

MICHIGAN

475 C

TURBO
transmission

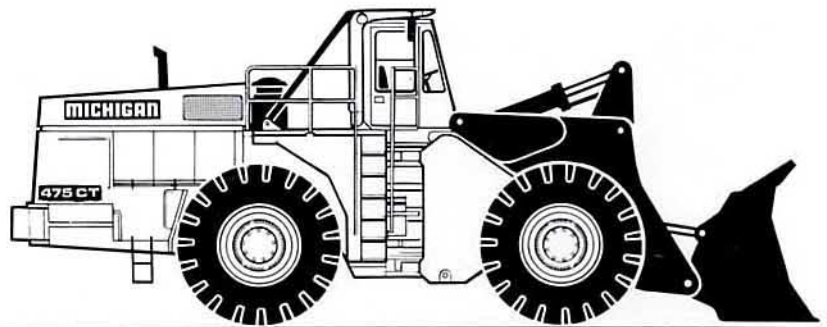


MICHIGAN 475 CT

- THE HIGH-PERFORMANCE LOADER

The Michigan 475CT with turbo transmission plays a vital role in continuous production cycles where large volumes of material must be loaded minute by minute to keep the haulage chain running smoothly and efficiently. The vast experience and know-how gained from building heavy equipment for some 80 years and the employment of the most advanced design and manufacturing technology, have resulted in a machine with high levels of dependability, durability and productivity. The Michigan 475CT weighs about 79 tonnes and normally works with a 9,2 m³ (12 yd³) bucket. It loads dumptrucks of up to 85 short tons effectively.

An exclusive feature on the 475CT is the turbo transmission - an advanced power transmission system that gives the 475CT very high acceleration and therefore short work cycles. The operator actuates the torque converter directly to obtain the desired tractive force. Limited Slip Differentials in both axles and an advanced hydraulic system also contribute to productivity. All of these features taken together make the 475CT with turbo transmission the right choice for intensive and demanding loading. That is its specialty.

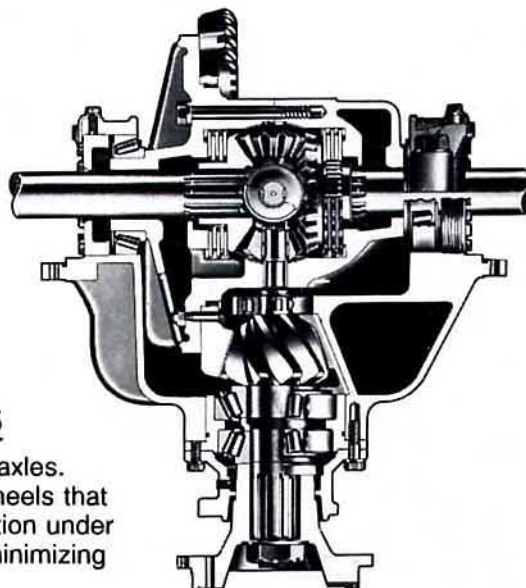


TURBO TRANSMISSION

The turbo transmission has three torque converters: two acting forward and one in reverse. In the forward and reverse work ranges, the engine rpm is constant and the ground speed is controlled by the accelerator pedal, which adjusts the variable vanes in the transmission's torque converter. In the travel range, a torque converter with fixed vanes is used and the accelerator pedal controls the engine rpm. Powerful hydraulics and fast, smooth directional shifts make the machine both easy to operate and highly productive. For safe driving on downgrades and to spare the service brakes, the transmission has a retarder function. The turbo transmission is guaranteed for 10 000 hours of operation or 30 months, whichever comes first.

