

Michigan L90

ENGINE OUTPUT: 145 HP (107kW) VOLVO DIRECT-INJECTED, TURBO-CHARGED DIESEL

OPERATING WEIGHT: 28,540 LB (12.9 T)

BUCKETS: 2.75 - 5.00 YD³ (2,10 - 3,82 m³)

AUTOMATIC POWER SHIFT TRANSMISSION

INDUSTRY'S FIRST QUICK COUPLING ATTACHMENT BRACKET SYSTEM

COMFORT/EFFICIENCY DESIGNED CAB

HIGH LIFT ARM MOUNTING OFFERS LONG REACH AND HIGH LIFT HEIGHT

PARALLEL LIFT ARMS, LEVEL FORKS THROUGH ENTIRE LIFT ARC

PILOT OPERATED
"FINGERTIP" HYDRAULICS



MICHIGAN



ENGINE

Make Model TD61G Max. rating* at2200 rpm (36,7 rps) SAE J1349 (ISO 1585) 156 hp (115 kW) Flywheel rating** at2200 rpm (36,7 rps) SAE J1349 (ISO 1585) 145 hp (107 kW) DIN 70020145 hp (107 kW) Max. torque at1400 rpm (23,3 rps)

Direct-injected, turbocharged 6 cylinder, in-line, 4-cycle diesel.

SAE J1349 (ISO 1585)(net)405 lbf ft (550 Nm) DIN 70020405 lbf ft (550 Nm) Number of cylinders 6 Displacement, total334 in³ (5,48 dm3,l) (98,4 mm) (120 mm)

Air cleaners

1. Cyclone pre-cleaner with automatic dust ejector.

Stroke4.72 in

- 2. Paper filter with restriction warning light on instrument panel.
- 3. Replaceable safety filter element.
- *Max. rating Rating of engine equipped only with components essential for engine function, such as injection pump, oil pump, and
- **Flywheel rating Net rating measured with fan, intake and exhaust system, cooling system and alternator mounted.



DRIVETRAIN

Torque Converter: Single stage, single phase

Transmission: Volvo BM automatic powershift transmission. Countershaft-type with bi-directional powershift clutch modulation. Axles: Full-floating axle half-shafts with planetary final gear reduction. Single piece cast axle housings. Fixed front axle and oscillating rear axle.

Differentials: Hypoid gear differentials on front and rear axles. 100% differential lock on front axle. Engagement and disengagement by means of switch on cab floor.

Hub Reduction: Planetary-type final drive reduction with lowfriction roller bearings mounted in each wheel hub.

Tires: Tubeless type with nylon cord. Optional tires available for specific applications.

Torque multiplication	2.66 :1			
Transmission make, model	Volvo BM, HT131			
Speeds, forward/reverse				
1	4.4	mph	(7,0	km/h)
2	8.7	mph	(14,0	km/h)
3	18.0	mph	(29,0	km/h)
4 (forward only)	24.9	mph	(40,0	km/h)
Measured with tires		2	0.5R25*	
Front axle make		Vo	Ivo BM	
Rear axle make		Vo	Ivo BM	
Rear axle oscillation, total	30	deg		
	20.7	in	(525	mm)
Standard tires		20.5-2	5 (12PR) L-2



ELECTRICAL

The electrical system is well protected by fuses. Pre-wired for optional equipment.

Voltage	24 V	
Batteries (12 volt)	2	
Battery capacity, ea	105 Ah	
Cranking capacity, ea		
Reserve capacity, ea		
Alternator rating	1540/55 W/A	
Starter motor output	7.3 hp	(5.4 kW)



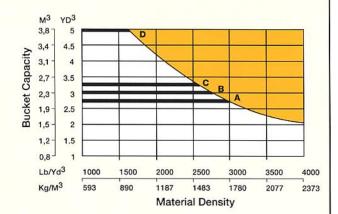
SERVICE REFILL CAPACITIES

Crankcase	(17,0 dm ³ ,l)
Fuel tank (usable)	(178 dm ³ ,l)
Fuel tank (total)48.9 US gal	(185 dm ³ ,l)
Cooling system14.0 US gal	(53,0 dm3,l)
Transmission, total 8.72 US gal	(33,0 dm3,l)
Front axle, total8.59 US gal	(32,5 dm3,l)
Rear axle, total7.79 US gal	(29,5 dm3,l)
Brake oil tank	(10,0 dm3,l)
Hydraulic system, total 37.0 US gal	(140 dm ³ ,l)
Hydraulic tank27.7 US gal	(105 dm ³ ,l)



BUCKETS

A - Straight Edge General Purpose	2.75 yd3	2.10 m ³
B - Straight Edge General Purpose	3.00 yd3	2.29 m ³
C - Straight Edge Material Handling	3.25 yd3	2.48 m ³
D - Straight Edge Light Material	5.00 yd ³	3.82 m ³



Correct Bucket Selection is determined by consideration of the work application, material density and type of material. Refer to Operational Data for bucket choices. The above graph is to be used as a guideline.

