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Manual of Operation and Maintenance for

MODEL 701 FLEXO FOLDER-GLUER

March 1973
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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 similar. The photographs in this manual depict a standard machine and not necessarily any one at a particular installation. Sufficient detail is presented to locate controls and components for operation and maintenance of the machine.

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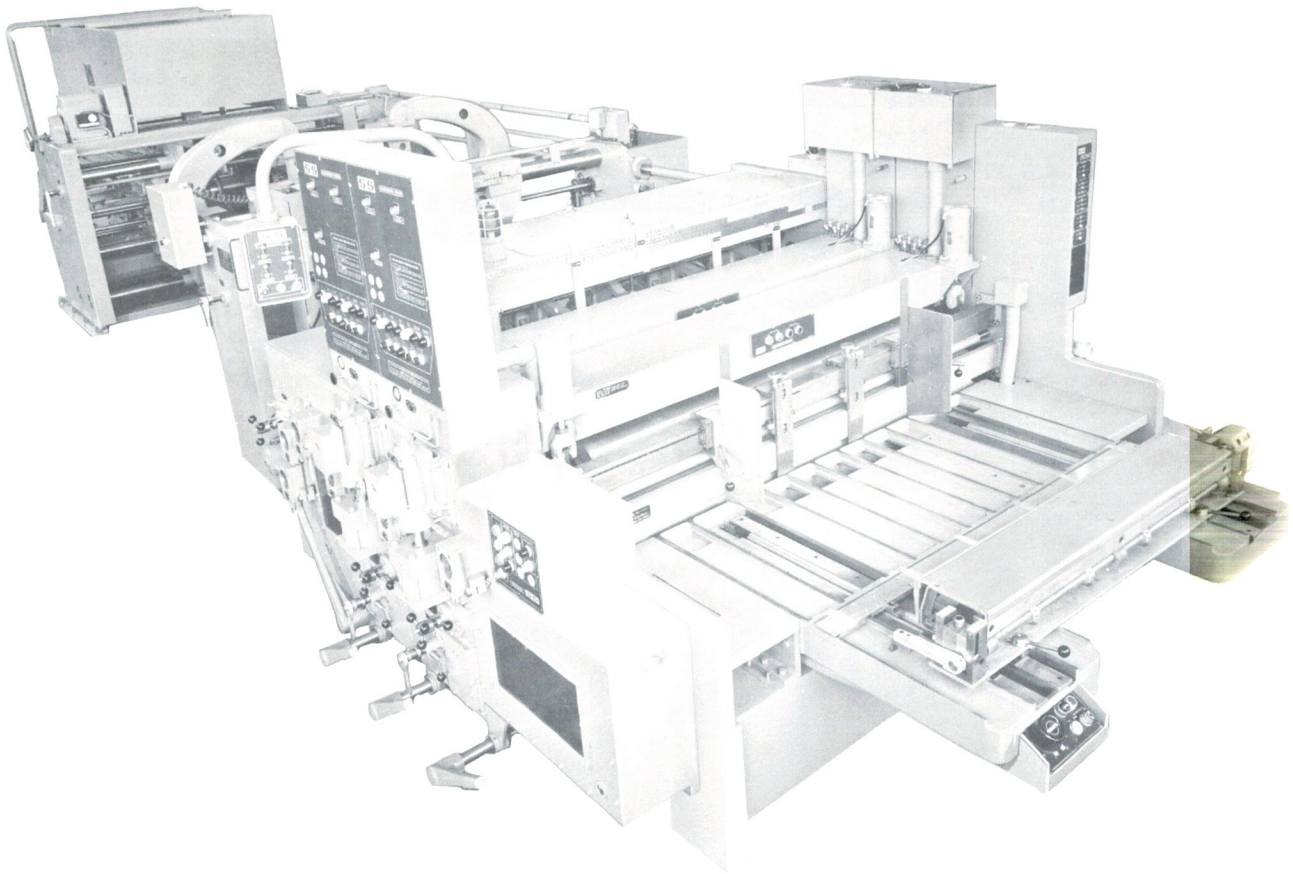


MODEL 701 FLEXO FOLDER-GLUER

SECTION I.
INTRODUCTION

A. GENERAL DESCRIPTION

The S&S Model 701 Flexo Folder-Gluer produces finished corrugated containers from corrugated board blanks supplied directly from the corrugator.

The standard 701 machine converts board to regular slotted containers with printing by performing the following operations: feeding, one or two color printing, creasing, slotting, lap cutting, trimming, inside lap-gluing, folding, squaring, counting, stacking and delivering. Tray boxes and other non-regular slotted containers, die cut boxes and multicolor printed boxes can be made if the machine is equipped with the proper options.

Model 701 is designed and built in modular sections that can be independently set up. The machine sections consist of: Feed (Section III. Feed Section), one or more printing units (Section IV. Flexographic Printing), creaser-slotter (Section V. Creaser-Slotter), glue unit (Section VI. Glue Units), folding section (Section VII. Folding Section), and delivery section (Section VIII. Delivery Section). Feed, printing and creaser-slotter sections open for setup then roll closed for operation (Section II. Opening and Closing).

B. SPECIFICATIONS

Table 1-1 lists all specifications and capacities for the 701. All tolerances and specifications depend on proper installation, following recommended setup procedures and proper maintenance.

C. INSTALLATION

Note

Since installation of the 701 is highly complex, we recommend that installation be carried out by trained and qualified personnel. If installation is carried out by personnel other than S&S, you should determine whether any portions of the machine guarantee become ineffective.

1. PLANNING DATA

Refer to Figure 1-1 and Table 1-2 for a basic floor plan for the 701. Also, you should consult wiring and floor diagrams supplied separately.

2. PREPARATION FOR INSTALLATION

If the proper tools and equipment are on hand when installation begins the installation process will be much easier and faster. Following are the suggested tools, materials and facilities to have on hand:

- Power supply - 60 KVa
- Tools – Pneumatic hammer and compressor with 2 in. carbide bit (needed for minimum of one day)

  Heavy-duty fork lift (5 ton)

  Precision level
- Plumbing – Water pressure minimum 44 psi (31,000 ksM)

  Air pressure minimum 100 psi (70,300 ksM), 25 cfm

  40-50 gallon (155-195 liter) hot water tank (if hot water not available)

  At least one 6 x 3 ft. (1.8 x .9 M) sink with hot and cold water located within 5 ft. (1.5 M) of printing unit drive side Vacuum and drainage facilities
- Hardware – 9 in. (230 mm) lengths of 5/8 in. threaded rod (74 needed for stationary creaser-slotter, 96 for roll back creaser-slotter)

  100 5/8 in. nuts

  200 5/8 in. flat washers

  4 flexible 1 in. air hoses in 10 ft. (3 M) lengths for attaching to the machine

  2 cleanup air hoses in 20 ft. (6 M) lengths

  4 flexible 1 in. water hoses in 10 ft. (3 M) lengths for attaching to machine

  2 additional cleanup water hoses in 20 ft. (6 M) lengths

TABLE 1-1. SPECIFICATIONS

Specification	Dimension	
	English (in.)	Metric (mm)
Sheet size		
Maximum length	38	965
Maximum length (with skip feed)	48	1200
Minimum length	9-1/2	240
Maximum width (1-1/2 in. glue lap, 1/4 in. trim)	81-3/4	2080
Minimum width (1-1/4 in. glue lap, no trim)	20-1/4	530
Panel size		
Maximum	33 x 7	840 x 180
Minimum (inside glue lap)	6 x 3-1/2	150 x 90
Minimum (outside glue lap)	6 x 7	150 x 175
Maximum flat sheet	66	1680
Printing width	78	1980
Printing length	38	965
Caliper limits		
Minimum	E-flute	
Maximum	AC double wall	
Shaft and head diameters		
Upper feed roll maximum (new roll)	5.235	132.969
Upper feed roll minimum (worn roll)	5.178	131.521
Impression cylinder	12.750	323.850
Printing cylinder	12.750	323.850
Ink roll	7.010	178.054
Primary creasing shaft	5.250	133.350
Slotting shaft	5.250	133.350
Upper secondary creasing shaft	3.750	95.250
Lower secondary creasing shaft	3.500	88.900
Upper primary creasing head	9.154	232.512
Lower primary creasing head	12.750	323.850
Upper slotter head	12.750	323.850
Lower slotter head	9.154	232.512
	English (lb)	Metric (kg)
Approximate weights		
Printing unit	7000	3178
Creaser slotter section	13750	6242
Folding section	13600	6174
Delivery section	7800	3541
Feed section	9400	4267
Tracks and miscellaneous parts	2300	1044
Horsepower requirements		
Main drive motor	40 Hp	
Suction blower motor	5 Hp	
Opening, closing motor	1 Hp	
Ink roll idler motor	1/2 Hp	
4 Jiffy-Set motors	1/2 Hp	
Glue wheel motor (DC)	1/2 Hp	
Glue pump motor	1/6 Hp	
Delivery section front stop power adjustment motor	1/6 Hp	
Machine speed		
Maximum	300 boxes/minute	

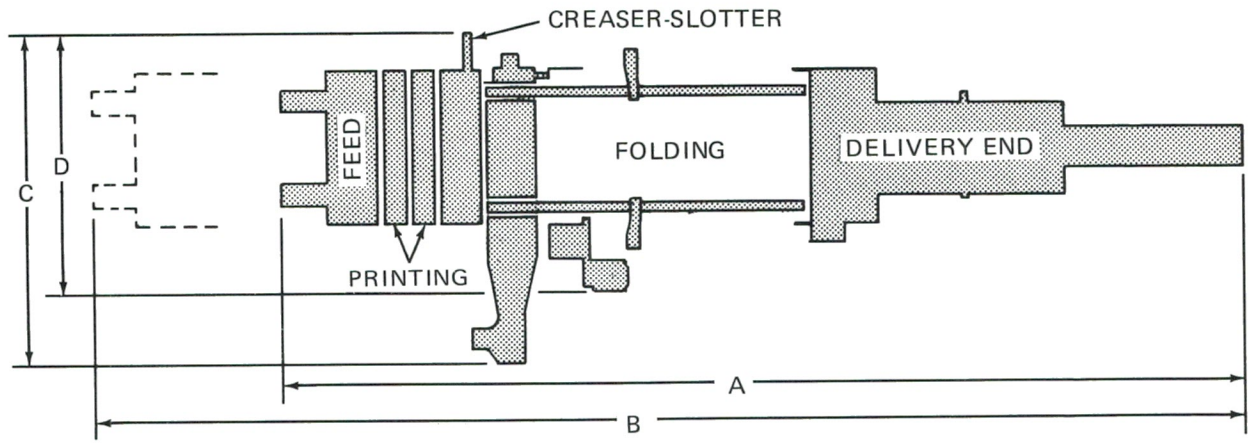


FIGURE 1-1. 701 FLOOR LAYOUT

TABLE 1-2. MODEL 701 DIMENSIONS

Dimension	English (in.)	Metric (mm)
A-Closed	640	16250
B-Open	740	18800
C-With scrap conveyor	200	5100
D-Without scrap conveyor	180	4600

Add to length for the following:	Add to A		Add to B	
	English (in.)	Metric (mm)	English (in.)	Metric (mm)
Skip feed	41	1100	42	1100
One printing unit	20	510	50	1270
Roll back creaser-slotter			30	770

- Lubricants – 30-gallon (115 liters) Mobil DTE extra heavy oil or equivalent

  AGMA SPEC. 252, viscosity index 60 or more

  5 gallon (19 liters) Molycote BR-2S (Dow Corning or equivalent)

  5 gallon (19 liters) EP-90 gear oil

  1 gallon (3.8 liters) Mobil DTE light oil or equivalent AGMA SPEC. 252 light oil

  15 gallon (57 liters) Lithium soap grease, NLGI No. 2

- Miscellaneous – Two 100 lb (45 kg) bags of anchor cement or pourox

  Two 50 lb (23 kg) bags of grout

D. RECOMMENDED SPARE PARTS

Tables 1-3, 1-4, 1-5 and 1-6 list recommended spare parts for the printing units, creaser-slotter, folding and gluing sections and delivery sections.

TABLE 1-3. RECOMMENDED SPARE PARTS – PRINTING UNIT

Part Number	Part Name	Quantity
1-ZLG-59574-0	Doctor Blade	3
4-701-57069-1	Anilox Roll	1
10750-95	Airmatic Cyl.	2
151	Viking Pump #151 LH	1
1613A2001	Ross 3-way Solenoid Valve	1
7900-3/8	Alkon Single 4-Way Solenoid Valve	1
No. 55	G.E. Bulb (Pilot Light)	2
No. 3V-800	Dodge Dyna V-Belt	1
No. R-3603	Tygon Hose 1"ID x 1¼ OD x 10 FT.	1
	Hose Clamp 1¼ ID	2
	55 Gallon Drum Flexoff	1
	Brass Wire Brush	2
	#2 Zahn Viscosimeter (Cup)	1
	Square-D Limit Switch Type B # 9007	1

TABLE 1-4. RECOMMENDED SPARE PARTS – CREASER-SLOTTER

Part Number	Part Name	Quantity
2-701-51005	Lower Creaser	Set of 3
2-701-51000	Lower Intermediate Creaser	Set of 4
2-701-01154	Scrap Ejector	Set of 4
1-ZLG-5149	Jiffy-Set Wear Shoe	
	Lower Slotter	Set of 16
	Upper Creaser	Set of 16
	Intermediate Creaser	Set of 32
1-ZLG-5314	Jiffy-Set Wear Shoe	
	Upper Slotter	Set of 16
	Lower Creaser	Set of 16
1-944-02212-0	Glue Lap Blade, Single Wall, Hard Anvil	6

TABLE 1-4. RECOMMENDED SPARE PARTS – CREASER-SLOTTER (Continued)

Part Number	Part Name	Quantity
1-944-02212-1	Glue Lap Blade, Double Wall, Hard Anvil	3
2-944-01387	Upper Slotter Blade, Trim	1
3-944-02022	Upper Slotter Blade, Tipped	Set of 3 for each size
3-944-01383	Upper Slotter Blade, Tipped and Bevelled	1 for each size
3-944-02023	Upper Slotter Blade, Plain	Set of 3 for each size
3-944-01384	Upper Slotter Blade, Plain and Bevelled	1 for each size
2-944-02400	Lower Slotter Blade	Set of 9
1-942-01102	Lap Cutter Holder "T" Bolt	4
1-942-01103	Crusher Segment "T" Bolt	4
1-942-01100	Slotter Blade "T" Bolt	20
1-942-01101	Lap Blade Holder "T" Bolt	2
No. 38 FN	Northwestern Flange Nut	20
1-945-00462	Lap Cut Holder Spring	8
B61-D	Square-D Limit Switch Type B # 9007	1
1-942-02036-2	Shim, for Jiffy Shoe 1-ZLG-5314	16
1-942-02036-3	Shim, for Jiffy Shoe 1-ZLG-5314	8
1-942-02036-4	Shim, for Jiffy Shoe 1-ZLG-5314	8
1-942-02036-5	Shim, for Jiffy Shoe 1-ZLG-5314	8
1-942-02037-2	Shim, for Jiffy Shoe 1-ZLG-5149	32
1-942-02037-3	Shim, for Jiffy Shoe 1-ZLG-5149	16
1-942-02037-4	Shim, for Jiffy Shoe 1-ZLG-5149	16
1-942-02037-5	Shim, for Jiffy Shoe 1-ZLG-5149	16

TABLE 1-5. RECOMMENDED SPARE PARTS – FOLDING AND GLUING SECTIONS

Part Number	Part Name	Quantity
2-ZLG-51252	Folding Section Roller	2
1-ZLR-2311	Inside-lap Glue Unit Glue Roll Scraper Blade	2
1-ZLR-2292	Glue Chamber Probe Rod	1
1-ZLR-2293	Glue Chamber Long Probe Rod	1
	Photo Switch Number 316 Probe Tip 9/16 dia. Tip	2
61LJ2-1000N	Probe Fitting	2
	Rubber Hose, 1 in. (25 mm) Inside Diameter	10 ft. (3 M)
46A211	Coil For Allen Bradley Bulletin 860 Type 860, GOD 107, 110V, 60 CYC.	1
1-ZLR-52204	Brush	Set of 2
#3V-560	Dodge Dyna V-Belt	1
	Inside/Outside-Lap Glue Shoe	

TABLE 1-6. RECOMMENDED SPARE PARTS – DELIVERY END

Part Number	Part Name	Quantity
1-ZLR-3155	Rubber Belting	9
1-ZLR-6622-1	Carriage Spring Finger	5
1-ZLG-6622-2	Carriage Spring Finger	5
1-ZLG-6622-3	Carriage Spring Finger	5
1-ZLG-6622-4	Carriage Spring Finger	5
1-ZLG-6622-5	Carriage Spring Finger	5
1-ZLG-6622-6	Carriage Spring Finger	5
1-ZLG-6622-7	Carriage Spring Finger	5
1-ZLG-6622-8	Carriage Spring Finger	5
# 30 - D	Revo Belt, Endless, 36 in. (914 mm) Long x 3 in. (76 mm) Wide	4
1-ZLG-9552	Belt Roller	9
# 120	Chain Connecting Link (1-1/2" Pitch)	9
2-ZLG-55659	Brake Wheel	2

SECTION II.
OPENING AND CLOSING

The feed section and each printing unit open by rolling back about two feet toward the feed end for setup. The creaser-slotter may be optionally equipped to roll back if the tracks extend underneath the section and a lock lever (see paragraph II.A.1) is located at the bottom of the operating side frame.

Since the feed section is the only power driven section, the other sections must be locked to each other and the feed section for opening. During closing the feed end will push the other sections ahead of it. When the machine is opened, the feed end pulls the other sections back until they reach appropriate positions for setup.

A. CONTROLS

1. LOCK LEVERS (Figure 2-1)

Each movable section has a section lock lever located at the bottom of the operating side frame. The lock lever permits the section to be engaged or disengaged to adjoining sections. When a section is closed but the lock lever is not locked, the main drive will not start.

2. OPENING AND CLOSING CONTROL PANEL (Figure 2-2)

The panel (Table 2-1) located on the operating side frame of the feed section (See paragraph III. C.) houses OPEN, JOG OPEN and CLOSE pushbuttons which activate the opening closing motors.

3. SAFETY SWITCH (Figure 2-2)

Located on the control panel underneath the close button is the safety switch, ROLL BACK LOCK. This key lock selector switch has two positions, SAFE and READY. The READY position is used when opening or closing the machine. SAFE position is used when the machine is open to prevent accidental closing of the machine sections.

4. TIMING MARKS (Figure 2-3)

Timing marks are often referred to as zero or register marks. Each moving section has a timing mark etched on a moving disc or gear that matches a similar point fixed to the section. When the fixed and moving marks coincide, the

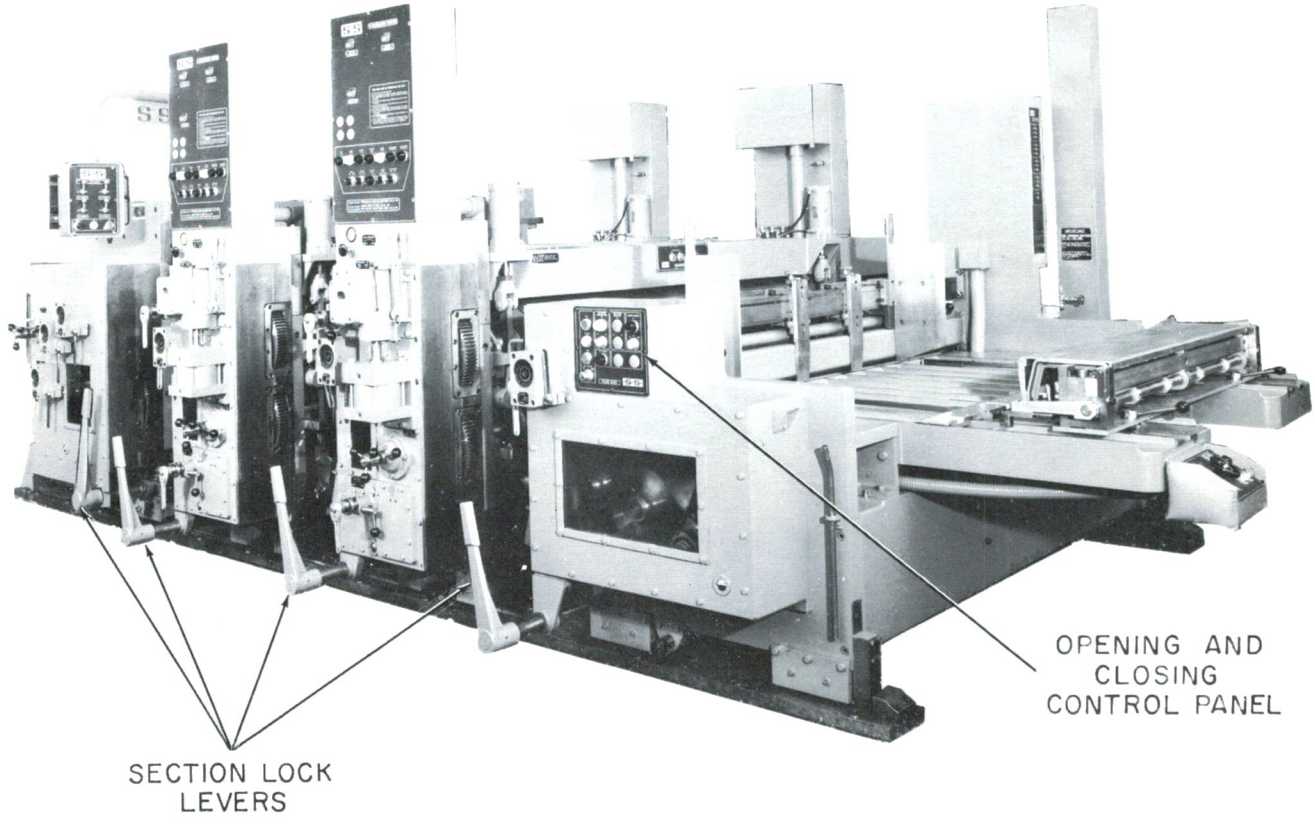


FIGURE 2-1. 701 IN OPEN POSITION

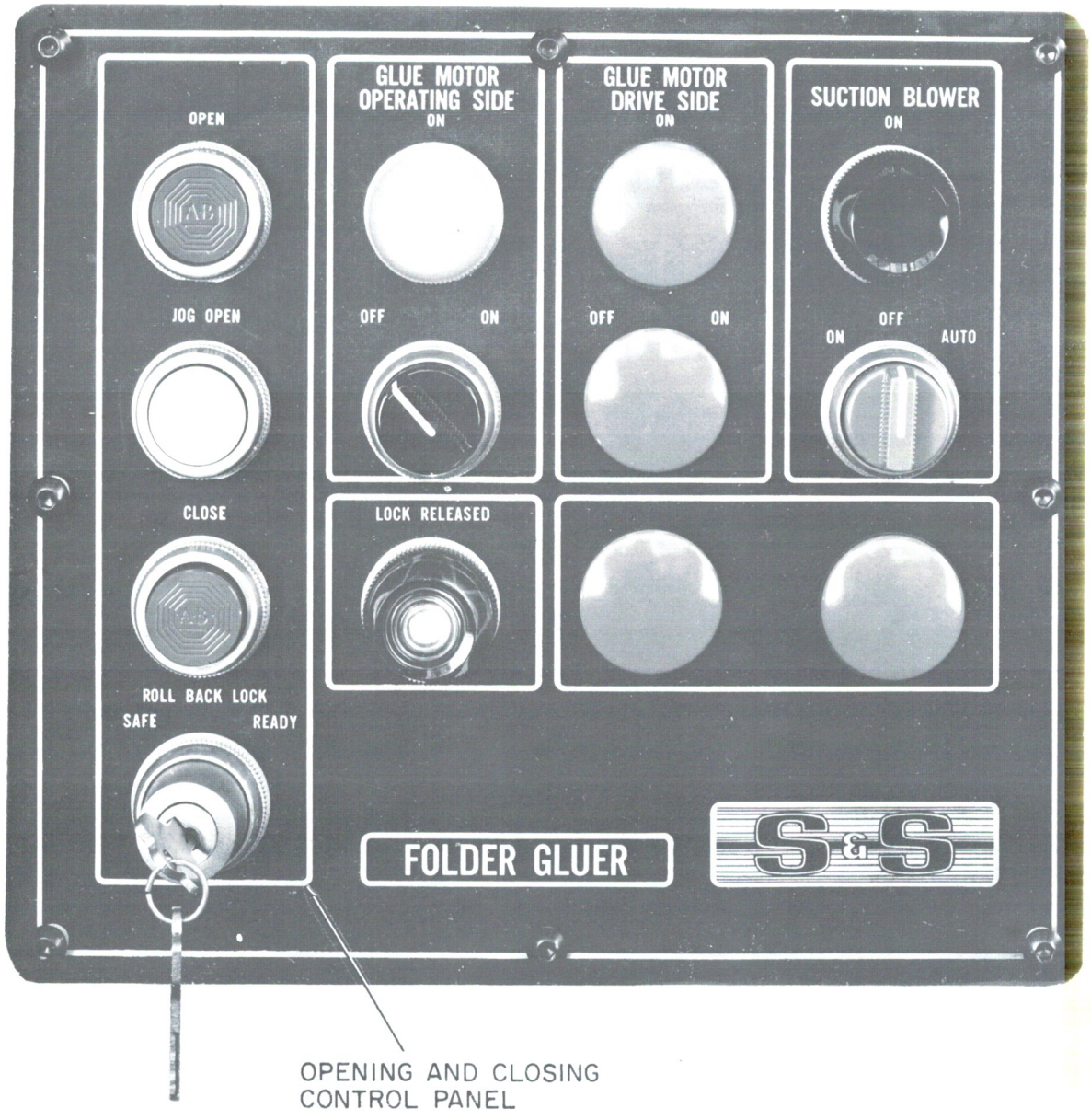


FIGURE 2-2. OPENING AND CLOSING CONTROL PANEL

TABLE 2-1. OPENING AND CLOSING CONTROLS (FIGURE 2-2)

Name	Type of Switch	Use
OPEN	Green pushbutton	Activates motor for opening.
JOG OPEN	Yellow pushbutton	Inches motor for closing or opening.
CLOSE	Red pushbutton	Activates closing motor.
ROLL BACK LOCK SAFE/READY	Key lock 2-position selector switch	SAFE position prevents activation of opening, closing motor. READY position allows activation of opening or closing motor.

section is zeroed. When each section is zeroed, all sections are in register and machine operations will occur at the proper time.

B. OPENING PROCEDURE (Figure 2-1)

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

CAUTION

Do not open until zero marks are aligned.

To align the zero indicators on the feed end of the machine, use one of the three JOG buttons--located on the feed table control panel (paragraph III. C.) pendant control (paragraph V. C.); or delivery end control panel (paragraph VIII. C.)-- to move the kicker carriage into alignment with the feed table zero mark. When the zero indicators on the feed end are aligned, the timing wheel zero indicator at the delivery end operating side will be aligned with the frame pointer.

Step 2) Release section lock lever (by rotating counterclockwise) on the section to be rolled back that is furthest from the feed end.

Step 3) Push OPEN pushbutton.

Step 4) Allow the moving section to stop them release the lock of the next section furthest from the feed end.

Note

When OPEN button is pushed, even momentarily, the feed end and any section locked to it automatically move 2½ feet (610mm) back and stop. To stop movement before 2½ feet (610mm) use JOG OPEN button. When using JOG button, sections will move only as long as JOG OPEN is pushed or until the section hits a limit switch or physical stop.

Step 5) Repeat steps 2, 3 and 4 and push OPEN button until all sections are opened.

Step 6) When opening sequence is finished, turn ROLL BACK LOCK key to SAFE position and remove key.

WARNING

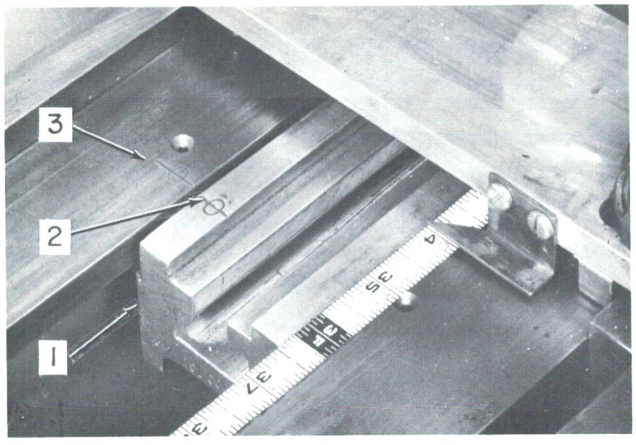
Failure to set ROLL BACK LOCK on SAFETY after the machine is open may allow accidental closing of the machine.

C. CLOSING PROCEDURE (Figure 2-4)

Step 1) Make sure all sections are zeroed. (See paragraph II.A.4.) Refer to appropriate sections of the manual for adjusting individual machine sections.

WARNING

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



1. Kicker carriage
2. Kicker carriage zero mark
3. Feed table zero mark

FIGURE 2-3. FEED TABLE TIMING MARKS

Step 2) Turn ROLL BACK LOCK key to READY.

Step 3) Press and hold CLOSE button. Feed will move toward first printing unit and push it and the other open sections toward the folding section of the machine.

Step 4) Lock all sections by rotating section lock levers clockwise.

Step 5) Turn ROLL BACK LOCK key to SAFE and remove key.

Note

The machine cannot be operated until all sections are locked.

D. MANUAL OPENING AND CLOSING

In case of power failure or problem with the opening motor, sections may be opened manually by unlocking each section and pushing it back by hand starting with the feed end. Reverse the procedure for closing.

E. TROUBLESHOOTING

Table 2-2 lists some of the problems often encountered when opening or closing the machine. Appropriate remedies are also included.

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

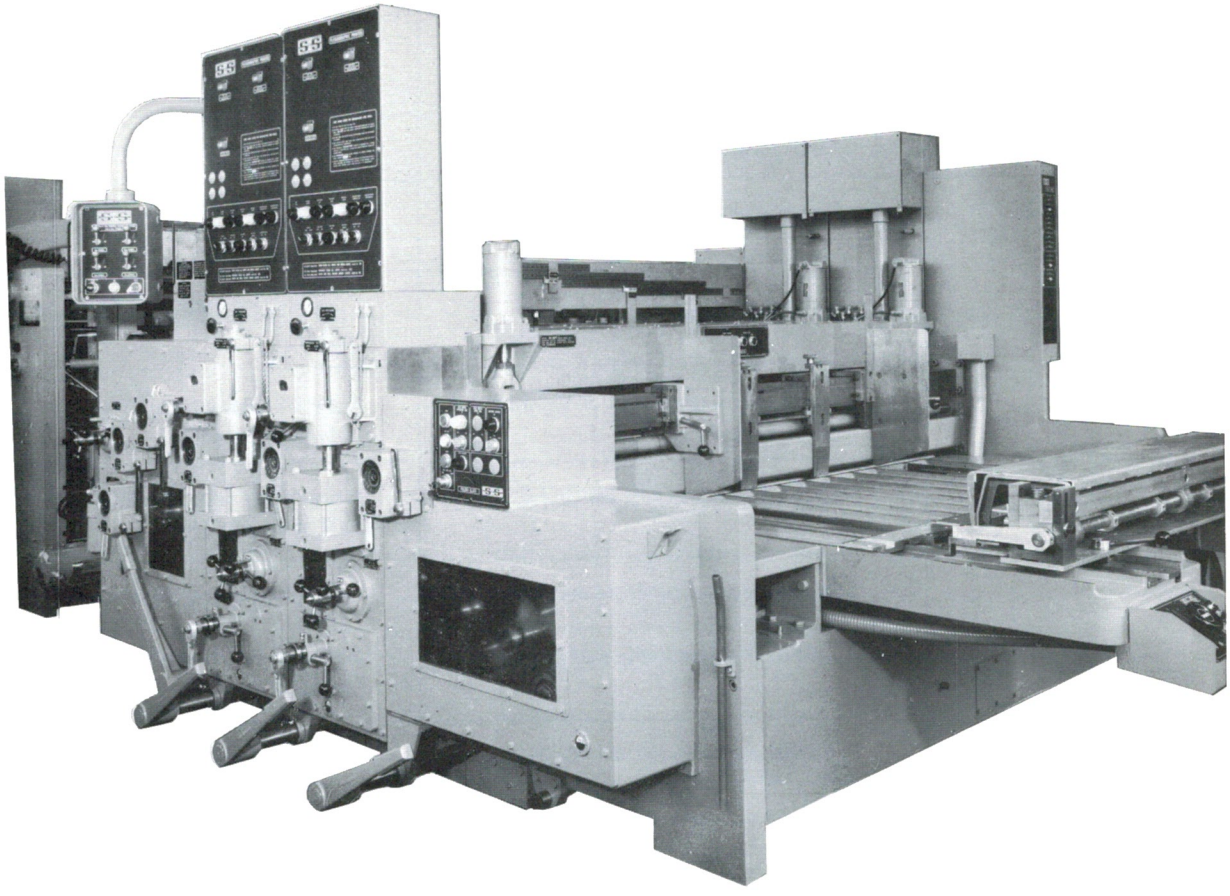


FIGURE 2-4. 701 IN CLOSED POSITION

TABLE 2-2. TROUBLESHOOTING OPENING AND CLOSING

Symptom	Cause	Remedy
Machine will not open	Power failure	Check power source; open by hand.
	Motor slipping	Check opening and closing motor linkage. Tighten, lubricate or replace if necessary.
	Obstruction on tracks	Clear any obstruction off the tracks.
	ROLL BACK LOCK on SAFE	Obtain key and turn ROLL BACK LOCK key to READY.
	Lock levers closed	Open section lock levers.
Machine will not close	Power failure	Check power source; close by hand.
	Motor slipping	Tighten drive chains or replace motor.
	Obstruction on tracks or between open sections	Clear obstruction off tracks and between sections.
	ROLL BACK LOCK on SAFE	Obtain key and turn ROLL BACK LOCK key to READY.
	Swivel pendant inside open section	Swing pendant outside machine.
	Doctor blade assembly down	Reset doctor blade in operating position.
	Printing register clutch disengaged	Reengage clutch.

SECTION III.
FEED SECTION

A. DESCRIPTION

The rollback feed section (Figures 3-1 and 3-2) moves about 114 in. (290 cm) toward the feed end to allow access to the other sections for setup. Mounted on the feed section are the main operating controls and opening and closing controls.

The feed section consists of the following major components: full width suction feed table with drop table attachment; sheet hopper including front, side and rear gauges; kicker plate; upper and lower feed rolls.

1. SUCTION FEED TABLE (Figure 3-3)

The full width suction feed table is a horizontal one-piece cast table. Suction chambers and kicker carriage openings are cast and machined into the table. Suction is created by a 5 Hp blower mounted on the drive side. A suction chamber damper placed over each suction chamber allows the operator to control the suction for various sheets. A suction damper located on the drive side underneath the table controls the amount of suction to the chambers.

Kicker plate and gauges are mounted on the feed table. The operator controls are set into one side of the feed table on the operating side.

A drop table is (Figure 3-4) is hinged at one end of the suction table and must be locked in the up position when sheet size exceeds 32 in. (840 mm).

2. SHEET HOPPER

a. Front Gauges (Figure 3-5)

Piles of boxes are stacked against the front gauges. The gauges are mounted on cam followers to facilitate movement from side to side.

b. Side Gauges (Figure 3-6)

Side gauges form two sides of the sheet hopper. They allow the hopper pile to be run on the centerline of the machine. Side gauges are mounted on cam followers on each side of the front gauges. A scale on the feed section top brace provides proper alignment of the gauges.

A skewed sheet detector is mounted on each side gauge. The detector consists of a limit switch with a long probe.

c. Back Gauge Assembly (Figures 3-7 and 3-8)

The back gauge, a rectangular assembly at the back of the hopper, forms the rear of the sheet hopper and helps align the sheets for proper feeding. Pneumatically operated feed interrupter arms are mounted underneath the back gauge. Tapered plates at the front of the back gauge feather the sheets before they reach the kicker.

3. KICKER PLATE (Figure 3-9)

The standard flat kicker rests in carriage recesses in the feed table so that the suction effect is concentrated ahead of the kicker.

4. FEED ROLLS (Figure 3-10)

The feed rolls are located at the delivery end of the feed section. The lower roll is knurled while the upper roll is rubber covered. Feed rolls provide positive feeding of the board into the next section of the machine. A caliper adjustment (3 Figure 3-2) allows setting the rolls for the board being run.

B. FEED SECTION PROCESS

Blanks are loaded into the sheet hopper. The kicker engages the trailing edge of the bottom sheet in the pile and pushes it into the nip of the feed rolls. Feed rolls grip the board and forward it into the next unit. Suction feed pulls the leading edge flat for proper kicking into the feed rolls and keeps the trailing edge flat for positive engagement by the kicker.

If a sheet is feeding incorrectly into the feed rolls, the skewed sheet detectors actuate the feed interrupter to lift the trailing edge of the pile and prevent the next sheet from being kicked into the feed rolls.

C. OPERATION AND ADJUSTMENT CONTROLS

The feed section houses the main operation controls, opening and closing, and the fault panel. Tables 3-1, 3-2 and 3-3 describe all the controls, indicator and adjustments mounted on the feed section.

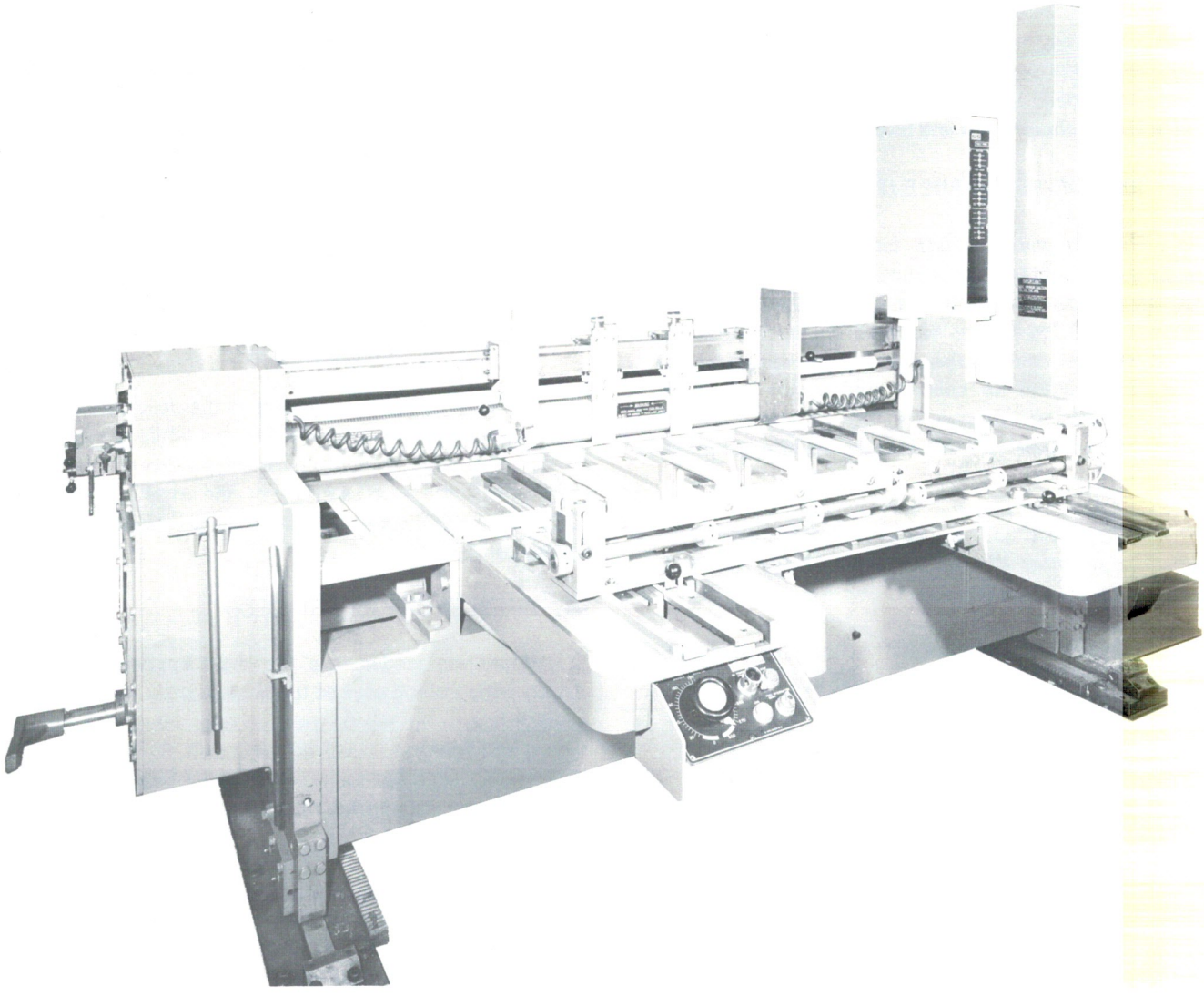
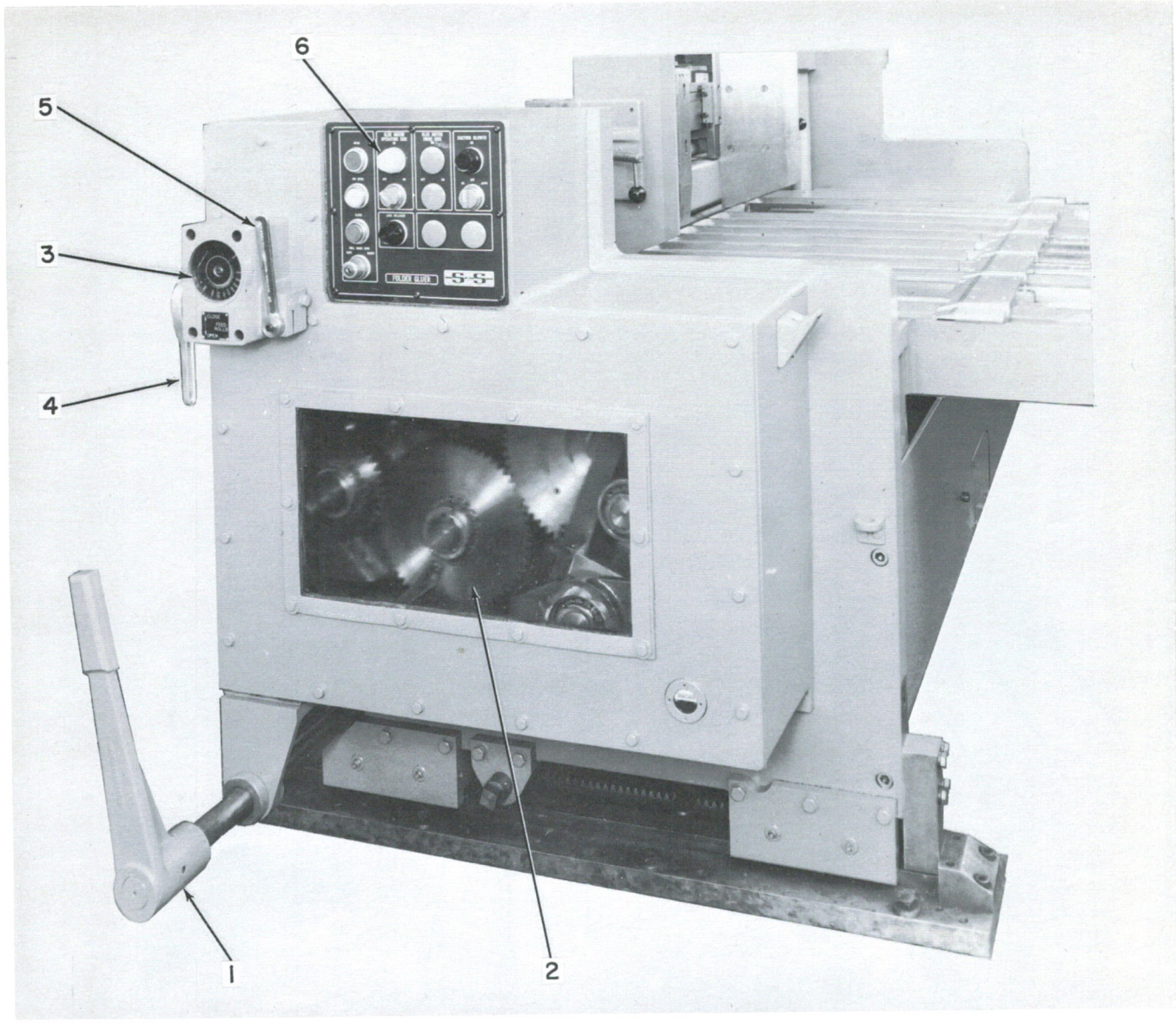
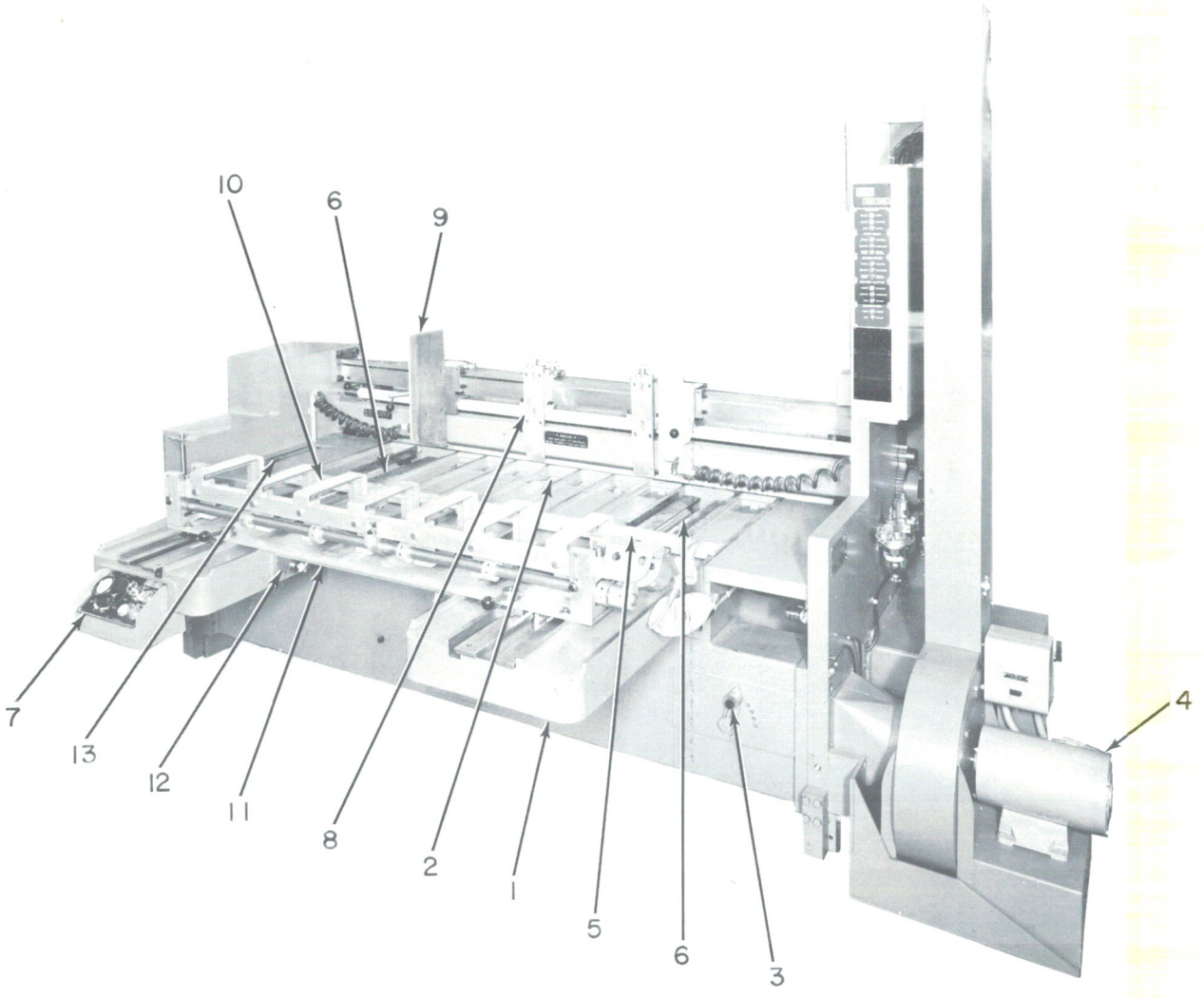


FIGURE 3-1. 701 FEED SECTION



1. Feed section lock lever
2. Main gear drive inspector plate
3. Feed roll caliper adjustment scale
4. Feed roll caliper adjustment ratchet handle
5. Feed roll caliper adjustment lock lever
6. Operating side control panel

FIGURE 3-2. 701 FEED SECTION OPERATING SIDE



1. Full width suction feed table
2. Suction chamber opening and damper
3. Suction damper lever
4. Suction blower
5. Kicker plate
6. Kicker carriage
7. Feed table control panel
8. Front gauge
9. Side gauge
10. Back gauge
11. Drop table
12. Drop table lock plunger
13. Timing disc

FIGURE 3-3. SUCTION FEED TABLE

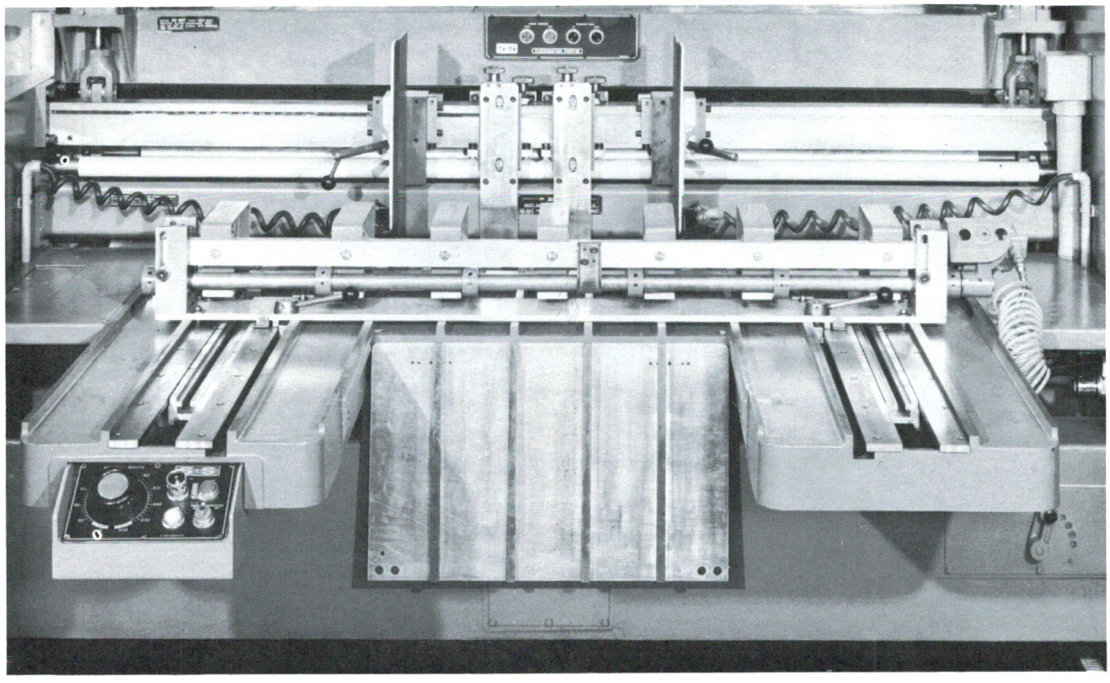


FIGURE 3-4. DROP TABLE IN DOWN POSITION

D. SETUP AND ADJUSTMENTS

1. ADJUSTING FLAT SHEET KICKER FOR SHEET SIZE (Figure 3-9)

Step 1) Loosen kicker plate locking screws.

Step 2) Place the kicker on the carriage so the bevelled edge faces the feed rolls.

Step 3) Slide kicker forward or backward until it is aligned with the kicker carriage scale corresponding to the sheet length to be run.

Step 4) Check setting with a sample blank. Make fine adjustments if necessary.

Step 5) Tighten the kicker plate locking screws.

2. ADJUSTING FRONT GAUGES (Figure 3-5)

Step 1) Unlock front gauge lateral adjustment locks.

Step 2) Position each gauge about equally distant from the machine centerline within the board dimensions. Each gauge should be positioned over an open suction chamber.

Step 3) Lock lateral adjustment.

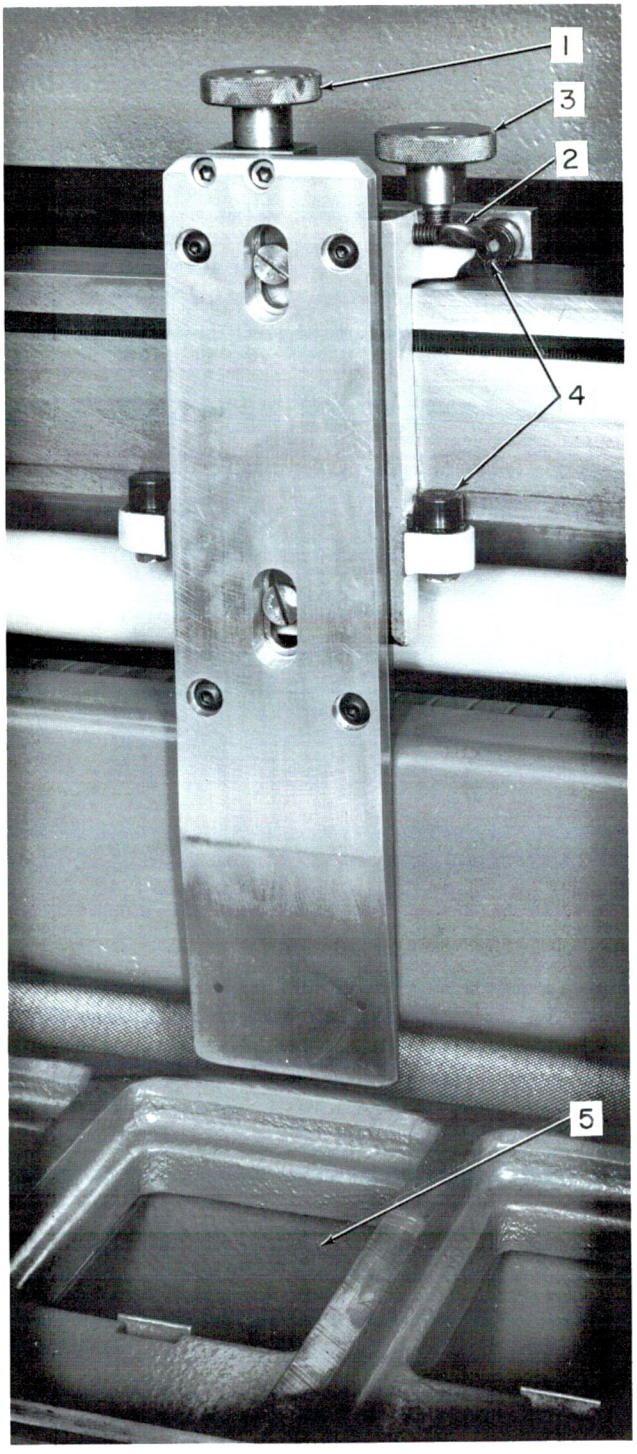
Step 4) Unlock front gauge height adjustment lock thumbscrew.

Step 5) Slide one sheet of the order to be run under the gauges.

Step 6) Turn SUCTION BLOWER selector switch to ON (Table 3-2).

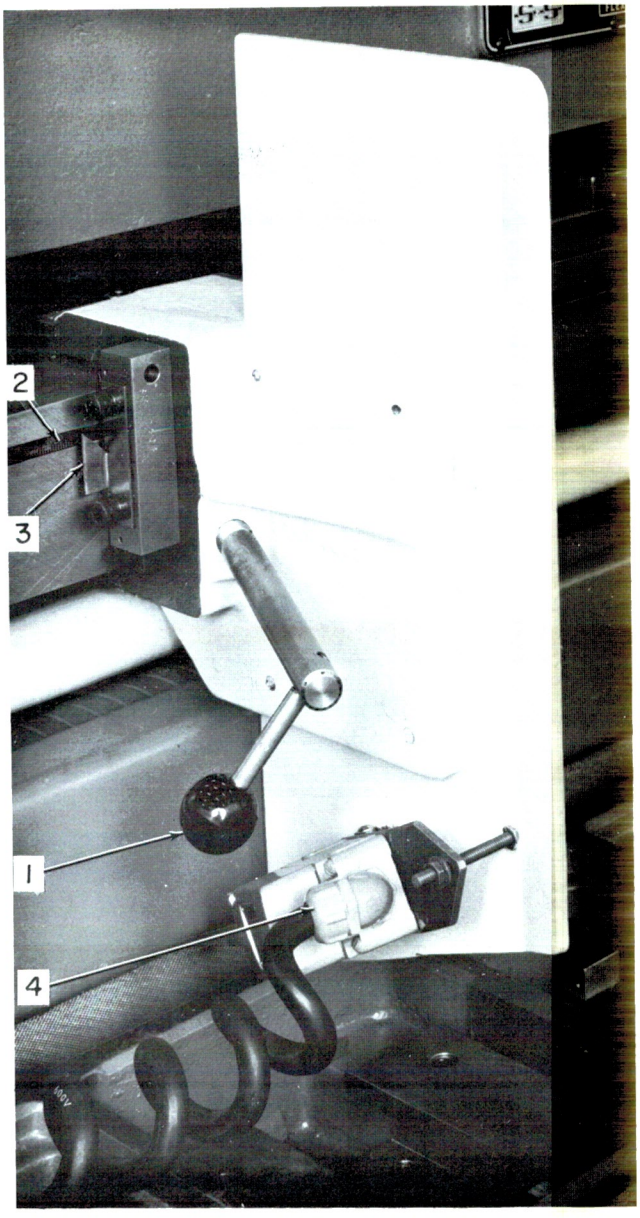
Step 7) Place a second sheet on top of the first to ensure that it does not pass under the front gauges.

Step 8) Rotate front gauge height adjustment knob so that the bottom sheet passes under the gauge but top sheet does not.



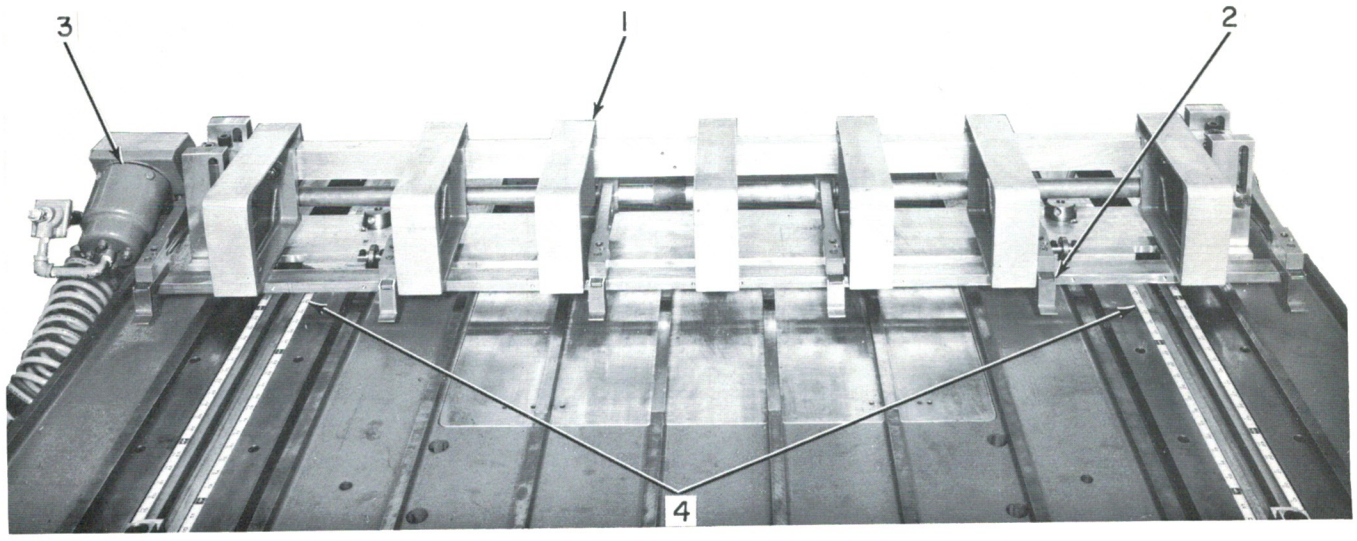
1. Front gauge height adjustment knob
2. Front gauge height adjustment lock thumbscrew
3. Front gauge lateral adjustment lock knob
4. Cam followers
5. Suction opening

FIGURE 3-5. FRONT GAUGE ASSEMBLY



1. Side gauge lateral adjustment lock lever
2. Side gauge lateral adjustment scale
3. Side gauge pointer
4. Skewed sheet detector

FIGURE 3-6. SIDE GAUGE ASSEMBLY



1. Tapered plate
2. Interrupter arm
3. Feed interrupter pneumatic cylinder
4. Back gauge scales

FIGURE 3-7. BACK GAUGE ASSEMBLY

Step 9) Lock height adjustment on both gauges.

3. ADJUSTING SIDE GAUGES (Figure 3-6)

Step 1) Loosen side gauge lock levers.

Step 2) Align operating side gauge with the side gauge adjustment scale reading 1/2 the sheet width plus the width of the glue tab and lock gauge.

Step 3) Align the drive side gauge with the sheet width plus 1/8-inch clearance. This will allow 1/4-inch trim if sheets were correctly cut at the corrugator.

Step 4) Tighten side gauge lock levers.

4. ADJUSTING BACK GAUGE ASSEMBLY (Figures 3-7 and 3-8)

Step 1) Unlock back gauge lock levers.

Step 2) Slide the back gauge forward and backward until the indicator is aligned with the correct sheet size on both back gauge scales.

Note

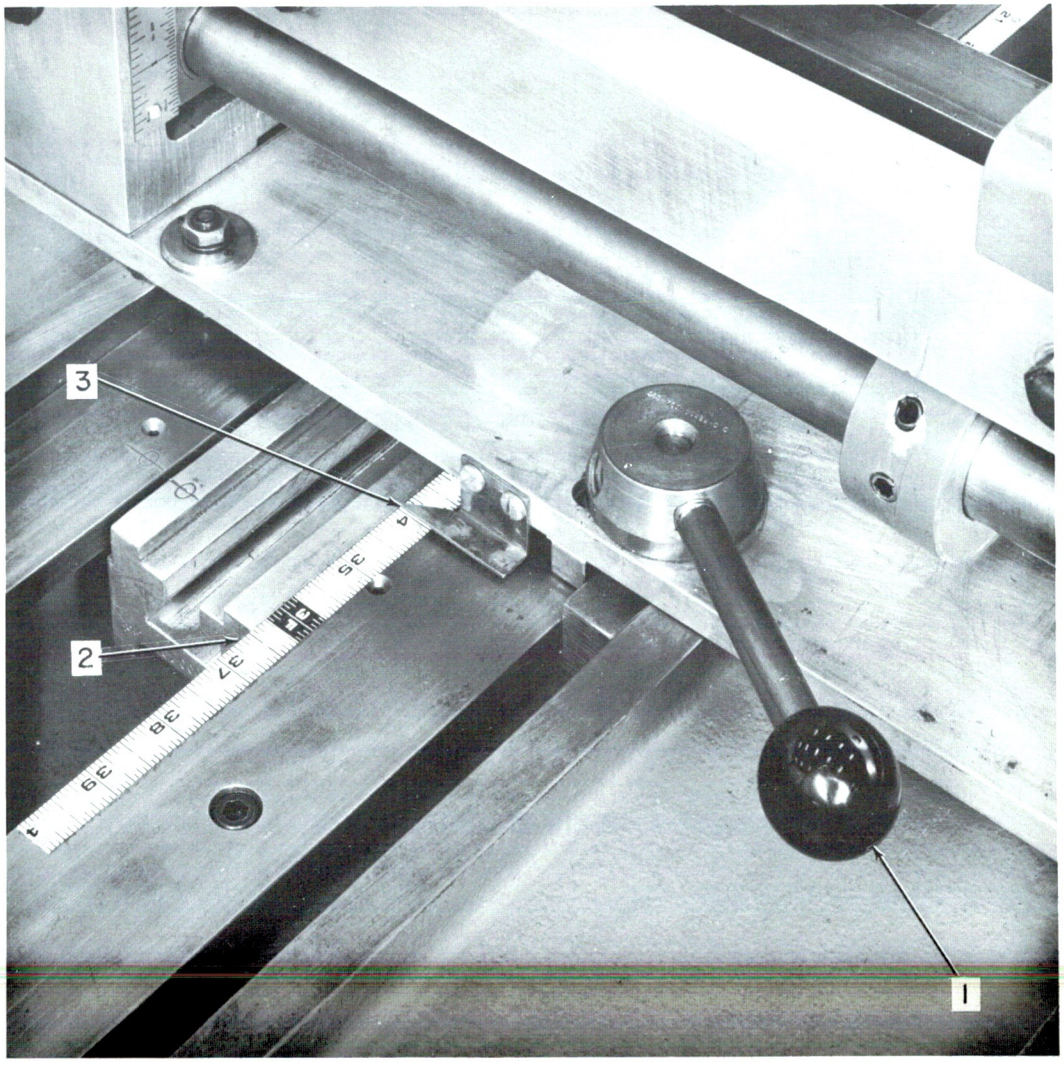
The scales have been pre-positioned to allow proper feathering and kicking when the gauge is set at the sheet size being run. Slight adjustment of the gauge may be necessary when running excessively warped sheets.

5. ADJUSTING FEED ROLL GAP (Figure 3-2)

Step 1) Unlock adjustment by rotating feed roll caliper adjustment lock lever.

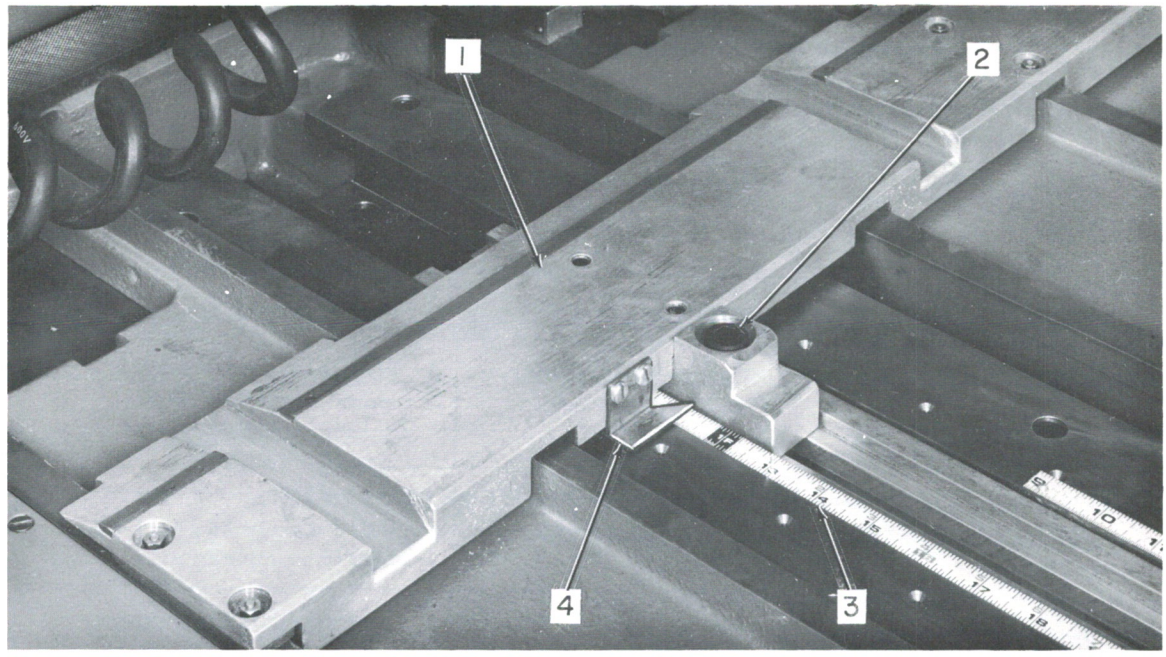
Step 2) Rotate the caliper adjustment ratchet handle until proper dimension appears on the indicator.

Step 3) Lock adjustment with the lock lever.



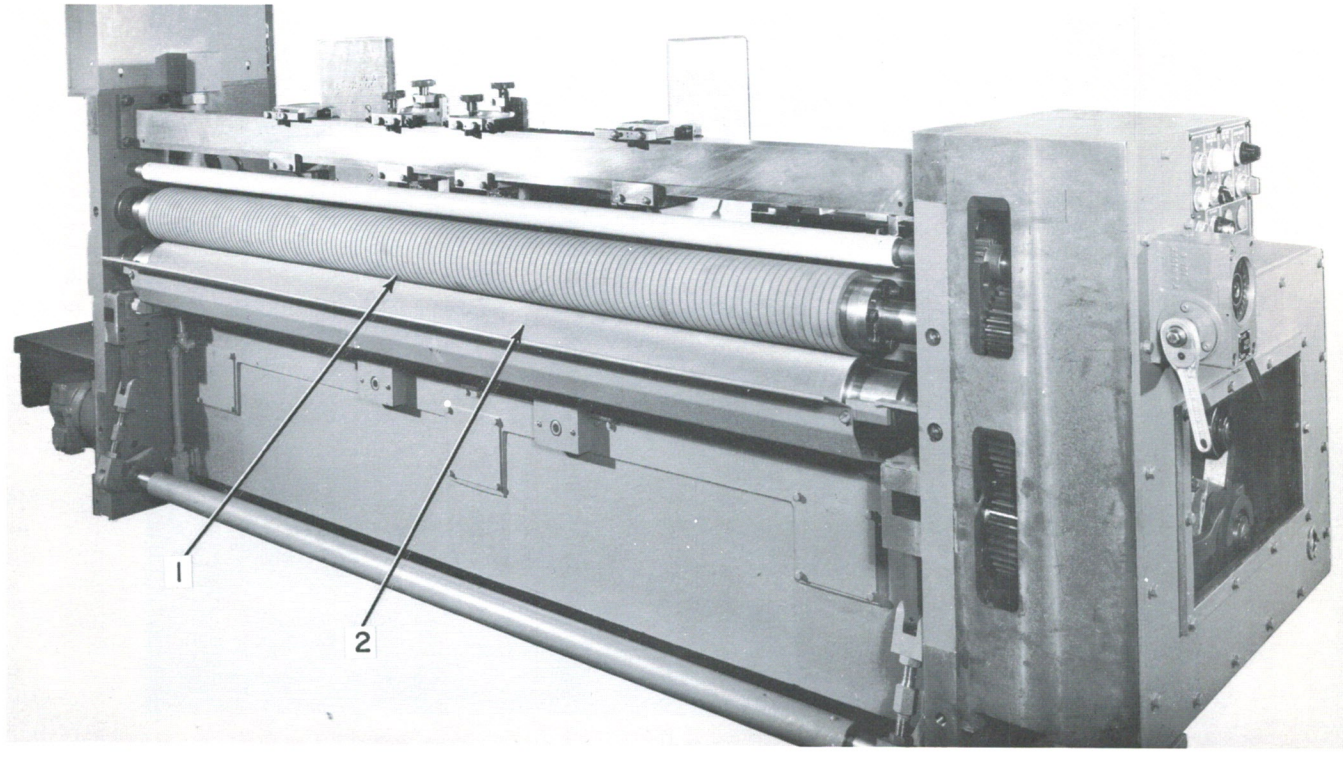
1. Back gauge lock lever
2. Back gauge adjustment scale
3. Back gauge pointer

FIGURE 3-8. BACK GAUGE ADJUSTMENTS



1. Kicker plate
2. Kicker plate locking screw
3. Kicker carriage scale
4. Kicker plate pointer

FIGURE 3-9. KICKER PLATE



1. Upper feed roll
2. Lower feed roll

FIGURE 3-10. FEED ROLLS

TABLE 3-1. FEED TABLE CONTROL PANEL (FIGURE 3-11)

Name	Type of Control	Use
AC POWER ON START	Green pushbutton	When lit, shows power is on. Press to start main drive motor.
JOG	Yellow pushbutton	Inches drive motor.
STOP	Red pushbutton with locking attachment	Press to stop main drive motor. Lock holds down button so drive cannot be started.
FEED INTERRUPTER UP/DOWN	Two-position selector switch	Raises and lowers pneumatic feed interrupter arms.
Machine speed rheostat	Variable dial	Varies speed of main drive.