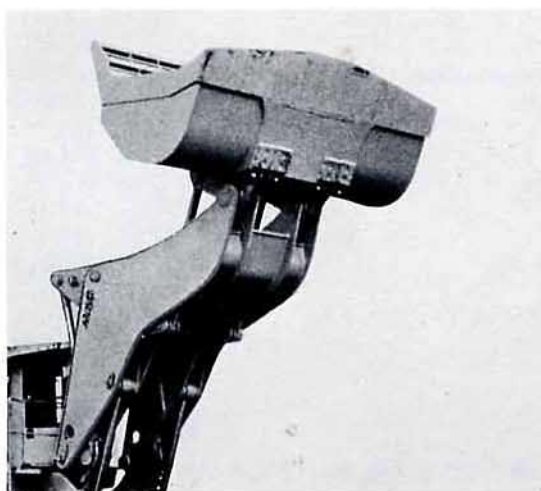
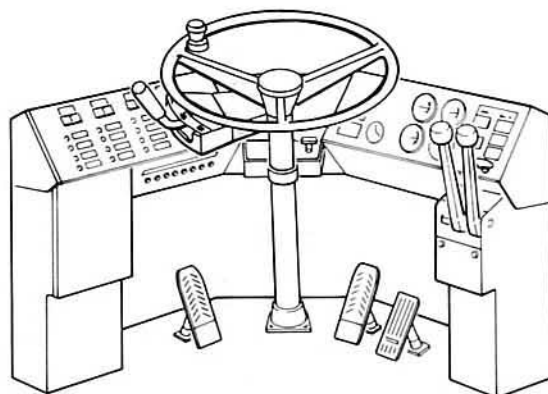
LIMITED SLIP DIFFERENTIALS

Limited Slip Differentials are standard in both axles. They proportion the driving torque to those wheels that have the best traction, ensuring optimum traction under varying conditions and easier steering while minimizing wheel spin.



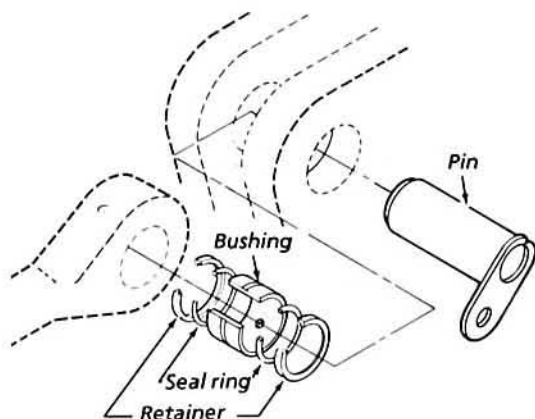
INSTRUMENTS AND CONTROLS

The new instrument panel has all instruments and controls located directly in front of the operator. On the left are switches for fan speed, temperature control, working lights, cold start and a test lamp for the secondary steering system (optional). A warning system with lamps monitors the pressure in the front/rear brake system, application of the parking brake, turbo transmission overspeed, low air pressure, transmission oil temperature and the necessary service of the transmission oil filter. The instruments on the right side monitor engine oil pressure and engine coolant temperature, torque converter oil temperature and electrical system voltage. The ignition switch and the parking brake release are also located on the right hand side.



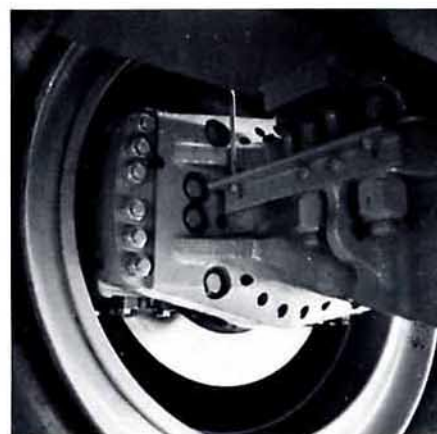
LOADER UNIT

New geometry with improved action, together with larger tilt cylinders, provides for effective bucket filling and faster loading of dumptrucks. The loader unit is made of high-grade alloy steel and with in-line lift and tilt cylinders for smooth, coordinated lifting action. All hinge pins have effective seals to protect against dirt and retain the lubricant. This contributes to long lubrication intervals and long service life.



