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SKIDOZER
302 HD

OPERATOR'S MANUAL

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C O N T E N T S

FOREWORD

This manual contains operating instructions and maintenance recommendations with which the operator must be familiar. Please take the time to read these instructions and follow them carefully.

Off-the-road vehicles are called upon to work in difficult terrain conditions. It is therefore of utmost importance that the routine daily check as well as the periodic maintenance recommended in this book be done at the specified intervals. An extremely severe use may dictate more frequent inspections for abnormal wear and shorter lubrication intervals. The operator's good judgement will be a determining factor in the economical upkeep of an off-the-road vehicle; he should operate it to its maximum efficiency without abusing it and give it the care it deserves when it is used in extremely difficult terrain.

The recommendations given in this book apply to the vehicles that were in production at the time the book was approved for printing. Bombardier Limitee reserves the right to discontinue models at any time or to change specifications without incurring obligations.

A WORD OF CAUTION

OFF-HIGHWAY OPERATION:

The very nature of off-highway operation of a vehicle is dangerous. Any terrain, which has not been specially prepared to carry vehicles, presents an inherent danger where angularity, snow substance and exact steepness are unpredictable. The terrain itself presents a continual element of danger, which must be accepted with pre-meditation by anyone venturing over it.

An operator who takes a vehicle off-highway should always exercise the utmost care in selecting the safest path and keeping close watch on the terrain ahead of him. On no account should the vehicle be operated by anyone who is not fully conversant with the "Driving instructions" applicable to the vehicle, nor should it be operated on steep terrain by anyone who has not become thoroughly familiar with the vehicle's performance on flat terrain.

DESIGN LIMITATIONS:

The Skidozer is designed primarily as an over-the-snow vehicle. The fundamental design concept is a compromise between ruggedness which calls for strength and weight, and lightfootedness to move over snow.

Whereas the Skidozer is exceptionally rugged for its class, it is still a light vehicle by definition and its operation must be restricted to its proper purpose, the grooming and packing of snow, or over-snow operation.

Tracks with the wedge-shaped aluminum crosslinks provide the best traction in all types of snow and should be operated only on snow-covered surfaces; their use on other terrain will not only cause excessive wear and damage to the tracks, but will place undue strain on the drive mechanism, especially when making turns, due to the width of the tracks and their high degree of traction.

The Skidozer must not be used for work on bare ground; such an abusive use will void the warranty.

If bare ground has to be traversed, avoid making turns especially on rocky terrain.

SAFETY

1. Before driving the Skidozer make sure you understand the basic operating principle of the hydrostatic drive and that you are familiar with the driving instructions.

2. Perform the required checks and maintenance of the Skidozer before starting.

3. Keep a first-aid kit and a fire extinguisher in a conveniently located place in the cab.

4. Adjust the operator's seat for maximum comfort.

5. Fasten and adjust seat belt and shoulder harness.

6. Keep the operator's cab clean and free of loose objects.

7. Stop the engine to refuel, to service or make repairs.

8. Make sure you are familiar with the guide to the safe driving of off-road tracked vehicles supplied with your vehicle.

9. Take the necessary precautions when working on steep slopes and beware of wind-blown drop-offs.

10. Do not attempt to make adjustments or repairs on a moving vehicle.

11. Do not remove the radiator cap when the engine is hot; the pressure in the cooling system can cause splashing of the hot liquid.

12. Correct all malfunctions immediately to prevent failure or breakdown in critical circumstances such as going down exceedingly steep slopes.

13. When parking the Skidozer make sure it is off the trail; park on a level surface if possible and always apply the parking brake.

    If the vehicle is equipped with a front blade, it should always be fully lowered when the vehicle is parked.

