



SHOP MANUAL

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Light Capability Rough Terrain Forklift (LCRTF)

TX 51-19M

CONTRACT NO. M67854-00-C-3014



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DEALER'S OR ASSISTANCE STAMP

Shop Manual **57.4400.0100**

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SECTION 1

INTRODUCTION

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1.0 INTRODUCTION

Owners, Users, and Operators:

Terex appreciates your choice of our machine for your application. Our number one priority is user safety, which is best achieved by our joint efforts. We feel that you make a major contribution to safety if you as the equipment users and operators:

1. **Comply** with OSHA, Federal, State, and Local Regulations.
2. **Read, Understand, and Follow** the instructions in this and other manuals supplied with this machine.
3. **Use Good, Safe Work Practices** in a common sense way.
4. **Only have trained operators** – directed by informed and knowledgeable supervision – running the machine.

NOTE: OSHA prohibits the alteration or modification of this machine without written manufacturers approval. Use only factory approved parts to service or repair this unit.

If there is anything in this manual that is not clear or which you believe should be added, please send your comments to Manager of Publication, Terex, 202 Raleigh Street, Wilmington, North Carolina 28412; or contact us by telephone at (910) 395-8500.

Thank you!

1.1 SYMBOLS

When using the machine, operators could face some situations requiring special care and particular knowledge.

When these situations involve the safety of operators or bystanders, the machine efficiency and proper utilization, this manual stresses these specific instructions by means of SPECIAL SYMBOLS. There are special (or safety) symbols in this manual, always combined with keywords, which class the situations according to their danger degree. The symbols are always followed by a text explaining the situation taken into account, the attention that must be paid to such situation, the method and the behavior, which should be adopted. When necessary, it stresses prohibitions or supplies instructions to prevent dangers. Sometimes, it can be followed by illustrations.

Listed below are special (or safety) symbols according to the relative seriousness of the hazard situation:



DANGER – Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING – Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION – Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



ATTENTION – Indicates a situation which, if not avoided, may result in property or equipment damage.



THIS SYMBOL MEANS YOUR SAFETY IS INVOLVED! READ, UNDERSTAND, AND FOLLOW ALL DANGER, WARNING, AND CAUTION DECALS ON YOUR MACHINE.

SECTION 2

SAFETY RULES

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2.0 SAFETY RULES

2.1 GENERAL

Most accidents, which occur while working, repairing or maintaining machines, are caused by not complying with the basic safety precautions. Therefore, it is necessary to pay attention to the potential hazards and the effects, which may come of operations carried out on the machine.

If you recognize hazardous situations, you can prevent accidents!

For instance, this handbook list special safety symbols to stress any potentially hazardous situation.

The instructions given in this manual are the ones established by Terex. They do not exclude other safe and most convenient ways for the machine installation, operation and maintenance which take into account the available spaces and means.

If in doubt, it is always better to ask! For this purpose, contact Terex the assistance service is at you disposal. Addresses, phone and fax numbers are given in the title page of this manual.



Machine must be used, operated and maintain in compliance with ASME B56.6 Standards.

2.2 OPERATORS MAINTENANCE STAFF RESPONSIBILITIES

The operators who use the machine regularly or occasionally (i.e. for transport reasons) shall have the following responsibilities:

- Make sure the machine is in proper order and all warning signals are functional before operating.
- Before and during any operation, operators shall never consume alcoholic beverages, medicines or other substances, which may alter their psychophysical conditions and, consequently, their working abilities.

- Never lift a load without a Rating Chart in the cab.
- Good eyesight, acute hearing, good coordination and ability to carry out all required operations in a safe way, according to the instructions of this manual.
- Ability to understand and apply the enforced rules, regulations and safety precautions. They shall be careful and sensible for their own as well as other's safety and shall desire to carry out the work correctly and in a responsible way.
- They shall keep calm and always be able to evaluate their own physical and mental conditions.
- Read and understand the operators' manual, its enclosed graphs and diagrams, the identification and hazard warning decals. The operator should be skilled and trained about the machine use.
- The operator might be required to have a license (or a driving license) when provided for by the laws enforced in the country where the machine works.



From a technical point of view, the ordinary maintenance of the machine is not complex. And can be carried out by the machine operator provided that he has a basic knowledge of mechanics.

2.3 CLOTHING

Your clothing should be relatively close fitting. Loose jackets, shirt sleeves, rings, and other jewelry should be avoided because of the danger of catching them in moving parts or on controls.

2.4 PERSONAL EQUIPMENT



Use only approved personal protective equipment in good condition.

Always wear required protective items such as hard hats, safety glasses, reflective clothing, safety shoes, and ear protection as required.

2.5 SAFETY PRECAUTIONS

JOB SITE

Always take into account the features of the job site where you are going in work:

- Always examine the working area and compare it with the machine dimensions in the different configurations.



Pay the greatest attention to overhead electric lines. Always keep at a minimum a safe distance of at least 20 feet from the telescopic boom and the lifted load. Electrical Hazards!

- When assembling the machine or part of it on site, you need a well-equipped area of suitable dimensions. The surface shall be even, compact and stable.
- Look for the best route to the job site.
- When the machine is running, nobody can enter its working range.
- While working, keep the working area in order. Never leave objects scattered: They could hinder the machine movements and represent a danger for personnel.

2.6 GETTING READY TO WORK

Before any operation, the following precautions should be taken:

- First of all, make sure that all maintenance has been carried out with care according to the established schedule.
- Ensure you have enough fuel to avoid a sudden stop of the engine, especially during a crucial maneuver.
- Clean instruments, data plates, lights and the cab windshield thoroughly.
- Check the correct functioning of all the safety devices installed on the machine and in the job site.
- In case of troubles or difficulties, inform the supervisor at once. Never start working under unsafe conditions.

2.7 DURING WORK OR MAINTENANCE

During work, and especially maintenance, always pay attention:

- Do not pass or stop under raised loads or machine parts supported by hydraulic cylinders or ropes only.
- Keep the machine handholds and access steps always clean from oil, grease or dirt to prevent falls or slips.
- When entering/leaving the cab or other raised parts, always face the machine.
- Do not get into or off the machine while it is running.
- Do not leave the operators seat when the machine is running.
- Neither stop nor carry out repairs under or between the machine wheels when engine is running. When maintenance in this area is required, stop the engine.



- Do not carry out maintenance or repair works without a sufficient lighting.
- When using the machine lights, the beam should be oriented in order not to Blind the personnel at work.
- Before applying voltage to electric cables or components, check their connection and proper functioning.
- Do not carry out repairs on electric components with voltage over 48V.
- Do not connect wet plugs or sockets.
- Plates and hazard warning stickers shall never be removed, hidden or become unreadable.
- Except for maintenance purposes, do not remove safety devices, shields, protection cases, etc. Should their removal be necessary, stop the engine, remove them with the greatest care and always remember to refit them before starting the engine and using the machine again.
- Before any maintenance or repair work, stop the engine and disconnect the batteries.
- Do not lubricate, clean or adjust moving parts.
- Do not carry out operations manually when specific tools are provided for this purpose.
- Absolutely avoid the use of tools in bad conditions or in an improper way i.e. pliers instead of adjustable wrenches, etc.
- Before carrying out operations on hydraulic lines under pressure or disconnecting hydraulic components, ensure the relevant line has been previously depressurized and does not contain any hot fluid.

Any repairs made on the hydraulic circuit must be carried out by authorized personnel. The hydraulic circuit of this machine is fitted with pressure accumulators. You and others could be seriously injured if accumulators are not completely depressurized. For this purpose, shut the engine down and step on the brake pedal 8-10 times. Operate the steering wheel and joystick several times until the wheels stop turning with the machine engine off.

- Neither smoke or open flames in areas subject to fire dangers and in presence of fuel, oil or batteries.
- Do not leave fuel cans or bottles in unsuitable places.
- Do not empty catalytic mufflers or tanks containing burning substances without taking the necessary measures.
- Carefully handle all flammable or dangerous substances.
- Do not tamper with fire-extinguishers or pressure accumulators: explosion hazard!
- After any maintenance or repair work, make sure that no tool, cloth or other object has been left within machine compartments, fitted with moving parts, or where suction and cooling air circulates.
- When working, do not have more than one person giving instructions to the operator. Instructions and signals must be given by one person only.
- Always follow the instructions given by the supervisor.
- Never distract the operator during working phases of a crucial maneuver.

- After working, never leave the machine under potentially dangerous conditions.
- The relief valves are factory preset. Adjusting the releif valve in the field will void machine warranty. Valves must be set only by trained personnel.

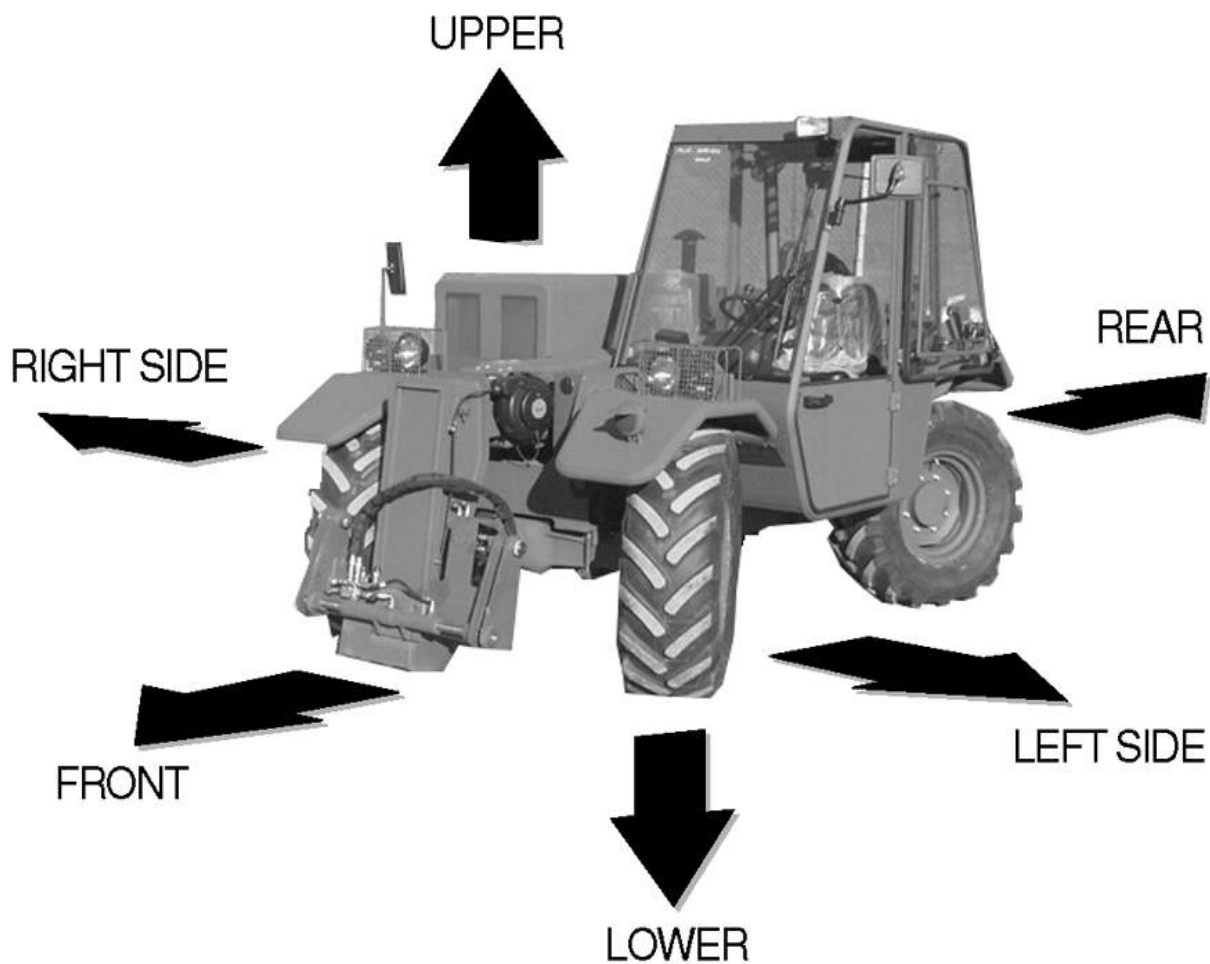
SECTION 3 GENERAL INFORMATION AND SPECIFICATIONS

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3.0 MACHINE REFERENCES

3.1 MACHINE POSITION

Any reference to the machine position will always be as if the operators is seating in the operator's seat, unless other wise specified.




3.2 LABELS AND WARNING DECALS

The labels and warning decals normally applied on standard machines or which can be found when special attachments are coupled to the machine are shown below.



Read and understand all decals on this machine. Make sure they are easy to read. For this purpose, clean them or replace those that become unreadable (either graphic or text). To clean labels, use a soft cloth, water and soap. Never use solvents, petrol, etc. When a label is applied on a part being replaced, make sure that the replaced part is already labeled as required or apply a new label.


WARNING

Your safety and the safety of those around you depends your using care and judgement in the operation of this equipment. Know the positions and functions of all controls before attempting to operate. All equipment has limitations. Understand the speed, braking, steering and load characteristics of the machine before starting to operate. Read the Operator's Manual and ask questions of your supervisor until you know the limitations.

Do not operate the FORK LIFT FORK HANDLER while people and property are within a 50 foot (15.24 M) minimum radius. Falling objects from the forks or attachment can cause serious injury or property damage. The 50 foot (15.24 M) minimum radius should be used as a guideline and should be enlarged if warranted by working conditions.

Always remain completely within canopy enclosure while operating machine. Falling debris can cause serious personal injury.

Never extend a load beyond the load chart band. Machine turn over, component damage, injury or death could occur.

Absolutely no riders on machine or attachment.

Never lower a maximum load before retracting it. Machine turn over, component damage, injury or death could occur.

Always wear the seat belt when operating the machine.

Always inspect the machine daily. Check for missing guards and screens, loose bolts or anything out of the ordinary. Repair and/or replace immediately. Failure to do so can cause injury or death.

