Michigan L150

- ***Engine output, gross:***
  SAE J1349 180 kW
  (245 hp)
- ***Operating weight:***
  21,6 t
  (47,550 lb)
- ***Buckets:***
  3,5 - 6,5 m^3
  (4.6 - 8.5 yd^3)

The high-capacity loader for the tough jobs

- *Torque Parallel Linkage – Powerful lift-arm system with:*
  - *unique breakout torque*
  - *excellent parallel lift-arm action*
  - *high lift height and long reach*
- *Direct-injected, turbocharged Volvo diesel*
- *Automatic Power Shift*
- *Enclosed wet oil-cooled brakes*
- *Care Cab – the cab with great comfort and safety*
- *Precision steering with good stability and maneuverability*
- *Contronic monitoring system*
- *Pilot-operated hydraulic system*
  - *Hydraulic attachment bracket*

MICHIGAN

ENGINE

Volvo TD 102, a 6-cylinder, direct-injection, 4-stroke, turbocharged diesel engine with wet, replaceable cylinder liners.

Air cleaning: Air cleaning in three stages
1. Cyclone cleaner with automatic particle ejector
2. Paper filter with indicator in cab
3. Safety filter

Make			Volvo	
Model			TD 102	
Output, gross at	rps	**rpm**	35,0	**2100**
SAE J1349	kW	**hp**	180	**245**
Flywheel output at	rps	**rpm**	35,0	**2100**
SAE J1349	kW	**hp**	170	**231**
DIN 70020 / 6271	kW	**hp**	170	**231**
Max. torque at	rps	**rpm**	20,0	**1200**
SAE J1349 Gross	N•m	**lbf ft**	1000	**738**
SAE J1349 Net	N•m	**lbf ft**	980	**723**
DIN 70020 / 6271	N•m	**lbf ft**	980	**723**
No. of cylinders			6	
Displacement, total	l	**in³**	9,6	**586**
Bore	mm	**in**	120,65	**4.76**
Stroke	mm	**in**	140	**5.50**
Compression ratio			15:1	

ELECTRICAL SYSTEM

Contronic monitoring system with extended function surveillance. Solid-state electrical distribution box. The electrical system is well-protected by fuses. Prewired for optional equipment.

Central warning:
Central warning lamp for following functions: engine oil pressure, brake pressure, parking brake (buzzer as well), engine temperature (buzzer as well), transmission temperature, transmission oil pressure, temperature front and rear axle/brake cooling, secondary steering (optional equipment), transmission hydraulic oil filter.

Voltage	V		24	
Batteries	V		2x12	
Battery capacity	Ah		2x140	
Alternator rating	W / A		1680 / 60	
Starter motor output	kW	**hp**	5,4	**7.3**

SERVICE REFILL CAPACITIES

Crankcase	l	**US gal**	29	**7.7**
Fuel tank	l	**US gal**	339	**89.6**
Cooling system	l	**US gal**	65	**17.2**
Transmission, total	l	**US gal**	45	**11.9**
Front axle, total	l	**US gal**	46	**12.2**
Rear axle, total	l	**US gal**	46	**12.2**
Hydraulic system	l	**US gal**	245	**64.7**
Hydraulic tank	l	**US gal**	165	**43.6**

DRIVETRAIN

Torque converter: Single-stage.

Transmission: Volvo BM power shift transmission of countershaft type with single-lever control. Directional clutch modulation provides faster and smoother shifting between forward and reverse.

Shifting system: Volvo BM Automatic Power Shift.

Axles: Fully floating half-shafts with planetary type hub reductions. One-piece cast-steel axle housing. Fixed front axle and oscillating rear axle.

Differential: 100% differential lock on front axle. Engagement and disengagement by means of switch on cab floor.

Hub reduction: Volvo BM manufacture with low-friction roller bearings on each planet wheel.

Tires: Alternative tires are available for different work operations.

Torque multiplication			2,4 : 1	
Transmission, make			Volvo BM	
Model			HT 210	
Running speeds				
1, forward/reverse	km/h	**mph**	6,4	**4.0**
2, forward/reverse	km/h	**mph**	11,8	**7.3**
3, forward/reverse	km/h	**mph**	23,3	**14.5**
4, forward	km/h	**mph**	33,9	**21.1**
Measurement with tires			26.5-25	
Front axle, make			VME	
Model			AWB 40	
Rear axle, make			VME	
Model			AWB 40	
Oscillation		± °		**15**
Ground clearance at 15° oscillation	mm	**in**	610	**24.0**

BRAKE SYSTEM

The brake system meets the requirements of ISO 3450, SAE J1473 and EG 71/320.

