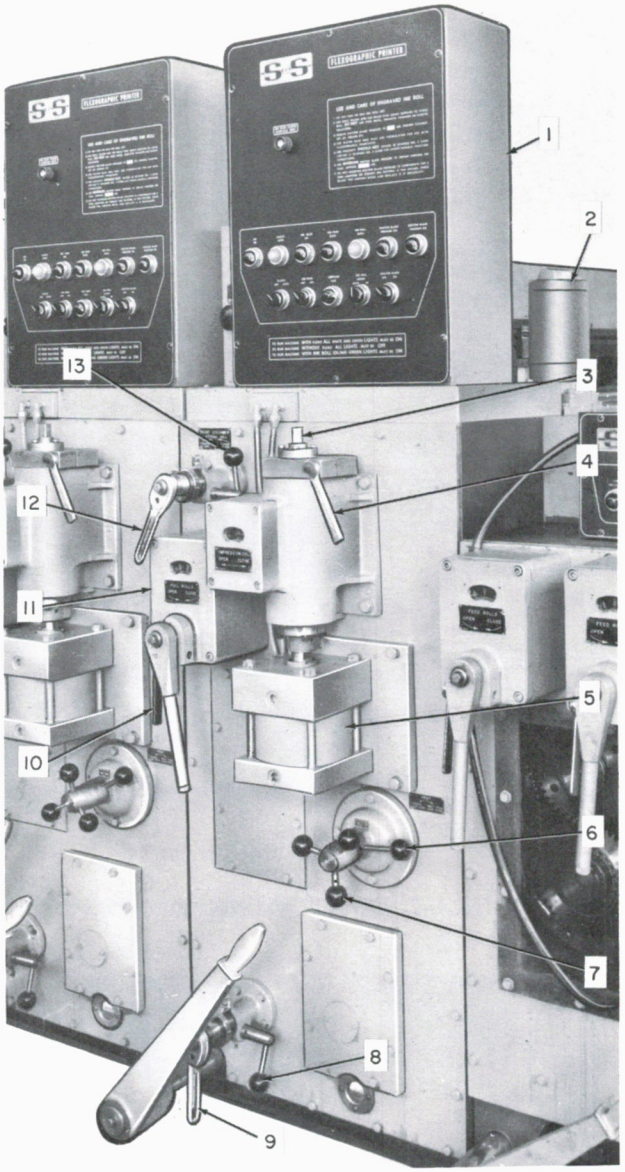
(b) Adjust the RUNNING REGISTER SCREW (7, Fig. 4-6) to the zero position.

(c) Lock the screw in position using the running register LOCK LEVER (6, Fig. 4-6).

(4) Mounting Printing Plates.

(a) Machines with Dorr Rapi-Die Mounting System.

1. Rotate the print cylinder until the two rows of mounting pins are facing you (Figure 4-8).



1. Control Panel
2. Ink Roll Air Cylinder
3. Impression Cylinder Up/Down Adjustment
4. Lock
5. Impression Cylinder
6. Running Register Lock
7. Print Cylinder Running Register
8. Ink Roll Adjustment Lock
9. Ink Roll Up/Down Adjustment
10. Pull Roll Adjustment Lock
11. Pull Roll Caliper Indicator
12. Print Cylinder Lateral Adjustment
13. Lock

Figure 4-6. Printing Unit Controls

2. Attach the mylar backing sheet (1, Fig. 4-9) by setting the grommets (2, Fig. 4-9) over the lower set of pins (4, Fig. 4-9).

Note

Ensure that the center line of both the blanket and cylinder are aligned.

1. Foot Switch

Figure 4-7. Print Cylinder Foot Switch

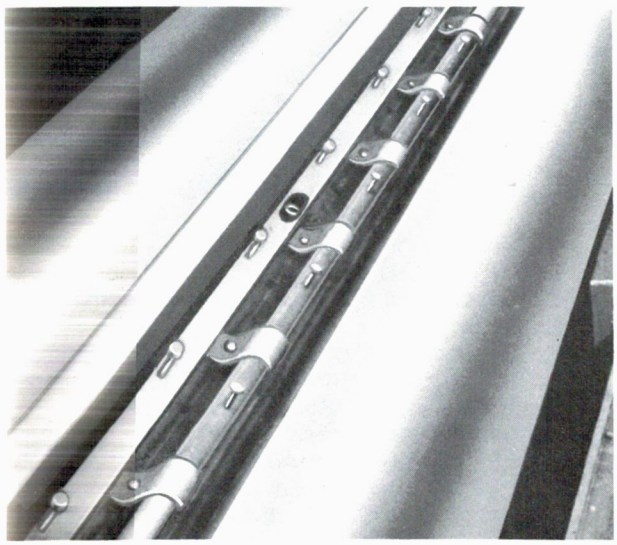
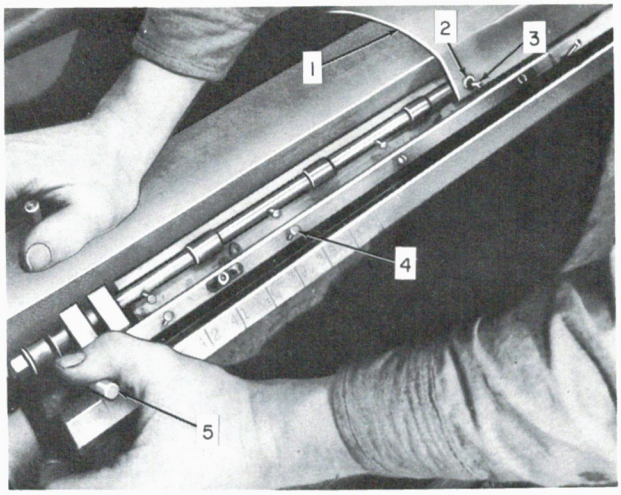


Figure 4-8. Dorr Rapi-Die Mounting System

3. Rotate the print cylinder upward smoothing the mylar backing sheet against the cylinder as it turns.

4. Stop turning when the second row of pins (3, Fig. 4-9) faces you.

5. Place the grommets (2, Fig. 4-9) on the mylar backing sheet (1, Fig. 4-9) over these pins.



1. Mylar Backing Sheet
2. Grommets
3. Upper Pins
4. Lower Pins
5. Bar

Figure 4-9. Attaching Mylar Backing Sheet

6. Place the special bar (5, Fig. 4-9), provided with the mounting system, in the hole at the left of the cylinder between the two rows of pins.

7. Pull the bar towards you to tighten the plate on the cylinder.

Note

As the bar is pulled, the two rows of pins will move toward each other. When the bar is removed, the pins will remain in place until separated for removal of the plate.

8. Rotate the print cylinder until the register scale zero lines up with the indicator and reengage the clutch.

9. Rotate the entire printing unit, using the handwheel until the indicator on the exposed gear lines up with the zero indicator on the frame.

(b) Machines with Matthews Plate Mounting System.

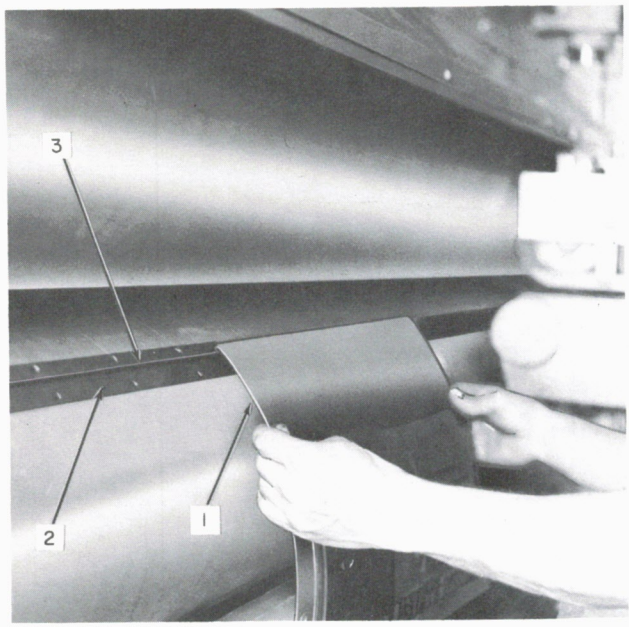
1. Rotate the print cylinder until the mounting slot (3, Fig. 4-10) is facing you.

2. Hook on the backing sheet (1, Fig. 4-10), to the leading edge slot (2, Fig. 4-10).

Note

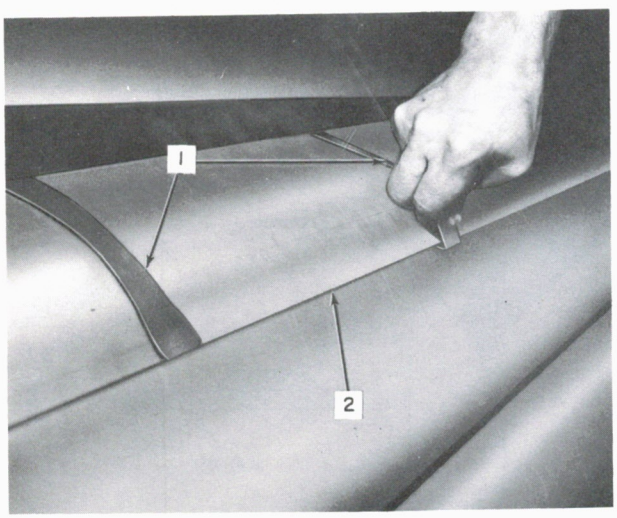
Ensure that the centerlines of both the blanket and cylinder are aligned.

3. Rotate the print cylinder, smoothing the blanket against the cylinder, until the tension clamps (1, Fig. 4-11) are in position for fastening.



1. Backing Sheet
2. Metal Strip Lip
3. Machined Slot

Figure 4-10. Matthews Plate Mounting System



1. Tension Clamps
2. Clamp Strip

Figure 4-11. Plate Tension Clamps

4. Expand the tension clamps and secure them in the first available groove (2, Fig. 4-11) on the cylinder.

5. Rotate the print cylinder for proper register and reengage the clutch.

(c) Setting Print Cylinder for Plates Mounted on Short Blankets.

Occasionally it becomes necessary to mount a short printing plate blanket so as to precisely locate the printing plate to contact the box blank at a particular location. To locate the plate properly, see Figure 4-12 and proceed as follows:

1. Measure the distance from the leading edge of the mounting strip to the leading edge of the printing plate.

2. Measure the distance from the leading edge of the box blank to the leading edge of the point the printing is to appear.

3. Subtract the smaller dimension from the larger. The resulting dimension is the amount the print cylinder must be advanced or retarded from "0" for proper placement of the printing impression on the blank.

4. Mount the printing plate on the print cylinder.

5. Rotate the cylinder to the established zero point on the handwheel scale (4, Fig. 4-5).

6. Advance or retard the cylinder an amount equal to that dimension obtained in step 3.

7. Reengage the print cylinder clutch.

8. Rotate the entire printing unit with the handwheel until the indicator on the exposed gear aligns with the frame indicator.

(d) Determining Plate Tension Band Length (Matthews Plate Mounting System).

Occasionally, printing blankets received at the press will require the installation of tension bands for attachment to the print cylinder. The following procedure should be used to determine the size of the proper tension band. In addition, the procedure also includes a method for use by die room personnel for determining the placement of the tension band grommet on the printing plate blanket and the proper tension band size.

1. Fabricating Cylinder Template.

a. Obtain a six-inch wide piece of printing plate blanket material sufficiently long to wrap around the printing cylinder.

b. Cement or staple a Matthews Fast-Lok strip to the leading of the blanket strip. See Figure 4-13.

c. Install the prepared blanket strip at the leading edge slot in the print cylinder.

d. Mark the position of the cylinder slot locations on the blanket strip. See figure 4-14.

2. Fabricating Punch Locator and Band Selector.

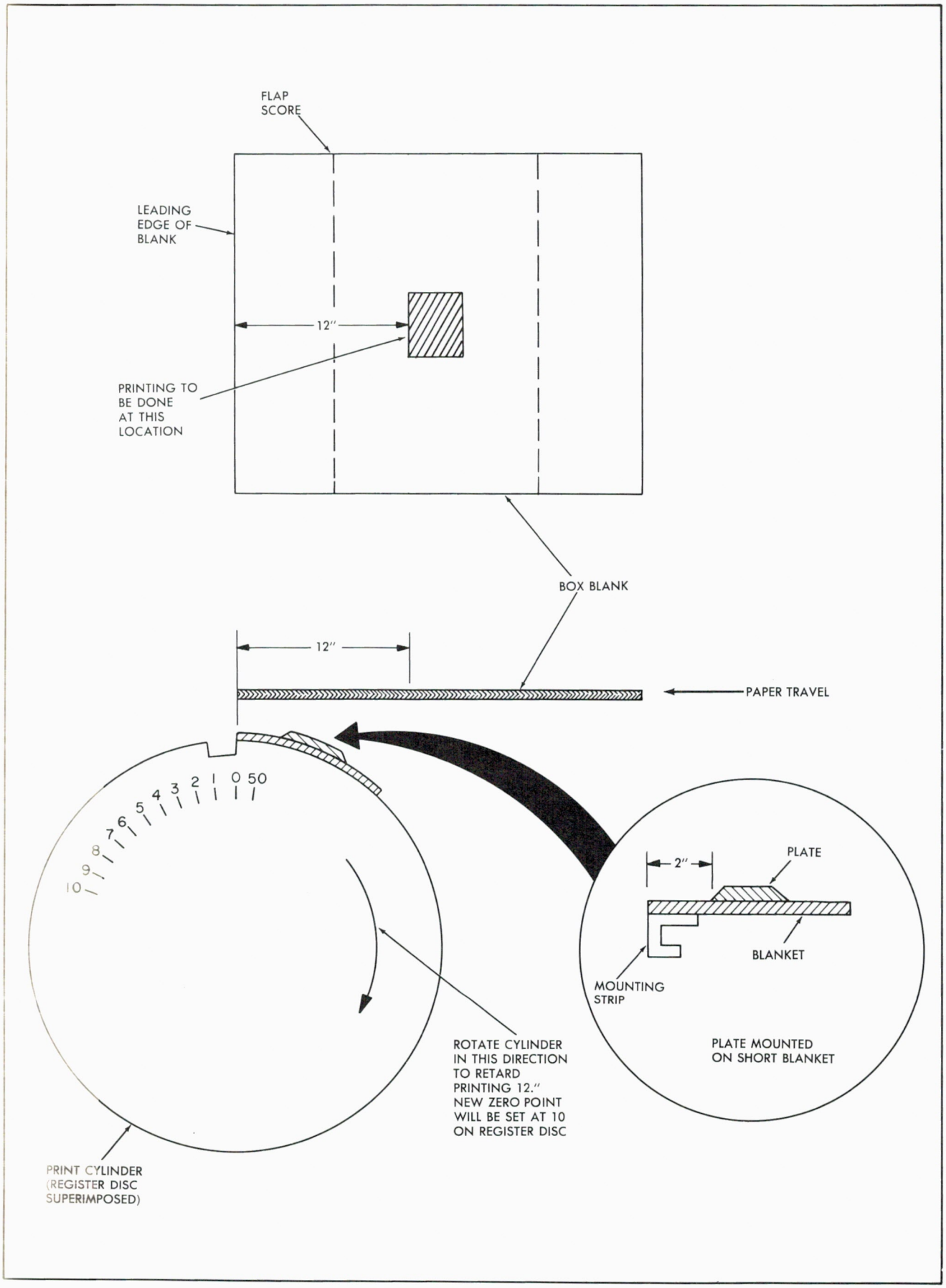


Figure 4-12. Example of Mounting Short Printing Plate Blanket

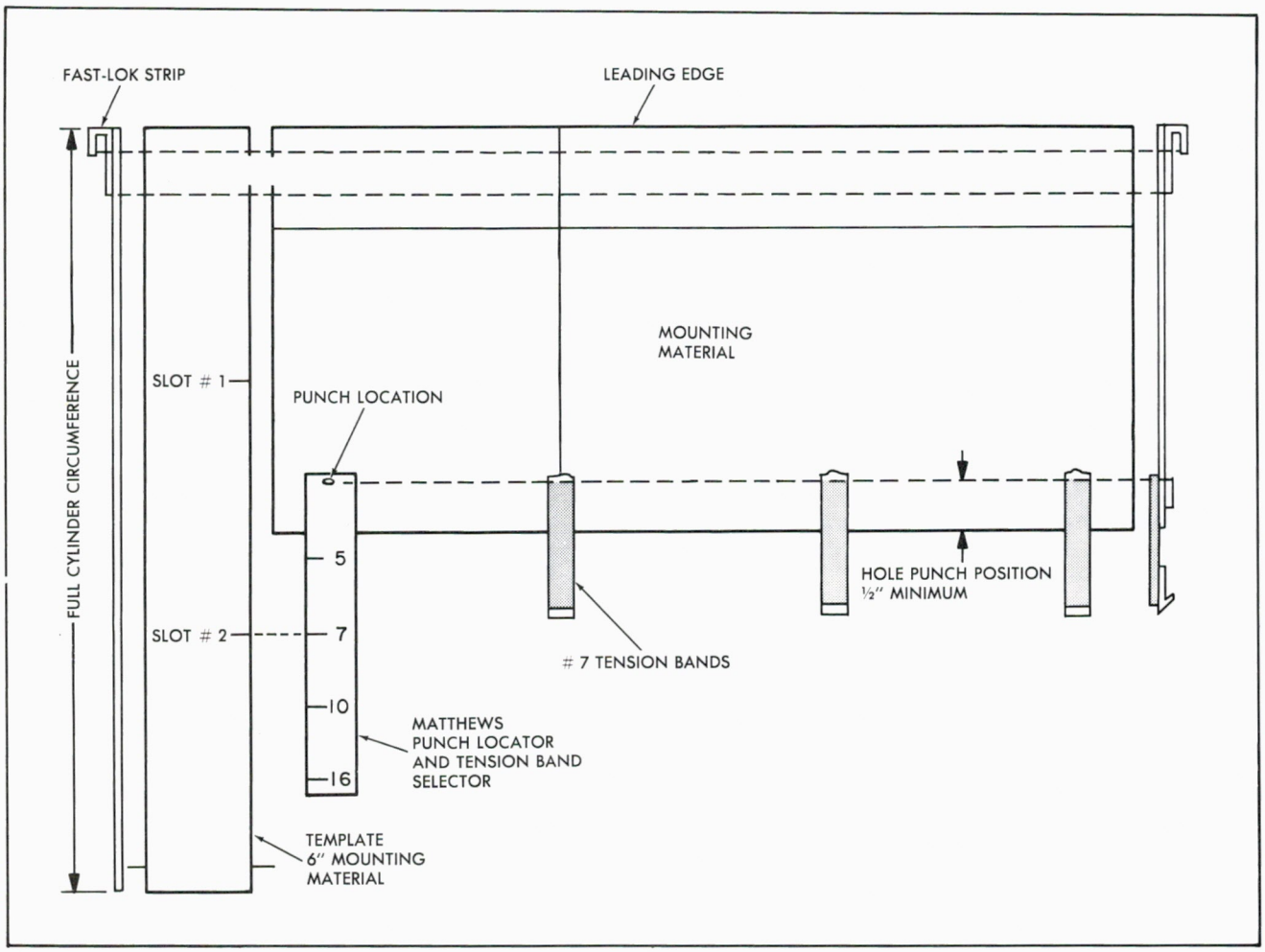


Figure 4-13. Template

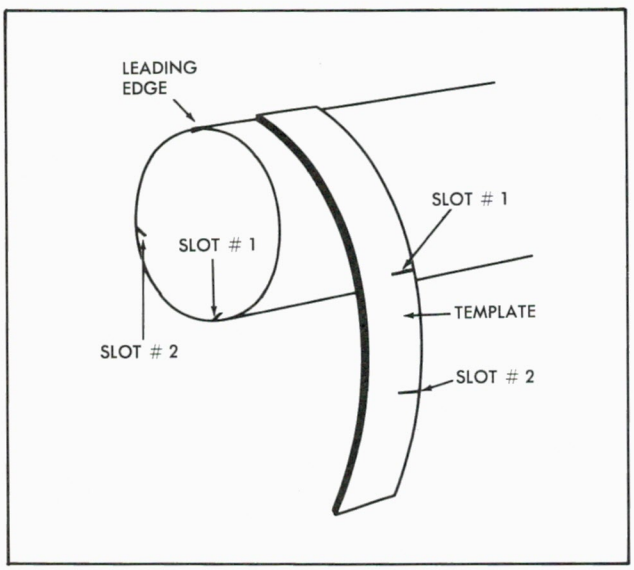


Figure 4-14. Locating Cylinder Slots

a. Obtain a metal strip approximately two inches wide by 20 inches long.

b. Drill a small diameter hole approximately at the location shown in Figure 4-15.

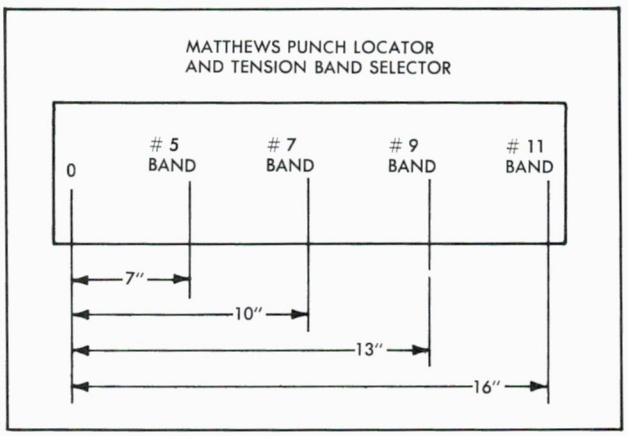


Figure 4-15. Punch Locator and Band Selector

c. Scribe a 7, 10, 13 and 16 inch location, from the hole center, on the metal strip. Identify each dimension for a tension band size as shown on Figure 4-15.

3. Die-Room Use.

To determine the location of the blanket grommets and the proper size tension bands to be used, see Figure 4-13 and proceed as follows:

a. Lay the printing plate blanket on a flat surface.

b. Align the leading edge of the template with the leading edge of the blanket.

c. Align one of the dimensions on the punch locator with one of the slot locations on the template.

Note

The slot location on the template must not fall within the area or dimension of the printing plate blanket.

d. Mark the punch location (center of the drilled hole on the punch locator) on the printing plate blanket. Check to ensure that the punch location is no closer than 1/2 inch from the edge of the printing plate blanket.

e. Read the tension band size required on the punch locator.

f. Install tension band grommets in the holes determined by the locations and use the proper tension band size indicated.

4. At The Press Use.

On occasion printing plates are received at the machine without tension bands installed. To determine the proper size tension band to use, see Figure 4-13 and proceed as follows:

a. Align the leading edges of the template and printing plate blanket.

b. Align the punch locator hole with the grommet hole in the printing plate blanket.

c. The tension band size required is the one that aligns with or is closest to alignment with a slot location on the template.

(5) Application and Installation of Pull Straps.

Constant and even contact of the paperboard with the printing unit cylinders assures desirable printing quality and prevents out-of-register printing. In addition, it prevents skewing and enables the board to enter the creaser/slotter and folding sections properly.

Pull straps are recommended to maintain non-slip contact when running short boxes, or when doing limited or no printing to prevent skewing and misregister.

(a) Running Short Boxes with Printing.

When running short boxes with printing, pull straps must be applied to the printing plate blanket and impression cylinder to facilitate feeding the box blank through the printing units.

Note

The preparation of the blanket should be made in the die room, prior to its use. The preparation of the impression cylinder should be done when the printing plate is installed on the print cylinder.

1. Preparation of Printing Plate.

Two straps, one on the operating side and one on the drive side extremity of the printing plate blanket will normally be sufficient to facilitate feeding the box blank. In cases where insufficient space on the printing plate blanket does not permit the installation of full length pull straps, several smaller straps may be installed.

a. Obtain pull straps from your printing plate manufacturer or any suitable source, fabricated to the specifications outlined in the chart of specifications.

b. Install the straps at strategic locations on the printing plate blanket. See Figure 4-16.

Note

Use an adhesive recommended by your printing plate manufacturer for mounting the straps.

2. Preparation of Impression Cylinder.

a. Obtain pull straps from your printing plate manufacturer, or any suitable source, fabricated to the specifications outlined in the chart of specifications.

b. Mount the prepared printing plate blanket on the print cylinder.

c. Install 0.032-inch mating straps on the impression cylinder using stickyback tape or an approved adhesive.

Note

Position the straps directly above those on the printing plate blanket and ensure that strap contact is maintained over the complete circumference. Some correction for misalignment can be overcome by using the impression cylinder lateral adjustment.

(b) No Printing.

When printing is not to be done, pull straps must be mounted on the print cylinder. Install the straps as follows:

1. Obtain pull straps from your printing plate manufacturer or any suitable force, fabricated to the specifications outlined in the chart of specifications.

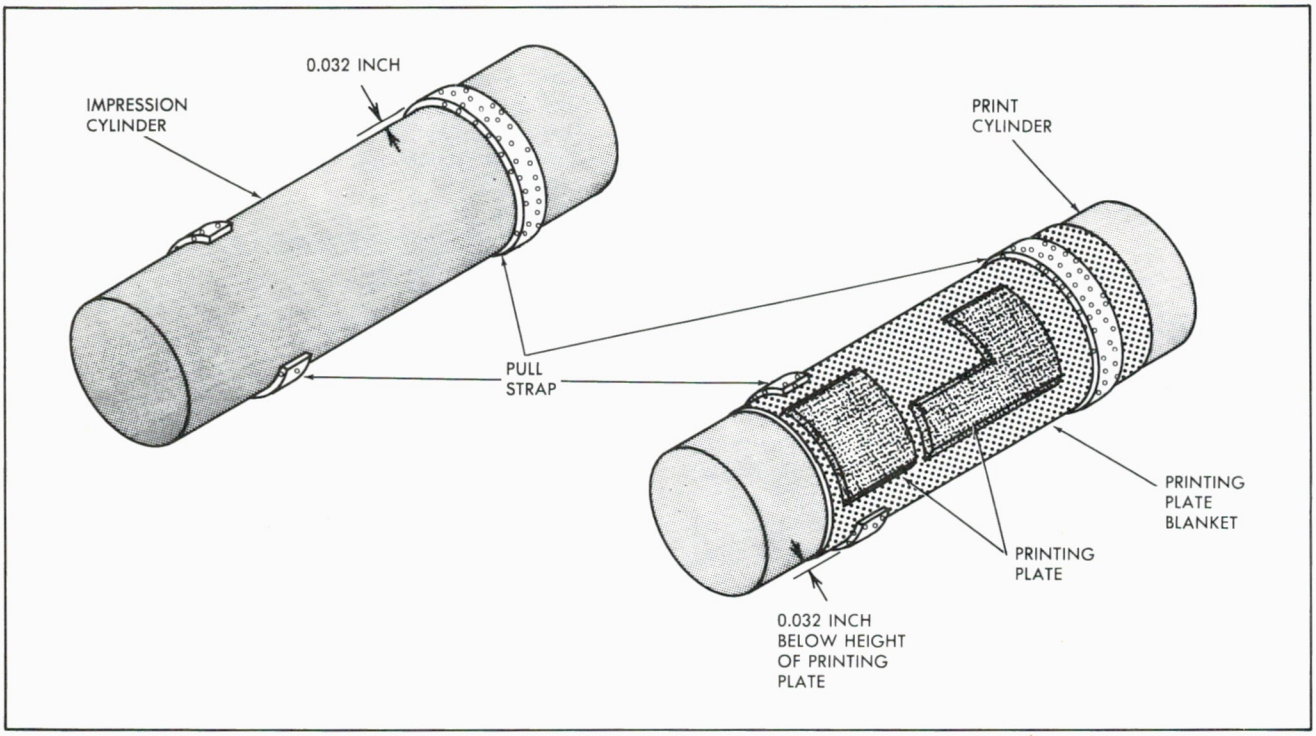


Figure 4-16. Pull Strap Installation

Note

For ease of installation, the pull strap mounting system should be identical to the printing plate mounting system in use on the machine (Matthews, Dorr or Stickyback).

2. Install the pull straps on the print cylinder within the box blank width dimension.

Note

A minimum of two straps must be used. Straps should be mounted at the extreme operating and drive sides of the box blank within the blank width. A third strap may be used at the blank center for additional control.

(c) Chart of Specifications.

Operation	Number of Straps	Strap Width	Strap Length	Strap Thickness	Required for Sheet Lengths of
No Printing	2 or 3 on print cylinder.	1-1/2 to 2 inches	Complete circumferential wrap on print cylinder.	Printing plate height plus backing.	All
Running Short Boxes	2 on printing plate blanket and 2 on impression cylinder or as plate configuration allows.	1-1/2 to 2 inches	As required but no longer than printing plate backing.	0.032 inch less than printing plate height (print cylinder), 0.032 inch (impression cylinder).	Less than 25 inches.
Running Short Boxes	2 on printing plate blanket. Locate on trim and glue lap.	1/2 to 1/4 inch	As required.	Same as plate height.	Less than 25 inches.

2. IMPRESSION CYLINDER.

a. Description.

The impression cylinder imparts a light pressure on the box blank as it passes over the printing plate and thus ensures a positive contact of the blank with the printing plate.

The impression cylinder (Figure 4-2) is located directly above the print cylinder. The cylinder is equipped with pneumatic components (5, Fig. 4-6) to automatically raise and lower it as the machine starts and stops.

b. Controls

(1) Impression cylinder UP/DOWN pushbuttons (3 and 4, Fig. 4-5) are located on the upper printing unit brace. They are used to facilitate caliper adjustment during setup, to check gap between the impression cylinder and printing plates, or when a sheet is to be proof printed.

(2) An impression cylinder VERTICAL ADJUSTMENT (3, Fig. 4-6) is located on the printing unit operating side frame. The adjustment is used for setting the gap between the impression cylinder and the printing plate for the caliper of board to be run. In addition, the adjustment is equipped with a caliper indicator which gives a visual indication of the gap set. Setting and reading can only be made when the impression cylinder is in the DOWN position. A LOCK (4, Fig. 4-6) is provided for the adjustment to prevent accidental movement of the setting.

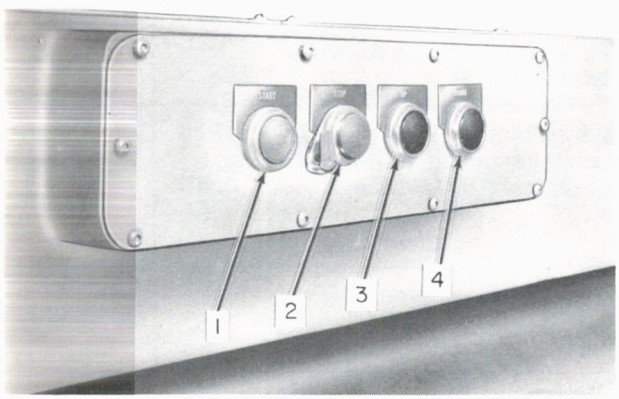
CAUTION

The adjustment must be locked after setting or the caliper setting will be lost when the cylinder automatically goes up.

c. Setup.

(1) Press the impression cylinder DOWN pushbutton (4, Fig. 4-17).

(2) Unlock the CALIPER ADJUSTMENT (3, Fig. 4-6) and rotate the adjustment until the specified board caliper dimension is aligned with the caliper indicator index.



1. Start Button
2. Stop Button
3. Impression Cylinder Up Button
4. Impression Cylinder Down Button

Figure 4-17. Proof Printing Electrical Panel

CAUTION

After completing the adjustment, lock it. If the adjustment is not locked and the UP pushbutton is pressed the roll will come up to its extreme up position and readjustment will be required.

(3) Press the impression cylinder UP pushbutton (3, Fig. 4-17).

3. INK (ANILOX) ROLL.

a. Description.

The steel anilox roll (Figure 4-2) is located directly below the print cylinder. The roll is made with a high degree of accuracy and is mechanically engraved to provide the surface with a uniform pattern of cells. It is equipped with a pneumatic system (2, Fig. 4-6) to automatically retract it from contact with the printing plate when the machine is stopped and to return it to the operating positions when the machine is restarted. The purpose of the roll is to transfer a metered film of ink to the printing plate.

The anilox roll is the heart of the ink system and must be handled with extreme care to avoid damaging it. Adherence to the following instructions will result in an increase in the service life of the roll.

(1) Never run or idle the roll dry with air pressure applied to the doctor blade.

(2) Do not use corrosive or abrasive materials for cleaning.

(3) Keep the doctor blade pressure at a minimum.

(4) Change the doctor blade when required.

(5) Keep the blade and ink system free of dried ink. Use ink that contains the least possible abrasives and is guaranteed to contain nothing that will attack chrome plate.

(6) Check all printing plate blankets for weak, loose or protruding grommets, straps and staples that could score or scratch the roll during a run.

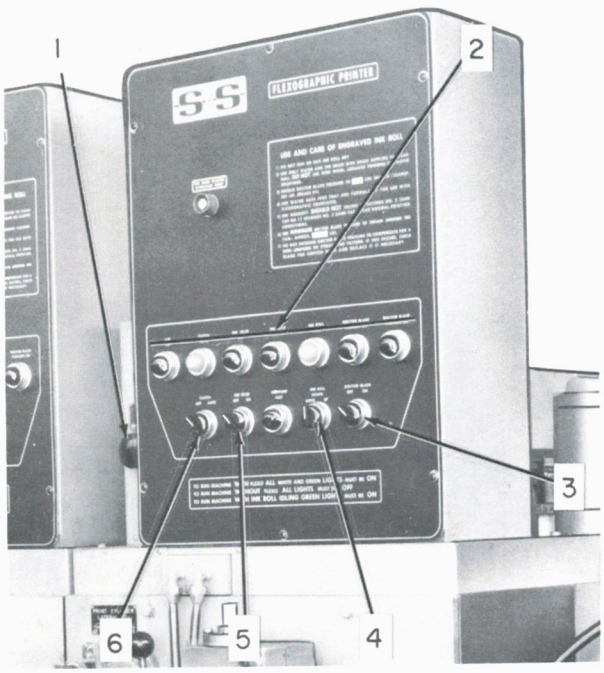
(7) Use care when removing staples from Permatone covered cylinders.

Note

The ink carrying capacity of the ink roll can be affected by a buildup of dry ink in the roll cells or pockets. This can occur in spots or over the entire roll and will result in the roll performing as if it were worn. Ink rolls must be wet with ink or water, when running, idling or cleaning, and as long as the doctor blade is against the roll under pressure. This prevents ink from drying in the roll cells and protects the blade and roll from wear by friction and heat.

b. Controls.

(1) An ink roll OFF/ON SWITCH (5, Fig. 4-18) is located on the electrical panel. When the switch is ON, it actuates the ink roll idling motor to keep the roll idling when the machine is not running to prevent buildup of ink and ink coagulation on the roll. When the machine is started, the idling motor is automatically stopped and the machine drive takes over the driving function.



1. Doctor Blade Pressure Adjustment Knob
2. Lights
3. Doctor Blade Pressure Selector Switch
4. Ink Roll Selector Switch
5. Ink Roll Idler Motor Off/On Switch
6. Ink Roll Clutch Selector Switch
7. Pressure Gauge

Figure 4-18. Printing Unit Electrical Control Panel

(2) An ink roll SELECTOR SWITCH (4, Fig. 4-18) is located on the electrical control panel. The switch has UP and DOWN positions to permit raising and lowering the ink roll. In addition, the switch has an AUTOMATIC position. When the switch is set in the AUTOMATIC position, the ink roll is automatically raised and lowered when the machine is started and stopped, respectively.

(3) An ink roll HEIGHT ADJUSTMENT (9, Fig. 4-6) is located at the bottom of the operating side frame. It is used to raise or lower the ink roll to obtain the required kiss contact between the ink roll and the printing plate. The adjustment has a LOCK (8, Fig. 4-6) to prevent accidental movement after setting and a caliper indicator to facilitate setting.

(4) An ink roll CLUTCH SELECTOR SWITCH (6, Fig. 4-18) is located on the electrical panel. When the selector switch is in the OFF position, the ink roll is disengaged from the main gear train. This switch position is used for bypassing the printing unit if no printing is to be done. When printing, the switch must be in the AUTOMATIC position. In this position the drive to the ink roll is automatically engaged when the machine is running and disengaged when the machine stops.

c. Setup.

(1) Place the CLUTCH SELECTOR SWITCH (6, Fig. 4-18) in the AUTO position.

(2) Place the ink roll SELECTOR SWITCH (4, Fig. 4-18) in the AUTO position.

4. INK METERING SYSTEM.

a. Description.

The ink metering system (Figure 4-2) consists of a doctor blade, a removable blade holder and clamp, side dams and a supporting member. The pneumatically loaded doctor blade removes or shaves excess ink from the surface of the ink roll, leaving the precise amount needed for good printing.

Doctor blades are made of plastic and are mounted in pivoted holders. The blade is air loaded at intervals along its entire length to provide a uniformly distributed pressure of the blade against the roll.

The doctor blade assembly incorporates a limit switch. When the blade assembly is in the retracted (non-operating) position, the limit switch is opened and prevents operation of the feed end roll-back motor.

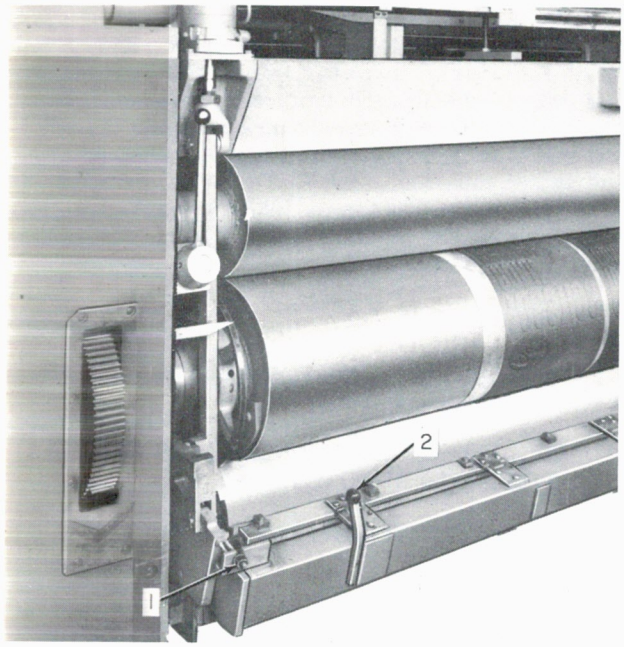
b. Controls.

