

938G

Series II
Wheel Loader



Cat® 3126B ATAAC diesel engine

Flywheel power 119 kW/160 hp

Maximum flywheel power 134 kW/180 hp

Bucket capacities 2.3 to 3.0 m³

Operating weight 14 000 to 14 700 kg

938G Series II Wheel Loader

State-of-the-art design, engine performance and operator comfort maximize productivity.

Engine

- ✓ Cat 3126B ATAAC diesel engine is built for performance, durability, excellent fuel economy, low sound levels and it meets the European Union emission regulations.
- ✓ This innovative engine features Caterpillar's exclusive, Advanced Diesel Engine Management (ADEM-III) electronic control module for advanced troubleshooting and diagnostic capabilities. Temperature sensing on-demand fan slows fan speed when temperatures are low, while the engine maintains a constant net power improving fuel efficiency. **pg. 4**

Electronic Transmission

- Automatic power shift transmission provides on-the-go speed and direction gear changes.
- ✓ The Electronic Clutch Pressure Control (ECPC) allows for smoother shifts and transmission neutralization, which let the operator adjust for specific site conditions.
 - ✓ Variable Shift Control allows the operator to match the shift pattern to the application, improving operator comfort and fuel efficiency.
 - ✓ The Integrated Braking System incorporated in the left-hand brake pedal combines optimized brake, transmission neutralizer and downshift functions for increased productivity and extended brake life. **pg. 5**

Operator Station

- Engineered to provide the operator unparalleled viewing area and comfort.
- ✓ Enhanced dash panel provides ergonomically positioned gauge indicators and switches to maximize productivity. **pg. 8-9**

Hydraulics and Operator Controls

- Powerful and efficient Caterpillar hydraulics help provide strength and versatility for various applications, giving the 938G Series II exceptional lift capacity and load handling.
- ✓ Enhanced, low-effort operator controls for steering, shifting and bucket loading precisely respond to operator input. **pg. 7**

Performance and comfort you can feel.

Caterpillar® design delivers excellent breakout force, fast load and cycle times, precise maneuvering and smoother shifts for optimal performance and comfort.

Reliability you can trust.

Proven components, field-tested durability, combined with easy maintenance, ensures reliability over the life of the machine.

- ✓ *New features*



Axles

Heavy-duty axles with enclosed wet-disc brakes are designed to provide optimum performance in all kinds of applications and operating environments. **pg. 6**

Buckets and Ground Engaging Tools

Choose from two bucket families, General Excavation and Universal, combined with a large variety of Ground Engaging Tool options to allow precise application match. **pg. 10-11**

Serviceability

Easily perform daily maintenance with ground-level access to all major service points including sight gauges for level checks of engine coolant, hydraulic and transmission oil.

- ✓ Engine oil change interval is increased to 500 hours and hydraulic oil change interval to 4000 hours thus decreasing service time and reducing owning and operating cost. The tilting hood provides unmatched access to the engine compartment and cooling system. **pg. 14**

Work Tools and Quick Couplers

Add versatility to your machine with a wide range of attachments and special buckets offered by Caterpillar. **pg. 12**

Environmental Machine

Quieter operation with the Low Sound version, availability of Cat bio-degradable hydraulic oil, axle ecology drains (optional), combined with easy serviceability help you meet or exceed worldwide regulations and protect the environment. **pg. 13**

Preventive Maintenance

Thanks to the Diagnostic Indicator, the Electronic Technician and the Scheduled Oil Sampling (S•O•S) analysis, you can anticipate potential problems and avoid unscheduled repairs. **pg. 15**



3126B ATAAC Engine

The six-cylinder, HEUI, turbocharged and-air-to-air aftercooled engine is built for power, reliability, low maintenance, excellent fuel economy and low emissions.



Powerful performance.

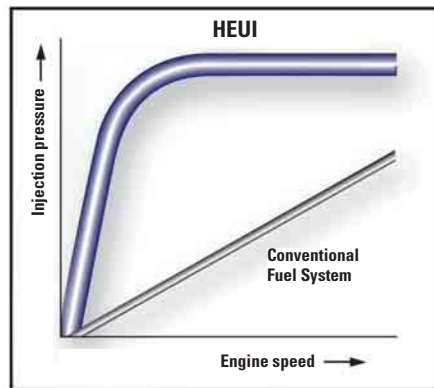
The 3126B ATAAC engine delivers, at the rated speed of 2200 rpm, the net power of 119 kW (160 hp), and meets all current worldwide emissions standards.

HEUI Fuel System. In the traditional common rail fuel system, the entire fuel line is under high pressure. With the HEUI system, fuel remains at low pressure until it is injected into the cylinder. Fuel pressure is created hydraulically in response to a signal from the Electronic Control Module (ECM).

HEUI controls injection pressure electronically.

This unique capability means the regulation of injection pressure is completely independent of crankshaft speed. Peak injection pressure can be achieved under acceleration and lug conditions, providing better fuel economy, better response and reduced smoke.

Three valves. Three valves per cylinder allow for good air flow enhancing fuel efficiency and heat rejection.



Injection pressure in a HEUI fuel system is independent of engine speed.

Advanced fuel system. The advanced Diesel Engine Module (ADEM III) fuel system is a Caterpillar exclusive electronic control module which provides improved engine response, performance, fuel efficiency, troubleshooting, diagnostics, and reduced emissions. The ADEM III electronic engine control improves altitude capability to 3050 meters without deration and allows integration with the electronic transmission control for maximum power train efficiency.

Turbocharged and Air-to-air aftercooled.

Turbocharger packs more dense air into the cylinders for more complete combustion and lower emissions improving performance and engine efficiency. These benefits are especially useful at high altitudes. Air-to-air aftercooler reduces smoke and emissions by providing a cooler inlet air for more efficient combustion. This also extends the life of the piston rings and bore.

Cooling system. It features an electronically controlled continuously variable on-demand fan. Fan speed is determined by engine coolant, transmission oil, hydraulic oil, and inlet manifold temperatures. Cooler operating conditions mean lower average fan speeds resulting in reduced fuel consumption, lower noise levels, and less radiator plugging. The electronic engine control continuously compensates for this varying fan load providing constant net horsepower for consistent power regardless of operating conditions. Hydraulic oil cooler, air conditioner condenser, and rear grill are all hinged for easier cleaning. Side panels allow access to both sides of all cores for easier cleaning.

Crankshaft. It is steel-forged, carburized, and induction-hardened for long-term durability. It is dynamically balanced for smooth operation. The crankshaft is completely regrindable. Connecting rods can be removed through the tops of the cylinders for servicing ease.

Caterpillar engine oil. It is formulated to optimize engine life and performance and is strongly recommended for use in Cat diesel engines. The engine oil change interval is increased to 500 hours.

Factory remanufactured parts. A large choice of factory remanufactured parts and dealer proposed repair options increase machine availability and reduce total repair costs.

Electronic Transmission

Caterpillar power train makes dependable performance a standard feature.

Electronic power shift transmission.

The Electronic power shift transmission with automatic shift capability is designed, developed and built by Caterpillar. The electronically controlled power shift transmission allows full-power, speed and directional changes. Fully modulated gear shifts significantly contribute to the operator comfort and increase machine productivity as well as component life.

Electronic Clutch Pressure Control (ECPC).

It senses input from both the transmission and the operator controls in the cab to modulate each individual clutch through a proportional electro-hydraulic valve. This results in smoother shifts in both speed and direction. Energy is modulated into the clutches, resulting in longer clutch life.

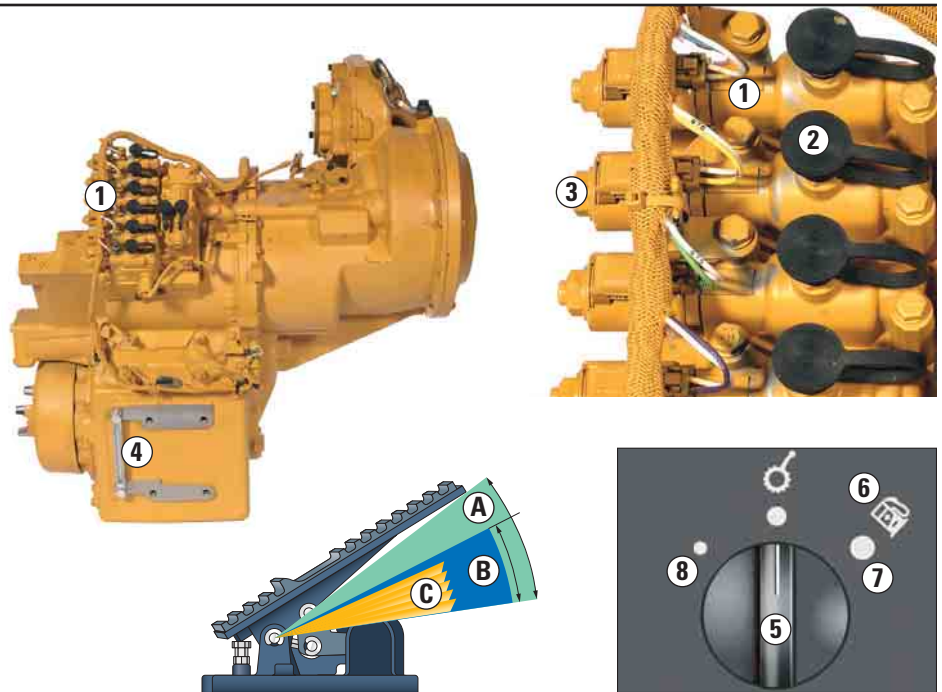
Integrated Braking System.

