

CLARK
EQUIPMENT

INDUSTRIAL TRUCK DIVISION

CLARK
EQUIPMENT

OPERATORS MANUAL

EC50, EC60, EC70

Equipped with Carbon Pile Control with or w/o Power Steering

70622-F

Book No. 0-9K-1 REV-2
Printing REPRINT FEB 76

CLARK EQUIPMENT COMPANY, INDUSTRIAL TRUCK DIVISION

CUSTOMER SERVICES PUBLICATION DEPARTMENT
BATTLE CREEK, MICHIGAN, U.S.A. 49016

SAFETY INSTRUCTIONS FOR MAINTAINING INDUSTRIAL TRUCKS

Powered industrial trucks may become hazardous if adequate maintenance is neglected. Therefore, adequate maintenance facilities, personnel and procedures should be provided.

Maintenance and inspection of all powered industrial trucks should be performed in conformance with the recommendation in this manual and the following practices.

1. A scheduled preventive maintenance, lubrication, and inspection system should be followed.
2. Only qualified and authorized personnel should be permitted to maintain, repair, adjust, and inspect industrial trucks.
3. Before Leaving The Truck:

- A. Stop truck.
- B. Fully lower the load engaging means.
- C. Place directional controls in neutral.
- D. Apply the parking brake.
- E. Stop the engine or turn off power.
- F. Lock the control or ignition circuit.
- G. Block the wheels if truck is on a ramp, or being worked on.

4. Before Working On Truck:

- A. Raise wheels free of floor or disconnect power source.
- B. Use chocks or other positive truck positioning devices.
- C. Block load engaging means, innermast(s), or chassis before working under them.

Before working on engine fuel system of gasoline powered trucks with gravity feed fuel systems, be sure fuel shutoff valve is closed.

Before working on engine fuel system of LP gas powered trucks, close LP gas cylinder valve and run engine until fuel in system is depleted and engine stops running.

Operation to check performance of the truck or attachments should be conducted in an authorized, safe clearance area.

5. Before Starting To Operate The Truck:

- A. Be in operating position.
- B. Depress clutch (or brake pedal on automatic transmission and electric trucks).
- C. Place directional controls in neutral.
- D. Start engine or turn on power.
- E. Before operating truck, check functioning of lift and tilt systems, directional and speed controls, steering, warning devices, brakes, and any attachment. (If used)
- F. Release parking brake.

- continued -

SAFETY INSTRUCTIONS FOR MAINTAINING INDUSTRIAL TRUCKS

6. Avoid fire hazards and have fire protection equipment present. Do not use an open flame to check level, or for leakage, of fuel, electrolyte or coolant. Do not use open pans of fuel or flammable cleaning fluids for cleaning parts.
7. Properly ventilate work area, vent exhaust fumes and keep shop clean and floor dry.
8. Handle LP gas cylinders with care. Do not drop, dent, or damage in any way.
9. Brakes, steering mechanisms, control mechanisms, warning devices, lights, governors, lift overload devices, guards and safety devices should be inspected regularly and maintained in a safe operating condition.
10. All parts of lift and tilt mechanisms and frame members should be carefully and regularly inspected and maintained in a safe operating condition.
11. Special trucks or devices designed and approved for hazardous area operation should receive special attention to ensure that maintenance preserves the original, approved safe operating features.
12. Fuel systems should be checked for leaks and condition of parts. Extra special consideration should be given in the case of a leak in the fuel system. Action should be taken to prevent the use of the truck until the leak has been corrected.
13. All hydraulic systems should be regularly inspected and maintained in conformance with good practice. Tilt cylinders, valves, and other similar parts should be checked to assure that "drift" has not developed to the extent that it would create a hazard.
14. Capacity, operation and maintenance instructions plates, tags, or decals should be maintained in legible condition.
15. Batteries, motors, controllers, limit switches, protective devices, electrical conductors and connections should be inspected and maintained in conformance with good practice. Special attention should be paid to the condition of electrical insulation.
16. Industrial trucks should be kept in a clean condition to minimize fire hazards and facilitate detection of loose or defective parts.
17. Modifications and additions which affect capacity and safe truck operation should not be performed by the customer or user without manufacturers prior written approval. Capacity, operation and maintenance instruction plates, tags or decals should be changed accordingly.
18. Care should be taken to assure that all replacement parts are interchangeable with the original parts and of a quality equal to that provided in the original equipment.



INDUSTRIAL TRUCK DIVISION



P L E A S E N O T E

I N S T R U C T I O N S O N U S E O F M A N U A L

This Operator's Manual is published as a service reference guide and includes Specifications, Operating Instructions, Lubrication and Preventive Maintenance Instructions, and Trouble Shooting Guide.

The TABLE OF CONTENTS for this manual is printed on green paper and is placed at the front for easy reference. A separate INDEX (also printed on green paper) is placed in front of the Lubrication and Preventive Maintenance Section.

Lubrication and Preventive Maintenance Instructions are listed under the TIME INTERVALS that they should be performed.

The TIME INTERVAL is part of the page number and code number.

Example: 8H 002-0; 8H is the TIME INTERVAL (8 operating hours), 002 is the PAGE NUMBER, and -0 is a CODE NUMBER that you as a customer should disregard. The dash number or code number is for the benefit of the publisher only.

The INDEX is set up under the TIME INTERVALS that the Lubrication and Preventive Maintenance should be performed.

| | | | |
|--------------------|-------------------------|---|--------------------|
| Example: (8 Hours) | Time Interval (H=Hours) | & | Page Number (000-) |
| | 8H | | 503 |
| | 8H | | 373 |

The above states to check the sump tank fluid level every 8 operating hours and refer to page 503 for fluid recommendations etc. Also, to check brake pedal free travel at this interval and turn to page 373 for instructions.

Turn to the eight (8) hour section (8H) and then to the page listed — 503 or 373 etc. The instructions covered therein will pertain only to the checks or adjustments that should be performed at this TIME INTERVAL.

If, for instance, the Brake Pedal Free Travel is incorrect, you would then refer to the INDEX for "Brake Pedal Free Travel, adjust" which would be listed in the TIME INTERVALS following the 8 hour section.

| | | | |
|-----------------------------|-------------------------|---|--------------------|
| <u>Example:</u> (100 Hours) | Time Interval (H=Hours) | & | Page Number (000-) |
| | 100H | | 302 |

Turn to the one hundred hour section (100H) and then to



INDUSTRIAL TRUCK DIVISION



(continued)

I N S T R U C T I O N S O N U S E O F M A N U A L

page 302. Complete instructions as to the importance of pedal free travel, the method to check and adjust for correct free travel with illustrations are included therein.

N O T E

YOU WILL NOTE THAT AT THE BEGINNING OF EVERY SECTION A LUBRICATION AND PREVENTIVE MAINTENANCE ILLUSTRATION IS SHOWN GIVING THE LOCATION OF THE COMPONENTS TO BE SERVICED.

It is impossible to cover all types of machine operations in one manual. Operating conditions should determine the lubrication and maintenance intervals. Common sense and a close observance can best determine the frequency with which you should service your machine.

The care you give your machine will greatly determine the satisfaction and service life that you will obtain from it. A definite maintenance program should be set up and followed. Haphazard maintenance will only lead to faulty performance and short life.



INDUSTRIAL TRUCK DIVISION



TABLE OF CONTENTS

| <u>Page</u> | <u>Description</u> |
|-------------|---------------------------------|
| A001 | Instructions on use of manual. |
| A073 | Table of Contents. |
| B071 | Illustration of machine. |
| B093 | Specifications. |
| B171 | New machine 50 hour inspection. |

OPERATIONS

| | |
|------|--|
| C072 | Overall controls. |
| C073 | Battery charge indicator; hour meter. |
| C173 | To operate machine |
| C303 | To move a load; safety and operating instructions. |
| C304 | Traveling, loading, operator care of the truck. |
| C511 | Preventive Maintenance. |
| C531 | Changing and charging storage batteries. |

LUBRICATION AND PREVENTIVE MAINTENANCE

| Time Interval & Number (H=Hours) | Page Number (000=) |
|----------------------------------|--------------------|
|----------------------------------|--------------------|

| | |
|------|-----|
| H | 071 |
| 8H | 072 |
| 8H | 273 |
| 8H | 373 |
| 8H | 374 |
| 8H | 473 |
| 8H | 503 |
| 8H | 603 |
| 100H | 072 |
| 100H | 073 |
| 100H | 273 |
| 100H | 302 |
| 100H | 303 |
| 100H | 403 |
| 100H | 473 |
| 100H | 476 |
| 100H | 503 |
| 100H | 603 |

Description

| |
|---|
| Index |
| <u>8 Hour Lubrication & Preventive Maintenance Illustration</u> |
| Battery charge indicator, hour meter. |
| Brake pedal free travel, check; parking brake, check. |
| Brake interlock switch check; seat safety (deadman) switch, check. |
| Battery, inspect. |
| Hydraulic sump tank, level check; operation check; hydraulic controls, check. |
| Tires, inspect. |
| 100 Hour Lubrication & Preventive Maintenance Illustration. |
| Axle adapter, lubricant level check. |
| Parking brake power cut-off switch, check and adjust; Service brake power cut-off switch, check and adjust. |
| Brake pedal free travel, check and adjust. |
| Brake system, inspect. |
| Lubricate machine; hydraulic control valve and lines, inspect. |
| lift cylinder and tilt cylinder, inspect; lift chains, check and adjust. |
| Pump control switches (lift and tilt); check and adjust. |
| Solid State Control, test and adjust. |
| Hydraulic sump tank breather, inspect. |
| Steering gear, lubricant level check. |



INDUSTRIAL TRUCK DIVISION



TABLE OF CONTENTS

| Time Interval & Number (H-Hours) | Page Number (000-1) | Description |
|----------------------------------|---------------------|---|
| 100H | 673 | Forward, reverse, 1A contactors, inspect and adjust. |
| 100H | 772 | Lubrication Charts |
| 500H | 072 | <u>500 Hour Lubrication & Preventive Maintenance Illustration</u> |
| 500H | 171 | Hydraulic sump tank, drain and refill. |
| 500H | 174 | Hydraulic sump tank filter, change. |
| 500H | 202 | Steering gear, check and adjust. |
| 500H | 302 | Steering adjustments. |
| 1000H | 069 | <u>1000 Hour Lubrication & Preventive Maintenance Illustration</u> |
| 1000H | 671 | Typical drive motor assembly. |
| 1000H | 672 | Typical drive motor assembly (disassembled view). |
| 1000H | 673 | Drive and pump motor, inspect; brush spring tension, check, brushes, inspect. |
| 1000H | 771 | Typical pump drive motor (disassembled view). |
| 1000H | 803 | Steering wheel bearings, clean, repack and adjust. |
| 1000H | 805 | Axle ends, clean and repack. |
| 1000H | 912 | Brake system, illustration. |
| 1000H | 913 | Brake system, bleed. |
| 1000H | 1003 | Service wheel brake assembly. |
| 1000H | 1172 | Seat safety brake (parking brake), check and adjust. |
| 1000H | 1173 | Seat linkage disconnect pin. |
| 1000H | 1303 | Axle adapter, drain and refill. |
| 1000H | 1506 | Typical control valve illustration. |
| 1000H | 1507 | System pressure checks. |
| 34M001 | | Lift carriage rollers, check and adjust. |
| 34S001 | | Lift carriage and upright roller, specs. |
| 34M101 | | Upright rollers, check and adjust. |

TROUBLE SHOOTING GUIDE

| | |
|--------------|---------------------------------------|
| TS 483 | Drive Axle |
| TS 521 | Steering Axle |
| TS 541 | Brakes |
| TS 542 | Brakes |
| TS 653 | Hydraulic System |
| TS 654 | Hydraulic System |
| TS 835 | Solid State Control, test and adjust. |
| TSH 005 | Hydraulic Circuit Diagram |
| M1 (1129-AT) | Side Shifter* |
| 16M001 | Pump, Drive, Traction Motor* |
| 16S001 | Pump, Drive, Traction Motor Specs* |
| 50M107 | Reels* |

* Located at rear of manual.

CLARK
EQUIPMENT

INDUSTRIAL TRUCK DIVISION

CLARK
EQUIPMENT

ILLUSTRATION OF MACHINE



Plate 7571. EC50, 60, 70

B 071-3

26 MAR 64



INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

DIMENSIONAL SPECIFICATION FOR EC-50

Capacity at 24" Load Center..... 5,000 lbs.

DIMENSIONS

| | |
|---|----------------------|
| Length (to front face of forks)..... | 81" |
| Wheelbase | 52" |
| Width - Frame | 40" |
| Width - Across Fenders | 42" |
| Tread - Drive | 34" |
| Tread - Steer | 32 1/2" |
| Turning Radius (w/std. batt. compt.)..... | 74 1/2" |
| Basic Aisle for Right Angle Stacking (Add load length)..... | 89 1/2" |
| Underclearances (truck empty) | |
| Upright | 3 7/16" |
| Drive Axle | 5" |
| Steer Axle | 3" |
| Center of Frame | 4 1/2" |
| Counterweight | 4 5/8" |
| Grade Clearance | 40% |
| Battery Compartment - Standard | 38 3/4 x 30 1/4 x 23 |
| Battery Compartment - Optional | 38 3/4 x 32 1/2 x 23 |
| Battery Compartment - Optional | 38 3/4 x 34 3/4 x 23 |

DIMENSIONAL SPECIFICATION FOR EC-60

Capacity at 24" Load Center..... 6,000 lbs.

DIMENSIONS

| | |
|---|-----------------------|
| Length (to front face of forks).... | 81 1/4" |
| Wheelbase..... | 52" |
| Width - Frame | 40" |
| Width - Across Fenders | 44" |
| Tread - Drive | 35" |
| Tread - Steer | 32 1/2" |
| Turning Radius (w/std. batt. compt.)..... | 74 1/2" |
| Basic Aisle for Right Angle Stacking (add load length)..... | 89 3/4" |
| Underclearances (truck empty) | |
| Upright | 3 7/16" |
| Drive Axle | 5" |
| Steer Axle | 3" |
| Center of Frame | 4 1/2" |
| Counterweight | 4 5/8" |
| Grade Clearance | 40% |
| Battery Compartment - Standard | 38 3/4 x 30 1/4 x 23* |
| Battery Compartment - Optional | 38 3/4 x 32 1/2 x 23* |
| Battery Compartment - Optional | 38 3/4 x 34 3/4 x 23 |
| * STANDARD AND HI-LO UPRIGHT ONLY | |
| (Triple Stage Compartment Size | 38 3/4 x 32 1/2 x 23 |

DIMENSIONAL SPECIFICATION FOR EC-70

Capacity at 24" Load Center 7,000 lbs.

DIMENSIONS

| | |
|---|----------------------|
| Length (to front face of forks) | 85 3/4" |
| Wheelbase..... | 52" |
| Width - Frame | 40" |
| Width - Across Fenders | 44" |
| Tread - Drive | 36" |
| Tread - Steer | 32 1/2" |
| Turning Radius (w/std. batt. compt.) | 80" |
| Basic Aisle for Right Angle Stacking (add load length)..... | 95 1/5" |
| Underclearances (truck empty) | |
| Upright | 3 7/16" |
| Drive Axle | 5" |
| Steer Axle | 3" |
| Center of Frame | 4 1/2" |
| Counterweight | 4 5/8" |
| Grade Clearance | 32% |
| Battery Compartment - Standard | 38 3/4 x 34 3/4 x 23 |



INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS CONTINUED

POWER SUPPLY SPECIFICATIONS

| 1. MODEL | EC-50 | EC-60 | EC-70 |
|---|------------------|------------------|------------------|
| 2. BATTERY | | | |
| Lead Acid (3 x 6 cell arrangement) | | | |
| Recommended Size | 18 cell-27 plate | 18 cell-27 plate | 18 cell-29 plate |
| Optional Size | 18 cell-25 plate | 18 cell-25 plate | 18 cell-25 plate |
| Optional Size | 18 cell-29 plate | 18 cell-29 plate | 18 cell-27 plate |
| Alkaline Battery..... (additional Cwt. required) | 30E-8 | 30E-8 | 30E-10 |

3. Battery Manufacturer Types

- a. Exide Types: TG(P), TSC.
- b. Gould Types: 72X, 85T.
- c. C & D Types: HC(R), HY(R).
 - 1. HY(R) cells increase battery compartment height 3" over standard 23" height, or to 26".
- d. K-W Types: FH.
- e. Exide Nickel-Alkaline:
..... 30 cells of E8 or E10.

*3. Normally closed contact gap.....
..... $3/16 \pm 1/16$

a. With contactor actuated.

4. Normally open contact pressure -..
..... 3 lbs.

5. Normally closed contact pressure..
..... 2 1/2 to 3 lbs.

6. Electrical interlock adjustment.

a. With armature open .010 minimum clearance between operating button and operating lever.

7. Coil resistance (20°C) - 30.2 OHMS

8. Contactor tip fastening nut tightening torque - 20 to 24 lbs. inches.

4. Battery Connector

Anderson Type EC rated at 300 amperes, 250 volt D.C.

SPEED CONTROL SYSTEM SPECIFICATIONS

1. Carbon Pile Control System.

- a. Refer to Index for Adjustment procedures.
- b. The normally closed pressure switch must open at 16 PSI system pressure and close when the pressure drops to 10 PSI
- c. For proper performance, all air must be bled from the hydraulic portion of the system.

2. Contactor Panel

a. Forward, reverse, and A1 contactors.

1. Nominally rated at 300 Amp D.C.

*2. Normally open contact gap.....
..... $7/16 \pm 1/16$

b. Pump Contactor.

1. Nominally rated at 200 Amp D.C.

*2. Normally open contact gap -.....
..... $23/64 \pm 1/16$.

3. Normally open contact pressure -..
..... 2 lbs.

4. Coil resistance (20°C) ..30.2 OHMS.

5. Contactor tip fastening nut tightening torque - 20 to 24 lbs. inches.

* With new contact tips.



INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

Timing Relays

1. CR-1. Contact Tip Gap..... 1/16"
2. CR-2. Contact Tip Gap..... 1/16"

Timing Relays

1. CR-1. Timing Period.... 0.55 to 0.75 seconds
2. CR-2. Timing Period..... 0.2 to 0.4 seconds

SOLID STATE CONTROL SYSTEM SPECIFICATIONS

Contactor Panel

Forward, Reverse, and IA Contactors

1. Normally open contact gap*..... .315"
2. Normally closed contact gap*..... .168"
(With contactor actuated.)
3. Normally open contact pressure..... 44 oz.
(Measured at center of tips.)
4. Normally closed contact pressure 32 oz.
(Measured thru hole in Boss Bar)
5. Coil resistance (20°C)..... 22.9 OHMS
6. Contactor tip fastening nut tightening torque..... 55 - 65 in. lbs.

Pump Contactor

1. Normally open contact gap*... .315 +/- 1/32"
 2. Normally open contact pressure..... 44 dz.
(Measured at center of tips.)
 3. Coil resistance (20°C)..... 22.9 OHMS
 4. Contactor tip fastening nut tightening torque 55 - 65 in. lbs.
- * With new contact tips.

DRIVE MOTOR (CARBON PILE CONTROL UNITS ONLY)

Motor Brush Spring Tension

1. New Brushes.....60 to 64 oz.
2. Used Brushes.....39 to 41 Oz.
(Minimum useable length 1 1/16")

DRIVE MOTOR (P.W.M. SOLID STATE CONTROL UNITS ONLY)

Motor Brush Spring Tension

1. New Brushes..... 3.2# per sq. inch constant rate.
2. Minimum useable length 1 1/16"

BRAKE SYSTEM SPECIFICATIONS

Parking Brake

The parking brake is located on the back end of the drive motor assembly.

1. When properly adjusted, the brake cam will, with action of the seat linkage, raise new brake shoes off of the drum approximately 1/8 inch at a point half way between the shoe pivot and the

brake cam pivot. The gap will increase as the shoe lining wears, refer to 1000H 1173.

2. The seat return spring length when properly adjusted will be 10 inches.

3. When properly adjusted, the bottom of the seat plate will form an angle of 40 degrees with the top of the hood when brakes are applied.

4. The brake must meet the parking brake effectiveness specifications listed below. Generally, an installed spring length of 2.5 inches will enable the brake to meet the specifications.

Parking Brake Effectiveness

1. The brake must be capable of holding a truck with full rated load on a maximum grade of up to 15%.

Parking Brake Power Cut-Off Switch

1. The normally open switch must be closed by the switch operating arm provided in the seat brake linkage when the rubber seat support bumpers are 2 to 3 inches from the top of the hook; that is, in the last 2 to 3 inches of movement of the seat to the occupied position.

Service Brakes

Brake Pedal

1. The brake pedal free play must be 3.8 to 1/2 inch as measured from top pedal position to where pedal meets resistance from the brake master cylinder, refer to page 100H 302.

2. Brake fluid specifications: S.A.E. 70R3, Clark Part Number 1800200.

Bleeding Procedure

1. Remove vented filler plug from master cylinder and attach pressure bleeder unit. (10-20 psi Oil Pressure). Open valve on unit.

2. Loosen bleeder screw located on top of brake line fitting at one wheel cylinder unit and allow fluid to run until all traces of air are gone. Tighten screw.

3. Repeat step above for other wheel cylinder unit.

4. Remove pressure bleeder unit from master cylinder after closing valve (Release pressure from bleeder unit before disconnecting, refer to page 1000H 912 & 913 for illustrat procedures) and check brakes by applying force to brake pedal. If "spongy" action exists, repeat both the above steps.



INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

NOTE

Pumping the brake pedal during bleeding procedure may be necessary to help remove air from master cylinder.

5. When all air has been removed from system and good hard brake pedal action is obtained, replace vented filler plug -- be sure plug vent is free of obstructions.

Service Brake Power Cut-Off Switch

1. The normally closed switch must be opened within the free play of the brake pedal.

HYDRAULIC SYSTEM SPECIFICATIONS

Pump (Main Hydraulic)

1. The pump is a gear type pump consisting of two sections having a common inlet with separate outlets. The two sections are connected by a common drive shaft. The large section (lift section) will produce 13.3 gpm at 2000 psi and 1800 rpm. The small section (tilt section) will produce 6.0 gpm at 2000 psi and 1800 rpm.

Pump Drive Motor (Main Hydraulic)

Motor Brush Tension

New Brushes..... 50 oz.
Used Brushes 33 oz.

Hydraulic Valves.

Lift Valve

1. Relief Valve Setting.....1750 to 1800 psi.

Tilt Valve

1. Contains special "metering lock out device to prevent drift of upright when valve spool is in neutral and to meter the flow of oil out of the front (rod end) end of the tilt cylinder during forward tilt to slow down forward tilt to acceptable speed."

2. Relief Valve Setting1750 to 1800 psi.

High Pressure Carry-Over.

Oil for attachments is taken off of the tilt valve when required by inserting a high pressure carry-over fitting into side of valve next to low pressure outlet.

Hydraulic Oil Filter

1. Filter located in sump on suction side of hydraulic pump.

2. Particle filtration..... 25 to 40 microns.

Valve Switch Adjustment

1. Loosen the two screws clamping switch to valve.
2. Position switch on spool end cover so that moveable switch contacts are centered between the stationary contacts. (Switch contacts are viewed thru clear plastic cover on switch.)

Sump Breather Filter.

Particle filtration 40 microns.

TORQUE SPECIFICATIONS

The following is a list of those nuts and bolts whose tightness when installed is deemed necessary. (Torque figures listed are with Dry Thread).

1. Drive Wheel Nuts.....450 to 500 lbs. ft.
2. Steer Wheel Nuts275 to 300 lbs. ft.
3. Axle Mounting Ring Bolts.....
- tapered head..... 650 to 700 lbs. ft.
4. Pitman Arm to Steer Gear Nut
..... 120 to 130 lbs. ft.
5. Hand Wheel to Steer Gear Shaft Nut
.....35 to 40 lbs. ft.
6. Pump Motor Mounting Studs
- Insert Torque 250 to 300 lbs ft.
7. Pump Motor Mounting Nuts
..... 250 to 300 lbs. ft.
8. Counterweight to spacer mounting bolts.....
..... 650 to 700 lbs. ft.
9. Axle End to Adaptor Bolt
..... 200 to 250 lbs. ft.
10. Axle End to Adaptor Stud
.....180 to 200 lbs. ft.
11. Axle End to Adaptor Stud Nut
.....180 to 200 lbs. ft.
12. Steer Axle Mounting Bolts - Silent Block..
to axle130 to 180 lbs. ft.

P.W.M. EQUIPPED UNITS ONLY

- a. A2 - 240 Amp Diode 80 to 100 lbs. ft.
- b. B2 - 400 Amp Diode 80 to 100 lbs. ft.

Diode mounting surface must be coated with silicon grease when removed or replaced. (Torques figures listed are with Dry Threaded).



INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

SOLID STATE CONTROL --- ALLIS CHALMERS P.W.M.
VEHICLES SO EQUIPPED

Contactor Panel

Forward, Reverse, and 1A Contactors

1. *Normally open contact gap:
..... 5/16 inch +/- 1/32 inch
2. *Normally closed contact gap:
..... 5/32 inch +/- 1/32 inch

(With contactor actuated.)
3. Normally open contact pressure:
..... 44 oz. +/- 10%

(As measured at center of tips.)
4. Normally closed contact pressure:
..... 32 oz. +/- 10%

(As measured thru hole in Boss Bar.)
5. Coil resistance (@ 20^o C.): 22.9 OHMS
6. Contactor tip fastening nut, tightening
..... torque 55 - 65 in. lbs.

Pump Contactor

1. *Normally open contact gap:
..... 5/16 inch +/- 1/32 inch
2. Normally open contact pressure:
..... 44 oz. +/- 10%

(As measured at center of tips.)
3. Coil resistance (@ 20^o C.): 22.9 OHMS
4. Contactor tip fastening nut, tightening
..... torque 55 - 65 in. lbs.

*With new contact tips.

SA -- ONLY

1. A2 240 AMP DIODE, torque to:
..... 80 - 100 lbs. ft.
2. B2 400 AMP DIODE, torque to:
..... 80 - 100 lbs. ft.

(Diode mounting surface must be coated with silicon grease when removed or replaced.)

C A U T I O N

DO NOT ALLOW SILICONE GREASE TO COME IN CONTACT WITH DIODE THREADS.



INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

LUBRICATION SPECIFICATIONS

Drive Axle - Differential

1. Extreme pressure Sulfo-Chloro lead hypoid gear lubricant of S.A.E. #90 grade. Clark Engineering Standards MS-8.

Axle Ends.

1. Lithium soap type N.L.G.L. consistency of "0", rust inhibited, having good water resistance and a worked penetration of 355-385 MM at 77° F. per Clark Specifications.

Steer Gear

1. Lubricant Recommendations: Use AMOCO Lithium Multipurpose Grease or its Equivalent.

Wheel Bearings

1. Medium bodied high temperature wheel bearing grease - melting point 250° F. or higher.

Hydraulic System

1. Hydraulic oil per Clark Specifications MS-68. Clark Part Number 885385.

Brake Fluid

1. S.A.E. 70R3 - Heavy Duty. Clark Part Number 1800200.

Carbon Pile Control System Fluid.

1. S.A.E. 70R3 - Heavy Duty Brake Fluid. Clark Part Number 1800200.

Grease Fittings Not Otherwise Listed.

1. Chassis Lubricant.

CAPACITIES

1. Hydraulic System with 154" MFH Standard Upright 25 quarts
2. Total Sump Capacity 33 quarts
3. Drive Axle 6 pints
4. Hydraulic Carbon Pile System 2 pints
5. Axle Ends..... 1 1/4 pounds each
6. Service Brake System 1 1/2 pints

POWER STEERING (VEHICLES SO EQUIPPED)

Pump Drive Motor (Double Drive Shaft)

1. Double End Pump Motor.
2. Compound Wound - Continuous Duty.
3. Clockwise Rotation, viewed from commutator end.
4. 2.18 HP, 2530 RPM, 57 AMPS OPEN.
5. .96 HP, 3240 RPM, 26 AMPS ENCLOSED
6. Brushes: 1/2 x 11/16 x 1 1/16 inches long minimum --- 15/32 inch wear.
7. Spring Pressure: 1:35 to 1.15 pounds total 3.9 to 3.3 P.S.I.

N O T E

The above pump drive motor is used with the dash panel installation (one pump), and the R.H. lower frame installation using a pump at each end of drive motor.

Pump - Steering

1. Pump output: 2.15 GPM @ 2000 RPM @ 0.P.S.I. with fluid at 150° +/- 5° F.
2. Pump rotation: clockwise from drive shaft end.
3. Relief Valve to pass @ 4 G.P.M. @ 550 +/- 100 PSI @ 3900 RPM.

Steering Gear & Control Valve Combination

1. Steering Gear: use AMOCO Lithium Multi-purpose Grease or its equivalent.
2. Control Valve: lubricated by hydraulic fluid.
3. Hose fittings at control valve ports to be torqued to..... 20 - 30 lbs. ft.
4. Pitman Arm Nut to be torqued to: 100 - 125 lbs. ft.
5. Right Turn: 2.79 turns of steering wheel for 42°37' travel (steering gear stops).
6. Left Turn: 2.76 turns of steering wheel for 42°11' travel (steering gear stops).
7. Pitman Arm in Neutral Position: 3° center line of pitman arm to center line of steering gear.

Electric
CLARKLIFT® 50

Engineering Specifications

| | | | |
|--------------------------------------|--|---|-------------------------------|
| MODEL | EC-50 Weight with 2730 lb. lead acid battery . . . | Standard 10,505 lbs. | Hi-Lo 10,565 lbs. |
| CAPACITY | Rated Capacity 5,000 lbs. at 24" load center See capacity chart for other ratings | | |
| DIMENSIONS | Length (to front face of forks) 81" | Tread (steer) 32½" | Turning radius 74½" |
| | Wheelbase 52" | Basic aisle for right angle stacking (add load length) 89½" | |
| | Width (overall) 42" | Tread (drive) 34" | |
| UNDER-CLEARANCES | Upright 3-7/16" | Center of Frame 4½" | |
| | Drive Axle 5" | Counterweight 4½" | |
| | Steer Axle 3" | Grade Clearance 40% | |
| SPEEDS AND GRADES AT 36 VOLTS | Travel speed, forward and reverse, loaded - Up to 7.1 m.p.h. | | |
| | Travel speed, forward and reverse, empty - Up to 7.4 m.p.h. | | |
| | Gradeability with rated load 10% | | |
| | | Standard | Hi-Lo |
| | Lift speed, f.p.m. | Loaded Empty Loaded Empty | |
| | Lowering speed, f.p.m. | 38 55 34 45 | 80 70 80 60 |

POWER SUPPLY

Lead acid battery in steel trays 36 volt, having adequate kilowatt hours capacity.
18 cells, 25 plate
Exide Types: TG(P), TSC
Gould Types: 72X, 85T
*C & D Types: HC(R), HY(R)
K - W Types: FH
Nickel-Alkaline battery in steel cradles 36 volt having adequate kilowatt hours of capacity.
30 cells of E8 or E10
Nickel-Alkaline batteries require added Ctwt.
Ready Power Model L-4 Gas-Electric Power unit recommended. 36 volt power supply.
Battery compartment is designed for top and side removal of battery.
Standard compartment size: 38¾" W x 30¼" L x 23" H.
Optional Compartments: 38¾" W x 32½" L x 23" H.
38¾" W x 34¾" L x 23" H.
*HY(R) cells increase battery compartment height 3".

BATTERY CONNECTOR

Anderson type EC, 300 ampere continuous rating with ample capacity for overloads. One half mounted on truck, other half attached to flexible battery leads with reliable compression joints.

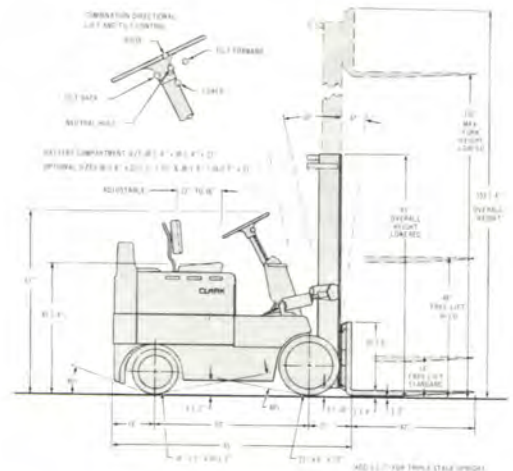
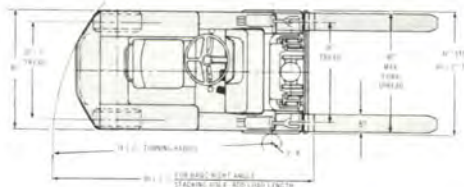
MOTORS

Uniquely designed heavy-duty drive motor is fan cooled and ventilated. Dual windings in motor fields provide high efficiency at low speeds and during fast acceleration. Large contact-area brushes provide good commutation and long service life. Class F insulation protects motor windings against temperatures far in excess of those normal to motor, is easily cleaned and resists cleaning solvents.
Compound wound pump motor provides fast lifting speeds. This motor, too, is fan cooled, ventilated and protected by Class F insulation to assure maximum motor life.

DRIVE CONTROL

Smooth acceleration is accomplished by the carbon pile resistor unit, which varies the resistance value within a given range. A compressive force, originating at the accelerator pedal is applied to the carbon elements through a highly efficient, closed hydraulic circuit, providing infinitely variable inching control. Truck speed is infinitely variable from zero to 70% of full speed in forward and reverse. When the accelerator is suddenly and fully depressed, the carbon pile is removed from the circuit after an automatically timed interval, leaving only the high-speed sections of the drive motor dual field coils energized.

Dimensional Specifications



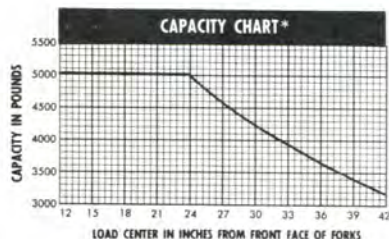
ELECTRIC CLARKLIFT 50

| | |
|----------------------|--|
| DRIVE AXLE | Heavy-duty drive axle by Clark. Double reduction of bevel and spur gears for maximum efficiency. Final gear reduction at drive wheels through pinion and internal ring gear, sealed in grease for longer life. |
| BRAKES | Three systems. Disc or spot type brakes, operated by two-stage master cylinder, provide positive braking action with a slight pedal effort. Wide pedal is centrally located for convenient operation with either foot. Self-adjusting shoes require no adjustment for life of lining. Brakes are enclosed within drive axle housing instead of inside drive wheels. Separate "deadman" parking brake, mounted on drive motor armature shaft, applies automatically when operator leaves seat and will hold truck on up to a 20% grade. Reverse torque braking through electric system is an added feature. |
| STEERING | Three factors combine to provide easier steering: reduced weight on steer wheels due to longer wheelbase . . . new spherical bushing tie rod ends . . . steer gear with 28 to 1 reduction. Shock is absorbed by strong vanadium steel axle mounted on two torsional rubber bushing assemblies. Positive stops assure lateral stability . . . inclined king pins provide anti-kickback control . . . 76.5 degree angularity provides short turns. Full cramp to full cramp takes 6 turns of 18" diameter hand wheel. |
| UPRIGHT | Nested roller type telescopic upright. I-beam inner section of 1045 modified steel is nested within the 1045 steel outer channel for safe, long-life operation. Carriage has lateral thrust rollers mounted on outside to assure maximum stability and prevent upright spread. Latch assures completion of free lift before inner section rises. Dual tilt cylinders have chrome plated rods. Anti-cavitation control valve prevents drifting. |
| TILT RANGE | 10° back tilt cradles load securely during quick stops. Generous 6° forward tilt facilitates horizontal load pickup while truck is on incline up to 10%. |
| LIFT CYLINDER | Piston type lift cylinder. Free floating mounting of lift cylinder eliminates side strains. Oil drain back line to sump prevents external seal leakage. Flow regulator controls lowering speed. |

| | |
|--------------------------------|--|
| HYDRAULIC SYSTEM | Gear-type, dual pump, coupled with fan cooled pump motor provides fast lift speeds. Oil from small section of pump is channeled through a separate tilt valve to the tilt cylinders. Special metering lockout device here provides full feathering during tilt and prevents upright drift in neutral. Oil from large section of pump is channeled through a directional lift valve to the lift cylinder. This valve also has a full feathering balanced spool for complete control of the load. Integral tamper-proof pressure relief valve protects system against overloads. All valves readily accessible. All hose lines steel braid reinforced, steel fitted. System is protected from dirt by (1) 40-micron replaceable filler cap breather, (2) a 25-micron filter in sump. |
| FORK CARRIAGE and FORKS | All welded construction, steel fork mounting to withstand impacts. Lateral fork adjustment from 0" to 36". 2,000 lb. through 5,000 lb. capacity trucks have identical fork mounting dimensions for interchangeability of attachments. Convenient snap action latch for fork spacing. Forks have 30° bottom taper and 1/2" top chisel tip for palletless pickup. Heat treated and upset forged to provide full section strength. Standard fork size is 40" long, 5" wide, 1 3/4" thick. |
| SEATING | Extra wide seat and back rest are foam rubber, covered with vinyl plastic. Curved back rest is swiveled to provide additional driver comfort. An automotive type latch releases the seat for horizontal adjustment up to 4". |
| MAINTENANCE | Removable hood and side plates provide top and side removal of battery. Pump, pump motor and control panel quickly exposed for inspection and maintenance. Pressure gun fittings at all lubrication points. |
| GENERAL | Standard equipment includes: Built-in sling eyes, electric horn, shock mounted direct reading hour meter, battery discharge indicator. All exposed surfaces are shot blasted and prime painted with weather resistant paint. Color selection two tone. Silver gray combined with one of five optional colors: red, orange, yellow, green or blue. |



Dimensional and performance specifications herein have been checked for accuracy by the Clark engineering dept.



* RATED CAPACITIES SHOWN ABOVE ARE COMPUTED WITH UPRIGHTS IN VERTICAL POSITION. THEY APPLY ONLY ON MAXIMUM FORK HEIGHTS UP TO AND INCLUDING 134

UPRIGHT DIMENSION TABLE

| Std. Hi-Lo | TSU | Over-all Height | | Free Lift | |
|------------|------|-----------------|--------|-----------|--------|
| | | Lowered | Std. | Hi-Lo | TSU |
| 76 | — | 56 | 13 1/2 | 32 1/2 | — |
| 82 | — | 59 | 13 1/2 | 35 1/2 | — |
| 88 | — | 62 | 13 1/2 | 38 1/2 | — |
| 94 | 126 | 65 | 13 1/2 | 41 1/2 | 11 1/2 |
| 100 | 135 | 68 | 13 1/2 | 44 1/2 | 11 1/2 |
| *106 | *144 | 71 | 13 1/2 | 47 1/2 | 11 1/2 |
| 112 | 153 | 74 | 13 1/2 | 50 1/2 | 11 1/2 |
| 118 | 162 | 77 | 13 1/2 | 53 1/2 | 11 1/2 |
| 124 | 171 | 80 | 13 1/2 | 56 1/2 | 11 1/2 |
| *130 | *180 | 83 | 13 1/2 | 59 1/2 | 11 1/2 |
| 136 | 189 | 86 | 13 1/2 | 62 1/2 | 9 1/2 |
| 142 | 198 | 89 | 13 1/2 | 65 1/2 | 9 1/2 |
| 148 | 207 | ** 92 | 11 1/2 | 68 1/2 | 9 1/2 |
| *154 | *216 | ** 95 | 11 1/2 | 71 1/2 | 9 1/2 |
| 160 | 225 | ** 98 | 13 1/2 | 75 1/2 | 9 1/2 |
| 172 | 243 | **106 | 13 1/2 | 82 1/2 | 9 1/2 |
| *178 | 252 | **109 | 11 1/2 | 85 1/2 | 9 1/2 |
| 184 | — | 112 | 11 1/2 | 88 1/2 | — |
| 190 | — | 116 | 13 1/2 | 92 1/2 | — |
| 196 | — | 119 | 11 1/2 | 95 1/2 | — |
| 202 | — | 123 | 13 1/2 | 99 1/2 | — |
| 208 | — | 126 | 13 1/2 | 102 1/2 | — |

*Preferred standard heights.
**Add 1" for triple stage upright.
For overall height raised add 20" to maximum fork height.

Electric
CLARKLIFT® 60

Engineering Specifications

| | | | |
|--------------------------------------|---|---|---------------------------------------|
| MODEL | EC 60 Weight with 2943 lb. lead acid battery . . . | Standard 11,465 lbs. | Hi-Lo 11,525 lbs. |
| CAPACITY | Rated Capacity 6,000 lbs. at 24" load center See Capacity chart for other ratings | | |
| DIMENSIONS | Length (to front face of forks) _____ 81 1/4" Wheelbase _____ 52" Width (overall) _____ 44" Tread (drive) _____ 35" | Tread (steer) _____ 32 1/2" Turning radius _____ 74 1/2" Basic aisle for right angle stacking (add load length) _____ 89 3/4" | |
| UNDER-CLEARANCES | Upright _____ 3-7/16" Drive Axle _____ 5" Steer Axle _____ 3" | Center of Frame _____ 4 1/2" Counterweight _____ 4 3/8" Grade Clearance _____ 40% | |
| SPEEDS AND GRADES AT 36 VOLTS | Travel speed, forward and reverse, loaded - Up to 7.0 m.p.h. Travel speed, forward and reverse, empty - Up to 7.4 m.p.h. Gradeability with rated load _____ 10% | | |
| | Lift speed, f.p.m. _____ 38 Lowering speed, f.p.m. _____ 80 | Standard Loaded Empty 55 34 | Hi-Lo Loaded Empty 45 60 |

POWER SUPPLY

Lead acid battery in steel trays 36 volt, having adequate kilowatt hours capacity.
18 cells, 25 plate
Exide Types: TG(P), TSC
Gould Types: 72X, 85T
*C & D Types: HC(R), HY(R)
K - W Types: FH
Nickel-Alkaline battery in steel cradles 36 volt having adequate kilowatt hours of capacity.
30 cells of E8 or E10 Edison
Nickel-Alkaline batteries require added ctwt.
Ready Power Model L-4 Gas-Electric Power unit recommended. 36 volt power supply.
Battery compartment is designed for top and side removal of battery.
Standard compartment size: 38 3/4" W x 30 1/4" L x 23" H.
Optional Compartments: 38 3/4" W x 32 1/2" L x 23" H.
38 3/4" W x 34 3/4" L x 23" H.
HY(R) cells increase battery compartment height 3".

BATTERY CONNECTOR

Anderson type EC. 300 amperes continuous rating with ample capacity for overloads. One half mounted on truck, other half attached to flexible battery leads with reliable compression joints.

MOTORS

Uniquely designed heavy-duty drive motor is fan cooled and ventilated. Dual windings in motor fields provide high efficiency at low speeds and during fast acceleration. Large contact-area brushes provide good commutation and long service life. Class F insulation protects motor windings against temperatures far in excess of those normal to motor, is easily cleaned and resists cleaning solvents.
Compound wound pump motor provides fast lifting speeds. This motor, too, is fan cooled, ventilated and protected by Class F insulation to assure maximum motor life.

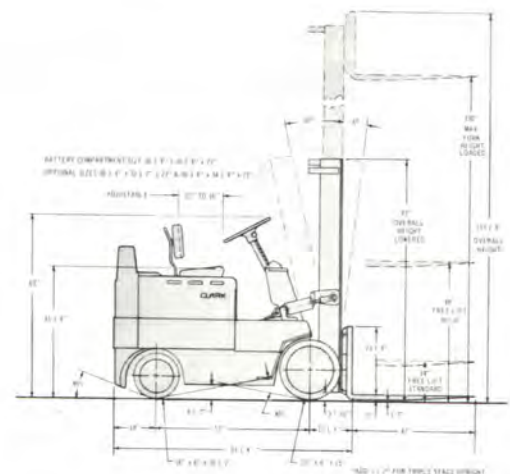
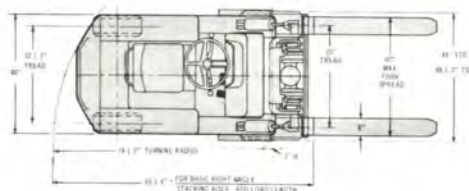
DRIVE CONTROL

Smooth acceleration is accomplished by the carbon pile resistor unit, which varies the resistance value within a given range. A compressive force, originating at the accelerator pedal is applied to the carbon elements through a highly efficient, closed hydraulic circuit, providing infinitely variable inching control. Truck speed is infinitely variable from zero to 70% of full speed in forward and reverse. When the accelerator is suddenly and fully depressed, the carbon pile is removed from the circuit after an automatically timed interval, leaving only the high-speed sections of the drive motor dual field coils energized.

Dimensional Specifications



Dimensional and performance specifications herein have been checked for accuracy by the Clark engineering dept.



ELECTRIC CLARKLIFT 60

SPECIFICATIONS

| | |
|----------------------|---|
| DRIVE AXLE | Heavy-duty drive axle by Clark. Double reduction of bevel and spur gears for maximum efficiency. Final gear reduction at drive wheels through pinion and internal ring gear, sealed in grease for longer life. |
| BRAKES | Three systems. Disc or spot type brakes, operated by two-stage master cylinder, provide positive braking action with a slight pedal effort. Wide pedal is centrally located for convenient operation with either foot. Self-adjusting shoes require no adjustment for life of lining. Brakes are enclosed within drive axle housing instead of inside drive wheels. Separate "deadman" parking brake, mounted on drive motor armature shaft, applies automatically when operator leaves seat, and will hold truck on up to a 20% grade. Reverse torque braking through electric system is an added feature. |
| STEERING | Three factors combine to provide easier steering: reduced weight on steer wheels due to longer wheelbase . . . new spherical bushing tie rod ends . . . steer gear with 28 to 1 reduction. Shock is absorbed by strong vanadium steel axle mounted on two torsional rubber bushing assemblies. Positive stops assure lateral stability . . . inclined king pins provide anti-kickback control . . . 76.5 degree angularity provides short turns. Full cramp to full cramp takes 6 turns of 18" diameter hand wheel. |
| UPRIGHT | Nested telescopic roller type. "T" beam inner section of SAE 1045 steel is nested within outer channel of SAE 1045 steel for greater safety and visibility. Side loading on upright rails is taken on upright rollers. Upright and carriage rollers are adjustable for wear to maintain new truck tolerances. Carriage also has 4 interior adjustable side thrust rollers to prevent binding. Carriage has additional lateral thrust rollers to prevent upright spread, insuring maximum free-rolling movement. |
| TILT RANGE | 10° back tilt cradles load securely during quick stops. Generous 6° forward tilt facilitates horizontal load pickup while truck is on incline up to 10%. |
| LIFT CYLINDER | Piston type lift cylinder. Free floating mounting of lift cylinder eliminates side strains. Oil drain back line to sump prevents external seal leakage. Flow regulator controls lowering speed. |

HYDRAULIC SYSTEM

Gear-type, dual pump, coupled with a fan cooled pump motor provides fast lift speeds. Oil from small section of pump is channeled through a separate tilt valve to the tilt cylinders. Special metering lockout device here provides full feathering during tilt and prevents upright drift in neutral. Oil from large section of pump is channeled through a directional lift valve to the lift cylinder. This valve also has a full feathering balanced spool for complete control of the load. Integral tamper-proof pressure relief valve protects system against overloads. All valves readily accessible. All hose lines steel braid reinforced, steel fitted. System is protected from dirt by (1) a 40-micron replaceable filler cap breather, (2) a 25-micron filter in sump.

FORK CARRIAGE and FORKS

All welded construction, 1045 steel fork mounting to withstand impacts. Lateral fork adjustment from 0° to 40°. 6,000 and 7,000 lb. capacity trucks have identical fork mounting dimensions for interchangeability of attachments. Convenient snap action latch for fork spacing. Forks have 22" bottom taper and 1/2" top chisel tip for palletless pickup. Heat treated and upset forged to provide full section strength. Standard fork size is 42" long, 6" wide, 2" thick.

SEATING

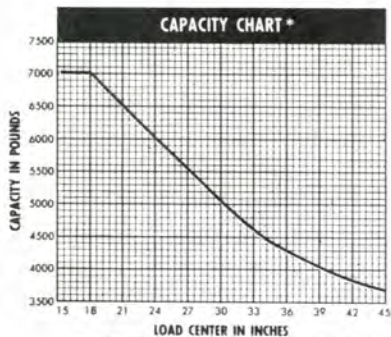
Extra wide seat and back rest are foam rubber, covered with vinyl plastic. Curved back rest is swiveled to provide additional driver comfort. An automotive type latch releases the seat for horizontal adjustment up to 4".

MAINTENANCE

Removable hood and side plates provide top and side removal of battery. Pump, pump motor and control panel quickly exposed for inspection and maintenance. Pressure gun fittings at all lubrication points.

GENERAL

Standard equipment includes: Built-in sling eyes, electric horn, shock mounted direct reading hour meter, battery discharge indicator. All exposed surfaces are shot blasted and prime painted with weather resistant paint. Color selection two tone. Silver gray combined with one of five optional colors: red, orange, yellow, green or blue.



* RATED CAPACITIES SHOWN ABOVE ARE COMPUTED WITH UPRIGHTS IN VERTICAL POSITION. THEY APPLY ONLY ON MAXIMUM FORK HEIGHTS UP TO AND INCLUDING 154.

UPRIGHT DIMENSIONAL TABLE

| Std. Hi-Lo | TSU | Over-all Height | | | |
|------------|------|-----------------|--------|-----------|--------|
| | | Lowered | Std. | Hi-Lo TSU | |
| 76 | — | 56 | 13 1/2 | 32 1/4 | — |
| 82 | — | 59 | 13 1/2 | 35 1/4 | — |
| 88 | — | 62 | 13 1/2 | 38 1/4 | — |
| 94 | 126 | 65 | 13 1/2 | 41 1/4 | 11 1/2 |
| 100 | 135 | 68 | 13 1/2 | 44 1/4 | 11 1/2 |
| *106 | *144 | 71 | 13 1/2 | 47 1/4 | 11 1/2 |
| 112 | 153 | 74 | 13 1/2 | 50 1/4 | 11 1/2 |
| 118 | 162 | 77 | 13 1/2 | 53 1/4 | 11 1/2 |
| 124 | 171 | 80 | 13 1/2 | 56 1/4 | 11 1/2 |
| *130 | *180 | 83 | 13 1/2 | 59 1/4 | 11 1/2 |
| 136 | 189 | 86 | 13 1/2 | 62 1/4 | 9 1/2 |
| 142 | 198 | 89 | 13 1/2 | 65 1/4 | 9 1/2 |
| 148 | 207 | ** 92 | 13 1/2 | 68 1/4 | 9 1/2 |
| *154 | *216 | ** 95 | 13 1/2 | 71 1/4 | 9 1/2 |
| 160 | 225 | ** 99 | 13 1/2 | 75 1/4 | 9 1/2 |
| 172 | 243 | **106 | 13 1/2 | 82 1/4 | 9 1/2 |
| *178 | 252 | **109 | 13 1/2 | 85 1/4 | 9 1/2 |
| 184 | — | 112 | 11 1/2 | 88 1/4 | — |
| 190 | — | 116 | 13 1/2 | 92 1/4 | — |
| 196 | — | 119 | 11 1/2 | 95 1/4 | — |
| 202 | — | 123 | 13 1/2 | 99 1/4 | — |
| 208 | — | 126 | 11 1/2 | 102 1/4 | — |

*Preferred standard heights.
**Add 1" for triple stage upright.
For overall height raised add 2 1/4" to maximum fork height.

ELECTRIC CLARKLIFT 60

Electric
CLARKLIFT® 70

Engineering Specifications

| | | | |
|--------------------------------------|--|---|-----------------------------|
| MODEL | EC 70 Weight with 3138 lb. lead acid battery . . . | Standard 12,961 lbs. | Hi-Lo 13,021 lbs. |
| CAPACITY | Rated Capacity 7,000 lbs. at 24" load center See Capacity chart for other ratings | | |
| DIMENSIONS | Length (to front face of forks) _____ 85¾" | Tread (steer) _____ 32½" | Turning radius _____ 80" |
| | Wheelbase _____ 52" | Basic aisle for right angle stacking (add load length) _____ 95¼" | |
| | Width (overall) _____ 46" | | |
| | Tread (drive) _____ 36" | | |
| UNDER-CLEARANCES | Upright _____ 3-7/16" | Center of Frame _____ 4½" | |
| | Drive Axle _____ 5" | Counterweight _____ 4¾" | |
| | Steer Axle _____ 3" | Grade Clearance _____ 32% | |
| SPEEDS AND GRADES AT 36 VOLTS | Travel speed, forward and reverse, loaded - Up to 6.9 m.p.h. | | |
| | Travel speed, forward and reverse, empty - Up to 7.4 m.p.h. | | |
| | Gradeability with rated load _____ 10% | | |
| | | Standard | Hi-Lo |
| | Lift speed, f.p.m. | 38 55 | 34 45 |
| | Lowering speed, f.p.m. | 80 70 | 80 60 |

POWER SUPPLY

Lead acid battery in steel trays 36 volt, having adequate kilowatt hours capacity.
18 cells, 27 plate
Exide Types: TG(P), TSC
Gould Types: 72X, 85T
*C & D Types: HC(R), HY(R)
K - W Types: FH
Nickel-Alkaline battery in steel cradles 36 volt having adequate kilowatt hours of capacity.
30 cells of E8 or E10 Exide
Nickel-Alkaline batteries require added cwt.
Ready Power Model L-4 Gas-Electric Power unit recommended. 36 volt power supply.
Battery compartment is designed for top and side removal of battery.
Standard compartment size: 38¾" W x 32½" L x 23" H.
Optional Compartments: 38¾" W x 32½" L x 23" H.
38¾" W x 34¾" L x 23" H.
*HY(R) cells increase battery compartment height 3".

BATTERY CONNECTOR

Anderson type EC, 300 ampere continuous rating with ample capacity for overloads. One half mounted on truck, other half attached to flexible battery leads with reliable compression joints.

MOTORS

Uniquely designed heavy-duty drive motor is fan cooled and ventilated. Dual windings in motor fields provide high efficiency at low speeds and during fast acceleration. Large contact-area brushes provide good commutation and long service life. Class F insulation protects motor windings against temperatures far in excess of those normal to motor, is easily cleaned and resists cleaning solvents.

Compound wound pump motor provides fast lifting speeds. This motor, too, is fan cooled, ventilated and protected by class F insulation to assure maximum motor life.

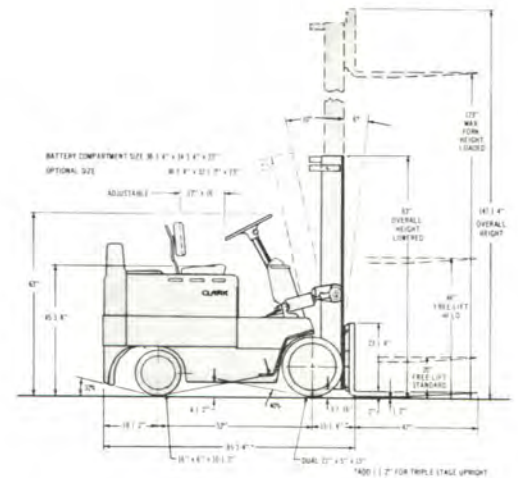
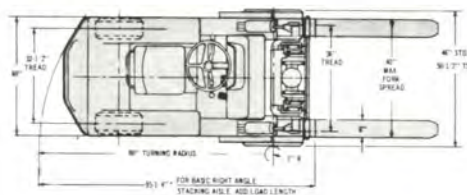
DRIVE CONTROL

Smooth acceleration is accomplished by the carbon pile resistor unit, which varies the resistance value within a given range. A compressive force, originating at the accelerator pedal is applied to the carbon elements through a highly efficient, closed hydraulic circuit, providing infinitely variable inching control. Truck speed is infinitely variable from zero to 70% of full speed in forward and reverse. When the accelerator is suddenly and fully depressed, the carbon pile is removed from the circuit after an automatically timed interval, leaving only the high-speed sections of the drive motor dual field coils energized.

Dimensional Specifications



Dimensional and performance specifications herein have been checked for accuracy by the Clark engineering dept.



ELECTRIC CLARKLIFT 70



INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

| | |
|----------------------|---|
| DRIVE AXLE | Heavy-duty drive axle by Clark. Double reduction of bevel and spur gears for maximum efficiency. Final gear reduction at drive wheels through pinion and internal ring gear, sealed in grease for longer life. |
| BRAKES | Three systems. Disc or spot type brakes, operated by two-stage master cylinder, provide positive braking action with a slight pedal effort. Wide pedal is centrally located for convenient operation with either foot. Self-adjusting shoes require no adjustment for life of lining. Brakes are enclosed within drive axle housing instead of inside drive wheels. Separate "deadman" parking brake, mounted on drive motor armature shaft, applies automatically when operator leaves seat, and will hold truck on up to a 20% grade. Reverse torque braking through electric system is an added feature. |
| STEERING | Three factors combine to provide easier steering: reduced weight on steer wheels due to longer wheelbase . . . new spherical bushing tie rod ends . . . steer gear with 28 to 1 reduction. Shock is absorbed by strong vanadium steel axle mounted on two torsional rubber bushing assemblies. Positive stops assure lateral stability . . . inclined king pins provide anti-kickback control . . . 76.5 degree angularity provides short turns. Full cramp to full cramp takes 6 turns of 18" diameter hand wheel. |
| UPRIGHT | Nested telescopic roller type. "I" beam inner section of SAE 1045 steel is nested within outer channel of SAE 1045 steel for greater safety and visibility. Side loading on upright rails is taken on upright rollers. Upright and carriage rollers are adjustable for wear to maintain new truck tolerances. Carriage also has 4 interior adjustable side thrust rollers to prevent binding. Carriage has additional lateral thrust rollers to prevent upright spread, insuring maximum free-rolling movement. |
| TILT RANGE | 10° back tilt cradles load securely during quick stops. Generous 6° forward tilt facilitates horizontal load pickup while truck is on incline up to 10%. |
| LIFT CYLINDER | Piston type lift cylinder. Free floating mounting of lift cylinder eliminates side strains. Oil drain back line to sump prevents external seal leakage. Flow regulator controls lowering speed. |

HYDRAULIC SYSTEM

Gear-type, dual pump, coupled with a fan cooled pump motor provides fast lift speeds. Oil from small section of pump is channeled through a separate tilt valve to the tilt cylinders. Special metering lockout device here provides full feathering during tilt and prevents upright drift in neutral. Oil from large section of pump is channeled through a directional lift valve to the lift cylinder. This valve also has a full feathering balanced spool for complete control of the load. Integral tamper-proof pressure relief valve protects system against overloads. All valves readily accessible. All hose lines steel braid reinforced, steel fitted. System is protected from dirt by (1) a 40-micron replaceable filler cap breather, (2) a 25-micron filter in sump.

FORK CARRIAGE and FORKS

All welded construction, 1045 steel fork mounting to withstand impacts. Lateral fork adjustment from 0" to 40". 5,000 lb. through 7,000 lb. capacity trucks have identical fork mounting dimensions for interchangeability of attachments. Convenient snap action latch for fork spacing. Forks have 22" bottom taper and 1/2" top chisel tip for palletless pickup. Heat treated and upset forged to provide full section strength. Standard fork size is 42" long, 6" wide, 2" thick.

SEATING

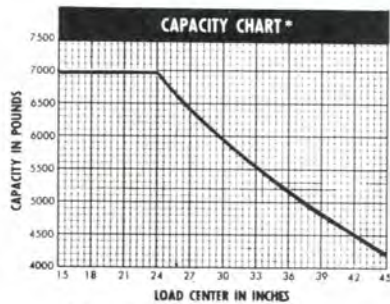
Extra wide seat and back rest are foam rubber, covered with vinyl plastic. Curved back rest is swiveled to provide additional driver comfort. An automotive type latch releases the seat for horizontal adjustment up to 4".

MAINTENANCE

Removable hood and side plates provide top and side removal of battery. Pump, pump motor and control panel quickly exposed for inspection and maintenance. Pressure gun fittings at all lubrication points.

GENERAL

Standard equipment includes: Built-in sling eyes, electric horn, shock mounted direct reading hour meter, battery discharge indicator. All exposed surfaces are shot blasted and prime painted with weather resistant paint. Color selection two tone. Silver gray combined with one of five optional colors: red, orange, yellow, green or blue.



* RATED CAPACITIES SHOWN ABOVE ARE COMPUTED WITH UPRIGHTS IN VERTICAL POSITION. THEY APPLY ONLY ON MAXIMUM FORK HEIGHTS UP TO AND INCLUDING 154

| Max. Fork Ht. Std. Hi-Lo | Over-all Height | | Free Lift | | |
|--------------------------|-----------------|--------------|-----------|---------|--------|
| | TSU | Lowered Std. | Std. | Hi-Lo | TSU |
| 75 | — | 59 | 19 1/2 | 35 1/4 | — |
| 81 | — | 62 | 19 1/2 | 38 1/4 | — |
| 87 | — | 65 | 19 1/2 | 41 1/4 | — |
| 93 | 126 | 68 | 19 1/2 | 44 1/4 | 17 1/2 |
| * 99 | 135 | 71 | 19 1/2 | 47 1/4 | 17 1/2 |
| 105 | *144 | 74 | 19 1/2 | 50 1/4 | 17 1/2 |
| 111 | 153 | 77 | 19 1/2 | 53 1/4 | 17 1/2 |
| 117 | 162 | 80 | 19 1/2 | 56 1/4 | 17 1/2 |
| *123 | 171 | 83 | 19 1/2 | 59 1/4 | 17 1/2 |
| 129 | *180 | 86 | 19 1/2 | 62 1/4 | 17 1/2 |
| 135 | 189 | 89 | 19 1/2 | 65 1/4 | 15 1/2 |
| 141 | 198 | ** 92 | 19 1/2 | 68 1/4 | 17 1/2 |
| *147 | 207 | ** 95 | 17 1/2 | 71 1/4 | 15 1/2 |
| 153 | *216 | ** 99 | 19 1/2 | 75 1/4 | 17 1/2 |
| 159 | 225 | **102 | 19 1/2 | 78 1/4 | 15 1/2 |
| 165 | 234 | **106 | 19 1/2 | 82 1/4 | 17 1/2 |
| *171 | 243 | **109 | 19 1/2 | 85 1/4 | 15 1/2 |
| 177 | — | 112 | 17 1/2 | 88 1/4 | — |
| 183 | — | 116 | 19 1/2 | 92 1/4 | — |
| 189 | — | 119 | 19 1/2 | 95 1/4 | — |
| 195 | — | 123 | 19 1/2 | 99 1/4 | — |
| 201 | — | 126 | 19 1/2 | 102 1/4 | — |

*Preferred standard heights.

**Add 1" for triple stage upright.

For overall height raised add 2 1/4" to maximum fork height.

ELECTRIC CLARKLIFT 70

OPERATIONS

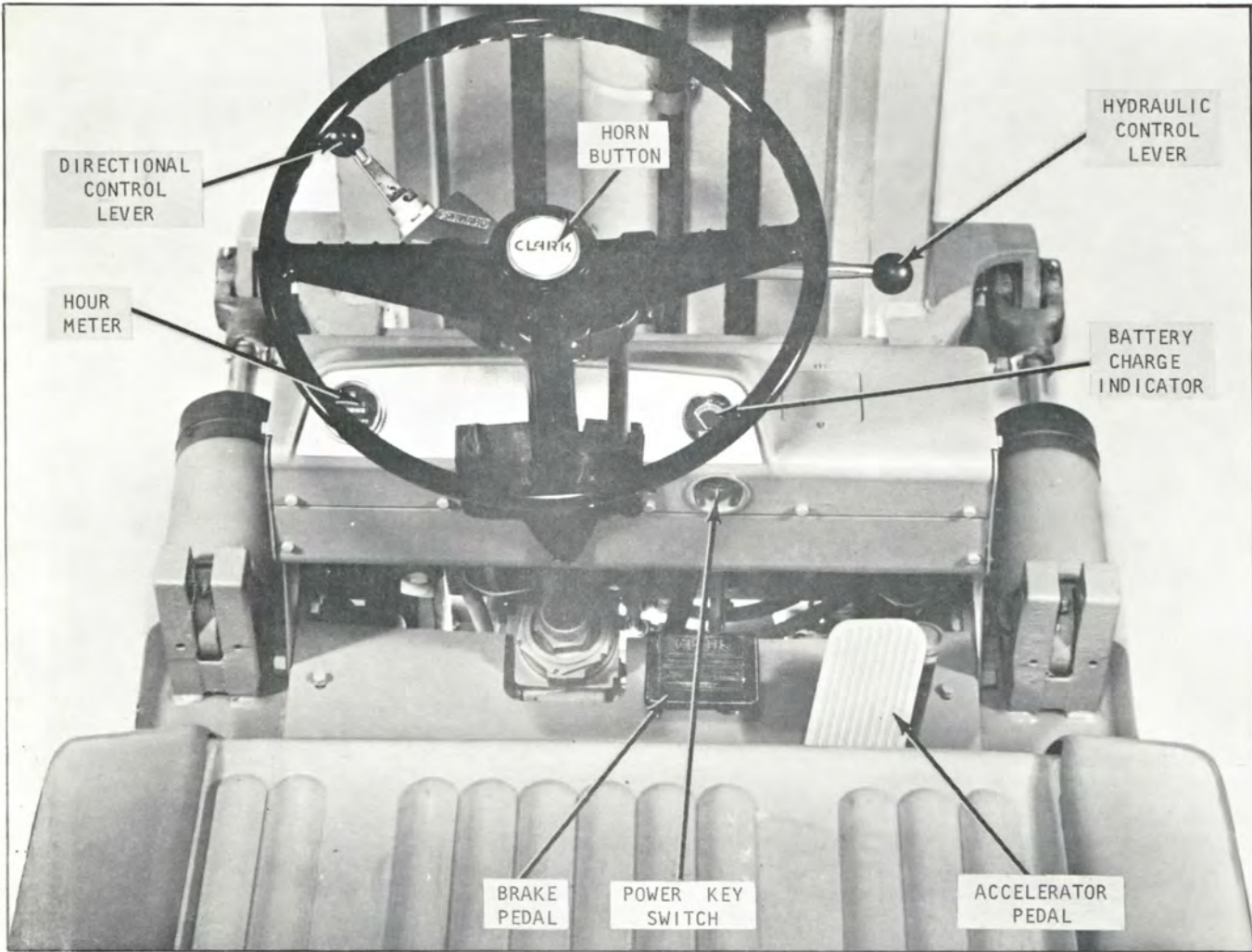


Plate 7543. Overall Controls

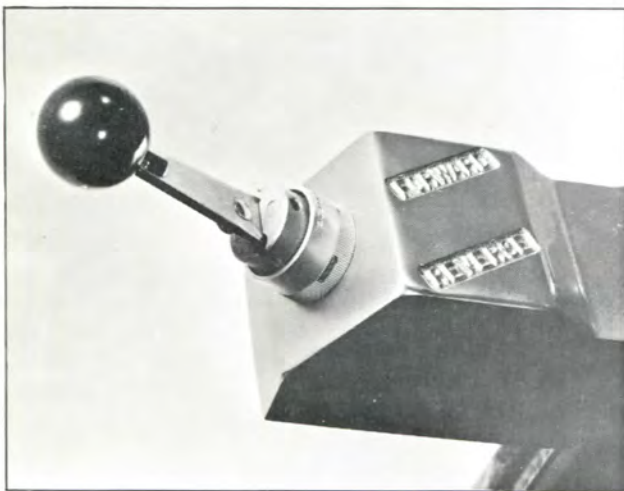


Plate 7216. Directional Control Lever

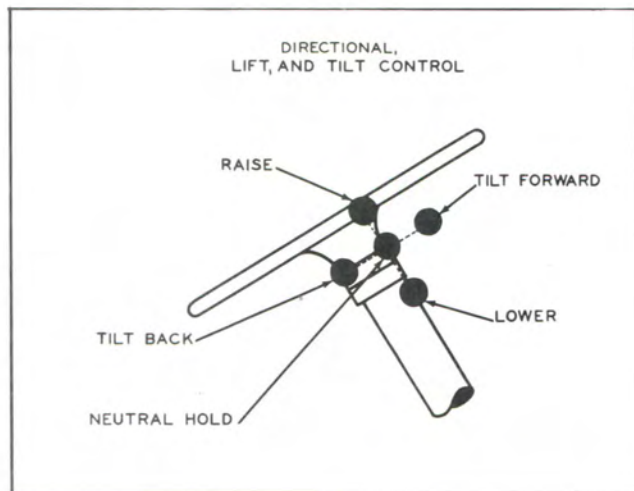


Plate 4448. Hydraulic Control Lever



Plate 7388. Battery Charge Indicator

With the key switch in the "on" position the battery charge indicator will show the available battery voltage. When the indicator needle registers in the red portion of the indicator scale the battery should be recharged. It is recommended that at this time a specific gravity test be taken with a hydrometer to more accurately determine battery condition.



Plate 7162. Hour Meter

The hour meter accurately records the actual hours of machine operation. This will serve as an aid in determining the time intervals for lubrication and preventative maintenance services.

O P E R A T I O N S

TO OPERATE MACHINE

1. When the driver's seat is occupied the seat safety brake (deadman brake) will be released.

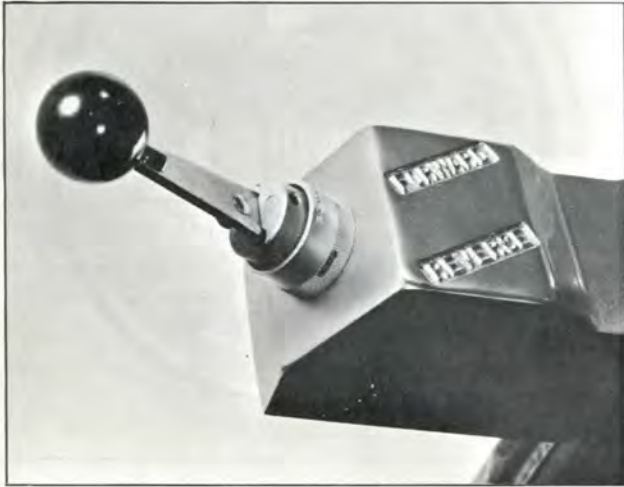


Plate 7216. Directional
Control Lever

2. Place directional control lever in neutral position.

3. Turn switch key to the "on" position, allow accelerator pedal and brake pedal to assume it's free or undepressed position.

4. Move the directional lever in position for the desired direction of travel.

5. Depress accelerator pedal as required for the speed desired. (Maximum acceleration is regulated by a time delay feature incorporated in the electrical circuit).

REVERSE TORQUE BRAKING

Release accelerator pedal and move directional control lever to opposite position or direction in which the truck is moving. At this time 'Minimum Reverse Torque Braking' is applied. As the truck coasts and the accelerator pedal is depressed, up to a safe predetermined maximum, a controlled flow of power is directed to the drive motor which speeds up reversal of direction by allowing battery power to overcome truck momentum. This is called 'Variable Reverse Torque Braking'.

TO STOP MACHINE

Remove foot from accelerator pedal and depress brake pedal sufficiently to allow a safe smooth stop. If the machine is to be parked, turn switch key to "off" and place directional lever in "neutral". When the driver's seat is unoccupied, the (deadman brake) Parking Brake is applied.



INDUSTRIAL TRUCK DIVISION



OPERATIONS

To Move A Load.

The forks should be adjusted sidewise on the fork bars to obtain firm support and maximum balance of the load. Raise or lower the forks to the proper level and engage the load by driving forward. Tilt the upright backward sufficiently to adequately cradle the load, and raise load sufficiently to clear obstructions. Back away from stack.

The operator should have clear vision ahead when moving in a forward direction. When this is not possible, the operator should drive in reverse and turn in his seat to obtain clear vision backward.

When the load is to be deposited, enter the area squarely, especially when placing one load on top of another, in order that all piles will be square and secure. Place load directly over desired area and slowly lower into position. Disengage forks from the load by using necessary lift-tilt and then back away.

Loads will vary in size, shape, method of packaging, stacking procedures, etc. The best way to handle a load will depend on these factors. If in doubt, consult with your supervisor.

I M P O R T A N T

EVERY 8 OPERATING HOURS (OR EVERY SHIFT) ELEVATE UPRIGHT TO THE UPPER LIMIT. THIS WILL PROVIDE LUBRICATION TO THE TOP PORTION OF THE LIFT CYLINDER. CHECK FOR NORMAL SEQUENCE OF OPERATION.

OPERATING SAFETY RULES AND PRACTICES.

1. Operators of powered industrial trucks should be physically qualified. An examination should be made on an annual basis and include such things as field of vision, hearing, depth perception and reaction timing.

2. Only trained and authorized operators should be permitted to operate a powered industrial truck. Methods should be devised to train operators in the safe operation of powered industrial trucks. It is recommended that badges or other visual indication of the operator's authorization should be displayed at all times during work period.

GENERAL.

1. Safeguard the pedestrians at all times. Do not drive a truck up to anyone standing in front of a bench or other fixed object.

- 2. Do not allow anyone to stand or pass under the elevated portion of any truck, whether loaded or empty.
- 3. Unauthorized personnel should not be permitted to ride on powered industrial trucks. A safe place to ride should be provided where riding of trucks is authorized.
- 4. Do not put arms or legs between the uprights of the mast or outside the running lines of the truck.
- 5. When leaving a powered industrial truck unattended, load engaging means should be fully lowered, controls should be neutralized, power shut off, brakes set, key or connector plug removed. Block wheels if truck is parked on an incline.
- 6. Maintain a safe distance from the edge of ramps or platforms and do not, while on any elevated dock or platform, push freight cars. Do not use trucks for opening or closing freight doors.
- 7. Have brakes set and wheel blocks in place to prevent movement of trucks, trailers, or railroad cars while loading or unloading. Fixed jacks may be necessary to support a semi-trailer during loading or unloading when the trailer is not coupled to a tractor. Check the flooring of trucks, trailers, and railroad cars for breaks and weakness before driving onto them.
- 8. Be sure of sufficient headroom under overhead installations, lights, pipes, sprinkler system, etc.
- 9. Use an Overhead Guard and Load Backrest Extension unless conditions prevent their use.

```

x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x
x
x           W A R N I N G           x
x
x AN OVERHEAD GUARD IS INTENDED TO OFFER PROTECTION FROM THE IMPACT OF SMALL PACKAGES, BOXES, BAGGED MATERIAL, ETC., REPRESENTATIVE OF THE JOB APPLICATION, BUT NOT TO WITHSTAND THE IMPACT OF A FALLING CAPACITY LOAD.
x
x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x

```

10. Use only approved industrial trucks in hazardous locations.



INDUSTRIAL TRUCK DIVISION



OPERATIONS

11. Elevate personnel only on an approved safety platform firmly secured to the lifting carriage and/or forks.

12. Report all accidents involving personnel, building structures, and equipment.

13. Fire aisles, access to stairways, and fire equipment should be kept clear.

TRAVELING.

1. Observe all traffic regulations including authorized plant speed limits. Under normal traffic conditions, keep to the right. Maintain a safe distance, approximately three truck lengths from the truck ahead, and keep the truck under control at all times. Use of truck on public roads should conform to local traffic regulations.

2. Yield the right of way to ambulances, fire trucks, or other vehicles in emergency situations.

3. Do not pass another truck traveling in the same direction at intersections, blind spots, or at other dangerous locations.

4. Slow down and sound horn at cross aisles and other locations where vision is obstructed. If the load being carried obstructs forward view travel with the load trailing.

5. Cross railroad tracks diagonally wherever possible. Do not park closer than 8 feet from center of railroad tracks.

6. Look in the direction of, and keep a clear view of the path of travel.

7. Ascend or descend grades slowly.

When ascending or descending grades in excess of 10%, loaded trucks should be driven with the load upgrade.

Unloaded trucks should be operated on all grades with the load engaging means downgrade.

On all grades the load and load engaging means should be tilted back if applicable, and raised only as far as necessary to clear the road surface.

8. Under all travel conditions the truck should be operated at a speed that will permit it to be brought to a stop in a safe manner.

9. Travel with load engaging means or load low and, where possible, tilted back. Do not elevate the load except during stacking.

10. Make starts, stops, turns or direction reversals in a smooth manner so as not to shift load and/or overturn the truck.

11. Stunt driving and horseplay should not be permitted.

12. Slow down for wet and slippery floors.

13. Before driving over a dockboard or bridgeplate, be sure that it is properly secured. Drive carefully and slowly across the dockboard or bridgeplate and never exceed its rated capacity.

14. Do not run vehicles onto any elevator unless specifically authorized to do so. Approach elevators slowly, and then enter squarely after the elevator car is properly leveled. Once on the elevator, neutralize the controls, shut off power, and set brakes. It is advisable that all personnel leave the elevator before a truck is allowed to enter or leave.

15. Avoid running over loose objects on the roadway surface.

LOADING.

1. Handle only stable or safely arranged loads. When handling off-center loads which cannot be centered, operate with caution.

2. Handle only loads within the rated capacity of the truck.

3. Adjust for long or high (including multiple tiered) loads which may affect capacity.

4. When attachments are used, particular care should be taken in securing, manipulating, positioning, and transporting the load. Operate trucks equipped with attachments as partially loaded trucks when not handling a load.

5. Place load engaging means under the load as far as possible and carefully tilt the mast backward to stabilize the load. Caution should be used in tilting backward with high or segmented loads.

6. Use extreme care when tilting load forward or backward particularly when high tiering. Do not tilt forward with load engaging means elevated except to pick up a load. Do not tilt an elevated load forward except when the load is in a deposit position over a rack or stack. When stacking or tiering use only enough backward tilt to stabilize the load.

OPERATOR CARE OF THE TRUCK.

1. Give special consideration to the proper functioning of tires, horn, lights, battery, controller, lift system (including load engaging means, chains, cable, and limit switches), brakes and steering mechanism. If at any time



INDUSTRIAL TRUCK DIVISION



OPERATIONS

OPERATOR CARE OF THE TRUCK (CONT.).

a powered industrial truck is found to be in need of repair, defective, or in any way unsafe, the matter should be reported immediately to the designated authority, and the truck should be taken out of service until it has been restored to safe operating condition.

2. Do not make repairs or adjustments unless specifically authorized to do so.
3. Do not use open flames for checking electrolyte level in storage batteries.

NOTE

The preceding is reproduced from:

American National Standard ... Safety Standard
for Powered Industrial Trucks. B56.1 - 1969



INDUSTRIAL TRUCK DIVISION



OPERATIONS

PREVENTIVE MAINTENANCE:

1. Arrange for systematic inspection and lubrication. See that the truck is properly lubricated and in good repair at all times. Refer to pertinent lubrication chart for lubrication instructions.
2. Avoid overloading the truck, as a safety measure against possible injury to the driver and fellow workmen. Overloading also shortens the life of the truck and increases maintenance. Refer to Name (Serial No.) Plate.
3. Take proper care of the battery. Check height of electrolyte solution daily. Never allow the water level to be below the top of the plates. When replacing evaporation, fill cells to proper level only -- overfilling causes loss of acid and reduces capacity. Use only water approved for battery use. Keep top of battery clean and dry at all times. A light coating of vaseline or a light cup grease on the battery terminals will help prevent corrosion. If terminals become corroded, wash off corrosion with a soda and water solution and rise thoroughly. See that the battery is properly charged after each day or shift.
4. Wiring should be checked periodically to make certain all connections are tight and intact.
5. The hydraulic system should be checked periodically for worn hoses, loose fillings and/or leaks, and security of mountings.
6. A periodic check of the brake system should be made for lining wear. Proper brake adjustment should be maintained at all times.
7. Charging equipment should be carefully maintained. Maintenance, operation, and service of charging equipment should be carried out in accordance with the battery manufacturers instructions.



INDUSTRIAL TRUCK DIVISION



OPERATIONS

CHANGING AND CHARGING STORAGE BATTERIES:

N O T E

The two types of batteries in common use are (1) lead and (2) nickel-iron. They contain corrosive chemical solutions, either acid or alkali, and therefore present a chemical hazard. On charge, they give off hydrogen and oxygen which, when mixed with air in certain concentrations, may be explosive. They are of relatively small bulk and great weight making handling a special consideration.

1. Battery charging installations should be located in areas designated for that purpose. Facilities should be provided for flushing and neutralizing spilled electrolyte, for fire protection, for protecting charging apparatus from damage by trucks, and for adequate ventilation for dispersal of fumes from gassing batteries.

2. When racks are used for support of batteries, they should be made of materials not conducive to spark generation or be coated or covered to achieve this objective.

Handling Batteries:

1. A conveyor, overhead hoist, or equivalent material handling equipment should be provided for handling batteries.

2. Chain hoists should be equipped with load-chain containers. When hand hoist is used, uncovered batteries should be covered with a sheet of plywood or other non-conducting material to prevent the hand chain from shorting on cell connectors or terminals. A properly insulated spreader bar should be used with any overhead hoist.

3. Reinstalled batteries should be properly positioned and secured in the truck.

4. A carboy tilter or siphon should be provided for handling electrolyte. Always pour acid into water; not water into acid. Personnel maintaining batteries should wear protective clothing such as face shield, long sleeves and gauntlet gloves.

5. Electrical installations should conform to the National Electrical Code (NEPA No. 70; USA Standard C1-1965) and any local ordinances.

6. Trained and authorized personnel should change or charge batteries.

7. Trucks should be properly positioned and brake applied before attempting to change or charge batteries.

8. When charging batteries, the vent caps

should be kept in place to avoid electrolyte spray. Care should be taken to assure that vent caps are functioning. The battery (or compartment) cover (s) should be open to dissipate heat.

