

# RANGER

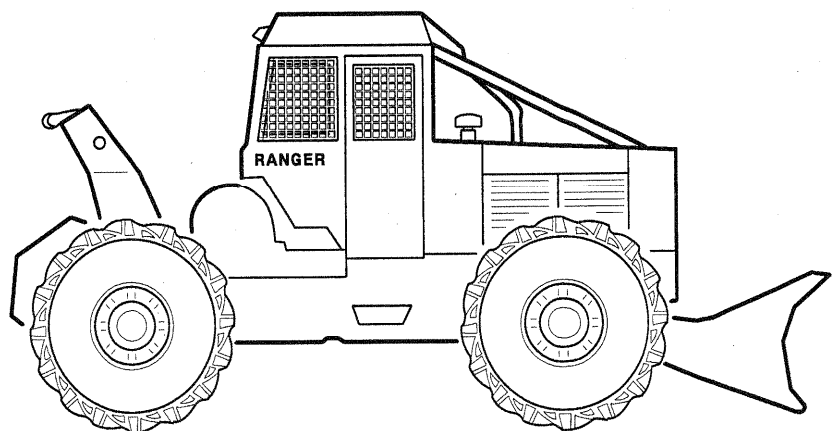
# F66/F67 SKIDDER OPERATORS MANUAL

PUBLICATION NO.

**R6409**

**Allied Systems**  
COMPANY

SHERWOOD, OREGON USA



**INTENTIONALLY BLANK**

**FOREWORD**

The purpose of this manual is to serve as a guide to the proper operation and maintenance of your machine. Study this manual carefully before starting, operating the machine or performing any preventive maintenance procedures. Many hours have been spent in designing and producing the safest and most efficient machine possible. All this may be wasted if you do not read the safety instructions and follow them. Become familiar with all controls and instructions and keep this manual in the machine for handy reference. Machines usually do not cause accidents, people do. A safety conscious person and a well maintained machine make a safe, efficient and profitable combination.

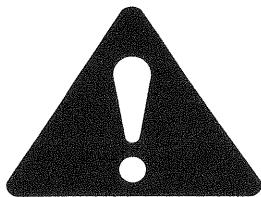
**NOTE:** *This manual has been written to include options not necessarily fitted to the version of the machine you have purchased. We therefore ask you to disregard information which is not applicable to your machine.*

It is our policy to constantly strive to improve our products. The right therefore is reserved to make changes in design and improvements whenever it is believed the efficiency of the product will be improved, without incurring any obligation to incorporate such improvements in any product which has been shipped or is in service.

**SAFETY REGULATIONS**

Each country has its own safety legislation. It is in the operator's own interest to be conversant with these regulations and to comply with them in full. This also applies to local bylaws and regulations in force on a particular worksite.

Should the recommendations in this manual deviate from those in the user's country, the national regulations should be followed.

**SAFETY ALERT SYMBOL**

The symbol shown above will appear at various points in this manual in conjunction with warning statements. Its appearance means: "WARNING! BE ALERT! YOUR SAFETY IS INVOLVED!"

**NOTE:** *Make sure that the warning Decals are readable, otherwise accidents may occur.*

**KNOW THE CAPACITY AND LIMITS OF YOUR MACHINE!**

**CONTENTS****PRESENTATION****INSTRUMENT PANEL****OTHER CONTROLS****OPERATING INSTRUCTIONS****BASIC PREVENTIVE  
MAINTENANCE****SPECIFICATIONS****ALPHABETICAL INDEX**

### **UNAUTHORIZED MODIFICATION OF ROLLOVER PROTECTIVE STRUCTURE (ROPS)**

Do not make unauthorized modifications or alterations to the ROPS such as: welding on fire extinguisher brackets, antenna brackets, or fire suppression systems. Unauthorized modifications will affect the structural limits of the ROPS and will void the certification.

The Rollover Protective Structures (ROPS) have been certified to meet specified test requirements. These certifications are required by the U.S. Department of Labor under OSHA Regulation 1926.1000 and other regulations.

Any planned modification or change must be reviewed in advance by the Engineering Department to determine if the modification or change can be made within the limits of the certifying tests.

It is important that each person in your organization, including management, be made fully aware of these rules involving the ROPS.

Whenever anyone sees a machine ROPS with unauthorized modifications or changes, both the customer and manufacturer should be notified in writing.

### **SPARK ARRESTER MAY BE REQUIRED**

Many states and other governmental entities have adopted laws and regulations which require spark arresters on machines operating on or near forests, brush or grass covered lands within their jurisdiction. The Federal government also has regulations (Forest Services) which require spark arresters on machines operating on National lands.

Use of machines without spark arresters in areas where such use is prohibited by law or regulation can subject the owner or operator of the machine to penal fines or civil damages, including the costs of fire suppression.

Spark arresting equipment complying with the applicable laws and regulations must be installed on any machines which are likely to be operated in such areas. All machines which are converted for woodland use (loggers, harvesters, etc.) should be equipped with approved spark arresting equipment.

The F66 & F67 machines have turbo charged engines which do not require additional spark arresting equipment to comply with currently known laws and regulation.



**FIRE; (PREVENTION, EQUIPMENT AND SUPPRESSION )****FIRE PREVENTIVE INSTRUCTIONS**

Forest fires are both costly and dangerous. Fire prevention must be foremost in the mind of a log skidder operator. Observe the following instructions to reduce the chance of a fire.

- Fire prevention features provided by the manufacturer should be maintained in operational condition and should be used to supplement the operator's fire prevention efforts. In no case should the features be used or assumed as replacement for operator efforts at preventing fires.
- Keep the machine and all equipment free of dirt, wood, oil etc. This will decrease possible fire hazards and make it easier to find loose or defective parts. This is especially important when working with combustible materials.
- The engine compartment and frame assembly should be inspected and cleaned at least daily. To do a thorough job, remove the access panels. Use regulated compressed air, steam or water with a non-flammable degreasing agent to remove all foreign materials. Maintain the engine cooling system to avoid overheating.
- Remove any debris from the operator's compartment and winch platform after each work shift.
- Check all the electrical wiring and connections for defects. Keep battery terminals clean and tight. If you find a problem, repair or replace immediately.
- Inspect the driveshaft and brakes for debris and remove all traces.
- Inspect all fuel, oil and hydraulic lines and connections. Tighten or replace any that show any leakage.
- Clean up any fuel, oil or hydraulic fluid spills after making repairs or servicing.
- Oily clothes are a serious fire hazard.
- Never perform welding operations until the entire machine has undergone a thorough cleaning. In addition, cover rubber hoses etc. and have at least a fire extinguisher at hand.
- Hydraulic fluid is flammable. Do not weld on pipes or tubes that are filled with fluid. Be careful when welding next to filled pipes or tubes.
- There is always a risk of fire. Find out which type of fire extinguisher to use, where it is and how to use it.
- Gasoline is highly flammable and should never be used as a cleaning fluid. Use an approved solvent for cleaning.
- Some solvents can cause skin rashes and or fire dangers. Do not inhale solvent vapors.
- Store flammable starting aids in a cool, well ventilated location away from combustible materials.
- Smoking, open flames, etc. should not be permitted around any machine during fueling operations and/or when fuel system is open to the atmosphere.

### **FIRE FIGHTING EQUIPMENT**

- Keep your fire extinguishers fully charged and in good working order. Know how to use them.
- Carry an approved fire extinguisher rated for all class of fires.
- A 5 pound rated extinguisher is the minimum size recommended in some areas. Check local laws.
- Install it within reach of the operator in a position that protects it from damage.
- Use only a "quick release" type of mount.
- Service the extinguisher according to the manufacturer's specifications. Service after every use, no matter how short a time and never operate the machine without both in full working order.

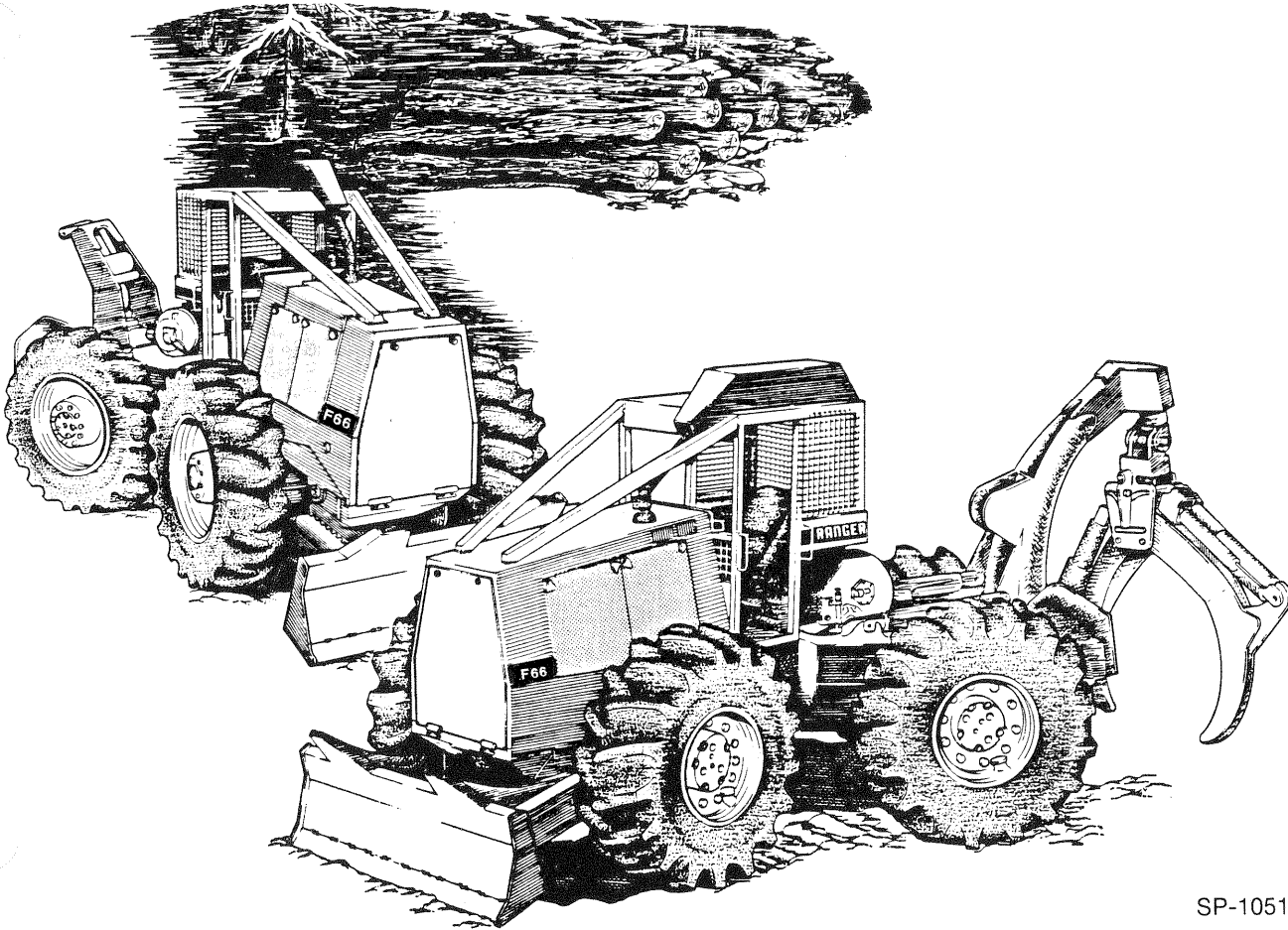
### **FIRE SUPPRESSION**

- Do not panic!
- Stop the machine and turn off engine in the clearest area available.
- Lower the blade (and log grapple if applicable).
- Shut off fuel and battery disconnect.
- Take the extinguisher and proceed to the source of the fire calmly.
- Though the manufacturer's instructions may vary, normally aim at the base of the fire.
- Even when the fire seems to be out, stand by with the extinguisher until the fire area is dead cool. Check this by removing any panels and looking for hot spots.
- Locate the cause of the fire and correct it before re-starting the machine.
- Thoroughly inspect the entire machine and recharge or replace the extinguisher(s) before returning to work.

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## PRESENTATION F66

The Ranger F66 articulated log skidders are available with four model styles. A Cable Skidder with a bare drum winch line pull of 130kN (29,200 lbf), Ranger A-Frame Arch Grappler Skidder With a 1780 mm (70 in) grapple opening and 360° rotation, Ranger Parallelgram Grapple Skidder With a 2670 mm (105 in) grapple opening and 360° rotation, and an optional Esco HI-VIS Single Arch Grapple Skidder with a 2184 mm (86 in) grapple opening and 270° rotation. All F66 grapple skidders are equipped with the above mentioned winch.

### ENGINE – (Current Production)

The machine is powered by a 5.9 liter (359 cubic inch), six cylinder, four cycle, turbocharged Cummins diesel engine that produces 113 kW (152 hp).

### ENGINE – (Earlier Production)

The machine is powered by a 5.9 liter (359 cubic inch), six cylinder, four cycle, turbocharged Cummins diesel engine that produces 110 kW (148 hp).

### DRIVE TRAIN

The transmission is a three speed power shift, full reversing, hydraulic transmission. A separate torque converter provides up to 2.73 to one torque multiplication. Gear shifting is through a lever operated, hydraulic control valve and Forward and Reverse modulation is provided for use in the first and second speed ranges.

Both drive axles incorporate No-Spin differentials and have additional gear reduction in the planetary wheel hubs.

## 8 PRESENTATION

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The winch is shaft driven and hydraulically controlled. It can be operated with the machine standing or with it moving in forward or reverse.

Drive shafts incorporate universal and slip shafts. The rear axle input drive shafts are supported by a pillow block bearing.

### BRAKES

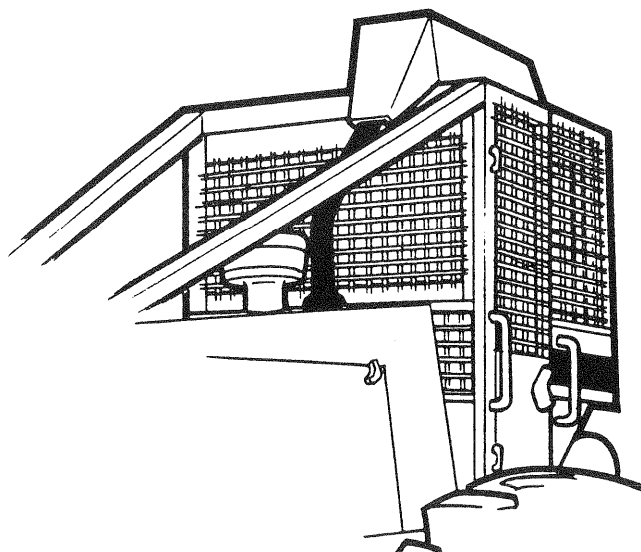
The service brake is a sealed, multiple wet disc type, mounted on the rear of the transmission. A caliper type disc brake on the front drive axle differential provides secondary braking. The service and secondary brakes are actuated by separate pedals and master cylinders. The mechanism of the service brake is mechanically applied for use as a parking brake.

### STEERING

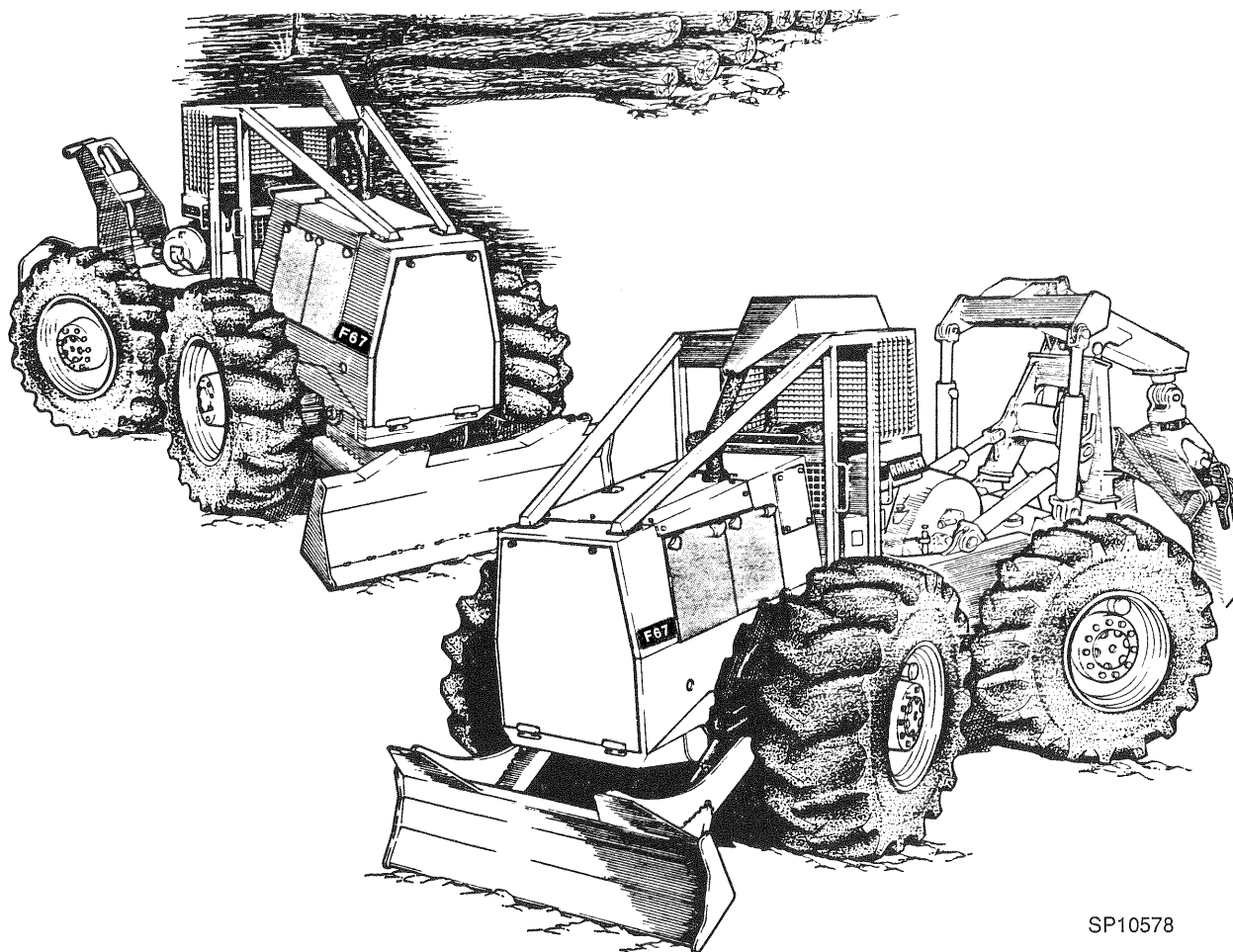
Two dual acting hydraulic cylinders, controlled by a lever or wheel actuated control valve move the hinged front and rear frames to steer the machine.

### CANOPY

The canopy and optional enclosed cab provide roll-over and falling object protection in accordance with applicable certification requirements.



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## PRESENTATION F67

The Ranger articulated log skidders are available with three model styles. A Cable Skidder with a bare drum winch line pull of 148kN (33,300 lbf), Ranger Parallelogram Grappler Skidder With a 2670 mm (105 in) grapple opening and 360° rotation, Ranger Parallelgram Grapple Skidder With a 2670 mm (105 in) grapple opening and 360° rotation, and an optional Esco HI-VIS Single Arch Grapple Skidder with a 2540 mm (100 in) grapple opening and 270° rotation. All F67 grapple skidders are equipped with the above mentioned winch.

## ENGINE

The machine is powered by a 5.9 liter (359 cubic inch), six cylinder, four cycle, aftercooled, turbocharged Cummins diesel engine that produces 132 kW (177 hp).

## DRIVE TRAIN

The transmission is a three speed power shift, full reversing, hydraulic transmission. A separate torque converter provides up to 2.73 to one torque multiplication. Gear shifting is through a lever operated, hydraulic control valve and Forward and Reverse modulation is provided for use in the first and second speed ranges.

Both drive axles incorporate No-Spin differentials and have additional gear reduction in the planetary wheel hubs.

The winch is shaft driven and hydraulically controlled. It can be operated with the machine standing or with it moving in forward or reverse.

Drive shafts incorporate universal and slip shafts.

## 10 PRESENTATION

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### BRAKES

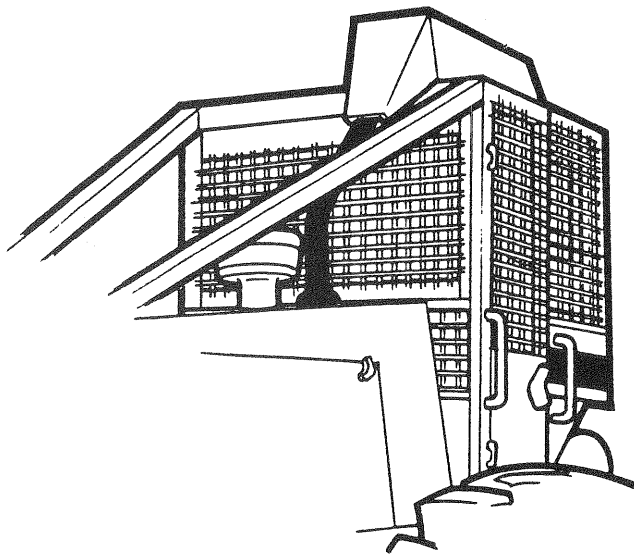
A single brake pedal actuates two sealed, multiple wet disc type break units. One is mounted on the rear of the transmission and the other is an enclosed midmount brake in the rear frame between the transmission and rear axle in the drive line. The mechanism of the transmission brake is mechanically applied for use as a parking brake.

### STEERING

Two dual acting hydraulic cylinders, controlled by a lever or wheel actuated control valve move the hinged front and rear frames to steer the machine.

### CANOPY

The canopy and optional enclosed cab provide roll-over and falling object protection in accordance with applicable certification requirements.



SP10506



## **MAINTENANCE AND INSPECTIONS**

### **MAINTENANCE**

If the machine is to work as economically as possible, thorough maintenance is necessary. The recommended intervals for maintenance and lubrication refer to normal working and environmental conditions. The maintenance work described in this manual can be carried out by a trained operator. Further adjustments and repairs to the machine should be performed by an authorized dealer.

### **INSPECTIONS**

#### **Delivery Inspections**

Before the machine left the factory it was tested and adjusted. In addition to this, your dealer has carried out a further check, the "Predelivery Inspection", according to our instructions before the machine was delivered to you.

#### **Follow-Up Inspections**

It is important that the machine receive further checks. Re-tightening of bolts, checking adjustments and other minor measures have to be carried out. You are entitled to two service inspections free of charge. The first must be carried out within the first 30 days or 100 hours of operation. The second is to be completed within 6 months, but not more than 1000 hours of operation.

The points in time at which these services should be carried out may be changed without prior notice.

#### **Maintenance Inspections**

In addition to the maintenance listed in this manual, authorized dealers offer maintenance programs which give an indication of the general condition of the machine.

Further information about these programs can be obtained from the nearest authorized dealer.



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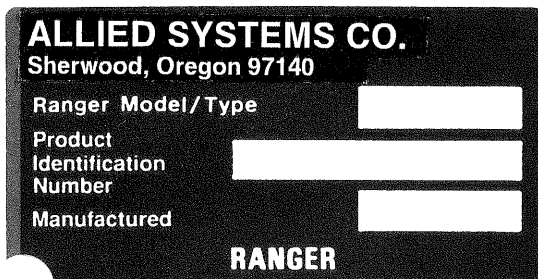


## PRODUCT IDENTIFICATION NUMBER

At the time of manufacture, every machine is assigned a product identification (serial) number to identify that machine from all others built by the allied systems co.

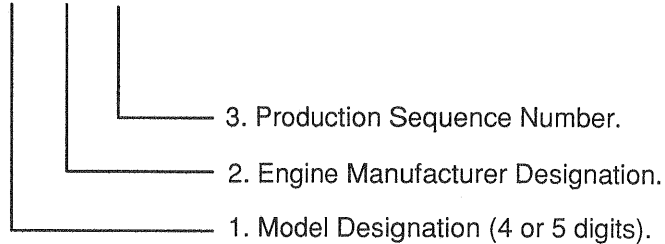
### Product Identification Breakdown (Current Production)

The following breakdown explains the product identification (serial) numbering system.



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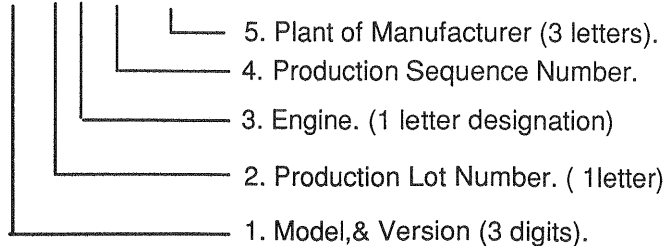


Always use the complete product identification (serial) number on all correspondence, service reports, literature and parts orders.

### Product Identification Breakdown (Earlier Production)

The following breakdown explains the product identification (serial) numbering system.

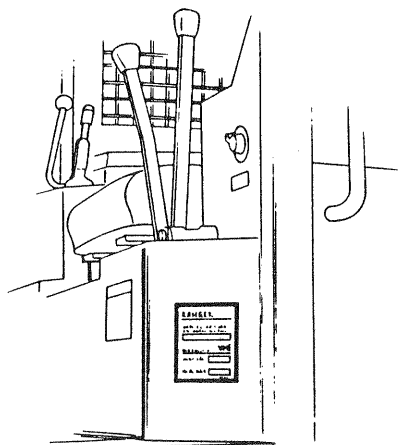
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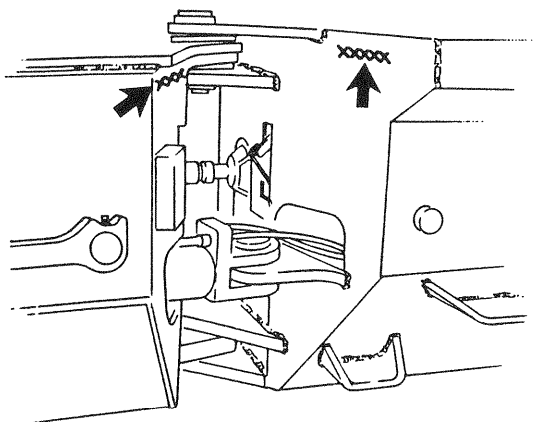
Always use the complete product identification (serial) number on all correspondence, service reports, literature and parts orders.

### PRODUCT IDENTIFICATION NUMBER LOCATIONS (Serial Number)

**Serial Number Plate** – Located on the floorboard panel to the left of the operator's seat.

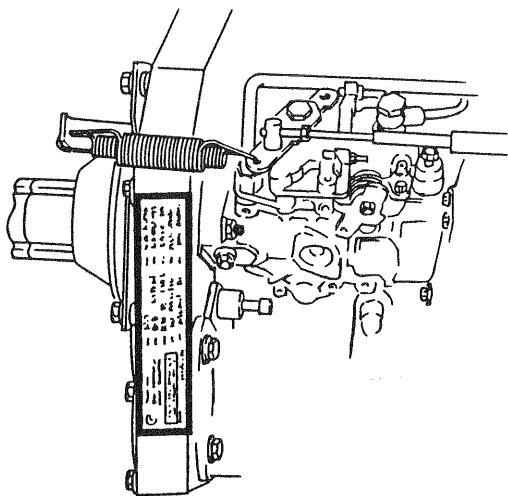


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**Frame** – The machine serial number is stamped into the front and rear frames in the center hinge area on the right hand side of the machine.

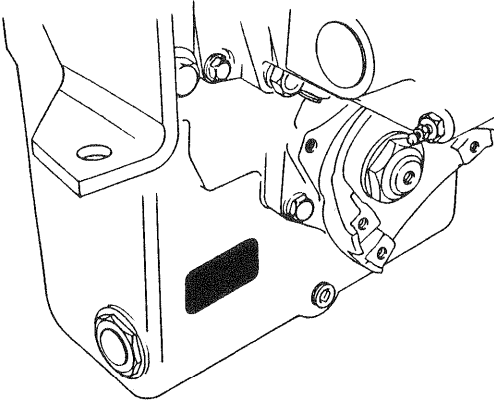
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**Engine serial number and data plate** – Located on the left side of the engine in front of the injection pump.

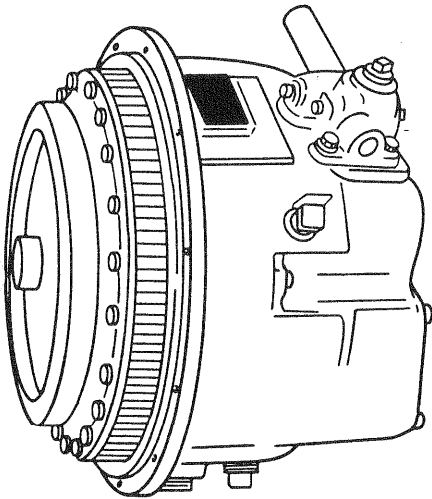
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**Transmission serial number and model plate** – Located on the metal tag, attached to the rear of the transmission.



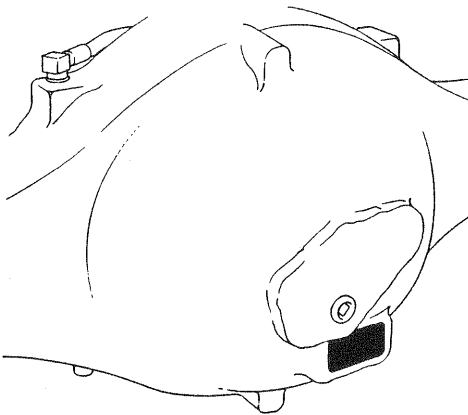
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**Torque converter serial number and model plate** – Located on the metal tag on the converter housing.



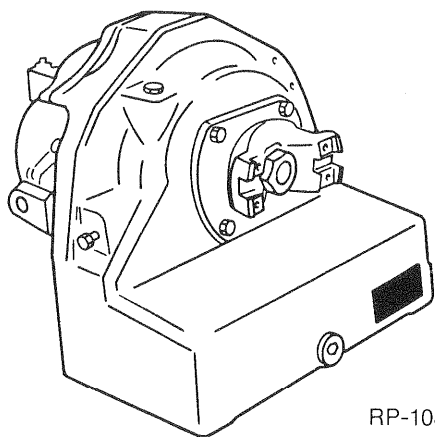
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**Drive axle ratio and serial number model plate** – Located on the metal tag on the differential housing.



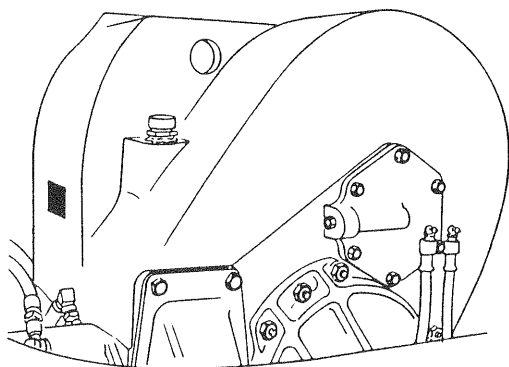
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### Mid-mount brake serial number and model plate (F67 only)



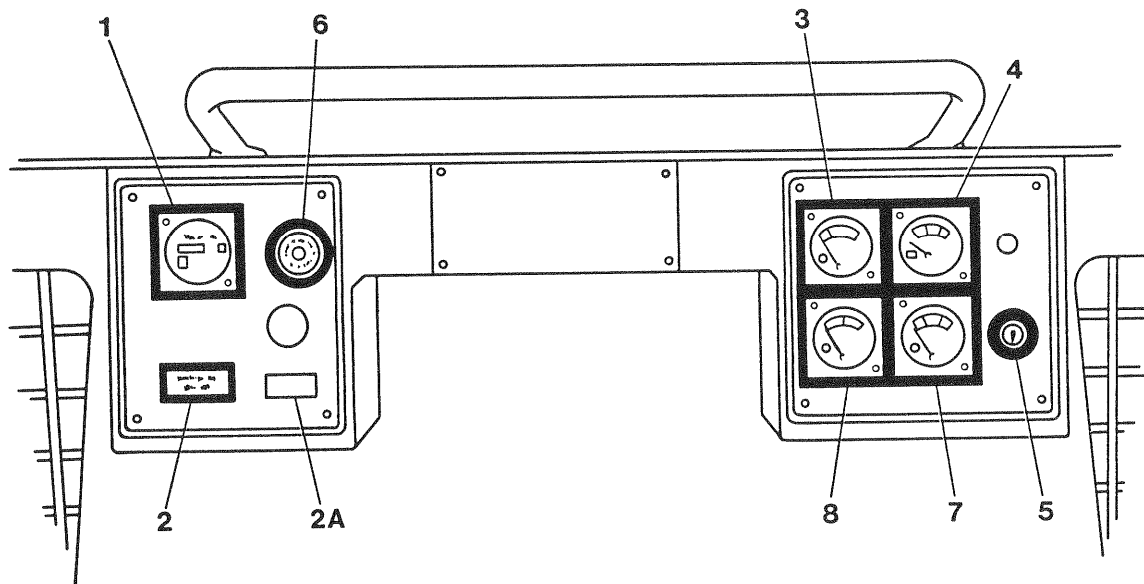
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### Winch serial number and model plate



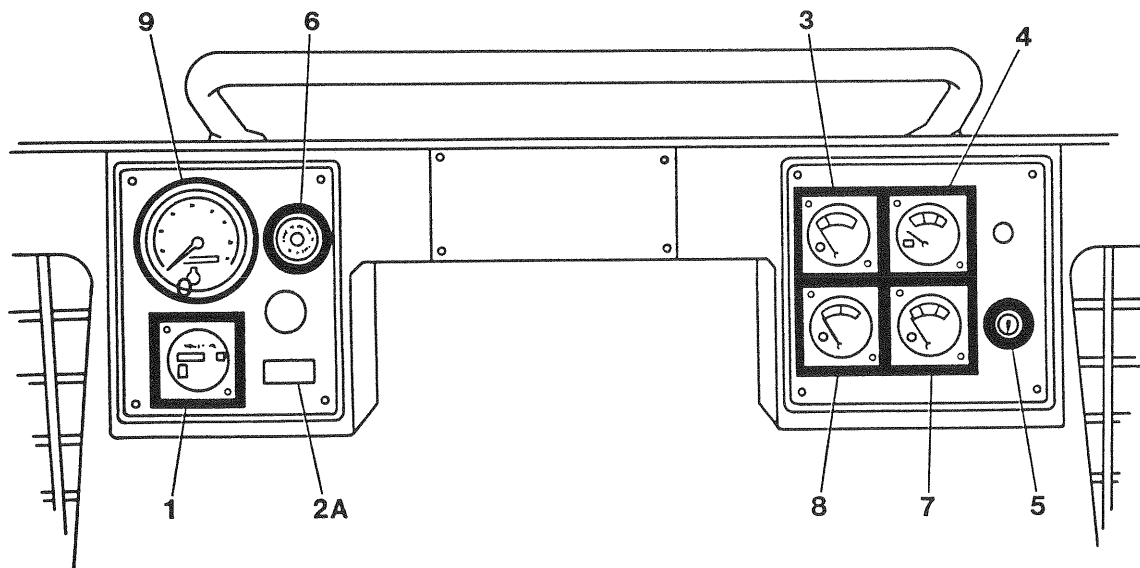
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INSTRUMENT PANEL (F66 ONLY)



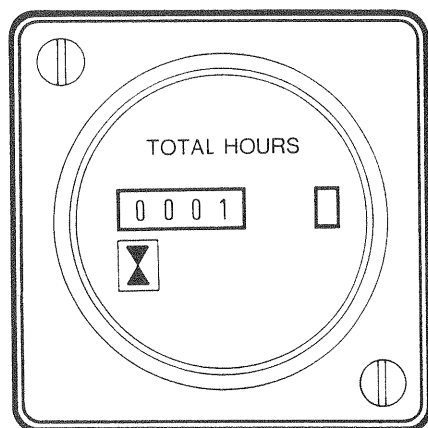
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INSTRUMENT PANEL (F67 ONLY)



RP-10887

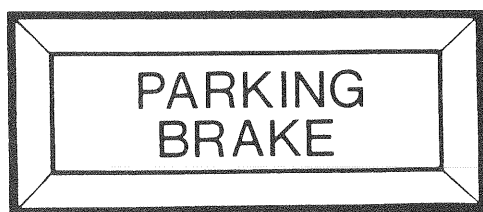
**Note:** Do not operate the machine until you study this manual carefully. Make yourself familiar with the operation of the machine, including the position and function of the various instruments and controls. Monitor the instruments occasionally, noting any abnormal readings, and take the appropriate corrective action to prevent serious damage.