HYDRAULIC BRAKE SYSTEM

The service brake system consists of disc brakes with hydraulic actuation, 737 x 32 mm (29,0 x 1,25 in) discs and two calipers per wheel. Secondary dead engine braking is provided by nitrogen-charged accumulators. The 508 x 13 mm (20,0 x 0,50 in) parking disc brake is mounted on the front axle input shaft. It is spring-applied and hydraulically released.





ENGINE

Cummins, direct-injected, turbocharged and aftercooled V-12 engine.

Make		Cummins	
Model		VTA-28C	
Max rating at	r/s (r/min)	33,3	(2000)
SAE J1349	kW (hp)	541	(725)
Flywheel rating at	r/s (r/min)	33,3	(2000)
SAE J1349	kW (hp)	477	(640)
Max.torque at	r/s (r/min)	21,7	(1300)
SAE J1349 Gross	Nm (lbf ft)	3204	(2363)
Number of cylinders		12	
Displacement, total	l (in ³)	28,0	(1710)
Bore	mm (in)	140	(5,50)
Stroke	mm (in)	152	(6,00)

NOTE:

Max. rating - Max. rating from engine equipped only with components essential for engine function, such as injection pump, oil pump and water pump.

Flywheel rating - Net rating measured with fan, intake and exhaust system, cooling system and alternator mounted.



DRIVETRAIN

Transmission: Clark turbo transmission with retarder. Two operating modes: Travel range and work range.

Axes: Clark fully-floating axle shafts with planetary-type hub reductions. Single-piece cast-steel axle housing. Fixed front axle and oscillating rear axle.

Differential: Clark limited slip differentials on front and rear axles.

Hub reductions: Clark planetary drives with low-friction roller bearings in each wheel.

Tires: Tubeless with nylon cord for wheel loaders/dozers. Other tires available for different applications.

Torque multiplication ratio		5,37:1
Speeds forward		
Work range	km/h(mile/h)	17,9 (11,1)
Travel range	km/h(mile/h)	25,4 (15,8)
Speeds reverse		
Work range	km/h(mile/h)	17,9 (11,1)
Travel range	km/h(mile/h)	17,9 (11,1)
Measured with tires		41.25/70-39 (34 PR) L-5
Rear axle oscillation	± °	10
	mm (in)	533 (21,0)



ELECTRICAL SYSTEM

The electrical system is well protected by circuit breakers. Prewired for optional equipment.

Voltage	V	24
Alternator	A	100



BRAKE SYSTEM

(SAE J1152) (ISO 3450)

Service brakes: Hydraulic disc brakes with two calipers on each wheel. Application of left pedal actuates transmission retarder.

Secondary system: Dual-circuit, axle-by-axle system. Manually actuated by service brake pedal. Audible and visual alarm. Dead engine braking capability provided by two accumulators precharged with nitrogen.

Parking brake: Disc brake mounted on front axle input shaft. Spring-on, hydraulic-off actuated by lever on instrument panel. Transmission interlock applies service brakes to prevent machine moving when parking brake is applied. There is a special dead engine parking brake release.

Pump: Piston pump, pressure-compensated.

Filtration: Full-flow filtration, 10 micron filter.

Pump	MPa (psi)	20,684	(3000)
Service brake, disc diameter	mm (in)	737	(29,0)
thickness	mm (in)	32	(1,25)
Parking brake, disc diameter	mm (in)	508	(20,0)
thickness	mm (in)	13	(0,50)



STEERING SYSTEM

Articulated frame. Fully hydraulic steering system with mechanical feedback.

Pump: Gear pump mounted on transmission.

System supply: The system is fed by the steer pump and below 1500 rpm by a switch pump as well. The switch pump supplies the working hydraulics above 1500 rpm.

Demand valve: Provides constant volume of oil to the steering valve for positive steering control at all engine rpm.

