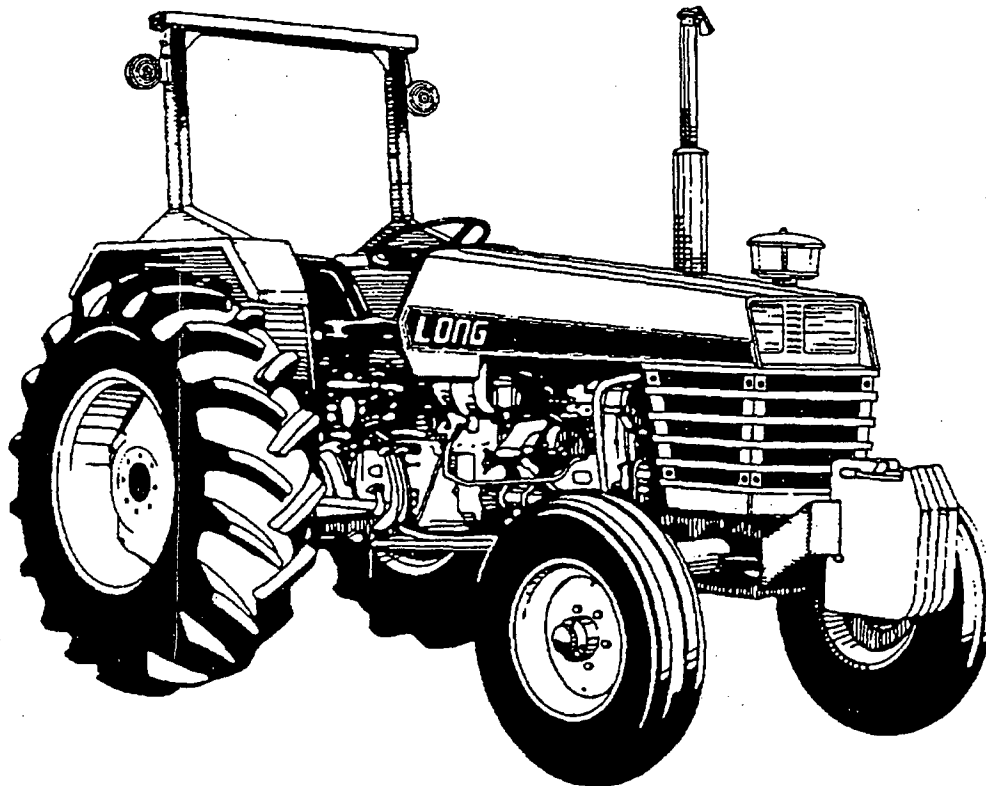


Owner's Manual & Operating Instructions




2460, 2460 - SD 2460 DTC, 2460 DTC - SD Tractor




LONG MFG. N.C., INC.

Box 1139 (111 Fairview St.)
Tarboro, N.C. 27886

IMPORTANT — READ CAREFULLY

This **Safety**  **Alert Symbol** is intended to warn you of some potential hazard. You should look for this Symbol on your Long equipment and throughout this manual.

When the **Safety**  **Alert Symbol** is seen, you should carefully read the warning that is printed beside or under the Symbol and should be closely followed!

The **Safety**  **Alert Symbol** is put on all Long equipment and in this and other manuals for your safety and protection. Be smart — AVOID ACCIDENTS!

TO THE OWNER

Thank you for purchasing a new 2460 Tractor. Your Tractor is a quality product, carefully designed and manufactured for easy use and minimal maintenance. These Tractors are constructed of premium components and are as durable as you'll find. Before starting your Tractor for the first time, we recommend that you read this entire manual and study the information contained herein carefully. This will aid you in planning the work and avoiding most human error.

TO THE OPERATOR

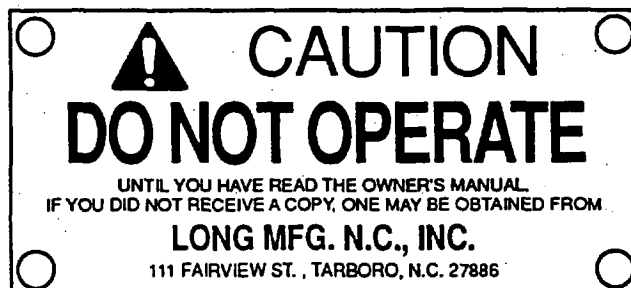
This piece of Long equipment is an investment which deserves the best in maintenance and service. Proper care will allow full return on this investment. Replace parts only with Long approved replacement parts. Use of non-approved parts will automatically void any warranty!

Record the serial number, chassis, and model numbers here when applicable. Any communication regarding equipment sold by Long or its' Dealers must include these reference numbers. In the event parts are needed for this tractor, these reference numbers will help speed up your order.

ENGINE SERIAL NUMBER _____

CHASSIS SERIAL NUMBER _____

MODEL NUMBER _____



The information contained herein is from data available at the time of printing. LONG MFG. N.C., INC. reserves the right to make changes in specifications shown herein or to add improvements without notice and without incurring obligation.

TABLE OF CONTENTS

SAFETY PRECAUTIONS	1-2
Safety Signs	3-4
INTRODUCTIONS	5
TRACTOR IDENTIFICATION	5
SPECIFICATIONS	5-6
STANDARD EQUIPMENT	7
OPTIONS	7
OPERATING CONTROLS & INSTRUMENTS	8-11
OPERATIONS	
Starting the Tractor	12
Cold Weather Starting	12
Warm-Up Period	13
Idling the Engine	13
Break-In Period	13
Driving the Tractor	13
Road Speeds	14
Shuttle Drive (2460 SD)	14
4 Wheel Drive (2460 DTC)	15
DTC Tire Matching	15
Three Point Hitch	15-16
Hydraulic Lift	17-18
Position Control	17
Full Float	18
Draft Control	18
Guide to Hydraulic Lift Control	20
Remote Control Valve	21
Power Take-Off	21-22
Drawbar for P.T.O. Operation	22
Weighting the Tractor	23
Tire Inflation	24
Seat Adjustment	24-25

Wheel Tread Adjustment	25
Adj. Rear Wheels (non power adjust)	26
Adj. Rear Wheels (power adjust)	27
Adjusting Front Wheels	28
Front Wheel Toe-In	28
Wheel Torques	28

TRACTOR MAINTENANCE & LUBRICATION

Lubrication & Service Guide	30
Engine Oil & Filter	31
Cooling System	31-32
Fan Belt	32
Clutch Adjustment	32-33
Transmission & Hydraulic Oil	33-34
Wheel Brakes	34
Servicing the Precleaner	34
Servicing the Air Cleaner	35
Primary Fuel Filter	35
Secondary Fuel Filter	35-36
Fuel Pump Filter	36
Bleeding the Fuel System	36
Draining the Fuel Tank	37
Power Steering Reservoir	37-38
Engine Valves	38
Final Drive Housing	38
Battery	39
Alternator	39-40
Lubrication	40-43
Maintenance & Lubrication	40-43
Fuel Care	43-44
Wiring Diagram	45
Trouble Shooting	46-47
Torque Chart	48

TRACTOR STORAGE	48-49
-----------------------	-------

WARRANTY	Inside Back Cover
----------------	-------------------

SAFETY PRECAUTIONS

In addition to endangering life and physical well-being, accidents can cause loss of money and man-hours. Most accidents can be avoided if all persons working with and around the equipment use good common sense and judgement. Always, observe these basic safety rules.

1. Read this manual carefully to acquaint yourself with the tractor and its' operation.
2. Make sure that all operators have been instructed in the tractor's operation and how to operate it properly and safely.
3. Prior to use of the tractor, inspect the tractor and attachments to insure that it is in good operating condition. Do not operate the equipment with damaged or missing parts.
4. Allow only the operator on the tractor when in motion. Do not carry passengers. Keep children away at all times.
5. Do not start or operate the tractor unless you are in the operator's seat. Be sure the gear and range selector levers are in neutral.
6. Do not by-pass the transmission safety switch. If the switch malfunctions, consult your LONG dealer.
7. Use seat belts at all times.
8. Before moving the tractor in any direction, be sure no person or obstructions are in your path of travel. Make sure there is enough clearance for the tractor and Roll Over Protective Structure (ROPS) before driving inside buildings, under sheds, or under low hanging objects.
9. Always keep a firm grip on the steering wheel.
10. Do not exceed safe driving speed. Adjust your speed to the type of ground you are traveling on.
11. Engage the clutch slowly, especially when driving up steep hills or out of ditches. There is always the possibility of the front wheels rising off the ground. Should this occur, immediately disengage the clutch.
12. Always keep the tractor in gear when going down hill. Do not coast with the clutch disengaged or the gear and range selector levers in neutral.
13. Whenever possible, avoid operating the tractor near ditches, embankments, or holes.
14. When operating on steep grades, use extra care to maintain proper stability. Do not operate on slopes too steep for safe operation.
15. Reduce speeds when turning on curves, hills, and on slick, rough, or muddy surfaces.
16. Always be conscious of where you are and where you are going, especially at row ends, on roads and highways, and going around obstructions (trees, buildings, etc.)
17. If the tractor drive wheels are stuck, shift to reverse gear and back out, to prevent from lifting the front wheels off the ground and possibly rolling the tractor over backwards.
18. Slow moving vehicles on highways are dangerous. Use a slow moving (SMV) sign in conjunction with head lights, tail lights, and flashing warning lights.
19. Do not tie ropes, chains, or cables to the axle or other parts of the chassis. Always hitch the load to the tractor's drawbar in the lowest possible position; except when pulling implements specifically designed for and properly attached to the three point hitch.
20. When using chains or cables, always take up the slack gradually. Never take up the slack with a jerk.
21. Drive slowly when pulling heavy wheeled loads, especially if the towed vehicle has no brakes. Towed loads that weigh more than the tractor should be equipped with an independent braking system.
22. Always wait until the tractor has come to a complete stop before dismounting.
23. Before dismounting from the tractor, with or without the engine running, disengage the PTO (unless operating as a stationary power unit), place gear and range selector levers in neutral, lower implements and/or attachments to the ground, and apply the parking brake.
24. Never stand between the tractor and the drawn implement, unless the gear and range selector levers are in neutral and the brakes are locked. Never stand between the tractor and the drawn implement while the tractor is being backed up for hitching.
25. Never examine, clean, service or adjust the tractor or any equipment operated by the tractor, until the tractor's engine has stopped, the gear and range selector levers are in neutral, the brakes are locked, the PTO is disengaged, and all moving parts have stopped.
26. Never re-fuel the tractor when the engine is hot or while it is running.

27. Never re-fuel the tractor while near any open flame or while smoking.
28. Do not fill the fuel tank completely to the top if the tractor is exposed to the sun for long periods of time. Fuel will expand and over run. Wipe up any spillage of fuel.
29. Keep a fire extinguisher handy at all times. Use a dry chemical or CO2 type extinguisher on fuel, oil or electrical fires.
30. Before removing the radiator cap, relieve the pressure in the cooling system by carefully turning the cap to its' first position.
31. Disconnect the battery ground cable before making any adjustment on the engine or electrical system.
32. If there is a need to charge the tractor's battery, keep away from sparks and flames, as the battery gives off a highly explosive hydrogen gas when being charged. Never smoke around a charging battery.
33. Keep brakes properly adjusted.
34. Escaping hydraulic oil can have extremely high pressure. A stream of oil can easily penetrate the skin and cause blood poisoning. All connections must be kept tight and all lines and pipes must be in good condition. Be sure to relieve all hydraulic pressure before disconnecting any line or pipe on the tractor's hydraulic system.
35. Do not operate the tractor and attachments with guards and shields removed. Keep them in place.
36. Set wheels as wide as practical for the job at hand. A wider wheel tread gives the tractor better stability.
37. Add front weights for pulling heavy drawbar loads or mounted implements.
38. Add rear weights for any front loader applications.
39. When preparing a calcium chloride solution for liquid tire ballast, never pour water on the calcium chloride. A chlorine gas is given off which is explosive and can be hazardous to your health if inhaled. This can be avoided by slowly adding the calcium chloride flakes to water and stirring until dissolved.
40. Never run the tractor engine in an enclosed area without proper ventilation.
41. Keep hands and loose clothing away from all moving parts.
42. Always lower any implement which is attached to the three point hitch or supported by a remote hydraulic cylinder to the ground, or block it securely at a workable height before inspecting, adjusting, or performing any maintenance.
43. When parts need replacing, use only parts approved by LONG MFG. N.C., INC. Do not substitute parts.



CAUTION: Some drawings in this manual may show shields or cover panels removed for the purposes of clarity. NEVER OPERATE the tractor without ALL shields and cover panels in place!

Safety Signs

The following Safety Signs will be found on your new Long 2460 tractor, depending on the type you have. Read each one carefully and follow it's instructions closely. These signs should be kept clean and legible at all times. A soft damp cloth may be used to clean these signs when they become unreadable from dirt and other debris. If the signs are damaged, missing, painted over, or otherwise not readable, they should be replaced with new Safety Signs available from your local Long dealer.

When components are replaced on the tractor during repairs, all Safety Signs on those components must be replaced with new signs. The Safety Signs are easily attached by first cleaning the area where the sign is to be placed. Remove the paper backing which covers the adhesive back on the sign and apply it directly to the surface.

NOTE: Spraying a light coat of water over the area where the sign is to be placed, allows for repositioning if a mistake is made. Once the Safety Sign is positioned properly, wipe away the excess water and let it dry.

⚠ SAFETY SIGNS ⚠



WARNING

The Differential Lock is Provided
for use on Slippery Surfaces.
It must not be used on the Road.

753214



BE CAREFUL

STOP ENGINE BEFORE ADJUSTING PTO
EQUIPMENT.

ENGAGE CLUTCH GENTLY.

WHEN TOWING HEAVY LOADS, USE ONLY
DRAWBAR OR OTHER APPROVED ATTACH-
ING POINTS.

CHANGE TO LOW GEAR DOWN STEEP HILLS.

KEEP GUARDS IN PLACE.

KEEP FLOORBOARDS CLEAN.

753213



CAUTION

AFTER FIRST HOUR OF OPERA-
TION. FRONT AND REAR WHEEL
LUG NUTS AND BOLTS SHOULD BE
CHECKED FOR PROPER TORQUE -
THERE AFTER CHECK DAILY.

767398



DANGER

Before dismounting from the tractor
with or without the engine running:

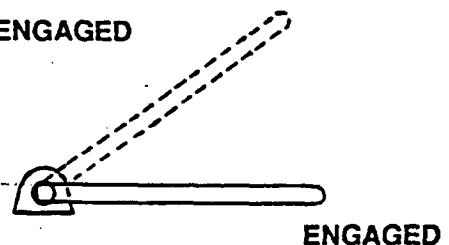
- Disengage the PTO (unless
operating as a stationary
power unit)
- Place gear and range selector
levers in neutral
- Lower implements and/or
attachments to the ground
- Apply the parking brake.

FAILURE TO HEED MAY RESULT IN
PERSONAL INJURY OR DEATH.

796493

IMPORTANT

DISENGAGED

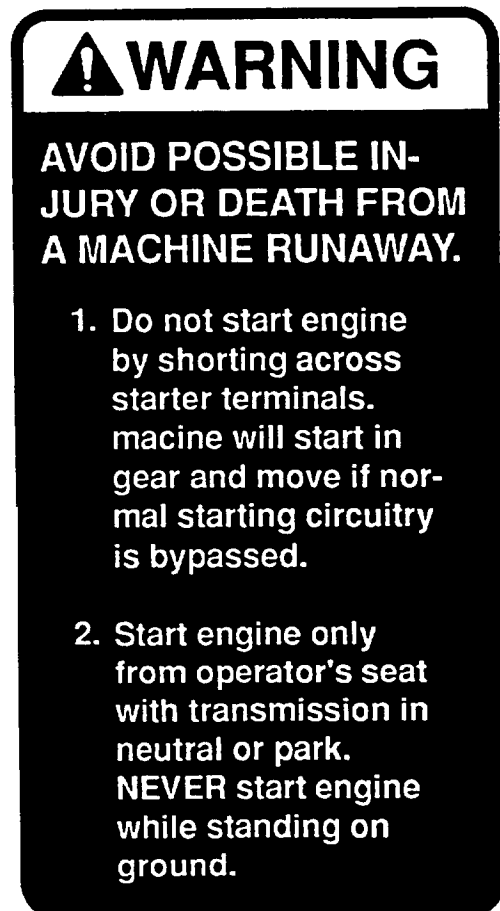
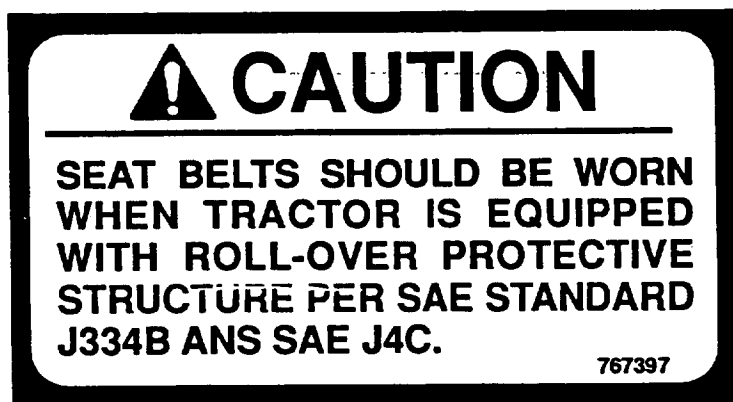
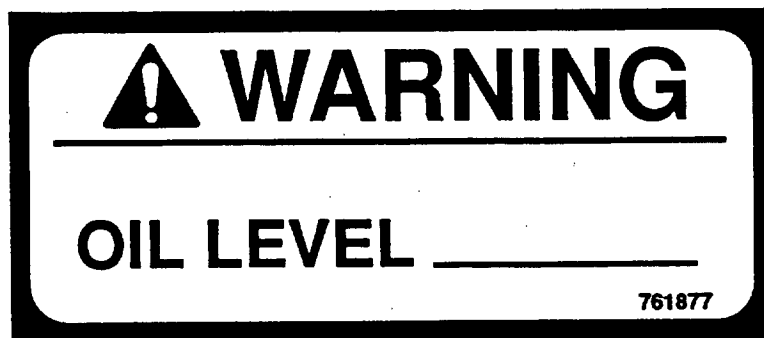
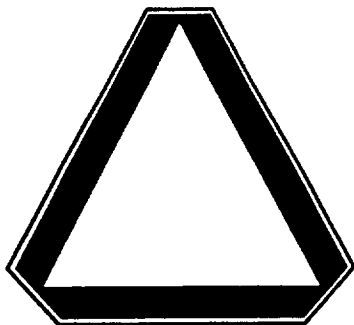
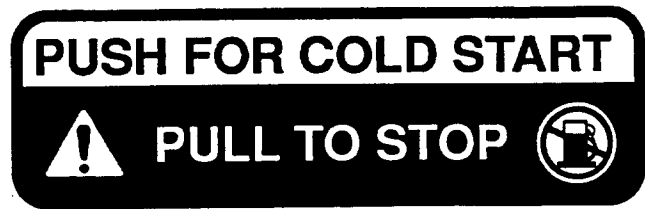


PTO CLUTCH LEVER

DO NOT LEAVE
IN DISENGAGED
POSITION

770594

SAFETY SIGNS



INTRODUCTION

The information contained in this owners/operators manual applies to the Long 2460, 2460SD, 2460DTC, and the 2460DTC-SD tractors. These tractors are equipped with an in-line 3 cylinder diesel, rated at 41.9 PTO H.P. (31.3 Kw).

The 2460SD is a standard 2460 tractor equipped with a shuttle drive (reversing) transmission.

The 2460DTC is a standard 2460 tractor with a front drive axle (4 wheel drive).

The 2460DTC-SD is a standard 2460 tractor with both the front drive axle and the shuttle drive transmission.

This manual was prepared to furnish you with information related to breaking-in, operating and servicing the tractor. Also included is information on safety procedures, specifications, accessories and the tractor warranty.

It is strongly recommended that you read this entire manual carefully prior to operating the tractor for the first time. This will allow you to become familiar with the tractor's controls and the break-in period procedures. The times spent in becoming familiar with the tractor will be repaid by your efficiency and a longer operating service life of the tractor.

TRACTOR IDENTIFICATION

The tractor's serial number is located on the identification plate located on the right hand side of the transmission housing as shown in Fig. 1

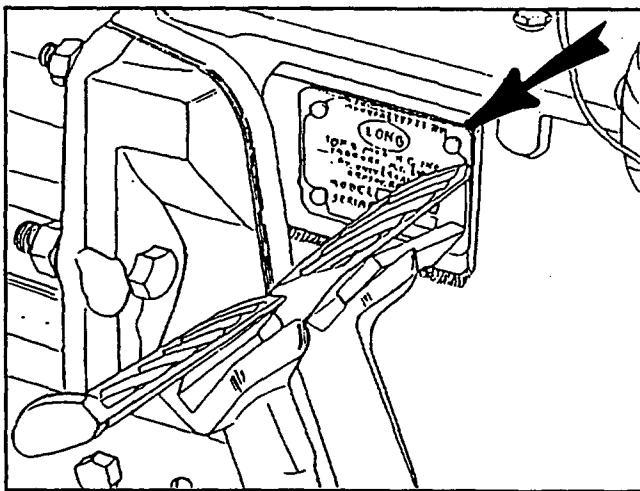


Fig. 1 — Chassis Serial No.

The tractor's engine serial number is located on the identification plate located on the left hand side of the engine block as shown in Fig. 2

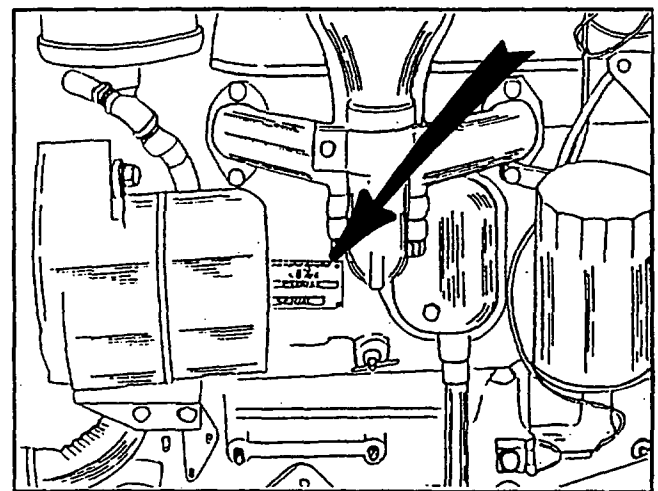


Fig. 2 — Engine Serial No.

SPECIFICATIONS

ENGINE

PTO Horsepower 41.9 (31.3Kw)
Type Direct Injection Diesel
Rated Engine Speed 2400 RPM
Number of Cylinders 3
Bore 3.74 in. (95mm)
Stroke 4.33 in. (110mm)
Displacement 143 Cu. in. (2344 cc)
Cylinder Liner Dry Replaceable
Compression Ratio 17:1
Operating Range 600 to 2550 RPM
Firing Order 1-2-3

POWER TRAIN

Clutch Type Dry W/ Independent Controls
Clutch Diameter 11 in. (279.4mm)
Transmission Type Sliding Gear/Constant Mesh
Number of Speeds 8 Forward, 2 Reverse
(Synchronized 3rd, 4th, 7th, & 8th)
Service Brakes
Type Dry Mechanical Band
Actuation Foot Pedals
(Independent for each side w/transport lock)

Parking Brake
 Type Wet Mechanical Disk
 Actuation Hand Lever
 (Independent of Service Brakes)
 PTO Type 2 Speed
 Speeds Independent (540 RPM)
 & Ground Synchronous
 Differential Lock Mechanical

HYDRAULICS

System Type Open Center
 Pump Type Gear
 Rated Capacity
 at 2400 Engine RPM ... 9.0 GPM (34.0 l/min.)
 Three Point Hitch Cat. I & II
 Lift Capacity 2645 lbs. (1200 kg.)
 Draft Sensing Upper Link
 Remote Valve Single or Double Acting
 Power Steering Hydrostatic

ELECTRICAL

Battery 12 Volts
 BCI Group 30H
 Alternator 36 Amps

TIRES (Std.)

Front 6.00 x 16 - 4PR, F2
 Rear 14.9 x 28 - 4PR, R1

DIMENSIONS WITH ABOVE TIRE EQUIPMENT

Wheelbase 84 In. (2134mm)

Overall Length 134 In. (3404mm)
 Overall Width 70 In. (1778mm)
 Minimum Turning Radius
 w/ brakes 123 In. (3124mm)
 Front Axle Clearance 17 1/2 In. (445mm)
 Rear Axle Clearance 20 In. (508mm)
 Minimum Ground Clearance 14.75 In. (375mm)
 Height:

Top of Precleaner 61 In. (1549mm)
 Top of Hood 59 In. (1499mm)
 Top of Steering Wheel 62 In. (1575mm)
 Top of Exhaust Stack 95 In. (2413mm)
 Top of ROPS 90 1/2 In. (2299mm)

Approximate Shipping Weight ... 4220 lbs. (1918kg.)

WHEEL TREAD

Front:

Minimum 57.0 In. (1448mm)
 Maximum 84.0 In. (2134mm)

Rear:

Minimum 55.3 In. (1403mm)
 Maximum 75.3 In. (1911 mm)

CAPACITIES

Cooling System 14.Qts. (13.2 L)
 Fuel Tank 16.4 Gal. (62.0 L)
 Crankcase:
 Oil Change 6.3 Qts. (6.0 L)
 Oil and Filter Change 7.3 Qts. (7.0 L)
 Transmission & Hydraulic System ... 21.1 Qts. (20.0 L)
 Final Drives 2.1 Qts. (2.0 L)

D.T.C. SPECIFICATIONS

TIRES

Front 8.3 x 24 - 4PR, R1
 Rear 14.9 x 28 - 4PR, R1

DIMENSIONS WITH ABOVE TIRE EQUIPMENT

Wheelbase 84.0 In. (2134mm)
 Overall Length 134 In. (3399mm)
 Overall Width 70 In. (1778mm)
 Minimum Turning Radius
 w/ brakes 139 In. (3531mm)
 Front Axle Clearance 13.0 In. (330mm)
 Rear Axle Clearance 19.8 In. (503mm)
 Minimum Ground Clearance 12.0 In (305mm)

Height:

Top of Precleaner 64.0 In. (1626mm)
 Top of Hood 60.0 In. (1524mm)
 Top of Steering Wheel ... 63.0 In. (1600mm)
 Top of Exhaust Stack 96.0 In. (2438mm)
 Top of ROPS 90 1/2 In. (2299mm)

Approximate Shipping Weight ... 4760 lbs. (2164kg.)

