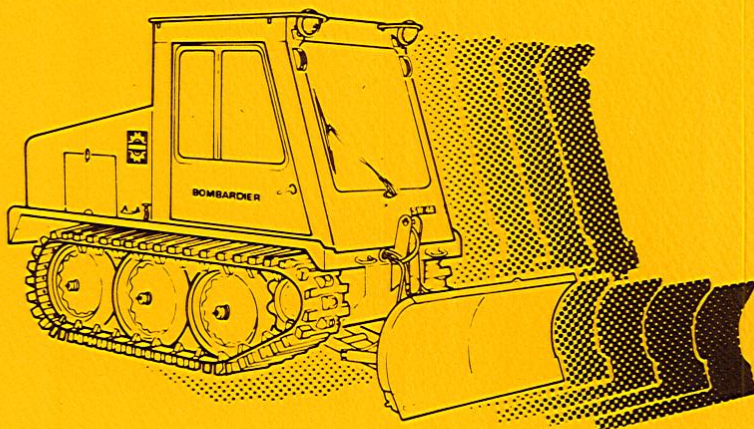




Manuel du conducteur Operator's manual

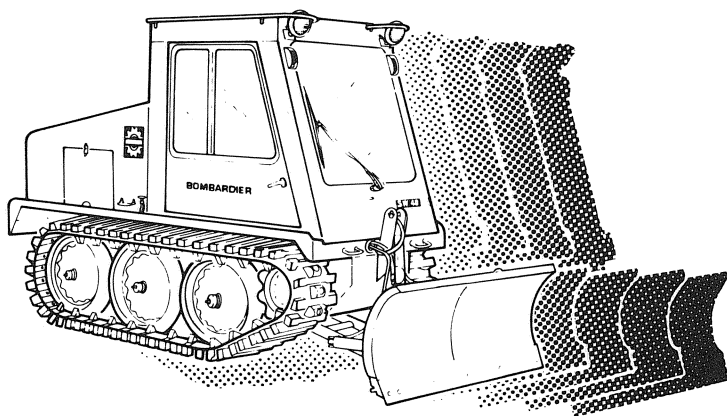
SW 48 FA





Operator's manual

SW 48 FA





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Muskeg (brush-cutter)	TF-110
Skidozer	TF-160
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B-15 (logger)	TF-300 TT
B-20 (transporter)	TF-305
B-10 (transporter)	TF-360
B-8 (transporter)	TF-600
	TF-900


FOREWORD

The operator manual has been prepared to acquaint the owner and/or operator(s) of an industrial tracked vehicle with the various controls and instruments, inspections, maintenance and safe driving instructions. Each is indispensable for the proper use of the product, and should be kept with the vehicle at all times.

This manual uses the following symbols.

 **WARNING:** Identifies an instruction which, if not followed, could cause personal injury.

 **CAUTION:** Denotes an instruction which, if not followed, could severely damage vehicle components.

 **NOTE:** Indicates supplementary information needed to fully complete an instruction.

Although the mere reading of such information does not eliminate the hazard, your understanding of the information will promote its correct use.

Most specifications are given in both metric and customary units. Where precise accuracy is not required, some conversions are rounded to even numbers for easier use.

SAFETY IN MAINTENANCE

Observe the following precautions

- The vehicle must be operated only by a qualified operator.
- Visually inspect vehicle before operation.
- Maintain your vehicle in top mechanical condition.
- Do not operate the vehicle and the equipment beyond its rated capacity.
- Do not remove radiator cap when engine is hot.
- Never perform lubrication, adjustments or repairs on a vehicle in operation.
- Fuel is flammable and explosive under certain conditions. Always manipulate in a well ventilated area. Do not smoke or allow open flames or sparks in the vicinity, if fuel fumes are noticed while driving, the cause should be determined and corrected without delay.
- Clean and check operation of the lighting equipment.
- Provide adequate identification with lights and flashers.
- Maintain good visibility.
- Never run the engine with hood raised.
- Seat and seat belts must be adjusted so the operator may reach the controls easily.
- Correctly secure doors and windows when operating.
- Do not operate vehicle when by-standing one in the vicinity.
- Frequently, check the instrument panel. Do not operate when dials indicate malfunction.
- Never leave the engine running while unattended.
- Operate at moderate speed.
- Avoid harsh and abusive operation.
- Check, avoid or remove any obstacle that may cause harm.
- Do not make sharp turns at high speed.
- Drop-offs, must be negotiated slowly and approached from a standstill when possible.
- Snow covered terrain could conceal dangerous obstacles. Proceed slowly and with caution.
- Never attempt "jumping" the vehicle over ditches hill crests or dropoffs. Injury and/or mechanical damage may result.

-
- Never cross a frozen body of water unless absolutely sure the ice is thick enough to support vehicle weight.
 - Unless the vehicle can safely descend as well as ascend a slope, or an alternate descent path is known, do not attempt a climb.
 - Small obstacles on steep slopes should always be considered a hazard.
 - Avoid stepping on the track to mount vehicle.
 - Never put vehicle into reverse while is moving forward.
 - Only perform procedures as detailed in this manual. Unless otherwise specified, engine should be turned off for all lubrication and maintenance procedures.
 - Should removal of a nylon lock nut be required when undergoing repairs/disassembly always replace by new one. Tighten as specified.

PLEASE READ AND UNDERSTAND ALL WARNINGS AND CAUTIONS IN THIS MANUAL AND ON THE VEHICLE.

THIS MANUAL SHOULD REMAIN WITH THE VEHICLE AT TIME OF RESALE.

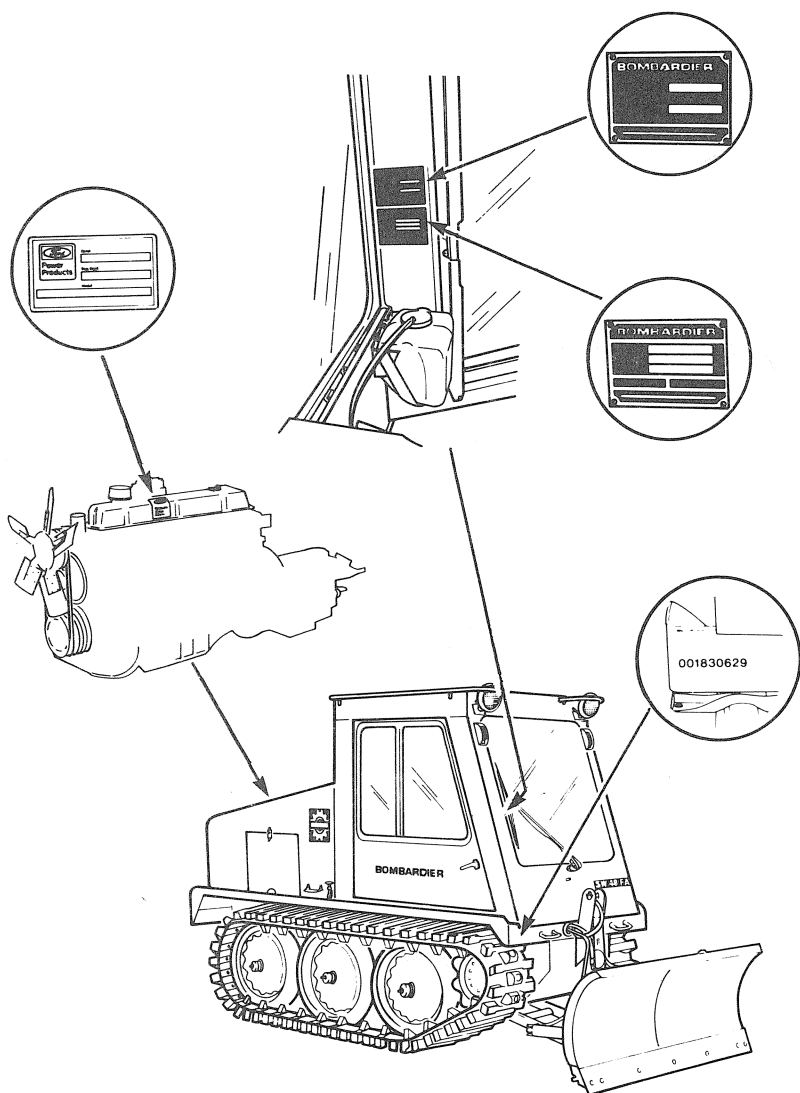
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VEHICLE IDENTIFICATION _____

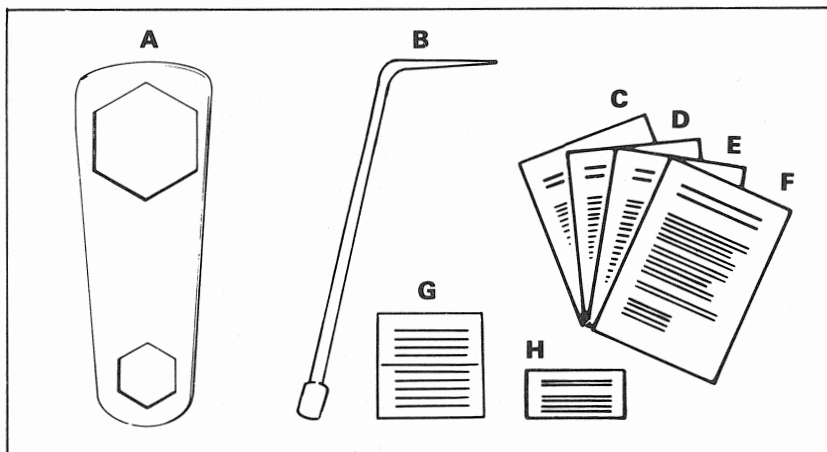
The main components of your vehicle (engine, body) are identified by different serial numbers. It may sometimes become necessary to locate these numbers for warranty purposes or to trace your vehicle in the event of theft.

