60
Skid-Steer
Loader

JOHN DEERE

TECHNICAL MANUAL

60 Skid-Steer
Loader

TM1185 (01APR81) English

John Deere
Lawn & Grounds Care Division
TM1185 (01APR81)

LITHO IN U.S.A.
ENGLISH

60 SKID-STEER LOADER

Technical Manual
TM-1185 (Apr-81)

CONTENTS

(All information, illustrations and specifications contained in this technical manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice).

CONTENTS — Continued

INTRODUCTION

This technical manual contains service and maintenance information for the John Deere 60 Skid-Steer Loader.

The manual is divided into sections. Each section pertains to a certain component or operational system of the loader. The information is divided into groups within each section.

All sections of this technical manual should be carefully studied by the service technician. Much basic information such as the principles of 4-cycle engine operation, carburetion and ignition have been omitted. Such information can be found in any good library and is recommended reading for the new service technician before consulting this manual for service procedures.

Emphasis is placed on diagnosing malfunctions, analysis and testing. Diagnosing malfunctions lists possible troubles, their causes and how to correct them. Under specific components these troubles are analyzed to help the service technician understand what is causing the problem so it can be corrected rather than just replace parts and have the same problem keep recurring.

Specifications are found at the beginning of each Section for easy reference.

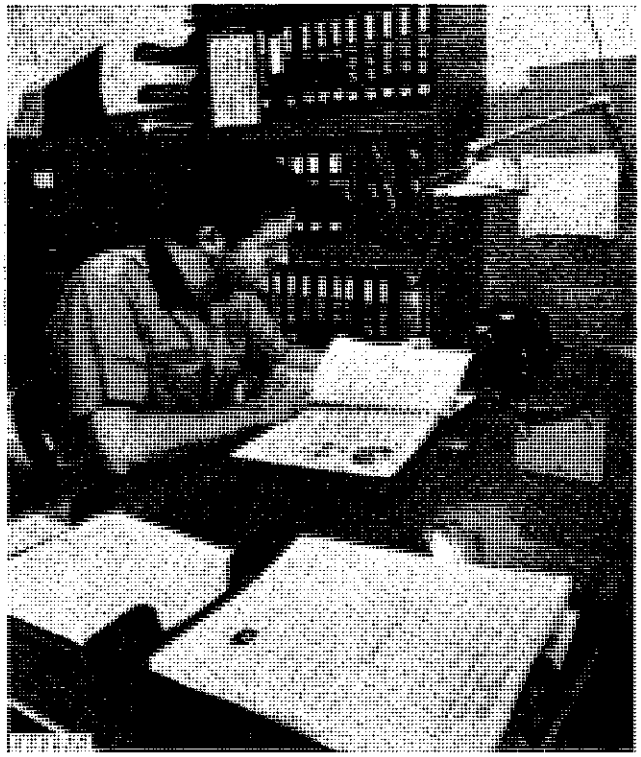
This safety alert symbol identifies important safety messages in this manual. When you see this symbol, be alert to the possibility of personal injury and carefully read the message that follows.

Metric equivalents have been included, where applicable, throughout this technical manual.

FOR YOUR CONVENIENCE

Vertical lines appear in the margins of many of the pages. These lines identify new material and revised information that affects specifications, procedures, and other important instructions.

INTRODUCTION



Use FOS Manuals for Reference

Use Technical Manuals for Actual Service

This technical manual is part of a twin concept of service:

- **FOS Manuals — for reference**
- **Technical Manuals — for actual service**

The two kinds of manuals work as a team to give you both the general background and technical details of shop service.

Fundamentals of Service (FOS) Manuals cover basic theory of operation, *fundamentals* of trouble shooting, *general* maintenance, and *basic* types of failures and their causes. FOS Manuals are for training new personnel and for reference by experienced service technicians.

Technical Manuals are concise on-the-job service guides containing only the vital information needed for a specific machine.

When a service technician should refer to a FOS Manual for more information, a FOS symbol like the one at the left is used in the TM to identify the reference.

Some features of this technical manual:

- *Table of contents at front of manual*
- *Exploded views showing parts relationship*
- *Photos showing service techniques*
- *Specifications grouped for easy reference*

This technical manual was planned and written for you — an experienced service technician. Keep it in a permanent binder in the shop where it is handy. Refer to it whenever in doubt about correct service procedures or specifications.

Using the technical manual as a guide will reduce error and costly delay. It will also assure you the best in finished service work.

SI UNITS OF MEASURE

Because John Deere sells its products worldwide, U.S. units of measure are shown with their respective Metric equivalents throughout this technical manual. These equivalents are the SI (International System) Units of Measure.

Section 10
GENERAL

CONTENTS

Group 5 Specifications

ENGINE

	Serial No. (-120,000)	Serial No. (120,001-)
Make	Kohler	Kohler
Model	K-312S	KT17QS
Cylinders	One	Two
Cycle	Four	Four
Bore	3.50 in. (88.9 mm)	3.125 in. (79.2 mm)
Stroke	3.25 in. (82.5 mm)	2.75 in. (69.8 mm)
Displacement	31.27 cu. in. (512 cm^3)	42.18 cu. in. (691.4 cm^3)
Horsepower*	14 @ 3600 rpm (10.44 kW)	17 @ 3400 rpm (12.58 kW)
Speeds		
Idler	1300 rpm	1200 rpm
High (No Load)	3600 rpm	3400 rpm

*Horsepower rating is established by engine manufacturer in accordance with Standard International Combustion Institute procedure. It is corrected to 60°F and 29.92 inches hg barometric pressure. Laboratory test engines are equipped with an air cleaner and muffler.

