

MICHIGAN

475 C



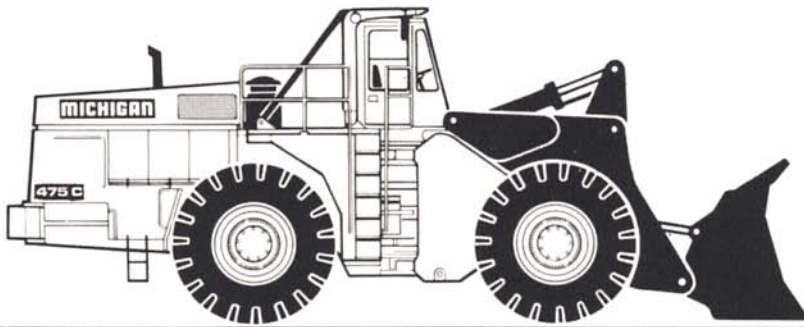
MICHIGAN 475 C **- THE HIGH-PERFORMANCE LOADER**

The Michigan 475C has its rightful place where crushers have to be continuously fed, or on loading applications where the haulage chain must be kept moving day in day out. The vast experience and know-how gained from nearly 80 years in the business, and the employment of the most up-to-date design and manufacturing technology, have resulted in a machine with high levels of dependability, durability and productivity. The Michigan 475C weighs about 76 tonnes and normally works with a 9.2 m³ bucket. It loads dumptrucks of up to 85 short tons effectively.

The hydraulic system, in combination with engine and transmission, is utilized with optimum efficiency in each phase of the work cycle. This reduces fuel consumption and provides greater tractive power when demanded.

Limited Slip Differentials in both axles is also an exclusive Michigan feature. These provide proportionately higher torque to the wheels that have the best traction.

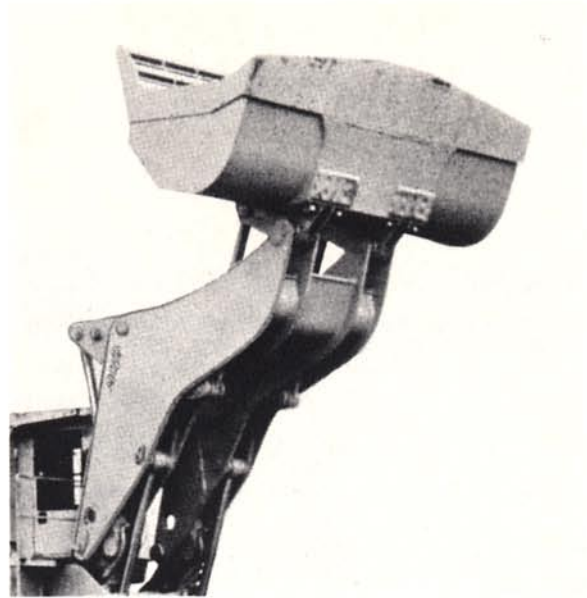
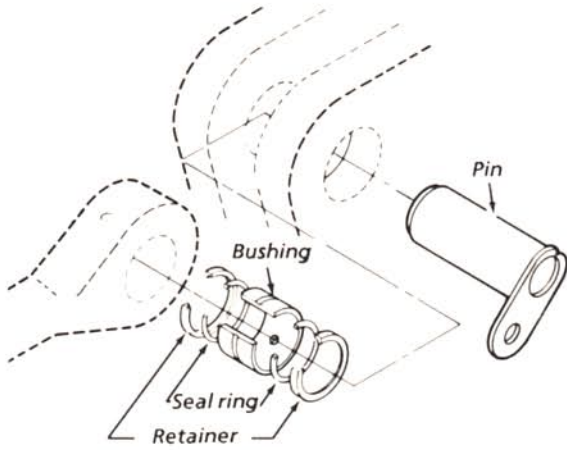
The operator works in an advanced cab with ROPS canopy that has everything necessary for optimum utilization of the machine's resources for effective work.



POWERSHIFT TRANSMISSION

The powershift transmission in the Michigan 475C features a rugged countershaft design and directional clutch modulation. Directional clutch modulation enables the operator to shift smoothly from forward to reverse at full power.