NOTE: We strongly recommend that you take note of all the serial numbers on your vehicle and supply them to your insurance company. It will surely help in the event a vehicle is lost or stolen.



TOOLS & LITERATURE

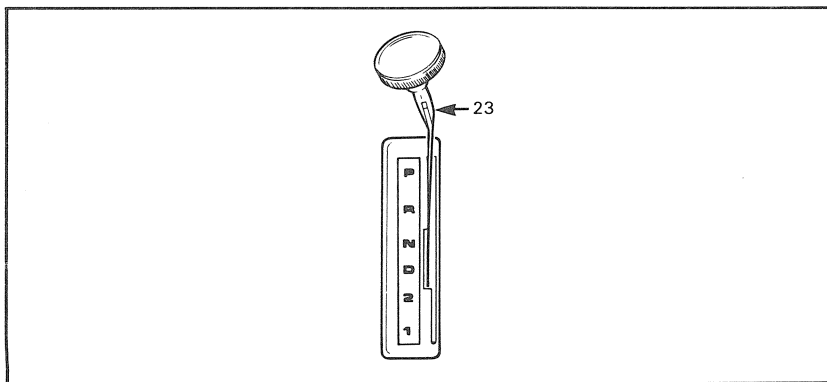
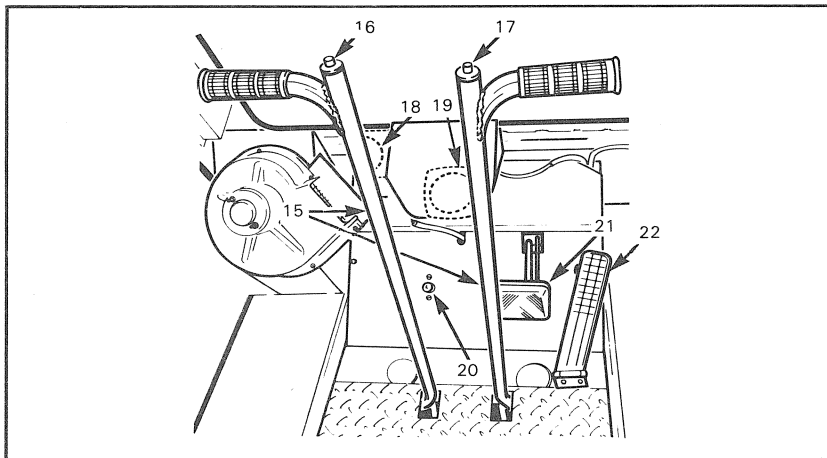
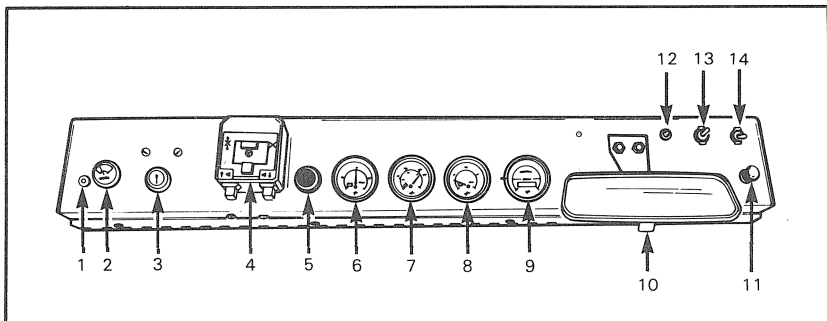
As standard equipment, each new vehicle is supplied with a basic tool kit and literature.

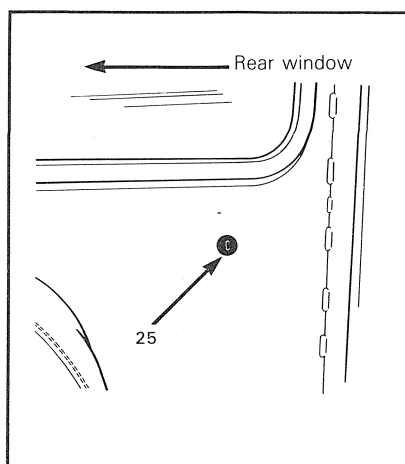
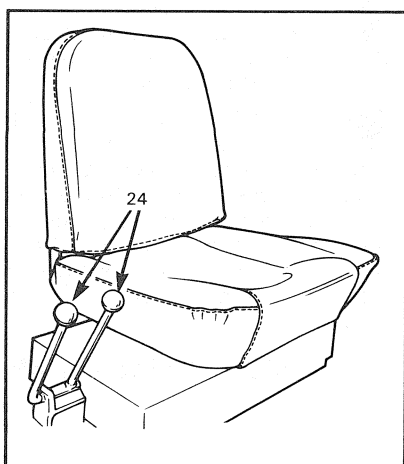


- A) Hub cap wrench
- B) Tensioner bleeder
- C) Operator's manual
- D) Driving guide
- E) Parts catalog
- F) "Ford" operator's manual
- G) "Ford" warranty card
- H) "Bombardier" warranty card

CONTROLS/INSTRUMENTS _____

Controls



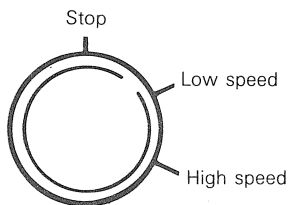


- | | |
|---|---------------------------------|
| 1. Main headlamp indicator light | 13. Light switch |
| 2. Wiper control knob | 14. Back-up light switch |
| 3. Starter switch | 15. Steering levers |
| 4. Directional signal light | 16. Horn switch |
| 5. Oil pressure warning light | 17. Windshield washer knob |
| 6. Ammeter | 18. RPM indicator |
| 7. Cooling liquid temperature indicator | 19. Speed indicator |
| 8. Fuel level indicator | 20. Main headlamp light switch |
| 9. Hour meter | 21. Emergency and parking brake |
| 10. Mirror | 22. Throttle pedal |
| 11. Heater control knob | 23. Transmission lever |
| 12. Flasher switch | 24. Blade control levers |
| | 25. Choke |

1) Main Headlamp Indicator Light

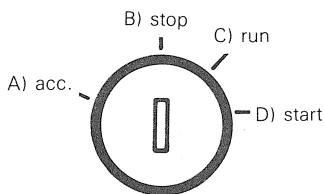
Lights up when headlamps are on main headlamp position.

2) Wiper Control Knob



Controls the wiper speed

3) Starter Switch



Four-way switch

A) Accessories position

Supplies the main lighting system.

B) "Stop" position

Stops the engine and cuts off supply power to vehicle.

C) "Run" position

Supplies the whole vehicle and the engine keeps on running at this position.

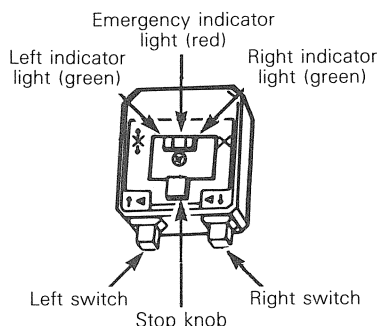
D) "Start position"

When the engine must be started, turn the key two (2) steps from the "stop" position and maintain this position. Once the engine has started, bring back the key immediately to "run" position.

▼ **CAUTION:** Never keep the key at "start" position once the engine is running because the starter could be damaged.

▼ **CAUTION:** Do not activate the starter more than thirty (30) seconds at a time so as not to cause overheating. If the engine does not start at first try, wait approximately one (1) minute before trying again. If it still does not start after four (4) tries, consult a mechanic.

4) Directional Signal Light



Push the right switch upwards to activate the right signal, and the left switch for the left signal.

Push both switches simultaneously upwards to activate the emergency signal. Stop signals by pushing on the stop button.

The indicator light corresponding to the signal will light up as the signal will be heard.

5) Oil Pressure Warning Light

This light will turn on whenever the oil pressure drops below normal. Should it go on during normal driving operation, the engine should be stopped immediately to find the cause of the low oil pressure.

6) Ammeter

Indicates whether current is flowing into or out of the battery. The ammeter will show a high charging rate when the battery is low and in need of a charge. When it is near full charge, it will show a low charging rate.

7) Cooling Liquid Temperature Indicator

Indicates the temperature of the cooling liquid inside the engine.

CAUTION: If the temperature exceeds 105°C (220°F), let the liquid cool down before operating the vehicle, or stop the engine and see a mechanic.

8) Fuel Level Indicator

Shows the approximate fuel level inside the tank.

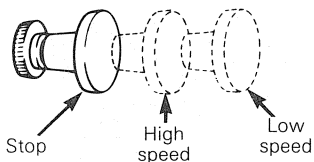
9) Hour Meter

Indicates the total number of hours of operation of the engine. It starts running as soon as the starting switch is at "run" position.

