INDUSTRIAL TRUCK DIVISION

OPERATORS MANUAL

C 100/120

CH 100/120

BOOK No. 0-152-2

1st REVISION

CLARK EQUIPMENT COMPANY

PUBLISHED BY

TECHNICAL SERVICE DEPARTMENT,

BATTLE CREEK, MICHIGAN, U.S.A.

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.

PLEASE NOTE

INSTRUCTIONS ON USE OF MANUAL

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-)
Hydraulic Sump Tank, level check...	8H		503
Brake Pedal Free Travel, check.....	8H		303

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 303 for instructions.

Turn to the eight (8) hour section (8H) and then to the page listed — 503 or 303 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.

Example: (100 Hours)	Time Interval (H=Hours)	&	Page Number (000-)
Brake Pedal Free Travel, adjust....	100H		302

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

(continued)

INSTRUCTIONS ON USE OF MANUAL

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.

NOTE

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 difinite maintenance program should be set up and followed. Haphazard maintenance will only lead to faulty performance and short life.

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INDUSTRIAL TRUCK DIVISION

CLARK EQUIPMENT

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LUBRICATION AND PREVENTIVE MAINTENANCE

TROUBLE SHOOTING GUIDE

Plate 7666. Illustration of Machine

ENGINEERING SPECIFICATIONS

CLARKLIFT® CH-C 100

10,000 pounds capacity, 24 inch load center

MODEL

C(H) 100 Weight .... 13,700 lbs.

TIRES

Dual drive .... 21 x 6 x 15 Steer .... 18 x 7 x 12⅛

DIMENSIONS:

Length (to front face of forks) .... 105¾"
Basic aisle for right angle stacking (add load length) .... 114⅛"
Wheelbase .... 66"
Width: standard .... 50"
Tread, drive .... 38"
Tread, steer .... 37½"
Turning radius .... 97⅛"

UNDERCLEARANCES

Upright .... 3 7/16" Center of Frame .... 8⅛"
Drive axle .... 5¾" Counterweight .... 4¼"
Steer axle .... 3⅛"

SPEEDS AND GRADES	C 100	CH 100
Maximum travel speed with rated load	11.2 M.P.H.	11.9 M.P.H.
Gradability with rated load	31%	27%
Upright lifting speed with rated load	70 F.P.M.	70 F.P.M.
No Load	75 F.P.M.	75 F.P.M.
Lowering speed with rated load	60 F.P.M.	60 F.P.M.
No Load	80 F.P.M.	80 F.P.M.

Lift of 10 feet averages 8.3 seconds

ENGINE. Industrial Continental Red Seal, 6 cylinder, "L" head, equipped with stellite-faced valves and seats; also positive valve rotators. Connecting rods, main bearings, cam shaft, and timing gears are pressure lubricated by submerged gear-type pump. Down-draft duplex carburetor contributes up to 30% more engine power.

DIESEL (OPTIONAL). General Motors 3 cylinder, 2-cycle, 4-valve. Rotor-type pump crank shaft driven. Quickly replaceable cam-operated unit fuel injectors pressurize fuel at injector tip, eliminating high pressure fuel lines. Optional equipment includes push button cold weather priming system, controlled from within the operator compartment, which injects additives into engine air-intake manifold for easier cold weather starting.

	Continental Gas or LPG*	General Motors Diesel*
Model	F-244	3-53
Bore	3 7/16"	3⅞"
Stroke	4⅜"	4½"
Displacement	244 cu. in.	159.2 cu. in.
Crankcase capacity	5 qts.	12 qts.
Governed R.P.M.	2600	2600
SAE rated horsepower at 2600 R.P.M.'s	95	93
SAE rated torque	209 lb. ft. at 1800 RPM	187 lb. ft. at 1200 RPM
Fuel tank capacity	18 gal.	18 gal.

*Optional at extra cost.

ENGINE FILTERS. Three types: (1) Fuel filter in metallic bowl. (2) One quart oil filter with automotive-type replaceable cartridge. (3) Dry type in-take air filter that uses replaceable pleated paper cartridge with minute 5-micron openings.

ELECTRICAL SYSTEM. 12-volt, 60 amp-hour battery; 25 amp low cut-in generator charges at idle. Enclosed electric starter motor has positive engagement, electrical cut-out. Weather-shielded key starting switch; dust-proof distributor; electric horn; and multiple disconnect plug to instrument panel. Lights optional at extra cost.

INSTRUMENTS. Direct reading engine hour meter; ammeter; engine oil pressure, fuel, and temperature gauges, all mounted in cowl.

AXLE AND FINAL DRIVE. Integral assembly with 3-point mounting including engine, transmission, spiral bevel pinion and ring gear, differential and full-floating drive axle assembly. Axle housing, not drive shaft, carries weight of truck. Final gear reduction is made through fully enclosed pinion and ring gear at drive wheels.

HYDRATORK® TRANSMISSION. Two-speed power shifted transmission has torque converter which multiples engine torque without shock on drive shaft and gears. Transmission oil is cooled through cooler in bottom radiator tank and is a filtered system with replaceable type cartridges. The forward and reverse gears, high and low range gears, are in constant mesh. Direction selection and range shift lever, for left-hand, finger-tip control, on steering column.

HYDRAULIC INCHING. In close quarters the "free-pedal" portion of either the left or the right inching-brake pedal, hydraulically actuates inching valve, permitting power to be gradually disengaged from the drive wheels, even when the engine is running at top speed for fast lifting.

HYDRACOOL* CLUTCH TRANSMISSION. Three-speed synchro-mesh transmission, with Hydracool oil-sprayed 12-inch clutch standard on CH models; provides for extended clutch life, better heat dissipation and smoother inching. Sump tank is integral with clutch housing. Gear-type pump delivers lubricant to clutch facing. Fluid is filtered with full-flow replaceable cartridge type filter. Pressure switch in spray tube controls warning light on dash.

BRAKES. Two systems. Hydraulic spot disc brakes provide powerful braking without sudden grabbing. Brakes are self-adjusting, and require no periodic maintenance for the life of the lining. Foot brake torque is multiplied through final reduction at each drive wheel to maximize braking, minimize pedal effort. Brakes are enclosed within drive axle housing. Mechanical parking brake operates on transmission drive shaft.

STEERING. Power steering is standard. Steering control is maintained through mechanical linkage in the event of power failure, and to maintain "road feel." Power pump is gear-driven from engine.

UPRIGHT. Nested telescopic roller-type, "I" beam inner-section of SAE 1045 modified steel is nested within outer channel of SAE 1045 modified steel for greater safety and visibility. Ball-bearing rollers take both lateral and longitudinal forces and are fully adjustable.

LIFT AND TILT CYLINDERS. Tilt rods are chrome plated. Externally removable shims compensate for wear on tilt cylinder gland packings. Tilt lock valves insure positive control — no upright drift. Both lift and tilt cylinders have metal rod wipers to keep foreign material from the packings. Free-floating mounting of piston-type lift cylinder minimizes side strains. Modulating flow regulator in cylinder base reduces maximum lowering speed as weight of load increases.

FORK CARRIAGE AND FORKS. All-welded construction, SAE 1045 steel fork carriage to withstand impacts. Lateral fork adjustment from zero inches to 48 inches with or without load backrest. Convenient snap-action latch assures positive fork positioning. Heat-treated and up-set forged forks provide full-section strength at heel of fork. Carriage has four interior rollers to absorb longitudinal forces. Integral with these rollers are an equal number of side thrust rollers to take up lateral thrust. Carriage has additional lateral thrust rollers to prevent upright spread, insuring maximum free-rolling movement.

HYDAULIC SYSTEM. Full-feathering balanced spool-type valves for gentle stops and starts. Vane-type main pump is driven directly off crankshaft. Hydraulic sump built into frame of ⅜" plate has 20 gal. capacity. System is protected from dirt by, (1) return-line filter with 10-micron replaceable cartridge, (2) screen in suction line, (3) 5-micron replaceable filler cap.

SEATING. Rubber-mounted extra-wide seat and backrest are polyether foam; curved backrest tilts to provide additional driver comfort. An automotive type latch releases the seat for horizontal adjustment up to 4".

OVERHEAD GUARD AND LOAD BACK REST. Driver's overhead guard is standard equipment. Load back rest is available as optional equipment. Clark Equipment Company advises owner to consider his operation for their necessity.

MAINTENANCE. Swing-out side panels offer easy access for servicing. Check-points, such as water and hydraulic sump filler caps, oil-stick and filler are readily accessible. Battery swings out. Quickly detachable counterweight is secured with one bolt.

PAINT. All exposed surfaces are shot blasted and prime painted with weather resistant paint. Standard delivery color is two-tone silver grey and yellow. Optional colors with grey are red, orange, green and blue.

GENERAL. Protecto seal gas tank filler cap, recessed pin-type coupler and multipass muffler are all standard equipment.

*Trademark of Clark Equipment Company.

INDUSTRIAL TRUCK DIVISION

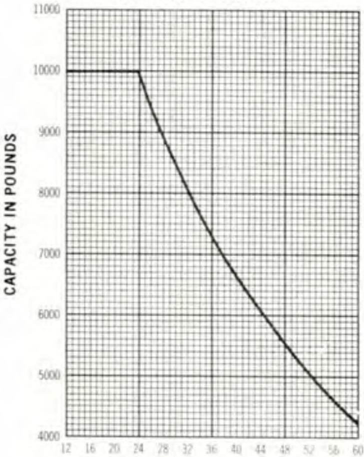
SPECIFICATIONS

DIMENSIONAL SPECIFICATIONS

CLARKLIFT® CH-C 100

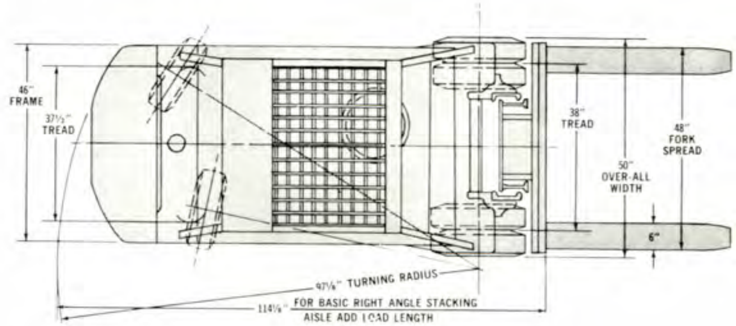
10,000 pounds capacity, 24 inch load center

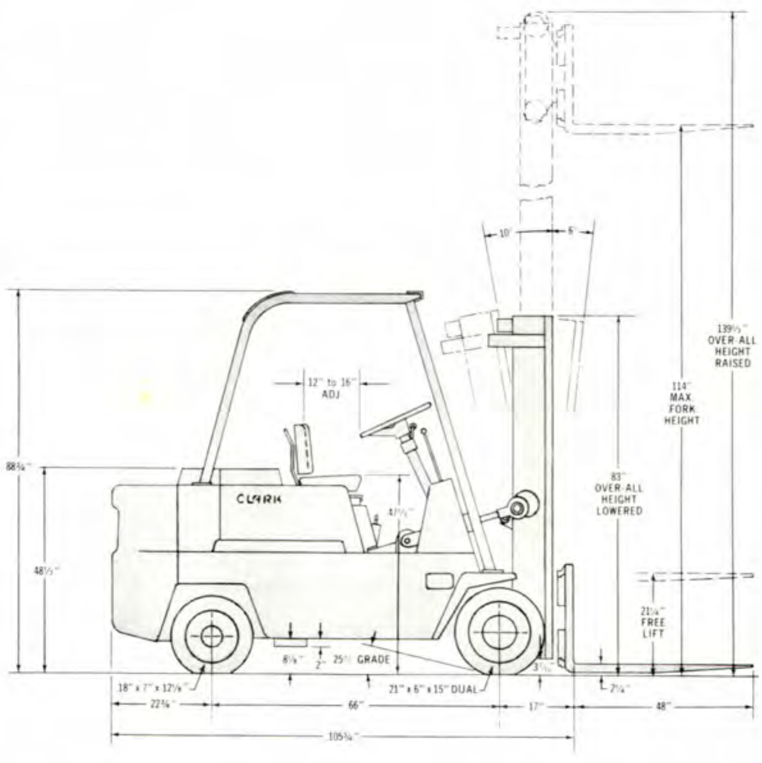
CAPACITY CHART



LOAD CENTER IN INCHES FROM FRONT FACE OF FORKS

Rated capacities shown above are computed with uprights in vertical position. They apply only on maximum fork heights up to and including 162".





UPRIGHT DIMENSION TABLE

MFH	OVER-ALL HEIGHT LOWERED	FREE LIFT	OVER-ALL HEIGHT RAISED
84"	68"	21¼"	109½"
* 90"	71"	21¼"	115½"
96"	74"	21¼"	121½"
102"	77"	21¼"	127½"
108"	80"	21¼"	133½"
*114"	83"	21¼"	139½"
120"	86"	21¼"	145½"
126"	89"	21¼"	151½"
132"	92"	21¼"	157½"
*138"	95"	21¼"	163½"
144"	99"	23¼"	169½"
150"	102"	21¼"	175½"
156"	106"	23¼"	181½"
*162"	109"	23¼"	187½"
168"	112"	21¼"	193½"
174"	116"	23¼"	199½"

Intermediate heights available in increments of 3" MFH.
*Indicates preferred standard sizes.

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SS1801-46415MC

Printed in U.S.A.

22 JUN 64

Engineering Specifications

CLARKLIFT® CH-C 120

12,000 pounds capacity, 24 inch load center

MODEL C(H) 120 Weight .... 14,900 lbs.

TIRES

Dual drive .... 21 x 7 x 15 Steer .... 18 x 8 x 12⅛

DIMENSIONS

Length (to front face of forks)	110¾"	Wheelbase	66"
Basic aisle for right angle stacking (add load length)	118¾"	Width: standard	54"
		Tread, drive	40"
		Tread, steer	37½"
		Turning radius	100½"

UNDERCLEARANCES

Upright	3⁷⁄₁₆"	Center of Frame	8⅛"
Drive axle	5¾"	Counterweight	4¼"
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SPEED AND GRADES	C 120	CH 120
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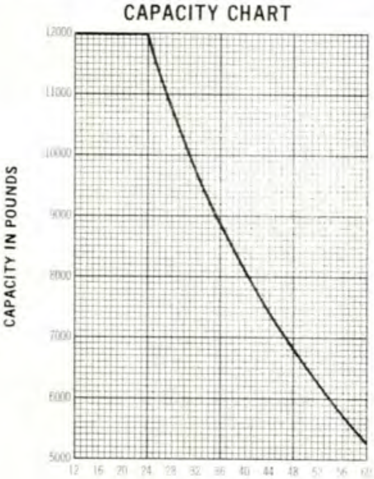
12,000 pounds capacity, 24 inch load center

CAPACITY CHART



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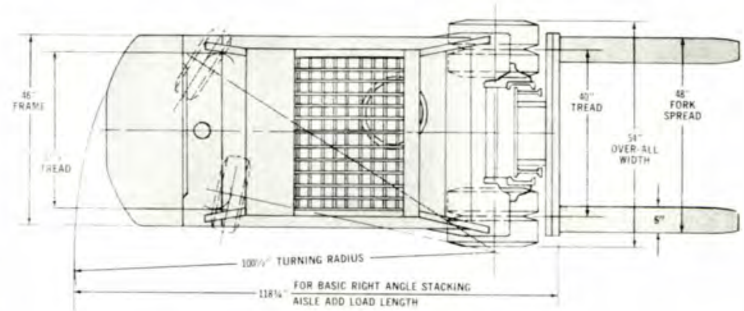

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* 90"	72"	23"	121¼"
96"	75"	23"	127¼"
102"	78"	23"	133¼"
108"	81"	23"	139¼"
*114"	84"	23"	145¼"
120"	87"	23"	151¼"
126"	90"	23"	157¼"
132"	93"	23"	163¼"
*138"	96"	23"	169¼"
144"	99"	23"	175¼"
150"	103"	23"	181¼"
156"	106"	23"	187¼"
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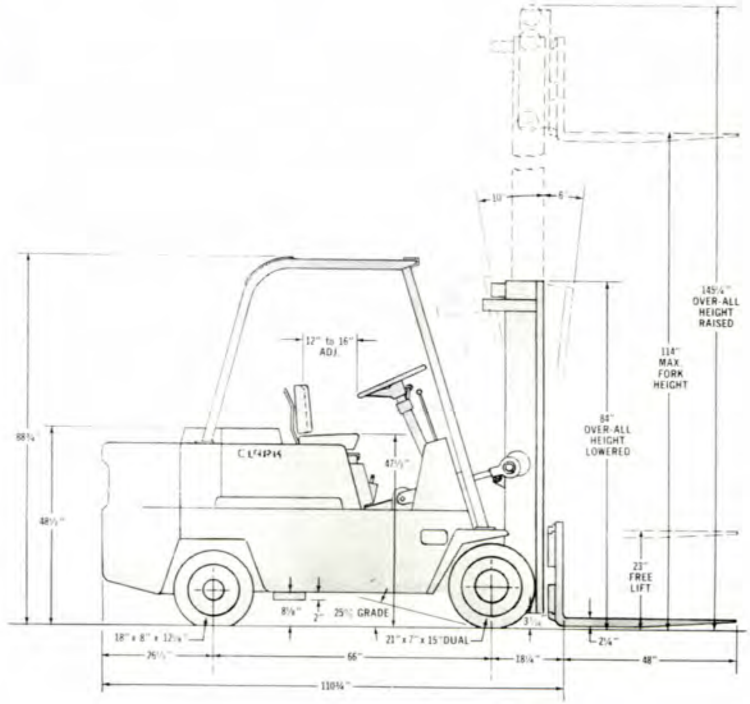

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CLARK® EQUIPMENT

SS1805-46415MC

Printed in U.S.A.

INDUSTRIAL TRUCK DIVISION

CLARK EQUIPMENT

S P E C I F I C A T I O N S

CH100/120, C100/120

COOLING SYSTEM CAPACITY .... 15 quarts

FAN BELT DEFLECTION (long span) .... 1/2"

CLUTCH PEDAL FREE TRAVEL (CH Models)....... 7/8"

CLUTCH OIL CAPACITY (CH Models).........6 quarts

BRAKE PEDAL FREE TRAVEL .... 3/16 to 1/2"

TORQUE CONVERTER (C Models) diameter......... 11"
Torque Multiplication..... 2 to 1

TRANSMISSION	Hydratork	Hydracool
Speeds Forward	2	3
Speeds Reverse	2	3
Capacity (approx.) ...	16 quarts	9 quarts

(Fill to full mark on dipstick)

STEERING AXLE

Toe-in .... 0 degrees
Camber Angle .... 1 degree
Caster .... 0 degrees

Left hand turning radius angle

Left Wheel .... 78°
Right Wheel..................... $56^{\circ}18'$

Right hand turning radius angle

Left Wheel .... $56^{\circ}18'$
Right Wheel..................... 78°

DRIVE AXLE

Ratio............................ 4.09 to 1
Axle end (grease capacity)....... 1 1/4 lbs.

MAIN HYDRAULIC PUMP

Type .... vane
Capacity .... 17 G.P.M. @ 1200 engine R.P.M.

STEERING PUMP

Type .... vane
Capacity ....
8 G.P.M. at 1200 engine R.P.M. 1500 P.S.I.

HYDRAULIC VALVE

Pressure Relief Valve Setting... 2000 P.S.I.

N O T E

REFER TO DIESEL OPERATORS MANUAL FOR DIESEL ENGINE SPECIFICATIONS.

ELECTRICAL SYSTEM

STARTING MOTOR

Brush tension .... 35-40 oz.
No load test .... 10.6 volts
49 amps. min.
76 amps. max.
Load test .... 435 amps.
10.5 lb. ft. torque min.
approximately 5.8 volts.

GENERATOR

Brush spring tension .... 28-30 oz.
Field current 80°F. .... 1.69-1.79 amps.
12 volts
Cold output .... 25 amps.
14 volts
at approx. 1970 R.P.M.
Hot output .... 25 amps.
14 volts
at approx. 2225 R.P.M.

VOLTAGE REGULATOR

Voltage regulator air gap .... .075 in.
Voltage setting range ... 14.2-15.2 @ 85° F.

Current regulator air gap .... .075 in.
Current setting range .... 23 to 27 amps.

DISTRIBUTOR

Start advance ..... $.5^{\circ}$ to 2.5° @ 300 R.P.M.
Maximum advance ..7.5° to 9.5° @ 1000 R.P.M.

Breaker point opening .... .022 in.

Cam angle range .... 31° to 37°

Rotation (cap end)..................... cc.

Ignition Timing............... 2° B.T.D.C.

GAS ENGINE GOVERNED R.P.M. (no load)...... 2600

Drive Wheel Stud Nut Torque ....
.... 450-500 ft. lbs. (Dry Thread)

Steer Wheel Stud Nut Torque...................
.... 275-300 ft. lbs. (Dry Thread)

Steering Gear Pitman Arm Lock Nut Torque ......
............................120-130 foot pounds

Steering Gear Mounting Bolts and Clamp Bolt Torque .... 80-90 foot pounds

DISTRIBUTOR (All FOUR and SIX Cylinder Engines)

N O T E

Distributors are equipped with either Standard or Heavy Duty Points. Heavy Duty Points are thicker (have more contact material) than Standard Points.

Heavy Duty Points - All FOUR Cylinder Engines
Set Dwell Angle at................$31^{\circ} - 34^{\circ}$

Heavy Duty Points - All SIX Cylinder Engines
Set Dwell Angle at................$22^{\circ} - 26^{\circ}$

Heavy Duty Points

When connecting leads, terminals must be back to back (flat sides together). Push into slot between insulator and spring. (DO NOT push lever spring.) Then push other terminal in place between first terminal and insulator. See following illustration.

WHEN CONNECTING LEADS, THE TERMINALS MUST BE BACK TO BACK (flat sides together)...........

- FOUR (4) CYLINDER ENGINES, ONLY -

Point Opening (in.)	Dwell Angle (deg.)	Centrifugal Advance							
		START		INTERMEDIATE		INTERMEDIATE		MAXIMUM	
		Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.
.022*	31-34	600	1-5	800	6-10	1600	11-15	2200	15-19
.021**	31-34	600	1-5	800	6-10	1600	11-15	2200	15-19

- SIX (6) CYLINDER ENGINES, ONLY -

Point Opening (in.)	Dwell Angle (deg.)	Centrifugal Advance							
		START		INTERMEDIATE		INTERMEDIATE		MAXIMUM	
		Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.
.020*	28-32	600	1-5	800	6-10	1600	11-15	2200	15-19
.021**	22-26	600	1-5	800	6-10	1600	11-15	2200	15-19

N O T E

Time engine with timing light and tachometer at 400 engine RPM or below to the above specifications. The initial advance RPM range is 430 - 580. Distributor advance at 600 engine RPM should be 1° to 5°. Distributor rotation (as viewed from cap end) is counterclockwise.

When checking Distributor on a test stand, the above specifications are 1/2 that shown.

*........... Four (4) or Six (6) Cylinder Engine STANDARD Points.
**.......... Four (4) or Six (6) Cylinder Engine HEAVY DUTY Points.

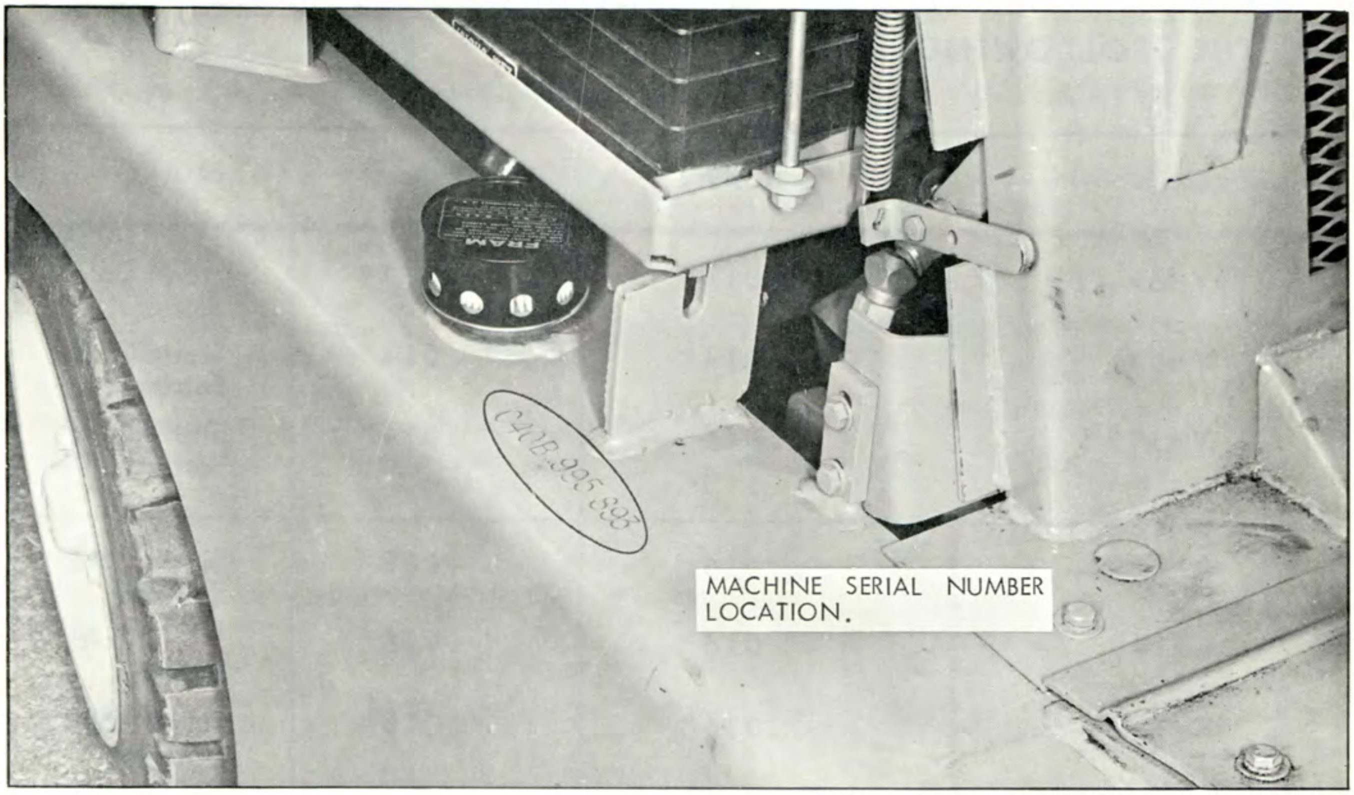


Plate 9474. Machine Serial No. Location

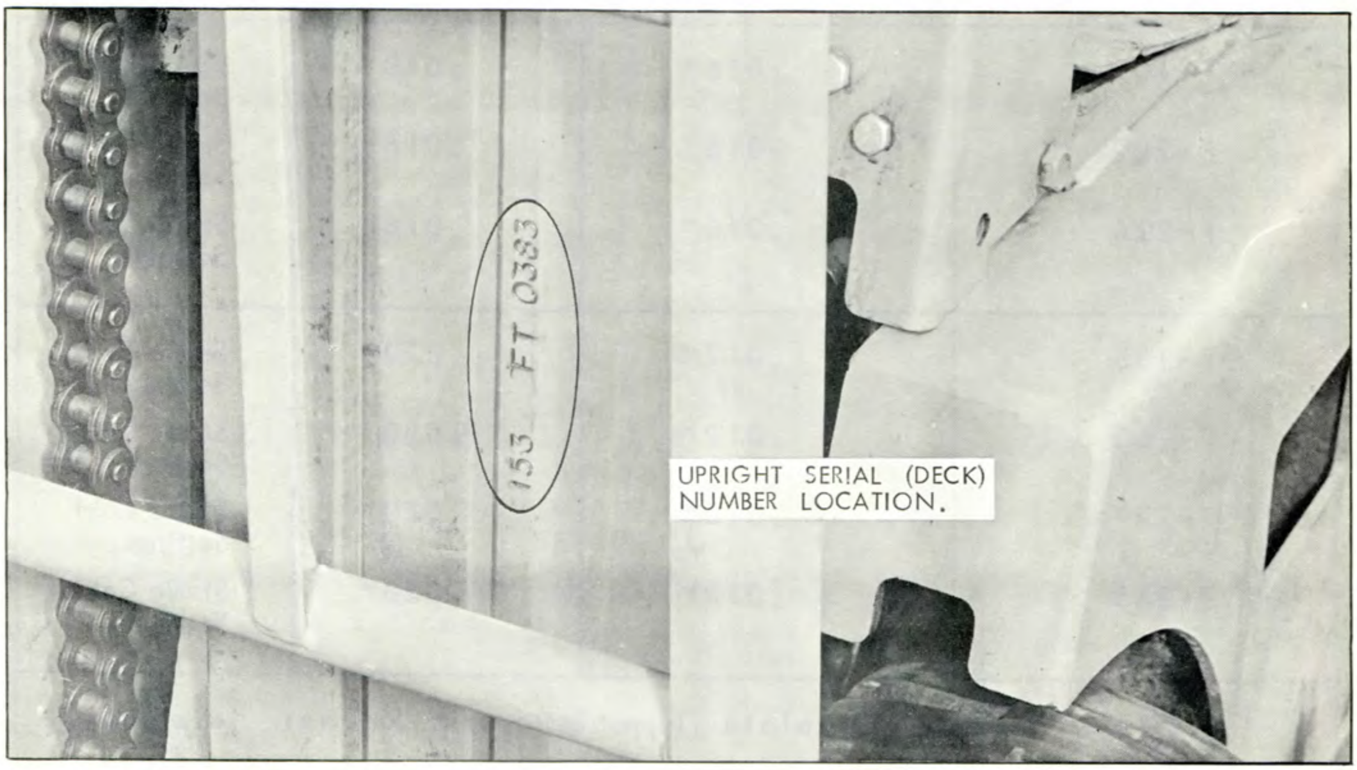


Plate 9475. Upright Serial (Deck) No. Location

ADJUST TAPPETS TO THE STATIC COLD SETTINGS LISTED IN THE FOLLOWING CHART:

Engine Model	Intake	Exhaust	NOTE
Y-69	.014"	.014"	Static Cold Settings.
Y-91	.014"	.014"	Static Cold Settings.
Y-112	.014"	.014"	Static Çold Settings.
F-124	.016"	.018"	Static Cold Settings.
F-140	.016"	.018"	Static Cold Settings.
F-162	.016"	.018"	Static Cold Settings.
F-244	.016"	.018"	Static Cold Settings.
F-186	.016"	.018"	Static Cold Settings.
F-209	.016"	.018"	Static Cold Settings.
F-226	.016"	.018"	Static Cold Settings.
F-135	.012"	.020"	Static Cold Settings.
F-163	.012"	.020"	Static Cold Settings.
F-227	.012"	.020"	Static Cold Settings.
F-245	.012"	.020"	Static Cold Settings.
NOTE: Engine Nameplate Tappet Settings is for Hot Idle only.			

FOR -- VEHICLES EQUIPPED WITH CONTINENTAL ENGINES.

SERVICE RECORDER:

The service recorder records number of productive lifts in addition to busy and idle time of each truck. The records are made on a 6-inch diameter chart, revolving once. This model records the raising or lowering of a predetermined load. The limits generally are between 5% of the truck's capacity and a full load. Minimums may be established, and the chart will show only those lifts of the minimum weight or greater. Selective load records are made by using an adjustable pressure switch. This switch fits into the hydraulic system between the lift control and the cylinder. It is sensitive to system pressure changes but insensitive to surges or vibration. Switch setting can be adjusted externally and then sealed. The load recording stylus is always in contact with the chart. When the predetermined load or more is lifted, an electrical circuit is closed and this stylus is lifted up, making a record. A surge dampener is recommended particularly when lift trucks are in service where rough or uneven floors occur.

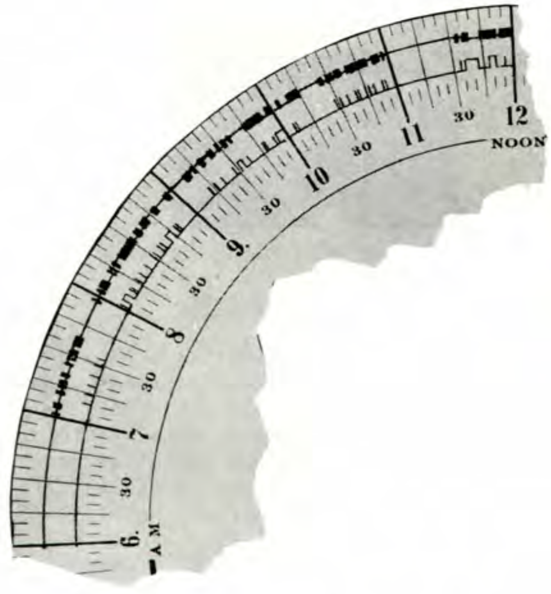


Plate 10161. Service Recorder Chart

HOW TO OPERATE SERVICE RECORDERS

Wind the Clock Movement: No key is needed. Turn the star-shaped winding disc clockwise until the movement is wound fairly tight. Do not over-wind. It is a good practice to wind the clock each time a chart is changed even if it is not run down.

Plate 10164

Place Chart in the Recorder: Snap up the two finger-like clamps. Slip the chart down over the now vertical clamps to the face of the winding disc.

Plate 10165

To Set the Chart: Before clamping it down, turn the chart so that the place on it that corresponds to the present time of the day is at the little white spot on rim of Recorder case. If this is not done correctly, the recorder will be "that much off" all day.

Plate 10166

Fasten the Chart in Place By snapping down the two clamping fingers. Now close and lock the Recorder and it is ready to operate for its full cycle, the length of time depending on the model and clock speed.

Plate 10167

HOW TO READ THE CHART:

This section of chart shows a typical record. The wide marks in the outer record band show when the truck was in motion. The fine line shows down time.

Inner record band shows lifts. Load recording stylus normally rests at lower or inner position. When activated by pressure switch, it is moved outward to record each lift.

Plate 10162. Service Recorder Chart

When the key is turned to lock or unlock the Recorder, the stylus makes a round dot at the exact time of locking or unlocking. The mark appears on the face of the chart, and it is also embossed on the back. It is unmistakable.

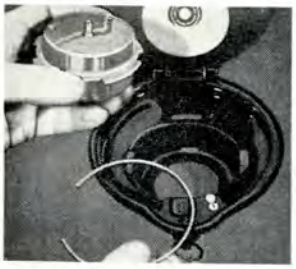


Plate 10163. Clock Exchange

HOW TO EXCHANGE CLOCK MOVEMENTS:

A clock movement is inherently a delicate mechanism that should receive reasonably good care. We have tried to make the clocks in Servis Recorders as rugged as possible to withstand the rough use they sometimes get. If the clock should fail, it can be easily lifted out and mailed in for repair or replacement. Merely unscrew the winding disc by turning it counter-clockwise and pry out wire retaining ring.

To replace the clock movement, first notice that one of the four retaining lugs in the Recorder case is wider than the rest. Match this wide space in movement top and settle movement into place. Then force wire retaining ring into place securely under lugs.

It is a good policy to have a spare clock movement in stock to insure uninterrupted service. Extra clocks are inexpensive.

TO ELEVATE DRIVE WHEELS

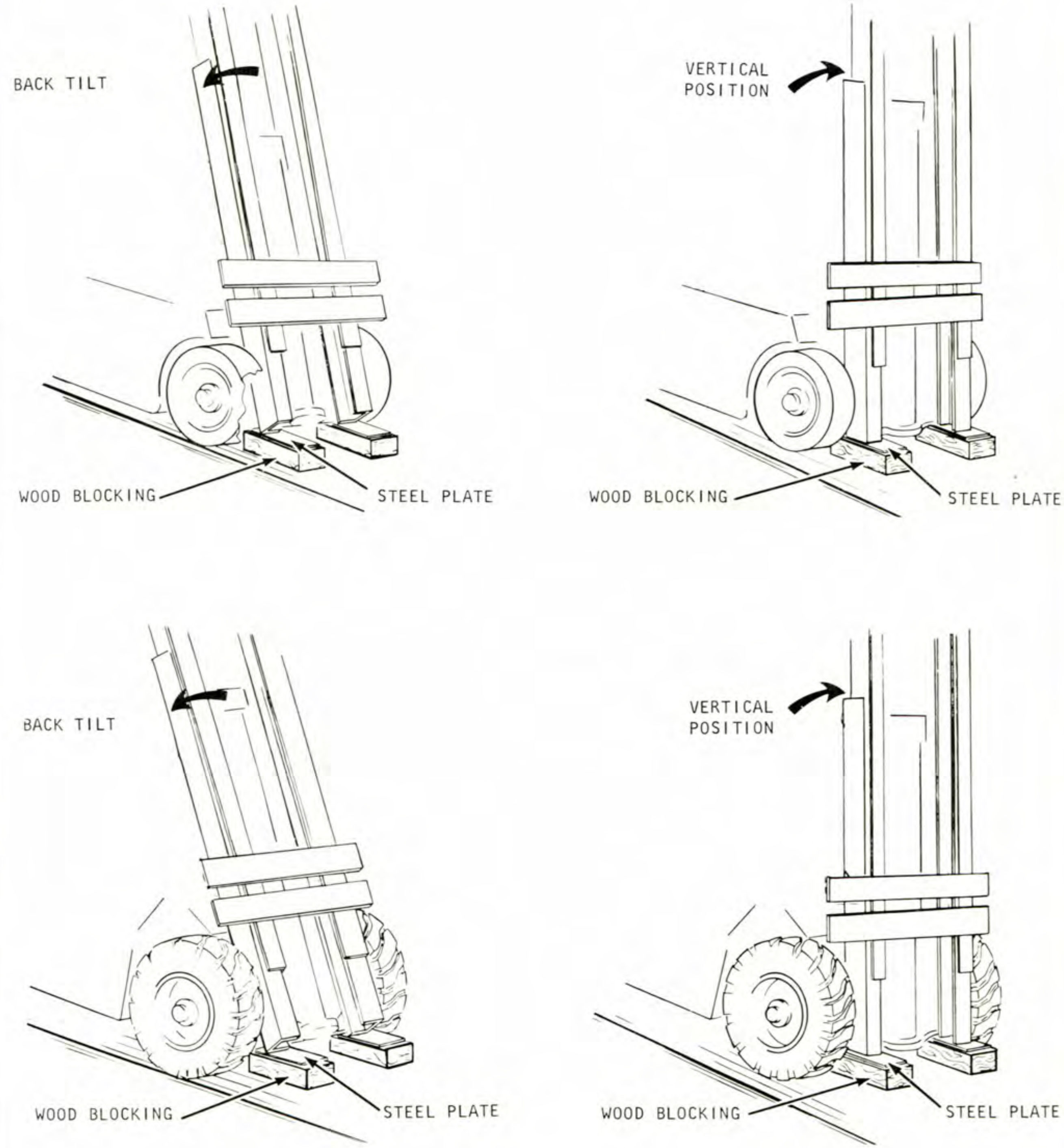


PLATE 10317. TO ELEVATE DRIVE WHEELS, PLACE UPRIGHT BLOCKING AS SHOWN ABOVE.

N O T I C E

THE WIRING DIAGRAM IN THIS MANUAL IS FOR A STANDARD TRUCK, WITHOUT SPECIAL CUSTOM FEATURES.

THE PARTS BOOK FOR THIS SERIAL NUMBER INCLUDES WIRING DIAGRAM/S COVERING SPECIAL CUSTOM OPTIONS INCORPORATED AT TIME OF SHIPMENT.

L.P.Gas and Gasoline ENGINE
TORQUE SPECIFICATIONS

Engines have many studs, bolts, and cap screws of special material and sizes and it is very important that care be exercised to torque all studs and bolts correctly.

The torque specifications,' **foot pounds**, listed below MUST be followed in order to have the engine conform to the original specifications.

Size - Diameter	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"
Cylinder Heads	------	35-40	70-85	100-110	130-140	145-155
Manifolds	15-20	25-30	40-50	50-60	50-60	60-70
Gear Covers, Water Pumps, Front and Rear End Plates	15-20	25-30	50-55	80-90	------	------
Oil Pans	12-16	12-16	------	------	------	------

OVERHEAD GUARD ADJUSTMENT:

GENERAL: Proper adjustment of the retractable overhead guard linkage is extremely important in maintaining this feature of the vehicle in proper operating condition. Failure to perform and maintain the proper adjustment on the guard linkage and components can result in severe distortion or damage to the guard linkage, rendering the guard inoperable. The adjustment procedure set forth below should be followed each time the guard is reinstalled, after any minor repair to components of the guard, or if the guard is not operating properly.

ADJUSTMENT PROCEDURE:

Refer to #11451, and proceed as follows:

1. With guard retracted check front stationary legs for dimensions "A", "B" and "C". See specs for all dimensions.

STATIONARY LEG DIMENSIONS:

2. Use flat washers or shim stock under the front leg attaching bolts to obtain the required dimensions. Shim equally on each side.

3. Raise guard to the fully closed position and loosen bolts holding the rear support legs to the counterweight. This will remove any strain from the linkage.

4. Clamp a straightedge to the fixed portion of the rear leg as shown in the illustration. Check to see that the upper (movable) section of the rear leg is in exact alignment with the lower section.

5. If the upper portion of the rear leg does not line up with the fixed leg, adjust the cylinder yoke and/or the rod yokes to bring sections into perfect alignment. Adjust dimensions D, E and F.

N O T E

> To insure proper operation, the retracting linkage must have equal adjustment on both sides. The retracting cylinder piston rod travel and the tie rod length must be the same on both sides. In addition, the rear legs must be perpendicular and square to the top retracting section and the leg mounting bolts must be kept tight, and frequently checked, during operation.

REAR LEG AND LINKAGE DIMENSIONS:

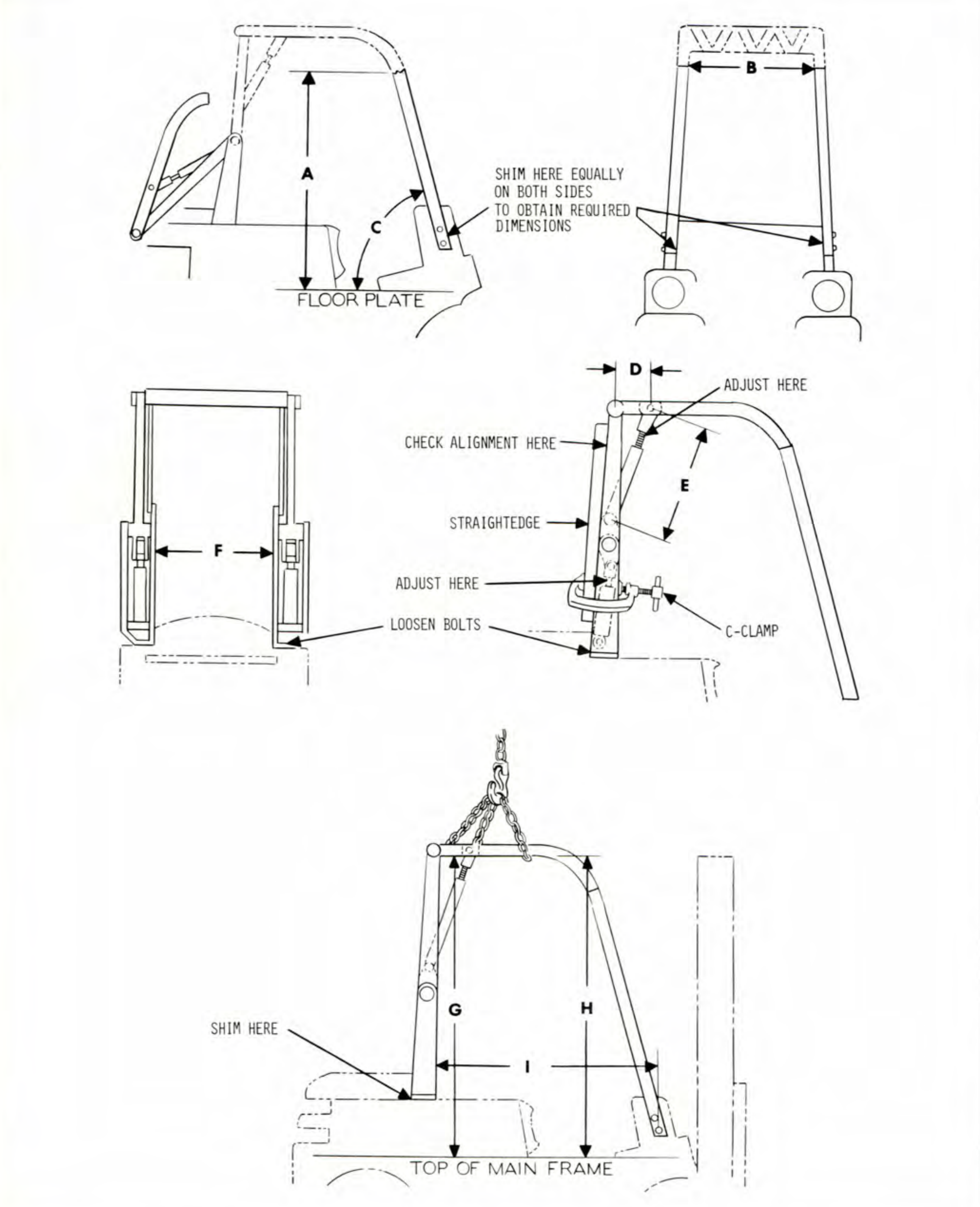
6. Check dimensions G, H and I. Be sure to check the dimensions on both sides of the guard.

7. If adjustment is required, remove bolts holding rear legs to counterweight. Using a chain hoist, lift entire guard assembly, and insert shims under rear legs as required to bring all dimensions on each side of the guard to specifications. After inserting shims, lower guard into place, install and tighten mounting bolts, and recheck all dimensions.

8. Test guard for proper operation by starting truck engine and cycling guard up and down several times.

C A U T I O N

> The uard and linkage in the retracted position can be easily jarred out of alignment by striking or backing into stationary objects. Exercise appropriate care when operating truck with guard retracted, to avoid such damage to the guard. Always check clearance when backing or turning the truck.


A
C
FLOOR PLATE
SHIM HERE EQUALLY
ON BOTH SIDES
TO OBTAIN REQUIRED
DIMENSIONS
B
F
LOOSEN BOLTS
D
ADJUST HERE
CHECK ALIGNMENT HERE
E
STRAIGHTEDGE
ADJUST HERE
C-CLAMP
SHIM HERE
G
H
I
TOP OF MAIN FRAME

WORK SAFELY

DRIVE SAFELY

BE CAREFUL

ALWAYS

GIVE MACHINE SERIAL NUMBER

WHEN ORDERING PARTS

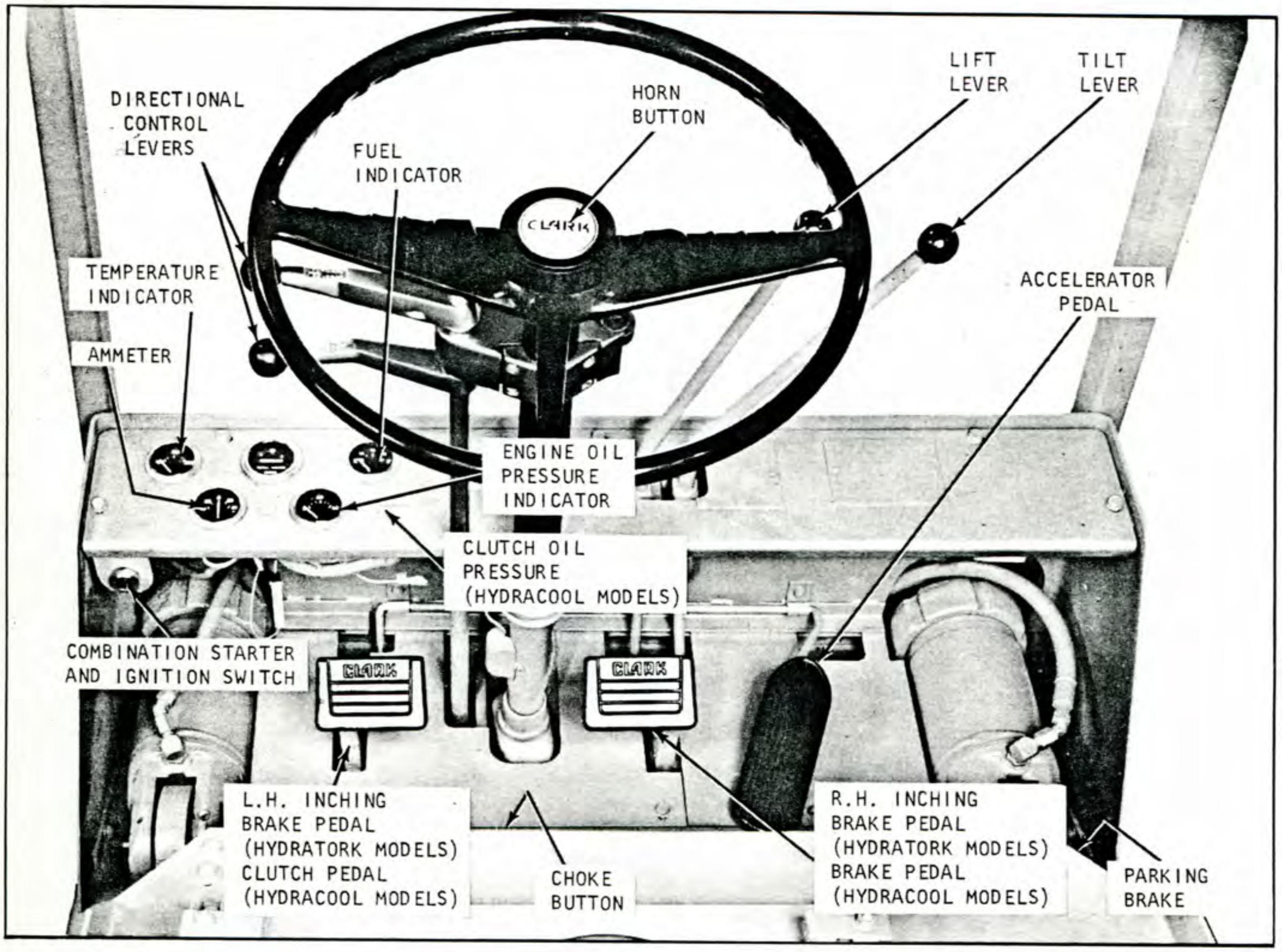


Plate 7495. Controls and Instruments

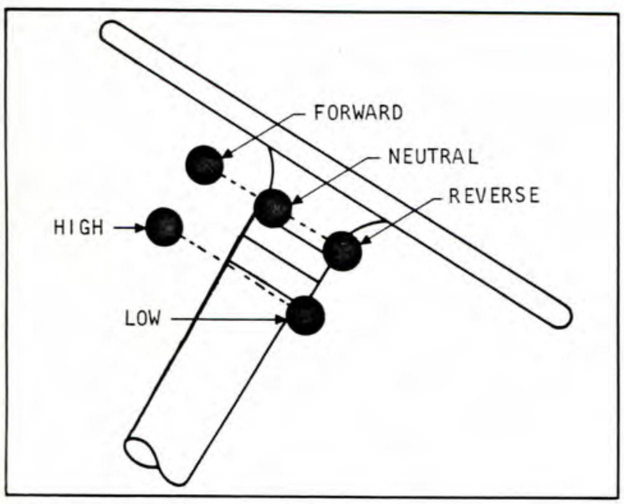


Plate 7496. Shift Pattern
(HYDRATORK MODELS)

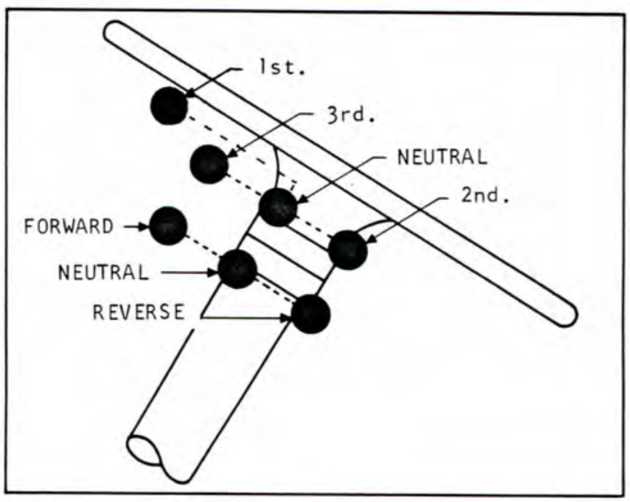


Plate 7497. Shift Pattern
(HYDRACOOL MODELS)

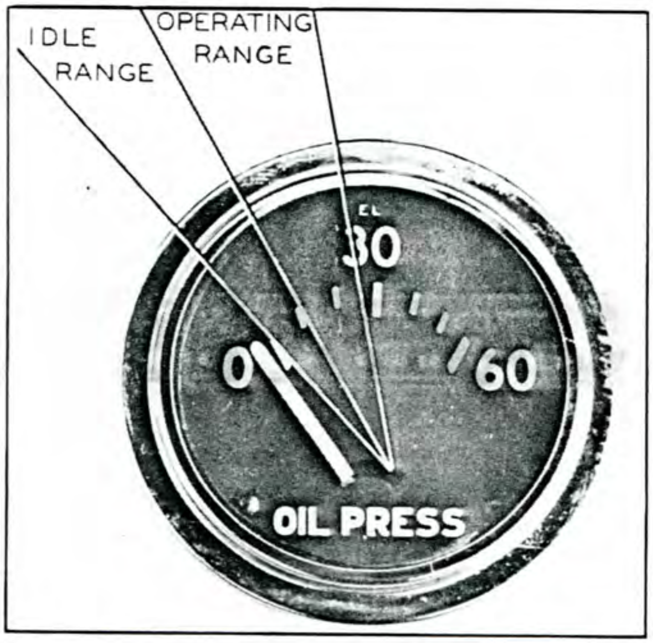


Plate 6417. Oil Pressure Indicator

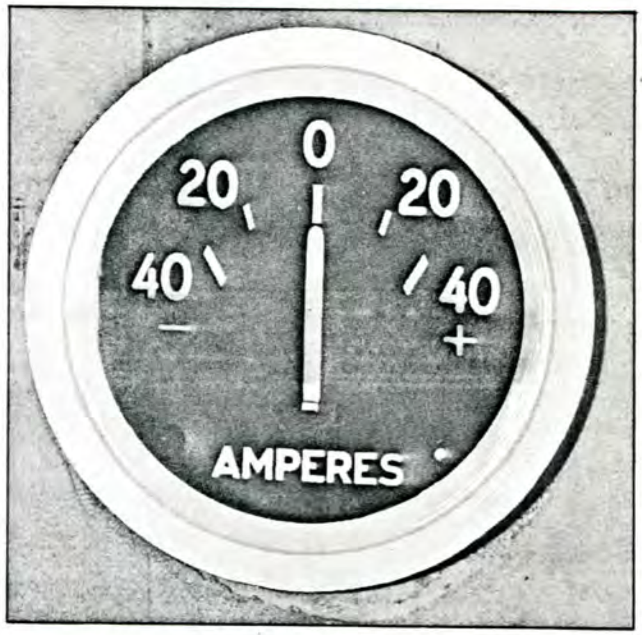


Plate 7647. Ammeter

INSTRUMENT INDICATORS

a. Oil Pressure Indicator. Oil pressure should be at least 7 pounds at idle (400 to 600 R.P.M.) CAUTION: IF THE OIL PRESSURE IS ERRATIC OR FALLS BELOW THE ABOVE LIMIT, STOP THE ENGINE IMMEDIATELY AND FIND THE CAUSE OF THE TROUBLE. REFER TO TROUBLE SHOOTING SECTION FOR THIS INFORMATION.

CAUTION

ON NEW MACHINES, AFTER STARTING ENGINE -- RUN IT AT IDLE FOR 5 MINUTES, THEN STOP ENGINE AND RECHECK OIL LEVEL IN CRANKCASE - BRING OIL LEVEL TO HIGH MARK, IF NECESSARY.

c. Ammeter. The ammeter is connected in the generator (or alternator if used) and battery circuit in such a manner as to indicate rate of charge or discharge. If the generator (or alternator) is functioning properly the ammeter should show a small amount of charge at engine idle. As engine R.P.M. increases the rate of charge also increases. When the battery becomes fully charged the circuit is regulated to reduce the rate of charge, and cause the ammeter needle to return to near neutral position, showing only a small amount of charge.

NOTE

BEFORE PLACING MACHINE IN OPERATION RUN ENGINE A FEW MINUTES TO WARM OIL, ESPECIALLY IN COLD OPERATING CONDITIONS.

NOTE

DIESEL ENGINE MODELS

REFER TO ENGINE OPERATORS MANUAL

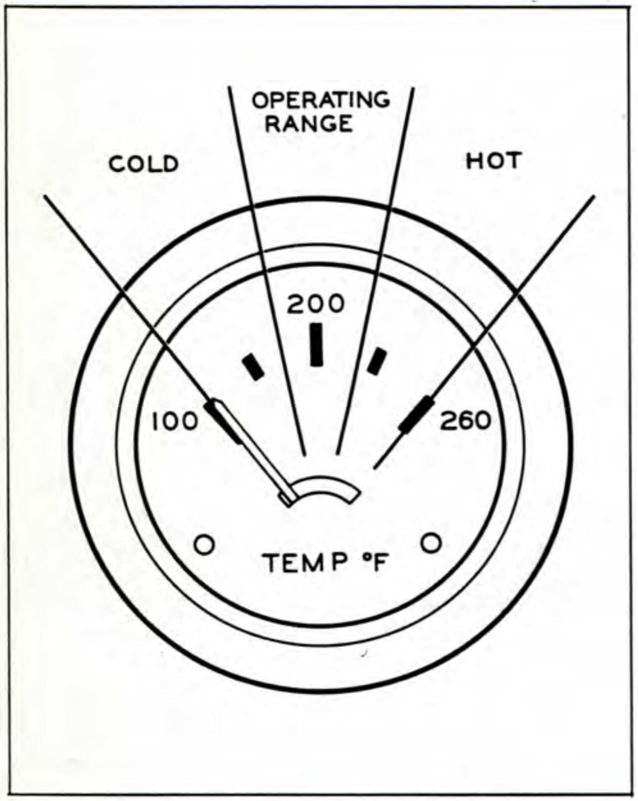


Plate 8288. Engine Coolant Temperature Indicator

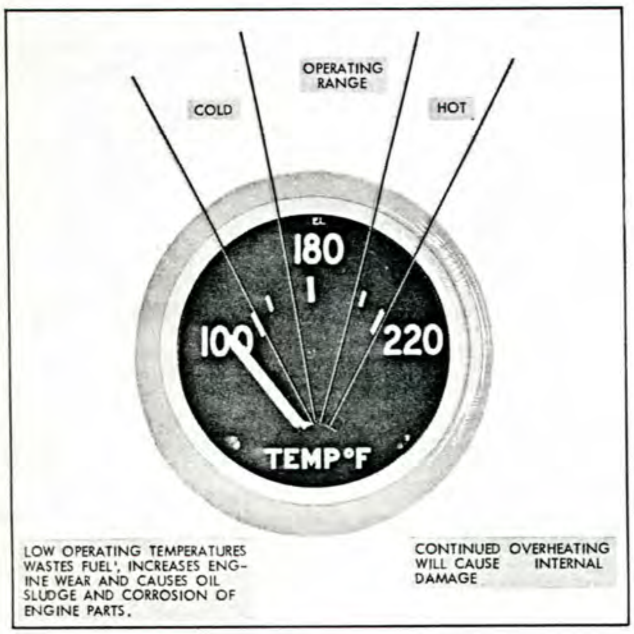


Plate 6287. Engine Coolant Temperature Indicator

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 preventive maintenance services.

N O T E

The coolant temperature should register in the operating range after the first few minutes of operation. Low operating temperatures wastes fuel and increases engine wear.

C A U T I O N

DO NOT IDLE THE ENGINE FOR LONG PERIODS AS IT IS NOT ONLY DETRIMENTAL TO THE ENGINE BUT ALSO INCREASES OPERATING COSTS AS YOU ARE USING FUEL WITHOUT BENEFIT.

N O T E

Select the indicator in your machine. Coolant temperatures should read as marked, except for diesel equipped machines.

DIESEL MACHINES: REFER TO DIESEL OPERATORS MANUAL FOR COOLANT TEMPERATURES.

CLARK EQUIPMENT

INDUSTRIAL TRUCK DIVISION

CLARK EQUIPMENT

WORK SAFELY

DRIVE SAFELY

BE CAREFUL

ALWAYS

GIVE MACHINE SERIAL NUMBER

WHEN ORDERING PARTS

DIESEL ENGINE COLD WEATHER STARTING AID

To assist in starting an engine under low temperature conditions, a Spray Priming System is provided. Instructions for operation of the system are as follows:

Push actuator button a full stroke while counting to five (equivalent to five seconds), and release. DO NOT PRE-LOAD THE ENGINE WITH STARTING FLUID. If engine falters after starting, depress the actuator button a partial stroke to provide injection of a minute amount of fluid to effect smoother engine operation ---- inject additional fluid only when necessary to keep the engine running ---- starting procedure may be modified to use longer or shorter injection period depending on weather conditions, etc. The Spray Priming System cannot be used after the engine has reached operating temperature.

To Install A New Can Of Starting Fluid

The handle of the main unit should be pulled all the way up and the can pulled straight down and then removed. A new can may be inserted after first removing the cap and spray button. It should be installed in as nearly a vertical position as possible, lifting with a slight twisting motion in order to have the stem of the can inserted into the "O" ring seal ---- DO NOT FORCE. Push handle down into position and the Spray Priming System is ready for use again.

NOTE

A Spray Starting Fluid Can, FULL OR EMPTY, should always be in place (installed in the spray system) to prevent drawing dust and dirt into the spray nozzle.

WARNING

THE STARTING FLUID IS TOXIC AND INFLAMMABLE. EXERCISE CAUTION WHEN HANDLING.

Plate 6418. Ignition Switch

STARTING DIESEL ENGINE

Refer to DIESEL OPERATOR'S MANUAL

Diesel Engine Cold Weather Starting Aid

To assist in starting an engine under low temperature conditions, a Spray Priming System is provided. Instructions for operation of the system are as follows:

Push actuator button a full stroke while counting to five (equivalent to five seconds), and release. DO NOT PRE-LOAD THE ENGINE WITH STARTING FLUID. If engine falters after starting, depress the actuator button a partial stroke to provide injection of a minute amount of fluid to effect smoother engine operation ---- inject additional fluid only when necessary to keep the engine running ---- starting procedure may be modified to use longer or shorter injection period depending on weather conditions, etc. The Spray Priming System cannot be used after the engine has reached operating temperature.

To Install a new can of starting fluid

The handle of the main unit should be pulled straight down and then removed. A new can may be inserted after first removing the cap and spray button. It should be installed in as nearly a vertical position as possible, lifting with a slight twisting motion in order to have the stem of the can inserted into the O-ring seal ----- DO NOT FORCE. Push handle down into position and the spray priming system is ready for use again.

NOTE

A Spray Starting Fluid Can /FULL OR EMPTY/ should always be in place (installed in the spray system) to prevent drawing dust and dirt into the spray nozzle.

WARNING

THE STARTING FLUID IS TOXIC AND INFLAMMABLE. EXERCISE CAUTION WHEN HANDLING.

STARTING GAS ENGINE

Place all transmission control levers in neutral position. Pull out on choke and engage the starter by actuating the ignition switch in the start position.

CAUTION

DO NOT ENGAGE THE STARTER LONGER THAN 15 SECONDS WITHOUT A MINUTE OR SO INTERVAL BETWEEN TRAILS.

If the engine becomes overchocked or flooded push choke button in, depress accelerator fully and engage starter. If all necessary equipment is in correct working order, the engine will start.

After engine has started, check instrument panel making certain the engine oil pressure indicator shows adequate pressure. If no oil pressure is indicated, stop engine and correct the difficulty.

NOTE

Run engine a few minutes to warm oil, before putting machine to work, especially in cold operating conditions.

STARTING AND OPERATING INSTRUCTIONS
FOR VEHICLES EQUIPPED WITH
OC-100 SERIES (CATALYTIC PURIFIER) MUFFLER

NOTE

The initial reaction of the OC-100 Series muffler is brought about by heating the *catalyst to proper temperature (reaction range 300° F. and above). This temperature is shown on the **pyrometer indicator as NORMAL range.

TO OPERATE MACHINE (HYDRACOOL CLUTCH MODELS)

1. Place transmission levers in neutral position and start engine.

2. Release hand brake and depress clutch pedal. Position shift levers for desired speed and direction.

3. Release clutch pedal slowly and at the same time accelerate as required.

4. Travel with the forks only high enough to clear any floor obstructions.

CAUTION

DO NOT ALLOW FOOT TO REST ON CLUTCH PEDAL WHILE DRIVING FROM POINT TO POINT. RIDING THE CLUTCH PEDAL WILL CAUSE SLIPPAGE OF THE DRIVEN DISC RESULTING IN UNNECESSARY WEAR OR DAMAGE TO THE CLUTCH COMPONENTS.

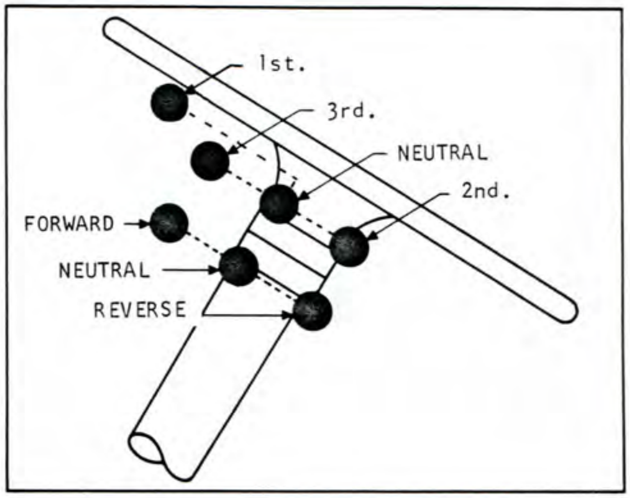


Plate 7497. Shift Pattern (HYDRACOOL CLUTCH MODELS)

TO STOP MACHINE

Remove foot from accelerator pedal and depress clutch and brake pedal. If machine is to be parked, place transmission control levers in neutral position, apply hand brake and shut off engine.

CAUTION

IF THE ENGINE HAS BEEN OPERATING AT OR NEAR FULL LOAD, IT SHOULD BE ALLOWED TO RUN AT FAST IDLE (600 to 800 R.P.M.) FOR ONE OR TWO MINUTES AFTER LOAD IS REMOVED BEFORE BEING STOPPED. THIS ALLOWS INTERNAL ENGINE TEMPERATURES TO EQUALIZE.

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, accelerating engine slightly at the same time. 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

W A R N I N G

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

10. Use only approved industrial trucks in hazardous locations.

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

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 fill fuel tanks while engine is running and avoid spillage.

4. Spilliage of oil or fuel should be carefully washed away or completely evaporated and fuel tank cap replaced before restarting engine.

5. Do not operate a truck with a leak in the fuel system until the leak has been corrected.

6. Do not use open flames for checking electrolyte level in storage batteries or gasoline level in fuel tanks.

NOTE

The preceding is reproduced from:

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

FUEL HANDLING AND STORAGE SAFETY

Liquefied Petroleum Gas Fuel (LPG Powered Trucks)

1. The storage and handling of liquefied petroleum gas (LP-Gas) should be in accordance with the Standard for Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58, USA Standard Z106.1-1965).

2. Trucks using LP-Gas should be refueled only at locations designated for that purpose. Safe outdoor locations are preferable to indoor. Trucks should be refueled as provided in the Standard for the Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58, USA Standard Z106.1-1965.)

3. Reasonable care should be exercised in handling of LP-Gas containers to avoid damage. Do not drop, throw, roll, or drag LP-Gas containers or any associated parts of the containers or fuel systems.

4. Do not over-fill LP-Gas containers.

5. Engine should be stopped and operator off the truck during refueling.

6. Trained and designated personnel should recharge or exchange LP-Gas containers.

7. Personnel engaged in recharging of LP-Gas containers should wear protective clothing such as face shield, long sleeves, and gauntlet gloves.

8. Never use a match or flame to check for leaks, use a soap solution.

9. LP-Gas powered trucks should not be refueled nor stored near underground entrances, elevator shafts nor any other place where LP-Gas could collect in a pocket causing a potentially dangerous condition.

10. Trucks equipped with permanently mounted LP-Gas containers should be refueled outdoors.

11. Exchange of removable LP-Gas containers preferably should be done outdoors, but may be done indoors. Means should be provided in the fuel system to minimize the escape of fuel when the containers are exchanged. This should be accomplished by either of the following methods:

A. Using an automatic quick closing coupling (a type closing in both directions when uncoupled) in the fuel line, or.......

B. Closing the valve at the LP-Gas container and allowing the engine to run until the fuel in the line is consumed.

12. When installing removable LP-Gas containers they should be so located on the truck that the safety pressure relief valve opening is always in contact with the vapor space (top) of the cylinder. This is accomplished by an indexing pin which, when the tank is properly installed, positions the container.

13. All reserve LP-Gas containers should be stored and transported with the service valve closed. Safety relief valves should have direct communication with the vapor space of the container at all times.

14. The careless handling of LP-Gas containers can result in a serious accident. Extreme care should be exercised when transporting containers so that they are not accidentally dropped or physically damaged. When it is necessary to move more than one container at one time, a proper carrying device should be provided.

15. Physical damage such as dents, scrapes, or gouges, may materially weaken the structure of the LP-Gas container and render it unsafe for use. All LP-Gas containers should be examined before recharging and again before reuse, for the following defects or damage:

A. Dents, scrapes, and gouges of the pressure vessel.

B. Damage to the various valves and liquid level gage.

C. Debris in the relief valve.

D. Indications of leakage at valves or threaded connections.

E. Deterioration damage or loss of flexible seals in the fill or servicing connections.

All defective or damaged LP-Gas containers should be removed from service.

16. Smoking should be prohibited in the refueling area.

17. Whenever vehicles using LP-Gas as a fuel are parked overnight or stored for protracted periods of time indoors, with the fuel container in place, the service valve on the fuel container should be closed.

When checking or adjusting L.P. Gas equipment be sure to:

1. Properly ventilate work area.

2. Eliminate ignition sources (sparks, pilot lights etc.).

3. Prohibit smoking.

4. Have fire fighting equipment present.

5. Check all equipment, lines, connections with soapy water. NEVER USE A MATCH OR FLAME WHEN CHECKING FOR LEAKS.

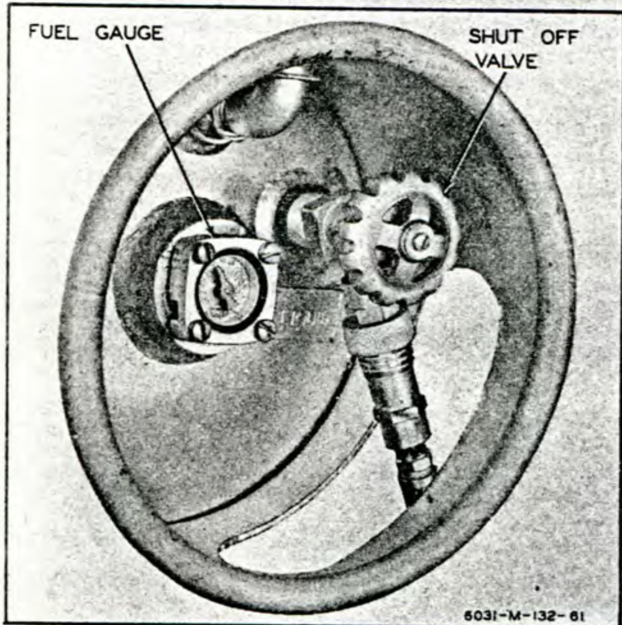


Plate 6031. Typical L.P. Gas Container

6. Check cylinder (container) for security of mounting.

7. Inspect hoses, grommets or whatever means is used to protect hoses from damage where they run through sheet metal etc. Replace any component that is unfit for further service.

8. Check all equipment for security of mounting.

9. Check the Solenoid Lock-Off Valve to be sure it is working. Upon turning off the ignition switch there should be an audible click indicating the valve has actuated shutting off the fuel flow at the valve. The valve should not open again until the ignition switch is turned on and the engine cranked. Cranking the engine provides oil pressure to the engine oil pressure sending unit which actuates completing an electrical circuit to the solenoid lock-off valve. The valve then opens allowing the L.P. Gas to pass through.

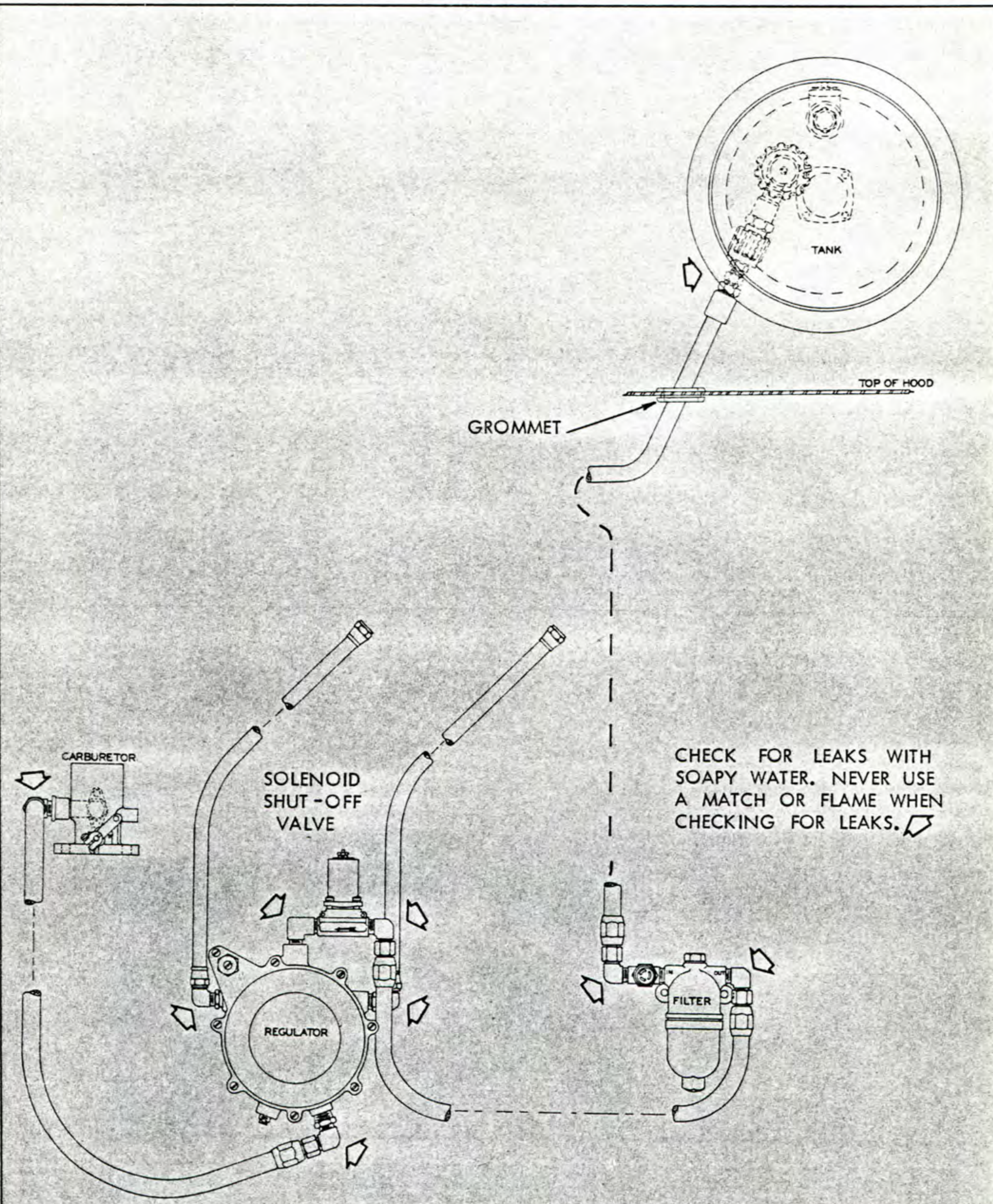


Plate 7405. Typical L.P. GAS Installation

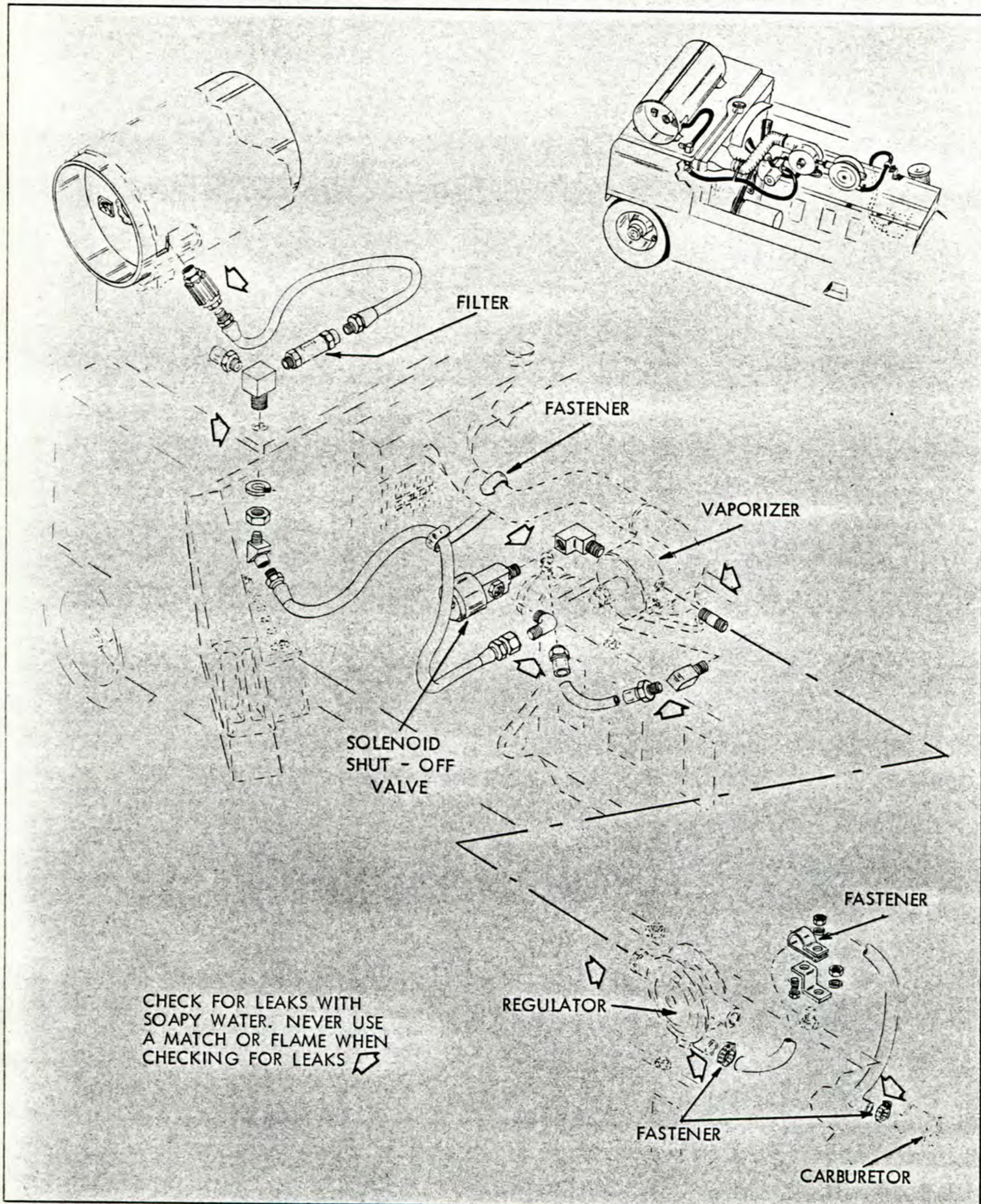


Plate 7406. Typical L.P. GAS Installation

FUEL HANDLING AND STORAGE SAFETY

(Gasoline Powered Trucks)

Liquid Fuels. (Such as Gasoline and Diesel Fuel).

1. The storage and handling of liquid fuels should be in accordance with the Flammable and Combustible Liquids Code. (NFPA No. 30).

2. Trucks using liquid fuels should be refueled only at locations designated for that purpose. Safe outdoor locations are preferable to those indoors. The Flammable and Combustible Liquids Code (NFPA No. 30), Paragraph 7211, outlines recommendations for arranging safe indoor fueling facilities.

3. Engines should be stopped and operator off the truck during refueling.

4. Liquid fuels not handled in approved dispensing pumps should be transported in safety cans. Safety cans should be inspected regularly for damage to closures and for leaks; faulty cans repaired or replaced. Care should be exercised in handling of safety cans to avoid damage.

5. Reasonable care should be exercised to prevent the spillage of fuel or overfilling either the vehicle fuel tanks or safety cans. Filler cap should be replaced and any spilled fuel disposed of by using a noncombustible adsorbent before the engine is restarted.

6. Smoking should be prohibited in the refueling area.

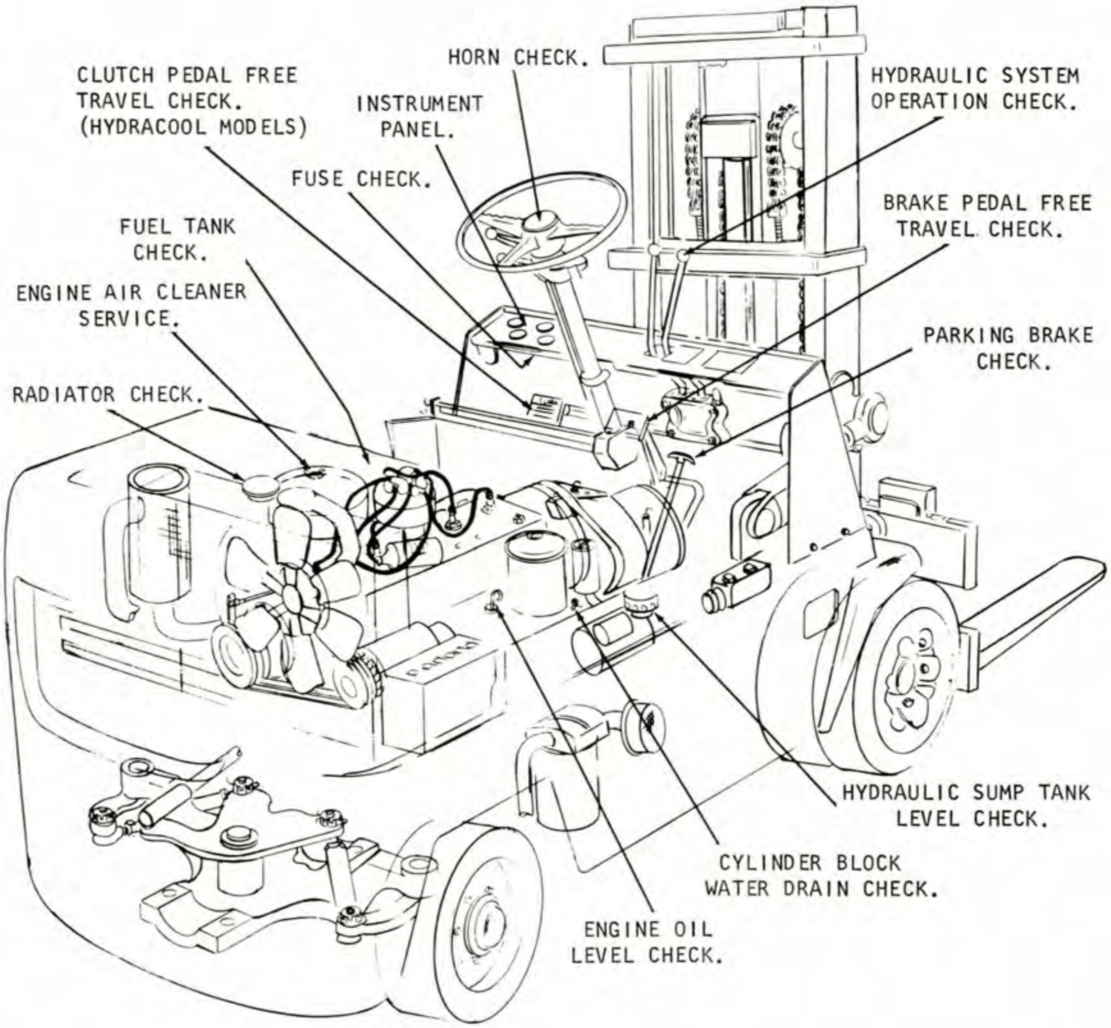
CAUTION

USE OF INCORRECT FILTER MAY DAMAGE YOUR ENGINE

DIESEL ENGINE SERVICE

REFER TO ENGINE
OPERATORS MANUAL

8 HOURS



NOTE

AFTER EACH 8 HOURS OF OPERATION, PERFORM
THE ABOVE PREVENTIVE MAINTENANCE SERVICES.

Plate 7643. Lubrication and Preventive Maintenance Illustration

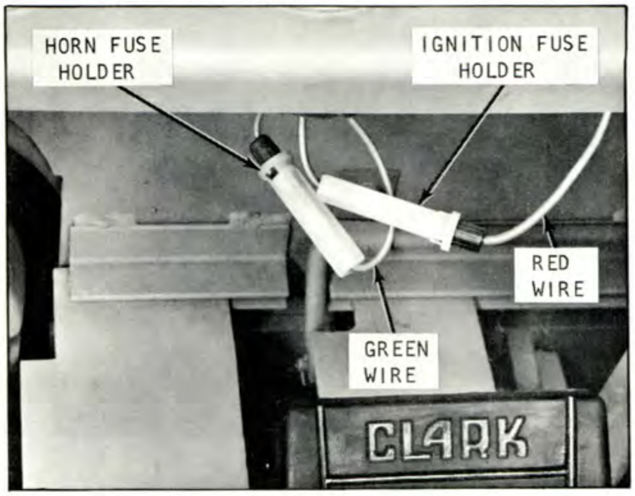


Plate 7648. Horn and Ignition Fuse

HORN

Check to be sure the horn is working properly.

FUSES

Check the electrical circuit fuses. The fuse holders are located beneath the dash. A red wire leads to the ignition fuse holder and a green wire leads to the horn fuse holder.

FUEL TANK

Check fuel supply and fill if necessary. Use a good grade of fuel.

Before filling fuel tank, make certain the filler cap screen is in place and not damaged (on machines so equipped).

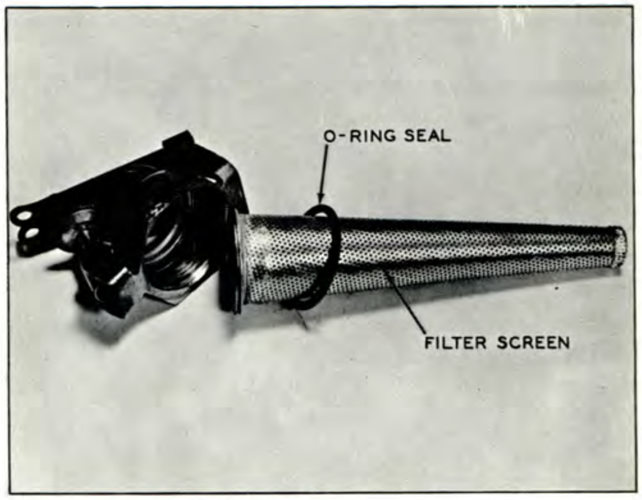


Plate 6627. Gasoline Tank Filler Cap and Screen

W A R N I N G

DO NOT FILL THE TANK WITH THE FILLER CAP SCREEN REMOVED. (GASOLINE MODELS)

INDUSTRIAL TRUCK DIVISION

LUBRICATION AND PREVENTIVE MAINTENANCE INDEX

LUBRICATION AND PREVENTIVE MAINTENANCE INDEX

NOTE

WHEN PERFORMING THE 100, 500 OR 1000 HOUR LUBRICATION AND PREVENTIVE MAINTENANCE, ALWAYS INCLUDE THE PREVIOUS LUBRICATION AND PREVENTIVE MAINTENANCE SCHEDULES.

ENGINE CRANKCASE CHECK

Every 8 operating hours....check the engine crankcase....USE YOUR DIPSTICK. Fill if necessary with...........

SAE 10W------------0 deg to 32 deg F
SAE 20W------------33 deg to 75 deg F
SAE 30-------------Above 75 deg F

See specifications for capacity.

CAUTION

NEVER PERMIT OIL LEVEL TO DROP BELOW ADD MARK ON DIPSTICK. DO NOT OVER FILL CRANKCASE CAUSING OIL CONSUMPTION, SMOKING, CARBON DEPOSITS, AND FOULED SPARK PLUGS. ON L.P. GAS ENGINES, USE A NONDETERGENT OIL DURING BREAK-IN PERIOD.

LOW TEMPERATURE OPERATION

Multi-viscosity oil should be used only where cold starting conditions make it necessary. The oil supplier should assume full responsibility for satisfactory performance of the multi-viscosity oil at both low and normal engine operating temperatures.

SERVICE CONDITIONS

Oil performance will reflect engine load, temperature, fuel quality, atmospheric dirt, moisture and maintenance. Where oil performance problems arise or are anticipated, the oil supplier should be consulted. When extended drain periods are contemplated, his analysis or that of a reputable laboratory should determine the suitability of oil for further service.

NOTE

Refer to diesel engine manual for machines so equipped.

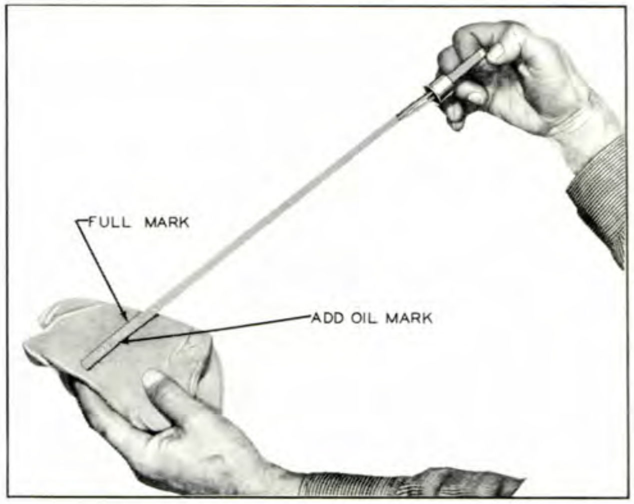


Plate 3145. Typical Crankcase Dipstick

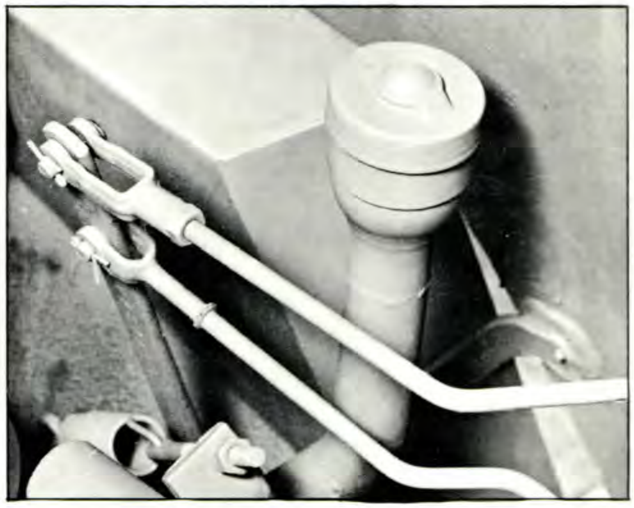


Plate 7649. Engine Crankcase Fill

ENGINE COOLING

Make sure that the radiator drain cock and the water drain in the cylinder block are closed. Check radiator coolant level and fill to within 1 inch of the top with clean water; or if operation is in cold weather, use a suitable anti-freeze solution.

It is recommended that a soluble oil in the proportion of 1 ounce per gallon of water be added to the Cooling System.

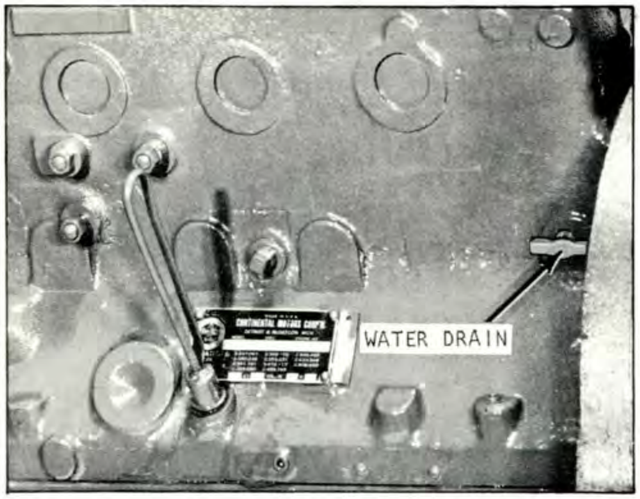


Plate 7008. Typical Cylinder Block Water Drain

CAUTION

NEVER POUR COLD WATER OR COLD ANTI-FREEZE INTO THE RADIATOR OF AN OVERHEATED ENGINE. ALLOW THE ENGINE TO COOL AND AVOID THE DANGER OF CRACKING THE CYLINDER HEAD OR BLOCK. KEEP ENGING RUNNING WHILE ADDING WATER OR ANTI-FREEZE. WHEN PERMANENT ANTI-FREEZE OF THE ETHYLENE GLYCOL TYPE IS USED, THE COOLANT SOLUTION MUST CONTAIN AT LEAST 40% WATER.

NOTE

REFER TO DIESEL ENGINE MANUAL FOR MACHINES SO EQUIPPED.

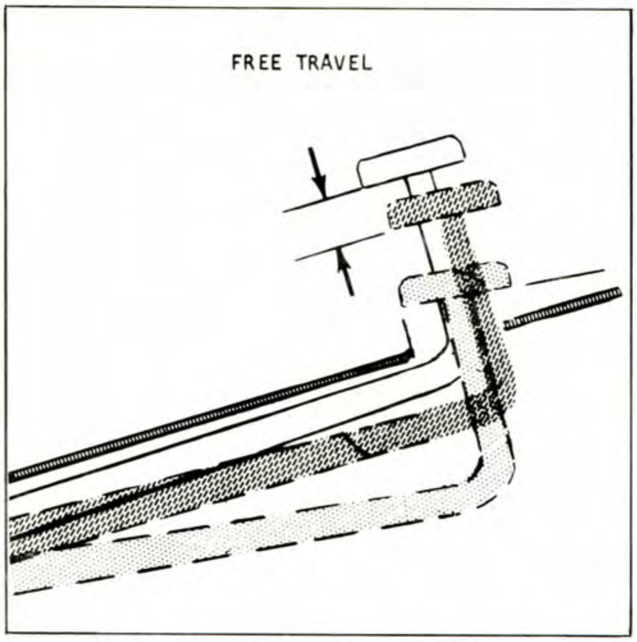


Plate 7048. Brake Pedal Free Travel

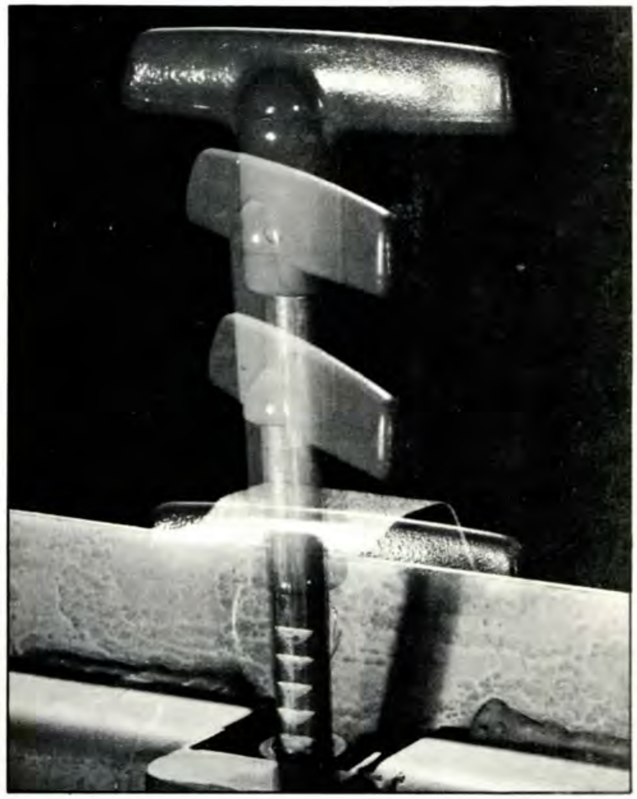


Plate 7482. Parking Brake

BRAKE PEDAL

Depress brake pedal by hand. When pedal meets resistance from the master cylinder, the distance traveled should be within the range listed in specifications.

If free travel is incorrect an adjustment should be made at the master cylinder linkage adjuster.

PARKING BRAKE

The parking brake linkage should be adjusted so that the brake handle will have 1 1/2 to 2 inches of upward free travel. If the lever travel exceeds this amount, the linkage should be adjusted.

PARKING BRAKE EFFECTIVENESS

The parking brake must be capable of holding the truck, with full rated load, on a 15% grade. This should be tested while occupying the driver's seat with parking brake applied and truck out of gear.

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

ENGINE AIR CLEANER (DRY TYPE)

Operating conditions determine the air cleaner service periods. Most operations require that the air cleaner be serviced each 8 operating hours. This may be necessary more often under extremely dusty conditions. Close observance and common sense can best determine the frequency of air cleaner maintenance.

Plate 7650. Typical Air Cleaner

1. Remove air cleaner cartridge and tap its sealing ends lightly on a flat surface to dislodge the accumulation of dirt particles.

2. After following the above procedure, clean unit with low pressure (10 to 20 lbs.) moisture free compressed air. This is best accomplished by directing the air stream away from the center of the cartridge. The air nozzle should be held several inches away from the pleated paper filter so that the force of the air will not rupture it.

3. Hold a light inside of the cartridge and look for any rupture or damage by observing the outside of the filter. Pay particular attention for damage of the filter near the sealing ends.

CAUTION

IF FILTER ELEMENT CANNOT BE PROPERLY CLEANED OR IF ANY RUPTURE OR DAMAGE IS NOTED THE FILTER CARTRIDGE MUST BE DISCARDED AND A NEW REPLACEMENT IS NECESSARY.

4. Check all connections between the air cleaner and carburetor to be sure they are air tight, thus preventing dirt from entering the system. Periodically check the interior of the air cleaner tube for evidence of dust or dirt that may have entered. If any dirt is found, the system is not operating properly and a correction must be made.

Plate 7651. Typical Air Cleaner Components

5. Clean the ends of the element, cap and air cleaner base taking precautions not to allow any of the dust or dirt to enter the air cleaner tube. If the metal cap or air cleaner base has been damaged or distorted in any way, a replacement of the damaged part is necessary. There must be an air tight seal at both ends of the filter or dust and dirt will enter the engine through these openings.

NOTE

1/4 TEASPOON OF DUST ENTERING THE ENGINE EACH HOUR WILL COMPLETELY RUIN AN ENGINE IN A 8 HR. DAY.

6. Install the filter element and tighten the thumb screw sufficiently to insure a good seal at both ends of the element.

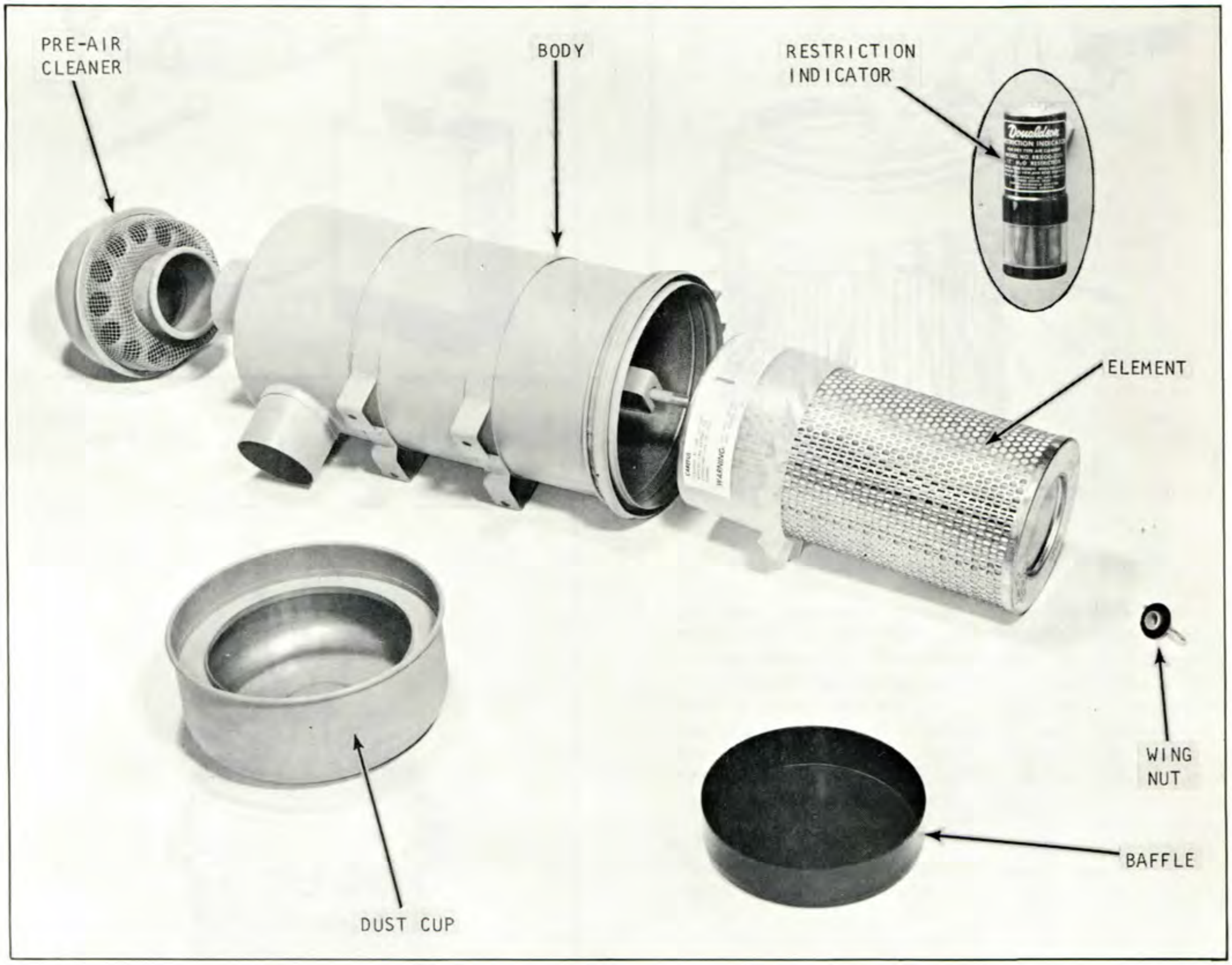


Plate 8310. Typical Air Cleaner Assembly

ENGINE AIR CLEANER

Operating conditions determine the air cleaner service periods. The air cleaner should be checked and cleaned every 8 operating hours. This may be necessary more often under dusty operating conditions. Proper servicing means cleaning unit throughly and maintaining air-tight connections between the air cleaner and intake manifold so that all air entering the engine is filtered.

1. Remove air stack cap (pre-air cleaner) and clean exterior and interior.

2. Remove dust cup from air cleaner, remove baffle and empty dust from cup.

3. Remove thumb screw and pull out filter element. Clean throughly by using the following methods.

a. With a dry dusty element, direct moisture free compressed air (100 P.S.I. or less) up and down pleats on the clean air side of the filter. Maintain reasonable distance between nozzle and filter to avoid rupturing the element.

Plate 7173. Cleaning Dusty Element

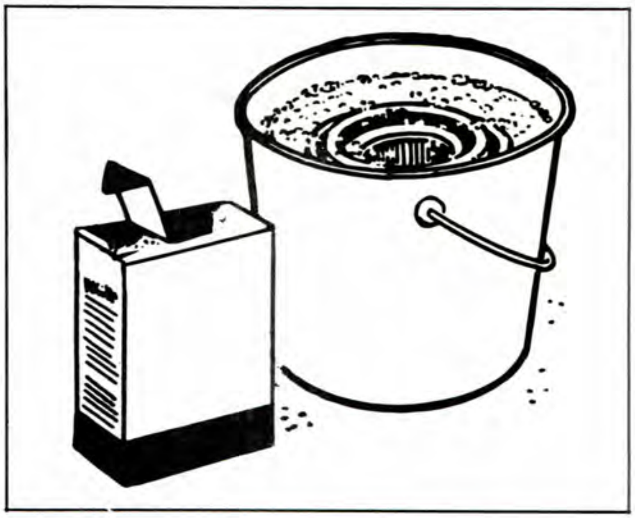


Plate 7174. Cleaning Oily Sooty Element

b. With oily or sooty element, use a garden hose (40 P.S.I. or less) to clean element. Then wash element in warm water (120° or less) containing a non-sudsing household detergent. The warmer the solution the better the cleaning. Soak for approximately 15 minutes. Rinse element throughly with clean water from hose (maximum pressure 40 P.S.I.) Air dry completely before using.

4. Clean cover, baffle and inside of filter body with a clean lint free cloth.

5. Check air cleaner hose connections to be sure they are air tight.

6. After air cleaner has dried, (a fan or air draft may be used, but do not heat element to hasten drying) inspect element for damage by placing a bright light inside element. Thin spots, pin holes or the slightest rupture will render the element unfit for further use.