ELECTRICAL SYSTEM

	Serial No. (-120,000)		Serial No. (120,001-)
Battery, John Deere	AM30094 or TY6024		AM31186
Volts	12V	12V	12V
BCI Group	U1	U1	22F
Cold Cranking Amps @ 0°F (17.7°C)	160	200	260
Reserve Capacity @ 25 amps	23	32	50
Charging Capacity	15 amps		15 amps
System Polarity	Negative Ground		Negative Ground
Spark Plug	Champion RH-10 or equivalent		Champion RBL15Y or equivalent
Spark Plug Gap	0.025 in. (0.64 mm)		0.025 in. (0.64 mm)
Breaker Point Gap	0.020 in. (0.508 mm)		0.020 in. (0.508 mm)
Ignition Timing	20° BTDC ("S" mark on flywheel)		Align "S" mark on flywheel

TRAVEL SPEEDS

Forward or Reverse	0 to 4.2 mph
Turning radius	360 Degrees in its own length

DRIVE CHAINS

Long chain	74 links, No. 60 roller chain
Short chain	50 links, No. 60 roller chain

HYDRAULIC SYSTEM

Pump	Serial No. (-020,303)	Serial No. (020,304-)
Type	Borg Warner fixed displacement gear pump	Webster Electric fixed displacement gear pump
Displacement	0.58 $in.^3$/rev. (9.50 cm^3/rev.)	0.58 $in.^3$/rev. (9.50 cm^3/rev.)

System Relief ..... 1500 psi (10 342 kPa) (103.5 bar)

Control Valve

- Main (Open Center) ..... Cessna, two-spool valve, foot-pedal operated
- Auxiliary (Open Center) ..... Cessna, single-spool valve. foot-pedal operated

Filter

- Serial No. (-120,000) ..... One 25 micron
- Serial No. (120,001-) ..... Mesh screen in reservoir

Hydraulic Cylinders

- Lift (double acting)
  - Bore diameter ..... 2 in. (51 mm)
  - Rod diameter ..... 1 in. (25.4 mm)
  - Stroke ..... 22 in. (559 mm)
- Tilt (double acting)

	Serial No. (-020303)	Serial No. (020304-)
Bore diameter	2-1/2 in. (63.5 mm)	2 in. (50.8 mm)
Rod diameter	1-1/4 in. (31.8 mm)	1 in. (25.4 mm)
Stroke	13 in. (330.2 mm)	13-1/8 in. (333.4 mm)

TIRES

Size	Tire Inflation
5.70 x 12	30 psi (206.9 kPa) (2.1 bar)
23 x 8.5 x 12	35 psi (241.3 kPa) (2.4 bar)

CAPACITIES

	Serial No. (-120,000)	Serial No. (120,001-)
Fuel tank	6 U.S. gallons (22.8 L)	5 U.S. gallons (18.9 L)
Engine lubrication oil	2 U.S. quarts (1.9 L)	3.5 U.S. pints (1.65 L)
Loader hydraulic system	18 U.S. gallons (68.5 L)	18 U.S. gallons (68.5 L)

HYDROSTATIC SYSTEM

Pump
- Type ..... Sunstrand variable displacement pump
- Displacement ..... 0 to 0.913 $in.^3$/rev. (0 to 14.967 cm^3/rev.)

Motor
- Type ..... TRW-Ross fixed displacement gerota motor
- Displacement ..... 11.80 $in.^3$/rev. (193.37 cm^3/rev.)

Maximum Operating Pressure ..... 3000 psi (20 685 kPa) (206.9 bar)

Charge Pump
- Type ..... Sunstrand gear pump
- Displacement ..... 0.330 $in.^3$/rev. (5.41 cm^3/rev.)
- Charge pressure ..... 70 to 150 psi (483 to 1 034 kPa) (4.83 to 10.34 bar)

Filters ..... Two 10 micron

OPERATIONAL SPECIFICATIONS

	Serial No. (-120,000)	Serial No. (121,000-)
Tipping load w/35 in. (889 mm) bucket	1100 lbs (498.3 kg)	1200 lbs (544.8 kg)
Operating capacity (SAE)	550 lbs. (249.4 kg)	600 lbs (272.4 kg)
Operating weight	1935 lbs (876.6 kg)	2076 lbs (942.5 kg)
Raising time w/full bucket	5.7 seconds	5.7 seconds
Lowering time	3.8 seconds	3.8 seconds
Dump time	2.8 seconds	2.8 seconds
Rollback time	1.9 seconds	1.9 seconds

DIMENSIONAL SPECIFICATIONS

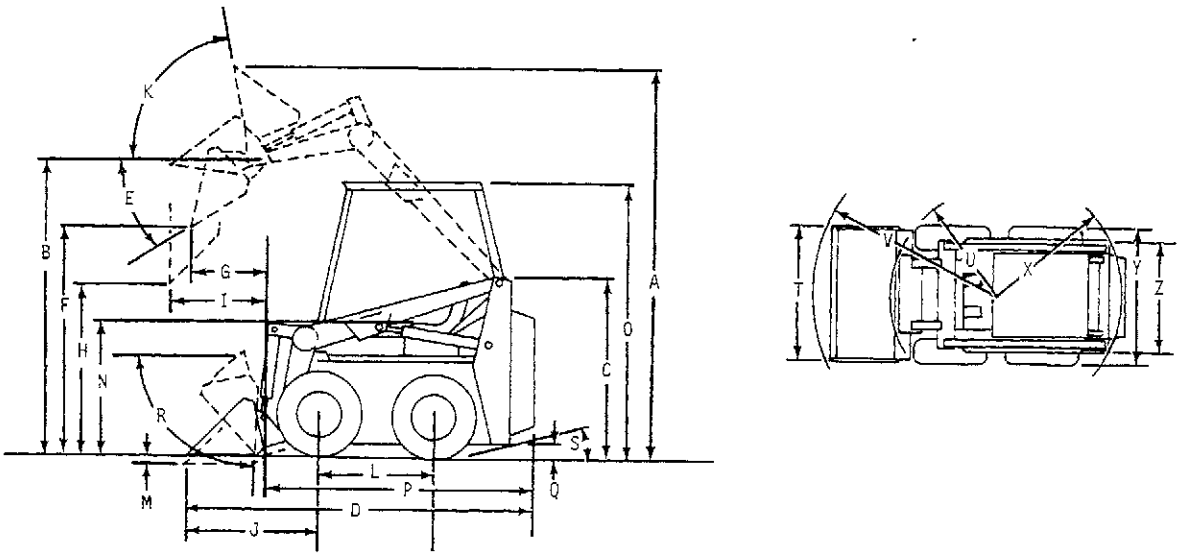


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Fig. 1 — Dimensional Specifications

Specifications are in accordance with IEMC Standards.
Dimensions are with 5.70-12 Tires and 35-Inch (889 mm) Earth Bucket.