Contact your VME Distributor for assistance.



BRAKES

The brake system meets requirements according to SAE J1152, ISO 3450, and EG 71/320.

Service brakes: Fully hydraulic system with outboard mounted dry disc brakes. Application of brake pedal applies brakes and also neutralizes transmission when transmission disengaging switch is activated.

Secondary: Dual circuit axle-by-axle system. Actuated by service brake pedal. Visual low pressure alarm. Dead engine braking pressure provided by three nitrogen-charged accumulators.

Parking brake: Disc brake on front axle input shaft. Manually applied and released. A warning lamp lights if the ignition is on when the parking brake is applied. If the gear lever is then placed in forward or reverse, the central warning lamp flashes.

Pump: Fixed displacement gear type, mounted on engine.

Filtration: Full-flow 10 micron filter.

Pressure setting2180	psi	(15,0	MPa)
Service brake, disc dia 18.4	in	(468	mm)
thickness 0.63	in	(16	mm)
Brake friction area ea. wheel 62.8	in ²	(405	cm ²)
Parking brake, disc dia14.6	in	(370	mm)
Parking brake area, total15.5	in ²	(100	cm ²)



STEERING

Articulated frame. Hydrostatic steering system. Pump: Variable piston type, mounted on torque converter.

Cylinders: Two double-acting cushioned cylinders with chrome plated piston rods.

Steering cylinders, no	2	
Bore	3.15 in	(80,0 mm)
Stroke	16.1 in	(410 mm)
Relief pressure	2390 psi	(16,5 MPa)
Steer pump output	25.6 US gal/min	(97,0 dm ³ ,l/min)
at pressure		(10,0 MPa)
and engine speed	2200 rpm	(36,7 rps)
Articulation	40 deg	



CAB

Integral ROPS/FOPS Cab meets requirements according to SAE J1040C, SAE J231, ISO 3471-1986, ISO 3449-1980, and SS/ISO 6055. Sound-insulating lining. Floor mats. Lockable door. Side and rear window exits.

Heater, Defroster and Ventilator: A three speed fan provides filtered fresh air and defroster for the front and side windows. Air conditioning optional.

Operator's Seat: Fully adjustable suspension seat with seat belt (SAE #J386) and heater.

Heating capacity	39,600 BTU/h	(11,6 kW)
Air conditioning (optional)	19,400 BTU/h	(5,7 kW)



HYDRAULICS

Open center pilot-operated system with a vented plate-steel tank. Hydraulic oil is fully filtered and cooled. An access hole is provided in the tank for easy cleaning. An in-tank magnet provides extra

Pumps: One main and one pilot, vane type, mounted on torque converter.

Valve: Split-spool three section valve with built-in pressure relief. Actuated by a manually operated pilot valve, it is mounted on the front frame for easy access.

Lift function: The valve has four positions: Raise, hold, lower and float. An automatic kickout detent is adjustable for any position between maximum reach and full lift height.

Tilt function: The valve has three positions: Rollback, hold and dump. Automatic bucket positioner adjustable to any desired loading angle.

Cylinders: Double-acting.

Filters: Full-flow 10 micron return filter with magnet, located in hydraulic oil tank.

Main relief pressure2975	psi	(20,5 MPa)
Main pump output53.4	US gal/min	(202 dm3, l/min)
at pressure1450	psi	(10 MPa)
and engine speed2200	rpm	(36,7 rps)
Pilot relief pressure510	psi	(3,50 MPa)
Pilot pump output5.30		(20,0 dm ³ ,l/min)
at pressure510	psi	(3,50 MPa)
and engine speed2200	rpm	(36,7 rps)
Lift cylinders, no2		
Bore4.72	in	(120 mm)
Stroke38.6	in	(980 mm)
Tilt cylinders, no2		
Bore4.33	in	(110 mm)
Stroke32.7	in	(830 mm)
Raising time (loaded) 6.6	S	
Dumping time (loaded) 1.5	S	
Lowering time (empty) 2.8	S	
Total cycle time10.9	S	