Plate 7166. Inspecting Element with Light

RESTRICTION INDICATOR (Machines so Equipped)

Service filter element when red signal locks in full view. After filter element has been cleaned or replaced, reset indicator by pushing on reset button.

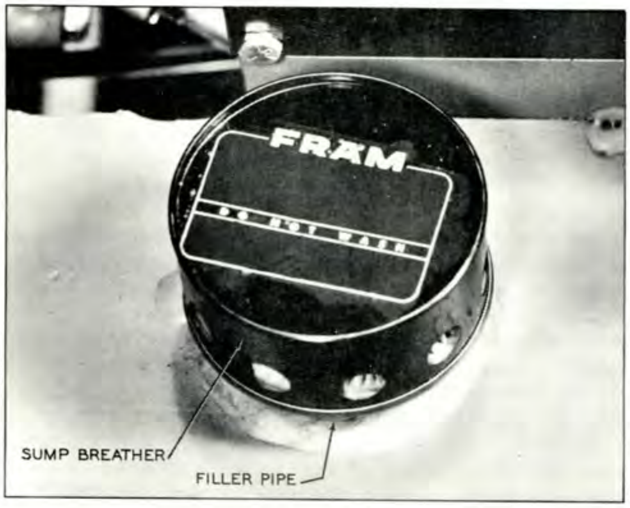


Plate 6626. Hydraulic Sump Tank and Sump Breather

HYDRAULIC SUMP TANK

Check hydraulic sump tank fluid level in the following manner:

1. Lower upright.

2. Turn switch key to off position.

3. Remove sump breather. Fluid level should be up to bottom of filler pipe.

If necessary, fill sump tank using MS 68 Hydraulic fluid. Move valve control levers with hydraulic pump operating to allow any air in the lines to escape, then recheck sump tank fluid level and fill as required before putting machine in operation.

HYDRAULIC CONTROL LEVERS

IMPORTANT

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.

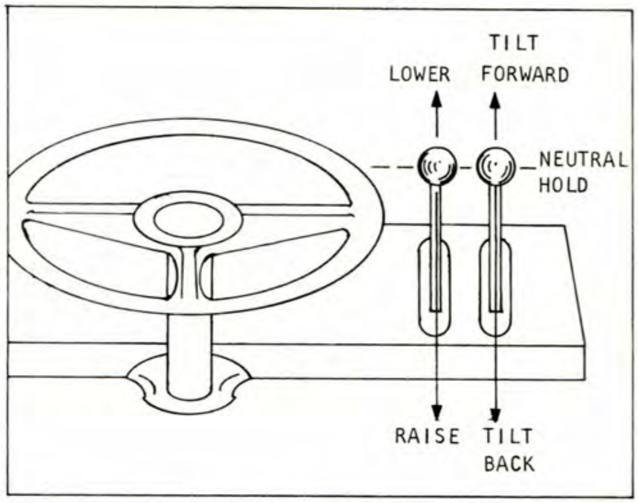


Plate 7305. Lift and Tilt Levers

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.

CAUTION

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.

RIM AND WHEEL MAINTENANCE:

N O T E

"In order to maintain and insure maximum service, a continuous maintenance program is advisable... maintenance procedures should be carried out both during tire inspections and during tire changes."

WARNING

PULL DAMAGED RIMS OR WHEELS. DEFLATE TIRES PRIOR TO THE REMOVAL OF RIMS OR WHEELS FROM THE VEHICLE.

Check all metal surfaces thoroughly while making tire inspections...watch for...

1. Fatigue cracks in metal.
2. Bent flanges, resulting from road obstructions.
3. Deep rim tool marks.
4. Loose, missing or damaged nuts.
5. Bent or stripped studs.
6. Excessive rust or corrosion.

Mark damaged or hazardous areas with chalk so that part will be removed from service...replace damaged parts.

Insure that replacements are made with the proper sizes and types...refer to your machine serial number when ordering replacement parts. 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.

Check all metal surfaces, as listed above, and check for cracks. These are caused by deep rim tool marks, overloading and overinflating tires and using larger than recommended tire sizes.

Cracks in wheel between stud holes are caused by loose wheel nuts...improper installation procedures and use of incorrect sizes or types of attaching parts. Insufficient mounting torque can cause wheel shimmy, resulting in damage to parts and extreme tire tread wear. Excessive mounting torque can cause studs to break and disc to crack in the stud hole area.

Thoroughly clean wheels...remove rust, dirt and other foreign materials from all surfaces. Hand or electric wire brushes, and blasting or chemical baths may be used.

Bead seat areas of the rim should be free of rust and rubber deposits. This is especially important for drop-center tubless rims...because of the air-sealing element.

Paint rim by brush or spray with a fast-drying metal primer. Surfaces should be clean and dry prior to painting. Insure that bare metal areas on outside or tire side of rim are covered. This is especially important on drop-center tubless rims, because warm and somethimes moist air is in constant contact with the metal surface on the tire side of the rim.

Lubricate tire side of rim base just prior to mounting tire...avoid the use of any lubricant which contains water or solvent that is injurious to rubber...a combination lubricant and rust-preventive compound is preferable. This protective measure is of particular importance with drop-center tubless rims as the air in the tire is contained by the tire-side rim surface.

N O T E

Rim Distributors can supply the proper compound that serves as a lubricant and rust preventive.

TIRE MAINTENANCE:

Inspect for proper inflation. Refer to Specifications for correct tire pressure.

Inspect tires and wheels regularly for cuts, breaks, alignment, security of wheel clamp bolts (on machine using split rims), and lug nuts or bolts.

Even with the best of maintenance practices, cuts will still be a source of tire trouble. The correct procedure for handling and repairing tires should be given careful attention. Close inspection of all tires should be made at the time of inflation check, and all tires having cuts that penetrate into the cord body should be taken off for proper repair.

Failure to make regular inspections and repairs, when needed, will result in further deterioration of the cord body and eventually a blowout. Small rocks and dirt will get into shallow cuts in the tread and if neglected will gradually be pounded through the cord body.

One simple method to forestall this action is to clean out the cut with an awl or similar tool to remove any stones or other matter which may be lodged in the cut. Use a sharp, narrow-bladed knife and cut away the rubber around the cut to form a cone-shaped cavity extending to the bottom of the injury. The sides of the cavity should be slanted enough to prevent stones from

TIRE MAINTENANCE (CONTINUED):

wedging into it. Tires with cuts treated in this manner may be continued in service without danger of further growth of these injuries. If a tire has at least one deep cut that requires a repair, then all smaller cuts may be quickly and economically repaired and vulcanized by the steam kettle method.

W A R N I N G

IT IS NOT RECOMMENDED THAT TIRES WITH BREAKS BE USED AGAIN.

If uneven tire wear is evident, wheel alignment should be checked.

TIRE INFLATION:

Before inflating tires, make certain all wheel nuts are tightened to proper torque (see Specifications).

W A R N I N G

IN ALL CASES, WHEN REMOVING TIRES WITH SPLIT RIMS FROM THE MACHINE FOR REPAIR OR PERIODIC ROTATION, COMPLETELY DEFLATE TIRES. THIS IS ACCOMPLISHED BY REMOVING THE VALVE CORE.

W A R N I N G

IN ALL CASES, WHEN REMOVING TIRES EQUIPPED WITH THE LOCK RING TYPE RIM FROM THE MACHINE FOR REPAIR OR PERIODIC ROTATION, COMPLETELY DEFLATE TIRES. THIS IS ACCOMPLISHED BY REMOVING THE VALVE CORE.

W A R N I N G

WHEN REPAIRING TIRES USED ON MACHINES THAT EMPLOY THE LOCK RING TYPE RIM, USE CAUTION WHEN INFLATING TIRE, PROCEED AS FOLLOWS:

1. After positioning lock ring on rim, turn wheel and rim assembly over so that lock ring is on side toward ground.

2. Inflate tire to 5 to 10 pounds.

3. Turn rim over and tap lock ring carefully with a mallet to be sure it is properly seated.

4. If you have access to a steel cage...use it, (see next page)...otherwise turn rim and wheel over once again so that lock ring is on the bottom and inflate tire to proper pressure.

W A R N I N G

IF LOCK RING IS NOT LOCATED PROPERLY, IT IS POSSIBLE FOR IT TO POP OFF RIM WITH GREAT FORCE WHEN TIRE IS INFLATED AND COULD RESULT IN SERIOUS INJURY TO ANYONE STRUCK BY IT.

On machines using split rims, make periodic checks for noises in the wheel, as it is possible for damage to occur to the wheel bolts if they are not securely tightened when tires are changed. If the wheel bolts are loose or have been sheared off as a result of being loose, a grinding or scraping noise will be present when wheels are turned. Should this condition exist, it will be necessary to immediately remove the rim and tire from the machine and determine the cause of noise and repair or replace defective parts.

N O T E

Refer to WARNING on deflation of tires before removing wheels from machine.

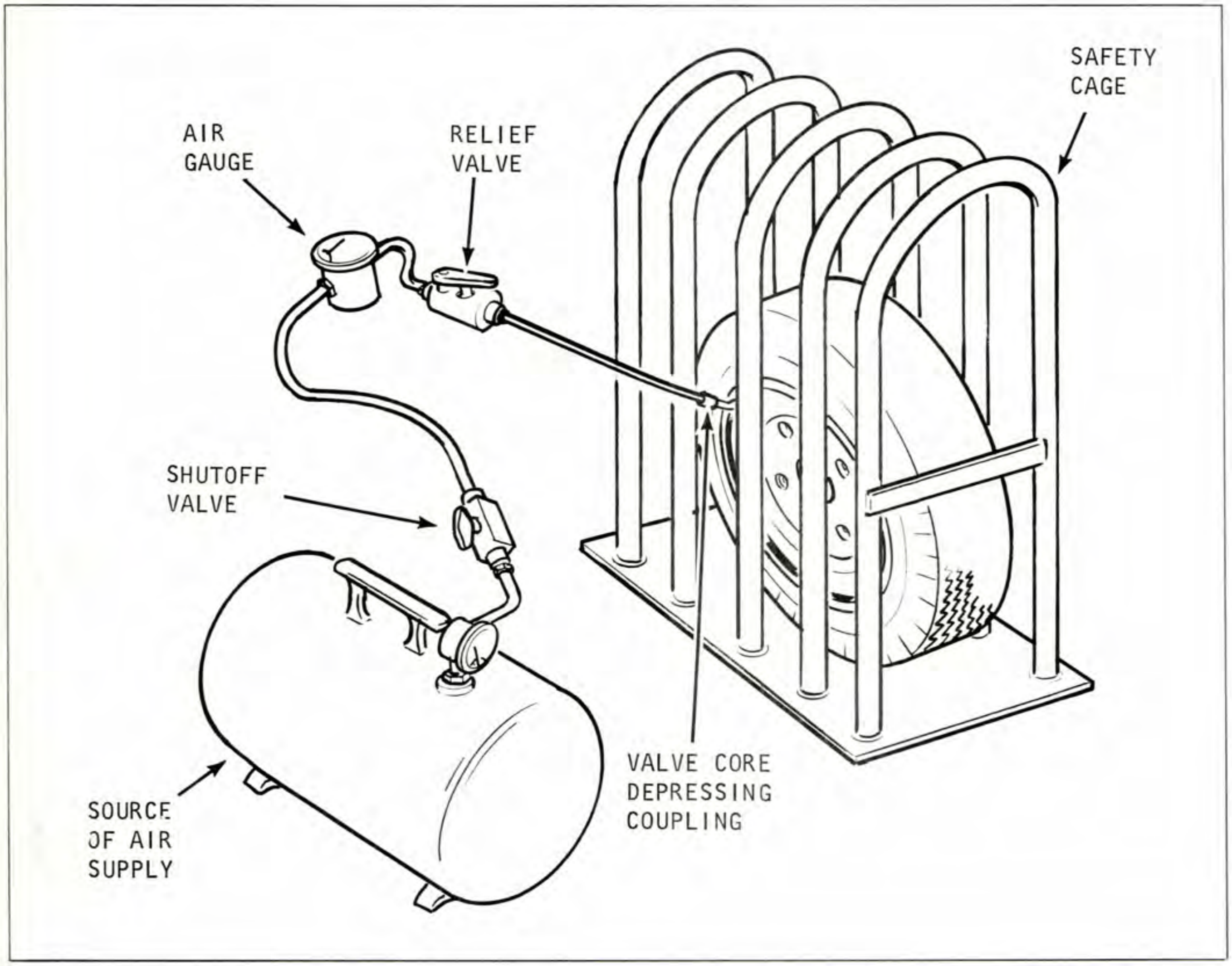


Plate 9702. Typical Tire Inflation Procedure

Torque wheel stud nuts or wheel bolts to the values listed in specifications. Excessive torque of wheel nuts can cause stud and rim damage.

Any replacement parts used should be of a quality equal to that provided in the original manufacture.

Inflation

> **CAUTION**
>
> ALL FASTENERS SHOULD BE PROPERLY INSTALLED BEFORE INFLATING WHEEL/TIRE ASSEMBLY.

Tires with split wheels should be inflated in a safety cage or when properly installed on the vehicle. In either case, make sure all nuts and bolts are properly installed and torqued according to specifications.

> **CAUTION**
>
> USE ONLY AN APPROVED SAFETY CAGE DESIGNED FOR THIS PURPOSE.

Tires used on lock-ring type wheels should be inflated in a safety cage (see previous caution) or use a clip-on type air chuck and stand aside (in-line with the tire tread) during inflation. Insure that rings are properly

Plate 7613. Typical Split Wheel

seated prior to inflation. An inflated tire contains potentially explosive energy that can blow rings loose.

All wheel/tire assemblies <u>should</u> be inflated in a safety cage. The air hose should have a special set-up as shown in Plate 9702. The hose should have an adapter so that it can be securely fastened to the valve stem. Using this set-up you would:

1. Attach air hose to valve stem.

2. Open shut-off valve allowing compressed air to enter tube.

3. Shut off air supply occasionally to check pressure in tube at air gauge.

4. Inflate to proper capacity. If pressure <u>exceeds</u> proper inflation capacity, depress the relief valve to release excess air pressure.

5. This alternating procedure is followed until proper inflation is reached. See specifications.

I M P O R T A N T

MAINTAIN UNIFORM INFLATION IN BOTH TIRES OF A DUAL ASSEMBLY SO THAT WEIGHT IS EQUALLY SUSTAINED.

NEVER RE-INFLATE A TIRE THAT HAS GONE FLAT WITHOUT FIRST INSPECTING IT AND THE WHEEL ASSEMBLY.

The tire inflation arrangement as shown in Plate 9702 can be made up from local suppliers.

Parts can be ordered from the following suppliers:

<u>Relief Valve</u> - Model 250V-1/4"

Humphrey Products
P.O. Box 2008
Kilgore at Sprinkle Rd.
Kalamazoo, Mich.

<u>Shut-Off Valve</u> - Imperial #77E(1/4 to 1/4 1 PT)

Kendall Industrial Supplies, Inc.
702 N. 20th St.
Battle Creek, Mich. 49016

<u>Air Gauge</u> - Marshaltown #23 (160 lb, 1/4 1 PT, 2 1/2" diameter gauge)

Kendall Industrial Supplies, Inc.
702 N. 20th St.
Battle Creek, Mich. 49016

<u>Safety Cage</u>

Meyers Tire Supplies
6400 Epworth Blvd.
Detroit, Mich.

DIRECTIONAL TREAD TIRES

All directional tread tires are to be mounted in the correct position with respect to the arrow cast on the side of the tire as explained and illustrated below.

Directional Tread Dual Tires:

1. Inside dual tire arrow to point in the direction of foward rotation, see Plate 6422.

   (Rotate wheel to bring arrow on tire above the wheel. Arrow must point toward front of truck.)

2. Outside dual tire arrow to point in the direction of rearward rotation, see Plate 6423.

   (Rotate wheel to bring arrow on tire above the wheel. Arrow must point toward rear of truck.)

Directional Tread Single Drive Tires:

1. Tire arrow to point in the direction of forward rotation, see Plate 6422.

   (Rotate wheel to bring arrow on tire above the wheel. Arrow must point toward front of truck, see Plate 6422.

Plate 6422. Inside Dual Tire
(or Single Drive Tire)
(Arrow to point toward front of truck)

Plate 6423. Outside Dual Tire
(Arrow to point toward
rear of truck)

SOLID OR CUSHION 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.

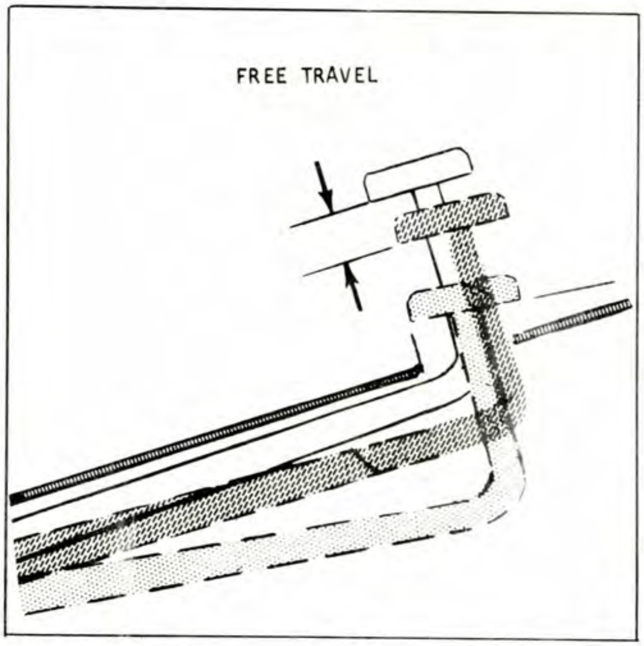


Plate 7048. Clutch Pedal Free Travel Check

CLUTCH PEDAL FREE TRAVEL: Depress clutch pedal from the top position to a point where it meets resistance. This free travel should be approximately 7/8 of an inch from top pedal position.

SAFETY TIPS

1. NEVER ATTEMPT TO WELD ON AN INFLATED TIRE/RIM ASSEMBLY.

2. ALWAYS EXHAUST ALL AIR FROM A SINGLE TIRE AND FROM BOTH TIRES OF A DUAL ASSEMBLY PRIOR TO REMOVING ANY RIM COMPONENTS, OR ANY WHEEL COMPONENTS, SUCH AS NUTS AND RIM CLAMPS.

   MAKE SURE TO REMOVE THE VALVE CORE AND EXHAUST ALL AIR FROM THE TIRE.

   REMOVE THE VALVE CORES FROM BOTH TIRES OF A DUAL ASSEMBLY.

   CHECK THE VALVE STEM BY RUNNING A PIECE OF WIRE THROUGH THE STEM TO MAKE SURE IT IS NOT PLUGGED.

3. CHECK RIM COMPONENTS PERIODICALLY FOR FATIGUE CRACKS. REPLACE ALL CRACKED, BADLY WORN, DAMAGED AND SEVEREL RUSTED COMPONENTS.

4. CLEAN RIMS AND REPAINT TO STOP DETRIMENTAL EFFECTS OF CORROSION. BE VERY CAREFUL TO CLEAN ALL DIRT AND RUST FROM THE LOCK RING GUTTER.

   THIS IS IMPORTANT TO SECURE THE LOCK RING IN ITS PROPER POSITION.

   A FILTER ON THE AIR INFLATION EQUIPMENT TO REMOVE THE MOISTURE FROM THE AIR LINE PREVENTS A LOT OF CORROSION. THE FILTER SHOULD BE CHECKED PERIODICALLY TO SEE THAT IT IS WORKING PROPERLY.

5. MAKE SURE CORRECT PARTS ARE BEING ASSEMBLED. CHECK YOUR DISTRIBUTOR OR THE MANUFACTURER IF YOU HAVE ANY DOUBTS.

6. DOUBLE CHECK TO MAKE SURE ALL COMPONENTS ARE PROPERLY SEATED PRIOR TO INFLATION.

7. MIXING PARTS OF ONE MANUFACTURER'S RIMS WITH THOSE OF ANOTHER IS POTENTIALLY DANGEROUS. ALWAYS CHECK MANUFACTURER FOR APPROVAL.

8. DON'T OVERLOAD OR OVER-INFLATE RIMS. CHECK YOUR RIM MANUFACTURER IF SPECIAL OPERATING CONDITIONS ARE REQUIRED.

9. DON'T REINFLATE A TIRE THAT HAS BEEN RUN FLAT WITHOUT FIRST INSPECTING THE TIRE, RIM, AND WHEEL ASSEMBLY.

   DOUBLE CHECK THE LOCK RING FOR DAMAGE...MAKE SURE THAT IT IS SECURE IN THE GUTTER BEFORE INFLATION.

SAFETY TIPS
- continued -

RIMS AND WHEELS

10. NEVER RUN A VEHICLE ON ONE TIRE OF A DUAL ASSEMBLY. THE CARRYING CAPACITY OF THE SINGLE TIRE AND RIM IS DANAGEROUSLY EXCEEDED, AND OPERATING A VEHICLE IN THIS MANNER CAN RESULT IN DAMAGE TO THE RIM.

11. DON'T BE CARELESS OR TAKE CHANCES. IF YOU ARE NOT SURE ABOUT THE PROPER MATING OF RIM AND WHEEL PARTS, CONSULT A WHEEL AND RIM EXPERT. THIS MAY BE THE TIRE MAN WHO IS SERVICING YOUR FLEET, THE RIM AND WHEEL DISTRIBUTOR IN YOUR AREA, OR THE CLARK DEALER.

12. DON'T USE UNDERSIZED RIMS. USE THE RIGHT RIMS FOR THE JOB.

13. DON'T SEAT RINGS BY HAMMERING WHILE THE TIRE IS INFLATED.

    DON'T HAMMER ON AN INFLATED OR PARTIALLY INFLATED TIRE/RIM ASSEMBLY.

14. DON'T LET ANYONE MOUNT OR DEMOUNT TIRES WITHOUT PROPER TRAINING.

15. NEVER SIT ON OR STAND IN FRONT OF A TIRE AND RIM ASSEMBLY THAT IS BEING INFLATED. USE A CLIP-ON CHUCK AND MAKE SURE INFLATION HOSE IS LONG ENOUGH TO PERMIT THE PERSON INFLATING THE TIRE TO STAND TO THE SIDE OF THE TIRE, NOT IN FRONT OR IN BACK OF THE TIRE ASSEMBLY.

16. DO NOT, UNDER ANY CIRCUMSTANCES, ATTEMPT TO REWORK, WELD HEAT, OR BRAZE ANY RIM COMPONENTS THAT ARE CRACKED, BROKEN OR DAMAGED. REPLACE WITH NEW PARTS OR PARTS THAT ARE NOT CRACKED, BROKEN, OR DAMAGED, WHICH ARE OF THE SAME SIZE, TYPE AND MAKE.

17. INFLATE IN A SAFETY CAGE OR USE SAFETY CHAINS DURING INFLATION.

18. REGARDLESS OF HOW HARD OR FIRM THE GROUND APPEARS, PUT HARDWOOD BLOCKS UNDER THE JACK.

19. BLOCK THE TIRE AND WHEEL ON THE OTHER SIDE OF THE VEHICLE, BEFORE YOU PLACE THE JACK IN POSITION...ALWAYS CRIB UP WITH BLOCKS JUST IN CASE THE JACK MAY SLIP.

20. REMOVE THE BEAD SEAT BAND SLOWLY TO PREVENT IT FROM DROPPING OFF AND CRUSHING YOUR TOES. SUPPORT THE BAND ON YOUR THIGH AND ROLL IT SLOWLY TO THE GROUND THIS WILL PROTECT YOUR BACK AND TOES.

21. BEAD BREAKERS AND RAMS APPLY PRESSURE TO BEAD FLANGES. KEEP YOUR FINGERS CLEAR. SLANT BEAD BREAKER ABOUT 10 DEGREES TO KEEP IT FIRMLY IN PLACE. IF... ...IT SLIPS OFF, IT CAN FLY WITH ENOUGH FORCE TO KILL. ALWAYS STAND TO ONE SIDE WHEN YOU APPLY HYDRAULIC PRESSURE.

21. WHEN USING A CABLE OR CHAIN SLING, STAND CLEAR...IT MIGHT SNAP AND LASH OUT.

#11500. Clip-on Air Chuck & Nitrogen Cylinder

PRESSURIZING TIRES WITH NITROGEN:

The primary object in using nitrogen to pressurize tires is to gain the pressure desired in case shop pressure is inadequate.

Most shops have air pressure somewhere around 90-100 PSI, so if you have pneumatic tires on a machine that require more pressure than this, nitrogen cylinders can be used to finish the pressurization.

When using nitrogen:

1. Make sure the cylinder, gauges, regulator, hoses, etc. are all in good condition and U.L. approved. The regulator should be adequate for the pressure desired.

2. Set the regulator at the pressure required.

#11501. Shows Set-up Using Nitrogen Cylinder

3. Using a clip-on air chuck, attach this to the tire valve (#11500).

4. Then stand behind the truck as shown in #11501.

5. When other people are clear of the area, the tire can then be pressurized.

W A R N I N G

TIRES REQUIRING PRESSURIZATION IN

THIS MANNER MUST FIRST BE MOUNTED

PROPERLY ON THE TRUCK.

N O T E

The tank and regulator with gauges need a carrying device or a stand to protect them from falling over.

FIRE EXTINGUISHERS AND SCR EQUIPMENT:

Fire Extinguishers Recommended

The two types of fire extinguishers recommended for use on SCR equipment are dry chemical (for B and C applications) and the CO/2 (carbon dioxide) which is more suitable for electrical type fires. The reason being that cleaning (after the use of carbon dioxide) is not necessary. Carbon dioxide simply replaces the oxygen in the area of the fire and extinguishes the flames. The only danger when using this type is in small areas where a great deal of carbon dioxide could replace so much oxygen that the persons in this area could collapse from the lack of oxygen themselves.

The chemical used in the dry type extinguishers is either sodium or potassium bicarbonate which has been treated for water repellency. After using, the control must be thoroughly cleaned and dried. When water is used to rinse down the control, it forms a CONDUCTIVE solution 'with' the sodium or potassium. Therefore, the battery MUST be <u>disconnected</u> before cleaning and must <u>not</u> be reconnected until after the control has been thoroughly dried. General Electric recommends the Ansul brand of dry type fire extinguisher.

Fire Extinguisher Not Recommended

Pyrene fire extinguishers are not recommended for use on SCR equipment. General Electric has reported that the chemical agents in pyrene extinguishers destroys the Flamenol insulation on the cables and has an adverse effect on Lexan used on SCR controls.

CAUTION

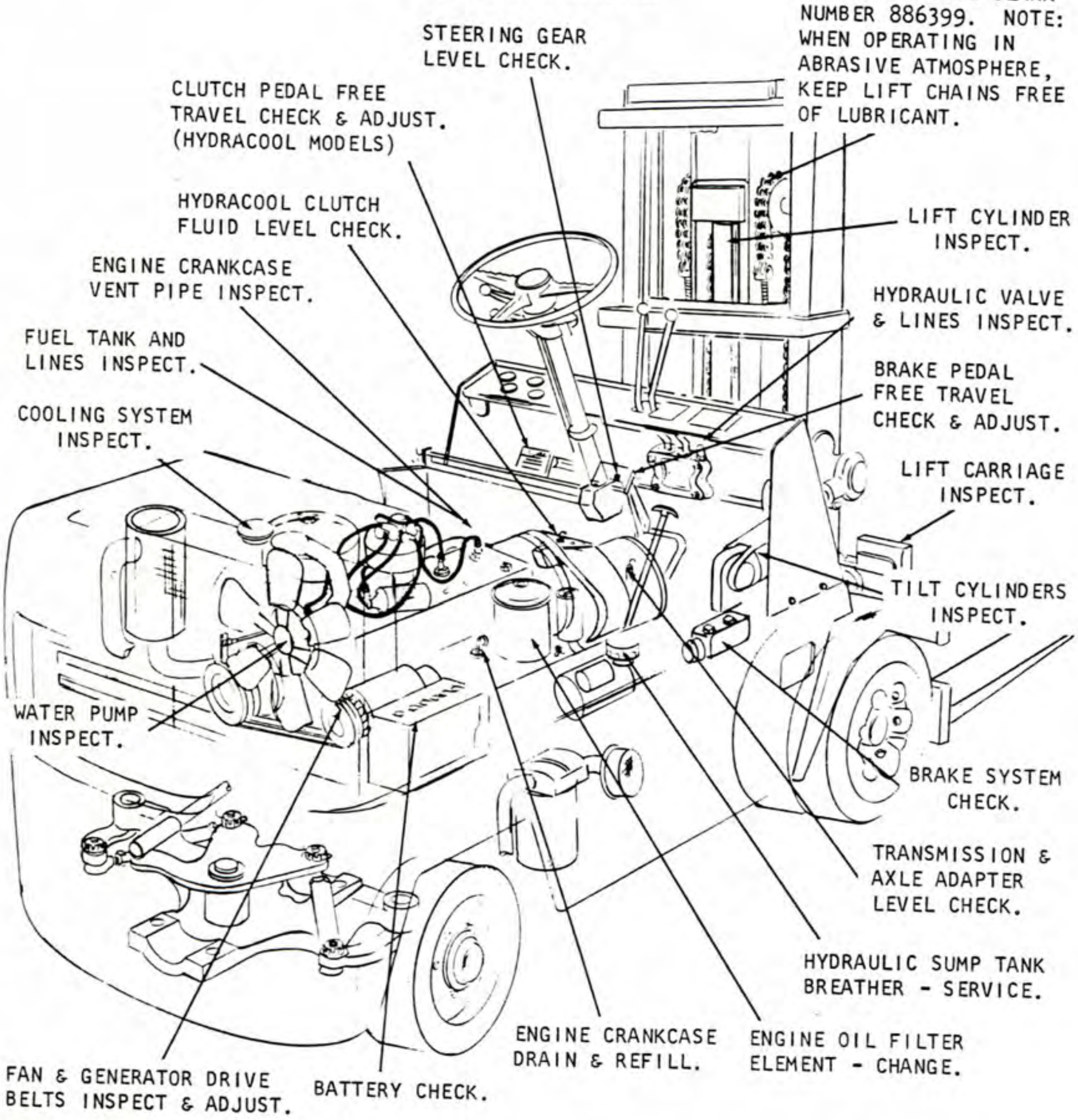
USE OF INCORRECT FILTER MAY DAMAGE YOUR ENGINE

DIESEL ENGINE SERVICE

REFER TO ENGINE OPERATORS MANUAL

100 HOURS

LUBRICATE MACHINE.



NOTE

IN ADDITION TO THE ABOVE, PERFORM THE 8 HOUR PREVENTIVE MAINTENANCE SERVICES.

Plate 7644. Lubrication and Preventive Maintenance Illustration

CONVERTER, TRANSMISSION AND AXLE ADAPTER
(HYDRATORK TRANSMISSION MODELS)

Verify fluid level with the transmission at normal operating temperature, engine at low idle and transmission in neutral. (Remove floorplate section to expose dipstick - See Plate 7654.)

Fill to the proper level as indicated on the dipstick. Use Automatic Transmission Fluid Type "A", Suffix "A". Containers must display a qualification number prefixed by the mark "AQ-ATF". Clark part number 879803.

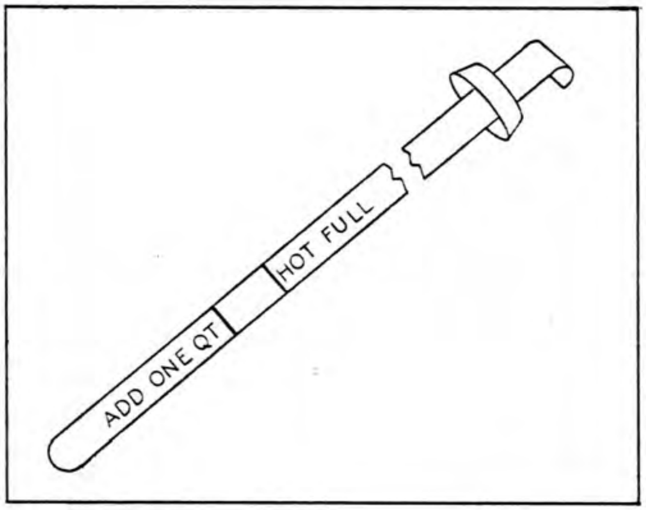


Plate 8281. Hydratork Transmission Dipstick

TRANSMISSION AND AXLE ADAPTER
(HYDRACOOL CLUTCH MODEL MACHINES)

The transmission and axle adapter have a common lubrication system. Verify fluid level with the transmission at normal operating temperature and the engine shut down. (See Plate 7654 for location of dipstick). Fill to the proper level as indicated on the dipstick. Use straight mineral gear lube of SAE 90 grade.

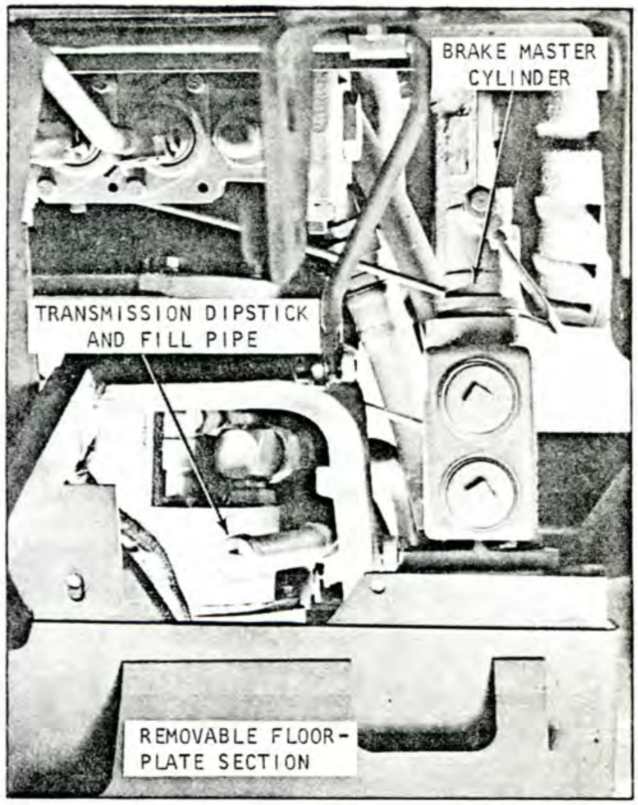


Plate 7654. Transmission Dipstick and Fill Pipe

FUEL LINES

Make certain that fuel line connections are secure. Check fuel lines for obstructions and leaks. On gasoline powered machines, check the screen in fuel filler cap to make certain that it is properly installed and not damaged.

W A R N I N G

THE FUEL TANK IS AN INTEGRAL PART OF THE MACHINE FRAME AND ANY WELDING IN THIS AREA SHALL NOT BE ATTEMPTED BEFORE FIRST TAKING ADEQUATE SAFETY PRECAUTIONS. REPORT TO DESIGNATED PERSON IN AUTHORITY.

CAUTION

USE OF
INCORRECT FILTER
MAY DAMAGE
YOUR ENGINE

ENGINE CRANKCASE

1. Every 100 operating hours; drain the engine crankcase at operating temperature and clean the magnetic drain plug.

2. Change the engine oil filter element. The filter is of the replaceable type. The element should be changed whenever the crankcase is drained. To remove the element, remove oil filter cover screw and gasket, oil filter cover, cover spring and cover gasket. Lift out oil filter element. Install new element after draining and thoroughly cleaning filter case. Install new element after draining and thoroughly cleaning filter case. Install new gaskets and replace cover spring, oil filter cover and secure with oil filter cover screw.

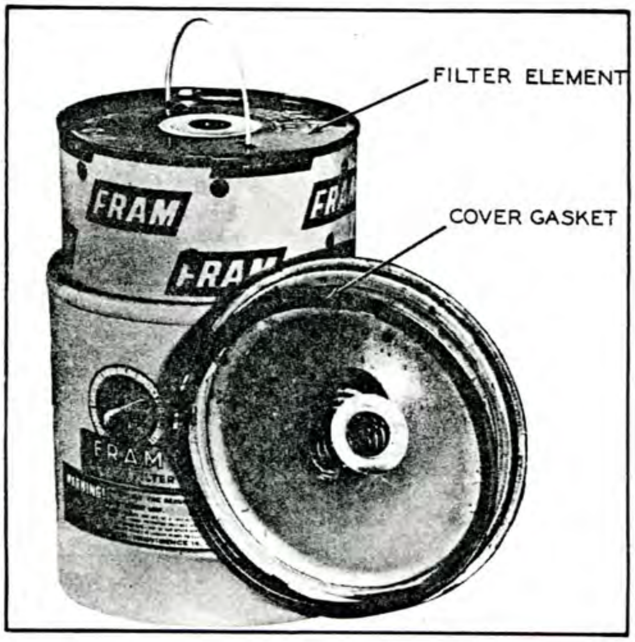


Plate 6642. Engine Oil Filter

3. Refill crankcase using recommended oil listed below. See specifications for capacity.

SAE 10W---0 deg to 32 deg F
SAE 20W---33 deg to 75 deg F
SAE 30----above 75 deg F

Low Temperature Operation

Multi-viscosity oil should be used only where cold starting conditions make it necessary. The oil supplier should assume full responsibility for satisfactory performance of the multi-viscosity oil at both low and normal engine operating temperatures.

4. Start engine and check oil filter for leaks at cover. Run engine at idle a few minutes, then shut down engine. Allow time for engine oil to return to crankcase (approx. 5 min.) and then check oil level with the dipstick. Add oil as necessary to bring oil level to full mark on the dipstick.

Service Conditions

Oil performance will reflect engine load, temperature, fuel quality, atmospheric dirt, moisture and maintenance. Where oil performance problems arise or are anticipated, the oil supplier should be consulted. When extended drain periods are contemplated, his analysis or that of a reputable laboratory should determine the suitability of oil for further service.

Engine Crankcase Ventilation Pipe

Check crankcase ventilation pipe for damage or obstructions. The pipe must be open to provide proper ventilation. Clean, repair or replace as required.

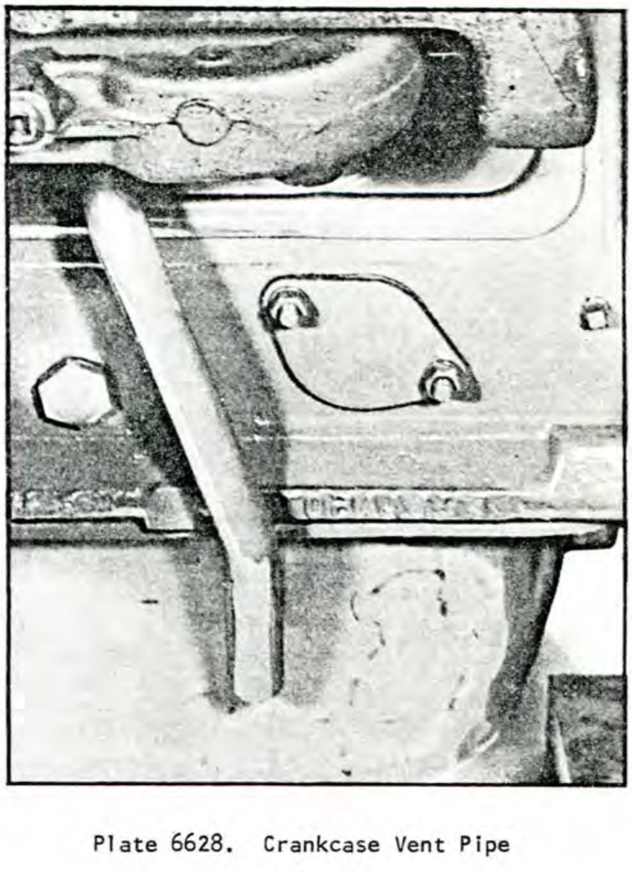


Plate 6628. Crankcase Vent Pipe

N O T E

Refer to Diesel Engine Manual for Machines So Equipped.

Plate 6458. Radiator Pressure Cap

WARNING

USE EXTREME CARE IN REMOVING THE RADIATOR PRESSURE CAP. IN PRESSURE SYSTEMS, THE SUDDEN RELEASE OF PRESSURE CAN CAUSE A STEAM FLASH AND THE FLASH, OR THE LOOSENED CAP CAN CAUSE SERIOUS PERSONAL INJURY. LOOSEN CAP SLOWLY AND ALLOW STEAM TO ESCAPE.

THIS MACHINE IS EQUIPPED WITH A 7 LB PRESSURE CAP.

COOLING SYSTEM

Check radiator, hoses and water pump for leaks.

Add proper amount of water or anti-freeze solution to cooling system. If anti-freeze is not available and machine is to be at rest for an appreciable length of time, drain system when temperature is likely to be 32° F, or lower. If water is added to radiator containing anti-freeze solution, always test solution in radiator with a hydrometer to determine the degree of protection. For proper amount of anti-freeze solution required to protect the cooling system, refer to instructions on anti-freeze container.

NOTE

COOLING SYSTEM CAPACITY - REFER TO SPECIFICATIONS.

Accumulated foreign material should be blown from radiator fins with compressed air. Direct air stream through radiator fins towards engine to make this process effective.

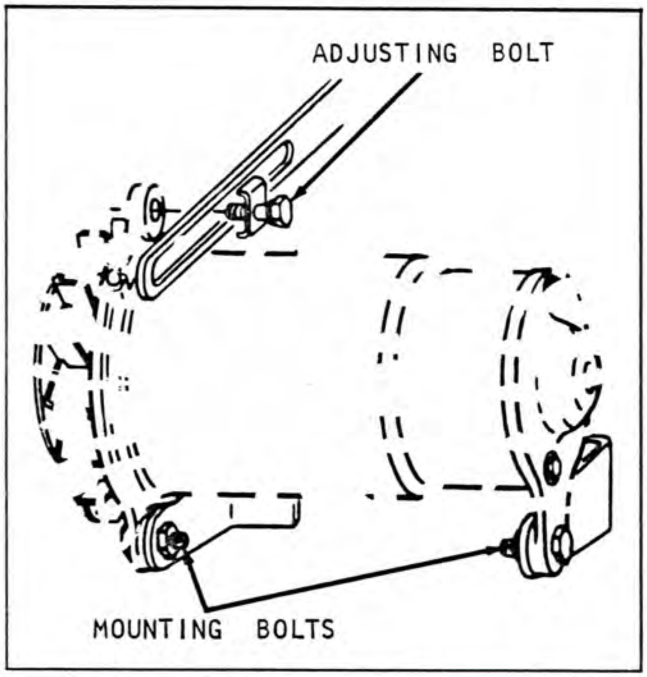


Plate 6631. Generator Drive Belt Adjustment

FAN AND GENERATOR DRIVE BELTS
(Gas Engine Machines)

The drive belts should have finger pressure deflection of 3/4 inch midway on long span. If belts require adjustment, use following procedure.

1. Loosen generator brace adjusting bolt and two lower mounting bolts, see Plate 6631.

2. Move generator toward cylinder block to loosen Generator Drive Belts and away from cylinder block to tighten belts. Tighten bolts when correct finger deflection is obtained.

C A U T I O N

EXERCISE CAUTION WHEN ADJUSTING BELTS. BELTS ADJUSTED TOO TIGHT WILL VERY LIKELY CAUSE BEARING DAMAGE. CONVERSELY, BELTS ADJUSTED TOO LOOSE WILL RESULT IN BELT WEAR AND HIGH ENGINE TEMPERATURE DUE TO BELT SLIPPAGE.

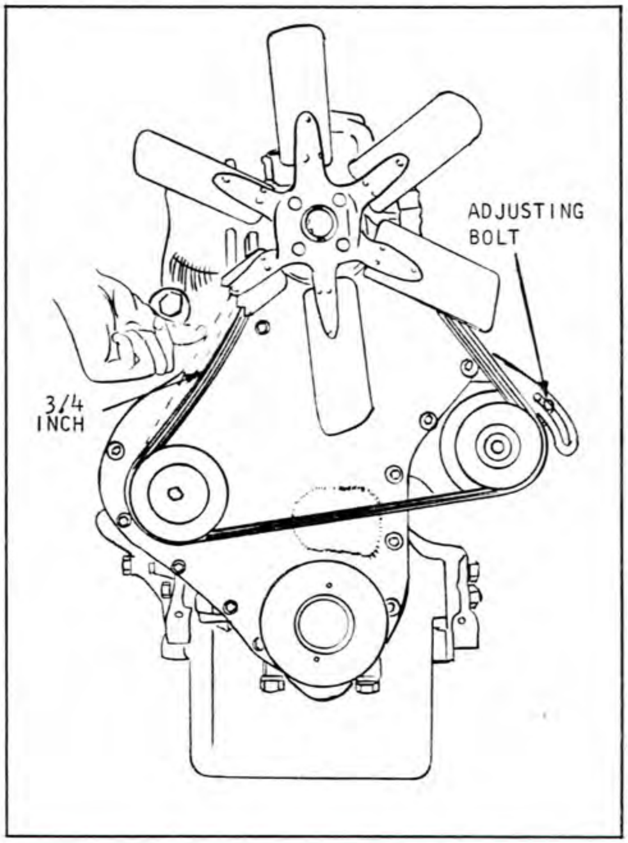


Plate 7652. Belt Deflection Check

GENERATOR BELTS
(Diesel Engine Machines)

The procedure for checking generator belt tension is the same as outlined under (Gas Engine Machines).

FAN BELT
(Diesel Engine Machines)

The fan belt should also have finger pressure deflection of 3/4 inch midway on the span. If adjustment is necessary loosen the fan bracket bolts and move the bracket in the direction necessary to obtain the correct belt deflection. Tighten bolts to retain this adjustment. To install a new set of fan belts it is necessary to remove the flange bolts from the crankshaft pulley, remove the hydraulic pump mounting bolts and move the pump and universal joint assembly forward enough to allow the belts to pass between the pulley and flange.

NOTE

Upon replacement of drive belts, it will be necessary to use a matched set of belts.

BRAKE PEDAL FREE TRAVEL

Pedal stop bolt should be positioned so that pedal arm will not strike the floorplate when in its full up position.

Depress brake pedal by hand as this is a sensitive adjustment. When resistance is noticed as the master cylinder push rod makes contact with the cylinder piston, the distance traveled by the pedal pad should be within the free travel range listed in specifications. See Plate 7964 for diagram on brake pedal free travel. If free travel is incorrect adjust as follows:

1. Loosen locknut, see Plate 6987.

2. Rotate adjuster in the direction necessary to obtain specified free travel.

3. Tighten locknut to secure adjustment.

ACTUATION STROKE

If nearly full pedal travel is necessary to apply the brakes, there is an indication of either lack of fluid in the master cylinder; air in system, leakage at the cylinders, or the brake linings require adjustment or replacement.

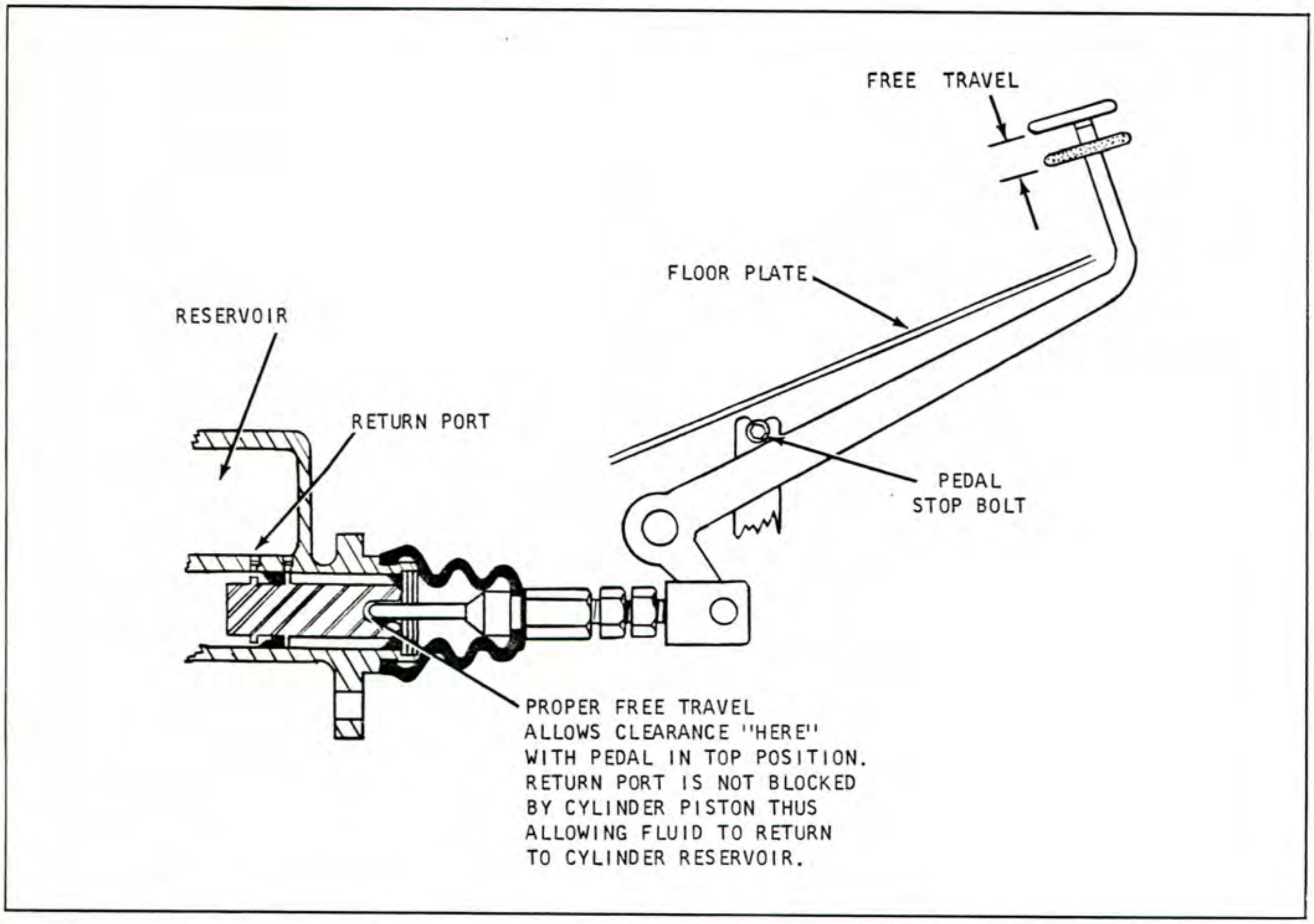


Plate 7964. Typical Brake Pedal Free Travel

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 6987.

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.

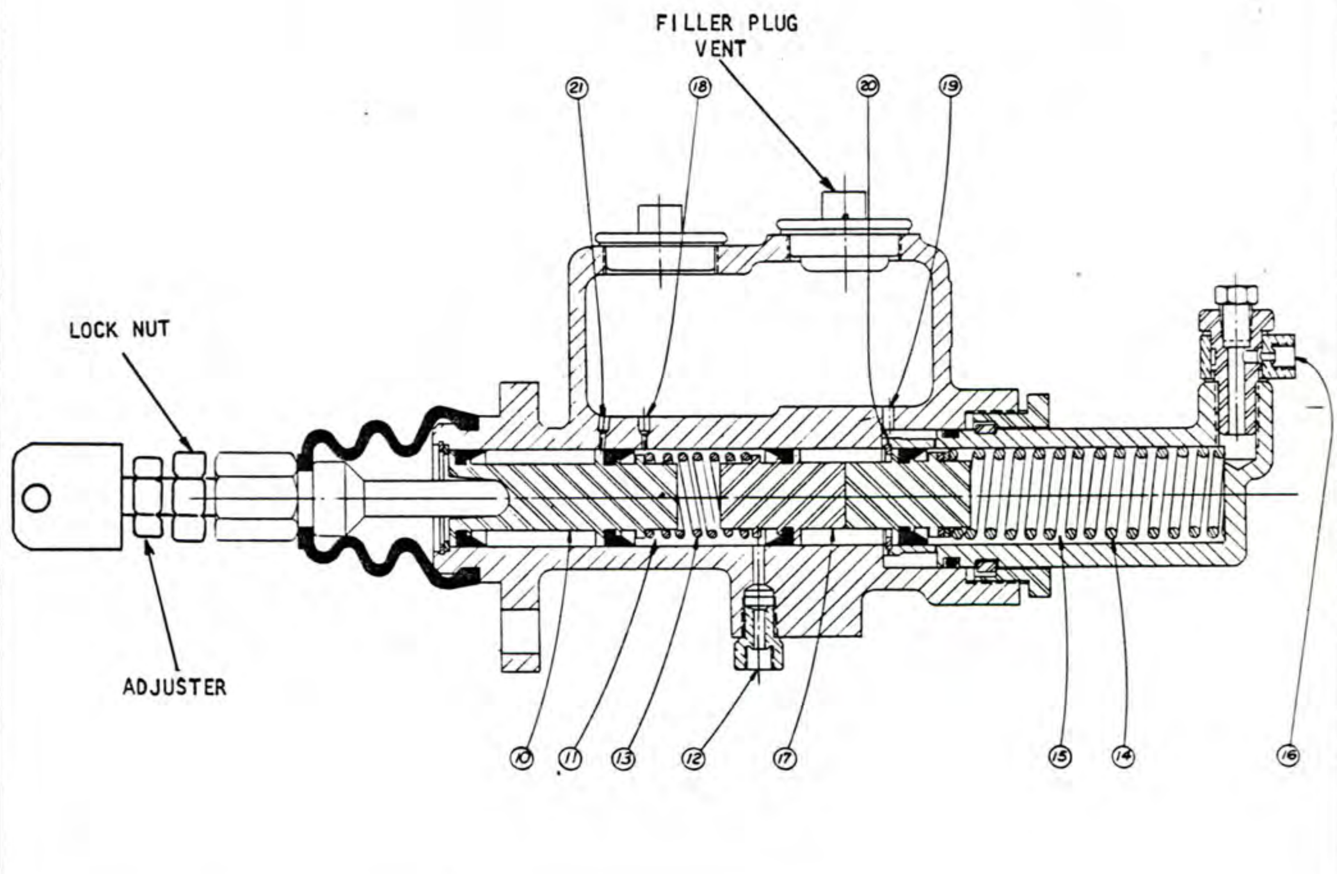


Plate 6987. Brake Pedal Adjustment

BRAKE PEDAL FREE TRAVEL

Pedal stop bolt should be positioned so that pedal arm will not strike the floorplate when in its full up position.

Depress brake pedal by hand as this is a sensitive adjustment. When resistance is noticed as the master cylinder push rod makes contact with the cylinder piston, the distance traveled by the pedal pad should be within the free travel range listed in specifications. See Plate 7964 for diagram on brake pedal free travel. If free travel is incorrect adjust as follows:

1. Loosen locknut, see Plate 6987.

2. Rotate adjuster in the direction necessary to obtain specified free travel.

3. Tighten locknut to secure adjustment.

ACTUATION STROKE

If nearly full pedal travel is necessary to apply the brakes, there is an indication of either lack of fluid in the master cylinder; air in system, leakage at the cylinders, or the brake linings require adjustment or replacement.

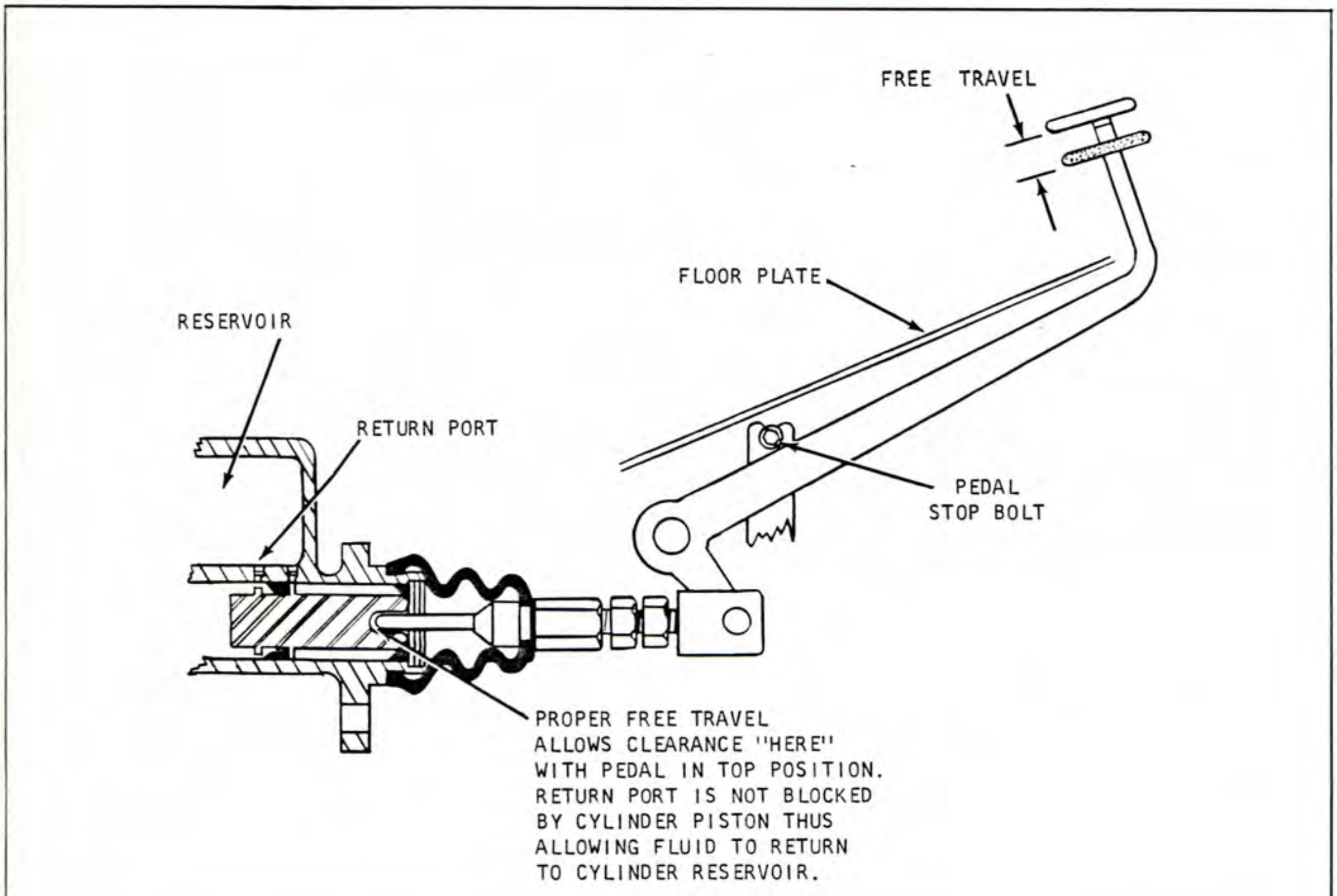


Plate 7964. Typical Brake Pedal Free Travel

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.

W A R N I N G

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

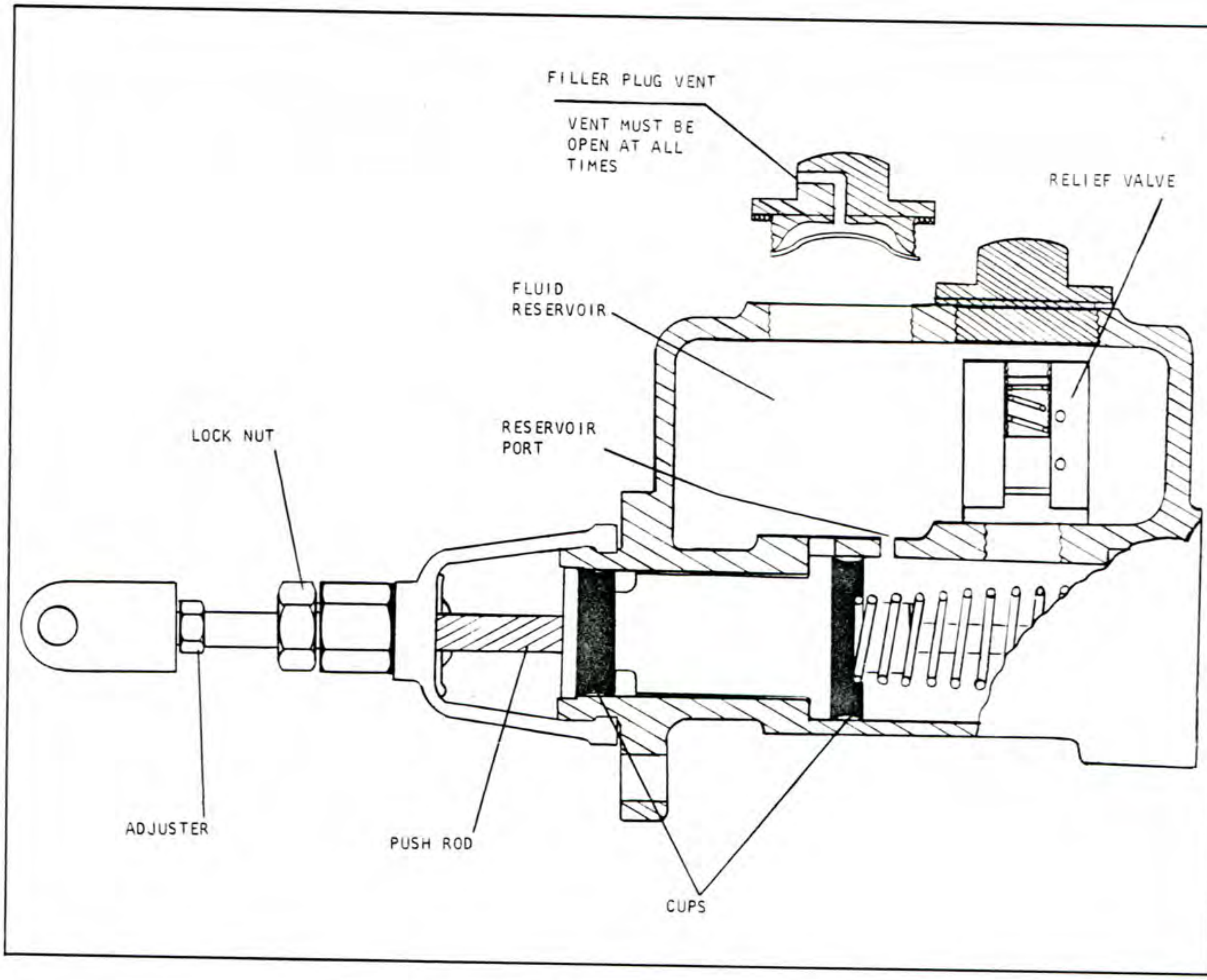


Plate 7339. Brake Pedal Adjustment

TO ELEVATE DRIVE WHEELS

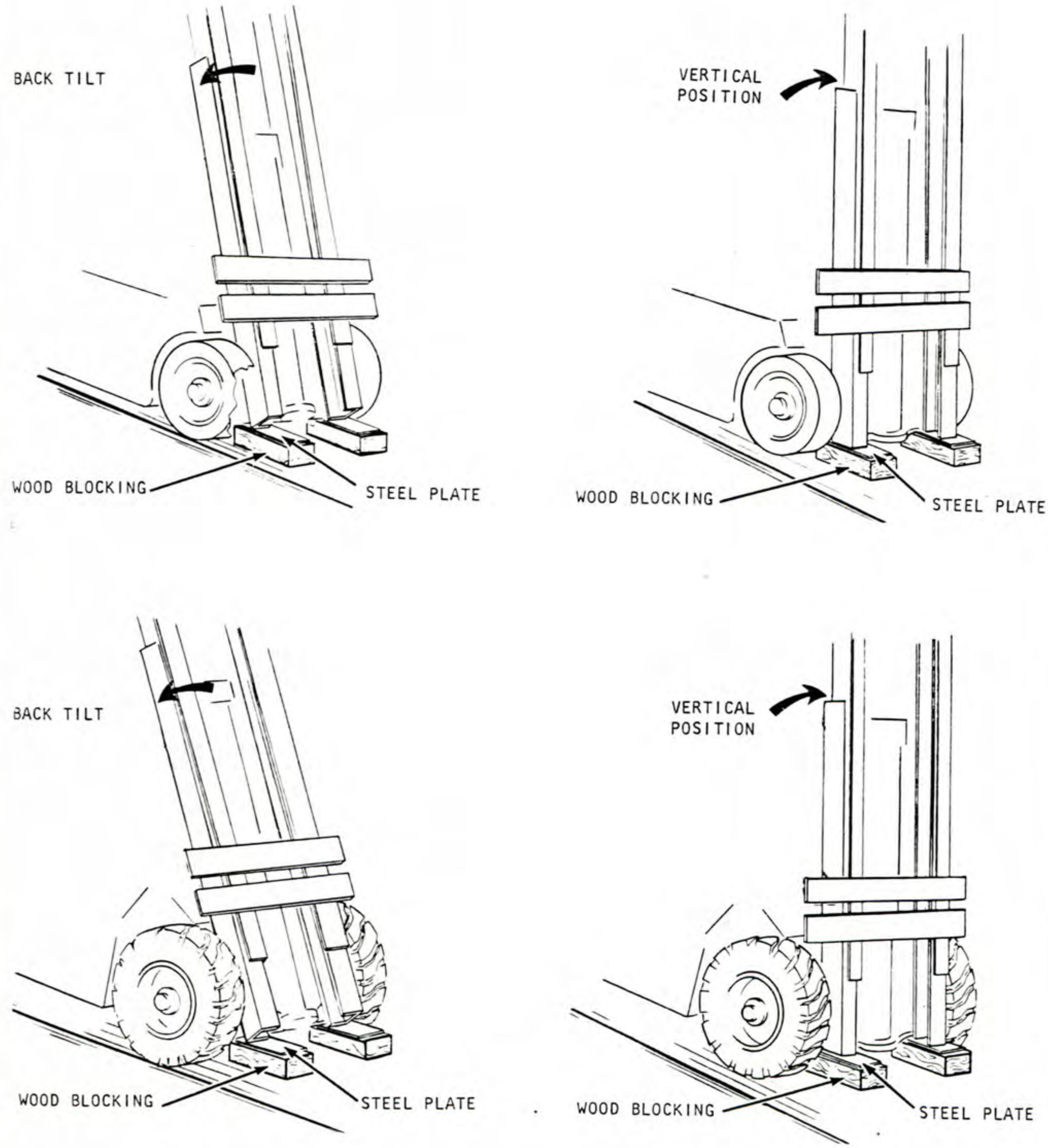


PLATE 10317. TO ELEVATE DRIVE WHEELS,
PLACE UPRIGHT BLOCKING AS SHOWN ABOVE.

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:

```
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
X  KEEP CLEAR OF LOAD AND CARRIAGE WHEN       X
X                                             X
X  MAKING ADJUSTMENTS TO AVOID INJURY IF      X
X                                             X
X  ANY MALFUNCTION SHOULD OCCUR AND CAUSE     X
X                                             X
X  LOAD OR CARRIAGE TO FALL.                  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
```

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 upright is 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 <u>bottom carriage roller</u> stopped, to the bottom edge of the inner slide. Distance must not be less than 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.

HYDRAULIC CONTROL VALVE AND LINES

Inspect for damage, leakage and security of mounting.

LIFT BRACKET

Inspect for damage, bent forks, etc.

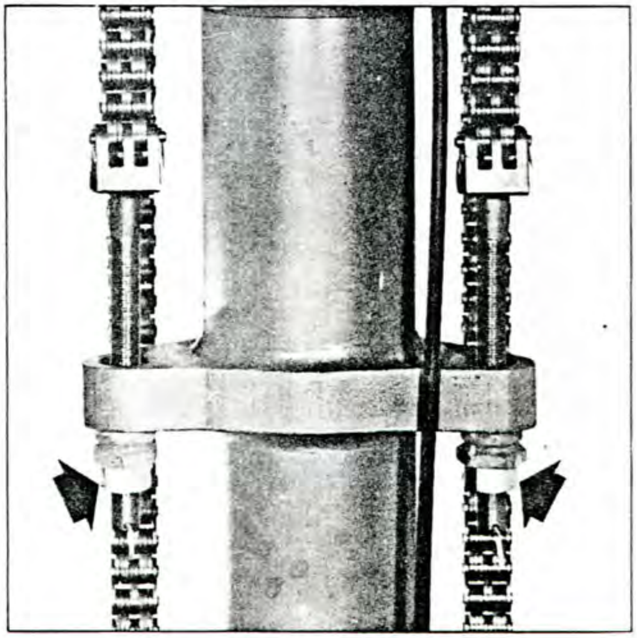


Plate 6634. Lift Chain Adjustment (Chain Anchor Rods)

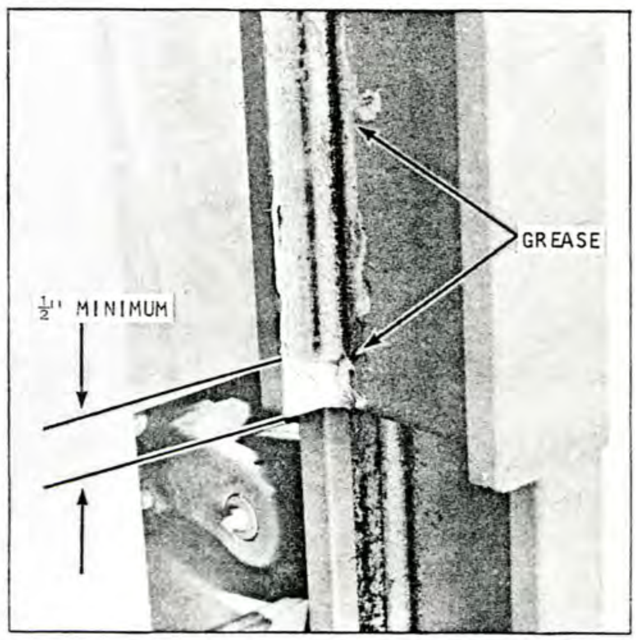


Plate 8622. Lift Chain Adjustment

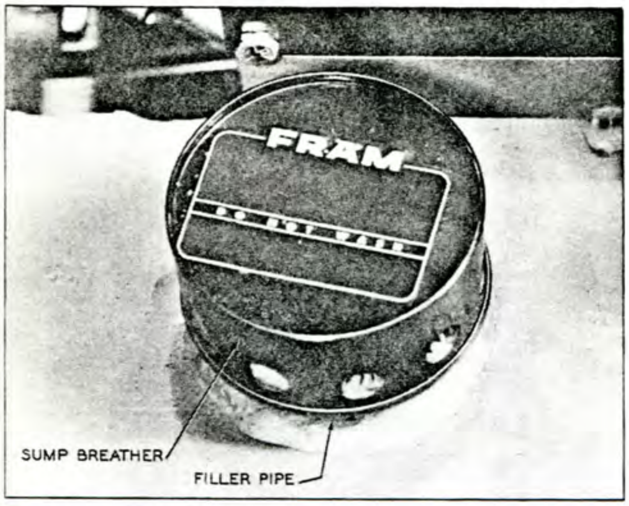


Plate 6626. Hydraulic Sump Tank

HYDRAULIC SUMP TANK BREATHER

Check breather to be sure it not dirty or clogged with foreign matter. Replace breather if dirty.

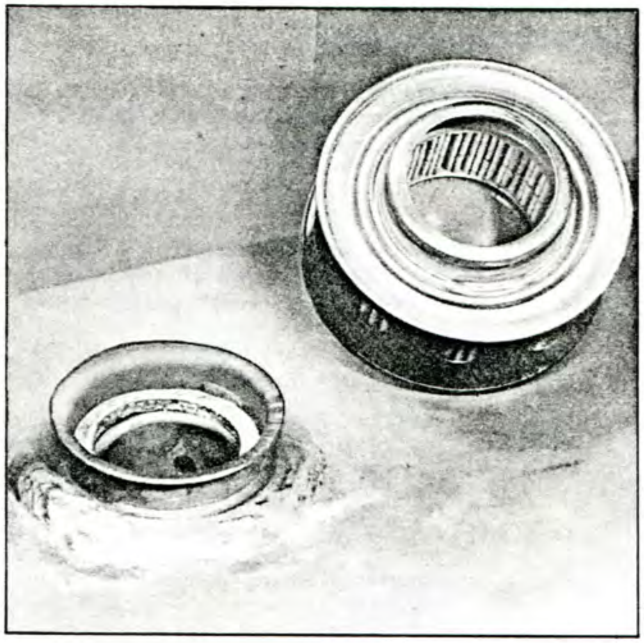


Plate 6682. Hydraulic Sump Tank & Sump Breather

BATTERY INSPECTION

Remove all caps and check fluid level. Keep the fluid in each battery cell above the plates or up to the level ring in the bottom of the filler well. Use only pure distilled water. If the machine is exposed to freezing temperatures, operate the engine for a period of time to make sure the added water mixes thoroughly with the battery electrolyte solution. Otherwise, the water may freeze and damage the battery.

W A R N I N G

NEVER ALLOW FLAME OR SPARKS NEAR THE BATTERY FILLER HOLES BECAUSE EXPLOSIVE HYDROGEN GAS MAY BE PRESENT.

Take hydrometer reading of electrolyte to determine state of charge. Charge battery if reading is below 1.225 at 24 deg. C (75 deg. F), or below 1.265, if machine is exposed to freezing temperatures. If machine is operating in tropical areas in which freezing weather is not encountered, the full charge specific gravity reading may be lowered from 1.375 to 1.225 by diluting the electrolyte with distilled water.

N O T E

Add distilled water before charging. Do not add distilled water immediately after a charge.

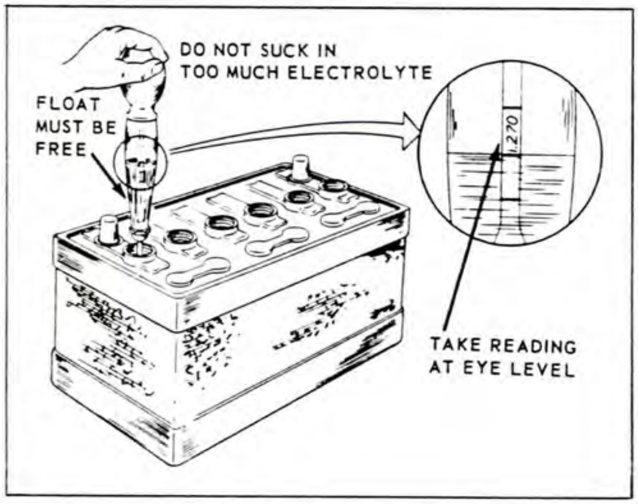


Plate 6271. Checking Specific Gravity of Battery

Make sure that all connections are tight at battery, starter, generator/alternator voltage regulator, distributor and spark plugs. Corrosion can be removed from the battery cables and terminals with a solution of baking soda or ammonia and water. After cleaning, flush the top of the battery with clean water, and coat the parts with grease to retard further corrosion.

BATTERY TEST PROCEDURE

A defective battery or a discharged battery may be found by performing the following "Light Load Test".

1. Place an electrical load on the battery by cranking the engine for three seconds. If it starts, turn the ignition off immediately.

2. Place a 10 ampere load across the battery terminals for one minute. This will condition the battery so an accurate voltage comparison test can be made between cells. (Connecting two headlights turned on low beam will equal the 10 ampere load - this method may be used in place of the load placed across the terminals.)

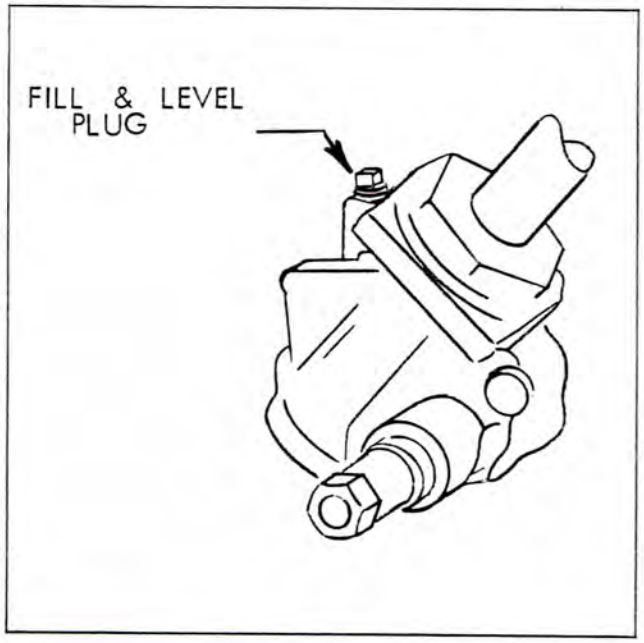


Plate 6429. Typical Steering Gear

STEERING GEAR

The steering gear is prepacked with grease at the factory and should not require lubrication until disassembled for repair. However, it is recommended that periodically the gear be checked for proper lubricant level, and filled if necessary with NLGI #1 (amolith grease EP #1 or its equivalent).

3. After one minute, and with the 10 ampere load still on the battery, check the individual cells with an expanded scale voltmeter.

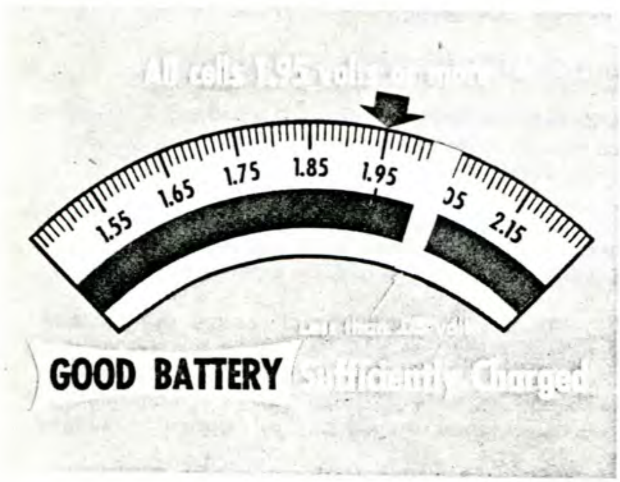


Plate 8306.

4. Place the positive voltmeter prod on the positive side of the cell and the other prod on the negative side. A good battery, sufficiently charged will read 1.95 volts or more on each cell with a difference of less than .05 volt between highest and lowest cell.

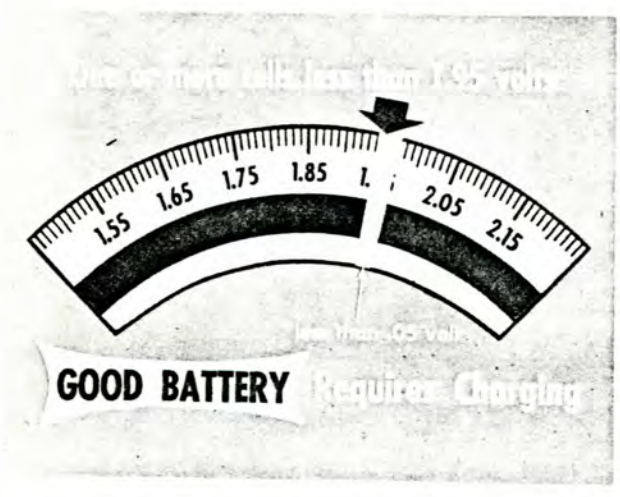


Plate 8307.

5. If cells read both above and below 1.95 volts and the difference between highest and lowest cell is less than .05 volt, battery is good but requires charging.

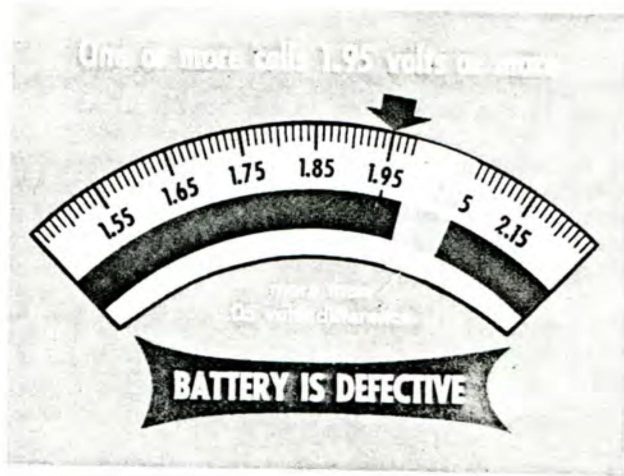


Plate 8308.

6. If any cell reads 1.95 volts or more and there is a difference of .05 volt or more between the highest and lowest cell, the battery is defective.

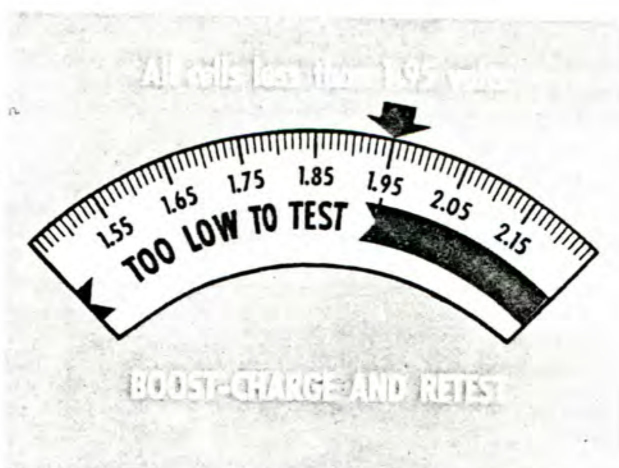


Plate 8309.

7. If all cells read less than 1.95 volts, battery is too low to test accurately. Boost-charge and repeat light load test.

CLUTCH PEDAL ADJUSTMENT

The clutch pedal adjustment is necessary to compensate for clutch facing wear and provide clearance between the release bearing and pressure plate fingers. The adjustment is made beneath the floor plates.

1. Adjust clutch pedal stop bolt to allow clearance of 3/8 inch between floor plate and top of brake lever at the location shown on Plate 7653.

2. The clutch pedal free travel should be 7/8 of an inch. Test the amount of free travel by depressing pedal by hand rather than the foot since this is a sensitive adjustment. The specified clearance is the distance from top pedal position (clutch arm against stop bolt) to a point where resistance is noticed from the release bearing making contact with the pressure plate release fingers. If an adjustment is necessary turn the free play adjuster in the direction required to attain the correct dimension.

3. Adjust the tension of the clutch pedal return spring so that the pedal will return to its fully released position after each actuation of the clutch pedal. Do not overtighten the adjustment so as to make depression of the clutch pedal difficult.

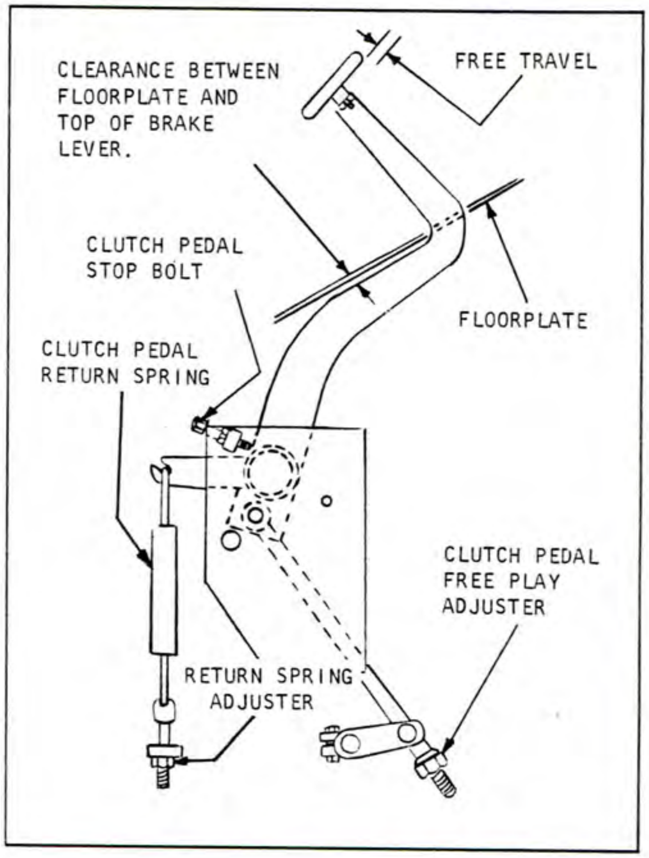


Plate 7653. Clutch Pedal Adjustments

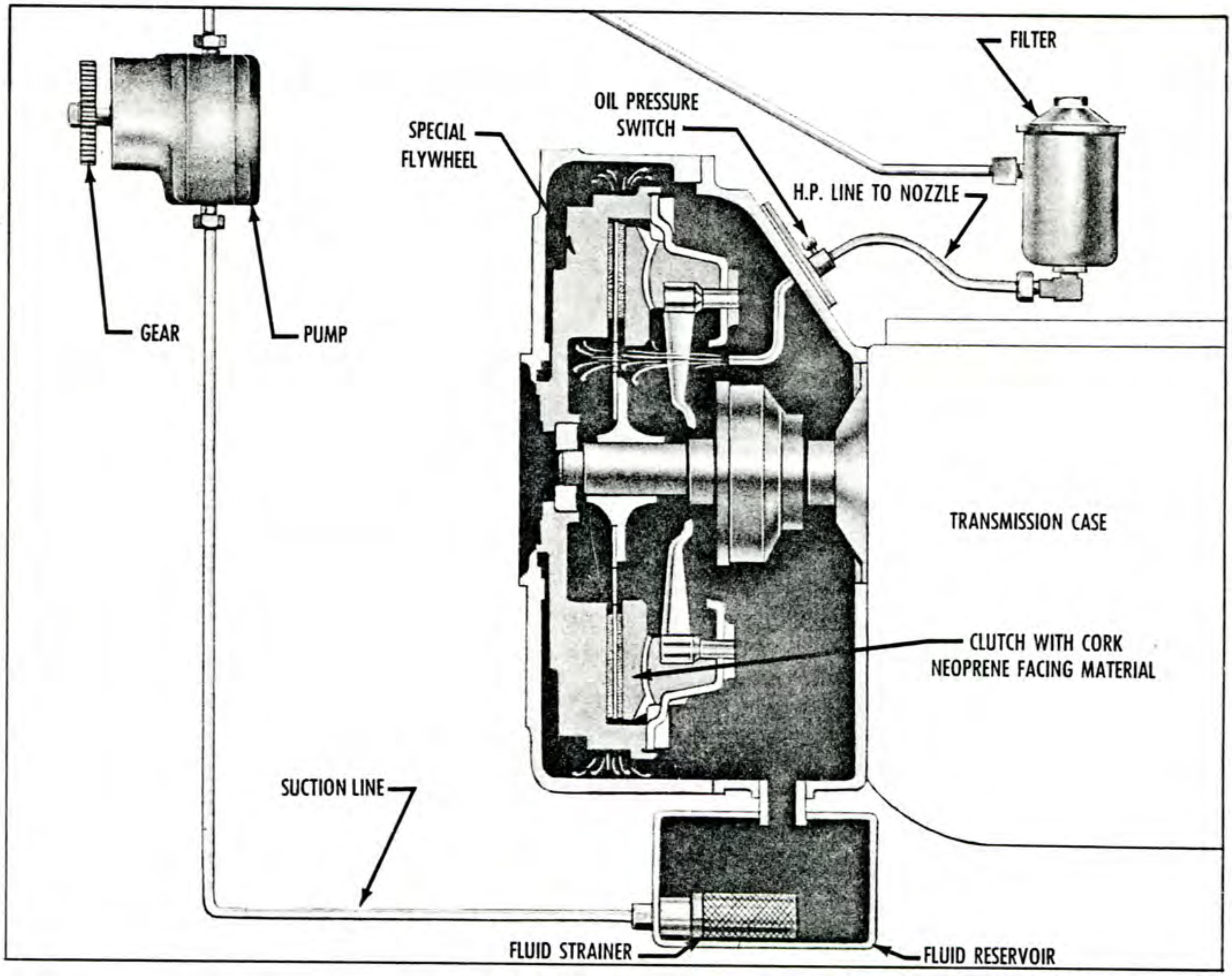


Plate 7182. Hydracool Clutch

HYDRACOOL CLUTCH

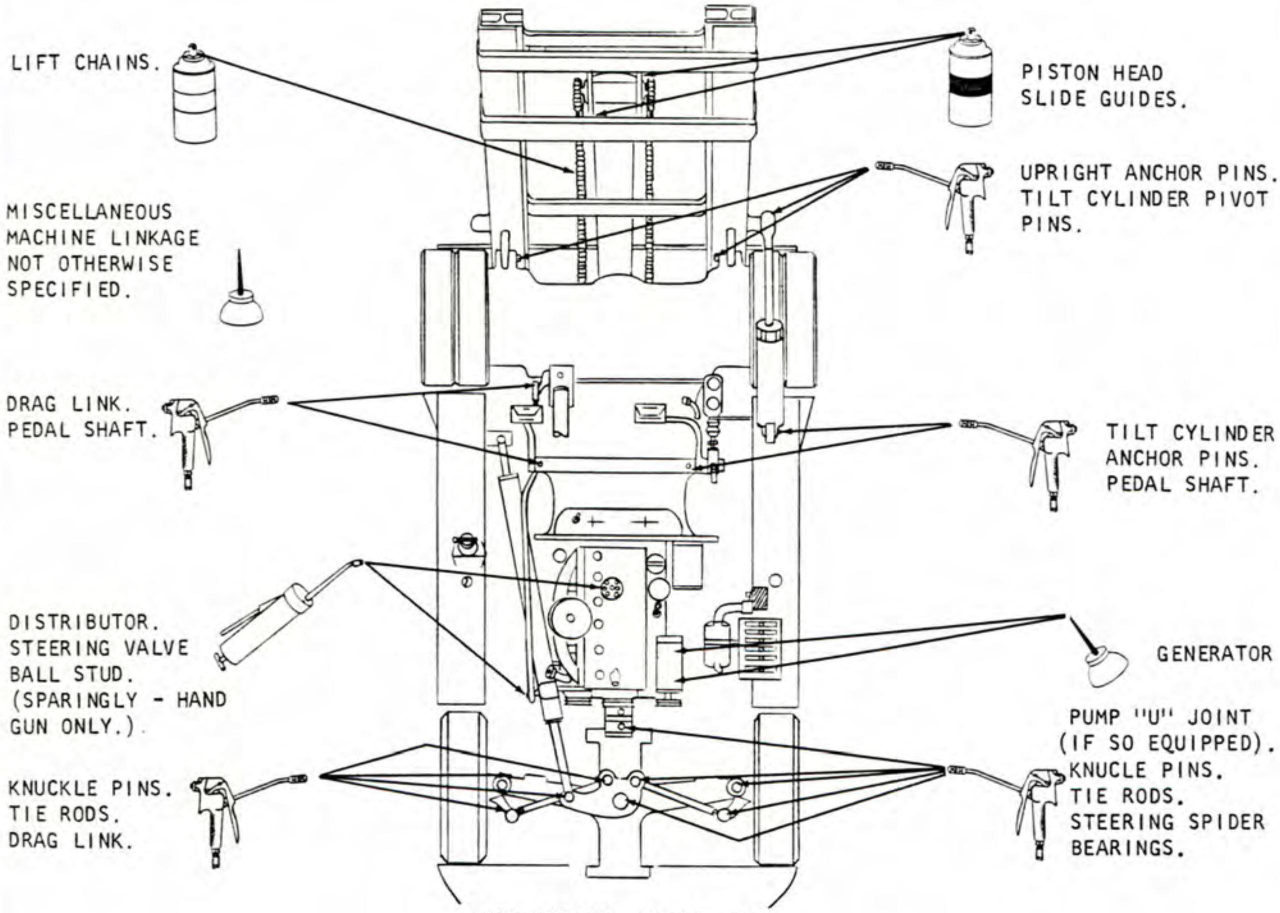
Remove the floorplate and check fluid level. Fill, if necessary, with automatic transmission fluid type "A", suffix "A" - Clark part number 879803. Fluid containers must display a qualification number prefixed by AQ-ATF.

NOTE

AFTER THE FIRST 100 OPERATING HOURS REMOVE AND CLEAN THE SUMP SCREEN. CHECK THE OIL FILTER AND CHANGE ELEMENT IF NECESSARY. THE FILTER ELEMENT AND SUMP SCREEN WILL NEED TO BE SERVICED EVERY 1000 OPERATING HOURS THEREAFTER.

NOTES

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



LUBRICATION CHART KEY

CHASSIS GREASE

CHASSIS GREASE

REFER TO PAGE 1000H 1815 FOR LUBRICATION PROCEDURE

ENGINE OIL: S.A.E. 20

ENGINE OIL FOR SERVICE "MS"	SAE	10W 0^{o} - 32^{o} F.
	SAE	20W 32^{o} - 75^{o} F.
	SAE	30 above 75^{o} F.
or use	SAE	10W - 30

AUTOMATIC TRANSMISSION FLUID TYPE "A", SUFFIX "A". CLARK PART NUMBER 879803.

OIL FILTER CARTRIDGE KIT

GRAPHITE GREASE

1800200 HYDRAULIC BRAKE FLUID HEAVY DUTY S.A.E 70 R3

886399 CHAIN LUBE

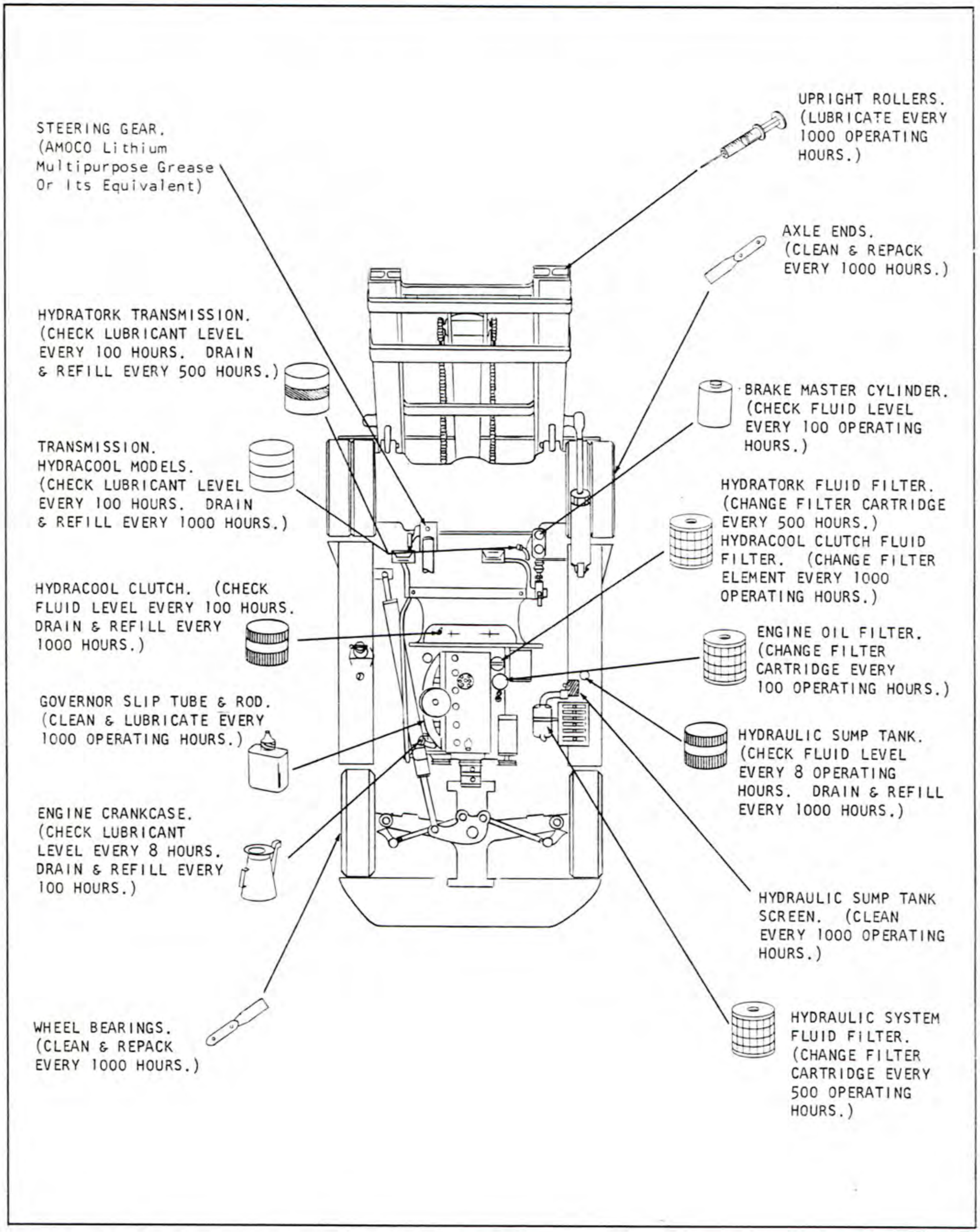
STEER WHEEL BEARINGS - USE MS-9C WHEEL BEARING GREASE AXLE ENDS - USE NO. 1 E.P. LITHIUM SOAP GREASE

GEAR LUBE. S.A.E. 90

HYDRAULIC OIL CLARK SPEC. MS 68 885385

SLIDING TANDEM LUBE CLARK NUMBER 886396.

LUBRICATION AND PREVENTIVE MAINTENANCE



GENERAL:

Proper lubrication techniques, combined with a waterproof type grease, prevents corrosion of the sleeve and housing on steering boosters.

The proper lubrication techniques are explained in the following paragraphs.

LUBRICATION TECHNIQUES:

Recommended lubrication (greasing) techniques is to apply grease with ball stud in a vertical position.

This will place the grease nipple exactly 180 deg. opposite the ball stud. The lubrication access hole at the bottom of the sleeve will also be lined up with the grease nipple.

This will allow the grease to penetrate into the ball stud and ball seat area (primary lubrication area).

Grease should then be applied while moving the ball stud from side to side to lubricate between the sleeve and the housing (secondary lubrication area).

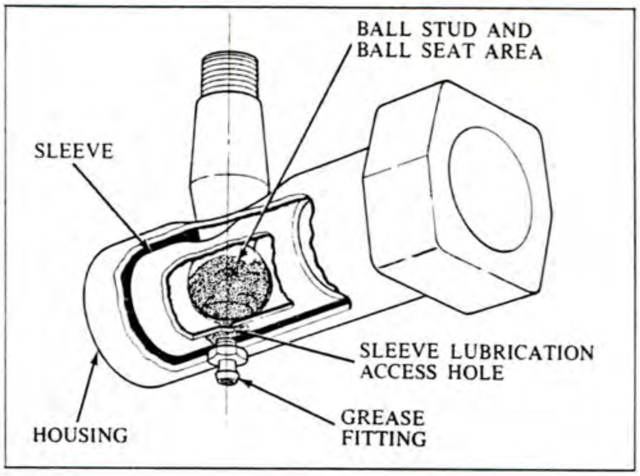
The following series of illustrations show how the grease should be properly dispersed in the ball joint area.

1. #11477 shows the ball stud in a vertical position which aligns the sleeve lubrication access hole directly opposite the grease nipple. This allows the grease to be adequately dispersed into the ball seat area (primary lubrication area) of the sleeve. Note that very little grease is dispersed between the sleeve and housing.

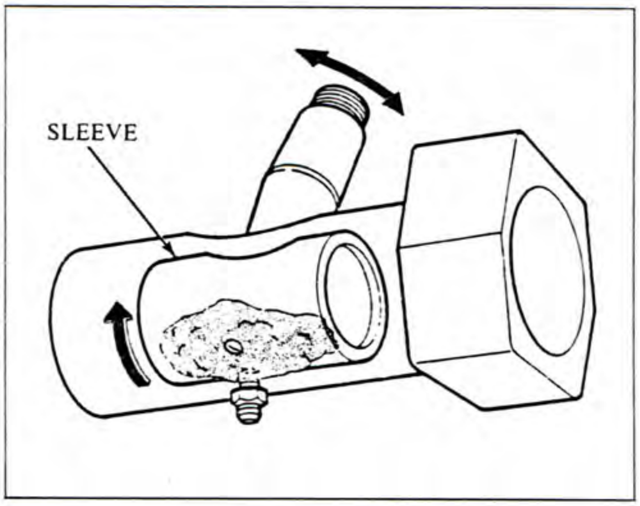
2. #11478 shows the grease properly dispersed around the O.D. of the sleeve. Apply grease when the sleeve is rotated and the grease fitting is not in line with the hole in the sleeve.

NOTE

> Grease the control ball stud housing sparingly under low pressure through the grease fitting. Use a hand grease gun rather than a high pressure gun to avoid packing of grease which would hamper control valve movement. Housing must be at least 50% filled and all internal parts thoroughly coated.



#11477



#11478

INDUSTRIAL TRUCK DIVISION

LUBRICATION SPECIFICATIONS

LUBRICATION CHART KEY

(A) ENGINE CRANKCASE OIL

FOR ... GASOLINE, L.P. GAS ENGINES AND NATURALLY ASPIRATED DIESEL ENGINES.

SPECIFICATION TO MEET API Service Classification "CC" and "SC" per SAE Report J183 and/or MIL-L-2104B* Sulfated ash content 1.00% weight maximum. Zinc content 0.06 to 0.10% weight maximum.

This specification includes oils meeting Specification MIL-L-46152 when applicable. Also, API Service "SC"/"SD" (Formerly "MS") oils may be preferred under stop-and-go or light service conditions.

*Although Specification MIL-L-2104B has recently been superceded, oils of this quality will continue to be available.

TYPICAL PRODUCT RECOMMENDED BY MAJOR BRAND OIL SUPPLIERS

Chevron RPM DELO Multi-Service Oil
Shell X-100 or Rotella, Rotella T
Sunfleet H.P. Motor Oil
ARCO Fleet X.H.D. Motor Oil
  or ARCO Fleet H.D.
Gulflube Motor Oil X.H.D.
Citgo C300 Motor Oil
AMOCO 200 Motor Oil
Texaco Havoline
  or URSA Extra Duty Motor Oil
Mobil Delvac 1100B
  or 1200 Series Motor Oil
...or the equivalent to the above.

OILS FORMULATED FOR L.P.G. ENGINES

Cito L.P. Gas Engine Oil
Chevron Gas Engine Oil HDAX

(B) ENGINE CRANKCASE OIL (cont.)

FOR ... TURBOCHARGED DIESEL ENGINES or DIESEL ENGINES USING HIGH SULFUR CONTENT FUEL (OVER 0.5% SULFUR).

SPECIFICATION TO MEET API Service Classification "CD" per SAE Report J183 and equivalent Series 3 and/or MIL-L-45199B specifications. Also MIL-L-2104C when applicable. Sulfated ash content 1.65% maximum.

Chevron DELO Super 3 Oil
Shell Rimula Motor Oil
Sunfleet S-3 Motor Oil
ARCO Fleet MS-3 Motor Oil
Gulf Super Duty Motor Oil
AMOCO 300 Motor Oil
Citgo C-500 Motor Oil
Texaco URSA LA-3 Motor Oil
Mobil Delvac 1300 Series Motor Oil
...or the equivalent to the above.

FOR ALL OPERATIONS WITHIN NOMINAL TEMPERATURE RANGES, THE USE OF SINGLE-GRADED OILS IS RECOMMENDED...AS LISTED BELOW.

SAE 10W	...	0 deg -to- 32 deg F.
SAE 20/20W	...	33 deg -to- 75 deg F.
SAE 30	...	above 75 deg F.

SAE #30 OIL OF MIL-L-2104B PERFORMANCE LEVEL IS RECOMMENDED FOR YEAR AROUND USE IN DETROIT DIESEL ENGINES...(Limitations - Zinc. 0.10% maximum, sulfated ash 1.0% maximum.). The use of Multi-grade oils in Detroit Diesel engines is not recommended.

Oil Change Intervals ... a helpful guide in determing the intervals is an engine oil analysis made several different times. Local oil distributors offer this service. And by using it you can set P.M. intervals with greater certainty.

INDUSTRIAL TRUCK DIVISION

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

L U B R I C A T I O N   C H A R T   K E Y

(A/B) ENGINE CRANKCASE OIL

FOR ... MISCELLANEOUS LINKAGE

TYPICAL PRODUCT RECOMMENDED BY MAJOR BRAND OIL SUPPLIERS

(C) TRANSMISSION LUBRICANT

FOR ... STANDARD MANUAL SHIFT (SYNCHROMESH) TRANSMISSIONS AND GEAR BOXES.

SPECIFICATION Regular type gear lubricant of straight mineral gear oil for API GL-1 Service per SAE Report J308a. ("EP" lubricants are not approved.)

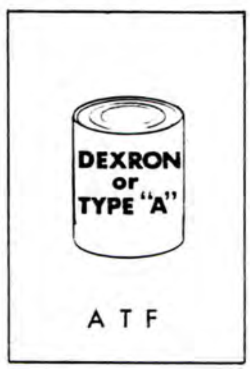
ABOVE 0 deg F. - SAE #90
BELOW 0 deg F. - SAE #80

Chevron RPM Gear Oil
Shell Dentax 90 Gear Oil
Sunoco Gear Oil
ARCO Mineral Gear Oil
Gulf Transmission Oil
AMOCO Gear Lubricant
Citgo Regular Gear Oil
Texaco Thuban 90
Mobilube C Gear Oil
Molub-Alloy Trans., Gear Lube
...or the equivalent to the above.

(D) TRANSMISSION FLUID

FOR ...
...POWRSHIFT FORWARD & REVERSE UNIT
...POWRWORKER HYDRAULIC SYSTEMS
...POWER STEERING RESERVOIRS
...POWRSHIFT TRANSMISSIONS
...HYDRACOOL (WET) CLUTCH TRANS.
...HYDRATORK TRANSMISSION
...AUTOMATIC TRANSMISSION
...FLUID COUPLING DRIVES
...TORQUE CONVERTERS
...ELECTRIC TRUCK DRIVE UNITS*
...(WHEN SPECIFIED ON LUBE CHARTS*)
...NARROW AISLE TRUCK HYDRAULIC SYS.