(1) A doctor blade PRESSURE SELECTOR SWITCH (3, Fig. 4-18) is located on the electrical control panel. The switch is an ON/OFF selector which opens or closes the air supply to the doctor blade cylinders.

(2) The air supply to the doctor blade is controlled by a PRESSURE VALVE (1, Fig. 4-18), located next to the electrical control panel. It is used to set the doctor blade air pressure (40 psi).

(3) Doctor blade assembly POSITION LOCKS (1, Fig. 4-19) are provided for the operating and drive sides of the doctor blade assembly. They are used to lock the doctor blade assembly in the operating position.

(4) Doctor blade POSITIONING LEVERS (2, Fig. 4-19) are located on the front of the doctor blade assembly on both the operating and drive sides of the machine. The levers facilitate pivoting the doctor blade assembly into or out of operating position.



1. Position Locks
2. Positioning Levers

Figure 4-19. Doctor Blade Assembly

c. Setup.

(1) Using the doctor blade POSITIONING LEVERS (2, Fig. 4-19), raise the doctor blade into operating position.

(2) Lock the blade assembly in position with POSITION LOCKS (1, Fig. 4-19).

(3) Set 40 psi on the doctor blade pressure gauge using the PRESSURE VALVE (1, Fig. 4-18).

Note

A higher initial pressure may be necessary to overcome inertia of the blade holder. Reduce pressure to 40 psi for running.

CAUTION

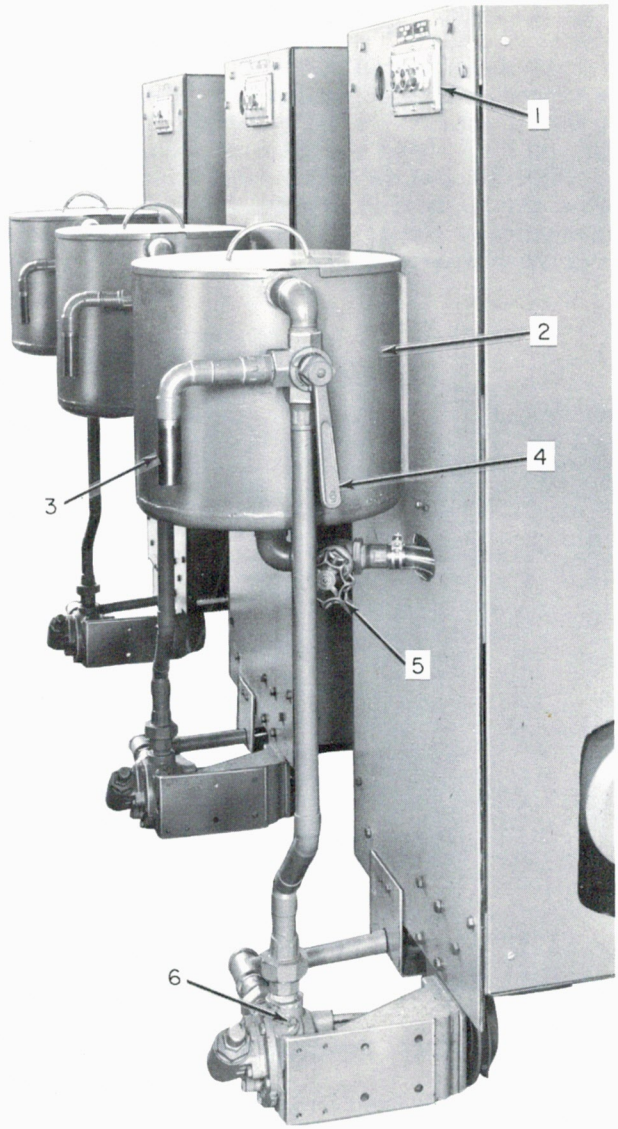
The doctor blade assembly must be in operating position with air pressure applied if ink is flowing or circulating.

5. INK CIRCULATING SYSTEM.

a. Description.

Each printing unit is equipped with an ink circulating system (Figure 4-20) mounted on the drive side frame.

The system is a closed system (Figure 4-21), except for washups. Ink from the reservoir flows by means of gravity to the center of the ink trough formed by the ink roll and doctor blade. The ink



1. Pump Electrical Control Panel
2. Reservoir
3. Drain Line
4. Directional Valve
5. Reservoir Outlet Valve
6. Pump

Figure 4-20. Ink Circulating System

flows along the trough toward the drive and operating sides of the machine. Ink is deposited on the rotating ink roll. The excess removed by the doctor blade and that remaining in the trough is directed by funnels, at the ends of the ink roll, to a supplementary trough below the roll. The pump maintains a continuous flow or circulation from the supplementary trough by returning the excess or overflow to the reservoir.

By proper use of the system valves, the system is converted for draining and washup.

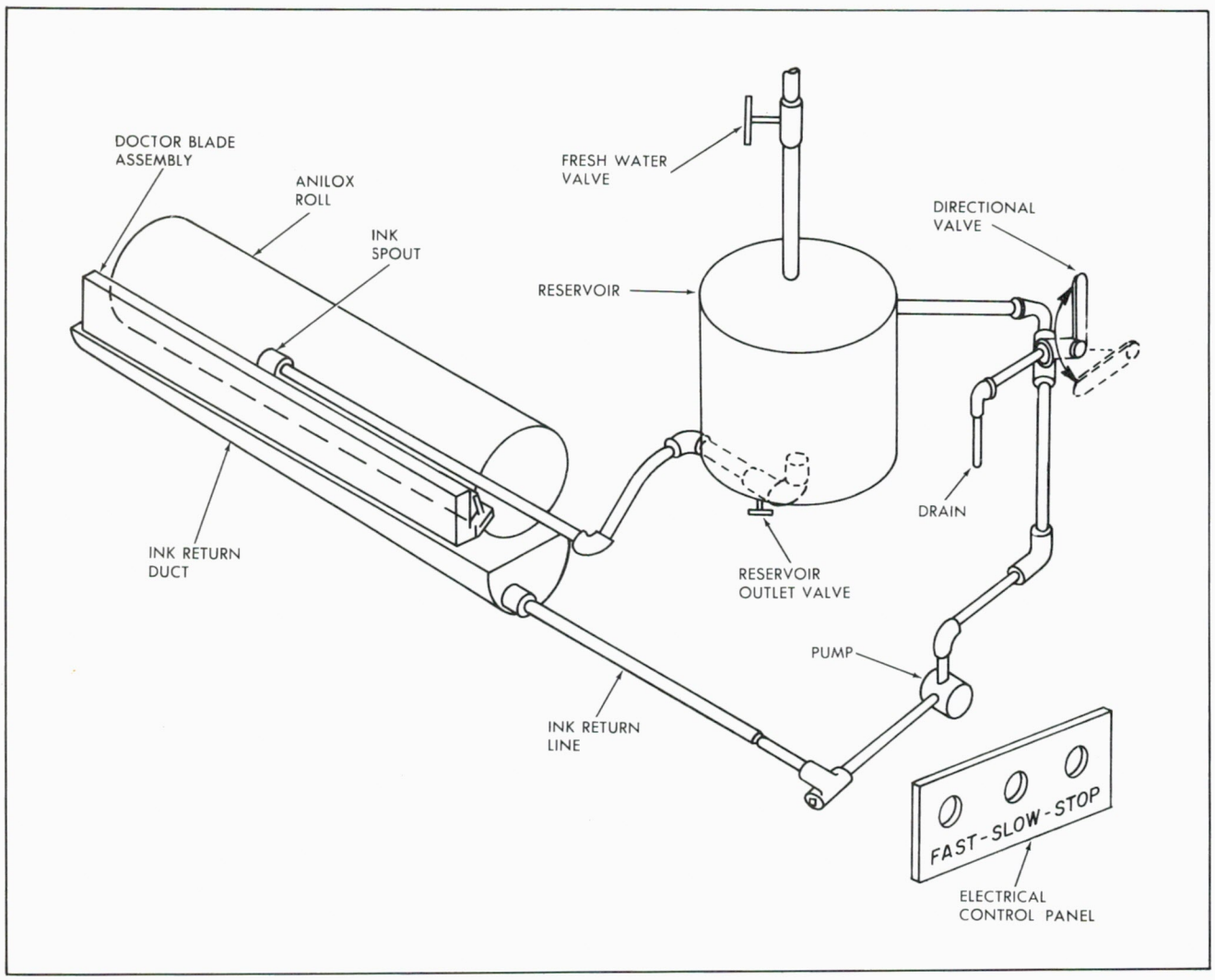


Figure 4-21. Ink Circulating System Schematic

b. Controls.

(1) PUMP MOTOR CONTROL SWITCHES (Figure 4-22) are mounted on an electrical panel on the drive side frame. SLOW speed (2, Fig. 4-22) is used for circulating ink, FAST speed (1, Fig. 4-22) is used for cleanup or washup. A STOP switch (3, Fig. 4-22) is also provided to shut down the ink pump.

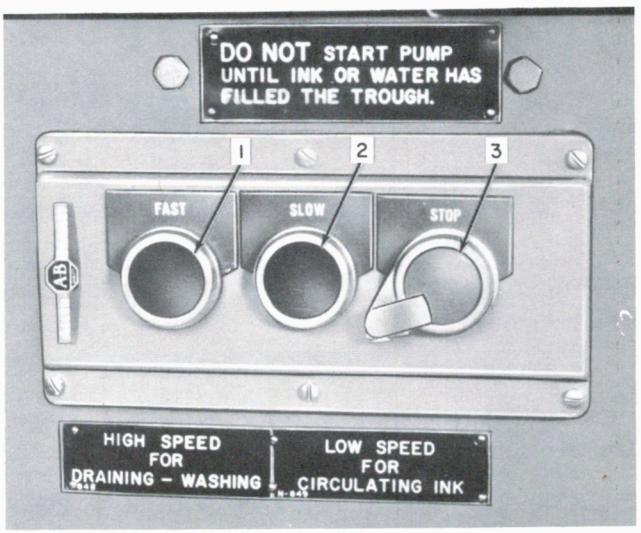
(2) DIRECTIONAL (4, Fig. 4-20) and RESERVOIR (5, Fig. 4-20) valves are located on the drive side. The valves control the circulation of fluid, whether ink for printing or water for washup.

c. Setup.

(1) Filling.

CAUTION

Ensure that the DOCTOR BLADE PRESSURE SELECTOR SWITCH (3, Fig. 4-18) and the INK ROLL IDLER MOTOR SELECTOR SWITCH (5, Fig. 4-18) are in the ON position.



1. Fast Button
2. Slow Button
3. Stop Button

Figure 4-22. Ink Circulating System Pump Control Switches

WARNING

Running the ink roll dry is detrimental to roll life. DO NOT run the roll dry any longer than absolutely necessary.

(a) Turn the ink dams to the operating position.

(b) Close the RESERVOIR OUTLET VALVE (5, Fig. 4-20).

(c) Turn the DIRECTIONAL VALVE (4, Fig. 4-20) handle away from the drain line.

(d) Fill the reservoir with ink.

Note

The recommended ink viscosity is 25 seconds, No. 2 Zahn cup or 15 seconds, No. 3 Zahn cup.

(e) Open the RESERVOIR OUTLET VALVE (5, Fig. 4-20).

(f) When the doctor blade trough overflows, press the pump SLOW speed switch (2, Fig. 4-22) to start circulation.

(2) Color Change.

When necessary to make a color change, the procedure outlined for setup of the printing unit must be preceded by proper draining and cleanup of the system.

(a) Open the side dams at both ends of the ink roll.

(b) Place a bucket under the ink system drain line (2, Fig. 4-21).

(c) Turn the DIRECTIONAL VALVE (4, Fig. 4-20) so the handle points to the drain line (3, Fig. 4-20).

(d) Press the pump motor FAST speed switch.

(e) When ink flow is down to a minimum, turn the DIRECTIONAL VALVE (4, Fig. 4-20) to the circulating position.

(f) Place the drain hose in the sewer.

(g) Place a fresh water hose in the reservoir and turn on the water.

(h) Turn the DIRECTIONAL VALVE (5, Fig. 4-20) to the drain position.

Note

The flushing should be continued until the waste water runs clear.

(i) Close the fresh water valve, remove the hose, drain the system of water and shut off the pump.

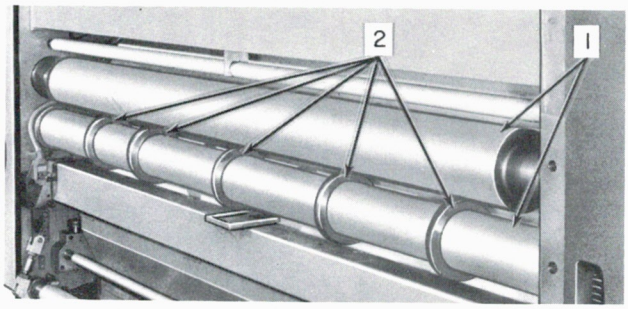
(j) Close the reservoir outlet valve (5, Fig. 4-20).

(k) Fill the reservoir with new ink.

6. PULL ROLLS.

a. Description.

A pair of pull rolls (1, Fig. 4-23) are incorporated in the printing unit directly behind the printing components. The lower pull roll is equipped with movable pull collars, (2, Fig. 4-23) which must be set to avoid contact with the printed surfaces of the box blank. The purpose of the pull rolls is to provide support for feeding of the box blank to the next machine unit.



1. Pull Rolls
2. Pull Collars

Figure 4-23. Pull Rolls

b. Controls.

The upper rolls are equipped with a CALIPER ADJUSTMENT (11, Fig. 4-6) and indicator for setting the gap between rollers for proper feeding action. A LOCK (10, Fig. 4-6) is provided to prevent accidental movement of the setting.

c. Setup.

(1) Loosen the collar clamp screws.

(2) Position the collars at a point on the shaft where they will not contact the printed area.

(3) Lock the collars with the clamp screws.

(4) Rotate the CALIPER ADJUSTMENT LOCK (10, Fig. 4-6), to unlock the adjustment.

(5) Using the CALIPER ADJUSTMENT (11, Fig. 4-6) set the appropriate dimension on the indicator.

(6) Secure the setting using the LOCK.

7. CONTROL PANEL SETUP CONDITION FOR VARIOUS PRINTING OR NO-PRINTING CONDITIONS.

Check all switch positions and light conditions on the printing unit control panel, as shown on Figures 4-23A, 4-23B and 4-23C, to determine if setup of the printing unit is correct for the printing condition required.

8. PROOF-PRINTING.

a. Unlock the ink roll HEIGHT ADJUSTMENT (9, Fig. 4-6) with the LOCK LEVER (8, Fig. 4-6).

b. Using the height adjustment, lower the ink roll (open) until the indicator reads 0.010 inch less than zero.

c. Press and hold the printing unit START button (1, Fig. 4-17) on the proof printing control panel. Release the button when the cylinder starts rotating.

WARNING

Keep hands, rags, tools and clothing away from the rotating parts.

Note

When the start button is pressed, the ink roll will stop idling and will go up automatically and the impression cylinder will go down automatically.

d. Allow the print cylinder to make two or three revolutions.

e. Press the STOP button (2, Fig. 4-17).

f. Check the ink pickup on the printing plates.

g. If the plates do not pick up ink, raise (close) the ink roll, using the height adjustment, until ink begins to appear on the plates.

CAUTION

Excessive contact between the ink roll and the printing plates can result in excessive wear or burning of the plates, variation in register, premature wear or damage to the ink roll, poor print definition or damage to the running register.

h. Raise the ink roll one graduation (0.005 inch) toward the plates after initial contact with the plates has been made.

Note

Plates that are uniform in height (not worn or cupped more than 0.005 inch) should be completely covered with ink at this point.

i. Plates or areas of plates that do not cover with ink at this time, are worn or cupped more than 0.005 inch and should be built up with makeready to make them of equal height.

Note

Use 0.006 to 0.009 inch thick paper for makeready purposes.

j. Upon completion of makeready, lower the ink roll one graduation (0.005 inch) from the printing plates.

k. Wash the printing plates and recheck them for ink coverage as outlined in steps c. through h.

l. If the plates are still not completely covered with ink, repeat the makeready procedure and again check for ink coverage.

m. When ink coverage is satisfactory, turn the printing unit, using the handwheel, to align the exposed gear indicator with the frame indicator.

n. Lock the height adjustment with the LOCK LEVER.

o. Disengage the running register clutch and turn the print cylinder until the desired scale dimension aligns with the brass pointer.

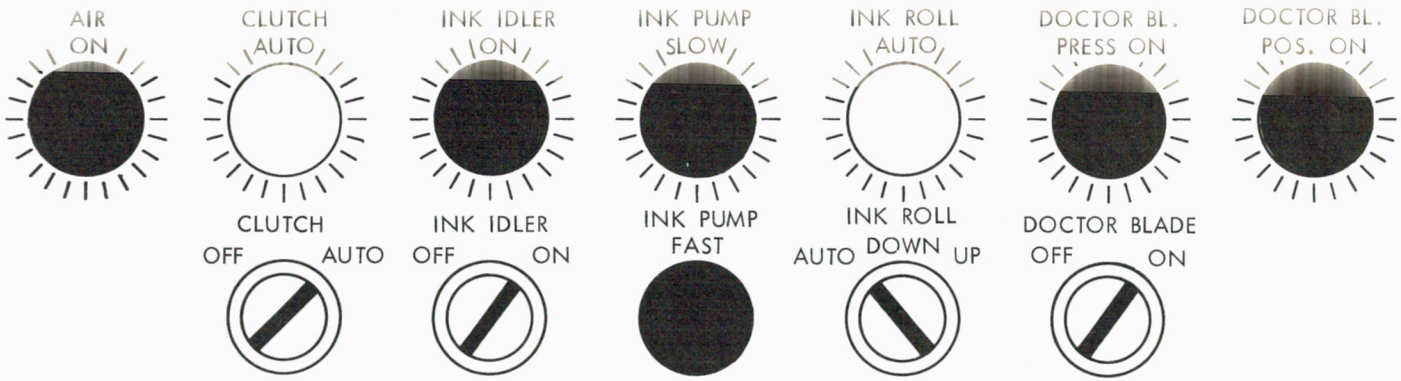
G. CLEANING RECOMMENDATIONS

Dried and hardened flexographic ink is an abrasive material that can cause ink roll wear and pump failure. Ink that accumulates on the blade, just below its contact point with the ink roll, must be removed to prevent streaking the ink film and scratching the surface of the ink roll.

The doctor blade, holder, splash guard and baffle must be thoroughly cleaned at least once in each eight hour running period. The ink reservoir filter must be cleaned, as often as required, to prevent hardened ink particles and paper dust from getting back into the ink system.

The ink carrying capacity of the ink roll can be affected by a buildup of dry ink in the roll cells or pockets. This can occur in spots or over the entire roll and will result in the roll performing as if it were worn. Ink rolls must be wet, with ink or water, when running, idling or cleaning, and as long as the doctor blade is against the roll under pressure. This prevents ink from drying in the roll cells and protects the blade and roll from wear by friction and heat.

At each color change, spray the ink roll with S&S Flexoff and brush it down.



TO RUN MACHINE WITH FLEXO PRINTING, THE CONTROL PANEL MUST BE SET UP AS SHOWN ABOVE.

SELECTOR SWITCH	POSITION	CONDITION OF LIGHT
1. INK ROLL	"AUTO"	(WHITE LIGHT "ON")
2. CLUTCH	"AUTO"	(WHITE LIGHT "ON")
3. INK IDLER	"ON"	(GREEN LIGHT "ON")
4. DOCTOR BLADE (AIR PRESSURE)	"ON"	(GREEN LIGHT "ON")

LIGHTS

5. AIR ON - - - - GREEN LIGHT ILLUMINATED.
6. DOCTOR BLADE POS. ON - - - - GREEN LIGHT ILLUMINATED.
7. INK PUMP SLOW - - - - GREEN LIGHT ILLUMINATED.

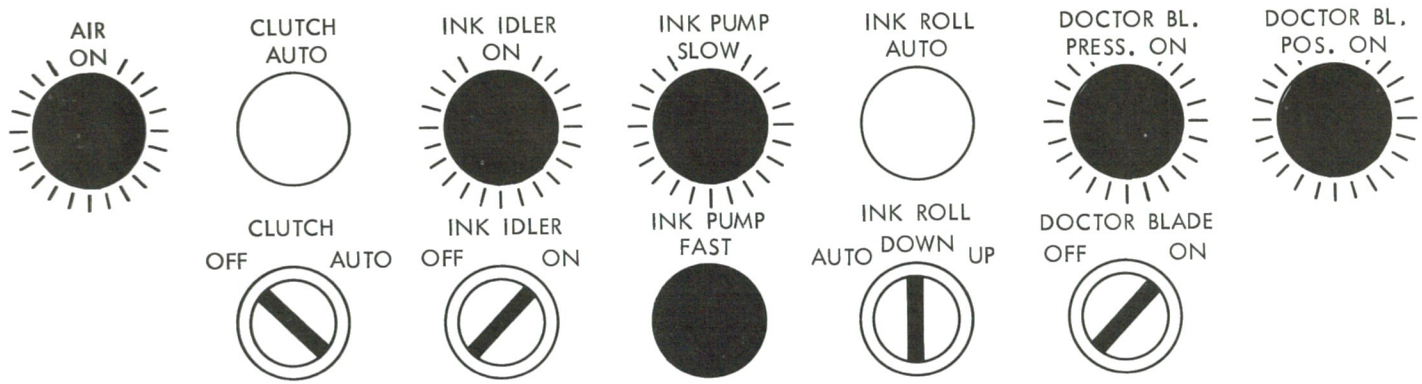
NOTE: INK PUMP FAST LIGHT (RED) SHOULD BE "OUT".


INDICATES LIGHT ON


INDICATES LIGHT OFF


INDICATES SELECTOR SWITCH

Figure 4-23A. Switch and Light Positions When Printing



TO RUN MACHINE WITHOUT PRINTING BUT WITH INK ROLL IDLING, CONTROL PANEL MUST BE SET UP AS SHOWN ABOVE.

INDICATES LIGHT ON

INDICATES LIGHT OFF

INDICATES SEL. SWITCH

SELECTOR SWITCH	POSITION	CONDITION OF LIGHT
1. INK ROLL	"DOWN"	WHITE LIGHT "OFF"
2. CLUTCH	"OFF"	WHITE LIGHT "OFF"
3. INK IDLER	"ON"	GREEN LIGHT "ON"
4. DOCTOR BLADE (AIR PRESSURE)	"ON"	GREEN LIGHT "ON"

LIGHTS

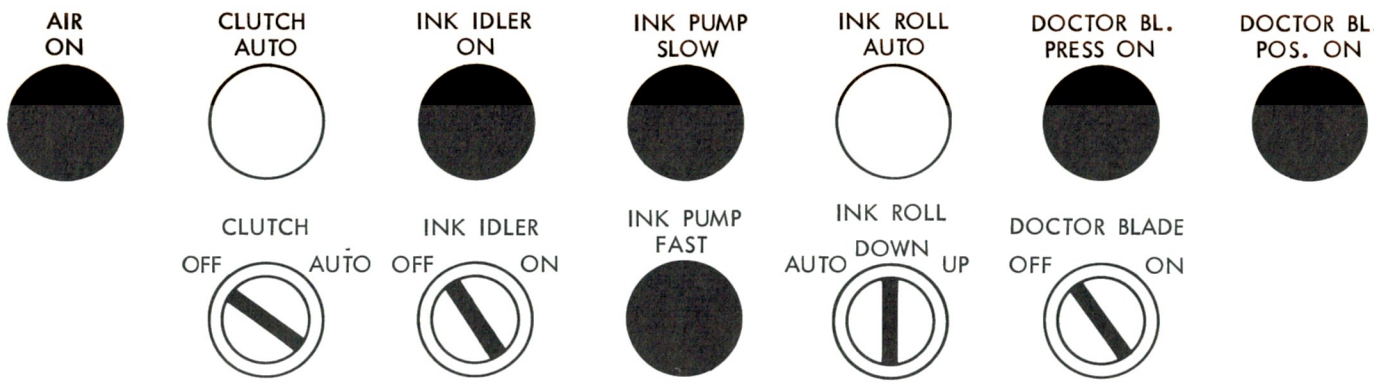
5. AIR ON - - - - GREEN LIGHT ILLUMINATED.
6. DOCTOR BLADE POS. ON - - - - GREEN LIGHT ILLUMINATED.
7. INK PUMP SLOW - - - - GREEN LIGHT ILLUMINATED.

NOTE 1: WHEN THE DOCTOR BLADE SELECTOR SWITCH (AIR PRESSURE) IS TURNED TO "OFF" THE PRESS. ON, POS. ON AND AIR ON LIGHTS WILL GO "OFF".

NOTE 2: WHEN THE MAIN AIR LINE PRESSURE IS "OFF" THE AIR ON LIGHT, PRESS. ON LIGHT AND, POS. ON LIGHT WILL BE "OFF" REGARDLESS OF DOCTOR BLADE SELECTOR SWITCH SETTING.

NOTE 3. WHEN THE AIR PRESSURE TO THE DOCTOR BLADE IS TOO LOW THE PRESS. ON LIGHT AND POS. ON LIGHT WILL BE "OFF" REGARDLESS OF DOCTOR BLADE SELECTOR SWITCH SETTING. THE AIR ON LIGHT (LINE PRESSURE) WILL BE "ON".

Figure 4-23B. Switch and Light Positions When Bypassing Printer With Ink in Circulating System



TO RUN MACHINE WITHOUT PRINTING, THE CONTROL PANEL MUST BE SET UP AS SHOWN ABOVE.

SELECTOR SWITCH	POSITION	CONDITION OF LIGHT
1. INK ROLL	"DOWN"	WHITE LIGHT "OFF"
2. CLUTCH	"OFF"	WHITE LIGHT "OFF"
3. INK IDLER	"OFF"	GREEN LIGHT "OFF"
4. DOCTOR BLADE (AIR PRESSURE)	"OFF"	GREEN LIGHT "OFF"

LIGHTS

5. AIR ON - - - - GREEN LIGHT "OFF".
6. DOCTOR BLADE POS. ON - - - - GREEN LIGHT "OFF".
7. INK PUMP SLOW - - - - GREEN LIGHT "OFF".

NOTE: INK PUMP FAST LIGHT (RED) SHOULD BE "OUT".

INDICATES LIGHT ON

INDICATES LIGHT OFF

INDICATES SELECTOR SWITCH

Figure 4-23C. Switch and Light Positions When Bypassing Printing Unit With No Ink in Circulating System

1. DAILY CLEANUP PROCEDURE (Once Per Shift).

CAUTION

DO NOT use metal tools of any kind to clean the ink roll or doctor blade.

DO NOT use metal tools or a brass wire brush to clean Teflon coated parts.

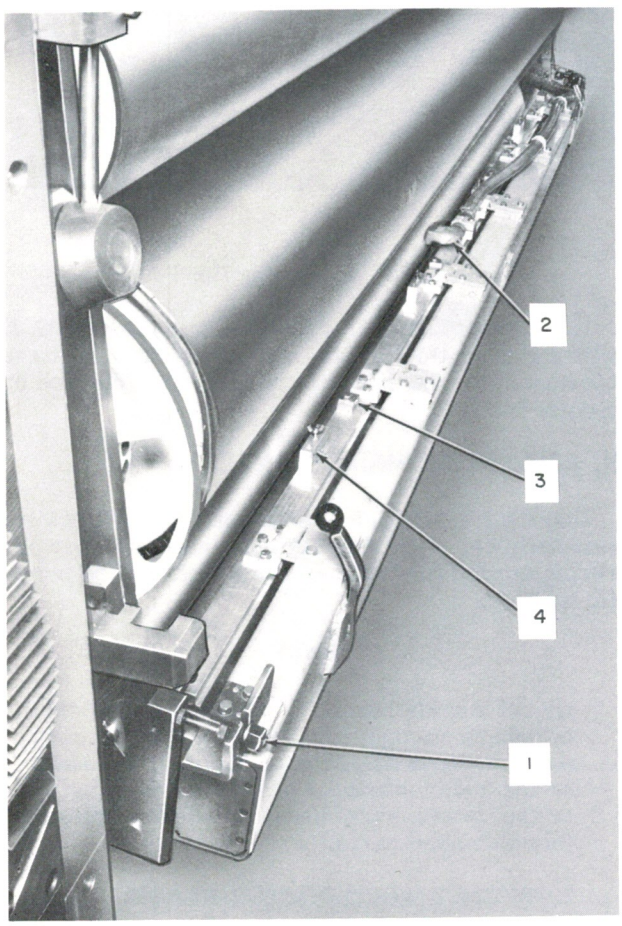
DO NOT use caustic solutions, steel wool or abrasive powders to clean any part of ink system.

AVOID getting scrap or chips of dried ink into the pump.

a. After normal washup, turn the ink roll IDLER MOTOR OFF/ON SWITCH (5, Fig. 4-18) to the OFF position.

b. Place the doctor blade PRESSURE SELECTOR SWITCH (3, Fig. 4-18) in the OFF position.

c. Loosen the swing bolt nuts (1, Fig. 4-24) at each end of the doctor blade assembly and lower the assembly.



1. Swing Bolt Nuts
2. Ink Spout
3. Blade Holder Clamps
4. Baffle Wing Nuts

Figure 4-24. Replacing Doctor Blade

d. Loosen the baffle wing nuts (4, Fig. 4-24) and remove the baffle.

e. Clean the baffle using a Nylon brush and S&S Flexoff.

f. Wipe the baffle clean, dry it and lay it aside.

g. Clean both sides of the doctor blade with S&S Flexoff and SOFT RAGS. Remove ALL dried ink.

h. Replace the baffle and tighten the wing nuts (4, Fig. 4-24).

i. Raise the blade assembly to operating position and tighten the swing bolt nuts (1, Fig. 4-24).

j. Place the doctor blade PRESSURE SELECTOR SWITCH (3, Fig. 4-18) in the ON position.

k. Place the ink roll IDLER MOTOR OFF/ON SWITCH (5, Fig. 4-18) in the ON position.

l. Pour two quarts of S&S Flexoff in the ink reservoir.

m. Fill the reservoir half full with water.

n. Turn the DIRECTIONAL VALVE (3, Fig. 4-20) to the CIRCULATE position. Press the SLOW speed button (2, Fig. 4-22) and circulate the solution for 15 minutes.

o. During this time, scrub the ink roll using a brass wire brush and the solvent in the system.

Note

This must be done to prevent gradual buildup of dried ink in the cells of the ink roll which will reduce its ink carrying capacity.

p. Place the DIRECTIONAL VALVE in the DRAIN position to remove the cleaning solution.

q. Remove the reservoir filter and clean it.

r. Place a fresh water hose in the reservoir and flush the entire system.

s. After the flushing is completed, shut off the water, press the pump STOP button (3, Fig. 4-22) when the water stops draining, dry the roll and doctor blade and place the ink roll IDLER MOTOR OFF/ON SWITCH (5, Fig. 4-18) in the OFF position.

2. WEEKLY CLEANUP PROCEDURE.

CAUTION

AVOID getting scrap or chips of dried ink into the ink pump.

a. Perform steps a. through e. of paragraph I. 2. (Doctor Blade Replacement).

b. Clean up the holder and blade using S&S Flexoff and SOFT RAGS or a Nylon brush. After cleaning flush with water and dry.

c. Inspect the blade for damage (nicks and cuts on edge), excessive wear, waviness or uneven wear.

Note

The blade must be replaced anytime the above conditions affect print results.

d. Remove the ink roll end slingers (1, Fig. 4-25) and funnels (2, Fig. 4-25) and clean them.

Note

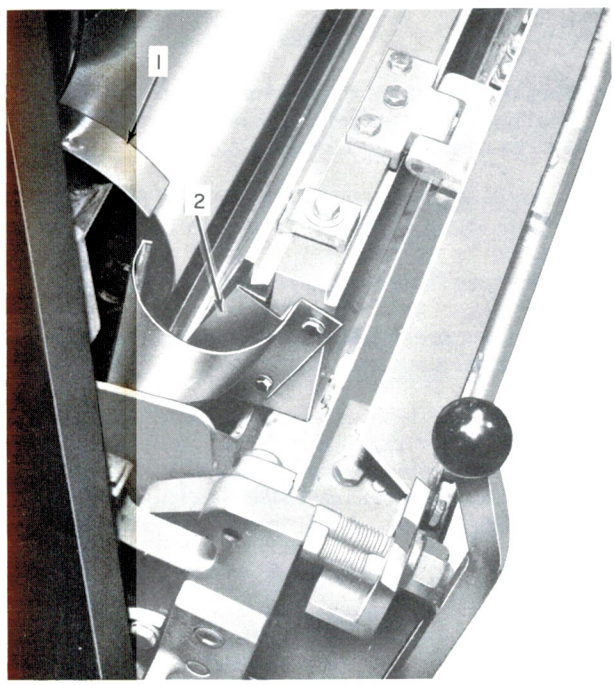
Use a Nylon brush or rags to clean Teflon coated parts.

e. Disconnect the plastic hose from the ink trough on the drive side of the machine.

f. Loosen the trough locking bolts, at both ends of the trough, and remove the trough (Figure 4-26). Clean the trough thoroughly.

g. Reinstall the trough, connect the plastic hose, reinstall the funnels, slingers, blade holder assembly and baffle.

h. Raise the blade assembly to the operating position and tighten the swing bolt nuts.



1. Slinger
2. Funnel

Figure 4-25. Ink System Slingers and Funnels

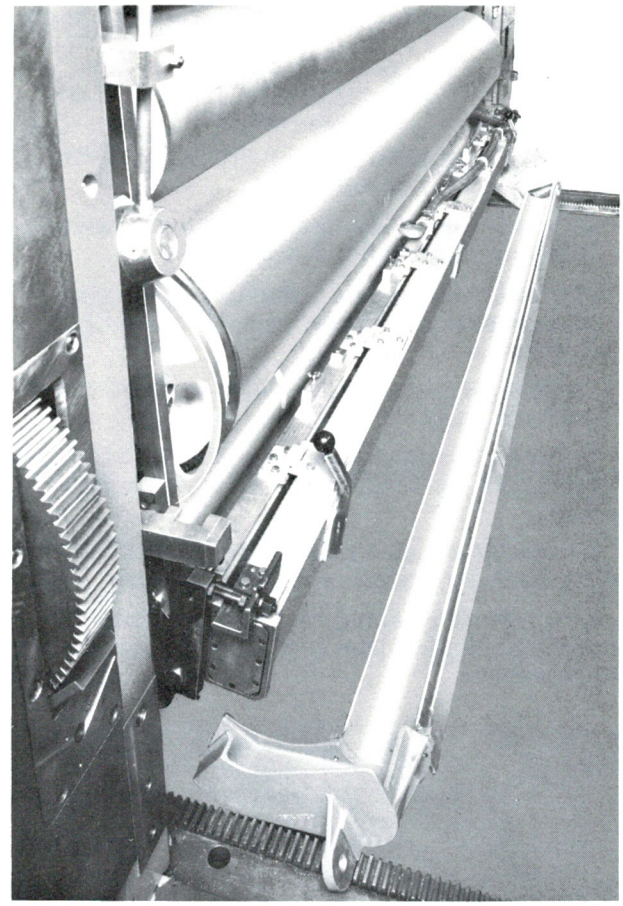


Figure 4-26. Removing Ink Trough

i. Perform steps j. through s. in paragraph G. 1. with the exception that the cleaning solution is to be circulated for one hour if the roll is not cleaned on a daily basis.

H. PREVENTIVE MAINTENANCE

Use the following chart as a guide for performing maintenance. The table outlines inspection periods recommended for various components on the printing section.

Note

Do not use air hoses for cleaning. Removal of dust by vacuum is preferred. Do not use metal tools of any kind to clean the ink roll or the doctor blade. Do not use metal tools or the brass wire brush to clean Teflon (black) coated parts.

1. UNEVENLY WORN DOCTOR BLADE.

The plastic doctor blade contacts the anilox roll surface with a corner for proper doctoring. Slight bending of the blade extending beyond the holder will occur at the recommended operating air pressure of 40 to 45 psi. This bending is uniform throughout the length of the blade and will cause an even bevel to develop. Increasing the blade air pressure

Components	Inspection Period	Remarks
Ink Trough Baffle	Daily	Clean the baffle using S&S Flexoff and a Nylon brush. Remove all dried ink.
Doctor Blade	Daily	Clean the blade using S&S Flexoff and SOFT RAGS. Remove all dried ink.
	Weekly	Check blade for wear and damage. Replace if necessary. Refer to paragraph I. 2. for replacement procedure.
Ink Roll	Daily	Clean the roll using S&S Flexoff and a brass wire brush.
	Six Months	Check the roll for wear by the copper-sulphate test. Replace the roll if it is worn.
Air Line Lubricator	Daily	Empty the water trap and refill the reservoir.
Locks	Monthly	Check the lock for wear and tightness. Replace worn parts and tighten as necessary.

changes the contact angle between the roll and blade and as a result a new bevel will form. If the blade contact angle is changed frequently by increasing and decreasing air pressure, the blade edge becomes faceted (forms many bevels) and a poor ink film will result. In this instance, the blade must be replaced.