Service brakes: VME fully hydraulic-operated, enclosed wet circulation oil-cooled disc brakes. Transmission disengagement during braking pre-selected via a switch on the instrument panel.

Secondary system: Dual-circuit system with rechargeable accumulators. One circuit or the parking brake fulfills the requirements.

Parking brake: Enclosed, wet multi-disc brake built into the transmission. Spring-loaded application. Hydraulic release via a lever to the left of the operator.

Number of discs/wheel			1	
Area/brake pad	cm^2	**in^2**	1750	**271**
Brake area/axle	cm^2	**in^2**	3500	**542**
Accumulators, volume, total	l	**in^3**	3 3	**183**
Parking brake, area, total	cm^2	**in^2**	2583	**400**
Accumulator, volume, total	l	**in^3**	1 0,5	**30.5**

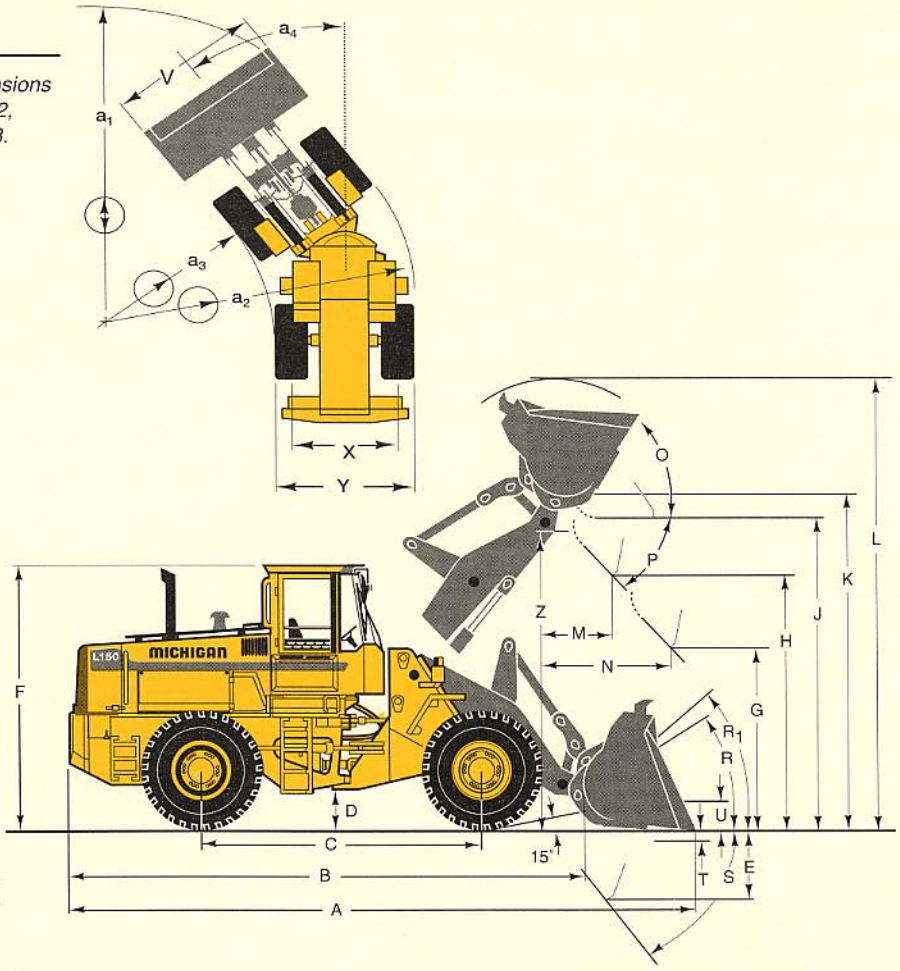
DIMENSIONAL DATA MICHIGAN L150

Tires: 26.5 R 25

Where applicable, specifications and dimensions are in accordance with ISO 7131, SAE J732, ISO 7546, SAE J742, ISO 5998, SAE J818.