A	Overall height (Lift arms raised)	127 in. (3 226 mm)
B	Height to hinge pin (Maximum)	97-3/4 in. (2 483 mm)
C	Overall height	51 in. (1 295 mm)
D	Overall length (with bucket)	91-3/4 in. (2 330 mm)
E	Dump angle	34°
F	Dump height	77-3/4 in. (1 975 mm)
G	Reach at maximum height	15-1/2 in. (394 mm)
H	Specified height	49-1/2 in. (1 257 mm)
I	Reach (specified height)	22 in. (559 mm)
J	Reach (bucket on ground)	39-1/2 in. (1 003 mm)
K	Maximum rollback (fully raised)	86°
L	Wheelbase	29-3/16 in. (741 mm)
M	Digging depth (above ground)	3/4 in. (19 mm)
N	Height to seat	34-1/2 in. (876 mm)
O	Overall height (with operator guard)	74-1/2 in. (1 892 mm)
P	Overall length (less bucket)	68-1/2 in (1 740 mm)
Q	Ground clearance	6-1/8 in. (156 mm)
R	Maximum grading angle (bucket)	89°
S	Angle of departure	21°
T	Bucket width	35 in. (890 mm)
U	Clearance circle, front (less bucket)	31 in. (787 mm)
V	Clearance cirlce, front (with bucket)	56-7/8 in. (1 445 mm)
X	Clearance circle, rear	43-1/4 in. (1 098.6 mm)
Y	Overall width (less bucket)	35-1/4 in. (895.4 mm)
Z	Tread (5.70-12 tires)	29-1/4 in. (743 mm)

BUCKET AND FORK SPECIFICATIONS

Item	Width	Length	Capacity		Weight
			SAE Struck	SAE Heaped	
Earth Bucket	35 in. (890 mm)	———	3.5 cu. ft. (0.10 m^3)	4.5 cu. ft. (0.1 3 m^3)	105 lbs. (47.63 kg)
Earth Bucket	44 in. (1 117.6 mm)	———	4.5 cu. ft. (0.13 m^3)	5.5 cu. ft. (0.15 m^3)	120 lbs. (54.43 kg)
Utility Bucket	47 in. (1 193.8 mm)	———	7 cu. ft. (0.20 m^3)	9 cu. ft. (0.25 m^3)	147 lbs. (66.68 kg)
Pallet Fork and Frame	38 in. (965.2 mm)	36 in. (914.4 mm)	———	———	220 lbs. (99.79 kg)
Utility Fork	39 in. (990.6 mm)	28 in. (711.7 mm)	———	———	155 lbs. (70.31 kg)
Utility Fork	35 in. (889 mm)	28 in. (711.7 mm)	———	———	141 lbs. (64.0 kg)

Group 10
LUBRICATION AND PERIODIC SERVICE
SERIAL NO. (-120,000)

LUBRICANTS

Engine Oil

If oil other than Torq-Gard® Supreme is used, it must conform to the following specifications:

Single Viscosity Oils	Multi-Viscosity Oils
API Service CD/SD MIL-L-2104C* Series 3*	API Service CC/SE, CC/SD or SD MIL-L-46152

Select oil viscosity depending on the highest expected prevailing temperature for the fill period.

Air Temperature	John Deere Torq-Gard Oil	Other Oils	
		Single Viscosity Oil	Multi-Viscosity Oil
Above 32°F (0°C)	SAE 30	SAE 30	Not recommended
−10°F to 32°F (−23°C to 0°C)	SAE 10W-20	SAE 10W	SAE 10W-30
Below −10°F (−23°C)	SAE 5W-20**	SAE 5W**	SAE 5W-20**

**As further assurance of quality, the oil should be identified as suitable for API Service Designation SD.*

***Some increase in oil consumption may be expected when SAE 5W-20 or SAE 5W oils are used. Check oil level more frequently.*

Hydraulic Fluid

Use John Deere All-Weather Hydrostatic Fluid or an equivalent Type "F" Automotive Automatic Transmission Fluid.

Greases

Use John Deere Multi-Purpose Lubricant or equivalent SAE multipurpose-type grease for all grease fittings.

LUBRICATION

CAUTION: Stop engine before lubricating loader.

Replace missing grease fittings.

SYMBOLS

Lubricate with John Deere Multi-Purpose Lubricant or an equivalent SAE multipurpose-type grease at the hourly intervals indicated on the symbols.

Lubricate periodically with John Deere PT508 or equivalent oil.

LUBRICATION CHART

Component	5 Hours or Daily	Reference
1. Grapple Cylinder Pivot Points	Lubricate grease fittings.	See page 10-10-3.
2. Tilt Cylinder* and Quik-Tatch Pivot Points	Lubricate grease fittings.	See page 10-10-3.
3. Lift Arm and Cylinder Pivot Points	Lubricate grease fittings.	See page 10-10-3.
25 Hours or Weekly		
4. Control Lever Pivot Points	Lubricate grease fittings.	See page 10-10-3.
5. Quik-Tatch Pin	Lubricate grease fittings.	See page 10-10-3.
100 Hours or Quarterly		
6. Lift Arm Stop Pins	Lubricate guide rails and lock shafts.	See page 10-10-3.