2. DOCTOR BLADE NICKED OR CUT.

The doctor blade is a soft plastic material and should only be cleaned with materials softer than itself. Nicks in the doctor blade can scratch the anilox roll and decrease the roll life. If the nick in the blade is not deep, it may be smoothed with fine emery paper or a honing stone as an emergency measure. Badly nicked blades must be replaced.

CAUTION

Do not use metal scrapers or brass wire brushes to clean the blade. Rags or a soft bristle brush, in combination with S&S Flexoff should be used to clean the blade.

Note

Flexoff may be purchased from S&S Corrugated Paper Machinery Co., Inc. 160 North 4th Street, Brooklyn, New York 11211.

3. GROOVES IN ANILOX ROLL.

A groove in the anilox roll is a rut or channel cut into the roll surface which has a depth that can be measured. A groove differs from a surface scratch in that the depth of a surface scratch cannot be measured and a scratch will have no noticeable effect on the ink film. A groove will cause heavy streaks of ink to be carried to the printing plates, flooding the printing plates and resulting in excessive deposits of ink on the printed surface of the box.

I. MAINTENANCE

1. INK ROLL REPLACEMENT.

a. Remove the ink baffle, end slingers, funnels, trough and doctor blade holder.

b. Place wooden blocks beneath the doctor blade air manifold assembly.

c. Remove the manifold assembly pivot stud (Fig. 4-27) on the operating side of the machine.

d. Disconnect the linkage to the drive side air cylinder, at the cylinder.

e. Disconnect and remove the drive side ink wiper plate (3, Fig. 4-28).

f. Slide the doctor blade manifold assembly away from the ink roll, place a sling around the assembly and move the assembly out of the way.

g. Mark the position of the two drive side eccentric gibs (Figure 4-29) and remove the gibs and shims.

h. Place the ink roll CLUTCH SELECTOR SWITCH (6, Fig. 4-18) in the ON position.

Note

This will prevent the roll from turning.

i. Place wooden blocks beneath the operating and drive sides of the ink roll.

j. Block up the ink idler motor using two by fours across the angles of the ink circulating housing.

k. Remove the ink roll trunnion attaching screws (Figure 4-29) on the drive and operating sides of the ink roll.

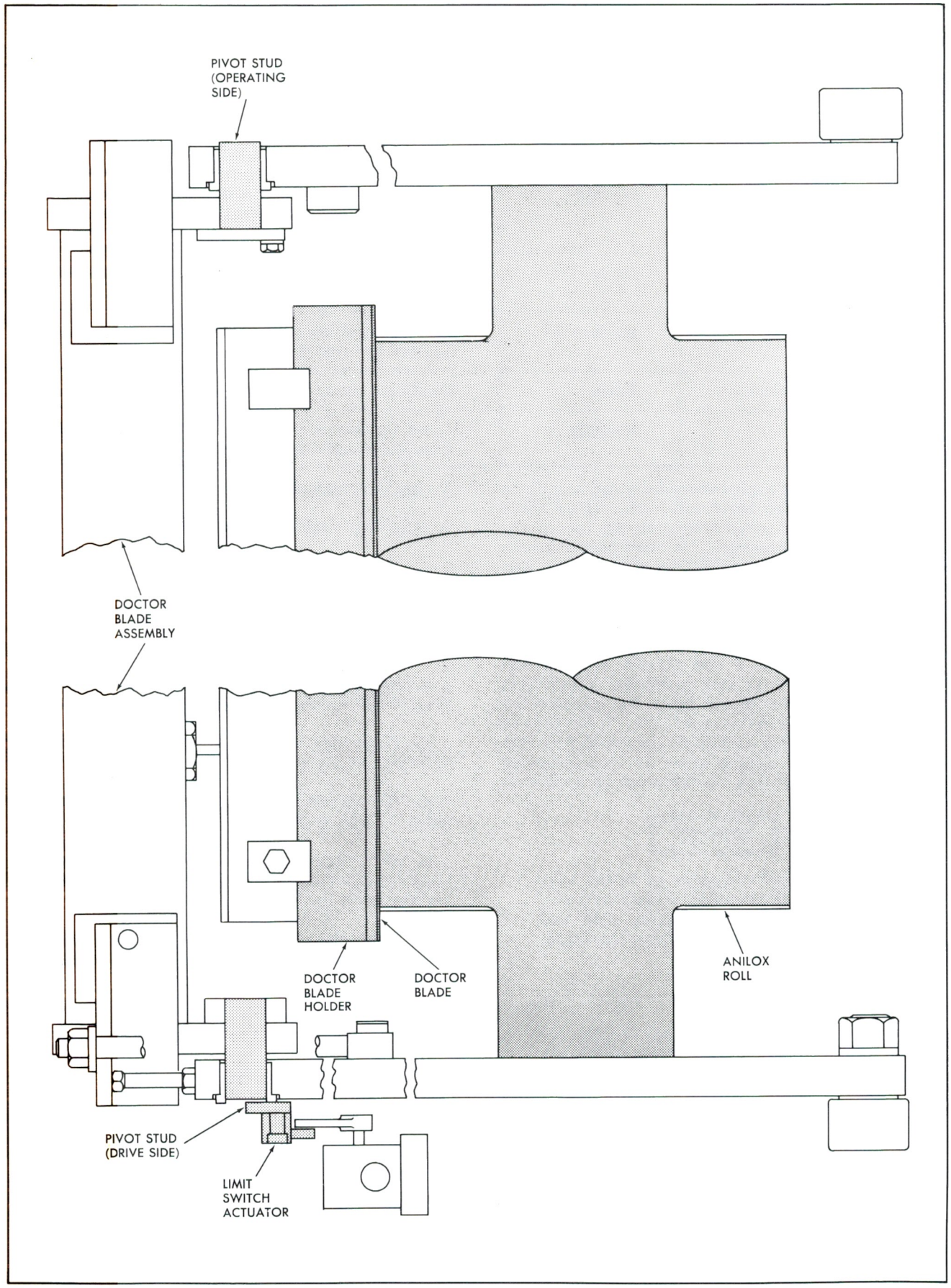
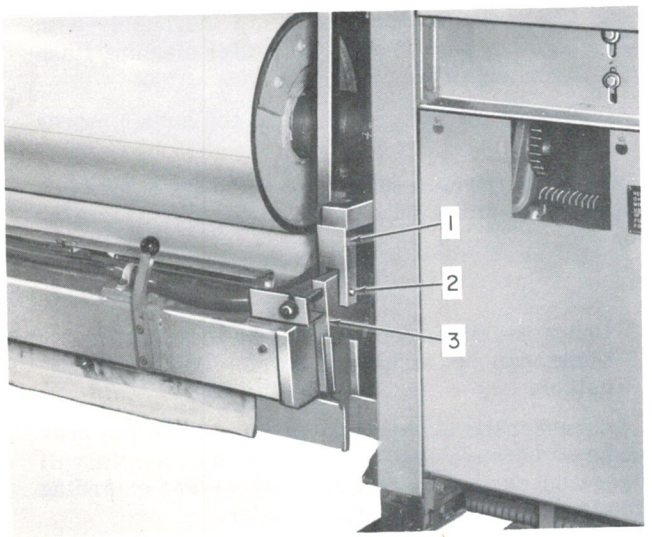


Figure 4-27. Removing Doctor Blade Assembly



1. Link
2. Ink Wiper Plate
3. Clevis Pin

Figure 4-28. Disconnecting Pneumatic Cylinder Linkage

CAUTION

The sockets of the screws will contain dried and hardened ink. The ink must be removed to ensure full engagement of the Allen wrench in the socket. Take all precautions necessary to avoid stripping the socket opening of the screws.

j. Tie up the limit switch arm located on the other side of the frame on the drive side.

k. Insert 1/2-13 x 3-1/2 inch long square head set screws into the jacking holes of the drive side trunnion.

Note

The threaded holes may contain dried and hardened ink. Run a 1/2-13 tap into the holes to remove the ink.

l. Turn the jackscrews in. This will push the drive side trunnion and all parts connected to it, the ink roll idler motor and the clutch housing and bearings toward the drive side of the machine.

Note

Use the jackscrews until the trunnion flange and pilot are separated from the roll. Pry at convenient points, until the trunnion pilot diameter is 4-1/2 inches from the roll face.

CAUTION

Check to ensure that the overhung weight of the ink idler motor is still supported firmly.

m. Insert 1/2-13 x 3-1/2 inch long jackscrews in the operating side trunnion and push the ink roll off the trunnion.

n. Place a sling around the roll and remove it from the machine.

o. Install the new roll by reversing the removal procedure.

Note

Use the jackscrews in the fastening holes to aid lineup of the trunnion and the roll.

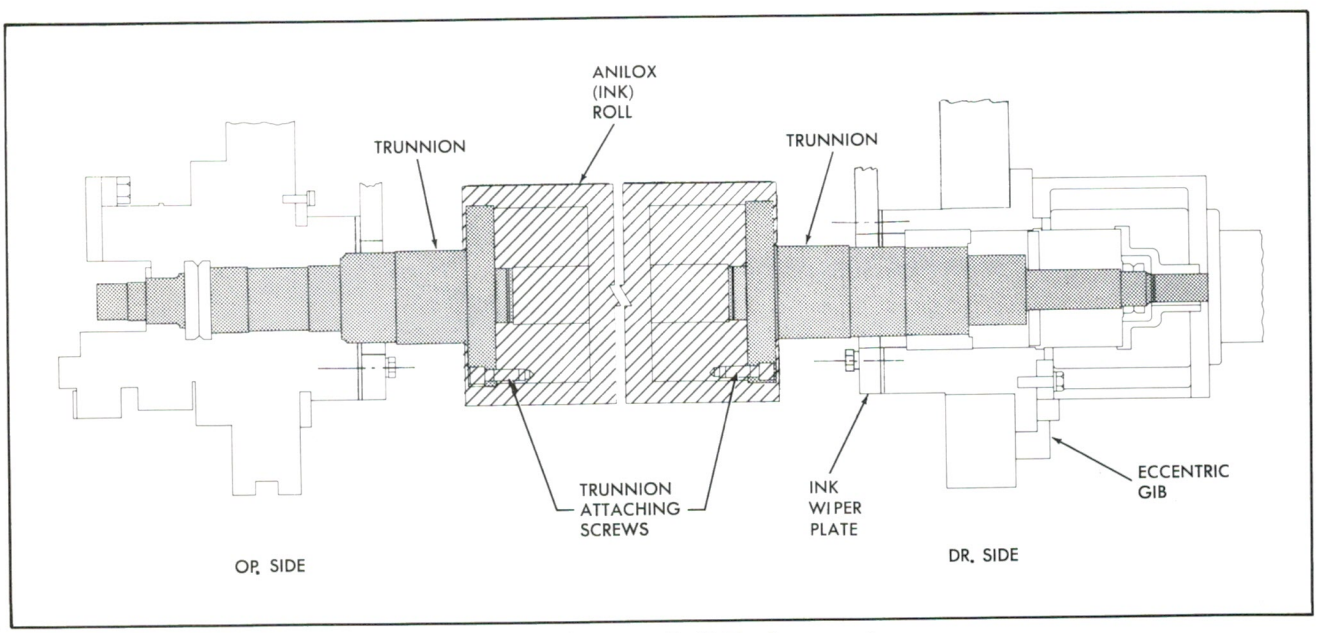


Figure 4-29. Ink Roll Replacement

p. When installing the trunnion attaching screws, tighten the bolts equally to avoid cocking of the roll.

Note

Apply grease to the OD of the trunnion pilot and flange or on the ID of the ink roll. Pack all screw socket openings with grease to keep ink from hardening in the sockets and to aid future replacement.

q. Disengage the ink roll clutch and check the roll runout. If the TIR (total indicator reading) is greater than 0.003 inch, the roll is cocked. Correct the condition by loosening and retightening the attaching screws.

r. When installing the doctor blade manifold assembly, be careful not to damage the limit switch (Figure 4-27) on the drive side. Check to ensure that the limit switch operates properly when finished.

2. DOCTOR BLADE REPLACEMENT.

The plastic doctor blade grows in length due to its absorption of moisture from ink and cleanup water. The blade is clamped every 4 inches. Therefore, the blade growth shows up as waves or warpage between the clamping screws. To overcome this condition, plastic doctor blades must be soaked in water for a period of one to two weeks prior to use.

Note

The blades can be soaked in any clean non-corrosive container of suitable size, with a lid.

CAUTION

Do not increase air pressure to eliminate waves since this will cause uneven blade wear.

a. Loosen the swing bolt nuts (1, Fig. 4-24) at the ends of the blade assembly and rotate the blade assembly away from the ink roll.

b. Pivot the ink spout (2, Fig. 4-24) back.

c. Loosen the baffle wing nuts (4, Fig. 4-24) and remove the baffle.

d. Loosen the blade holder clamps (3, Fig. 4-24) and rotate them 90 degrees.

e. Remove the blade holder assembly.

f. Remove the blade clamp attaching screws and remove the blade.

Note

Only one side of the blade can be used.

g. Clean the holder and clamp thoroughly with S&S Flexoff and a Nylon brush. After cleaning flush with water and dry.

h. Oil the hinge to ensure that the holder moves freely.

i. Place the clean blade clamp on the holder and hold it in position with a few of the clamp locking screws.

Note

Leave the clamp loose enough so that the new blade can be inserted between it and the holder.

j. Insert the blade, curl down, so that the prepared or concave edge (identified by bevel cuts) will be against the anilox roll and with its end extending equally over both ends of the holder.

CAUTION

Handle the blade carefully as the plastic blade is soft and can be damaged easily.

k. Finger-tighten the center clamp locking screw and two additional screws on each side of center.

l. Pull the blade, at the center screw, so that it extends out from the holder more than 17/32 inch.

m. Place the blade setting gauge (Figure 4-30) on the blade edge and push the blade into the holder until the banking face of the gauge is against the blade holder and the blade is against the gauge.

Note

Uniform extension of the blade from its holder is essential in obtaining an even bevel on the edge of the blade. If the blade extension is uneven, those portions having a greater extension will wear a bevel faster than the rest of the blade and will result in a poor ink film.

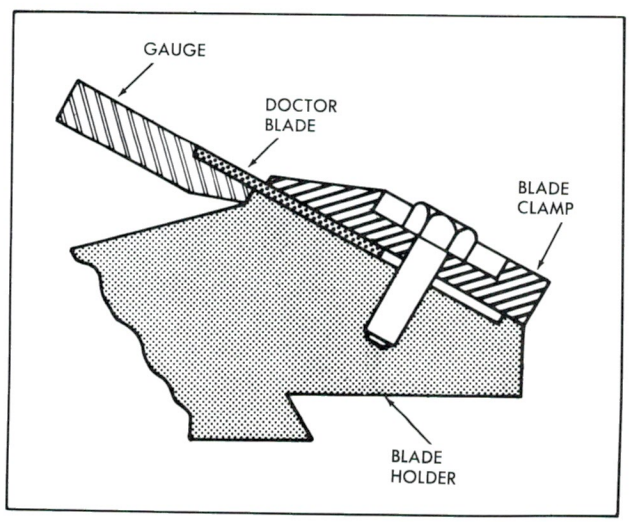


Figure 4-30. Setting Doctor Blade

n. Tighten the center screw sufficiently to hold the blade in position.

Note

Do not tighten the center screw excessively. All screws will be finally tightened after the entire blade is set.

o. Repeat steps l., m. and n., at each screw location alternately on each side of center.

p. Using a six-inch scale set against the blade holder, observe the blade edge reading along the entire length of the blade. Variations of more than 1/32 inch over or under the mean measurement, at any point along the length of the blade, must be corrected by resetting.

q. When the blade is properly set, tighten all the screws.

r. Reinstall the blade holder assembly and secure it in position with the blade holder clamps.

s. Reinstall the baffle and tighten the wing nuts.

t. Pivot the ink spout into position.

3. CHECKING INK ROLL FOR WEAR.

The anilox roll is considered worn when the transfer of ink from the roll to the printing plates is insufficient for obtaining satisfactory color and coverage on the box. This condition is very noticeable on solid areas of coverage on the box. Reds appear pink, blues are lighter and blacks are washed out. This condition can also be caused by worn printing plates mounted on the same blanket as plates of proper height. To check if it is a plate problem and not the anilox roll, increase the contact of the anilox roll with the printing plates until all plates are equally covered with ink. Run several boxes through the machine and check the printing. Plates of proper height will display a squeezeout imprint on the box, worn plates will print properly. If all plate impressions display a squeezeout condition, it can be concluded that the anilox roll is worn and should be replaced. If the printing plates are at fault, return them to the die room for makeready.

For the most efficient operation and best printing results, worn plates must be built up with makeready in the die room and proofed to eliminate plate problems at the press.

An anilox roll is worn if copper can be seen by eye on its surface. Perform a copper sulphate test to verify this condition. If the roll is worn, replace it.

a. Prepare a saturated solution of copper sulphate by dissolving copper sulphate crystals ($CuSO_4 \cdot 5H_2O$), in powder form, in water as follows:

Note

Approximately three tablespoons of powdered copper sulphate to one-half pint of water will be sufficient to saturate the solution.

(1) Add the powdered copper sulphate to the water.

(2) Slowly stir the solution until it is saturated (crystals will no longer dissolve).

b. Using a brush, apply the solution to a number of small areas on the roll.

c. If the areas, to which the solution was applied, do not turn a copper color, the chrome has not worn off and the roll is serviceable.

d. If the area turns a copper color, the roll must be replated.

e. If the roll is serviceable and will immediately be used, it will not be necessary to clean the roll to remove the copper sulphate solution.

f. If the roll is not to be run, the copper sulphate solution must immediately be removed from the roll surface to avoid corrosion and pitting.

4. PRESSURE SWITCH SETTING, CHECKING AND ADJUSTMENT.

a. Doctor Blade Pressure Switch.

Note

Use the following procedure to check the setting of the doctor blade pressure switch (3, Fig. 4-32) and to readjust it if it becomes necessary.

(1) Rotate the doctor blade PRESSURE ADJUSTMENT KNOB (1, Fig. 4-18) to decrease the doctor blade pressure to a point where the control panel lights (2, Fig. 4-18) go out.

(2) Check the doctor blade pressure gauge (7, Fig. 4-18) for a reading of 35 psi.

Note

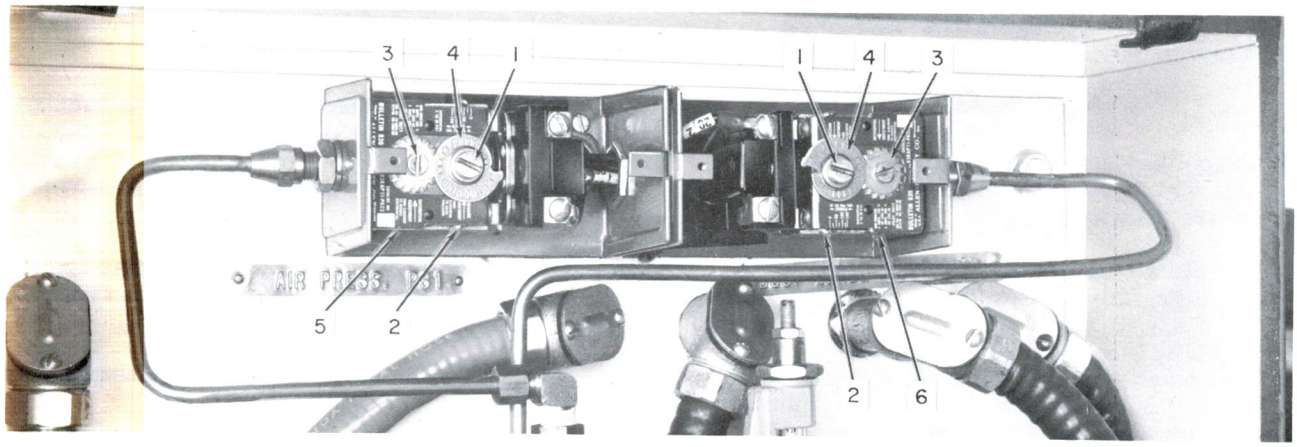
If the gauge reads 35 psi, the switch setting is correct and the pressure should be increased until the lights on the panel go on. If the gauge does not read 35 psi proceed to step (3) of this procedure.

(3) If the gauge reading obtained in step (2) is greater or less than 35 psi, remove the pressure switch cover (Figure 4-31).

(4) Rotate the pressure switch pressure adjustment (1, Fig. 4-31) to zero the range pointer (2, Fig. 4-31).

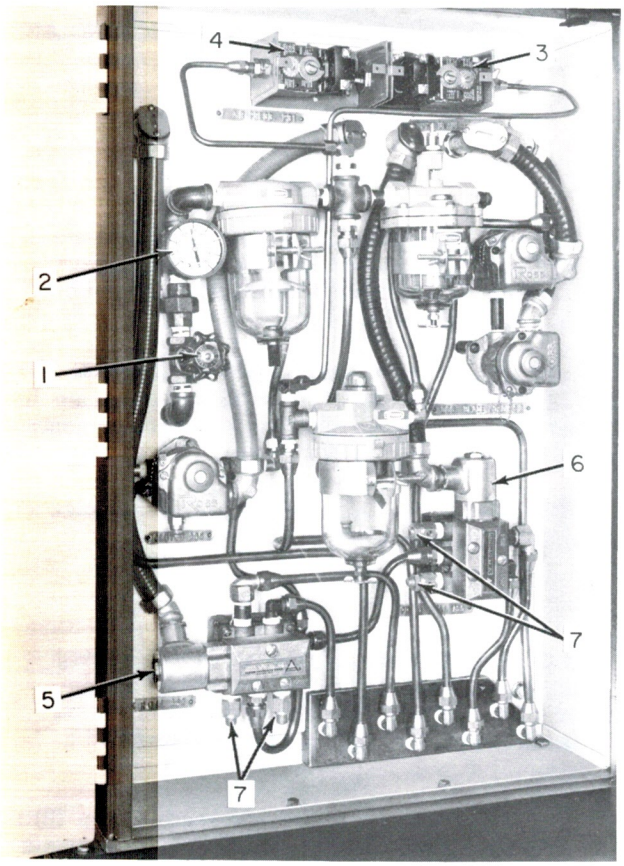
(5) Back-off the adjustment one-half turn.

(6) Rotate the doctor blade PRESSURE ADJUSTMENT KNOB (1, Fig. 4-18) to increase the pressure to a point where the control panel lights (2, Fig. 4-18) go on.



1. Pressure Adjustment
2. Range Pointer
3. Differential Adjustment
4. Graduated Dial
5. Main Air Supply Switch
6. Doctor Blade Pressure Switch

Figure 4-31. Pressure Switch Adjustment



1. Main Air Supply Valve
2. Pressure Gauge
3. Doctor Blade Pressure Switch
4. Main Air Supply Pressure Switch
5. Ink Roll Solenoid Valve
6. Impression Cylinder Solenoid Valve
7. Exhaust Ports

Figure 4-32. Air Control Cabinet

(7) Rotate the doctor blade PRESSURE ADJUSTMENT KNOB (1, Fig. 4-18) to decrease the pressure to a point where the control panel lights (2, Fig. 4-18) go out.

(8) Check the pressure gauge (7, Fig. 4-18) reading. It should read 35 psi.

(9) If the gauge does not read 35 psi, turn the pressure adjustment (1, Fig. 4-31) slightly to increase or decrease the pressure as applicable.

(10) Recheck the setting as outlined in steps (6) through (9) until 35 psi can be read on the pressure gauge.

(11) Check the pressure switch differential adjustment (3, Fig. 4-31). It should be set at minimum. To set it at minimum, turn the differential adjustment clockwise until the protrusion of the graduated dial (4, Fig. 4-31) hits the stop.

(12) Install the pressure switch cover.

b. Main Air Supply Pressure Switch.

Note

Use the following procedure to check the setting of the main air supply pressure switch (4, Fig. 4-32) and to readjust it if it becomes necessary.

(1) Turn the main AIR SUPPLY VALVE (1, Fig. 4-32) to decrease the air supply pressure to a point where the control panel lights (2, Fig. 4-18) go out.

(2) Check the air supply pressure gauge (2, Fig. 4-32) for a reading of 60 psi.

Note

If the gauge reads 60 psi the switch setting is correct and the pressure should be increased until the lights on the panel go on. If the gauge does not read 60 psi proceed to step (3) of this procedure.

(3) If the gauge reading obtained in step (2) is greater or less than 60 psi, remove the pressure switch cover (Figure 4-31).

(4) Rotate the pressure switch pressure adjustment (1, Fig. 4-31) to zero the range pointer (2, Fig. 4-31).

(5) Back-off the adjustment one-half turn.

(6) Rotate the MAIN AIR SUPPLY VALVE (1, Fig. 4-32) to increase the pressure to a point where the control panel lights (2, Fig. 4-18) go on.

(7) Rotate the MAIN AIR SUPPLY VALVE (1, Fig. 4-32) to decrease the pressure to a point where the control panel lights (2, Fig. 4-18) go out.

(8) Check the pressure gauge (2, Fig. 4-32) reading. It should read 60 psi.

(9) If the gauge does not read 60 psi, turn the pressure adjustment (1, Fig. 4-31) slightly to increase or decrease the pressure as applicable.

(10) Recheck the setting as outlined in steps (6) through (9) until 60 psi can be read on the pressure gauge.

(11) Check the pressure switch differential adjustment (3, Fig. 4-31). It should be set at minimum. To set it at minimum turn the differential adjustment clockwise until the protrusion of the graduated dial (4, Fig. 4-31) hits the stop.

(12) Install the pressure switch cover.

5. ADJUSTING RAISING AND LOWERING OF INK ROLL AND IMPRESSION CYLINDER.

Adjustments are available on the machine for controlling the speed at which the ink roll and impression cylinder move up and down. Solenoid valves (5 and 6, Fig. 4-32) are located in the air control cabinets on the drive side of the printing units.

Both rolls should move up and down freely and smoothly. If the rolls appear to snap up or if loud banging is heard, the exhaust ports (7, Fig. 4-32) of the solenoids must be adjusted until a smooth steady upward motion is obtained.

J. TROUBLESHOOTING

Refer to the following chart for a listing of operating difficulties which may be encountered and the standard procedures to correct them.

The chart is divided into two parts; finished box troubles and operating troubles. Operating troubles are defined as those that are caused by improper setup or malfunction of a machine component. Finished box troubles are defined as those resulting in improper assembly of the box when inspected at the delivery end of the machine.

To use the chart properly, determine if the trouble is operational or shows up as a result of box inspection at the delivery end. Turn to that part of the chart concerned and locate the symptom encountered. Check the possible causes of the difficulty. When the trouble is located, refer to the chart to determine how the difficulty may be remedied.

To isolate electrical difficulties, refer to the wiring diagrams and schematics supplied with the machine. To isolate pneumatic difficulties, see Figure 4-33 for the pneumatic system schematic.

PRINTING UNIT - BOX TROUBLES

Symptom	Cause	Remedy
Ink Smear	Excessive ink application due to worn or dirty doctor blade	Clean or replace doctor blade.
	Dirty printing plates	Clean the plates.
	Ink not drying	Speed up first-color down drying.
	Pull collars	Reposition collars to avoid printing.
	Viscosity too heavy	Decrease the ink viscosity to 20 to 25 seconds.
	Ink roll height incorrect	Adjust contact and proof.
	Box slips during printing	Install pull straps. Check pressure roll setting.

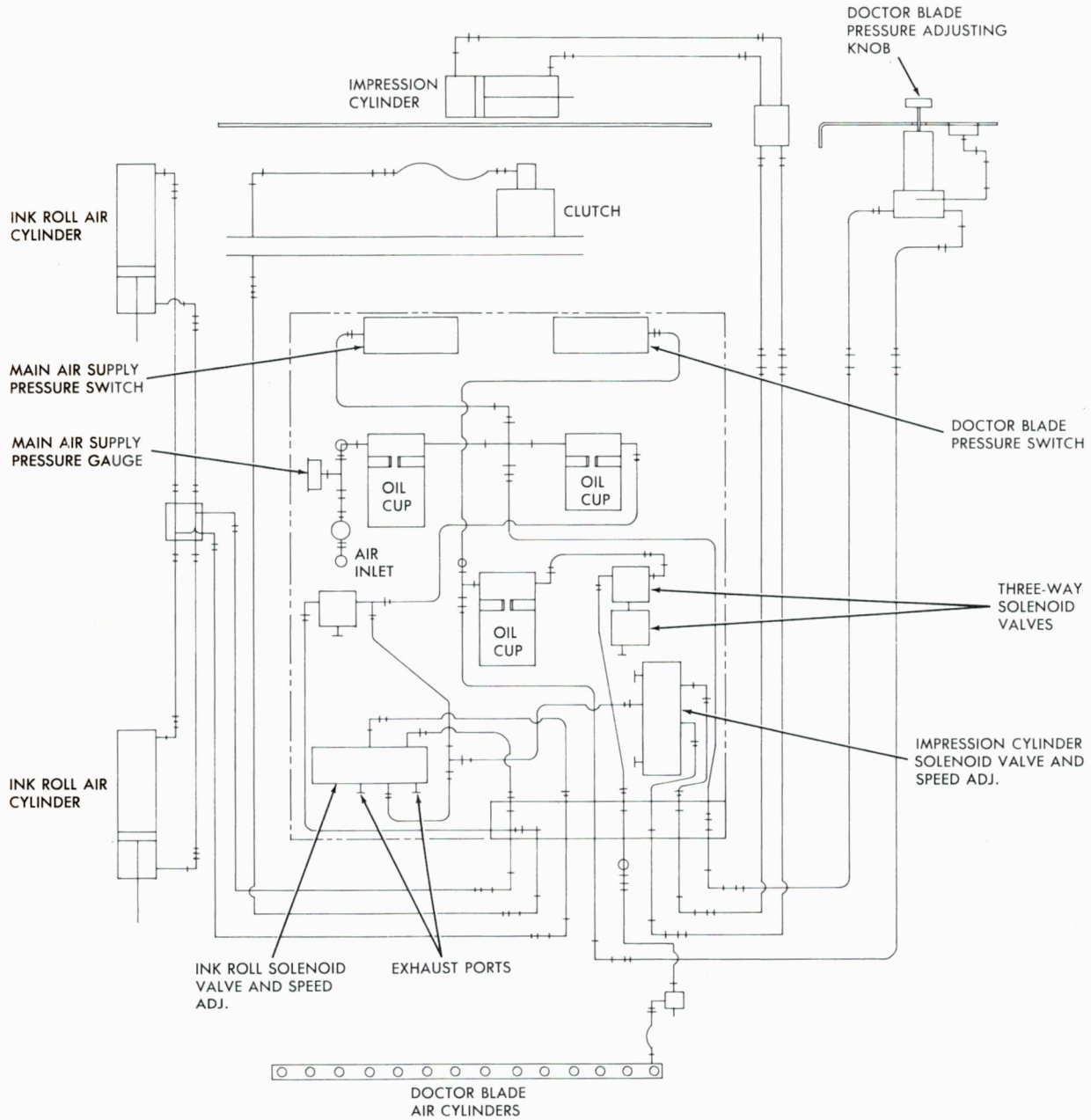


Figure 4-33. Pneumatic System Schematic

PRINTING UNIT - BOX TROUBLES (CONT)

Symptom	Cause	Remedy
	Printing plates pick up excessive ink prior to boxes entering printing section	Place ink roll selector switch in DOWN position. Place it in the AUTO position when blanks are ready to be printed.
	Box liner has "holddout"	Run at slower speed and use a faster drying ink.
Insufficient Ink Coverage	Ink roll worn or dirty	Replace the worn ink roll. Clean a dirty ink roll.
	Ink foaming	Add defoamer to the ink.
	No ink in reservoir	Check circulating system for valve positioning. Replenish the reservoir.
	Ink roll height incorrect	Adjust contact and proof.
	Printing plates of unequal height	Check the makeready.
Variations in Printing Register	Printing Plates Loose	Tighten plates more securely to cylinder.
	Box slipping in feed rolls	Check feed roll adjustment.
	Box slipping during printing of short boxes	Install pull straps and check impression cylinder pressure.
	Pull collars loose or not on box	Check pull collar gap and position.
Poor Definition of Printing	Printing plate thickness not uniform	Replace defective printing plates.
	Impression cylinder applying excessive pressure	Readjust the impression cylinder to printing plate gap.
	Excessive ink application	Refer to symptom "Ink Smear".
	Ink roll height incorrect	Adjust contact and proof.
	Printing plates dirty or worn	Clean the printing plates.
	Durometer of plates to high	Plates harden with age. Use 20 durometer on solids and heavy type, use 30 durometer on fine type and halftones.
	Highs and lows in board stock	Improve corrugator operation.
Poor Trapping	Ink colors and ink tack improperly selected	Lighter color must be first down and must be dry before second down color is applied.
	Box liner has "holdout"	Use liner with faster rate of absorption.
	Excessive ink application	Refer to symptom "Ink Smear".
	Machine speed too fast	Run slower.
Offsetting	Excessive ink application	Refer to symptom "Ink Smear".
	Slow drying ink	Check with ink supplier for agent to speed ink drying.
	Box liner has "holdout"	Use liner with faster rate of absorption.

PRINTING UNIT - BOX TROUBLES (CONT)

Symptom	Cause	Remedy
Excessive Printing Crush	Excessive impression cylinder pressure	Adjust the impression cylinder to printing plate gap.
	Printing plates not uniform in height	Proof plates for ink coverage.
	Printing plate durometer too high	Durometer of the plate should be 20 to 25 Shore A scale.
Haloing	Excessive impression cylinder pressure	Readjust the impression cylinder to print cylinder gap.
	Excessive ink application and printing-plate-to-ink roll contact	Readjust the ink-roll-to-printing-plate contact.
	Printing plates not uniform in height	Proof plates for ink coverage.
Print Placement Incorrect or Misses Box Completely	Cylinder not registered correctly after installing printing plates	Open machine, de-clutch and re-register cylinder. To move print ahead on box turn cylinder UP. To move print back on box turn cylinder DOWN.
	Printing plates incorrectly mounted on blanket	Return blanket to die room.
	Blanket and order form disagree	Call foreman.
	Print unit not put on zero before closing machine	Open machine and turn print unit to zero marks.

PRINTING UNIT - OPERATING TROUBLES

Insufficient Ink	No ink in reservoir	Replenish the reservoir.
	Clogged hoses	Remove and clean.
	Air pressure lost	Find and correct trouble.
	Ink foaming	Add defoamter to ink.
	Electricity failure	Find and correct trouble.
	Ink circulating system filter clogged	Remove and clean the filter.
	Ink spilled on floor	Doctor blade assembly not in position or air pressure not on.
	Incorrect setting of circulating system valves	Check valve settings.
	Pump not turned on	Ensure that system switches are activated.
Ink Roll Does Not Go Up	Air solenoid defective	Replace the solenoid.
	Pneumatic lines clogged with oil or water	Remove and bleed. Replace if necessary.
	Ink roll eccentrics are bound and cannot move.	Clean and relubricate.
	Leaky pneumatic lines	Repair or replace.
	Air supply not turned on	Ensure that the air supply valves are open.

PRINTING UNIT - OPERATING TROUBLES (CONT)

Symptom	Cause	Remedy
Non-Uniform Ink Coverage On Ink Roll	Doctor blade air cylinder clogged with oil or water	Remove, bleed and clean.
	Anilox roll worn or dirty	Replace a worn roll. If the roll is dirty, clean it.
	Doctor blade worn or dirty	Replace a worn blade. If the blade is dirty, clean it.
	Ink foaming	Add defoamer.
	Insufficient supply of ink	Replenish the reservoir.
Poor Ink Film On Anilox Roll	Groove in anilox roll	Refer to paragraph G. 5. Replace roll.
	Ink (low viscosity)	Refer to paragraph D. 3. Correct viscosity.
	Ink foaming	Refer to paragraph G. 4. Add defoamer.
	Doctor blade nicked or cut	Refer to paragraph G. 4. Replace the blade.
	Doctor blade unevenly or excessively worn	Refer to paragraph G. 3. If blade is worn, replace it. Keep air pressure steady at 40 psi.
	Doctor blade improperly installed	Refer to paragraph I. 2. Replace or reset blade.
	Doctor blade warped or wavy	Refer to paragraph I. 2.
	Doctor blade or ink system dirty	Refer to paragraph G. Clean blade and ink system.
	Anilox roll dirty	Refer to paragraph G. Clean roll.
	Faulty air system	Check response of cylinders. Replace any defective cylinder and bleed air lines.
	Worn anilox roll	Refer to paragraph I. 3. Replace roll.