OPERATION

INSTRUMENT PANEL

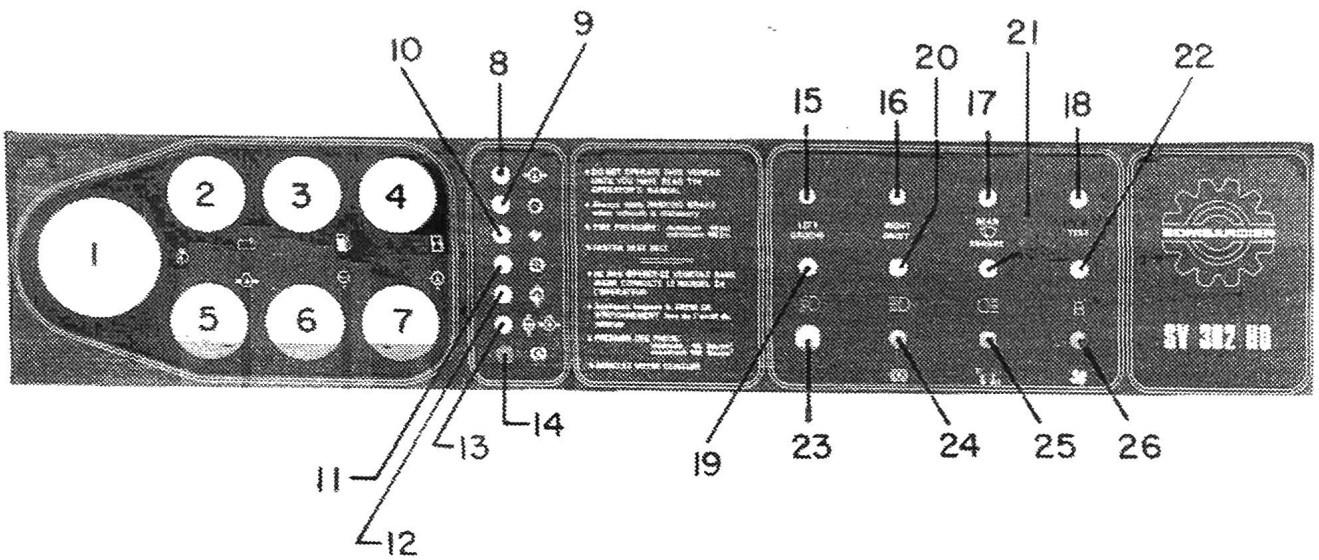


FIG. I

1. Tachometer
2. Ammeter
3. Fuel gauge
4. Hourmeter
5. Engine oil pressure
6. Engine water temperature.
7. Hydrostatic oil temperature
8. Low replenish pressure
9. Low hydrostatic oil level
10. Overspeed
11. Filter by-pass
12. Hydrostatic temperature
13. Engine oil low pressure or high temperature
14. Brake warning light
15. L.H. wiper switch
16. R.H. wiper switch
17. Rear wiper switch
18. Test button for warning lights
19. Lower lights switch
20. Upper lights switch
21. Rear light switch
22. Flasher or revolving lamp switch
23. Ignition switch
24. Parking brake switch
25. Heater switch
26. Electric fan switch

NOTE: Before starting the engine, check all the warning lights 8 to 14 as follows: turn the ignition key "ON" and press test switch #18 which lights up all the warning lights. Replace any defective light immediately. THESE LIGHTS ARE FOR THE SAFEGUARD OF THE MAJOR COMPONENTS OF THE VEHICLE.