WHEEL TREAD

Front: 59.0 In. (1449mm)

Rear:

Minimum 55.3 In. (1405mm)
 Maximum 75.3 In. (1913 mm)

STANDARD EQUIPMENT

Engine — 143 Cu. In. Diesel (2344cc)
Oil Bath Air Cleaner w/External Precleaner
Thermostat Starting Aid
Transmission — 8 Forward and 2 Reverse Speeds
(STD & DTC)
Shuttle Drive — 8 Forward and 2 Reverse Speeds
(SD & DTC - SD)
Hand and Foot Throttle Control
Instrumentation - Alternator Warning Light, Engine Oil
Pressure Light, Water Temperature Gauge,
Fuel Gauge, Tachometer and Hourmeter
Dual Clutch (Main & PTO), w/Independent Controls

Remote Control Valve
PTO - Independent and Ground Synchronous
Differential Lock.
Cat. I & II Three Point Hitch
Hydraulic Lift - Draft and Position Control
Hydrostatic Steering
Adjustable Front Axles (Except DTC & DTC - SD)
Halogen Headlights
Rear Work Light
Adjustable Seat
2 Post ROPS w/Seat Belts
Safety Flashers and Turn Signals

OPTIONS

Front Hand Weight Kit (73 lbs. for each weight)
Rear Wheel Weights (122 lbs. for each weight)
(258 lbs. set — DTC & DTC - SD)
Power Adjust Rear Wheels
Wheel Spacers

Water Pre-heater
FOPS Canopy
Cold Start Battery Kit
Remote Control Valve Hose Kit
2 Spool Valve Kit

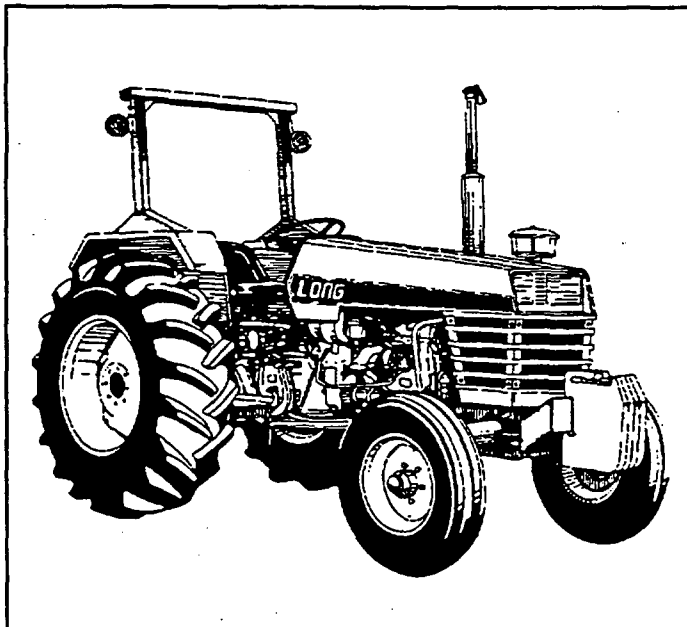


Fig. 3 - 2460 & 2460 SD

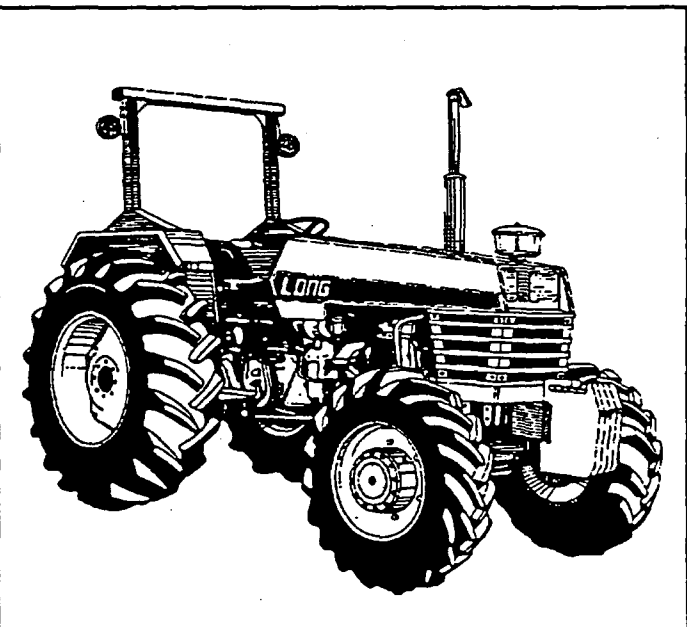


Fig. 4 - 2460 DTC & 2460 DTC - SD

OPERATING CONTROLS AND INSTRUMENTATION

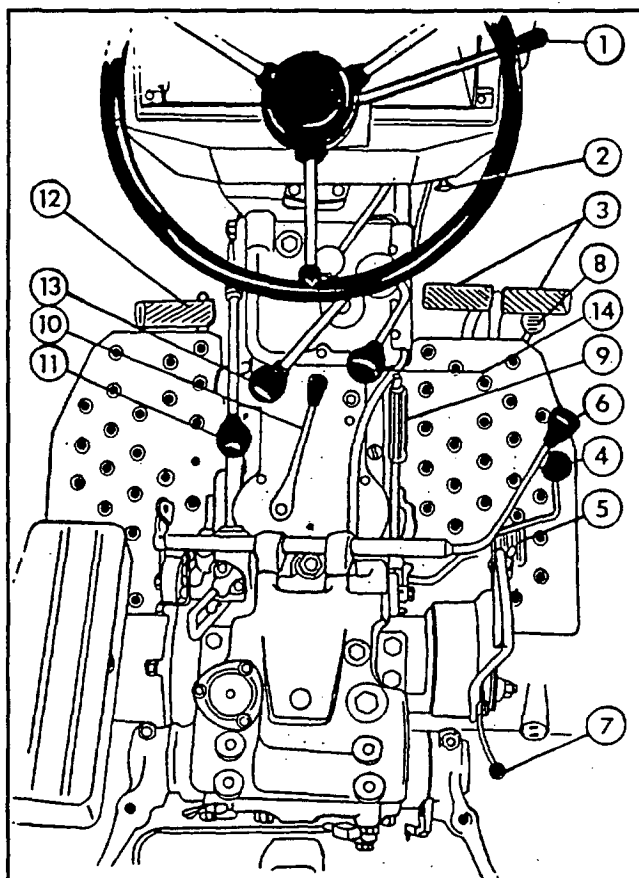


Fig. 5 - Operating Controls and Instruments

1. **Hand Throttle Lever** - Controls engine speed. Moving the lever forward decreases engine speed and moving the lever rearward increases engine speed.

2. **Engine Shut-Off Knob** - The engine fuel shut-off knob controls the starting and stopping of the engine. Pushing the knob forward against the spring tension retards the engine's timing, which aids in starting, and allows fuel flow to the injectors. To stop the engine, pull the knob to the rear, and hold until the engine stops. If the knob is released before the engine stops completely, fuel flow will resume, and the engine may continue running.

WARNING:
NEVER ATTEMPT TO TURN THE ENGINE OVER BY HAND IN ANY WAY UNLESS THE FUEL SHUT-OFF KNOB IS SECURELY CLAMPED OR LOCKED IN THE REARWARD "OFF" POSITION.
AFTER LOCKING THE KNOB IN THE "OFF" POSITION, TURN THE ENGINE OVER SEVERAL TIMES, USING THE STARTER, TO MAKE SURE THAT NO FUEL REMAINS IN THE INJECTORS. FAILURE TO DO SO COULD RESULT IN ENGINE STARTING WHEN TURNING OVER BY HAND, RESULTING IN POSSIBLE INJURY OR DEATH.

3. **Brake Pedals** - Are used to actuate the tractor's service brakes. Brakes may be used individually to aid in turning at slow speeds or operated together, by engaging the transport lock, for highway and road travel.

WARNING:
IF BOTH BRAKE PEDALS ARE LOCKED TOGETHER FOR HIGHWAY OR ROAD TRAVEL, BE SURE THAT BOTH BRAKES ARE EQUALLY ADJUSTED. FAILURE TO DO SO WILL CAUSE ONE BRAKE TO BE ENERGIZED MORE THAN THE OTHER, CAUSING THE TRACTOR TO PULL TO ONE SIDE, WHICH COULD CAUSE AN ACCIDENT, RESULTING IN POSSIBLE INJURY OR DEATH.

WARNING:
DO NOT ATTEMPT SHORT TURNS AT HIGH SPEEDS. DOING SO COULD CAUSE THE TRACTOR TO OVERTURN, RESULTING IN POSSIBLE INJURY OR DEATH.

4. **Hydraulic Lift Control Lever** - This lever controls the raising and lowering of the three point hitch and any implement attached to it. To raise the lift, move the control lever up and to the rear of its' quadrant. To lower the lift, slowly move the lever forward and down until the desired operating position is obtained. (See Fig. 5). Do not operate levers 4 & 7 at the same time because the hydraulic system will not function properly.

5. **Differential Lock Pedal** - The differential lock pedal is used to lock the differential so both rear wheels will travel at the same speed, increasing traction in muddy or slippery conditions.

To lock the differential, slow down the tractor and depress the pedal. Hold the pedal down for as long as you need the lock engaged. To disengage the lock, remove your foot from the pedal and briefly press one of the brake pedals.

WARNING:
DO NOT ENTER A CURVE OR TRY TO MAKE A TURN WITH THE DIFFERENTIAL LOCKED. NEVER USE THE DIFFERENTIAL LOCK WHEN TRAVELING ON A HIGHWAY OR ROAD.

IMPORTANT:
Never engage the differential lock with the rear wheels spinning excessively. To do so may cause damage to the differential. Use the lock only when traveling in a straight path.

6. **Remote Control Valve** - This lever controls the raising and lowering of the remote hydraulic cylinder. Pulling the lever rearward extends the cylinder, and pushing the lever forward retracts the cylinder.

7. **Hydraulic Lift Mode Lever** - This lever is used to select position control or draft control operation of the lift system.

NOTE: The lift arms should be in their uppermost position before moving this lever. Failure to do so can result in damage to the lift control mechanism.

8. **Foot Accelerator Pedal** - This pedal controls engine speed. Depress the pedal to increase engine speed, and release it to return to the engine speed set by the hand throttle.

9. **Parking Brake Lever** - This lever applies the parking brake, which operates on both rear wheels at the same time. Pulling the lever up engages the brake. Press the button on the end of the lever and lower the lever to disengage the brake. Always engage the parking brake before leaving the operator's seat.

10. **PTO Control Lever** - This lever couples the PTO to either the engine or the rear wheels. To shift the PTO into gear, the PTO clutch lever must be in the raised (disengaged) position. (See item 11) To engage the independent PTO, disengage the PTO clutch, shift the control lever to the left, and engage the PTO clutch by lowering the PTO clutch lever. With the PTO coupled directly to the engine, the PTO can be used with the tractor moving or stationary. To disengage the independent PTO, disengage the PTO clutch, shift the control lever right, toward the center (neutral) position, and engage the PTO clutch.

To engage the ground synchronous PTO, disengage the main clutch (depress the clutch pedal (item 12), stop the tractor. While keeping the clutch pedal depressed, shift the PTO control lever to the right, then slowly engage the clutch pedal. To disengage, depress the clutch pedal, and shift the control lever left, toward the center (neutral) position. The ground synchronous PTO operates only with the tractor moving and revolves at a speed proportional to the tractor's ground speed. The ground synchronous PTO should always be disengaged before shifting the tractor into reverse, as the implement's motion will also be reversed.



CAUTION:

THE GROUND SYNCHRONOUS PTO, WHEN ENGAGED, IS CONNECTED DIRECTLY TO THE REAR WHEELS OF THE TRACTOR, REGARDLESS OF TRANSMISSION, MAIN CLUTCH, OR PTO CLUTCH POSITION.

THEREFORE, TO STOP THE TRACTOR, THE ROTATION OF THE IMPLEMENT MUST ALSO BE STOPPED. AN IMPLEMENT WITH SUFFICIENT ROTATIONAL INERTIA CAN OVERPOWER THE TRACTOR'S BRAKES, MAKING IT IMPOSSIBLE TO STOP THE TRACTOR QUICKLY. THIS CAN LEAD TO AN ACCIDENT, POSSIBLY CAUSE INJURY OR DEATH. TO PROTECT AGAINST SUCH AN OCCURRENCE, MAKE SURE THAT ANY IMPLEMENT USED WITH THE GROUND SYNCHRONOUS PTO IS DESIGNED FOR SUCH USE AND IS EQUIPPED WITH AN OVER-RUNNING (ONE-WAY) CLUTCH OR OTHER SUITABLE SAFETY DEVICE.



WARNING:

KEEP THE PTO CONTROL LEVER IN THE NEUTRAL POSITION AT ALL TIMES WHEN THE PTO IS NOT IN USE.

11. **PTO Clutch Control Lever** - To disengage the PTO clutch, slowly raise the lever until it locks in the disengaged position. To engage the clutch, push the knob inward and slowly lower the lever.

IMPORTANT: The PTO clutch must be left engaged at all times, except when the PTO is being shifted into or out of gear. Do not leave the clutch disengaged for more than 1 minute. Failure to do so can cause severe damage to the clutch, engine, or both.

12. **Clutch Pedal** - This pedal controls the main clutch, which connects the engine to the transmission. To disengage the clutch, depress the pedal. To engage, slowly release the pedal.

13. **Gear Selector Lever** - This lever is used to select the different forward speeds and the reverse gears. The lever must be in the neutral position to start the engine. 3rd, 4th, 7th, and 8th gears may be shifted while the tractor is moving (The main clutch must be depressed).

14. **Range Selector Lever** - This lever is used to select either the high range transmission or low range transmission. Shift forward for low range, and rearward for high range. The center position is neutral. This lever must be in neutral to start the engine.



WARNING:

ANYTIME THE TRACTOR IS LEFT UNATTENDED BOTH THE GEAR SHIFT LEVER AND THE RANGE SHIFT LEVER MUST BE PLACED IN NEUTRAL. IF THIS PROCEDURE IS NOT FOLLOWED THE TRACTOR CAN JUMP IN GEAR CAUSING PERSONEL INJURY OR DEATH.

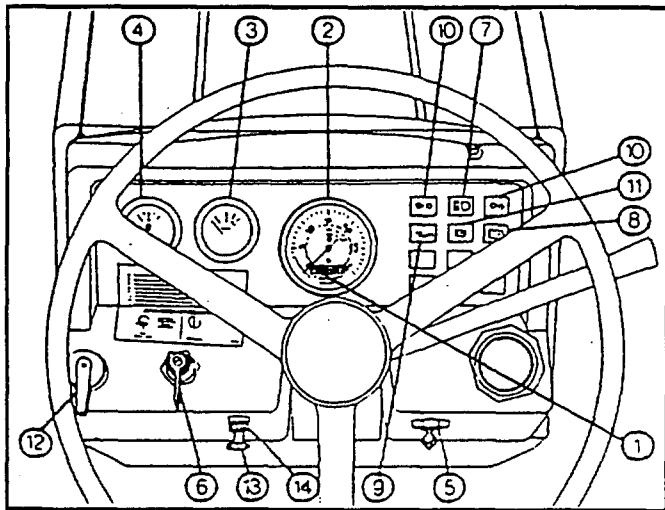


Fig. 6 - Operating Controls and Instruments

1. **Tachometer w/**
2. **Hourmeter** - The tachometer/hourmeter pointer indicates the engine RPM as well as the PTO RPM. Numbers on the outer perimeter are engine RPM. Numbers on inner perimeter are PTO RPM. Hours recorded are located in the center of the dial. Numbers on the black background give hours of engine operation, while the last figure on right (In red background) give readings in tenths of an hour.
3. **Water Temperature Gauge** - The Temperature gauge indicates engine operating temperature in degrees Celsius. The proper operating temperature is between 75°C and 95°C (167°F - 203°F). Do not subject the engine to heavy loads until it has reached proper operating temperature. If engine will not come to operating temperature, check for a defective thermostat. If temperature rises above 95°C, the engine is overheating. Stop the engine immediately and correct the condition. A plugged radiator, low coolant level, slipping or broken fan belt, or a defective thermostat are prime causes.
4. **Fuel Gauge** - This gauge indicates the level of fuel in the fuel tank. When the fuel level drops below approximately 1/8th of a tank, a red warning light in the gauge comes on. Do not allow the fuel tank to run completely dry, because air will enter the fuel system. This will require the fuel system to be bled after filling the fuel tank. See service section..
5. **Ignition Switch w/Key** - This switch controls all electrical circuits on the tractor.

This switch can be turned to six different positions as indicated in Fig. 5. The circuits are controlled as shown in the chart on this page.



CAUTION:

ALWAYS MAKE CERTAIN OF THE SETTING YOU HAVE THE SWITCH IN. THE POSSIBILITY OF A BATTERY DISCHARGE IS GREAT IF THE SWITCH IS LEFT IN ANY POSITION OTHER THAN ZERO WHEN THE TRACTOR IS UNATTENDED.

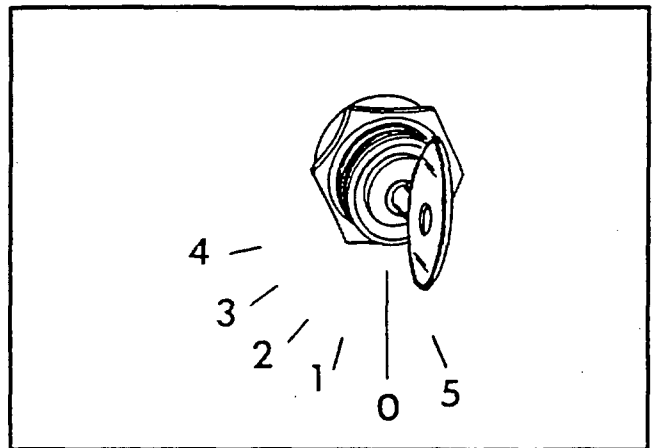


Fig. 7 - Ignition Switch w/Key

Circuit	Switch Position					
	5	0	1	2	3	4
Alternator, Instruments & Starter Feed On.			X	X	X	X
Instrument Panel Lighting & Rear Work Light.	X			X	X	X
Front Work Lights (LIGHTS)					X	

"X" Indicates that the circuit is energized

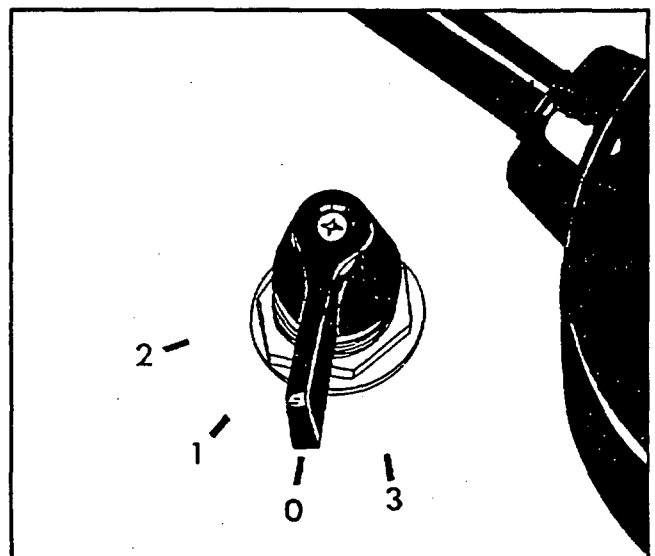


Fig. 8 - Starter and Thermostat Start Switch

NOTE: The tractor must not be operated with the switch in position "0" or "5" since the charging system and warning instruments will not function.

6. **Starter and Thermostat Switch** - This switch controls the starter and thermostat (Starting Aid) circuits. This switch has 4 positions as shown in Fig. 8. The circuits are controlled as shown in the chart at the top of the following page.

Circuit	Switch Position			
	3	0	1	2
Thermostarter			X	X
Starter	X			X

"X" indicates that the circuit is energized

7. **Work Light Indicator** - The indicator is a blue lamp which burns when the ignition switch is in position "3" and indicates that the front work light are on.
8. **Alternator Warning Lamp** - This red lamp indicates a faulty operation of the battery charging system. The lamp should come on when the ignition switch is turned on. If it does not, check the fuse and bulb. Once the engine is started, the lamp should go out. If it does not, stop the engine and check the voltage regulator, battery charge control relay, or for loose wires.
9. **Oil Pressure Warning Lamp** - This red lamp indicates insufficient engine oil pressure. The lamp should come on when the ignition switch is turned on. If it does not, check the fuse and bulb. The lamp should go out a few seconds after the engine has started. If it stays on or comes on any time while the engine is running, stop the engine immediately and find and correct the cause.

10. **Turn Signal Indicators** - These indicators are two green lamps which blink when the turn signals are activated. The right lamp indicates a right turn, and the left lamp indicates a left turn. If the lamps fail to blink, find and correct the cause as soon as possible.

11. **Parking Brake Warning Lamp** - This lamp is currently not used.

12. **Turn Signal Switch** - This switch controls the operation of the turn signal lights. Rotate the switch handle clockwise to signal for a right turn, and counterclockwise to signal a left turn. Rotate the switch either direction to the center position to turn off the signal lights.

13. **4-Way Flasher Switch** - This switch controls the 4-Way (Hazard) flasher lights. Pull the switch out to turn on the lights, pushing it back in turns them off. The turn Signals will operate with the 4-Way flashers operating.

14. **Flasher Fuse** - This fuse is used for the 4-Way flashers and turn signals. To remove the fuse, twist the knob counterclockwise and then pull the knob out.

OPERATIONS

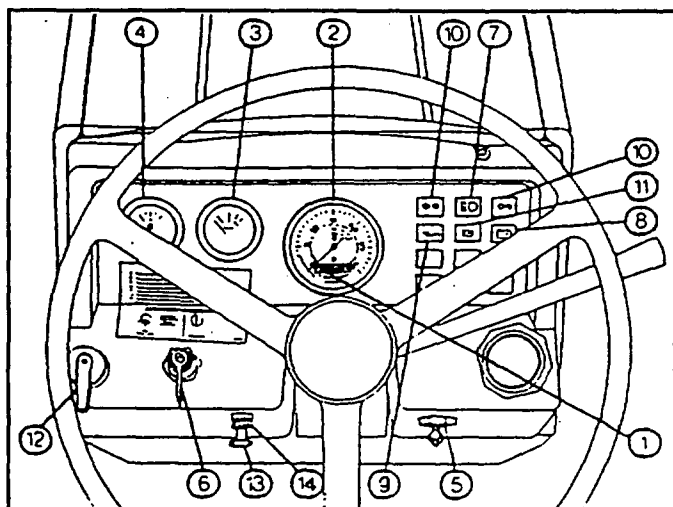


Fig. 9 - Instruments & Controls

1. Hourmeter; 2. Tachometer; 3. Water Temperature Gauge; 4. Fuel Gauge; 5. Ignition Switch w/Key; 6. Starter & Thermostat Switch; 7. Work-light Indicator; 8. Alternator Warning Lamp; 10. Turn Signal Indicator; 11. Parking Brake Warning Indicator; 12. Turn Signal Switch; 13. 4-Way Flasher Switch; 14. Flasher Fuse.

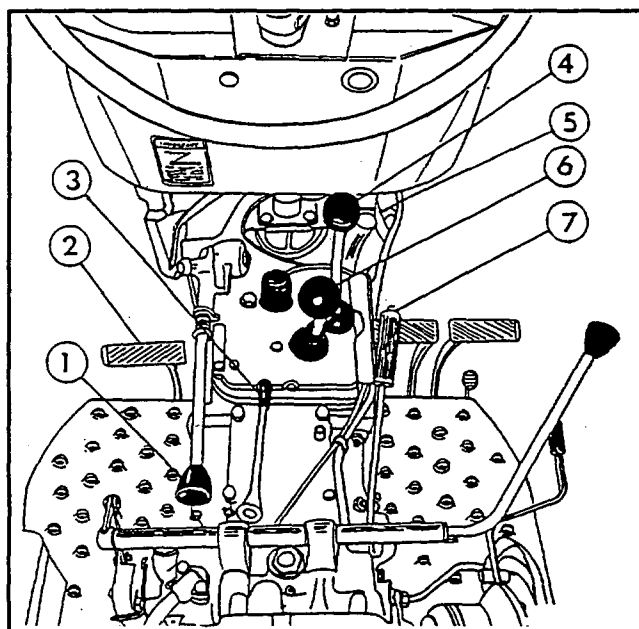


Fig. 10 - Instruments & Controls

1. P.T.O. Clutch Lever; 2. Clutch Pedal; 3. P.T.O. Shift Lever; 4. Range Shift Lever; 5. Fuel Shut-Off Knob; 6. Transmission Shift Lever; 7. Hand Brake.

STARTING THE TRACTOR

Before starting the tractor's engine, the following operations should be carried out.

1. Check the oil level in the engine oil sump.
2. Check the coolant level in the radiator.
3. Check the fuel level in the fuel tank.
4. Check the fuel system, lubrication system, hydraulic system, and cooling system for loose connections.
5. Check for loose or missing lug bolts on the front and rear wheels.

The following operations should be done before starting the engine:

1. Be sure the parking brake is engaged.
2. Place the gear and range selector levers in neutral to activate the safety start switch.
3. Make certain the PTO shift lever is disengaged.
4. Open the throttle lever to a 1/3 to 1/2 open position.
5. Place the key in the ignition switch and turn the key clockwise to position "1". The alternator and oil pressure warning lamps should glow. If not, find and correct the cause before you continue.
6. Depress the clutch pedal fully and hold it to disengage the transmission.
7. Push the fuel shut-off knob all the way in and hold it there to retard the injection timing until the engine has started. At the same time, turn the starter switch counterclockwise (to position "3") to engage the starter motor. Release the starter switch and fuel shut-off knob as soon as the engine starts.

NOTE: If the engine fails to start after cranking for more than 30 seconds, wait at least 2 minutes before trying to start the engine again. This is to prevent overheating the starter.

COLD WEATHER STARTING

When starting the tractor in cold weather it may be necessary to use the thermostat starting aid. To utilize this system follow the steps below:

1. Stroke the lever on the fuel lift pump 20 times to fill the thermostat reservoir.
2. Follow steps 1-6 of the Starting Procedure given on this page.
3. Turn the starter switch one position clockwise to turn on the thermostarter. Hold for 10 to 15 seconds.
4. Push the fuel shut-off knob all the way in against the spring and hold. At the same time turn the starter switch as far as it will go clockwise to engage the starter motor. Release both as soon as the engine starts.
5. If the engine fails to start in about 30 seconds, release the starter switch, wait 2 minutes and proceed to start the engine using the normal starting procedure.