B	mm	ft in	6695	22'0"
C	mm	ft in	3550	11'8"
D	mm	ft in	481	1'7"
F	mm	ft in	3649	11'8"
G	mm	ft in	2130	7'0"
J	mm	ft in	3920	12'10"
K	mm	ft in	4351	14'3"
O	°		58	
P	°		45	
R	°		44	
R_1*	°		48	
S	°		66	
T	mm	ft in	72	0'3"
U	mm	ft in	363	1'2"
X	mm	ft in	2364	7'9.5"
Y	mm	ft in	2964	9'8.5"
Z	mm	ft in	3920	12'10"
a_2	mm	ft in	6787	22'3.3"
a_3	mm	ft in	3823	12'6.8"
a_4	± °		37	

* Carrying position SAE



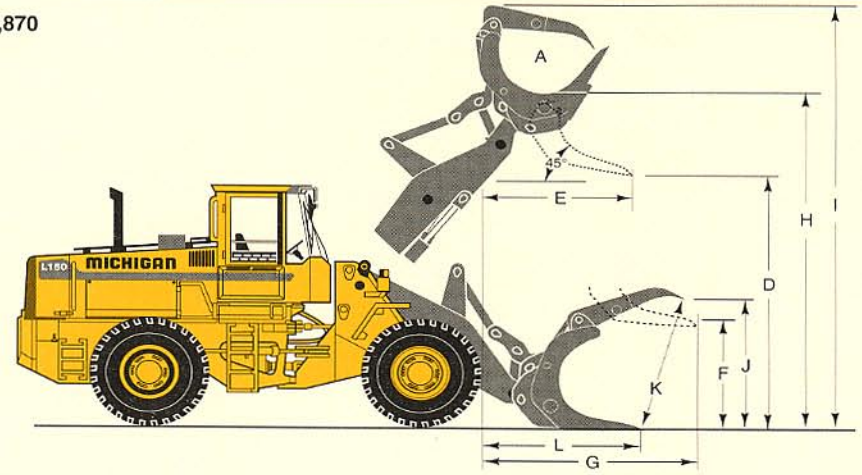
The labels mentioned below show some examples of available buckets. Most of the buckets shown here are available for hook-on. For further information, see the attachment catalog.

† Bucket Capacity Includes Bolt-on Cutting Edge		Pin-on		Pin-on		Pin-on		Pin-on	Hook-on	Pin-on
		†		†		†				
Volume, heaped	m^3	4,0	3,8	4,0	3,8	3,7	3,5	3,5	3,5	6,5
	yd^3	**5.2**	**5.0**	**5.2**	**5.0**	**4.8**	**4.6**	**4.5**	**4.5**	**8.5**
Struck	m^3	3,1	3,0	3,1	3,0	2,9	2,8	2,8	2,8	5,3
	yd^3	**4.0**	**3.9**	**4.0**	**3.9**	**3.8**	**3.7**	**3.7**	**3.7**	**6.9**
Tipping load, straight	kg	14 860	15 430	14 855	15 410	15 005	15 570	15 560	14 920	14 566
	lb	**32,760**	**34,020**	**32,750**	**33,970**	**33,080**	**34,330**	**34,310**	**32,900**	**32,085**
at 35° turn	kg	13 170	13 735	13 165	13 715	13 315	13 880	13 870	13 260	12 873
	lb	**29,040**	**30,280**	**29,020**	**30,240**	**29,360**	**30,600**	**30,580**	**29,240**	**24,354**
at full turn	kg	12 970	13 540	12 970	13 515	13 120	13 680	13 670	13 060	12 667
	lb	**28,600**	**29,850**	**28,590**	**29,800**	**28,930**	**30,160**	**30,140**	**28,800**	**27,901**
Breakout force	kN	166	178	160	172	172	185	178	165	123,8
	lbf	**37,320**	**40,010**	**35,970**	**38,670**	**38,670**	**41,590**	**40,010**	**37,090**	**27,832**
A	mm	8215	8110	8265	8160	8165	8055	8115	8200	8722
	ft in	**26'11"**	**26'7"**	**27'1"**	**26'9"**	**26'9"**	**26'5"**	**26'7"**	**26'11"**	**28'7"**
L	mm	5895	5895	5945	5945	5825	5825	5890	5940	6105
	ft in	**19'4"**	**19'4"**	**19'6"**	**19'6"**	**19'1"**	**19'1"**	**19'4"**	**19'6"**	**20'0"**
V	mm	3200	3200	3000	3000	3200	3200	3000	3000	3200
	ft in	**10'6"**	**10'6"**	**9'10"**	**9'10"**	**10'6"**	**10'6"**	**9'10"**	**9'10"**	**10'6"**
a_1 clearance circle	mm	14 785	14 730	14 625	14 570	14 760	14 705	14 545	14 595	15 053
	ft in	**48'6"**	**48'4"**	**48'0"**	**47'10"**	**48'5"**	**48'3"**	**47'9"**	**47'11"**	**49'4"**
E	mm	1210	1125	1255	1170	1170	1085	1135	1210	1631
	ft in	**4'0"**	**3'8"**	**4'1"**	**3'10"**	**3'10"**	**3'7"**	**3'9"**	**4'0"**	**5'4"**
H	mm	3045	3120	3010	3085	3080	3155	3115	3060	2643
	ft in	**10'0"**	**10'3"**	**9'11"**	**10'1"**	**10'1"**	**10'4"**	**10'3"**	**10'0"**	**9'0"**
M	mm	1215	1175	1250	1210	1180	1140	1180	1245	1576
	ft in	**4'0"**	**3'10"**	**4'1"**	**4'0"**	**3'10"**	**3'9"**	**3'10"**	**4'1"**	**5'1.5"**
N	mm	1805	1795	1825	1815	1785	1770	1795	1840	1651
	ft in	**5'11"**	**5'11"**	**6'0"**	**5'11"**	**5'10"**	**5'10"**	**5'11"**	**6'0"**	**5'5"**
Operating weight	kg	21 600	21 290	21 570	21 280	21 470	21 160	21 180	21 480	21 582
	lb	**47,620**	**46,940**	**47,550**	**46,910**	**47,340**	**46,650**	**46,700**	**47,360**	**47,538**