10) Mirror

Adjust the mirror to be able to see properly through the rear window.

11) Heater Control Knob

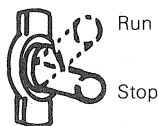


12) Flasher Switch

Push on the button to light up the flasher; push again to turn it off.

WARNING: The flasher must be on when the vehicle is working.

13) Light Switch

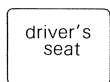
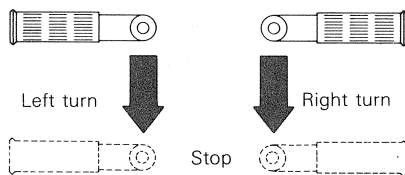


14) Back-Up Light Switch



15) Steering Levers

These control levers permit steering and stopping the vehicle.



16) Horn Switch

To activate the horn, push on the knob located on top of the left steering lever.

17) Windshield Washer Knob

To activate the windshield washer pump, push on the knob located on top of the right steering lever.

18) RPM Indicator

Indicates the number of engine RPM. (Optional).

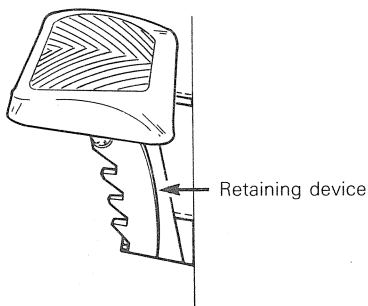
19) Speed Indicator

Indicates the forward speed of the vehicle. (Optional).

20) Main Headlamp Light Switch

Activated with the left foot, this switch controls the beam orientation upwards (high beam) or downwards (low beam).

21) Emergency and Parking Brake



Right pedal with retaining device. Press on the pedal and push on its upper part to maintain it in position (parking). Press on the lower part of the pedal to disengage the parking brake.

22) Throttle Pedal

The engine RPM increases according to the pressure applied on the throttle pedal. The engine comes back automatically to idle as soon as the pedal is released.

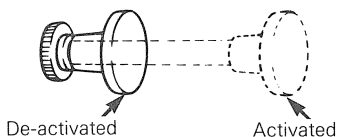
23) Transmission lever

This lever is located on the left of the driver's seat. (For transmission lever operation, see section "Driving").

24) Blade control levers

These levers are located to the right of the driver's seat. (For blade control levers operation, see section "Equipment operation").

25) Choke



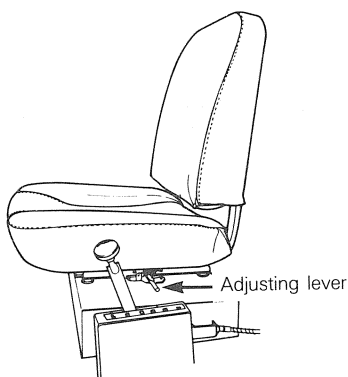
Located on the rear of the cab on the left of the driver's seat, the choke controls the opening and closing of the choke to the carburetor.

Safety Belts

◆ **WARNING:** Safety belts must be adjusted in such a way that control instruments are easy to reach by the operator.

◆ **WARNING:** In order to reduce the risk of injury, it is strongly recommended to make use of safety belts at all times.

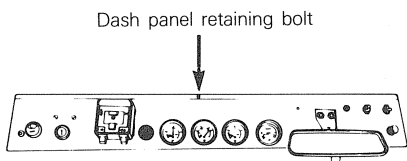
Operator's Seat



To adjust the seat, unlock the slider by pushing the adjusting lever towards front. To lock the seat in position, allow the lever to come back to its original position.

Fuse Holder

The fuse holder is located under the dash panel. To gain access to the fuse holder, completely unscrew the retaining bolt located on top of the dash and tilt the dash downwards.



Dash panel

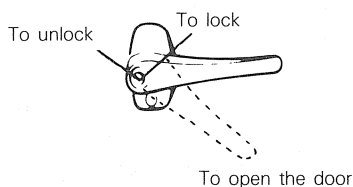
○ **NOTE:** If an instrument or an electrical device stops working, the first thing to do is to check fuses.

▼ **CAUTION:** Never replace a fuse with a stronger one since the electrical system could be seriously damaged.

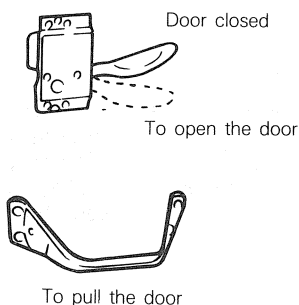
○ **NOTE:** All SW-48 fuses have a 15 amp. capacity.

Door Handles

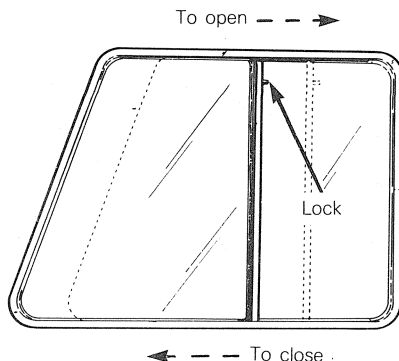
Outside



Inside



Side Windows



Before opening or closing the window, unlock it by pulling the lock downwards.

Fuel Tank Cap

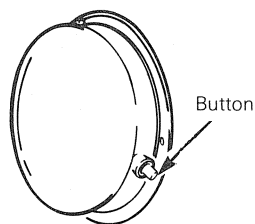
▼ **CAUTION:** Fill the tank at the end of each day of operation to help prevent moisture from collecting and freezing inside the fuel system.

◆ **WARNING:** Fuel is flammable and explosive. Always manipulate in a well ventilated area. Do not smoke.

Hood

To open, unlock both latches and lift. The hood gives access to fuel and hydraulic tanks and to the engine

Dome Lamp



Press on the button to turn on the dome lamp. Press again to turn it off.

BREAK-IN PERIOD

Break-In

A break-in period is recommended before running such a vehicle at full load. The break-in period recommended is twenty-five (25) operating hours. To facilitate break in, avoid prolonged periods of engine idling. Frequently check the instrument panel.

If coolant temperature rises above specifications (see controls/instruments section), reduce engine load or stop the engine.

If the low oil pressure indicator lamp comes on, immediately stop the engine. Locate the source of the problem and correct it before starting the engine.

PRE-OPERATION INSPECTION

Care should always be taken to assure that the vehicle is in good mechanical condition before operating it. Regular preventative maintenance and "pre-operation inspection" by each working shift will extend vehicle life and save on costly downtime. Special attention should be given to the following items.

Before Starting the Engine

Engine oil level

Open the hood to gain access to the oil gauge.

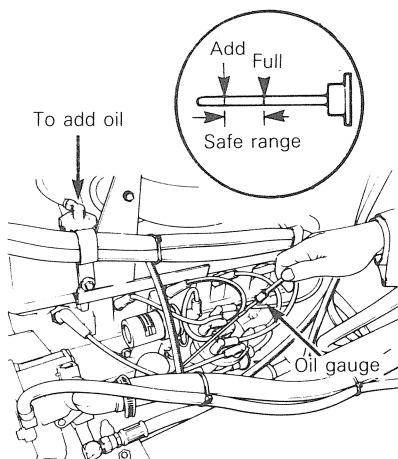
Check engine oil level with the engine cold and the vehicle on a level surface.

The oil level should be within the safe range.

25-Hour Inspection

As with any precision piece of mechanical equipment, we suggest that after the first twenty-five (25) hours of operation, that the SW-48 be checked by a trained mechanic.

The inspection is at the expense of the vehicle owner.



CAUTION: Using inferior or incorrect oil type will handicap the engine. Use only specified quality lubricants at specified intervals (see "Maintenance" section).

Coolant Level

To check the coolant level, tilt the hood.

The coolant level should reach 5 cm (2") below the filler neck.

WARNING: Place a cloth over the cap before removing it from the radiator. Turn the cap slowly to release pressure. Loss of fluid and possibility of severe burns could occur if this notice is disregarded.

The antifreeze/water mixture must protect the cooling system from freezing at -40°C (-40°F).

CAUTION: Coolant leakage on the radiator indicates that the cap does not properly pressurized the radiator or that the radiator is cracked. Ensure to correct the problem before operating the vehicle, since engine overheating will occur.

"V" belts

To gain access, tilt the hood.

Check "V" belt tension as follows:

Fan:

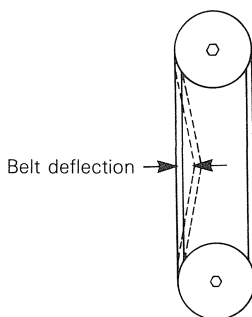
Deflection must equal 9.5 mm ($3/8''$) when a force of 2.3 kg (5 lb) is applied midway between the two pulleys.

Alternator:

Deflection must equal 4.8 mm ($3/16''$) when a force of 2.3 kg (5 lb) is applied midway between the water pump pulley and the alternator pulley.

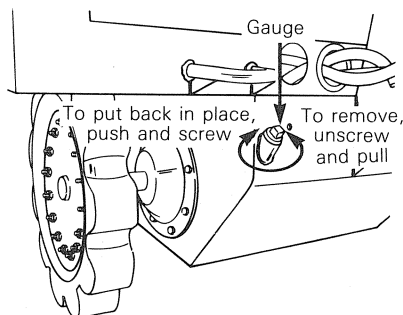
Hydraulic Pump:

Deflection must equal 7.9 mm ($5/16''$) when a force of 3.2 kg (7 lb) is applied midway between the two pulleys.