ATTACHMENTS

(for further information please contact your local dealer)

Buckets

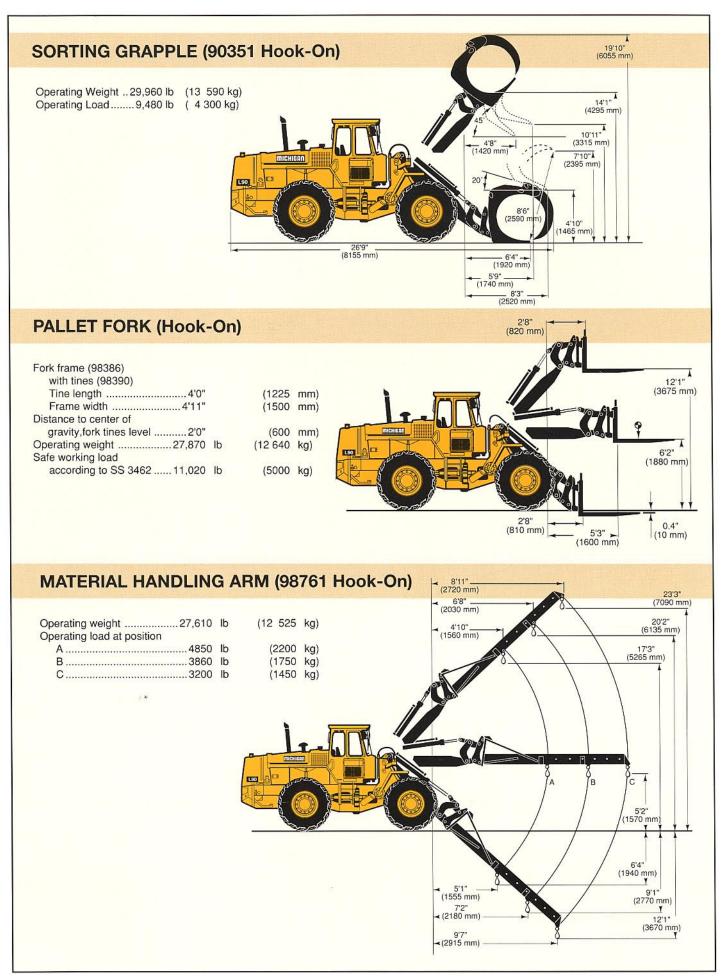
High-Dump Light Materials Light Materials Multi-Purpose Side Dump Spade Nose with Teeth Straight Edge Straight Edge with Teeth

Timber Grapples

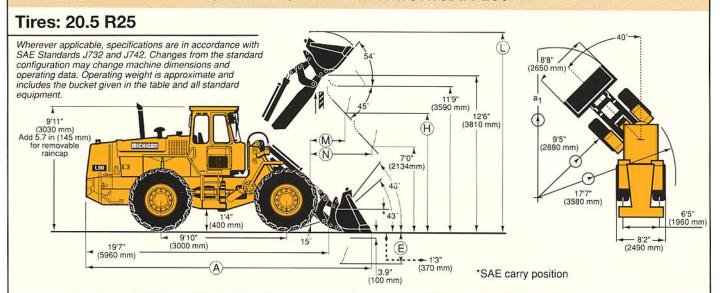
Sorting Tree Length Unloading Heel Kickout for Use Only on the Sorting and Unloading Grapples, Requires Hydraulic Control for 4th Function Log Pusher

Examples of Other Attachments

Asphalt Cutter Bale Clamp Breakout Forks Broom Combination Forks Diagonal Snow Blade Fork Carrier Protection Bars Fork Tine Extensions Forklift Carrier with Hydraulic Top Clamp Forklift Carrier with Two Top Clamps Material Handling Arm, Telescopic Manually, Pinned Positions Material Handling Arm with Hydraulic Folding, Telescopic Manually, Pinned Positions Pallet Forks Pallet Fork with Tine Positioner







