CAT® MAINTENANCE AND REPAIRS

REPAIR INDICATOR INSPECTION GUIDE

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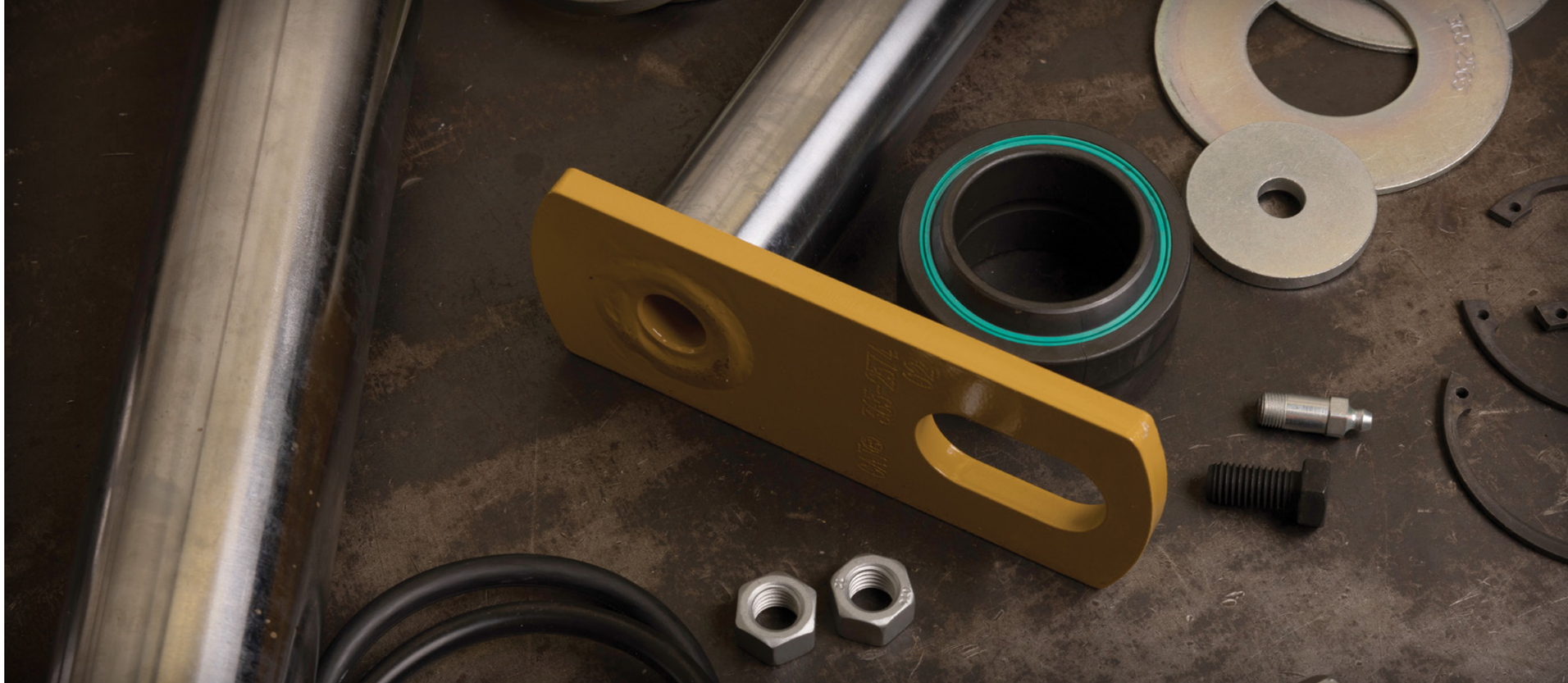
ABOUT THIS GUIDE

In this guide, you'll find common repair indicators for key Cat® machine systems and components, along with possible causes and recommendations for how to address any issues that arise. **Also included:** upgrade kit options that can help you simplify maintenance, improve performance and safety, and reduce downtime.

LINKAGE PINS & BEARINGS

Cat linkage pins and bearings keep your machine and your work moving, all day, every day. They're designed with your equipment to strict Caterpillar specifications.

That means every joint is a precision fit, delivering enhanced productivity and long life while keeping operating costs low.