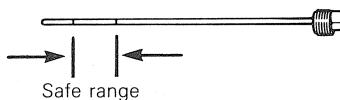
Differential oil level

The gauge is located on the front part of the frame outside the vehicle.



Check the differential oil level with the vehicle on a flat surface.

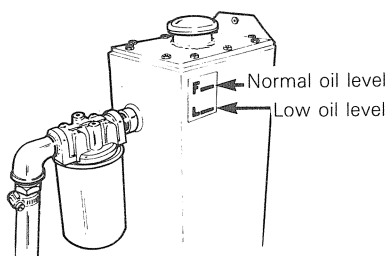
At room temperature (21°C - 70°F approx.) the oil level should be within the sage range.



Hydraulic oil level

Tilt the hood to gain access to the hydraulic tank.

At room temperature (21°C - 70°F approx.) oil should reach level "F" on the tank.



CAUTION: Avoid oil contamination (see "Hydraulic oil contamination control").

Tracks

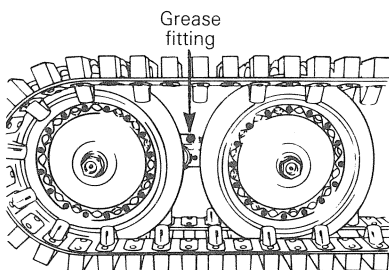
Check for any loose bolt. Torque if necessary.

Recommended torque: 27-34 N•m (20-25 lbf•ft).

Replace any damaged cross link.

Track tension is correct when the upper center part of the track cannot be lifted more than 5-7 cm (2"-3") manually.

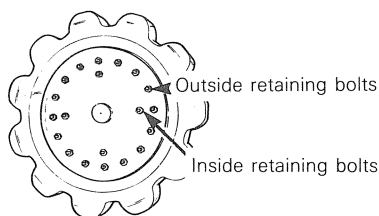
The tracks are adjusted by means of hydraulic track-tensioners located between the rear and center wheels. To tighten the tracks, inject grease by means of a grease gun, in the grease fitting of the track-tensioner. To loosen the tracks, bleed the track-tensioner by means of the bleeder tool which release grease through the grease fitting.



NOTE: When adjusting the tracks, use high quality multi-purpose grease resistant to shearing and which remains fluid under cold temperatures.

Sprockets

Check if sprocket teeth are worn and/or damaged and if retaining bolts are tight.



Recommended torque:

Outside retaining bolts (16): 27 N•m (20 lbf•ft).

Inside retaining bolts (4): 47 N•m (35 lbf•ft).

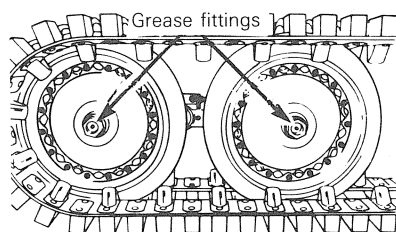
Tire air pressure

Recommended pressure: 620-690 kPa (90-100 PSI).

NOTE: Full rubber tires offered in option can be installed on the SW-48.

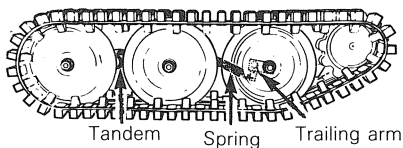
Wheel bearing and tandem cone bearing lubrication

Using the grease gun, inject grease inside the grease fitting.



Suspension

Check the condition of tandems, arms and springs.



Steering

Check the play of steering levers which should be off at least 8 cm (3").

○ NOTE: The ideal play will be between 8 and 13 cm (3" and 5")

Lighting system

Check if all lights are working properly.

Wiper

▼ CAUTION: Always make sure that nothing impedes the good operation of the wiper before turning it on. A wiper frozen to the windshield would cause its motor to overheat, thus resulting in damage.

▼ CAUTION: Avoid operating the wiper when the windshield is dry or if the wiper blade is damaged.

Check the windshield washer level and refill as necessary.

Check the operation of the wiper and the windshield washer pump.

Fuel level

Before using the vehicle, make sure that its tank contains enough fuel.

Body, doors, windows and mirror

Clean and adjust as required.

Once the Engine Has Been Started

○ NOTE: To start the engine, see section "Starting procedure".

Instrument panel

▼ CAUTION: Frequently check the instrument panel. Do not operate when dials and/or warning light indicate malfunction.

Emergency and parking brake

To check operation, see "Controls/instruments" section.

◆ WARNING: Ensure brake functions properly before operating the vehicle.

Oil, fuel, coolant and exhaust leak

▼ CAUTION: Remedy any leakage before operating the vehicle.

Engine idle and max. R.P.M.

Idle: 600 R.P.M. (transmission in "D" position).

Max. R.P.M.: 2800 R.P.M. (no load)

Hose, pipe

▼ CAUTION: Ensure to correct any leakage, cracking, wear or tear before operating the vehicle.

Heater

See "Controls/instruments" section.

Horn

See "Controls/instruments" section.

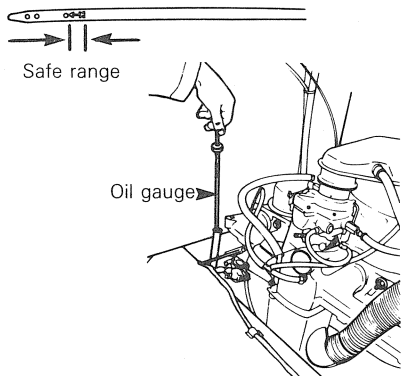
Transmission oil level


Open the hood to gain access to the oil gauge.

Put the transmission lever to parking position ("P") and let the engine idle.

○ **NOTE:** Check transmission oil level at normal operating temperature.

The oil level should be within the safe range.



Pre-operation Inspection Check List	
Before starting the engine	
Engine oil level	
Coolant level	
"V" belt tension	
Differential oil level	
Hydraulic oil level	
Track tension and crosslink	
Sprockets	
Tire pressure	
Wheel bearing and tandem cone bearing lubrication	
Suspension	
Steering lever adjustment	
Lighting system	
Wiper and windshield washer pump operation (check liquid level)	
Fuel level	
Body, doors, windows and mirror	
After engine has started	
Instrument panel	
Emergency and parking brakes	
Leaks (oil, fuel, coolant and exhaust)	
Engine idle and maximum RPM	
Hose and piping	
Heater	
Horn	
Transmission oil level	



CAUTION: Any mechanical problem must be corrected before operating the vehicle.

STARTING

◆ **WARNING:** Make sure that the parking brake is applied and that the throttle pedal is free. Also make sure that steering levers are free.

Place the transmission lever at position "N" or "P". Position "N" should be used especially under cold temperatures (-29°C/-20°F). Pull the choke; press on throttle pedal; turn the ignition key to "start" position, and bring it back immediately to "run" once the engine has started.

▼ **CAUTION:** Holding the ignition key in "start" position once the engine has started will damage the starter.

▼ **CAUTION:** Never activate the starter more than thirty (30) seconds at a time to avoid overheating. If the engine does not start at first try, wait at least one (1) minute before trying again. If it still does not start after four attempts, consult mechanic.

○ **NOTE:** Using the choke when the engine is warm is useless and may even cause damage.

Always make sure the engine has reached its normal operating temperature (82°C/180°F) before operating the vehicle.

◆ **WARNING:** All internal combustion engines give off various fumes and gases while running. Do not start or run the engine in a closed or poorly ventilated building where exhaust gases can accumulate.

DRIVING INSTRUCTIONS

Gear Shifting:

The Ford C-6 automatic transmission has 6 positions of the transmission lever:

"P" which is the park position.

"R" - Reverse.

"N" - Neutral.

"D" - Normal drive position where the vehicle starts in low gear and automatically upshifts to second and high gears as speed increases. In this position, the transmission will also downshift when the load increases sufficiently.

"2" Second gear MANUAL; there is no upshift or down-shift.

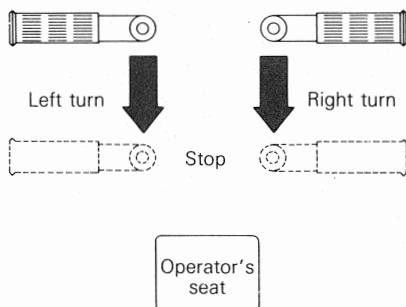
"1" Low gear MANUAL; there is no upshift: this range is designed primarily for engine braking when coming down steep hills.

Normal operation of the SW-48 is in the "D" driving range; however, should there be conditions where the transmission will downshift and upshift frequently from drive to 2nd, then the "2" position should be used. Should frequent up and down shifting between 2nd and 1st occur while operating in "D", manually select "1" position to prevent transmission damage.

Steering:

SW-48 steering is effected by means of the steering levers, through the planetary-type controlled differential. Applying the brake on one drum of the differential slows down the axle gear of that side, with a proportionate increase of the speed of the axle gear on the other side. One track running faster than the other makes the vehicle turn. With this type of differential, there is traction on both tracks, even when turning. Levers should be pulled sharply.