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## 1. HOURMETER

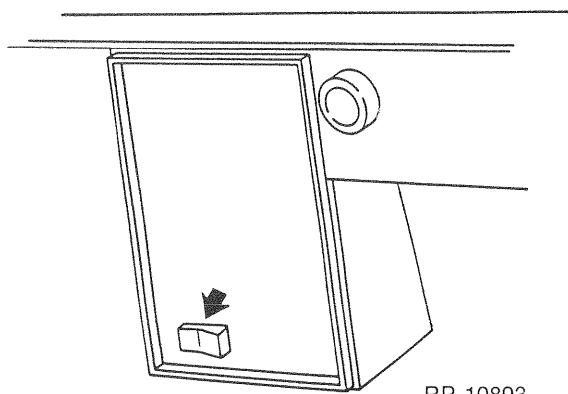
The hourmeter indicates the number of hours of operation that the machine has worked. Monitor the hourmeter closely to enable periodic lubrication and maintenance operations to be done at the recommended operating intervals. This will contribute to longer, trouble-free operation of your Ranger Log Skidder.



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## 2. PARKING BRAKE LIGHT (Earlier F66 Models only)

This light glows to indicate that the parking brake is applied when the ignition switch is in the ON position.

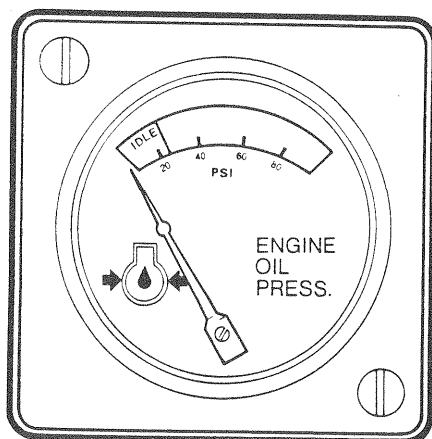


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## 2A. DECLUTCH SELECT SWITCH (Grapple Machines Only)

This switch allows the transmission to be declutched in reverse so the engine can be sped-up to speed up the hydraulics.

**Note:** *DECLUTCH: The transmission although engaged in gear is temporary disengaged.*

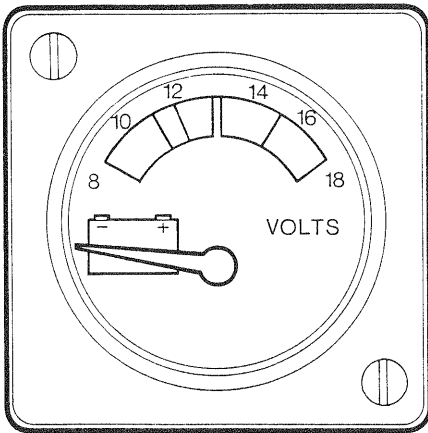


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## 3. ENGINE OIL PRESSURE GAUGE

This gauge allows the operator to monitor the operating pressure of the engine lubrication system. After 15 seconds of operation, the gauge should read 70 kPa (10 PSI) minimum at Low Idle RPM. If the pressure is below this, shut down the engine immediately and determine the cause.

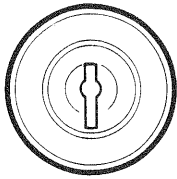




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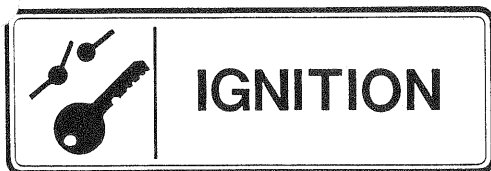
#### 4. VOLTMETER

This gauge shows the electrical system voltage with the ignition switch ON. Under normal conditions, the needle will be within green area of the gauge (12-15 volts). If the needle enters the red zones (under 11 or over 15 volts) and remains there while operating, the electrical system should be serviced.

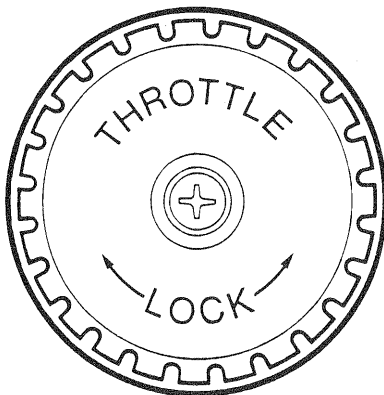


#### 5. IGNITION SWITCH

Insert the key into the ignition switch and turn it fully to the right to start the engine. The transmission must be in neutral to be able to start the engine. If the engine stops cranking while starting or will not crank, push the circuit breaker reset button on the side of the engine and try again. If the engine will not crank, further troubleshooting will be required.



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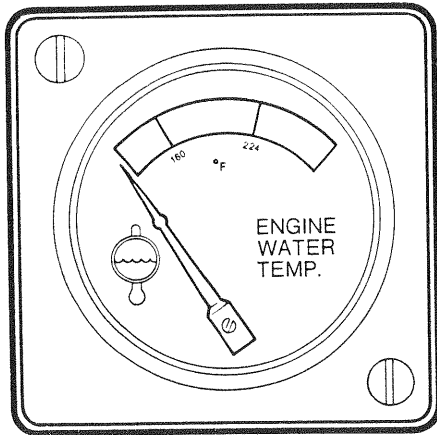
#### 6. HAND THROTTLE CONTROL (Optional)

This control is for use during warm-up or while making checks or adjustments at specified engine speeds. Pull the handle out until the desired engine speed is reached and turn the handle clockwise to lock it in that position. Turn the handle counter clockwise and push it in all the way to return the engine to Low idle RPM.



### **WARNING!**

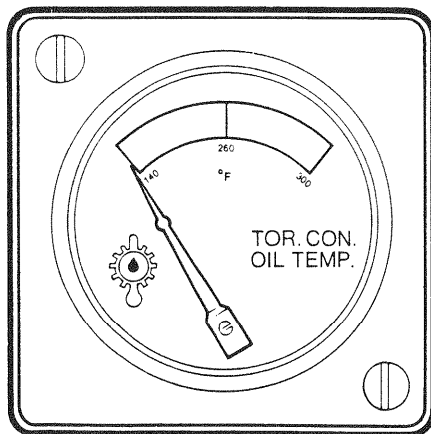
**DO NOT** use the hand throttle while traveling. When the control is locked, the accelerator linkage is locked as well and it will not be released by the service brake. Release the lock to restore throttle control to the accelerator pedal for traveling.



SP-10388

### 7. ENGINE COOLANT TEMPERATURE GAUGE

This gauge allows the operator to monitor the temperature of the engine coolant. Do not allow the indicator needle to enter the red zone on the gauge or serious damage to the engine and its components can result. If overheating does occur, shut down the engine immediately and determine the cause.



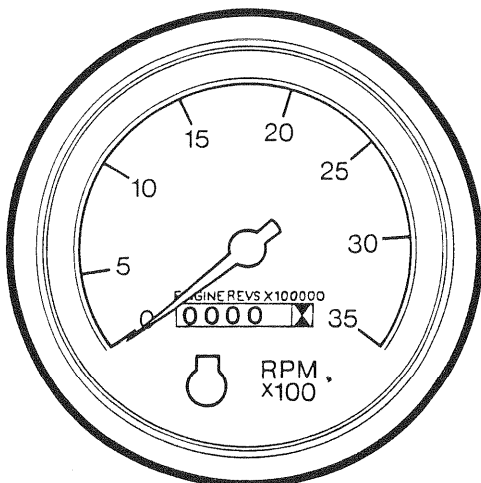
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### 8. CONVERTER OIL TEMPERATURE GAUGE

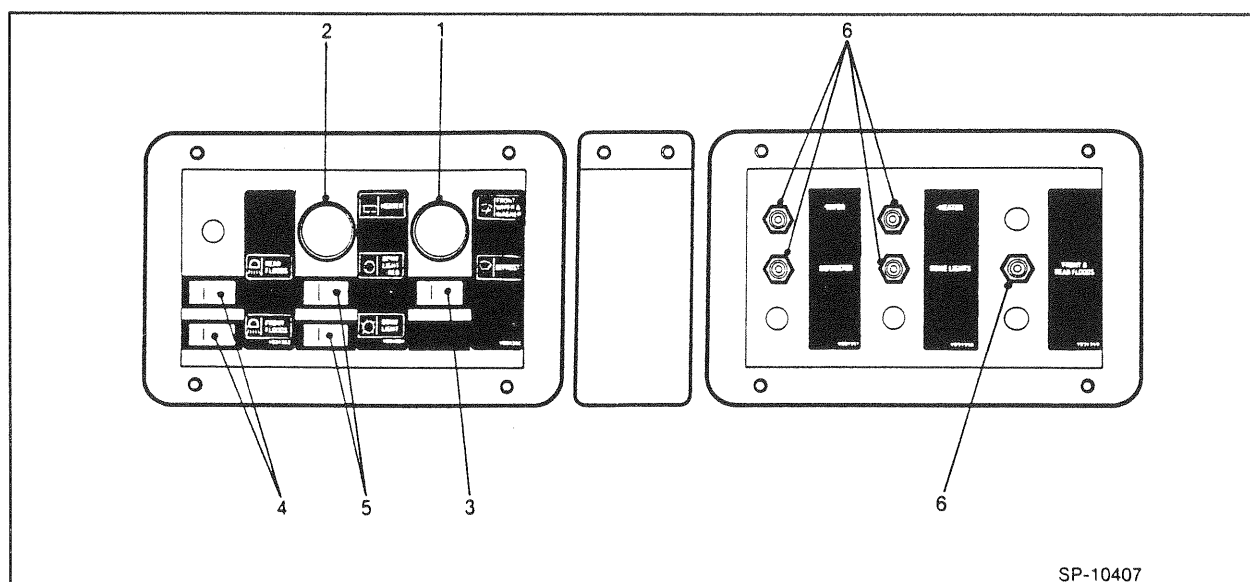
This gauge allows the operator to monitor the temperature of the transmission/ converter hydraulic fluid. DO NOT allow the indicator needle to enter the red zone on the gauge or serious damage to the system can result. If the system begins to overheat, choose a lower transmission speed range. If the system continues to overheat, shut down the engine and determine the cause.

### 9. TACHOMETER (F67 Only)

The tachometer shows the operating speed of the engine in revolutions per minute (RPM).



SP-10580



SP-10407

## 1. WINDSHIELD WIPER AND WASHER SWITCH (Optional)

Turn this switch clockwise one or two positions to turn on the windshield wiper (two speeds). Turn the switch fully counterclockwise to turn the wiper off. Press the switch to activate the windshield washer.

**NOTE:** Use only clean windshield washer solvent in the washer reservoir. Use a quality brand of washer anti-freeze if the ambient temperature falls below 0° C (32 °F).

## 2. HEATER SWITCH

Turn this switch clockwise one position for a low fan speed or two positions for a fast fan speed to heat the interior of the enclosed cab.

## 3. DEFROST FAN SWITCH

This switch controls the windshield defrost fan to clear the inside of the windshield of frost and condensation.

## 4. FRONT AND REAR FLOOD LAMP SWITCHES

These switches control the front and rear flood lamps independently for use when the machine is operated at night.

## 5. DOME LIGHT SWITCH

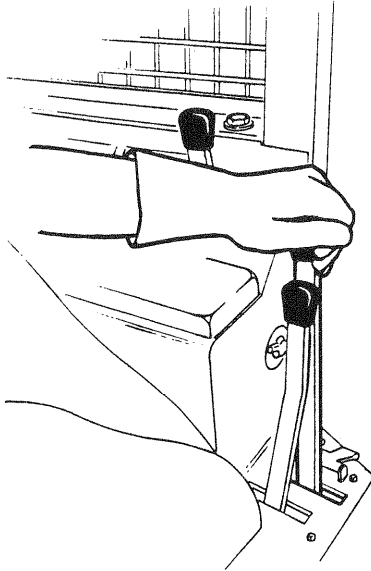
The red dome light switch controls the red light inside the top of the cab for use when traveling at night. The other switch controls the white dome light, which is to be used ONLY when the machine is stationary.

## 6. ACCESSORY CIRCUIT BREAKERS

If any of the controls do not work, push the appropriate circuit breaker reset button and try the control switch again. If this fails to correct the problem, further troubleshooting will be required.

## NOTES

[illegible]

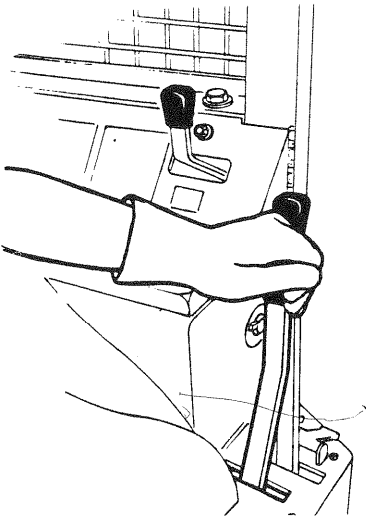


SP-10519

### DIRECTION CONTROL LEVER

This lever is connected to the transmission control valve and controls the transmission's Forward and Reverse functions and has a center Neutral position.

**Note:** *Your machine is equipped with Forward/Reverse modulation to provide a system cushion when the machine's direction is changed while it is still moving. This feature should ONLY be used in First or Second speed ranges. Damage to the transmission can result if this feature is used in the Third speed range at travel speeds.*



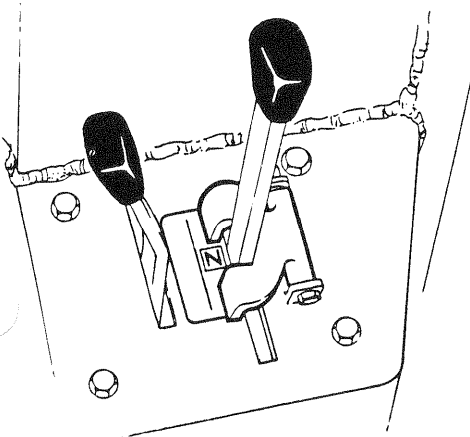
SP-10521

### SPEED RANGE CONTROL LEVER

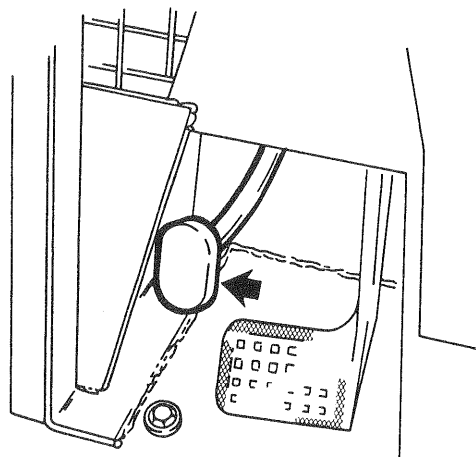
This lever also connected to the transmission's First, Second and Third speed ranges. The lower the range selected, the less strain is put on the engine when the machine is pulling a load

### NEUTRAL LOCK

Turn this latch to the right when the direction control lever is in the NEUTRAL position to lock the lever in that position. ALWAYS engage the neutral lock when you leave the seat with the engine running.



SP-10520



SP-10522

### SECONDARY BRAKE PEDAL (F66 ONLY)

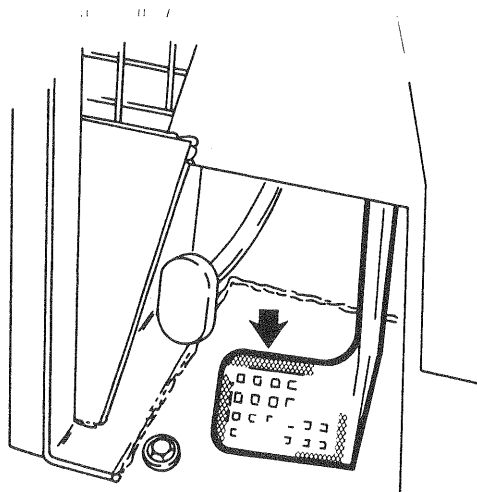


#### **WARNING!**

**DO NOT** operate the machine with **ONLY** the secondary brake system operational. Make sure that **BOTH** brake systems are in good operating condition at all times.

This pedal is located adjacent to the service brake pedal in the left hand operator's footwell. It should be used to stop the machine in the event that the service brake system should fail.

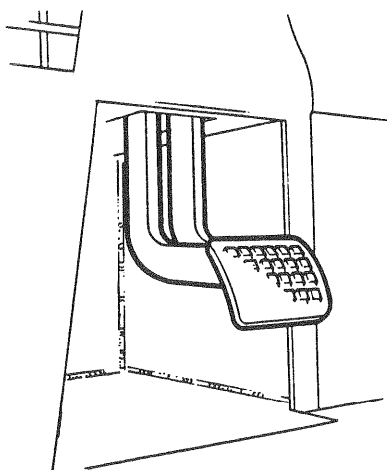
**NOTE** Because this brake system is not used regularly, it should be tested at the beginning of each work shift to ensure that it is in safe working condition if the need to use it arise.



SP-10523

### SERVICE BRAKE PEDAL (F66 ONLY)

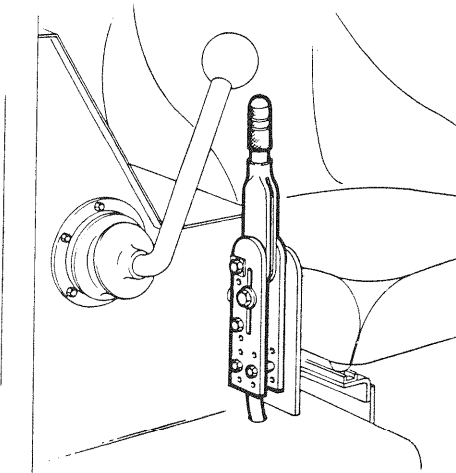
This pedal is located to the right of the secondary brake pedal and controls the transmission mounted hydraulic brake for normal machine braking. Depress the pedal to decrease the speed of the machine or to stop the machine completely.



SP-10581

### SERVICE BRAKE PEDAL (F67 ONLY)

This pedal is located in the left hand operator's footwell and is a dual braking system which controls both the transmission mounted hydraulic brake and the enclosed midmount brake for normal machine braking. Depress the pedal to decrease the speed of the machine or to stop the machine completely.



SP-10508

### PARKING BRAKE LEVER

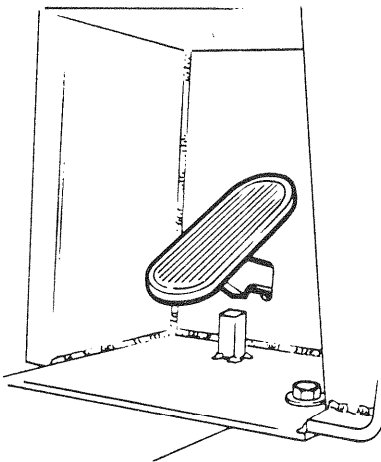
Pull this lever up and back to actuate the parking brake mechanism.

#### (Current Production)

**NOTE:** *F66 & F67 machines automatically declutch the transmission when the parking brake is applied to prevent driving thru the parking brake.*

#### (Earlier Production)

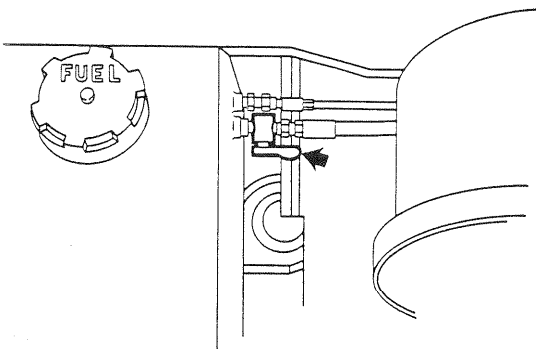
**NOTE:** *On the F66 an indicator light on the instrument panel will glow to indicate that the parking brake is being applied when the ignition switch is in the ON position.*



SP-10524

### ACCELERATOR PEDAL

This pedal is located in the right operator's footwell and controls the engine throttle. Depress the pedal to increase the speed of the machine or release it to decrease the speed.



RP-10892

### FUEL SHUT OFF VALVE

The fuel shut off valve located at the fuel tank should be closed at the end of the work shift. Remember to turn the valve on prior to starting the machine.



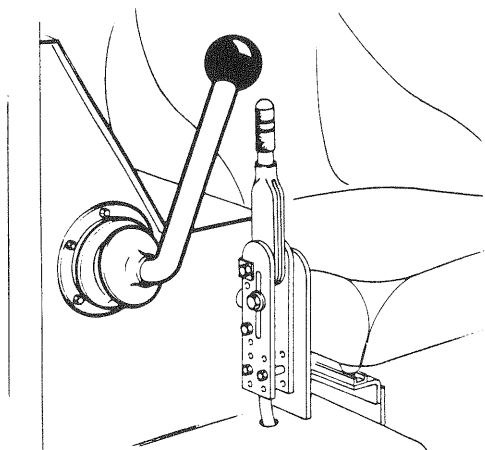
SP-10397

### BATTERY DISCONNECT SWITCH

Turn this switch to the OFF position to disconnect the current supply from the battery to the electrical system.

**NOTE:** *DO NOT turn this switch to the OFF position with the engine running. Serious damage to the alternator and electrical system can result.*

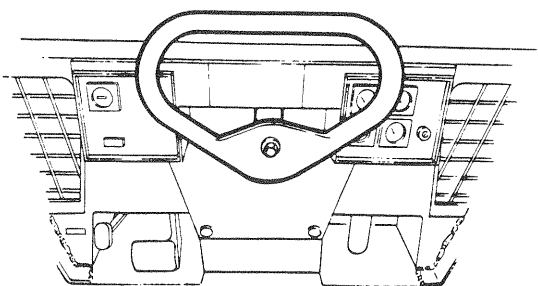
**NOTE:** *Turn the battery disconnect to the OFF position at the end of each workshift or when the machine is not to be operated.*



SP-10507

### STEER AND BLADE CONTROL LEVER

This lever is connected to the main control valve and controls both functions (except on machines equipped with an optional steering wheel). Moving the lever to the left and right steers the machine in that direction. Pulling the lever straight back lifts the blade and pushing it straight forward lowers it.

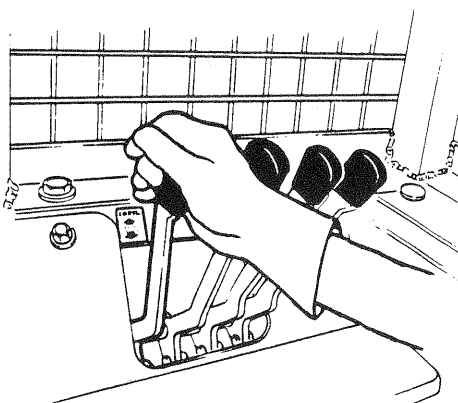


### STEERING WHEEL (OPTIONAL)

The steering wheel is connected to the steering section of the main control valve. Turning the wheel to the left and right steers the machine in that direction.

SP-10527



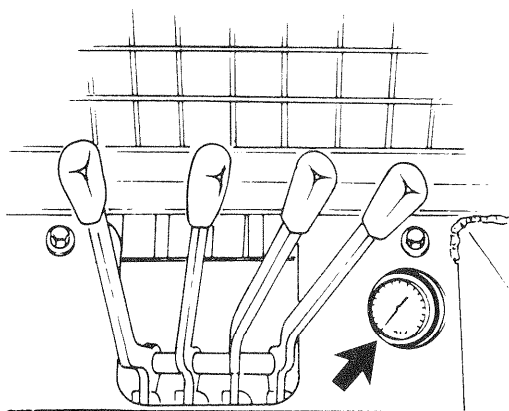


SP-10504

### GRAPPLE CONTROL LEVER

On grapple skidders, this lever opens and closes the grapple tongs to pick up or drop a load of logs.

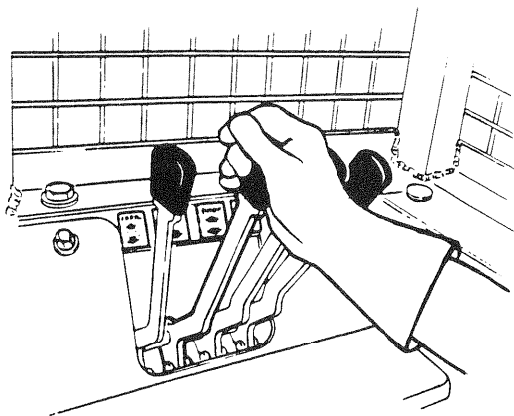
**NOTE:** *F66 & F67 HI-VIS & Parallelogram Grapple Skidders are equipped with a log grapple accumulator system that uses a hydraulic accumulator to store hydraulic energy for the grapple hydraulic circuit to maintain a firm hold on the log bundle in the grapple tongs.*



SP-10533

### GRAPPLE ACCUMULATOR SYSTEM PRESSURE GAUGE

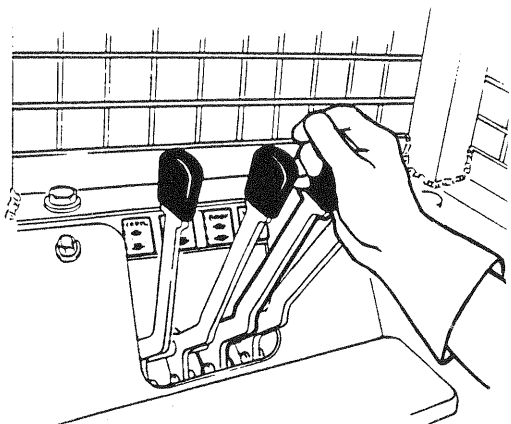
This gauge reads the pressure in the hydraulic accumulator and the base end of the log grapple cylinder to allow the operator to monitor the operation of the system. If there is a pressure drop shown on the gauge, hold the grapple control lever in the CLOSE position long enough to allow the system to reach maximum pressure, about 15.2 MPa (2200 PSI). Experience with your specific operating conditions will tell you what pressure reading on the gauge will require that the accumulator be re-energized.



SP-10503

### ARCH CONTROL LEVER

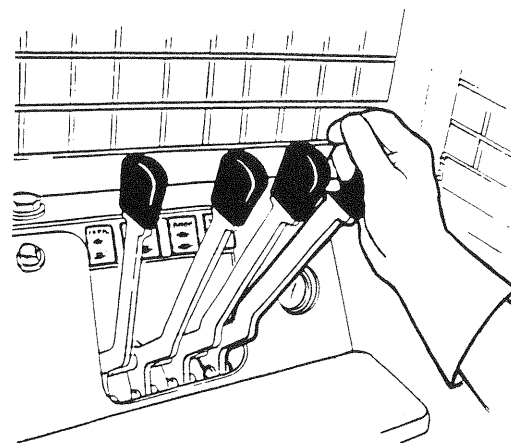
On grapple skidders, this lever moves the grapple arch forward or back to position the grapple tongs over the load.



SP-10531

### BOOM CONTROL LEVER

On F66 & F67 Parallelogram grapple skidders this lever controls the boom pivot to better access the grapple over the load.



SP-10505

### GRAPPLE ROTATING HEAD CONTROL LEVER

This lever rotates the log grapple assembly to the left and right to position the grapple around the load.

### WINCH CONTROL LEVER

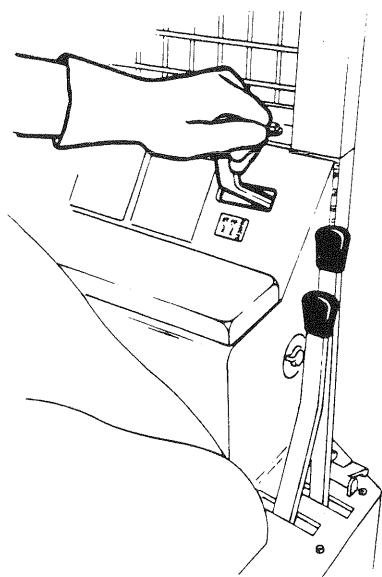
This lever actuates the winch control valve to operate the winch with the engine running. When the lever is moved to the detented FREE-SPOOL position, the winch mainline can be pulled out from the winch cable drum. When the lever is moved to the WINCH-IN position, the winch cable drum will rotate and pull the load. When the lever is in the detented center LOCK position, the cable drum is held in the SKIDDING mode and the load can be transported to its destination.



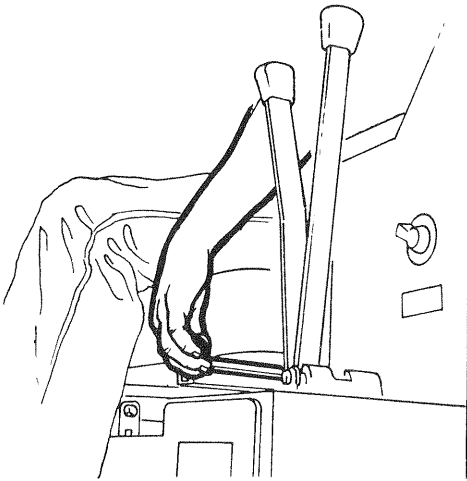
### **WARNING!**

*The winch must only be operated from the operator's seat. NEVER stand in the articulation area ( outside the operator's guard) when you operate the winch. The operator's guard will protect you in the event that the cable should snap under tension.*

**Note:** *When the load has been WINCHED-IN to the butt pan, release the winch control lever to the LOCK position IMMEDIATELY. Serious damage to the winch and transmission can result if the winch is made to pull against the butt pan longer than momentarily.*



SP-10518



SP-10534

## OPERATORS SEAT

Adjust the operator's seat to a comfortable position.



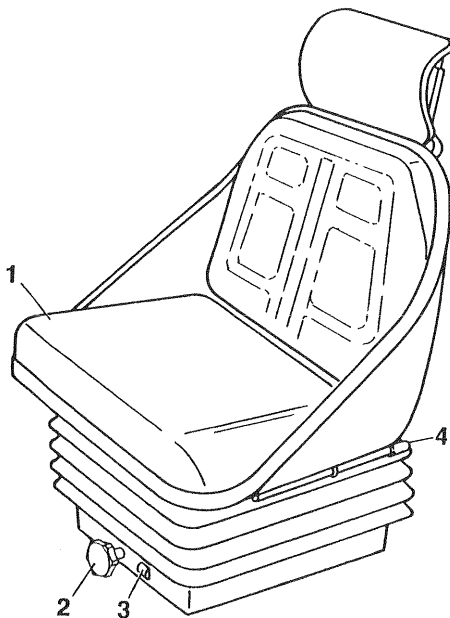
### **WARNING!**

*Do not attempt to make seat adjustments while machine is in motion.*

## STANDARD SEAT

### Seat Adjustment Lever

This lever is located below the operator's seat and allows the operator to position the seat forward or back for his operating comfort.