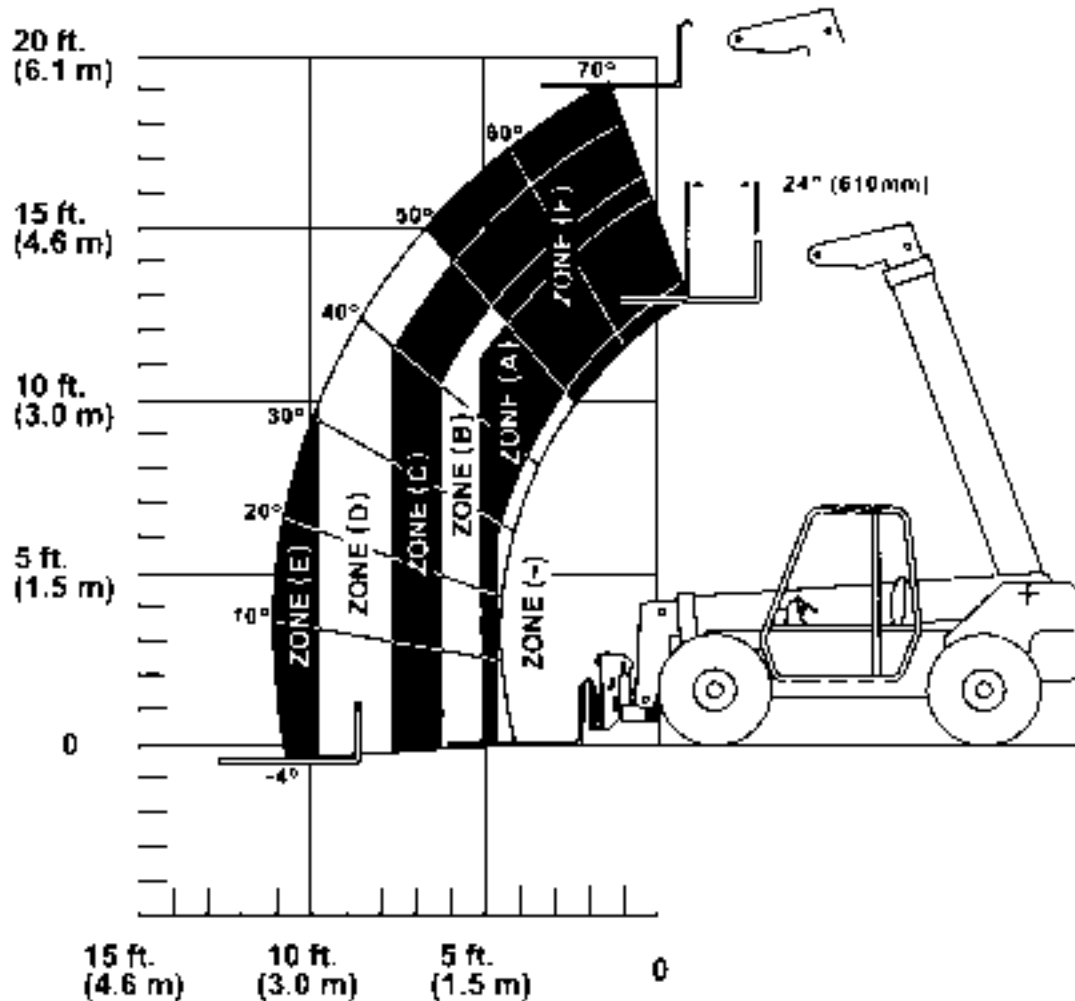
Do not travel on terrain or in a dangerous areas that could cause the machine to tip over.

Carry a load so that you have maximum machine stability.

Always level the machine as indicated on the gauge before raising the boom. Raising the boom with an unlevel machine may cause the machine to overturn causing injury or death.

TEREX
WILMINGTON N.C. 28412

TEREXLIFT TX51-19M



RATED LIFT CAPACITIES ARE WITH:
 MACHINE ON A FIRM LEVEL SURFACE WITH UNDAMAGED,
 PROPERLY INFLATED TIRES.

TIRE SIZE: 375/75 R20
 TIRE PRESSURE: 54 psi
 TIRE PRESSURE - SOFT GROUND: 26 psi

S/N

LOAD LIMITS / HORIZONTAL BOOM LAST FULLY VISIBLE LETTER

I - I	RETRACTED = 5070 LBS (2300 Kg)
A)	LETTER VISIBLE = 4410 LBS (2000 Kg)
B)	LETTER VISIBLE = 3305 LBS (1500 Kg)
C)	LETTER VISIBLE = 2755 LBS (1250 Kg)
D)	LETTER VISIBLE = 2205 LBS (1000 Kg)
E)	LETTER VISIBLE = 1765 LBS (800 Kg)
F)	BOOM ANGLE +50° = 500 LBS (225 Kg)

09.4697.0076

⚠ WARNING

USE THE SEAT BELT
 ALWAYS ADJUST SEAT AND FASTEN SEAT BELT BEFORE STARTING ENGINE.

⚠ WARNING

BEFORE OPERATING
 IMPROPER OPERATION OF THIS EQUIPMENT CAN CAUSE SEVERE INJURY OR DEATH.
 READ AND UNDERSTAND THE OPERATOR'S MANUAL AND SAFETY INSTRUCTIONS BEFORE OPERATING OR SERVICING.

⚠ WARNING

PARKING BRAKE
 AN UNATTENDED MACHINE CAN MOVE OR ROLL.
 SET PARKING BRAKE, LOWER CARRIAGE OR ATTACHMENT TO GROUND BEFORE LEAVING MACHINE.
 FAILURE TO HEED COULD RESULT IN DEATH OR SERIOUS INJURY.

⚠ WARNING



Operation & Maintenance Manual

- Do not remove manual from machine.
- Replace manual if damaged.

⚠ CAUTION

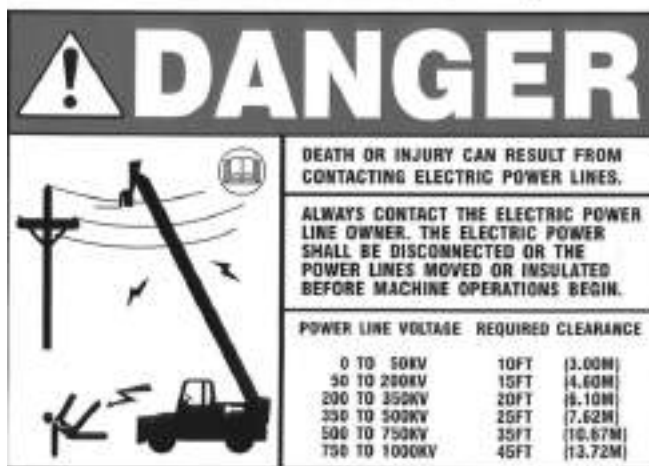
COOLING SYSTEM
 PRESSURIZED COOLING SYSTEM. REMOVE CAP SLOWLY.

⚠ WARNING

NO RIDERS

⚠ WARNING



























PINCH POINT AREA
 TO PREVENT INJURY KEEP CLEAR ANYTIME MACHINE IS RUNNING.



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3.3 EXPLANATION OF THE DIFFERENT SYMBOLS USED ON THE MACHINE

This paragraph illustrates those symbols, which are normally applied on the main control devices and instruments of a standard machine, and those, which can be applied on accessories or special attachments. They are mainly (ISO) standardized symbols, which are now part of the common life.

Symbol	Description	Symbol	Description	Symbol	Description
	Hazard indicator lights		Steering selection		Lift Tie Down
	Windshield wiper		Brake pressure		Work - road setting
	Windshield washer		Engine oil pressure		
	Cab ventilation fan		Boom raising		
	Diesel engine water temperature		Boom lowering		
	Fuel level		Boom extension		
	Hydraulic oil temperature		Boom retraction		
	Fork Rotating		Attachment locking device		
	Turn signals		Attachment releasing device		
	Parking brake		Fork pitching forward		
	Battery charge		Fork pitching back		
			Oil filter clogged		
			Air filter clogged		

3.4 MACHINE MODEL AND TYPE

Light Capability Rough Terrain Forklift (LCRTF), model TX-51-19M

3.5 MANUFACTURER

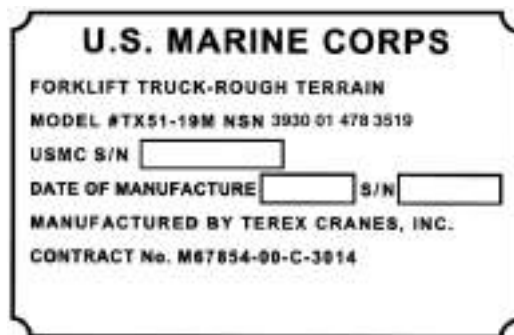
Terex
 202 Raleigh Street
 Wilmington, NC 28412
 Phone: 910-395-8500 Fax: 910-395-8507

ATTENTION

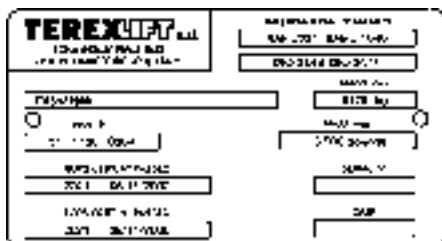
Check that the operator and maintenance manual refers to the delivered machine. When asking for information or technical assistance, always specify model, type and serial number of the machine.

3.6 MACHINE IDENTIFICATION

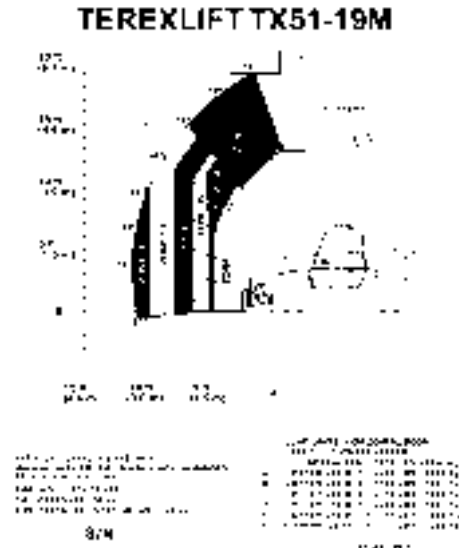
plates are applied on the machine.



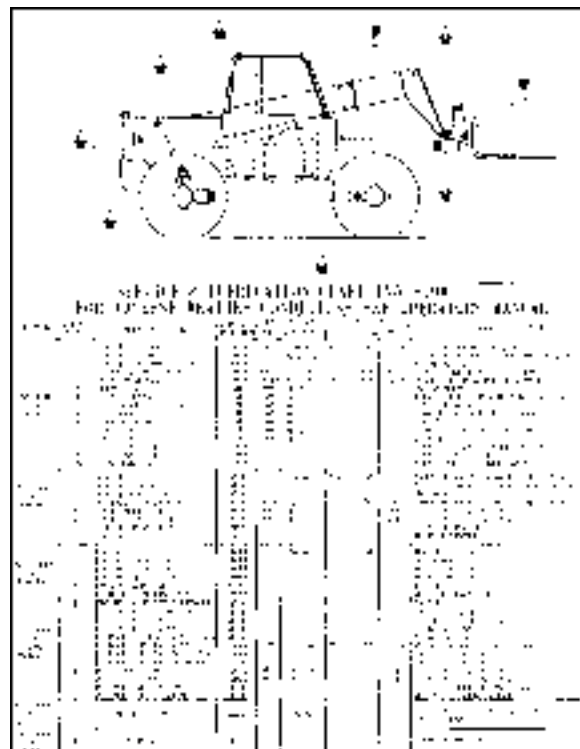
The ROPS / FOPS Cert. Plate is located inside the machine.



Machine Lifting Diagram is on the driver side, rear of machine, and left of the identification plate. This is to be used only as a reference. You should always use the current rating chart.



Service Lubrication Chart is located on the inside door of the operators cab. This should be used to locate all lubrication points and will tell you what type of lubrication is required.



3.7 CHASSIS SERIAL NUMBER

The chassis serial number is stamped on the front left part of the chassis side member.

3.8 IDENTIFICATION PLATES

The plates of the main components, which are not directly manufactured by Terex (engines, pump, etc.), are located where originally applied by the manufacturers.

3.9 ALLOWED USE

The machines have been designed and manufactured for lifting, handling. Any other use is considered contrary to that established and, therefore, improper. The compliance with and the strict respect of the operation, maintenance and repair conditions, indicated by the Manufacturer, represent an essential part of the allowed use. The use, maintenance and repair of the machine shall be carried out by skilled operators only who know well the special characteristics of the machine and the safety precautions to be taken.



The Manufacturer disclaims any responsibility for damage to persons or things arising from arbitrary modifications carried out on the machine.

3.10 IMPROPER USE

Improper use means a utilization of the machine following working criteria, which do not comply with the instructions of this manual, and in general, may result in risks for both operators and bystanders.



We list below some of the most frequent and hazardous situations of improper use:

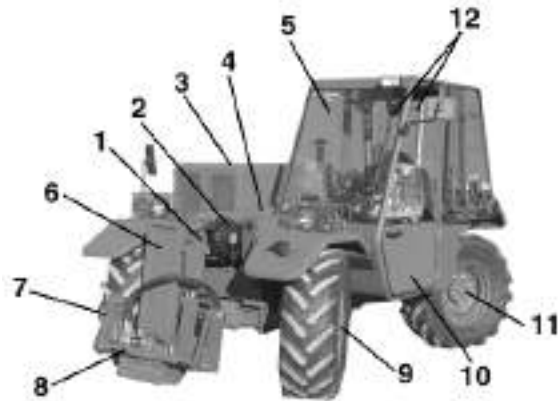
- Carrying passengers on the machine
- Not strictly complying with the operation and maintenance instructions of this manual.
- Working beyond the handler working limits
- Working on unstable edges of ditches
- Working on steep slopes
- Working in potentially explosive environments.

3.11 APPLICABLE STANDARDS

For ensuring the operator's safety, the following standards were followed during the risk analyze of the machine with telescopic boom:

DIRECTIVE	TITLE
89/392 CEE	Machine Directive
98/39 CEE	Steering Devices
86/295 CEE-91/368 CEE	ROPS – FOPS
86/296 CEE-91/368 CEE	Driving Place
88/465 CEE	Seats-Type-Approval
98/40 CEE	Rear view mirrors for agricultural machines
73/23 CEE-93/68 CEE	Low Voltage Directive
74/151 CEE	Tractors–Weight,Plate, etc.
79/532 CEE	Tractors – Lighting and signaling devices
80/720 CEE-97/54 CEE	Tractors–Working Ranges
89/391 CEE	Safety and Health of workers at work
89/336 CEE-92/31 CEE	Electromagnetic compatibility
96/627 CEE	Agricultural Tractors – Noise levels within the driving cab
STANDARD	TITLE
EN292-1/2	Machine Safety – Designing principles
EN294	Machine Safety – Safety distance
EN418	Machine Safety – Emergency stop
EN457	Machine Safety – Audible hazard signaling devices
EN563	Machine Safety - Surface temperature
EN574	Machine Safety – Control devices
EN811	Machine Safety – Safety distance
EN349	Machine Safety – Min. spaces
EN842	Machine Safety – Visible hazard signaling devices
EN982	Machine Safety – Hyd. systems
EN1032/5007/5008	Measurement of vibrations
EN1033/1037	Machine Safety – Prevention of accidental starting
EN1050	Machine Safety – Risk evaluation
EN1088	Machine Safety – Locking Devices
EN4871/ISO5131/7216	Acoustics
NC337-01/ISO5010	Steering devices
NC344-01/05/10	Braking devices
UNI EN 25353	Seat reference point
ISO 3767-1/2	Pictorial signs for the operator's controls
EN ISO 6682	Access to the operation controls
EN 22860/ISO 4252/4253	Minimum access dimensions
ASME B56.6 Stability	Safety standard for rough terrain forklift trucks
SAE J1040,ISO 3471	ROPS – FOPS
SAE J231, ISO 3449	ROPS – FOPS

3.12 LIST OF THE MAIN COMPONENTS



1. 2nd Boom Section
2. Electrical Reel
3. Engine Hood
4. Boom Base Section
5. Driving Cab According to ROPS-FOPS Provisions
6. Boom Tip Section
7. Attachment Holding Frame
8. Attachment Locking Cylinder
9. Left Front Wheel Reduction Gear
10. Cab Door
11. Left Rear Wheel Reduction Wheel
12. Windshield Wipers

3.13 DESCRIPTION OF THE MAIN COMPONENTS

Transmission

Consists of a variable displacement hydraulic pump that drives a hydraulic motor located on the front axle. The pump only begins to drive the motor when the accelerator is depressed. The hydraulic motor adjusts to give maximum torque when under heavy loads, or maximum flow under light loads.