LINKAGE PINS

INDICATORS	POSSIBLE CAUSES	WHAT TO LOOK AT	WHAT TO LOOK FOR	IMPACT/CONSEQUENCES
Unusual noise at pin joint	• Improper maintenance • Lack of lubrication • Improper fit due to non-genuine Cat parts	• Pin joints • Lubrication point (zerk) conditions • Grease type used for application of the machine	• Signs of wear • Lack of grease • Metal-on-metal contact	• Abnormal wear and shorter life of pins and bearings • Possible deformation of bores • Loss of production and increased cycle time • Possible impact on hydraulic joint
Sticking joint	• Improper lubrication • Defect and deformities in the structure like bucket, powerlink or hydraulic cylinder	• Pin joints • Hydraulic cylinders • Linkages	• Buildup of dirt or rust • Insufficient lubrication • Bent components • Excessive shimming	• Accelerated and abnormal wear of the pins and bearings • Damage to linkage pins • Damage to hydraulic cylinders • Loss of productivity
Loose joint	• Worn/deformed bucket holder • Worn-out rod eye joint • Worn-out bearing • Lack of shimming	• Cylinder rods • Cylinders, trunnions and eye connections • Bucket connections	• Excessive play • Visible wear on hardware or deformed connections • Excessive wear	• Damage to cylinder rods and possibility of cylinder leakages • Loss of productivity • If bearing is worn, issue with grease retention and further wear
Missing or broken retention system components	• Sticking pin joint • Improper maintenance • Improper hardware • Broken flag	• Pins • Locking mechanisms • Hardware securing components	• Missing pins or components • Visible cracks or signs of metal fatigue • Difficult tip implement placement	• Accelerated and abnormal wear of the pins and bearings • Damage to linkage pins • Damage to hydraulic cylinders • Loss of productivity
Excessive play in bearings	• Worn-out bearings • Incorrect bearing size or misalignment	• Bearing housing and pin connections	• Movements in the bearings beyond normal limits • Worn bearing surfaces	
Heat buildup around pin joint	• Under-or over-lubrication • Friction from improper alignment or worn components	• Pin joints and surrounding areas for signs of excessive lubrication or wear	• Signs of heat discoloration, smoke or smell of burning grease	

LINKAGE PINS

INDICATORS	RECOMMENDATIONS
Unusual noise at pin joint	• Schedule regular lubrication checks and ensure that all maintanance procedures follow Caterpillar guidelines. • Use correct grease types for the application. • Upgrade to autolube, if not equipped. • If equipped with autolube system, consider upgrading to larger, high capacity reservoir.
Sticking joint	• Clean linkage areas frequently, especially in high-dust environments, and inspect for rust or build-up. • Check for linkage condition. • Follow correct shimming requirements.
Loose joint	Excessive play may signal underlying damage in other components, requiring a more detailed inspection.
Missing or broken retention system components	Use Caterpillar hardware for replacement and always double-check the torque of bolts and fasteners after repairs.
Decreased machine efficiency	
Broken structure/oval pin bore	
Excessive play in bearings	Bearing replacement may be needed if excessive wear is observed. Also, check for the correct bearing type during the replacement.
Heat buildup around pin joint	Heat buildup could lead to a catastrophic failure if not addressed early. Monitor closely if detected and perform a full inspection.

UPGRADE KIT OPPORTUNITIES

01

AUTOLUBE SYSTEM

Here's a simple way to help prevent future linkage pin and bearing issues: Upgrade to the Cat Autolube System. It helps you maintain proper joint lubrication and makes it easier to monitor system performance.

ELECTRICAL SYSTEM:

BATTERIES, STARTERS AND ALTERNATORS

The reliability of your equipment begins with a reliable electrical system. You need to feel confident that your machine will start every time, even in adverse environments and extreme temperatures.