It integrates a downshifting and neutralizer logic into the left-hand brake pedal. This system translates into increased performance/productivity for the operator thanks to the optimized transmission neutralizer, the automatic downshifting and downhill retarding feature. The Integrated Braking System also lowers the owning and operating costs thanks to reduced axle oil temperatures and extended brake life.

A Downshift logic only

B Brake application initiated

C Self-adjusting transmission neutralization



1 Electro-hydraulic valves.

The six proportional electro-hydraulic valves pressurizing the clutches are identical and bolted on top of the transmission.

2 Dedicated pressure port.

It is fitted on each electro-hydraulic valve to help reduce troubleshooting time for increased machine availability. By connecting the Electronic Technician (ET) and the service tool box, the transmission can easily be recalibrated to maintain quick response.

3 Thermoplastic connectors.

Heavy-duty thermoplastic connectors, sealed against moisture and contaminants, ensure reliable and trouble-free connections with the transmission control.

4 Easy service. Easy service is built in the transmission. The daily level check is done from ground level through a well-protected sight gauge. An oil sampling valve allows quick, clean access to the transmission for S•O•S oil analysis.

5 Variable Shift Control.

A transmission software which allows the operator to select three different shift patterns based on his application and operating preference. This feature reduces fuel consumption depending on the application. In all modes, the full machine power remains available for loading.

6 ISO symbol for fuel efficiency.

7 Economy mode (typically used for load and carry and roading applications).

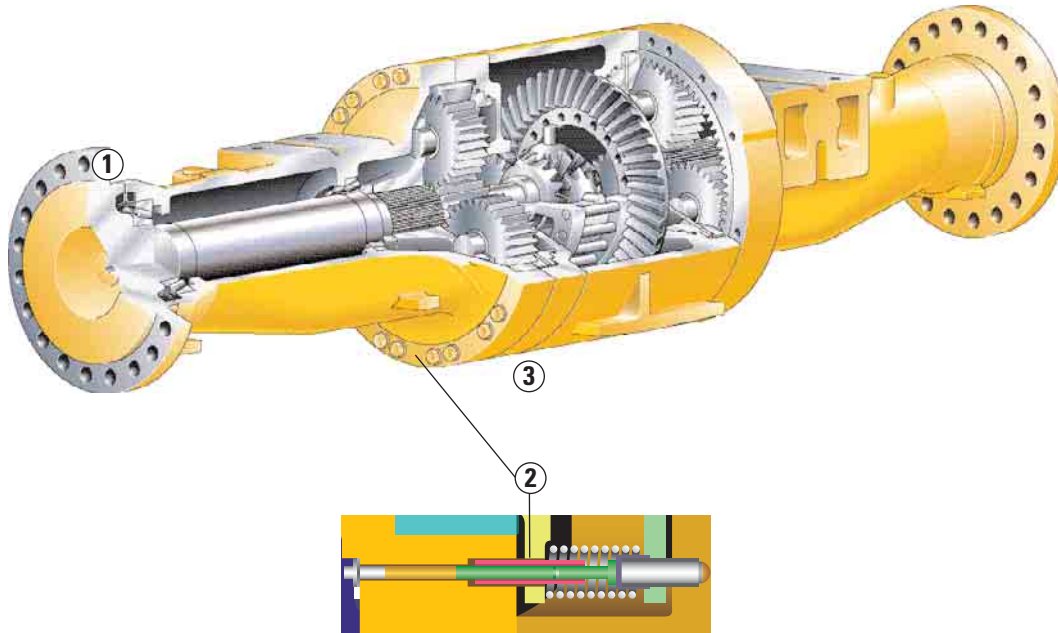
8 Aggressive mode (typically used for tight truck loading applications).

Caterpillar transmission oil. It has been developed to provide optimum friction control for power shift transmissions and brake disc material, as well as, to optimize transmission and final drive gear life.

Transmission neutralizer. It allows the operator to disengage the transmission clutches, removing torque from the drive train. With the neutralizer, high engine rpm's are maintained for full hydraulic flow and brake drive through is prevented.

Axles

Large, heavy-duty axles protect internal components from the harsh environment and offer excellent serviceability and maintenance.



Heavy-duty axles and brakes.

Designed to last in all kinds of operating conditions. Planetary final drives use free-floating, bronze sleeve bearings in the planet gears.

- The differential pinions use free-floating bronze sleeve bearings, and bronze spherical thrust washers for increased durability.
- Multiple oil-disc brakes are adjustment free and fully enclosed to lock out contaminants.

Front axle. It is rigidly mounted to the frame to support the weight of the wheel loader, internal torque loads and external loads applied during breakout and loading.

Rear axle. It includes a trunnion, two trunnion supports and the associated bearings, allowing it to oscillate plus or minus twelve degrees, ensuring four-wheel ground contact for traction and stability, even on rugged terrain.

Limited slip differentials. Deliver maximum traction on uneven ground and in changing traction conditions such as mud, water, snow and ice. They are available for front and/or rear axles.

1 Duo-Cone Seals. Patented metal-to-metal, Duo-Cone Seals between the axle shafts and housings keep lubrication in and dirt out.

2 External port. An external port (patented) provides access to measure brake disc wear without disassembling the axle. The original brake measurement is recorded in the machine controls at the factory to allow precise wear calculation and schedule appropriate service.

3 Four-piece axle. It contains two axle shaft housings, the center housing, and the intermediate housing. Features and benefits of this design include:

- Inboard brakes are positioned immediately adjacent to the differential and operate on the low torque side of the final drive, requiring less braking force to stop the machine.
- Independent front and rear brake circuits use separate, heavy-duty, piston-type accumulators to ensure dead engine braking.
- Brakes are bathed in axle oil for excellent cooling.
- Brakes can be serviced without disassembling the final drive.
- Larger diameter axle shafts on high torque side of final drive provide greater torsional strength for better performance and durability.

Axle oil temperature sensor.

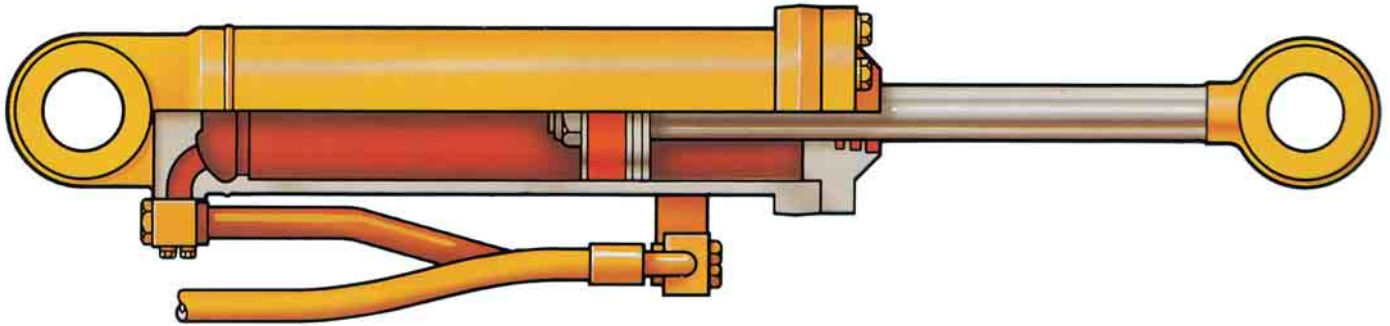
Optional oil temperature sensors in both front and rear axles alert the operator when oil temperatures are too high and a change in operating technique is required or slowing the machine. When an over-temperature situation is detected, the sensors illuminate an LED on the dash board.

Axle oil Ecology drains.

Axle oil ecology drains are available.

Hydraulics

Well balanced hydraulics deliver precise, low-effort control and trouble-free operation.



Hydraulic pumps. Perform with high efficiency and great reliability. High flow rates result in fast hydraulics, for an optimum balance between machine ground speed and hydraulic lift speed.

Low-effort hydraulic controls.

Pilot control valves enable the operator to move the control levers with minimum effort. This reduces operator fatigue, while providing quick response and precise control. Lift height and digging angle can be preset, ensuring accuracy and cutting down on operator distractions.

Single hydraulic control.

The single hydraulic control (joystick) combines lift and tilt functions (option) in one lever.

Forward/neutral/reverse switch.

The forward/neutral/reverse switch (option) is mounted on the hydraulic control lever for easier operation.