To slow down or to stop, pull simultaneously on both steering levers. Avoid stopping sharply.



CAUTION: Release steering levers completely when not in use for steering or braking. "Dragging" the bands will cause differential overheating and unnecessary wear of the bands.

WARNING: The foot brake is of the drum type and acts on the drive line. It is not a service brake and should be used only in case of emergency. It is a parking brake which is applied by depressing the pedal and pressing on the top part of the pedal. To release, press the bottom part of the pedal.

WARNING: When turning, too high a speed could cause the vehicle to lose its balance.

Vehicle Gradeability

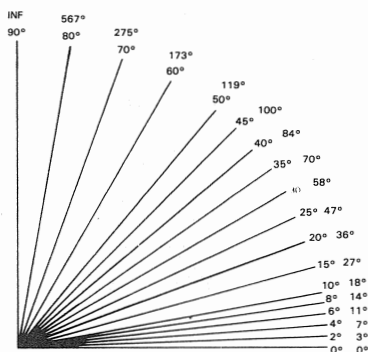
Up: 55%
Down: 55%
Side: 35%

Slope conversion chart

It is a general trade practice to discuss slope angularity in terms of percentage. For those who are not familiar with this form of measurement, the following chart converts percentage of slope into degrees of angle.

Degrees/Percentages

Percentages
Degrees



WARNING: In addition to the general operational limits shown above, the published specifications for Bombardier tracked vehicles state maximum performance limits for uphill, downhill and sidehill operations. These limits are determined with the vehicle stationary on a firm, flat surface and the extent to which they can be approached in practice will depend on the expertise of the operator and his familiarity with the vehicle.

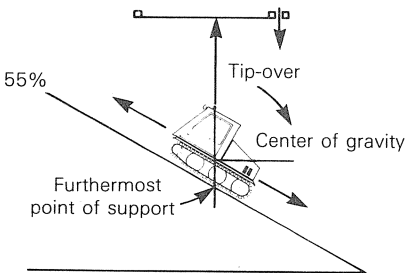
In a tracked vehicle the following can occur when moving uphill or downhill.

When the center of gravity of the vehicle passes beyond an imaginary line drawn vertically upwards from the furthestmost point of support of the tracks, the vehicle will tip-over or roll-over.

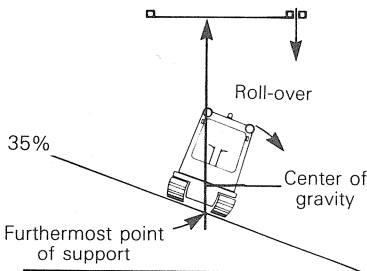
This can be likened to the action of a seesaw with the vertical line forming the center or pivot of the seesaw. When more weight is placed on one side than on the other the seesaw will move in that direction.

While these limits can be determined with accuracy under ideal conditions, the skill and ability of the operator, the loading of the vehicle and actual terrain conditions, constantly influence and change these limits during operation of the vehicle.

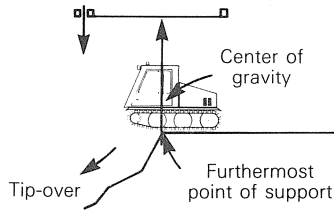
Schematic



When moving sidehill:

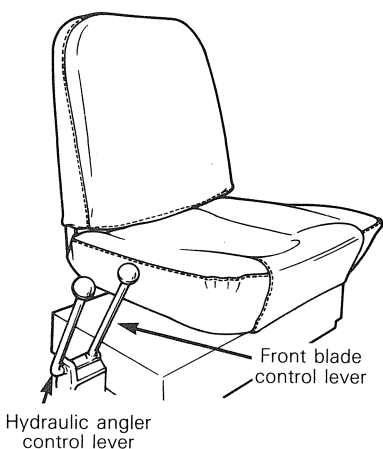


When moving over generally flat but uneven terrain:



Therefore, one must evaluate every situation carefully and as a separate case. Never assume that the vehicle can traverse a certain piece of terrain, because it has passed there previously or because another vehicle has passed before it, or because the terrain appears to be within the known performance limits of the vehicle. Moreover, under actual operating conditions, the slope of the terrain is constantly changing and sudden local variations may result in slopes which exceed operational limits, although the overall slope of the terrain is within safe operational limits.

OPERATION OF EQUIPMENT



Front Blade Operation

The lever of the hydraulic control valve which operates the front blade has 4 operating positions:

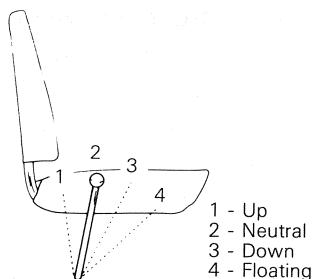
"U" - Up: to raise the blade, pull the lever backwards.

"N" - Neutral: this position holds the blade steady at any desired height.

"D" - Down: to lower the blade, push the lever forward.

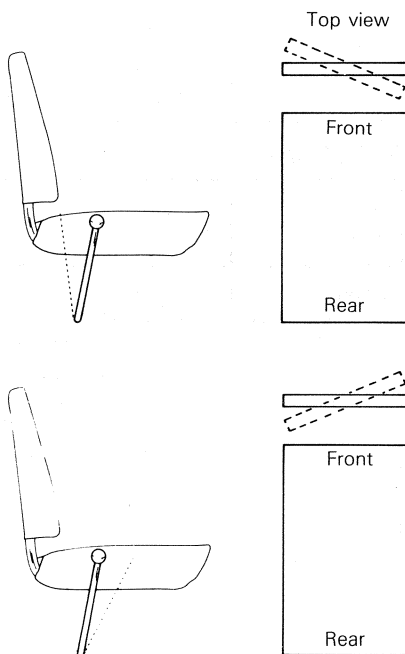
"F" - Float: force the lever beyond the "down" position to engage the "float" position. In this position, the blade moves freely up and down to follow the contour of the surface and the only downward pressure applied to the cutting edge is that of the weight of the blade itself.

○ **NOTE:** When not engaged in the F "float" position, the lever normally returns to the N position.



Hydraulic Angler

SW-48 tractors equipped with the hydraulic angler have a second lever installed to the right of the blade operating lever. Pull this lever backward to angle the blade to the right; push it forward to angle the blade to the left.



TROUBLE SHOOTING_____

Engine and transmission

See manufacturer's manual.

DIFFERENTIAL:

Trouble	Probable cause	Suggested remedy
Noisy	1- Scored crown & pinion gears 2- Bearings worn or pitted 3- Improper adjustment of crown and pinion	Replace Replace Adjust
Excessive Back Lash	1- Worn gears 2- Worn carrier bearings 3- Worn U-Joints	Replace Replace Replace
Oil Leaks	1- Faulty gaskets or seals	Replace

PROPELLER SHAFT:

Vibration or noise	1- Joints not aligned 2- Bent 3- Out of balance 4- Worn bearings and cross	Correct Replace Correct or replace Replace
--------------------	---	---

STEERING:

Does not steer	1- Steering brake bands too loose 2- Faulty differential	Adjust Repair
Steers to one side only	1- Broken axle 2- Broken axle gear 3- Broken steering band	Replace Replace Replace
Veers to one side	1- Uneven track tension 2- Trailing levers at incorrect angle 3- Broken wheel bearings 4- Low tire pressure on 2 or 3 tires on same side 5- Faulty track belts	Adjust tracks Correct Replace Correct Correct or replace


HYDRAULIC SYSTEM

Trouble	Probable cause	Suggested remedy
No pressure	1- Not enough hydraulic fluid 2- Pump inlet blocked 3- Broken drive belt 4- Dirt in relief valve	Replenish Clean Replace Clean
Pressure Too Low	1- Inlet strainer 2- Defective or worn pump 3- Dirt in tank 4- Loose drive belt	Correct or replace Repair or replace Clean Adjust
Leaking Down	1- Faulty control valve 2- Leak in hose or fitting 3- Leak in cylinder	Check spool return spring Correct or replace Repair with cylinder kit
Cavitation	1- Low fluid supply 2- Clogged oil strainer 3- Leak in intake 4- Too high RPM when fluid is cold	Fill to proper level Correct Repair Let engine warm up idle speed
Excessive Noise	1- Air entering in pump intake line 2- Defective pump	Repair Repair or replace
Air in System	1- Loose pump inlet 2- Leaks in joints 3- Defective seals	Tighten Repair Replace
Overheating	1- Low fluid supply 2- Faulty relief valve 3- Dirty fluid 4- Worn pump	Fill to proper level Adjust setting Change Repair or replace

MAINTENANCE

Service and Maintenance Chart/Vehicle Accumulated Hours

The following maintenance charts indicate regular servicing schedules to be performed by a mechanic. If these services are performed as suggested, the SW-48 will give many years of low-cost use.

 **WARNING:** It is recommended that the service maintenance be performed by specialized mechanics. Engine should be turned "off" for all lubrication and maintenance procedures.