9. Smoking should be prohibited in the charging area.

10. Precautions should be taken to prevent open flames, sparks, or electric arcs in battery charging areas.

11. Tools and other metallic objects should be kept away from the top of uncovered batteries.



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE INDEX

| (8 HOURS) | Time Interval (H-Hours) | Page Number (0000-) | (100 HOURS cont'd) | Time Interval (H-Hours) | Page Number (0000-) |
|--|-------------------------|---------------------|--|-------------------------|---------------------|
| Battery charge indicator | 8H | 273 | Solid State Control, adjust (Acc. Pedal/1MS & 2MS) | 100H | 476 |
| Battery, inspect | 8H | 473 | Steering gear lubricant level check. | 100H | 603 |
| Brake interlock switch, check | 8H | 374 | <u>(500 HOUR)</u> | | |
| Brake pedal free travel check | 8H | 373 | Hydraulic sump tank, drain and refill | 500H | 173 |
| Hour meter, check | 8H | 273 | Hydraulic sump tank filter, change | 500H | 174 |
| Hydraulic controls, check | 8H | 503 | Steering adjustments | 500H | 302 |
| Hydraulic sump tank, level check | 8H | 503 | Steering gear, check and adjust | 500H | 202 |
| Parking brake linkage, inspect/check | 8H | 373 | <u>(1000 HOURS)</u> | | |
| Seat safety (deadman) switch, check | 8H | 374 | Axle adaptor, drain and refill | 1000H | 1308 |
| Tires, inspect | 8H | 603 | Axle ends, clean & repack | 1000H | 805 |
| <u>(100 HOURS)</u> | | | Brake system, bleed..... | 1000H | 913 |
| Axle adaptor, lubricant level check | 100H | 073 | Brushes (motor), inspect | 1000H | 673 |
| Axle adaptor vent, check | 100H | 073 | Brush spring tension, inspect..... | 1000H | 673 |
| Brake pedal free travel, check/adjust | 100H | 302 | Lift carriage and upright rollers, check/adjust... | 34M001 | |
| Brake system, inspect | 100H | 303 | Drive and pump motor, inspect | | 673 |
| Contactors, inspect | 100H | 673 | Seat linkage disconnect.. | 1000H | 1173 |
| Hydraulic control valve and lines, inspect | 100H | 403 | Seat safety brake (parking brake), check/adjust..... | 1000H | 1172 |
| Hydraulic sump tank breather, inspect | 100H | 503 | Service wheel brake assy.. | 1000H | 1003 |
| Lift and Tilt Cylinders | 100H | 403 | Steering wheel bearings, clean/repack & adjust..... | 1000H | 803 |
| Lift chains, check and adjust | 100H | 403 | System pressure/checks.... | 1000H | 1507 |
| Lubrication chart | 100H | 772 | <u>TROUBLE SHOOTING</u> | | |
| Parking brake power cut-off switch, check/adjust | 100H | 273 | Drive axle | TS 483 | |
| Pump control switches, (lift/tilt) check/adjust | 100H | 473 | Steer axle | TS 521 | |
| Service brake power cut-off switch, check and adjust | 100H | 273 | Brakes | TS 541 | |
| | | | Hydraulic System | TS 653 | |
| | | | Solid State Control | TS 835 | |
| | | | Hydraulic Circuit Diagram | TSH 003 | |
| | | | Side Shifter | TS-1129-AT/1 | |
| | | | Motors | 16M001A | |
| | | | Hose Reel | 50M107A | |



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE INDEX

(1000 HOURS cont'd)

| | Time Interval (H-HOURS)&(0000-0) | Page Number |
|---|--|----------------|
| Seat safety brake (parking brake), check/adjust..... | 1000H | 1172 |
| Service wheel brake assy.. | 1000H | 1003 |
| Steering wheel bearings, clean/repack & adjust..... | 1000H | 803 |
| System pressure/checks.... | 1000H | 1507 |

TROUBLE SHOOTING

| | |
|---------------------------|---------|
| Drive axle | TS 483 |
| Steer axle | TS 521 |
| Brakes | TS 541 |
| Hydraulic System | TS 653 |
| Hydraulic Circuit Diagram | TSH 003 |
| Solid State Control | TS 835 |

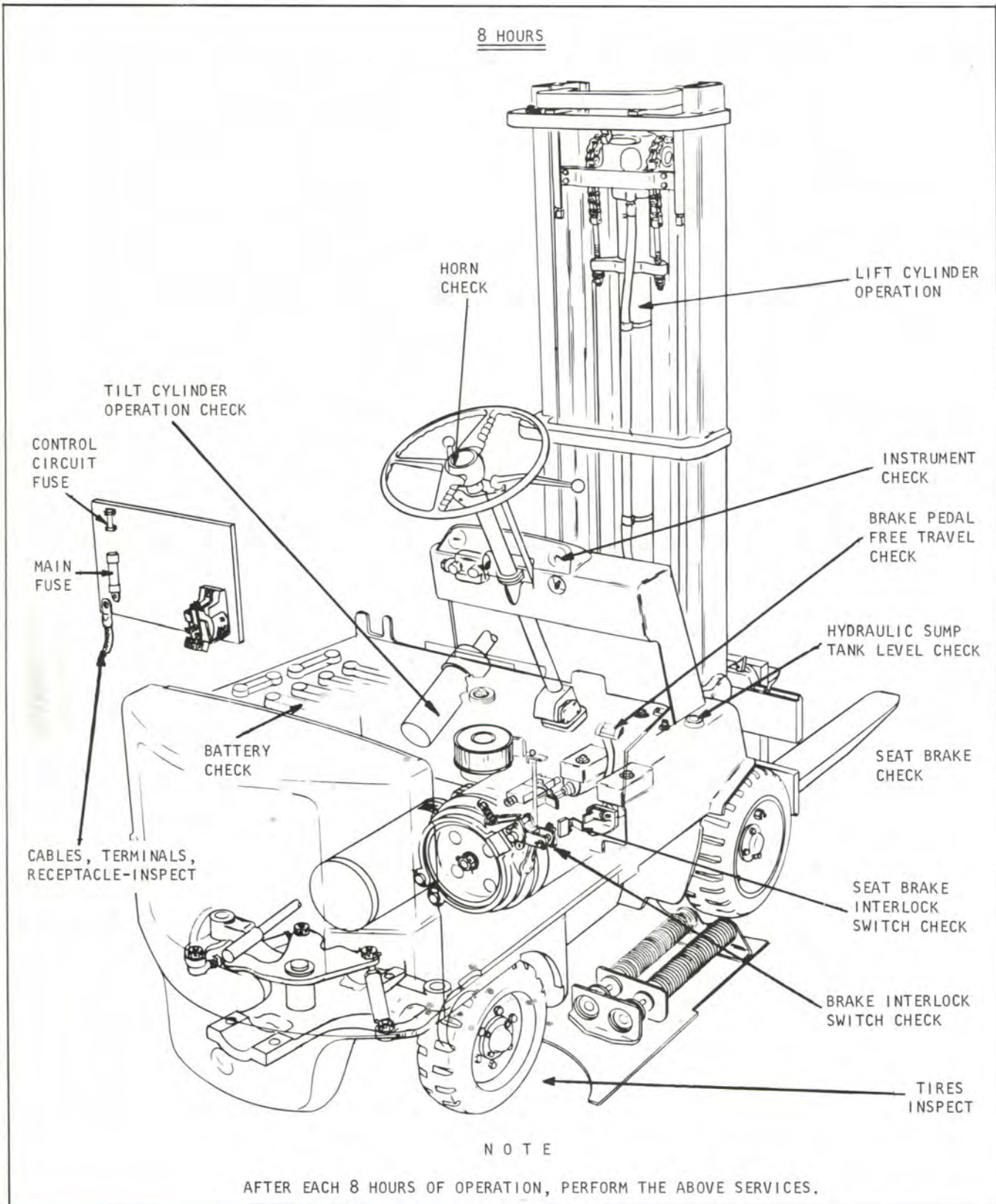


Plate 7546. Lubrication and Preventive Maintenance Illustration

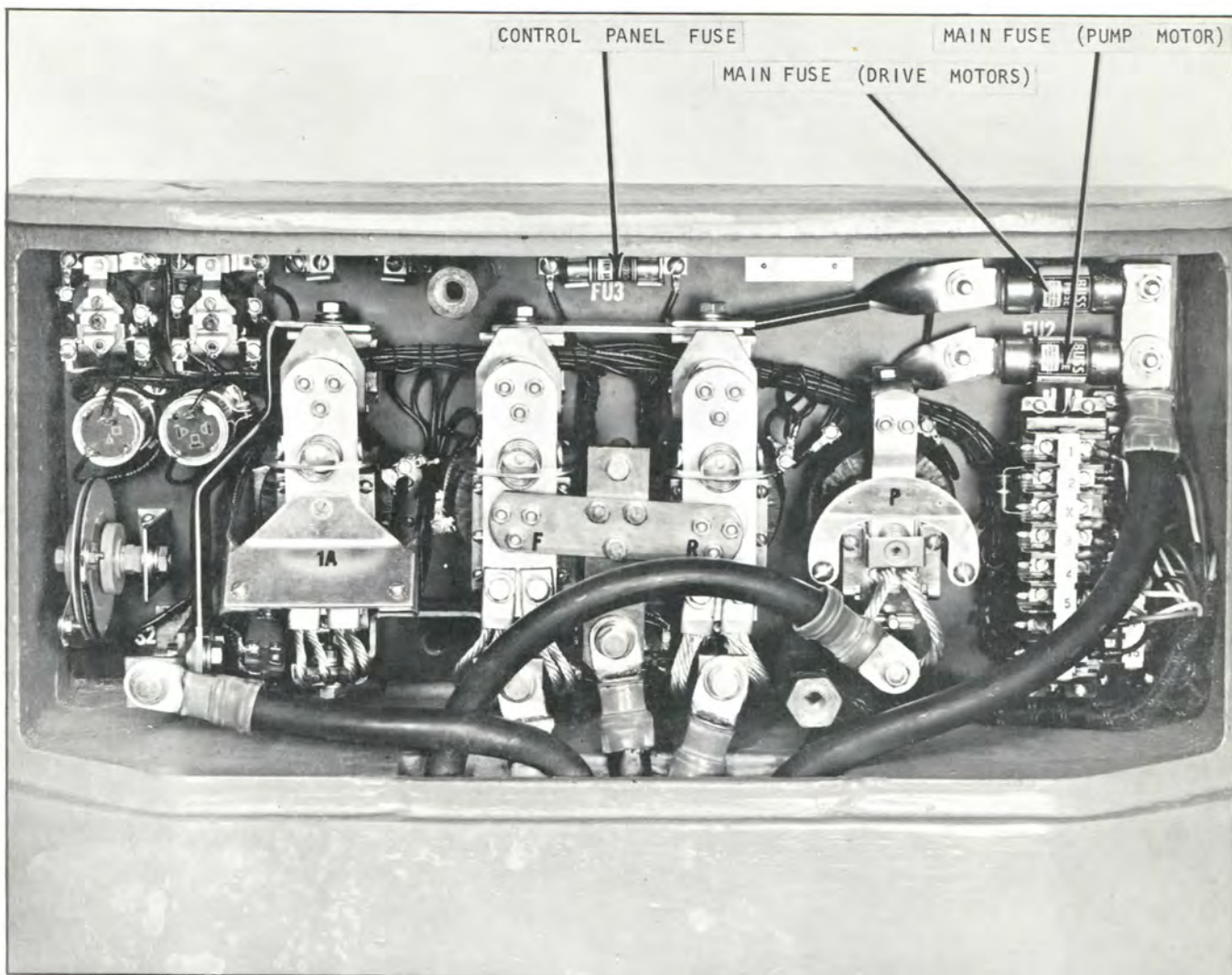


Plate 7544. System Fuses

HORN

Check to be sure the horn is working properly.

LIGHTS (MACHINES SO EQUIPPED)

Check all lights to see if they are functioning properly.

SYSTEM FUSES

| | |
|---|---------------|
| Control Panel Fuse | FU3 (10 amp) |
| Main Fuse (two required) (Drive Motor)..... | FU1 (400 amp) |
| | (Pump)..... |
| | FU2 (400 amp) |

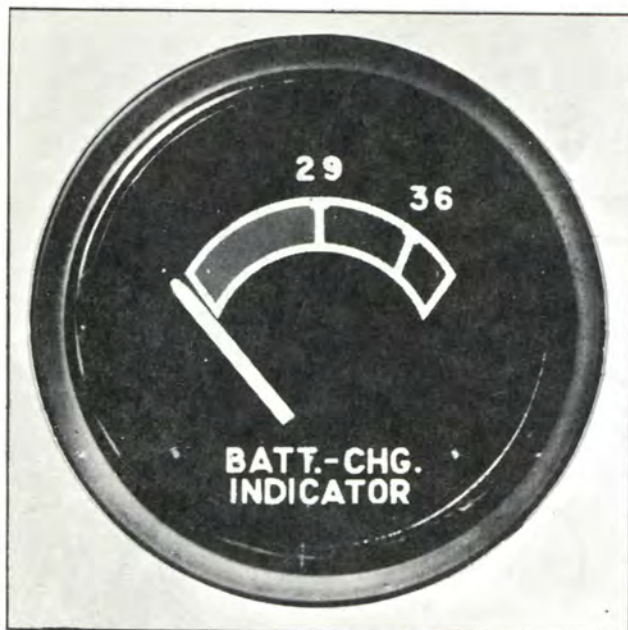


Plate 7388. Battery Charge Indicator

With the key switch in the "on" position the battery charge indicator will show the available battery voltage. When the indicator needle registers in the red portion of the indicator scale the battery should be recharged. It is recommended that at this time a specific gravity test be taken with a hydrometer to more accurately determine battery condition.



Plate 7162. Hour Meter

The hour meter accurately records the actual hours of machine operation. This will serve as an aid in determining the time intervals for lubrication and preventative maintenance services.

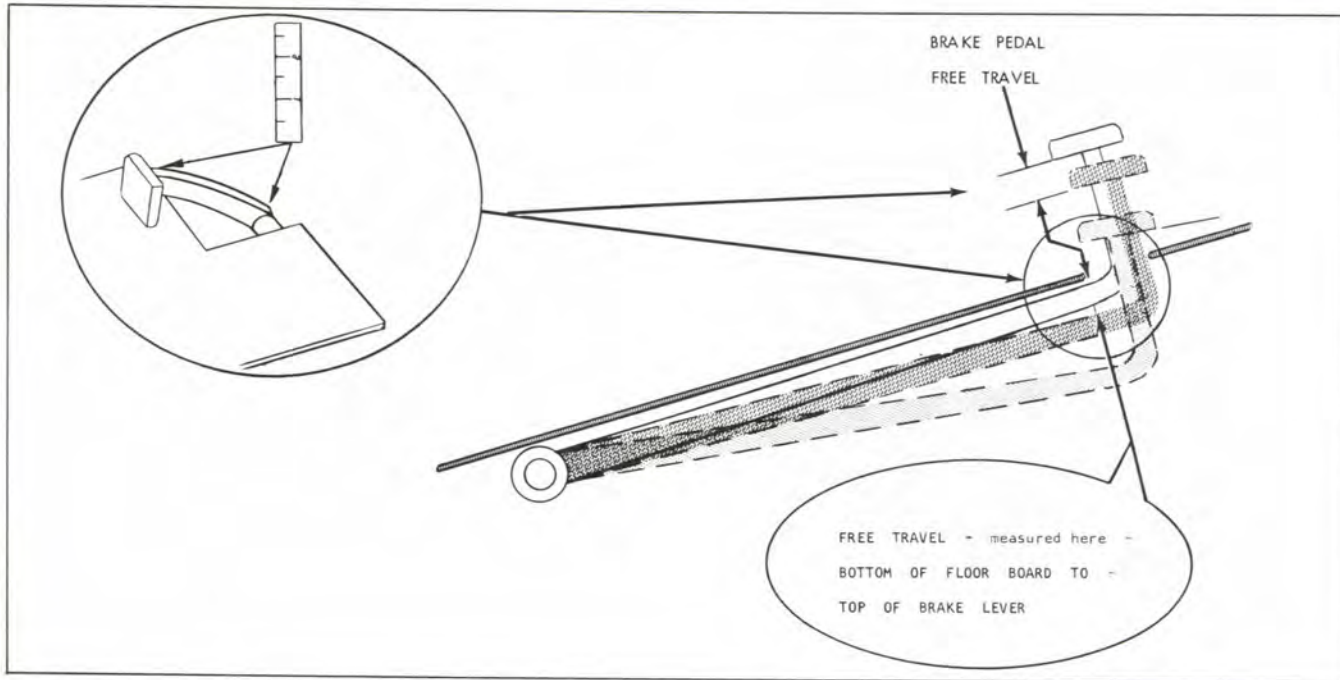


Plate 6630. Brake Pedal Free Travel

BRAKE PEDAL

1. Depress brake pedal and hold foot pressure for at least ten seconds. Pedal must be solid, must not be spongy or drift under foot pressure.
2. Brake pedal should have 3/8" to 1/2" free travel. Depress pedal by hand. When pedal meets resistance from the master cylinder, the distance traveled should be as specified. If Pedal Free travel is incorrect, refer to the Index for adjustment procedures.

PARKING BRAKE

NOTE

BRAKE EFFECTIVENESS SHOULD BE TESTED WITH TRUCK POWER OFF, SEAT LINKAGE DISCONNECTED AT LINKAGE PIN AND DRIVER OCCUPYING DRIVER'S SEAT.

Parking Brake Effectiveness - must be capable of holding the truck, with full rated load, on a 15% grade.

If brake operation is not satisfactory, report to designated person in authority.

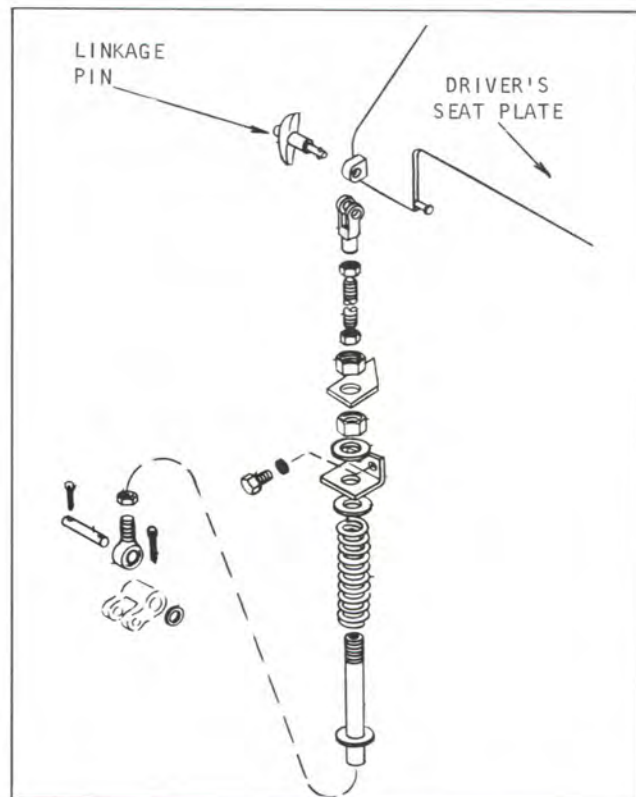


Plate 7548. Parking Brake Linkage

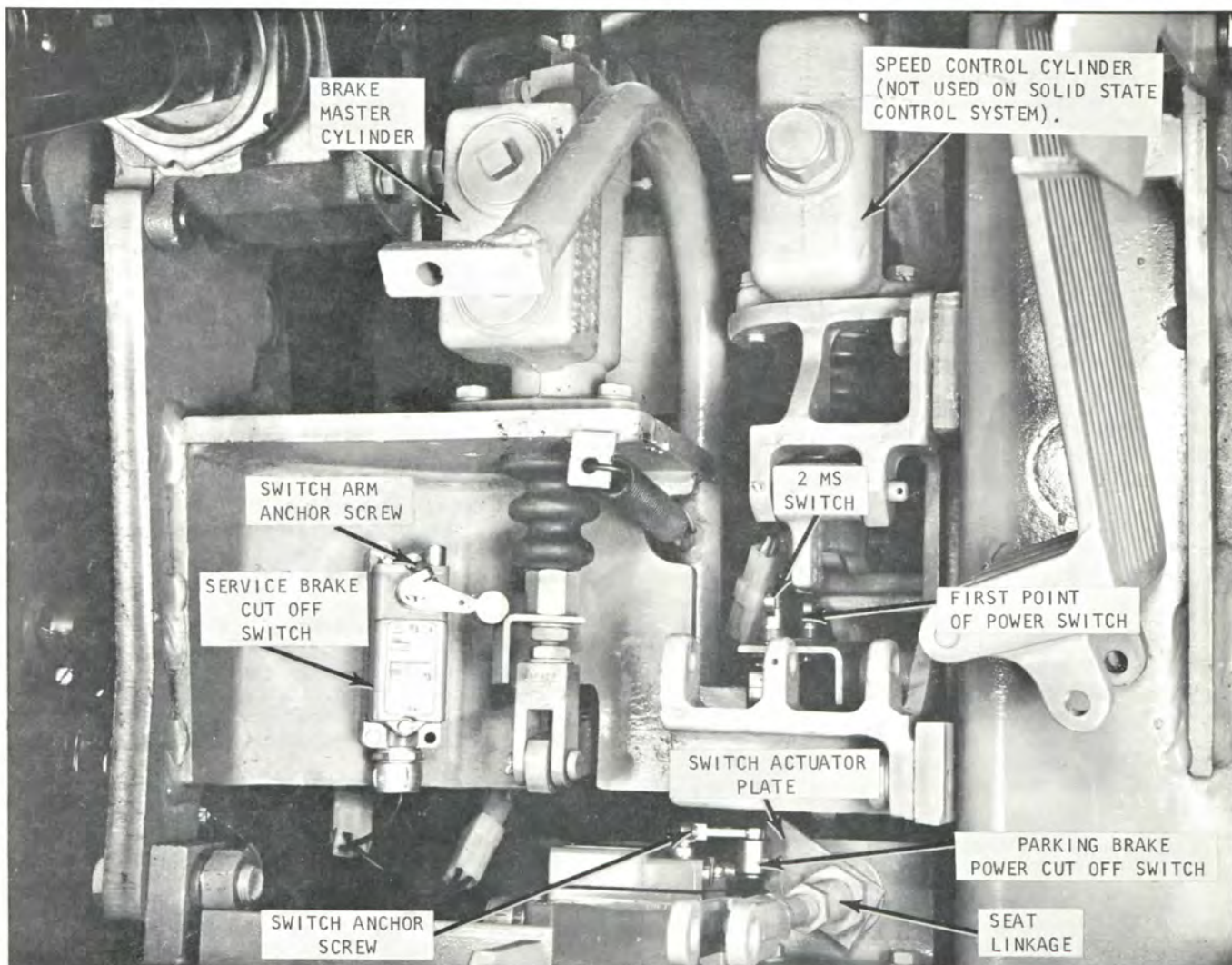


Plate 7545. Parking Brake (Deadman) Power Cut Off Switch; check Service Brake (Interlock) Power Cut Off Switch - Typical Illustration

PARKING BRAKE POWER CUT OFF SWITCH

The normally open switch must be closed by the switch operating arm provided in the seat brake linkage when the rubber seat support bumpers are 2 to 3 inches from the top of the hood; that is, in the last 2 or 3 inches of movement of the seat to the occupied position.

SERVICE BRAKE POWER CUT OFF SWITCH

The switch must open within the pedal free travel; that is, switch must cut all electrical power before the service brakes actuate or start to apply.

Depressing brake pedal will cause the (interlock switch) service power cut off switch to open a circuit, cutting all power to the drive motor. This prevents the possibility of trying to drive and brake the truck at the same time.



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

BATTERIES - LEAD-ACID

The lead-acid battery has a lead peroxide positive plate, a sponge lead negative plate, and the electrolyte is a solution of sulphuric acid.

The battery does not store electricity. When the battery is connected to an electrical circuit, a chemical reaction starts inside the battery. This chemical action produces lead sulphate on both the positive and negative plates, and the chemical actions produces the electric current through the electrical circuit. This action continues only as long as the circuit is complete from negative pole to the positive pole. As the battery plates become coated with lead sulphate the voltage output of the battery decreases. When both the positive and negative plates have become thoroughly coated with lead sulphate, both plates act alike (or like similar metals). This causes the current to stop flowing.

When the point is reached where the battery is discharged, the battery must be charged. Charging is accomplished by connecting the battery to a direct current source in such a manner that the electricity flows through the battery in the opposite direction of the normal battery current.

BATTERY LIFE

Economical and efficient operation of the electric fork lift truck depends, to a great extent, upon the efficiency and life of the battery.

During the operation of the fork lift truck, many things occur which, if not corrected or prevented, can greatly reduce the life of the battery.

The operator should be acquainted with the limits, capacities and capabilities of his truck. He should know the correct point of power to use to move all loads up to the rated capacity of the truck.

Batteries are rated in ampere hours over a set period of time, and should be of a proper size for the particular work intended. Extending the work means over-discharging the battery. This will greatly shorten its life. Overcharging the battery by using too high a rate of charge, will cause it to gas vigorously after it has reached its fully charged state and will also shorten its life.

If service requirements demand only partial discharge of the battery, it is unnecessary to recharge following each partial discharge. When the hydrometer reading indicates the battery is 75% discharged, (approximately 1130 specific gravity) arrangements should be made to recharge.

Controlling the "charge" and "discharge" of the battery is a very important contributing factor in determining battery life.

The discharge of a battery can be controlled in several ways.

Batteries are rated according to the job for which they are being used. A fully charged battery is capable of doing a certain amount of work or lasting a certain length of time in a specific service. With information of this type, a schedule or duty cycle can be worked out and the batteries can be changed or serviced with very few failures.

Experienced operators can tell from the action of the truck, when the battery is reaching the point where it should be charged or changed. Prompt action in seeing that the battery is serviced at this time can result in longer battery life.

Several "meters" or "indicators" are available for use on battery powered trucks. These indicators show the operator the state of charge of the battery, how much useful power is left in the battery, or just simply warns the operator when the battery should be charged.

MAINTENANCE

Keep the "tops" of the battery clean and dry at all times. Normally wiping the top of the battery with a damp cloth is sufficient. If the battery is removed from the truck, it can be hosed off with clean water. If electrolyte is spilled, it will not dry off. Neutralize the acid with a solution of ordinary "bicarbonate of soda" and rinse thoroughly with clean water.

A light coating of vasoline or a light cup grease on the terminals will help prevent corrosion. If the terminals have become corroded, wash off the corrosion with a soda solution and rinse thoroughly.

The vent plugs should be in place at all times when using, cleaning, and charging the battery. They should be cleaned weekly by immersing in a bucket of clean water for one half hour. Check the vent holes in the vent plugs and clean out.

The vent holes must be open to allow gas to escape from the cell.

The batteries should be numbered and assigned to a given truck. A record should be kept of (1) daily hydrometer reading on a pilot cell at the beginning of each charging, (2) a weekly reading of the pilot cell after charge, and (3) a hydrometer reading of all cells and temperature of one cell each "4" months before and after charging. When battery shows nonuniformity of these readings and an inability to work through a shift, it is an indication that replacement is necessary.

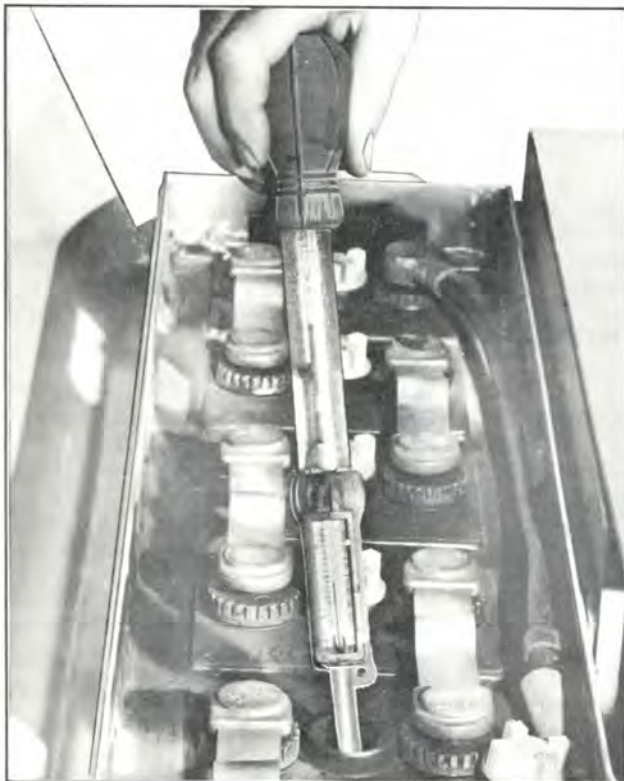


Plate 4018. Hydrometer Check Method

TWO-RATE CHARGING

"Two-Rate" charge, as the name implies, consists of two average rates. A "high" rate is provided at the beginning of the charge, while, toward the end of the charge, this is automatically changed to a "low" rate. (In actual operation, both high and low-rate is obtained in modern charging equipment by the use of a voltage relay in a rate charging circuit). When the battery cell voltage rises to approximately 2.37 volts per cell, at

77° F., the voltage relay automatically lowers the charging rate. The same voltage relay operating with a time switch can also be used to stop the charge automatically.

"Two-Rate" charging is generally used with rectifiers, although it is also used with a generator when the voltage is too high for the taper charge. For dependable, day-in and day-out repeat performance, the quality of the voltage relay and time switch is important.

TAPER-CHARGING

The "Taper" charge (Modified constant potential) is obtained inherently (a natural characteristic) in a circuit design by balancing the charging voltage source against the battery voltage rise during charge. As the battery voltage rises, it approaches the value of the charging source and hence, there is less difference between the charging source and battery voltage. As a consequence, the flow of charging current will taper off in value opposite to the way the battery voltage rises.

"Taper" charge requires a close tolerance (plus or minus 3%) of charging source voltage (2.63 times the number of cells) when more than one charge circuit is on the same machine. A single circuit taper charge does not need this close voltage limit as the inherent taper is obtained as a natural part of the shunt generator load characteristic.

However, taper charge circuits are specifically designed for a definite number of cells, in the battery, to achieve the inherent taper. The only duty performed by a voltage relay time switch control, on the taper circuit, is to stop the charge.

NICKEL-IRON-ALKALINE STORAGE BATTERIES

The alkaline storage battery is known as the "nickel-iron-alkaline type" because nickel oxide is used in the positive elements, and iron in the negative elements; while the electrolyte is an alkaline solution containing potash and lithia.

TYPE AND SERIES

Each cell bears a distinguishing type letter and size number plainly stamped upon the cover. A serial number, just under the type letter and size number combination, denotes date of manufacture. All cells having the same type letter are similar in operating characteristics and



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

are made from the same class of plates and size. Therefore, the capacity of the cell simply varies with the number of plates. The "size number" indicates the number of positive plates. The total number of positive and negative plates is one more than twice the size number.

INSPECTION ON RECEIPT

Alkaline batteries are shipped in either a "charged" or "discharge" condition. The cells shipped charged, are intended for service within a short time without further charging. If the cells are not put into service within a month, it will be found advisable to charge one or two hours before using.

A red label, included with the battery in each shipment, indicates that the cells are charged ready for immediate use on receipt.

A green label, indicates that the cells are in a discharged condition and must be given an extra charging time as specified by the manufacturer.

Upon receipt of the battery, inspect each cell for solution height. Use a glass tube for this purpose. DO NOT use a match or other open flame for inspection.

If electrolyte has been spilled, if plate tops are visible above the surface of the solution, or if the inside of packing case, etc., shows yellowish stains. The loss must be replaced; preferably with Refill Alkaline Storage Battery Solution, or lacking this, with RENEWAL Solution diluted to a specific gravity of 1.215 by the addition of distilled water. The proper height of solution above plate tops is as follows: Cell type is stamped on the cover of each cell.

- "A" Type Cells - 1/2"
- "C" Type Cells - 1"
- "D" Type Cells - 1 1/4"

When the level of solution is only a small amount below the proper height, fill with pure distilled water and in the future, use pure distilled water for replenishing the solution.

CONNECTIONS

The positive pole of an "alkaline cell" is designated by a red bushing around the pole and a plus (+) mark stamped on the cell cover.

The negative pole, is designated by a black bushing around the pole; no designating mark on the cover.

The connections between cells, in a tray, are made of solid wire with lugs on both ends. These are known as "connectors". The flexible, rubber-covered cables used to join trays together are known as "jumpers".

To avoid unnecessary electrical losses, all electrical connections must be tight. (To obtain this, it is necessary to see that all the contact surfaces between the poles and lugs are clean and make good contact.) Remove any Esbaline, grease, or dirt that may stick to the tapered surfaces of the poles or the inside of the lugs before connecting. If necessary, use 00 sandpaper or 00 emery cloth for this purpose. NEVER use a file or anything that will harm the contact surfaces.

A loose or dirty contact on a cell pole will cause excessive heating, and may be detected by touching the connectors after the current has been passing through them for some time.

DISCONNECTING LUG

A "disconnecting jack" or "lug puller" is supplied with each battery. This jack is designed to straddle the connector or jumper lug and, by means of a jack screw, break the lug loose from the cell pole.

CHARGING

Direct current must be used to charge any storage battery. If only alternating current is available, it is necessary to convert to direct current by the use of a motor generator set, mercury arc rectifier, or other suitable form of current rectifier.

An alkaline battery may be charged at either a constant current rate throughout the entire charging period, or at a modified constant potential rate. In either case the average rate should be such that the battery can be brought from a discharged state to full charge within between six and seven hours. In connecting a battery to the charging circuit, always connect the positive terminal to the positive side of the line, and the negative terminal to the negative side of the line.

It is not necessary to take specific gravity reading during charge, as the electrolyte does not change appreciably.

Before starting to charge, see that the solution is at the proper level. If the solution is low, bring it to the proper level by adding pure distilled water as instructed under watering. If the battery is in a compartment, open the cover before starting a charge. DO NOT charge in a hot place or allow the temperature of the solution to exceed 115° Fahrenheit on charge.

CHARGE TEST FORK

The charge test fork was developed to provide an easy means of determining the state of charge of an alkaline battery.



Plate 4008. Charge Test Fork Check

This is done by obtaining a key voltage reading which, on reference to the charts supplied for use with instrument, will indicate the amount of charge necessary to restore the battery to a fully charged condition.

ELECTROLYTE

The specific gravity of the electrolyte in fully charged alkaline cells has a normal operating range of between 1.215 and 1.160, with electrolyte at the proper level and corrected for temperature.

The specific gravity reading of the electrolyte (of an alkaline cell) has no value in determining its state of charge, as the specific gravity does not change during the charging or discharging periods

to any marked extent. It, therefore, is only necessary to take infrequent readings, to determine if the specific gravity has dropped to the point where a change of electrolyte is desirable.

There are two kinds of alkaline potash electrolyte which are normally used when a "change" of solution is found necessary. Renewal solution, which has a specific gravity of approximately 1.250; is normally used to replace old electrolyte, the gravity of which has dropped to the low limit ranging between 1.160 and 1.170. Refill solution has a specific gravity of approximately 1.215 and is used to replace spillage. DO NOT use any potash solution other than alkaline electrolyte, as the presence of impurities or improper compounding of such solution may permanently injure your battery.

WATERING CELLS

Before putting a new electric filler into service; see that the tank is washed thoroughly to remove any foreign matter and then rinse tank, hose and filler thoroughly by running distilled water through them. Then fill the tank with distilled water and mount in a convenient place at least four or five feet above the cells to be watered.

To operate, insert the nozzle into the filler opening in the top of the cell. If the solution is already at the proper height, the bell signal will ring. If bell does not ring, start flow of water by opening valve by pushing down lever on filler handle. When the bell rings, remove the nozzle from the cell, close cell filler cap and proceed to next cell.

LAYING UP BATTERY

If battery is to be laid up for any length of time (in excess of one year) be sure that the plates are covered to the proper height with solution and that the battery is discharged and short circuited. The battery should be stored in a cool dry place.

Alkaline batteries are easy to lay up. Merely discharge to zero voltage and short circuit. They may be left standing idle indefinitely, without injury, if stored in this short circuited condition. The battery may be stored for 6 months to a year without discharging and short circuiting.



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

CAUTIONS

NEVER put lead battery acid into an alkaline battery or use utensils that have been used with acid; you may ruin the battery.

NEVER bring a "lighted match" or other "open flame" near a battery.

NEVER lay a "tool" or any piece of "metal" on a battery. Always keep the filler caps closed except when necessary to have them open for filling as provided for in these instructions.

ALWAYS keep batteries clean and dry externally.

ALKALINE ELECTROLYTE is injurious to the skin or clothing and must be handled carefully. Solution spilled on the person should be immediately washed away with plenty of water.

DO NOT use the electric filler, or fill cells while a battery is on charge.

USE ONLY pure distilled water for watering the battery.

WEAR GOGGLES when cleaning or changing solution.

CABLES, TERMINALS AND BATTERY RECEPTACLE.

Check cables, terminals and receptacle for condition and security of mounting. Correct as necessary.



Plate 7046. Typical Hydraulic Sump Tank and Sump Breather

HYDRAULIC SUMP TANK

Check hydraulic sump tank fluid level in the following manner:

1. Lower upright.
2. Turn key switch off.
3. Remove sump breather from R.H. side of machine and fill plug from L.H. side of machine. Fluid level should be within 1 1/2 to 2 inches of the filler hole.

If necessary, fill sump tank with hydraulic fluid per Clark Specifications MS-68. Turn key switch on and operate valve control levers allowing any air in the lines to escape, then recheck sump tank fluid level before putting machine into operation. Replace breather and fill plug to their same locations as when removed.

HYDRAULIC CONTROL LEVERS

I M P O R T A N T

EVERY 8 OPERATING HOURS (OR EVERY SHIFT)

ELEVATE UPRIGHT TO THE UPPER LIMIT. THIS WILL PROVIDE LUBRICATION TO THE TOP PORTION OF THE LIFT CYLINDER.

Check lift and tilt operation. The lift and tilt cylinders should actuate when lift or tilt levers are moved either way from neutral position.

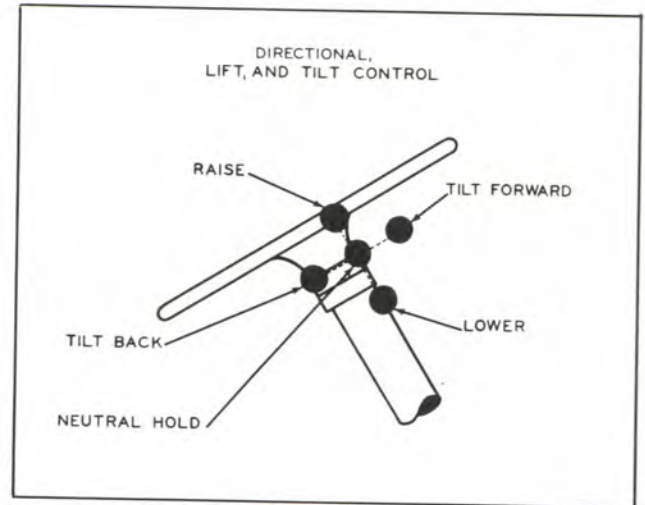


Plate 4448. Lift and Tilt Lever

When load is elevated and control lever returned to neutral position, load should remain in elevated position with no noticeable downward drift. If load drifts downward excessively, this may indicate lift cylinder U-cup or seal damage -- report to designated person in authority.

With tilt lever in neutral position, upright should remain steady with no noticeable backward or forward drift. If upright drifts excessively either way, this may indicate tilt cylinder seal or U-cup damage -- report to designated person in authority.

C A U T I O N

NEVER ALLOW LOADED OR UNLOADED LIFT CARRIAGE TO REMAIN IN AN ELEVATED POSITION FOR ANY PROLONGED PERIODS. LIFT CARRIAGE SHOULD BE LOWERED WHEN NOT IN USE.

DO NOT HOLD CONTROL LEVERS IN EXTREME POSITIONS AFTER A LOAD HAS REACHED ITS LIMITS. TO DO SO WILL RESULT IN HIGH OIL PRESSURE THAT MAY RESULT IN HEATING OF THE HYDRAULIC OIL.



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

TIRE AND RIM MAINTENANCE

1. Inspect tires regularly - remove all sharp objects picked up by treads before they have a chance to cut further into the rubber and cause chipping or possible separation of the rubber from the base metal.
2. Avoid overloading and do not allow vehicle to stand under heavy loads for prolonged periods as this will cause a "flat" spot on the tires.
3. Check steering axle alignment regularly to protect against fast, irregular tread wear and separation.
4. If rubber tires come in contact with oils, grease, and gasoline they should be wiped off without delay.
5. Regular lubrication of all wheel bearings will assure free-rolling and elimination of tire drag when stopping or starting.

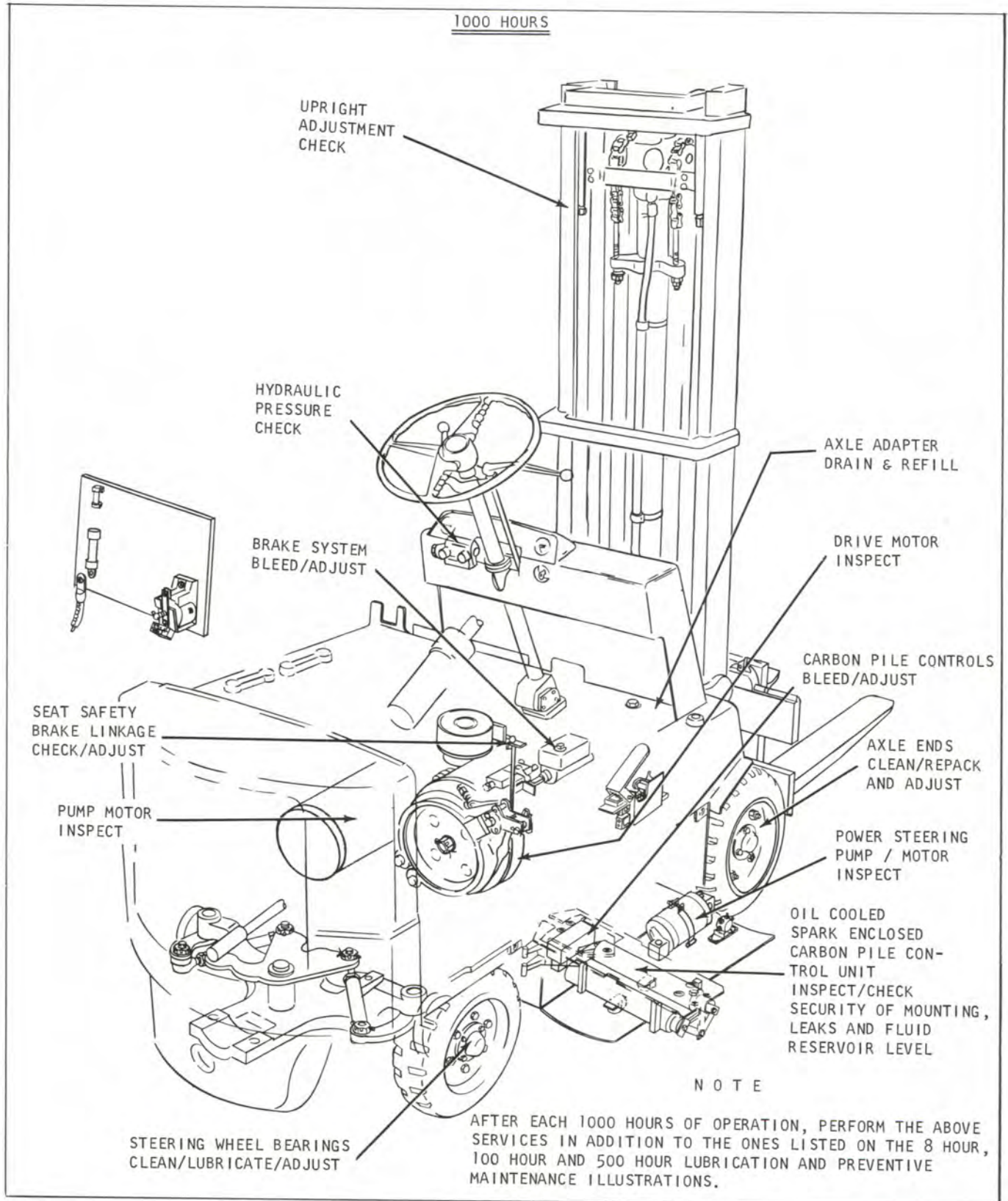


Plate 8658. Lubrication and Preventive Maintenance Illustration
(Optional --- Carbon Pile Units Equipped with Power Steering)

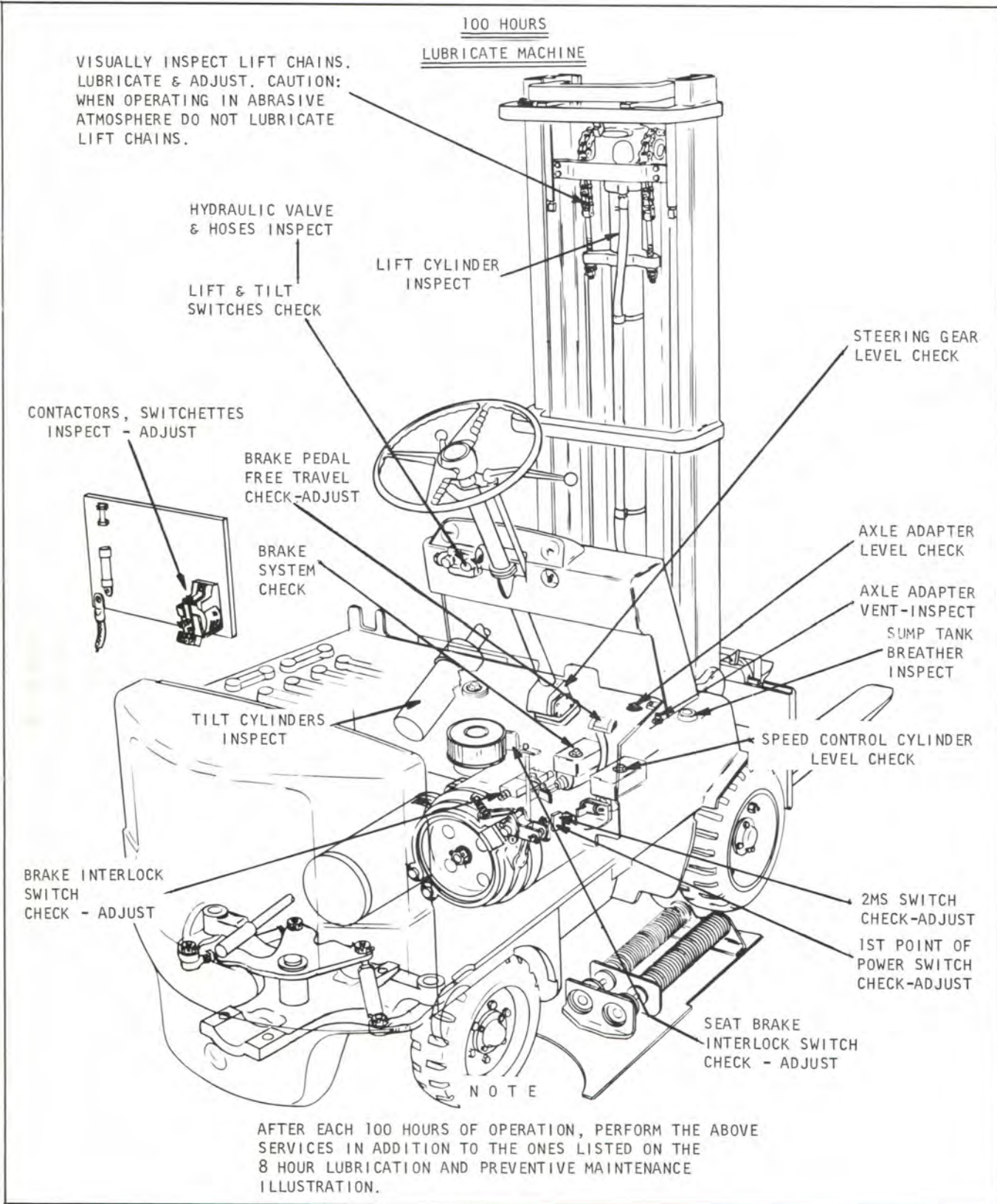


Plate 7547. Lubrication and Preventive Maintenance Illustration

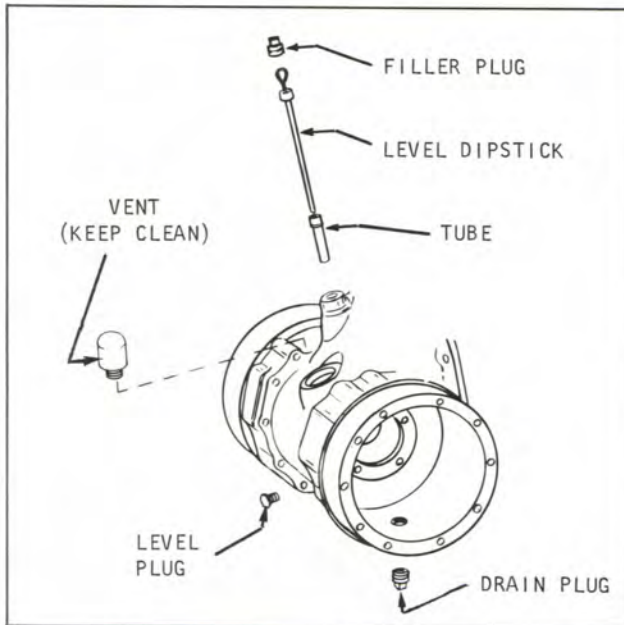


Plate 7549. Typical Axle Adapter



Plate 7550. Typical Axle Adapter Vent

AXLE ADAPTER LUBRICANT LEVEL CHECK

Check lubricant level and fill if necessary. Use Type "A", Suffix "A", Automatic Transmission Fluid (fluid containers must display a qualification number prefixed by "AQ-ATF"...Clark Part Number 879803) or Dexron Automatic Transmission Fluid in all vehicles beginning with the following machine serial number:

EC-----1-831 and above

Use E.P.G.L. S.A.E. #90 Gear Lubricant (Per Clark Specifications MS-8) in all machines built prior to the above listed machine serial numbers.

Clean dirt from around filler plug and remove plug. Fill until level reaches the level of the test plug. DO NOT overfill, as the excess quantity will serve no useful purpose. If the oil level is too high, it will cause excessive oil churning and attendant high oil temperature and possible leakage.

AXLE ADAPTER VENT

Inspect axle adapter vent to be sure it is free of obstructions. If vent is not open remove and clean in a Stoddard type cleaning solvent. Be sure vent is completely dry before replacing on axle adapter.

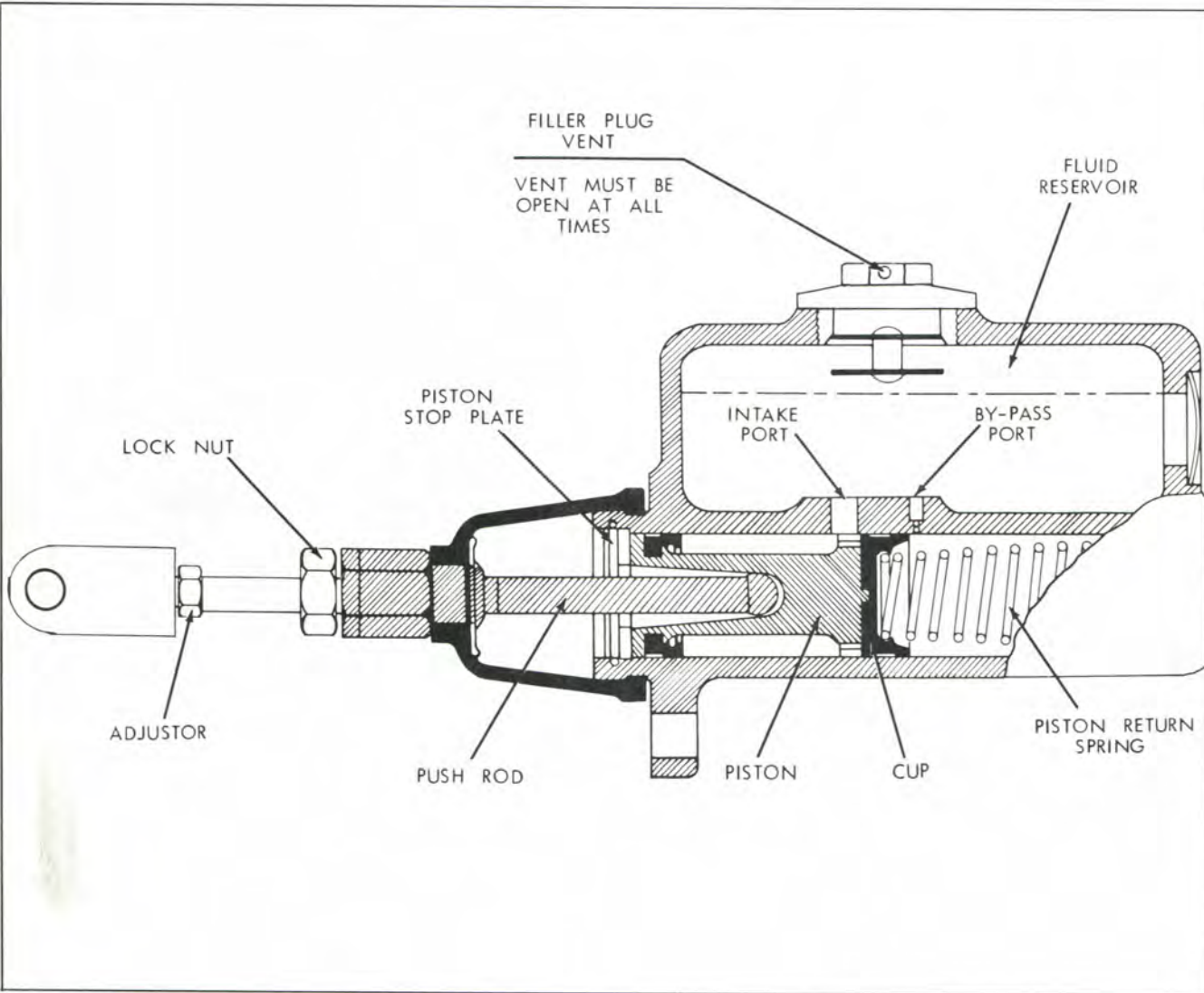


Plate 6633. Carbon Pile Speed Control Cylinder

SPEED CONTROL CYLINDER (CARBON PILE)

Check brake fluid level in the speed cylinder. Brake fluid should be within 1/4 inch of the top. Fill with S.A.E. 70 R3 Heavy Duty Hydraulic Brake Fluid.

Speed Cylinder Filler Cap Vent Hole:
Check cap vent hole for obstruction. Vent hole must be open at all times. Clean if necessary.



Plate 7545. Parking Brake (Deadman) Power Cut Off Switch; Service Brake Power Cut Off Switch Assy's.

PARKING BRAKE POWER CUT OFF SWITCH

The normally open switch must be closed by the switch operating arm provided in the seat brake linkage when the rubber seat support bumpers are 2 to 3 inches from the top of the hood; that is, in the last 2 to 3 inches of movement of the seat to the occupied position.

If adjustment is necessary, loosen arm retainer screw, move arm as required allowing switch to actuate as previously stated. Tighten arm retainer screw when correct adjustment is obtained.

SERVICE BRAKE POWER CUT OFF SWITCH

The switch must open within the pedal free travel; that is, switch must cut all electrical power before the service brakes actuate or start to apply.

If adjustment is necessary, loosen arm retainer screw. Move arm as required allowing switch to open (actuate) just before service brakes start to apply. Normally, adjusting switch arm to contact the switch actuator plate, with the brake pedal in the released position, will provide correct adjustment. This should be



INDUSTRIAL TRUCK DIVISION

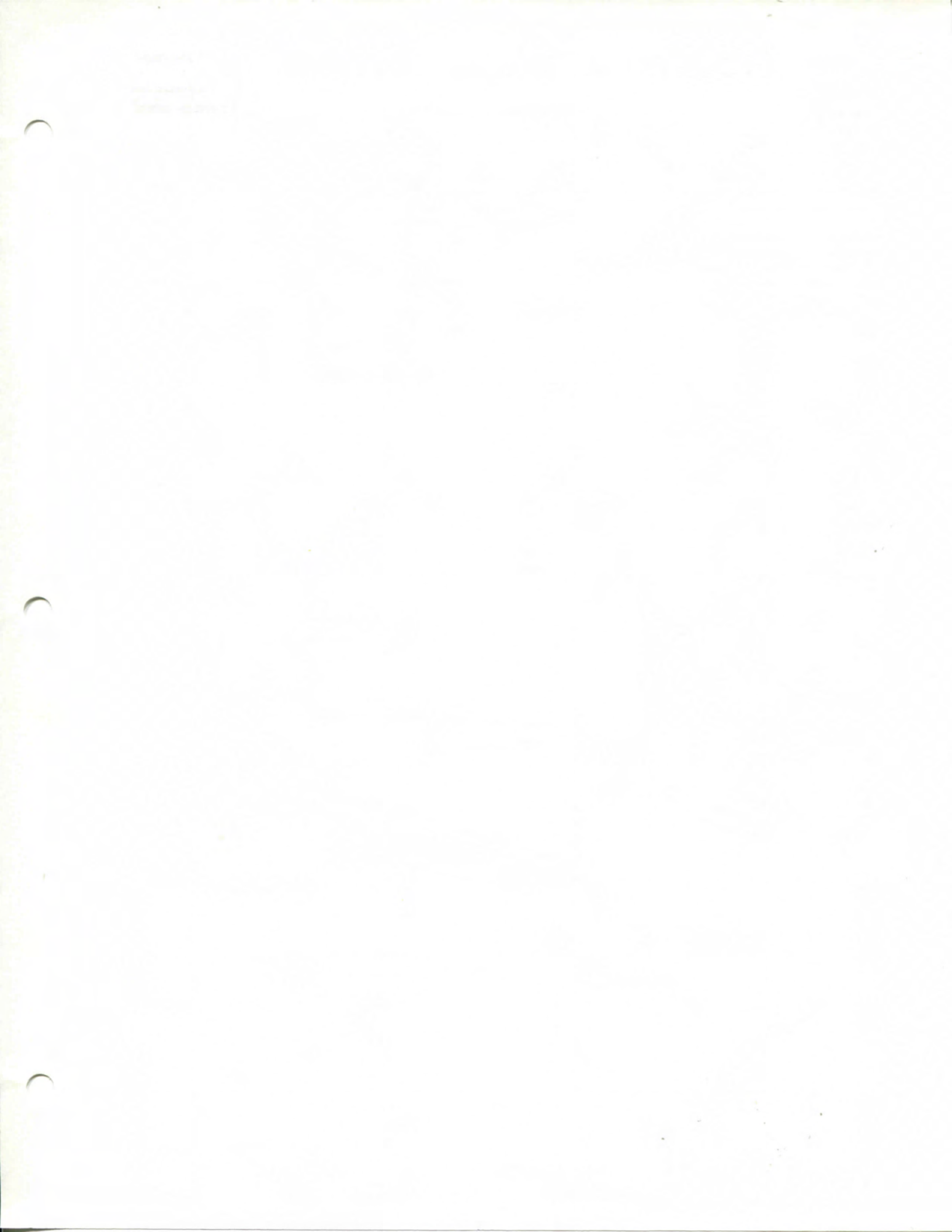


LUBRICATION AND PREVENTIVE MAINTENANCE

checked however, to be sure electrical current cuts off before brakes start to apply.

N O T E

DEPRESSING BRAKE PEDAL WILL CAUSE THE (INTERLOCK SWITCH) SERVICE BRAKE POWER CUT OFF SWITCH TO OPEN A CIRCUIT, CUTTING ALL POWER TO THE DRIVE MOTOR. THIS PREVENTS THE POSSIBILITY OF TRYING TO DRIVE AND BRAKE THE TRUCK AT THE SAME TIME.



BRAKE PEDAL FREE TRAVEL

Using a rule, measure pedal free travel at either of the two places shown below.

Depress brake pedal by hand. When pedal meets resistance from the master cylinder, the distance traveled should be 3/8 to 1/2 in. — if free travel is incorrect, adjust as follows:

1. Loosen lock nut, see Plate 7339.
2. Rotate adjuster to obtain specified pedal free travel.
3. Tighten lock nut to hold adjustment.

ACTUATION STROKE

If brake pedal travels beyond this point ----- this indicates either lack of fluid in the master cylinder; air in the system, or the brake linings require replacement.

CLEARANCE - measured here
TOP PEDAL POSITION -TO- WHERE
PEDAL MEETS RESISTANCE FROM
THE MASTER CYLINDER.

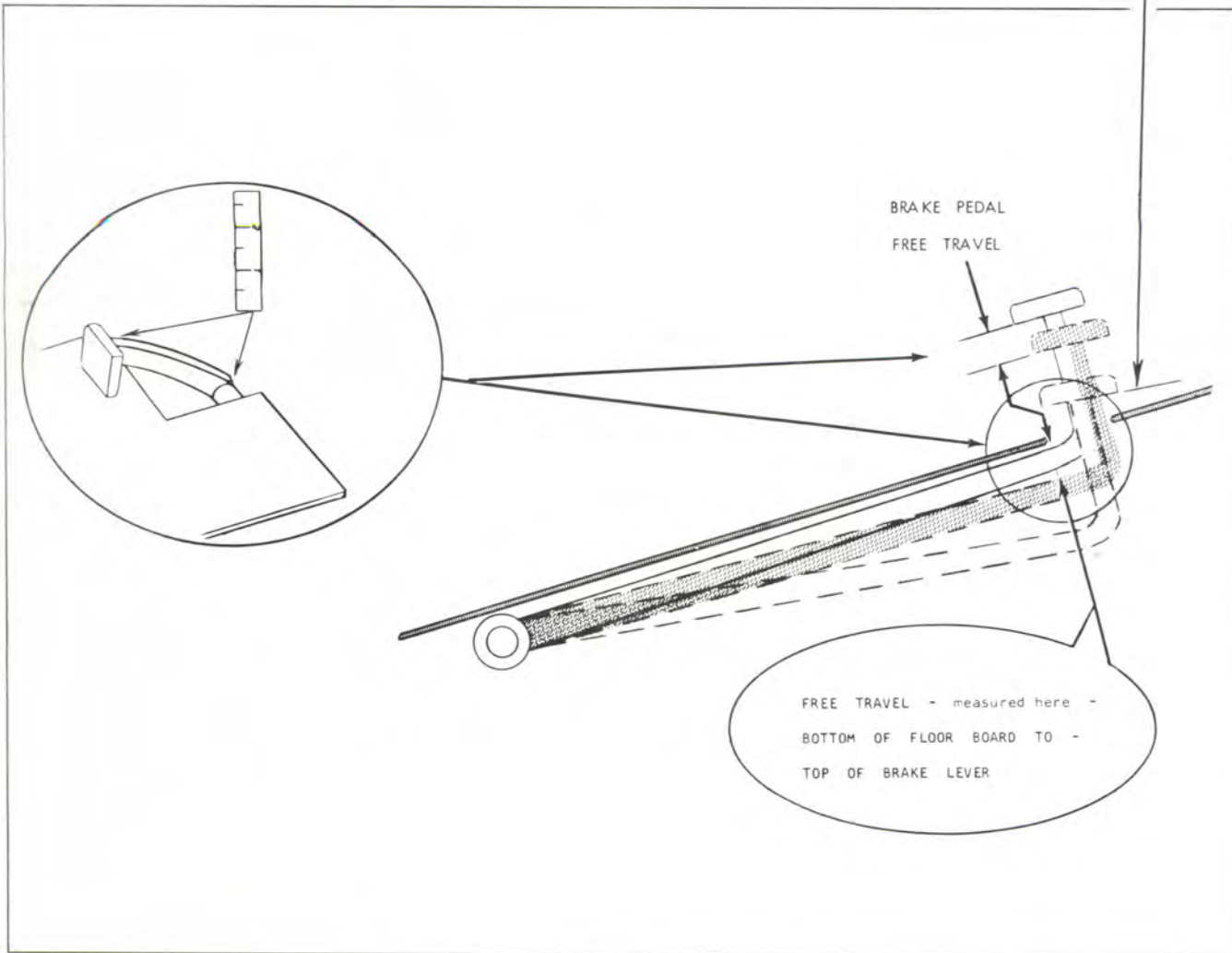


Plate 7042. Brake Pedal Check and Adjustment

BRAKE SYSTEM

Check brake fluid level in the master cylinder. Brake fluid should be within 1/4 inch of the top. Fill with SAE 70 R3 Heavy Duty Brake Fluid. Clark Part Number 1800200.

Master Cylinder Filler Cap Vent Hole:

Check cap vent hole for obstruction. Vent hole must be open at all times. Clean if necessary, see Plate 7339.

BRAKE PEDAL

A correctly adjusted brake pedal is important so that the internal ports in the master cylinder are not blocked by the cylinder piston. The following lists two important reasons for proper brake pedal free travel.

Inadequate pedal free travel will block the internal ports so that upon releasing the brake pedal fluid will be trapped in the lines and hold the brake linings in contact with the brake disc or drum, resulting in lining wear and excessive fuel consumption.

Brake Pedal Adjustment: Refer to Plate 7964 on Page 100H 302 and follow the instructions and diagrams.

WARNING

CORRECT BRAKE PEDAL FREE TRAVEL IS IMPORTANT FOR SAFE OPERATING BRAKES.

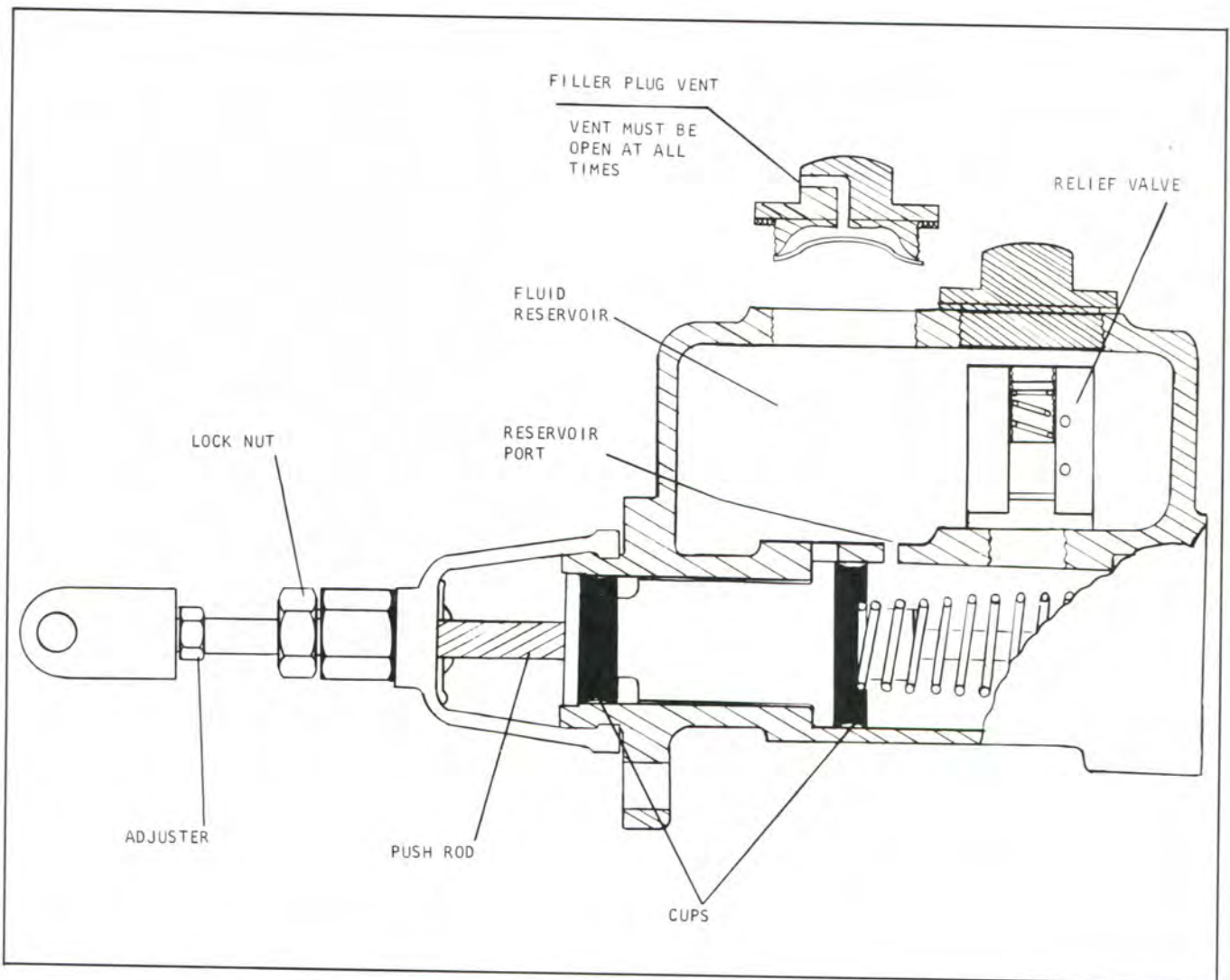


Plate 7339. Brake Pedal Adjustment

LUBRICATION AND PREVENTIVE MAINTENANCE

LIFT AND TILT CYLINDERS

Check for drift, leakage at packings, damage and security of mountings (Anchor Pivot Pins, Flanges and Mounting Rings).

LIFT CHAINS

The lift chains are mounted to the chain anchors on the lift carriage and at the chain anchor rods near the lift cylinder piston head.

If it becomes necessary to adjust the lift chains place a capacity load on forks (or device if used) and adjust chains so center line of lower carriage roller is at least 1/2" above the bottom end of the inner slide channel. It is important that the chain adjustment be made with a capacity load. In this manner you will allow for chain stretch.

W A R N I N G

KEEP CLEAR OF LOAD DURING ADJUSTMENT TO AVOID INJURY IF ANY MALFUNCTION SHOULD OCCUR AND CAUSE LOAD TO FALL.

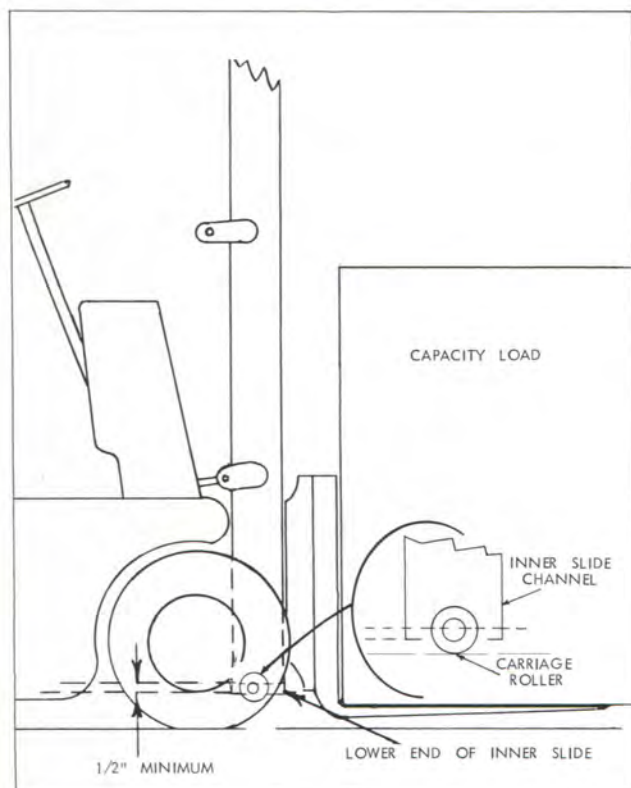


Plate 6884. Lift Chain Adjustment
(Place Maximum Load On Forks)

LUBRICATE MACHINE

C A U T I O N

WHEN LUBRICATING THE TRUCK, MAKE A VISUAL INSPECTION OF ALL HYDRAULIC LINES, FITTINGS AND ALL ELECTRICAL WIRING. LUBRICATE ALL MISCELLANEOUS LINKAGE WITH S.A.E. NUMBER 20 OIL.

HYDRAULIC CONTROL VALVE AND LINES

Inspect for damage, leakage and security of mounting.

LIFT BRACKET

Inspect for damage, bent forks etc.

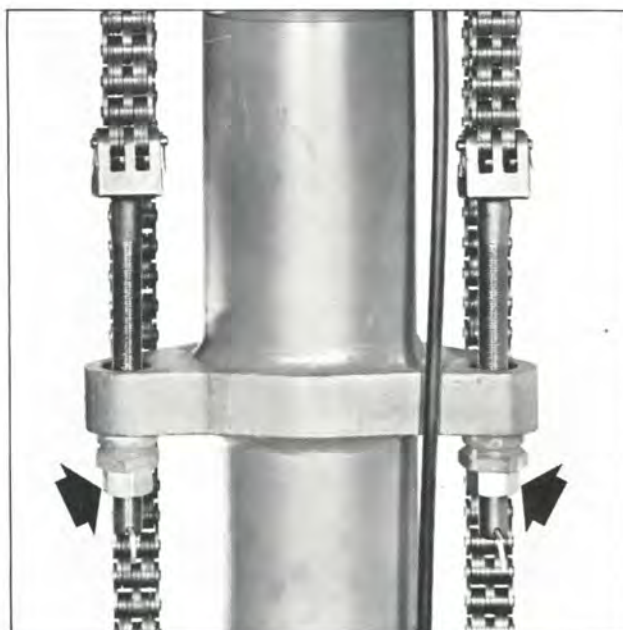


Plate 6634. Lift Chain Adjustment
(Chain Anchor Rods)

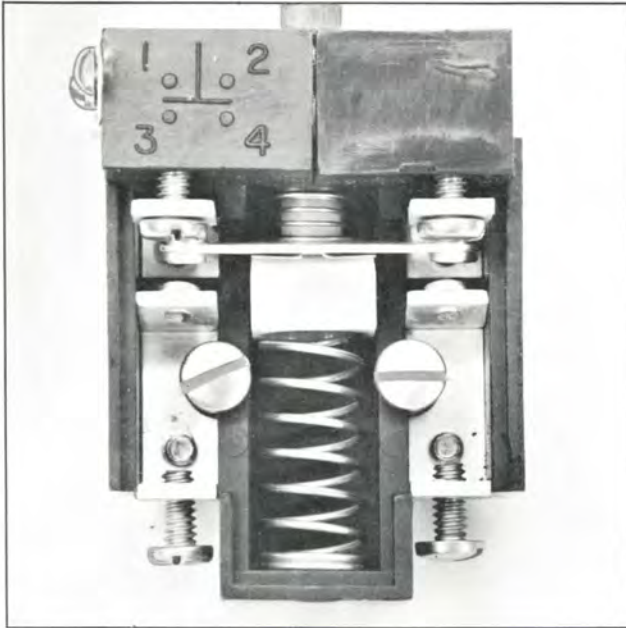


Plate 7443. Typical Pump Control Switch

PUMP CONTROL SWITCHES

The pump control switches are mounted at the valve spool end covers and are activated by movement of the valve spool.

SWITCH ADJUSTMENT

1. Loosen the two screws clamping switch to valve.

2. Position switch on spool end cover so that movable switch contacts are centered between stationary contacts. (Switch contacts are viewed thru clear plastic cover on switch.)

NOTE

ADJUSTMENT OF SWITCHES MUST BE MADE WITH VALVE SPOOL IN NEUTRAL POSITION.

3. After correct adjustment is obtained tighten switch clamping screws.

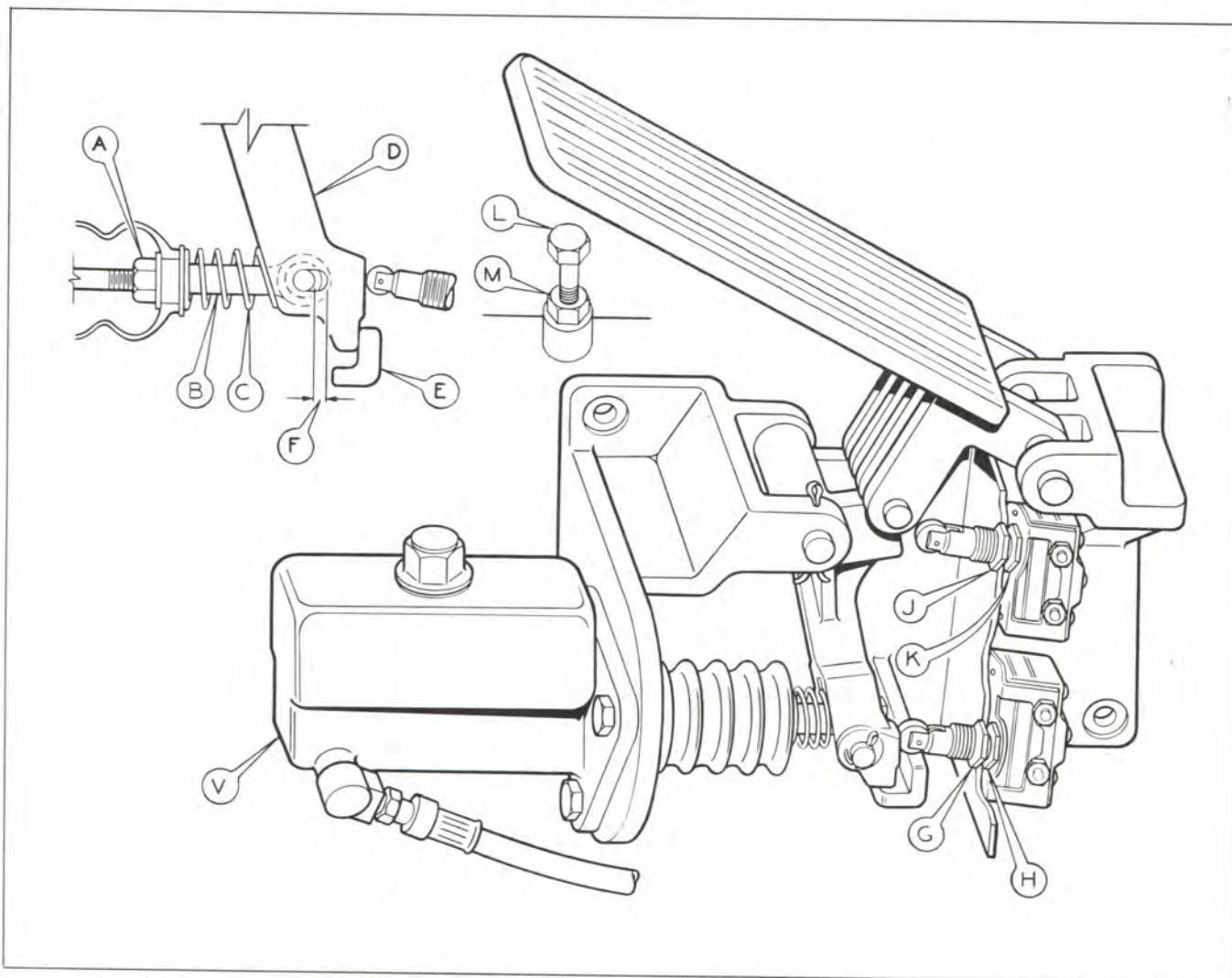


Plate 10138. Typical Accelerator Adjustment

MASTER CYLINDER PISTON ROD ADJUSTMENT

Loosen nut (Item A). Adjust piston rod, so that when it makes contact with the piston the rod end (Item B) by using the spring (Item C) pushes the lever (Item D) up to the stop (Item E) without decreasing the free play (Item F). Tighten nut (Item A).

FIRST POINT OF POWER SWITCH ADJUSTMENT

Loosen nuts (Item G & H). Move switch toward the lever (Item D) or away from the lever to adjust. Normally open switch contacts must open within free play (Item F). Tighten nuts (Item G & H).

2MS SWITCH ADJUSTMENT

Loosen nuts (Item J & K). Move switch in to or out of the bracket to adjust. Normally closed switch contacts must open when the toe of the

accelerator pedal is 3/4 of an inch from the floorboard. Tighten nuts (Item J & K). Be sure switch does not bottom when accelerator pedal is fully depressed.

ACCELERATOR PEDAL ADJUSTMENT

Adjust stop screw (Item L) so that when the accelerator pedal is fully depressed the pedal will be parallel with the floorboard. Then tighten stop screw nut (Item M).

HYDRAULIC SUMP TANK BREATHER

Wash breather in a Stoddard type cleaning solvent until free of all foreign matter. Use compressed air to dry breather before replacing it on the machine.