Smooth, efficient steering.

Load sensing steering maximizes machine performance by directing power through the steering system only when needed. When the machine is not steering, more engine power is available to generate rimpull, breakout and lift forces. Load sensing reduces horsepower draw by up to 8 percent, resulting in increased fuel economy. Large-bore steering cylinders allow responsive maneuverability.

Pressure taps. Pressure taps allow quick diagnosis of the hydraulic system components.

Caterpillar's XT hose and couplings.

Uniquely designed and tested to work together as a system for superior performance. Hoses are engineered and manufactured for high abrasion resistance, excellent flexibility and easy installation. Caterpillar couplings use pre-installed O-ring face seals which provide positive sealing for durable, leak-free connections. Reliable components reduce the risk of leaks, helping protect the environment.

Automatic Ride Control.

The automatic ride control* helps operators perform better. This system uses a nitrogen over oil piston-type accumulator in the hydraulic lift circuit that acts like a shock absorber for the bucket. The lift arms and bucket response to movement is dampened over rough ground, reducing fore and aft pitch. A smoother, more comfortable ride gives operators the confidence to travel at higher speeds, improving cycle times, load retention and productivity.

Caterpillar hydraulic oil.

Maximum protection against mechanical and corrosive wear in all hydraulic systems. Its high zinc content reduces wear and extends pump life. Provided certain requirements are met (e.g. S•O•S analysis every 500 hours), the hydraulic oil change interval is extended to 4000 hours.

* May be optional in some countries.

Operator Station

Comfort and control – top-quality operator’s station will help maximize productivity.



The 938G Series II cab is a spacious and comfortable work environment that promotes productive operation. The cab includes large windows, full sized mirrors, excellent ergonomics and generous storage areas.



1 Large windows. They ensure the viewing area in all directions. The stylish, sloping hood allows the operator a good view to the rear of the machine. Visibility to the bucket corners is excellent, too. Silicone-bonded windshield and rear window eliminate pillar obstructions and improve serviceability.

2 Automatic shift control. It allows the operator to concentrate on the work, not gear selection. Preset factory shift points ensure each shift occurs at optimum torque. A switch allows the operator to select either automatic or manual shifting. The low-effort shift control allows one-handed shifting for speed or directional changes. A quick gear kickdown button located on the lift lever lets the operator downshift easily, saving time, increasing bucket fill factors and lowering cycle times.

3 Variable Shift Control. It allows the operator to select three different transmission shift patterns based on application and working preferences.

4 Floor mounted pedals. Floor mounted pedals ensure good ergonomics and operator efficiency. The Integrated Braking System incorporated in the left-hand brake pedal combines optimized brake, transmission neutralizer and downshift functions for increased productivity and extended brake life.

5 Hydraulic Controls. Pilot-assisted hydraulic controls make low-effort operation possible. An optional joystick combines lift and tilt functions in one lever for easier operation and enhanced productivity. An optional third valve control lever for operating various work tools is available.

6 Forward/neutral/reverse switch. The forward/neutral/reverse switch (optional) located on the lift lever enables the operator to easily make directional transmission shifts while continuing implement operation and keeping full control of the steering, thus reducing effort, saving time and shortening loading cycles.

7 Wrist rest. Padded, adjustable wrist rest helps reduce fatigue.

8 Steering system. The Load-sensing steering system with flow amplification matches steering response to application requirements.

9 Steering console. The steering console can be positioned infinitely within the tilt range by the operator. With the stroke of a lever, the entire console lifts effortlessly out of the way for easy access to the operator station.

10 Instrument panel. It features a modern looking ergonomic styling. It combines gauges and indicators which ensure full time monitoring of key machine parameters.

11 Seat. The seat has adjustable fore/aft position, back rest cushion angle, seat height, bottom cushion angle, lumbar support, armrest angle and suspension stiffness. The seat cover is a combination of durable, breathable cloth and vinyl. The seat is equipped with a retractable seat belt.

12 Generous storage space:

- Lockable compartment for personal items
- Coat hook
- Molded compartments for lunchbox, cooler, thermos, cup or can.

13 Ventilation and heating system. It ensures the cab's heating, cooling, defrosting and defogging capabilities. Six air vents positioned throughout the cab keep air flowing to the operator and windows. A large recirculation filter provides better air quality and contributes to the operator comfort.

14 Transmission neutralizer. The transmission neutralizer switch allows to deactivate the transmission neutralizer control for the left brake pedal.

15 Ride Control System. The ride control system switch* allows the selection of three different modes of the system operation (off/on/auto).

16 Quick coupler control. The quick coupler control (optional) is used to activate the quick coupler hydraulic circuit and change work tools without leaving the cab.

Radio ready. Cab includes a 12-volt converter (5-amp), speakers, antenna, all wiring and brackets for entertainment or communications radio installation.

Payload Control System. This is an optional attachment providing multiple weighing capabilities. Bucket loads are weighed and accumulated with a high level of accuracy and displayed on a multiple mode monitor in the cab.

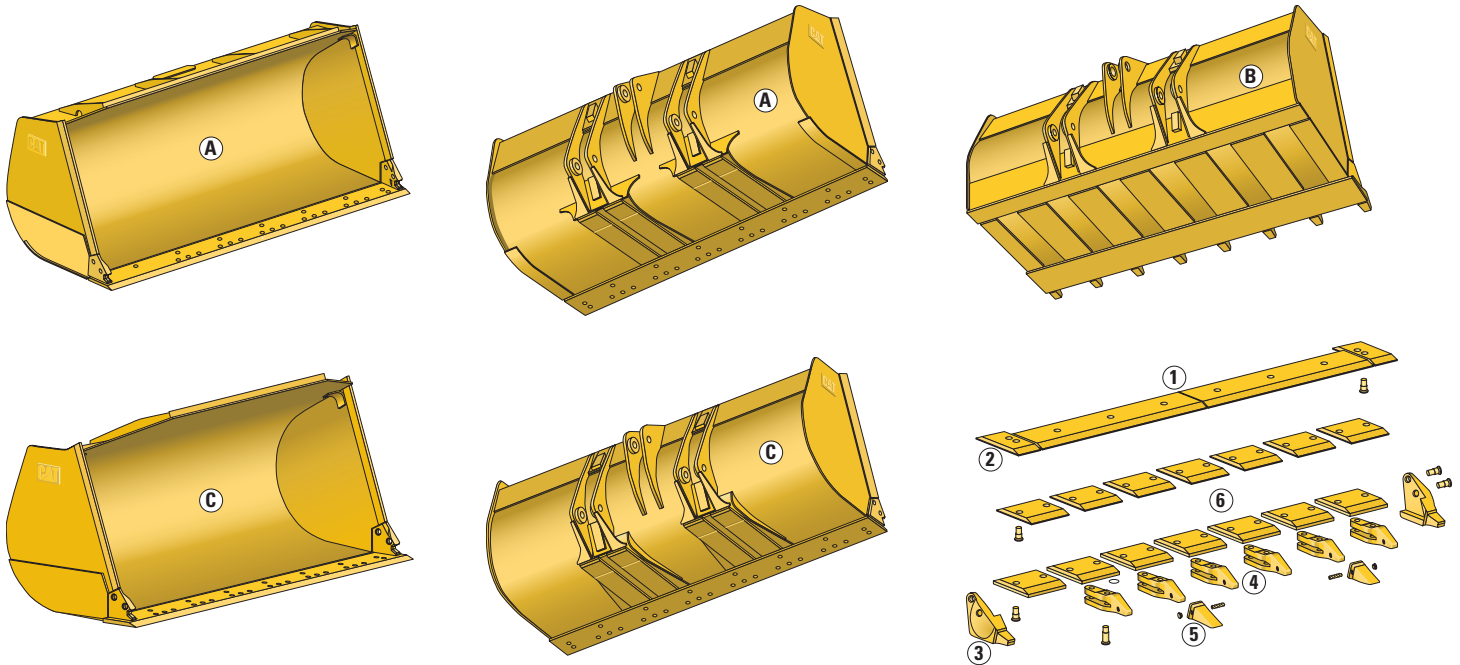
Other operator's station equipment:

- Cigar lighter and ashtray
- Dome light
- External mirror package
- Internal rearview mirrors*
- Sun visor* for the front windshield
- Air conditioning*
- Optional roll-down sun screen for the rear window

* May be optional in some countries.

Cat Buckets and Ground Engaging Tools

Buckets and a large choice of Ground Engaging Tools maximize performance in all applications.



A Standard Universal buckets.

These flat floor buckets, equipped with various Ground Engaging Tools, provide easier pile penetration, better fill factors and faster loading cycles; they are offered in a wide range of capacities and are recommended in all applications, except fulltime bank or rock loading. All buckets feature integral spill plates to prevent rear spillage, as well as, bottom and side wear plates for greater durability.

B Universal buckets with Back Grading Edge.