RP-10763

## SUSPENSION SEAT (Optional)

### Forward and Back Adjustment

Lift lever (Item 4) up and hold, slide seat to desired position, then release lever.

### Height Adjustment

To raise the height of the seat you must manually lift the seat (Item 1) to the first or second click stop.

To lower the seat lift it to its highest position, seat will then lower into its lowest position. Adjustments can be made accordingly.

### Weight Adjustment

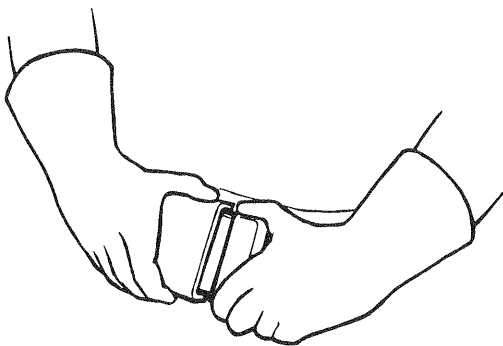
By turning the weight adjustment knob (Item 2), located at the bottom of the seat, the operator's weight can be set for a more stable and comfortable ride. The weight selected can be seen through a window (Item 3) next to the adjustment knob with the seat in the unloaded position.

The suspension seat can be adjusted from 110 lbs (50 kg) to 287 lbs. (130 kg) and should be set so the seat does not bottom out during normal operation for maximum suspension life.

### SEAT BELT

Always fasten your seat belt when you operate the machine. Adjust the belt so that it fits snugly around the hips.

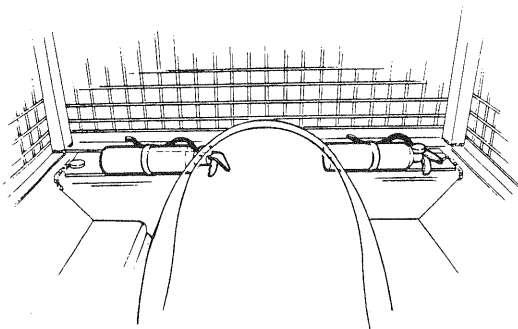
Seat belt and mounting must be inspected for damage or wear. Check the buckle for correct operation. Replace as needed.



SP-10405

### FIRE EXTINGUISHERS

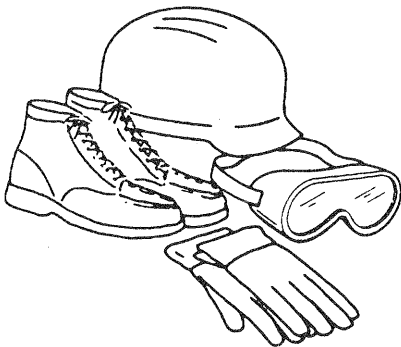
Ranger Log Skidders are equipped with two 2.3 kg (5 lb.) hand operated fire extinguishers mounted behind the operator's seat. Read and understand the instructions printed on the canister and learn how to operate them. Learn how to remove the canisters from their mounting brackets in the shortest possible time.



SP-10536



V50385



EL13914

## PREPARE TO OPERATE

Before you operate the machine, read and understand this manual.

Never operate the machine while under the influence of alcohol, medicine or other drugs.

The optional enclosed cab has two exits; the left hand door and the right hand door.

The canopy and optional cab are for the protection of the operator. They meet the requirements for R.O.P.S./F.O.P.S protection according to the S.A.E. and I.S.O. Standards.

Wear suitable clothing.

Know the area and the company rules and regulations.

## PROCEDURE BEFORE STARTING

1. A walk around inspection should be carefully performed looking for leaks, loose, missing or damaged parts. Defects should be corrected prior to starting the engine.
2. Daily maintenance checks should be completed.

**Note:** *Perform maintenance checks in a sequence to avoid repeatedly mounting and dismounting the machine.*



## WARNING!

**When mounting and dismounting the machine, use three point mount (i.e. Two hands and one foot/one hand and two feet). Don't Jump!**

In addition to the walk around inspection and daily maintenance check, the following checks should be made:

- Frame locking link is in the stored position.
- Wheel blocks removed.
- Battery disconnect switch is in the "On" position.
- Fuel shut off valve is turned on.
- Windows are clean, if applicable.
- Park brake is applied.

### RUN IN INSTRUCTIONS

During the first 50 hours of a new machine's operation, the machine must be operated with extra care until all components are adequately run in.

#### Engine

See the Cummins Operation and Maintenance Manual for the break-in instructions for the engine. The engine lubricating oil and filters should be changed after the first 50 hours of operation and every 250 hours of operation thereafter under normal operating conditions.

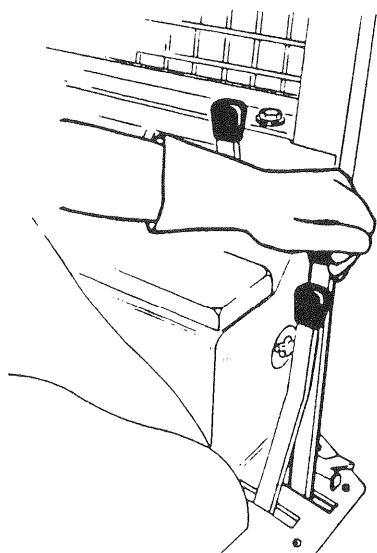
#### Transmission

The fluid in the transmission/converter hydraulic system should be checked daily and changed every 1000 hours of operation. The transmission filter element should be changed after the first 50 and 100 hours and every 500 hours thereafter. The sump screen should be cleaned every 1000 hours of operation.

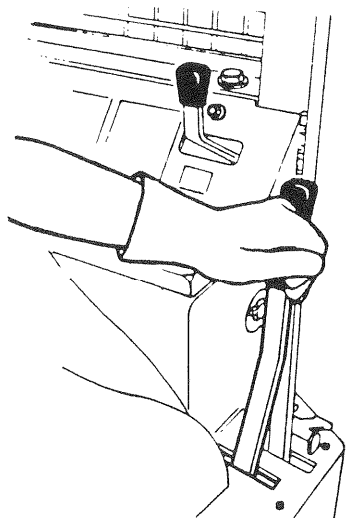
#### Hydraulic System

The hydraulic fluid should be checked daily and changed every 1000 hours of operation. Change the filter after the first 50 hours and every 500 hours thereafter. Clean the magnet in the bottom of the tank the first 50 hours and when the fluid is changed.

**Note:** *Cleanliness is very important when you work on the engine, transmission/converter or hydraulic systems.*



SP-10519



SP-10521

### GENERAL INFORMATION

#### Transmission

The powershift transmission in your machine allows the operator to shift directly to a higher speed range, even at full throttle. When shifting to a lower speed range, it is recommended that the engine speed be increased to reduce drag from the wheels. The transmission is equipped with Forward-Reverse modulation that allows the direction to be changed under power while the machine is still moving in the First and Second speed ranges.

**Note:** *This feature should not be used in the THIRD speed range because damage to the transmission can result.*



### WARNING!

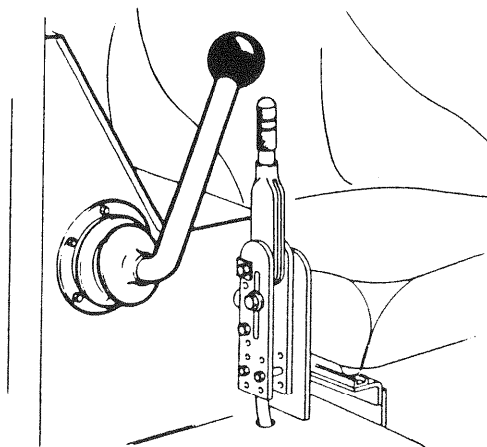
**DO NOT** use the transmission as a downhill brake, shifting the transmission into reverse while going forward down a grade. The engine can stall and there will be no steering.

Use the FIRST speed range for maximum tractive effort while pulling a load.

Use the SECOND speed range for normal skidding or decking operations.

Use the THIRD speed range for operating the machine without a load, to travel at maximum speed.

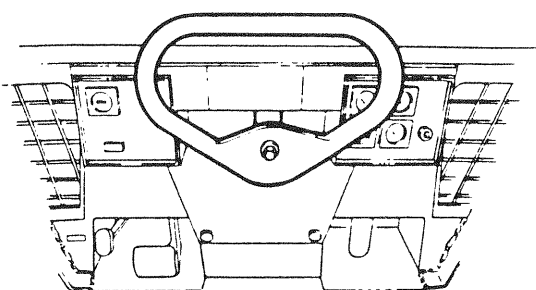
**Note:** *If the reading on the converter oil temperature gauge starts to enter the red zone, shift the machine to a lower speed range to reduce the strain on the torque converter.*



SP-10507

## Steering

The hydraulic steering on the machine is controlled by the steer and blade control lever or the optional steering wheel. The steering section of the main hydraulic system receives priority so that if another hydraulic function is being used and the steering is needed, full hydraulic power is given to the steering. Since the main hydraulic pump that supplies flow to the steering hydraulics is driven by the engine and torque converter, if the engine stalls for any reason steering will be lost and the machine should be brought to a complete stop immediately.



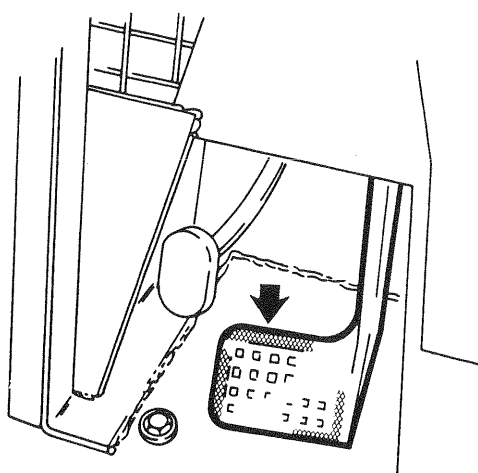
SP-10527

## OPTIONAL STEERING WHEEL

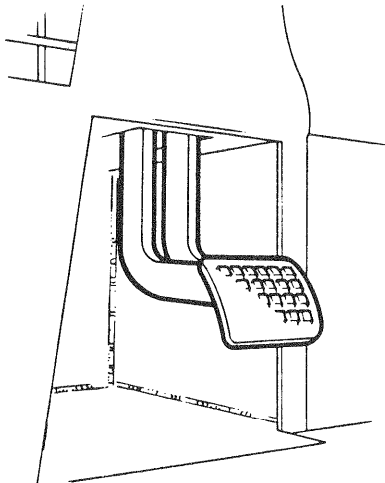
## Service Brakes

**Note:** *This applies to the F66 machines only.*

The service brake pedal actuates a master cylinder to control the enclosed wet disc brake unit mounted on the back of the transmission. The brake unit is sealed to reduce the effect of operating in wet or muddy conditions and it applies directly on the output of the transmission to brake all drive wheels equally. Although the actuating fluid is separated from the transmission fluid system, the brake is cooled and lubricated by the transmission/converter hydraulic system. On latter grapple machines the transmission will declutch in reverse if so selected to allow for faster hydraulic operation.



SP-10523



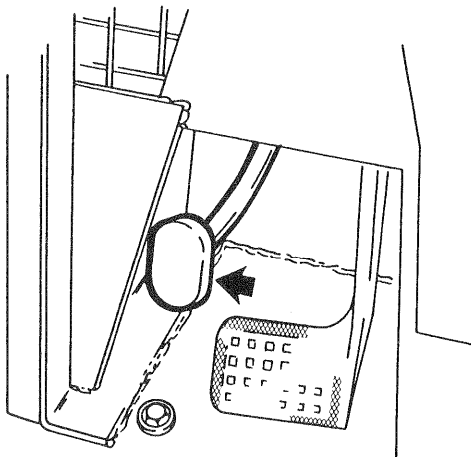
SP-10581

**Note:** *This applies to the F67 machines only.*

The service brake pedal actuates two master cylinders to control the enclosed wet disc brake unit mounted on the back of the transmission and the enclosed midmount brake in the rear frame. The brake units are sealed to reduce the effect of operating in wet or muddy conditions. The transmission mounted brake applies directly on the output of the transmission and the midmount brake applies directly on the lower drive shafts to brake all drive wheels equally. Although the actuating fluid of the transmission mounted brake is separated from the transmission fluid system, the brake is cooled and lubricated by the transmission/converter hydraulic system. The enclosed midmount brake has its own lube oil sump in its housing. Although one pedal actuates both systems, they are totally two separate systems. But if one of the systems should fail the other would assume the function of a secondary brake and sufficient braking will be available to bring the machine to a complete stop. On latter grapple machines the transmission will declutch in reverse if so selected to allow for faster hydraulic operation.

### Secondary Brake

**Note:** *This applies to the F66 machines only.*



SP-10522



### **WARNING!**

**DO NOT** operate any of the **RANGER** machines with only one brake system operational. Both brake systems should be kept in good working condition at all times.

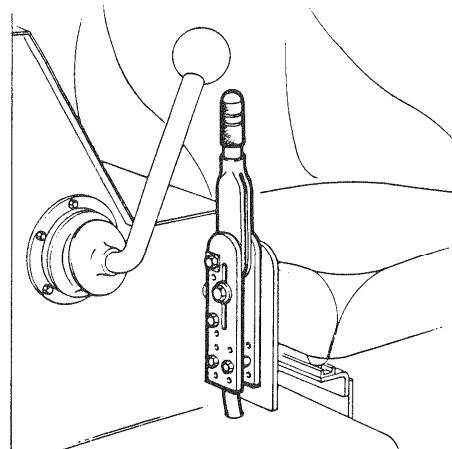
### Parking Brake

The brake mechanism of the transmission mounted hydraulic service brake is mechanically applied for use as a parking brake. Always apply the parking brake and lower the blade when you leave the operator's seat. It should be released before you put the machine in motion. If you park the machine on a grade, the tires should be securely blocked in addition to applying the parking brake and lowering the blade.

### CURRENT PRODUCTION

#### **F66 & F67 Grapple Machines With Reverse Declutch Select Switch.**

Operating conditions and operator preference will dictate if the reverse declutch feature will be used. This selection is made by turning the switch to the on or off position.

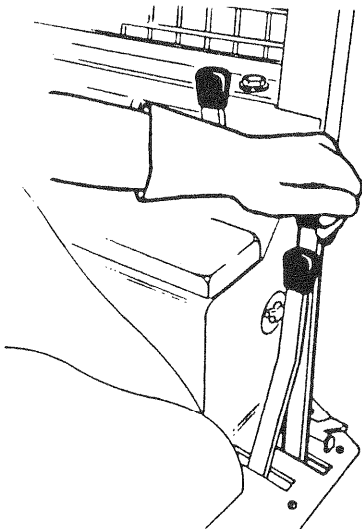


SP-10508



## STARTING THE ENGINE

1. Check that the transmission is in NEUTRAL with the neutral lock applied and that the parking brake is applied. If the machine is equipped with a hand throttle, it should be pushed all the way in (to its low idle position).



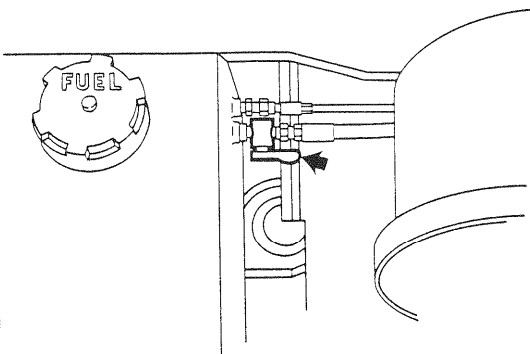
SP-10519



SP-10397

2. Put the battery disconnect switch in the ON position.

3. Turn on fuel shut off valve.



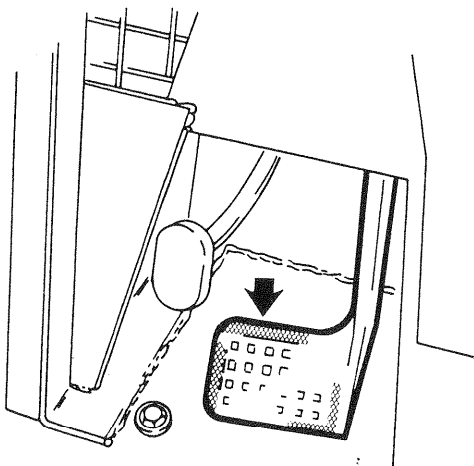
RP-10892

4. Fasten the seat belt.



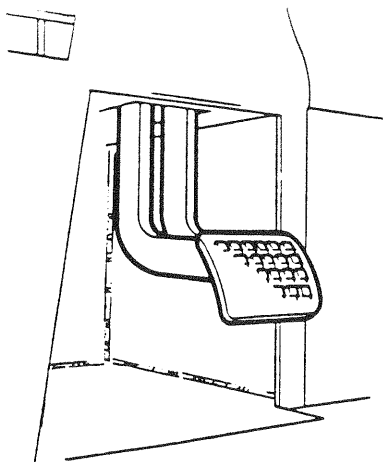
SP-10405

5. Apply and hold the service brake pedal.



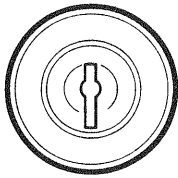
SP-10523

**F66**



SP-10581

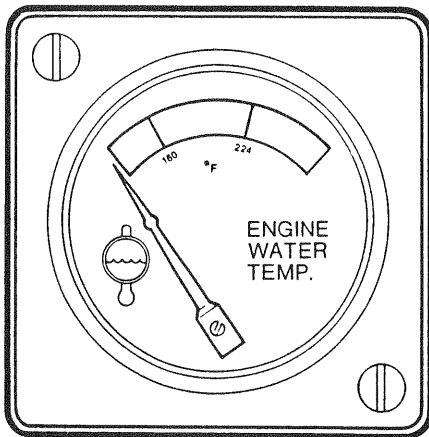
**F67**



SP-10386

6. Insert the key into the ignition switch and turn it fully clockwise to the Start position until the engine starts and then release the key. If the reading on the engine oil pressure gauge is less than the 70 kPa (10 PSI), after 15 seconds of operation, shut down the engine immediately and determine the cause before you operate the machine.

**Note:** *DO NOT crank the engine for longer than 30 seconds if the engine fails to start promptly. Wait until the starter stops turning before you turn the key again. Serious damage to the starter motor and to the flywheel drive gear can result.*



SP-10388

7. Allow the engine coolant temperature gauge to reach a temperature of 66° C (150° F) before you put the machine into full power operation.

**Note:** *DO NOT operate the engine at a high RPM until it has reached this temperature. The engine should be run at Low Idle (800–900) RPM for three to five minutes, then at 1000 RPM for three minutes and at 1800 RPM for three minutes to warm the engine.*

## Starting Engine In Cold Weather

Other than the use of a suitable low temperature motor oil and a suitable anti-freeze mixture in the engine cooling system, extensive preparation is not required for cold weather starts. For operation at temperatures below –18° C (0° F), a change of oil in the main hydraulic system to the lubricant recommend in the specification section will aid starting by reducing resistance in the main hydraulic pump. Choose a good quality brand of winter diesel fuel. It may be necessary to change the lubricant in the drive axle planetary hubs and differential housing or in the transmission/converter hydraulic system as shown in the specification section. It is important to cold weather starting that the electrical system, especially the batteries, be properly maintained.

**Note:** *See your Cummins engine distributor for the cold starting aids recommended for their engine.*

## If The Engine Does Not Start

1. Wait until engine flywheel comes to a complete stop.
2. Turn the ignition key to the OFF position before trying to start the engine again.
3. Repeat the procedure for starting the engine.



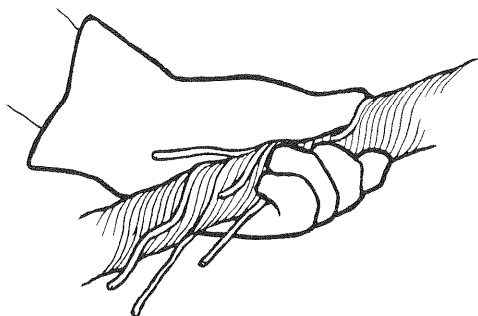
## WARNING!

*If auxiliary batteries are to be utilized for starting in cold weather, be sure to refer to the electrical section in the maintenance section of this manual.*

### OPERATING A CABLE SKIDDER

**Note:** *Do not try to work too fast. Know your capability and that of the machine.*

**Note:** *Make sure the path of operation is clear of large rocks or other large debris. Failure to do so may result in damage to the machine.*



SP-10411



### WARNING!

*Never enter or leave the operator's compartment while the machine is still moving.*

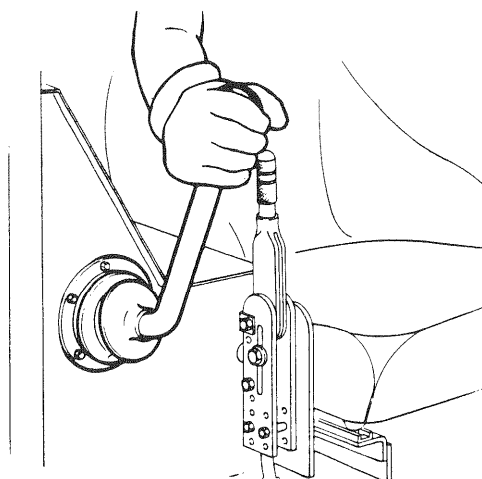
*Operate the machine only when seated. Do not allow riders! Watch where you are going. Stay away from people, the edge of cliffs, other machines and vehicles; etc.*

*Check the condition of the winch mainline and chokers regularly. If they become worn or damaged, they could break under stress and cause serious bodily injury to yourself or co-workers. Replace badly worn or damaged cables promptly.*

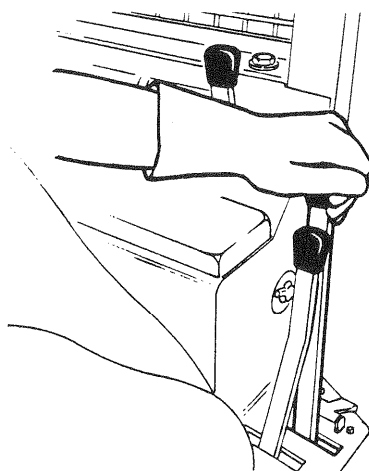
*Always wear protective work gloves when you handle winch cables.*

### Operation

1. Raise the blade to the desired operating height. High enough to clear objects on the ground, but not so high as to restrict air flow thru the radiator.
2. Put the transmission control levers in the desired direction and speed range position.

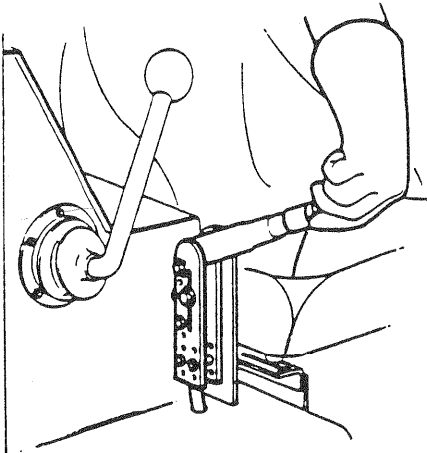


SP-10526



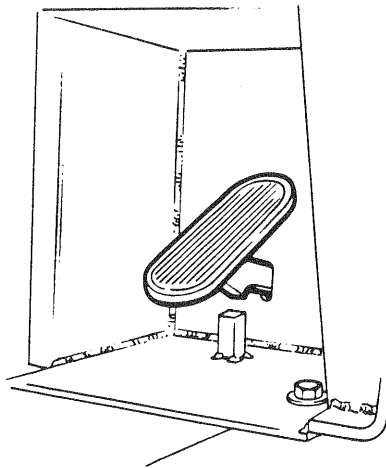
SP-10519

3. Release the parking brake lever.



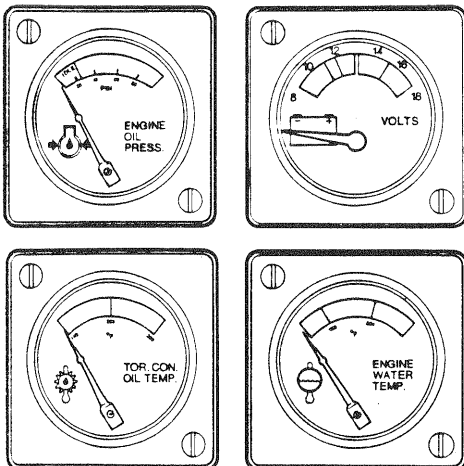
RP-10894

4. Depress the accelerator pedal to put the machine in motion.



SP-10524

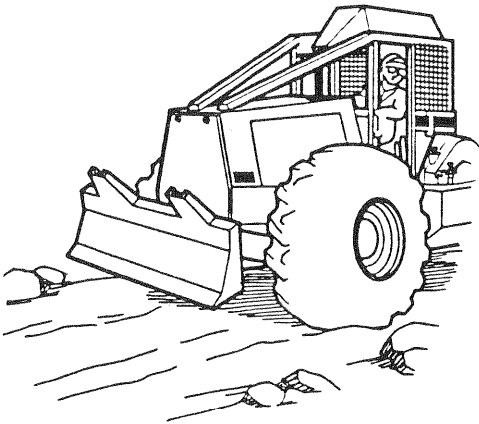
5. Check all gauges to see that all systems are operating correctly.



SP-10419

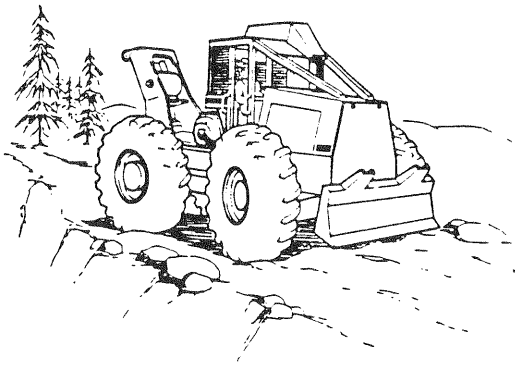
## 40 OPERATING INSTRUCTIONS

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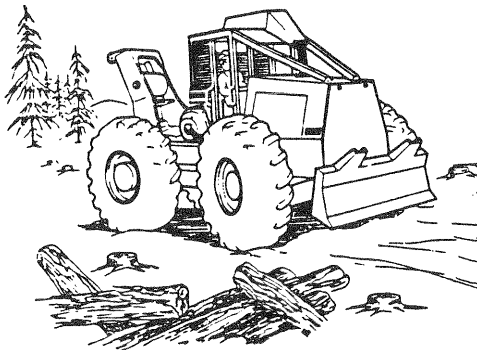
SP-10538

6. Watch out for any obstructions such as rocks and stumps that could overturn or damage the machine.



SP-10539

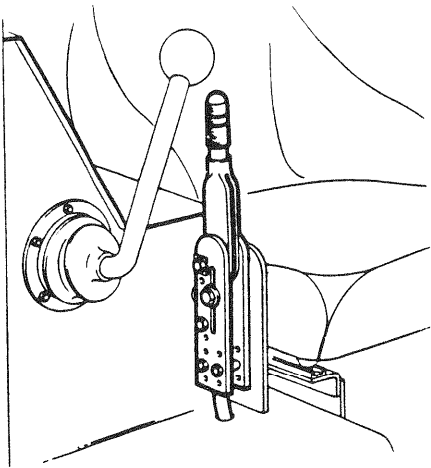
7. Pay attention along the route you travel to see if there is a easier way to return. The machine will behave much differently when it is pulling a load. This change in mobility can make it necessary to change your return route.



SP-10540

8. When you enter the stump area make a slow turn to see the best position to approach the logs with the least amount of effort and time. Avoid obstructions that can snag or tangle the load.

9. Before you leave the operator's seat, put the transmission in NEUTRAL and engage the neutral lock mechanism, lower the blade and apply the parking brake.



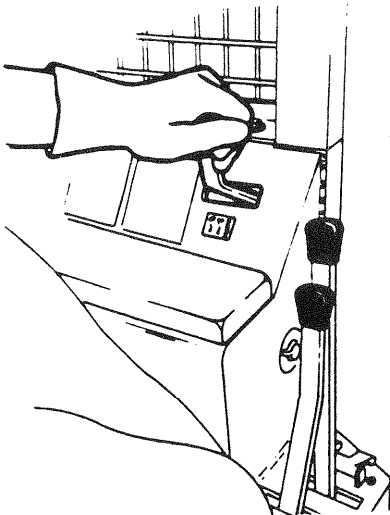
SP-10508

10. Put the winch control lever in the FREE-SPOOL position. Unbuckle your seat belt and exit the operator's compartment.



## **WARNING!**

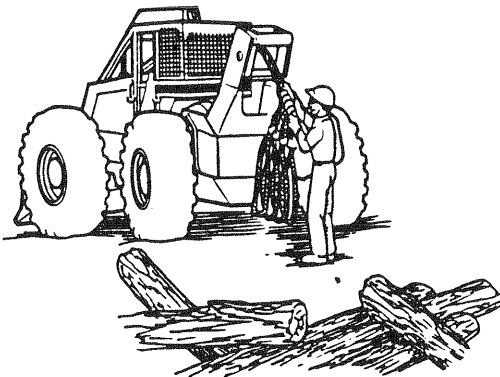
***Never enter or leave the operator's compartment while the machine is still moving.***



SP-10518

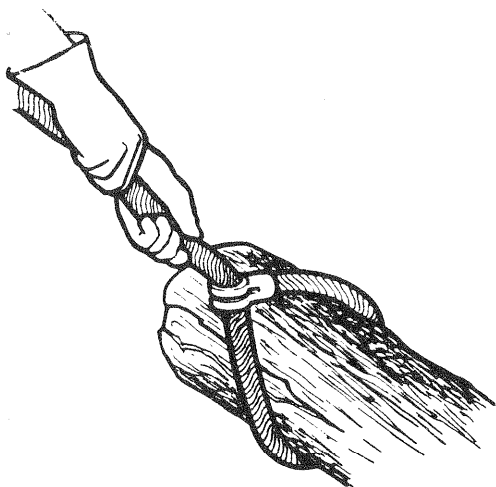
11. Go to the rear of the machine and pull the winch mainline and chokers from the winch cable drum far enough to reach the ends of the logs to be attached.

***Note: Remember to wear protective work gloves when you handle winch cables.***



SP-10543

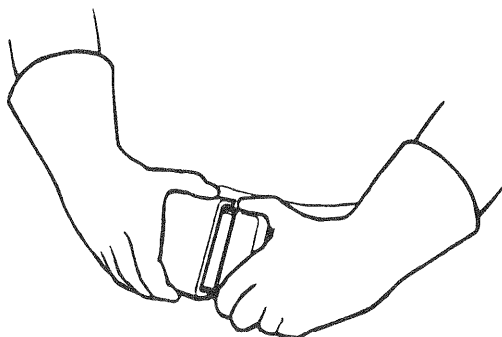
## 42 OPERATING INSTRUCTIONS



SP-10423

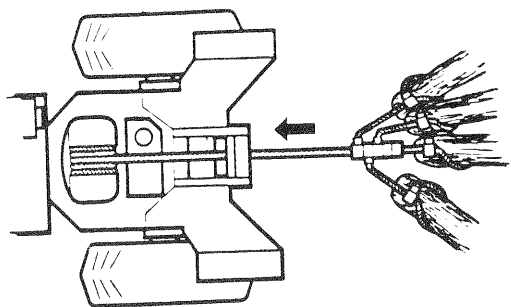
12. Attach the chokers around the butt ends of the logs approximately 60 cm (24 in.) from the ends, pulling the cables snug.

**Note:** *The size and number of the logs you can skid at one time will depend on the terrain and the conditions in which you are working as well as the nature of the wood itself. Experience and common sense will tell you the load you should skid.*



SP-10405

13. With all the chokers set, remount the skidder and fasten your seat belt.

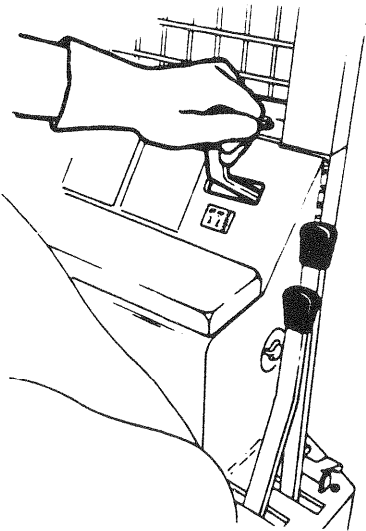


SP-10424

14. Before you winch in the logs, make sure that the machine is pointing in the same general direction as the logs are to be pulled. It is best to pull the load straight into the rear of the machine, especially on a grade.

**Note:** *Watch for co-workers that may be in your path and advise them to stand clear.*





SP-10518

15. Raise the blade, release the parking brake and put the winch control lever in the WINCH-IN position to pull in the load. The winch cable drum speed is determined by the speed of the engine and the load on the torque converter, so increase the engine speed as required. As the logs are pulled in, they will be bunched together. Make sure that the load is neatly bunched and pull snug against the butt pan. Put the winch control lever in the LOCK position and return to the landing.

## WINCHING TECHNIQUES

### Bunching

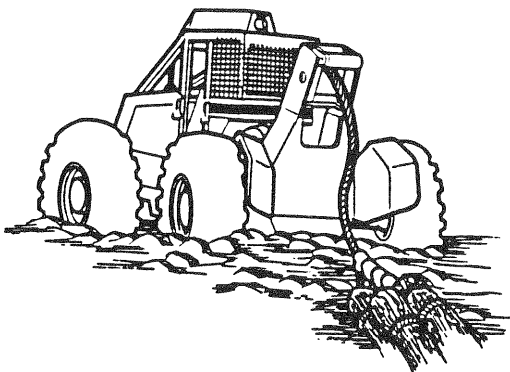
As stated earlier, when the logs are winched up to the butt pan, they will bunch together. Increasing the speed of the winch can help to pull the load easier over obstructions but you must use common sense to avoid breaking the cables on large rocks or stumps or even overturning the machine. Bunching can also be done with the machine in motion if necessary. This can help to bunch the logs under certain conditions.