Steering Axles (front and rear) Differential Gears

The front axle (limited slip differential) drives the rear axle (locked differential) thru a drive shaft to provide 4 -wheel drive at all times.

Tires

The machine is equipped with tires suitable sized for the maximum load allowed on the machine. When replacement is necessary, they shall be replaced with new ones having the same dimensions and loading capacity.

Overload Warning System

The standard overload warning system installed on the vehicle enables the operator to work under the safest conditions. At the machine starting, the overload warning system carries out a diagnostics of all LED's then sets to the first green LED signaling the proper functioning of the instrument. Refer to 3B6 manual for more information.

Hydraulic Circuit

Consists of a gear pump connected to the engine which, through a steering valve, dispenses oil to the distributor for the following functions:

- Boom lifting / Lowering
- Telescopic Boom Sections Extension / Retraction
- Fork Rotation
- Fork Locking
- Fork Tilting
- Fork Side Shift
- Steering Valve
- Control Valve

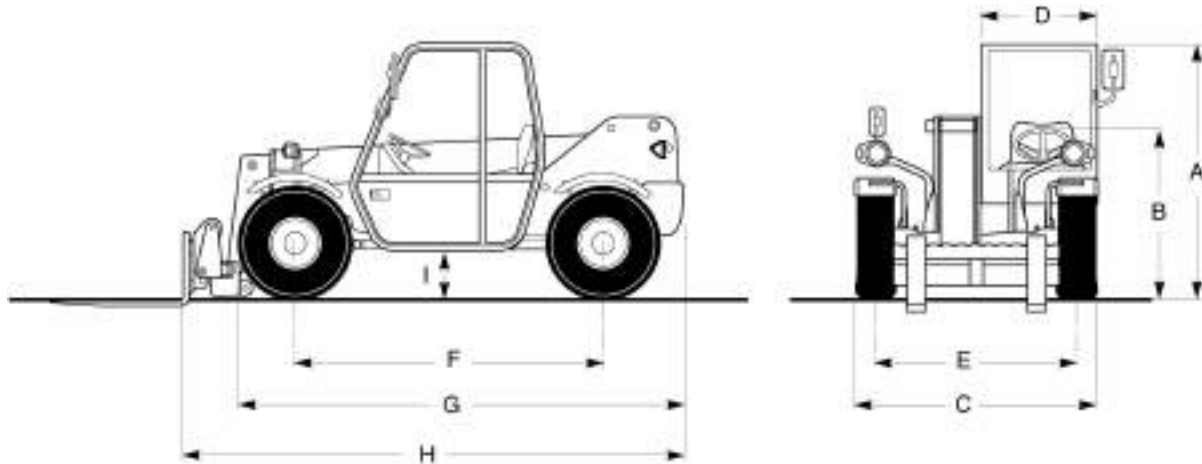
Brake Circuit

Consists of an independent reservoir and circuit: The brake pedal operates a pump which pressurizes the wet disc brakes in the front axle.

3.14 OPTIONAL ACCESSORIES

The machine can be fitted with a wide range of optional accessories, (Terex sales network). Check the accessories, which can be fitted.

3.15 TECHNICAL DATA AND PERFORMANCE



MAIN DIMENSIONS

A	Overheight
B	Height Of Steering Wheel
C	Overall Width
D	Inside Cab Width
E	Track
F	Wheelbase
G	Length At Front Wheels
H	Length At Fork-Holder Plate
I	Ground Clearance
•	Outside Turn Radius

STANDARD

7'	6"	Ft.	In.
4'	11"	Ft.	In.
6'	6"	Ft.	In.
3'	0"	Ft.	In.
4'	11"	Ft.	In.
7'	10"	Ft.	In.
12'	6"	Ft.	In.
14'	8"	Ft.	In.
1'	4"	Ft.	In.
26'	8"	Ft.	In.

Metric

CHARACTERISTIC ANGLES

•	Angle Of Approach	90°
•	Departure Angle	70°

WEIGHT

•	Weight In Running Order	Lb	13450
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SPEED

•	Working Speed (*)	Mph	5.0
•	Travel Speed (*)	Mph	20
•	Max. Slope With Full Load		45%
(*) = either forward or reverse motion			

PAYLOAD AND REACH

•	Max. Lifting Height	Ft. In.	18' 9"
•	Reach At Max. Height	Ft. In.	14' 8"
•	Max. Reach Forward	Ft. In.	10' 9"
•	Implement Holding Plate Rotation		135°
•	Payload At Max. Height	Lb	500
•	Payload At Max. Reach	Lb	1765
•	Payload At 50° Boom Angle	Lb	2205

DIESEL ENGINE

- Make Perkins
 - Model / Type 704-30t
 - Features: Diesel
 - 4 Strokes
 - Direct Injection
 - Cylinders 4 Cylinder In Line
 - Bore X Stroke 3.8 X 3.9 (97 X 100)
 - Total Displacement Cu. In. 180.4 (2956)
 - Power At 2600 Rpm (*) Hp 80
- (*) = Gross Power, Calculated According To The Din 70020 Standard.

ELECTRIC SYSTEM

- Voltage V 24
- Self – Regulated Alternator (On Diesel Engine) V 24
- Battery Ah 2x120

MACHINE NOISE LEVELS

- Drive By @25 feet 68 dBa
- Static @25 feet 61 dBa

PRESSURE SETTING

- Main Distributor Valve 4100 psi
- Propel Pump Valve 6000 psi
- Counterbalance Valve 5100 psi

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SECTION 4

CONTROLS AND INSTRUMENTS

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4.0 PREPARATION, INSPECTION AND ADJUSTMENTS

GENERAL

The following operating suggestions are offered as a reminder rather than as an attempt to instruct.

- a. Always consult the rating chart in the cab for the maximum load, which may be lifted with the various combinations.
- b. Before actually operating the machine each day, perform the pre-operation inspection check list (Section 5)
- c. Clean the windows, headlights, and mirrors to ensure full vision. Also make sure the mirrors are properly adjusted to suit the needs of the operator.
- d. Adjust the operator's seat to provide a comfortable and safe operating position.



Overinflated or overheated tires can burst. A tire burst may result in serious injury; never use the machine if tires are worn, wrongly inflated or damaged.

- e. Check the correct inflation of the tires (see chart below).

Dimensions	375/75 R20 x M27	
Load Index	155A	
Rim	11" x 20"	
Wheel Disc	8 holes DIN 70361	
Pressure	Bar	1.8 (soft) 3.7 (standard)
	PSI	26 (soft) 54 (standard)

- f. Make sure that the tire plies are not cut or worn.



Always use tires having the dimensions indicated in the vehicle registration document.



A tire burst may result in serious injury; never use the machine if tires are worn, wrongly inflated or damaged.

4.1 ADJUSTING THE SEAT

A correct adjustment of the seat ensures the operator a safe and comfortable driving. The operator's seat is fitted with devices, which allow for the adjustment of springing, back rest angle and distance from the controls.

Seat Distance From The Controls

The operator's seat is fitted with an adjusting device that allows sliding the same seat forward or back with respect to the steering column.

Springing Adjustment

Rotate knob (2) clockwise or counterclockwise until obtaining the required springing. Rotate clockwise to increase the seat springing or counterclockwise to reduce it.

Height Adjustment

The seat height can be set to three different positions. To adjust, lift the seat until hearing the characteristic "clack" coupling sound. To lower the seat, raise to stroke end to unlock the mechanism, then release the seat; it automatically sets to the lowest position.

Back rest angle adjustment

The back rest can be adjusted by means of knob (4). Rotated clockwise, it increases the back rest angle; counterclockwise it reduces it.



4.2 FASTENING THE SEAT BELTS

1. Sit correctly in the driving seat.
2. Check that belts are not tangled, then push tab (1) into buckle (2) until it latches.
3. To release the belt push button (3) and remove the tab from the buckle.
4. Adjust the belt across the hips and not on the stomach.
5. The two ends of the buckle can be adjusted separately, by holding the buckle in central position.



4.3 ADJUSTING THE REAR VIEW MIRRORS

The machine is fitted with two rear view mirror.

1. Right rear view mirror (1) is located on a special supporting bracket in an advanced position and allows checking the area behind the machine, on the right-hand side. To adjust its position, manually rotate the joint it is fitted with.
2. Left rear view mirror (2) is placed on the left upper post of the windshield and allows checking the area behind the machine, on the left hand side. To adjust its position, manually rotate the joint it is fitted with.

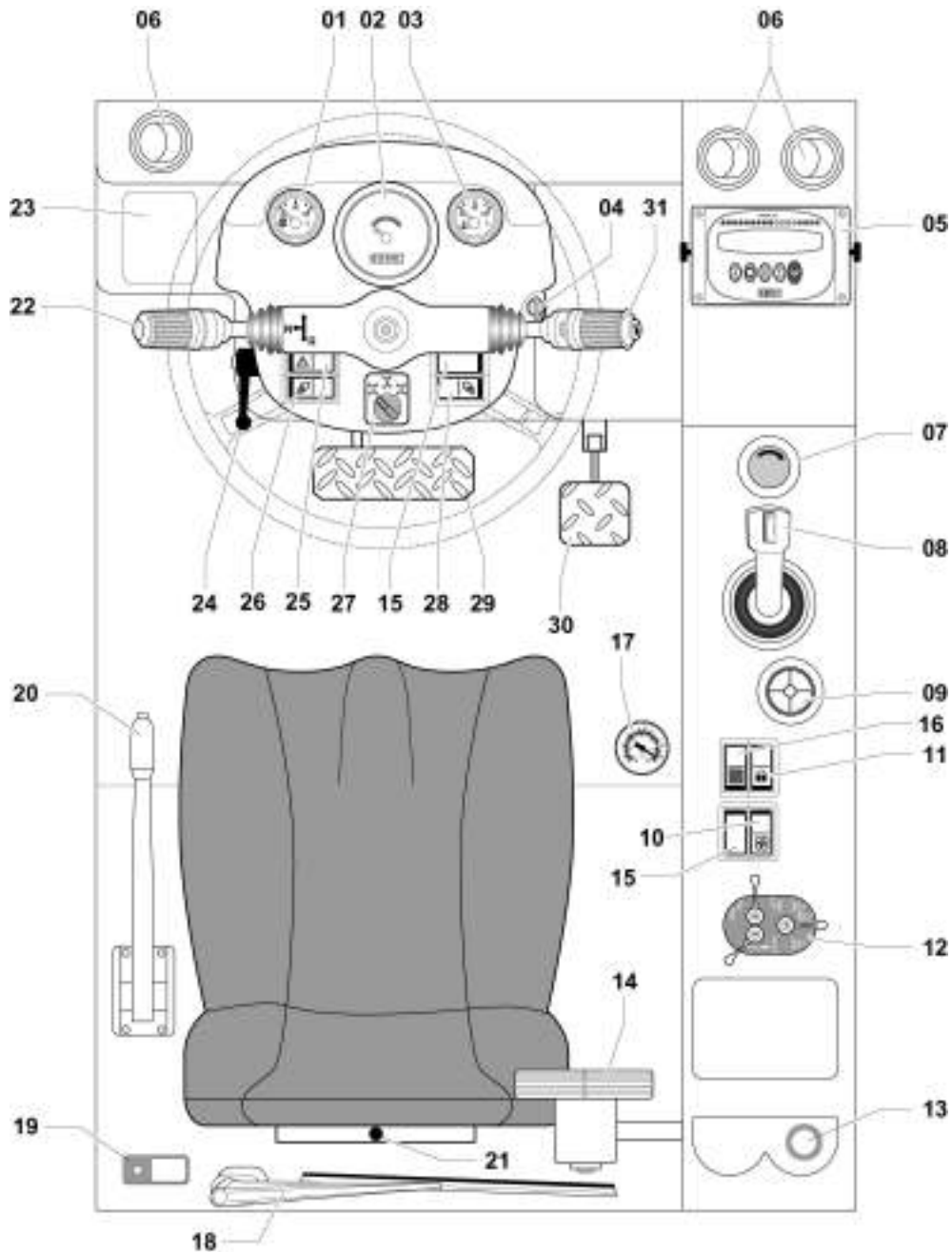


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4.4 CONTROLS AND OPERATIONS

CONTROL IDENTIFICATION

The instruments and controls are shown below. The numbers on the illustration correspond to the numbers on the following list, which identifies the controls and describes their operations.



4.5 CONTROLS AND INSTRUMENTS

01. Hydraulic Oil Temperature
02. Gauge / Indicator Cluster
03. Engine Coolant Temperature
04. Ignition Switch
05. Overload Warning System
06. Air Vents
07. Emergency Stop Button
08. Joystick Lever
09. Machine Level
10. Defroster Fan Switch
11. Work - Travel Switch
12. Blackout Lighting Control Switch
13. Windshield Water Reservoir
14. Cab Fan
15. Blank
16. Fork Side Shift / Rotating Switch
17. Filter Indicator
18. Rear Wiper
19. Dome Light
20. Parking Brake Lever
21. Seat Switch
22. Forward / Neutral / Reverse Speed Lever
23. Fuse / Relay Panel
24. Steering Column Tilt Lever
25. Hazard Lights Switch
26. Front Work Light
27. Steering Selection Switch
28. Rear Work Light
29. Brake Pedal
30. Accelerator Pedal
31. Turn Signals / Horn / Wiper / Windshield Washer Switch

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4.6 CONTROL DESCRIPTION

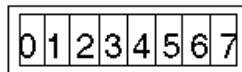
1. **Hydraulic Oil Temperature Indicator** – Indicates the oil temperature within the reservoir.