Lubrication Chart & Schedule

Lubrication points	Change or service intervals	Capacity	Specifications of recommended lubricants
ENGINE: Including Filter	Every 100 hrs	6.6 litres 5.8 Imp. qts 7 U.S. qts	Service API CC/SE Multi-viscosity SAE 10W30
TRANSMISSION Including Torque converter	Every 600 hrs	9.1 litres 8 Imp. qts 9.5 U.S. qts	Automatic transmission fluid meeting Ford specifications M2C33F (type F)
DIFFERENTIAL	Every 200 hrs	18.2 litres 16 Imp. qts 19.2 U.S. qts	- Type F - Dexron
HYDRAULIC SYSTEM Including Filter	Once a year	13.6 litres 12 Imp. qts 14.3 U.S. qts	- Dexron - Type A - Type F - DN 600 (conoco)
WHEEL BEARINGS TANDEM U-JOINTS STEERING LEVERS	Every 50 hrs Every 50 hrs Every 100 hrs Every 100 hrs	6 fittings 2 fittings 3 fittings Smear grease under lever plates	Good quality Multi-purpose grease with superior shear stability and which will remain fluid at cold temperatures.

Maintenance Schedule

C - Check

I - Inspect (adjust or correct if necessary)

L - Lubricate

R - Replace

Item	Every 10 hrs or daily	Every 50 hrs or weekly	Every 100 hrs	Every 200 hrs	600 hrs	Once a year
Engine oil with filter	C		R			
Transmission oil	C				R	
Differential oil	C			R		
Hydraulic oil including filter	C					R
Coolant	C					R
Air filter						R
Fuel filter						R
Suspensions	C	I				
Battery			C			
Tires	C	I				
Wheel bearings		L				
Sprockets	C	I				
Tracks	C	I				
Tandem		L				
U-Joints			L			
Brakes				I		
Steering levers			L			

Minor Repairs

Removal of track

1. Jack up tractor
2. Bleed track-adjuster
3. Remove center wheel
4. Remove track-adjuster
5. Remove rear wheel hub cap and spindle nut
6. Pull out rear wheel and track will come off

Installation of track

1. Jack up the tractor
2. Remove the rear wheel
3. Place the track alongside the tractor
4. Place the front part of the track over the sprocket
5. Place the rear wheel inside the rear part of the track
6. Pull the track with the wheel to the rear while supporting the upper part of the track to pass it over the wheels
7. Push the rear wheel on its spindle
8. Reinstall spindle nut, adjust bearings, install cotter pin and hub cap
9. Adjust the track

Changing a sprocket

To change a sprocket, release the tension of the track then remove the bolts that hold the sprocket to the hub and it will fall out of the track.


To install a sprocket, proceed in the reverse order of its removal.


Changing a tire

To change a tire, the complete wheel has to be removed from the vehicle. Proceed as follows:

1. Loosen the track by bleeding the hydraulic track-adjuster.
2. Jack up the vehicle to raise the wheel higher than the track-guard.
3. Spread both sides of the track apart, and hold them apart, by means of a board or a piece of 2 x 4 about 30'' long (86 cm).
4. Remove the hub cap, the cotter pin and the spindle nut, and pull the wheel out.

To reinstall the wheel, proceed in the reverse order of its removal.

 **NOTE:** The rear wheel comes off with the track.

 **CAUTION:** Care should be taken to protect the wheel seal and to prevent dirt from getting into the wheel bearings. If the wheel seal has to be replaced, note how it is installed in the wheel. It prevents water and dirt from getting into the wheel hub but allows the bearings to be lubricated with a grease gun without the hazard of damaging the seal; installed in this manner, the seal allows water and dirt that could have entered the hub to be pushed out by the grease that is pumped in the hub.

Changing a trailing arm

Remove the wheel as per instructions for changing a tire. Remove the bolt that tightens the trailing arm to the Flexitor shaft. Pry the trailing arm off the Flexitor shaft.

When reinstalling the trailing arm, make sure that it is installed at the correct angle. The best way to insure that the new trailing arm is installed at the correct angle is to make a mark on the Flexitor shaft, where the slot of the trailing arm is located. The slot in the new trailing arm should be at that same location.

○ **NOTE:** There are R and L trailing levers and this indication is stamped on each trailing lever. Be sure to use the proper one when making a replacement.

Replacing a fuse

See section "Controls/Instruments".

STORING

If the vehicle is to remain idle for a prolonged period of time, certain precautions have to be taken so that it will not deteriorate during this idle period. The following storage procedure is recommended:

- Clean the vehicle thoroughly.
- Make a thorough inspection and make all the necessary repairs.
- Lubricate all points mentioned in the lubrication schedule.
- Prepare the engine according to the instructions found in the Maintenance and Operator's Manual prepared by the engine Manufacturer.
- Check the oil in the differential; if it is contaminated, drain and refill with new oil.
- Lift the vehicle off the ground and block it to take the weight off the suspension and tracks.
- Release the track-tension on both tracks.
- Release the load on all hydraulic circuits by operating the valves and leaving the levers in the "float" position.
- Remove the battery and put it on a trickle charge or check and charge monthly.

SPECIFICATIONS

ENGINE

Make	"Ford"
Model	4.9 L (300 cu. in.)
Type	Gasoline in line
No. of cylinders	6
Power at RPM (without fan)	88 kw (118 H.P.) at 2800 RPM
Torque at RPM (without fan)	327 N•m (241 lbf•ft) at 2000 RPM
Maximum operating RPM	2800 RPM
Firing order	1-5-3-6-2-4
Stroboscopic timing at RPM	6° BTDC at 600 RPM
Breaker point:	
- Set adjustment	.61 - .66 mm (.024" - .026")
- Spring tension	4.5 - 5.8 N (17 - 21 ounces)
Spark plug:	
- Make	"Autolite"
- Model	BTF - 42
- Spark plug gap	.81 mm (.032")
- Torque	21-27 N•m (15-20 lbf•ft)
Starter	Electrical (12 volts)
Oil filter	Full flow (replaceable cartridge)
Fuel	Gasoline, 83M/91R octane
Exhaust type	"Bombardier"

CARBURATION

Make	"Motorcraft"
Model	D9JLJ
Engine idle speed	600 RPM (transmission on "D")
Air filter type	Dry

COOLING SYSTEM

Engine:	
- Type	Liquid cooling/radiator/fan
- Water/antifreeze mixture	50/50
- Antifreeze	Glycol ethylene
- Thermostat	Opening at 71°C (160°F)
- Radiator cap pressure	90 kPa (13 PSI)
Transmission:	
- Type	Radiator/fan cooling
- Fan type	Blower ("V" belt driven)

POWER TRAIN

Transmission:

- Make
- Model
- Gear ratio

"Ford"
C-6
1st — 2.46 to 1
2nd — 1.46 to 1
3rd — 1 to 1
Reverse — 2 to 1

Differential:

- Make
- Model
- Gear ratio

"Bombardier"
Planetary-type controlled
5.83 to 1

Transmission shaft:

- Type
- "U" joint

"Spicer" 1350 series
"Spicer" 1350 series

Track:

- Width
- Length
- Tension

34.29 cm (13 1/2") (for one track)
5.638 m (222") (for one track)
Track tension is correct if its upper
center section cannot be lifted more than
5-7 cm (2" - 3") by hand.
Thermally treated steel
56

- Cross link type
- Number (for one track)

Wheels:

- Quantity
- Tires
- Dimensions
- Ply rating

6
Pneumatic
11.43 x 40.64 cm (4.50" x 16")
6 ply rating

ELECTRICAL SYSTEM

Generator:

- Type
- Power
- Drive

Alternator
60 amp/12 volts
"V" belt driven
"Autolite" GR-540
12 volts

Voltage regulator

Voltage

Battery:

- Make
- Model
- Type/number
- Power
(cold start under -18° C (0° F))

"Cegeler" or "Prestolite"
12 volts
Acid/1

- Reserve capacity

"Cegeler" 500 amp.
"Prestolite" 455 amp.
"Cegeler" 120 min.
"Prestolite" 140 min.

Lighting:

- Front headlamps
- Back-up light
- Tail/stop lights
- Directional lights
- Flasher

"G.E." 12 volts, 2 contacts
"G.E."

Ground

Fuses

"Maurice Hughes"
"Dominion auto"
"Dominion auto"
Negative
15 amp.