**CAUTION:**

DO NOT USE STARTING FLUID. AN EXPLOSION; POSSIBLY CAUSING SERIOUS INJURY, COULD RESULT FROM USING STARTER FLUID IN CONJUNCTION WITH THE THERMOSTARTER.

WARM-UP PERIOD

After the engine has started, allow the engine to run at fast idle (1000-1200 RPM's) for approximately one minute. Do not "rev" the engine to normal operating speed while it is cold, since this results in unnecessary wear.

Operating the engine at a light to medium load will speed engine warm-up and is preferred over allowing the engine to idle. If it is desired to run the engine at a heavy load immediately, then select a lower gear and operate in that gear until the temperature gauge indicates normal operating temperature. At this time you may shift up to the desired gear for the application.

IDLING THE ENGINE

Avoid idling the engine excessively as this causes the coolant temperature to drop and results in engine wear. It is best to stop the engine rather than let it idle for long periods of time.

STOPPING THE ENGINE

If the engine has been operating under a heavy load, allow the engine to idle a few minutes before stopping it. This allows the engine to cool gradually. Stop the engine, move the throttle to the idle position, pull out the fuel shut-off knob and hold it there until the engine comes to a complete stop. Turn the ignition switch to the "0" (Off) position and remove the key from the ignition.

BREAK-IN PERIOD

The tractor engine has been designed to provide many hours of trouble free operation. However, a proper "break-in" procedure must be followed to insure this. Follow these suggestions to properly "break-in" the tractor.

1. Whenever the engine is started, let it idle a few minutes.
2. During the first 60 Hours of operation, run the engine at a medium load.

3. Avoid lugging or overloading the engine, but do not operate the tractor continuously at light loads or excessively low RPMs.
4. Do not operate the engine continuously at full load or maximum RPM's during the "break-in" period.
5. When operating under heavy load, such as plowing, avoid lugging or overloading the engine. Shift to a lower gear if necessary. However, during the "break-in" period, vary the load by shifting up to the normal gear for short periods.
6. Maintain the proper oil level in the engine oil sump at all times and periodically check for any leakage.
7. Check all nuts, bolts, screws, and fittings for tightness. Refer to the torque chart.

After the first 60 hours of operation, the following should be done:

1. Refer to the lubrication and maintenance chart. Service all points as outlined under the "Break-In" Hours of Operation.

DRIVING THE TRACTOR

Travel speed must be chosen according to the type of work to be done, type of implement to be used, and the type of field conditions.

To insure long transmission life, take care when shifting gears. We suggest you follow these guidelines when shifting:

1. Release the parking brake, and with the engine running at approximately 1/3 throttle, depress the clutch pedal fully and hold. Select the desired range first (high or low) and shift into it.
2. With the clutch pedal still depressed, shift the transmission into the desired gear.
3. Slowly engage the clutch to start the tractor smoothly. After the clutch has been engaged and the desired gear selected, increase the engine speed to the desired operating speed and let off the clutch pedal slowly to engaged the transmission.

**WARNING:**

NEVER ALLOW THE TRACTOR TO COAST DOWN HILL WITH THE GEAR OR RANGE SELECTOR LEVERS IN NEUTRAL OR THE CLUTCH DISENGAGED. TO DO SO MAY CAUSE LOSS OF CONTROL, RESULTING IN POSSIBLE INJURY OR DEATH TO THE OPERATOR OR A BYSTANDER. IN ADDITION, COASTING CAN CAUSE SEVERE DAMAGE TO GEARS, BRAKES, CLUTCH, AND THE ENGINE.

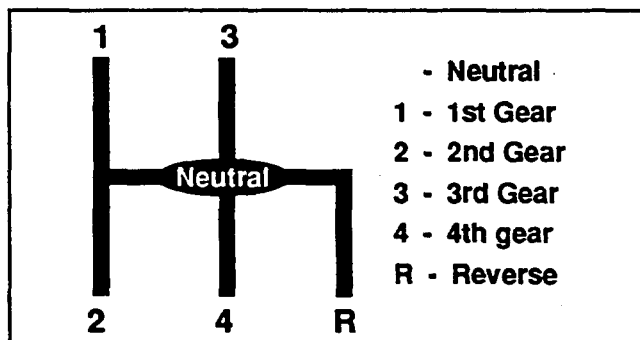


Fig. 11 - Gear Selector Diagram

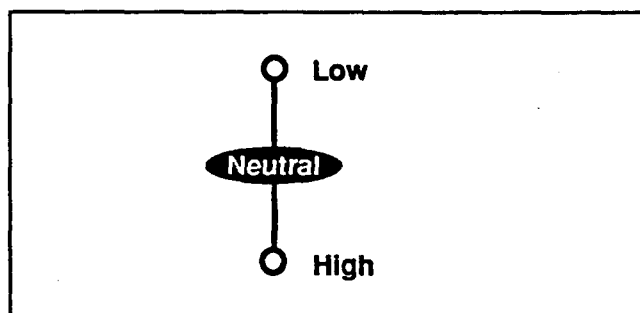


Fig. 12 - Range Selector Diagram

ROAD SPEEDS

The chart below gives the tractor's travel speed at 2400 RPM's with 14.9 x 28, R1 rear tires (std.).

Gear	Speed			
	STD		DTC	
Low Range	mph	kph	mph	kph
1	1.52	2.45	1.39	2.23
2	2.29	3.68	2.09	3.36
3	3.36	5.41	3.06	4.92
4	4.34	6.98	3.96	6.37
R1	2.19	3.52	2.00	3.22
High Range	mph	kph	mph	kph
5	5.49	8.83	5.00	8.05
6	8.27	13.31	7.53	12.12
7	12.11	19.48	11.02	17.73
8	15.64	25.16	14.24	22.91
R2	7.89	12.70	7.19	11.57

SHUTTLE DRIVE (2460)

The shuttle drive, or reversing transmission, allows the operator to change the direction of travel without shifting the main transmission. This transmission gives the tractor 8 forward and 8 reverse gears.

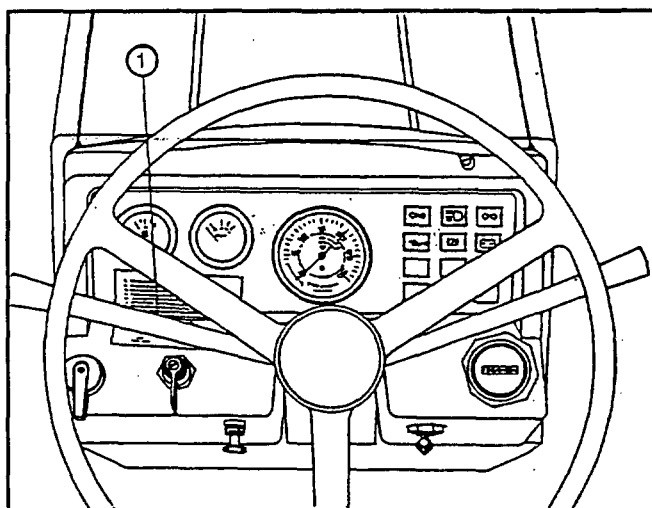


Fig. 13 - Shuttle Drive Controls

The shuttle drive control lever (See Fig. 13) is located on the left hand side of the steering column. There are three positions: forward, neutral, and reverse. Moving the control lever all the way forward places the tractor in a forward motion. Moving the control lever all the way to the rear, places the tractor in a backward motion. The neutral position is between the two.

To change the direction of travel using the shuttle drive, depress the clutch pedal, bring the tractor to a complete stop, shift the shuttle drive lever, and slowly release the clutch pedal.

**CAUTION:**

ALWAYS BRING THE TRACTOR TO A COMPLETE STOP BEFORE CHANGING THE DIRECTION OF TRAVEL WITH THE SHUTTLE DRIVE. FAILURE TO DO SO MAY CAUSE DAMAGE TO THE SHUTTLE DRIVE.

NOTE:

THE REVERSE GEAR POSITION SHOWN IN FIG. 11 IS NOT APPLICABLE. REVERSE GEAR IS IN THE SHUTTLE DRIVE. EACH REVERSE SPEED IS THE SAME AS ITS CORRESPONDING FORWARD SPEED.

4 WHEEL DRIVE (2460 DTC)

The 2460 DTC is equipped with a center driven power front axle. This gives the tractor increased traction and pulling ability in nearly all field conditions (With the front axle engaged).

To engage the front drive axle, bring the tractor to a complete stop, depress the clutch pedal, and slowly push the front wheel drive lever forward. Reverse the procedure to disengage the front drive axle.

CAUTION:
DO NOT DRIVE ON ROADS, HIGHWAYS, OR OTHER HARD SURFACES WITH THE FRONT AXLE ENGAGED. FAILURE TO HEED THIS CAUTION MAY RESULT IN DAMAGE TO THE TRACTOR'S FRONT AXLE OR DRIVETRAIN.

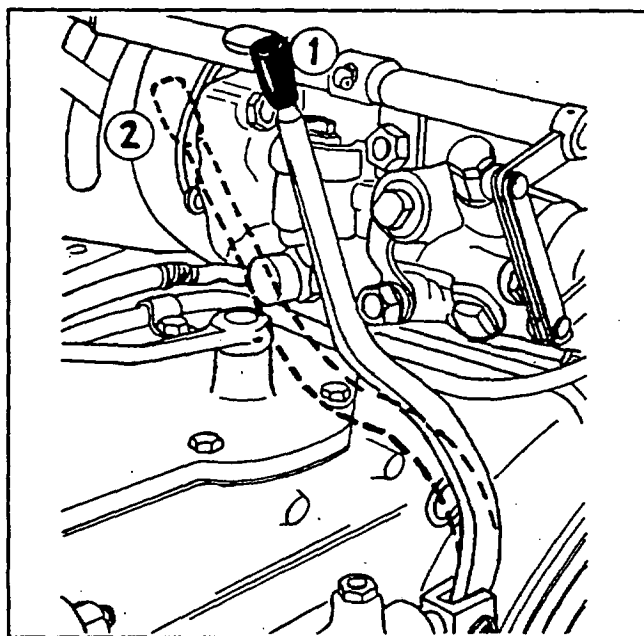


Fig. 14 - Front Drive Axle Control

DTC TIRE MATCHING

The DTC tractor is designed so that, with the front axle engaged, the peripheral speed of the front wheels is slightly faster than the rear wheels. This causes the front wheels to pull, thereby increasing traction and pulling ability. However, the amount of this slip (over-speed) is very critical. Too much or too little slip will cause reduced efficiency, reduced pulling ability, and possible drivetrain damage.

The tires on the tractor affect the amount of slip. The OEM tires are matched to provide 1-3% slip. The actual

allowable slip is 0-4%, but by matching to 103%, an allowance is built in to compensate for tire wear, over/under-inflation, changes in load, etc. As is easily seen, the range for slip is very small. Unfortunately, it takes very little change in the size of a new tire to destroy the match. In fact, a tire with a static loaded radius as little as 1/4 inch larger than the OEM tire will not match.

Therefore, when replacing tires, it is important that the replacement tire be of the same size, brand, and line as the OEM tire. All tires marked with the same size and type code, even from the same manufacturer, are not the same size. For example, one manufacturer offers three different tires marked 16.9 x 28, R1. There is a 1.6 inch difference in the static loaded radii among these three tires, even though the tire marking shows them to be the same.

If for some reason an exact replacement tire is not available, the tire match must be checked to find a suitable replacement. The tire match equations are given below:

$$\% \text{ Slip} = 100 \times 1 - \left\{ \frac{\text{F/R Tire Ratio}}{\text{F/R Gear Ratio}} \right\}$$

$$\text{Where: F/R Tire Ratio} = \left\{ \frac{\text{Rev/Mile (Front)}}{\text{Rev/Mile (Rear)}} \right\}$$

$$\text{and F/R Gear Ratio} = 1.3915$$

The Rev/Mile data are available from your tire dealer. Make sure that the data is for the exact tires under consideration. If you need assistance matching tires, contact your LONG dealer.

THREE POINT HITCH

The three point hitch provides a way to attach implements to the tractor so they can be controlled by the tractor's hydraulic system.

The Lower links can be independently adjusted up or down by changing the lengths of the vertical arm assemblies. This is done by rotating the turnbuckle on each vertical arm assembly in the direction desired. This adjustment provides alignment of the lower links with the hitch pins on the implement during the initial hook-up. This adjustment also provides the required side tilt for implements that operate with one wheel of the tractor running in the furrow — such as plows.

For implements needing some freedom of movement to follow the contour of the ground; such as disc harrows, cultivators, seed drills, etc., the lower adjusting pin on each vertical arm assembly can be repositioned into the slot at the bottom of each vertical arm assembly. This will allow the lower links to float.

The upper link can be adjusted by turning the center section of the link like a turnbuckle. It can be adjusted to obtain the correct pitch for the implement being used. It may also be shortened or lengthened to facilitate attachment of an implement.

The upper link may be located in any of the four sets of holes in the upper link anchor. The hole selection influences the responsiveness of the hydraulic lift when in draft control. Select the correct set of holes for the job being done, by referring to the data in the "Guide To Hydraulic Lift Control" chart. (See page 18)



WARNING:

NEVER - UNDER ANY CIRCUMSTANCES, ATTEMPT TO PULL ANYTHING FROM THE UPPER LINK, THE LIFT SHAFT, THE AXLE, OR THE LIFT ARMS. HITCH LOADS TO BE PULLED ONLY AT THE DRAWBAR, EXCEPT WHEN PULLING IMPLEMENTS SPECIFICALLY DESIGNED FOR, AND PROPERLY ATTACHED TO THE THREE POINT HITCH. FAILURE TO HEED THIS WARNING CAN CAUSE THE TRACTOR TO OVERTURN, RESULTING IN POSSIBLE INJURY OR DEATH.

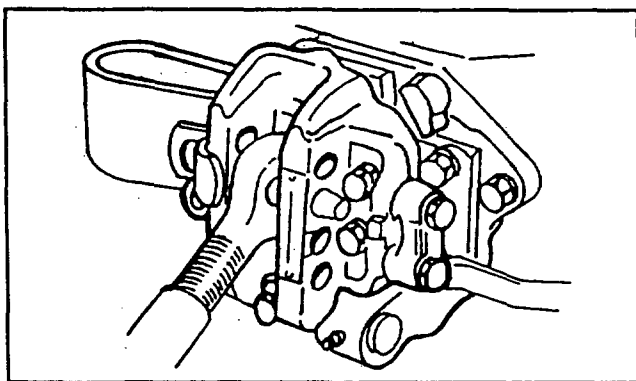


Fig. 15 - High Response Adjustment Upper Link

The sway chains are used to limit the lateral or transverse movement of the implement. They are adjusted by rotating the adjusting sleeves like a turnbuckle. During transport of any type of implement, the chains should be tightened to hold the implement stationary.

When working with implements such as graders, rollers, scrapers, mowers, weeders, spreader, drills, planters, etc. the chains should be tight.

When working with implements such as plows, disc harrows, cultivators, ditch diggers, etc., leave a little slack in the chains

Refer to the "Guide To Hydraulic Lift Control" for further information.

The tractor is shipped from the factory set up for a Category 1 three point hitch. The factory hitch has holes for 7/8" (22.2mm) pins in the lower links and an upper link with a 3/4" (19.1mm) hole and pin. Also, the tractor is shipped with an extra upper link end with a 1" (25.4mm) hole and pin, and two bushings for the lower links, so that the hitch can be converted to Category II.

To convert to a Cat. II three point hitch, use the following procedure:

1. Remove the sway chain eye bolts from the lower draft arms and remove the pin from the lower clevis of each lift link.
2. Remove the snap pins holding the front ends of the lower draft arms on the hitch pins under the tractor differential. Slide the arms off the pins. Remove the bushings located on each pin (or in the draft arm hole), and store in the tool box.
3. Turn each lower draft arm end over end and then rotate 1/2 a turn to place the end with the 1 1/8" (28.6mm) holes away from the rear of the tractor. Slide the end of the arm with the 7/8" (22.2mm) hole back onto the pins under the tractor differential. Replace the snap pins.

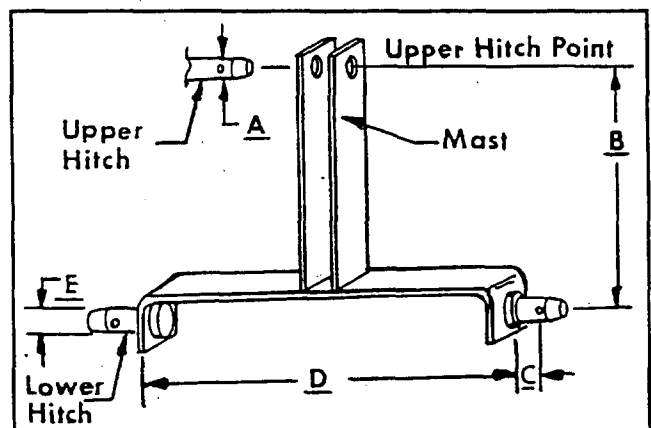


Fig. 16 - Category 1 & II Implement Dimensions
(see chart for dimensions)

DIM. NAME	CAT. I	CAT. II
A Upper Hitch Pin	3/4" (19.05mm)	1" (25.4mm)
B Mast Height	18" (457.2mm)	19" (482.6mm)
C Hitch Pin	1.53 (38.9mm)	1.91(48.5mm)
D Lower Hitch Point Spread	26.875 (682.6mm)	32.437 (823.9mm)
E Hitch Pin Diameter	.875 (22.2mm)	1.120(28.4mm)

1. Attach the lower clevis of each lift link to the center hole in each draft arm with pins and install the eye bolts of the sway chains in the rear holes. Rotate the adjusting sleeves on the sway chains to allow the lower draft arms to come to a 27" (686mm) inside dimension.

2. Replace the 3/4" (19.1mm) upper link end and pin with the 1" (25.4mm) end and pin.

The drawing on the following page (Fig. 17) will give you specific locations with regards to location of the hydraulic lift and it's components. This is standard for both the 2460, 2460SD, 2460DTC, and the 2460DTC-SD.

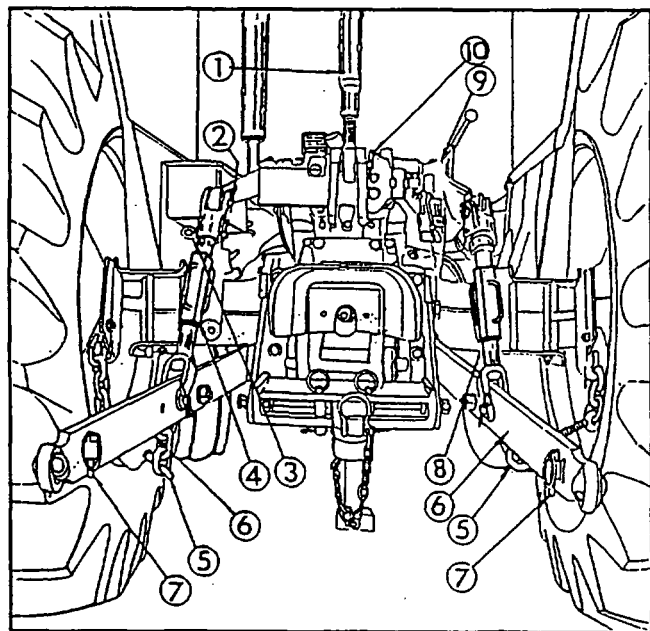


Fig. 17 - Hydraulic Lift, Three Point Hitch

1. Top Link; 2. Axle; 3. Pin; 4. Left Hand Rod; 5. Side Sway Limiting Chain w/ Turnbuckle; 6. Lower Links; 7. Pin; 8. Adjusting Rod; 9. Crank; 10. Pin

HYDRAULIC LIFT

The hydraulic lift controls the raising and lowering of implements attached to the three point hitch. An engine driven gear pump supplies pressurized oil. The lift cylinders and controls are located in a housing on top of the differential.

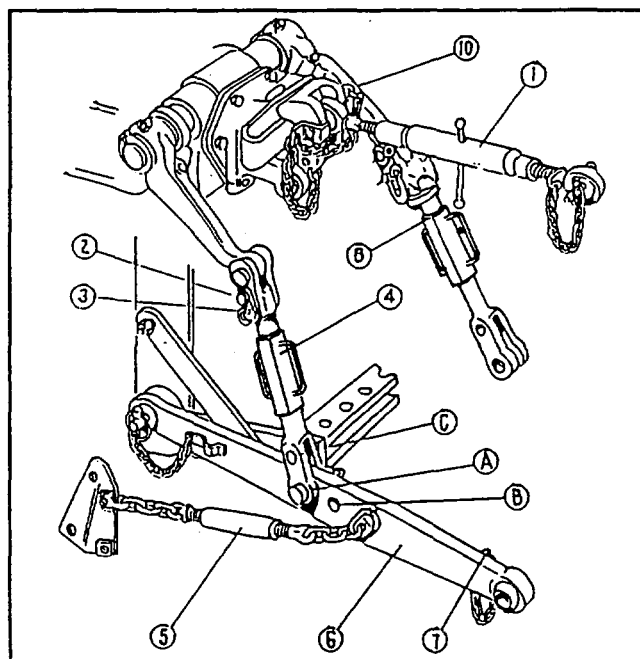


Fig. 18 - Hydraulic Lift, Three Point Hitch
(see Fig. 17 for corresponding items)

The hydraulic lift controls can be used to control the three point hitch mounted implements in the following three ways:

1. **Position Control** - This permits the operator to select the position, either in or out of the ground, at which the implement will run. The lift position is selected by the position of the lift control lever in its quadrant. The movement of the lift and the implement is proportional to the movement of the control lever.

Position control is used for grader blades, scrapers, drills, cutters, and any other carried implements; that is, implements without gauge wheels or other means of resting on the ground during operation.

To place the lift in position control, do the following:

- Raise the hydraulic lift to full height using the hydraulic lift control lever.
- Move the hydraulic lift mode lever to its most downward position. (See Fig. 18)
- Rotate the upper link anchor support wedge to the left and insert it between the upper link anchor and the tractor's chassis.
- When the desired working height of the implement is obtained by the adjustment of the control lever, the control lever stop can be set on the quadrant to permit the lift to return to the same position after it has been raised for turns and transport.

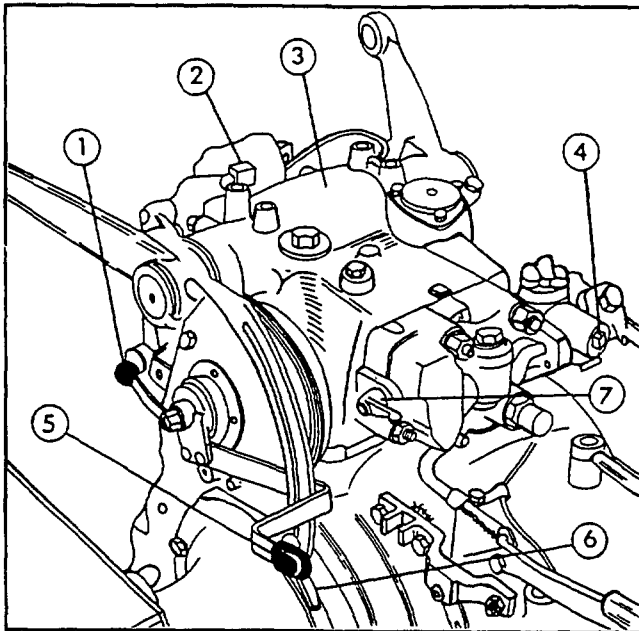


Fig. 19 - Hydraulic lift

1. Hydraulic Lift Mode Lever; 2. Link; 3. Hydraulic Lift Housing; 4. Pressure Relief Valve; 5. Control Lever; 6. Stop; 7. Sensitivity Adjusting Lever

2. Full Float - This position is used for implements that rest indirectly on the ground via Gauge wheels, skids, or other means when operating.

To use the full float position:

- A. Set the controls for position control.
- B. Move the control lever to its' lowest position (See Fig. 18)

3. Draft Control - In this position the upper link sensing system is activated to automatically vary the height of the implement to maintain approximately the same draft (pull) at all times.

To place the lift in the draft control mode, do the following:

- A. Raise the hydraulic lift to full height using the hydraulic lift control lever.
- B. Move the hydraulic lift mode lever to its most upward position.
- C. Rotate the upper link anchor support wedge up and to the right to disengage it from the anchor and chassis, to allow the anchor full freedom of movement for draft sensing.
- D. At the start of operation lower the control lever to move the implement from the transport position on to the ground. The farther the control lever is lowered, the deeper the implement will pen-

etrate the ground, and the higher the draft will be. When the desired depth, or draft, has been met, move the control lever stop against the control lever so that the same operating position can be returned to after raising the lift for turns or transport.

E. After the operating height has been selected, while the implement is still working, adjust the sensitivity lever forward to obtain maximum responsiveness to draft changes without unnecessary movement, or "hunting" of the lift. (See Fig. 19)

F. In cases where large variations in the soil conditions are present and cause undesirable depth variations from the draft control system, the desired working depth can be maintained (within the tractive capabilities of the tractor) by adjusting the control lever as soil conditions change.

NOTE: Always raise the hydraulic lift to its highest position before changing the lift from position to draft control, or vice versa. Failure to do so may damage the lift control mechanism.