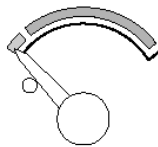
2. **Gauge / Indicator Lights:**



- a. **Hourmeter** – This indicates the running time of the engine in hours.



- b. **Fuel Gauge** – Indicates the amount of fuel remaining in the fuel tank.



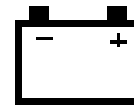
- c. **Hazard Light** – Green indicator signaling when position lights are ON.



- d. **Water Temperature Indicator** – Indicates when engine coolant is overheated.



- e. **Low Battery Charge** – Signals a low charge from the alternator.



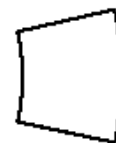
- f. **Low Engine Oil Pressure** – This indicator will light up when engine oil pressure is too low. Stop the engine.



- g. **Parking Brake Engaged** – Indicates the parking brake is engaged.



- h. **Blank** – Not used



- i. **Turn signal Indicator** – Green indicator signaling when turn signals are ON.



3. **Engine Coolant Temperature** – Indicates the engine coolant temperature.



Engine cannot be started if the parking brake is not engages, operator completely sitting in seat and Forward/Neutral/Reverse lever in Neutral.

4. **Ignition Switch** - This switch is used to energize the electrical system of the machine and start the machine.



Before using the machine, make sure that the first green LED of the overload warning system is ON.

The overload warning system must not be used to check the load to be lifted. During work if, several indicators light up, operate the levers more smoothly.



This machine is equipped with overload warning, when machine is out of balance and / or over capacity the overload warning system will shut down the Boom Down and Telescope Out functions. However Boom Up and Telescope In functions are still available to reposition load to a more stable area.

5. **Overload Warning System** – A LED warning display. The LED's switch on in sequence from the right to the left and indicates the gradual variation of the machine stability as follow:



Green LED

- 0-89% of capacity
- normal operation

Yellow LED

- 90-100% capacity

Red LED

- hazardous overload; boom down, extend cut and allows only for the load return within safety limits.

At the machine starting, the overload warning system carries out a diagnostics of all LED's then sets to the first green LED signaling the proper functioning of the instrument.

6. **Air Vents** – Allows air flow in the cab. Rotate the vent to direct the air flow.



7. **Emergency Stop Button** – Any operated function can be stopped by pressing the emergency stop button. This button allows shutting the engine down. To reset, rotate the button clockwise.



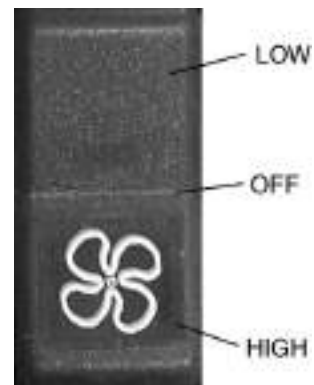
8. **Joystick Lever** – Controls the Boom / Attachment function see section on control levers functions (page)



9. **Machine Level** – Use this device to ensure that the machine is level.



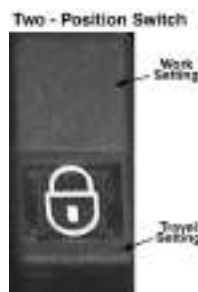
10. **Defroster Fan Switch** – Three – position switch that controls the speed of the fan. Press switch up for low speed, Press down for high speed.





When traveling with or without a load, depress the Work - Travel Switch to lockout tilt, side shift, rotation functions on the attachment and to lockout crab and 4-wheel modes.

11. **Work - Travel Switch** – When traveling with or without a load this switch prevents operations of attachment functions and steering in crab and 4-wheel modes.



- (a). Press the switch down to select the Travel Setting. This disables all attachment functions, steering in crab and 4-wheel modes.
- (b). Press the switch up to select the Work Setting and enable all attachment functions and all steering modes.

12. **Blackout Lighting Control Switch –**

- (a) Mechanical Lockout Lever
 - Unlock switch by moving the lock CCW when operating the light and auxiliary switch or damage can occur to the switch mechanism.
 - The Mechanical Lock prevents accidental switching in Blackout Modes.
- (b) Lighting Control Lever
 - BO Drive position – Operates the blackout headlight, blackout stoplight-taillights and all four blackout marker lights. All internal, external lights, horn and backup alarm are not operable when blackout lights are in operation. The Auxiliary Switch lever can operate indicator lights on the dash.
 - BO Marker position – Operates the two front and two rear blackout markers. All internal and external lights, horn and the backup alarm are not operable when blackout markers are in operation. The Auxiliary Switch lever can operate indicator lights on the dash.

- Off position – All lights, backup alarm, horn, panel lights, blackout headlight, blackout stoplight taillights and all four blackout marker lights are inoperable.
- Stop Light position – Operates taillights, horn and the backup alarm. Blackout headlight, blackout stoplight-taillights and blackout markers are not operable.
- Ser. Drive position – All lights, taillights, and horn and the backup alarm are operable. Blackout stoplight-taillights and blackout markers are not operable.
- Ser. Drive position – All lights, taillights, and horn and the backup alarm are operable. Blackout headlight, blackout stoplight – taillights and blackout markers are not operable.

(c) Panel Light Control lever

- Panel Brt. position – Operates the bright indicator lights on the dash.
- Dim position – dims the indicator lights on the dash.
- Off position – indicator lights on the dash are inoperable.
- Park position – dims the indicator lights on the dash.



13. **Windshield Water Reservoir** – Holds the washer / water solution.



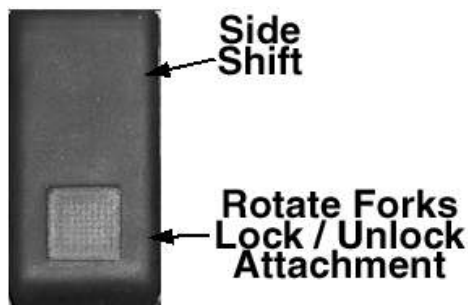
14. **Cab Fan** - To turn the fan on and off use the on / off switch bottom side of fan.



15. **Blank**



16. **Side Shift / Rotate Function Switch** – Works in conjunction with the rocker switch on the joystick control lever.



17. **Filter Indicator** - Indicates the degree of clogging so you will know when to change filter.

ATTENTION

Operating with indicator in red can damage the transmission pump and motor. You must change the filter. Do not wait until the filter change interval is reached.

Green Area - 0-20 (PSI) is normal condition.

Yellow Area - 20-25 (PSI) Prepare to change filter

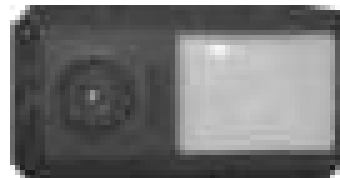
Red Area - 25-30 (PSI) Shut the machine down and change the filter.



18. **Rear Wiper** – To operate the rear wiper depress the rocker switch on the wiper motor box.



19. **Dome Light** - Three position side switch. Turn on / off to light the cab. Center position Off, Forward position Dome Light Rear Position Spot / Map Light.



20. **Parking Brake Lever** – To engage the parking brake, pull the lever upward while holding the locking button pressed. Release the button when reaching the required braking tension. This brake when engaged, by means of a proximity switch allows the machine to start and prevents transmission from going forward or reverse.



Never use the parking brake to slow down the machine, unless in an emergency. This could cause damage to the parking brake.



Engine cannot be started if the parking brake is not engaged, operator completely sitting in seat and Forward/Neutral/Reverse lever in Neutral.

21. **Seat Switch** - Located on bottom of seat. Enables the engine from starting unless operator is sitting in set.



Engine cannot be started if the parking brake is not engaged, operator completely sitting in seat and Forward/Neutral/Reverse lever in Neutral.

22. **Forward / Neutral / Reverse Speed Selection Lever** – Three position switch with locking in neutral position:



Engine cannot be started if the parking brake is not engaged operator completely sitting in seat and Forward/Neutral/Reverse lever in Neutral.



- | | |
|---|--|
| N | Neutral position; drive not engaged. |
| F | Raise and shift lever to pos. F to select forward. |
| R | Raise and shift lever to pos. R to select reverse. |

23. **Fuse / Relay Panel** – The electrical system is protected by fuses placed into the driving cab, on the left of steering column. Before replacing a blown fuse with a new one having the same amperage, find out why the fuse has blown.



Do not use fuses having higher amperage than that recommended, since they can damage the electric system seriously.



If the fuse blows after a short time, look for the fault source by checking the electric system.

Always keep some spare fuses for an emergency.

Never try to repair or short blown fuses.

Make sure the contacts of fuses and fuse sockets ensure a good electric connection and are not oxidized.

24. **Steering Column Tilt Lever** – Both the steering column and dashboard can be set to a different angle. Loosen the control lever and adjust column as required then retighten to lock the column in place.



Before driving the machine, ensure the steering wheel is locked in place.



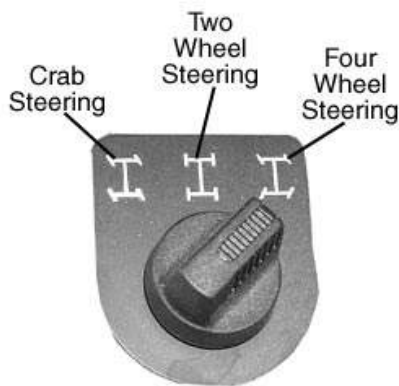
25. **Hazard Light Switch** – Fitted with on-off position, it switches on the hazard lights.



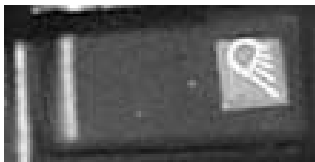
26. **Front Work Light** - A spot light located on the front of the machine, used for night working.



27. **Steering Selection Switch** – Three position switch for selecting the steering mode, See Steering / Tire Alignment.



28. **Rear Work Light** - A spot light located on the rear of the machine, used for night working



29. **Brake Pedal** – Gradually step on the brake pedal to decelerate and stop the machine. The brake operates on the front axle only.



30. **Accelerator Pedal** – Controls the engine rpm. and the machine speed. It is fitted with an adjustable stop located behind the pedal in cab.



31. **Turn Signals / Horn / Wiper / Windshield Washer Switch** –



- a. **Turn Signals** – Set lever to pos. 1 to indicate a turn left or to pos. 2 to indicate a turn to the right.
- b. **Windshield Wiper** – To operate the windshield wiper, rotate the lever tip to one of the four positions:

0	Wiper OFF
J	Timed wiper (if available)
1	Low Speed
2	High Speed

- c. **Windshield Washer** – Push the second stage of the lever to spray windshield washer solution on the windshield.
- d. **Horn Function** – By pressing the lever built- in button, horn will sound.

4-7 CONTROL LEVER

Handlers are equipped with a piloted supplied service control lever. Only one function can be operated at a time.

The lever is equipped with a two-position button that returns to central position for the selection of the Fork Attachment functions: Side Shift, Rotate, Tilt and Disconnect Attachment.

Additionally, when operated in the four directions (right / left, forward / back) it allows for the control of the boom functions (up / down, retract / extend) and the Fork Attachment functions (forward / rearward tilting), (left/right side shift), Rotate clockwise / counter clockwise, connect / disconnect attachment.



Smoothly move the control lever. The motion speed of the actuators depends on the lever position: a small motion results in a slow control movement of the actuators; vice versa, a full range motion of the lever corresponds to the max. speed of the actuator.

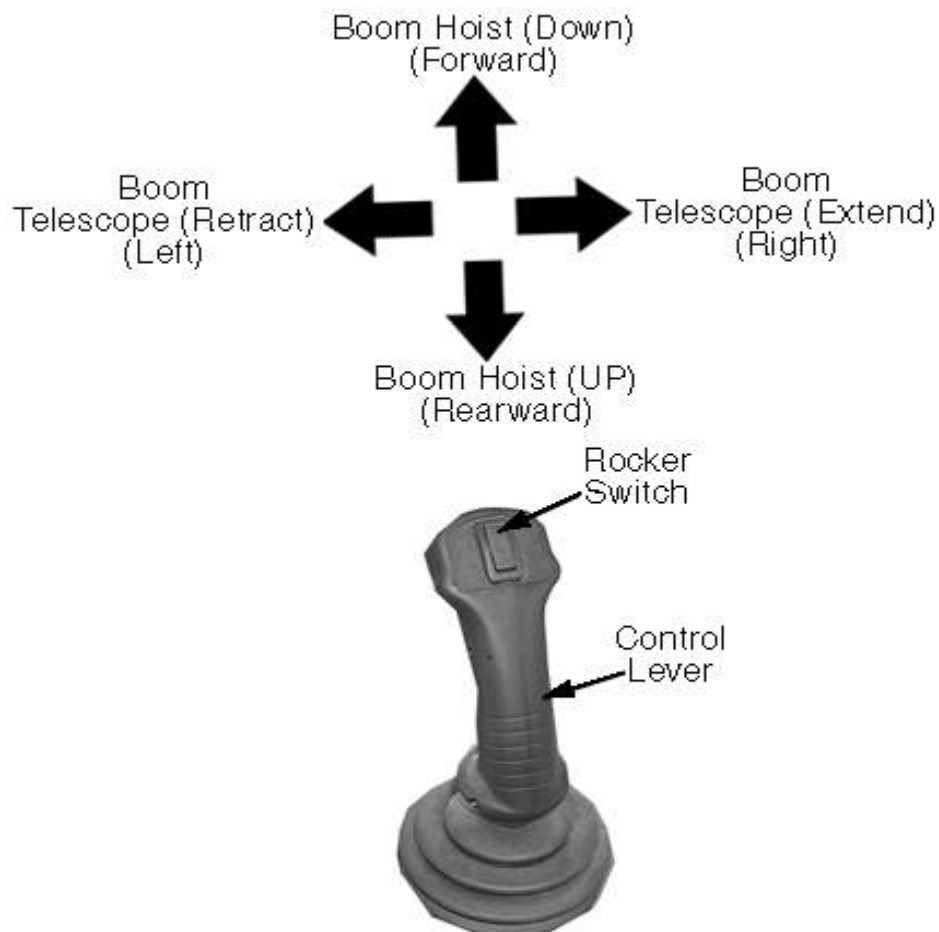


Before operating the control lever, make sure that nobody is within the working range of the machine.

4-8 OPERATING THE CONTROL LEVER

The control lever is enabled to carry out the following functions:

- Boom hoist (Up / Down) is operated by moving the lever forward or rearward.
- Boom Reach (Telescoping) is operated by moving the lever to the left or right.
- Fork Tilting, Side Shifting or Rotating is operated by depressing the rocker switch and moving the control lever in the proper position.