CONTROLS

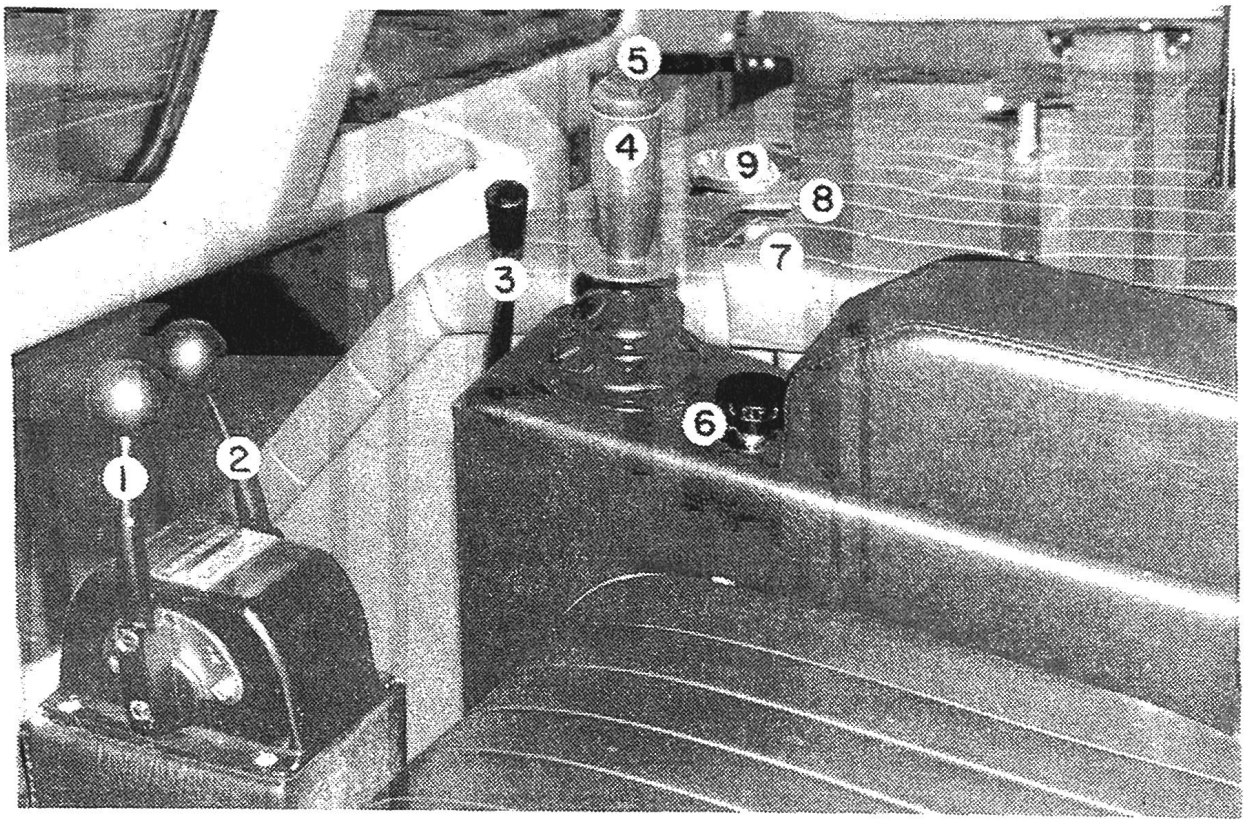


FIG. 2

1. Left hand motor control lever
2. Right hand motor control lever
3. Throttle
4. Joystick for blade control
5. Switch for blade tilt
6. Lever for float position of front blade
7. Horn button
8. High and low speed switch
9. Radiator cap

DAILY CHECK LIST

Preventive maintenance is most important and contributes to economical operating costs. A quick inspection of the vehicle before driving away will help to discover any faulty part or abnormal wear from previous use and corrective measures can be taken before an actual failure occurs.

The following inspection should be made daily:

a) Before starting the engine, check:

1) oil level in the engine crankcase
2) level of engine coolant
3) the warning lights on the instrument panel by turning the ignition key to the "ON" position and pressing test switch #18 on fig. 1.

b) Start the engine and while it is warming up make a check of the following items:

1) all the gauges and instruments
2) wheels and tires - pressure 90 - 100 lbs.
3) general condition and tension of the tracks
4) broken crosslinks or track guards
5) loose or missing crosslink bolts
6) abnormal wear on tires or sprockets
7) fuel, oil or coolant leaks
8) general condition of the chassis
9) the condition of the hydraulic hoses and ascertain that there are no oil leaks
10) the operation of the hydraulic cylinders of the blade
11) look for and remove any foreign body that may be caught or frozen between the frame and the running gear

c) Make the necessary corrections before putting the vehicle to work.

