AccuGrade®

Grade Control System for Backhoe Loaders

AccuGrade® Systems	
for Backhoe Loaders	**AccuGrade Site Reference, AccuGrade Laser Reference**
Machine Compatibility	
Machine Model	**416E, 420E, 430E**

AccuGrade® Grade Control System for Backhoe Loaders

AccuGrade Grade Control System simplifies digging, improves accuracy, increases productivity, minimizes material usage, and lowers operating costs.

AccuGrade® Site Reference System

The AccuGrade Site Reference System for backhoe loaders is an entry-level grade and depth check systems that provides accuracy, productivity, lower operating costs and enhanced profitability. **pg. 3**

AccuGrade® Laser Reference System

The AccuGrade Laser Reference System is an advanced grade and depth check system. This system builds on the functionality of the Site Reference System and provides accuracy, productivity, lower operating costs and enhanced profitability. **pg. 4**

Features and Benefits

AccuGrade delivers a wide range of customer benefits designed to increase operator efficiency and productivity, improve accuracy, reduce material costs, reduce surveying and labor costs, and lower overall operating costs. **pg. 5**

Excavate with greater accuracy and control using AccuGrade technology solutions for backhoe loaders. In-cab guidance features allow operators to quickly excavate trenches, slopes and complex designs without traditional survey stakes.

AccuGrade® Site Reference System

Advanced technology simplifies excavation, improves accuracy, increases efficiency and lowers production costs.

AccuGrade Site Reference Operation. The AccuGrade Site Reference System enables the operator to excavate to pre-determined coordinates. The intuitive layout and controls allow the operator to set target grades relative to points on the work-site. The in-cab display provides bucket position and grade settings to ensure the operator excavates to those parameters. Additional feedback is provided through LED lights and sound. The basic system consists of five components:

- Inclinometer (pitch and roll sensor)
- Cylinder position sensors (boom, bucket, stick/e-stick)
- In-cab display
- Swing sensor
- Wiring harnesses

The AccuGrade Site Reference System is fully functional from the factory and is easily upgraded to the optional AccuGrade Laser Reference System.

In-Cab Display. The AccuGrade monitor allows the operator to enter slope and dig depth parameters while providing real-time, continuous feedback.

The in-cab display with easy to read grade indicator and elevation display delivers all system information to the cab for easy viewing by the operator. The display shows all ECM diagnostic data for the machine. Within the AccuGrade system there are three different modes of operation: grade mode, layer mode and measure points.

The following measures are displayed throughout the system:

Main Digging Screen

- Cut
- Slope
- Pitch
- Roll
- Distance to Target Grade
- Bucket Position (relative to grade line)
- Laser Mast Height

Measure Points Screen

- Reach
- Offset
- Elevation
- Rise
- Run
- Distance from Set Point
- Swing

Weatherproof Design

All components are ruggedly designed for dependable performance in harsh environments.

Applications

- Foundations
- Footings
- Curb cuts
- Water and sewer lines
- Slopes
- Pads
- Basements
- Vaults

AccuGrade® Laser Reference System

The AccuGrade® Laser Reference System builds on the functionality of the Site Reference System.

AccuGrade Laser Reference Operation. The optional AccuGrade Laser Reference System, which is easily upgraded from the AccuGrade Site Reference System, works with laser transmitters to accurately grade or excavate to a site plan without the use of grade stakes. The advanced system includes all components of the basic system with the addition of the following:

- Laser receiver
- Electric mast
- Laser mast mount
- Laser wiring harnesses

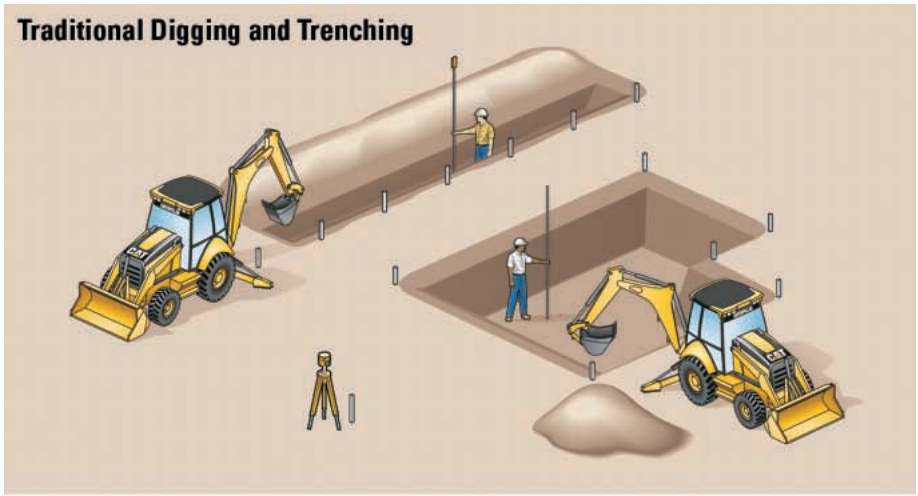
Laser Transmitter. An off-board laser transmitter (sold separately) emits a thin beam of light that rotates 360°, creating a grade reference over the entire work area. The transmitter is mounted on a tripod so the laser beam can rotate unobstructed above the backhoe loader. A rotating dual grade laser transmitter for use in long range applications for general construction or machine control is recommended.

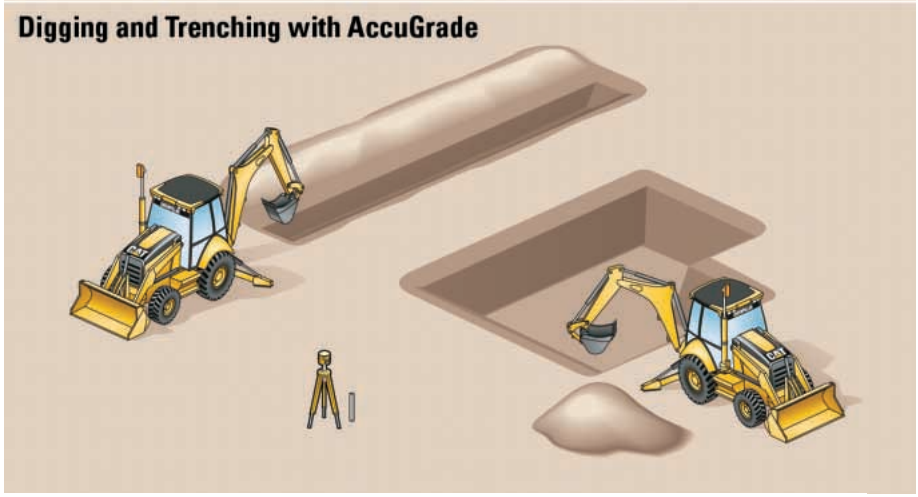
Laser Receiver. A digital laser receiver, located on a machine-mounted telescopic mast, is used to detect the laser beam. During grade set-up, the electronic mast automatically centers the laser receiver in the laser beam. The operator is alerted through the in-cab display as the bucket moves above or below finish grade elevation.

Electric Mast. An electronic adjustable machine-mounted telescopic mast is used for mounting the laser receiver, ensuring unobstructed laser reception. Powered by an electric motor, the mast automatically adjusts for precise positioning of the receiver's elevation.

Features and Benefits

AccuGrade® grade control system is easy to use and delivers a wide range of customer benefits.





Increases Productivity and Efficiency.

- Increases productivity
- Reduces guesswork and costly rework by moving dirt right the first time
- Reduces survey costs
- Increases material utilization
- Reduces operating costs
- Extends the work day
- Reduces digging

Worksite Safety.

- Removes stakers and checkers from the worksite and away from the heavy equipment

Assists with Labor Shortage.

- Reduces labor requirements and costs by freeing up additional job-site resources
- Customers can get the job done more quickly and efficiently
- Reduces need for staking and checking
- Empowers operator and improves operator confidence by delivering excavation information to the cab

Improves Employee Satisfaction and Retention.

- In-cab display brings elevation control to the cab
- Empowers operator with real-time results
- Real-time feedback on progress increases job satisfaction, eliminates guesswork and reduces operator stress
- Improves operator skills and takes performance to the next level
- Investing in the latest technology leads to a sense of value and trust in the operator

Increases Equipment Versatility.

- Provides consistency and accuracy, turning your production machine into a fine digging machine

Integrated into Cat® Machines.

- Proven, optimized on-board electronic system
- Components designed into machine to maximize reliability
- Integration into cab increases ease of use
- Cat® Dealer Network provides unmatched service and support

Customer Support. For more than 25 years, Caterpillar has been providing electronic and electrical components and systems for the earthmoving industry — real world technology solutions that enhance the value of Cat products, making customers more productive and profitable. Your Cat Dealer is ready to assist you with matching machine systems to the application and obtaining responsible, knowledgeable support.