STEERING

Type

Inside turning radius

Manual (see "Steering" section)
3.6 m (12")

BRAKE	
Service brake	Steering lever deceleration (see "Steering" section)
Emergency and parking brake	Foot-operated drum brake (see "Controls/Instruments" section)
HYDRAULIC SYSTEM	
Hydraulic pump:	"Vickers"
- Make	VTM 42-40-45-15-MF RI 14
- Model	Vane
- Type	15 L (3.3 Imp. gal., 4 U.S. gal.)/MN at 1200 RPM
- Capacity	V-belt driven
Drive	
Hydraulic system control valves:	"Gresen"
- Make	SPK-4 and SPK-4-4
- Models	Directional
- Type	
Hydraulic cylinders:	"Bombardier"
- Make	Double action
- Type	Min. -40° C (-40° F)
Hydraulic liquid operating temperature	Max. 93° C (200° F)
LIQUID CAPACITIES	
Fuel tank	91 L (20 Imp. gal., 2.4 U.S. gal.)
Hydraulic system & tank	13.6 L (3 Imp. gal., 3.4 U.S. gal.)
Engine cooling system	20.5 L (4.5 Imp. gal., 5.4 U.S. gal.)
Engine oil with filter	6.6 L (1.5 Imp. gal., 1.75 U.S. gal.)
Transmission oil	9.1 L (2 Imp. gal., 2.4 U.S. gal.)
Differential	18.2 L (4 Imp. gal., 4.8 U.S. gal.)
Windshield washer tank	1.5 L (53 Imp. liq. oz., 50 U.S. liq. oz.)
VEHICLE	
Frame material	A 36 H.R.M.S. steel
Cab material	H.R.M.S. steel
Overall length (with push frame)	343 cm (135")
Overall width (without blade)	127.6 cm (50 1/4")
Overall height	218 cm (86")
Ground clearance	20.3 cm (8")
Dry weight	2273 kg (5000 lbs)
Curb weight (with blade)	2500 kg (5500 lbs)
PERFORMANCE	
Makimum speed	35 km/h (22 MPH)
Ground pressure with a penetration of 0 cm (0")	23.4 kPa (3.4 PSI)
Bearing area with a penetration of 0 cm (0")	9487 cm ² (1470 in ²)
Loading capacity	682 kg (1500 lbs)
Gradeability:	
- Up	55%
- Down	55%
- Side	35%

TORQUES

Crosslink (steel)/track	3/8''-24 gr.8 27-34 N•m (20-25 lbf•ft)
Flexitor shell/frame	1/2''-20 gr.5 98-122 N•m (72-90 lbf•ft)
Trailing arm	5/8''-18 gr.8 264-324 N•m (195-239 lbf•ft)
Drive sprocket/flange (3/8''-24 gr.5)	Outside bolts (16): 27 N•m (20 lbf•ft) Inside bolts (4): 47 N•m (35 lbf•ft)
Flange companion/pinion shaft (differential)	3/4''-16 gr. 8 122 N•m (90 lbf•ft)
Flange-yoke (transmission shaft)	7/16''-20 gr. 5 60-75 N•m (44-55 lbf•ft)
Flange companion (differential)	
''U'' joint/yoke transmission	3/8''-24 24-31 N•m (18-23 lbf•ft)
''U'' bolt	
Hydraulic valve/frame	3/8''-24 gr. 5 38-47 N•m (28-35 lbf•ft)

HYDRAULIC OIL CONTAMINATION CONTROL

Contamination Control

Contaminated fluid leads to leakage and eventual component failure. It also results in wasteful fluid changeout and costly equipment downtime. Hydraulic system contamination is produced by three major sources:

- A) Built-in contaminants
 - B) System-generated contaminants
 - C) Externally-introduced contaminants
- A) Built-in contaminants include core sand, drawing compounds, metal chips from threaded fittings, paint flakes, pipe scale, rust preventatives, sealants and weld spatter. These are unavoidable, but usually are easily controlled by filter system.
- B) System-generated contaminants include carbon and varnish from overheated oil, fiber particles from filters and metal particles scraped off of moving surfaces in pumps, valves and cylinders, as well as particles from elastomeric seals and persistent emulsions. These tend to cause little trouble in conventional hydraulic systems but their small size makes them difficult to remove.
- C) Externally-introduced contaminants include airborne metal flakes, dust, bacteria, bearing grease, cutting oil, dirt, lint from rags, and waste, metal chips, water, wax lubricants, the wrong oil and particles which enter when equipment is opened for repair or at oil addition. Prevent their entry into systems and you escape the most numerous and damaging contaminants.

Contamination, regardless of its source, can largely be controlled by these precautions:


Make sure removable reservoir cover fits well, is gasketed and tightly bolted.

Seal all clearance holes to prevent dust suction by reservoir and drain line.


Leakage Reduction

Uncontrolled leakage creates safety hazards, increases cleaning costs and requires more make up oil and the labor to add it. Static joint leakage occurs at tube fittings and connections, pipe threads and joints, and at flexible hose couplings. Other sites include cylinder heads, valve caps, manifold joints, filter and pump. These leaks are caused by unsuitable joints, incomplete joining, faulty pipe and hose layout which is prone to vibration, strain and damage caused by the water hammer effect. Effective control of static joint leakage involves regular inspection and correction of faulty joints. Leakage from moving parts is found at cylinder piston and rod seals, valve stems, and pump or motor shaft seals.

Preventive Maintenance

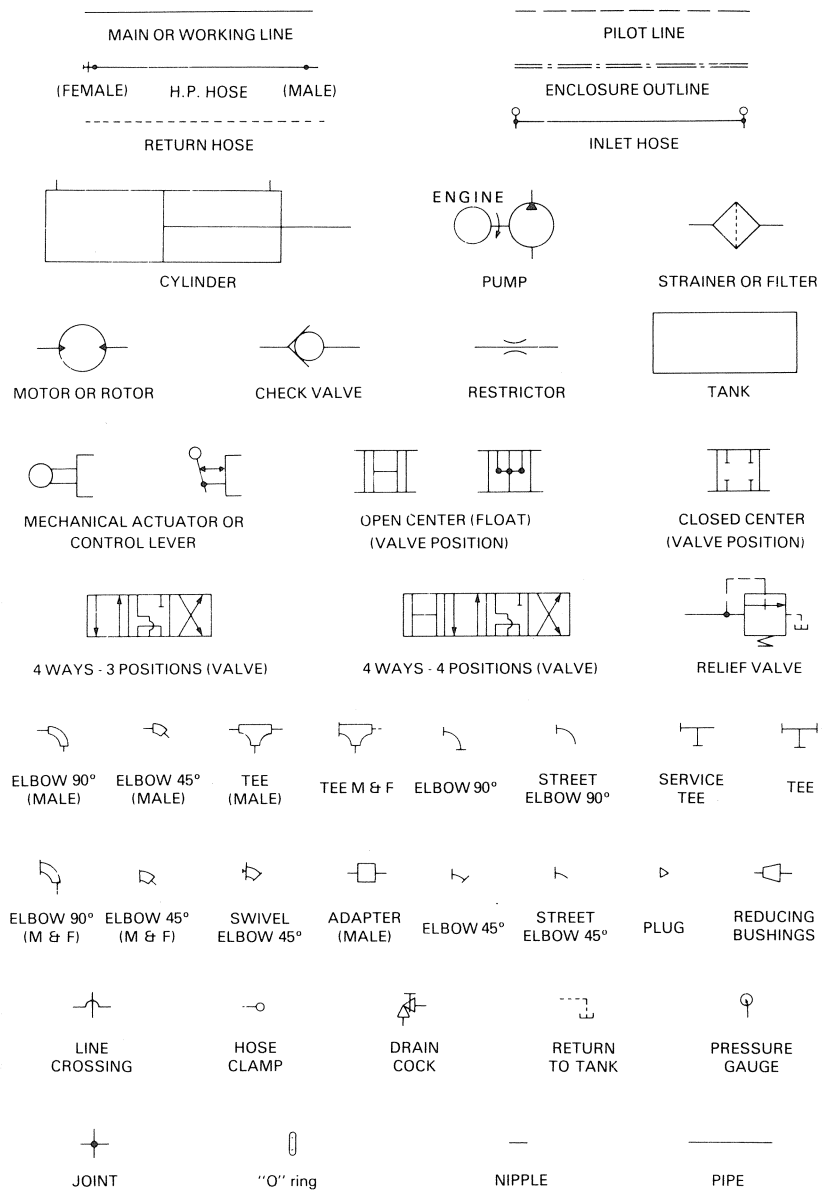
 **CAUTION:** Only maintenance personnel trained on hydraulic equipment should work on it.

Controlling hydraulic system reliability depends on concerned operators and well-trained maintenance personnel. If operators are taught to shut off equipment when a hose or hydraulic line breaks, or leaks, pumps and fluid are saved.

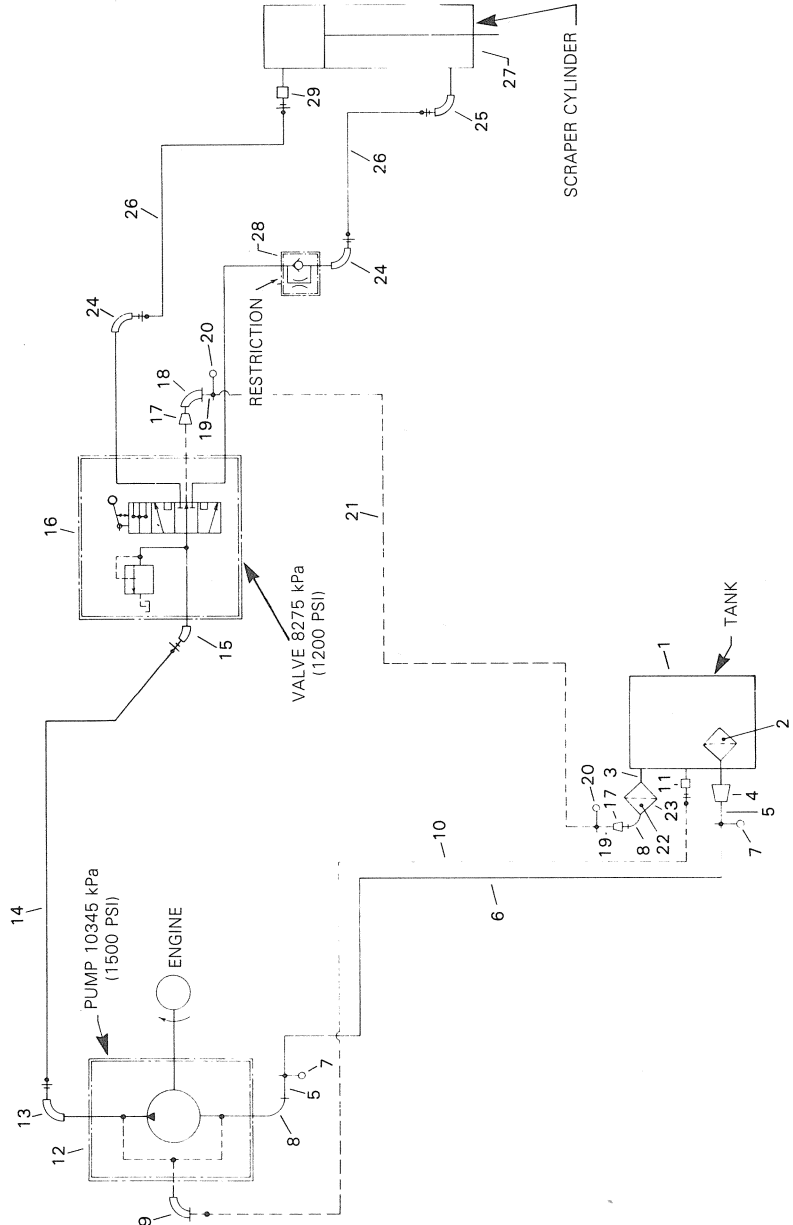
 **CAUTION:** Avoid oil contamination when checking or adding oil.