OPERATION

DRIVE MECHANISM:

Driving a vehicle with an hydrostatic transmission is very simple. Once the engine has been started and the HAND THROTTLE Fig. 2 #3 set at the desired engine speed ALWAYS OVER 1700 RPM, it is simply a matter of working two levers Fig. 2 #1 and #2 which control the speed as well as the direction of the vehicle.

The hydrostatic transmission provides individual control for each track. The right hand steering lever controls the direction and flow of oil which powers the right hand track; the left hand lever does the same for the left hand track.

When both levers are pushed forward, the Skidozer moves forward; the more the levers are pushed forward, the greater the amount of oil flow and the faster the vehicle will go. Bringing the levers back decelerates the vehicle. When the levers are at dead-centre, the brake is automatically applied.

Pulling both levers to the rear puts the vehicle in reverse.

One lever can be pushed forward while the other one is pulled backwards in which case the vehicle will turn on itself. Sharp turns can thus be made and the Skidozer can maneuver out of tight places quite easily. However, such a maneuver should be avoided on bare ground as turning in this manner is exceedingly hard on the tracks and on the drive train.

The hydrostatic transmission has a range of two speeds controlled electrically by means of a switch Fig. 2 #8, on the front top part of the engine cowling.

The parking brake is applied electrically by means of a switch on the instrument panel. (See Fig. 1 #24)

STARTING THE ENGINE:

Push the shut-off knob located on the rear top left part of the engine cowling. Make sure the two driving control levers are in neutral(dead-centre). Press the accelerator pedal approximately 1/4 of the way down. Turn the ignition switch to "ON" position to activate starter.

The filter by-pass warning light will go on as soon as the engine starts when the hydraulic oil is cold. It will go out when the hydrostatic oil is insufficiently warm.

Besides providing a circuit around clogged filters, the purpose of the by-pass is to prevent too high pressures in the circuit which could damage seals.

Let engine warm up at idle speed, around 700 RPM until normal temperature is reached before putting it under heavy load.

To heat up the oil more quickly, place the hydraulic valves in the fully open position; this will cause the by-pass to open.

To avoid any cold start problem, the heater installed in the hydrostatic oil tank should be connected as soon as the vehicle is stopped. This heater will keep the oil at an acceptable 27°C (80°F) above the ambient temperature.

DRIVING:

After the engine has reached operating temperature, push the manual throttle located on the left hand side front

engine cowling, so that the engine will turn at a minimum 1700 RPM. Then, it is a simple matter of controlling the speed and the direction of the Skidozer by means of the two steering levers. The speed of the vehicle is controlled by the movement of the steering levers and not by the accelerator pedal or the throttle.

The hydrostatic transmission has a two speed range controlled by an electric switch located on top of the engine cowling. The high range is the forward position illustrated by the rabbit and the low range is the rear position illustrated by the turtle.

The low speed range is used for high tractive power maneuvers, whereas the high speed range is used for travelling to and from the work area or for work requiring less tractive power.

WARNING:

An abrupt change in direction occurs when a steering lever is moved quickly. The operator of the Skidozer should familiarize himself with the steering and handling characteristics of this vehicle before operating it on slopes.

The Skidozer may stall in high range if the pressure in the hydrostatic circuit attains its maximum (5000PSI). To restart the vehicle, simply switch the transmission to the low range.

OVERSPEED:

This vehicle is equipped with an overspeed control system to limit the speed of the hydraulic motors at 3600 RPM. When going down steep slopes with the engine at full throttle, it may happen that the hydraulic motors exceed 3600 RPM in high range. When this occurs, a light goes

on and a buzzer warns the operator to cut down the speed by pulling the control levers back; if this is not done, the vehicle will automatically fall in low speed range for 10 seconds, then go back to high speed range. The operator should set back the speed or this change from high to low range will repeat itself.

The overspeed module and the fuses are also in the instrument panel.