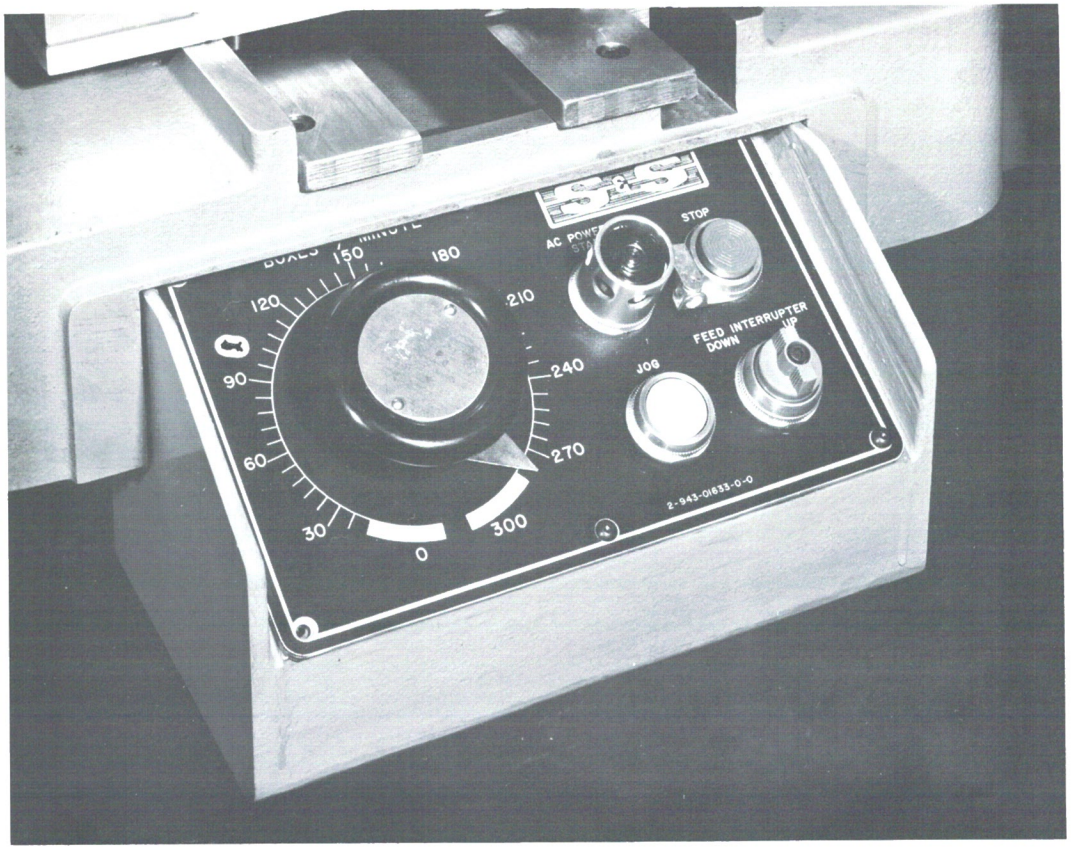


FIGURE 3-11. FEED TABLE CONTROL PANEL

TABLE 3-2. OPERATING SIDE CONTROL PANEL (FIGURE 3-12)

Name	Type of Control	Use
OPEN	Green pushbutton	Activates opening motor to open machine.
JOG OPEN	Yellow pushbutton	Inches opening motor.
CLOSE	Red pushbutton	Activates closing motor to close machine.
ROLL BACK LOCK SAFE/READY	Key lock switch	SAFE position locks out motor, READY position allows motor to activate.
GLUE MOTOR OPERATING SIDE ON OFF/ON	White indicator light Two pole gray selector switch	White indicator lit. Shows glue motor on. Selector switch turns motor off or on.
SUCTION BLOWER ON ON/OFF/AUTO	Green indicator light Three pole gray selector switch	ON, OFF positions turn suction blower on or off. AUTO position starts blower when machine drive is started.
LOCK RELEASED	Red indicator light	When lit, shows the section lock lever is released.

6. ADJUSTING SUCTION

Note

Use SUCTION BLOWER selector switch to turn on suction.

a. Suction Chambers (Figure 3-3)

Open the suction chamber covers if the board being run covers at least part of the opening. If the board does not reach the opening, close the suction chamber cover.

b. Adjusting For Operation

Use the suction dampening lever (3 Figure 3-3) to control the amount of suction used for operation. Rotate lever down to decrease suction; rotate up to increase suction. Amount of suction will depend on the size and weight of the board, amount of warp and operating speed. Heavier sheets usually need more suction than lighter sheets. Too much suction will interfere with the kicking action.

Note

Use the minimum amount of suction required for the job.

7. RAISING AND LOWERING DROP TABLE (Figure 3-4)

The drop table is held in the horizontal position by two spring loaded lock plungers (12 Figure 3-3). To release plunger, pull out. Turn plunger clockwise to lock it in the out position.

WARNING

The drop table must be in the up position to avoid injury to personnel if sheet length exceeds 32 in. (813 mm).

FIGURE 3-12. OPERATING SIDE CONTROL PANEL

TABLE 3-3. FEED SECTION ADJUSTMENT CONTROLS

Name	Figure No.	Location	Use
Front gauge height adjustment knob (2) and lock thumb-screw (2)	3-5 (1, 2)	Top of each front gauge	Adjusts height of the gauges over the feed table
Front gauge lateral adjustment lock knob (2)	3-5 (3)	Adjacent to each height adjust-ment knob on the side of the gauge	Unlocks gauge to allow lateral movement
Side gauge lateral adjustment lock lever (2)	3-6 (1)	Attached to each side gauge	Unlocks gauge to allow lateral movement
Side gauge lateral adjustment scale	3-6 (2)	Mounted on the feed section cross brace above feed rolls	Indicates sheet width for setting side gauge
Suction damper lever and lock pin	3-3 (3)	Underneath feed table on drive side	Controls amount of suction in the suction chamber
Suction chamber covers (9)	3-3 (2)	Sliding covers over each suction chamber	Opens or closes individual chamber
Back gauge lock lever (2)	3-8 (1)	Operating and drive side of back gauge behind the gauge	Locks position of back gauge
Back gauge adjustment scale (2)	3-8 (2)	Operating and drive side of feed table	Indicates sheet length for setting back gauge
Kicker plate locking screws (2)	3-9 (2)	Operating and drive side of kicker plate	Locks the plate to kicker carriage
Kicker carriage scale	3-9 (3)	Operating and drive side of feed table	Indicates sheet length for setting kicker
Feed roll caliper adjustment ratchet and lock lever	3-2 (3, 4, 5)	Operating side frame of feed section	Adjusts gap between feed rolls
Feed end register disc and barring collar	3-3 (13)	Inside operating side frame adjacent to feed table	Allows manual turning of kicker carriage for zeroing.

E. OPERATING PROCEDURE FOR NORMAL RUNNING

Note

Use this procedure for setting up feed section and starting up machine.

Step 1) Make sure machine is on zero (paragraph II.B.).

Step 2) Install flat sheet kicker (paragraph IV.D.1.).

Step 3) Raise or lower drop table (paragraph IV.D.7.).

Step 4) Press INTERRUPTER DOWN pushbutton (Table 3-1).

Step 5) Adjust front gauges (paragraph IV.D.2).

Step 6) Adjust back gauges (paragraph IV.D.4.).

Step 7) Adjust suction chamber covers (paragraph IV.D.6.a.).

Step 8) Adjust side gauges (paragraph IV.D.3.).

Step 9) Press INTERRUPTER UP pushbutton (Table 3-1).

Step 10) Place a handful of sheets in hopper. They should be placed on angle so they feather against the back gauge. Make sure that the bottom sheet did not slide under front gauge.

Step 11) Fill hopper to suitable height for operation.

Step 12) Adjust suction dampening (paragraph IV.D.6.b.).

Step 13) Make sure the other machine sections are properly set up (see appropriate section of this manual). Close machine if it is not already closed.

Step 14) Turn SUCTION BLOWER switch to AUTO (Table 3-1).

Step 15) Adjust speed rheostat (Table 3-1) to about 40 on dial.

Step 16) Press and hold START pushbutton (Table 3-1).

Step 17) Press INTERRUPTER DOWN to begin feeding.

Step 18) Adjust machine speed as required.

F. PREVENTIVE MAINTENANCE

Use Table 3-4 as a guide for performing periodic preventive 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.

1. CHECKING FEED ROLL WEAR (Figure 3-13)

Feed roll wear will be more evident at the center of the roll than at the ends because most of the work is less than full width. When feed roll wear is excessive, it can cause slippage, poor registration or crushing on some areas of the box blank.

Check upper feed roll for wear as follows:

Step 1) Using the feed roll caliper adjustment, close the gap between the feed rolls until the feed roll stop contacts the gib (Figure 3-14).

TABLE 3-4. PERIODIC MAINTENANCE

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 on 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 in. Lateral clearance must not exceed 0.025 in.
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. (Paragraph III.F.1.)
Kicker link bearing and wear plates	Six Months	Check for wear. (Paragraph III.F.3.)

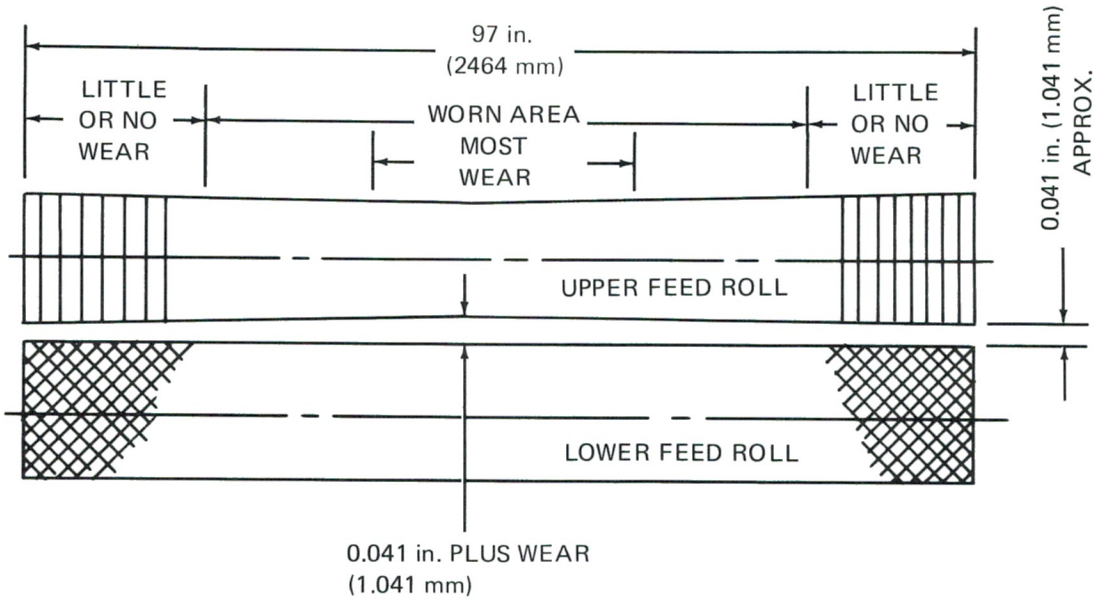


FIGURE 3-13. FEED ROLL WEAR

Step 2) Place two strips of paper of known thickness between the feed rolls, at the extreme ends (Figure 3-13).

Step 3) Insert feeler gauge between the strips of paper so that there is a firm steady drag on the gauge as it is removed (Figure 3-15).

Step 4) Record the feeler gauge thickness used.

Step 5) Move the strips of paper approximately 15 in. (381 mm) toward the center of the roll. Repeat step 3 adding feeler gauge thickness as required to obtain the same drag as in step 3.

Step 6) Repeat step 5 at various places along the length of the roll to determine the largest feeler gauge thickness required.

Step 7) To determine the amount of wear on the diameter of the feed roll, subtract the thinnest feeler gauge thickness (obtained in step 3) from the maximum gauge thickness obtained from steps 5 and 6 and multiply by two.

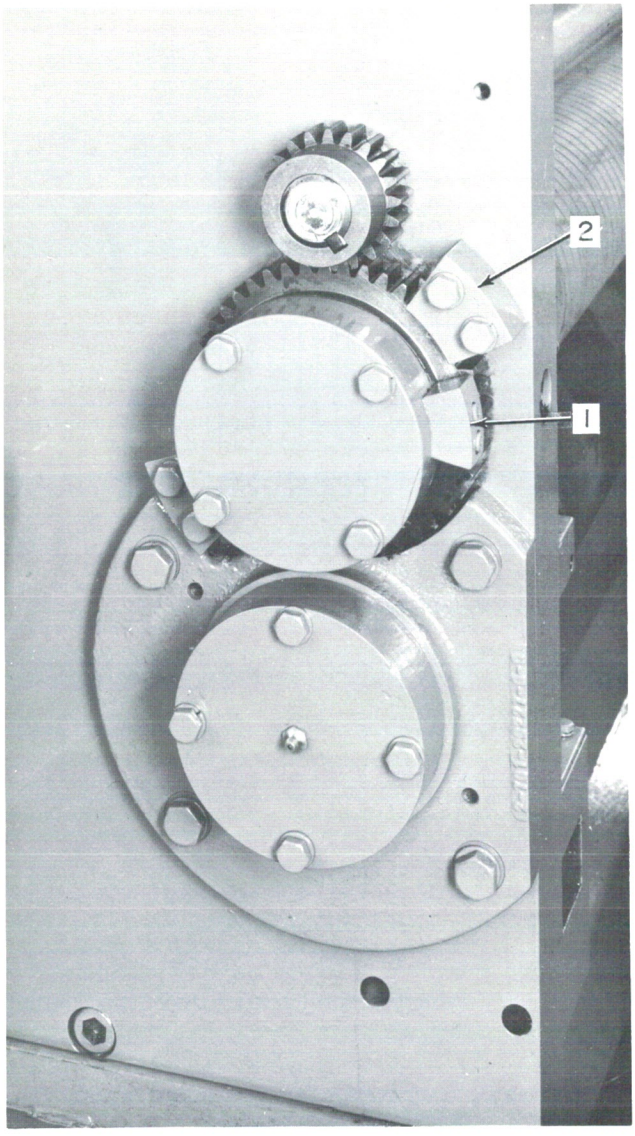
Step 8) Subtract the figure obtained in step 7 from 5.325 in. (135.255 mm), the diameter of a new feed roll.

Step 9) If the diameter obtained in step 8 is more than 5.178 in. (131.521 mm), the roll can be removed and refinished. If the diameter obtained in step 8 is less than 5.178 in. (131.52 mm), the roll must be removed and recovered.

Step 10) If the roll is refinished to a new diameter the feed roll stop must be reset. Refer to Section IV.F.2.

2. FEED ROLL STOP ADJUSTMENT (Figure 3-16)

The diameter of a new upper feed roll is 5.325 in. (132.255 mm). 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.



1. Feed roll stop
2. Gib

FIGURE 3-14. FEED ROLL ADJUSTMENT

The stop is positioned so that a clearance of approximately 0.041 in. (1.041 mm) exists between the upper and lower rolls when they are adjusted as close as possible to each other.

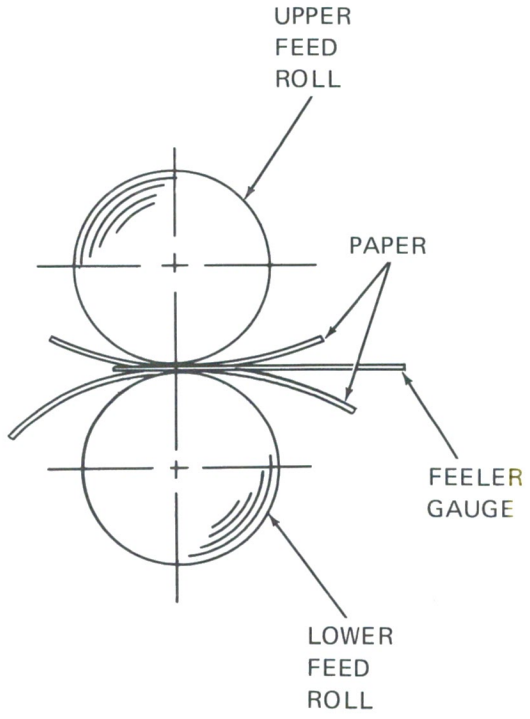


FIGURE 3-15. CHECKING FEED ROLL DRAG

When the feed roll diameter is reduced because of refinishing, or increased due to wear 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 3-16. 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 5-degree increments.

To determine the stop position (clearance between the feed rolls) to use for any feed roll diameter less than 5.325 in. (132.255 mm) and greater than 5.200 in. (131.080 mm) proceed as follows:

Step 1) Subtract the minimum allowable feed roll diameter (5.200 in., 131.080 mm) from the worn or refinished feed roll diameter.

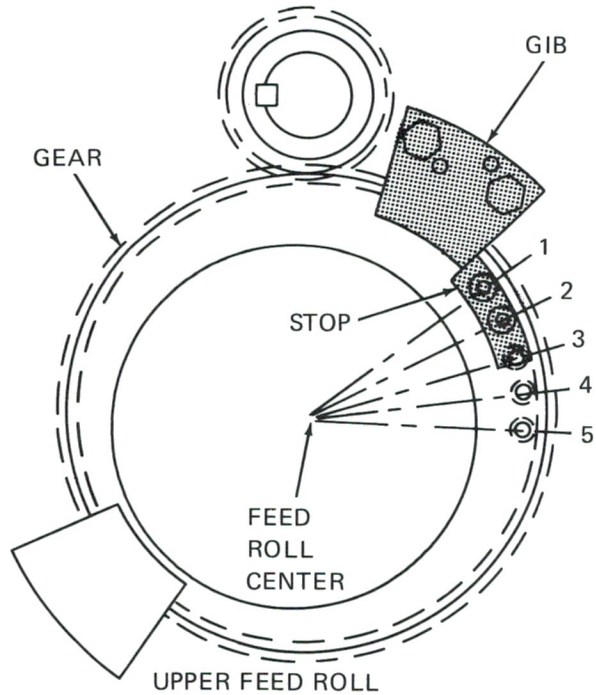


FIGURE 3-16. FEED ROLL STOP LOCATION

For Example: 5.287 in. (worn or refinished diameter)
−5.200 in. (minimum diameter)
0.087

Step 2) Subtract one-half the difference (from step 1) from the distance given in Table 3-5 so that the remainder is close to .041 in. (1.041 mm).

Step 3) Relocate the stop into the appropriate holes using either the short or long side of the stop to maintain the proper clearance.

For Example: For the sample dimensions used in the previous examples relocate the stop into holes 2 and 3 (Figure 3-16) using the long side of the stop.

Step 4) When a roll is worn to the minimum recommended diameter of 5.200 in. (131.080 mm), use holes 4 and 5 on the gear with the short side of the stop against the gib to maintain a clearance of 0.041 in. (1.041 mm) 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 (Figure 3-17). 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:

Step 1) Jog the kicker carriage away from the feed rolls to the farthest point on the back stroke.

Step 2) Using a 0.01 in. (.25 mm) feeler gauge, check the vertical clearance between the gibs and blocks at the front and rear of the kicker carriages.

Step 3) If the vertical clearance exceeds 0.010 in. (.25 mm), the micarta blocks must be shimmed or replaced.

TABLE 3-5. FEED ROLL STOP LOCATION

Minimum feed roll diameter		Stop location	Distance between Upper and Lower feed rolls	
In.	mm	Short side	In.	mm
5.200	132.080	Holes 1 and 2	0.103	2.616
5.200	132.080	Holes 2 and 3	0.074	1.879
5.200	132.080	Holes 3 and 4	0.050	1.270
5.200	132.080	Holes 4 and 5	0.320	0.812
		Long Side		
5.200	132.080	Holes 1 and 2	0.119	2.844
5.200	132.080	Holes 2 and 3	0.088	2.235
5.200	132.080	Holes 3 and 4	0.061	1.549
5.200	132.080	Holes 4 and 5	0.040	1.016

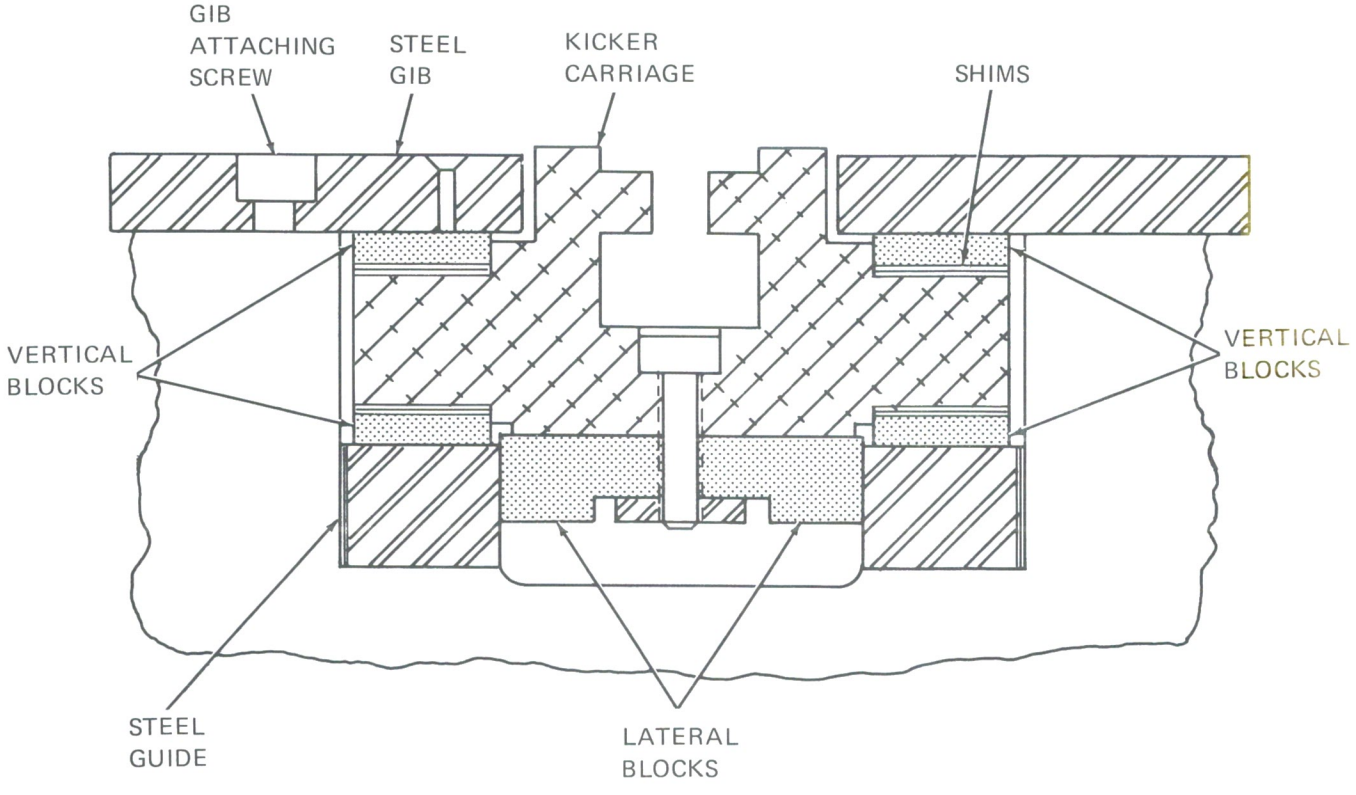


FIGURE 3-17. CHECKING KICKER CARRIAGE WEAR

Any number of shims may be added to provide a running clearance between the gibs and blocks of not less than 0.002 in. (.025 mm). 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 Section IV.F.4.

Step 4) Check the clearance between the lateral micarta blocks and the steel guides using a .025 in. (.64 mm) feeler gauge.

Step 5) If the clearance exceeds .025 in. 0.64 mm), replace the lateral blocks. Refer to paragraph IV.F.4.

4. REPLACING KICKER CARRIAGE MICARTA BLOCKS (Figure 3-17)

Note

Blocks should be soaked in oil for 24 hours before installing.

Step 1) Remove the gib attaching screws. Remove the gibs.

Step 2) Raise the kicker carriage assembly.

Step 3) Remove the block attaching screws. Remove the block and shims.

Step 4) Install new blocks, where required, using the appropriate number of shims to obtain a 0.002 in. (0.051 mm) running clearance.

Step 5) Lower the kicker carriage assembly and install the gibs.

5. CHECKING KICKER LINKAGE WEAR (Figures 3-18 and 3-19)

The kicker carriage moves back and forth by a linkage assembly. The likely wear points in the linkage are the bearing and gibs in the kicker harp and the oilite bushings in the carriages and connecting links.

Note

Gibs and bearing wear will cause a banging noise as the kicker comes to the end of its forward stroke. The noise is more evident at high speed.

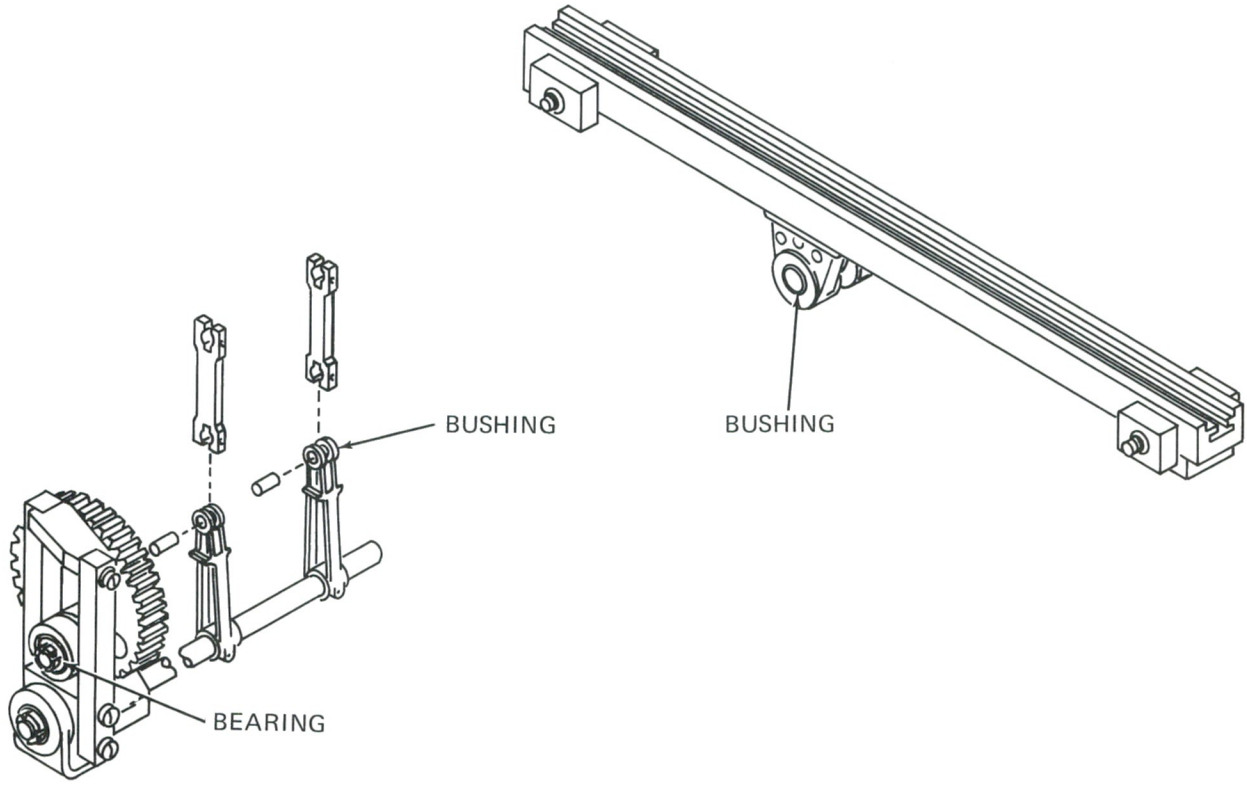
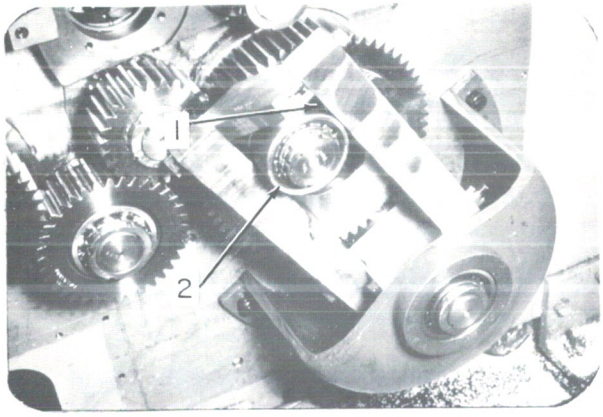


FIGURE 3-18. KICKER LINKAGE



1. Gibs
2. Bearing

FIGURE 3-19. CHECKING KICKER LINKAGE WEAR

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

Step 1) Remove the inspection plate on the gearbox on the operating side of the machine. (Figure 3-2).

Step 2) Using a 0.010-inch feeler gauge, check the clearance between the gibs and the outside diameter of the bearing (Figure 3-18) at several places along the length of the gibs.

Step 3) If the clearance between the gibs and bearing exceeds 0.010 inch at any point, or if banging becomes evident, replace the bearings and gibs.

Step 4) 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.

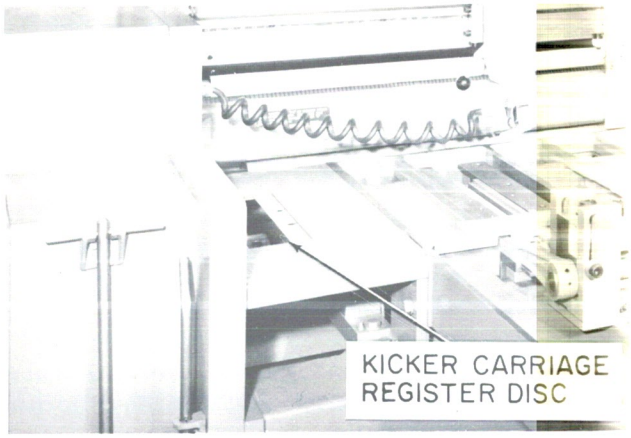


FIGURE 3-20. KICKER CARRIAGE REGISTER DISC

6. CHECKING KICKER LINKAGE BUSHING WEAR (Figure 3-19)

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:

Step 1) Align the kicker carriage register disc (Figure 3-20) and feed table zero marks (Figure 2-3) on the forward stroke of the kicker. If the zero marks do not align simultaneously, bushing wear is evident and the bushing must be replaced.

Step 2) As a further check, remove the kicker plate and move each carriage forward and back by hand. If free movement exceeds 0.0625 in. (0.161 mm), the bushings are worn and must be replaced.

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 bearings at a different location and check bushing wear again.

G. TROUBLESHOOTING

1. TEST PANEL (Figure 3-21)

Table 3-6 lists the indicators mounted on the TEST PANEL (also called FAULT PANEL). The indicator lights

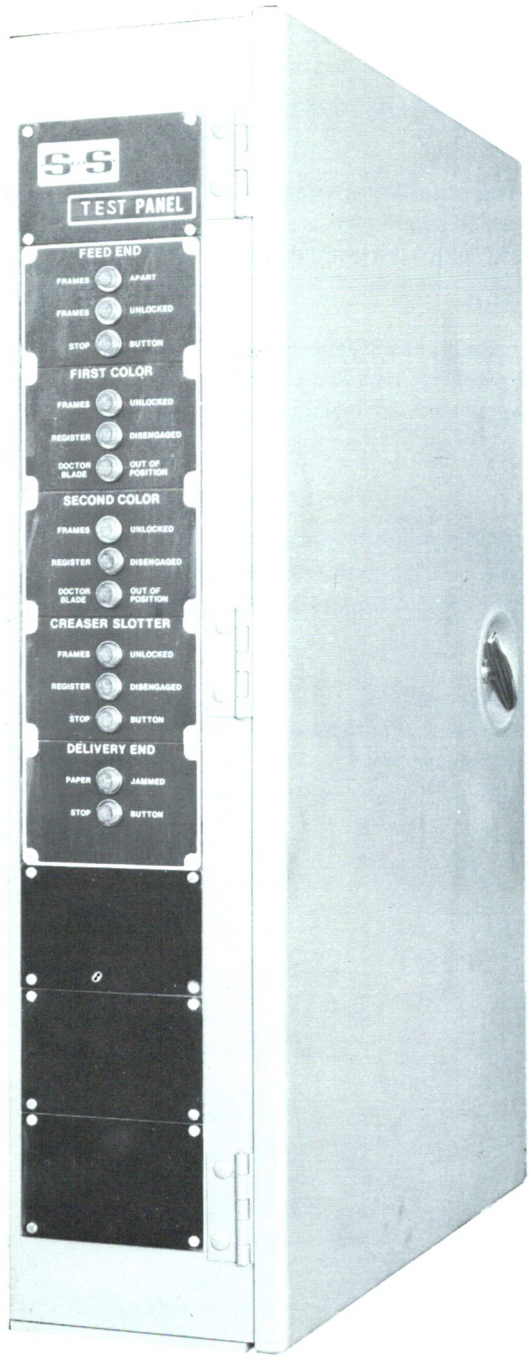


FIGURE 3-21. TEST PANEL

show trouble areas throughout the machine that will not allow the machine to start.

Note

Each printing unit has a separate section on the panel, but each section has the same indicators.

2. TROUBLESHOOTING OPERATING AND BOX BOX TROUBLES

Refer to Tables 3-7 and 3-8 for a listing of operating difficulties and the standard procedures to correct them.

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 tables properly, determine if the trouble is operational or shows up as a result of box inspection at the delivery end. Turn to the correct table concerned and locate the symptom encountered. Check the possible causes of the difficulty. When the trouble is located, again refer to the appropriate table to determine remedy.

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

H. FEED SECTION LUBRICATION

Refer to Table 3-9 and Figure 3-22, 3-23, and 3-24 for points of lubrication frequency, method and type of lubrication.

TABLE 3-6. TEST PANEL

Name	Yellow Indication
FEED END	
FRAMES APART	Section not properly closed
FRAMES UNLOCKED	Lock lever disengaged
STOP BUTTON	Feed table stop button depressed
FIRST COLOR	
FRAMES UNLOCKED	Section not properly closed
REGISTER DISENGAGED	Register clutch handle disengaged
DOCTOR BLADE OUT OF POSITION	Doctor blade out of running position
CREASER SLOTTER	
FRAMES UNLOCKED	Section not properly closed
REGISTER DISENGAGED	Register clutch handle disengaged
STOP BUTTON	Pendant control stop button depressed
DELIVERY END	
PAPER JAMMED	Paper jammed
STOP BUTTON	Delivery section control panel stop button depressed

TABLE 3-7. 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 • Scrap buildup • Worn roll • Insufficient pressure • Wear in linkage mechanism	Remove built-up scrap. Check for uneven wear. Reset gap for caliper of board to be run. Replace worn parts.
All slots out of register	Feed roll gap improperly set	Adjust the feed roll caliper setting.
Slot variations at different speeds	Feed roll gap improperly set	Adjust feed roll caliper 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.
Box creased or slotted crooked	Kicker askew	Readjust the kicker mechanism.
	Blanks feeding incorrectly	Check all hopper gauge adjustments.
	Feed roll gap improperly set	Adjust feed rolls caliper setting.
Variations in printing register	Feed end setup incorrect	Check the feed end setup. Check all hopper adjustments and settings. Check all caliper settings.
Poor definition of printing	Feed rolls crushing board	Adjust the feed roll caliper setting.

TABLE 3-8. FEED SECTION OPERATING TROUBLES

Symptom	Cause	Remedy
Feeding double blank	Front gauge adjustment	Readjust the gauges to permit feeding of only one blank at a time.
	Kicker engaging two sheets	Reverse board.
	Damaged kicker edge	Replace kicker.
Kicker jamups	Kicker ledge engaging more than one blank	Apply tape to reduce height of ledge.
	Boxes buckling because of weakness at corrugated score	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 crooked	Kicker mechanism crooked	Readjust the kicker plate.
	Front gauge adjustment	Check the gauge height and readjust, if necessary.
Sheets jam at feed end	Suction not turned on	Place suction selector switch on AUTO.
	Insufficient suction	Open suction damper, check suction damper openings.
	Excessively warped sheets	Increase suction to maximum; break flaps; run on a printer slotter.
	Poorly fabricated sheets	Remove loose back, delaminations.
	Excessive suction	Close suction damper.
	Sheets crushed at kicking edge	Tape kicker or reverse hopper pile for better edge against kicker.
	Front gauges too tight, too loose	Adjust front gauges carefully for caliper; adjust laterally.
	Kicker set incorrectly for sheet size	Check kicker setting on carriage scale.
	Back gauge set incorrectly for sheet size	Check gauge setting on table scale.
	Excessive operating speed for cross-corrugated or weak board	Reduce speed; reduce suction; do both.
	Hopper too full	Reduce hopper pile especially B flute sheets.
	Feed rolls too loose	Tighten feed rolls.

TABLE 3-9. FEED SECTION LUBRICATION

Item	Figure No.	Description	Lubricant	Period	Method
1	3-22	Manifold	NLGI no. 2 Lithium soap grease	Weekly	
2	3-22	Kicker slides	Agma no. 1, Agma spec. no. 252	Daily	
3	3-22	Blower motor	Per manufacturer's recommendation		
1	3-23	Gear case	Agma no. 3, Agma spec. no. 252	Daily	
2	3-23	Roller assemblies, operating and drive sides	NLGI no. 2	Weekly	
1	3-24	Frame fittings (4)	NLGI no. 2	Weekly	
2	3-24	Opening and closing motor	Per manufacturer's recommendation		
3	3-24	Front gauges	Agma no. 1	Weekly	
4	3-24	Side gauges	Agma no. 1	Weekly	

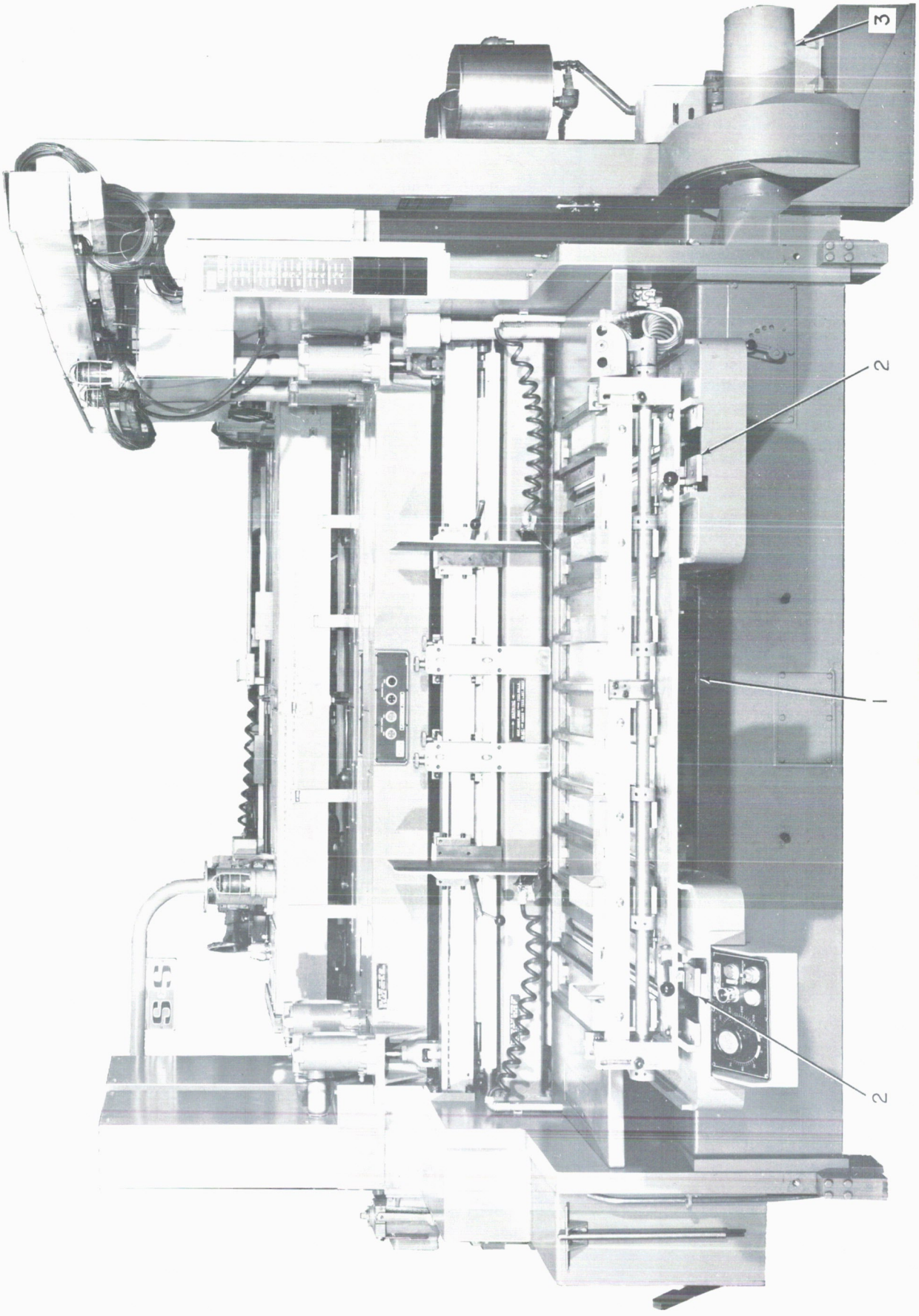


FIGURE 3-22. FEED SECTION LUBRICATION, FEED END VIEW

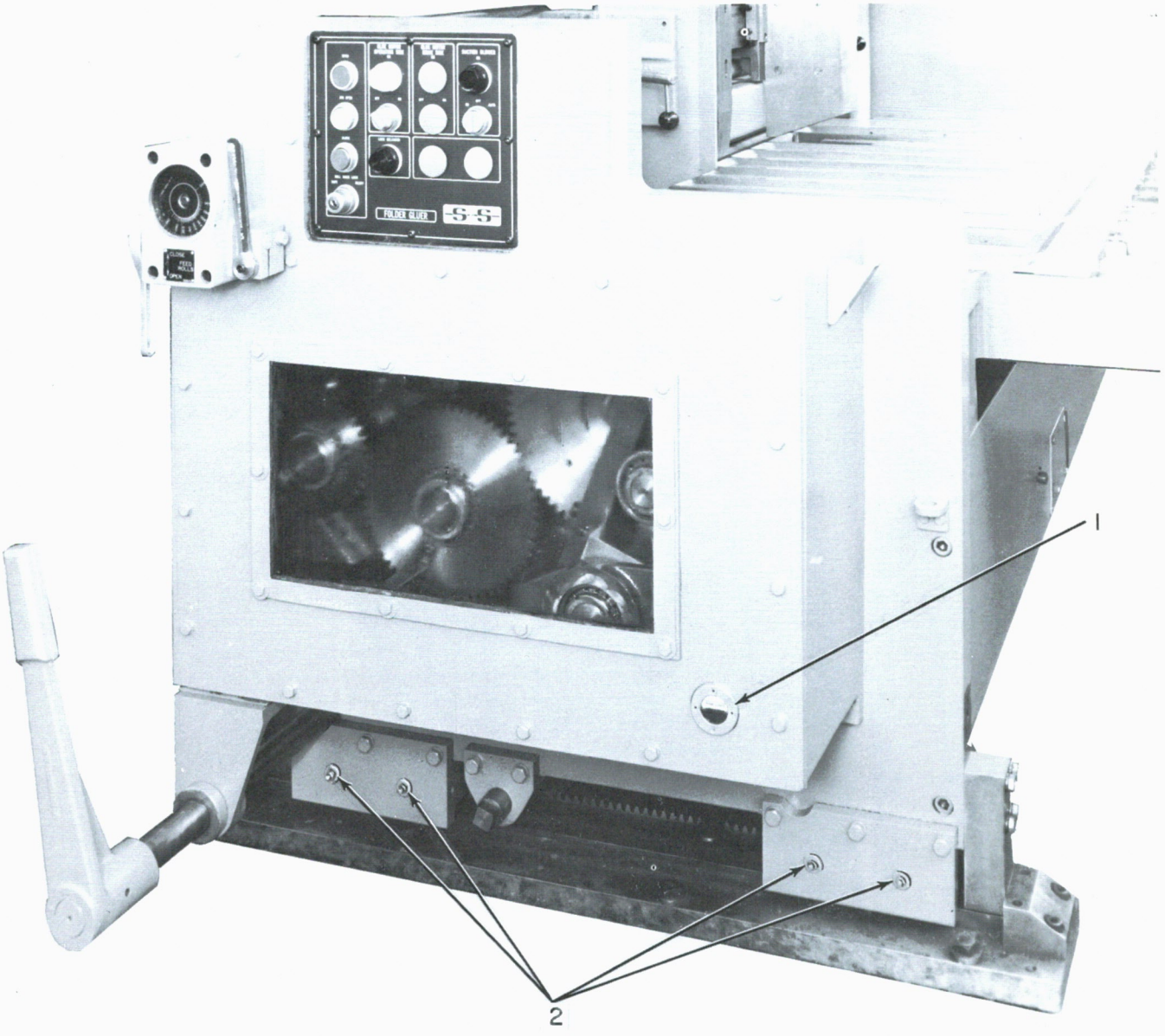


FIGURE 3-23. FEED SECTION LUBRICATION, OPERATING SIDE

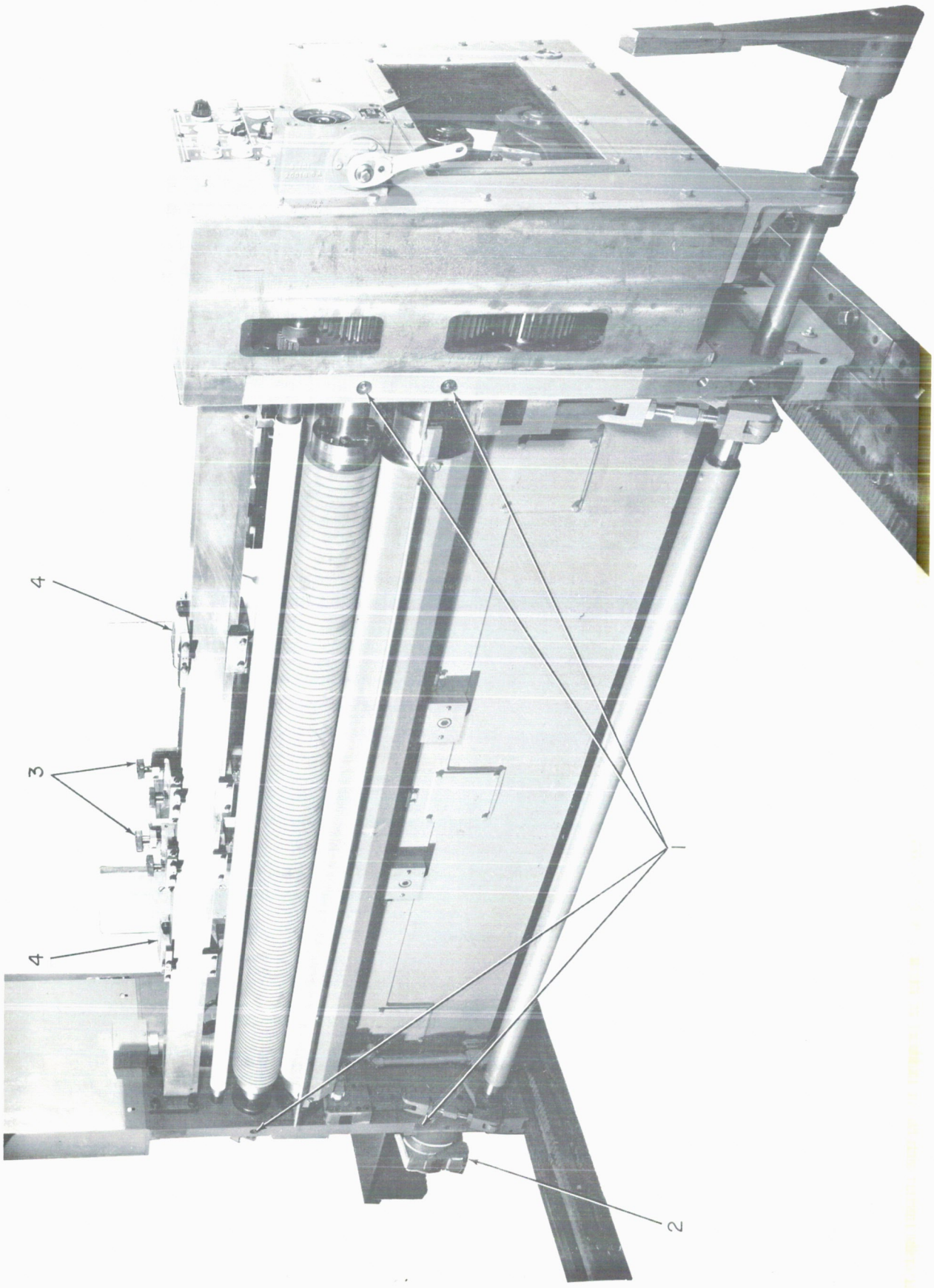


FIGURE 3-24. FEED SECTION LUBRICATION, DELIVERY END VIEW

SECTION IV.
FLEXOGRAPHIC PRINTING

A. FLEXOGRAPHIC PRINTING PLATES AND INKS

1. PRINTING PLATES

Current specifications for the manufacture of flexographic printing plates represent the consensus of industry opinion among makers of plates and flexo printers.

a. Hardness

Plates should usually be uniformly hard, 20-25 Shore A. Soft plates, about 20 Shore A, enable lighter grades of board to be run with good printing. Hard plates, 25-30 Shore A are best for light printing and half tones. Sometimes a plate may be used with varying degrees of hardness to achieve higher degree of print definition.

b. Thickness

The thickness of the plate—also called plate caliper—should be the dimension specified for the particular print cylinder diameter, usually 0.25 in. (6.4 mm) ±0.0015 in. (.038 mm) within a plate and ±0.003 in. (.076 mm) plate to plate. Height of the printing plates should be uniform throughout the plate. It is not necessary to add thickness for differences in types of printing.

c. Relief

Relief is a measure of how far the printing surface is raised above the surface of the plate. Shallow plate relief will contribute substantially to good quality printing. Shallow relief provides greater support for the elements of the printing plate, especially for fine line printing. Shallow relief also reduces the tendency of haloing and filling in.

If low relief plates are to be used on oil ink printer slotters as well as flexo printer, filling-in may occur. In such cases standard relief plates should be adhered to.

d. Materials

Plate materials are usually natural rubber or synthetic rubber of the Buna-N type. Verify plate compound from code or packing slips.

e. Bevel

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

f. Checking Plates as Received and Makeready

Plates should be checked upon receipt 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, usually furnished with the plates, can be checked for register and bleed. Plates, as well as proofs, should be carefully checked for correct reading matter. In many cases only the proof made when the plates were mounted on a curve will adequately show all defects.

For the least amount of downtime at the printing press plates should be checked for uniformity of height in the die room and built up on the backing or blanket material to meet recommended tolerances — This is called makeready.

When makeready is done at the press, the operator is required to mount the plate, run a proof, remove the plate, and build up as necessary. This procedure can be repeated several times before the plates are right.

g. Care and Storage

Careful maintenance of printing plates helps assure top quality printing and long plate life. Plates should be washed as often as practical while mounted on the machine. Washing the plate on the machine means cleaning the plate surface with a wet cloth to remove dirt, dust or other foreign matter. Foreign matter on the plate will interfere with good printing and may cause excessive plate wear.

Ink should be removed from the plate as soon as possible after a job is done—wet flexo ink is easier to remove then dry ink. Use a proper brush and plate cleaning solution then blot the plate dry. Rinse with fresh cleaner, blot and air dry.

Plates should never be laid flat in storage. Care must be taken not to allow the plates to be stepped on or otherwise left open to damage. Plates are best stored hanging from circular racks.

2. PRINTING INKS

S&S flexographic printers use only water-base flexographic ink. These water-base inks are formulated to meet specific customer requirements. Specifications involve processing conditions as well as end-product conditions.

Conditions affecting ink ingredients include: wet and dry rub resistance; resistance to heat, light and various chemical reagents; printing quality; drying rate; viscosity; color shade and strength.

Flexographic inks depend on a delicate balance of ingredients to maintain their physical characteristics and stability. For this reason never mix water-base inks produced by different manufacturers. Inks formulated by different suppliers will differ widely in their ingredients. Inks made by the same manufacturers often vary from batch to batch.

Water is the only fluid recommended for general cleaning of printing plates, ink rolls, ink pans and doctor blades.

a. Recommendation for Handling

(1) Ink Containers

Flexographic inks are packed and shipped in kits of 5-gallon capacity and in 30- and 50-gallon drums. Ink containers are specially lined to prevent any undesirable reaction between ink and metal container.

Ink returned from the press for storage should be kept in these specially lined container 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 used.

Shelf life of new ink can vary from 2 months to a year or more. Check with your ink manufacturer.

(2) Storage Area

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 close to 70° F.

Temperatures much above 70° F may affect the evaporation rate of the liquid portion of the ink, but they will not affect the runability 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.

(3) Used Ink

Used ink that has been inactive for 6 months or more, will become unfit for use and should be discarded. However, when color is not critical, small quantities of recently used ink can be mixed with other used ink. Care should be used not to mix press return ink with new ink since return ink contains contaminants from the press.

b. Ink Viscosity

Viscosity means the ability of a liquid to flow. Many factors influence the viscosity of ink, most important are temperature, water content, additives and agitation. Since viscosity is the most important ink characteristic that determines final printing result, factors that influence viscosity require careful attention.

Recommended running viscosity for S&S Flexographic Printers is 20 to 25 seconds with a #2 Zahn cup at 75° F. Temperatures more than 10 degrees below will give higher viscosity readings.

The Zahn cup should be kept clean and handled carefully. Dropping or denting the cup may damage the cup orifice and result in inaccurate readings. Water will give a reading of about 16 seconds at 75° F with a good cup.

Adding water or other fluids dilutes the ink and reduces viscosity. Mixing or agitating the ink also reduces the viscosity.

c. Press-ready Inks

Inks labeled press-ready by manufacturer need only a thorough mixing before use. Generally, fresh press-ready ink will have a #2 Zahn cup reading of 30 to 35 seconds when tested straight from the newly opened kit. Thorough premixing and agitation by the ink pump in the machine will reduce the viscosity to 20 to 25 seconds for normal running.

Since there is usually about 1 quart (about 1 liter) of wash-up water remaining in the ink system after wash-up no additional water is needed to dilute press-ready inks.

d. Non Press-ready Inks and Additives

Inks that are not press-ready, reading 40 seconds or more, will require diluting. Care should be taken to dilute only with water in small amounts unless otherwise directed by manufacturer.

The best method for diluting is to add water in 6 to 8 ounce (1/4 to 1/2 liter) amounts to a 5 gallon (19 liters) kit. Mix thoroughly after each addition of water. Do not reduce the ink below 30 seconds. Agitation in the ink pump will reduce the ink to proper running viscosity.

Caution must be used when adding material other than water (see paragraph IV.A.2.e). Check with the manufactures to determine if an additive is compatible with the ink you are using. Since flexographic inks dry by penentration, additives can alter the inks drying characteristics by lowering its ability to penetrate the board.

If there is a question whether a material is compatible, mix a small amount of ink and additive in a cup in roughly the same proportions as you would add to the kit. Let the mixture stand then observe the results.

e. Foaming

Foaming has the appearance of suds or bubbles. Since all water-base inks have the tendency to foam, most inks contain de-foaming agents. Excessive foaming, however, can be caused by several problems: dirty equipment or an obstruction in the pump lines; the system not pumping enough ink causing air to be mixed in the ink; too high or too low viscosity. These conditions should be checked before adding additional defoamer to the kit.

When defoamer is needed, use only a defoamer approved by the ink manufacturer. Add the defoamer in small amounts. Adding too much defoamer produces poor printing results or even gelling of the ink.

If there is a question about the defoamer, add a small amount of defoamer to some ink in a paper cup. Let it stand and observe the results. Incompatible ink defoamer can cause color change or gelling.

3. SUGGESTED FLEXOGRAPHIC PRINTING ACCESSORIES

Many items that should always be close at hand during operation are often overlooked. Following is a list of items that could save some unnecessary production problems.

- Plate wash table
- Plate racks for hanging
- Bin compartments for stamps and numbers
- Plate mounting accessories
- Water hoses on cord reels
- Drum of plate wash detergent
- Ink storage racks
- #2 Zahn cup
- Oil cans
- Grease gun
- Hand cleaner and towels
- Good vacuum system
- Floor squeegee and mop
- 6 in. to 12 in. throat micrometer (.001-1.000)

B. FLEXOGRAPHIC PRINTING UNIT

1. DESCRIPTION

Flexo folder-gluers may be equipped with one or more flexographic printers (Figure 4-1), each ink printing one color. Printing units are placed in series after the feed section and the units roll back toward the feed end for setup.

Each printing unit consists of the following components: printing cylinder, impression cylinder, anilox roll—also called ink roll, ink return duct, ink metering system, ink circulating system, running register, pull shafts, and proof printing system.

a. Print Cylinder (1 Figure 4-2)

The print cylinder carries the printing die and helps feed the board through the printing unit. Printing plates are mounted on the cylinder in one of the conventional plate-mounting systems. (See Section IV.B.4 for setup of various plate mountings).

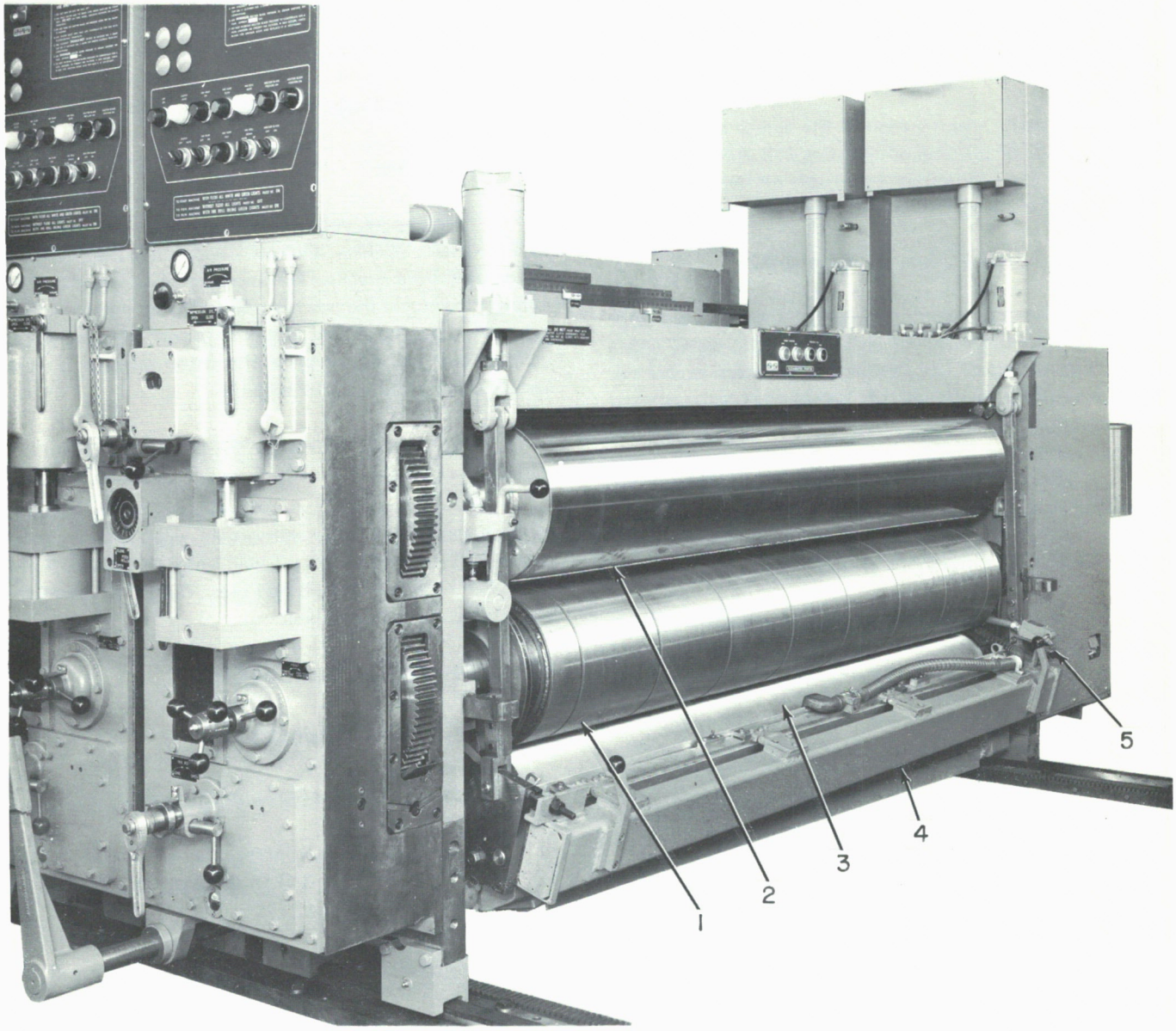
b. Impression Cylinder (2 Figure 4-2)

The impression cylinder (also called pressure roll) is located directly above the print cylinder. It imparts a light pressure on the box blank as the blank passes over the printing plate and thus assures a positive contact of the blank with the printing plate. Pneumatic components automatically raise and lower the impression cylinder as the machine stops and starts.

c. Ink (Anilox) Roll (3 Figure 4-2)

The chrome-plated steel ink roll, usually called anilox roll, is located below the print cylinder. The surface of the roll is mechanically engraved with a precisely uniform pattern of cells allowing the roll to transfer a metered amount of ink to the printing plate.

FIGURE 4-1. 701 FLEXOGRAPHIC PRINTER



1. Print cylinder
2. Impression cylinder
3. Ink (anilox) roll
4. Doctor blade assembly
5. Limit switch

FIGURE 4-2. PRINTING UNIT COMPONENTS

A pneumatic system automatically retracts the anilox roll from contact with the printing plate when the machine stops and returns the roll to operator position when the machine starts.

Careful maintenance of the anilox roll is critical to the quality of printing obtained as well as the life of the roll. Follow the instructions for proper cleaning and maintenance of the roll and roll life will stay at a maximum.

d. Ink Metering System (4 Figure 4-2)

The ink metering system consists of a doctor blade, removal blade holder and clamp, side dams, and a supporting member. The doctor blade 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 uniformly distributed pressure of the blade against the roll.

A limit switch (5 Figure 4-2) on the doctor blade assembly prevents the feed and roll back motor from closing the machine when the doctor blade is in the retracted position.

e. Ink Circulating System (Figure 4-3)

Each printing unit is equipped with an ink circulating system mounted on the drive side frame.

The ink circulating system consists of an ink reservoir; directional and outlet valves; ink pump; ink return channel; drain line and control panel. The ink system maintains a flow of ink from the reservoir to the roll and back to the reservoir. It also provides a means of for wash-up.

f. Pull Shafts (Figure 4-4)

A pair of pull shafts, mounted directly behind the printing and pressure cylinders provide support for feeding the box blank into the next machine section. Movable collars on the lower shaft must be set to avoid contact with the printed surface.

2. FLEXOGRAPHIC PRINTING PROCESS

a. Ink Circulation

Ink from the reservoir is gravity fed to the center of the ink trough formed by the ink roll and doctor blade. The ink is deposited on the ink roll as it flows along the trough toward the sides of the machine. Funnels at each end of the ink roll channel excess ink removed by the doctor blade and overflow ink into an ink return trough below the roll. The ink pump maintains continuous circulation from the ink return channel to the reservoir.

b. Printing

As the ink roll rotates, the doctor blade removes excess surface ink from the roll leaving only the ink in the anilox roll in the 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.

3. OPERATION AND ADJUSTMENT CONTROLS

The flexographic printing unit has three operation control panels—operating side panel, proof printing panel and the ink circulating pump panel. Refer to Tables 4-1, 4-2 and 4-3 for all the controls and uses. Table 4-4 lists all the adjustment controls and uses.

4. SETUP AND ADJUSTMENTS

a. Preparing to Mount Plates

Step 1) Open machine (see paragraph II.B).

Step 2) Rotate running register clutch handle (Table 4-4) to disengage the print cylinder.

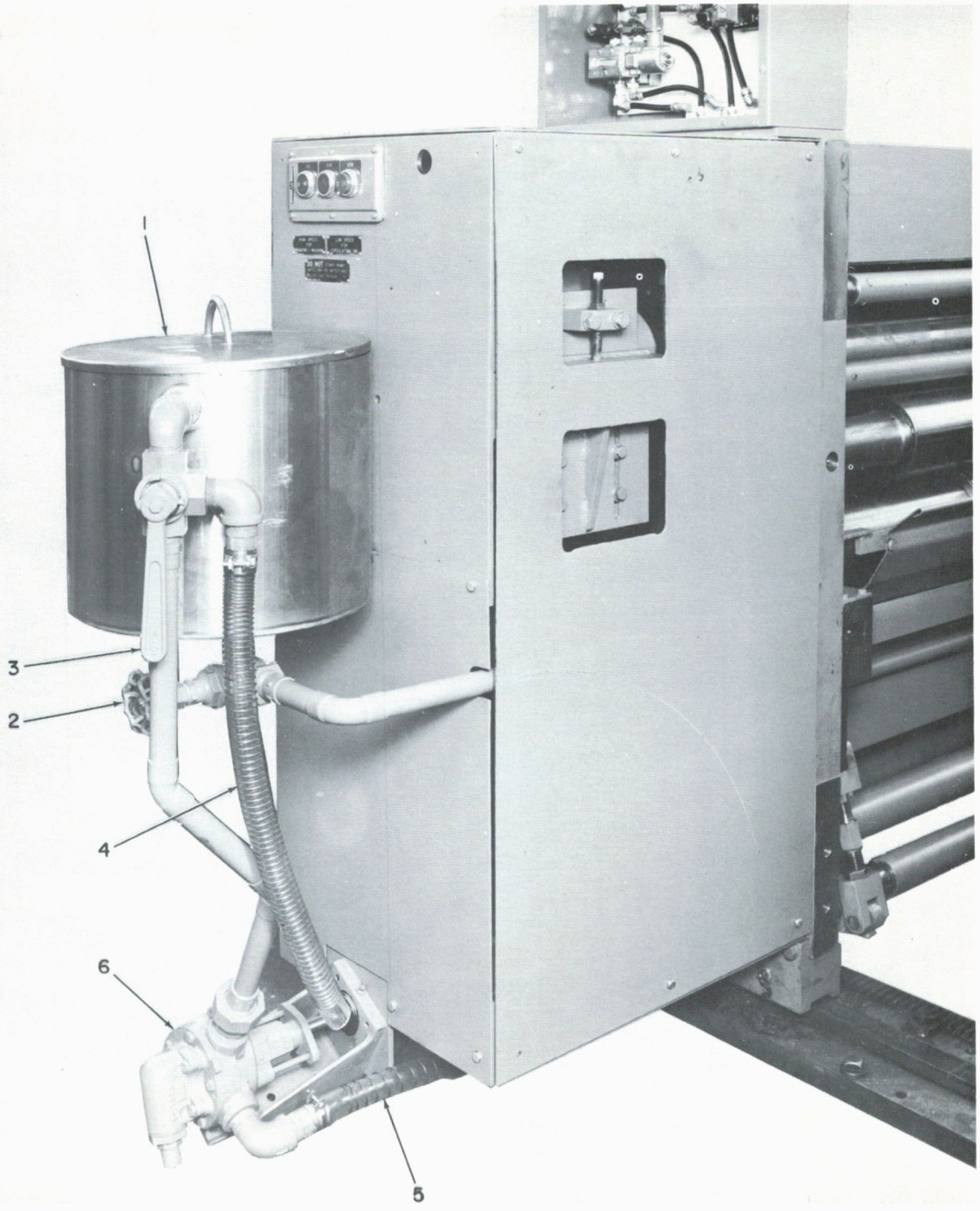
Step 3) Unlock running register (Table 4-4) and set the running register adjustment handle at zero.

Step 4) Unlock print cylinder lateral adjustment (Table 4-4) and set the lateral adjustment handle at zero.

Step 5) Lock adjustments.

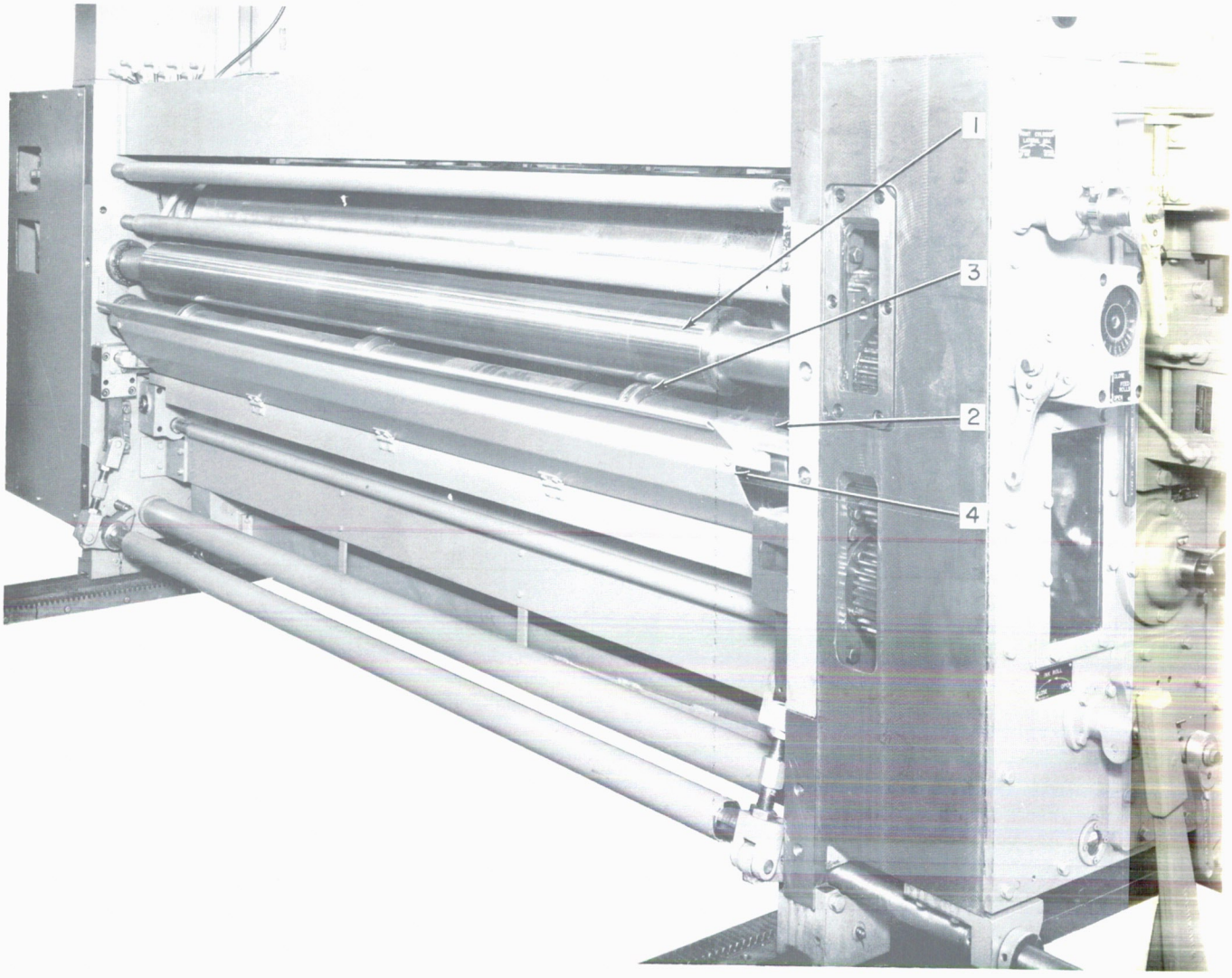
Note

Paragraphs IV. B.4.b and IV. B.4.c describe the setup procedure for two plate mounting systems: Matthews and Dorr. If the mounting system in use on your 701 is not one of these, contact S&S or the mounting system manufacturer directly for assistance.



1. Ink reservoir
2. Reservoir outlet valve
3. Directional valve lever
4. Drain hose
5. Return hose
6. Ink pump

FIGURE 4-3. INK CIRCULATING SYSTEM



1. Upper pull shaft
2. Lower pull shaft
3. Pull collar
4. Guard

FIGURE 4-4. DELIVERY END OF PRINTING UNIT

TABLE 4-1. OPERATION CONTROLS - OPERATING SIDE PANEL (FIGURE 4-5)

Selector Switches	Use
CLUTCH OFF/ AUTO	OFF position disengages ink roll from drive. AUTO position automatically engages and disengages roll when machine is running; idles roll when machine stops.
INK IDLER OFF/ ON	ON position activates idling motor to keep ink roll rotating. OFF position shuts off idler. When machine starts, the ink roll idler automatically stops.
INK ROLL AUTO/ DOWN/ UP	AUTO position automatically raises ink roll when machine starts and lowers ink roll when machine stops. UP, DOWN positions permit raising or lowering when machine is off for proof printing or checking.
DOCTOR BLADE OFF/ ON	ON position opens air supply to doctor blade air cylinders. OFF position closes air supply.
Indicators AIR ON (green)	Main air supply on when lit.
CLUTCH AUTO (white)	CLUTCH selector switch in AUTO position when lit.
INK IDLER ON (green)	INK IDLER in ON position when lit. Light goes out when machine is running.
INK PUMP SLOW (green)	Ink pump SLOW pushbutton (Table 4-3.) pushed, ink pump circulating.
INK ROLL AUTO (white)	INK ROLL selector switch in AUTO position when lit.
DOCTOR BLADE PRESSURE ON (green)	DOCTOR BLADE selector switch in ON position when lit.
DOCTOR BLADE POSITION ON (green)	DOCTOR BLADE in operating position when lit.
INK PUMP FAST (red)	Ink pump FAST pushbutton pushed (Table 4-3), pump on fast for draining or washing.
RESET BUTTONS FAST SPEED INK CIRCULATING PUMP OVERLOAD RESET	Use reset if pump motor stops due to electrical overload or in case of power failure while pump motor is on FAST (Table 4-3).
SLOW SPEED INK CIRCULATING PUMP OVERLOAD RESET	Use reset if pump motor stops due to electrical overload or in case of power failure while pump motor is on SLOW (Table 4-3).
INK IDLER STARTER OVERLOAD RESET	Use reset if idler motor stops due to electrical overload or in case of power failure.

FIGURE 4-5. OPERATING SIDE PANEL

TABLE 4-2. OPERATION CONTROLS - PROOF PRINTING PANEL (FIGURE 4-6)

Name	Use
PROOF PRINTING START (green)	Start button starts printing unit for proof printing while machine is open.
STOP (red)	Stop button stops unit.
PRESSURE ROLL UP (black)	Up button raises impression cylinder from print cylinder while machine is open.
DOWN (black)	Down button lowers cylinder for proof printing.