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

Steering cylinders, number		2	
Bore	mm (in)	152 (6,00)	
Stroke	mm (in)	605 (23,80)	
Relief pressure	MPa (psi)	17,237 (2500)	
Output	l/min (US gal/min)	348 (92)	
at	MPa (psi)	6,895 (1000)	
and engine speed	r/s (r/min)	33,3 (2000)	



CAB

Cab (not ROPS) with two lockable doors. Sound-insulated lining.

Sliding self-locking windows. Tinted safety glass.

ROPS canopy: Approved separately, ROPS canopy.

Heater and defroster: Heating element with filtered fresh air and three-speed fan plus defroster for front and side windows.

Operator's seat: Adjustable suspension seat with seat belt (SAE J386).



HYDRAULIC SYSTEM

Closed and pressurized system with a sturdy plate-steel tank.

Access hole in tank for easy cleaning. In-tank magnet provides extra protection.

Pump: Three gear-type pumps mounted on transmission.

System supply: The system is, below 1500 rpm, fed from two pumps. Above 1500 rpm it is also supplied from the switch pump.

Valve: Split spool valve with built-in pressure relief valve, actuated by pilot valve. Mounted on front frame for easy access.

Lift function: The valve has four positions: Raise, hold, lower and float. Automatic electric/magnetic kickout adjustable for any position between maximum reach and full lift height.

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

Cylinders: Double-acting.

Filters: Full-flow 10 micron return filter (with 4 elements), located in hydraulic oil tank.

Relief pressure	MPa (psi)	18,616 (2700)
Output, total	l/min (US gal/min)	1045 (276)
Output, each pump	l/min (US gal/min)	348 (92)
at	MPa (psi)	6,895 (1000)
and engine speed	r/s (r/min)	33,3 (2000)
Lift cylinders, number		2
Bore	mm (in)	267 (10,50)
Stroke	mm (in)	1483 (58,38)
Tilt cylinders, number		2
Bore	mm (in)	267 (10,50)
Stroke	mm (in)	848 (33,40)
Raising time (with load)	s	10,0
Dumping time (with load)	s	3,7
Lowering time (empty)	s	5,5
Total cycle time	s	19,2