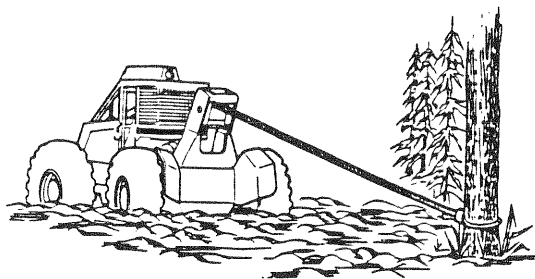
SP-10544

### Drop – Winching

If the machine loses traction in soft or muddy ground or because of obstructions, quickly put the winch control lever in the FREE-SPOOL position and drop the load until the machine reaches firmer or clearer ground. Remember not to out run the length of your main-line. When better conditions are reached winch in the load, put the winch control lever in the LOCK position and proceed to the landing.



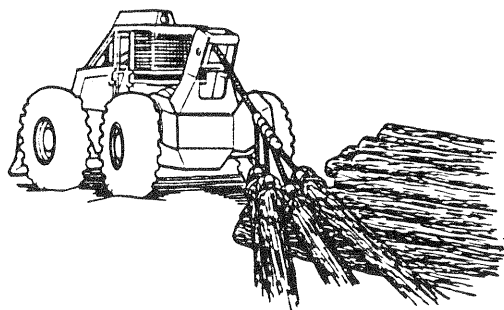
SP-10545



SP-10546

### Reverse – Winching

If the machine becomes stuck and cannot be freed in either direction, the winch cable can be fastened to a stationary object such as a large tree and with the transmission in REVERSE, winch in the cable under power to free the machine.

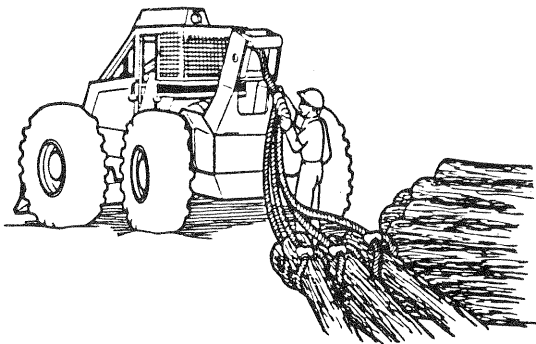


SP-10547

### DECKING

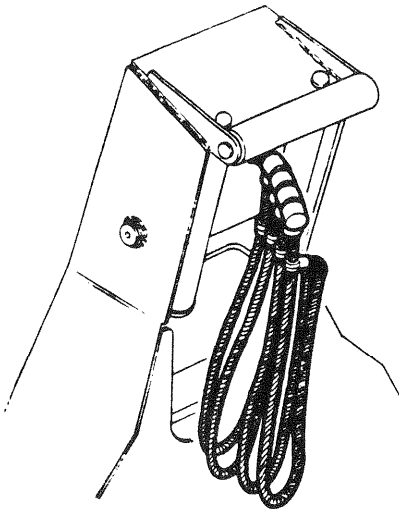
1. When you reach the landing, pull the logs onto the pile and put the winch control lever in the FREE-SPOOL position while the machine is still moving to drop the logs in the desired position on the pile.

2. Before you leave the operator's seat put the transmission in NEUTRAL and engage the neutral lock mechanism, lower the blade and apply the parking brake.
3. Unfasten your seat belt and exit the operator's compartment.
4. Pull the mainline from the cable drum so that the chokers are loose enough to remove easily and remove all of the chokers from the logs.



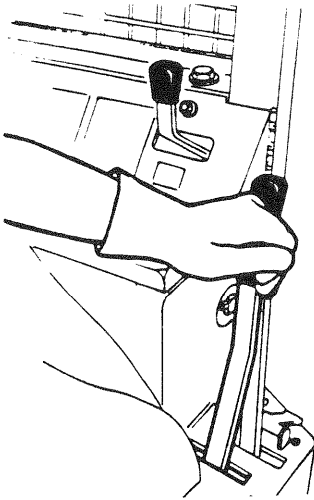
SP-10548

5. Remount the machine, fasten your seatbelt and winch the mainline onto the winch cable drum until the chokers are pulled up to the fairlead main roller.

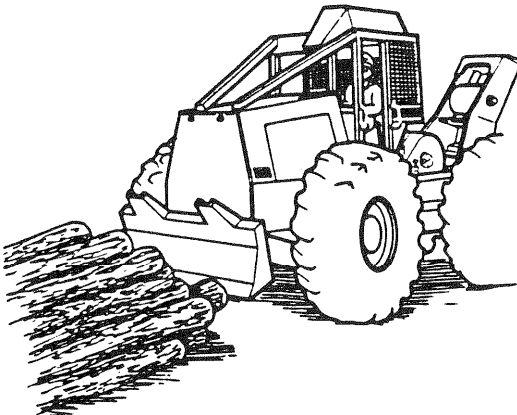


SP-10549

6. To make a pile and even up the logs. Release the neutral lock mechanism and the parking brake, put the transmission in the first or second speed range so that more power will be available to the hydraulic system and position the machine so the logs can be evened and piled up with the blade.



SP-10521



SP-10550

### OPERATING A GRAPPLE SKIDDER

#### "A" Frame Arch, Parallelogram or Optional HI-VIS Grapple Skidder

**Note:** *Do not try to work too fast. Know your capability and that of the machine.*

**Note:** *Make sure the path of operation is clear of large rocks or other large debris. Failure to do so may result in damage to the machine.*



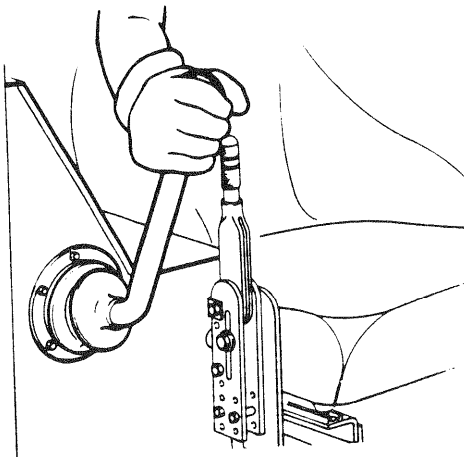
### **WARNING!**

**Never enter or leave the operator's compartment while the machine is still moving.**

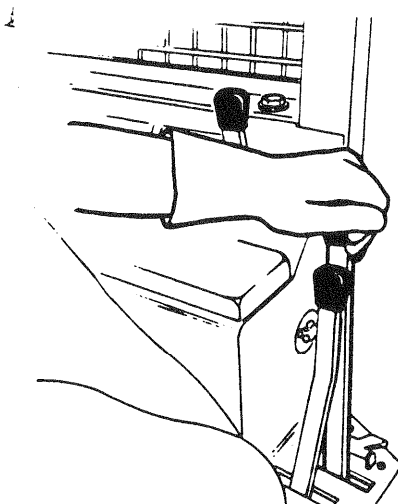
**Operate the machine only when seated. Do not allow riders! Watch where you are going. Stay away from people, the edge of cliffs, other machines and vehicles; etc.**

### Operation

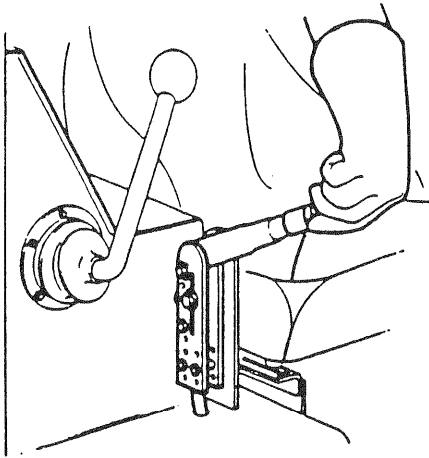
1. Raise the blade to the desired operating height. High enough to clear objects on the ground, but not so high as to restrict air flow thru the radiator.
2. Put the transmission control levers in the desired direction and speed range position.



SP-10507

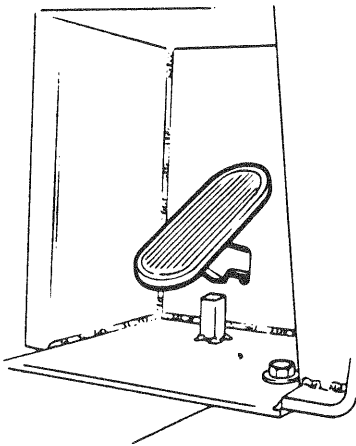


SP-10519



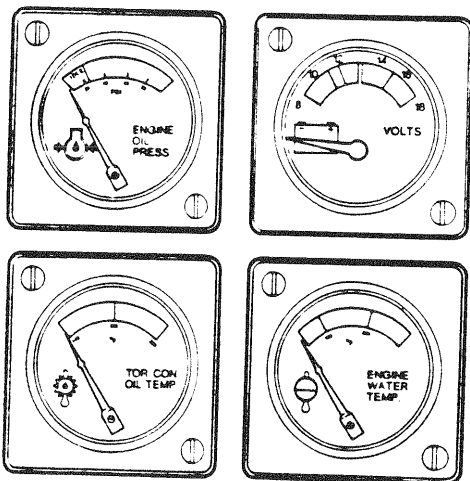
RP-10894

3. Release the parking brake lever.



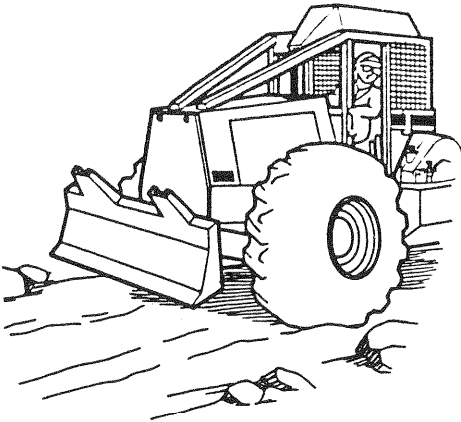
SP-10524

4. Depress the accelerator pedal to put the machine in motion.



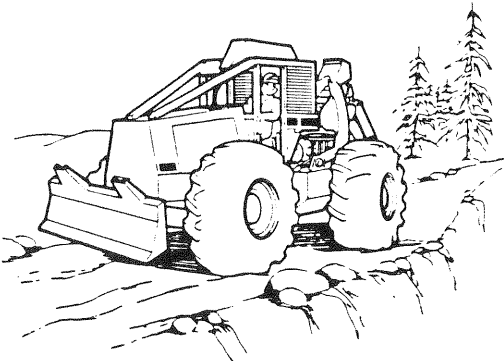
SP-10419

5. Check all gauges to see that all systems are operating correctly.



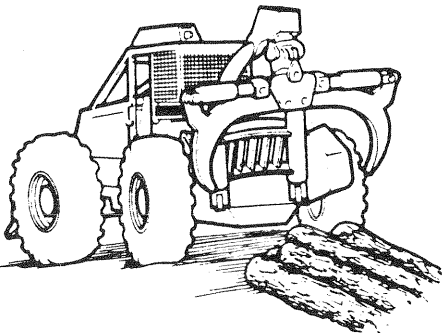
SP-10538

6. Watch out for any obstructions such as rocks and stumps that could overturn or damage the machine.



SP-10435

7. Pay attention along the route you travel to see if there is a easier way to return. The machine will behave much differently when it is pulling a load. This change in mobility can make it necessary to change your return route.

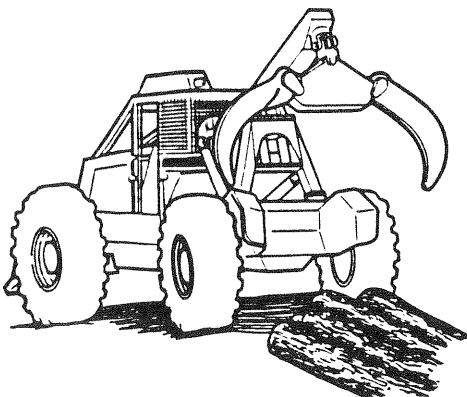


SP-10436

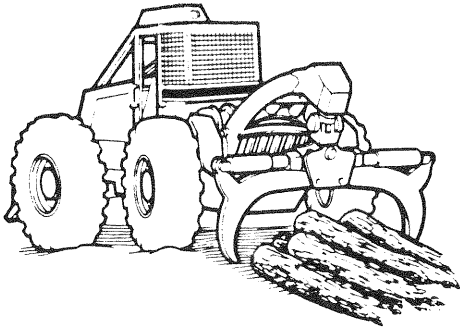
8. **A-Frame Arch and HI-VIS.** Approach the log pile with the transmission in REVERSE, the grapple tongs OPEN and the arch pulled forward so that the grapple can fit around the load.

**Parallelogram.** Approach the log pile with the transmission in REVERSE, the grapple tongs OPEN, the arch pulled forward and the boom in the raised position so that the grapple can fit around the load .

**Note:** *Newer grapple machines have the option of selecting de-clutch in reverse to speed up hydraulic action when backing up to a load.*



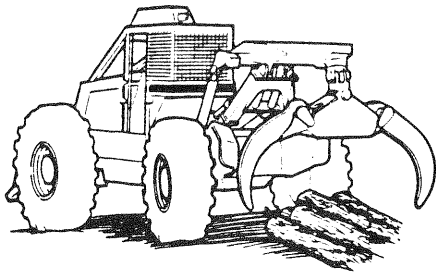
SP-10583



SP-10437

9. **A-Frame Arch or HI-VIS.** Move the arch back to lower the grapple on the log pile so that the grapple tongs will pick up the logs approximately one meter (three feet) from their butt ends to prevent any unevenly bunched logs from being lost.

**Parallelogram.** Move the arch back and lower the boom to position the grapple on the log pile so that the grapple tongs will pick up the logs approximately one meter (three feet) from their butt ends to prevent any unevenly bunched logs from being lost.

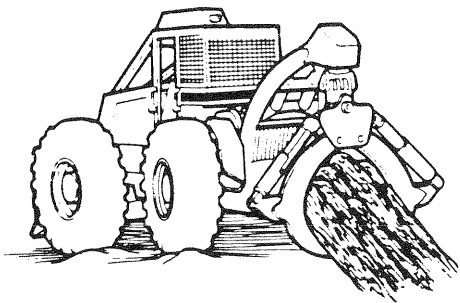


SP-10584

10. **OLDER MACHINES.** Put the transmission in NEUTRAL, and put the grapple control lever in the CLOSE position. Increase the speed of the engine to increase power and speed to the hydraulic system. Close the grapple firmly around the logs.

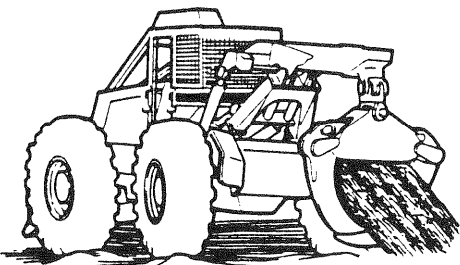
**NEWER MACHINES.** These machines are equipped with a reverse de-clutch mechanism. If selected and by applying the service brake with the transmission in reverse, will put the transmission in neutral. To increase power and speed to the hydraulic system. Close the grapple firmly around the logs.

**HI-VIS.** See figure 11.

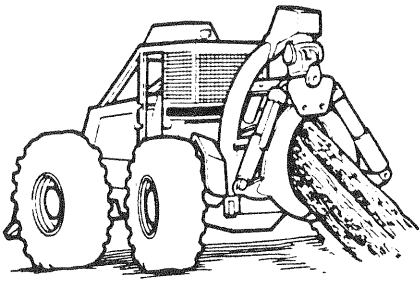


SP-10438

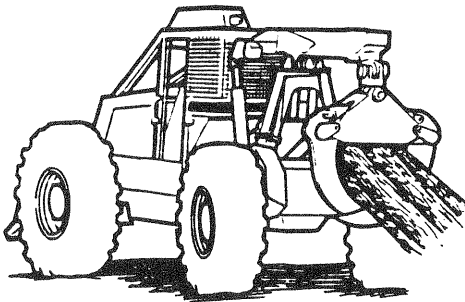
**Note:** *If the service brake is applied with the transmission in neutral or reverse and the declutch switch on, the transmission put in forward; forward clutch will not engage until the service brake is released.*



SP-10585



SP-10439



SP-10586

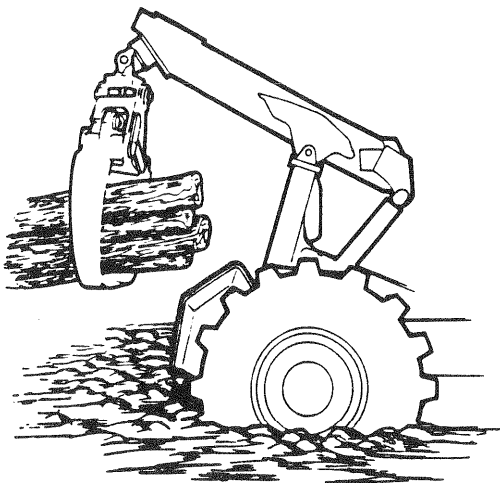
11. **A-Frame Arch.** When the grapple tongs have closed put the grapple control lever in the center **HOLD** position and pull the arch forward until the load makes contact with the arch butt grille and return to the landing.

**Parallelogram and HI-Vis.** When the grapple tongs have closed hold the grapple control lever in the **CLOSE** position until approximately 2,200 psi reading shows on the grapple accumulator system gauge. Put the grapple control lever in the center **HOLD** position, pull the arch forward if applicable, and position the boom until the load makes contact with the arch butt grille and return to the landing.

**Note: All Grapples**

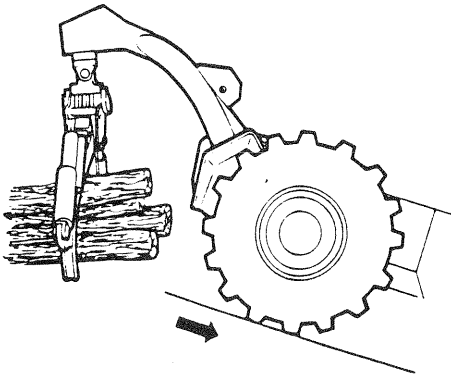
*As the load is pulled across the ground, it will shift position in the tongs. Put the grapple control lever in the **CLOSE** position momentarily once or twice along the route to tighten up the grapple tongs to prevent any logs from falling out of the bundle. On the Parallelogram and HI-VIS grapple skidders, the grapple accumulator system should be re-energized when a pressure drop is noticed on the pressure gauge.*

12. **Parallelogram.** The load should be carried high enough to clear obstructions on the ground. Carry the load properly; low for stability, high for clearance.

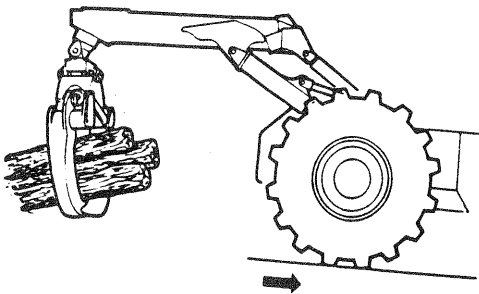


SP-10587

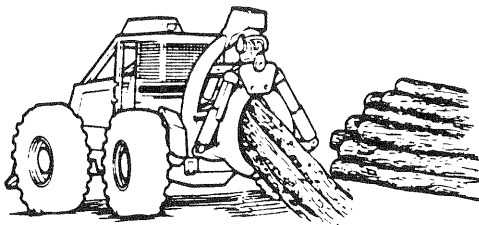




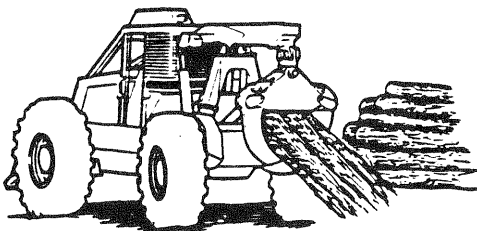
SP-10441



SP-10588



SP-10442



SP-10589

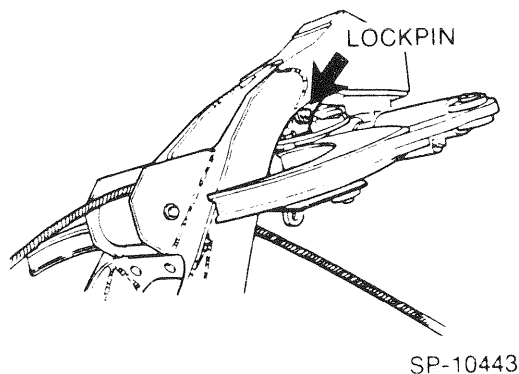
13. The load should be carried as low as possible when traveling down a steep grade especially when turning.

14. If you are to add to a pile, move along the side of the pile with the log grapple at its highest position to pull the load onto the pile.

15. Open the grapple arms and release the load on the pile. Drive forward away from the pile and close the grapple tongs. Position the arch approximately halfway forward and return to the area for another load.

**Note:** *Ranger grapple skidders are equipped with a winch and can be fitted with a winch cable to perform any of the WINCHING TECHNIQUES described earlier in this manual.*

### Cable Skidding



The log grapple assembly on A-Frame Arch grapple skidders can be pinned up to the arch and the arch fairlead can be used for cable skidding. Pin the grapple up as follows:

1. Start the engine and put the winch in the FREE-SPOOL MODE. Pull out the mainline so it can be attached to the backside of the grapple box.
2. Put the grapple in the fully closed position and shut down the engine.
3. Fasten the winch cable to the back of the grapple box.
4. Lower the arch fully to the rear and winch in the grapple to the rear.
5. With the engine operating at LOW IDLE RPM, raise the arch and winch—in the cable simultaneously.
6. When the arch is fully forward, open the grapple fully.
7. With the winch in the LOCK mode, lower the arch until the lock pin lugs in the arch and grapple box are aligned and install the lock pin to secure the grapple to the arch.
8. Close the grapple firmly around the arch and shut down the engine.
9. Remove the winch cable from the grapple box.

To use a parallelogram grapple skidder as a cable skidder, raise the rear of the boom as high as is possible and open the grapple. This will keep the mainline from tangling in the grapple and allow the arch fairlead to be use for cable skidding.



### **WARNING!**

***Log grapples are equipped with snubbers that prevent it from swinging when the machine is traveling without a load. Their adjustment should be checked at the beginning of each work shift and adjusted if necessary.***

***The HI-Vis Grapple Skidder is equipped with grease adjustable grapple snubbers. See your Esco Maintenance manual.***

## **STOPPING**

The machine can be stopped regardless of the gear selector control position.

### **Stop the Machine as Follows:**

- Remove foot from the accelerator pedal.
- Apply service brake and, after the machine has come to a complete stop, move the transmission gear selector to the desired gear range to either continue operation or to neutral for parking.

## **PARKING MACHINE**

### **Short Term:**

1. Move the machine to a safe area for parking.
2. Set the park brake.
3. Put the transmission gear selector in the "NEUTRAL" position, engage the neutral lock mechanism.
4. Lower the blade and (if so equipped) log grapple to the ground and make sure the levers are in the "HOLD" position.
5. Let the engine run at low idle rpm for approximately 5 minutes to allow the engine to cool down.
6. Turn the ignition switch key to the "OFF" position.
7. Check that all switches and controls are in the "OFF" position.
8. When leaving the machine unattended, remove the ignition switch key, turn the battery disconnect switch to the "OFF" position and shut off the fuel valve.



## **WARNING!**

***When mounting and dismounting the machine, use three point mount (i.e. Two hands and one foot/one hand and two feet). DON'T JUMP!***

***Note: If necessary, secure the frame locking link and block the wheels.***

***Machines should be parked far enough away from each other so as not to allow fire to spread from one to the other.***

### Long Term:



### **WARNING!**

***When mounting and/or dismounting the machine, use a three point mount (i.e. Two hands and one foot or one hand and two feet) NEVER JUMP!***

1. Thoroughly clean machine. Touch-up paint where necessary to prevent rust.
2. Cover exhaust pipe openings.
3. Check all fluid levels (Hydraulic, transmission, axles, engine oil, radiator, check for proper anti-freeze protection).
4. Fill fuel tank and hydraulic reservoir.
5. Set parking brake.
6. Grease unpainted parts for protection (Cylinder rods, driveshaft splines, hydraulic valve spools and transmission linkage).
7. Apply anti-corrosion spray to exposed pin ends and lock plates.
8. The battery disconnect switch should be in the off position and batteries cleaned of all external acid and corrosion. For additional protection, remove ground cables from batteries.
9. Check tire pressures.
10. Check for signs of oil or water leaks.
11. Check air filter and piping.
12. Check fans and all belts.
13. Grease machine thoroughly.
14. Cover canopy with waterproof tarpaulin. Optional cab doors should be closed.
15. Remove all keys.
16. Store the machine in a position to allow forward and reverse motion (for scheduled maintenance of stored machines).

**Start and Operate Machine Every 30 Days (sooner if conditions warrant)**

1. Check all fluid levels (Hydraulic, transmission, axles, engine oil, coolant, check for proper anti-freeze protection and battery electrolyte level). Refill as required.
2. Check air filter and piping.
3. Check tire pressure.
4. Check condition of the fan and belts.
5. Turn battery disconnect switch to **"ON"** position (make sure batteries are fully charged).
6. Remove any hardened grease on the cylinder rods.
7. Remove exhaust pipe opening covers, start engine. See starting the engine.
8. Release parking brake.
9. Check the brakes (service and secondary).
10. Actuate the transmission through all gears (forward and reverse).
11. Move the machine forward and backward. A minimum of one complete tire revolution.
12. All hydraulic components to be cycled to assure oil flow through the complete system.
13. Reposition machine with blade and grapple lowered.
14. Run engine at low idle for three (3) minutes.
15. Set the parking brake.
16. Stop the engine.
17. Reinstall waterproof covering over entire canopy (if machine is not equipped with enclosed cab).
18. Grease all exposed cylinder rods or any other rod that cannot be retracted.
19. Battery disconnect switch to be off.
20. Check for leaks on the machine.
21. Install exhaust pipe opening covers.
22. Fill out the machine record card: Date, operator's name. Note the conditions to be repaired as well as any discrepancy.

### TRANSPORTING

1. Always load and unload on a level non-slippery surface.
2. Use adequate chains, blocks, cables, etc. to secure to trailer anchoring points.
3. Measure overall height and width of the machine on the trailer.

**Note:** *It is important that you know the overall height, width, and weight when transporting the machine.*

4. Transporting in foggy, dusty, or stormy weather conditions requires extreme care and in most cases should not be attempted.
5. Check local laws about transporting machinery prior to shipment.

### MOVING DISABLED MACHINES

**Note:** *The engine cannot be started by towing the machine.*

If the machine must be towed, put all control levers in their neutral positions. Remove the front and rear drive axle input driveshafts from the machine but do not separate the driveshaft halves.

**Note:** *When the engine is shut down, the transmission/converter charging (lubricating) pump is inoperative. Serious damage to the transmission will occur if it is driven by the wheels without lubrication.*

**Note:** *ALWAYS fasten the steering frame lock between the frames and tie a red warning flag to the operator's handrail to indicate that the steering frame lock is fastened. The secondary brake (F66) is the only brake that is operable with the driveshaft disconnected. The midmount brake (F67) will stop the machine only if the midmount to rear driveshaft is in place.*

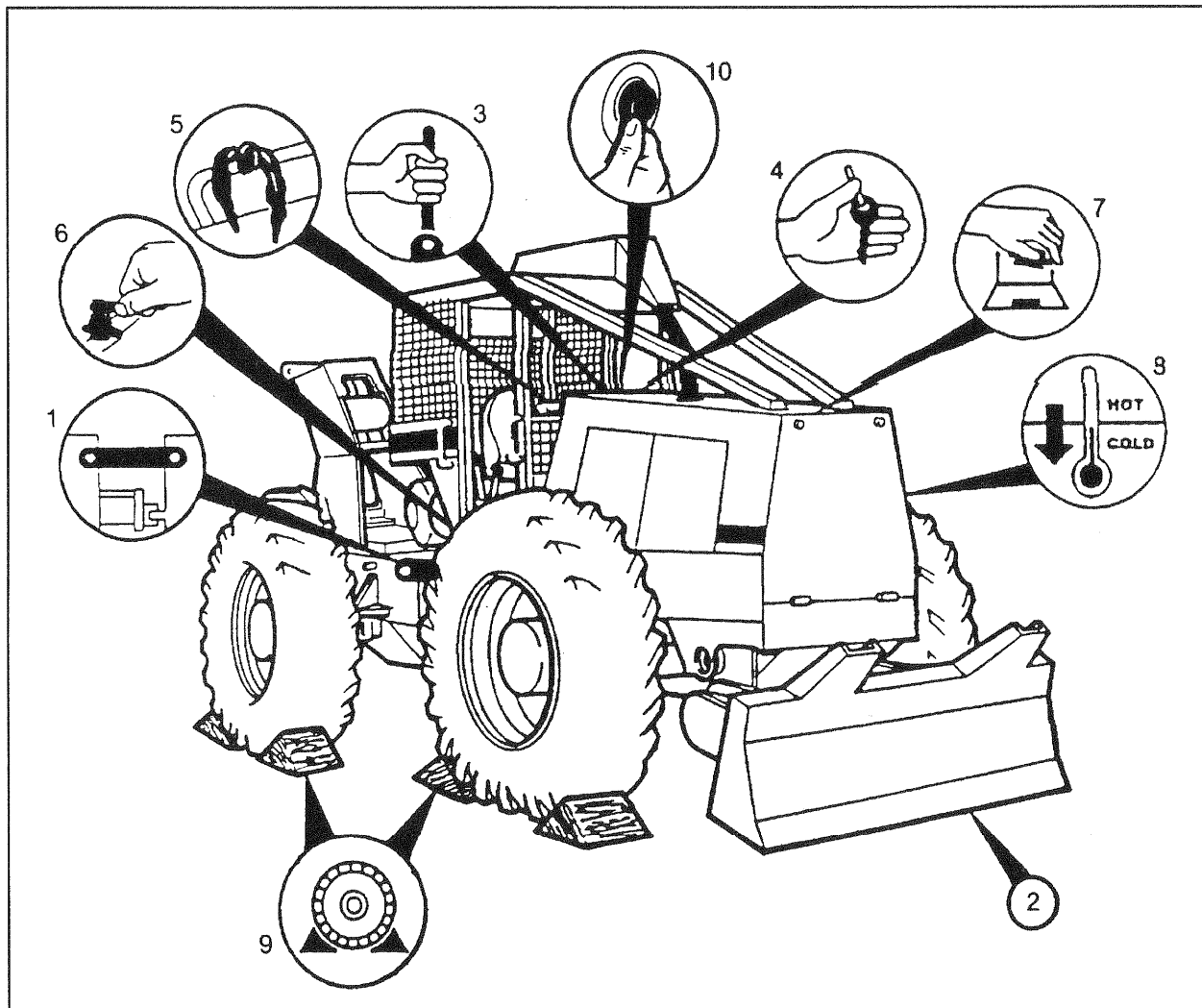
Use a solid tow bar or raise one end of the machine because with the engine shut down and the steering frame lock fastened, the machine cannot be steered.

When you reinstall the driveshafts use only the special bolts provided and tighten them to the specified torque.

Put the machine in the SERVICE POSITION

## SERVICE POSITION

*Before working on the machine, park it on a level surface and put in the "SERVICE POSITION"*



SP-10560

1. Frame locking link connected
2. Blade and grapple assembly (if applicable) on the ground
3. Parking brake applied
4. Stop Engine, key removed except when service requires engine operating.
5. Do not operate tag or Red warning flag on steering wheel or operator's handrail.
6. Fuel shut-off valve OFF
7. Remove all pressure caps slowly to relieve pressure.
8. Allow the machine to cool down.
9. Wheels securely blocked.
10. Battery disconnect switch OFF.

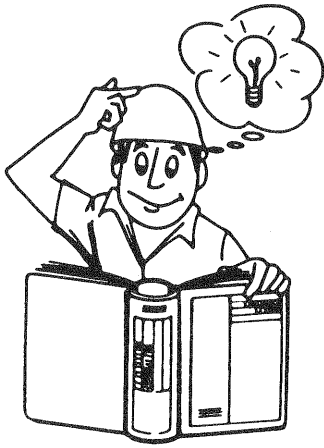


## WARNING!

*If work must be done on a warm machine, beware of hot fluids and components.*

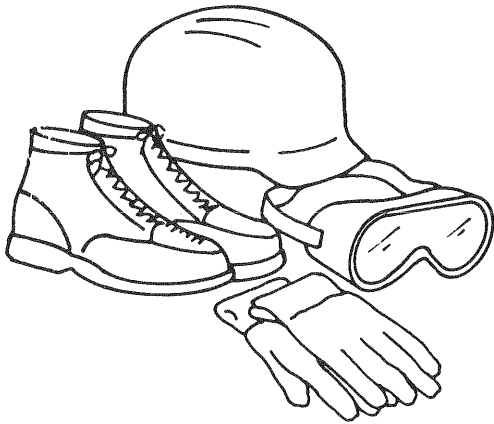
Put the machine in the SERVICE POSITION

### A FEW SIMPLE RULES WHEN SERVICING



SP-10409

- Do not perform any work on the machine unless you are authorized to do so.
- Maintenance can be dangerous unless performed properly. Be satisfied that you have the necessary skill and information, correct tools and equipment to do the job correctly.
- Standard maintenance procedures should always be observed. Read the manufacturer's manual or find assistance if you do not understand what you are doing.
- Keep the work place clean. Oil or water on the floor makes it slippery and also dangerous in connection with electrical equipment or electrically powered tools. Oily clothes are a serious fire hazard.
- When running a machine indoors, be sure the building is properly ventilated.