In this configuration, an additional full-width box-section profile with a wear edge is welded at the back of the bucket floor. The bucket base edge and the additional rear edge are at the same level, providing better grading capabilities. This bucket can be fitted with welded flush mounted adapters and tips still allowing excellent grading capability.

C General Excavation Buckets.

Built to handle the toughest conditions, these slope floor buckets feature a well proven, shell-tine construction design that resists twisting and distortion and are excellent for bank and excavation applications. Bucket hinges are part of a structure that extends under the bucket shell to the cutting edge, forming box sections.

These structures act as protection against impact and twisting forces. All buckets have integral spill plates that prevent rear spillage, keeping material away from the linkage. Hardened weld-on rear wear plates protect the bottom of the bucket for greater durability. Bucket side plates are also reinforced in their lower portion with additional wear plates for longer life.

Ground Engaging Tools.

Allow maximum flexibility between teeth and edge systems for superior protection and performance in each application.

Bolt-on cutting edge (1) and end bits (2)

- Standard DH-2, reversible, for superior strength and wear life.
- Heavy-duty, reversible, providing 50% more wear life.
- Abrasion Resistant Material (ARM) with impregnated tungsten carbide is another option for maximum wear life in low-to-medium impact application.

Bolt-on teeth

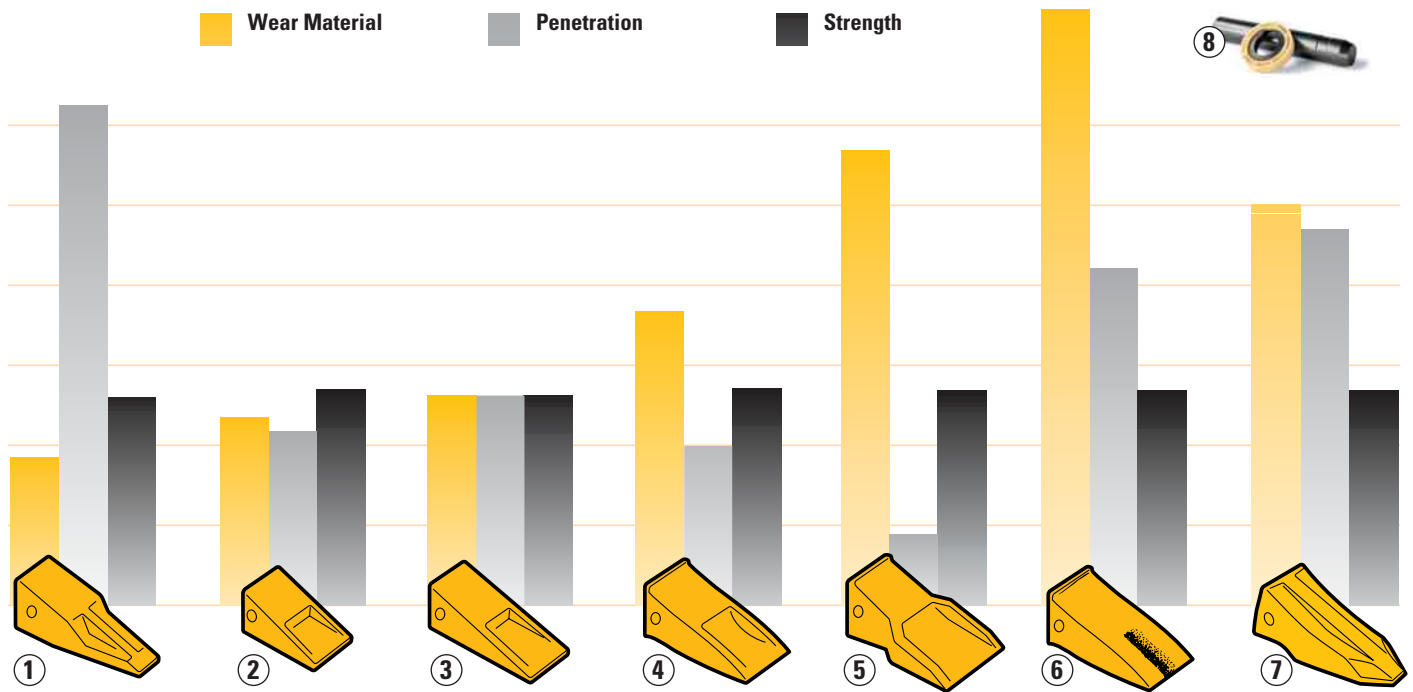
- Two-bolt corner adapters (3), securely attached to prevent shifting.
- Bolt-on two-strap center adapters (4).
- Seven tip options with Heavy-duty retention system. (5).

Bolt-on teeth and edge segments

- Standard reversible segments (6) protect the base edge between teeth, eliminating scalloping and maintaining a smooth work surface.
- Heavy-duty reversible segments for 50% more wear life.

Tip Selection and GET System Selection Guide

Seven tip options are available to provide the best combination of wear life, penetration and strength needed for each application.



1 Penetration

- Use in densely compacted material such as clay.
- Gives maximum penetration.
- Self-sharpening.

2 Short

- Use in high-impact and pry-out work such as rock.
- Extremely strong.

3 Long

- Use in most general applications where breakage is not a problem.

4 Heavy Duty Long

- Use in general loading and excavation work.
- Has extended wear life and greater strength.

5 Heavy Duty Abrasion

- Use when working in sand, gravel and shot rock.
- Maximum wear material.

6 Heavy Duty Long Life

- A.R.M. positioned to increase wear life and penetration.
- As the Heavy Duty Long Life tip wears, ease of penetration increases.

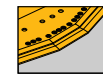
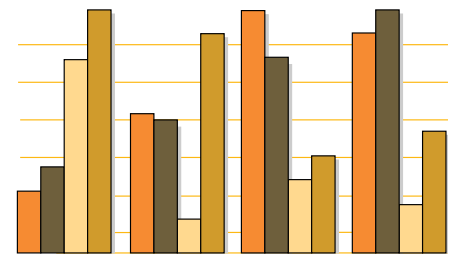
7 Heavy Duty Penetration

- Use in high-impact, hard-to-penetrate material.
- Extended wear life.
- Good combination of strength and wear life.

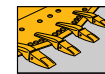
8 Heavy Duty retention system

Eliminates pin walking and the resultant tip loss in particularly severe loading conditions.

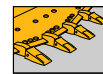
GET system selection guide



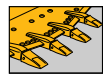
Cutting edges (bolt-on or weld-on)



Flushmount adapters



Bottom-strap adapters



Two-strap adapters

Penetration ability

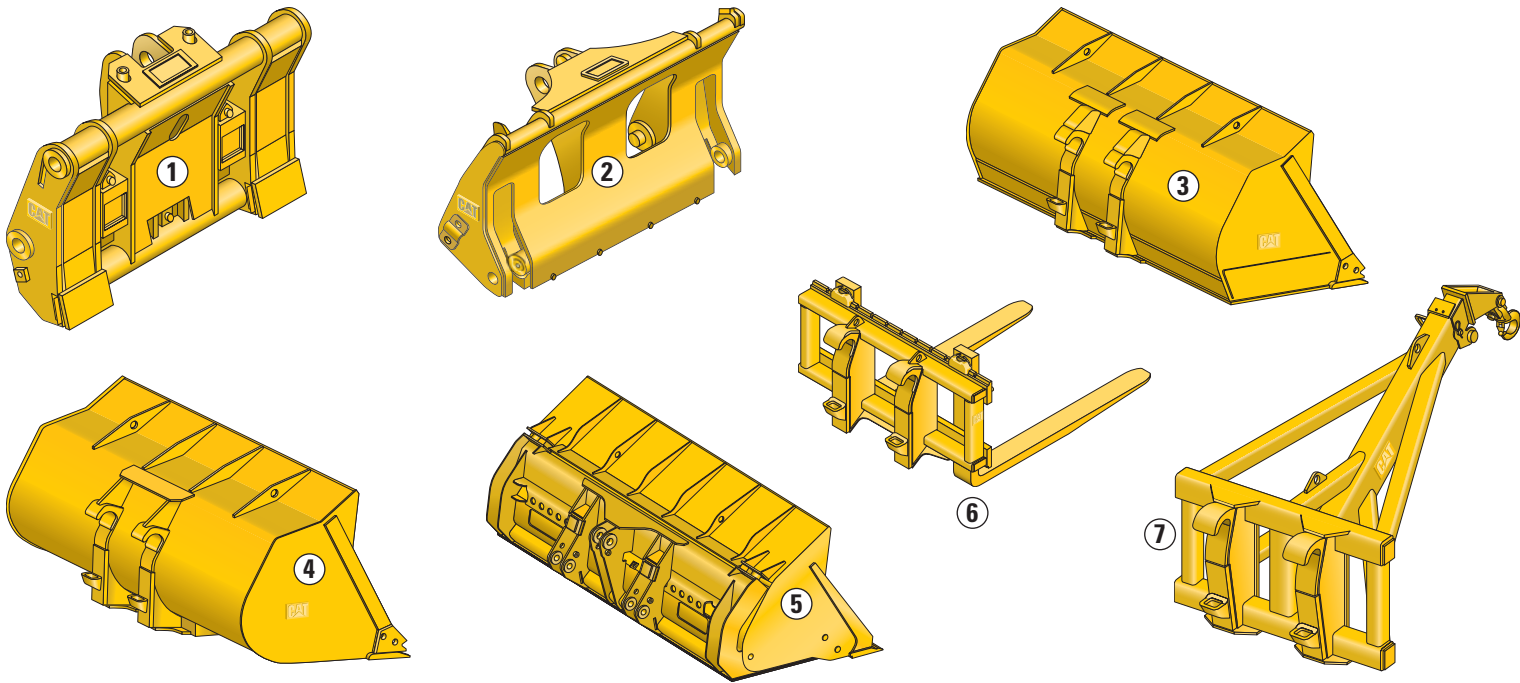
Impact resistance

Wear life/Abrasion protection

Smooth floor maintenance

Work Tools and Quick Couplers

Add versatility to your machine with a wide range of special buckets and quick couplers designed for the 938G Series II to optimize your operation.