TABLE 4-3. OPERATION CONTROLS - INK CIRCULATING PUMP PANEL (FIGURE 4-7)

Name	Use
FAST (blue)	Starts ink pump motor fast for wash-up.
SLOW (blue)	Starts ink pump motor slow for normal ink circulation.
STOP (red)	Stops ink pump.

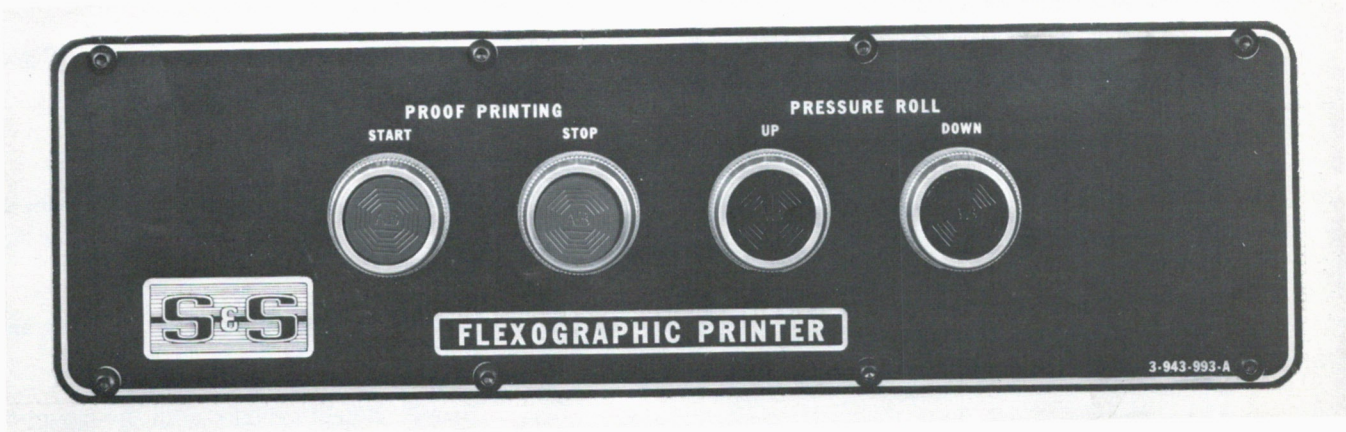


FIGURE 4-6. PROOF PRINTING PANEL

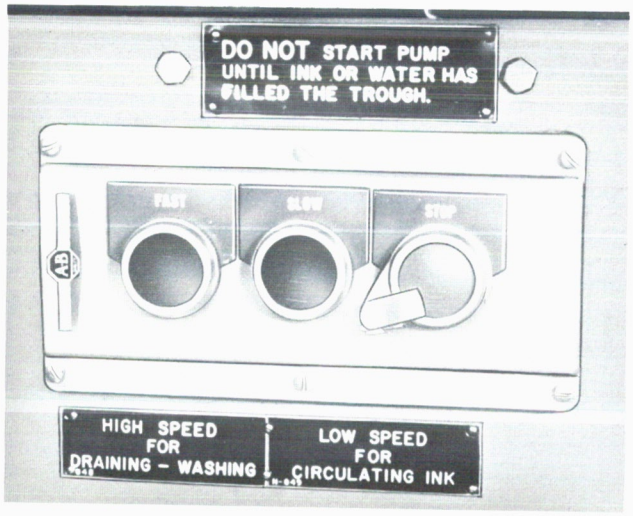


FIGURE 4-7. INK CIRCULATING PUMP PANEL

b. Mounting Plates on Dorr Rapi-Die Register System (Figure 4-10)

Dorr mounting uses a system of fixed pins and moveable pins to lock the printing die to the printing cylinder. When mounting a full-wrap blanket, use the main fixed pin bar and tightener shaft (omit steps 2, 3, 4 below). If the blanket is short use an appropriate auxiliary fixed pin bar and the main tightner shaft (use steps 2, 3, 4 below).

Step 1) Rotate the print cylinder until the fixed pin and tightner shaft are facing you.

Step 2) Rotate the print cylinder until the position of the auxiliary fixed pin bar is facing you.

Step 3) Remove lagging so that the pin bar faces you.

Step 4) Move the handle on the slide wire assembly so that the pins pop up.

Step 5) Place the grommets on the leading edge of the blanket over the fixed pins.

Note

Ensure that the centerline of both the blanket cylinder are aligned.

Step 6) Rotate the print cylinder upward, smoothing the blanket against the cylinder as it turns.

Step 7) Stop turning when the tightner shaft (the moveable pins) faces you.

Step 8) Place the grommets on the trailing edge of the blanket over the moveable pins.

Step 9) Place the special mounting tool in the hole on the operating side of the cylinder between the two rows of pins.

Step 10) Pull the tool toward you to blanket on the cylinder.

Note

As the tool is pulled toward you, the two rows of pins move toward each other. The pins remain in place when the bar is removed until they are separated to remove the blanket.

Step 11) Rotate the print cylinder until the register scale (Table 4-4) zero lines up with the indicator and reenegage the clutch.

Step 12) Rotate the entire printing unit using the handwheel until the indicator on the exposed gear (1 Figure 4-11) lines up with the zero indicator on the frame (2 Figure 4-11).

c. Mounting Plates on Matthews System (Figure 4-12, 4-13)

(1) Mounting Full Size Blankets

Matthews plate mounting uses a system of slots in the cylinder and tension straps to hold the plate and blanket to the cylinder.

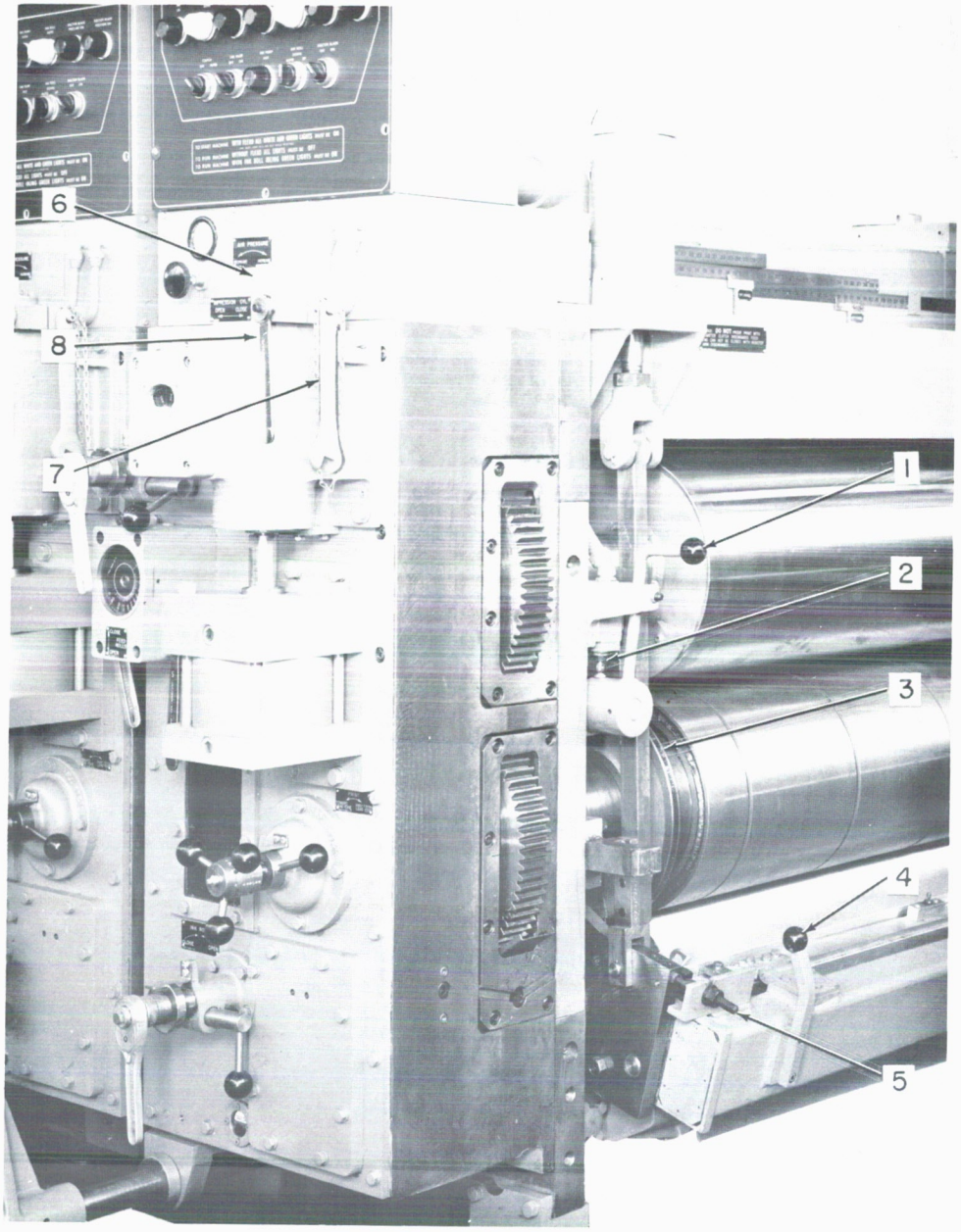
Step 1) Perform steps 1-5 in paragraph IV.B.4.a.

Step 2) Rotate cylinder until the mounting slot faces you.

Step 3) Hook the leading edge of blanket to the leading slot edge (Figure 4-12).

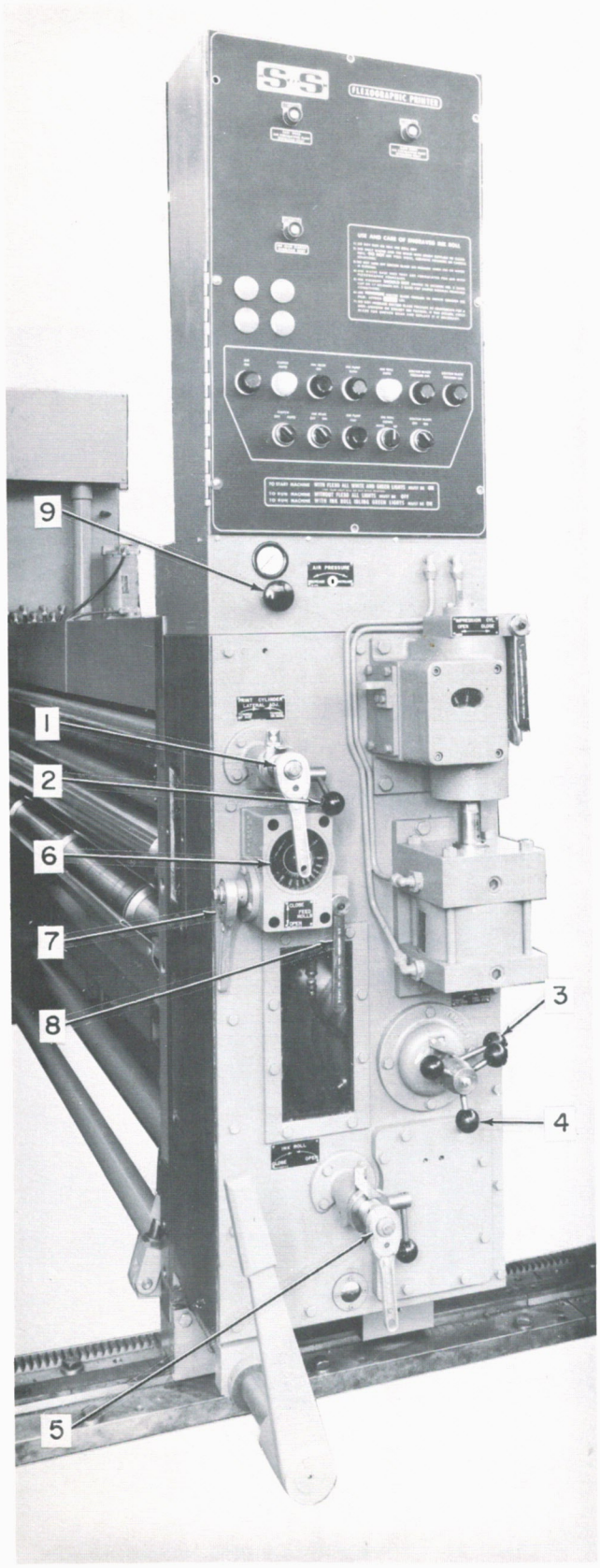
TABLE 4-4. ADJUSTMENT CONTROLS

Name	Figure No.	Location	Use
Running register clutch handle	4-8 (1)	Inside of operating side frame	Engage or disengage print cylinder drive mechanism.
Print cylinder lateral adjustment ratchet handle and lock knob	4-9 (1, 2)	Middle of operating side frame below control panel	Moves cylinder laterally to align printing with box panels.
Impression cylinder height adjustment nut, adjustment wrench and lock lever	4-8 (6, 7, 8)	Underneath operating side control panel at the top of the operating side frame	Adjusts the gap between the pressure roll and the printing cylinder
Running register adjustment handle and lock knob	4-9 (3, 4)	Middle of operating side frame	Rotates the printing cylinder during operation to adjust printing placement on blank. Maximum adjustment 3/4 in. either direction in 1/8 in. increments
Register scale and barring collar	4-8 (3)	Inside operating side frame below clutch handle	Helps register print cylinder during setup. Barring collar allows rotation of cylinder with a lever bar.
Ink roll height adjustment	4-9 (5)	Bottom of operating side frame	Raises or lowers ink roll to required contact with plates.
Dock blade positioning levers (2) and locks	4-8 (4, 5)	Attached to outside of doctor blade assembly	Manual raising or lowering of doctor blade assembly
AIR PRESSURE selector knob	4-9 (9)	Underneath operating side panel next to the impression cylinder height adjustment	Controls air pressure on the doctor blade
Directional valve lever	4-3 (3)	Drive side next to ink reservoir	Controls ink flow out of ink reservoir into printing press.
Reservoir outlet valve knob	4-3 (2)	Drive side underneath ink reservoir	Controls ink flow into reservoir.
Pull shaft caliper adjustment ratchet handle and lock lever	4-9 (6, 7, 8)	Operating side underneath print cylinder lateral adjustment	Adjusts gap between pull shafts.
Doctor blade pressure switch	4-31 (4)	Top left of air control cabinet	Controls air pressure to doctor blade pressure cylinder.
Main air supply pressure switch	4-31 (3)	Top right of air control cabinet	Controls main air supply for printing unit.



1. Running register clutch handle
2. Running register clutch limit switch
3. Running register scale and barring collar
4. Doctor blade positioning lever
5. Doctor blade positioning lock
6. Impression cylinder height adjustment nut
7. Impression cylinder height adjustment wrench
8. Impression cylinder height adjustment lock

FIGURE 4-8. PRINTING UNIT ADJUSTMENT CONTROLS



1. Print cylinder lateral adjustment ratchet handle
2. Print cylinder lateral adjustment lock lever
3. Running register adjustment handle
4. Running register adjustment lock knob
5. Ink roll height adjustment
6. Pull shaft caliper adjustment indicator
7. Pull shaft caliper adjustment ratchet handle
8. Pull shaft caliper adjustment lock lever
9. Air pressure selector lever

FIGURE 4-9. PRINTING UNIT OPERATING SIDE

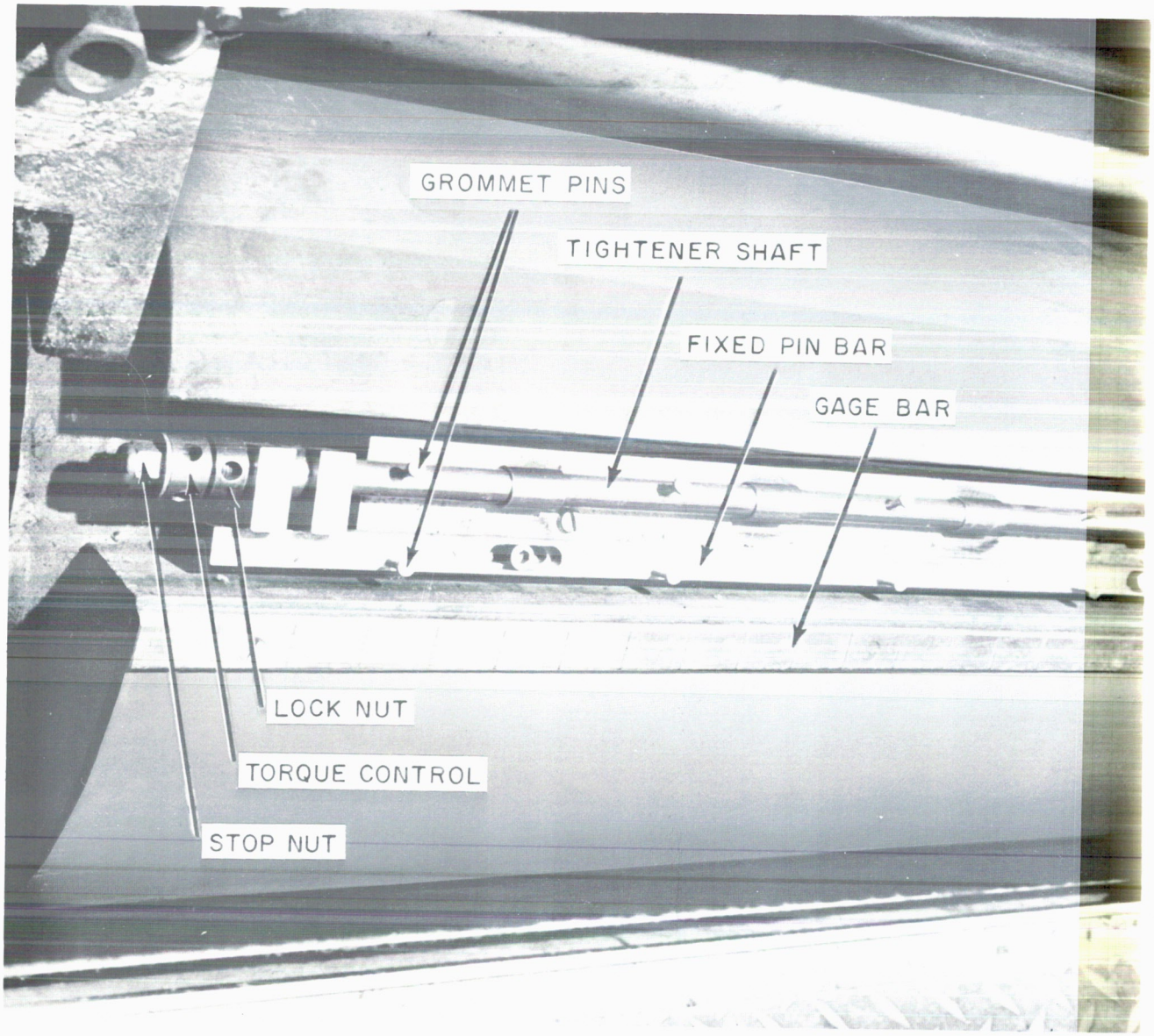
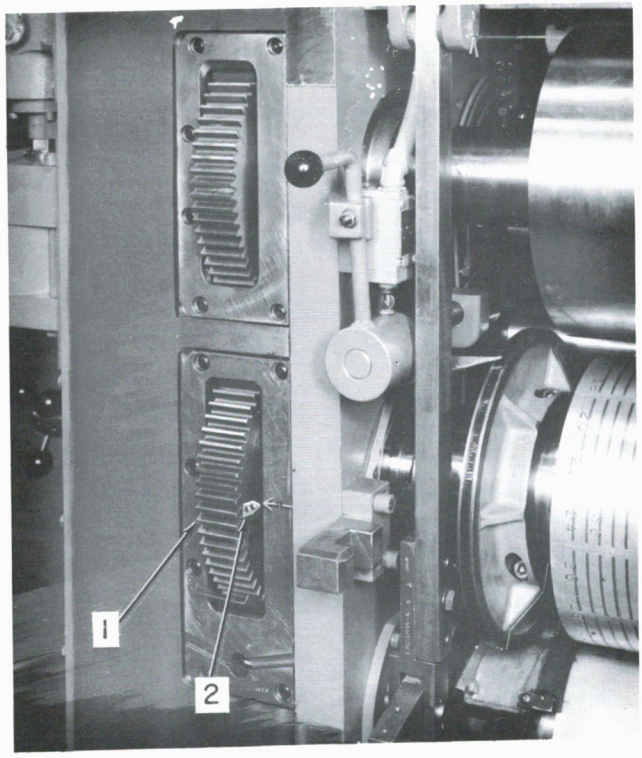
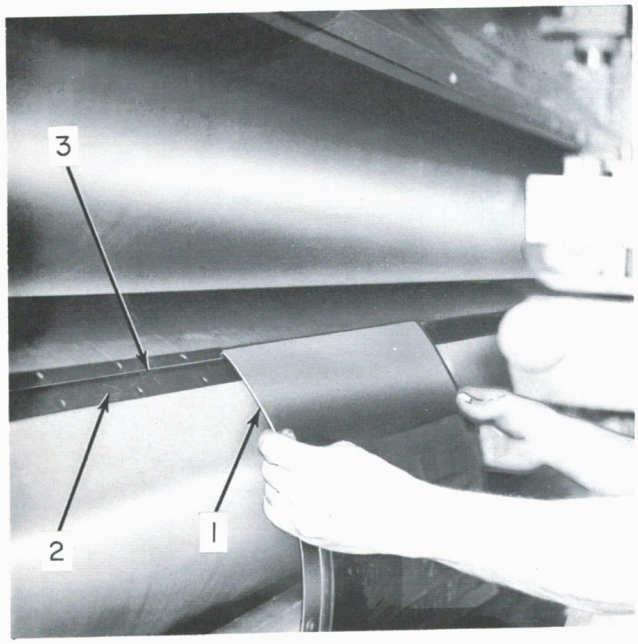


FIGURE 4-10. DORR RAPI DIE-REGISTER PLATE MOUNTING



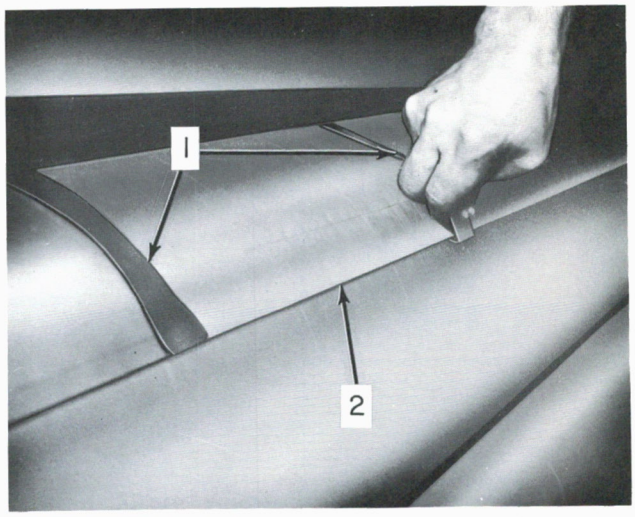
1. Exposed gear indicator
2. Zero indicator

FIGURE 4-11. PRINTING UNIT TIMING MARKS



1. Backing sheet
2. Metal strip lip
3. Machined slot

FIGURE 4-12. MATTHEWS PLATE MOUNTING



1. Tension clamps
2. Clamp strip

FIGURE 4-13. MATTHEWS TENSION CLAMP

Note

Ensure that the centerline of the blanket and cylinder are aligned.

Step 4) Rotate the print cylinder, smoothing the blanket against the cylinder, until the tension clamps (1 Figure 4-13) are in position for fastening.

Step 5) Stretch the tension clamps and secure them to the first available groove on the cylinder.

Step 6) Rotate the print cylinder for proper register and reengage the clutch.

(2) Mounting Short Blankets

When it is necessary to mount a short printing plate in order to locate the printing at the correct location, use the following procedure. (Refer to Figure 4-14).

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

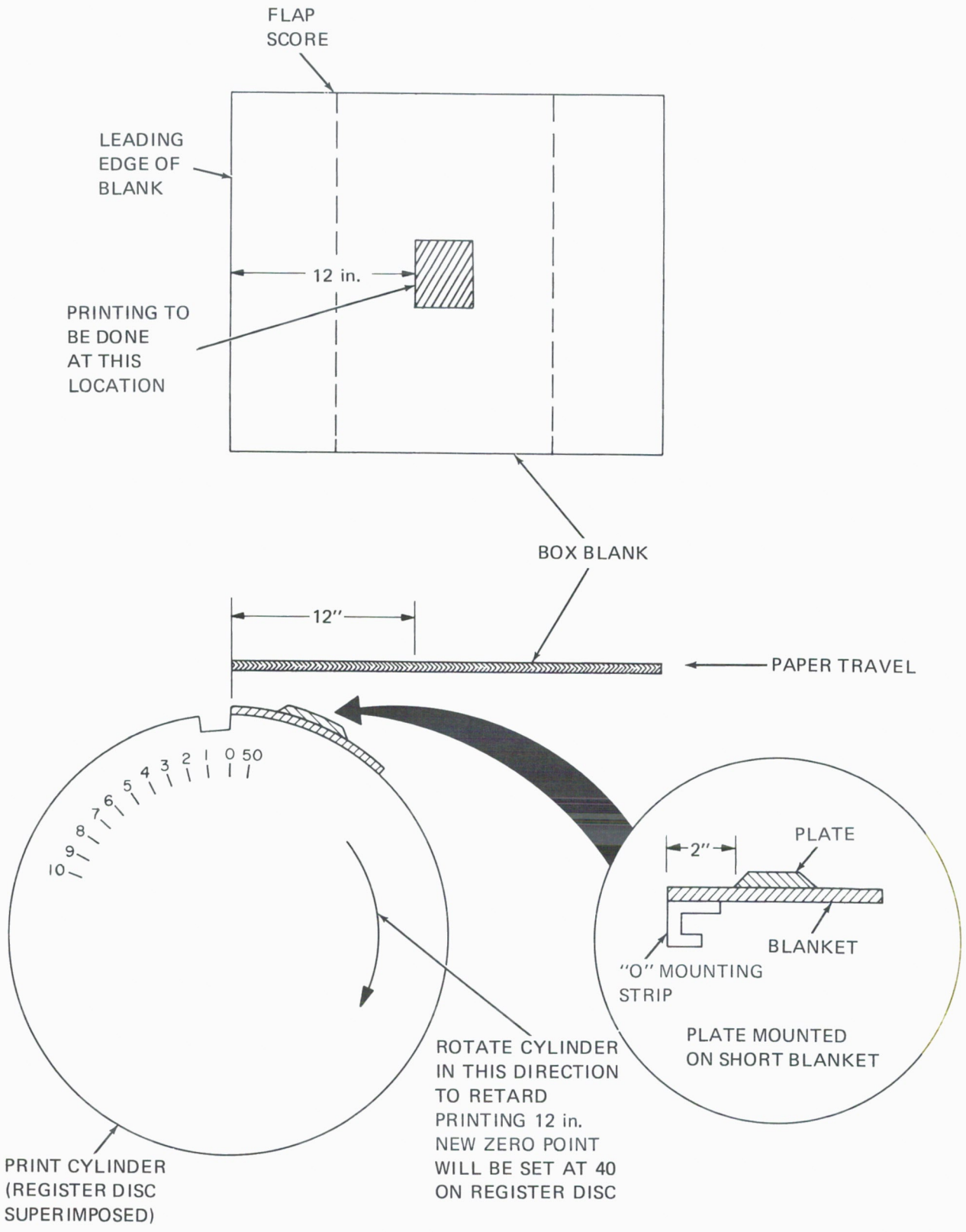


FIGURE 4-14. MOUNTING SHORT PRINTING BLANKET

Step 2) Measure the distance from the leading edge of the box blank to the leading edge of the printing area.

Step 3) Subtract the smaller dimension from the larger. The result is the amount the print cylinder must be advanced or retarded from the zero point for proper placement of the printing impression on the blank.

Step 4) Mount printing plates on the print cylinder [see steps 1-5 in paragraph IV.B.4.c(1)].

Step 5) Rotate the cylinder to the established zero point on the register scale.

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

Step 7) Reengage the print cylinder clutch.

Step 8) Rotate the entire printing unit with the barring collar until the indicator on the exposed gear aligns with the frame indicator.

d. Application and Installation of Pull Straps

The best printing results are not achieved when the printing plates are used to advance and grip the board as it passes through the printing unit. Using the plates to pull the board causes excessive contact between board and plate and accelerates printing plate wear. Pull straps should be used to do the heavy work of gripping the board allowing the plates to do precise printing.

Pull straps are attached to the printing plate blanket, print cylinder and the impression cylinder. When the machine is running short sheets, not printing, or printing in a small area, straps are important. They can be applied to the blanket in the die room or directly to the cylinder.

Even when the printing area is large and the sheet is long enough to apparently not require pull straps, it is considered good practice to use pull straps, one on the trim and one on the glue lap to support the ends of the blank.

(1) Installing Pull Straps for Printing

Step 1) Obtain pull straps from the printing plate manufacturer, or other suitable source, fabricated to the specifications in Table 4-5.

Step 2) Mount the prepared printing plate blanket on the print cylinder.

Step 3) Install straps at strategic locations on the print cylinder (See Figure 4-15).

Note

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

Step 4) Install 0.032 in. (0.810 mm) mating straps on the impression cylinder (Figure 4-15) using sticky back tape or an approved adhesive.

TABLE 4-5. INSTALLING PULL STRAPS

Operation	No. of Straps	Strap Widths	Strap Length	Strap Thickness
Printing	Two on printing plate blanket or cylinder. Mating straps on impression cylinder. Locate on trim and glue lap.	1/4 - 1/2 in. (6.4 - 12.7 mm)	As required by length of blanket	0.015 - 0.020 in. (0.38 - 0.51 mm) higher than plate height
No printing	Two or three on print cylinder. Locate on extreme sides of box within blank width.	1/4 - 1/2 in. (6.4 - 12.7 mm)	Complete circumference wrap	0.015 - 0.020 in. (0.38 - 0.51 mm) higher than a plate plus backing.

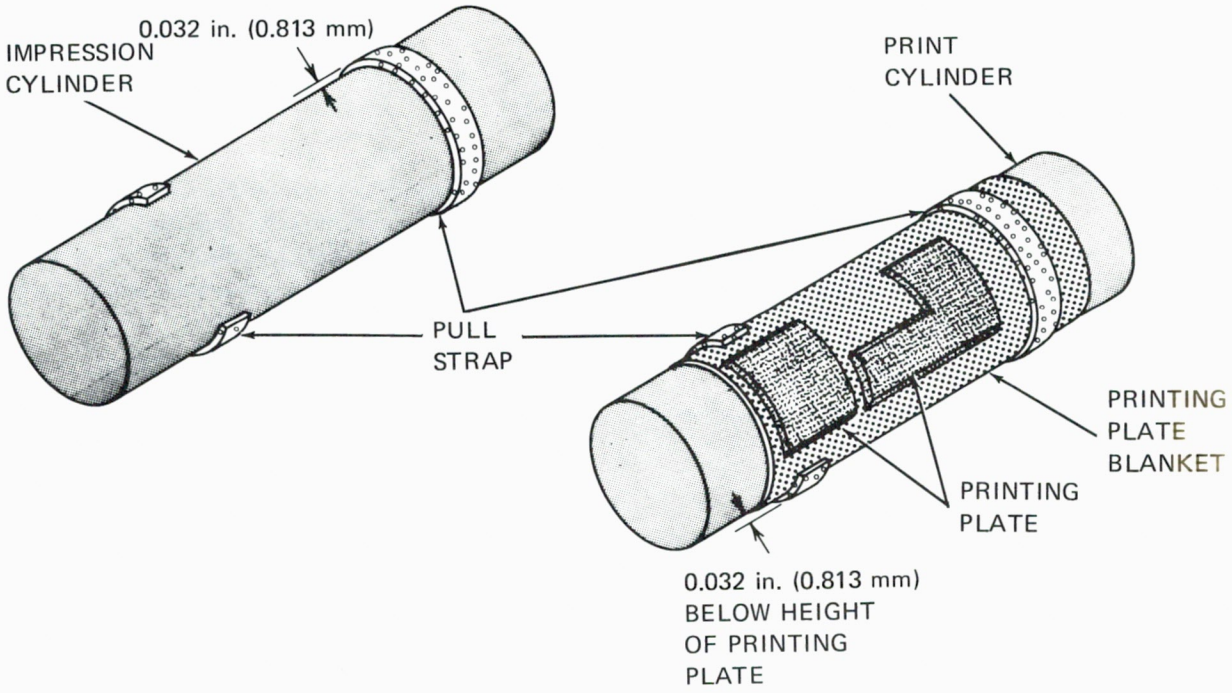


FIGURE 4-15. PULL STRAP INSTALLATION

Note

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

(2) Pull Straps for No Printing

Pull straps must be used when no printing is done. The pull strap mountings should be the same type of mounting as the print cylinder system.

Use a minimum of two straps mounted on the extreme sides of the box within the blank width.

e. Setting the Impression Cylinder

Step 1) Press the PRESSURE ROLL DOWN pushbutton (Table 4-2).

Step 2) Unlock impression cylinder height adjustment (Table 4-4) and rotate the adjustment nut with the attached wrench until the specified board caliper dimension appears on the indicator.

Step 3) Lock adjustment.

Note

After completing the adjustment, lock it. If the adjustment is not locked when the PRESSURE ROLL UP button is pushed, the impression cylinder will come up to its extreme up position and readjustment will be necessary.

Step 4) Press PRESSURE ROLL UP button (Table 4-2).

f. Setting the Anilox Roll for Printing

Step 1) Place the CLUTCH selector switch on AUTO (Table 4-1).

Step 2) Place INK ROLL selector switch on AUTO (Table 4-1).

g. Setting Doctor Blade

Step 1) Using the doctor blade positioning levers (Table 4-4), raise the doctor blade assembly to operating position.

Step 2) Lock the blade in position with positioning locks.

Step 3) Set the air pressure gauge to 28 psi using the AIR PRESSURE selector knob.

Note

When DOCTOR BLADE selector switch is turned ON, a higher air pressure may be needed to move the doctor blade. Reduce the pressure to 28 psi as soon as the blade makes contact.

h. Ink Change Procedure (Figure 4-16)

Note

If machine is clean, skip paragraph IV.B.4.h. (1).

(1) Draining and Washing

Step 1) Open side drains at both ends of ink roll.

Step 2) Place drain hose in bucket.

Step 3) Turn directional valve lever to drain position.

Step 4) Press pump motor FAST button (Table 4-3).

Step 5) Place drain hose in drain after ink is removed.

Step 6) Remove filter from reservoir and clean.

Step 7) Open fresh water valve over reservoir.

Step 8) Clean reservoir by hand as water flows in.

Step 9) Continue flushing until clean water runs from drain hose.

Step 10) Close fresh water valve.

Step 11) When all water is removed, press pump motor STOP button.

(2) Filling (Figure 4-16)

Step 1) Make sure DOCTOR BLADE and INK IDLER selector switches (Table 4-1) are ON.

Step 2) Turn ink drains at both ends of the ink roll to operating position.

Step 3) Turn directional valve to circulate.

Note

Reservoir valve knob is usually left open.

Step 4) Place clean filter in reservoir.

Step 5) Pour fresh ink into reservoir.

Step 6) When ink is flowing off the ends of the ink roll, press the pump motor SLOW button (Table 4-3).

Step 7) Place quart container under reservoir spout and fill with first liquid pumped up. Discard liquid.

Note

The initial fluid is a mixture of water and ink. It is best to discard to avoid reducing viscosity of ink.

Step 8) Place clean filter in reservoir.

i. Adjusting Pull Collars (Figure 4-4)

Step 1) Lower the guard behind the lower pull shaft.

Step 2) Loosen the collar clamp screws.

Step 3) Position the collars at a point on the shaft where they will not contact the printed area.

Step 4) Lock the clamp screws.

Step 5) Unlock the pull roll caliper adjustment and rotate the pull roll caliper adjustment handle to set the correct board caliper on the inidcator.

Step 6) Lock adjustment.

j. Control Panel Setup for Printing or No-Printing Conditions

Check all switch positions and indicator light conditions on the printing unit control panel, as shown on Figure 4-18, 4-19, 4-20 to determine if setup of the printing unit is correct for the printing condition required.

k. Proof Printing

Step 1) Open machine sections (See paragraph II.B.)

Step 2) Install printing plate blanket and ink system.

Step 3) Unlock ink roll height adjustment (Table 4-4) and rotate the ratchet handle until the indicator reads 0.010 in. (.254 mm) less than zero.

Step 4) Press and hold PROOF PRINTING START button (Table 4-2) until the cylinder starts rotating.

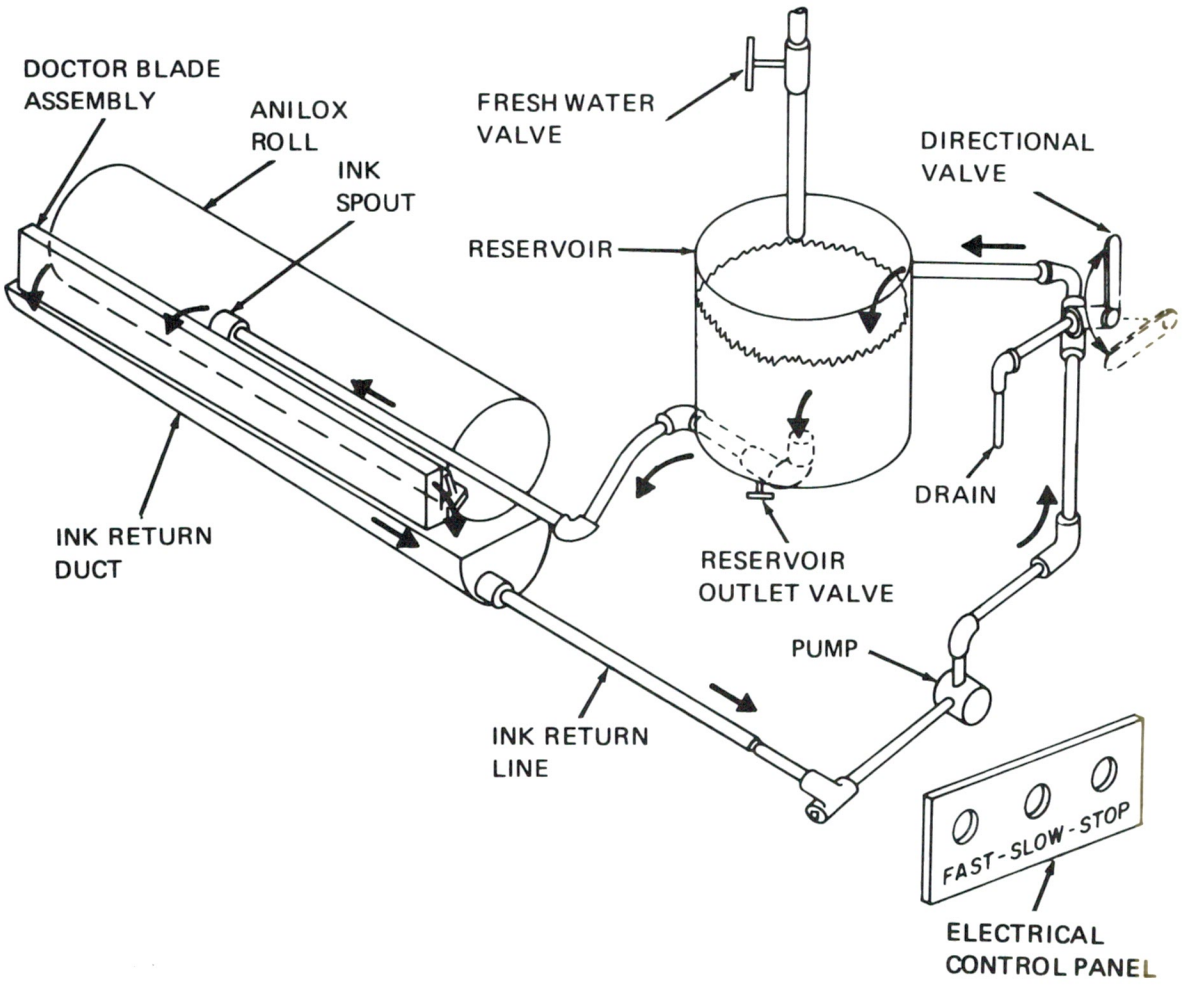
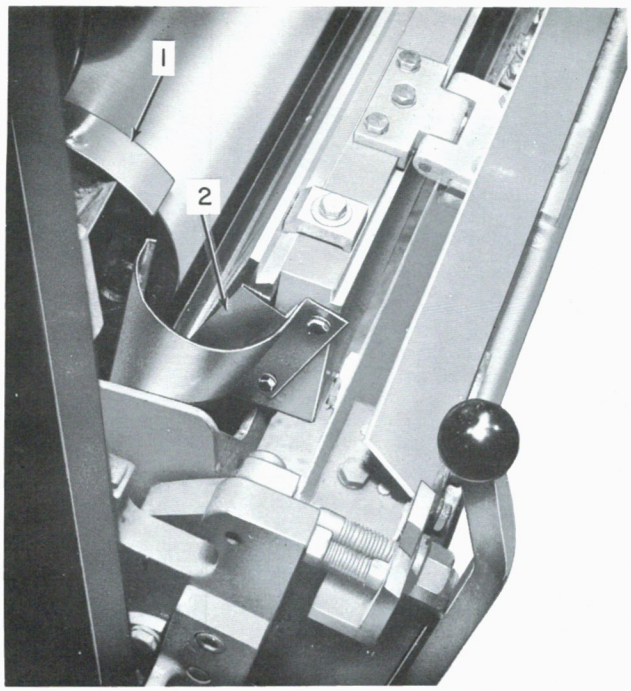


FIGURE 4-16. INK CIRCULATING SYSTEM



1. Slinger
2. Funnel

FIGURE 4-17. INK SYSTEM SLINGERS AND FUNNELS

WARNING

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

Note

When PROOF PRINTING START button is pressed, the ink roll will stop idling and go up automatically; the impression cylinder will go down automatically; ink idler motor will restart and all rolls will rotate.

Step 5) Allow the print cylinder to make two or three revolutions then press PROOF PRINTING STOP button (Table 4-2).

Step 6) Check to see that printing plates are picking up ink. If plates are not getting inked, close the gap by rotating the ink roll height adjustment until ink appears on the plate.

CAUTION

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

Step 7) Raise the ink roll one graduation, 0.005 in. (0.127 mm), toward the plates after initial contact with the plates has been made.

Note

Plates that are uniform height, not worn or cupped more than 0.005 in. (0.127 mm), should be completely covered at this point.

Step 8) Perform any necessary makeready or worn cuppled plates. Use 0.006 to 0.009 in. (.152 to .223 mm) thick paper for makeready.

Step 9) Complete makeready then lower the ink roll one graduation, 0.005 in. (0.127) from the printing plates.

Step 10) Wash the printing plates and recheck them for ink coverage by performing steps 2 through 4.

Note

Repeat makeready and check for ink coverage until proper coverage is obtained.

Step 11) Align the exposed gear indicator (Figure 4-11) with the frame indicator.

Step 12) Lock ink roll height adjustment.

I. Using the Zahn Cup (Figure 4-21)

The best Zahn cup readings are obtained at a temperature of about 75° F. If the reading is taken in a room much warmer or cooler than 75° F, a correction table should be used to make the reading more accurate.

Note

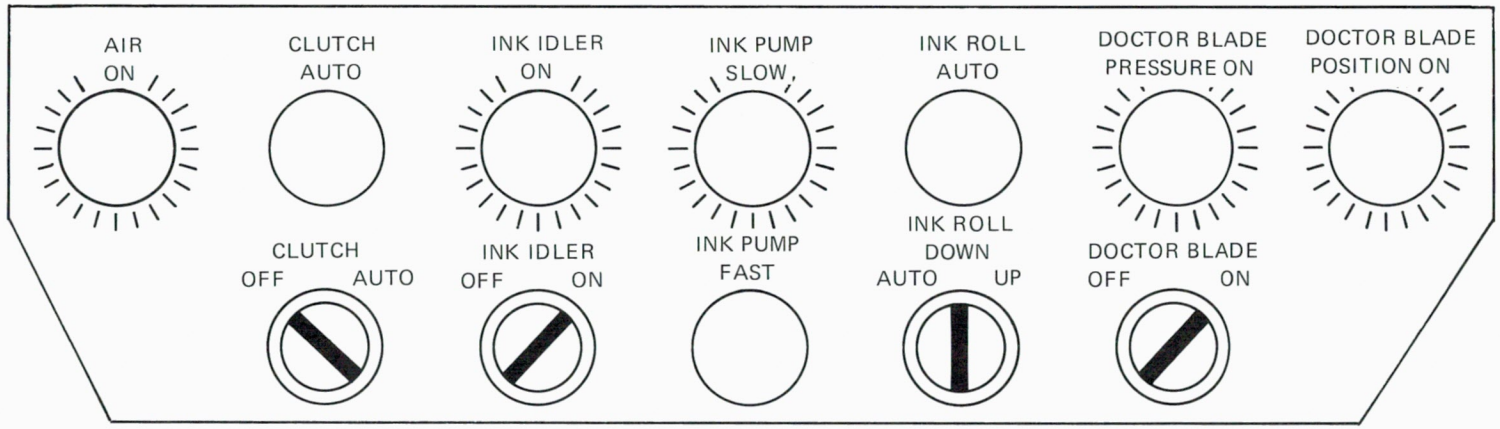
Use a stop watch for the best timing results.

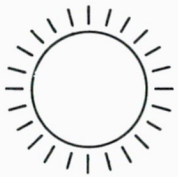
Step 1) Determine temperature of the room.

Step 2) Fill a 6 or 8 ounce paper cup with ink and let it come to room temperature.

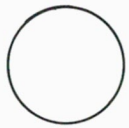
Step 3) Immerse the Zahn cup in the ink.

Step 4) Lift the Zahn cup slowly out of the ink. Start timing as soon as the cup breaks the surface of the liquid.





INDICATES LIGHT ON



INDICATES LIGHT OFF

INDICATES SELECTOR 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

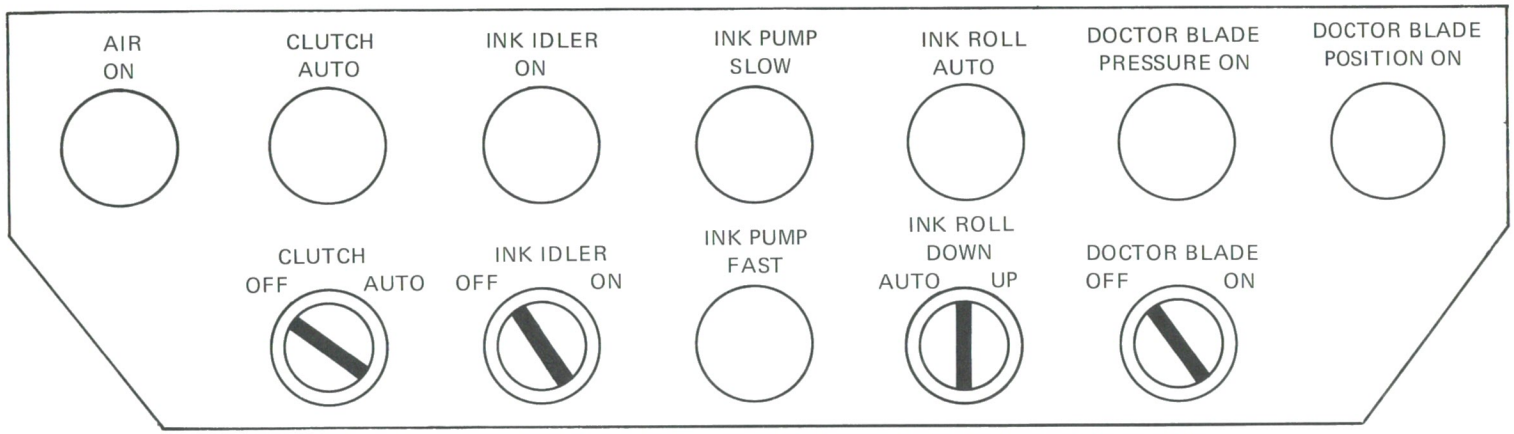
5. AIR ON – – – – GREEN LIGHT ILLUMINATED.
6. DOCTOR BLADE PRESSURE ON – – – – GREEN LIGHT ILLUMINATED.
7. INK PUMP SLOW – – – – GREEN LIGHT ILLUMINATED.

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

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

FIGURE 4-18. CONTROL PANEL SETUP FOR PRINTING



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

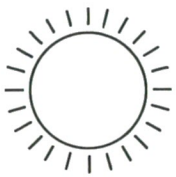
LIGHTS

5. AIR ON – – – – GREEN LIGHT OFF.

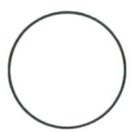
6. DOCTOR BLADE POSITION ON – – – – GREEN LIGHT OFF.

7. INK PUMP SLOW – – – – GREEN LIGHT OFF.

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



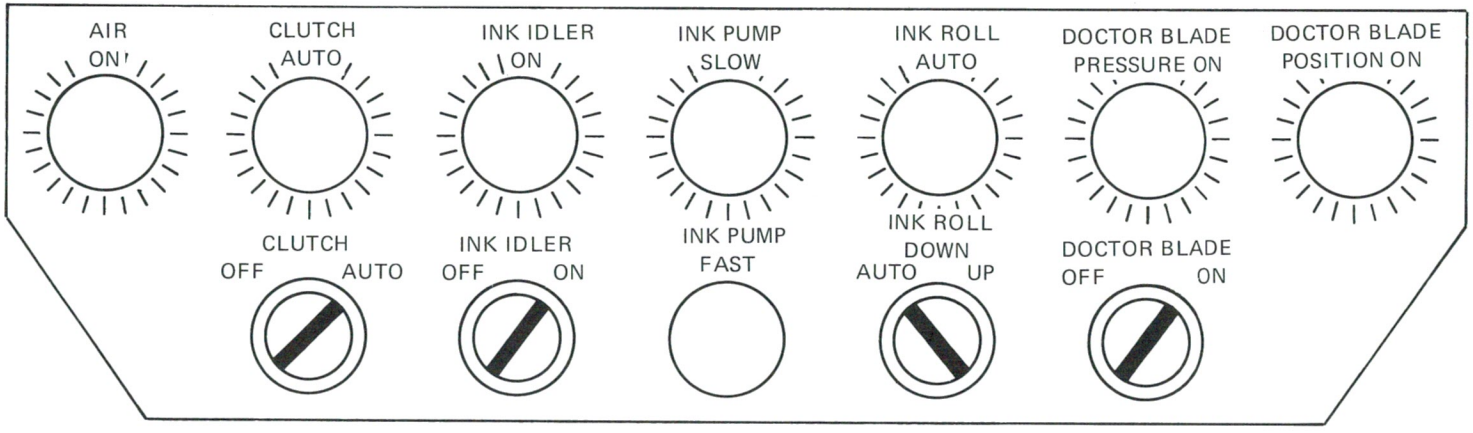
INDICATES LIGHT ON



INDICATES LIGHT OFF

INDICATES SELECTOR SWITCH

FIGURE 4-19. CONTROL PANEL SETUP FOR NO PRINTING



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

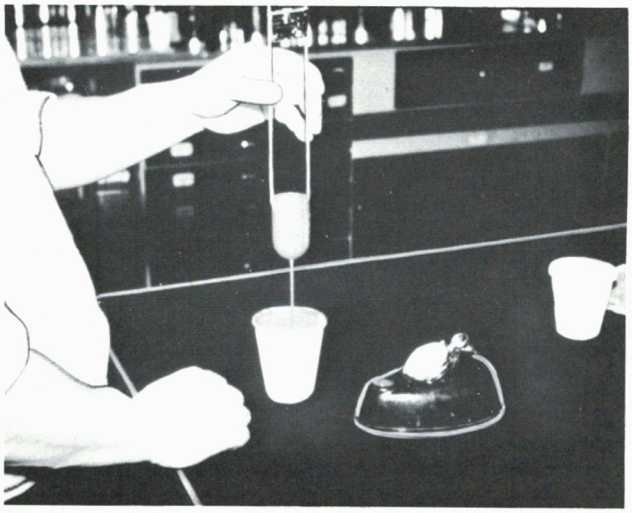
5. AIR ON – – – – GREEN LIGHT ILLUMINATED.

6. DOCTOR BLADE POSITION ON – – – – GREEN LIGHT ILLUMINATED.

7. INK PUMP SLOW – – – – GREEN LIGHT ILLUMINATED.

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

FIGURE 4-20. CONTROL PANEL SETUP FOR NO PRINTING WITH INK ROLL IDLING



BOXBOARD CONTAINERS

FIGURE 4-21. USING THE ZAHN CUP

Step 5) Stop timing when the steady flow of ink out of the Zahn cup breaks.

Step 6) Apply necessary temperature corrections to the reading.

5. PERIODIC MAINTENANCE

Use Table 4-6 as a guide for performing periodic maintenance. The table recommends inspection periods for various components on the printing section.

Note

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

CAUTION

Do not use metal tools (brass wire brush only) to clean the ink roll or doctor blade. Do not use metal tools or the wire brush to clean teflon coated parts.

Proper cleaning is the most important periodic maintenance for the flexographic press. Dried and hardened flexographic ink becomes an abrasive material that can cause ink roll wear and pump failure. Ink that accumulates on the doctor blade must be removed to prevent streaking the ink film or scratching the surface of the ink roll.

The doctor blade assembly should be thoroughly cleaned at least once in each 8-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.

Buildup of dry ink in the anilox roll cells affects the ink carrying capacity of the roll, causing a good roll to perform like a worn roll. Ink rolls should be kept wet while running, idling or cleaning and as long as the doctor blade is in position against the roll. Constant wetting keeps ink from drying on the roll and protects the blade and roll from friction and heat wear. For best results spray and brush the roll after each color change with S&S Flexoff or comparable cleaner.

Note

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

a. Daily Cleanup Procedure

CAUTION

Do not use metal tools to clean ink roll or doctor blade.

Do not use metal tools or brass 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.

Step 1) Complete normal washup (See paragraph IV.B.4.h.(1)) then turn INK IDLER selector switch (Table 4-1) to OFF.

Step 2) Turn DOCTOR BLADE (Table 4-1) switch to OFF.

Step 3) Loosen doctor blade positioning lock (Figure 4-22) at each end of the doctor blade assembly and lower doctor blade assembly.

TABLE 4-6. PERIODIC INSPECTION

Component	Inspection period	Remarks
Ink trough baffle	Daily	Clean the baffle 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. (See paragraph IV.B.6.C).
Ink roll	Daily	Clean roll using S&S Flexoff and a brass wire brush.
	Six months	Check roll for wear by copper sulphate test. Replace roll if worn.
Air line lubricator	Daily	Empty water trap and refill reservoir.
Locks	Monthly	Check the lock for wear and tightness. Replace worn parts and tighten as necessary.

Step 4) Loosen the baffle wing nuts and remove baffle.

Step 5) Clean baffle with nylon brush and S&S Flexoff. Wipe clean, dry, lay aside.

Step 6) Clean both sides of doctor blade with S&S Flexoff and soft rags. Remove all dried ink.

Step 7) Replace baffle and tighten wing nuts.

Step 8) Raise blade assembly to operating position and tighten the positioning locks.

Step 9) Turn DOCTOR BLADE and INK IDLER to ON.

Step 10) Pour two quarts of S&S Flexoff into ink reservoir and fill reservoir halfway with water.

Step 11) Rotate directional valve (Table 4-4) to vertical position to circulate.

Step 12) Press pump motor SLOW button (Table 4-3) allow circulation for 10-15 minutes.

Step 13) Scrub anilox roll thoroughly using a brass wire brush.

Step 14) Turn directional valve horizontally to drain cleaning solution.

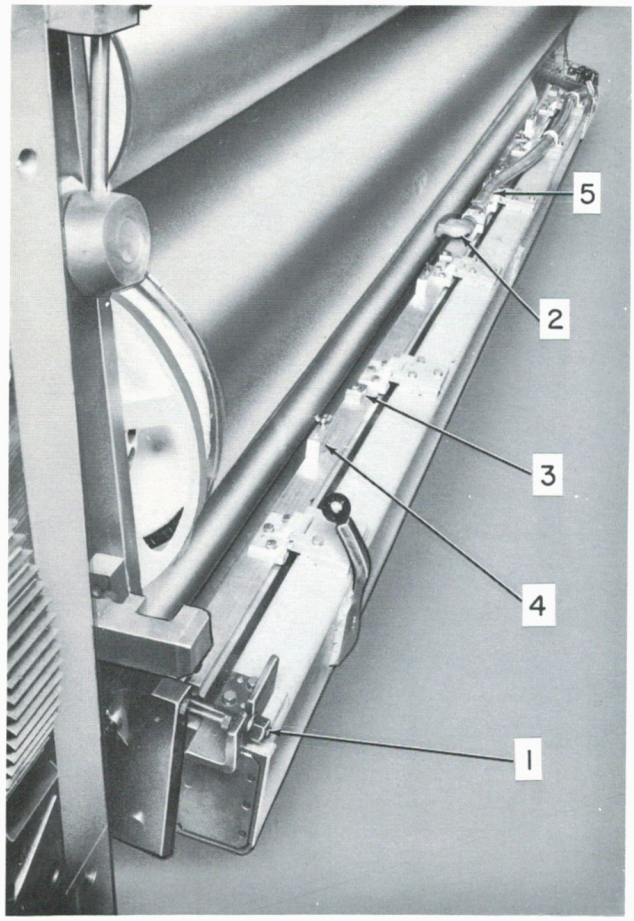
Step 15) Remove reservoir filter and clean.

Step 16) Place a fresh water hose in reservoir and flush entire system.

Step 17) Shut off water when flushing completed. Press pump STOP button when water stops draining, dry roll and doctor blade, turn INK IDLER to OFF.

Note

To resume production follow ink change procedure in paragraph IV.B.4.h.



1. Doctor blade positioning lock
2. Ink spout
3. Blade holder clamps
4. Baffle wing nuts
5. Plastic ink hose

FIGURE 4-22. REPLACING THE DOCTOR BLADE

b. Weekly Cleanup Procedure (Figure 4-22, 4-23, 4-24)

Step 1) Loosen doctor blade positioning lock (Figure 4-22) at the ends of the blade assembly and rotate the blade assembly away from the ink roll.

Step 2) Pivot the ink spout (2 Figure 4-22) back.

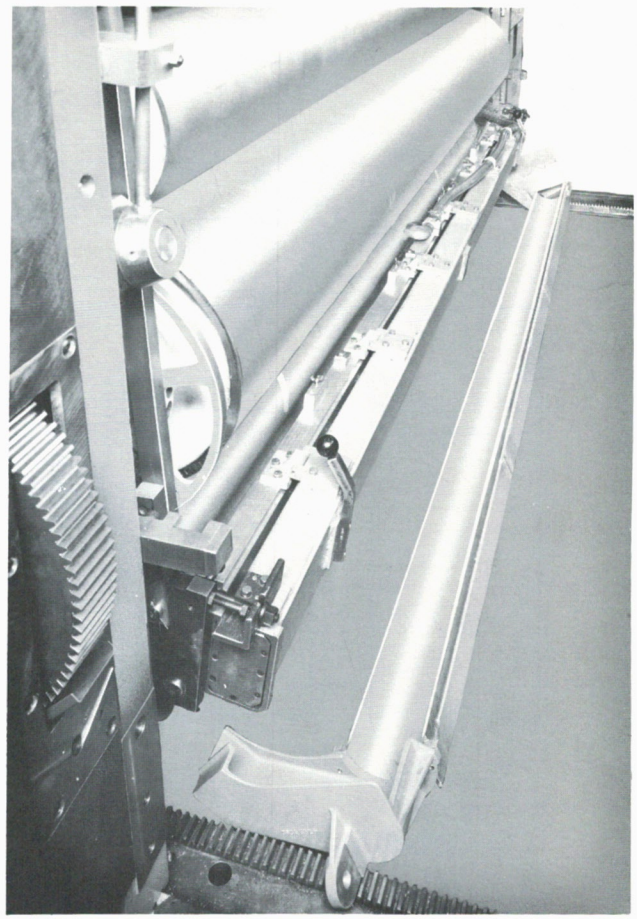


FIGURE 4-23. REMOVING THE INK TROUGH

Step 3) Loosen baffle wing nuts (4 Figure 4-22) and remove baffle.

Step 4) Loosen blade holder clamps (3 Figure 4-22) and rotate them 90°.

Step 5) Oil the blade holder hinges to insure the holder moves freely.

Step 6) Remove blade holder assembly.

Step 7) Clean the holder and blade using S&S Flexoff and nylon brush. Flush and dry.

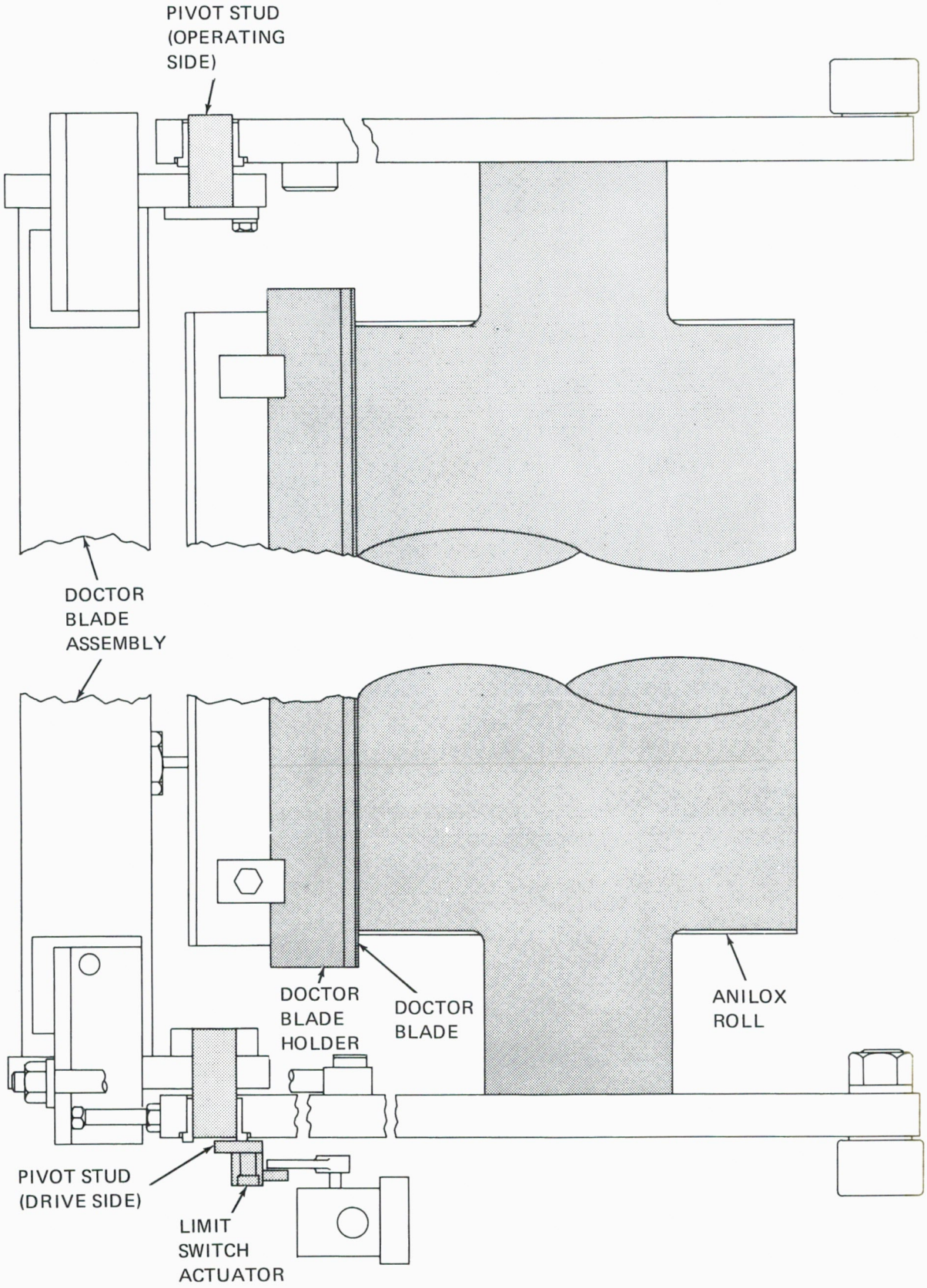


FIGURE 4-24. REMOVING DOCTOR BLADE ASSEMBLY

Step 8) Inspect blade for nicks or cuts on the edge, excessive wear, uneven wear (See paragraph IV.B.6.a and IV.B.6.b).

Note

The blade must be replaced whenever blade damage affects printing.

Step 9) Remove and clean ink roll end slingers and funnels (1, 2 Figure 4-17) using nylon brush or soft rags.

Step 10) Disconnect the plastic ink hose (5 Figure 4-22) from the ink trough on the drive side of the machine.

Step 11) Loosen the trough locking bolts (Figure 4-23) at both ends of the trough, remove and clean thoroughly.

Step 12) Reinstall trough, connect plastic hose, reinstall funnels, slingers, baffle and blade holder assembly.

Step 13) Raise the blade assembly to the operating position and tighten the swing nut bolts.

Step 14) Follow steps 9 through 17 in paragraph IV.B.5.a.

6. PREVENTIVE MAINTENANCE

a. Unevenly Worn Doctor Blade

The plastic doctor blade contacts the anilox roll surface at a recommended pressure of 28 to 30 psi. Slight bending occurs in the part of the blade extended beyond the holder. This bending should be uniform, causing an even bevel to develop. Increasing the blade air pressure changes the contact between the roll and blade, resulting in a new bevel. If the blade contact angle is changed frequently by increasing decreasing the air pressure, the blade edge becomes faceted and poor ink film will result. When this happens, the blade must be changed.

b. Nicked or Cut Doctor Blade

Since the doctor blade is made of relatively soft plastic, it should be cleaned with soft utensils. Nicks in the doctor blade can scratch the anilox roll and decrease roll life. If the nick is not too deep, it may be smoothed with fine emery paper or honing stone as an emergency measure. Badly nicked blades must be replaced immediately.

c. Doctor Blade Replacement (Figure 4-22, 4-24)

Step 1) Follow steps 1 through 6 in paragraph IV.B.5.b.

Step 2) Remove blade clamp attaching screws (3 Figure 4-22) and remove the blade.

Step 3) Clean the clamp and holder throughly using S&S Flexoff and a nylon brush. Flush and dry.

Step 4) Place clean blade clamp on the holder and hold it in position with a few clamp locking screws.

Note

Leave clamp loose enough so a new blade can be inserted.

Step 5) Insert new blade, curl down so that the concave edge (identified by bevel cuts) will be against the anilox roll with the blade ends extending equally over both ends of the holder.

CAUTION

Handle the blade carefully. The soft plastic can be damaged easily.

Step 6) Finger tighten the center clamp locking screw end two additional screws on both sides of center.

Step 7) Pull the blade at the center screw so that it extends more than 17/32 in. (13.5 mm) out from the blade holder.

Step 8) Place the blade setting gauge (Figure 4-25) on the blade edge and push the blade into the holder until the banked face of the gauge rests against the blade holder and the blade rests against the gauge.

Step 9) Tighten center screw sufficiently to hold blade in position.

Note

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

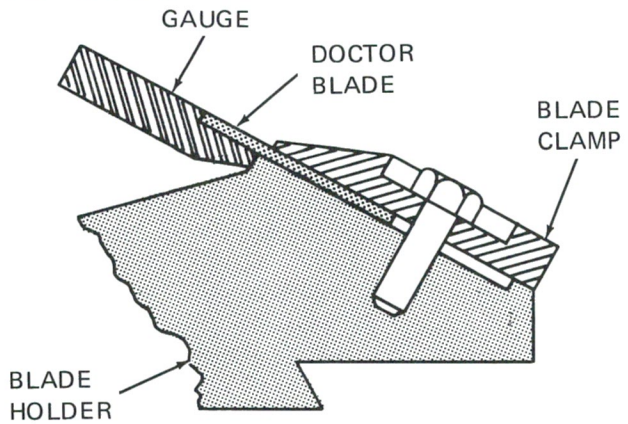


FIGURE 4-25. SETTING DOCTOR BLADE

Step 10) Repeat steps 7-9 for each screw location alternating each side of center.

Step 11) Using a 6 in. (150 mm) scale set against the blade holder, observe the blade edge readings along the entire length of the blade. Variations of more than 1/32 in. (0.8 mm) over or under the mean measurement, at any point along the length of the blade must be corrected by resetting the blade.

Step 12) Reinstall the blade holder assembly and secure it in position with blade holder clamps.

Step 13) Reinstall the baffle and tighten the wing nuts.

Step 14) Pivot the ink spout into position.

d. Care of the Anilox Roll

(1) Handling the Roll

The anilox roll is the heart of the ink system and must be handled with extreme care to avoid damaging the engraving. Observing the following rules will increase the service life of the roll.

CAUTION

- Never run or idle the roll dry with air pressure applied to the doctor blade.
- Do not use corrosive or abrasive materials for cleaning.
- Keep the doctor blade pressure at a minimum.
- Change the doctor blade when required.
- Keep the blade and ink system free from dried ink.
- Use ink that contains the least possible abrasives and is guaranteed to contain nothing that will attack chrome plating.
- Check all printing plate blankets for weak, loose or protruding grommets, straps and staples that could groove or scratch the anilox roll.
- Use care when removing staples from polyurethane covered cylinders.

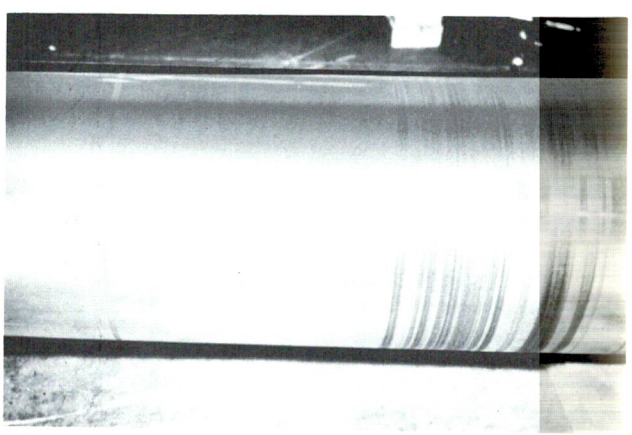
(2) Grooves in the Anilox Roll (Figure 4-26)

A groove in the anilox roll is a rut or channel cut into the roll surface. The depth of a groove can be measured while a surface scratch cannot. Grooves cause heavy streaks of ink to be carried to the printing plates, flooding the plates and causing excessive inking on the box. Deep grooves may require the roll to be replaced.

Surface scratches in the roll may become grooves if the scratch is caused by metal bits in the ink trough, nicks on the doctor blade or dried ink on the doctor blade. Surface scratches also mean some of the chrome plating (see paragraph IV.B.6.e) is gone from that spot and rusting may occur.

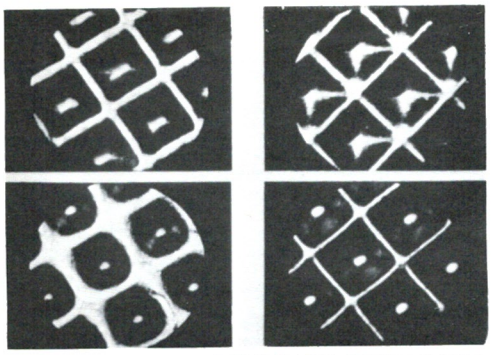
e. Checking the Ink Roll for Wear (Figure 4-27)

The anilox roll is considered worn when the transfer of ink to the printing plates is insufficient to obtain satisfactory color and coverage on the box. Light inking is



BOXBOARD CONTAINERS

FIGURE 4-26. GROOVES IN THE ANILOX ROLL



BOXBOARD CONTAINERS

FIGURE 4-27. FOUR ANILOX CELLS ENLARGED 600 TIMES, COUNTERCLOCKWISE FROM TOP LEFT: NEW ANILOX CELL; SMALL AMOUNT OF WEAR; MORE WEAR; EXCESSIVE WEAR

very noticeable on solid areas of coverage on the box. Reds appear pink, blues are lighter and blacks are washed out.

Poor color and coverage can also be caused by worn printing plates mounted on the same blanket as plates of proper height. To check if the problem is in the plate increase the contact between the anilox roll and the printing cylinder until all plates are euqally covered with ink. Run several boxes through the machine and observe the printing. Plates of proper height will display a squeezeout imprint while the worn plates will print properly. If the printing plates are faulty, perform the necessary makeready or discard the plates. If all the plates display squeezeout impression, however, then the anilox is probably worn and needs replacement.

Another symptom of worn anilox roll is the appearance of copper on the surface due to wearing away of the chrome plating. The appearance of copper should be verified by a copper sulphate test. If the test proves positive, the roll is worn and needs replacement.

f. Copper Sulphate Test for Anilox Roll Wear

Step 1) Prepare a saturated solution of copper sulphate by adding about 3 tablespoons of copper sulphate crystals, a little at a time, to 1/2 pint water. Stir the solution slowly until the crystals no longer dissolve.

Step 2) Apply the solution with a brush to small areas across the roll.

Step 3) Observe the results. If the areas where the solution was applied turn copper color the roll needs replating.

Step 4) Remove the copper sulphate solution from the roll surface as soon as you have finished the test.

g. Replacing the Anilox Roll (Figure 4-24, 4-28 through 4-30)

Step 1) Remove ink baffle, end slinger, funnels, trough and doctor blade holder.

Step 2) Place wooden blocks underneath the doctor blade air manifold assembly.