SECTION V
CREASER/SLOTTER SECTION

A. GENERAL

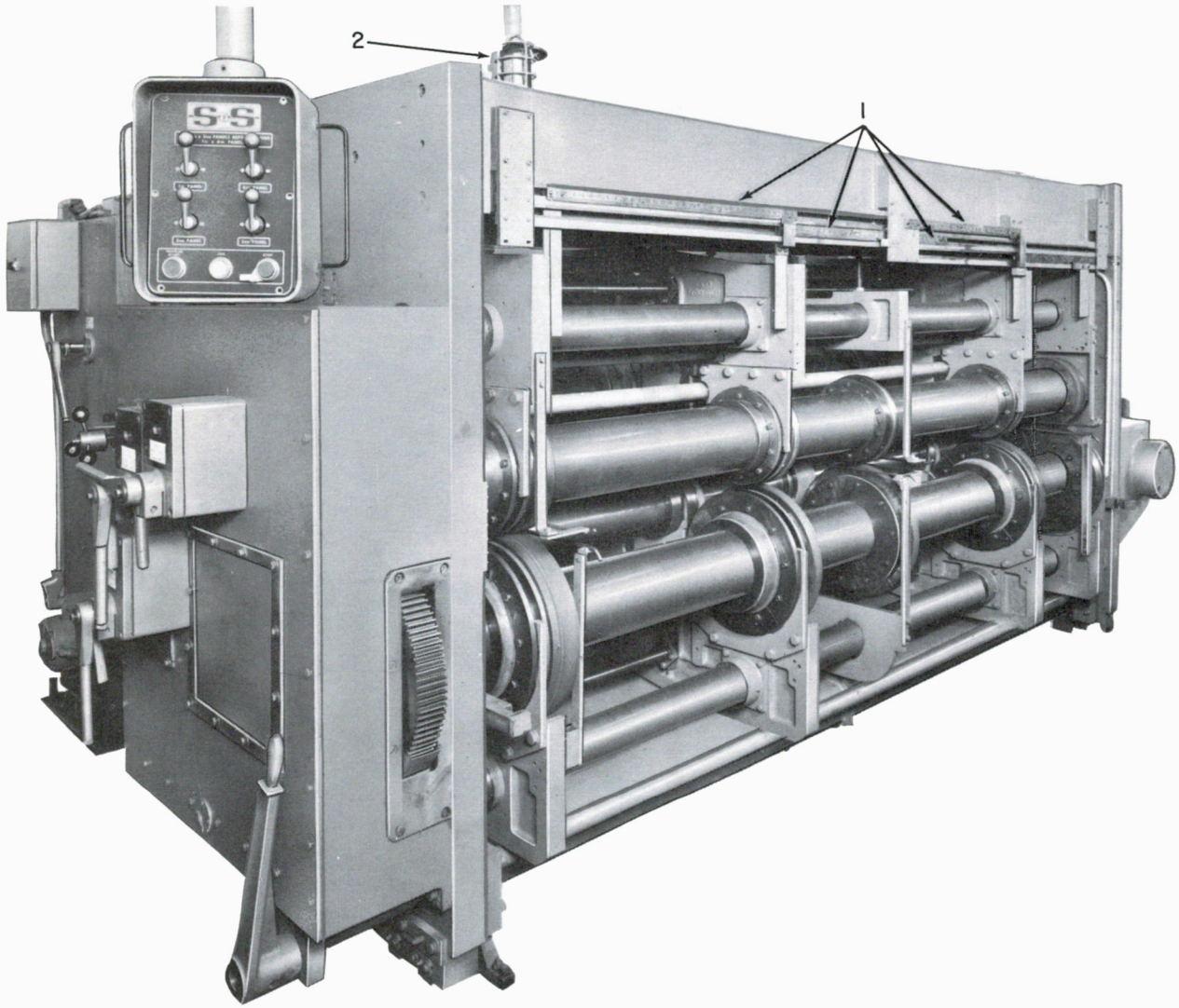
The creaser and slotter section (Figure 5-1) can be stationary or roll-back. The roll-back unit is mounted on rollers that run on tracks on the floor.

The roll-back slotter unit moves about two feet to allow access to the slotter heads for setup. The stationary unit is equipped with a step arrangement on the folding section to facilitate access to the slotter heads.

The creaser and slotter section (Figure 5-2) houses the primary and secondary creaser shafts, the slotter shafts, the swivel pendant control panel, the lap crushers, trimming and lap-cutting knives, a jiffy-set mechanism for head positioning and alignment and a conveyor for removing scrap generated by the slotting, trimming and lap-cutting operations.

B. FUNCTIONING

As the blank enters the creaser/slotter section of the machine (Figure 5-2), a primary crease is made in the sheet by Harrison or Sauer-type primary



1. Panel Size Scales
2. Limit Switch

Figure 5-1. Creaser/Slotter Section

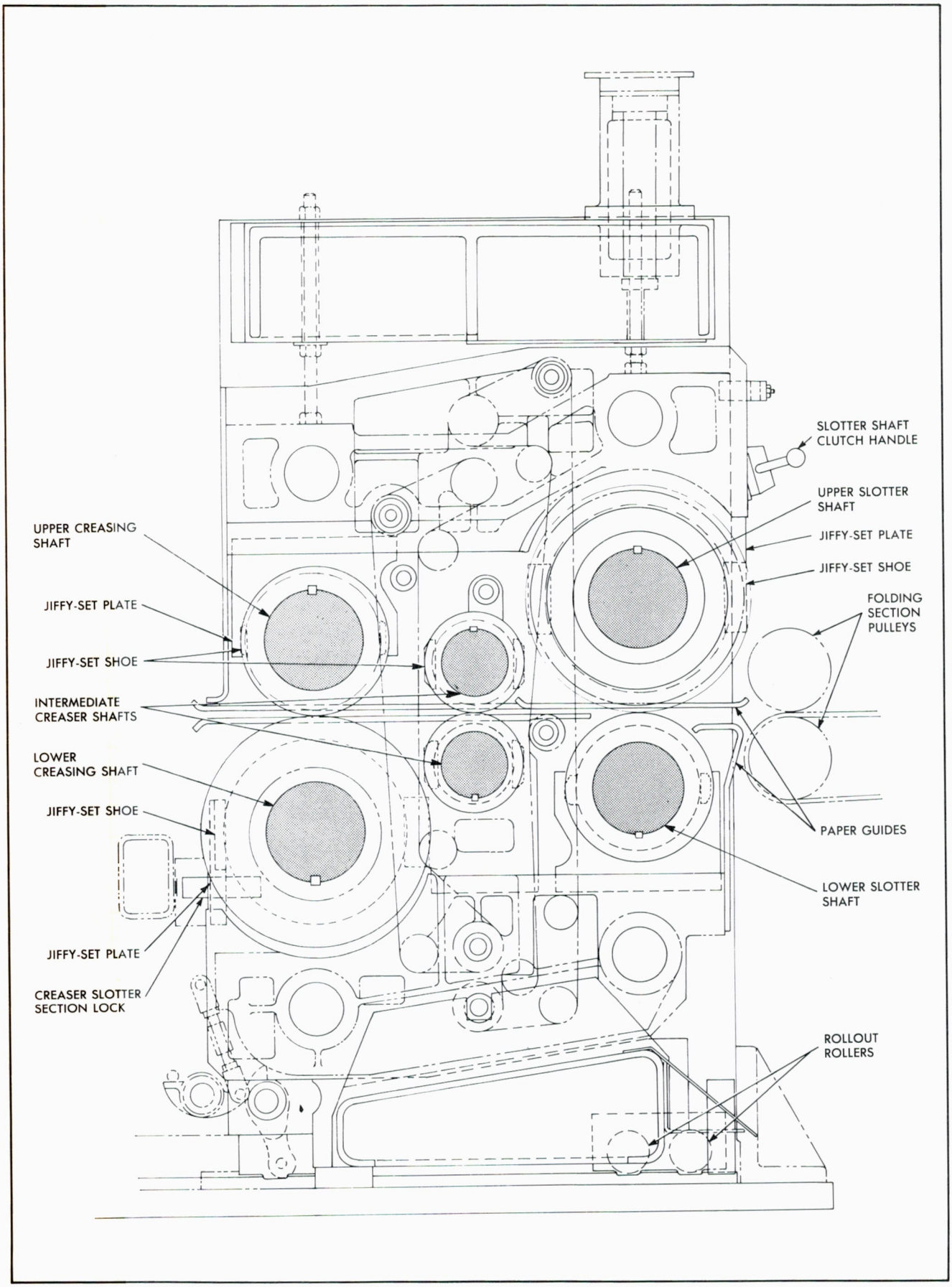


Figure 5-2. Creaser/Slotter Cross-Section

creasing wheels running against plastic inserts in the lower creasing wheels. Secondary creasing wheels, with V-type profile, impart the desired sharp finish crease.

During the creasing operation, lap crushers, on the creaser shafts, crush a portion of the body panel or the entire body panel on the drive side of the machine and the glue lap panel on the operating side of the machine.

The sheet then advances into the slotting shafts where it is accurately slotted, trimmed to exact length and the glue tap formed. All scrap drops onto an air conveyor and is removed from the area.

C. LUBRICATION

Refer to Figures 5-3 and 5-4 for the frequency, method and points of lubrication on the creaser/slotter section.

D. CREASER/SLOTTER COMPONENTS

1. JIFFY-SET MECHANISM

a. Description.

The creaser/slotter section incorporates a motor-operated jiffy-set mechanism (1, Fig. 5-5) for lateral positioning of the creaser and slotter heads. Each member moved by the jiffy-set mechansim is moved laterally by means of rotating screws. Movement can take place in either direction. When the adjusting motor is off, all components are locked in place on the creaser and slotter shafts.

b. Controls.

The swivel pendant control panel (Figure 5-6) is mounted on the creaser/slotter unit. It swings through a wide arc on the operating side of the machine and between the opened units. The pendant

EXPLANATION OF SYMBOLS

Symbol	Meaning
	Lubricant is applied by means of the implement depicted within the circular area.
daily weekly  monthly annually	The terms appearing above or below the circular area indicate the frequency of lubrication for the component. The terms are based on a single operating shift of eight hours of machine operation or 40 hours of machine operation per week.
4 	The number appearing on the left of the circular area indicates the item number of the component appearing in the legend that accompanies each figure.
 3	The number appearing on the right of the circular area indicates the lubricant necessary as specified in the table of lubricants appearing with each figure.

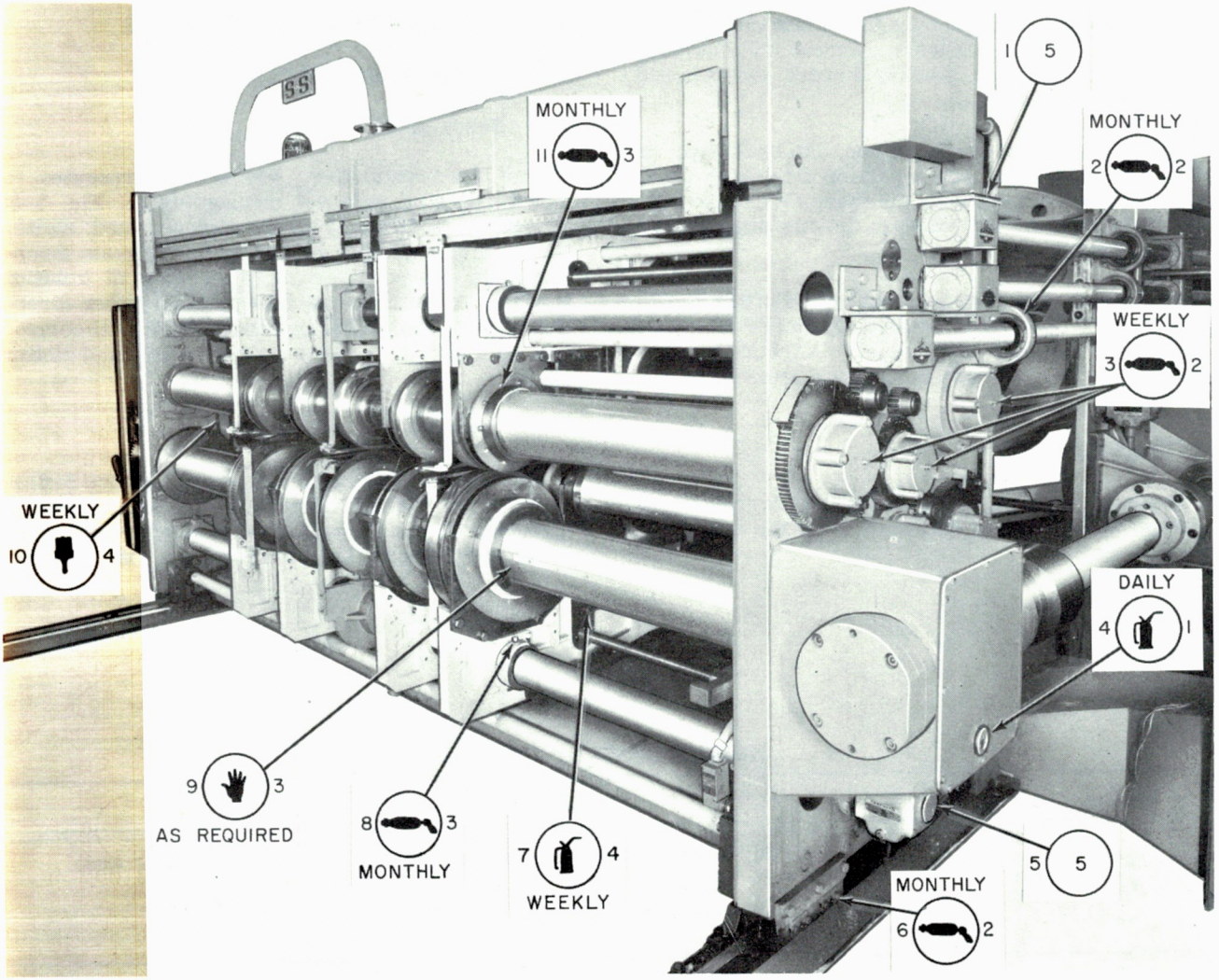


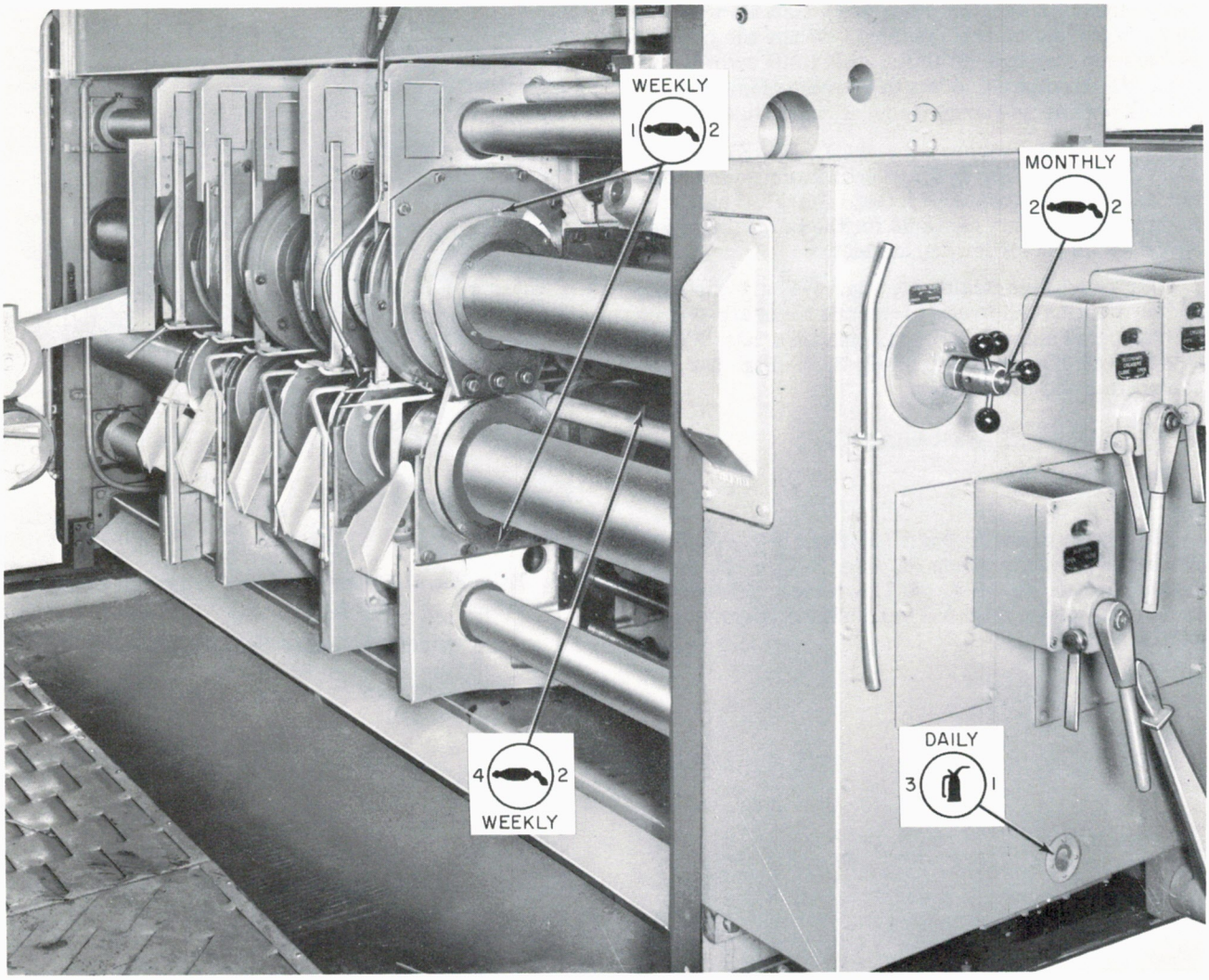
TABLE OF LUBRICANTS

Symbol	Classification	Description of Lubricant
1	AGMA NO. 3	AGMA SPEC. #252. Highly refined mineral gear oil; non-foaming, non-corrosive, non-separating. Viscosity index 60 or greater.
2	NLGI NO. 2	Lithium soap grease.
3	MOLYKOTE BR-2	Molybdenum disulfide grease.
4	AGMA NO. 1	Light oil per AGMA SPEC. #252 (described above).
5	PER MANUFACTURER'S RECOM-MENDATIONS	

Item No.	Description
1	Hub City gearboxes
2	Sealmaster bearings
3	Creaser and slotter shaft bearings
4	Gearbox
5	Lateral adjustment drive motor
6	Roller assemblies (operating and drive sides)
7	Lead screw nuts (8 places)

Item No.	Description
8	Carriers (16 places)
9	Shafts (all shafts are to be cleaned and lubricated as required)
10	Chain (operating and drive sides, clean, lubricate and tension check)
11	Upper and lower primary creaser secondary creaser and slotter heads

Figure 5-3. Creaser/Slotter Lubrication, Front View



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4	AGMA NO. 1	Light oil per AGMA SPEC. #252 (described above).
5	PER MANUFACTURER'S RECOM-MENDATIONS	

Item No.	Description
1	Upper and lower tie brace
2	Slotter running register
3	Gearbox
4	Manifold

Figure 5-4. Creaser/Slotter Lubrication, Rear View

has a limit switch (2, Fig. 5-1) tied in with the closing circuit of the machine. When the pendant is between the opened units, the limit switch disconnects the closing motor to prevent closing of the machine while personnel are at work in the area.

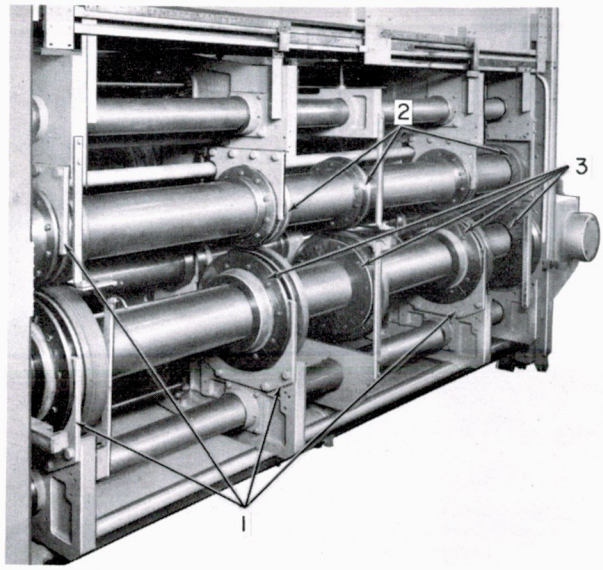
The pendant houses the BOX PANEL DRUM SWITCHES (1, Fig. 5-6). The switches are used for setting the creaser/slotter, the glue unit, the folding and delivery sections for the box panel sizes specified on the order work sheet.

Four panel size scales (1, Fig. 5-1) are mounted on the section top brace to permit accurate setting of box panel sizes. The pendant also has STOP, START and JOG pushbuttons (2, 3, 4, Fig. 5-6) for controlling the main drive.

2. PRIMARY CREASER SHAFTS.

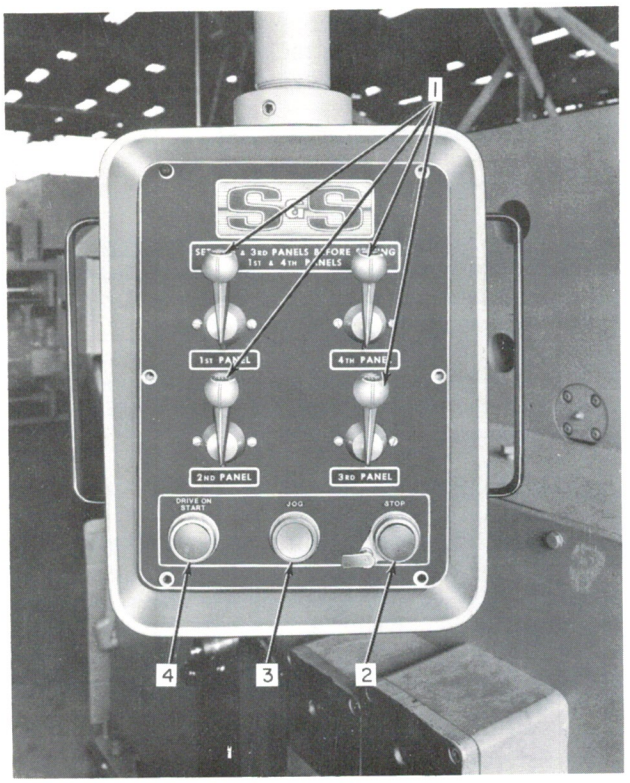
a. Description.

The upper creaser shaft (3, Fig. 5-7) supports the male creasing heads (4, Fig. 5-7). The lower creaser shaft (6, Fig. 5-7) carries the female creaser heads (5, Fig. 5-7) which have polyurethane anvils.



1. Jiffy-Set Plates 2. Upper Creaser Heads 3. Lower Creaser Heads

Figure 5-5. Jiffy-Set Mechanism



1. Panel Size Drum Switches
2. Stop Button
3. Jog Button
4. Start Button

Figure 5-6. Swivel Pendant Control Panel

Creasing is performed from the top on the inside of the blank by the male head running against the anvil. The primary creaser heads impart the initial crease in the board about which folding will take place.

b. Controls.

A PRIMARY CREASER ADJUSTMENT (3, Fig. 5-8) and caliper indicator are located on the operating side frame. The adjustment is used to set the gap between the creaser shafts for the caliper of board to be run.

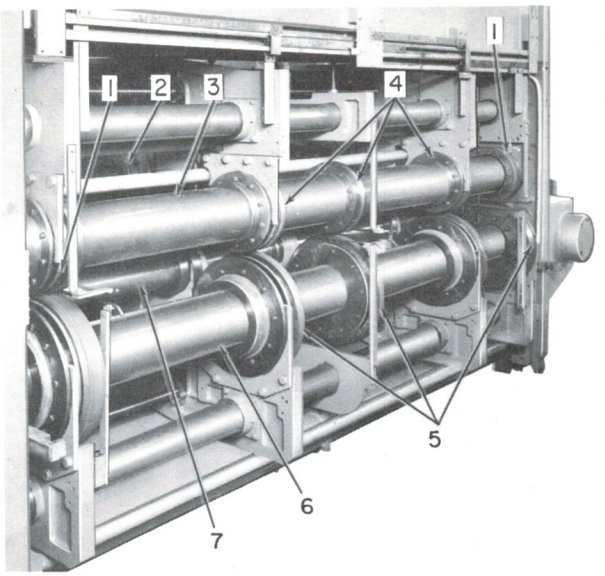
A LOCK LEVER (4, Fig. 5-8) prevents accidental movement of the adjustment after setting.

c. Setup.

(1) Unlock the primary creaser adjustment using the LOCK LEVER (4, Fig. 5-8)

(2) Rotate the primary creaser CALIPER ADJUSTMENT (3, Fig. 5-8) until the desired board caliper dimension is set on the caliper indicator.

(3) Lock the handle in position using the LOCK LEVER.



1. Lap Crusher Head
2. Upper Secondary Creaser Shaft
3. Upper Primary Creaser Shaft
4. Male Creaser Head
5. Female Creaser Head
6. Lower Primary Creaser Shaft
7. Lower Secondary Creaser Shaft

Figure 5-7. Primary Creaser Shafts and Heads

3. LAP CRUSHERS.

a. Description.

Two lap crusher heads (1, Fig. 5-7) are mounted on the creaser shafts to crush the glue lap and the entire length of the fourth panel that will mate with the glue lap.

The head mounted on the operating side of the creaser shaft provides continuous crushing. The head mounted on the drive side of the shaft is also a continuous crushing head or can be a segmental crushing head for partial crushing.

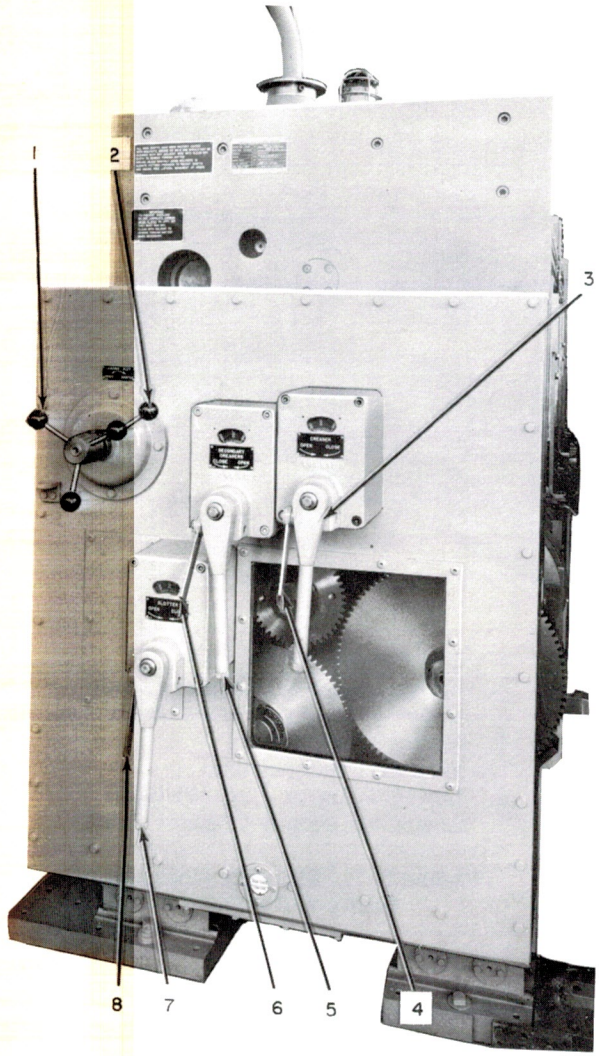
b. Function.

The purpose of the lap crushers are to crush the glue lap and the part of the fourth panel with which it will mate. In this way the total thickness of board at the glue lap will not exceed the initial caliper of the board.

c. Setup (for machines with drive side segmental lap crusher wheel).

(1) Loosen the segment locknuts.

(2) Pull the segments away from the head face to unseat the segment keys from the head grooves.



1. Slotter Running Register
2. Running Register Locks
3. Primary Creaser Adjustment
4. Lock Lever
5. Secondary Creaser Adjustment
6. Lock Lever
7. Slotter Vertical Adjustment
8. Lock Lever

Figure 5-8. Creaser/Slotter Controls

(3) Place the first segment with its extension leg facing the operating side of the machine, opposite the scale reading on the crusher head outside diameter, and equal to the depth of box minus one inch.

(4) Place the last segment on the wheel with its extension leg facing the operating side of the machine, opposite the reading on the scale and equal to the depth of slot plus the depth of the box plus one inch.

(5) After setting the first and last segments, install additional segments between them and secure them in position.

(6) Remove all segments not used. Secure them on the crusher head with their extension legs facing the opposite way of the segments already installed.

4. SECONDARY CREASER SHAFTS.

a. Description.

The upper secondary creaser shaft supports pull rolls and the male creasing heads which have sharp V-Type creasers to impart the desired finish crease to the second and third panel creases.

The lower secondary creaser shaft supports pull rolls and the female creaser heads which have polyurethane creasing anvils.

b. Controls.

A SECONDARY CREASER ADJUSTMENT (5, Fig. 5-8) and caliper indicator are located on the operating side frame. The adjustment is used for setting the gap between the creaser shafts for the caliper of board to be run. The LOCK LEVER (6, Fig. 5-8) prevents accidental movement of the adjustment after setting.

c. Setup.

(1) Unlock the secondary creaser adjustment using the LOCK LEVER (6, Fig. 5-8).

(2) Rotate the secondary creaser ADJUSTMENT HANDLE (5, Fig. 5-8) until the desired board caliper dimension is set on the caliper indicator.

(3) Lock the adjustment in position using the LOCK LEVER.

5. SLOTTER SHAFTS.

a. Description.

The slotter shafts (3, Fig. 5-9) carry the slotter heads (1, Fig. 5-9), lap cutter blades (2, Fig. 5-10) and trim knife (3, Fig. 5-11).

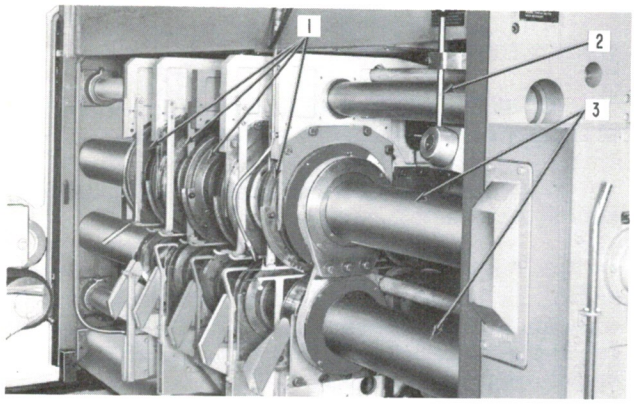
Each upper slotter head carries two slotter blades. One blade, a tipped blade (2, Fig. 5-11) slots the leading edge of the blank. The other blade, a beveled blade (1, Fig. 5-11) slots the trailing edge of the blank.

Each lower slotter head has a full circumference female slot into which the upper slotter blades fit.

The upper slotter heads are equipped with knurled feed rings (2, Fig. 5-12) to feed the board securely into the next section of the machine.

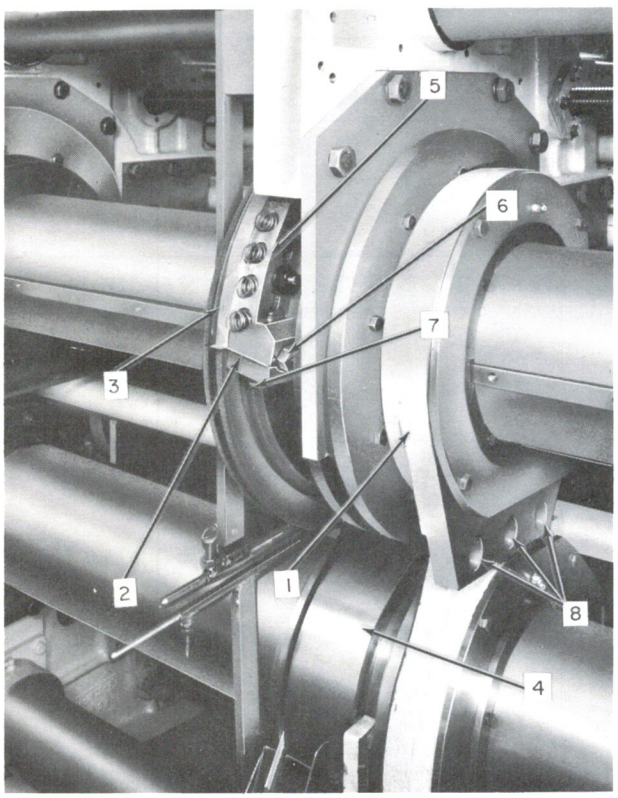
Each head is equipped with slot depth scales (3, Fig. 5-12) to facilitate individual blade setting.

The upper number 2 head has a register disc (4, Fig. 5-12) for setting the entire upper slotting shaft for proper slot depth.



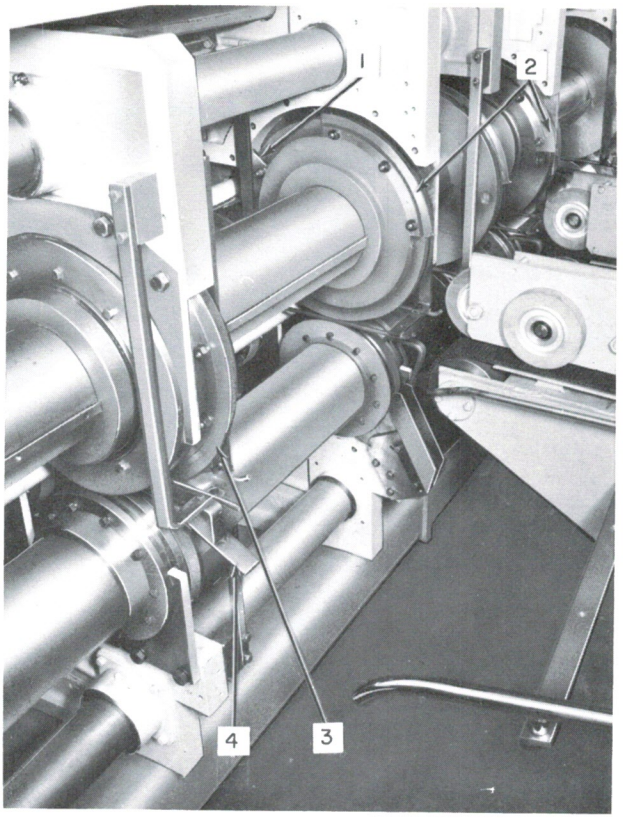
1. Slotter Heads
2. Slotter Shaft Clutch Handle
3. Slotter Shafts

Figure 5-9. Slotter Shafts and Heads



1. Tie Brace
2. Lap Cutter Blade
3. Tipped Male Slotter Blade
4. Anvil
5. Lap Cut Blade Holder
6. Clamp Screw
7. Cam Adjustment
8. Tie Brace Lock Bolts

Figure 5-10. Slotter Head



1. Beveled Male Blade
2. Tipped Male Blade
3. Trim Knife
4. Trim Deflector

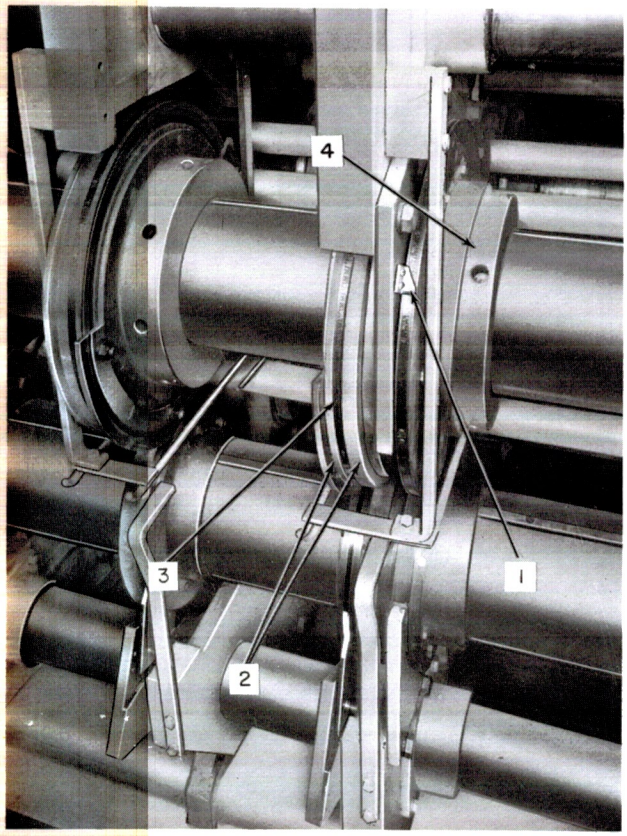
Figure 5-11. Slotting Blades and Trim Deflector

b. Controls.

(1) A slotter shaft CLUTCH HANDLE (2, Fig. 5-9) is located just inboard of the operating side frame on the delivery end of the unit. The handle is used to engage and disengage the shaft gearing from the main gear to permit rotation of the upper shaft when setting the slotting blades.

(2) A slotter shaft VERTICAL ADJUSTMENT (7, Fig. 5-8) is located on the operating side frame. It is used to raise or lower the upper slotter shaft to permit setting the gap between the male and female heads for the caliper of board to be run. The adjustment has a LOCK LEVER (8, Fig. 5-8) to prevent accidental movement.

(3) In addition to the controls for setup, the unit is equipped with provisions for adjusting the position of slots while the machine is in operation. A slotter shaft RUNNING REGISTER and LOCK (1 and 2, Fig. 5-8) are located on the operating side frame. If the slot position is improper, short or long, the running register is used to adjust the length of the slot.



1. Pointer
2. Knurled Feed Rings
3. Slot Depth Scale
4. Barring Collar and Register Disc

Figure 5-12. Slotter Register Disc

Note

The amount of adjustment can be read on the body of the adjusting screw. It is graduated in one-eight inch increments. Clockwise rotation of the adjusting screw results in slots closer to the blank leading edge. Counter-clockwise rotation results in slots closer to the blank trailing edge.

c. Setup.

(1) Disengage the slotter running register clutch by rotating the CLUTCH HANDLE (2, Fig. 5-9).

(2) Place a lever bar in one of the holes in the slotting shaft register disc (4, Fig. 5-12).

(3) Rotate the slotting shaft until the tipped male slotter blades (2, Fig. 5-11) enter the female blades.

(4) Unlock the slotter shaft RUNNING REGISTER (1, Fig. 5-8) and rotate it until the indicator on the body of the screw reads zero.

(5) Lock the handwheel in position with the LOCK LEVER (2, Fig. 5-8).

(6) Place a lever bar in one of the holes in the slotting shaft register disc (4, Fig. 5-12).

(7) Rotate the disc until the beveled blade locknuts are accessible.

(8) Loosen the locknuts of each beveled blade and align the beveled ends of the blade with the dimension on the head scale (3, Fig. 5-12) corresponding to the blank body dimension (box depth) specified on the order work sheet.