AccuGrade Systems

for Backhoe Loaders	AccuGrade Site Reference, AccuGrade Laser Reference
Emissions and susceptibility	CE compliant

Machine Compatibility

Machine Model	416E, 420E, 430E

Swing Sensor

Working range	±90º	
Network connector	4-pin	
Humidity	100%	
Length	155 mm	6.1 in
Width	144 mm	5.67 in
Depth	138 mm	5.43 in
Weight	1.7 kg	3.75 lb

Inclinometer

Working range	45º	
Electrical input	9 to 32V DC	
Network connector	6-pin	
Reverse voltage protection	to 36V DC	
Load dump protected	ISO 7637 compliant	
Humidity	100%	
Sealing	IP68 sealed to 34.48 kPa (5 psi)	
Operating temperature	–40º C to 85º C	–40º F to 185º F
Storage temperature	–40º C to 100º C	–40º F to 212º F
Height	88.9 mm	3.5 in
Width	184.2 mm	7.25 in
Length (with connector)	122.6 mm	4.83 in
Weight	5 kg	11.02 lb

In-Cab 2D Display

Display screen	CD600, LCD, 320 × 240 pixel, backlit display	
On-grade indicator	Green	
Above/below grade indicator	Amber	
Operating temperature	–40º C to 85º C	–40º F to 185º F
Storage temperature	–40º C to 85º C	–40º F to 185º F
Humidity	100%	
Sealing	IP68 sealed to 34.48 kPa (5 psi)	
Electrical input	9 to 32V DC	
Input connector	10-pin	
Length	221 mm	8.7 in
Width	140 mm	5.51 in
Depth	71 mm	2.8 in
Weight	1.59 kg	3.51 lb

Laser Receiver

Detection angle	360º	
Detection window length	231 mm	9.09 in
Transmitter speed	270 to 1,320 rpm	
Operating temperature	–40º C to 71º C	–40º F to 160º F
Storage temperature	–55º C to 85º C	–67º F to 185º F
Sealing	IP68 sealed to 34.48 kPa (5 psi)	
Electrical input	9 to 32V DC	
Network connector	6-pin	
Height	292 mm	11.5 in
Width	168 mm	6.61 in
Depth	213 mm	8.39 in
Weight	2.8 kg	6.17 lb

Electric Mast

Position repeatability	±1 mm	
Typical speed	30 mm/sec	1.2 in/sec
Operation	12 and 24V	
Operating temperature	–29º C to 60º C	–20º F to 140º F
Storage temperature	–40º C to 80º C	–40º F to 176º F
Humidity	100%	
Sealing	IP54 sealed	
Electrical input	9 to 32V DC	
Network connector	10-pin	
Input connector	6-pin	
Height retracted	1640 mm	64.57 in
Height extended	2900 mm	114.17 in
Base diameter	240 mm	9.45 in
Weight	25 kg	55.12 lb

Power Control Module

Electrical input	9 to 32V DC	
Load dump protection	ISO 7637 compliant	
Over-current protection	15 amps	
Output	3 circuits, 15-amps	
Operating temperature	–40º C to 71º C	–40º F to 160º F
Storage temperature	–55º C to 85º C	–67º F to 185º F
Humidity	100%	
Sealing	IP68 sealed to 34.48 kPa (5 psi)	
Input connector	8-pin	
Output connector	8-socket	
Height	64 mm	2.52 in
Width	89 mm	3.5 in
Length	213 mm	8.39 in
Weight	1 kg	2.2 lb

AccuGrade® Systems

Machine

Equipped with the AccuGrade Site Reference System

In-Cab Display

Swing Sensor

Position Sensing Cylinders

Inclinometer

Laser System

Laser Receiver

Electric Mast

Power Module

AccuGrade® Systems

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

AccuGrade Site Reference System
- In-cab display
- Wiring harness
- Bracket
- Swing sensor
- Position sensing cylinders
- Inclinometer
- Carrying case

AccuGrade Laser Reference System
- Laser receiver
- Electric mast
- Power module
- Mount
- Wiring harness
- Carrying case

AccuGrade® Grade Control System for Backhoe Loaders

For more complete information on Cat products, dealer services, and industry solutions, visit us on the web at **www.cat.com**

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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