GENERAL PURPOSE GRAPPLE

Operating weight kg **lb** 21 260 **46,870**

A	m^2	**ft^2**	1,8	**19.38**
D	mm	**ft in**	2900	**9'6"**
E	mm	**ft in**	1740	**5'8"**
F	mm	**ft in**	1610	**5'3"**
G	mm	**ft in**	3030	**10'1"**
H	mm	**ft in**	4950	**16'5"**
I	mm	**ft in**	6640	**22'1"**
J	mm	**ft in**	2820	**9'4"**
K	mm	**ft in**	2900	**9'6"**
L	mm	**ft in**	2400	**8'0"**



ATTACHMENTS

Buckets

Straight bucket without teeth	3,5-4,0 m^3	**4.6-5.2 yd^3**
Straight bucket with teeth	3,5-3,8 m^3	**4.6-5.0 yd^3**
Spade nose bucket without teeth	3,5 m^3	**4.6 yd^3**
Spade nose bucket with teeth	3,5 m^3	**4.6 yd^3**
Rock bucket	3,2 m^3	**4.2 yd^3**
Light materials bucket	6,5-12,0 m^3	**8.5-15.7 yd^3**
High-dump light materials bucket	6,0-11,0 m^3	**7.8-14.4 yd^3**

Timber grapples

Unloading grapple	2,9 m^2	**31 ft^2**
Sorting grapple	2,9 m^2	**31 ft^2**
General purpose grapple	1,8 m^2	**19.4 ft^2**
Tree length grapple	1,8 m^2	**19.4 ft^2**
Tropical timber grapple	1,4 m^2	**15 ft^2**
Heel/kickout		
Log pusher		

Examples of other attachments

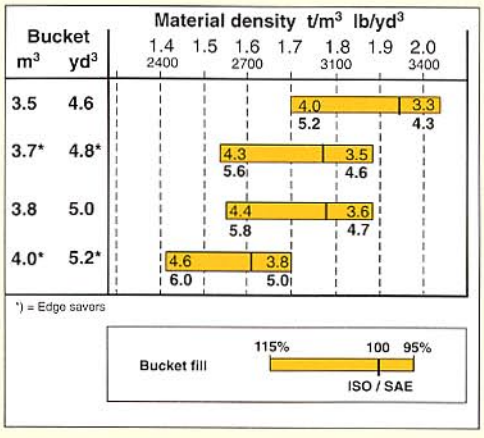
Fork holder	2260 mm	**7'5"**
Fork tines	1500 mm	**4'11"**
Combination forks		
Fork attachments with fixed tines		
Materials handling arm		