SPECIFICATION USE DEXRON AUTOMATIC TRANSMISSION FLUID or Type "A", Suffix "A" ATF (AQA-Armour Qualified) as available.



Shell Auto. Trans. Fluid Donax T-6, Dexron.
Sunoco Auto. Trans. Fluid, Dexron.
ARCO Auto. Trans. Fluid, Dexron.
Gulf Auto. Trans. Fluid, Dexron.
Mobil Auto. Trans. Fluid 220 Dexron.
Texaco 1859 Texamatic Fluid, Dexron.
Citgo Auto. Trans. Fluid, Dexron.
AMOCO Auto. Trans. Fluid, Dexron.
...or the equivalent to the above.

- continued -

L U B R I C A T I O N   C H A R T   K E Y

(D) TRANS. FLUID - continued - DRIVE UNIT FLUID

FOR ... -COLD STORAGE OPERATION-

FOR ... DRIVE UNIT(S)
NARROW AISLE TRUCKS
POWRWORKERS
ELECTRIC RIDER TRUCKS

SPECIFICATIONS Refer to Specifications listed under Item "D" on the previous page.

COLD STORAGE

A T F

TYPICAL PRODUCT RECOMMENDED BY MAJOR BRAND OIL SUPPLIERS

Refer to the previous page under Item "D".

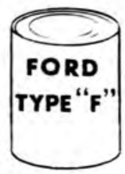
(E) TRANSMISSION FLUID - FORD

FOR ... ALL FORD AUTOMATIC TRANSMISSIONS AND CONVERTERS.

SPECIFICATIONS Automatic Trans., Fluid, Type "F", which meets FORD MOTOR COMPANY Specification:

M2C33E (UNDYED) -or-
M2C33F (RED DYED)

CAUTION



A T F

Shell Auto. Trans. Fluid Donax T-7, Type "F".
Sunoco Auto. Trans. Fluid, Type "F".
ARCO Auto. Trans. Fluid, Type "F".
Gulf Auto. Trans. Fluid, Type "F".
Citgo Auto. Trans. Fluid, Type "F".
Texaco 1876 Texamatic Fluid, Type "F".
Mobil Auto. Trans. Fluid 210, Type "F".
...or the equivalent to the above.

C A U T I O N

DEXRON AND TYPE "A" FLUIDS ARE NOT COMPATIBLE WITH TYPE "F" FLUIDS AND SHOULD NOT BE MIXED. DEXRON FLUID OR TYPE "A" FLUID SHOULD NOT BE USED IN THESE TRANSMISSIONS AND CONVERTERS ... (CTA "E" MODELS) ... TO DO SO WILL RUIN CLUTCH DISC FACINGS.

(F) HYDRAULIC BRAKE FLUID

FOR ... HYDRAULIC BRAKE SYSTEMS EXCEPT WHEN SPECIFIED DIFFERENTLY ON THE LUBRICATION CHART(S) AND NOT USED FOR COLD STORAGE.

SPECIFICATION Use only heavy-duty Hydraulic Brake Fluid which meets the requirements of SAE J1703b.

H B F

Shell Super Safety or Donax "B" Brake Fluid.
Gulf Super Heavy Duty Hydraulic Brake Fluid.
Atlas Heavy Duty Hydraulic Brake Fluid.
Texaco Super Heavy Duty Hydraulic Brake Fluid.
Mobil Hydraulic Brake Fluid.
ARCO Heavy Duty Brake Fluid.
Wagner 21B Hydraulic Brake Fluid.
Hollingshead 2665 Heavy Duty Brake Fluid.
...or the equivalent to the above.

LUBRICATION CHART KEY

(F) HYDRAULIC BRAKE FLUID

FOR ... -COLD STORAGE OPERATION-

FOR ... ALL HYDRAULIC BRAKE SYSTEMS EXCEPT WHEN SPECIFIED DIFFERENTLY ON LUBRICATION CHART(S).

SPECIFICATION Use Fluid per CLARK Specification MS-92:

Recommended fluid: 85% by volume,
Isopropyl Alcohol: 15% by volume.

TYPICAL PRODUCT RECOMMENDED BY MAJOR BRAND OIL SUPPLIERS

Extreme Low Temperature Hydraulic Brake Fluid:

Dow Chemical Company
(Pre-Blended
Clark Fluid Number 300)

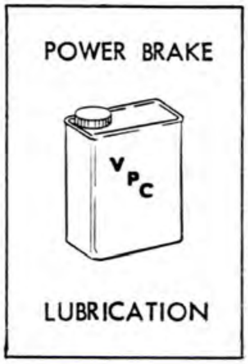
... Dow Chemical Fluid HD35-4
... Hollingshead Formula 2665

(G) POWER BRAKE VACUUM CYLINDER LUBRICANT

FOR ... BENDIX HYDROVAC UNIT

SPECIFICATION Bendix Vacuum Power Cylinder Oil or approved equivalent.

Apply after installation and periodic maintenance per instruction.

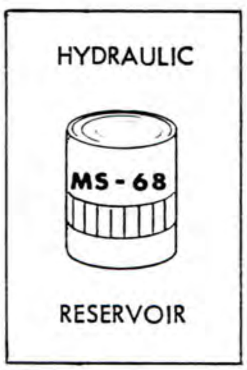


Bendix Vacuum Power Cyl Lubricant
Part No 377299 (2 oz Tube)
Part No 377300 (Quart Can)
Texaco Rabtex
AeroShell Fluid 4
...or the equivalent to the above.

(H) HYDRAULIC FLUID

FOR ... MAIN HYDRAULIC SYSTEMS EXCEPT WHEN SPECIFIED DIFFERENTLY ON THE LUBRICATION CHART(S).

SPECIFICATIONS Use only high quality hydraulic fluid with Zinc Anti-Wear Additive which meets Clark Specification MS-68.



Shell LO Hydrax 127
Sunvis Industrial Oil #816 WRP
Gulf Harmony 43 AW
AMOCO Industrial Oil RL #14A
Citgo Pacemaker XD-15 MS-68
Hydraulic Fluid.
Texaco 729 Rando Oil HD-A
ARCO Duro AW-16 or Duro AWS-150
Chevron EP Hydraulic Oil 9
Molub-Alloy Industrial Hydraulic
Oil #601.
...or the equivalent to the above.

- continued -

(H) -continued-

TYPICAL PRODUCT RECOMMENDED BY MAJOR BRAND OIL SUPPLIERS

HYDRAULIC FLUID

FOR ... -COLD STORAGE OPERATION-

FOR ... MAIN HYDRAULIC SYSTEMS EXCEPT WHEN SPECIFIED DIFFERENTLY ON THE LUBRICATION CHART(S).

SPECIFICATIONS Use Hydraulic Fluid which meets MIL-H-5606A per CLARK Specification MS-226.

A petroleum base hydraulic fluid with additives to improve viscosity index, oxidation resistance, and anti-wear characteristics blended to form a stable product under storage and operational conditions between -65 and +160 deg. F. meeting MIL-H-5606A* per CLARK Specifications MS-226.

*The restrictive cleanliness specifications of later revisions is not required.

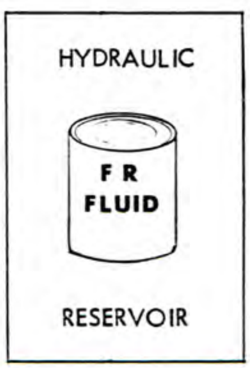
Shell Product #60421
AeroShell Hydraulic Fluid 4
...or the equivalent to the above.

HYDRAULIC FIRE RESISTANT FLUID

FOR ... SPECIAL APPLICATIONS

FOR ... MAIN HYDRAULIC SYSTEMS EXCEPT WHEN SPECIFIED DIFFERENTLY ON THE LUBRICATION CHART(S).

SPECIFICATIONS High quality Water-Glycol Fire Resistant Hydraulic Fluid composed of approximately 42% water and 58% glycol with a nominal viscosity of 200 SUS at 100F. Pour point -60 deg. F min. To contain proper additive balance to impart optimum stability, lubricity, wear and corrosion protection. Approved by Factory Mutual Insurance Underwriters.



Citgo Pacemaker Glycol - FR Fluid, Grade 20.
Houghto-Safe 620
Texaco Hydraulic Safety Fluid 200
...or the equivalent to the above.

N O T E

For data pertaining to the "testing" of Water-Glycol ... refer to the last page of this KEY.

INDUSTRIAL TRUCK DIVISION

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

L U B R I C A T I O N   C H A R T   K E Y

(J) DRIVE AXLE GEAR LUBRICANT:

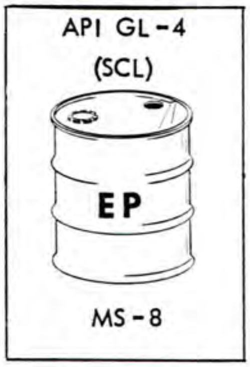
FOR: ... DRIVE AXLES,
HEAVY DUTY DIFFERENTIALS,
PLANETARY WHEEL ENDS.

SPECIFICATIONS: Extreme pressure type gear lubricant with sulfur-chlorine-lead (SCL) 'EP' additive for API GL-4 Service per SAE Report J308a. To meet CLARK Specification MS-8.

Below 0 to -10 de F	-- SAE 80
Normal Temperature	-- SAE 90
100 deg F and above	-- SAE 140

NOTE

SAE 80 and SAE 140 viscosities, when used, should contain like additives as specified by MS-8 (SAE 90). DO NOT ADD (MIX) DIFFERENT TYPES OF LUBRICANT.



TYPICAL PRODUCT RECOMMENDED BY MAJOR BRAND OIL SUPPLIERS

Shell HDR Gear Oil 90 EP
Shell HDR Gear Oil 140 EP
Chevron RPM Special Gear Lube SCL
Sunoco XD Gear Lubricant
Gulf Hypoid Gear Lubricant A.P.T.
AMOCO Superla Gear Lubricant
Citgo Gear Oil Lead Base
Texaco Gear Lube HD 90
Molub-Alloy Drive Axle Lube #518
Mobilube 46
ELCO Gear Safety 28
...or the equivalent to the above.

(K) GENERAL PURPOSE GREASE:

FOR: ... CLARK AXLE ENDS
WHEEL BEARINGS
STEERING GEARS
JOINTS, LEVERS & BUSHINGS
POWRWORKER and NARROW AISLE TRUCKS - ALL POINTS

SPECIFICATIONS: NLGI #1 per MS-107B

MS-107B

Shell Alvania EP Grease #1 or #2
Sun Prestige 741 EP #1 or #2
Gulfcrown Grease EP #1 or #2
AMOLITH GREASE EP #1 or #2
Citgo HEP Grease #1 or #2 or Citgo AP Grease.
Texaco Multifak EP #1 or Marfak ALL Purpose #2.
Molub-Alloy General Purpose Grease #1 or #2.
ARCO Litholine Ind. Grease #2 EP or Litholine EP #2 Grease.
Mobilgrease 76 or 77
...or the equivalent to the above.

GENERAL PURPOSE GREASE:

FOR: ... STEER AXLE TRUNNION BRGS.
UPRIGHT MAST ROLLERS & SLIDES.
UNIVERSAL JOINTS.
WATER PUMP BEARINGS.
GENERAL CHASSIS LUBRICATION.

SPECIFICATIONS: NLGI #2 per MS-107C

A multi-purpose grease of refined mineral oil blended with a lithium soap thickener or equal containing anti-wear, anti-rust and anti-oxidants with EP additives.

Clark Specification:
MS-107B - Grade No. 1
MS-107C - Grade No. 2

MS-107C

REFER TO THE ABOVE FOR RECOMMENDED SUPPLIERS.

ADDITIONAL RECOMMENDATIONS

*Chevron BRB-2
*Shell AeroShell Grease 5

*Recommended for Water Pumps and Universal Joints.

- continued -

INDUSTRIAL TRUCK DIVISION

LUBRICATION SPECIFICATIONS

LUBRICATION CHART KEY

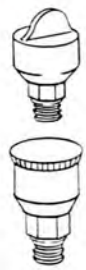
(L) HIGH TEMPERATURE GREASE

FOR ... CLUTCH THROWOUT BEARINGS
CLUTCH PILOT BEARINGS
DYNATORK PILOT BEARINGS

SPECIFICATIONS A high temperature grease of refined mineral oil base with a lithium soap thickener or equal compounded with additives to give high load-carrying ability and resistance to water and high temperature. To withstand temperatures of -20 deg F (to) +300 deg F. NLGI Grade No. 2.

Reference Specification:
(For typical product.)
MIL-G-3545C

HIGH TEMP



NLGI #2

TYPICAL PRODUCT RECOMMENDED BY MAJOR BRAND OIL SUPPLIERS

Shell AeroShell Grease #5
Gulfcrown Grease EP #2
AMOLITH Grease EP #2
Citgo HEP Grease #2 or
Citgo AP Grease.
Texaco High Temperature Grease
1999 #2.
Mobilgrease 28
...or the equivalent to the above.

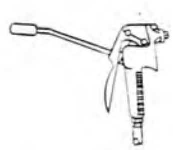
(M) LOW TEMPERATURE GREASE

FOR ... -COLD STORAGE OPERATION-

FOR ... GENERAL CHASSIS GREASE
UPRIGHT MOUNTING
UPRIGHT LIFT CHAINS
ALL MOVABLE PARTS EQUIPPED WITH GREASE FITTINGS.
BRAKE (AND CLUTCH) PEDAL LINKAGE.
(Narrow Aisle Trucks and Powrworkers)
DRIVE UNIT FITTINGS
PANTOGRAPH
CASTER WHEELS
STEER CHAIN
LOAD WHEELS WITH FITTINGS

SPECIFICATION An extreme low temperature aircraft quality grease meeting Specification MIL-G-23827A, or equivalent product. Temperature range -100 to +250 deg F.

LOW TEMP



MIL-G-23827A

Texaco #2346 Low Temperature
Grease "EP".
American Oil SUPERMIL
Grease A-72832.
...or the equivalent to the above.

(N) SPECIAL GREASE

FOR ... STRADDLE CARRIERS
EQUALIZING LINKAGE
HOOK & HANGER BUSHINGS
HOIST MECHANISM

SPECIFICATIONS A smooth high quality grease of refined mineral oil base with a lithium soap thickener or equal compounded with corrosion and oxidation inhibitors and containing 1 to 3% moly (molybdenum disulfide).
NLGI #2

MOLY GREASE

American Molylith Grease #92006
Molub-Alloy General Purpose
Grease #2.
Molytex #2
...or the equivalent to the above.

- continued -

LUBRICATION CHART KEY

TYPICAL PRODUCT RECOMMENDED BY MAJOR BRAND OIL SUPPLIERS

(N) SPECIAL GREASE - continued -

FOR: ... DISTRIBUTOR CAMS

SPECIFICATION: Refer to previous page.

Clark Part Number: 1800636

SPECIAL GREASE - continued -

FOR: ... DELCO STARTER BEARINGS

SPECIFICATION: Refer to previous page.

Clark Part Number: 1800574

(P) SPECIAL GREASE:

FOR: ... GENERATOR PUMP DRIVE TANG
PUMP & MOTOR SHAFT SPLINES

SPECIFICATIONS: A lithium base or equal multi-purpose grease blended with selected additives to provide high load-carrying capacity with superior protection against corrosion and high-temperature oxidation and containing 3 (to) 5% moly (molybdenum disulfide).

NLGI #2

NOTE

Grease products under this specification are suitable for use on ball and roller bearings operating under extreme loads or in severe environments, and for extended lubrication intervals including chassis, sleeve bearings, cams and sliding mechanisms, etc., under heavy loads, shock and vibration.

Clark Part Number: 1800531

- continued -

INDUSTRIAL TRUCK DIVISION

LUBRICATION SPECIFICATIONS

LUBRICATION CHART KEY

(R) SPECIAL LUBRICANT

FOR ... CLUTCH THROWOUT BEARING-CARRIER RAILS

SPECIFICATION Use an approved Dry Film Type Lubricant or the equivalent.

TYPICAL PRODUCT RECOMMENDED BY MAJOR BRAND OIL SUPPLIERS

Graph-O-Kote #220 (Aerosol-can)
(Joseph Dixon, Crucible Company, Jersey City, N.J.)

Molub-Alloy #369 Dry Lube.

Dow Corning Molykote 321
Bonded Lubricant

...or the equivalent to the above.

(S) COLD STORAGE OPERATION

FOR ... ELECTRICAL SWITCHES AND TERMINALS.
- ELECTRIC RIDER TRUCKS -

FOR ... SOLID STATE CONTROL EQUIPPED TRUCKS.

SPECIFICATION Spray Coating

Krylon, Inc.,
Norristown, Pa. -6412-

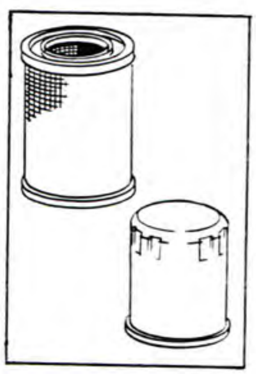
Sprayon 707 PDRP
26300 Fargo Avenue
Bedford, Ohio -44146-

...or the equivalent to the above.

(‡) OIL & FLUID FILTERS

FOR ... TRUCK SYSTEM(S)

SPECIFICATIONS Replacement parts to be of a quality equal to that provided in the original equipment. ‡Consult CLARK Service Parts Publication(s) for recommended replacement parts.



Oil Filter Cartridge Kit(s)
(Reference: Appropriate Parts Manual)

- continued -

INDUSTRIAL TRUCK DIVISION

CLARK EQUIPMENT

LUBRICATION SPECIFICATIONS

LUBRICATION CHART KEY

(T) ENGINE FUEL - GASOLINE

FOR ... INDUSTRIAL GASOLINE ENGINES

SPECIFICATIONS Fuel to be Automotive Quality Regular Grade Gasoline containing a corrosion inhibitor.

Minimum Motor Octane Number - 85

GASOLINE

TYPICAL PRODUCT RECOMMENDED BY MAJOR BRAND OIL SUPPLIERS

Shell Regular Gasoline
Sunoco 200 Gasoline
Good Gulf Gasoline
American Regular Gasoline
Citgo Regular Gasoline
Texaco Firechief Gasoline
ARCO Gasoline Regular
Mobil Gasoline Regular
...or the equivalent to the above.

(U) ENGINE FUEL - L.P.GAS

FOR ... INDUSTRIAL L.P.GAS POWERED ENGINES

SPECIFICATIONS Use LPG meeting PROPANE HD-5 (NGPA Specification 2140-62) or ASTM D2154 (Special Duty Propane) requirements.

Minimum Motor Octane Number - 95

L.P. GAS

Citgo L.P. Gas (HD-5)
Texaco 436 Propane
...or the equivalent to the above.

(V) ENGINE FUEL - DIESEL

FOR ... INDUSTRIAL DIESEL POWERED ENGINES

SPECIFICATIONS Fuel to be Automotive Quality Diesel Fuel Oil as defined by ASTM D975, Grades No. 1-D and 2-D, and having a Sulfur Content of less than 0.5% weight.

Recommended Cetane Number - 45 Minimum

NOTE

AN ASTM NO. 1-D FUEL IS PREFERRED WHERE MINIMUM SMOKE AND ODOR IS REQUIRED OR WHERE LIGHT LOAD AND SPEED WITH CONSIDERABLE IDLING IS ENCOUNTERED AND FOR COLD-WEATHER USE GENERALLY.

DIESEL

Shell Preminum Dieseline OR45
Sun Diesel Fuel 245-T
ARCO Preminum Diesel
ARCO Diesel #1 and #2
Gulf Diesel Fuel #1 or #2
AMOCO Diesel Fuel #1D and American Premier Diesel Fuel #2D
Citgo Diesel Fuel #1 or #2
Texaco Diesel Chief #1
Mobil Fuel Diesel & Mobil Diesel Fuel Special
...or the equivalent to the above.

- continued -

INDUSTRIAL TRUCK DIVISION

CLARK EQUIPMENT

LUBRICATION SPECIFICATIONS

LUBRICATION CHART KEY

LUBRICANTS ETC., BY CLARK PART NUMBER

	PART NUMBER		DESCRIPTION
HYDRAULIC BRAKE FLUID	884677 1800200 850487		1 - quart can 1 - case of 16-ounce cans 1 - case of 6 one-gallon cans
HYDRAULIC SYSTEM FLUID	885385 885382		1 - case of 24 one-quart cans 1 - case of 6 one-gallon cans
AUTOMATIC TRANSMISSION FLUID	879803 879804 941615		1 - quart can 1 - case of 24 one-quart cans 1 - case of 6 one-gallon cans
BATTERY CLEANER	886398		1 - case of 12 one-pint cans
LUBRICANT	886396		1 - case of 12 one-pint cans
PENETRATING OIL	886397		1 - case of 12 one-pint cans
BELT DRESSING	1800078		1 - case of 12 one-pint cans
CHAIN LUBE	886399		1 - case of 12 one-pint cans (Roller & Leaf Chain Lube)
SPRAY KOTE	886784		1 - case of 12 16-ounce cans (Transparent Protective Insulating Sealer with Clear Lube.)
SPRAY LUBE	886785		1 - case of 12 16-ounce cans (Black Heavy-Duty "EP" Lubricant.)
DEGREASER	1800330		1 - case of 12 one-pint cans
CONQUER SPRAY	1801145		1 - case of 12 16-ounce cans
DEGREASER	1801146	AEROSOL—CANS	1 - case of 12 16-ounce cans

- continued -

INDUSTRIAL TRUCK DIVISION

LUBRICATION SPECIFICATIONS

LUBRICATION CHART KEY

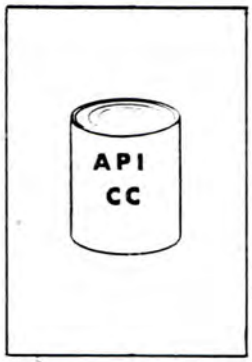
LUBRIPLATE

FOR ... SLIP TUBES, SLEEVES,
SPRING APPLIED SLEEVES,
LINKAGE BALL JOINTS, ETC.

SPECIFICATION Lubriplate 630-AA or equivalent.

Fiske Brothers Refining Company
...or the equivalent to the above.

CRANKCASE MOTOR OIL



S.A.E. 10W	1800946	1 - case of 24 one-quart cans
S.A.E. 20W	1800990	1 - case of 24 one-quart cans
S.A.E. 30	1800947	1 - case of 24 one-quart cans
S.A.E. 10W - 30	1800948	1 - case of 24 one-quart cans

TECHNICAL SOCIETIES IN REFERENCE (PREVIOUS PAGES)

AGMA	---------	American Gear Manufacturers Association
API	---------	American Petroleum Institute
ASTM	---------	American Society for Testing and Materials
EMA	---------	Engine Manufacturers Association
MIL	---------	Military Specification
NGPA	---------	Natural Gas Processors Association
NLGI	---------	National Lubricating Grease Institute
SAE	---------	Society of Automotive Engineers

- continued -

LUBRICATION SPECIFICATIONS

LUBRICATION CHART KEY

PRODUCTS IN REFERENCE

AMERICAN OIL COMPANY
STANDARD OIL DIVISION

AMOCO
Amolith
Molylith

ATLANTIC RICHFIELD COMPANY

ARCO

CHEVRON OIL COMPANY

Chevron Products

CITIES SERVICE OIL COMPANY

Citgo Products

GULF OIL CORPORATION

Gulf Products
Gulfcrown

IMPERIAL OIL & GREASE COMPANY., INC

Molub-Alloy

SHELL OIL COMPANY

Rotella, Rotella T Motor Oil
Rimula Motor Oil
Dentax Gear Oil
Spirax Gear Lubricant
Alvania Grease
AeroShell

SUN OIL COMPANY

Sunfleet Motor Oil
Sunoco Products
Sun Prestige
Sunvis Oil

THE ELECO CORPORATION

ELCO

TEXACO, INC

Texaco Havoline or URSA
Thuban
Texamatic
Molytex

MOBIL OIL CORPORATION

Mobilube
Mobilgrease

LOW TEMPERATURE OPERATION (MULTI-VISCOSITY OILS)

MULTI-VISCOSITY OIL SHOULD BE USED ONLY WHERE COLD STARTING CONDITIONS MAKE IT NECESSARY. THE OIL SUPPLIER SHOULD ASSUME FULL RESPONSIBILITY FOR SATISFACTORY PERFORMANCE OF THE MULTI-VISCOSITY OIL AT BOTH LOW AND NORMAL ENGINE OPERATING TEMPERATURES.

SERVICE CONDITIONS

OIL PERFORMANCE WILL REFLECT ENGINE LOAD, TEMPERATURE, FUEL QUALITY, ATMOSPHERIC DIRT, MOISTURE AND MAINTENANCE. WHERE OIL PERFORMANCE PROBLEMS ARISE OR ARE ANTICIPATED, THE OIL SUPPLIER SHOULD BE CONSULTED. WHEN EXTENDED DRAIN PERIODS ARE CONTEMPLATED, HIS ANALYSIS OR THAT OF A REPUTABLE LABORATORY SHOULD DETERMINE THE SUITABILITY OF OIL FOR FURTHER SERVICE.

- continued -

INDUSTRIAL TRUCK DIVISION

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

L U B R I C A T I O N C H A R T K E Y

Reference: HYDRAULIC FIRE RESISTANT FLUID (SPECIAL APPLICATIONS)
Ref. Specification(s): 871-L-224-1971 Water-Glycol

THE FOLLOWING "TEST PROCEDURE" WAS DEVELOPED BY CITGO ... BE SURE TO REQUEST "TEST PROCEDURE(S)" FROM THE SUPPLIER OF THE PRODUCT USED IN YOUR EQUIPMENT.

The Cities Service Research and Development Department has developed a simple and rapid method for determining the alkalinity level of CITGO Pacemaker Glycol-FR Fluid. This procedure is based on the use of Quantab B001, an indicating device calibrated to permit the direct determination of free alkalinity present in the fluid. Quantabs are available from Ames Company, Inc, Elkhart, Indiana.

CITIES SERVICE TEST PROCEDURE --
CONTROL OF FREE ALKALINITY

1. Measure 90 ml. of distilled water into a 100 ml. graduate.
2. Add 10 ml. of the CITGO Pacemaker Glycol-FR Fluid from the system to be tested. This measurement should be accurate in order to assure proper alkalinity readings.
3. Stopper the graduate and shake well for approximately 30 seconds.
4. Place approximately 10 ml. of the diluted fluid into a small (150 ml.) beaker or other suitable receptacle.
5. Remove the end tab from a Quantab B001 indicator and place the Quantab into the beaker with the 10 ml. sample of diluted fluid.
6. After the fluid has wetted the entire column (about 15 to 20 minutes) read the height of the color alternation on the Quantab as shown by a change from blue to green opposite the Quantab scale.
7. If the Quantab scale reading is 3.2 or above, no alkalinity adjustment is required; if the scale reading is below 3.2, add 1 quart of morpholine for each 50 gallons of fluid in the system.

An alkalinity check should be made twenty-four hours after the water content or alkalinity of the fluid is adjusted. Alkalinity levels should be checked frequently during the first month after a system has been converted to CITGO Pacemaker Glycol-FR Fluid. Thereafter, a regular schedule for checking alkalinity should be set up depending on experience and the needs of the system.

Control of alkalinity by direct measurement of the pH of the system fluid is not recommended. Where laboratory facilities are available the free alkalinity of CITGO Pacemaker Glycol-FR Fluid may be measurd by electrometric titration. A sample of fluid from the system is diluted with distilled water and tirated to a pH of 6.3 with standardized 0.1N HCL. If the milliequivalents per liter of HCL is below 60, one quart of morpholine should be added for each 50 gallons of fluid in the system. The control valve of "60" in this procedure corresponds to the 3.2 scale reading of the Quantab B001 indicator in the Cities Service Test Procedure.

GENERAL:

Proper lubrication techniques, combined with a waterproof type grease, prevents corrosion of the sleeve and housing on steering boosters.

The proper lubrication techniques are explained in the following paragraphs.

LUBRICATION TECHNIQUES:

Recommended lubrication (greasing) techniques is to apply grease with ball stud in a vertical position.

This will place the grease nipple exactly 180 deg. opposite the ball stud. The lubrication access hole at the bottom of the sleeve will also be lined up with the grease nipple.

This will allow the grease to penetrate into the ball stud and ball seat area (primary lubrication area).

Grease should then be applied while moving the ball stud from side to side to lubricate between the sleeve and the housing (secondary lubrication area).

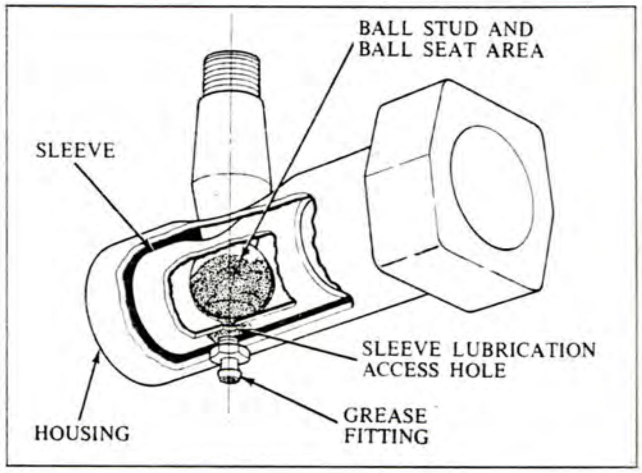
The following series of illustrations show how the grease should be properly dispersed in the ball joint area.

1. #11477 shows the ball stud in a vertical position which aligns the sleeve lubrication access hole directly opposite the grease nipple. This allows the grease to be adequately dispersed into the ball seat area (primary lubrication area) of the sleeve. Note that very little grease is dispersed between the sleeve and housing.

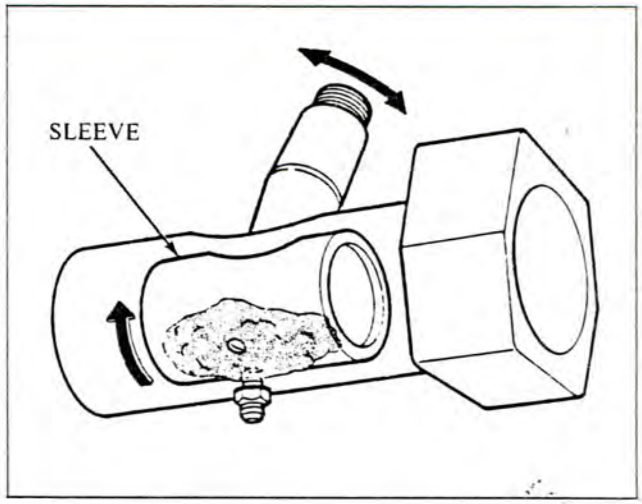
2. #11478 shows the grease properly dispersed around the O.D. of the sleeve. Apply grease when the sleeve is rotated and the grease fitting is not in line with the hole in the sleeve.

NOTE

Grease the control ball stud housing sparingly under low pressure through the grease fitting. Use a hand grease gun rather than a high pressure gun to avoid packing of grease which would hamper control valve movement. Housing must be at least 50% filled and all internal parts thoroughly coated.



#11477



#11478

FOUNDRY SPECIAL INSPECTION AND SERVICE INTERVAL CHECK LIST

	HOURS 8	50	100	250	500	1000
ENGINE OIL - CHECK LEVEL	X					
DRAIN & REFILL		X				
REPLACE FILTER		X				
ENGINE AIR FILTER - PRECLEANER BOWL - EMPTY	X					
DUST CUP - END COVER - EMPTY	X					
FILTER - CLEAN (CLEAN MORE FREQUENTLY IF RESTRICTION INDICATOR IS IN RED ZONE)			X			
FILTER - REPLACE						X
RADIATOR COOLANT LEVEL - CHECK	X					
BATTERY WATER LEVEL - CHECK			X			
TRANSMISSION OIL LEVEL - CHECK	X					
REPLACE FILTER ELEMENT				X		
DRAIN OIL, CLEAN SUMP SCREEN & REFILL					X	
CRANKCASE VENTILATION - COLLECTOR JAR - EMPTY		X				
VAPOR FILTER ELEMENT - REPLACE				X		
CHECK VALVE - CLEAN				X		
CRANKCASE BREATHER FILTER - CLEAN				X		
CRANKCASE BREATHER FILTER - REPLACE						X
SUMP TANK - BREATHER FILTER - CLEAN		X				
- REPLACE					X	
INTAKE SCREEN - CLEAN OR REPLACE						X
CHANGE OIL & FLUSH HYDRAULIC OIL SYSTEM						X
HYDRAULIC OIL RETURN LINE FILTER - REPLACE ELEMENT WHEN INDICATOR GAUGE POINTS TO RED ZONE OR AS INDICATED ON FILTER DECAL. (CHECK AT IDLE SPEED WITH OIL HOT) (APPROX.)					X	
POWER STEERING - FILLER CAP - REPLACE						X
DRAIN OIL, FLUSH COMPLETE SYSTEM, ADD OIL						X
ROD WIPER - REPLACE						X
LIFT & TILT CYLINDER ROD WIPER (URETHANE) REPLACE						X
BRAKE MASTER CYLINDER BREATHER FILTER - CLEAN					X	

NOTE - SEE TRUCK OPERATORS MANUAL FOR ADDITIONAL INSPECTION & SERVICE RECOMMENDATIONS

CAUTION

USE OF
INCORRECT FILTER
MAY DAMAGE
YOUR ENGINE

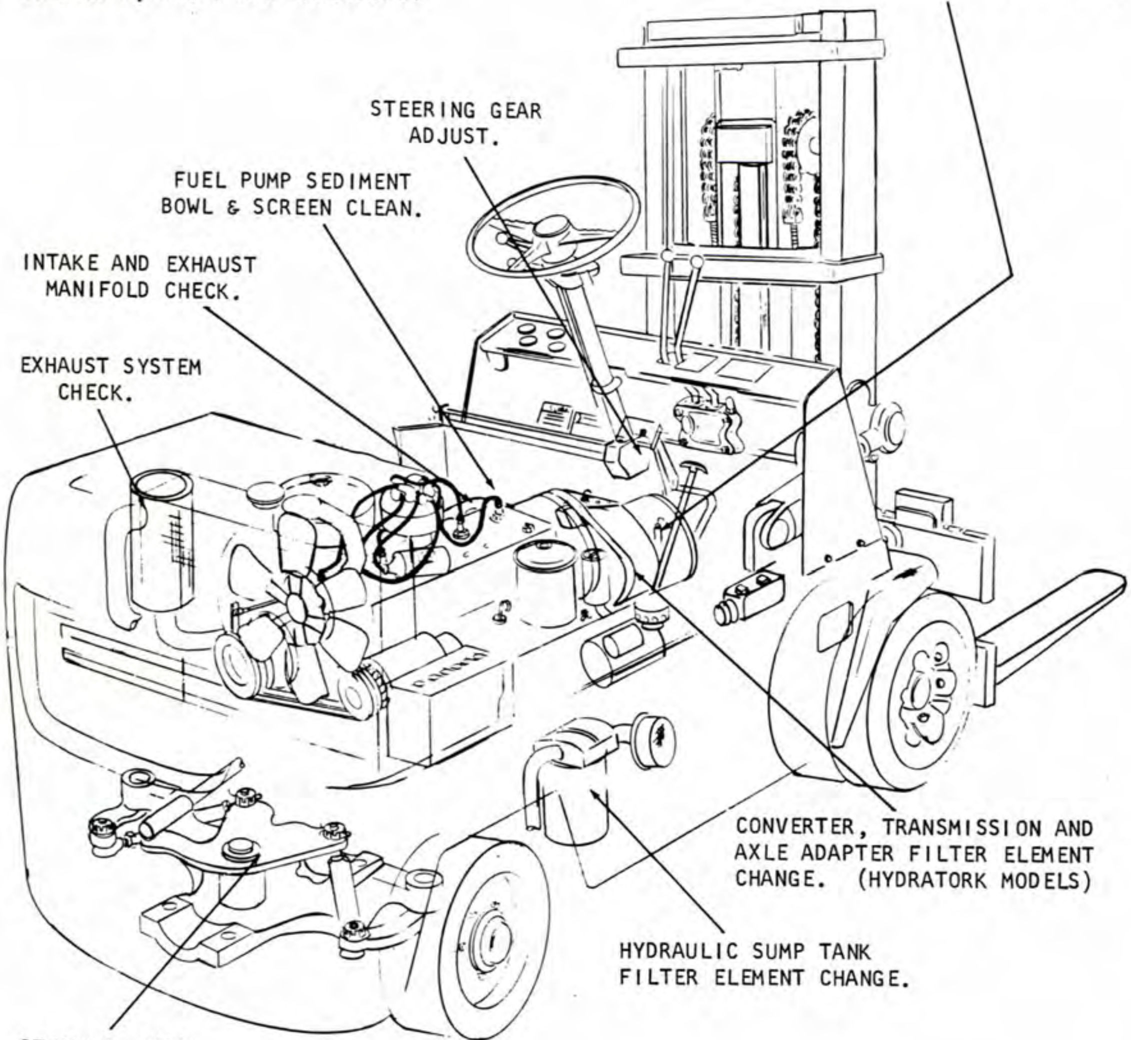
DIESEL ENGINE SERVICE

REFER TO ENGINE
OPERATORS MANUAL

500 HOURS

STEAM CLEAN MACHINE.

CHECK SECURITY OF MOUNTING ON
ALL NUTS, BOLTS AND CAPSCREWS.



NOTE

IN ADDITION TO THE ABOVE, PERFORM THE 8 HOUR AND 100 HOUR PREVENTIVE MAINTENANCE SERVICES.

Plate 7645. Lubrication and Preventive Maintenance Illustration

FUEL PUMP STRAINER

The fuel filter and sediment bowl should be cleaned every 500 operating hours. Remove and clean sediment bowl. If fuel strainer is dirty, install a new strainer assembly and gasket. Do not reuse old gasket.

FUEL PUMP

To determine if the fuel pump is defective, remove the fuel tank supply line at the pump and blow out line with compressed air to remove any possible obstructions. Reconnect fuel tank line and disconnect pump to carburetor line. Install a fuel pressure gauge, by placing a "T" in the line, and run engine at 1800 R.P.M. with all lines connected. Fuel pump pressure should be between 1 1/2 and 2 1/4 pounds. If the fuel pump pressure is not within this range the pump should be removed for repair or replacement.

C A U T I O N

TO AVOID CREATING A FIRE HAZARD CARE SHOULD BE TAKEN SO THAT GASOLINE IS NOT SPILLED DURING THESE OPERATIONS.

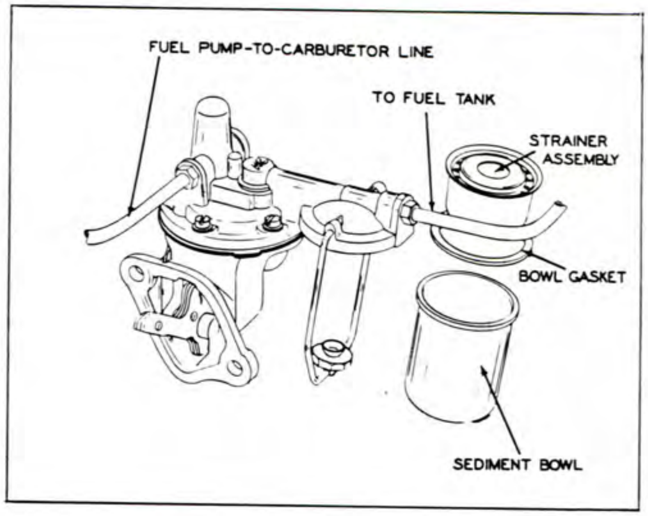


Plate 6432. Fuel Pump & Sediment Bowl

N O T E

DIESEL ENGINE MODELS

REFER TO ENGINE OPERATORS MANUAL

Transmission Filter (Hydratork Models)

Install new element every 500 operating hours.

1. Remove cover retainer, cover, gasket and spring.
2. Thoroughly clean filter body.
3. Install new element.
4. Install new cover gasket and cover.
5. Secure cover in place with retainer.

I M P O R T A N T

A new element should be installed any time the fluid is changed and...when a repair is made on the transmission or axle adapter.

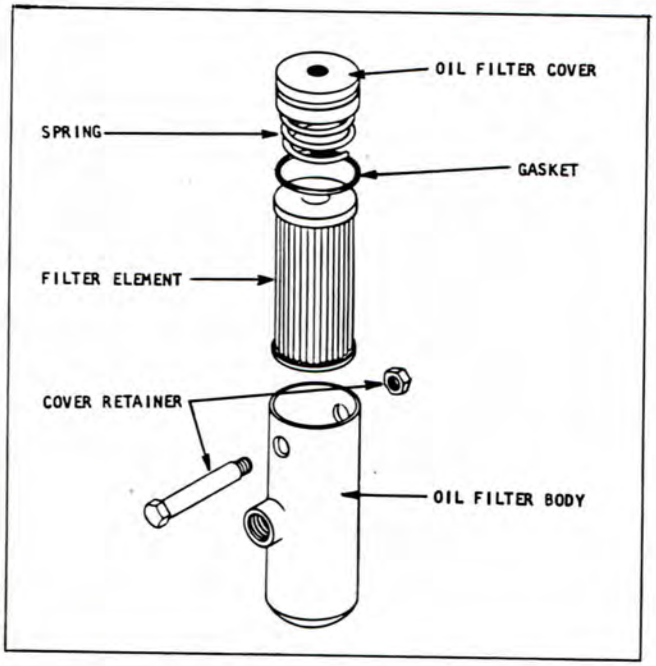


Plate 7234. Transmission Filter (typical)

Converter...Axle Adapter and Transmission Reservoir Screen (Hydratork Models)

1. Drain fluid at operating temperatures...refer to next page, Plate 7301.

C A U T I O N

DO NOT USE FLUISHING OIL OR COMPOUND TO FLUSH SYSTEM.

2. Remove and clean sump screen in a Stoddard type cleaning solvent...dry with filtered compressed air... directing air thru neck of screen.

Plate 7235. Transmission Screen (typical)

3. Install new O-ring as shown above...Plate 7235.

4. Refill to full mark indicated on transmission dipstick...use Automatic Transmission Fluid, Type "A", Suffix "A"...number to be prefixed by AQ-ATF on container...or use DEXRON Automatic Transmission Fluid.

5. Operate engine to completely charge the converter and plumbing with fluid...then recheck fluid level...with engine running, transmission in neutral, and fluid at operating temperature.

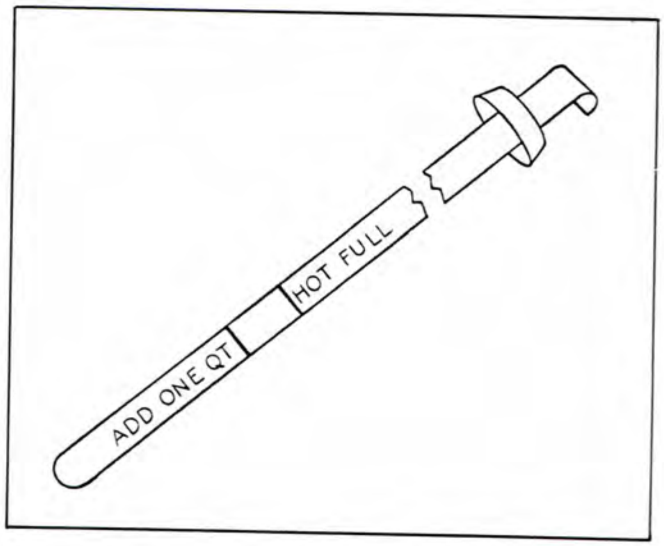


Plate 8281. Transmission Dipstick
(Typical illustration)

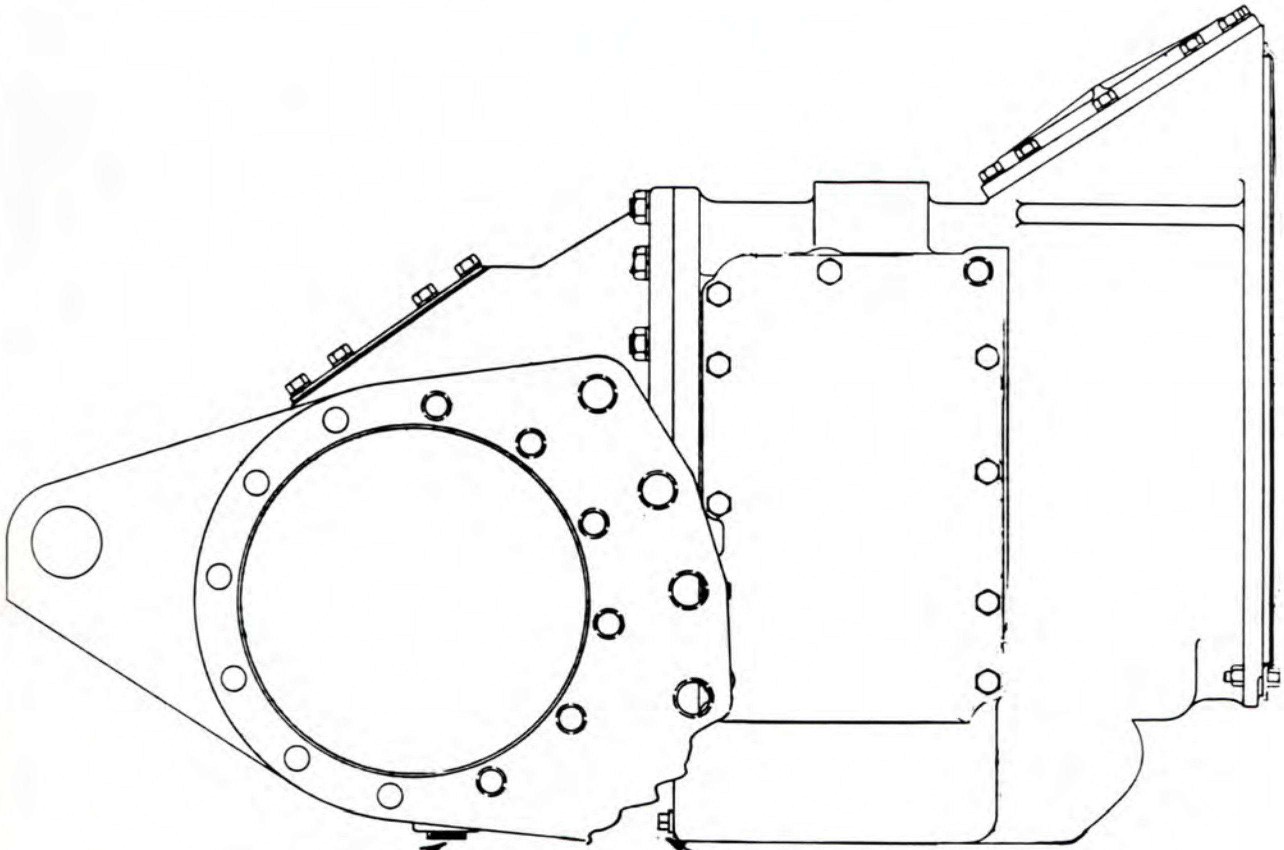


Plate 7301. Axle Adapter and Transmission Drain Plugs

HYDRAULIC SYSTEM FLUID FILTER

Frequency of element change depends on individual applications. Replacement of original element after first 50 hours of operation is recommended, generally each 500 thereafter will insure maximum filtration.

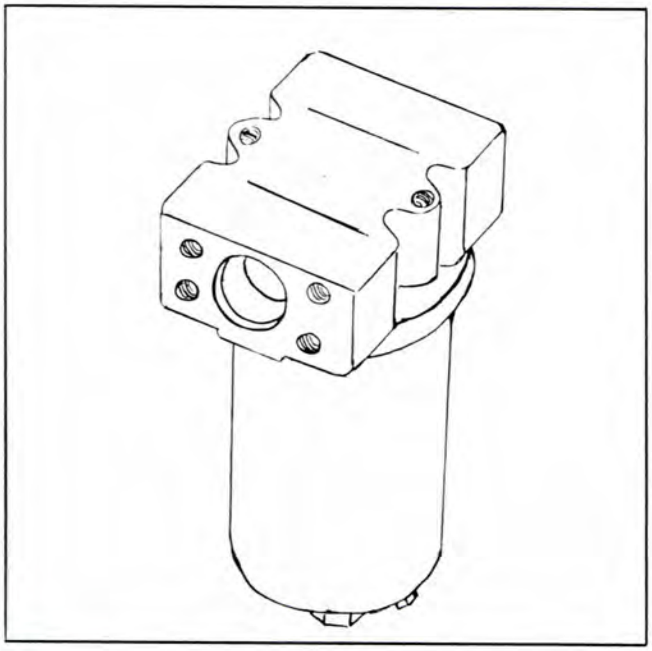


Plate 7656. Typical Hydraulic Fluid Filter

DISASSEMBLY

1. Lower upright. Shut engine off.

2. Remove drain plug from filter case and allow fluid to drain in a suitable container.

3. Unscrew the retainer bolt allowing the case and filter element to be removed from the filter base.

4. Remove the sealing ring, filter element, spring, retainer bolt and gasket from the case.

5. Discard the element, sealing ring and retainer bolt gasket.

6. Throughly clean the filter case in a Stoddard type cleaning solvent and allow to dry.

REASSEMBLY

1. Place a new gasket on the retainer bolt and insert bolt in filter case. Slide the spring over the retainer bolt and place a new element in the case so that it rests upon the spring.

2. Using a new sealing ring install the case sub-assembly to its base and securely tighten the retainer bolt. Install the drain plug and its gasket in the case and tighten.

CAUTION

START ENGINE AND OPERATE HYDRAULIC CONTROLS SEVERAL TIMES, CHECK OIL FILTER FOR LEAKS. IF ANY LEAKS ARE EVIDENT, CORRECT AS REQUIRED.

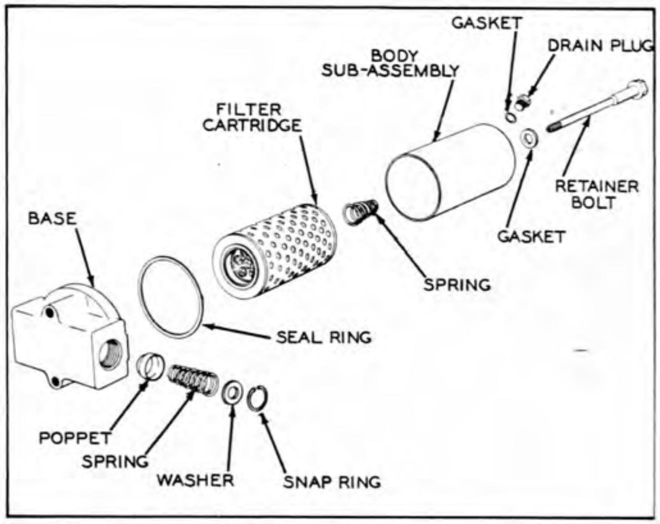


Plate 6433. Typical Hydraulic Fluid Filter Components

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.

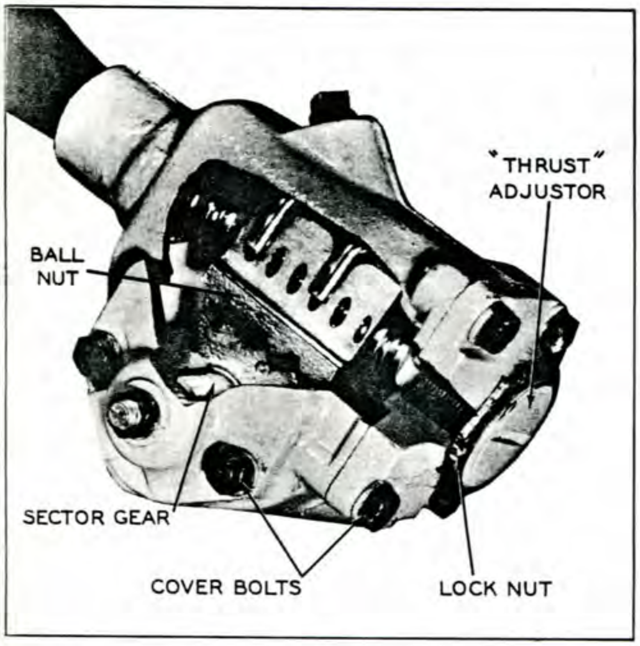


Plate 6636. Steering Gear Thrust Adjustment (Worm Bearings)

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.

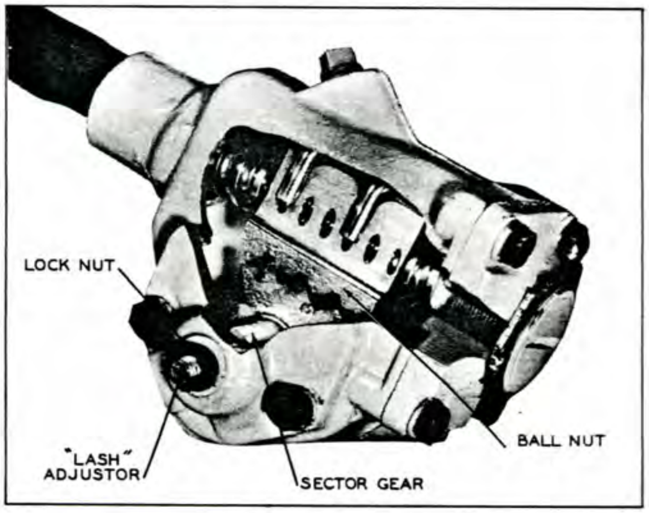


Plate 6637. Steering Gear Lash Adjustment (Sector Gear)

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

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.

NOTE

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

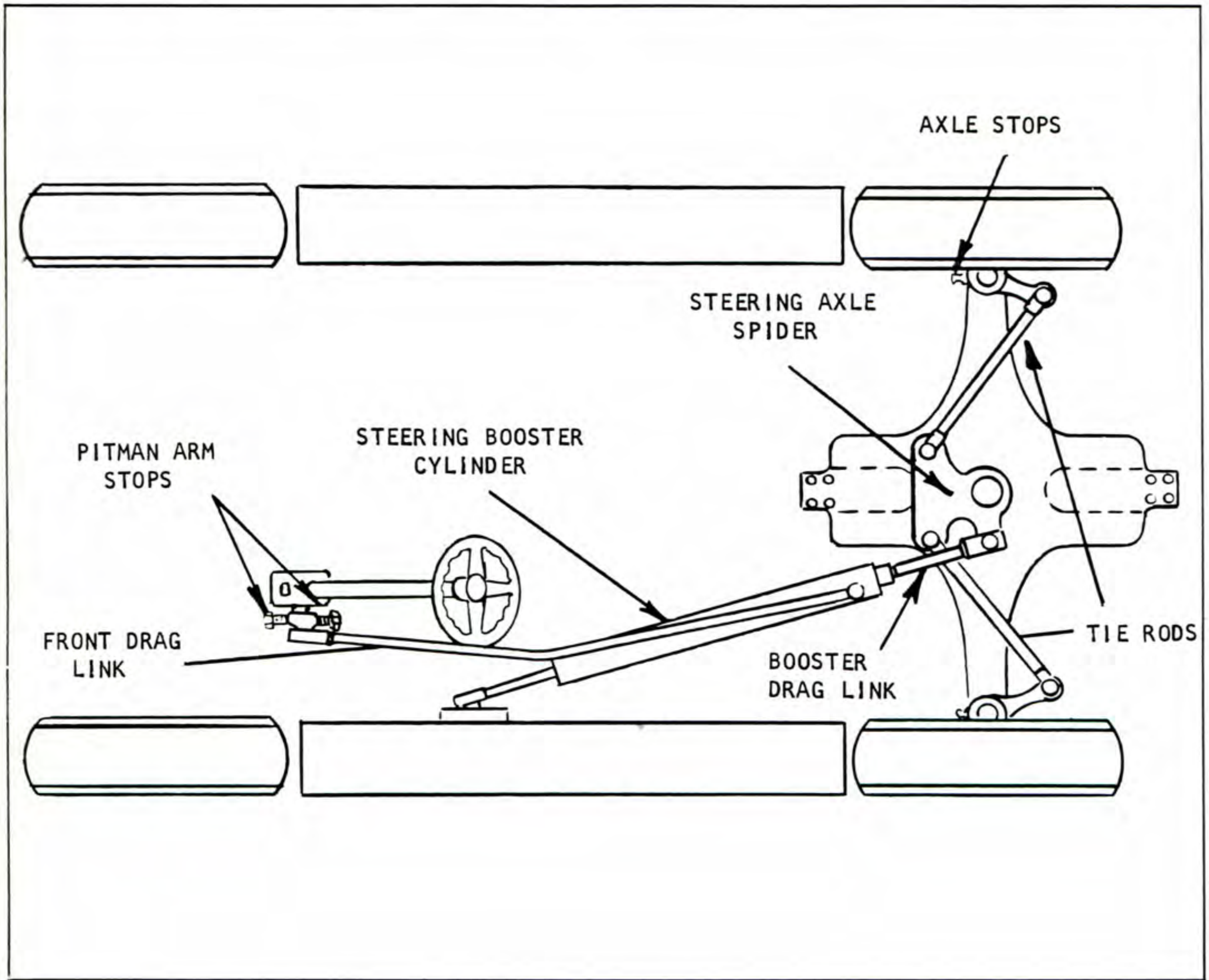


Plate 7340. Steering Linkage

STEERING AXLE AND LINKAGE ADJUSTMENT

1. Raise the rear of the machine until steering wheels clear the ground.

W A R N I N G

PRIOR TO ANY ADJUSTMENT OF THE LINKAGE, PLACE BLOCKING UNDER MACHINE FRAME SO IT CANNOT BECOME LOWERED BY ACCIDENT. BLOCKING MUST BE OF ADEQUATE STRENGTH TO SUPPORT THE WEIGHT OF THE MACHINE.

2. The steering wheels should 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 <u>same length</u> when the correct adjustment is obtained. Tighten tie rod lock nuts to secure this adjustment.

3. Disconnect the steering booster socket from the steering axle spider noting the relative position of the socket parts so they may be re-installed correctly after checking wheels for correct turning geometry.

4. Check wheels for correct turning geometry by turning the wheels all the way for a left turn - this should allow

the left wheel to attain an angle of 78 degrees to the frame. If an adjustment is necessary, the axle stop on the left side should be turned in or out whichever is necessary to achieve the correct angle. Repeat this procedure in a right turn with the opposite wheel and adjust the right axle stop as required.

W A R N I N G

IF THE STEERING BOOSTER CYLINDER IS TO BE ACTUATED UNDER POWER DO SO ONLY WITH THE ENGINE RUNNING AT IDLE SPEED, USING EXTREME CARE TO KEEP CLEAR OF MOVING LINKAGES TO PREVENT PERSONAL INJURY.

5. Collapse the booster cylinder until bottomed out. Extend booster cylinder from collapsed position 1/2". Adjust socket on end of rear drag link so that grease fitting lines up with center of spider ball. (Wheels remaining in the right turn position against axle stop). Before securing socket lock nut position the booster cylinder so that the control ball stud points out toward the truck frame at an angle of about 45 degrees to the vertical. (This is necessary to prevent mechanical interference of linkage while turning.)

6. Turn wheels to straight ahead position and disconnect drag link at pitman arm.

7. Determine center position of steering gear. (Refer to Steering Gear adjustments for correct procedure.)

8. With Steering Gear centered; adjust drag link socket so that the grease fitting lines up with the centerline of the pitman arm ball stud and secure with lock nut and cotter pin.

9. Back off pitman arm stop bolts and slowly turn wheel until steering knuckle contacts axle stop bolt. Turn pitman arm stop until it contacts pitman arm. Lock in this position. Repeat this procedure with the remaining pitman arm stop bolt with the wheels turned in the opposite direction.

10. Turn the handwheel until wheels are in straight ahead position. Remove handwheel and replace on steering column with the center spoke aligned minus or plus 10 degrees with the center line of the machine, the center spoke pointing back.

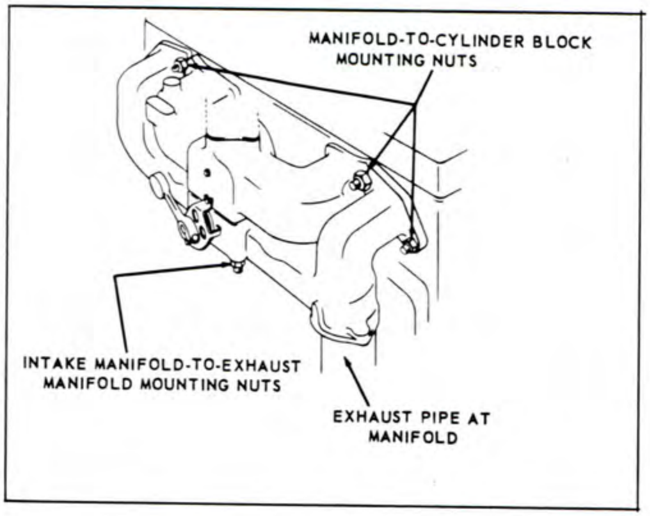


Plate 6269. Intake and Exhaust Manifolds

INTAKE AND EXHAUST MANIFOLDS

1. Inspect gaskets for leaks and inspect security of manifold nuts.

2. Inspect exhaust pipe and muffler for damage, leakage and security of mountings.

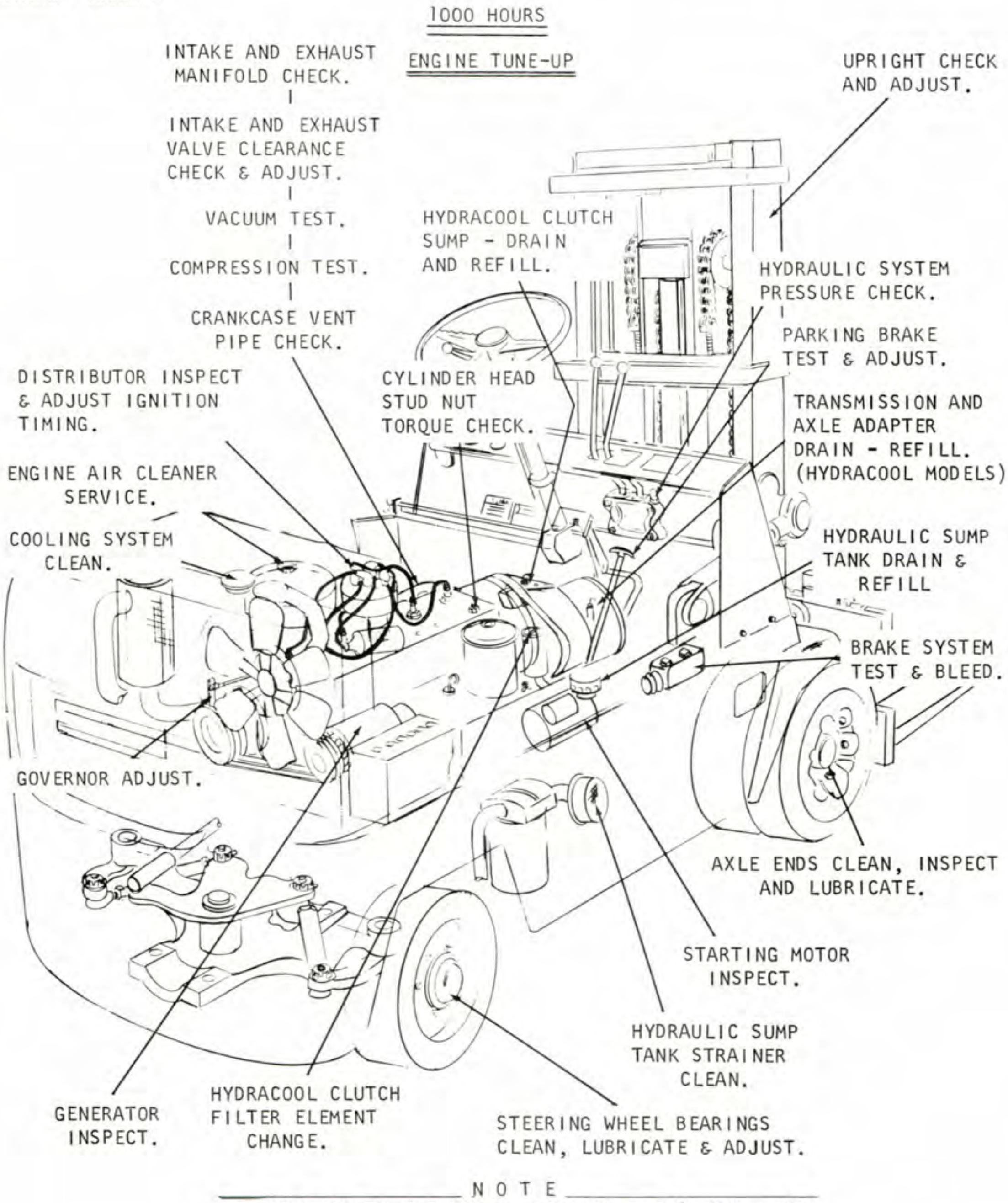
NUTS, BOLTS AND CAP SCREWS. Check security of mounting, tighten as required.

CAUTION

USE OF
INCORRECT FILTER
MAY DAMAGE
YOUR ENGINE

DIESEL ENGINE SERVICE

REFER TO ENGINE OPERATORS MANUAL



NOTE

IN ADDITION TO THE ABOVE, PERFORM THE 8 HOUR, 100 HOUR AND 500 HOUR PREVENTIVE MAINTENANCE SERVICES.

Plate 7646. Lubrication and Preventive Maintenance Illustration

ENGINE TUNE-UP (GAS ENGINES)

Engine tune-up is the orderly and systematic process of checking the engine and accessory equipment to maintain or restore satisfactory engine performance. Engine tune-up must be accomplished semi-annually and more frequently if engine performance indicates the need for these services. Perform engine tune-up as follows:

1. AIR CLEANER. Be sure air cleaner has received proper service. Air cleaner must be installed before making engine tune-up.

2. FUEL PUMP. Be sure the fuel pump bowl and strainer has been properly serviced and the fuel pump is operating satisfactorily.

Plate 7650. Typical Air Cleaner

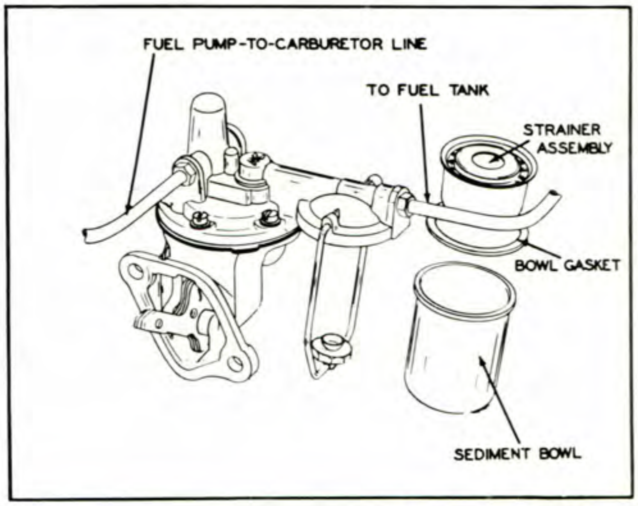


Plate 6432. Fuel Pump Strainer and Sediment Bowl

NOTE

DIESEL ENGINE MODELS

REFER TO ENGINE OPERATORS MANUAL

ENGINE PERFORMANCE CHECK:

1. Before making check, run engine until unit is at operating temperature. This is important as the transmission oil temperature should be 200 degrees F. and the engine water jacket should be at operating temperatures. Apply parking brake.

2. With the engine operating at idle and the transmission in NEUTRAL, check the fluid level on the dipstick. Fill if necessary to the FULL mark on the dipstick...using Type "A". Suffix "A" Automatic Transmission Fluid (Clark Part Number 879803. Fluid containers must display a qualification number prefixed by "AQ-ATF").

3. With a tachometer, check engine for governed speed at full throttle. The unloaded engine RPM should be set at 2400.

4. Check the governed engine speed with partial load. With engine at full throttle and the tilt lever in full backward tilt, momentarily hold the tilt lever back to load the engine. With the engine loaded in this manner, the approximate engine RPM should be 2250.

C A U T I O N

PROLONGED STALLING OF THE CONVERTER CAN CAUSE INTERNAL DAMAGE TO THE CONVERTER. STALL CONVERTER ONLY LONG ENOUGH TO ATTAIN THE PEAK RPM READING....MAXIMUM 30 SECONDS.

5. With a capacity load on the forks, check for normal stall RPM by positioning machine against an immovable object....or by applying a correctly adjusted parking brake....equipped with good brake linings. Place the machine in gear and accelerate engine to full throttle. Normal stall is 1230 (cushion models) and 1340 (pneumatic models); accelerate engine to governed rpm, place machine in gear and slowly let out on the clutch.

If readings taken are not reasonably close to those listed above, appropriate repairs/adjustments should be made. Refer to Engine Tune-Up and Hydratork Transmission Pressure checks.

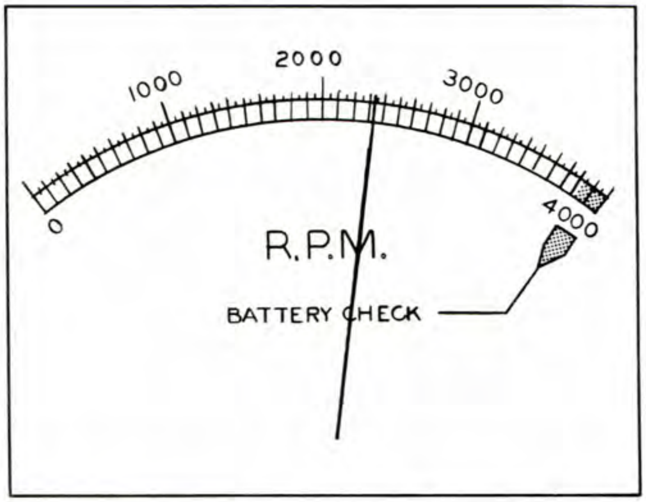


Plate 6683. Engine RPM (NO LOAD)

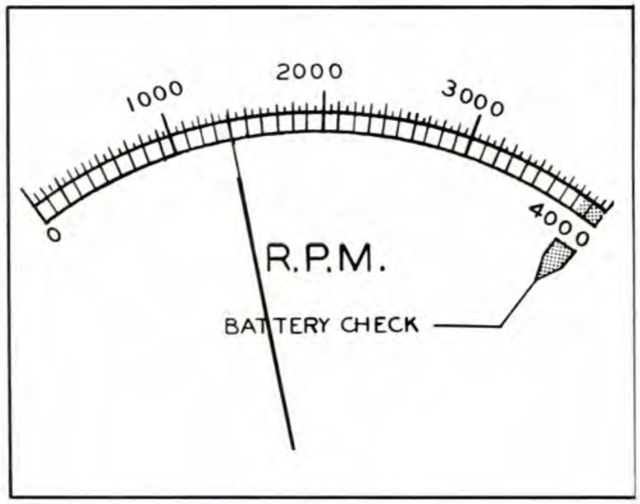


Plate 6684. Normal Engine Stall

3. CYLINDER HEAD STUD NUTS. Check all stud nuts for correct torque, refer to specifications. Check cylinder head gasket for leaks.

CAUTION

THE SEQUENCE LISTED IN PLATE 5927 MUST BE FOLLOWED. ALL CYLINDER HEAD CAP SCREWS OR NUTS MUST BE TIGHTENED EVENLY AND TORQUED IN ACCORDANCE WITH LIMITS LISTED IN SPECIFICATIONS.

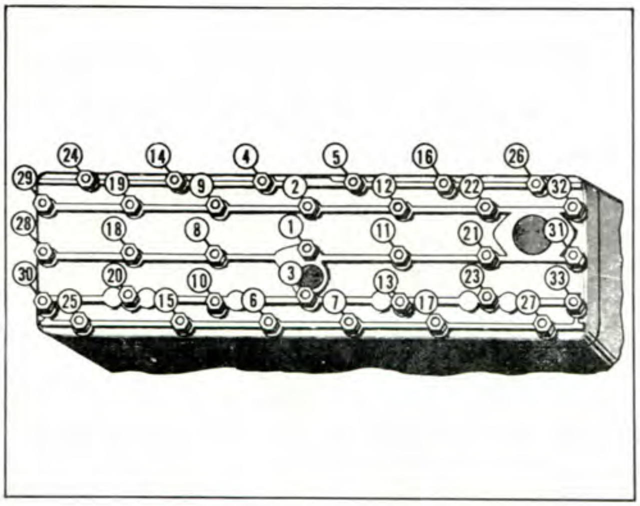


Plate 5927. Cylinder Head Stud Nut Tightening Sequence

4 INTAKE AND EXHAUST MANIFOLDS. Inspect for gasket leaks and security of mountings.

5. CRANKCASE VENTILATION. The crankcase vent pipe allows clean air to pass through the crankcase to help carry off corrosive gases (which are the by-products of combustion) that leak by the pistons and valve stems.

Check crankcase ventilation pipe for damage or obstructions. The pipe must be open to provide proper ventilation. Clean, repair, or replace as required, see Plate 6628.

6. INTAKE AND EXHAUST VALVE CLEARANCE ADJUSTMENTS. (PREFERRED METHOD).

a. Remove valve chamber cover mounting screws, and the valve chamber cover gasket.

b. With engine running at idling speed and at normal operating temperature, adjust intake valves as follows:

c. Check for proper 0.014 inch clearance by alternately passing a 0.013 inch and a 0.015 inch flat feeler gauge between head of adjusting screw and valve stem, see Plate 3223 on following page.

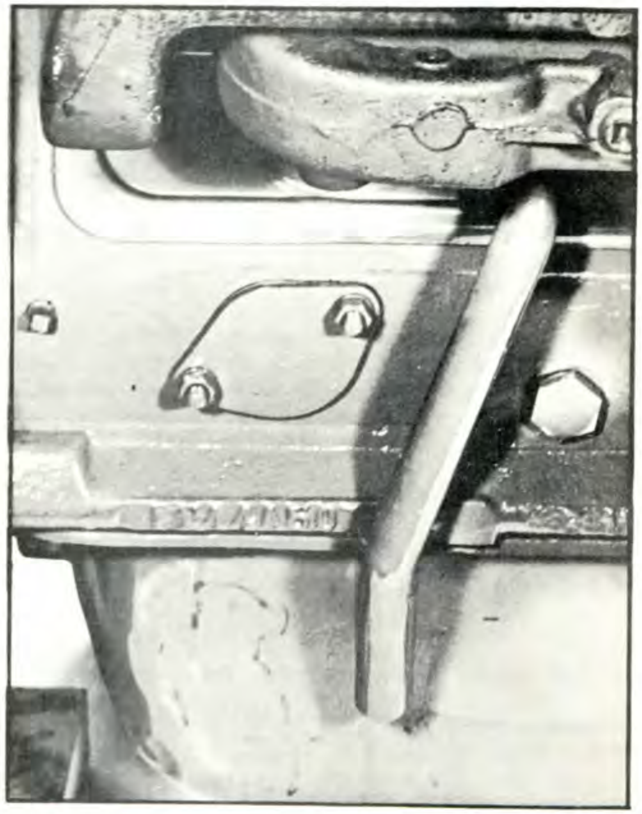


Plate 6628. Crankcase Vent Pipe

d. If a 0.013 inch feeler gauge moves freely back and forth in gap when valve is not being lifted and a 0.015 inch feeler gauge binds, at all times, clearance requires no adjustment.

e. If a 0.013 inch feeler gauge is gripped at all times, the clearance is insufficient.

f. Hold valve lifter with an open end wrench while using a second wrench to turn adjusting screw 1/4 to 1/2 turn clockwise. Repeat clearance check and adjustment, until proper clearance is obtained. The adjustable type valve lifters have self-locking adjusting screws that require no lock nuts.

g. If 0.015 inch feeler moves freely when valve is not being lifted, the clearance is too great. Hold valve lifter with an open end wrench while using a second wrench to turn valve lifter adjusting screw counterclockwise 1/4 to 1/2 turn. Repeat clearance check and adjustment until proper clearance is obtained.

h. Repeat clearance check and adjustment on remaining intake valves.

i. With engine running at slow idle and at normal operating temperature, adjust exhaust valves as follows:

j. Check for proper 0.016 inch clearance by alternately passing a 0.015 inch and a 0.017 inch flat feeler gauge between head of adjusting screw and valve stem, see Plate 3223.

k. If a 0.015 inch feeler gauge is gripped at all times, the clearance is insufficient. If a 0.017 inch feeler gauge moves freely when valve is not being listed, the clearance is too great.

m. Turn adjusting screw in the direction necessary so that a 0.015 inch feeler gauge moves freely back and forth in gap and a 0.017 inch feeler is gripped at all times.

n. After adjustment is complete on all exhaust valves, install valve chamber cover using new cover gasket and replace cover retainment screws.

NOTE

DO NOT REUSE OLD GASKETS. THEY DO NOT AFFORD A POSITIVE SEAL.

o. Check valve chamber cover gasket for leaks.

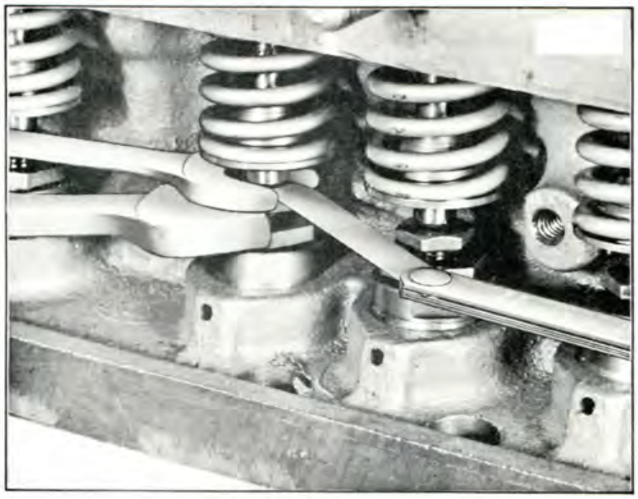


Plate 3223. Adjusting Valve Clearance

6A. COLD SETTING. (ALTERNATE METHOD) To adjust valve clearance when engine is at room temperature and not running, proceed in the following manner:

a. Remove distributor cap.

b. Crank engine until distributor rotor points to No. 1 cylinder position with the breaker points open. In this position the No. 1 piston is at the top of its compression stroke with both lifters on the base circle of the cam and both valves can be adjusted.

c. Adjust the valve clearance to 0.016 inch on the intake and 0.018 inch on the exhaust. The exhaust (E) and intake (I) valve arrangement on the six cylinder engine is: E-I-I-E-E-I-I-E-E-I-I-E.

d. The other valves may be adjusted by setting the engine with the distributor rotor pointing to the rest of the cylinder positions in the sequence of the firing order which is: 1-5-3-6-2-4.

INDUSTRIAL TRUCK DIVISION

ADJUST TAPPETS TO THE STATIC COLD SETTINGS LISTED IN THE FOLLOWING CHART:

Engine Model	Intake	Exhaust	NOTE
Y-69	.014"	.014"	Static Cold Settings.
Y-91	.014"	.014"	Static Cold Settings.
Y-112	.014"	.014"	Static Çold Settings.
F-124	.016"	.018"	Static Cold Settings.
F-140	.016"	.018"	Static Cold Settings.
F-162	.016"	.018"	Static Cold Settings.
F-244	.016"	.018"	Static Cold Settings.
F-186	.016"	.018"	Static Cold Settings.
F-209	.016"	.018"	Static Cold Settings.
F-226	.016"	.018"	Static Cold Settings.
F-135	.012"	.020"	Static Cold Settings.
F-163	.012"	.020"	Static Cold Settings.
F-227	.012"	.020"	Static Cold Settings.
F-245	.012"	.020"	Static Cold Settings.
NOTE: Engine Nameplate Tappet Settings is for Hot Idle only.			

FOR -- VEHICLES EQUIPPED WITH CONTINENTAL ENGINES.

7. COMPRESSION TEST

a. Test battery for full charge (specific gravity 1.280 temperature of 24°C (75° F). If battery is not fully charged, replace with fully charged battery.

b. Start engine and allow it to warm up until normal operating temperature is reached.

c. Turn off ignition.

d. Remove spark plug cables from spark plugs and remove spark plugs from cylinder head. Examine spark plugs for carbon deposits, defective insulation and general serviceability. All carbon or lead deposits must be removed from the insulation shell and electrodes. This can be done on a sand blast cleaner. Carbon deposits should be removed from the plug threads with a stiff brush. After cleaning, inspect plugs carefully for cracked or broken insulator, badly pitted electrodes or other signs of failure.

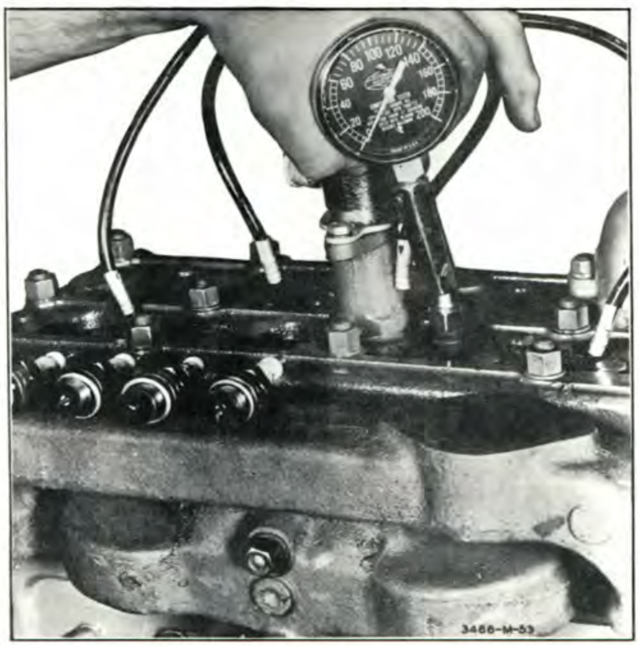


Plate 3486. Compression Test

e. With all plugs removed, install compression gauge in front spark plug port. Operate starting motor until maximum reading on gauge is obtained, see Plate 3486. Record gauge reading. Repeat this operation on each remaining cylinder.

f. If readings are reasonably high (110 to 120) pounds and the readings do not vary more than about 10 pounds between cylinders, compression may be considered normal. Excessively low readings or readings that vary more than 10 pounds between cylinders indicate internal trouble to be corrected after further examination and testing.

g. Set the spark plug gap as specified, by bending side electrode only. The gap should be checked with a wire feeler gauge rather than a flat type gauge as it is better suited for this purpose.

h. Spark Plug Specifications:

Standard Type	-	.025" Gap
Resistor Type	-	.035" Gap

i. Replace spark plugs using new gaskets. Always replace spark plug gasket whenever a spark plug is removed from the engine. Before installing plugs, be sure that the spark plug seat in the cylinder head is clean and free from obstructions. The spark plug should be screwed into cylinder head (using a socket of proper size) sufficiently tight to fully compress the gasket. This is most important as a large percentage of troubles due to overheated spark plugs are caused by plugs being too loose in the cylinder head. Conversely, excessive tightening may change the gap between the electrodes or crack the insulator.

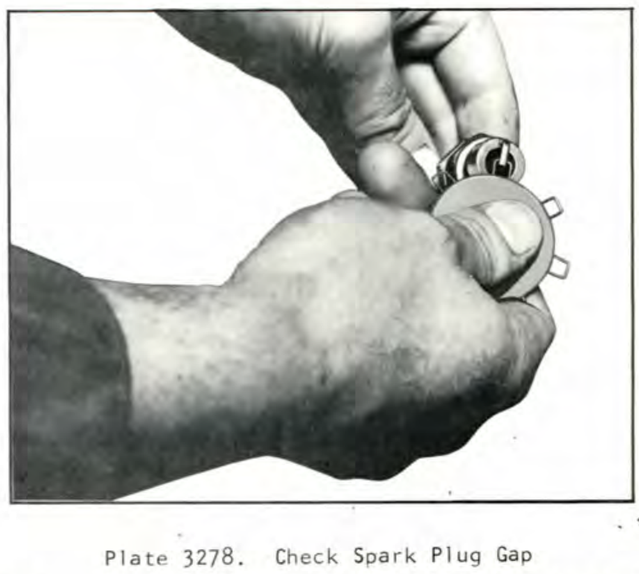


Plate 3278. Check Spark Plug Gap

8. DISTRIBUTOR

Inspection: Remove distributor cap (without removing wires). Wipe cap with a clean cloth. Examine rotor and cap for chips, cracks, corroded terminals, carbon runners (paths which will allow high-tension leakage to ground) or if the vertical faces of the inserts are burned -- install a new cap and rotor, as this is due to the rotor being too short.

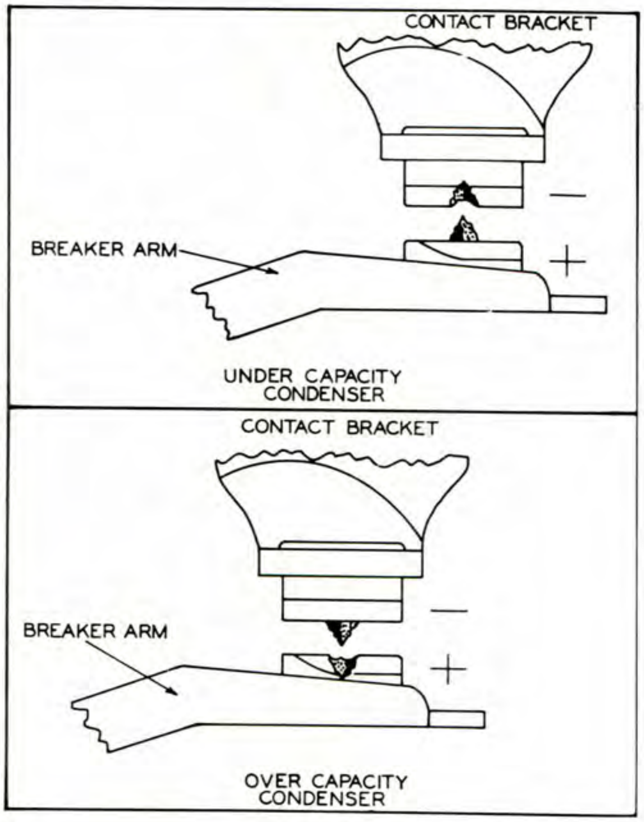


Plate 5933. Breaker Points

Check the centrifugal advance mechanism for "freeness" by turning the breaker cam in the direction of rotation and then releasing it. The advance springs should return the cam to its original position without sticking.

Inspect breaker points. If points are pitted, burned or worn to an unserviceable condition, install a new set of points.

The normal color of contact points should be a light gray. If the contact point surfaces are black, it is usually caused by oil vapor, or grease from the cam. If they are blue, the cause is usually excessive heating due to improper alignment, high resistance or open condenser circuit.

Badly pitted points may be caused by a defective or improper condenser capacity.

If the condenser capacity is too high, the crater (depression) will form in the positive contact. If the condenser capacity is too low, the crater will form in the negative contact, see Plate 5933.

For a temporary repair, dress the contact points with a few EVEN strokes using a clean fine-cut contact file. DO NOT ATTEMPT TO REMOVE ALL ROUGHNESS OR DRESS THE POINT SURFACES DOWN SMOOTH. See Plate 7475.

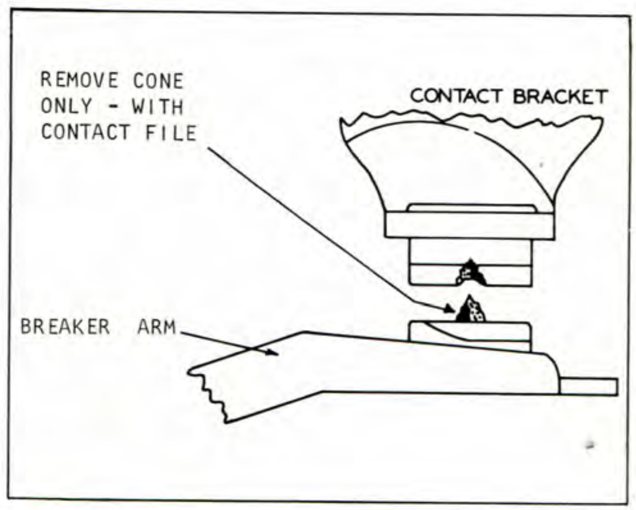


Plate 7475. File Contact Points

CAUTION

NEVER USE EMERY CLOTH OR SANDPAPER TO CLEAN POINTS AS PARTICLES WILL EMBED IN THE POINTS AND CAUSE ARCING AND RAPID BURNING.

CLARK EQUIPMENT

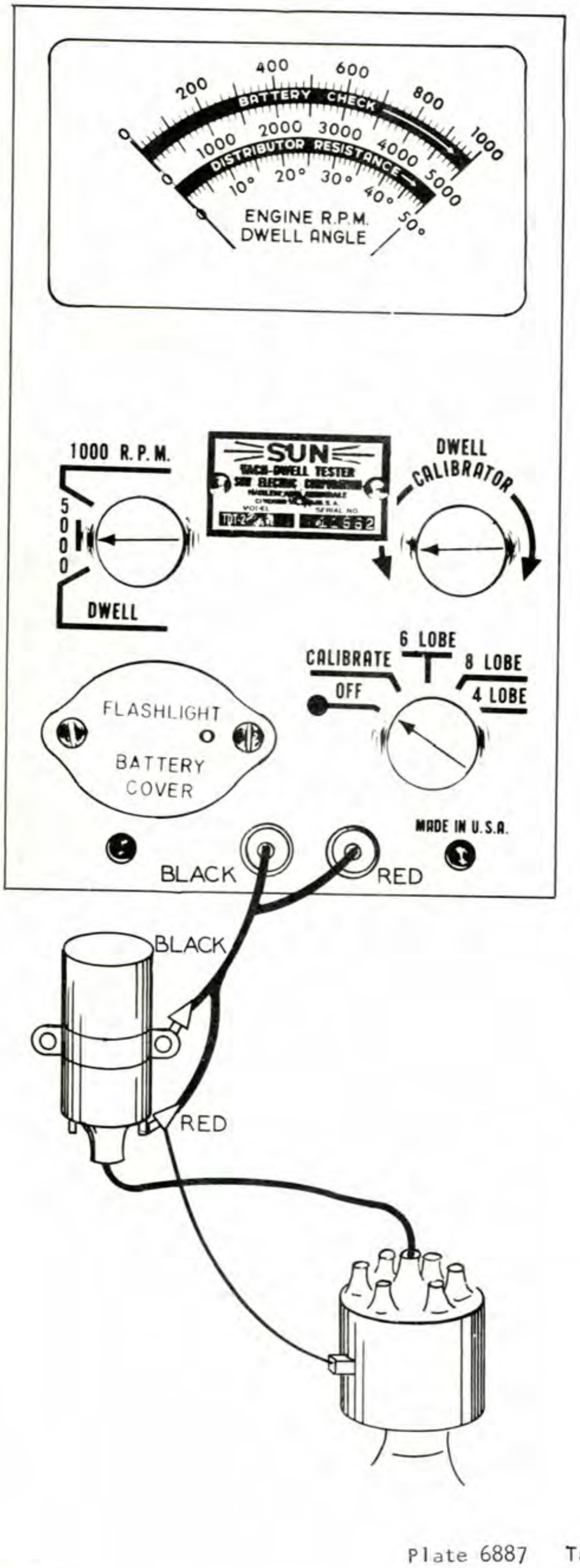


Plate 6887 Tach Dwell Meter

MEASURING ENGINE SPEED

1. Connect the test leads as shown.
2. Turn switch to the LOBE position corresponding to the number of cylinders.
3. Turn the other switch to the 1000 rpm position for all idle and low speed testing. Use the 5000 rpm position for all speeds over 1000 rpm.

DISTRIBUTOR RESISTANCE TEST

1. With test leads disconnected, turn switches to DWELL and CALIBRATE positions and adjust dwell calibrator until meter reads on the SET LINE.
2. Connect test leads as shown.
3. Turn ignition switch ON with engine stopped. If distributor resistance is not excessive, meter will read in the black bar marked DISTRIBUTOR RESISTANCE.

If meter does read within black bar, readjust dwell calibrator until meter again reads on the SET LINE before making the following tests.

If meter does not read within black bar, excessive resistance is indicated. To locate excessive resistance, trace the primary circuit through the distributor with the red test lead until point of high resistance is located. Excessive resistance must be eliminated and the dwell calibrator adjusted until the meter again reads on the SET LINE before proceeding with the following tests.

DWELL AND DWELL VARIATION TESTS

1. Turn switch to the proper LOBE position.
2. Operate engine at idle speed and note reading on dwell scale of meter. Refer to specifications for proper dwell.
3. Turn tachometer switch to the 5000 rpm position and increase speed to 1500 rpm.
4. Turn switch back to the DWELL position and again note dwell reading. Slowly reduce speed to idle while watching meter. Dwell should not change more than 3 degrees in either case.

Contact Point Adjustment: The point opening of new points can be checked with a wire feeler gauge, but the use of a feeler gauge on older, rough points is not recommended, since accurate gauging cannot be done on such points. The gauge measures between high spots on the points instead of the true point opening. Point opening of used points can be checked with a Dwell Angle Meter. A meter of this type indicates the cam or contact angle. This angle is the number of degrees that the breaker cam rotates from the time the points close until they open again. The cam angle increases as the point opening decreases and it is reduced as the point opening is increased. Manufacturers of this type equipment furnish complete instructions as to their use.

NOTE

REFER TO SPECIFICATIONS FOR DWELL ANGLE AND CONTACT POINT OPENING.

To check point opening with a feeler gauge, insert a wire feeler gauge of proper size between the contact points. MAKE CERTAIN THAT THE BUMPER BLOCK ON THE MOVABLE CONTACT IS AT THE HIGH POINT ON THE CAM. If adjustment is necessary, loosen the lock screw, and insert a screwdriver of the proper size in the adjustment slot and move the stationary arm until the correct clearance is obtained. Tighten locking screw and recheck point gap. See Plate 7457.

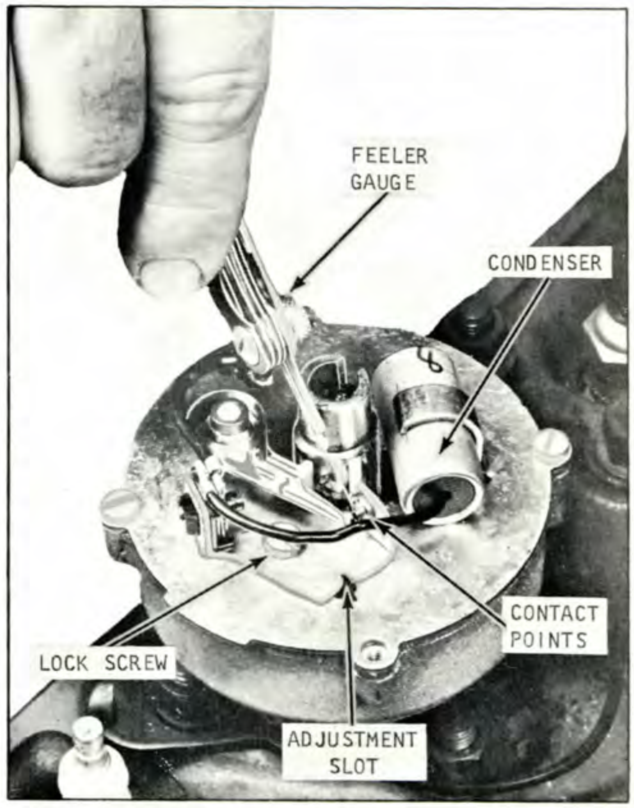


Plate 7457. Contact Point Adjustment

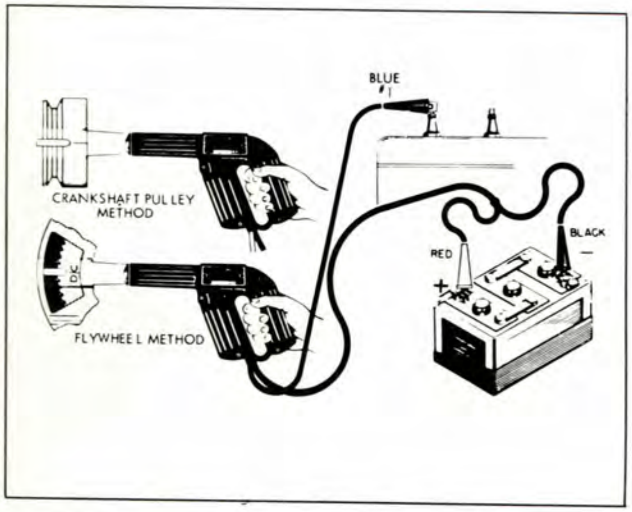


Plate 7818. Timing Light Hookup

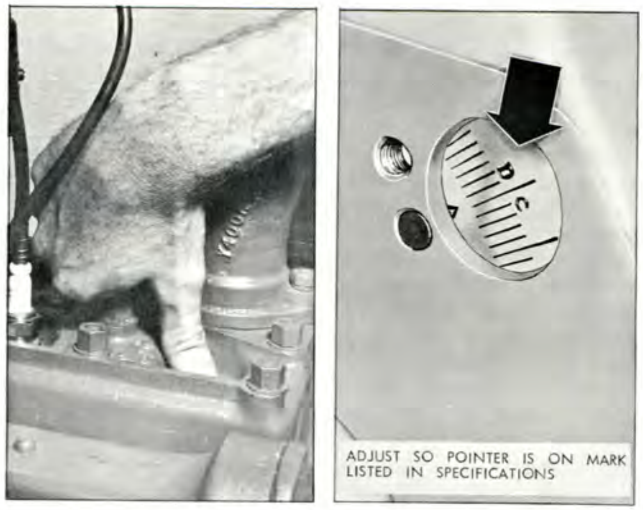


Plate 7861. Ignition Timing

9. IGNITION TIMING

There are two methods of checking ignition timing --- with or without a timing light. The PREFERRED METHOD is to use a timing light in following sequence:

Paint a line on the flywheel (or in some cases, on the front pulley) so the correct timing mark will be more legible under the timing light.

a. Clip blue secondary lead of light to the #1 spark plug -- leave spark plug wire on plug.

b. Connect primary positive lead (red) to positive terminal of battery.

c. Connect primary negative lead (black) to negative battery terminal.

d. Start engine and run a 400 RPM or below so the automatic advance of the distributor is completely retarded. THIS IS VERY IMPORTANT TO OBTAIN CORRECT TIMING.

N O T E

The initial advance RPM range is 430-580. Distributor advance at 600 engine RPM should be 1° to 5°.

e. Direct timing light on the pulley (or flywheel through opening in bell housing) and note timing marks as light flashes. The light should flash on the timing mark that is listed in specifications.

f. To advance timing, turn distributor body clockwise. To retard timing, turn distributor body counterclockwise.

g. When timing is correct, tighten distributor clamp screw securely. Then recheck timing again with light.

ALTERNATE TIMING METHOD

a. Remove #1 Spark Plug -- put your thumb over the spark plug hole and crank engine by hand until air is exhausting.

b. Continue to slowly crank engine until the mark listed in specifications lines up with the pointer in bell housing.

c. Loosen the distributor clamp bolt and rotate the distributor body until the contact points just start to open. (This may be more accurately checked by means of a test lamp connected between the distributor primary lead and the negative terminal of the battery -- when the points are closed the light will be ON and as soon as the points break the light will go OFF.)

d. Tighten distributor mounting bolts.

10. VACUUM TEST

Before making vacuum test, make certain cylinder head is securely tightened and that cylinder head gasket is not leaking. Air cleaner must be installed and must be clean to perform vacuum test. Manifold stud nuts must be tight and there must not be any leakage at gasket.

Remove vacuum pipe plug from intake manifold or carburetor (machines so equipped) and attach vacuum gauge in pipe plug opening. Start engine and allow it to warm up to normal operating temperature.

Idle Fuel Adjustment: The idle adjustment needles regulate the fuel-air mixture, see Plate 6447 and 6448. Turning the screws clockwise, towards the seat, cuts off air increasing the suction on the idle jet and making the mixture richer. Turning the idle adjusting screws counterclockwise, or away from seat, allows more air to be mixed with the fuel making a leaner mixture for idling.

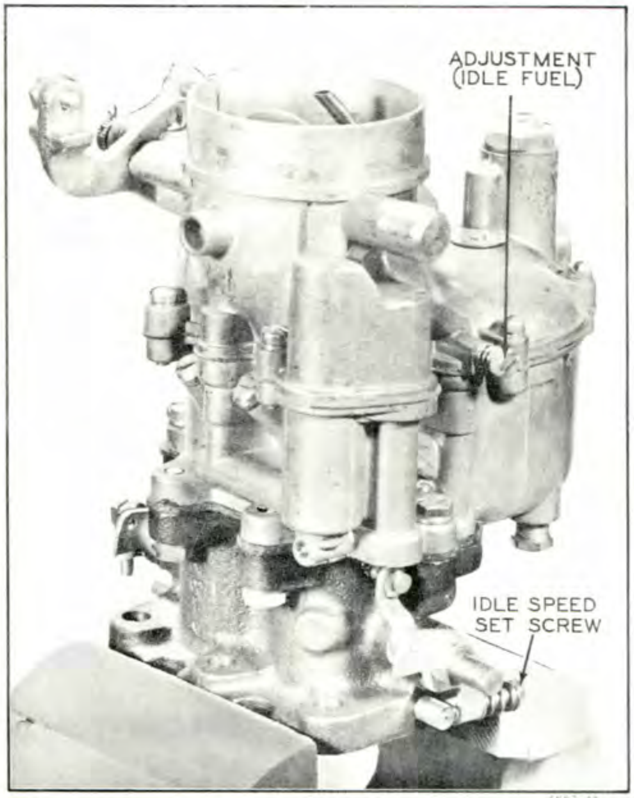


Plate 6447. Idle Fuel Adjustment

Turn the screws until highest vacuum reading is obtained.

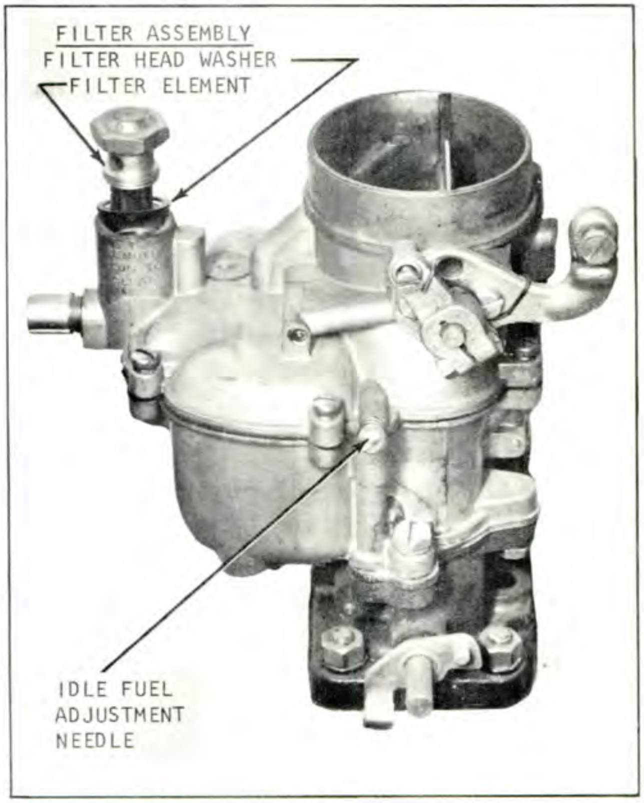


Plate 6448. Idle Fuel Adjustment and Filter Assembly

If a guage is not used, set the screws to a range at which engine idles its smoothest.

Idle Speed Adjustment: A stop screw controls action of the throttle valve. Turn screw clockwise for faster idle speed, or counterclockwise for slower idle speed. This adjustment should be made with a tachometer. Idling speed should be set for 450 to 500 revolutions per minute. Reset idle fuel needle screw if necessary, after throttle adjustment has been made.

Carburetor Fuel Filter: Remove Fuel Filter Assembly, see Plate 6448. Clean or replace as required. Check Filter Head Washer for serviceability before reassembling filter to carburetor.

DISTRIBUTOR (All FOUR and SIX Cylinder Engines)

N O T E

Distributors are equipped with either Standard or Heavy Duty Points. Heavy Duty Points are thicker (have more contact material) than Standard Points.

Heavy Duty Points - All FOUR Cylinder Engines
Set Dwell Angle at................ $31^\circ - 34^\circ$

Heavy Duty Points - All SIX Cylinder Engines
Set Dwell Angle at................ $22^\circ - 26^\circ$

Heavy Duty Points

When connecting leads, terminals must be back to back (flat sides together). Push into slot between insulator and spring. (DO NOT push lever spring.) Then push other terminal in place between first terminal and insulator. See following illustration.

WHEN CONNECTING LEADS, THE TERMINALS MUST BE BACK TO BACK (flat sides together)...........