1 Quick Couplers (SW). They provide unmatched versatility and allow one operator with one machine to perform a wide variety of tasks, resulting in greater machine performance and cost efficiency. Use the dedicated quick coupler actuation circuit (optional) to activate the quick coupler and change mechanical tools without leaving the cab. Having a dedicated circuit also leaves the third valve solely to actuate hydraulic tools without the need for diverter valves.

The benefits of the vertical wedge-lock quick coupler are:

- Minimal loss of break-out force
- Automatic adjustment for wear
- High durability.

2 Quick Coupler (PW). Pin-lock quick coupler (VCE tools).

3 Universal Buckets (WP). Standard and back grading edge. Equipped with hooks for use with SW quick couplers.

4 General Excavation Buckets (WG). Equipped with hooks for use with SW quick couplers.

5 High-Dump Buckets (WGO, WLO). High-dump buckets are ideal for applications as various as loading stockpiled, light material into high sided trucks, hoppers in waste transfer stations or rehandling fertilizer, coal or grain.

6 Pallet Forks (PS). Pallet forks are the ideal tools for handling a variety of materials.

7 Material Handling Arm (KM). Material handling arm with adjustable length and load capacity provides a boom for placing material from overhead – great for lowering pipes and beams into position on construction projects.

Other work tools are available upon request. Contact your Caterpillar dealer for a complete range of attachments and tools.

Environmental Machine

Caterpillar cares about the environment and continues to develop innovative solutions.



Machine Features

- An on-demand fan (standard on all 938G Series II), which automatically regulates the fan speed depending on the cooling requirements.
- Additional sound insulation around the engine.
- Oil sampling valves and pressure test ports for service diagnostics.

These features result in reduced operating cost, quieter machine, and easier service.

Low Sound version. The Low Sound version is much quieter than the standard machine. The sound pressure levels for the Low Sound version are 104 and 71 dB(A) for exterior and operator station respectively.

Environmental Fluids

- Extended Life Coolant/Antifreeze with anti-foaming and anti-corrosion properties provides extended service intervals (up to 6000 hours) requiring less frequent fluid renewals and disposals. This is a standard feature.
- Cat Bio Hydo (HEES) is formulated from a fully saturated Hydraulic Environmental Ester Synthetic base stock and selected additives. It has excellent high-pressure and high-temperature characteristics. Provided a special water separator filter has been installed and depending on regular S•O•S analysis, Cat Bio Hydo (HEES) service intervals can be extended up to 6000 hours. It is fully compatible with our hydraulic components and allows operation over a broad temperature range. Cat Bio Hydo (HEES) is fully decomposed by soil or water microorganisms. This is available as an attachment.

Low exhaust emissions. The Cat 3126B ATAAC engine used in the 938G Series II is a low emission engine designed to meet current emission regulations. Electronically controlled engine adjusts the fuel-to-air ratio and the air-to-air aftercooler provides more efficient combustion, lower fuel consumption and cleaner emissions.

Fewer leaks and spills. Transmission and hydraulic oil filters, as well as engine oil and fuel filters are spin-on elements, positioned vertically and purposely located for a quick and easy access allowing their removal without fluid spillage. Lubricant fillers and drains are also designed to avoid spills.

Ecology drains. They are standard from factory for the engine, transmission, hydraulics, radiator and fuel system. Ecology drain valve allows the fluid to be drained into a container without spillage. Axle oil ecology drains are optional.

Rebuildable components. Many of the major components used in the 938G Series II are designed for rebuildability. That means you have high-quality, remanufactured (REMAN) parts available to you at a fraction of the new component cost.

Serviceability

Keep machines up and running with easy-to-perform daily maintenance.



Maintenance. It has never been more accessible than on G-Series II machines. Fast, easy and reduced maintenance means improved uptime and greater value.

- Lockable, ground level service doors give quick access to engine oil fill and dipstick, coolant sight gauge, air filter indicator, rear grease fittings, and battery disconnect switch. Sight gauges for hydraulic and transmission oil levels are also easily viewable from the ground.
- Oil cooler and optional A/C condenser swing out, allowing quick easy cleaning of the engine radiator. The air flows first through the hydraulic oil cooler and the optional A/C condenser, then through the engine radiator and is rejected through three perforated panels.
- Grouped remote grease fittings allow ground level access for lubricating tilt and steering cylinder pins and rear axle oscillation bearings.
- Caterpillar fluid filters are especially designed to assure maximum component life. The unique design uses non-metallic centertube and molded end-caps, which fully blend with media ensuring no internal leakage.
- Cat high efficiency fuel filters with STAY CLEAN VALVES™ feature cellulose/synthetic blend media that remove more than 98 percent of particles that are two microns or larger, maximizing fuel injector life.
- Caterpillar Radial Seal air filters do not require tools to service, reducing maintenance time. The ultra-high efficiency primary air filter element

is coated with a fine layer of fibers that prevent dust particles from entering the filter media. This results in more efficient filtration, extended service intervals, and extended filter life – all contributing to reduced operating costs.

- Caterpillar Extended Life Coolant allows extended change intervals (6000 hours).
- Caterpillar maintenance-free, high output batteries are designed for high cranking power and maximum protection against vibration.
- The 938G Series II axles feature a brake wear indicator port.

Reliability and durability

- **Paint Process.** Great care is given to ensure a durable paint finish. Most brackets and other hardware are zinc-plated. Larger components are all prime painted, the cab receiving a zinc-phosphate based coating to prevent rust. The entire machine, as well as decals, is finish painted with a clear, two-component, polyurethane based paint which provides a durable, UV resistant, high gloss.
- **Electrical Systems.** Designed and manufactured to resist the most severe conditions. Harnesses are made of large-section, colored and number-coded wires, the complete harness being protected by an abrasion resistant braiding. Connectors are made of rugged thermoplastic or cast-aluminum shells, sealed against moisture and contaminants. Harnesses are properly routed and securely clamped to ensure their reliability and durability.

Sloped hood. It is electrically or mechanically activated, tilts up for complete access to the engine, cooling system and other major components. If needed, the hood can be removed quickly and easily by removing three pins and disconnecting a single harness connector. A built-in lifting point facilitates easy lift off.

Automatic Greasing System

attachment. It supplies the required quantity of grease at the right interval to the grease points automatically, without manual interference. It greases while the machine is in operation, resulting in better distribution of grease over the bearing surface. Also, the automatic greasing reduces downtime, repair and overhaul costs, safety and environmental hazards and greasing costs (up to 75%). The automatic greasing system is optional and being factory installed prior to final assembly.

Engine, transmission, hydraulic oils.

Caterpillar engine, transmission and hydraulic oils deliver maximum performance and service life. The oil change intervals are extended to 500 hours for engine oil and 4000 hours for hydraulic oil (provided certain conditions are met) limiting service time and lowering owning and operating costs.

Factory remanufactured parts.

A large choice of factory remanufactured parts and dealer proposed repair options increases machine availability and reduces repair cost.

Preventive Maintenance

By anticipating potential problems and avoiding unscheduled repairs, your equipment is always up and ready to run.

Diagnostic Indicator. The Diagnostic Indicator alerts the operator of immediate or impending problems with engine oil pressure, brake oil pressure, parking brake, electrical charging system, low fuel level, hydraulic oil level and primary and secondary (if equipped) steering.

Electronic Technician (ET).

Caterpillar Electronic Technician is a software program which allows the service technician to find and identify a problem on a machine and to analyze how to fix it quickly. ET provides him with the capability to access the Electronic Control Modules from a personal computer.

The Electronic Technician is used for:

- Viewing active and non active diagnostic codes and clearing them after repair.
- Displaying the status of all parameters such as engine speed, gear engaged, control levers position, control switch position, etc.
- Performing diagnostic test and calibrations of electro-hydraulic components.
- Viewing current configuration and changing parameter settings.
- Flashing new Caterpillar software in the Electronic Control Modules.
- Recording all parameters during machine operation.