Step 3) Remove the manifold assembly pivot stud (Figure 4-24) on the operating side of the machine.

Step 4) Disconnect the linkage to the drive side air cylinder, at the cylinder. (Figure 4-28).

Step 5) Disconnect and remove the drive side ink wiper plate (Figure 4-29).

Step 6) 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.

Step 7) Mark the position of the two drive side eccentric gibs and remove the gibs and shims.

Step 8) Turn ink roll CLUTCH switch to AUTO.

Note

Turning the clutch on prevents the roll from rotating.

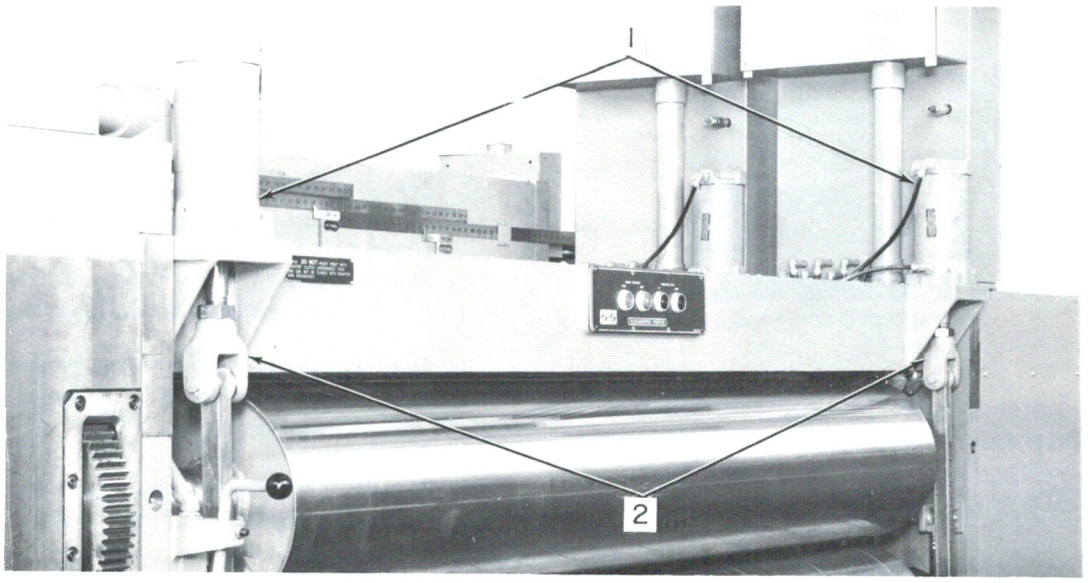
Step 9) Place wooden blocks beneath the operating and drive sides of the ink roll.

Step 10) Block up the ink idler motor using two by fours across the angles of the ink circulating housing.

Step 11) Remove the ink roll trunnion attaching screws (Figure 4-30) on the drive and operating sides of the ink roll.

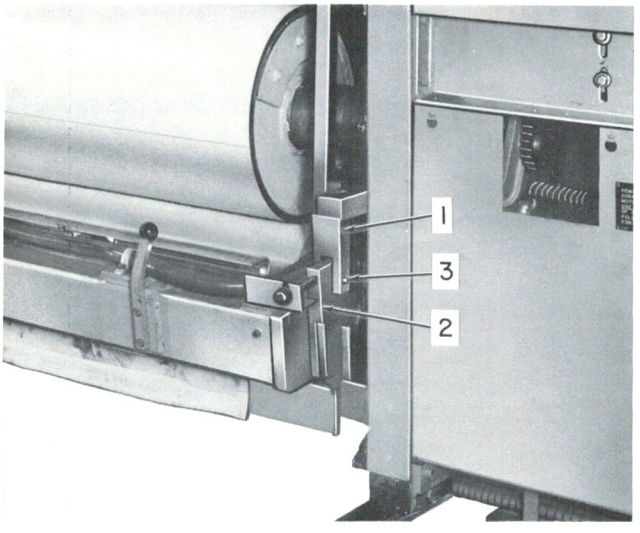
CAUTION

The sockets of the screws will contain dried and hardened ink. Dried 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.



1. Pneumatic cylinders
2. Cylinder linkage

FIGURE 4-28. PNEUMATIC CYLINDERS



1. Link
2. Ink wiper plate
3. Clevis pin

FIGURE 4-29. DISCONNECTING PNEUMATIC CYLINDER LINKAGE

Step 12) Insert 1/2 - 13 x 3 - 1/2 in. long square head set screws into the jacking holes of the drive side trunnion.

Note

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

Step 13) Turn the jackscrews in. This will push the drive side trunnion and all parts connected to it toward the drive side. Use the jade screws until the trunnion flange and pilot are separated from the roll. Pry at convenient points until the trunnion pilot diameter is 4-1/2 in. (114.3 mm) from the roll face.

CAUTION

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

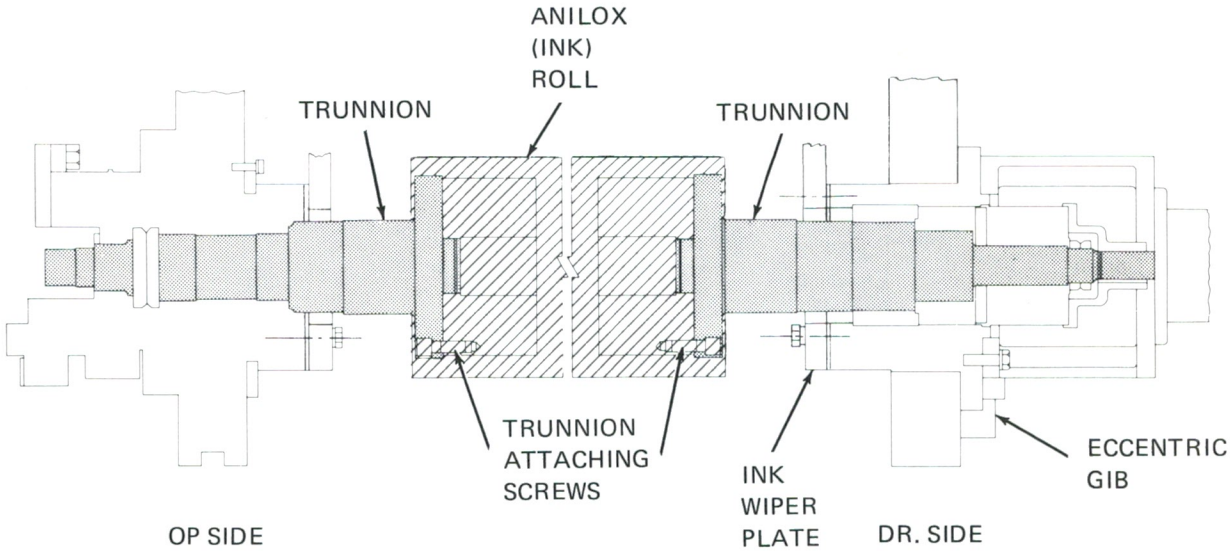


FIGURE 4-30. INK ROLL REPLACEMENT

Step 14) Insert 1/2 - 13 x 3-1/2 in. jackscrews in the operating side trunnion and push the ink roll off the trunnion.

Step 15) Place a sling around the roll and remove it from the machine.

Step 16) Install the new roll by reversing steps 1-15.

Step 17) Readjust ink roll height adjustment.

Note

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

Note

Fill socket heads with grease to prevent ink accumulation.

h. Checking and Adjusting Pressure Switch Setting

(1) Doctor Blade Pressure Switch (Figure 4-31, 4-32)

Step 1) Rotate the doctor blade AIR PRESSURE adjustment knob (Table 4-4) until the operating side control panel indicator, DOCTOR BLADE PRESSURE, just goes out.

Step 2) Check the doctor blade pressure gauge reading.

Note

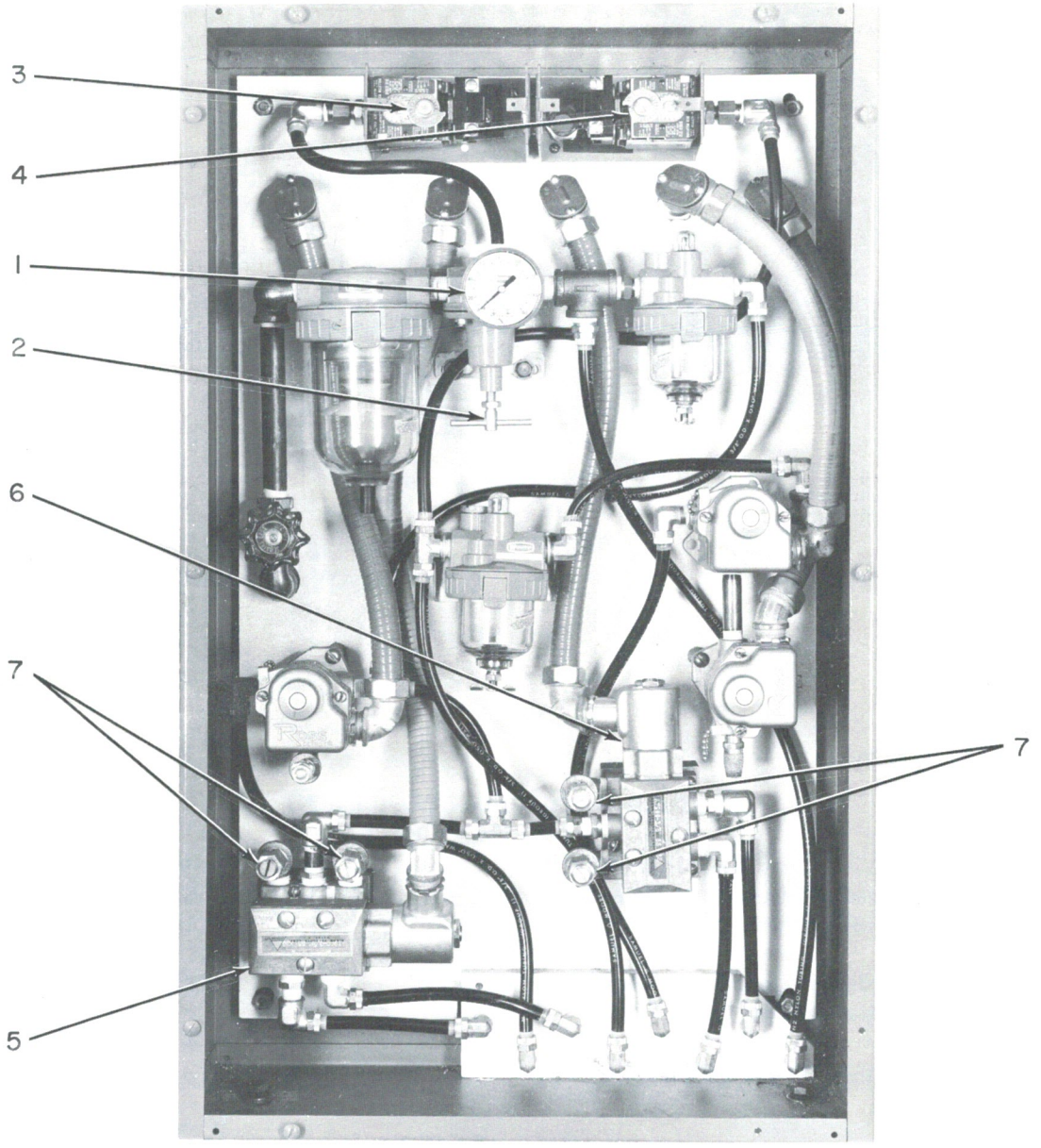
IF the gauges reads 25 psi, the switch setting is correct and this procedure is complete. Readjust the pressure until the indicator light goes on again. IF the gauge does not read 25 psi, proceed to step 3) below.

Step 3) Remove the pressure switch cover.

Step 4) Rotate the pressure switch pressure adjustment to zero the range pointer.

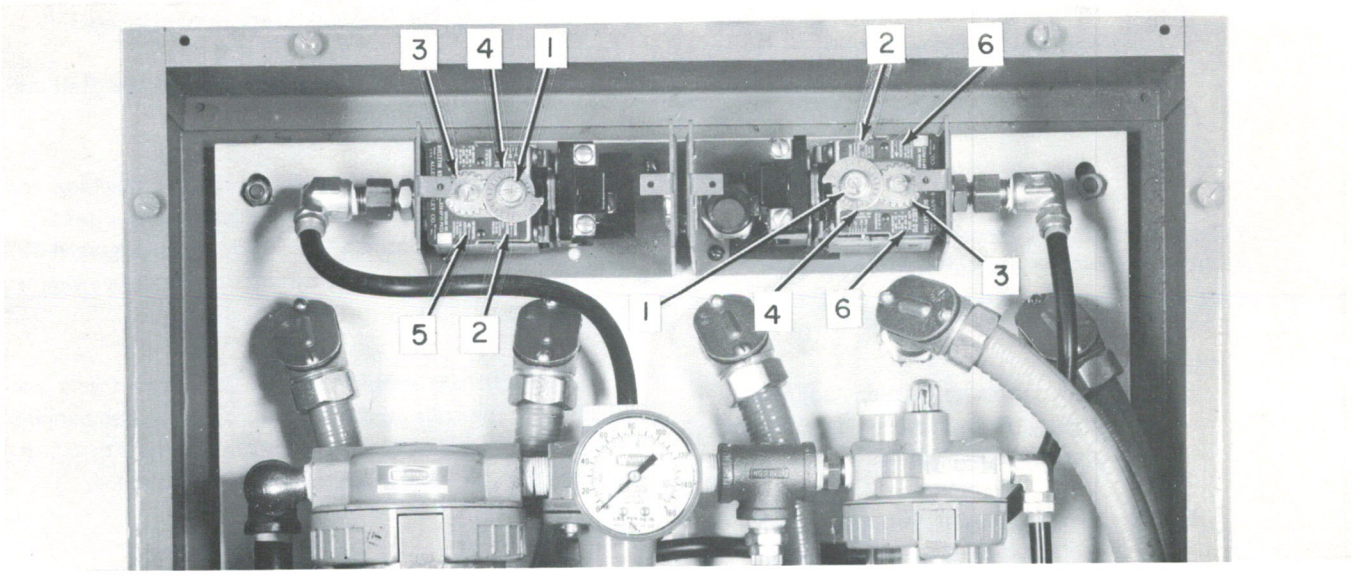
Step 5) Back-off the adjustment 1/2-turn.

Step 6) Rotate the AIR PRESSURE adjustment knob until the control panel



1. Main air supply gauge
2. Main air supply valve
3. Main air supply pressure switch
4. Doctor blade pressure switch
5. Ink roll solenoid valve
6. Impression cylinder solenoid valve
7. Exhaust ports

FIGURE 4-31. AIR CONTROL CABINET



1. Pressure adjustment
2. Range pointer
3. Differential adjustment
4. Graduated dial
5. Main air supply switch
6. Doctor blade pressure switch

FIGURE 4-32. PRESSURE SWITCH ADJUSTMENT

indicator, DOCTOR BLADE PRESSURE ON indicator (Table 4-1) goes on.

Step 7) Perform steps 1 and 2 again.

Note

IF the pressure gauge reads 25 psi, the procedure is over. Readjust the pressure adjustment knob until the light goes on again. IF the gauge does not read 25 psi, go on to step 8.

Step 8) Turn the pressure adjustment to increase or decrease the pressure as applicable.

Step 9) Perform steps 6 through 8 again until the pressure gauge reads 25 psi.

Step 10) Check the pressure switch differential adjustment for minimum setting. To set a minimum, turn the differential adjustment clockwise until the protrusion of the graduated dial hits the stop.

Step 11) Reinstall pressure switch cover.

(2) Main Air Supply Pressure Switch (Figure 4-31, 4-32)

Step 1) Turn main air supply valve to decrease air supply until the AIR ON indicator (Table 4-1) goes out.

Step 2) Check the air supply pressure gauge for a reading of 60 psi.

Note

IF the gauge reads 60 psi, the procedure is completed. Readjust the valve until the indicator light goes on again. If the gauge does not read 60 psi, go on to step 3).

Step 3) Remove pressure switch cover.

Step 4) Rotate the pressure switch adjustment to zero on the range pointer.

Step 5) Back off the adjustment 1/2-turn.

Step 6) Rotate main air supply valve until AIR ON indicator goes on.

Step 7) Perform steps 1 and 2 again.

Note

If the gauge reads 60 psi, the procedure is completed. Readjust pressure valve until indicator goes on. If the gauge does not read 60 psi go on to step 8.

Step 8) Turn pressure switch adjustment slightly to increase or decrease the pressure as applicable.

Step 9) Repeat steps 6 through 8 until 60 psi is read on the pressure gauge.

Step 10) Check the pressure switch differential adjustment for minimum setting. To set it at minimum turn the differential clockwise until the protrusion on the graduate dial hits the step.

Step 11) Reinstall pressure switch cover.

i. 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 (Figure 4-31) are located in the air control cabinets on the drive side of 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 of the solenoids must be adjusted until a smooth steady upward motion is obtained.

7. TROUBLESHOOTING

Refer to Tables 4-7, 4-8 for a listing of operating difficulties which may be encountered and the standard procedures to correct them. See paragraph IV.A. for discussion of printing plates and inks.

TABLE 4-7. PRINTING UNIT OPERATING TROUBLES

Symptom	Cause	Remedy
Insufficient ink	No ink in reservoir	Replenish the reservoir
	Clogged hoses	Remove and clean.
	Air pressure lost	Find and correct trouble.
	Ink foaming	Add defoamer 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; press reset button.
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.

TABLE 4-8. 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.
	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 "holdout"	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.
	Excessively warped board	Use different board.
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. Add pull straps.
	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.

TABLE 4-8. PRINTING UNIT BOX TROUBLES (Continued)

Symptom	Cause	Remedy
	Durometer of plates too 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.
Excessive Printing Crush	Excessive impression cylinder pressure	Adjust the impression cylinder to printing plate gap. Add pull straps.
	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.
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.
Mottle or pebbled printing	Improper or excessive use of diluting agent or other additive; low viscosity	Add fresh, undiluted ink.
Halo or double outline around printed surface	Excessive inking	Check anilox roll and doctor blade for wear and pressure setting.
	Excessive printing pressure	Check impression cylinder gap adjustment. Add pull straps.
	Low viscosity	Add fresh, undiluted ink.
	Uneven printing plate	Check plate for tolerances, make ready as necessary or discard plate.

TABLE 4-8. PRINTING UNIT BOX TROUBLES (Continued)

Symptom	Cause	Remedy
Fuzzy or ragged edges	Ink drying on plate prior to transfer to stock	Increase machine speed; retard ink drying rate.
	Uneven printing plate	Check plate for proper tolerances; make ready as necessary or discard plate.
	Excessive printing pressure	Check impression cylinder gap adjustment; add pull straps.
Reverse type fill-in	Too much inking	Check anilox roll and doctor blade for wear and pressure setting.
	Excessive printing pressure	Check impression cylinder gap adjustment; add pull straps.

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 tables properly, determine if the trouble is operational or shows up as a result of box inspection at the delivery end. Turn to the table concerned and locate the symptom encountered. Check the possible causes of the difficulty. When the trouble is located, refer to the table 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.

C. PRINTING UNIT LUBRICATION

Refer to Table 4-9 and the accompanying figures for points of lubrication, frequency, method and type of lubricant.

TABLE 4-9. PRINTING UNIT LUBRICATION

Item	Figure No.	Description	Lubricant	Period	Method
1	4-34	Frame fittings (4)	NLGI no. 2 Lithium soap grease	Weekly	
2	4-34	Maxitorq clutch			
3	4-34	Gear case	Agma no. 3, Agma spec. no. 252	Daily	
4	4-34	Print cylinder register handle	NLGI no. 2	Monthly	
1	4-35	Manifold	NLGI no. 2	Weekly	
2	4-35	Frame fittings (3)	NLGI no. 2	Weekly	
3	4-35	Lower pull roll cap	NLGI no. 2	Weekly	
4	4-35	Form Sprang clutch			
5	4-35	Ink pump motor	Per manufacturer's recommendation		
1	4-36	Ink pump	NLGI no. 2	Monthly	
2	4-36	Ink pump shaft	NLGI no. 2	Weekly	

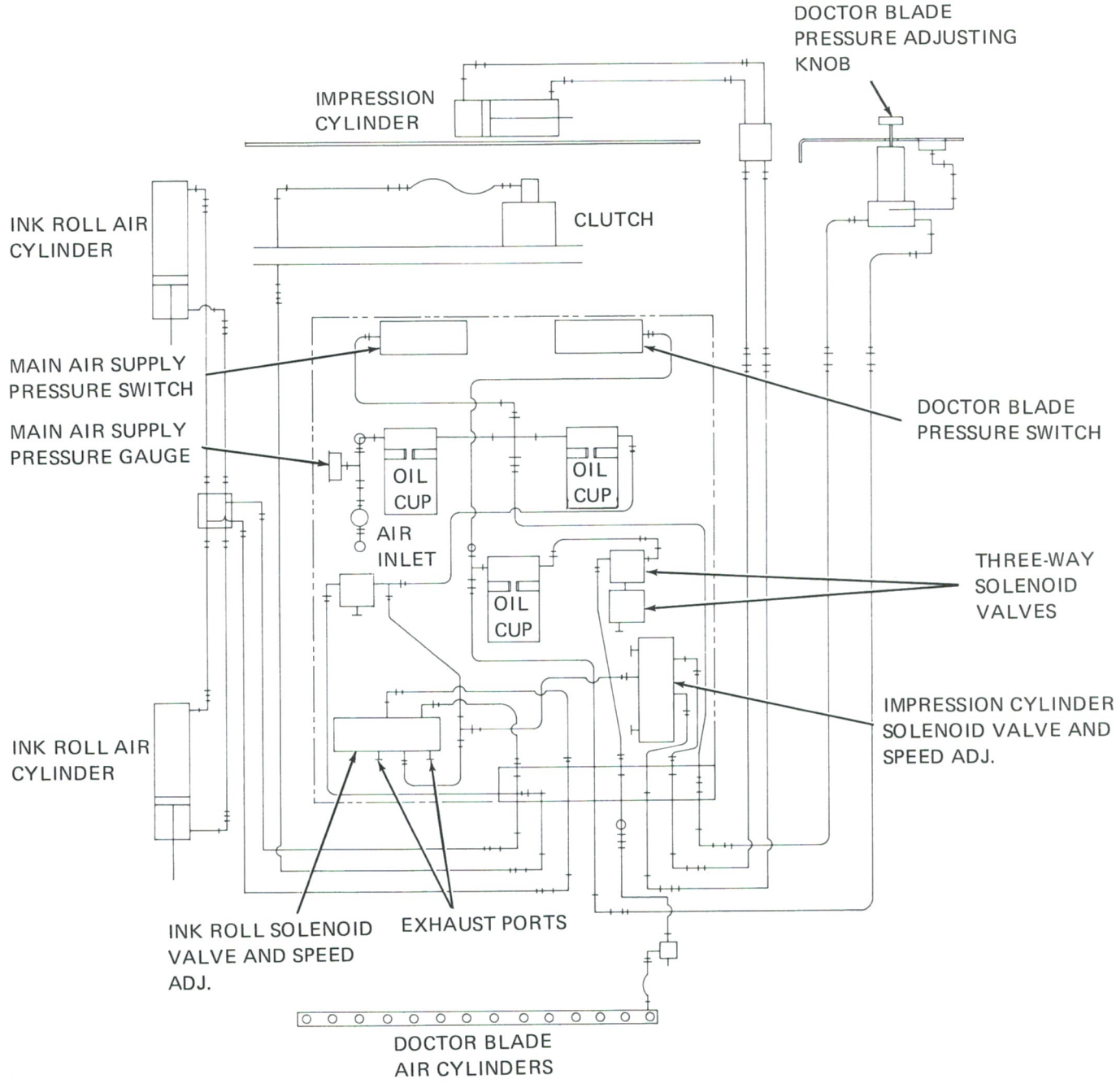


FIGURE 4-33. PNEUMATIC SYSTEM SCHEMATIC

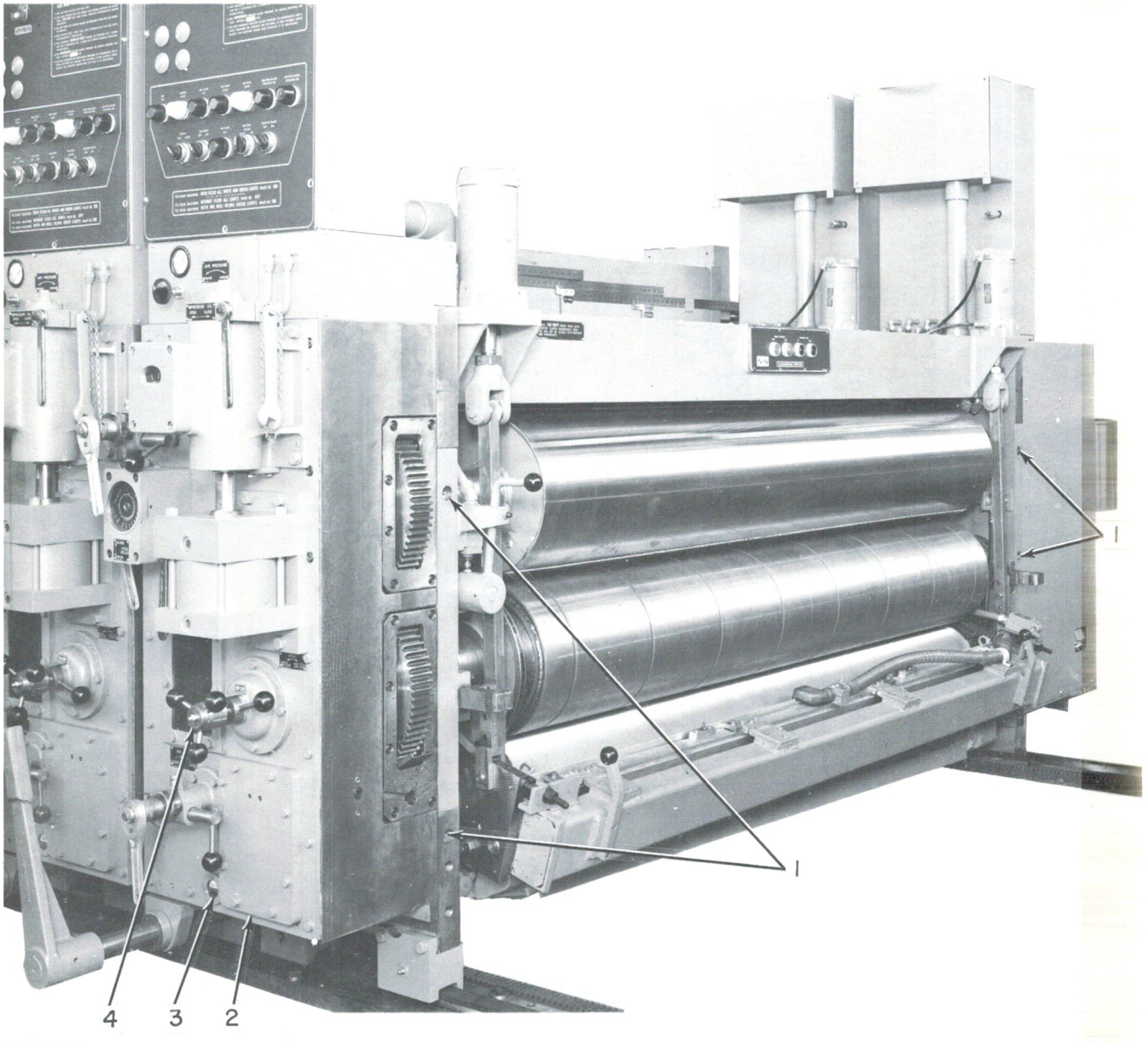


FIGURE 4-34. PRINTING UNIT LUBRICATION, FEED END VIEW

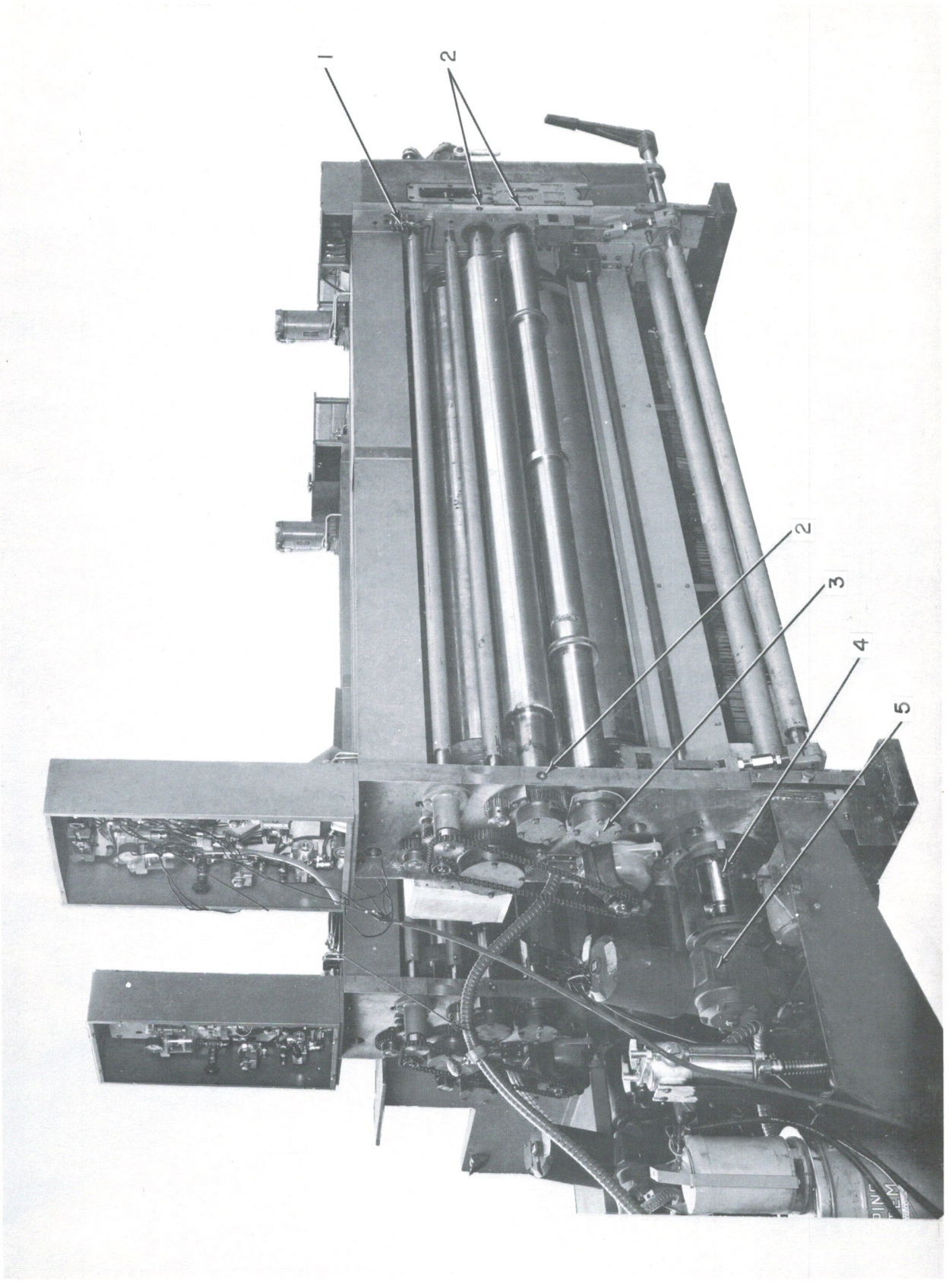


FIGURE 4-35. PRINTING UNIT LUBRICATION, DELIVERY END VIEW

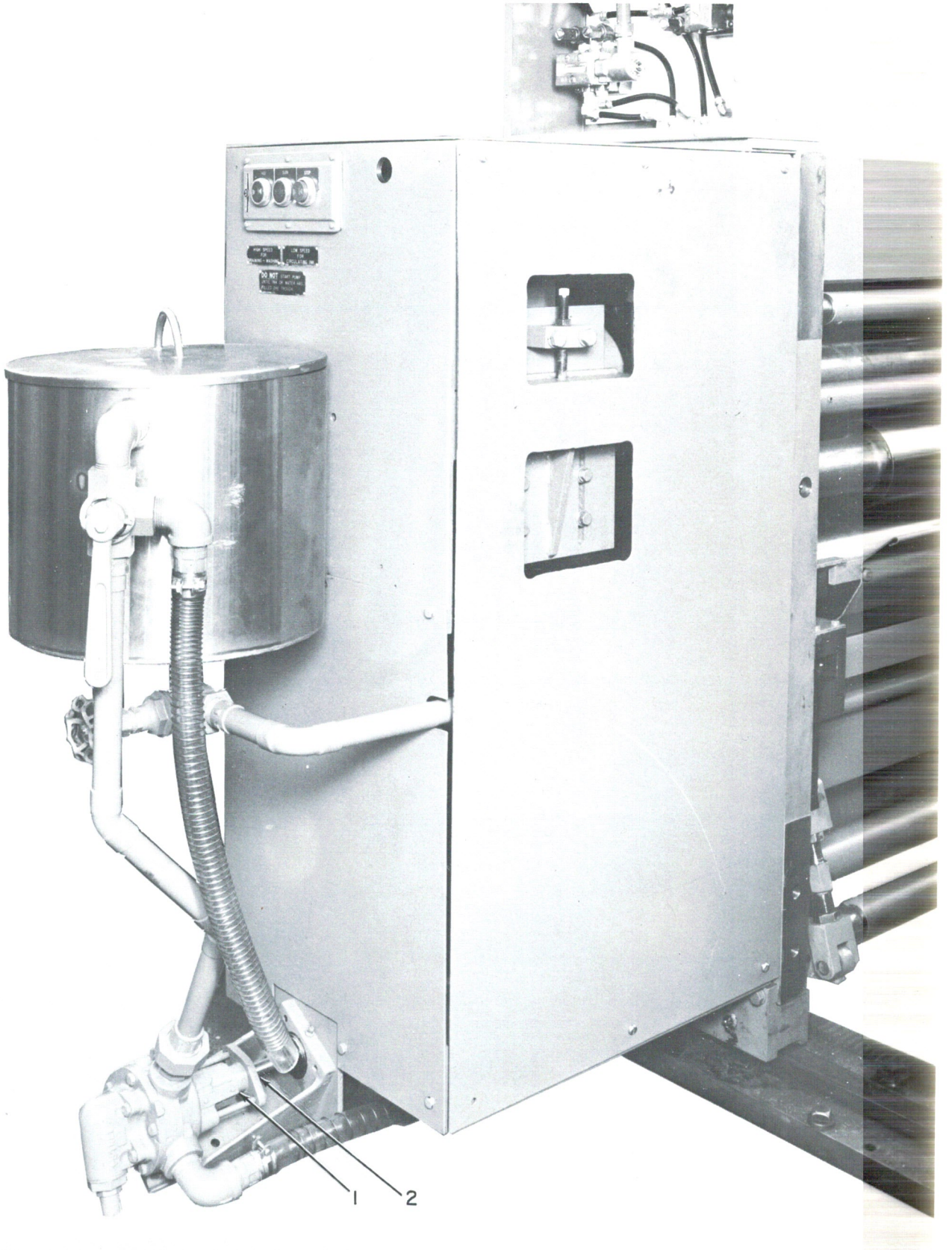


FIGURE 4-36. PRINTING UNIT LUBRICATION, DRIVE SIDE VIEW

SECTION V.
CREASER-SLOTTER SECTION

A. CREASER-SLOTTER DESCRIPTION

The creaser-slotter (Figure 5-1) may be either a stationary or roll-back model. The roll-back unit moves about 2 feet toward the feed end, allowing easy access to the slotter heads (See paragraph II. B). If the creaser-slotter is stationary, steps attached to the folding section enable the operator to step over the folding rails to reach the slotting heads.

The creaser-slotter houses these main components: primary creasing shafts including creasing heads; intermediate creasing shafts; slotting shafts including slotting, trimming and lap-cutting assemblies; head positioning and alignment mechanism (called Jiffy-Set); pendant control. An air or belt scrap conveyor is located after the creaser-slotter to catch scraps from the slotter heads.

Four sets of the working heads, linked by traveling plates, move laterally to the proper position; the center heads remain stationary. The working or traveling heads are referred to by number for easy reference (Figure 5-2): operating side traveling heads—1; traveling heads between center and operating side—2; traveling heads between center and drive side—3; traveling heads on drive side—4.

1. PRIMARY CREASING SHAFTS (Figure 5-2)

Upper and lower primary creasing shafts carry the primary creasing heads, anvils and lap crushers.

a. Creasing Heads (Figure 5-3)

The upper shaft supports the Harrison-profile creasing wheels and upper lap crushing anvils while the lower shaft carries the polyurethane creasing anvils and crushing heads.

b. Lap Crushers (Figure 5-3)

Two crusher heads - one mounted on the drive side and the other on the operating side of the primary creaser shaft -- crush the glue lap and its mating panel. The operator side lap crusher provides continuous crushing to crush the glue lap panel. The drive side crusher may be continuous or, optionally, segmental--crushing only the portion of the body panel that joins the glue lap.

2. INTERMEDIATE CREASER SHAFT

The upper intermediate creaser shaft carries V-profile creasing heads and upper pull rolls while the lower shaft carries polyurethane creasing anvils and lower pull rolls.

3. SLOTTER SHAFTS (Figure 5-4)

The slotter shafts carry slotter heads, trim knives and lap cutter.

a. Slotter Heads (Figure 5-5)

Each upper slotter head --#1, #2, #3 and center--have two blades, one tipped and one plain. The tipped blade slots the blanks leading edge. The plain blade cuts the trailing edge. These slots form the box flaps. See Figure 5-6.

Lower slotter heads including the lap cutter, have full circumference female slots to fit the slotter blades.

Knurled feed rings on the upper heads feed the board securely into the next section.

Box depth scales mounted on each upper slotter head are used for setting individual blades. A register disc mounted adjacent to #2 head allows the operator to rotate the upper shaft for setting slot depth registration. The scale mounted on the drive side of the #2 head helps set slot depth.

b. Lap Cutter and Trim Knife (Figure 5-7)

The lap cutter is mounted on the #1 head and the trim knife is mounted on the #4 head. The lap cutter cuts a glue lap. A pair of slotting knives and two extra knives form the lap.

A continuous trim knife is mounted on the #4 head.

4. JIFFY-SET AND PENDANT CONTROL

Each set of creasing and slotting heads is fastened in tandem to Jiffy-Set plates (2 Figure 5-8) mounted from a common traveling plate (also called carrier plate). The

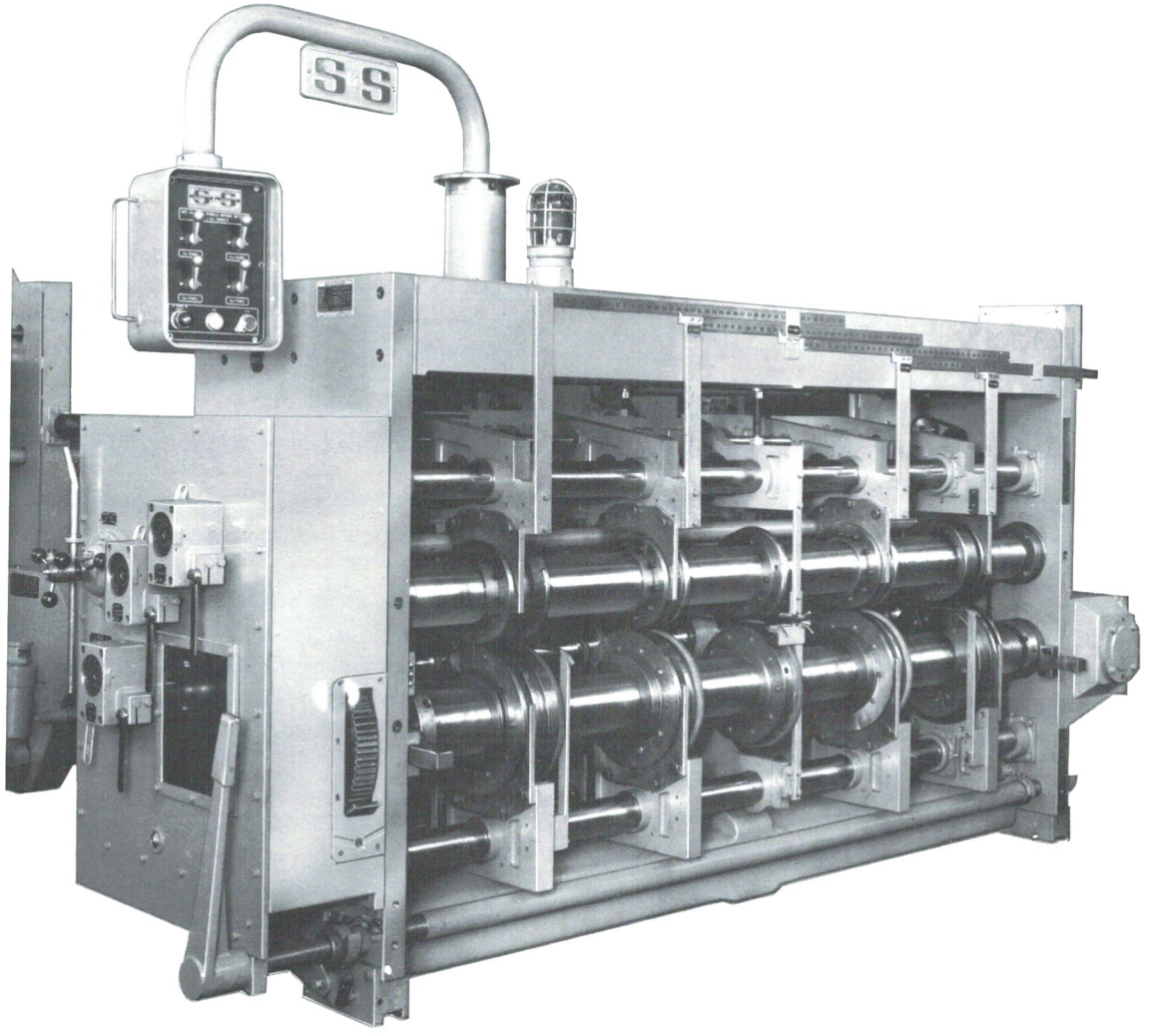
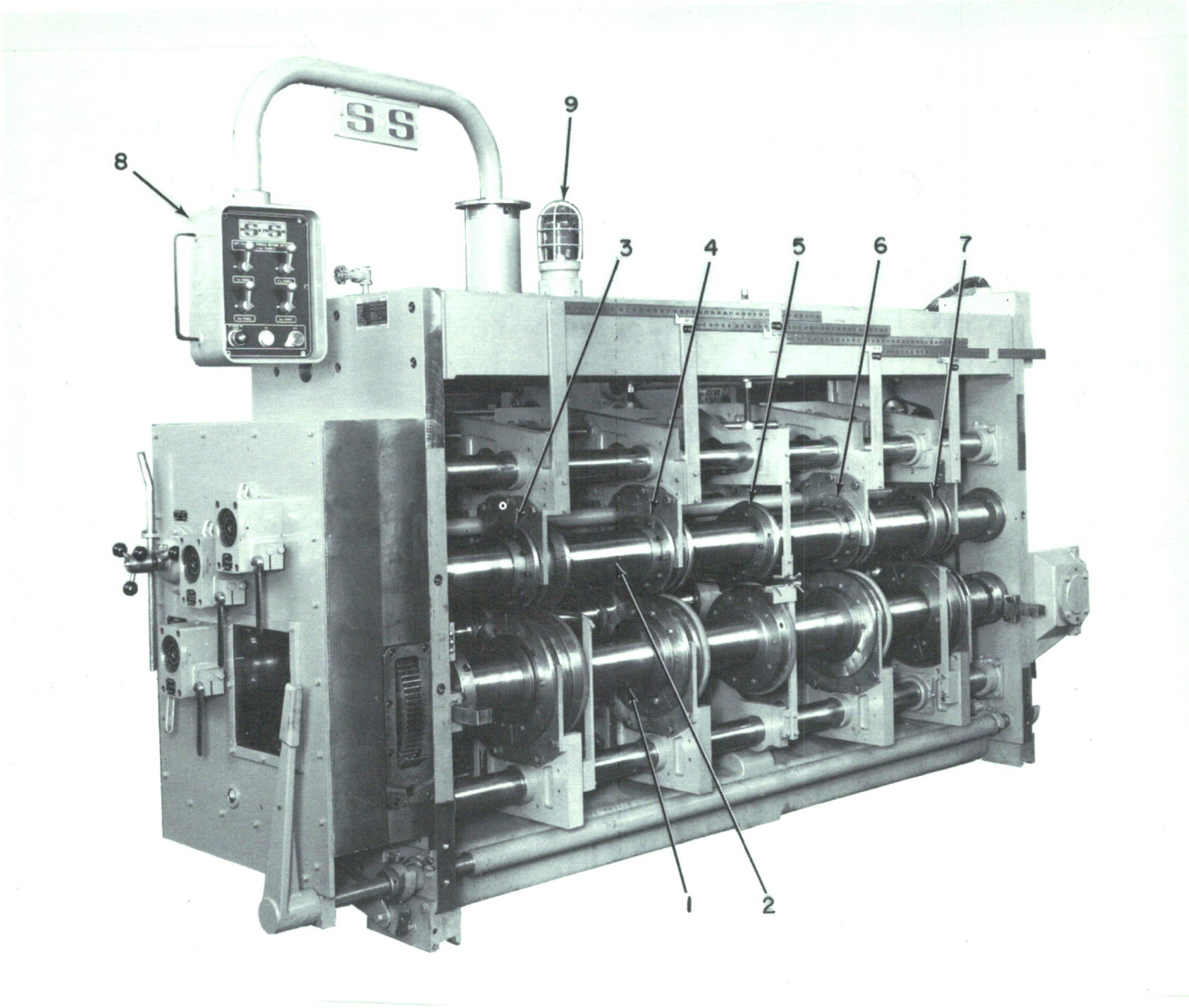
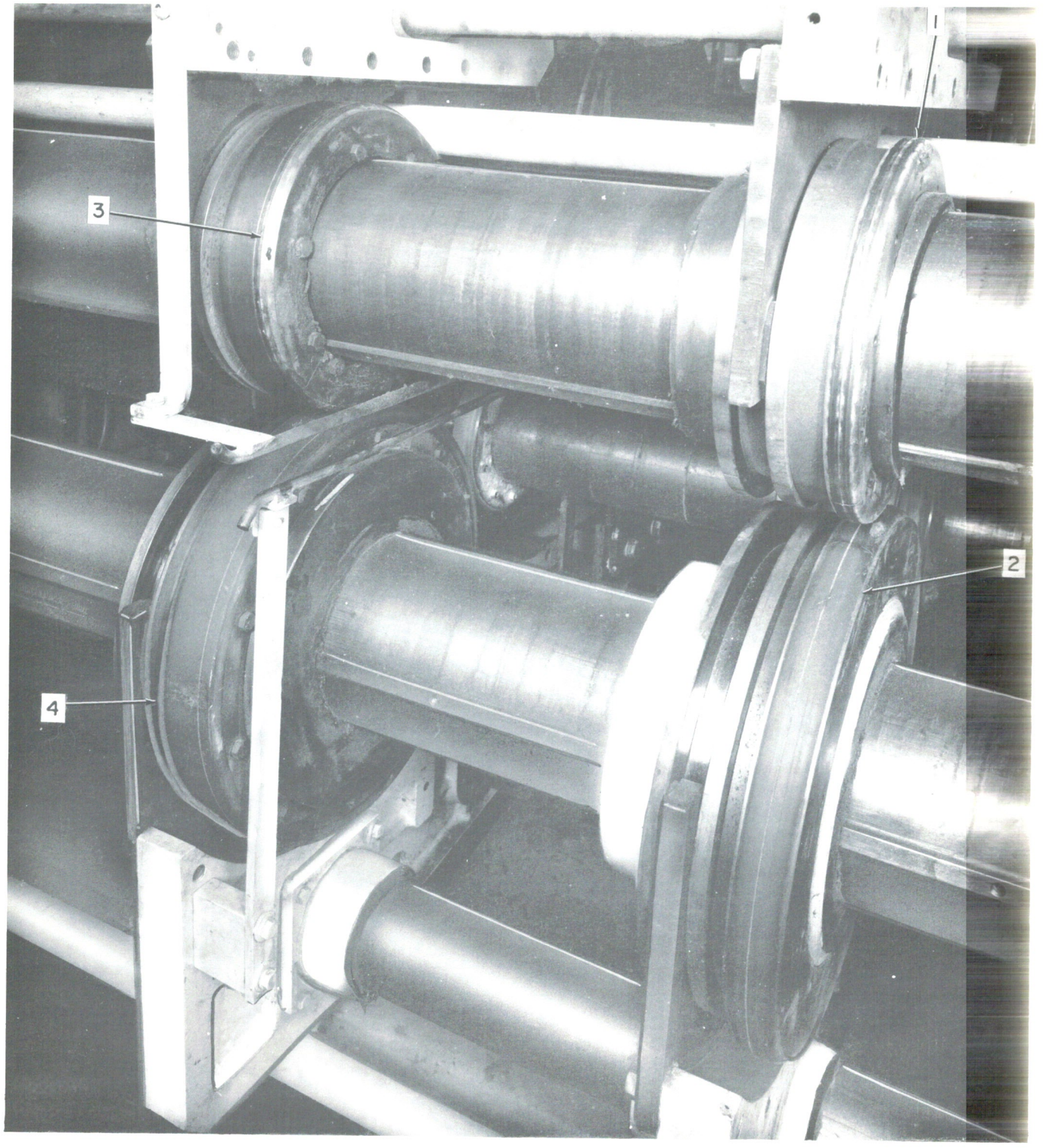


FIGURE 5-1. 701 CREASER-SLOTTER SECTION



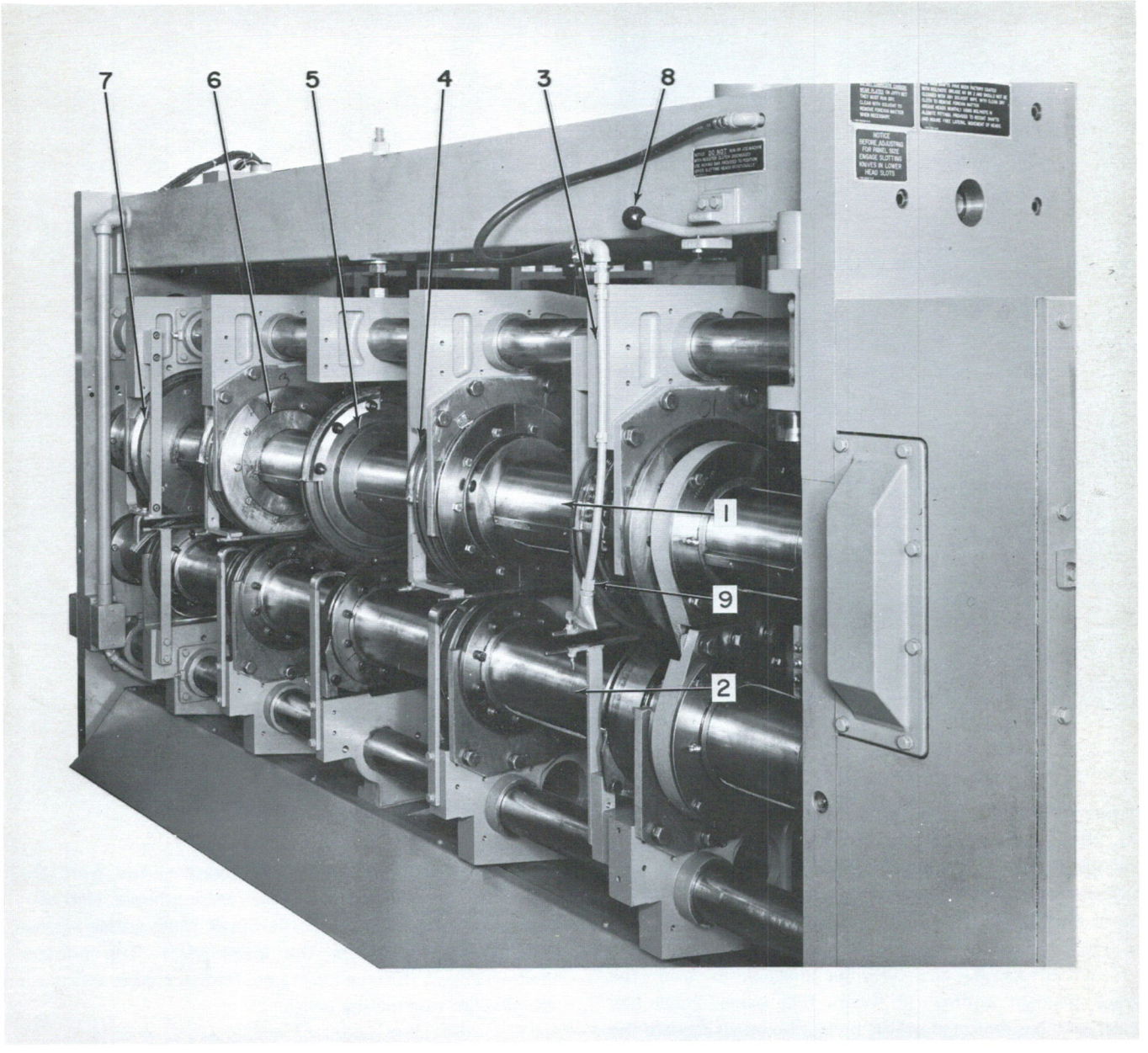
1. Lower primary creasing shaft
2. Upper primary creasing shaft
3. #1 traveling heads
4. #2 traveling heads
5. Center heads
6. #3 traveling heads
7. #4 traveling heads

FIGURE 5-2. CREASER-SLOTTER FEED END



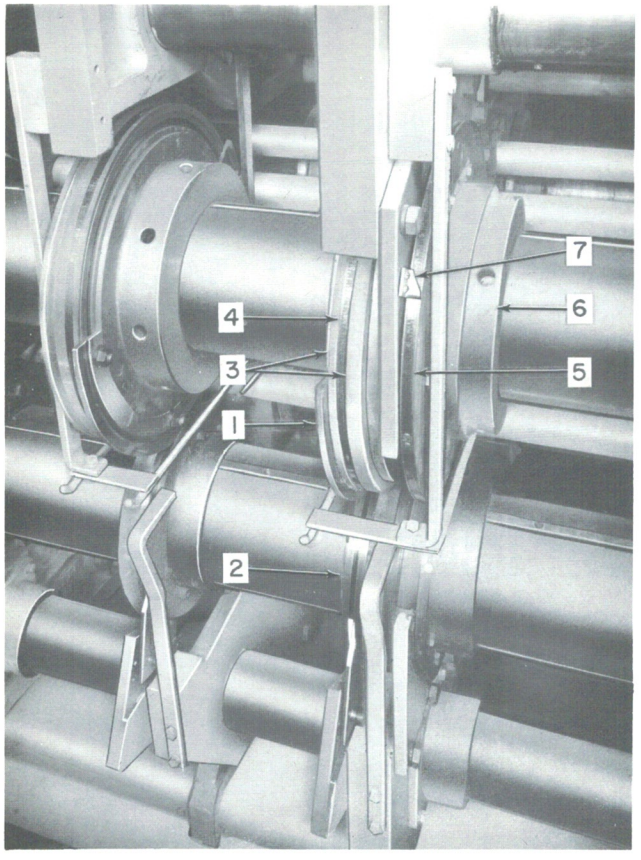
1. Harrison creasing wheel
2. Polyurethane creasing anvil
3. Crushing anvil
4. Crushing head

FIGURE 5-3. PRIMARY CREASING SHAFT HEADS



1. Upper slotter shaft
2. Lower slotter shaft
3. #1 traveling heads
4. #2 traveling heads
5. Center heads
6. #3 traveling heads
7. #4 traveling heads
8. Running register clutch handle
9. Air nozzle

FIGURE 5-4. CREASER-SLOTTER DELIVERY END



1. Slotting knife
2. Female knife
3. Knurled feed rings
4. Box depth scale
5. Register scale
6. Barring collar
7. Pointer

FIGURE 5-5. SLOTTER SHAFT HEADS

middle set is not mounted on a carrier and remains stationary. Rotary screws driven by an independent motor, position the traveling plates laterally according to the panel widths desired. Shaft heads lock in place when positioning motor shuts off.

You operate the Jiffy-Set mechanism from the swivel pendant control (8 Figure 5-2) panel. Panel size drum switches mounted on the pendant control accuate the adjusting motors for moving the creasing and slotter heads to the correct lateral position. At the same time the switches automatically set the glue unit, folding and delivery sections for the correct panel sizes.

Four panel size scales (3 Figure 5-8) mounted along the section top brace on the feed end provide direct reading of panel sizes.

5. SCRAP CONVEYOR (OPTION)

An air scrap conveyor may be located between the creaser-slotter and the folding section. The air conveyor blows the scraps into a vacuum takeup.

B. CREASER-SLOTTER PROCESS

Corrugated blanks enter the creaser-slotter from the feed end and engage the primary creasing heads. Harrison-profile creasing wheels on the upper shaft crease against polyurethane anvils on the lower shaft. The primary creasers impart the glue lap crease, folding creases and crush the glue lap amd mating panel.

Next, intermediate creasing heads, located after the primary shaft put a sharp V-profile crease into the folding creases (Figure 5-9).

During the creasing operation, lap crushers mounted on the primary creasing shafts crush the glue-lap panel and the mating panel. Crushing the panels makes sure that the thickness of the board at the glue lap will not exceed the thickness of the rest of the board.

Scrap from the lap cutter are pushed away by coil springs in the lap cut blade holder and blown away by an air nozzle (9 Figure 5-4). All the scrap from the slotter drop onto a scrap conveyor.

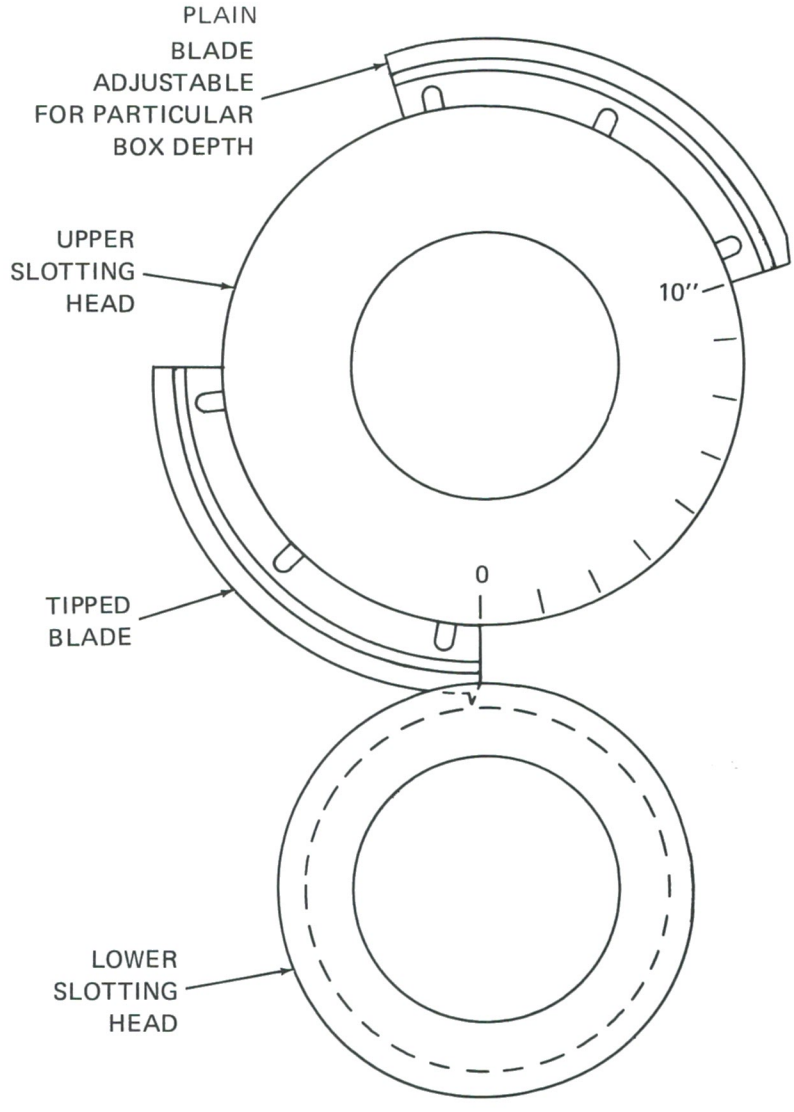
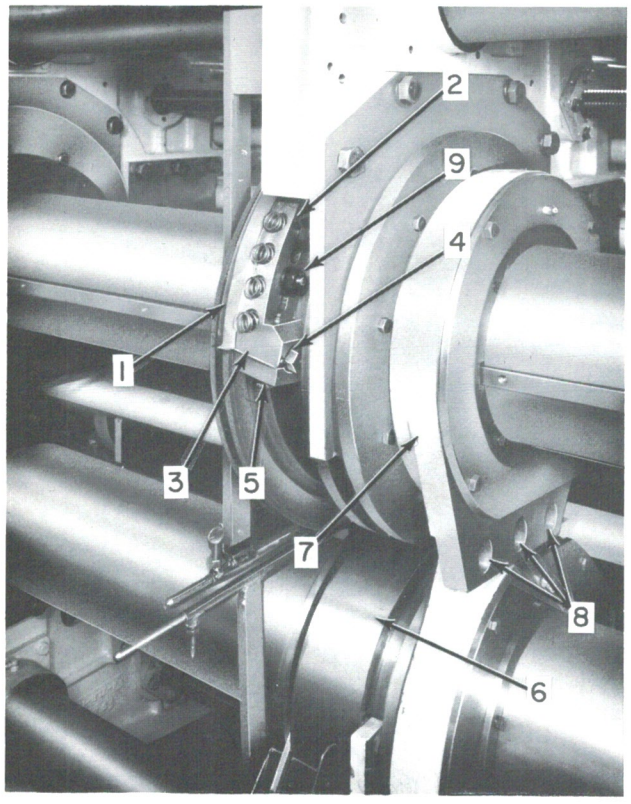
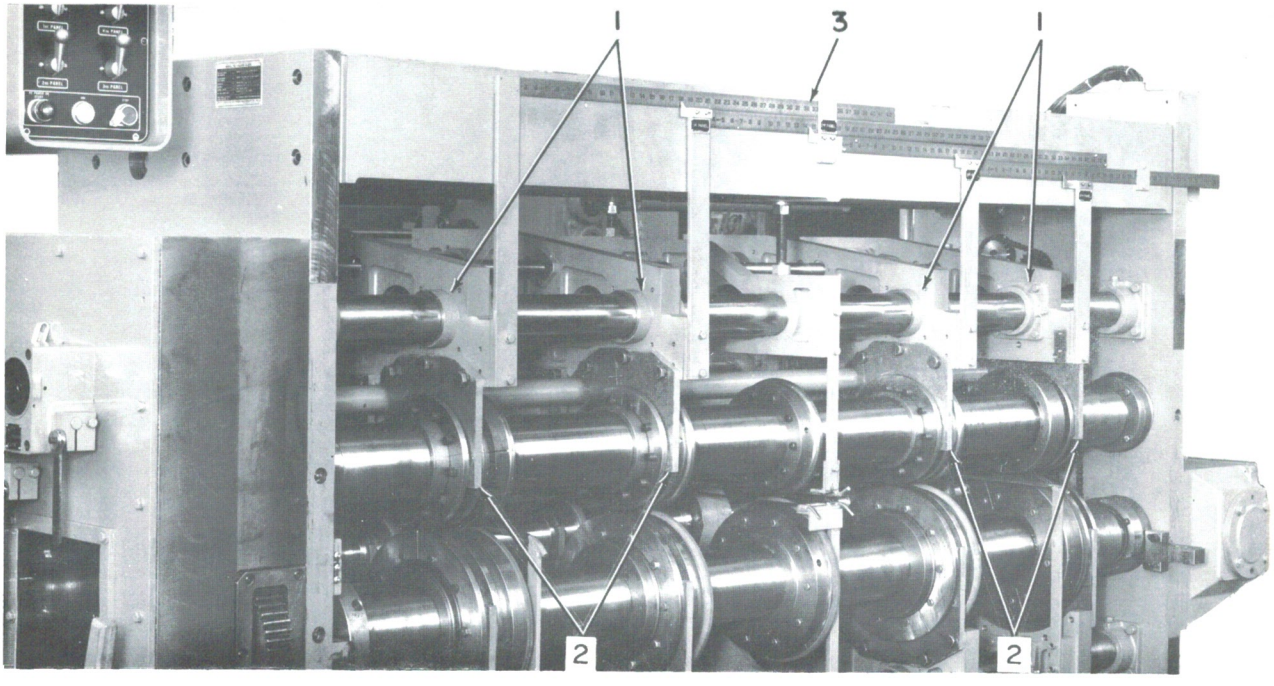


FIGURE 5-6. SLOTTING KNIVES



1. Tipped slotter blade
2. Lap cut blade holder
3. Lap cut blade
4. Clamp lock nut
5. Clamp adjustment screw
6. Anvil
7. Tie brace
8. Tie brace lock bolts
9. Slotter blade lock nut

FIGURE 5-7. LAP CUTTER HEAD



1. Traveling plates
2. Jiffy-set plates
3. Panel size scales

FIGURE 5-8. JIFFY-SET MECHANISM

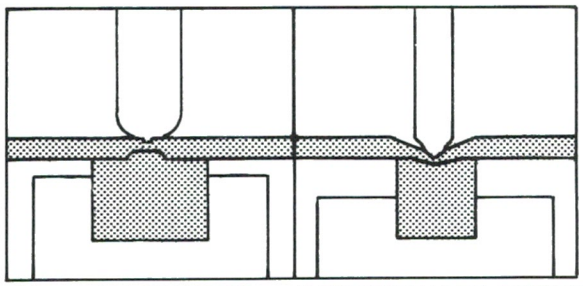


FIGURE 5-9. 701 CREASING OPERATION

A creased and slotted box is shown in detail in Figure 5-10.

C. OPERATION AND ADJUSTMENT CONTROLS

Tables 5-1 and 5-2 list and describe operation and adjustment controls for the creaser-slotter. Figure references are included.

D. SETUP AND ADJUSTMENTS

The following procedures will be helpful in setting up and operating the 701 creaser-slotter.

1. SELECTING SLOTTER BLADES

Tables 5-3 and 5-4 and Figure 5-13 give you a guide to the proper blade lengths to use for a given box depth.

2. SETTING THE SLOTTER BLADES

Step 1) Unlock running register with running register lock lever (Table 5-2) and rotate running register handle (Table 5-2) until indicator shows zero.

Step 2) Relock running register with lock lever.

Step 3) Disengage running register clutch (Table 5-2).

Step 4) Rotate slotter shaft, using a lever bar inserted in the register disc barring collar (Table 5-2), until the bevelled blade lock nuts are accessible.

Step 5) Loosen lock nuts on each bevelled blade and align bevelled end with box depth dimension on the box depth scale.

Step 6) Tighten lock nuts.

Note

The tipped blade is normally never moved since the blade is present to the zero mark on the slotter head box depth scale. If the tipped blade needs changing follow steps 1-6 above.

WARNING

Ensure that blades are securely locked.

3. SETTING THE LAP CUTTER (Figure 5-7)

Note

Set lap cutter at the same time as the slotting blades on #1 head.

Step 1) Make sure running register clutch is engaged.

Step 2) Loosen lap cut blade holder lock nuts (4 Figure 5-7).

Step 3) Follow steps 2 to 6 in paragraph V.D.2 above to set bevelled and tipped blades.

Step 4) Loosen lap cut blade holder clamp screws (5 Figure 5-7).

Step 5) Align the holder so that the lap cutter blades are in line with the bevelled end of the plain blade and the tipped end of the tipped blade.

Step 6) Tighten clamp screws and lock nuts.

WARNING

Ensure that knives are securely locked.

4. SETTING THE LAP CUTTER FOR EXTENDED GLUE LAP

Step 1) Follow steps 1 to 3 in paragraph V.D.3.

TABLE 5-1. OPERATION CONTROLS

Name	Location	Use
Pendant control (Figure 5-11)	Overhead operating side of creaser slotter section	Houses panel size drum switches.
1st PANEL 2nd PANEL 3rd PANEL 4th PANEL	Drum switches mounted on pendant face	Sets box panel size to be run.
DRIVE ON START (green pushbutton) JOG (yellow pushbutton) STOP (red pushbutton)	Pushbuttons mounted on bottom of pendant face	Controls main drive functions.
Limit switch Figure 5-12 (9)	Base of pendant swivel on top of slotter section	Shuts off closing motor when pendant swings inside section.

Step 2) Loosen the lap cut blade holder clamp screw (5 Figure 5-7) and position the lap blade holders for desired lap size.

Note

When lap cut blades are set for extended lap cutting the slotting knives will extend beyond the lap cut blades.

Step 3) Tighten clamp screws and lock nuts.

5. SETTING SLOT DEPTH

Step 1) Make sure running register clutch disengaged.

Step 2) Rotate the slotting shaft with the lever bar to the correct slot depth shown on the register disc scale (Table 5-2).

Step 3) Check slot depth when a few boxes have run. If adjustment is necessary use the running register adjustment handle while the machine is running for fine adjustment of slot depth. Clockwise rotation of the handle shortens leading edge slots and lengthens trailing slots counterclockwise rotation lengthens slots on the leading edge and shortens trailing edge.

6. SETTING THE SLOTTER SHAFT GAP

CAUTION

Before adjusting slotter gap, loosen tie brace bolts (8 Figure 5-7) on both operating and drive sides (if so equipped).

CAUTION

If center support is used, back-off the jamnut from the cam-follower housing before adjusting the gap.

Step 1) Unlock slotter gap adjustment handle (Table 5-2) and rotate until the desired gap appears on the indicator.

Step 2) Lock handle.

Step 3) Tighten tie-brace; Tighten center support to contact shaft if die cutting (Section IX).

7. SETTING THE CREASER SHAFT GAPS

Note

Use the same procedure for primary and intermediate creaser shafts.

TABLE 5-2. ADJUSTMENT CONTROLS

Name	Figure No.	Location	Use
Gap adjustment Ratchet handles and indicators (3)	5-12	Clustered on operating side of slotter sections	Adjust openings between shaft pairs to suit board caliper.
Primary creaser	5-12 (1, 5)	Right side of cluster	
Intermediate creaser	5-12 (1, 4)	Center of cluster	
Slotter	5-12 (1, 3)	Left side of cluster	
Lock levers	5-12 (2)	Adjacent to each adjustment ratchet	Lock gap adjustments so they will not change while running.
Running register adjustment handle	5-12 (6)	Operating side toward delivery end of slotter	Fine adjustment of slot depth.
Running register adjustment lock	5-12 (7)	Adjacent to running register adjustment handle	Locks adjustment.
Running register clutch handle	5-4 (8)	At delivery end of slotter inside operating side frame	Disengages slotter shafts from drive.
Box depth scales	5-5 (4)	Mounted on each slotter head	Sets box depth for each slotter head.
Register disc and barring collar	5-5 (5, 6)	Mounted on operating side of #2 slotting head	For turning slotter shaft with lever bar and setting slotting shaft for correct slot depth.
Panel size scales	5-8 (3)	Feed end of creaser-slotter on upper crossbrace	For setting panel sizes.