†Mounting/Bucket Type		Pin-On	Hook-On	Pin-On	Hook-On	Pin-On	Hook-On	Pin-On	Hook-On
Volume, heaped	yd ³	3.00	3.00	2.75	2.75	3.25	3.25	5.00	5.00
76)	m ³	2,29	2,29	2,10	2,10	2,48	2,48	3,82	3,82
Struck	yd ³	2.40	2.40	2.28	2.28	2.69	2.69	4.12	4.12
	m ³	1,84	1,84	1,74	1,74	2,06	2,06	3,15	3,15
Static tipping load, straight	lb	21,760	20,960	21,760	20,940	21,270	20,550	20,330	19,620
	kg	9 870	9 510	9 870	9 500	9 650	9 320	9 220	8 900
at 35° turn	lb	19,430	18,690	19,440	18,690	18,960	18,300	18,100	17,460
	kg	8 820	8 480	8 820	8 478	8 600	8 300	8 210	7 920
at full turn	lb	18,750	18,220	18,760	18,020	18,290	17,640	17,440	16,830
	kg	8 510	8 270	8 510	8 180	8 300	8 000	7 910	7 630
Breakout force	lbf	26,760	24,680	26,800	24,710	23,990	22,310	17,840	16,830
	kN	119,0	109,8	119,3	109,9	106,7	99,2	79,4	75,0
Hyd. lifting force, ground level	lbf	36,320	36,350	36,420	36,440	36,330	36,350	36,550	36,570
,	kN	161,6	161,7	162,0	162,1	161,6	161,7	162,6	162,7
at max. height	lbf	14,200	13,900	14,240	13,930	14,020	13,730	13,760	13,470
	kN	63,2	61,8	63,4	62,0	62,4	61,1	61,2	59,9
A	ft in	23'6"	23'9"	23'6"	23'9"	23'11"	24'2"	25'2"	25'6"
0	mm	7 170	7 250	7 170	7 250	7 280	7 360	7 680	7 760
1	ft in	3'4"	3'7"	3'4"	3'7"	3'8"	3'10"	4'9"	4'11"
	mm	1 010	1 080	1 010	1 080	1 180	1 180	1 440	1 510
Θ	ft in	9'3"	9'0"	9'3"	9'0"	8'11"	8'9"	8'0"	7'10"
~	mm	2 810	2 750	2810	2 750	2 730	2 670	2 450	2 390
D	ft in	16'9"	16'11"	16'6"	16'7"	16'10"	17'0"	17'5"	17'6"
	mm	5 120	5 150	5 040	5 060	5 130	5 170	5 300	5 340
M	ft in	3'5"	3'8"	3'5"	3'8"	3'9"	3'11"	4'8"	4'9"
	mm	1 050	1 110	1 050	1 110	1 130	1 190	1 410	1 460
<u>N</u>	ft in	5'4"	5'5"	5'4"	5'5"	5'5"	5'7"	5'10"	5'11"
	mm	1 620	1 650	1 620	1 650	1 650	1 690	1 780	1 800
a, Turning circle over bucket	ft in	38'3"	38'5"	38'3"	38'5"	38'6"	38'8"	39'3"	39'5"
(bucket in carry position)	mm	11 670	11 720	11 670	11 720	11 730	11 780	11 960	12 010
Weight distribution, front	lb	11,390	11,770	11,240	11,640	11,660	11,990	11,930	12,260
	kg	5 170	5 340	5 100	5 280	5 290	5 440	5 410	5 560
Weight distribution, rear	lb	17,150	16,990	17,220	17,040	17,000	16,890	16,860	16,750
g diotribution, rout	kg	12 950	13 050	12 910	13 010	13 000	13 100	13 060	13 160
Operating weight	lb	28,540	28,760	28,460	28,680	28,660	28,880	28,790	29,010
Sportaining Worging	kg	12 950	13 050	12 910	13 010	13 000	13 100	13 060	13 160
†Bolt-on Cutting Edge Increase			10 000	12 310	10010	10 000	10 100	10 000	10 100

.....

ALTERATION OF OPERATIONAL DATA

Tires	20.5-R	25	20.5-25	(12PR)L-2	20.5-25	(12PR)L-3	*Counterweight
Liquid ballast in rear tires	*75	% CaCl ₂					N/A
Width over wheels			±0 in	(±0 mm)	±0 in	(±0 mm)	
Ground Clearance			-1 in	(-25mm)	+0.6 in	(+15 mm)	
Tipping Load at full turn	+2050 lb	(+930 kg)	-220 lb	(-100 kg)	-200 lb	(-91 kg)	+1014 lb(+460 kg)
Operating weight	+1820 lb	(+825 kg)	-485 lb	(-220 kg)	-441 lb	(-200 kg)	+661 lb(+300 kg)

Wherever applicable, specifications are in accordance with SAE Standards J732 and J742. Changes from the standard configuration may change machine dimensions and operating data. Operating weight is approximate and includes the bucket given in the table and all standard equipment.