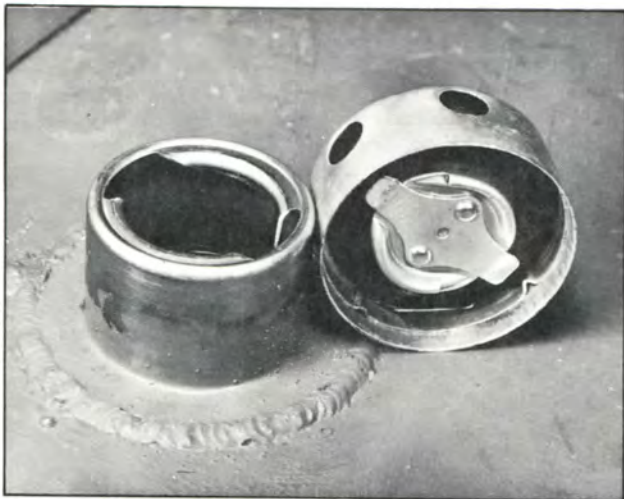
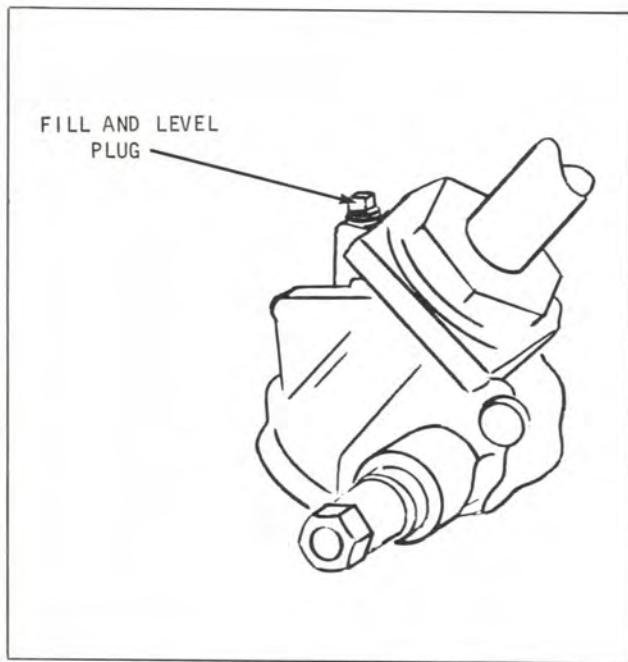


Plate 7046. Sump Tank and Breather

**STEERING GEAR**

The gear lubricant level should be checked every 100 operating hours and filled if necessary with NLGI #1 (Amolith grease EP #1 or its equivalent). Fill to level of filler plug opening only. Replace plug after filling.

N O T E

Before removing fill/level plug, be sure to wipe all dirt from around the plug and opening.

Plate 6429. Steering Gear

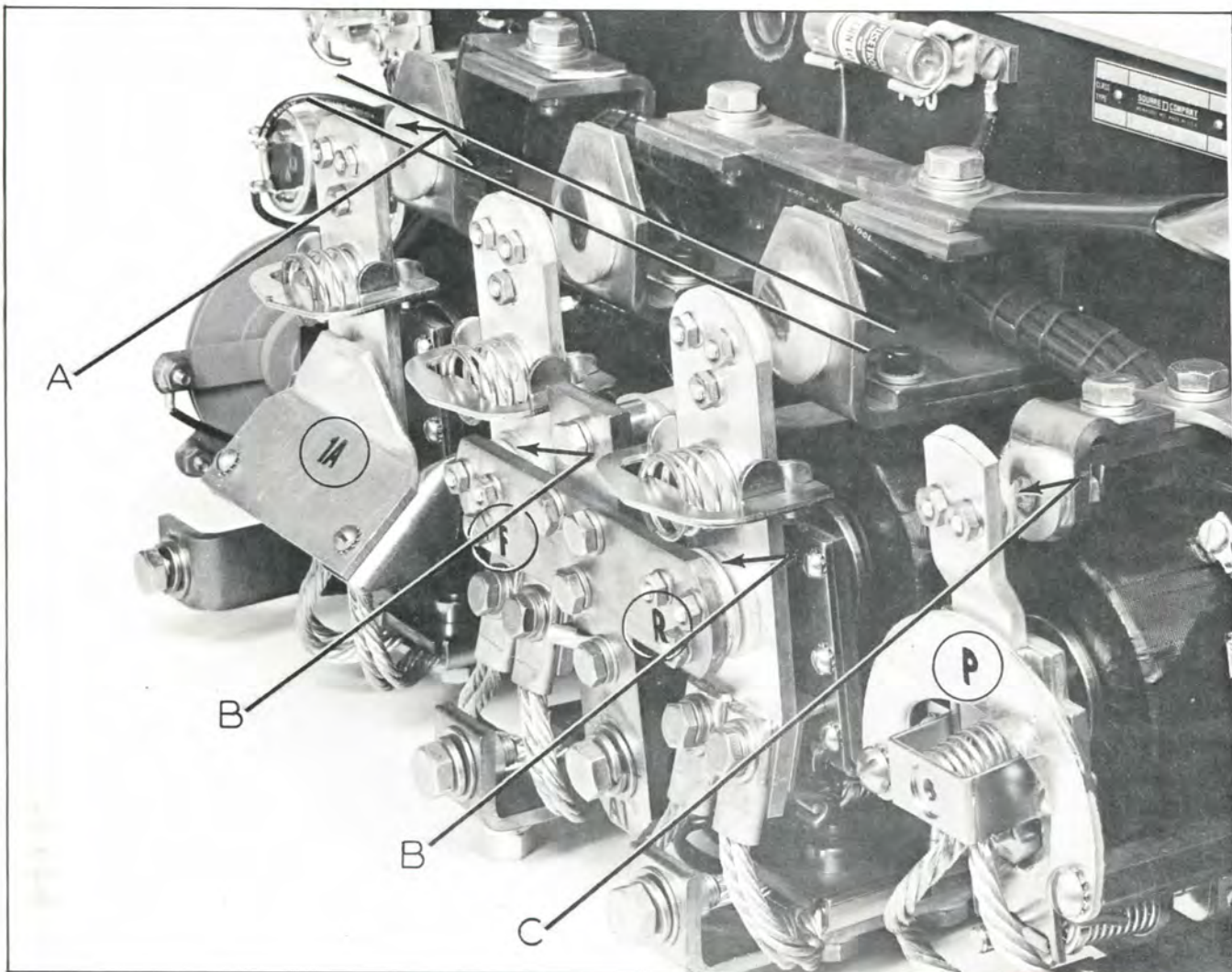


Plate 7552. Contactor Adjustments

FORWARD, REVERSE AND "A-1" CONTACTORS

1. *A. Normally open contact gap - $7/16 \pm 1/16$
2. *B. Normally closed contact gap - $3/16 \pm 1/16$
(with contactor actuated.)
3. A. Normally open contact pressure 3 lbs.
4. B. Normally closed contact pressure 2 1/2 to 3 lbs.
5. Electrical interlock adjustment: With armature open, .010 minimum clearance between operating button and operating lever (refer to next page).
6. Contactor tip fastening nut tightening torque: 20 to 24 lbs. inches.

PUMP CONTACTOR

1. *C. Normally open contact gap - $23/64 \pm 1/16$
2. Normally open contact pressure 2 lbs.
3. Contactor tip fastening nut tightening torque: 20 to 24 lbs. inches.

* With new contact tips.

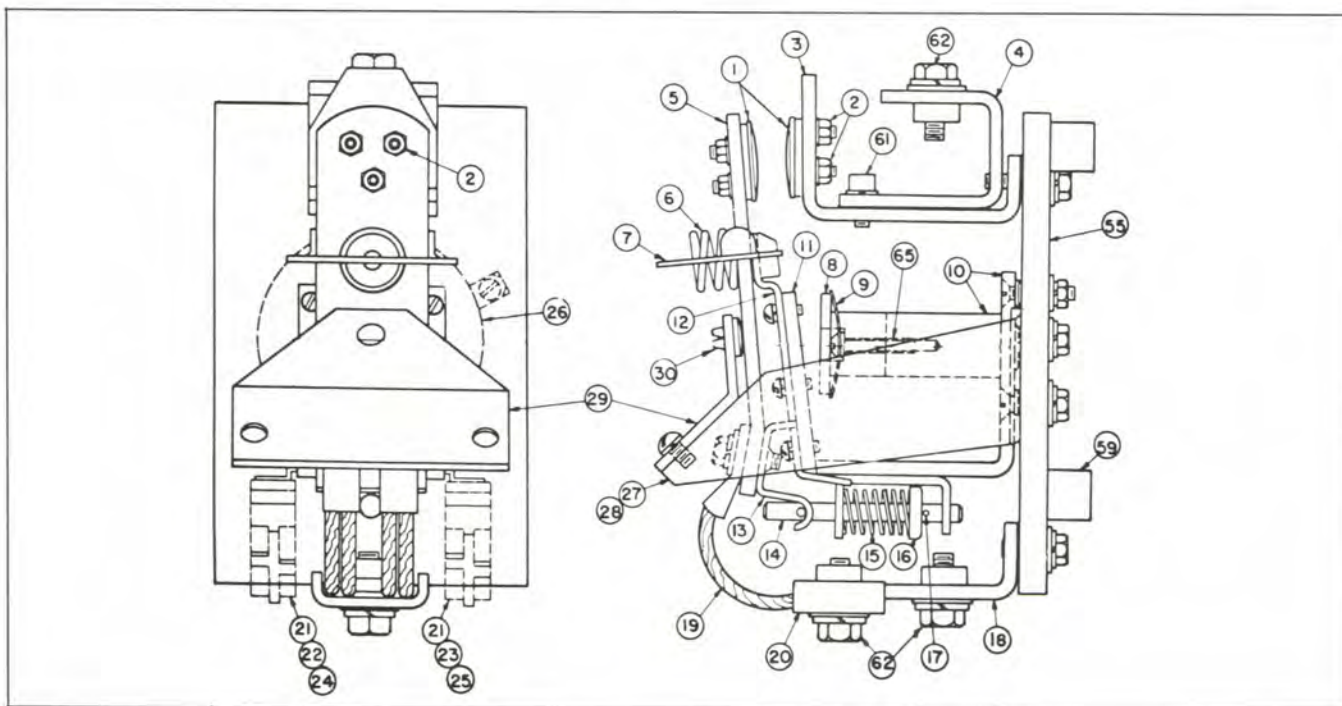


Plate 7553. Single Pole Normally Open Contactor.

CONTACTORS

1. Darkening of contacts does not indicate burning, this darkening is normal. Burning is judged by actual loss of contact material or droplets of molten contact material being displaced. The contact itself may be used until the contact material has been almost completely worn away; however, it is sometimes advisable to replace tips when, in the opinion of the maintenance department, there is not enough tip material remaining to last until the next regular maintenance check. The silver alloy portion of the tip is usable contact material. The remainder is unusable copper backing that serves to anchor the mounting studs.

2. Contacts should not be filed for the purpose of removing discoloration of minor surface irregularities. Such action wastes contact material and introduces a contact surface which is susceptible to sticking. A discolored appearance is normal in the proper operation of the contact. Occasionally, on dc service, a cone and crater may develop. To insure continuous service of such contacts, remove the cone only with a file — do not use sandpaper or emery cloth — but avoid any further filing.

3. When replacing the contact tips, the special combination nut and conical lock

washer must be used to fasten the tip of the finger. The recommended tightening torque is 20-24 lb. inches.

4. When replacing contact fingers, do not remove silver plating from the aluminum contact finger. If plated surface under tip is damaged, a new finger must be used. Do not file or sandpaper this area.

5. Contact finger springs should be replaced when tips are changed. With armature sealed, contact tip pressure should be approximately 3 lbs. or more on normally open tips. Normally closed tips should have a contact pressure of 2 1/2 - 3 lbs.

6. With new tips, the contact gap at the center of the tips should be 7/16 inches plus or minus 1/16 inch for normally open contacts and 3/16 inches plus or minus 1/16 inch for normally closed contacts. Minimum contact follow-up is .078 inch as measured between the contact finger and the top of the armature lever, with armature sealed to magnet core. If follow-up is below minimum value (with new tips), bend top end of armature slightly (at offset form) to obtain .078 inch minimum to .098 inch maximum follow-up.

WITH ARMATURE OPEN, .010
MIN. CLEARANCE BETWEEN
OPERATING BUTTON & INT. OPER.

WITH ARMATURE SEALED INT. OPER
TO PROVIDE .025 MIN. OVERTRAVEL
PAST TRIP POINT. MAX. OVERTRAVEL
MUST NOT ALLOW SNAP SWITCH OPER.
BUTTON TO BOTTOM
BEND LEVER
TO ADJUST

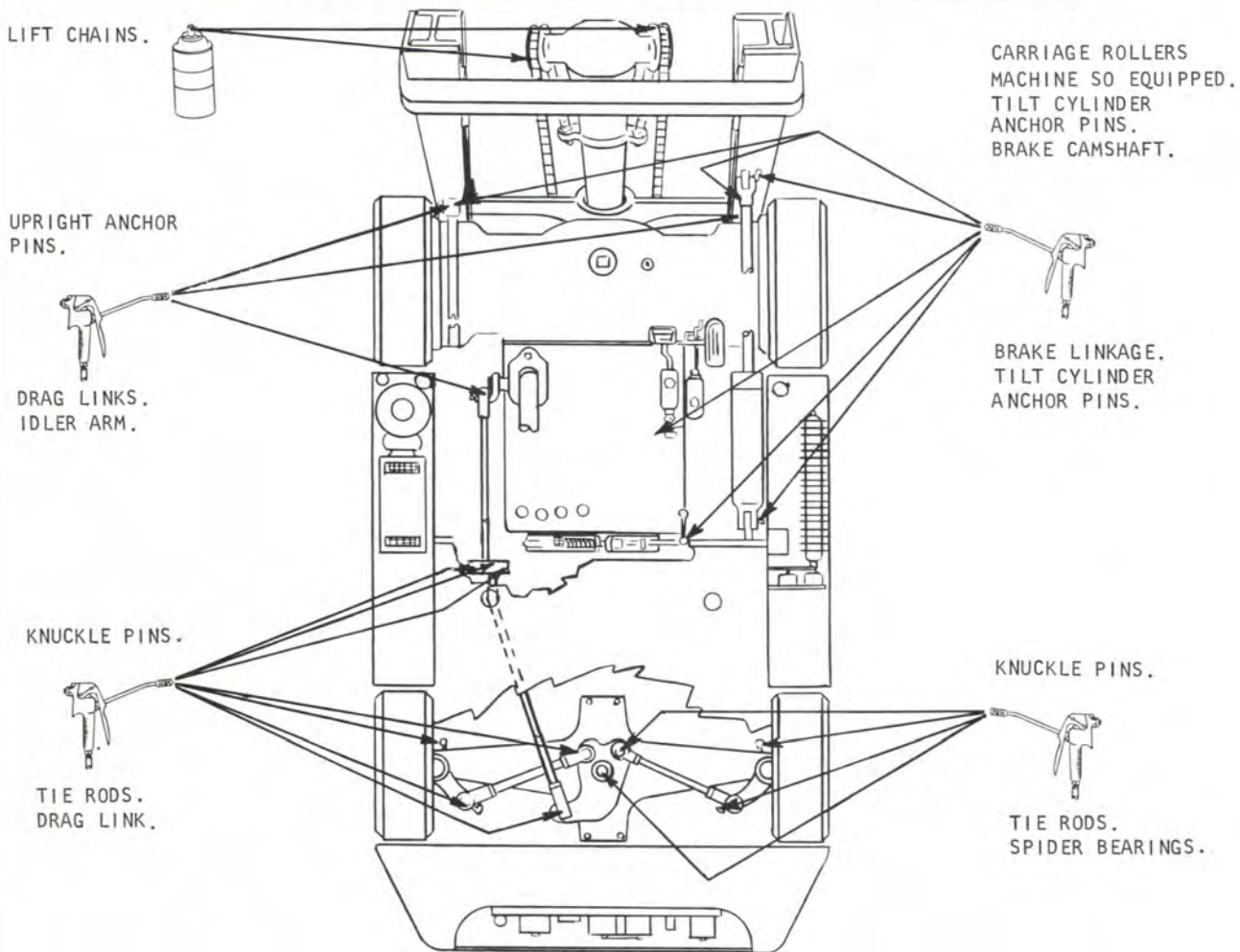
USE THESE (2) HOLES
FOR INTLK. MTG.

R.H. INTLK. & OPERATOR
ASS'Y AS SHOWN.
L.H. OPPOSITE











Plate 7554. Switchette Adjustment

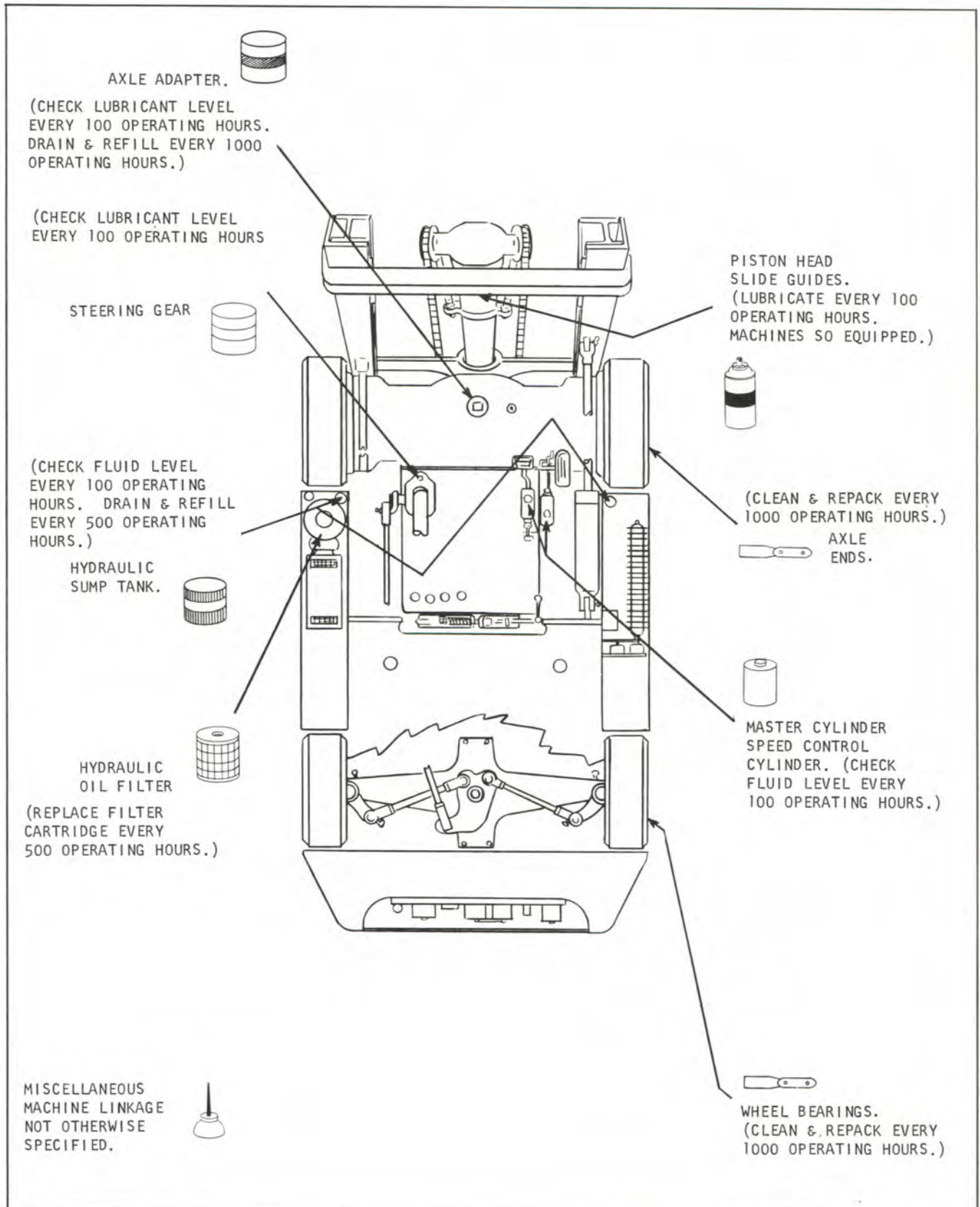
100
100
100

NOTE: WIPE ALL DIRT FROM FITTINGS BEFORE APPLYING A GREASE GUN.



Lubrication Chart Key

- | | | | |
|--|---|---|--|
| NLGI #2 (Amolith grease EP #2 or its equivalent) |  |  | 886399 CHAIN LUBE |
| ENGINE OIL: S.A.E. 20 |  |  | REFER TO PAGES 100H 073 AND 1000H 1303 |
| NLGI #1 (Amolith grease EP #1 or its equivalent) |  |  | SLIDING TANDEM LUBE CLARK NUMBER 886396. |
| OIL FILTER CARTRIDGE KIT |  |  | NLGI #1 (Amolith grease EP #1 or its equivalent) |
| 1800200 HYDRAULIC BRAKE FLUID HEAVY DUTY S.A.E. 70R3 |  |  | HYDRAULIC FLUID - CLARK SPEC. MS-68 885385 |



500 HOURS

NUTS BOLTS & CAPSCREWS.
CHECK SECURITY OF MOUNTING,
TIGHTEN AS REQUIRED.

HYDRAULIC SUMP
FILTER ELEMENT
CHANGE

HYDRAULIC SUMP
TANK DRAIN &
REFILL

STEERING AXLE
& LINKAGE ADJUST

STEERING GEAR
CHECK-ADJUST

NOTE

AFTER EACH 500 HOURS OF OPERATION, PERFORM THE ABOVE SERVICES IN ADDITION TO THE ONES LISTED ON THE 8 HOUR AND 100 HOUR LUBRICATION AND PREVENTIVE MAINTENANCE ILLUSTRATIONS.

Plate 7555. Lubrication and Preventive Maintenance Illustration

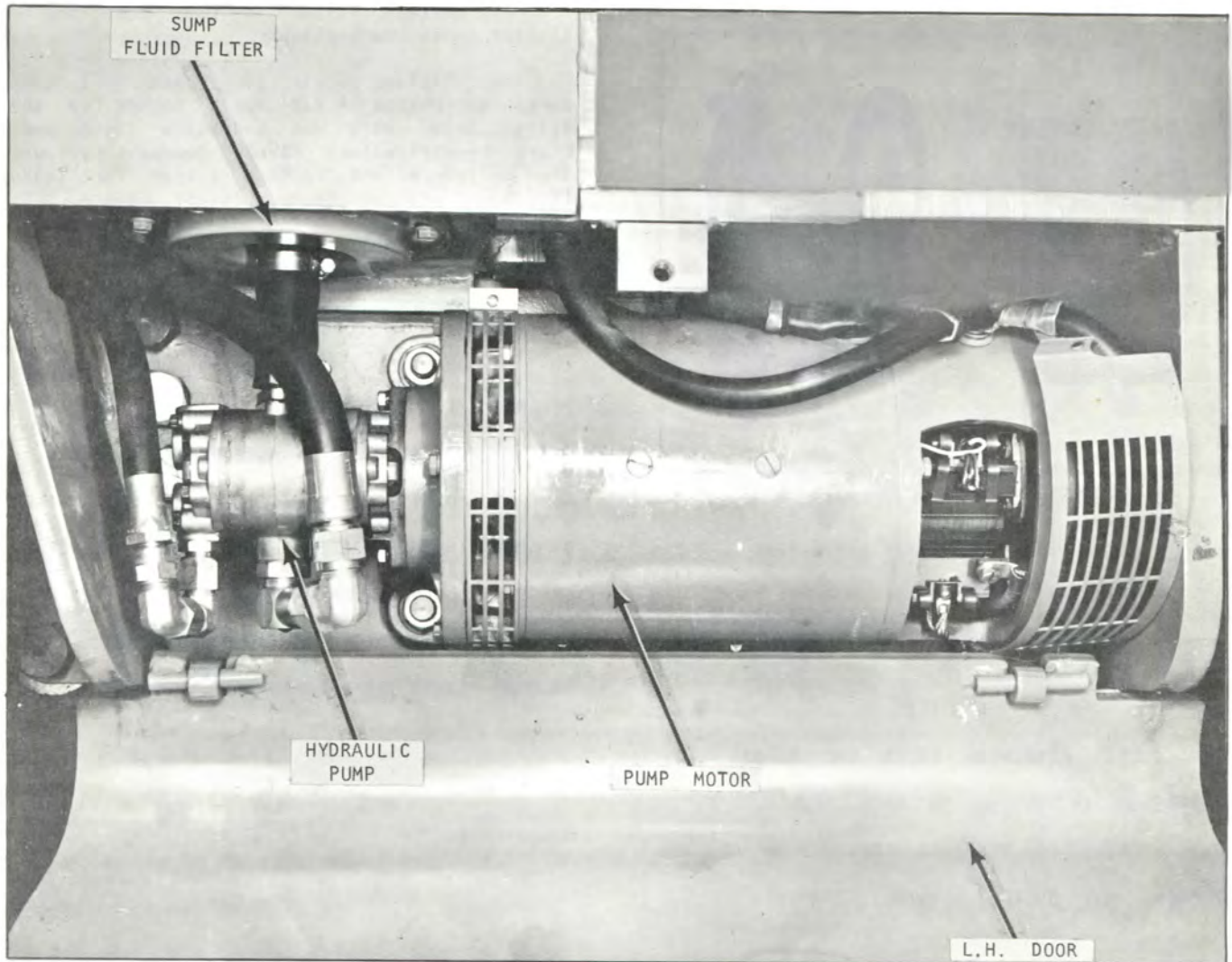


Plate 7556. Sump Tank, Filter and Pump

DRAIN SUMP TANK AND CHANGE HYDRAULIC FILTER ELEMENT

1. Lower upright. Turn power switch to off position.

2. Open both L.H. and R.H. frame doors to allow access to the sump tank drain plugs and hydraulic filter.

3. Remove sump fill plug from L.H. tank and sump breather from R.H. tank. Using a hose attached to a funnel, place unattached end of hose in a large container.

Remove drain plugs and allow tanks to thoroughly drain.

4. Flush each tank with about two quarts of clean hydraulic fluid.

CAUTION

DO NOT OPERATE HYDRAULIC PUMP WHILE SUMP TANK IS EMPTY AS DAMAGE TO HYDRAULIC PUMP WILL RESULT.

5. Disconnect hose and remove hydraulic filter retaining bolts.

6. Pull filter assembly out of sump tank and remove any remaining gasket material from mounting flanges.

7. Clean out any residue left in the sump cavity.

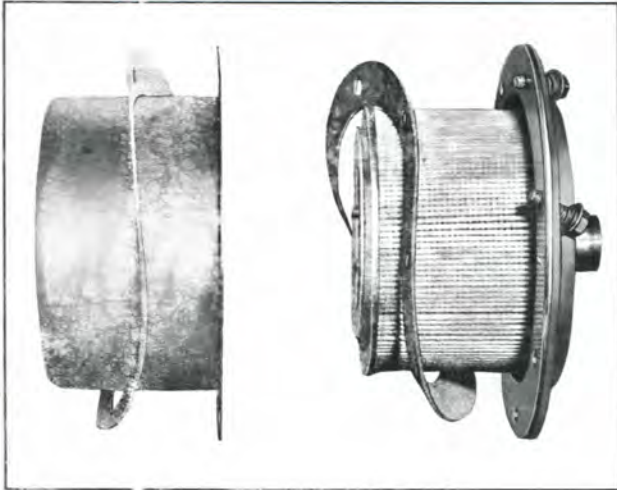


Plate S274. Hydraulic Oil Filter

8. Install new filter element and gaskets to the filter housing and secure housing to the sump tank with the attaching capscrews.

N O T E

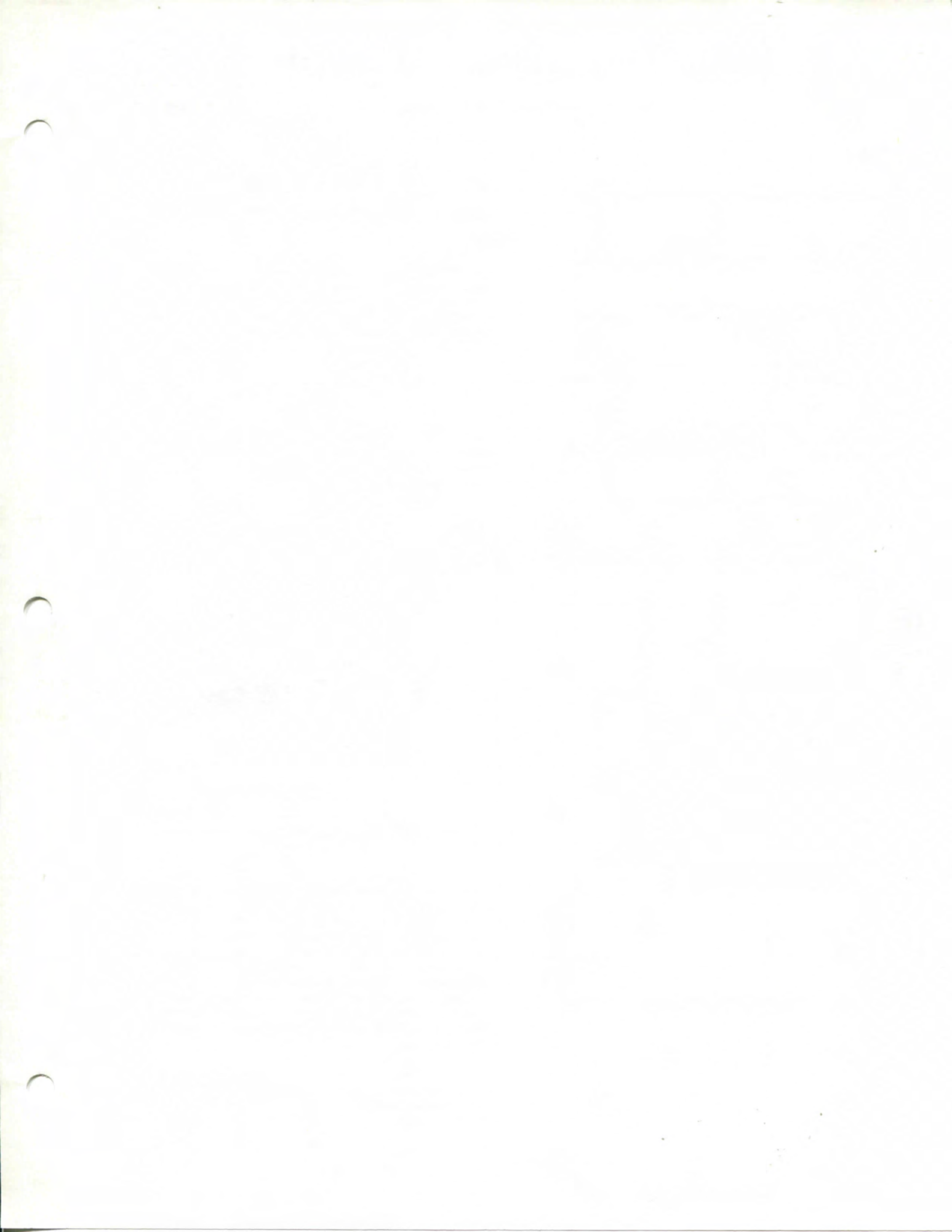
THE FILTER ATTACHING BOLTS SHOULD BE TIGHTENED TO 40 to 50 INCH POUNDS. IF THIS TORQUE IS EXCEEDED, DISTORTION OF THE HOUSING MAY OCCUR, CAUSING LEAKAGE.

9. Install filter to pump hose and tighten hose connections.

10. Replace drain plugs and fill sump tanks to within 1 1/2 to 2 inches of the filler hole. Only use hydraulic fluid per Clark Specifications MS-68. Operate hydraulic cylinders and recheck system for leaks. If there are no leaks present, close both the access frame doors and secure with fasteners provided. Replace fill plug and sump breather to their correct locations.

C A U T I O N

THE HYDRAULIC SYSTEM MUST BE KEPT CLEAN. IT MAY BE NECESSARY TO DRAIN, CLEAN AND REFILL THE SUMP TANK MORE OFTEN UNDER ADVERSE CONDITIONS. THIS IS BEST DETERMINED BY CHECKING HYDRAULIC FLUID FOR EVIDENCE OF DIRT, SLUDGE OR ANY FOREIGN MATTER AT PERIODIC INTERVALS. IF SUMP BREATHER BECOMES DIRTY REPLACEMENT IS NECESSARY.



STEERING GEAR

Steering gear adjustments must be made in the following manner (see Plates 6636 and 6637).

Always check worm bearing thrust adjustment, and adjust if necessary, before making sector gear lash adjustment.

Before making above adjustments, the following preliminary operations are necessary.

1. Disconnect steering drag link from pitman arm. Note relative position of drag link parts when disconnecting link so the parts may be re-assembled correctly.
2. Check lubricant level in steering gear housing. If low, add enough lubricant to bring level up to filler plug hole. (Use NLGI #1 Amolith grease EP #1 or its equivalent).
3. Tighten steering gear housing to frame side member bolts, see Plate 6636.
4. Determine straight-ahead position of steering mechanism by turning steering wheel to extreme right.



Plate 6636. Steering Gear Thrust Adjustment (Worm Bearings)

C A U T I O N

APPROACH EXTREME ENDS CAUTIOUSLY; WORM BALL NUT MUST NOT STRIKE ENDS WITH ANY DEGREE OF FORCE.

Then turn to extreme left, counting the exact number of turns from right to left end. Turn wheel back one-half number of wheel turns. Mark wheel with respect to steering column so center position may readily be found during adjustment procedures.

Worm Bearing THRUST Adjustment: Refer to Plate 6636 and proceed as follows:

1. Check tightness of cover bolts, see Plate 6636. Loosen lock nut and turn lash adjuster screw (Plate 6637) counterclockwise a few turns to provide clearance between sector gear and worm ball nut.

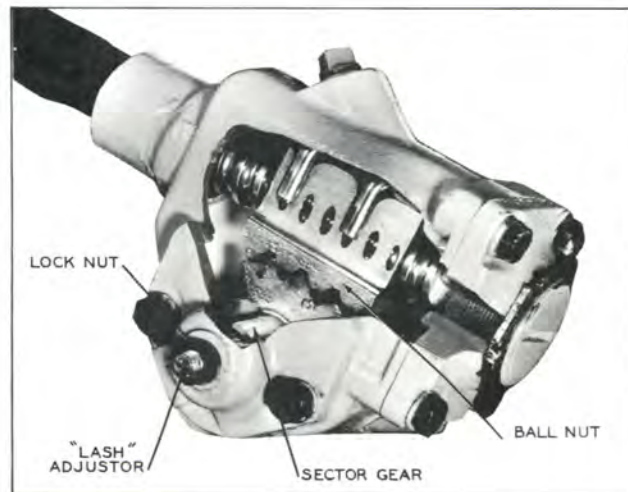


Plate 6637. Steering Gear Lash Adjustment (Sector Gear)

2. Turn steering wheel GENTLY to one extreme end. Turn wheel back one full turn. With spring scale on spoke of wheel, measure pull required to KEEP WHEEL MOVING. Pull on scale should be made at right angles to wheel spoke. If pull is within 1 1/2 to 2 pounds, proceed to lash adjustment in the following paragraphs. If pull is not within 1 1/2 to 2 pounds, adjust worm bearings. The pitman shaft adjustment must be made if worm bearing check is accomplished, or if the worm bearings are adjusted.

3. If it is necessary to adjust the worm bearings, loosen lock nut and then turn worm bearing adjuster nut clockwise until all end play is removed, see Plate 6636. Using



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

spring scale, as directed in Step 2, check pull and readjust as necessary; then tighten lock nut securely.

Sector Gear Lash Adjustment: Refer to Plate 6637 and proceed as follows:

1. Steering Gear Mechanism must be in straight ahead position as previously explained.
2. Turn lash adjuster screw clockwise to remove all lash between gear teeth. Tighten adjuster screw lock nut. Position spring scale on steering wheel so pull may be made at right angles to wheel spoke.
3. Measure pull while wheel is TURNED THROUGH CENTER POSITION. Readjust if reading is not within 2 1/2 to 3 pounds.
4. Tighten adjuster screw lock nut, check pull again.
5. After adjustments are made, install drag link on pitman arm.

N O T E

If steering linkage adjustment is necessary do not install drag link to pitman arm.

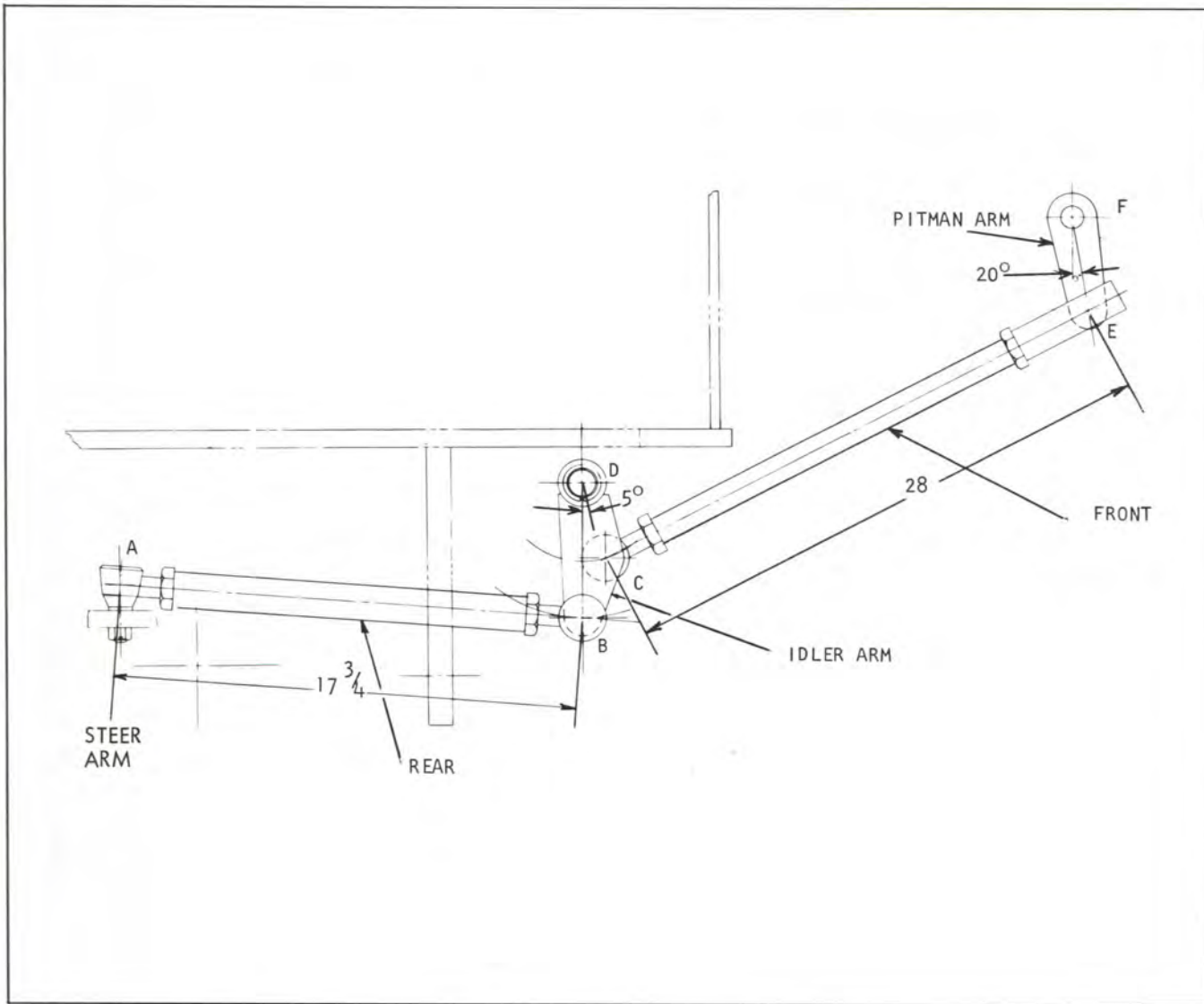


Plate 7569. Typical Steering Linkage (Side View)

Steer Gear (Manual Steering)

1. Center to R.H. turn, without drag link attached, takes 3.30 turns of hand wheel.
2. Center to L.H. turn, without drag link attached, takes 3.27 turns of hand wheel.
3. Total number of turns of hand wheel from full cramp to full cramp with the drag link attached is 6 turns.
4. Steer effort or hand wheel rim pull: (steer wheels on ground)

EC50, 47# + or - 10%
 EC60, 55# + or - 10%
 EC70, 65# + or - 10%

Linkage Adjustment Specifications

Steer Gear Overtravel (Manual Steering)

Over travel of hand wheel should be a minimum of 90° beyond the steer axle stops for both clockwise and counterclockwise rotation.

Steer Axle (Manual and Power Steering)

1. Turn angle of inside wheel: 76.5°
2. Turn angle of outside wheel: 54°15'
3. For linkage adjustment, refer to the following page.



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

STEERING AXLE AND LINKAGE ADJUSTMENTS

1. Raise the steering wheels far enough to clear the floor and allow accessibility to the Idler Arm, see Plate 7569.

WARNING

AFTER RAISING MACHINE AND BEFORE MAKING ANY ADJUSTMENTS OR ADJUSTMENT CHECKS, PLACE ADEQUATE (HEAVY) BLOCKING (SUFFICIENT TO SUPPORT THE WEIGHT OF THE MACHINE) UNDER THE FRAME TO PREVENT ACCIDENTAL LOWERING OR FALLING OF THE VEHICLE, THUS PREVENTING PERSONAL INJURY TO MECHANIC OR BYSTANDERS.

2. The steering wheels should be parallel with the sides of the truck so that the steer axle spider is centered and so that the tires track square with the drive wheels with no toe-in or toe-out.

If adjustment is necessary, loosen the lock nuts at the tie rod ends and turn each tie rod in a manner so they will be the same length when the correct adjustment is obtained. Tighten tie rod lock nuts to secure this adjustment.

3. Rear drag link should be adjusted so that centerline between points "B" & "D" is approximately 5° from vertical centerline as shown in the illustration on the preceding page.

If adjustment is necessary, loosen the lock nuts at the drag link rod ends and turn drag link until the correct adjustment is obtained. Tighten drag link lock nuts to secure this adjustment.

4. Center steer hand wheel (steer gear) between full right and full left cramp. Refer to "Steering Gear Adjustments" listed on the preceding pages for correct procedure. (Do not install front drag link until later.)

5. Pitman arm should be adjusted so that centerline between Points "E" & "F" is approximately 20° from vertical in direction shown in the preceding illustration. (This rotates Pitman arm two serrations towards front of truck.)

If adjustment is necessary, remove and re-install Pitman arm to obtain the previously listed adjustment. Tighten Pitman arm nut to the torque listed in Specifications in front of this manual.

6. Check steer wheels for correct turning geometry by turning the wheels all the way to the left — this should allow the right steer wheel to attain an angle of $54\frac{1}{4}^{\circ}$ to the frame.

If adjustment is necessary, the axle stops on the right hand side of the axle are turned "in" or "out", whichever is necessary to achieve the correct angle. Repeat this procedure with the left wheel.

7. Turn steer wheels to the straight ahead position.

8. Loosen lock nut on front drag link and adjust rod end as necessary allowing front drag link to be attached to the Pitman arm without moving any of the previously adjusted components "out" of adjustment. Tighten lock nut.

9. Remove steer (hand) wheel and replace on steering column with the center spoke aligned + or - 10° with the center line of the machine — the center spoke pointing back.

NOTE

CHECK STEERING GEAR SUPPORT BOLTS FOR SECURITY OF MOUNTING. TIGHTEN MOUNTING BOLTS AND CLAMP BOLTS TO 90 FOOT POUNDS TORQUE.

10. If interferences are encountered during steer linkage travel between full right to full left turn, linkage is misadjusted — repeat Steps 2 thru 8 until correct adjustments are obtained. Repeat Step 9 if necessary, after completing Steps 2 thru 8.

11. Remove blocking from under machine frame and lower vehicle to the floor.

NOTE

IF NEW COMPONENTS WERE INSTALLED FOR ANY REASON, BE SURE TO PROPERLY LUBRICATE AS INSTRUCTED IN THE LUBRICATION CHART ON PAGE 100H 773.



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

STEERING AXLE AND LINKAGE ADJUSTMENTS (VEHICLES EQUIPPED WITH POWER STEERING)

Specifications

1. Center to R.H. turn, without drag link attached, takes 2.7 turns of hand wheel.
2. Center to L.H. turn, without drag link attached, takes 2.76 turns of hand wheel.
3. Total number of turns of hand wheel from full cramp to full cramp with the drag link attached is 5 turns.
4. Steer effort or hand wheel rim pu.. (steer wheels on the ground): 3/4 to 1 1/2 lbs.

+++++

+ Refer to preceding page [500H 303] and follow the +
 + procedure outlined for manual steering, then con- +
 + tinue with paragraph below for adjusting the power +
 + steering cylinder. +

+++++

Vehicles Equipped with Power Steering

Refer to Plate 7569 on page 500H 302. As you will note the rear drag link is connected to the spider steer arm (at item "A") of the steer axle. The rod end of the steer cylinder is connected to another arm on the spider assembly, while the base end or anchor end of the steer cylinder is attached to the vehicle frame.

With cylinder in retracted position, measure the distance between center line of rod end to center line at anchor end (center line of retainer pin that anchors the steer cylinder to the vehicle frame). This distance should be 18 1/16 inches.

[This adjustment will provide approximately 3/16 inches between the end of the piston and the end of the cylinder case, preventing the steer cylinder from bottoming out when turning in either direction.]

If the distance is incorrect, rotate rod end until specified distance is obtained. Tighten clamp bolt nut to 30 - 40 lbs. torque.

[Unless the steer cylinder is disconnected, removed for repair or replacement, adjustment should not be necessary after original factory installation.]

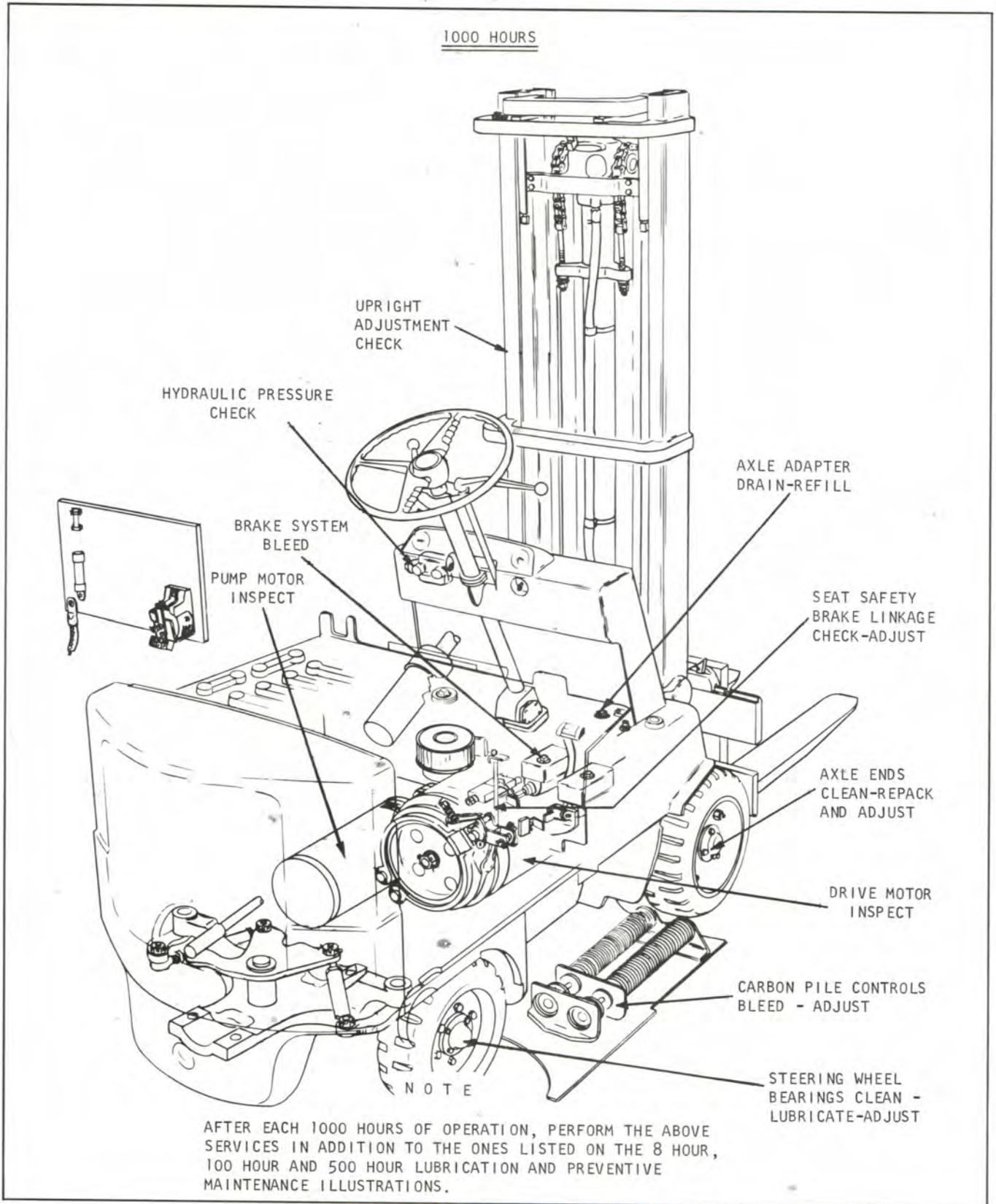


Plate 7557. Lubrication and Preventive Maintenance Illustration

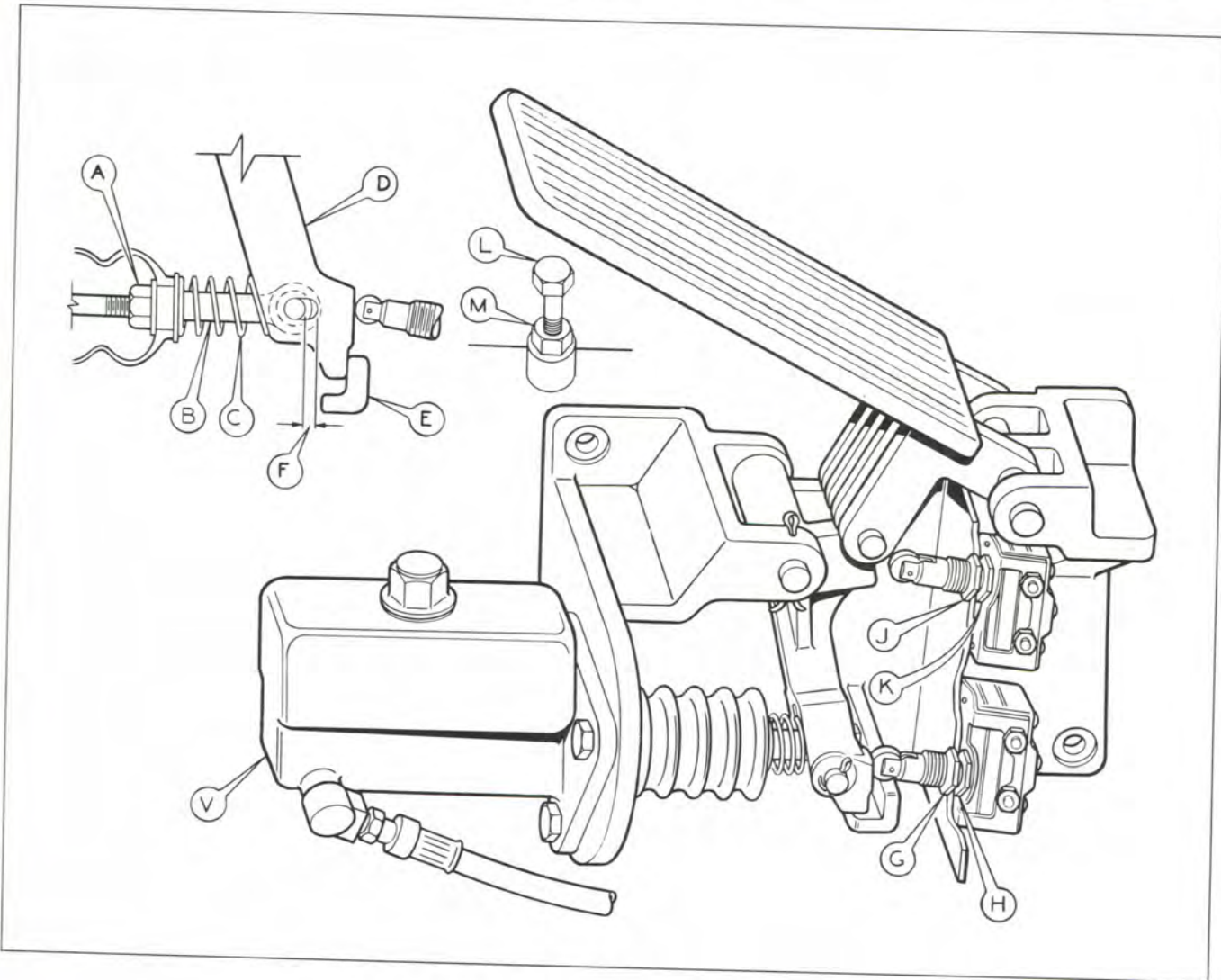


Plate 10138. Typical Accelerator Control

RECOMMENDED BLEEDING PROCEDURE

Attach pressure bleeder unit to control cylinder (Item V). Pressure bleeding unit is same as is used to bleed air from hydraulic brake system. Open valve on pressure unit hose to control cylinder. Open bleeder valve (Item W1). Allow air and oil to flow until oil is clear of air, shut off valve. Repeat this procedure with bleeder valve (Item W2, W3, W4 & W5). In numerical sequence. Shut off pressure unit. Remove excess pressure from hydraulic system by opening one bleeder valve. Allowing oil to flow until almost stopped.

CAUTION

TIGHTEN VALVE BEFORE OIL FLOW HAS COMPLETELY STOPPED. OTHERWISE AIR WILL BE DRAWN BACK

INTO SYSTEM.

Test System

If air is completely bled from system the pressure switch (Item X) will give an audible "click" when the control cylinder plunger is compressed approximately 3/4 inch. Repeat bleeding procedure until test conditions are met. Then remove pressure unit.

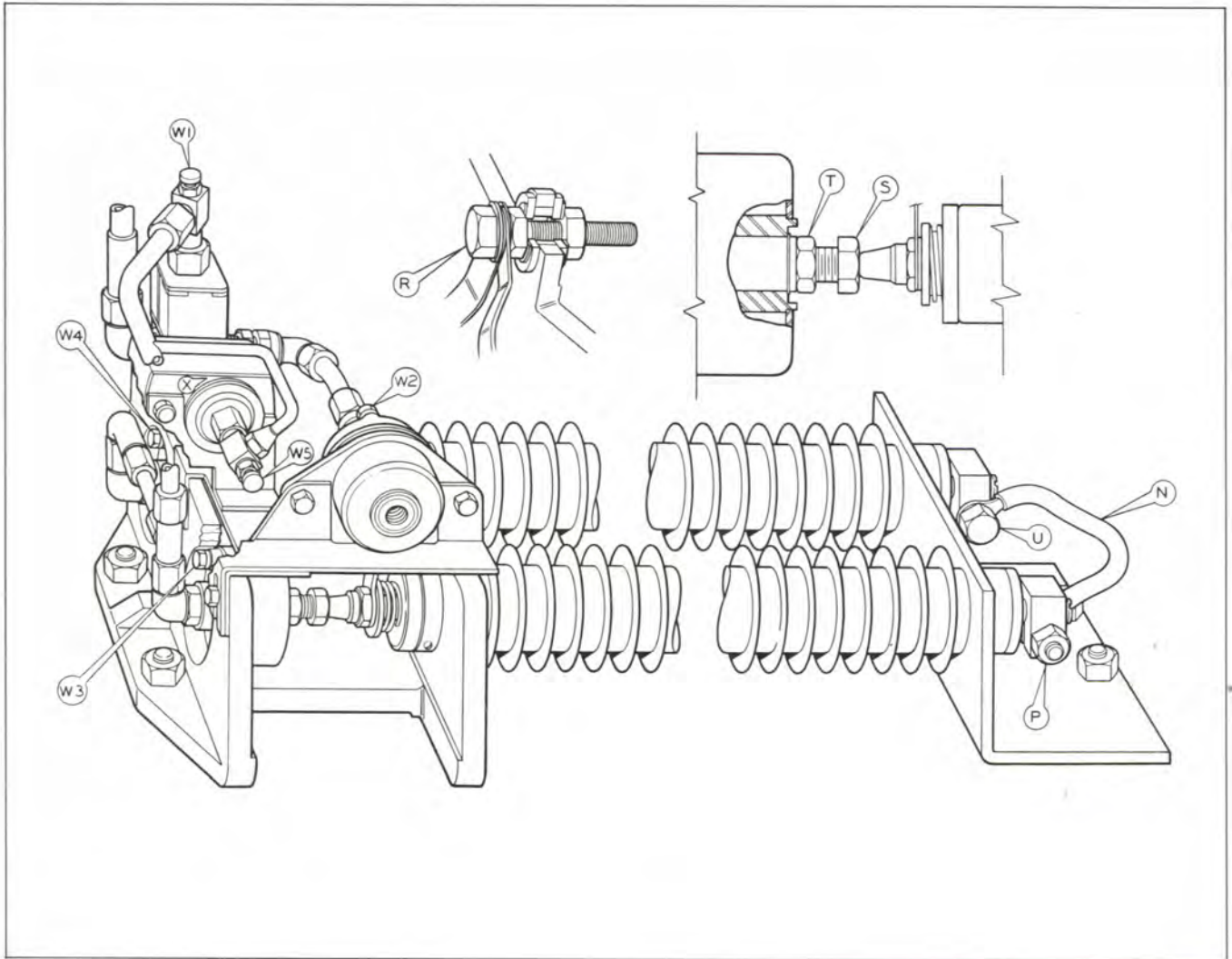


Plate 10139. Typical Carbon Pile Control

ALTERNATE BLEEDING PROCEDURE

Fill control cylinder (Item V) with heavy duty hyd. brake fluid (SAE Type 70 R3). Replace cap. Depress accelerator pedal and hold. Open bleeder valve (Item W1) allowing air and brake fluid to flow until almost stopped.

all air is removed from system. Test system as outlined under recommended bleeding procedure.

C A U T I O N

CLOSE BLEEDER VALVE WHILE OIL IS STILL FLOWING TO PREVENT AIR FROM BEING DRAWN BACK INTO SYSTEM.

Repeat this procedure with bleeder valve (Item W2) and then bleeder valve (Item W3 & W4). Wait about one minute between accelerator pedal strokes to allow control cylinder to refill itself. Repeat this bleeding procedure until

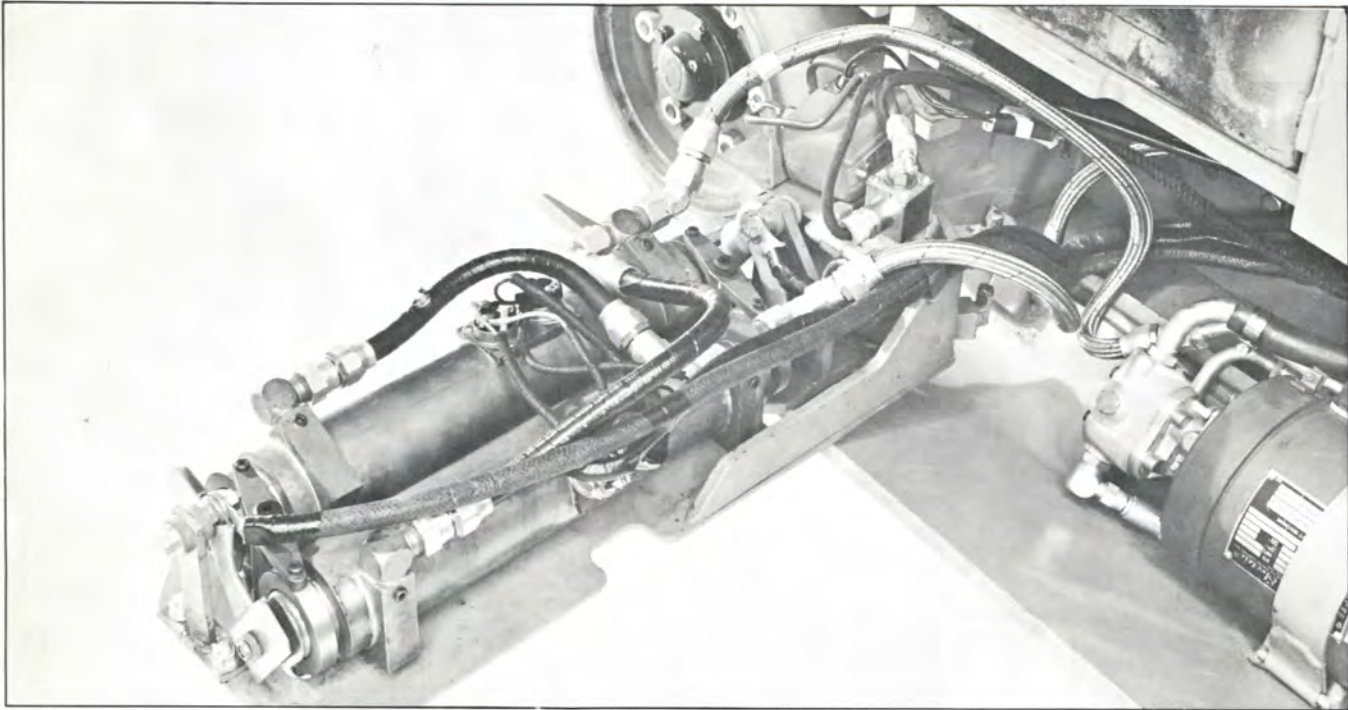


Plate 8672. Oil Cooled Carbon Pile Control Units

N O T E

REFER TO THE PRECEDING AND FOLLOWING PAGES FOR RECOMMENDED BLEEDING PROCEDURES.

Spark Enclosed -- Oil Cooled Carbon Pile Control Equipped Units.

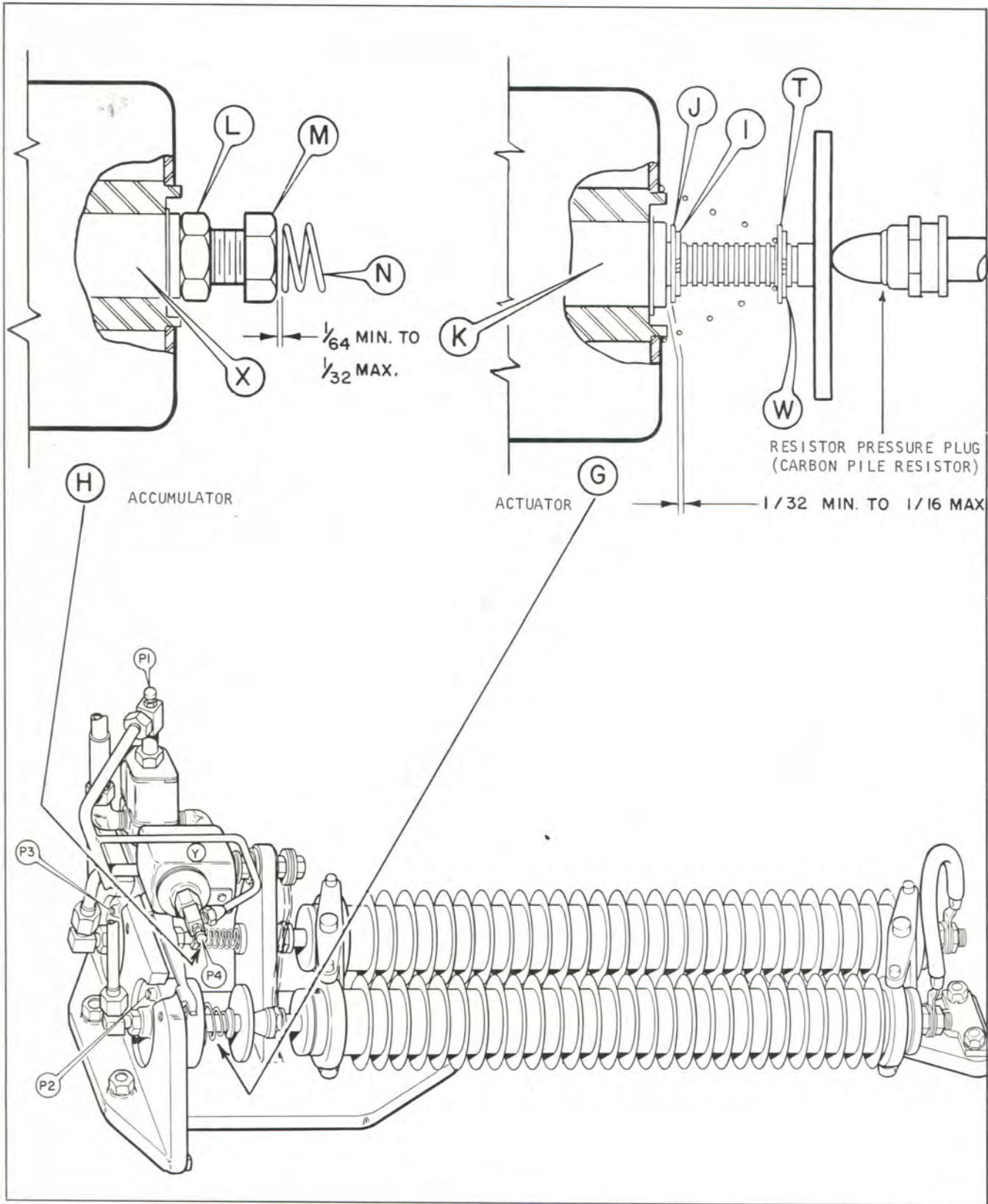


Plate 7560. Accumulator, Creep Speed and Actuator Adjustment

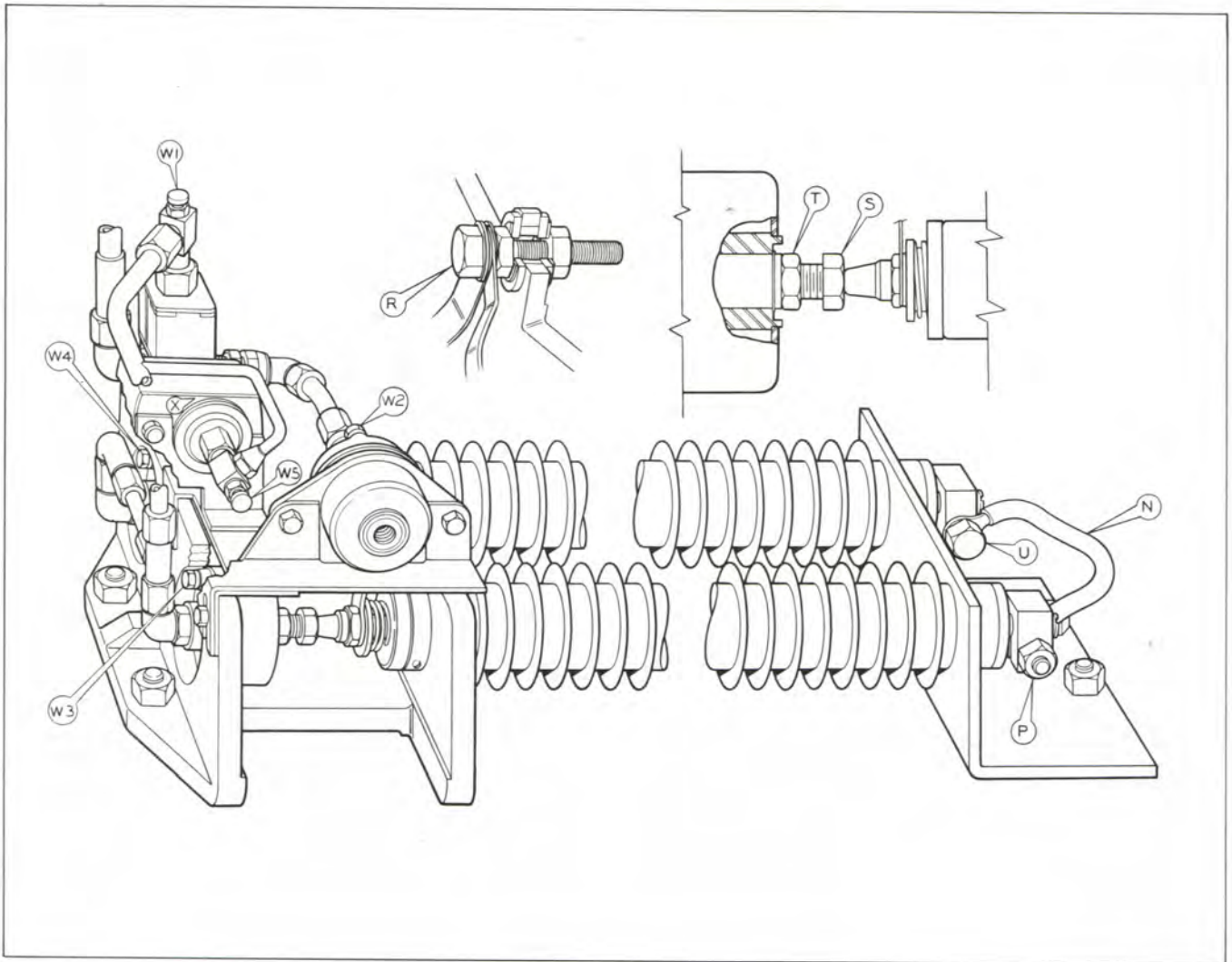


Plate 10139. Typical Carbon Pile Control

ACTUATOR PLUNGER & CREEP SPEED ADJUSTMENT

Remove jumper wire (Item N) between carbon pile resistors. With an ohmmeter set on the RX1 scale and connected across one resistor (at Items P & R), adjust the actuator bolt (Item S) so that a reading of 2 ohms is obtained. Tighten lock nut (Item T). Adjust second resistor in the same manner. Replace jumper wire (Item N).



Plate 7562. Typical Drive Motor Assembly

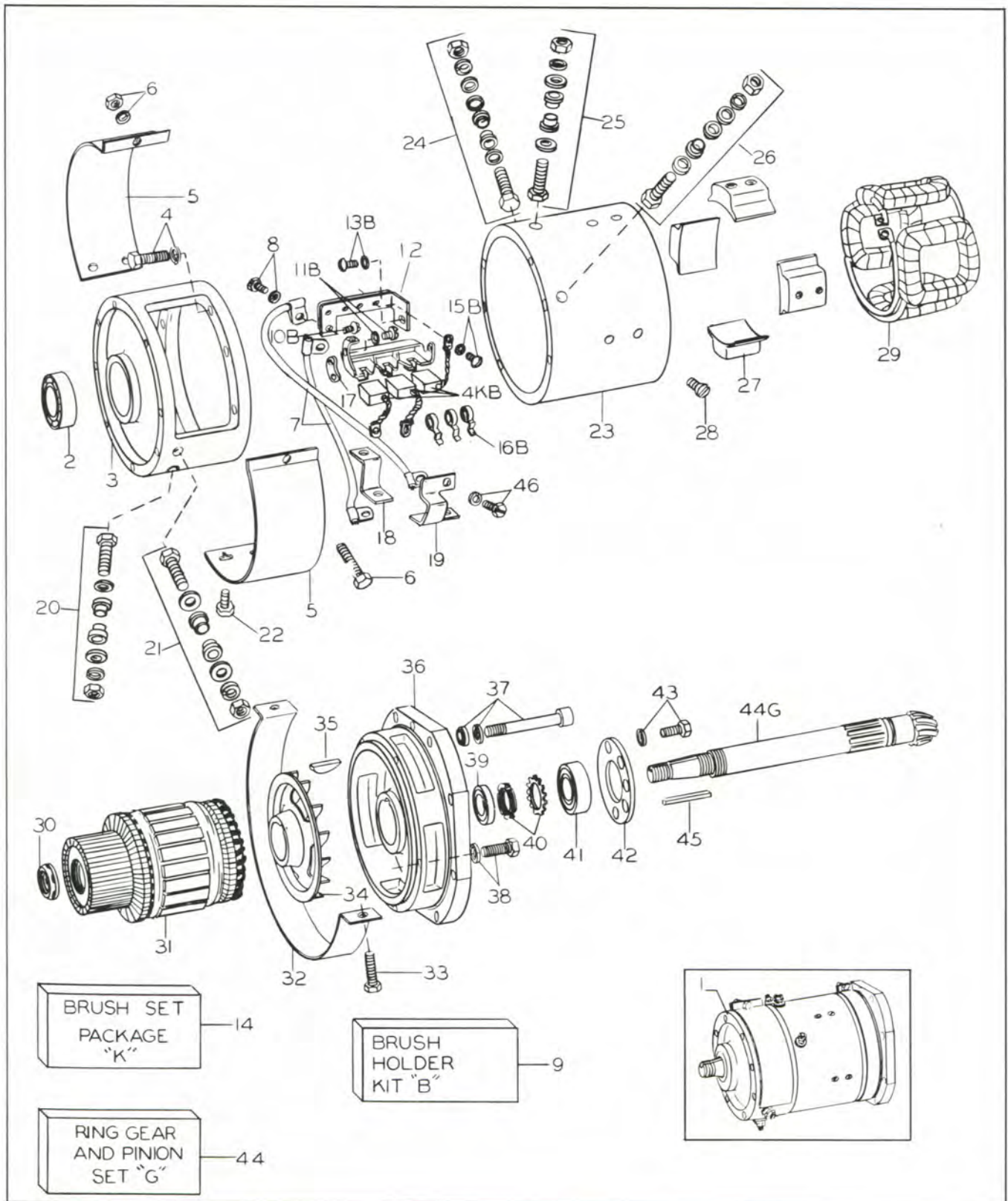


Plate 7565. Typical Drive Motor (Disassembled View)

MOTOR INSPECTION AND CHECKS

Wiring: Inspect all connecting wires to be sure they are secure. Insulation should not be worn or damaged.

Commutator: If commutator is glazed or dirty clean with a strip of No. 00 sandpaper. Blow out all dirt and grit with compressed air.

C A U T I O N

DO NOT USE EMERY CLOTH TO CLEAN COMMUTATOR.

Brushes: The brushes should slide freely in their holders and make full contact on the commutator. Worn brushes (worn beyond half the original length) should be replaced. Badly chipped, broken or oil soaked brushes should also be replaced. Brushes may be wiped with a dry clean cloth to remove loose particles of dirt.

N O T E

DO NOT CLEAN THE BRUSHES IN ANY KIND OF SOLVENT OR ALLOW THEM TO COME IN CONTACT WITH GREASE OR OIL.

Check brush spring tension with a spring scale. To check reaction type brush springs, hook the scale under the brush spring near the brush and pull on a line parallel with the side of the brush. Take the reading just as the spring leaves the brush. To assist in telling the exact instant that the pressure is relieved, a small strip of paper can be placed under the brush. Pull slightly on the paper and the paper will slip out at the correct instant for reading the spring scale.

If the brush spring tension is too great, the commutator and brushes will wear excessively and result in short life. If the brush spring tension is too low, there will be a loss of efficiency due to poor brush contact.

To change brush spring tension, twist the spring at the holder with long nose pliers.

C A U T I O N

DO NOT ALLOW SPRING TO SNAP DOWN ON A BRUSH.

Refer to Specifications for correct brush spring tension.



Plate 6560. Typical Method Checking Brush Spring Tension

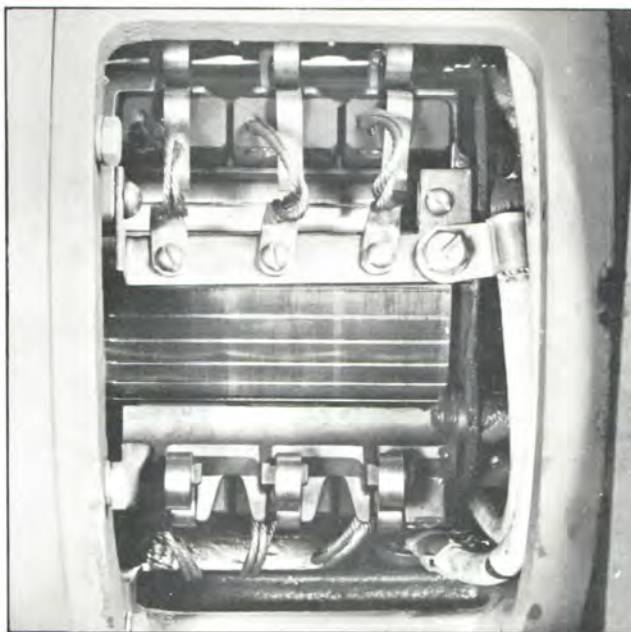


Plate 7564. Typical Motor Brushes

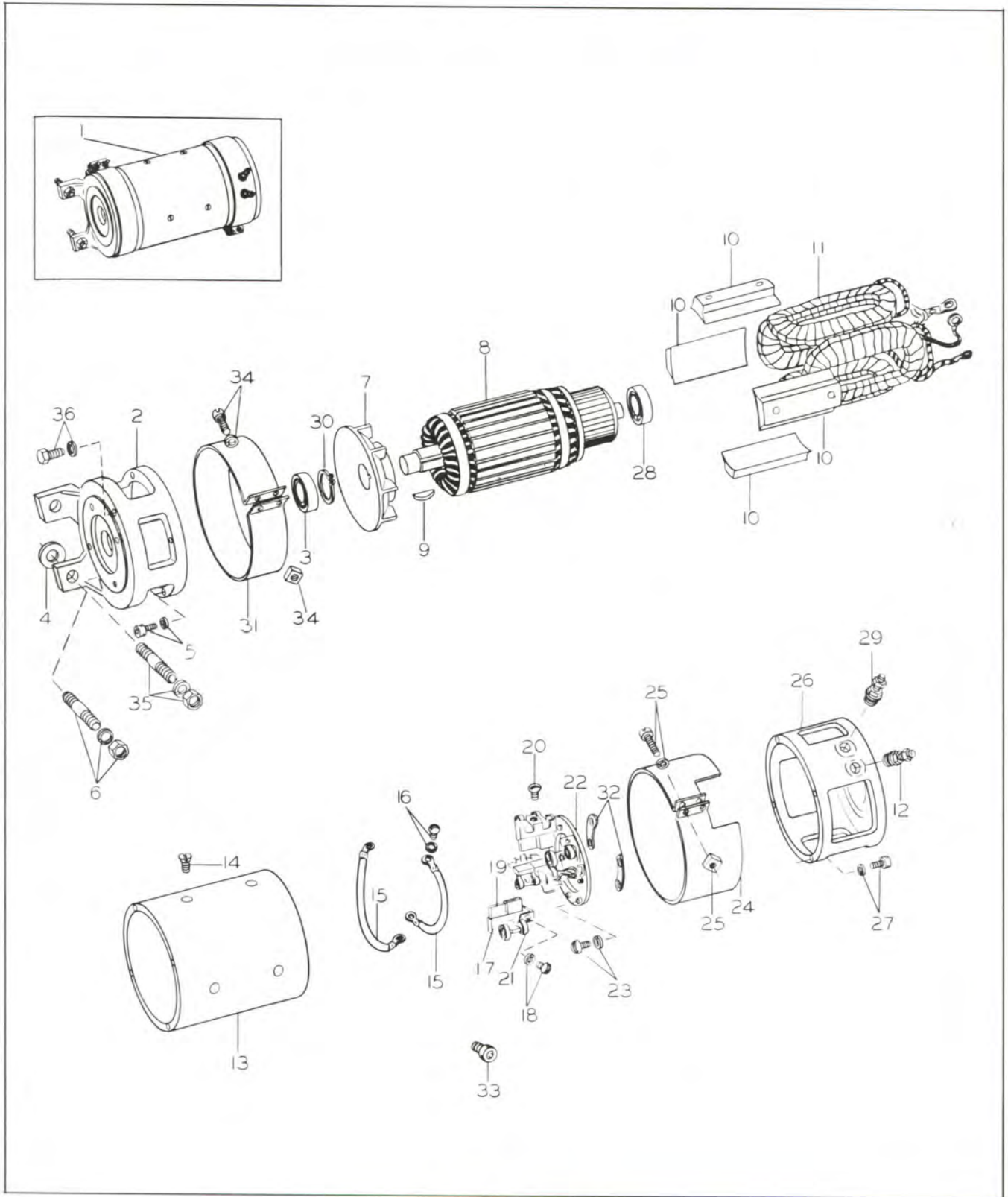


Plate 7563. Typical Pump Drive Motor
(Refer to preceding page 1000H 673 for Inspection and Checks)

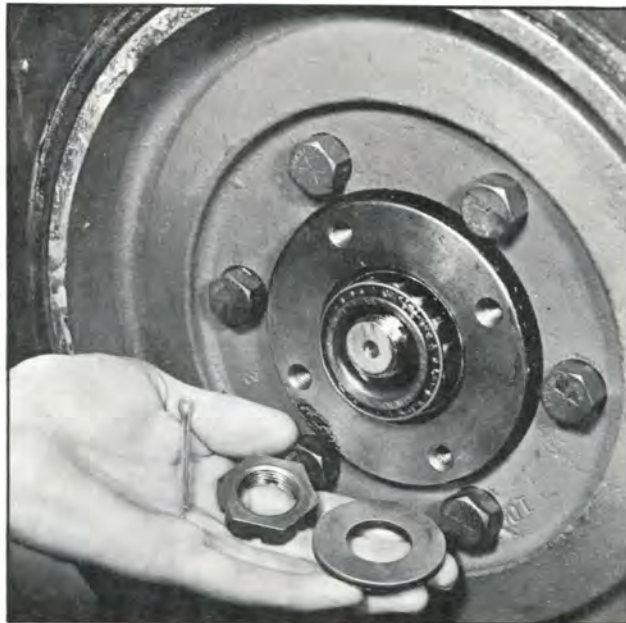


Plate 6640. Typical Wheel Bearings

STEERING WHEEL BEARINGS

Adjustment

1. Raise rear of machine so that tires clear floor.

x
 x
 x W A R N I N G x
 x
 x AFTER RAISING MACHINE AND BEFORE MAKING x
 x ANY ADJUSTMENTS OR ADJUSTMENT CHECKS, x
 x PLACE ADEQUATE (HEAVY) BLOCKING (SUFFI- x
 x CIENT TO SUPPORT THE WEIGHT OF THE x
 x MACHINE) UNDER THE FRAME TO PREVENT x
 x ACCIDENTAL LOWERING OR FALLING OF THE x
 x VEHICLE, THUS PREVENTING PERSONAL INJURY x
 x TO MECHANIC OR BYSTANDERS. x
 x
 x

2. Inspect adjustment of bearings by gripping top and bottom of tire, chuck tire "in" and "out" to determine looseness or wobble.