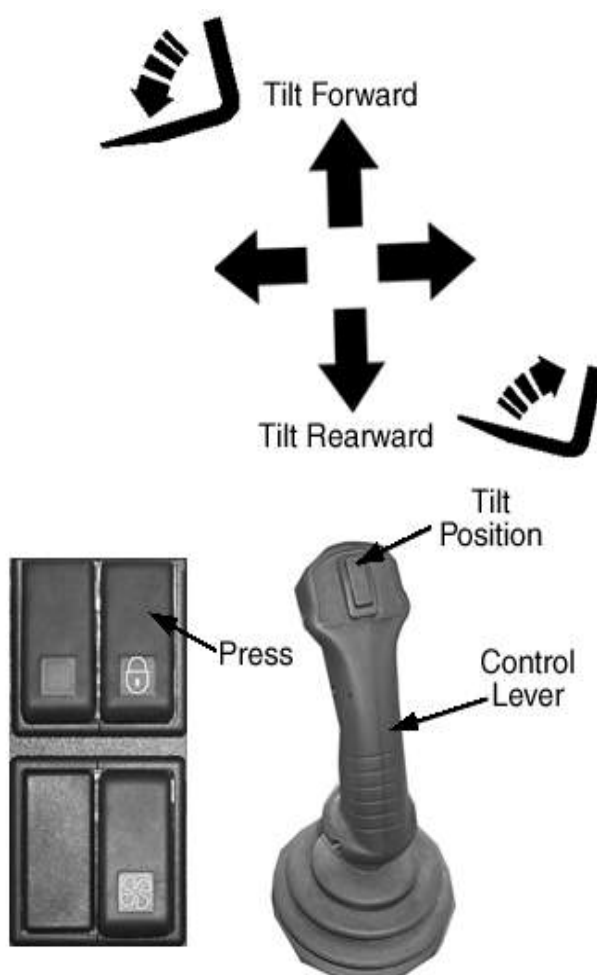


4-9 Tilting the Forks Forward and Rearward



Before operating the boom, make sure that nobody is within the working range of the machine.

- Depress the rocker switch forward to tilt position.
- Shift the lever forward to tilt the forks forward.
- Shift the lever rearward to tilt the forks rearward.

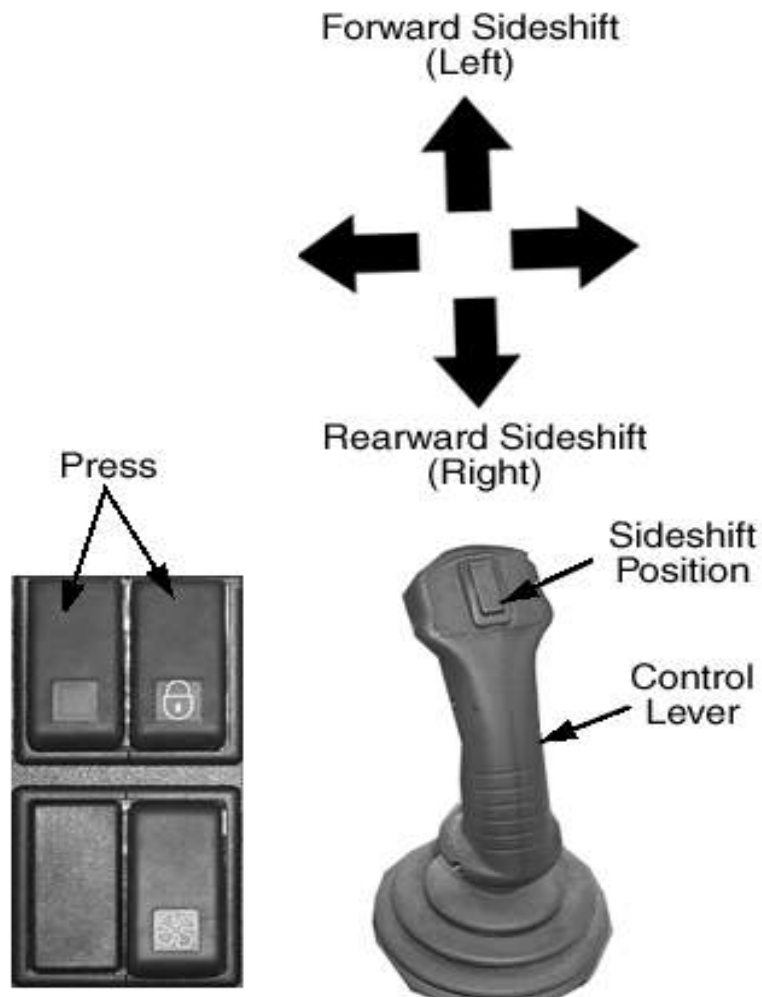


4-10 Side Shifting The Forks



Before operating the Forks make sure that nobody is within the working range of the machine.

- Ensure the side shift / Rotate rocker switch is depressed in the Side Shift Position.
- Depress the rocker switch on the lever to the Side Shift Position.
- To Side Shift the Forks left move the control lever forward.
- To Side Shift the Forks right, move the control lever rearward.

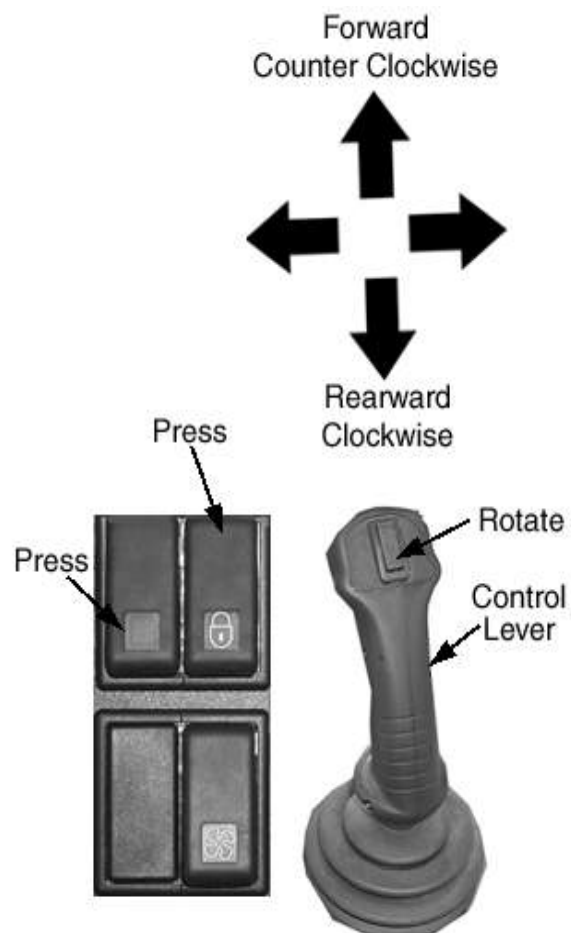


4-11 Rotating The Forks



Before operating the boom, make sure that nobody is within the working range of the machine.

- Ensure the side shift / rotate rocker switch is in the rotate position.
- Depress the rocker switch on the control lever to the rotate position.
- To rotate the fork clockwise move the control lever rearward.
- To rotate the forks counter clockwise move the control lever forward.



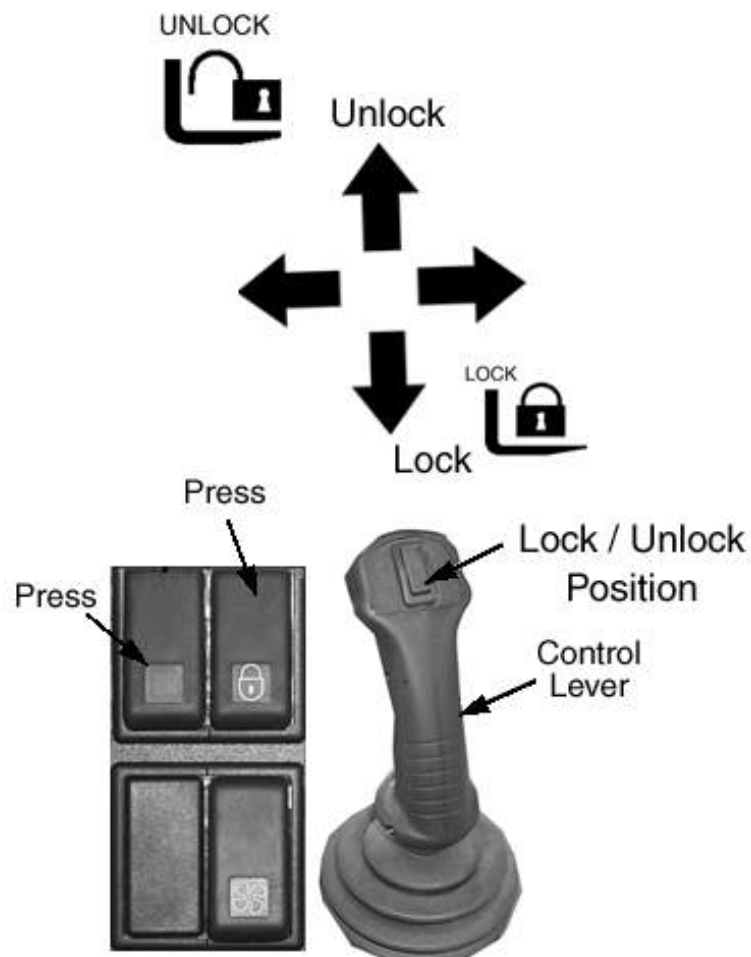
4-12 Quick-Coupling the Fork Attachment



Before operating the boom, make sure that nobody is within the working range of the machine.

To lock / unlock the attachment couplings, it is necessary to change the connection of the hydraulic lines to the control valve placed on the fork carriage carrier element.

- Disconnect both quick couplings controlling the fork rotation.
- Connect hoses to feed the locking cylinder.
- Depress the rocker switch on the control lever to the lock/unlock position.
- To unlock the fork attachment move the lever forward.
- To lock the fork attachment move the lever rearward.



SECTION 5 PRE-OPERATION INSPECTION AND ADJUSTMENT

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5-0 PREOPERATION INSPECTION AND ADJUSTMENT

General

The following operating suggestions are offered as a reminder rather than as an attempt to instruct since a machine of this size must not be entrusted to anyone except a fully qualified operator.

1. Read and understand section 4 'Controls and Instruments' prior to starting this machine.
2. Always consult the rating chart in the cab for the maximum load which may be lifted.
3. Engine RPM's may need to be increased to smoothly function the hydraulic controls.

5.1 PREOPERATION INSPECTION AND CHECK LIST

Before starting the engine check the items below for safe conditions:

- _____ Fluid Leaks
- _____ All Windows Clean
- _____ All lights Clean
- _____ Tire and Wheels
- _____ Guards in Place
- _____ Operators Manual
- _____ Rating Chart in Cab
- _____ Boom Slide Pads
- _____ Engine Air Cleaner
- _____ Engine Oil Level
- _____ Hydraulic Oil Level
- _____ Brake Oil
- _____ Engine Coolant Level
- _____ Windshield Wiper Solvent

Before operating the machine verify the controls and functions listed below:

- _____ Horn
- _____ Gauges
- _____ Brake Lights
- _____ Reverse Lights
- _____ Head Lights
- _____ Turn Signal Lights

- _____ Black Out Lights
- _____ Wiper (Front and Rear)
- _____ Park Brake
- _____ Forward / Reverse
- _____ Service Brake
- _____ Accelerator
- _____ Back Up Alarm
- _____ Steering All 3 Selections
- _____ Wheel Alignment
- _____ Boom Up/Down
- _____ Boom Telescope Out/In
- _____ Fork Tilt Up/Down
- _____ Fork Side- Shift Left / Right
- _____ Fork Rotate CW/CCW
- _____ Attachment Lock Out

5.2 STARTING THE ENGINE

ATTENTION

Do not operate the starter motor for more than 20 seconds at a time. If the engine fails to start within that time, release the switch lever and wait 2 minutes before trying again. If this precaution is not followed serious damage to the starter motor may result.

To start the engine proceed as follows:

1. Set the battery disconnect switch (located on the rear of the battery box) to the on position by turning the switch clockwise.



2. Apply the parking brake.
3. Place the gear lever in the NEUTRAL (N) position.

4. To start the engine, turn the ignition switch on and release when the engine starts. If the engine does not start within 20 seconds, release the switch lever and wait at least 2 minutes before attempting again.
5. As soon as the engine starts reduce engine speed to idle. Wait some seconds before engaging a gear; this allows for a gradual warm up of the engine oil and a better lubrication.
6. Place the gear lever in the forward or reverse position.
7. Release the parking brake.
8. Slowly press the accelerator pedal to start moving.
5. Then install the supply end to the supporting machine. Start the supporting machine to supply maximum voltage to the disable system.
6. Only from the operator's seat of disabled unit, attempt to start the unit, using proper starting procedures, explained in section 5.2 "Starting the Engine".
7. Upon the starting of disabled machine disconnect the slave cable from the supporting machine. Then from the machine that was disabled.
8. Reinstall weather cover on both units.

5.3 JUMP-STARTING THE ENGINE



When jump-starting the engine through the battery of another machine, make sure that the two vehicles cannot collide to prevent formation of sparks. Batteries give off a flammable gas and sparks may ignite it and cause an explosion.

Do not smoke when checking the electrolyte level.

Keep any metal object like buckles, watch straps, etc. clear of the battery positive (+) terminal. These elements can short between the terminal and nearby metal work and the operator can get burned.

The booster supply must have the same rated voltage and output of the battery installed on the handler.

To jump-start the engine with Nato Slave Connection:

1. Set the gear switch to the neutral position, and engage the parking brake.
2. Remove cover from Nato Slave connection.
3. Install the slave connection support cable into the disabled unit.
4. Check that brakes on supporting machine are set.

5.4 BATTERY DISCONNECT SWITCH

At the end of operation or during maintenance and repair work, especially while welding, set the battery disconnect switch (located on the rear of the battery box) to the off position by turning the switch counter-clockwise.



5.5 STOPPING / PARKING MACHINE



Always face the machine when getting off the driving cab; make sure that your hands and shoe soles are clean and dry, and hold to the handholds to prevent falls and slips.



Always engage the parking brake when stopping the machine to prevent any accidental motion of the vehicle.

To stop and park the machine proceed as follows:

1. When possible, stop the machine on a dry, level and firm ground.
2. Bring the machine to a smooth stop by easing up the accelerator pedal and stepping down on the brake pedal.
3. When stopped engage the parking brake and ensure its indicator lights up.
4. Release the service brake pedal.
5. Rest the attachment coupled to the boom flat on the ground.
6. Get out the operators cab and close the cab door.
7. Set the battery cutout switch to OFF position.