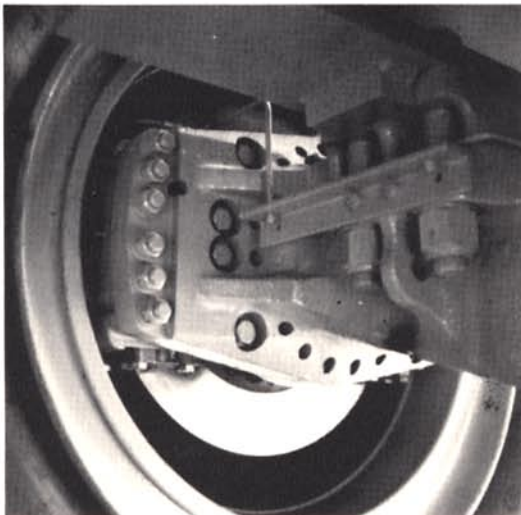
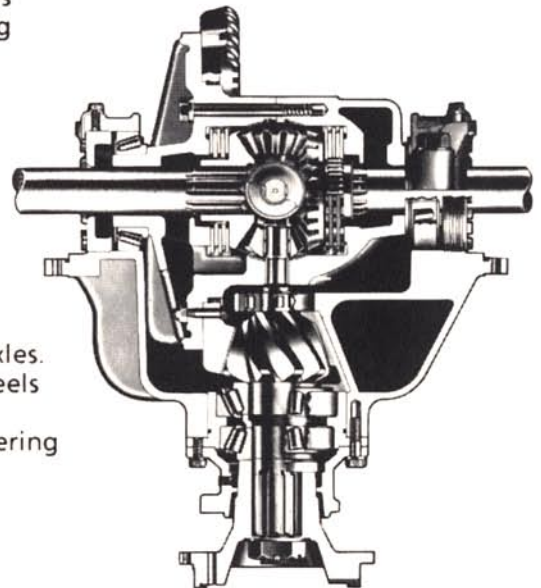


LOADER UNIT

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 boom and bucket 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.

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.



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 intercooled V-12 engine.

Make		Cummins
Model		VTA-28C
Max rating at SAE J1349	rps (rpm)	33,3 (2000)
	kW (hp)	541 (725)
Flywheel rating at SAE J1349	r/s (r/min)	33,3 (2000)
	kW (hp)	488 (655)
Max.torque at	rps (rpm)	21,7 (1300)
	Nm (lbf ft)	3204 (2363)
Number of cylinders		12
Displacement, total	dm ³ 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

Torque converter: Clark, high-efficiency, single-stage

Transmission: Clark countershaft-type powershift transmission with direction clutch modulation.

Axles: 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.

Tyres: Tubeless with nylon cord for wheel loaders/dozers. Other tyres available for different applications.

Torque multiplication ratio		2,96:1
Speeds forward/reverse		
1	km/h (mile/h)	5,6 (3,5)
2	km/h (mile/h)	10,0 (6,2)
3	km/h (mile/h)	17,4 (10,8)
4	km/h (mile/h)	29,9 (18,6)
Measured with tyres		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 fuses. 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 all wheels. Application of left pedal also causes transmission cut-out when driving forward.

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.

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.

Pump: Gear-type pump mounted on torque converter.

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	dm ³ (USgal)/min	314 (83)
at	MPa (psi)	6,895 (1000)
and engine speed	rps (rpm)	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.

Operators 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 torque converter.

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)	18,615 (2700)
Output, total	dm ³ (USgal)/min	878 (232)
Output	dm ³ (USgal)/min	314 (83)
at	MPa (psi)	6,895 (1000)
and engine speed	rps (rpm)	33,3 (2000)
Output	dm ³ (USgal)/min	314 (83)
at	MPa (psi)	6,895 (1000)
and engine speed	rps (rpm)	33,3 (2000)
Output	dm ³ (USgal)/min	250 (66)
at	MPa (psi)	6,895 (1000)
and engine speed	rps (rpm)	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	12,0
Dumping time (with load)	s	5,5
Lowering time (empty)	s	6,3
Total cycle time	s	23,8