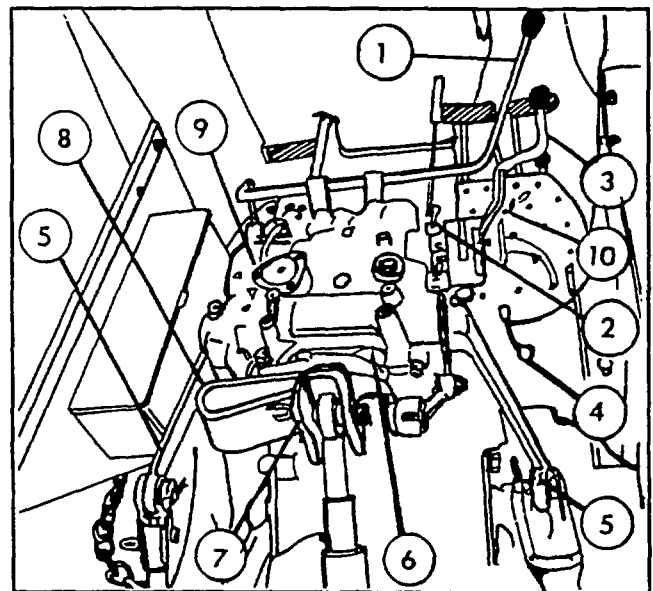


Fig. 20 - Hydraulic Controls

1. Remote Control Valve Lever; 2. Draft Control Sensitivity Adjustment Lever (forward as shown, increases sensitivity. Rotate the lever rearward, decreases sensitivity); 3. Lift, Lower Control Lever; 4. Hydraulic Lift Mode Lever; 5. Lift Arm; 6. Link anchor support Wedge; 7. Upper Anchor Link; 8. Draft Sensing Spring; 9. Remote Hydraulic Valve; 10. Control Lever Stop

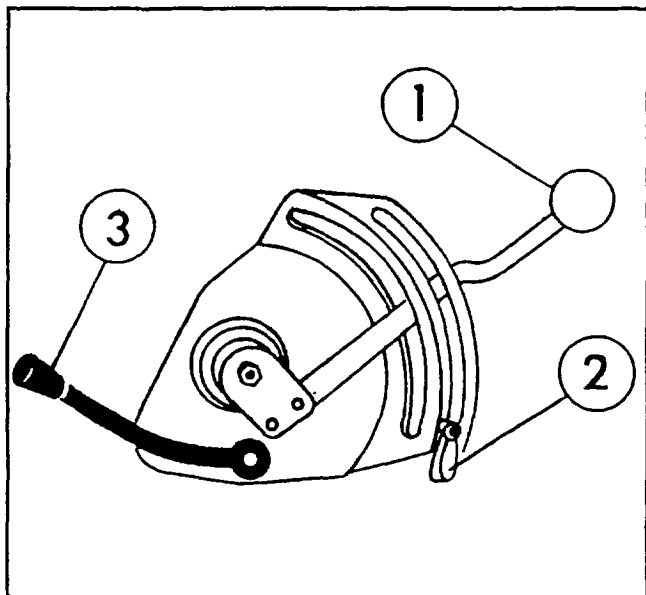


Fig. 21 - Lift Controls

1. Position Control Lever; 2. Stop Control Lever; 3. Hydraulic Lift Mode Lever, in Position Control

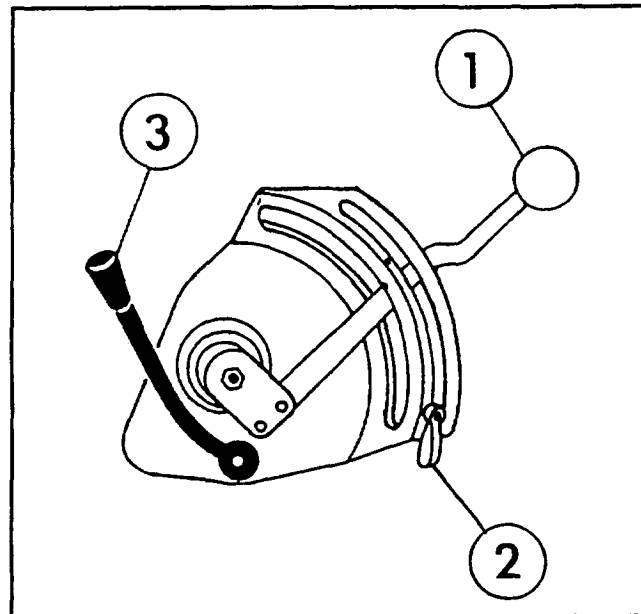


Fig. 23 - Lift Control

1. Position Control Lever; 2. Draft Control Lever; 3. Hydraulic Lift Mode Lever in Draft Control Mode.

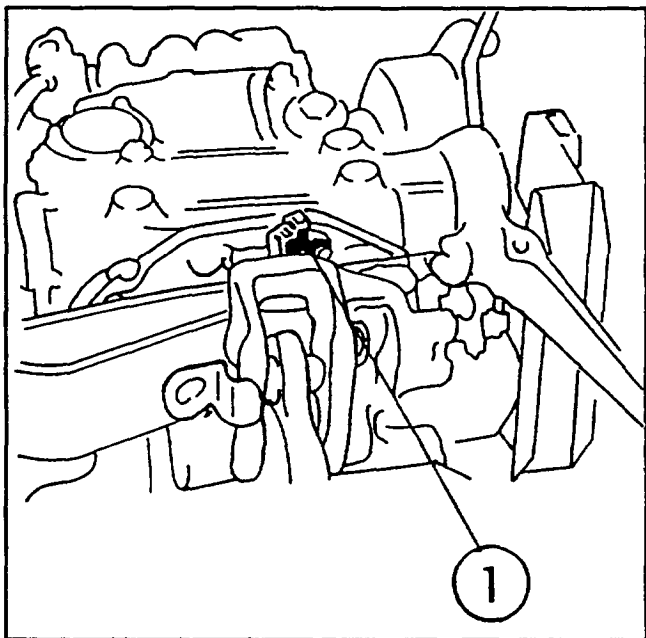


Fig. 22 - Upper Link Anchor

1. Upper Link Anchor Support Wedge, Rotated to the left.

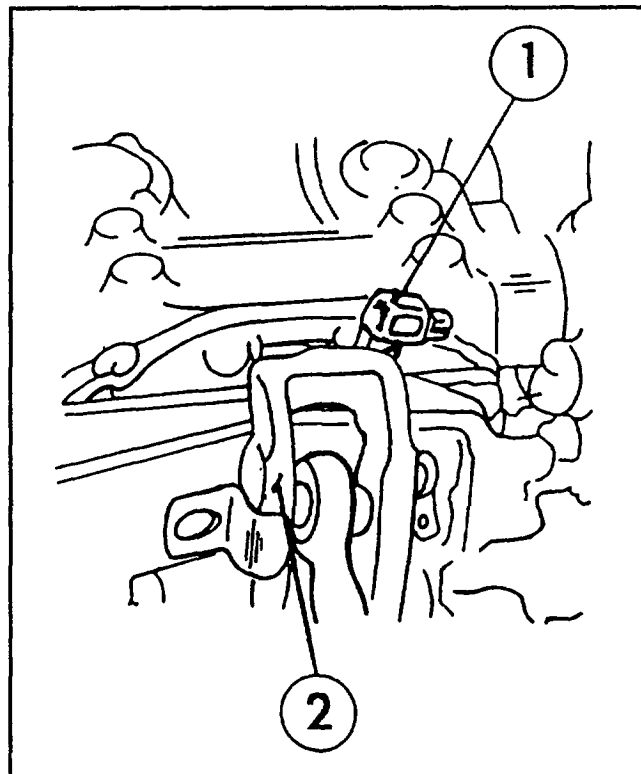
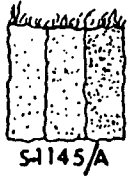
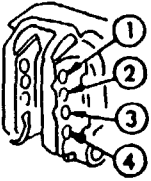


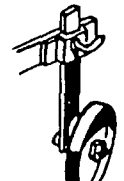
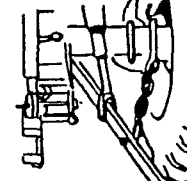


Fig. 24 - Upper Link Anchor

1. Upper Link Wedge, Rotated to the right.

GUIDE TO HYDRAULIC LIFT CONTROL

For proper use of the hydraulic lift, the operator should follow the recommendations. However, they cannot be held as fixed rules since the different working techniques and the diversified characteristics of an implement and its' work may require particular provisions that only experience can suggest case by case.

IMPEMENT	 S-1145/A Soft Nature	 Link Anchor Holes	 Required Use	 Upper Link Anchor Support Wedge	 Guage Wheels	 Sideways Limiting Chains	REMARKS
Moldboard Plows:							
— Single-furrow (one-way or two-way)	{ loose medium compact	1 or 2 2 or 3 3 or 4	} draft control	disconnected	no	slack	Adjust chains so that the implement is allowed limited sideways (2 - 2 3/8 inches)
— Two-furrow (one-way or two-way)	{ loose medium compact	2 3 4	} draft control	disconnected	no	slack	
— Three-furrow	{ loose medium compact	} 3 3 4	} draft control	diconnected	no	slack	
Disc Plows:							
— Two-Disc	—	3	} draft control	disconnected	no	slack	When in the raised position, the implement must not move sideways excessively
— Three-Disc	—	4	} draft control	disconnected	no	slack	
Narrow (blade, tooth or disc type)	{ —	3 or 4	draft control	disconnected	no	slack	{ During work, leave the lift control lever all the way down
Subsoilers	{ —	3 or 4	draft control	disconnected	no	slack	
Cultivators (of any type)	{ —	3 or 4	draft control	disconnected	no	slack	
Ditcher	{ —	3 or 4	draft control	disconnected	no	slack	
Weeders, Ridgers, etc.	—	3 or 4	position control	connected	yes	taut	
Carried Seed Drills	—	3 or 4	position control	connected	yes	taut	{ If the implement has gauge wheels, during work leave the lift control lever all the way down
Grader Blade, Augers, Scrapers, Manure Forks, Rear Mounted Transport Boxes, ect.	{ —	3 or 4	position control	connected	yes	taut	
Mower Bars (side & rear mounted)	{ —	3 or 4	position control	connected	yes	taut	

CAUTION: Adjust lifter response sensitivity by suitably setting lever (item 3 -fig. 20 - 23). Obtain maximum possible sensitivity without causing implement jolting or operator discomfort.

REMOTE CONTROL VALVE

The remote control valve allows the operator to operate a remote hydraulic cylinder.

If a single action hydraulic cylinder is to be used, the valve should be hooked up with one hose as shown in Fig. 25 or, if the valve is already hooked up with two hoses for a double action cylinder, be sure and connect the single action cylinder to the hose shown in Fig. 25

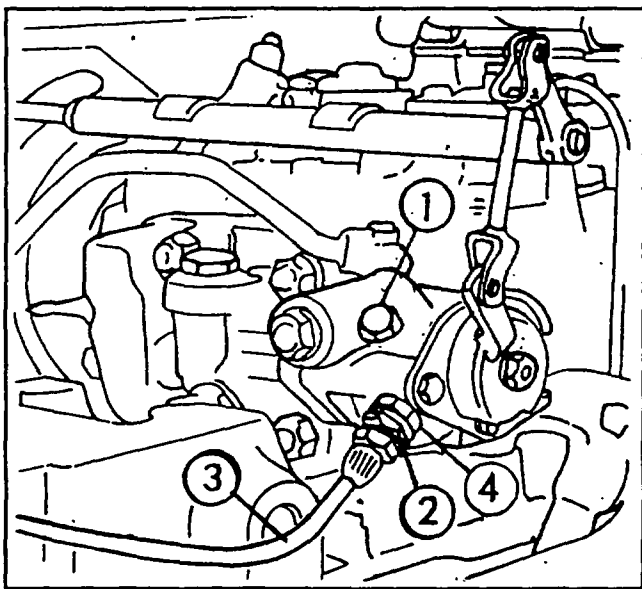


Fig. 25 - Remote Control Valve, Single Action Cylinder 1. Plug; 2. Metric to SAE Threaded Adaptor; 3. Hose; 4. Adaptor

If a double action cylinder is to be used, the valve should be hooked up with two hoses (Ref. Fig. 26.)

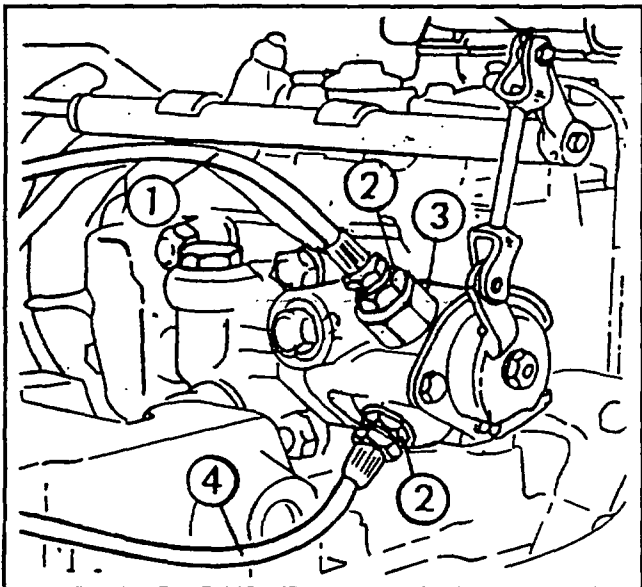


Fig. 26 - Remote Control Valve, Double Action Cylinder 1. Plug; 2. Metric to SAE Threaded Adaptor; 3. Hose; 4. Adaptor

POWER TAKE OFF

The power take off (PTO) control lever is located on the top of the tractor's transmission housing directly in front of the operator's seat. To engage the independent PTO; raise the PTO clutch lever to the disengaged position, shift the control lever to the left, push in the knob on the clutch lever and slowly lower the clutch lever to engage the PTO clutch.

To disengage the independent PTO, raise the PTO clutch lever, shift the PTO control lever back to the center or (neutral) position and lower the clutch lever. The PTO control lever should be kept in the neutral position at all times when the PTO is not in use.

NOTE: The PTO clutch must be kept in the engaged or (down) position at all times, except when the PTO control lever is being shifted. Failure to follow these guidelines can result in clutch and engine damage.

When heavy PTO requirements are encountered in the field during operation, the clutch pedal may be depressed to stop the motion of the tractor, without affecting the operation of the independent PTO. This allows the tractor to be stopped so that the PTO driven implement can clear itself of the overload. The main clutch however, should not be "ridden" or held partially at a disengaged position to slow the tractor's ground speed when an overload occurs. This will damage the clutch. (a well known condition known as "riding the clutch"). If field conditions change, and continuously overload the implement, shift the transmission to a lower gear.

To engage the ground synchronous PTO, depress the clutch pedal, stop the tractor, and shift the PTO control lever to the right. The PTO shaft will revolve at a speed proportional to the tractor's ground speed. To disengage the ground synchronous PTO, depress the clutch pedal and shift the control back to the center or (neutral) position. The ground synchronous PTO should always be disengaged before shifting the tractor into reverse, since the implement's rotation will also be reversed, thereby possibly resulting in damage.



CAUTION:

THE GROUND SYNCHRONOUS PTO, WHEN ENGAGED, IS CONNECTED DIRECTLY TO THE REAR WHEELS OF THE TRACTOR, REGARDLESS OF TRANSMISSION, MAIN CLUTCH, OR PTO CLUTCH POSITION. THEREFORE, TO STOP THE TRACTOR, THE ROTATION OF THE IMPLEMENT MUST ALSO BE STOPPED. AN IMPLEMENT WITH SUFFI-

CIENT ROTATIONAL INTERIA CAN OVER-POWER THE TRACTOR'S BRAKES, MAKING IT IMPOSSIBLE TO STOP THE TRACTOR QUICKLY. THIS CAN LEAD TO AN ACCIDENT, POSSIBLY CAUSING INJURY OR DEATH. TO PROTECT AGAINST SUCH AN OCCURRENCE, MAKE SURE THAT ANY IMPLEMENT USED WITH THE GROUND SYNCHRONOUS PTO IS DESIGNED FOR SUCH USE AND IS EQUIPPED WITH AN OVER-RUNNING (ONE-WAY) CLUTCH OR OTHER SUITABLE SAFETY DEVICE.

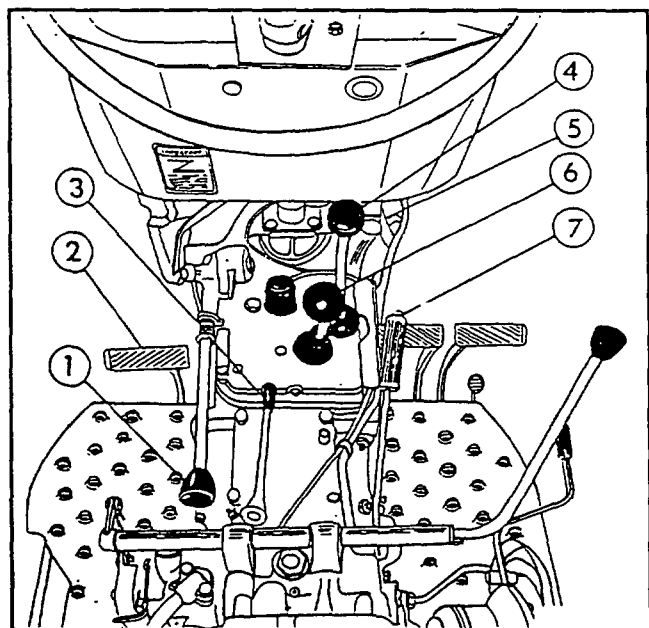


Fig. 27- P.T.O. Lever

1. P.T.O. Clutch Lever; 2. Clutch Pedal; 3. P.T.O. Lever; 4. Range Shift Lever; 5. Fuel Shut-Off; 6. Transmission Shift Lever; 7. Hand Brake

SAFETY PRECAUTIONS —PTO

WARNING:

Be sure to observe the following safety precautions when working with the PTO.

1. Before dismounting from the tractor, with or without the engine running, disengage the PTO (unless operating as a stationary power unit), place gear and range selector levers in neutral, lower implements and/or attachments to the ground, and apply the parking brake.
2. Be sure to disengage the PTO when not in use.
3. Keep the tractor's PTO shield in place at all times.
4. Keep the shields on the PTO driven equipment at all times.

5. Never permit anyone to adjust, clean, lubricate, or inspect a PTO driven implement until the tractor engine is shut off, with the PTO disengaged, the gear and range selector levers are in neutral, the tractor's parking brake is engaged, making certain that all moving parts have stopped, and the implement and/or attachment has been lowered to the ground or securely blocked.

PTO OPERATING HINTS

1. When attaching a pto driven implement to the tractor, be sure that the tractor engine is not running, the gear and range selector levers are in neutral, the parking brake engaged, and the PTO is disengaged. This will allow the PTO shaft to be turned by hand when attaching the implement to the tractor.
2. Always start the job in a low gear, to avoid overloading the tractor or the implement. You can always shift up if conditions permit.
3. Set the engine speed so that the PTO driven implement is driven at the standard PTO RPM. (2160 engine RPM for 540 PTO RPM).
4. If the tractor begins to lug, or a tough spot is encountered, depress the clutch to stop the tractor while the implement clears itself.
5. Do not use the throttle to slow down the travel speed of the tractor. The PTO driven implement is designed to operate at standard PTO RPM. If necessary, shift to a lower gear.

IMPORTANT: Always disengage the PTO before making sharp turns and before raising a mounted implement to its highest raised position. Failure to do so can cause damage to the tractor, the implement, or both.

DRAWBAR FOR PTO OPERATION

The drawbar, which is used in conjunction with the PTO driven implement, must be locked in the center of its quadrant and the top of the drawbar must be at least 8" (203mm) below the center of the PTO shaft. Also, the pin hole in the drawbar must be 14" (935mm) toward the rear of the PTO shaft. The drawbar can be adjusted to obtain the correct dimensions.

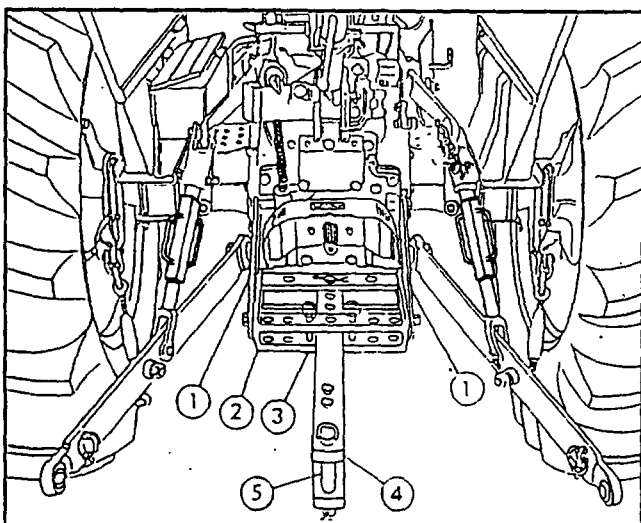


Fig. 28- Rear-Mounted Hitch with Swinging Bar
1. Support Arm; 2. Drawbar Assembly; 3. Pin; 4. Drawbar; 5. Drawhook

WEIGHTING THE TRACTOR

Conditions may exist where you plan to use the tractor and will want to add weight to the tractor to increase drawbar pulling efficiency, power, and to eliminate excessive wheel slippage. This additional weight can be in the form of a calcium chloride solution in the tires, cast iron wheel weights, or front "suitcase" weights. The amount of weight you need to add will depend on the soil conditions and the type of job(s) the tractor will be used for. As weight is added to the rear wheels, the increased draft force will tend to take weight off the front wheels.

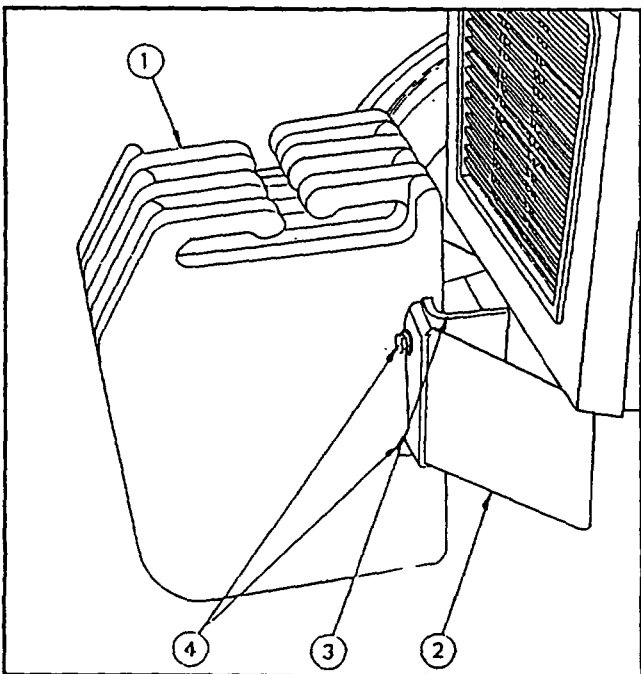


Fig. 29 - Front End Weights 1. Front Weights 2. Carrier 3. Retaining Clip 4. Bolt

IMPORTANT:

DTC tractors equipped with front end loaders must have an appropriate rear weight kit installed. This prevents damaging the DTC drive mechanism. Operation without the proper weights will void the warranty of DTC drive parts.



WARNING:

MAKE CERTAIN THAT THE TRACTOR IS EQUIPPED WITH ENOUGH FRONT END WEIGHT TO MAINTAIN STABILITY AND STEERING CONTROL.

It is recommended that you do not use more weight than is actually needed to provide good reasonable traction. It is also suggested that the added weight be removed for lighter jobs.

LIQUID FILLED TRACTOR TIRES

Since water alone will freeze inside the tires during cold weather, the tires should be filled with a calcium chloride and water solution. This solution will not harm the tire casing, tube, or valve stem. If your LONG dealer does not have the necessary equipment to install this solution, he should be able to refer you to someone that can.

NOTE: Do not substitute antifreeze for the calcium chloride. Tire deterioration could result.

Generally, the tires are filled about 3/4 full of liquid, and inflated to the recommended pressure. A solution of 3 1/2 lbs. of the calcium chloride per gallon of water (0.42 kg/l) is slush free to -12°F (-24°C), and will freeze solid at -52°F (-47°C). A 5lb/gal (0.60 kg/l) solution will freeze solid at -62°F (-52°C). If more weight is needed for a difficult traction condition, wheel weights may also be added.

If the valve core is to be removed for any reason, it will be necessary to jack the tractor up and turn the wheel until the valve stem is on top, or the solution will be lost.



WARNING:

THE CALCIUM CHLORIDE AND WATER SOLUTION USED IN TRACTOR TIRES CAN CAUSE SKIN IRRITATION, ESPECIALLY IF IT COMES IN CONTACT WITH THE EYES OR OPEN CUTS. AVOID DIRECT CONTACT WITH THE SOLUTION. WEAR PROTECTIVE RUBBER GLOVES. IN CASE OF CONTACT, WASH THE AFFECTED AREAS IMMEDIATELY. FLUSH WITH LARGE AMOUNTS OF CLEAR WATER.

REAR WHEEL WEIGHTS - 125 LBS. (57 KG) EACH

Rear wheel weights are available as optional equipment. They are bolted to the outside of the tractor's rear center disc. Two weights per wheel will add a total of 500 lbs (227 kg) to the tractor.

FRONT END WEIGHTS - 75 LBS. (34 KG)

A weight carrier and the weights are available as optional equipment. They are used to help add weight to the front of the tractor. Also, the calcium chloride solution may be added to the front tires as well.

IMPORTANT:

added weight of any kind directly to the tractor, must be limited by the gross tractor weight rating shown on the ROPS label.

PLOWING

When plowing with one wheel in the furrow, add more weight to the land wheel than the furrow wheel, as weight is shifted to the furrow wheel.

IMPORTANT:

Do not "overweight" the tractor. This puts excessive strain on the tires, drivetrain, and the engine and possibly other drive components.

TIRE INFLATION

Improper inflation is a large contributor to tire failure. Under-inflation will cause damage to the cord body of the tire. The repeated excessive flexing of the sidewalls may cause a series of breaks and separations in the chord body. Over-inflation should be avoided also. Over-inflation can cause reduced traction, in addition to tire damage. Never inflate the tires above the maximum pressure ratings marked on the tire. This could cause the tire to burst, possibly causing serious injury.

Always check tire pressure every two or three weeks. Special gauges are available for checking liquid filled tires. If your LONG dealer can fill the tire, he should carry the gauge used to check the tire pressures.

To determine the actual operating pressure of a liquid filled tire, the valve should be at the bottom of the tire. If a standard tire pressure gauge (air Only) is used, it is permissible to rotate the tire to the point where the

valve stem is on the top. Depress the valve core briefly to blow out the liquid in the valve stem and then check the tire pressure. Remember that the pressure will check lower than what it actually is. (2 - 3 PSI is standard for most tractor tires filled with liquid.

Tires that are filled with a liquid should be tested when the tires are cold and before the tractor is put into operation, as pressures tend to rise in the tire somewhat as the fluid get warm. A tire that has enough pressure when it is hot may be under-inflated when cold.

Generally, the tire inflation should be high enough in the rear tires to prevent wrinkling or buckling when pulling heavy draft loads.

TIRE PRESSURE

Refer to the manufacturer's recommendations for correct tire pressures.