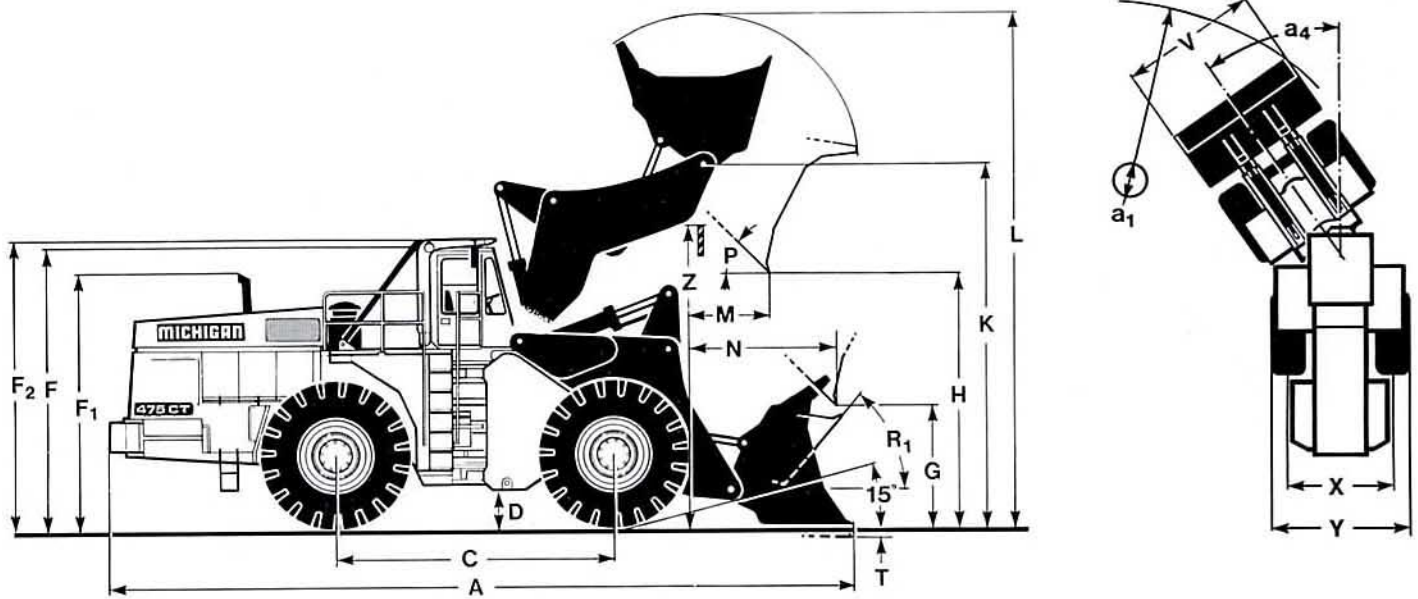
SERVICE REFILL CAPACITIES

Crankcase	l (US gal)	102,2 (27,0)
Fuel tank	l (US gal)	1033,4 (273,0)
Cooling system	l (US gal)	280,1 (74,0)
Transmission total	l (US gal)	208,2 (55,0)
Differentials (each)	l (US gal)	109,8 (29,0)
Hubs (each)	l (US gal)	40,1 (10,6)
Midmount bearing	l (US gal)	4,7 (1,25)
Hydraulic system	l (US gal)	939 (248,0)
Hydraulic tank	l (US gal)	567,8 (150,0)

DIMENSIONS MICHIGAN 475 CT

Tires: 41.25/70-39 (34PR) L-5

Wherever applicable, specifications are in accordance with SAE Standard J732 and J742. Changes in the standard configuration may change machine dimensions and operating data. Operating weight is approximate and includes the bucket given in the table, ROPS canopy, cab (not ROPS) and counterweight, 1785 kg (3936 lb).



Bucket type		1	2
Volume, heaped	m ³ (yd ³)	9,2 (12)	9,2 (12)
Volume, struck	m ³ (yd ³)	7,52 (9,84)	7,81 (10,22)
V	mm (ft in)	4475 (14'8")	4475 (14'8")
H [⊖]	mm (ft in)	4801 (15'9")	4597 (15'1")
M [⊖]	mm (ft in)	1753 (5'9")	1956 (6'5")
N	mm (ft in)	2870 (9'5")	3073 (10'1")
A [⊖]	mm (ft in)	12 624 (41'5")	12 903 (42'4")
L	mm (ft in)	8738 (28'8")	8738 (28'8")
a ₁ Clearance circle (bucket in carry position)	mm (ft in)	20 777 (68'2")	20 777 (68'2")
Breakout force	kN (lb)	662,8 (149 000)	573,8 (129 000)
Static tipping load, straight	kg (lb)	48 444 (106 800)	48 104 (106 050)
Full turn	kg (lb)	43 750 (96 450)	43 446 (95 780)
Operating weight	kg (lb)	79 185 (174 570)	79 439 (175 130)

Bucket type

- 1 Straight-edge rock
- 2 Spade-nose rock

- ⊖ Add 206 mm (8,1 in) for bucket teeth.
- ⊖ Add 330 mm (13,0 in) for bucket teeth.
- ⊖ Subtract 315 mm (12,4 in) for bucket teeth.