N O T E

Before making wheel bearing adjustments, be sure play (looseness or wobble) is in the wheel bearings and not in the king pins.

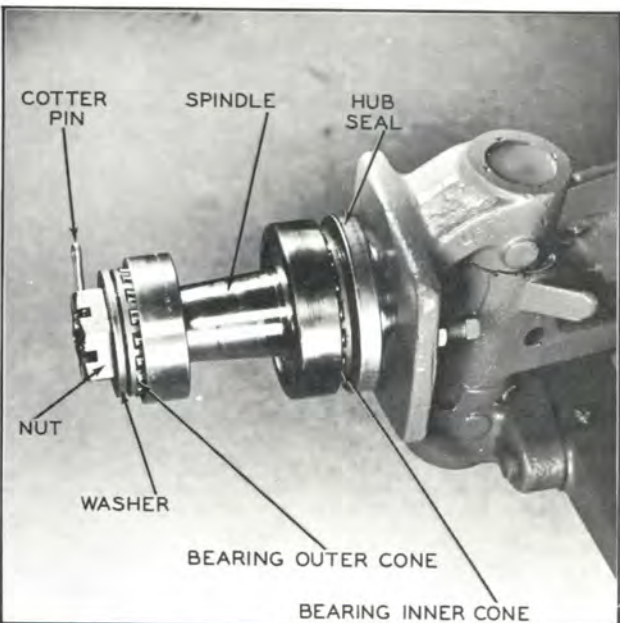


Plate 6703. Typical Wheel Bearings

N O T E

If wheel bearings need adjusting, clean and repack bearings before making adjustments. Refer to lubrication paragraph. Before repacking wheel bearings, check for any indication of leakage around hub seals. If such a condition exists, report to designated person in authority.

3. If looseness or wobble is in the wheel bearings, remove hub cap and spindle cotter pin, see (Plate 6640). Tighten nut with a 12" wrench, and at the same time rotate the wheel in one direction and then in the other until there is a slight bind to be sure all bearing surfaces are in contact. Then back off the nut 1/6 to 1/4 turn allowing the wheel to rotate freely. Secure nut at this position with a new cotter pin and replace hub cap.

Lubrication

1. Remove wheels after 1000 hours or every six months of operation. Clean bearings and repack with NLGI #1 (Amolith grease EP #1 or its equivalent.)
2. Install wheels and adjust wheel bearings as previously described.

LUBRICATION AND PREVENTIVE MAINTENANCE

CLEAN AND REPACK AXLE ENDS

Every 1000 operating hours remove and re-pack the axle ends with NLGI #1 (Amolith grease #1 or its equivalent).

1. Tilt upright back. Place solid heavy blocks under each upright rail. Tilt upright forward until vertical to the floor. This should allow the drive wheels to clean the floor. Remove drive wheels.

2. Remove hub cap, cotter pin, washer, spindle nut and pull hub assembly from spindle.

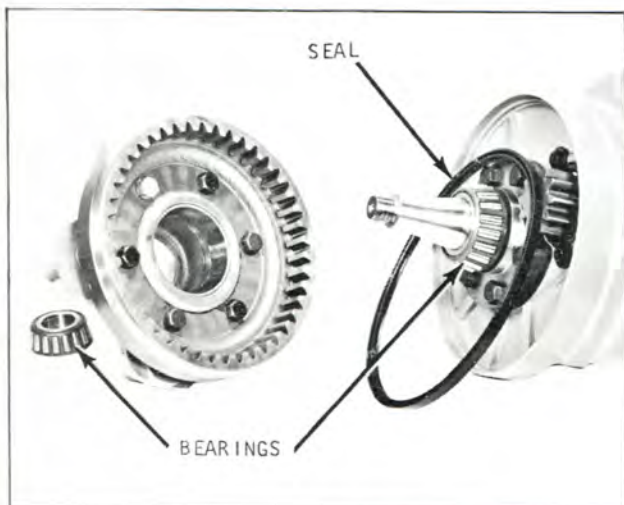


Plate 6892. Axle End Assembly

3. Remove bearings and clean in a Stoddard type cleaning solvent. Sloss bearings up and down in solvent. Remove and tap large side of bearing against a block of wood to dislodge solidified particles of lubricant. Repeat operation until bearings are thoroughly clean. Blow bearings dry with compressed air. Direct air stream across bearing to avoid spinning. Slowly rotate bearing by hand to facilitate drying. Dip bearings in gear oil and wrap in paper until they are to be reinstalled.

4. Clean ring gear, pinion drive shaft, hub assembly, spindle and spindle support.

5. Inspect seal for cuts, scratches and nicks. If is necessary to replace seal if such a condition is found.

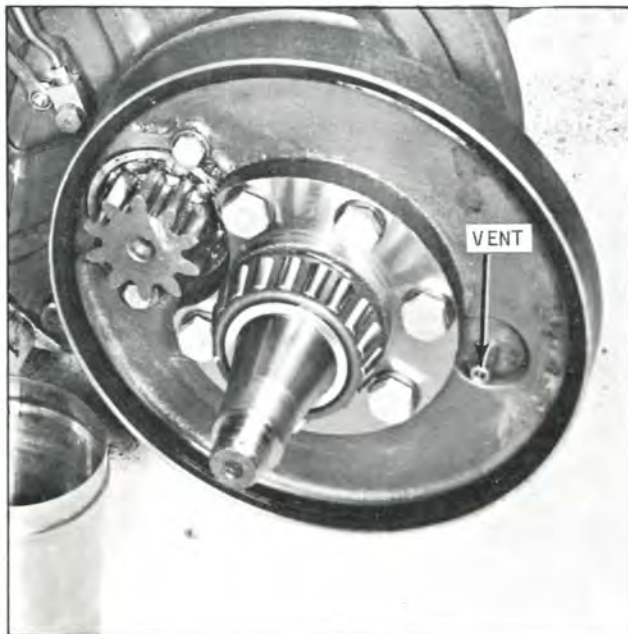


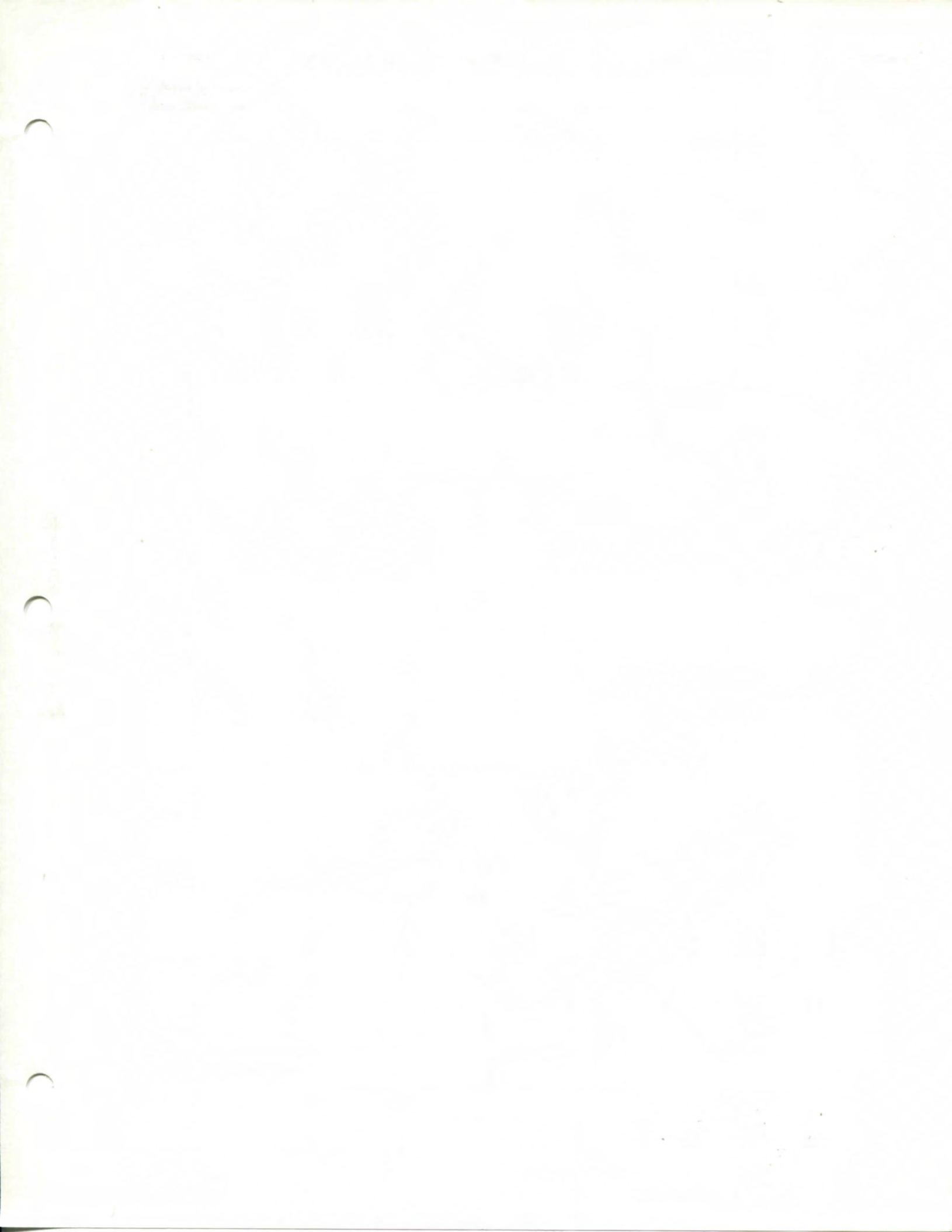
Plate 6893. Axle End Vent

6. Repack each axle end (bearings, spindle, ring gear and pinion) with one pound of NLGI #1 (Amolith grease #1 or its equivalent). Check the axle end vent for obstructions. the vent must be open.

7. Install bearings, seal and hub assembly.

8. Install washer, spindle nut and hub cap.

9. Tilt upright back and remove blocking.



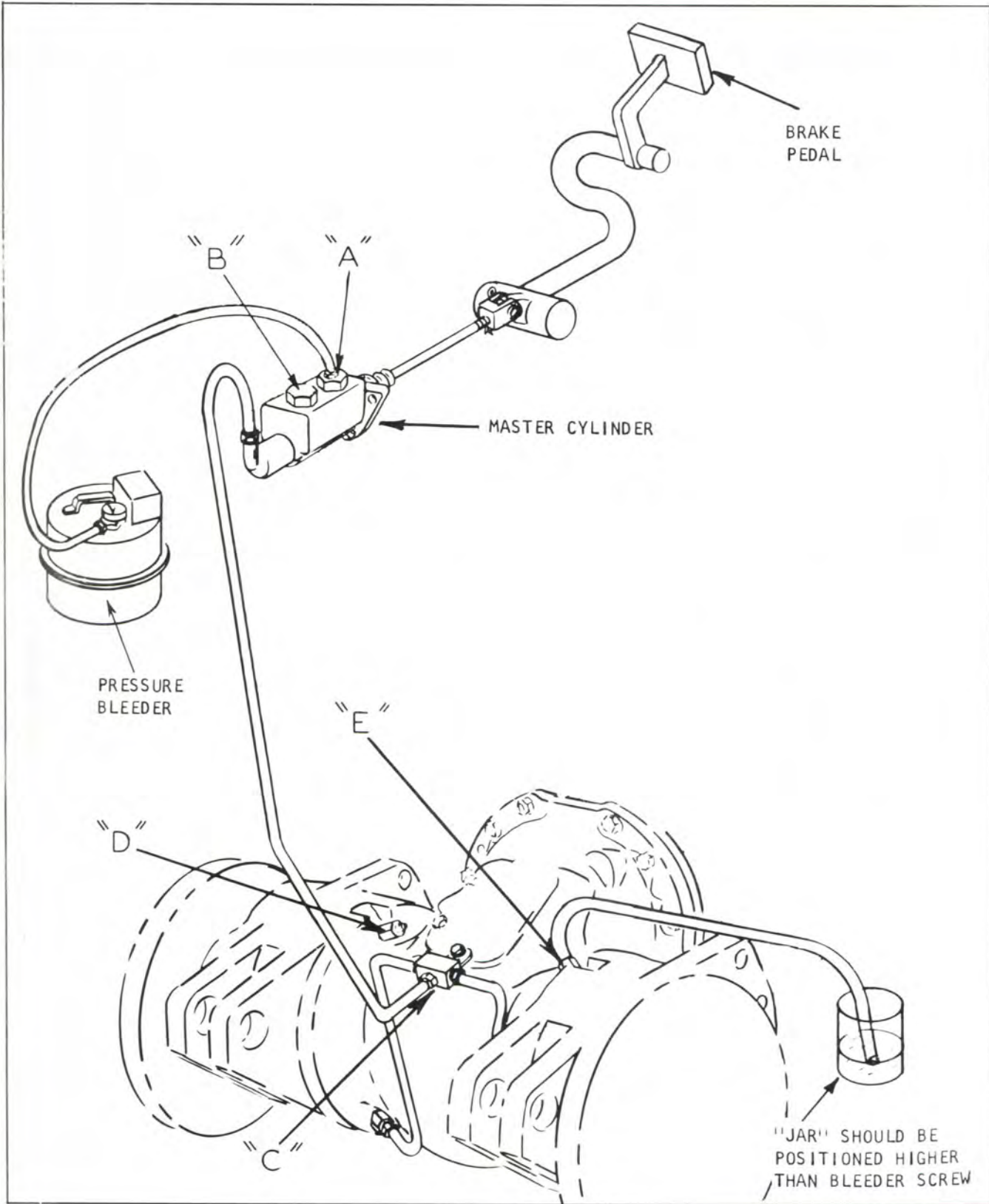


Plate 7566. Bleeding Brakes



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

BRAKE BLEEDING PROCEDURE

Proper operation of the hydraulic brake system requires a solid column of fluid without air bubbles at all points in the pressure system. Under certain conditions it becomes necessary to bleed fluid from the system in order to expel air bubbles which have become mixed with the fluid. The necessity of bleeding is indicated by a soft spongy pedal, or at any time a brake line is removed (or broken) the system must be bled.

Step 1. Tilt upright back. Place solid heavy blocks under each upright rail. Tilt upright forward until vertical to the floor. This should allow the drive wheels to clear the floor. If the bleeder screws are not accessible with the drive wheels on the machine, the wheels should be removed.

NOTE

MACHINES EQUIPPED WITH PNEUMATIC TIRES, DEFLATE TIRES BEFORE REMOVING DRIVE WHEELS FROM MACHINE.

Step 2. Check the brake pedal free travel (see Specifications). Clean dirt from around the vented filler cap of the master cylinder reservoir. Brake fluid should be within 1/4 of an inch from the top. With filler cap off the master cylinder, depress and release brake pedal. A small displacement of fluid should be noticed in the reservoir. If this happens, the brake pedal (upon being released) is returning the master cylinder piston to its normal position to open a cylinder port. This port must be open. If fluid does not return to the reservoir (when releasing brake pedal), this indicates improper pedal free travel and a pedal adjustment is required.

Step 3. To properly bleed the system it is recommended that a pressure bleeder filled with about two quarts of S.A.E. 70R-3 heavy duty brake fluid be connected to the master cylinder reservoir point "A". Pressure bleeder should then be pressurized to approximately 20 P.S.I.

Step 4. Loosen plug "B" to permit air to escape from reservoir. Tighten plug after oil appears around plug.

Step 5. Loosen tube nut "C" and allow all air to escape. Tighten tube nut.

Step 6. Install a bleeder hose on bleeder screw "D" and submerge the unattached end of the hose in a clean transparent jar containing several inches of brake fluid. NOTE: DURING BLEEDING OF

THE WHEEL CYLINDERS, THE JAR SHOULD BE ELEVATED TO A POSITION HIGHER THAN THE BLEEDER SCREW MAKING SURE THAT THE END OF THE HOSE REMAINS SUBMERGED IN THE

FLUID AT ALL TIMES. Loosen bleeder screw and slowly push brake pedal to the floorboard and hold pedal in this position until bleeder screw is retightened. Repeat this operation until all air bubbles disappear and clear fluid is being pumped into the jar.

Step 7. Install bleeder hose on the remaining bleeder screw "E" and proceed as in Step 6.

Step 8. After all bleeding has been completed close the pressure bleeder shut-off cock and loosen hose connection at master cylinder to allow pressure to escape. Replace master cylinder vented cap.

Step 9. If drive wheels were removed from the machine replace them. (Inflate tires if they are of the pneumatic type). Tilt upright back and remove blocking from under each upright rail.

If a pressure bleeder is unavailable, the system may be bled manually by following Steps 1, 2, 5, 6, 7 and 9. It must be remembered that the brake pedal should be depressed slowly and held to the floorboard until the line connections or bleeder screws are securely tightened. This prevents the possibility of air being drawn into the system during the bleeding operation. Check master cylinder reservoir level periodically during manual bleeding and fill to within 1/4 of an inch of the top as required.

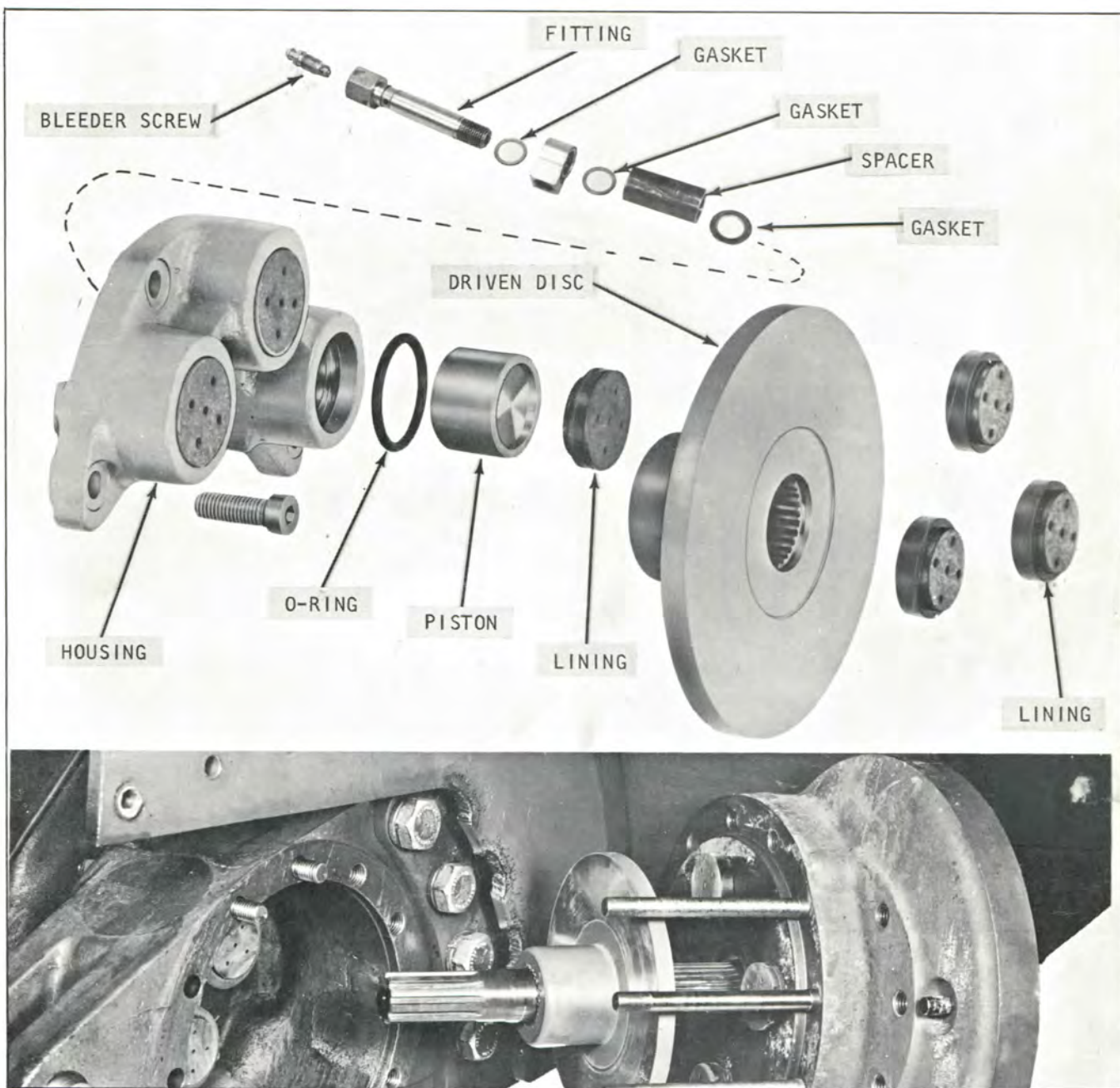


Plate 7567. Typical Service Wheel Brake Assembly

DESCRIPTION

When depressing the brake pedal hydraulic pressure is applied to the brakes, the pistons move out clamping the rotating disc between the pistons and anvil linings producing the braking action. When hydraulic brake pressure is released the clamping action is removed and the disc is again free to rotate.

If it is found that the brake effectiveness has gradually dropped to a noticeable degree (and the system has been properly bled and pedal free travel is adjusted correctly) the linings are worn beyond their designed limits. If lining wear has reached this point, the replacement of linings is necessary. Report to designated person in authority.

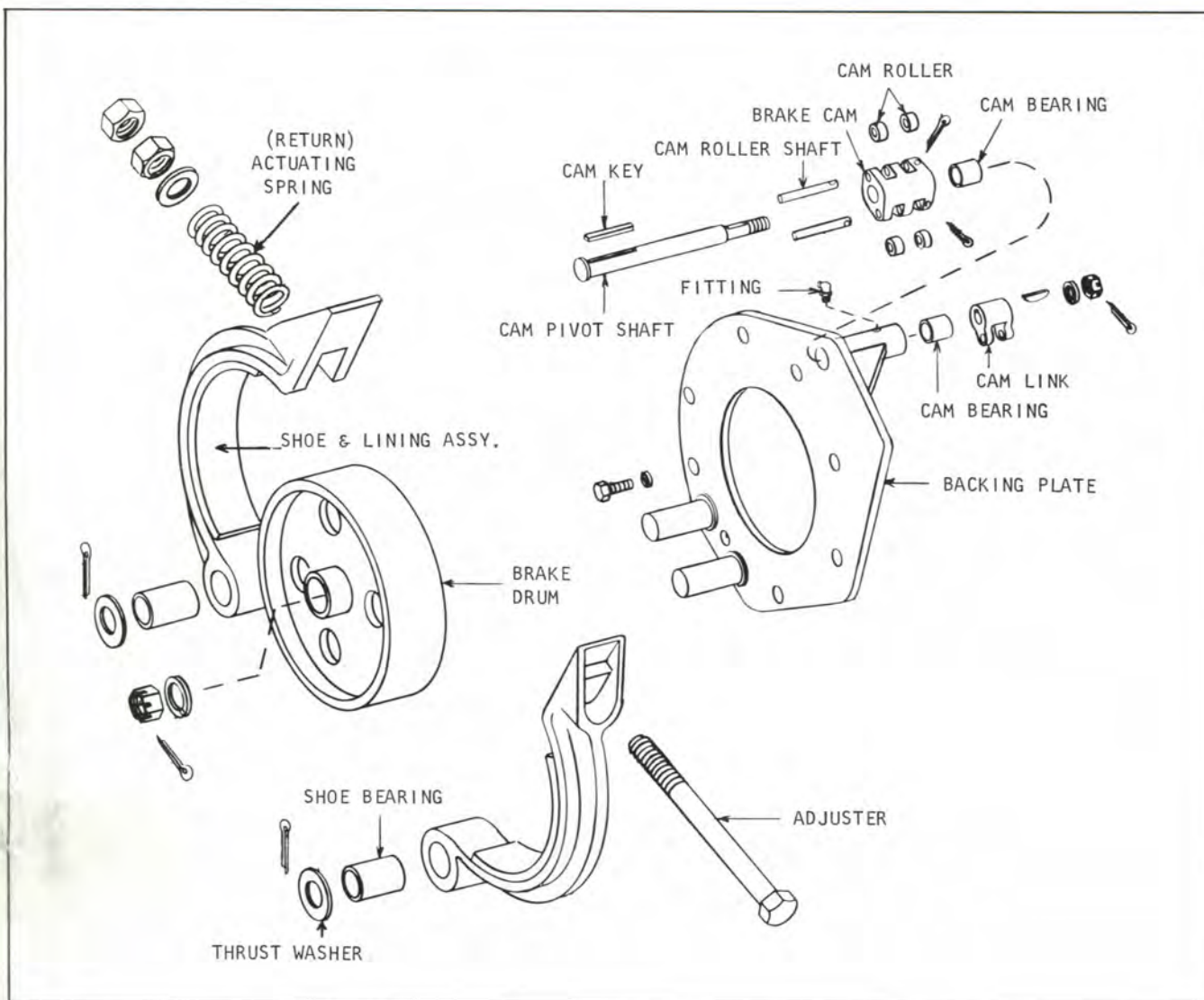


Plate 7568. Seat Safety (Parking) Brake

SEAT SAFETY BRAKE (PARKING BRAKE)

1. The parking brake is mounted to the end of the drive motor and is operated by means of linkage attached to the driver's seat.

2. When properly adjusted, the brake cam will, with action of the seat linkage, raise new brake shoes off of the drum 1/8 inch at a point half way between the shoe pivot and the brake cam pivot. The gap will increase as the shoe lining wears. (Refer to the next page.)

3. Adjust seat return spring tension to allow the seat to raise as soon as the driver leaves the seat.

4. With the return spring installed the bottom of the seat plate should form an angle of 40 degrees with the top of the hood when brakes are applied.

5. The brake shoe return spring should be adjusted to a length of approximately 2 1/2 inches to enable the brake to meet the following specifications.

SEAT BRAKE EFFECTIVENESS

The brake must be capable of holding the truck with full rated load on a 15% grade. To Test: Disconnect seat linkage pin (Plate 7410). The driver should be seated on the truck with all power off. (Refer to following page.)

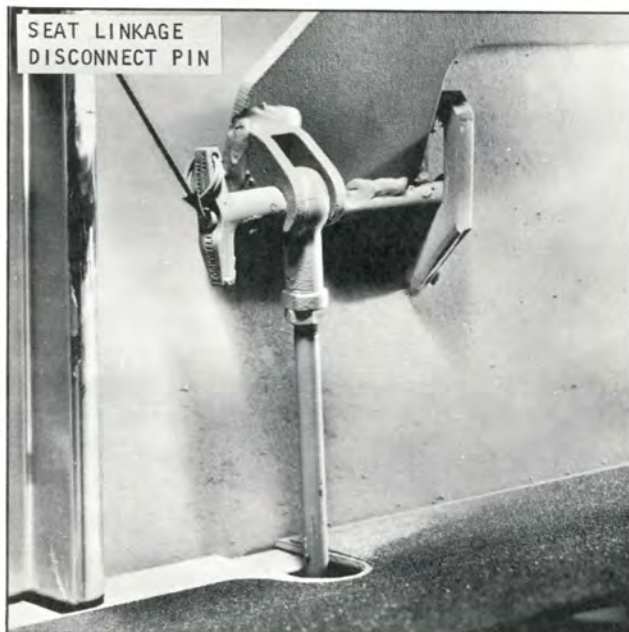


Plate 740. Seat Linkage Disconnect Pin

If adjustment is necessary, rotate adjustor (shown with arrows on preceding page) as required to provide spring tension capable of holding truck on a 15% grade. Recheck adjustment.

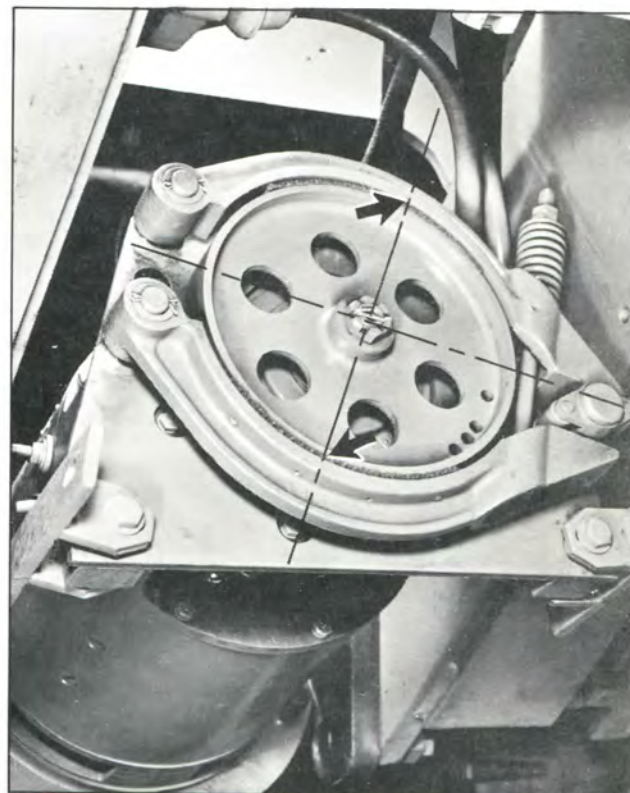


Plate 750. Brake Adjustment Check

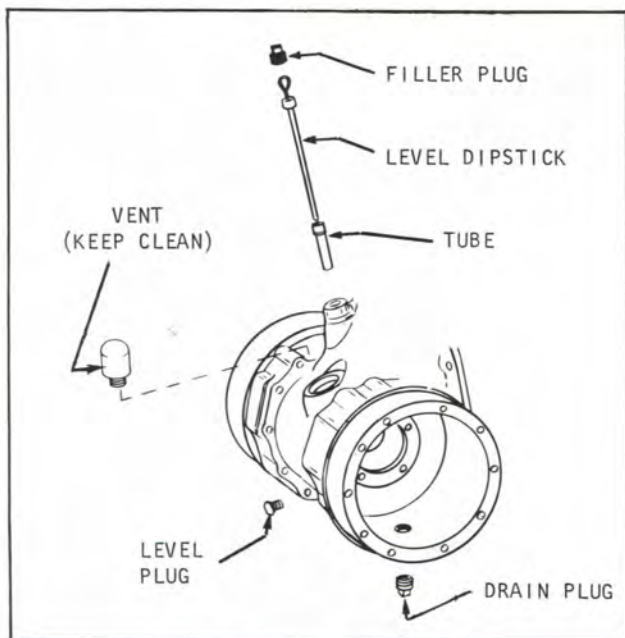


Plate 7549. Typical Axle Adaptor

AXLE ADAPTOR...DRAIN AND REFILL

Drain and refill every 1000 operating hours at operating temperature. Remove drain plug from bottom of adaptor allowing old lubricant (or fluid) to completely drain. Replace drain plug.

Clean dirt from level device (plug or dipstick) and remove. Fill with the recommended lubricant or fluid...refer to following paragraph...until fluid or lubricant reaches the plug opening or high mark on dipstick. Do not overfill as the excess quantity will serve no useful purpose. If the level is too high it will cause excessive churning and attendant high lubricant or fluid temperature and possible leakage.

Use Type 'A', Suffix 'A', Automatic Transmission Fluid (fluid containers must display a qualification number prefixed by 'AQ-ATF'...Clark Part Number 879803) or Dexron Automatic Transmission Fluid in all vehicles beginning with the following machine serial number:

EC-----1-831 and above

Use E.P.G.L. S.A.E. #90 Gear Lubricant (Per Clark Specifications MS-8) in all machines built prior to the above listed machine serial numbers.

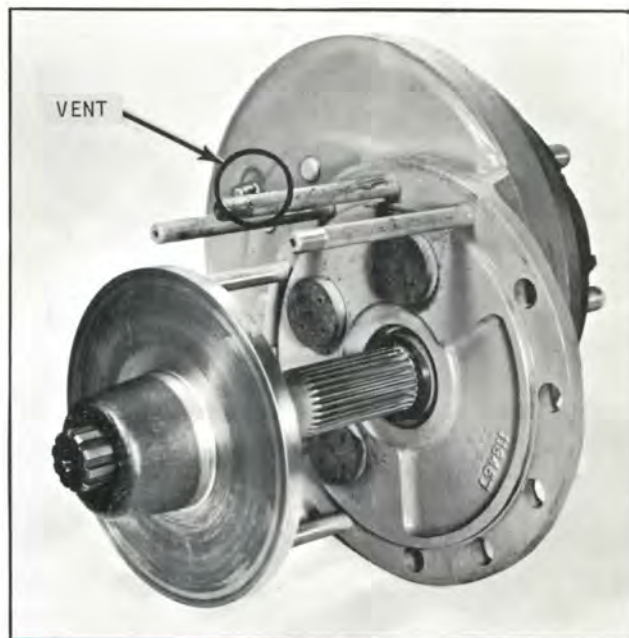


Plate 7550. Typical Axle Adaptor Vent

AXLE ADAPTOR VENT

Inspect vent to be sure it is free of obstructions. If vent is not open remove and clean in a Stoddard type cleaning solvent. Be sure vent is completely dry before replacing on axle.

LUBRICATION AND PREVENTIVE MAINTENANCE

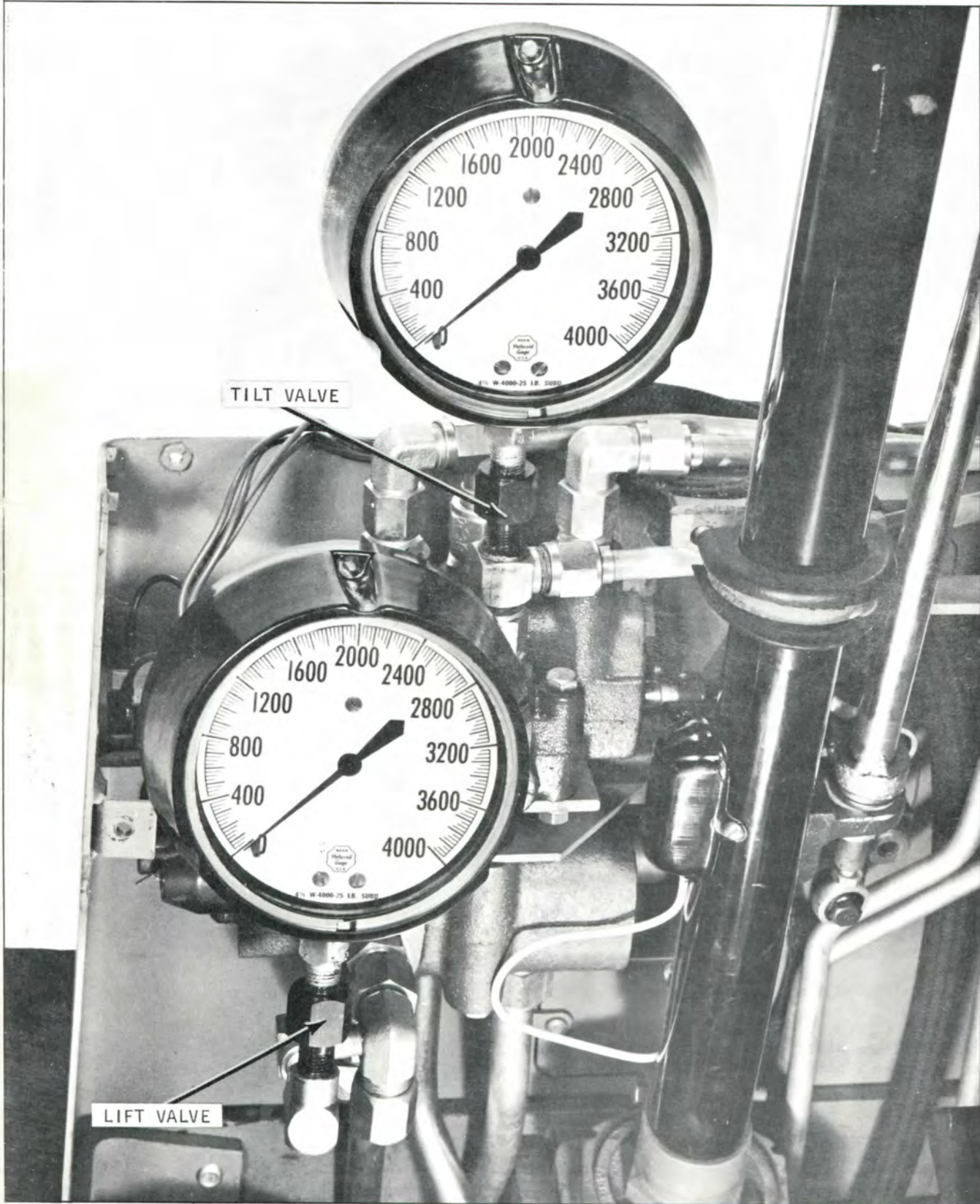


Plate 7226. Typical Control Valve



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

MAIN HYDRAULIC SYSTEM PRESSURE CHECK

1. Pressure check at lift valve.
 - a. Remove the pressure check plug from the lift valve (Plate 7224) and install a 0-4000 P.S.I. gauge at this location.
 - b. Turn key switch on and move hydraulic control lever to the "lift" position. When the upright has reached its maximum height the gauge should register 1750 to 1800 P.S.I. If pressure is not within this range report to designated person in authority.

NOTE

DO NOT HOLD LIFT LEVER IN "LIFT" POSITION FOR ANY PROLONGED PERIOD AFTER UPRIGHT HAS REACHED IT MAXIMUM HEIGHT. THIS WILL CAUSE HEATING OF THE HYDRAULIC OIL AND SHOULD BE AVOIDED.

- c. If pressure readings are satisfactory remove pressure gauge and install plug securely.

NOTE

ONLY REPRESENTATIVES OF AN AUTHORIZED CLARK INDUSTRIAL TRUCK DEALER OR THE VENDOR SHOULD REPAIR OR ADJUST THE CONTROL VALVES.

2. Pressure Check at Tilt Valve.

- a. Provide a means for connecting a 0-4000 P.S.I. pressure gauge at the inlet side of the valve (refer to Plate 7224). A tee at the inlet port may be used.
 - b. Turn key switch on and hold tilt lever back until upright reaches maximum back tilt. With the lever held momentarily in this position the pressure gauge should register 1750 to 1800 P.S.I. If pressure is not within this range report to designated person in authority.
 - c. If pressure readings are satisfactory remove pressure gauge and securely install inlet line in its original position.

HOW TO IDENTIFY THE:

"C" MODEL UPRIGHT

Note the INNER RAIL TIE BAR
is mounted VERTICALLY to the rails.

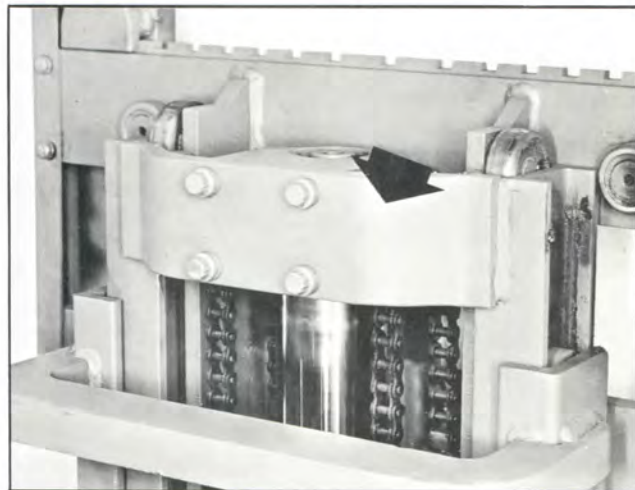


Plate 11847

"B" MODEL UPRIGHT

Note the INNER RAIL TIE BAR
is mounted HORIZONTALLY to the rails.

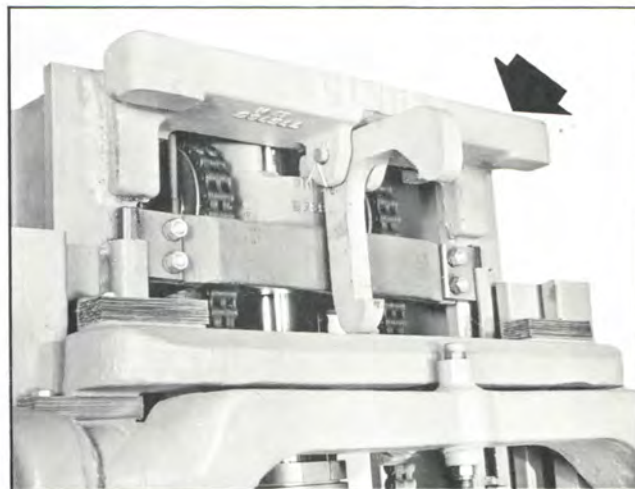


Plate 11848

"B" MODEL UPRIGHT

Note this upright has the TIE BAR
mounted inbetween the rails.

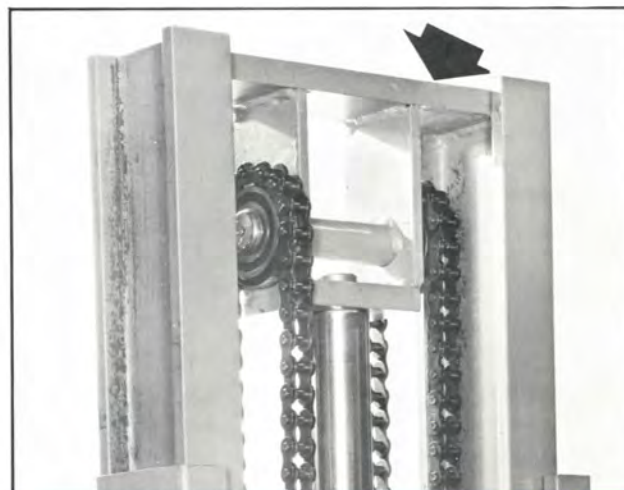


Plate 11849

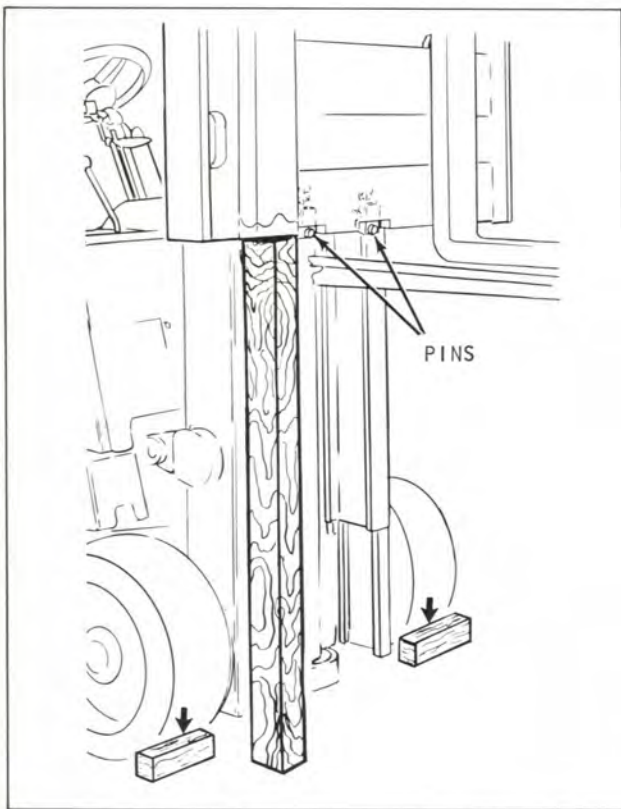


Plate 9593 Carriage Pin Replacement

Step 2. Remove anchor pins and replace with 3/8" x 2" bolts. FOR SAFETY REASONS, REMOVE ONLY ONE PIN AT A TIME. This will make pin removal easier when carriage is lowered.

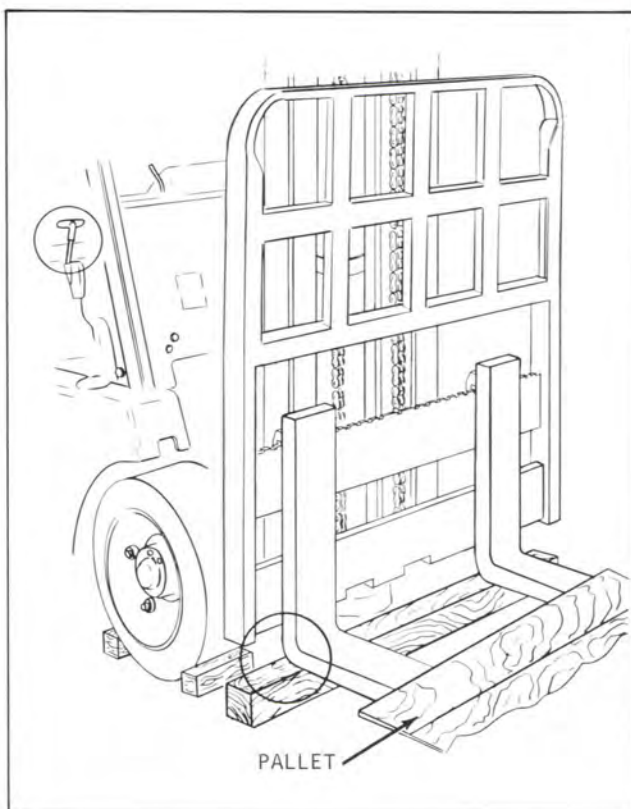


Plate 9560 Fork and Carriage Blocking

Step 3. Raise carriage off beam. Place beam on floor so, when lowered, the heel of the fork will rest on it as shown.

Step 4. Tilt upright full forward.

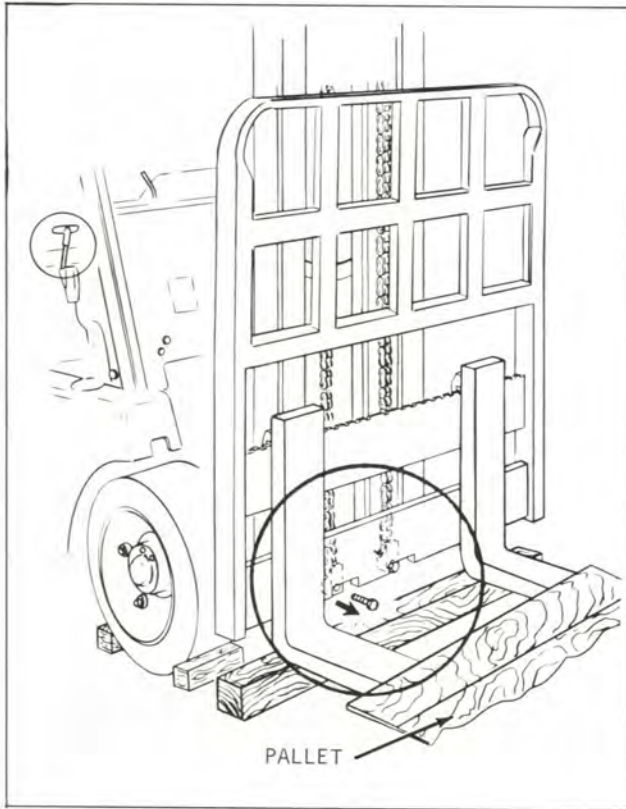


Plate 9561 Removing Bolts

Step 5. Remove 3/8" x 2" bolts. Place pallet on fork ends.

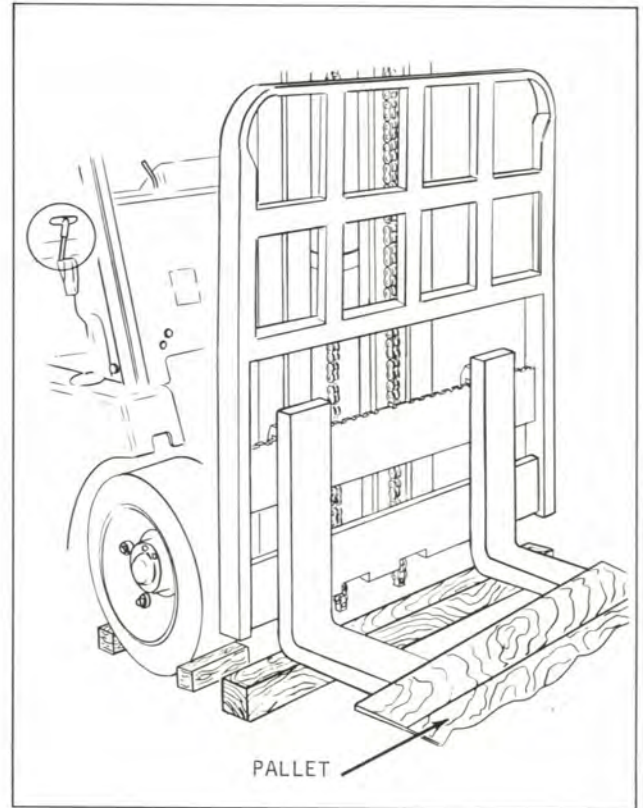


Plate 9562 Removing Chains From Anchors

Step 6. Pull chains out of carriage anchor brackets.

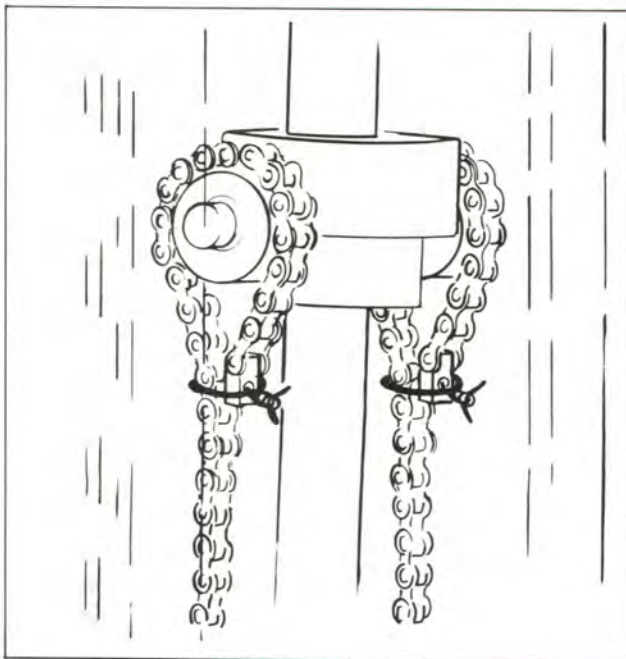


Plate 9563 Securing Chains (Typical)

Step 7. Wire chains around chain sheaves as shown

N O T E

Use the same method on all cylinders.

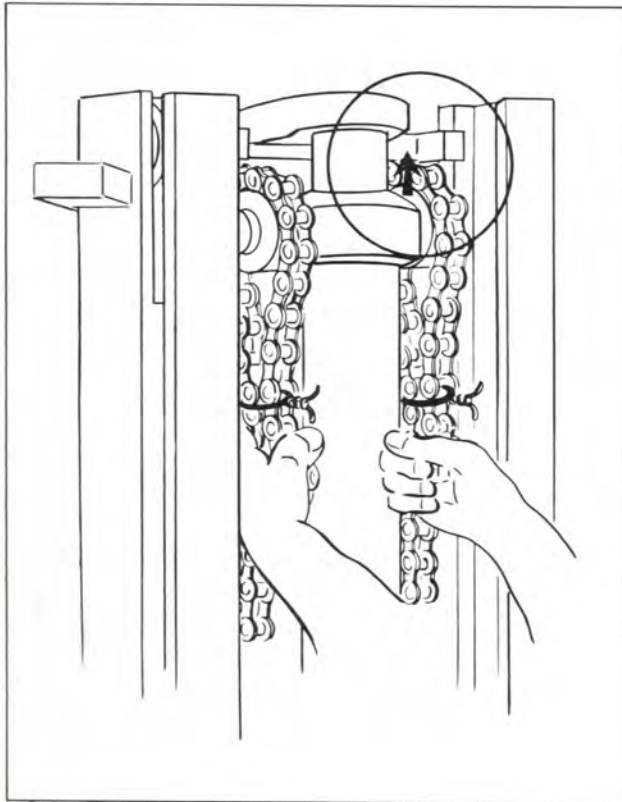


Plate 9564 Guiding Piston Head

Step 8. Guiding piston head with hands on chains raise piston to full up position.

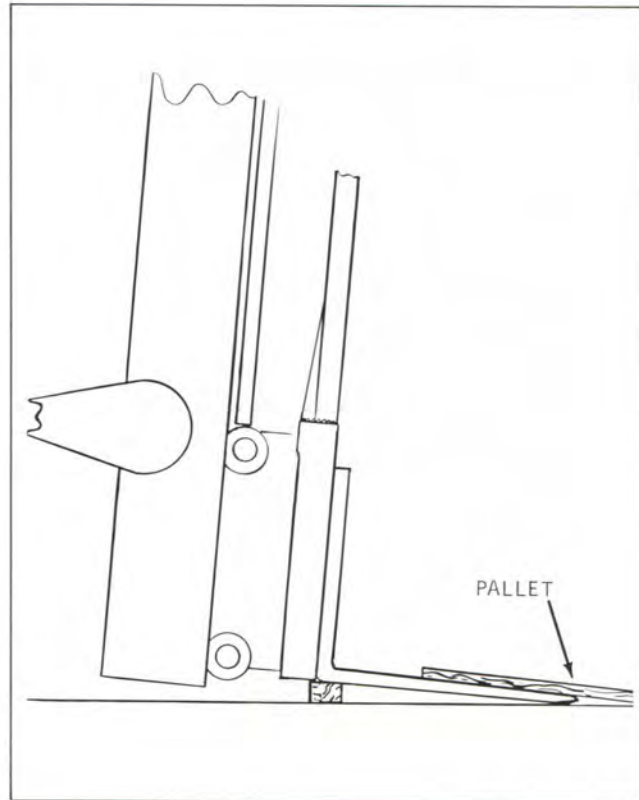


Plate 9565 Inner Rail Clearing Carriage Rollers

Step 9. Raise inner rail so it just clears upper carriage rollers. Leave upright at full forward tilt.

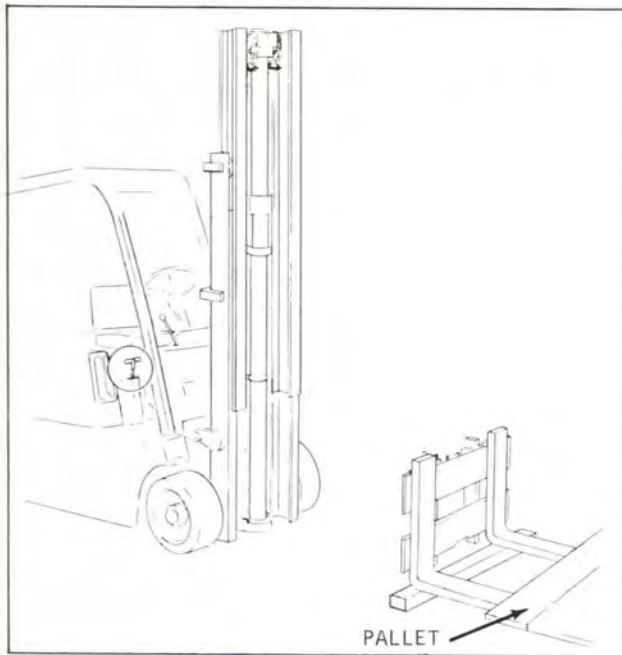


Plate 9566 Backing Machine Away From Carriage

Step 10. Remove blocks and release brake. Back machine away from carriage.

B. CARRIAGE ROLLER ADJUSTMENT

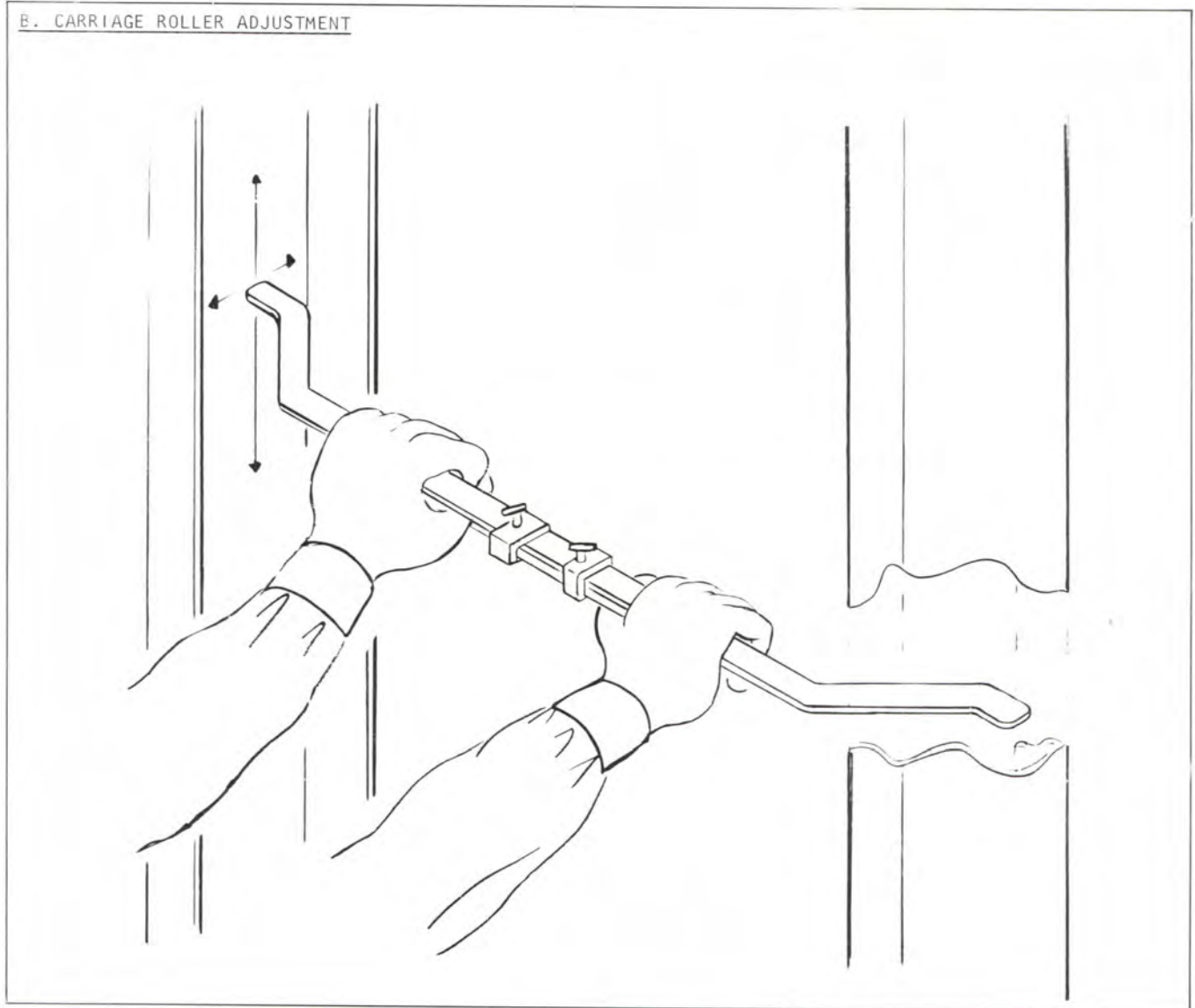


Plate 9567 Spanning Inner Rail

Step 1. Span inner rail with inside spanning tool to find the smallest distance between the rails. Lock tool in position.

N O T E

FOR SIX ROLLER CARRIAGE ONLY

After finding the smallest distance between rails, place a shim between the spanning tool and the inner rail, then lock spanning tool in position.

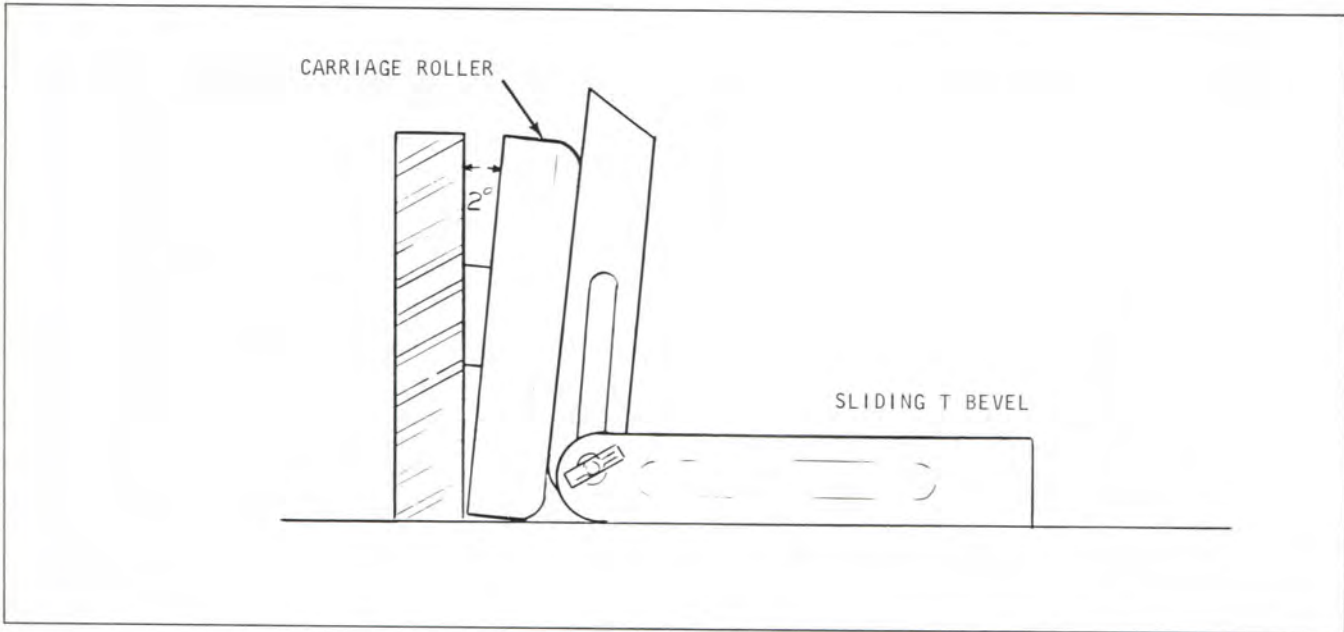


Plate 9589 Setting T Bevel

N O T E

Check angle of carriage rollers. Roller pin bosses are weled at $2^{\circ} \pm 1/2^{\circ}$ and if damaged, replace carriage roller pin boss assembly. To obtain this contact Central Parts.

To check roller angle use a Sliding T Bevel and Protractor. Lay one side against roller surface and lock in place.

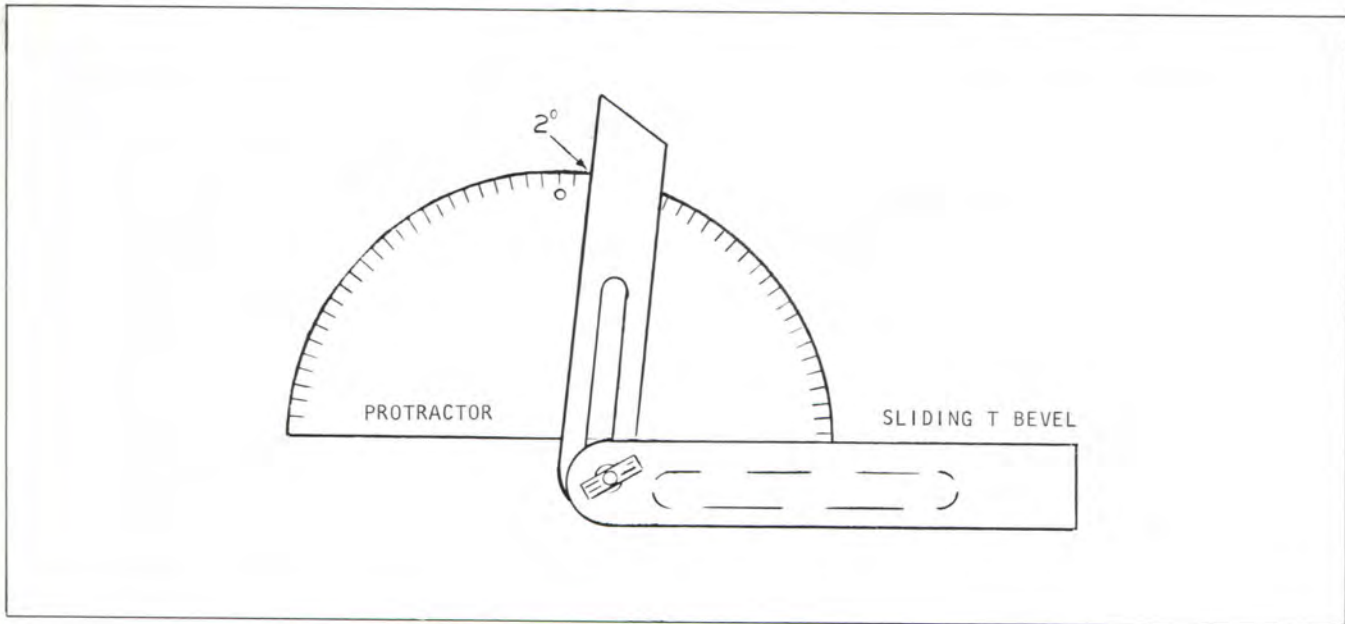


Plate 9590 Checking Roller Angle

Determine degree of angle by placing Protractor on Sliding T Bevel.

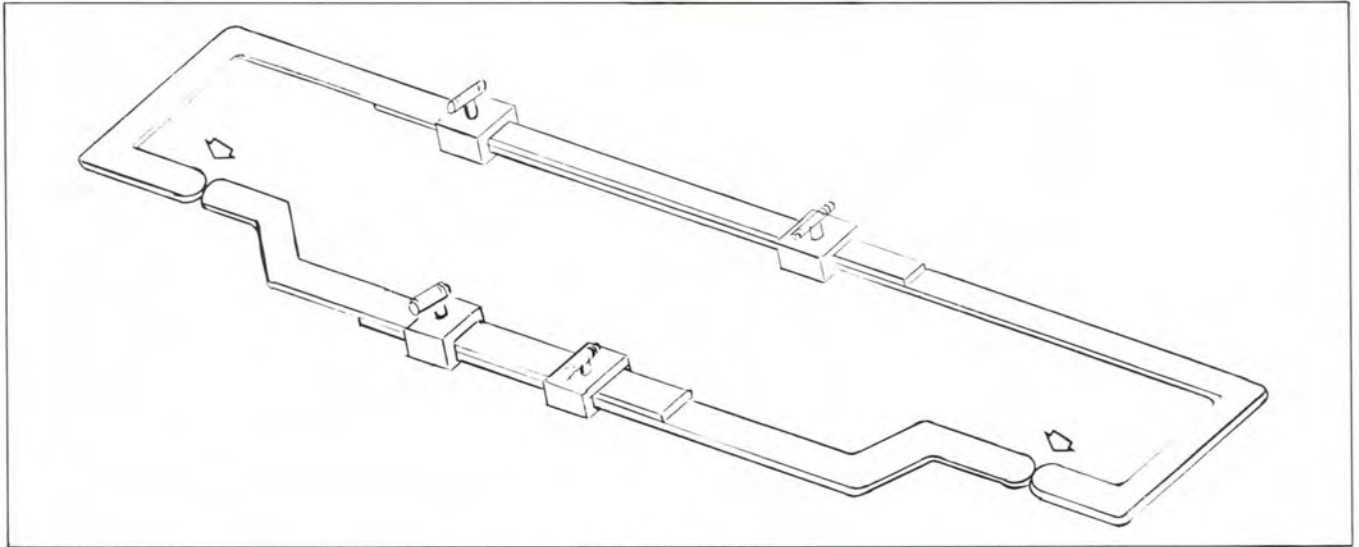


Plate 9568 Setting Outside Spanning Tool

Step 2. Set outside spanning tool to match inside spanning tool. Lock tool in position.

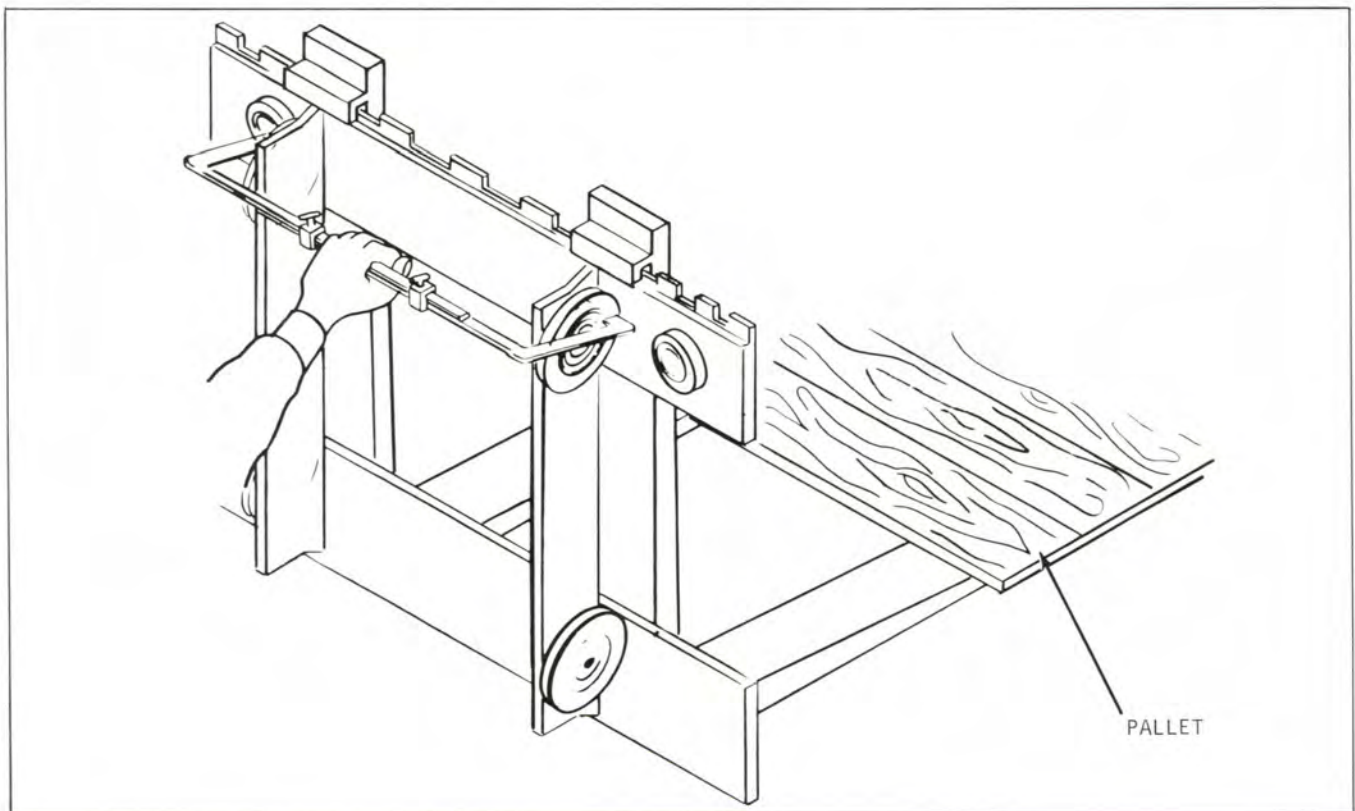


Plate 9569 Spanning Upper Rollers (Four Roller Carriage)

Step 3. Span upper carriage rollers at their outer most camber point. Add or subtract ...

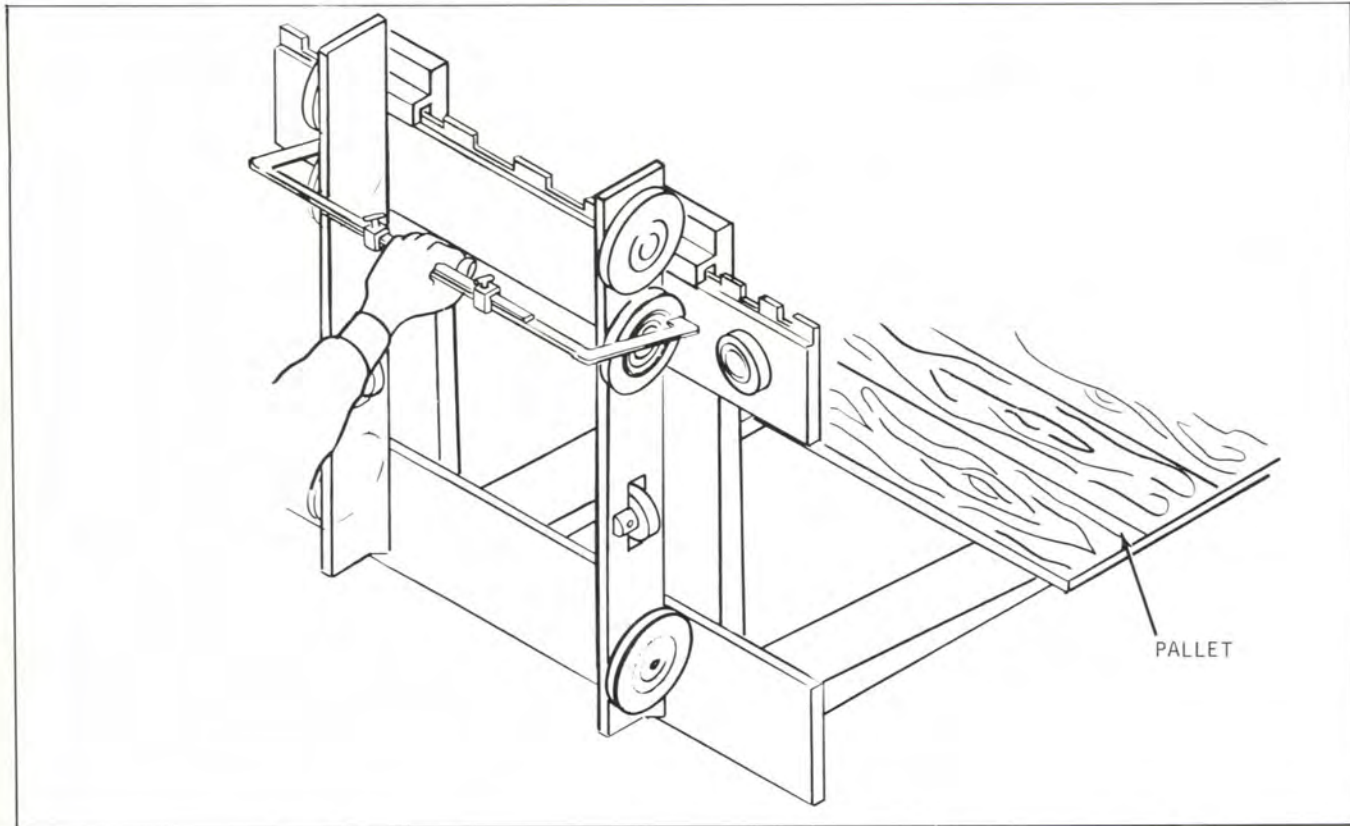


Plate 9570 Spanning Upper Rollers (Six Roller Carriage)

...shims at roller shaft to reach tool size.

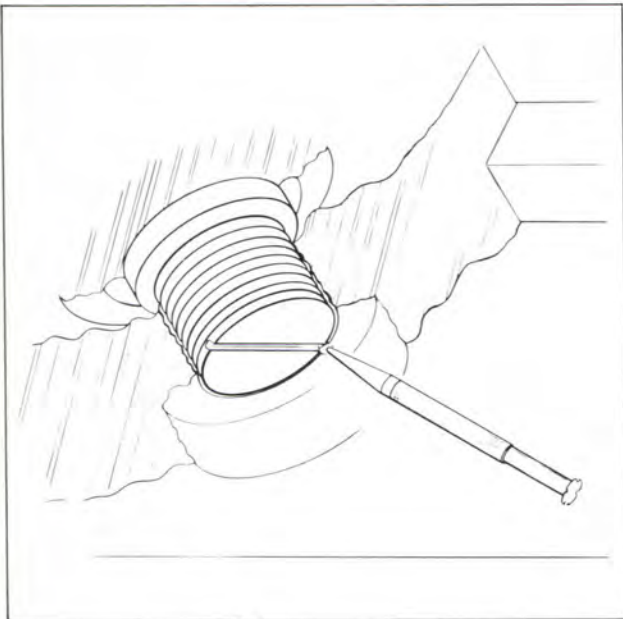


Plate 9571 Securing Outer Thrust Roller

NOTE

Before centering carriage rollers check outer thrust rollers for security and condition of bearings. If loose tighten and stake. If worn replace.

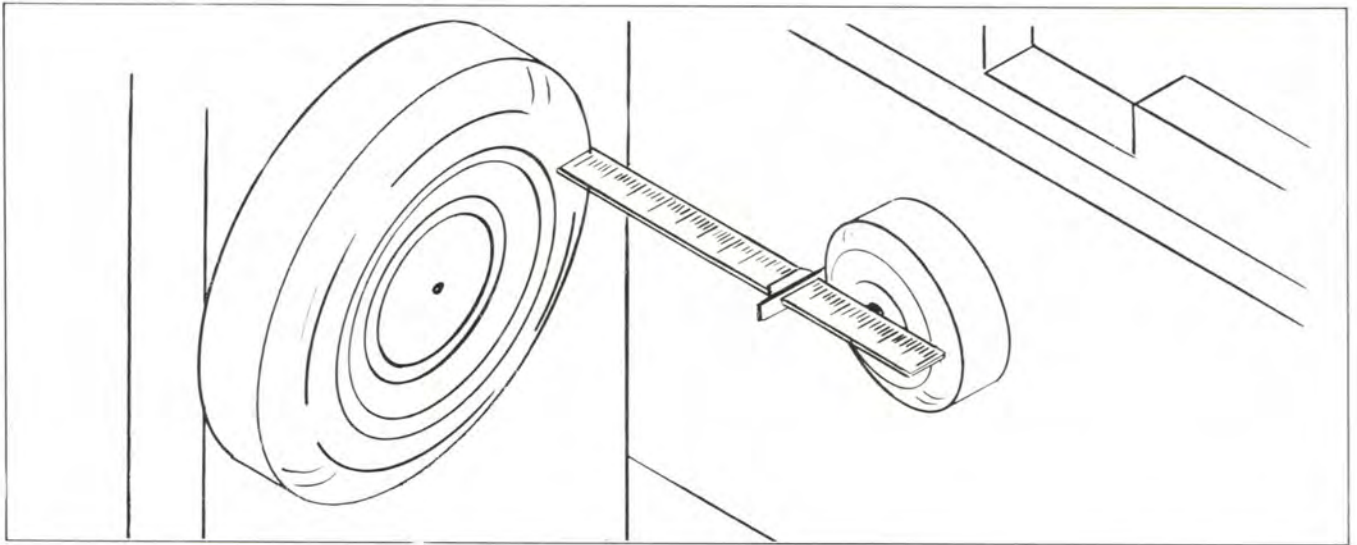


Plate 9572 Centering Carriage Rollers

Step 4. Center carriage rollers within outer thrust rollers by placing 6" scale on the carriage roller surface and measuring the distance to the outer thrust roller face. Add or subtract shims from one roller to the other to make measurement equal.

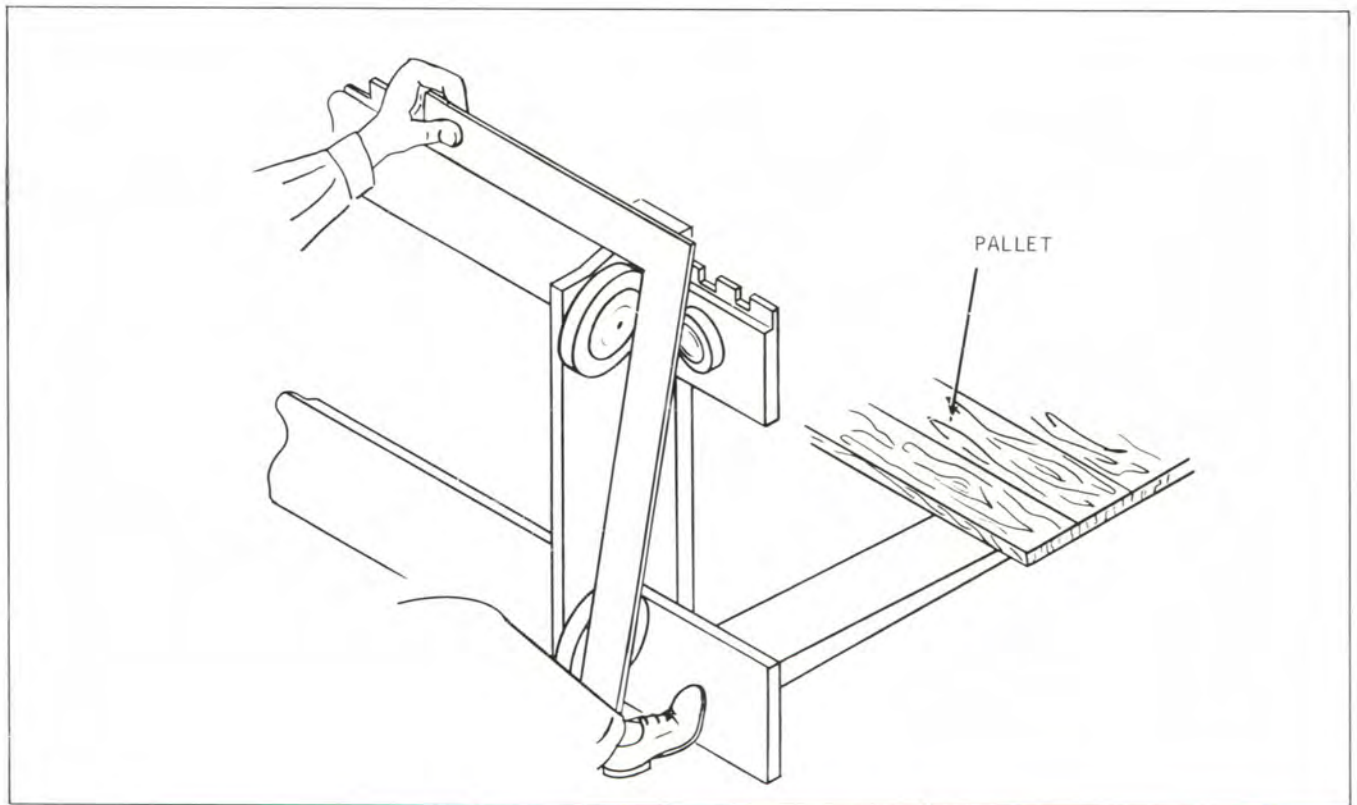


Plate 9573 Squaring Carriage Rollers (Four Roller Carriage)

Step 5. Square carriage rollers by placing carpenter's square at the outer most camber of the ...