** A single tilt cylinder was used until Serial Number 020,303. From Serial Number (020,304-120,000), dual tilt cylinders were used. Lubricate both cylinders per the specifications given here.*

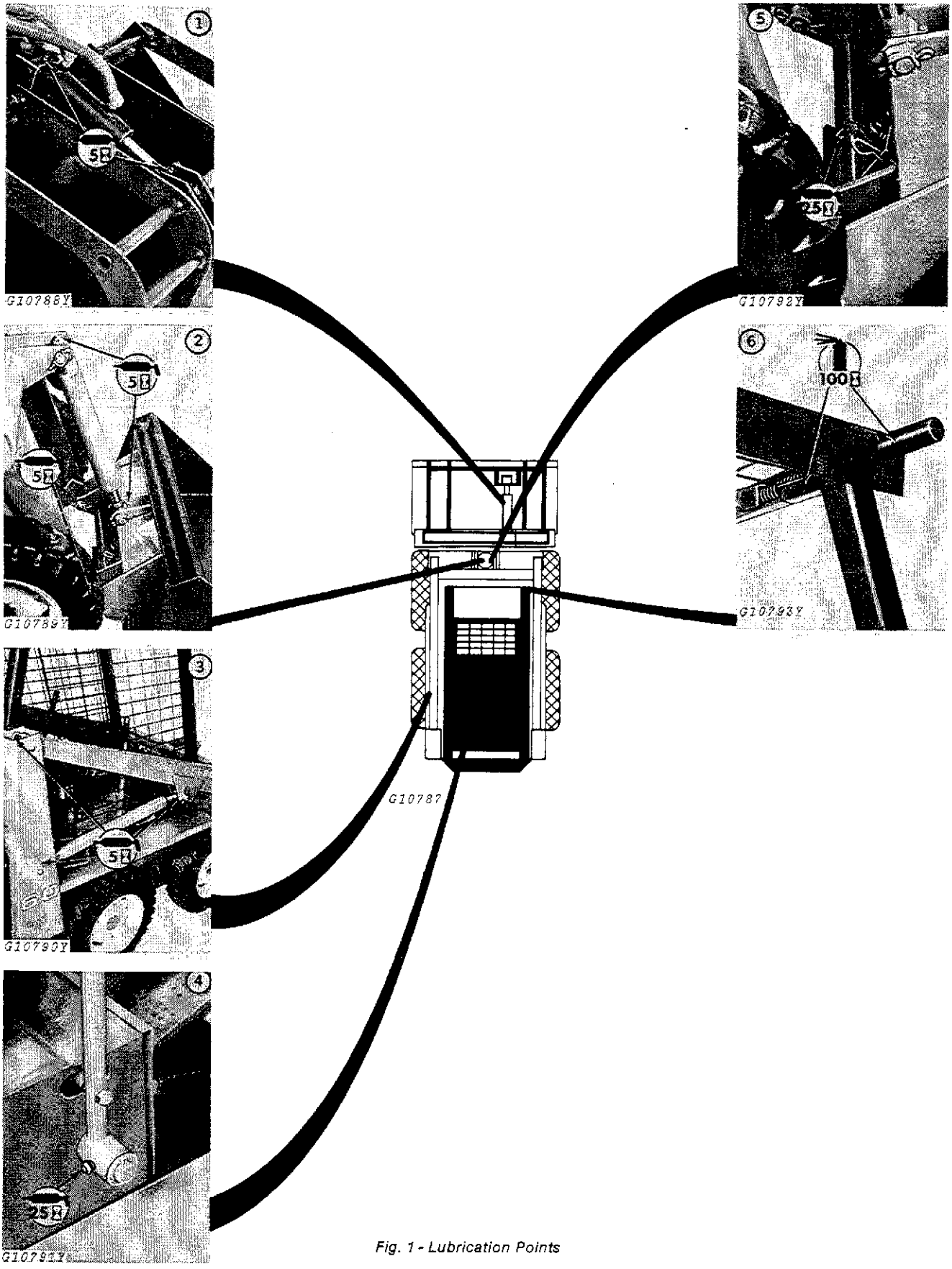


Fig. 1 - Lubrication Points

PERIODIC SERVICE

Component	As Required	Reference
1. Carburetor	Adjust.	Page 10-10-5
2. Hydraulic Pump Belt	Check tension.	Page 10-10-6
3. Fuse	Replace.	Page 10-10-6
5 Hours or Daily		
4. Air Cleaner	Check element.	Page 10-10-6
5. Engine Crankcase Oil	Check oil level.	Page 10-10-6
6. Brakes	Check tension.	Page 10-10-7, 10-10-9
25 Hours or Weekly		
7. Tires	Check inflation.	Page 10-10-9
8. Engine Crankcase Oil	Drain and refill.	Page 10-10-9
9. Hydraulic System	Check oil level.	Page 10-10-9
10. Hydrostatic Pump Belt	Check alignment.	Page 10-10-10
11. Battery	Check electrolyte level.	Page 10-10-10, 10-10-11
100 Hours or Quarterly		
12. Hydrostatic Filters (2)	Replace elements.	Page 10-10-12
13. Hydraulic Filter	Replace element.	Page 10-10-12
14. Spark Plug	Clean and regap.	Page 10-10-12
200 Hours or Semi-Annually		
15. Air Cleaner	Replace element.	Page 10-10-13
16. Drive Chains	Check and adjust.	Page 10-10-13
500 Hours or Annually		
17. Fuel Filter	Replace filter.	Page 10-10-13
18. Hydraulic Reservoir	Drain and refill.	Page 10-10-14
19. Ignition Points and Condensor	Replace.	Page 10-10-14
20. Cylinder Head Bolts	Tighten.	Page 10-10-15
21. Engine Valve Tappets	Adjust clearance.	Page 10-10-15
22. Fuel Tank	Drain and refill.	Page 10-10-15
23. Engine Speed	Check rpm.	Page 10-10-16
24. Carburetor	Clean sediment bowl.	Page 10-10-16

AS REQUIRED

1. Carburetor

⚠ CAUTION: Never smoke when making adjustments to carburetor or fuel system.