Machine dimensions		TIRES					
		41.25/70-39 (L-5)		37.5-39 (L-5)		37.5 R 39 XRD2A*	
C	mm (ft in)	4623 (15'2")	4623 (15'2")	4623 (15'2")	4623 (15'2")	4623 (15'2")	4623 (15'2")
C ₁	mm (ft in)	3861 (12'8")	3861 (12'8")	3861 (12'8")	3861 (12'8")	3861 (12'8")	3861 (12'8")
D	mm (ft in)	584 (1'11")	620 (2'0,4")	620 (2'0,4")	574 (1'10,6")	574 (1'10,6")	574 (1'10,6")
F	mm (ft in)	4674 (15'4")	4709 (15'5,4")	4709 (15'5,4")	4663 (15'3,6")	4663 (15'3,6")	4663 (15'3,6")
F ₁	mm (ft in)	4267 (14'0")	4303 (14'1,4")	4303 (14'1,4")	4257 (13'11,6")	4257 (13'11,6")	4257 (13'11,6")
F ₂	mm (ft in)	4877 (16'0")	4912 (16'1,4")	4912 (16'1,4")	4867 (15'11,6")	4867 (15'11,6")	4867 (15'11,6")
G	mm (ft in)	2134 (7')	2134 (7')	2134 (7')	2134 (7')	2134 (7')	2134 (7')
H	⊕ ⊖ mm (ft in)	†	+36 (+1,4")	+36 (+1,4")	-10 (-0,4")	-10 (-0,4")	-10 (-0,4")
K	mm (ft in)	6274 (20'7")	6309 (20'8,4")	6309 (20'8,4")	6264 (20'6,6")	6264 (20'6,6")	6264 (20'6,6")
L	⊕ ⊖ mm (ft in)	†	+36 (+1,4")	+36 (+1,4")	-10 (-0,4")	-10 (-0,4")	-10 (-0,4")
M	⊖ mm (ft in)	†	-30 (-1,2")	-30 (-1,2")	-38 (-1,5")	-38 (-1,5")	-38 (-1,5")
P	°	45	45	45	45	45	45
R ₁	°	48	48	48	48	48	48
T	mm (ft in)	89 (3,5")	53 (2,1")	53 (2,1")	99 (3,9")	99 (3,9")	99 (3,9")
X	mm (ft in)	3023 (9'11")	3023 (9'11")	3023 (9'11")	3023 (9'11")	3023 (9'11")	3023 (9'11")
Y	mm (ft in)	4140 (13'7")	4061 (13'3,9")	4061 (13'3,9")	4102 (13'5,5")	4102 (13'5,5")	4102 (13'5,5")
Z	mm (ft in)	5156 (16'11")	5192 (17'0,4")	5192 (17'0,4")	5146 (16'10,6")	5146 (16'10,6")	5146 (16'10,6")
a ₄	± °	35	35	35	35	35	35

† See bucket-dependent dimensions.

SUPPLEMENTARY OPERATING DATA		Change in operating weight	Change in static tipping load			
			Straight machine		Full turn	
Tires:						
41.25/70-39 (34PR) L-5	kg (lb)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
41.25/70-39 (42PR) L-5	kg (lb)	370 (816)	239 (526)	239 (526)	215 (473)	215 (473)
37.5-39 (44PR) L-5	kg (lb)	646 (1424)	416 (918)	416 (918)	375 (826)	375 (826)
37.5-39 XRD2A* Radial	kg (lb)	-758 (-1672)	-489 (-1078)	-489 (-1078)	-440 (-970)	-440 (-970)
Bucket teeth, Heavy Duty	kg (lb)	476 (1050)	-538 (-1186)	-538 (-1186)	-598 (-1318)	-598 (-1318)
Cab (removal)	kg (lb)	-318 (-700)	-255 (-562)	-255 (-562)	-230 (-506)	-230 (-506)
Counterweight, 4 plates						
Thickness each: 76,2 mm (3 in)	kg (lb)	628 (1384)	1538 (3390)	1538 (3390)	1384 (3051)	1384 (3051)
ROPS canopy (removal)	kg (lb)	-1089 (-2400)	-807 (-1780)	-807 (-1780)	-727 (-1602)	-727 (-1602)

ATTACHMENTS

Buckets (SAE heaped)