WARNING:

THE PROPER AND SAFE MOUNTING OF TIRES, BOTH TUBE TYPE AS WELL AS TUBELESS, REQUIRE SPECIAL EQUIPMENT AND PROCEDURES. TO ATTEMPT MOUNTING ANY TIRES WITHOUT THE PROPER EQUIPMENT CAN CAUSE THE TIRE OR RIM TO RUPTURE DURING INFLATION, RESULTING IN AN EXPLOSIVE FORCE SUFFICIENT TO CAUSE VERY SEVERE INJURY OR DEATH. FOR THIS REASON, IT IS HIGHLY RECOMMENDED THAT TRACTOR TIRE MOUNTING BE DONE ONLY BY YOUR LOCAL TRACTOR TIRE DEALER OR OTHER EQUIPPED LOCATIONS WHICH ARE TRAINED AND QUALIFIED TO PERFORM THE NEEDED SERVICE.

SEAT ADJUSTMENT

Your new Long tractor is equipped with an adjustable sliding seat which can be positioned for optimum operator comfort. The seat can be adjusted 4 ways.

1. The seat can be adjusted forward or backward by moving the lock lever (Fig. 30, item 4) toward the left-hand fender, position the seat where desired, then return the lock lever to its locked position.
2. The entire sliding mechanism can be moved forward or backward by removing two bolts (fig. 30, item 2) and repositioning the seat

3. The entire seat and suspension assembly can be moved forward or backward by removing four bolts (Fig. 30, item 3), and reposition the entire assembly. Two bolts must always be used on each side.
4. The spring tension of the seat suspension can be varied to give a harder or softer ride by turning the adjusting knob (Fig. 30, item 1).

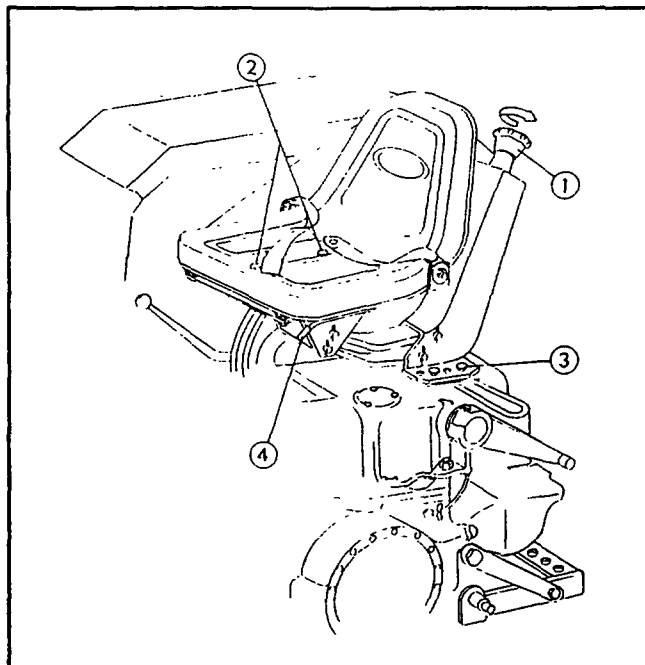


Fig. 30- Seat Adjustment 1. Adjusting Knob; 2. Cap Screws; 3. Mounting Holes; 4. Lock Lever;

WHEEL TREAD ADJUSTMENT

The rear wheels can be adjusted from 55 1/4" (1403mm) to 75 1/4" (1911mm) in 6 different positions. the front wheels can be adjusted from 57" (1448mm) to 84" (2134mm) in 7 different positions.

Generally, the rear wheel tread is set first to fit the job at hand, then the front wheel tread is set accordingly.

In row crop work and for harvesting, weeding, mowing, etc., it is advisable to have the outer walls of the front and rear tires in alignment or as close as possible. In plowing, it is better to have the inside walls of the front and rear tires aligned.

The following diagram will help in wheel tread adjustment. The diagrams shows the maximum and minimum settings for the 2460 tractor. As noted above, there are 6 different positions with in the A and B range for the rear tires and a total of 7 different positions between C and D for the font tires. Following these guidelines will make the desired application easier to

obtain. Any other variation from these listed will make the tractor hand in an unusually irate manner and may cause some very noticeable handling problems while in the field.

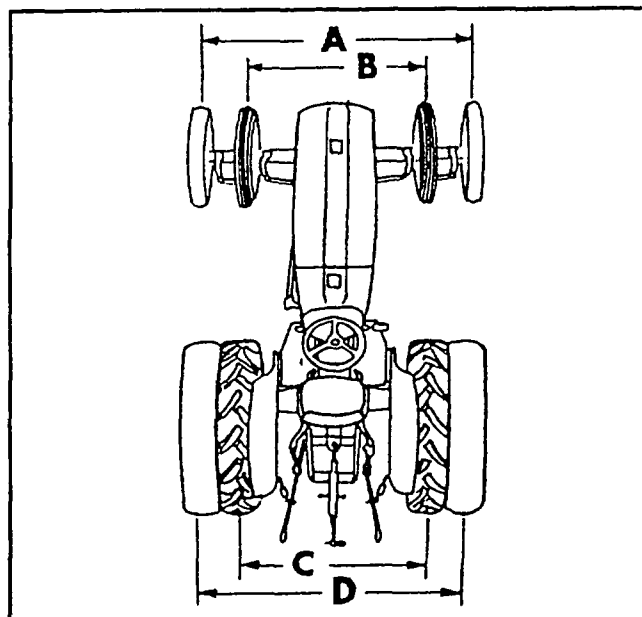


Fig. 31 - Wheel Tread Adjustments

Dim.	Inches	MM
A (max.)	84.0	2134
B (min.)	57.0	1448
C (min.)	55.75	1403
D (max.)	75.75	1911

ADJUSTING REAR WHEELS

The rear wheel disc can be mounted on the hub with the dish in, for narrow tread patterns and with the dish out, for wider tread patterns.

The rim lugs can be mounted on either side of the center disc. In addition, the rim lugs are offset to one side of the rim which makes it possible to install the wheels with the tire's center on either the inside or outside of the lugs.

To reverse this relationship of tire center and rim lug, the wheel can be moved from one side of the tractor to the other without turning it around.

NOTE: The tread on both tires must always point in the same direction, and the tires must rotate in the same direction as the arrow located on the tire. This means that the tire must be mounted on the opposite side of each rim.

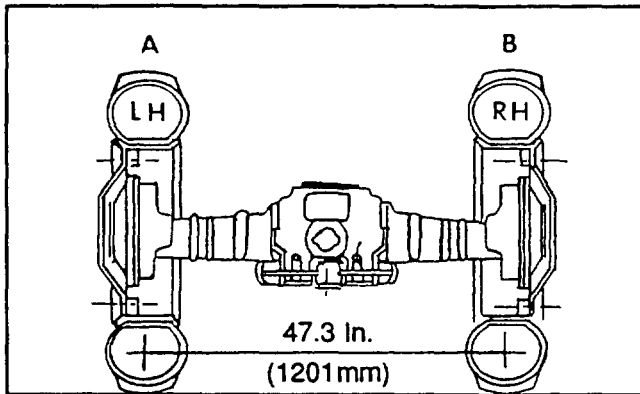


Fig. 32 - Disc Dish In Lug, Inside of Disc

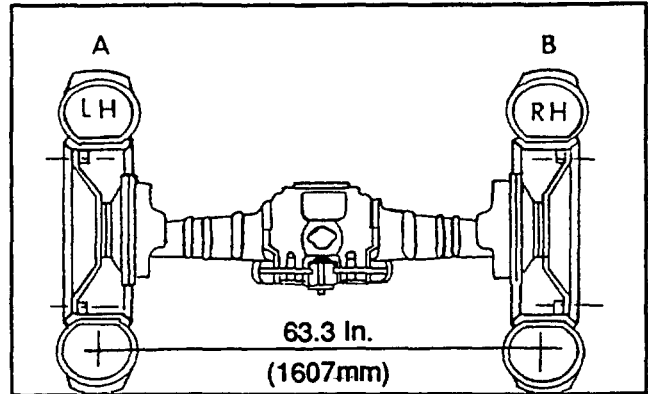


Fig. 36 - Disc Dish In Lug, Inside of Disc

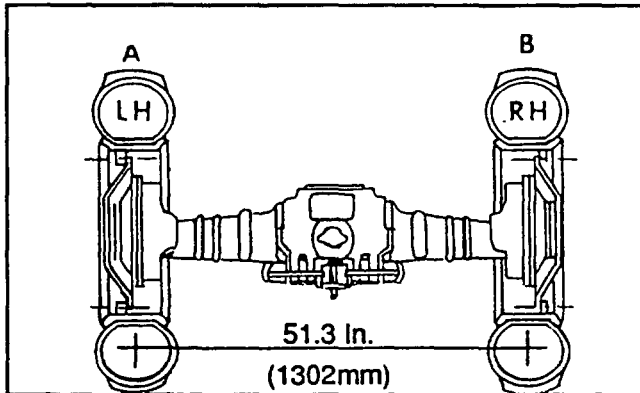


Fig. 33 - Disc Dish In Lug, Outside of Disc

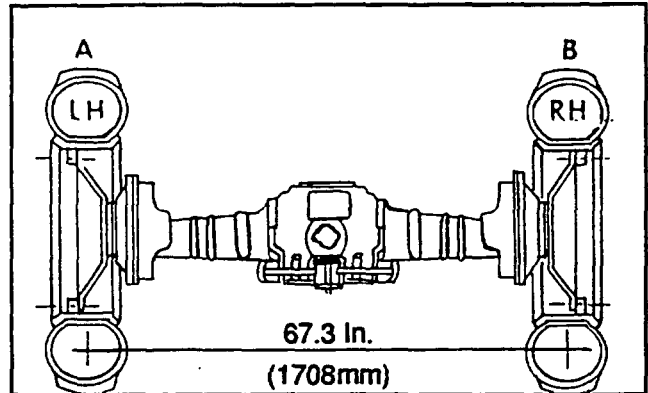


Fig. 37 - Disc Dish Out Lug, Outside of Disc

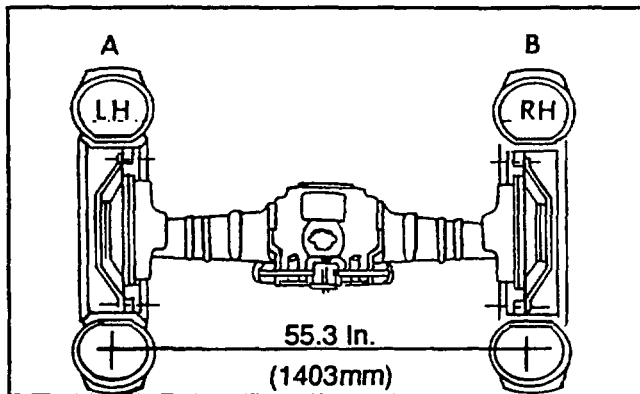


Fig. 34 - Disc Dish In Lug, Inside of Disc

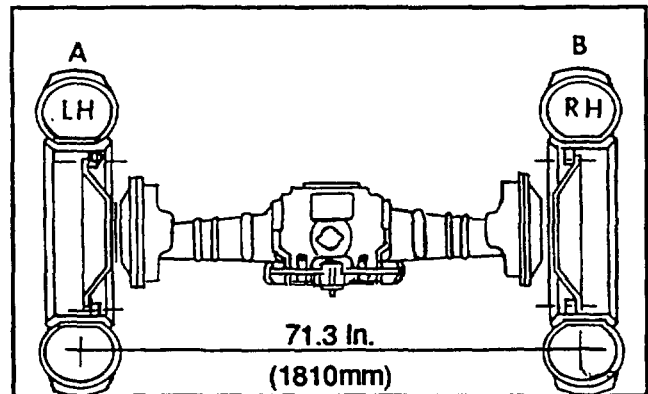


Fig. 38 - Disc Dish In Lug, Inside of Disc

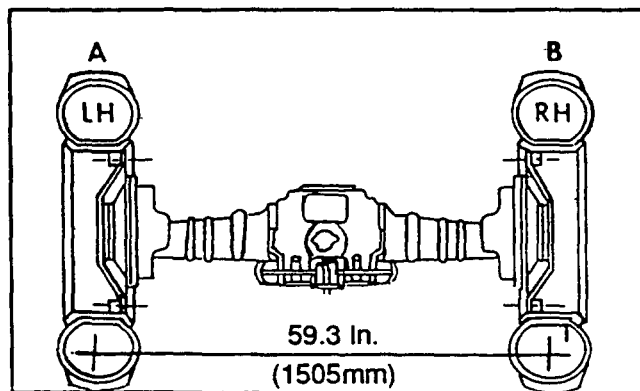


Fig. 35 - Disc Dish In Lug, Outside of Disc

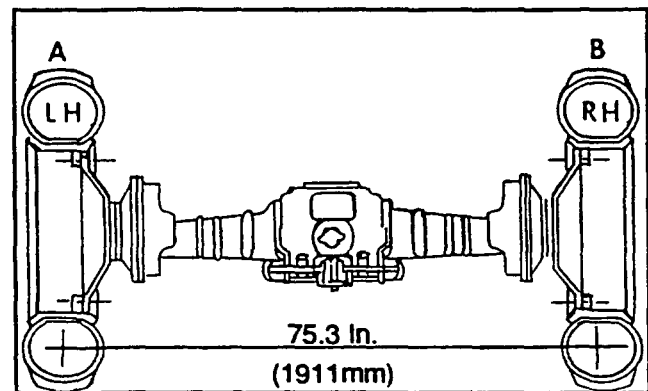


Fig. 39 - Disc Dish In Lug, Outside of Disc

The previous page gives 8 possible combinations for tread width. (See Fig.'s 32 - 39). The narrowest tread is not available, and the next tread is available with tire sizes of 13.6 or narrower, due to interference with the tractor's fenders.

REAR WHEEL TREAD (Power Adjust Wheels)

The rear wheel tread can be adjusted from 52 1/4" (1307mm) to 76 1/4" (1947mm) by following the steps listed below:

1. Loosen the 4 rail clamp bolts.
2. Remove the wheel stop next to the two rail clamps. Which stop you need to remove will depend on whether you want to increase or decrease the wheel tread.
3. Place the two wheel stops in the desired holes in the rails and tighten the capscrews.

NOTE: Moving the wheel stops from one rail hole to the next will change the tread by 2" (51mm)

4. Place the transmission in low gear or reverse, depending on whether you are increasing or decreasing the tread.

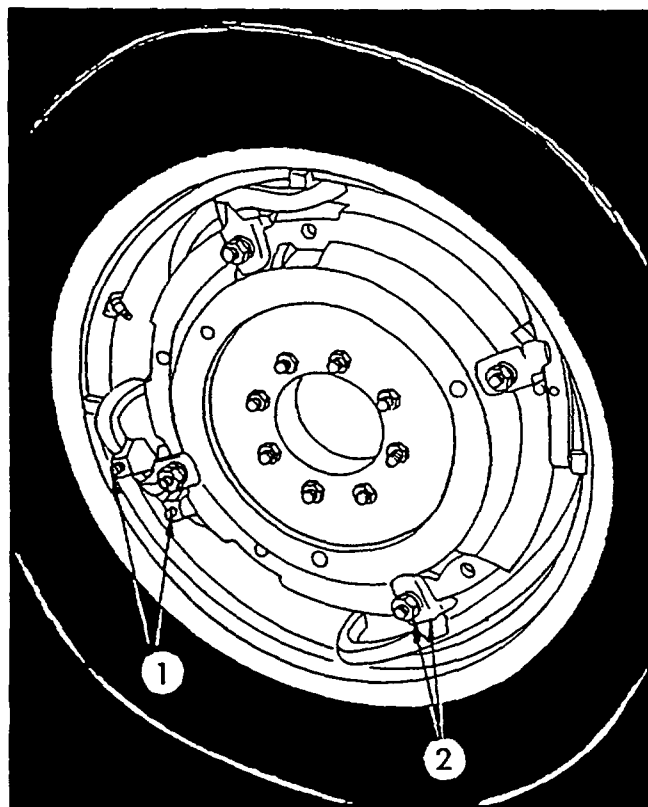


Fig. 40 - Power Adjust Wheels 1. Wheel Stop; 2. Rail & Clamp Bolt

5. Hold the brake on the wheel not being adjusted.
6. Engage the clutch quickly or suddenly to move the wheel in or out.
7. Place the wheel stops against the rail clamps and tighten them.
8. Tighten the four rail clamp bolts to the following torque 200 ft-lbs. (271 N-m).
9. Check that the rear lug bolts are torqued to 190 ft-lbs. (258 N-m)



WARNING:

NEVER OPERATE A TRACTOR WITH LOOSE OR MISSING WHEEL, RIM OR LUG BOLTS. THE TIRE AND RIM CAN SUDDENLY RING ITSELF OFF AND RENDER THE TRACTOR UNCONTROLLABLE THUS CAUSING THE TRACTOR TO ROLL OVER, POSSIBLY CAUSING INJURY OR DEATH.



WARNING:

CHECK ALL TORQUES AND RE-TIGHTEN ANY BOLTS IF NECESSARY AFTER 1 HOUR'S OPERATING TIME AND THEN ONCE DAILY UNTIL THEY SEAT AND REMAIN TIGHT.

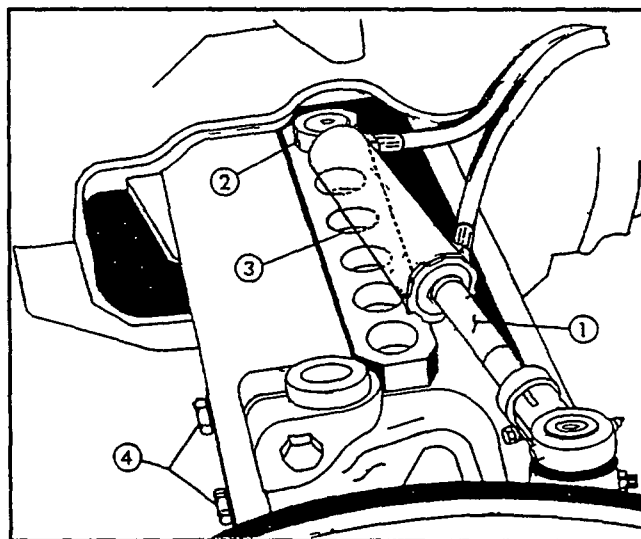


Fig. 41 - Front Axle

1. Steering Cylinder; 2. Bolt (Bushing Under Cylinder) 3. Cylinder Adjustment Holes; 4. Axle Adjustment Bolts

ADJUSTING FRONT WHEELS

The tractor's front axle consist of three parts; a center section attached to the tractor's chassis, and two axle ends which carry the wheels and slide into the center section.

To set the front wheels, use the following procedure:

1. Jack up and securely block the front of the tractor so that the axle swings freely. Optional: Jack up and block one side of the tractor's front axle and repeat the procedure on the other side of the tractor.
2. Remove the 4 bolts holding the axle ends in the axle center, the 4 bolts on the tie rod clamps, and the bolt holding the steering cylinder to the axle center.
3. Slide the axle ends to the desired new setting, making sure to extend the tie rods the same amount.
4. Move the bushing under the steering cylinder to its new position, and then attach the cylinder, making sure the front wheel angle has not changed. (There is a cylinder mounting hole for each axle position).
5. Replace all bolts and tighten.
6. Check the toe in of the front wheels and adjust accordingly.

When the axle has been extended to its' maximum width, a wider tread (maximum) may be obtained by turning the front wheels around.

NOTE: Make this adjustment only if absolutely necessary. Do not use this widest tread position for heavy front axle loads, such as using a front end loader. This may cause severe axle damage.

FRONT WHEEL TOE IN

The proper toe-in for this tractor is $3/8"$ (10mm). Always check the toe-in by measuring the distance between the inside edges of the front rims at the hub height. The measurement on the front side of the rims should be ($3/8"$ 910mm) less than the measurement on the back side of the rims. To adjust the toe-in use the following procedure:

1. Remove the rod end from the right hand steering arm.

2. Loosen the right hand locknut on the connecting bar between the two tie rods.
3. Turn the right hand tie rod to adjust the toe-in.
4. Replace the right hand tie rod end in the steering arm to check the toe in.
5. When the toe-in is correct, replace the tie rod end and tighten all nuts. Replace the cotter pin key in the tie rod end.

NOTE: For DTC tractors, the front wheels should set with a $3/8"$ (10mm) toe-out. This means that the front wheels should be closer together at the rear, rather than the front as on the STD.

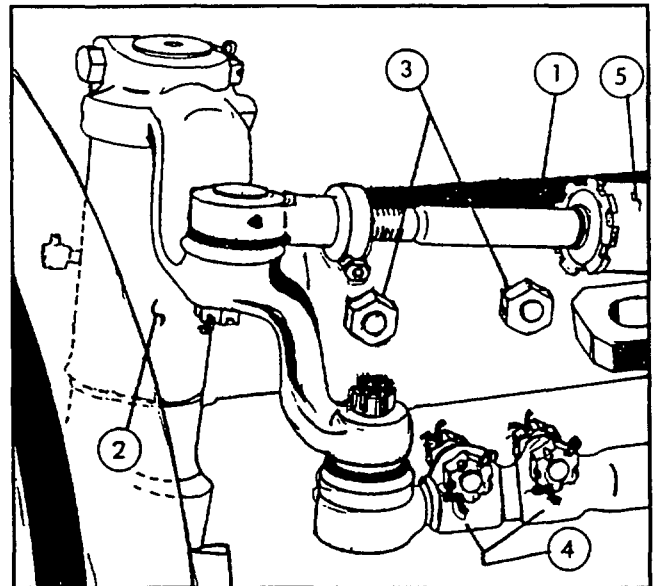


Fig. 41 - Front Axle

1. Axle Center; 2. Axle End; 3. Axle Adjustment Bolts; 4. Tie Rod Clamps; 5. Steering Cylinder

WHEEL TORQUES

The following torques are recommended for the wheels

- A. Front wheel disc to hub — 90 ft-lbs. (122 N-m)
- B. Rear wheel disc to hub — 190 ft-lbs. (258 N-m)
- C. Rear wheel rim to disc — 130 ft-lbs. (176 N-m)



WARNING:
CHECK ALL TORQUES AND RE-TIGHTEN ANY BOLTS IF NECESSARY AFTER 1 HOUR'S OPERATING TIME AND THEN ONCE DAILY UNTIL THEY SEAT AND REMAIN TIGHT.

TRACTOR LUBRICATION AND MAINTENANCE

This section will deal with maintenance and lubrication requirements for your tractor. Make certain you follow the times intervals and types of lubricants that are recommended.

TRACTOR LUBRICATION

The service life and dependability of your tractor largely depends on your using the proper lubricants along with the correct lubrication being carried as planned.

Tractor lubrication is, therefore, one of the most important service operations for your tractor and requires particular attention to detail.

1. Check the level of the oil in the engine, gearbox, final drives, etc. Check these fluids when the engine is cold and the tractor is level.
2. Oil changes should be made at the end of the day's work. Oil drains more easily when hot.
3. Clean grease fittings before and after you apply grease with a grease gun, to help prevent the accumulation of dirt and dust.
4. Clean the tractor weekly, when in use, removing any dust, dirt, and mud. After using chemicals and fertilizers, remove the residue from the tractor and tires.

Assembly	Quantity	Type
Cooling System	16qt. (13.2 L)	Permanent type Antifreeze
Fuel Tank	16.0 gal. (60.5 L)	#2 Diesel Fuel
Engine Oil Sump and Filter	7.3qt. (7.0 L)	SAE 15W-40 API Rating
Engine Oil Sump w/out Filter	6.3qt. (9.0L)	SF, CD (MIL-L-45199B) or Equivalent
Air Cleaner Oil Sump	1.0qt. (0.9L)	Motor Oil SAE 10W-30

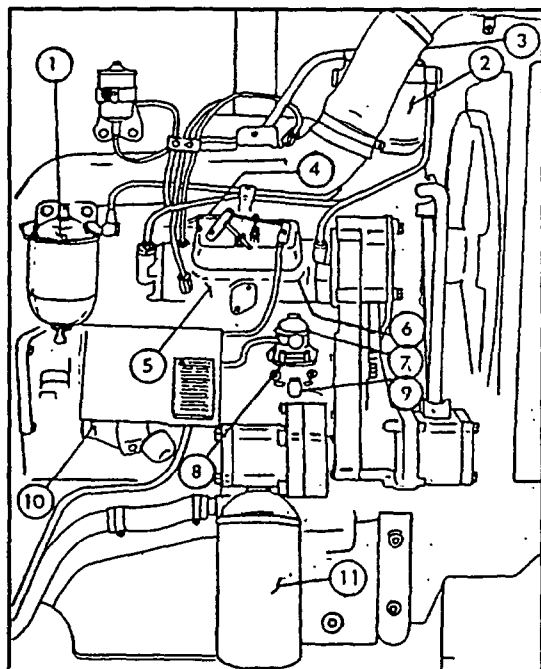


Fig. 43 - Engine (Right Hand Side)

1. Primary Fuel Filter; 2. Secondary Fuel Filter; 3. Air Vent Plug; 4. Upper Vent Plug; 5. Lower Vent Plug; 6. Injection Pump; 7. Fuel Pump Cover; 8. Fuel Pump; 9. Priming Lever; 10. Starter Motor; 11. Hydraulic Filter

Assembly	Quantity	Type
Transmission Housing	21.1qt. (20.0 L)	Exxon Torque Fluid 56 or equivalent
Final Drive Housing	2.1qt. (2.0 L)	SAE 90 EP Gear Oil
Front Drive Axle: Differential (DTC only)	3.0qt. (2.84 L)	SAE 90 EP Gear Oil
Planetary Hubs (DTC only)	1.7qt. (1.6 L)	SAE 90 EP Gear Oil
Steering Reservoir	2.8qt. (2.6 L)	Exxon Torque Fluid 56 or equivalent
Grease Fittings	—	Muti-Purpose Lithium Grease

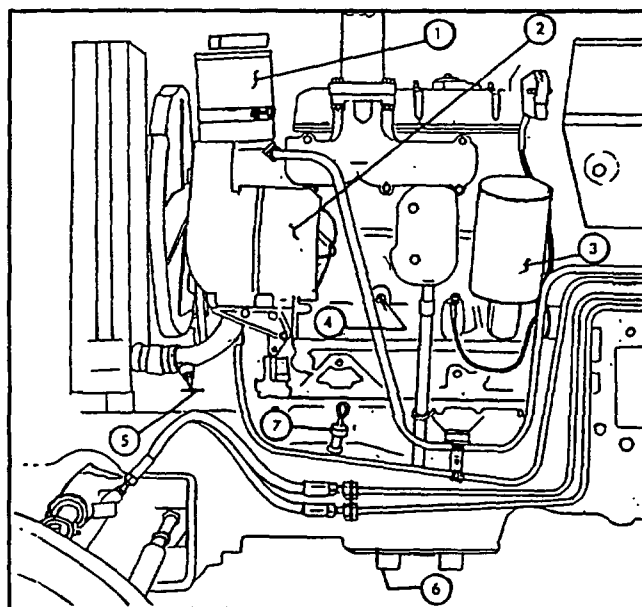


Fig. 44 - Engine (Left Hand Side)

1. Power Steering Reservoir; 2. Alternator; 3. Engine Oil Filter; 4. Block Drain Cock; 5. Radiator Drain Cock; 6. Oil Drain Plug; 7. Oil Dipstick;

LUBRICATION AND SERVICE GUIDE

Break-In Period		Maintenance To Be Performed	Normal Maintenance and Lubrication Period					
Operating Hours			Operating Hours					
8-10	60		8-10	60	120	250	500	1000
•		Check engine oil sump level	•					
	•	Change engine oil			•			
	•	Change Engine oil filter			•			
•		Check engine radiator coolant level	•					
		Change engine radiator coolant						•
	•	Check fan V-belt tension			•			
		Drain and clean fuel tank					•	
		Change primary fuel filter cartridge				•		
		Change secondary fuel filter cartridge						•
	•	Change primary fuel filter bowl		•				
	•	Clean fuel pump filter			•			
	•	Check oil level in air cleaner sump		•				
		Clean air filter sump and element, change oil			•			
		Remove air filter assembly, disassemble and clean				•		
		Adjust clutch pedal free play and the control lever				•		
		Adjust brake pedal free play				•		
		Change power steering oil and clean filter (Hydrostatic steering)			•			
	•	Check oil level of front drive axle differential (DTC only)			•			
	•	Check oil level of front drive wheel's planetary system (DTC only)			•			
	•	Change oil of front drive axle differential (DTC only)						•
•		Check oil level of transmission housing	•					
		Change oil in transmission housing						•
	•	Change oil of front drive wheel's planetary system (DTC only)						•
	•	Change oil of front drive axle reduction gearbox (DTC only)						•
	•	Change hydraulic system filter element				•		
•		Check tire pressures	•					
	•	Check level of battery electrolyte		•				
	•	Lubricate tie rods		•				
	•	Lubricate steering knuckle pivot		•				
	•	Lubricate front axle pivot		•				
	•	Lubricate clutch release bearing		•				
	•	Lubricate brake shaft		•				
	•	Lubricate three point hitch and hydraulic lift mechanism		•				
	•	Lubricate front U-joint (DTC only)		•				
	•	Lubricate front-axle-pivot (DTC only)		•				
•		Check tightness of all bolts, nuts, fittings and unions. Torque to proper value.	•					
	•	Have dealer check valve clearance and torque head bolts					•	
	•	Lubricate front Kingpins (DTC only)		•				

ENGINE OIL

Check the engine oil level every 10 hours or at least daily. It is recommended that the oil level be checked at the Beginning of a work day prior to starting the engine while it is cold.