SP-10502

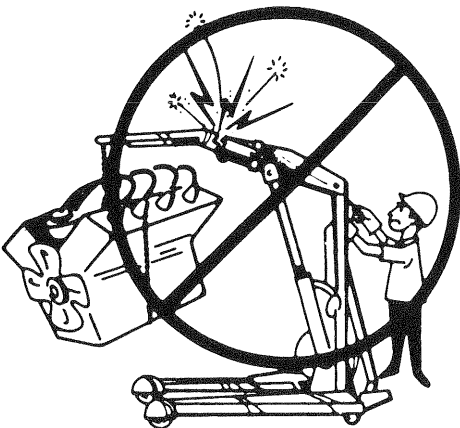
- Do not wear loose fitting clothing or jewelry when operating or working on a machine.
- Always wear a hard hat, safety glasses, gloves, boots, or other protective articles as the job requires.
- Keep the machine and all equipment free of dirt and oil. This will decrease the possible fire hazards and make it easier to find loose or defective parts. This is especially important when working with combustible materials.
- Machines should be clean of debris particularly around the engine, exhaust, and drive line components.



**Put the machine in the SERVICE POSITION****A FEW SIMPLE RULES WHEN SERVICING (con't)**

SP-10412

- Fire prevention features provided by the manufacturer should be maintained in operational condition and should be used to supplement operator's fire prevention efforts. In no case should the features be used or assumed as replacement for diligent operator efforts at preventing fires.
- Prior to welding or brazing on any part of the machine, the part and the surrounding area should be cleaned and a fire extinguisher should be made readily available.
- There is always a risk of fire. Find out which type of fire extinguisher to use, where it is and how to use it.
- In case of fire be prepared to run for safety, but if time permits first, if the engine is operating:
  - Stop the engine.
  - Turn off the battery disconnect switch and close the fuel shutoff valve.
  - Start combating the fire and/or call for help.
- Gasoline is highly flammable and should never be used as a cleaning fluid. Use an approved solvent for cleaning.
- Some solvents can cause skin rashes and or fire dangers. Do not inhale solvent vapors.
- Store flammable starting aids in a cool, well ventilated location.
- Smoking, open flames, etc., should not be permitted around any machine during fueling operations and/or when the fuel system is open to the atmosphere.



SP-10410

- Always be sure the "Frame Locking Link" is connected when working on the machine except when it is necessary to articulate it.
- When lifting or supporting components, use equipment with a weight capacity as great as or greater than the weight of the component.
- Use the correct tool(s) for the job. Repair or replace any broken or defective equipment or tools.
- Make sure that no tool(s) or other object(s) are left inside the machine where they may cause damage.
- Check that there is no damage to electric wires and hoses.

Put the machine in the SERVICE POSITION



SP-10413



SP-10414

### A FEW SIMPLE RULES WHEN SERVICING (con't)

- Release all system pressure slowly before working on any part of the hydraulic system. Be alert – There could be high pressure stored in the grapple circuit on units with a grapple accumulator system.



### **WARNING!**

*See discharging the grapple accumulator pressure on page 44.*

- Remove all pressure caps slowly.
- Be careful of hot fluid when changing oil in the engine, hydraulic system, transmission, etc.
- Before you work on the machine always lower the blade and grapple (if so equipped). If you must work on the machine with the blade or grapple raised, always securely support them.
- Be sure the machine is in the SERVICE POSITION before lifting the machine. Always support an elevated machine using proper blocks and/or cribbing before beginning work on it.
- To find leakage, use cardboard or wood, not your hand.
- Never adjust a pressure relief valve above the manufacturer's recommendations.
- Hydraulic fluid is flammable. Do not weld on pipes or tubes that are filled with fluid. Be careful when welding next to filled pipes or tubes.
- Always inspect the cooling system with the engine stopped. This as a pressurized system, relieve the pressure by slowly turning the cap off.
- Read all nameplates and decals before you operate the machine. Each nameplate and decal has important information about operation or service.
- Always stop the engine before removing inspection covers. Do not let tools or parts fall into the opening.

## NOTES

## 62 BASIC PREVENTIVE MAINTENANCE

Put the machine in the SERVICE POSITION

### MAINTENANCE INTERVAL CHART

#### MAINTENANCE INTERVALS OPERATING HOURS

	Page No.	Daily	First 50	Every 50	First 100	Every 100	Every 250	Every 500	Every 1000	Every 2000	Yearly or Every 2500	As Req'd
<b>GENERAL</b>												
Check for Leaks		●										
Check Tire Pressure	81	●										
<b>LUBRICATION</b>												
<b>SEE LUBRICATION CHART</b>												
<b>ENGINE</b>												
Engine Oil Level, Check	65	●										
Engine Oil, Change	65		●				●					
Engine Oil Filters, Change	65		●				●					
Fuel Filter, Drain Water and Sediment	66	●										
Fuel Filter, Change	66											●
Fuel Strainer, Clean or Replace	66											●
Fuel Tank, Drain Water and Sediment	66	●										
Empty Air Pre Cleaner (Optional)	67											●
Air Cleaner Service Indicator, Check	67	●										
Air Cleaner Element Outer, Change	67											●
Air Cleaner Element inner, Change	67									●		
Coolant Level, Check	68	●										
Coolant Protection, Check	68						●					
Change Coolant, Flush System,	68								●			
Radiator, Clean	68	●										
Belt Tension, Check	69								●			
<b>ELECTRICAL SYSTEM</b>												
Battery Condition, Check	70	●										
<b>POWER TRANSMISSION</b>												
Trans. / Converter Oil Level, Check	85	●										
Transmission / Converter Oil, Change	86								●			
Transmission Oil Filter, Change	86		●		●			●				
Transmission Suction Screen, Clean	86								●			
Transmission & Converter Vents, Clean	87						●					
Axle Lubricant Levels, Check	80			●								
Axle Lubricant, Change	80								●			
Axle Breathers	80							●				
Driveshafts, Check	84	●										
Slip Joints, Lube	84					●						
Universal Joint, Lube	84								●			

[illegible]

**NOTE: \* After wheel removal, check torque of bolts at 5 & 10 hours of operation.**

## 64 BASIC PREVENTIVE MAINTENANCE

Put the machine in the SERVICE POSITION



TS40011

### GENERAL INFORMATION

If the machine is to work as economically as possible, thorough maintenance is necessary. The most important care a machine receives is the preventive maintenance that you perform, which comprises of lubrication, various checks and adjustments. The recommended intervals for maintenance and lubrication refer to normal working and environmental conditions.

Most of the maintenance procedures are simple to perform. The necessary detailed instructions are provided in this manual.

All maintenance and service work should be performed by qualified personnel.



### **WARNING!**

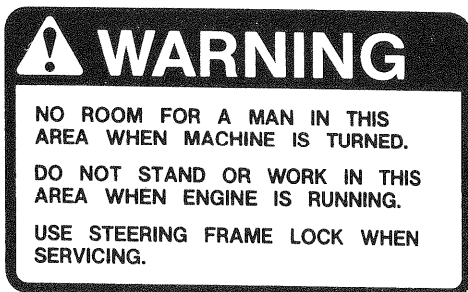
*When working in the center hinge area the frame locking link must be used.*



### **WARNING!**

*There is a risk of the machine moving even with the park brake applied.*

- When checking fluid levels, the machine should be on level ground.
- Fluid levels should be checked in the morning when the fluids are cold and have drained to the bottom of each component. This does not apply to the hydraulic transmission and the hydraulic tank.
- Schedule servicing to avoid damage to the machine. Keep good records. Read the machine manuals.
- Make a complete visual inspection.
- Check for loose bolts and capscrews, leaks and worn parts. Report everything that needs attention.



TS16350

Put the machine in the SERVICE POSITION

## ENGINE

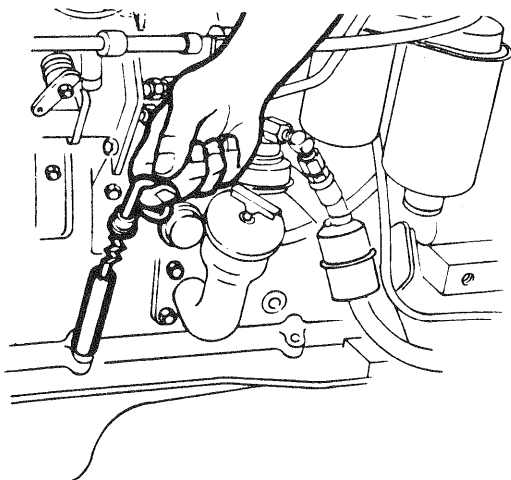


### **WARNING!**

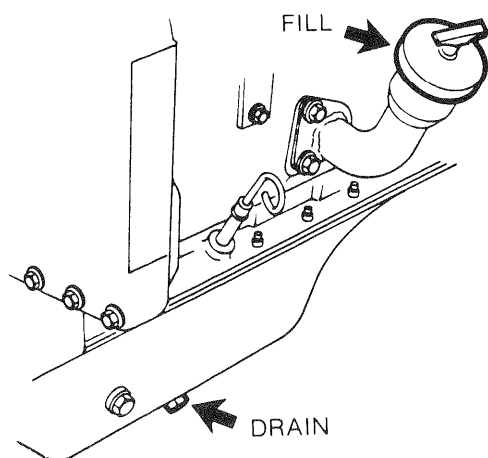
*Be careful if the engine is hot, hot oil can cause severe burns.*

### Checking Oil Level

The oil level should be checked daily and should be between the high – H and – L marks on the dipstick.



SP-10454



SP-10455

### Changing Engine Oil

Drain the engine oil into a suitable container when the engine is hot. Hot oil flows more freely and carries more contaminants with it.

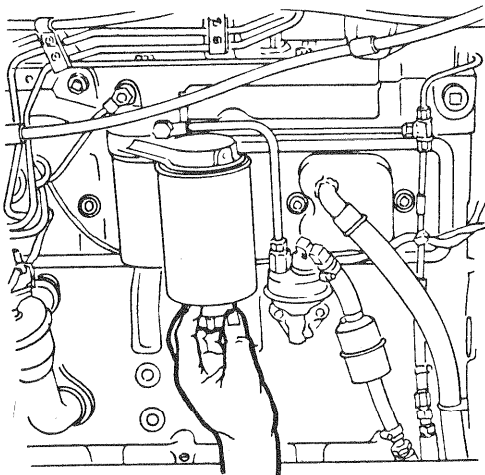
Replace the engine lube oil filter with the filter specified in the Parts Manual for your Skidder.

Choose an oil viscosity that is correct for the ambient operating temperature as recommended in the Cummins Engine Operation and Maintenance Manual.

Engine lube oil capacity is approximately 16 liters (4.4 US gallons.)

## 66 BASIC PREVENTIVE MAINTENANCE

Put the machine in the SERVICE POSITION



SP-10629

### FUEL SYSTEM

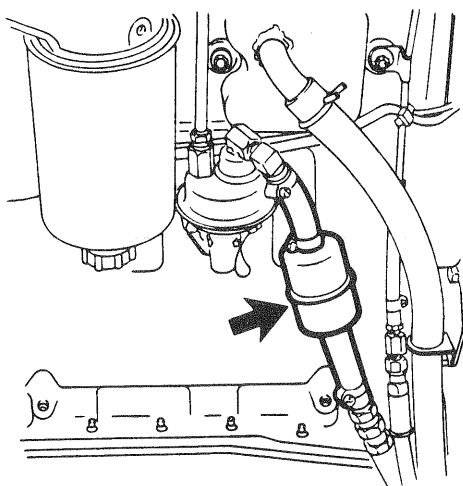
#### Fuel Filters

Drain any water and sediment from the engine fuel/water separator at the beginning of each work shift

Change the engine fuel filters according to the instructions in the Cummins Operation and Maintenance Manual.

#### Check The Fuel Strainer

Check the in line fuel strainer for a build-up of foreign material by blowing through it orally. The strainer should be replaced if it is contaminated.



SP-10596

#### Fuel Tank

Clean fuel is essential for trouble-free operation of the engine. Clean the area around the fuel filler cap before you remove it. Avoid spilling fuel to reduce the chance of a fire and to reduce the build-up of dirt. Fill tank at the end of each work shift to inhibit condensation.



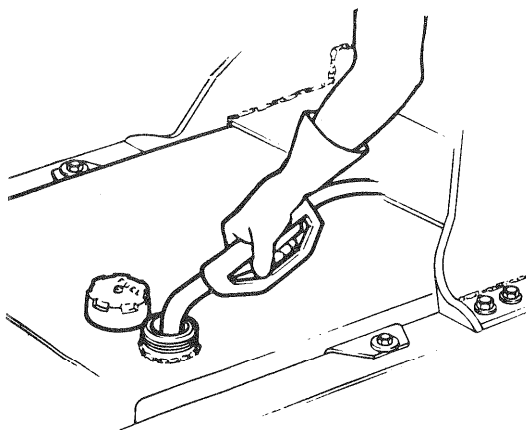
### WARNING!

*Do not smoke while refueling.*

If the strainer screen in the fuel filler hole becomes clogged or dirty, it should be cleaned in solvent and blow dried with compressed air

Before each shift, open the drain cock on the bottom of the fuel tank and drain sufficient fuel to remove any sediment and water from the tank.

Check and clean vent hole in the fuel cap.



SP-10553



Put the machine in the SERVICE POSITION

## AIR CLEANER SYSTEM

### Air Cleaner

The air cleaner prevents dust and other impurities from entering the engine. The air first passes through the outer filter element and then through the inner element. Engine wear is largely affected by the cleanliness of the intake air therefore it is very important to check the air cleaner regularly and to service it correctly.

### Check Air Cleaner Service Indicator

Check the air cleaner service indicator located on the air intake tube between the air cleaner and turbocharger. When the indicator shows red, the air cleaner elements should be serviced.

### Check Air Intake Tubes and Clamps

Check the intake tubes and clamps between the air cleaner and turbocharger and replace any tubes that are cracked or damaged. Tighten any loose clamps.

### Service Air Cleaner

Remove the outer element from the air cleaner body and use compressed air ( from the inside of the element ) to blow any dirt particles from the element. Wash the element in a non-sudsing detergent for about 15 minutes. Rinse with warm tap water from the inside until the water that passes through the element is clean. Air dry the element .

Shine a bright light from the inside of the element and check it for pin holes, ruptures or thin spots. Replace the element if any of these conditions exist.

**Note:** *Do not remove the inner element except to change it. Replace both elements after the second cleaning of the outer element or every 2000 hours of operation. The frequency of air cleaner servicing depends on the working conditions of the machine.*

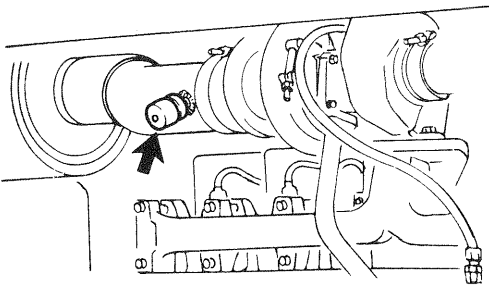
### Clean the Air Cleaner Vacuator Valve

Tap the rubber vacuator valve to remove dust and dirt on a daily basis.

**Note:** *It may be necessary to remove the vacuator valve to remove caked particles of dirt from the valve.*

### AIR PRE CLEANER ( Optional )

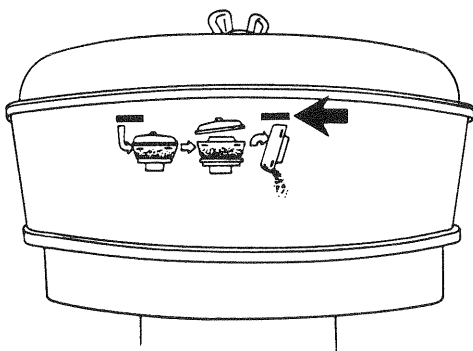
When the level of debris in the air pre cleaner reaches the full line on the bowl, remove the pre cleaner and empty it.



SP-10563



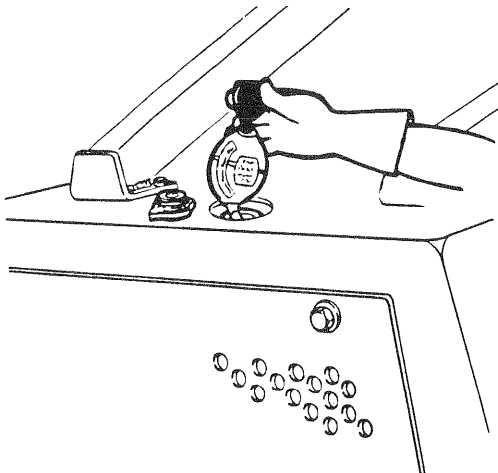
SP-10598



SP-10628

## 68 BASIC PREVENTIVE MAINTENANCE

Put the machine in the SERVICE POSITION



SP-10554

### COOLING SYSTEM

The following measures must be carried out regularly to ensure that the cooling system operates correctly.

#### Antifreeze:

The cooling system of the machine was shipped with a solution of equal parts of ethylene glycol and water. This concentration is recommended for subsequent fills. The coolant should be changed every 1000 hours of operation.

#### Checking Coolant

Check the coolant level daily. The level should be up to the bottom of the filler neck in the radiator. Add coolant as required.



### WARNING!

*The cooling system is pressurized and there is a risk of scalding whenever removing the radiator cap. Remove slowly with gloved hand. Wear safety glasses.*

#### Check Hoses and Clamps

Check hoses and clamps and replace any hoses that are cracked or damaged. Tighten any loose clamps, do not over tighten the clamps.

#### Cleaning the Radiator

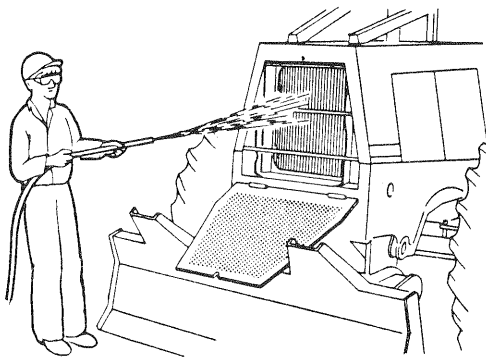
The radiator should be cleaned daily to reduce the chance of possible engine damage caused by improper engine cooling.

Remove the bolts from the top of the grill and lower the grill so that rests on the blade. Use a fire hose or pressure washer to clean the radiator in the opposite direction to the air flow.

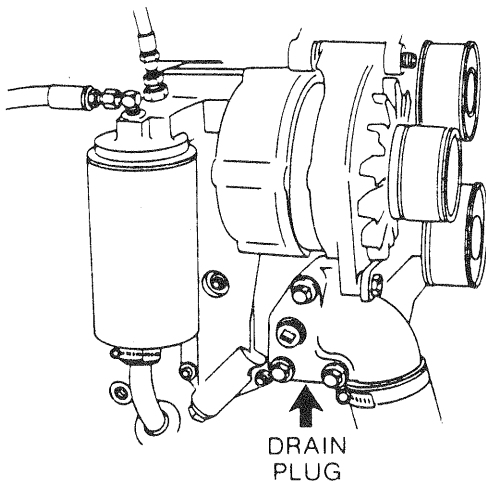
**Note:** *Be careful not to damage the radiator core while cleaning.*

#### Change Coolant and Flush System

1. Slowly remove the radiator cap.
2. Open the drain cock on the bottom of the radiator.
3. Remove the drain plug from the bottom of the coolant inlet elbow on the engine.
4. Open the bleeder cock on the engine aftercooler to drain system. (F67 only)



SP-10463



SP-10621

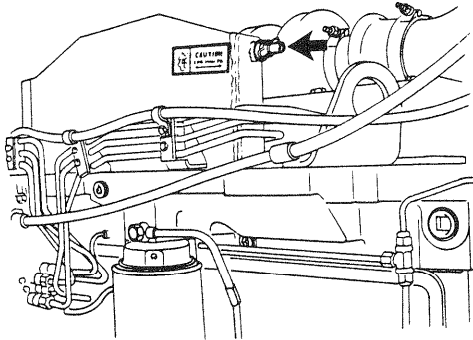
Put the machine in the SERVICE POSITION

### Change Coolant and Flush System (con't.)

5. Install drain plugs.

**Note:** See engine manufacture's manual for correct cooling system cleaning procedures.

6. Flush the cooling system by running clean water thru it.
7. Close the drain cocks and install the drain plug (leaving the aftercooler bleeder cock open F67 only).
8. Add coolant to the radiator filler hole to the correct level, (closing the aftercooler bleeder cock when a continuous flow of coolant flows through it (F67 only).
9. Pressure test system and cap for leaks using a cooling system pressure tester.
10. Start the engine and add coolant until the radiator is full and free of air.
11. Check the coolant level when the engine reaches its operating temperature and again when it has cooled.

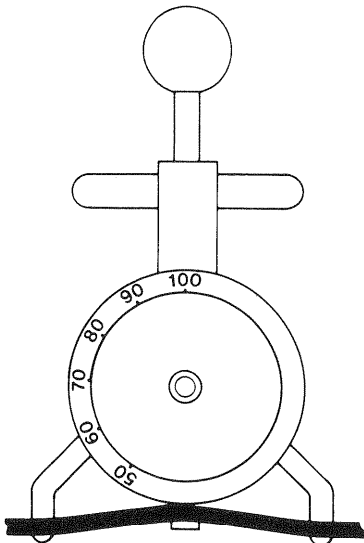


SP-10599



### **WARNING!**

***Never pour cold coolant into a hot engine. This could cause the cylinder head or engine block to crack. The failure to change the coolant can result in the cooling system becoming clogged and the engine can be seriously damaged by overheating.***



EL14032

### FAN BELT TENSION

Visually check belts for looseness, or worn belts, replace worn belts.

The engine is equipped with a fan belt tensioner that eliminates the need to adjust the belt. Use a belt tensioner gauge to check belt tension every 1000 hours of operation to make sure the tensioner is working properly. See the Cummins Engine Operation and Maintenance Manual.

## 70 BASIC PREVENTIVE MAINTENANCE

Put the machine in the SERVICE POSITION

### ELECTRICAL SYSTEM

#### Batteries

The batteries are located in the operator's guard behind the seat.

#### Check Battery Condition



### WARNING!

*All lead-acid batteries generate hydrogen gas which is highly flammable. If ignited by a spark or flame, the gas may explode violently, causing spraying of acid, fragmentation of the battery, and possible severe personal injuries. Wear safety glasses when working near batteries.*

**ANTIDOTE:** *EXTERNAL – Flush with water. INTERNAL – Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil. Call physician immediately. EYES – Flush with water for 15 minutes and get prompt medical attention.*

The batteries are connected in parallel in a 12 volt system. Check the electrolyte level weekly ( more often in warm weather ). The level should be approximately 10mm ( 3/8 in ) above the plates. If necessary add distilled water. Check that the cable terminals and battery posts are clean, tight and coated with an anti-corrosive substance. During cold weather, it is very important that the batteries do not become discharged, because the electrolyte can freeze and damage the battery.

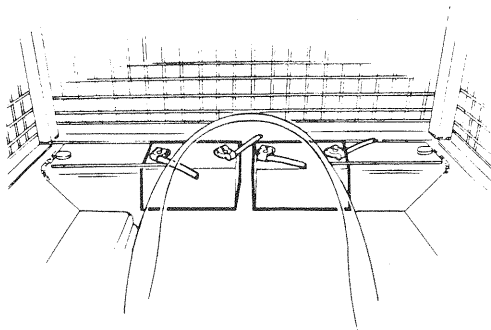


### WARNING!

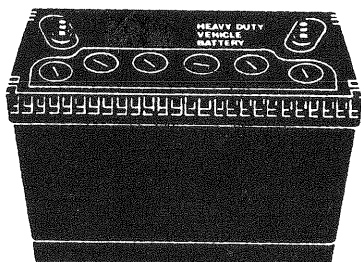
*Do not attempt to charge or load test a frozen battery. If frozen it may explode, allow the battery to warm to 15.5° C (60° F) before placing on charge.*

**Note:** *VME Maintenance –Free batteries allow you to use a hydrometer to test the specific gravity of the electrolyte. Individual plugs can be unscrewed allowing access to each cell. Specific gravity of each cell can then be tested. When installing plugs be sure they are properly seated. If the specific gravity, when corrected to 80° F is less than 1.225, the battery is to be charged.*

**Note:** *When checking battery at temperature other than 80° F, for every 10° above 80° –Add .004 to reading. For every 10° below 80° – Subtract .004 from the reading.*



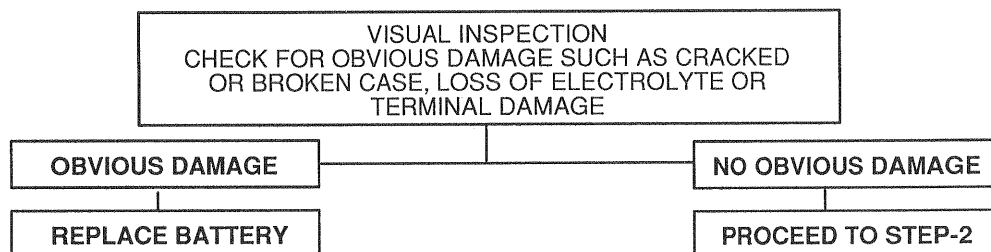
SP-10565



TS40415

**Put the machine in the SERVICE POSITION**

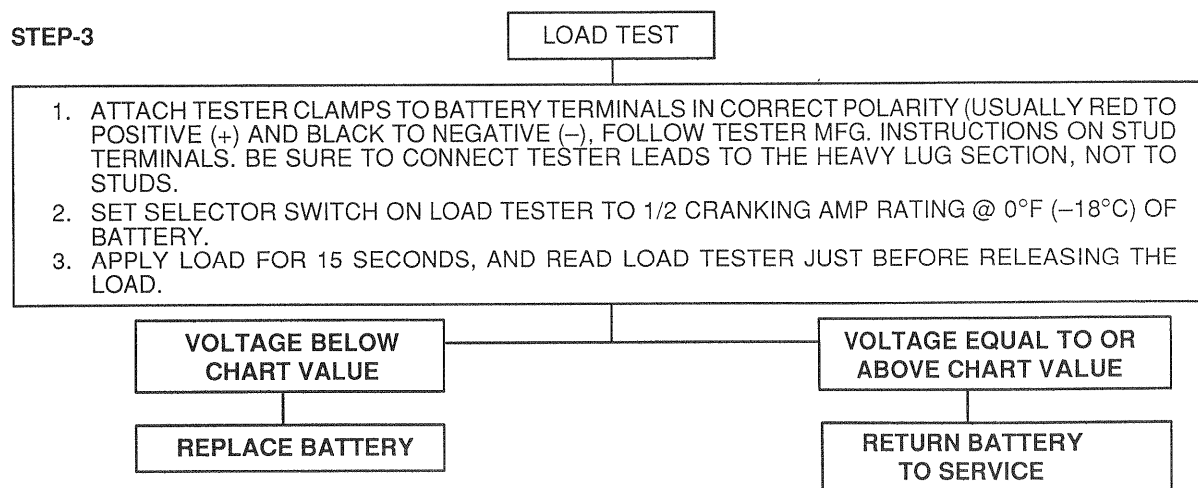
## STEP-1



## STEP-2

CHECK OPEN CIRCUIT VOLTAGE FOR STATE OF CHARGE	
NOTE: STABILIZE VOLTAGE BY TURNING ON LIGHTS OR 15 AMP LOAD FOR 15 SECONDS.	
STABILIZED OPEN CIRCUIT VOLTAGE	PERCENT CHARGED
12.6 VOLTS OR MORE	100%
12.4	75%
12.2	50%
12.0	25%
11.7 OR LESS	0%
STABILIZED VOLTAGE BELOW 12.4 VOLTS CHARGE BATTERY AND RETEST	STABILIZED VOLTAGE ABOVE 12.4 VOLTS Proceed To STEP-3

## STEP-3



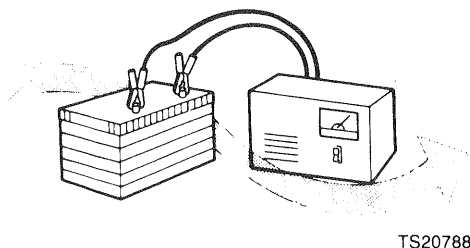
## VOLTAGE CHART

ESTIMATED ELECTROLYTE TEMPERATURE		MINIMUM REQUIRED VOLTAGE UNDER 15 SEC. LOAD
70° F	(21° C) & ABOVE	9.6
60° F	(16° C)	9.5
50° F	(10° C)	9.4
40° F	(4° C)	9.3
30° F	(-1° C)	9.1
20° F	(-7° C)	8.9
10° F	(-12° C)	8.7
0° F	(-18° C)	8.5

## 72 BASIC PREVENTIVE MAINTENANCE

Put the machine in the SERVICE POSITION

### Charging Maintenance-Free or Low-Maintenance Batteries



#### **WARNING!**

*When batteries are being charged, explosive gases are formed. A short circuit, open flame or spark near the battery can cause a serious explosion. Provide good ventilation, especially if the battery is being charged in an enclosed area.*



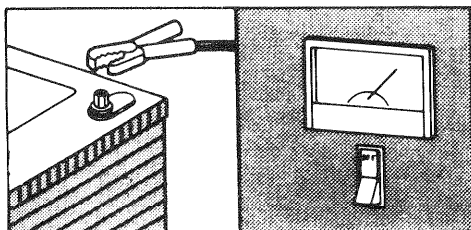
#### **WARNING!**

*Make sure the battery charger is OFF. Connect the positive (+) charger lead to the positive (+) terminal on the battery first. Connect the negative (-) charger lead to the negative (-) terminal on the battery.*



#### **WARNING!**

*Always use a voltmeter or hydrometer to check the battery charge. Never use a metal object across the posts to test a battery. Sparks may cause an explosion.*



#### **WARNING!**

*Never let fluid be pushed out of the battery or the temperature go above 52° C (125° F). If the battery case feels hot, stop charging for 20 minutes then start the charger at a lower amperage rate. High temperature will prevent the battery from holding a charge. Make sure the battery is a minimum of 16° C (60° F) before charging.*

**Note:** Check the voltage from one terminal to the other on the same battery. Do not connect the voltmeter to the battery cables.

**Note:** Follow the instructions of the battery charger or the manufacturer.

VOLTAGE OF 12.4 OR ABOVE		VOLTAGE BETWEEN 11.7 AND 12.4		VOLTAGE 11.7 OR BELOW	
Amps of Recharge	Hours of Recharge	Amps of Recharge	Hours of Recharge	Amps of Recharge	Hours of Recharge
5	5	5	14	5	27
10	2.5	10	7	10	14
15	1.5	15	4.5		

Put the machine in the SERVICE POSITION

### Check Battery Cables and Connections

Check the battery cables, connections and hold downs for damage, looseness and corrosion. Replace damaged parts as needed. Clean and tighten connections as needed. Disconnect the ground cables first at end remote from battery when removing a battery to avoid causing sparks which could cause an explosion. Connect the ground cable last during installation.

### Starting With Auxiliary Batteries

DO NOT connect jumper cables to the battery terminals. Use system voltage to jump start. Connect the positive cable first to the positive starter cable. Connect the negative cable to the machine frame.



### **WARNING!**

*Failure to follow this procedure could result in personal injury or damage to the electrical system.*



SP-10397

### Battery Disconnect Switch

**Note:** When performing any welding operation on a machine turn off the battery disconnect switch and disconnect the positive and negative cable connections at the battery.

**Note:** Never connect the arc welder ( or cutter ) ground cable to the opposite frame to the one being welded on. Connect the ground cable as close as possible to the area to be welded. Thoroughly clean the weld area before welding to reduce the chance of fire and have a fully charged fire extinguisher on hand.

### Check Neutral Start Switch

Put the transmission control lever in the FORWARD position. Try to start the engine. If the starter turns the engine, replace the neutral start switch.

Put the transmission control lever in the REVERSE position. Try to start the engine. If the starter turns the engine, replace the neutral start switch.

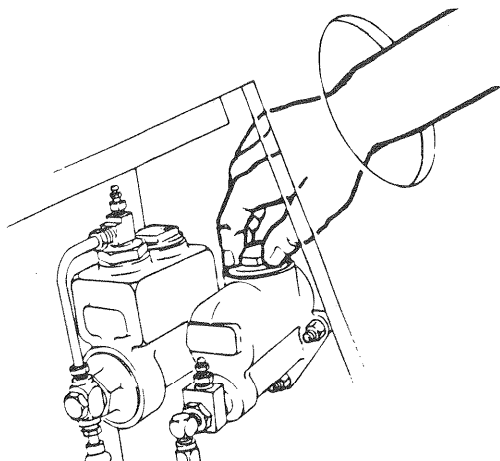
**Note:** If the starter will turn the engine with the transmission control lever in the NEUTRAL only position, the neutral start switch is good.