TABLE 5-3. SLOTTING BLADE SELECTION
WITHOUT CHANGING TIPPED BLADE

Approximate Body Depth (Inches)	Tipped Blade Length (Inches)	Plain Blade Length (Inches)
0 to 20	10	10
21	10	9
22	10	8
23	10	7
24	10	6
25	10	5
26	10	4
27	10	3
28	10	2
29	10	1

TABLE 5-4. SLOTTING BLADE SELECTION
CHANGING BOTH TIPPED AND PLAIN BLADES

Approximate Body Depth (Inches)	Tipped Blade Length (Inches)	Plain Blade Length (Inches)
20	10	10
22	9	9
24	8	8
26	7	7
28	6	6
30	5	5
32	4	4
34	3	3
36	2	2
38	1	1

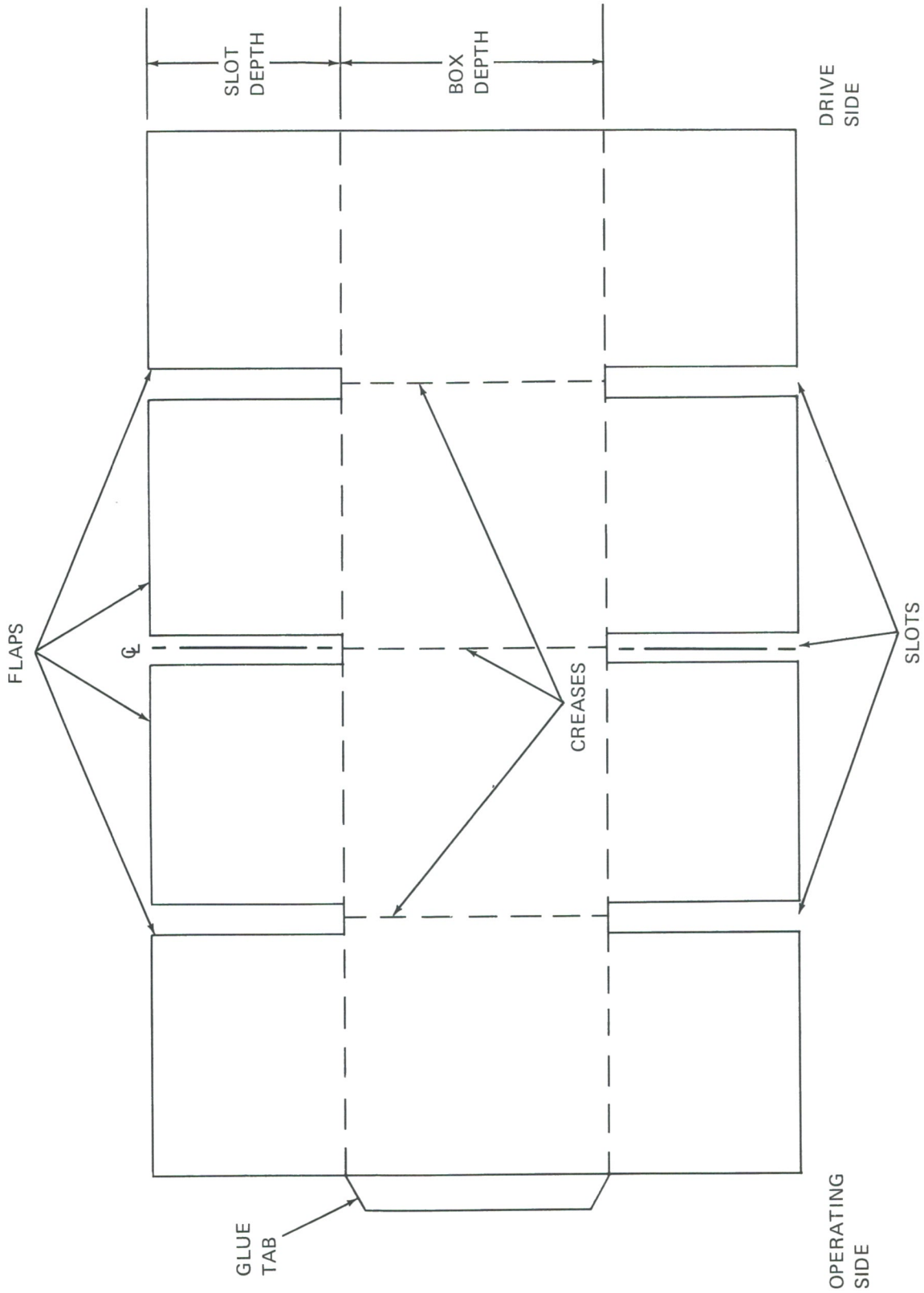
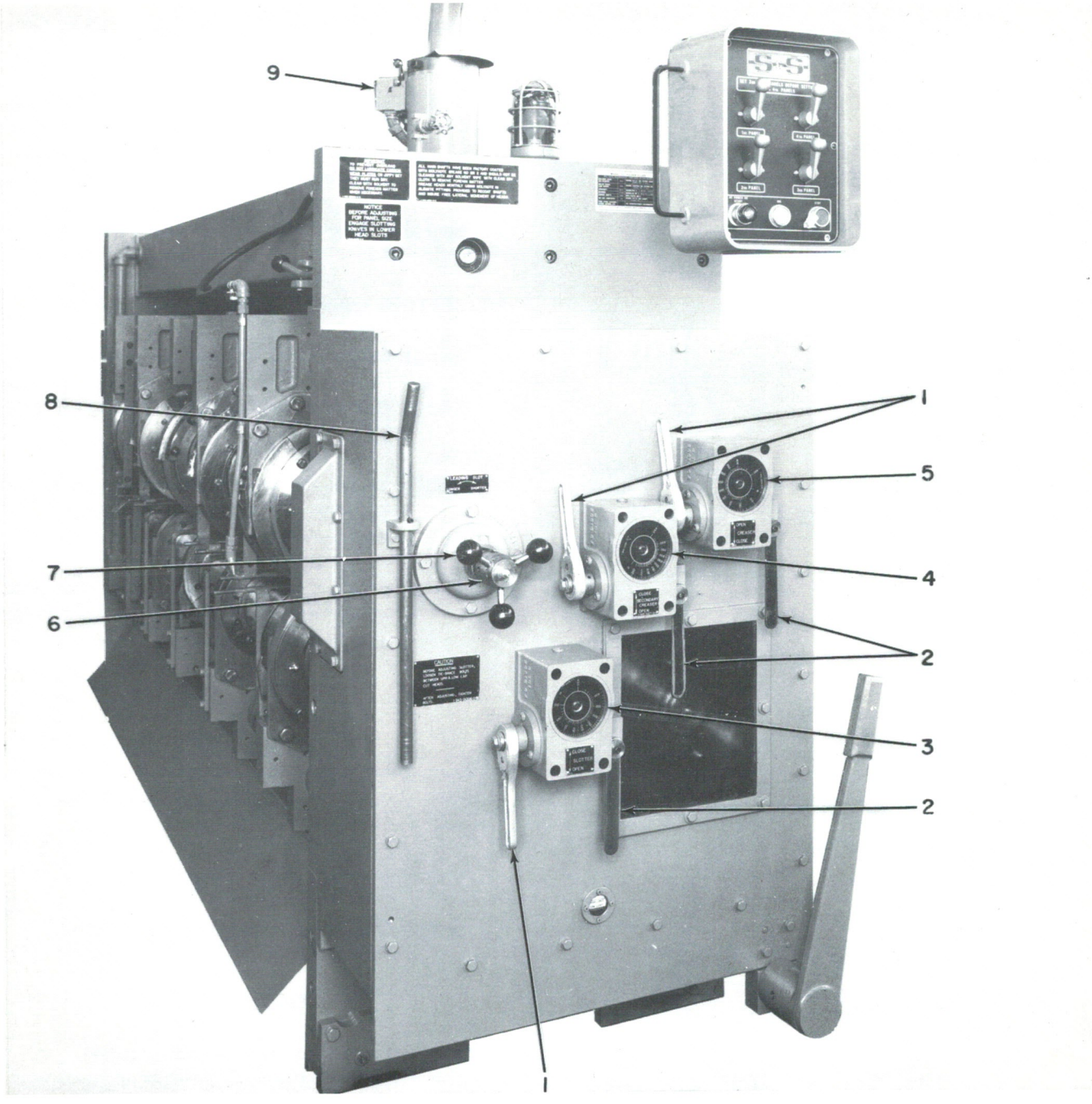


FIGURE 5-10. CREASED AND SLOTTED BOX

FIGURE 5-11. PENDANT CONTROL FACE



1. Gap adjustment ratchet handles
2. Lock levers
3. Slotter gap indicator
4. Intermediate creaser gap indicator
5. Primary creaser gap indicator
6. Running register adjustment handle
7. Running register adjustment lock
8. Lever bar
9. Swivel pendant control limit switch

FIGURE 5-12. CREASER-SLOTTER ADJUSTMENT CONTROLS

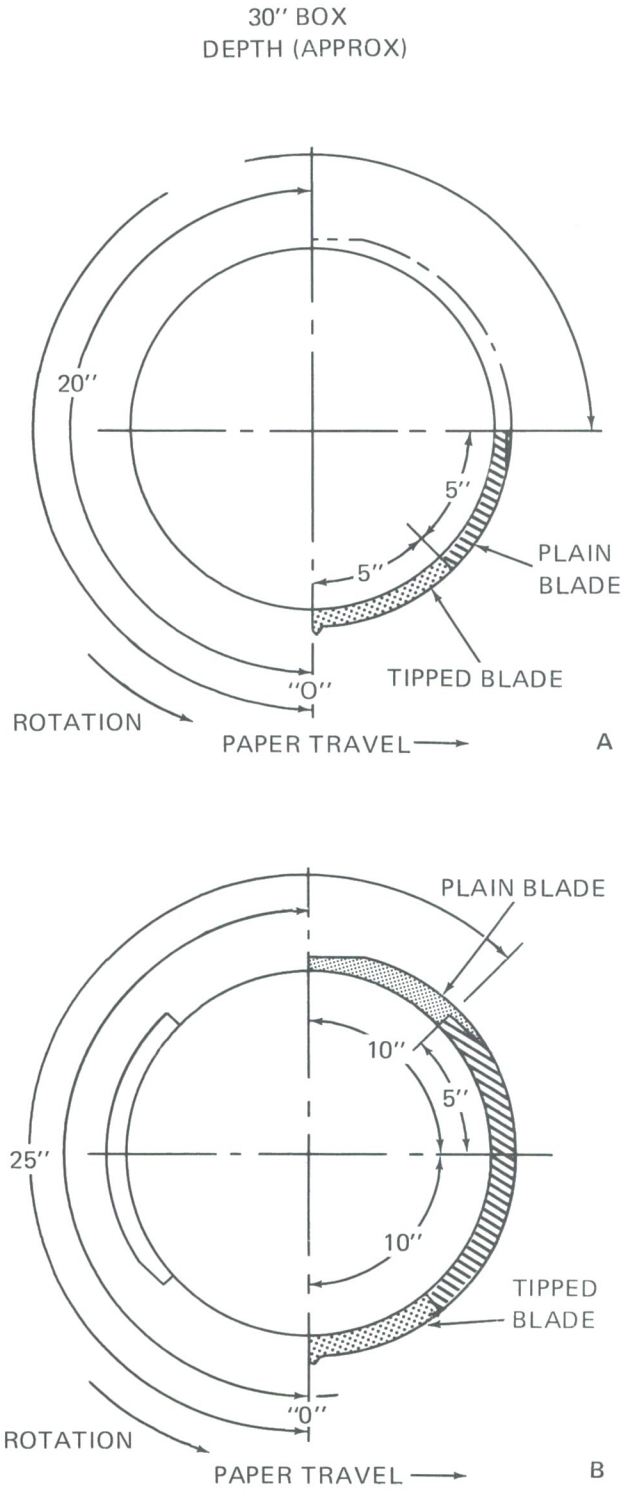


FIGURE 5-13. SLOTTING BLADE SELECTION GUIDE

Step 1) Unlock gap adjustment (Table 5-2) by turning lock lever about 1/2 turn.

Step 2) Rotate gap adjustment handle until correct dimension reading appears on the indicator window. Rotate handle clockwise to open gap. Rotate counterclockwise to close.

Step 3) Relock adjustment ratchet handle (Table 5-2).

8. SETTING THE PANEL SIZES

Step 1) Open machine (see Section II. B.)

Step 2) Disengage running register clutch (Table 5-2).

Step 3) Loosen the three tie-brace bolts on the tie brace between upper and lower slotting shafts on both operating and drive sides.

Step 4) Engage slotting knives in lower head slots by inserting a lever bar into the register disc barring collar (Table 5-2).

CAUTION

Before setting panel sizes engage knives to prevent damaging the knives while the plates travel.

Step 5) Reengage running register clutch.

Step 6) Swing swivel pendant inside machine.

Note

When pendant swings inside the open machine a limit switch (9 Figure 5-12) prevents operation of the opening and closing motor.

Step 7) Set panel sizes using the 1st, 2nd, 3rd and the 4th PANEL drum switches on the pendant control.

Set 2nd and 3rd panels first. These are the inside two Jiffy-Set carriers one on either side of the center. If 1st and 4th panels are in the way they should be moved away before setting 2nd and 3rd. The panel size scales show the actual panel width.

Note

No arithmetic is necessary to find correct panel setting.

9. SETTING FOR SEGMENTAL CRUSHING (OPTION)

Figure 5-14 shows a segmental crushing head mounted on the drive side of the primary creasing shaft.

Step 1) Loosen crusher head lock nuts (1 Figure 5-14) and remove split continuous crusher head.

Step 2) Insert first segment opposite the scale reading on the crusher head (3 Figure 5-14) equal to box depth minus 1 inch.

Step 3) Insert last segment opposite the scale reading equal to sloth depth plus 1 inch.

Step 4) Install additional segment between first and last segments.

Note

It may be necessary to shift, slightly, the positions of the end segments in order to fit segments inbetween.

Step 5) Secure all segments by tightening segment nuts.

Step 6) Remove unused segment nuts and "T" bolts.

10. SETTING FOR OFFSET SLOTTING (OPTION)

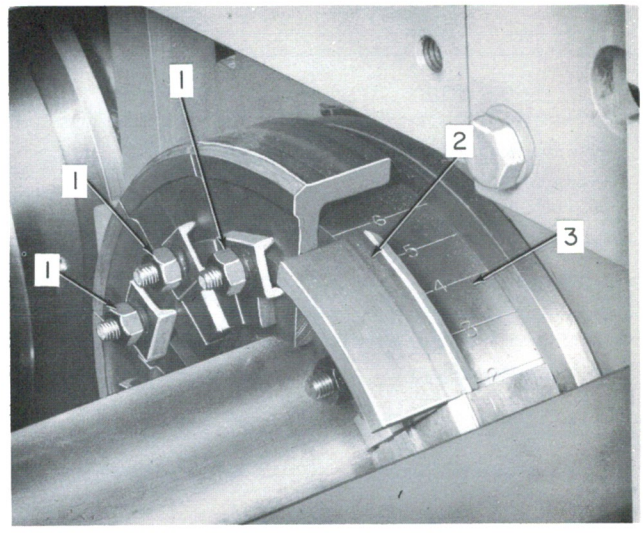
Step 1) Loosen bolts and remove upper and lower Jiffy-Plate spacers as 1st carrier. Retain any plastic shims.

Note

Normal inline slotting (see Figure 5-10) has 1/8-inch (3.3 mm) thick spacers on the 1st, 2nd and 3rd carriers. The middle carrier is set on the center line.

Step 2) Install 1/4-inch (6.4 mm) thick Jiffy-Plate spacers at the 2nd and 3rd carriers.

Step 3) Set center slotter head 1/8-inch (3.3 mm) from the centerline mark toward the drive side for A-slotting or toward the operating side for B-slotting (Figure 5-15).



1. Segment lock nuts
2. Crusher segment
3. Scale

FIGURE 5-14. SEGMENTAL CRUSHING

Step 4) Adjust 4th carrier--trim knife--with the pendant control for the correct panel size.

Note

Most offset slotting is 1/8-inch. For wider offset, install appropriate spacers and offset the center as in step 3 above.

E. PREVENTIVE MAINTENANCE

Note

Do not use air hoses for cleaning. Vacuum dust-removal is preferred.

Use Table 5-5 as a guide for periodic maintenance of the crease-slotter section. The chart outlines inspection periods recommended for various components on the delivery end.

TABLE 5-5. PREVENTIVE MAINTENANCE

Component	Location	Inspection Period	Remarks
Primary and intermediate creasing heads	Upper primary creasing shafts	Monthly	Check for creasing head wear - flatness or chipping. Replace as necessary.
Creasing anvils	Lower primary creasing shafts	Monthly	Check for deep grooves in soft anvils. Replace as necessary.
Male Slotter blades	Upper slotting shaft	Monthly	Replace broken or chipped knives.
Female Slotter knives	Lower slotting shaft	Monthly	Replace broken or chipped knives.
Lap Cutting blades	Operating side on slotter shafts	Daily	Check for dull blade. If cut edges are ragged or incompletely cut due to dull or worn blades, then replace.
Trim knife	Drive side on slotter shafts	Monthly	Check for wear, tightness of blade and head. Shim carbon plate to ensure good cutting.
Jiffy-set carbon wear plates	Each side of Jiffy plate between each creaser, slotter head	Monthly	Shim as necessary to maintain .002 in. running clearance. Replace broken or missing plates.
Scraper blades	Delivery end of slotter section female slotter heads	Daily	Remove scrap that causes binding.
		Weekly	Check for excessive scrap buildup under scraper blade. If blade is worn - causing too much build up - replace or reverse blade.
Locking mechanism	Operating side of section	Monthly	Check tightness of lever against stop block. Adjust as necessary.

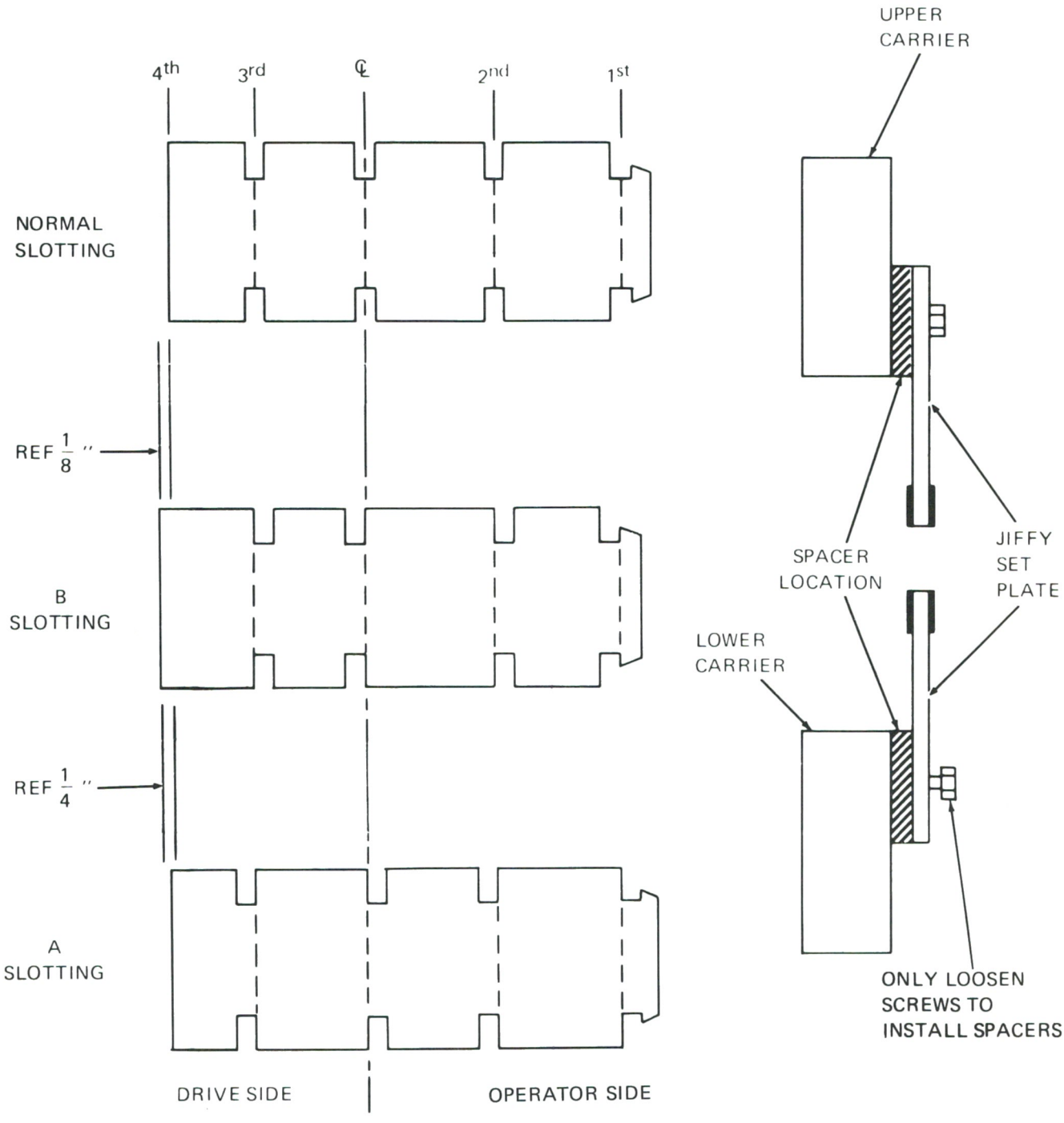


FIGURE 5-15. OFF-SET SLOTTING GUIDE

1. REPLACING JIFFY-SET SHOES (CARBON WEAR PLATES FIGURE 5-16)

If the carbon plates become worn or cracked a number of problems can appear such as incorrect panel sizes, ragged trimming, misaligned creases, partial or no trimming, insufficient gap, ragged slotting and excessive slotter blade wear. Periodic checking of carbon plates help prevent these problems. If the carbon to plate clearance exceeds .001 in. (.025 mm) or the wear is uneven the shoe must be shimmed or replaced.

2. REPLACING UNEVENLY WORN SHOES (Figure 5-16)

Step 1) Remove screws and washers that secure Jiffy plate to carrier plate.

Step 2) Pull the Jiffy plate out and remove the upper shim.

Step 3) Remove bronze screws that attach the carbon shoe and shim to the Jiffy plate.

Note

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

Step 4) Using the bronze screws, install a new carbon shoe onto the Jiffy plate.

CAUTION

The Jiffy-set shoes are fragile. They may crack or chip if mishandled. Exercise care when installing them.

Step 5) Replace the Jiffy-plate and shoe assembly into the appropriate head groove.

Step 6) Check the clearance between head and shoe using a feeler gauge.

Step 7) If clearance is acceptable go to step 10.

Step 8) If clearance exceeds -.002 in. (.051 mm) then remove shoe and install shim to bring the clearance within the acceptable range.

Step 9) If clearance is less than acceptable remove sufficient material (use sand or emery paper) from shoe to bring head-to-shoe clearance within acceptable limits.

Step 10) Pull the plate out again. Apply locktite to the bronze screws. Then install the shoe on the plate.

Step 11) Reinstall the plate, shim and spacer on the traverse plate.

3. REPLACING SHOES WITH EVEN WEAR BUT EXCESSIVE CLEARANCE

Step 1) Determine clearance using feeler.

Step 2) Remove Jiffy-set plate shim and spacer (steps 1-5 paragraph V.E.2).

Step 3) Add shims to compensate for clearance.

Note

To determine required shim thickness subtract .001 from clearance determined in step 1 above.

Step 4) Apply locktite and reinstall plate.

4. ADJUSTING SECTION LOCK MECHANISM (Figure 5-17)

To adjust lock down for wear between locking bars and wedges:

Step 1) Place 1/16 in. thick shim between the chain links and square head set screw.

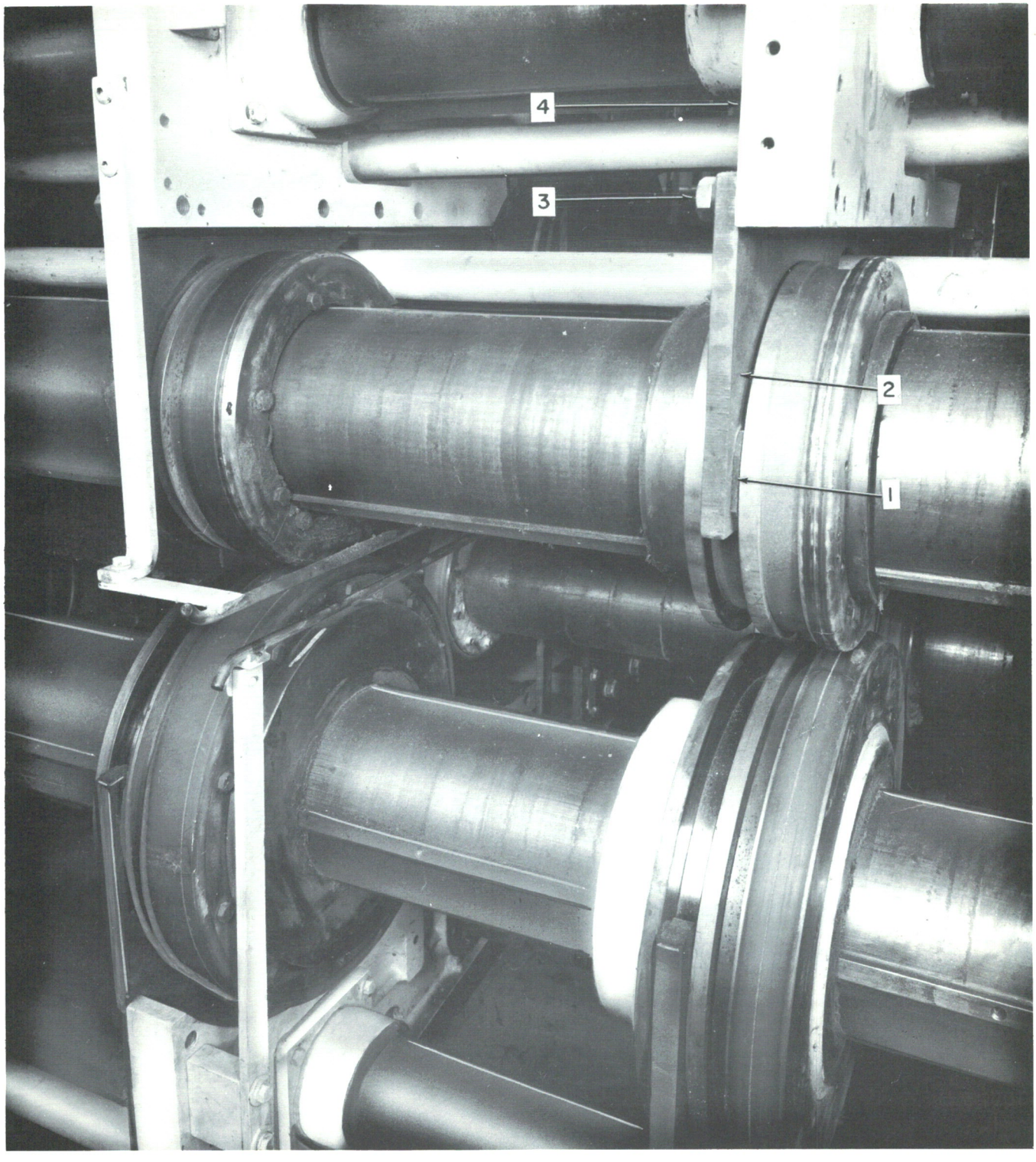
Step 2) Loosen eccentric trunion screws and rotate screws clockwise on operating side; counter-clockwise on drive side until locking bars contact wedges.

Step 3) Retighten trunion screws and remove shims.

F. TROUBLESHOOTING

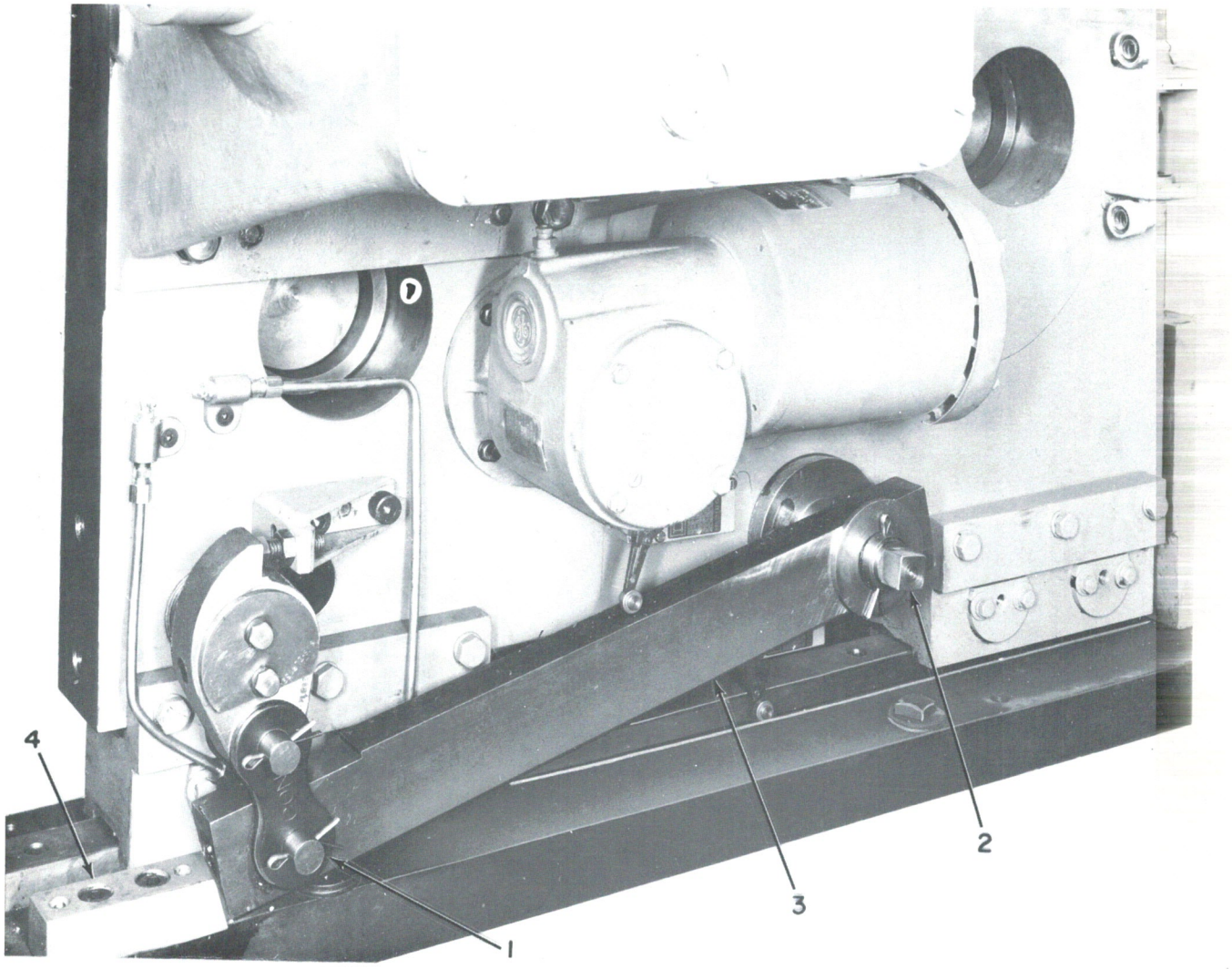
Refer to Tables 5-6 and 5-7 for a listing of operating difficulties which may be encountered and some standard procedures to correct them.

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.



1. Jiffy-set shoes
2. Jiffy-set plate
3. Plate attaching screws
4. Traveling plate

FIGURE 5-16. REPLACING JIFFY-SET SHOES



1. Chain link
2. Square head set screw
3. Locking bar
4. Wedge

FIGURE 5-17. ADJUSTING LOCKDOWN MECHANISM

TABLE 5-6. CREASER-SLOTTER BOX TROUBLES

Symptom	Cause	Remedy
Incorrect panel sizes	Panel sizes improperly set on panel scales	Adjust 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.
	Worn or missing jiffy plate carbon shoes	Replace missing or worn shoes.
	Tray clutches incorrectly engaged	Repeat realignment procedure.
Boxes not square	Kicker not straight	Adjust kicker plate
	Pull rolls too loose	Adjust for correct board caliper. Clock caliper settings in all sections; check for pull straps on printer.
Slotter head marks on box adjacent to crease	Slotter head gap too tight	Adjust the slotter for correct board caliper.
Rolling folds	Slotter head gap too tight and crushing blank along score line	Adjust the slotter head to correct board caliper.
	Insufficient creasing	Adjust the creasing head contact.
	Female creasers worn	Replace the creaser wheel and return it to the manufacturer for recovering.
Insufficient gap at glue joint	Trim knife not cutting or panel settings incorrect	Adjust or replace the trim knife.
	Insufficient trim allowance	Check panel setting and adjust if necessary.
	Rolling fold	See rolling fold symptom.
	Insufficient crease	Adjust for correct board caliper.
Excessive gap at glue joint	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	Properly position the lap-cut knives.
Glue-lap knives not cutting	Knife dull, worn or improperly adjusted	Replace the knife if worn or readjust.
	Tie brace loose	Tighten attaching bolts.
	Improper caliper	Check specification and readjust.
Trailing edge slots out of register	Beveled slotter knives improperly set	Adjust the slotter knives.
	Box slipping in slotting section	Readjust the slotter head caliper setting.

TABLE 5-6. CREASER-SLOTTER BOX TROUBLES (Continued)

Symptom	Cause	Remedy
All slots out of register (shallow or deep)	Slotting heads improperly registered	Adjust the slotter head running 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.
	Boxes slipping in section	Check caliper settings.
	Warped box	Run slower, Break lead edge flap.
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 conditions 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 different speeds	Slotter head caliper too wide	Adjust caliper setting.
	Primary and secondary creaser caliper too wide	Adjust caliper setting.

TABLE 5-7. CREASER-SLOTTER OPERATING TROUBLES

Symptom	Cause	Remedy
Lap-cutter knives not cutting	Tie brace loose	Tighten the tie-brace attaching bolts.
	Anvil worn	Replace the anvil.
	Lap-cutter knives dull	Replace the knives.
	Lap-cutter caliper adjustment incorrect	Adjust the caliper setting of knives.
	Eccentric lock screw loose	Tighten the screw.
No trimming	Trim knife not cutting	Adjust the knife contact with the anvil or replace the knife.
	Wear plates worn	Shim or 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.
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	Reengage clutch handle.
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 hold down.
	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.

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

Model 701
Flexo Folder-Gluer

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

G. CREASER-SLOTTER LUBRICATION

Refer to table 5-8 and figures 5-18, 5-19 and 5-20 for points of lubrication, frequency method and type of lubricant.

TABLE 5-8. CREASER-SLOTTER LUBRICATION

Item	Figure No.	Description	Lubricant	Period	Method
1	5-18	All working shafts	Molykote BR-2. Molybemum disulfide grease	As required	
2	5-18	Carriers (16)	NLGI no. 2, Lithium soap grease	Monthly	
3	5-18	Lead screw nuts (8)	AGMA no. 1, AGMA Spec. no. 252	Weekly	
4	5-18	Chain (operating and drive sides)	AGMA no. 1, AGMA Spec. no. 252	Weekly	
5	5-18	Upper and lower creasing heads on primary and secondary shafts	Molykote BR-2	Monthly	
6	5-18	Frame fittings (3)	NLGI no. 2	Weekly	
7	5-18	Running register adjustment handle	NLGI no. 2	Monthly	
8	5-18	Gearbox	AGMA no. 3, AGMA Spec. no. 252	Daily	
1	5-19	Hub City gear boxes	Per manufacturer's recommendation		
2	5-19	Adjustment shafts	NLGI no. 2	Weekly	
3	5-19	Sealmaster bearings	NLGI no. 2	Weekly	
4	5-19	Shaft bearings	NLGI no. 2	Weekly	
5	5-19	Sealmaster bearing	NLGI no. 2	Weekly	
6	5-19	Adjustment motor	Per manufacturer's recommendation		
7	5-19	Roller assemblies (if so equipped), operating and drive sides	NLGI no. 2	Weekly	
8	5-19	Gearbox	AGMA no. 3, AGMA Spec. 252	Daily	
1	5-20	Frame fittings (3)	NLGI no. 2	Weekly	
2	5-20	Slotting shafts	Molykote BR-2	As required	
3	5-20	Tie brace (if so equipped)	NLGI no. 2	Weekly	

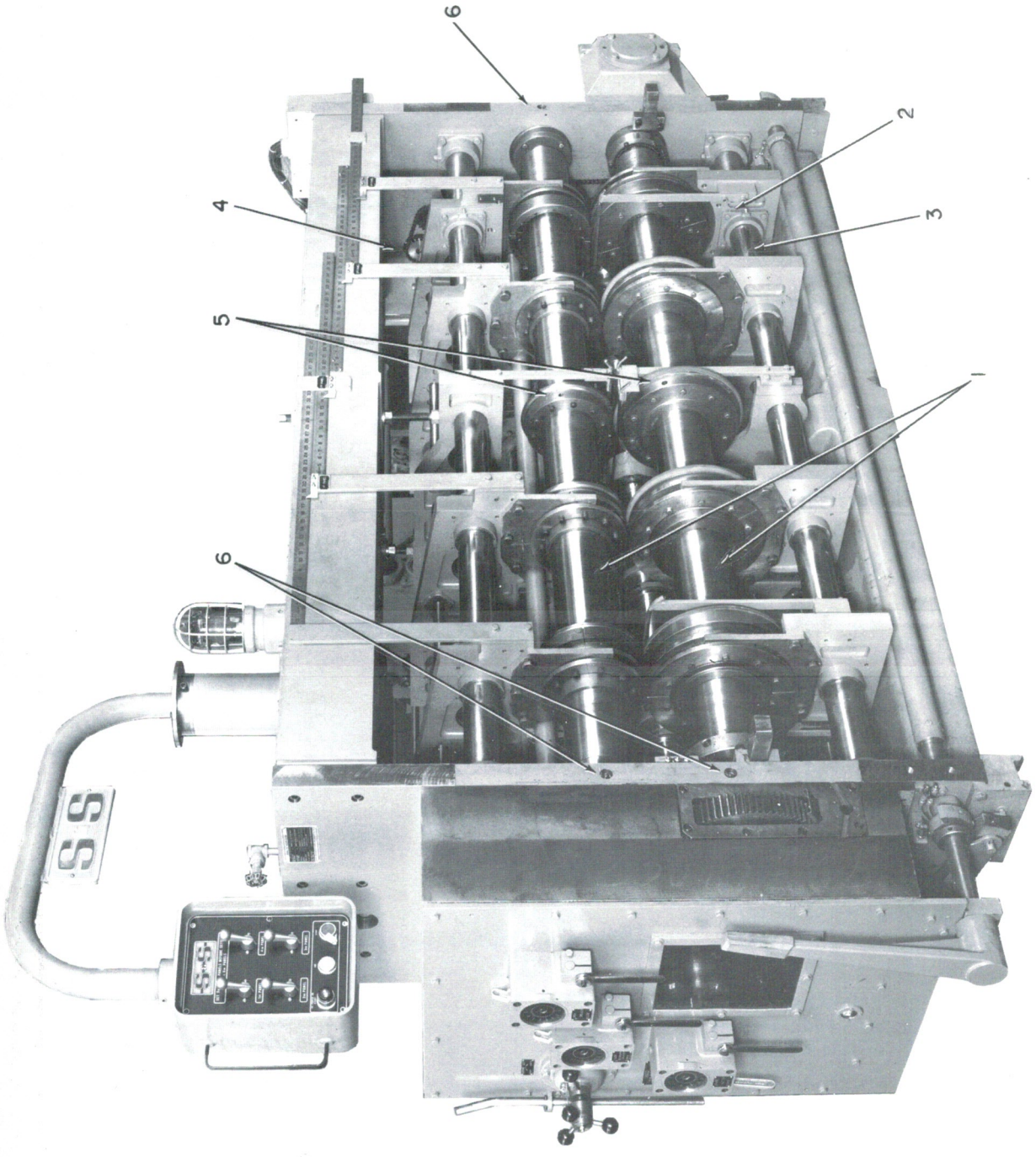


FIGURE 5-18. CREASER-SLOTTER LUBRICATION, FEED END VIEW

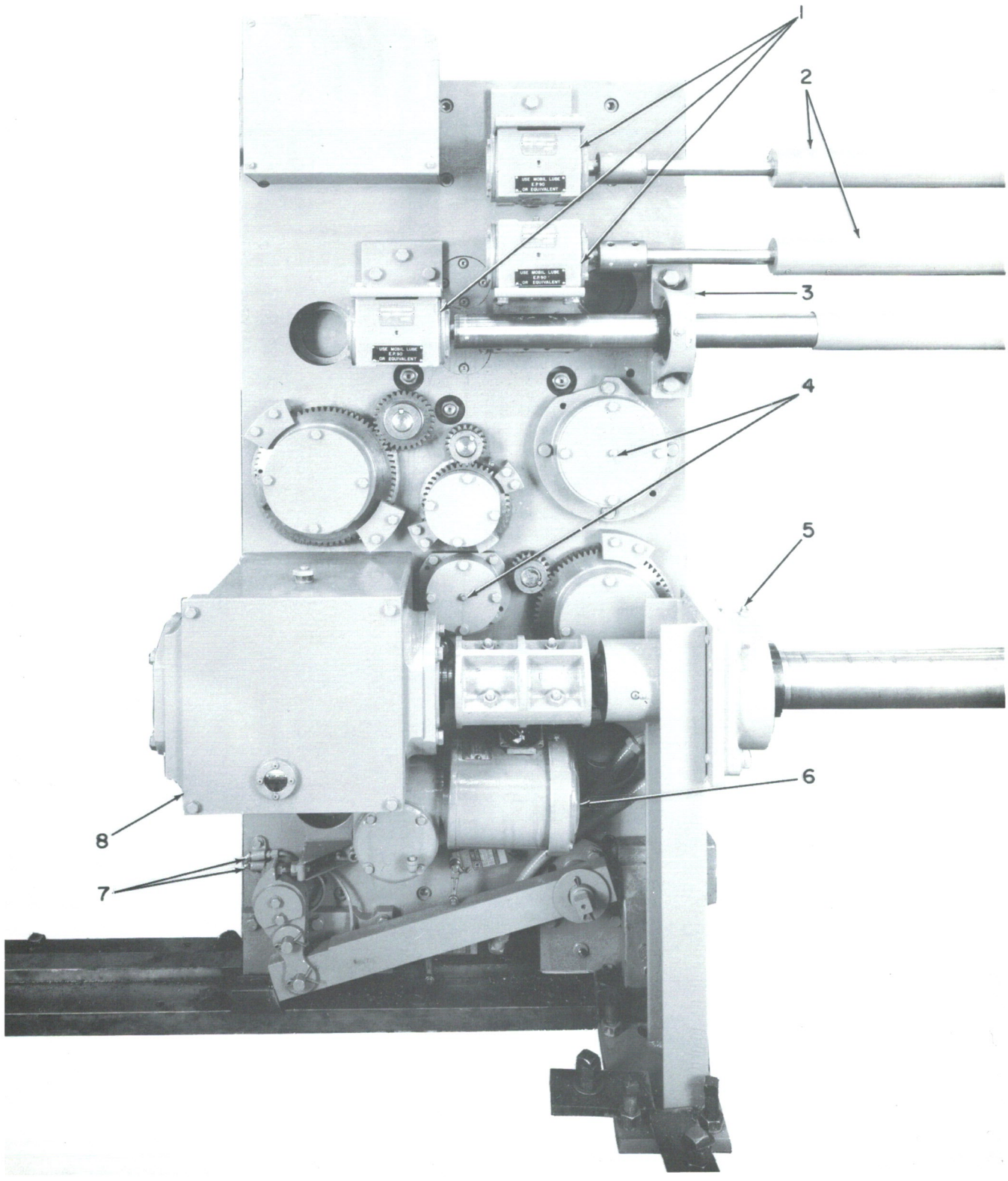


FIGURE 5-19. CREASER-SLOTTER LUBRICATION, DRIVE SIDE VIEW

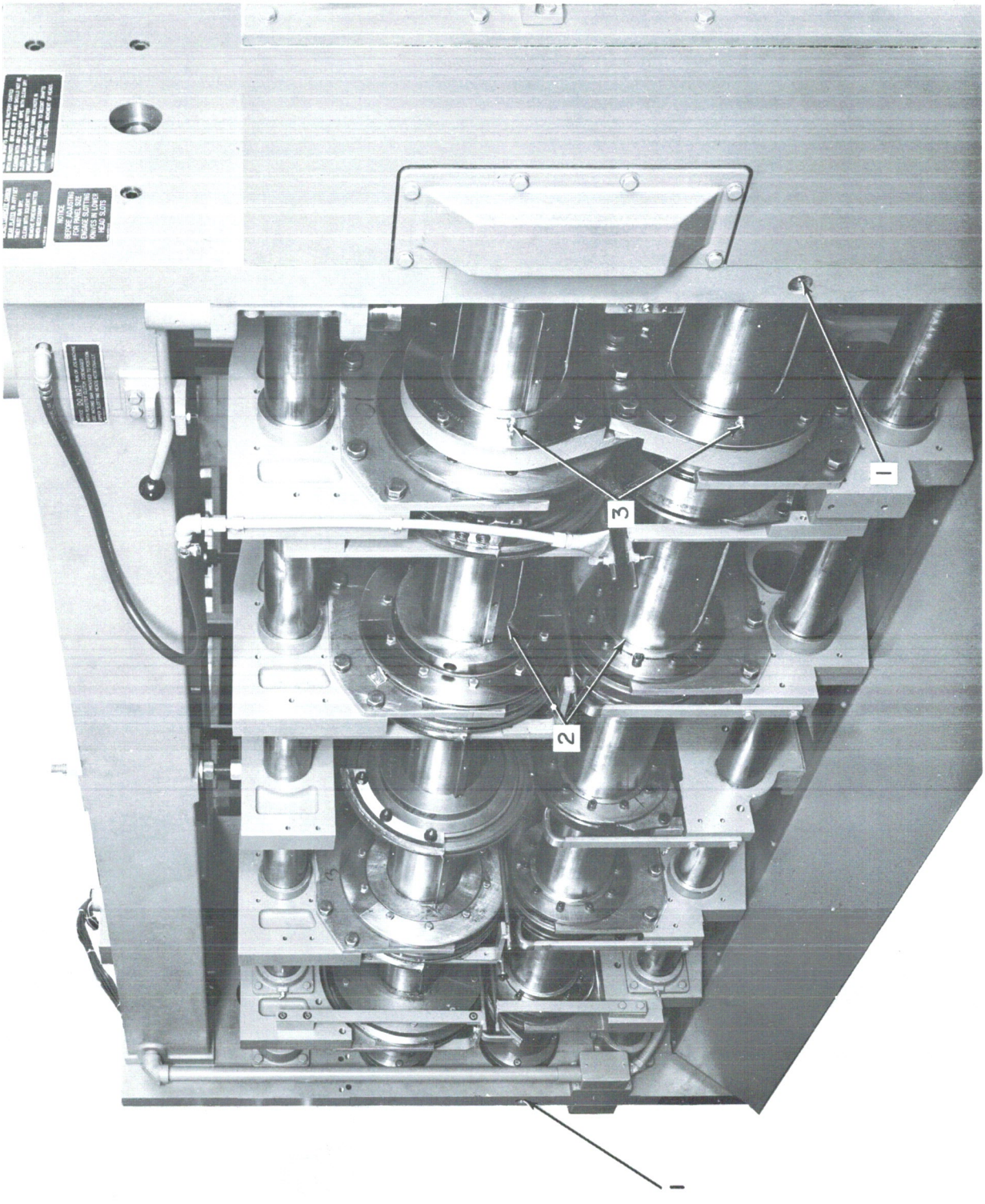


FIGURE 5-20. CREASER-SLOTTER LUBRICATION, DELIVERY END VIEW

SECTION VI.
GLUE UNITS

A. GLUE-LAP ADHESIVES

The following paragraphs give basic information about adhesives. Check with your adhesive manufacturer for detailed information. Table 6-1 gives S & S recommendations for glue lap adhesives.

1. ADHESIVES AND PH

The pH number measures the amount of acid or alkaline in a material. Low pH numbers, from 1 to 6, indicate an acid material. Number one is most acid and number 6 least. High pH, from 8 to 14 indicates an alkaline material. Number fourteen is most alkaline and number 8 least. A pH of 7 means the material is neutral, neither acid nor alkaline.

Alkaline and acid glues should not be mixed. Take care not to mix glues from different manufacturers since their pH numbers are probably different. Also, keep adhesives stored in neutral-pH containers.

2. STORAGE

Since adhesives set by losing moisture, keep the adhesives in tightly sealed containers. Glue will set in open or loosely sealed containers. Adhesives should be stored at room temperature. Cold temperatures make the glue difficult to use. Freezing ruins adhesives.

Many adhesives settle out while standing in storage. So, the glue drums should be upended every two weeks. Mix adhesives thoroughly in the drum before using.

3. SETTING TIME

On the 701 the adhesive must not set until the box has been folded and squared. S & S recommends using a glue with a setting time of 10 seconds or less.

4. SETTING TEMPERATURE

Since the speed of set depends on how fast mositure evaporates and how fast the board absorbs it, you must pay careful attention to the temperature of both glue and liner board. The colder the adhesive or board, the slower the water absorption and evaporation. If the glue is heated over 80°F too much moisture evaporates before it has time to penetrate the board and a poor bond results. Best working temperature is 70°F.

5. AMOUNT OF GLUE APPLICATION

The type of liner used determines how much glue to apply to the glue lap. Dense, water-finished kraft absorbs moisture slowly and requires relatively little adhesive. A dry-finish kraft or any porous liner requires a relatively large amount of the same adhesive. Lightweight liners of any type generally need less adhesive than similar heavyweight liner.

6. VISCOSITY (see paragraph IV.A.2.b.)

Fresh adhesives are quite thick and flow slowly. They have high viscosity. While it is fairly common to dilute the adhesive with water, this practice hurts the glue's ability to set by quickly losing moisture. The heavy body of

TABLE 6-1. RECOMMENDED GLUE LAP ADHESIVE CHARACTERISTICS

Characteristic	Specification
Type of product	Aqueous resin-emulsion
Appearance	Creamy white fluid
Odor	Slight - wet; none - dry
Viscosity	1,900 to 2,000 cps
Percent solids	50 to 55 percent
Weight per gallon	9.0 to 10.0 lb. (4.2 to 4.6 kg)
PH	4.5 to 5.5
Setting time	10 seconds or less

adhesives results from thickening agents added to the glue by the manufacturer. Diluting the glue thins out these thickening agents and causes a poor glue bond.

7. FOAMING

Use caution when adding defoamer to glue preparations. Check with glue manufacturer if you have questions about adding a defoamer.

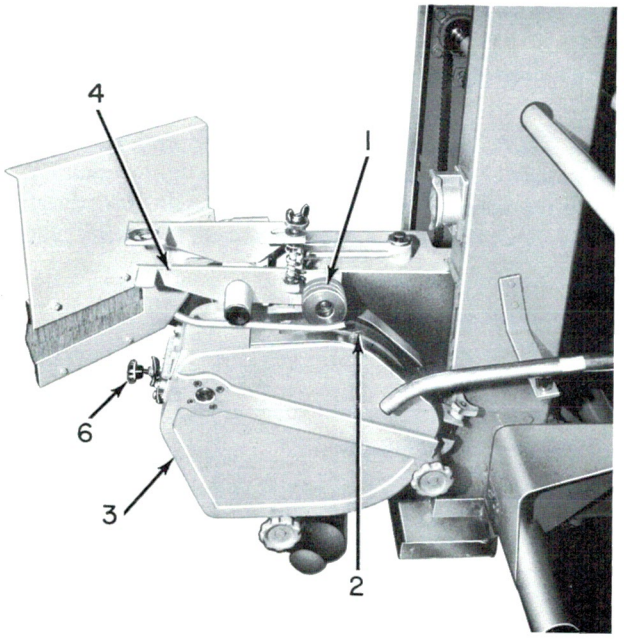
B. INSIDE-LAP GLUE UNIT

1. DESCRIPTION

The inside-lap glue unit (Figure 6-1), standard equipment on all 701 Flexo Folder-Gluers, applies glue to the bottom of the glue lap (also called glue tab) to form an inside-glued box. The unit is mounted on the operating side of the folding section feed end frame (see Section V.A.) and consists of the following components: glue pot, probe unit, glue wheel, 2 pressure rolls, doctor blade, scrap shield and brush assembly.

a. Glue Pot (3 Figure 6-1)

The glue pot forms the main housing for the glue wheel and doctor blade. The gluepot receives the glue pumped in from the glue drum.



1. Pressure roll
2. Glue wheel
3. Glue pot
4. Pressure roll swivel bracket

FIGURE 6-1. 701 INSIDE-LAP GLUE UNIT

b. Probe Unit (1 Figure 6-2)

An electromechanical sensing device mounted in a supplementary glue pot (2 Figure 6-2) adjacent to the glue pot, monitors the glue level in the glue pot. This probe automatically maintains the glue at a constant operating level. The probe consists of two sensing elements and an electrical ground. One element is used for controlling a high glue level condition, the other a low level condition.

c. Glue Wheel (1 Figure 6-1)

The stainless steel glue wheel is mounted in the glue pot. Engraved serrations in the wheel carry the glue to the glue lap. The wheel is driven by a fractional horsepower motor mounted on the operating side of the unit (3 Figure 6-2).

d. Pressure Roll (1 Figure 6-1)

The pressure roll is mounted on a swivel bracket above the glue roll. It maintains positive uniform contact of the glue 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.

e. Doctor Blade (1 Figure 6-3)

A plastic reverse angle doctor blade removes excess glue from the glue wheel. The assembly is also equipped with wiper extensions to remove glue from the sides of the roll. This prevents seepage outside the glue unit housing.

f. Scrap Shield and Brush Assembly (4 Figure 6-2)

Two brushes mounted on a swiveling scrap shield wipe the blade clean of scrap or dust generated by forming the glue lap. In addition to scrap removal, the shield also maintains a clean glue pot, preventing glue contamination.

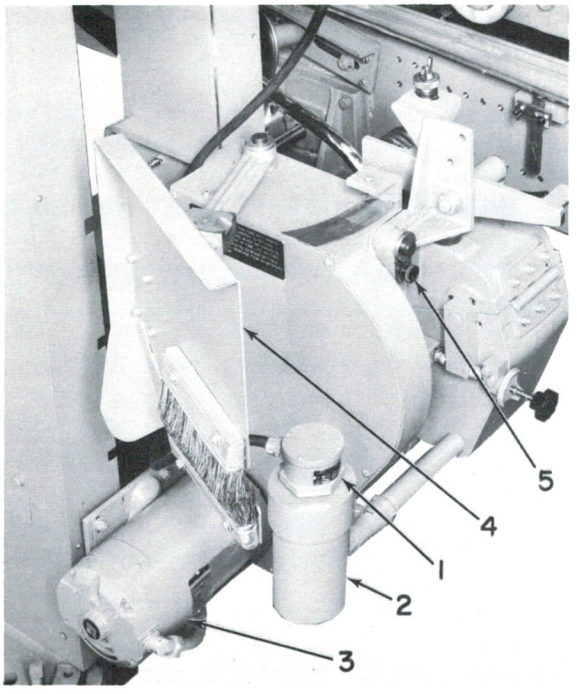
g. Glue Drum Stand (Figure 6-12)

The glue drum stand is a separate unit that supports the glue drum and a solenoid switch.

2. INSIDE GLUE UNIT PROCESS (Figure 6-4)

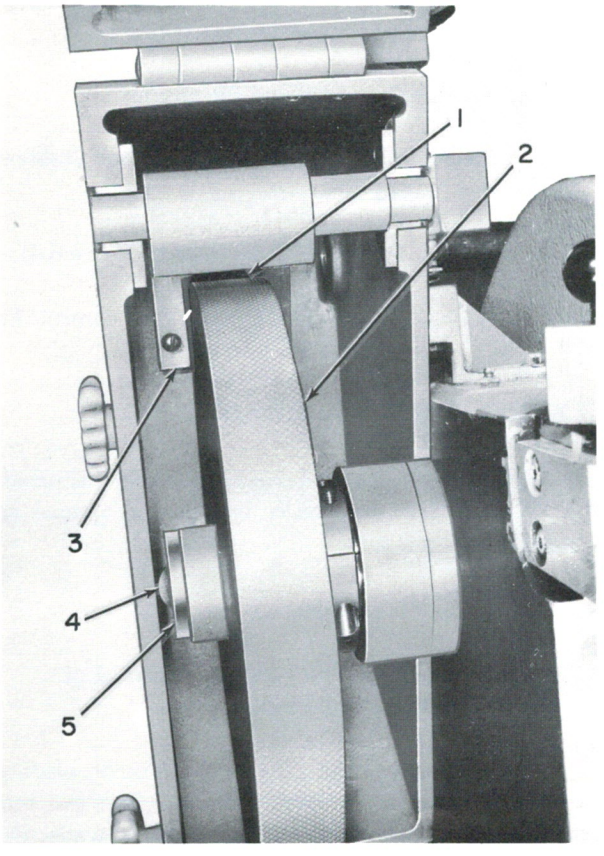
a. Glue Feed

The glue wheel is driven by its own dc slave motor; motor speed compensating for the speed of the main drive. The slave motor and an idling mechanism keep the glue wheel turning to prevent the glue from drying on the wheel.



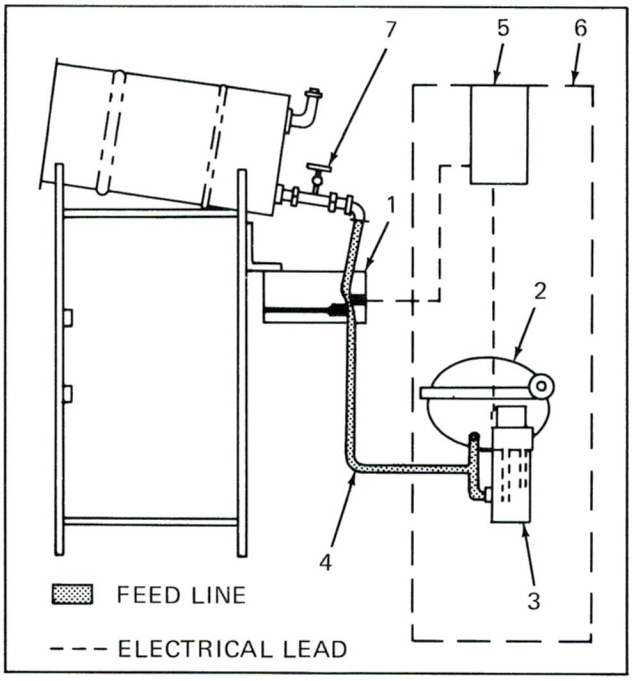
1. Probe unit
2. Supplementary glue pot
3. Glue roll motor
4. Swivel scrap shield and brush assembly
5. Scrap shield and brush assembly lock

FIGURE 6-2. PROBE UNIT



1. Doctor blade
2. Glue roll
3. Extension wipers
4. Glue wheel attaching screw
5. Collar

FIGURE 6-3. DOCTOR BLADE AND GLUE WHEEL



1. Solenoid
2. Glue Pot
3. Probe Unit
4. Outlet Hose
5. Control Box with sensitivity selector rheostat
6. Folding Section Frame
7. Glue Drum Valve

FIGURE 6-4. INSIDE-LAP GLUE UNIT SCHEMATIC

A gravity feed system feeds glue from a 55-gallon drum into the glue pot. The electronic sensing device keeps the glue at proper operating level. When the glue level drops below the long probe, the system circuit engages a solenoid switch to open the glue hose. Glue flows into the pot until the glue level reaches the short probe. The solenoid then activates to pinch the hose and prevent additional flow until the glue level drops again.

An amber light on top of the creaser-slotter section (9 Figure 5-2) flashes when the glue is flowing. This usually lasts about 30 seconds. Continued flashing indicates trouble such as an empty drum or sticking solenoid.

b. Glue Application

As each blank leaves the creaser-slotter section, the glue lap is directed by guides mounted on the scrap shield between the cleaning brushes. The lap passes over the glue wheel and underneath the pressure roll, receiving a thin layer of glue on the bottom surface.

In the folding section the operating side panel with the glue lap gets folded down first to form an inside glue lap.

3. INSIDE GLUE UNIT OPERATION AND ADJUSTMENT CONTROLS

Tables 6-2 and 6-3 give the name, location and use of the inside glue unit operation and adjustment controls.

4. INSIDE GLUE UNIT SETUP AND ADJUSTMENTS

The glue unit is automatically positioned when panel #1 is set.

Use following procedures to set up and operate the inside glue unit.

a. Setting Pressure Roll

Step 1) Set pressure roll using pressure roll height adjustment knob (Table 6-1)

Note

Set pressure roll as close to the glue roll as possible without picking up glue.

Step 2) Ensure pressure roll height adjustment lock nut is properly seated.

Step 3) Ensure scrap shield is swiveled and locked into operating position.

b. Starting Glue Feed and Glue Motor

Step 1) Turn glue feed control knob (Table 6-2) to ON.

Step 2) Open glue drum valve (7 Figure 6-4)

Step 3) Turn GLUE MOTOR control knob (Table 6-2) to ON.

5. PREVENTIVE MAINTENANCE

Use Table 6-4 as a guide for periodic maintenance. The chart outlines inspection periods for various components on the glue unit.

Note

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

When cleaning the glue wheel, doctor blade and holder do not use wire brushes. Hard-to-remove glue can be removed with a soft brush and a solution of water, detergent and acetone.

TABLE 6-2. INSIDE GLUE UNIT OPERATION CONTROLS

Name	Figure No.	Location	Use
Glue feed control selector switch	6-5	Mounted outside electrical box on top of operating side of folding section feed end frame	ON/OFF positions turn probe unit on or off.
Sensitivity selector rheostat	6-7	Mounted inside electrical box on top of operating side of folding section delivery end frame	Numbered positions set the sensitivity of the probe according to the type of glue.
Glue motor control knob	3-12	Feed end control box	Turns glue motor on or off.
Glue drum valve	6-4 (7)	Mounted on glue drum	Shuts off flow of glue from glue drum.

TABLE 6-3. INSIDE GLUE UNIT ADJUSTMENT CONTROLS

Name	Figure No.	Location	Use
Pressure roll height adjustment wing nut and lock	6-6 (1)	Above glue roll	Adjusts pressure of glue lap against glue roll by turning wing nut up or down.
Doctor blade adjustment knob and lock nut	6-6 (6)	Feed end of glue pot assembly	Adjusts position of doctor blade against glue roll.
Glue pot cover lock nut	6-6 (3)	Delivery end of glue unit assembly	Unlocks glue pot cover for top access to glue pot and glue roll.
Glue pot lower section lock knobs (2)	6-6 (4)	Bottom of glue unit assembly, above probe unit	Adjusts position and removes glue pot assembly.
Scrap shield and brush assembly swivel spring lock pin	6-2 (5)	Adjacent to pressure roll	Allows movement of pressure roll assembly into or out of operating position.

TABLE 6-4. INSIDE-LAP GLUE UNIT PERIODIC MAINTENANCE

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 thoroughly.
	Weekly	Inspect glue unit. Clean glue wheel thoroughly.
	Monthly	Check doctor blade for wear. Replace blade if necessary.
Glue wheel shaft	Weekly	Grease shaft before replacing wheel after cleaning.
Drip pan	Daily	Remove and wash thoroughly

6. TROUBLESHOOTING

Refer to Tables 6-5 and 6-6 for a listing of operating difficulties which may be encountered and the standard procedures to correct them.

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 from improper assembly of the box when inspected at the delivery end of the machine.

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

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

C. INSIDE/OUTSIDE-LAP GLUE UNIT (OPTION)

1. DESCRIPTION

The inside/outside-lap glue unit (Figure 6-8) can apply glue to either the top or the bottom of the glue lap to form an inside or an outside-glued container. The unit is mounted on the operating side of the folding section feed end frame. It consists of the following components: glue wheel; glue shoe; pressure rolls; scrap shield and brush assembly; glue wheel drive motor; and glue stand.

a. Glue Wheel (1 Figure 6-9)

The stainless steel glue wheel is mounted inside the main housing. Engraved serrations in the wheel carry the glue to the glue lap. The wheel is driven by a dc slave motor (1 Figure 6-10) mounted underneath the glue unit pivot.

b. Glue Shoe (2 Figure 6-9)

The cast bronze glue shoe applies glue directly to the glue wheel. It serves as a combined glue pot and doctoring mechanism. Intake and outlet cavities are cast into the shoe.

c. Pressure Rolls (2 Figure 6-10, 6-11)

The pressure rolls are mounted on swivel brackets, one above and one below the glue roll. Thin circular flanges make contact with the box to prevent fouling the pressure roll with adhesive when the board is not feeding through the unit.

d. Scrap Shield and Brush Assembly (5 Figure 6-10)

Two brushes mounted on a swiveling scrap shield wipe the blank clean of scrap or dust generated by forming the glue tab. In addition to scrap removal, the shield also maintains a clean glue pot, preventing contamination.

TABLE 6-5. INSIDE GLUE UNIT BOX TROUBLES

Symptom	Cause	Remedy
Insufficient glue pattern	Pressure roll improperly set	Readjust pressure roll contact pressure for caliper of board to be run.
	Glue roll unevenly worn	Replace glue roll.
	Insufficient glue in glue pot or drum	Replenish 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 pressure roll for the caliper of board to be run.
	Worn glue roll depositing glue on folding belts	Replace glue roll.
	Excessive glue application	Reduce glue film thickness.

TABLE 6-6. INSIDE GLUE UNIT OPERATING TROUBLES

Symptom	Cause	Remedy
Insufficient glue in pot	Glue drum empty	Replace drum.
	Glue drum membrane	Ensure membrane is punctured.
	Hoses clogged	Flush and clean hoses. Replace hoses if necessary.
	Glue drum valve closed	Ensure drum valve is open.
	Probe unit inoperative or dirty	Clean unit. Replace if defective.
	Glue foaming	Add defoamer to glue.
	System not turned on	Ensure system switch is activated.
Glue pot overflows	Probe unit inoperative or dirty	Clean unit. Replace if defective.
	Solenoid mechanism defective	Replace defective parts in mechanism.
	Glue feed hose from drum not engaged properly by solenoid	Check solenoid; re-thread hose.
Glue flinging or slinging	Scrap in glue pot	Clean glue mechanism and glue pot.
	Worn glue roll	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 glue film.

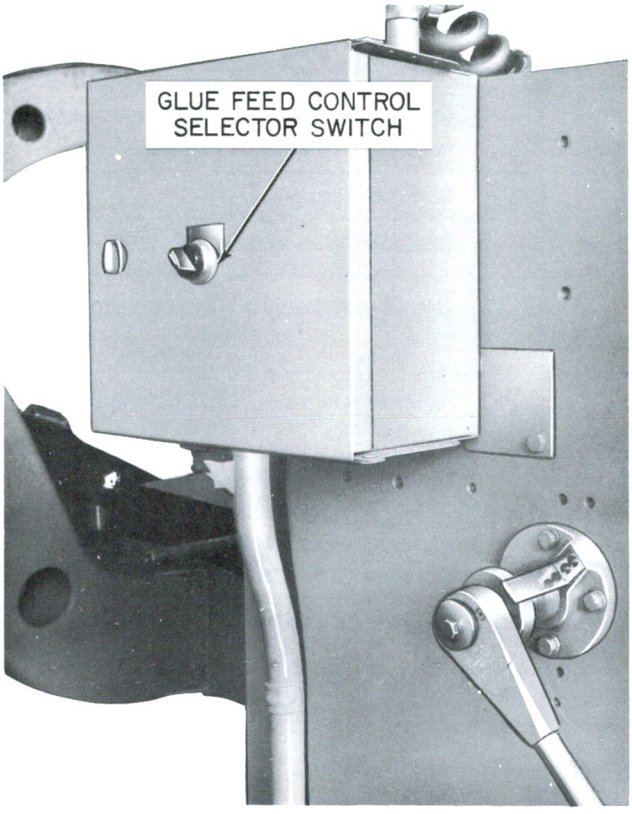
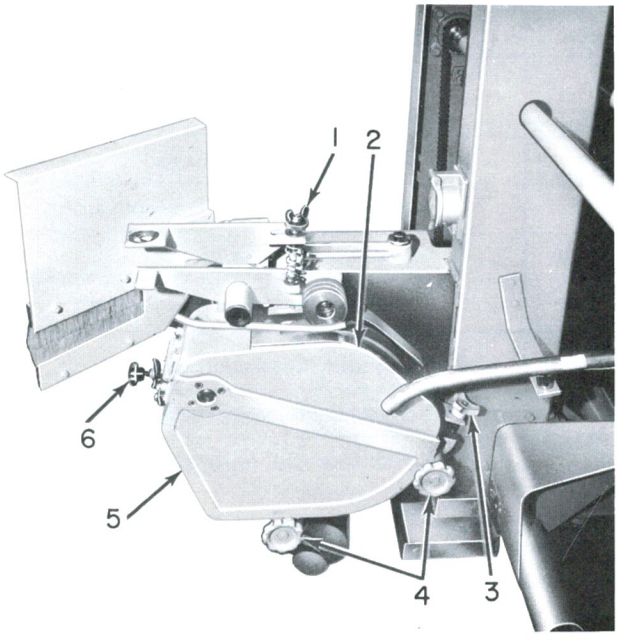


FIGURE 6-5. GLUE FEED CONTROL CABINET



1. Pressure roll height adjustment
2. Glue pot cover
3. Glue pot cover lock nut
4. Glue pot lower section lock knobs
5. Glue pot lower section
6. Doctor blade adjustment

FIGURE 6-6. GLUE UNIT ADJUSTMENT CONTROLS

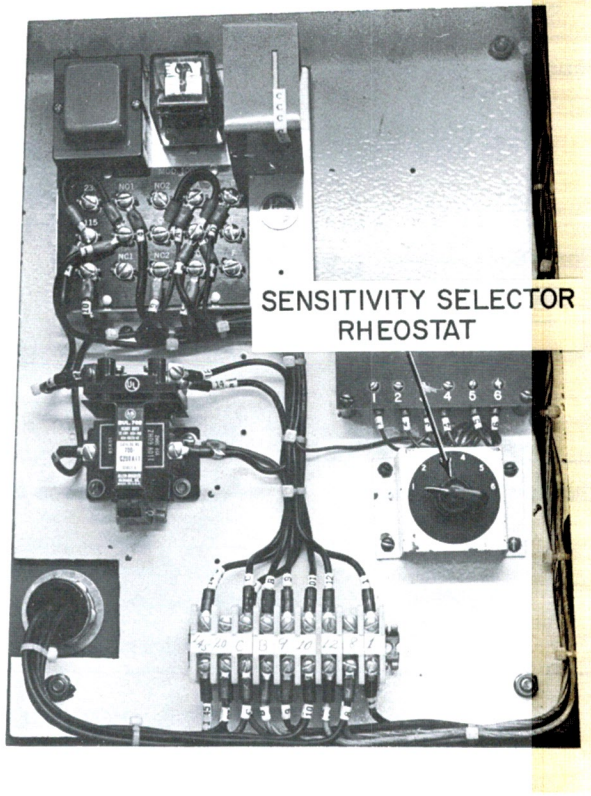


FIGURE 6-7. SENSITIVITY SELECTOR RHEOSTAT

e. Glue Drum Stand (Figure 6-12)

The glue drum stand is a separate unit that supports the glue drum and control box.

2. INSIDE/OUTSIDE LAP GLUING PROCESS (Figure 6-13)

a. Glue Feed

A gravity feed system feeds glue from a 55-gallon drum into the supplementary glue pot. The electronic sensing device monitors the glue level in the pot. When the glue level reaches a certain height, the sensor activates a solenoid switch which pinches off the glue hose form the drum. When the glue level falls to the low point, the sensor disengages the solenoid and allows glue to flow into the supplementary pot.

The glue pump sends the glue from the supplementary glue pot to the glue shoe through the glue inlet hose. Sealing action of the shoe against the wheel prevents glue from escaping. Excess glue returns to the glue pot by the glue outlet hose. A bypass valve allows the operator to pump glue directly from the drum into the glue shoe to apply a richer load to the glue wheel.

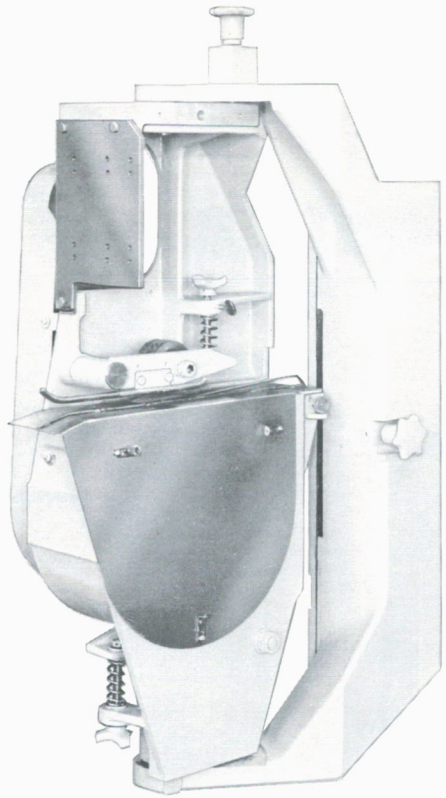
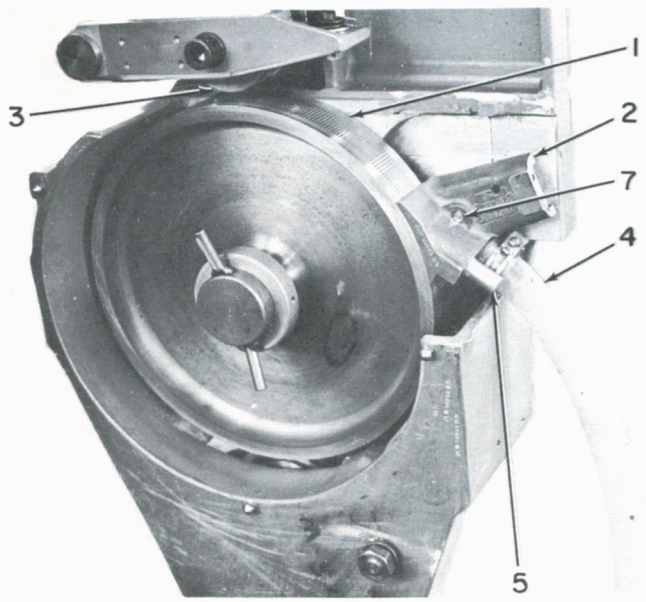


FIGURE 6-8. 701 INSIDE/OUTSIDE-LAP GLUE UNIT



1. Glue wheel
2. Glue shoe
3. Pressure roll
4. Glue intake
5. Glue outlet
6. Glue wheel lock nut
7. Glue shoe adjusting screw

FIGURE 6-9. GLUE SHOE AND GLUE WHEEL

An amber light on top of the creaser-slotter (9 Figure 5-2) flashes when glue is flowing. Glue flow usually lasts about 30 seconds. Continued flashing indicates trouble such as empty drum or sticking solenoid.

b. Glue Application

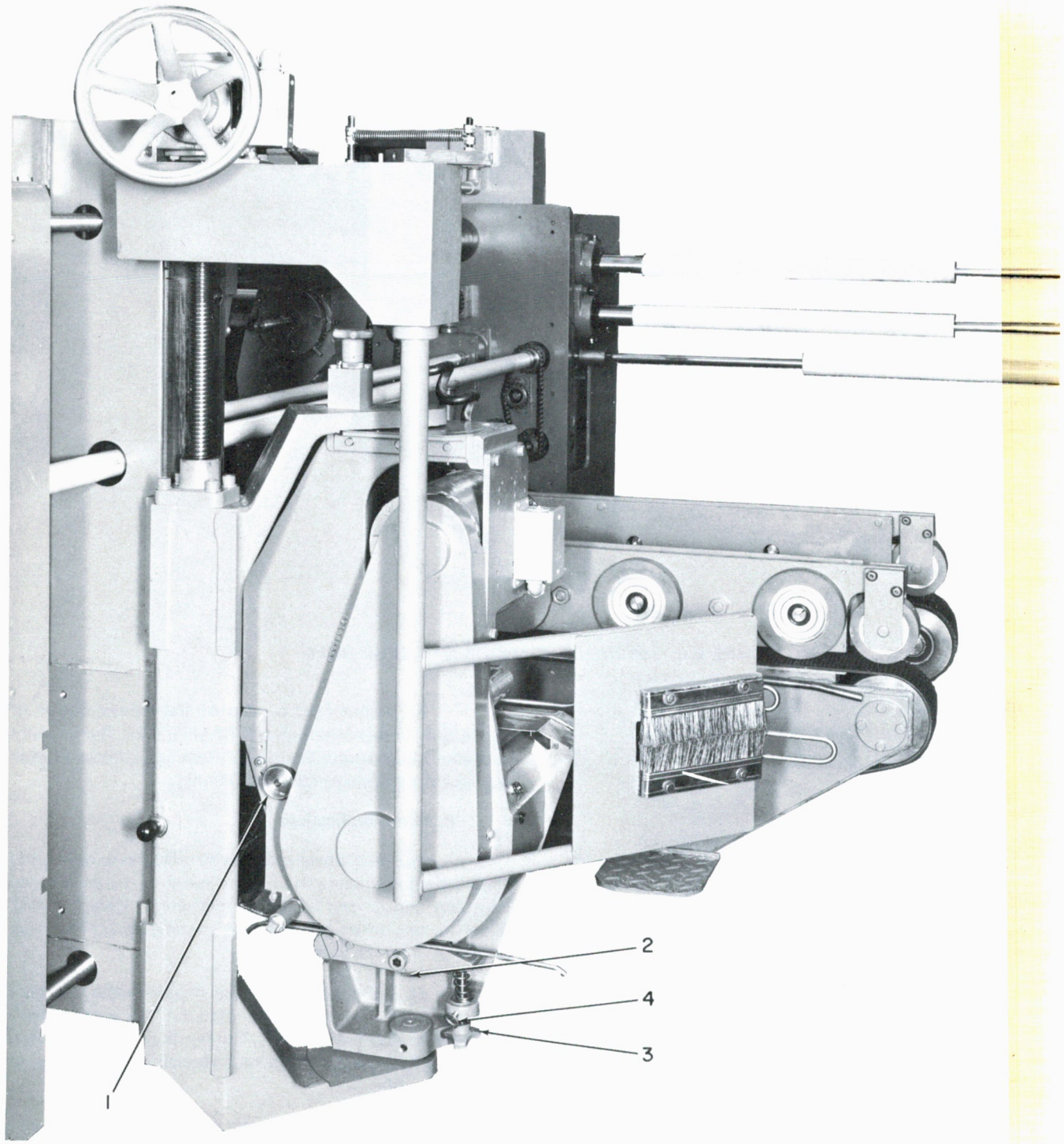
The glue wheel is driven by a DC slave motor, the motor speed compensating for the speed of the main drive. The slave motor and an idling mechanism keep the glue wheel turning when board is not running to prevent glue from drying on the wheel.