ELECTRICAL SYSTEM

INDICATORS	POSSIBLE CAUSES	WHAT TO LOOK AT	WHAT TO LOOK FOR	IMPACT/CONSEQUENCES	ADDITIONAL INFORMATION
Engine fails to crank or cranks too slowly	• Weak or discharged battery • Corroded or loose terminal • Starter relay connection issues or failure • Bad starter	• Alternator and connections • Starter connections	• Low voltage • Corrosion on terminals or loose conections • Additional fault codes on the machines	Possible damage to starter motor cranking gear as well as flywheel engaging gear, if problem is due to discharged battery	Regular battery load testing can help detect issues early and prevent downtime.
Alert indicator/charging system warning	• Faulty alternator • Faulty voltage regulator • Broken or loose alternator belt • Electrical fault in the charging circuit	• Charging system • Voltage regulators • Alternator • Battery and battery connections	• Faulty alternator • Faulty voltage regulator • Faulty battery • Any associated fault codes on machine	Drained or overcharged batteries	Check the voltage across the battery while engine is running to make sure alternator is working correctly. An alternator charging above the voltage is also problematic and will cause damage to electrical system.
Dim or flickering lights	• Failing battery alternator • Loose or faulty bulb • Loose wiring connections • Faulty lights	• Electical wiring • Check bulbs • Lights, switches, fuses	• Loose wires • Loose bulbs • Corroded connections • Battery voltage	Lights do not turn on	Ensure that no auxiliary electrical systems are draining power unnecesarily when the machine is idle.
Grinding or clicking noise when ignition key is turned	• Worn starter motor • Damaged flywheel • Misaligned gears • Magnetic clutch failure • Low battery voltage	• Starter and flywheel • Battery	• Worn teeth on the flywheel or starter gear • Low battery voltage • Failing starter	Major downtime with possible need to remove the engine	Grinding can damage the flywheel and starter over time, leading to more costly repairs. Immediate attention is advised.
Lack of power to machine system	• Dead battery • Blown fuse • Faulty electrical wiring	• Battery connections • Fuses • Electrical control system	• Blown fuses • Broken wires • Dead battery	Ineffective machine operation or starting problems	Use a multimeter to test continuity in wiring circuits to quickly locate breaks or faults.
Rapid battery drain	• Parasitic power draw • Short circuits • Faulty electrical components	• Electrical components • Battery terminals • Fuse boxes	• Unnecessary power draw from components when the machine is off — faulty relays		Perform a parasitic draw test by using a multimeter in series with the battery to measure current when the ignition is off.
Burning smell or smoke from electrical components	• Electrical short • Damaged wiring • Overheating components	• Wiring harness • Relays • Electrical connenctors	• Burnt insulation • Frayed wires • Melted components	Electrical damage to key components like ECMs and/or EMCPs	Electrical fires are a serious risk. If any burning smell or smoke is detected, stop operations inmediately and investigate the issue thoroughly.

ELECTRICAL SYSTEM

INDICATORS	POTENTIAL SOLUTIONS
Engine fails to crank or cranks too slowly	• Replace battery • Check starter and connections and replace if necessary
Alert indicator/charging system warning	• Check charging system and voltage regulators and replace if necessary • Replace alternator or components including alternator belt if necessary • Replace battery
Dim or flickering lights	• Check bulbs and replace or upgrade to LED • Check lights, switches and fuses and replace if necessary • Replace battery alternator
Grinding or clicking noise when ignition key is turned	• Replace battery • Replace starter • Replace flywheel
Lack of power to machine system	• Replace battery • Replace blown fuses or damaged/broken wires
Rapid battery drain	• Replace relay/check connected components for battery drain • Check battery disconnect switch to ensure nothing is bypassing it • If no parasitic draw, replace battery
Burning smell or smoke from electrical components	• Upgrade electronic modular control panel (EMCP) panel • Upgrade energy control system (ECS) genset controls

UPGRADE KIT OPPORTUNITIES

01

LED LIGHTS

Add high-powered LED lights to help provide great visibility for machine operators.

02

SEAT BELT REMINDER

Boosts operator safety with alerts, event logging, and easy installation on most machines.

OPERATOR STATION SYSTEMS

Operator Station Systems are designed to protect the operator environment and help maintain machine performance. From cracked glass and faulty latches to HVAC inefficiencies, small issues can quickly escalate into major problems that compromise safety, comfort, and productivity.

These systems help prevent dirt ingress, reduce wear on electronic components, and ensure clear visibility and reliable climate control. With timely repairs, upgrades like laminated glass or suspension seat kits, and regular maintenance of latches, filters, and HVAC components, you can extend equipment life and keep operators focused and efficient.