Put the machine in the SERVICE POSITION

### BRAKE SYSTEM

#### Checking the Fluid Levels Master Cylinders

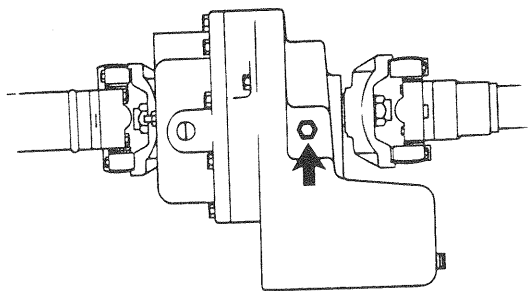
Check the fluid levels in the service brake master cylinders every 50 hours of operation. The master cylinders are located behind the access panel on the side of the firewall. The levels in the reservoirs should be within 6mm (1/2 in) from the top of the filler hole. Add approved automatic transmission fluid to the reservoirs as required.



SP-10569

#### Checking the Fluid Levels Midmount Brake (F67)

Check the lubricant level in the midmount brake unit. The level should be up to the bottom of the check plug hole. Drain and refill the midmount brake housing every 500 hours of machine operation with approved automatic transmission fluid.



SP-10622

#### Checking the Secondary Brake Pads (F66)

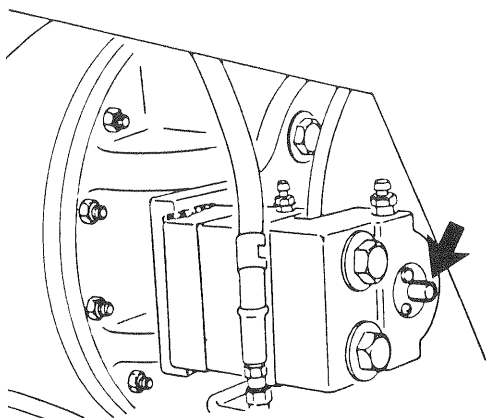


### **WARNING!**

*Operating the secondary brake with excessive brake pad wear can result in unsafe brake operation and damage to the brake disc.*

Check the secondary brake retractor pins to determine the amount of wear on the pads. The pads should be replaced if the protrusion of the pins is 3.2 mm (.125 in) or less.

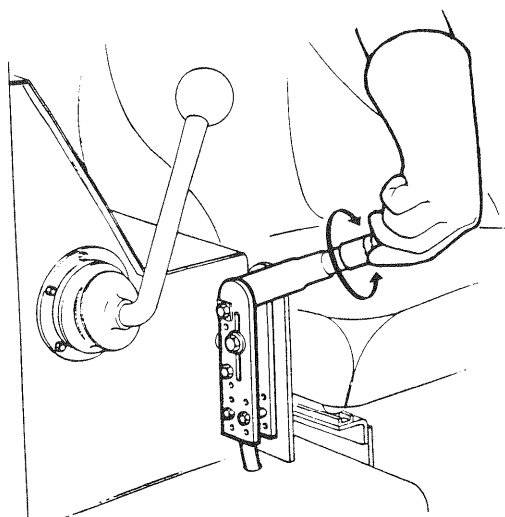
Check the condition of the brake disc. If it is warped or pitted, it should be replaced.



SP-10612



Put the machine in the SERVICE POSITION

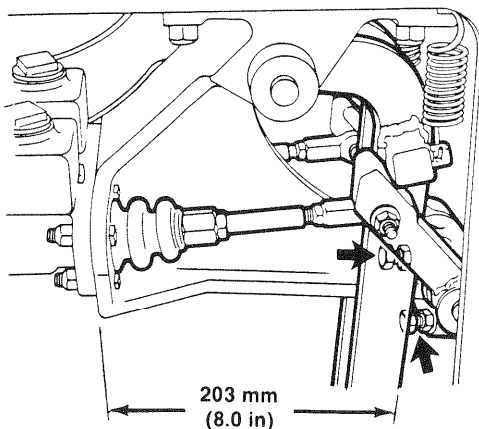


SP-10570

## Adjusting the Parking Brake Lever

If slack develops when the parking brake lever is applied, release the parking brake lever and turn the acorn nut on the end of the lever to clockwise to tighten the cable.

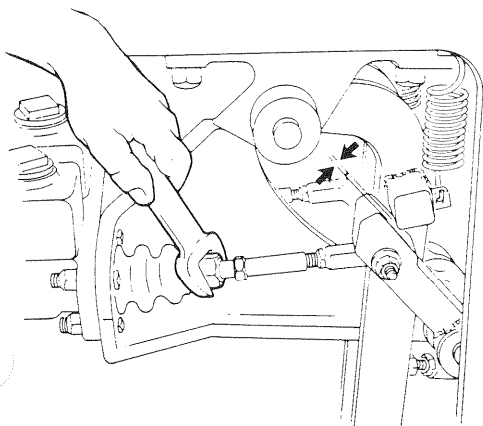
## Adjusting the Service Brake, Linkage (F67)



SP-10624

Adjust the brake pedal stops to obtain a dimension of 203mm (8.0 in.) between the master cylinder mounting faces and the center lines of the clevis joints.

Adjust the master cylinder pushrod end play to obtain a 1.5mm (.06 in.) gap between the contact cams and the cam followers.



SP-10625

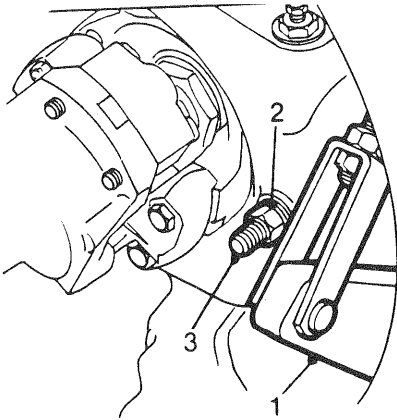
## 76 BASIC PREVENTIVE MAINTENANCE

Put the machine in the SERVICE POSITION

### Adjusting the Service Brake, Transmission (F66-F67)

If the service brake pedal stroke becomes excessive, it may be necessary to adjust the brake units.

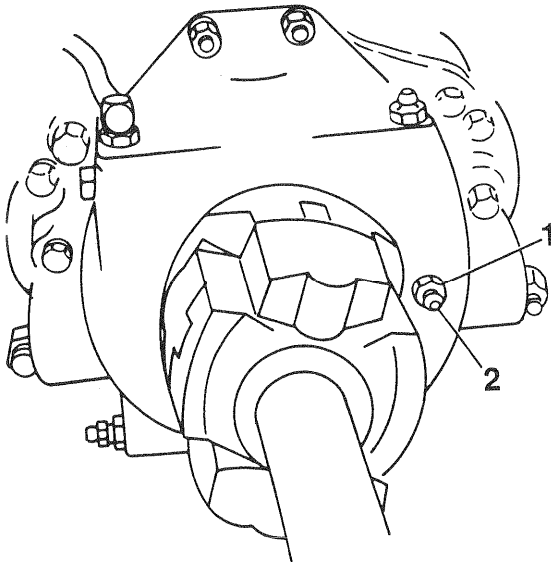
**Note:** *The parking brake lever arm (1) applies only to the transmission mounted brake, not the midmount brake.*



SP-10613

- Loosen locknut (2) on brake adjusting screw (3).
- Disconnect parking brake linkage from brake lever arm (1). Brake lever arm end only.
- Tighten adjusting screw (3) until screw bottoms out (return springs compressed).
- Back adjusting screw (3) out one turn.
- Hold adjusting screw (3) from turning and tighten locknut (2).
- Reconnect parking brake linkage to brake lever arm.

### Adjusting the Service Brake, Midmount (F67 Only)



RP-10907

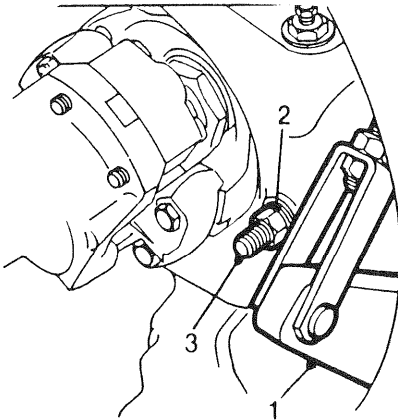
- Loosen locknut (1) on brake adjusting screw (2).
- Tighten adjusting screw (2) until screw bottoms out.
- Back adjusting screw (2) out one turn.
- Hold adjusting screw (2) from turning and tighten locknut (1).

Put the machine in the SERVICE POSITION

### Adjusting the Parking Brake Linkage, (F66-F67)

Before adjusting the clevis at the brake lever arm:

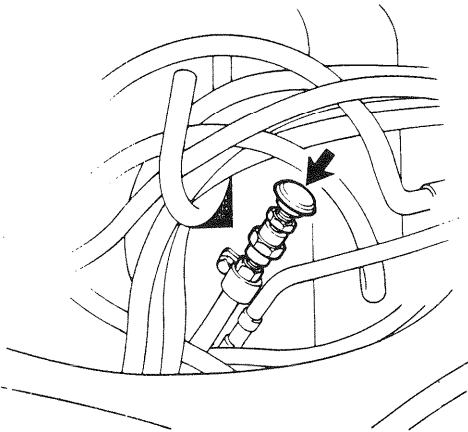
- Adjust the transmission service brake clearance.
- Rotate the adjustment knob on the hand lever to full release position.
- Adjust the clevis until the pin slides freely through the brake lever arm.
- Adjust the knob on the hand lever until the lever force is firm.



SP-10613

### Midmount Brake Breather, (F67 Only)

The breather should be cleaned every 250 hours of operation. Remove the breather from the hose on the right hand side of the winch, clean it in a solvent and blow dry it with compressed air.



SP-10623

### Bleeding the Brakes



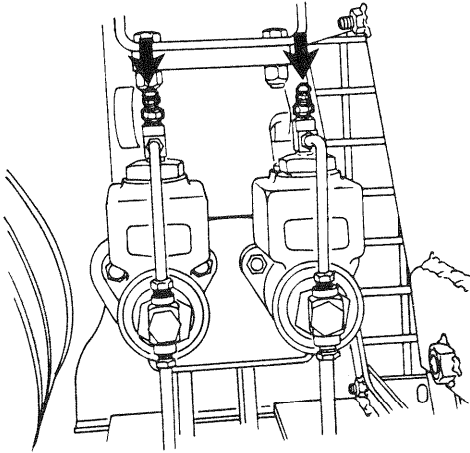
## **WARNING!**

*Never reuse fluid that has been collected during bleeding, it could be contaminated and could interfere with the safe operation of the brakes.*

**NOTE:** *Both brake units must be correctly adjusted before you begin to bleed the brakes. Correct brake adjustment can correct certain brake conditions.*

## 78 BASIC PREVENTIVE MAINTENANCE

Put the machine in the SERVICE POSITION



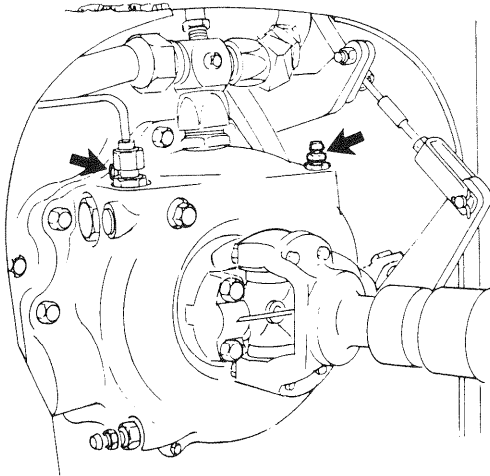
SP-10614

**NOTE:** Do not use pressure type bleeders for this system. Pressure type bleeders disturb the air bubbles already in the fluid making bleeding more difficult.

**NOTE:** The F67 uses a single pedal to actuate both brake units, a separate fluid system is used for each system. The F66 has two separate brake pedals.

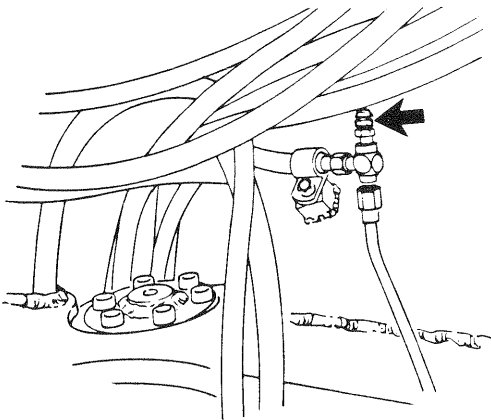
When bleeding the brake systems it is imperative that the master cylinder reservoirs be kept filled. If a reservoir is allowed to empty air will enter the system and it will have to be rebled. Refill the reservoir after each step. Always remember to close a bleeder screw before the brake pedal is released.

### F67



SP-10615

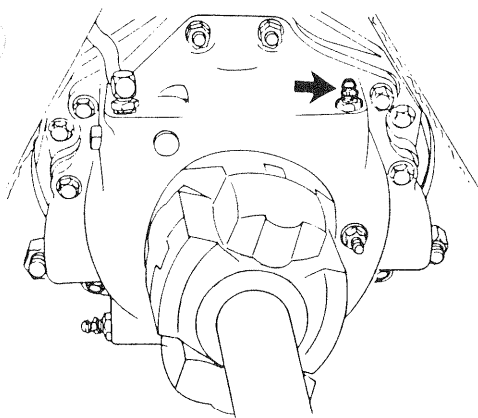
- Hold the service brake fully applied and open the bleeder screw on the inner (transmission) brake master cylinder, close the bleeder screw and release the pedal.
- Repeat the procedure until a clear stream of fluid (free of air) is expelled from the bleeder and close the bleeder screw. To make sure all the air that can be expelled is, bleed several times after a clear stream of fluid has been expelled. If any air is expelled at this time, repeat several times.
- Repeat the procedure with the two bleeder screws on top of the transmission mounted brake unit.
- Hold the service brake fully applied and open the bleeder screw on the outer (midmount) brake master cylinder, close the bleeder screw and release the pedal.
- Repeat the procedure until a clear stream of fluid (free of air) is expelled from the bleeder and close the bleeder screw. If any air is expelled at this time, repeat several times.



SP-10626

- Repeat the procedure with the center bleeder screw under the seat plate. If any air is expelled at this time, repeat several times.

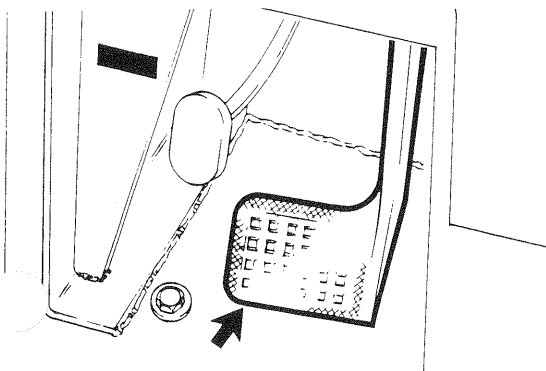
## Put the machine in the SERVICE POSITION



SP-10627

- Repeat the procedure with the bleeder screw on top of the midmount brake unit. If any air is expelled at this time, repeat several times.
- Allow the brakes to stand for 20 minutes and recheck the pedal stroke to determine if the brakes have been bled completely.
- Allowing the machine to stand for 8 hours can help to allow any remaining air in the system to be expelled from the system or to collect at the bleeder screws for easy rebleeding

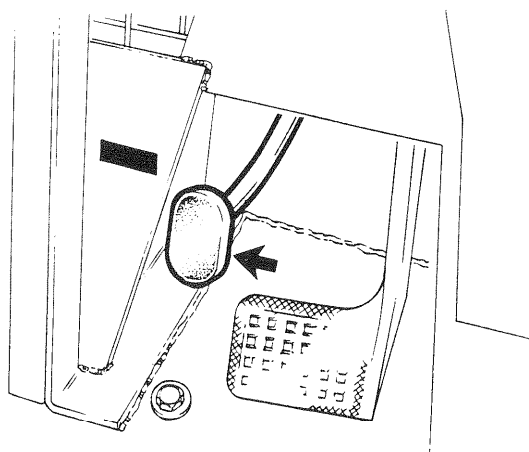
## F66 Service Brake



SP-10523

- Hold the service brake pedal fully applied and open the bleeder screw on the service brake master cylinder.
- Close the bleeder when the pedal goes to the floor then release the pedal.
- Repeat the procedure with the two bleeder screws on the transmission mounted brake unit. If any air is expelled at this time, repeat several times.

## F66 Secondary Brake



SP-10522

- Hold the service brake fully applied and open the bleeder screw on the secondary master cylinder.
- Close the bleeder when the pedal goes to the floor then release the pedal.
- Repeat the procedure with the bleeder screws on the disc brake unit at the front drive axle. If any air is expelled at this time, repeat several times.

**NOTE:** If the brakes feel spongy, too long a pedal stroke, brake pedal does not return, or is slow to return when it is released, air could still be in the system or the pedal linkage is binding. Check the linkage for binding and correct condition. If no binding is found the pedal should be returned by hand to continue the bleeding procedure.

## 80 BASIC PREVENTIVE MAINTENANCE

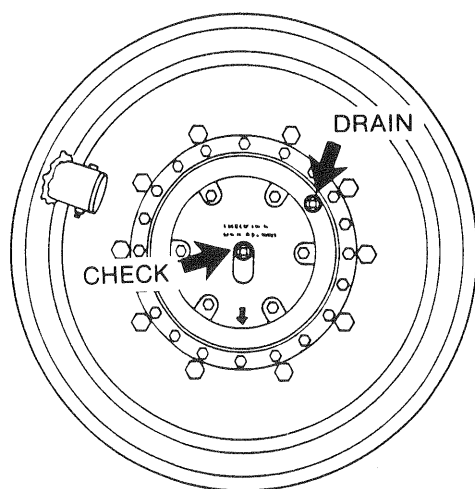
Put the machine in the SERVICE POSITION

### FRONT AND REAR DRIVE AXLES

#### Checking the Axle Lubricant Levels

The lubricant in the drive axle differentials and planetary hubs should be checked every 50 hours of operation and changed every 1000 hours. A lubricant change may be needed earlier due to ambient temperatures. The differential level check plugs are located in the center of the differential housings opposite the input flanges. The differential drain plugs are located on the bottom of the differential housings.

SP-10470

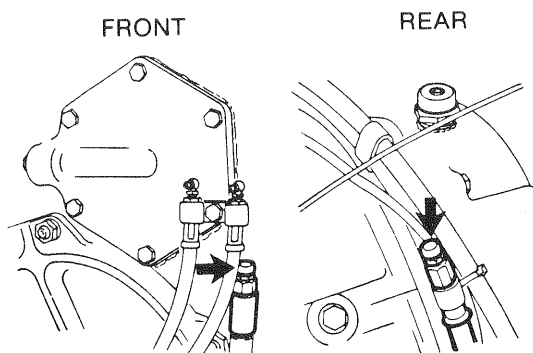


SP-10568

#### Checking the Planetary Hub Level

The planetary hub level check plugs are located in the center of each planetary hub. The arrow on the hub should point down when the level is checked. The planetary drain plugs are located on the outer edge of the hubs and should point down for complete draining.

**Note:** On some planetary hubs the planetary oil level plugs are higher than the differential plugs. Therefore the differential plug should be used to determine the axle assembly oil level.



SP-10609

#### Axle Breathers

The axle breather Caps should be rotated every 50 hours of operation to clear the passages. Every 500 hours of operation the breathers should be cleaned with compressed air to remove any debris.

Put the machine in the SERVICE POSITION

## WHEELS AND TIRES



### WARNING!

*When doing any tire service, especially tire inflation, NEVER stand in the TRAJECTORY PATH. Serious injury or death can result if an explosion should occur.*

*Use a self attaching air chuck with a hose long enough to avoid stranding in the trajectory path when inflating a tire.*

*Use an inflation cage, safety cables or chains when inflating tires.*

*Never use air from a compressed air system to inflate a tire if alcohol has been used as antifreeze.*

### Tire Inflation Pressure

When checking the air pressure of the tires, examine the valves and make sure all valve caps are in place. For the recommended Tire inflation pressures see the specification section of this manual.

**Note:** *Never check tire pressures with a load (of logs) in place.*

### Check Tire Condition

Check the condition of the tires with the machine empty. Make a report of any damaged tires.



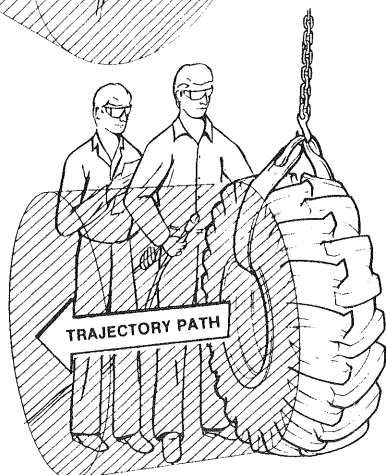
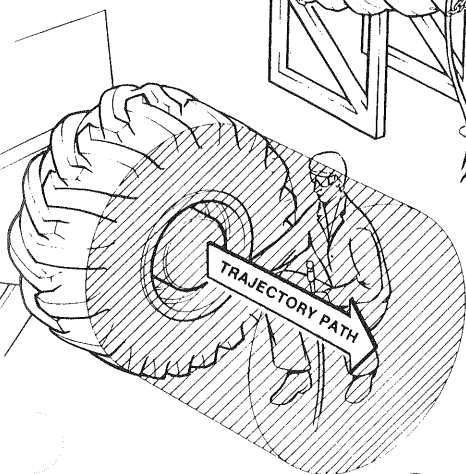
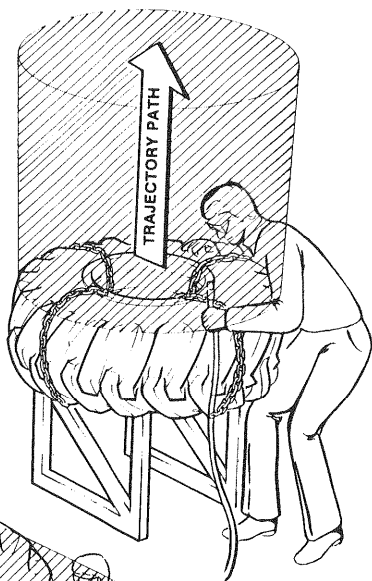
### WARNING!

*Completely deflate a tire before removing foreign material from the tire tread. Keep your fingers away from bead breakers and rims, and stay out of the trajectory path when removing foreign material. If a bead breaker disengages, it will release with enough force to cause injury or death.*

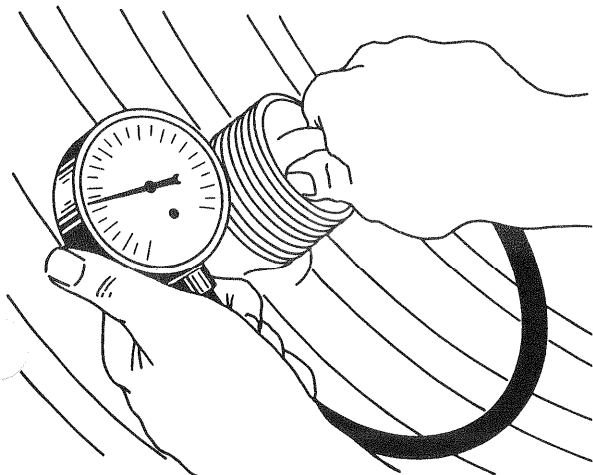


### WARNING!

*For complete information pertaining to dismounting and mounting the tires on rims, refer to the Tire Manufacturer's Off-Highway Tire Maintenance Manual.*



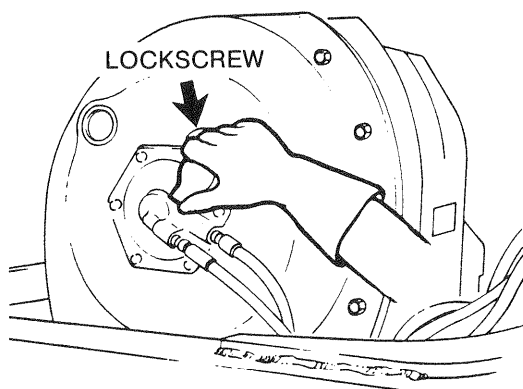
RP-10895



RP-10896

## 82 BASIC PREVENTIVE MAINTENANCE

Put the machine in the SERVICE POSITION



SP-10572

### WINCH

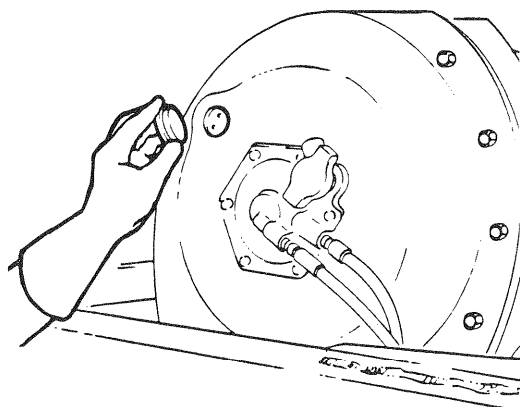
#### Adjust the Winch Free-Spool Tension

If the winch cable requires too little effort to pull it from the cable drum, the tension can be adjusted as follows:

- Loosen the lock screw.
- Tighten the adjusting nut to increase the tension and loosen it to decrease it.
- Tighten the lock nut.

#### Installing The Winch Mainline

**Note:** *Installing the winch cable this way provides a safety break away if the load should fall down a grade as well as a method of holding the cable under normal operation.*



SP-10573



### WARNING!

*This break-away feature will help to prevent the machine from being pulled by the load should the load slip down a hillside, but it is imperative that the operator put the winch control lever in the FREE-SPOOL position immediately to allow the cable to unwind from the winch.*

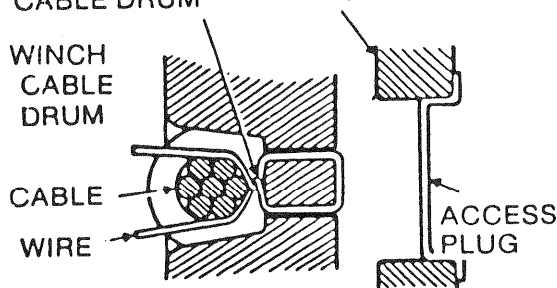
TWIST THE WIRE  
AGAINST THE  
CABLE DRUM

WINCH HOUSING

WINCH  
CABLE  
DRUM

CABLE  
WIRE

ACCESS  
PLUG

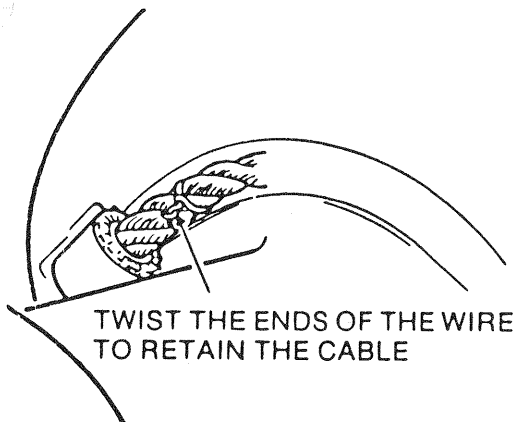


SP-10082

Install the winch mainline to the winch cable drum as follows:

- Remove the access plug from the winch housing.
- Start the machine and put the winch in the FREE-SPOOL mode.
- Rotate the cable drum by hand until the two cable anchor wire holes are in the center of the hole.
- Put the winch in the HOLD mode and return the machine to the SERVICE POSITION.
- Choose a gauge of wire that will insert through the holes.



**Put the machine in the SERVICE POSITION**

SP-10083

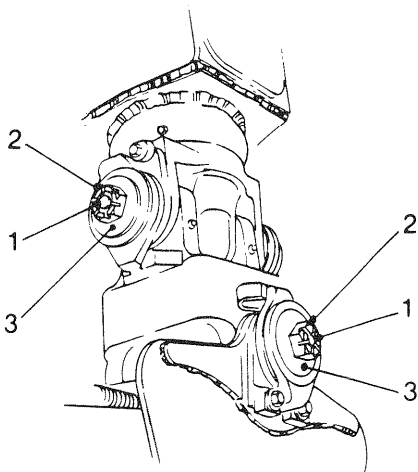
- Twist the wire ends together against the cable drum.
- Install the cable into the groove between the ends of the wire so that the cable ferrule is in the ferrule groove.
- Twist the ends of the wire together to hold the cable.
- Start the engine and WINCH-IN the cable onto the cable drum.
- Install the access plug.

**LOG GRAPPLE****Checking and Adjusting the Grapple Snubbers**

The operation of the snubbers should be checked at the beginning of each work shift as follows:

Pull back the grapple 30 cm (12 in) and release it. It should stop completely just before it reaches the bottom of its swing. If the grapple swing is greater than this, the snubber should be adjusted as follows:

Each set of upper and lower adjusting nuts should be adjusted equally. Tightening only one nut per set can overload the snubber causing premature wear.



SP-10484

- Remove the cotter pins (1) from the top snubber adjusting nuts (2).
- Loosen each adjusting nut and then tighten them until each Belleville washer (3) collapses about halfway.
- Recheck the grapple swing.
- Install new cotter pins to maintain the adjustment. It may be necessary to tighten or loosen an adjusting nut to install the cotter pin.

Check the adjustment of the lower snubbers by pulling the grapple 30mm (12 in) to each side and releasing it. The bottom snubbers are adjusted the same way as the top.

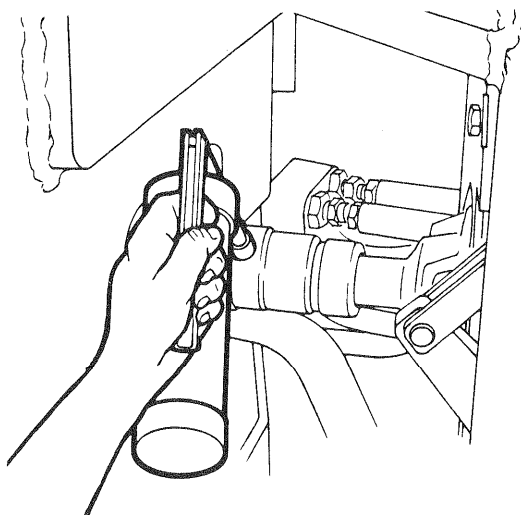
**Note:** *Keep oil and grease away from the snubbers so they will operate at maximum efficiency.*

Put the machine in the SERVICE POSITION

### DRIVESHAFTS

#### Lubrication

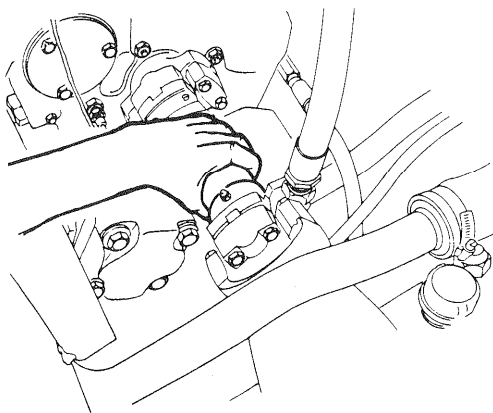
Grease the slip joints of the driveshafts every 100 hours of operation using a hand grease gun. Some of the universal joints used are sealed, non greasing type that require no lubrication maintenance. They can be identified by a hole in the center of the U-joint cross. Greaseable U-joints should be greased every 1000 hours of operation. A needle type grease gun adapter may be required to reach the grease fittings on some U-joints. this may be purchased from a local tool supplier.



SP-10610

#### Checking the Driveshafts

Check for play in the universal joints, slip joints and loose, missing or damaged bolts.



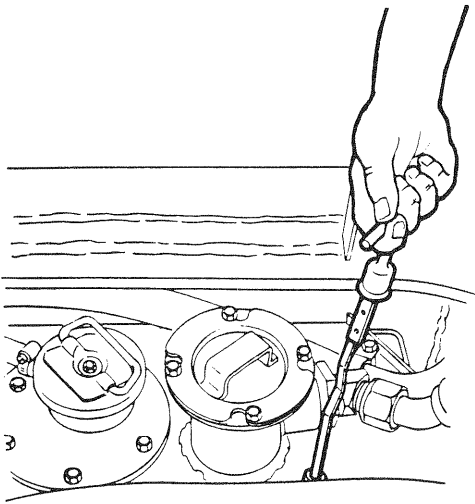
SP-10611

Put the machine in the SERVICE POSITION

## HYDRAULIC SYSTEM

### Transmission, Converter and Winch

The fluid in the transmission, converter and winch hydraulic system serves several purposes. It lubricates the transmission, converter and winch, transmits engine power through the torque converter. The fluid also cools the components. It is very important that the oil level is always correct. Too low an oil level will affect the transfer of power and can damage the system. Too much oil will cause foaming and the system will overheat. Damage can also be caused by dirty oil. It is important to keep contaminants away from the dipstick and the system clean.



SP-10567

### Checking Fluid Level

The fluid level should be checked daily as follows:

- Park the machine on level ground.
- Apply the parking brake.
- Transmission in neutral.
- Fluid at operating temperature 82° – 93° C (180° – 200° F)
- Start engine and operate it at low idle RPM.
- Check fluid level on dipstick.
- Add fluid to filler tube as required to bring level to between marks on the dipstick.

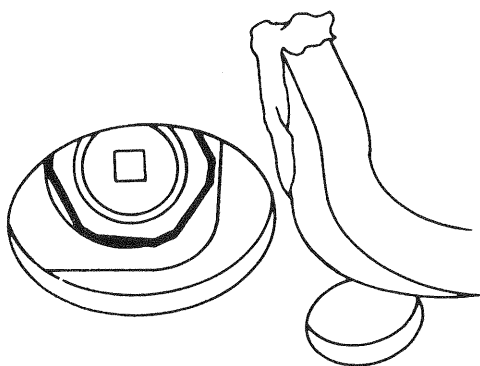
**Note:** *If adding a large quantity of oil, it may be poured into the winch through the breather hole on top of the housing.*

### Transmission and Torque Converter Fluid Warm-Up Procedure

- Block tires and hold service brake pedal applied.
- Transmission in FORWARD and THIRD.
- Run the engine at two thirds throttle until the fluid reaches its operating temperature.