If the engine is or has been running, stop the engine and wait at least 30 minutes for the oil to drain down before checking the oil level.

Maintain the oil level between the upper and lower marks on the dipstick at all times. Never fill the crankcase above the upper mark. Add oil through the oil filter opening in the valve cover. (item #7 Fig. 44)

CHANGING OIL AND FILTER

On a new tractor, change the oil and oil filter after the first 60 hours of operation. The engine oil is drained from the plug in the center of the oil sump cover plate on the bottom of the engine. Oil should be drained when the engine is warm as this lets the oil drain better. (item #3 Fig. 45)

⚠ WARNING:
HOT OIL CAN CAUSE SEVERE BURNS. USE EXTREME CAUTION WHENEVER CHANGING OIL.

After this initial oil change, the oil and oil filter should be changed after every 120 hours of operation.

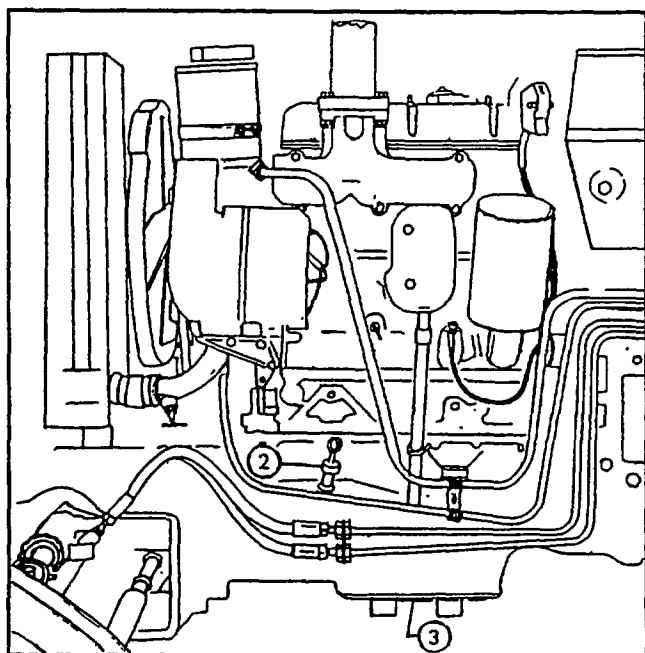


Fig. 45 - Engine Oil Filter, Dipstick and Drain
1. Oil Filter; 2. Dipstick; 3. Drain

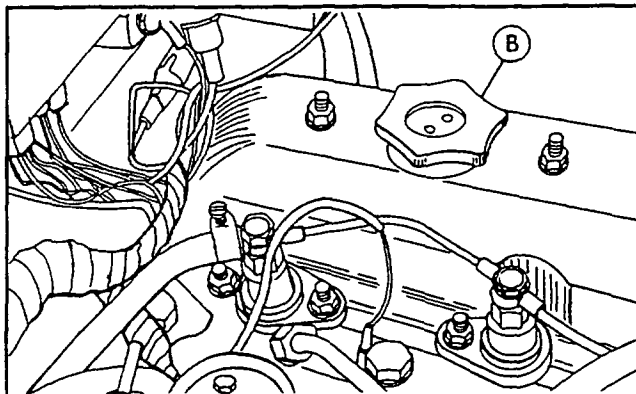


Fig. 46 - Engine Oil Fill Cap

When changing filters, make certain that the old gasket is completely removed from the filter mount before installing a new one.

Refer to the lubrication chart for type and quantity of oil to be used.

COOLING SYSTEM

Check the coolant every 10 hours of operation or at least daily when the engine is cold. The Coolant level should be approximately 1 3/16" (30mm) below the radiator neck. (Ref. Fig. 49) Do not over fill.

⚠ WARNING:
DO NOT REMOVE THE RADIATOR CAP WHILE THE ENGINE IS HOT. THE RADIATOR IS PRESSURIZED WHEN HOT AND IF OPENED, STEAM AND BOILING COOLANT WILL BE SPRAYED OUT, POSSIBLY CAUSING SERIOUS BURNS AND EYE INJURY.

The tractor is shipped with a 50% permanent type antifreeze solution which will protect the engine down to -20°F (-29°C).

In areas where antifreeze is not needed for protection against freezing, it is recommended that a solution of at least 33% antifreeze be used to prevent rust and corrosion within the cooling system.

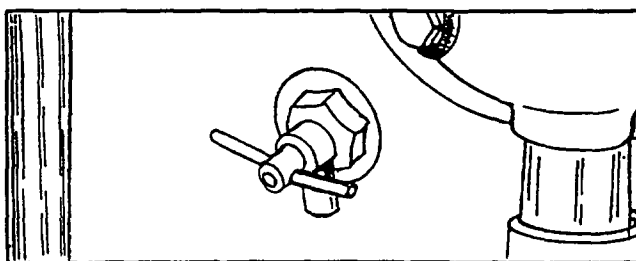


Fig. 47 - Engine Drain Cock or Drain Plug

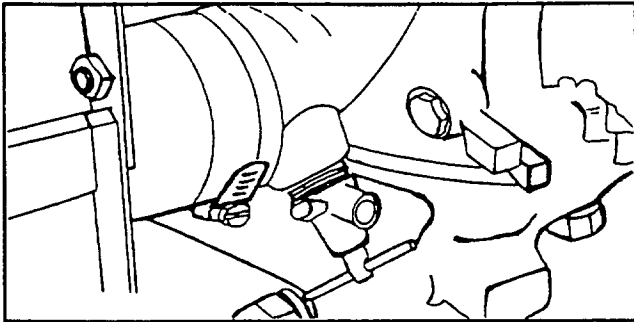


Fig. 48 - Radiator Hose Drain Cock

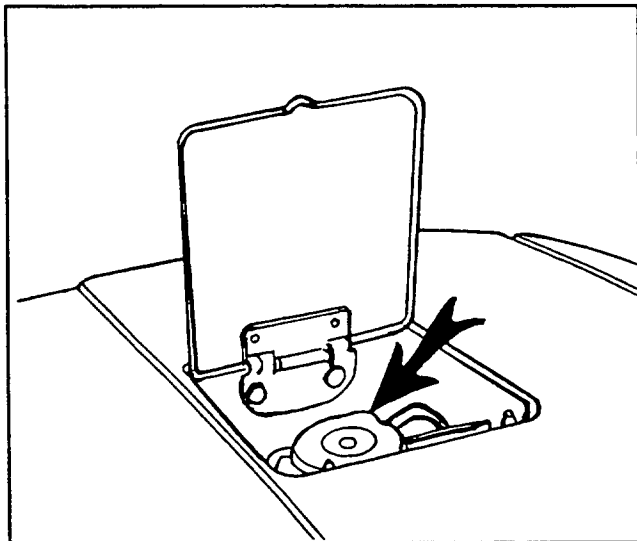


Fig. 49 - Radiator Fill Cap

The rust and corrosion inhibitors in antifreeze lose their effectiveness after approximately two years. Therefore, the cooling system should be flushed and refilled with a fresh antifreeze solution every two years.

The use of 100% antifreeze is not recommended since a certain amount of water is required to make the antifreeze effective. Always use a permanent (ethylene glycol) type antifreeze. Never use a methanol type antifreeze.

The radiator drain cock is located on the lower radiator hose on the left hand side of the engine. The engine drain cock is located on the left side of the engine block. Open both drains at the same time to drain the cooling system. Another alternative is to drain one at a time which will take a little longer for the coolant to drain. Removing the radiator cap will also help to speed up the draining process.

FAN BELT

The fan belt tension should be checked after the first 60 hours of operation, and every 120 hours thereafter. Not enough tension on the V-belt can cause overheating

and low alternator output. Too much tension can place undue strain on the alternator bearings, water pump bearings, and the fan belt, resulting in premature failure.

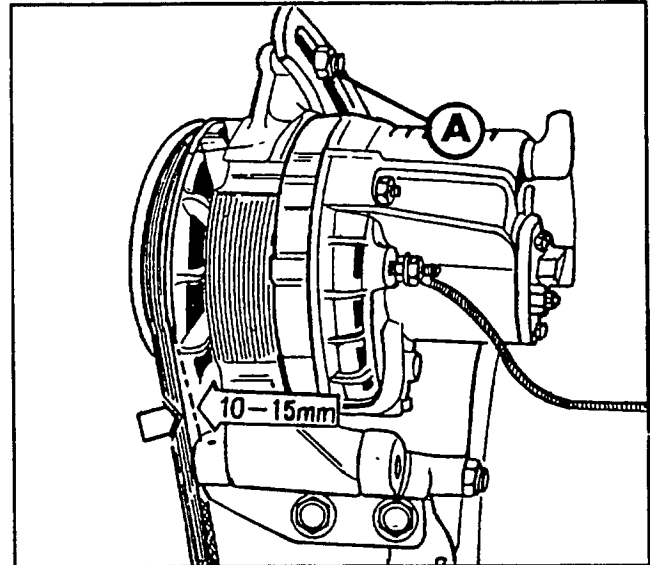


Fig. 50 - Fan Belt Adjusting Bracket

To check the tension, depress the belt midway between the alternator and the crankshaft pulley with a force of 11-15 lbs. (5-7 kg). The belt deflection should be between 3/8 - 19/32" (10 - 15mm). To adjust the belt, loosen the alternator mounting bolts and rotate the alternator to tighten the belt. Tighten the alternator mounting bolts. (See Fig. 50)

CLUTCH ADJUSTMENT

The main clutch should have some free play. The recommended amount of free play should be 1 3/8" to 1 9/16" (35 - 40mm) as shown in Fig. 50, item "N". If the free play drops, due to wear, below 1" (25mm) adjust the clutch as follows:

1. Detach the fork (3) from the clutch release lever by removing the pin (4).
2. Loosen the locknut (2) and extend the length of the clutch rod (1) by rotating the fork as required.
3. Re-connect the fork and check the free play.
4. When the free play is within the recommended amount, tighten the locknut.

The PTO clutch lever should have some free play as well. The recommended amount for the PTO clutch lever is 1 9/16" (40mm) as shown in Fig. 50, item "X". When the free play drops below 1" (25mm), adjust the PTO clutch lever as follows:

1. Detach the fork (7) from the PTO clutch release lever by removing the pin (8).
2. Loosen the locknut (5) and adjust the length of the PTO clutch rod (6) by rotating the fork.
3. Re-connect the fork and check the lever for free play.
4. When the free play is within the recommended amount, tighten the locknut.

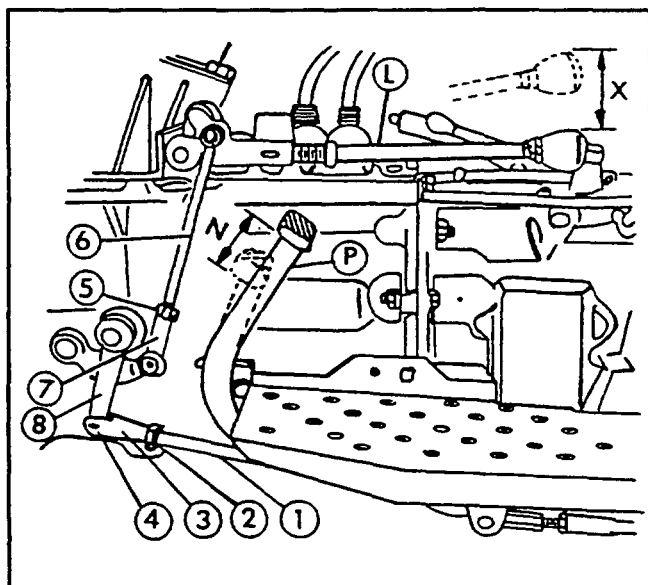


Fig. 51 - Clutch Controls

1. Main Clutch Control Rod; 2. Locknuts; 3. Forkhead; 4. Pin; 5. Locknuts; 6. P.T.O. Clutch Control Rod; 7. P.T.O. Clutch Fork; 8. Pin, P.T.O. Fork; 9. P.T.O. Clutch Control Lever; 11. Main Clutch Control Pedal; P. Pedal Free Travel; L. Lever Free Travel

TRANSMISSION AND HYDRAULIC OIL

Check the transmission and hydraulic oil every 10 hours or at least daily, by the transmission dipstick. The lift arms should be down for this procedure and any remote hydraulic cylinders retracted before checking the transmission oil. The oil level should be maintained between the two marks on the dipstick. Refer to the lubrication chart for the correct type and quantity of oil.

Oil is added through the plug in the front left hand corner of the transmission cover. Be sure to clean the areas around the dipstick and plug before removing either of them (Fig.'s 52 & 53).

After the first 60 hours, the transmission oil should be changed. Thereafter it should be changed every 1,000 hours, or once each year, whichever comes first. Drain the oil (when hot) by removing the plug in the bottom of the transmission housing, and the plug in the bottom of the differential housing (Fig. 55).

! WARNING:
HOT OIL CAN CAUSE SEVERE BURNS. USE EXTREME CAUTION WHENEVER CHANGING OIL.

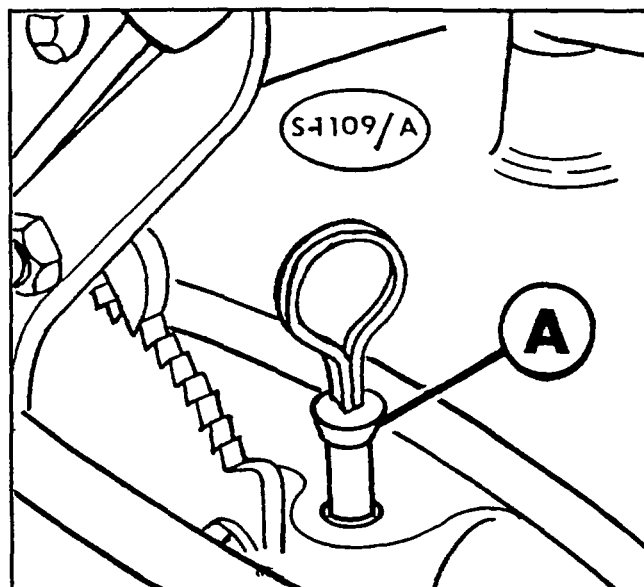


Fig. 52 - Transmission Oil Dipstick

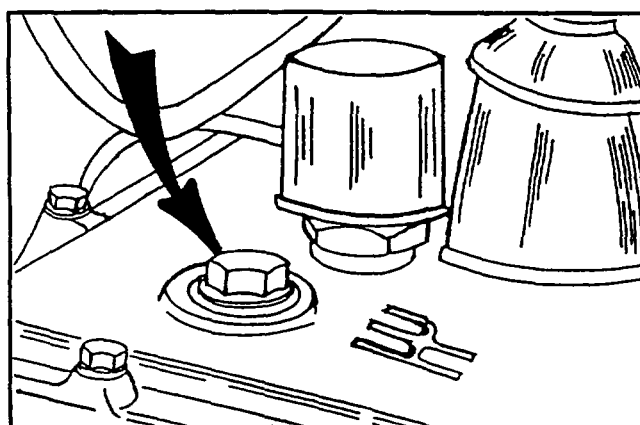


Fig. 53 - Transmission Oil Filler Plug

HYDRAULIC FILTER (Ref. Fig. 54)

After the first 60 hours, the Hydraulic filter should be changed. Thereafter it should be changed every 250 hours. The filter is changed in the same manner as the engine oil filter.

NOTE: Be sure that the filter mount is clean and free of gasket material before installing the new filter. Check the transmission oil level after changing the filter and add oil as required to bring the level to the to or very near the upper mark on the dipstick.

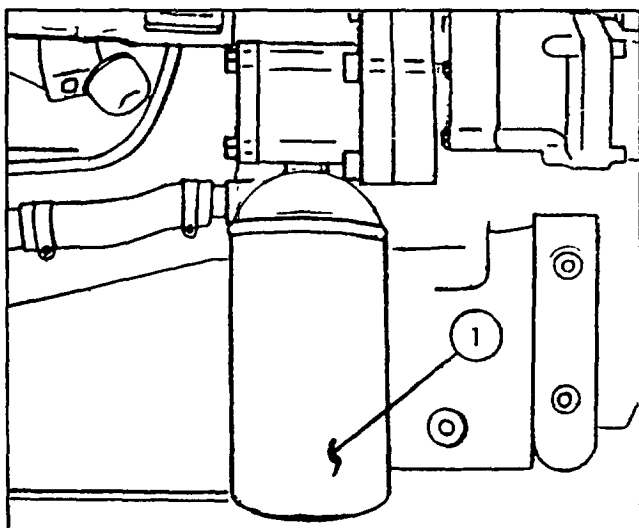


Fig. 54 - Hydraulic Filter

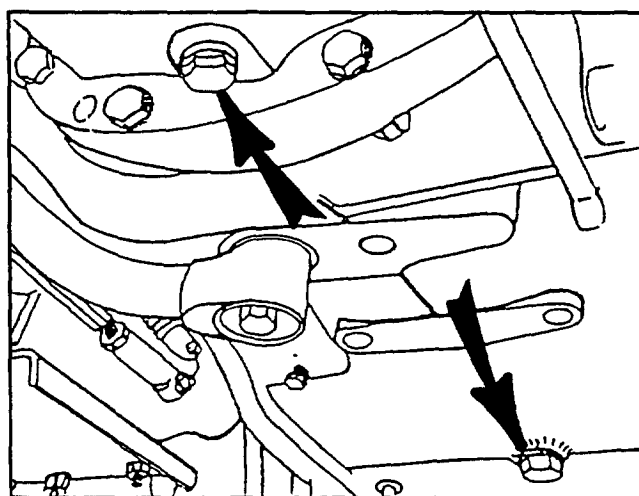


Fig. 55 - Transmission Oil Drain Plug

WHEEL BRAKES

The brake pedal should have some free play. The recommended amount of free play should be 1 - 2" (25-50mm). The free play is the same for both pedals. If an adjustment is required use the following steps:

1. Apply the parking brake.
2. Loosen the locknut on the brake band centering screw, tighten the screw until it locks down, and then back it out 1 1/2 turns. Tighten the locknut.
3. Loosen the locknut and turn the brake rod until the free play is completely taken up. Then loosen the brake rod until the desired free play is obtained.
4. Tighten the locknut.
5. Repeat the procedure for the other side.

NOTE: Be certain that both brakes are adjusted equally. If necessary, re-adjust one of the brakes to obtain equal free play on both sides.

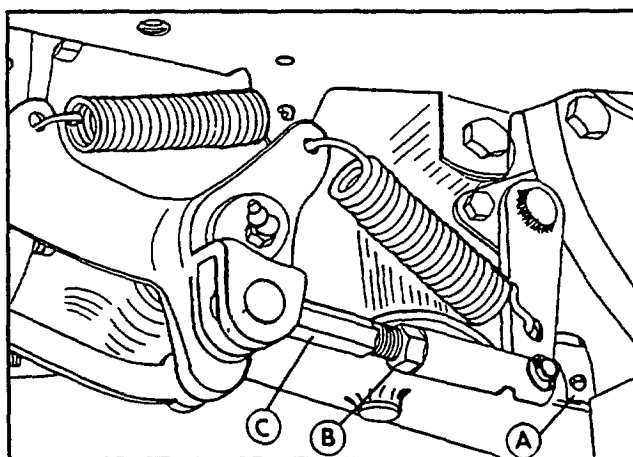


Fig. 56 - Brake Pedal Adjustment

1. Brake Band Centering Screw; 2. Lock Nut; 3. Rod

SERVICING THE PRECLEANER (Ref. Fig. 57)

When the precleaner bowl is approximately 1/3 full of dust and dirt, clean it by unscrewing the top of the precleaner, removing the bowl, and emptying it. Wash the bowl in soap and water, if necessary.

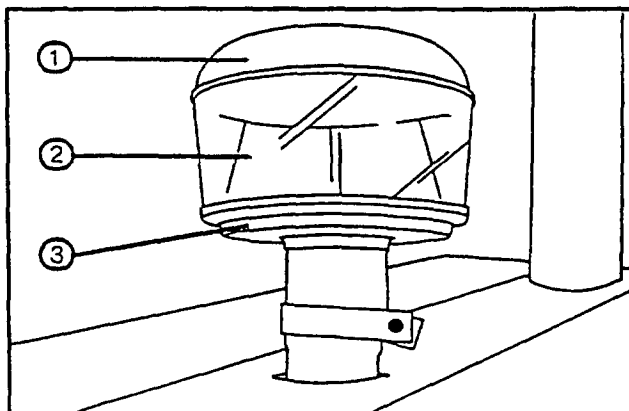


Fig. 57 - Precleaner

1. Cap; 2. Bowl; 3. Base

SERVICING THE AIR CLEANER (Ref. Fig. 58)

After every 60 hours of operation check the oil level in the air cleaner oil sump. Wait at least 15 minutes after the engine has been shut off before performing this check, so as to allow the oil to drain back into the sump. If the impurities and sediments in the bottom of the sump exceed 3/8" (9.5mm) in depth, wash the sump and then refill it with fresh oil.

If working in extremely dusty conditions, the air cleaner should be checked every 10 hours or at least daily.

After every 120 hours of operation, remove the oil and the filter assembly from the air cleaner. Wash each part thoroughly in a cleaning solution. Prior to the re-assembly, check the center tube and clean it also if necessary, and moisten the filter with new oil. Refill the oil sump before installing it.

After every 250 hours of operation, the air cleaner should be completely cleaned. Remove the oil sump, remove the air cleaner completely (from the tractor) and break the air cleaner down into its components. Soak each part in cleaning solvent for at least 30 minutes, and check to insure that each component is clean. Drain and let dry. Prior to re-assembly and reinstallation, moisten the cleaner element with new oil, and refill the sump.

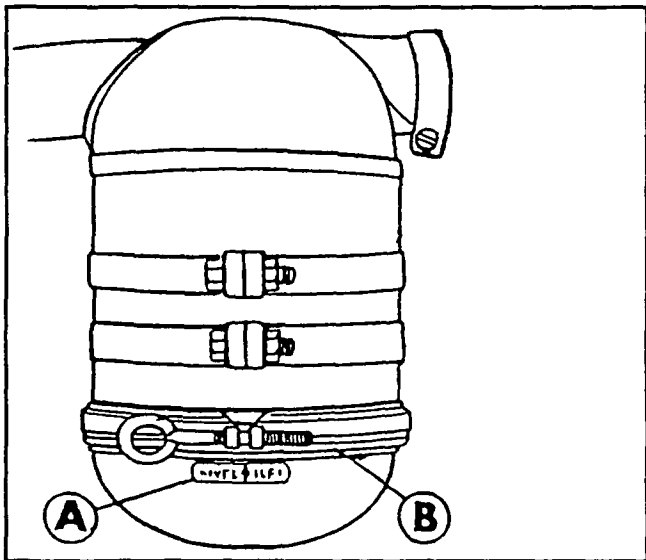


Fig. 58 - Air Cleaner
1. Oil Sump; 2. Notch for Oil Level

PRIMARY FUEL FILTER (Ref. Fig. 59)

After every 60 hours of operation, loosen the lower screw in the primary fuel filter 3 or 4 turns. Stroke the fuel lift pump hand lever (Ref. Fig. 59, item 6) until the water and sediment in the bowl are pumped out. Tighten the lower screw.

After 250 hours of operation, the fuel filter should be changed.