- FOUR (4) CYLINDER ENGINES, ONLY -

Point Opening (in.)	Dwell Angle (deg.)	Centrifugal Advance							
		START		INTERMEDIATE		INTERMEDIATE		MAXIMUM	
		Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.
.022*	31-34	600	1-5	800	6-10	1600	11-15	2200	15-19
.021**	31-34	600	1-5	800	6-10	1600	11-15	2200	15-19

- SIX (6) CYLINDER ENGINES, ONLY -

Point Opening (in.)	Dwell Angle (deg.)	Centrifugal Advance							
		START		INTERMEDIATE		INTERMEDIATE		MAXIMUM	
		Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.
.020*	28-32	600	1-5	800	6-10	1600	11-15	2200	15-19
.021**	22-26	600	1-5	800	6-10	1600	11-15	2200	15-19

N O T E

Time engine with timing light and tachometer at 400 engine RPM or below to the above specifications. The initial advance RPM range is 430 - 580. Distributor advance at 600 engine RPM should be 1° to 5°. Distributor rotation (as viewed from cap end) is counterclockwise.

When checking Distributor on a test stand, the above specifications are 1/2 that shown.

*........... Four (4) or Six (6) Cylinder Engine STANDARD Points.
**.......... Four (4) or Six (6) Cylinder Engine HEAVY DUTY Points.

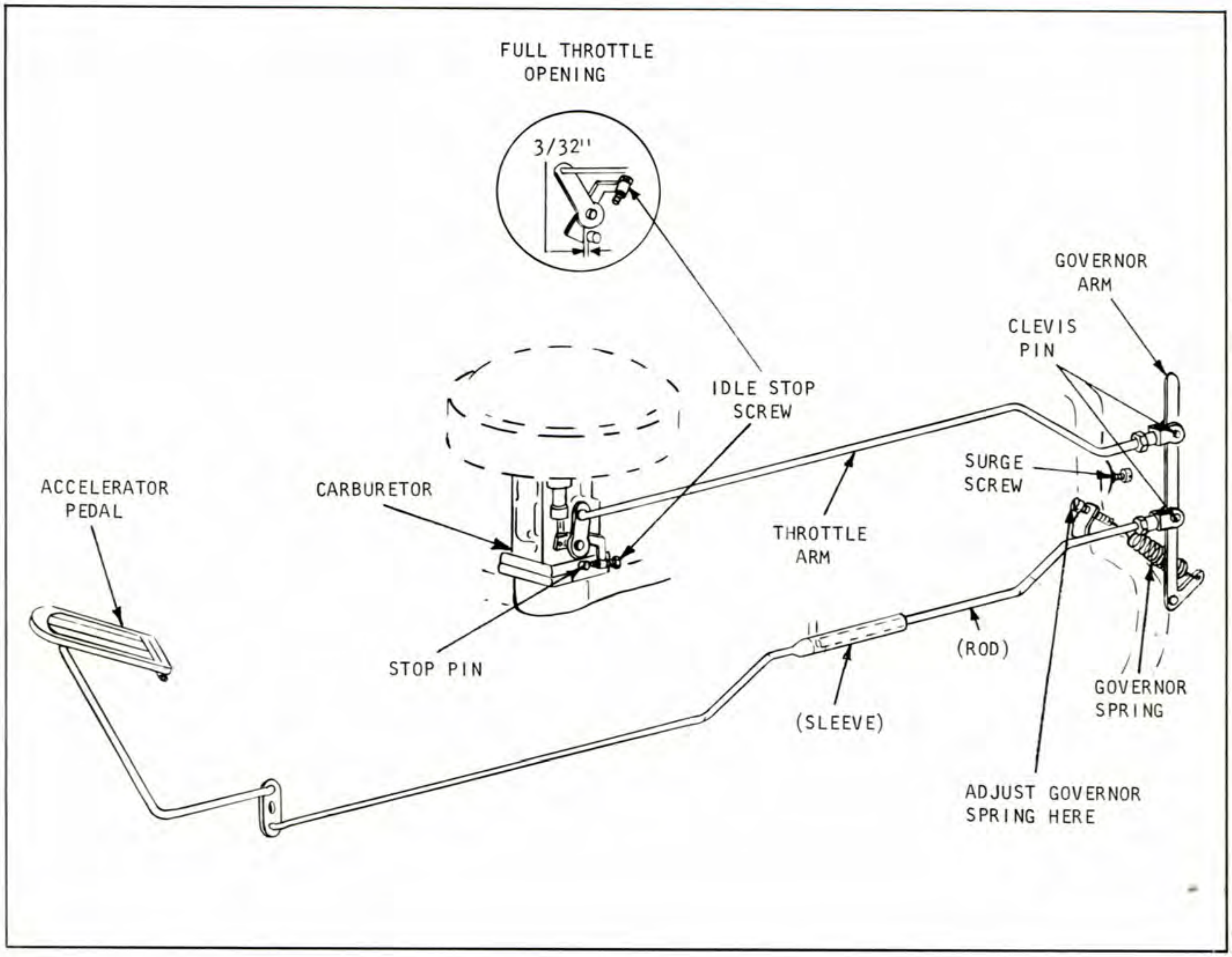


Plate 7658. Governor Adjustment

11. GOVERNOR ADJUSTMENT (GAS ENGINES)

With timing set on top dead center, and the carburetor properly adjusted to idle at 500 R.P.M., proceed with the following:

A. Loosen Governor Surge Screw Jam Nut and back Surge Screw out.

B. Disconnect Slip Tube Rod from Governor Arm by removing Clevis Pin.

NOTE

REMOVE CLEVIS PIN --- DO NOT LOOSEN CLEVIS JAM NUT.

C. Pull rod from Slip Tube Sleeve and thoroughly clean rod and sleeve. Lubricate rod with Graphite Grease after cleaning.

NOTE

THE SLIP TUBE ROD AND SLEEVE ASSEMBLY CANNOT FUNCTION PROPERLY IF IT IS BINDING, THEREFORE, THE ASSEMBLY MUST BE CLEAN AND PROPERLY LUBRICATED TO CORRECTLY ADJUST THE GOVERNOR.

D. With the Slip Tube and Sleeve Assembly disconnected, the Governor Arm will move forward. Check the Carburetor Throttle Opening Stop and Stop Pin on the carburetor.

If adjustment is necessary, adjust the Throttle Rod between carburetor and governor arm until the specified clearance (3/32 inch between STOP and STOP PIN) is obtained.

E. Push the Governor Arm toward rear of machine until the Idle Stop Screw contacts Stop Pin on the carburetor. Rotate the Governor Surge Screw inwards until screw comes in contact with the Governor Shaft Lever (when holding the Governor Arm rearward) ---- Do Not Rotate Screw So Far That The Idle Stop Screw Moves Away From Stop Pin. When correct surge screw adjustment is obtained, tighten jam nut.

F. With the use of an Electric Tachometer, start engine (Warm up to normal temperature) and check for NO -- LOAD 2600 R.P.M.

NOTE

GOVERNED R.P.M. SHOULD BE CHECKED WITH THE SLIP TUBE ROD DISCONNECTED BETWEEN THE ACCELERATOR LINKAGE AND THE GOVERNOR ARM.

If adjustment is necessary, adjust the Governor Spring, see Plate 7658.

G. Install Slip Tube over rod. Attach Rod Clevis to Governor Arm with Clevis Pin.

IMPORTANT

WITH IGNITION OFF, DEPRESS ACCELERATOR PEDAL AND CHECK THROTTLE OPENING. IF THERE IS MORE THAN 3/32 INCH CLEARANCE BETWEEN THE FULL THROTTLE OPENING STOP AND STOP PIN (ON THE CARBURETOR), ADJUST THE SLIP TUBE CLEVIS, OR ACCELERATOR PEDAL LINKAGE TO OBTAIN THIS DIMENSION.

H. Start engine and again check for NO - LOAD 2600 R.P.M.

If specified R.P.M. is not obtained, check for binding linkage, bent Slip Tube, etc., free up, straighten or repair as required.

STARTING MOTOR

1. Remove end plate (or Brush Cover) from starter. Use a wire hook to lift a brush spring and remove brush from holder. Compare brush size with that of a new brush. If brush is worn beyond half the original size, or if brushes are jammed, chipped, or broken they must be replaced.

CAUTION

NEVER ALLOW SPRING TO SNAP DOWN ON BRUSHES.

Plate 6449 Checking Brush Spring Tension

2. Check for Brush Spring Tension, refer to Specifications. Refer to the following procedures for checking spring tension.

Measuring Brush Spring Tension - Reaction Type Brushes. Hook the scale under the brush spring near the end and push or pull on a line parallel to the sides of 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.

Measuring Spring Tension - Swinging Type Brushes: Hook the spring scale under the brush screw tight against the brush and push or pull on a line parallel to the sides of the brush. Take the reading just as the brush leaves the commutator. Pulling slightly on a strip of paper which has been placed under the brush will indicate when the brush leaves the commutator and the correct instant for reading the spring scale.

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

CAUTION

DO NOT USE EMERY CLOTH TO CLEAN COMMUTATOR.

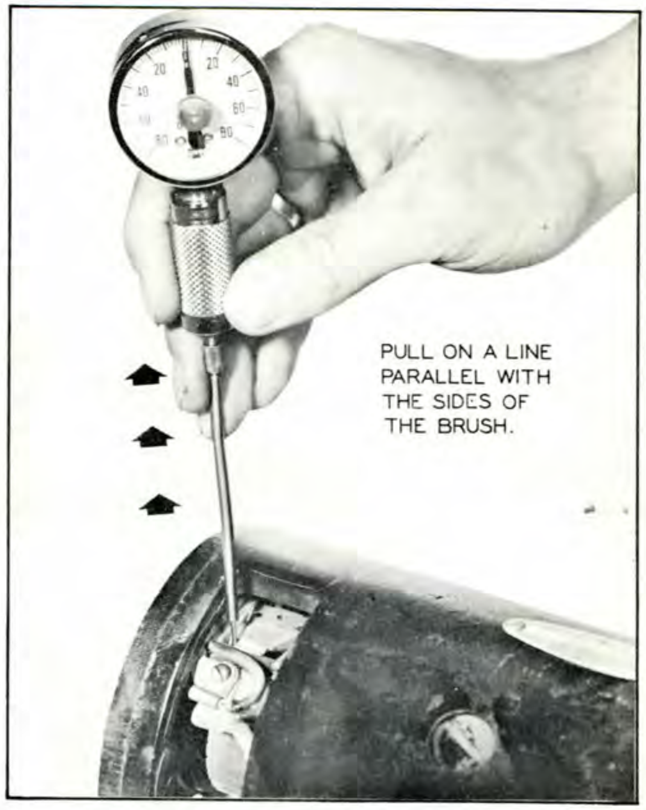


Plate 6450. Checking Brush Spring Tension

Condition Test: Use one of the two following methods to determine whether the starting motor should be removed from the engine for inspection, service or replacement.

1. First Method: Operate the starting motor by disconnecting the battery cable from the solenoid switch and holding the cable terminal firmly against the starting motor terminal, using a battery known to be fully charged and in good condition. To do this it will be necessary to remove the solenoid switch.

2. If the motor reacts correctly, and the drive mechanism engages and disengages each time the starting motor is operated, the starting motor is in good condition.

3. If motor does not react properly, it must be removed for inspection or replacement.

4. Second Method: Using a voltmeter and a battery (fully charged) that is in good condition, connect positive lead of test voltmeter to positive terminal of battery and negative lead of voltmeter to negative (grounded) terminal of battery. Record voltmeter reading. Now pull high-tension wire from ignition coil so engine will not start when starter is engaged. Connect positive lead of test voltmeter to ground and negative lead of test voltmeter to starter switch terminal. Turn ignition switch to start position and note voltmeter reading. Compare this reading with the previously recorded reading. If the voltage drop is more than 4 volts, or if the second reading is below 8 volts, the starting motor should be removed from the engine for further testing and repair, or replacement.

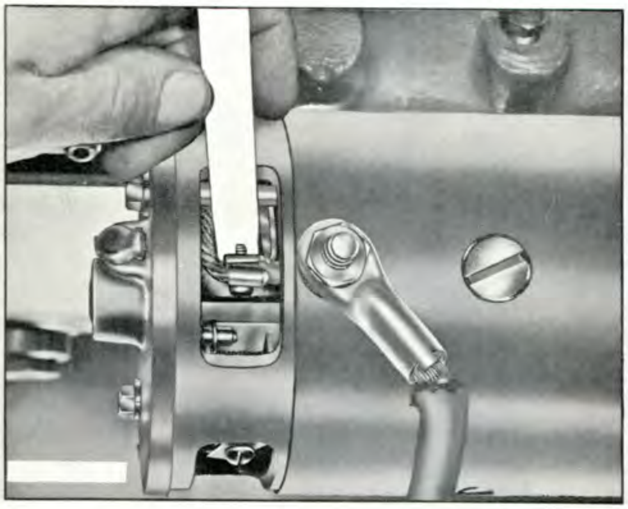


Plate 3436. Seating Brushes

N O T E

BLOW OUT ABRASIVE PARTICLES AFTER SEATING BRUSHES.

STARTER LUBRICATION

The starter end frame bushing (Commutator End) should be lubricated every 30,000 starts or at least once a year (2000 operating hours). Use American Oil Molylith number 2 grease or its equivalent.

C A U T I O N

DO NOT OVER-LUBRICATE, AS EXCESS GREASE IS DETRIMENTAL TO STARTER COMPONENTS —— OVER-LUBRICATING MAY CAUSE GREASE TO BE FORCED ONTO THE COMMUTATOR AND BRUSHES.

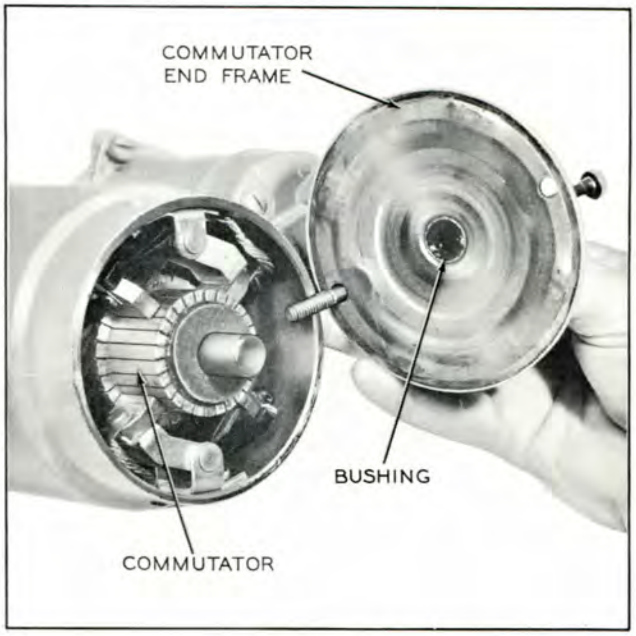


Plate 6236. End Frame Bushing Lubrication-Typical Starter

GENERATOR

1. Remove end plate (or Brush Cover) from generator. Use a wire hook to lift a brush spring and remove brush from holder. Compare brush size with that of a new brush. If brush is worn beyond half the original size, or if brushes are jammed, chipped, or broken they must be replaced.

CAUTION

NEVER ALLOW SPRING TO SNAP DOWN ON BRUSHES.

New brushes can be seated with a brush seating stone. When held against the revolving commutator, the abrasive material carries under the brushes, seating them in a few seconds. Blow out abrasive particles after seating brushes. See Plate 3436.

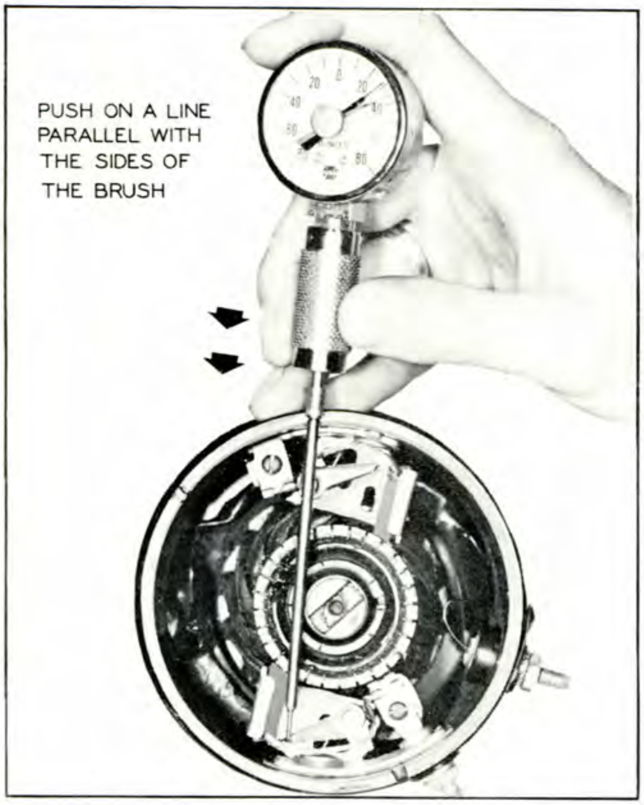


Plate 6451. Checking Brush Spring Tension

Using a spring scale, check for proper brush spring tension. Refer to Specifications. Refer to the following procedures for checking spring tension.

Measuring Brush Spring Tension - Reaction Type Brushes. Hook the scale under the brush spring near the end and push or pull on a line parallel to the sides of 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.

Measuring Spring Tension - Swinging Type Brushes: Hook the spring scale under the brush screw tight against the brush and push or pull on a line parallel to the sides of the brush. Take the reading just as the brush leaves the commutator. Pulling slightly on a strip of paper which has been placed under the brush will indicate when the brush leaves the commutator and the correct instant for reading the spring scale.

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

CAUTION

DO NOT USE EMERY CLOTH TO CLEAN COMMUTATOR.

Plate 6450. Checking Brush Spring Tension

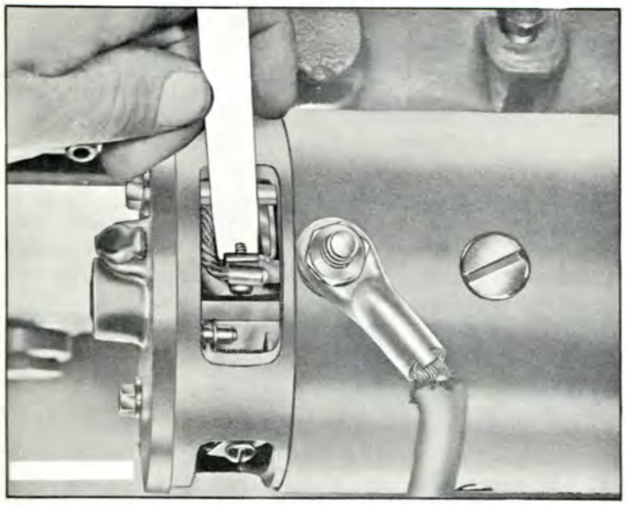


Plate 3436. Seating Brushes

NOTE

BLOW OUT ABRASIVE PARTICLES AFTER SEATING BRUSHES.

REGULATOR

Inspect regulator leads for frayed or worn condition. Check to make certain that leads are tight and securely mounted.

WIRING

Check all wires for loose or corroded connections and for fraying. Replace defective wires.

Plate 6640. Typical Wheel Bearings

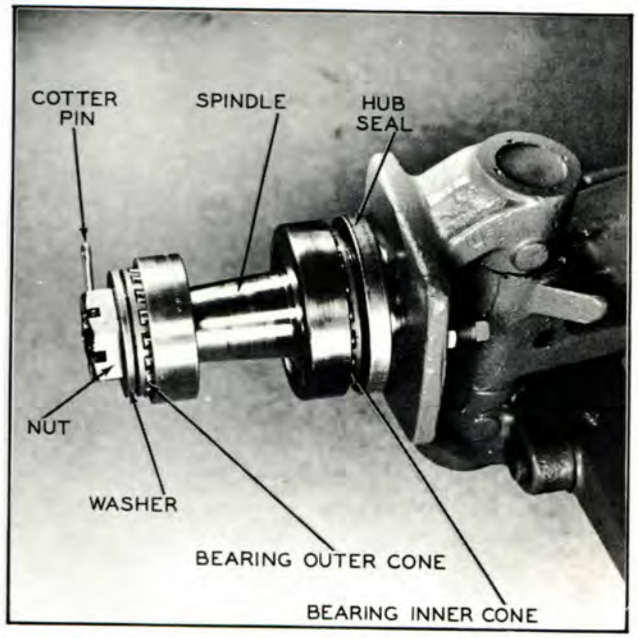


Plate 6703. Typical Wheel Bearings

STEERING WHEEL BEARINGS

Adjustment

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

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

NOTE

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

NOTE

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.

TO ELEVATE DRIVE WHEELS

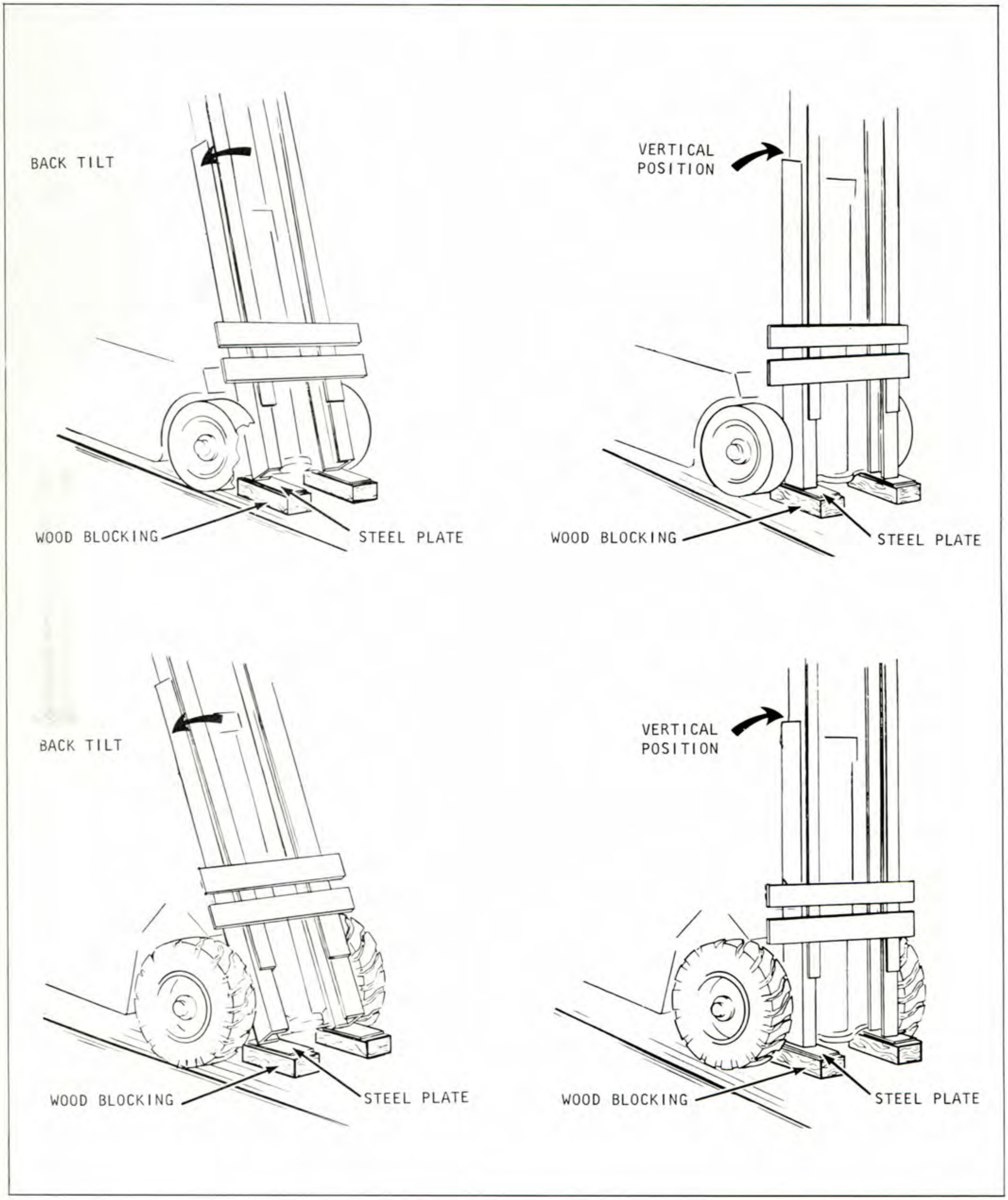


PLATE 10317. TO ELEVATE DRIVE WHEELS, PLACE UPRIGHT BLOCKING AS SHOWN ABOVE.

CLEAN AND REPACK AXLE ENDS

Every 1000 operating hours remove and repack the axle ends.

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. Remove drive wheels.

WARNING

ON PNEUMATIC TIRE MACHINES DEFLATE TIRES BEFORE REMOVING WHEELS.

2. Remove hub cap, outer spindle nut, lockwasher, inner spindle nut and washer. Pull hub assembly from spindle.

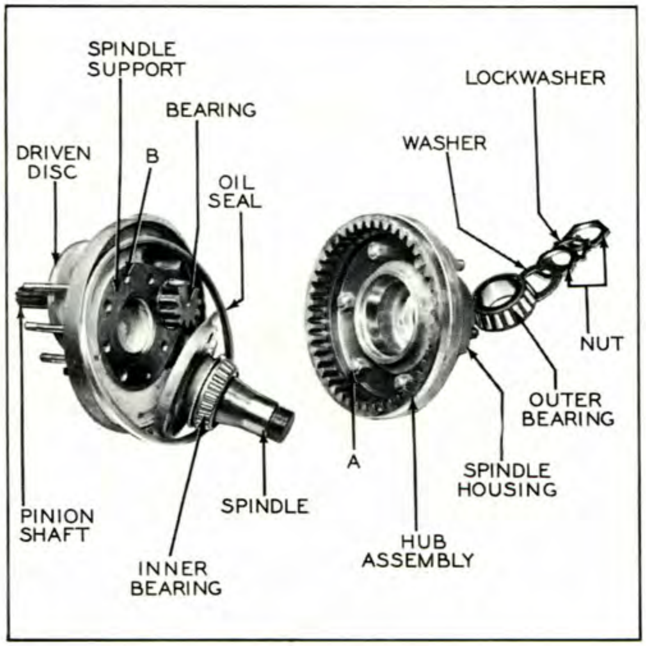


Plate 5694. Axle End Assembly

3. Remove bearings and clean in a Stoddard type cleaning solvent. Slosh 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. Pack all bearings with NLGI #1 (Amolith grease EP #1 or its equivalent) before final assembly. Also pack the hub cavity between the bearings 1/2 full. (As an alternate grease No. 1 E.P. lithium soap grease may be used).

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

6. Inspect seals for cuts, scratches and nicks. It is necessary to replace seal if such a condition is found. Check the axle end vent for obstruction, vent must be open. See Plate 6893.

Plate 6893. Typical Axle End Vent

7. Pack the spaces between the teeth of the ring gear and pinion, level full for the entire circumference with NLGI #1 (Amolith grease EP #1 or its equivalent). The approximate amount of grease in this area is to be 1 1/4 pounds.

8. Install bearings, seal and hub assembly on spindle. Tighten inner bearing adjusting nut until bearings bind slightly during rotation. Back off adjusting nut approximately 1/8 turn and lock with outer nut. Secure this adjustment by bending the tangs on the lock washer. Install the hub cap.

9. Replace drive wheels and tires. Inflate tires if they are of the pneumatic type. Tilt upright back and remove blocking.

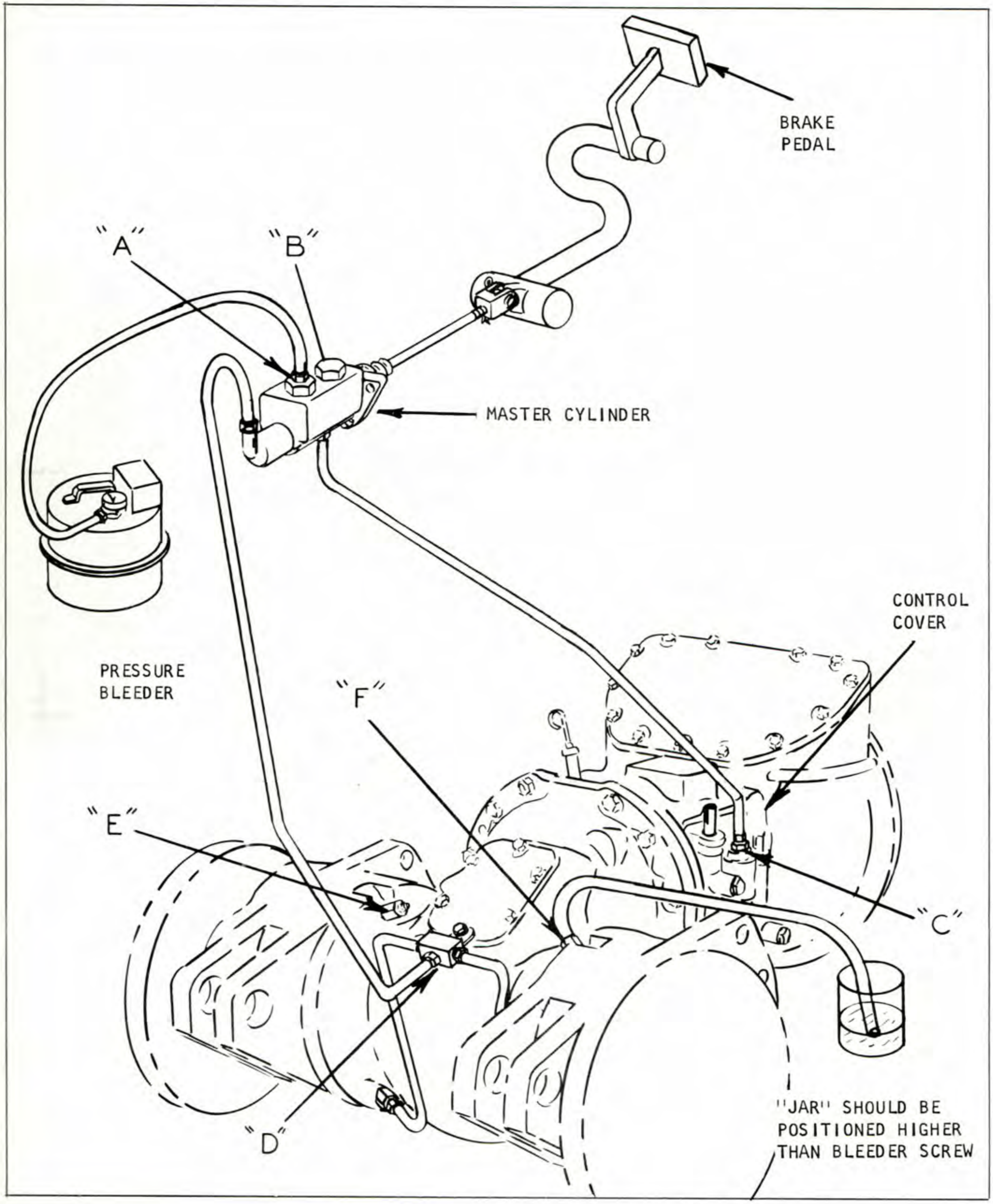


Plate 7302. Bleeding Brakes

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 or 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.

NOTE

IF DRIVE WHEELS ARE REMOVED FROM MACHINES EQUIPPED WITH PNEUMATIC TIRES, DEFLATE TIRES BEFORE REMOVING.

Step 2. Check the brake pedal free travel (see specifications). Clean dirt from around the filler cap of the master cylinder reservoir. Brake fluid should be within 1/4" of the top. With filler cap off the master cylinder, depress and release brake pedal. A small displacement of fluid should be noticed in the cylinder reservoir. If this happens, the brake pedal (upon being released) is returning the master cylinder piston to its normal position to open a master 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.

NOTE

THE KEY LETTERS IN PARENTHESES ARE SHOWN ON OPPOSITE PAGE EXCEPT WHERE OTHERWISE INDICATED.

Step 3. To properly bleed the system it is recommended that a pressure bleeder filled with about two quarts of S.A.E. 70-R-3 heavy duty brake fluid be connected to the master cylinder reservoir. Pressure bleeder should then be pressurized to 10-20 P.S.I.

Step 4. Remove vented filler plug and attach pressure bleeder.

Step 5. Loosen plug (B) to permit air to escape from reservoir. Tighten plug after fluid appears around plug.

Step 6. Loosen tube nut (C) and allow all air to escape. Tighten tube nut.

Step 7. Loosen tube nut (D) and allow air to escape. Tighten tube nut.

Step 8. Install a bleeder hose on bleeder screw (E) and submerge the unattached end of the hose in a clean transparent jar containing several inches of brake fluid. NOTE: DURING BLEEDING THE JAR SHOULD BE ELEVATED TO A POSITION HIGHER THAN THE BLEEDER SCREWS MAKING SURE THAT THE END OF THE HOSE REMAINS SUBMERGED IN THE FLUID AT ALL TIMES. Allow fluid to flow until all traces of air are gone. Tighten bleeder screw. Repeat this operation on opposite bleeder screw (F).

Step 9. 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 cap.

Step 10. If wheels were removed 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 six thru eight. It must 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 inch of the top as required.

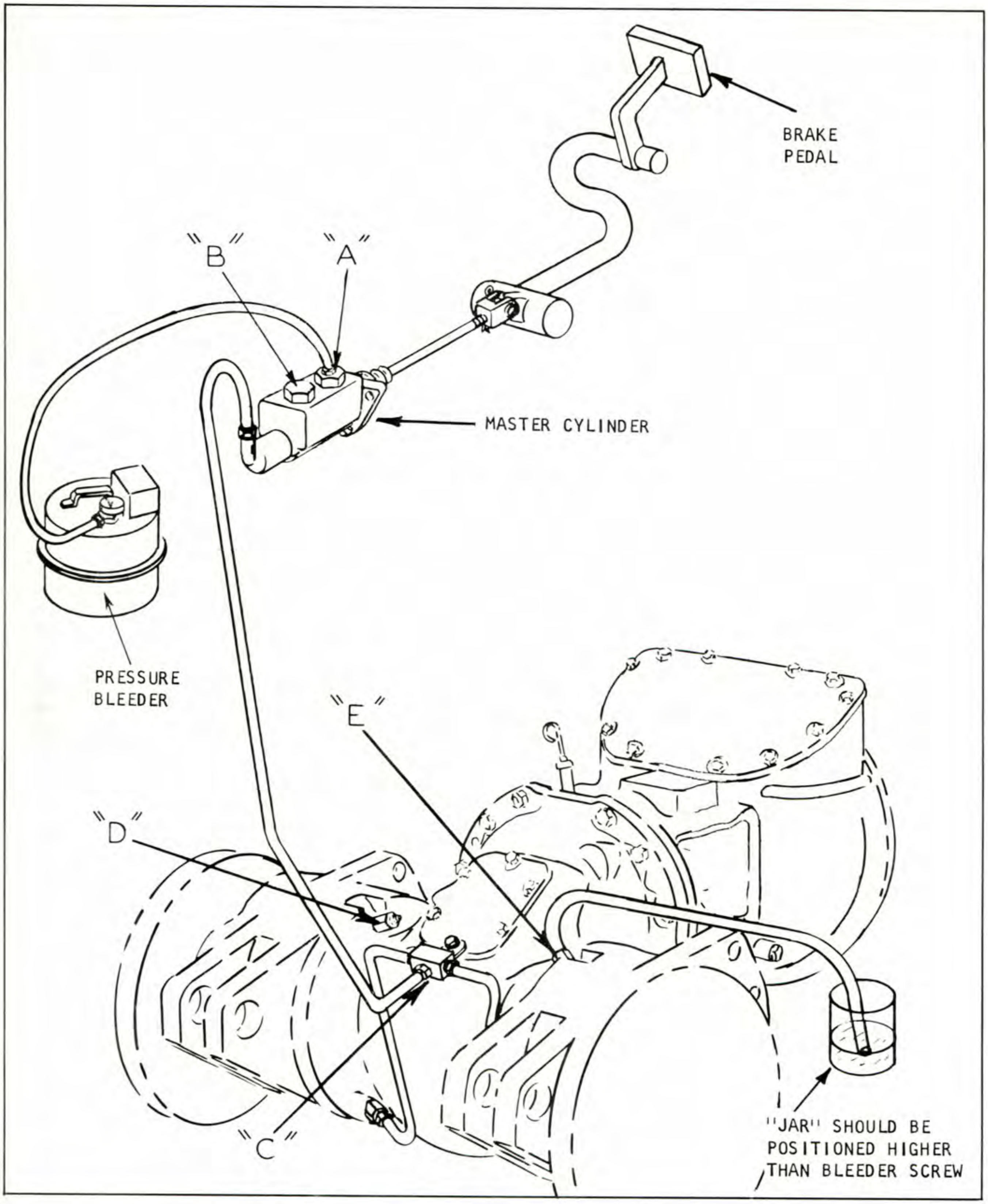


Plate 7394. Bleeding Brakes

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.

N O T E

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 shutoff 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.

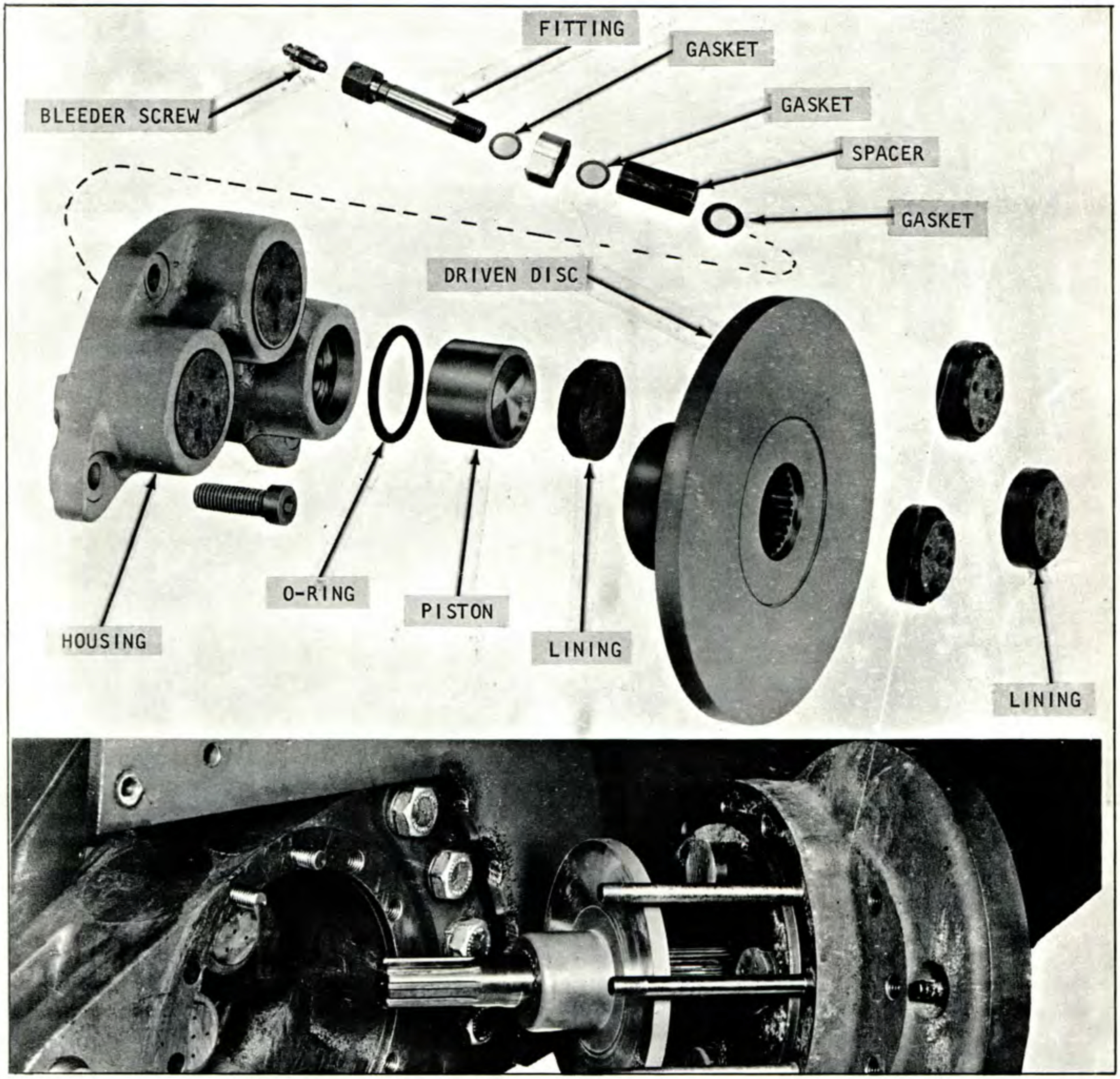


Plate 7567. Typical Service Wheel Brake Assembly

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.

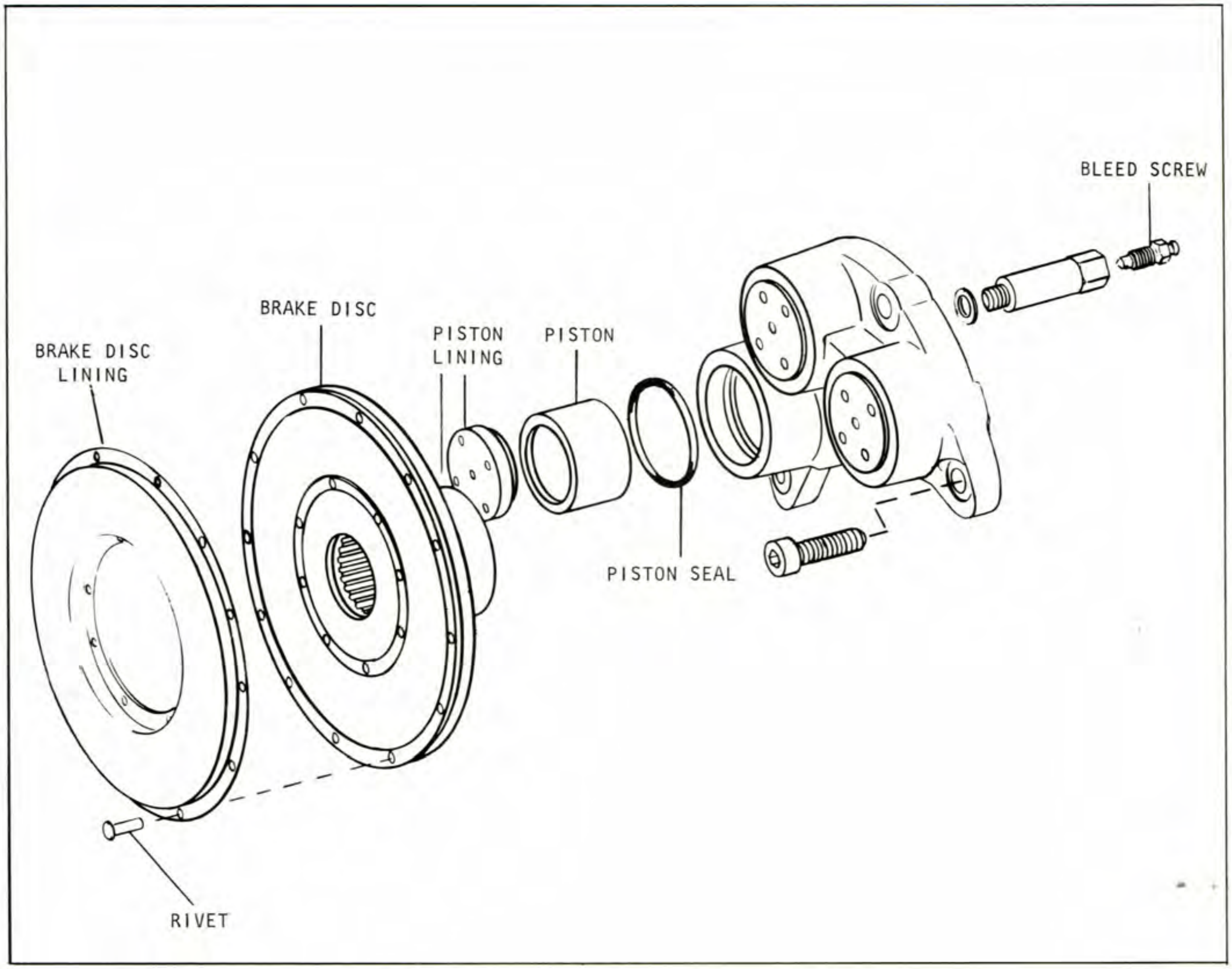


Plate 8261. Typical Wheel Brake Assembly

DESCRIPTION

When depressing the brake pedal, hydraulic pressure is applied to the brakes, the pistons move out and their linings force the brake disc and its lining against a member of the axle end producing braking action by friction.

INSPECTION

Operating conditions determine the inspection and service periods for the brake linings. If it is found that the brake effectiveness has dropped to a noticeable degree (and the system has been properly bled and pedal free travel is correctly adjusted) the axle ends should be removed so that linings may be inspected to determine their further serviceability.

The original thickness of the brake disc lining is 0.221 inch. The disc lining is effective until it is worn to 1/16 inch thickness. If after inspection it is found that the lining is worn to the extent that it will not be effective until the next inspection period, it should be replaced. The brake piston lining when new is 0.649 inch thick to the step on the lining. This lining should also be replaced if it is determined that it will be worn to within 1/16 inch of step before the next inspection period.

Before replacing axle ends, check the cylinders for leakage. The actual presence of fluid, other than mere dampness, indicates a fluid leak. Correct leaks as necessary by replacing the piston seals after cleaning the pistons and seal grooves thoroughly.

PARKING BRAKE ADJUSTMENT

The mechanical "V" block type parking brake operates on the transmission drive shaft brake drum. The only adjustment necessary during the useful life of the brake lining, is a periodic adjustment of the linkage.

To adjust the linkage, remove the floor plates, and adjust the clevis on the linkage, so that the brake handle has 2 inches of upward travel, before resistance is noticed and the brake becomes applied.

The parking brake must be capable of holding the truck, with full rated load, on a 15% grade. This should be tested with the drivers seat occupied, parking brake applied and the truck out of gear. If brake operation is not satisfactory report to designated individual in authority.

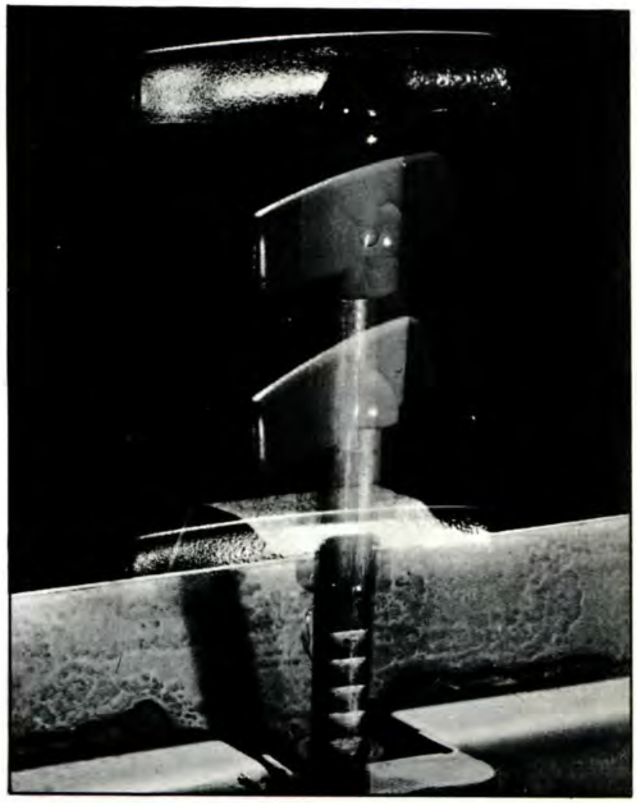


Plate 7482. Parking Brake

COOLING SYSTEM

Radiator Pressure Caps:

WARNING

USE EXTREME CARE IN REMOVING THE RADIATOR PRESSURE CAP. IN PRESSURE SYSTEMS, THE SUDDEN RELEASE OF PRESSURE CAN CAUSE A STEAM FLASH AND THE FLASH, OR THE LOOSENED CAP CAN CAUSE SERIOUS PERSONAL INJURY. LOOSEN CAP SLOWLY AND ALLOW STEAM TO ESCAPE.

1. Inspect pressure cap gasket and radiator filler neck to be sure they are providing a proper seal. If the rubber face of the valve is defective, a new cap should be installed.

Plate 6458. Radiator Pressure Cap

2. Inspect pressure cap for freedom of operation.

Pressure caps employ a spring loaded, rubber-faced valve which presses against a seat in the radiator top tank. Pressure caps employ either a vacuum valve held against its seat under spring pressure, or a weighted vacuum valve which hangs open until forced closed by a surge of vapor or coolant. Check to be sure components are free to operate.

NOTE

IF A NEW CAP IS REQUIRED, ALWAYS INSTALL A CAP OF THE SAME TYPE AND PRESSURE RATING. PRESSURE RATING 7 LB.

3. Inspect for dented or clogged overflow pipe. To remove clogged material, run a flexible wire through pipe until obstruction is removed.

When a pressure cap opens the sudden surge of vapor or liquid must pass thru the overflow pipe. If the pipe is dented or clogged, the pressure developed by the obstruction may cause damage to radiator or hoses.

Inspect and Clean Cooling System:

Check hose connections for coolant leaks as well as air leakage. Air leakage around hose connections allows oxygen into the system which is a major factor in corrosion.

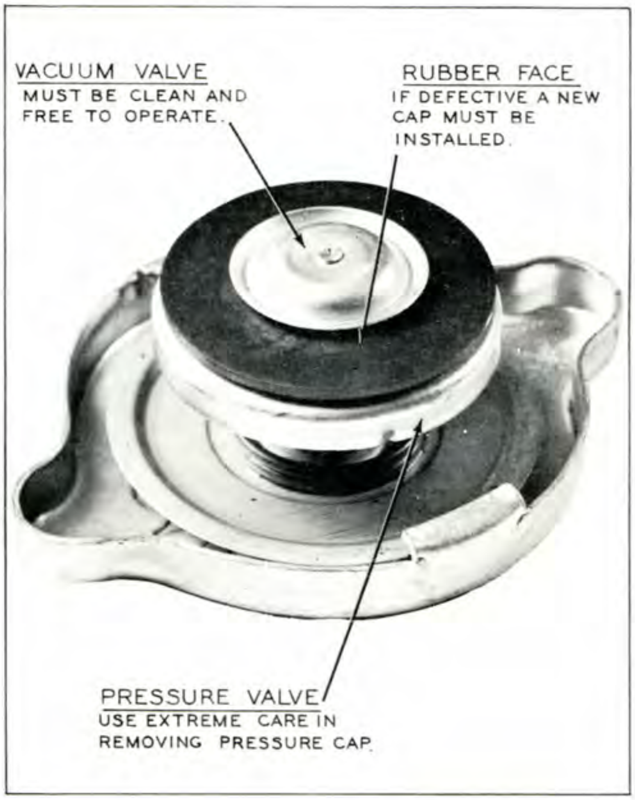


Plate 6459. Pressure Cap Gasket, Valve and Valve Gasket

NOTE

EXHAUST GAS LEAKAGE BETWEEN CYLINDER HEAD AND GASKET ALSO RESULTS IN CORROSION. IF EXHAUST GAS DISCHARGES INTO COOLANT, THE COOLANT AND THE GAS COMBINE TO FORM A VARIETY OF ACIDS. IT IS THEREFORE IMPORTANT THAT CYLINDER HEAD STUD NUTS BE DRAWN DOWN TO SPECIFICATIONS AS INSTRUCTED IN "ENGINE TUNE-UP".

Using a washing soda solution, flush cooling system in the following manner:

1. Drain system.

2. Replace half of volume with fresh water. Refer to Specifications for capacity.

3. Boil other half of volume and add washing soda until no more will dissolve.

4. Add hot soda solution to cooling system (fill up).

5. Operate engine normally for 24 hours.

6. Drain, flush, refill with clean water to which a soluable oil has been added in a proportion of 1 ounce per gallon of water.

Maintaining the cooling system efficiency is important, as engine temperatures must be brought up to and maintained within satisfactory range for efficient operation; however, must be kept from overheating, in order to prevent damage to valves, pistons and bearings. Continued overheating may cause internal damage, while continuously low operating temperature wastes fuel, increases engine wear and causes oil sludge and corrosion of engine parts.

Overcooling may be caused by operating conditions such as excessive idling, low speeds and light loads during cold weather. Overheating may be caused by faulty thermostat, clogged radiator or an improperly adjusted fan belt.

CAUTION

NEVER POUR COLD WATER OR COLD ANTI-FREEZE INTO THE RADIATOR OF AN OVERHEATED ENGINE. ALLOW THE ENGINE TO COOL AND AVOID THE DANGER OF CRACKING THE CYLINDER HEAD OR BLOCK. KEEP ENGINE RUNNING WHILE ADDING WATER.

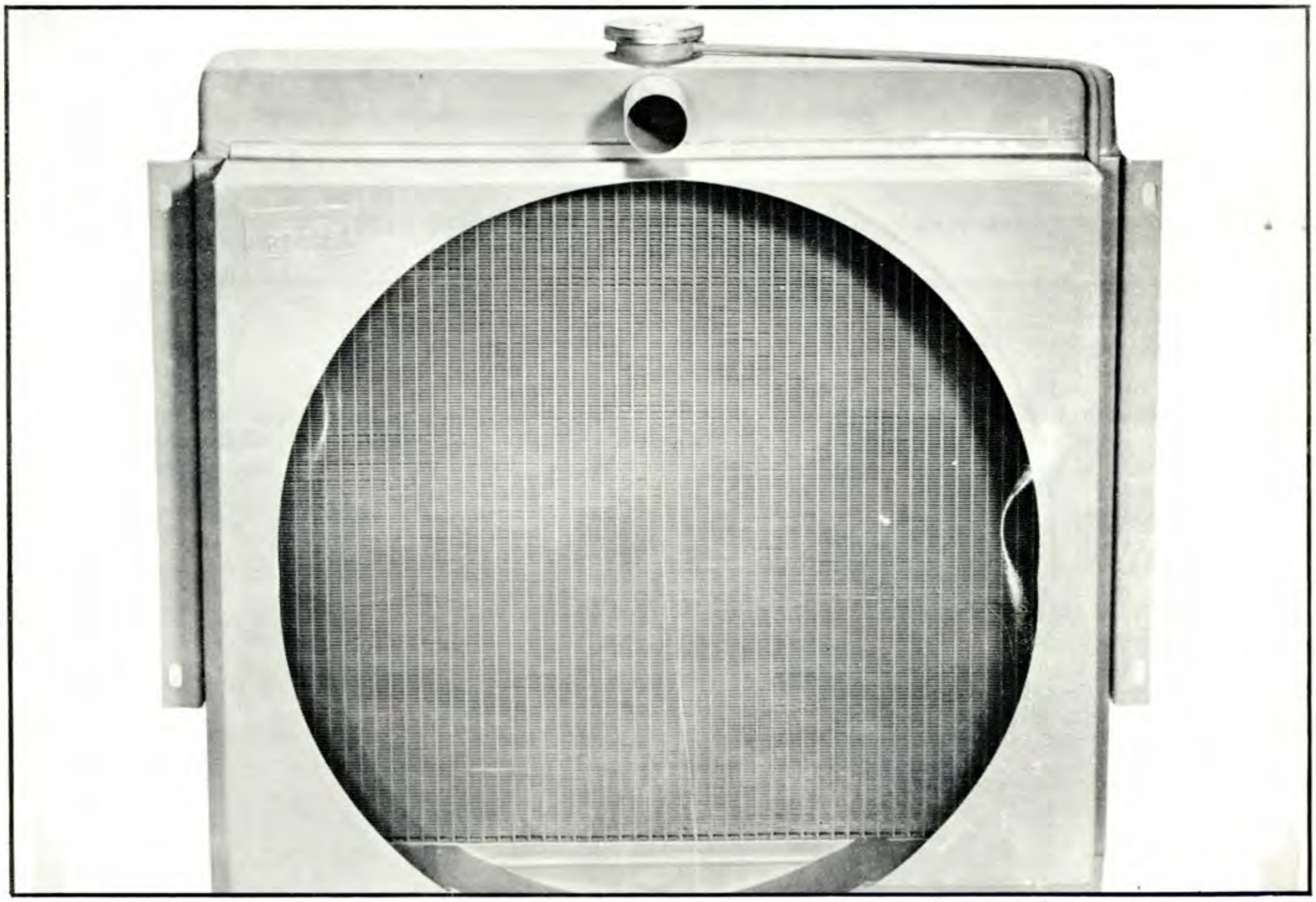


Plate 6461 Typical Radiator

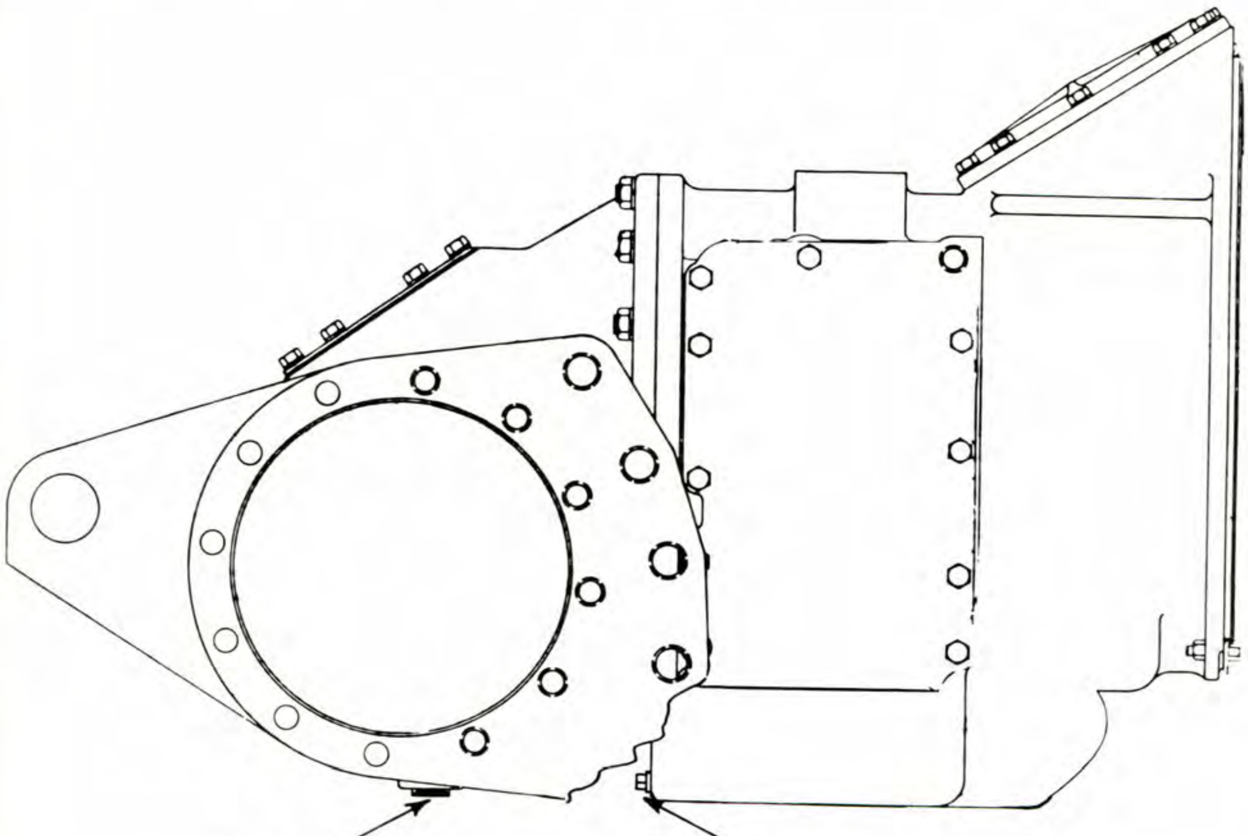


Plate 7301. Axle Adapter and Transmission Drain Plugs

TRANSMISSION AND AXLE ADAPTER - DRAIN AND REFILL. (HYDRACOOL CLUTCH MODELS)

The transmission and axle adapter have a common lubrication system and should be drained at operating temperatures.

It is necessary to remove both the axle adapter drain plug and the transmission drain plug to facilitate complete draining.

After the transmission and axle adapter have completely drained, replace drain plugs and refill to the full mark on the transmission dipstick. Use a straight mineral gear lubricant of a S.A.E. number 90 grade.

Operate the machine in forward or reverse for a short period of time to distribute the lubricant throughout the system. Stop engine and again check lubricant level. Add lubricant until the level reaches the full mark on the dipstick.

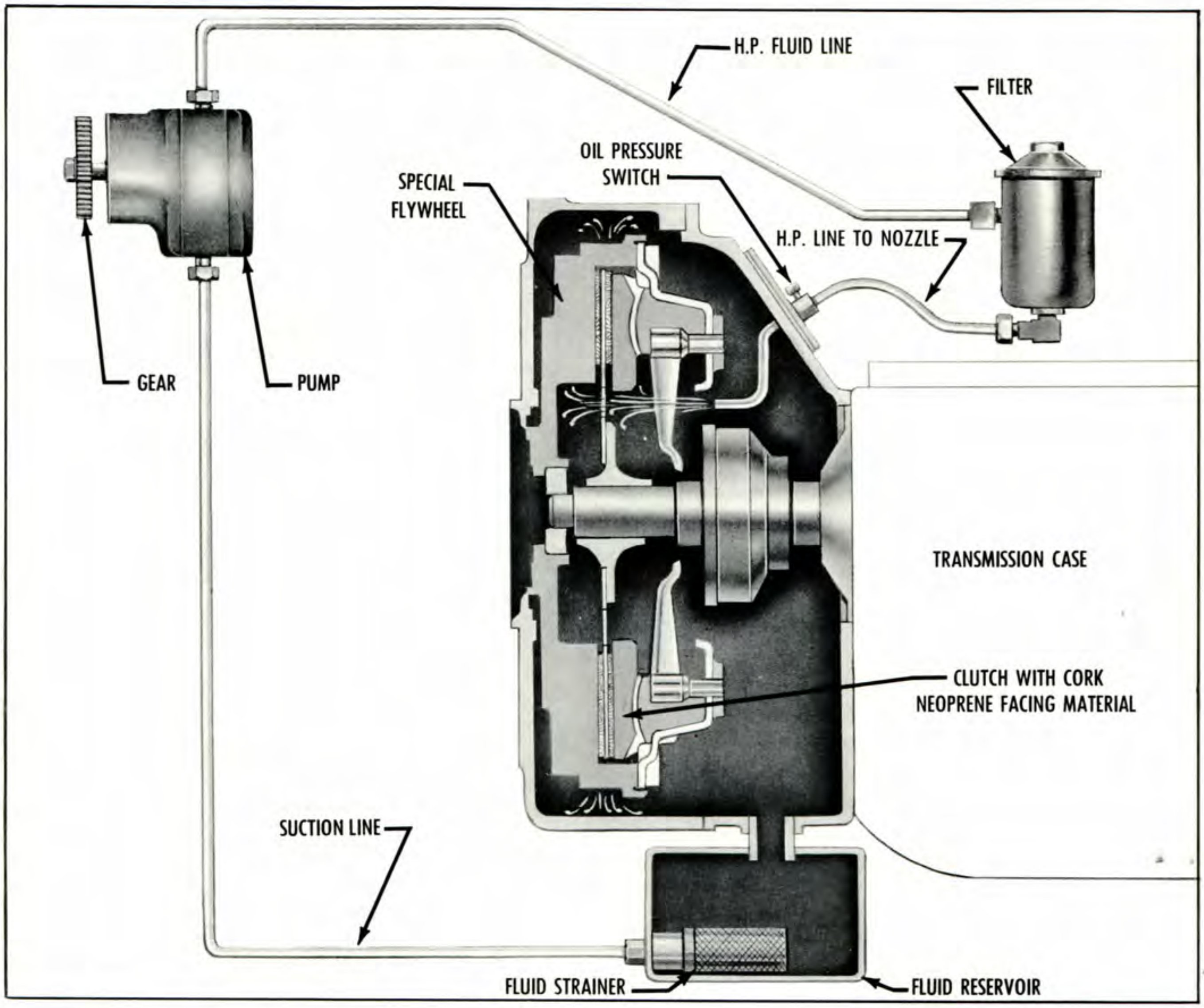


Plate 7182. Typical Hydracool Clutch

HYDRACOOL CLUTCH

1. Drain clutch reservoir at drain plug.

2. Remove fluid strainer screen from clutch reservoir. Thoroughly clean screen in a Stoddard type solvent.

3. Install screen into reservoir. Refill clutch reservoir through dipstick opening to proper level indicated on the dipstick (capacity 6 quarts). Use Automatic Transmission Fluid Type "A", Suffix "A", Clark Part number 879803. Fluid containers must display a qualification number prefixed by AQ-ATF.

HYDRACOOL CLUTCH FILTER

The filter element is of the replacable type and should be changed every time the fluid reservoir is drained.

1. Remove filter cover retainer, cover, gasket and spring.

2. Remove old element and thoroughly clean case with a lint free cloth.

3. Install new filter element.

4. Install spring and cover using a new gasket. Secure cover with retainer.

C A U T I O N

AFTER CLEANING RESERVOIR SCREEN, CHANGING RESERVOIR FLUID AND INSTALLING NEW FILTER ELEMENT, START ENGINE AND CHECK FOR LEAKS.

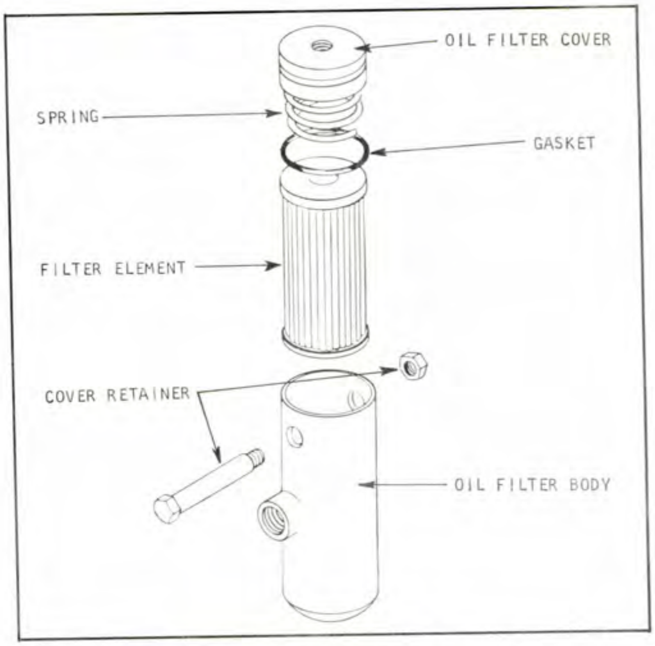


Plate 7234. Typical Hydracool Clutch Fluid Filter

HYDRAULIC SUMP TANK

Drain and refill with Hydraulic Fluid. Use fluid meeting Clark Specification MS-68.

CAUTION

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 CONDITION OF THE HYDRAULIC FLUID FOR EVIDENCE OF DIRT, SLUDGE OR ANY FOREIGN MATTER AT PERIODIC INTERVALS.

Plate 7657. Typical Hydraulic Fluid Strainer Components

1. Lower upright. Shut engine off.

2. Place a container of adequate capacity underneath the sump tank (approximately 20 gallons) which is located in front of the steer wheel on the right side of the machine.

3. Remove sump tank drain plug, located at bottom of tank, and allow the fluid to completely drain. Replace drain plug.

CAUTION

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

4. <u>Remove and Clean Sump Tank Strainer</u>: The sump tank strainer is located on the inward side of the box type frame that also serves as the sump tank.

a. Disconnect hoses leading to sump strainer and remove strainer retaining bolts.

b. Pull strainer assembly out of sump tank.

c. Remove any remaining gasket material from mounting flange.

d. Clean sump strainer in a Stoddard type cleaning solvent. After all foreign material has been cleaned from strainer it should be dried with filtered compressed air.

e. Install strainer in sump tank using new gaskets. Secure strainer assembly with the retaining bolts. Tighten all bolts evenly.

f. Install hoses to strainer and tighten hose connections.

CAUTION

BE SURE ALL CONNECTION ARE AIR TIGHT. AIR ENTERING ON THE SUCTION SIDE OF HYDRAULIC PUMP WILL RESULT IN DAMAGE TO THE PUMP.

g. Place or solder a fine-mesh wire screen into the large end of a funnel spout. Thoroughly clean funnel before putting it into use. Remove sump breather and fill the sump tank to within 2 inches from the top of the tank. Remove the funnel from the tank and install the breather cap.

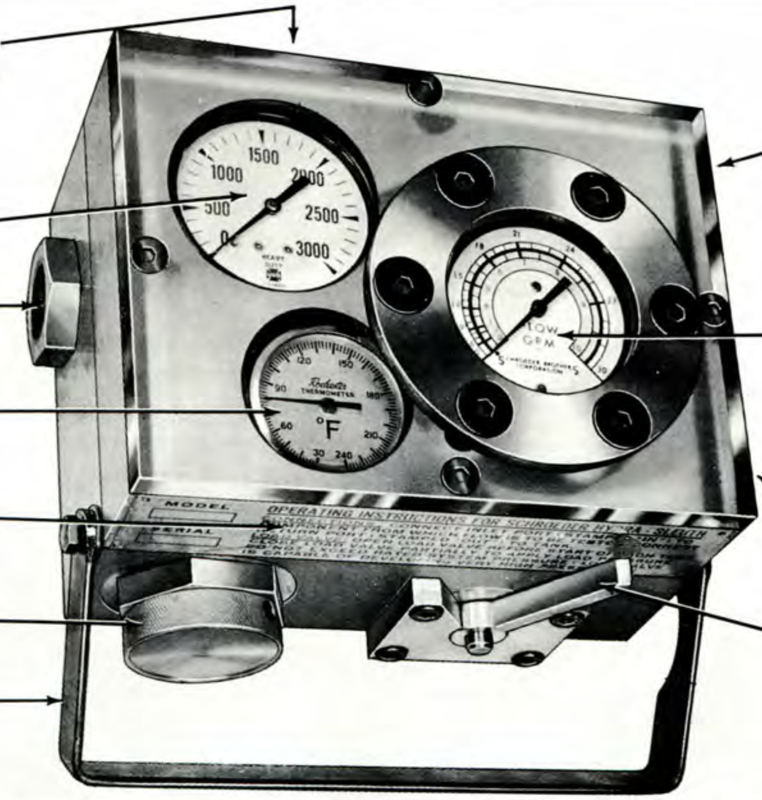


Plate 6747. Schroeder Hydraulic Circuit Tester CLARK PART NUMBER 1800060

PRESSURE GAUGE

Reads directly in pounds per square inch (PSI).

TEMPERATURE GAUGE

Reads directly in degrees Fahrenheit and indicates the temperature of the oil passing through the instrument.

FLOW GAUGE

Reads two scales in gallons per minute.

0 - 30 gallons
9 - 30 gallons

Read the scale that corresponds with the orifice selector position.

Turn orifice selector to the left (counterclockwise) to read 10 gallon scale.

Turn orifice selector to the right (clockwise) to read 30 gallon scale.

You may switch from one scale to the other, while operating machine. Always start on 30 gallon scale.

LOAD VALVE

The load valve is a flow restrictor or shut off valve. Turning the valve to the right throttles flow through the Hydra-Sleuth, thus the operator may load a hydraulic pump or circuit to the desired test pressure, simulating work.

SAFETY PLUG

Located opposite the load valve this plug protects the Hydra-Sleuth and the tested system from pressures in excess of 3200 PSI. When pressure becomes higher the plug will rupture and dump oil to atmosphere.

HYDRAULIC FLUID

Unless marked to the contrary, the unit is for use with petroleum, hydraulic fluids.

HOW TO CONNECT THE PORTABLE TESTER

Using a 1/2" hose or larger, connect tester INLET PORT to the flow to be tested. Connect the tester outlet port to reservoir fill port, or system return line.

HYDRA-SLEUTH ADJUSTMENTS BEFORE OPERATION

A. Depending on flow (GPM) to be checked choose proper orifice. (It is good practice to start always on 30 gallon scale.)

B. Fully open load valve by turning all the way to the left.

HYDRA-SLEUTH ADJUSTMENTS DURING OPERATION

1. Turn load valve to right to develop test pressures.

CAUTION

LOAD VALVE IS CAPABLE OF VERY HIGH PRESSURES.

A. Always start test with load valve fully open.

B. Do not exceed design pressure of system under test.

C. Keep load pressures within range of the Hydra-Sleuth pressure gauge.

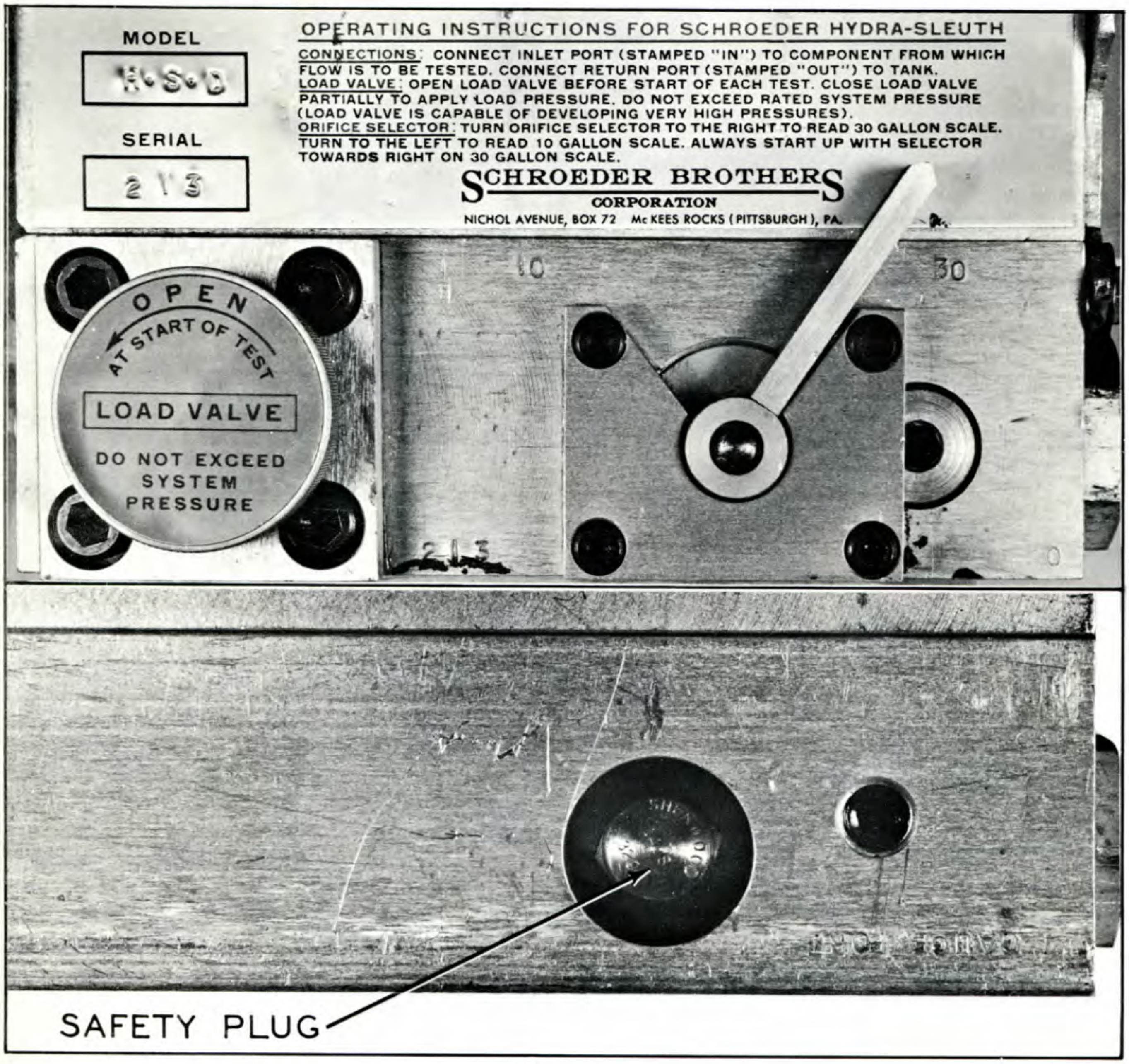


Plate 6748. Schroeder Hydraulic Circuit Tester

MAIN HYDRAULIC SYSTEM PRESSURE CHECK

The hydraulic relief valve setting may be checked with a hydraulic circuit tester. The pressure should be within the limits listed in specifications.

If a circuit tester is not available the relief valve setting may be checked in the following manner.

1. Connect a pressure gauge that is capable of withstanding 4000 P.S.I. to the pressure test plug opening at the main hydraulic valve. See Plate 7664. If the machine is not equipped with a pressure test plug it will be necessary to install a "tee" in the pressure line to provide a means for connecting a pressure gauge in the circuit.

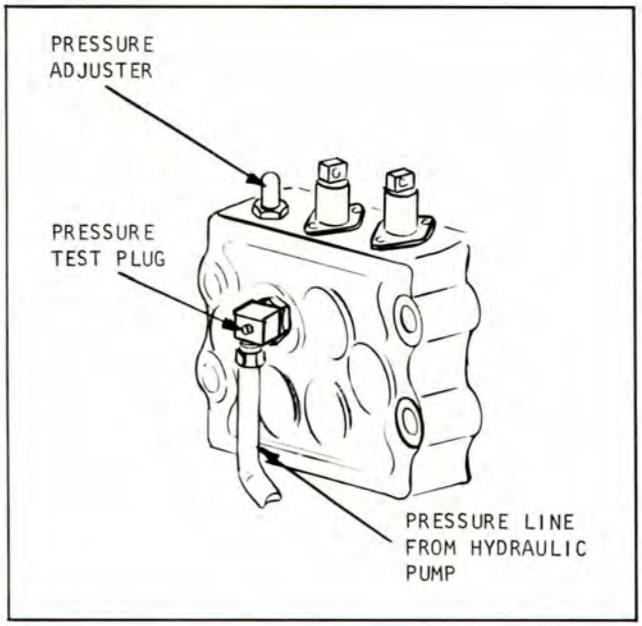


Plate 7664. Main Hydraulic System Pressure Check

2. System pressure should be checked with the upright raised to its maximum height and the engine running at top governed R.P.M. Momentarily hold the lift lever in raise position to "load" the hydraulic pump. With the pump under load in this manner, check the pressure gauge reading. Pressure should be within the limits listed in specifications. If adjustment is necessary, remove acorn nut at valve and turn adjuster clockwise to raise pressure, counterclockwise to lower pressure. After correct adjustment is obtained replace acorn nut and tighten securely.

3. Remove pressure gauge and "tee" if used, from the circuit and reinstall test plug and all fittings. Operate hydraulic controls and check to be sure there are no leaks in the hydraulic system.

TRANSMISSION STALL AND PRESSURE CHECKS. (HYDRATORK MODELS)

Minimum Tools Required.

1 - Pressure Guage 0 - 250 P.S.I.
1 - Tachometer

Before making transmission checks the machine should be steam cleaned. It is important that the radiator be clean externally and internally so that it is capable of maintaining proper cooling for the engine and transmission.

1. Operate engine 3 to 4 minutes to fully charge the transmission plumbing and the torque converter. With the engine operating at idle and the transmission in "Neutral" check the fluid level on the dipstick. Fill if necessary to the "Cold Full" mark or the "Hot Full" mark -- depending upon the temperature of the transmission. Use Type "A" (Armour Qualified) transmission fluid. Clark part number 879803.

2. Check brake pedal free travel.

The hydraulic inching (brake) pedal must have the proper free travel to allow an accurate check on torque converter and transmission condition. Refer to page 100H 302 for explanatory illustrations on Pedal Free Travel.

3. With a tachometer, check engine for governed speed at full throttle. The unloaded engine R.P.M. should be set at 2600.

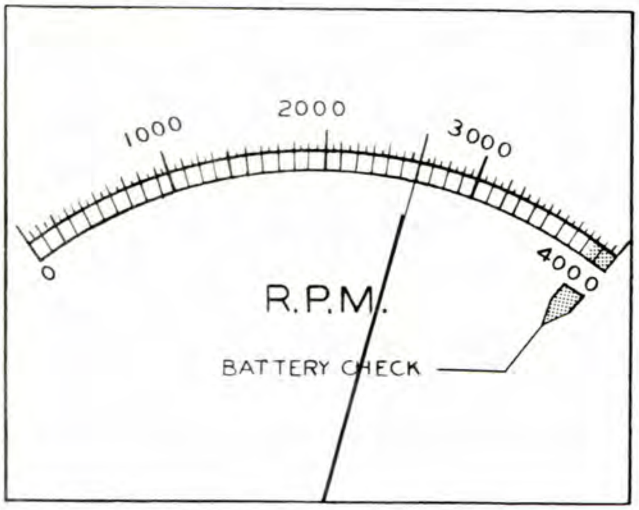


Plate 7661. Engine R.P.M. (no load)

4. Check governed engine speed with partial load -- With engine at full throttle and upright in full backward tilt, momentarily hold the tilt lever back to load the engine. With the engine loaded in this manner the approximate engine R.P.M. should be 2400.

N O T E

ENGINE MUST BE PROPERLY TUNED BEFORE MAKING TRANSMISSION STALL CHECKS.

C A U T I O N

PROLONGED STALLING OF THE CONVERTER CAN CAUSE INTERNAL DAMAGE TO THE CONVERTER. STALL CONVERTER ONLY LONG ENOUGH TO ATTAIN THE PEAK R.P.M. READING. (MAXIMUM 30 SECONDS).

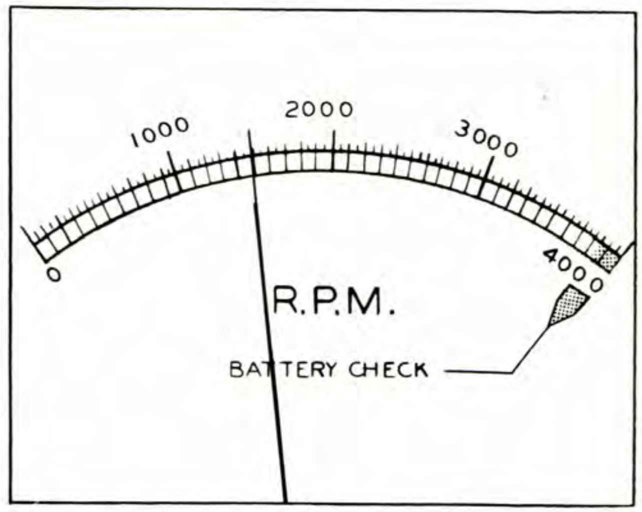


Plate 7662. Normal Engine Stall

5. With a capacity load on the forks, check for normal stall R.P.M. by positioning machine against an immovable object. Place the machine in its highest gear and accelerate engine to full throttle.

Normal Stall for F-244 Engine
1450 to 1550 R.P.M.

WHEN APPLYING BRAKE HYDRAULIC PRESSURE 92# ± 5 TO INCHING VALVE "F" AND "R" CHECKED INDIVIDUALLY MUST DROP OFF TO 3# ± 2 P.S.I. MAX. WITH INCHING BREAK OFF POINT OF 55# ± 5

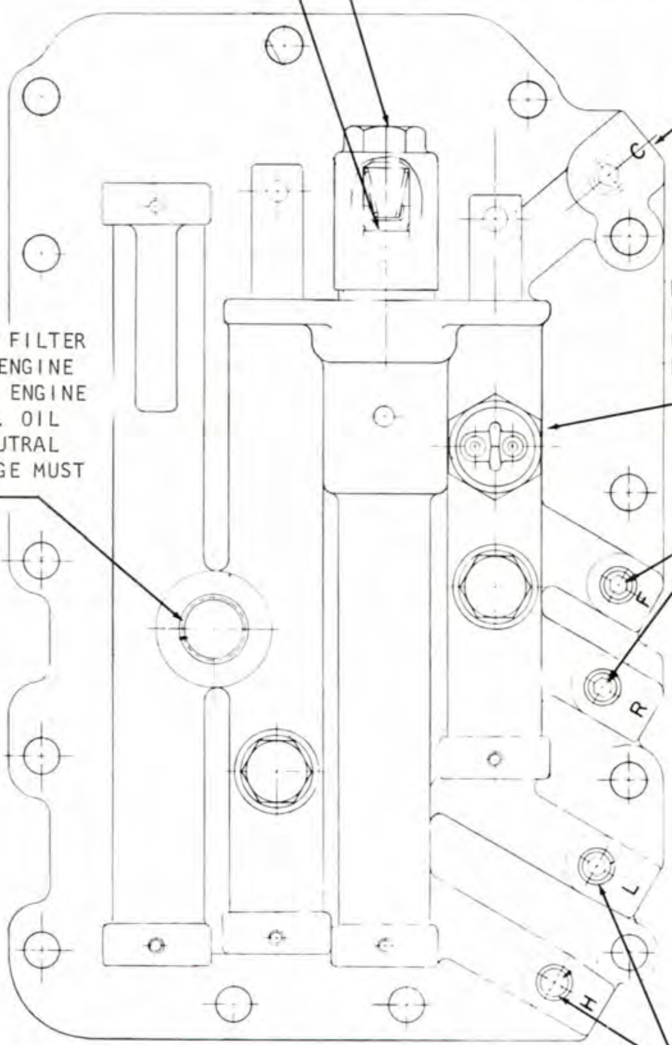
IMMERSE IN UCON-1145 FLUID BEFORE ASSEM.

UNLESS OTHERWISE SPECIFIED

IMMERSE ALL OIL SEALS IN TYPE "A" TRANSMISSION FLUID BEFORE ASSEMBLY

OIL ALL "O" RINGS BEFORE ASSEMBLY

TIGHTEN ALL CAP SCREWS 20-25 FT. LBS. TORQUE



CONV. PRESS. 60 PSI AT 1300 RPM. NOT TO EXCEED 75 PSI AT 2200 RPM ENGINE.

NEUTRAL SWITCH (12 VOLTS)
NEUTRAL-SWITCH CLOSED
FOR. & REV.-SWITCH OPEN
NEUTRAL START SWITCH TEST
SEE NOTE

OIL FLOW TO CONTROL FROM FILTER 5-7 GALLONS AT 1300 RPM ENGINE 8-11 GALLONS AT 2000 RPM ENGINE TO BE TESTED WITH 200° F. OIL LEAKAGE-WITH F & R IN NEUTRAL & H OR L ENGAGED. LEAKAGE MUST NOT EXCEED .2 GAL..

OIL PRESSURE CHECK AT 1300 RPM ENGINE 120 LBS MIN-135 LBS MAX

OIL PRESSURE CHECK
AT 1300 RPM ENGINE-150 LBS. MIN.
AT 2200 RPM ENGINE-165 LBS. MAX.

NOTE

NEUTRAL START SWITCH TEST
1-WIRE SWITCH INTO TEST STAND LIGHT CIRCUIT
2-WITH ENGINE RUNNING & TRANSMISSION IN LOW FOR., NUDGE CONTROL FOR. & REV. SPOOL SLOWLY TOWARD NEUTRAL. IF SWITCH DOES NOT MAKE CONTACT REPEAT STARTING IN LOW REV. IF IN EITHER TEST CONTACT IS MADE WHEN NOT IN DEAD NEUTRAL, SWITCH IS TO BE SHIMED, TILL TEST SHOWS PROPER FUNCTION.

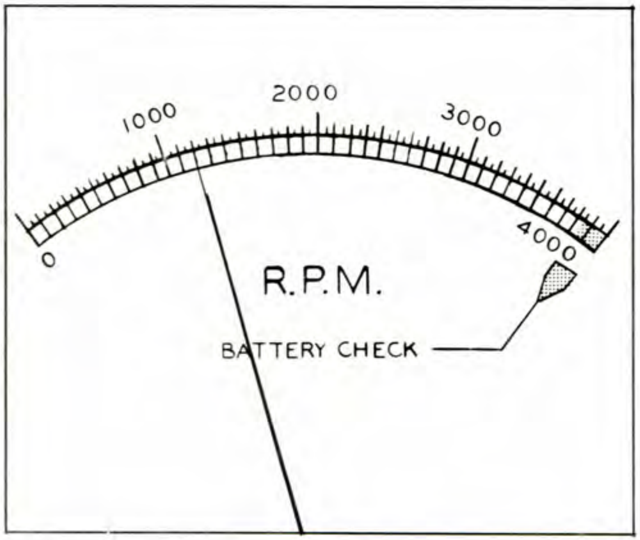


Plate 7327. Interim Stall

If the engine stall R.P.M. is within the following range -- loss of engine power is indicated.

F-209 Engine 1000 to 1300 R.P.M.
F-244 Engine 1150 to 1450 R.P.M.

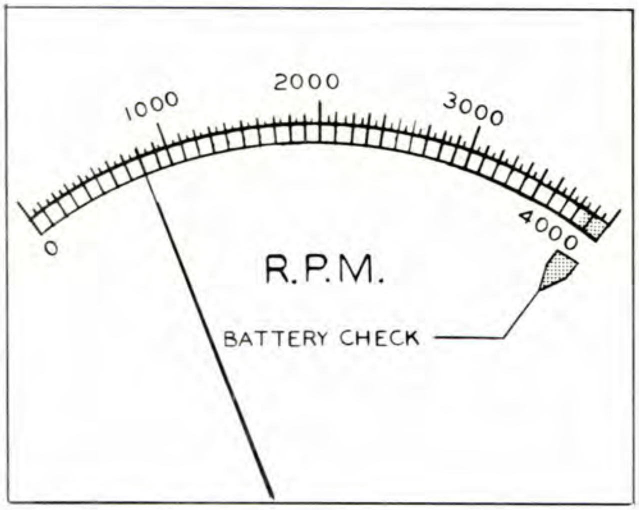


Plate 6686. Low Engine Stall

If the engine stall R.P.M. is within the following range -- converter malfunction is indicated.

F-209 Engine 650 to 900 R.P.M.
F-244 Engine 750 to 1000 R.P.M.

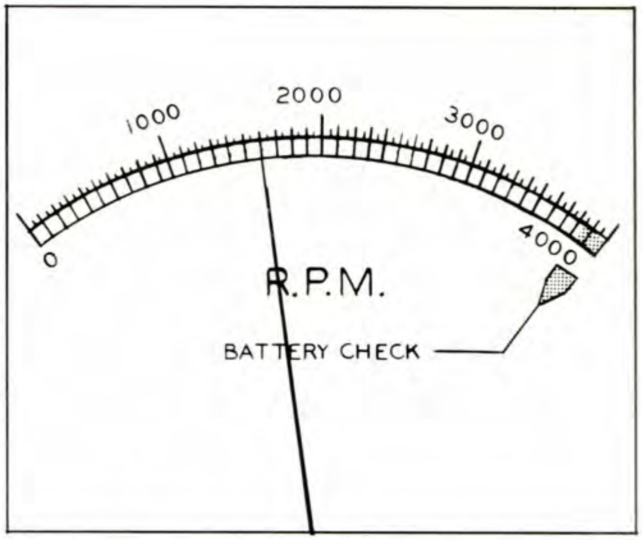


Plate 7328. High Engine Stall

If the engine stall R.P.M. is within the following range -- either slippage of the selector packs or low oil pressure is indicated.

F-209 Engine 1450 R.P.M. and above.
F-244 Engine 1600 R.P.M. and above.

N O T E

ANY STALL READING OTHER THAN NORMAL SHOULD BE REPORTED TO DESIGNATED PERSON IN AUTHORITY.

Transmission Pressure Checks

The transmission pressure checks are made at the testing ports of the control cover. See Plate 7326.

1. Place heavy blocking under the upright rails and tilt upright forward until vertical. This will allow the drive wheels to clear the floor.

2. Install a 250 P.S.I. pressure gauge at one of the testing ports (whichever direction or range of speed being tested.) With shift lever in related position the pressure should be within the range as specified on Plate 7326.

If pressures are not within this range report to designated person in authority.

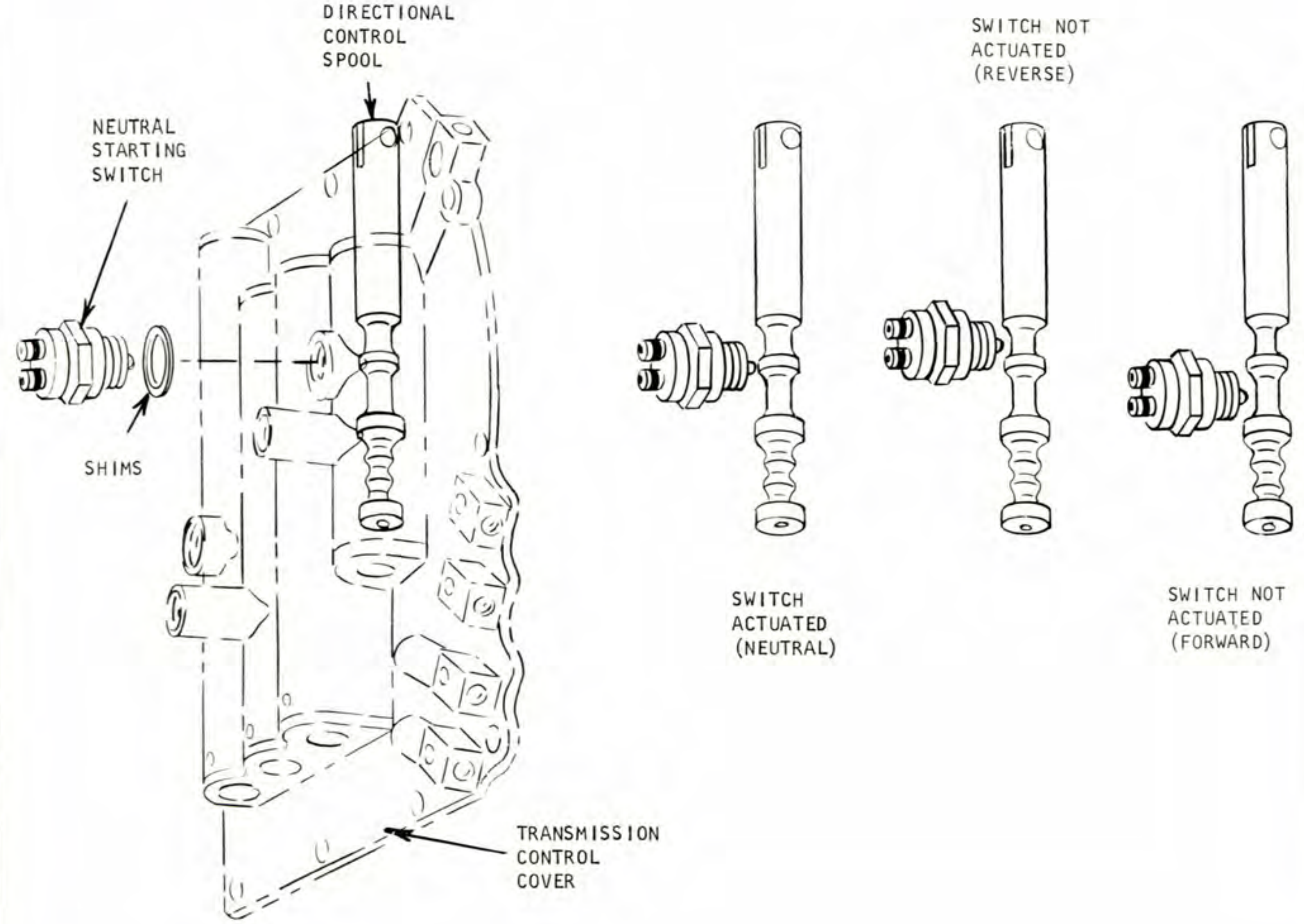


Plate 7300. Neutral Starting Switch

NEUTRAL STARTING SWITCH

The neutral starting switch should be adjusted so that machine will not start except when the transmission control is in the (dead) neutral position.

ADJUSTMENT CHECK

1. With driver's seat occupied and transmission in gear hold starting switch in actuated position and gently move shift lever towards neutral position.

2. If engine does not start, repeat adjustment operation in opposite direction.

3. If engine starts, coming from either direction on the shift lever prior to reaching neutral, switch should be adjusted by means of shims underneath the switch until engine will not start unless it is in (dead) neutral; that is, vehicle will not move regardless of shift lever position during the starting cycle.

LIFT CARRIAGE AND UPRIGHT ROLLER ADJUSTMENTS

To maintain top performance from the upright it may be necessary, from time to time, to adjust the rollers located on the Lift Carriage and Upright Assembly. These adjustments may be accomplished as follows:

Before checking for proper roller clearance, check to be sure the Inner Slide contacts with both Fabreeka (Stop) Pads at the same time when lowering the Inner Slide.

If adjustment is required, add or remove shims between Fabreeka (Stop) Pads located on the Outer Rail Tie Bar Assembly.

NOTE: MORE SHIMS MAY BE REQUIRED ON ONE SIDE THAN THE OTHER IN ORDER TO ALLOW THE INNER SLIDE TO COME IN CONTACT WITH BOTH FABREEKA (STOP) PADS AT THE SAME TIME WHEN LOWERING THE INNER SLIDE.

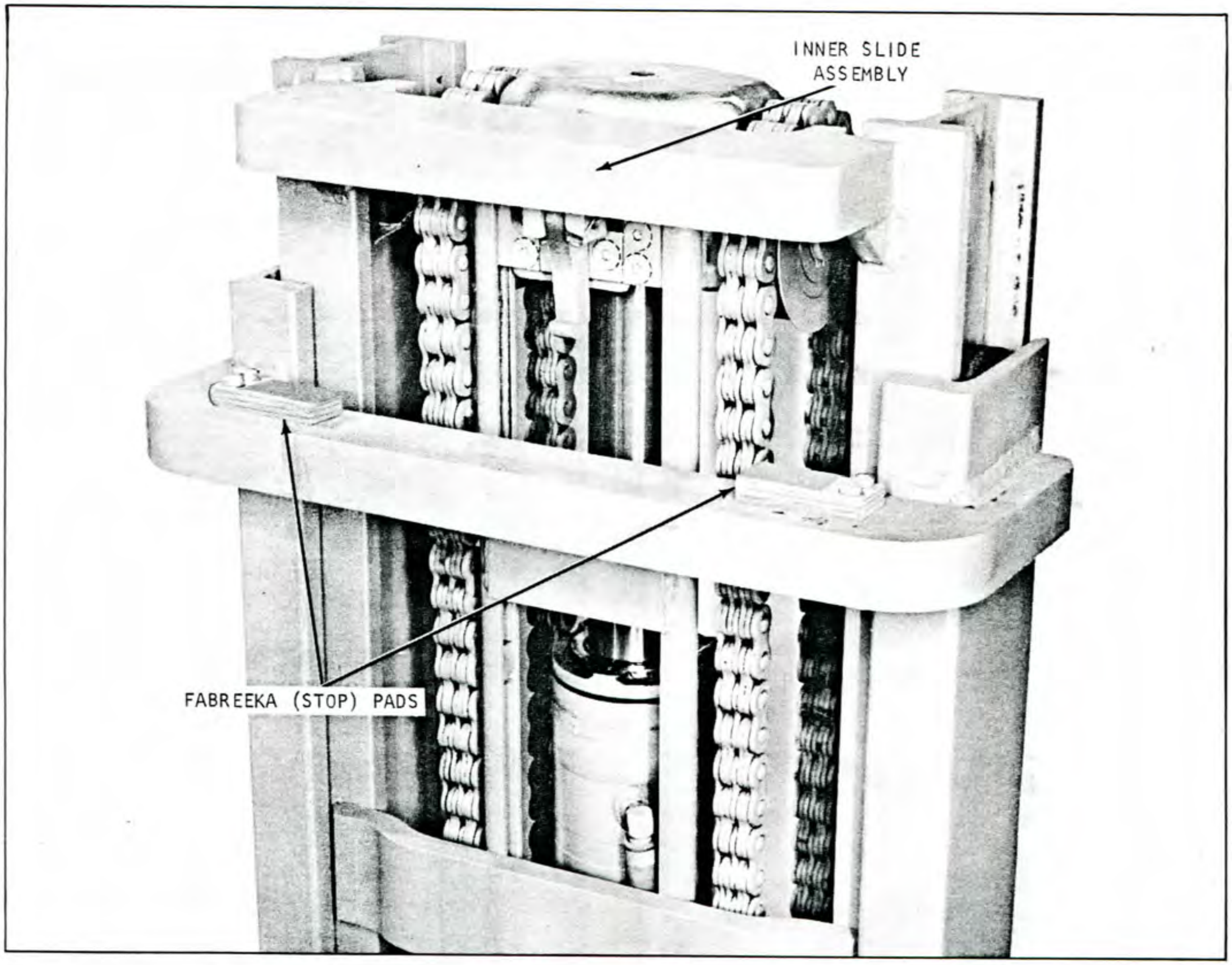


Plate 7660. (Typical Illustration) Inner Slide Must Contact Both Fabreeka (Stop) Pads at the Same Time When Lowering Inner Slide

INDUSTRIAL TRUCK DIVISION

H O W   T O   I D E N T I F Y   T H E:

"C" MODEL UPRIGHT

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

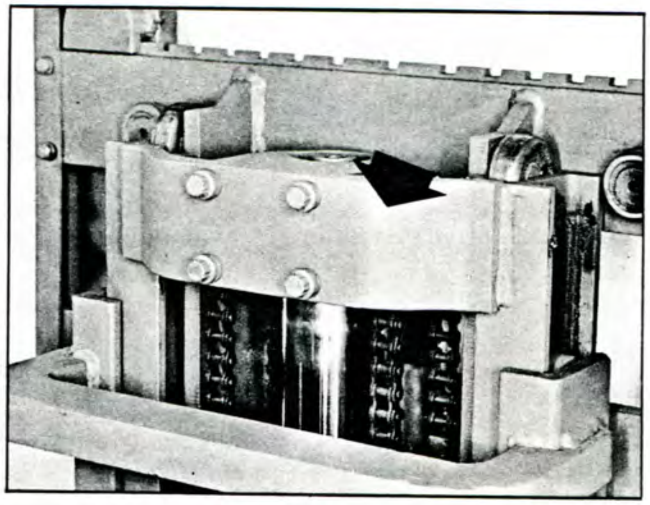


Plate 11847

"B" MODEL UPRIGHT

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

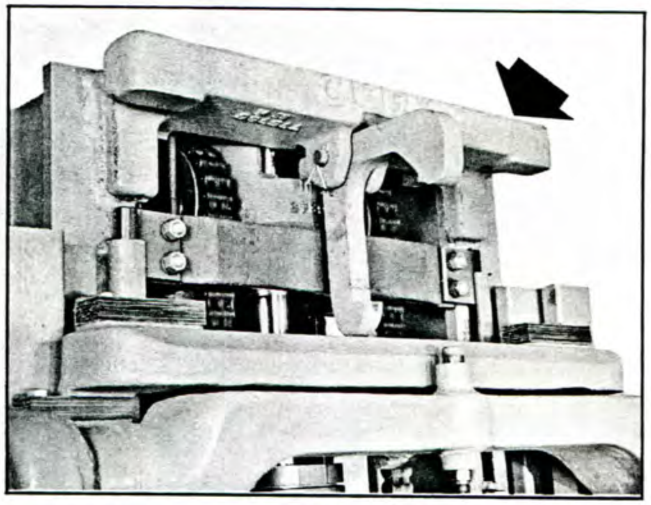


Plate 11848

"B" MODEL UPRIGHT

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

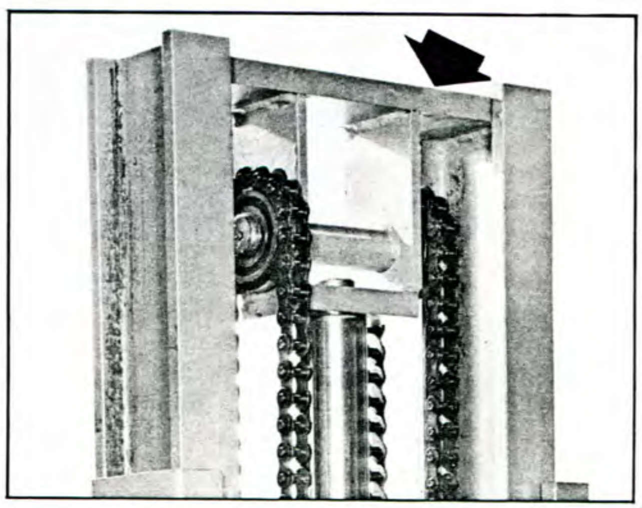


Plate 11849

A. CARRIAGE REMOVAL

Before working on the upright, set parking brake and block drive wheels.