**Note:** *Do not apply parking brake as this will declutch the transmission on some models.*

Put the machine in the SERVICE POSITION



SP-10600

### Changing Hydraulic Transmission Fluid

The fluid should be changed every 1000 hours of operation. Drain the fluid by removing the plug from the bottom of the transmission housing. Drain with the fluid at 65° – 93° C (150° – 200° F)



### **WARNING!**

*Be careful when working with hot fluids*

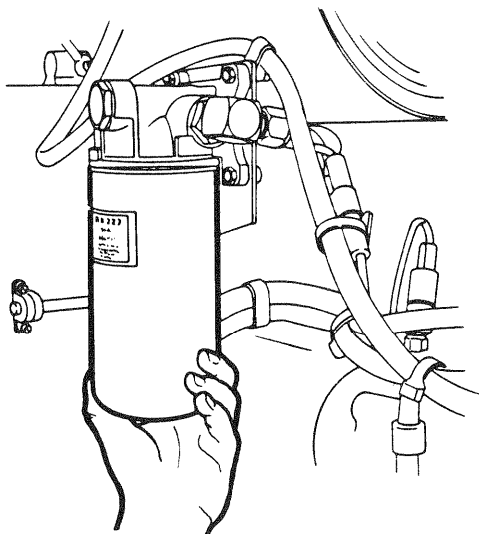
### Flushing the Transmission and Torque Converter

In the event of a major failure or when it becomes necessary to change most of the oil in the circuit the following procedure should be followed:

- Drain the transmission oil.
- Clean and replace the suction screen.
- Change the transmission filter.
- Remove lube line at transmission brake (from cooler) and divert into a 10 gallon pail.
- Over fill transmission a few extra gallons until oil comes out the breather.
- Start engine and run at idle until clean oil appears at lube line or oil stops flowing.
- Shut off engine as soon as oil flow stops.

### Suction Screen

The suction screen should be cleaned every 1000 hours of operation. It is located on the bottom on the right hand side of the transmission beside the steps. Clean the screen when the fluid in the system is drained for changing. When the cleaned screen is replaced, use a new gasket. It should be tighten just enough to seat the suction screen.



SP-10601

Refill transmission to low mark on the dipstick. Start the engine and run at 500–600 RPM to prime converter and lines. Recheck level with engine running at 500–600 RPM and add oil to bring level to low mark. When the oil temperature is hot 82° –93° (180–200° F) make final oil check bringing oil level to full mark. Check system for leaks.

### Changing the Transmission Filter

The filter should be changed after the first 50 hours of operation and every 500 hours of operation thereafter. It is accessible behind the left hand rear engine side panel. The filter cannot be cleaned, it must be replaced. Apply a thin coat of transmission fluid to the gas-

## Put the machine in the SERVICE POSITION

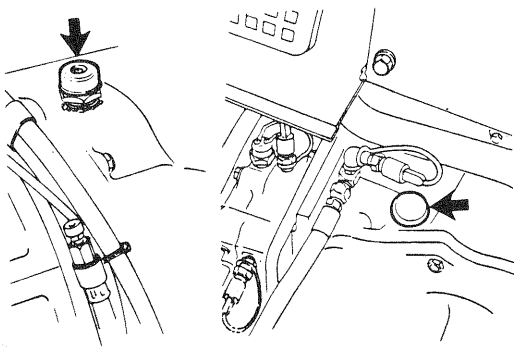
ket surface and tighten the filter. Operate the engine for five minutes at 1500 RPM and check for leaks. If leaks appear, remove and replace the filter and repeat the installation. It usually does not help to tighten the filter further.

**Note:** *Normal drain periods and filter change intervals are for average environmental and duty-cycle conditions. Severe or sustained high operating temperatures or very dusty atmospheric conditions will cause accelerated deterioration and contamination. For extreme conditions judgment must be used to determine the required change intervals.*

## Torque Converter and Transmission Vent and Breather

The vent and breather should be cleaned every 250 hours of operation. Remove them from the top of the torque converter and transmission, clean them in solvent and blow dry with low pressure compressed air as not to damage the internal parts.

**Note:** *Breather – transmission  
Vent – converter and winch*



SP-10602

## HYDRAULIC SYSTEM; STEER, BLADE & GRAPPLE



## WARNING!

*If your Skidder is equipped with a grapple hydraulic accumulator System the hydraulic fluid in the accumulator is stored under high pressure. BEFORE doing any service on grapple circuit of the hydraulic system, the accumulator must be discharged COMPLETELY. If the accumulator is to be disassembled, the nitrogen precharge pressure must also be discharged completely.*

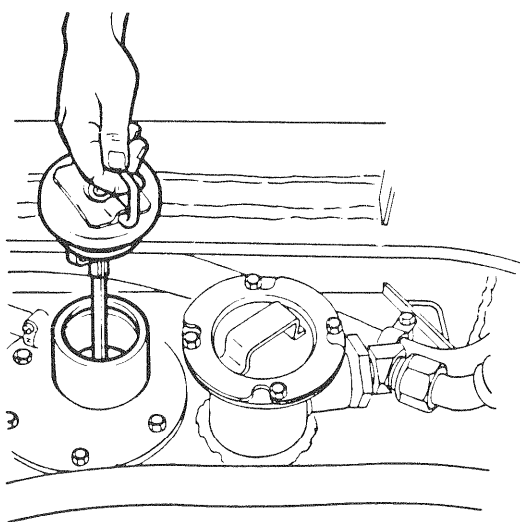
## Discharge the Accumulator Hydraulic Pressure as Follows:

- With the engine running, open the grapple tongs halfway (tip to tip) – do not close the tongs halfway.
- Raise the grapple tips a few centimeters (inches) off the ground.
- Shut down the engine and put the machine in the service position (with the exception of the raised grapple).
- Hold the grapple control lever in the OPEN position for ten seconds.

## Put the machine in the SERVICE POSITION

- Check the grapple accumulator system pressure gauge to ensure that the pressure reading is zero.

**Note:** *If the grapple cannot be opened (because of a problem such as a pump or engine failure) then the above procedure should be done with the closed grapple on the ground. If the pressure still cannot be reduced to zero, loosen the hose 1–2 turns ( Do Not Remove ) at the pilot operated check valve to the accumulator CAREFULLY at the the check valve until all of the hydraulic pressure is removed. There will be approximately 3.8 liters (1 US gal.) of oil in the accumulator.*



SP-10571

## Checking the Hydraulic Fluid Level

**Note:** *The blade should be on the ground, arch forward, grapple open, and the boom cylinders at mid stroke.*

The hydraulic fluid should be checked daily and be between the add and full mark on the dipstick. Add fluid to the reservoir as required through the filler tube.

## Changing the Hydraulic Fluid

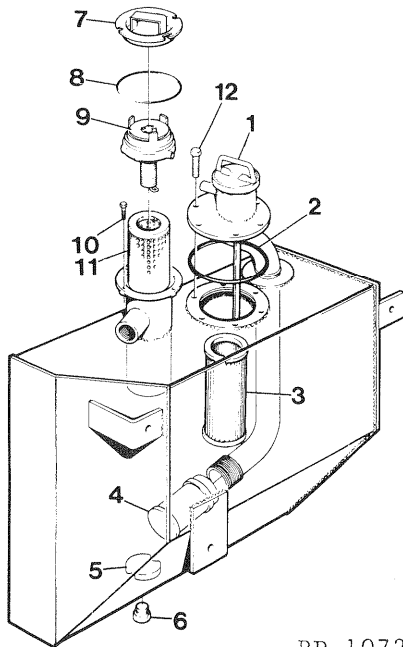
Change the hydraulic fluid every 1000 hours of operation or whenever the main hydraulic pump fails and must be overhauled.

- Run the Skidder until the hydraulic fluid reaches its operating temperature.
- Raise the blade, move the arch forward and the boom up (if applicable) and open the log grapple tongs.
- Shut the engine down.
- Raise the floor board to gain access to the hydraulic tank. Remove the pressure cap (4 PSI under pressure) then remove the drain plug on the bottom of the reservoir. Draining the oil into a suitable container.
- Slowly lower the blade, close the grapple arms move the arch back (and lower the boom) to flush the fluid from those cylinders.
- Remove the hydraulic reservoir top plate and clean the inside of the tank using diesel fuel as a solvent and clean the magnet (6).
- Remove and clean the suction screen (4). Replace it if it is damaged.
- Refill the reservoir to the correct level. Start the engine and operate it at Low Idle RPM for a few minutes.

**Put the machine in the SERVICE POSITION**

- Raise the blade, move the arch forward, level boom and open the grapple arms.
- Recheck the level, adding fluid as required.

**Note:** *Never use flushing oil or compounds to clean the system, use only the recommended operating fluid.*



RP-10721

**Changing the Main Hydraulic Filter**

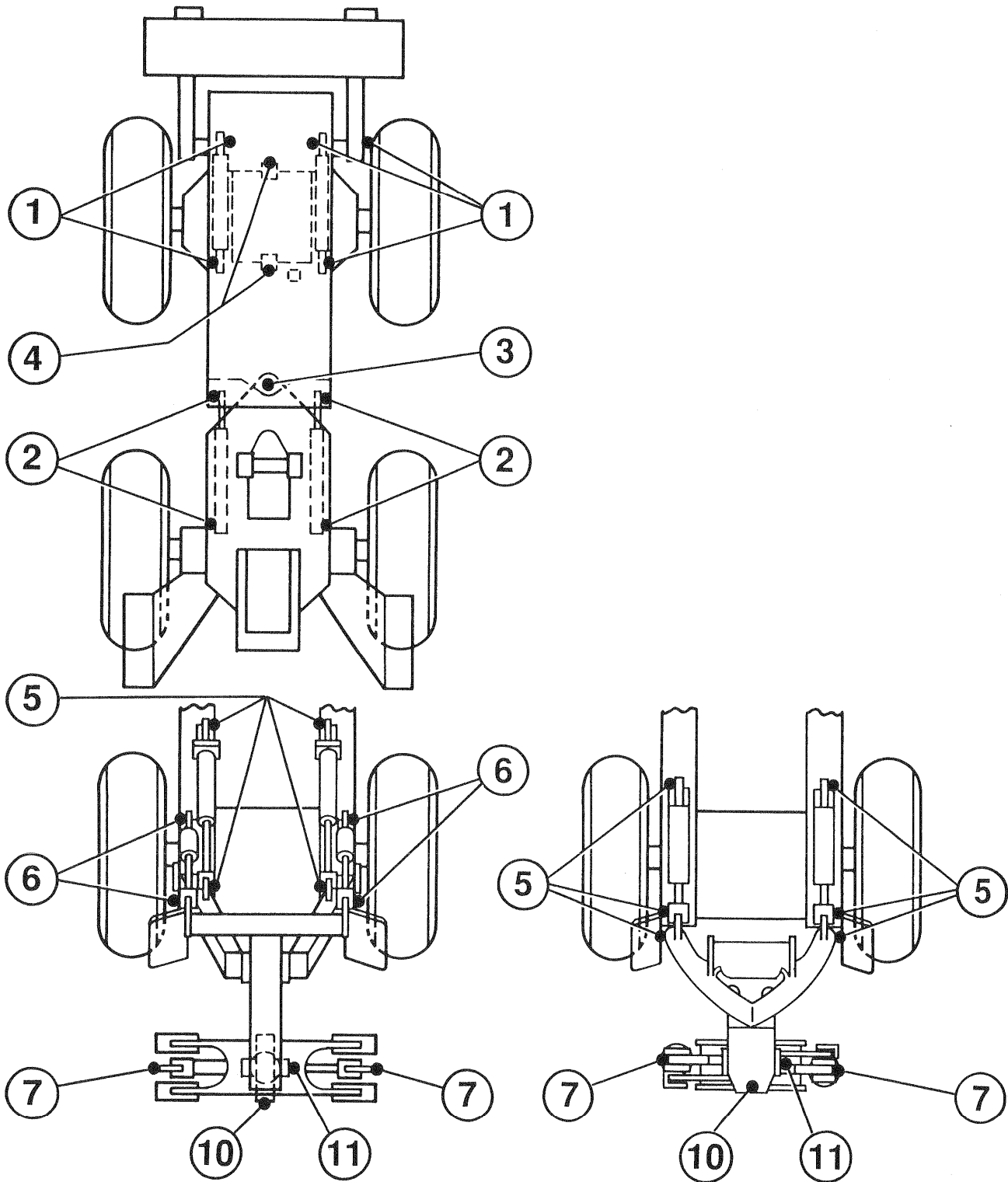
Change the filter element ( 11 ) after the first 50 hours of operation and every 500 hours of operation thereafter.

See Hydraulic section in Service Manual (R6416) for further information on hydraulic system.

## 90 BASIC PREVENTIVE MAINTENANCE

Put the machine in the SERVICE POSITION

### Lubrication Instructions (F66 & F67)





Put the machine in the SERVICE POSITION

**Lubrication Instructions (F66 & F67)**

ITEM	EVERY 10 HOURS OF OPERATION
1	Utility Blade and Cylinder Pins
2	Steer Cylinder Pins
3	Center Hinge Pins
4	Axle Cradle Pins
5	Arch and Cylinder Pins
6	Boom and Cylinder Pins
7	Grapple and Cylinder Pins
	<b>EVERY 100 HOURS OF OPERATION</b>
8	Driveshaft Slip Joints
9	
	<b>EVERY 500 HOURS OF OPERATION</b>
10	Snubber Pins
11	
12	

## 92 BASIC PREVENTIVE MAINTENANCE

## Put the machine in the SERVICE POSITION

## NOTES

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Put the machine in the SERVICE POSITION

## SPECIFICATIONS

### RECOMMENDED LUBRICANTS

**Main Hydraulic System: (Blade, Steer, Arch, Boom and Grapple Cylinders)**

PREVAILING AMBIENT TEMPERATURE	FLUID TO BE USED
-23° C (-10° F) TO 50° C (120° F)	Mobil DTE 13M Premium Grade Hydraulic Oil ISO VG32

### Transmission/Converter/Winch Hydraulic System and Midmount Brake

PREVAILING AMBIENT TEMPERATURE	FLUID TO BE USED
-1° C (30° F) and Above	C-3 Grade 30 Transmission Fluid
-23° C (-10° F) and Above	C-3 Grade 10 Transmission Fluid
-34° C (-30° F) and Above	Dextron II D Transmission Fluid
-55° C (-65° F) to -18° C (0° F)	MIL -L-46167 or MIL-L-46167A
-55° C (-65° F) and above	Conoco Polar Start DN-600 Fluid

Hydraulic fluid must be kept clean. Any fluid added to the reservoir must be filtered through a 100 mesh screen. It is important to service filters and breathers at the correct hourly intervals.

Any time oil is added to top off the fluid level, the same oil as is already in the system must be used. If the same fluid is not available, another approved fluid (for the given temperature range) can be added if the fluid is supplied by the same manufacturer and the amount added is not greater than 50% of the system capacity. If these conditions cannot be met, the system must be drained completely and refilled.

When the fluid is changed because of changes in ambient temperature, the system must be drained and the fluid replaced.

Because of the many types and brands of fluids that are available, it is not practical to test each one. Selecting the correct fluid should be done with the help of a reputable oil supplier who is responsible for the quality of the fluid. It is important to change fluids and filter elements at the intervals specified in this manual.

Put the machine in the SERVICE POSITION

### **Front and Rear Axle Differentials and Planetary hubs**

#### **Extreme Pressure Gear Lubricant Multi-grade Viscosities MIL-L-2105C**

PREVAILING AMBIENT TEMPERATURE	LUBRICANT TO BE USED
-12° C (+10° F) and Above	85W -140
-26° C (-15° F) and Above	80W -140
-26° C (-15° F) to 38° C (100° F)	80W -90
-40° C (-40° F) and Above	75W -140
-40° C (-40° F) to 38° C (100° F)	75W -90
-40° C (-40° F) to -18° C ( 0° F)	75W -80
Below - 23° C (- 10° F)	Special Polar MIL-L 2105C 75W

### **Chassis and Driveshaft Lubrication**

PREVAILING AMBIENT TEMPERATURE	LUBRICANT TO BE USED
-18° C (0° F) and Above	NLGI Grade 2 Lithium Base Extreme Pressure Multi-puposeGrease with 3% to 5% Molybdenum Disulfide added.
-32° C (-25° F) and Above	NLGI Grade 0 Lithium Base Extreme Pressure Multi-purpose Grease.

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Put the machine in the SERVICE POSITION

**Pillow Block Bearing Lubrication****PREVAILING AMBIENT TEMPERATURE**

–18° C (0° F) and Above  
–Below –18° C (0° F)

**LUBRICANT TO BE USED**

Unirex EP Grease (ESSO-Canada, Mobil-U.S.) Grade 2.  
Unirex EP Grease (ESSO-Canada, Mobil-U.S.) Grade 0.

**Fuel Specifications**

Fuel: N°. 2 Diesel

Put the machine in the SERVICE POSITION

**UNITS OF MEASUREMENT**

The new SI units have been used in this Instruction Manual. Previously used units are given within brackets.

The new units used are as follows:

Power is stated in kW (kilowatt) , hp (horse power)

Torque is stated in N.m (newton meter) , lbf. ft (pound force foot)

Force is stated N (newton) ,lbf (pound force)

Pressure of liquids and gases are stated in kPa (kilo Pascal) , MPa (mega Pascal) , PSI (pounds per square inch)

**CAPACITIES (F66 Machines)**

	LITERS	GALLONS
Engine Crankcase .....	16	4.4
Cooling System .....	45	12
Transmission/Converter/Winch System .....	40	10.5
Differential – Front .....	7	1.5
Differential – Rear .....	12	2.6
Planetary Hubs – Front .....	5	1.1
Planetary Hub – Rear .....	9	2.0
Fuel Tank .....	182	48
Hydraulic System – Cable Skidder .....	73	19
Hydraulic System – A-Frame Arch Grapple .....	78	21
Hydraulic System – Parallelogram .....	87	23
Windshield Washer Reservoir .....	10	2.6

**MACHINE WEIGHTS (Cable Skidder)**

Front Axle .....	6775 kg (14936 lb)
Rear Axle .....	3072 kg (6773 lb)
Total .....	9847 kg (21709 lb)

**MACHINE WEIGHTS (A-Frame Arch Grapple Skidder)**

Front Axle .....	5552 kg (12240 lb)
Rear Axle .....	4717 kg (10400 lb)
Total .....	10269 kg (22640 lb)

**MACHINE WEIGHTS (Parallelogram Grapple Skidder)**

Front Axle .....	5534 kg (12200 lb)
Rear Axle .....	5688 kg (12540 lb)
Total .....	11222 kg (24700 lb)

**TRAVELING SPEEDS**

23.1–26 Tires .....	km/h .....	mile/h
1st Gear .....	6.0 .....	3.7
2nd Gear .....	10.9 .....	6.8
3rd Gear .....	21.6 .....	13.4

**NOTE:** The weights and fluid capacities listed are approximates. Weights given are for machines with standard tires and equipment.

**Put the machine in the SERVICE POSITION**

## **ENGINE SPECIFICATION (F66 MACHINES ONLY)**

Make .....	Cummins Diesel
Model .....	6BT-5.9
Configuration .....	Inline 6 Cylinder-Turbocharged
Gross Power .....	113 kw (152 hp) @ 2500 RPM (Earlier Production)
.....	110 kw (148 hp) @ 2300 RPM (Earlier Production)
Maximum Torque @ 1500 RPM .....	576N•m (425 lbf. ft)
Bore .....	102 mm (4.02 in)
Stroke .....	120 mm (4.72 in)
Displacement .....	5.9 liter (359 cu. in)
Low Idle RPM .....	700-750
High Free Idle RPM .....	2600-2750 (Current Production)
.....	2650-2700 (Earlier Production)

## **ENGINE LUBRICATING SYSTEM**

Oil Pressure -Low Idle RPM .....	70- 207 kPa (10-30 PSI)
Oil Pressure-Operating RPM .....	207- 414 kPa (30-60 PSI)

## **ELECTRICAL**

System Voltage .....	12 Volt
Batteries .....	Two 31D Parallel
Battery Voltage .....	12 Volt
Battery Capacity .....	625 CCA
Alternator Rating .....	1765 W (63 A)
Ground .....	Negative

## **HYDRAULIC TRANSMISSION**

Make .....	Clark
Model .....	R28320
Type .....	Powershift with Forward-Reverse Modulation
Number of Forward Gears .....	3
Number of Reverse Gears .....	3

## **TORQUE CONVERTER**

Make .....	Clark
Model .....	C-273.1
Stall Torque Ratio .....	2.728:1

## **AXLES**

Make .....	Clark
Model .....	17620 Front/19640 Rear
Differential Type .....	No-Spin
Differential Ratio .....	6.333:1
Planetary Ratio .....	4.125:1
Total Ratio .....	26.125:1

Put the machine in the SERVICE POSITION

**BRAKE SYSTEM**

Service Brake, Type ..... Enclosed Wet Disc, Transmission Mounted  
Secondary Brake, Type ..... Caliper Disc, Front Drive Axle Mounted  
Parking Brake, Type ..... Transmission Brake Mechanically Applied

**HYDRAULIC SYSTEM**

Pump ..... Gear Type  
Pump Capacity ..... 106 l/min (28 gal/min) @ 2000 RPM (Current Production)  
..... 90 l/min (23.8 gal/min) @ 2000 RPM (Earlier Production)  
Cylinders— Steer Blade ..... Double Acting, 90 mm (3.5 in) diameter  
Cylinder— Arch, Boom  
Grapple (A— Frame Arch) ..... Double Acting, 102 mm (4 in) diameter  
Cylinder— Grapple (Parallelogram) ..... Double Acting, 152 mm (6 in) diameter  
Main Relief Pressure ..... 14.5– 15.2 MPa (2100 – 2200 PSI)



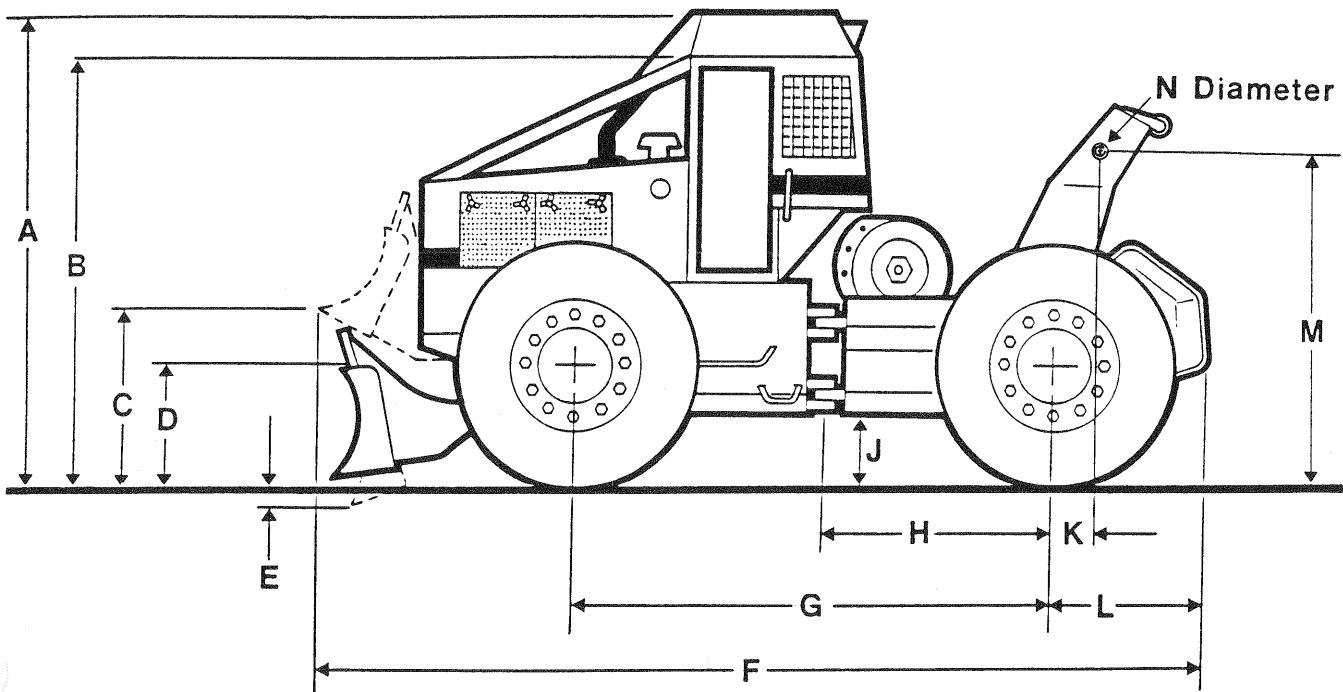
**Put the machine in the SERVICE POSITION**

**MACHINE DIMENSION (F66 Cable Skidder)**

The following machine specifications are provided for your convenience. All specifications are approximate and are subject to change without notice or obligation.

Turning Radius ..... 5435 mm (17 ft 8 in)      Track, Front & Rear ..... 2134 mm (7 ft)  
Width Over Tires ..... 2758 mm (9 ft 0 in)      Blade Width ..... 2134 mm (7 ft)

TIRES		A	B	C	D	E	F	G	H	J	K	L	M	N
18.4-34	mm	3221	2968	1313	597	277	6248	3264	1638	508	475	1016	2166	218
	ft in	10'7"	9'9"	4'4"	2'0"	0'11"	20'6"	10'9"	5'5"	1'8"	1'7"	3'4"	7'1"	0'9"
23.1-26	mm	3124	2895	1254	597	335	6248	3264	1638	450	475	1016	2108	218
STD	ft in	10'3"	9'6"	4'1"	2'0"	1'1"	20'6"	10'9"	5'5"	1'6"	1'7"	3'4"	6'11"	0'9"
24.5-32	mm	3254	3000	1360	597	231	6248	3264	1638	554	475	1016	2212	218
	ft in	10'8"	9'10"	4'6"	2'0"	0'9"	20'6"	10'9"	5'5"	1'10"	1'7"	3'4"	7'3"	0'9"
28L-26	mm	3188	2934	1280	597	310	6248	3264	1638	475	475	1016	2134	218
	ft in	10'6"	9'8"	4'2"	2'0"	1'0"	20'6"	10'9"	5'5"	1'7"	1'7"	3'4"	7'0"	0'9"
30.5L-32	mm	3284	3030	1377	597	213	6248	3264	1638	572	475	1016	2230	218
	ft in	10'9"	10'0"	4'6"	2'0"	0'8"	20'6"	10'9"	5'5"	1'11"	1'7"	3'4"	7'4"	0'9"



SP-10574

# 100 SPECIFICATIONS

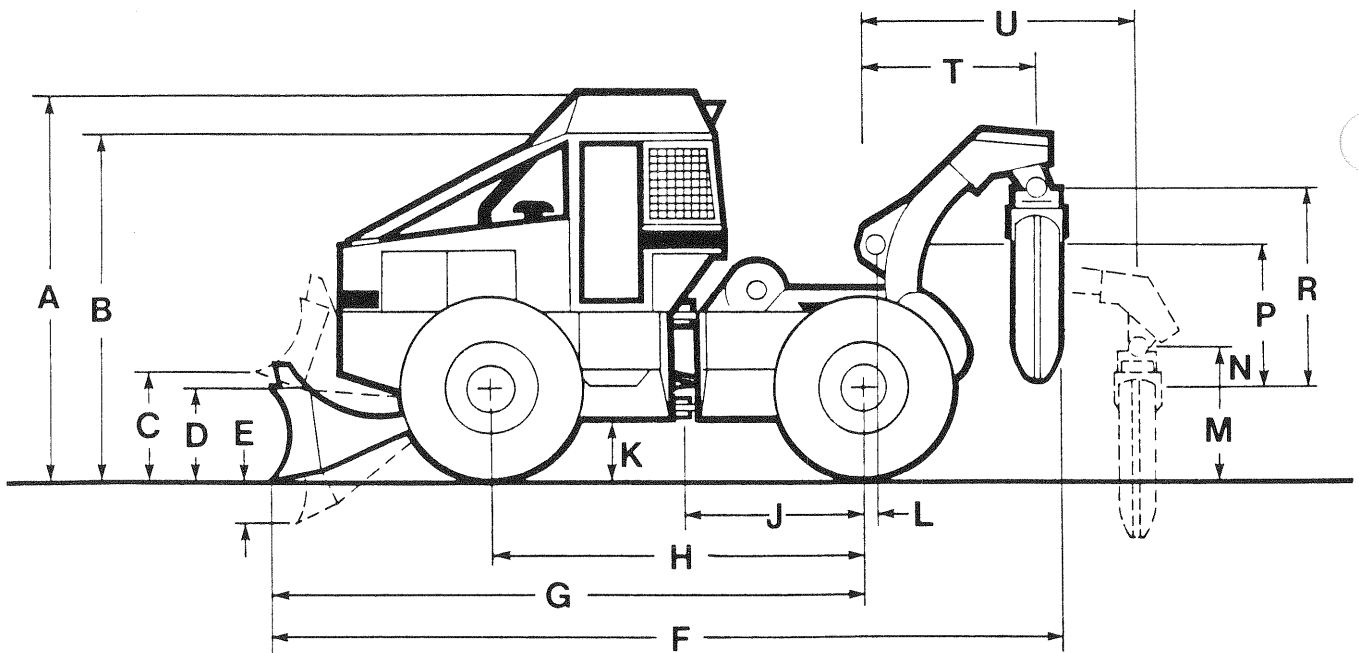
Put the machine in the SERVICE POSITION

## MACHINE DIMENSIONS (F66 A-FRAME ARCH Grapple Skidder)

The following machine specifications are provided for your convenience. All specifications are approximate and are subject to change without notice or obligation.

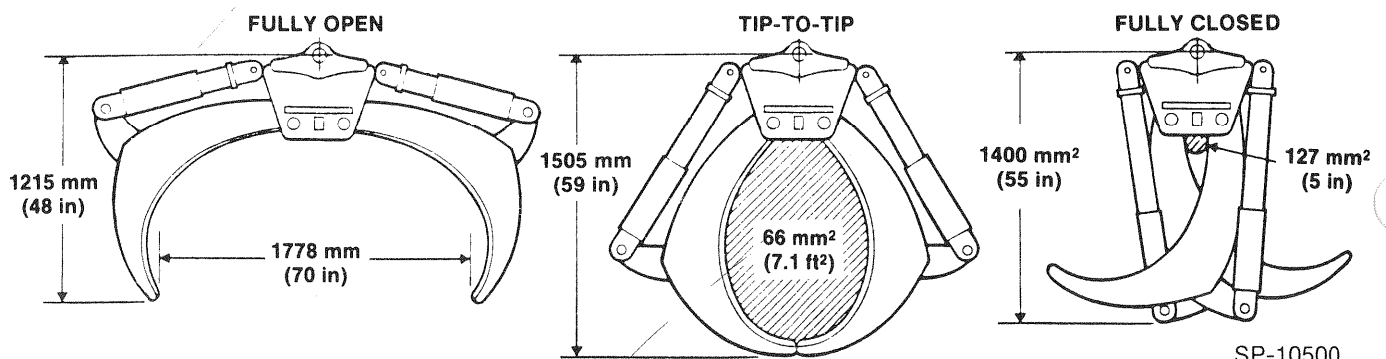
Turning Radius ..... 5160 mm (18 ft 2 in)      Track, Front & Rear ..... 2134 mm (7 ft )  
 Width Over Tires ..... 2762 mm (9 ft 11 in)      Blade Width ..... 2134 mm (7 ft)

TIRES	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U
24.5-32 mm STD ft in	3228 10'7"	2987 9'10"	1255 4'1"	597 2'0"	239 0'9"	5476 18'0"	3505 11'6"	1880 6'2"	546 1'9"	869 2'10"	1298 4'3"	127 0'5"	1298 4'3"	2580 8'6"	1206 3'11"	1320 4'4"	2332 7'8"	2847 9'4"
28L-26 mm ft in	3170 10'5"	2929 9'7"	1196 3'11"	597 2'0"	180 0'7"	5476 18'0"	3505 11'6"	1880 6'2"	488 1'7"	765 2'6"	1298 4'3"	127 0'5"	1298 4'3"	2580 8'6"	1206 3'11"	1320 4'4"	2332 7'8"	2847 9'4"
30.5L-32 mm ft in	3272 10'9"	3030 10'0"	1298 4'3"	597 2'0"	196 0'8"	5476 18'0"	3505 11'6"	1880 6'2"	589 1'11"	886 2'11"	1298 4'3"	127 0'5"	1298 4'3"	2580 8'6"	1206 3'11"	1320 4'4"	2332 7'8"	2847 9'4"



SP-10575

## LOG GRAPPLE



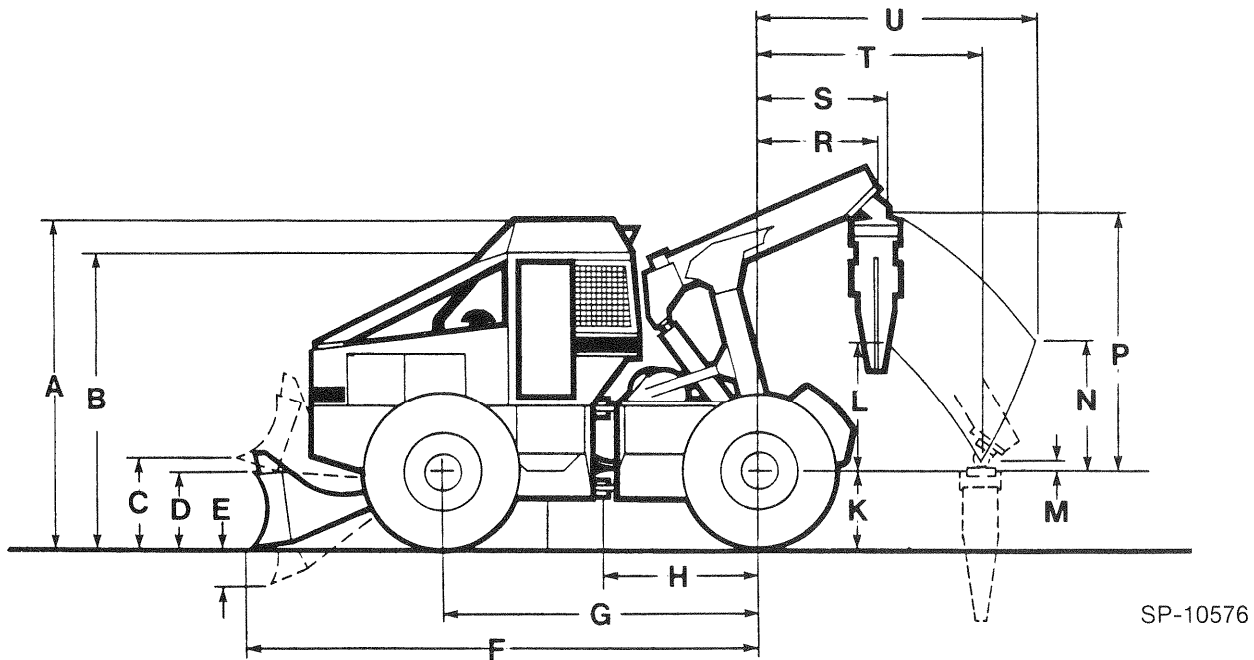
SP-10500

Put the machine in the SERVICE POSITION

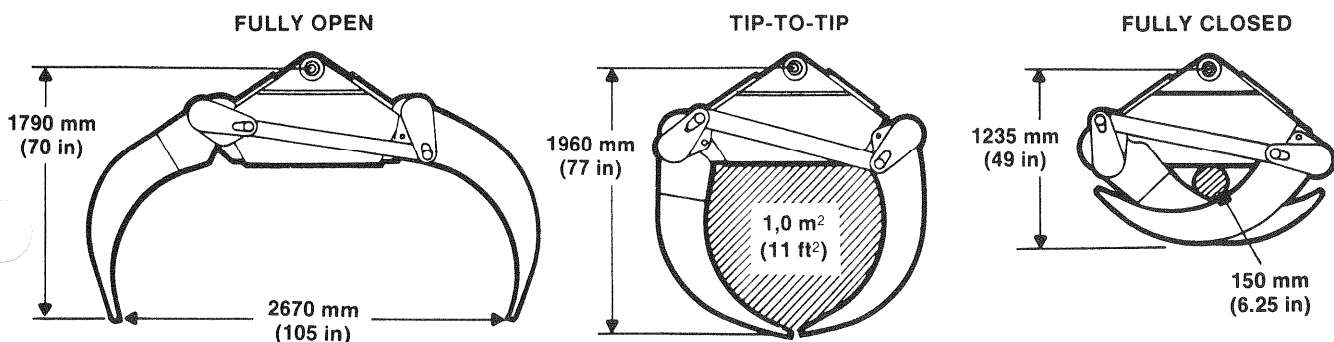
# **MACHINE DIMENSIONS (F66 Parallelogram Grapple Skidder)**

The following machine specifications are provided for your convenience. All specifications are approximate and are subject to change without notice or obligation.