Close the shut off valve under the fuel tank. Clean the outside of the filter to prevent dirt from entering the fuel system. Unscrew the center retaining bolts on top of the filter and remove the element. Clean the filter housing and bowl, and be sure that no old gasket material remains. Install the new filter element and gaskets, securing the assembly with the center bolt. Open the fuel shut off valve and bleed the fuel system. Be careful not to over tighten the bolts.

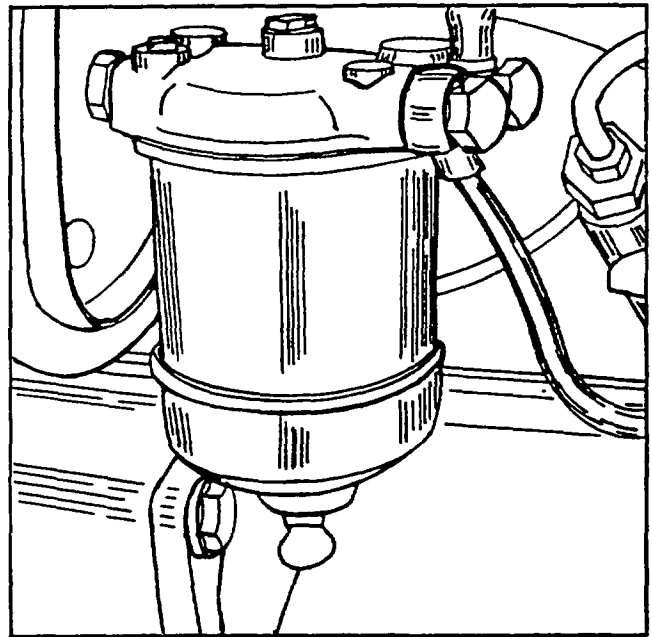


Fig. 59 - Primary Fuel Filter

SECONDARY FUEL FILTER (Ref. Fig. 60)

Every year the secondary fuel filter element should be changed. This should be done at the same time as the primary filter change is done. Shorten, if necessary, the change interval on either filter so that they can be changed together whenever the secondary fuel filter is due to be changed. Use the same procedure as for changing the primary filter.

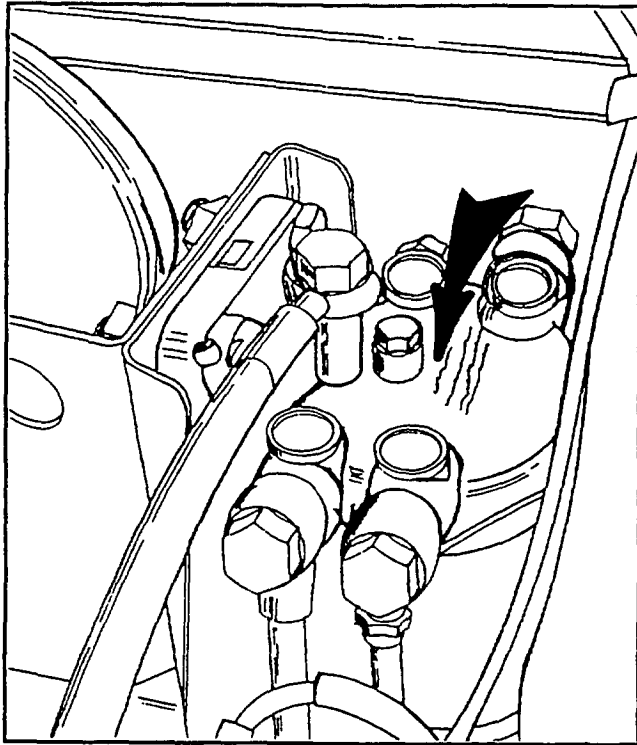


Fig. 60 - Secondary Fuel Filter

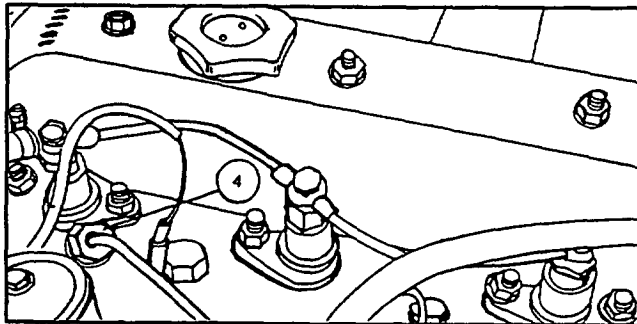


Fig. 61 - Bleeding the Fuel System
1. Injector Connector

FUEL FILTER PUMP

After 120 hours of operation, remove the cover from the fuel lift pump and clean the filter (Fig. 62, item 7)

BLEEDING THE FUEL SYSTEM

When air is allowed to enter the fuel system by running the fuel tank completely dry, draining the fuel filters, changing the fuel filters, or a loose connection, the fuel system must be bled. To properly bleed the fuel system, use the following procedure:

1. Open the fuel shut off valve on the tank and loosen the air vent plug on the primary fuel filter (1). Stroke the hand lever on the fuel lift pump (6) until the fuel flows out of the vent, free of trapped air pockets. Tighten the vent plug.

If the cam that operates the lift pump is on the high spot, the lift pump will not pump by stroking the hand lever. To correct this, rotate the engine 1/2 a turn, using the starter.

2. Loosen the vent plug on the top of the secondary fuel filter (5), and stroke the lift pump lever until the fuel flows out of the vent, free of trapped air. Tighten the vent plug.
3. Loosen the lower vent plug (2) on the injection pump, and stroke the lift pump lever until fuel flows out the vent; again, free of air. Tighten the vent plug. Loosen the upper vent plug (item 8, on the back of the injection pump) only by two turns.
4. Loosen the injector lines at the injectors (Ref. Fig. 58). Crank the engine with the starter motor until the fuel flows free without any pockets of air at each connection.

NOTE: The fuel shut off knob must be pushed in for the fuel to flow.

NOTE: Avoid overheating the starter motor. Allow the motor to cool for 2 minutes after each 30 seconds of operation.

5. Tighten the injector connections. Leave the upper vent plug open by two turns. Start the engine. As soon as the fuel flows free of all air pockets, tighten the upper vent plug.

Diagram 62 on the following page shows the items used in bleeding the fuel system. Whenever a filter and/or other items are changed the steps listed above should always be followed as they will help make the task of bleeding the fuel system much easier.

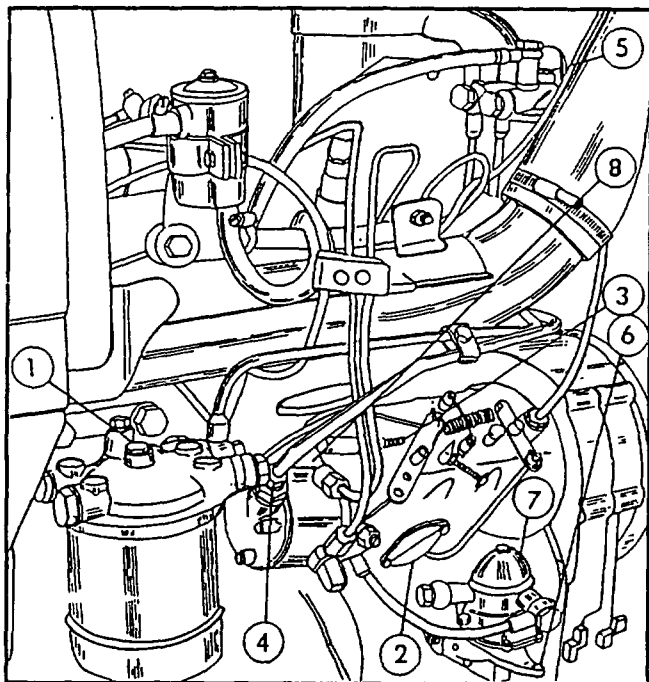


Fig. 62 - Bleeding the Fuel System

1. Vent Plug; 2. Lower Vent Plug; 3. Injection Pump Return Line Bleeder Screw; 4. Injector Connectors; 5. Upper vent Plug; 6. Fuel Pump Hand Primer Lever; 7. Fuel Pump Cover; 8. Vent Plug, Injector Pump

DRAINING THE FUEL TANK (Ref. Fig. 63)

Once each year, or more often if necessary, drain the fuel tank when it is nearly empty. Drain the fuel tank by removing the plug on the bottom right hand side of the tank. This is done to remove any water condensation or sediments that may have accumulated in the tank.

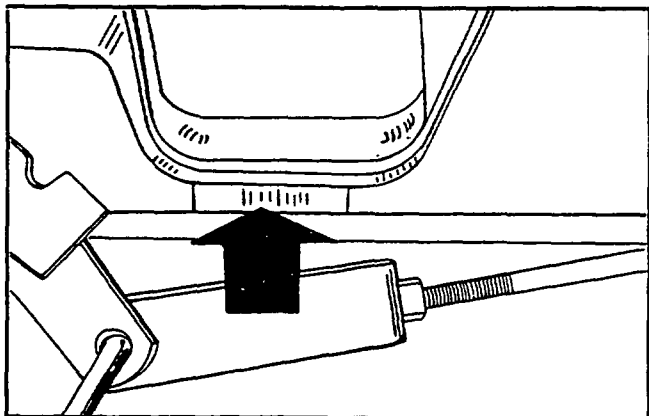


Fig. 63 - Fuel Tank Drain Plug

POWER STEERING RESERVOIR

After the first 120 hours of operation drain the power steering reservoir and refill it. (Refer to the lubrication chart for the correct type and quantity of oil). Thereafter change the oil after every 500 hours operations. (Ref. Fig.'s 44 & 64).

When servicing the reservoir, the following procedure must be followed:

1. Drain the oil from the reservoir.
2. Remove the filter and clean thoroughly with a cleaning solvent. Dry the reservoir off with compressed air until dry.
3. Jack up and securely block the tractor's front wheels.
4. Replace the filter and refill the reservoir and then replace the cap.
5. Using the starter motor, crank the engine for approximately 10 seconds.
6. Refill the reservoir and replace the cap.
7. Start the engine and let it run at a low idle. Turn the steering wheel to the left one full turn, and then to the right one full turn. Be careful not to turn the wheels to the stops in either direction.
8. Refill the reservoir to its maximum level and then turn the steering all the way to the stops in either direction. Hold the wheels at each stop for only a few seconds. Repeat this operation several times.
9. Refill the reservoir and let the front wheels down. Turn the steering wheel in both directions and observe for the proper operation of the steering system.

The following diagram (See Fig. 64) is a complete breakdown of the power steering reservoir. Replacement filters and parts are available through your local Long dealer.

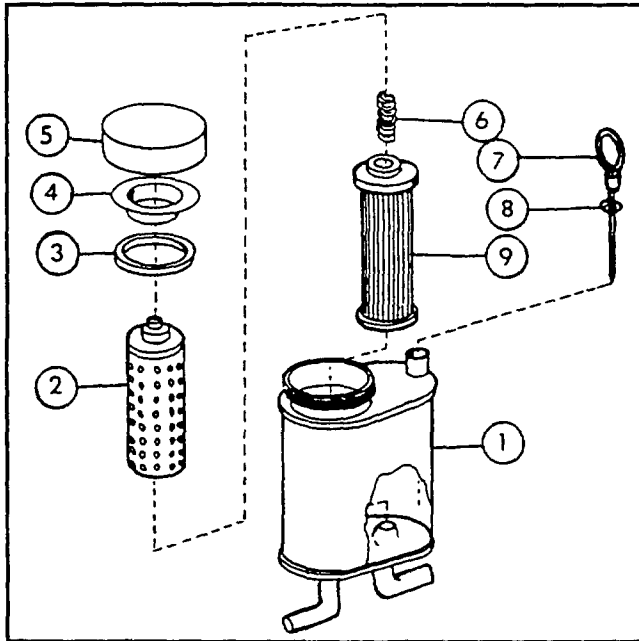


Fig. 64 - Power Steering Reservoir

1. Reservoir; 2. Primary Filter Element; 3. Gasket; 4. Inner Cap; 5. Cap; 6. Set Screw; 7. Dipstick; 8. "O" Ring; 9. Secondary Filter Element

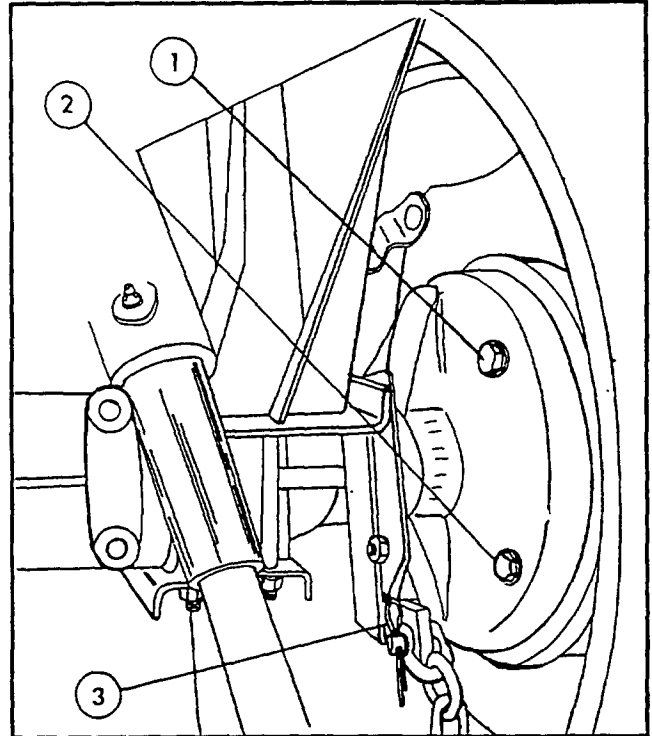


Fig. 65 - Final Drive Housing

1. Breather Plug; 2. Oil Level Check and Fill Plug; 3. Gasket; 4. Drain Plug

FINAL DRIVE HOUSING (Fig. 65)

After the first 60 hours of operation, and every 250 hours thereafter, check the oil level in both the left hand and right hand final drive housings. Park the tractor on a level surface, and remove the filler plugs. The oil should be even with the bottom of the filler hole. If oil is not present at this level a good grade oil should be added to bring the oil level to it's proper setting . (Refer to the lubrication guide for quantity and type).

Once each year; such as at the end of a season, remove the drain plugs from the lower part of the housing, and drain the oil completely. Replace the plugs and refill the drives with fresh oil as indicated in the above paragraph.



WARNING:
HOT OIL CAN CAUSE SEVERE BURNS. USE
EXTREME CAUTION WHENEVER CHANG-
ING OIL.

ENGINE VALVES

Once each year, have the valve clearance set by your LONG dealer. The specified clearance is 0.010" (0.25mm) for both the intake and exhaust valves, hot or cold.

NOTE: We recommend that you let your LONG dealer handle this task as he has been provided with the tools to do the job properly.

BATTERY

The tractor uses a single BCI Group 30H battery as part of its' standard equipment. The heavy duty option is a 1,000 cold cranking amp, 12V battery. The battery is located in front of the radiator. To gain access to the battery, the front grill must be removed. Remove the top two screws holding the grill in place and pull backward and upward to remove it.

Check the electrolyte of the battery after every 60 hours of operation. The electrolyte should be maintained at the indicator level in each cell, which is approximately 3/8" (9.5mm) above the plates. Never add anything to the battery but distilled water. Use only clean containers and equipment to accomplish this work.

During cold weather add water to the battery prior to starting the engine so the water and electrolyte will mix during charging. A fully charged battery will not freeze, but if partially charged it can freeze and be damaged.

Always keep the terminals clean. If the terminals show signs of corrosion or if the battery becomes soaked in acid, wash the battery with a mixture of water and baking soda. Make sure the holes in the vent caps are open.



WARNING:

KEEP ALL OPEN FLAME AWAY FROM THE BATTERY AT ALL TIMES, SINCE THE BATTERY GENERATES AN EXPLOSIVE GAS WHEN BEING CHARGED. USE CAUTION TO PREVENT SPARKS CAUSED FROM SHORT CIRCUITING WHEN CONNECTING OR DISCONNECTING THE BOOSTER CABLES. AN EXPLOSION IS POSSIBLE, CAUSING SERIOUS BURNS.

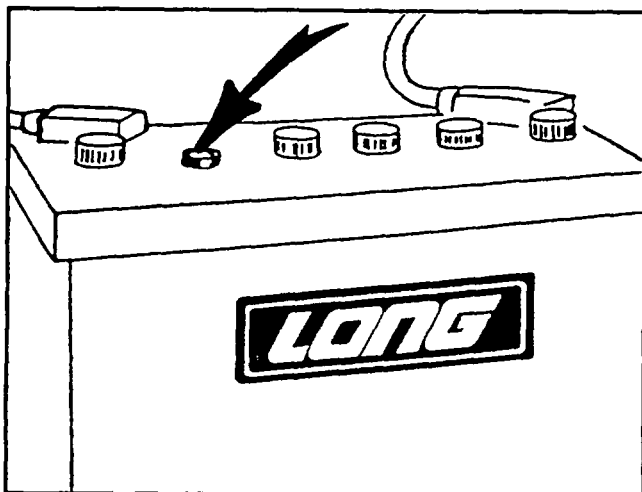


Fig. 66 - Checking the Battery Electrolyte Level

If the tractor is not to be used over an extended period of time, remove the battery, put a full charge on it, and store it in a cool dry place with above freezing temperatures.

When removing the battery from the tractor, disconnect the ground cable first and then disconnect the positive cable. When reinstalling the battery, connect in the reverse order with the positive cable first and the ground cable last. Connect the ground cable to the negative terminal of the battery. The battery retainer should be kept tight at all times to prevent battery damage.



CAUTION:

WHEN USING A BOOSTER BATTERY OR AN AUXILIARY POWER SOURCE AS A STARTING AID, ATTACH THE CABLES AS FOLLOWS:

1. Attach the positive cable to the positive terminal of the discharged battery and then to the positive terminal of the booster battery or auxiliary power source.
2. Attach the negative cable to the negative terminal of the booster battery or auxiliary power source. DO NOT CONNECT THE OTHER END OF THE NEGATIVE CABLE TO THE NEGATIVE TERMINAL OF THE DISCHARGED BATTERY.
3. Attach the other end of the negative cable to a ground source well away from the discharged battery. (such as the chassis or engine block support).
4. Disconnect the cables in the reverse order of the procedure stated above.

The specific gravity of a fully charged battery is 1.250.

ALTERNATOR

The alternator is located on the left hand side of the engine, and is used to charge the battery and supply power to the electrical system. It requires no lubrication. The alternator and regulator are designed for a negative ground system. Always observe the following precautions when working on the charging system. (Ref. Fig.'s 43 & 50)

1. When installing the battery, make sure that the ground polarity of the alternator and the ground polarity of the battery are the same. If a battery of the wrong polarity is installed, or the battery cables are connected backwards, the battery is shorted directly through the alternator's diodes. The diodes and wiring could be damaged by the resulting high current.
2. When connecting a booster battery or auxiliary power source, make sure to connect the positive terminals together and the negative terminal on the booster source to a good ground (i.e. chassis or engine block support) away from the discharged battery. Connect the negative terminal of the discharged battery to the ground.
3. When connecting a charger to the battery, connect the positive charger lead to the positive battery terminal and the negative charger lead to the negative terminal. Failure to do so will result in alternator and wiring damage. Never attempt to start the engine or turn the ignition switch "ON" while the charger is in use.
4. Never short across or ground any terminals on the alternator or regulator. Grounding or shorting any of the terminals can cause serious electrical malfunctions that can damage components in the electrical system.
5. Do not attempt to polarize the alternator. This procedure is not necessary with an alternator. It is important that the battery and the alternator ground be of the same polarity for diode protection



CAUTION:

NEVER OPERATE THE ALTERNATOR WITH ARMATURE WIRES DISCONNECTED. WITH NO ELECTRICAL LOAD IN THE CIRCUIT, (WIRES REMOVED OR DISCONNECTED) THE ALTERNATOR CAN BUILD UP HIGH VOLTAGE, WHICH CAN BE EXTREMELY DANGEROUS TO ANYONE WHO MIGHT ACCIDENTALLY TOUCH THE BATTERY TERMINALS OR ALTERNATOR. BEFORE MAKING ANY CHECKS OR TEST, MAKE SURE THAT ALL CONNECTIONS IN THE CIRCUIT ARE TIGHT AND SECURE.

LUBRICATION

LUBRICATION

This section will show diagrams indicating certain points on the tractor that should be lubricated or greased at the regular intervals indicated in the Lubrication and Service Guide. These points must not be over-looked as doing so will cause pre-mature wear on certain parts of the tractor.

This section is designed as a quick reference tool to help you locate grease fittings and other items that should receive regular maintenance. If you have any questions concerning where you should lubricate certain parts of the tractor contact your local Long dealer for service.

Lubricate the following locations at the time intervals indicated with a multi-purpose grease. Be sure to clean the grease fittings before and after greasing.

After every 60 hours, lubricate the tie rod ends and steering cylinders ends. There are a total of 4 fittings.

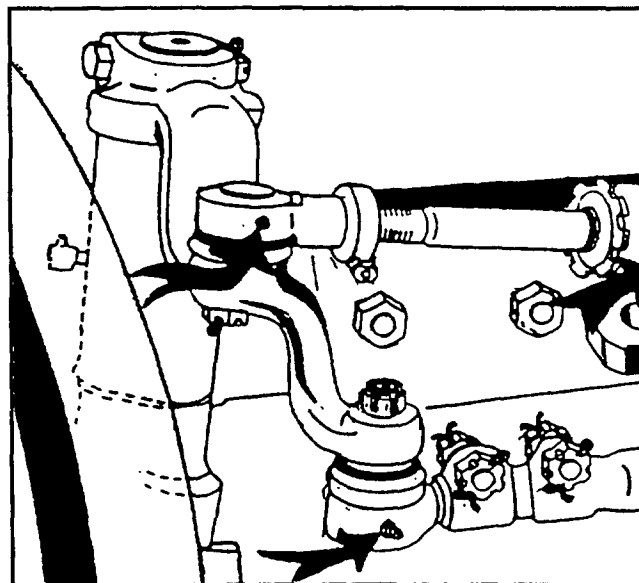


Fig. 67 - Lubrication Pivot Points

After every 60 hours, lubricate the front spindles. There is one fitting on each side.

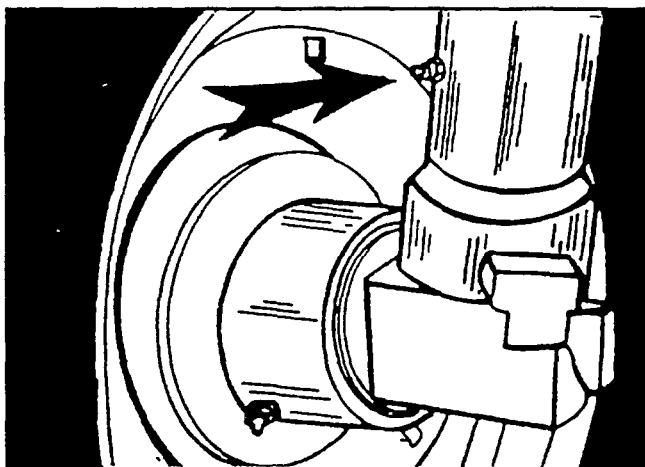


Fig. 68 - Steering Knuckle Pivots

After every 60 hours, lubricate the front axle pivot. There is one fitting.

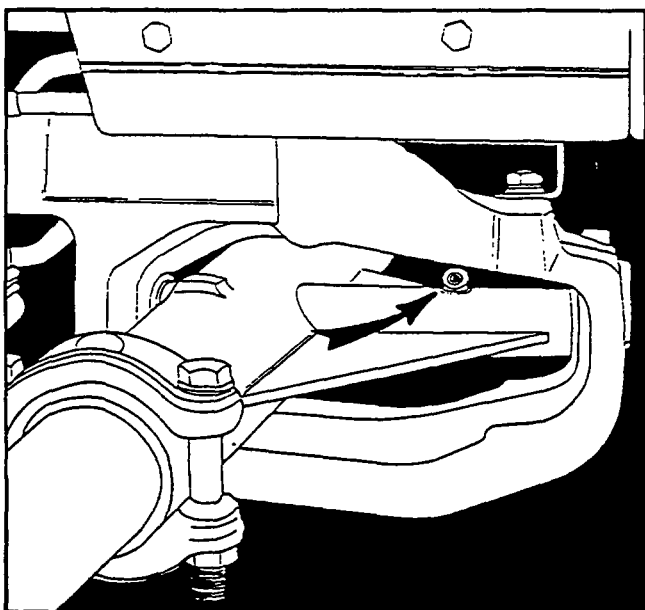


Fig. 69 - Front Axle Pivot

After every 60 hours, lubricate the clutch release bearing. There is one fitting.

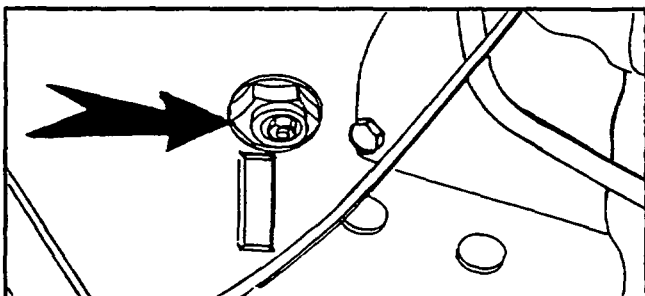


Fig. 70 - Clutch Release Bearing

After every 60 hours, lubricate the brake pedal shaft. There is one fitting on the right hand side. Also lubricate the clutch pedal shaft. There is one fitting on the left hand side.

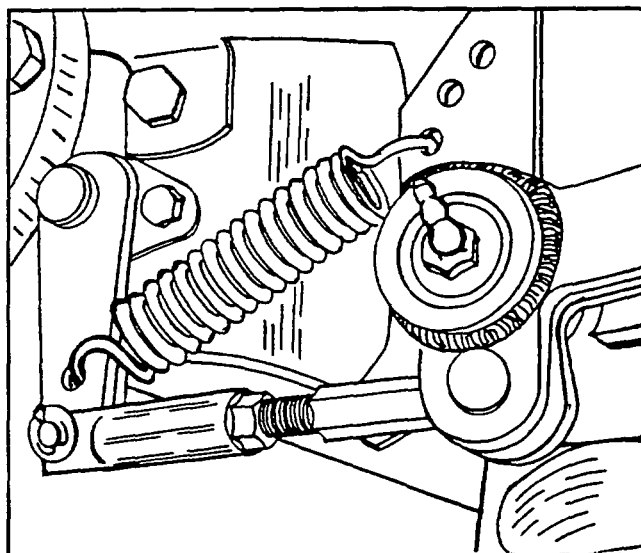


Fig. 71 - Brake Pedal Shaft

After every 60 hours, lubricate the three point hitch system. There are six fittings.