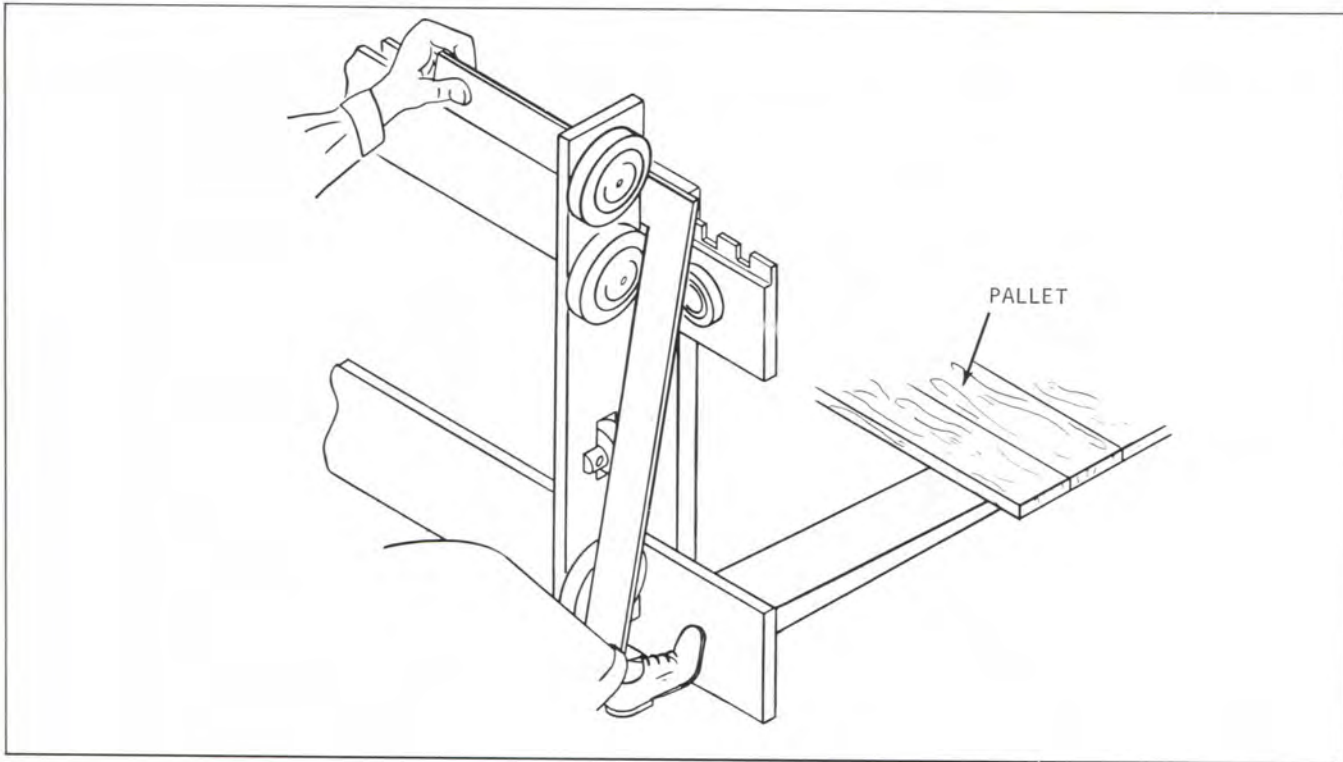
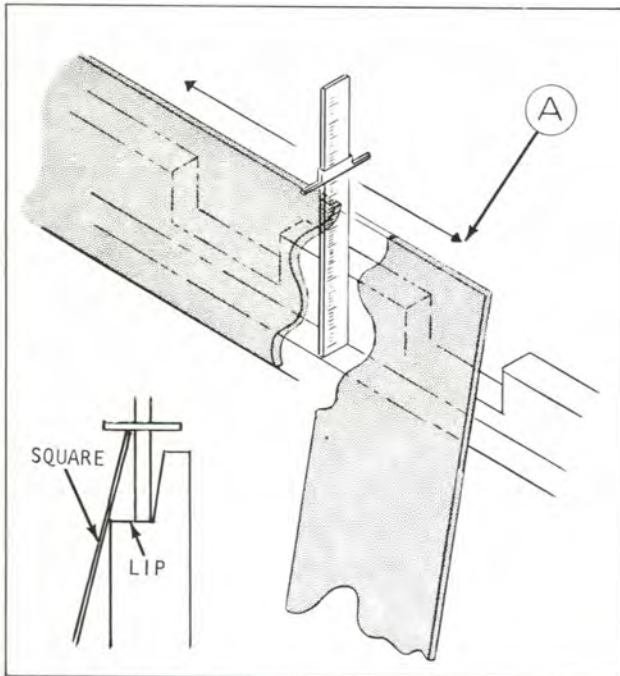


Plate 9574 Squaring Carriage Rollers (Six Roller Carriage)

... upper and lower rollers. Hold square in place with ankle and hand as shown.



Step 6. Hold square and measure the distance between the top face (or lip) of the upper fork bar to the edge of the square at Point A. Now take a measurement at opposite end of square these measurements should be the same. If they are not, add or remove shims on lower roller shaft until distance measured at each end is equal.

Plate 9575 Measuring For Squareness

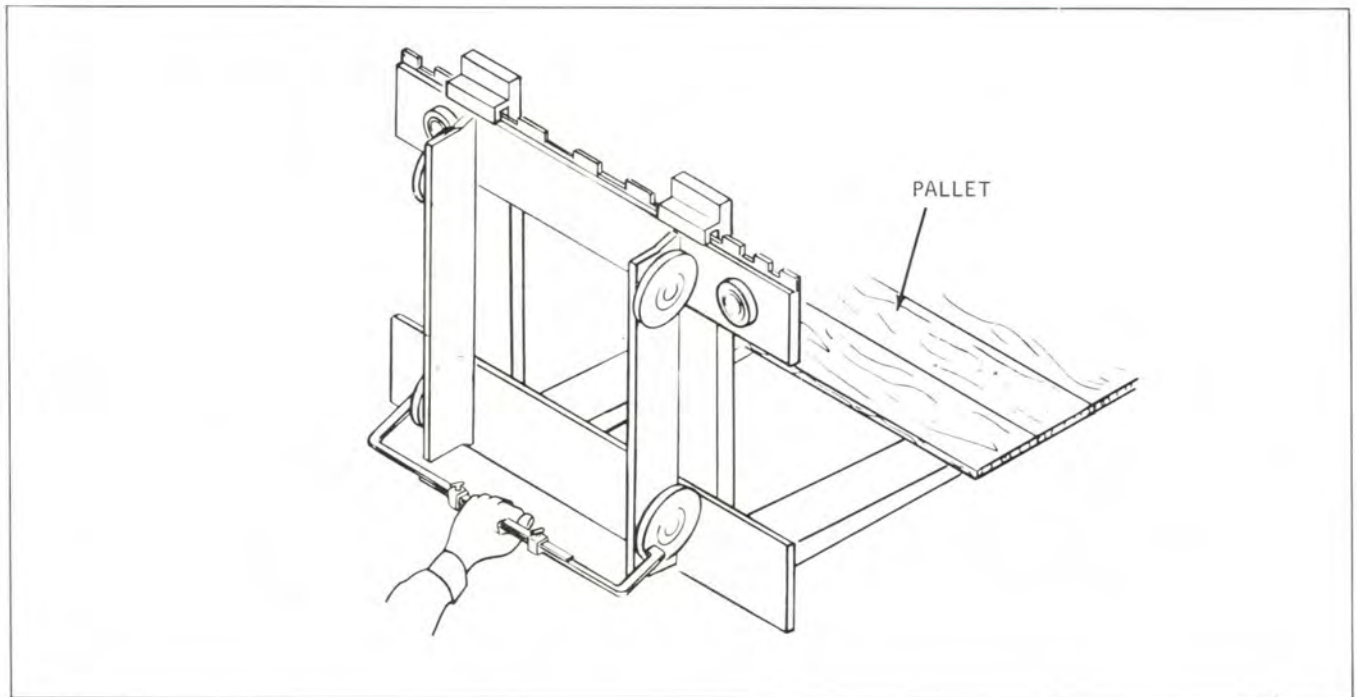


Plate 9576 Spanning Lower Rollers (Four Roller Carriage)

Step 7. Span lower rollers. Add or subtract shims to (the roller that has not been squared) ...

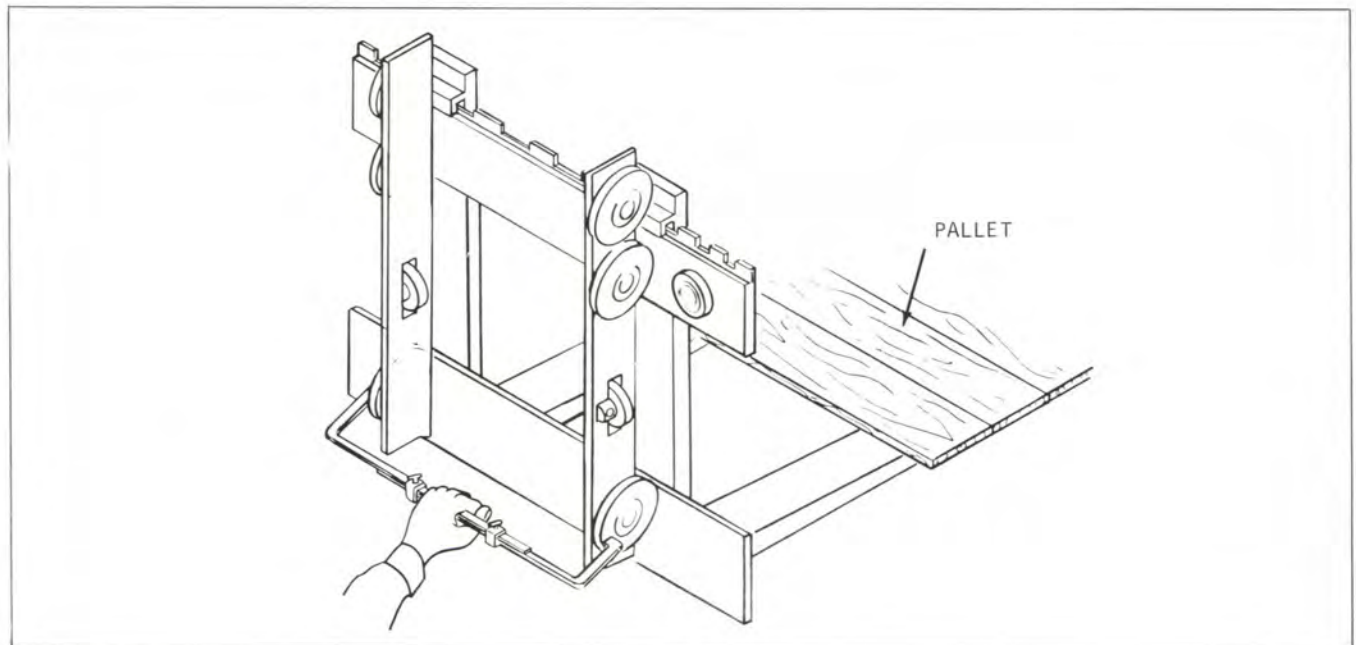


Plate 9577 Spanning Lower Rollers (Six Roller Carriage)

... reach the size of the outside spanning tool.

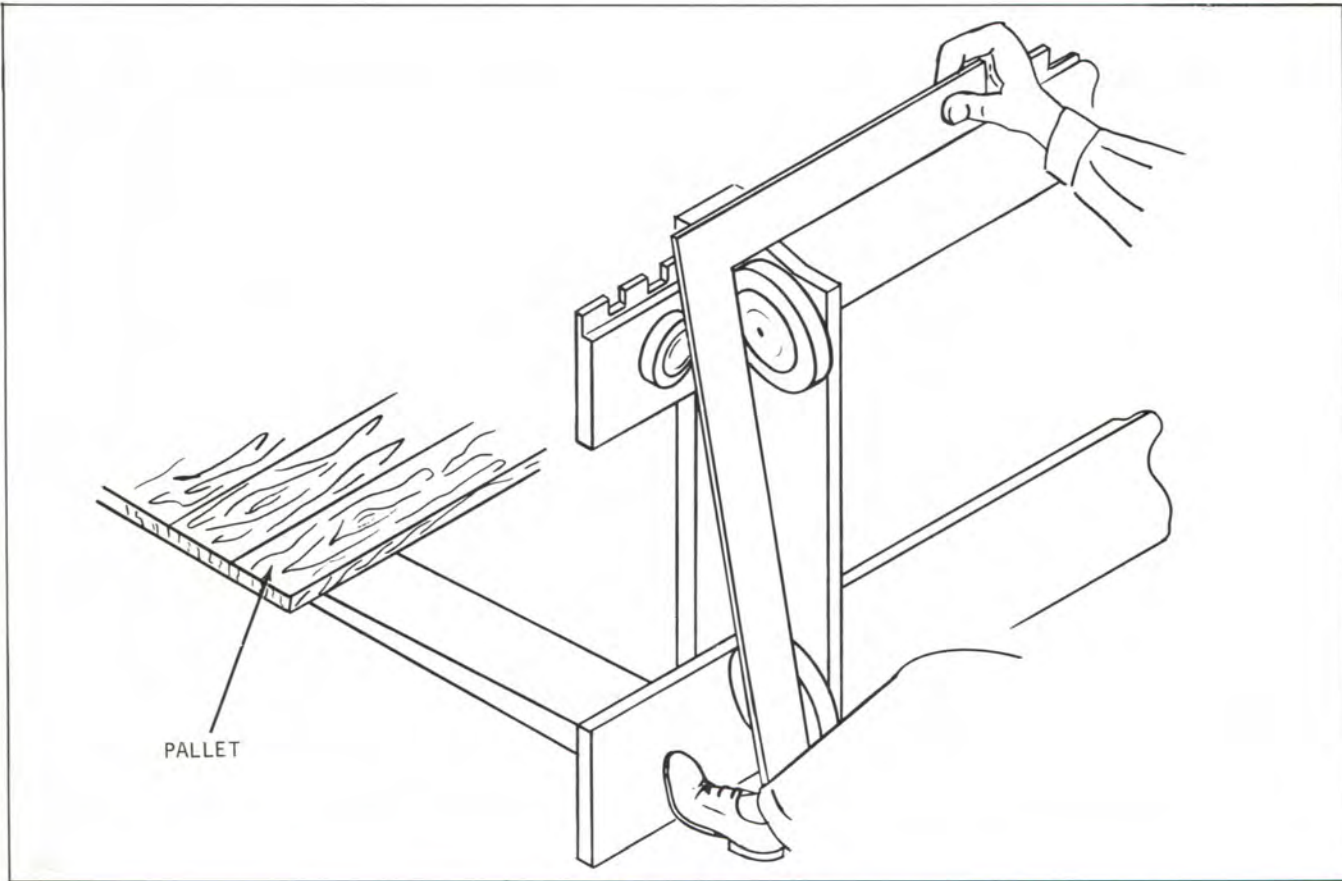


Plate 9578 Checking Squareness (Four Roller Carriage)

Step 8. Check opposite side for squareness (by holding square in the same manner as before and checking ...

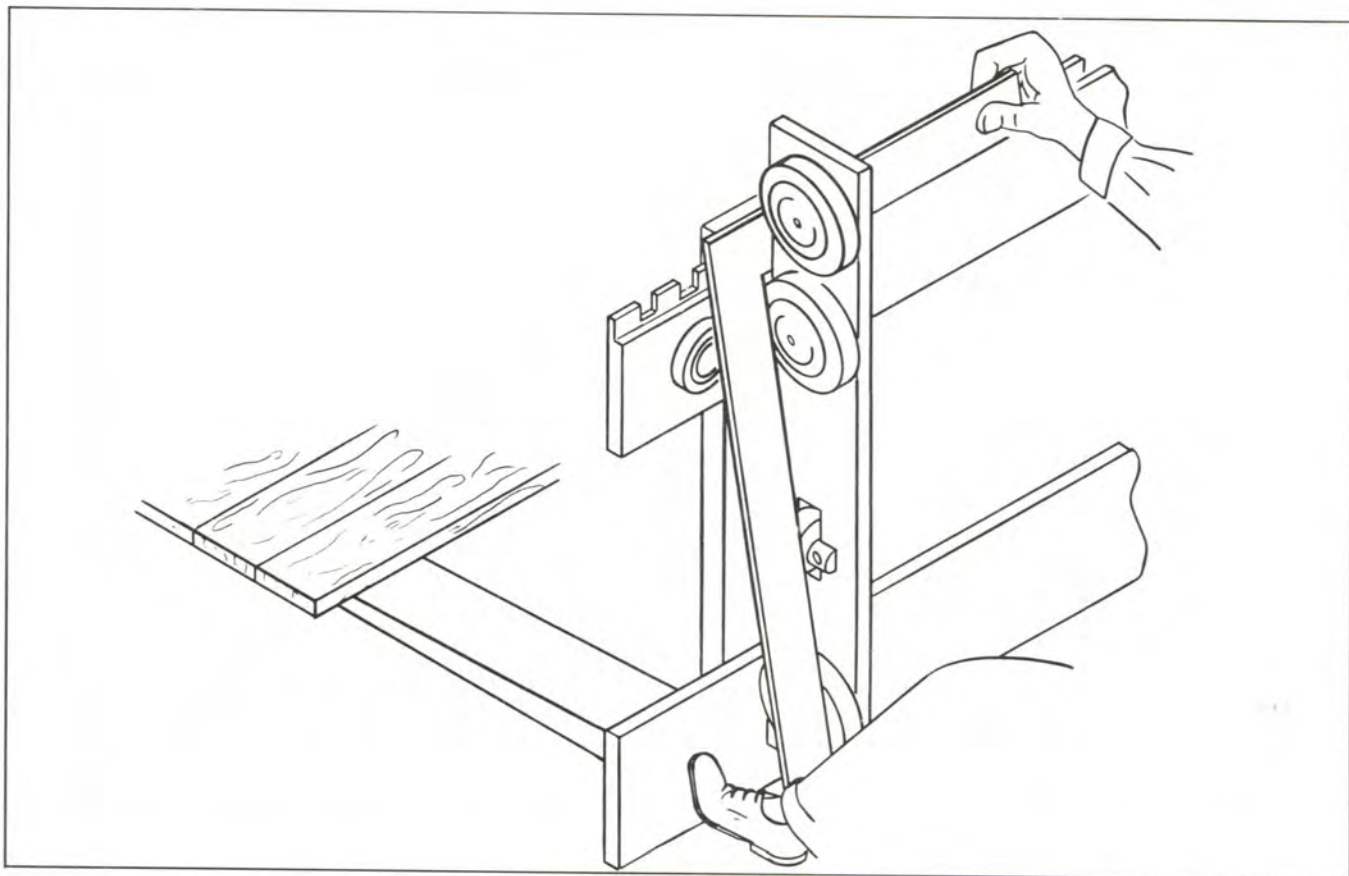


Plate 9579 Checking Squareness (Six Roller Carriage)

... measurement). This side will be square within $1/32''$; if not, return to Step 5. and repeat procedure.

SIX ROLLER CARRIAGE ONLY

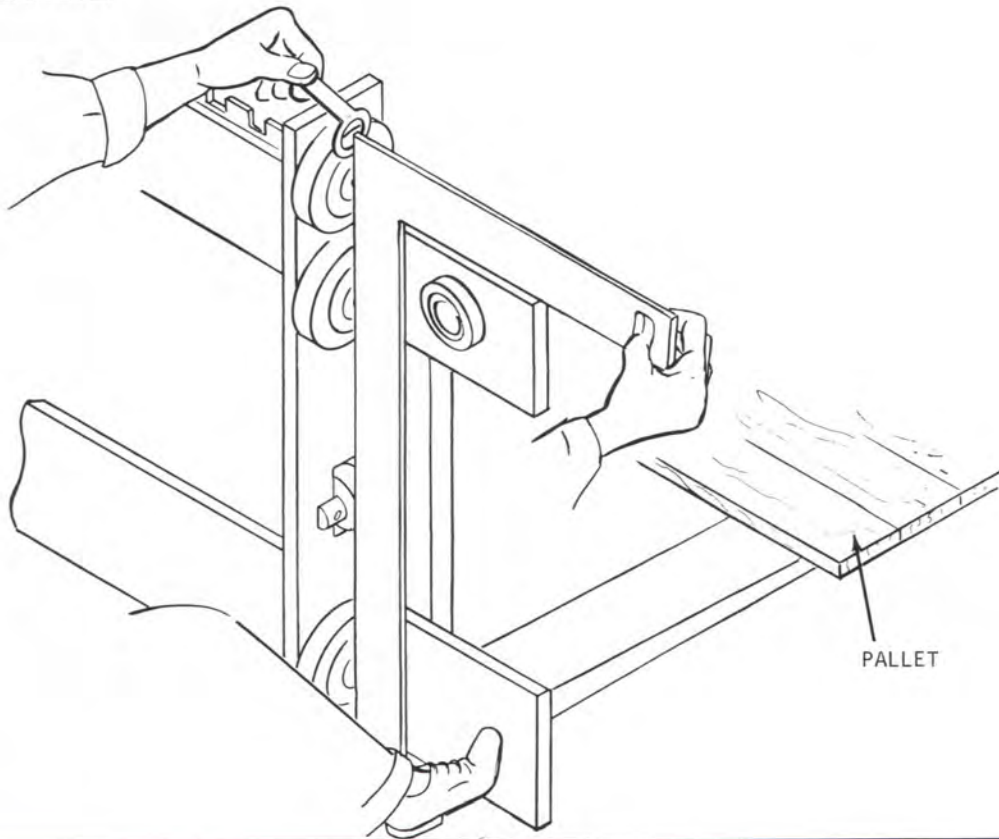


Plate 9580 Top Roller Clearance

Step 1. Place square on the vertical center line of the carriage rollers, as shown above. There must be some clearance between the square and the side surface of the top roller. This clearance should not exceed 1/32" or one shim

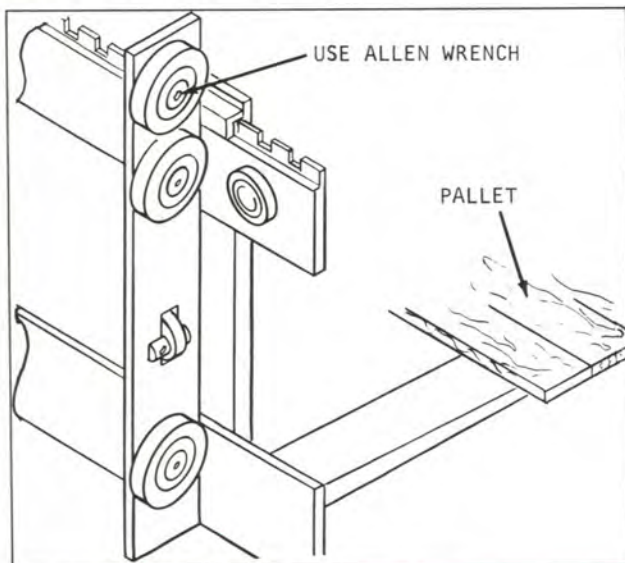


Plate 9581 Removing Top Roller

Step 2. If adjustment is necessary, remove allen screw, lock washer and flat washer to add or remove shims on shaft. Tighten screw securely after completing adjustment.

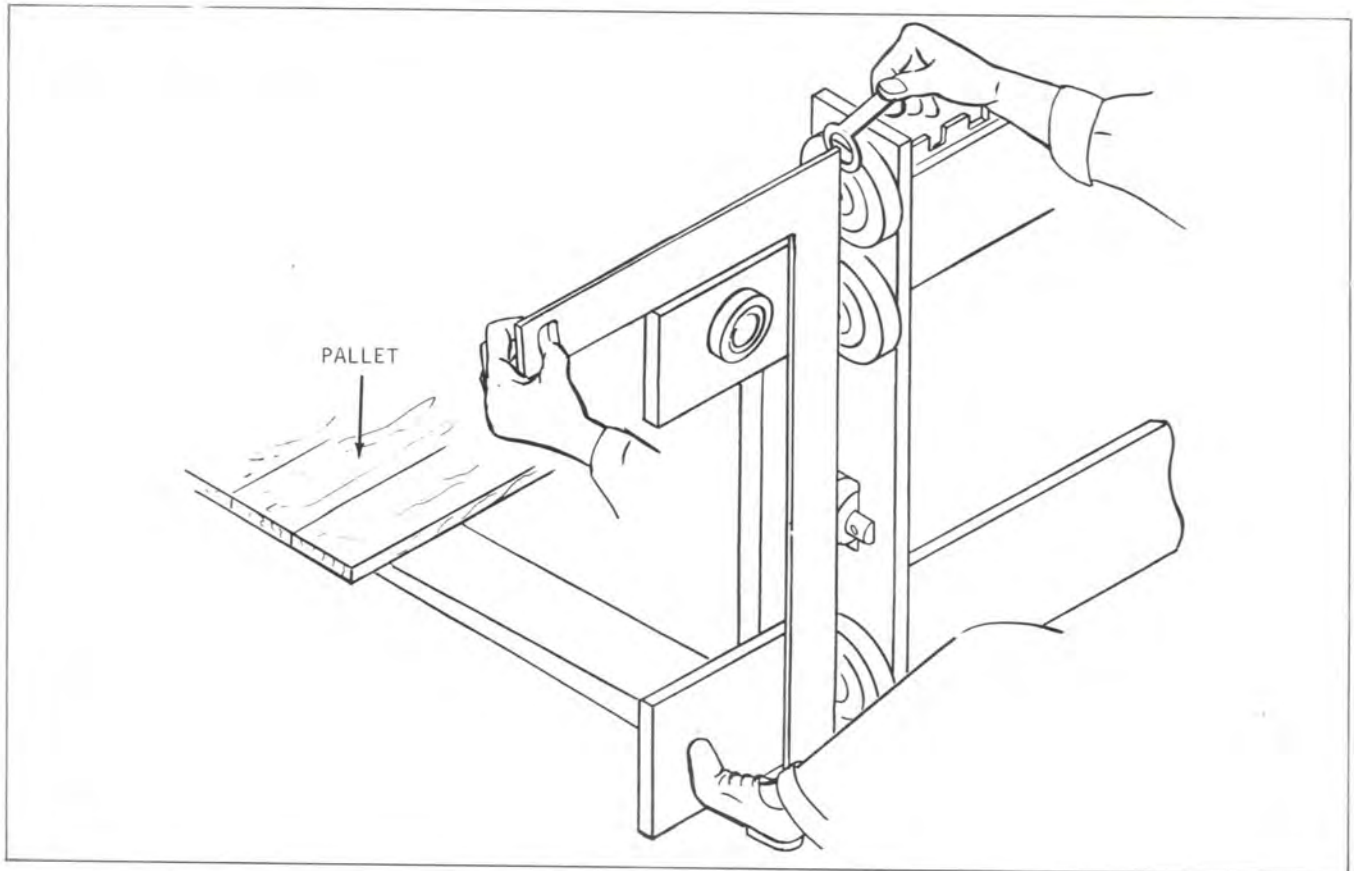


Plate 9582 Top Roller Clearance

Step 3. Check opposite upper roller in the same manner; adjust if necessary.

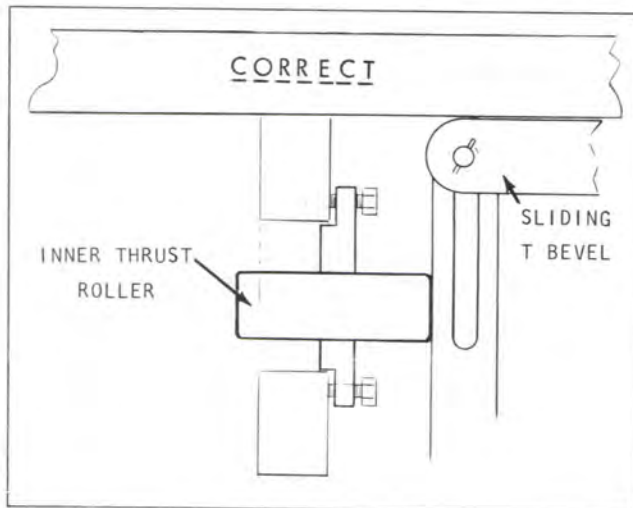


Plate 9583 Checking Squareness ■ CORRECT

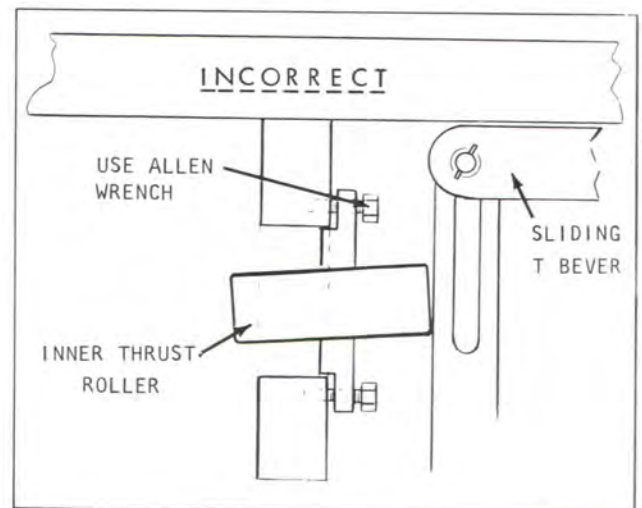


Plate 9584 Checking Squareness ■ INCORRECT

Step 4. Check squareness of inner thrust rollers with Sliding T Bevel. Set Sliding T Bevel to 90° using carpenter's square.

Step 5. Add or subtract shims for adjustment (Use allen wrench see Plate 9584).

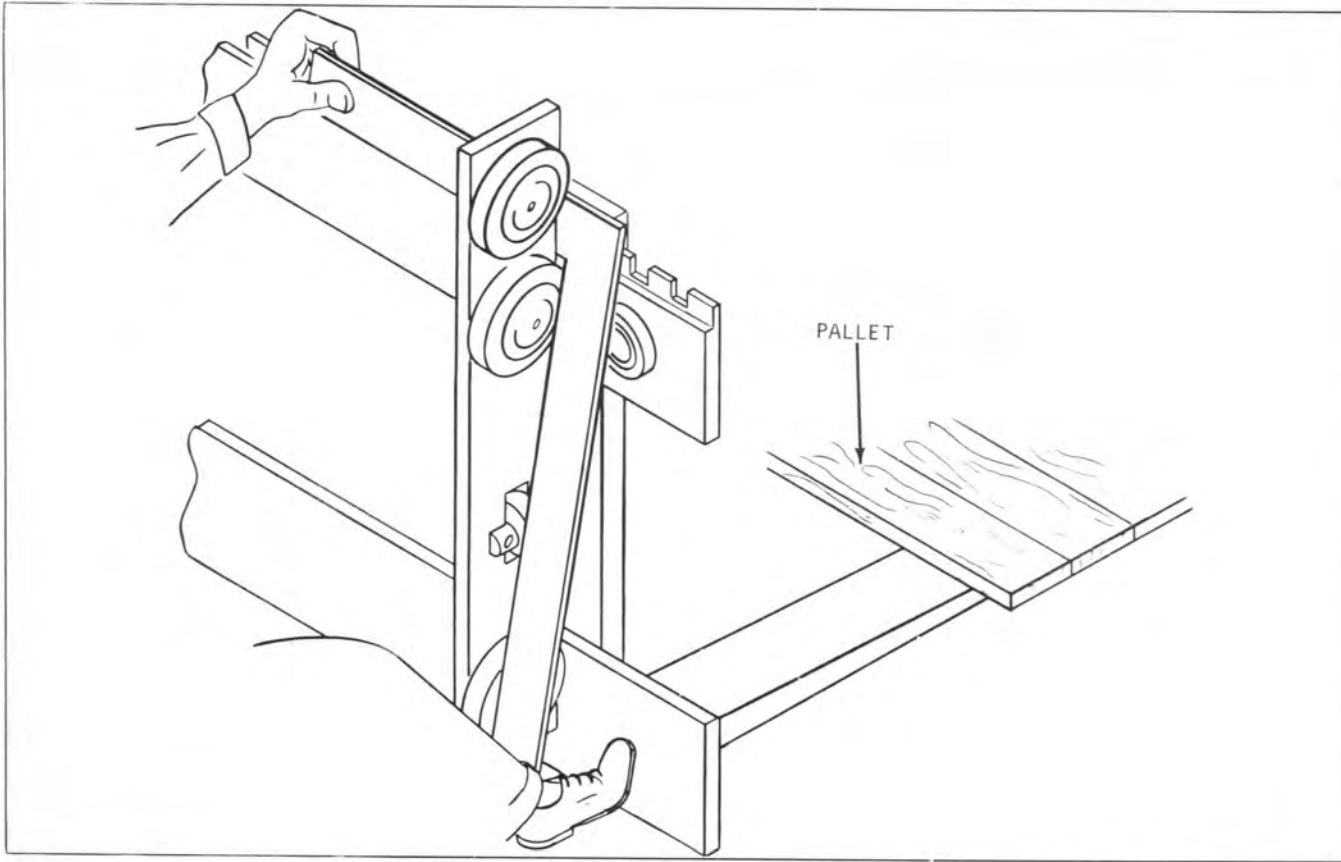


Plate 9574 Square And Side Thrust Roller

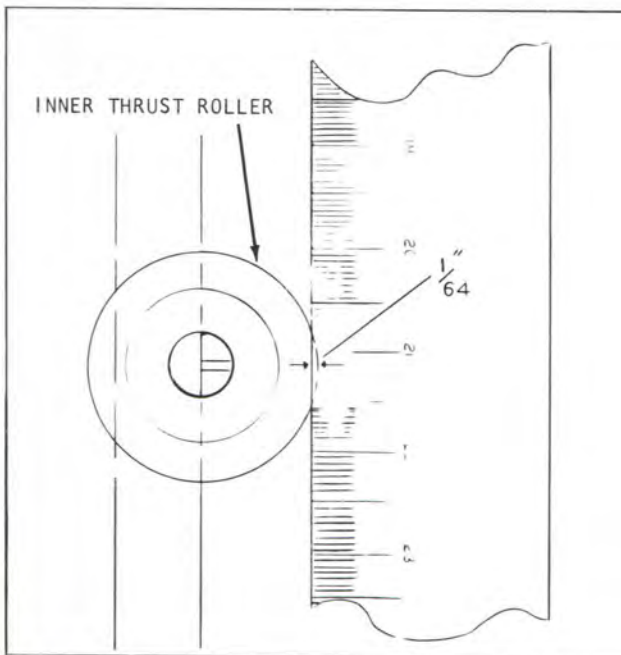


Plate 9585 Reading Roller Projection

Step 6. The inner thrust roller is to project $1/64$ " past line of square. Use one thrust roller shim and eyeball distance as shown (Plate 9573 and Plate 9585).

Step 7. Repeat Step 6. on opposite side.

C. CARRIAGE INSTALLATION

N O T E

Before installing carriage, check upright for proper shimming adjustment.

Step 1. Drive machine up to carriage and position upright to match tilt of carriage.

Step 2. Raise inner rails to just clear upper carriage rollers.

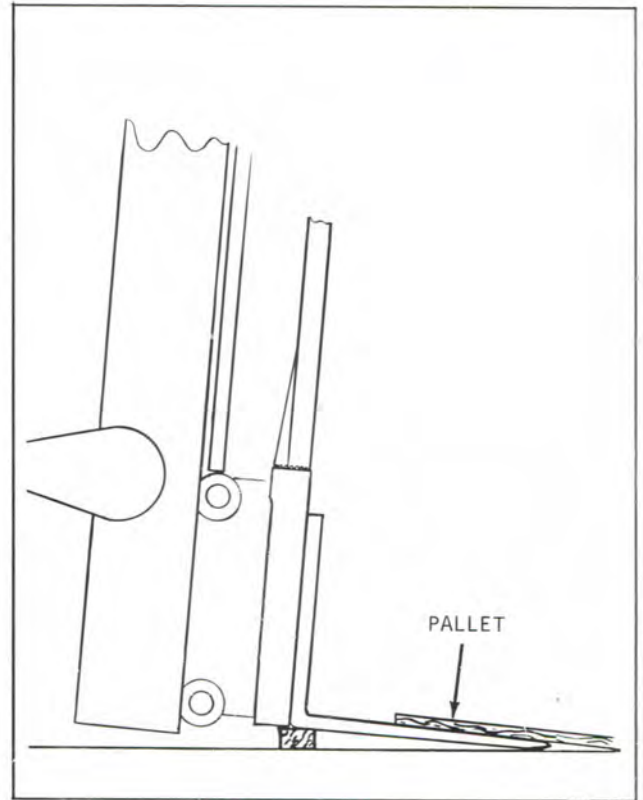


Plate 9565 Inner Rail Clearing Carriage Rollers

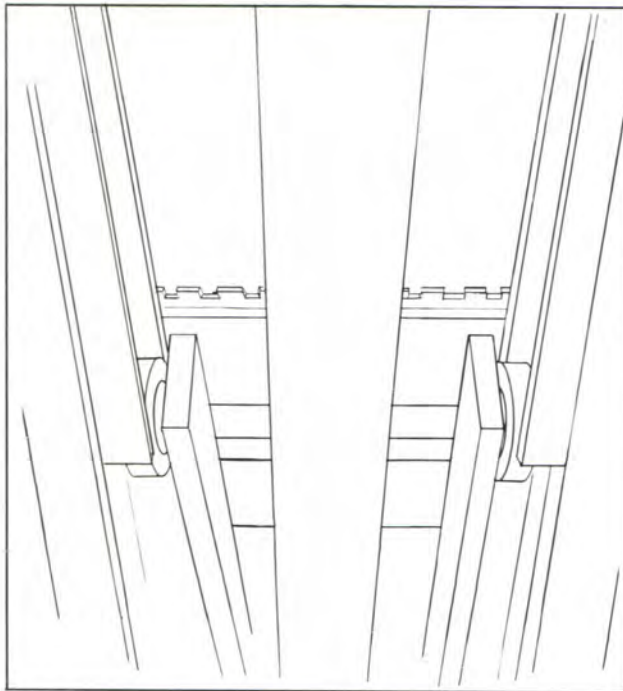


Plate 9591 Rollers Guiding Into Inner Rail

Step 3. Continue to drive machine forward until inner rails line up with upper carriage rollers, then... slowly lower inner rails to full down position.

C A U T I O N

CHECK TO BE SURE THE TOP CARRIAGE ROLLERS ARE GUIDING INTO INNER RAIL.

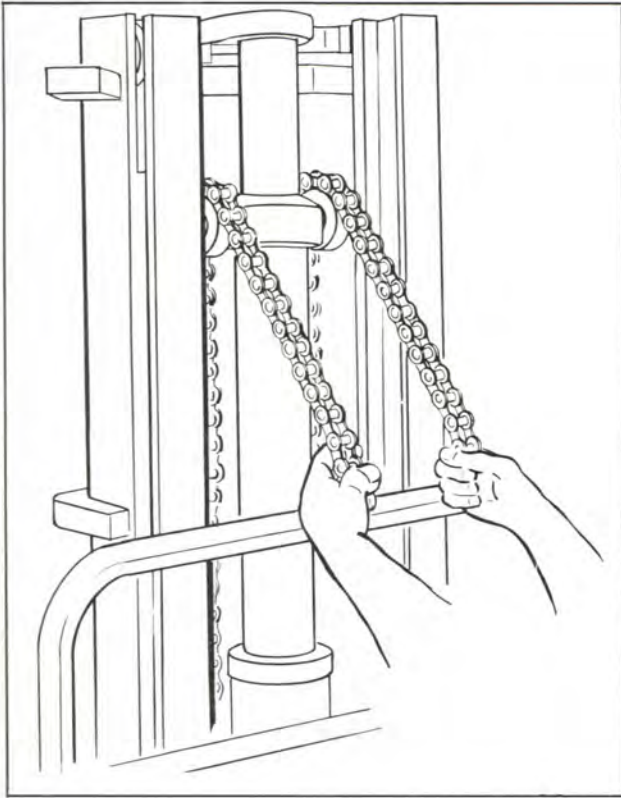


Plate 9586 Pulling Piston Head Down

Step 3(a). Remove wires holding lift chains.

(b). With a chain in each hand and someone holding the lift cylinder lever down, pull the piston to full down position. Place chains behind carriage.

Step 5. Raise carriage about 5' and place a 3' to 4' long 4"x4" wooden beam under it. DO NOT stand directly under forks. Lower carriage onto beam.

Step 6. Replace bolts with anchor pins.

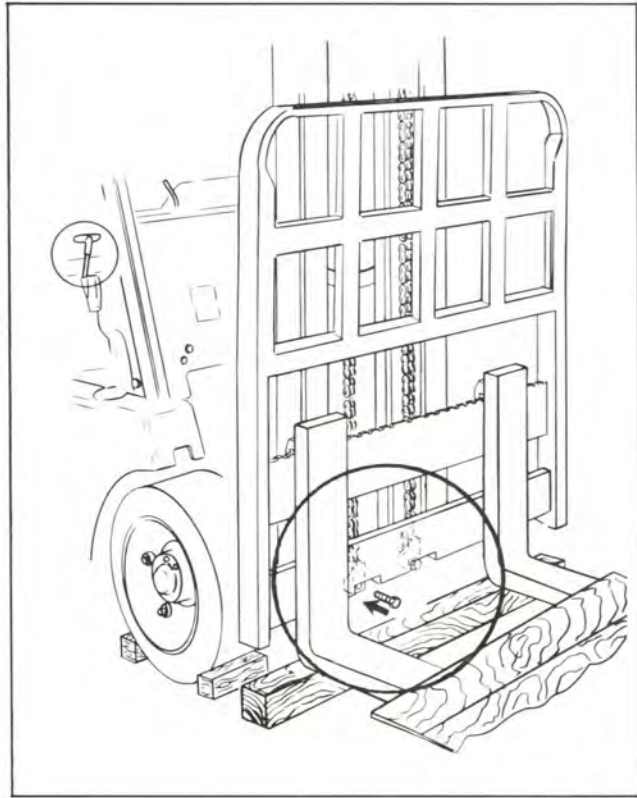


Plate 9587 Installing Bolts

Step 4. Put chain anchors in carriage anchor brackets and install 3/8" x 2" bolts in anchor pin holes.

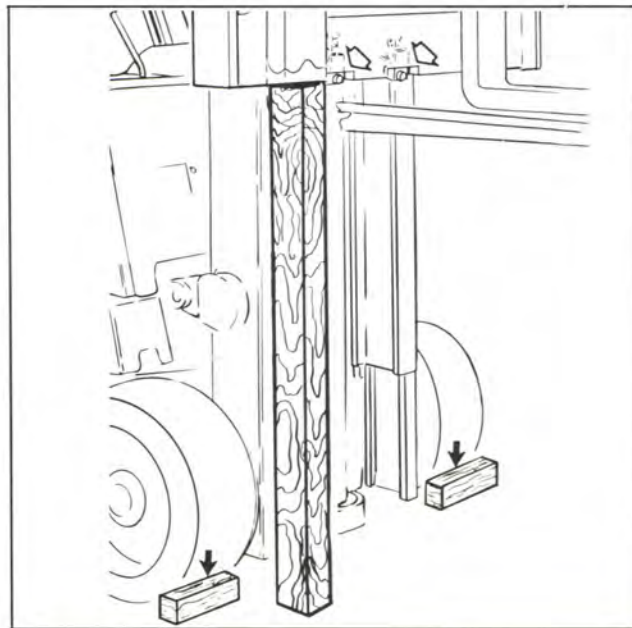


Plate 9593 Carriage Pin Replacement

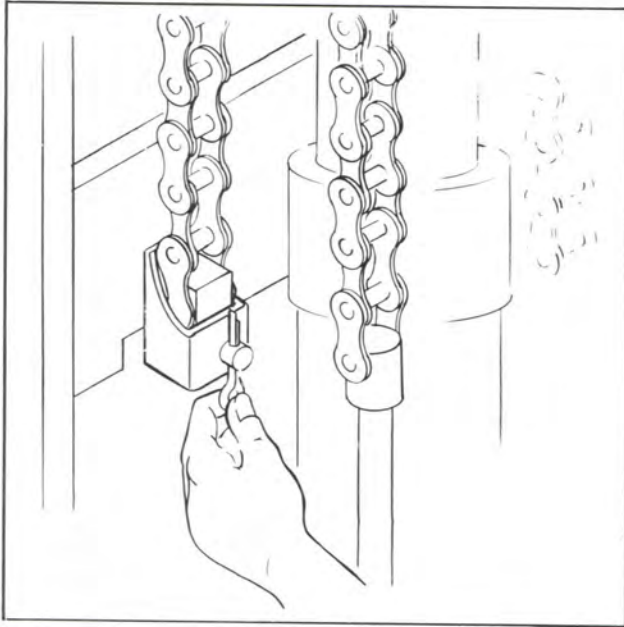
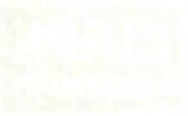
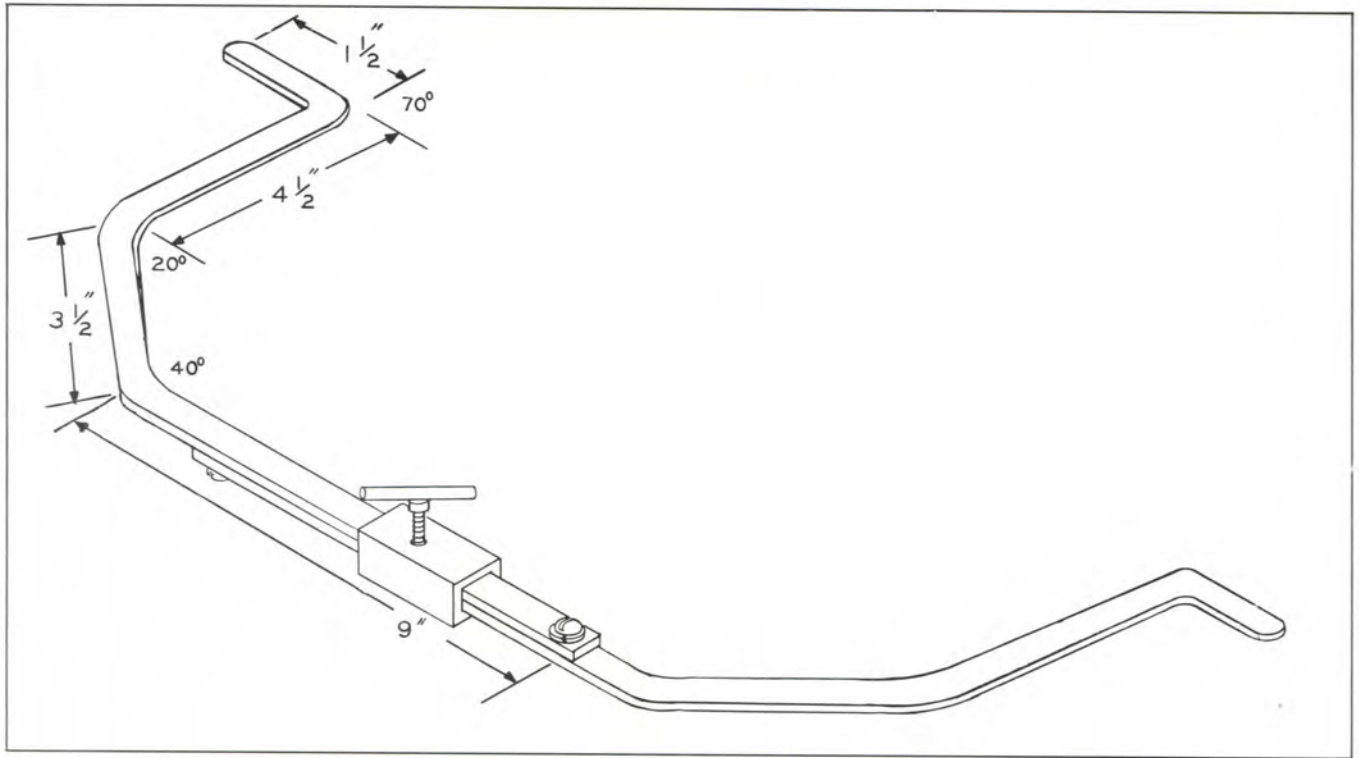


Plate 9588 Installing Cotter Pins

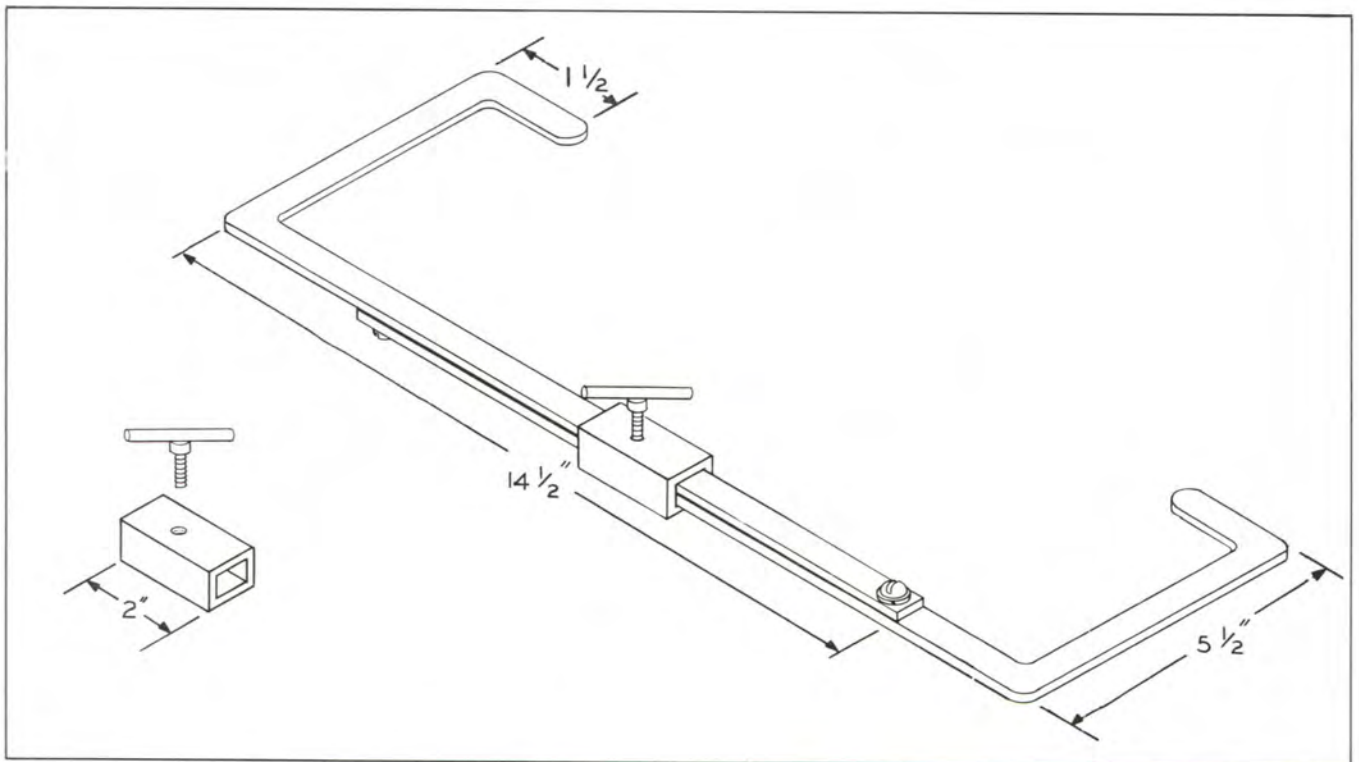
Step 7. Replace cotter pins in anchor pins.

Step 8. Raise and lower carriage to full positions checking all phases of operation.

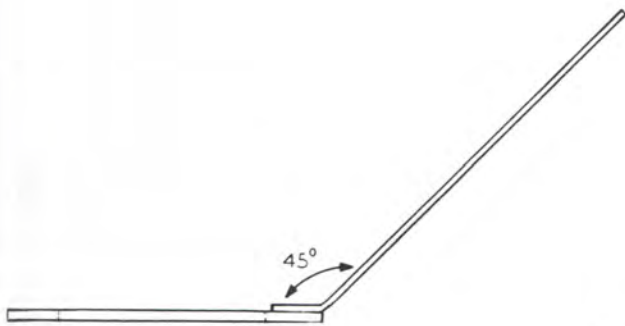
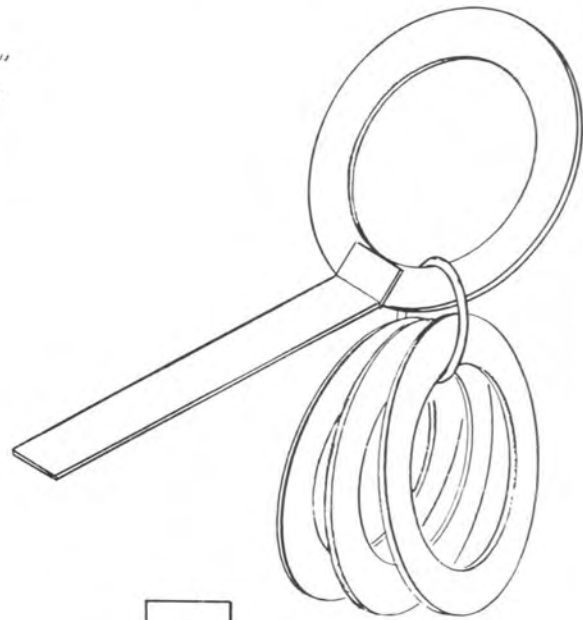
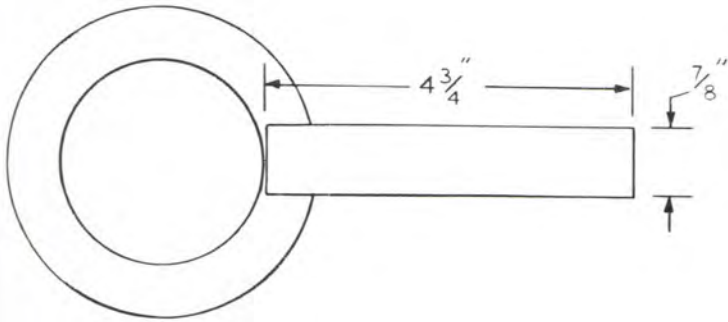




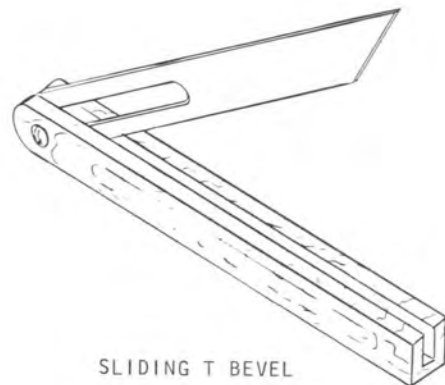
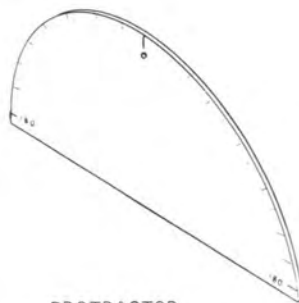
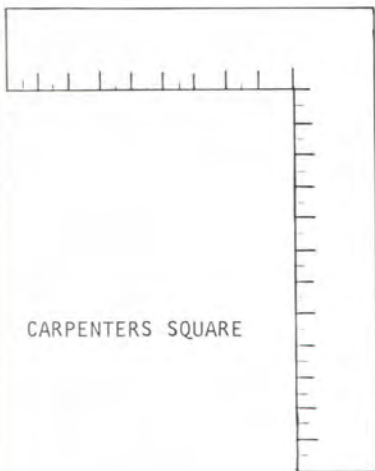
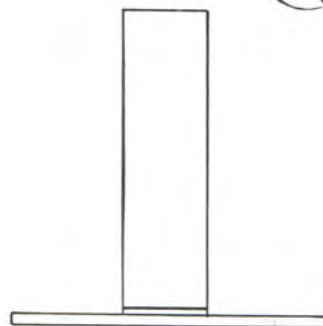
INSIDE SPANNING TOOL



OUTSIDE SPANNING TOOL



SHIM GAUGE



LIFT AND TILT CYLINDERS

Check for drift, leakage at packings, damage and security of mountings. (Anchor pivot pins, flanges and mounting rings).

LIFT CHAINS

The lift chains are mounted to the chain anchors on the lift carriage and at the chain anchor rods near the lift cylinder piston head.

If it becomes necessary to adjust the lift chains, proceed as follows:

W A R N I N G

KEEP CLEAR OF LOAD & CARRIAGE ADJUSTMENTS TO AVOID INJURY IF ANY MALFUNCTION SHOULD OCCUR AND CAUSE LOAD OR CARRIAGE TO FALL.

1. Elevate carriage to about 4 feet.
2. Smear grease on the innerslide channel as shown in Plate 8622.

3. Pick up a capacity load.

N O T E

It is important that the chain adjustment be made with a capacity load. In this manner you will allow for chain stretch.

4. Making sure uprights are either vertical or aft of vertical, lower load to the bottom.
5. Remove capacity load.
6. Raise carriage and measure the distance from where the center of the bottom carriage roller stopped, to the bottom edge of the inner slide. Distance must not be less than $\frac{1}{2}$ ".

LUBRICATE MACHINE

Lubricate all miscellaneous linkage with SAE 20 oil and all grease fittings with chassis grease. (Refer to Lubrication Chart.)

C A U T I O N

WHEN LUBRICATING MACHINE, INSPECT FOR LEAKING HYDRAULIC LINES, FITTINGS AND ELECTRICAL WIRING FOR DAMAGE.

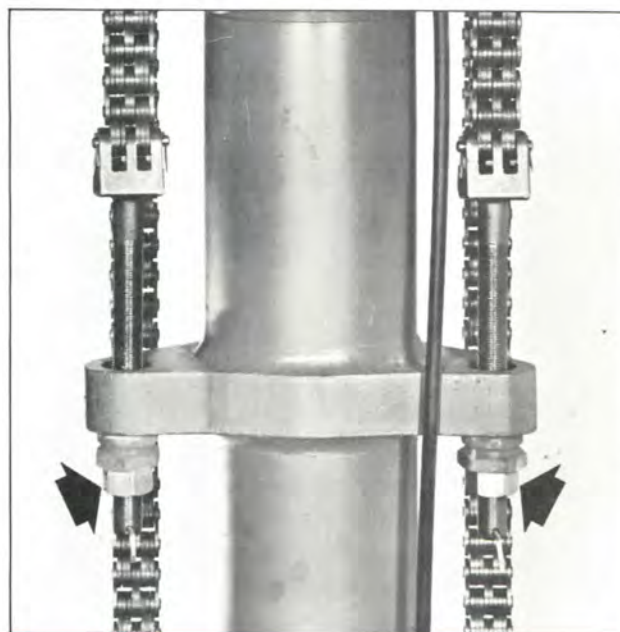


Plate 6634. Lift Chain Adjustment (Chain Anchor Rods)

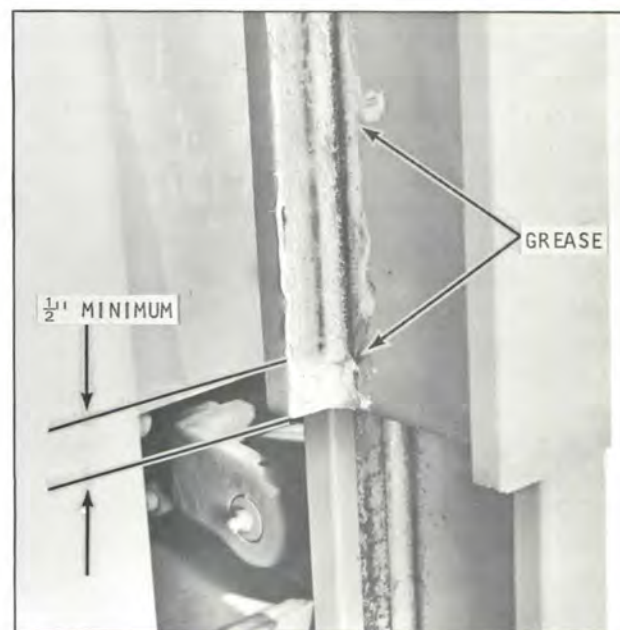
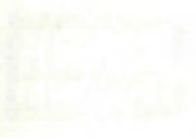


Plate 8622. Lift Chain Adjustment

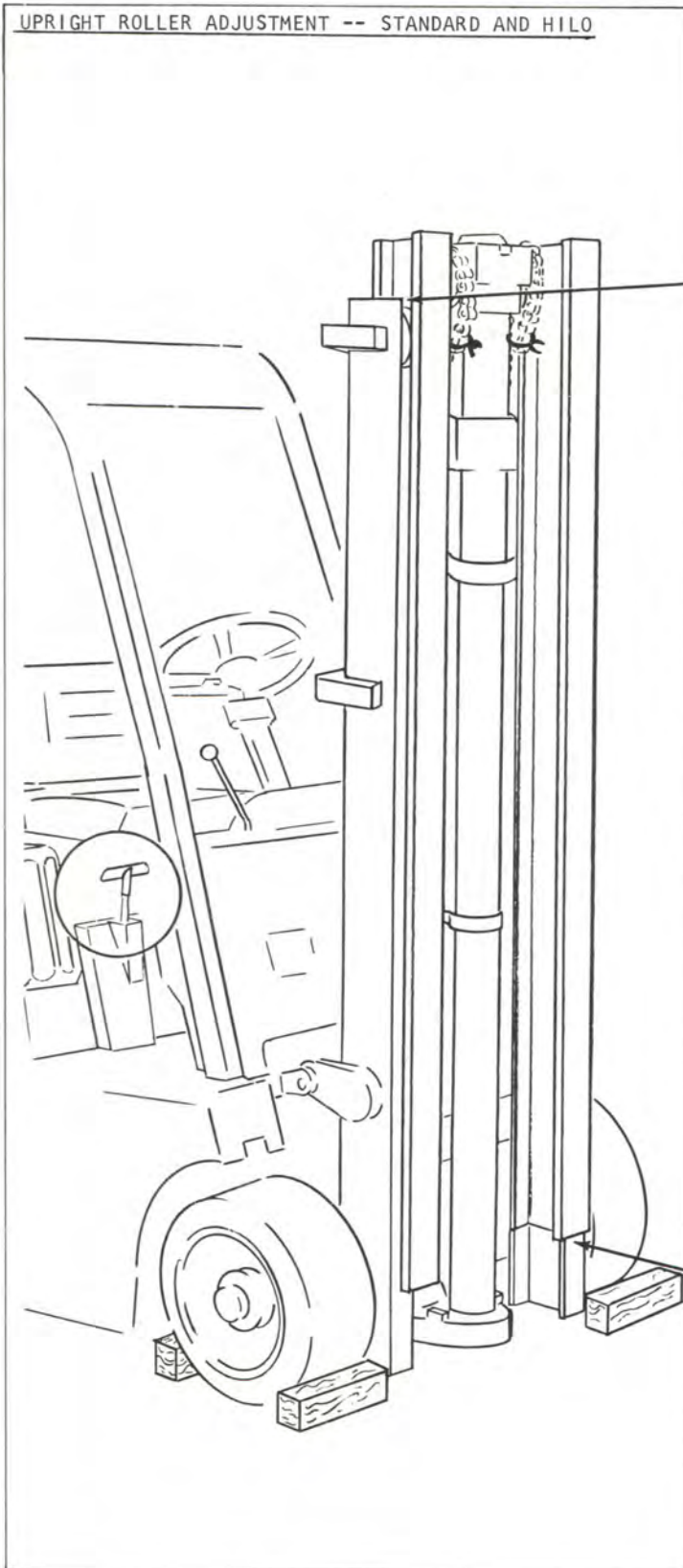


Faint vertical text or markings along the left edge of the page.



UPRIGHT ROLLER ADJUSTMENT

UPRIGHT ROLLER ADJUSTMENT -- STANDARD AND HILO



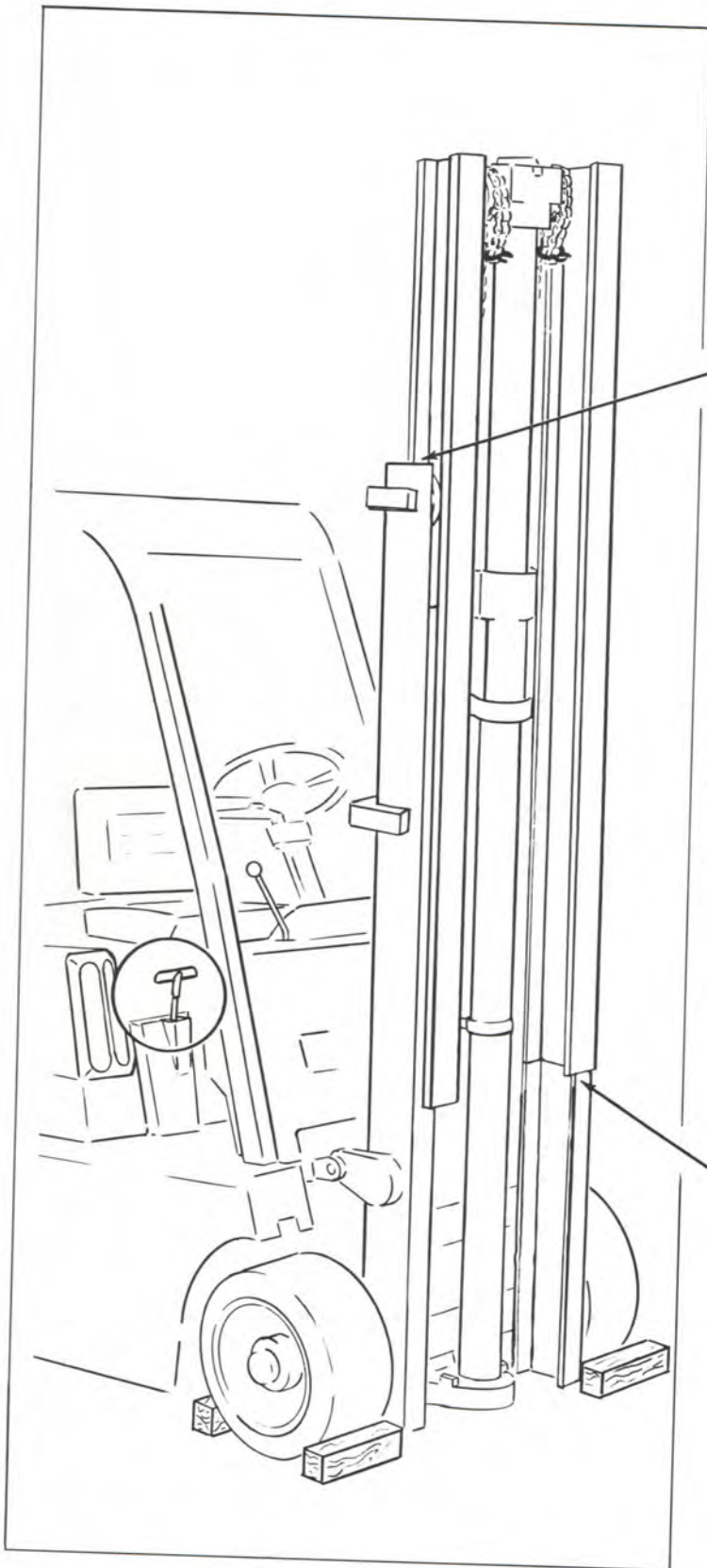
Step 1(a). Remove carriage. Refer to CARRIAGE REMOVAL.

Before checking roller clearance, position inner rail about 5" above full down position.

Check both sides for roller clearance at (top and bottom) of inner rail. Use tool to determine the number of shims to be added and record this number on the rail. Record number of shims to be used, on outer rail (for top rollers only). Record number of shims to be used on inner rail (for bottom rollers only).

There is to be some clearance but it is not to exceed 1/32".

Plate 9624

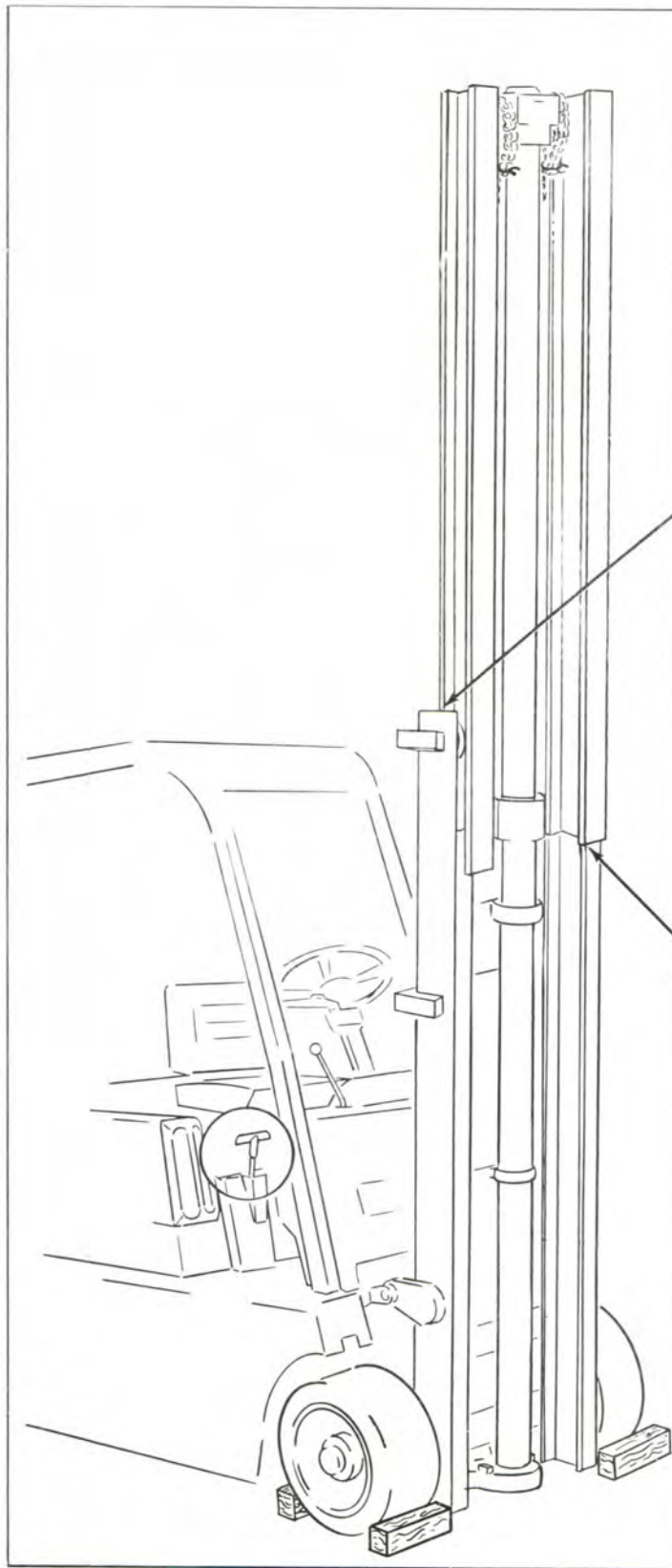


Step 1(b). Raise inner rail to 1/2 of its full up position. With tool and bar, check the roller clearance in the same manner as before.

Record number of shims to be used, on outer rail (for top rollers only).

Record number of shims to be used on inner rail (for bottom rollers only).

Plate 9625



Step 1(c). Raise inner rail to full up position and with tool and bar, check for roller clearance in the manner as before.

Record number of shims to be used, on outer rail (for top rollers only).

Record number of shims to be used, on inner rail (for bottom rollers only).

Plate 9626

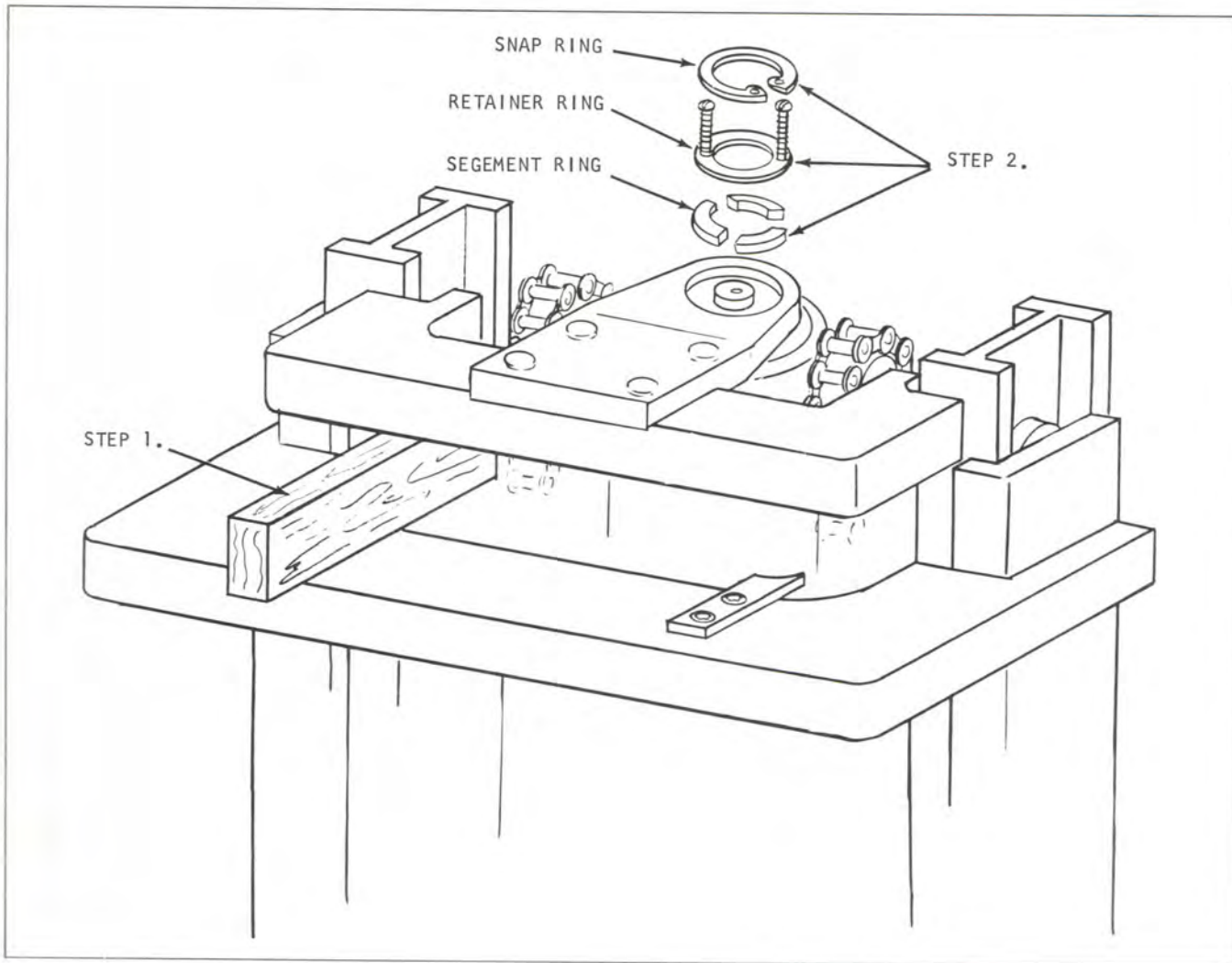


Plate 9627

REMOVAL OF INNER RAIL

Step 1. Raise inner rail about 5 inches and place a 2" x 4" block between upper tie bars. Lower inner rail until block supports it.

The upright you are working with may have a different piston anchor than the one shown above, remove it accordingly.

Step 2(a). Secure piston head with chain hoist.

(b). Remove lift cylinder from upper anchor

1. Remove snap ring

2. Place two (2) #6-32X2" round head slotted machine screws (in holes provided) in retainer ring.

(c). Remove segment ring.

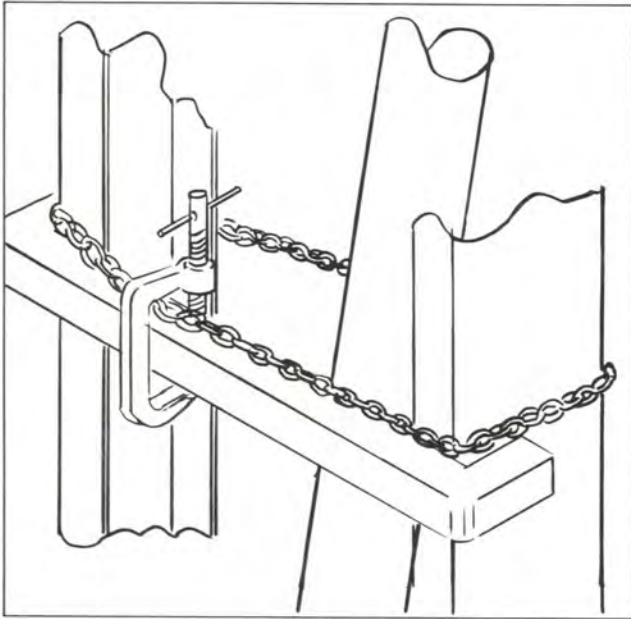


Plate 9628

Step 3. Place a safety strap or chain around outer rail as shown.

Step 4. Lower piston head out of anchor using pry bar. With the upright tilted forward the piston will rest on the strap or chain.

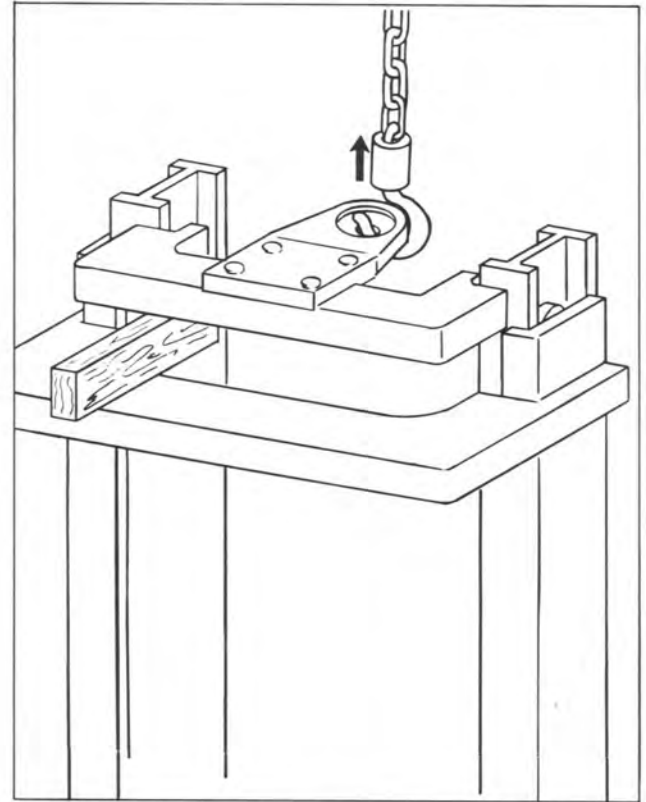


Plate 9630

Step 6. Place lifting device hook in hole of cylinder anchor. Raise about 2" and remove block between tie bars.