A customer version of ET is also available for your fleet of Caterpillar equipment. Contact your Caterpillar dealer for more detailed information.



- 1 ET software
- 2 Communications Adapter
- 3 Diagnostic Connector
- 4 Electronic Control Module (ECM)

Caterpillar Product Link system.

This optional attachment includes a transceiver module (on-board the machine), office application PC software, and a satellite communications network to track machine hours, location, and warnings (PL-201). Product Link simplifies maintenance scheduling, fleet management, unauthorized machine usage or movement, and product problem event tracking and diagnosis (PL-201).

- Available in two versions, there is a Product Link system for most customers needs. See your Caterpillar dealer for details.

Scheduled Oil Sampling (S•O•S)

analysis. Caterpillar has specially developed S•O•S to help ensure better performance, longer life and increased customer satisfaction. It is an extremely thorough and reliable early warning system which detects traces of metals, dirt and other contaminants in your engine, axle, transmission and hydraulic oil. It can predict potential trouble early, thus avoiding costly unscheduled failures. Your Caterpillar dealer can give you results and specific recommendations shortly after receiving your sample.

Each S•O•S test can provide specific types of diagnostic:

- **Oil condition analysis** identifies loss of lubricating properties by quantifying combustion products such as soot, sulfur, oxidation and nitrates.
- **Wear analysis** monitors components wear by detecting, identifying and assessing the amount and type of metal wear elements found in the oil.
- **Chemical and physical test** detect the physical presence of unwanted fluids (water, fuel, antifreeze).

Engine

Four-stroke cycle, six-cylinder 3126B HEUI, turbocharged and air-to-air aftercooled diesel engine.

Power and Torque

Flywheel power at 1800 rpm	134 kW	180 hp
Maximum flywheel torque at 1400 rpm	839 Nm	
Total torque rise	62%	

The following ratings apply at 2200 rpm when tested under the specified standard conditions:

Rated flywheel power	kW	hp
ISO 9249	119	160
EEC 80/1269	119	160

Dimensions

Bore	110 mm	
Stroke	127 mm	
Displacement	7.2 liters	

Exhaust emissions

The 3126B meets the following emission requirements:
EU directive 97/68/EC Stage II

Power rating conditions

- net power advertised is the power available when the engine is equipped with hydraulic fan drive, alternator, air cleaner, and muffler
- no derating required up to 3050 m altitude

Features

- Caterpillar exclusive Advanced Diesel Engine Module (ADEM III) electronic fuel system control module is fully integrated with other electronic control modules on the machine for improved performance
- Caterpillar state-of-the-art hydraulically actuated, electronically controlled unit injection fuel system (HEUI)
- air-to-air aftercooler
- electronically controlled continuously variable temperature-sensing on-demand fan is integrated with electronic engine control module
- cross-flow cylinder head design with three alloy-steel valves per cylinder
- aluminum-alloy skirt and steel crown, 3-ring, 2-piece articulated pistons, cam-ground, tapered and cooled by oil spray
- induction-hardened, forged crankshaft
- deep-skirted cast cylinder block
- tapered connecting rods
- direct-electric 24-volt starting and charging system with two 12-volt, CCA: 750BCI, 475 DIN Caterpillar maintenance-free batteries, heavy-duty starter and a 50-amp alternator
- Electronic Clutch Pressure Control (ECPC) modulates clutch engagement
- single control for both speed and direction
- separate control to lock in neutral
- single-stage, single-phase torque converter
- automatic shift capability
- high energy friction material provides extended clutch life
- externally mounted controls with quick disconnects for easy diagnostic checks
- high contact ratio gears are precision ground for quieter operation
- transmission can be recalibrated using Electronic Technician (ET) service tool
- Variable Shift Control (standard) controlling the selected shift pattern

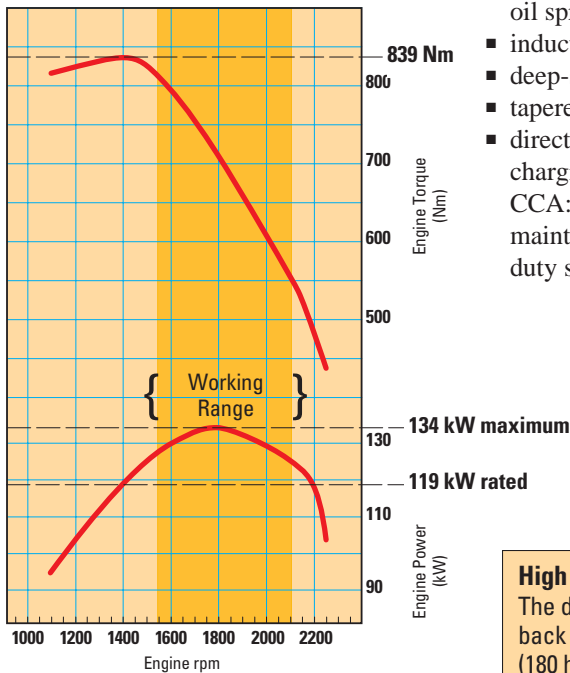
Transmission

Electronic countershaft power shift transmission with automatic shift capability has four speeds forward and three reverse.

Maximum travel speeds (standard 20.5-R25 tires)

Forward	km/h
1	7.6
2	13.4
3	23.3
4	38.8
Reverse	km/h
1	7.6
2	13.4
3	23.3

Features



High available Torque

The direct injected fuel system delivers a controlled increase of fuel as the engine lugs back from rated speed. This results in horsepower greater than rated power. The 134 kW (180 hp) maximum power occurs at 1800 rpm when power is needed during the working cycle. As the maximum torque is close to the working range and the average torque is high, a lot of torque is available during the working cycle. The combination of high available torque and maximum horsepower in the entire working range improves response, provides greater rimpull, more lift force and faster cycle times.

Axles

Fixed front, oscillating rear ($\pm 12^\circ$)*.

Features

- maximum single-wheel rise and fall: 420 mm
- threaded nuts to set bearing pre-load
- patented Duo-Cone Seals between axle shaft and housing
- uses SAE 30W (oil change interval: 2000 hours or one year)
- conventional differential
- conventional differentials (standard)
- limited slip differentials (optional)
- no spin differential, rear (optional)
- axle oil temperature sensors (optional)

* Oscillating may have to be reduced when using L5 tires, chains or oversized tires.

Brakes

Meet the following standard:
ISO 3450-1996.

Service brake features

- full-hydraulic actuated, oil-disc brakes
- completely enclosed and sealed
- adjustment-free
- separate circuits for front and rear axles
- dual pedal braking system with transmission neutralizer
- external ports provide access to measure brake disc wear

Parking brake features

- mechanical, shoe-type brake
- mounted on transmission output
- pull-cable operated
- application of parking brake neutralizes the transmission

Final Drives

Planetary final drives consist of ring gears and planetary carrier assemblies.

Features

- ring gears are pressed in and doweled to axle housings
- carrier assemblies include:
 - planet gears with free-floating bronze sleeve bearings
 - planet shafts
 - retaining pins
 - bearings
 - sun gear shafts
 - planetary carriers

Hydraulic System

Implement system, vane-type pump

Output at 2596 rpm and 7000 kPa with SAE 10W oil at 66°C	163 liters/min
Relief valve setting	24 800 kPa
Cylinders, double acting:	
lift, bore and stroke	127 x 693 mm
tilt, bore and stroke	139.7 x 527 mm

Pilot system, variable displacement piston-type pump*

Output at 2596 rpm and 7000 kPa with SAE 10W oil at 66°C	102 liters/min
Working pressure	3000 kPa
Hydraulic cycle time	seconds
Raise	6.0
Dump	1.4
Lower, empty, float down	2.8
Total	10.2

* Common with steering pump.

Features

- completely enclosed system
- low effort, pilot-operated controls
- full-flow filtering
- reusable couplings with O-ring face seals
- lift height and digging angle presetting possibility
- pilot shutoff valves disables implement functions for added safety
- standard hydraulic oil cooler tilts out for easy cleaning of heat exchanger
- Caterpillar XT hoses
- pressure taps
- automatic Ride Control System available
- Cat biodegradable oil available

Cab

Caterpillar cab and Rollover Protective Structure (ROPS) are standard.

Features

- ROPS meets the following criteria:
 - ISO 3471:1994
- also meets the following criteria for Falling Objects Protective Structure:
 - ISO 3449:1992 LEVEL II
- corrosion-free roof cap

Implement Controls

Pilot-operated lift and tilt circuits.

Lift circuit features

- four positions: raise, hold, lower and float
- adjustable automatic kickout from horizontal to full lift

Tilt circuit features

- three positions: tilt back, hold and dump
- adjustable automatic bucket positioner to desired loading angle
- doesn't require visual spotting

Controls

- two lever control (standard)
- three lever control (optional)
- joy stick (optional) combines lift and tilt controls
- F/N/R switch (optional), integrated into the lift lever or joystick
- controls can be locked for roading and servicing

Load Sensing Steering

Full hydraulic power steering.