(9) Tighten the lock screws.

Note

The tipped blade (2, Fig. 5-11) is preset to the zero mark on the slotter head scale. It should not be moved unless changing to shorter blades. Refer to the following chart.

CHANGING BOTH BLADES

Maximum Box Body Depth	Tipped Blade	Beveled Blade
26	12	12
32	9	9
38	6	6
44	3	3
CHANGING BEVELED BLADES ONLY		
26	12	12
29	12	9
32	12	6
35	12	3

(10) Loosen the lap-cut blade attaching nuts adjacent to the beveled blade.

(11) Align the lap-cut blade with the end of the bevel on the blade.

(12) Lock the blades using the clamp nuts.

Note

The lap-cut blade adjacent to the tipped slotter blade is preset and should not be moved except as indicated below. Under certain conditions, an extended lap-cut may be desired. The lap-cut blades may be positioned within the limits of the lap-cut blade holder (5, Fig. 5-10) slots to obtain an extended glue lap.

(13) Using the lever bar, rotate the shaft until the pointer (1, Fig. 5-12) shows the desired dimension on the scale.

(14) Rotate the slotter shaft CLUTCH HANDLE (2, Fig. 5-9) to reengage the slotter shaft drive mechanism.

(15) Remove the lever bar from the register disc.

(16) Set the slotter shaft gap as follows:

(a) Loosen the three tie-brace locking bolts (8, Fig. 5-10).

(b) Unlock the slotter shaft vertical adjustment by rotating the LOCK LEVER (8, Fig. 5-8).

(c) Rotate the slotter shaft VERTICAL ADJUSTMENT HANDLE (7, Fig. 5-8) until the desired board caliper dimension is set on the caliper indicator.

(d) Lock the handle using the LOCK LEVER.

(e) Tighten the three tie-brace bolts.

(17) Reengage the slotter shaft clutch.

(18) Set the machine laterally for the panel sizes on the blank to be run using the box panel DRUM SWITCHES (1, Fig. 5-6) on the pendant control panel.

Note

Ensure that the tipped slotter blades are engaged in the female heads when setting panel sizes.

The numbers 2 and 3 panel switches are set first and then the numbers 1 and 4 switches until the desired panel sizes are matched on the scales (1, Fig. 5-1) at the top of the creaser/slotter section.

6. TRIM AND LAP CUTTING KNIVES.

a. Description.

The extreme drive side slotter head carries a pair of trim knives (3, Fig. 5-11). The operating side slotter head carries the lap-cutting knives and holders (2, Fig. 5-10). The purpose of the lap cutting knives is to remove the excess board from the first panel to form the glue tab. The purpose of the trim knives is to trim the edge of the blank to the proper size.

b. Adjusting Cutting Action of Lap-Cut Knives.

(1) Disengage the slotter shaft clutch.

(2) Insert a lever bar in one of the holes in the slotter shaft register disc (4, Fig. 5-12) and rotate the shaft to position a lap-cut knife above the cutting anvil.

(3) Loosen the clamp screws on the operating side of the blade holder (6, Fig. 5-10).

(4) Rotate the clamp adjustment (7, Fig. 5-10) until the blade contacts the anvil.

(5) Tighten the clamp screw.

(6) Check the cutting action of the blade using a piece of newspaper and rotating the slotting shaft to allow the blade to cut through the newspaper.

(7) The knife should cut cleanly and not contact the anvil (4, Fig. 5-10) too hard.

(8) Repeat the procedure for the other lap-cut knife.

(9) Rotate the slotter shaft, using the lever bar, until the pointer (1, Fig. 5-12) shows the desired dimension on the register disc.

(10) Reengage the slotter shaft clutch.

E. PREVENTIVE MAINTENANCE

Use the following chart as a guide for performing maintenance. The chart outlines inspection periods recommended for various components on the creaser/slotter section.

Note

Do not use air hoses for cleaning. Removal of dust by vacuum is preferred.

Component	Inspection Period	Remarks
Strippers	Daily	Remove all scrap.
	Weekly	Check condition and function of strippers. Disassemble, if necessary, to remove all scrap and dust. Replace badly worn strippers.
Primary and Secondary Creaser Heads	Weekly	Check condition of the creasers. Replace if necessary.
Lap Cutting Blades	Weekly	Check condition of blades. Replace flattened blades.
Male and Female Slotter Blades	Weekly	Check condition of blades. Replace broken or chipped male blades. If female blades are worn and chipped, report condition to the maintenance department or remove the head for turning or replacement.

Component	Inspection Period	Remarks
Jiffy-Set Carbon Wear Plates	Monthly	Check the wear plates for wear. Shim as necessary to maintain a 0. 002 inch running clearance. Replace any broken or missing plates.
Trim Knife	Monthly	Check for tightness. Shim carbons and/or jiffy plate to ensure good cutting.
Lock (Roll Back Slotter Only)	Monthly	Tighten as necessary.

F. MAINTENANCE

1. REPLACING JIFFY-SET SHOES (Carbon Wear Plates).

If the primary creaser, secondary creaser or slotter head jiffy-set shoes become excessively worn, several discrepancies in the box quality, such as incorrect panel sizes, ragged trimming, misaligned creases, partial or no trimming, insufficient gap, ragged slotting and slotter blade wear may become evident. To overcome these conditions, periodically check the clearance between the jiffy-set shoes the creaser and slotter heads. The clearance should not exceed 0. 001 to 0. 002 inch. If the clearance is excessive or if the shoes exhibit an uneven wear pattern, they must be shimmed or replaced.

a. If the jiffy-set shoe (1, Fig. 5-13) exhibits an uneven wear pattern, the shoe must be replaced. To replace the shoe, proceed as follows:

(1) Remove the screws (3, Fig. 5-13) and lockwashers securing the jiffy-set plate to the traverse plate (4, Fig. 5-13).

(2) Remove the plate (2, Fig. 5-13) and shim.

(3) Remove the bronze screws securing the shoe and shims to the plate and remove the shoe and shims.

Note

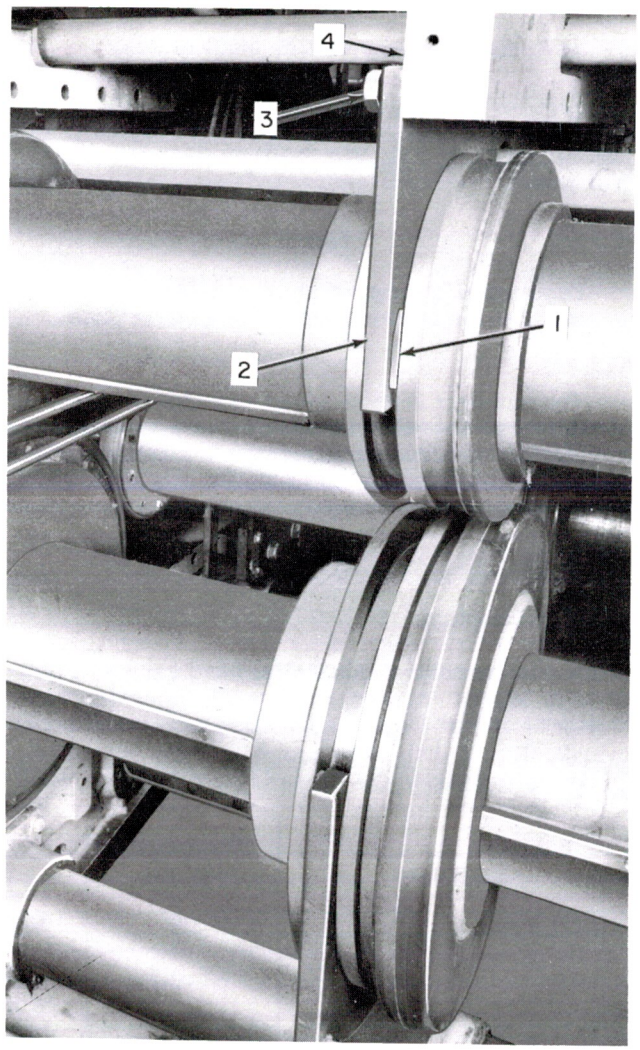
If screws are very tight, heat them slightly to loosen the locktite.

(4) Using bronze screws, install a new shoe on the jiffy-set plate.

CAUTION

The jiffy-set shoes are fragile and will crack if mishandled. Exercise care when installing them.

(5) Place the assembly on the head, with the shoe in the appropriate head groove, and check the clearance between the head and shoe using a feeler gauge.



1. Jiffy-Set Shoes
2. Jiffy-Set Plate
3. Plate Attaching Screws
4. Traverse Plate

Figure 5-13. Replacing Jiffy-Set Shoes

(6) If the clearance exceeds 0.001 to 0.002 inch, remove the shoe and install a shim, of appropriate thickness, to bring the head-to-shoe clearance within the acceptable range.

(7) If the clearance is less than acceptable, remove sufficient material from the shoe to bring the head-to-shoe clearance within the acceptable range.

(8) Apply locktite on the bronze screws and install the shoe on the plate.

(9) Reinstall the plate, shim and spacer on the traverse plate.

b. If the jiffy-set shoe is evenly worn, but the clearance is excessive, proceed as follows:

(1) Determine the clearance between the head and shoe using a feeler gauge.

(2) Remove the jiffy-set plate, shim and spacer.

(3) Remove the jiffy-set shoe and add shims between the shoe and plate to compensate for the clearance in excess of 0.001 inch.

Note

To determine the thickness of shims required, subtract 0.001 inch from the clearance determined in step b. (1).

(4) Apply Locktite on the bronze screws and install the shoe and shim or shims on the plate.

(5) Install the plate, shim and spacer on the traverse plate.

G. TROUBLESHOOTING

Refer to the following chart for a listing of operating difficulties which may be encountered and the standard procedure to correct them.

The chart is divided into two parts; finished box troubles and operating troubles. Operating troubles are defined as those that are caused by improper setup or malfunction of a machine component. Finished box troubles are defined as those resulting in improper assembly of the box when inspected at the delivery end of the machine.

To use the chart properly, determine if the trouble is operational or shows up as a result of box inspection at the delivery end. Turn to that part of the chart concerned and locate the symptom encountered. Check the possible causes of the difficulty. When the trouble is located, refer to the chart to determine how the difficulty may be remedied.

To isolate electrical difficulties, refer to the wiring diagrams and schematics supplied with the machine.

CREASER/SLOTTER - BOX TROUBLES

Symptom	Cause	Remedy
Incorrect Panel Sizes	Panel sizes improperly set on panel scales	Readjust the panel sizes.
	Panel size pointers moved or installed improperly	Check the installation of the pointers. Move the pointers, if necessary, to correct the condition.
	Tray clutches (if so equipped) incorrectly engaged	Repeat realignment procedure.
	Worn or missing jiffy plate carbon shoes	Replace missing or worn shoes.
Boxes Not Square	Kicker not straight	Readjust.
	Creaser and slotter feed roll, pull rolls and print roll gap too loose	Readjust gap for caliper of board to be run.
Slotter Head Marks on Box Adjacent to Crease	Slotter head gap too tight	Readjust the slotter for caliper of board to be run.
Rolling Folds	Slotter head gap too tight and crushing blank along score line	Readjust the head gap for the caliper of board to be run.
	Insufficient creasing	Readjust the creasing head contact.
	Female creasers worn	Replace the creaser wheel and return it to the manufacturer for recovering.

CREASER/SLOTTER - BOX TROUBLES (CONT)

Symptom	Cause	Remedy
Insufficient Gap	Trim knife not cutting or panel settings incorrect	Readjust or replace the trim knife.
	Insufficient trim allowance	Readjust to obtain the proper trim allowance.
	Gauging rolls too tight	Readjust.
	Insufficient crease	Readjust gap for board caliper.
Excessive Gap	Panel sizes incorrect	Readjust.
	Undersize sheets (no trim)	Adjust feed hopper.
	Board not folding on crease	Replace worn jiffy-set shoes.
Improper Lap-Cut Location	Lap-cut knives improperly set	Readjust to properly position the lap-cut knives.
Glue-Lap Knives Not **Cutting**	Knife dull or worn or improperly adjusted	Replace the knife if worn or readjust.
	Tie brace loose	Tighten attaching bolts.
Trailing Edge Slots out of **Register**	Beveled slotter knives improperly set	Readjust the slotter knives.
	Box slipping in slotting section	Readjust the slotter head gap.
All Slots out of Register (shallow or deep)	Slotting heads improperly registered	Readjust the slotter head register.
	Feed end zero not in line with slotter zero	Jog to zero at delivery end. Open machine, zero feed end and close up.
	Creaser heads improperly set for board caliper	Readjust the heads for the caliper of board to be run.
Ragged Slotting	Slotter blades, male or female, dull or worn	Replace the slotter blades.
	Jiffy wear plates worn or missing	Replace worn or missing parts.
	Wet board	Report the condition to the foreman. Remove the board from the machine and return it to storage for further curing.
Ragged Trimming or No **Trimming**	Trim knife dull	Replace the trim knife.
	Anvil worn	Replace the anvil knife.
	Gap between blade and anvil	Shim tight.
	Worn wear plates	Replace the worn plates.
	Insufficient trim allowance	Increase trim allowance.
Slot Variations at Different **Speeds**	Slotter head gap too loose	Reset the gap.
	Feed roll gap loose	Readjust gap.

CREASER/SLOTTER - BOX TROUBLES (CONT)

Symptom	Cause	Remedy
	Pull roll gap loose	Readjust gap.
	Primary and secondary creaser loose	Readjust gap.
Glue-Lap Knives Not Cutting	Tie brace loose	Tighten the tie-brace attaching bolts.
	Anvil worn	Replace the anvil.
	Glue-lap knives dull	Replace the knives.
	Glue-lap knives improperly adjusted for caliper change	Readjust the knives for the caliper of board to be run.
	Eccentric lock screw loose	Tighten the screw.
No Trimming	Trim knife not cutting	Readjust the knife contact with the anvil or replace the knife.
	Wear plates worn	Replace the wear plates.
	Insufficient trim allowance	Glue lap can be made slightly smaller to allow for additional trim.
	Brass nuts or lead screws worn	Replace the nuts or screws.
Unable to Set Panel Sizes	Box panel drum switch defective	Replace the switch. Refer to the wiring diagrams supplied with the machine.
	Interference at delivery end	Reposition pushers and holddown.
	Slotting head binding	Clean all shafts and remove nicks or burrs. Lubricate shafts and heads.
	Lead screws dirty	Wipe the screws clean and lubricate them.
	Tie brace jamming shafts	Loosen the brace.
	Worn lead screw nut threads	Replace the lead screw nut.
Machine Won't Close	Pendant control left between slotter and printer	Move pendant to outside machine area.
Machine Won't Run or Jog	Register clutch open	Secure clutch handle in proper position.

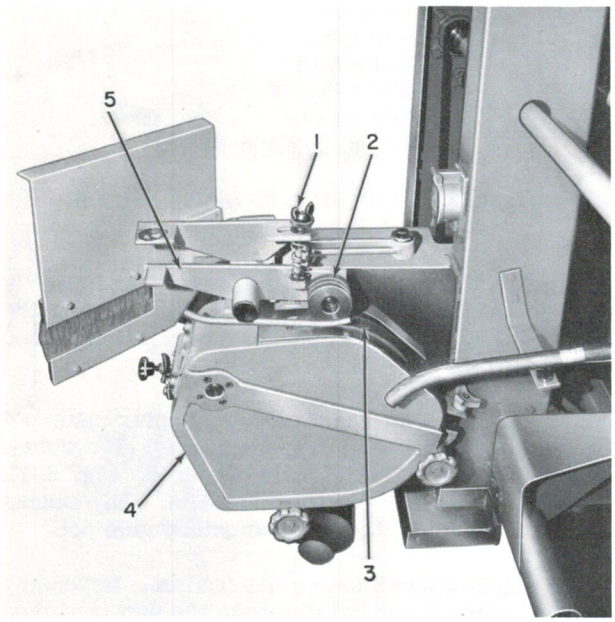
SECTION VI
GLUING SECTION

A. GENERAL

Three gluing units are available for the machine. An inside-lap gluing unit (Figure 6-1) is standard equipment with all machines. If the machine is equipped with a standard unit, an additional gun-type outside lap-gluing unit (Figure 6-1A) may be optionally purchased or a combination inside/outside glue wheel applicator (Figure 6-2) can be optionally selected.

Note

All units use glue with a setting time of 10 seconds or less.



1. Pressure Roll Height Adjustment
2. Pressure Roll
3. Glue Roll
4. Glue Pot
5. Swivel Bracket

Figure 6-1. Inside Lap-Gluing Unit

B. FUNCTIONING

1. STANDARD INSIDE-LAP GLUING UNIT.

The glue wheel is driven by its own dc slave motor that tracks with the main drive motor. The system is gravity fed from a 55 gallon drum and uses an electronic sensing device to maintain the proper glue operating level in the glue pot at all times.

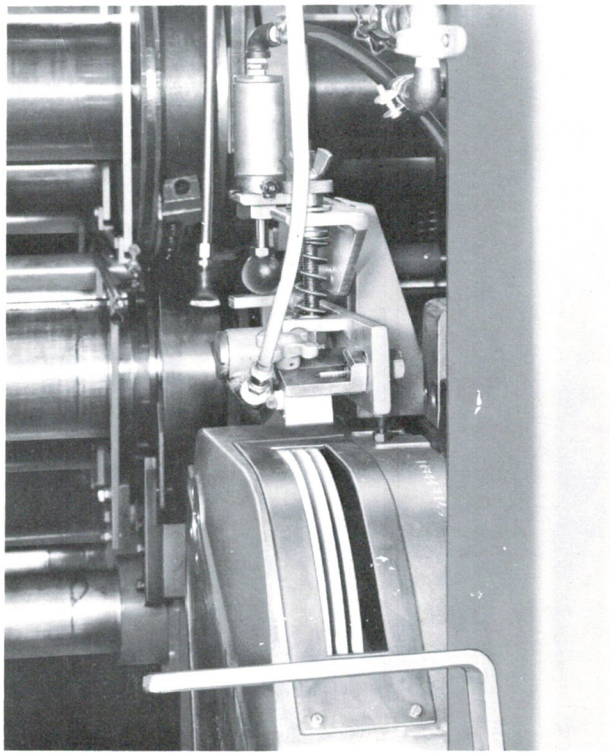


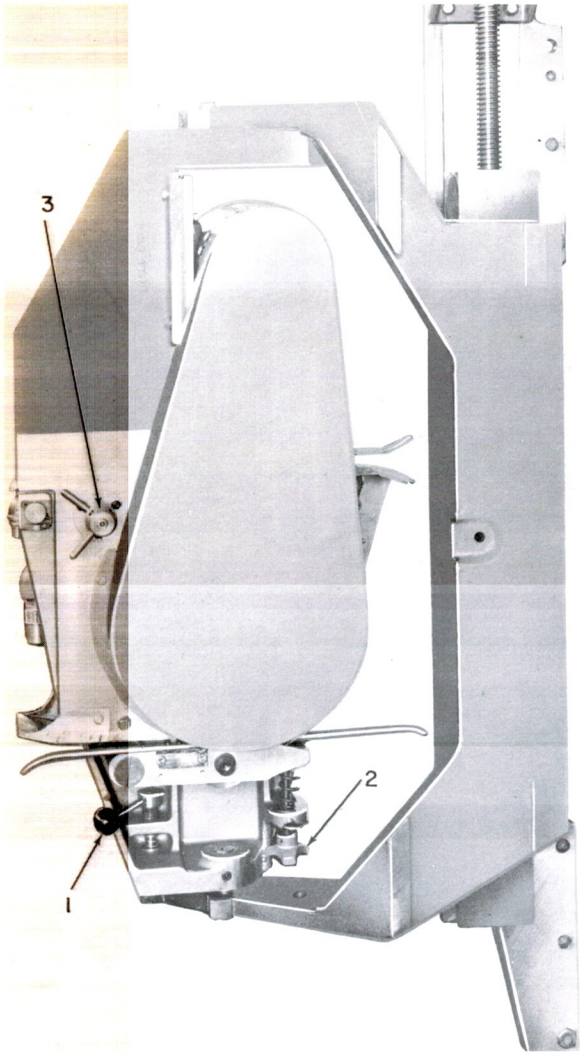
Figure 6-1A. Gun-Type Outside Lap-Gluing Unit

The probe unit (3, Fig. 6-3), mounted in a reservoir adjacent to the glue pot, consists of two sensing elements and an electrical ground. One element is used for controlling a high liquid level condition; the other a low level condition.

Upon detection of a low level condition, the long probe emits a signal to the system control box (5, Fig. 6-3). The control box transmits the signal to the system solenoid (1, Fig. 6-3). The solenoid, when energized, releases the glue drum outlet house (4, Fig. 6-3), permitting a flow of glue to the glue pot (2, Fig. 6-3) until the glue level reaches the short probe. The solenoid is deenergized at this time. It pinches the outlet hose and prevents any additional flow of glue until the cycle repeats. Whenever glue is flowing (solenoid energized), an amber light on the slotter section will flash. This usually lasts about 30 seconds. Continued flashing indicates trouble, such as an empty drum, sticking solenoid, etc., and should be looked into.

2. GUN-TYPE OUTSIDE-LAP GLUE UNIT.

Glue is supplied from a pressurized tank to a trigger-type glue gun. When the trigger is tripped



1. Swivel Lock
2. Pressure Roll Up/Down Adjustment (Outside Lap-Gluing)
3. Doctor Blade Adjustment

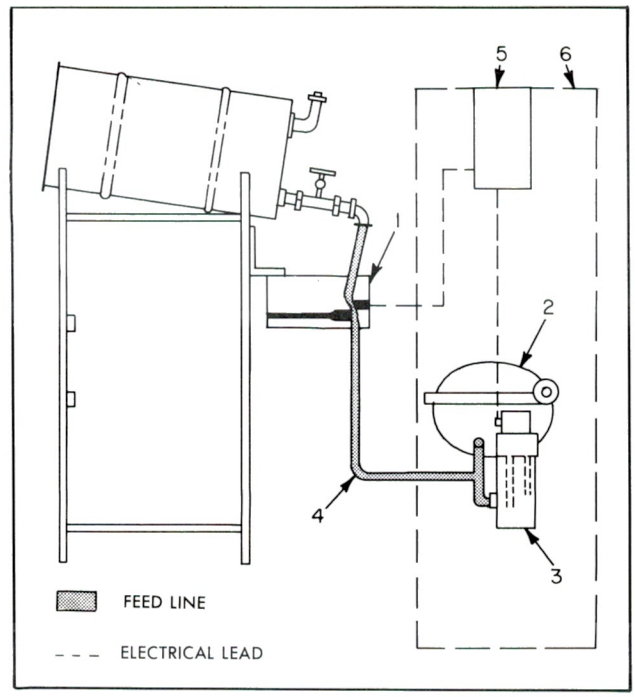
Figure 6-2. Inside/Outside Lap-Gluing Unit

by the leading edge of the glue lap tab, glue is deposited on the top surface of the glue tab until the trigger is released as the glue tab leaves the gun.

3. INSIDE/OUTSIDE LAP GLUE UNIT.

Glue from the glue drum is gravity fed to the supplementary glue pot (2, Fig. 6-4) mounted on the glue drum stand. An electromechanical sensing device (4, Fig. 6-4) mounted on the supplementary glue pot monitors the liquid level in the pot and maintains it at operating level.

When the probe senses a low liquid level condition, an electrical signal is sent through the control box to the system solenoid. The solenoid releases the drum feed hose and adhesive gravity feeds to the



1. Solenoid
2. Glue Pot
3. Probe Unit
4. Outlet Hose
5. Control Box
6. Folding Section Frame

Figure 6-3. Inside Lap-Gluing System Schematic

glue pot. When a high liquid level condition is sensed, the probe emits a signal to energize the solenoid which in turn pinches or closes the feed hose.

Glue is pumped from the supplementary glue pot to a nozzle (8, Fig. 6-4) overhanging the glue wheel. Glue is dripped directly on the wheel (5, Fig. 6-4). A doctor blade meters the glue film. Any excess glue drains back to the supplementary glue pot.

The unit is a combination mechanism. Depending upon the type of gluing to be done the unit is raised or lowered and then swiveled 180° to do inside or outside gluing as required.

C. LUBRICATION

Refer to Figure 6-5 for the frequency, method and lubrication points on the lap glue unit.

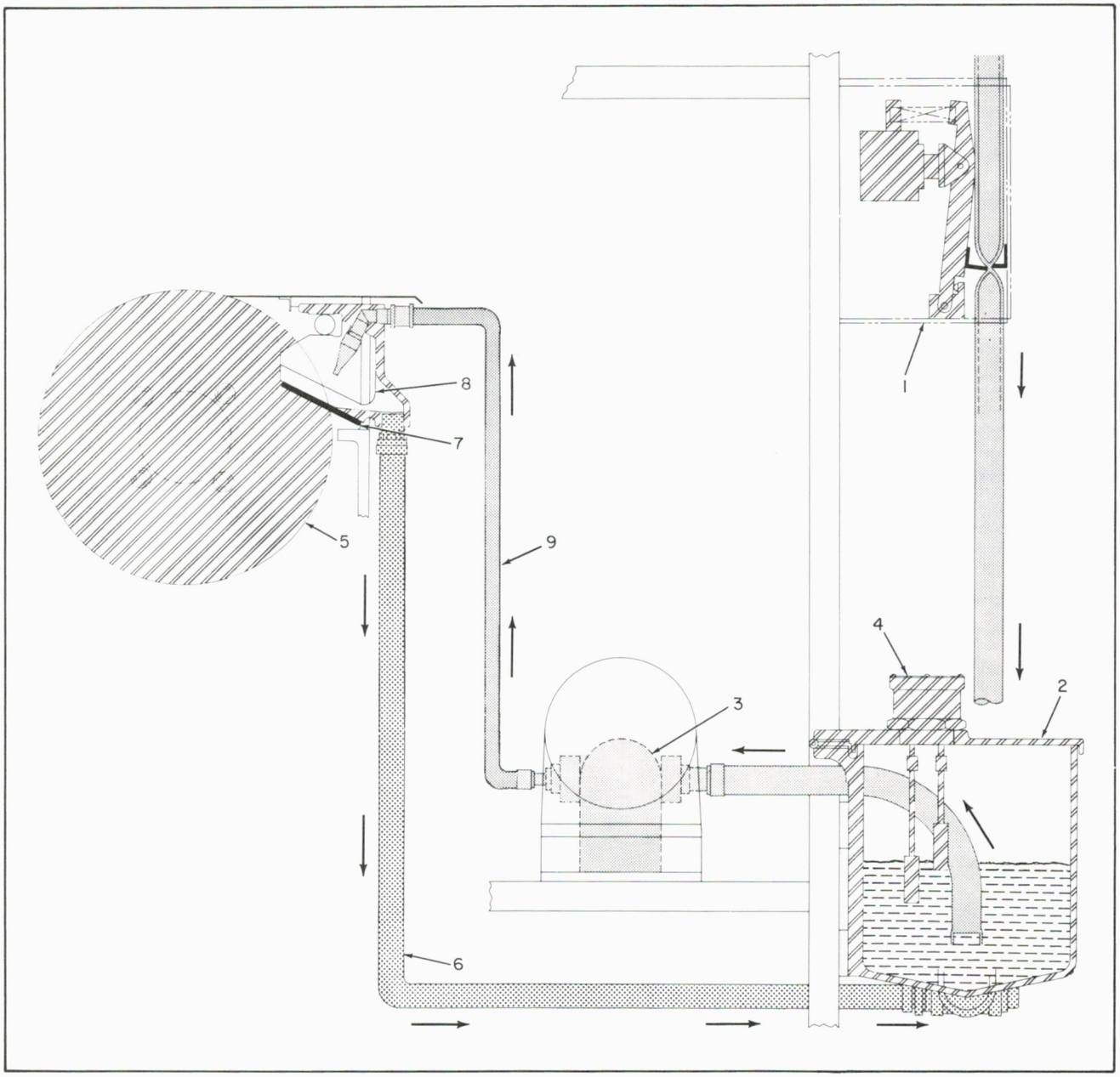
D. GLUE UNIT COMPONENTS

1. STANDARD INSIDE-LAP GLUE UNIT.

a. Probe unit.

(1) Description.

The glue unit incorporates an electro-mechanical sensing device (3, Fig. 6-3) which monitors the glue level, in the glue pot, automatically and maintains the glue in the pot at a constant operating level.



1. Solenoid
2. Supplementary Glue Pot
3. Pump
4. Probe Unit
5. Glue Roll
6. Drain Line
7. Doctor Blade
8. Nozzle
9. Supply Line

Figure 6-4. Inside/Outside Lap-Gluing System Schematic

(2) Controls.

(a) A GLUE FEED CONTROL SWITCH (Figure 6-6) for energizing the probe unit is provided on the control box on the folding section operating side frame.

(b) A SENSITIVITY SELECTOR RHEOSTAT (Figure 6-7) is mounted in the electrical control box. It adjusts the sensitivity of the probe unit and solenoid to control the speed at which glue flow can be started or stopped.

(3) Setup.

Place the GLUE FEED CONTROL SWITCH (Figure 6-6) in the ON position and open the glue drum valve.

b. Glue Roll.

(1) Description.

The glue roll is mounted in the glue pot, (Figure 6-8). It is chrome plated and is driven by a fractional horsepower motor mounted on the operating side of the unit.

(2) Controls.

A GLUE ROLL MOTOR selector switch (5, Fig. 2-2) is located on an electrical panel on the feed section frame. The switch is used to turn on the glue roll motor.

(3) Setup.

Place the glue roll MOTOR SELECTOR SWITCH (5, Fig. 2-2) in the ON position.

c. Pressure Roll.

(1) Description.

The pressure roll (2, Fig. 6-1) is mounted on a swivel bracket (5, Fig. 6-1) above the glue roll. It maintains positive uniform contact of the box lap against the glue roll. Thin circular flanges make contact with the box to prevent fouling the pressure roll with adhesive when board is not feeding through the unit.

(2) Controls.

The pressure roll mounting bracket is equipped with a HEIGHT ADJUSTMENT (1, Fig. 6-1) for setting the roll for the caliper of board to be run. The roll is also provided with a low limit stop to prevent contact of it with the glue roll. In addition, the swivel bracket incorporates a LOCK (5, Fig. 6-9) to secure the bracket in operating position.

(3) Setup.

(a) If the pressure roll is in the non-operating position, rotate it into operating position. Check to ensure that the LOCK (5, Fig. 6-9) is properly seated.

(b) Using the pressure roll HEIGHT ADJUSTMENT (1, Fig. 6-1) set the pressure roll as close to the glue roll as possible, without picking up glue.

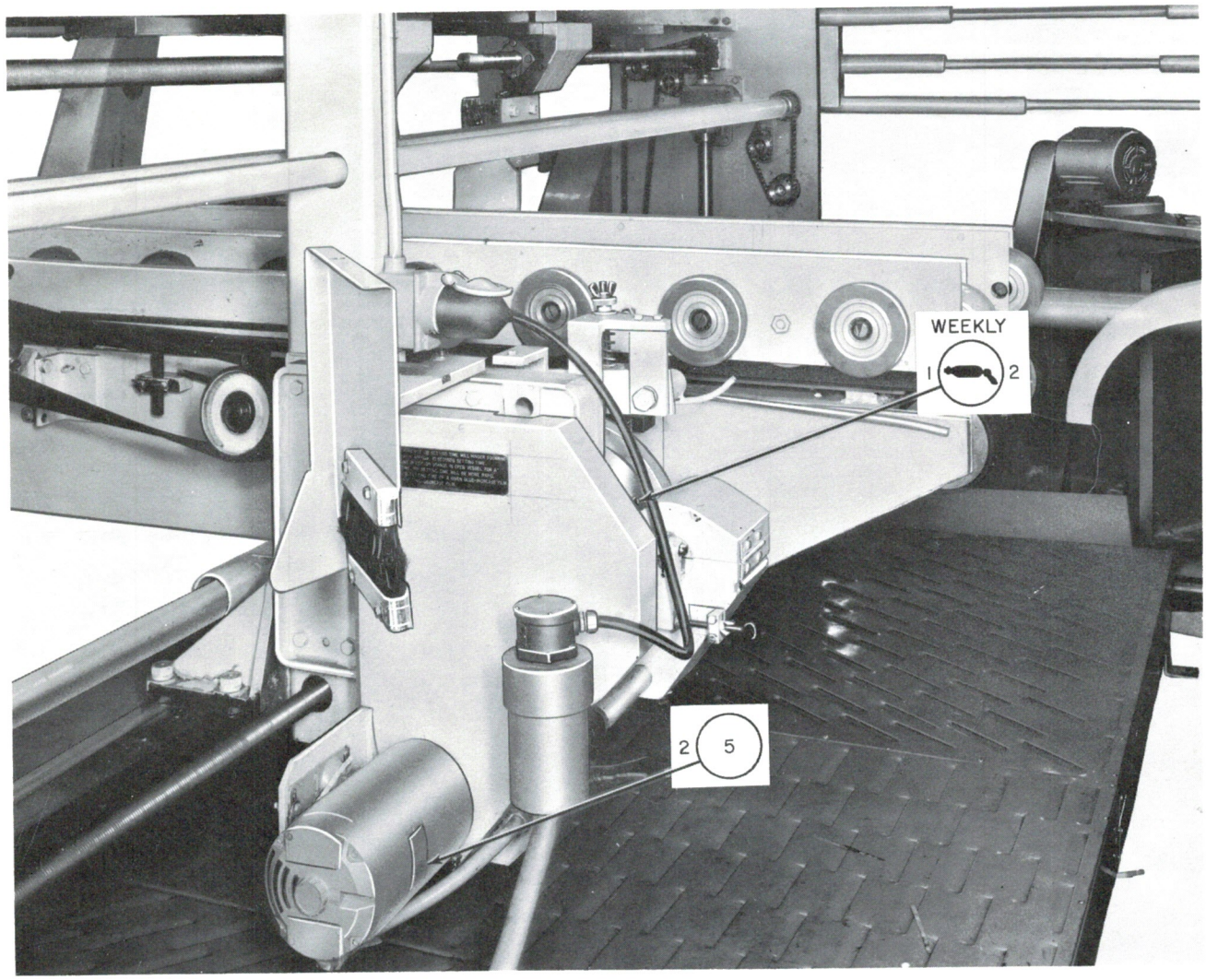


TABLE OF LUBRICANTS

Symbol	Classification	Description of Lubricant
1	AGMA NO. 3	AGMA SPEC. #252. Highly refined mineral gear oil; non-foaming, non-corrosive, non-separating. Viscosity index 60 or greater.
2	NLGI NO. 2	Lithium soap grease.
3	MOLYKOTE BR-2	Molybdenum disulfide grease.
4	AGMA NO. 1	Light oil per AGMA SPEC. #252 (described above).
5	PER MANUFACTURER'S RECOM-MENDATIONS	

Item No.	Description
1	Glue roll shaft bearing
2	Glue roll drive motor

Figure 6-5. Glue Unit Lubrication

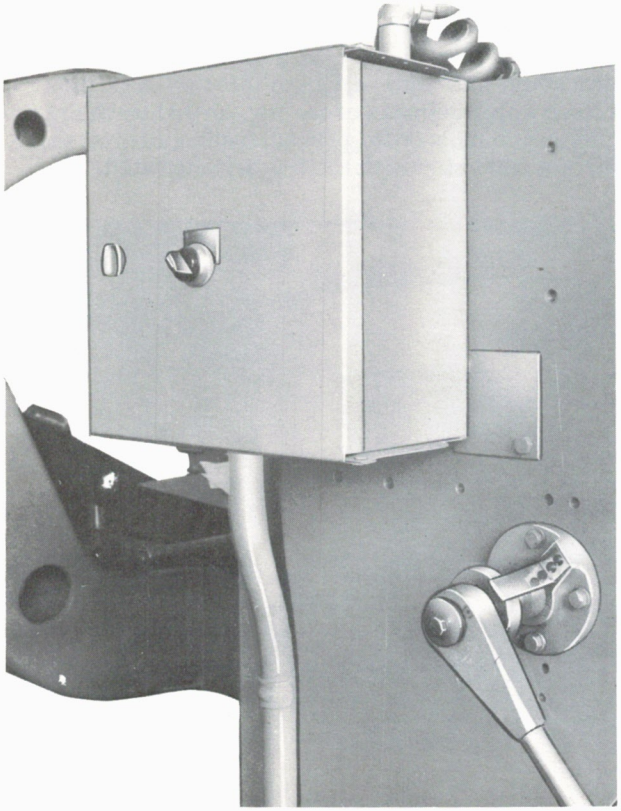


Figure 6-6. Glue Feed Control Switch

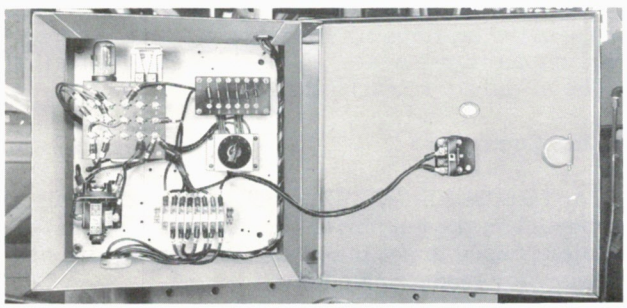


Figure 6-7. Sensitivity Selector Rheostat

d. Doctor Blade.