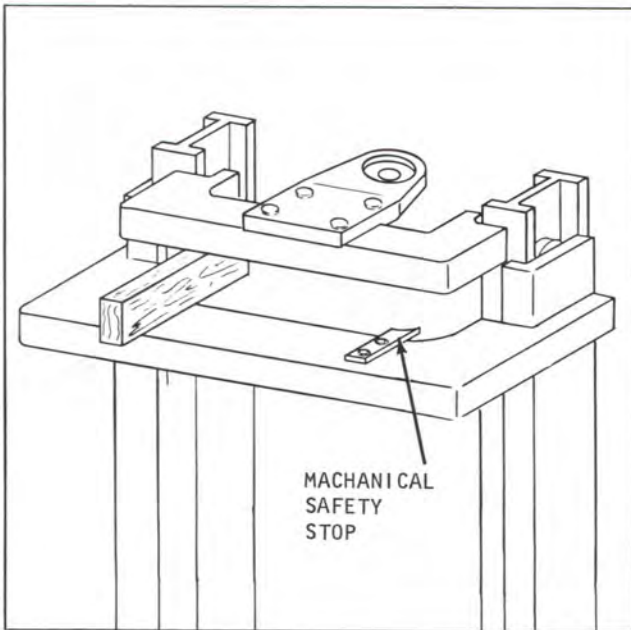
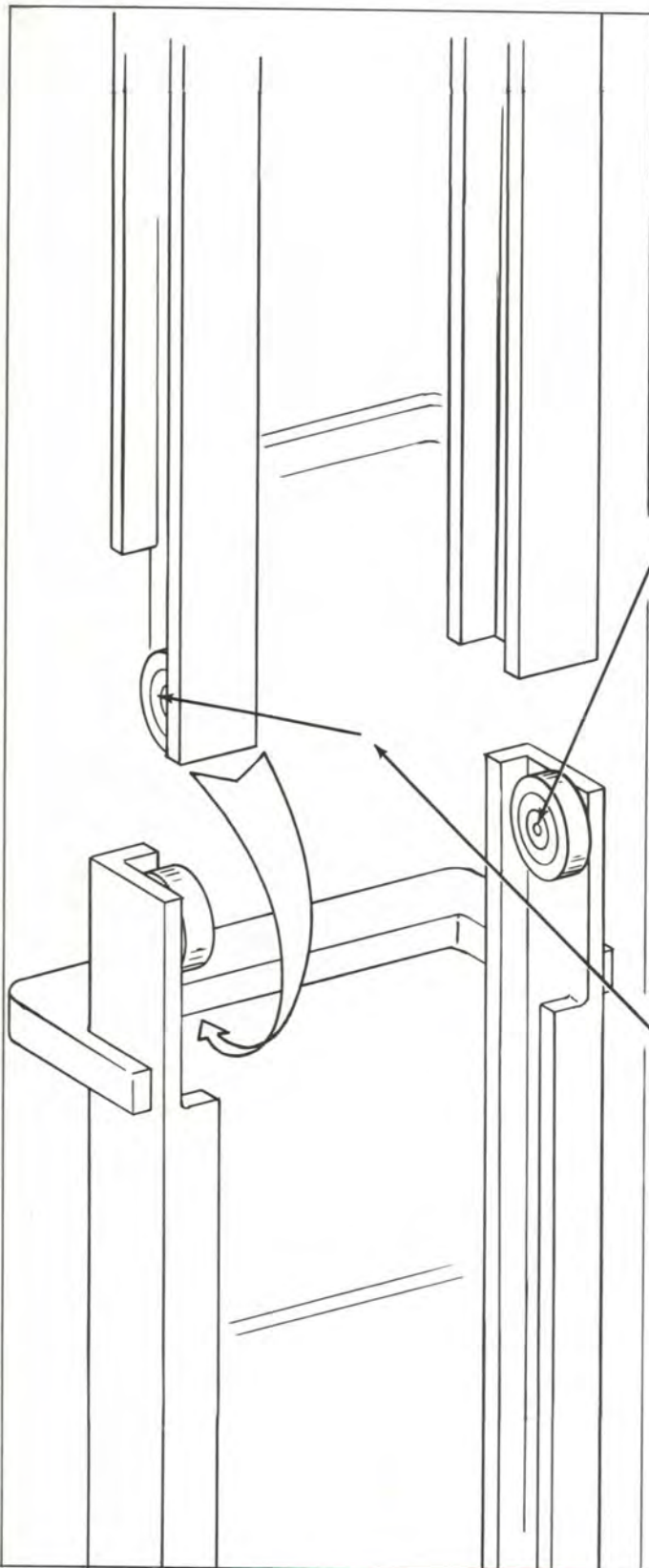


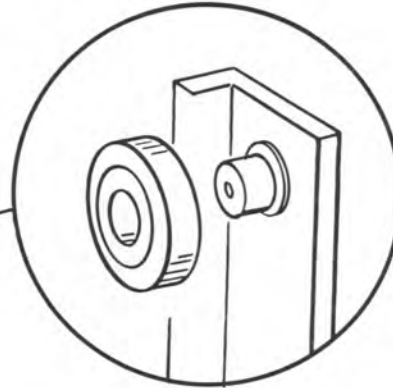
Plate 9629

Step 5. Remove mechanical safety stops with allen wrench.



Step 7. Raise inner rail out of outer rail.

Step 8. Leave inner rail in this position while adjusting rollers.



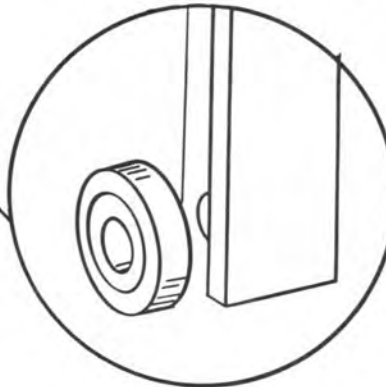
Step 9. Adjusting upright rollers:

A. Outer rail rollers.

1. Count the number of shims at the right and left hand rollers.

2. Look at the three (3) numbers you recorded on the outer rail in Step 1. The smallest of these numbers is the total number of shims to be added. A "0" means DO NOT add shims.

3. Your target for adjustment is to have the same number of shims at each upper roller. If you end up with an extra shim DO NOT remove it. Mark the side having an extra shim.



B. Inner rail rollers

1. Count the number of shims at the right and left hand rollers.

2. Look at the three (3) numbers you recorded on the inner rail in Step 1. Go through the same steps you followed in adjusting the upper rollers.

3. If you end up with an extra shim here too, be sure it is on the same side as the extra upper shim.

C. Replace inner rail.

Plate 9631

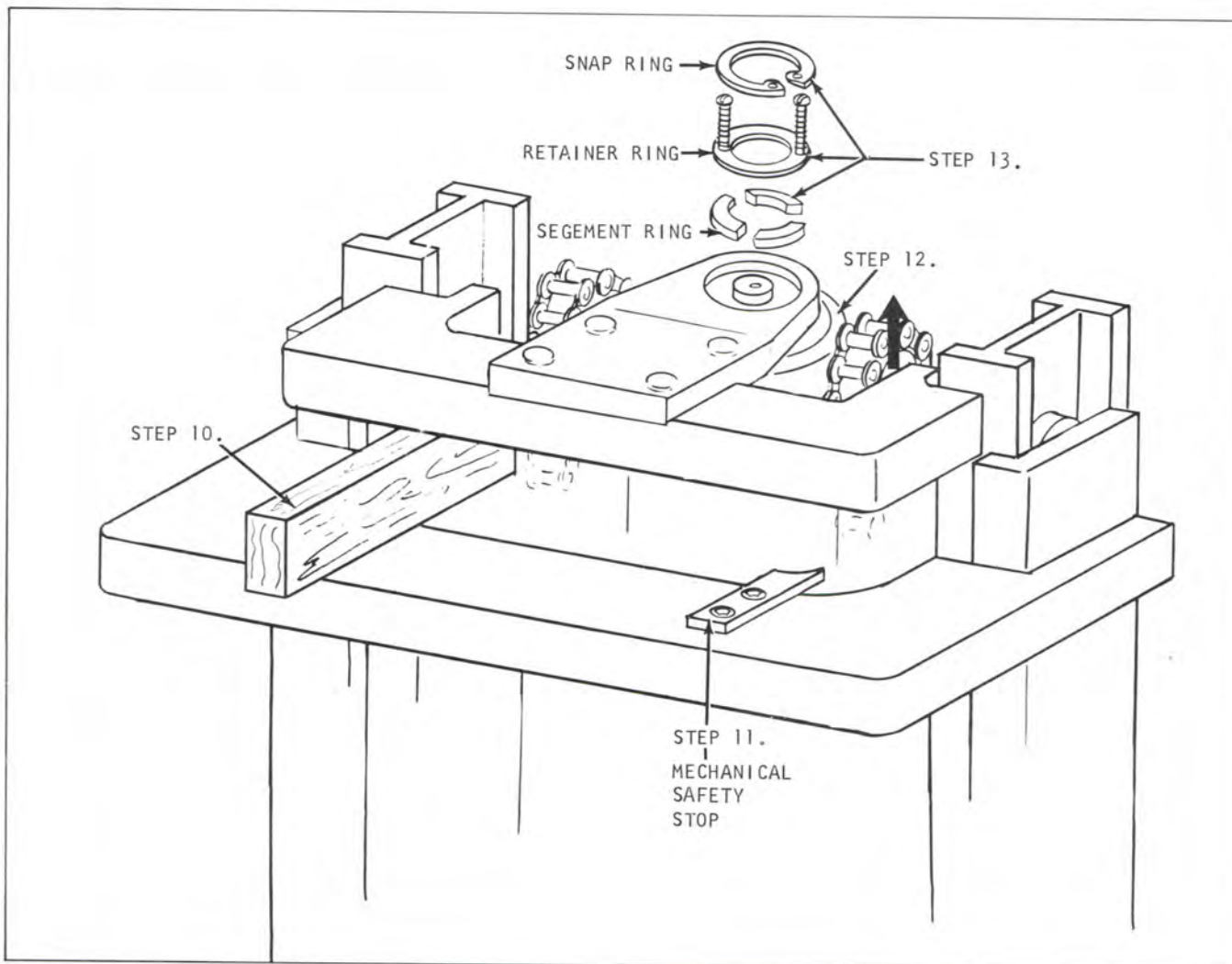


Plate 9632

Step 10(a). Place block between upper tie-bars. Lower inner rail until block supports it.

(b). Unhook lifting device.

Step 11. Install mechanical safety stops. Besure to install lock washer and screw fasteners.

Step 12. Guide piston into anchor with one hand and move the lift lever with the other.

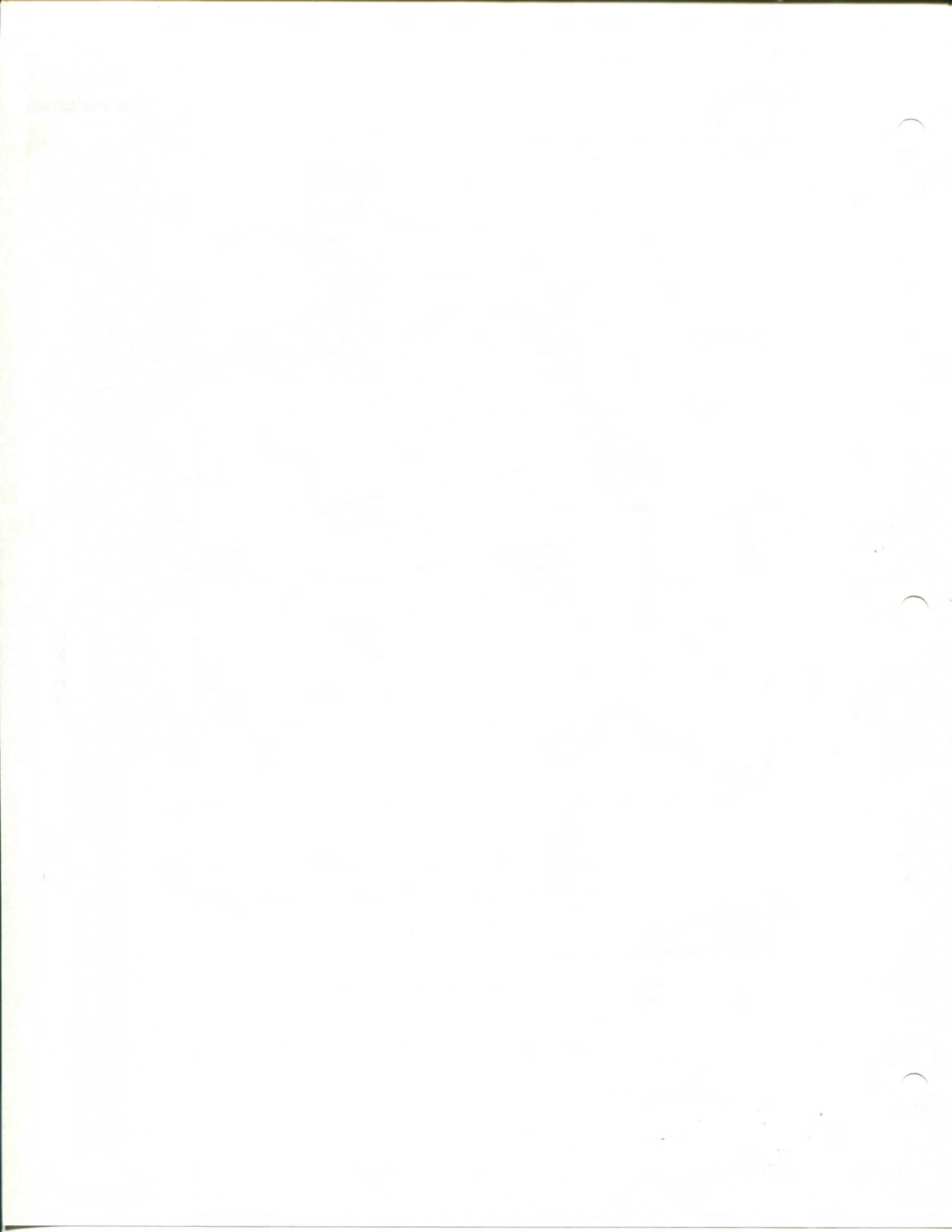
Step 13. Secure lift cylinder to anchor.

(a). Install segement ring.

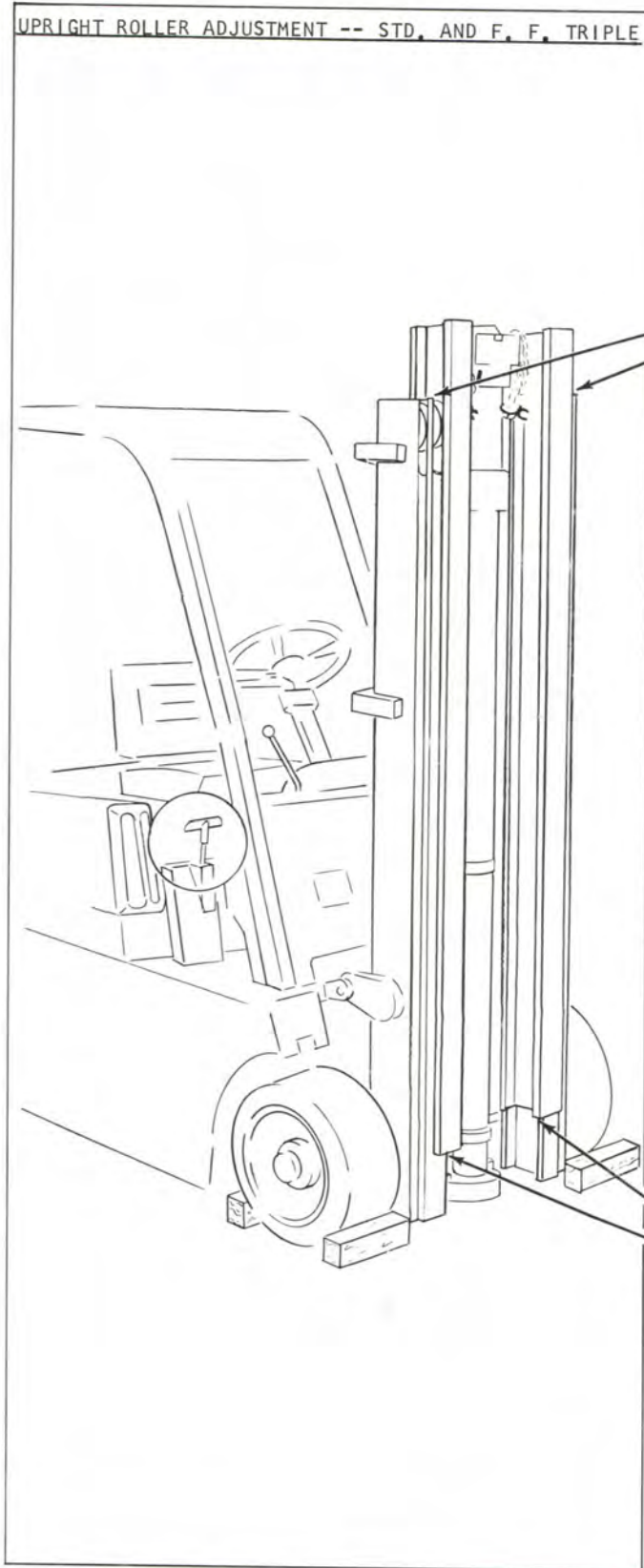
(b). Install retainer ring and remove both slotted machine screws.

(c). Install snap ring.

(d). Raise and lower to full positions checking piston and anchor. Remove block between tie bars.



UPRIGHT ROLLER ADJUSTMENT -- STD. AND F. F. TRIPLE



Step 1(a). Remove carriage.

Before checking, position inner rail about 5 inches above full down position.

Check both sides for roller clearance at (top and bottom) of inner rail. Use tool to determine the number of shims to be added and record this number on the rail.

Record number of shims to be used, on intermediate rail (for top rollers only).

Record number of shims to be used on inner rail (for bottom rollers only).

There is to be some clearance but it is not to exceed 1/32 inch.

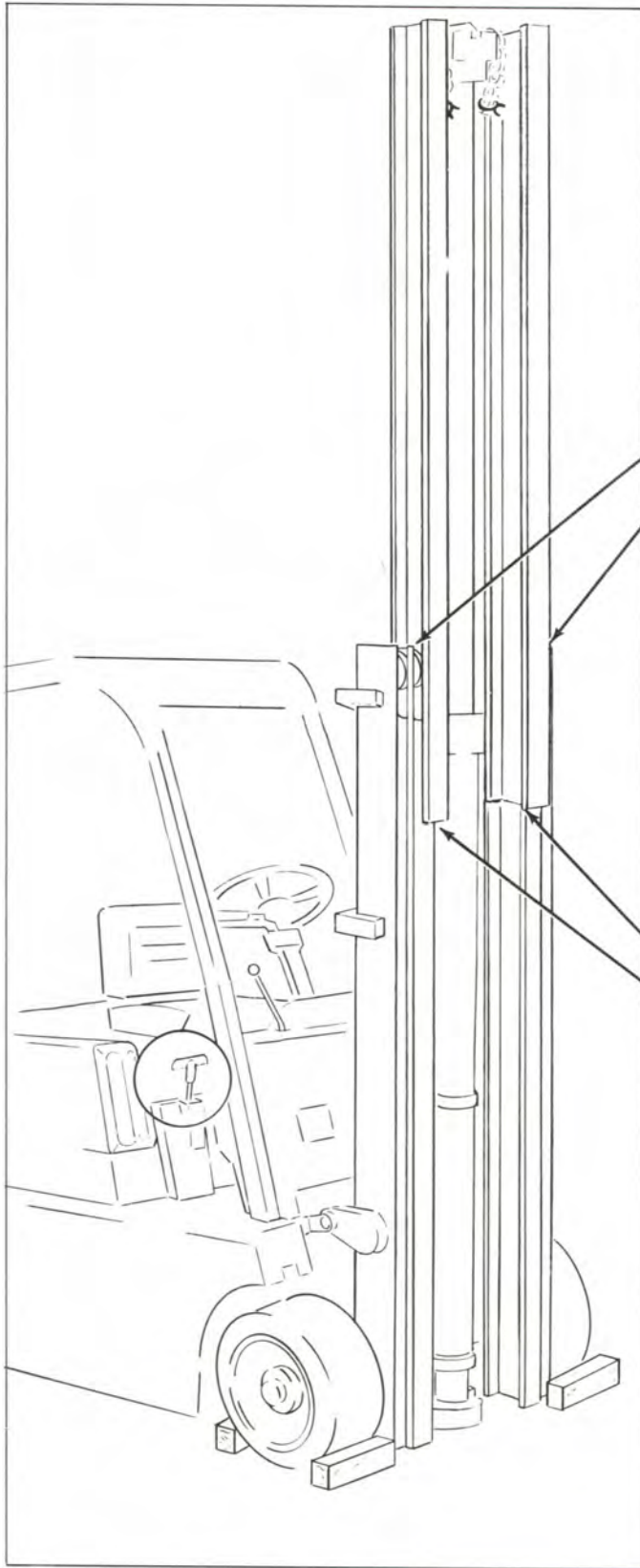
Plate 9636



Step 1(b). Raise inner rail to 1/2 of its full up position. Check roller clearance in the same manner as before.

Record number of shims to be used, on intermediate rail (for top roller only).

Record number of shims to be used, on inner rail (for bottom rollers only).

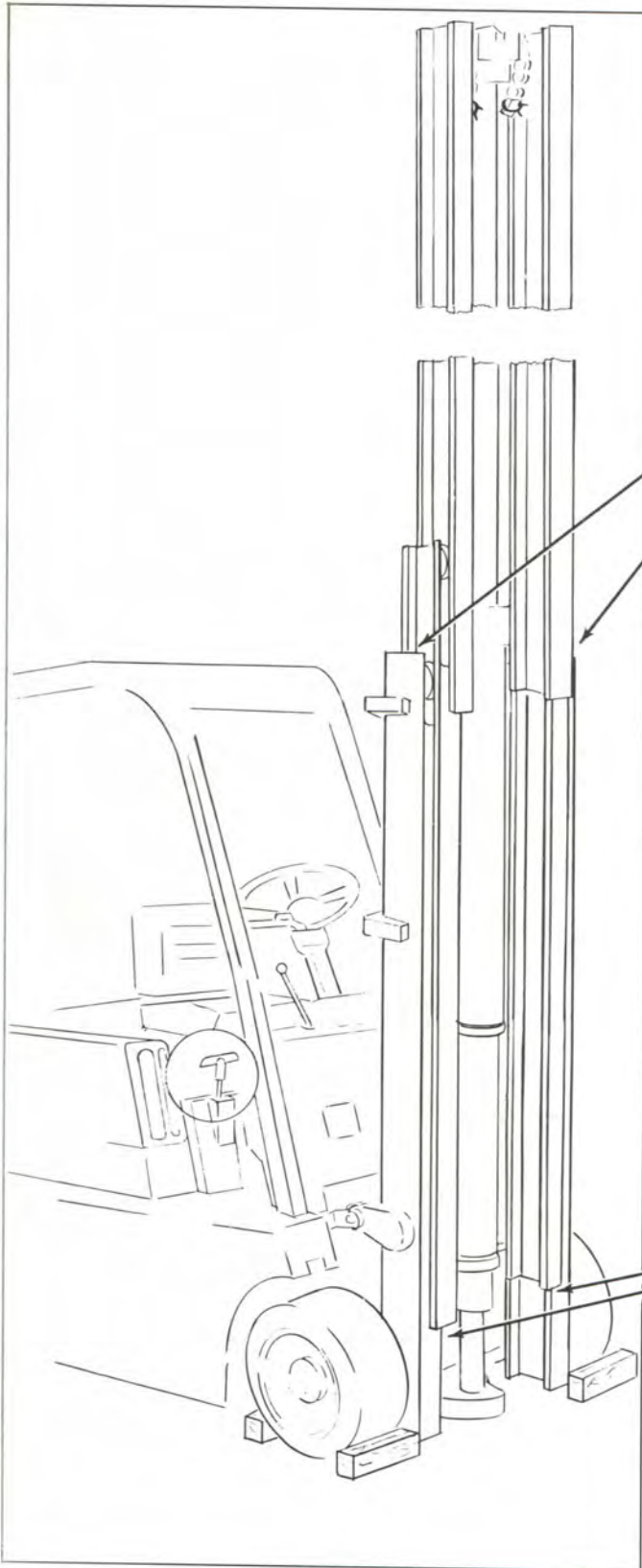


Step 1(c). Raise inner rail to full up position. Check roller clearance in the same manner as before.

Record number of shims to be used, on intermediate rail (for top rollers only).

Record number of shims to be used, on inner rail (for bottom rails only).

Plate 9638



Step 2(a). Raise intermediate rail about 5 inches. Check roller clearance in the same manner as before.

Record number of shims to be used, on outer rail (for top rollers only).

Record number of shims to be used, on intermediate rail (for bottom rollers only).

Plate 9639



Step 2(b). Raise intermediate rail to 1/2 its full up position. Check roller clearance in the same manner as before.

Record number of shims to be used, on outer rail (for top rollers only).

Record number of shims to be used, on intermediate rail (for bottom rollers only).

Plate 9640



Step 2(c). Raise intermediate rail to full up position. Check roller clearance in the same manner as before.

Record number of shims to be used, on outer rail (for top rollers only).

Record number of shims to be used, on inner rail (for bottom rollers only).

Plate 9641

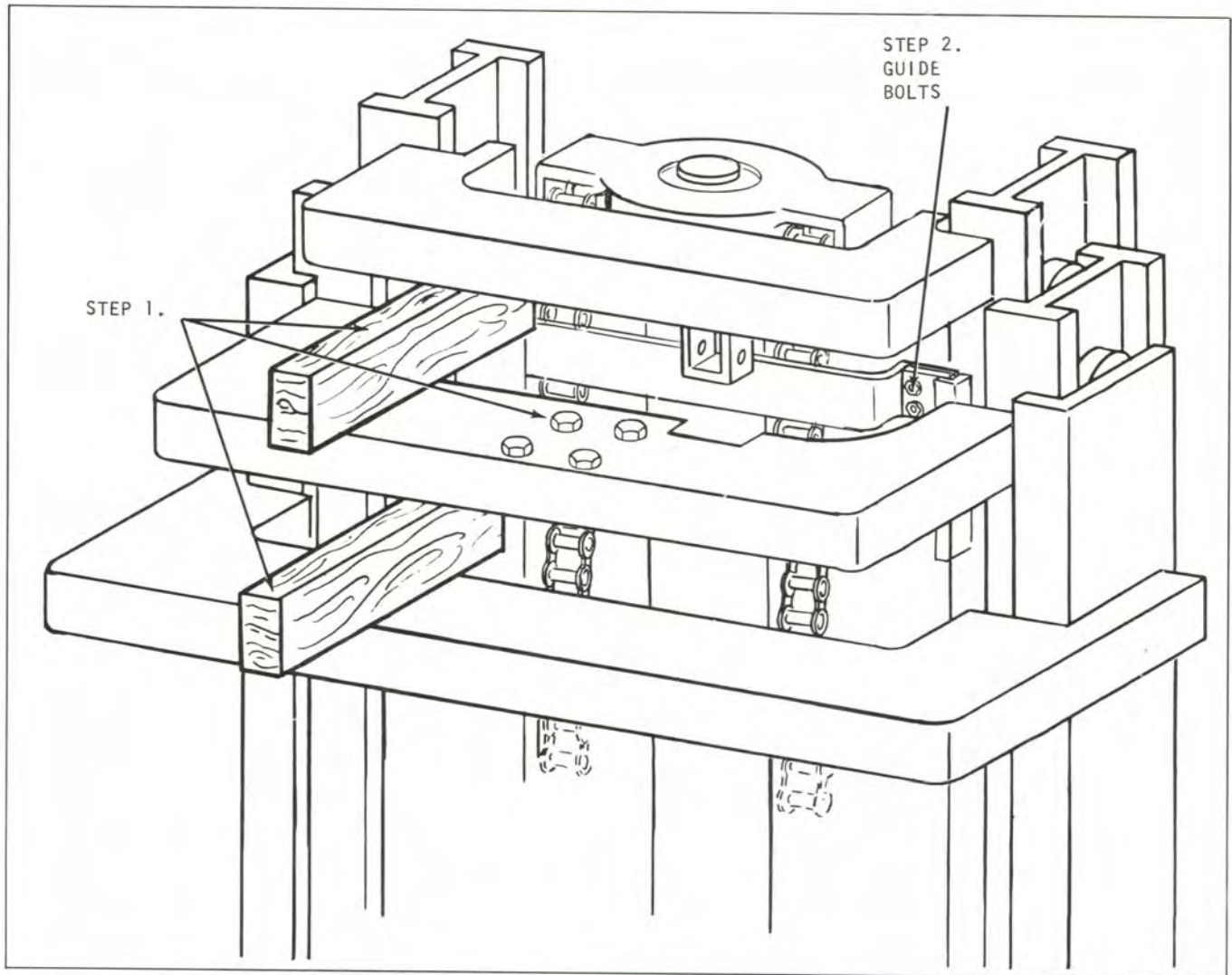
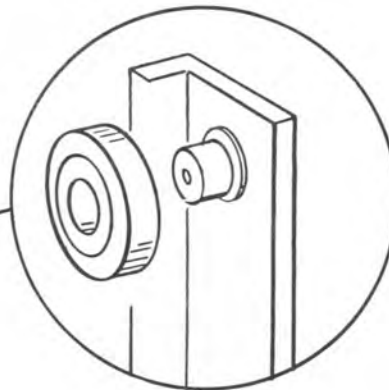
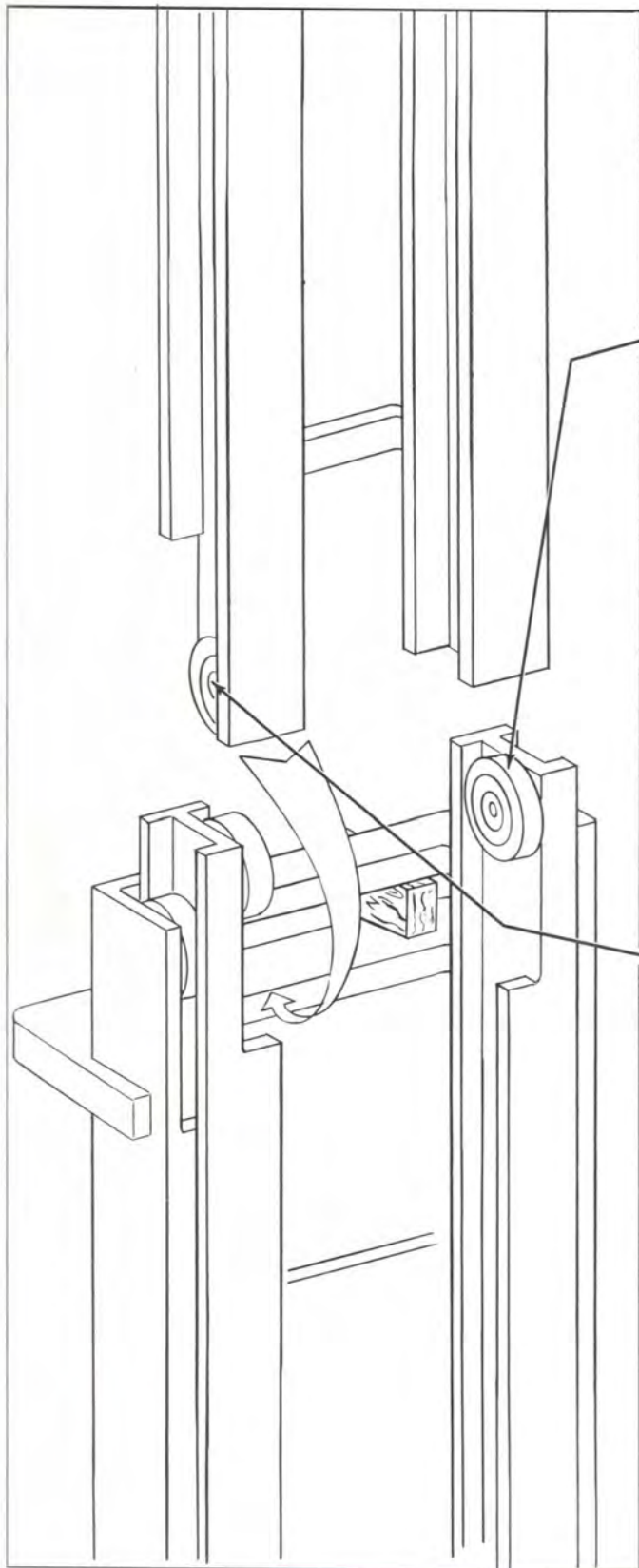


Plate 9642 Standard Triple Piston Head

REMOVAL OF RAILS--STANDARD TRIPLE

- Step 1. Place blocks between inner and intermedaite rail tie bars. Remove mechanical safety stops.
- Step 2. Pull piston head down far enough to get at piston head guide bolts. Remove both piston head guides.
- Step 3. Pull piston head to full down position.

Step 4. Remove inner rail and leave it in this position while adjusting rollers.

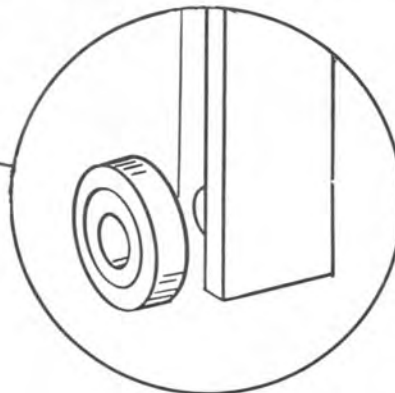


A. Intermediate rail rollers:

1. Count the number of shims at the right and left hand rollers.

2. Look at the three (3) numbers you recorded on the intermediate rail in Step 1. The smallest of these numbers is the total number of shims to be added. A "0" means DO NOT add shims.

3. Your target for adjusting is to have the same number of shims at each upper roller. If you end up with an extra shim DO NOT remove it. Mark the side having an extra shim.



B. Inner rail rollers.

1. Count the number of shims at the right and left hand rollers.

2. Look at the three (3) numbers you recorded on the inner rail in Step 1. Go through the same steps you followed in adjusting the upper rollers.

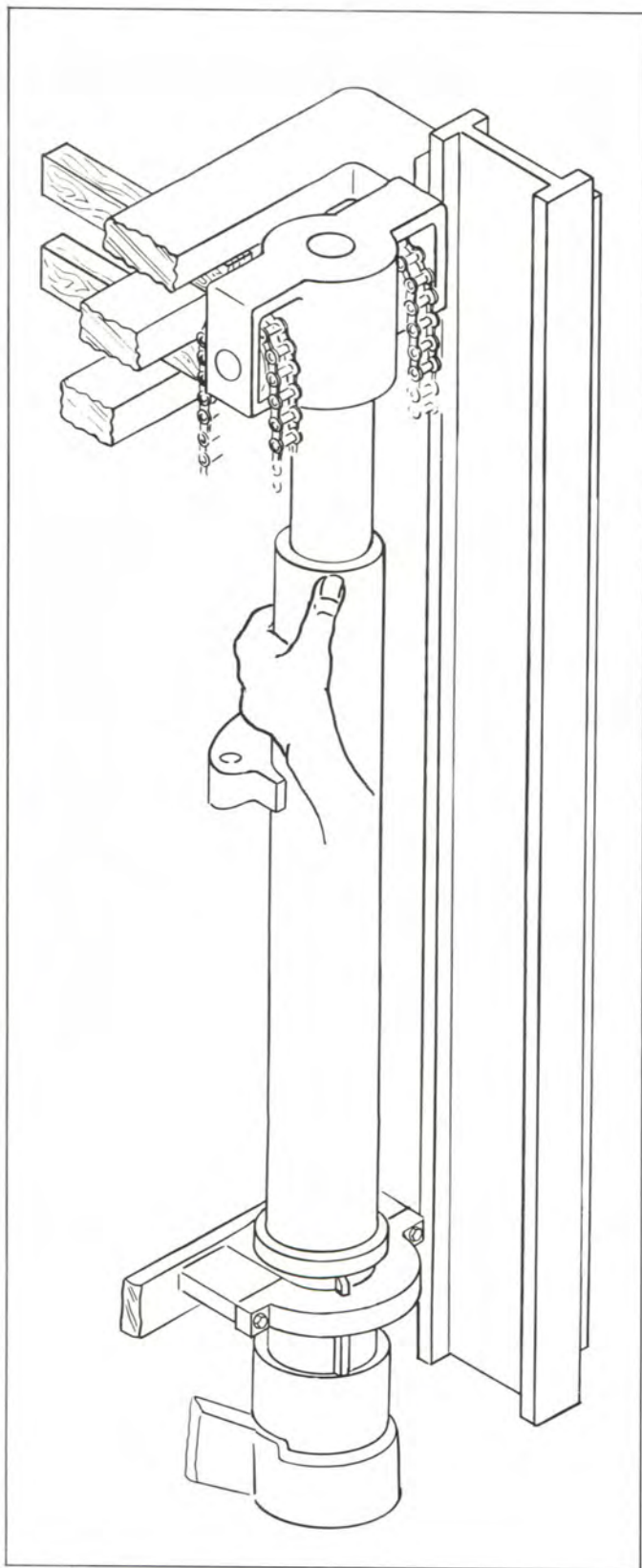
3. If you end up with an extra shim here too, be sure it is on the same side as the extra upper shim.

C. Replace inner rail.

NOTE

Refer to next page.

Plate 9643



N O T E

With one hand pull piston head forward to let tie bar pass by piston head freely.

Plate 9644

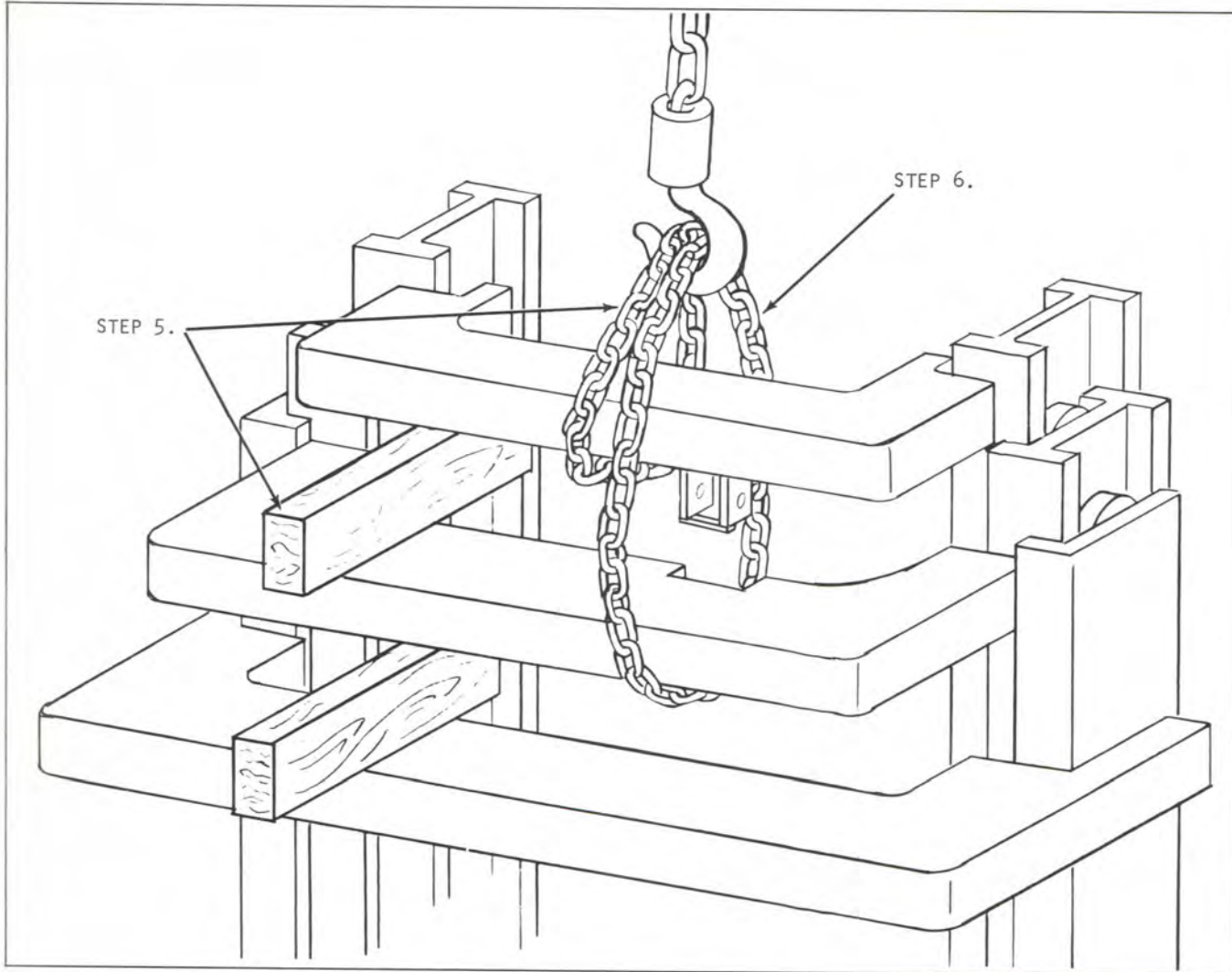


Plate 9645 Chain Placement

Step 5. Replace block and remove chain hoist.

Step 6. Remove intermediate rail assembly.

(a). Place chain around inner and intermediate rail assembly as shown above.

Step 6(b). Place a strap or chain around outer rail and secure. This will support lift cylinder.

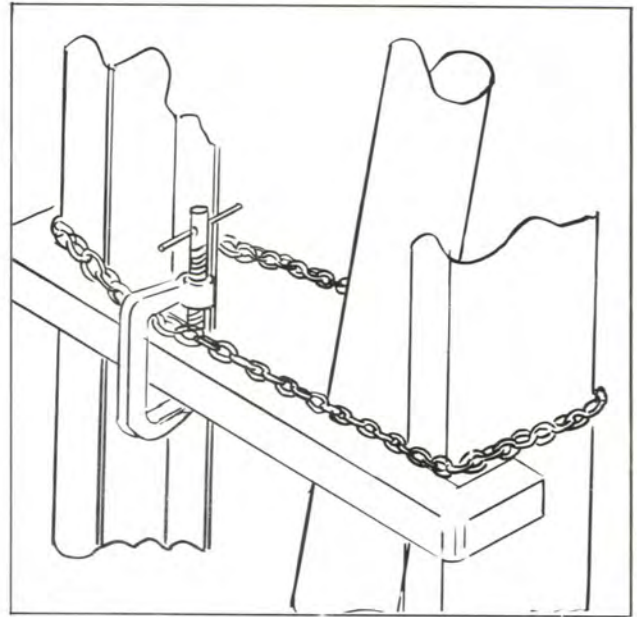


Plate 9628

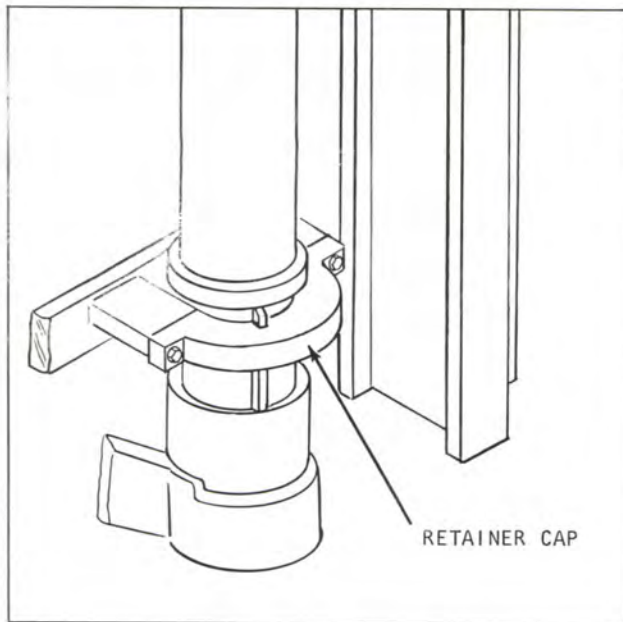
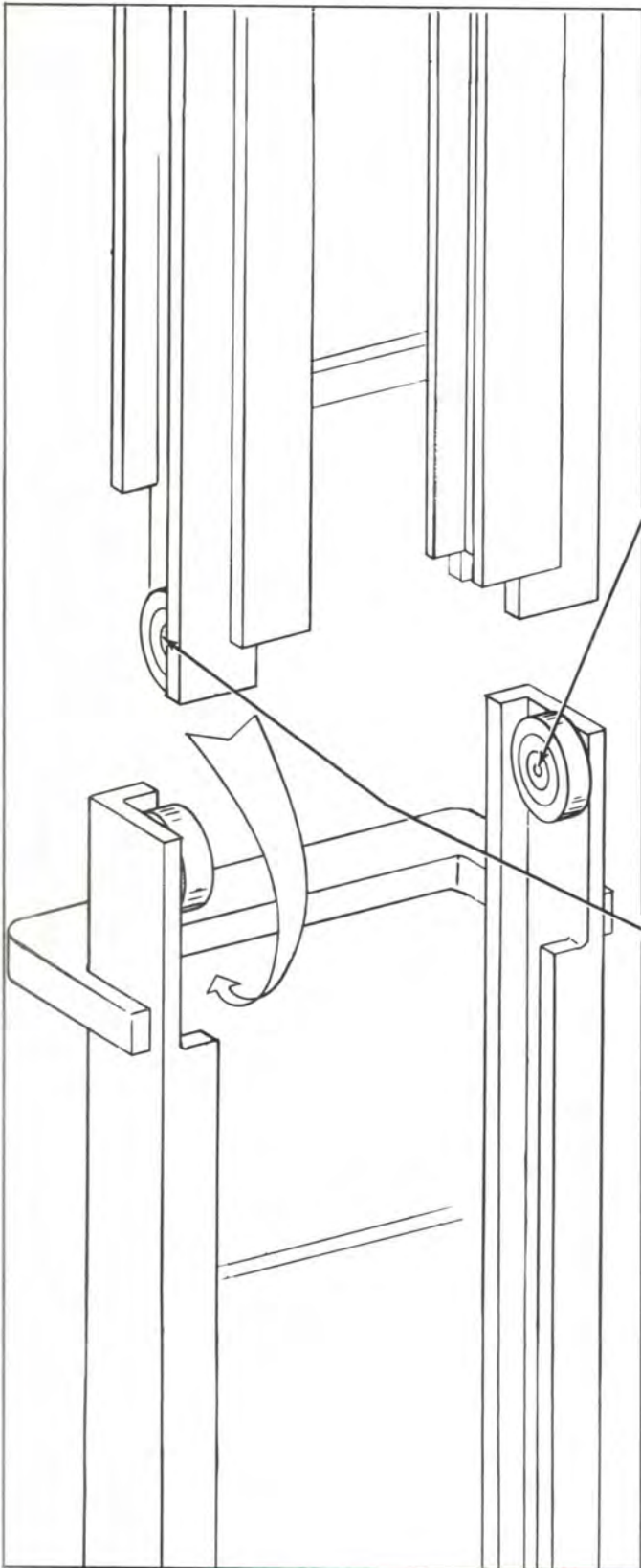


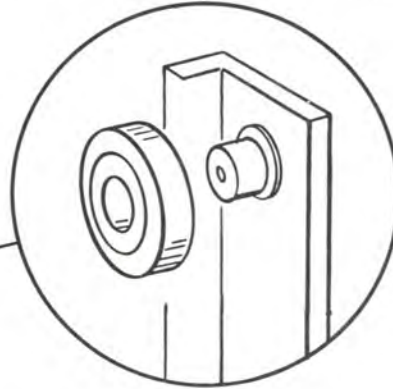
Plate 9646

Step 6(c). Remove lift cylinder retainer cap.



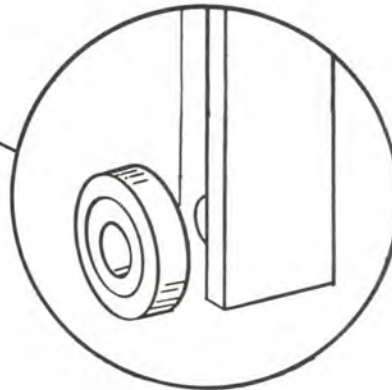
Step 6(d). Lean cylinder forward to rest on strap, as shown in Plate

Step 6(e). Leave intermediate rail assembly in this position while adjusting rollers.



A. Outer rail rollers:

1. Count the number of shims at the right and left hand rollers.
2. Look at the three (3) numbers you recorded on the outer rail in Step 1. The smallest of these numbers is the total number of shims to be added. A "0" means DO NOT add shims.
3. Your target for adjustment is to have the same number of shims at each upper roller. If you end up with an extra shim DO NOT remove it. Mark the side having an extra shim.

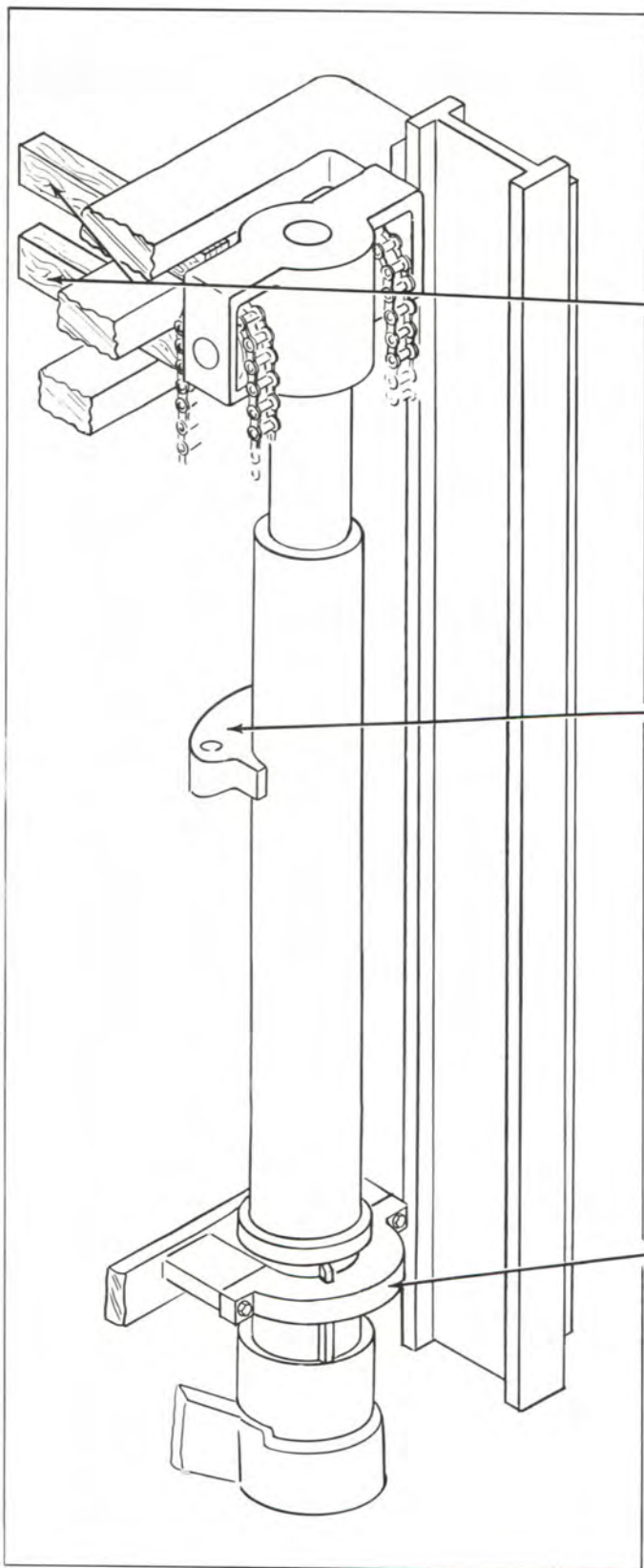


B. Intermediate rail rollers:

1. Count the number of shims at the right and left hand rollers.
2. Look at the three numbers you recorded on the intermediate rail in Step 1. Go through the same steps you followed in adjusting the upper rollers.
3. If you end up with an extra shim here too, be sure it is on the same side as the extra upper shim.

C. Replace intermediate rail assembly.

Plate 9647



Step 6(f). Replace block between intermediate rail assembly tie bar and remove chain.

Step 7. Place chain around chain anchors on cylinder. Use hoist to support cylinder.

Step 8. Remove supporting strap.

Step 9. Install cylinder retainer cap.

Plate 9648

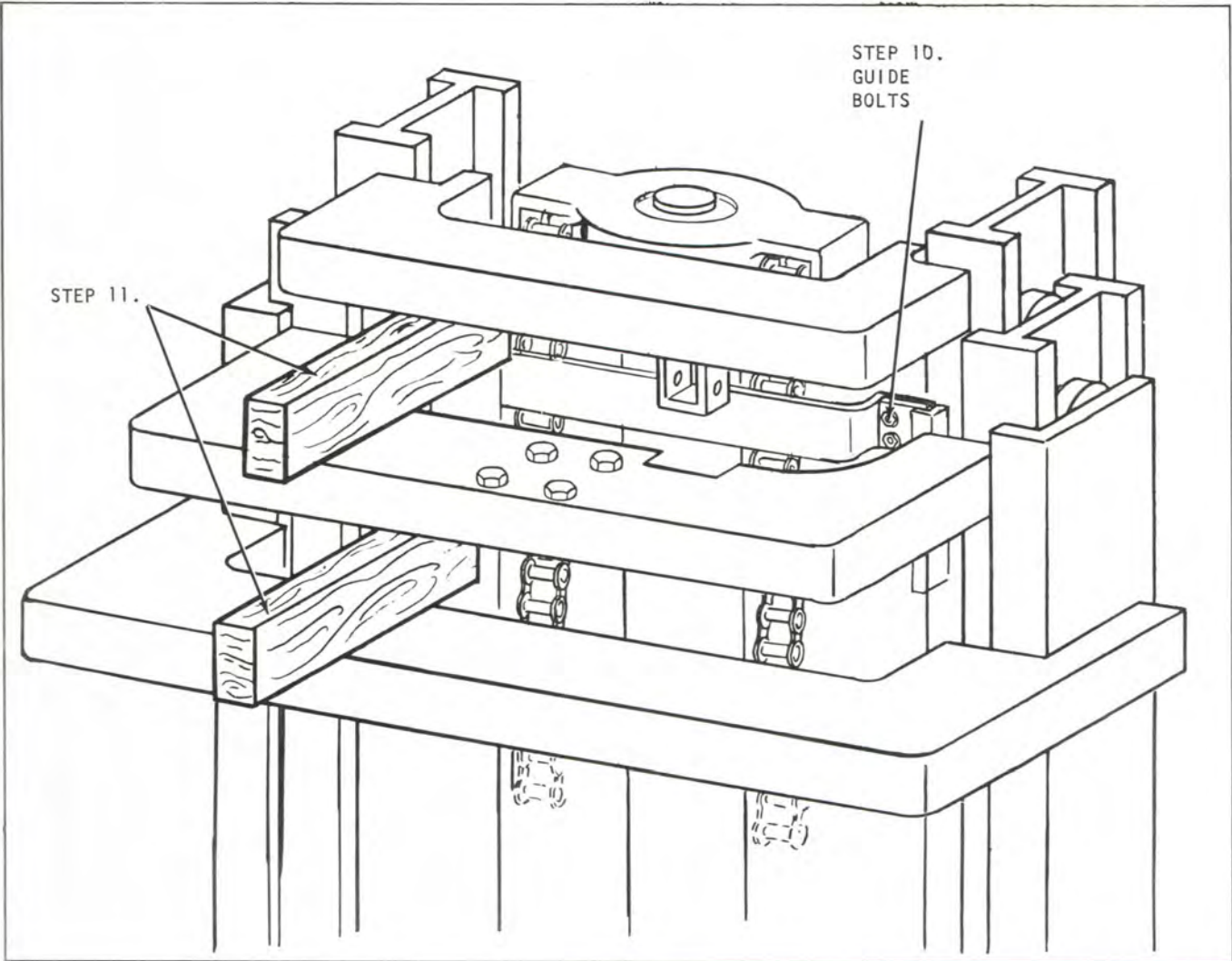


Plate 9649 Standard Triple Piston Head

Step 10. Install both piston head guides.

Step 11. Install mechanical stop. Raise rails and remove blocks.

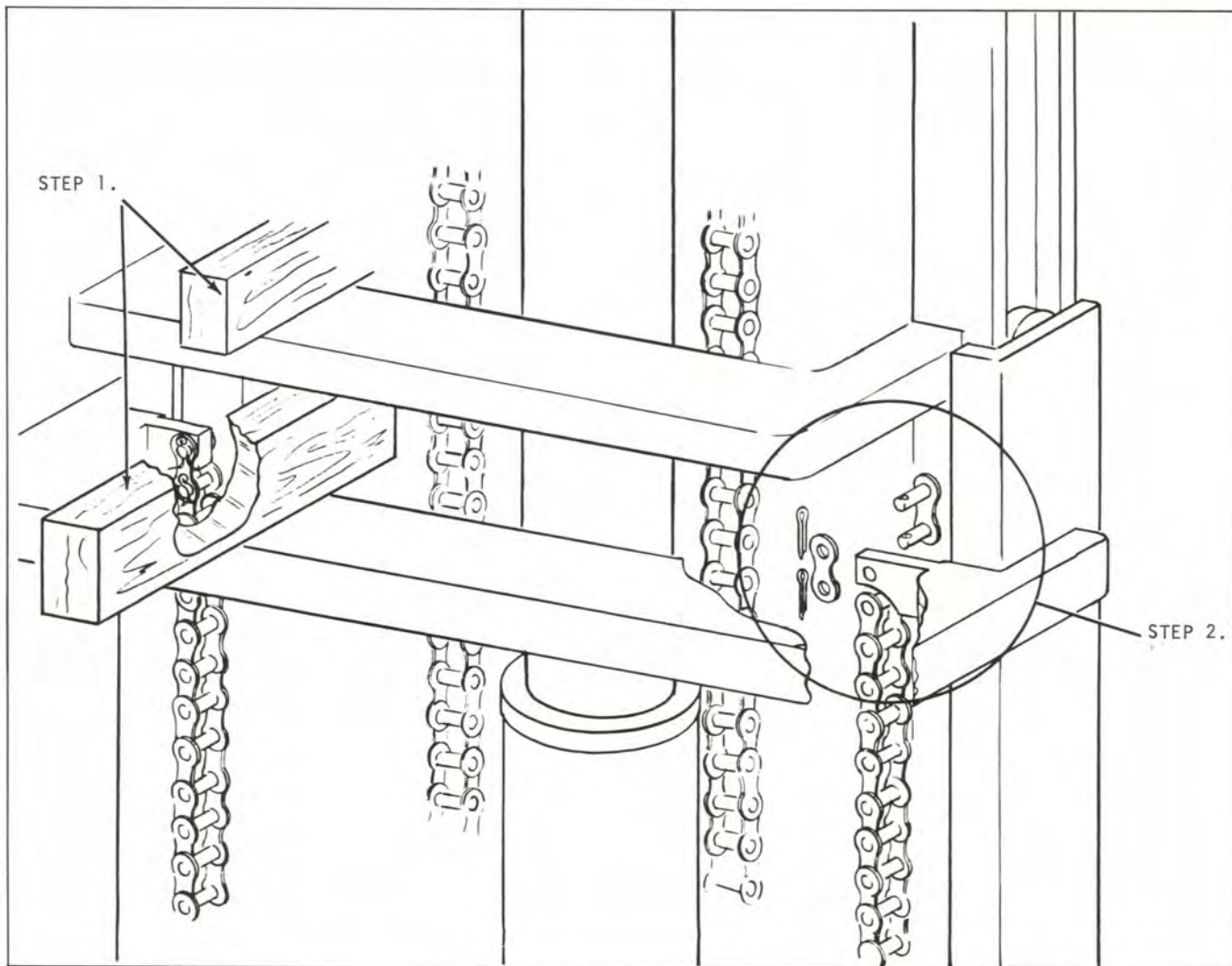


Plate 9650 Rear Lift Cylinder Removal

UPRIGHT REMOVAL--FULL FREELIFT TRIPLE

Step 1. Place blocks between inner and intermediate rail tie bars.

Step 2. Remove rear lift chains at the top or master link end.

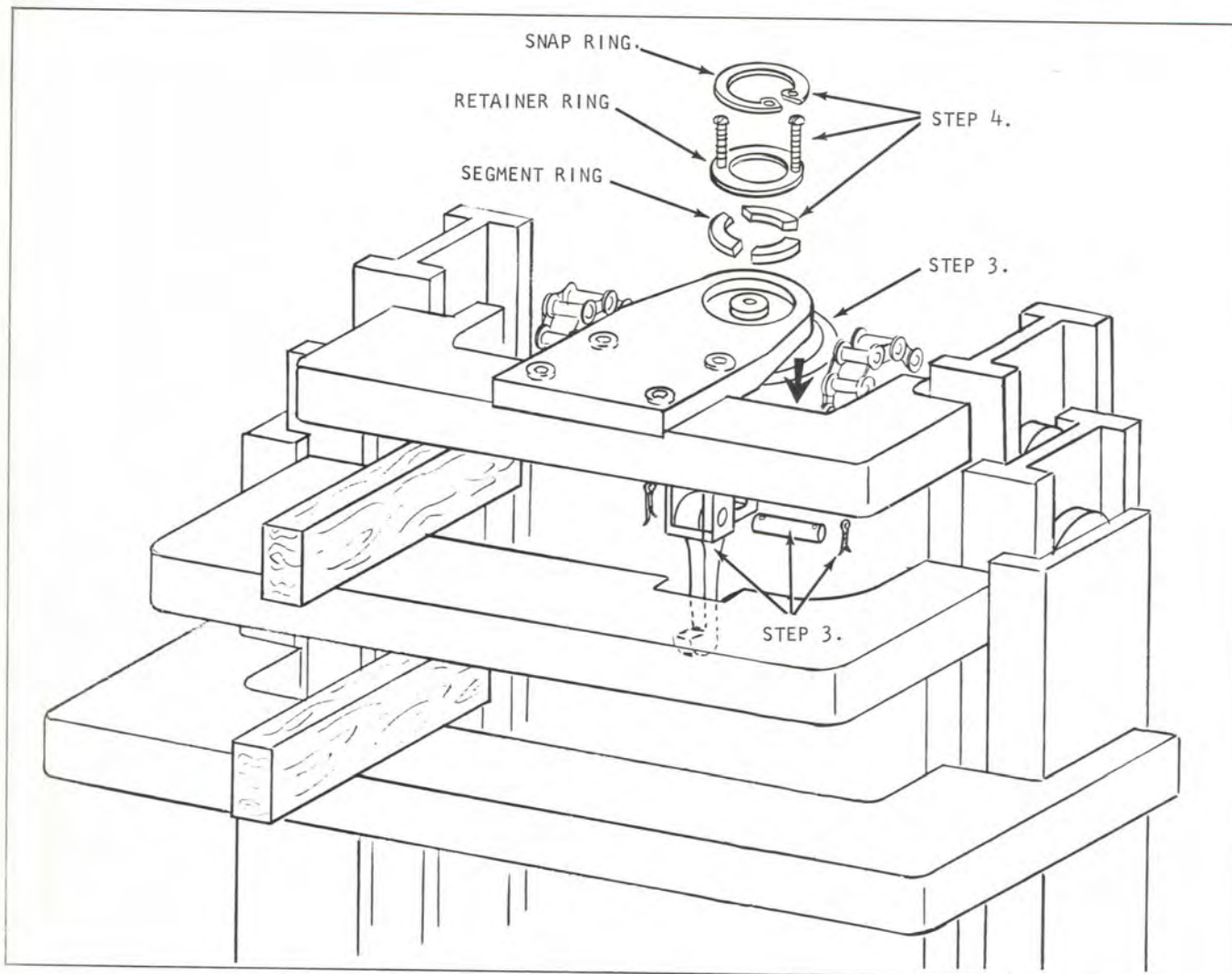


Plate 9651 F.F.T. Piston Head

Step 3. Pull piston head down

Remove mechanical safety stop pin and remove stop.

Step 4(a). Secure piston head with chain hoist.

(b). Remove lift cylinder from upper anchor.

1. Remove snap ring.

2. Place two (2) #6-32X2" round head slotted machine screws (in holes provided) in retainer ring.

(c). Remove segment ring.

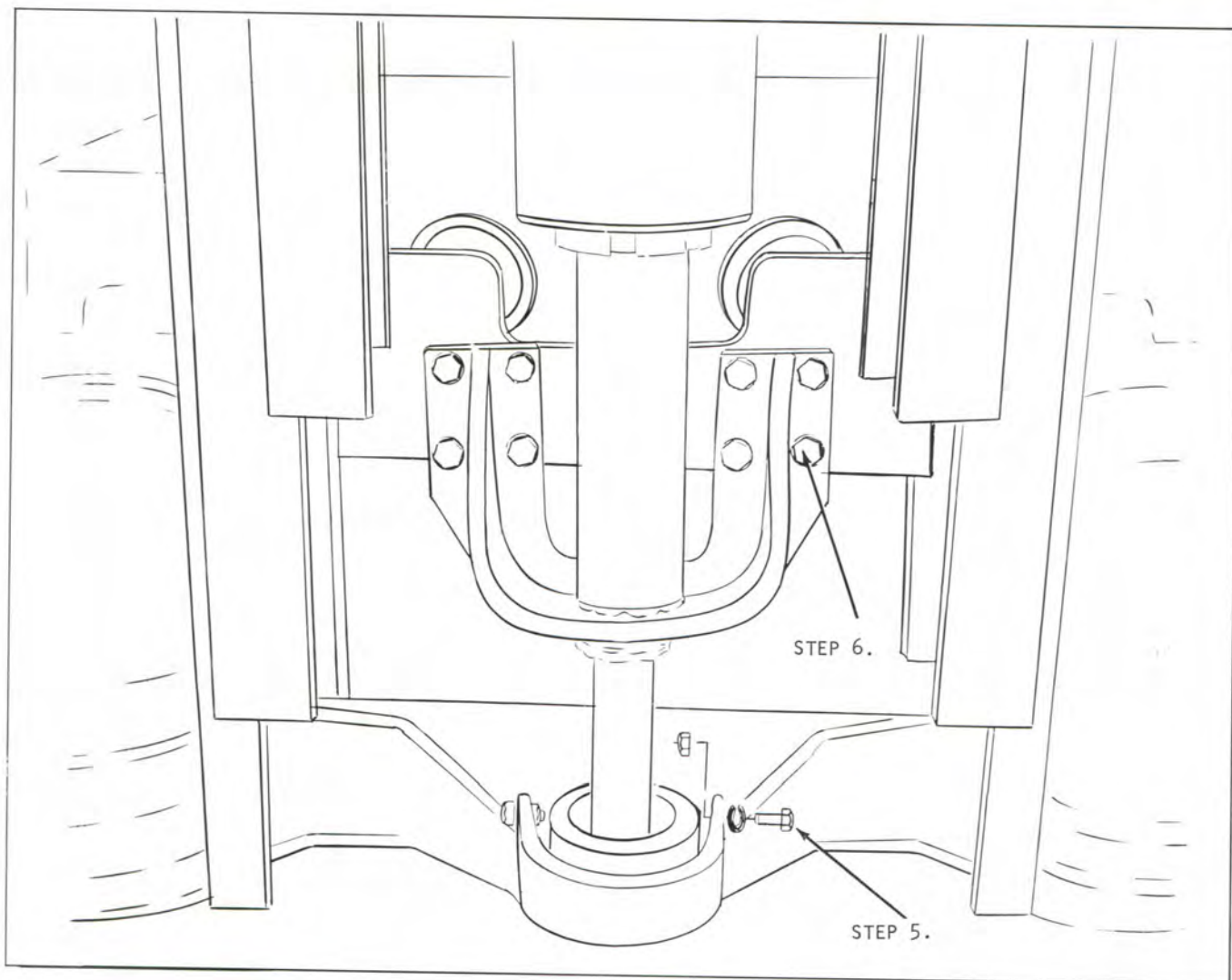


Plate 9652 Cylinder Lifting Bracket

Step 5. Remove lift cylinder support bolts.

Step 6. Remove cylinder lifting bracket.

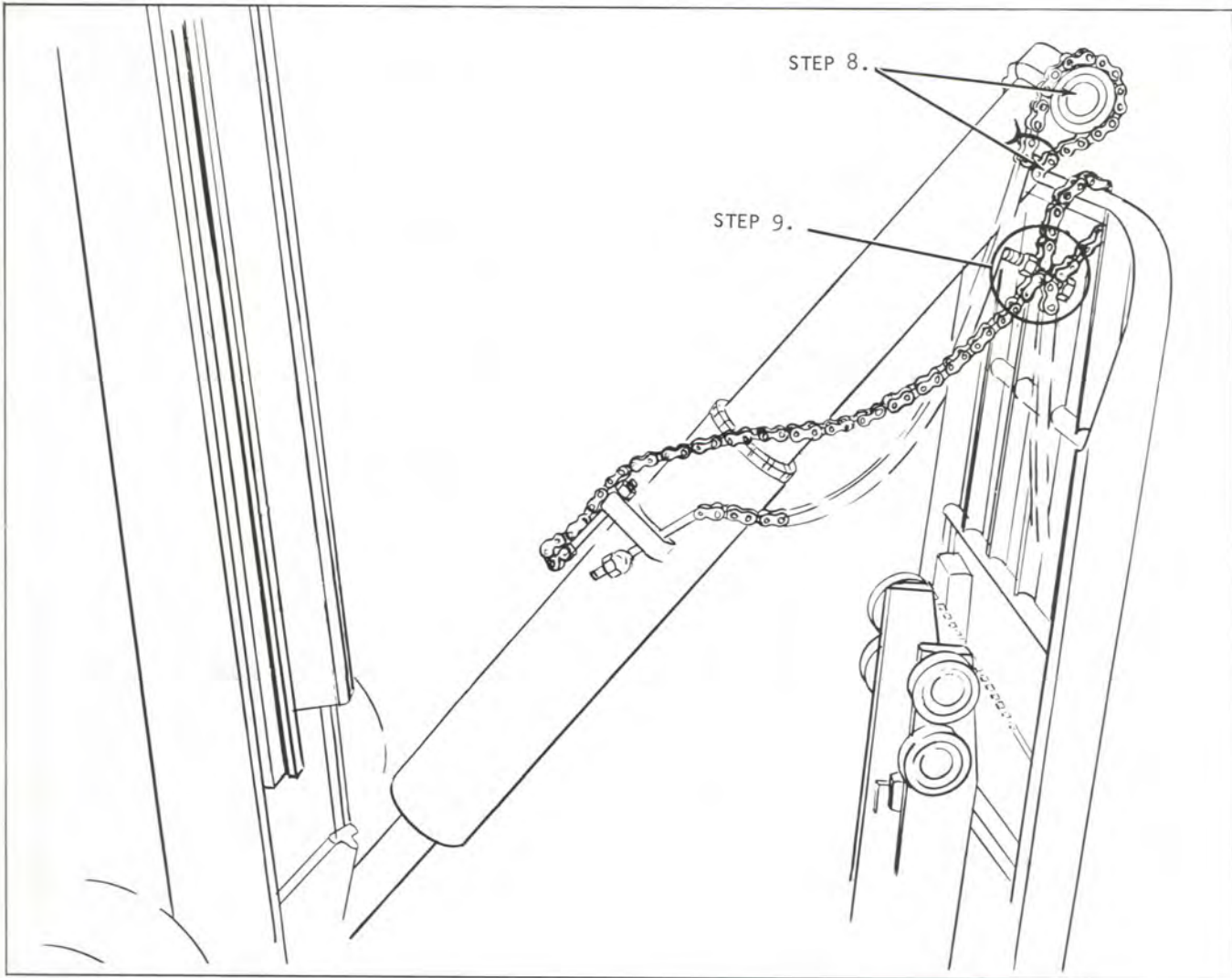


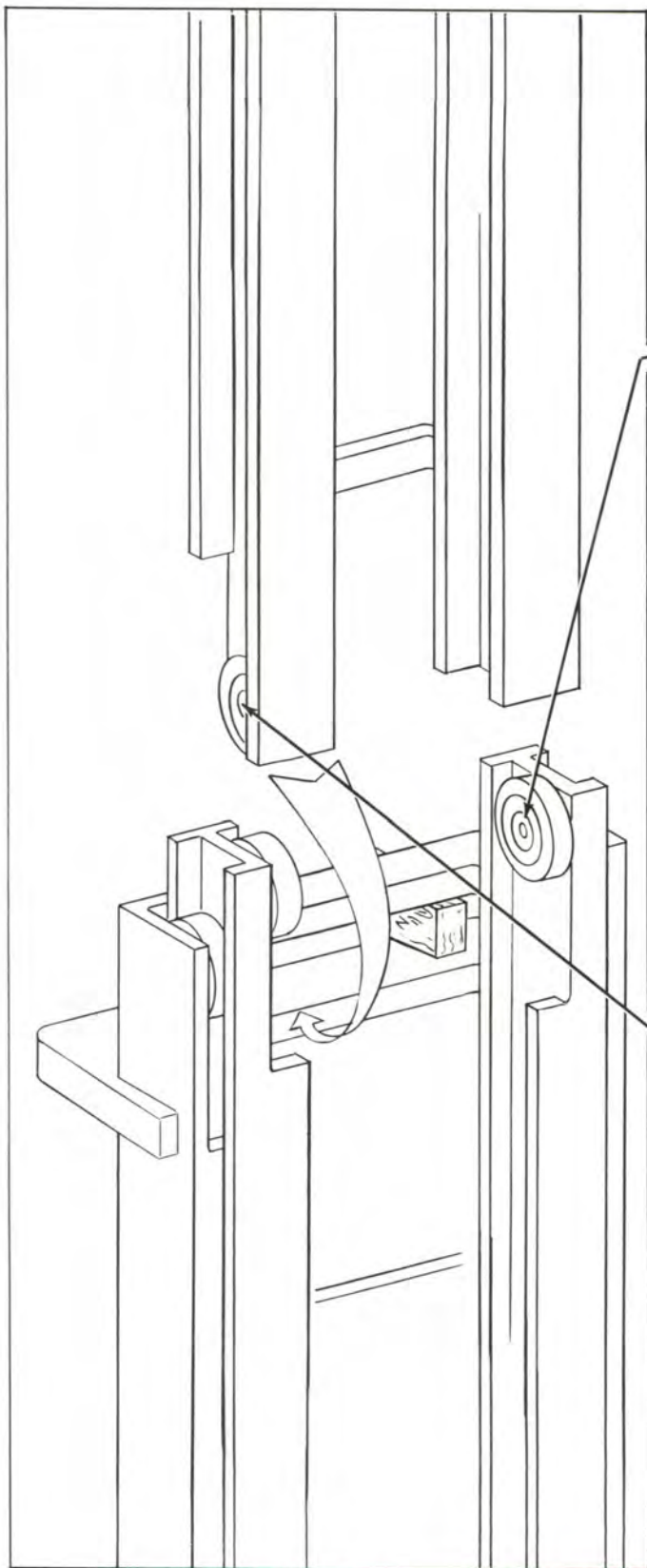
Plate 9653 Supporting Cylinder

Step 7. Lower cylinder and lean it toward the load back rest (on the carriage).

Step 8. Place padding type material on the load back rest to prevent scoring of the cylinder.

Let cylinder rest onto load back rest.

Step 9. Place rear lift chains around top bar of load back rest and place bolts through chains, as shown above. This will prevent cylinder from falling.



Step 10. Remove inner rail and leave it in this position while adjusting rollers.

A. Intermediate rail rollers:

1. Count the number of shims at the right and left hand rollers.

2. Look at the three (3) numbers you recorded on the intermediate rail in Step 1. The smallest of these numbers is the total number of shims to be added. A "0" means DO NOT add shims.

3. Your target for adjusting is to have the same number of shims at each upper roller. If you end up with an extra shim DO NOT remove it. Mark the side having an extra shim.

B. Inner rail rollers.

1. Count the number of shims at the right and left hand rollers.

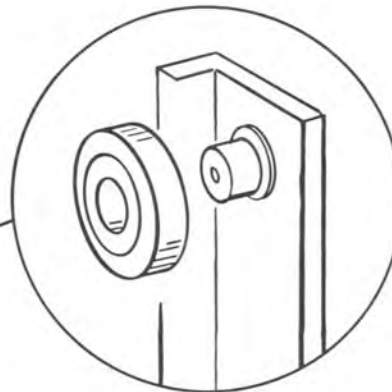
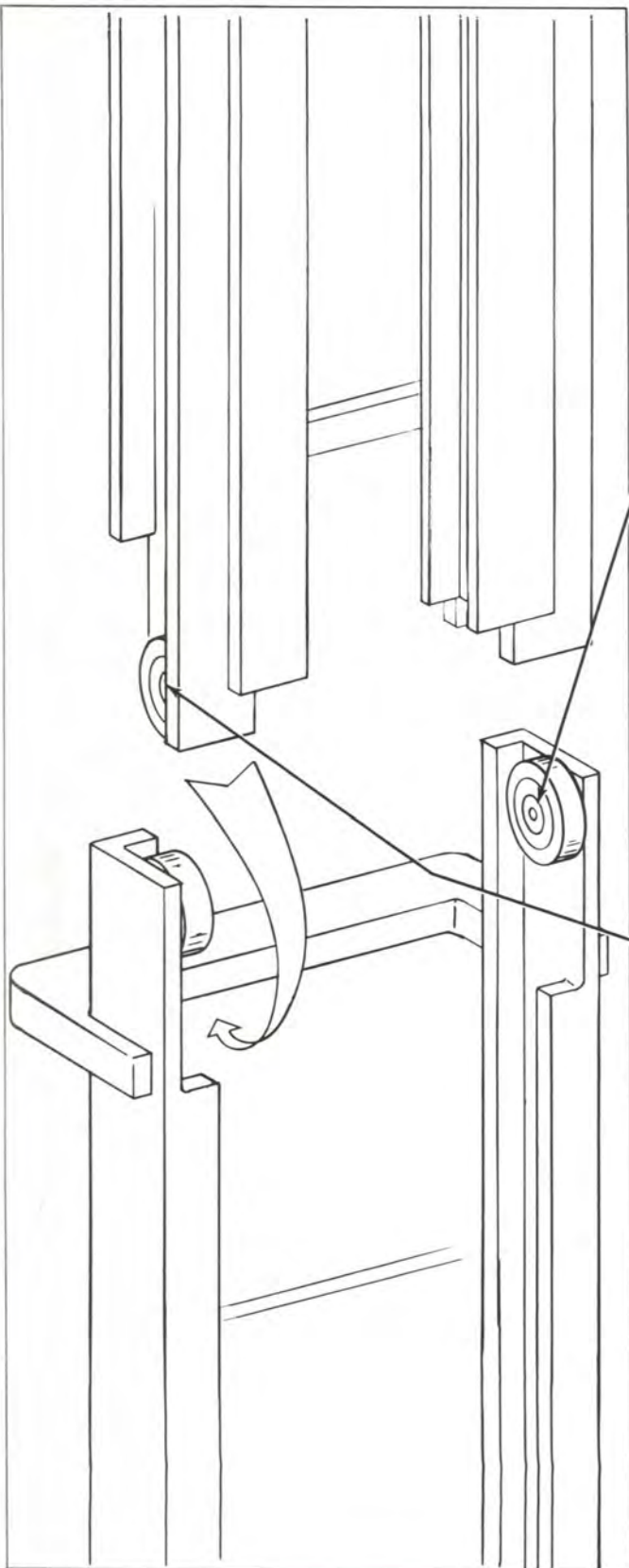
2. Look at the three (3) numbers you recorded on the inner rail in Step 1. Go through the same steps you followed in adjusting the upper rollers.

3. If you end up with an extra shim here too, be sure it is on the same side as the extra upper shim.

C. Replace inner rail.

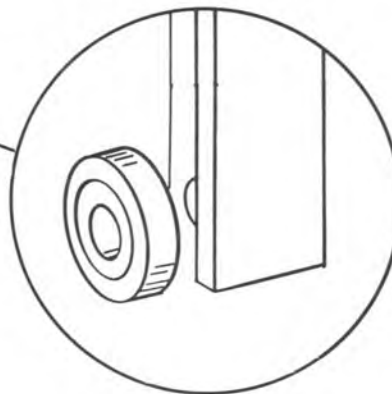
Plate 9654

Step 11. Leave intermediate rail assem. in this position while adjusting rollers.



A. Outer rail rollers:

1. Count the number of shims at the right and left hand rollers.
2. Look at the three (3) numbers you recorded on the outer rail in Step 1. The smallest of these numbers is the total number of shims to be added. A "0" means DO NOT add shims.
3. Your target for adjustment is to have the same number of shims at each upper roller. If you end up with an extra shim DO NOT remove it. Mark the side having an extra shim.



B. Intermediate rail rollers:

1. Count the number of shims at the right and left hand rollers.
2. Look at the three numbers you recorded on the intermediate rail in Step 1. Go through the same steps you followed in adjusting the upper rollers.
3. If you end up with an extra shim here too, be sure it is on the same side as the extra upper shim.

C. Replace intermediate rail assembly.

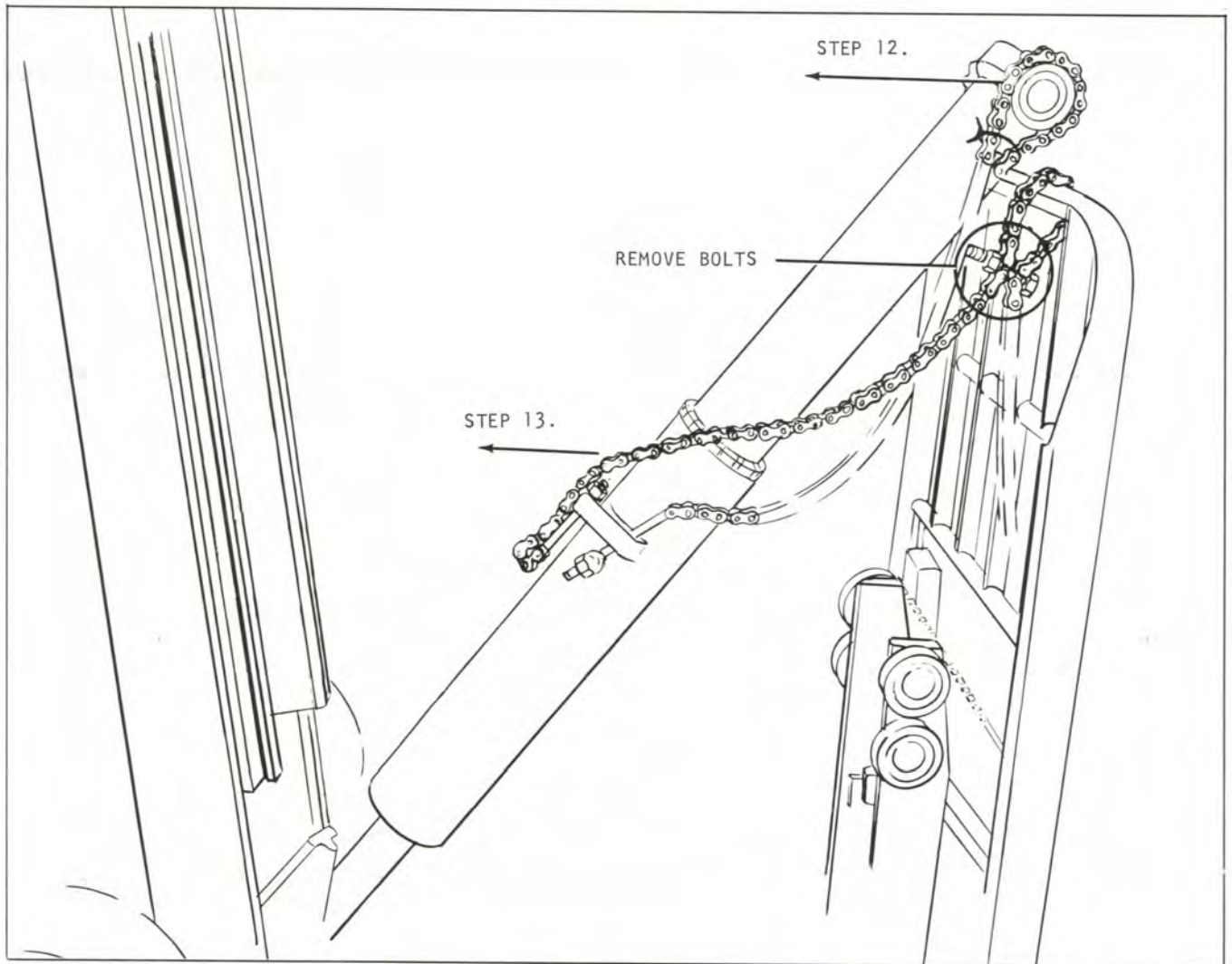


Plate 9656 Cylinder Replacement

Step 12. Using chain hoist, place cylinder back between rails.