NOTE: Idle adjustment and high-speed adjustment must be made at the same time as each affects the other.

Preliminary Adjustment

Disengage drive clutch and set parking brake.

Turn high-speed mixture needle (A) clockwise until closed. Close finger-tight only. Open 2 turns.

Turn idle mixture needle (B) clockwise until closed. Close finger-tight only. Open 1-1/4 turns.

Loosen lock nut (C).

Start engine and raise throttle lever to "FAST" position. Allow engine to warm up.

Turn high-speed mixture needle (A) until engine runs smoothly at full throttle. Keep needle position slightly on rich side (open).

Move throttle lever to "SLOW" position and turn idle mixture needle (B) until engine runs smoothly.

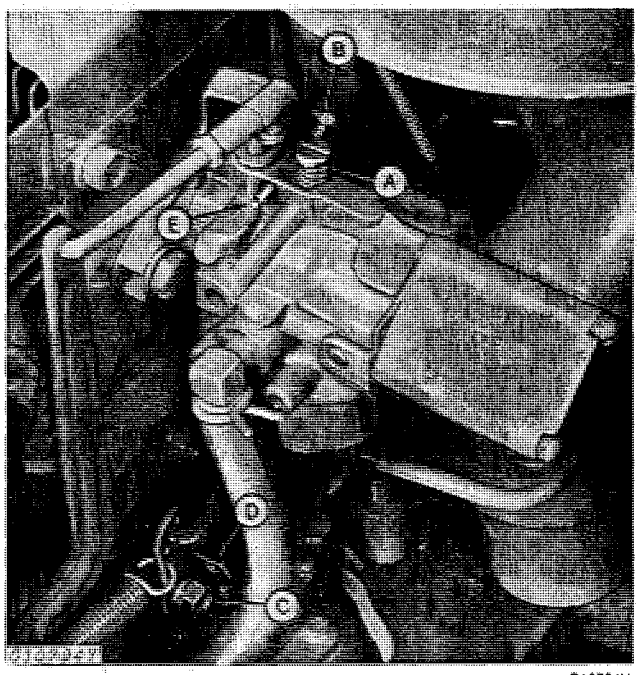
Advance throttle lever quickly to check for uniform acceleration. If engine misses, turn high-speed mixture needle (A) counterclockwise until positive acceleration can be obtained.

Final Adjustment

Move throttle lever to "SLOW" position and set low idle at 1300 rpm by turning idle speed screw (E).

With drive clutch engaged, move throttle lever upward until 3600 rpm has been obtained. Move high-speed stop (D) up and lock in position with lock nut (C).

NOTE: Check engine rpm with a Vibra-Tach or equivalent.



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A - High-Speed Mixture Needle
B - Idle Mixture Needle
C - Lock Nut
D - High-Speed Stop
E - Idle Speed Screw

Fig. 2 - Adjusting Carburetor

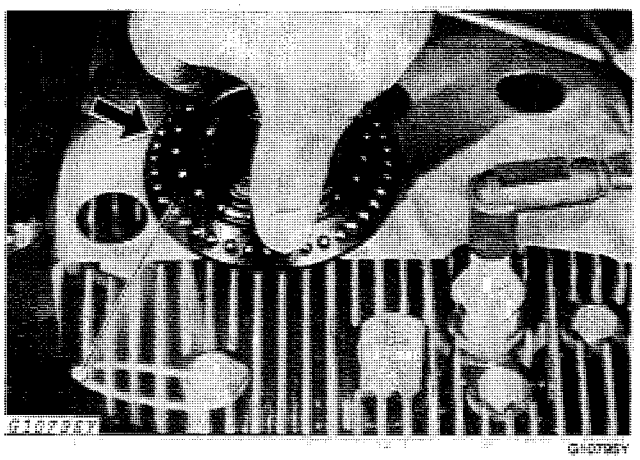

Fig. 3 - Vibration Tachometer

AS REQUIRED—Continued

2. Hydraulic Pump Belt

1. (Not illustrated.) Remove rear guard.

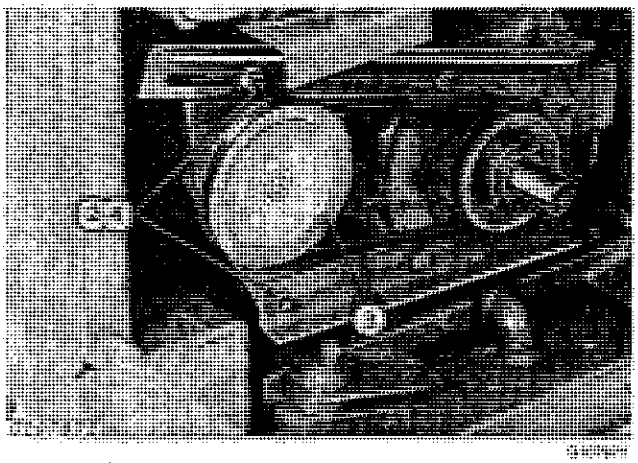

Fig. 4 - Hydraulic Pump Belt

2. Loosen pump brackets.

3. Tighten pump belt to 1/2-inch (13 mm) deflection at 20 pounds (89 Nm) pressure, midway between sheaves.

4. Tighten pump bracket nuts.

5. (Not illustrated.) Install rear guard.