5.6 REFUELING MACHINE



1. Never fill fuel tank while engine is running.
2. No smoking or open flames
3. Avoid spillage.
4. Spillage of oil or fuel shall be carefully washed away or completely evaporated.
5. Never operate machine with a leak in the fuel system. All make sure fuel cap is on fuel tank before starting machine.

To refuel the machine proceed as follows:



1. Turn off the machine.
2. Remove the diesel fuel cap from the fuel tank.
3. Fill fuel tank with diesel fuel only. Do not over fill tank.
4. Replace fuel tank cap and restart machine

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SECTION 6
LUBRICATION

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6.0 LUBRICATION

General

This section covers the lubrication of this machine and includes lubrication charts for the purposed of showing the lubrication points. The various capacities of this machine, and listing the lubricant specifications, are included.

Lubrication

To ensure proper operation of this machine, all points requiring lubrication must be serviced with the correct lubricant at the proper time interval as shown on the lubricant chart. All normal wear points, which require lubrication, are shown in the lubrication charts. The possible exception, lubrication information concerning major purchased components, information concerning purchased components, see the manufacturer's manual. If any conflict exists between the lubrication recommendations contained in this manual and the original manufacturer's service recommendations, the original manufacturer's recommendations take precedence. Points (levers, linkages, pins etc.) should be lubricated with an oil can once a week. Use a few drops of engine oil on each exposed pin or lever not equipped with grease fittings to prevent rust and to provide the limited lubrication required.

6.1 LUBRICANT SPECIFICATIONS

ATTENTION

The lubrication specifications that follow were in effect at the time this manual was printed. These specifications are periodically updated to include the most recent lubricants issued by lubricant manufacturers.

The following list defines three terms. Each one of the terms can be used to identify the type of lubricant needed to satisfy the lubricant specifications listed in the lubrication charts (see page 59)

1. **Terex Specification Number.** This number is used in the Material Specifications system to identify a specific type of lubricant.

2. **Military Specification Number.** This number is used in the military lubrication system to identify a specific type of lubricant. This lubricant identified by the specification number that is listed in the same row of the lubricant specification chart.

ATTENTION

The absence of an entry in the Military Specification Column of a lubricant specification chart does not mean that the recommended lubricant does not have an equivalent military specification. It may mean that the lubricant has not been tested by the military because it is a relatively new lubricant. For this reason, the lubricant may not be certified as meeting the standards of a particular military specification even though it may be perfectly capable of meeting the military standards.

3. **Equivalent Lubricant.** These are lubricants that presently meet the Terex standards. These lubricants are listed under the manufacturer's trade names. The absence of a lubricant from this list does not mean that Terex considers the lubricant unsuitable. It means that Terex has not yet tested the lubricant. The order in which the lubricants appear on any list does not signify any preference or superiority of any brand name. The listings are purely random and all products on the list are equally acceptable.

4. During extreme operating conditions below 32 degrees use lubricants listed in Lube and Fluid Chart shown on page 81.

- | | |
|-------------------|--|
| A. Grease: | NLGI #1
MIL-G-10942C
MIL-G-3278A |
| B. Hydraulic Oil: | MIL-H24459
DIN 51524
DENISON HF-0
VICKERS M-2950-S
GM LS-2
(ISO 32) |
| C. Engine Oil: | MIL-L-2104 F
API CD-CE
(SAE 5W-20) |

6.2 LUBRICANT CHART

SERVICE / LUBRICATION CHART TX51-19M
FOR ADVERSE WEATHER CONDITIONS SEE OPERATORS MANUAL

INTERVAL	SERVICE POINTS	IDENTIFICATION	SERVICE REQUIRED	SAE	VISCOSITY	AMLI LUBRICANT	API	SERVICE LOCATION
50 HOURS OR WEEKLY	1	ENGINE OIL	CHECK	15W-40	15W-40	HL-L-210AF	CH-4	DISPENSE ON ENGINE SIDE
	1	ENGINE COOLANT LEVEL	CHECK	---	---	---	---	OVERFLOW RESERVOIR, REAR ENGINE SUPPORT
	1	ENGINE FUEL PRE-FILTER	CHECK	---	---	---	---	UNDER FUEL TANK
	1	HYDRAULIC RESERVOIR OIL	CHECK	HM-30	30C AG	HL-H-3000	29-3	LIFT ARM & OPERATING LEVER RESERVOIR, REAR ENGINE SUPPORT
	1	SPARE RESERVOIR	CHECK	---	---	---	---	END OF BOOM
	8	BOOM PIVOT	LUBE	HM-30	30C AG	HL-H-3000	29-3	4 INCH AXLE, TOP & BOTTOM EACH END
	8	AXLE PIVOTS	LUBE	HM-30	30C AG	HL-H-3000	29-3	TOP OF REAR AXLE
	1	AXLE REAR PIVOT PIN	LUBE	HM-30	30C AG	HL-H-3000	29-3	BEARING EACH END OF CR. LEVER
	9	CR. LEVER	LUBE	HM-30	30C AG	HL-H-3000	29-3	PLATE
	1	STEERING JOINT	LUBE	HM-30	30C AG	HL-H-3000	29-3	IRON PIVOT & JOINT OF BOOM
	2	BOOM PIVOT	LUBE	HM-30	30C AG	HL-H-3000	29-3	STEERING JOINT
	2	DRIVESHAFT BOLTS	CHECK	---	---	---	---	6 EACH JOINT, THREADED 25 FT/LB
2	WHEEL NUTS	CHECK	---	---	---	---	1 EACH, 54 PSI TORQUE 11 EACH WHEEL, TORQUE 294 FT/LB	
250 HOURS OR MONTHLY	1	ENGINE OIL	CHECK	15W-40	15W-40	HL-L-210AF	CH-4	DISPENSE VALVE, REAR ENGINE SUPPORT
	1	ENGINE COOLANT	CHECK	---	---	---	---	SPECIFIC GRAVITY OVERFLOW RESERVOIR
	1	FUEL AIR FILTER	CHECK	---	---	---	---	JACOBY
	4	HYDRAULIC RESERVOIR OIL	CHECK	HM-30	30C AG	HL-H-3000	29-3	DISPENSE VALVE, REAR ENGINE SUPPORT
	7	AXLE, WHEEL BROS OIL	CHECK	HM-30	30C AG	HL-H-3000	29-3	LEVEL PLUG, 2 EACH AXLE
	2	ENGINE DRIVE BELT	CHECK	---	---	---	---	FRONT OF ENGINE ON REAR FENDER
500 HOURS OR QUARTERLY	1	ENGINE OIL	CHANGE	15W-40	15W-40	HL-L-210AF	CH-4	ENGINE OIL PAN
	1	ENGINE AIR FILTER	CHANGE	---	---	---	---	UNDER HOOD
	1	ENGINE OIL FILTER	CHANGE	---	---	---	---	ON ENGINE SIDE
	4	ENGINE FUEL FILTER	CHANGE	---	---	---	---	ON ENGINE SIDE
	1	ENGINE GLOW PLUGS	CHECK	---	---	---	---	ENGINE
	1	HYDRAULIC RESERVOIR FILTER	CHANGE	---	---	---	---	OUTSIDE RESERVOIR
1000 HOURS OR YEARLY	1	ENGINE VALVE TYP. CLEARANCE	CHECK	---	---	---	---	ENGINE
	1	ENGINE AIR FILTER	CHECK	---	---	---	---	UNDER HOOD
	1	ELECTRIC STARTER	CHECK	---	---	---	---	ENGINE
	1	FUEL INJECT. SYSTEM	CHECK	---	---	---	---	ENGINE
	1	HYDRAULIC RESERVOIR OIL	CHANGE	HM-30	30C AG	HL-H-3000	29-3	RESERVOIR AND OIL FULL LINE
	1	HYDRAULIC RESERVOIR FILTER	CHANGE	---	---	---	---	OUTSIDE RESERVOIR
1500 HOURS OR 2 YEARS	1	ENGINE OIL	CHANGE	15W-40	15W-40	HL-L-210AF	CH-4	ENGINE OIL PAN
	1	ENGINE AIR FILTER	CHANGE	---	---	---	---	UNDER HOOD
	1	ENGINE OIL FILTER	CHANGE	---	---	---	---	ON ENGINE SIDE
	1	ENGINE FUEL FILTER	CHANGE	---	---	---	---	ON ENGINE SIDE
	1	ENGINE GLOW PLUGS	CHECK	---	---	---	---	ENGINE
	1	HYDRAULIC RESERVOIR FILTER	CHANGE	---	---	---	---	OUTSIDE RESERVOIR
2000 HOURS OR 3 YEARS	1	ENGINE OIL	CHANGE	15W-40	15W-40	HL-L-210AF	CH-4	ENGINE OIL PAN
	1	ENGINE AIR FILTER	CHANGE	---	---	---	---	UNDER HOOD
	1	ENGINE OIL FILTER	CHANGE	---	---	---	---	ON ENGINE SIDE
	1	ENGINE FUEL FILTER	CHANGE	---	---	---	---	ON ENGINE SIDE
	1	ENGINE GLOW PLUGS	CHECK	---	---	---	---	ENGINE
	1	HYDRAULIC RESERVOIR FILTER	CHANGE	---	---	---	---	OUTSIDE RESERVOIR

6.3 LUBE AND FLUID CAPACITY CHART

ABOVE 32 DEGREES F				
WHERE USED	FLUID	CAPACITY	SPECIFICATION	VISCOSITY
ENGINE	OIL	8.5 QUARTS	MIL-L 2104 F API CD-CE	SAE 15W-40
ENGINE COOLING SYSTEM	ANTIFREEZE /WATER	TOTAL 6.6 GALLONS	ANTIFREEZE ASTM D3306-74 50/50 MIX	USE 50% WATER, 50% ANTIFREEZE
FRONT AXLE DIFFERENTIAL	GEAR OIL	6.6 QUARTS	ASTM D445 API GL-4	SAE 10W-30
REAR AXLE DIFFERENTIAL	GEAR OIL	5.5 QUARTS	ASTM D445 API GL-4	SAE 10W-30
FRONT WHEEL REDUCTION	GEAR OIL	1.8 QUARTS	ASTM D445 API GL-4	SAE 10W-30
REAR WHEEL REDUCTION	GEAR OIL	.7 QUARTS	ASTM D445 API GL-4	SAE 10W-30
HYDRAULIC RESERVOIR	Hydraulic Oil	18.5 GALLONS	MIL-H24459 DIN 51524 DENISON HF-0 VICKERS M-2950-S GM LS-2	ISO 46
BRAKE RESERVOIR	Hydraulic Oil	1 PINT	MIL-H24459 DIN 51524 DENISON HF-0 VICKERS M-2950-S GM LS-2	ISO 46
TELESCOPIC BOOM SECTIONS (SURFACES AT WEAR PAD CONTACT)	GREASE		NLGI #2	
CHASSIS & BOOM GREASE FITTINGS	GREASE		NLGI #2	

BELOW 32 DEGREES F				
WHERE USED	FLUID	CAPACITY	SPECIFICATION	VISCOSITY
ENGINE (SEE PERKINS FOR BELOW 10°F)	OIL	8.5 QUARTS	MIL-L 2104 F API CD-CE	SAE 5W-20
ENGINE COOLING SYSTEM	ANTIFREEZE /WATER	TOTAL 6.6 GALLONS	ANTIFREEZE ASTM D3306-74 50/50 MIX	USE 50% WATER, 50% ANTIFREEZE
HYDRAULIC RESERVOIR	Hydraulic Oil	18.5 GALLONS	MIL-H24459 DIN 51524 DENISON HF-0 VICKERS M-2950-S GM LS-2	ISO 32
BRAKE RESERVOIR	Hydraulic Oil	1 PINT	MIL-H24459 DIN 51524 DENISON HF-0 VICKERS M-2950-S GM LS-2	ISO 32
TELESCOPIC BOOM SECTIONS (SURFACES AT WEAR PAD CONTACT)	GREASE		NLGI #1 MIL-G-10942C MIL-G-3278A	
CHASSIS & BOOM GREASE FITTINGS	GREASE		NLGI #1 MIL-G-10942C MIL-G-3278A	

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SECTION 7

PREVENTIVE MAINTENANCE

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7.0 PREVENTIVE MAINTENANCE

ATTENTION

The following suggested schedule check sheets are based on average operating conditions. The type of work being done, size of loads, and ground and weather conditions are all factors which must be considered when establishing a maintenance schedule for the machine. The suggested schedule basis is given for hours of operation and calendar intervals.

GENERAL

The actual operating environment of the machine governs the maintenance schedule. The suggested check sheets on the following pages indicate the areas of the machine to be checked and the intervals at which they should be checked.

Any changes in the established maintenance schedule should be preceded by a complete reanalysis of the machine operation. Carefully study previous maintenance sheets and records before making changes in, or extending, the check intervals.

The lubrication charts in Section 3 provide general locations of the individual service points and list the type of lubricant, which should be used for each component. This machine has the engine mounted on the right side of the machine; all service location references will be made with this in mind.

The relief valves are factory preset. Adjusting the valve in the field will void machine warranty. Valves must be set only by trained personnel.

7.1 USING THE SUGGESTED SCHEDULE CHECK SHEETS

The maintenance schedule check sheets are designed as a preventative maintenance guide, until adequate experience is obtained to establish a schedule to meet a specific operating environment. Following the check sheets are detailed procedures, grouped in check intervals, describing the procedure that should be used to perform the check sheet operation. The check sheets can be reproduced by any printer to obtain additional copies. Maintenance personnel making each check should then indicate on the sheet that the required check has been completed, and the machine will be ready for additional service until the next check is due. Completed check sheets should be retained as a permanent part of the machine's maintenance records for future reference.