ALTERATION OF DIMENSIONAL DATA

Tires			23.5-25(20PR)L-3		23.5R25*		23.5-25(20PR)L-4		23.5-25(20PR)L-5		Counterweight 1		Counterweight 2	
Extra counterweight	kg	**lb**									375*	**830**	600**	**1320**
Width over wheels	mm	**in**	-164	**-6.5**	-164	**-6.5**	-69	**-2.7**	-76,2	**-3**				
Ground clearance	mm	**in**	-76	**-3.0**	-76	**-3.0**	-3	**-0.2**	+8	**+0.3**				
Tipping load at full turn	kg	**lb**	-480	**-1054**	-355	**-780**	+157	**+346**	+464	**+1022**	+735	**+1620**	+1260	**+2780**
Operating weight	kg	**lb**	-614	**-1352**	-445	**-980**	+198	**+440**	+588	**+1300**	+375	**+830**	+600	**+1320**

BUCKET SELECTION DIAGRAM

The volume of material handled is often greater than the bucket's ISO/SAE classification. Refer to the Material densities and bucket fill factor table prior to bucket selection.



) **Counterweight 1: 375 kg **830 lb** may be used in all handling.*

***) **Counterweight 2:** 600 kg **1320 lb** may only be used for stabilizing purposes within timber and pallet handling on a flat surface. Counterweight 2 replaces hydroinflation of rear tires.*

***Combination of counterweights 1+2** may only be used in extreme cases for stabilizing purposes within timber and pallet handling with fork attachments. Only when working on a firm and flat surface.*

Material densities and bucket fill factor

Material	Earth	Clay	Sand	Gravel	Rock
Bucket fill %	100-115	110-120	100-110	100-110	75-100
Density t/m^3	1.4-1.6	1.4-1.6	1.6-1.9	1.7-1.9	1.5-1.9
Density lb/yd^3	2400-2700	2400-2700	2700-3200	2900-3200	2500-3200

STEERING SYSTEM

Load-sensing hydrostatic articulated steering with power amplification.

Pump: Variable-flow axial piston pump mounted on a power take-off on the transmission.

System supply: The steering system is fed from a separate steering pump.

Cylinders: Two double-acting cylinders with chromed piston rods.

Steering cylinders			2	
Bore	mm	**in**	90	**3.5**
Piston rod diameter	mm	**in**	50	**2**
Stroke	mm	**in**	418	**16.5**
Relief pressure	MPa	**psi**	21	**3046**
Max. flow	l/min	**US gpm**	91,4	**24**
at	MPa	**psi**	10	**1450**
and engine speed	rps	**rpm**	35,0	**2100**

CAB

Tested and approved according to standards:
ROPS (ISO/CD 3471-1990, SAE J1040), FOPS (ISO 3449, SAE J231), also meets standard according to "Overhead guards for rider lift trucks" (ISO 6055) and "Operator Restraint System" (SAE J386).

Safety and comfort: The *Care Cab* has convenient boarding steps and a wide door opening. It is lined on the inside with sound-absorbent material and mounted on 4 rubber pads to damp sound and inhibit vibration. Large glazed areas, good all-round visibility. The windshield is curved and made of laminated green-tinted glass. All important operator information is presented clearly in front of the operator. Information panel for *Contronic* monitoring system (optional).

Heater and defroster: Heating element with filtered fresh air and 4-speed fan which gives over pressure and defroster outlets for all windows.

Operator's seat: Spring-suspended, adjustable operator's seat with seat belt. The seat is hung on a bracket on the rear wall. The force from the seat belt is absorbed by the seat rails.

Emergency exits			3	
Sound level in cab (ISO 6396)				
max.	dB(A)		75	
Ventilation	m^3/min	**cfm**	10	**353**
Heating capacity	kW	**Btu/h**	11	**37500**
Operator's seat			ISRI	**6000/575**

HYDRAULIC SYSTEM

Open center system with pilot-operated hydraulic valve.

Pump: A single pump (vane pump) mounted on a power take-off on the transmission.

System supply: The pilot system is fed from a separate pilot pump, shared by the brake system.