As each blank leaves the creaser-slotter, the glue lap is directed by guides, mounted on the scrap shield, between the cleaning brushes. The lap then passes between the glue wheel and pressure roll, receiving a thin layer of glue on one side.

In the folding section the operating side panel with the glue lap folds down first to form an inside-glued box. The drive side panel folds down first to form an outside-glued box.

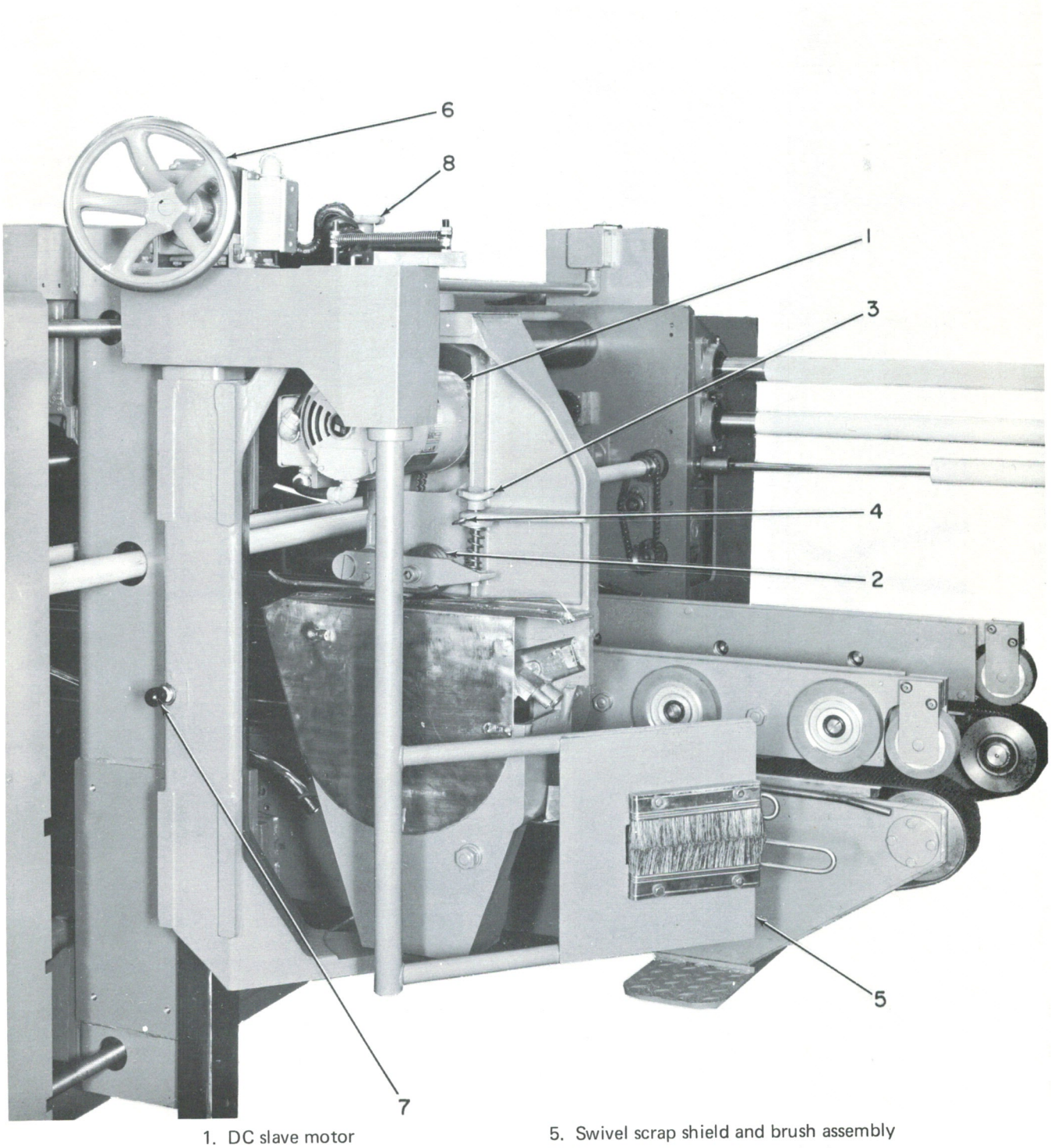
3. INSIDE/OUTSIDE FLAP GLUE UNIT OPERATION AND ADJUSTMENT CONTROLS

Tables 6-7 and 6-8 describe operation controls, adjustment controls and indicators for the inside/outside glue unit.



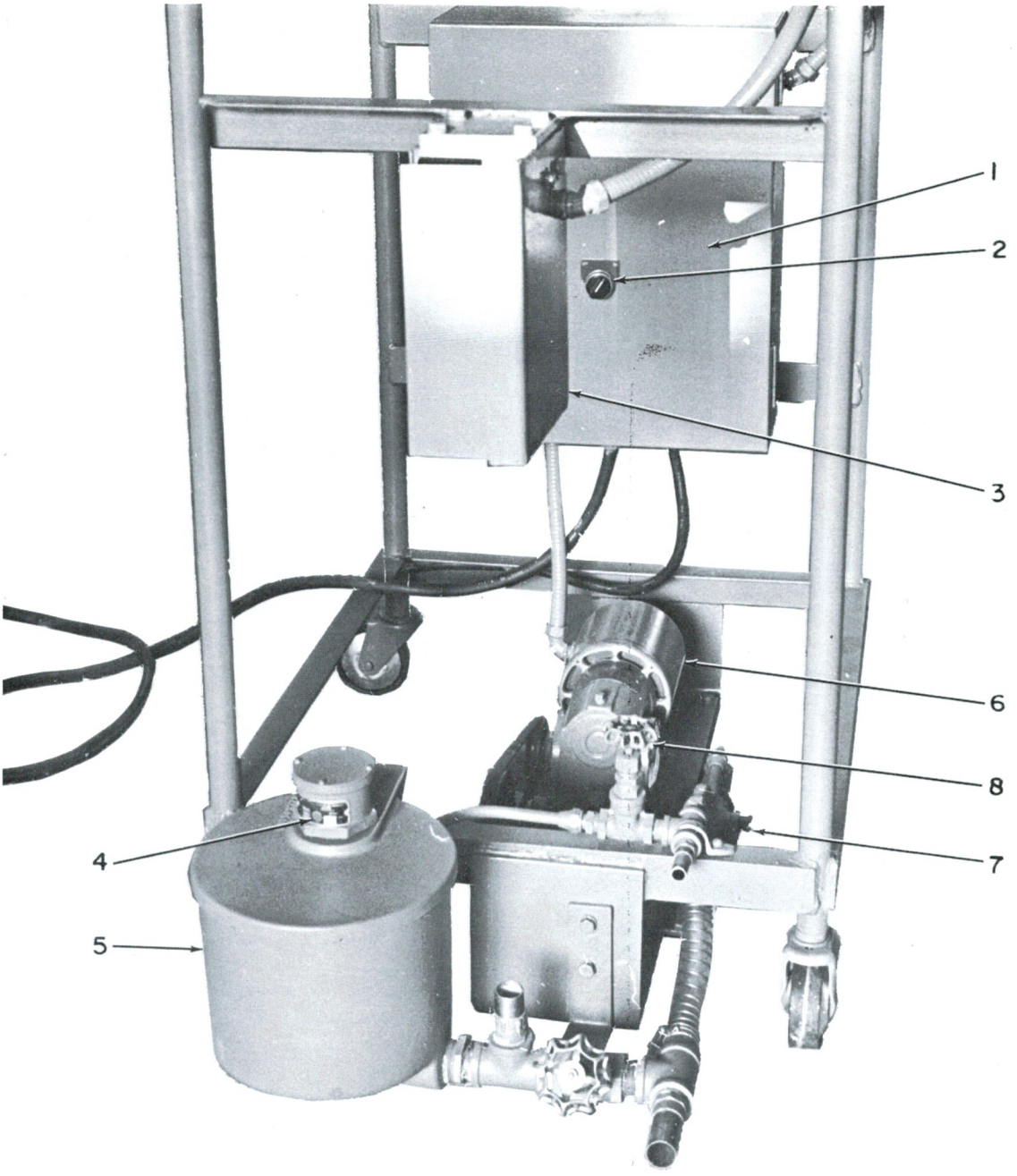
1. Glue shoe adjusting knob
2. Pressure roll
3. Pressure roll adjustment knob
4. Pressure roll adjustment lock

FIGURE 6-10. INSIDE-LAP POSITION



1. DC slave motor
2. Pressure roll
3. Pressure roll adjustment knob
4. Pressure roll adjustment lock
5. Swivel scrap shield and brush assembly
6. Vertical adjustment handwheel
7. Vertical adjustment lock pin
8. Swivel lock pin

FIGURE 6-11. OUTSIDE-LAP POSITION



1. Glue feed control box
2. Glue feed selector switch
3. Solenoid switch
4. Probe unit
5. Supplementary glue pot
6. Glue pump motor
7. Glue pump
8. By-pass valve

FIGURE 6-12. GLUE DRUM STAND

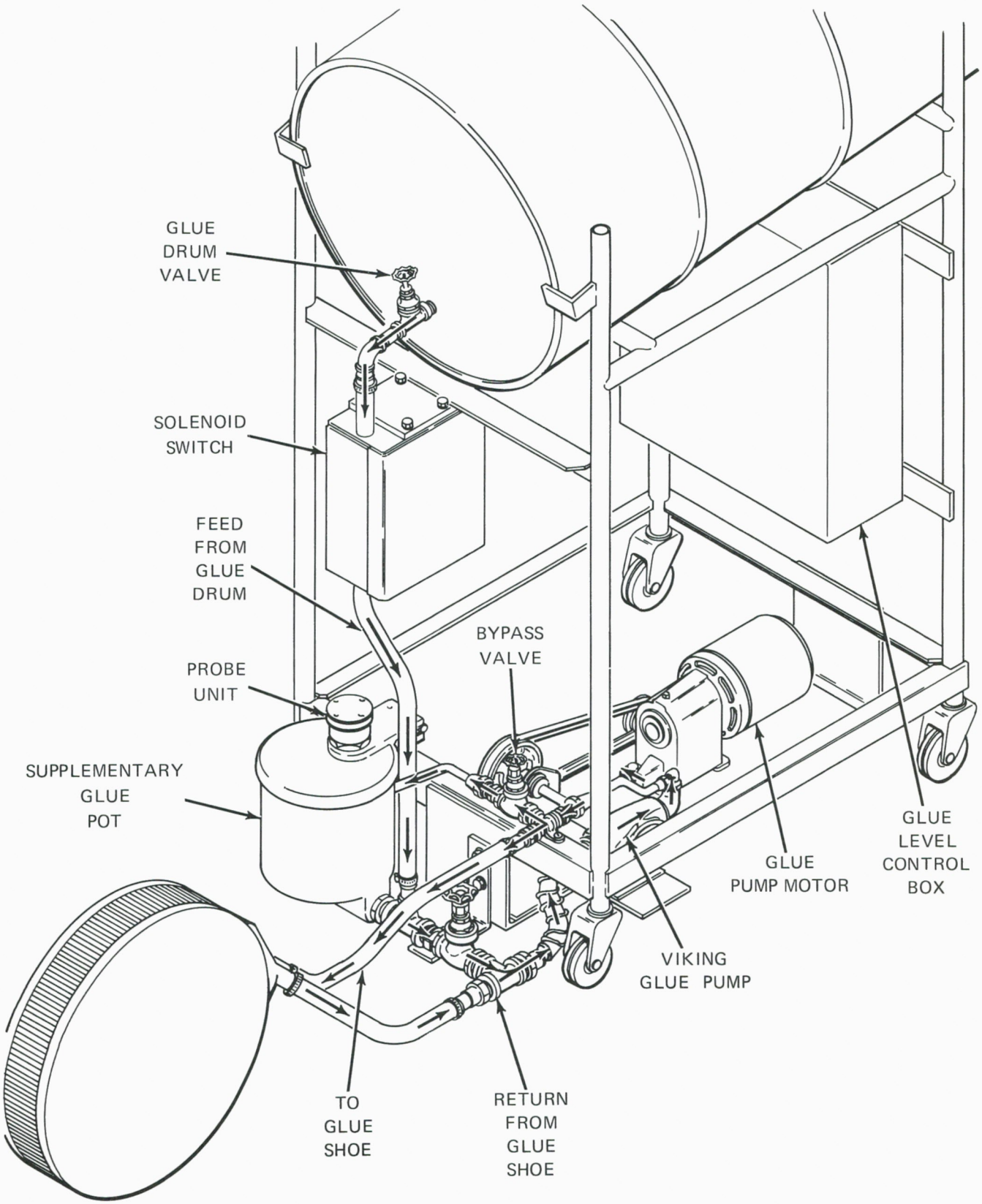


FIGURE 6-13. INSIDE/OUTSIDE-LAP GLUE UNIT SCHEMATIC

TABLE 6-7. INSIDE/OUTSIDE-LAP GLUE UNIT OPERATION CONTROLS

Name	Figure No.	Location	Use
GLUE FEED selector switch	6-12 (2)	Outside control box mounted in glue drum stand	ON/OFF positions turn the pump on or off.
GLUE MOTOR control	3-12	Two-pole switch mounted on feed end operating side control panel	ON/OFF positions turn glue motor on or off.
Glue drum valve	6-4 (7)	Attached to glue drum	Shuts off flow of glue from glue drum .
Glue flow yellow indicator light	5-2 (9)	Mounted on top of creaser-slotter section	Light on indicates glue flowing.
Sensitivity selector rheostat	6-7	Inside glue feed control box	Adjusts sensitivity of glue pot probes.

TABLE 6-8. INSIDE/OUTSIDE GLUE UNIT ADJUSTMENT CONTROLS

Name	Figure No.	Location	Use
Vertical adjustment handwheel	6-11 (6)	Top of glue unit supporting frame	Controls the up and down movement of the unit for inside or outside gluing.
Vertical adjustment lock pin	6-11 (7)	Middle of the glue unit supporting frame on the drive side	Locks the vertical position of the glue unit.
Swivel lock pin	6-11 (8)	Top of the glue unit, adjacent to the pivot	Allows the unit to swivel to position for inside or outside gluing.
Glue shoe adjusting knob	6-10 (1)	Adjacent to the glue shoe outside the main housing	Locks the glue shoe in place against the glue wheel.
Pressure roll adjustment knobs (2)	6-10 (3) 6-11	Adjacent to both pressure rolls	Adjusts the location of the pressure rolls to the glue wheel.
Pressure roll adjustment lock	6-10 (4) 6-11	Attached to each pressure roll adjustment knob	Locks the pressure roll adjustment so the roll does not move during operation.
Glue shoe adjusting screw	6-9 (7)	Attached to glue shoe casting	Adjusts glue shoe for wear.

4. INSIDE/OUTSIDE-LAP GLUE UNIT SETUP AND ADJUSTMENTS

a. Setting the Proper Glue Lap

Step 1) Pull out the vertical adjustment lock pin (Table 6-8)

Step 2) Turn the handwheel (Table 6-8) until the unit is in the top position for outside glue lap or in the bottom position for inside glue lap.

Step 3) Reset vertical adjustment lock pin.

Step 4) Release swivel lock (Table 6-8) and rotate unit for appropriate glue lap.

Step 5) Set correct pressure roll, using pressure roll adjustment knob (Table 6-8) as close as possible to glue wheel without picking up glue.

Step 6) Open glue drum valve (Table 6-7).

Step 7) Turn GLUE FEED control switch to ON (Table 6-7).

Step 8) Turn GLUE MOTOR selector switch (Table 6-7) to ON.

Step 9) Adjust folding secton for proper glue lap if necessary (see paragraph VII.D.3.)

b. Setting and Adjusting Glue Shoe

The glue shoe should be set against the glue wheel with the minimum amount of pressure necessary to prevent leakage. Excessive pressure of glue shoe against the wheel can cause the wheel to stop idling or running. Too little pressure between shoe and wheel can cause leakage.

Note

The glue film on the wheel is predetermined by serrations on the wheel. The film cannot be increased or decreased by glue shoe pressure.

Step 1) Remove accumulated scrap, glue and paper dust before adjusting shoe.

Step 2) Loosen glue shoe adjusting knob (Table 6-7) a small amount counterclockwise while the glue roll is idling and glue pump is on.

Step 3) Push the shoe against the glue roll until no glue escapes from the shoe, and sides of the glue roll face are clean and dry.

Step 4) Tighten adjusting knob to secure adjustment in position. Small adjustments for wear may be required periodically. The least amount of pressure necessary for good operation is desirable.

CAUTION

Do not overadjust glue shoe or adjust glue shoe unnecessarily.

5. PREVENTIVE MAINTENANCE

The glue shoe should be cleaned thoroughly with warm water at the end of each shift. The glue wheel should also be cleaned of dried glue and accumulated scrap.

Note

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

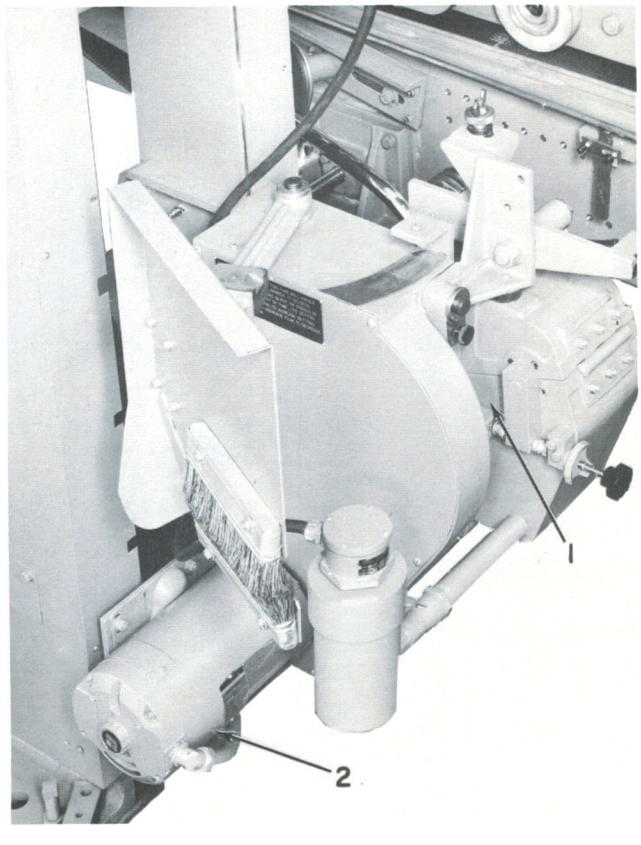


FIGURE 6-14. INSIDE-LAP GLUE UNIT LUBRICATION

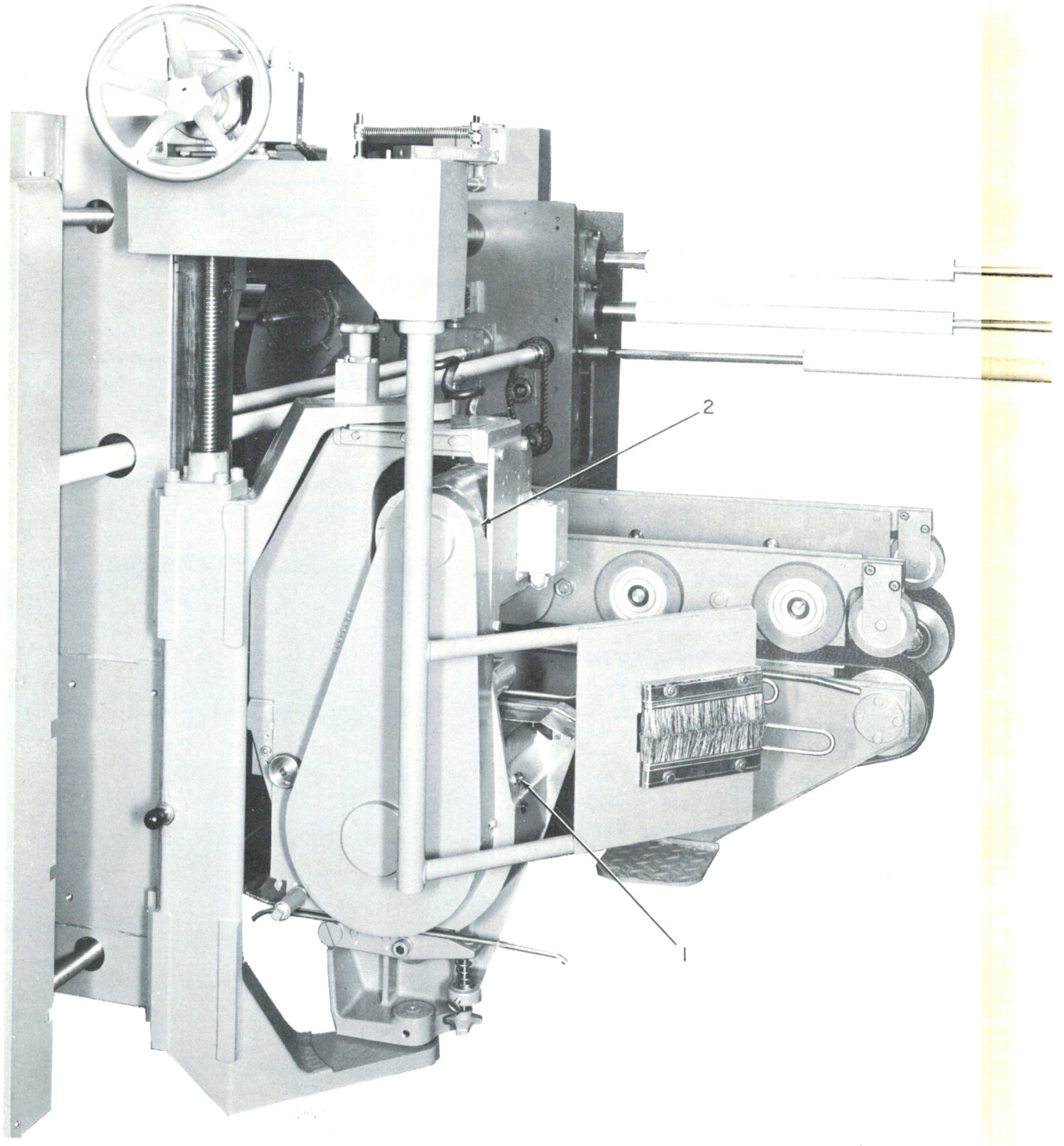


FIGURE 6-15. INSIDE/OUTSIDE-LAP GLUE UNIT LUBRICATION

For shutdown periods of only one or two shifts remove the glue shoe and place in a bucket of warm water. Draining and flushing the glue system is not necessary.

Weekend shutdowns or longer require thorough draining and cleaning of the glue lines, glue wheel and glue shoe.

b. Removal and Cleaning of Glue Shoe

Step 1) Loosen and turn glue shoe adjusting knob (Table 6-8) until disengaged from glue shoe.

Step 2) Slide shoe away from glue wheel until clear of key and remove.

Step 3) Remove dried glue from shoe.

Avoid using steel tools or instruments that can damage the smooth, polished surfaces of the bronze shoe. Dried glue that does not come off easily by hand or soft brush can be softened for removal by soaking in a mixture of warm water, detergent and acetone.

Step 4) Replace shoe (see paragraph VI.C.4.b.)

c. Removal and Cleaning of Glue Wheel

Step 1) Hold glue wheel stationary and turn glue wheel lock nut (6 Figure 6-9) counterclockwise until disengaged from glue wheel.

Step 2) Remove nut and wheel.

The glue wheel should be cleaned with a stiff nylon or other nonmarking bristled brush which will not damage the surface of the wheel. For difficult cleaning conditions use a mixture of warm water, detergent and acetone. Allow the wheel to soak if necessary.

CAUTION

Do not use a steel wire brush to clean glue wheel.

6. TROUBLESHOOTING

Refer to Table 6-10 for a listing of operating difficulties which may be encountered and the standard procedures to correct them.

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.

7. LUBRICATION

To use the tables 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 table concerned and locate the symptom encountered. Check the possible causes of the difficulty. When the trouble is located, refer to the table to determine how the difficulty may be remedied.

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

D. GLUE UNIT LUBRICATION

1. INSIDE-LAP GLUE UNIT

Refer to Table 6-11 and Figure 6-14 for points of lubrication, frequency, method and type of lubricant.

2. INSIDE/OUTSIDE-LAP GLUE UNIT

Refer to Table 6-12 and Figures 6-15 and 6-16 for points of lubrication, frequency, method and type of lubricant.

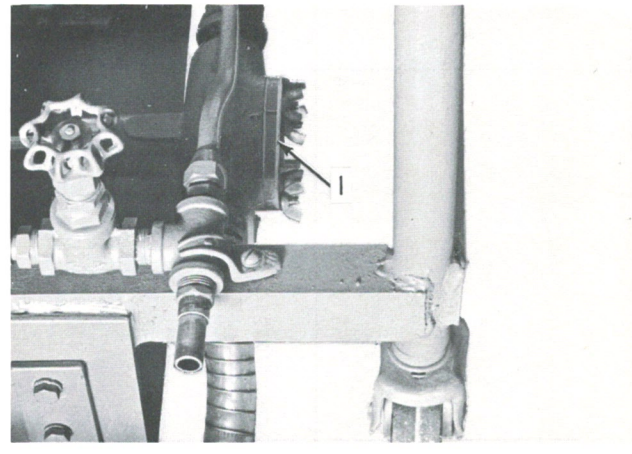


FIGURE 6-16. GLUE PUMP LUBRICATION

TABLE 6-9. INSIDE/OUTSIDE GLUE UNIT OPERATING TROUBLES

Symptom	Cause	Remedy
No glue on wheel	Pump not turning	Turn pump motor selector switch ON; Disassemble pump and clean; push RESET
	Feed line obstructed	Eliminate kink or obstruction. Flush line with water if necessary.
	Glue shoe intake obstructed	Remove shoe and clean.
	Glue reservoir, lines or drum empty. Sensing device defective	Replace drum; check solenoid shut off; glue too viscous. Check sensing device.
	Bypass open fully	Reduce bypass flow.
Insufficient glue on wheel	See "No glue" causes	See "No glue" remedies.
	Glue wheel clogged with scrap, dried glue	Remove and clean.
	Wheel worn	Replace wheel.
Glue leaks	Scrap caught in shoe cavity	Remove and clean shoe.
	Sealing surfaces of shoe dirty, damaged or worn	Clean, repair or replace shoe.
	Shoe improperly adjusted	Readjust shoe.
	Excess glue being pumped	Open bypass.
Glue wheel does not turn	Glue drive motor not turned on	Turn on.
	Drive belt loose	Tighten belt.
	Glue drive motor burned out	Replace motor.
	Glue shoe too tight	Adjust shoe.
	Glue drive motor overload kicked out	Reset overload.

TABLE 6-10. INSIDE/OUTSIDE GLUE UNIT BOX TROUBLES

Symptom	Cause	Remedy
Insufficient glue pattern	See Table 6-9 insufficient glue on wheel cause	See Table 6-9 insufficient glue on wheel remedy.
	Pressure roll improperly set	Readjust the pressure roll contact pressure for the caliper of board to be run.
Excessive glue on glue lap	Glue shoe worn, dirty, needs adjustment	Clean, repair, replace or adjust glue shoe.
Poor glue pattern on glue lap	Glue shoe worn, dirty, needs adjustment	Clean, repair, replace or adjust glue shoe.
	Drive belt slipping	Tighten belt.
	Glue wheel not tracking	Re-track wheel.
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	Check glue shoe for wear, cleanliness, adjustment.

TABLE 6-11. INSIDE-LAP GLUE UNIT LUBRICATION

Item	Figure No.	Description	Lubricant	Period	Method
1	6-14	Glue roll shaft fitting	NLG no. 2 Lithium soap grease	Weekly	
2	6-14	Glue roll drive motor	Per manufacturer's recommendation		
3	Not Shown	Glue roll shaft	NLG no. 2	Weekly	

TABLE 6-12. INSIDE/OUTSIDE-LAP GLUE UNIT LUBRICATION

Item	Figure No.	Description	Lubricant	Period	Method
1	6-15	Glue roll shaft fitting	NLG no. 2 Lithium soap grease	Weekly	
2	6-15	Glue roll drive motor	Per manufacturer's recommendation		
3	Not Shown	Glue roll shaft	NLG no. 2	Weekly	
1	6-16	Glue pump	NLG no. 2	Monthly	

SECTION VII.
FOLDING SECTION

A. FOLDING SECTION DESCRIPTION

The 701 folding section (Figure 7-1) is independently mounted directly after the creaser-slotter in its own side frames and is supported at the delivery end on movable carriers.

The folding section consists of a lower beam assembly; an upper roll bracket assembly; upper and lower belts; removable folding guides; gauging and forming roll assemblies; box supports; and folding pulleys.

1. LOWER BEAM ASSEMBLY (Figure 7-2, 7-3)

The feed end of the lower beam (Figure 7-2) is mounted on cam followers. Rotating screws (Figure 7-2) move the beams from side to side for proper box width, at the same time that panels 2 and 3 are positioned. The delivery end (Figure 7-3) is mounted on sliding carriers.

2. UPPER ROLL BRACKET ASSEMBLY (Figure 7-2)

The upper roll bracket assembly is supported from the lower beam section by C-shaped supports at one end and by shafts and hangers at the other end. Caliper adjustments on the supports and one adjustment on the section side frame set the correct gap between rollers and belt for the board being run.

3. UPPER AND LOWER BELTS (1, Figure 7-4; 2, Figure 7-2)

Rubber folding belts on each side of the section run the full length of the folding section. Belt takeups compensate for stretch. A caliper adjustment sets gap between belts at the delivery end frame.

4. REMOVABLE FOLDING GUIDES (2, Figure 7-4)

Removable folding guides are attached to the delivery end of the roller bracket assemblies. The bayonet mounted guides prevent the boxes from flying and are easily removed if a jam occurs.

5. GAUGING AND FORMING ROLL ASSEMBLIES (2, Figure 7-3)

One bank of gauging and forming rolls on each side of the section has positively driven rolls that are spaced to permit the entire length of the largest box sites to be fully engaged. Both sets of rolls are positioned automatically during box panel size setting. They also have separate gang adjustment.

6. BOX SUPPORTS (3, Figure 7-2; 3, Figure 7-4)

A guide bar on each side of the folding section supports and guides the first and fourth panels as the box feeds through the C-support. The center panels are supported underneath by a bar between the lower beams.

7. FOLDING PULLEYS (3, Figure 7-3)

Folding pulleys ride against the upper folding belts and determine the folding sequence on each side. For an inside glue lap the operating side pulleys would be set at a lower angle than the drive side so that panel 1 folds down before panel 4.

B. PROCESS

The 701 folding section folds creased and slotted corrugated blanks, joining the glue lap and mating panel.

As an unfolded box enters the folding section, it is gripped between the lower folding belts and upper rubber rollers. Outside panels are folded up 90 degrees gradually, by the upper folding belts while the lower belts move the sheet forward. The pitch of the folding pulleys against the belts controls the second 90 degrees of folding (see Figure 7-5).

When the fold is completed, the box passes between a series of gauging rolls. The gauging rolls gently squeeze the box together, reducing the gap. The last gauging roll on each side also compresses the fold to insure flatness.

C. OPERATION AND ADJUSTMENT CONTROLS

The folding section has no direct operator controls. Operating controls are located on the pendant control (See paragraph V.A.6.) and on the delivery end control panel (See Table 8-1). Adjustment controls for setting panel sizes are mounted on the pendant control. Other independent adjustment controls for the folding section are listed in Table 7-1.

D. SETUP AND ADJUSTMENTS

The following procedure will aid you in setting up and operating the 701 folding section.

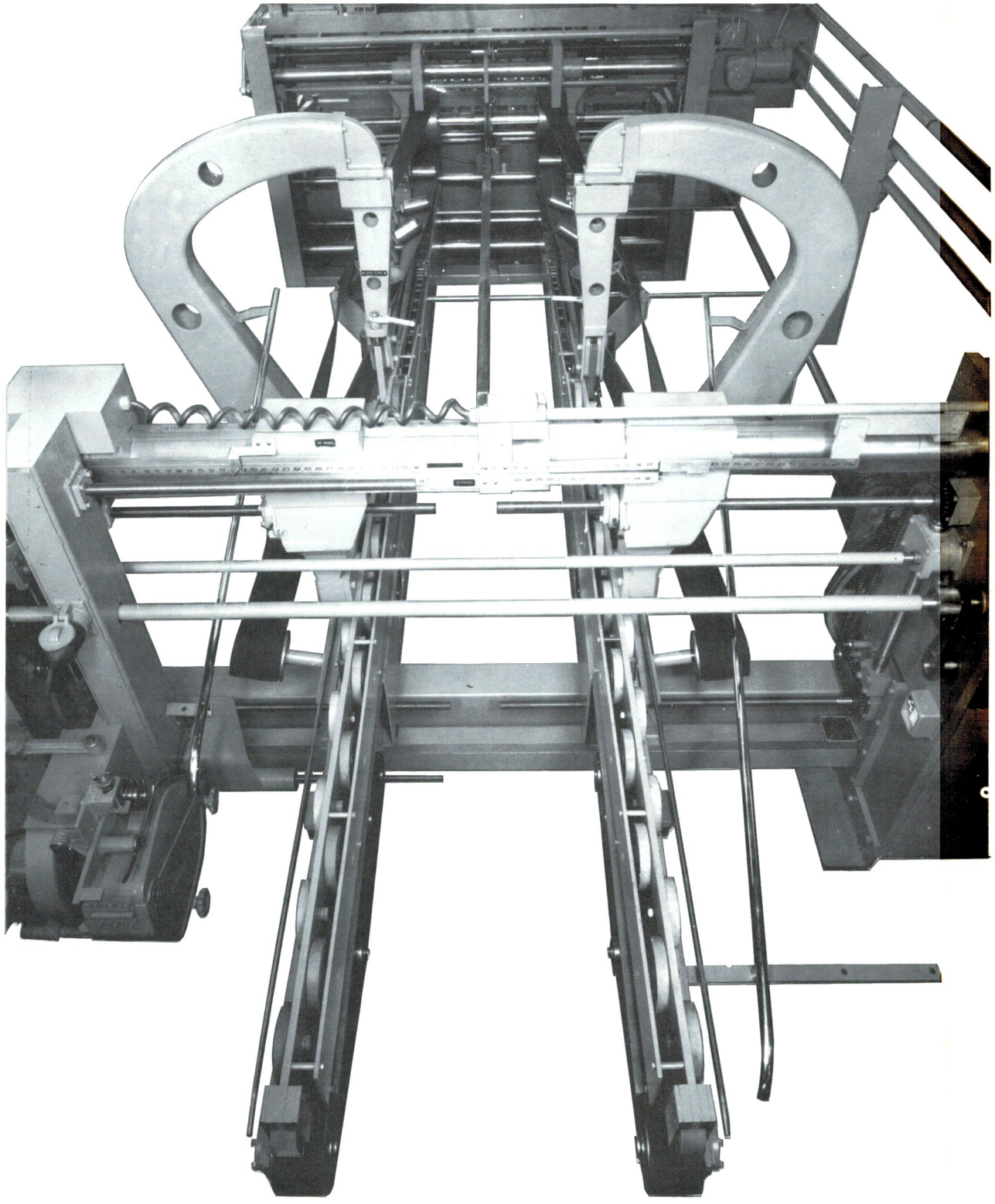
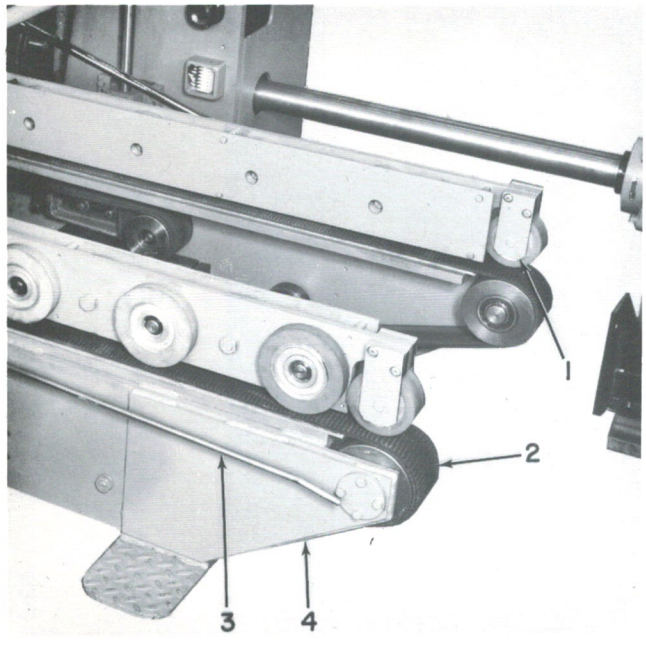


FIGURE 7-1. 701 FOLDING SECTION



1. Upper roll bracket assembly
2. Lower belt
3. Side box support
4. Lower beam assembly

FIGURE 7-2. FOLDING SECTION FEED END

The folding section is automatically positioned for correct panel sizes when the creaser-slotter panels are set up.

1. SETTING CALIPER ADJUSTMENTS

Note

Feed end of folding section is adjusted for single caliper. Delivery end is adjusted for twice the caliper.

All three caliper adjustments on the folding section are set the same way (see Table 7-1 for name, location and use).

Step 1) Rotate the adjustment handle until the suitable caliper is read on the indicator.

Step 2) Set the folding belt caliper adjustment for twice the board caliper.

Step 3) Use a sample piece of board to be run to check caliper settings on feed end of roller assemblies and at C-support end of roller assemblies. Proper setting is attained when the rolls exert sufficient pressure on the board against the belt to prevent slipping without evidence of crushing. Both sides should be set with equal pressure.

2. SETTING THE CENTER BOX SUPPORT (3, Figure 7-4)

The center box support moves laterally with the lower beams as the panel sizes are set. The support should be approximately centered between the beams. To center the box support push the ends laterally by hand to desired position. Lock in place with thumb screws provided.

Note

When running board widths less than 9 in., the center box support must be removed.

3. ADJUSTING FOLDING PULLEYS FOR REQUIRED GLUE LAP (3, 4, 5 Figure 7-9)

The machine is preset for inside glue-lap boxes. This means the panel 1 folds down before the panel 4. The folding pulleys on the operating side are preset closer to the feed end so that the panel 1 folds down first. To reset for outside glue-lap follow this procedure:

Step 1) Unlock folding pulley lock knobs on the operating side.

Step 2) Rotate the pulley heads so that there is progressively less contact on the belt going toward the delivery end.

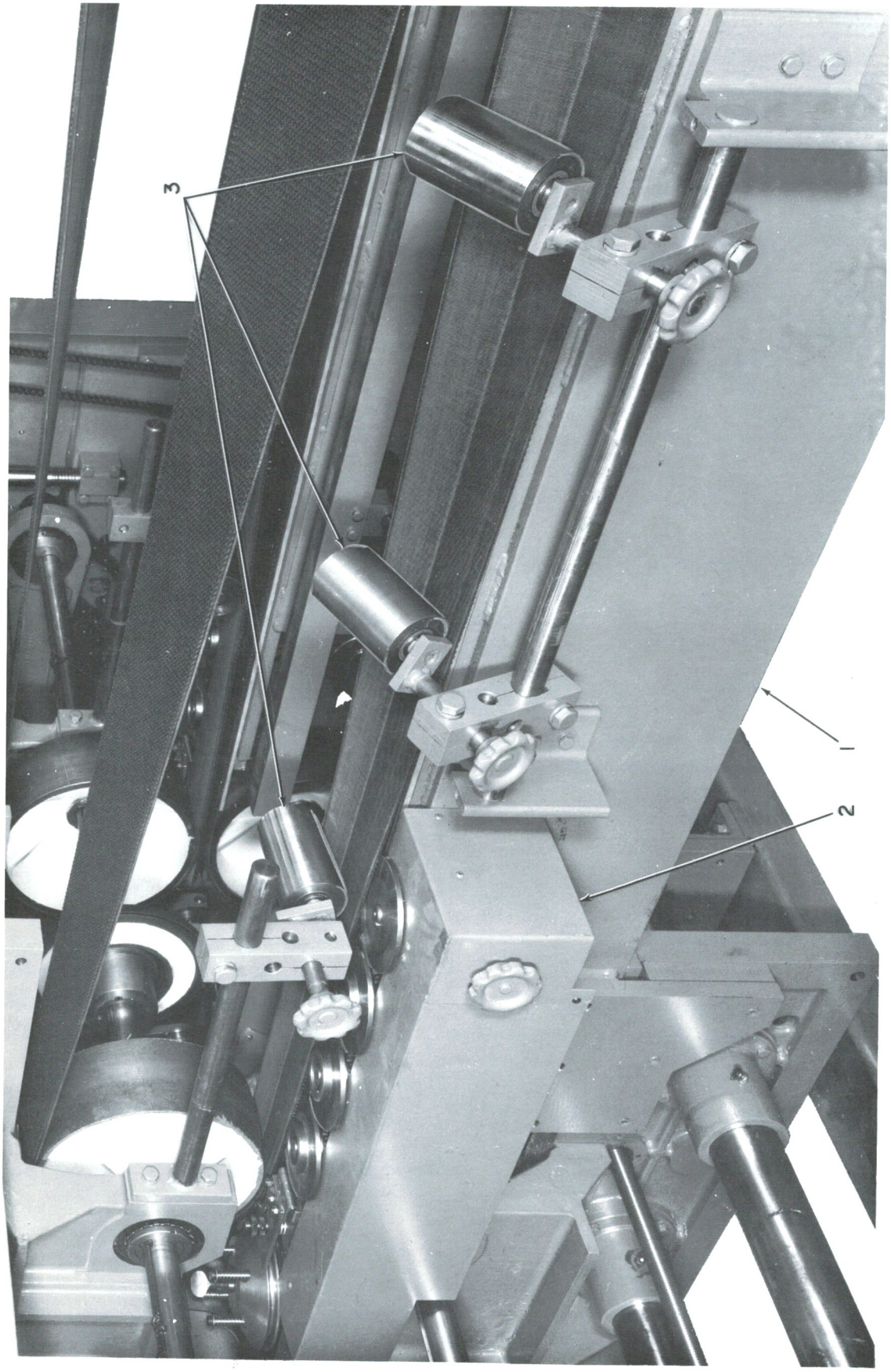
Step 3) Unlock the drive side pulleys and rotate the heads so that there is progressively more contact on the belt going toward the delivery end.

Step 4) Adjust position of pulleys in direction of paper travel according to box length.

Step 5) Relock pulleys.

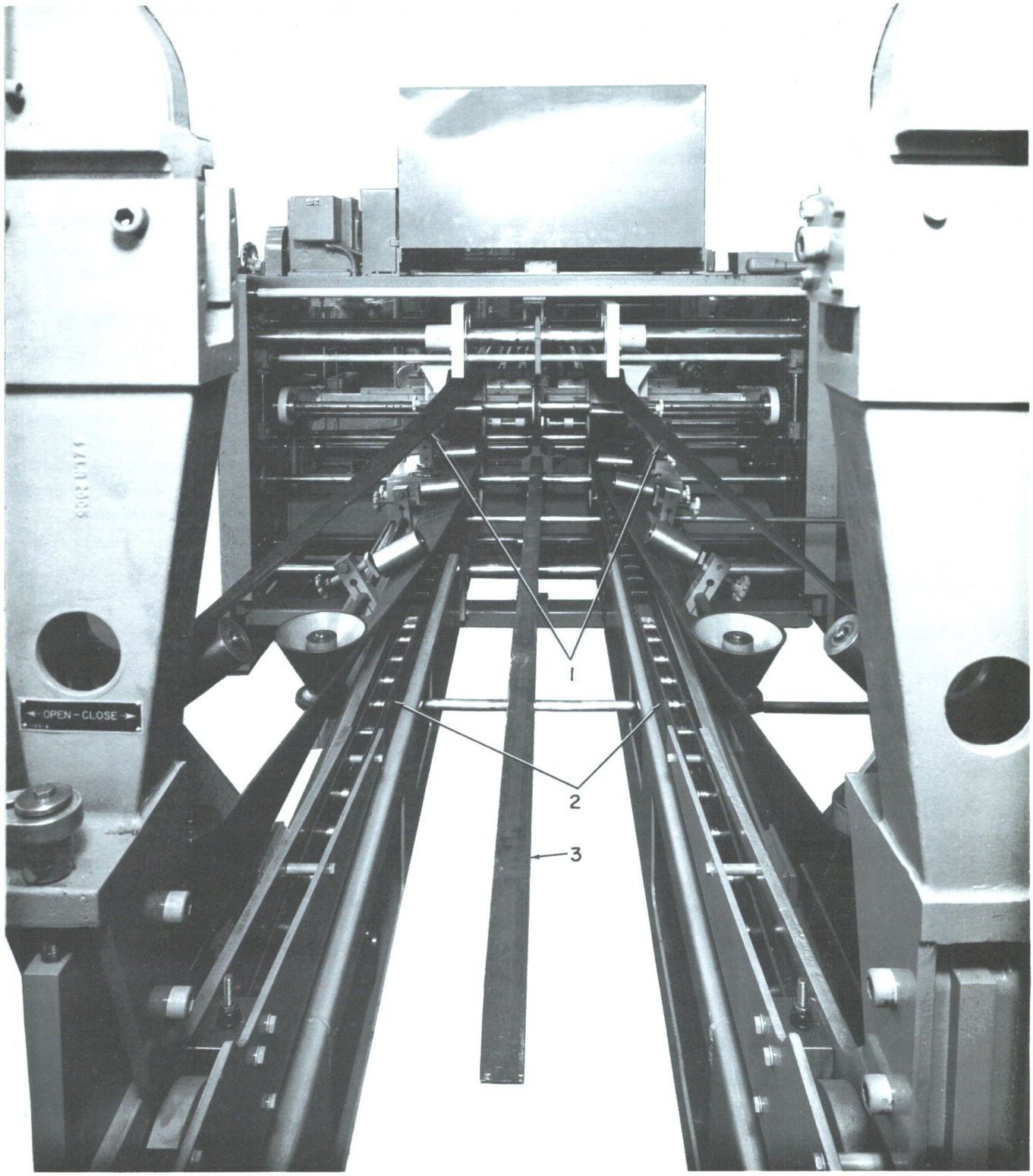
CAUTION

Adjusting belts for proper folding action requires careful attention. Run the machine at slow speeds to check the folding action.



1. Lower beam assembly
2. Gauging and forming roll assembly
3. Folding pulleys

FIGURE 7-3. FOLDING SECTION DELIVERY END



1. Upper belts
2. Folding guides
3. Center box support

FIGURE 7-4. FOLDING BELTS AND GUIDES

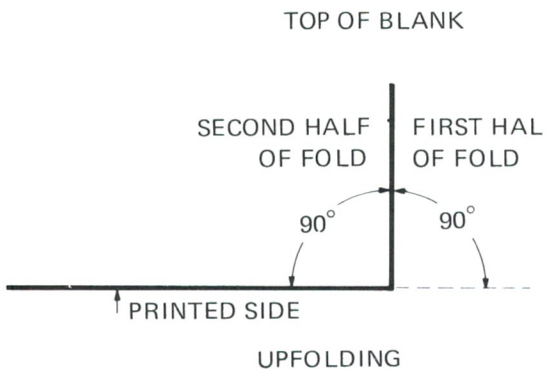


FIGURE 7-5. 701 FOLDING OPERATION

4. FOLDING BELT ADJUSTMENT

The folding belts should be periodically checked for tightness after about 80 hours of operation. If tightening is required, follow this procedure:

a. Lower Belts (Figure 7-2)

Step 1) Loosen takeup locking belts.

Step 2) Loosen adjusting screw lock nut.

Step 3) Rotate adjusting screw so that belt is tight.

Step 4) Tighten takeup bolts.

Step 5) Tighten lock nut.

b. Upper Belts (Figure 7-4)

Step 1) Loosen takeup locking bolts.

Step 2) Loosen adjusting screw lock nut.

Step 3) Rotate adjusting screw to move the pulley toward the feed end, tightening the belt.

Step 4) Tighten takeup bolts.

Step 5) Tighten lock nuts.

5. CORRECTING OVER-STRETCHED BELT

This procedure applies to all belts. See Table 7-2 for specific belt lengths.

Step 1) Loosen takeups as far as they will go.

Step 2) Pull lacing pin to separate belt ends.

Step 3) Remove belt from machine.

Step 4) Stretch belt out on floor and measure length.

Step 5) Subtract the specified belt length from the stretched belt length. The resulting dimension is the belt length to be cut.

Step 6) Cut equal lengths from each end of the belt to obtain the specified length.

Step 7) Strip 1-ply of fabric about 1/32 to 1/16 inch (0.76 to 1.5 mm) thick from the belt backing about 5/8-inch (15 mm) long on each end (See Figure 7-12) before replacing belt lacing. This will allow the lacing to seal properly and not rub when reinstalled.

Step 8) Replace belt lacing.

Step 9) Reinstall belts on guide rolls.

Step 10) Install new locking pin.

Step 11) Stretch belt as necessary using stretching tool to seat belt on guide rolls.

Step 12) Make additional tightness adjustments as necessary.

E. PREVENTIVE MAINTENANCE

Use Table 7-3 as a guide for periodic 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.

F. TROUBLESHOOTING

Tables 7-4 and 7-5 list operating difficulties which may be encountered and some standard procedures to correct them.

Operating troubles are defined as those caused by improper setup or malfunction of a machine component. Finished box troubles are defined as those resulting in

TABLE 7-1. ADJUSTMENT CONTROLS

Adjustment Name	Figure No.	Location	Use
Folding section feed end caliper adjustment handle	7-6	Operating side of folding section feed end frame	Sets feed end roll bracket assemblies for board caliper
C-support vertical adjustment handles (2)	7-7	Attached to both C-supports above roll assemblies	Sets roll bracket assemblies at C-support for board caliper
Folding belt caliper adjustment handle	7-8	Operating side of delivery end frames	Sets folding belt pulleys for twice board caliper
Gauging rolls lateral adjustment knob	7-9 (2)	Operating side of gauging roll assembly on operating side, drive side of drive side assembly	Adjusts gauging assembly according to box width
Upper folding belt takeups	7-10	One takeup on outside of each lower beam near feed end	Tightens belts to compensate for stretching
Lower folding belt takeups	7-11	One takeup on the inside of each lower beam	Tightens lower belt to compensate for stretching
Folding pulley lock knobs (6)	7-9 (4)	Attached to each folding pulley	Rotates pulley eccentrically for more or less pressure on belt
Folding pulley locking bolts	7-9 (5)	Attached to each folding pulley	Locks eccentric adjustments and universal adjustments

improper assembly of the box when inspected at the delivery end of the machine.

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

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

TABLE 7-2. STANDARD BELT LENGTHS

Belt	Length	
	IN.	M
Upper	366	9.6
Lower	500	12.7

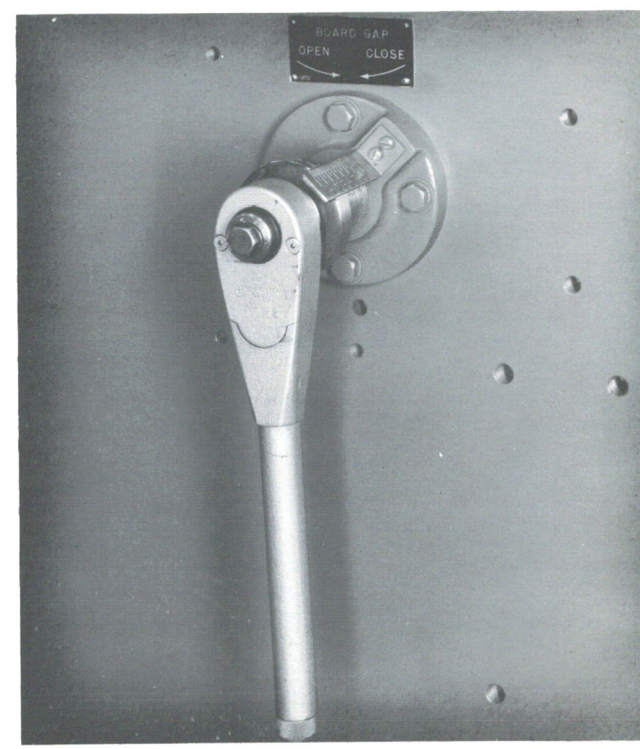


FIGURE 7-6. FOLDING SECTION FEED END CALIPER ADJUSTMENT HANDLE

TABLE 7-3. PERIODIC MAINTENANCE

Component	Inspection Period	Remarks
Folding section (General)	Daily	Vacuum all paper dust. Remove all scrap caught in components.
Upper roll bracket assembly	Weekly	Check rolls for free turning and improper wear such as flats or egg shape. Replace damaged rolls.
Folding belts	Weekly	Check for breaks and tears. Check belt lacing. Check for stretch and tightness.
Belt takeup	Daily	Remove scrap from openings.
Chains	Weekly	Chains must be kept tight and lubricated to prevent jumping on sprocket and misalignment between creaser-slotter and delivery sections.
	Six months	Check for sprocket and chain wear and possible replacement.
Gauging rolls	Weekly	Remove the gauging roll covers. Remove paper dust and scrap. Tighten drive belt if loose.

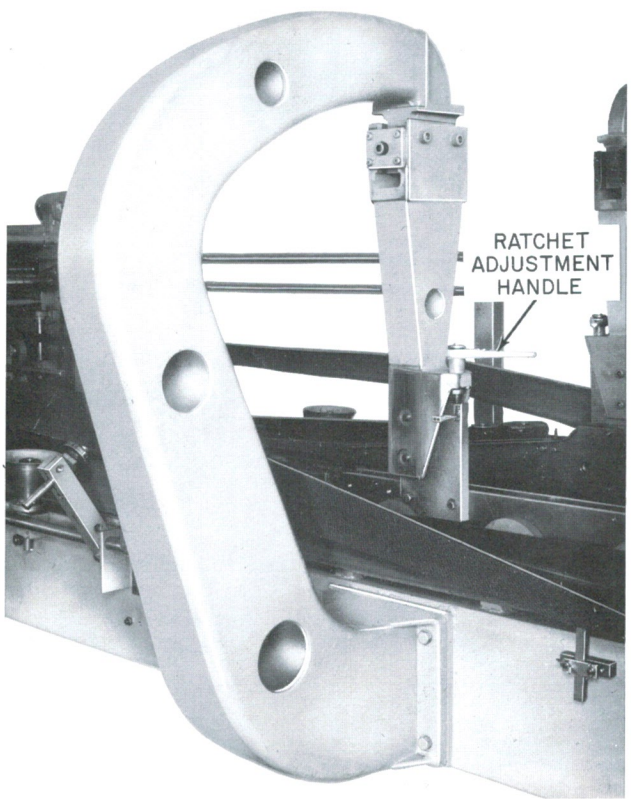


FIGURE 7-7. C-SUPPORT

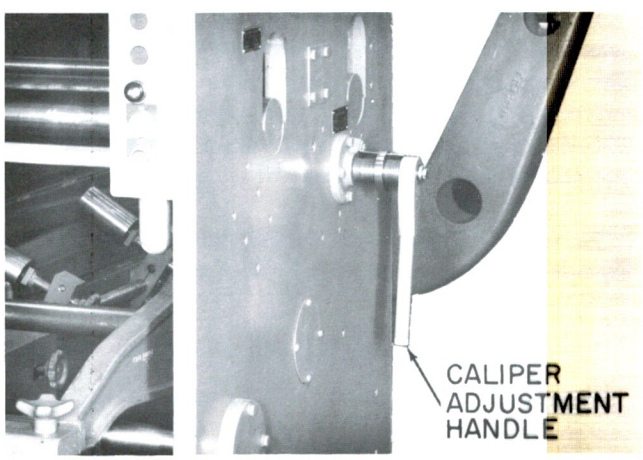
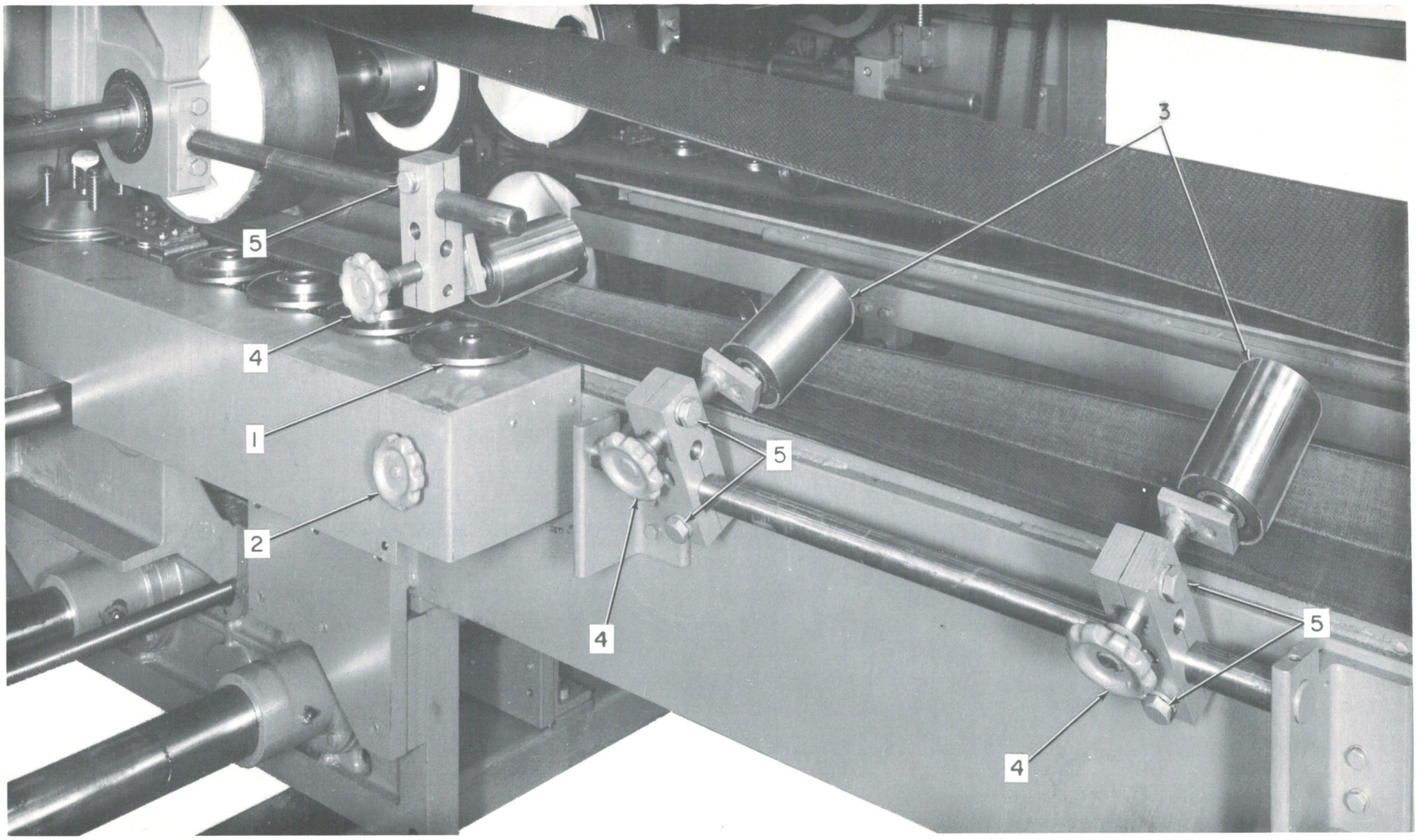


FIGURE 7-8. FOLDING BELT CALIPER ADJUSTMENT HANDLE

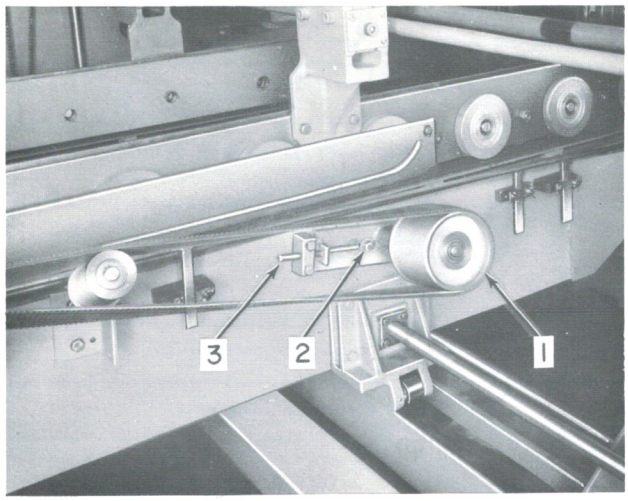


1. Gauging and forming roll assembly
2. Gauging and forming roll lateral adjustment
3. Folding pulleys
4. Folding pulley lock knobs
5. Folding pulley locking bolts

FIGURE 7-9. GAUGING ROLL AND PULLEY ADJUSTMENTS

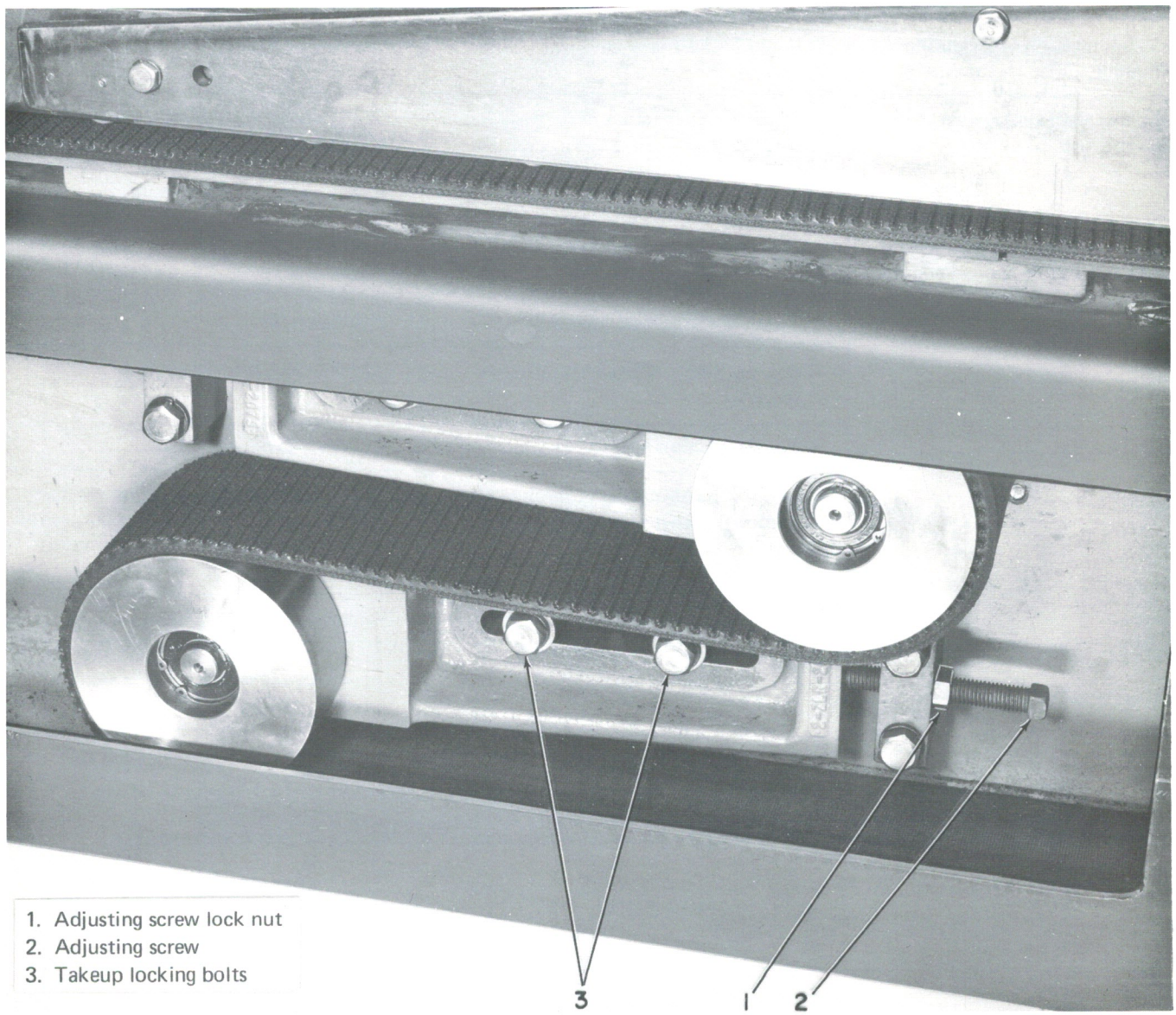
TABLE 7-4. BOX TROUBLES

Symptom	Cause	Remedy
Boxes not square	Folding section improperly adjusted for caliper of board to be run	Reset caliper adjustments.
	Lower folding belt stretched	Use the belt takeups to tighten the belts. Cut and replace if necessary.
Rolling folds	Upper roll bracket assembly positioned incorrectly	Adjust the bracket assembly.
	Boxes folding abruptly	Set the folding pulley to obtain a gradual fold. Spread pulleys apart.
Insufficient gap between boards	Gauging mechanism too tight	Readjust the gauging mechanism to obtain the proper gap.
	Rolling fold too tight	Refer to symptom "Rolling Folds."
	Roller bracket caliper setting	Reset caliper adjustment.
Excessive gap between boards	Gauging mechanism too wide	Readjust the gauging mechanism to close the gap.
	Roller bracket caliper setting too loose	Reset caliper adjustment.
	Rolling fold	See Symptom - "Rolling fold."
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."



1. Pulley
2. Takeup locking bolt
3. Adjusting screw

FIGURE 7-10. UPPER FOLDING BELT TAKEUP



1. Adjusting screw lock nut
2. Adjusting screw
3. Takeup locking bolts

FIGURE 7-11. LOWER FOLDING BELT TAKEUP

TABLE 7-5. OPERATING TROUBLES

Symptom	Cause	Remedy
Boxes hesitating in the folding section	Lower folding belts slipping	Tighten belts. If no takeup left, remove belts, cut and relace them.
	Folding belts worn	Replace belts.
	Incorrect board caliper adjustment	Readjust for caliper of board to be run.
	Gauging mechanism set too tight	Readjust gauging mechanism.
	Folding section out of line	Check machine alignment.
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 folding pulleys.
Blanks enter delivery end misaligned	Slipping or hesitation in folding section	Check setting of the folding section rollers, condition of the folding guides, tightness of the lower belts, and other folding section components.
Leading edge of subsequent box contacting trailing edge of box being lifted	Lower folding belts loose	Readjust belt tension or cut and relace belts.
	Trapped scrap in gauging rolls	Remove scrap.
	Box not tracking properly through machine	Check caliper adjustments.
	Folding section out of line	Check machine alignment.
	Slipping or hesitation in the folding section or other section of machine	Check setting of folding section rollers, condition of folding guides, tightness of lower belts, and other folding section components.
	Machine out of time	Check delivery end timing.

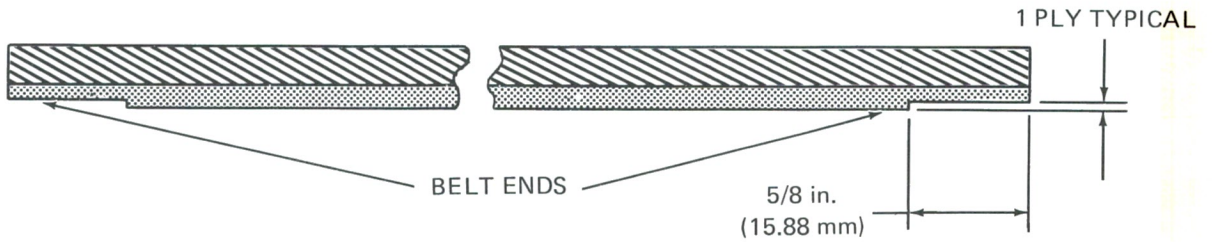


FIGURE 7-12. BELT LACING

TABLE 7-6. FOLDING SECTION LUBRICATION

Item	Figure No.	Description	Lubricant	Period	Method
1	7-13	Sealmaster bearings	NLGI No. 2, Lithium Soap Grease	Monthly	
2	7-13	Chain	Agma No. 1, Agma Spec. 252	Weekly	
3	7-13	Lead screw nuts	Molykote BR-2, Molybdenum disulfide grease	Weekly	
4	7-13	Cam followers	Agma No. 1	Monthly	
1	7-14	Hub City Gear boxes (2 locations)	Per manufacturer's recommendation		
2	7-14	Line shafts (3 locations)	NLGI No. 2	Monthly	
3	7-14	Sealmaster bearings	NLGI No. 2	Monthly	
4	7-14	Sealmaster bearing	NLGI No. 2	Monthly	
1	7-15	Hub City Gear boxes (3 locations)	Per manufacturer's recommendation		
2	7-15	Chain	Agma No. 1	Weekly	
3	7-15	Folding section adjustment motor	Per manufacturer's recommendation		
1	7-16	Sealmaster bearing	NLGI No. 2	Monthly	
2	7-16	Chain	Agma No. 1	Weekly	

G. FOLDING SECTION LUBRICATION

Refer to Table 7-6 and Figures 7-13, 7-14 and 7-15 for points of lubrication, frequency, method and type of lubricant.