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7.2 'A' MAINTENANCE CHECKS – 50 HOURS OR WEEKLY SERVICES

Company Name _____

Company Address _____

Maintenance Person _____

Date Performed _____

Model Number _____ Serial Number _____

MAINTENANCE POINT		PERFORMED BY
	Check Engine Oil Level	
	Check Coolant Level	
	Drain Fuel Pre-Filter	
	Check Hydraulic Oil Level	
	Check Brake Reservoir	
	Lube Boom Pads	
	Lube Drive Shaft	
	Lube Axle King Pins	
	Lube Rear Axle Pivot	
	Lube Cylinder	
	Lube Fork Attachment	
	Lube Boom Pivot	
	Check Tire Inflation	
	Check Wheel Lug Nuts Torque	
	Check Drive Shaft Bolt Torque	

7.3 'B' MAINTENANCE CHECKS – 250 HOURS OR MONTHLY SERVICES

Company Name _____

Company Address _____

Maintenance Person _____

Date Performed _____

Model Number _____ Serial Number _____

MAINTENANCE POINT		PERFORMED BY
	Check and Sample Engine Oil	
	Check Engine Coolant Concentration	
	Check Engine Air Filter	
	Check Drive Belt Condition	
	Check and Sample Hydraulic Oil	
	Check Wheel Ends	
	Check Differentials	
	Check Batteries	

7.4 'C' MAINTENANCE CHECKS – 500 HOURS OR QUARTERLY SERVICES

Company Name _____

Company Address _____

Maintenance Person _____

Date Performed _____

Model Number _____ Serial Number _____

MAINTENANCE POINT		PERFORMED BY
	Change Engine Oil	
	Change Engine Air Filter	
	Change Engine Oil Filter	
	Change Fuel Filter Element	
	Check Glow Plugs	
	Change Hydraulic Filter	

7.5 'D' MAINTENANCE CHECKS – 1000 HOURS OR SEMIANNUALLY SERVICES

Company Name _____

Company Address _____

Maintenance Person _____

Date Performed _____

Model Number _____ Serial Number _____

MAINTENANCE POINT		PERFORMED BY
	Check Engine Valve Tip Clearance	
	Check Alternator	
	Check Starter	
	Check Electrical System	
	Check Hydraulic Hoses & Fittings	
	Change Hydraulic Reservoir Oil	
	Change Hydraulic Reservoir Filter	
	Clean Hydraulic Reservoir Magnet	
	Change Axle Wheel End Oil	
	Change Axle Differential Oil	
	Check System Accumulator	
	Check Steering Accumulator	

7.6 'E' MAINTENANCE CHECKS – 2000 HOURS OR TWO YEARS SERVICES

Company Name _____

Company Address _____

Maintenance Person _____

Date Performed _____

Model Number _____ Serial Number _____

MAINTENANCE POINT		PERFORMED BY
	Change Engine Coolant	

7.7 'F' MAINTENANCE CHECKS – 3000 HOURS OR THREE YEARS SERVICES

Company Name _____

Company Address _____

Maintenance Person _____

Date Performed _____

Model Number _____ Serial Number _____

MAINTENANCE POINT		PERFORMED BY
	Check Atomisers (Fuel Injector)	

SECTION 8
50 HOURS OR WEEKLY
MAINTENANCE

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8.0 50 HOURS OR WEEKLY MAINTENANCE

GENERAL

The lubrication charts in Section 10 provide general locations of the individual service points and list the type of lubricant, which should be used for each component. Before proceeding with the 50 hours or weekly maintenance be sure you have completed the Pre-operation checklist.

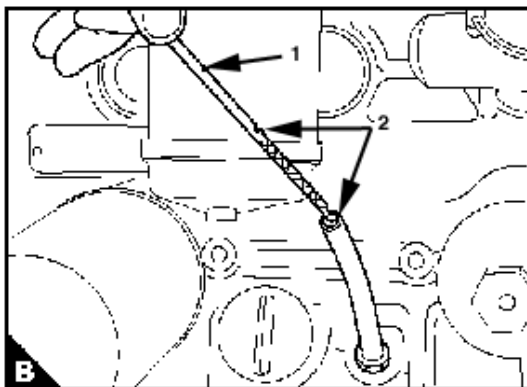
8.1 CHECK ENGINE OIL

ATTENTION

Never operate the engine with the oil, level below the low mark on the dipstick or above the high mark.

PERKINS ENGINE

The engine oil dipstick is reached from the right side of machine at the lower left center of the engine. The oil level must be kept between the low and high marks on the dipstick. If the oil is below the low mark on the dipstick, add oil of the type specified, through the filler cap. Wait at least five minutes after shutting off the engine to check the oil level. This allows time for the oil to drain to the oil pan.



8.2 ENGINE COOLANT LEVEL



Check the coolant level only when the engine is stopped. Wait until the coolant temperature is below 50°C (122°F) before removing the pressure cap. Failure to do so can cause personnel injury from heated coolant spray.

ATTENTION

Never use a sealing additive to stop leaks in the cooling system. This can result in cooling system plugging and inadequate coolant flow.

Remove the filler cap slowly to relieve cooling system pressure. Check the engine coolant level and add water / antifreeze mixture consisting of 50% water and 50% antifreeze, as required to bring the fluid level to the lower edge of the filler pipe. Use the type and amount of antifreeze recommended by the engine manufacturer for prevailing temperature.



8.3 DRAIN ENGINE FUEL PRE-FILTER

The Perkins engine is equipped with a fuel pre-filter located at the right side of engine. The fuel pre-filter removes water from the fuel as the fuel passes through the filter. Place a container under the valve to collect the water. Drain the water by opening the valve on the bottom of the filter. Allow all water to drain, then close the drain valve securely.



8.4 CHECK HYDRAULIC RESERVOIR OIL



Cleanliness is very important. Contamination can damage the hydraulic system.

Check the hydraulic oil level with all cylinders fully retracted. If the oil level is low, clean around the fill tube cap before removing, then add specified oil to the fill tube as required, to bring the full level. The oil viscosity must match the climate. Do not mix brands of hydraulic oil.



8.5 CHECK BRAKE OIL RESERVOIR LEVEL



Cleanliness is very important. Contamination can damage the hydraulic system.

The brake reservoir is located behind the engine, rear engine support. If the oil level is low, clean round the cap before removing, add hydraulic oil as required, to bring the oil to full level. Do not mix brands of hydraulic oil. **Do not use dot 3 brake fluid.**



8.6 LUBE BOOM PADS

The boom pads are located at the end of boom. Lubricate the boom pads by using a brush or roller to apply EP2 lubrication on all eight boom pads. Clean and lubricate all areas of the boom where the pads make contact.



8.7 LUBE DRIVE SHAFT



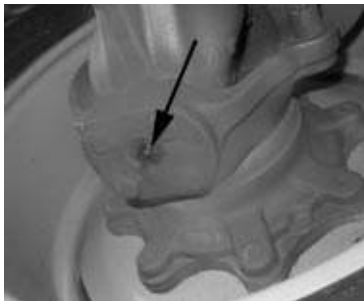
Clean all fitting before applying lubrication.

Lubricate the drive shaft by applying recommended lubrication to the grease fitting points.

8.8 LUBE AXLE KING PINS

Apply recommended lubrication to all eight king pins, located on top, bottom and each end of the axle.

Bottom King Pin



Top King Pin



8.9 LUBE REAR AXLE PIVOT PIN

Apply recommended lubrication to the rear pivot pin, which is located top of rear axle.



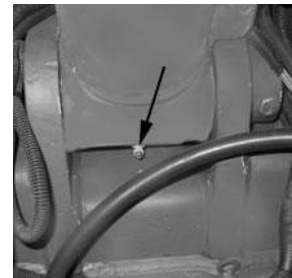
8.10 LUBE CYLINDERS

Raise the boom and clean all the grease fittings before applying EP2 lubrication. Lube all eight bearing, located on each end of cylinder.

Top Boom Cylinder



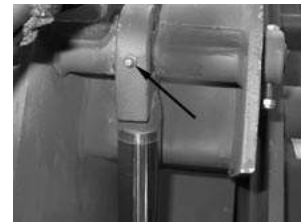
Bottom Boom Cylinder



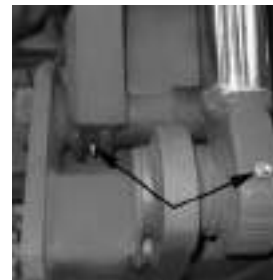
Bottom Slave Cylinder



Top Slave Cylinder



LH Fork Carrier
Bottom Tilt Cylinder



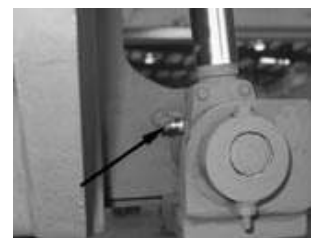
RH Fork Carrier
Cylinder



Top Tilt Cylinder



Bottom Rotation Cylinder



8.11 LUBE FORK ATTACHMENTS

Apply recommended lubrication to all three pivots. Lube bar and bushing.



8.12 LUBE BOOM PIVOT



If pin is pivot pin is removed, the complete cavity must be refilled with recommended lubrication.

Apply lubrication to boom pivot pin.



8.13 CHECK TIRE INFLATION



Overinflated or over heated tires can burst. A tire burst may result in serious injury; never use the machine with worn, improperly inflated or damaged tires.



Always use tires having the dimensions indicated in the vehicle registration document.

Dimensions	375/75 R20 x M27	
Load Index	155A	
Rim	11" x 20"	
Wheel Disc	8 holes DIN 70361	
Pressure Bar	1.8 (soft)	3.7 (Standard)
PSI	26 (soft)	54 (standard)

8.14 CHECK TIRE WHEEL NUTS



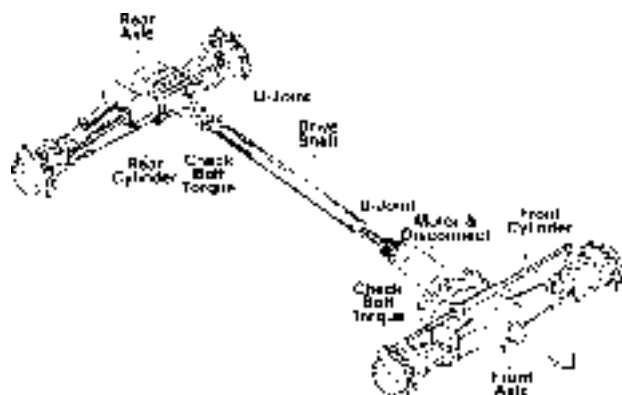
If wheel nuts loose torque often, check for damage of wheel.

Check tire wheel nuts (8 per wheel – 32 places) to be sure they are secure. Tighten nuts as necessary by using a 33-MM socket and torque wrench. The nut torques should be 220 Ft Lbs. / 300 Nm.



8.15 CHECK DRIVE SHAFT BOLTS

Check drive shaft bolts (12 places) to be sure they are secure. Tighten bolts as necessary by using torque wrench. The bolt torques should be 27 Ft Lbs. / 36.6 Nm.



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SECTION 9
250 HOURS OR MONTHLY
MAINTENANCE

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9.0 250 HOURS OR MONTHLY MAINTENANCE

GENERAL

The lubrication charts in section 10 provide general locations of the individual service points and list the type lubricant, which should be used for each component.

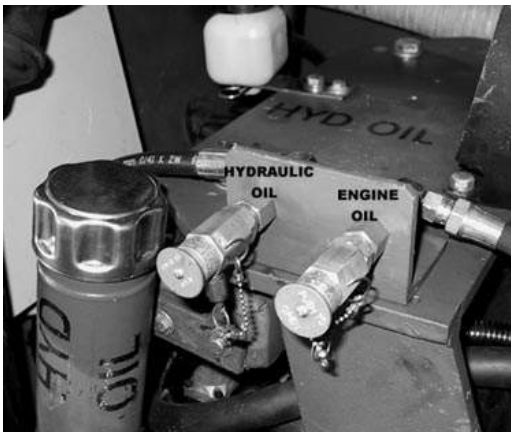
Before proceeding with 250 hours or Monthly Maintenance Checks, refer back to the pre-operation checklist and the 50 hours Maintenance.

9.1 ENGINE AND HYDRAULIC OIL SAMPLING

ATTENTION

Cleanliness is important to obtain an accurate sample.

The sampling valves are located near the rear engine support. When taking a sample, use proper containers. Clean the sampling valve and have the operator to start the engine. Remove the sampling valve cap and press front of valve to take a sample.



9.2 CHECK ENGINE COOLANT CONCENTRATION

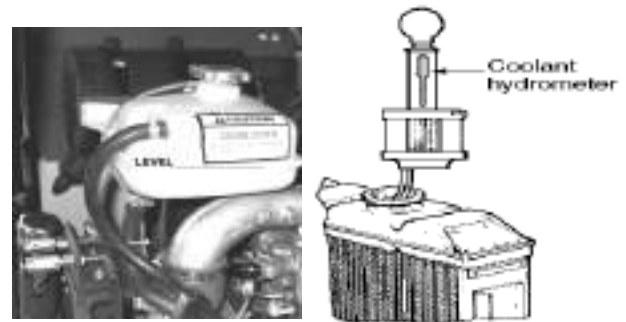


Do not drain the coolant while the engine is still hot and the system is under pressure because dangerous hot coolant can be discharged.

ATTENTION

Perkins POWERPART antifreeze with a concentration of 50% will give protection to a temperature of -35°C (-31°F). It will also give protection against corrosion. This is especially important when there are aluminum components in the coolant circuit.

The coolant must be 50% Antifreeze and 50% water. The coolant mixture can be tested with a hydrometer. Remove the radiator cap (once the radiator is cool) place the tube of the hydrometer into the reservoir. Squeeze the bulb to pull coolant into the glass tube. Compare the position of the float to the graduated lines on the glass tube of the ethylene glycol. Graduations of the float indicate the freezing point of the coolant. The freezing point is 40° below zero F.



9.3 CHECK ENGINE AIR FILTER

ATTENTION

Environmental conditions have an important effect of the frequency at which the air filter needs service. If working in dusty area clean the filter and dust bowl daily. The filter element must be cleaned or renewed.

The air filter is located at the rear of the engine. Check the engine air filter as follows:

Shut the engine down and engage the parking brake. Remove the wing nut and air filter cover. Remove inner wing nut and filtering element. Clean the filter bowl and all other components using 40 psi pressure. Apply a small amount of grease to the seal. Then refit the element. Reassemble all components.

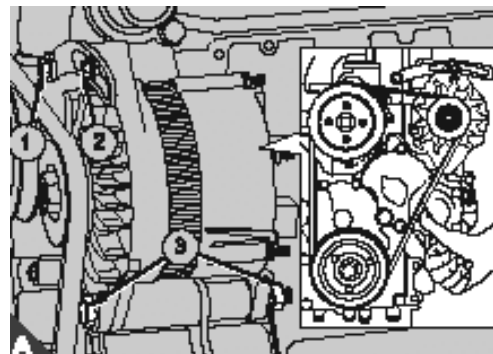


9.4 CHECK ENGINE DRIVE BELTS

ATTENTION

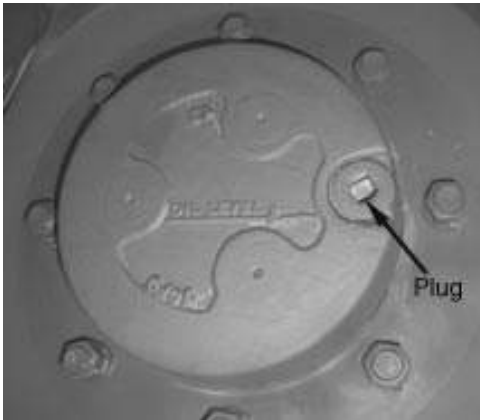
The alternator fitted to the 700 Series engine is driven by a drive belt of a specific design. Use only a Perkins POWERPART drive belt. If this is not done, an early failure of the belt may occur.