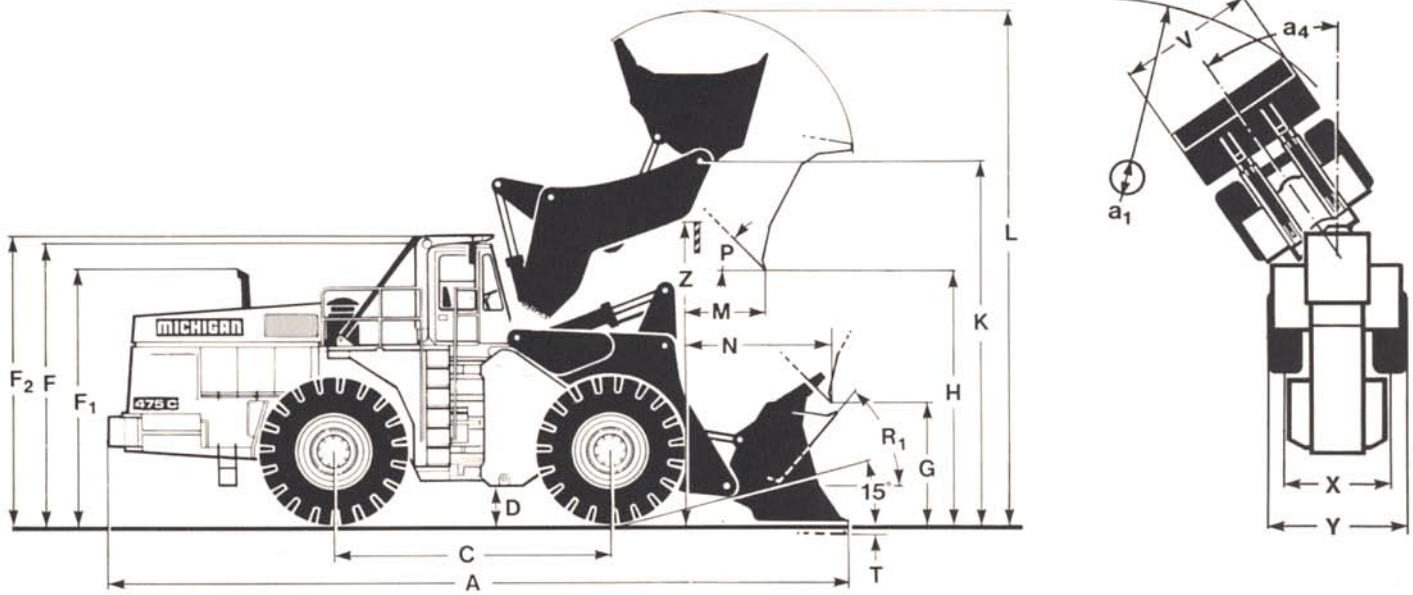
SERVICE REFILL CAPACITIES

Crankcase	dm ³ l (US gal)	102,2 (27,0)
Fuel tank	dm ³ l (US gal)	1033,4 (273,0)
Cooling system	dm ³ l (US gal)	257,4 (68,0)
Transmission total	dm ³ l (US gal)	124,9 (33,0)
Differentials (each)	dm ³ l (US gal)	109,8 (29,0)
Hubs (each)	dm ³ l (US gal)	40,1 (10,6)
Midmount bearing	dm ³ l (US gal)	4,7 (1,25)
Hydraulic system	dm ³ l (US gal)	939 (248,0)
Hydraulic tank	dm ³ l (US gal)	567,8 (150,0)

DIMENSIONS MICHIGAN 475C

Tyres: 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	9,2	9,2
	(yd ³)	(12)	(12)
Volume, struck	m ³	7,52	7,81
	(yd ³)	(9,84)	(10,22)
V	mm	4475	4475
	(ft. in)	(14'8")	(14'8")
H ⊕	mm	4801	4597
	(ft in)	(15'9")	(15'1")
M ⊕	mm	1753	1956
	(ft in)	(5'9")	(6'5")
N	mm	1753	1956
	(ft in)	(5'9")	(6'5")
A ⊕	mm	12 624	12 903
	(ft in)	(41'5")	(42'4")
L	mm	8738	8738
	(ft in)	(28'8")	(28'8")
a ₁ Clearance circle (bucket in carry position)	mm	20 777	20 777
	(ft in)	(68'2")	(68'2")
Breakout force	kN	662,8	573,8
	(lbf)	(149 000)	(129 000)
Static tipping load, straight	kg	48 095	47 968
	(lb)	(106 030)	(105 750)
Full turn	kg	43 319	43 214
	(lb)	(95 500)	(95 270)
Operating weight	kg	76 486	76 740
	(lb)	(168 620)	(169 180)

Bucket type

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

⊕ Add 206 mm (8.1 in) for bucket teeth.
 ⊖ Subtract 315 mm (12.4 in) for bucket teeth.

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

† See bucket-dependent dimensions.

SUPPLEMENTARY OPERATING DATA		Change in operating weight	Change in static tipping load	
			Straight machine	Full turn
Tyres:				
41.25/70-39 (34PR) L-5	kg(lb)	0 (0)	0 (0)	0 (0)
41.25/70-39 (42PR) L-5	kg(lb)	370 (816)	213 (470)	240 (535)
37.5-39 (44PR) L-5	kg(lb)	646 (1424)	370 (820)	420 (930)
37.5-39 XRD2A* Radial	kg(lb)	-758 (-1672)	-435 (-960)	-494 (-1090)
Bucket teeth, Heavy Duty	kg(lb)	476 (1050)	-572 (-1260)	-631 (-1390)
Cab (removal)	kg(lb)	-318 (-700)	-259 (-572)	-249 (-550)
Counterweight, 4 plates				
Thickness each: 76.2 mm (3 in)	kg(lb)	628 (1384)	1326 (2924)	1495 (3295)
ROPS canopy (removal)	kg(lb)	-1089 (-2400)	-735 (-1620)	-735 (-1620)

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

Drivetrain

4-wheel hydraulic disc brakes
Secondary brake system
Clark Limited Slip Differentials on front and rear axles
Transmission cut-out
Clutch packs with directional clutch modulation
Alternative tyres
41.25/70-39 (34PR) L-5
41.25/70-39 (42PR) L-5
37.5-39 (36PR) L-5
37.5-39 (44PR) L-5
37.5-39 XRD2A* Radial

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

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
Counterweight kit, eight 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

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