Meets ISO 5010:1992

Ratings

Minimum turning radius (over tire)	5480 mm
Steering angle, each direction	40°
Hydraulic output at 2596 rpm and 7000 kPa	102 liters/min
Relief valve setting	22 800 kPa

Features

- center-point frame articulation
- load sensing hydraulic steering pump
- front and rear wheels track
- flow-amplified, closed-center, pressure-compensated system
- steering-wheel operated metering pump controls flow to steering cylinders
- full-flow filtering
- adjustable steering column
- secondary steering available

Sound Levels/Dynamics

	dB(A)
Operator sound	
Standard sound suppression	75
Low sound	73
Exterior sound	
Standard sound suppression	107
Low sound	104

Sound power levels are measured according to the dynamic test procedures and conditions specified in ISO6396 (operator sound), ISO6395 (exterior sound) and 2000/14/EC.

Service Refill Capacities

	Liters
Fuel tank	254
Cooling system	48
Crankcase	31
Transmission	30
Differentials and final drives	
front	30
rear	32
Hydraulic system (including tank)	90
Hydraulic tank	76

Tires

Tubeless, loader-design tires.

- 20.5-R25 XTLA (L2)
- 20.5-R25 XHA (L3)
- 20.5-R25 XLDD 2A (L-5)*
- 650/65-R25 XLD (L3)*
- 20.5-R25 GP2B (L2/L3)
- 20.5-R25 GP4B
- 20.5-R25 RL2+ (L2T)
- 20.5-R25 RL5K (L-5)*

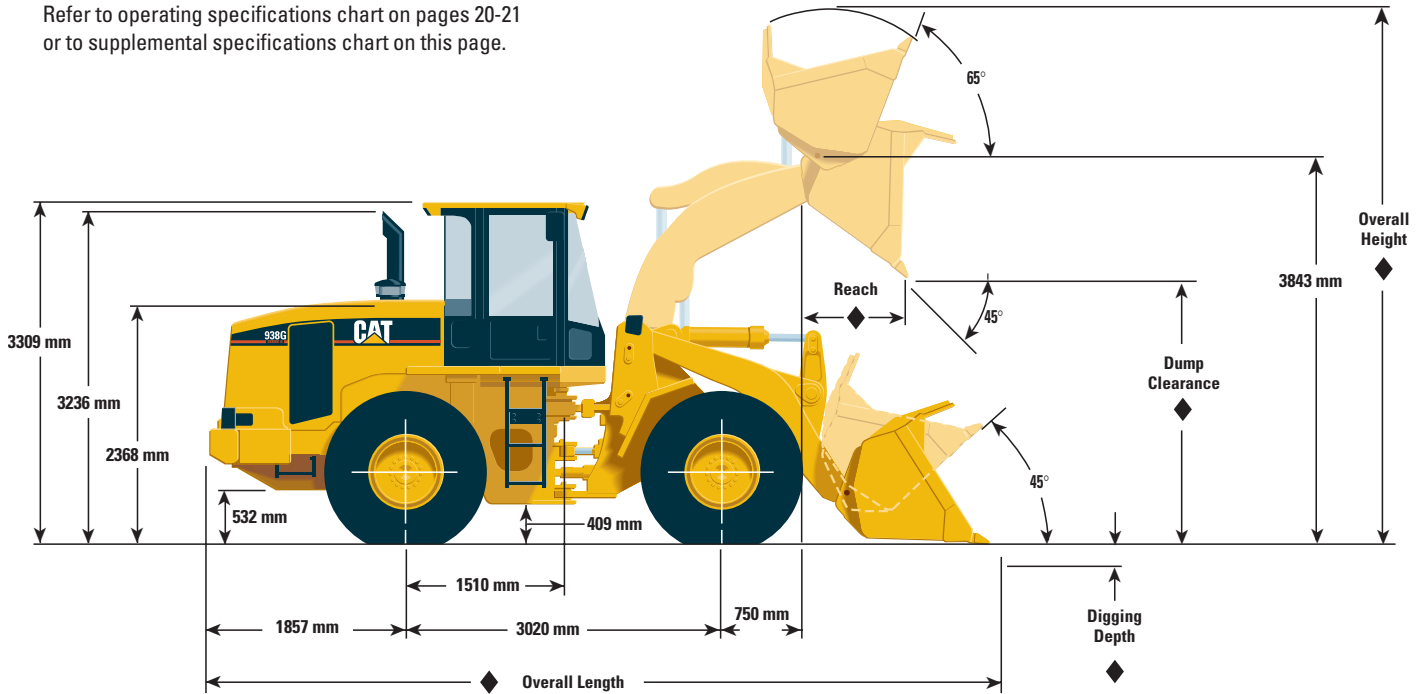
In certain applications (such as load-and-carry work) the loader's productive capabilities might exceed the tires' tonnes-km/h capabilities. Caterpillar recommends that you consult the tire supplier to evaluate all conditions before selecting a tire model.

* Axle oscillation is limited.

Dimensions

All dimensions are approximate.

- ◆ Dimensions vary with buckets or tires.
Refer to operating specifications chart on pages 20-21
or to supplemental specifications chart on this page.



Dimensions listed are for machines equipped with 20.5 R 25 XHA (L-3) tires.
Tread width for all tires is 2020 mm.

Supplemental Specifications

	XHA	XTLA	XLDD2	XLD65
	L3	L2	L5	L3
Dimension	20.5 x R25	20.5 x R25	20.5 x R25	650/65 R25
Width over tires (mm)	2550	2555	2557	2572
Ground clearance (mm)	420	411	449	409
Change in all vertical dimensions (mm)	Used as reference	-9	+29	-11
Tire weight	223	187	336	278
Weight variation (kg)	Used as reference	-144	+452	+220
Change in static tipping load (kg)				
straight	Used as reference	-107	+335	+163
full articulation	Used as reference	-91	+285	+138
	GP2B	RL2+	GP4B	RL5K
Tread type	L2/L3	L3T	L4	L5
Dimension	20.5 x R25	20.5 x R25	20.5 x R25	20.5 x R25
Width over tires (mm)	2555	2564	2553	2577
Ground clearance (mm)	426	421	437	466
Change in all vertical dimensions (mm)	+6	+1	+17	+46
Tire weight	221	247	271	373
Weight variation (kg)	-8	+96	+192	+600
Change in static tipping load (kg)				
straight	-6	+71	+142	+444
full articulation	-5	+60	+121	+377

Operation Specifications

		General Excavation Buckets					
		Bolt-on Cutting Edge	Bolt-on adapters, Tips and Segments	Bolt-on Cutting Edge	Bolt-on adapters, Tips and Segments	Bolt-on Cutting Edge	Bolt-on adapters, Tips and Segments
Rated bucket capacity	m ³	2.3	2.3	2.5	2.5	2.8	2.8
Struck capacity	m ³	2.0	2.0	2.1	2.1	2.4	2.4
Width	mm	2706	2777	2706	2777	2706	2777
Dump clearance at full lift and 45° discharge ⁴	mm	2889	2763	2856	2730	2791	2665
Reach at full lift and 45° discharge ⁴	mm	977	1062	1015	1100	1091	1176
Reach with lift arms horizontal and bucket level ⁴	mm	2185	2332	2235	2382	2335	2482
Digging depth	mm	50	64	50	64	50	64
Overall length ⁴	mm	7181	7328	7231	7378	7331	7478
Overall height with bucket at full raise	mm	5140	5140	5188	5188	5284	5284
Loader turning radius with bucket in carry position	mm	5955	6032	5968	6041	5996	6075
Bucket weight	kg	1186	11294	1219	1327	1290	1398
Static tipping load straight ¹	kg	11444	11317	11335	11208	11112	10986
Static tipping load at 37° articulation ¹	kg	9939	9810	9839	9712	9637	9511
Breakout force ²	kN	126	125	120	119	109	109
Operating weight ¹	kg	13979	14087	14012	14120	14083	14191

¹ Static tipping load and operating weight shown are based on standard machine configuration with sound-suppression cab and ROPS, secondary steering, air conditioning, ride control, 20.5-R25, L-3, tires, full fuel tank, coolant, lubricants, lights, directional signals with CE plates and operator.

² For buckets with adapters, tips and segments, value is measured 102 mm behind the tip of the segment, with bucket hinge pin as pivot point, in accordance with SAE J732C.

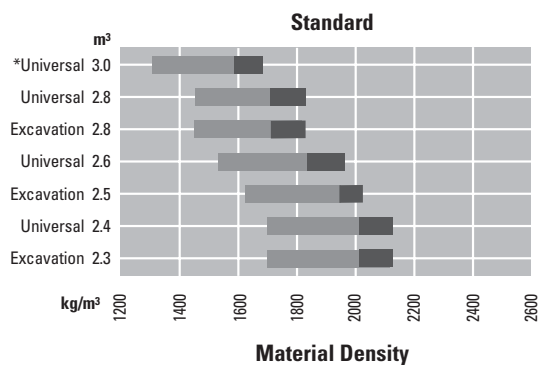
³ All buckets shown can be used on the high lift arrangement. High lift column shows changes in specifications from standard lift to high lift. Add or subtract as indicated to or from specifications given for appropriate bucket to calculate high lift specifications.