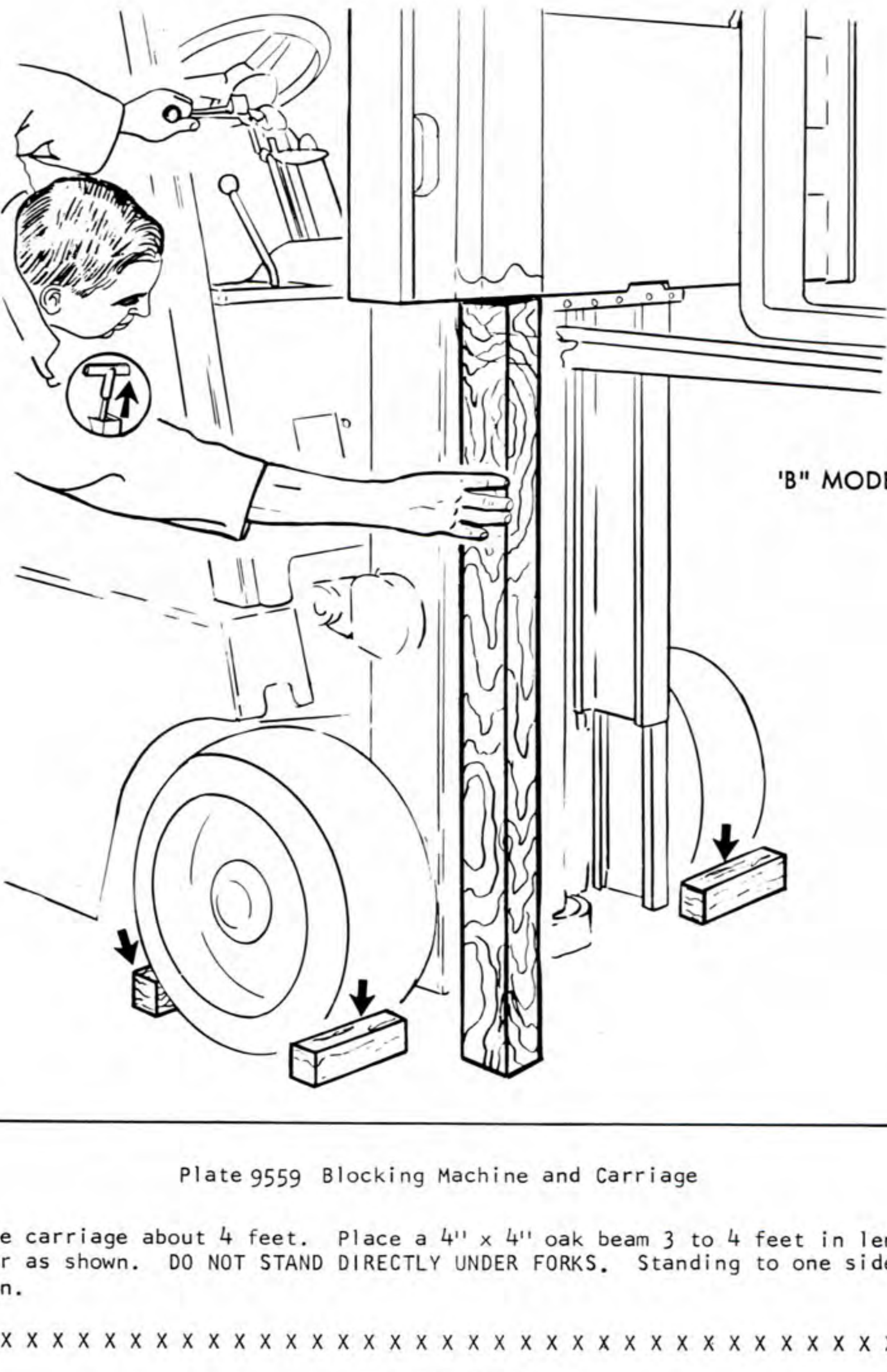


Plate 9559 Blocking Machine and Carriage

Step 1. Raise carriage about 4 feet. Place a 4" x 4" oak beam 3 to 4 feet in length between carriage and floor as shown. DO NOT STAND DIRECTLY UNDER FORKS. Standing to one side, lower carriage onto beam as shown.

WARNING

BEFORE WORKING ON UPRIGHT, SET PARKING BRAKE AND BLOCK DRIVE WHEELS AS SHOWN

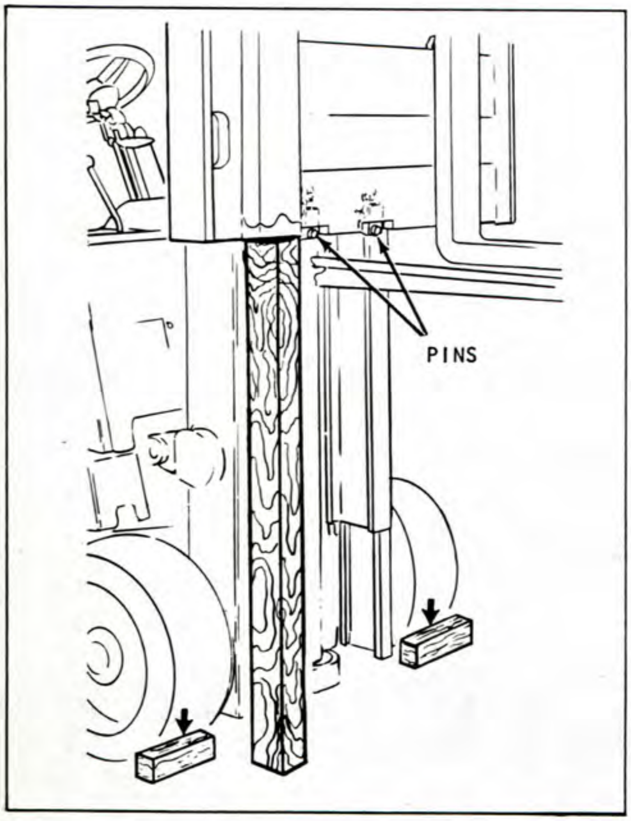


Plate 9593 Carriage Pin Replacement

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.

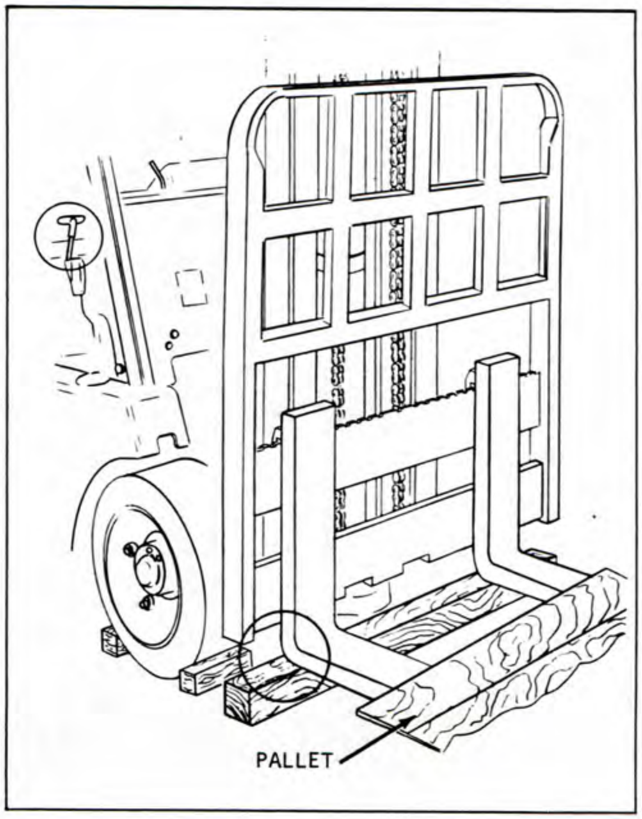


Plate 9560 Fork and Carriage Blocking

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

Step 4. Tilt upright full forward.

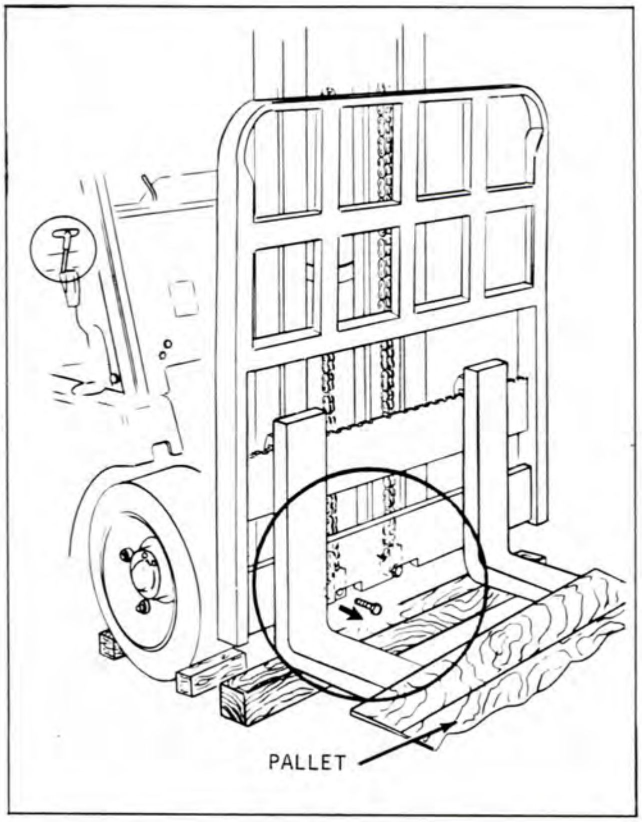


Plate 9561 Removing Bolts

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

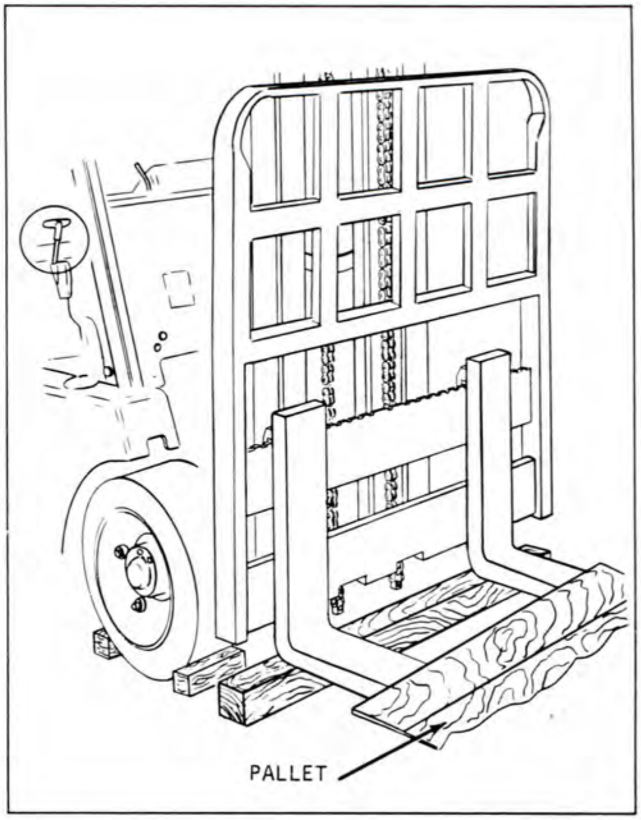


Plate 9562 Removing Chains From Anchors

Step 6. Pull chains out of carriage anchor brackets.

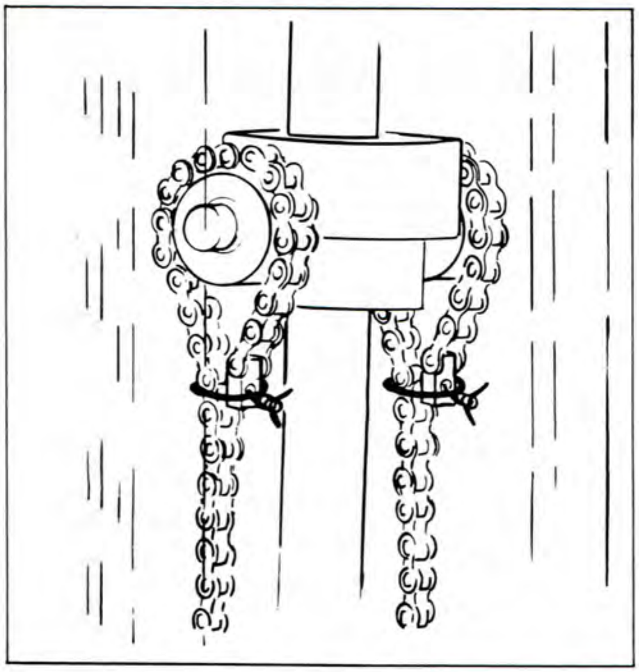


Plate 9563 Securing Chains (Typical)

Step 7. Wire chains around chain sheaves as shown

NOTE

Use the same method on all cylinders.

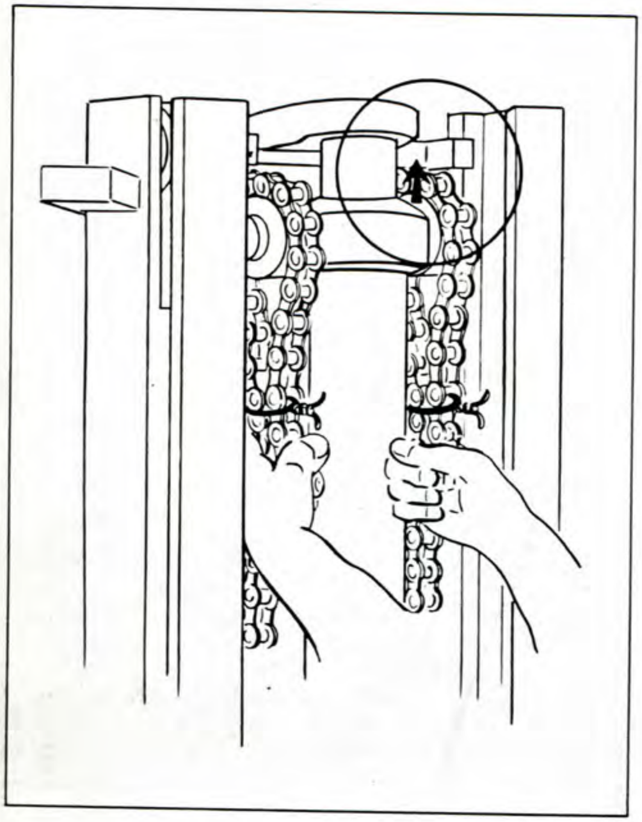


Plate 9564 Guiding Piston Head

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

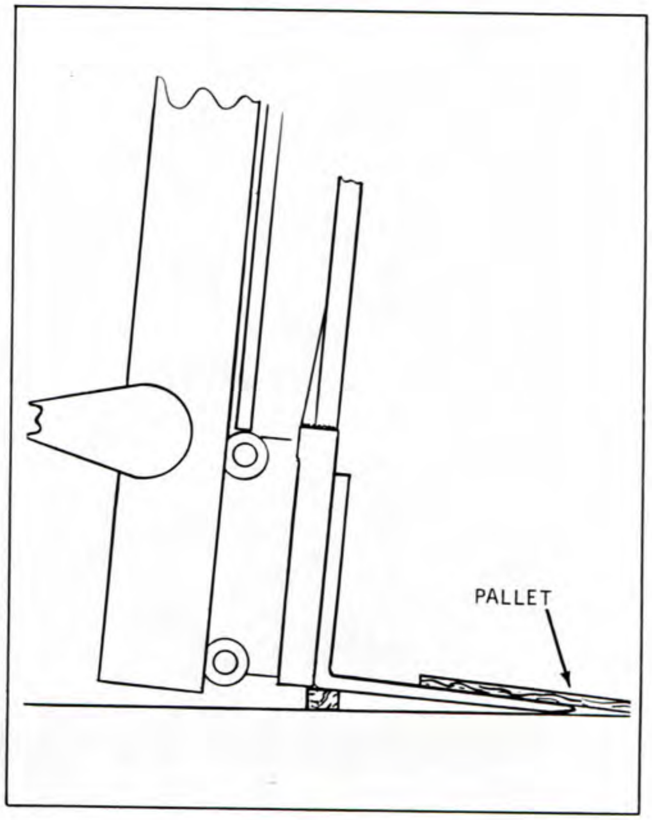


Plate 9565 Inner Rail Clearing Carriage Rollers

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

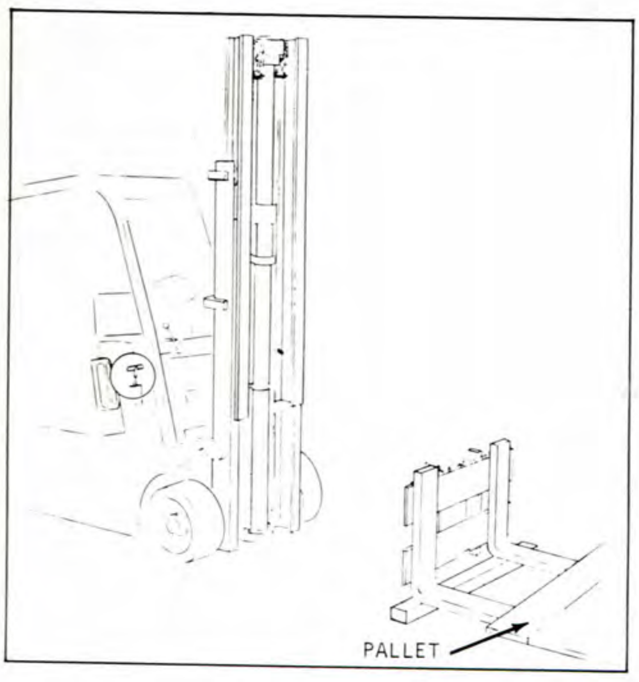


Plate 9566 Backing Machine Away From Carriage

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

B. CARRIAGE ROLLER ADJUSTMENT

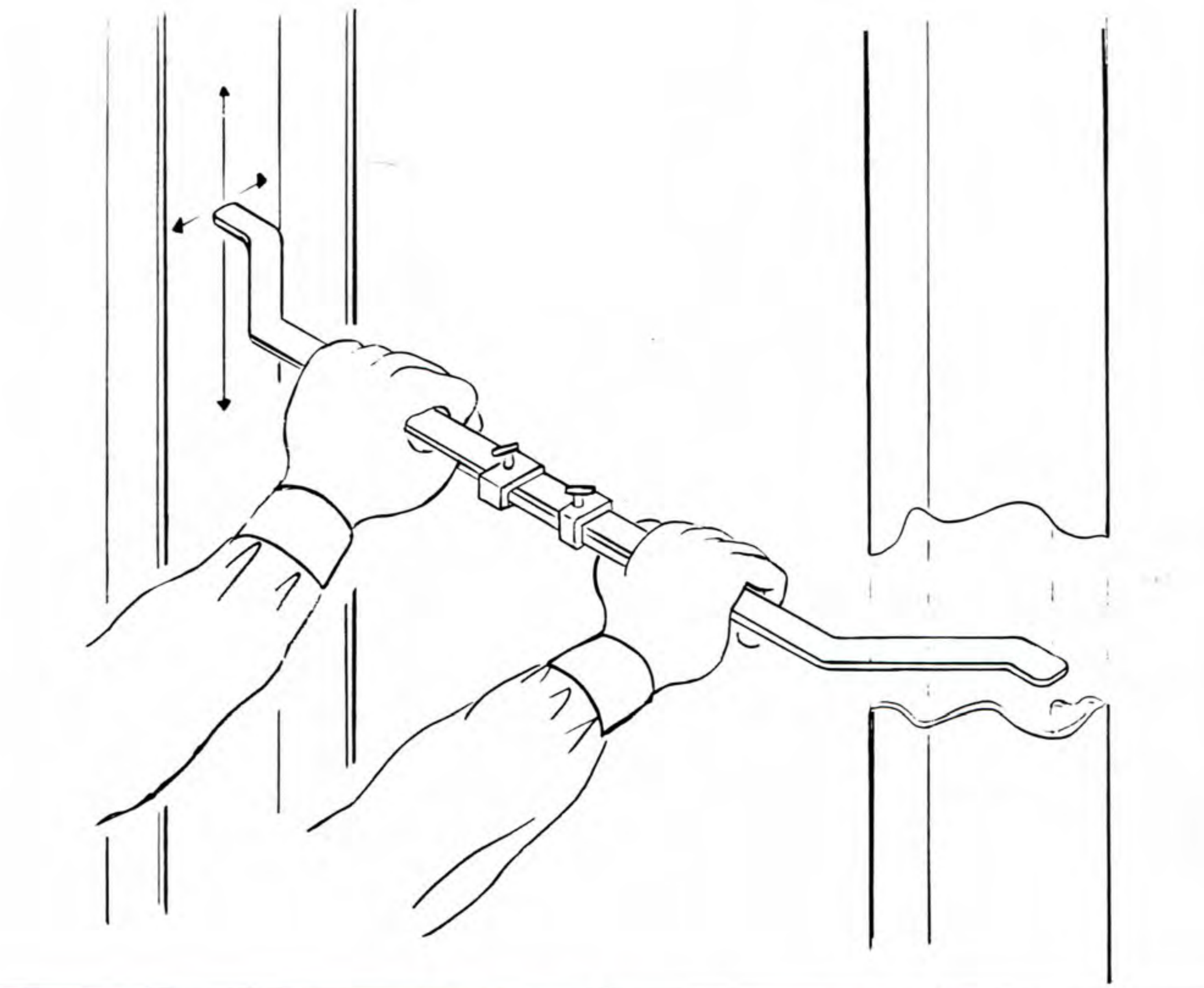


Plate 9567 Spanning Inner Rail

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

NOTE

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.

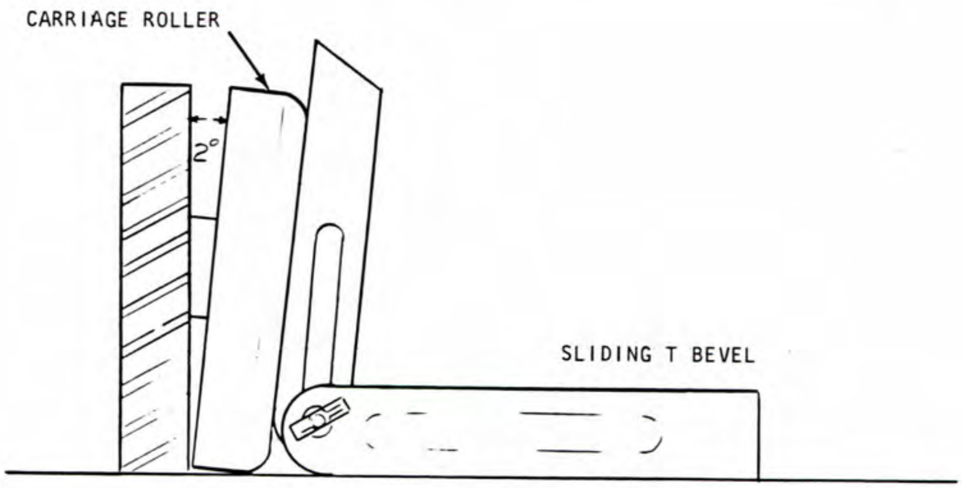


Plate 9589 Setting T Bevel

NOTE

Check angle of carriage rollers. Roller pin bosses are welded at 2° ± 1/2° 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.

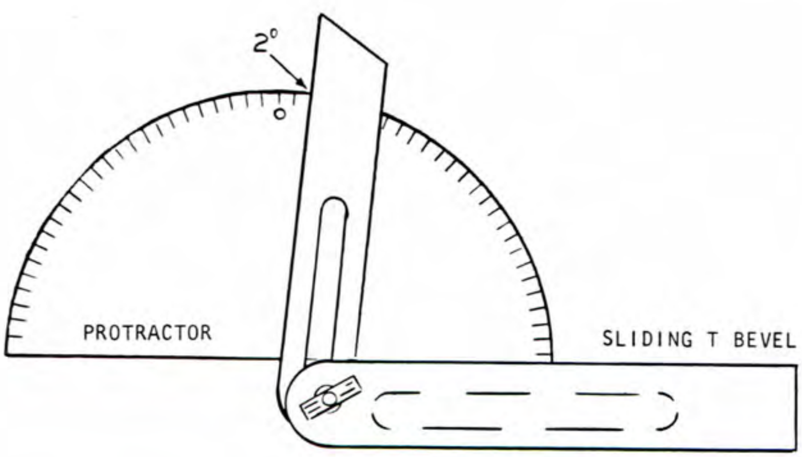


Plate 9590 Checking Roller Angle

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

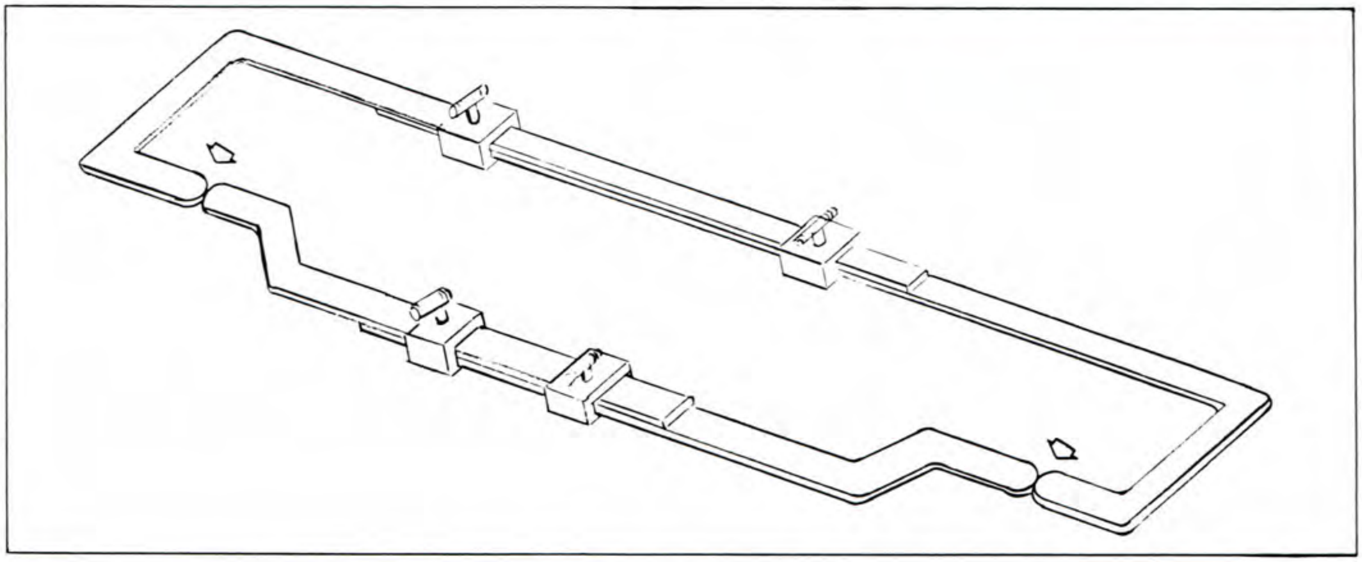


Plate 9568 Setting Outside Spanning Tool

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

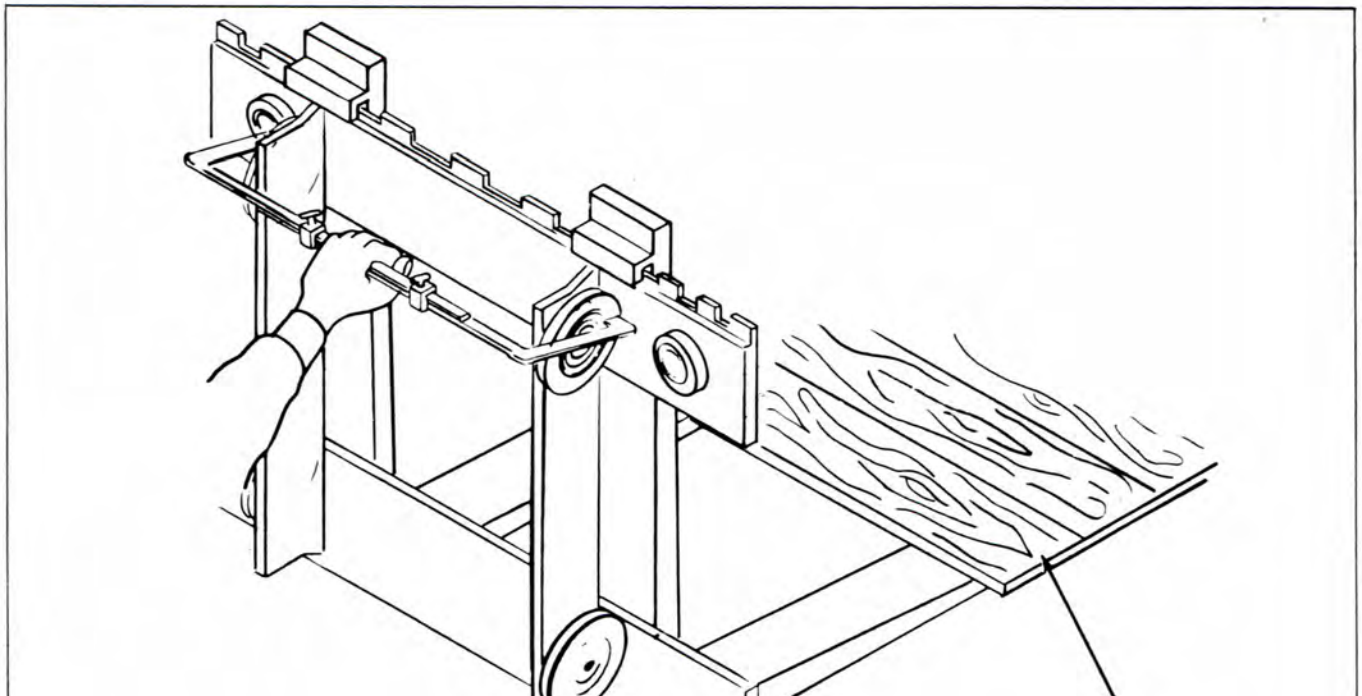


Plate 9569 Spanning Upper Rollers (Four Roller Carriage)

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

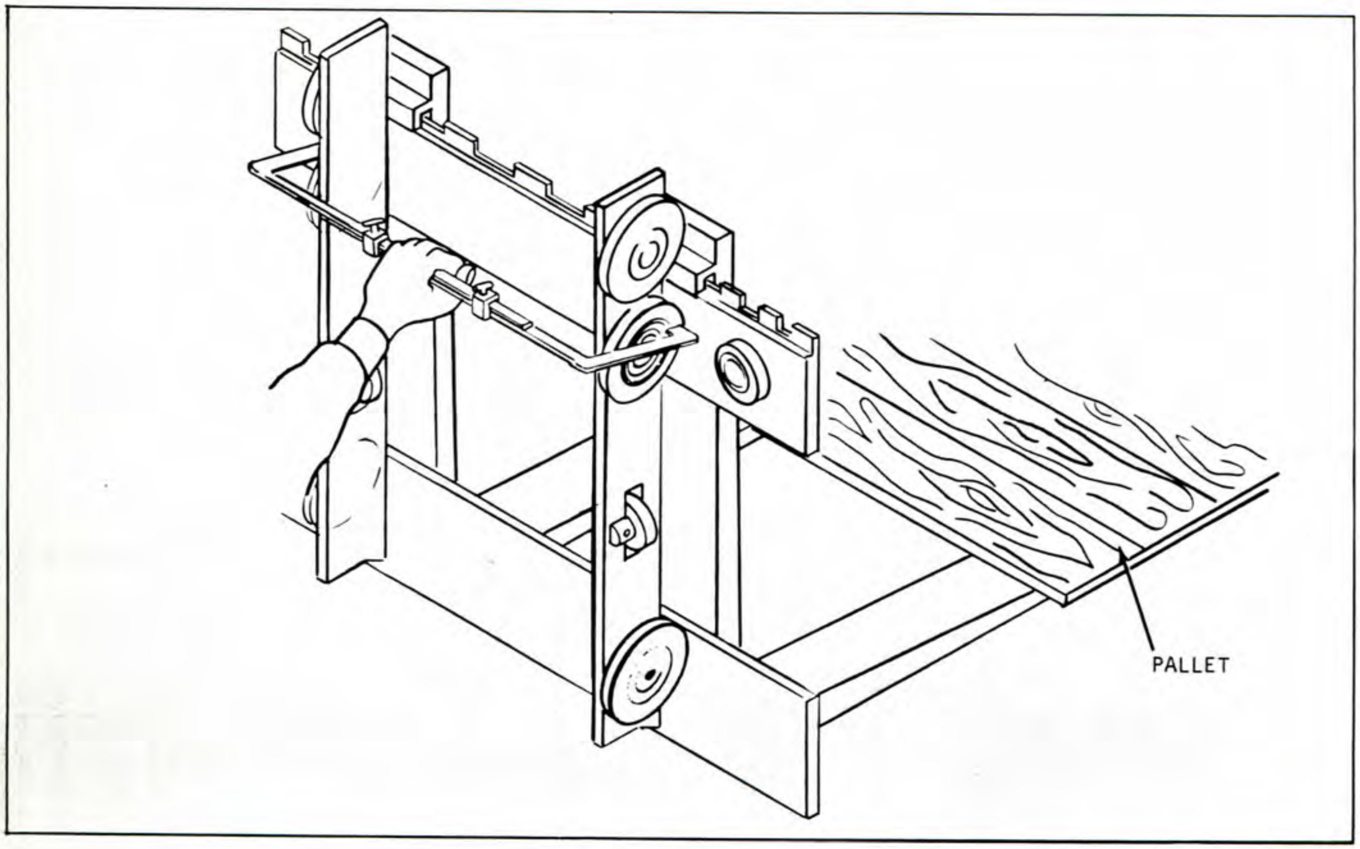


Plate 9570 Spanning Upper Rollers (Six Roller Carriage)

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

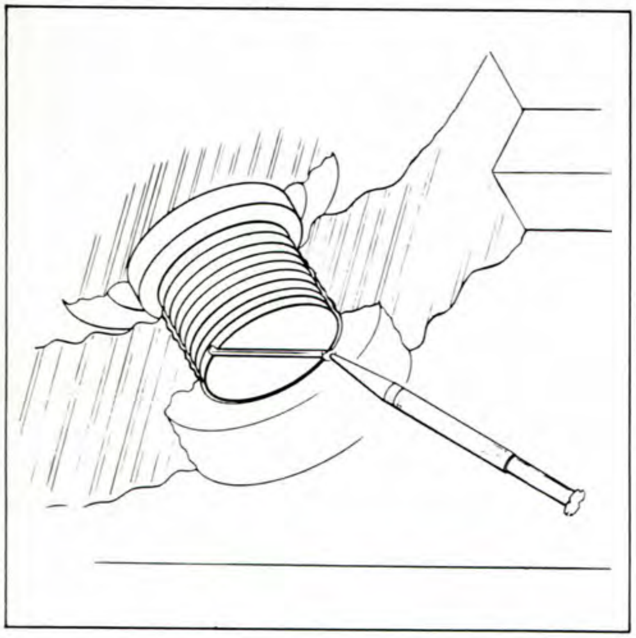


Plate 9571 Securing Outer Thrust Roller

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.

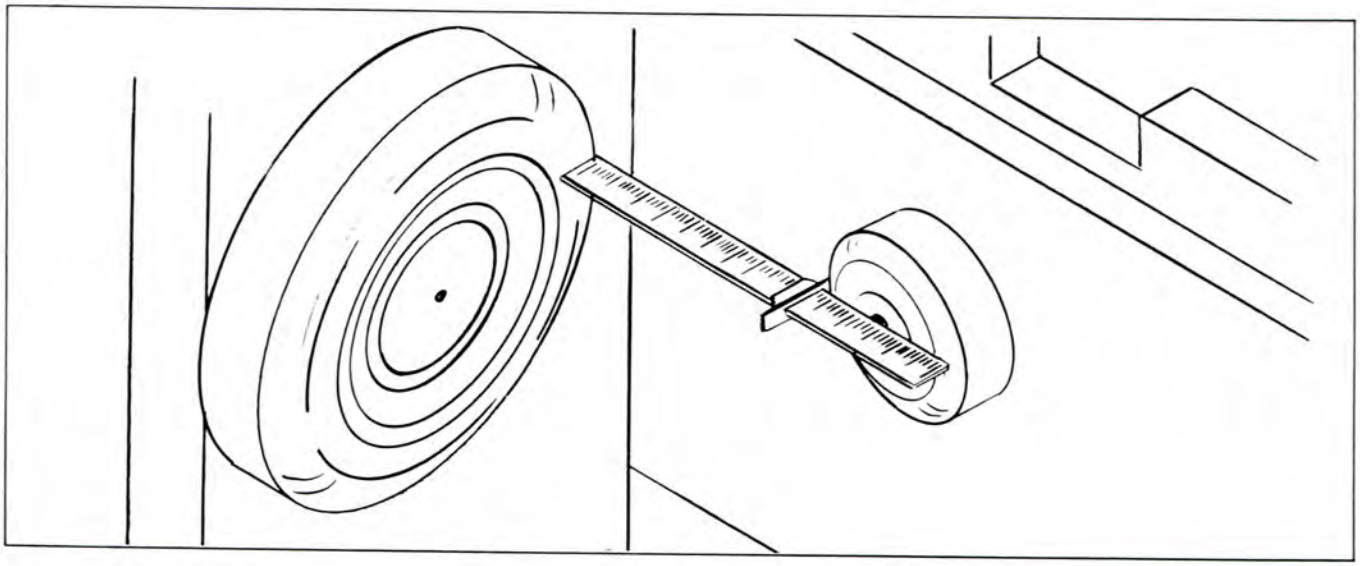


Plate 9572 Centering Carriage Rollers

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.

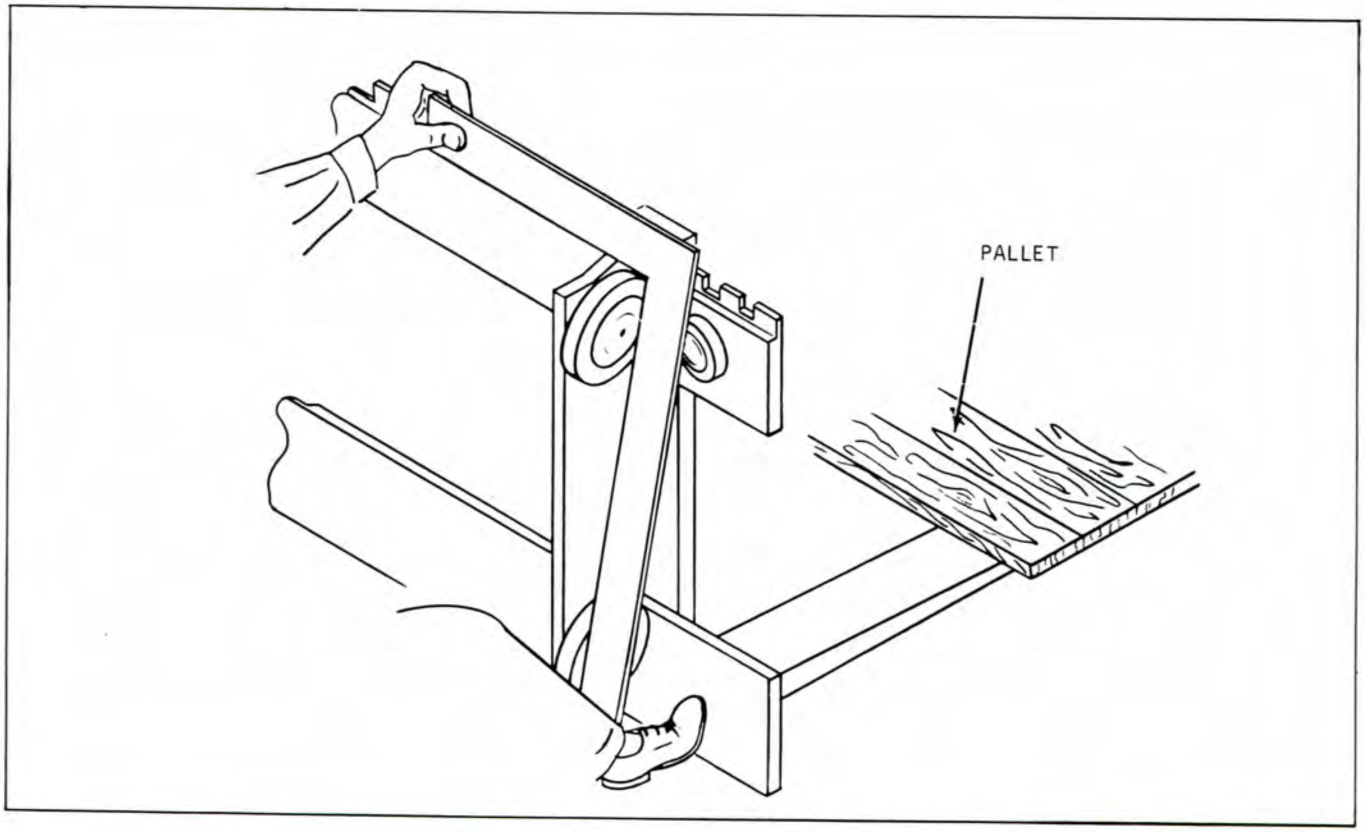


Plate 9573 Squaring Carriage Rollers (Four Roller Carriage)

Step 5. Square carriage rollers by placing carpenters square at the outer most camber of the ...

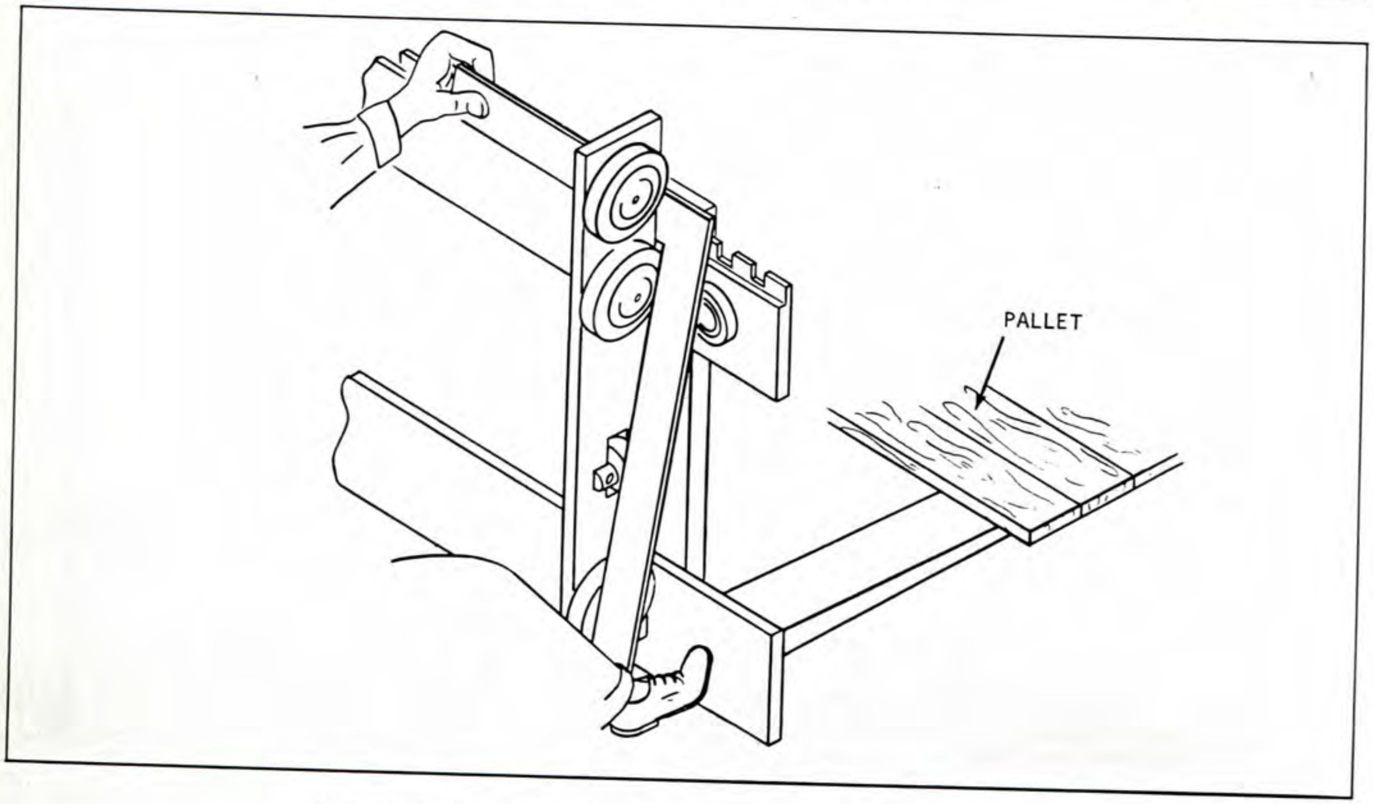


Plate 9574 Squaring Carriage Rollers (Six Roller Carriage)

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

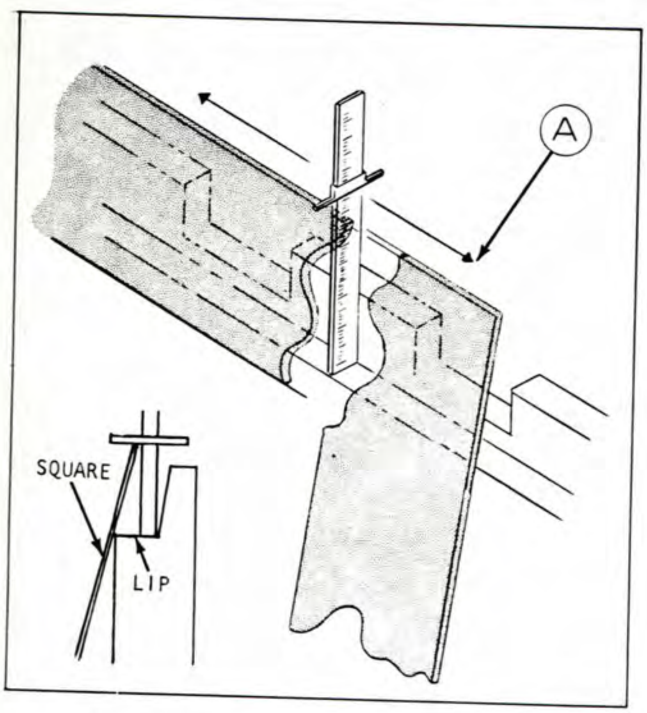


Plate 9575 Measuring For Squareness

Step 6. Hold square and measure the disance 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.

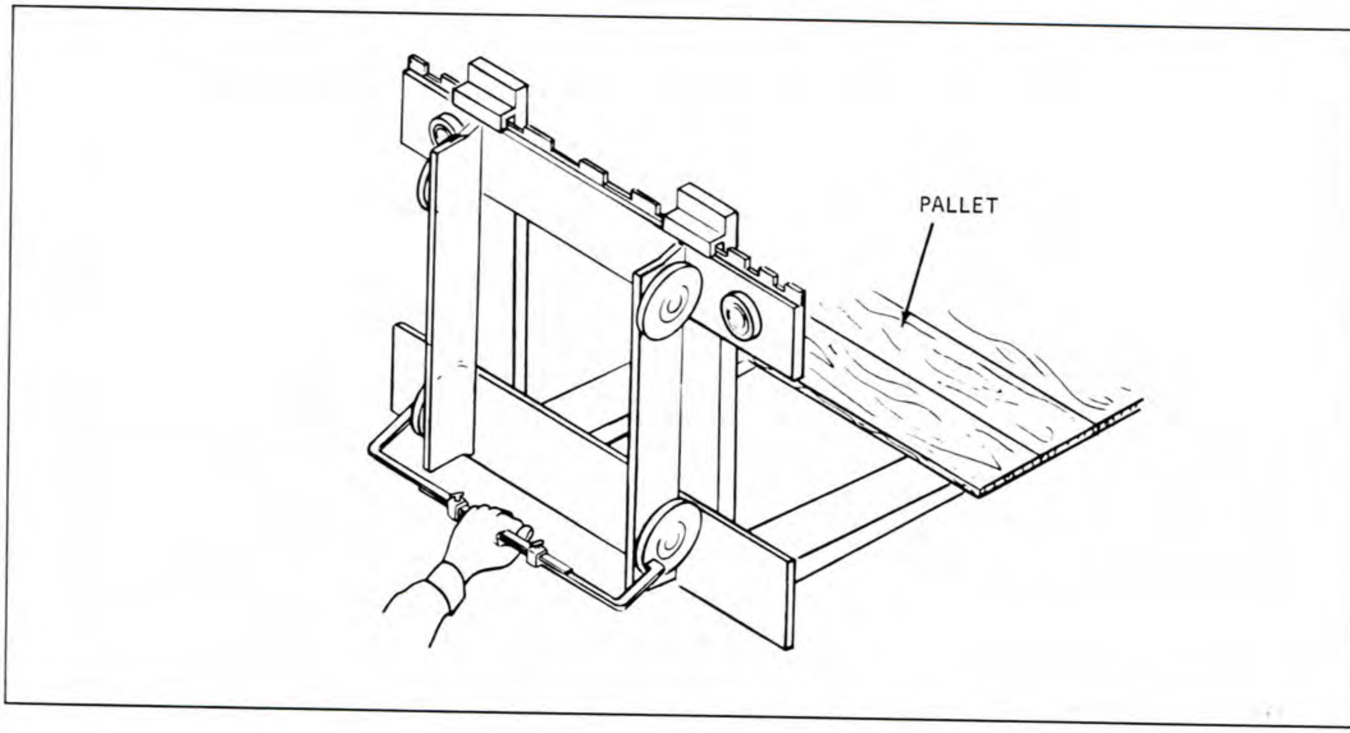


Plate 9576 Spanning Lower Rollers (Four Roller Carriage)

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

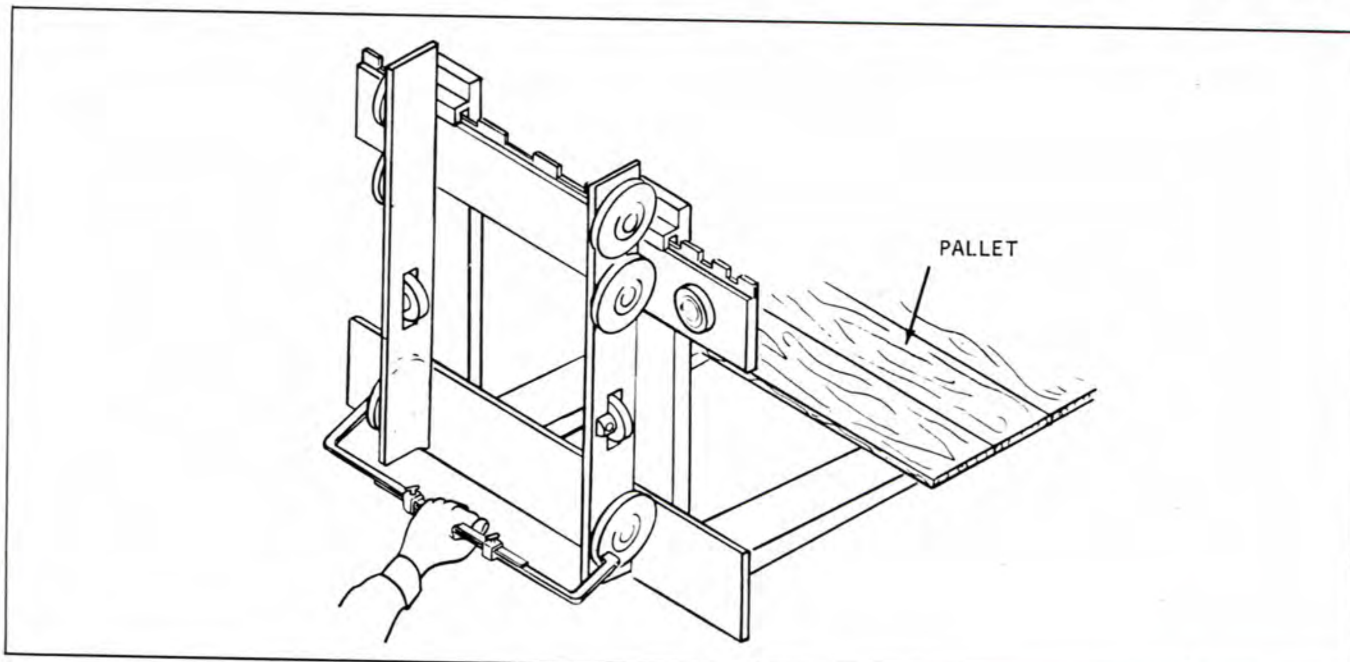


Plate 9577 Spanning Lower Rollers (Six Roller Carriage)

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

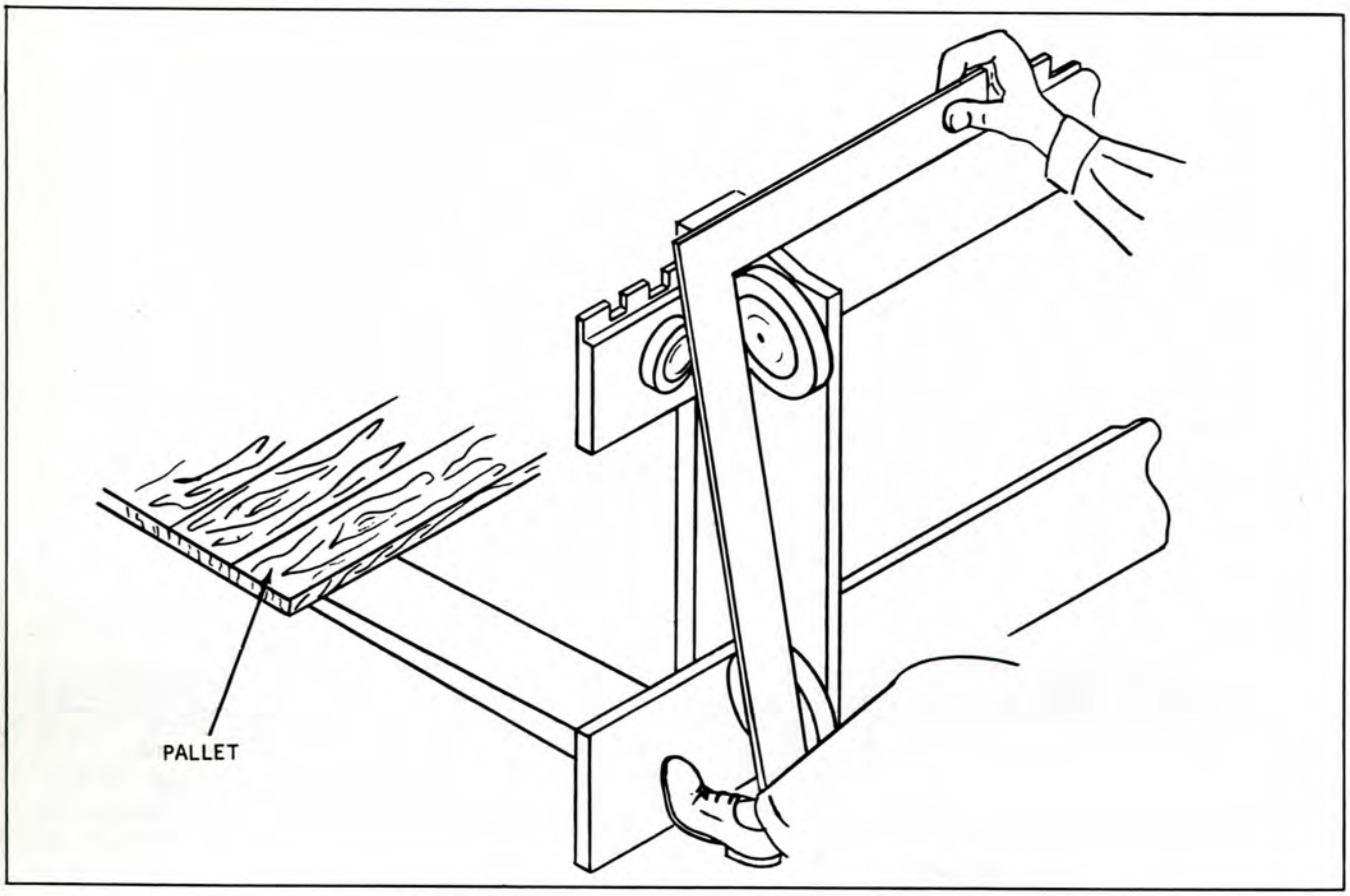


Plate 9578 Checking Squareness (Four Roller Carriage)

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

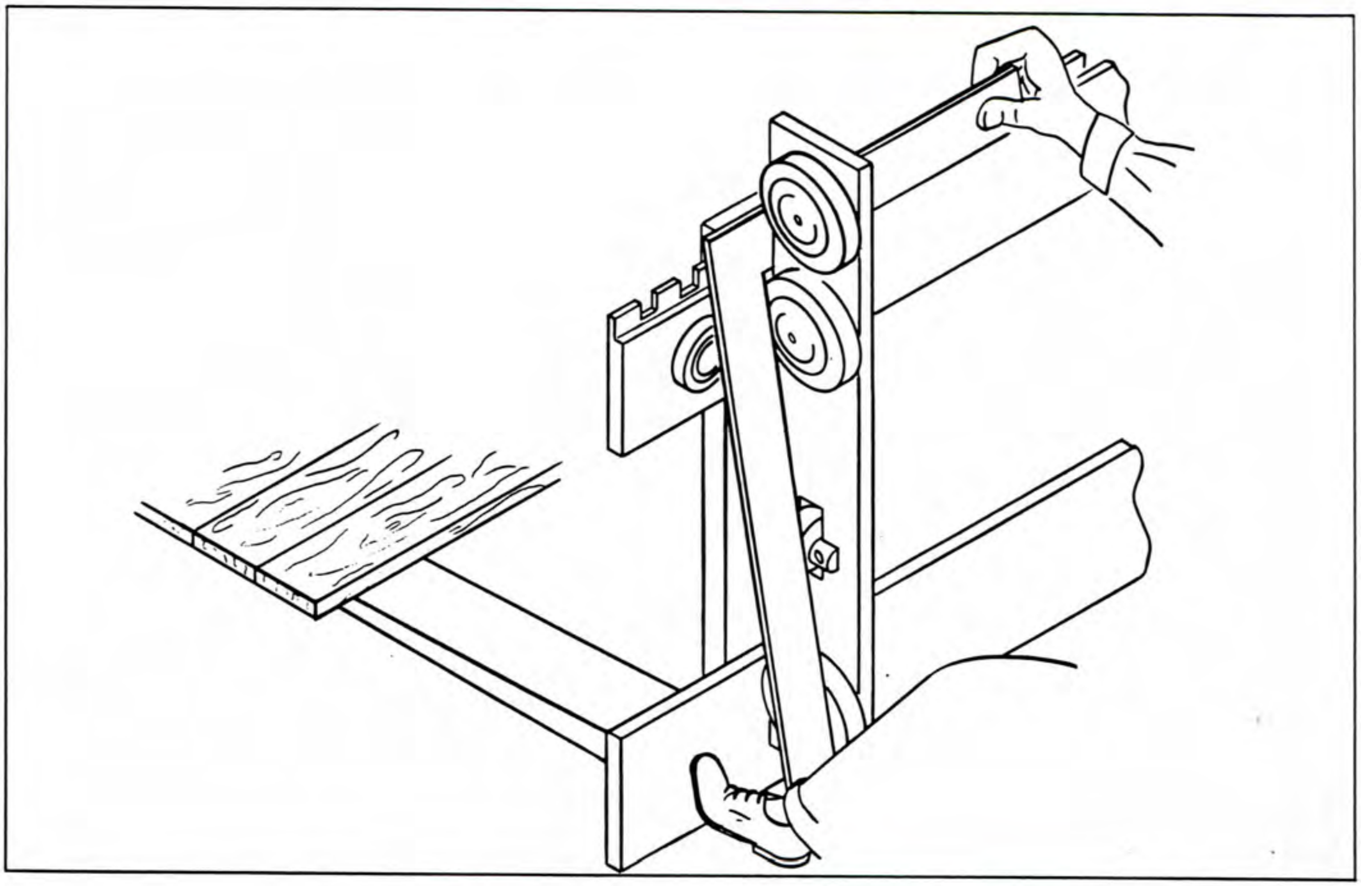


Plate 9579 Checking Squareness (Six Roller Carriage)

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

SIX ROLLER CARRIAGE ONLY

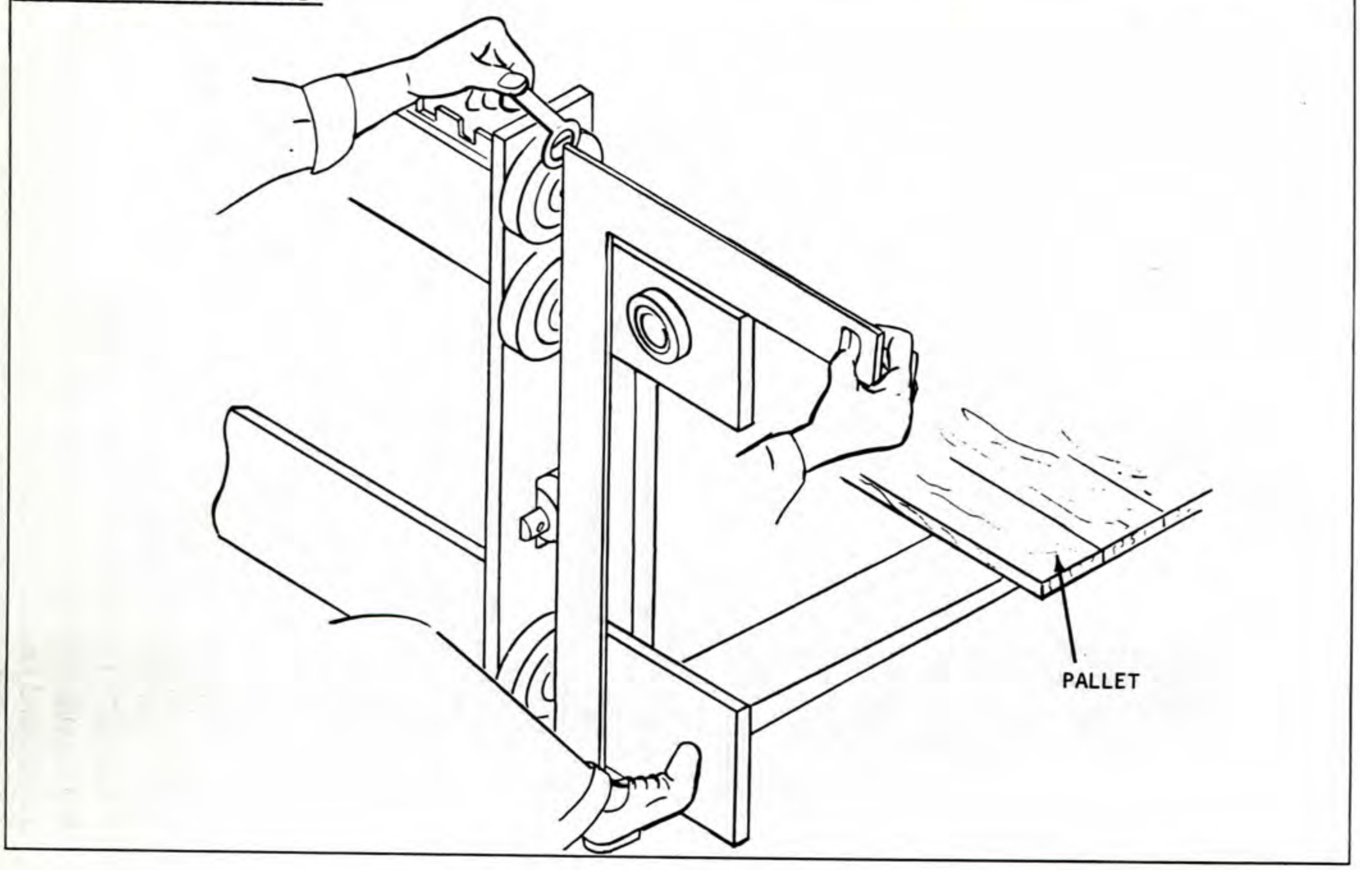


Plate 9580 Top Roller Clearance

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

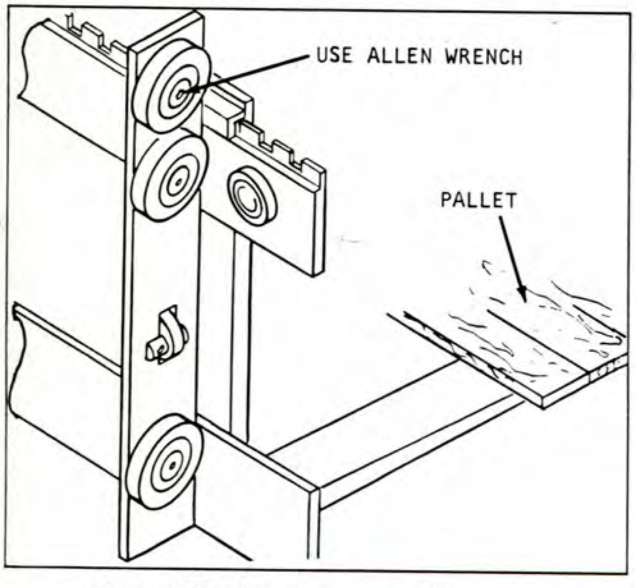


Plate 9581 Removing Top Roller

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.

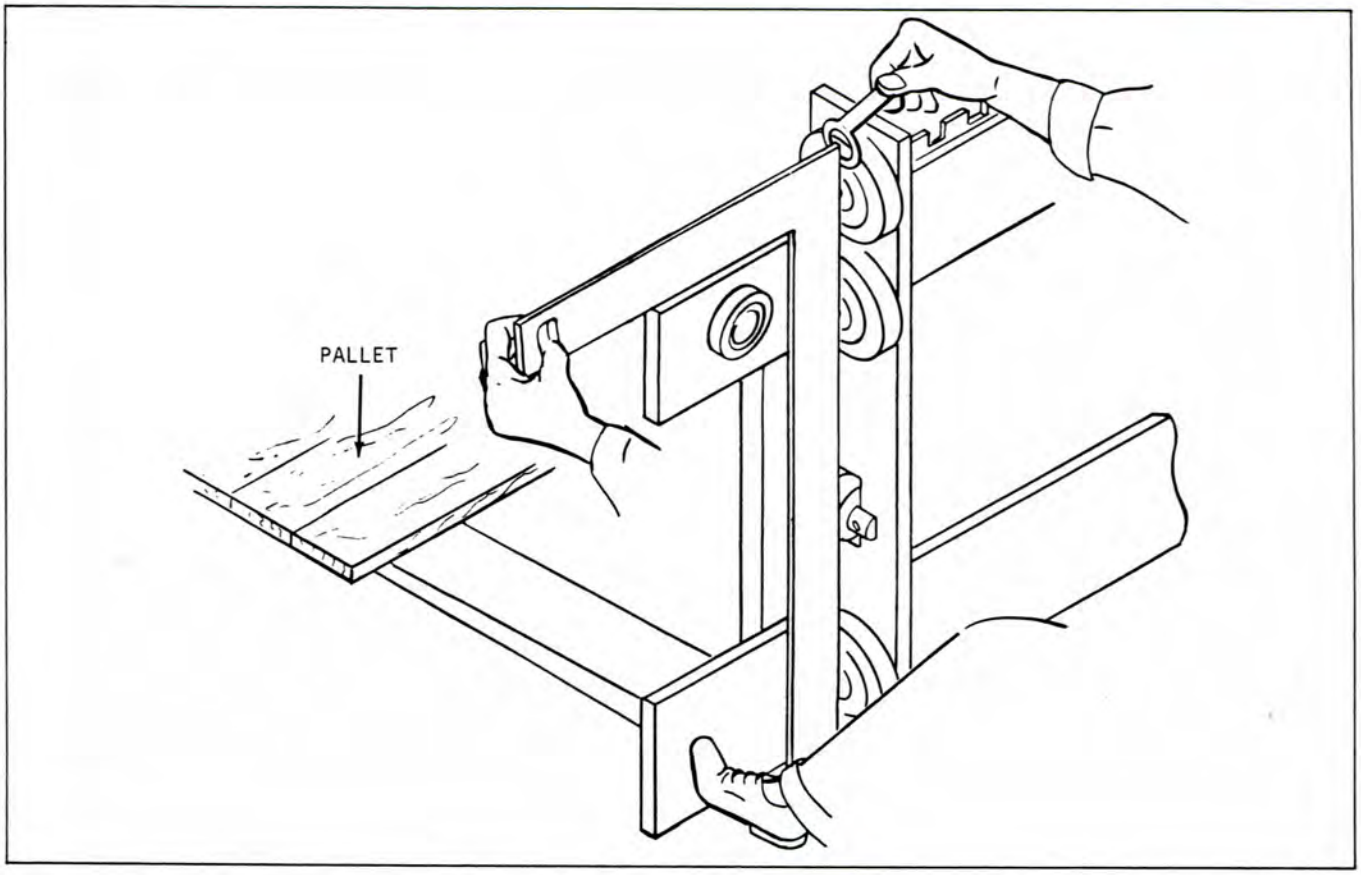


Plate 9582 Top Roller Clearance

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

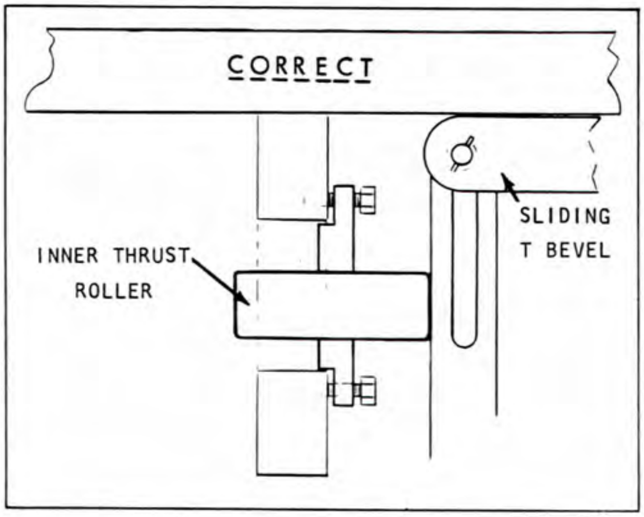


Plate 9583 Checking Squareness■CORRECT

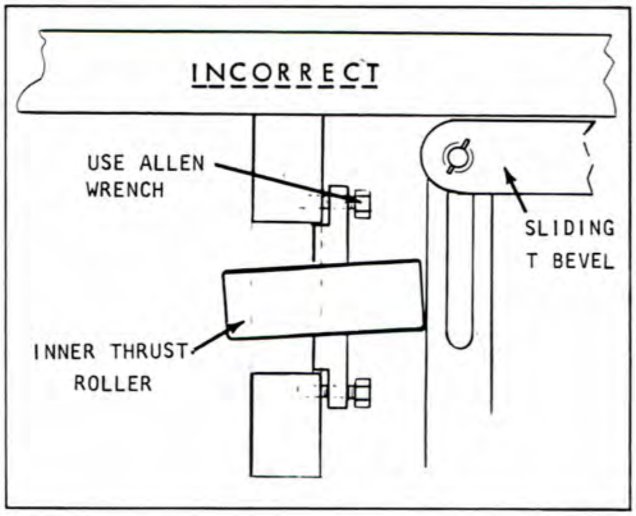


Plate 9584 Checking Squareness■INCORRECT

Step 4. Check squareness of inner thrust rollers with Sliding T Bevel. Set Sliding T Bevel to 90° using carpenters square.

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

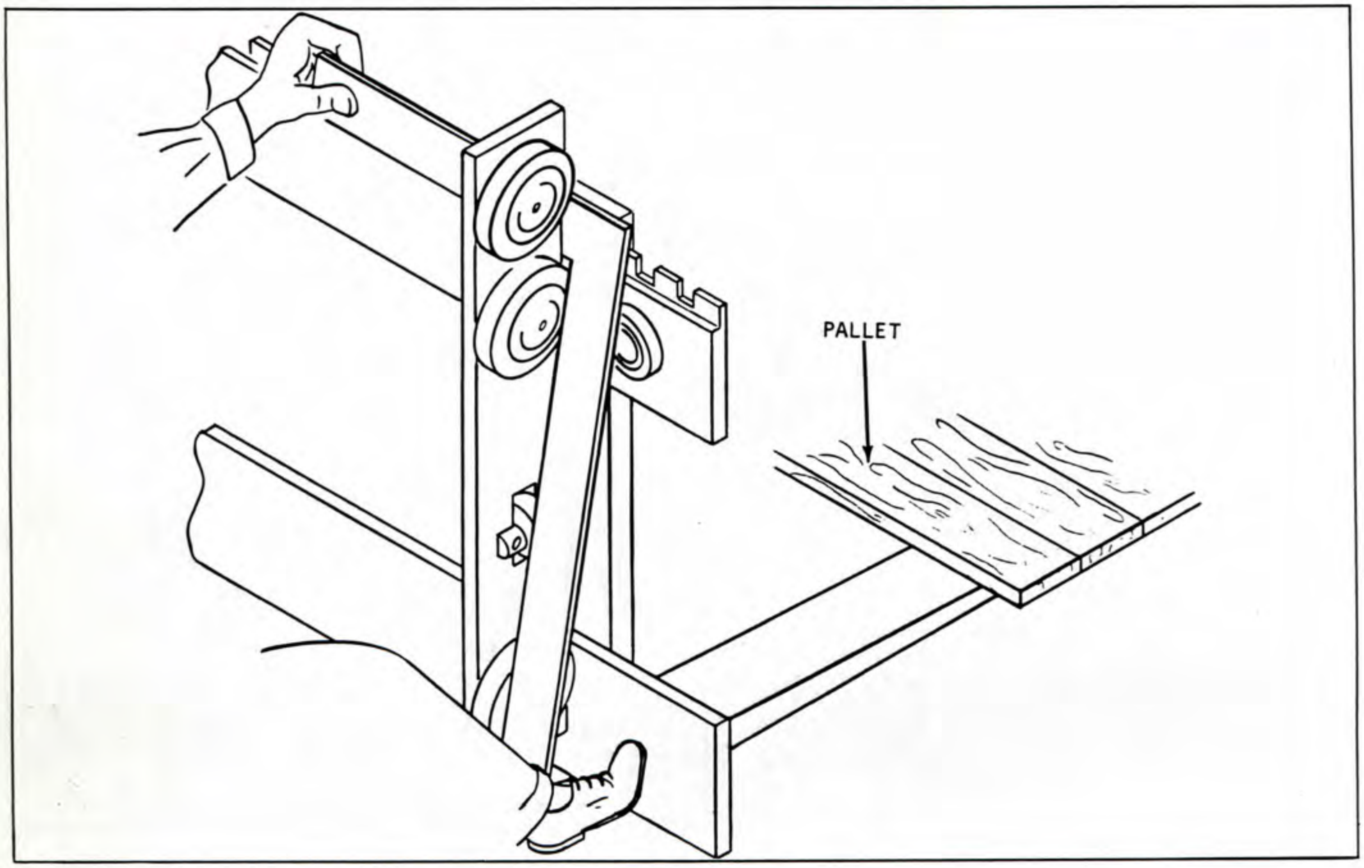


Plate 9574 Square And Side Thrust Roller

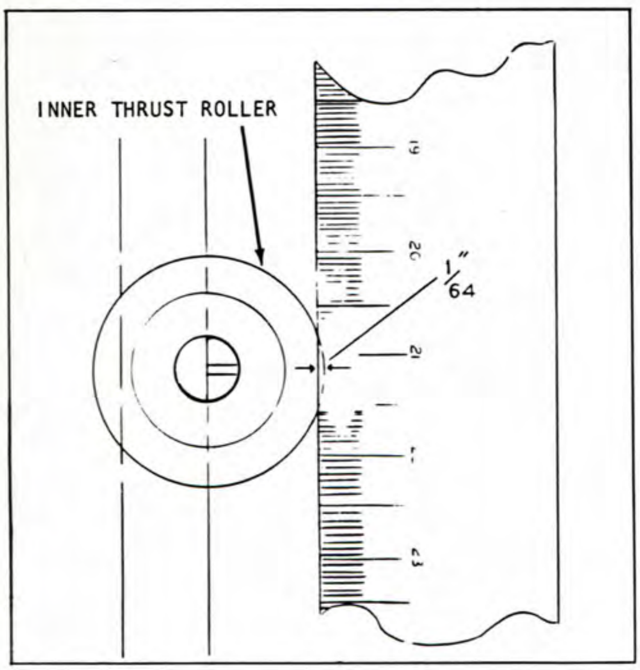


Plate 9585 Reading Roller Projection

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

NOTE

Before installing carriage, check upright for proper shimming adj-ustment.

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.

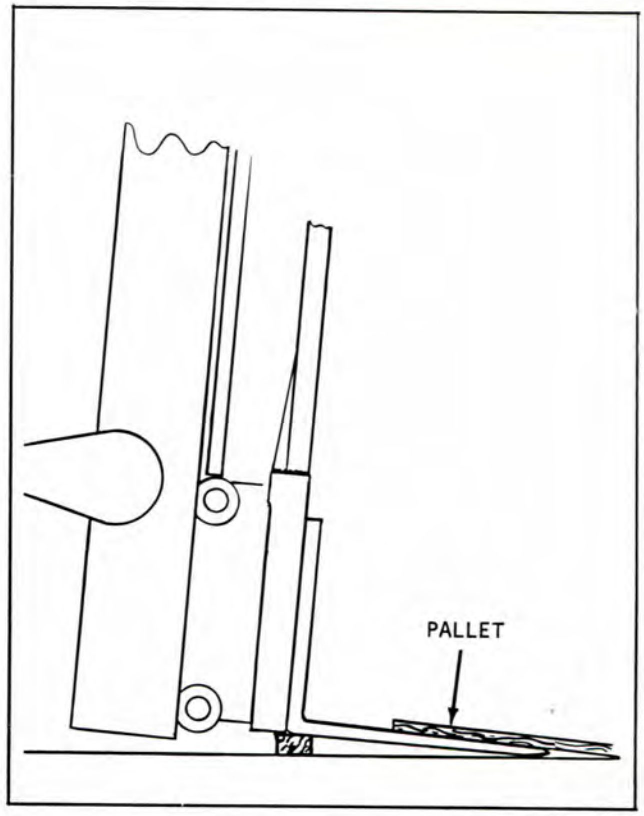


Plate 9565 Inner Rail Clearing Carriage Rollers

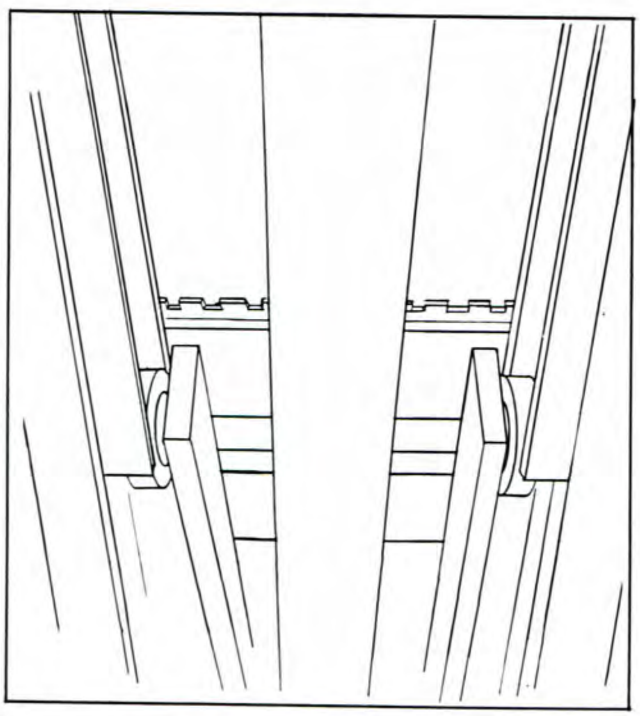


Plate 9591 Rollers Guiding Into Inner Rail

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.

CAUTION

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

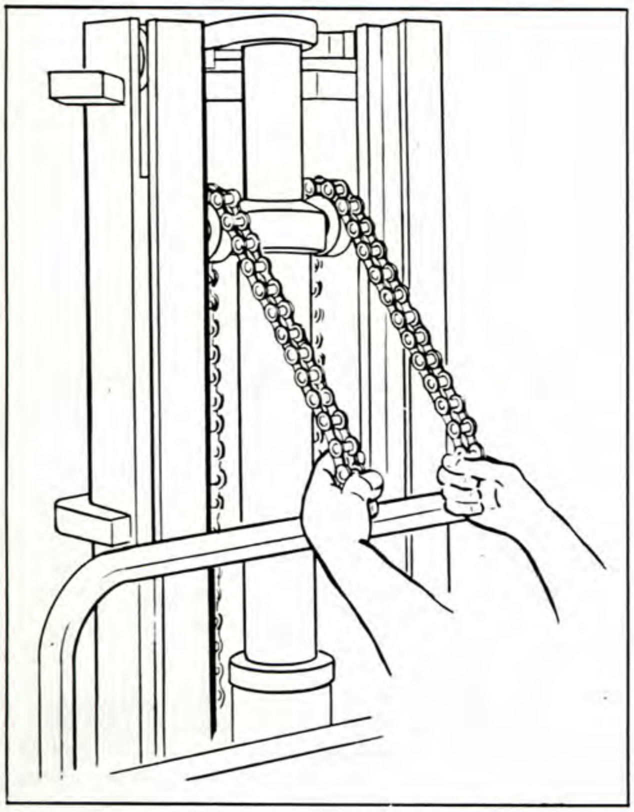


Plate 9586 Pulling Piston Head Down

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.

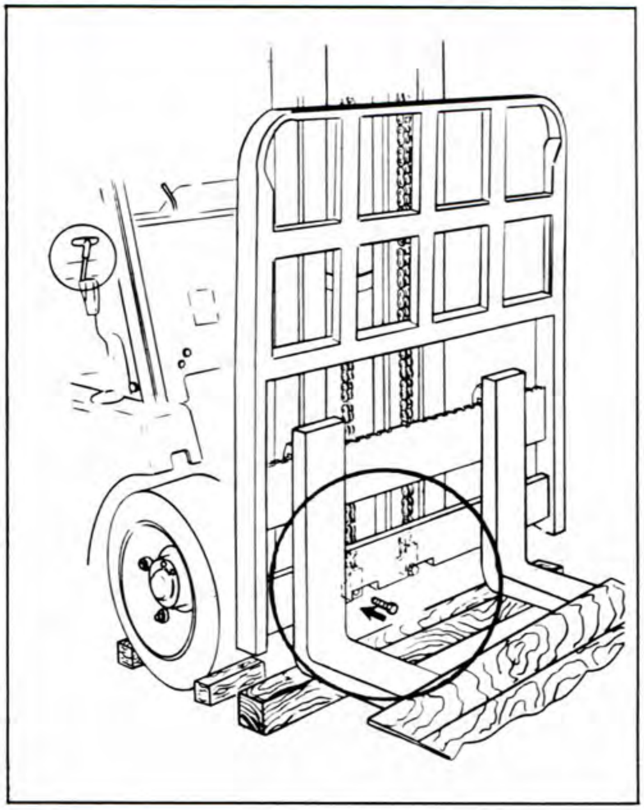


Plate 9587 Installing Bolts

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

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.

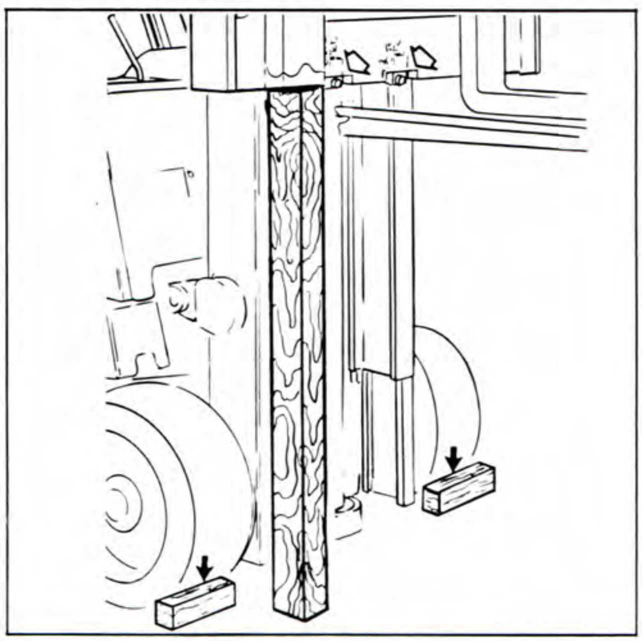


Plate 9593 Carriage Pin Replacement

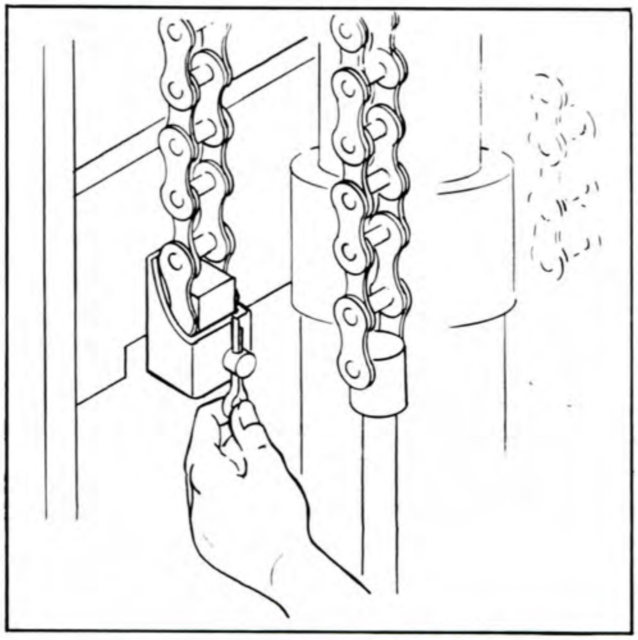


Plate 9588 Installing Cotter Pins

Step 7. Replace cotter pins in anchor pins.

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

CLARK EQUIPMENT

INDUSTRIAL TRUCK DIVISION

CLARK EQUIPMENT

WORK SAFELY

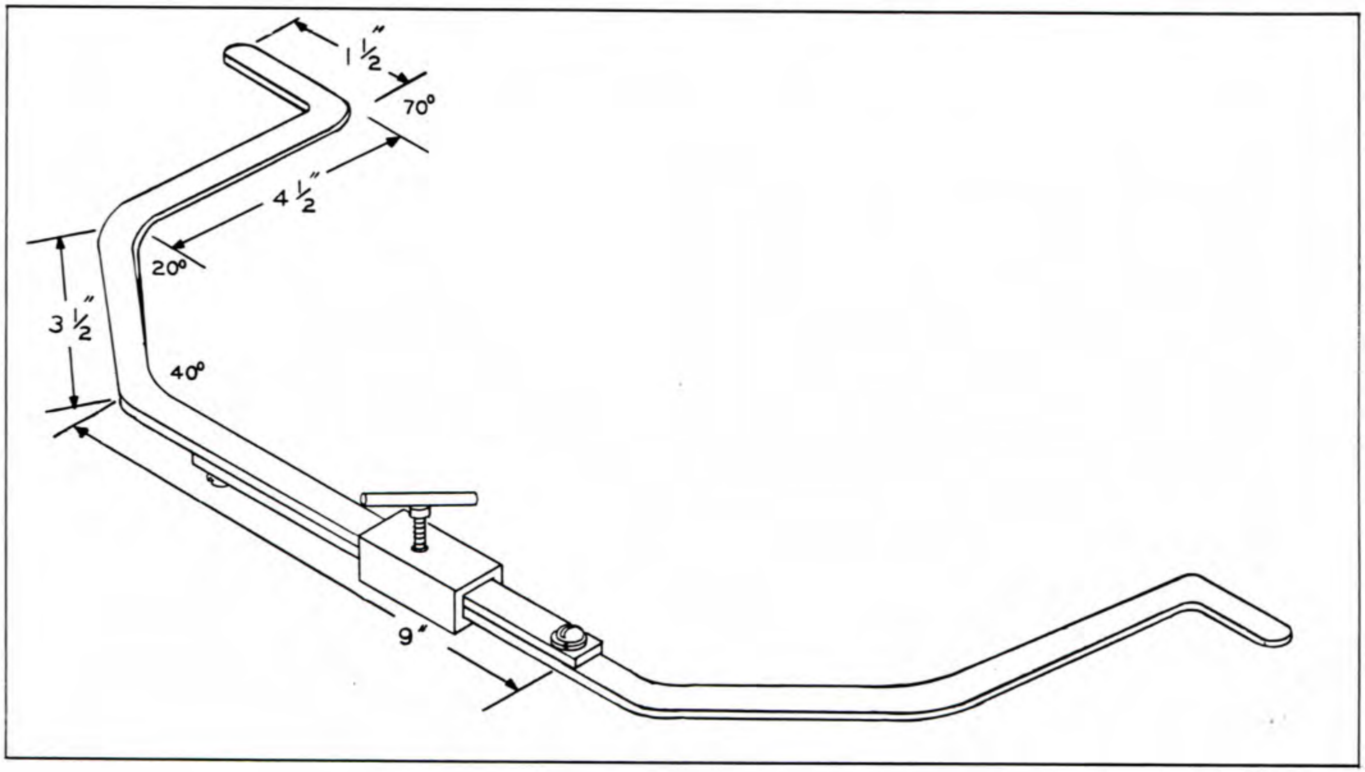
DRIVE SAFELY

BE CAREFUL

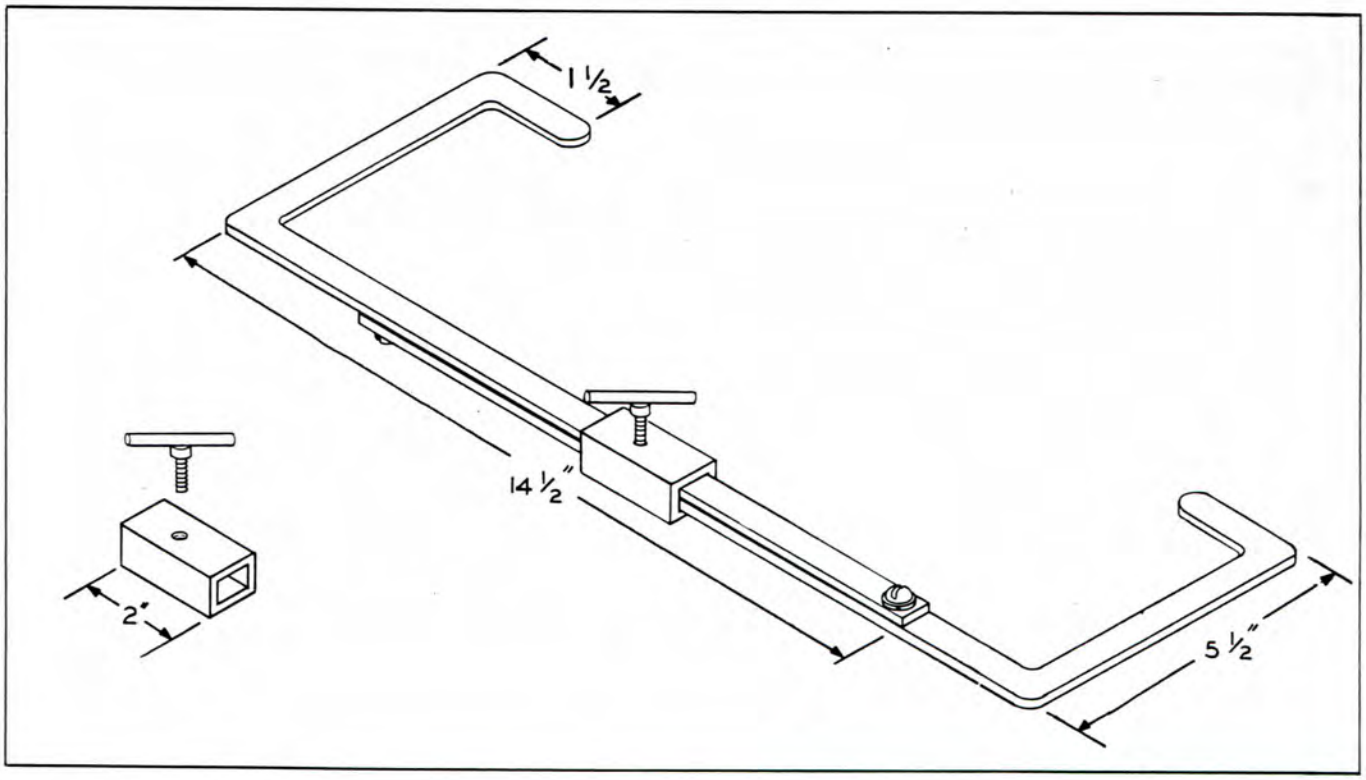
ALWAYS

GIVE MACHINE SERIAL NUMBER

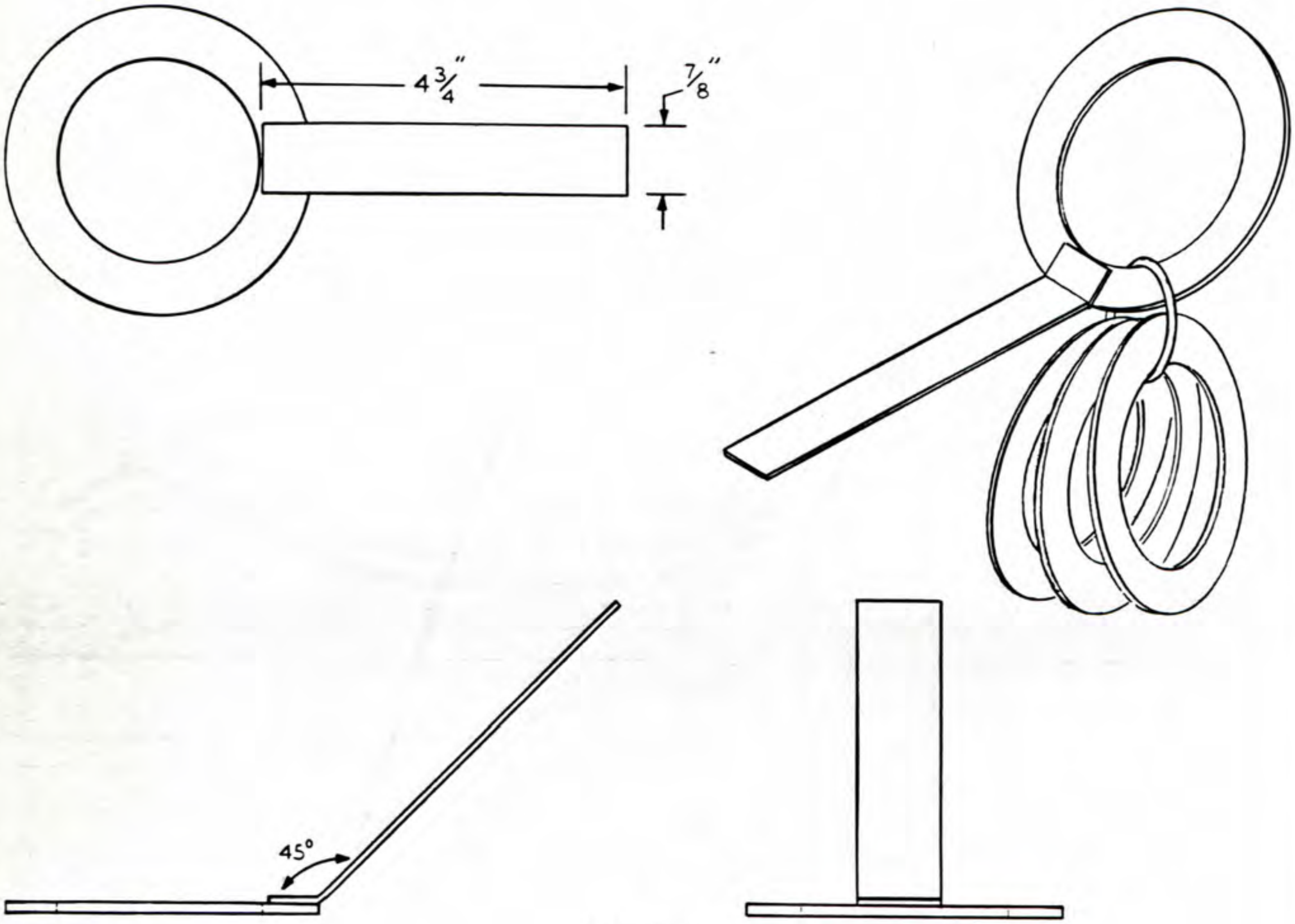
WHEN ORDERING PARTS



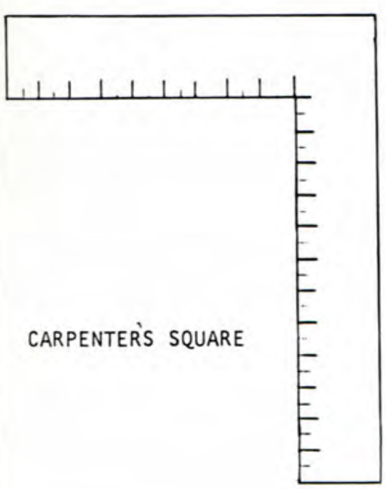
INSIDE SPANNING TOOL



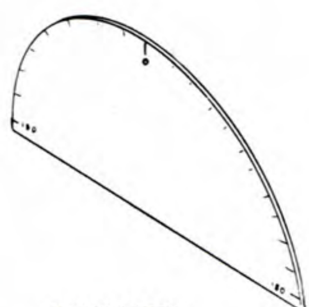
OUTSIDE SPANNING TOOL



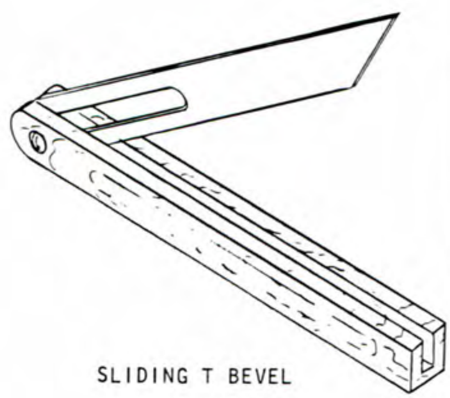
SHIM GAUGE



CARPENTER'S SQUARE

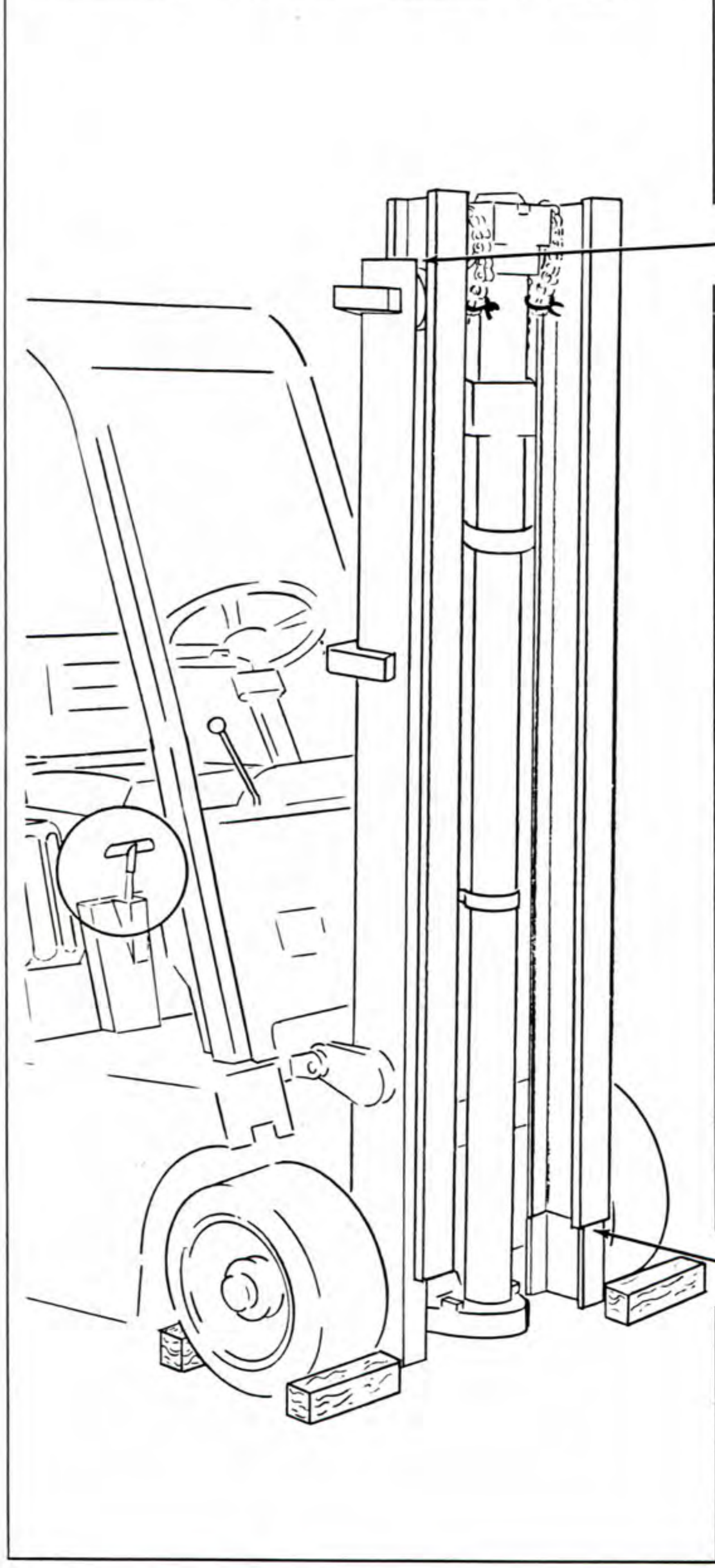


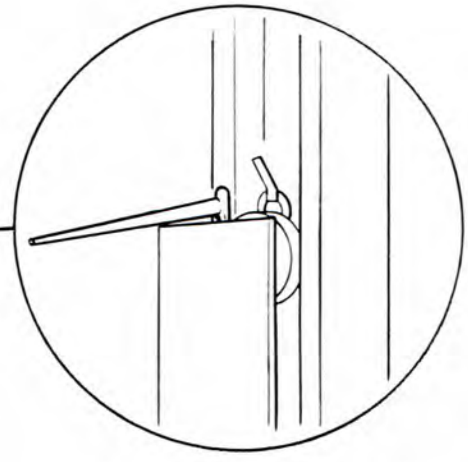
PROTRACTOR



SLIDING T BEVEL

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".

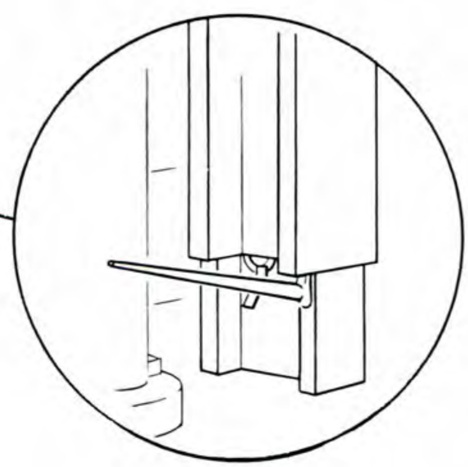
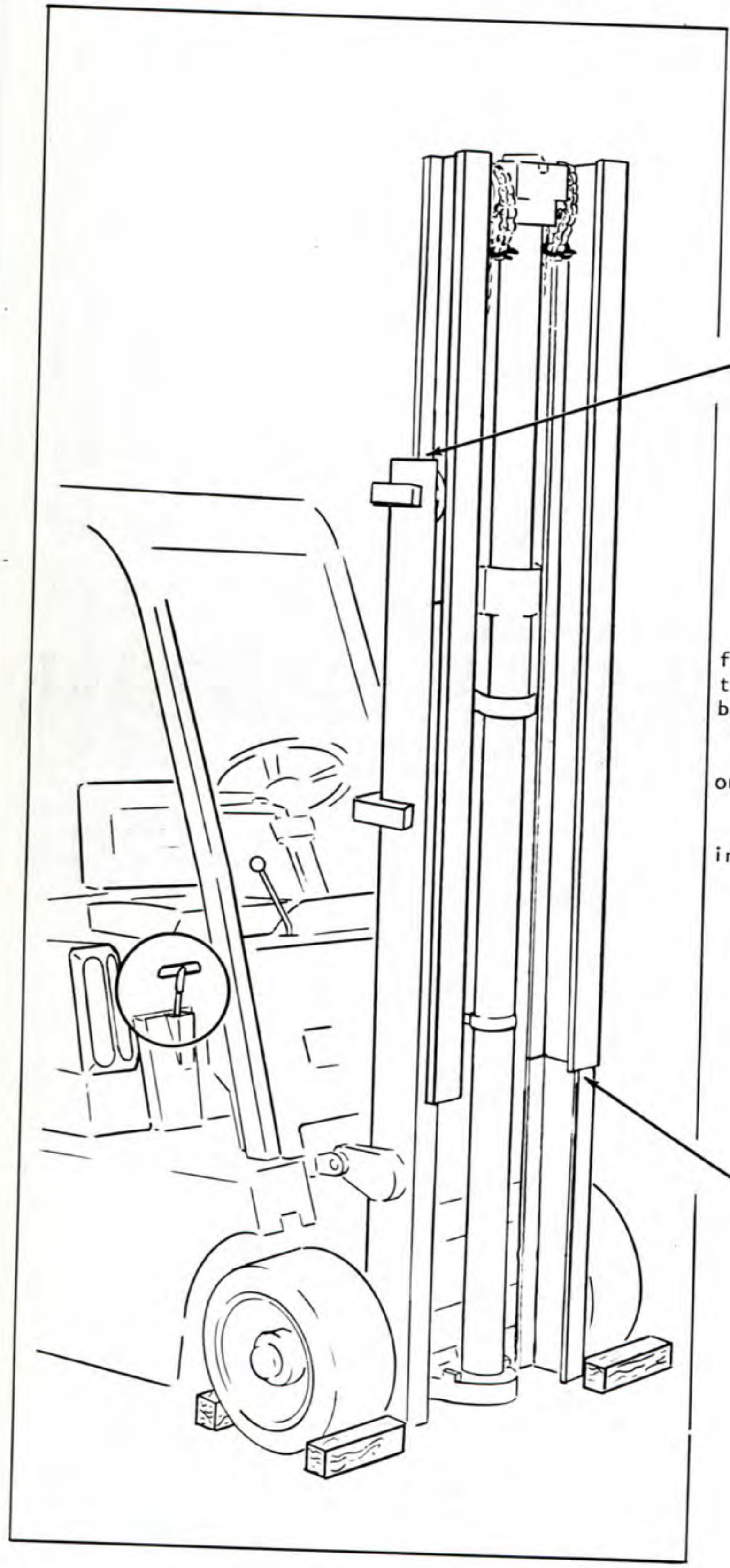
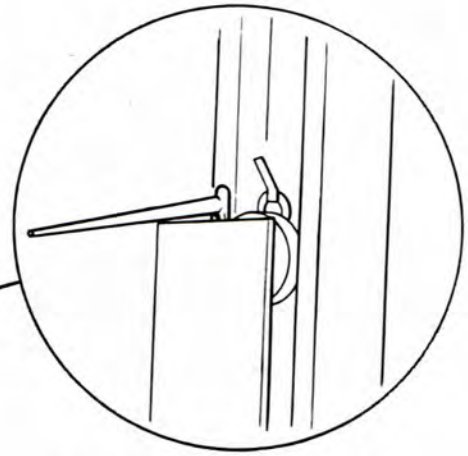


Plate 9624





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).