*Liquid ballast in rear tires/

"Liquid ballast in rear tires/ counterweight only recommended for stabilizing purposes in timber and pallet handling on hard and level ground.

STANDARD EQUIPMENT

AIR CLEANER, DRY TYPE. DUAL ELEMENT, EXHAUST ASPIRATED PRECLEANER ALTERNATOR, 24V, 55 AMP BATTERY DISCONNECT, LOCKABLE BOOM KICKOUT. **AUTOMATIC** BRAKES, 4-WHEEL, DRY DISC. DUAL CIRCUIT BRAKE SYSTEM. SECONDARY 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, Cigar Lighter Door, Lockable (Left Side Access) Electrical System: 24V. Pre-wired for Optional

Accessories

Filtered Air

Hand Throttle

Interior Light

Floor Mat

Environmental Control:

Interior Rearview Mirror

Heater/Defroster/Pressurizer

Three-Speed Blower Fan,

39,600 BTU/h (11,6 kW) with

Safety Glass, Tinted Seat Belt (SAE J386) Seat, Suspension, 6-Way Adjustable Heated Steering Wheel, Adjustable Tilt Storage Compartment Sun Visor Windshield Washer, Front & Rear Windshield Wiper, Front, Intermittent Windshield Wiper, Rear COLD STARTING AIDS: Engine Intake Manifold Pre-Engine Fuel Mixture Enrichment DIFFERENTIALS: Front, Hydraulic Differential Lock Rear, Conventional DRAWBAR WITH PIN ENGINE COOLANT FILTER EXHAUST RAIN CAP (ELBOW FENDERS, FRONT & REAR HYDRAULIC CONTROL LEVER SAFETY LATCH HYDRAULIC OIL COOLER HYDRAULIC PRESSURE TEST PORTS, QUICK CONNECT INSTRUMENTS/GAUGES. ILLUMINATED: Brake System Pressure Gauge Engine Coolant Temperature

Transmission/ Converter Fluid Temperature Gauge Sight Gauges: Brake Fluid Level Coolant Level Hydraulic Fluid Level Transmission/ Converter Fluid Temperature Gauge ISOLATION MOUNTS: Cab. Engine, Transmission LIFTING LUGS LIGHTS: Driving (2-Front), Halogen with High/Low Beam, Parking Lights, Side Marker Lights, Stop/Tail Combination (2-Rear) Turn Signals with Hazard Warning Switch Work Lights, Halogen (4-Front, 4-Rear) MIRRORS, REARVIEW (2), EXTERIOR MUFFLER, SPARK ARRESTING NEUTRAL START FEATURE SIDE PANELS, ENGINE HOOD STEERING FRAME LOCK TIRES: 20.5-25 (12PR) L-2 (General) TRANSMISSION: MODULATED, WITH SINGLE LEVER CONTROL, AUTOMATIC POWER SHIFT, AND **OPERATOR** CONTROLLED DECLUTCH VALVE, MAIN HYDRAULIC, THREE (3) SPOOL, PILOT

VANDALISM LOCK, PROVISION FOR: Batteries, Engine Coolant, Engine Oil, Fuel, Hydraulic Fluid, Converter/ Transmission Fluid WARNING ALARMS: 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) Transmission Fluid Temperature Differential Lock Engine Intake Manifold Preheater High Beam Driving Lights Parking Brake Applied Transmission Clutch Pressure

OPERATED

OPTIONAL EQUIPMENT

Air Conditioner, 19,400 Btu/h (5,7 kW)
Beacon, Amber Rotating
Bucket Teeth, Bolt-On, (8) (Not for Use on Light Material Buckets)
Cold Starting Aid, Engine
Coolant Pre-heater (110V-1500W)
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
Engine, Low Emission Version,
Factory
Engine, Shutdown to Idle Kit
Guards:
Headlights, Front
Muffler
Taillights, Rear
Worklights, Rear
Hydraulic Attachment Bracket
Hydraulic Control for 3rd
Function
Hydraulic Control for 3rd and

4th Functions

Gauge

Fuel Gauge

Hourmeter

Hydraulic Single Acting Control Light, Attachment Flood (Halogen) Radio Mounting Panel (Includes 2 Speakers and Antenna) ROPS/FOPS Canopy (Open Type) Secondary Steering Slow Moving Vehicle Emblem Speedometer/Tachometer Tire Options: 20.5R25 20.5-25(12PR)L-2 20.5-25(12PR)L-3 25/65R25

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.

VME Americas Inc.

23001 Euclid Avenue P.O. Box 178017 Cleveland, Ohio 44117-8017