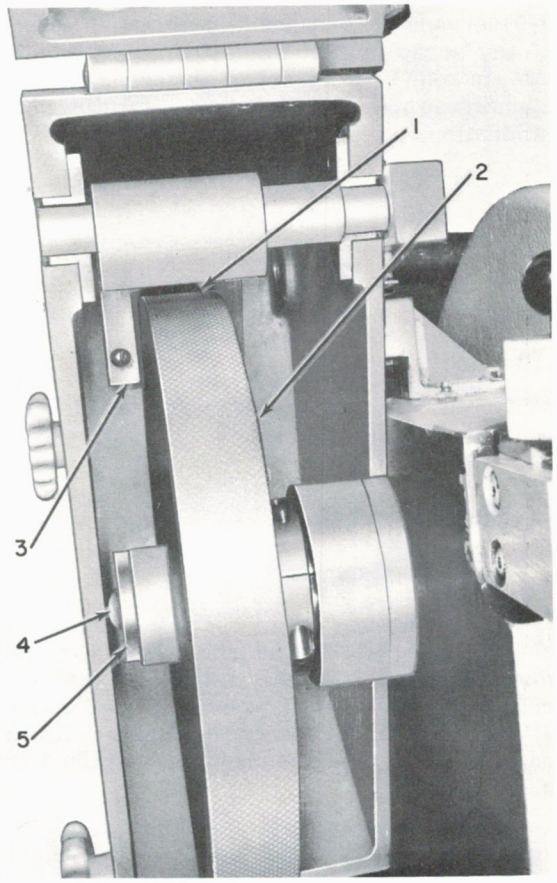
(1) Description.

A reverse angle plastic doctor blade (1, Fig. 6-8) is incorporated in the unit to remove excess glue from the glue roll (2, Fig. 6-8). The assembly is also equipped with wiper extensions (3, Fig. 6-8) to remove glue from the sides of the roll to prevent seepage outside of the glue unit housing.

e. Scrap Shield and Brush Assembly.

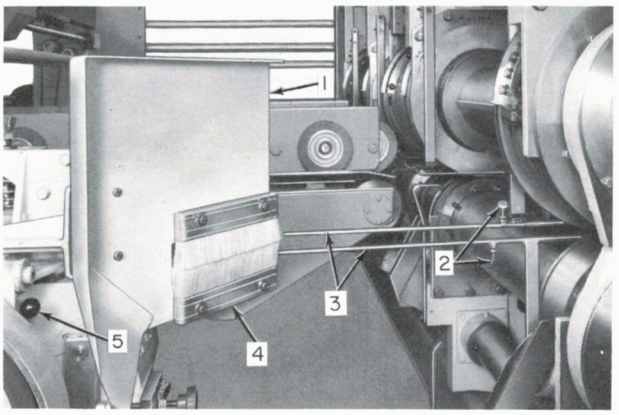
(1) Description.

The glue unit is provided with a pair of brushes, (4, Fig. 6-9) mounted on a swiveling scrap shield (1, Fig. 6-9). As each blank leaves the slotting section, the glue lap is directed by guides (3, Fig.



1. Doctor Blade
2. Glue Roll
3. Extension Wipers
4. Glue Wheel Attaching Screw
5. Collar

Figure 6-8. Glue Roll and Doctor Blade



1. Scrap Shield
2. Thumbscrews
3. Glue Lap Guides and Supports
4. Brush Assembly
5. Pressure Roll Swivel Bracket Lock

Figure 6-9. Scrap Shield and Brush Assembly

6-9) between the brushes. The blank is wiped clean of any scrap or dust generated in forming the glue tab. In addition to removing the scrap, it maintains cleanliness at the glue pot, thus preventing glue contamination.

(2) Setup.

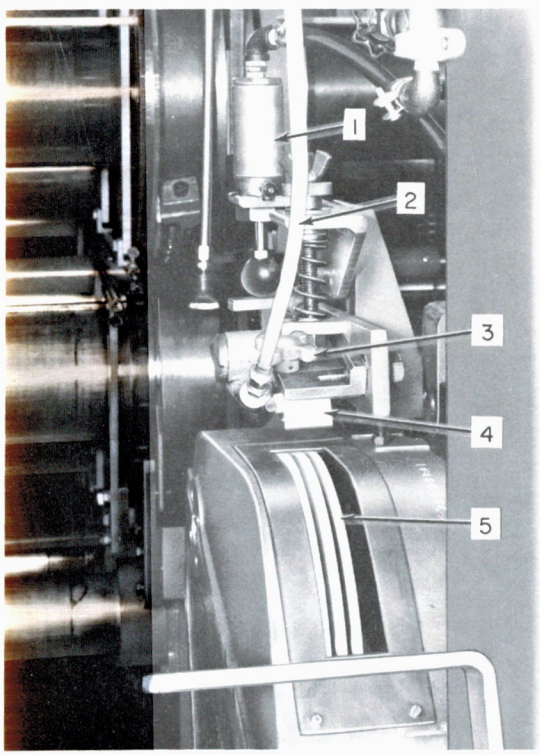
(a) Swing the scrap shield and brush assembly (1 and 4, Fig. 6-9) into operating position.

(b) Extend the box panel supports (3, Fig. 6-9) on the creaser/slotter section and lock them in position with the thumbscrews (2, Fig. 6-9).

2. TRIGGER-TYPE OUTSIDE-LAP GLUE UNIT.

a. Description.

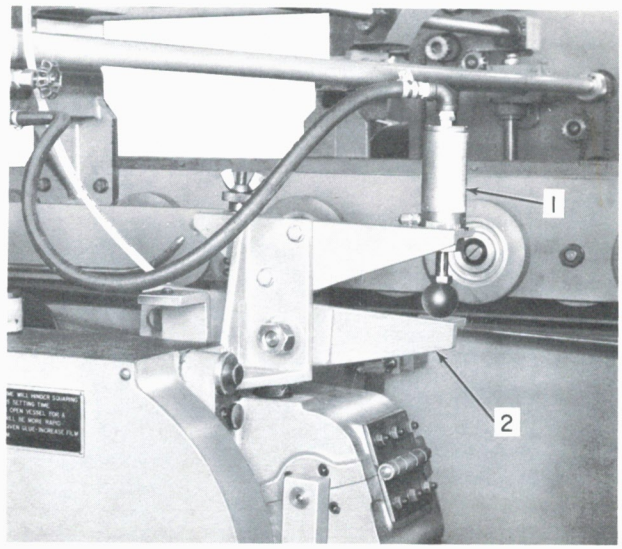
The unit mounts on the operating side of the machine (Figure 6-9A). The glue gun (4, Fig. 6-9A) is mounted in place of the inside glue unit pressure roll. Thin circular flanges (5, Fig. 6-9A) are installed in place of the standard glue roll. Glue is supplied from a pressurized tank supplied with the unit.



1. Air Cylinder
2. Feed Hose
3. Gun Holder
4. Gun
5. Glue Roll

Figure 6-9A. Gun-Type Outside Lap-Glue Unit

The unit also incorporates a pneumatic cylinder (1, Fig. 6-9B), which operates automatically with the start and stop circuits of the machine. It raises a pivoted bracket (2, Fig. 6-9B) on which the glue gun is mounted to prevent feeding of glue should the machine stop with the trigger activated.



1. Air Cylinder
2. Bracket

Figure 6-9B. Outside Glue-Unit Mounting

As the blank enters the gluing section, the leading edge of the lap trips the gun trigger. Glue is deposited on the top surface of the lap until the trailing edge of the lap releases the trigger.

b. Controls.

A PRESSURE REGULATOR (3, Fig. 6-10) is mounted on the tank cover (5, Fig. 6-10). The regulator is used to set the operating air pressure necessary for feeding glue from the tank.

c. Installation.

(1) Remove the pressure roll shaft lock nut and lockwasher.

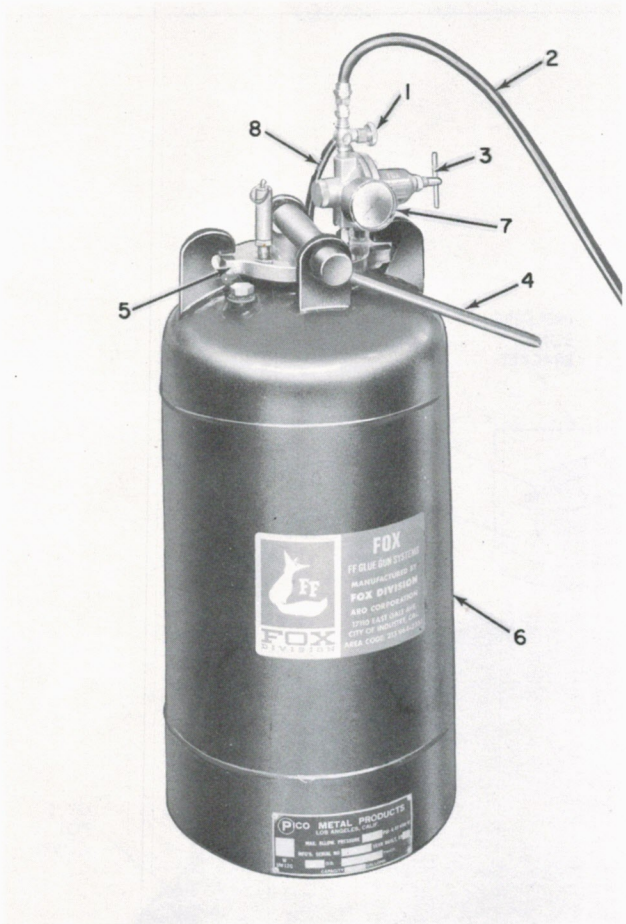
(2) Remove the pressure roll assembly (1, Fig. 6-11).

(3) Pull the pressure roll mounting bracket LOCK (5, Fig. 6-9) and rotate the bracket to the non-operating position.

(4) Loosen the glue pot cover LOCK (3, Fig. 6-11) and open the cover (2, Fig. 6-11).

(5) Loosen the glue pot lower section LOCK (4, Fig. 6-11) and swing the lower section (5, Fig. 6-11) away from the glue wheel.

(6) Loosen the DOCTOR BLADE ADJUSTMENT (6, Fig. 6-11) and rotate the blade away from the glue wheel.



1. Air Valve
2. Feed Hose
3. Pressure Regulator
4. Eccentric Cover Lock
5. Cover
6. Tank
7. Gauge
8. Air Line

Figure 6-10. Outside Lap-Glue Unit Tank

(7) Remove the glue wheel attaching screw (4, Fig. 6-8) and collar and remove the glue wheel.

(8) Install the flanged glue wheel and secure it to the shaft with the collar and screw.

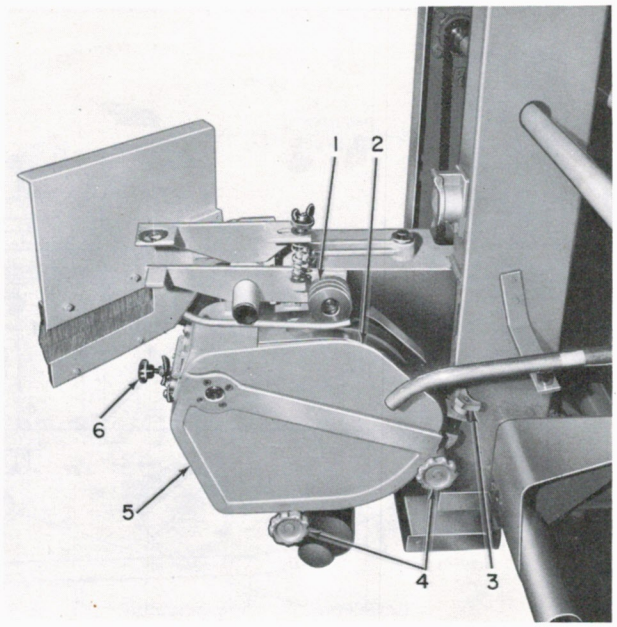
(9) Rotate the lower portion of the glue pot (5, Fig. 6-11) into position and secure it with the LOCK (4, Fig. 6-11).

(10) Close the glue pot cover (2, Fig. 6-11) and secure it with the cover LOCK (3, Fig. 6-11).

(11) Assemble the glue gun to the holder using the glue gun knob. See Figure 6-12.

(12) Install the assembly on the pressure roll bracket with the edge of the holder butted against the cap screw. See Figure 6-12.

(13) Close the tank air valve (1, Fig. 6-10).



1. Pressure Roll
2. Cover
3. Glue Pot Cover Lock
4. Glue Pot Lower Section Locks
5. Glue Pot Lower Section
6. Doctor Blade Adjustment

Figure 6-11. Preparation for Installation of Outside Lap-Glue Unit

(14) Rotate the eccentric cover lock (4, Fig. 6-10) and remove the lock.

(15) Twist the cover (5, Fig. 6-10) and remove it.

(16) Fill the tank (6, Fig. 6-10) with adhesive.

(17) Reinstall the tank cover. Rotate it to properly position it for locking.

(18) Install the cover lock with the lock handle in a vertical position. Rotate the handle to a horizontal position.

(19) Attach the feed hose (2, Fig. 6-10) to the tank and glue gun. Attach the air hose (8, Fig. 6-10) to the tank.

(20) Open the tank air valve.

d. Setup.

(1) Using the tank PRESSURE REGULATOR, set the air pressure at 40 psi on the tank gauge (7, Fig. 6-10).

(2) Open the air gate valve.

(3) Adjust the folding section as outlined in Section VII for outside glue laps.

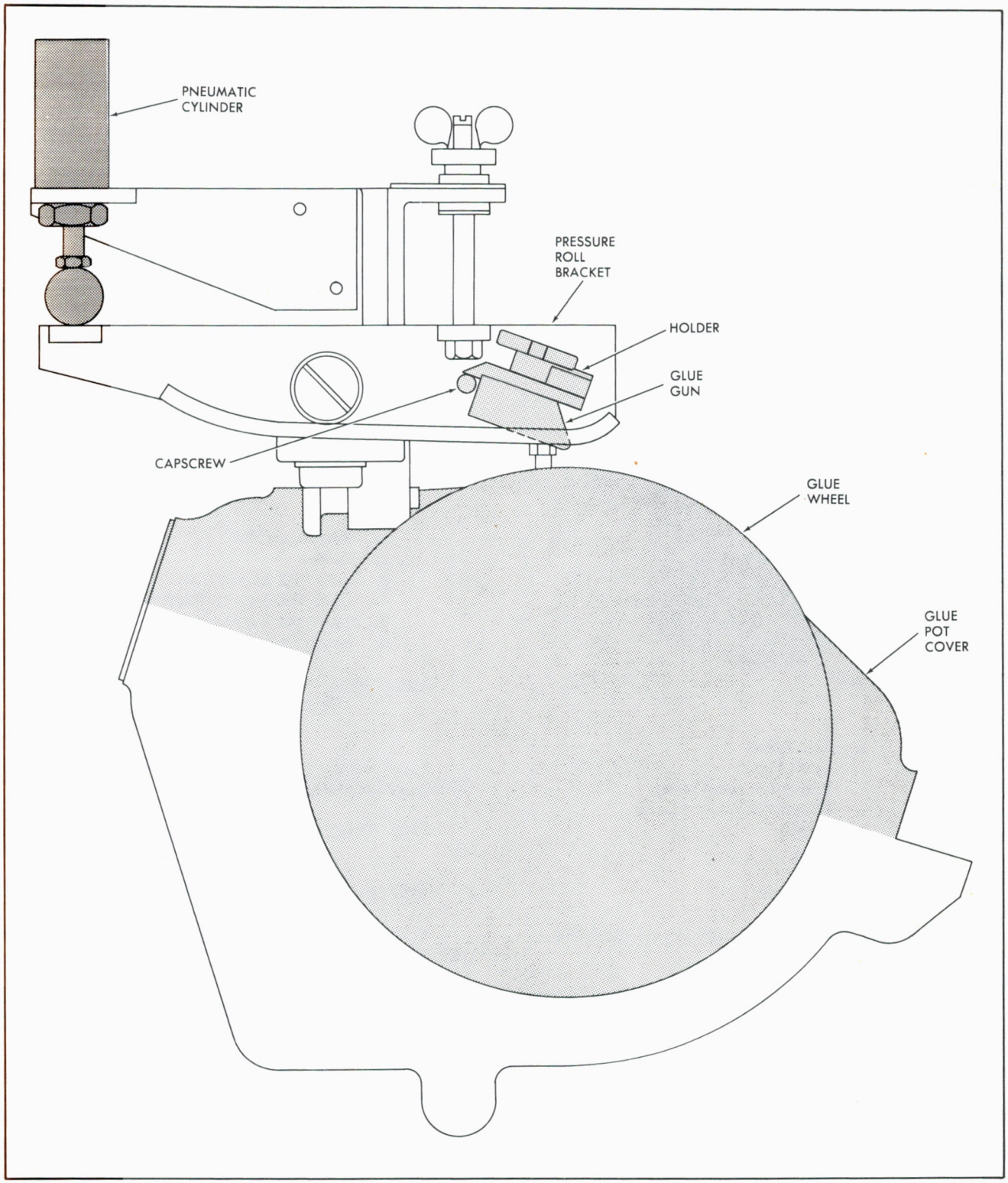


Figure 6-12. Installing Outside Lap-Glue Unit

3. INSIDE/OUTSIDE - LAP GLUE UNIT.

a. Description.

The machine can be equipped with an inside/outside lap glue unit (Figure 6-2) instead of the inside-lap glue unit supplied with the standard machine.

The unit is mounted on the operating side of the machine where the glue tab is formed. It applies glue to the top or bottom of the glue tab for outside or inside gluing, respectively. The glue wheel is driven by its own 1/2 hp dc motor (Figure 6-13) designed to track with the machine main drive within plus or minus five percent speed deviation over the entire machine speed range. In addition, a glue

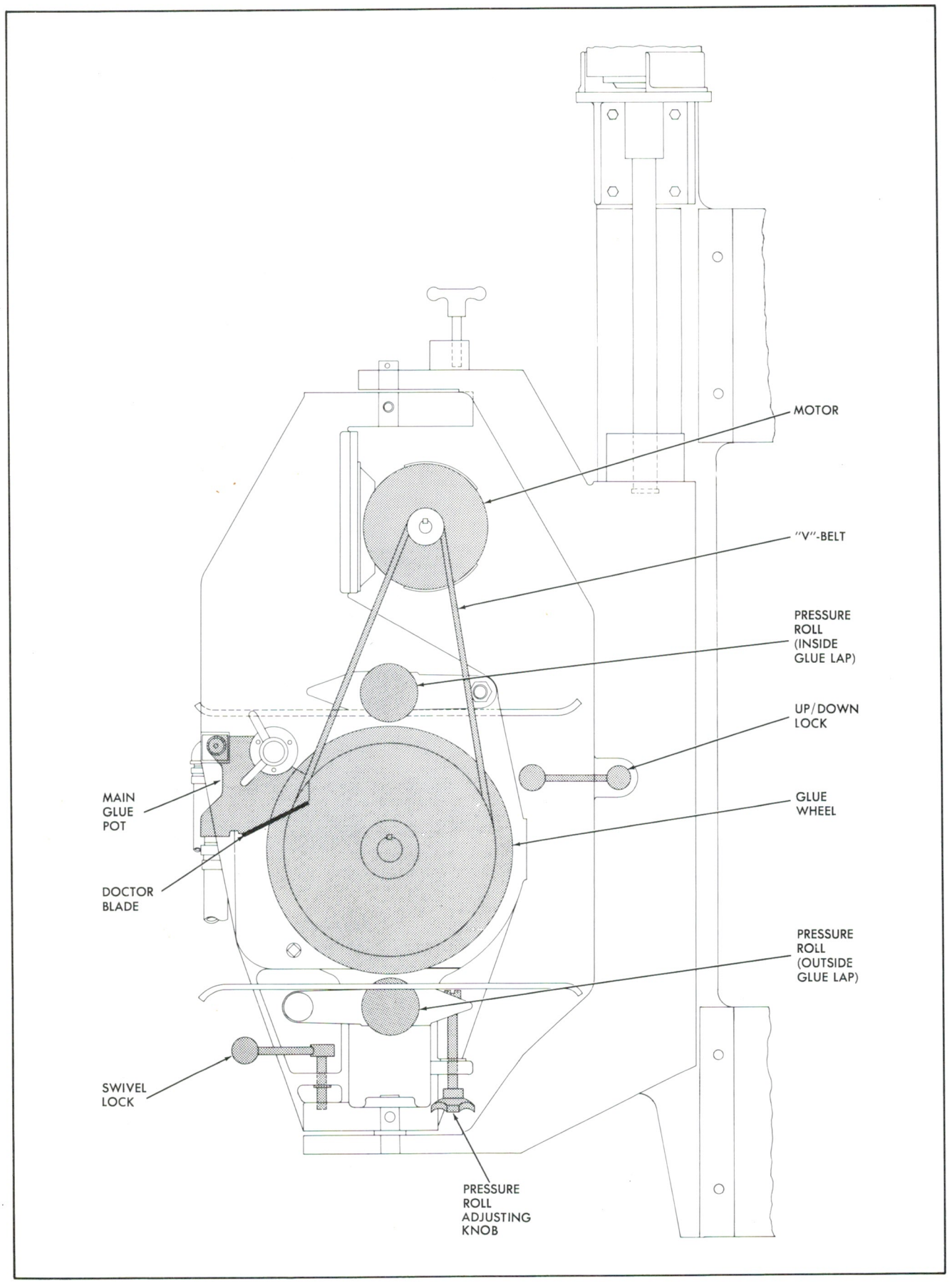


Figure 6-13. Inside/Outside Lap-Glue Unit Components

wheel idling arrangement is provided to keep the wheel rotating whenever the machine is stopped, to prevent glue contamination or hardening on the wheel.

The glue wheel is of the engraved type and chrome plated. A reverse angle plastic doctor blade (Figure 6-13) is used for metering the ink film. The drive to the glue wheel is a direct V-belt drive (Figure 6-13) for both inside and outside gluing. Glue feed to the wheel is by pump. Both the inside and outside glue system use the same main glue source and supplementary glue pot where the operating level is automatically maintained by an electro-mechanical sensing device.

b. Controls.

The unit is equipped with a handwheel (4, Fig. 6-14) for raising or lowering the unit for the particular gluing application. In addition, an UP/DOWN LOCK (Figure 6-13) and a SWIVEL LOCK (1, Fig. 6-2) are provided for securing the unit in position.

UP/DOWN ADJUSTMENTS (2, Fig. 6-2 and 1, Fig. 6-14) are provided for setting the height of the pressure roll assemblies.

A doctor blade adjustment and lock (3, Fig. 6-2) is provided to allow for means of movement of the blade for optimum metering and to compensate for any blade wear.

c. Setup.

(1) Using the handwheel (4, Fig. 6-14) position the unit for the type of glue lap to be run (UP for outside laps, DOWN for inside laps).

(2) Lock the unit in position using the UP/DOWN LOCK (Figure 6-13).

(3) Release the SWIVEL LOCK (1, Fig. 6-2) and rotate the unit for the appropriate glue lap. Lock the unit in position.

Note

The unit must be rotated to properly position the paper guides and the appropriate pressure roll for the particular gluing application.

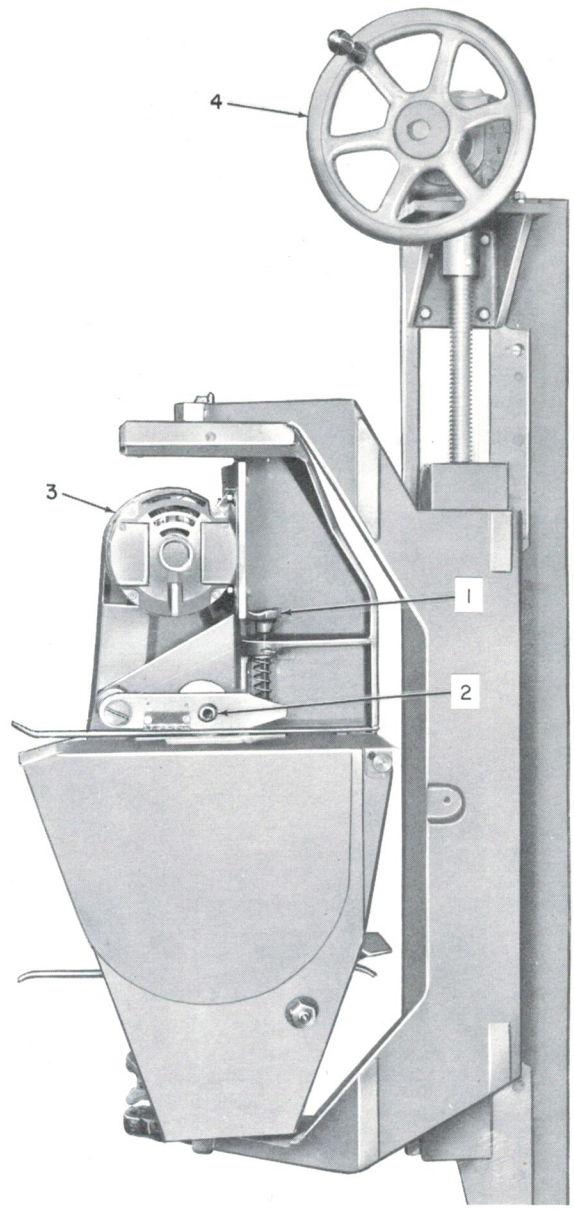
(4) Set the pressure roll as close to the glue wheel as possible, without picking up glue.

(5) Place the GLUE FEED CONTROL SWITCH (Figure 6-6) in the ON position.

(6) Open the GLUE DRUM VALVE.

(7) Place the glue roll MOTOR SELECTOR SWITCH (5, Fig. 2-2) in the ON position.

(8) Adjust the folding section as outlined in Section VII for outside glue laps.



1. Pressure Roll Up/Down Adjustment (Inside Lap-Gluing)
2. Pressure Roll Assembly (Inside Lap-Gluing)
3. Motor
4. Up/Down Handwheel

Figure 6-14. Inside/Outside Lap-Glue Unit Controls

E. PREVENTIVE MAINTENANCE

Use the following chart as a guide for performing maintenance. The chart outlines inspection periods recommended for various components on the glue unit.

Note

Do not use air hoses for cleaning. Removal of dust by vacuum is preferred.

Component	Inspection Period	Remarks
Glue Pot, Glue Wheel, Doctor Blade and Holder, and Probe Unit	Daily	Shut off glue feed mechanism. Stop the glue feed to the pot by tying off the hose close to the glue pot connection. Drain the glue pot. Remove all components and wash them thoroughly.
	Weekly	Inspect glue unit. Clean glue wheel thoroughly.
	Monthly	Check doctor blade for wear. Replace the blade if necessary.
Drip Pan	Daily	Remove and wash thoroughly.

F. TROUBLESHOOTING

Refer to the following chart for a listing of operating difficulties which may be encountered and the standard procedures to correct them.

The chart is divided into two parts; finished box troubles and operating troubles. Operating troubles are defined as those that are caused by improper setup or malfunction of a machine component. Finished box troubles are defined as those resulting in improper assembly of the box when inspected at the delivery end of the machine.

To use the chart properly determine if the trouble is operational or shows up as a result of box inspection at the delivery end. Turn to that part of the chart concerned and locate the symptom encountered. Check the possible causes of the difficulty. When the trouble is located, refer to the chart to determine how the difficulty may be remedied.

To isolate electrical difficulties, refer to the wiring diagrams and schematics supplied with the machine.

GLUING SECTION - BOX TROUBLES

Symptom	Cause	Remedy
Insufficient Glue Pattern	Pressure roll improperly set	Readjust the pressure roll contact pressure for the caliper of board to be run.
	Glue roll unevenly worn	Replace the glue roll.
	Insufficient glue in glue pot or drum	Replenish the glue supply.
Boxes Not Square	Improper adhesive	Use adhesive with a 10-second setting time.
Boxes Not Sealing	Insufficient glue pattern	Refer to Symptom "Insufficient Glue Pattern."
	Improper glue	Use glue with a 10-second setting time.
Boxes Stick Together	Pressure roll set too close	Readjust the roll for the caliper of board to be run.
	Worn glue roll depositing glue on folding belts	Replace the glue roll.
	Excessive glue application	Reduce glue film thickness

GLUING SECTION - OPERATING TROUBLES

Insufficient Glue in Pot	Glue drum empty	Replace the drum.
	Glue drum membrane	Ensure that the membrane is punctured.
	Hoses clogged	Flush and clean the hoses. Replace the hoses if necessary.
	Glue drum valve closed	Ensure that the valve is open.

GLUING SECTION - BOX TROUBLES (CONT)

Symptom	Cause	Remedy
	Probe unit inoperative or dirty	Clean the unit. Replace it if it is defective.
	Glue foaming	Add defoamer to the glue.
	System not turned on	Ensure that the system switch is activated.
Glue Pot Overflows	Probe unit inoperative or dirty	Clean the unit. Replace it if it is defective.
	Hose shutoff mechanism defective	Replace defective parts in mechanism.
	Hoses not properly engaged by shutoff mechanism	Refer to Figure for proper threading of hose.
Glue Flinging or Slinging	Scrap in glue pot	Clean the glue mechanism and glue pot.
	Worn glue roll (worn or sides)	Replace glue roll.
Glue Wheel Does Not Idle	Idler motor burned out or overloaded	Replace or check electrical resets.
	V-belt slipping	Tighten belt.
Dragging Blanks at Pushoff	Excessive glue application	Reduce the glue film.

SECTION VII
FOLDING SECTION

A. GENERAL

The folding section (Figure 7-1) of the machine is independently mounted directly after the slotter section, in its own side frames and is supported, at the delivery end, on movable carriers.

The folding section consists of a lower beam section (1, Fig. 7-1), an upper roll bracket assembly (4, Fig. 7-1), the belts (3, Fig. 7-1) and gauging and forming roll assemblies (2, Fig. 7-1).

B. FUNCTIONING

As the blank enters the folding section it is gripped between the lower folding belts and pressure rolls. Folding is performed gradually by the upper folding belts while the sheet is moved forward.

After the fold is completed, the box gap is controlled by the preset gauging rolls and the edges of the box are smoothed by the spring-loaded forming rolls.

C. LUBRICATION

See Figure 7-2 for the frequency, method and lubrication points on the folding section.

D. FOLDING SECTION COMPONENTS

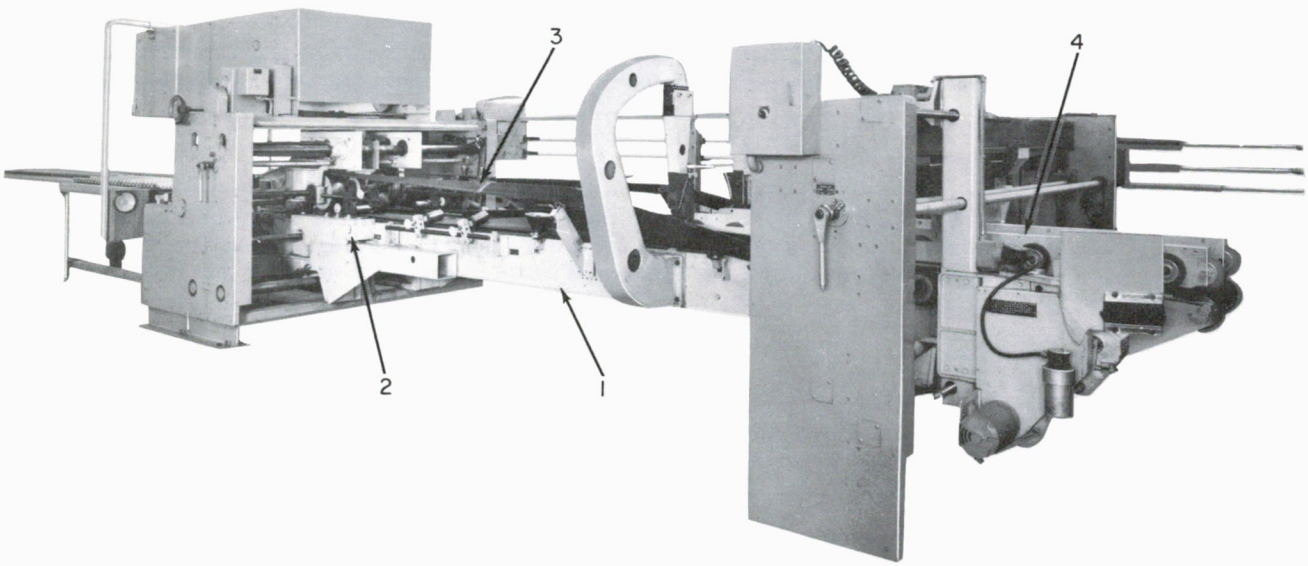
1. UPPER ROLL BRACKET ASSEMBLY.

a. Description.

The upper portion of the folding section is supported from the lower channels by "C" shaped supports (Figure 7-3). This arrangement provides open workspace for adjustment and maintenance functions.

b. Controls.

GAP ADJUSTMENTS (1, Fig. 7-3) are provided on each "C" shaped member for setting the upper roll bracket (2, Fig. 7-3) to the caliper of board to be run. An additional GAP ADJUSTMENT is provided on the operating side frame (1, Fig. 7-4) for setting the front end of the folding unit for board caliper.



1. Lower Beam Section
2. Gauging and Forming Rolls Assembly
3. Belt
4. Upper Roll Bracket Assembly

Figure 7-1. Folding Section

c. Setup.

(1) Operate the folding section front end GAP ADJUSTMENT (1, Fig. 7-4) until the board caliper, specified on the work order, can be read on the caliper indicator.

(2) Using a sample piece of board to be run, check the upper roll bracket setting at the "C" shaped supports on the operating and drive sides of the machine.

Note

Proper setting is attained when the rolls exert pressure on the board against the belt without evidence of crushing.

(3) If adjustment is required, use the GAP ADJUSTMENT (1, Fig. 7-3) on the support.

2. LOWER BEAM SECTION.

a. Description.

The lower beam section (1, Fig. 7-1) has box shaped ship and car channels as the main beam. The front end is mounted on cam followers (2, Fig. 7-5) and incorporates a rotating screw arrangement (1, Fig. 7-5) for side to side positioning. The rear end of the section is mounted on movable carriers.

b. Setup.

The section is automatically positioned for box panel sizes when the creaser/slotter is adjusted for panel sizes.

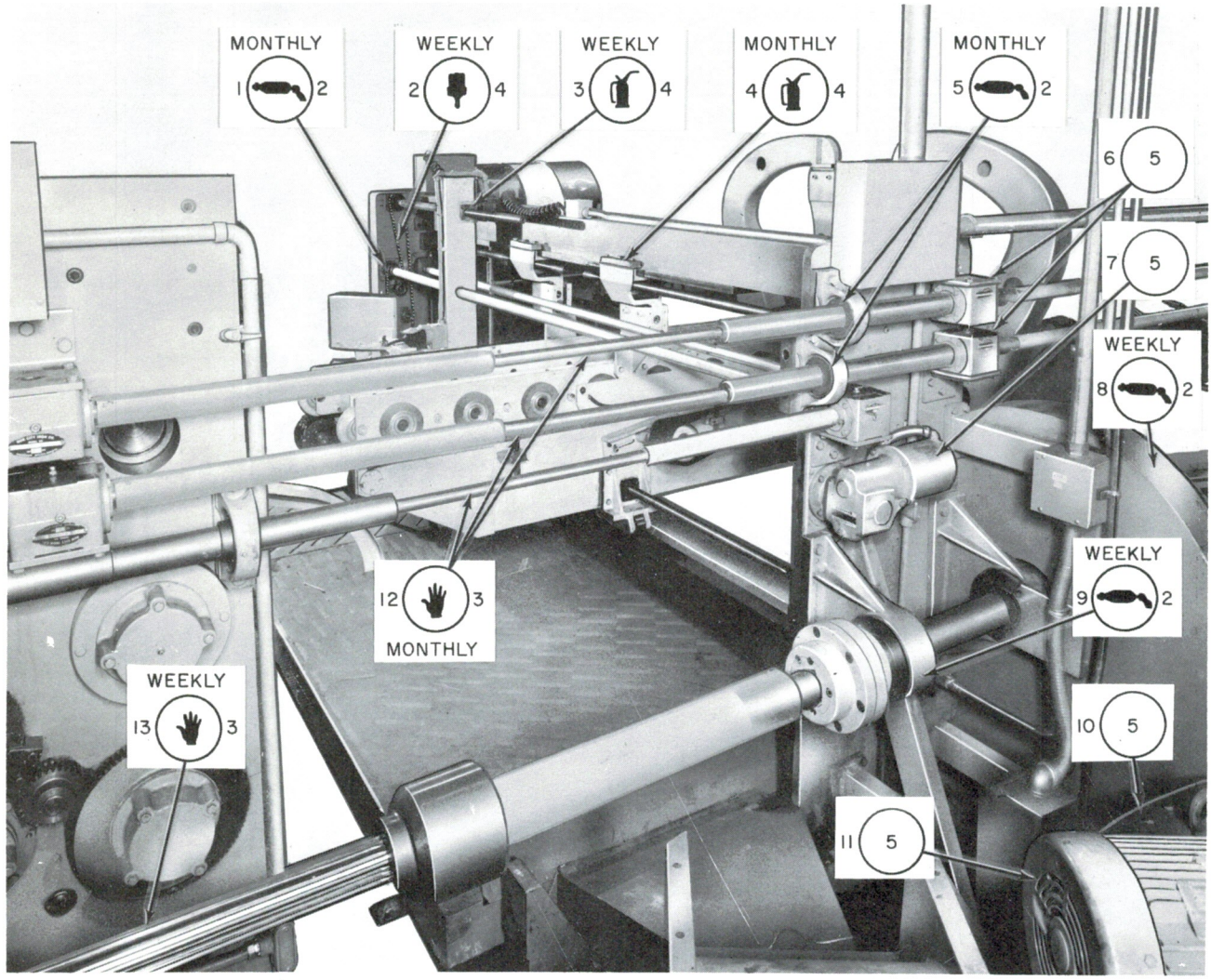
3. BELTS.

a. Description.