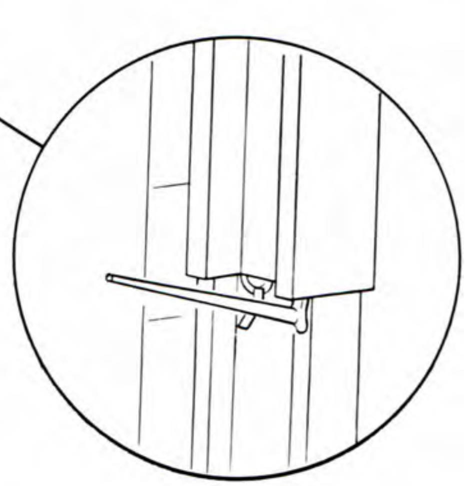
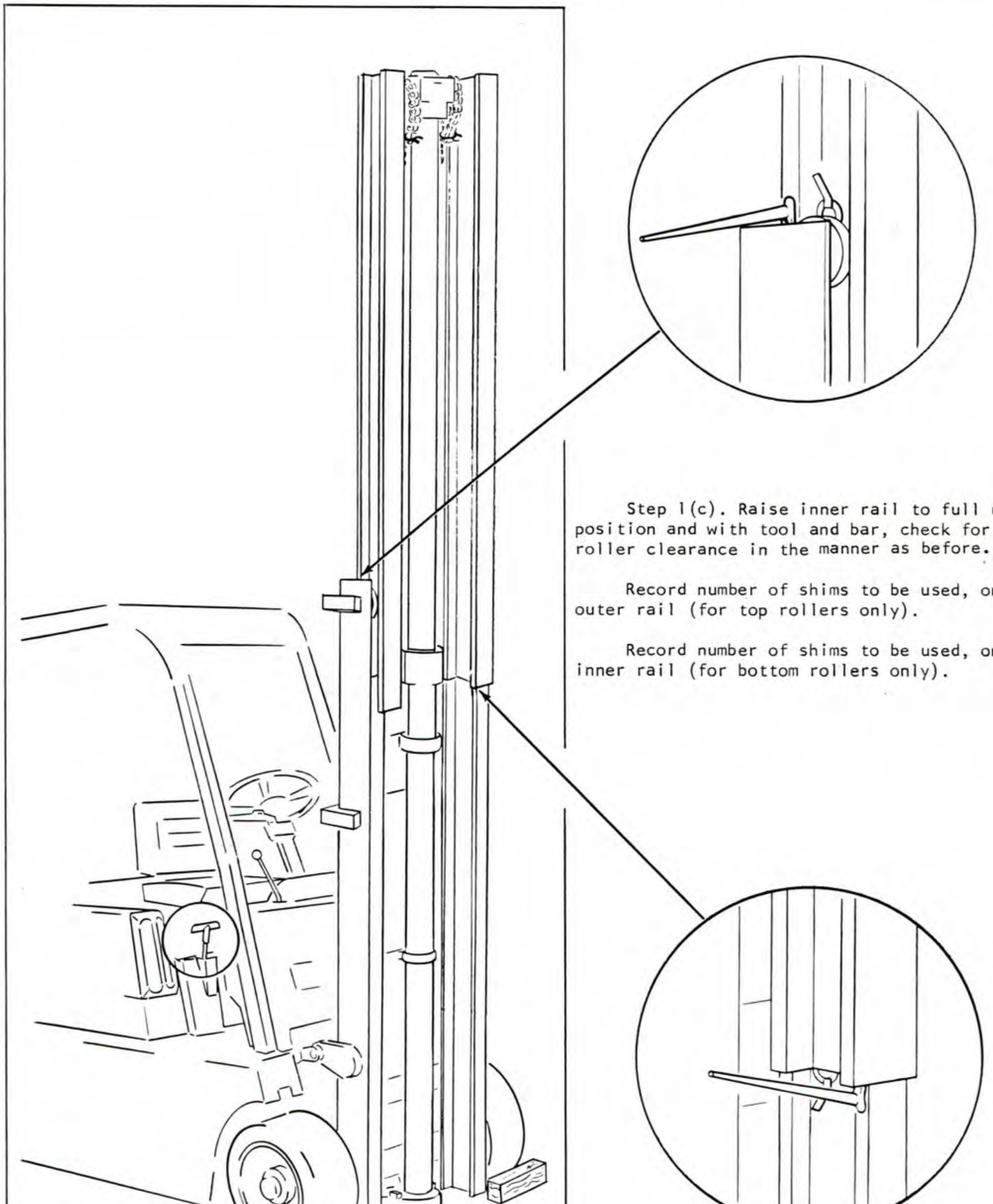


Plate 9625



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

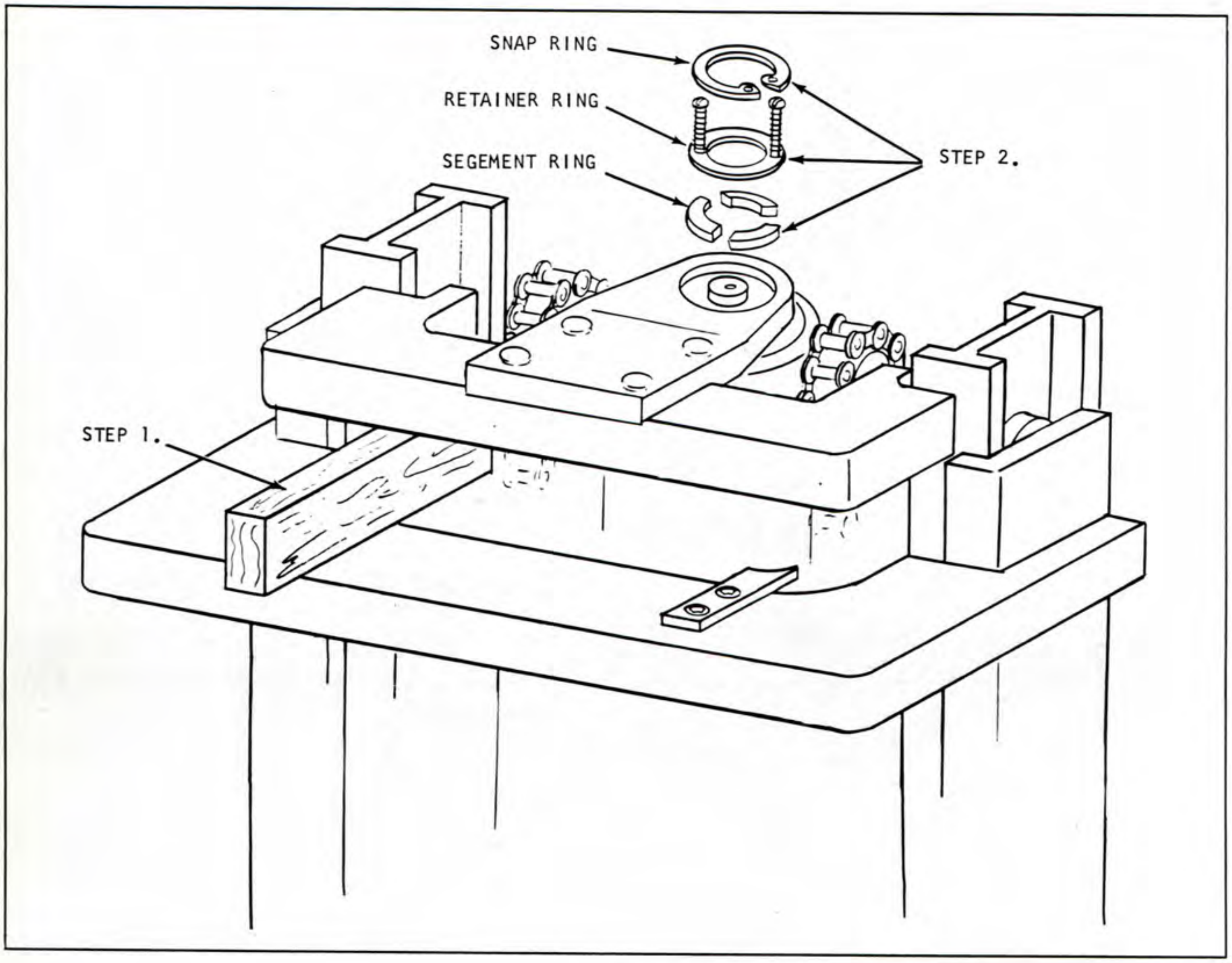


Plate 9627

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 segement ring.

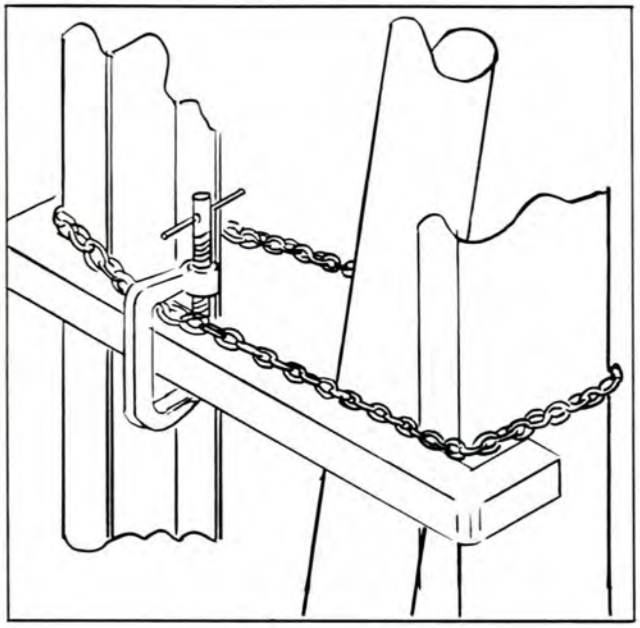


Plate 9628

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.

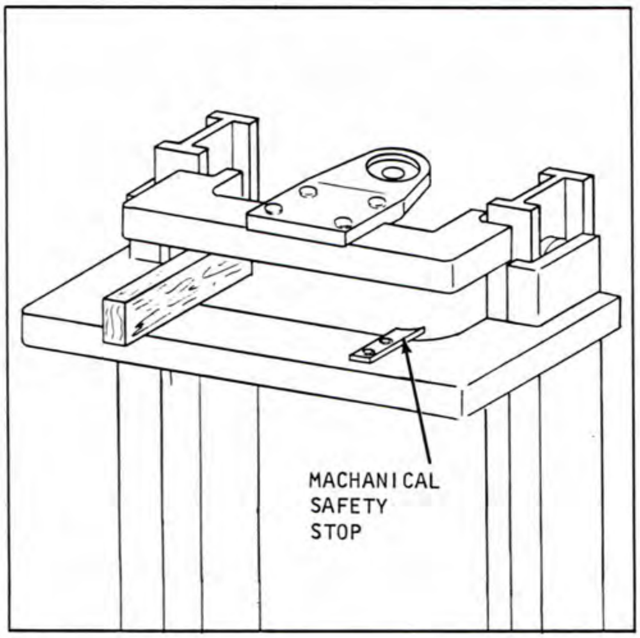


Plate 9629

Step 5. Remove mechanical safety stops with allen wrench.

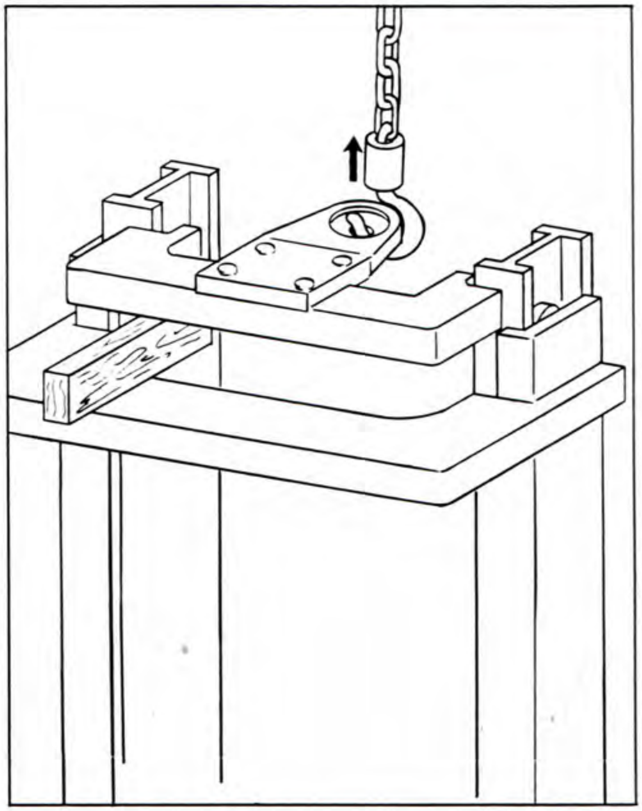


Plate 9630

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

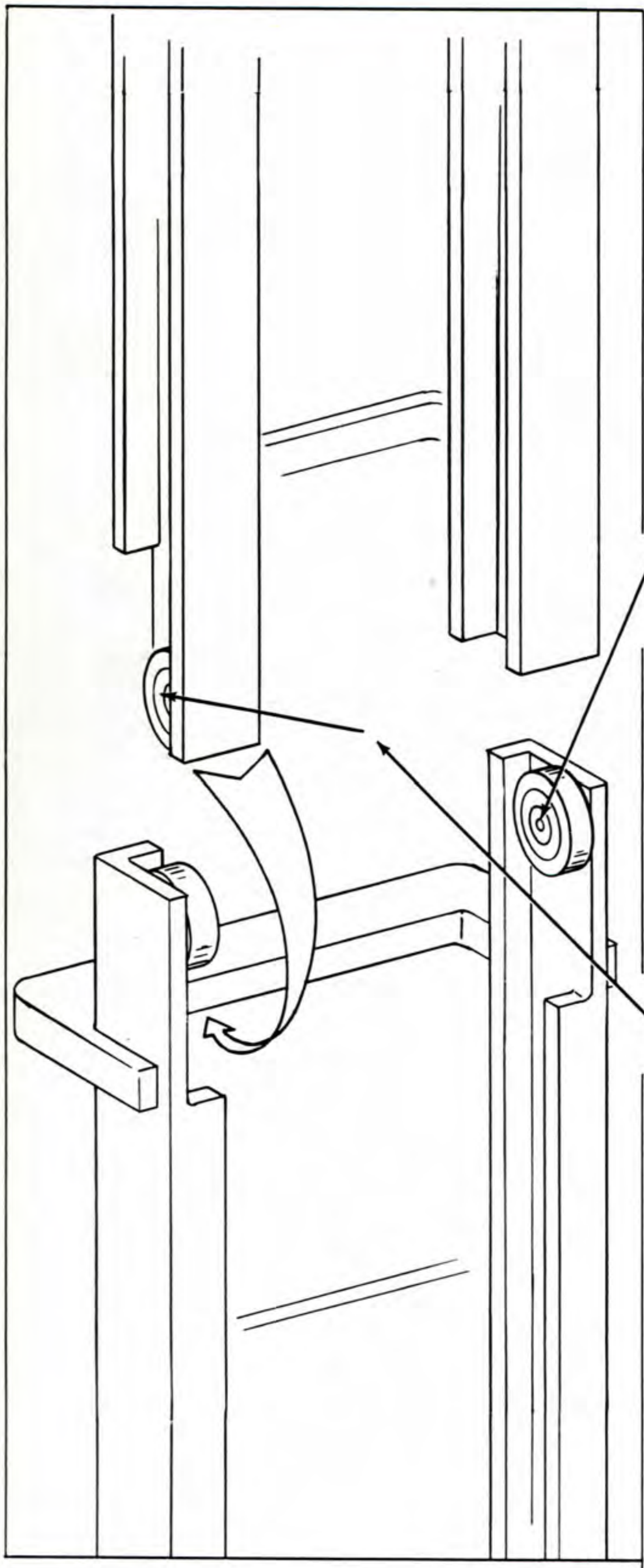
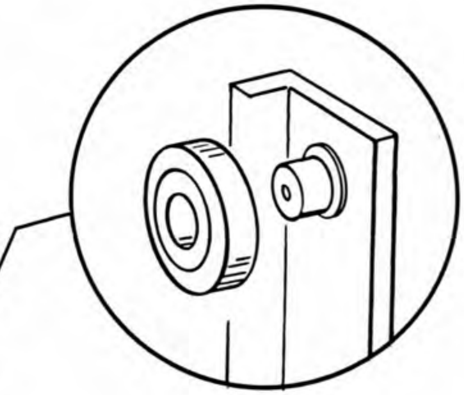


Plate 9631

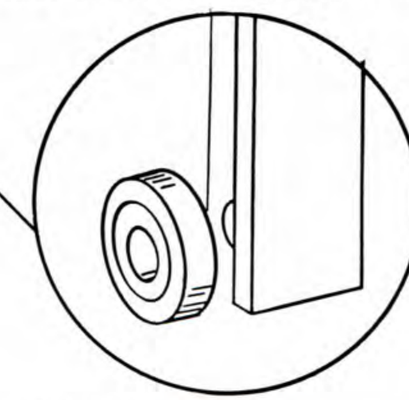
Step 7. Raise inner rail out of outer rail.

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, besure it is on the same side as the extra upper shim.

C. Replace inner rail.

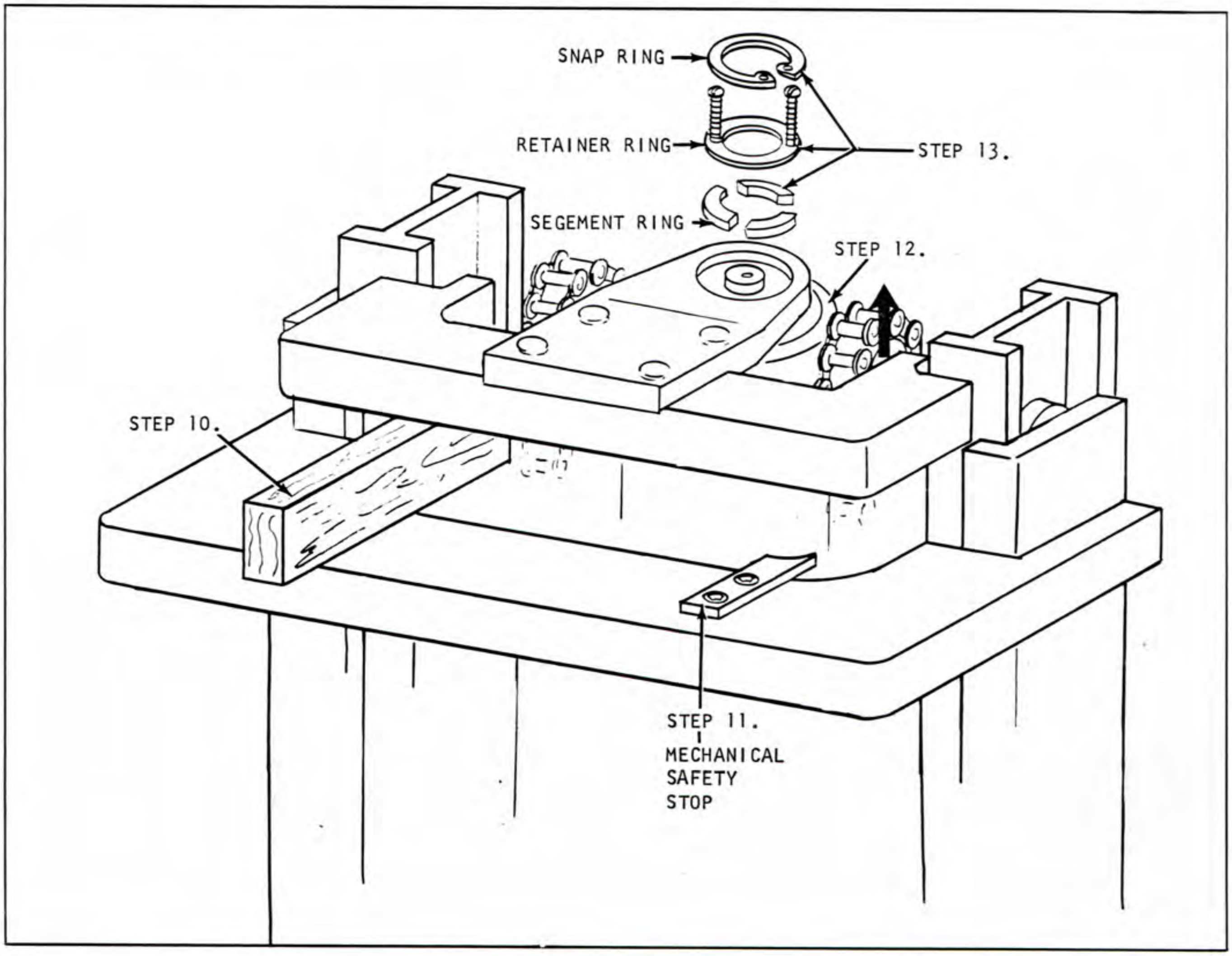


Plate 9632

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.

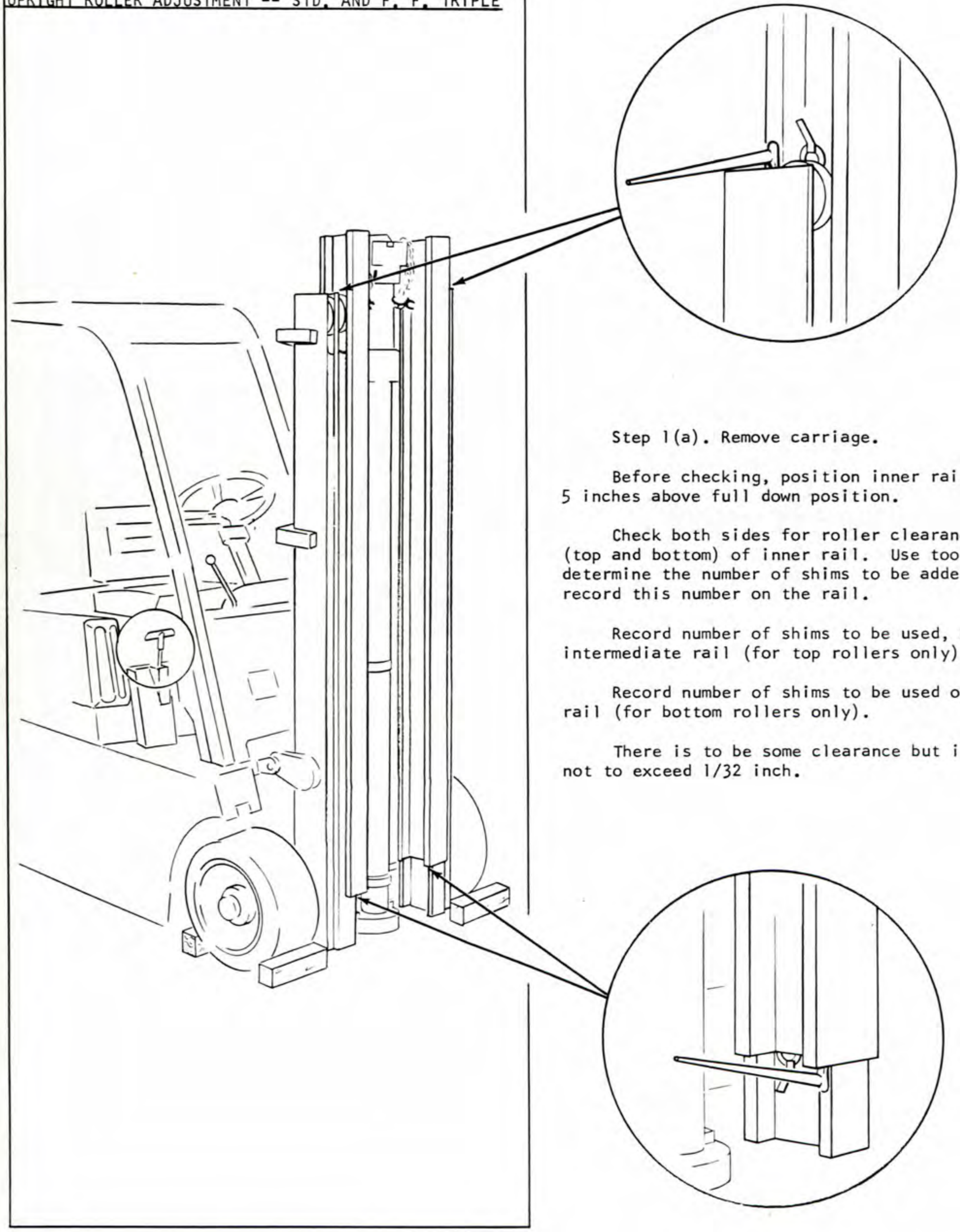
(a). Install segement ring.

(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.

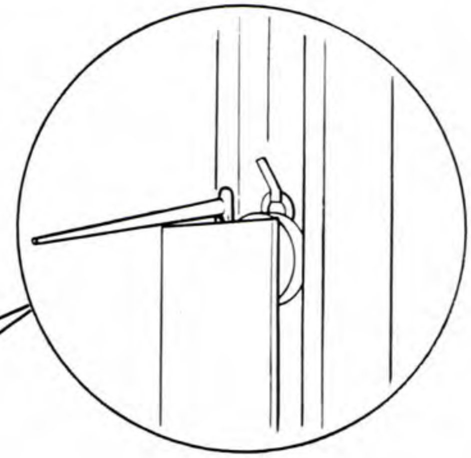
Check both sides for roller clearance at (top and bottom) of inner rail. Use tool to determine the number of shims to be added and record this number on the rail.

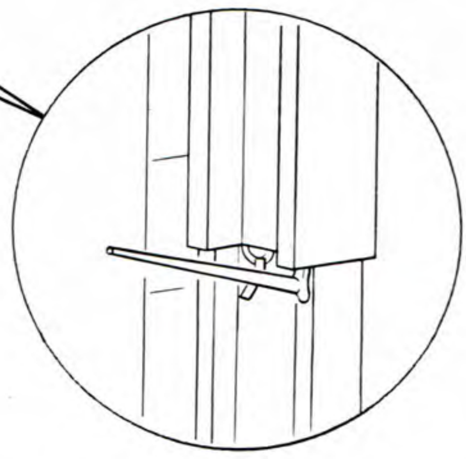
Record number of shims to be used, on intermediate rail (for top rollers only).

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



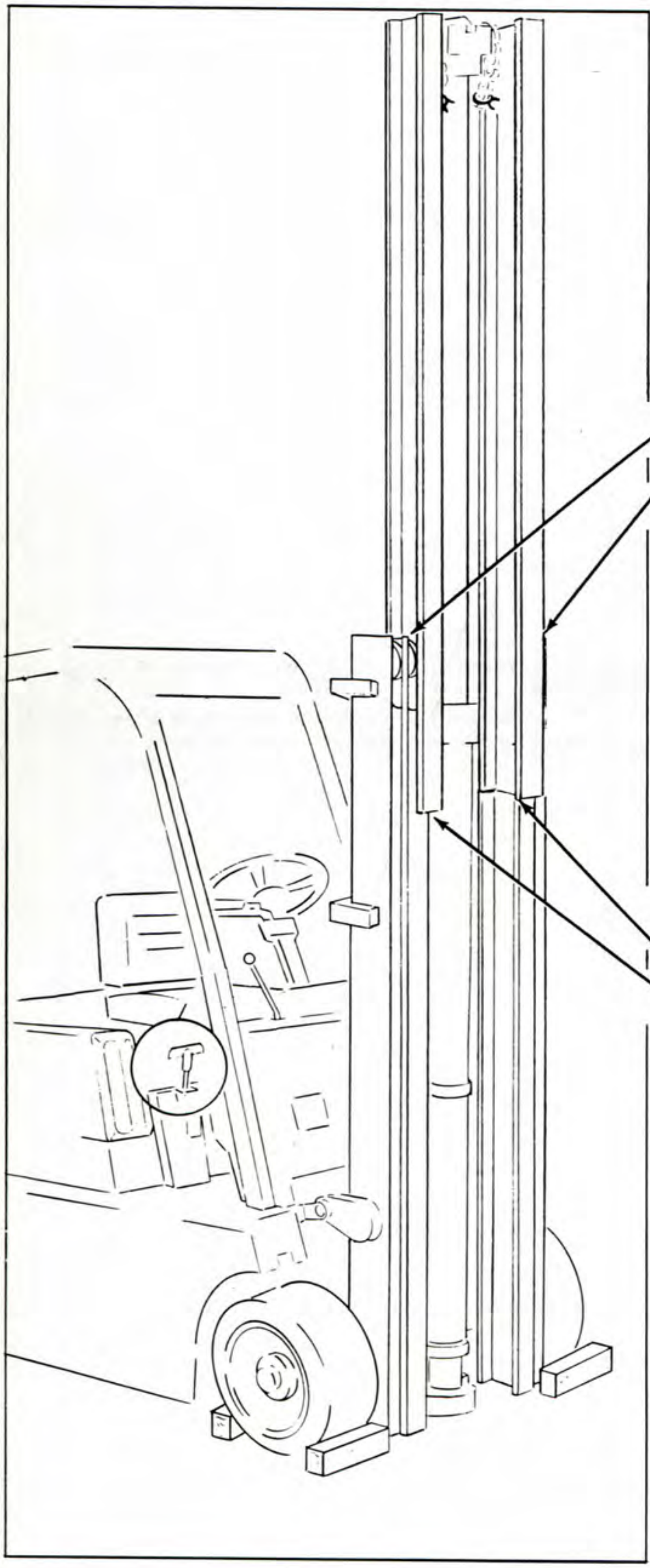


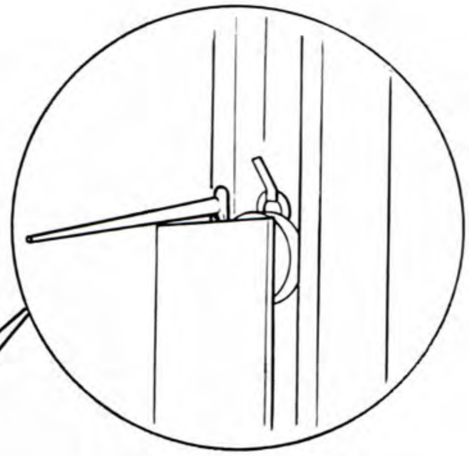
Step 1(b). Raise inner rail to 1/2 of its full up position. Check roller clearance in the same manner as before.

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).

Plate 9637





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).

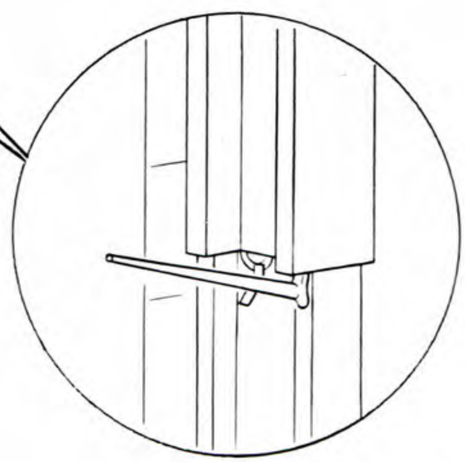
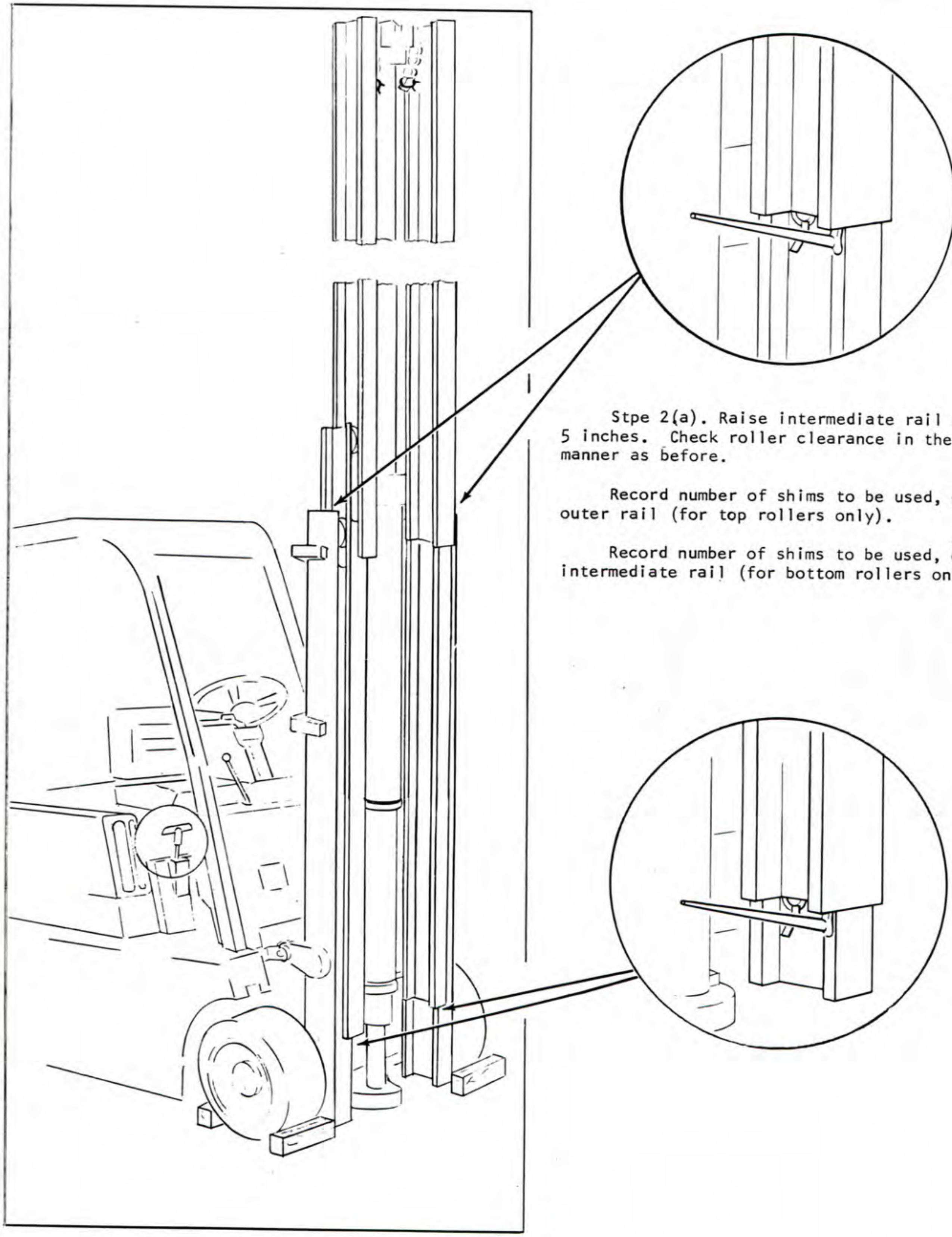


Plate 9638

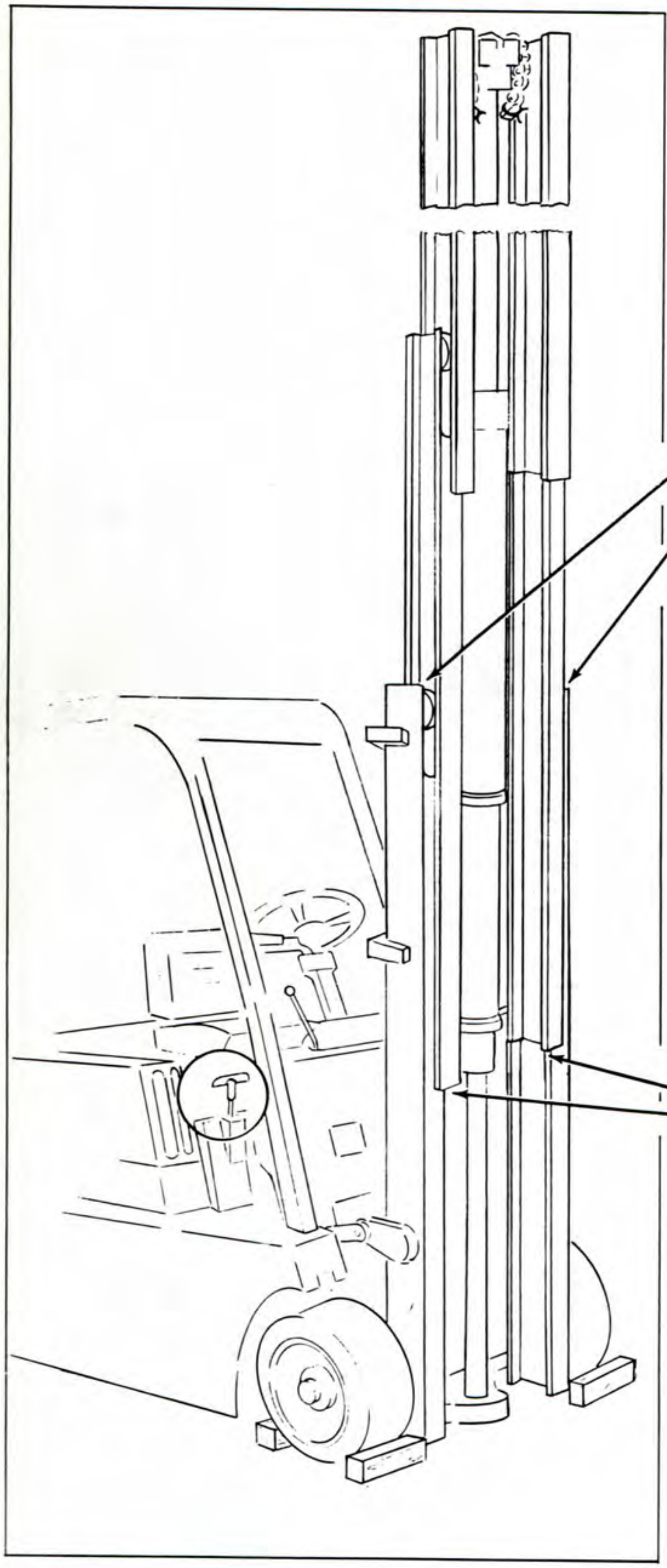


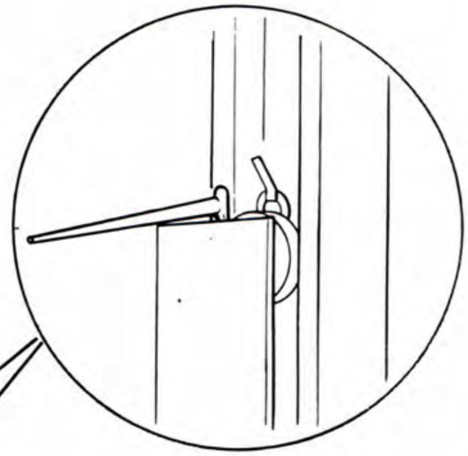
Stpe 2(a). Raise intermediate rail about 5 inches. Check roller clearance in the same manner as before.

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





Stpe 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).

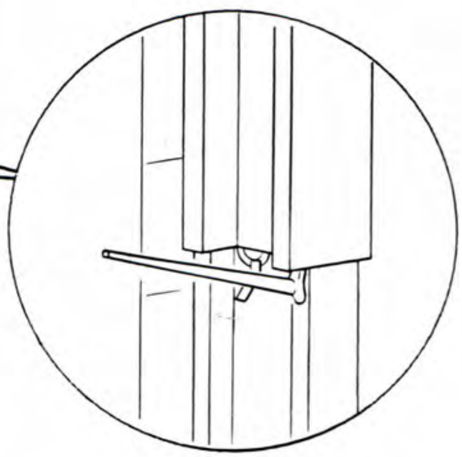
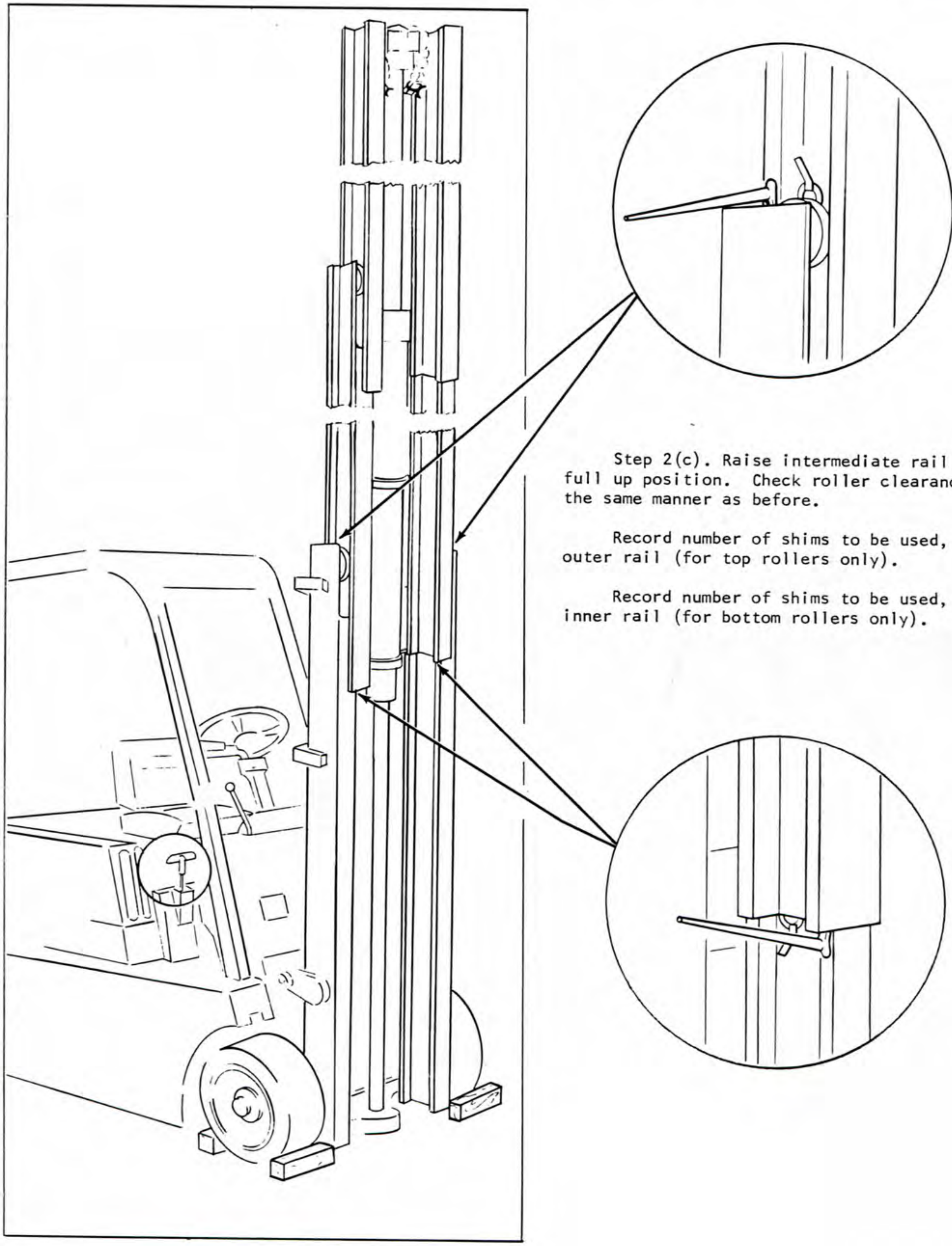


Plate 9640



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

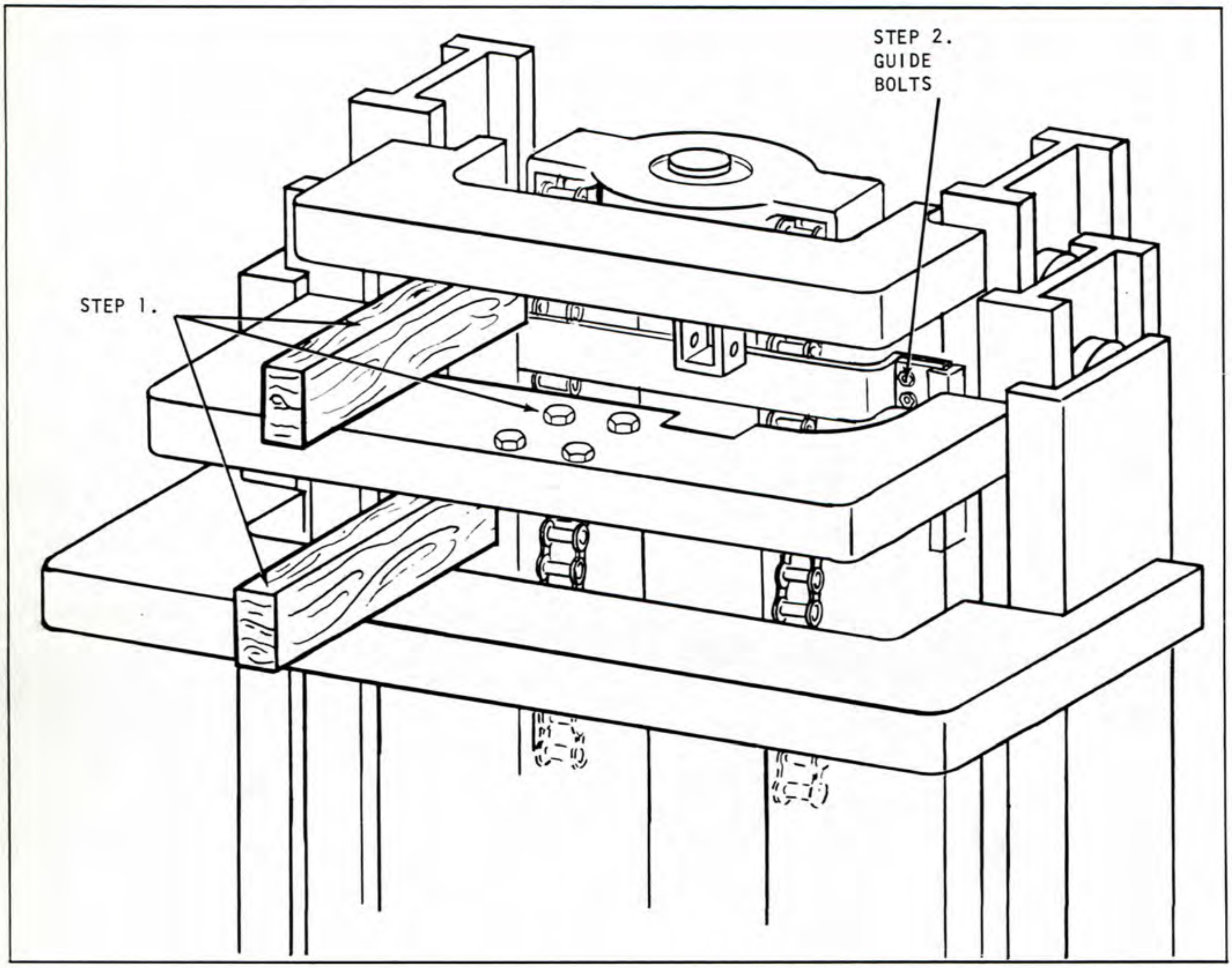


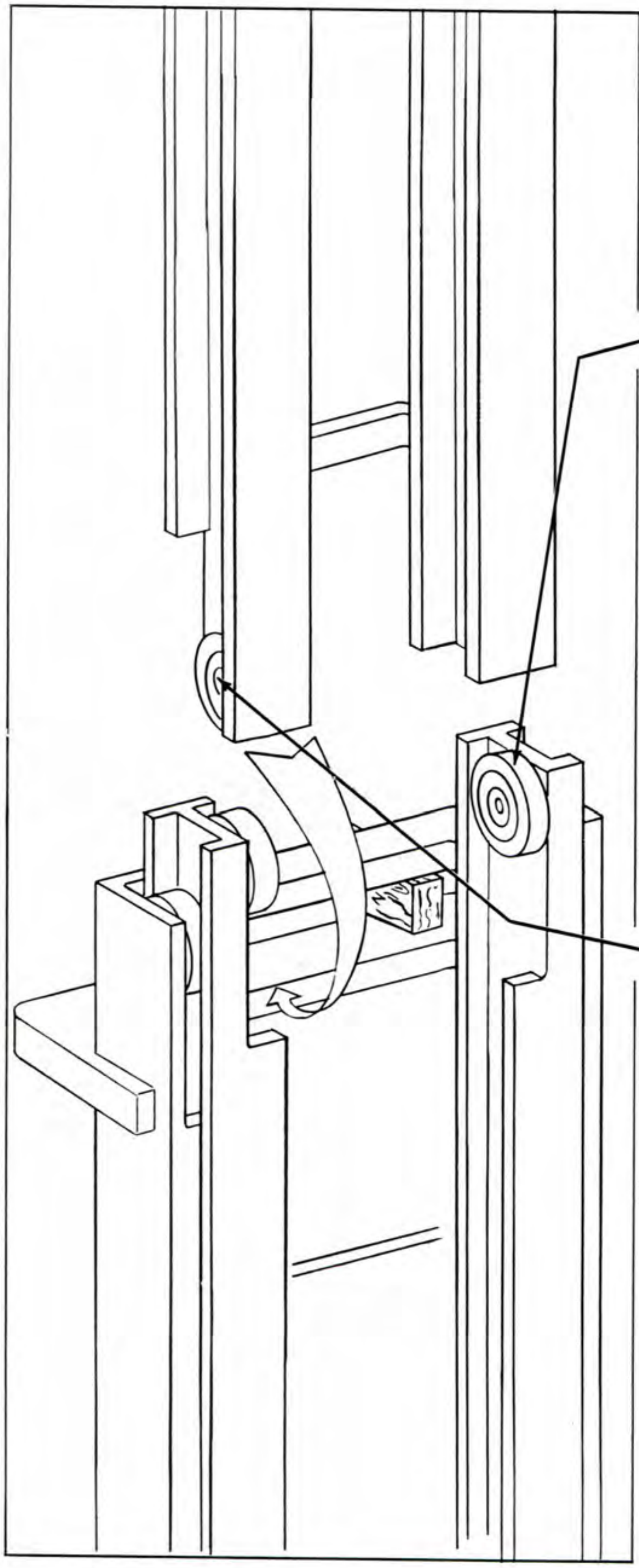
Plate 9642 Standard Triple Piston Head

<u>REMOVAL OF RAILS--STANDARD TRIPLE</u>

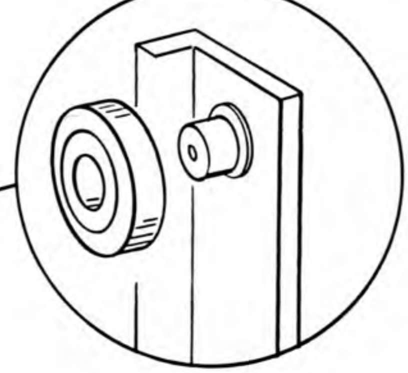
Step 1. Place blocks between inner and intermedaite rail tie bars. Remove mechanical safety stops.

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.

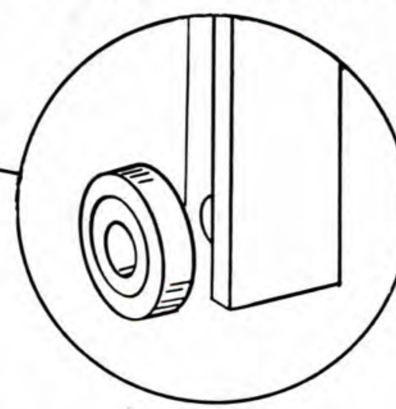


A. Intermediate rail rollers:

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

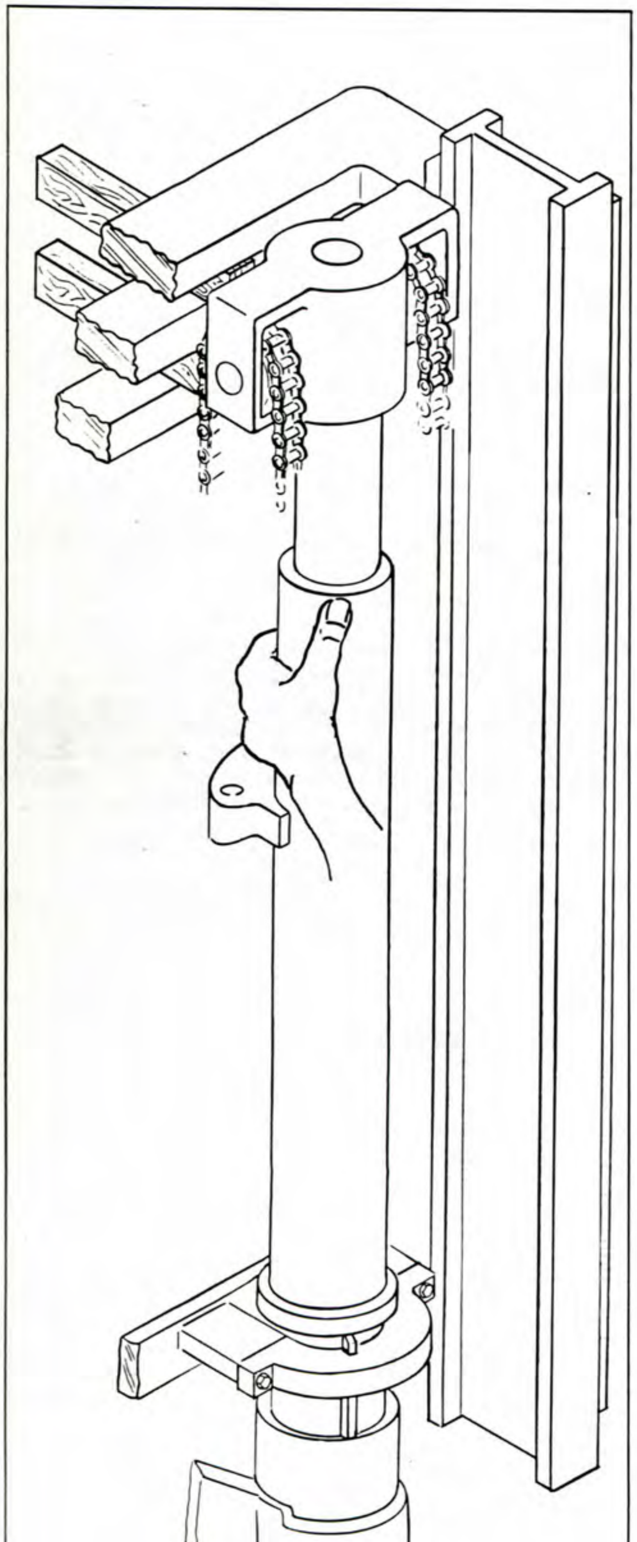


Plate 9644

NOTE

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

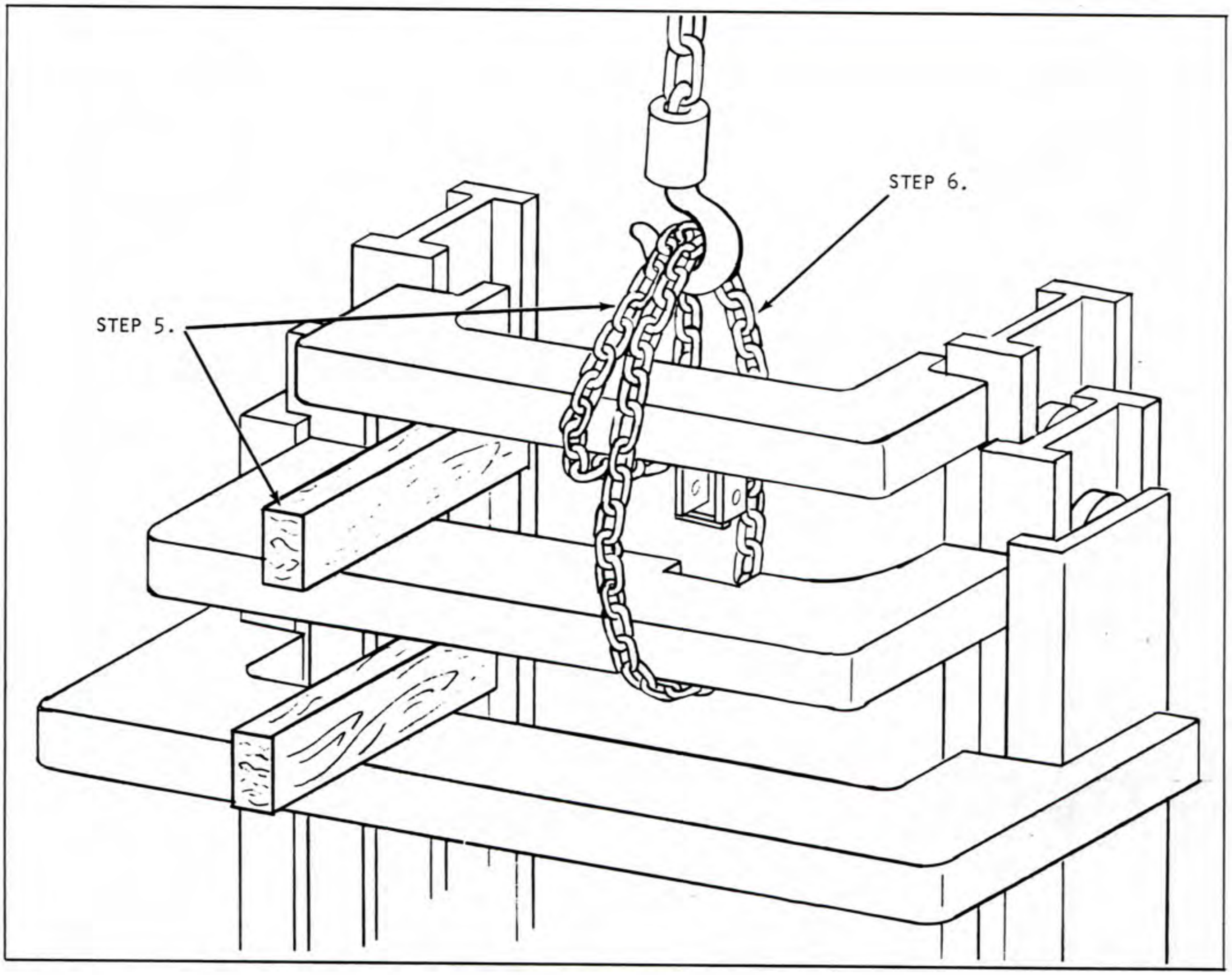


Plate 9645 Chain Placement

Step 5. Replace block and remove chain hoist.

Step 6. Remove intermediate rail assembly.

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

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

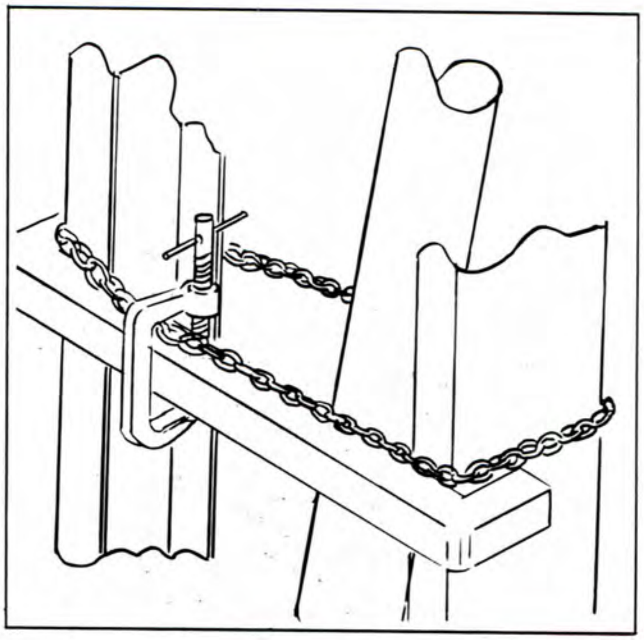


Plate 9628

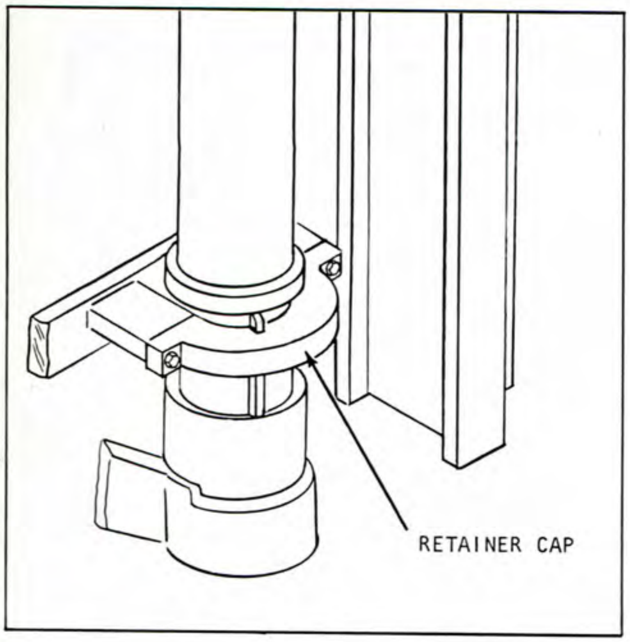


Plate 9646

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

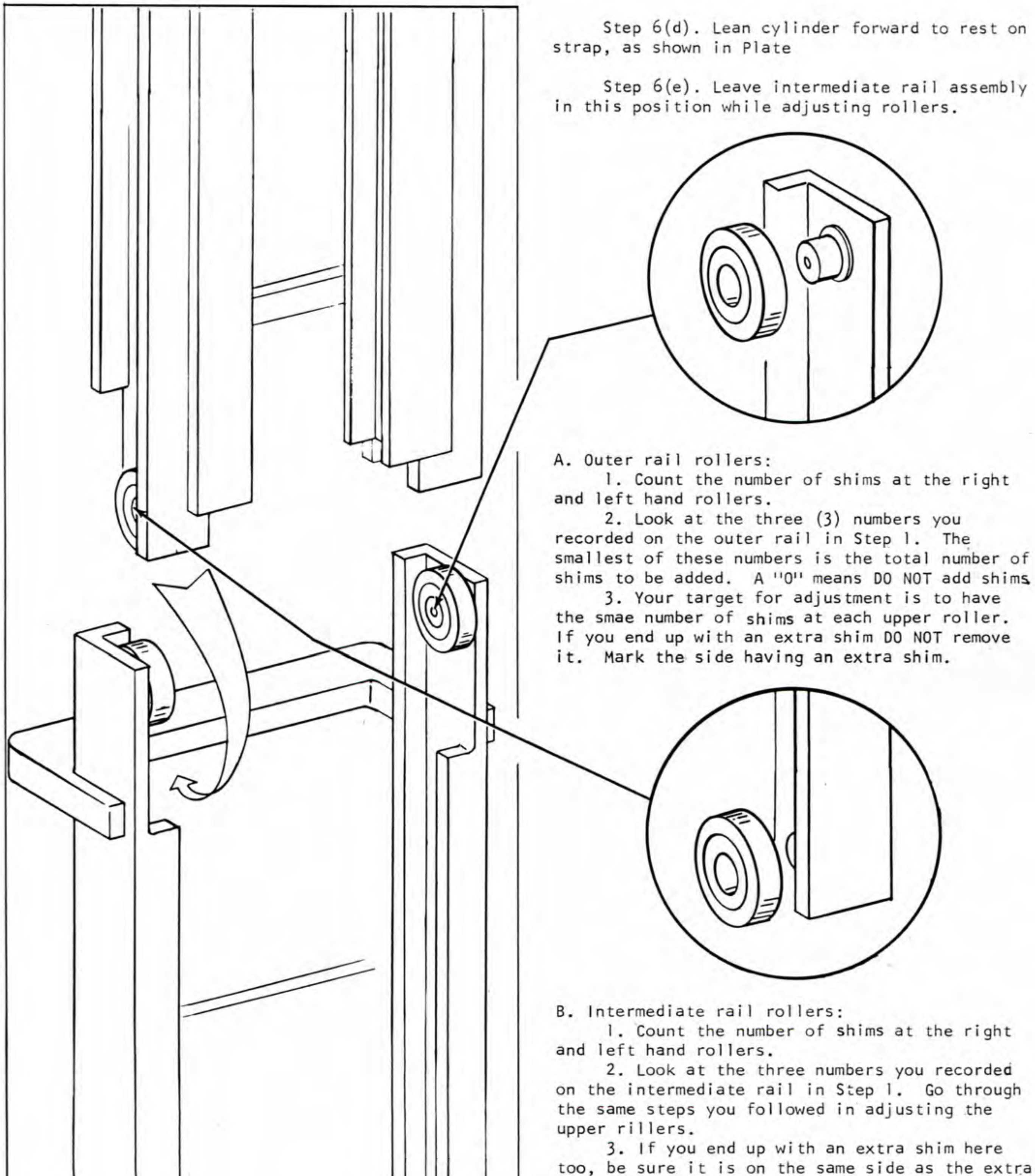


Plate 9647

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 smae 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.

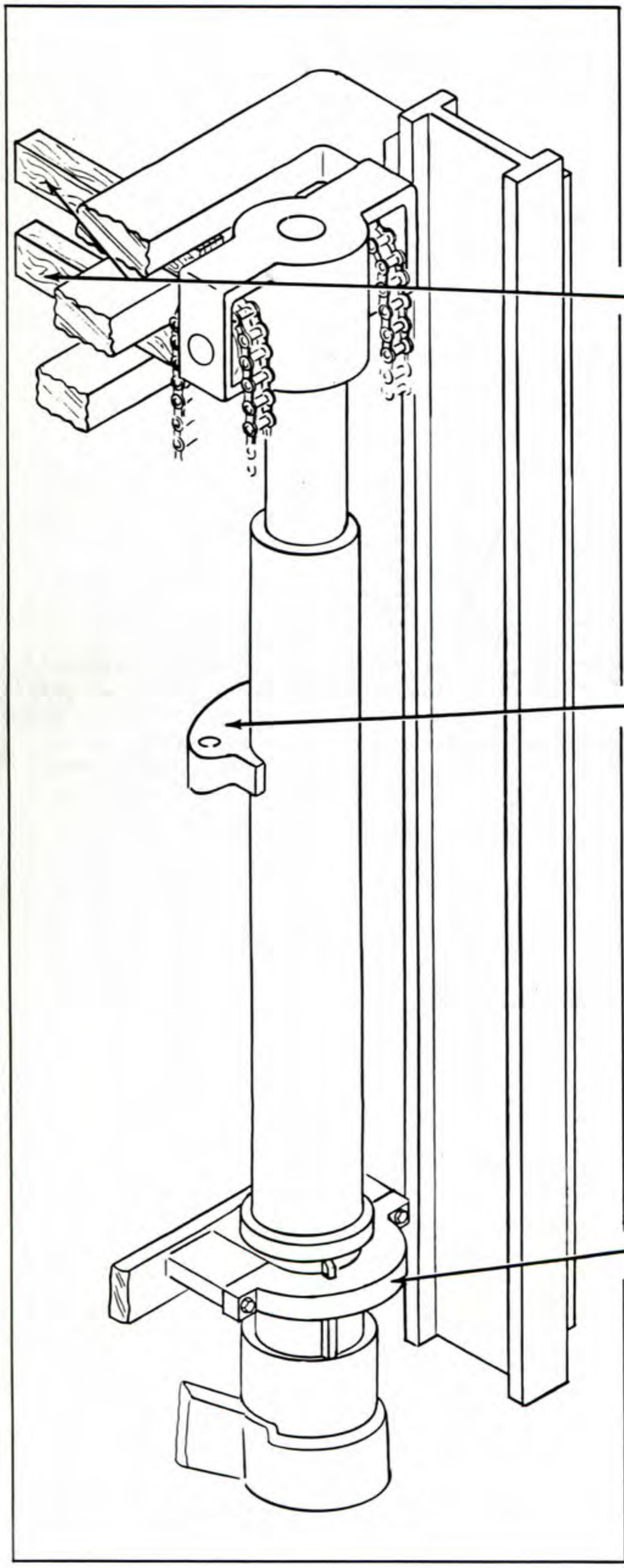
B. Intermediate rail rollers:

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 rillers.

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.



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

CLARK EQUIPMENT

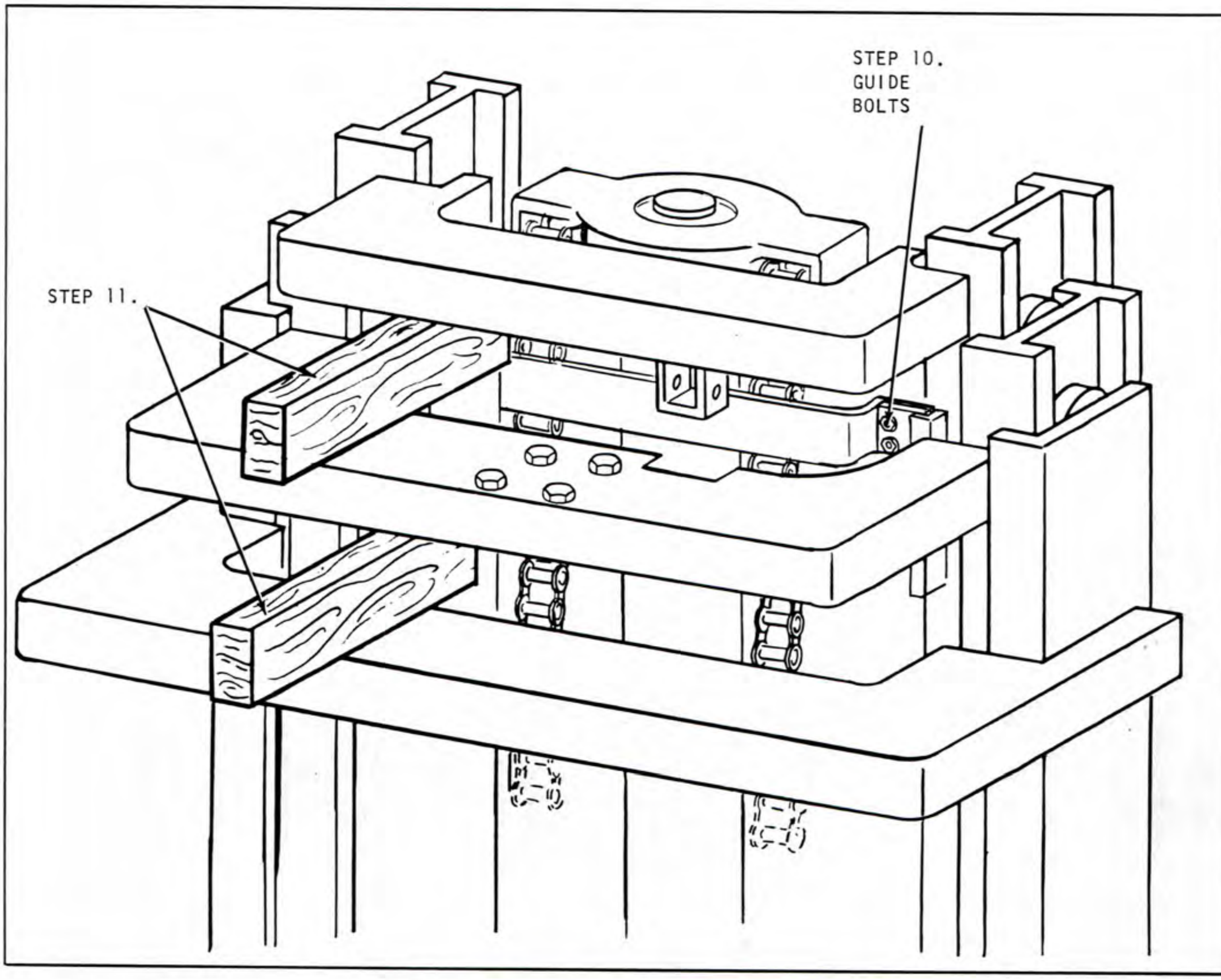


Plate 9649 Standard Triple Piston Head

Step 10. Install both piston head guides.

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

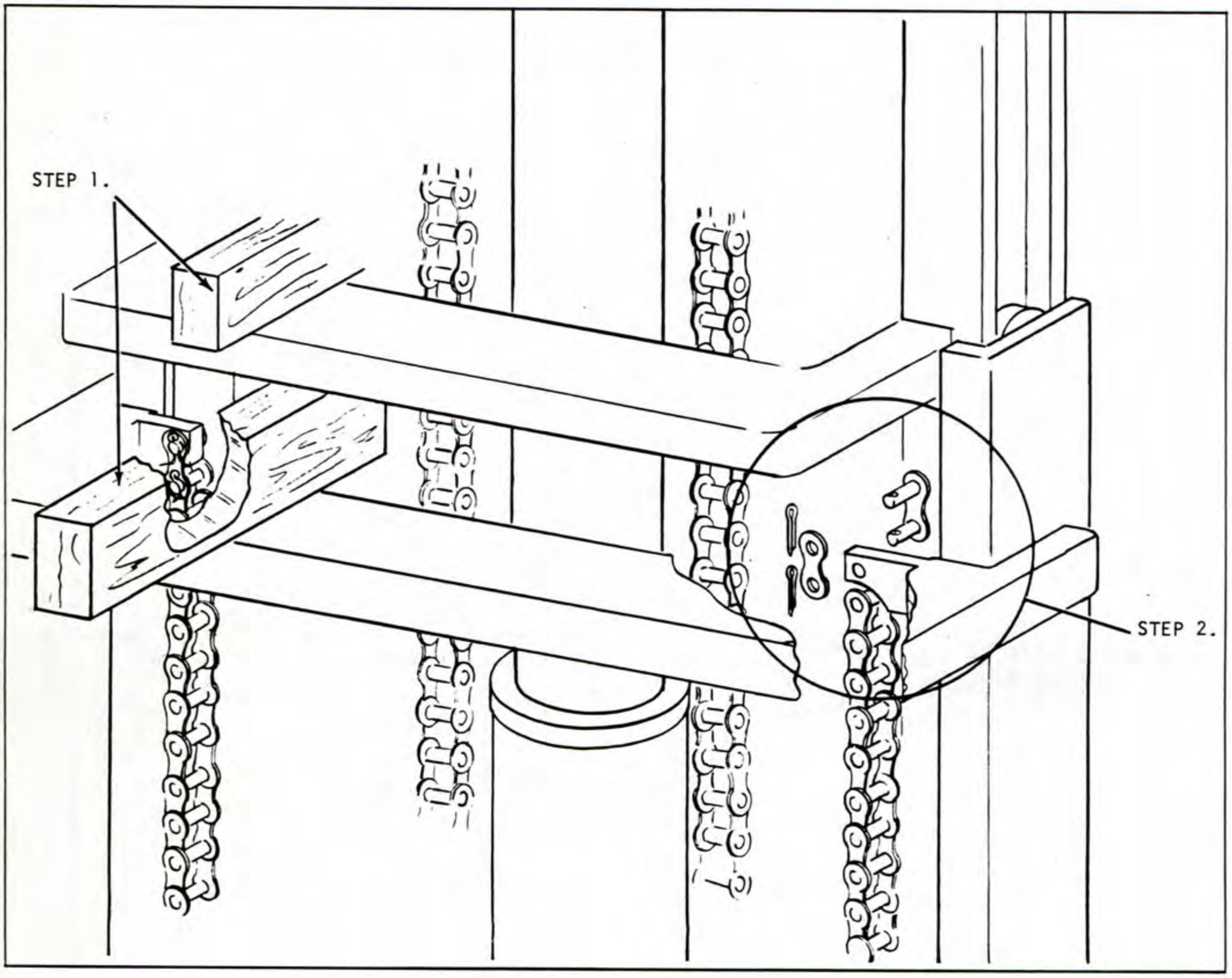


Plate 9650 Rear Lift Cylinder Removal

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.

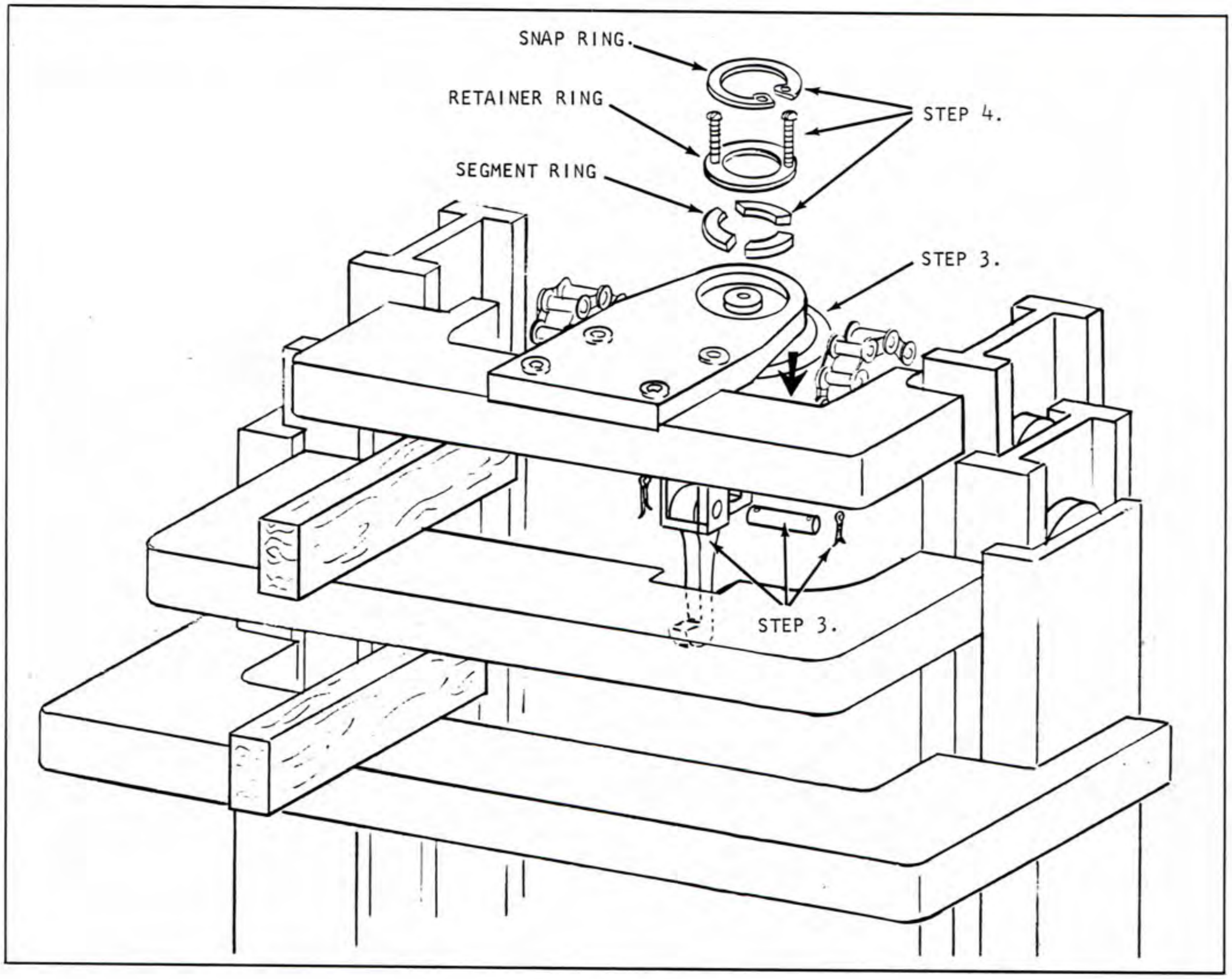


Plate 9651 F.F.T. Piston Head

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.

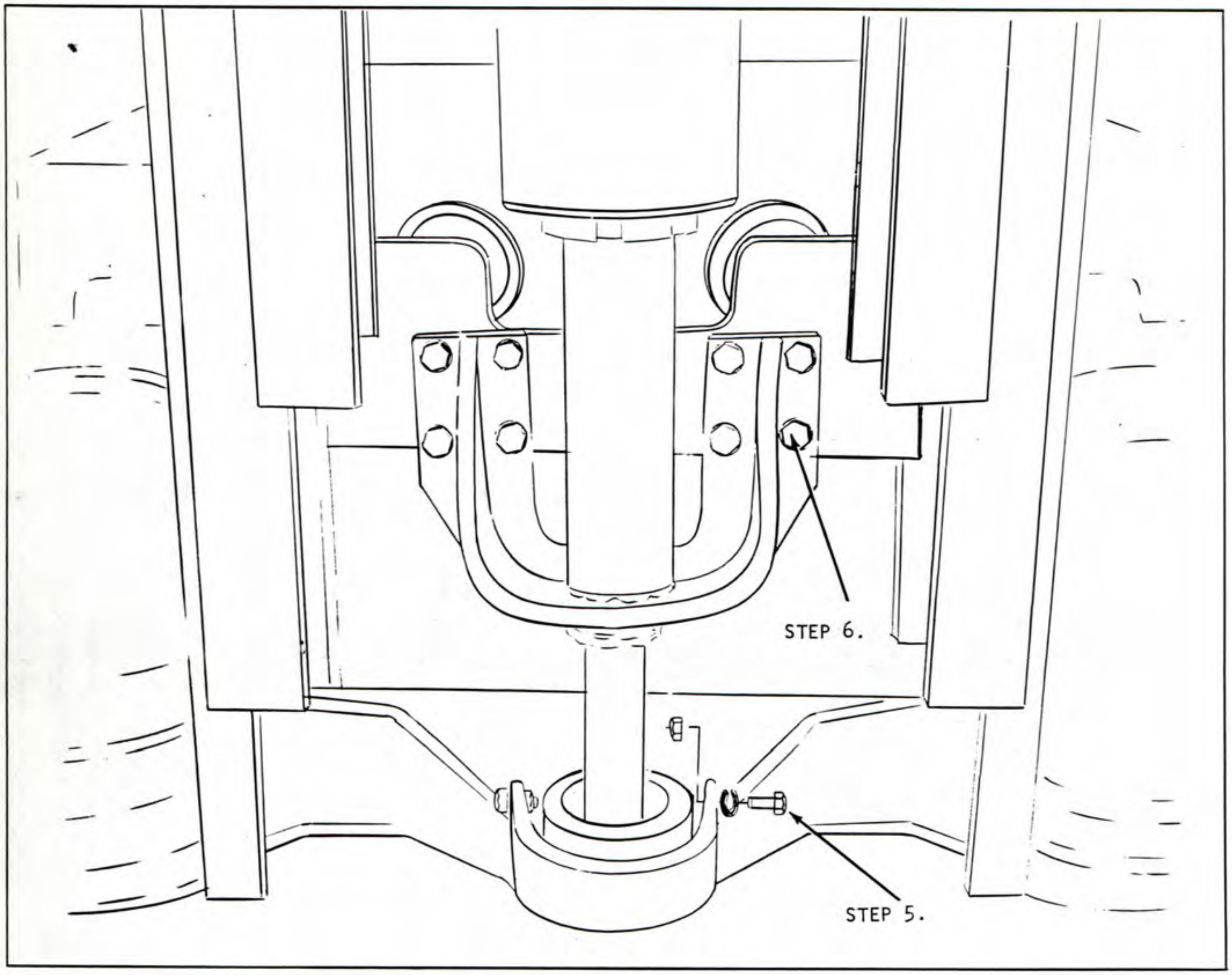


Plate 9652 Cylinder Lifting Bracket

Step 5. Remove lift cylinder support bolts.

Step 6. Remove cylinder lifting bracket.

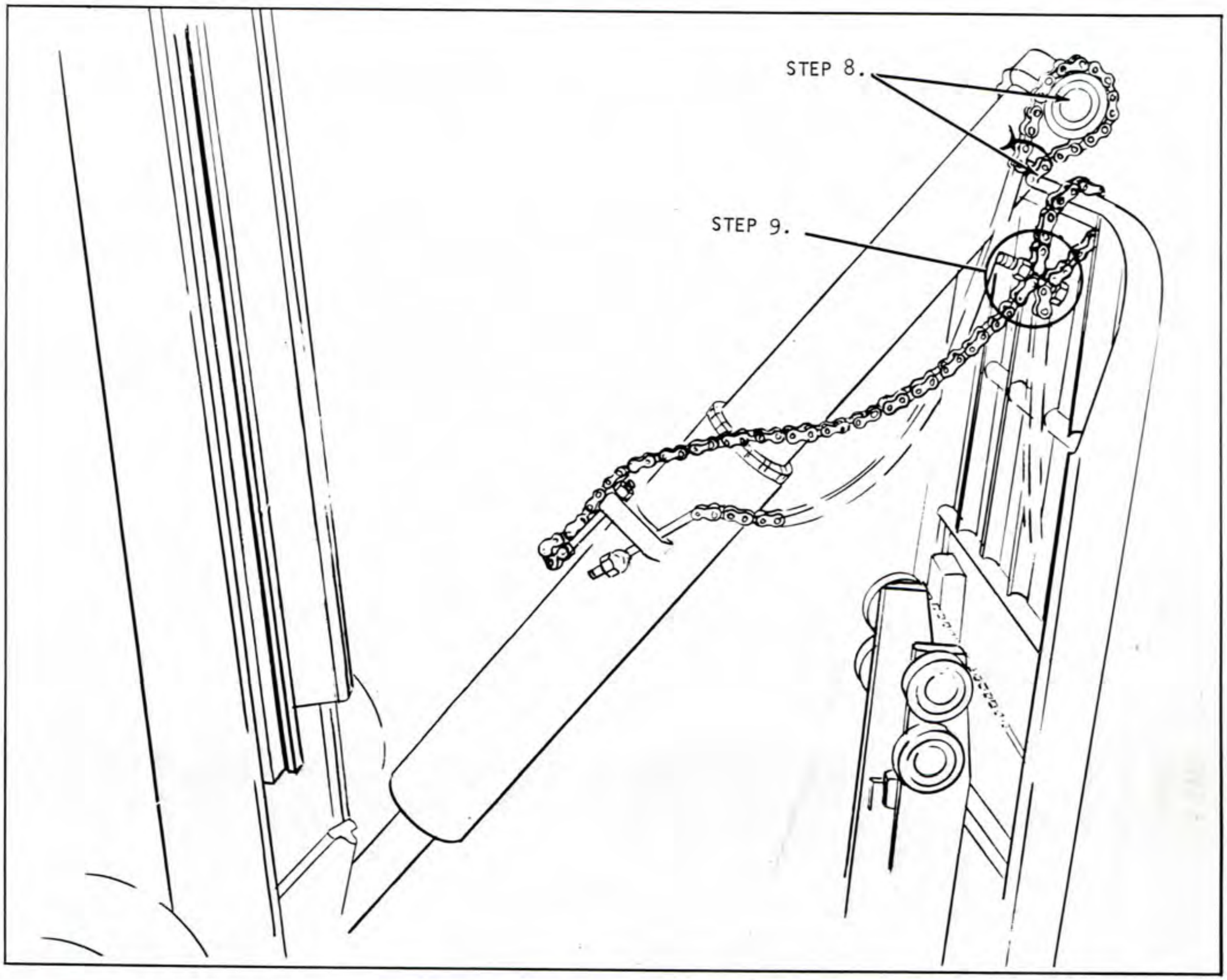


Plate 9653 Supporting Cylinder

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

Step 8. Place pading 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.

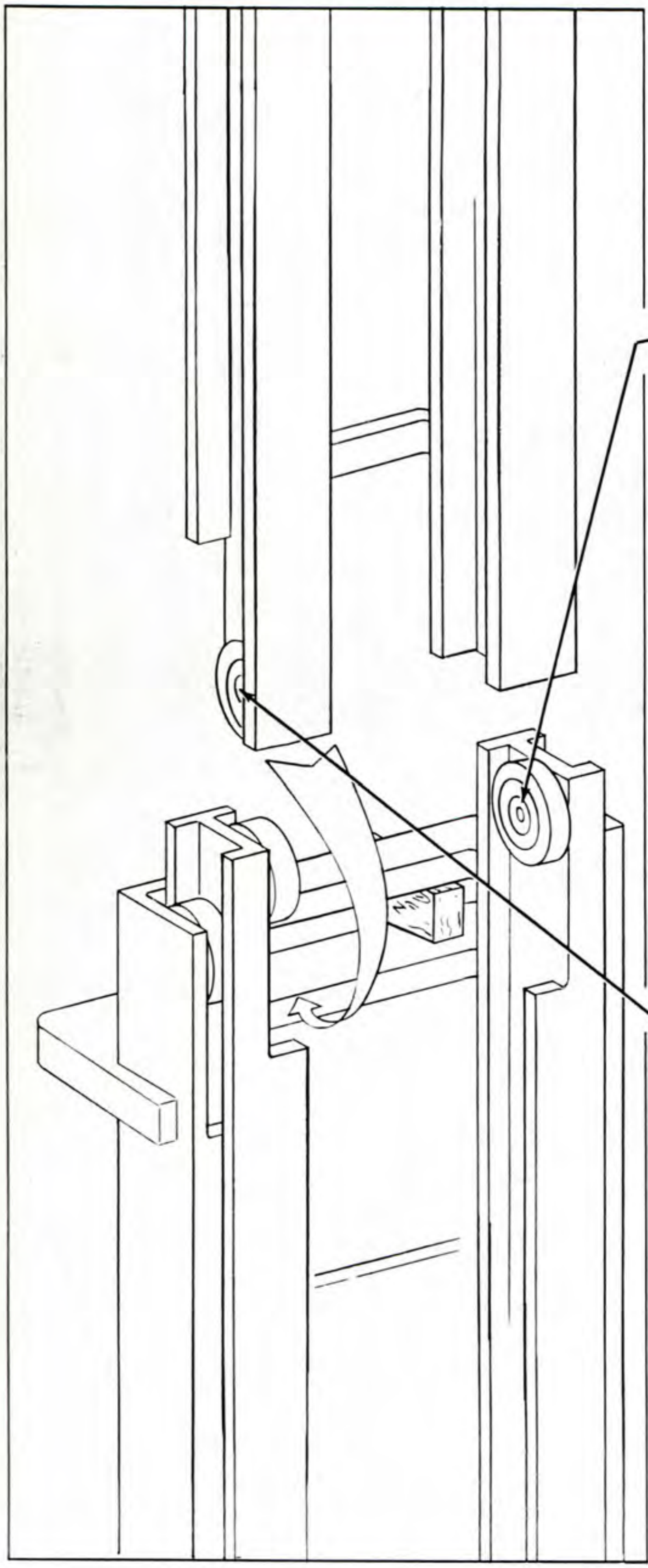
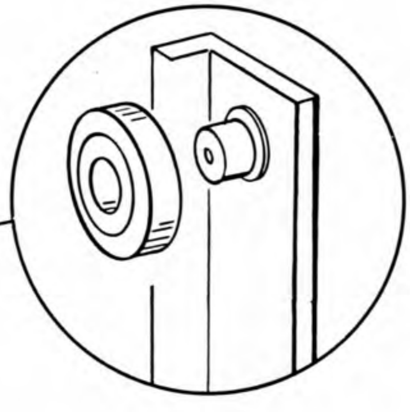


Plate 9654

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

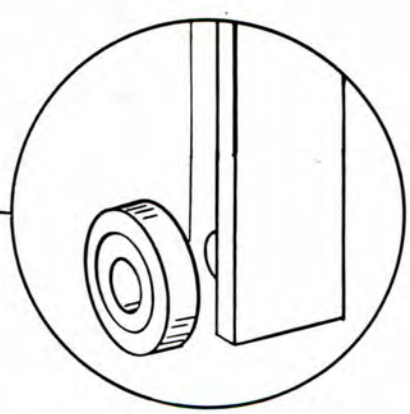


A. Intermediate rail rollers:

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.

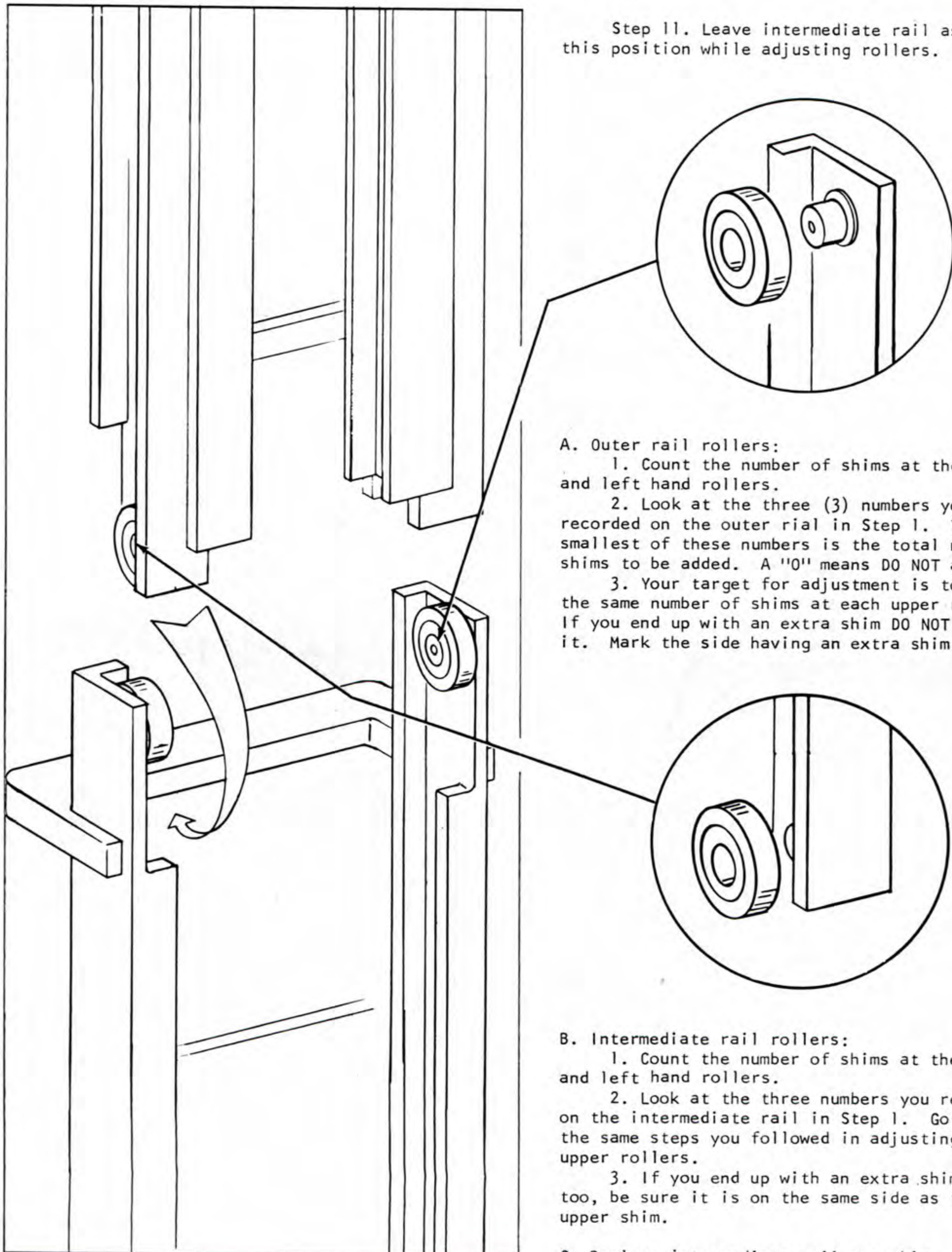


Plate 9655

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 rial 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.

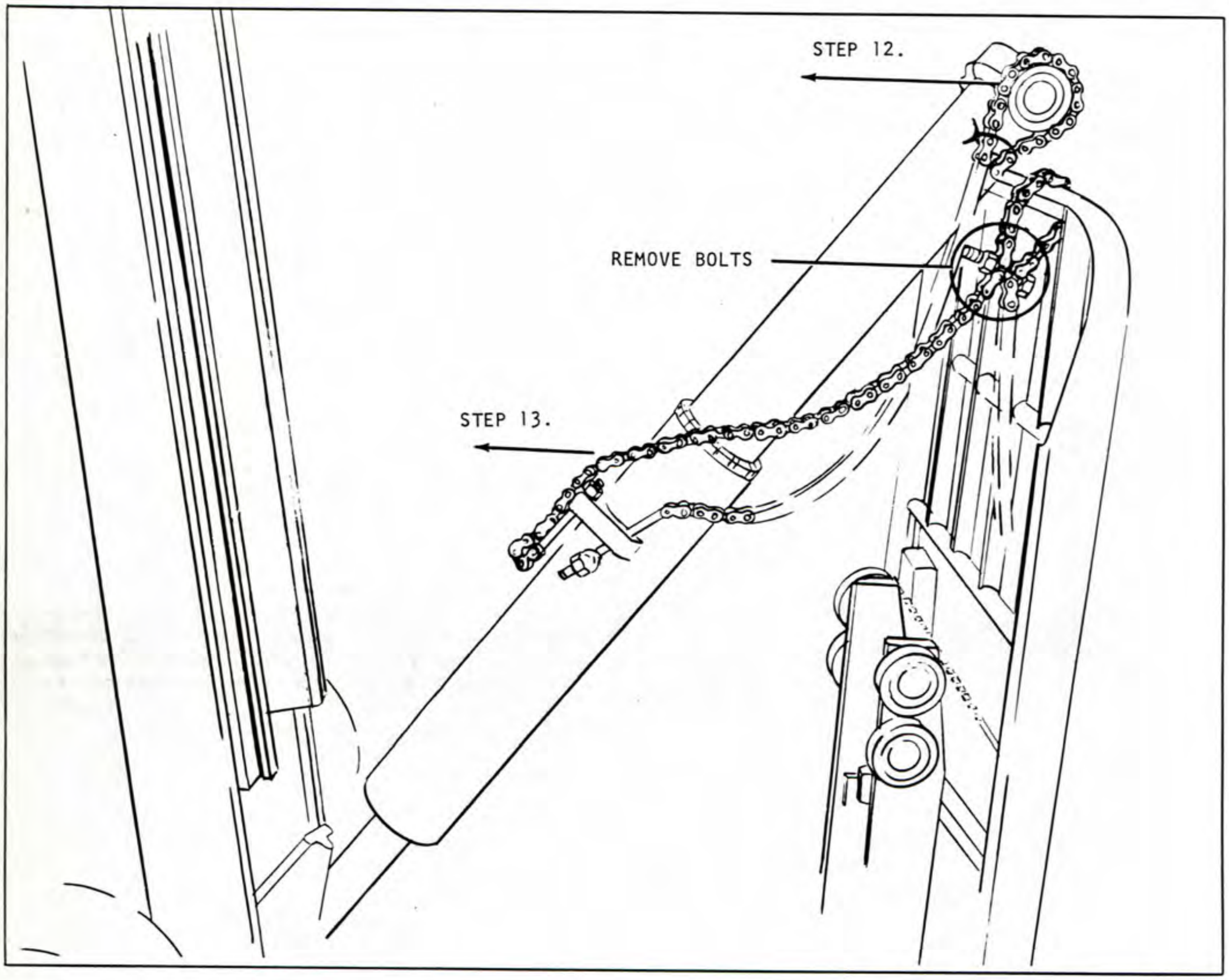


Plate 9656 Cylinder Replacement

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.

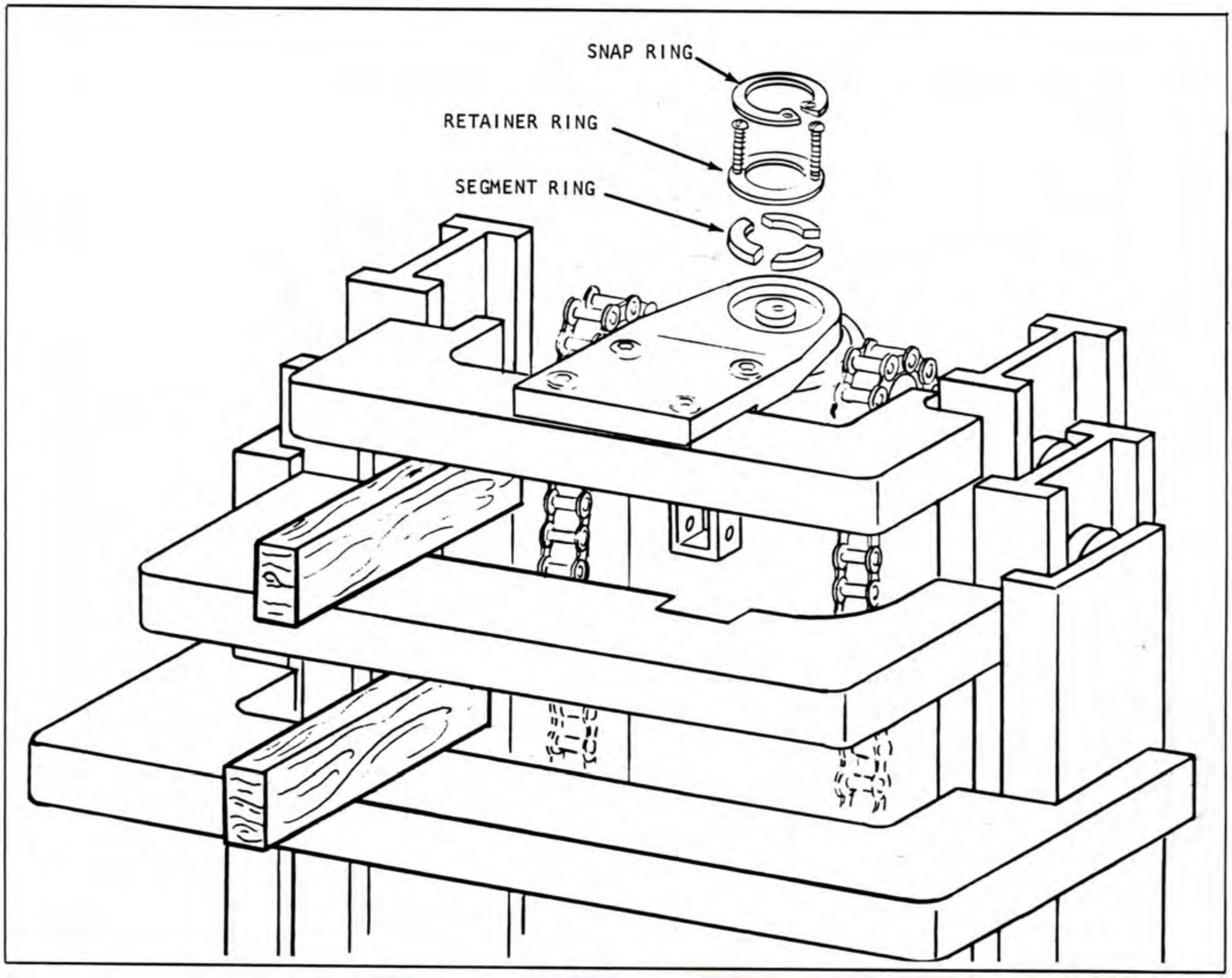


Plate 9657 Piston Head F.F.T.

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.

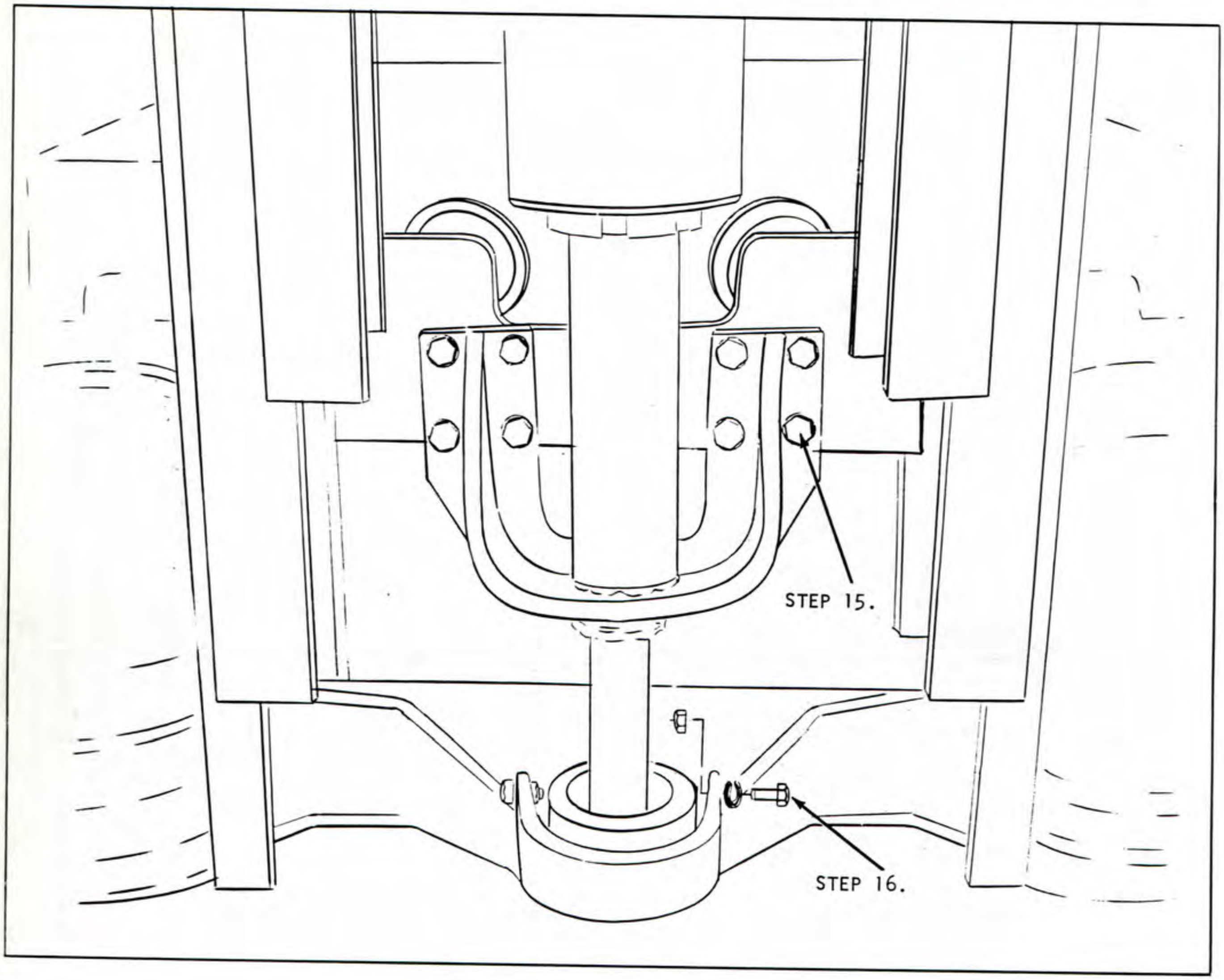


Plate 9658 Cylinder Lift Bracket

Step 15. Instll cylinder lifting bracket.