N O T E

When installing cylinder watch position of cylinder line and tube, to prevent damage.

Step 13. Pull rear lift chains through back of upright.

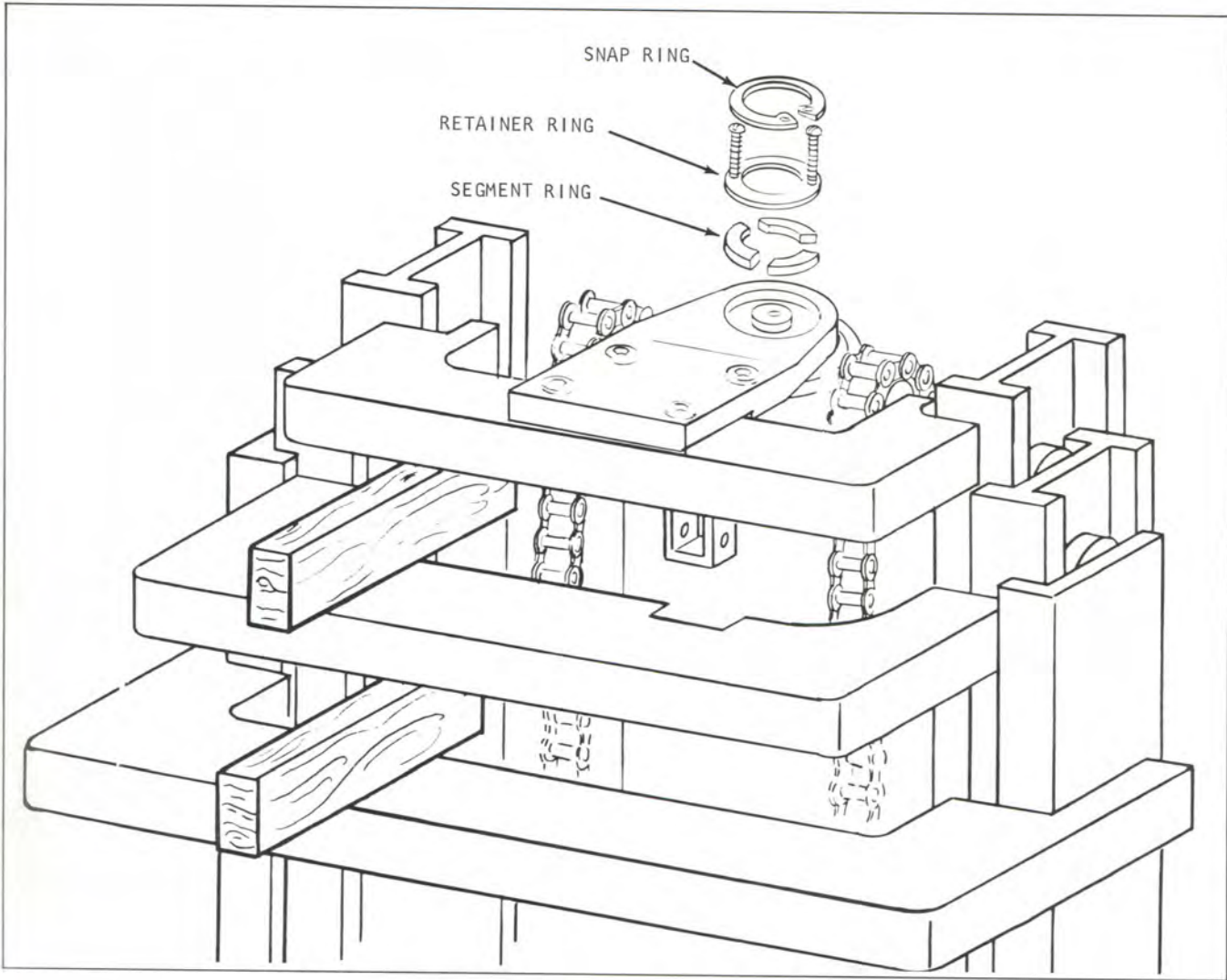


Plate 9657 Piston Head F.F.T.

Step 14(a). Install segment ring.

(b). Install retainer ring and remove both slotted machine screws.

(c). Install snap ring.

(d). Raise and lower to full positions checking piston and anchor. Remove blocks between tie bars.

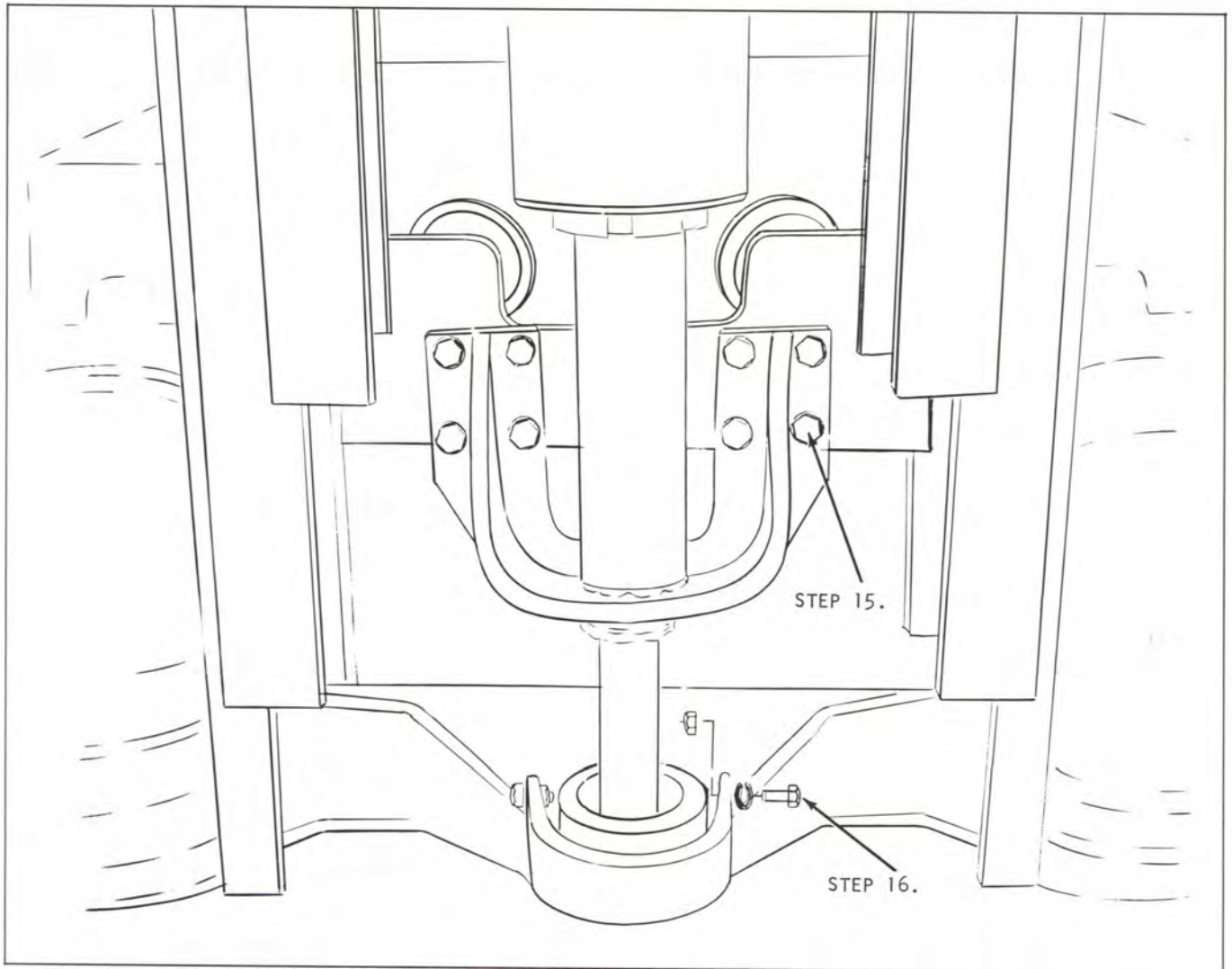


Plate 9658 Cylinder Lift Bracket

Step 15. Install cylinder lifting bracket.

Step 16. Install lift cylinder support bolts.

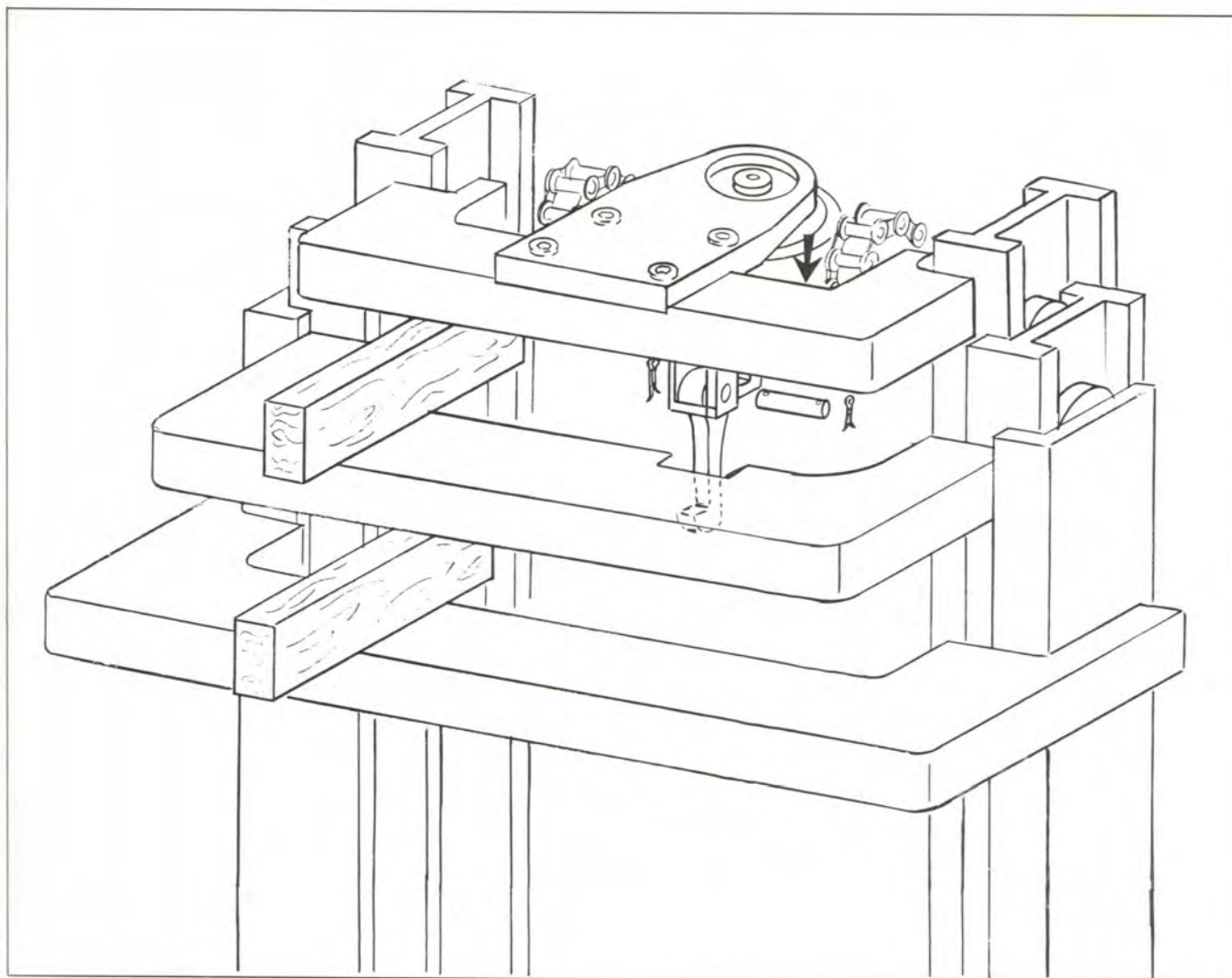


Plate 9659 Safety Stop

Step 17. Pull piston head down.

Install mechanical safety stop.

Replace cotter keys.

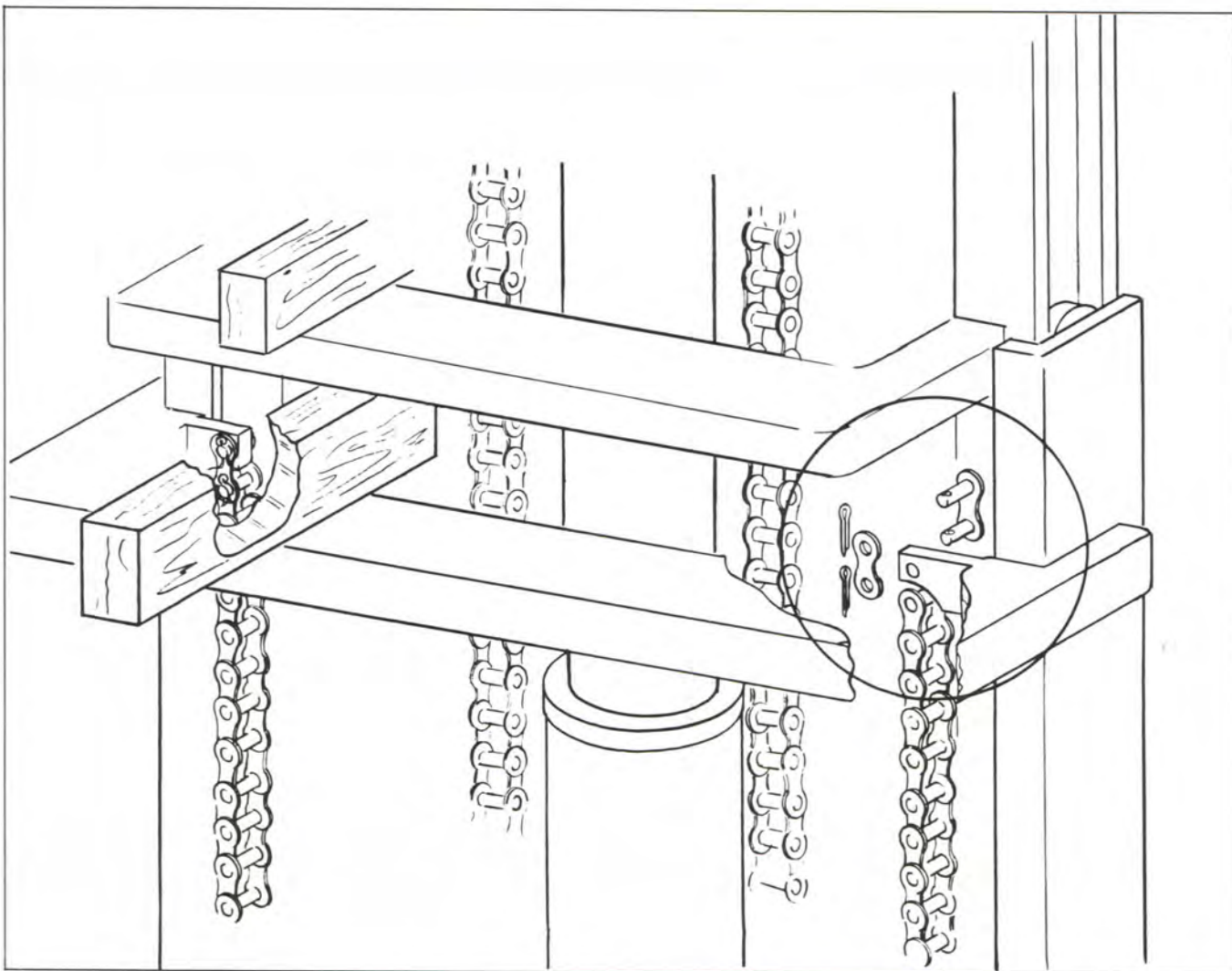


Plate 9660 Replacing Rear Lift Chains

Step 18. Install rear lift chains.

Check chain tension for adjustment. If adjustment is necessary be sure to secure adjusting nuts before operating machine.



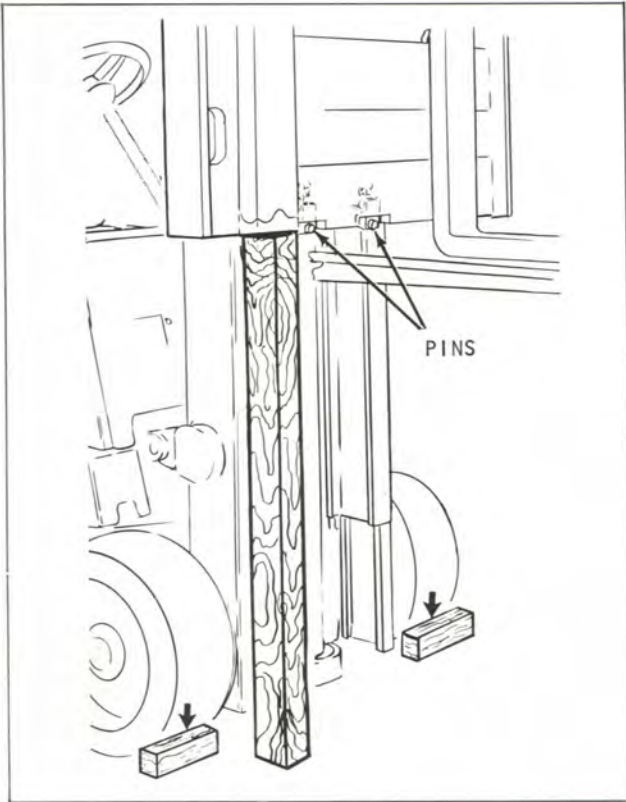


Plate 9593 Carriage Pin Replacement

Step 2. Remove anchor pins and replace with 3/8" x 2" bolts. FOR SAFETY REASONS, REMOVE ONLY ONE PIN AT A TIME. This will make pin removal easier when carriage is lowered.

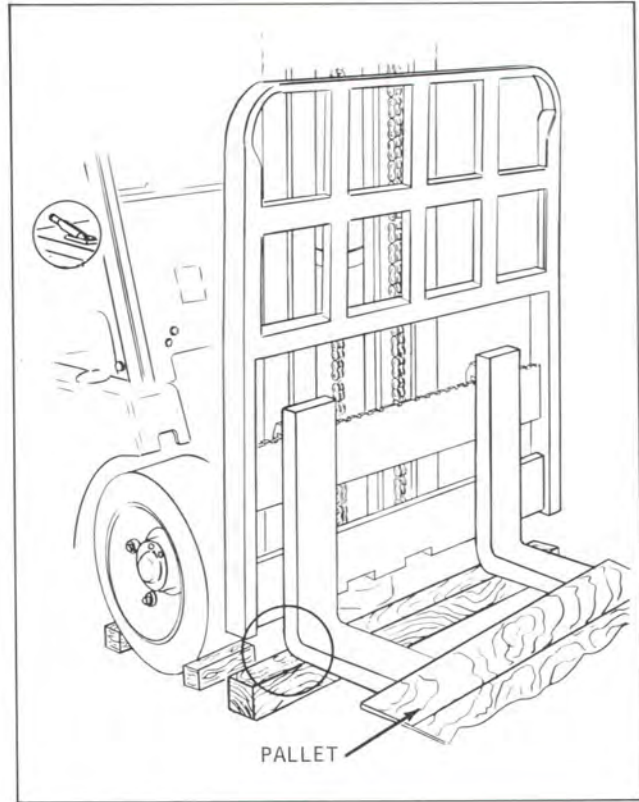


Plate 9560 Fork and Carriage Blocking

Step 3. Raise carriage off beam. Place beam on floor so, when lowered, the heel of the fork will rest on it as shown.

Step 4. Tilt upright full forward.

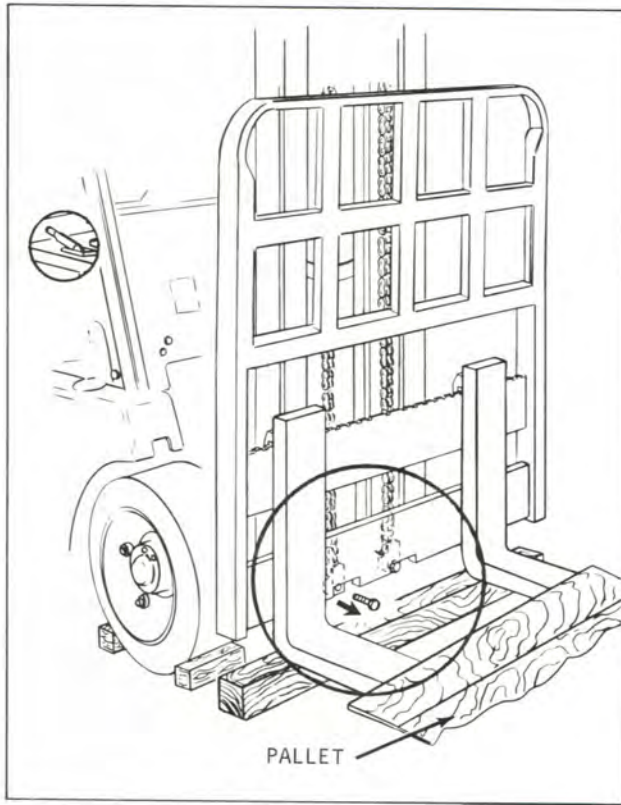


Plate 9561 Removing Bolts

Step 5. Remove 3/8" x 2" bolts. Place pallet on fork ends.

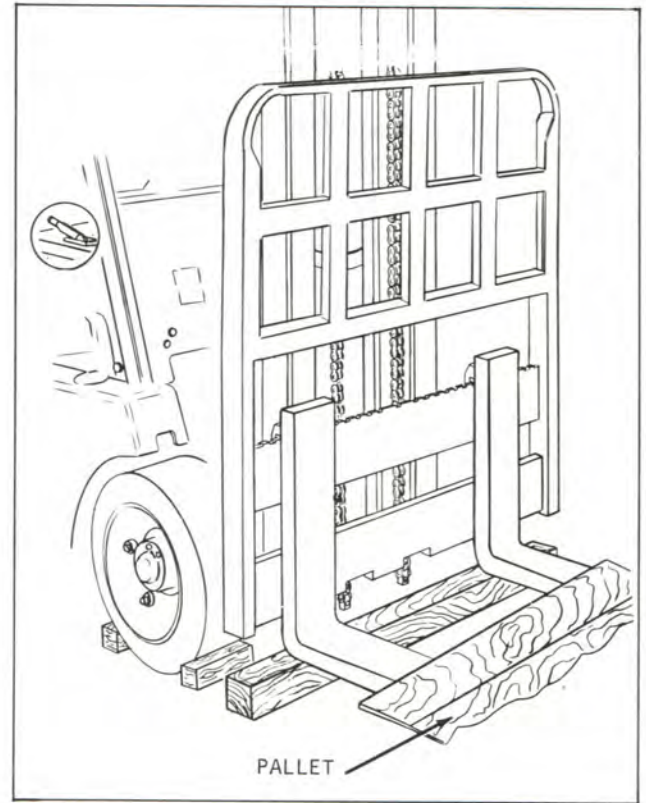


Plate 9562 Removing Chains From Anchors

Step 6. Pull chains out of carriage anchor brackets.

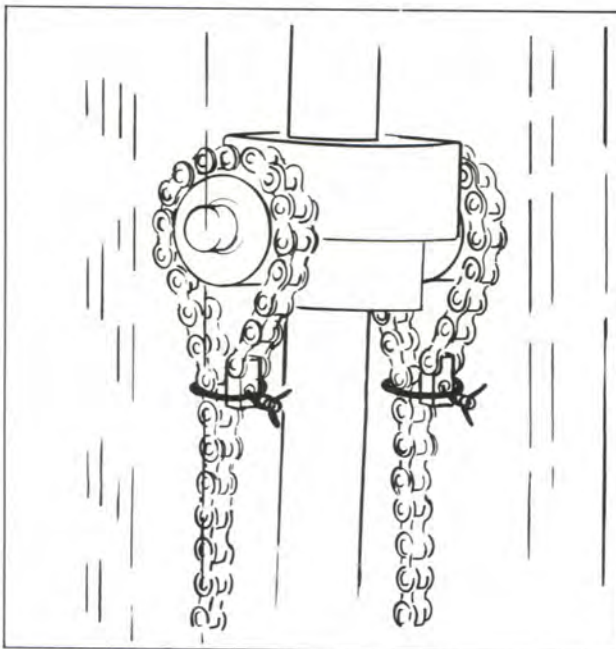


Plate 9563 Securing Chains (Typical)

Step 7. Wire chains around chain sheaves as shown

NOTE

Use the same method on all cylinders.

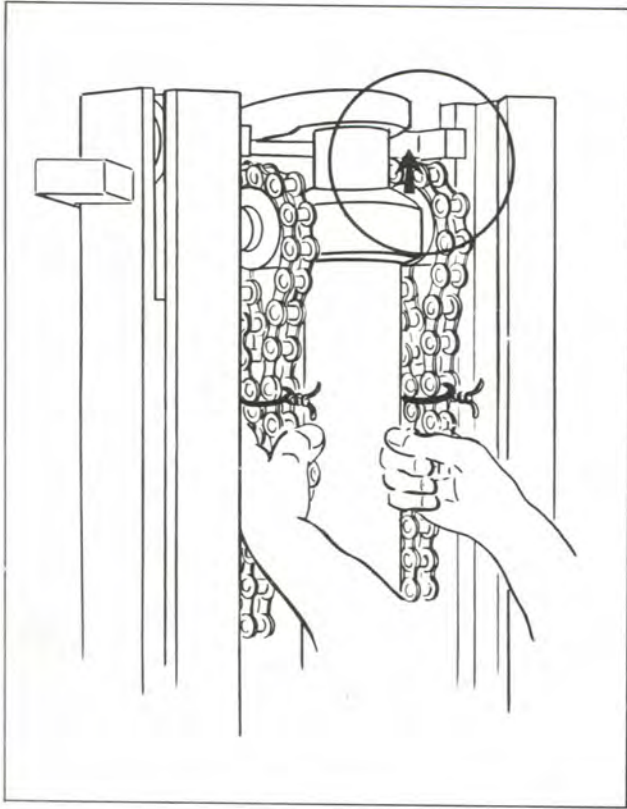


Plate 9564 Guiding Piston Head

Step 8. Guiding piston head with hands on chains raise piston to full up position.

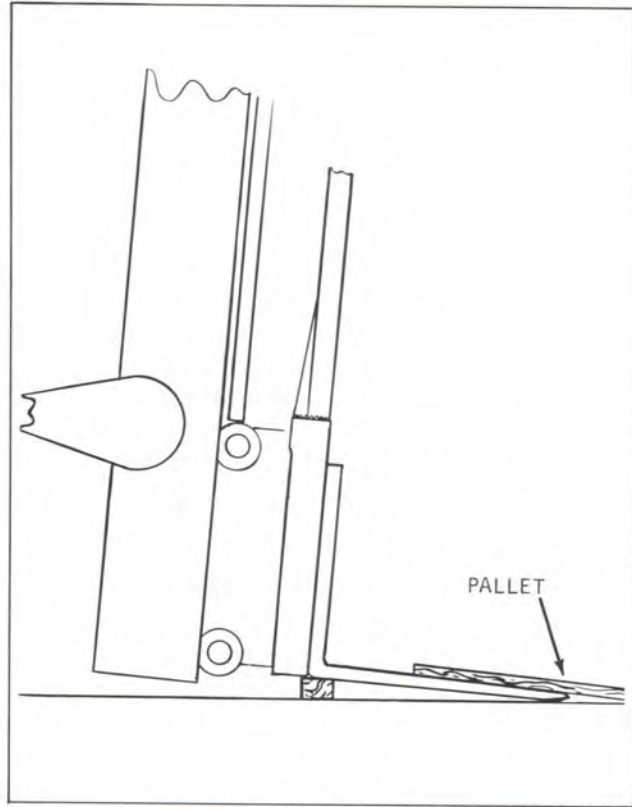


Plate 9565 Inner Rail Clearing Carriage Rollers

Step 9. Raise inner rail so it just clears upper carriage rollers. Leave upright at full forward tilt.

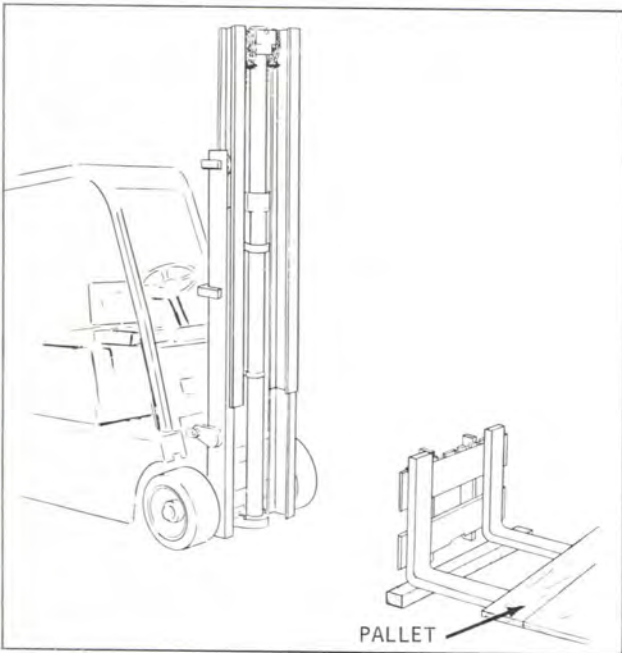


Plate 9566 Backing Machine Away From Carriage

Step 10. Remove blocks and release brake. Back machine away from carriage.

B. CARRIAGE ROLLER ADJUSTMENT

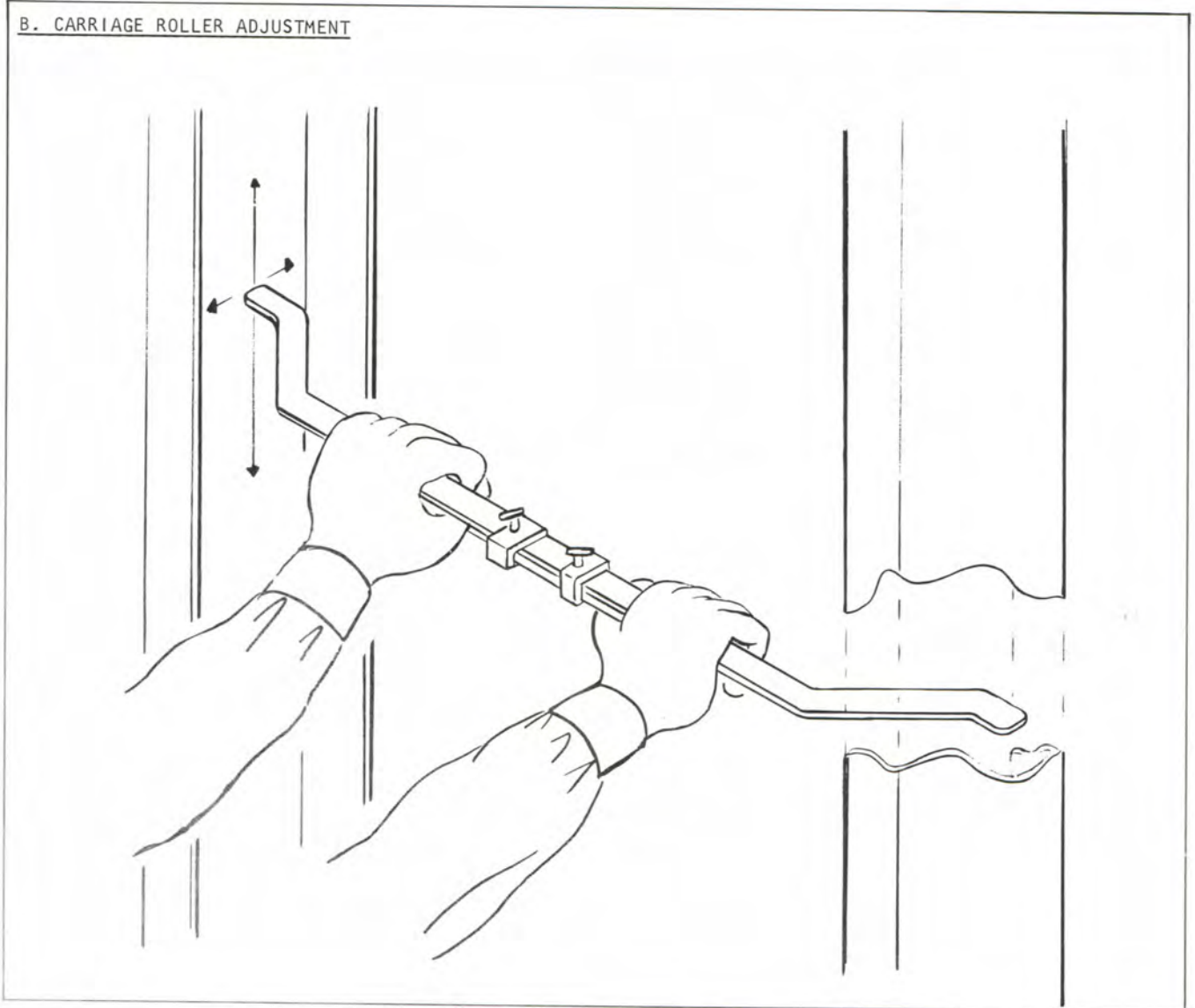


Plate 9567 Spanning Inner Rail

Step 1. Span inner rail with inside spanning tool to find the smallest distance between the rails. Lock tool in position.

N O T E

FOR SIX ROLLER CARRIAGE ONLY

After finding the smallest distance between rails, place a shim between the spanning tool and the inner rail, then lock spanning tool in position.

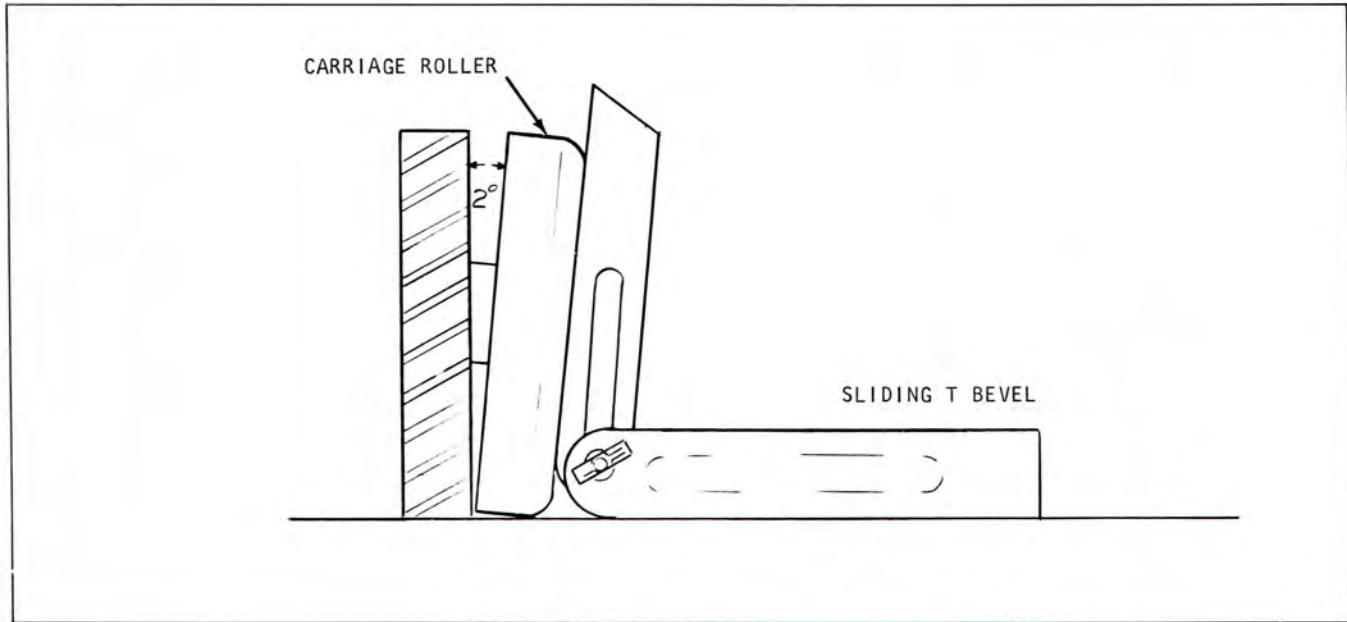


Plate 9589 Setting T Bevel

N O T E

Check angle of carriage rollers. Roller pin bosses are welded at $2^{\circ} \pm 1/2^{\circ}$ and if damaged, replace carriage roller pin boss assembly. To obtain this contact Central Parts.

To check roller angle use a Sliding T Bevel and Protractor. Lay one side against roller surface and lock in place.

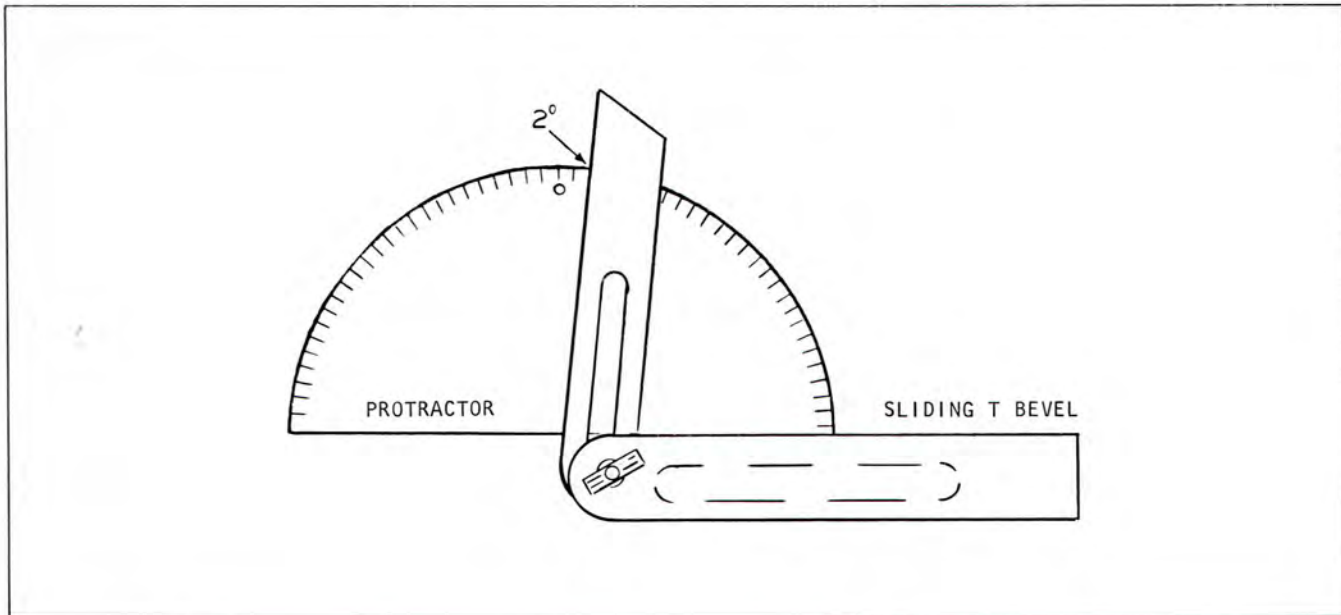


Plate 9590 Checking Roller Angle

Determine degree of angle by placing Protractor on Sliding T Bevel.

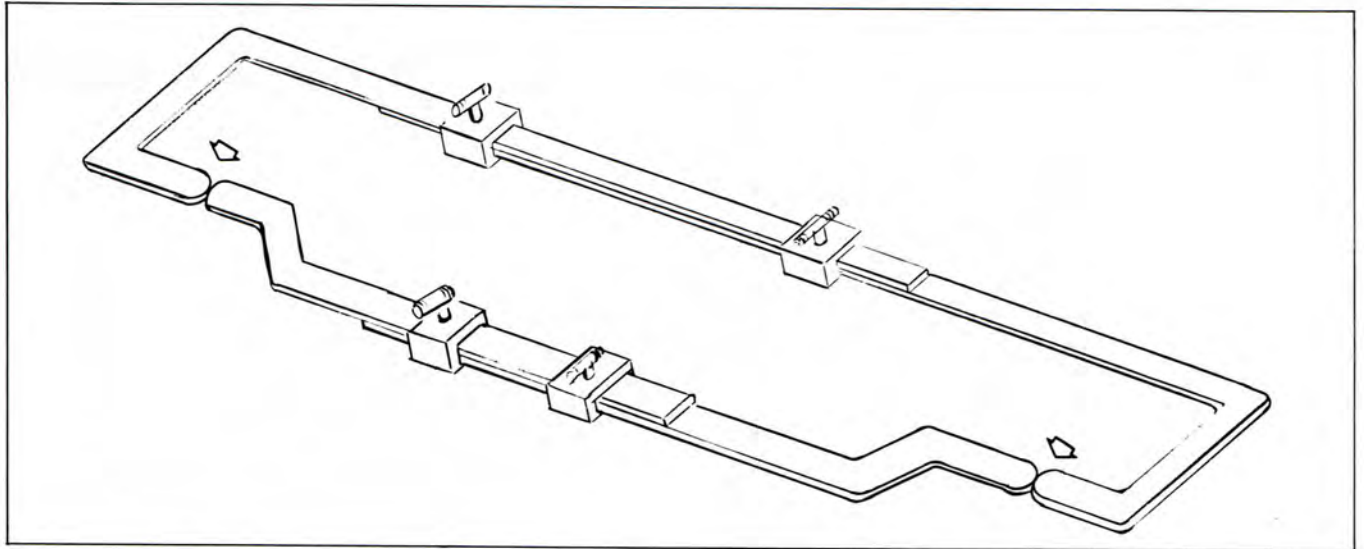


Plate 9568 Setting Outside Spanning Tool

Step 2. Set outside spanning tool to match inside spanning tool. Lock tool in position.

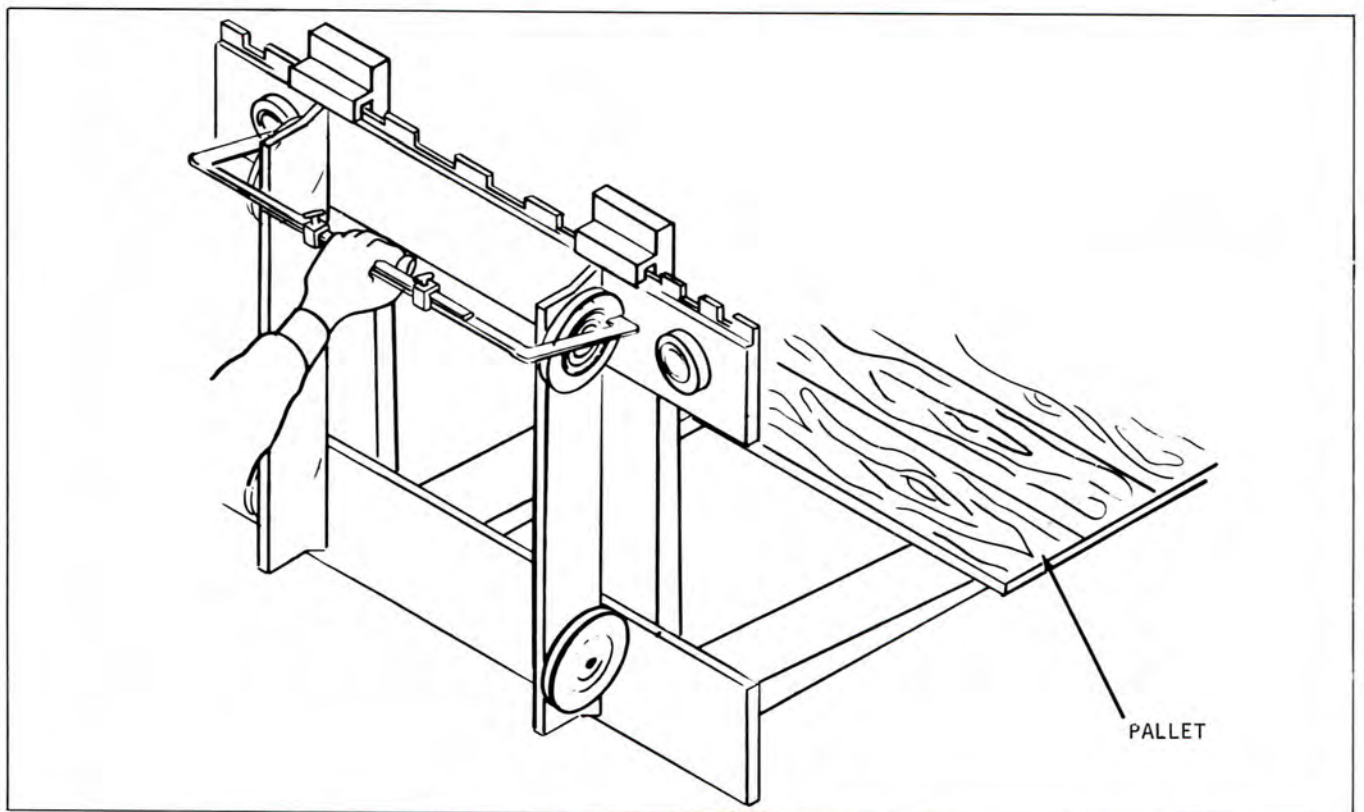


Plate 9569 Spanning Upper Rollers (Four Roller Carriage)

Step 3. Span upper carriage rollers at their outer most camber point. Add or subtract ...

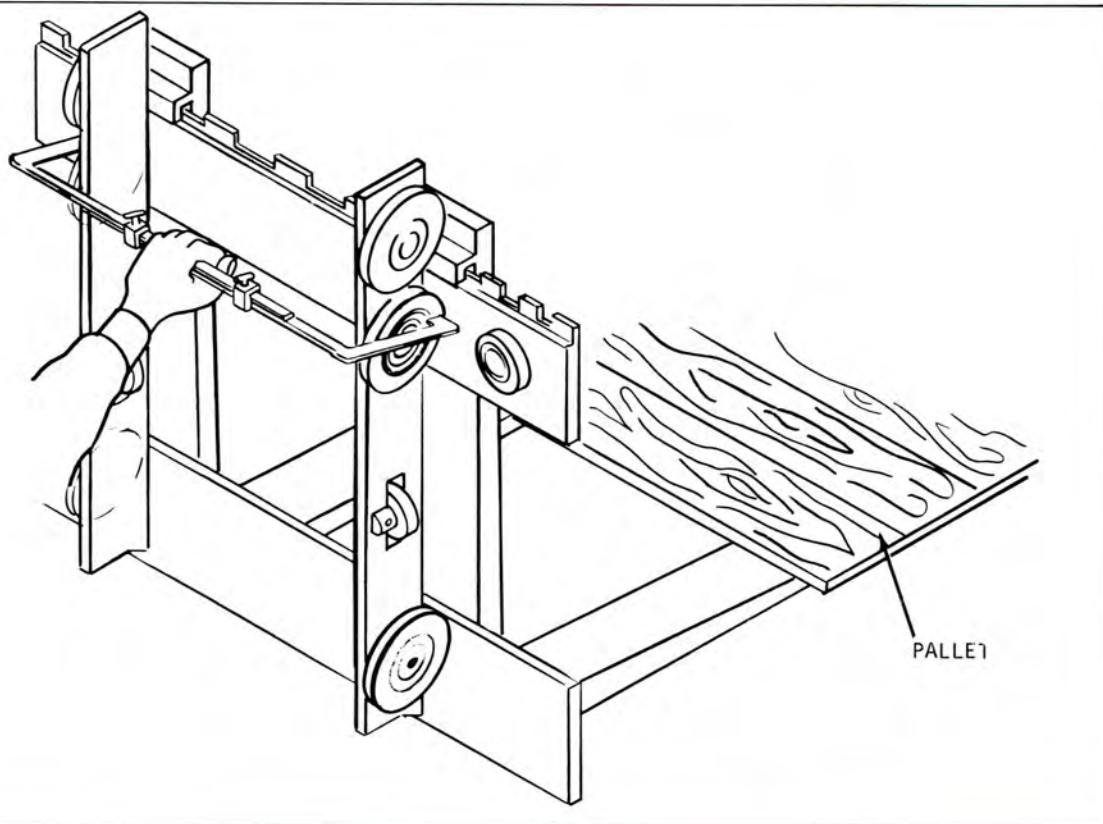


Plate 9570 Spanning Upper Rollers (Six Roller Carriage)

...shims at roller shaft to reach tool size.

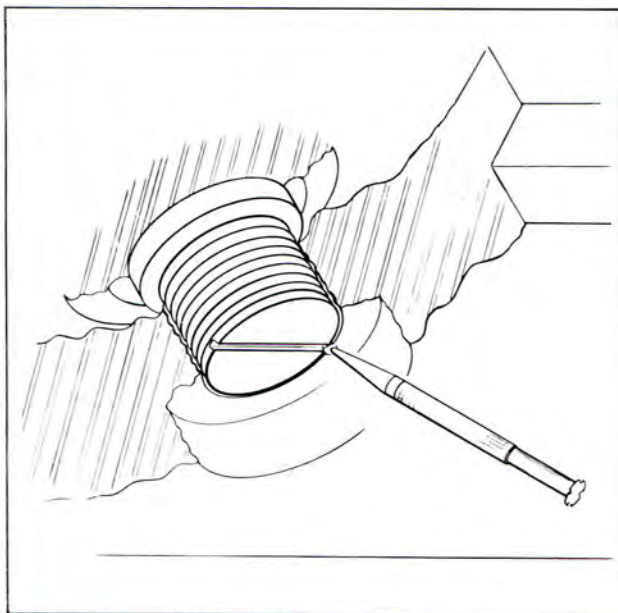


Plate 9571 Securing Outer Thrust Roller

N O T E

Before centering carriage rollers check outer thrust rollers for security and condition of bearings. If loose tighten and stake. If worn replace.

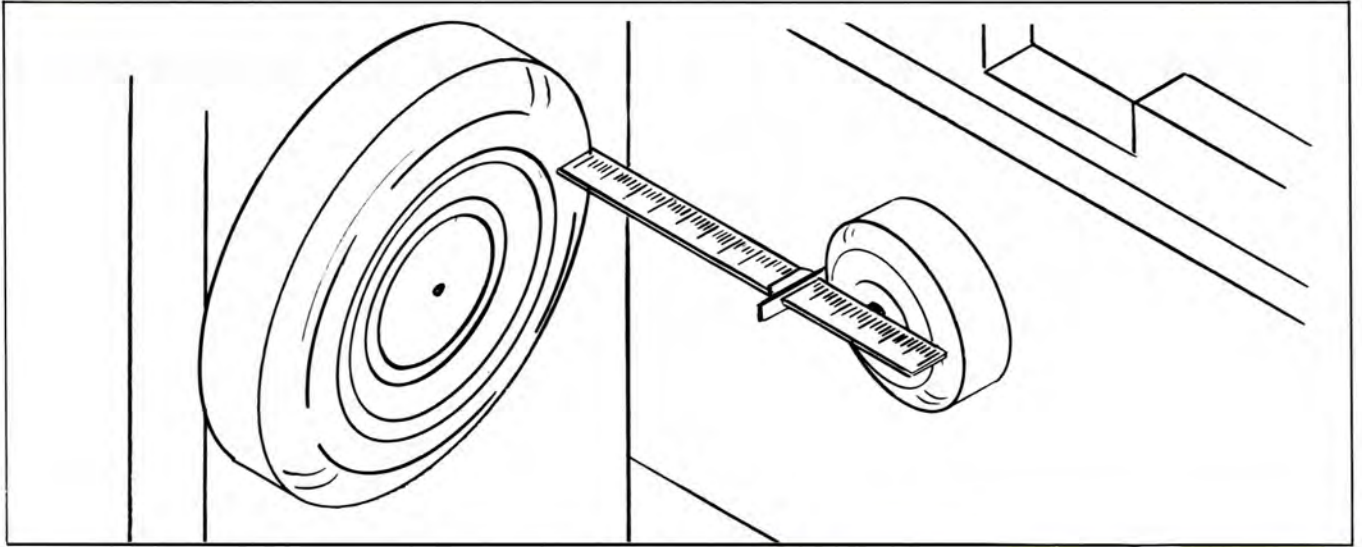


Plate 9572 Centering Carriage Rollers

Step 4. Center carriage rollers within outer thrust rollers by placing 6" scale on the carriage roller surface and measuring the distance to the outer thrust roller face. Add or subtract shims from one roller to the other to make measurement equal.

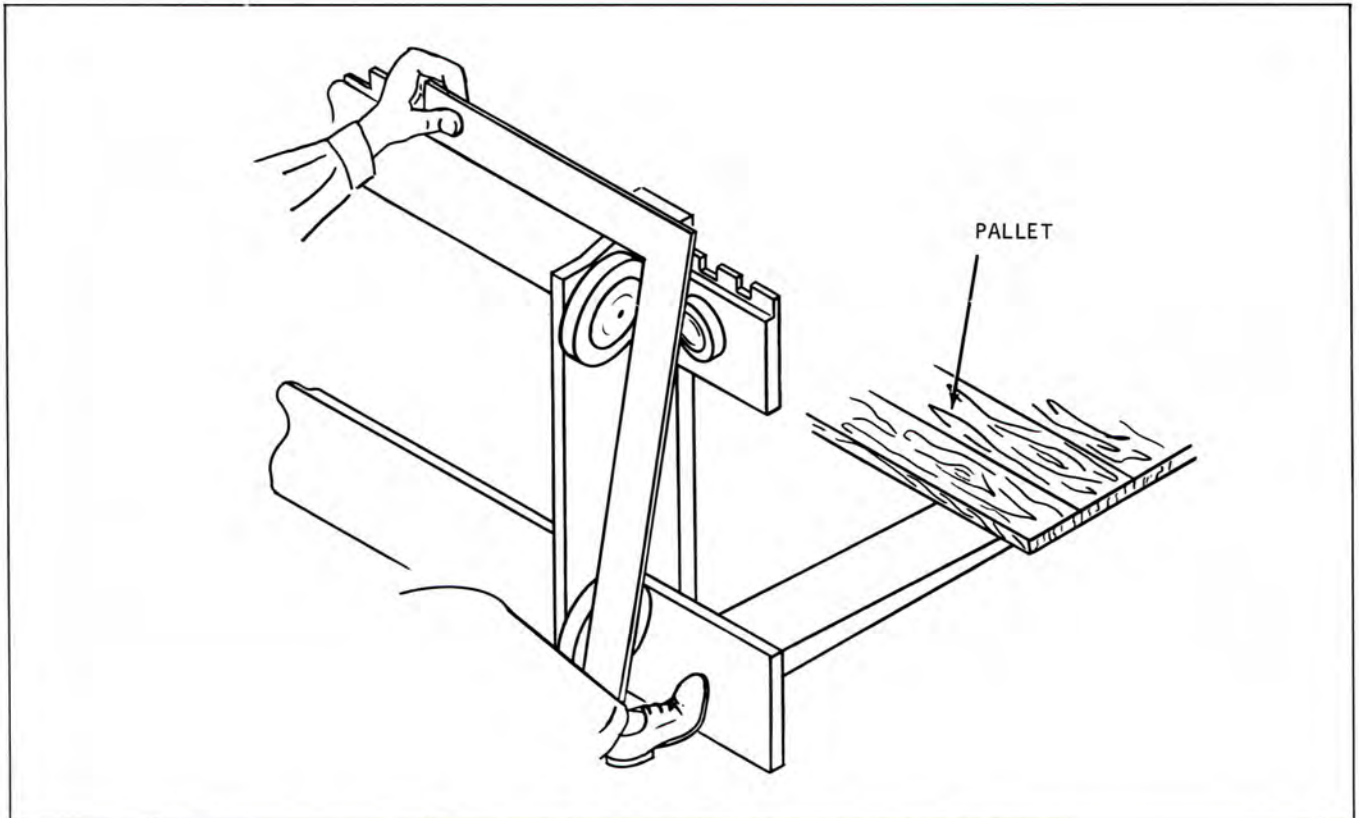


Plate 9573 Squaring Carriage Rollers (Four Roller Carriage)

Step 5. Square carriage rollers by placing carpenter's square at the outer most camber of the ...

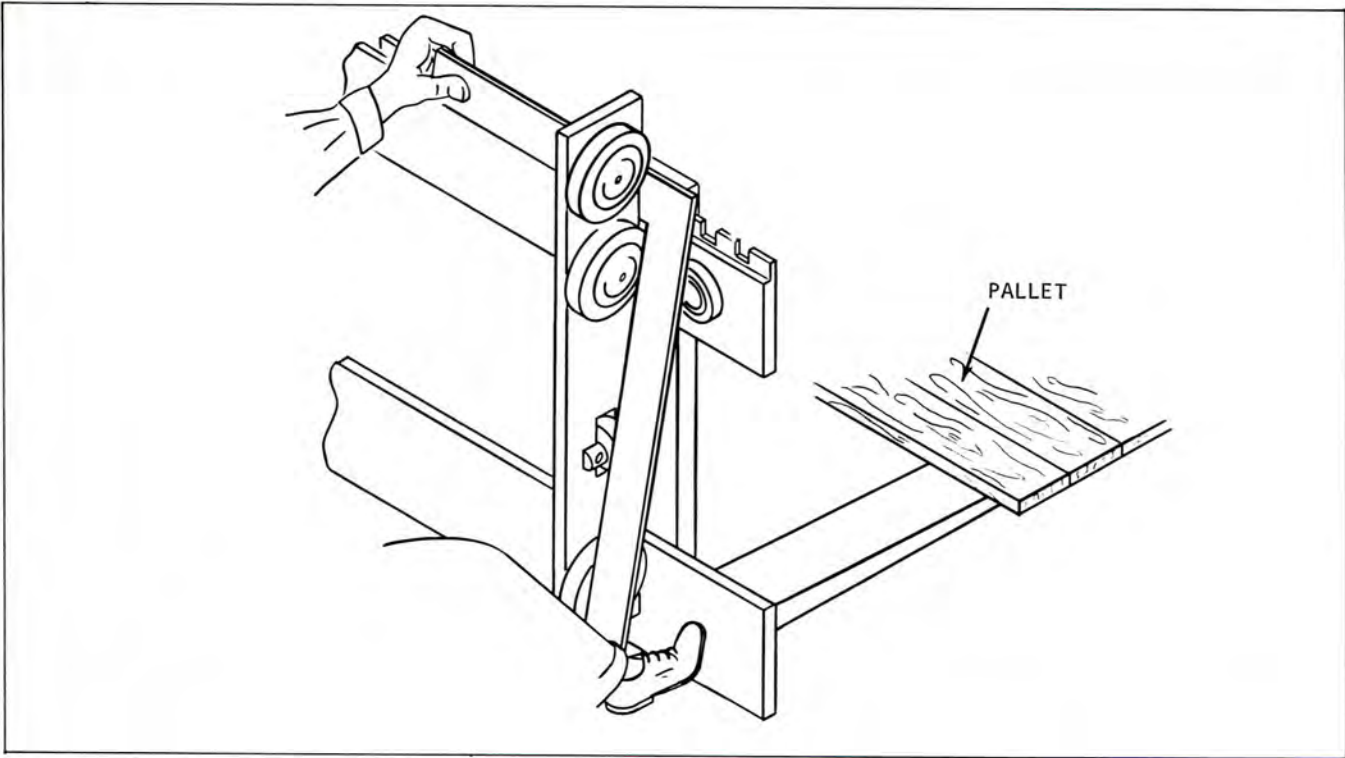
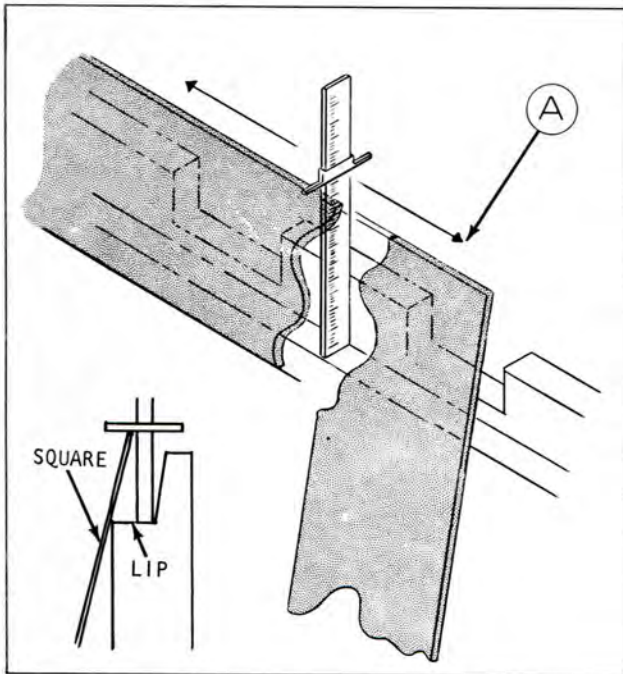


Plate 9574 Squaring Carriage Rollers (Six Roller Carriage)

... upper and lower rollers. Hold square in place with ankle and hand as shown.



Step 6. Hold square and measure the distance between the top face (or lip) of the upper fork bar to the edge of the square at Point A. Now take a measurement at opposite end of square ... these measurements should be the same. If they are not, add or remove shims on lower roller shaft until distance measured at each end is equal.

Plate 9575 Measuring For Squareness

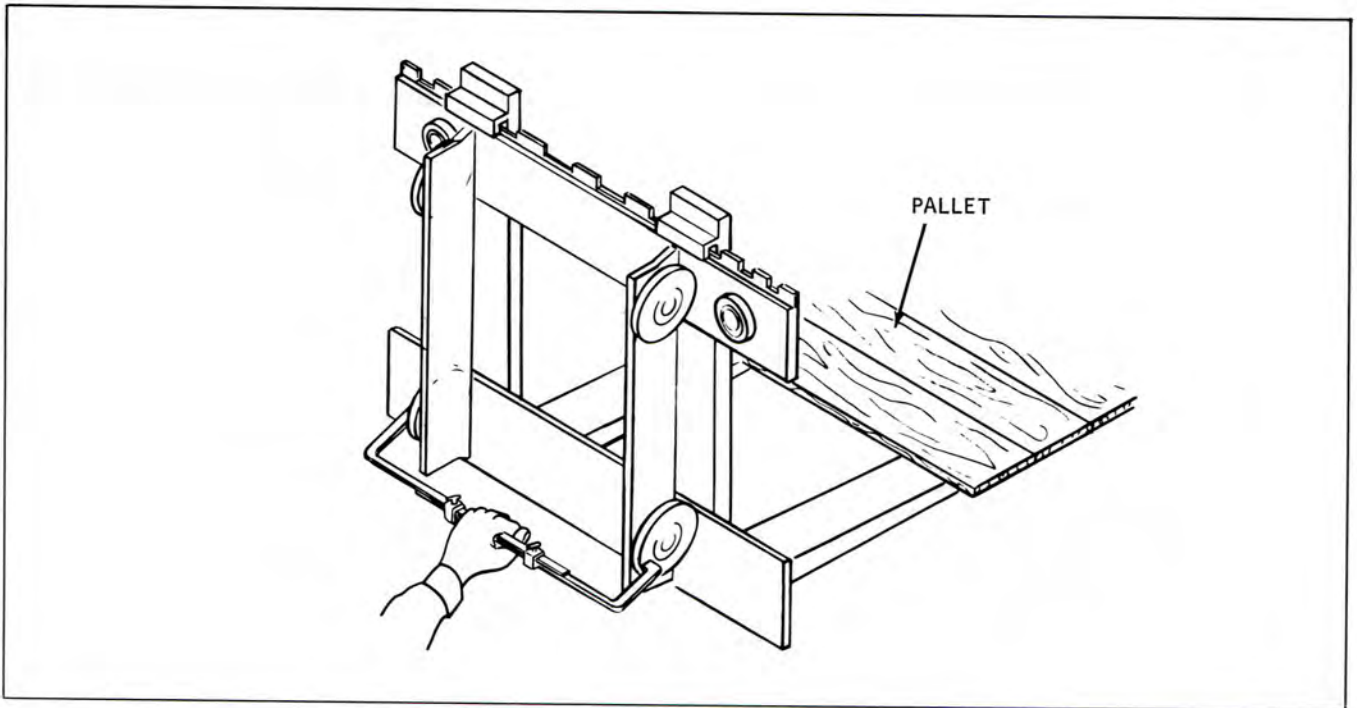


Plate 9576 Spanning Lower Rollers (Four Roller Carriage)

Step 7. Span lower rollers. Add or subtract shims to (the roller that has not been squared) ...

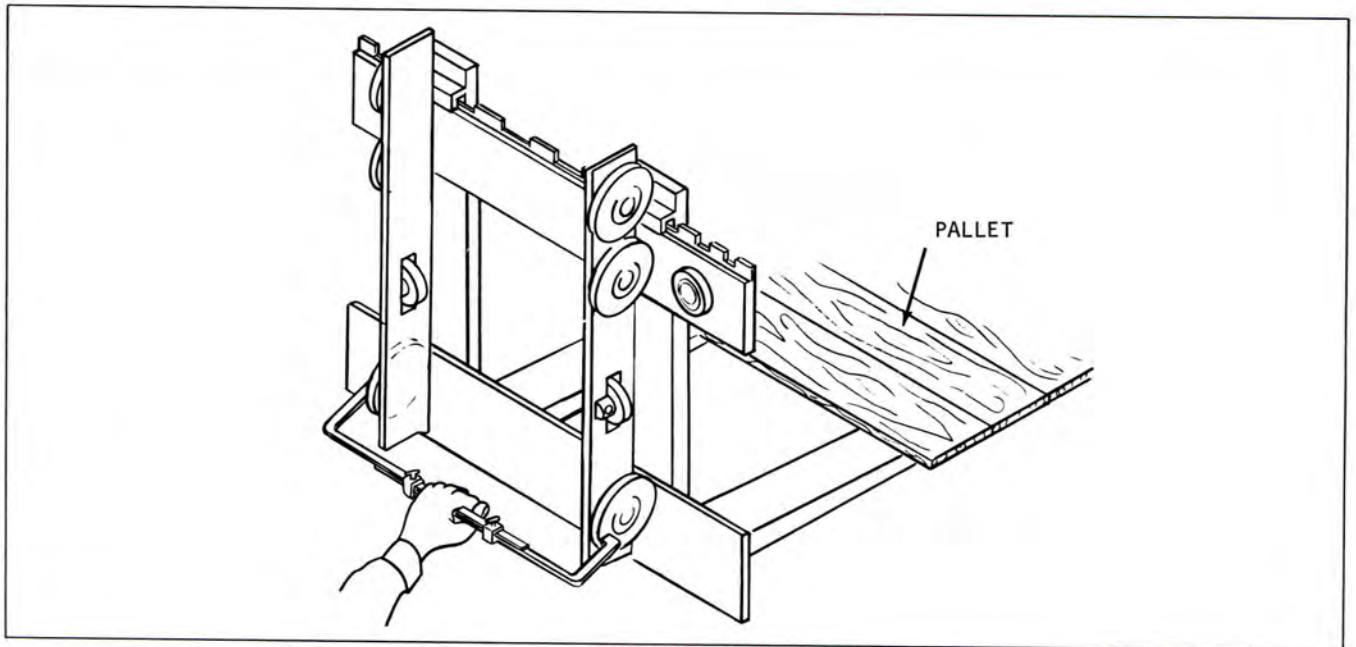


Plate 9577 Spanning Lower Rollers (Six Roller Carriage)

... reach the size of the outside spanning tool.

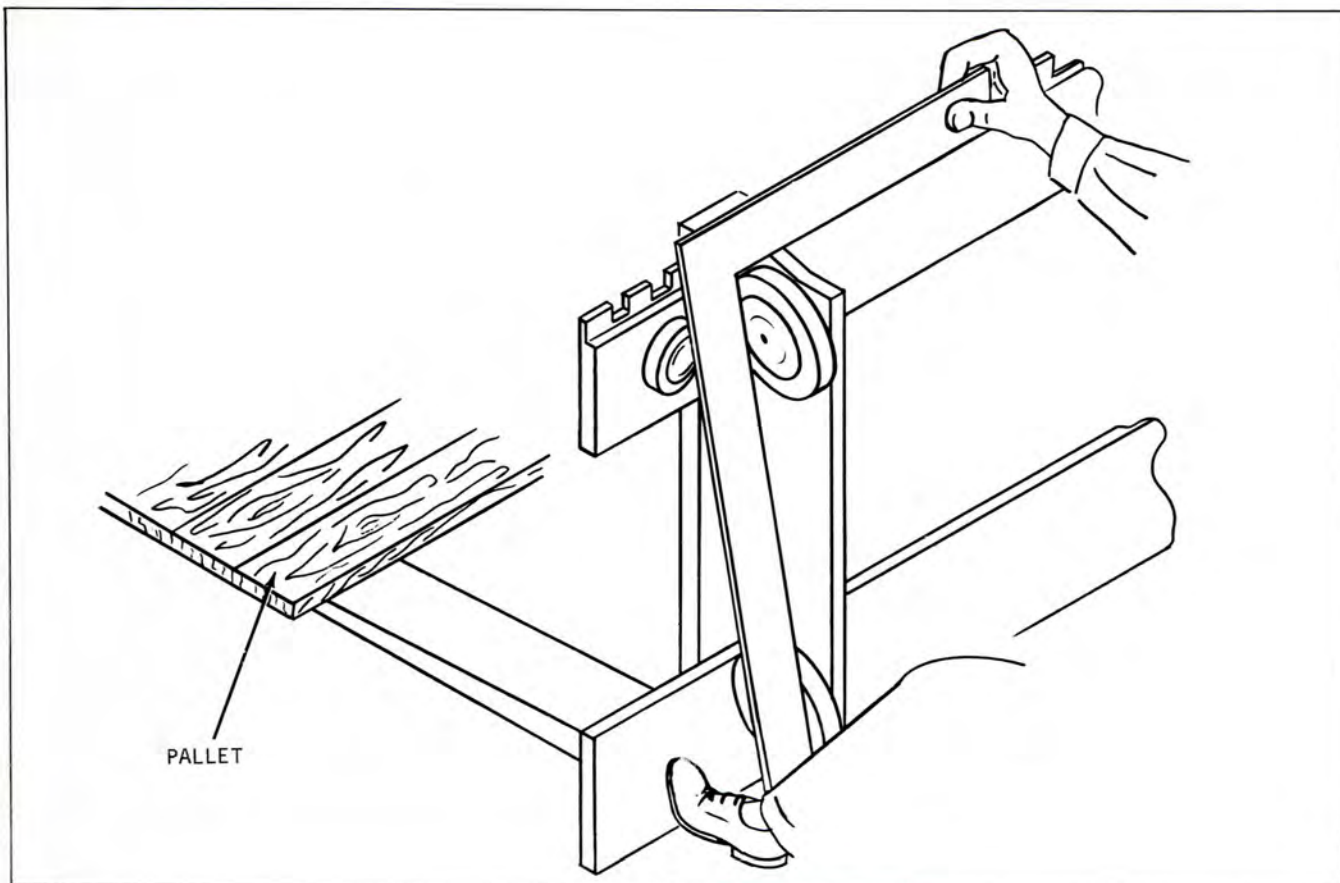


Plate 9578 Checking Squareness (Four Roller Carriage)

Step 8. Check opposite side for squareness (by holding square in the same manner as before and checking ...

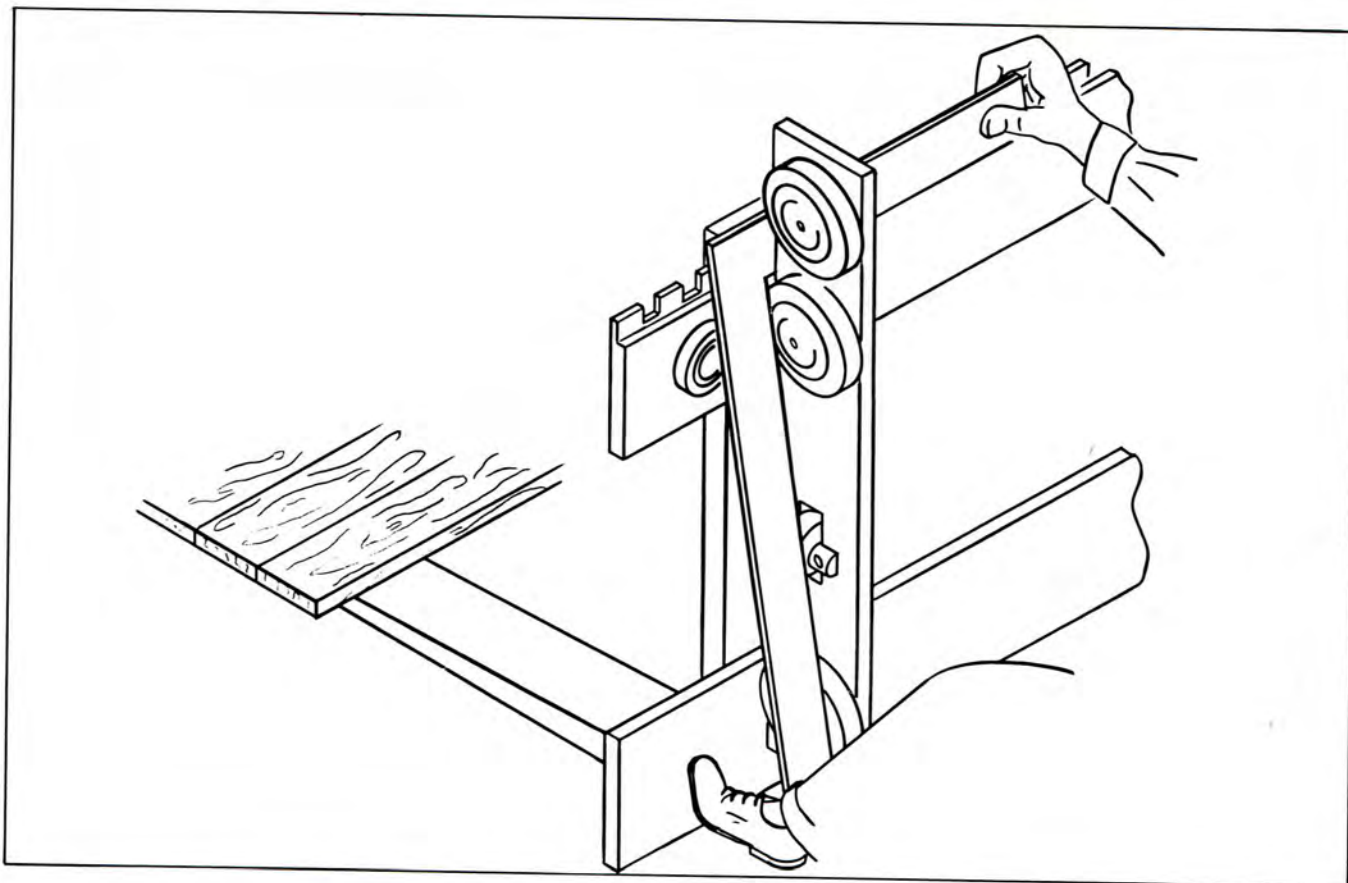


Plate 9579 Checking Squareness (Six Roller Carriage)

... measurement). This side will be square within $1/32''$; if not, return to Step 5. and repeat procedure.

SIX ROLLER CARRIAGE ONLY

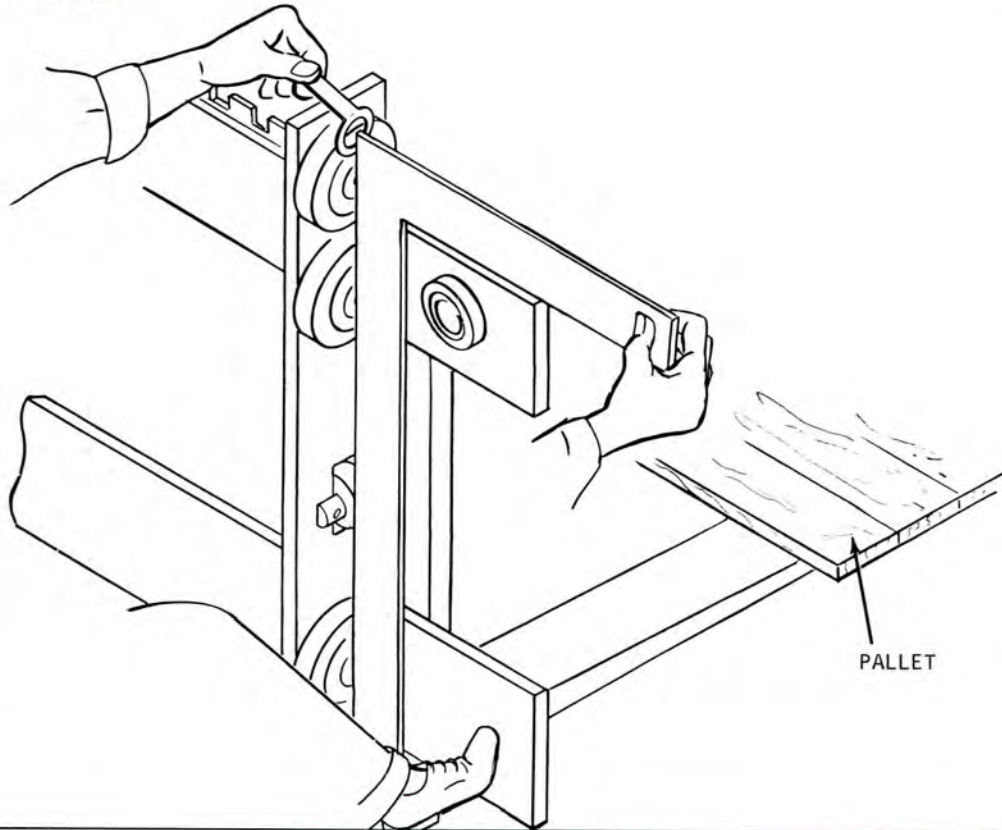


Plate 9580 Top Roller Clearance

Step 1. Place square on the vertical center line of the carriage rollers, as shown above. There must be some clearance between the square and the side surface of the top roller. This clearance should not exceed 1/32" or one shim

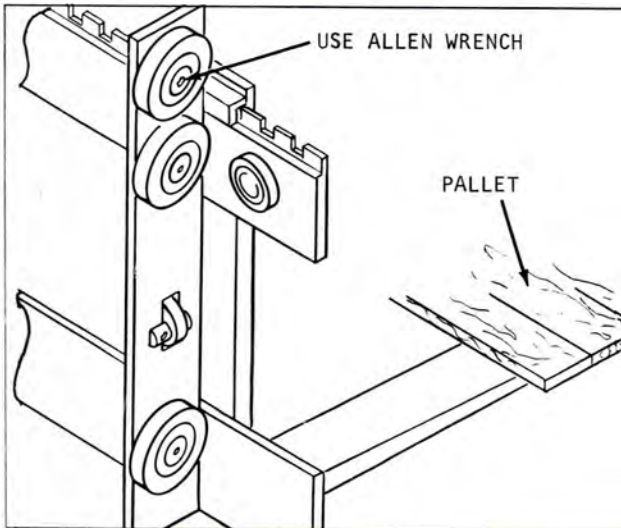


Plate 9581 Removing Top Roller

Step 2. If adjustment is necessary, remove allen screw, lock washer and flat washer to add or remove shims on shaft. Tighten screw securely after completing adjustment.