WARNING:

The maximum temperature of the oil in the hydrostatic system is 82°C(180°F). If this temperature is reached, stop the vehicle and let the engine run a few moments so that the fan will cool the hydrostatic oil.

STOPPING:

There is positive deceleration whenever the two levers are simultaneously moved toward the central position; when the two levers are at dead-centre, the brake is applied. Slowing down should be done gradually and evenly; sudden stops should be avoided whenever possible.

The braking system on the Skidozer is of the spring-applied type and is pressure-released. Any break in the hydrostatic system which results in a loss of pressure sets the parking brake mechanism in motion for an immediate stop. The Skidozer is a SAFE vehicle.

The parking brake can also be used as an emergency brake in extreme cases. However, this brake is not of the progressive type and when applied, it blocks both tracks instantaneously.

SAFETY FEATURES:

There is an electrical alarm system which lights a warning light to identify the problem on the dash and starts a buzzer whenever anyone of the following problem arises:

Cavitation: that is, low replenish pressure.

Vehicle overspeed.

Clogged oil filter in hydrostatic oil system or by-pass of filter at low temperature.

Low oil level in hydrostatic oil system.

Too high temperature in hydrostatic oil system.
There is no temperature gage sender in the hydrostat system.

Engine overheating and low oil pressure.

Parking brake engaged (no buzzer, light only).

Whenever any light comes on and the buzzer is sounded, check the cause and take immediate action.

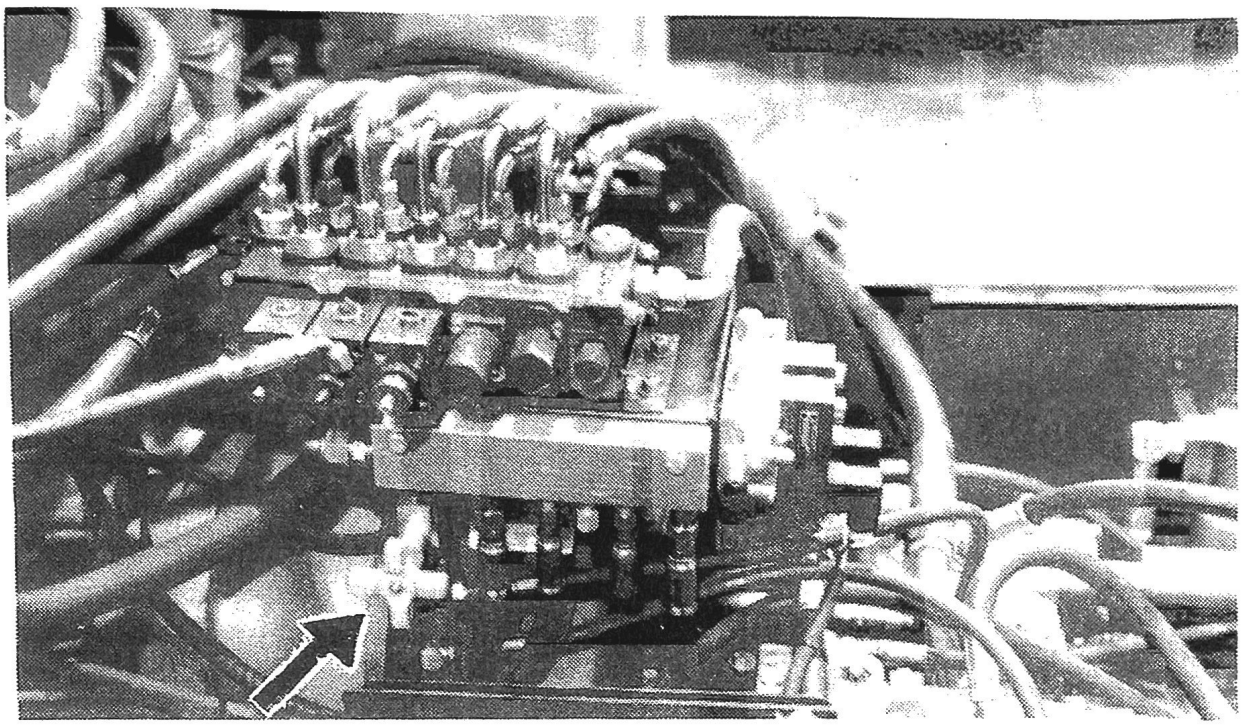
RESTARTING THE ENGINE AFTER STALL UNDER PRESSURE:

If the engine RPM is too low (less than 1700 RPM) when the control levers are moved to set the vehicle in motion, the load may stall the engine. The hydrostatic circuit is then under pressure and the starter may not be able to crank the engine. The hydraulic circuit pressure has to be released as follows:

APPLY THE PARKING BRAKE: (VERY IMPORTANT)

Pull the engine shut-off.

Open the bleeder valve located beneath the valve bank on the left hand side. (See photo below)



Crank the engine 2 or 3 revolutions by means of the starter.

Close the bleeder valve.

The pressure is now relieved and the engine will start without difficulty.

WARNING:

Always make sure that the bleeder valve is closed before starting the engine, otherwise the hydrostatic system is unable to build up pressure. Furthermore, the hydraulic brake is eliminated if the control levers are moved. If the electric parking brake is not applied, the Skidozer will run out of control if it is on a slope.

PARKING:

The parking brake is applied by an electrical switch on the dash. It should be applied whenever the operator steps down for whatever reason.

WARNING:

Never leave the vehicle without having applied the parking brake. The control levers at the dead-centre position stop the vehicle, but the parking brake MUST be applied to assure the complete immobility of the vehicle in case the control levers are handled inadvertently.

Hydraulic pressure is required to release the parking brakes.

We are not sure that the hydrostat hydraulic pressure has any control over the parking brakes. However if the parking brake has hydraulic pressure releasing the brake that pressure also allows the hydrostat to travel.

Turning the parking brake switch "ON" applies hydraulic pressure to the brakes to "RELEASE" them. This confusing.

The hydraulic pressure to release the brakes and switch the drive motors to low speed comes from the dozer blade hydraulic pump.

HYDRAULIC SYSTEM

The hydraulic system is used to operate the front mounted blade or rear mounted grooming equipment.

The electric-hydraulic joy stick controls all the operating positions of the blade. (Fig. 2 #4)

To lower the blade, push the joy stick forward.

To raise the blade, pull the joy stick back.

To angle the blade to the right, push the joy stick to the right.

To angle the blade to the left, push the joy stick to the left.

To tilt the blade forward, press the front part of the top switch. (Fig. 2#5)

To tilt the blade to the rear, press the rear part of the top switch. (Fig. 2#5)

There is a knob located immediately to the rear of the joy stick (Fig. 2 #6): this is to engage the float position of the blade. Pull up for float; push down for pressure-control.

The operating speed of each function of the joy stick can be adjusted up to a limit to the operator's wish. The control of the oil flow is adjusted by means of a screw located at the end of each valve section. There is an independent adjustment for each direction of flow.

The two control levers on the engine top door operate rear mounted equipment connected to the rear outlets. The lever to the front has a float position.

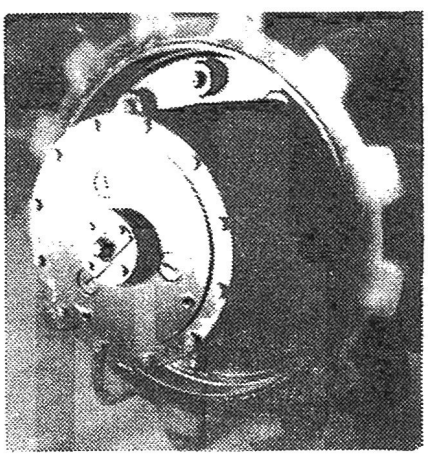
NOTE: Always release completely the hydraulic pressure of a circuit before disconnecting the hose, otherwise, you will have to bleed the hose on the equipment before being able to reconnect it.

Disengaging the planetary drives.