The folding belts (3, Fig. 7-1) run the full length of the folding section. The lower belt, in conjunction with the upper roll bracket rollers, move the box blanks through the section. The upper belts provide the folding action.

EXPLANATION OF SYMBOLS

Symbol	Meaning
	Lubricant is applied by means of the implement depicted within the circular area.
daily weekly  monthly annually	The terms appearing above or below the circular area indicate the frequency of lubrication for the component. The terms are based on a single operating shift of eight hours of machine operation or 40 hours of machine operation per week.
4 	The number appearing on the left of the circular area indicates the item number of the component appearing in the legend that accompanies each figure.
 3	The number appearing on the right of the circular area indicates the lubricant necessary as specified in the table of lubricants appearing with each figure.



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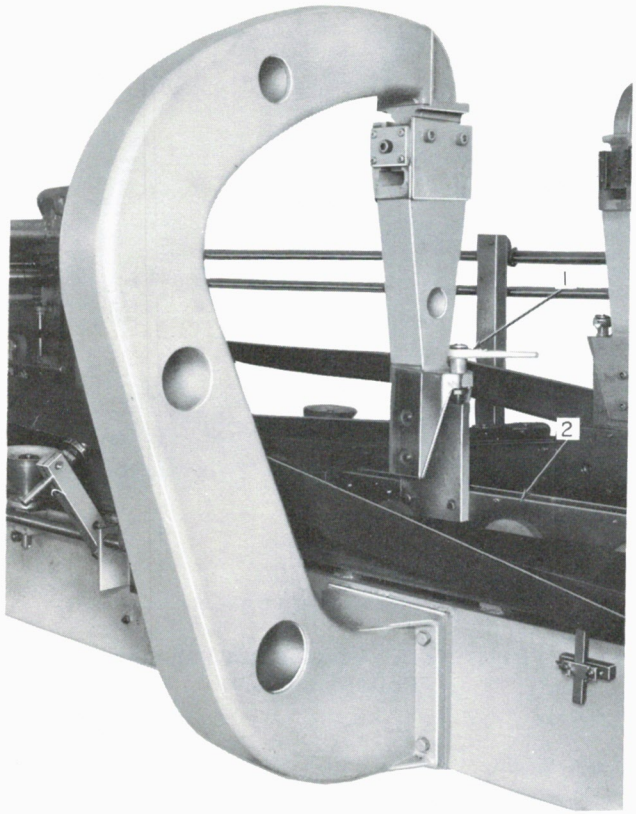
3	MOLYKOTE BR-2	Molybdenum disulfide grease.
4	AGMA NO. 1	Light oil per AGMA SPEC. #252 (described above).
5	PER MANUFACTURER's RECOM-MENDATIONS	

Item No.	Description
1	Sealmaster bearings
2	Chain (clean, lubricate and tension check)
3	Lead screw nuts
4	Cam followers
5	Sealmaster bearings
6	Hub city gearboxes

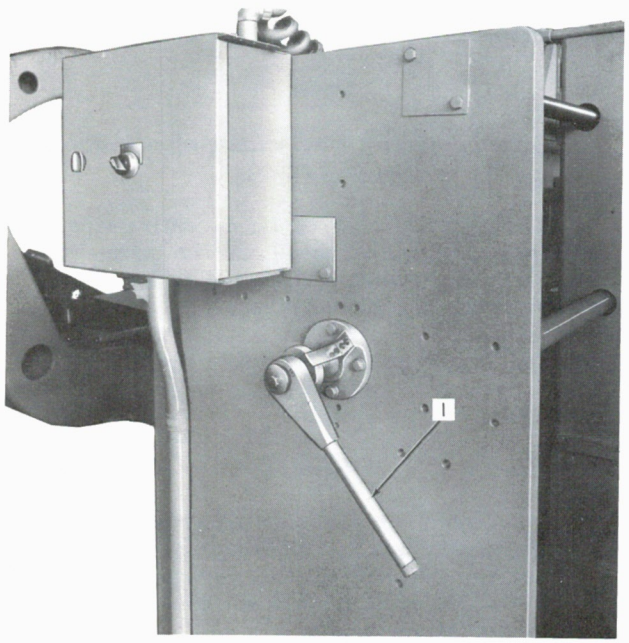
Item No.	Description
7	Lateral adjustment drive motor
8	Rex shaper bearing
9	Sealmaster bearing
10	Main drive motor
11	Jetstream conveyor
12	Adjustment shafts
13	Splined shaft

Figure 7-2. Folding Section Lubrication



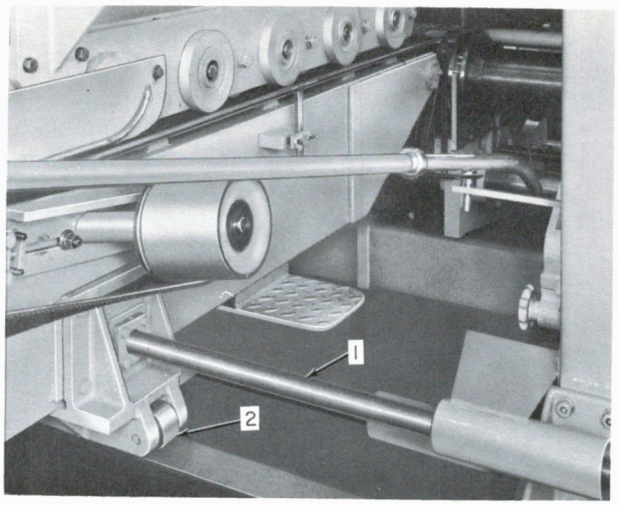
1. Height Adjustment
2. Upper Roll Bracket

Figure 7-3. "C" Shaped Supports



1. Height Adjustment

Figure 7-4. Folding Section Feed End Adjustment



1. Rotating Screw
2. Cam Follower

Figure 7-5. Folding Section Screw Arrangement and Cam Followers

The lower belts are provided with a belt takeup (Figure 7-6) to compensate for any belt stretch. (The folding belts should always be run tight.)

b. Controls.

Mounted on the delivery end operating side frame is a GAP ADJUSTMENT (1, Fig. 7-7) for setting the upper and lower belt gap.

c. Setup.

Operate the folding pulley RATCHET (1, Fig. 7-7) until twice the board caliper dimension can be read on the caliper indicator.

4. GAUGING AND FORMING ROLL ASSEMBLIES.

a. Description.

The delivery end of the folding section is equipped with two banks of gauging rolls and forming rolls (Figure 7-8). Each roll is positively driven and spaced sufficiently far apart to permit the entire edge length of the largest box sizes to be fully engaged. Both sets of rolls are positioned automatically during box panel size setting.

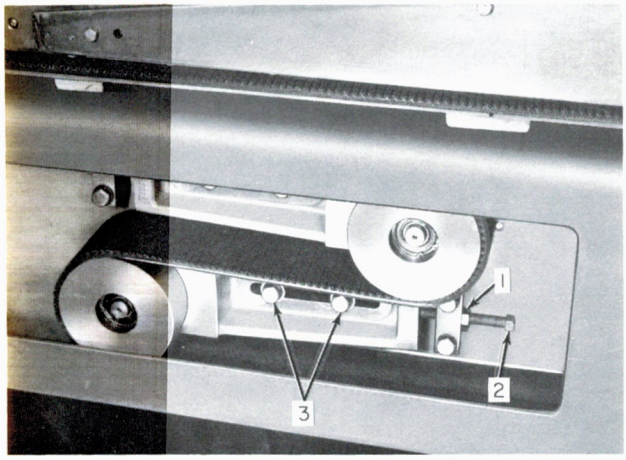
b. Controls.

Each set of gauging rolls is equipped with manually operated controls (3, Fig. 7-8) to move them laterally for making running gap adjustments and vertically to compensate for folding belt wear

5. BOX SUPPORTS.

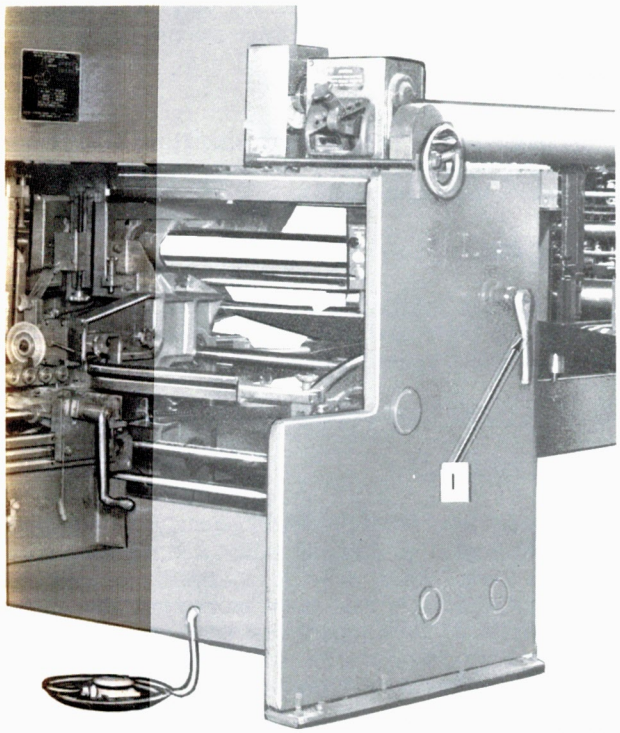
a. Description.

The folding section incorporates two box supports: One for supporting the center panels (2, Fig. 7-8A)



1. Adjusting Screw Locknut
2. Adjusting Screw
3. Takeup Locking Bolts

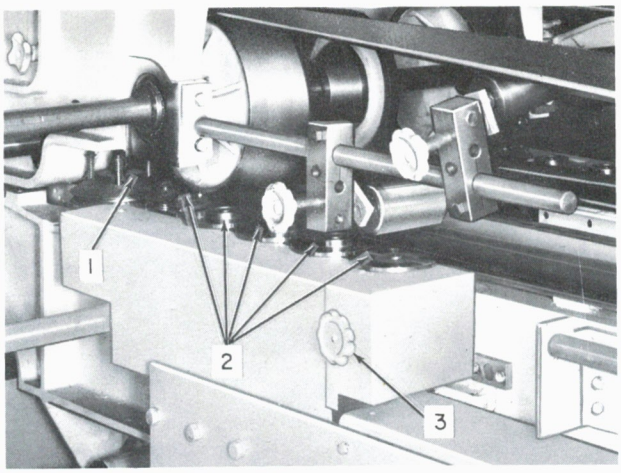
Figure 7-6. Folding Belt Takeup



1. Caliper Adjustment

Figure 7-7. Folding Pulley Adjustment

of the box as it moves through the folding section and a set of two bars (1, Fig. 7-8A) for supporting and guiding large first and fourth panels as they feed through the "C" shaped upper folding section supports.



1. Forming Roll
2. Gauging Rolls
3. Lateral Adjustment

Figure 7-8. Gauging and Forming Rolls Assembly

b. Setup.

(1) Move the center box support (2, Fig. 7-8A) to a point approximately centered between the folding section channels.

(2) Install the bar supports as required for the job to be run.

6. SETTING FOLDING SECTION FOR RUNNING TRAYS.

a. Setup.

Note

See Figure 7-8B for a schematic representation of the setting procedure.

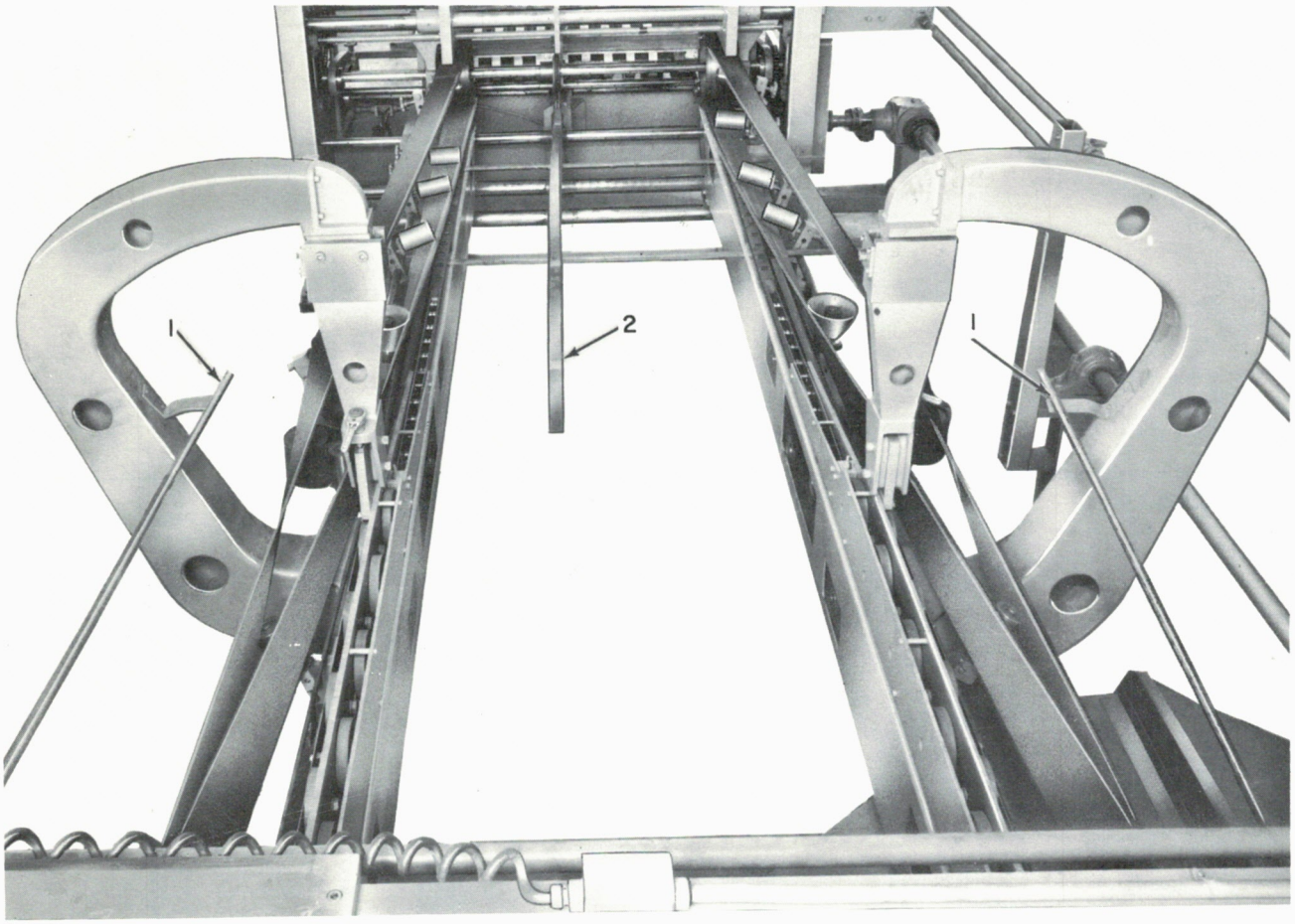
If trimming is required on operating side, remove the crusher head on the primary creaser shafts and install a trim knife in place of the lap cutter knives.

(1) Using the number one panel DRUM SWITCH (1, Fig. 5-6), set the first panel at 45 inches from the centerline of the machine.

Note

The 45 inch dimension should be read on the folding section scale. The scales at the feed end of the creaser/slotter section (1, Fig. 5-1) should read a total of 45 inches for the first and second panels.

(2) Using the numbers two and three panel DRUM SWITCHES (1, Fig. 5-6), set the second and third panels for the box size to be run.



1. Panel Supports

2. Center Box Support

Figure 7-8A. Folding Section Box Supports

Note

The size dimensions should be read on the scales at the feed end of the creaser/slotter section (1, Fig. 5-1).

(3) Pull the three clutch pins and rest them on the screw heads.

Note

Pulling the clutch pins disengages the creaser/slotter first, second and third panels from the folding section and allows independent movement of the folding section (second and third panels in creaser/slotter will remain stationary).

(4) Using the numbers two and three box panel DRUM SWITCHES, set the folding section to the overall blank size to be run.

Note

Blank size is not to exceed 35 inches each side of the machine centerline. Read the dimension on the folding section scales.

(5) If trimming and/or pulling with the first and/or fourth panels, use the numbers one and four box panel DRUM SWITCHES, to set the first and fourth panels for the box size to be run. Read the dimensions on the creaser/slotter feed end scales.

b. Realigning for Normal Operation.

(1) Using the first panel drum switch, set the first panel so that the total of the first and second panels read 45 inches (Example: second panel reads 15 inches, set first panel to read 30 inches.)

(2) Reengage the first panel clutch.

(3) Using the numbers two and three box panel DRUM SWITCHES, set the folding section in exact alignment with the second and third panel sizes set on the creaser/slotter section.

(4) Reengage the two clutches.

7. FOLDING SECTION ADJUSTMENT FOR OUTSIDE LAP-GLUING.

If the gun-type outside lap-glue unit is to be used or if doing outside glue laps with the inside/outside

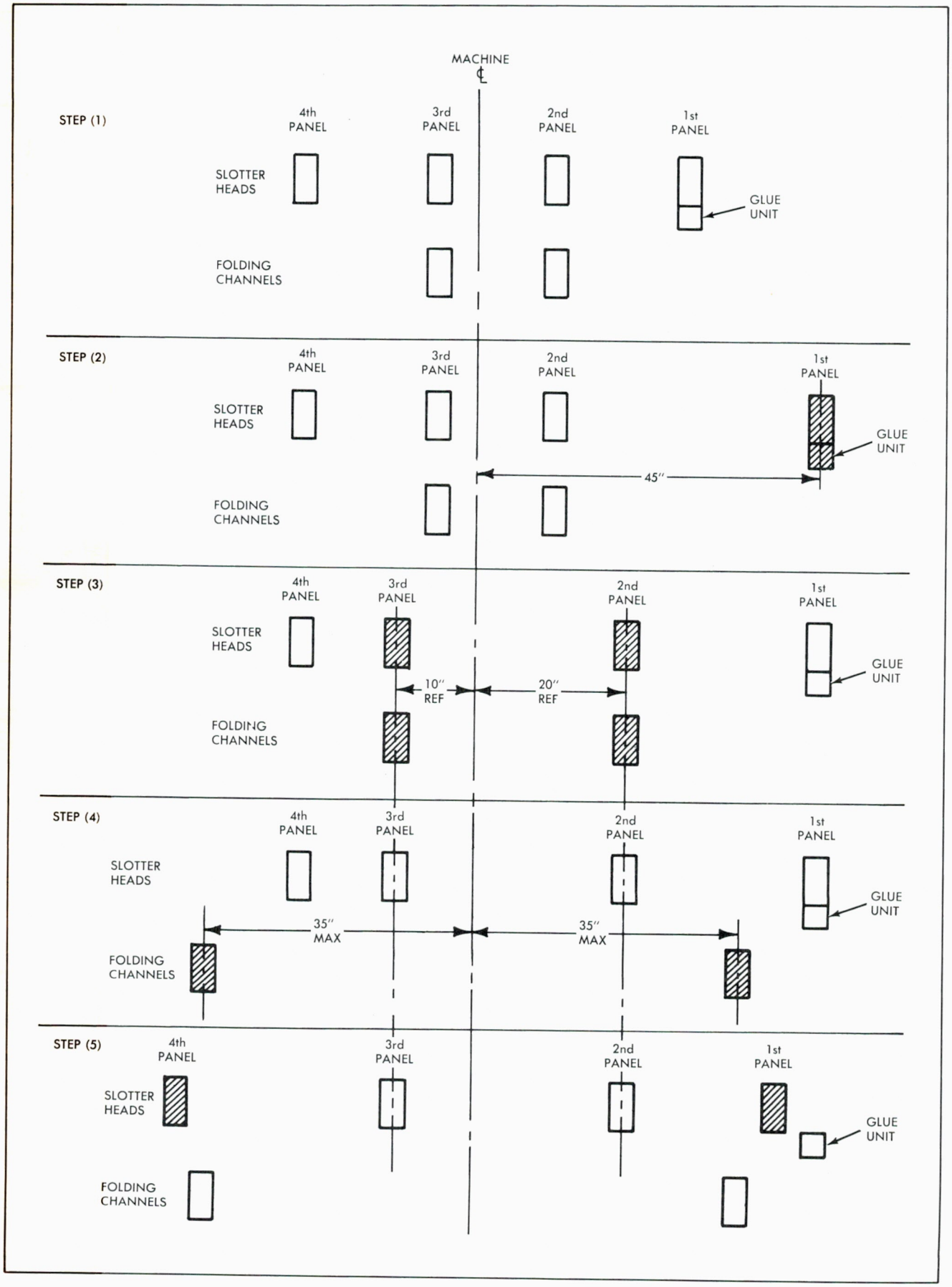


Figure 7-8B. Independent Folding Section Adjustment

lap-gluing unit, the adjustable pulleys of the folding section must be reset so that the number one box panel comes down after the fourth panel in the folding operation. The amount of adjustment required will be determined by the sheet length and panel size of the box to be run.

E. PREVENTIVE MAINTENANCE

Use the following chart as a guide for performing maintenance. The chart outlines inspection periods recommended for various components on the folding section.

Note

Do not use air hoses for cleaning. Removal of dust by vacuum is preferred.

Component	Inspection Period	Remarks
Folding Section (General)	Daily	Vacuum all paper dust. Remove any scrap caught in components.
Upper Roll Bracket Rolls	Weekly	Check rolls for free turning and damage such as flats or egg shape. Replace damaged rolls.
Folding Belts	Weekly	Check for breaks and tears. Check condition of belt lacing. Check for stretch and tightness.
Folding Guides	Weekly	Check for cracks and bends. Replace or straighten as required. Check rollers for wear, damage and free turning. Replace rollers as required.
Belt Takeup	Weekly	Remove scrap from openings.
Chains	Weekly	**Note** Chains must be kept tight and lubricated to prevent jumping on sprocket and misalignment between slotter/creaser and delivery sections.
	Six Months	Check chains and sprockets for wear and possible replacement.
Gauging Rolls	Weekly	Remove the gauging rolls covers. Remove any paper dust and scrap. Tighten the drive belt if it is loose.

F. MAINTENANCE

1. FOLDING BELT ADJUSTMENT.

After each 80 hours of operation, the folding belts must be checked for tightness. If tightening is required, proceed as follows:

a. Lower Belt.

Note

The following applies to both lower belts.

(1) Loosen the takeup locking bolts (3, Fig. 7-6).

(2) Loosen the adjusting screw locknut (1, Fig. 7-6).

(3) Tighten the adjusting screw (2, Fig. 7-6), until the belt is tight.

(4) Tighten the adjusting screw locknut.

(5) Tighten the takeup locking bolts.

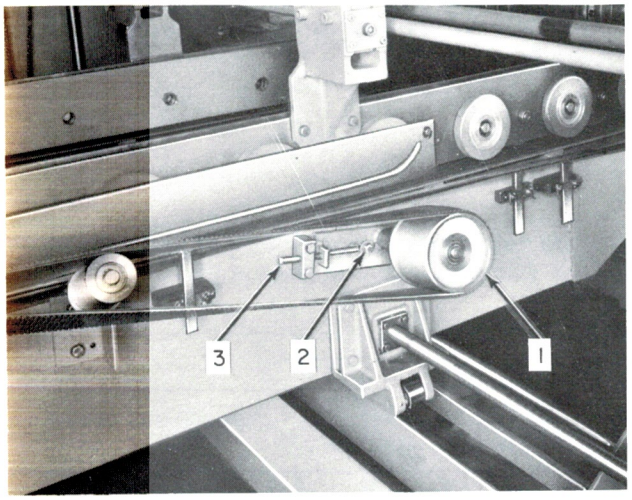
b. Upper Belts.

Note

The following procedure applies to both upper belts.

(1) Loosen the takeup locking bolts (2, Fig. 7-9).

(2) Loosen the adjusting screw locknut.



1. Pulley
2. Takeup Locking Bolt
3. Adjusting Screw

Figure 7-9. Upper Belt Adjustment

(3) Rotate the adjusting screw (3, Fig. 7-9) to move the pulley (1, Fig. 7-9) toward the feed end of the folding section.

(4) Tighten the takeup locking bolt.

2. CORRECTING FOLDING BELT STRETCH.

The following procedure outlines a means of compensating for belt stretch if the amount of stretch exceeds the takeup afforded by the belt tighteners.

Note

The following procedure applies to all belts.

a. Loosen the takeup locking bolts and position the takeups at a point where the belts are at maximum looseness.

b. Pull the lacing pin to separate the ends of the belt and remove the belt from the machine.

c. Stretch out the belt on the floor and measure its length. Subtract the actual belt length (See chart below) from the stretched length. The resulting dimension is the length of belt that must be cut.

Belt	Machine Serial Numbers	Length
Upper	All	38"-8"
Lower	487, 268, 239, 636	47"-8"
Lower	All others	49"-7"

d. Cut equal lengths from each end of the belts to obtain the dimension as outlined in the chart.

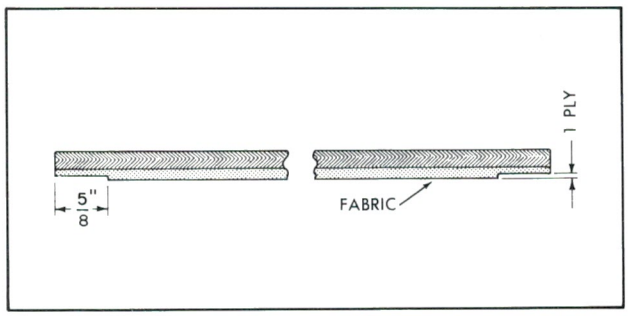


Figure 7-10. Belt Lacing

e. Strip one ply of fabric about 5/8-inch wide, from the belt backing at each end of the belt. See Figure 7-10.

f. Replace the belts at the cut ends, using a belt lacing machine and No. 5 hooks.

g. Reinstall the belt on the guide rolls.

h. Install the hook locking pin.

i. Stretch the belt as necessary, using a stretching tool, to seat it on the guide rolls.

j. Make any additional tightness adjustments as outlined in paragraph F. 1.

G. TROUBLESHOOTING

Refer to the following chart for a listing of operating difficulties which may be encountered and the standard procedures to correct them.

The chart is divided into two parts; finished box troubles and operating troubles. Operating troubles are defined as those that are caused by improper setup or malfunction of a machine component. Finished box troubles are defined as those resulting in improper assembly of the box when inspected at the delivery end of the machine.

To use the chart properly, determine if the trouble is operational or shows up as a result of box inspection at the delivery end. Turn to that part of the chart concerned and locate the symptom encountered. Check the possible causes of the difficulty. When the trouble is located, refer to the chart to determine how the difficulty may be remedied.

To isolate electrical difficulties, refer to the wiring diagrams and schematics supplied with the machine.

FOLDING SECTION - BOX TROUBLES

Symptom	Cause	Remedy
Boxes Not Square	Folding section improperly adjusted for caliper of board to be run	Readjust the folding section.
	Lower folding belt stretched	Use the belt takeups to tighten the belts. Cut and relace if necessary.
Rolling Folds	Upper bracket folding wheel assembly positioned incorrectly (too wide or too close)	Readjust the bracket assembly.
	Boxes folding abruptly	Set the pulleys to obtain a gradual fold.
Insufficient Gap	Gauging mechanism too tight	Readjust the gauging mechanism to obtain the proper gap
	Folding section brackets too tight	Readjust the brackets.
	Rolling fold	Refer to symptom "Rolling Folds".
Excessive Gap	Gauging mechanism too wide	Readjust the gauging mechanism to close the gap.
	Folding section brackets too wide	Readjust.
Box Panels Toe in or Toe out	Folding guide bars set too wide or too narrow	Readjust the folding guide bars.
	Slot and crease alignment incorrect	Check carbon shoes for wear. Check for jumped chains. Check for worn parts and adjusting components of carriers.
	Rolling folds	Refer to symptom "Rolling Folds".

FOLDING SECTION - OPERATING TROUBLES

Boxes Hesitating in the Folding Section	Lower folding belts loose	Remove the belts, cut and relace them.
	Folding belts worn	Replace the belts.
	Incorrect board caliper adjustment	Readjust for the caliper of board to be run.
	Gauging mechanism set too tight	Readjust the gauging mechanism.
Panel Folding Incorrectly	Glue on folding belt	Clean belts.
	Folding abruptly	Readjust folding pulleys to obtain gradual fold.
Panels Hit Each Other During Folding	Incorrect setting of folding pulleys	Readjust the folding pulleys.
Blanks Enter Delivery End Askew	Slipping or hesitation in folding section	Check the setting of the folding section rollers, condition of the folding guides, tightness of the lower belts, and other folding section component.

FOLDING SECTION - OPERATING TROUBLES (CONT)

Symptom	Cause	Remedy
	Lower folding belts loose	Readjust the belt tension or cut and relace the belts.
	Trapped scrap in engaging or re-creasing rolls	Remove scrap.
Boxes Not Feeding Properly into Squaring Section	Slipping or hesitation in the folding section	Check the setting of the folding section rollers, condition of the folding guides, tightness of the lower belts and other folding section components.
	Box not tracking properly through machine	Check caliper adjustments.
Leading Edge of Subsequent Box Contacting Trailing Edge of Box Being Lifted	Slipping or hesitation in the folding section or other section of machine	Check the setting of the folding section rollers, condition of the folding guides, tightness of the lower belts, and other folding section components.
Delivery End Jamup	Slipping or hesitation in the folding section or other machine section	Check the setting of the folding section rollers, condition of the folding guides, tightness of the lower belt, and other folding section components.

SECTION VIII
DELIVERY END

A. GENERAL

The delivery section (Figure 8-1) of the machine performs the functions of squaring, counting and ejecting uniform piles of boxes. The glued joint is kept under continuous pressure once it is made until the boxes are tied and stacked.

The delivery end consists of a receiving hopper, a mechanical counter, a pusher assembly and delivery conveyors.

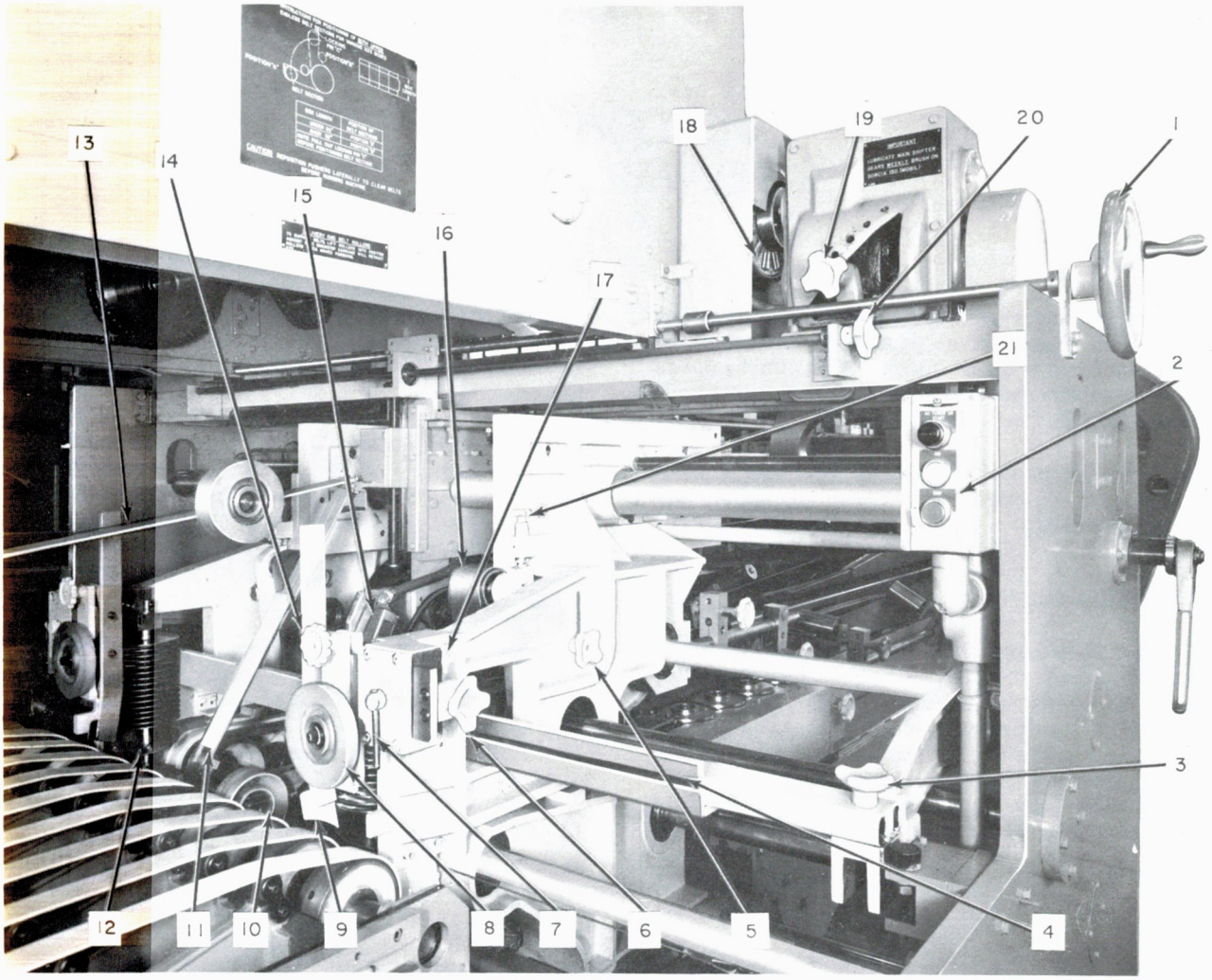
B. FUNCTIONING

When each box leaves the folding section, it enters the delivery end receiving hopper. The edges are engaged by spiral lift screws (12, Fig. 8-2). The first flight of the screws raises the trailing edge of each box quickly to clear the leading edge of the next box entering the receiving hopper. A cam-actuated roller (10, Fig. 8-2) lifts the center of the trailing edge of the box out of the path of the next box being underfed. As the pile continues to build, the spiral lift screws keep the boxes seperated from each other to allow for squaring by the reciprocating slapper bar (4, Fig. 8-2). Pressure is maintained on the glued lap by a short holddown (11, Fig. 8-2).

As the pile builds, it is supported at the leading edge by a motor driven shaft which runs the full width of the receiving hopper. In addition, the shaft accelerates the upward movement of the leading edge of the upper boxes of the pile to ensure that sufficient space is available to accommodate on-coming underfed boxes.

Pile squareness is maintained by the leading edge stop (2, Fig. 8-3), by the short holddown (11, Fig. 8-2), by the action of the slapper bar (4, Fig. 8-2) and by the side guides (9, Fig. 8-2) which also keeps the boxes from contacting the lift screw shafts. This design allows inspection of a complete stack of boxes at one time. It allows for mass comparison of boxes for gap and squareness.

Figure 8-1. Delivery End



1. Holddown Lateral Adjustment
2. Electrical Control Panel
3. Slapper Bar Lock
4. Slapper Bar
5. Upper Belt Lock
6. Brake Wheel and Side Guide Lateral Adjustment Lock
7. Side Guide Adjustment Clamp
8. Brake Wheel
9. Side Guide
10. Lift Roll
11. Short Holddown
12. Spiral Lift Screw
13. Long Holddown
14. Brake Wheel Lock
15. Jam Limit Switch
16. Upper Kidney Belt
17. Lift Screw Retainer Block Plunger
18. Clutch
19. Count Change Knob
20. Holddown Vertical Adjustment
21. Kidney Belt Up Position Lock

Figure 8-2. Delivery End Components

When the pile reaches the proper height, cycling arms (1, Fig. 8-3) push the preset number of boxes from the top of the hopper pile. The next pile builds as the pusher arms cycle for the next pushoff. The pushers are driven through an electric clutch (18, Fig. 8-2) which will slip if resistance to their movement is encountered. Brake wheels apply pressure to the blank at the wheel centerline, preventing the top box of the subsequent pile from being carried along, by friction, with the stack being pushed off.

Continuous pressure is applied to the glued lap by a long metal holddown (13, Fig. 8-2) as the pile is pushed into the telescoping conveyor to a gravity conveyor for bundling or palletizing for shipment.

C. LUBRICATION

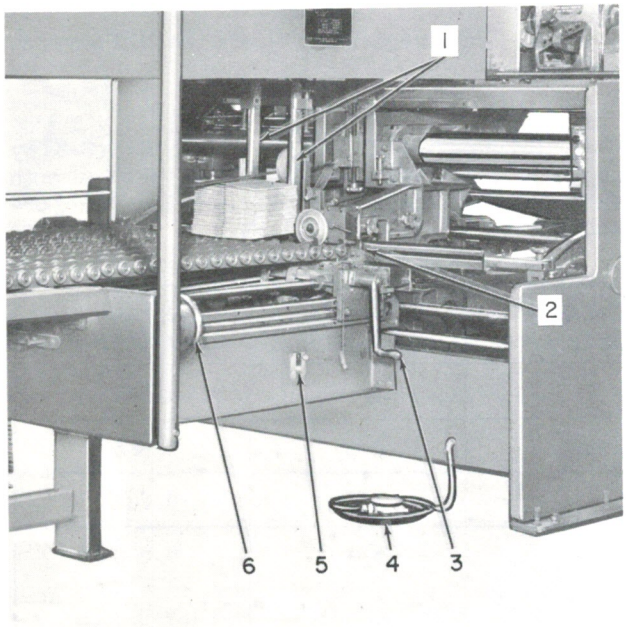
See Figures 8-4, 8-5, 8-5A and 8-6 for the frequency, method and points of lubrication on the delivery end.

D. DELIVERY END COMPONENTS

1. RECEIVING HOPPER.

a. Description.

The receiving hopper is formed by the front stop (2, Fig. 8-3), the side guide and brake wheel assemblies (8 and 9, Fig. 8-2), the spiral lift screws



1. Pushers
2. Front Stop
3. Belt Roller Lever
4. Step Switch
5. Power Adjustment Lever
6. Front Stop Fine Adjustment Handwheel

Figure 8-3. Delivery End Controls

(12, Fig. 8-2), the slapper bar (4, Fig. 8-2) and the short and long holddowns (11 and 13, Fig. 8-2).