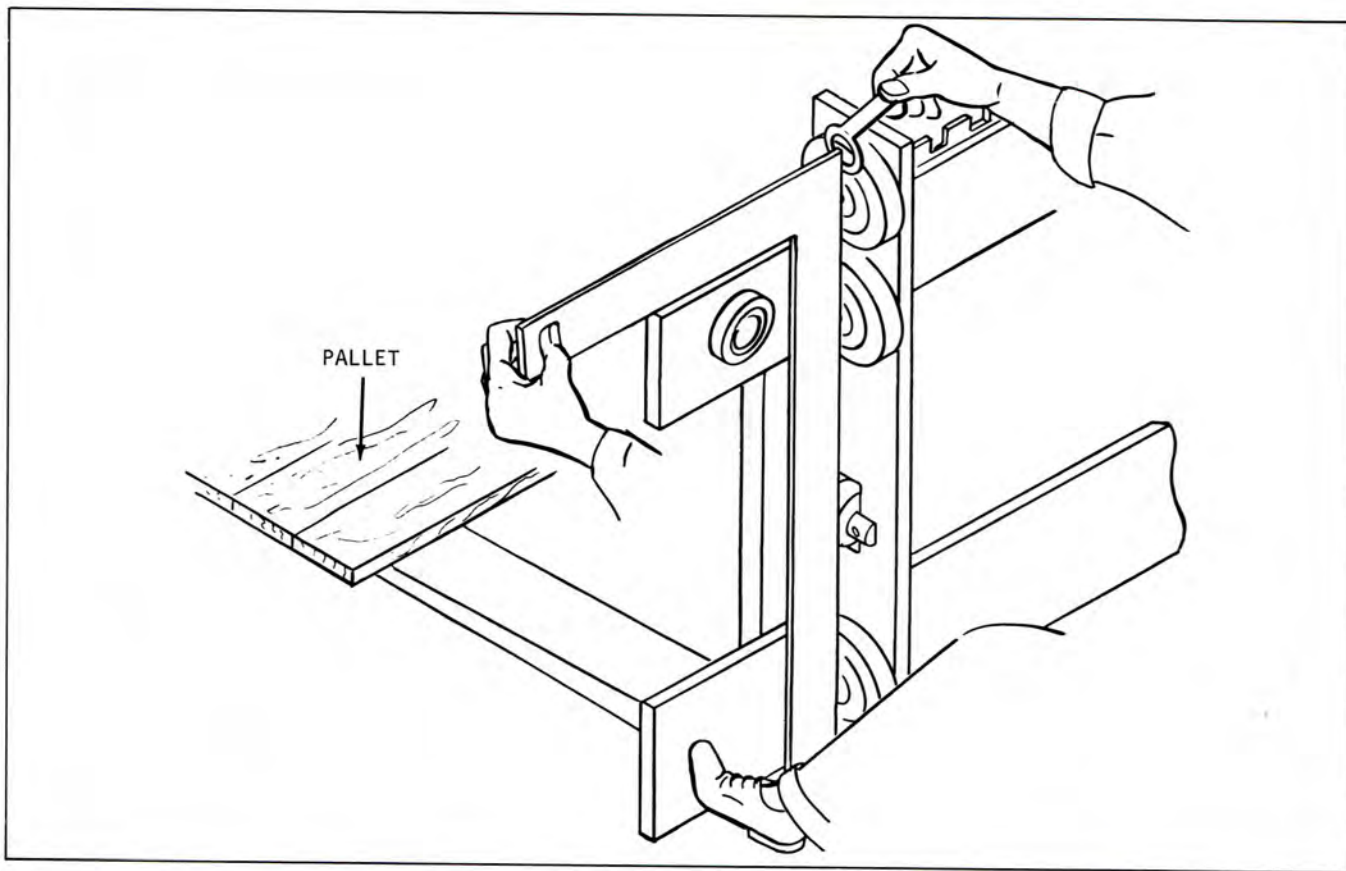


Plate 9582 Top Roller Clearance

Step 3. Check opposite upper roller in the same manner; adjust if necessary.

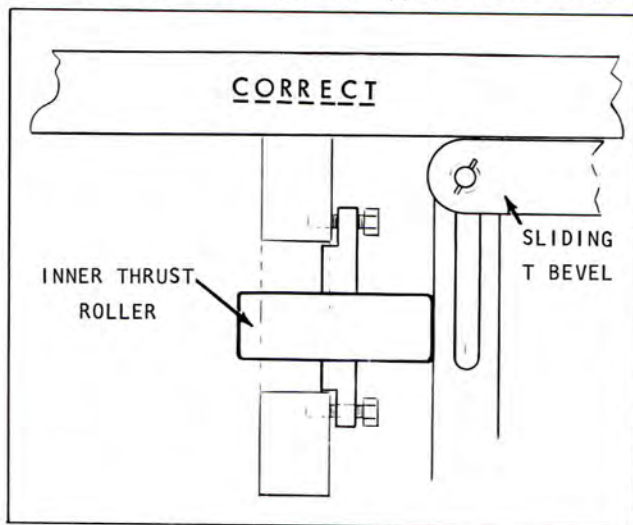


Plate 9583 Checking Squareness ■ CORRECT

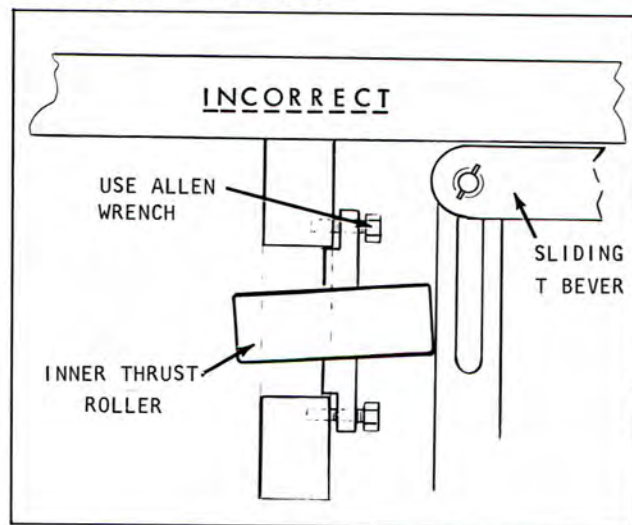


Plate 9584 Checking Squareness ■ INCORRECT

Step 4. Check squareness of inner thrust rollers with Sliding T Bevel. Set Sliding T Bevel to 90° using carpenter's square.

Step 5. Add or subtract shims for adjustment (Use allen wrench see Plate 9584).

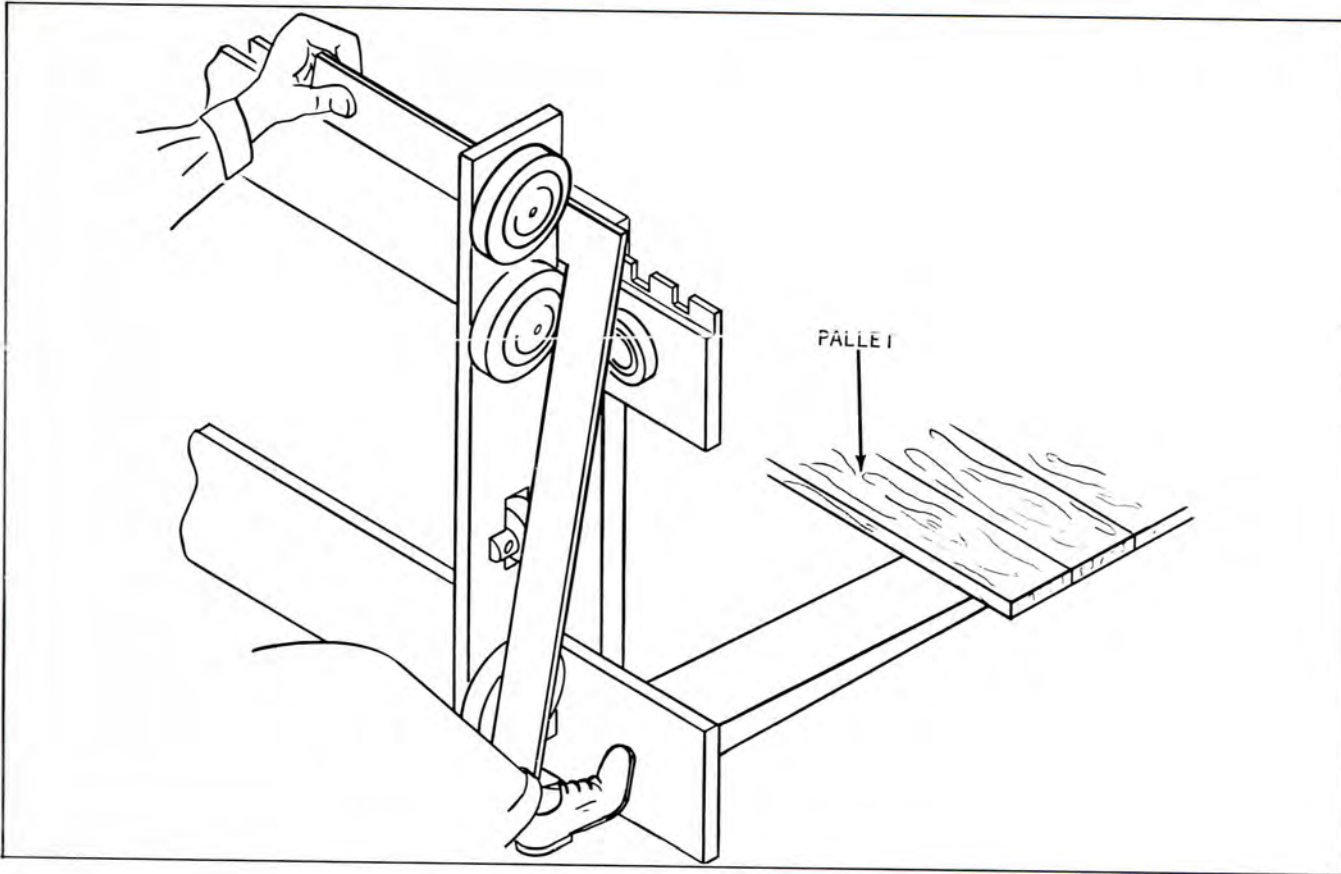


Plate 9574 Square And Side Thrust Roller

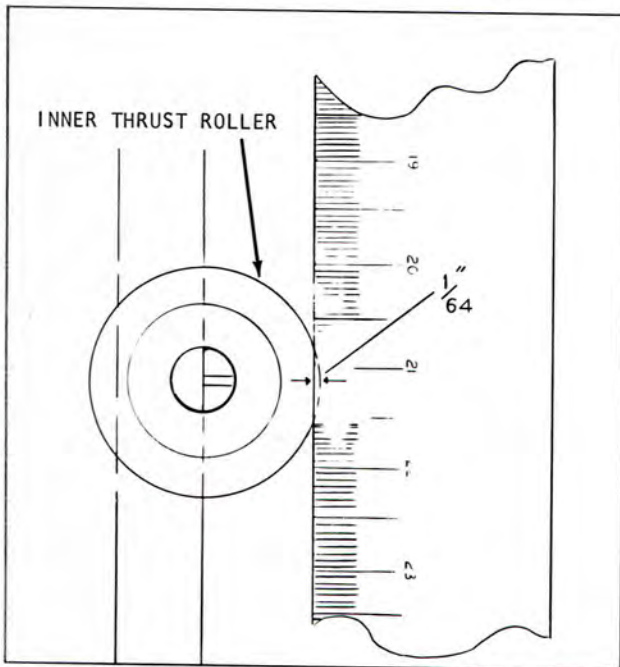


Plate9585 Reading Roller Projection

Step 6. The inner thrust roller is to project 1/64" past line of square. Use one thrust roller shim and eyeball distance as shown (Plate 9573 and Plate 9585).

Step 7. Repeat Step 6. on opposite side.

C. CARRIAGE INSTALLATION

N O T E

Before installing carriage, check upright for proper shimming adjustment.

Step 1. Drive machine up to carriage and position upright to match tilt of carriage.

Step 2. Raise inner rails to just clear upper carriage rollers.

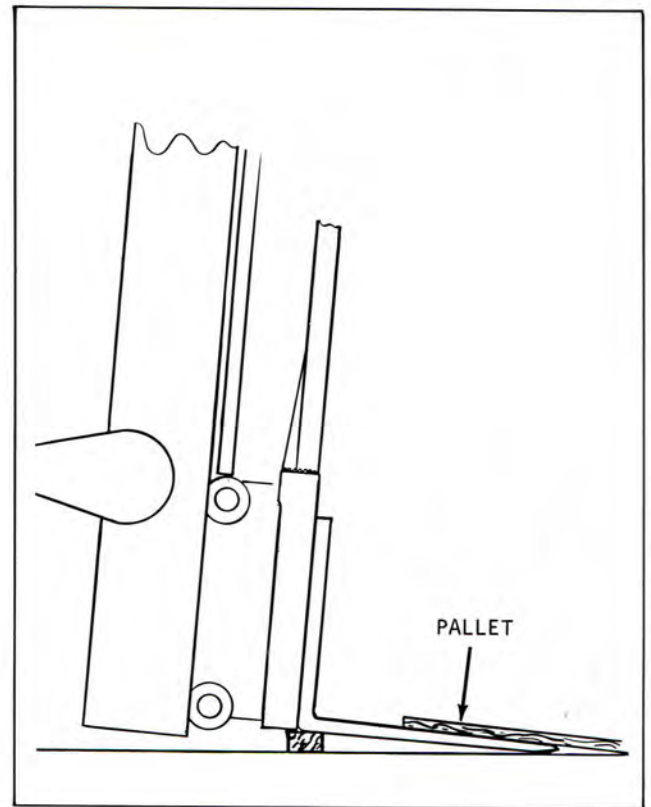


Plate 9565 Inner Rail Clearing Carriage Rollers

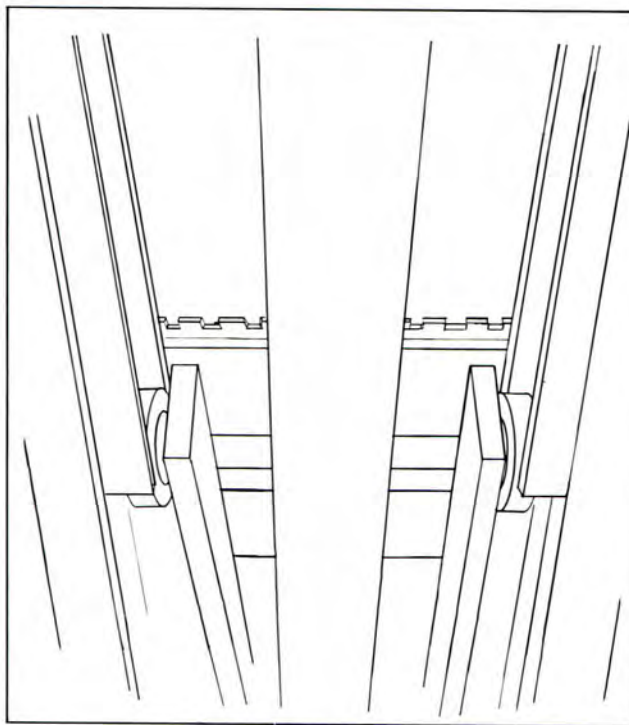


Plate 9591 Rollers Guiding Into Inner Rail

Step 3. Continue to drive machine forward until inner rails line up with upper carriage rollers, then... slowly lower inner rails to full down position.

C A U T I O N

CHECK TO BE SURE THE TOP CARRIAGE ROLLERS ARE GUIDING INTO INNER RAIL.

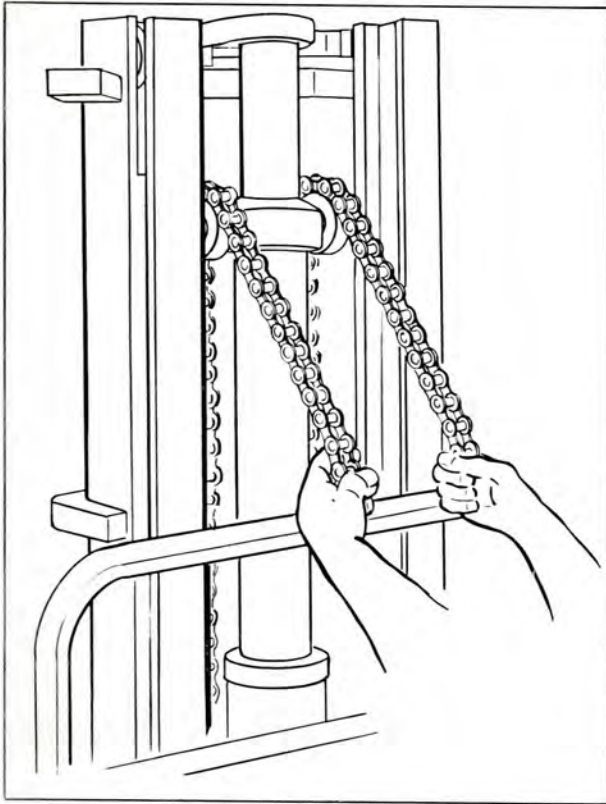


Plate 9586 Pulling Piston Head Down

Step 3(a). Remove wires holding lift chains.

(b). With a chain in each hand and someone holding the lift cylinder lever down, pull the piston to full down position. Place chains behind carriage.

Step 5. Raise carriage about 5' and place a 3' to 4' long 4"x4" wooden beam under it. DO NOT stand directly under forks. Lower carriage onto beam.

Step 6. Replace bolts with anchor pins.

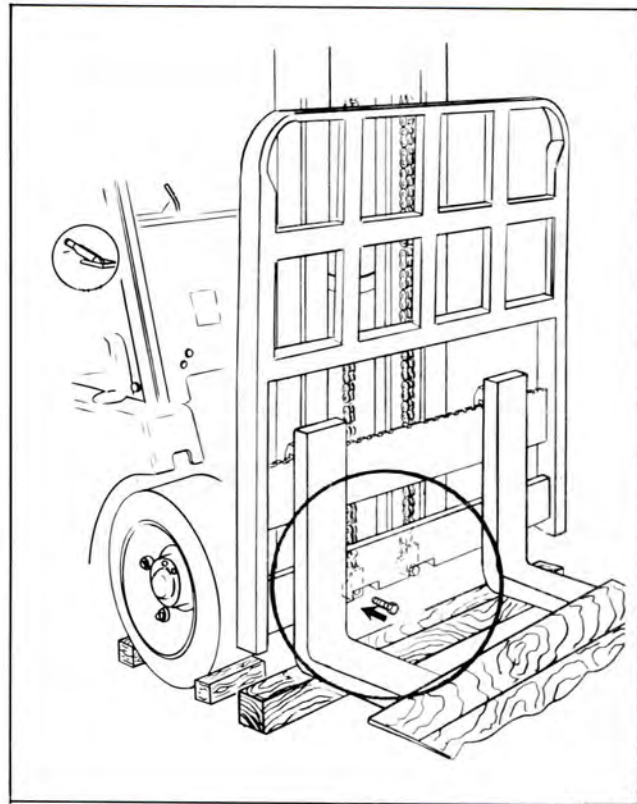


Plate 9587 Installing Bolts

Step 4. Put chain anchors in carriage anchor brackets and install 3/8" x 2" bolts in anchor pin holes.

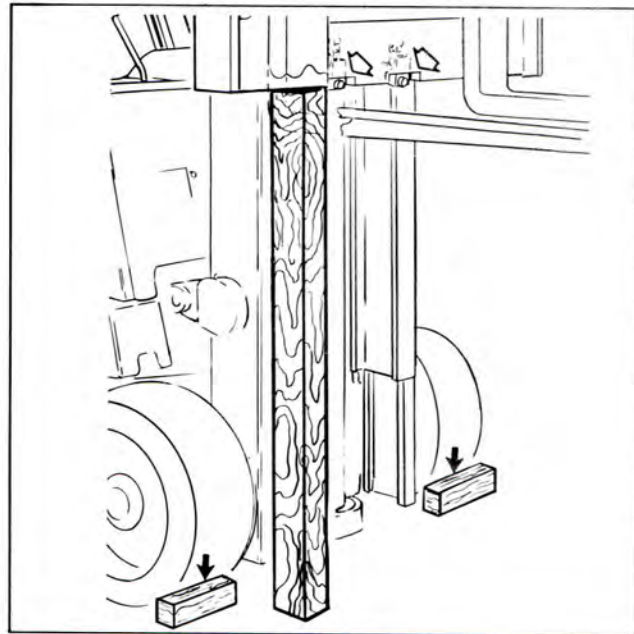


Plate 9593 Carriage Pin Replacement

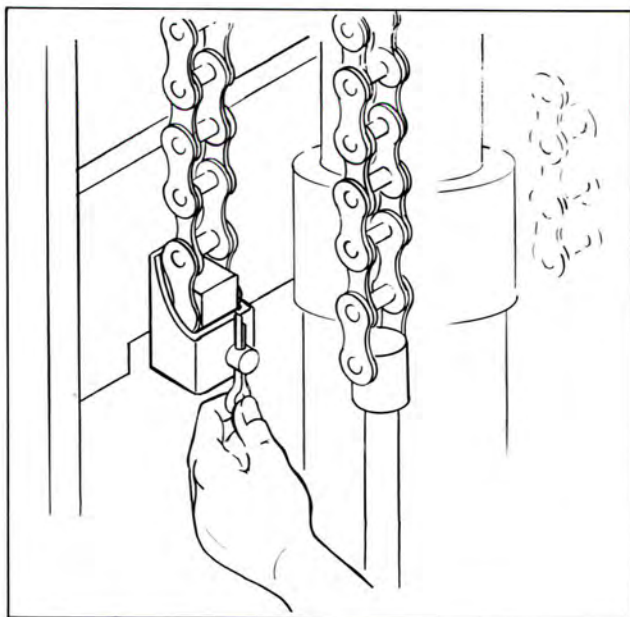
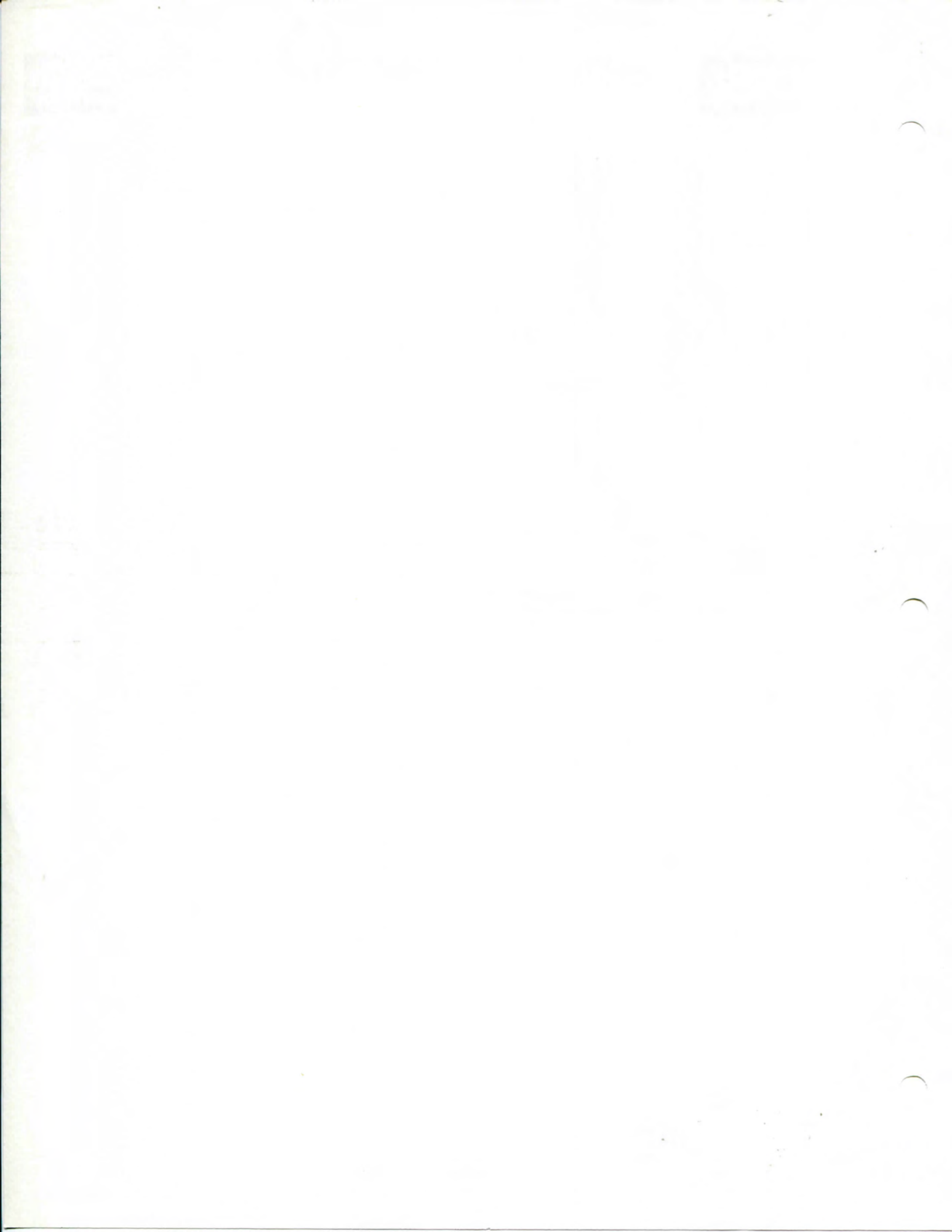
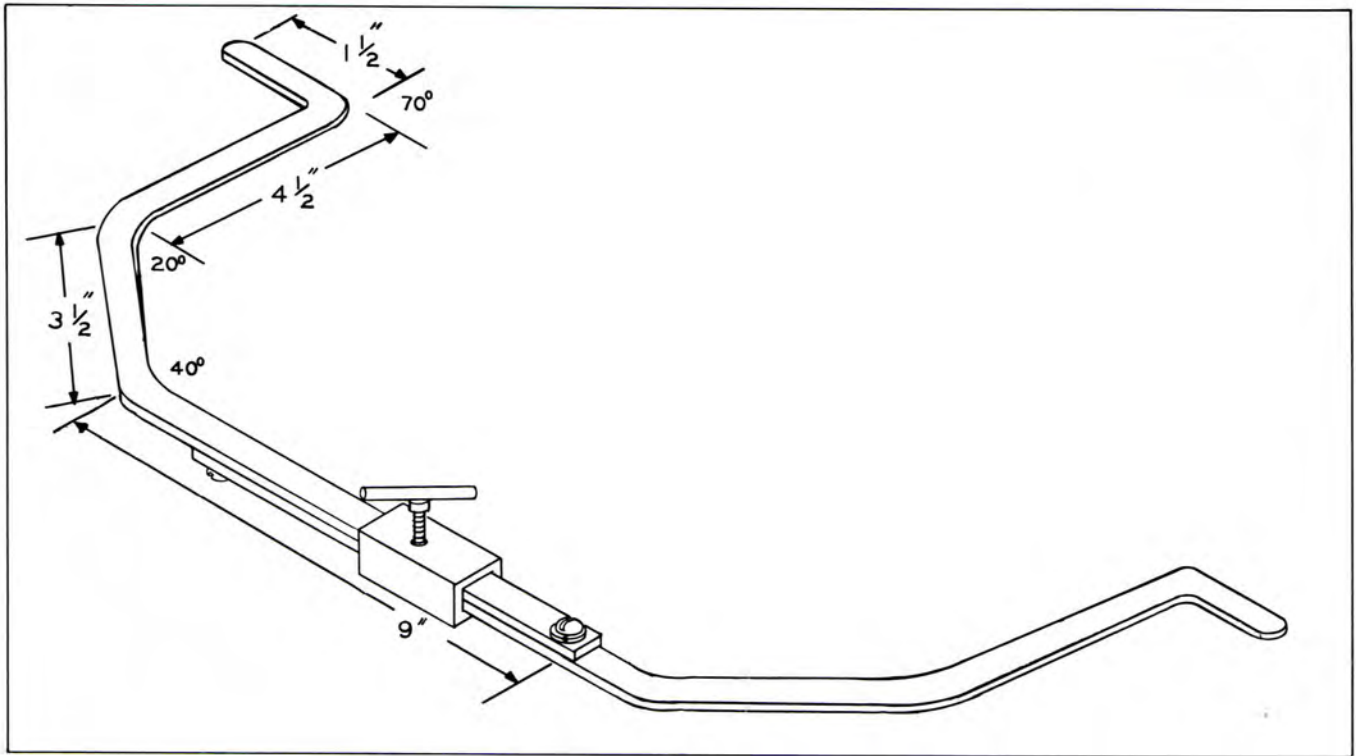


Plate 9588 Installing Cotter Pins

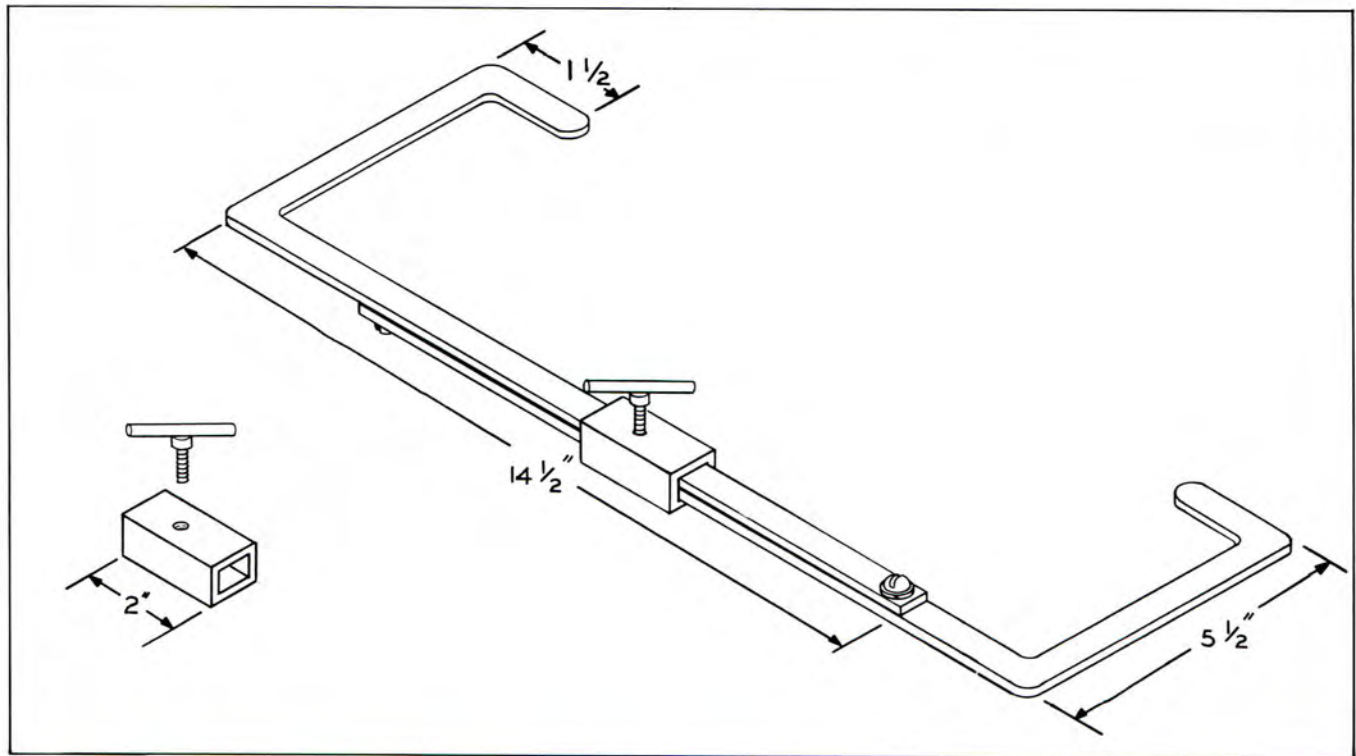
Step 7. Replace cotter pins in anchor pins.

Step 8. Raise and lower carriage to full positions checking all phases of operation.

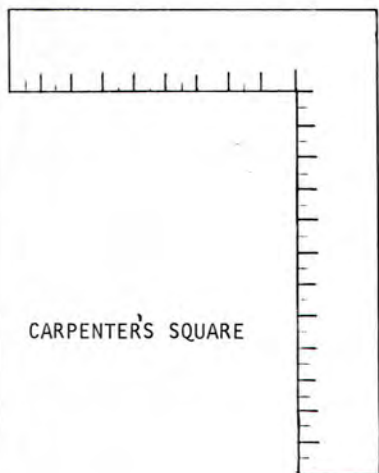
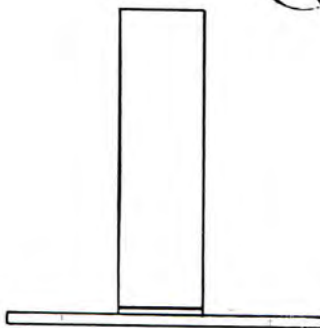
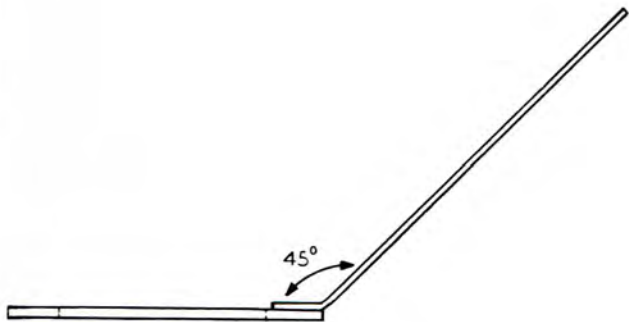
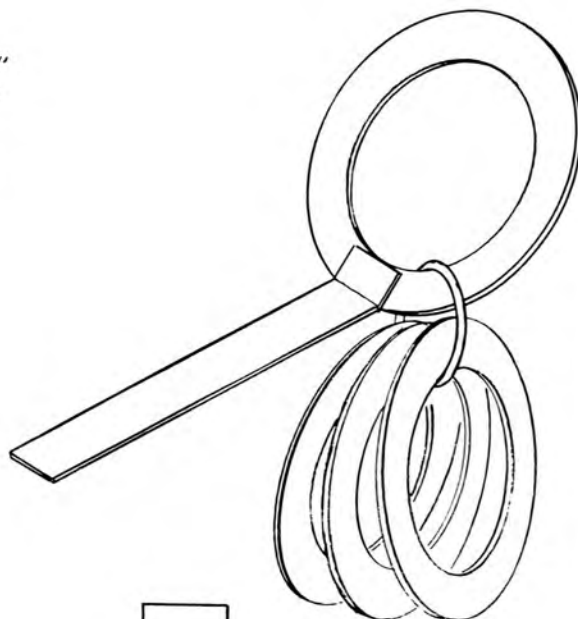
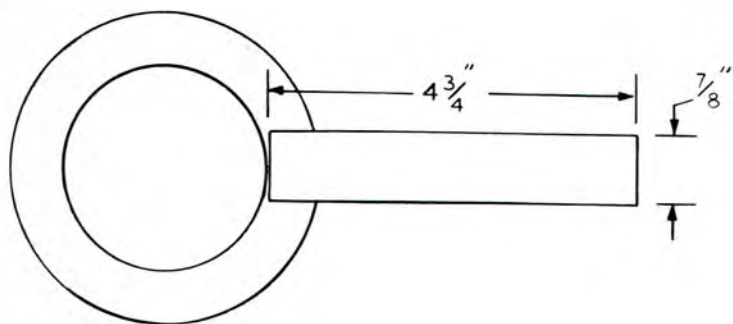




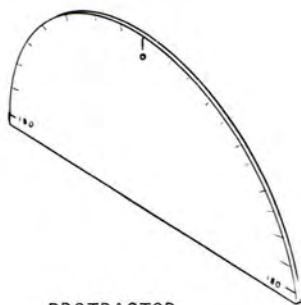
INSIDE SPANNING TOOL



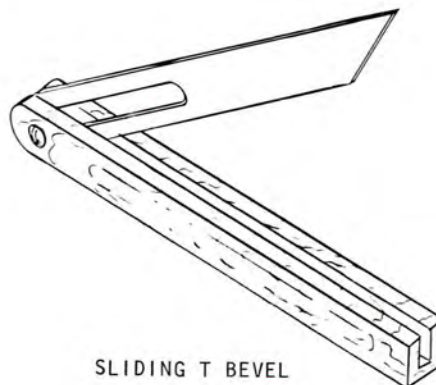
OUTSIDE SPANNING TOOL



CARPENTER'S SQUARE

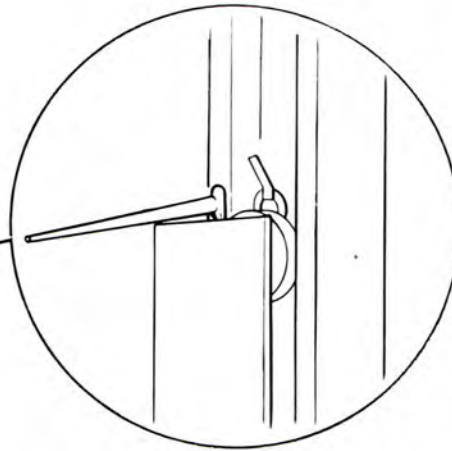
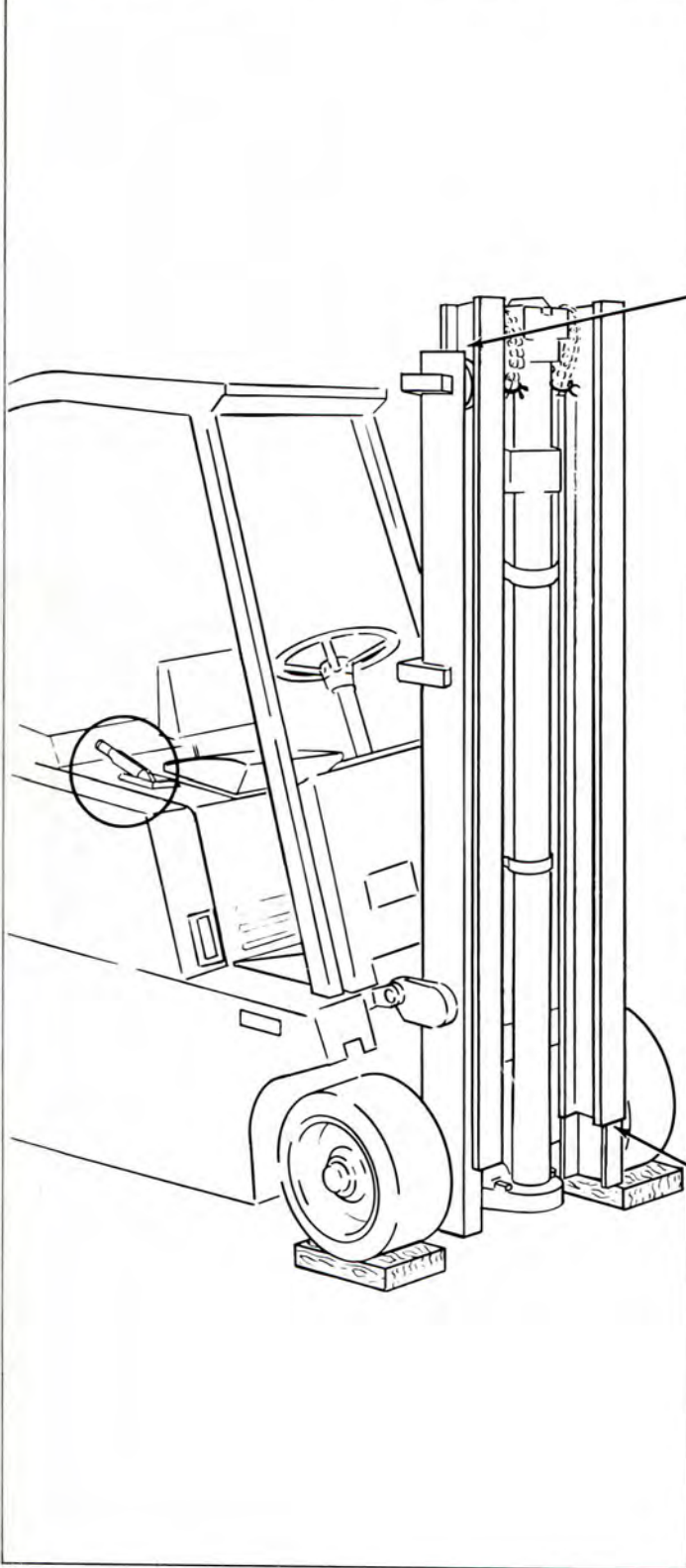


PROTRACTOR



SLIDING T BEVEL

UPRIGHT ROLLER ADJUSTMENT -- STANDARD AND HILO SERIES 500

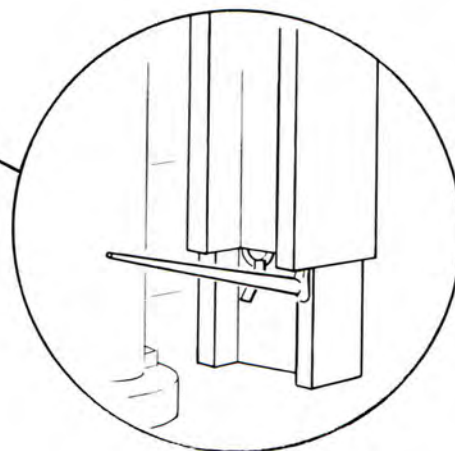


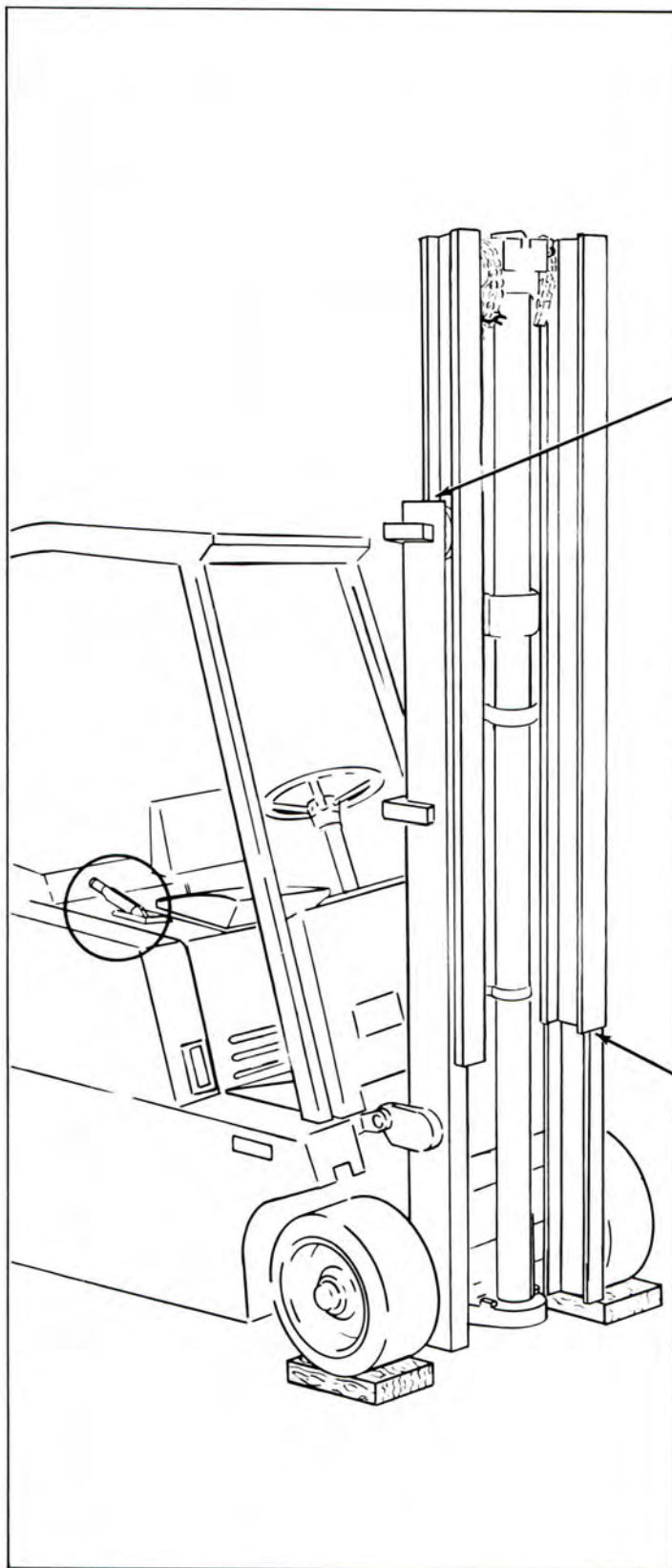
Step 1. Remove carriage. Refer to CARRIAGE REMOVAL.

Step 2. Before checking roller clearance, position inner rail about 5 inches above full down position.

Check both sides for roller clearance at (top and bottom) of inner rail. Use tool to record this number on the rail. Record number of shims to be used, on outer rail (for top rollers only). Record number of shims to be used on inner rail (for bottom rollers only).

There is to be some clearance but it is not to exceed 1/32".

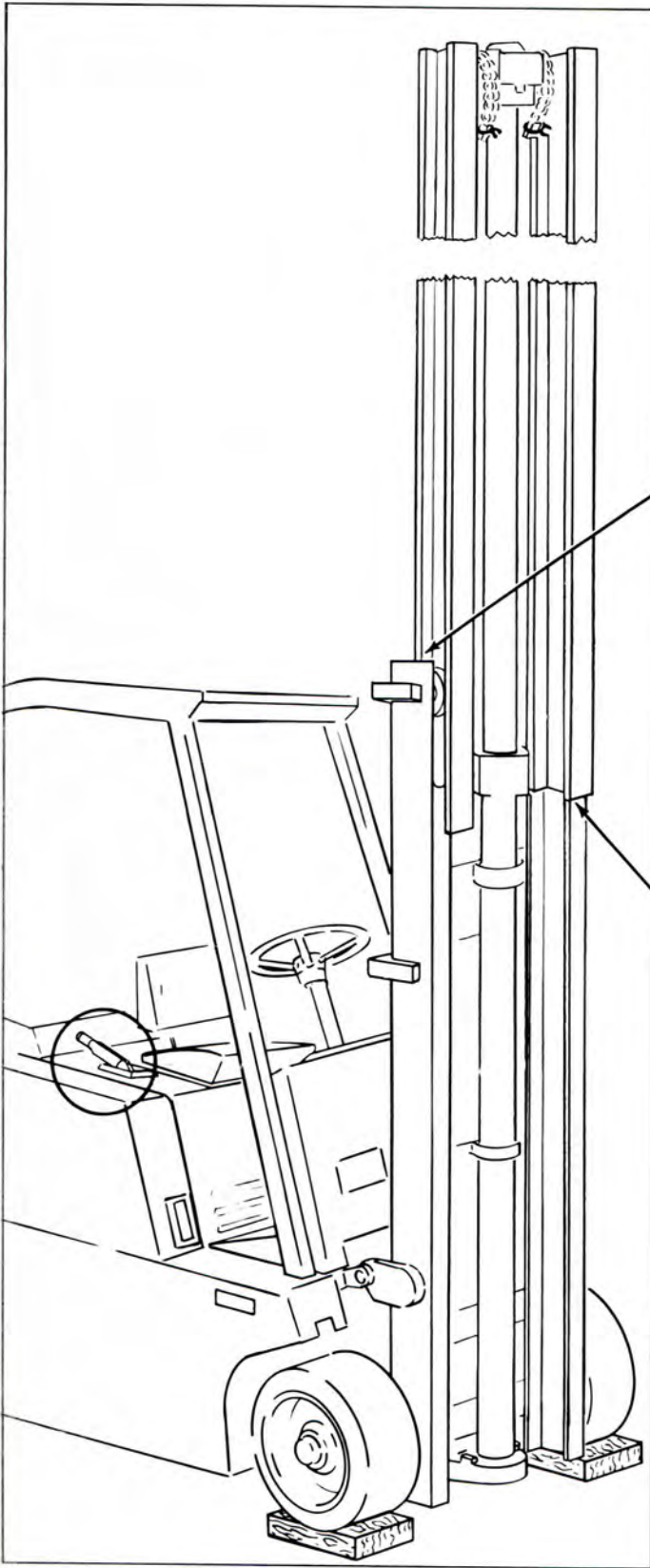




Step 3. Raise inner rail to 1/2 of its full up position. With tool and bar, check the roller clearance in the same manner as before.

Record number of shims to be used, on outer rail (for top rollers only).

Record number of shims to be used, on inner rail (for bottom rollers only).



Step 4. Raise inner rail to full up position and with tool and bar, check for roller clearance in the manner as before.

Record number of shims to be used, on outer rail (for top rollers only).

Record number of shims to be used, on inner rail (for bottom rollers only).

Plate 9806

Step 5. Raise inner rail about 5 inches and remove stop block.

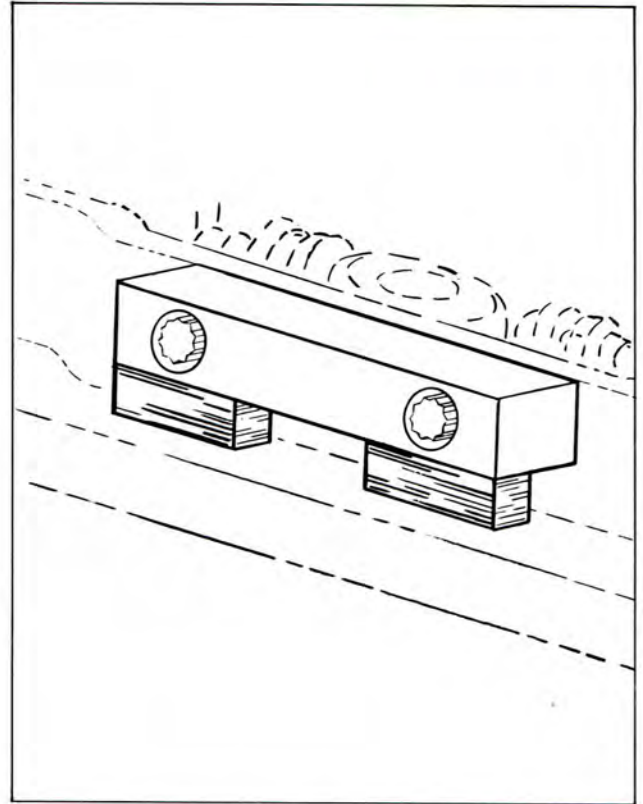


Plate 9808

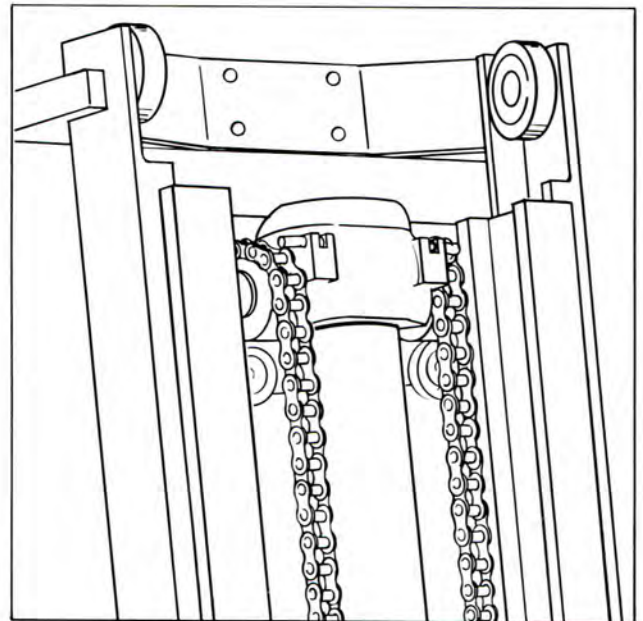
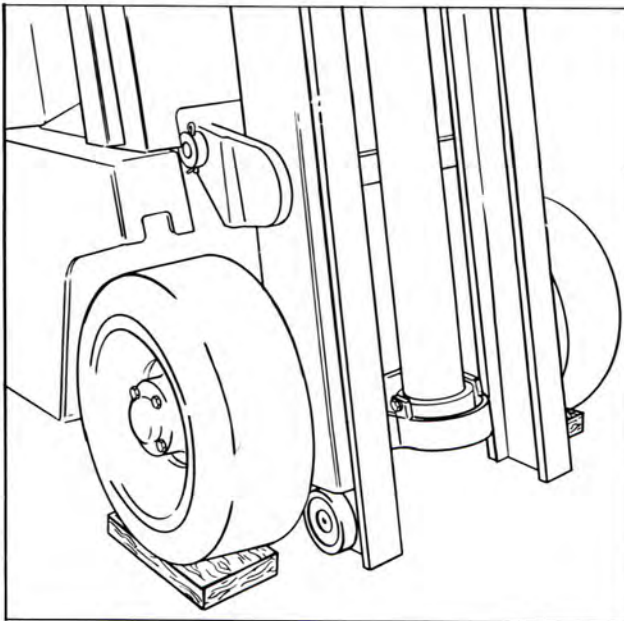


Plate 9809

Step 6. Lower inner rail until upper and lower rollers are clear for removal.

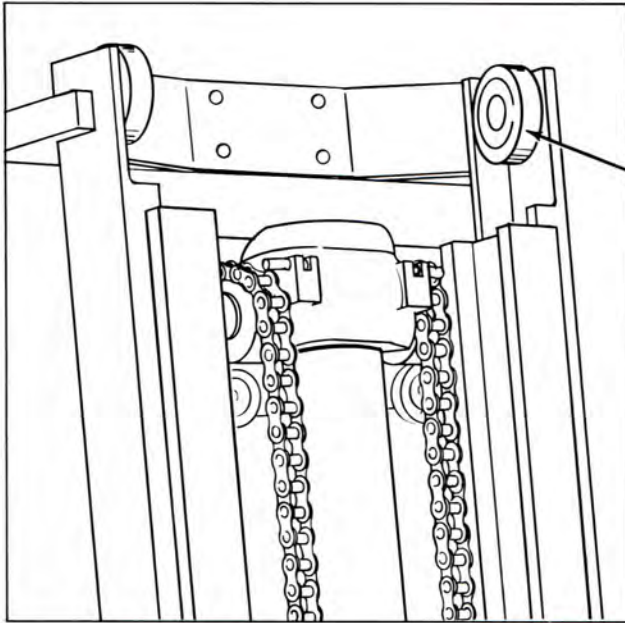


Plate 9810

Step 7. Adjusting upright rollers:

A. Outer rail rollers.

1. Count the number of shims at the right and left hand rollers.

2. Look at the three (3) numbers you recorded on the outer rail in Steps 2-3 & 4. The smallest of these numbers is the total number of shims to be added. A "0" means DO NOT add shims.

3. Your target for adjustment is to have the same number of shims at each upper roller. If you end up with an extra shim DO NOT remove it. Mark the side having an extra shim.

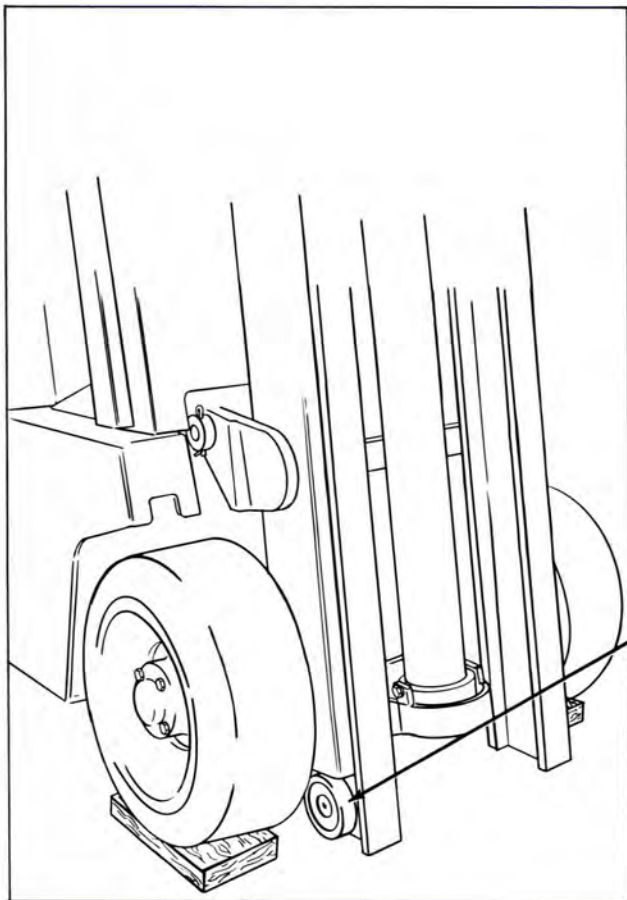


Plate 9812

B. Inner rail rollers.

1. Count the number of shims at the right and left hand rollers.

2. Look at the three (3) numbers you recorded on the inner rail in Step 2-3-& 4. Go through the same steps you followed in adjusting the upper rollers.

3. If you end up with an extra shim here too, be sure it is on the same side as the extra upper shim.

Step 8. Raise inner rail about 5 inches above upper tie bar (of the outer rail) and install stop block and pad assembly.

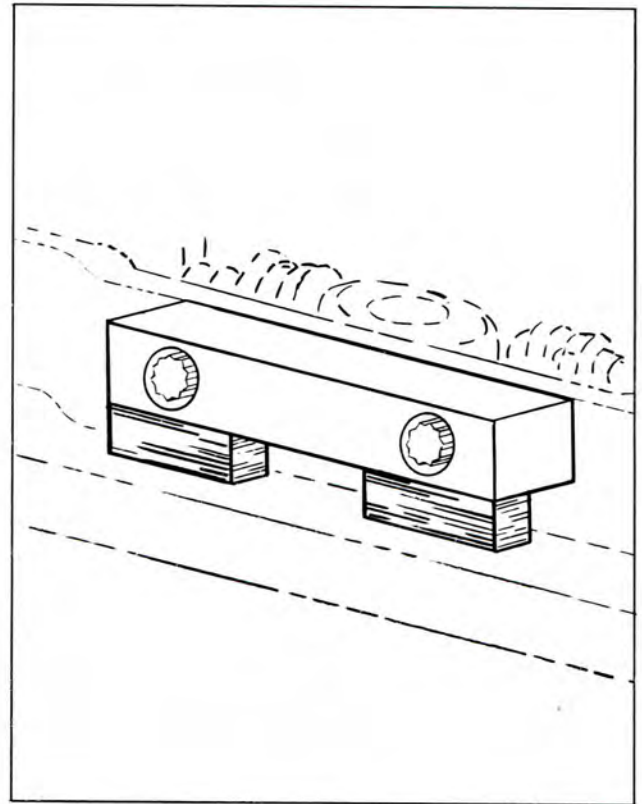


Plate 9808

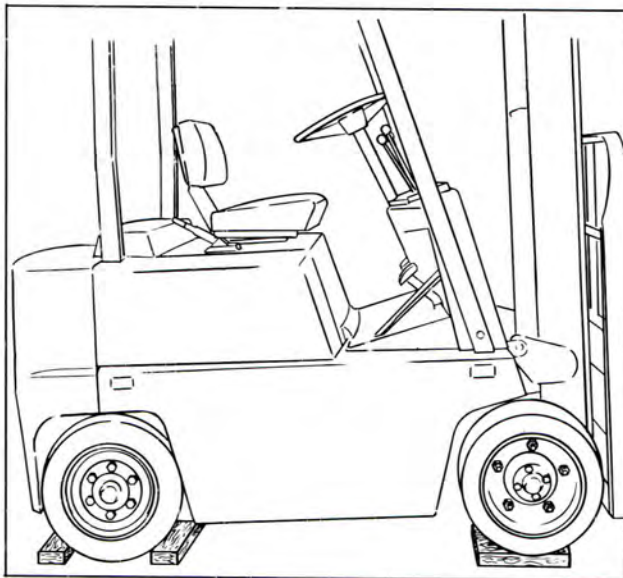


Plate 9811

Step 9. Remove carriage support chain and wheel blocks.

1951

MASTER MAIL

1951



1951



1951



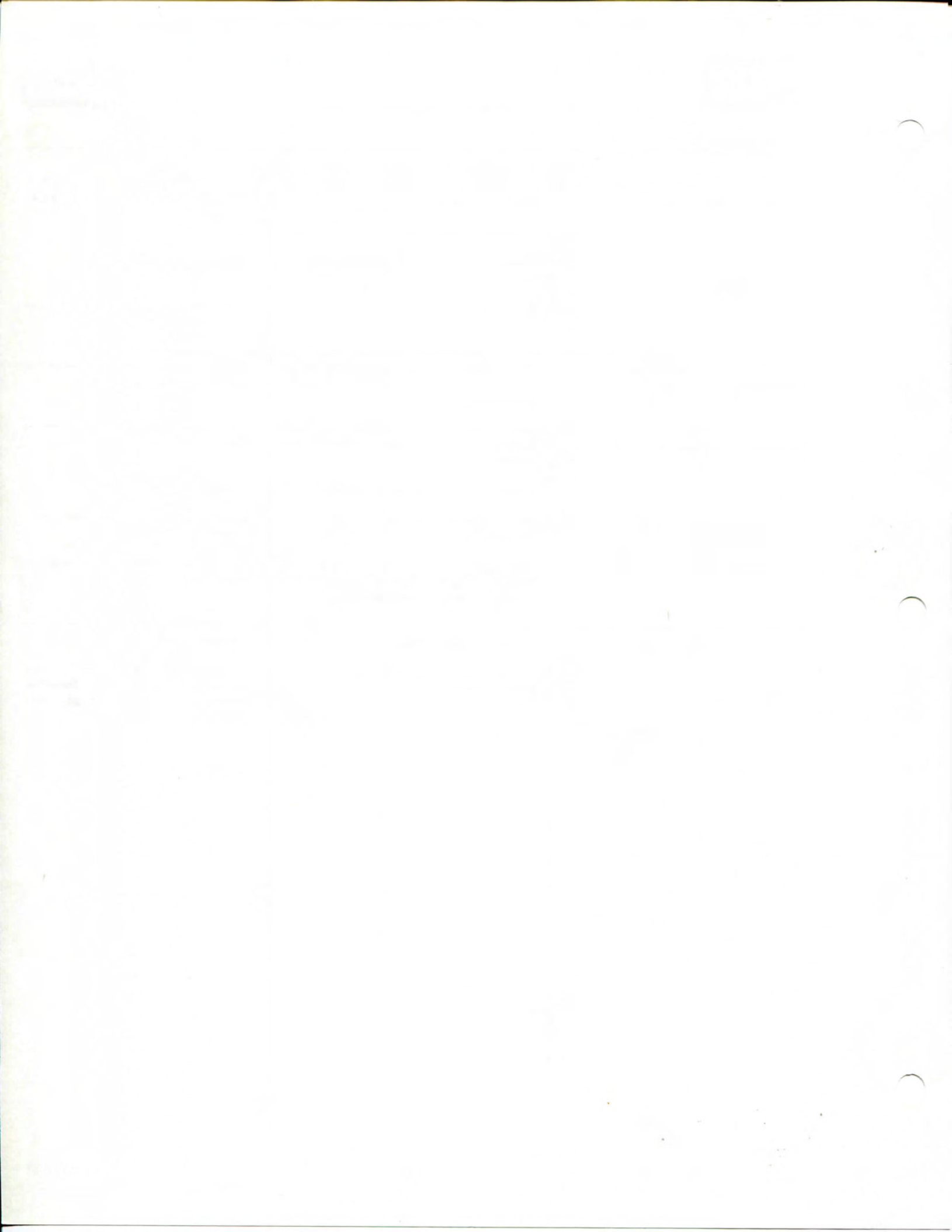
INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

DRIVE AXLE

| TROUBLE | PROBABLE CAUSE | REMEDY |
|---------------------------------------|--|--|
| Continuous Axle Noise. | Badly worn parts. Unevenly worn tires. Improperly adjusted wheel bearing. Lack of lubricant. | Replace worn parts with new. Replace tires. Adjust correctly. Add sufficient lubricant of correct grade. |
| Axle Noise on Drive or on Coast Only. | Differential pinion gear and ring gear out of adjustment or worn excessively. | Adjust, repair or replace entire unit if conditions warrants. |
| Excessive Backlash in Axle Driving. | Loose axle shaft drive flange cap screws. Flange loose on axle shaft. Worn splines on axle shaft at differential end. Differential drive pinion gear and ring gear out of adjustment or worn excessively. | Tighten cap screws. Reweld flange to shaft. Replace drive flange and shaft assembly. Adjust or replace as condition warrants. |
| Complete Failure to Function. | Broken axle shaft. Broken teeth on ring gear or pinion gear. | Replace axle shaft. Replace ring gear and pinion and other parts of differential necessary. Adjust ring gear and pinion gear correctly. |





INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

STEERING AXLE

| TROUBLE | PROBABLE CAUSE | REMEDY |
|----------|---|--|
| Trouble. | Damaged axle. Lubrication leaks. Incorrect caster or camber. Uneven tire wear. | Replace axle. Replace oil seals. (Refer to Lubrication Section). Report to designated individual in authority. Report to designated individual in authority. Inflate tires properly. Check wheel alignment. |



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

BRAKES

| TROUBLE | PROBABLE CAUSE | REMEDY |
|--|--|---|
| Brakes drag. | <p>Improper pedal adjustment.</p> <p>Brake pedal return spring broken or weak.</p> <p>Brakes improperly adjusted.</p> <p>Brake shoe anchor pin tight in shoe.</p> <p>Brake shoe return spring broken or weak.</p> <p>Loose or damaged wheel bearings.</p> <p>Insufficient brake shoe clearance, or improper brake anchor pin adjustment.</p> <p>Brake backing plate loose.</p> <p>Grease on linings.</p> <p>Dirt imbedded in lining.</p> <p>Drums scored or rough.</p> | <p>Adjust brake pedal free travel.</p> <p>Replace spring.</p> <p>Adjust brakes.</p> <p>Free-up pin and lubricate lightly.</p> <p>Replace spring.</p> <p>Adjust or replace wheel bearings.</p> <p>Adjust brakes.</p> <p>Tighten plate.</p> <p>Correct grease leakage; clean or install new shoes and lining assemblies.</p> <p>Clean lining with wire brush.</p> <p>Replace drum and brake shoe and lining assemblies.</p> |
| Severe brake action on light pedal pressure. | <p>Brake shoes improperly adjusted.</p> <p>Grease on linings.</p> <p>Loose brake shoe anchor.</p> | <p>Adjust brakes.</p> <p>Correct grease leakage; clean or install new shoes and lining assemblies.</p> <p>Adjust and tighten.</p> |
| Brake locked. | <p>Brake pedal lacks free travel.</p> <p>Brakes frozen to drums (cold weather).</p> | <p>Adjust pedal free travel.</p> <p>Break loose by driving vehicle.</p> |
| Brake noisy or chatters. | <p>Brake lining worn.</p> <p>Grease on linings.</p> <p>Dirt embedded in linings.</p> <p>Improper or loose linings.</p> <p>Brake shoe or drum distorted.</p> | <p>Replace shoe and lining assemblies.</p> <p>Correct leakage; clean or replace shoe and lining assemblies.</p> <p>Clean lining with wire brush.</p> <p>Replace shoe and lining assemblies.</p> <p>Straighten or replace.</p> |



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

BRAKES (Continued)

| TROUBLE | PROBABLE CAUSE | REMEDY |
|---------------------------|---|--|
| Excessive pedal travel. | Lining worn. Brake improperly adjusted. Scored brake drums. | Adjust or replace shoe and lining assemblies. Adjust brake. Repair or replace drums. |
| Excessive pedal pressure. | Grease on linings; worn or glazed lining. Warped brake shoes, or defective brake linings. Shoes improperly adjusted. Brake drum scored or distorted. Shoes improperly adjusted. Insufficient fluid in master cylinder. | Correct grease leakage; clean up and replace shoe and lining assemblies. Replace shoe and lining assemblies. Adjust brakes. Repair or replace drums. Adjust brakes. Fill master cylinder to within 1/4 inch of the top. |
| Wheel troubles. | Wheel wobbles; bent. Wheel loose on hub. Wheel out of balance. Wheel bearings run hot. | Inspect mounting on hub, spindles, and drive axle; replace defective wheel or mounting. Tighten. Balance wheel. Adjust, lubricate wheel bearings. |



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

HYDRAULIC SYSTEM

| TROUBLE | PROBABLE CAUSE | REMEDY |
|--------------------------------------|--|---|
| Pump not delivering oil. | <p>Wrong direction *of rotation.</p> <p>Tank oil level low.</p> <p>Oil intake pipe or suction filter plugged.</p> <p>Air leak in suction line.</p> <p>Oil viscosity too heavy to pick up prime.</p> <p>Broken pump shaft or gear.</p> | <p>Must be reversed immediately to prevent seizure and breakage of parts due to lack of oil.</p> <p>Add recommended oil.</p> <p>Replace filter cartridge, clean strainer if so equipped.</p> <p>Will prevent priming, or cause noise and irregular action of control circuit.</p> <p>Thinner oil should be used, per recommendations for given perature and service.</p> <p>Report to designated individual in authority.</p> |
| Pump not developing pressure. | <p>Pump not delivering oil for any of the above reasons.</p> <p>Relief valve setting not high enough.</p> <p>Relief valve sticking open.</p> <p>Leak in hydraulic control system (cylinders or valves).</p> <p>Partially clogged intake line, intake filter or restricted intake pipe.</p> | <p>Check oil circulation by watching oil in tank.</p> <p>Refer to relief valve instructions.</p> <p>Dirt under pressure adjustment valve. Refer relief valve instructions.</p> <p>Find leak and correct.</p> <p>Pump must receive intake oil freely or cavitation will take place.</p> |
| Pump making noise. | <p>Small air leak at pump intake piping joints.</p> <p>Air leak at pump shaft packing.</p> <p>Tank air vent plugged.</p> <p>Too high oil viscosity.</p> <p>Shaft packing worn.</p> <p>Oil filter dirty.</p> | <p>Test by pouring oil on joints while listening for change in operation. Tighten as required.</p> <p>Repair or replace.</p> <p>Must be open thru breather opening or air filter.</p> <p>Use recommended oils.</p> <p>Replace shaft packing per preceding instructions.</p> <p>Replace filter element.</p> |
| Forks do not lift to maximum height. | <p>Hydraulic Oil level low.</p> | <p>Fill sump tank.</p> |



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

HYDRAULIC SYSTEM CONTINUED

| TROUBLE | PROBABLE CAUSE | REMEDY |
|---|--|--|
| Lift or tilt action fails. | Loss of oil pressure. | Report to designated individual in authority. |
| Oil leak at top of lift cylinder assembly. | Worn or damaged lift piston seal. Scored cylinder wall. Plugged vent line. | Replace seal. Replace cylinder. Clean out vent line. Replace if collapsed. |
| Oil leak around piston rod at tilt cylinder. | Worn seal. Scored piston rod. | Replace seal. Replace rod and eliminate cause of scoring which may be caused by misalignment, worn bearing or foreign matter. |
| With load centered on lift forks load is lifted unevenly. | Lift chains out of adjustment. | Adjust chains. |

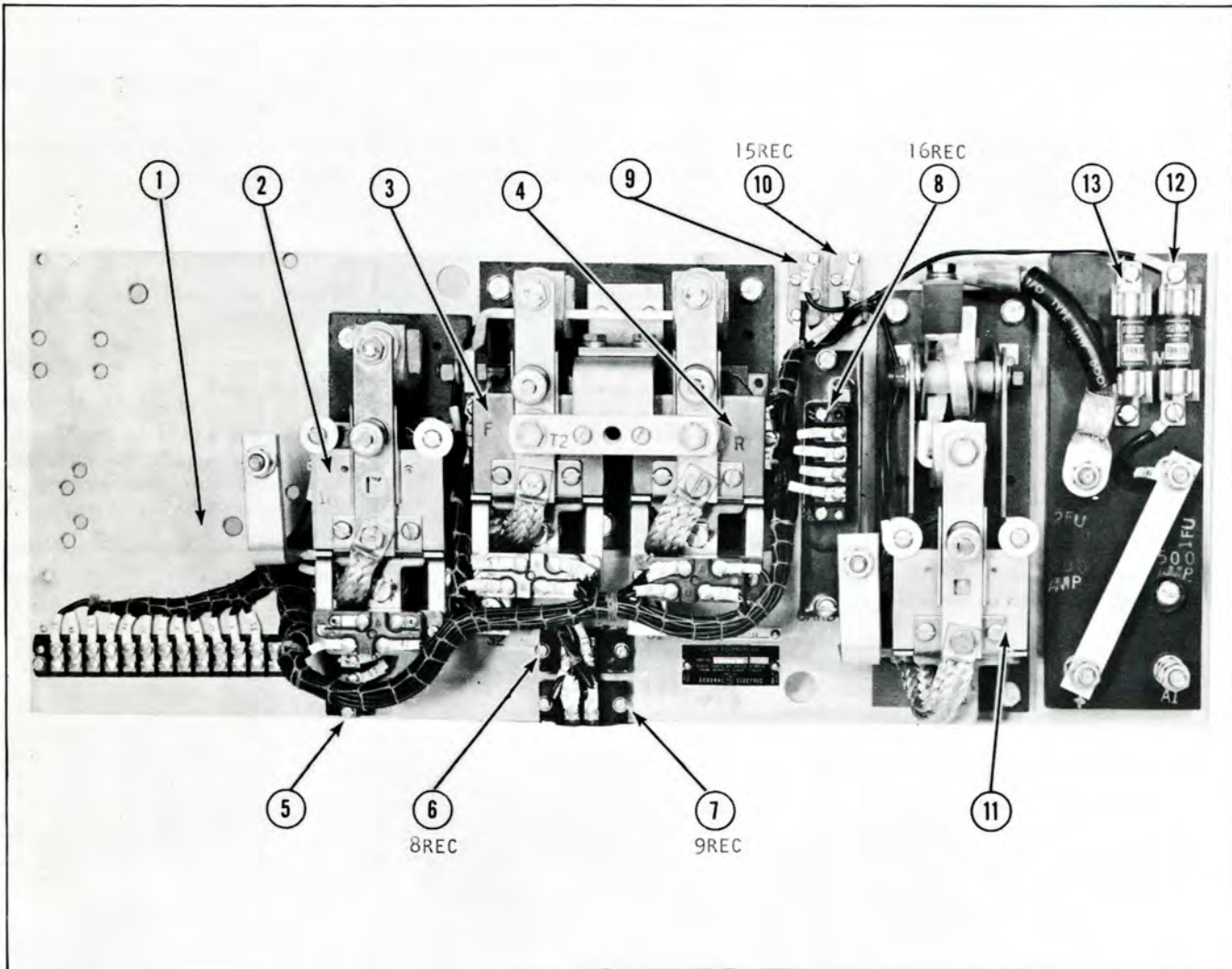
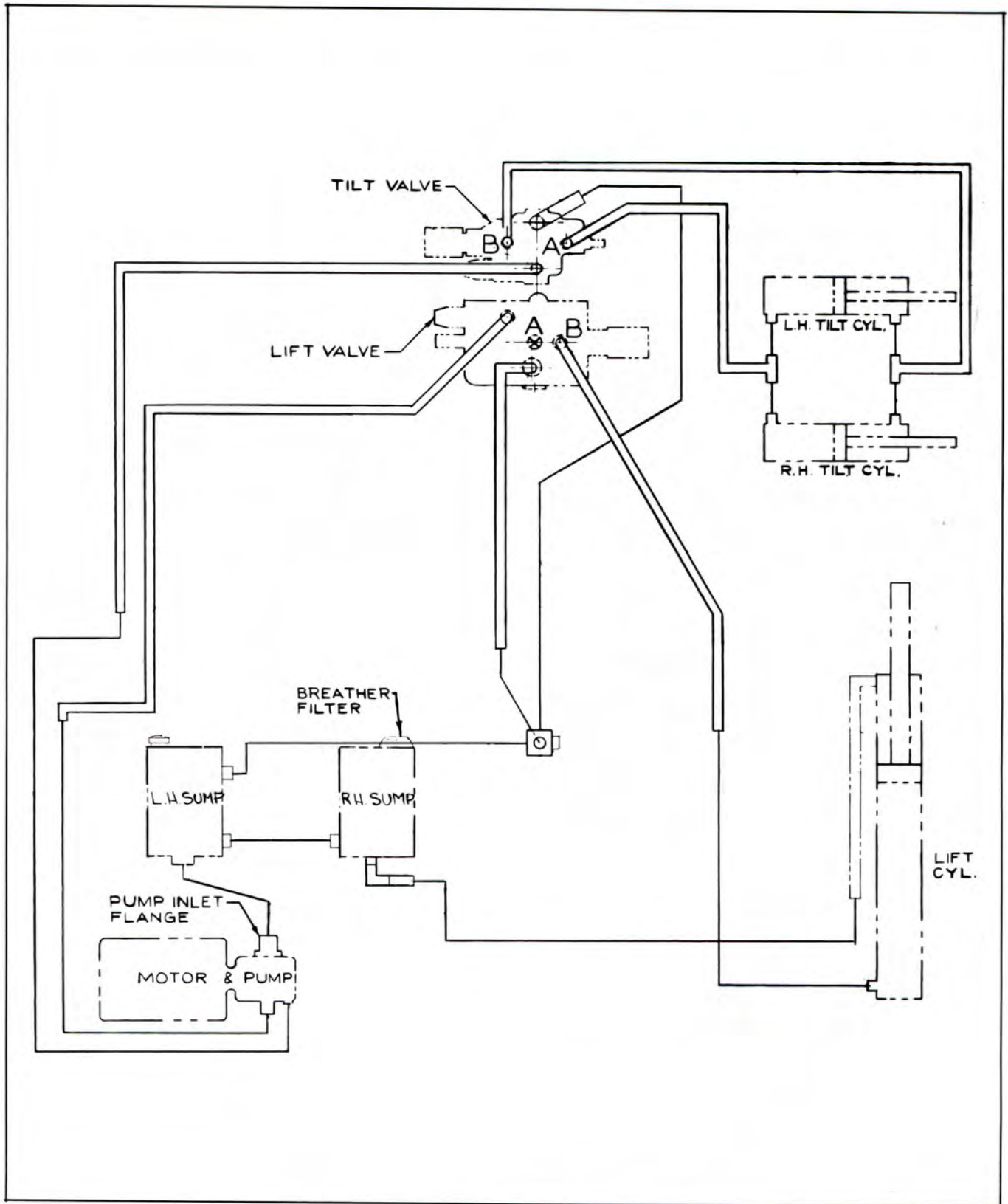


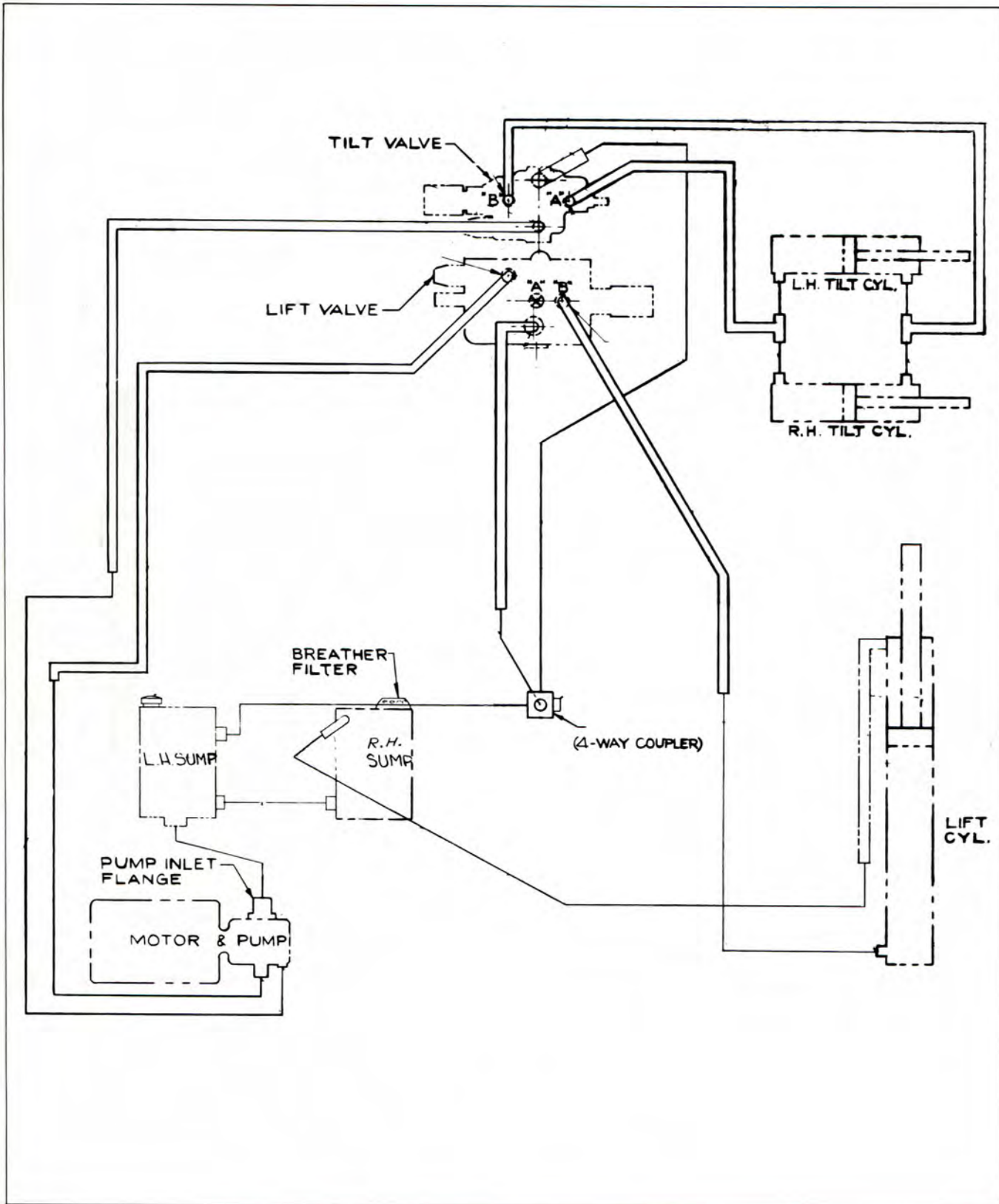
Plate 9325. Typical Electric Truck Control Panel Assembly

- 1---Panel assembly, electric truck control
- 2---Contactor assembly, 1A
- 3---Contactor assembly, forward
- 4---Contactor assembly, reverse
- 5---Rectifier, forward contactor coil
- 6---Rectifier, reverse contactor coil
- 7---Diode, pump contactor coil

- 8---Timer, directional control static
- 9---Switch, hour meter upmp circuit
- 10--Switch, hour meter directional circuit
- 11--Contactor assembly, pump
- 12--Fuse, control panel
- 13--Fuse, control panel accessory



Hydraulic Circuit Diagram



Hydraulic Circuit Diagram