3. Fuse

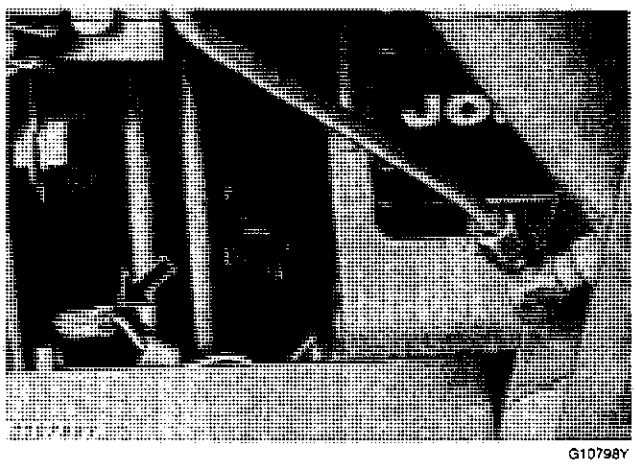

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Fig. 5 - Fuse Location

The fuse is located on the left-hand side of the engine compartment. A burned-out starter-solenoid fuse indicates a dead short in the wiring harness.

5 HOURS OR DAILY

4. Air Cleaner

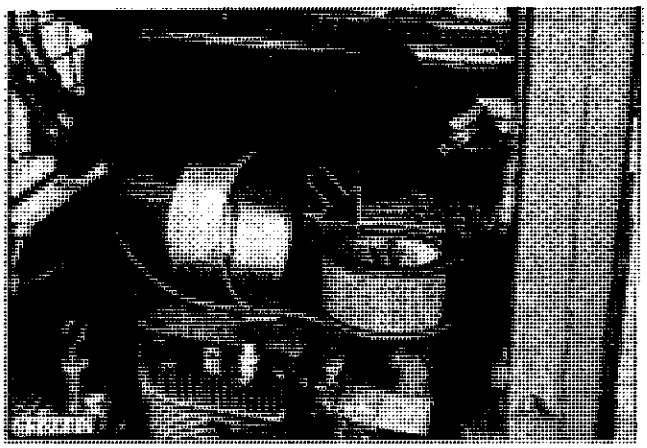

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Fig. 6 - Air Cleaner

Remove wing nut and cover.

Remove element.

Tap element lightly on a hard surface to remove loose dirt. Replace element if dirt does not drop off easily.

IMPORTANT: Do not attempt to clean filter element with liquid cleaner or air hose.

Install cover and wing nut.

5. Engine Crankcase Oil

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Fig. 7 - Dipstick

Check crankcase oil level with loader on a level surface and engine stopped.

Add oil as needed to top mark on dipstick.

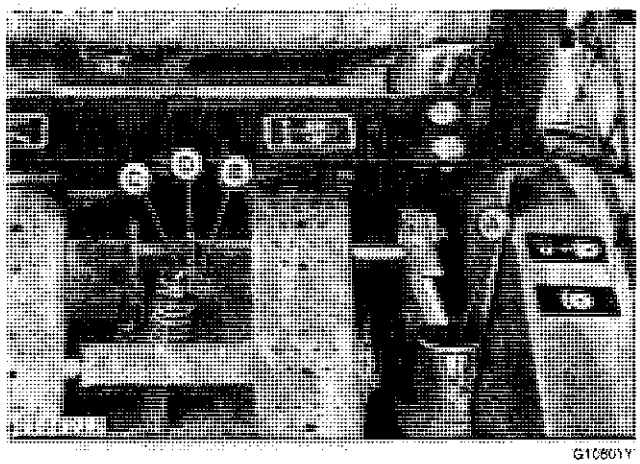
IMPORTANT: Do not overfill.

6. Brakes

Check tension by depressing brake pedal (A). To remove excess travel and tighten brake, follow minor adjustment procedure.

Minor Adjustment

(Not illustrated.) Raise lift arms and engage lift arm stop pins.



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A - Brake Pedal
B - Cotter Pin
C - Brake Link
D - Pedal Assembly

Fig. 8 - Minor Brake Adjustment

Remove cotter pin (B) from brake link (C).

Disconnect brake link from pedal assembly(D).

Turn brake link counterclockwise to reduce excess travel.

NOTE: If above procedure is unsuccessful or brake is pulling to the left or right, perform major adjustment.

Major Adjustment

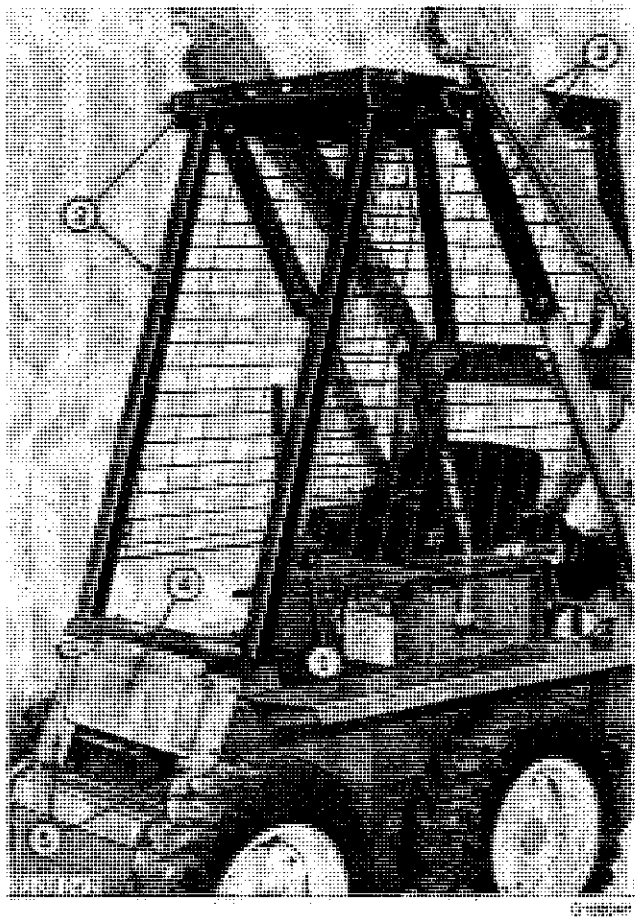

Fig. 9 - Removing Screens and Roll-Gard

1. Remove safety side screens.
2. Remove Roll-Gard and canopy.
3. Raise lift arms and install cylinder rod stops.
4. Remove foot guard panel.
5. Remove Roll-Gard supports.