Each box leaves the folding section and enters the delivery end receiving hopper. Spiral lift screws (12, Fig. 8-2) engage the side edges of the box and lift it clear of the next box entering the hopper. The screws also support the boxes to keep them from buckling while being squared. The screws provided have different spacing to correspond with the running of different board flutes. The screws are changed easily and quickly without the use of special tools.

Squaring is performed by a reciprocating slapper bar, (4, Fig. 8-2), side guides (9, Fig. 8-2) and the front stop (2, Fig. 8-3).

b. Controls.

(1) The leading edge of the receiving hopper frame is power adjusted for different box sizes. A POWER ADJUSTMENT LEVER (3, Fig. 8-3) is provided for rough setting the front stop for the sheet length to be run.

(2) A FINE ADJUSTMENT HANDWHEEL (6, Fig. 8-3) is provided to set the proper squeeze between the slapper bar and front stop for proper squaring action.

(3) The side guides (9, Fig. 8-2) maintain side to side alignment of the boxes during the squaring and stacking operation. They are equipped with LATERAL and VERTICAL ADJUSTMENTS (7, Fig. 8-2). (Once set, they rarely need adjustment.)

(4) Short and long holddown SIDE TO SIDE (1, Fig. 8-2) and VERTICAL ADJUSTMENTS (20, Fig. 8-2) are provided for properly positioning the holddown assembly over the glue lap area to maintain the glue joint under compression.

(5) The function of the brake wheel assemblies is to restrict movement of the top sheet, in the subsequent pile to be pushed off, during a pile pushoff. They are automatically positioned laterally when panel sizes are set. However, the wheels are rubber and subject to wear. To compensate for wear and to adjust them vertically for different pile heights, the assemblies are provided with LOCKING CLAMPS (14, Fig. 8-2) and LATERAL ADJUSTING KNOBS.

c. Setup.

(1) Set the front stop for the sheet length to be run using the POWER ADJUSTMENT LEVER (5, Fig. 8-3).

Note

A scale on the receiving hopper and an indicator on the front stop are provided to aid setting of the front stop.

(2) Rotate the holddown assembly SIDE TO SIDE HANDWHEEL (1, Fig. 8-2) to position the short and long holddown over the glue lap.

(3) During operation, when a pile of boxes has accumulated in the receiving hopper, precisely position the holddown assembly over the glue lap area. Adjust the holddown assembly vertically using the VERTICAL ADJUSTING KNOB (20, Fig. 8-2).

Note

The short holddown is so positioned that the roller rests slightly ahead of the center of the top box of the subsequent pile after pushoff. This is done by loosening the wing nut and extending the slide on which the roller is mounted. In operation, the short holddown rides flush against the underside of the long holddown and is in contact with the top box of the pile being pushed off.

(4) Select the proper lift screw as follows:

Spiral lift screws of the correct gap must be used for the blank caliper being run. The following chart indicates the required screws for specific board thicknesses. Due to variations in board caliper, the next larger gap screw should be used if, after manually testing the folded box or during operation in the screw, the box is tight. Change the lift screws as follows:

(a) Pull the retainer block plunger (17, Fig. 8-2) and remove the screw retainer block. Lift the screw from the shaft housing. After selecting the appropriate screw for the flute to be run, align the key at the collar end with the keyway in the lift screw seat and install the screw.

(b) Reinstall the screw retainer block and seat the block plunger.

(5) Perform the following operation if blanks to be run exceed 38 inches in the direction of blank travel to preclude the possibility of the lift screws raising a box while it is still held by the forwarding belts.

(a) Pull the pushers clear of the lift screws.

(b) Remove the slapper bar (4, Fig. 8-2) by removing the locking knobs (3, Fig. 8-2) on both sides of the machine and sliding the bar out of the machine.

Flute	Caliper (Inches)	Folded Thickness (Inches)	Screw Gap (Inches)	Clearance (Inches)
B	0.135	0.270	5/16	0.042
C	0.150 to 0.175	0.350 max.	3/8	0.025
A	0.200	0.400	1/2	0.100
A-B Double Wall Single Caliper	0.340 to 0.345	0.690 max.	3/4	0.060

EXPLANATION OF SYMBOLS

Symbol	Meaning
	Lubricant is applied by means of the implement depicted within the circular area.
daily weekly  monthly annually	The terms appearing above or below the circular area indicate the frequency of lubrication for the component. The terms are based on a single operating shift of eight hours of machine operation or 40 hours of machine operation per week.
	The number appearing on the left of the circular area indicates the item number of the component appearing in the legend that accompanies each figure.
	The number appearing on the right of the circular area indicates the lubricant necessary as specified in the table of lubricants appearing with each figure.

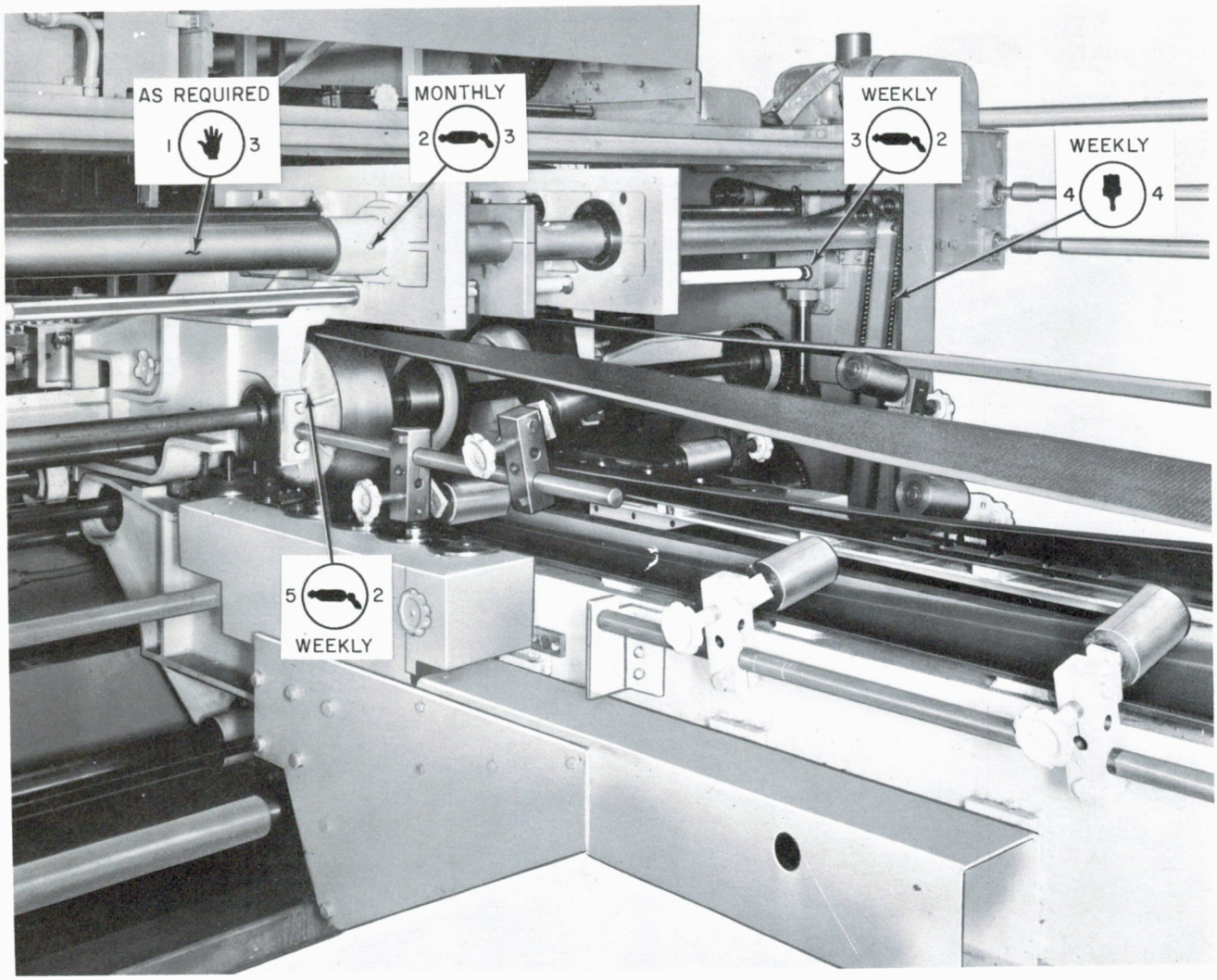
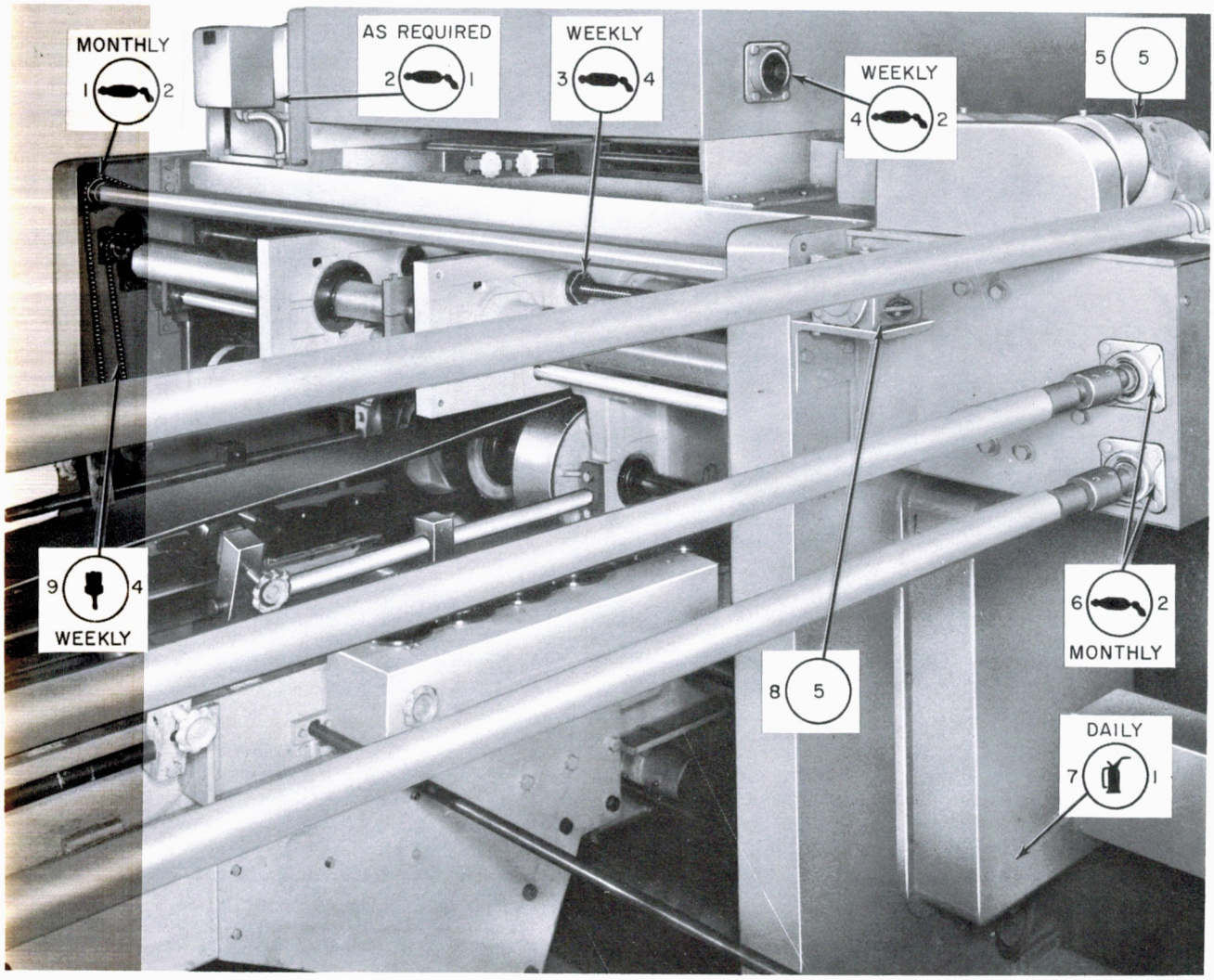


TABLE OF LUBRICANTS

Symbol	Classification	Description of Lubricant
1	AGMA NO. 3	AGMA SPEC. #252. Highly refined mineral gear oil; non-foaming, non-corrosive, non-separating. Viscosity index 60 or greater.
2	NLGI NO. 2	Lithium soap grease.
3	MOLYKOTE BR-2	Molybdenum disulfide grease.
4	AGMA NO. 1	Light oil per AGMA SPEC. #252 (described above).
5	PER MANUFACTURER'S RECOM-MENDATIONS	

Item No.	Description
1	Delivery end shafts (clean and lubricate)
2	Upper and lower guide shaft bushings (8 places)
3	Upper and lower bearing housings (operating and drive sides, 4 places)
4	Chain (clean, lubricate and tension check)
5	Upper and lower folding belt pulleys (4 places)

Figure 8-4. Delivery End Lubrication, Front View Operating Side



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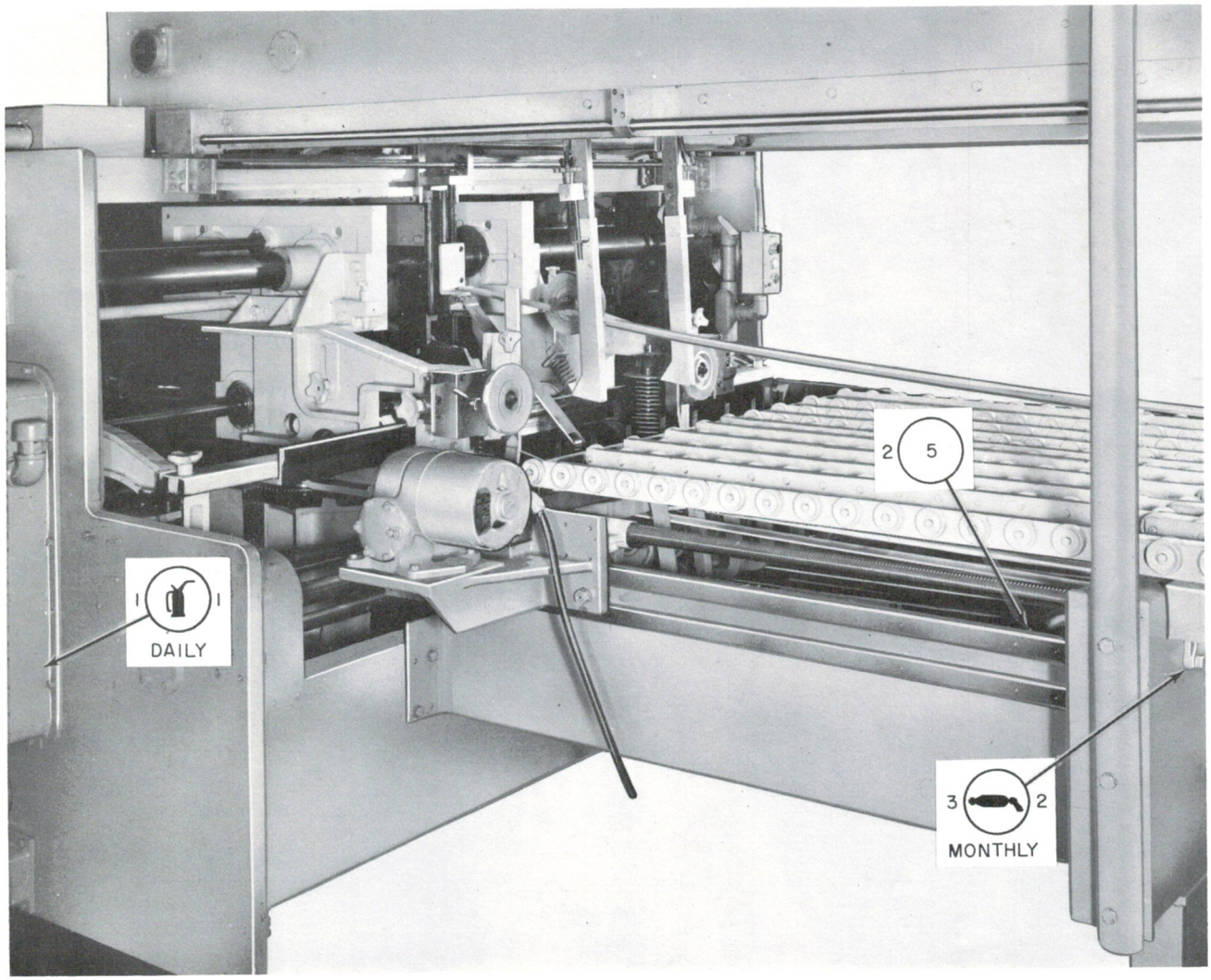
4	AGMA NO. 1	Light oil per AGMA SPEC. #252 (described above).
5	PER MANUFACTURER'S RECOM-MENDATIONS	

Item No.	Description
1	Sealmaster bearings (operating and drive sides)
2	Shifter gearbox, pusher and counter mechanism and clutch
3	Lead screw nuts (4 places)
4	Sealmaster bearings (2 places)

Item No.	Description
5	Lateral adjustment drive motors
6	Sealmaster bearings
7	Gearbox
8	Hub City gearbox
9	Chain (clean, lubricate and tension check)

Figure 8-5. Delivery End Lubrication, Front View Drive Side



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2	NLGI NO. 2	Lithium soap grease.
3	MOLYKOTE BR-2	Molybdenum disulfide grease.
4	AGMA NO. 1	Light oil per AGMA SPEC. #252 (described above).
5	PER MANUFACTURER'S RECOM-MENDATIONS	

Item No.	Description
1	Gearbox (drive side)
2	Back stop adjusting motor
3	Delivery end brace (operating and drive sides)

Figure 8-5A. Delivery End Lubrication, Rear View Drive Side

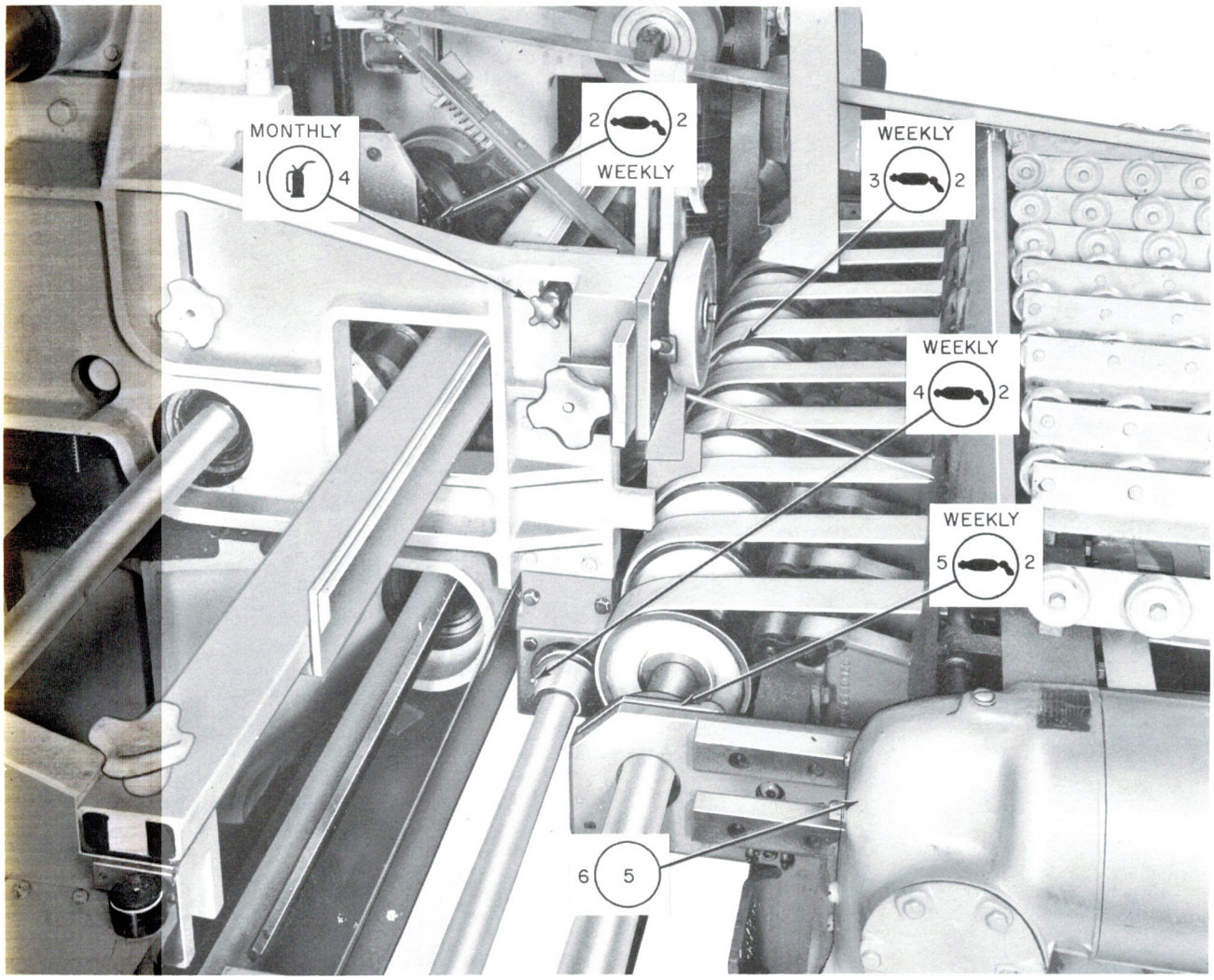


TABLE OF LUBRICANTS

Symbol	Classification	Description of Lubricant
1	AGMA NO. 3	AGMA SPEC. #252. Highly refined mineral gear oil; non-foaming, non-corrosive, non-separating. Viscosity index 60 or greater.
2	NLGI NO. 2	Lithium soap grease.
3	MOLYKOTE BR-2	Molybdenum disulfide grease.
4	AGMA NO. 1	Light oil per AGMA SPEC. #252 (described above).
5	PER MANUFACTURER'S RECOM-MENDATIONS	

Item No.	Description
1	Lift screw lock jacks (operating and drive sides)
2	Upper and lower six-inch pulleys (operating and drive sides)
3	Lift roll assembly
4	Lift screw drive shaft (operating and drive sides, 2 places)
5	Counter frame Sealmaster bearings (3 places)
6	Back stop roller motor

Figure 8-6. Delivery End Closeup, Lubrication

(c) Loosen the upper belt locking knobs (5, Fig. 8-2) on both sides of the machine. Lift the knobs to the top of the slots and retighten.

(d) Lift the upper forwarding belt sections to a vertical position. Allow the upper belt section plungers (4, Fig. 8-2) to seat in the holes in the belt section plates.

(e) Reinstall the slapper bar.

(f) Reposition the pushers laterally to clear the raised belts prior to running the machine.

(6) During operation, check the action of the brake wheel assemblies. If they show evidence of wear or need adjustment for pile height, proceed as follows:

(a) Adjust the brake wheels so that the last blank of the pile being pushed off is just above the wheel centerline.

(b) To obtain this setting, the brake wheels may be adjusted independently vertically or laterally by loosening the LOCKING CLAMPS (14, Fig. 8-2) or laterally in conjunction with the side guides by loosening the SIDE GUIDE ADJUSTMENT CLAMPS (7, Fig. 8-2) and using the brake wheel and side guide LATERAL ADJUSTING KNOBS.

2. COUNTER.

a. Description.

A counter is an integral part of the squaring and delivery section of the machine. Its operation is completely mechanical and easily set for piles of 10 to 30 boxes, in five-box increments.

b. Controls.

A counter GEAR SHIFT (19, Fig. 8-2) is provided to allow changing of the box count for various sizes of boxes.

c. Setup.

Set the counter GEAR SHIFT (19, Fig. 8-2) in the appropriate hole for the required box count.

3. PUSHER ASSEMBLY.

a. Description.

The delivery end is equipped with a pusher assembly. As a pile of boxes builds in the receiving hopper, a cycling pusher mechanism with underhanging arms (1, Fig. 8-2) pushes the preselected quantity of boxes from the top of the hopper pile.

b. Controls.

(1) The pusher arms are equipped with SIDE TO SIDE and HEIGHT ADJUSTMENTS (1 and 2, Fig. 8-7). The arms must be set properly to obtain a correct count pushoff.

(2) A FOOT SWITCH (4, Fig. 8-3) is also provided to disengage the pusher clutch mechanism (18, Fig. 8-2) to aid in setup of the pusher arms.

c. Setup.

(1) Depress the FOOT SWITCH (4, Fig. 8-3) and pull the pushers around to their lowest center position, clear of the side guides.

(2) Loosen the SIDE TO SIDE adjustment clamps (1, Fig. 8-7) and move the pushers to within 1/2-inch of the spiral lift screws.

(3) Tighten the adjustment clamps.

d. Operation.

During operation, the pusher height must be adjusted to obtain a proper pushoff. Adjust the pushers vertically as follows:

(1) Depress the FOOT SWITCH and pull the pushers around to the trailing edge of the boxes in the receiving hoppers.

(2) Adjust the pushers vertically by loosening the adjustment wing nut and rotating the pusher VERTICAL ADJUSTING KNOBS (2, Fig. 8-7), so that the pushers contact the pile for a clean, correct count pushoff while the last box in the pile is just leaving the final flight of the spiral lift screws.

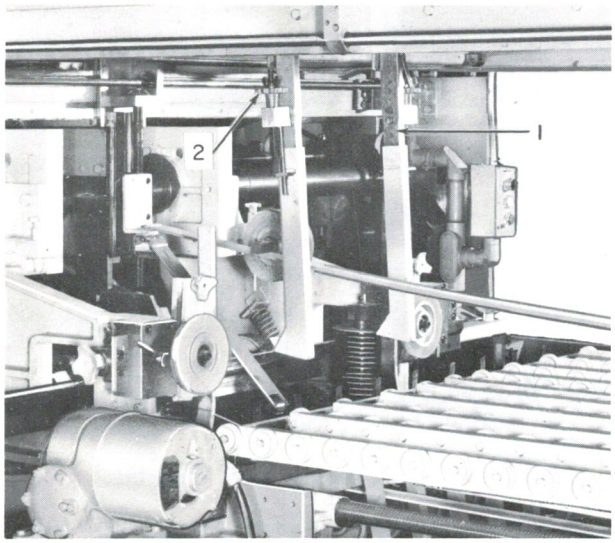
E. PREVENTIVE MAINTENANCE

Use the following chart as a guide for performing maintenance. The chart outlines inspection periods recommended for various components on the delivery end.

Note

Do not use air hoses for cleaning. Removal of dust by vacuum is preferred.

Component	Inspection Period	Remarks
Belts	Weekly	Check for wear and tightness. Check condition of lacing. Replace worn belts.
	Monthly	Check short Nylon feed belts for wear or damage. Replace belts as required.
Lift Screws	Weekly	Check for broken welds or bent flutes. Reweld or straighten as required.
Hold Down Assembly	Weekly	Check condition of assembly (hinge, rollers, freedom of movement).
Leaf Springs	Weekly	Check springs for breakage or distortion. Replace broken springs.
Chains	Weekly	Check for looseness. Tighten if necessary.
	Six months	Check chains and sprockets for wear. Replace as required.



1. Lateral Adjustment Clamps
2. Height Adjustment Knobs

Figure 8-7. Pusher Adjustments

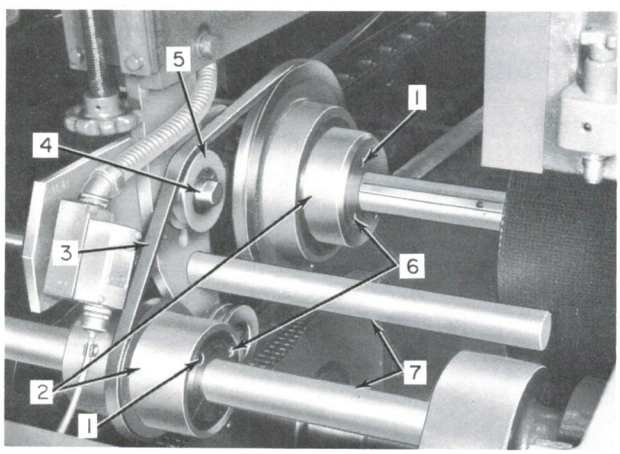
F. MAINTENANCE

1. DELIVERY END V-BELT REPLACEMENT.

Note

Use the following procedure when theV-belt shows evidence of wear or breaks.

a. Remove the coupling set screws (1, Fig. 8-8) on both the operating and drive sides of the shaft couplings (2, Fig. 8-8).



1. Set Screws
2. Couplings
3. Belt
4. Idler Pulley Stud
5. Idler Pulley
6. Jack Screw Holes
7. Shafts

Figure 8-8. "V"-Belt Pulley Drive

b. Loosen the V-belt upper idler pulley stud (4, Fig. 8-8)nut and move the pulley (5, Fig. 8-8) down to release the tension on the belt (3, Fig. 8-8).

c. Install the coupling set screws in the jack screw holes (6, Fig. 8-8) and jack the shafts (7, Fig. 8-8) free of the couplings.

d. Replace the V-belt with a new one and reassemble the shafts in the couplings. Secure the shafts in the couplings using the set screws.

e. Thread the belt as shown in Figure 8-8. Push the idler pulley up to make the belt taut and lock the pulley stud with the stud nut.

2. CHECKING TIMING RELATIONSHIP BETWEEN FEED AND DELIVERY END OF THE MACHINE.

Two timing marks have been installed on the machine. One on an aluminum disc at the delivery end, the other on a barring collar at the feed end, beneath the inspection plate on the operating side feed table. When the barring collar timing mark is aligned with the frame pointer, the kicker carriage zero-zero indication will be aligned with the feed table zero mark.

The machine should not be opened unless the timing marks are aligned by jogging to either the feed end or delivery end zero. The machine should not be closed if the feed end, while open, has been rotated and is not on zero alignment.

The timing relationship between the feed and delivery ends must be maintained at all times so that sheets kicked into the machine arrive at th delivery end at the right time for engagement by the lift screws and to be lifted properly by the lift roll. If this relationship is altered, sheets will be kicked in too early or too late for the lift screws and lift roll to function correctly. Damage to each sheet, by the screws, or jamups may continually occur.

The most common reason for an out-of-time condition, is closing the feed end when it is not aligned on zero and as a result, it is not in a proper timed relationship with the delivery end. To correct this condition, proceed as follows:

a. Using the delivery end JOG button (2, Fig. 8-2), jog the machine to align the timing disc zero mark with the pointer on the inboard side of the delivery end frame operating side.

b. Check the timing disc beneath the inspection plate on the operating side feed table. The disc zero mark should be aligned with the frame pointer.

c. If the feed end timing mark is not aligned when the delivery end timing mark is on zero, unlock the feed section and press the OPEN button (2, Fig. 2-2).

d. Install a bar in one of the holes of the timing disc and rotate the shaft until the zero mark on the disc aligns with the frame pointer.

e. Press the CLOSE button (4, Fig. 2-2). After the feed end stops moving, lock it using the lock lever.

f. Jog a sheet into the machine and observe its entry into the delivery end.

Note

Check to ensure that sheets do not slip or hesitate in any section of the machine. Slipping would give the appearance of an out-of-time condition.

3. RETIMING FOR BROKEN OR DISCONNECTED CHAIN DRIVE TO LIFT SCREW SHAFT.

Note

If the machine is open, ensure that all sections are zero aligned prior to closing the machine. If the machine is closed, jog the machine to obtain zero-zero alignment of the kicker carriage and feed table on the forward stroke of the kicker.

a. After closing and/or zero aligning the machine, check to ensure that the zero mark on the delivery end timing disc is on zero.

b. If the delivery end disc is not zero aligned, remove the lift screw shaft drive chain (if not already removed) and turn the shaft until the disc timing mark aligns with the arrow. Reinstall the chain.

c. Kick a medium size sheet into the machine.

Note

C-flute caliper is preferred.

d. Stop the machine when the leading edge of the sheet is flush with the upper kidney belt pulley outside diameter.

e. Check the lift roll cam follower. The cam follower should be approximately one-half inch beyond the high point of the cam (on the way down).

f. If the cam follower is not at this position, jog the machine to obtain zero-zero alignment of the kicker on its forward stroke. Recheck the zero alignment at the delivery end. Repeat steps b, c, d and e until the lift roll timing is correct.

Note

Check to ensure that sheets do not slip or hesitate in any section of the machine. Slipping would give the appearance of an out-of-time condition.

4. RETIMING LIFT SCREWS TO SHEET.

The lift screws must be timed to the sheet to ensure that the leading edge of the sheet passes between the screw flights without hitting them and yet be lifted at the right instant to the proper height. The lift screws must also operate properly for various sheet lengths, up to the maximum.

The timing relationship between the screws and the lift roll has been preset by the machinery manufacturer. The relationship cannot change unless the bevel gears that drive the lift screws are disengaged from the lift screw bevel gears.

If the gears become disengaged, retime the machine as follows:

a. Perform the procedure for retiming the lift roll as outlined in paragraph 3.

b. Jog a C-flute sheet into the machine.

c. Stop the machine when the leading edge of the sheet aligns with the center of the belt pulley shaft.

d. Disengage the lift screw drive shaft bevel gears from the lift screw bevel gears.

e. Rotate the lift screws until the bottom of the first screw flight clears the top of the sheet by about 1/16-inch.

f. Reengage the bevel gears.

g. Kick in a second and third sheet and observe their entry into the delivery end. Make any corrections, if required, by repeating the timing procedure.

Note

Check to ensure that sheets do not slip or hesitate in any section of the machine. Slipping would give the appearance of an out-of-time condition.

G. TROUBLESHOOTING

Refer to the following chart for a listing of operating difficulties which may be encountered and the standard procedure to correct them.

The chart is divided into two parts; finished box troubles and operating troubles. Operating troubles are defined as those that are caused by improper setup or malfunction of a machine component. Finished box troubles are defined as those resulting in improper assembly of the box when inspected at the delivery end of the machine.

To use the chart properly, determine if the trouble is operational or shows up as a result of box inspection at the delivery end. Turn to that part of the chart concerned and locate the symptom encountered. Check the possible cause of the difficulty. When the trouble is located, refer to the chart to determine how the difficulty may be remedied.

To isolate electrical difficulties, refer to the wiring diagrams and schematics supplied with the machine.

DELIVERY END - BOX TROUBLES

Symptom	Cause	Remedy
Boxes Not Sealing	Short and long hold downs improperly positioned	Reposition the hold downs over the glue joint.
Marking of Blank at Front Edge	Pile pushoff low and blank contacts resisting portion of leading-edge leaf springs	Readjust the pusher height.
	Leaf springs broken	Replace broken springs.
Marking of Blank at Rear Edges	Lift screw (flight pitch too tight)	Replace the lift screw with one having the correct flight pitch for the caliper of board being run.
	Lift screw (damaged)	Replace the lift screw.
	Side guides (too loose or too tight permitting blank to contact lift screw shaft)	Adjust and tighten the side guides.
	Brake wheels (too tight)	Readjust the brake wheel setting.

DELIVERY END - OPERATING TROUBLES

Unable to Set Panel Sizes	Pushers and/or short and long hold downs interfere with panels	Move pushers to midpoint to laterally adjust components.
Incorrect stacking (leading edge low)	Lift screw incorrect for caliper of board being run (loose fit)	Replace the lift screw with a screw having a smaller flight pitch.
	Short hold down adjustable roller out of adjustment	Readjust the roller extension for the blank being run.
	Horizontal shaft not rotating	Check motor. Replace it if it is defective.
	Low caliper board	Use next smaller pitch lift screws if possible.
Dragging Blanks at Pushoff	Pusher partially contacting the top blank of the subsequent pile.	Readjust the pusher height.
	Insufficient rubber brake wheel contact	Readjust the brake wheel tightness vertically or horizontally.
	Pile pushoff high (blank at point of least resistance of lead edge leaf springs)	Readjust the pusher height.
Pile Not Building Uniformly	Incorrect lift screw	Replace with proper screw.
	Tight or damaged lift screw flight	Repair flight or regap flight.
	Warped board	Improve corrugating operation.
Blanks Enter Delivery end Askew	Boxes hitting lift screw shaft	Readjust the side guides.
Boxes Not Feeding Properly Into Squaring Section	Kidney belts not in proper position for blank length being run	Raise or lower the kidney belts as required.

DELIVERY END - BOX TROUBLES (CONT)

Symptom	Cause	Remedy
Leading Edge of Subsequent Box Contacting Trailing Edge of Box Being Lifted	Spiral lift screws incorrectly timed	Correct the timing.
	Machine not closed on zero.	Check machine timing.
	Reverse warped board.	Use reverse warp hold downs.
Delivery End Jamup	Spiral lift screw too tight or too loose	Install the proper lift screw.
	Blanks reverse warped	Move the reverse warp hold downs into operating position.
	Looseback	Remove all sheets with looseback from the feed hopper and from subsequent piles.
	Crooked blank	Check the front gauge height. Readjust the height if necessary.
	Box over 38 inches in length	Reposition kidney belt assembly.
	Double blank	Check the front gauge height. Readjust, if necessary.
Incorrect Count	Pusher chains loose	Check the chain tightness. Readjust if necessary. **Note** Do not remove chain links to adjust tightness.
	Pusher	Check the pusher height. Readjust if necessary.
	Hold down height incorrect	Readjust the hold down height for the pile height (count and caliper) of board, so that pile pushing off is in contact with the hold down and under some pressure.
	Electric clutch slipping	Increase potentiometer setting.
	Brake wheels.	The wheels should restrain the top blank of the subsequent pile. When the rubber wears, adjust the tightness.