OPERATOR STATION SYSTEMS

INDICATORS	POSSIBLE CAUSES	WHAT TO LOOK AT	WHAT TO LOOK FOR	IMPACT/CONSEQUENCES	ADDITIONAL INFORMATION	POTENTIAL SOLUTIONS
Broken/cracked glass	• Impact damage • Wear and tear • Stress fractures	• Windows • Windshields • Door glass	• Visible cracks • Chips • Broken panes	• Broken glass causing issues with operator environment • Reduced life of electrical and electronic components • Damage to air conditioner blower and filter elements	Small chips can quickly turn into large cracks. Consider timely repair or replacement to ensure operator safely and visibility.	• Replace cracked, chipped or broken glass • Upgrade to laminated or toughened glass option • Add glass protection or guarding upgrade kit for additional protection
Window/door latches inoperable	• Worn or damaged latches • Misaligment • Debris buildup	• Door hinges • Latch mechanisms	• Misaligned doors • Broken or jammed latches • Dirt buildup	• Dirt in the operator environment • Operator safety • Air conditioner issues	Regular cleaning of latched areas and lubrication can extend the life of these components.	• Replace faulty latches and hinges • Grease joints for smoother operation
Seat belt serviceability	• Frayed belts • Malfunctioning retractor • Worn buckles • Expired seat belt	• Seat belts • Retractors • Buckles	• Frayed or cut webbing • Broken or sticking retractors • Damaged buckles	• Operator safety	Seat belts are a critical safety feature. Replace immediately if defects are found.	• Replace seat belt or upgrade to Cat Seat Belt Reminder • Replace retractor • Replace buckles
Operator controls condition	• Electrical faults • Mechanical wear • Contamination	• Levers • Pedals • Switches • Control panels	• Sticky or unresponsive controls • Loose connections • Damaged components	• Machine malfunctions, fault codes	Ensure that operator controls are fully functional to prevent machine accidents or reduced performance.	• Consult dealer for additional information pertaining to fault codes • Replace faulty control
Seat condition	• Wear and tear • Foam breakdown • Mechanical damage	• Seat cushions • Seat frames • Suspension	• Rips in the fabric • Worn padding • Broken seat mechanisms	• Operator safety, especially with operator presence switches • Operator comfort	Comfort and ergonomics are important for the operator's well-being and productivity. Replace worn or damaged seats promptly.	• Replace seats or associated components • Upgrade using armrest kits, suspension seat kits, heater kits, etc.
Climate controls (if applicable)	• Electrical faults • Blower motor failure • Refrigerant leaks	• HVAC system • Vents • Electrical wiring	• Inoperative blowers • No airflow • No temperature control	• Uncomfortable operator environment • Reduced operator efficiency	Regular HVAC maintenance can prevent uncomfortable operating conditions and costly repairs down the line.	• Replace HVAC air filters • Reduce dirt ingress in the cabin • Maintain HVAC components like compressor, refrigerant, etc. • Upgrade with Advanced Cabin Filtration (ACF)

UPGRADE KIT OPPORTUNITIES

01

CAB GLASS

Did you know you can convert an open canopy machine into an enclosed cab? Glass front door and side windows kits make it easy to provide a safer, quieter, more comfortable environment.

02

GUARDING

Add protection with optional guarding features like operator shields, window guards, and light guards to reduce exposure to debris and enhance safety.

03

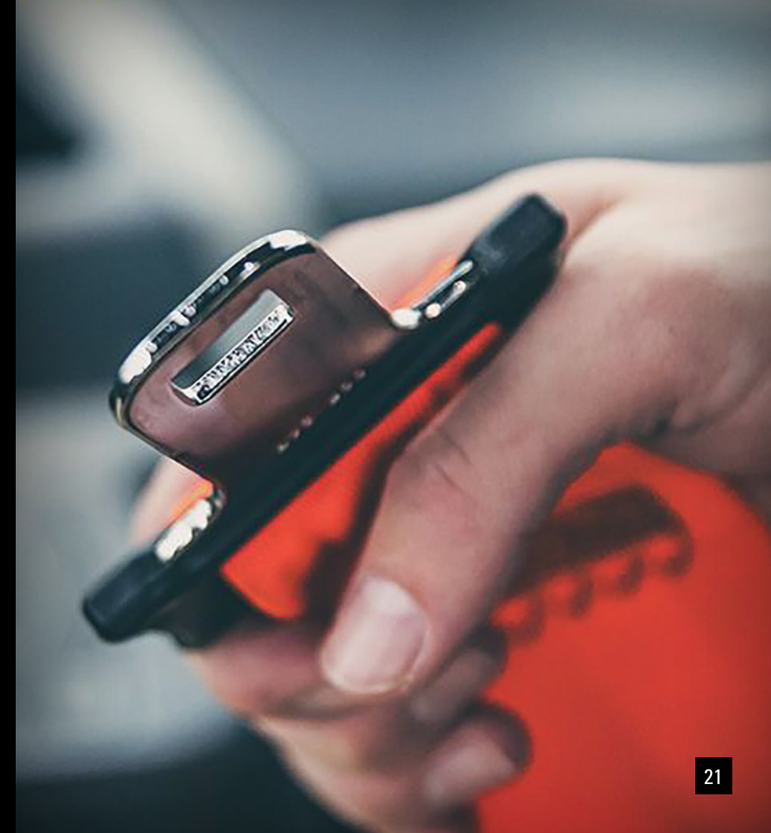
OPERATOR COMFORT

Air suspension seats, extra storage, cell phone holders, shock absorbers and more — simple upgrades like these can help operators work more productively and with less fatigue.