HYDRAULIC SCHEMATIC DIAGRAMS

Hydraulic Schematic Diagrams Symbols

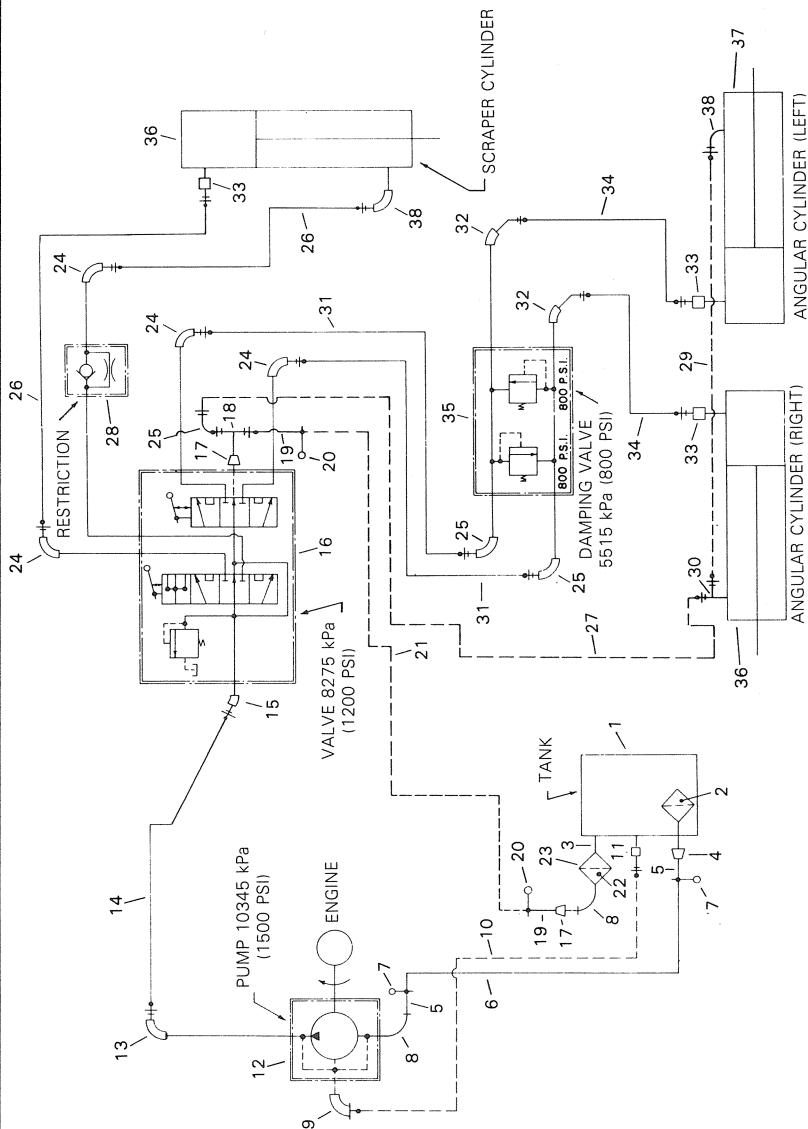


Hydraulic System Diagram (Scraper Only)



REF. NO.	DESCRIPTION	QTY PER VEHICLE
1	Oil tank	1
2	Oil tank strainer	1
3	Close nipple	1
4	Reducing bushing	1
5	Half nipple	2
6	Paragas hose (multiple 12'')	A.R.
7	Hose clamp	2
8	Elbow 90°	2
9	Elbow	1
10	L.P. hose (with fittings) (3/8" dia. x 34" long)	1
11	Male connector	1
12	Hydraulic pump	1
13	Swivel elbow	1
14	H.P. hose (with fittings) (1/2" dia. x 57" long)	1
15	Elbow 45°	1
16	Control valve ass'y	1
17	Reducing bushing	2
18	Street elbow 90°	1
19	Half nipple	2
20	Worm gear hose clamp	2
21	Paragas hose (multiple 12'')	A.R.
22	Oil filter element	1
23	Ass'y oil filter	1
24	Elbow 90°	2
25	Elbow 90°	1
26	H.P. hose (with fittings) (3/8" dia. x 50" long)	2
27	Cylinder ass'y	1
28	Check poppet restrictor	1
29	Male pipe	1

Hydraulic System Diagram (With Angular Cylinders)



REF. NO.	DESCRIPTION	QTY PER VEHICLE
1	Oil tank	1
2	Oil tank strainer	1
3	Close nipple	1
4	Reducing bushing	1
5	Half nipple	2
6	Paragas hose (multiple 12'')	A.R.
7	Worm gear hose clamp	2
8	Elbow 90°	2
9	Elbow 90°	1
10	L.P. hose (with fittings) (3/8" dia. x 34" long)	1
11	Male connector	1
12	Hydraulic pump ass'y	1
13	Swivel elbow	1
14	H.P. hose (with fittings) (1/2" dia. x 57" long)	1
15	Elbow 45°	1
16	Control valve ass'y	1
17	Reducing bushing	2
18	Tee	1
19	Half nipple	2
20	Worm gear hose clamp	2
21	Paragas hose (multiple 12'')	A.R.
22	Oil filter element	1
23	Oil filter ass'y	1
24	Elbow 90°	4
25	Elbow 90°	3
26	H.P. hose (with fittings) (3/8" dia. x 50" long)	2
27	H.P. hose (with fittings) (3/8" dia. x 58" long)	1
28	Check poppet restrictor	1
29	H.P. hose (with fittings) (3/8" dia. x 24" long)	1
30	Tee	1
31	H.P. hose (with fittings) (3/8" dia. x 44" long)	2
32	Elbow 45°	2
33	Male pipe adaptor	3
34	H.P. hose (with fittings) (3/8" dia. x 21" long)	2
35	Cushion valve	1
36	Angler (R.H.) cylinder (lift cylinder)	2
37	Angler (L.H.) cylinder	1
38	Elbow 90°	2

SI * METRIC INFORMATION GUIDE

BASE UNITS

DESCRIPTION	UNIT	SYMBOL
length	meter	m
mass	kilogram	kg
liquid	liter	L
temperature	celsius	°C
pressure	kilopascal	kPa
torque	Newton meter	N•m
speed	kilometer per hour	km/h

PREFIXES

PREFIX	SYMBOL	MEANING	VALUE
kilo	k	one thousand	1,000
centi	c	one hundredth of a	0.01
milli	m	one thousandth of a	0.001

*THE INTERNATIONAL SYSTEM OF UNITS (SYSTEME INTERNATIONAL)
ABREVIATES "SI" IN ALL LANGUAGES.

NOTES_____



CHANGE OF ADDRESS AND OWNERSHIP

Any change in address or ownership should be brought to the attention of the manufacturer by completing and sending out the card supplied below.

CHANGE OF ADDRESS

VEHICLE IDENTIFICATION NUMBER

--	--	--	--	--	--	--	--	--	--

OLD ADDRESS:

NAME

NO

STREET

APT.

CITY

STATE/PROVINCE

ZIP/POSTAL CODE

NEW ADDRESS:

NAME

NO

STREET

APT.

CITY

STATE/PROVINCE

ZIP/POSTAL CODE

CHANGE OF OWNERSHIP

VEHICLE IDENTIFICATION NUMBER

--	--	--	--	--	--	--	--	--	--

The ownership of this vehicle is transferred

FROM:

NAME

NO

STREET

APT.

CITY

STATE/PROVINCE

ZIP/POSTAL CODE

TO:

NAME

NO

STREET

APT.

CITY

STATE/PROVINCE

ZIP/POSTAL CODE

BOMBARDIER INC.
ATT.: WARRANTY DEPARTMENT
VALCOURT, QUEBEC
CANADA, JOE 2LO

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