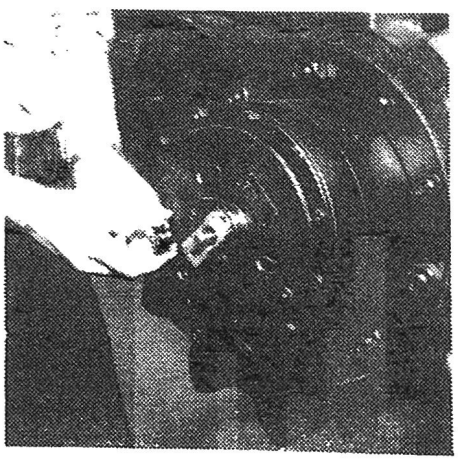
The planetary drives can be disengaged to allow the towing of the Skidozer which otherwise would be practically impossible to pull should any breakage occur in the propulsion system.

To disengage, remove the disconnect cap in the centre of each planetary (see photos below) and turn it inside out, so that the embossed centre will push the disconnect rod inside. Be careful not to lose the disconnect rod which is free to come out.

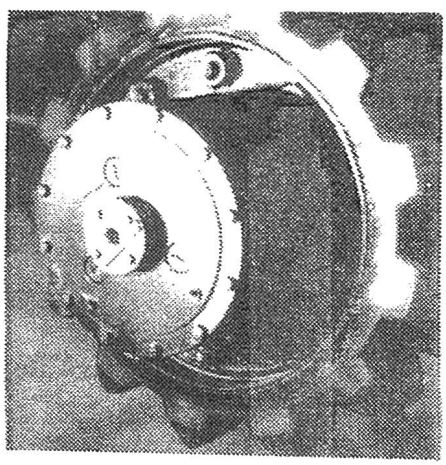
To re-engage, return the disconnect cap to its original position with the embossed centre to the outside.



ENGAGED



DISCONNECT ROD



DISENGAGED

WARNING:

When the planetaries are disengaged, the Skidozer is free wheeling and does not have any brake.

It should be towed by a vehicle having the weight and towing capacity big enough to control it on the terrain it will travel.

MAINTENANCE

The efficiency and good running condition of a vehicle depends, to a great extent, on the regular maintenance it receives. Besides the daily checks, the Skidozer should be inspected weekly or after every 50 hours of operation; any correction found necessary should be done immediately.

RUNNING IN:

The running-in of the Skidozer is done at the factory; it is checked and ready to put to work.

PERIODIC MAINTENANCE:

The daily checks are very important and contribute to the prevention of failures. Lubrication should be performed in accordance with the lubrication chart and schedule given in this manual.

The electronic warning system brings to the operator's attention, some working irregularities in some important components. If a warning light and the buzzer go on when the Skidozer is working, stop immediately and make the necessary corrections.

MOST IMPORTANT:

Any repairs to the hydrostatic system and the oil change should be done in absolutely clean environmental conditions.

Before removing a hose, clean the fittings thoroughly; install a plug immediately after the removal of the

fitting.

Whenever a hose is replaced, the new hose must be flushed with oil to insure that it is perfectly clean before installing it.

HYDROSTATIC OIL FILTERS:

HIGH PRESSURE: There are 3 filters in the high pressure system: one located behind the cab and two behind the hydrostatic pumps. Change these filters when the electronic warning system Fig. 1 #11 (instrument panel) is activated when the hydrostatic oil is warm.

LOW PRESSURE: There are 2 filters on the return circuits: one on the hydrostatic oil tank and one on the rear left hand side of the vehicle underneath the floor board. Change these filters when preparing the Skidozer for storage.