04

ADVANCED CABIN FILTRATION

Improves cab air quality by filtering out dust, fumes, and contaminants to support operator health and comfort in adverse conditions.



OTHER STRUCTURAL COMPONENTS

The backbone of your machine is its frame and the other key structures that keep it powering through tough conditions day in and day out. These hard-working components need regular inspections, lubrication and maintenance to stay strong.

OTHER STRUCTURAL COMPONENTS

INDICATORS	POSSIBLE CAUSES	WHAT TO LOOK AT	WHAT TO LOOK FOR	IMPACT/CONSEQUENCES	ADDITIONAL INFORMATION
Boom, stick or linkage damage/cracks	• Overloading • Fatigue • Improper operation • Seized pin	• Boom • Stick • Linkage arms and welds • Pivot and rotational points	• Cracks • Visible deformation • Stress marks	• Significant machine downtime	Small cracks can lead to larger strutural failures. Inspect welds carefully and avoid overloading the machine.
Machine frame damage/cracks	• Impact damage • Overloading • Stress fatigue	• Machine frame • Chassis • Support structures	• Visible cracks • Bent sections • Missing fasteners	• Significant machine downtime	Frame integrity is crucial for safe operation. Conduct repairs immediately if any signs of damage are found.
Enclosure damage (hood, compartment doors, toolboxes, sheet metal, etc.)	• Accidental impact • Wear and tear • Corrosion	• Enclosures • Doors • Panels • Toolboxes	• Dents • Missing or loose panels • Corrosion • Broken latches	• Possible component damage due to dirt or other material ingress • Possible safety concerns due to unsecured enclosures	Damaged enclosures may expose sensitive components to environmental factors. Ensure all panels and covers are secure and intact.

UPGRADE KIT OPPORTUNITIES

01

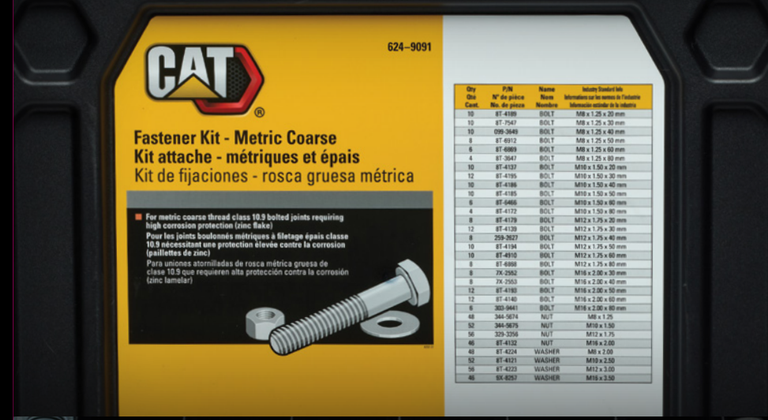
CAT DETECT

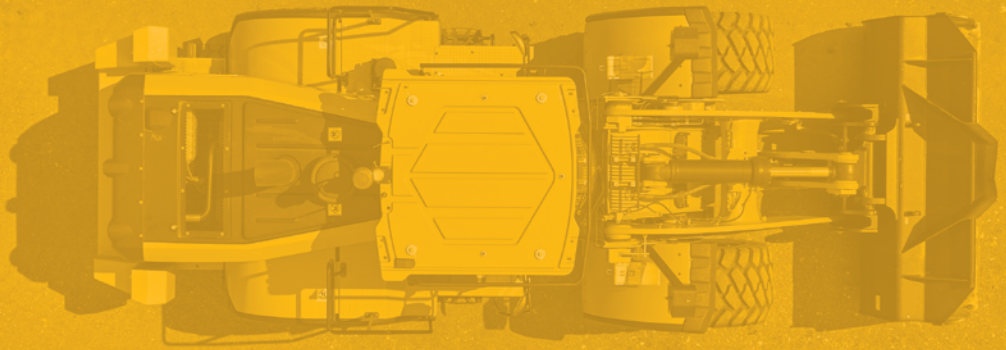
Enhance your equipment with Cat® Detect. These upgrades use intelligent alerts and high-definition displays to detect people and obstacles, helping operators work more confidently and safely. Compatible across all equipment brands, they support safer, more productive operations.

02

SEALS AND FASTENERS KITS

Be ready for any repair with our all-in-one kits, stocked with the most common seals and fasteners for Cat and other equipment brands, so you can skip the store runs and get straight to work.





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