Press down the belt with the thumb at the center of the longest free length and check the deflection. With moderate thumb pressure – 45N (10 lbs.) the correct deflection of the belt is 10 mm (3/8 in.). To adjust the belt tension loosen the pivot fasteners (3) of the alternator and loosen the setscrew (2) of the adjustment link. Change the position of the alternator to give the correct tension. Tighten the pivot fasteners of the alternator and the setscrew of the adjustment link. Check the belt tension again to ensure that it is still correct. If a new belt is fitted, the belt tension must be checked again after the first 25 hours of operation.



9.5 CHECK AXLE WHEEL ENDS OIL

Move machine to level ground. Rotate each wheel so oil level line is horizontal. Each axle hub has one plug level on the vertical center of axle. The oil should be at bottom of plug hole. Add recommended oil if necessary. See lubrication section for the type of oil.



9.6 CHECK AXLE DIFFERENTIAL OIL

REAR DIFFERENTIAL – One plug located on rear of axle differential. The oil level should be level with plug hole. Add recommended oil if necessary. See lubrication section for the type of oil.



FRONT DIFFERENTIAL – One plug located on rear left side of axle beside differential. The oil level should be level with plug hole. Add recommended oil if necessary. See lubrication section for the type of oil.



9.7 CHECK BATTERY



Battery Posts, terminals and related accessories contain lead and lead compounds, chemical known to the State of California to cause cancer and reproductive harm. Wash Hands after handling.



Battery electrolyte contains sulfuric acid. It can burn you if it touches your skin and eyes. Always wear goggles and protective gloves, and handle the battery with caution to prevent spillage. Keep metal objects watchstraps, rings, and necklaces, clear of the battery leads, since they can short the terminals and burn you.

The battery is located on top rear of engine.

Check that the cable clips are well secured to the battery terminals. To tighten the clips, always use a wrench, never pliers. Protect the terminals by using Dielectric grease. Remove the battery and store it in a dry place, when the machine is not used for a long time. Before disconnecting the battery, set all switches in the cab to off. To disconnect the battery, disconnect negative (-) lead from the frame ground first. To connect the battery, connect the positive (+) lead first.



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SECTION 10
500 HOURS OR QUARTERLY
MAINTENANCE

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10.0 500 HOURS OR QUARTERLY MAINTENANCE CHECKS

GENERAL

The lubrication charts in section 10 provide general locations of the individual service points and list the type lubricant, which should be used for each component.

Before proceeding with 500 hours or Quarterly Maintenance Checks, refer back to the pre-operation checklist and the 50, 250 hours Maintenance.

10.1 CHANGE ENGINE OIL



Discard the used lubricating oil in a safe place and in accordance with local regulations.



If the base of the sump is divided to fit over a transmission shaft, ensure that the drain plugs on both sides of the sump are removed. If they are not only some of the lubricating oil will be drained.



Do not exceed the correct level of lubricating oil in the sump. If there is too much lubricating oil, the excess must be drained to the correct level. An excess of lubricating oil could enter the breather valve. This could cause the engine speed to increase rapidly without control.

Move the machine to level ground. Operate the engine until it is warm. Stop the engine. Put a container with a capacity of approximately 8 liters (14 pints) under the sump. Remove the sump drain plugs (Fig.A 1) and drain the lubricating oil from the sump. Fit the drain plugs with the new o-ring (Fig.A 2) and tighten the plugs to 34 Nm (25 Ft. lbs). Remove the filler cap and fill sump to the notch (Fig.B 2) on the dipstick (Fig.B 1) with new and clean lubricating oil of an approved grade. Remove the container of used lubricating oil. Start the engine and check for leakage from the filter. Stop the engine after 15 minutes check the oil level on the dipstick and, if necessary, put more lubricating oil into the sump.

Fig. A

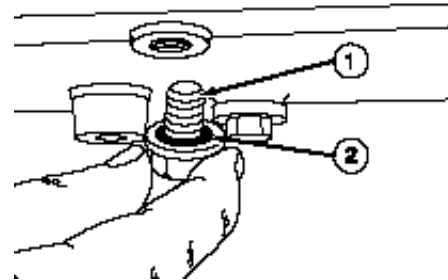
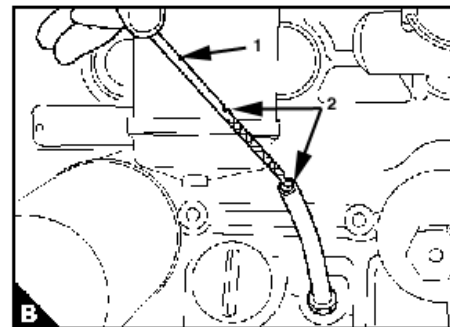


Fig.B



10.2 CHANGE ENGINE OIL FILTER

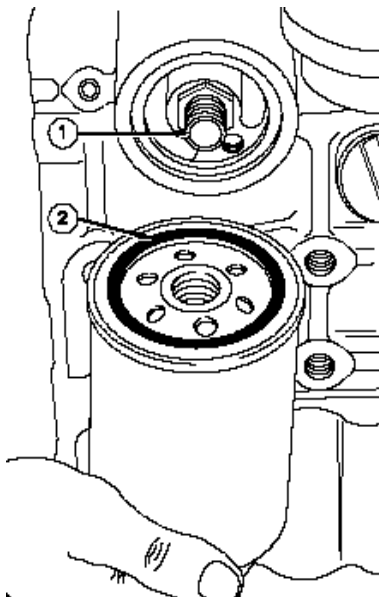
ATTENTION

Discard the used canister and lubricating oil in a safe place and in accordance with local regulation.

ATTENTION

Some application have a separate filter head that is fitted directly onto the filter mounting face on the cylinder block. The filter canister is then fitted to the filter head. Follow the procedures below for changing the oil filter.

Put a tray under the filter to retain spilt lubricating oil, clean thoroughly the outside surfaces of the filter assembly. Use a strap wrench or similar tool to loosen the filter canister. Remove and discard the canister. Ensure that the adapter (1) is secure in the filter head. Clean inside the filter head. Lubricate the seal (2) on top of the canister with clean engine lubricating oil. Fit the new canister and tighten the canister a further $\frac{1}{2}$ to $\frac{3}{4}$ of turn by hand only. Do not use a strap wrench.



Do not fill the sump past the "FULL" Mark on the dipstick.

Ensure that there is lubricating oil in the sump. Ensure that the engine will not start and operate the starter motor until oil pressure is obtained. To ensure that the engine will not start, disconnect the electrical stop control of the fuel injection pump. Oil pressure is indicated when the warning light is extinguished or by a reading on the gauge. Ensure the electrical stop control is connected. Start the engine and check for leakage from the filter. Stop the engine after 15 minutes check the oil level on the dipstick and, if necessary, put more lubricating oil into the sump.

10.3 CHANGE ENGINE AIR FILTER

ATTENTION

If working in dusty area remove the filter and dust bowl daily to clean.

The air filter is located at rear of engine. Change the engine air filter as following:

Shut the engine down and engage the parking brake. Remove the wing nut and air filter cover. Remove inner wing nut and filtering element. Clean the filter bowl. Clean all components using 40 psi pressure. Check for cracks or damage of the elements and replace if necessary. Apply a small amount of grease to the seal. Then refit the element. Reassembly all components.



10.4 CHANGE ENGINE FUEL FILTER

The engine fuel filter is located on the right side of engine.



Discard the used canister filter and fuel oil in a safe place and in accordance with local regulation.



It is important that only genuine Perkins parts are used. The used of wrong parts could damage the fuel injection equipment.

Thoroughly clean the outside surfaces of the fuel filter assembly. Hold the bottom cover of the filter element and release the setscrew (1), which is fitted through the filter head above the center of the element. Lower the bottom cover (6) of the filter. Remove the element (4) and discard it. Clean the inside surfaces of the filter head and the cover. Renew the seals (2) and (5) and the o-ring (3) and lightly lubricate them with clean fuel. Put the bottom cover under the new element and hold the element squarely to the filter head. Ensure that the element is fitted in the center against the o-ring in the filter head. With the assembly in this position, engage and tighten the setscrew. Eliminate the air from the fuel filter.



10.5 CHECK ENGINE GLOW PLUGS

The engine glow plug is located outside the reservoir. Disconnect the glow plug connection. Apply one probe of a multimeter, which can check continuity to the terminal of the glow plug and apply the other probe to a suitable ground. If the continuity is correct the multimeter will give an audible signal. If there is no audible signal, change the glow plug. Repeat this check for all of the glow plugs.



10.6 CHANGE HYDRAULIC RESERVOIR FILTER

ATTENTION

The hydraulic oil-filtering element cannot be cleaned or washed and refitted. They must be replaced with new ones of the type recommended by manufacturer.

ATTENTION

Discard the used filter in a safe place and in accordance with local regulations.

Stop the machine on a level ground and engage the parking brake. Place a container of suitable size under the filter to collect any oil leaks, then close the valve. Using a strap wrench, remove the filter element. Change the filtering element, then before fitting a new one, thoroughly clean and grease both seat and gasket.



Failing to open the valve all the way can cause damage to the transmission pump and motor. Do not start the engine with the valve closed.

Hand-tighten the filter, then reopen the valve. Check hydraulic oil level and add as necessary. Start the engine and inspect for any leaks.



SECTION 11
1000 HOURS OR SEMIANNUALLY
MAINTENANCE

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11.0 1000 HOURS OR SEMIANNUAL

GENERAL

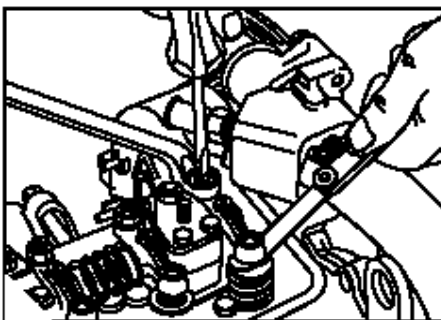
The lubrication charts in section 10 provide general locations of the individual service points and list the type lubricant, which should be used for each component. Before proceeding with 1000 hours or semiannual maintenance checks, refer back to the pre-operation checklist and the 50, 250, and 500 hours Maintenance.

11.1 CHECK ENGINE VALVE TIP CLEARANCE



If the cap nut is over tightened the stud and plate assembly for the rocker pedestal may be damage.

The valve tip clearance (8 places) is checked with a feeler gauge between the top of the valve stem and the rocker lever, with the engine cold. The correct clearance for both the inlet and the exhaust valves is 0.35mm (0.014 in.). Refer to Perkins manual for procedures for setting valve tip clearances.

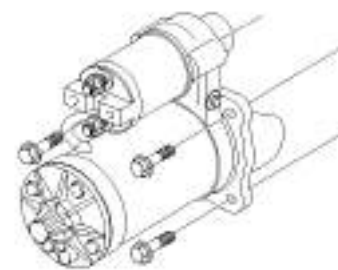


11.2 CHECK ELECTRICAL ALTERNATOR

With the engine off, check for side ply in the pulley. Start the engine. Make sure all accessories are off. Rev up the motor to a fast idle. Using a voltmeter set to the DC scale. Measure the voltage across the battery terminals - Red lead of the voltmeter on the positive terminal, black on the negative. The voltage should read around 26 volts. IF it reads less than 24 volts you may have a failed alternator. Turn on the defroster heater, headlights, work light, dome light and fan to draw power. Rev up the engine and watch the voltmeter. It should still be reading around 26 volts. If it reads lower than 25 volts the chances are the alternator is staring to fail. Check the field voltage at the alternator. Place ignition switch in the on position. Do not start engine. The brown / black wire on the alternator is the one that supplies the field. Check with a voltmeter to see if there is 24 volts at the field.

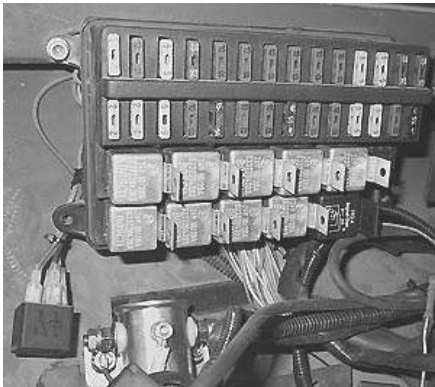
11.3 CHECK ELECTRICAL STARTER

Test the starter motor on the engine. Ensure that the battery is fully charged. Turn on the lights and operate the starter switch. Connect a voltmeter across the battery terminals and operate the starter switch. If the starter does not operate but the lights keep their power or there is no voltage drop across the battery, check the switch and all the connections and wires. Slow action of the starter can be caused by faulty wire connections. Failure to engage smoothly between the starter and the flywheel can be caused, on some types of starter motor, by dirt on the helical grooves of the starter motor drive, which can prevent free pinion movement. Clean the shaft thoroughly with cleaning fluid made especially for the purpose, and apply a small quantity of aero shell 6B or its equal. The starter is a specialist repair only.



11.4 CHECK ELECTRICAL SYSTEM

Remove the fuse panel located on the left side of steering column. Inspect for corrosion. Check for damaged wires and faulty connections. Apply dielectric grease to connections. Spray waterproof / anticorrosion fluid to panel. Check the condition of all grounds. Pull solenoid caps and apply dielectric grease to connection. Check solenoid wire connections. Check wires to switches.



11.5 CHECK HYDRAULIC HOSES AND FITTING

Carefully inspect all hoses and fitting on the machine for leaks, and or damage. Leaks that cannot be stopped by tightening the connection should be removed and repaired. Make sure all fitting are tightened.



11.6 CHANGE HYDRAULIC RESERVOIR OIL, FILTER CLEANING HYDRAULIC MAGNET

ATTENTION

When changing the oil, drain it when it is still hot and the polluting substances are in suspension.

To change the hydraulic reservoir oil procedures as follows:

Stop the machine on level ground and engage the parking brake. Raise boom fully and support it. Eliminate any residual pressure from the hydraulic circuit. Place a 25 gallon container or larger under the drain plug. Remove the drain plug and allow oil to flow out into the container. Remove the inspection cover from tank. Wash the tank thoroughly with solvent and a jet of compressed air. Remove old filter from inside reservoir and install new one. Remove magnet from bottom of reservoir, clean and replace it. Refit the oil drain plug and the inspection cover. Add new recommended oil, until it is present at the center of the sight glass.