5 HOURS OR DAILY—Continued

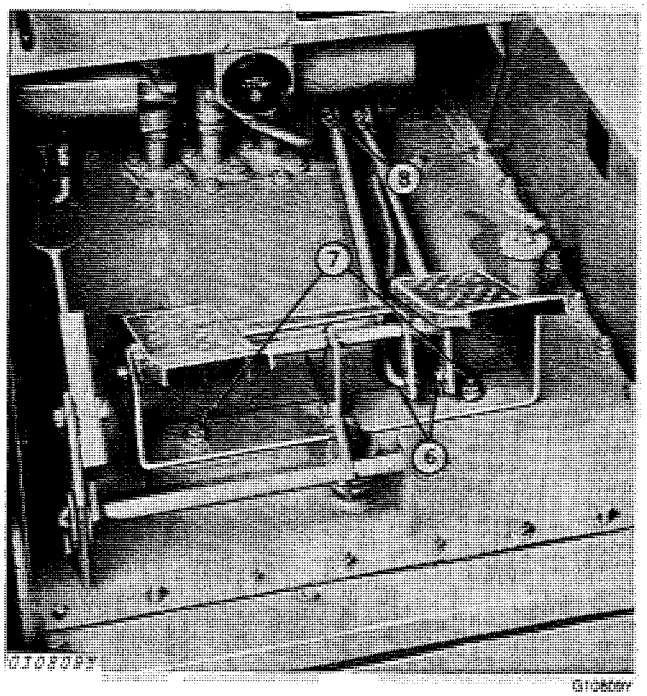

Fig. 10 - Disconnecting Linkage

6. Disconnect valve linkage from control pedals.

7. Remove control pedal assembly.

8. Remove valve linkage from control valve.

9. Remove cotter pin and disconnect brake link.

10. Remove clamp and boot.

11. Remove hydraulic oil dipstick.

IMPORTANT: Clean floor plate before removing it to prevent foreign material from entering hydraulic system.

12. Carefully remove floor plate to prevent damage to seal gasket.

13. Remove lock nuts and pull ball joint ends out of pivot arms.

14. Turn ball joint ends clockwise equally on both brackets to tighten.

15. Install ball joint ends, lock nuts and assemble loader.

NOTE: Check condition of pads and replace if necessary.

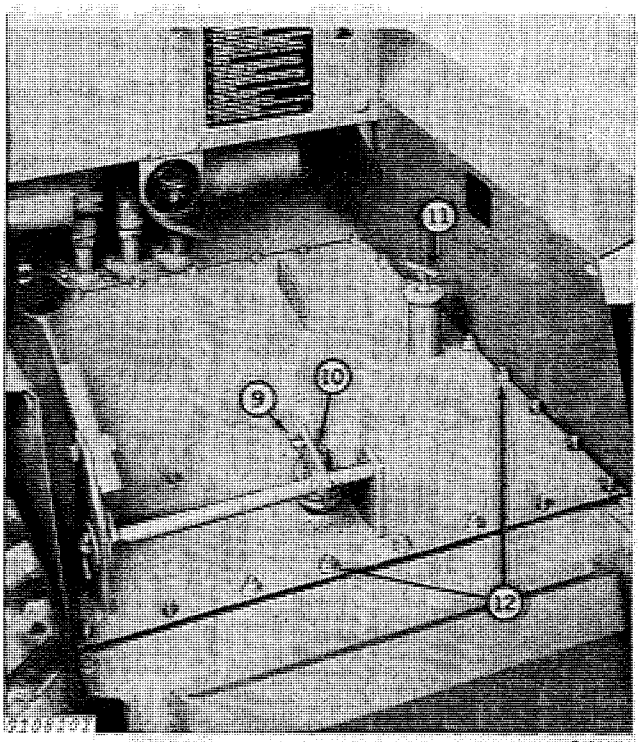

Fig. 11 - Removing Floor Plate

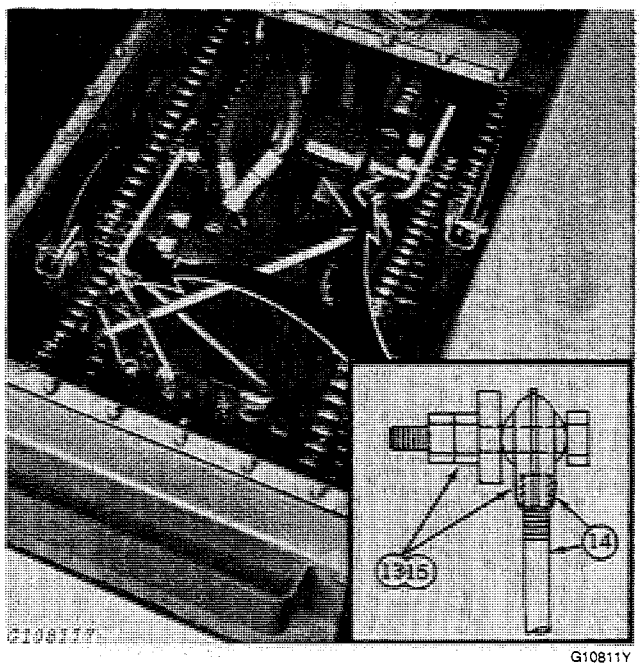

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Fig. 12 - Adjusting Linkage Ball Joints