LUBRICATION CHART AND SCHEDULE

LUBRICATION POINTS	SERVICE INTERVAL	CAPACITY	LUBRICANT SPECS. RECOMMENDED
ENGINE	100 hours	21 litres 4.6 imp.gal 5.5 US gal	from 0°to -23°C(+32 to -10°F) SAE 10W below -23°C(-10°F) SAE 5W-20
FUNK DRIVE FOR PUMPS	600 hours	5 litres 4.5 imp.qt. 5.4 US qt.	Gear oil to US ordnance specs.
FINAL DRIVES	600 hours	2,6 litres 2.3 imp.qt. 2.7 US qt.	MIL-L2105B SAE 75/80
HYDROSTATIC OIL RESERVOIR	600 hours or after operating season	109 litres 24 imp.gal 27 US gal.	Automatic transmission oil ATF type F only
WHEEL BEARINGS	100 hours	10 fittings	multi-purpose grease with superior shear stability and which will remain fluid at very low temperatures
PINTLE HOOK	100 hours	2 fittings	
DOOR HINGES	100 hours	a few drops of oil	

REPLACEMENT OF FILTERS

ENGINE	200 hours	John Deere #AR 43634
FUEL	as required	John Deere #AR 50041
AIR	yearly	
HYDROSTATIC HIGH PRESSURE	when the electronic warning system Fig. 1 #11 goes on during work when the oil is warm.	
LOW PRESSURE	yearly	

TROUBLE SHOOTING

For engine problems, see the operator's manual provided by the engine manufacturer, section: trouble shooting.

In the Skidozer 302HD, an electronic warning system advises the operator whenever some of the important components of the vehicle do not function properly. Warning lights on the instrument panel go on and a buzzer sounds to attract the attention of the operator.

Before starting the engine, the operator should check to ascertain that the system functions properly. With the ignition switch "ON", press the test button on the upper right hand corner of the instrument panel Fig. 1 #18: all the warning lights should go on and the buzzer should sound. If any light fails to light, it should be changed immediately.

Some of the lights will go on when the switch is turned to "ON" but the engine is not running.

When the engine is running or the Skidozer is in operation, a malfunction is indicated when the following lights go on: (reading from top to bottom)

1ST.

LOW REPLENISH PRESSURE:

- engine RPM too low
- too high temperature of the hydrostatic oil.
  If the light does not go out when the RPM of the engine is increased, stop the engine and let the hydrostatic oil cool down.

2ND.

LOW HYDROSTATIC OIL LEVEL:

- check the hydrostatic circuit for leaks and make the necessary repairs or corrections before filling with automatic transmission fluid type F.

3RD.

OVERSPEED:

- bring the control levers back towards the center to cut down the speed.

4TH.

FILTER BY-PASS:

- this light may go on when the hydrostatic oil is cold.
  If it goes on during normal operation, it indicates that the filters are getting clogged. Change and inspect the filters to ascertain that they do not contain metal parts,which could indicate a problem in some hydrostatic component.

5TH.

HYDROSTATIC OIL TEMPERATURE TOO HIGH:

- this light will go on when the hydrostatic oil temperature reaches 87°C (190°F). Normal operating temperature is 70°C (160°F).
- check the fan belt and tighten if necessary.
- check the heat exchanger to ascertain it is clean.
- make sure there is a free flow of air through the heat exchanger and out of the engine compartment. Stop the vehicle and let the engine run at 1600 RPM until the temperature comes back to normal.

6TH. 

ENGINE TEMPERATURE TOO HIGH:

ENGINE OIL PRESSURE TOO LOW:

- check the corresponding gauges on the left hand side of the instrument panel to determine what the problem is.
  The normal engine temperature is 82°C (180°F).
  The normal oil pressure at idle is 20 PSI ± 5.
  The normal oil pressure at full throttle: 50 PSI ± 10.
  See the engine operator's manual for remedial action.

I M P O R T A N T

The Skidozer 302HD has a safety system which applies the brake automatically whenever there is an important leak in the high pressure circuit of the hydrostatic system.

The brake is also applied when there is a failure in the electrical system. If this should happen, check the fuses and make the necessary corrections.

NOTE:

The Skidozer 302HD has a two speed range; the change from low to high speed is done by means of an electric switch. If the Skidozer is in high range and changes to low range without any apparent reason, look for a burnt fuse.

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