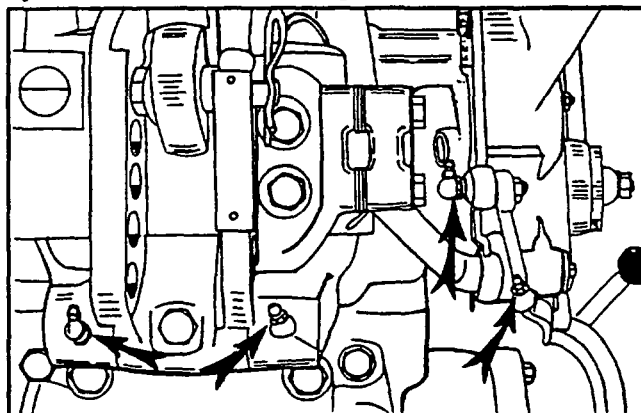


Fig. 72- Three Point Hitch

After every 60 hours, lubricate the remote control valve lever. There is one fitting.

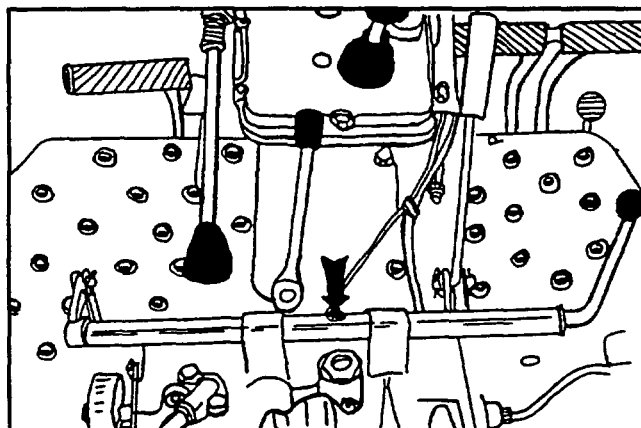


Fig. 73 - Remote Hydraulic Control Valve Lever

After every 250 hours, or more in very wet, muddy conditions, lubricate the front wheel bearings. There is one fitting on each wheel.

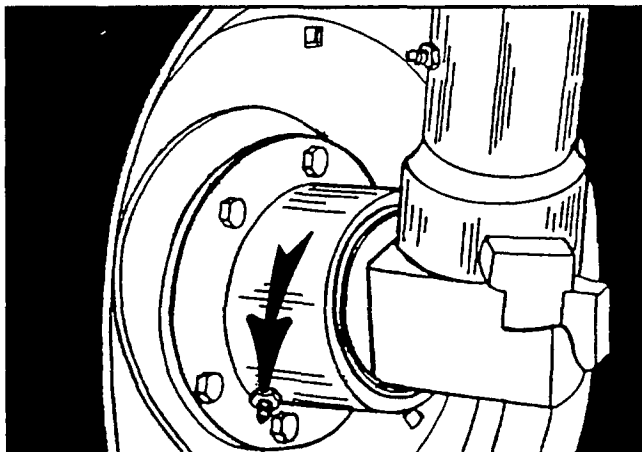


Fig. 74 - Front wheel Lubrication

MAINTENANCE & LUBRICATION (DTC Tractor)

In addition to the aforementioned maintenance and lubrications, the following should also be done for the (DTC) 4-wheel drive tractor.

After every 60 hours of operation, lubricate the front axle pivot, and both of the universal joints on the front drive shaft. There are three fittings. (Fig. 75, 76 & 77) Also, after every 60 hours of service, lubricate the front axle kingpins. (Fig. 75). There are four fittings.

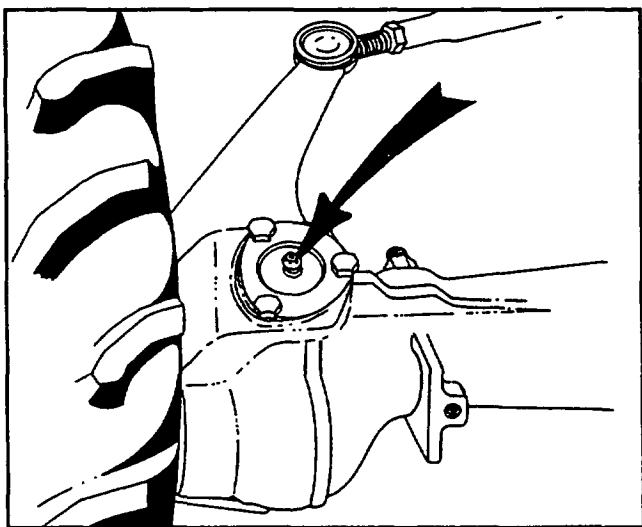


Fig. 75- Front Drive Steering Knuckle Pivot

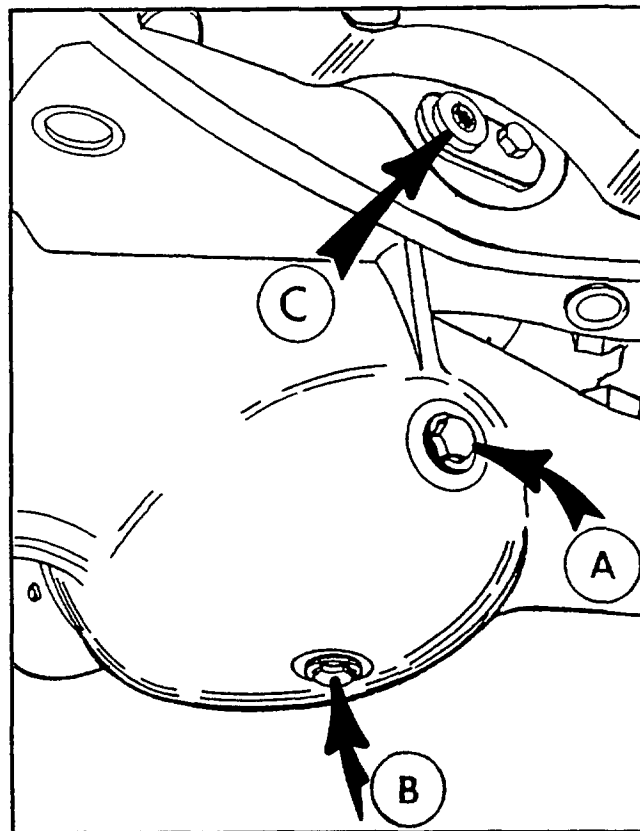


Fig. 76 - Front Axle Pivot
A. Filler Plug; B. Drain Plug; C. Pivot Pin

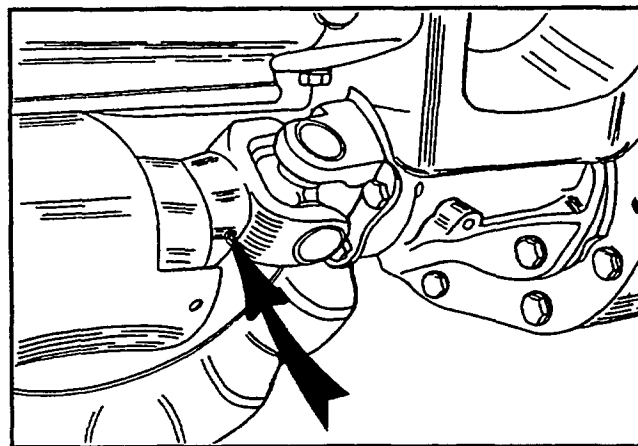


Fig. 77 - Universal Joint, Front Drive Axle

After every 120 hours of operation, check the oil level in the front axle housing (Fig. 76). The oil should be level with the bottom of the filler hole. Add oil as necessary. Refer to the lubrication guide for the proper type and quantity of the oil used.

After every 120 hours of operation, remove the center plug from the front hubs and check the oil level. (Fig. 78) The oil level should be at the bottom of the hole. In a case where it is low, just add oil as necessary. Refer to lubrication guide for the proper type and quantity of oil.

After every 1,000 hours, or at least once per year, whichever comes first, remove the drain plugs from both the front axle and hubs. Drain the old oil and refill with fresh oil.

NOTE: If the front axle is run in deep water or mud, and especially if the axle is submerged, change the oil to remove any water contamination.

NOTE: The front wheels must be turned so the drain plugs in the front hubs are on the bottom.

When changing the transmission oil, be sure to remove the plug from the front drive reduction gearbox, and drain the oil from it as well. (Fig. 79)

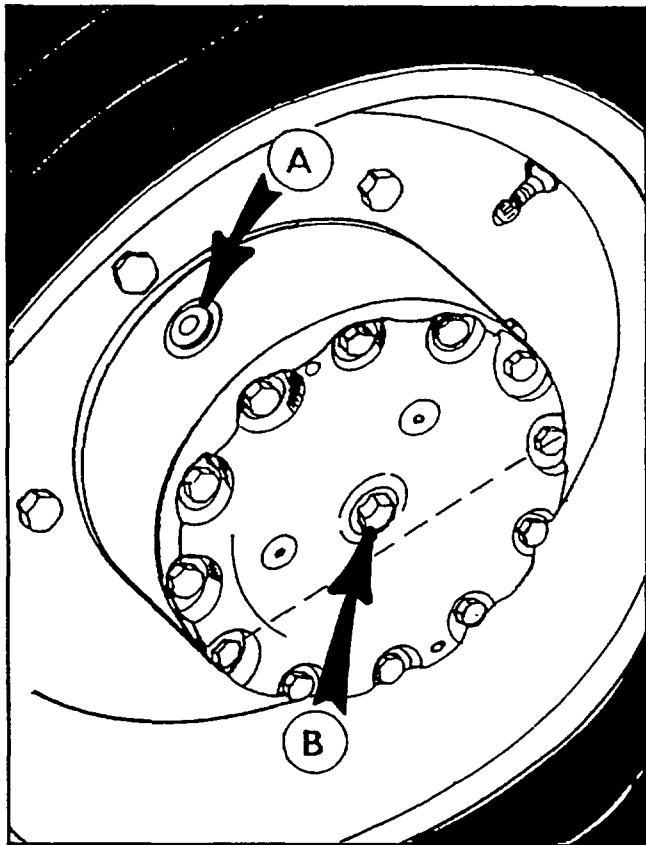


Fig. 78 - Front Wheel Planetary System
A. Drain Plug; B. Filler Plug

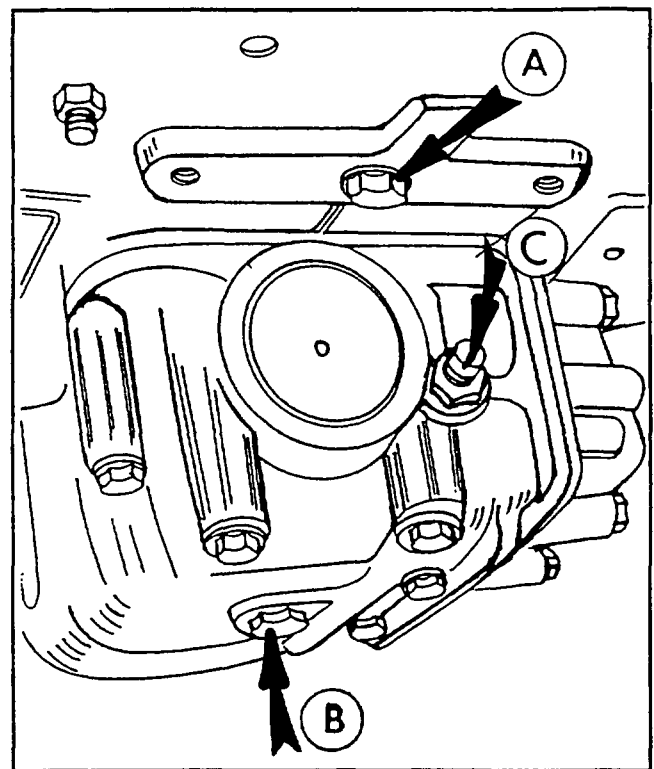


Fig. 79 - Front Drive Axle Reduction Gearbox
A. Transmission Drain Plug; B. Reduction Gearbox Drain Plug; C. Parking Brake Adjustment Screw

FUELS

Diesel fuels are classified as either No. 1 or No. 2 fuels. No. 2 diesel fuel is heavier and will produce more work per gallon and is recommended for temperatures above 32°F (0°C). No. 1 diesel fuel is lighter and is recommended for temperatures below 32°F (0°C), because, at these low temperatures, the waxes in No. 2 diesel fuel may solidify and clog the fuel injection system.

NOTE: Be sure to use ONLY diesel fuel and not fuel oil, which is formulated for furnaces. Even though the petroleum fractions are the same, fuel oil contains much more dirt and contains deposits which are very unsuitable for internal combustion engines and fuel injection systems.

FUEL CARE

No fuel is satisfactory for use if it is dirty. Fuel injection systems are seriously affected by dirt, water, and other sediments. For proper engine performance, only clean fuel must enter the injection pump. The following "rules of thumb" should be covered with the handling of fuels:

1. Do not handle fuel in open containers.
2. Do not use dirty or lint filled rags around fuel containers or injection equipment.
3. Clean all storage tanks at regular intervals.
4. If pumps are used to transfer fuel from storage tanks to the tractor, keep them covered with dust proof covers when not in use.
5. When emptying a drum or storage tank, agitate the fuel as little as possible, and leave approximately one inch of fuel in the bottom of the tank or drum. This fuel may contain water and sediment.

6. Store fuel in tanks or drums which are manufactured especially for fuel. Use a tank with a water trap or other form of filtering device.

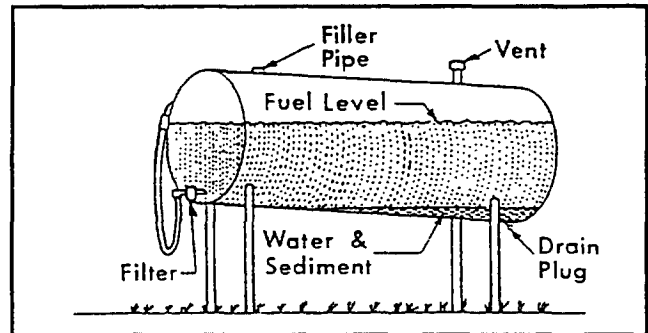


Fig. 80 - Fuel Storage Tank

TROUBLE SHOOTING

The following suggestions are listed for your assistance. You can make simple adjustments on your tractor that will improve its' operation and will save you time as well as money.

If any trouble is experienced, make sure of the cause before attempting to make any repairs or adjustments. Always make one adjustment at a time, so that if the adjustment made does not improve the problem, then return to its original setting before proceeding to the next adjustment.

HARD TO START

Possible Causes

Cold Air Temperature	Use thermo-start aid, see Cold Start Procedure
No Fuel	Refill the fuel tank and bleed the fuel system
Air Trapped in Fuel System	Bleed the fuel system
Flooded Engine	Crank the engine with the fuel shut off knob pulled out until the excess fuel is out of the cylinders, then follow normal starting procedures
Incorrect Timing	Have your LONG dealer reset the timing
Loss of Compression	Check the head gasket, see your LONG dealer
Dirty Nozzles	Have your LONG dealer check and clean the nozzles
Defective Battery	Check battery
Valve Clearance Incorrect	Have your LONG dealer check and correct valve clearance
Fuel Transfer Pump Faulty	See your LONG dealer
Fuel Injection Pump Faulty	See your LONG dealer
Fuel Injection Pump Out of Time	See your LONG dealer

Corrective Action

ENGINE OVERHEATING

Possible Causes

Low Coolant Level in Cooling System	Fill radiator to proper level
Radiator Clogged	Clean cooling system
Fan Belt Slipping	Tighten fan belt
Collapsed Radiator Hose	Replace hose
Radiator Cores Clogged	Remove all dirt and chaff from radiator grill; clean with compressed air or water
Thermostat Not Functioning or Stuck	Install new thermostat of correct range
Engine Overloaded	Reduce engine load or use a lower gear
Diluted Lubricating Oil	See your LONG dealer
Water Pump Impeller Vanes Broken	Replace the water pump

Corrective Action

LOSS OF POWER

Possible Causes

Insufficient Fuel	Refill the fuel tank and bleed the fuel system
Air in Fuel System	Bleed the fuel system
Obstruction in Fuel Line	Clean the fuel system
Transfer Pump Defective	Replace the transfer pump
Late Injection Timing	See your LONG dealer
Loss of Compression	See your LONG dealer
Clogged Air Cleaner or Restricted Air Flow	Clean the air cleaner element
Sticking Valves	See your LONG dealer
Valve Clearance Incorrect	See your LONG dealer
Faulty Nozzles	Clean or replace nozzles
High Idle RPM's Too Slow	See your LONG dealer

Corrective Action

IRREGULAR OPERATION

Possible Causes

	Corrective Action
Governor Control Linkage Binding	Correct binding
Compression Pressure Uneven	See your LONG dealer
Valves Not Seating Properly	See your LONG dealer
Faulty Fuel Nozzle	Clean or replace the nozzle
Low Fuel Pressure	Replace the fuel transfer pump
Low Operating Temperature	Run the engine before putting it under full loads
Fuel Injection Pump Out of Time	See your LONG dealer

EXCESSIVE EXHAUST SMOKE

Black Smoke

Possible Causes

	Corrective Action
Excessive Fuel Rate	See your LONG dealer
Overloading Engine	Reduce engine load
Restriction in the Air Supply	Clean the air cleaner
Low Coolant Temperature	Check thermostat, increase the engine temperature

White Smoke (Indicates Misfiring)

Possible Causes

	Corrective Action
Low Engine Operating Temperature	Check thermostat, increase the engine temperature
Faulty Injector	Clean the injectors, test the nozzle for pressure, leakage, spray pattern.
Poor Compression	See your LONG dealer

Blue Smoke (Indicates high Oil Consumption)

Possible Causes

	Corrective Action
Worn or Stuck Rings	See your LONG dealer
Low Coolant Temperatures	Check thermostat, increase the engine temperature

ENGINE KNOCKING

Possible Causes

	Corrective Action
Engine Overloaded	Reduce engine load
Incorrect Timing	See your LONG dealer
Engine RPM's too low	Adjust engine RPM's
Excessively Worn Rod and Main Bearings	See your LONG dealer

TIGHTENING TORQUES — GRADE 8*

M4 2 ft. lbs. (.28 kpm)	M8 18 ft. lbs. (2.5 kpm)	M16 144 ft. lbs. (20 kpm)	M24 470 ft. lbs. (65 kpm)
M5 4 ft. lbs. (.55 kpm)	M10 32 ft. lbs. (4.42 kpm)	M18 190 ft. lbs. (26.3 kpm)	M27 707 ft. lbs. (97.8 kpm)
M6 7 ft. lbs. (.97 kpm)	M12 58 ft. lbs. (8.02 kpm)	M20 260 ft. lbs. (36 kpm)	M30 967 ft. lbs. (133.7 kpm)
M7 11 ft. lbs. (1.52 kpm)	M14 94 ft. lbs. (13 kpm)	M22 368 ft. lbs. (51 kpm)	

* Equivalent American Grade 5

TRACTOR STORAGE

Tractors that are to be stored for an extended period of time, should be protected during the storage period. The following is a suggested list of precautionary measures that should be carried out when storing the tractor for a long time.

1. Thoroughly clean the tractor. Use touch-up paint when there are any bare metal spots showing on painted surfaces to help prevent rust.
2. Check the tractor for any worn or damaged parts and install new parts as required.
3. Raise the lift arms hydraulically to their highest position so the lift piston is in a completely extended position. This will protect the cylinder wall surfaces from corrosion.
4. Lubricate the tractor. Drain and refill the transmission, rear axle housing, final drive housing, and hydraulic lift system with fresh oil. Drain the engine oil and refill with fresh oil. Drain and refill the air cleaner with fresh oil. Change the respective filters also. Drain the oil from the working mechanism of the fuel pump and refill with fresh lubricating oil. Clean the air cleaner and replace parts as needed.
5. If the tractor is stored or removed from operation for an extended period of time, other special precautions should also be taken to protect the fuel injection system against corrosion and gumming.
 - Before storing, the fuel system should be flushed with a special oil, a quantity of which will remain in the system while the engine is shut down for the storage period.

- Special diesel fuel system flushing oils are available from most retail oil stores. If special flushing oil is not readily available, mix one U.S. pint (.47L) of SAE 10 non-detergent engine oil with 10 U.S. quarts (9.4L) of No 2 diesel fuel, which is a suitable substitute.
- Drain the fuel tank and pour two U.S. gallons (7.5L) of special Flushing oil (or lubricating mixture) in the fuel tank
- Run the engine for 10 minutes to assure complete distribution of the special oil through the injection pump and fuel injectors. There is no need to remove the injector nozzles.
- Fill the fuel tank with No. 1 diesel fuel

Important: Do not use No. 2 diesel fuel for winter storage because of the wax separation and settling at low temperatures.

6. Drain the radiator and engine block. Flush the cooling system, close the drain valves, and fill with anti-freeze that contains a rust inhibitor.
7. Remove the battery and clean it thoroughly. Clean the terminals and coat them with a corrosion inhibitor. Be sure that it is fully charged and that the electrolyte is to its proper level. Place the battery in a cool dry place which is above freezing. The battery should be charged periodically during the storage period.

8. Place blocking under the tractor's axles to remove its' weight directly from the tires.
9. Cover the exhaust pipe opening.

AFTER THE STORAGE PERIOD

Tractors that have been placed in storage should be completely serviced in the following manner before they are returned to service:

1. Inflate the tires to the recommended pressures, and remove the blocking.
2. Drain the No. 1 diesel fuel, that is only for storage purposes, from the fuel tank

3. Fill the fuel tank with No. 2 diesel fuel. Check the oil level in the crankcase, hydraulic lift system (rear axle), transmission, power steering reservoir, and oil bath air cleaner.
4. Install a fully charged battery and remove the exhaust cover, if other than a rain cap.
5. Check the cooling system. Use a corrosion inhibitor in warm climates; permanent antifreeze in cold climates.
6. Start the engine and allow it to idle a few minutes. Be sure the engine is receiving lubrication and that each control is functioning correctly.

LIMITED WARRANTY

LONG 24 TO 90 HP 2000 SERIES

TRACTORS

LONG MFG. N.C. INC., warrants to the first/original owner that each new agricultural row crop tractor sold by its' authorized dealers will be free from faults in material and workmanship under normal row crop use and service for a period of one (1) year or one-thousand (1,000) hours of operation, whichever comes first from the date of delivery to the ORIGINAL PURCHASER. LONG's obligation under this warranty is limited to repairing or replacing at its' option in an authorized LONG dealership any part or parts that, within the applicable period previously stated, are returned to its factory in Tarboro, North Carolina with transportation charges pre-paid. LONG's examination must show that the returned part(s) were faulty at the time of manufacture. Replacements made under this warranty shall be warranted only for the remainder of the tractor warranty period.

This warranty is expressly limited to the replacement of faulty parts as set forth herein, and is the only warranty given by the manufacturer or agent, distributor, dealer, or seller to the purchaser, and is in lieu of any and every warranty of every kind either expressed or implied and this warranty cannot be changed, modified or added to except in writing by a duly elected officer of LONG MFG. N.C. INC., and no dealer, distributor, agent, salesman or representative has the right or authority to change, modify or enlarge this warranty or to make any promise, stipulation and/or agreement inconsistent or in conflict there with.

NOT COVERED BY WARRANTY

The following are not covered by warranty:

1. Transportation charges to and from dealer; OR
2. Damages caused by misuse, or by operating the product in excess of the recommended capacities; OR
3. Damages caused by negligence, or accident; OR
4. Damages caused by use other than agricultural row crop use; OR
5. Products which have been altered or repaired in a manner not authorized by LONG MFG. N.C. INC.; OR
6. Normal maintenance and/or replacement of maintenance wear items, such as oil, filters, belts, light bulbs, brake and clutch linings; OR
7. Products which are warranted separately by their respective manufactures; OR
8. Normal maintenance services such as engine tune-ups, cleaning, or minor adjustments.

No other warranty whether of merchantability, fitness or otherwise, expressed or implied, in fact or by law, is given by Long with respect to any new equipment or part and no other or further obligation or liability shall be incurred by Long by reason of the manufacture of sale of any equipment or part whether for breach of any warranty, negligence of manufacture or otherwise.

The obligations of LONG set forth here in shall be the exclusive remedy for any breach or warranty hereunder. In no event shall Long be liable for any general, consequential, or incidental damages including, without limitations, any damages for loss of use or loss of profits.

Long equipment sold through other than authorized dealers is not subject to standard Long Warranty and service policies.

This warranty shall not apply to any equipment or part that has been repaired or altered outside of Long's factory or an authorized dealer's shop.

It is a policy of LONG MFG. N.C., INC. to improve its' products whenever possible. We reserve the right to make changes or improvements at any time without incurring any obligations to make such changes on products sold previously, prior to the changes or improvements.

This warranty becomes effective on the date of retail sale as shown on the Pre-Delivery Inspection Report. This report should be completed and mailed within 15 days of the date of sale. If a warranty or service question cannot be answered by the selling dealer, contact:

LONG MFG. N.C., INC.
Customer Service Dept.
Post Office Box 1139
Tarboro, NC 27886
Phone: (919) 823-4151

WARRANTY DISCLAIMER

THE LIMITED WARRANTY OF THE MANUFACTURER FOR ITS PRODUCTS DOES NOT INCLUDE:

1. ANY WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR USE.
2. ANY IMPLIED WARRANTIES OF ANY KIND.
3. LIABILITY FOR CONSEQUENTIAL DAMAGES SUCH AS THOSE RESULTING FROM LOSS OF USE OF THE PRODUCT OR LOSS OF PROFITS OR DAMAGE TO CROPS.
4. LIABILITY OF ANY KIND WHERE THE PRODUCT HAS BEEN FAULTY ERECTED, ALTERED, MISUSED, ABUSED, IMPROPERLY ASSEMBLED AND OR ATTACHED, OR INVOLVED IN AN ACCIDENT.
5. LIABILITY OF USING COMPONENTS INCLUDING BOLTS AND WASHERS, OTHER THAN THOSE IDENTIFIED BY PARTS MANUAL OR THE SPECIFICATIONS IN THE OWNER'S MANUAL.