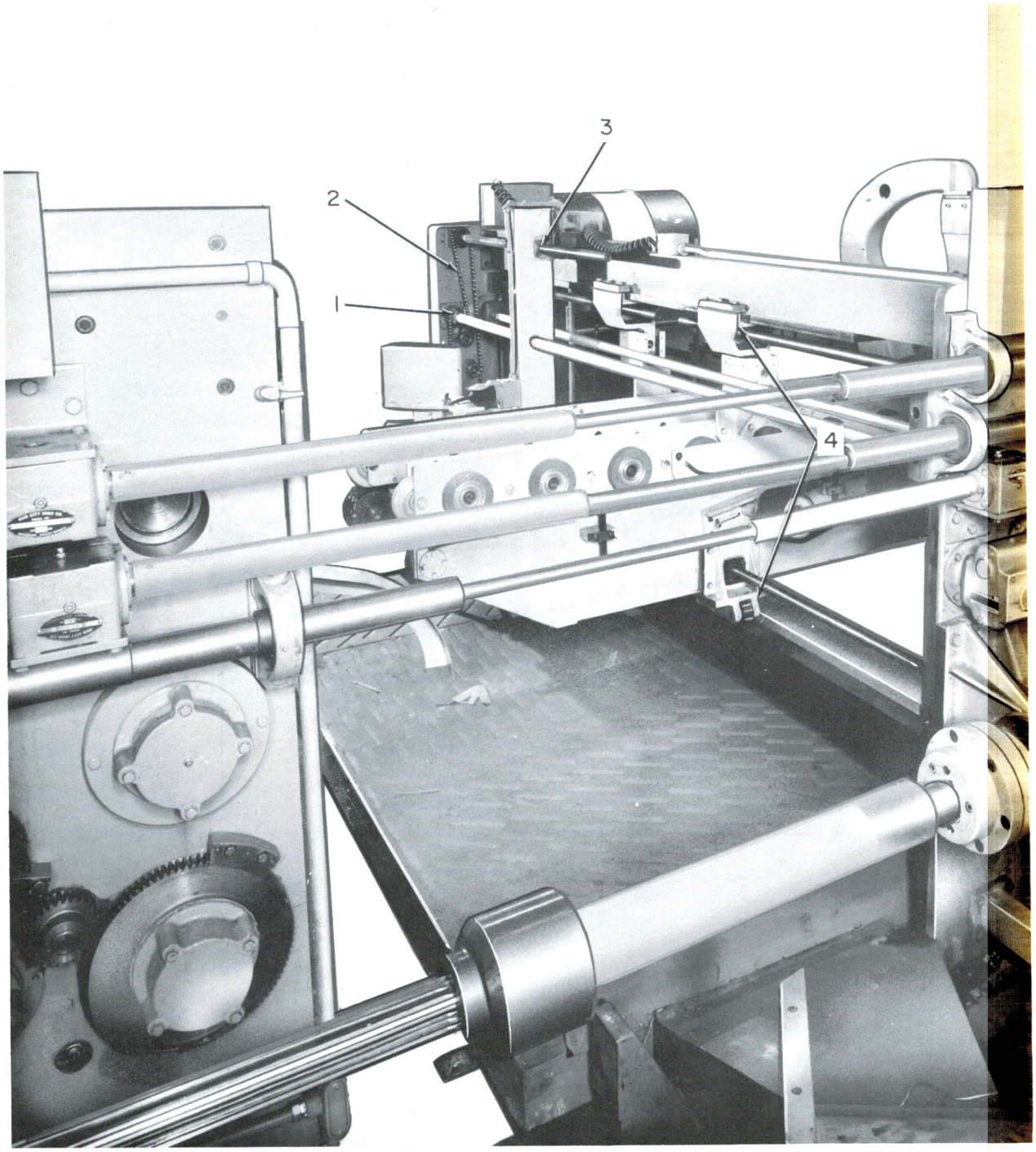


FIGURE 7-13. FOLDING SECTION LUBRICATION (VIEW 1)

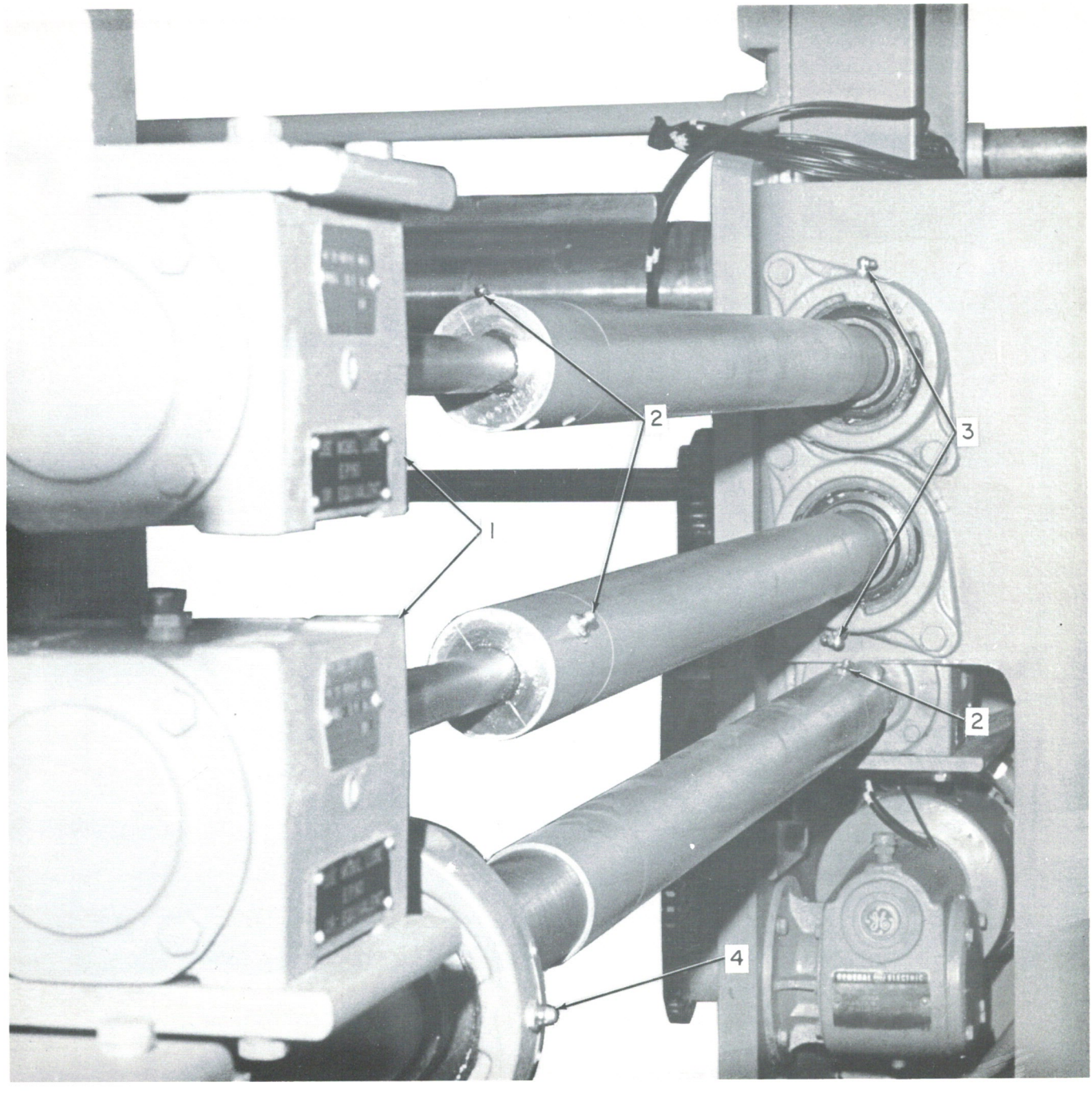


FIGURE 7-14. FOLDING SECTION LUBRICATION (VIEW 2)

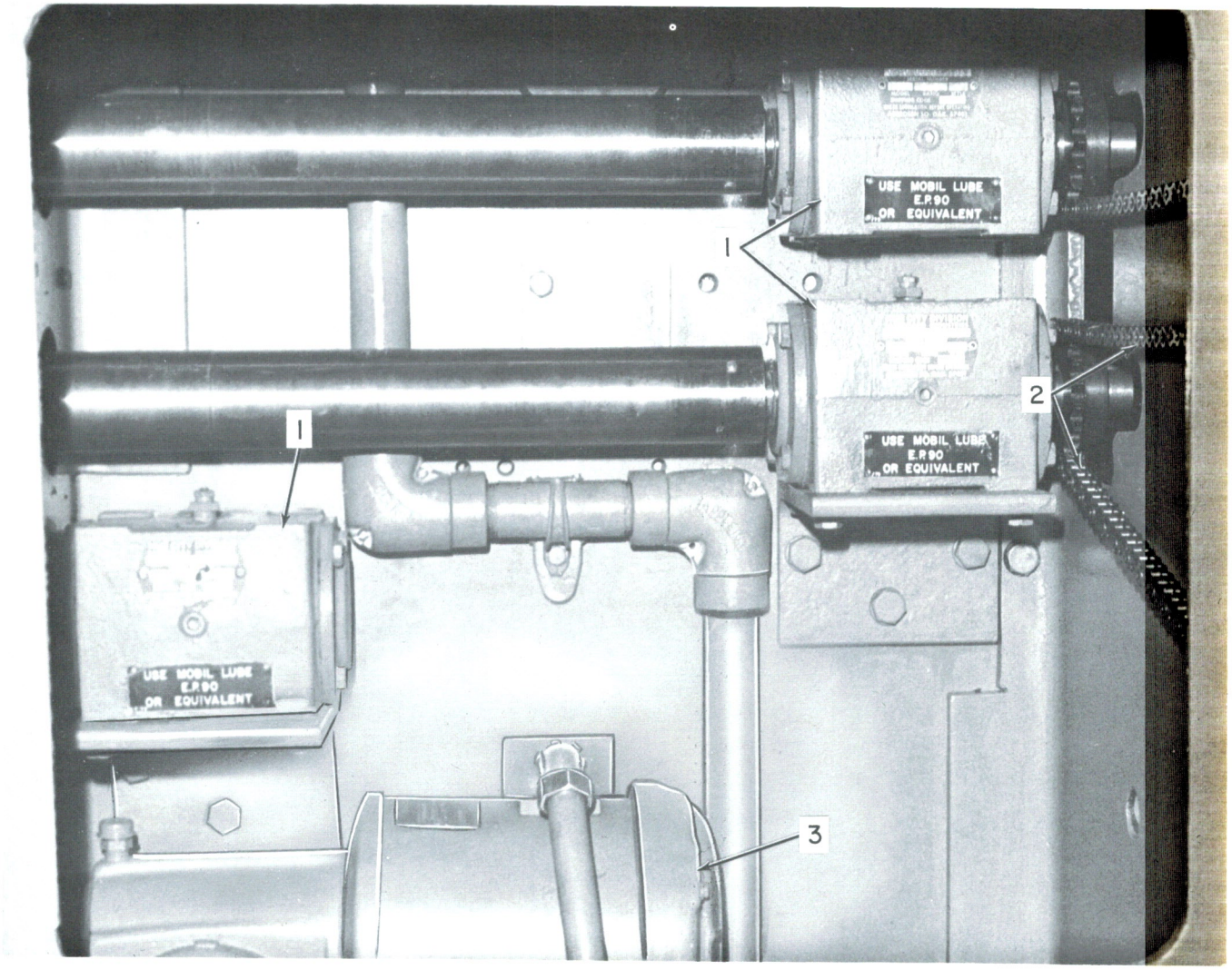


FIGURE 7-15. FOLDING SECTION LUBRICATION (VIEW 3)

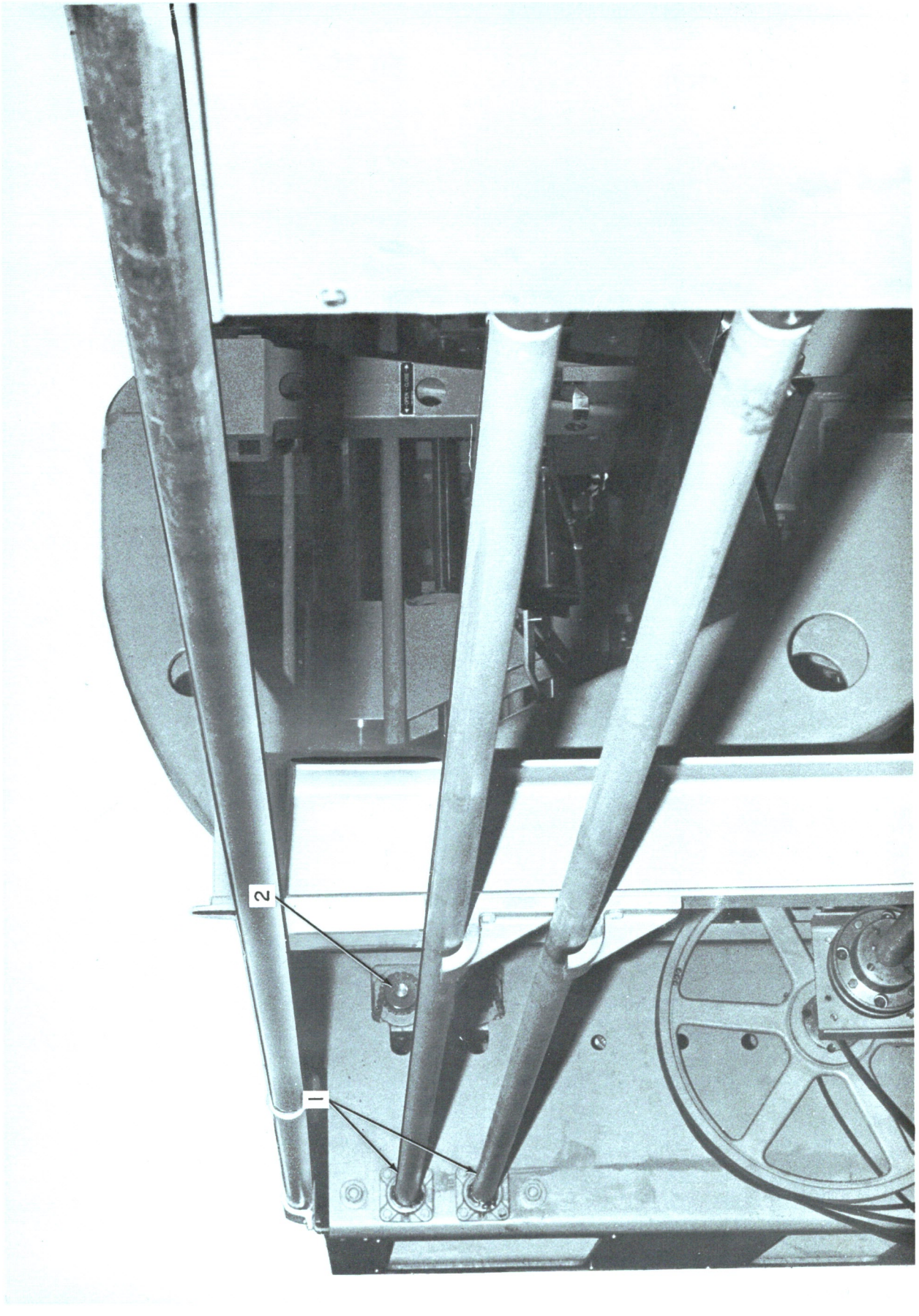


FIGURE 7-16. FOLDING SECTION LUBRICATION (VIEW 4)

SECTION VIII.
DELIVERY SECTION

A. DELIVERY END

The delivery end (Figure 8-1) consists of four major components: receiving hopper, mechanical counter, pusher assembly and delivery conveyors.

1. RECEIVING HOPPER (Figure 8-2)

The receiving hopper is formed by the front stop: side guide and brake wheel assemblies, spiral lift screws, slapper bar, short and long holddowns.

Each box leaves the folding section and enters the delivery end receiving hopper. Spiral lift screws (Figure 8-3) engage the side edges of the box and lift it clear of the next box. The screws also support and separate the boxes to prevent them from buckling.

The delivery end is supplied with several sets of screws corresponding with the various board calipers that may be run. Screws are changed easily without special tools.

Squaring is performed by a reciporcating squaring bar (2 Figure 8-2), adjustable side guides (3 Figure 8-2) and the front stop (4 Figure 8-2). The front stop is power adjusted to accommodate all box sizes and to give the proper squeeze between the squaring bar and front stop. Short and long holddowns (2, 3 Figure 8-4) maintain pressure in the give joint during delivery.

Limit switches (5 Figure 8-4) mounted behind the slapper bar act as jam switches that detect a jamup and activate the feed interrupter.

An optional gap detector system may be used to spot jamups. This gap-detector senses the gap between boxes as they feed into the receiving hopper. An electric eye and light source are mounted above the board, just before it enters the receiver hopper, and a reflector underneath. If a jam occurs or the gap between boxes disappears, the detector senses it, activates the feed interrupter and stops the machine.

2. PILE COUNTER (1, 2 Figure 8-5)

The counter is a gear box that controls the pusher assembly timing through an electric clutch (3 Figure 8-5). By setting the gear shift lever in the correct hole, you can set the counter to deliver 10 to 35 boxes in increments of 5.

3. PUSHER ASSEMBLY (Figure 8-6)

The pusher assembly consists of underhanging arms mechanically driven through an electromagnetic clutch that cycle according to the preset counter. Pusher arms push box piles onto the delivery conveyors.

B. DELIVERY PROCESS

The 701 delivery section stacks, squares, counts and ejects uniform piles of boxes.

As each box enters the delivery end receiving hopper, the edges engage the spiral lift screws. The bottom flight of each screw quickly raises the trailing edge of each box to clear the leading edge of the next box. A cam-operated roller lifts the center of the trailing edge of the box out of the path of the next box.

While the pile of boxes builds, the spiral lift screws keep the boxes separated to allow effective squaring by a reciprocating squaring bar.

Once the glue lap is made, it is kept under continuous pressure by a series of holddowns.

Running the full width of the receiving hopper, a motor drive shaft supports the leading edges of the pile of boxes and accelerates the upward movement. This ensures sufficient space for oncoming boxes.

Pile squareness is maintained by the power-adjusted leading edge stop, the short holddown, the action of the slapper bar, and the side guides. Side guides keep the boxes from contacting the lift screw shafts. This design allows mass comparison of boxes for gap and squareness.

If no space exists between successive underfeeding boxes, the gap detector will shut off the machine, preventing heavy jams.

When the pile reaches the proper height, cycling arms 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. The clutch slips if the pushers meet resistance.

Brake wheels apply pressure to the blank at the wheel centerline, preventing the top box of the next pile from being carried along with the stack being pushed off.

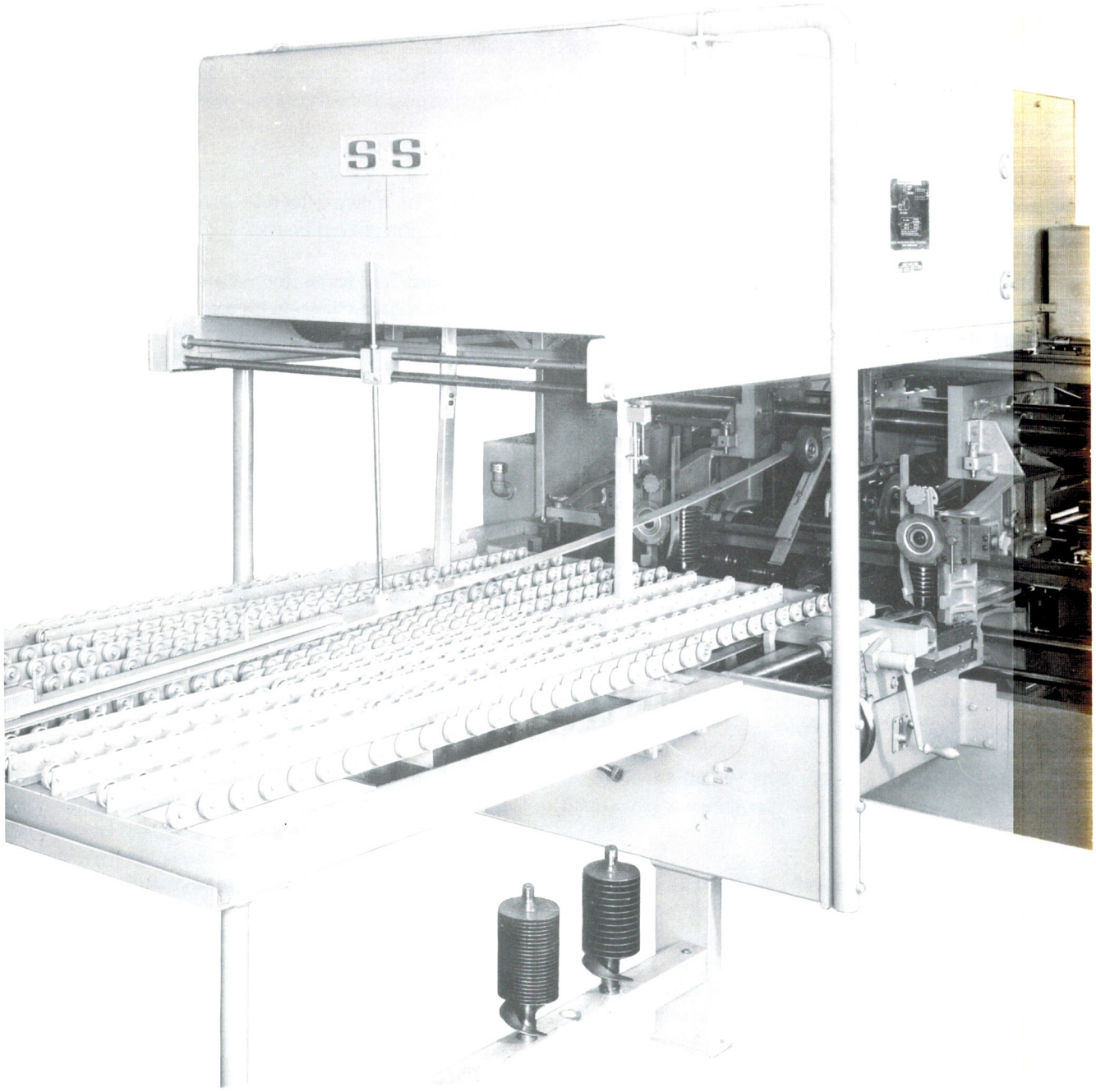
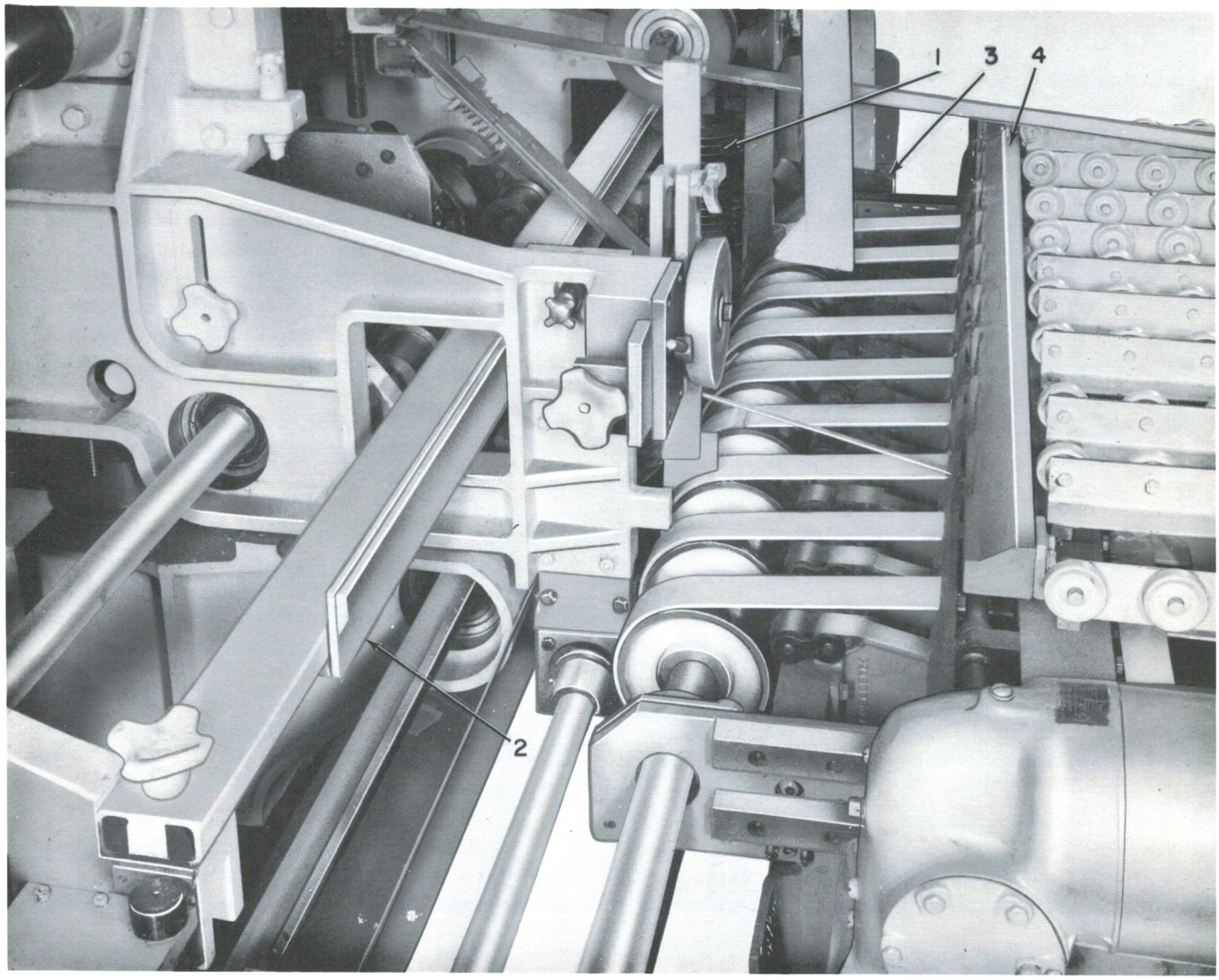
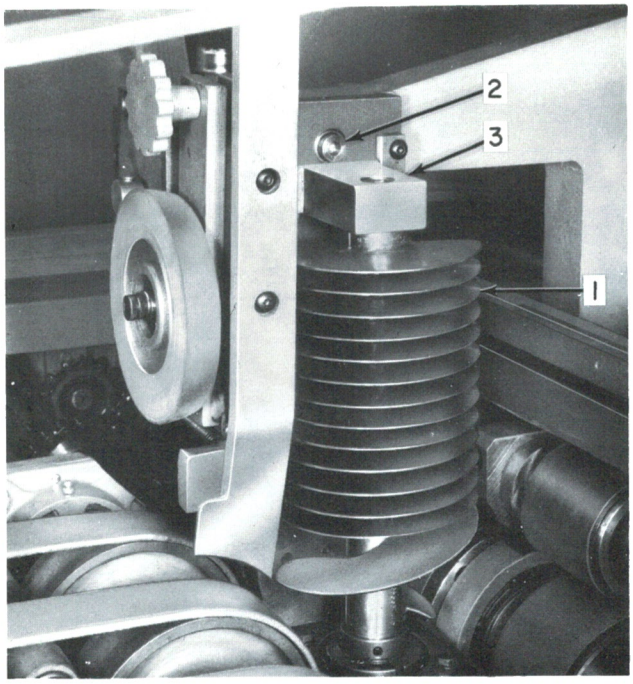


FIGURE 8-1. 701 DELIVERY SECTION



1. Spiral lift screw
2. Side guides
3. Front stop

FIGURE 8-2. RECEIVING HOPPER



1. Lift screw
2. Retainer block plunger
3. Retainer block

FIGURE 8-3. SPIRAL LIFT SCREW

Continuous pressure is applied to the glued lap by a long metal holddown as the pile is pushed onto the delivery conveyors and readied for shipment.

C. CONTROLS

Tables 8-1 and 8-2 list and describe operation controls, indicators and adjustment controls for the delivery section.

D. SETUP AND ADJUSTMENTS

The following procedures will aid you in setting up and operating the 701 delivery end.

1. SETTING DELIVERY END FOR CORRECT BOX SIZE

Step 1) Set the front stop for sheet length being run using power adjustment lever and scale (Table 8-1) provided.

Step 2) Move holddown assembly to center position using lateral holddown adjustment wheel (Table 8-1).

Step 3) Make sure pushers are clear of lift screws.

Step 4) Set panel sizes (see paragraph V.D.8).

Step 5) Set approximate lateral position of holddown assembly over the glue lap using lateral holddown adjustment wheel.

Note

Use production order specifications to determine approximate holddown position. When a few boxes have run, you can adjust to precise glue lap position.

Step 6) Set approximate vertical holddown position over glue lap area using the vertical holddown adjustment. The height of the vertical holddown position varies according to the number of boxes per pile and the thickness of a folded box.

Step 7) Set the the correct vertical position when one full pile has accumulated in the hopper.

Note

During operation on the short holddown shoe rests ahead of the center of the top box when the pile is complete. You can adjust the shoe by loosening the wing nut and extending the slide on which the shoe is mounted.

2. SELECTING AND INSTALLING LIFT SCREWS

a. Selecting the Lift Screw

Depending on the board caliper being run, a different lift screw is needed. Table 8-3 indicates the proper screw and clearance provided for a specific board thickness.

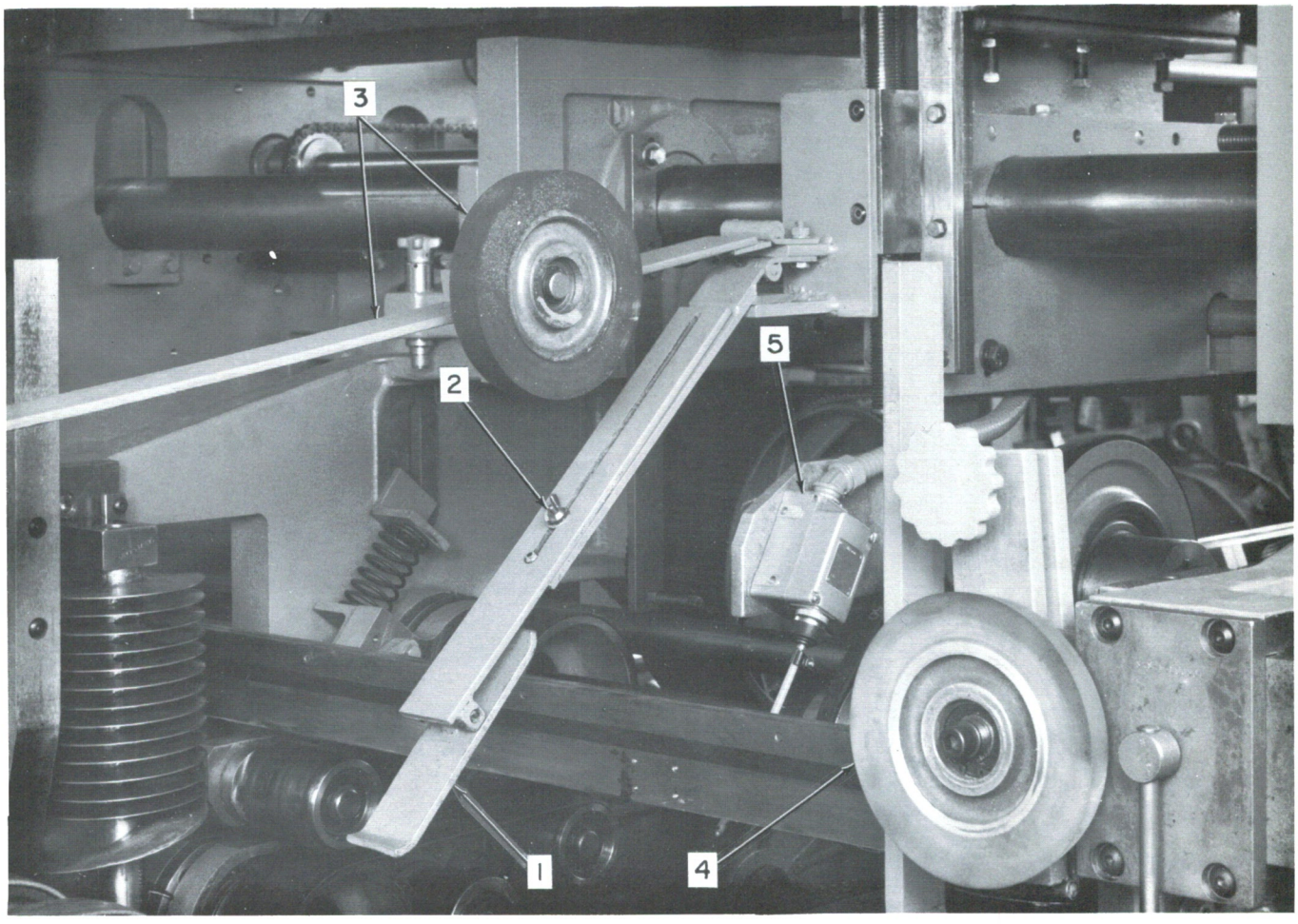
Because of variation in board caliper between corrugator runs, screws should be manually tested with the board to be run before installing them. If the screw is tight, the next larger gap screw should be used. If board caliper changes between batches during operation, the screw may become tight. The next larger size is needed.

b. Changing the Lift Screws (Figure 8-3)

Step 1) Step on the foot switch and pull the pusher arms clear of the lift screws.

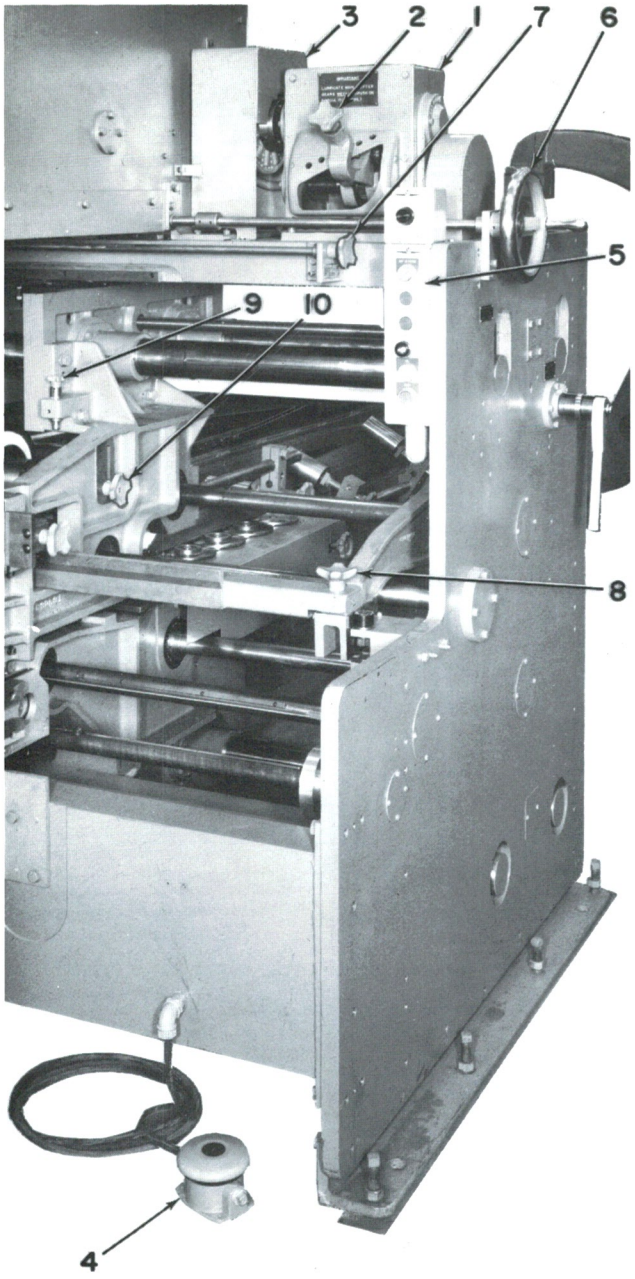
Step 2) Pull the retainer block plunger and remove the retainer block.

Step 3) Pull screw from shaft housing and store in rack underneath conveyer.



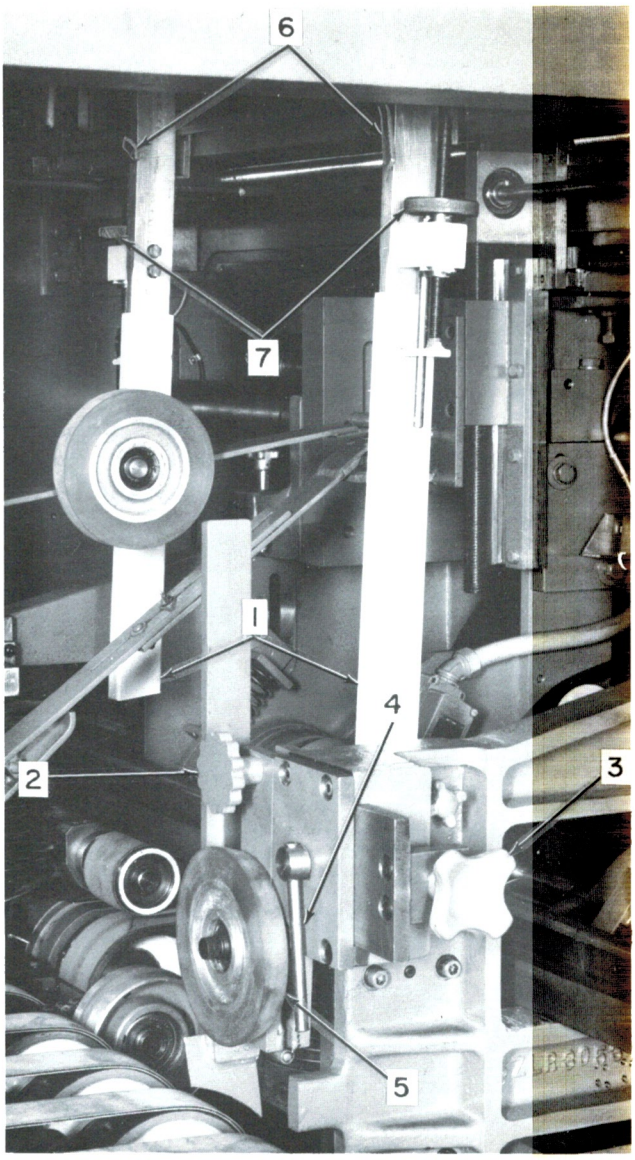
1. Short holddown shoe
2. Short holddown
3. Long holddown
4. Sideguide and brakewheel assembly
5. Limit switch

FIGURE 8-4. HOLDDOWN ASSEMBLIES



1. Pile counter gear box
2. Count change knob
3. Electric clutch
4. Foot switch
5. Operator side control panel
6. Holddown lateral adjustment
7. Holddown vertical adjustment
8. Slapper bar lock knob
9. Kidney belt lock pins
10. Kidney belt adjustment lock knobs

FIGURE 8-5. DELIVERY SECTION OPERATING SIDE



1. Pusher arms
2. Side guide vertical adjustment lock knob
3. Side guide lateral adjustment knob
4. Side guide lateral adjustment lock lever
5. Side guide brake wheel
6. Pusher arm lateral adjustment lock levers
7. Pusher arm vertical adjustments

FIGURE 8-6. DELIVERY SECTION ADJUSTMENTS

TABLE 8-1. OPERATION CONTROLS AND INDICATORS

Control Name	Figure No.	Location	Use
Foot switch	8-5 (4)	On floor underneath receiver hopper	Disengages pusher arms for setup purposes and interrupted pile control.
Operator side control panel	8-5 (5)		
GAP DETECTOR		Red light at top of panel	When lit, indicates a jam.
GAP CONTROL		Selector switch below GAP DETECTOR	Turns gap detector on or off by turning dial to BYPASS.
INTERRUPTER UP		Pushbutton below GAP CONTROL	Raises feed interrupter to discontinue feeding.
INTERRUPTER DOWN		Pushbutton below INTERRUPTER UP	Lowers feed interrupter to resume feeding.
POWER ON-START		Green pushbutton below INTERRUPTER DOWN	Depressing button starts machine. When lit, indicates power on.
JOG		Yellow pushbutton below POWER ON	Depressing button intermittently inches machine.
STOP		Red pushbutton below JOG	Stops machine.
Jam Limit Switches	8-4 (5)	Between the lift screws	Shut down main drive when jamup occurs.
Gap detector control panel indicators (option)		Drive side on section top brace facing delivery end	Lights indicate status of gap detector.
GAP SENSED		Bottom of gap detector control panel, top yellow	When lit, indicates when gap is sensed.
VANE-SENSED		Bottom light of gap detector control panel	When lit, indicates when a board should be sensed.

Note

Each pair of lift screws is numbered according to different gap sizes and marked for operating side or drive side. Care should be taken to replace screws in proper hole on the correct side before selecting a new screw.

Step 4) Select the screw size to be used for the run. Test manually if necessary (paragraph VIII.D.2.a.).

Step 5) Align the key at the collar end with the keyway in the lift screw seat and install the screw.

Step 6) Replace screw retainer block and lock in place with the plunger.

3. ADJUSTING FOR BLANKS OVER 32 IN. (812 mm) LONG

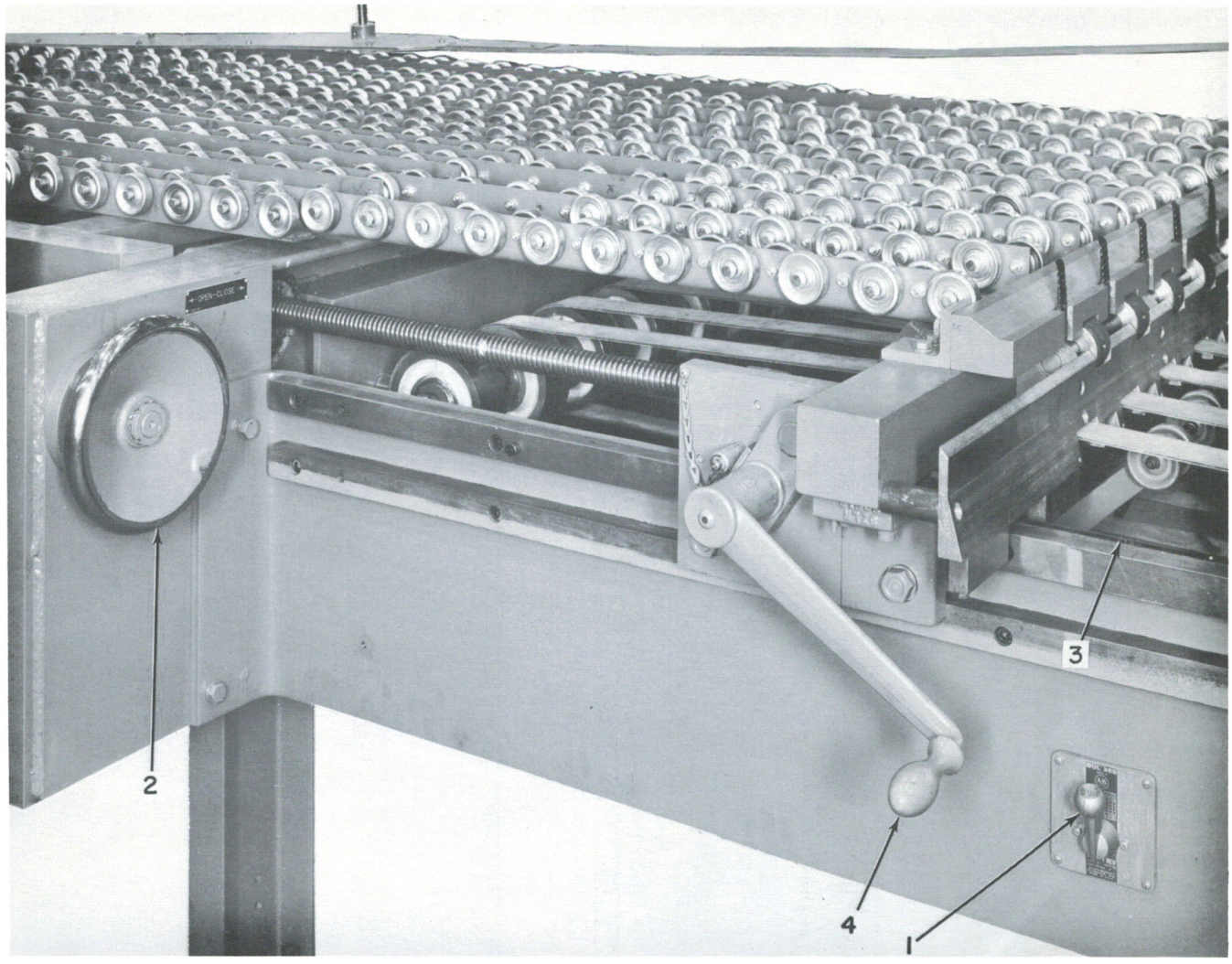
If the blank size is over 32 in. (812 mm) raise the kidney belts (Figure 8-8) to prevent jamups caused by the lift screws trying to raise boxes while they are still held by the kidney belts.

Step 1) Pull pushers clear of lift screws.

Step 2) Open squaring bar locks (Table 8-2) on both sides and slide squaring bar (2 Figure 8-2) out of the machine.

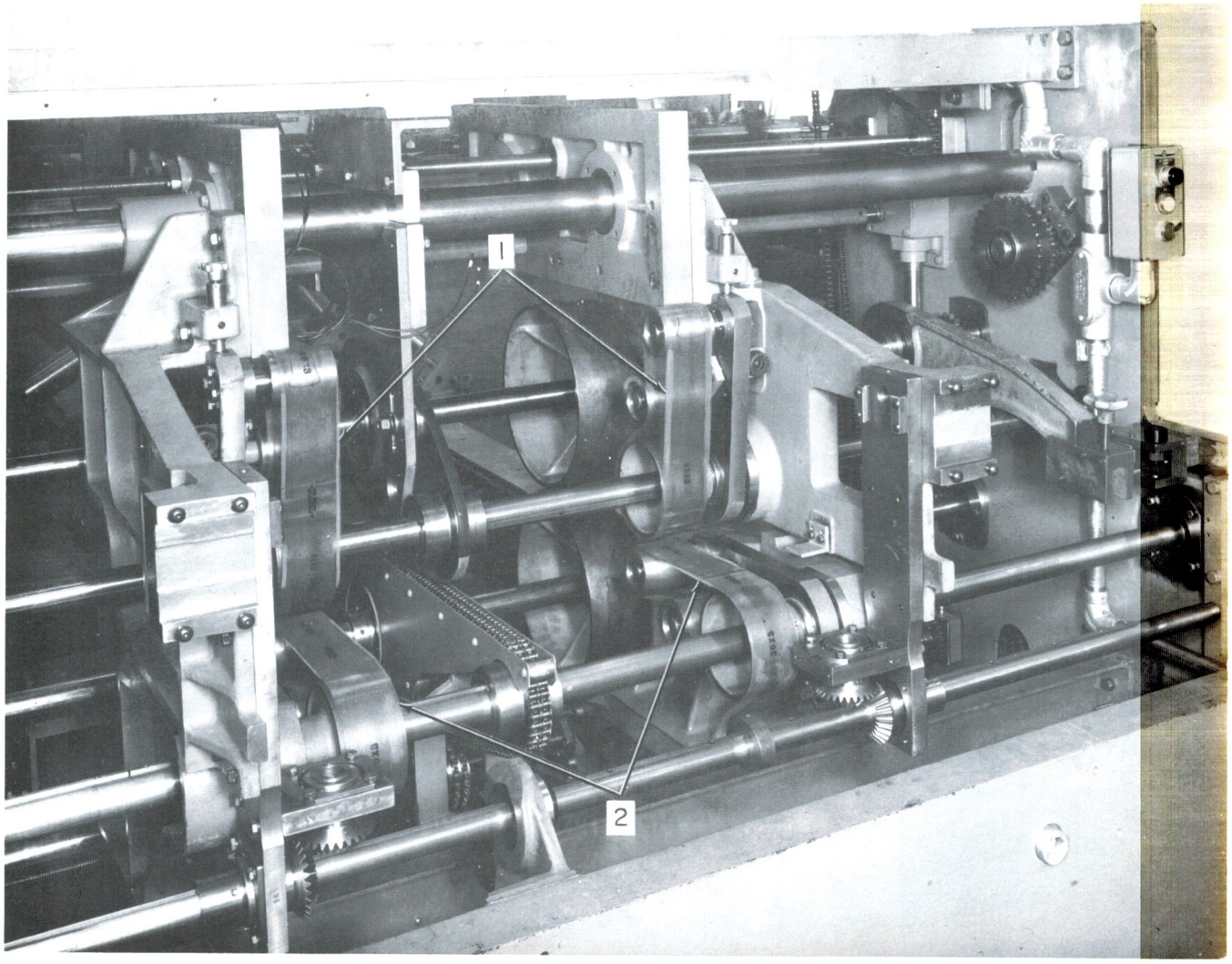
TABLE 8-2. ADJUSTMENT CONTROLS

Control Name	Figure No.	Location	Use
Front stop adjustment drum switch	8-7 (1)	Operating side on conveyor frame	Power positioning of front stop for box size.
Front stop fine adjustment handwheel	8-7 (2)	Operating side on delivery end of power adjustment lever	Fine adjustment of front stop for box size and squaring pressure.
Front stop adjustment scale	8-7 (3)	Operating frame	Setting front stop position.
Holddown lateral adjustment	8-5 (6)	Operating side on top of section frame	Position holddown over glue lap.
Holddown vertical adjustment wheel	8-5 (7)	Operating side underneath counter change knob	Raises and lowers holddown and pressure wheel.
Side guide vertical adjustment lock knob	8-6 (2)	Mounted on both side guides	Adjusts side guides and brake wheels for pile height.
Side guide lateral adjustment (2)	8-6 (3, 4)	Mounted on both side guides	Adjusts side guides and brake wheels for board width.
Count change knob	8-5 (2)	Facing delivery end above section top cross brace on operating side	Changes box count, in increments 5, from 10 to 35 boxes
Pusher arm lateral (2) and height adjustments	8-6 (6, 7)	Two clamps on each pusher for lateral positioning. One knob on each pusher for vertical positioning.	Adjusts for correct count push-off.
Manual pile lifter	8-7 (4)	Operating side	Raises lead edge of boxes for push off at end of the run or when run is interrupted.
Slapper bar lock knobs (2)	8-5 (8)	Mounted on each side of slapper bar	Unlocks slapper bar for removal.
Kidney belt lock pin (2)	8-5 (9)	Spring loaded pin mounted above each kidney belt	Locks the kidney belts in the up-right position
Kidney belt adjustment lock knob (2)	8-5 (10)	Mounted on each side of kidney belt assembly	Locks kidney belts in down posi-tion.



1. Front stop adjustment drum switch
2. Front stop fine adjustment handwheel
3. Front stop adjustment scale
4. Manual pile lifter

FIGURE 8-7. DELIVERY CONVEYOR OPERATING SIDE



1. Upper kidney belts
2. Lower kidney belts

FIGURE 8-8. KIDNEY BELTS IN RAISED POSITION

TABLE 8-3. LIFT SCREW SELECTION

Flute	Caliper	Folded Thickness	Screw Gap	Clearance
B	0.135 in. 3.429 mm	0.270 in. 6.858 mm	.3125 in. 7.9375 mm	0.042 1.0668 mm
C	0.150 to 0.175 mm 3.81 to 4.445 mm	0.350 in. max. 8.890 mm max.	.3750 in. 9.525 mm	0.025 in. 0.635 mm
A	0.200 in. 5.080 mm	0.400 in. 10.16 mm	.5000 in. 12.69 mm	0.100 in. 2.538 mm
A-B Double Wall Single Caliper	0.340 to 0.345 in. 8.636 to 8.763 mm	0.690 in. max. 17.526 mm max.	.7500 in. 19.05 mm	0.060 in. 1.524 mm

Step 3) Loosen kidney belt adjustment lock knobs (Table 8-2) on both sides of the machine, lift the knobs to the top of the slot, turn so that spring faces up and retighten.

Step 4) Lift the upper kidney belt (1 Figure 8-8) sections to a vertical position, allowing the kidney lock (Table 8-2) to seat in the holes of the belt section plates.

Step 5) Replace slapper bar and lock in position.

Step 6) Reposition the pushers laterally to clear the raised belts before running machine.

4. CHECKING AND ADJUSTING SIDE GUIDE BRAKE WHEEL ASSEMBLIES

Note

During operation brake wheel action should be checked for evidence of wear or the need of adjusting for pile height.

Step 1) Loosen the brake wheel vertical adjustment lock (Table 8-2).

Step 2) Adjust brake wheel (5 Figure 8-6) so that the last box of the pile being pushed off is just above the wheel centerline.

5. SETTING SIDE GUIDES

Step 1) Unlock brake wheel and side guide adjustment.

Step 2) Position side guides and relock.

Step 3) Relock brakewheel vertical adjustment lock.

6. SETTING MECHANICAL COUNTER

Pull out the count change knob (2 Figure 8-5) and reposition in the appropriate hole for the required box count. If gears will not engage cleanly, step on foot switch (Table 8-1).

7. SETTING THE LATERAL POSITION OF THE PUSHER ARM ASSEMBLY

Step 1) Make sure panel sizes are set.

Step 2) Depress foot switch (Table 8-1).

CAUTION

If foot switch is depressed when pusher arms are on sprocket radius, they will roll free.

Step 3) Pull pusher arms around to lowest position, clear of the side guides.

Note

Keep switch depressed while moving pushers. Release switch when pushers are in desired position.

Step 4) Loosen the pusher arm lateral adjustment clamps and move the pushers to within 1/2 in. (12.7 mm) of the spiral lift screws.

Note

The pushers should contact the pile for a clean, correct count pushoff while the last box is just leaving the top flight of the lift screws.

8. SETTING VERTICAL POSITION OF THE PUSHER ARMS

The height of the pushoff is largely determined by the relation of the lead edge of the box to holdback springs. When the lead edge of the boxes tip too much, they will be resisted by the springs if the pushers are set too low. This causes the pushers to jam or to feather the pile during pushoff.

The usual pusher height setting is two to three boxes above the top flight of the lift screw. Individual push adjustments may be required for clean pushoffs while running because of warped board or caliper change in a board run. Adjust pusher vertical position by rotating the pusher vertical adjustment knobs (Table 8-2).

E. PREVENTIVE MAINTENANCE

Use Table 8-4 as a guide for periodic maintenance. It 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.

TABLE 8-4. PERIODIC MAINTENANCE

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.
Belt support rollers	Monthly	Check that all rollers turn freely and are not jammed with paper dust. Replace worn rollers or rollers with flattened areas on the outside diameter.
Brake wheels	Monthly	Check for wear.
Delivery end equipment	Monthly or sooner if jamups become frequent	Determine if possible the cause of misalignment. Loose chain, operator carelessness, poor lubrication.
Gap detector reflector (option)	Daily or as required	Clean off accumulated dust.
Gap detector light source (option)	As required	Replace bulb.

1. DELIVERY END V-BELT REPLACEMENT

Note

Use the following procedure when the V-belt shows evidence of wear or breaks.

Step 1) Remove the coupling set screw (1 Figure 8-9) on both the operating and drive sides of the shaft couplings (2 Figure 8-9).

Step 2) Loosen the V-belt upper idler pulley stud (4 Figure 8-9) nut and move the pulley (5 Figure 8-9) down to release the tension on the belt (3 Figure 8-9).

Step 3) Install the coupling set screws in the jack screw holes (6 Figure 8-9) and jack the shafts (7 Figure 8-9) free of the couplings.

Step 4) Replace the V-belt with a new one and re-assemble the shafts in the couplings. Secure the shafts in the couplings using the set screws.

Step 5) Thread the belt as shown in Figure 8-9.

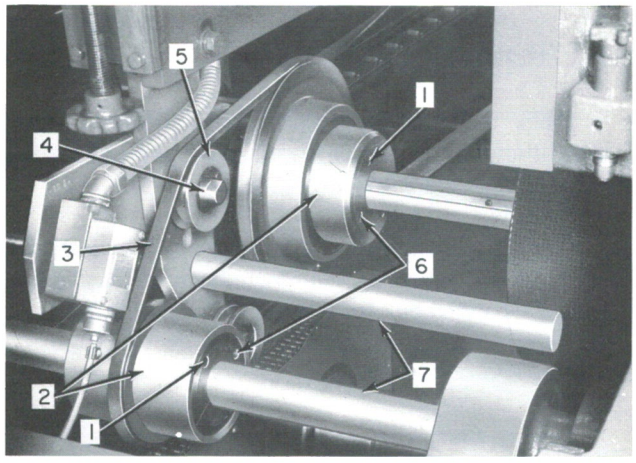


FIGURE 8-9. V-BELT REPLACEMENT

1. Coupling set screws
2. Couplings
3. V-belt
4. Idler pulley stud
5. Idler pulley
6. Jack screw holes
7. Shafts

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

Two timing discs with coinciding zero 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 of the feed table. When the barring collar timing mark is aligned with the pointer attached to the frame, 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. 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 the delivery end at the right time for engagement by the lift screws. 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:

Step 1) Jog the machine using the delivery end JOG button to align the timing disc zero mark with the pointer on the inside of the delivery end frame operating side (Figure 8-10).

Step 2) 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.

Step 3) If the feed end timing mark (Figure 3-20) is not aligned, unlock and open the feed section (see paragraph II.A).

Step 4) 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.

Step 5) Close machine.

TABLE 8-5. DELIVERY END BOX TROUBLES

Symptom	Cause	Remedy
Boxes not sealing	Short and long holddowns improperly positioned	Reposition the holddowns over the glue joint.
	Insufficient or excessive glue film or improper glue formulation	
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.

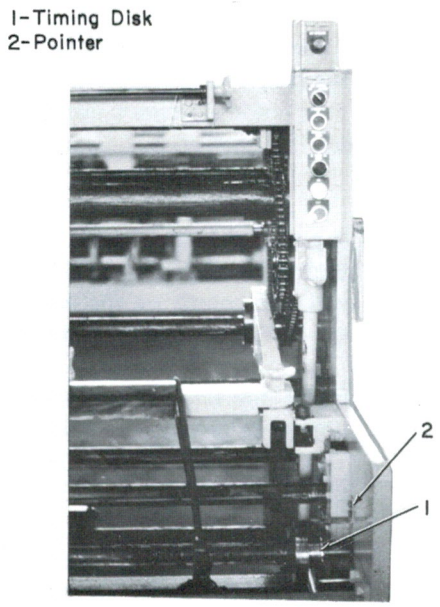


FIGURE 8-10. DELIVERY END TIMING MARK

F. TROUBLESHOOTING

Refer to Tables 8-5 and 8-6 for a listing of operating difficulties which may be encountered and some standard procedures to correct them.

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

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

G. DELIVERY SECTION LUBRICATION

Refer to Table 8-7 and Figures 8-11, 8-12, 8-13 and 8-14 for points of lubrication, frequency, method and type of lubricant.

TABLE 8-6. DELIVERY END OPERATING TROUBLES

Symptom	Cause	Remedy
Unable to set panel sizes	Pushers or short and long holddowns interfere with panels	Move pushers and holddown 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 holddown adjustable roller out of adjustment	Readjust the roller extension for the blank being run.
	Holddown too high for count	Lower holddown to exert pressure on boxes
	Horizontal shaft not rotating	Check motor. Replace if necessary.
	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.
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.
	Holddown height incorrect	Readjust the holddown 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	Wheels should restrain the top blank of the subsequent pile. When the rubber wears, adjust the tightness.
	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.
	Machine out of line	Check alignment.

TABLE 8-6. DELIVERY END OPERATING TROUBLES (Continued)

Symptom	Cause	Remedy
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.
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 holddown.
Delivery end jamup	Spiral lift screw too tight or too loose	Install the proper lift screw.
	Blanks reverse warped	Move the reverse warp holddowns into operating position.
	Looseback	Remove all sheets with loosebacking from the feed hopper and from subsequent piles.
	Crooked blank	Check kicker for alignment.
		Check the front gauge height. Readjust the height if necessary.
	Delivery out of line	Check machine alignment.
	Box over 32 inches in length	Reposition kidney belt assembly.
	Double blank	Check the front gauge height. Readjust if necessary.
	Boxes slipping in other sections	Check and adjust caliper settings.

TABLE 8-7. DELIVERY SECTION LUBRICATION

Item	Figure No.	Description	Lubricant	Period	Method
1	8-11	Upper and lower folding belt pulleys	Agma No. 3, Agma spec. 252	Weekly	
2	8-11	Delivery end guide shafts	Molykote BR-2, Molybdenum Sulphite grease	Monthly	
3	8-11	Upper and lower guide shaft bushings 8 locations	Molykote BR-2	Monthly	
4	8-11	Upper and lower bearing housings	NLGI No. 2 Lithium soap grease	Weekly	
5	8-11	Chain, drive and operating sides	Agma No. 1, Agma spec. 252	Weekly	
1	8-12	Sealmaster bearings, drive and operating sides	NLGI No. 2	Monthly	
2	8-12	Chain, drive and operating sides	Agma No. 3	Weekly	
3	8-12	Gear Shift box	Agma No. 3	Weekly	
4	8-12	Lead screw nuts, 4 locations	Molykote BR-2	Weekly	
5	8-12	Sealmaster bearings, 2 locations	NLGI No. 2	Weekly	
6	8-12	Lateral adjustment motor	per manufacturer's recommendation		
7	8-12	Sealmaster bearings, 2 locations	NLGI No. 2	Monthly	
8	8-12	Hub City gear box	per manufacturer's recommendation		
1	8-13	Gearbox	Agma No. 1	Daily	
2	8-13	Lateral adjustment motor	per manufacturer's recommendation		
3	8-13	Sealmaster bearing	NLGI No. 2	Monthly	
4	8-13	Back stop roller motor	per manufacturer's recommendation		
5	8-13	Front stop adjustment motor	per manufacturer's recommendation		
6	8-13	Bearing	NLGI No. 2	Monthly	
1	8-14	Upper and lower pulleys, drive and operating sides	NLGI No. 2	Weekly	
2	8-14	Lift screw lock pins	Agma No. 1	Monthly	
3	8-14	Lift roll assembly	NLGI No. 2	Weekly	
4	8-14	Lift screw drive shaft, drive and operating sides	NLGI No. 2	Weekly	
5	8-14	Counter frame sealmaster bearing, 3 locations	NLGI No. 2	Weekly	

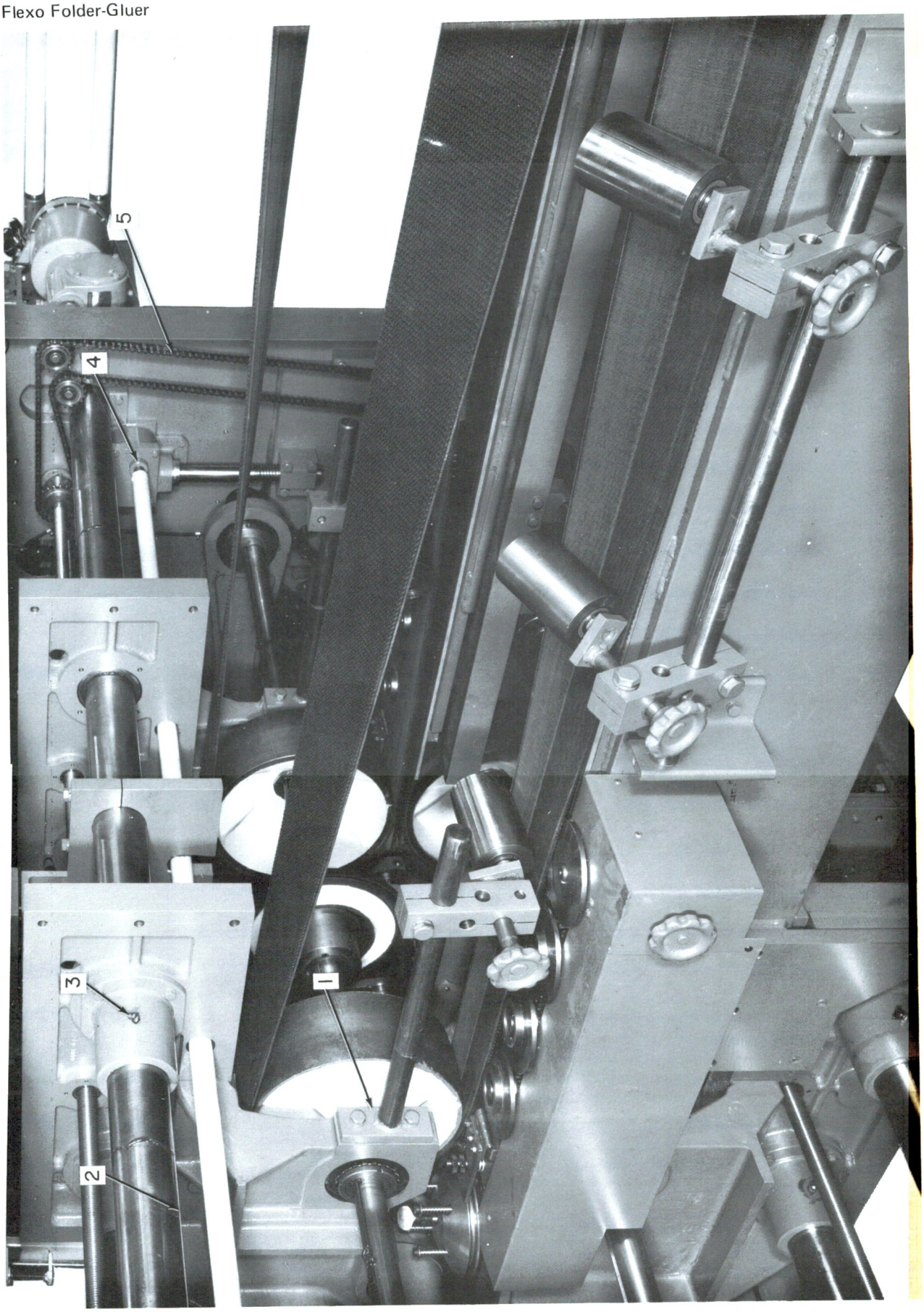


FIGURE 8-11. DELIVERY END LUBRICATION, OPERATING SIDE

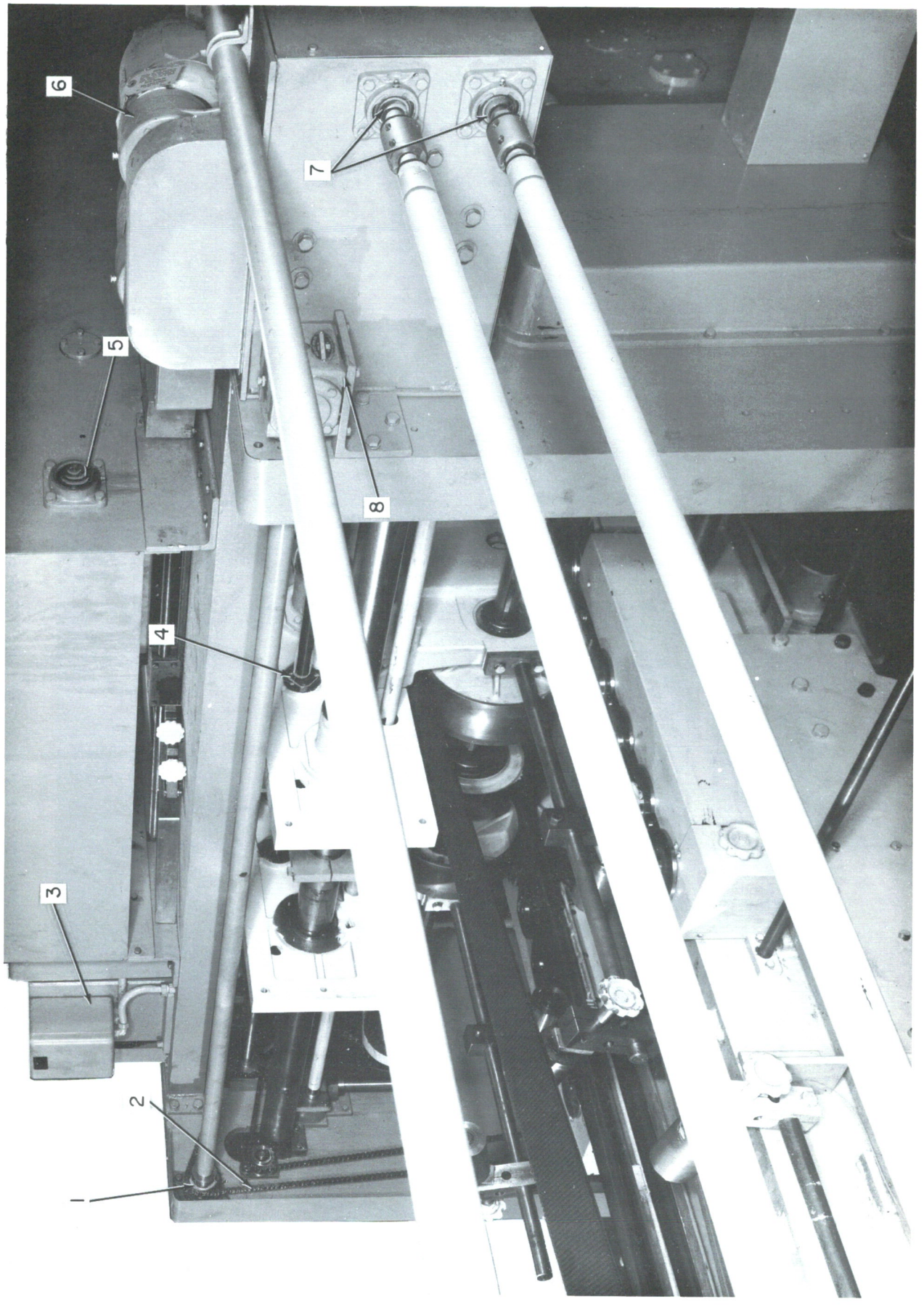


FIGURE 8-12. DELIVERY END LUBRICATION, DRIVE SIDE (VIEW 1)

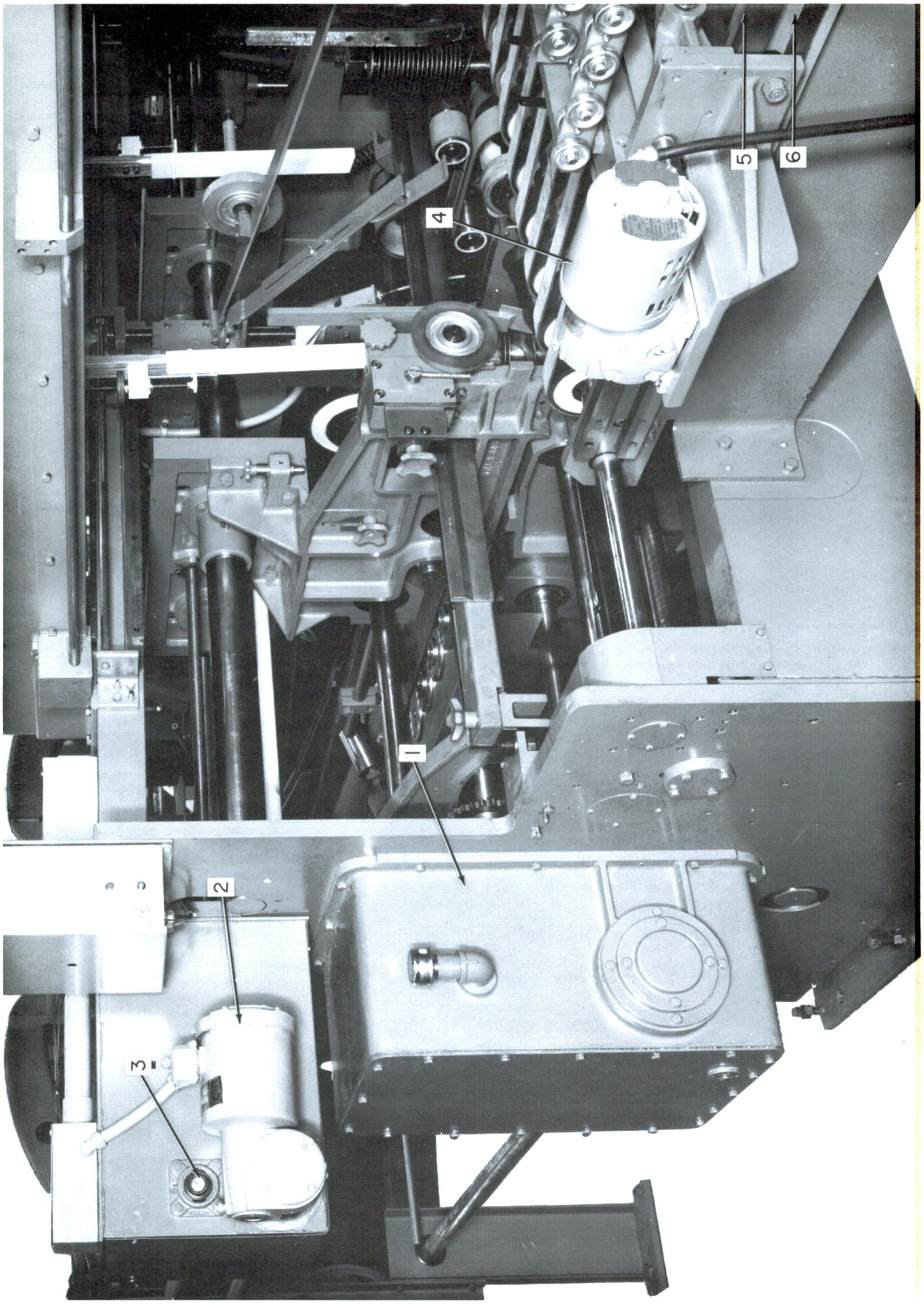


FIGURE 8-13. DELIVERY END LUBRICATION, DRIVE SIDE (VIEW 2)

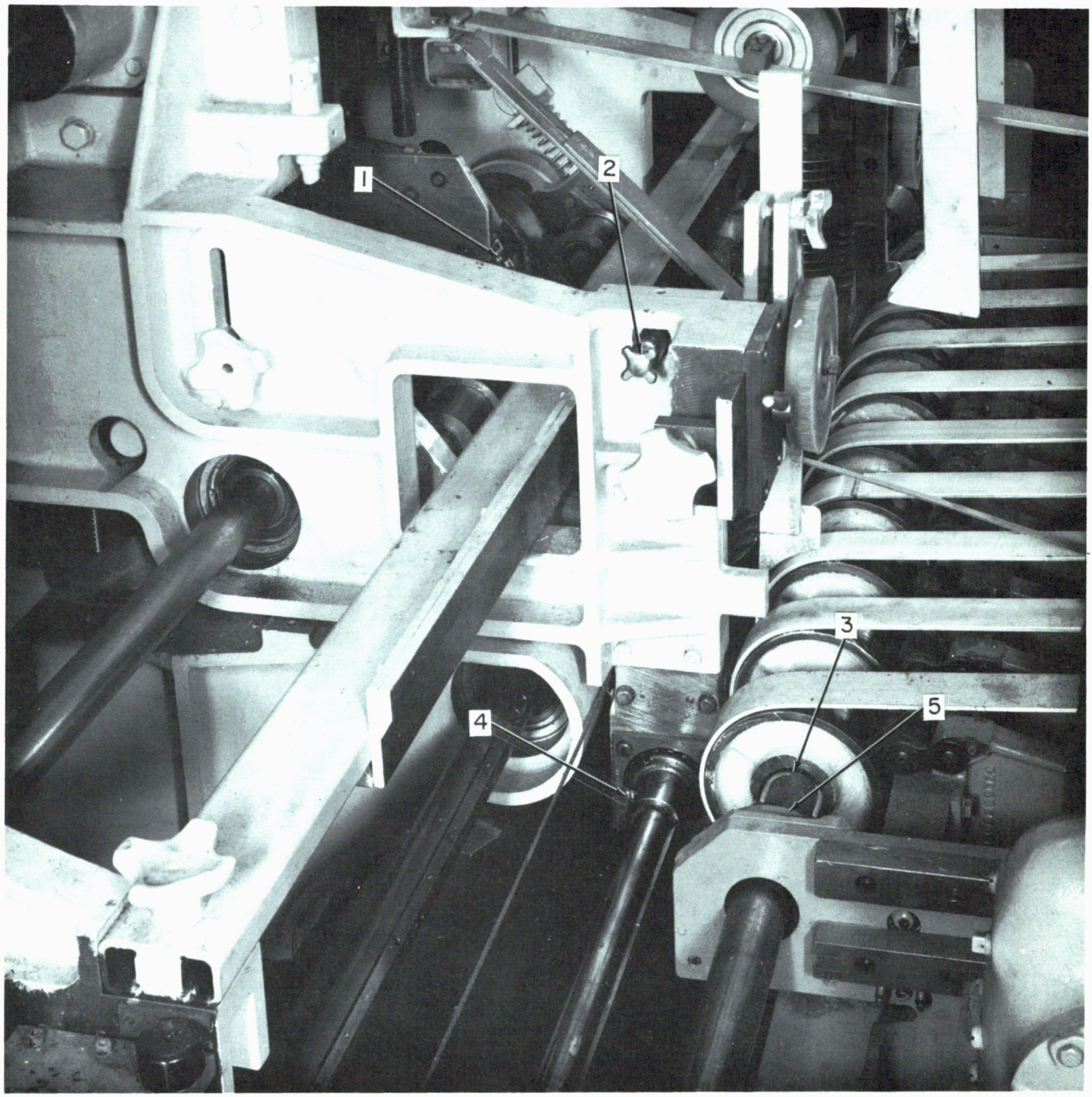


FIGURE 8-14. DELIVERY END LUBRICATION, DRIVE SIDE (VIEW 3)

SECTION IX.
SPECIAL OPERATIONS (WITH OPTIONAL EQUIPMENT)

A. RUNNING UNFOLDED BOXES, TRAY BOXES AND FIVE-PANEL BOXES

Refer to Table 9-1 to select proper life screw.