Step 16. Install lift cylinder support bolts.

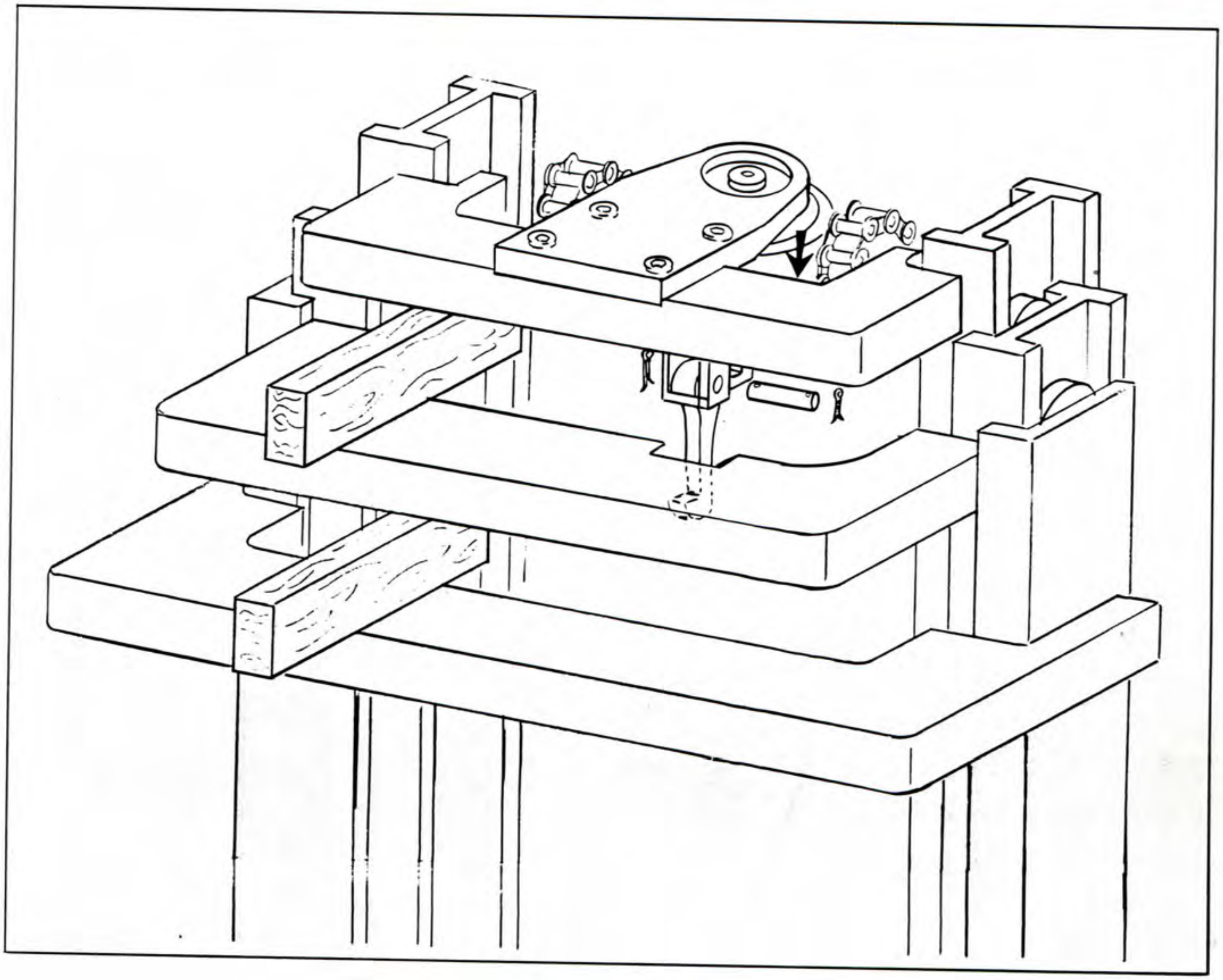


Plate 9659 Safety Stop

Step 17. Pull piston head down.

Install mechanical safety stop.

Replace cotter keys.

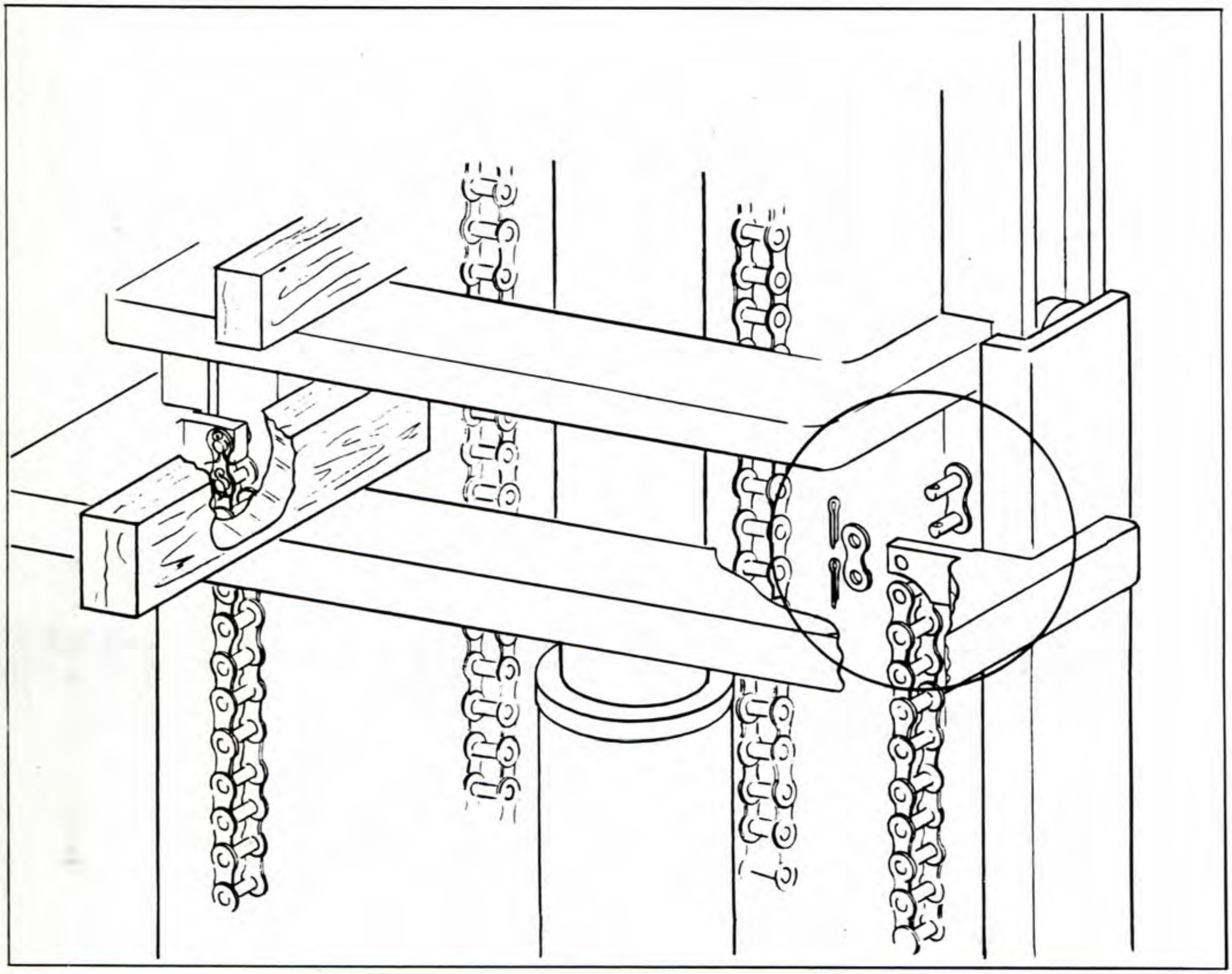


Plate 9660 Replacing Rear Lift Chains

Step 18. Install rear lift chains.

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

HOW TO IDENTIFY THE:

"C" MODEL UPRIGHT

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

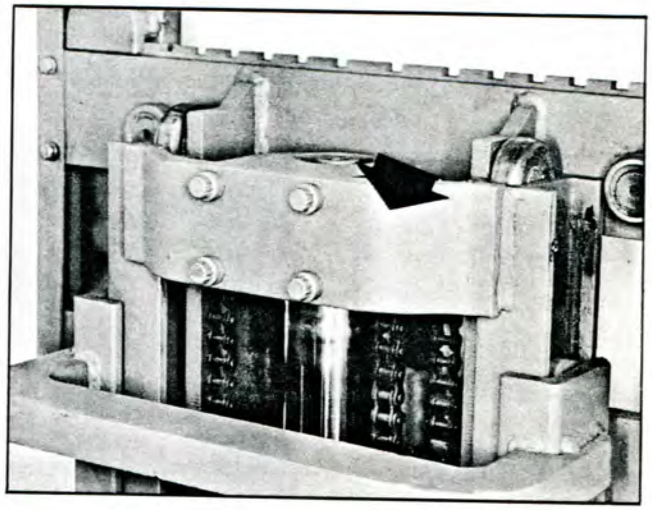


Plate 11847

"B" MODEL UPRIGHT

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

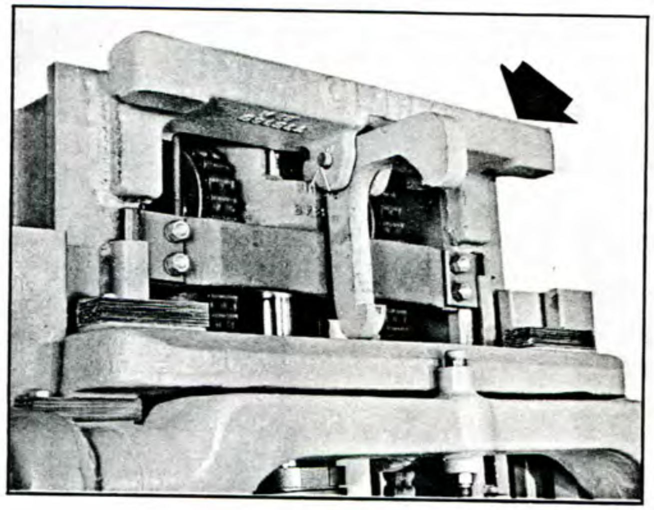


Plate 11848

"B" MODEL UPRIGHT

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

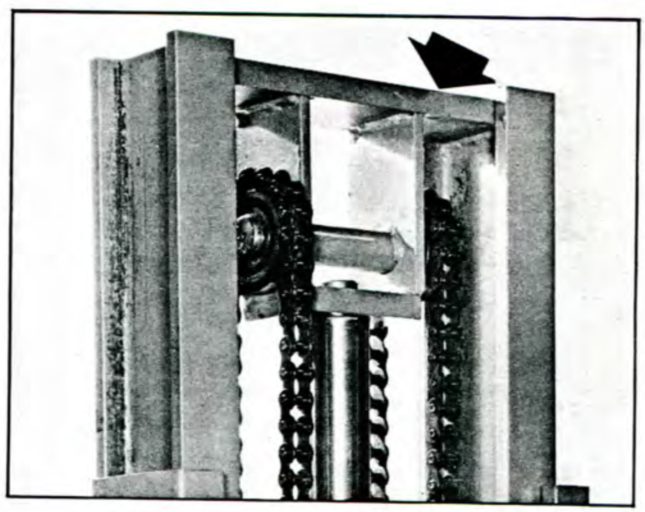


Plate 11849

INDUSTRIAL TRUCK DIVISION

TO ELEVATE DRIVE WHEELS

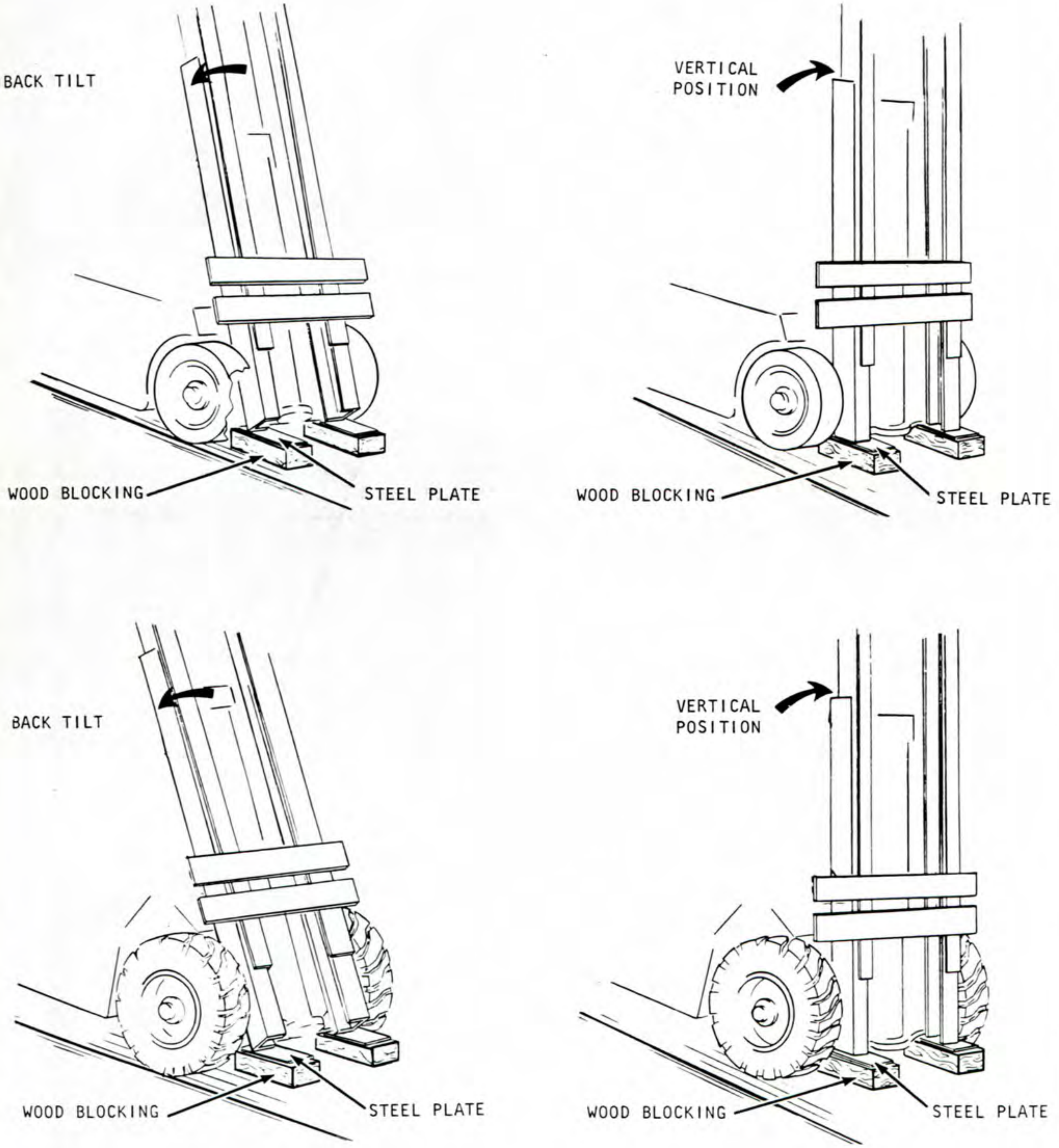
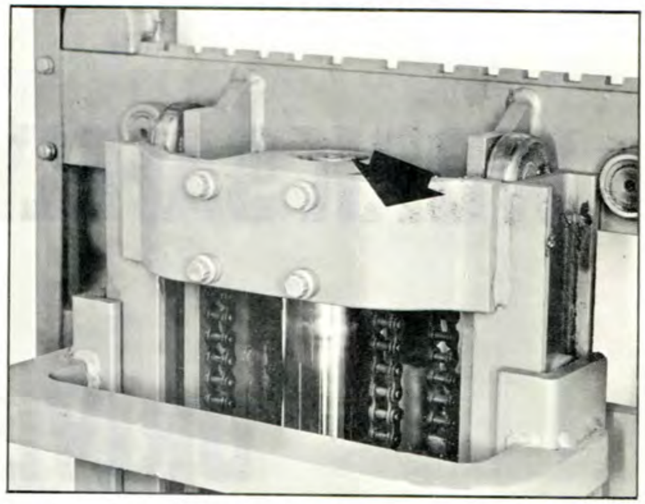


PLATE 10317. TO ELEVATE DRIVE WHEELS,
PLACE UPRIGHT BLOCKING AS SHOWN ABOVE.

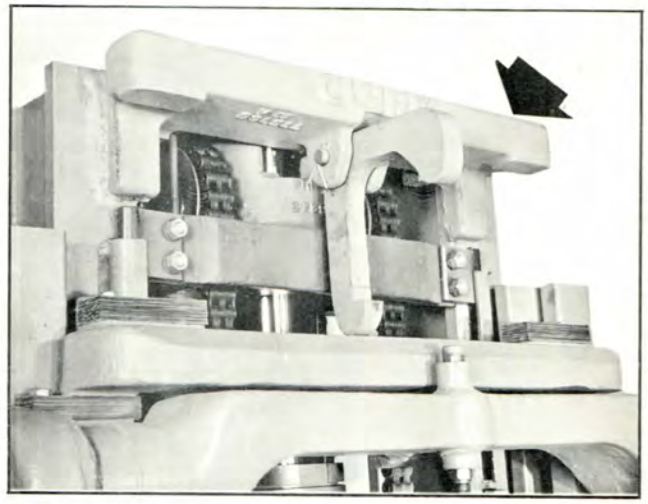
HOW TO IDENTIFY THE:



"C" MODEL UPRIGHT

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

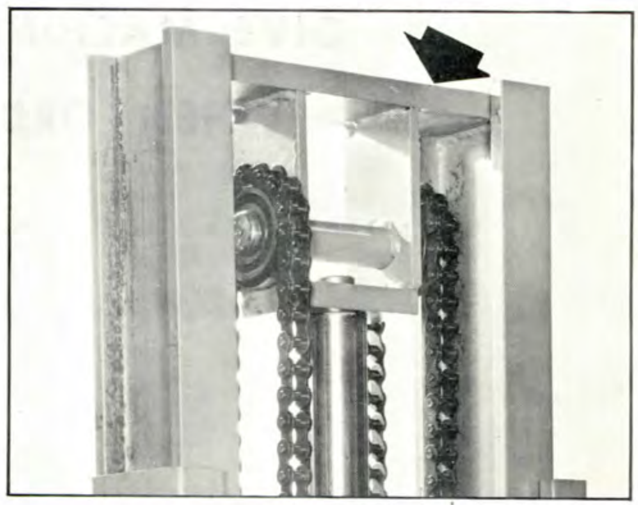
Plate 11847



"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

WORK SAFELY

DRIVE SAFELY

BE CAREFUL

ALWAYS

GIVE MACHINE SERIAL NUMBER

WHEN ORDERING PARTS

A. CARRIAGE REMOVAL

Before working on the upright, set parking brake and block drive wheels.

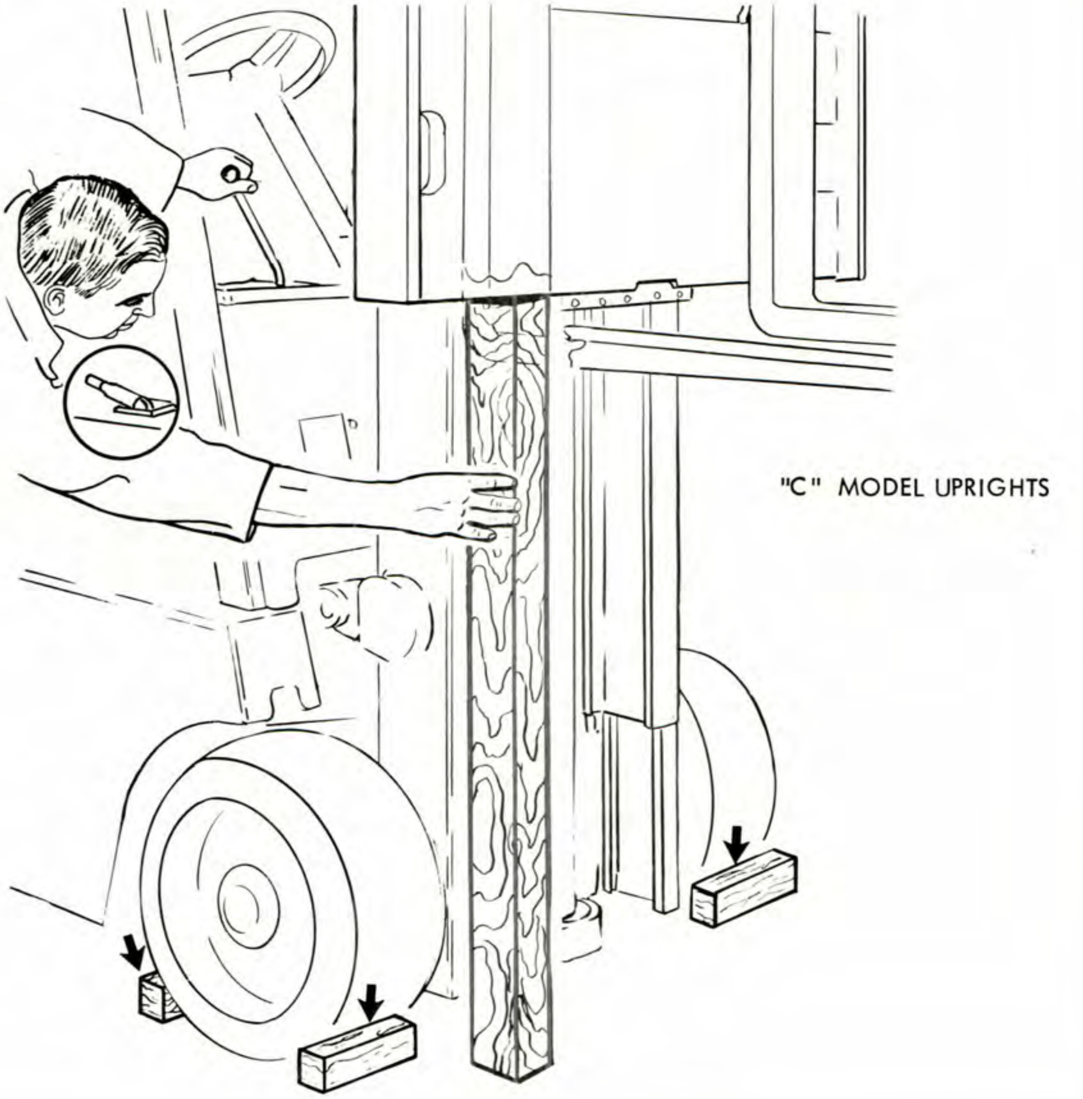


Plate 9559 Blocking Machine and Carriage

Step 1. Raise carriage about 4 feet. Place a 4" x 4" oak beam 3 to 4 feet in length between carriage and floor as shown. DO NOT STAND DIRECTLY UNDER FORKS. Standing to one side, lower carriage onto beam as shown.

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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 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
X   BEFORE WORKING ON UPRIGHT, SET PARKING BRAKE AND BLOCK DRIVE WHEELS AS SHOWN                   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 X X X X X X X X X X X X X X X X X X X X X
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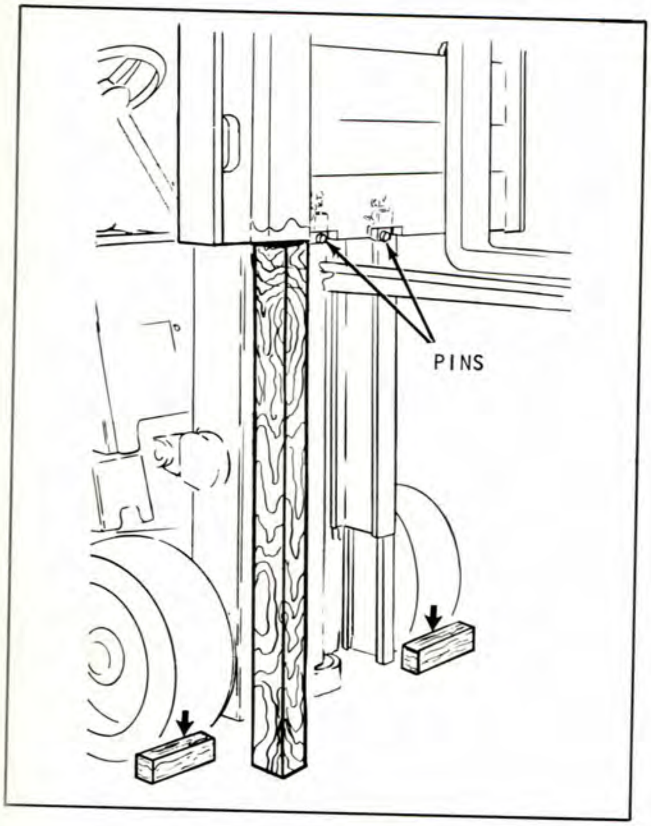


Plate 9593 Carriage Pin Replacement

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.

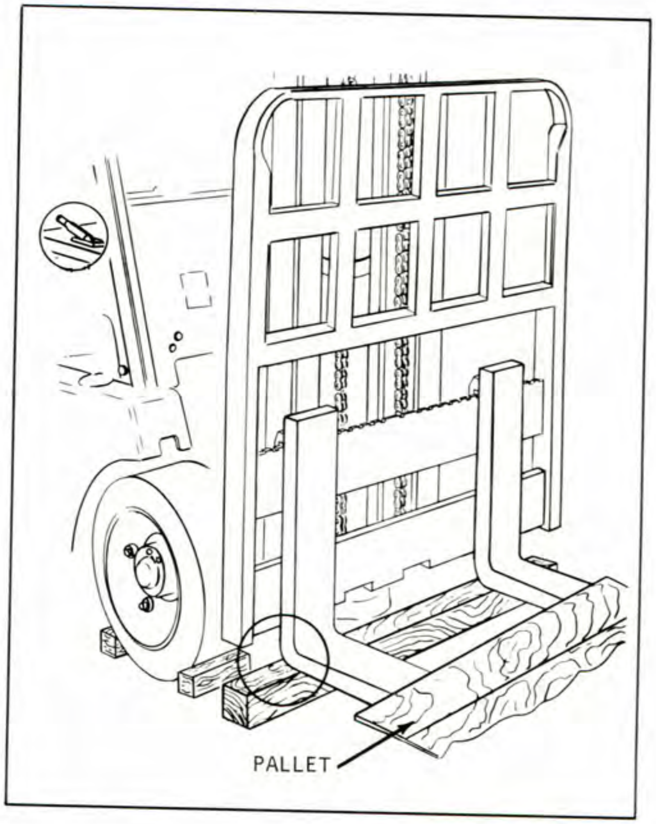


Plate 9560 Fork and Carriage Blocking

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

Step 4. Tilt upright full forward.

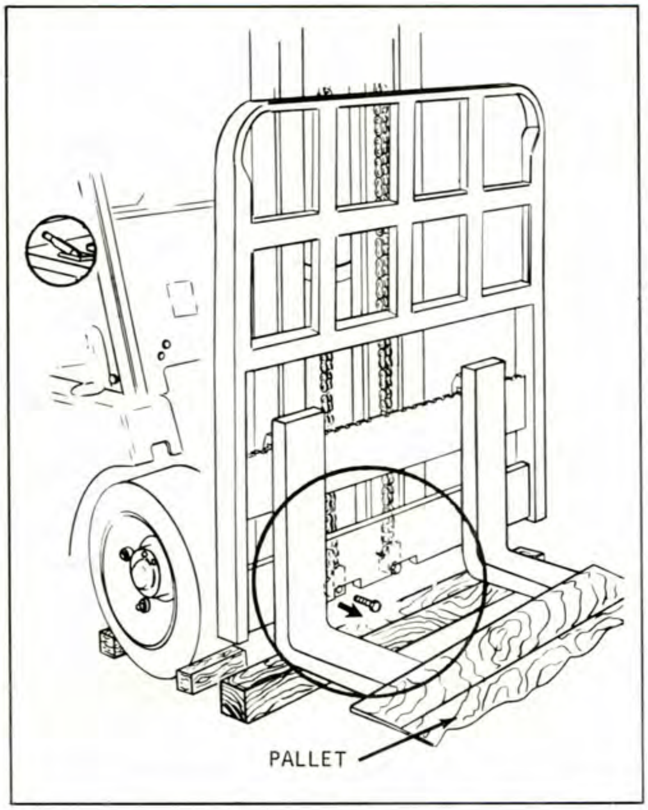


Plate 9561 Removing Bolts

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

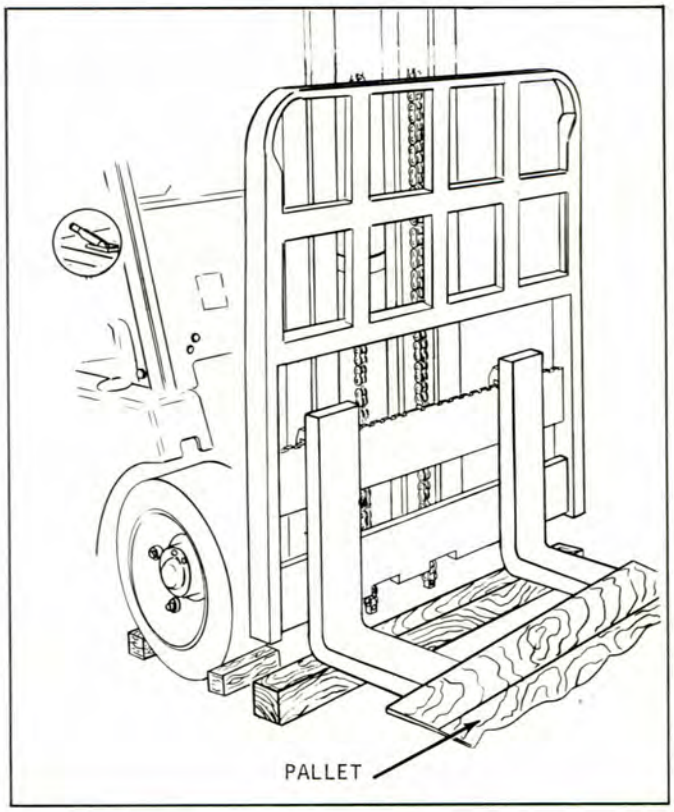


Plate 9562 Removing Chains From Anchors

Step 6. Pull chains out of carriage anchor brackets.

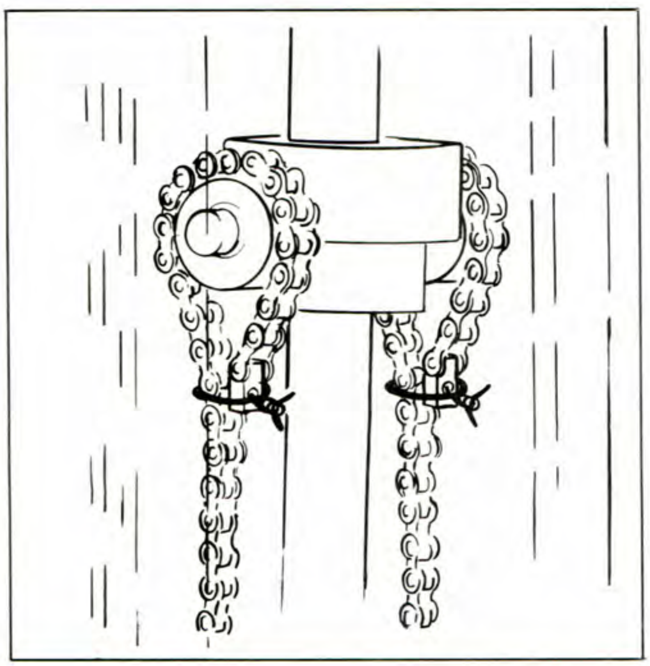


Plate 9563 Securing Chains (Typical)

Step 7. Wire chains around chain sheaves as shown

N O T E

Use the same method on all cylinders.

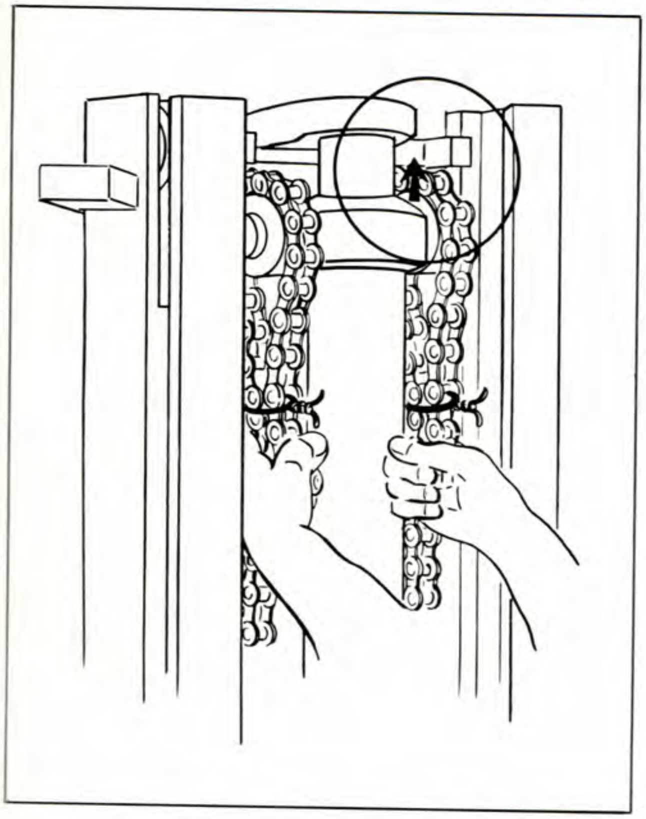


Plate 9564 Guiding Piston Head

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

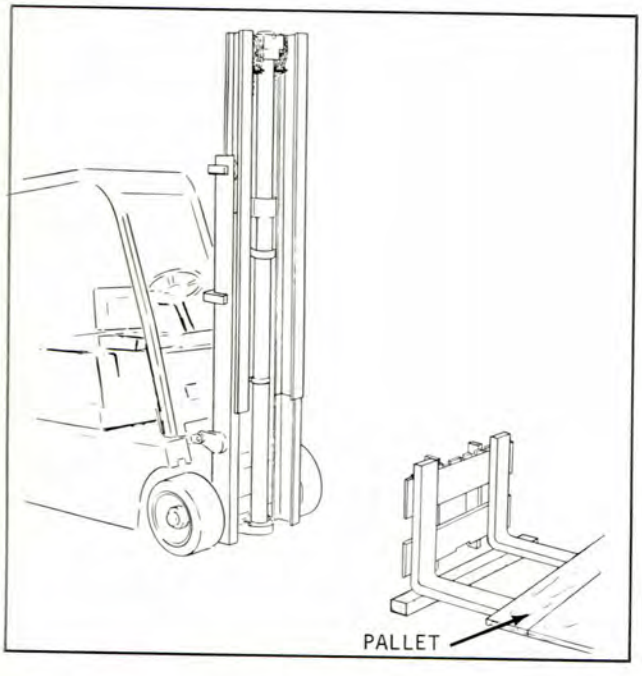


Plate 9566 Backing Machine Away From Carriage

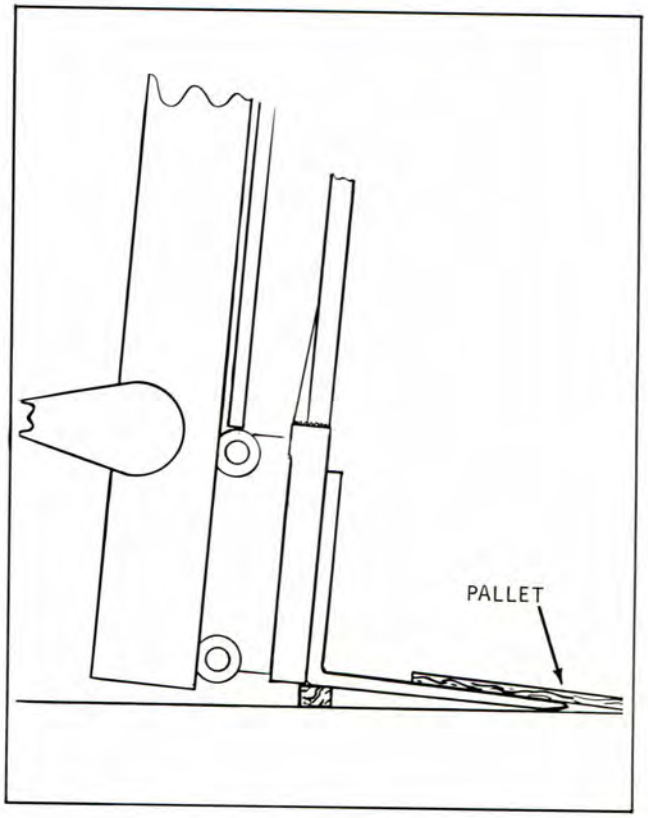


Plate 9565 Inner Rail Clearing Carriage Rollers

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

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

B. CARRIAGE ROLLER ADJUSTMENT

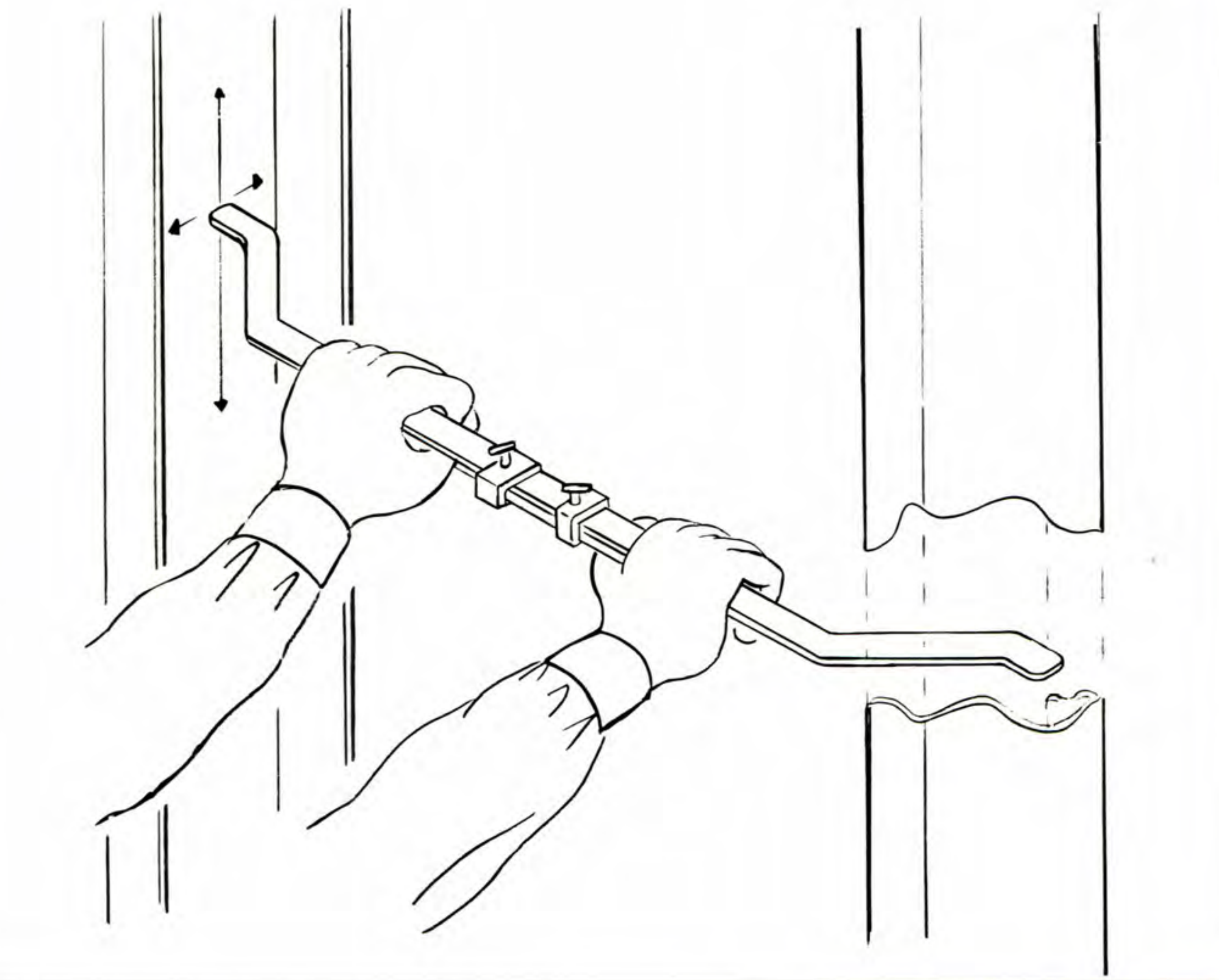


Plate 9567 Spanning Inner Rail

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

NOTE

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.

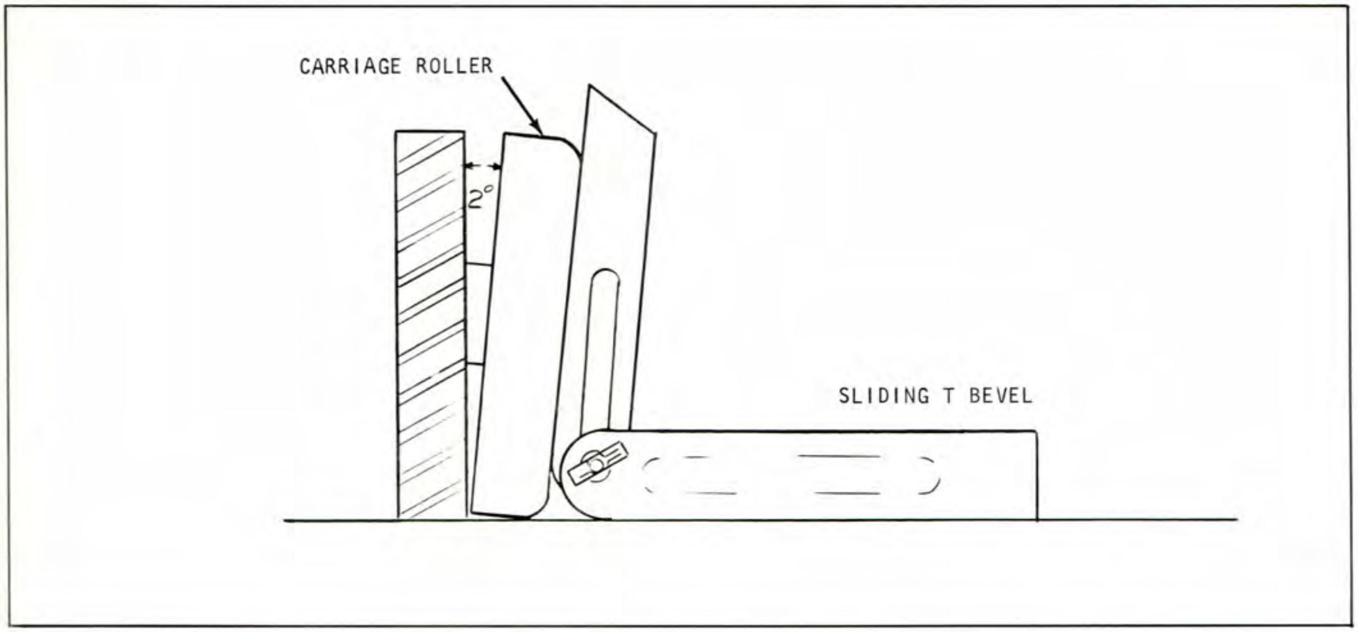


Plate 9589 Setting T Bevel

NOTE

Check angle of carriage rollers. Roller pin bosses are welded at 2° ± 1/2° 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.

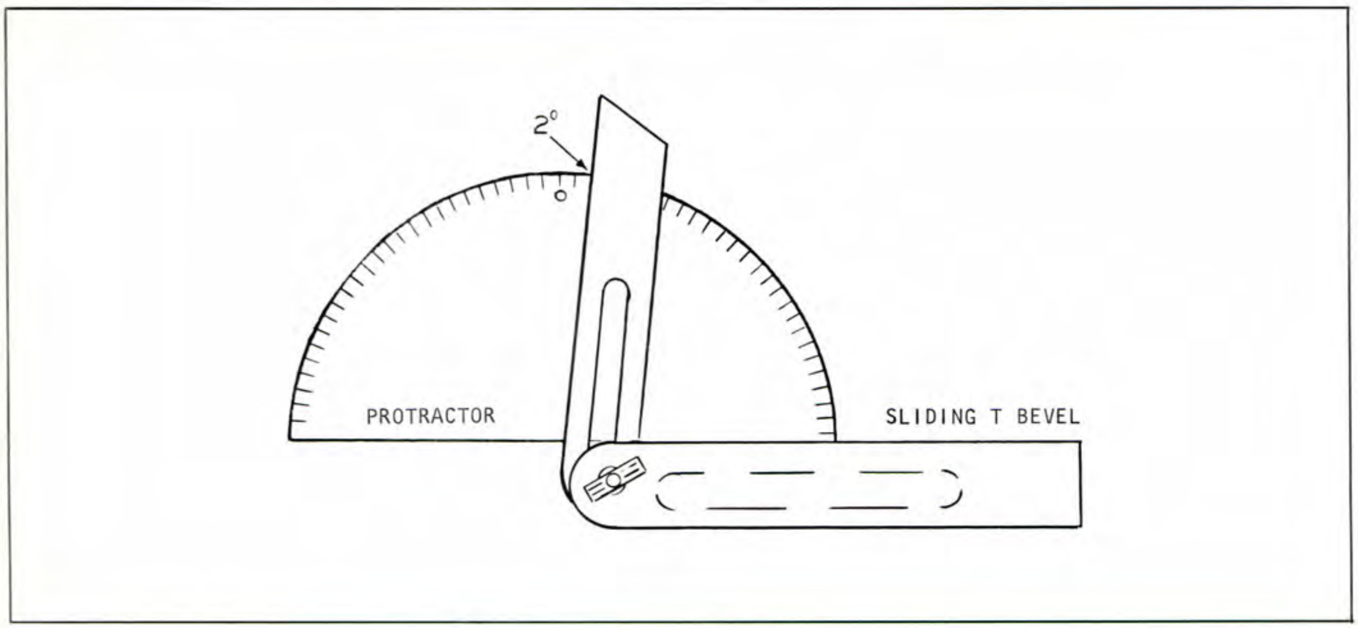


Plate 9590 Checking Roller Angle

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

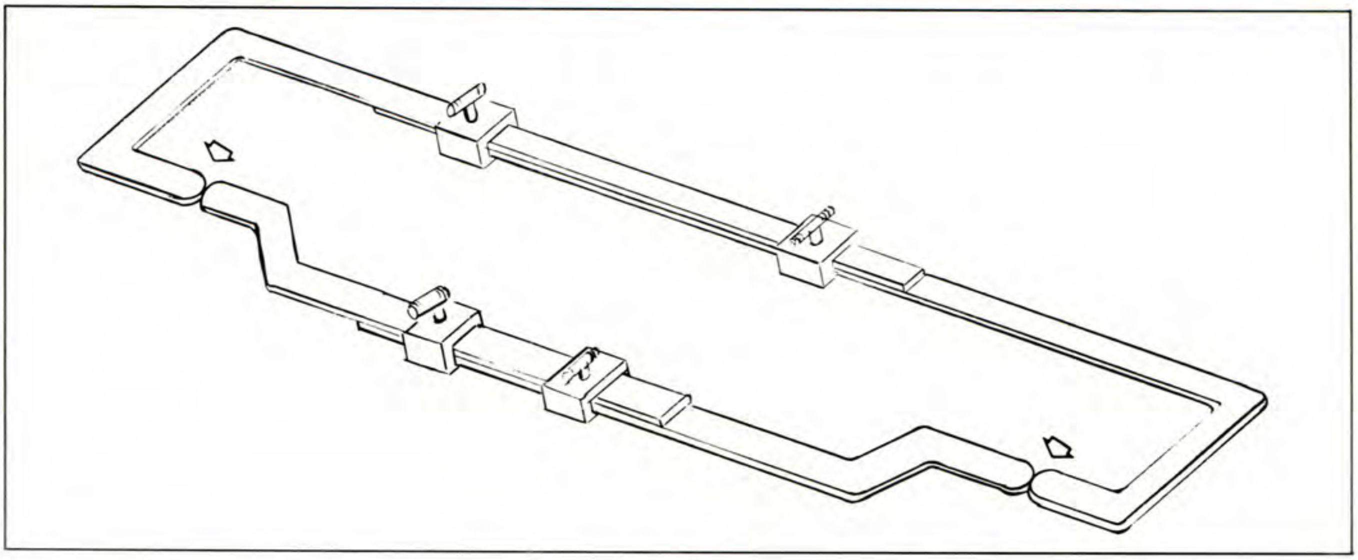


Plate 9568 Setting Outside Spanning Tool

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

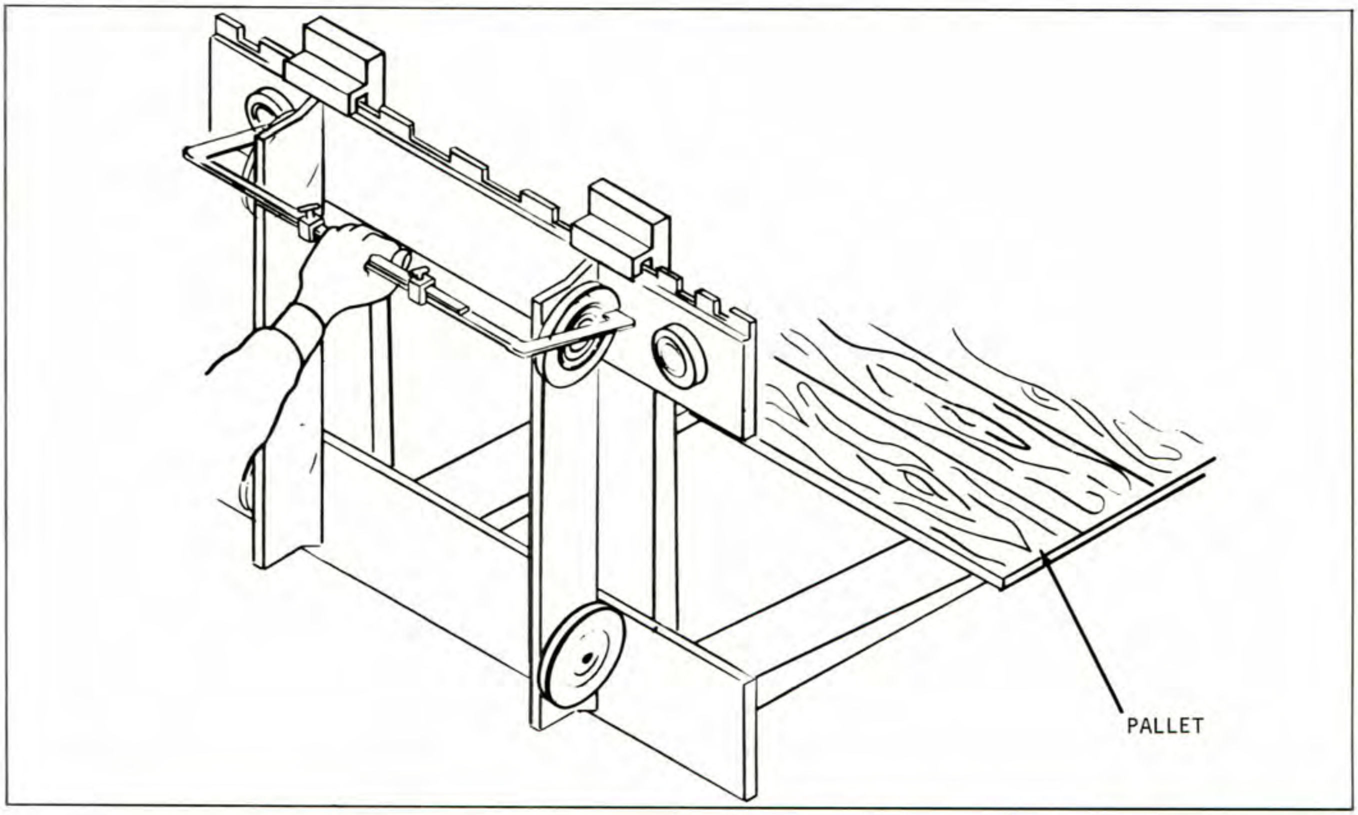


Plate 9569 Spanning Upper Rollers (Four Roller Carriage)

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

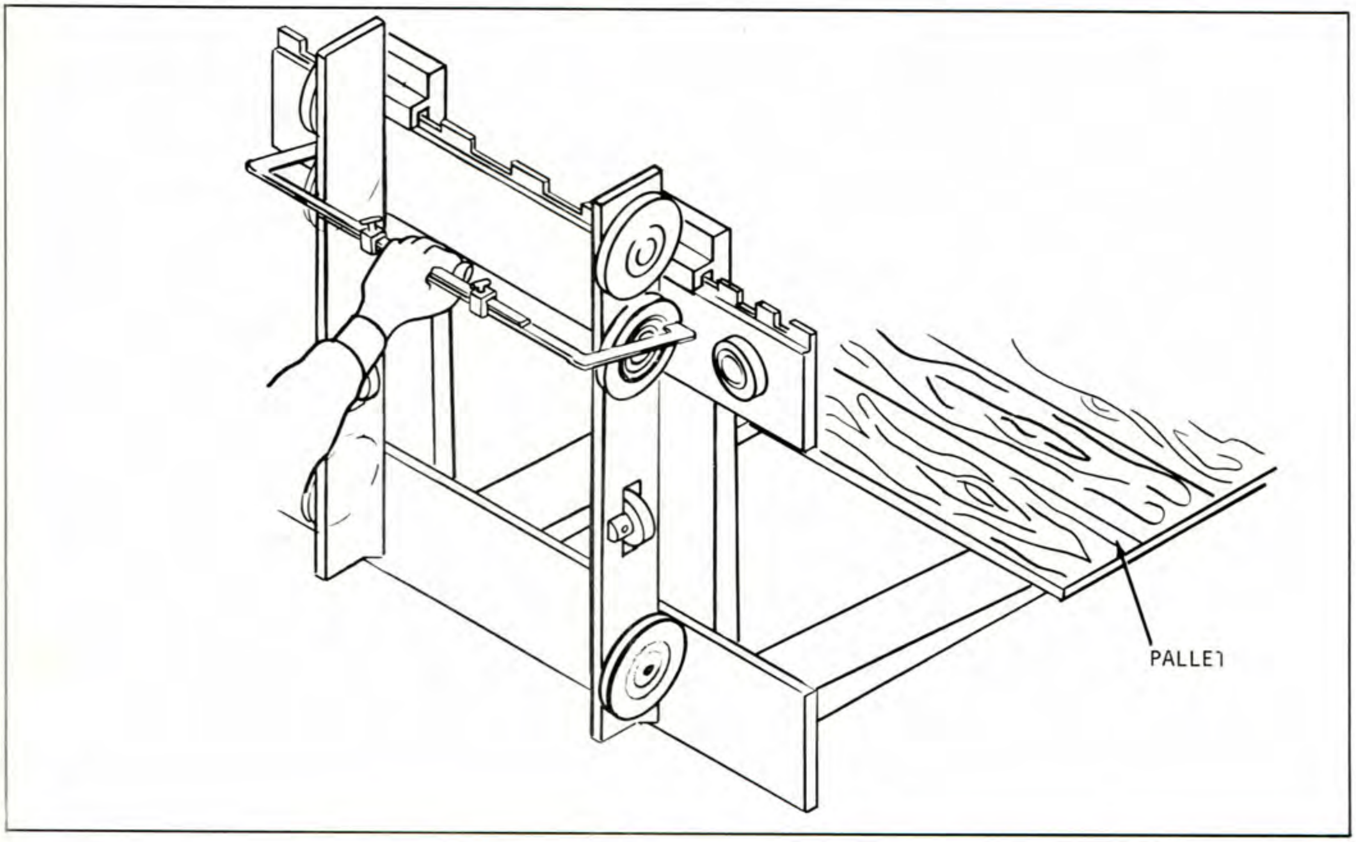


Plate 9570 Spanning Upper Rollers (Six Roller Carriage)

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

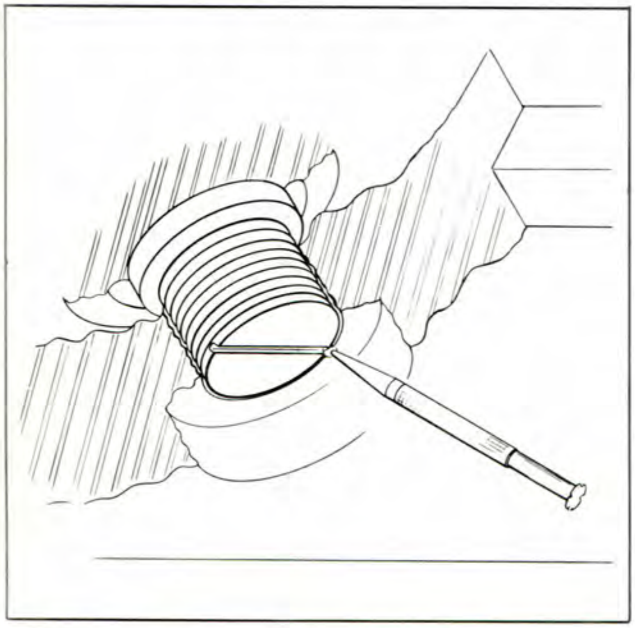


Plate 9571 Securing Outer Thrust Roller

NOTE

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

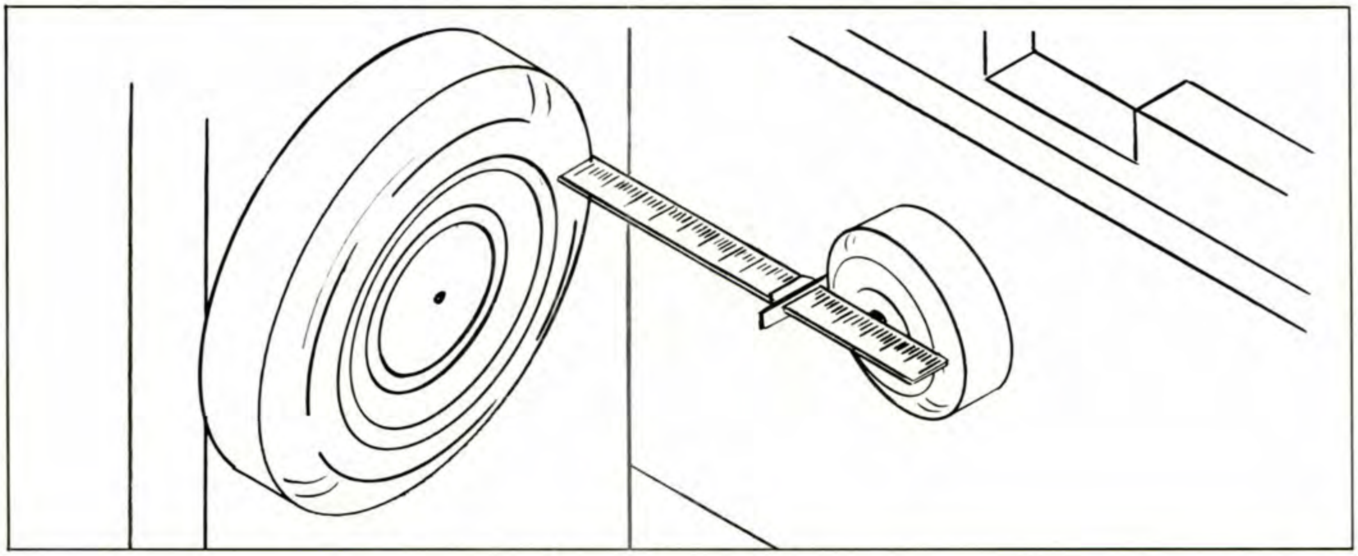


Plate 9572 Centering Carriage Rollers

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.

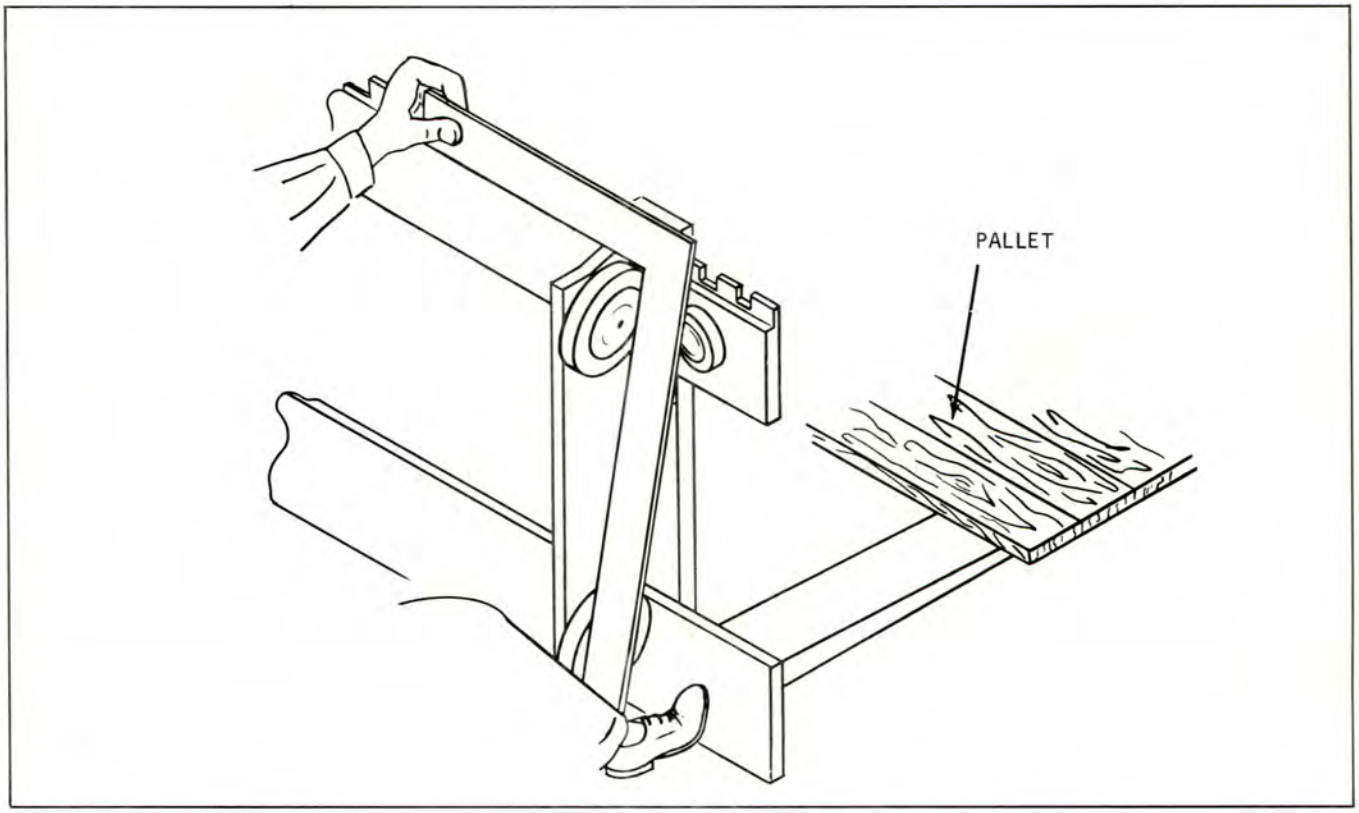


Plate 9573 Squaring Carriage Rollers (Four Roller Carriage)

Step 5. Square carriage rollers by placing carpenters square at the outer most camber of the ...

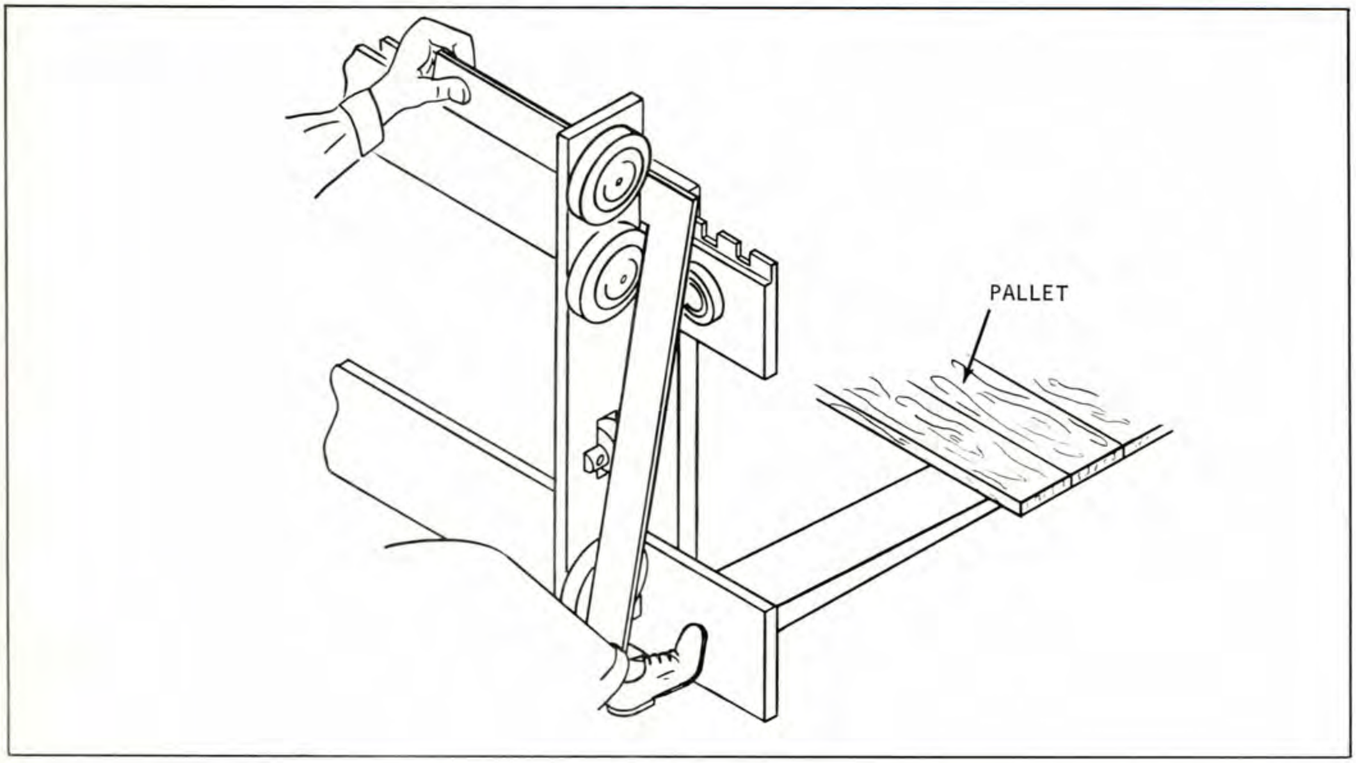


Plate 9574 Squaring Carriage Rollers (Six Roller Carriage)

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

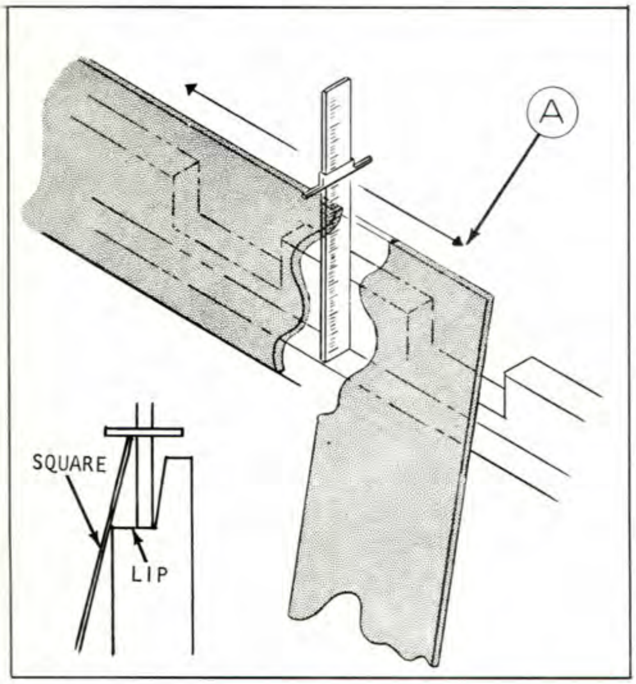


Plate 9575 Measuring For Squareness

Step 6. Hold square and measure the disance 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.

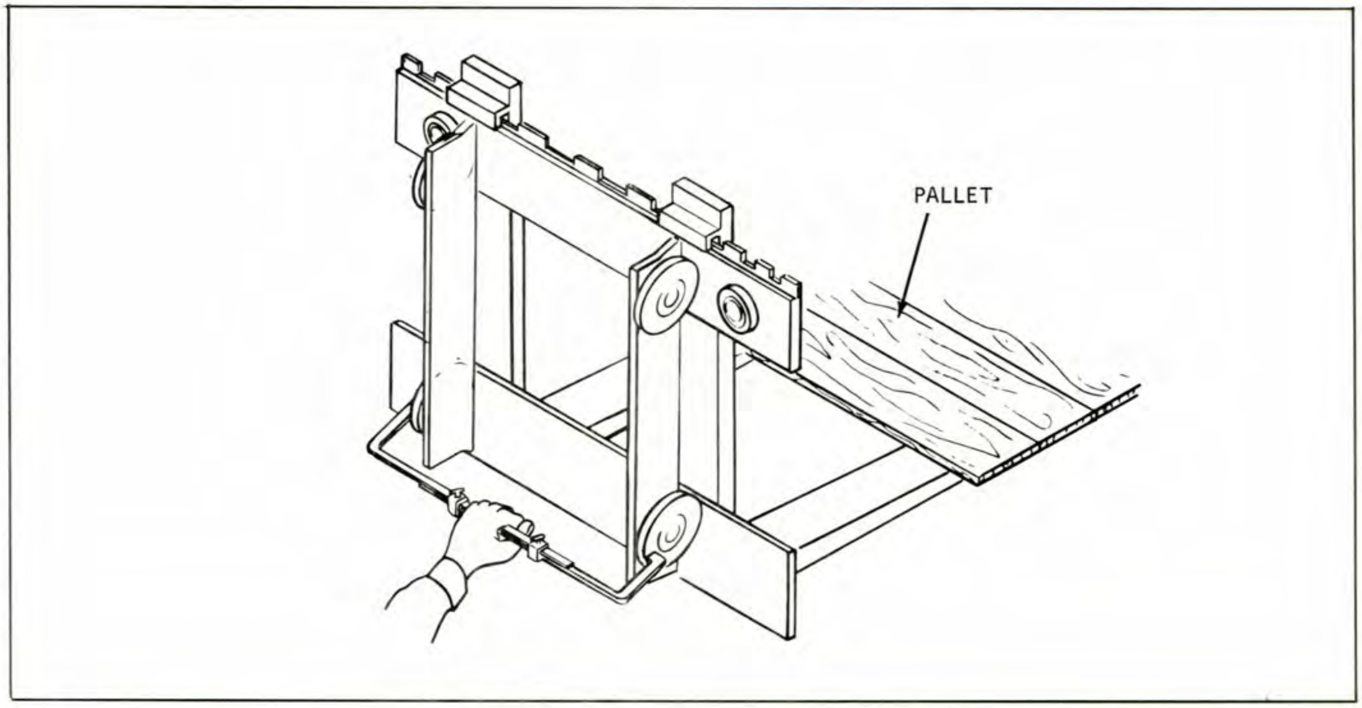


Plate 9576 Spanning Lower Rollers (Four Roller Carriage)

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

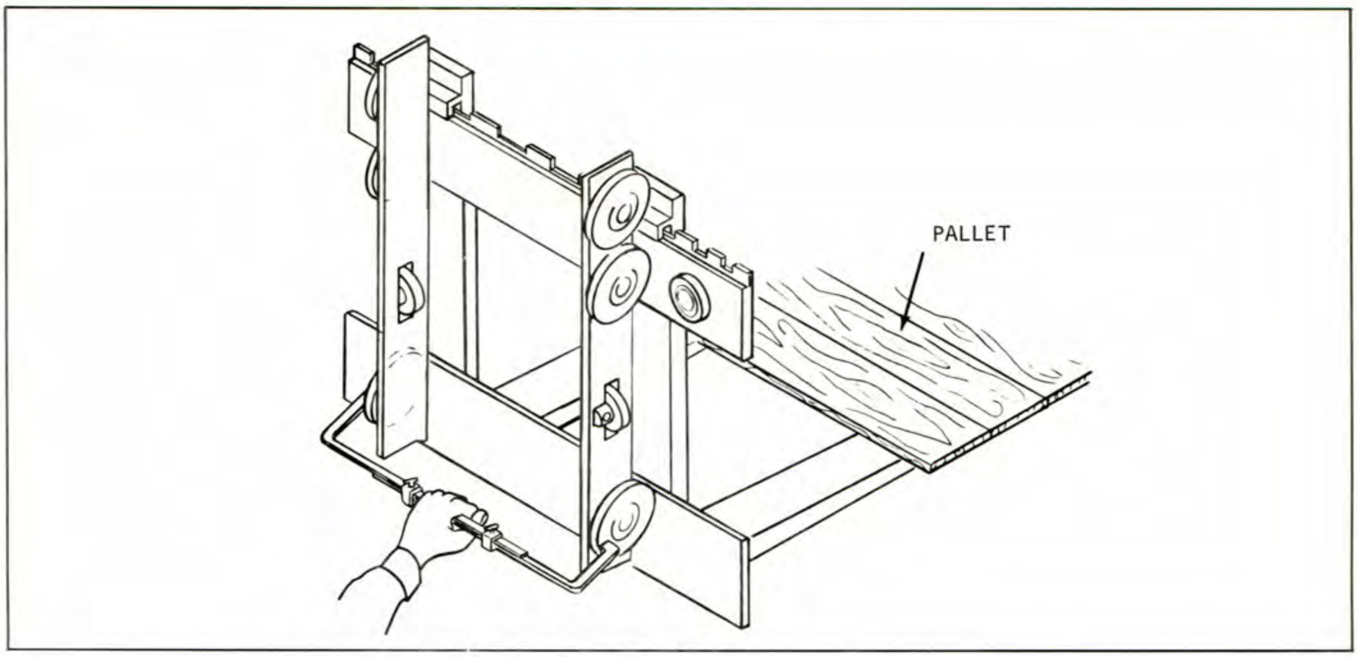


Plate 9577 Spanning Lower Rollers (Six Roller Carriage)

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

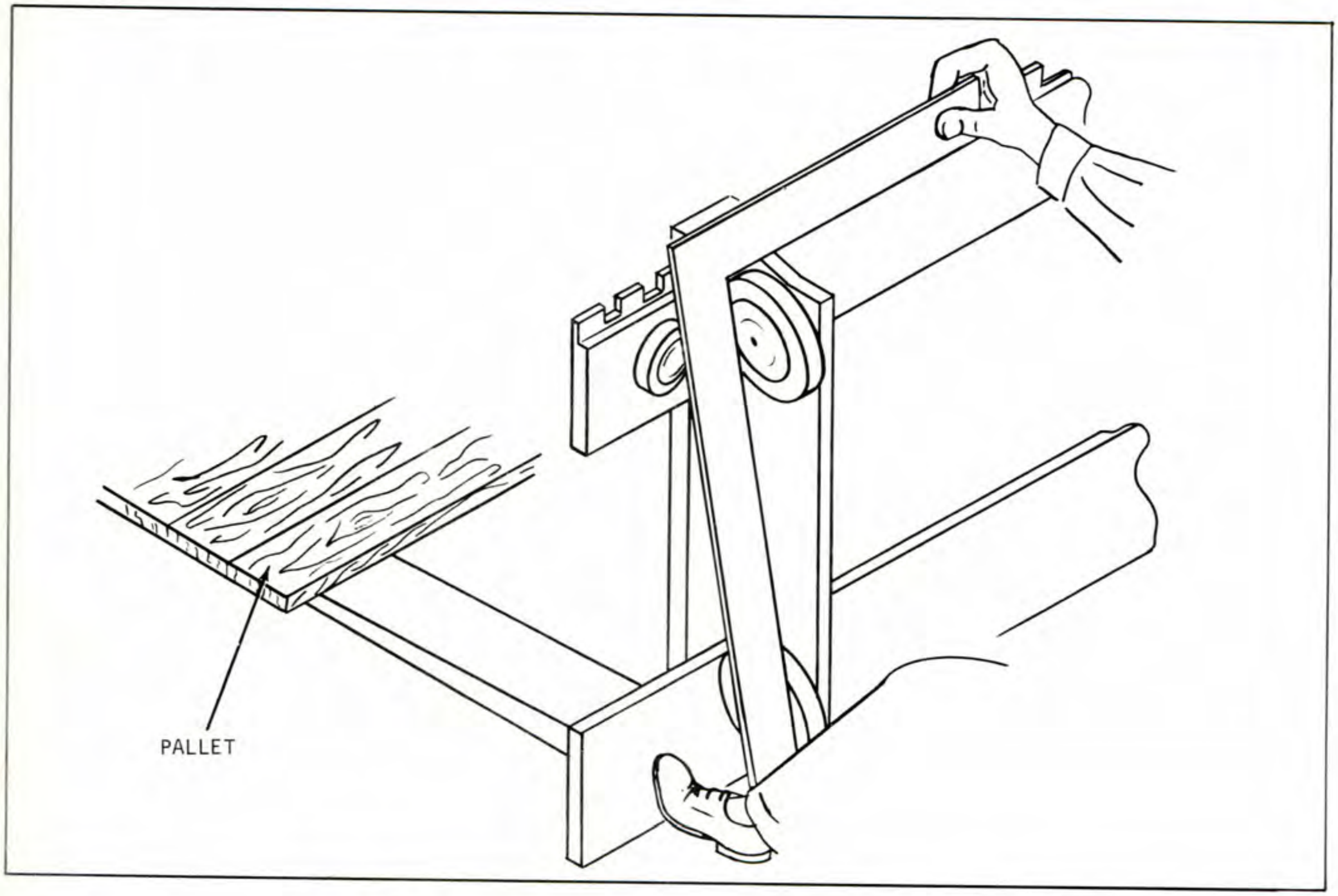


Plate 9578 Checking Squareness (Four Roller Carriage)

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

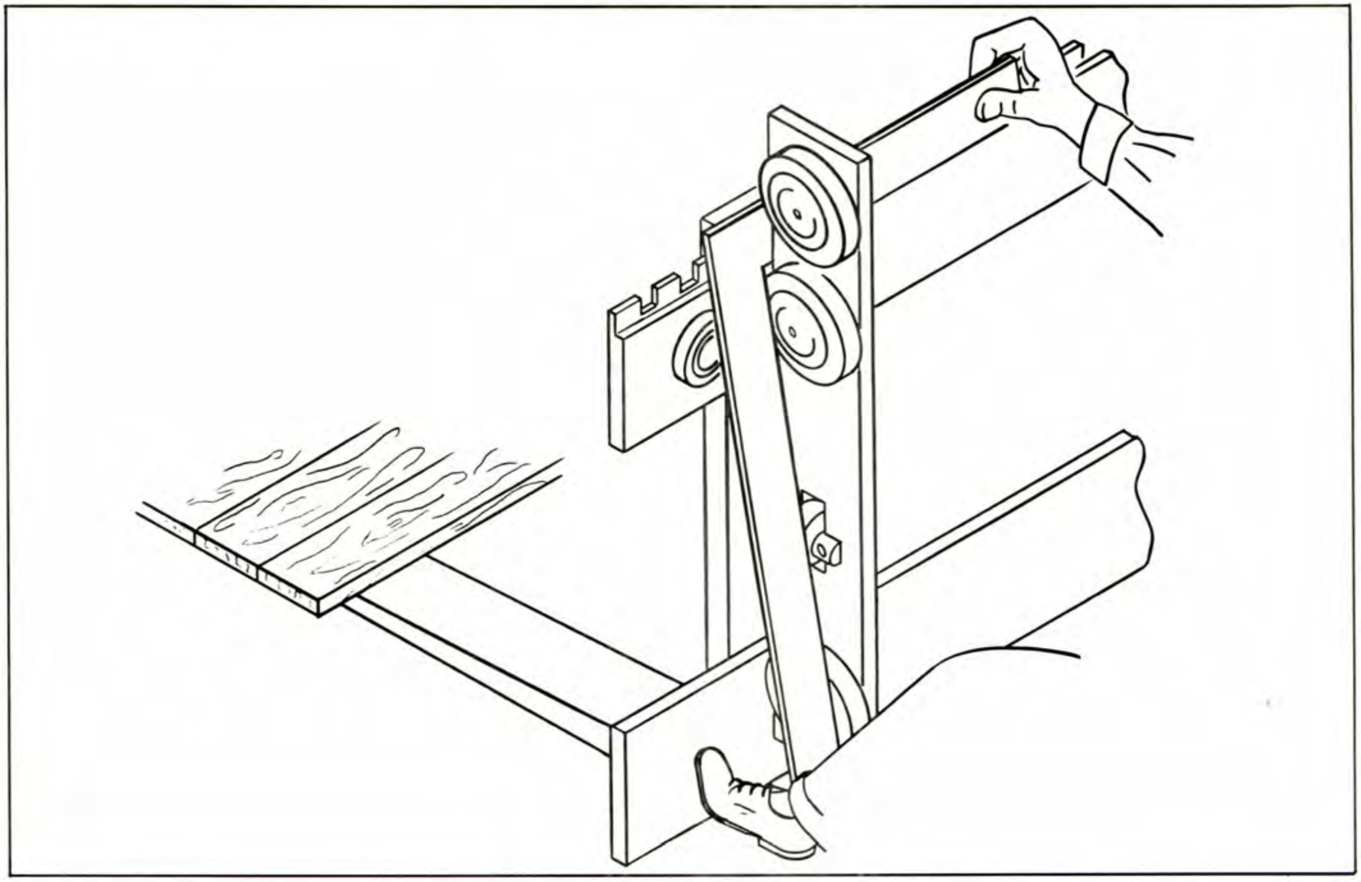


Plate 9579 Checking Squareness (Six Roller Carriage)

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

SIX ROLLER CARRIAGE ONLY

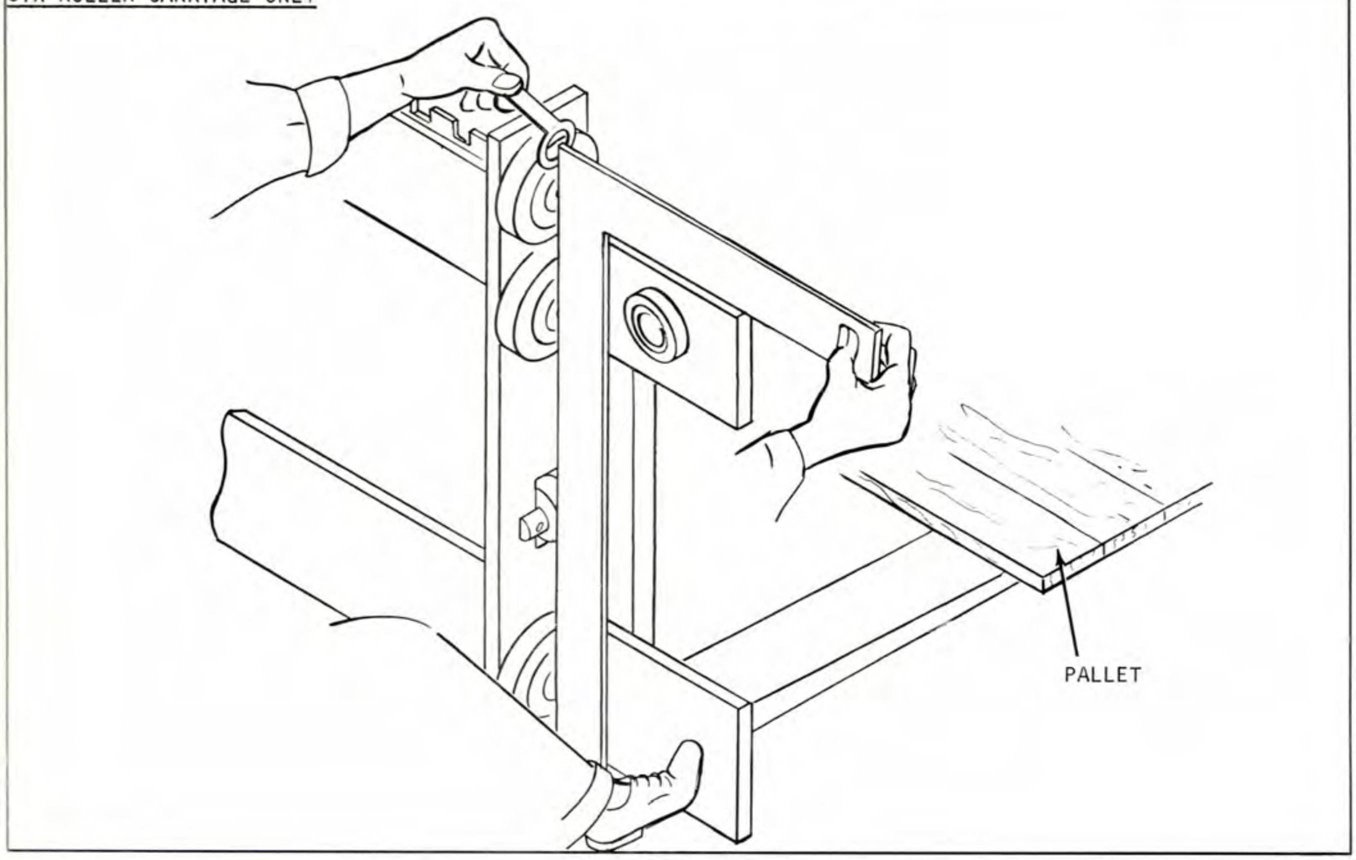


Plate 9580 Top Roller Clearance

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

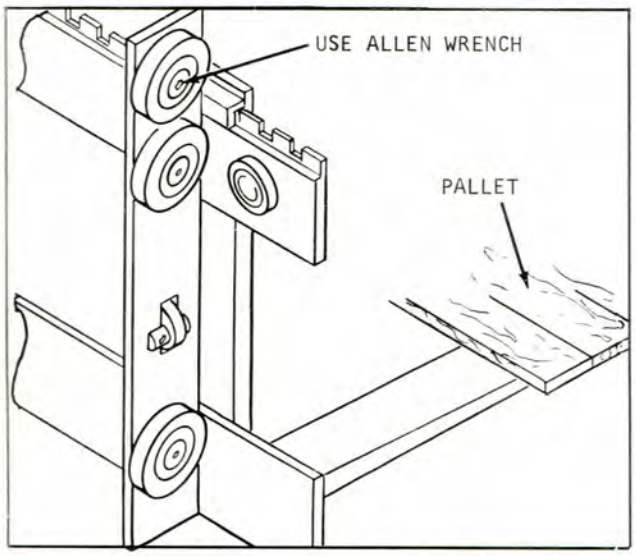


Plate 9581 Removing Top Roller

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.

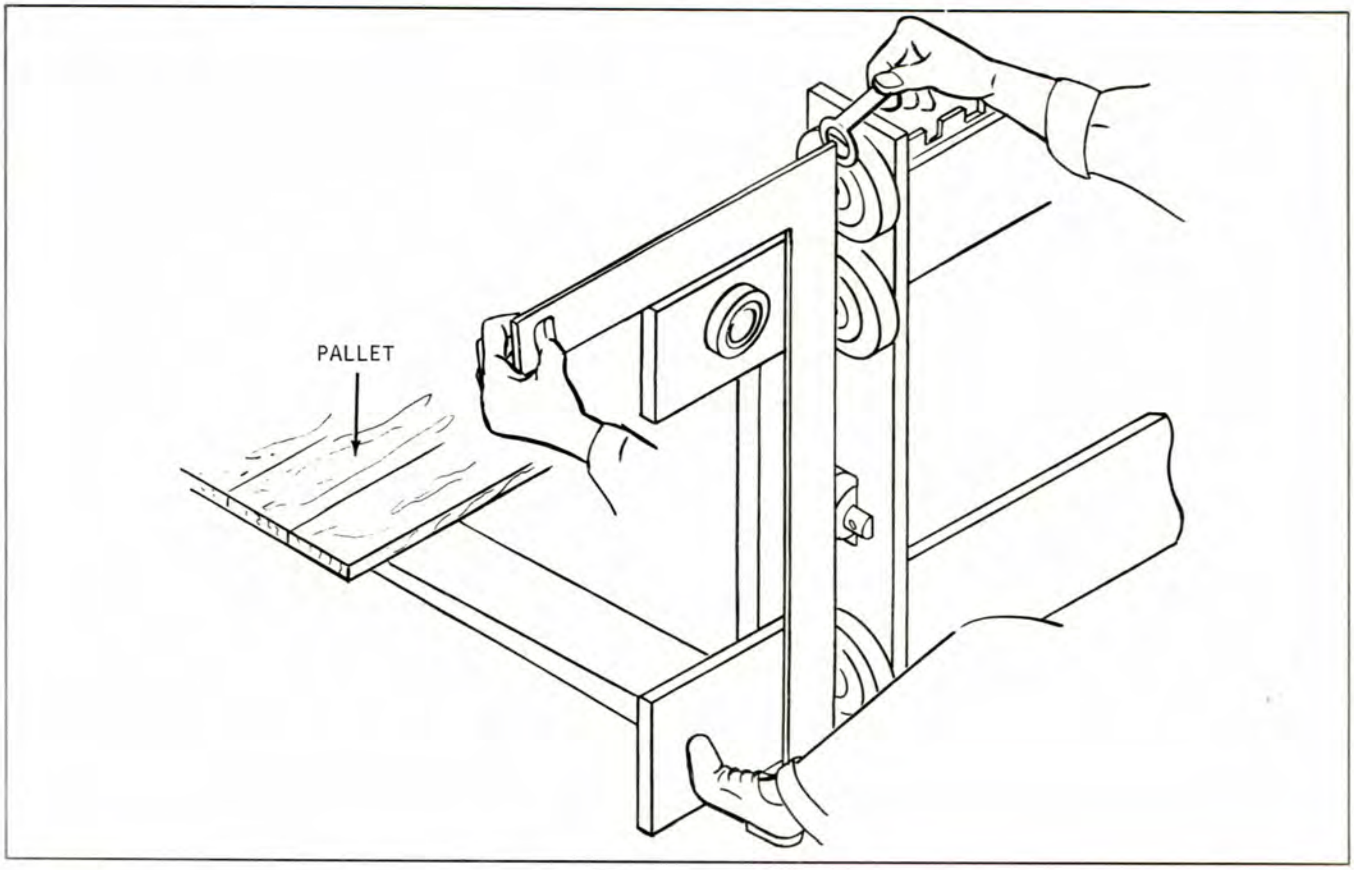


Plate 9582 Top Roller Clearance

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

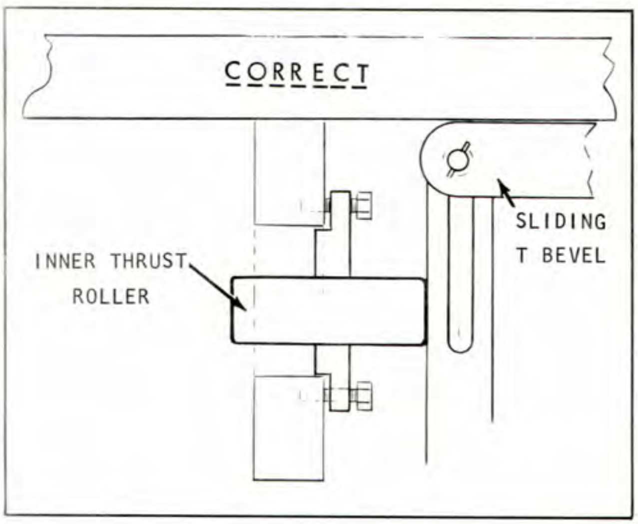


Plate 9583 Checking Squareness■CORRECT

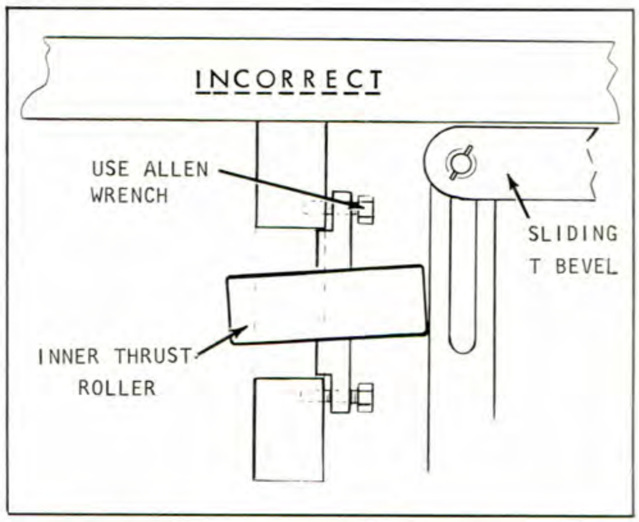


Plate 9584 Checking Squareness■INCORRECT

Step 4. Check squareness of inner thrust rollers with Sliding T Bevel. Set Sliding T Bevel to 90° using carpenters square.

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

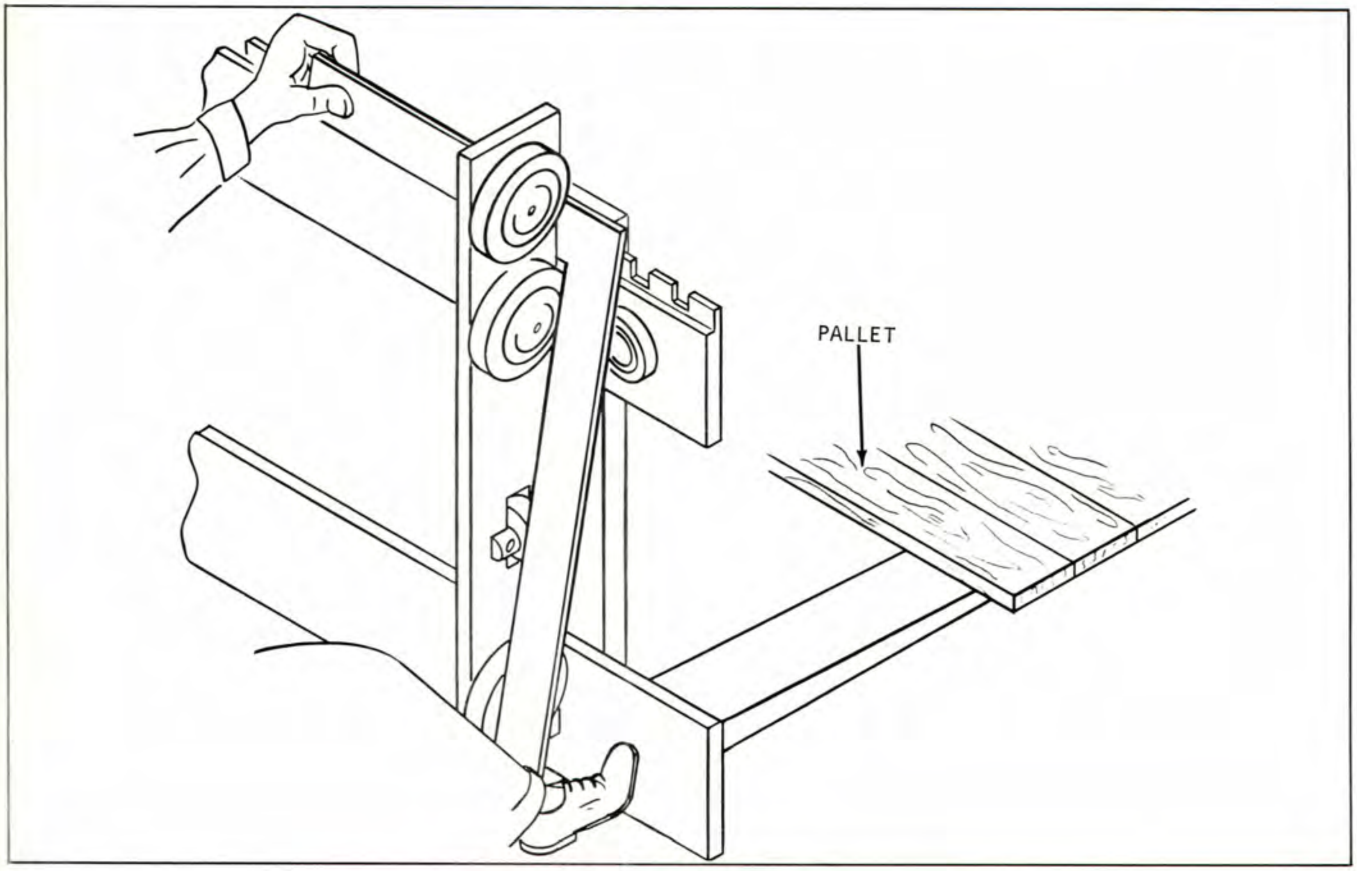


Plate 9574 Square And Side Thrust Roller

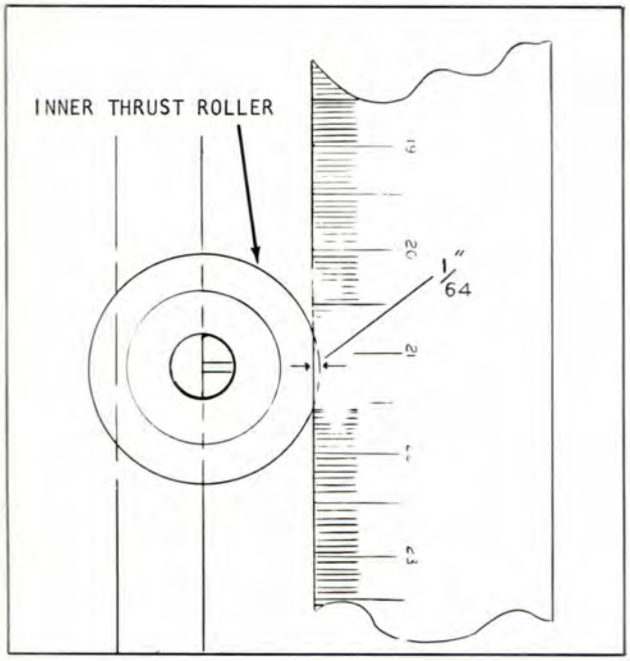


Plate 9585 Reading Roller Projection

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

NOTE

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.

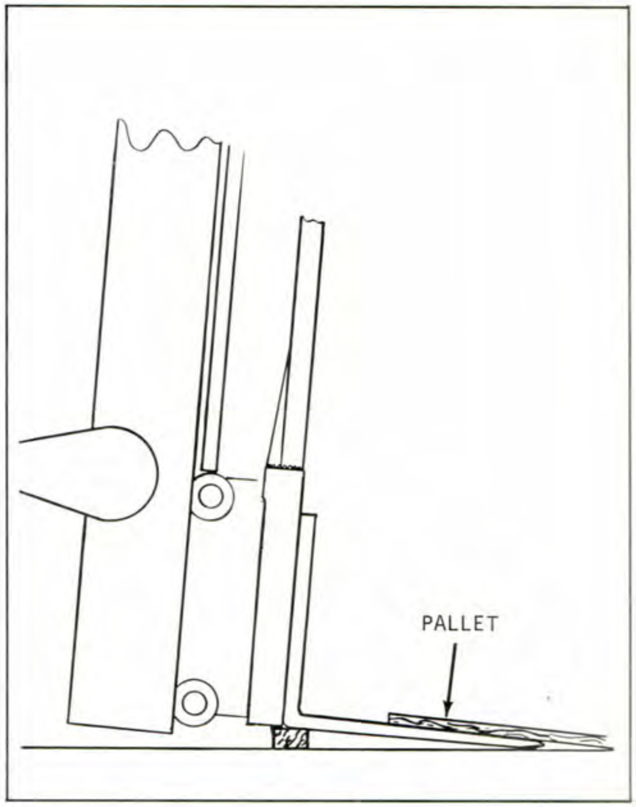


Plate 9565 Inner Rail Clearing Carriage Rollers

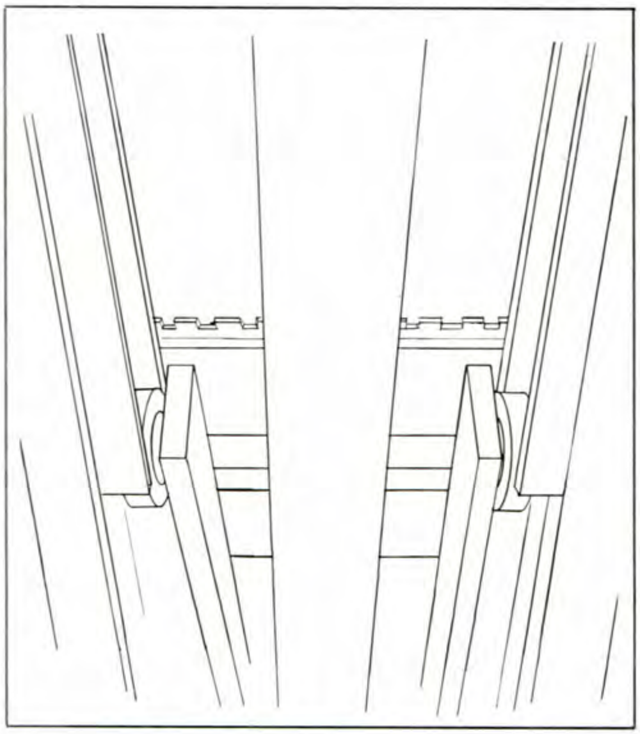


Plate 9591 Rollers Guiding Into Inner Rail

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.

CAUTION

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

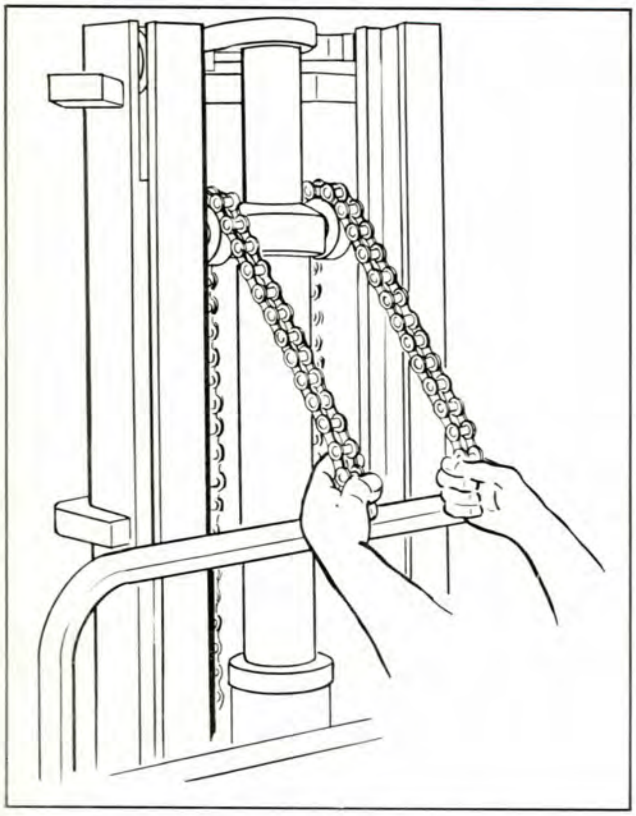


Plate 9586 Pulling Piston Head Down

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.