Dimensions for dump clearance, reach and overall length:

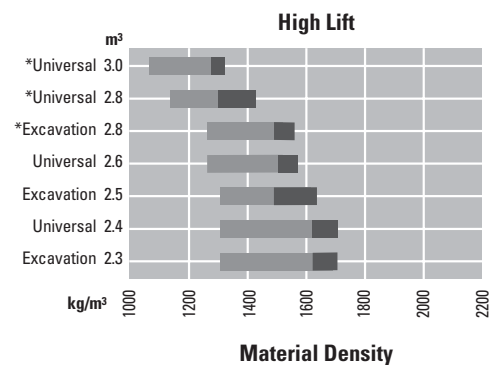
⁴ Actual dimensions taken at the tip of the Ground Engaging Tools, either the tip of the bolt-on cutting edge or the tip of the teeth, type long.

Universal Buckets									High Lift ³
Bolt-on Cutting Edge	Bolt-on adapters, Tips and Segments	Bolt-on Cutting Edge	Bolt-on adapters, Tips and Segments	Bolt-on Cutting Edge	Bolt-on adapters, Tips and Segments	Bolt-on Cutting Edge	Bolt-on adapters, Tips and Segments	Bolt-on Cutting Edge	Bolt-on adapters, Tips and Segments
2.4	2.4	2.6	2.6	2.8	2.8	3.0	3.0	same	
2.0	2.0	2.2	2.2	2.5	2.5	2.6	2.6	same	
2706	2777	2706	2777	2706	2777	2706	2777	same	
2799	2688	2757	2648	2715	2606	2673	2564	+423	
920	1018	962	1057	1004	1099	1047	1141	+121	
2225	2372	2284	2428	2344	2488	2403	2547	+390	
50	59	50	60	50	60	50	60	+58	
7223	7370	7282	7426	7342	7486	7401	7545	+494	
5270	5270	5270	5270	5270	5270	5270	5270	+423	
6000	6035	6020	6055	6040	6075	6060	6090	+233	
1286	1427	1334	1475	1380	1521	1429	1570	same	
11270	11087	11128	10944	10971	10786	10844	10656	-1980	
9779	9594	9649	9465	9508	9321	9388	9201	-1780	
122	120	115	113	109	107	103	101	-6	
14079	14220	14127	14268	14173	14314	14222	14363	+346	

Bucket Selection Guide



* Light material only



In accordance with SAE J818, these data consider the bucket load to be equal to half of the static tipping load at full turn.

Standard Equipment

Standard equipment may vary. Consult your Caterpillar dealer for specifics.

Electrical

Alternator (50-amp)
Batteries (two 12-volt, Maintenance free, CCA: 750 BCI, 475 DIN)
Direct electric starting (24-volt)
Ignition key, start/stop switch
Main disconnect switch
Starter, electric, heavy duty
Voltage converter (12-volt, 5 Amp)
Working halogen lighting system, including six lights:
 two forward floodlights on the front frame
 two forward floodlights on the cab
 two rearward floodlights on the counterweight

Starting Aid

Air intake heater

Operator Environment

Adjustable steering column
Air recirculation filter
Cab, pressurized with sound suppression and rollover protective structure (ROPS)
Cigar Lighter and ashtray.
Cloth Seat-KAB with adjustable backrest, armrest, and lumbar support
Dome light
Heater and defroster
Horn, electric
Implement lever lockout
Instrumentation:
 Torque converter oil temperature gauge
 Engine coolant temperature gauge
 Fuel level gauge
 Hydraulic oil temperature gauge
Mirrors, outside mounted
Radio ready cab
Seat belt, retractable, 76 mm wide
Storage:
 Coat hook
 Cup and thermos holders
 Lockable compartment for personal items
Sunvisor
Tinted glass

Warning indicators:

Alternator
Coolant temperature
Engine oil pressure
Fuel pressure
Hydraulic oil temperature
Inlet air temperature
Parking brake engaged
Service brake oil pressure
Steering pressure indicators
Transmission oil temperature
Transmission filter by passing
Windshield washers/wipers, wet arm (front and rear), front intermittent

Engine

Air precleaner, Radial Seal filters, primary (Ultra High Efficiency) and secondary
Cat 3126B ATAAC diesel engine, HEUI, turbocharged with air-to-air aftercooler
Cooling system:
 Unit core radiator
 On-demand cooling fan, hydraulically driven
 Hydraulic oil cooler
 Air conditioner condenser*/**
Fuel system priming pump, electric
Sound suppressed muffler

Drive Train

Torque converter
Transmission, countershaft, power shift, 4F/3R:
 Electronic Clutch Pressure Control
 Automatic shift capability
 Fully automatic speed range control
Direction and gear selection switch with quick gear kickdown button
Transmission diagnostic connectors (pressure taps)
Transmission auto/manual switch
Transmission neutralizer on/off switch
Brakes, full-hydraulic actuated, enclosed wet discs
Differential limited slip, rear axle**
Integrated Braking System
Variable Shift Control

Hydraulics

Automatic bucket positioner
Automatic lift kickout
Automatic Ride Control System**
Caterpillar O-ring face seals couplings
Caterpillar XT hoses
Loader linkage, sealed Z-bar design
Pilot hydraulic controls
Secondary steering**
Steering, load-sensing hydraulic

Preventive Maintenance

Caterpillar diesel engine oil
Caterpillar hydraulic oil
Caterpillar transmission oil
Caterpillar high efficiency fuel filters
Caterpillar ultra high efficiency air filter
Caterpillar liquid filters
Extended life coolant (-30°C)
Hydraulic pressure taps (diagnostic connectors)
Service Indicators:
 Air cleaner
 Coolant level sight gauge
 Hydraulic oil level sight gauge
 Transmission oil level sight gauge
Scheduled Oil Sampling (S•O•S) valves

Other Standard Equipment

Bottom guard**
Counterweight
Drawbar hitch with pin
Front fenders (steel) and rear platform deflectors
Front fender mud flaps
Power train guard**
Tilting hood, non-metallic, one-piece
Vandalism protection caplocks**

* Not included in open cab configuration

** May be optional in some countries

Optional Equipment

Optional equipment may vary. Consult your Caterpillar dealer for specifics.

Electrical

Alternator, heavy duty
70 amp and 75 amp
Auxiliary halogen lighting package
Including alternator (70 amp),
four cab-mounted floodlights
(two front and two rear)
Back up alarm
Directional signals
Roading lighting package, including
turning signals and high/low beams
Warning lighting system
(rotating beacon)

Starting Aid

Batteries, high output
(two 12-volt, maintenance free,
CCA: 900BCI, 525 DIN)
Engine coolant heaters
(120 or 220 volt)

Operator Environment

Cat contour seat (fully adjustable,
with air suspension)
Left and right pull down,
latch windows*
Radio, 12 volt, AM/FM, Cassette
Rearview mirrors, internal
Roll-down sun screen (rear window)*
Sun visor, front
Wiper, intermittent, rear window

Drive Train

Axle seal guards
Differential, Limited Slip (front, rear)
Differential, No Spin (rear)
Monitoring system, axle oil temperature
Oscillation limitation block for rear axle

Hydraulic

Hydraulic arrangement, third valve
Hydraulic arrangement, joystick
(single lever)
Ride Control
Switch, F-N-R, mounted on lift lever
or joystick
Quick coupler actuation circuit

Preventive Maintenance

Automatic lubrication system
Precleaner, turbine
Precleaner, turbine, trash version
Extended Life Coolant (-35 to -50°C)
Remote pressure taps

Environmental Attachments

Low sound version*:
104 dB(A) exterior and
71 dB(A) operator
Cat Bio Hydo (HEES), biodegradable
hydraulic synthetic ester based oil
Ecology drains for axle oil

Other Optional Attachments

Buckets and work tools
Caterpillar Product Link
High Lift arrangement
High Lift arrangement, third valve
Open cab, including ROPS
Payload Control System
Platform extension fenders, rear
Rear full coverage roading fenders,
swingable, non-metallic
Speed limiter, 20 km/h

Field Installed Attachments

Field kit, High Lift arrangement
Field kit, hydraulics, third valve
Field kit, joystick

Corrosion Resistance Arrangement

Provides extensive protection to
vital machine components for harsh
corrosive applications.

Waste Handling Arrangement

Provides extensive guarding and
machine modifications (e.g. trash grill),
yet allowing easy access for cleaning
and maintenance.

* Not included in open cab configuration

938G Series II Wheel Loader

HEHL2874 (02/2003) hr

Materials and specifications are subject to change without notice.
Featured machines in photos may include additional equipment.
See your Caterpillar dealer for available options.

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