TIRES	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U
24.5-32 mm	3228	2987	1255	597	239	5476	3505	1880	546	869	1298	127	1298	2580	1206	1320	2332	2847
STD ft in	10'7"	9'10"	4'1"	2'0"	0'9"	18'0"	11'6"	6'2"	1'9"	2'10"	4'3"	0'5"	4'3"	8'6"	3'11"	4'4"	7'8"	9'4"
28L-26 mm	3170	2929	1196	597	180	5476	3505	1880	488	765	1298	127	1298	2580	1206	1320	2332	2847
ft in	10'5"	9'7"	3'11"	2'0"	0'7"	18'0"	11'6"	6'2"	1'7"	2'6"	4'3"	0'5"	4'3"	8'6"	3'11"	4'4"	7'8"	9'4"
30.5L-32 mm	3272	3030	1298	597	196	5476	3505	1880	589	886	1298	127	1298	2580	1206	1320	2332	2847
ft in	10'9"	10'0"	4'3"	2'0"	0'8"	18'0"	11'6"	6'2"	1'11"	2'11"	4'3"	0'5"	4'3"	8'6"	3'11"	4'4"	7'8"	9'4"



## **LOG GRAPPLE**



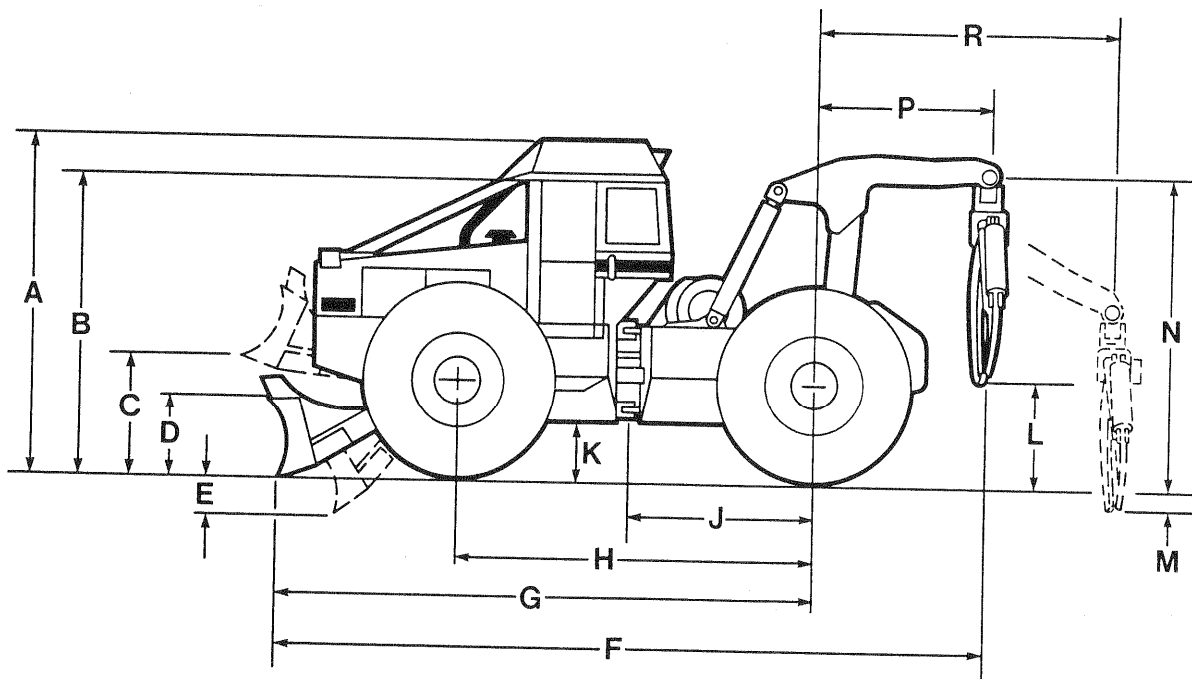
SP-10577

## 102 SPECIFICATIONS

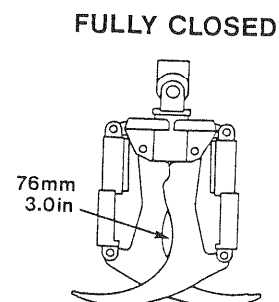
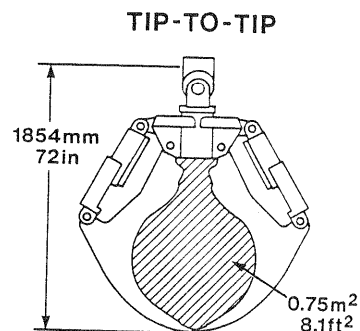
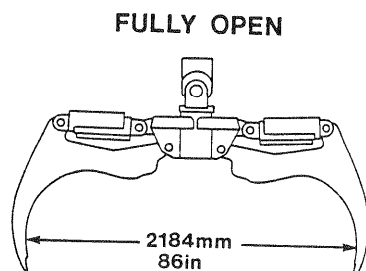
Put the machine in the SERVICE POSITION

### MACHINE DIMENSIONS (F66 ESCO HI-VIS Grapple Skidder)

The following machine specifications are provided for your convenience. All specifications are approximate and are subject to change without notice or obligation.



RP-10890



RP-10891

**Put the machine in the SERVICE POSITION**

**UNITS OF MEASUREMENT**

The new SI units have been used in this Instruction Manual. Previously used units are given within brackets.

The new units used are as follows:

Power is stated in kW (kilowatt) , hp (horse power)

Torque is stated in N.m (newton meter) , lbf. ft (pound force foot)

Force is stated N (newton) , lbf (pound force)

Pressure of liquids and gases are stated in kPa (kilo Pascal) , MPa (mega Pascal) , PSI (pounds per square inch)

<b>CAPACITIES (F67 Machines)</b>	<b>LITERS</b>	<b>GALLONS</b>
Engine Crankcase .....	14	3.8
Cooling System .....	47	12.5
Transmission/Converter/Winch System .....	40	10.5
Differential – Front Cable/Grapple .....	12	3.3
Differential – Rear Grapple .....	16	4.4
Planetary Hubs .....	9	2.4
Fuel Tank–Cable Skidder .....	182	48
Fuel Tank–Parallelogram Grapple Skidder .....	254	67
Midmount Brake Housing .....	10	2.6
Hydraulic System – Cable Skidder .....	73	19
Hydraulic System – Parallelogram Grapple Skidder .....	87	23
Windshield Washer Reservoir .....	10	2.6

**MACHINE WEIGHTS (Cable Skidder)**

Front Axle .....	6775 kg (14936 lb)
Rear Axle .....	3072 kg (6773 lb)
Total .....	9847 kg (21709 lb)

**MACHINE WEIGHTS (Parallelogram Grapple Skidder)**

Front Axle .....	5534 kg (12200 lb)
Rear Axle .....	5688 kg (12540 lb)
Total .....	11222 kg (24700 lb)

**TRAVELING SPEEDS**

23.1–26 Tires .....	km/h	mile/h
1st Gear .....	6.0	3.7
2nd Gear .....	10.9	6.8
3rd Gear .....	21.6	13.4

**NOTE:** *The weights and fluid capacities listed are approximates. Weights given are for machines with standard tires and equipment.*

## 104 SPECIFICATIONS

Put the machine in the SERVICE POSITION

### ENGINE SPECIFICATION (F67 MACHINES ONLY)

Make .....	Cummins Diesel
Model .....	6BTA-5.9
Configuration .....	Inline 6 Cylinder-Turbocharged Aftercooled
Gross Power @ 2500 RPM .....	132 kw (177 hp)
Maximum Torque @ 1500 RPM .....	605 N•m (447 lbf. ft)
Bore .....	102mm (4.02 in)
Stroke .....	120mm (4.72 in)
Displacement .....	5.9 liter (359 cu. in)
Low Idle RPM .....	675-725
High Free Idle RPM .....	2500-2750

### ENGINE LUBRICATING SYSTEM

Oil Pressure -Low Idle RPM .....	70- 207 kPa (10-30 PSI)
Oil Pressure-Operating RPM .....	207- 414 kPa (30-60 PSI)

### ELECTRICAL

System Voltage .....	12 Volt
Batteries .....	Two 31D Parallel
Battery Voltage .....	12 Volt
Battery Capacity .....	625 CCA
Alternator Rating .....	1765 W (63 A)
Ground .....	Negative

### HYDRAULIC TRANSMISSION

Make .....	Clark
Model .....	R28320
Type .....	Powershift with Forward-Reverse Modulation
Number of Forward Gears .....	3
Number of Reverse Gears .....	3

### TORQUE CONVERTER

Make .....	Clark
Model .....	C-273.1
Stall Torque Ratio .....	2.728:1

### AXLES

Make .....	Clark
Model .....	Front/ 33640 Rear
Differential Type .....	No-Spin
Differential Ratio .....	6.333:1
Planetary Ratio .....	4.125:1
Total Ratio .....	26.125:1

**Put the machine in the SERVICE POSITION**

## **BRAKE SYSTEM**

Service Brake, Type .....	Enclosed Wet Disc, Transmission Mounted and
.....	Enclosed Wet Disc, Rear Frame Mounted
Secondary Brake, Type .....	Split system, hydraulically actuated by the service
.....	brake pedal.
Parking Brake, Type .....	Transmission Brake Mechanically Applied

## **HYDRAULIC SYSTEM**

Pump .....	Gear Type
Pump Capacity .....	106 l/min (28 gal/min) @ 2000 RPM (Current Production)
.....	90 l/min (23.8 gal/min) @ 2000 RPM (Earlier Production)
Cylinders— Steer Blade .....	Double Acting, 90 mm (3.5 in) diameter
Cylinder— Arch, Boom	
Grapple (A— Frame Arch) .....	Double Acting, 102 mm (4 in) diameter
Cylinder— Grapple (Parallelogram) .....	Double Acting, 152 mm (6 in) diameter
Main Relief Pressure .....	14.5– 15.2 MPa (2100 – 2200 PSI)

## 106 SPECIFICATIONS

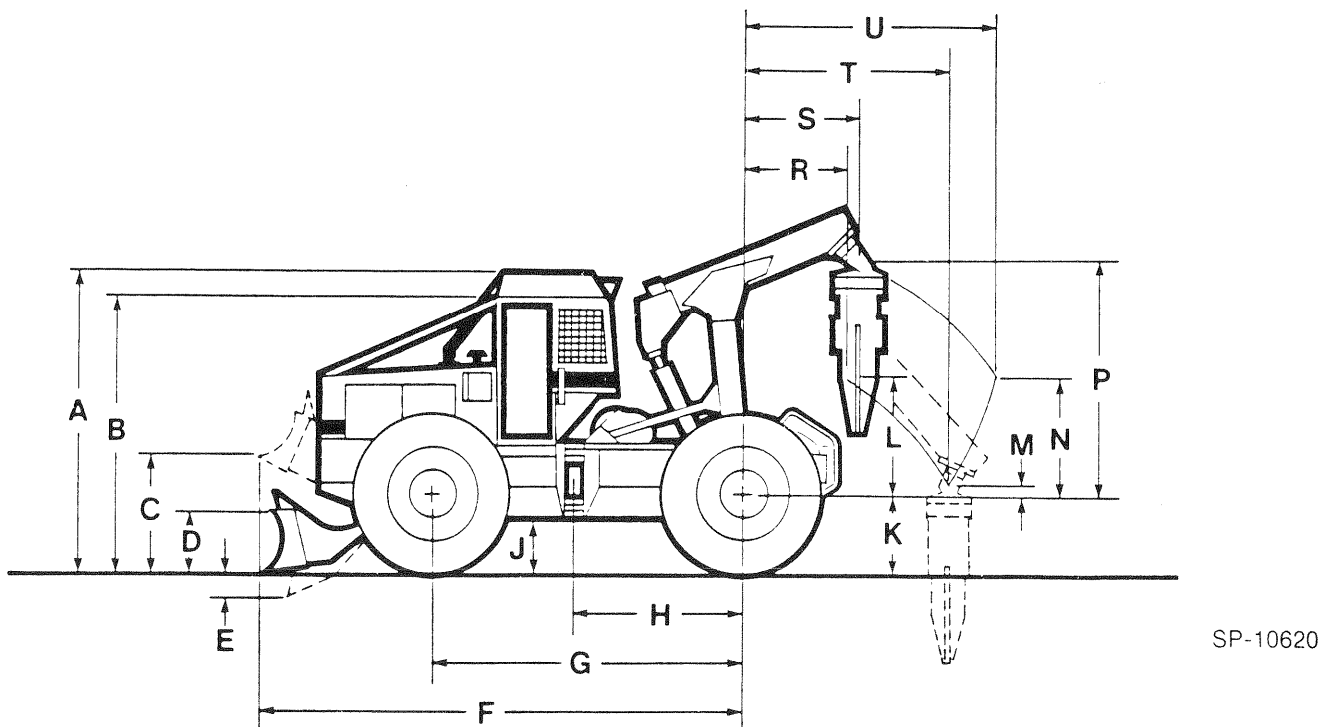
Put the machine in the SERVICE POSITION

### MACHINE DIMENSIONS (F67 Parallelogram Grapple Skidder)

The following machine specifications are provided for your convenience. All specifications are approximate and are subject to change without notice or obligation.

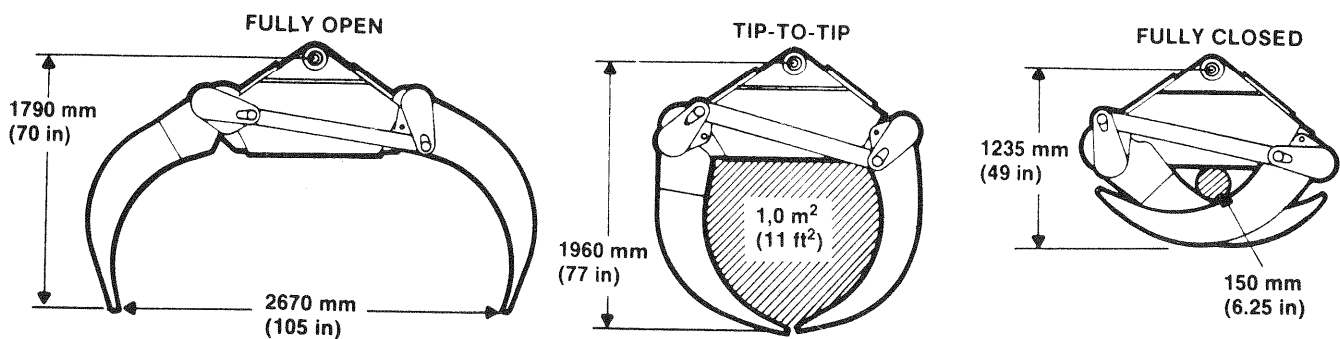
Turning Radius ..... 6159 mm (20ft 2 in)      Track, Front & Rear ..... 2349 mm (7 ft 9 in)  
Width Over Tires ..... 3048 mm (10 ft 0 in)      Blade Width ..... 2134 mm (7 ft)

TIRES	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U
24.5-32 mm STD ft in	3228 10'7"	2987 9'10"	1255 4'1"	597 2'0"	239 0'9"	5476 18'0"	3505 11'6"	1880 6'2"	540 1'9"	823 2'8"	1298 4'3"	127 0'5"	1298 4'3"	2580 8'6"	1206 3'11"	1320 4'4"	2332 7'8"	2847 9'4"
28L-26 mm ft in	3170 10'5"	2929 9'7"	1196 3'11"	597 2'0"	180 0'7"	5476 18'0"	3505 11'6"	1880 6'2"	488 1'7"	765 2'6"	1298 4'3"	127 0'5"	1298 4'3"	2580 8'6"	1206 3'11"	1320 4'4"	2332 7'8"	2847 9'4"
30.5L-32 mm ft in	3272 10'9"	3030 10'0"	1298 4'3"	597 2'0"	196 0'8"	5476 18'0"	3505 11'6"	1880 6'2"	589 1'11"	886 2'11"	1298 4'3"	127 0'5"	1298 4'3"	2580 8'6"	1206 3'11"	1320 4'4"	2332 7'8"	2847 9'4"



SP-10620

### LOG GRAPPLE



SP-10577



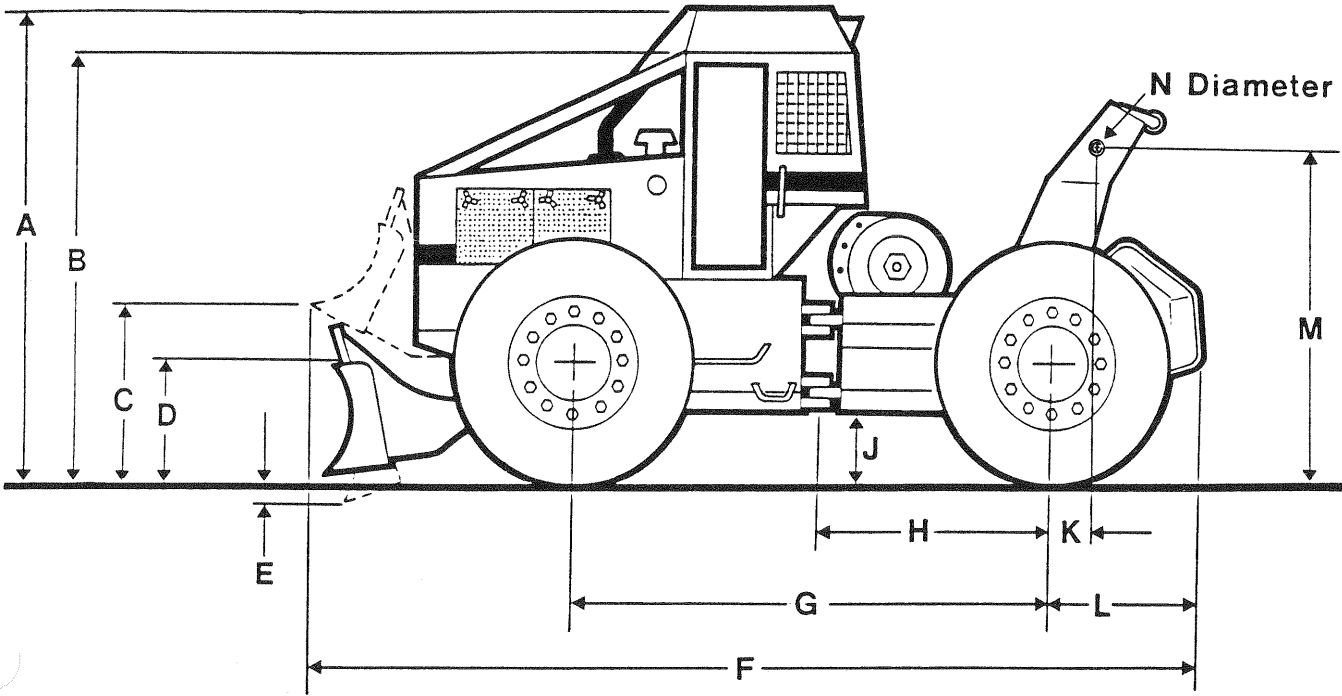
Put the machine in the SERVICE POSITION

MACHINE DIMENSION (F67 Cable Skidder)

The following machine specifications are provided for your convenience. All specifications are approximate and are subject to change without notice or obligation.

Turning Radius ..... 5490 mm (18 ft 0 in)      Track, Front & Rear ..... 2182 mm (7 ft 2 in)  
Width Over Tires ..... 2817 mm (9 ft 2 in)      Blade Width ..... 2134 mm ( 7 ft)

TIRES		A	B	C	D	E	F	G	H	J	K	L	M	N
18.4-34	mm	3221	2968	1313	597	277	6248	3264	1638	508	475	1016	2166	218
	ft in	10'7"	9'9"	4'4"	2'0"	0'11"	20'6"	10'9"	5'5"	1'8"	1'7"	3'4"	7'1"	0'9"
23.1-26	mm	3124	2895	1254	597	335	6248	3264	1638	450	475	1016	2108	218
STD	ft in	10'3"	9'6"	4'1"	2'0"	1'1"	20'6"	10'9"	5'5"	1'6"	1'7"	3'4"	6'11"	0'9"
24.5-32	mm	3254	3000	1360	597	231	6248	3264	1638	554	475	1016	2212	218
	ft in	10'8"	9'10"	4'6"	2'0"	0'9"	20'6"	10'9"	5'5"	1'10"	1'7"	3'4"	7'3"	0'9"
28L-26	mm	3188	2934	1280	597	310	6248	3264	1638	475	475	1016	2134	218
	ft in	10'6"	9'8"	4'2"	2'0"	1'0"	20'6"	10'9"	5'5"	1'7"	1'7"	3'4"	7'0"	0'9"
30.5L-32	mm	3284	3030	1377	597	213	6248	3264	1638	572	475	1016	2230	218
	ft in	10'9"	10'0"	4'6"	2'0"	0'8"	20'6"	10'9"	5'5"	1'11"	1'7"	3'4"	7'4"	0'9"



## 108 SPECIFICATIONS

Put the machine in the SERVICE POSITION

### MACHINE DIMENSIONS (F67 ESCO HI-VIS Grapple Skidder)

The following machine specifications are provided for your convenience. All specifications are approximate and are subject to change without notice or obligation.

TIRES		A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U
24.5-32 mm		3228	2987	1255	597	239	5476	3505	1880	546	869	1298	127	1298	2580	1206	1320	2332	2847
STD	ft in	10'7"	9'10"	4'1"	2'0"	0'9"	18'0"	11'6"	6'2"	1'9"	2'10"	4'3"	0'5"	4'3"	8'6"	3'11"	4'4"	7'8"	9'4"
28L-26 mm		3170	2929	1196	597	180	5476	3505	1880	488	765	1298	127	1298	2580	1206	1320	2332	2847
	ft in	10'5"	9'7"	3'11"	2'0"	0'7"	18'0"	11'6"	6'2"	1'7"	2'6"	4'3"	0'5"	4'3"	8'6"	3'11"	4'4"	7'8"	9'4"
30.5L-32 mm		3272	3030	1298	597	196	5476	3505	1880	589	886	1298	127	1298	2580	1206	1320	2332	2847
	ft in	10'9"	10'0"	4'3"	2'0"	0'8"	18'0"	11'6"	6'2"	1'11"	2'11"	4'3"	0'5"	4'3"	8'6"	3'11"	4'4"	7'8"	9'4"

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**Put the machine in the SERVICE POSITION****TIRE PRESSURES –kPa (PSI) F66 & F67**

<b>TIRE SIZE</b>	<b>PLY RATING</b>	<b>MINIMUM</b>	<b>MAXIMUM</b>
18.4-34	10	105 (15)	170 (25)
<b>23.1-26*</b>	10	105 (15)	140 (20)
23.1-26	14	105 (15)	205 (30)
<b>24.5-32**</b>	12	105 (15)	170 (25)
24.5-32	16	105 (15)	205 (30)
28L-26	10	105 (15)	140 (20)
28L-26	14	105 (15)	170 (25)
28L-26	18	105 (15)	205 (30)
30.5L-32	12	105 (15)	140 (20)
30.5L-32	16	105 (15)	170 (25)

\*Standard F66 Cable and Grapple. Standard F67 Cable.

\*\*Standard F67 Grapple.

# 110 SPECIFICATIONS

Put the machine in the SERVICE POSITION

## BOLT TORQUE CHART - GENERAL

*Note: Use this chart only if the torque is not shown on the BOLT TORQUE CHART APPLICATION.*

Thread Diameter		GRADE 5 Coarse Fine Thread		Grade 8 Coarse Fine Thread		Socket Head and 12 Point Head Capscrew— Coarse and Fine Thread	
Fraction	Decimal	N•m	lbf. ft	N•m	lbf. ft	N•m	lbf. ft
1/4	0.2500	10	7	12-14	9-10	15-16	11-12
5/16	0.3125	20-22	15-16	24-27	18-20	31-34	23-25
3/8	0.3750	34-38	25-28	50-55	34-40	60-65	45-50
7/16	0.4375	55-60	40-45	80-90	60-65	95-100	70-75
1/2	0.5000	90-95	65-70	125-135	90-100	150-160	110-120
9/16	0.5625	125-135	90-100	170-190	125-140	205-225	150-165
5/8	0.6250	170-190	125-140	240-255	175-190	285-310	210-230
3/4	0.7500	300-330	220-245	405-445	300-330	490-540	360-400
7/8	0.8750	450-490	330-360	645-710	475-525	815-880	600-650
1 in	1.0000	645-710	475-525	985-1085	725-800	1220-1355	900-1000
1-1/8	1.1250	800-975	650-720	1425-1595	1050-1175	1760-1965	1300-1450
1-1/4	1.2500	1220-1355	900-1000	2000-2205	1475-1625	2510-2710	1850-2000
1-3/8	1.3750	1630-1830	1200-1350	2710-2980	2000-2200	3320-3660	2450-2700
1-1/2	1.5000	2035-2235	1500-1650	3523-3865	2600-2850	4270-4680	3150-3450
1-5/8	1.6250	2710-2980	2000-2200	4680-5150	3450-3800	5630-6240	4150-4600
1-3/4	1.7500	3390-3730	2500-2750	5830-6510	4300-4800	6910-7730	5100-5700
1-7/8	1.875	4270-4745	3150-3500	7460-8270	5500-6100	8810-9760	6500-7200
2 in	2.000	5150-5965	3800-4200	8810-9760	6500-7200	10575-11660	7800-8600

Put the machine in the SERVICE POSITION

**BOLT TORQUE CHART, APPLICATION (F66 SKIDDERS ONLY)**

	Thread	N•m.	lbf.-ft.
Converter to Engine Flywheel Housing .....	M10	55-60	40-45
Flange to Rear Shaft .....	1.000-20	339-373	250-275
Front Axle to Cradle .....	1.00-8	950-1255	700-925
Front Engine Mount to Engine .....	*M12	85-100	65-75
Front Engine Mount to Frame .....	.625-11	230-300	170-220
Front Engine mount to Support .....	.625-11	120-155	90-115
Grapple Motor Box Cover to Arch .....	.375-24	45-55	35-40
Hinge and Cradle Bushing Retaining Cap Capscrew ...	*.500-20	120-130	90-95
Hinge and Cradle End Plate to Pin Capscrew .....	*.500-20	123-130	90-95
Hinge and Cradle Pin to Frame Capscrews .....	*.500-13	110-115	80-85
Lower Driveshaft Mounting Bolts (Early F66 - 6C) ...	.375-24	45-55	35-45
Lower Driveshaft Mounting Bolts (Late F66 - 7C) ...	.500-20	120-155	90-115
Midmount Bearing Support to Frame .....	.750-10	400-515	290-380
Midmount Bearing to Support .....	.625-11	230-300	170-220
Rear Axle to Frame .....	1.000-8	950-1255	700-925
Rear Engine Mount to Engine .....	*M12	75-80	55-60
Rear Engine Mount to Frame .....	.625-11	120-155	90-115
Secondary Brake Disc to Flange .....	.437-20	74-102	55-75
Secondary Brake Head to Support .....	.625-18	230-300	170-220
Snubber Adjusting Nut .....	1.250-12	45-55	35-40
Transmission Mount to Frame .....	*.750-10	400-515	290-380
Transmission Mount to Transmission .....	.750-10	400-515	290-380
Upper Driveshaft- Winch .....	.375-24	45-55	35-45
Upper Driveshaft- Conv. ....	.375-24	45-55	35-45
Upper Driveshaft Mounting Bolts .....	.375-24	45-55	35-45
Wheel Nuts- Rim to Axle (Spherical) .....	.750-16	575-645	425-475
Wheel Nuts- Rim to Axle (Flat) .....	.750-16	407-408	300-330
Winch to Frame .....	1.250-7	1150-1355	850-1000

When you install the above mounting bolts, lubricate the threads with SAE NO.30 unless otherwise instructed.

\*When you install these mounting bolts, apply Loctite-271 or equivalent to the threads.

**BOLTS NOT LISTED ARE TO BE DRAWN UP TIGHT IN A MANNER CONSISTENT WITH GOOD WORKMANSHIP- SEE BOLT TORQUE CHART- GENERAL.**

## 112 SPECIFICATIONS

Put the machine in the SERVICE POSITION

### BOLT TORQUE CHART, APPLICATION (F67 SKIDDERS ONLY)

	Thread	N•m.	lbf.- ft
Converter to Engine Flywheel Housing . . . . .	M10	55-60	40-45
Front Axle to Cradle . . . . .	1.00-8	950-1255	700-925
Front Engine Mount to Engine . . . . .	M12	85-100	65-75
Front Engine Mount to Frame . . . . .	.625-11	230-300	170-220
Front Engine Mount to Support . . . . .	.625-11	120-155	90-115
Hinge and Cradle Bushing Retaining Cap Capscrew . . .	.500-20	120-130	90-95
Hinge and Cradle End Plate to Pin Capscrew . . . . .	.500-20	123-130	90-95
Hinge and Cradle Pin to Frame Capscrews . . . . .	.500-13	110-115	80-85
Lower Driveshaft-Mech. 7C . . . . .	.500-24	120-155	90-115
Midmount Break to Frame . . . . .	.750-10	400-515	290-380
Rear Axle to Frame . . . . .	1.000-8	950-1255	700-925
Rear Engine Mount to Engine . . . . .	M12	75-80	55-60
Rear Engine Mount to Frame . . . . .	.625-11	120-155	90-115
Snubber Adjusting Nut . . . . .	1.250-12	45-55	35-40
Transmission Mount to Frame . . . . .	.750-10	400-515	290-380
Transmission Mount to Transmission . . . . .	.750-10	400-515	290-380
Upper Driveshaft- Mech. 5C . . . . .	.375-24	45-55	35-45
Wheel Nuts- Rim to Axle (Spherical) . . . . .	.750-16	575-645	425-475
Winch to Frame . . . . .	1.250-7	1150-1355	850-1000

When you install the above mounting bolts, lubricate the threads with SAE NO.30 unless otherwise instructed.

\*When you install these mounting bolts, apply Loctite-271 or equivalent to the threads.

**BOLTS NOT LISTED ARE TO BE DRAWN UP TIGHT IN A MANNER CONSISTENT WITH GOOD WORKMANSHIP- SEE BOLT TORQUE CHART- GENERAL.**

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