Valve: Double-acting 3-spool valve. The control valve is actuated by a 3-spool pilot valve.

Lift function: The valve has four positions: Raise, neutral, lower and float. Disengageable inductive/magnetic automatic boom kick-out, adjustable for any position between maximum reach and full lift height.

Tilt function: The valve has three positions: Rollback, neutral and dump. Disengageable inductive/magnetic automatic bucket positioner, adjustable to any desired loading angle.

Cylinders: Double-acting.

Filters: Full-flow filtration through 10 micron filter cartridge.

Loader unit: *Torque Parallel Linkage* – with very high breakout force throughout the working range. Good parallel lift-arm action with both level and fully angled-up bucket throughout the lifting range. Lift cylinders mounted in line with lift-arms. Tilt cylinder mounted between lift-arms.

Main pump				
Relief pressure	MPa	**psi**	21	**3046**
Flow	l/min	**US gpm**	313,4	**82.8**
at	MPa	**psi**	10	**1450**
and engine speed	rps	**rpm**	35,0	**2100**
Pilot pump				
Relief pressure	MPa	**psi**	3,0-4,5	**435-652**
Flow	l/min	**US gpm**	25,1	**6.6**
at	MPa	**psi**	10	**1450**
and engine speed	rps	**rpm**	35,0	**2100**
Lift cylinders			2	
Bore	mm	**in**	170	**6.7**
Piston rod diameter	mm	**in**	80	**3.2**
Stroke	mm	**in**	789	**31.1**
Tilt cylinder			1	
Bore	mm	**in**	250	**9.8**
Piston rod diameter	mm	**in**	120	**4.7**
Stroke	mm	**in**	452	**17.8**

Raise time *	s	6.7
Dump time *	s	1.9
Lower time (empty)	s	3.2
Total cycle time	s	11.8

** with load as per ISO 5998 and SAE J818.*

STANDARD EQUIPMENT

- AIR CLEANER, DRY TYPE, DUAL ELEMENT, EXHAUST ASPIRATED PRECLEANER
- ALTERNATOR, 24V, 60 AMP
- BATTERY DISCONNECT, LOCKABLE
- BOOM KICKOUT, AUTOMATIC
- BRAKE SYSTEM, SECONDARY
- BRAKES, 4-WHEEL HYDRAULIC, SEALED WET DISC TYPE, DUAL CIRCUIT
- BUCKET LEVELER, AUTOMATIC WITH POSITION INDICATOR
- CAB ACCESS STEPS & HANDRAILS (SAE J185)
- CAB: ROPS (SAE J1040C) (ISO 3471) FOPS (SAE J231) (ISO 3449)
  - Acoustical Lining
  - Ash Tray, Cigarette Lighter
  - Door, Lockable (Left Side Access)
  - Electrical System: 24V Pre-wired for Optional Accessories
  - Environmental Control: Heater/Defroster/Pressurizer 11 kW **(37,500 Btu/h)** with Four-Speed Blower Fan, Filtered Air
  - Floor Mat
  - Interior Light
  - Interior Rearview Mirror
  - Safety Glass, Tinted
  - Seat Belt (SAE J386)
  - Seat, Suspension, 6-Way Adjustable, Heated
  - Steering Wheel, Adjustable Tilt, Telescopic
  - Storage Compartment
  - Sun Visor
  - Windshield Washer, Front & Rear
  - Windshield Wiper, Front, Intermittent
  - Windshield Wiper, Rear
- COLD STARTING AIDS:
  - Engine Fuel Enrichment
  - Engine Intake Manifold Preheater
- CONTRONIC MONITOR SYSTEM
- DIFFERENTIALS:
  - Front, Hydraulically Operated Differential Lock
  - Rear, Conventional
- DRAWBAR WITH PIN
- ENGINE COOLANT FILTER
- EXHAUST RAIN CAP (ELBOW TYPE)
- FENDERS, FRONT & REAR
- FUEL WATER SEPARATOR
- HYDRAULIC CONTROL LEVER SAFETY LATCH
- HYDRAULIC OIL COOLER
- HYDRAULIC PRESSURE TEST PORTS, QUICK CONNECT
- INSTRUMENT/GAUGES, ILLUMINATED:
  - Engine Coolant Temperature Gauge
  - Fuel Gauge
  - Hourmeter
  - Transmission Temperature Gauge
  - Sight Gauges: Coolant Level, Hydraulic Fluid Level
- ISOLATION MOUNTS: Cab, Engine, Transmission
- LIFTING LUGS
- LIGHTS:
  - Driving (2-Front), Halogen with High/Low Beam, Parking Lights, Stop/Tail Combination
  - Worklights, Halogen (2-Front, 2-Rear)
  - Turn Signals with Hazard Warning Switch
- MIRRORS, REARVIEW (2) EXTERIOR, (1) INTERIOR
- MUFFLER, SPARK ARRESTING
- NEUTRAL START FEATURE
- SIDE PANELS, ENGINE HOOD
- STEERING FRAME LOCK
- TIRES: 23.5-25(20PR) L-3
- TRANSMISSION, MODULATED WITH SINGLE LEVER CONTROL, AUTOMATIC POWER SHIFT, AND OPERATOR-CONTROLLED DECLUTCH
- VALVE, MAIN HYDRAULIC, THREE (3) SPOOL, PILOT OPERATED
- VANDALISM LOCK, PROVISION FOR:
  - Batteries, Engine Coolant, Engine Oil, Fuel, Hydraulic Fluid, Converter/ Transmission Fluid
- WARNING ALARMS:
  - Central Warning Audible
    - Axle/Brake Temperature
    - Engine Coolant
    - Parking Brake
  - Horn, Electric
  - Reverse Alarm (SAE J994)
- WARNING & MONITORING LIGHTS:
  - Air Cleaner Restriction
  - Alternator Malfunction
  - Central Warning Lamp:
    - Brake System Pressure
    - Engine Coolant Temperature
    - Engine Oil Pressure
    - Parking Brake Applied (Transmission in Forward or Reverse)
    - Temperature F/R Axle/Brake Cooling
    - Transmission Fluid Temperature
    - Transmission Oil Pressure
  - Differential Lock
  - Engine Intake Manifold Preheater
  - High Beam Driving Lights
  - Parking Brake Applied