1. ADJUSTING FOLDING SECTION FOR UNFOLDED, TRAY AND FIVE-PANEL BOXES (Figure 9-1)

Step 1) Set 1st and 4th panels to read 40 in. (1016 mm) on each side (Figure 9-2) and creaser-slotter.

Step 2) Set 2nd and 3rd panels for box size to be run.

Step 3) Disengage panel clutches (Figure 9-3) on drive side and glue unit clutch (Figure 9-4) located inside folding section feed end frame on drive side.

Step 4) Set folding section to overall blank size to be run not to exceed 33 in. (838 mm) on either side of the centerline.

Step 5) If trimming, (see paragraphs IX.A.2.a., IX.A.2.b. and IX.A.3.), set 4th panel for box size to be run.

2. ADJUSTING CREASER-SLOTTER FOR TWO-OUT TRAY OPERATION

a. 3 in. (76.2 mm) End Panel With Trim (Figure 9-5)

Step 1) Move #1 head and glue unit clear of blank.

Step 2) Install slotting, creasing and trimming head on #2 head and position for box size.

Step 3) Move center head off center 3 in. (76.2 mm).

Step 4) Install split head on centerline for perforated cut.

Step 5) Install split head for slotting and creasing position.

Step 6) Install slotting and creasing head on #3 head and position for box size.

Step 7) Position #4 trimming head for box size.

b. 5 in. (127 mm) End Panel With Trim (Figure 9-6)

Step 1) Move glue unit clear of blank.

Step 2) Install trim knife on #1 head and position for box size.

Step 3) Install creasing and slotting head on #2 head and position for box size.

Step 4) Move center head off center 5 in. (127 mm).

Step 5) Install split head on centerline for perforated cut.

Step 6) Install split head for slotting and creasing and then position off center 5 in. (127 mm).

TABLE 9-1. LIFT SCREW SELECTION FOR TRAY BOXES

Flute	Caliper (in.)	Screw gap (in.)	Clearance (in.)
B	0.120 - 0.135	0.140	0.015 - 0.005
C	0.150 - 0.175	0.187	0.037 - 0.012
A	0.200	0.250	0.050
AB	0.340 - 0.345	0.375	0.030 - 0.035

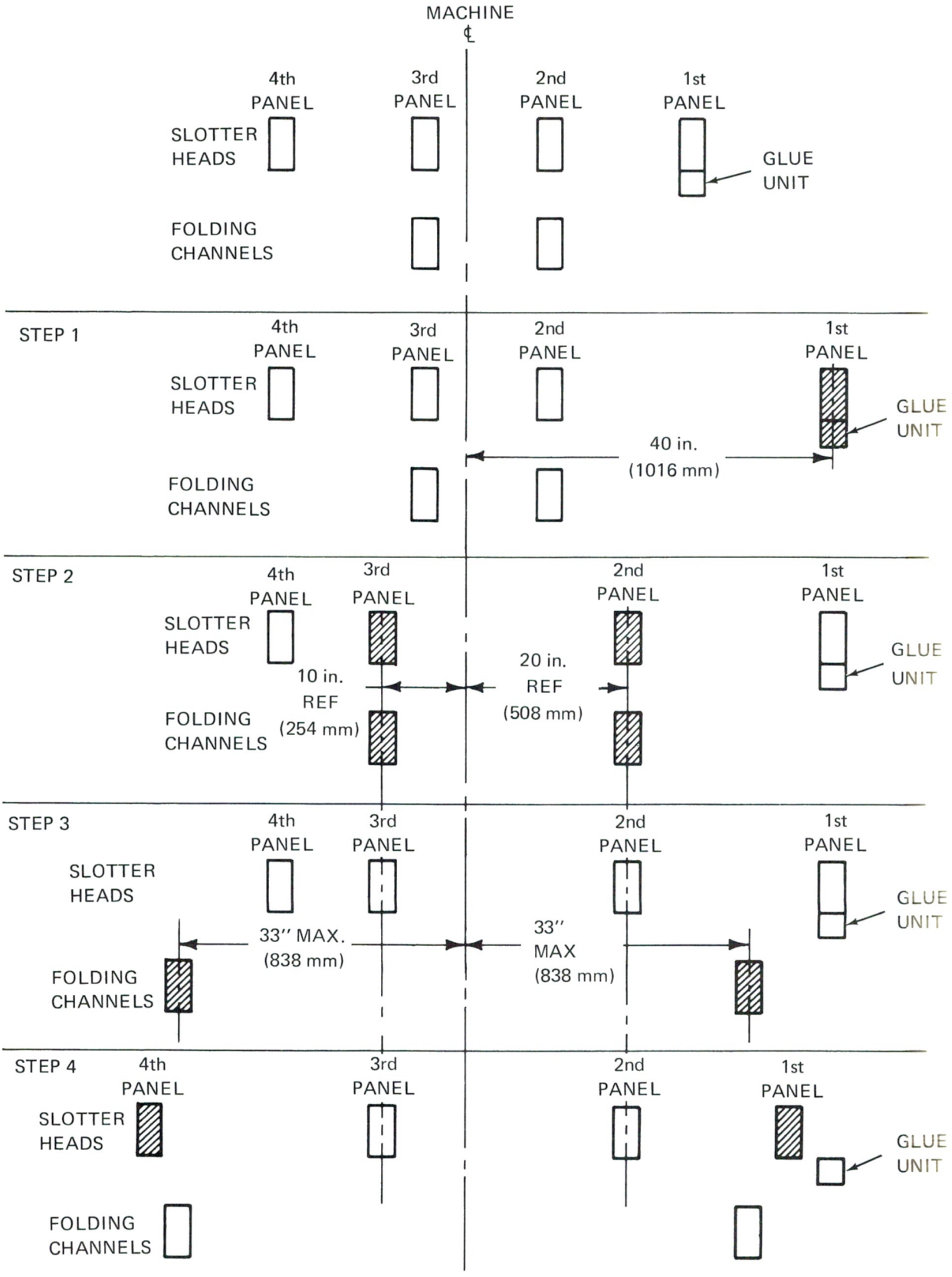


FIGURE 9-1. INDEPENDENT FOLDING SECTION ADJUSTMENT

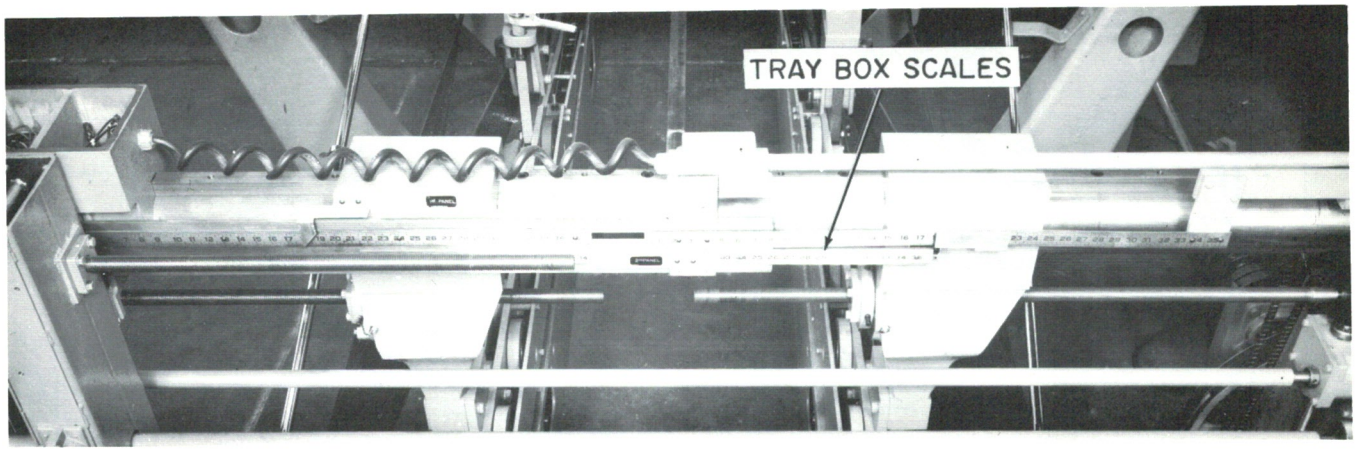


FIGURE 9-2. FOLDING SECTION TRAY BOX SCALES

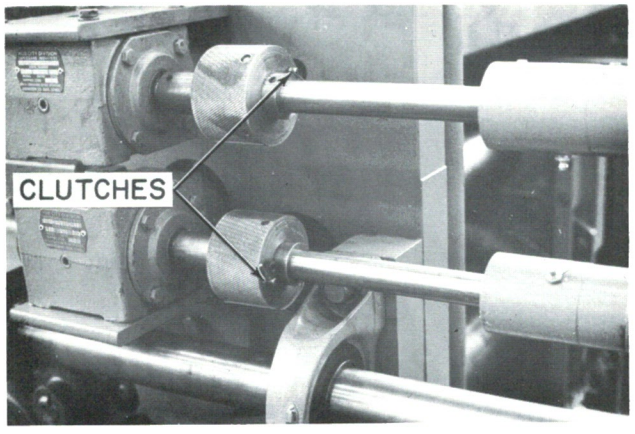


FIGURE 9-3. PANEL CLUTCHES

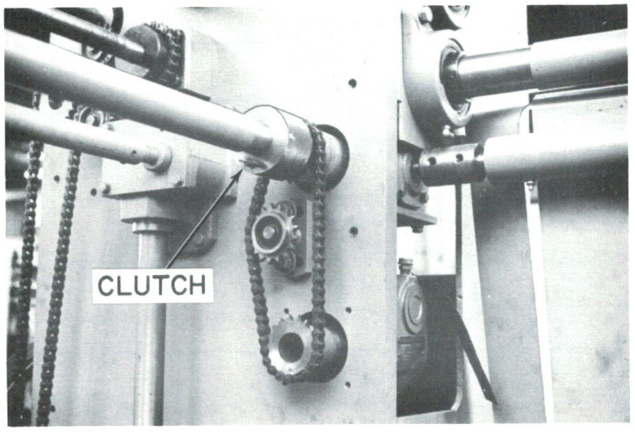


FIGURE 9-4. GLUE UNIT CLUTCH

Step 7) Install slotting and creasing head on #3 head and position for box size.

Step 8) Position #4 trimming head for box size.

c. 2-3/4 in. (70 mm) End Panel Without Trim (Figure 9-7)

Step 1) Move #1 head and glue unit clear of blank.

Step 2) Install creasing and slotting head on #2 head and position for box size.

Step 3) Move center head off center 2-3/4 in. (70 mm).

Step 4) Install split head on centerline for perforated cut.

Step 5) Install split head for slotting and creasing and position 2-3/4 in. (70 mm) off center.

Step 6) Install slotting and creasing head on #3 head and position for box size.

Step 7) Position #4 head for box size.

3. ADJUSTING CREASER-SLOTTER FOR 5-PANEL BOXES (Figure 9-8)

Step 1) Disengage glue unit clutch and move glue unit away from board.

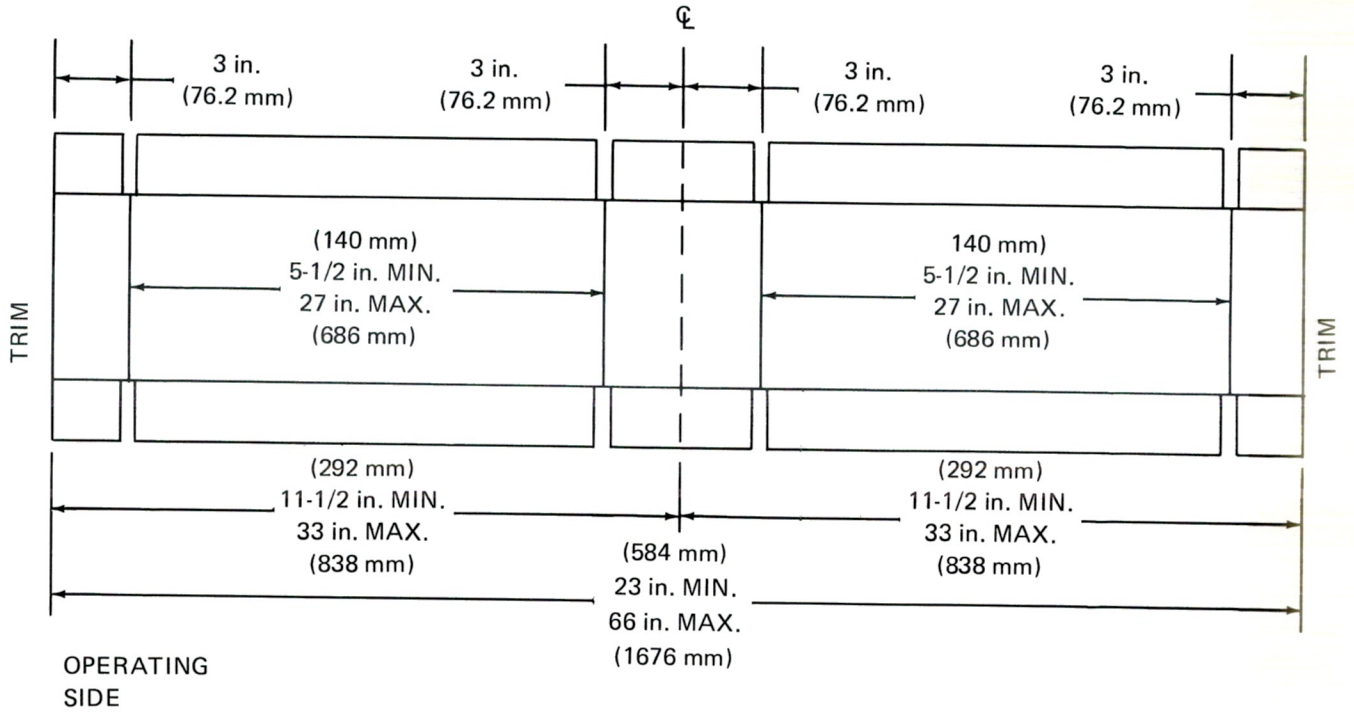


FIGURE 9-5. 3 in. (76.2 mm) END PANEL WITH TRIM

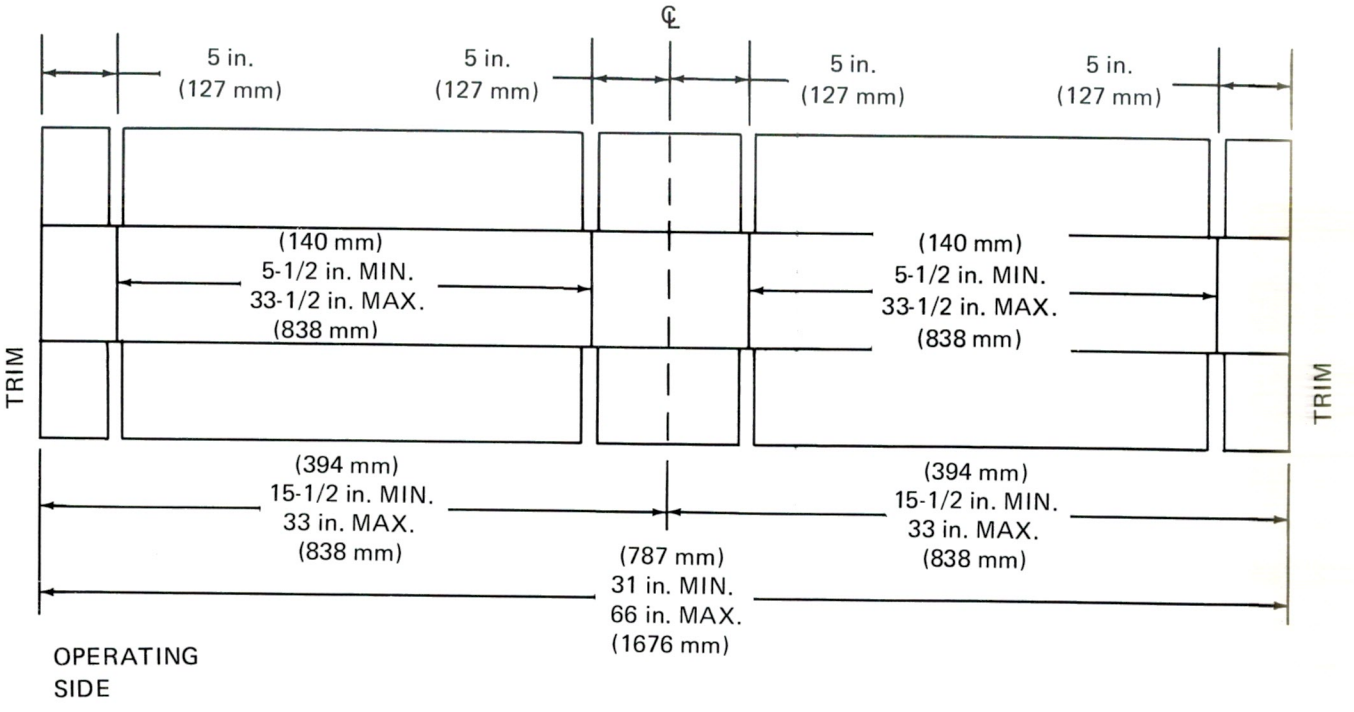


FIGURE 9-6. 5 in. (127 mm) END PANEL WITH TRIM

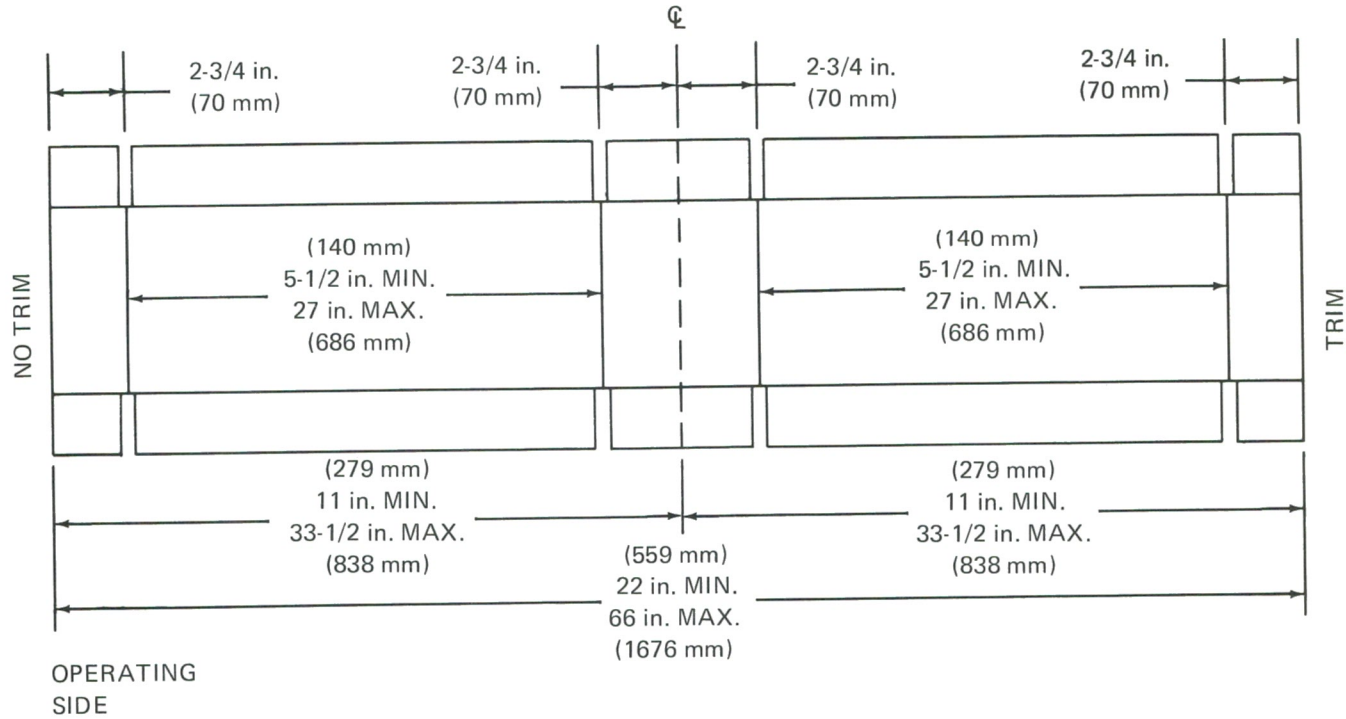


FIGURE 9-7. 2-3/4 in. (70 mm) END PANEL WITHOUT TRIM

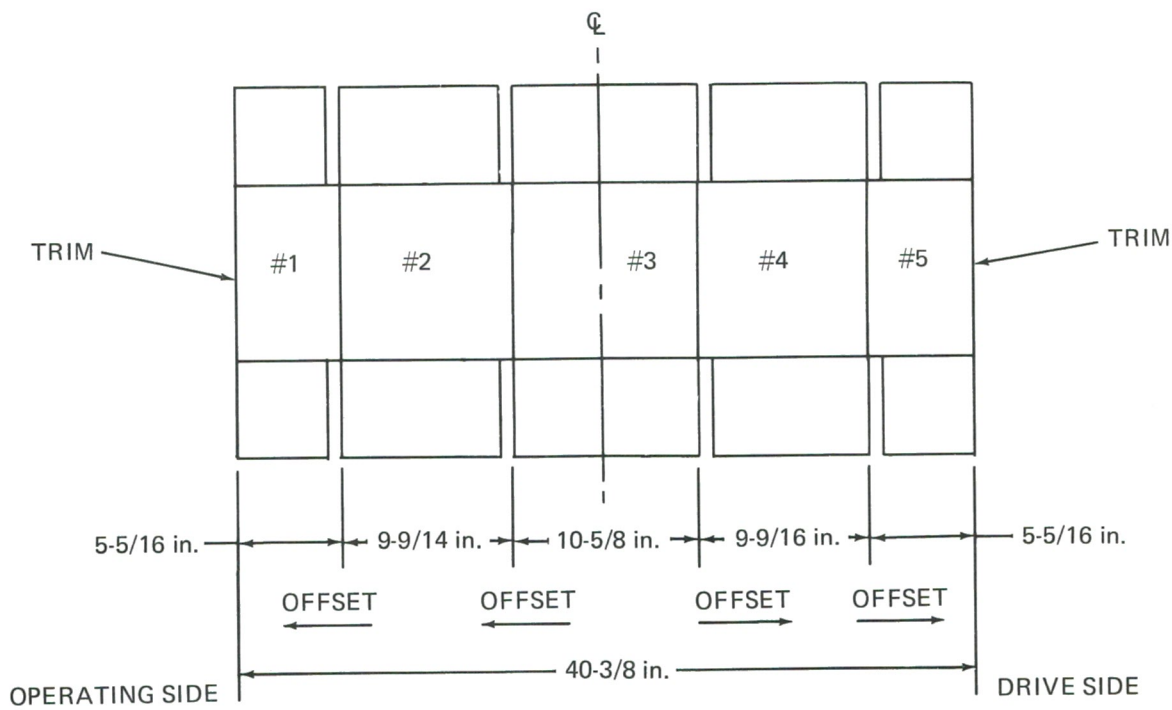


FIGURE 9-8. TYPICAL 5-PANEL BOX

Step 2) Install trim blade on #1 head.

Step 3) Install offset spacers, and slotting and creasing head on #2 head and position for box size.

Step 4) Install offset spacers on center head and move head off center for box size.

Step 5) Install offset spacers and slotting and creasing head on #3 head and position for box size.

Step 6) Install split creasing and slotting head and position for box size.

Step 7) Position #4 head for trim.

4. REALIGNING FOLDING SECTION

Step 1) Set 2nd and 3rd PANELS to read the same as the folding section.

Step 2) Reengage clutches.

B. DIECUTTING ON THE SLOTTER SHAFTS

Diecutting on the 701 slotter shafts should be limited to hand holes, vent holes, tear tape cuts and similar types of minor diecutting. All other types of diecutting should be done with a separate diecutting unit.

To find minimum panel size for diecutting on 701 slotter shafts add about 5 in. (127 mm) to the panel size on which the diecutting is being done.

Note

S&S does not manufacture or supply cutting die holders, dies or anvils for slotter shaft application. This equipment may be ordered through S&S upon request. S&S will supply, upon request, pertinent information required for the manufacture of such equipment.

When performing diecut operations on the slotter shafts, follow these recommendations:

1) Machine speed should not exceed 50% of maximum.

2) Install a lower slotter shaft support in order to minimize any tendency of the slotter shafts to bounce.

CAUTION

Bouncing of the shafts can result in premature wear of Jiffy plates and slotting knives.

SECTION X.
JET-WASH AUTOMATIC WASHUP AND INK CIRCULATING SYSTEM (Optional)

A. DESCRIPTION

The Jet-Wash Automatic Washup and Ink Circulating System is housed on the drive side of the 701 flexographic printer.

Jet-Wash consists of the following main components: control cabinet housing the stepping drum programmer with air and electrical switches; hydro-pneumatic valves and air pressure regulator; gate valves; ink reservoir with ink filter; water pressure reducing valve and water strainer; upper and lower spray rails; ink pump and motor.

1. CONTROL CABINET AND STEPPING DRUM PROGRAMMER

The control cabinet (Figure 10-1) houses the control switches and stepping drum programmer. The stepping drum programmer (Figure 10-2) is the heart of the automatic system. Plugs (Figure 10-2) fixed on the drum in a predetermined pattern activate air and electrical switches (Figure 10-2) in the correct sequence for the washup to occur.

2. HYDRO-PNEUMATIC VALVES AND AIR PRESSURE REGULATOR

Eight hydro-pneumatic valves (A, B, C, D_1, E, Figure 10-1; D_2, G, F, Figure 10-3) are located in the ink and water lines. These are automatic valves. They operate automatically on signals coming from the air switches activated by the stepping drum programmer. Each valve is normally either open or closed. When activated, the valve assumes the opposite state.

An air pressure regulator (Figure 10-1) maintains the air pressure to operate the valves at 50 to 60 psi (3.5 to 4.2 kgscm).

3. GATE VALVES

Four manually operated gate valves (H,J,K,L, Figure 10-3) allow manual washup and normal ink circulation in the event of automatic system malfunction or failure.

4. INK RESERVOIR AND FILTER (Figure 10-4)

The Teflon-coated ink reservoir carries the ink supply during operation. The large removable ink filter removes scrap and paper dust in the ink.

5. UPPER AND LOWER SPRAY RAILS AND NOZZLES (Figure 10-5)

The lower spray rail (Figure 10-5) runs across the width of the ink roll and doctor blade inside the ink trough. The lower rail has two rows of spray nozzles. One set of nozzles sprays perpendicular to the roll in an overlapping pattern as the roll rotates. The second set of nozzles sprays the underside of the doctor blade to prevent ink buildup.

The upper spray rail (Figure 10-5) runs across the top of the doctor blade and sprays the top side of the doctor blade and holder and the valley formed by the blade and ink roll.

A wide-angle spray nozzle (Figure 10-4) inside the ink reservoir cover cleans the underside of the cover and reservoir.

6. WATER PRESSURE REDUCING VALVE AND WATER STRAINER

The water pressure reducing valve (Figure 10-1) maintains the required 40 psi (2.8 kgscm) for effective washups. A water strainer (Figure 10-1) fits into the main water line to filter out foreign material that might restrict water flow.

7. MOTOR AND PUMP

One pump (Figure 10-1) circulates the water for washup and the ink for printing. Ink flow to the roll is by gravity feed. Return ink is also gravity fed to the pump. The pump is placed at the lowest point in the system for adequate drainage and circulation.

A two-speed, 1800 rpm/900 rpm, 3/4 Hp motor drives the pump.

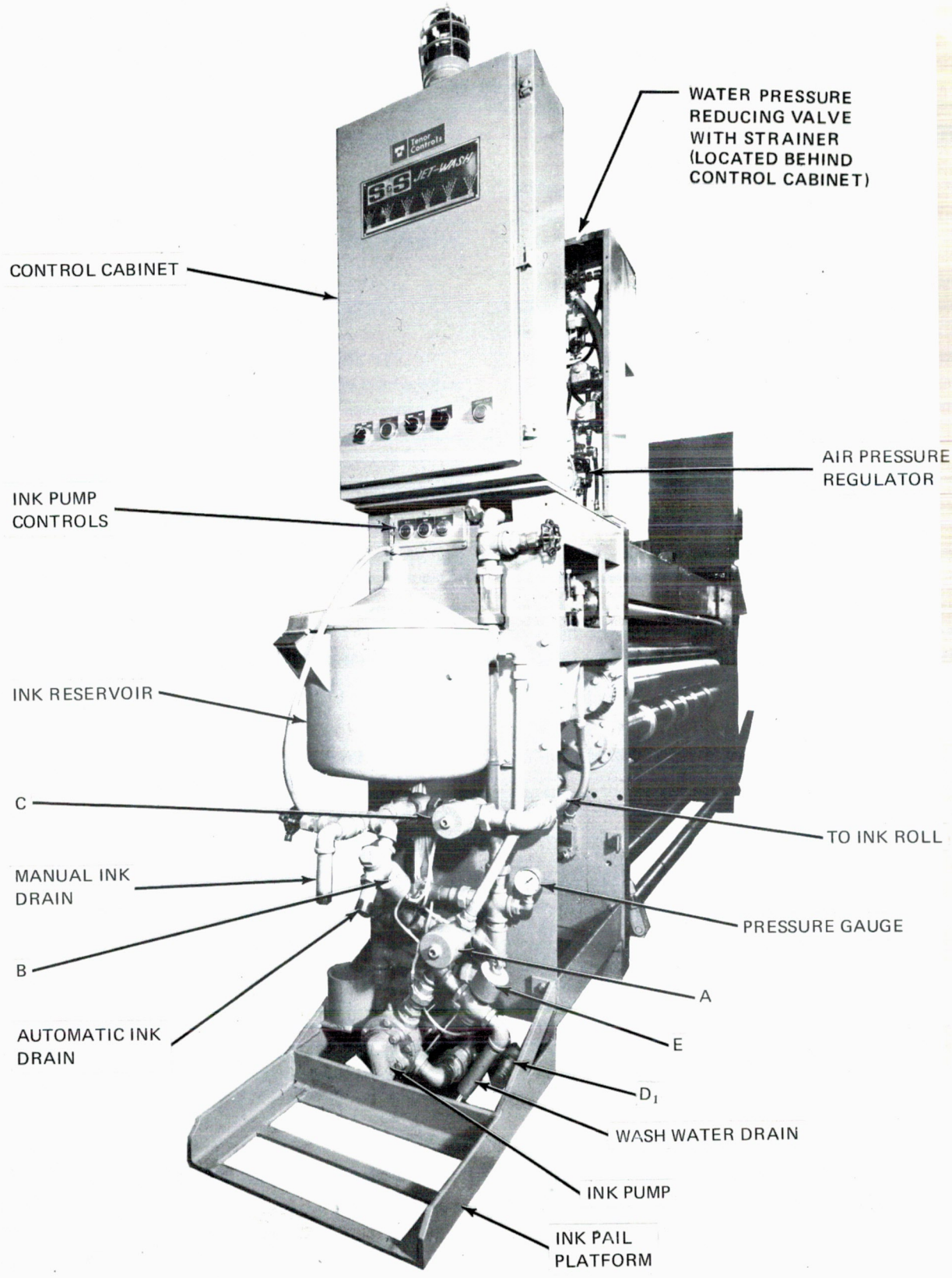


FIGURE 10-1. WASHUP UNIT COMPONENTS

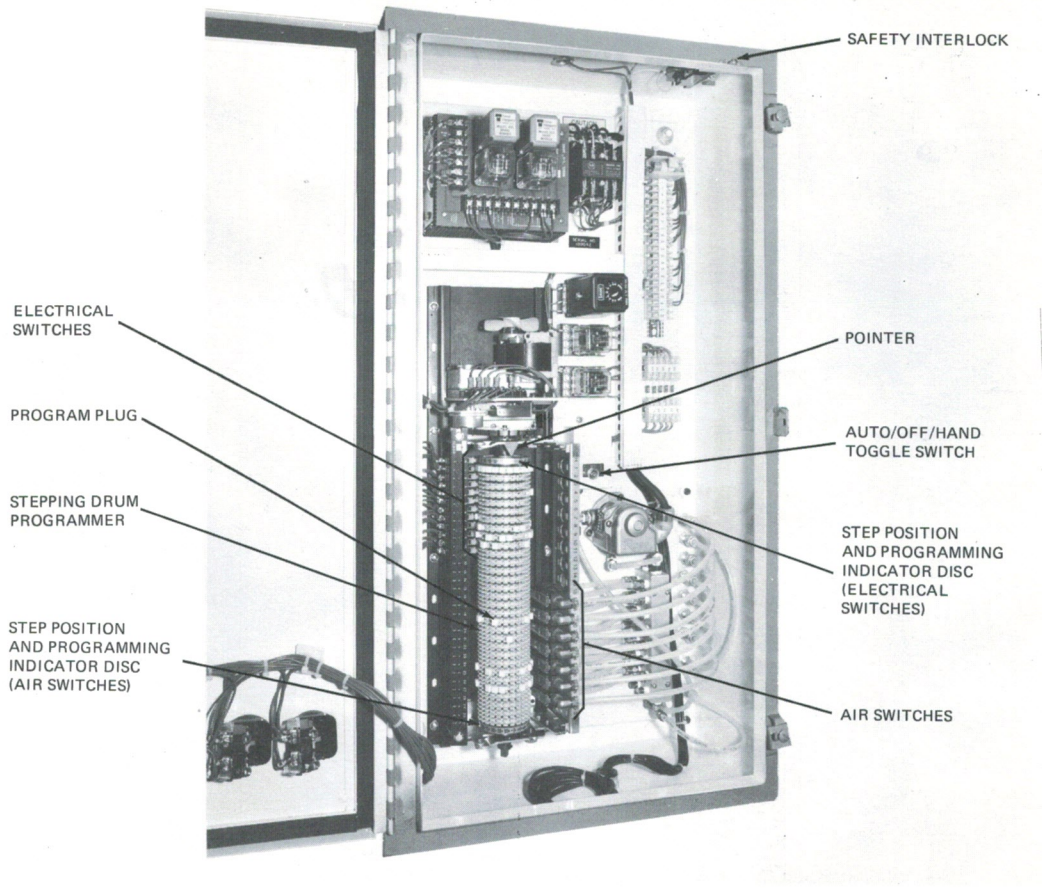


FIGURE 10-2. CONTROL CABINET COMPONENTS

B. PROCESS

The Jet-Wash unit washes the ink roll, ink trough and ink circulating system of the printing unit by automatically circulating fresh water and detergent throughout the ink circulating system. The automatic washup unit runs through washing and draining steps much like an ordinary washing machine. A 24-step cycle for a long wash or a 14-step cycle for a short wash activated by the programmer drains the ink, washes the system with water and detergent, rinses, and then drains the water.

A timer connected to the stepping drum programmer begins timing the first step when the automatic washup starts. As each step times out, the programmer rotates, activating other air or electrical switches. For example, during step 4, a wash step, the programmer activates the timer and opens the water supply and drain valves. When step 4 times out, the programmer rotates to step 5. Step 5 activates the timer and the next set of switches therefore closing the water supply valve, the ink return valve and leaving the drain valve open. This continues until the washup cycle is complete. Once the washup is complete the ink circulating system is automatically ready for new ink.

Figure 10-6 is a schematic diagram of the washup and ink circulating system.

C. OPERATION CONTROLS

The operation controls are mounted on the Jet-Wash control cabinet on the drive side of the printing unit (Figure 10-7). Table 10-1 lists the name and use of all the controls and indicators for the Jet-Wash system. Table 10-2 lists the hydro-pneumatic valves and Table 10-3 lists manual gate valves. Refer to Table 4-3 for ink pump operating controls.

D. SELECTING SHORT OR LONG WASH

Two washup cycles are programmed into the system. The operator needs to select the length of wash to meet his requirements.

1. SHORT WASH

A short wash takes 8 minutes and uses about 15 gallons of water. In general, use the short wash when changing from a lighter ink to a darker ink. Also, a short

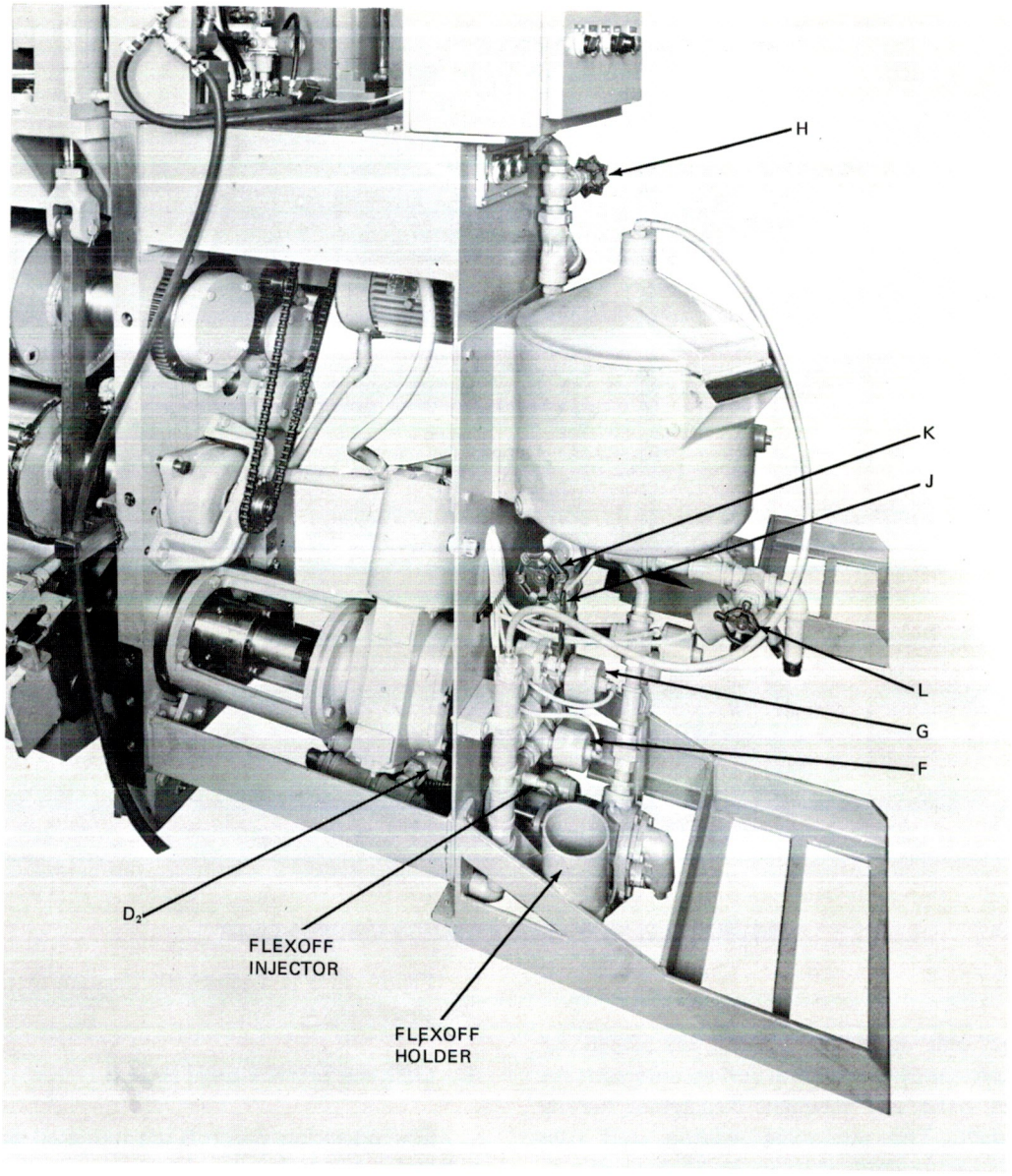


FIGURE 10-3. GATE VALVES

wash should be used to flush out a printing unit that has been bypassed for sometime, before putting in new ink.

2. LONG WASH

A long wash lasts 13 minutes and uses about 25 gallons of water. In general, use the long wash when changing from dark ink to light ink. Also, a long wash should be used before a shutdown period.

3. VARIABLES AFFECTING WASH SELECTION

As you gain experience with the automatic washup, remember the following variables when selecting long or short wash.

a. Ink Formulation

Ink manufacturers use considerably different ink formulas. A particular color of one supplier may clean up with a short wash while the same color of another supplier may require additional washing.

b. Solid Content of Ink

Inks vary considerably in solid content. For example, many blacks and reds contain about 30% solid content. These clean up with a short wash. Some yellows, whites and oranges, though, contain 50% or more solids. These inks require more thorough washing.

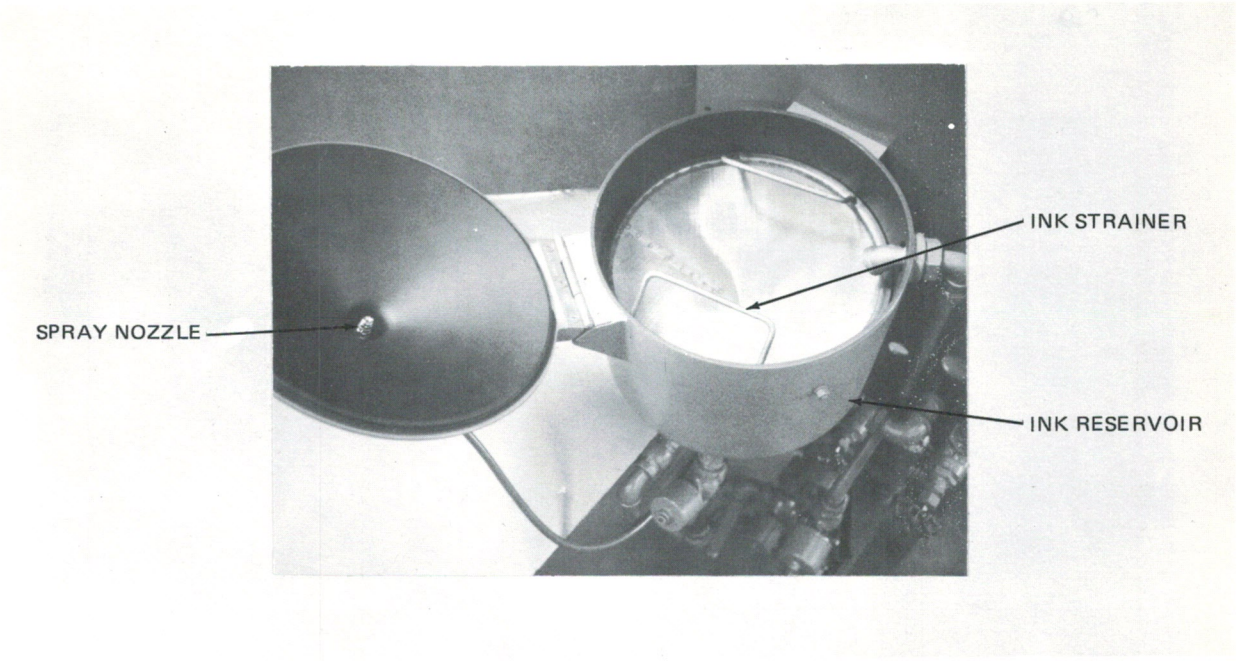


FIGURE 10-4. INK RESERVOIR

c. Time in Use

Ink in use for a long period of time may require longer washups.

d. Ink Viscosity

High-viscosity inks, 30 seconds or more with #2 Zahn cup may be more difficult to wash up than normal viscosity inks (20-25 seconds).

e. Use of Warm Water and Detergent

Warm water and detergent like S & S Flexoff could result in more usage of short wash cycles.

f. Water Pressure

Note

A minimum water pressure of 40 psi (2.8 kgscm) is required for effective washup.

g. Wash Water Disposal

Restrictions in wash water disposal and facilities affect the use of short or long wash cycles.

h. Scheduling

Efficient production scheduling can improve the effectiveness of the washups and decrease ink loss and water disposal problems. For example, schedule as few washups as possible. Schedule dark colors over lighter. Use each printer for different one-color jobs and wash up one printer while the other is running.

E. AUTOMATIC INK DRAIN AND WASHUP PROCEDURE

1. DRAINING INK AND WASHUP

Step 1) Make sure gate valves H and K (Table 10-3) are open. Make sure gate valves J and L (Table 10-3) are closed.

Note

Turn valve clockwise to close. Turn counter-clockwise to open.

Step 2) Open ink dams at both ends of the ink roll.

Step 3) Place ink pail under drain spout (Figure 10-1).

Step 4) Remove filter (Figure 10-4) from ink reservoir and close lid.

Note

While washup takes place, clean filter separately.

Step 5) Select long or short wash using appropriate selector switch.

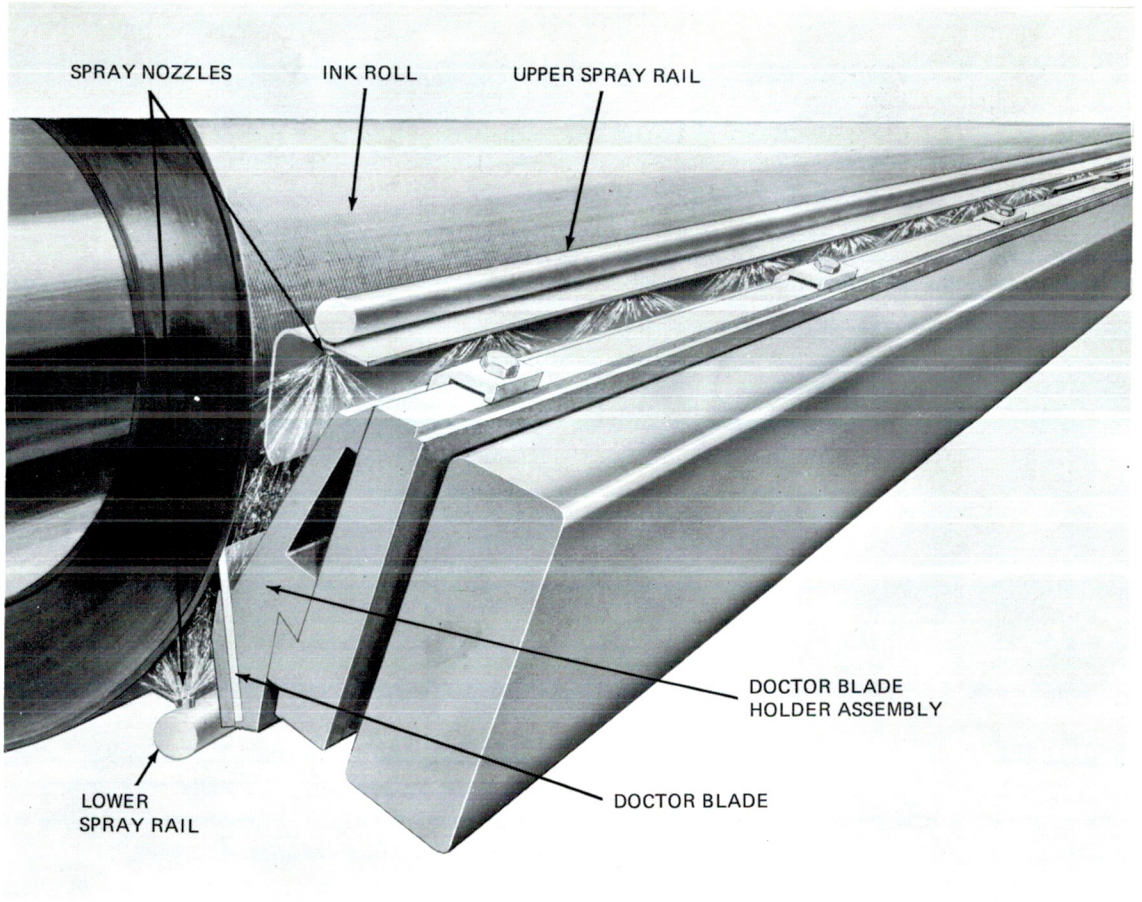


FIGURE 10-5. SPRAY RAILS AND NOZZLES

Step 6) Press START button and hold (Figure 10-7).

CAUTION

Control cabinet door must be closed for system to operate.

Step 7) Turn WASH/RUN selector switch (Figure 10-7) to WASH position.

CAUTION

Steps 6 and 7 must be followed in order.

Step 8) Remove ink pail when ink stops draining.

Step 9) Observe the green indicator (Figure 10-7). When light goes out, the wash is complete and unit is ready for new ink.

2. CHECKING RESULTS

While you are still experimenting with the effective use of short or long washes, periodically check washup results by sampling the final drain water and ink system components for cleanliness. Any washup can be repeated. Also, you can follow a long washup with a short or a short washup with a long.

3. INK CIRCULATION

Step 1) Close ink dams at both ends of the ink roll.

Step 2) Place cleaned ink filter in ink reservoir.

Step 3) Pour new ink into reservoir.

Step 4) Turn WASH/RUN selector switch to RUN position (Table 10-1).

Step 5) Press ink pump SLOW button (Figure 10-7).

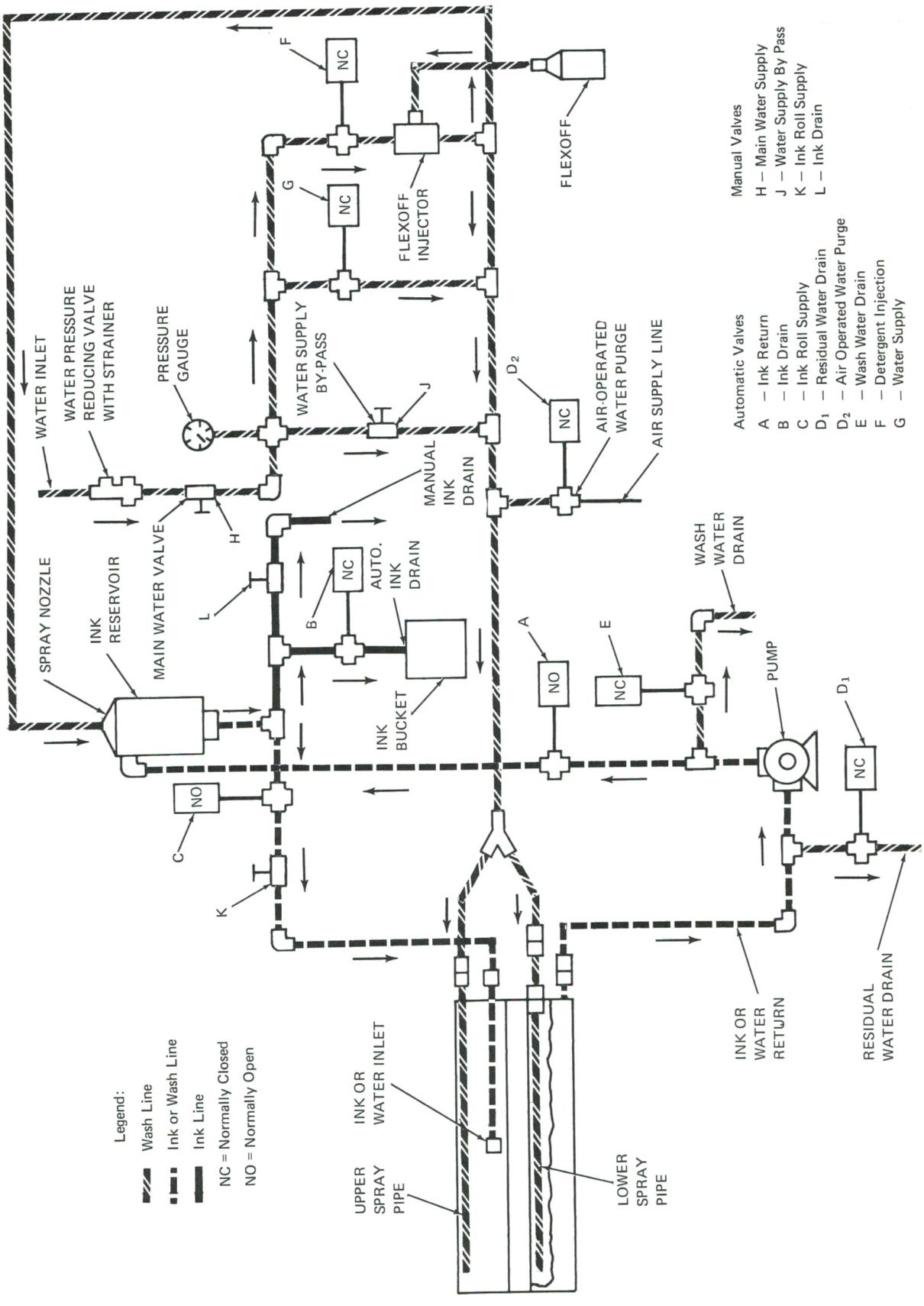


FIGURE 10-6. WASHUP FLOW SCHEMATIC

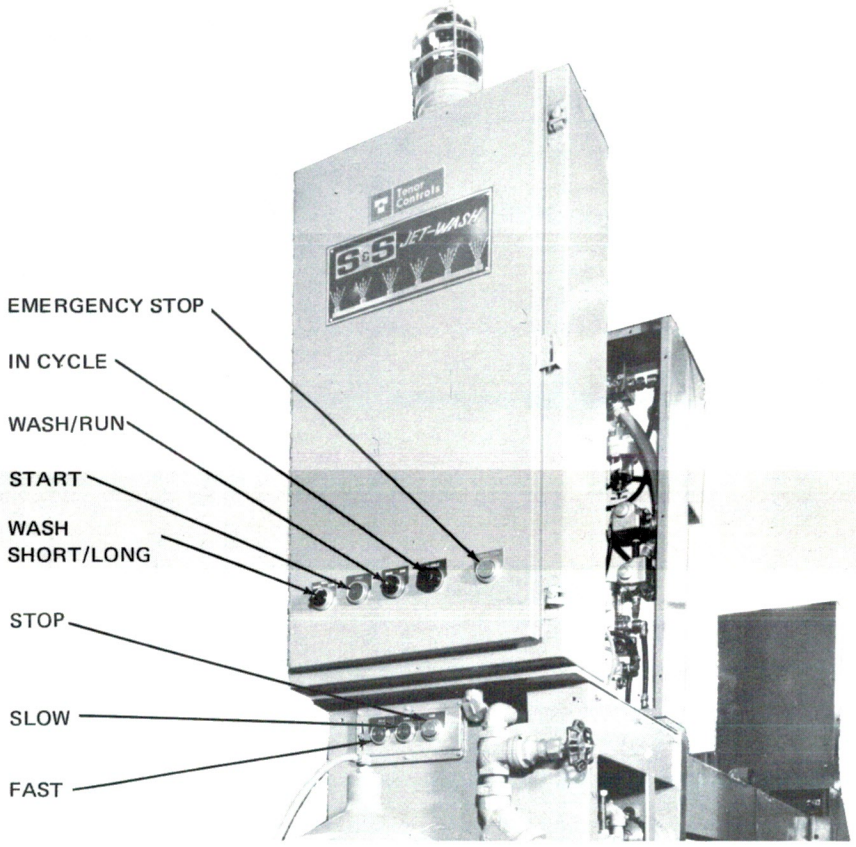


FIGURE 10-7. CONTROLS AND INDICATORS

4. USING EMERGENCY STOP

The EMERGENCY STOP pushbutton (Table 10-1) stops the washup cycle at whatever step is being executed. The cycle may be restarted at that point by pushing the START pushbutton. Pushing the START pushbutton restarts the stepping drum programmer from the point of interruption and completes the cycle.

Here is an example of using the EMERGENCY STOP pushbutton. The operator starts the washup cycle and the ink starts draining. He notices that the pail is not placed correctly and ink is spilling on the floor. The operator presses the EMERGENCY STOP pushbutton to stop ink draining. He repositions the pail and presses the START pushbutton. Ink draining will resume from the beginning of the drain step and the unit continues through the rest of the washup sequence.

F. MANUAL WASHUP PROCEDURE

Note

Use this procedure only if automatic system fails.

1. INK DRAIN

Step 1) Open ink dams at both ends of the ink roll.

Step 2) Place ink pail under drain spout.

Step 3) Close gate valve K and open gate valve L.

Step 4) Remove ink filter from reservoir.

Note

Clean filter thoroughly before replacing.

TABLE 10-1. OPERATION CONTROLS

Control Name	Figure	Type of Switch	Use
START	10-7	Green pushbutton	Turns on electric current to washup components.
WASH/RUN	10-7	Selector switch	WASH position starts washup cycle. Switch must be in RUN position for printing.
WASH SHORT/LONG	10-7	Selector switch	Appropriate position cycles system for 6 minute or 10 minute wash.
IN CYCLE	10-7	Green indicator light	Remains lit during washup. When light goes out, system is ready for new ink.
EMERGENCY STOP	10-7	Red pushbutton	Stops all electrical and pneumatic outputs and the program timer allowing the programmer to remain in position.
Safety interlock	10-2	Button located inside the top of JET-WASH control cabinet	Disconnects power to internal electrical components when door is opened.
AUTO/OFF/HAND	10-2	3-position toggle switch located next to the programmer	Used for servicing the programmer. **CAUTION** The switch should remain in AUTO position for normal operation of washup.

Step 5) Press ink pump FAST pushbutton.

Step 6) Allow ink to drain thoroughly.

Step 7) Remove ink pail after ink is drained.

Step 8) Turn WASH/RUN selector switch to WASH position.

2. WASHUP

Step 1) Close gate valve L and open gate valve K.

Step 2) Open gate valve J and regulate flow of water.

Step 3) Turn WASH/RUN selector switch to RUN position.

Note

Make sure Jet-Wash control cabinet door is closed.

Step 4) Press ink pump FAST button.

Step 5) Open gate valve L and close gate valves K and J to drain dirty water.

Step 6) Repeat steps 1 through 6 until ink roll and wash water are clean.

Step 7) Press ink pump STOP button.

Step 8) Turn INK IDLER ON/OFF selector switch to OFF.

CAUTION

Do not allow ink roll to idle more than necessary without an ample flow of water or ink across the roll.

TABLE 10-2. HYDRO-PNEUMATIC VALVES

Name	Figure	Normal Valve State	Valve State During Automatic Operation		
			Ink Drain	Washup	Ink Circulating
A - Ink return	10-1	Open	Open	Open and Closed	Open
B - Ink drain	10-1	Closed	Open	Open and Closed	Closed
C - Ink roll supply	10-1	Open	Closed	Open	Open
D_1 - Residual water drain	10-1	Closed	Closed	Open and Closed	Closed
D_2 - Air-operated water purge	10-3	Closed	Closed	Open and Closed	Closed
E - Wash water drain	10-1	Closed	Closed	Open and Closed	Closed
F - Detergent injection	10-3	Closed	Closed	Open and Closed	Closed
G - Fresh water	10-3	Closed	Closed	Open and Closed	Closed

TABLE 10-3. GATE VALVES SETTING FOR AUTOMATIC AND MANUAL OPERATION

Name	Figure	Valve State for Automatic Cycle	Valve State for Manual Operation		
			Ink Drain	Washup	Ink Circulating
H - Main water supply	10-3	Open	Open	Open	Closed or Open
J - Water supply bypass	10-3	Closed	Closed	Open and Closed	Closed
K - Ink roll supply	10-3	Open	Closed	Open and Closed	Open
L - Manual ink drain	10-3	Closed	Open	Closed and Open	Closed

3. INK CIRCULATION

Step 1) Close ink dams at both ends of the roll.

Step 2) Close gate valves L and J, open gate valve K.

Step 3) Place clean filter in ink reservoir.

Step 4) Pour new ink into reservoir.

Step 5) Turn WASH/RUN selector switch to RUN position.

Step 6) Press ink pump SLOW button.

Step 7) Turn INK IDLER ON/OFF selector switch to ON.

G. PROGRAMMING THE STEPPING DRUM

1. USING THE STEP POSITION AND PROGRAMMING INDICATOR (Figure 10-2)

The stepping drum has a numbered disc at each end called the step position indicator disc. Since the programmer has electrical switches at the top and air switches at the bottom of the drum, the electrical switch programming indicator disc is at the top of the drum and the air switch programming indicator disc is at the bottom.

Each disc has two sets of numbers, a set of large numbers and a set of small numbers. When the red pointer at the top of the drum aligns with a pair of numbers, the

large number indicates the step currently being executed and the small number indicates the step to be programmed.

Note

To find the step being executed read only the large number aligned with the red pointer.

Note

To find the step to be programmed read only the small number aligned with the red pointer.

2. USING THE PROGRAM CHARTS

a. Quick Check Chart (Figure 10-8)

Each square of the quick check grid corresponds to a slot on the programming drum. An X in the square indicates a plug goes in the corresponding slot on the drum.

To locate a plug on the drum using the quick check chart follow this procedure:

Step 1) Find the number of the switch on the side scales of the chart.

Step 2) Find the number of the step by reading across the programming indicator scale at the top for an electrical switch or at the bottom for an air switch.

CAUTION

Read only the small numbers.

Step 3) If there is an X in the square for that switch and step number, a plug should be inserted in the stepping drum in the corresponding slot.

Note

To rotate the stepping drum programmer for programming turn the AUTO/OFF/HAND switch to OFF and rotate the drum by hand.

b. Program Chart (Figure 10-9)

Figure 10-9 shows the complete program chart with each step named, sequence, time of each step and switch names. You can use the program chart for troubleshooting or modifying the washup program. The column marked step number corresponds to the small numbers on the programming indicator disc.

H. PERIODIC MAINTENANCE

Use Table 10-4 as a guide for performing periodic maintenance on the Jet-Wash system. Refer to the paragraph IV B. 5. for periodic maintenance of the flexographic printer.

The automatic washup system is intended to reduce manual ink changes. The washup does not replace daily thorough maintenance of the printing unit.

Note

Adequate cleaning of the printing unit is important to effective automatic washup for ink changes.

1. DAILY CLEANUP

Use this procedure for last washup of the day to remove dried and hardened ink accumulating in the ink system. It will also insure a clean anilox roll with full cell depth.

CAUTION

Do not use metal tools of any kind to clean roll or blade.
Do not use metal tools or 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 pump.

Step 1) Complete LONG automatic washup cycle.

Step 2) After washup, turn ink idler motor selector switch to OFF. Shut off air pressure.

Step 3) Loosen swing bolt nuts at each end of blade assembly and lower the assembly.

Step 4) Loosen wing nuts and remove baffle.

Step 5) Clean baffle, using Nylon brush and S & S Flexoff. Wipe clean, dry and lay aside.

Step 6) Clean both sides of doctor blades with S & S Flexoff and soft rags. Remove all dried ink.

Step 7) Replace baffle and tighten wing nuts.

Step 8) Raise blade assembly to operating position and tighten swing bolt nut.

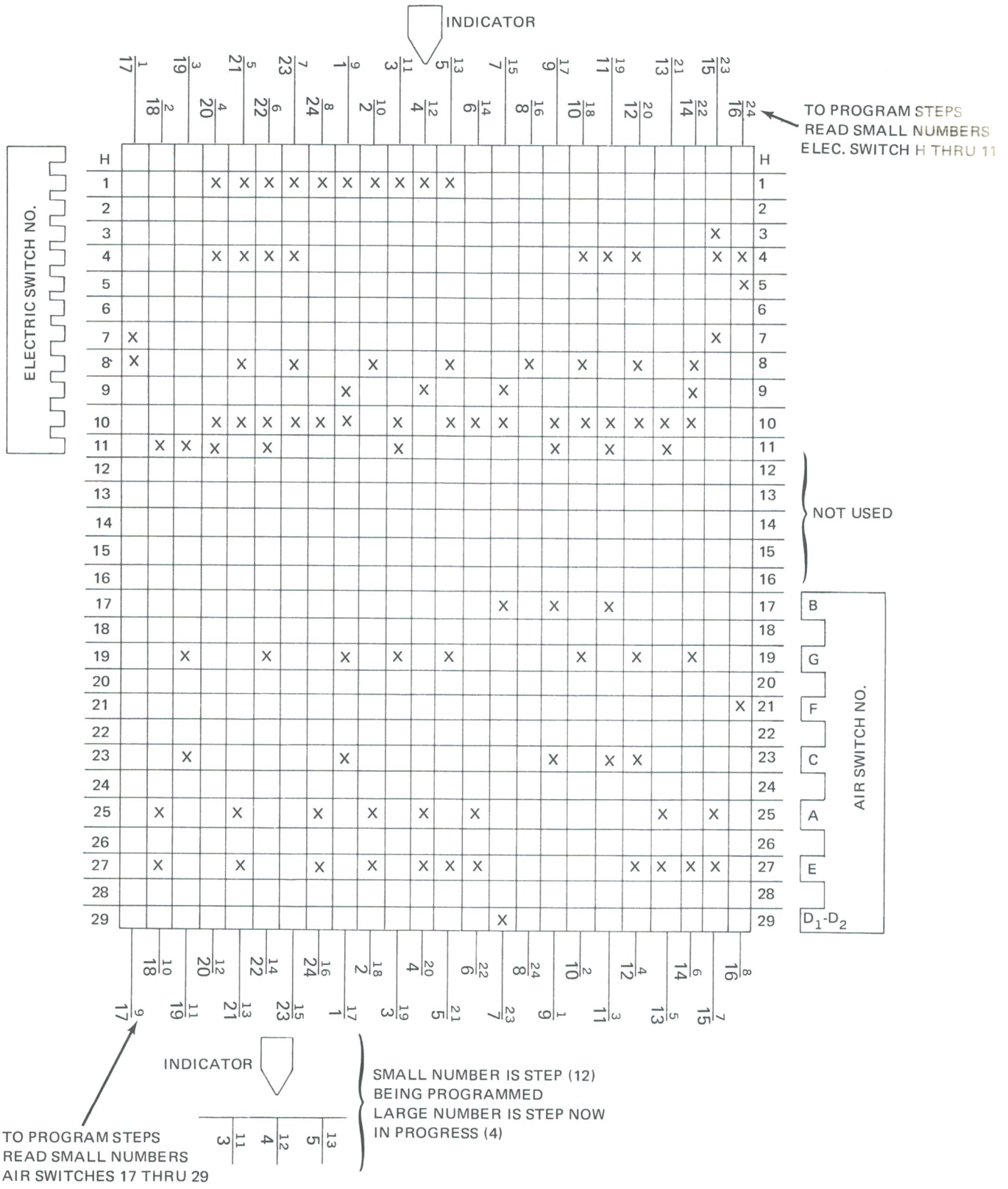


FIGURE 10-8. QUICK CHECK CHART

SWITCH NO. / STEP NO. / TIME INTERVAL / SEQUENCE OF EVENTS ▼			H	1 SHORT WASH	2 LONG WASH	3 INK PUMP FAST	4 DOCTOR BLADE	5 LIGHT	6 SPARE	7 80 SEC.	8 40 SEC.	9 20 SEC.	10 10 SEC.	11 5 SEC.	12	13	14	15	16	17 INK DRAIN N/C B	18	19 WATER N/C G	20	21 FLEXOFF N/C F	22	23 INK-ROLL SUPPLY N/O C	24	25 INK-RES. SUPPLY N/O A	26	27 SEWER DRAIN N/C E	28	29 EXCESS WATER DRAIN	30 N/C D, & D_2	31
INK DRAIN	120	1								X	X									X						X									
WATER-CIRCULATE	5	2												X								X													
INK DRAIN	5	3												X						X						X									
WATER-DRAIN	15	4		X			X						X	X								X				X				X					
DRAIN	50	5		X			X				X		X															X		X					
WATER-CIRCULATE-DRAIN	15	6		X			X						X	X								X								X					
DRAIN	50	7		X			X				X		X															X		X					
FLEXOFF - CIRCULATE	10	8		X									X										X												
CIRCULATE	30	9		X								X	X																						
DRAIN	40	10		X							X																	X		X					
WATER	15	11		X									X	X								X				X									
CIRCULATE	20	12		X								X																							
DRAIN	50	13		X							X		X															X		X					
WATER-CIRCULATE	10	14											X									X													
CIRCULATE	30	15										X	X																						
DRAIN	40	16									X																	X		X					
WATER	15	17										X	X									X				X									
DRAIN	50	18					X				X		X															X		X					
WATER - CIRCULATE	15	19					X						X	X								X													
DRAIN	50	20					X				X		X															X		X					
WATER–CIRCULATE-DRAIN	15	21											X	X								X								X					
DRAIN	70	22									X	X	X															X		X					
EXCESS WATER DRAIN	80	23				X	X			X										X													X		
HOME POSITION		24					X	X																											
		25																																	
		26																																	

FIGURE 10-9. PROGRAM CHART

Step 9) Pour 2 quarts of S & S Flexoff into reservoir. Fill reservoir half full with water.

Step 10) Place clean filter in reservoir.

Step 11) Turn WASH/RUN Selector switch to RUN position.

Step 12) Press ink pump SLOW button.

Step 13) Scrub engraved ink roll at this time, using brass wire brush and solvent in system.

Note

This is recommended to prevent gradual buildup of dried ink in cells of ink roll which will reduce ink carrying capacity.

Step 14) Complete a SHORT automatic washup cycle.

Step 15) To resume production See paragraph X.E.3.

2. WEEKLY CLEANUP

CAUTION

Avoid getting scrap or chips of dried ink into pump.

Step 1) Loosen swing bolt nuts at each end of blade assembly and lower assembly.

Step 2) Loosen wing nuts and remove baffle. Pivot ink spout back.

Step 3) Loosen blade holder clamps and rotate clamps 90 degrees.

Step 4) Remove blade holder assembly and lay aside on flat surface. Clean up holder and blade.

Step 5) Remove roll end slingers and funnels, and clean.

Note

Use nylon brush or rags to clean Teflon-coated parts.

Step 6) Disconnect plastic hose from ink trough. Loosen fastening bolts at ends of trough. Remove and clean trough. Remove ink accumulation from other areas of machine.

Step 7) Replace trough and connect plastic hose. Replace funnels, slingers, blade holder assembly and baffle. Reposition ink spout.

Step 8) Raise blade holder assembly to operating position and tighten swing bolt nuts.

Step 9) Set flexo control panel for operation. See Figure 4-18.

Step 10) Pour 2 quarts of S & S Flexoff into reservoir. Fill reservoir half full with water.

Step 11) Place clean filter in reservoir.

Step 12) Turn WASH/RUN selector switch to RUN.

Step 13) Press pump motor SLOW speed button. Circulate for one hour.

Step 14) Scrub engraved ink roll at this time, using brass wire brush and solvent in system.

Note

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

Step 15) Complete a SHORT wash automatic washup cycle.

TABLE 10-4. PERIODIC MAINTENANCE

Component	Inspection Period	Remarks
Ink reservoir	Daily	Wash with soft nylon brush or rag. **CAUTION** Do not use metal bristle brush or steel wool on teflon-coated parts.
Ink drain valve	Daily	Flush with water.
Water pressure reducing valve strainer	Monthly	Remove and clean.