Spade-nose rock bucket	9,2 m ³ (12 yd ³)
Straight-edge rock bucket	9,2 m ³ (12 yd ³)

Bucket teeth adapters and points

For spade-nose bucket	
weld-on, with corner adaptors	
teeth (8) flush leg shank	273 kg (602 lb)
teeth (8) 1½ leg shank	279 kg (614 lb)

For straight-edge bucket

weld-on, with corner adaptors	
teeth (8) flush leg shank	273 kg (602 lb)
teeth (8) 1½ leg shank	279 kg (614 lb)
rock points (8) standard	140 kg (308 lb)
rock points (8) heavy abrasion	196 kg (432 lb)
flush point (8) clean-up	142 kg (312 lb)
tooth lock removal tool (1)	3 kg (7 lb)
Cutting edge wear caps	
spade-nose (7)	227 kg (500 lb)
straight-edge (7)	227 kg (500 lb)

STANDARD EQUIPMENT

Safety & comfort

Cab, (not ROPS) sound-insulated and airtight
ROPS canopy
(SAE J1040) (ISO 3471)
Lockable doors with self-locking sliding glass windows
Door hold-open struts (2)
Cab heating with filtered fresh air intake and defroster
Floor mats
Cab access steps and handrails (SAE J185)
Interior lighting, red and white
Tinted safety glass
Seat belt (SAE J386)
Adjustable suspension seat
Windshield washers, front and rear

Dead engine parking brake release
Drawbar with pin
Hood side panels
Working lights (150 W)
3 front, 2 side, 2 rear
Lifting lugs
Safety start
Exterior rearview mirrors (2)
Service platforms
Vandalism lock for:
Batteries
Coolant
Engine oil
Hydraulic oil
Transmission oil
Horn
Reverse alarm (SAE J994)

Engine & electrical system

Electrical system (24 V)
Alternator (100 A)
Battery disconnect, lockable
Ether start
Instruments/gauges
Indicator for air filter
Engine coolant level
Coolant temperature
Oil pressure gauge
Hour meter
Hydraulic oil level
Torque converter oil temperature
Transmission oil level
Voltmeter
Warning lamps/audible alarm:
Applied handbrake
Brake pump differential pressure
Brake system, front
Brake system, rear
Transmission operating oil pressure
Transmission oil filter, pressure drop
Transmission oil temperature
Transmission overspeed

Drivetrain

4-wheel hydraulic disc brakes
Secondary brake system
Clark Limited Slip Differentials on front and rear axles
Tires 41.25/70-39 (34PR) L-5

Hydraulic system

Automatic boom kickout
Automatic bucket positioner
Hydraulic oil cooler, oil to air
Quick-connect hydraulic test ports

OPTIONAL EQUIPMENT *(Standard on certain markets)*

Service and maintenance equipment

Coupler, fast fuel (Wiggins)
Engine oil evacuation (Wiggins)
Hydraulic oil evacuation (Wiggins)
Single-point manual lubrication system
Service centre (Wiggins), engine oil
engine coolant
hydraulic oil
transmission oil

Transmission oil evacuation (Wiggins)
Automatic lubrication system

Engine equipment

Engine preheater
Engine shutdown to idle kit
Suction fan

Electrical equipment

Warning system AID:
high water temperature
low oil pressure
Working lights (2) 150 W

Tires

41.25/70-39 (42PR) L-5
37.5-39 (36PR) L-5
37.5-39 (44PR) L-5
37.5-39 XRD2A* Radial

Cab equipment

Air conditioning
Sun visor

Hydraulic equipment

3rd hydraulic control valve, piping and controls

Exterior equipment

Counterweight kit, four 76 mm (3 in) plates
Fenders, front

Protective equipment

Radiator sand grid
Radiator shutters (includes suction fan)
Fire suppression system

Other equipment

Secondary steering kit (electric)

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.

Volvo BM Company

S-63185 ESKILSTUNA SWEDEN