Brake Pad Replacement

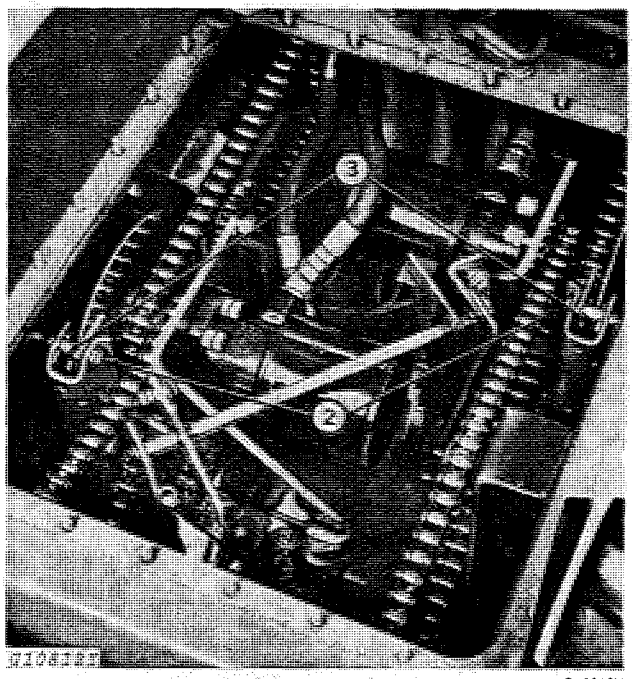

Fig. 13 - Replacing Brake Pads

1. Follow disassembly procedure, under major adjustment Steps 1 through 12, pages 10-10-7 and 10-10-8.

2. Remove shoulder bolt from both brake housings.

3. Remove and replace brake pads.

25 HOURS OR WEEKLY

7. Tires

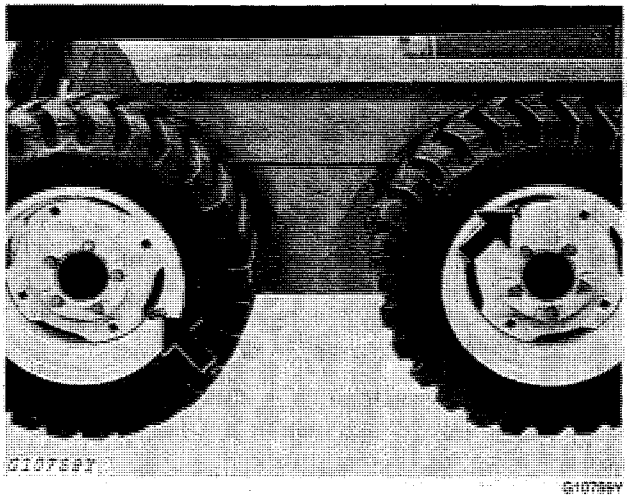

Fig. 14 - Inflating Tires

Check and inflate tires if necessary to 30 psi (207 kPa) (2.1 kg/cm²) for 5.70 x 12 tires and 35 psi (241 kPa) (2.5 kg/cm²) for the 23 x 8.5 x 12 flotation tires.

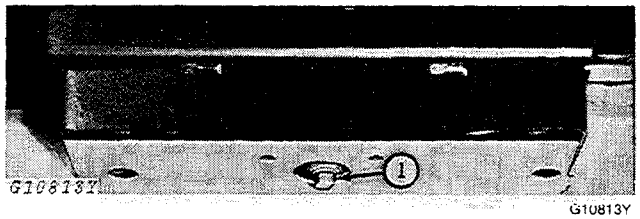

Fig. 15 - Engine Crankcase Drain Plug

NOTE: Oil must be warm.

1. Remove oil drain plug and drain oil. Replace drain plug.

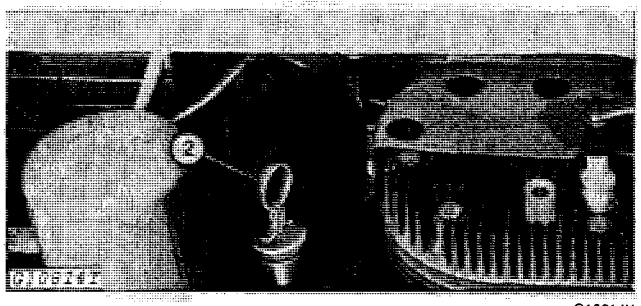

Fig. 16 - Engine Oil Fill Tube and Dipstick

2. Fill with new oil through dipstick filler neck. Refer to page 10-10-6.

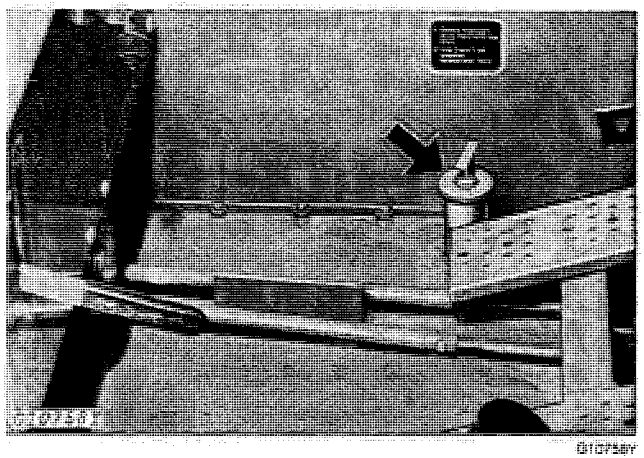

Fig. 17 - Hydraulic Oil Dipstick

NOTE: Loader must be on level surface and lift arms lowered and engine stopped.

The fluid level should be between "F" and "L" on the dipstick.