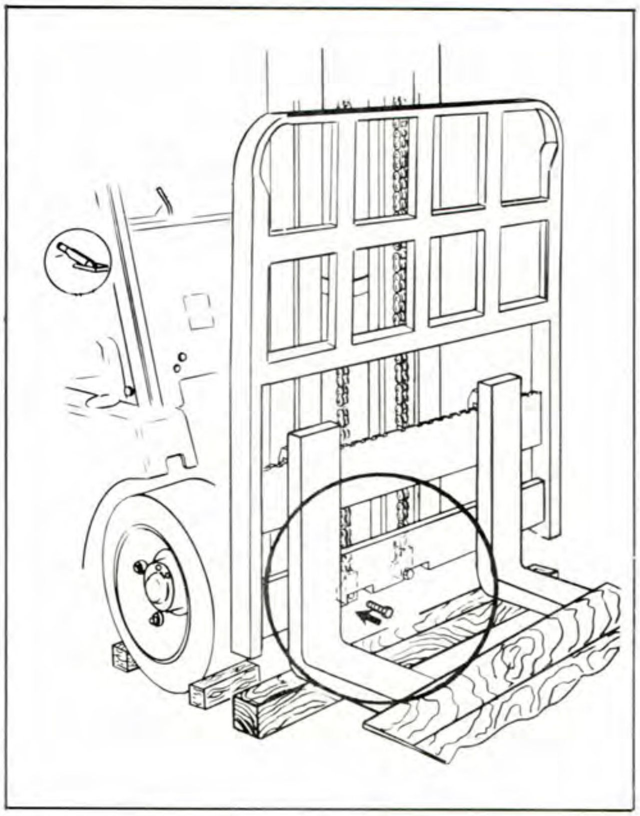


Plate 9587 Installing Bolts

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

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.

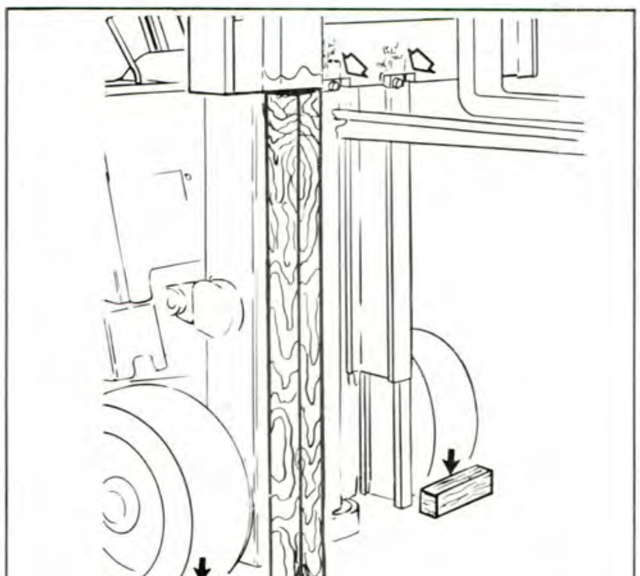


Plate 9593 Carriage Pin Replacement

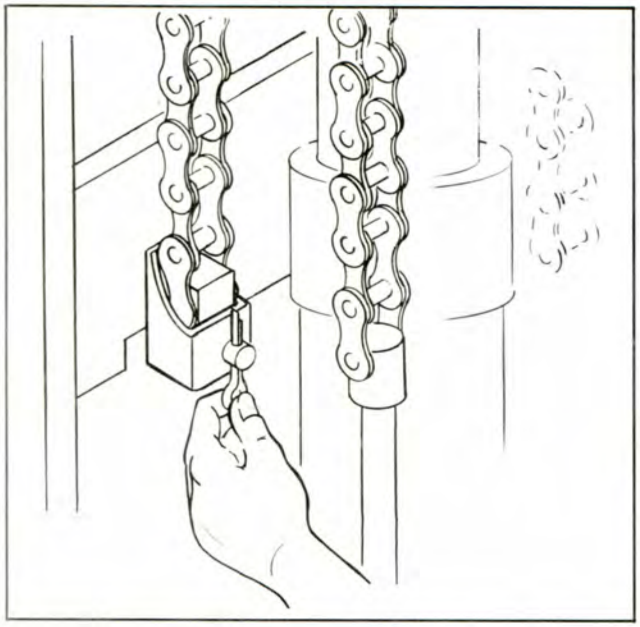
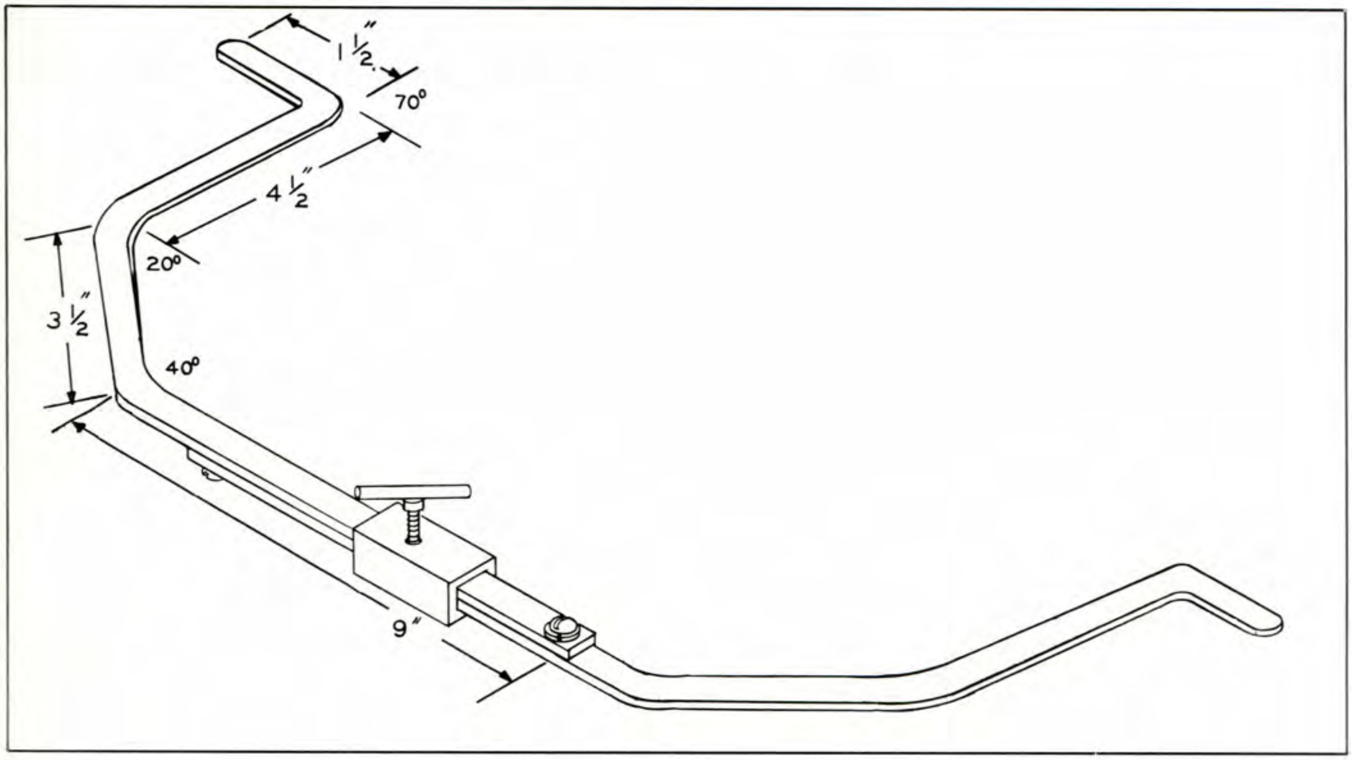


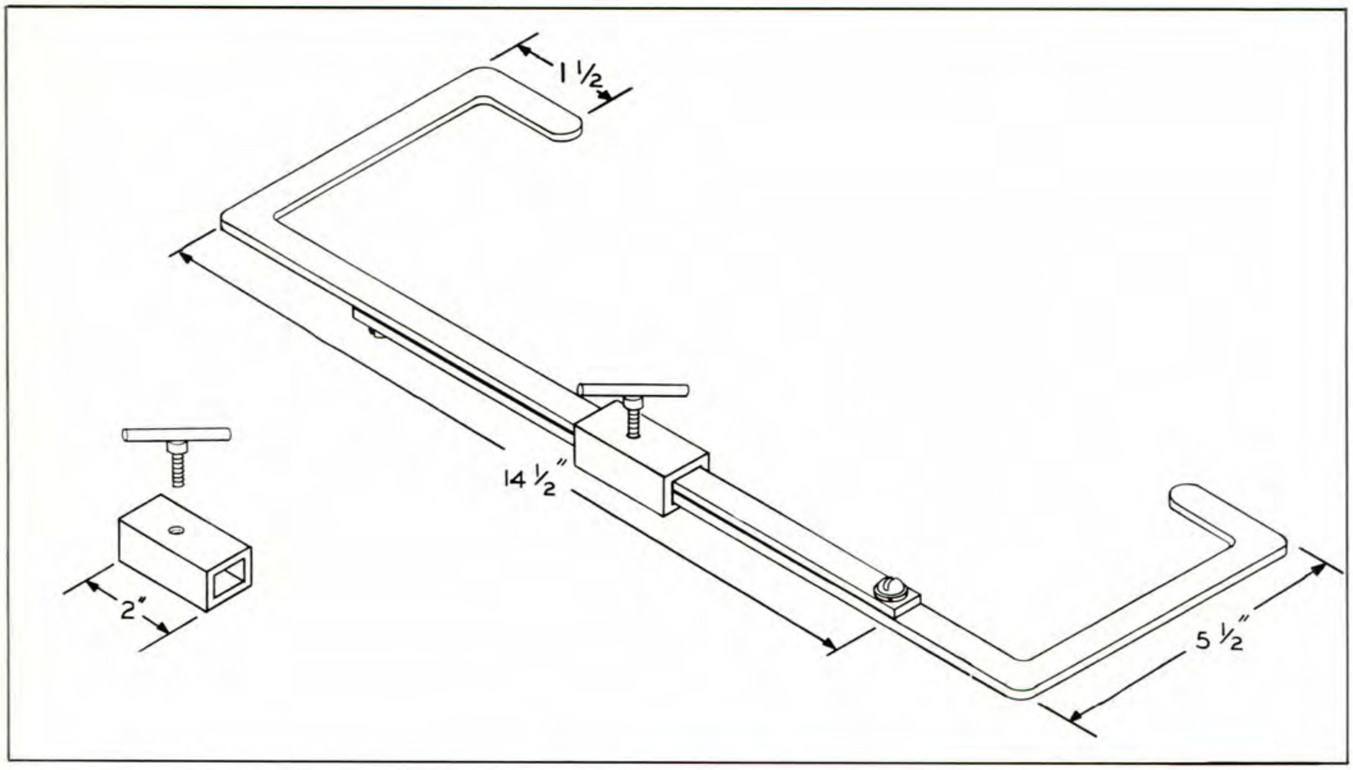
Plate 9588 Installing Cotter Pins

Step 7. Replace cotter pins in anchor pins.

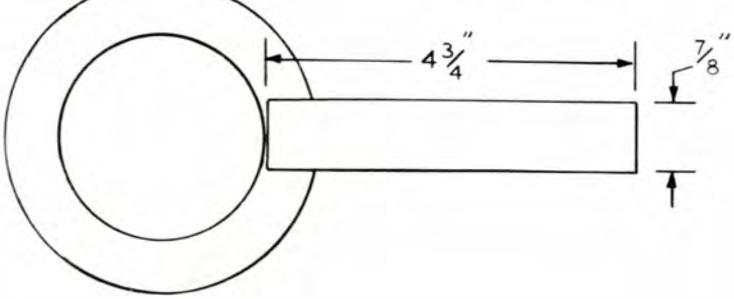
Step 8. Raise and lower carriage to full positions checking all phases of operation.

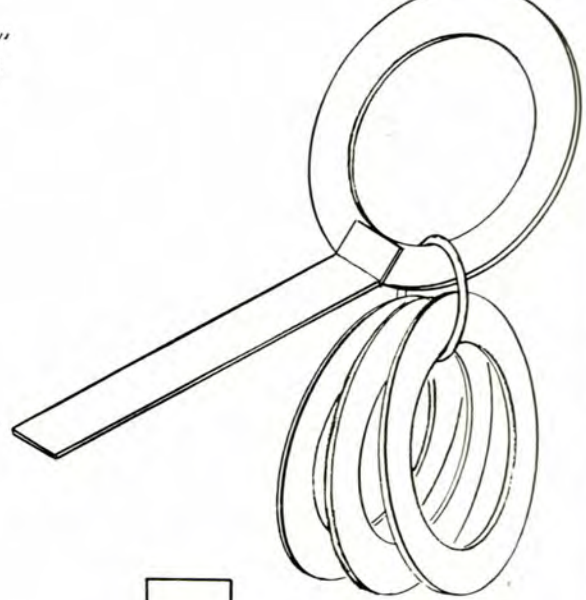


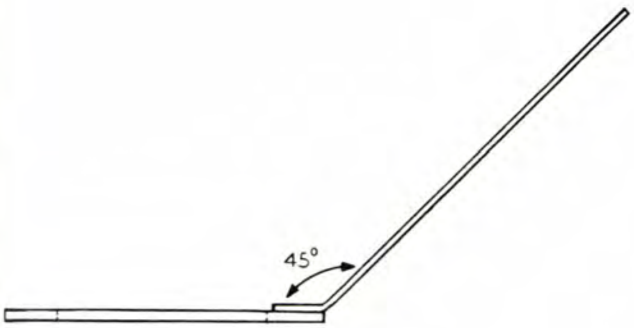
INSIDE SPANNING TOOL

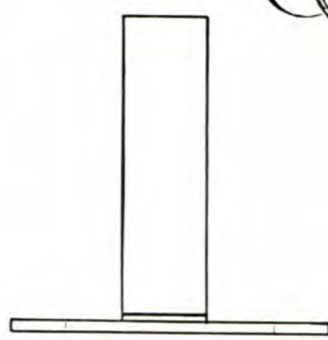


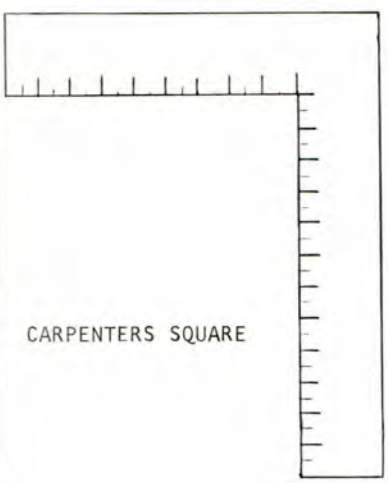
OUTSIDE SPANNING TOOL



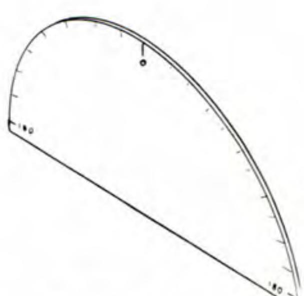




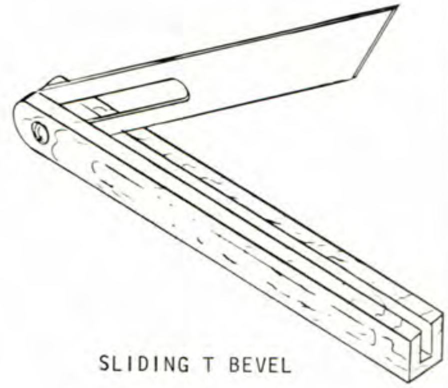




CARPENTERS SQUARE



PROTRACTOR



SLIDING T BEVEL

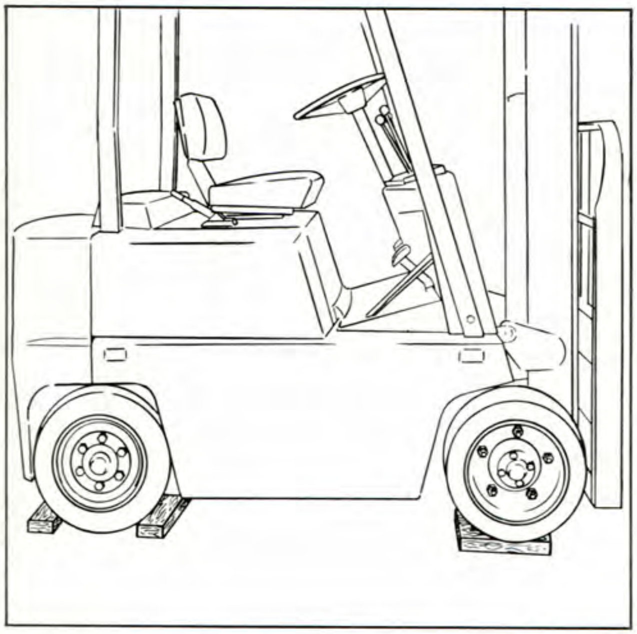


Plate 9811. Drive Wheels on Blocking, Block Steer Wheels

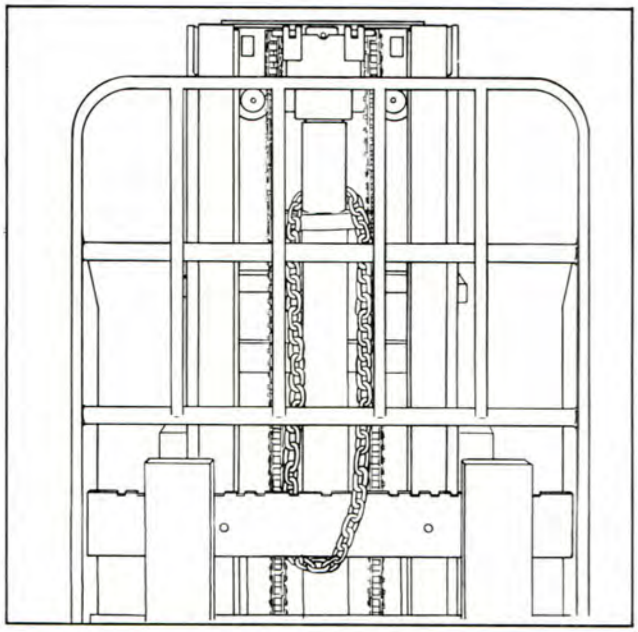
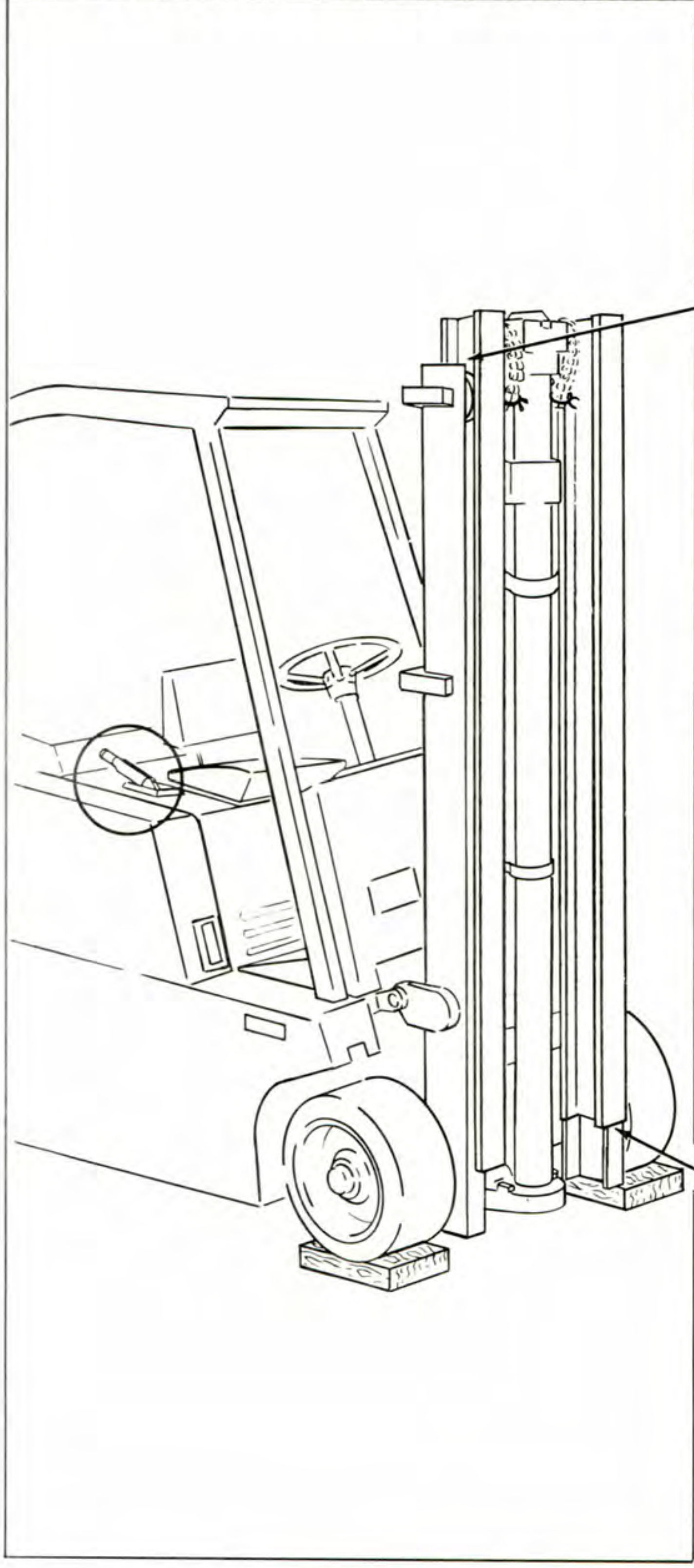


Plate 9807.. Support Carriage with Chain

```
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
X                                                              X
X                      W A R N I N G                           X
X                                                              X
X IF CARRIAGE IS TO BE LEFT ON MACHINE, SUPPORT CARRIAGE        X
X                                                              X
X BY PLACING CHAIN THROUGH LOWER CARRIAGE BAR AND RAPPING       X
X                                                              X
X IT AROUND THE CYLINDER JUST ABOVE THE CYLINDER CHAIN          X
X                                                              X
X ANCHOR BRACKET.                                               X
X                                                              X
X BE SURE TO BLOCK STEER WHEELS BEFORE WORKING ON UPRIGHT.      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 X X X
```

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".

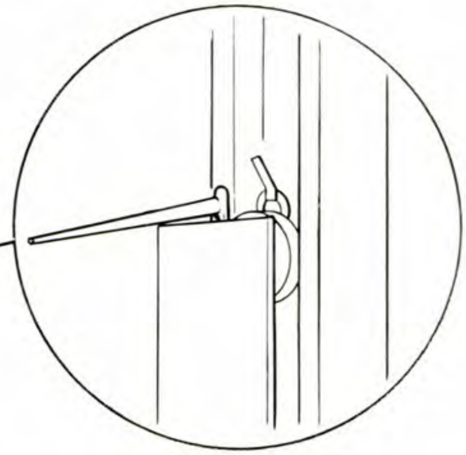
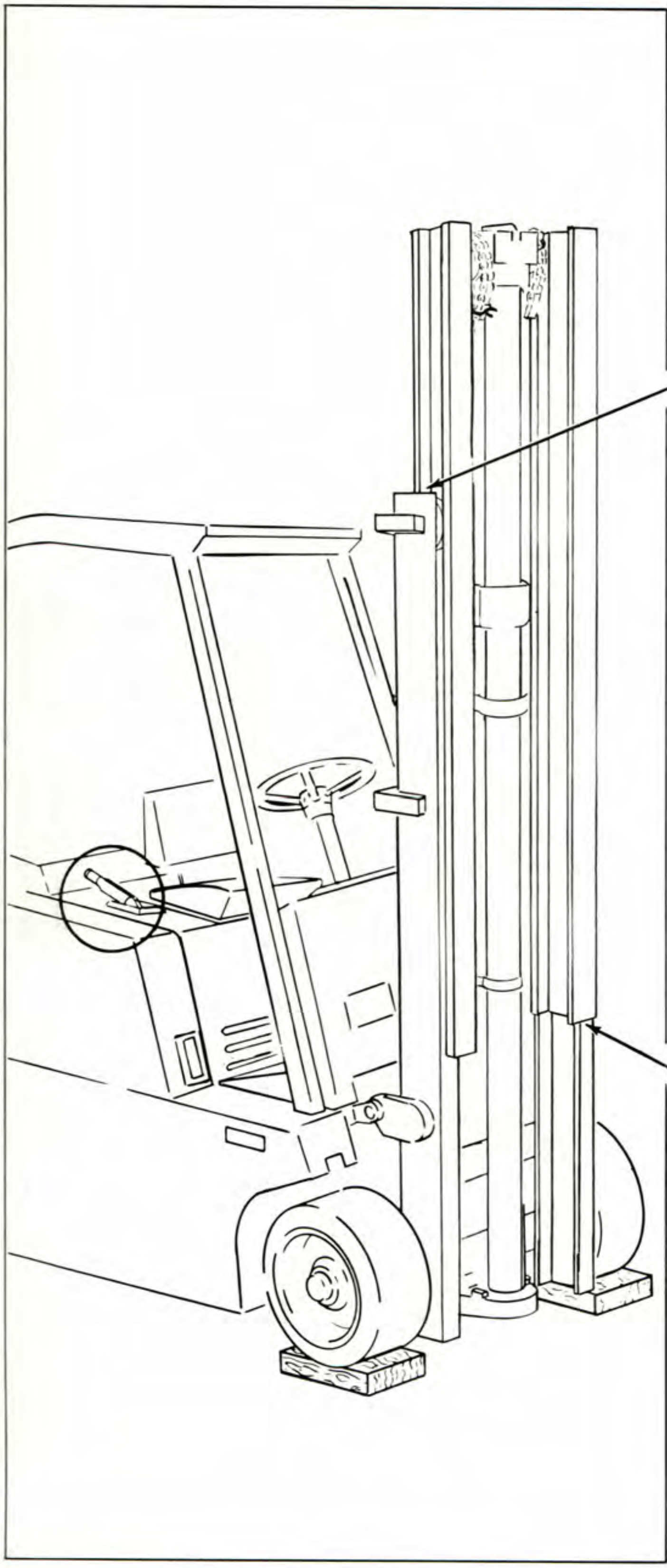
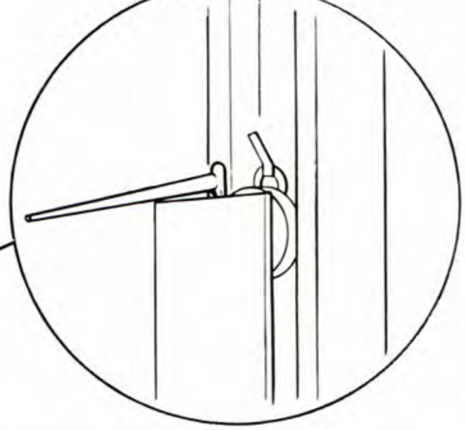


Plate 9804





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).

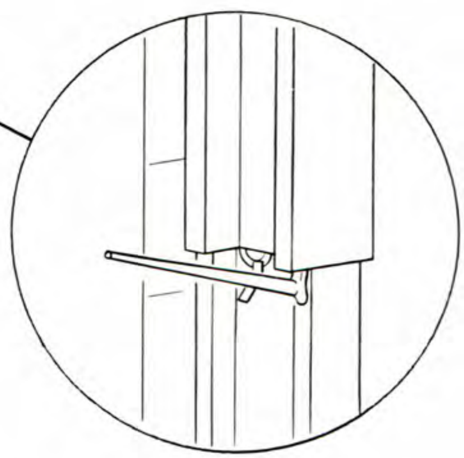
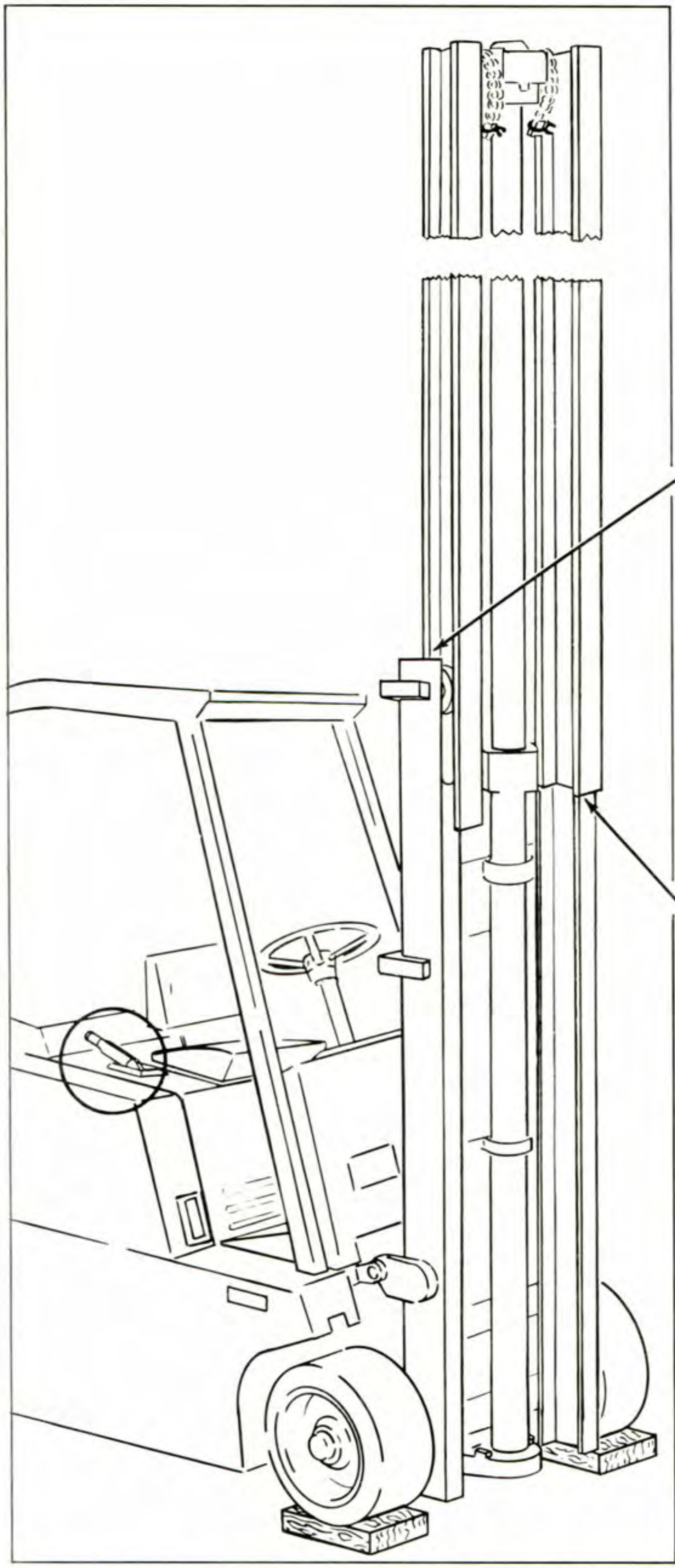
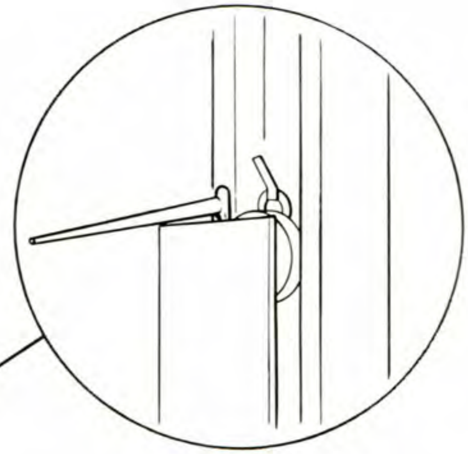


Plate 9805





Step 4. Riase inner rial 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).

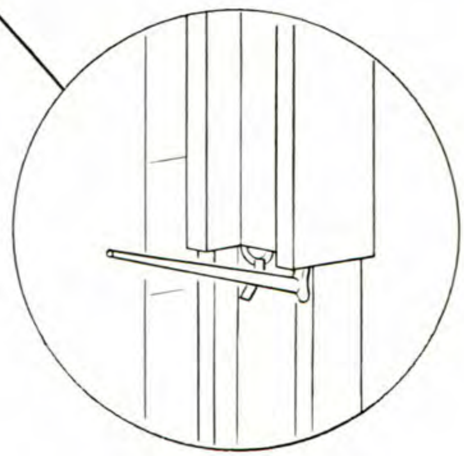


Plate 9806

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

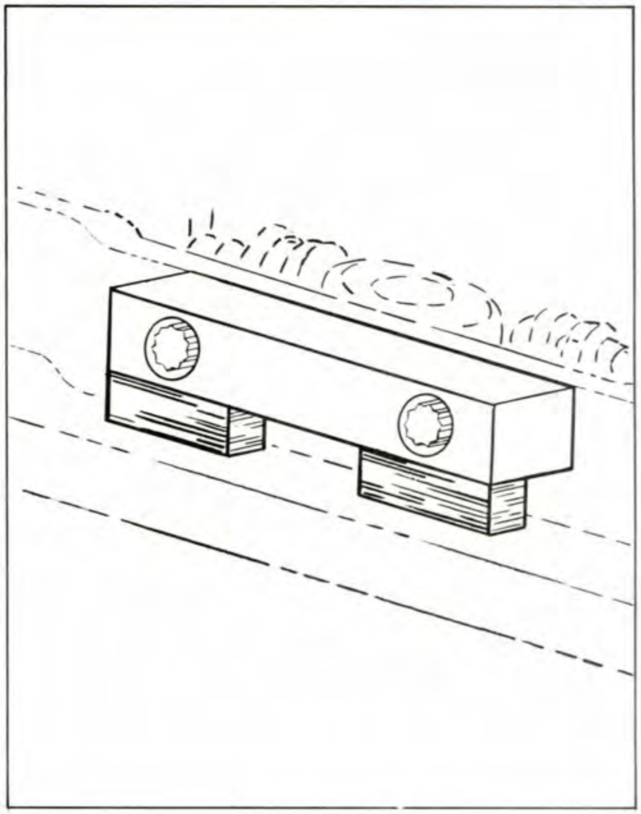


Plate 9808

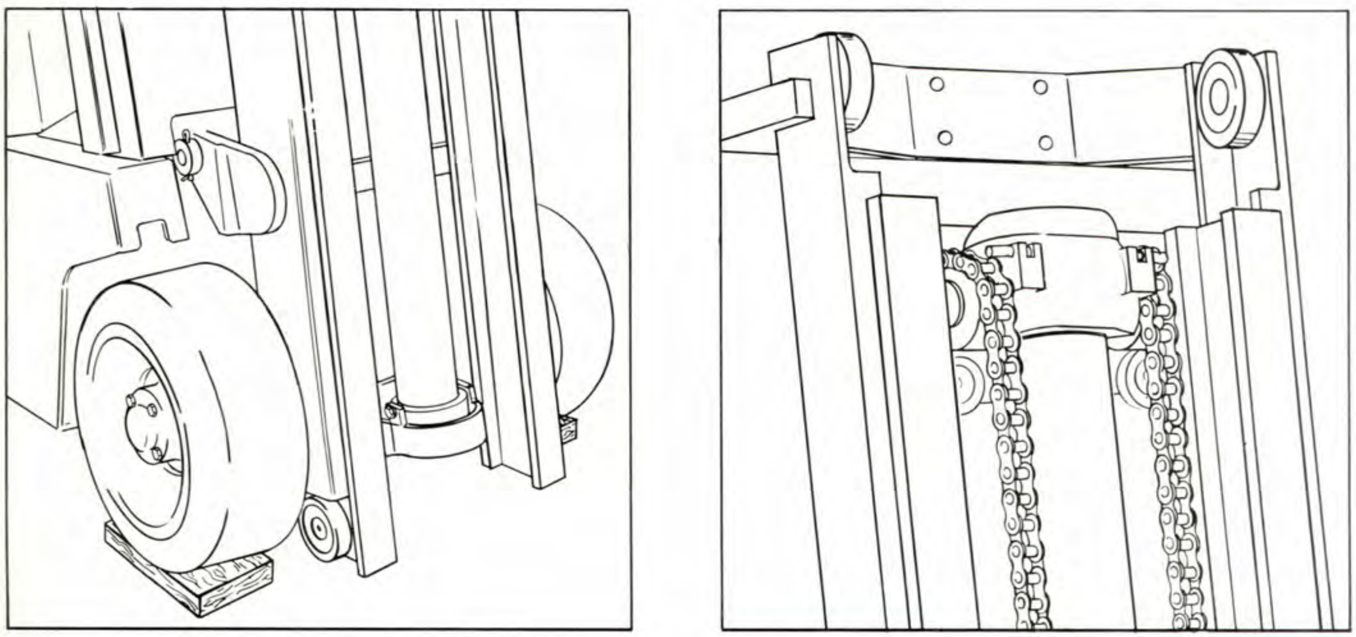


Plate 9809

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

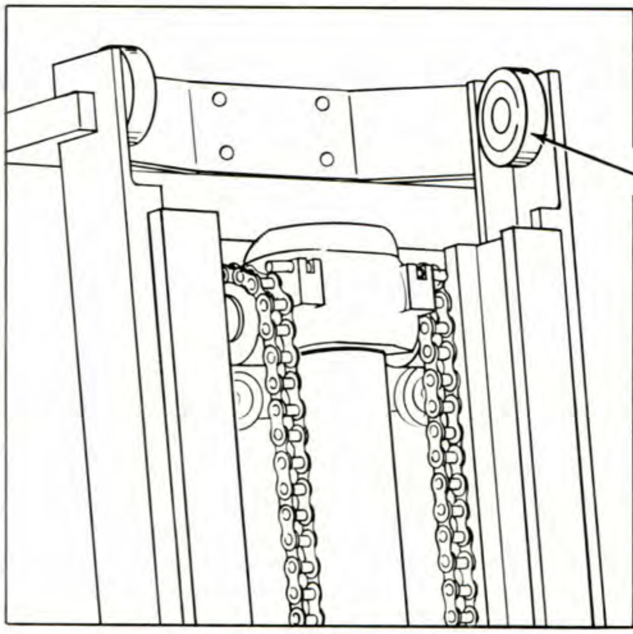
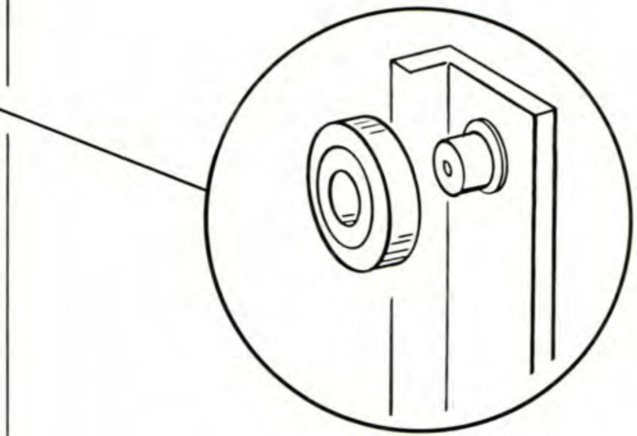



Plate 9810

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.

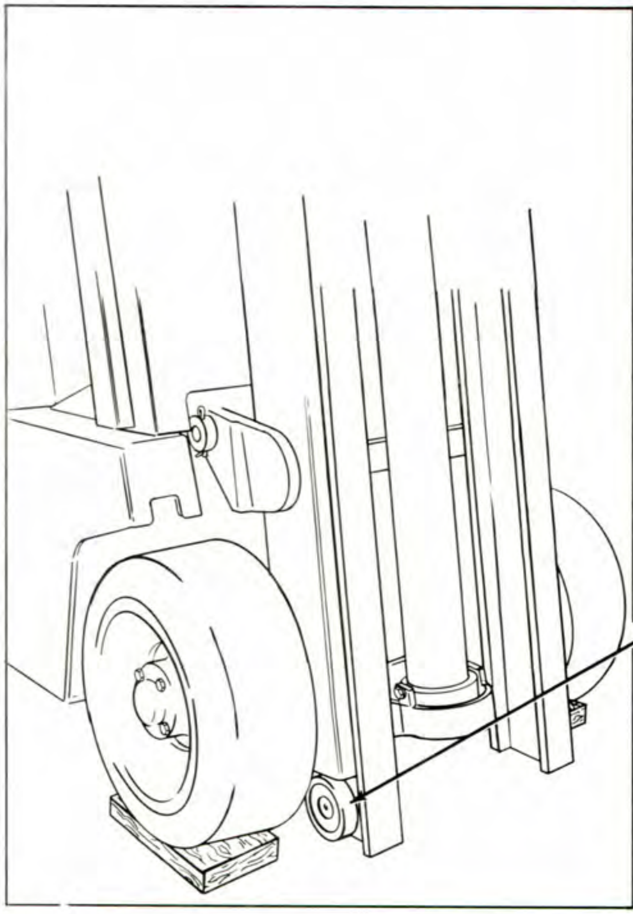
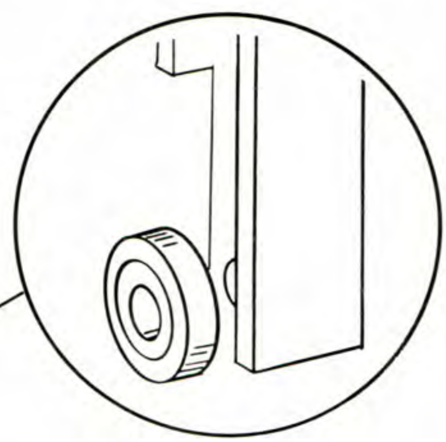



Plate 9812

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, besure 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.

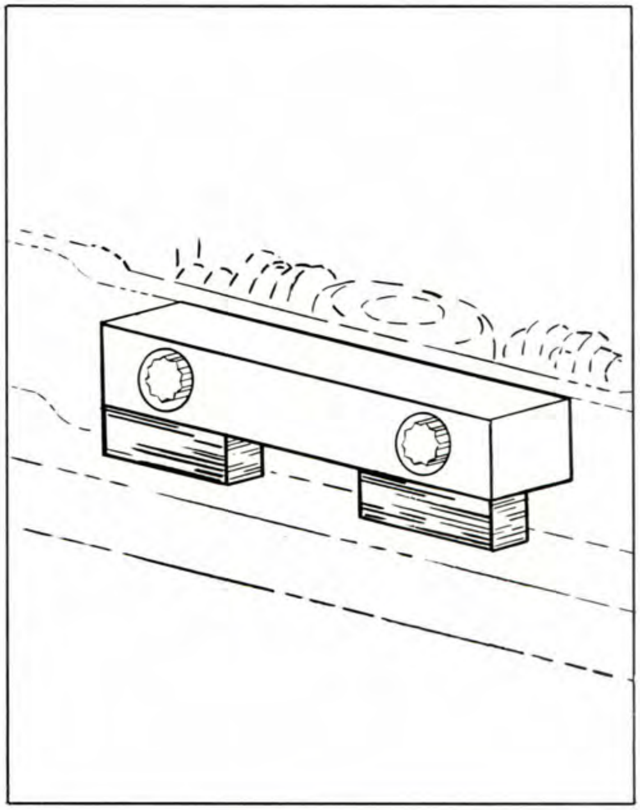


Plate 9808

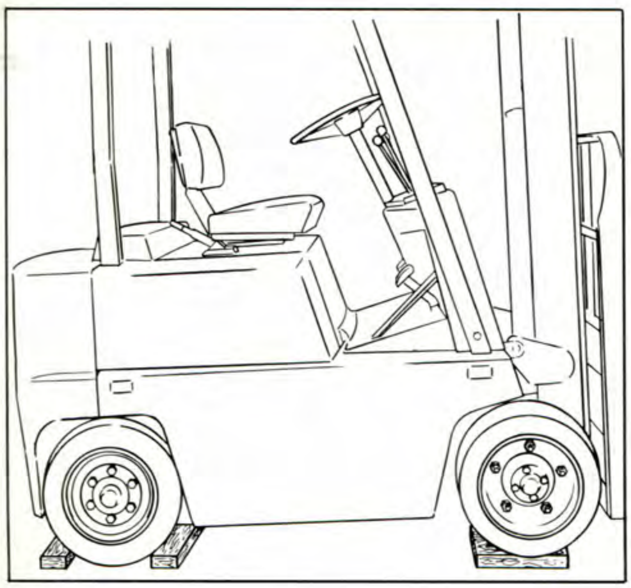


Plate 9811

Step 9. Remove carriage support chain and wheel blocks.

TROUBLE SHOOTING GUIDE

ENGINE

TROUBLE	PROBABLE CAUSE	REMEDY
Starting motor will not crank engine.	Battery discharged	Recharge or replace battery.
	Battery cable terminals loose or corroded. Ignition Fuse blown.	Remove and clean, reinstall and tighten cables. Replace fuse.
	Starting motor drive gear jammed in flywheel teeth.	Loosen starting motor and free-up gear.
	Improper oil.	Change oil to proper grade.
	Battery cable terminal broken.	Replace cable.
	Poor starting switch contacts.	Replace switch.
	Faulty Neutral Starting Switch.	Refer to Starting Motor.
Starting motor operates, but fails to crank engine when switch is engaged.	Starting motor gear does not engage flywheel.	Remove starting motor, and clean drive mechanism.
	Starting motor or drive gear defective.	Replace starting motor.
<u>Engine will not start</u>. No spark. Ammeter shows no discharge (Zero reading) with ignition switch "on".	Ignition switch partly "on".	Turn switch "on" fully.
	Ignition switch defective.	Replace switch.
	Ignition primary wires or starting motor cables broken or connections loose.	Repair, or replace and tighten.
	Ignition coil primary winding open.	Replace coil.
	Distributor points dirty.	Clean and adjust points.
	Distributor points not closing.	Adjust or replace points.
	Loose or corroded ground, or battery cable connections.	Remove and clean, reinstall and tighten cables.
<u>Engine will not start</u>. Ammeter showing abnormal discharge with ignition switch "on".	Defective condenser.	Replace condenser.
	Short-circuited or burned distributor cap or rotor.	Replace parts.
	Short-circuited wire between ammeter and ignition switch.	Repair or replace wire.
	Short-circuited primary winding in ignition coil.	Replace coil.
	Distributor points not opening.	Clean or replace, and adjust points.
Weak spark.	Distributor points pitted or burned.	Clean or replace, and adjust points.
	Distributor condenser weak.	Replace condenser.
	Ignition coil weak.	Replace coil.

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine will not start.		
Weak spark (continued)	Primary wire connections loose.	Tighten.
	High-tension, spark plug wires, or distributor cap wet.	Dry thoroughly.
	High-tension, spark plug wires, or distributor cap damaged.	Replace defective parts.
	Distributor cap or rotor burned or broken.	Replace defective parts.
	Spark plug gap incorrect.	Reset gaps.
	Short-circuited secondary circuit in coil.	Replace coil.
Good spark.	Fuel tank empty.	Refill tank.
	Dirt or water in carburetor, or float stuck.	Drain and clean carburetor.
	Carburetor and engine flooded by excessive use of choke.	Depress accelerator pedal fully, crank engine with starting motor, when engine starts, reset throttle and leave choke control "in".
	Fuel does not reach carburetor.	Inspect for damaged or leaky lines or air leak into line between tank and fuel pump.
	Dirt in fuel lines or tank.	Disconnect lines, drain tank, and blow out lines.
	Fuel line pinched.	Repair or replace line.
	Ignition wires incorrectly installed in distributor cap.	Install wires correctly.
	Ignition timing incorrect.	Reset timing.
	Fuel Strainer Clogged.	Remove and clean strainer.
	Fuel pump does not pump.	Clean screen, replace pump if defective.
	Lack of engine compression.	Report to designated individual in authority.
Backfiring.	Ignition out of time.	Reset timing.
	Spark plug wires incorrectly installed distributor cap or at spark plugs.	Install wires correctly.
	Distributor cap cracked or shorted.	Replace cap.
	Valve holding open.	Report to designated individual in authority.

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine operates, but backfires and spits.	Improper ignition timing.	Reset timing.
	Spark plug wires incorrectly installed in distributor cap.	Install wires correctly.
	Dirt or water in carburetor.	Drain and clean carburetor.
	Carburetor improperly adjusted.	Clean and adjust carburetor.
	Carburetor float level low.	Report to designated individual in authority.
	Valve sticking or not seating properly, burned or pitted.	Report to designated individual in authority.
	Excessive carbon in cylinders.	Remove carbon from cylinders.
	Valve springs weak.	Report to designated individual in authority.
	Heat control valve not operating.	Free-up, and adjust valve.
	Fuel pump pressure low.	Clean screen; replace pump, if defective.
	Fuel strainer clogged.	Remove and clean strainer.
	Partly clogged or pinched fuel lines.	Clean and repair lines.
	Intake manifold leak.	Inspect gaskets and tighten manifold stud nuts.
	Distributor cap cracked or shorted.	Replace cap.
Engine stalls on idle.	Carburetor throttle valve closes too far, or idle mixture incorrect.	Adjust carburetor.
	Carburetor choke valve remains closed.	Free-up and lubricate valve.
	Dirt or water in idler passages of Carburetor.	Clean or replace carburetor.
	Air leak at intake manifold.	Inspect gaskets and tighten manifold stud nuts.
	Heat control valve defective.	Free-up and adjust valve.
	Spark plugs defective, gaps incorrect.	Clean or replace spark plugs, set gap clearance.
	Ignition timing early.	Reset timing.
	Low compression.	Report to designated individual in authority.
	Water leak in cylinder head or head gaskets.	Replace gasket; report cylinder head leak to designated individual in authority.

TROUBLE SHOOTING GUIDE

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine misfires on one or more cylinders.	Dirty spark plugs.	Clean, adjust, or replace plugs.
	Spark plug gap incorrect.	Reset gap.
	Cracked spark plug porcelain.	Replace spark plug.
	Spark plug wires grounded.	Replace wires.
	Spark plug wires incorrectly installed in cap or at spark plugs.	Install wires correctly.
	Distributor cap or rotor burned or broken.	Replace defective parts.
	Valve tappet holding valve open.	Report to designated individual in authority.
	Low engine compression.	Report to designated individual in authority.
	Leaky cylinder head gasket.	Replace gasket.
	Cracked cylinder block, broken valve tappet or tappet screw.	Report to designated individual in authority.
Engine does not idle properly.	Ignition timing.	Reset timing.
	Dirty spark plugs, or gaps too close.	Clean and adjust spark plugs.
Engine misses at high speeds.	Ignition coil or condenser weak.	Replace defective parts.
	Distributor points sticking, dirty or improperly adjusted.	Clean, adjust, or replace points.
	Distributor rotor or cap cracked or burned.	Replace defective parts.
	Leaky cylinder head gaskets.	Replace gaskets.
	Uneven cylinder compression.	Report to designated individual in authority.
	High-tension or spark plug wires leaky, cracked insulation.	Replace defective parts.
	Carburetor choke not adjusted.	Adjust choke.
	Carburetor accelerating pump system defective, dirt in metering jets or float level incorrect.	Report to designated individual in authority.
	Fuel pump defective, causing lack of fuel.	Clean screen, replace defective pump.
	Air cleaner dirty.	Clean complete air cleaner and refill oil cup.
	Heat control valve defective.	Free-up and adjust

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine misses at high speeds. (continued)	Valves sticking, weak or broken valve springs.	Report to designated individual in authority.
	Fuel strainer clogged.	Remove and clean strainer.
	Weak distributor bracket arm spring	Replace point set.
	Excessive play in distributor shaft bearing.	Replace distributor.
	Spark plugs defective, dirty or gap incorrectly set.	Clean, adjust or replace spark plugs.
Engine pings (Spark Knock).	Ignition timing early.	Reset timing.
	Distributor automatic spark advance stuck in advance position, or spring broken.	Replace distributor.
	Excessive carbon deposit in cylinders.	Remove cylinder head and clean.
	Incorrect fuel.	Drain, use correct fuel.
Engine lacks power.	Ignition timing late.	Reset timing.
	Incorrect fuel.	Use correct fuel.
	Leaky cylinder head gasket.	Replace gasket.
	Excessive carbon formation.	Remove cylinder head, and clean cylinder head, piston heads, cylinder block, and valves.
	Engine runs cold.	Test thermostat; in cold weather, cover radiator.
	Insufficient oil, or improper grade oil.	Lubricate in accordance with lubrication section.
	Oil system failure.	Report to designated individual in authority.
	Air Cleaner dirty.	Clean complete air cleaner, change oil in cup.
	Spark plug gaps too wide.	Reset gaps.
	Choke valve partially closed, or throttle does not open fully.	Adjust valve or throttle.
	Manifold heat control inoperative.	Free-up and adjust control.
	Exhaust pipe, muffler or tail pipe obstructed.	Service or replace obstructed parts.
	Low compression, broken valve springs, sticking valves.	Report to designated individual in authority.

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine lacks power. (Continued)	Improper tappet adjustment.	Adjust tappets.
	Lack of fuel.	Clean filter, inspect fuel pump, inspect carburetor for water or dirt and clean if necessary.
Engine overheats.	Cooling system deficient. Water low, air flow through radiator core restricted.	Clean radiator core from engine side with compressed air or water, or fill radiator to proper level.
	Clogged radiator core (Clogged internally).	Clean by flushing radiator.
	Cylinder head gasket leaking.	Tighten cylinder head stud nuts and/or replace gasket.
	Radiator or water pump leaking.	Repair or replace defective parts.
	Damaged or deteriorated hose or fan belt.	Replace defective parts.
	Loose fan belt.	Adjust fan belt tension.
	Cylinder block or head leaking.	Report to designated individual in authority.
	Ignition timing incorrect.	Reset timing.
	Damaged muffler, bent or clogged exhaust pipe.	Service or replace defective parts.
	Excessive carbon in cylinders.	Remove cylinder head, and clean cylinder head, piston heads cylinder block, and valves.
	Insufficient oil, or improper grade.	Refer to Lubrication Instructions.
	Air Cleaner restricted.	Clean complete change oil in cup.
	Inoperative thermostat.	Replace thermostat and gasket.
	Water pump impeller broken.	Replace pump.
	Poor compression.	Report to designated individual in authority.
	Valve timing incorrect.	Reset timing.
High fuel consumption.	High engine speeds (Excessive driving in lower gear range).	Correct driving practice.
	Air cleaner clogged.	Clean complete air cleaner and change oil in cup.
	Carburetor float level too high, accelerating pump not properly adjusted.	Report to designated individual in authority.
	Fuel line leaks.	Correct leaks, replace lines.

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
High fuel consumption. (Continued)	Overheated engine.	See "Engine overheats".
	Carburetor parts worn or broken.	Replace fuel carburetor.
	Fuel pump pressure too high, or leaky diaphragm.	Replace fuel pump.
	Engine running cold.	Inspect thermostat, cover radiator in winter.
	Ignition incorrectly timed.	Reset timing.
	Spark advance stuck.	Replace distributor.
	Leaking fuel pump bowl gasket.	Replace gasket.
	Low compression.	Report to designated individual in authority.
	Carburetor controls sticking.	Free-up and lubricate controls.
	Engine idles too fast.	Adjust carburetor throttle stop screw.
	Spark plugs dirty.	Clean or replace spark plugs.
	Weak coil or condenser	Replace coil or condenser.
	Clogged muffler, or bent exhaust pipe.	Service or replace defective parts.
	Loose engine mounts, permitting engine to shake and raise fuel level in carburetor.	Tighten; if damaged, replace defective mounts.
High oil consumption.	High engine speeds, or excessive driving in low gear range.	Correct driving practice.
	Oil leaks.	Replace leaking gaskets.
	Improper grade oil, or diluted oil.	Use new oil of proper grade.
	Overheating of engine causing thinning of oil.	See "Engine overheats".
	Oil filter clogged.	Clean filter case thoroughly and replace element.
	Defective piston or rings, excessive side clearance of intake valves in guides, cylinder bores worn (scored, out-of-round, tapered); excessive bearing clearance, misaligned connecting rods.	Report to designated individual in authority.

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Low oil pressure.	Insufficient oil supply.	Fill crankcase to prescribed level.
	Improper grade of oil, or diluted oil foaming at high speeds.	Change oil, inspect crankcase ventilator, inspect for water in oil.
	Oil too heavy (funneling in cold weather).	Change to proper grade oil. (Refer to Lubrication Instructions.
	Oil pump screen clogged.	Remove oil pan and clean pump screen.
	Oil leaks.	Report to designated individual in authority.
	Faulty oil pump, pressure regulator valve stuck or improperly adjusted, or spring broken.	Report to designated individual in authority.
Defective valves.	Incorrect tappet adjustment.	Adjust tappets.
	Other valve troubles.	Report to designated individual in authority.
Abnormal engine noises.	Loose fan, fan pulley or belt, heat control valve.	Tighten or correct conditions as required.
	Leaking intake or exhaust manifold or gaskets, cylinder head gasket, or spark plugs.	Tighten loose components or replace defective gaskets.
	Overheated engine, clogged exhaust system.	Remove obstruction from exhaust system. Inspect for further serviceability.
	Other abnormal engine noises.	Report to designated individual in authority.
Poor compression.	Incorrect tappet adjustment.	Adjust tappets.
	Leaking, sticking, or burned valves; sticking tappets; valve spring weak or broken; valve stems and guides worn; piston ring grooves worn or rings worn, broken, or stuck; cylinder bores scored or worn.	Report to designated individual in authority.

FUEL SYSTEM

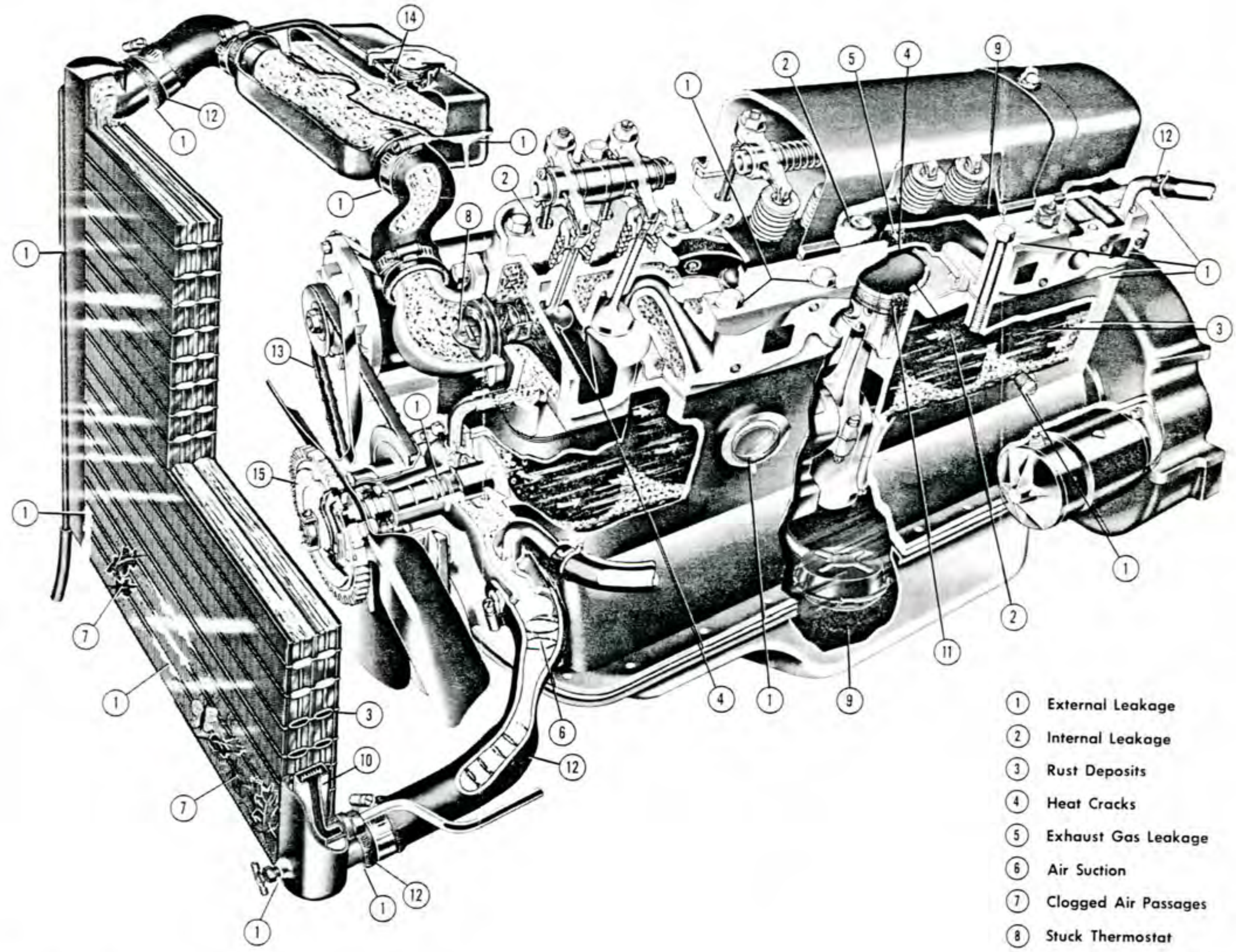
TROUBLE	PROBABLE CAUSE	REMEDY
Fuel does not reach carburetor.	No fuel in fuel tank.	Fill fuel tank.
	Fuel pump inoperative.	Replace pump.
	Fuel line air leak between tank and fuel pump.	Repair or replace line.
	Fuel line clogged.	Disconnect and blow out lines.
	Fuel tank cap vent clogged.	Clean vent.
Fuel reaches carburetor, but does not reach cylinders.	Choke does not close.	Free-up and lubricate, inspect for proper operation.
	Fuel passage in carburetor clogged.	Clean or replace carburetor.
	Carburetor float valve stuck closed.	Report to designated individual in authority.
High fuel consumption.	Lubricant in power train too heavy.	Use correct lubricant.
	Incorrect adjustment of carburetor.	Adjust carburetor.
	Vehicle overloaded.	Reduce loads to specified maximum capacity.
	Tires improperly inflated.	Inflate tires properly.
	Tight brakes.	Adjust brakes.
Low fuel pressure.	Air leak in fuel lines.	Tighten connections, repair lines if damaged.
	Fuel pump defective, diaphragm broken; valves leaking, linkage worn.	Replace fuel pump.
	Fuel lines clogged.	Clean or replace lines.
Engine idles too fast.	Improper carburetor throttle stop adjustment.	Adjust throttle stop screw.
	Carburetor control sticking.	Free-up and lubricate control.
	Control return spring weak.	Replace spring.
Fuel gauge does not register.	Loose wire connection at instrument panel or tank unit .	Tighten connections.
	Instrument panel unit or tank unit inoperative.	Replace unit.

COOLING SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Overheating.	Unusual operating conditions of high temperature.	Inspect. (Refer to "Engine overheats".)
Loss of cooling solution.	Loose hose connections.	Tighten hose connections.
	Damaged or deteriorated hose.	Replace hoses.
	Leaking radiator.	Repair or replace radiator.
Engine operates too cool.	Thermostat sticking.	Replace thermostat and gasket.
	Low air temperature.	Cover radiator.
Noises.	Frayed or loose fan belt.	Replace or adjust belt.
	Water pump defective.	Replace pump.

THE ENGINE COOLING SYSTEM

Trouble spots resulting from service neglect



1. External Leakage
2. Internal Leakage
3. Rust Deposits
4. Heat Cracks
5. Exhaust Gas Leakage
6. Air Suction
7. Clogged Air Passages
8. Stuck Thermostat
9. Sludge Formation in Oil
10. Transmission Oil Cooler
11. Heat Damage
12. Hose Failure
13. Worn Fan Belt
14. Pressure Cap Leakage
15. Temperature Control Fan Drive

The cooling system depicted here does not represent that of any particular make of car. It incorporates features used by many different manufacturers.

Cooling System Care Pays!

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IGNITION SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Ignition system troubles.	Weak spark.	Refer to "Engine will not start".
	Timing incorrect.	Retime ignition.
	Moisture on distributor wires, coil, or spark plugs.	Clean and dry thoroughly.
	Ignition switch inoperative.	Replace switch.
	Primary or secondary wiring loose, broken, or grounded.	Service.
	Coil defective.	Refer to "Ignition coil troubles", below.
	Distributor defective.	Refer to "Distributor troubles", below.
	Spark plug defective.	Refer to spark plug troubles below.
Ignition coil.	Connections loose; dirty or broken external wire, wet.	Clean and tighten, or repair, dry thoroughly.
	Coil defective.	Replace coil.
Distributor troubles.	Distributor breaker points dirty or pitted, point gaps incorrect.	Clean, adjust or replace breaker points.
	Distributor breaker point arm spring weak.	Replace breaker point arm.
	Distributor breaker points sticking.	Free-up breaker points.
	Distributor automatic advance defective.	Lubricate and free-up. If seized, replace distributor.
	Distributor cap or rotor shorted, cracked or broken.	Replace defective parts.
	Distributor rotor does not turn.	Report to designated individual in authority.
	Condenser defective.	Replace condenser.
Spark plug troubles.	Cracked, broken, leaking, or improper type.	Replace spark plug.
	Spark plug wires incorrectly installed on plugs or in distributor cap.	Install wires correctly.
	Spark plugs dirty; gap incorrect.	Clean, set gaps, or replace plugs.
	Spark plug porcelain cracked or broken.	Replace plug.

STARTING MOTOR

TROUBLE	PROBABLE CAUSE	REMEDY
Starting motor cranks engine slowly.	Engine oil too heavy.	Change to proper grade oil.
	Battery charge low.	Recharge or replace battery.
	Battery cell shorted.	Replace battery.
	Battery connections corroded, broken, or loose.	Clean and tighten, or replace cables.
	Dirty commutator.	Clean commutator.
	Insufficient brush surface contact.	Free-up or replace brush.
	Defective starting motor.	Replace starting motor.
	Starting switch defective.	Replace switch.
Starting motor does not crank engine.	Engine oil too heavy.	Change to proper grade oil.
	Starting motor, Solenoid, or cables defective; loose connections.	Replace or tighten loose connections.
	Starting motor pinion gear jammed in flywheel drive gear.	Remove starting motor and reinstall. Replace defective driving gear.
	Dirty drive mechanism.	Clean and lubricate drive mechanism.
	Faulty Relay Switch.	Replace Relay Switch.
	Ignition Fuse Blown.	Replace Fuse.
	Faulty Ignition Switch.	Replace Switch.
	Faulty Neutral Starting Switch.	Replace Switch. NOTE: The INDEX of this manual will list an ADJUSTABLE Neutral Starting Switch if your machine is so equipped.

INDUSTRIAL TRUCK DIVISION

TROUBLE SHOOTING GUIDE

GENERATOR TROUBLES

TROUBLE	PROBABLE CAUSE	REMEDY
No output.	Regulator defective.	Replace regulator.
Low or fluctuating output.	Loose fan belt.	Adjust belt.
	Insufficient brush surface contact.	Free-up or replace brush.
	Weak brush springs.	Replace spring.
	Worn commutator.	Report to designated individual in authority.
	Broken or loose connections.	Repair, tighten or replace.
	Dirty commutator.	Clean commutator.
	Regulator defective.	Replace regulator.
	Loose or dirty connections in charging circuit.	Clean and tighten connections.
Excessive output.	Short circuit between field coil and armature leads.	Replace generator.
	Regulator defective.	Replace regulator.
Noisy.	Loose pulley or generator mounting.	Tighten.
	Defective bearings, or armature rubbing on field poles.	Replace generator.
	Improperly seated brushes.	Seat brushes.
Generator regulator troubles.	Loose connections or mountings.	Clean and tighten.
	Defective regulator.	Replace regulator.

BATTERY, LIGHTS AND HORN

TROUBLE	PROBABLE CAUSE	REMEDY
Battery discharged.	Battery solution level low.	Add distilled water to bring level above plates; inspect for cracked case.
	Short in battery cell.	Replace battery.
	Generator not charging.	Inspect generator, fan belt, and regulator.
	Loose or dirty connections; broken cables.	Clean and tighten connections; replace cables.
	Excessive use of starting motor.	Tune up engine; charge battery.
	Idle battery, or excessive use of lights with engine at idle.	Recharge or replace battery. Use lights sparingly.
	Short circuits.	Replace defective wiring.
Battery (other troubles)	Overheated battery.	Inspect for short circuit or excessive generator charge.
	Case bulged (or out of shape).	Inspect for overcharging and over-tightening of hold-down screws.
Light switch.	Loose or dirty connections; broken wire.	Clean and tighten; replace broken wire.
	Defective switch.	Replace switch.
Wiring.	Loose or dirty connections; broken wire or terminal.	Clean, tighten, repair or replace. Wire or terminal.
Lights do not light.	Switch not fully "on".	Turn switch "on" fully.
	Loose or dirty connections; broken wire.	Clean and tighten; replace or repair wire or terminal.
	Wiring circuit short-circuited, or open.	Correct short circuit or replace defective parts.
	Light burned out.	Replace light.
Lights dim.	Loose or dirty connection.	Clean and tighten connections.
	Wiring short-circuited.	Correct short circuit or replace defective parts.
	Defective switch.	Replace switch.

BATTERY, LIGHTS AND HORN (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Horn troubles.	Loose or dirty wiring connections.	Clean and tighten connections.
Horn sounds continuously.	Short-circuit in wiring between horn and horn button.	Replace wire.
Improper tone.	Loose or dirty wiring connections.	Clean and tighten connections.
	Cover or bracket screws loose.	Tighten.
	Points adjusted improperly.	Adjust points.
Horn will not operate.	Horn Fuse Blown.	Replace Fuse.
	Open Circuit.	Trace, repair or replace as required.
	Faulty Horn Relay.	Replace relay.

TROUBLE SHOOTING GUIDE

DRIVE AXLE

TROUBLE	PROBABLE CAUSE	REMEDY
Continuous Axle Noise.	Badly worn parts.	Replace worn parts with new.
	Unevenly worn tires.	Replace tires.
	Improperly adjusted wheel bearing.	Adjust correctly.
	Lack of lubricant.	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.	Tighten cap screws.
	Flange loose on axle shaft.	Reweld flange to shaft.
	Worn splines on axle shaft at differential end.	Replace drive flange and shaft assembly.
	Differential drive pinion gear and ring gear out of adjustment or worn excessively.	Adjust or replace as condition warrants.
Complete Failure to Function.	Broken axle shaft.	Replace axle shaft.
	Broken teeth on ring gear or pinion gear.	Replace ring gear and pinion and other parts of differential necessary. Adjust ring gear and pinion gear correctly.

STEERING

TROUBLE	PROBABLE CAUSE	REMEDY
Steering difficult.	Lack of lubrication	Lubricate.
	Tight steering system connections.	Lubricate and adjust linkage.
	Tight steering gear; misaligned wheels.	Report to designated individual in authority.
	Bent steering connecting linkage or arm.	Straighten or replace linkage.
	Misaligned steering gear mounting.	Adjust mounting.
Wander or weaving.	Improper toe in camber or caster (axle twisted).	Report to designated individual in authority.
	Steering system connections or king pin bearings not properly lubricated.	Lubricate.
	Loose wheel bearings.	Adjust wheel bearings.
	Steering gear worn or maladjusted.	Report to designated individual in authority.
	Steering gear mountings loose.	Tighten mounting bolts.
Low speed shimmy or wobble.	Loose steering connections.	Adjust and tighten linkage.
	Steering gear worn, or adjustment too loose.	Report to designated individual in authority.
	Loose wheel bearings.	Adjust wheel bearings.
Vehicle pulls to one side.	Odd size, or new and old tires on opposite wheels.	Match tires.
	Tight wheel bearings.	Adjust. Lubricate wheel bearings.
	Bent steering arm or connection.	Straighten or replace bent linkage.

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

TROUBLE SHOOTING GUIDE

BRAKES

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

BRAKES (Continued)

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

INDUSTRIAL TRUCK DIVISION

TROUBLE SHOOTING GUIDE

HYDRAULIC SYSTEM

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

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.	Replace seal.
	Scored cylinder wall.	Replace cylinder.
	Plugged vent line.	Clean out vent line. Replace if collapsed.
Oil leak around piston rod at tilt cylinder.	Worn seal.	Replace seal.
	Scored piston rod.	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.

INDUSTRIAL TRUCK DIVISION

CLARK EQUIPMENT

TROUBLE SHOOTING GUIDE

TRANSMISSION, CONVERTER AND AXLE ADAPTOR (HYDRATORK DRIVE)

TROUBLE	PROBABLE CASE	REMEDY
Machine will not move in either direction.	Parking Brake not released.	Release brake.
	Control Linkage not Properly adjusted.	Readjust linkage.
	Oil level low.	Determine cause and correct. Fill to proper level with Type "A" Automatic Transmission Fluid Armour Qualified.
	No oil pressure.	Report to designated person in authority.
Machine will move in one direction only.	Control linkage not adjusted.	Adjust linkage.
	No oil pressure to Directional Selector. Seals and "O" Rings in Directional Selector may be defective.	Report to designated person in authority.
	Directional Selector Discs not releasing. Discs defective. Relief hole in D.S. Drum clogged.	Report to designated person in authority.
Machine moves slowly in both directions at wide open throttle.	Oil level low.	Fill to correct level and determine cause for loss of oil.
	Low oil pressure. Faulty Inching Valve, Faulty Relief Valve, Faulty Pump.	Report to designated person in authority.
	Brakes dragging.	Report to designated person in authority.
	Clogged Sump Screen.	Clean Screen.
Transmission overheating.	Low oil.	Check and fill to correct level.
	Low Directional Selector pressure (check with gauge). Inching valve not functioning properly.	Report to designated person in authority.
	Seals in selector defective.	Report to designated person in authority.
	Regulating valve sticking open.	Report to designated person in authority.
	Brakes Dragging.	Report to designated person in authority.
	Clogged Sump Screen.	Clean Screen.

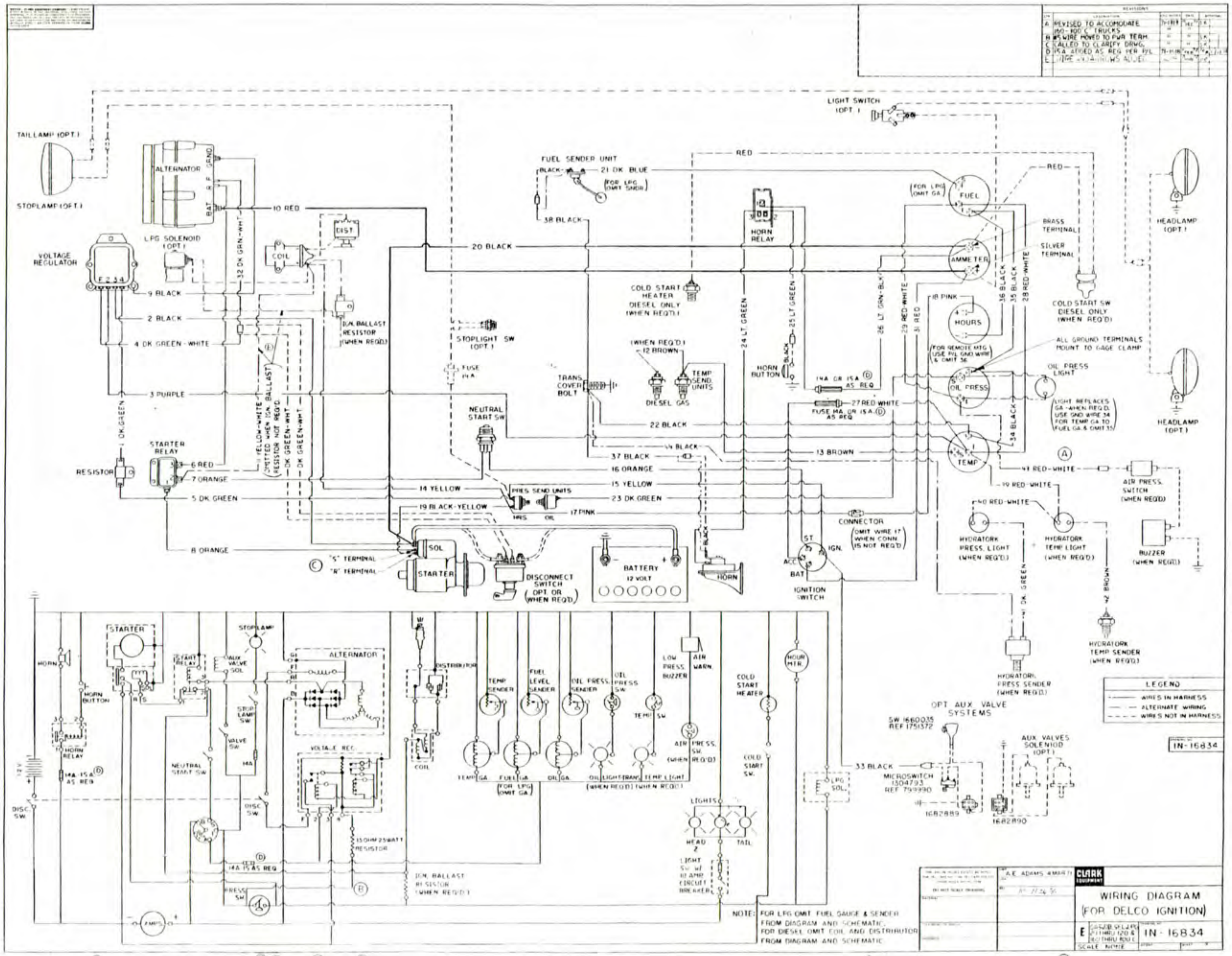
TRANSMISSION, CONVERTER AND AXLE ADAPTOR (HYDRATORK DRIVE)

TROUBLE	PROBABLE CAUSE	REMEDY
Transmission Overheating (Continued)	Insufficient oil to Torque Converter and Cooler.	Report to designated person in authority.
	Cooler clogged internally stopping flow of oil.	Clean Cooler.
	Bushing in Torque Converter Impeller Hub worn, allowing oil to leak out.	Report to designated person in authority.
	Slipping Stator.	Refer to Transmission Pressure Checks
Machine has full power and overheats.	Overloading machine.	Check Capacity Loads. Never overload.
	Radiator core clogged externally.	Clean Core.
	Pressure Regulator Valve sticking, giving low pressure.	Report to designated person in authority.

N O T I C E

THE WIRING DIAGRAM IN THIS MANUAL IS FOR A STANDARD TRUCK, WITHOUT SPECIAL CUSTOM FEATURES.

THE PARTS BOOK FOR THIS SERIAL NUMBER INCLUDES WIRING DIAGRAM/S COVERING SPECIAL CUSTOM OPTIONS INCORPORATED AT TIME OF SHIPMENT.


WIRING DIAGRAM
(FOR DELCO IGNITION)
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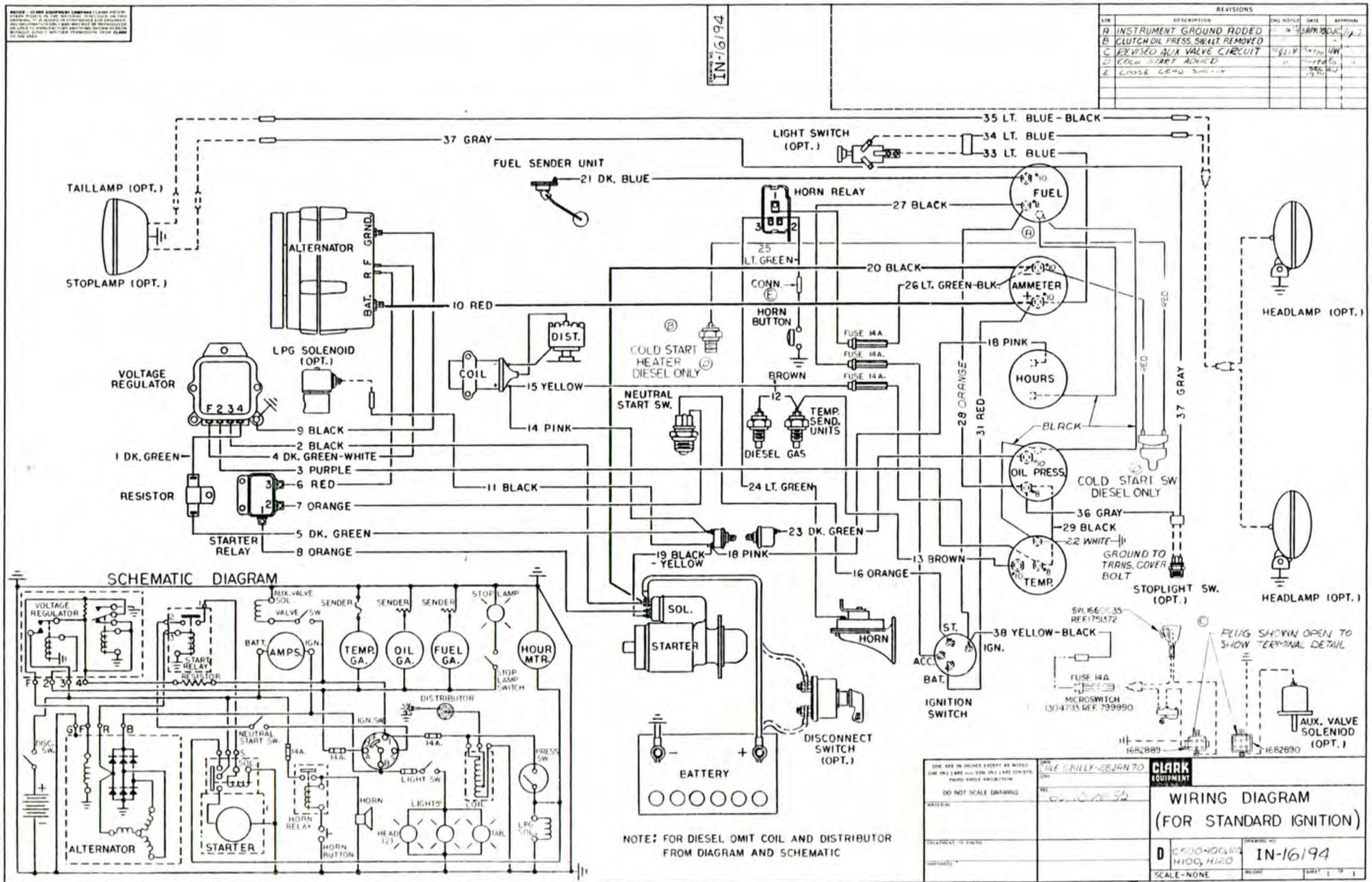
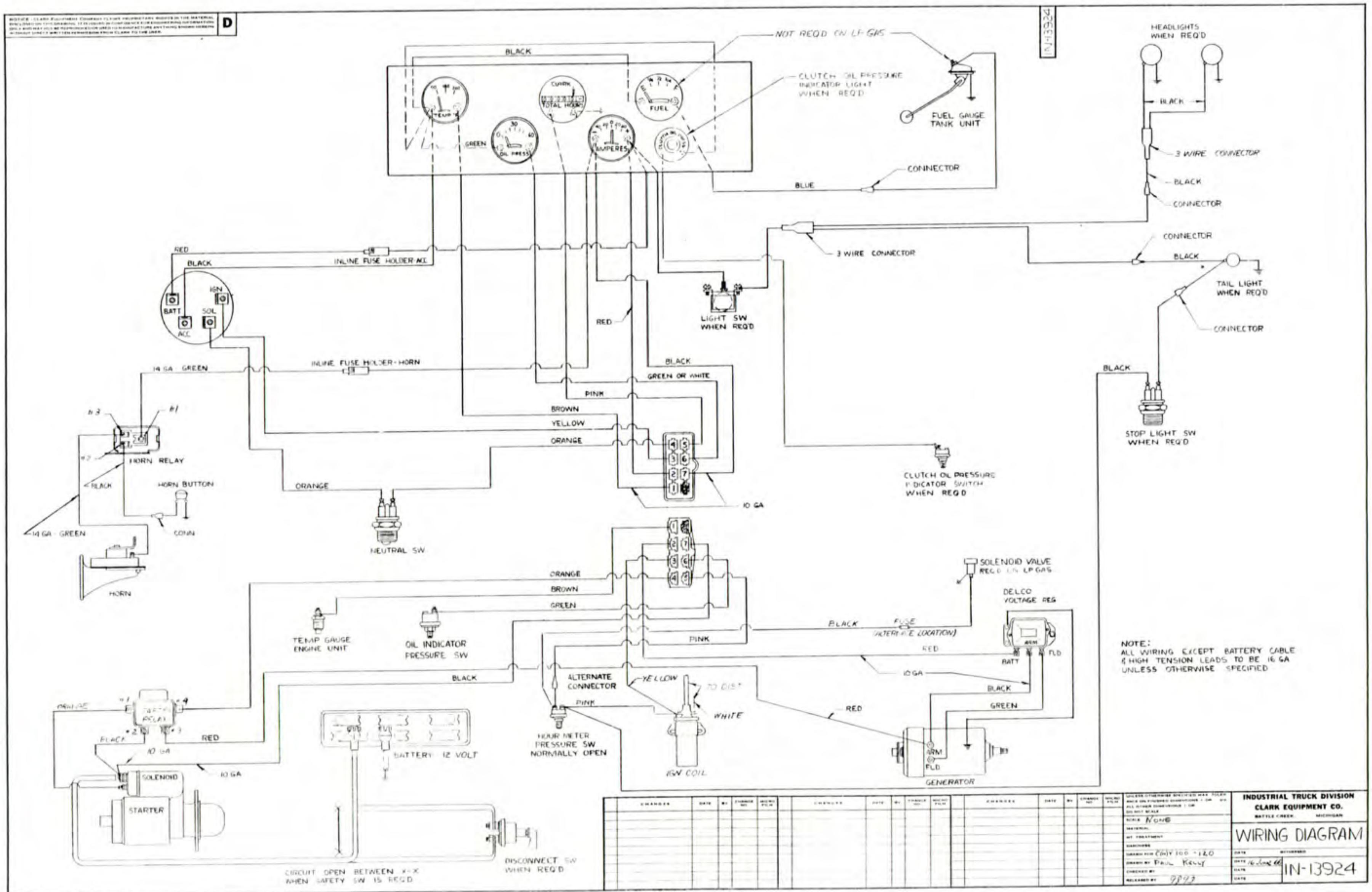
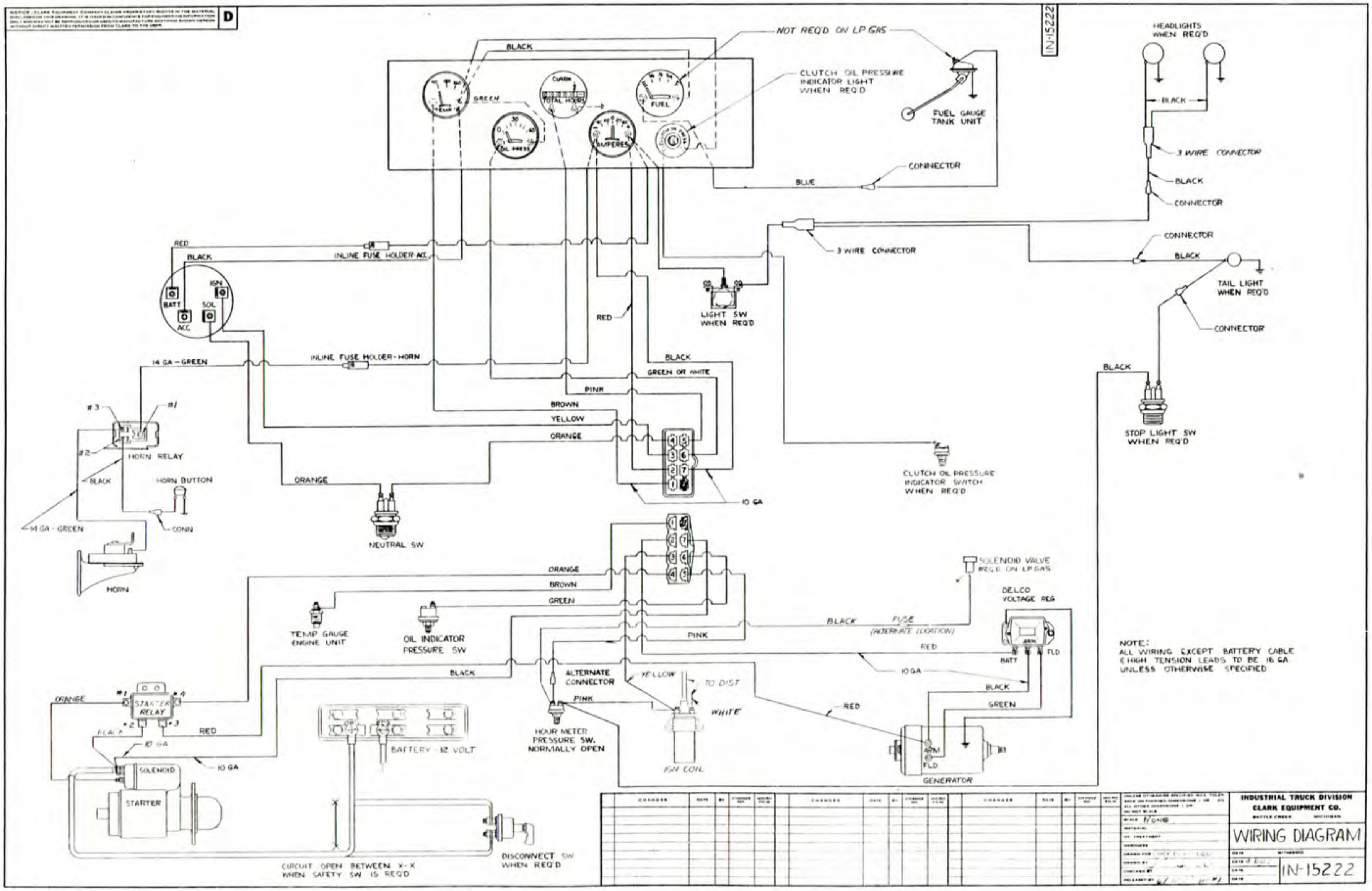
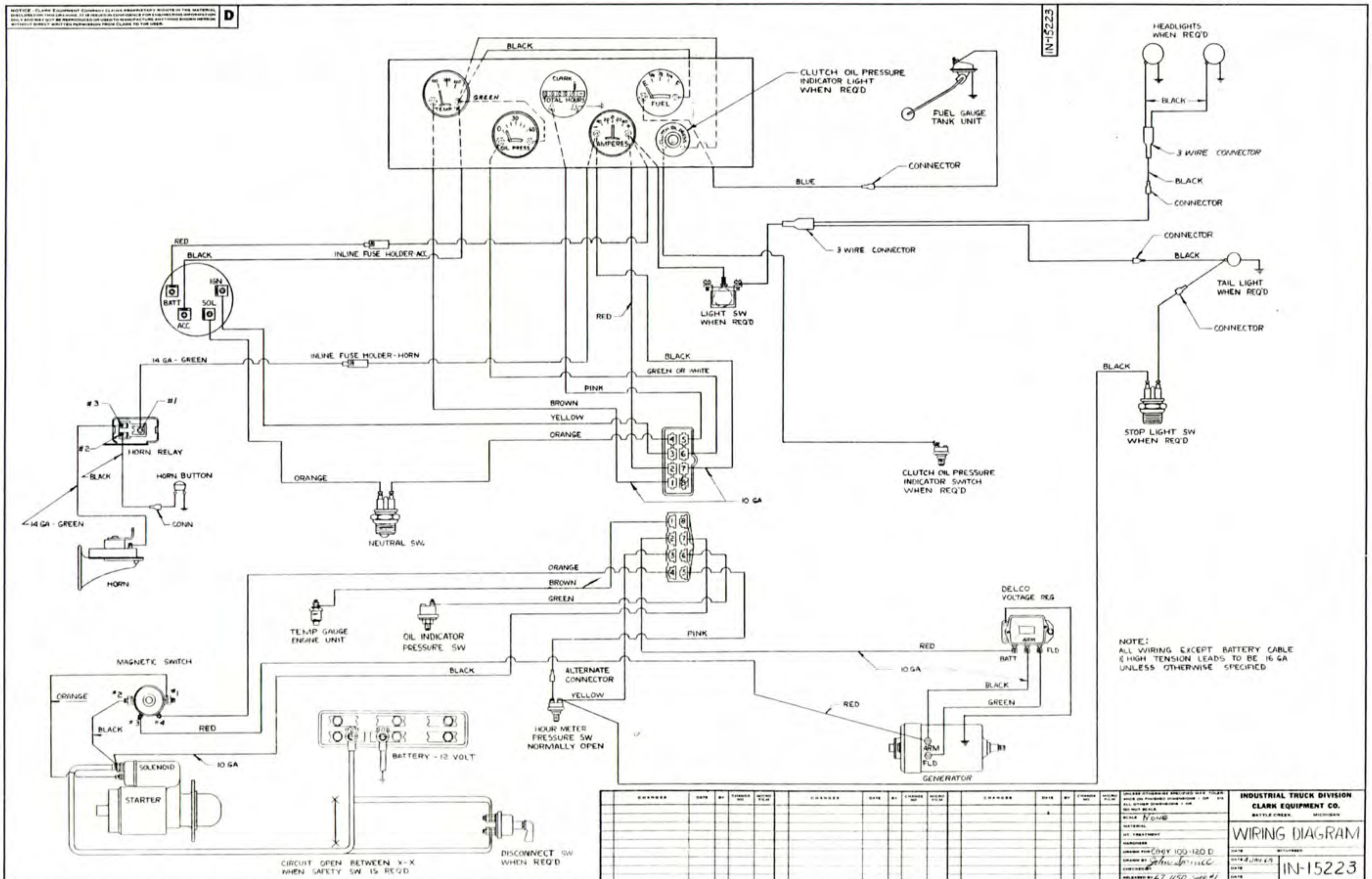
CLARK EQUIPMENT
A.E. ADAMS
LEGEND
WIRES IN HARNESS
ALTERNATE WIRING
WIRES NOT IN HARNESS
NOTE: FOR LPG OMIT FUEL GAUGE & SENDER FROM DIAGRAM AND SCHEMATIC. FOR DIESEL OMIT COIL AND DISTRIBUTOR FROM DIAGRAM AND SCHEMATIC
A REVISED TO ACCOMODATE 160-400 C TRUCKS
B #5 WIRE MOVED TO PWR TERM.
C CALLED TO CLARIFY DRWG.
D 15A ADDED AS REQ PER PVL
TAILLAMP (OPT.)
STOPLAMP (OPT.)
ALTERNATOR
VOLTAGE REGULATOR
LPG SOLENOID (OPT.)
COIL
DIST.
IGN. BALLAST RESISTOR (WHEN REQ'D)
STARTER RELAY
RESISTOR
STOPLIGHT SW (OPT.)
NEUTRAL START SW
FUEL SENDER UNIT
COLD START HEATER DIESEL ONLY (WHEN REQ'D)
TRANS. COVER BOLT
TEMP SEND. UNITS
DIESEL GAS
HORN RELAY
HORN BUTTON
PRES SEND UNITS
DISCONNECT SWITCH (OPT OR WHEN REQ'D)
BATTERY 12 VOLT
STARTER
SOL
HORN
IGNITION SWITCH
CONNECTOR
LIGHT SWITCH (OPT.)
FUEL
AMMETER
HOURS
OIL PRESS
TEMP
BRASS TERMINAL
SILVER TERMINAL
COLD START SW DIESEL ONLY (WHEN REQ'D)
ALL GROUND TERMINALS MOUNT TO GAGE CLAMP
OIL PRESS LIGHT
HEADLAMP (OPT.)
AIR PRESS. SWITCH (WHEN REQ'D)
BUZZER (WHEN REQ'D)
HYDRATORK PRESS. LIGHT (WHEN REQ'D)
HYDRATORK TEMP LIGHT (WHEN REQ'D)
HYDRATORK PRESS SENDER (WHEN REQ'D)
HYDRATORK TEMP SENDER (WHEN REQ'D)
OPT AUX VALVE SYSTEMS
AUX VALVES SOLENOID (OPT.)
MICROSWITCH
10 RED
20 BLACK
9 BLACK
2 BLACK
4 DK GREEN-WHITE
3 PURPLE
1 DK GREEN
6 RED
7 ORANGE
5 DK GREEN
8 ORANGE
14 YELLOW
19 BLACK-YELLOW
17 PINK
15 YELLOW
16 ORANGE
23 DK GREEN
37 BLACK
22 BLACK
13 BROWN
21 DK BLUE
38 BLACK
24 LT GREEN
25 LT GREEN
26 LT GRN-BLK
27 RED WHITE
29 RED-WHITE
31 RED
18 PINK
36 BLACK
35 BLACK
28 RED-WHITE
34 BLACK
33 BLACK


REVISIONS
A INSTRUMENT GROUND ADDED
B CLUTCH OIL PRESS. SW. & LT. REMOVED
C REVISED AUX VALVE CIRCUIT
IN-16194
TAILLAMP (OPT.)
STOPLAMP (OPT.)
35 LT. BLUE - BLACK
37 GRAY
LIGHT SWITCH (OPT.)
34 LT. BLUE
33 LT. BLUE
FUEL SENDER UNIT
21 DK. BLUE
HORN RELAY
27 BLACK
FUEL
ALTERNATOR
GRND.
R F
BAT.
10 RED
25 LT. GREEN
CONN.
20 BLACK
26 LT. GREEN-BLK.
AMMETER
HEADLAMP (OPT.)
HORN BUTTON
COLD START HEATER DIESEL ONLY
FUSE 14A.
18 PINK
HOURS
DIST.
COIL
15 YELLOW
BROWN
12
TEMP. SEND. UNITS
DIESEL
GAS
NEUTRAL START SW.
LPG SOLENOID (OPT.)
VOLTAGE REGULATOR
F 2 3 4
9 BLACK
2 BLACK
4 DK. GREEN-WHITE
3 PURPLE
6 RED
7 ORANGE
5 DK. GREEN
8 ORANGE
1 DK. GREEN
RESISTOR
STARTER RELAY
14 PINK
11 BLACK
24 LT. GREEN
28 ORANGE
31 RED
RED
BLACK
37 GRAY
OIL PRESS.
COLD START SW DIESEL ONLY
36 GRAY
29 BLACK
22 WHITE
GROUND TO TRANS. COVER BOLT
TEMP.
23 DK. GREEN
19 BLACK - YELLOW
18 PINK
13 BROWN
16 ORANGE
STOPLIGHT SW. (OPT.)
SOL.
STARTER
HORN
ST.
ACC.
BAT.
IGN.
IGNITION SWITCH
38 YELLOW-BLACK
FUSE 14A
MICROSWITCH 1304733 REF. 799990
1682889
1682890
PLUG SHOWN OPEN TO SHOW TERMINAL DETAIL
AUX. VALVE SOLENIOD (OPT.)
DISCONNECT SWITCH (OPT.)
BATTERY
SCHEMATIC DIAGRAM
VOLTAGE REGULATOR
START RELAY
RESISTOR
AUX. VALVE SOL.
VALVE SW
SENDER
BATT.
AMPS.
IGN.
TEMP. GA.
OIL GA.
FUEL GA.
STOP LAMP
STOP LAMP SWITCH
HOUR MTR.
DISTRIBUTOR
IGN. SW.
NEUTRAL START SW.
DISC. SW.
ALTERNATOR
STARTER
HORN RELAY
HORN
HORN BUTTON
LIGHT SW
LIGHTS
HEAD (2)
TAIL
COIL
PRESS SW
LPG SOL.
14A.
NOTE: FOR DIESEL OMIT COIL AND DISTRIBUTOR FROM DIAGRAM AND SCHEMATIC
DO NOT SCALE DRAWING
CLARK EQUIPMENT
WIRING DIAGRAM
(FOR STANDARD IGNITION)
D
IN-16194
SCALE-NONE
IN-16194


D
IN-13924
BLACK
NOT REQ'D ON LP GAS
CLUTCH OIL PRESSURE INDICATOR LIGHT WHEN REQ'D
FUEL GAUGE TANK UNIT
HEADLIGHTS WHEN REQ'D
BLACK
3 WIRE CONNECTOR
BLACK
CONNECTOR
TEMP
GREEN
OIL PRESS
TOTAL HOURS
AMPERES
FUEL
BLUE
CONNECTOR
3 WIRE CONNECTOR
CONNECTOR
BLACK
TAIL LIGHT WHEN REQ'D
CONNECTOR
RED
BLACK
INLINE FUSE HOLDER ACC
BATT
ACC
SOL
IGN
RED
LIGHT SW WHEN REQ'D
14 GA GREEN
INLINE FUSE HOLDER-HORN
BLACK
GREEN OR WHITE
PINK
BROWN
YELLOW
ORANGE
#3
#1
#2
HORN RELAY
BLACK
HORN BUTTON
14 GA GREEN
CONN
HORN
ORANGE
NEUTRAL SW
10 GA
CLUTCH OIL PRESSURE INDICATOR SWITCH WHEN REQ'D
BLACK
STOP LIGHT SW WHEN REQ'D
SOLENOID VALVE REQ'D ON LP GAS
DELCO VOLTAGE REG
ORANGE
BROWN
GREEN
TEMP GAUGE ENGINE UNIT
OIL INDICATOR PRESSURE SW
BLACK
FUSE
(ALTERNATE LOCATION)
PINK
RED
BATT
FLD
10 GA
NOTE:
ALL WIRING EXCEPT BATTERY CABLE & HIGH TENSION LEADS TO BE 16 GA UNLESS OTHERWISE SPECIFIED
BLACK
ALTERNATE CONNECTOR
YELLOW
TO DIST
WHITE
BLACK
GREEN
RED
PINK
RED
BLACK
10 GA
SOLENOID
10 GA
STARTER
BATTERY 12 VOLT
HOUR METER PRESSURE SW NORMALLY OPEN
IGN COIL
ARM
FLD
GENERATOR
CIRCUIT OPEN BETWEEN X-X WHEN SAFETY SW IS REQ'D
DISCONNECT SW WHEN REQ'D
SCALE NONE
INDUSTRIAL TRUCK DIVISION
CLARK EQUIPMENT CO.
BATTLE CREEK, MICHIGAN
WIRING DIAGRAM
DRAWN BY PAUL KELLY
IN-13924
IN-13924


D
IN-15222
NOT REQ'D ON LP GAS
CLUTCH OIL PRESSURE INDICATOR LIGHT WHEN REQ'D
FUEL GAUGE TANK UNIT
HEADLIGHTS WHEN REQ'D
BLACK
3 WIRE CONNECTOR
CONNECTOR
BLUE
GREEN
TOTAL HOURS
FUEL
AMPERES
OIL PRESS
RED
INLINE FUSE HOLDER-ACC
BATT
ACC
IGN
SOL
LIGHT SW WHEN REQ'D
TAIL LIGHT WHEN REQ'D
STOP LIGHT SW WHEN REQ'D
14 GA - GREEN
INLINE FUSE HOLDER - HORN
GREEN OR WHITE
PINK
BROWN
YELLOW
ORANGE
HORN RELAY
HORN BUTTON
CONN
HORN
NEUTRAL SW
10 GA
CLUTCH OIL PRESSURE INDICATOR SWITCH WHEN REQ'D
SOLENOID VALVE REQ'D ON LP GAS
DELCO VOLTAGE REG
FUSE (ALTERNATE LOCATION)
TEMP GAUGE ENGINE UNIT
OIL INDICATOR PRESSURE SW
ALTERNATE CONNECTOR
TO DIST
WHITE
STARTER RELAY
SOLENOID
STARTER
BATTERY - 12 VOLT
HOUR METER PRESSURE SW. NORMALLY OPEN
IGN COIL
ARM
FLD
GENERATOR
NOTE:
ALL WIRING EXCEPT BATTERY CABLE & HIGH TENSION LEADS TO BE 16 GA UNLESS OTHERWISE SPECIFIED
CIRCUIT OPEN BETWEEN X-X WHEN SAFETY SW IS REQ'D
DISCONNECT SW WHEN REQ'D
INDUSTRIAL TRUCK DIVISION
CLARK EQUIPMENT CO.
WIRING DIAGRAM
IN-15222

IN-15222


D
IN-15223
BLACK
GREEN
CLUTCH OIL PRESSURE INDICATOR LIGHT WHEN REQ'D
FUEL GAUGE TANK UNIT
CONNECTOR
BLUE
HEADLIGHTS WHEN REQ'D
3 WIRE CONNECTOR
CONNECTOR
3 WIRE CONNECTOR
TAIL LIGHT WHEN REQ'D
RED
INLINE FUSE HOLDER-ACC.
BATT
ACC
IGN
SOL
LIGHT SW WHEN REQ'D
14 GA - GREEN
INLINE FUSE HOLDER - HORN
GREEN OR WHITE
PINK
BROWN
YELLOW
ORANGE
#3
#1
#2
HORN RELAY
HORN BUTTON
CONN
14 GA - GREEN
HORN
NEUTRAL SW.
10 GA
CLUTCH OIL PRESSURE INDICATOR SWITCH WHEN REQ'D
STOP LIGHT SW WHEN REQ'D
TEMP GAUGE ENGINE UNIT
OIL INDICATOR PRESSURE SW
DELCO VOLTAGE REG
ARM
FLD
MAGNETIC SWITCH
ALTERNATE CONNECTOR
HOUR METER PRESSURE SW NORMALLY OPEN
NOTE: ALL WIRING EXCEPT BATTERY CABLE & HIGH TENSION LEADS TO BE 16 GA UNLESS OTHERWISE SPECIFIED
SOLENOID
STARTER
BATTERY - 12 VOLT
GENERATOR
CIRCUIT OPEN BETWEEN X-X WHEN SAFETY SW IS REQ'D
DISCONNECT SW WHEN REQ'D
INDUSTRIAL TRUCK DIVISION
CLARK EQUIPMENT CO.
BATTLE CREEK, MICHIGAN
WIRING DIAGRAM
SCALE None
CHEV 100-120 D
IN-15223

IN-15223