OPTIONAL EQUIPMENT

- Air Conditioner, 7 kW **(24,000 Btu/h)**
- Air Precleaner, Heavy Duty Cyclone, Turbo II Type Oil Bath Type
- Attachment Rib Kit
- Beacon, Amber Rotating
- Boom Suspension System
- Bucket Teeth, Bolt-On, (8) (Not for Use on Light Material Buckets)
- Cold Starting Aid, Engine Preheater-Coolant and Oil (110V-1500W)
- Comfort Drive Control (CDC)
- Counterweight
- Cutting Edge, 3 pc. Reversible, Bolt-On (Not for Use on High Tip Buckets)
- Dual Service Brake Pedal
- Engine Fan, Suction
- Engine, High Altitude Version, Factory Installed
- Engine, Low Emission Version, Factory Installed
- Engine Shutdown to Idle Kit
- External Brake Cooler
- Guards:
  - Belly Plates
  - Headlights, Front
  - Muffler Guard
  - Taillights, Rear
  - Windshield
  - Worklights, Rear
- Hand Throttle Control
- Hydraulic Attachment Bracket with Separate Locking System
- Hydraulic Control for 3rd Function
- Hydraulic Control for 4th Function
- Instrument/Gauges: Speedometer/Tachometer
- Light, Attachment Flood (Halogen)
- Lockable Tool Box
- Mud Guards
- Oil Cooler, Front & Rear Axle
- Radio Mounting Kit (Includes 2 Speakers, Antenna & Voltage Reducers)
- Retractable Seat Belt
- Secondary Steering
- Sliding Window, Door
- Slow Moving Vehicle Emblem
- Spillguard, Bolt-On (Not for Use on Light Material Buckets)
- Strainer for Fueling
- Switch, Forward/Reverse Shifting
- Tire Options:
  - 23.5R25
  - 23.5-25(20PR)L-2
  - 23.5-25(20PR)L-4
  - 23.5-25(20PR)L-5
  - 26.5-25(20PR)L-2
  - 26.5-25(20PR)L-3
  - 26R25
- Working Lights, Front, Extra
- Working Lights, Rear, Extra

Under our policy of continuous product improvement, we reserve the right to change specifications and design without prior notice. The illustrations do not necessarily show the standard version of the machine.

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