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## INTRODUCTION

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### TO THE READER

- This manual is written for an experienced technician to provide technical information needed to maintain and repair this machine.
- Be sure to thoroughly read this manual for correct product information and service procedures.
- If you have any questions or comments, at if you found any errors regarding the contents of this manual, please contact using "Service Manual Revision Request Form. at the end of this manual.  
(Note: Do not tear off the form. Copy it for usage.):  
Publications Marketing & Product Support  
Hitachi Construction Machinery Co. Ltd.  
TEL: 81-298-32-7173  
FAX: 81-298-31-1162

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### ADDITIONAL REFERENCES

- Please refer to the materials listed below in addition to this manual.
  - The Operator's Manual
  - The Parts Catalog
- Operation Manual of the Engine
- Parts Catalog of the Engine
- Hitachi Training Material

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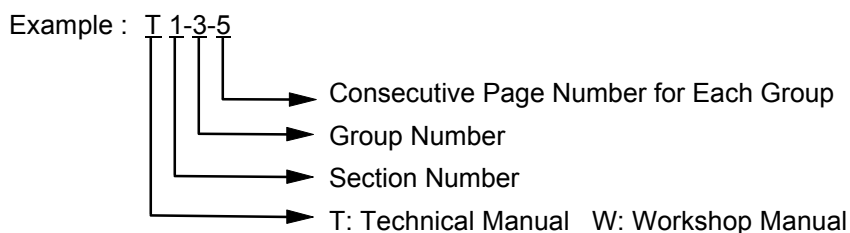
### MANUAL COMPOSITION

- This manual consists of three portions: the Technical Manual (Operational Principle), the Technical Manual (Troubleshooting) and the Workshop Manual.
- Information included in the Technical Manual (Operational Principle):  
technical information needed for redeliver and delivery, operation and activation of all devices and systems.
- Information included in the Technical Manual (Troubleshooting):  
technical information needed for operational performance tests, and troubleshooting procedures.
- Information included in the Workshop Manual:  
technical information needed for maintenance and repair of the machine, tools and devices needed for maintenance and repair, maintenance standards, and removal/installation and assemble/disassemble procedures.

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### PAGE NUMBER

- Each page has a number, located on the center lower part of the page, and each number contains the following information:






# INTRODUCTION

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## SAFETY ALERT SYMBOL AND HEADLINE NOTATIONS

In this manual, the following safety alert symbol and signal words are used to alert the reader to the potential for personal injury or machine damage.

 This is the safety alert symbol. When you see this symbol, be alert to the potential for personal injury. Never fail to follow the safety instructions prescribed along with the safety alert symbol. The safety alert symbol is also used to draw attention to component/part weights. To avoid injury and damage, be sure to use appropriate lifting techniques and equipment when lifting heavy parts.

-  **CAUTION:**  
Indicated potentially hazardous situation which could, if not avoided, result in personal injury or death.
- **IMPORTANT:**  
Indicates a situation which, if not conformed to the instructions, could result in damage to the machine.
-  **NOTE:**  
Indicates supplementary technical information or know-how.

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## UNITS USED

- SI Units (International System of Units) are used in this manual. MKS system units and English units are also indicated in parentheses just behind SI units.

Example : 24.5 MPa (250 kgf/cm<sup>2</sup>, 3560 psi)

A table for conversion from SI units to other system units is shown below for reference purposes.

Quantity	To Convert From	Into	Multiply By	Quantity	To Convert From	Into	Multiply By
Length	mm	in	0.03937	Pressure	MPa	kgf/cm <sup>2</sup>	10.197
	mm	ft	0.003281		MPa	psi	145.0
Volume	L	US gal	0.2642	Power	kW	PS	1.360
	L	US qt	1.057		kW	HP	1.341
	m <sup>3</sup>	yd <sup>3</sup>	1.308	Temperature	°C	°F	°C×1.8+32
Weight	kg	lb	2.205	Velocity	km/h	mph	0.6214
Force	N	kgf	0.10197		min <sup>-1</sup>	rpm	1.0
	N	lbf	0.2248	Flow rate	L/min	US gpm	0.2642
Torque	N·m	kgf·m	1.0197		mL/rev	cc/rev	1.0
	N·m	lbf·ft	0.7375				

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Group 2 Component Layout

Group 3 Component Specifications

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 Group 2 Standard  
 Group 3 Engine Test  
 Group 4 Excavator Test  
 Group 5 Component Test  
 Group 6 Adjustment

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 Group 2 Component Layout  
 Group 3 Troubleshooting A  
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 Group 6 Electrical System Inspection  
 Group 7 ICX

*All information, illustrations and specifications in this manual are based on the latest product information available at the time of publication.*

*The right is reserved to make changes at any time without notice.*

## WORKSHOP MANUAL

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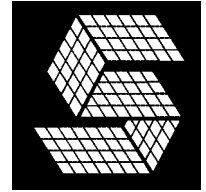
### SECTION 5 ENGINE



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# SECTION 1 GENERAL



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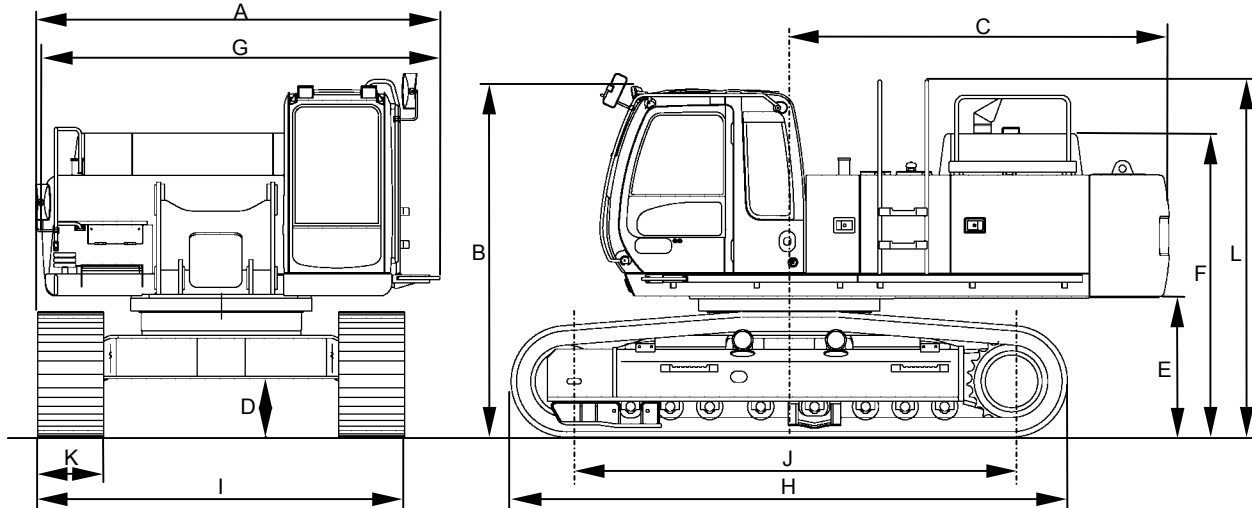
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## GENERAL / Specifications

### SPECIFICATIONS

#### ZAXIS450, ZAXIS450LC (BACKHOE)



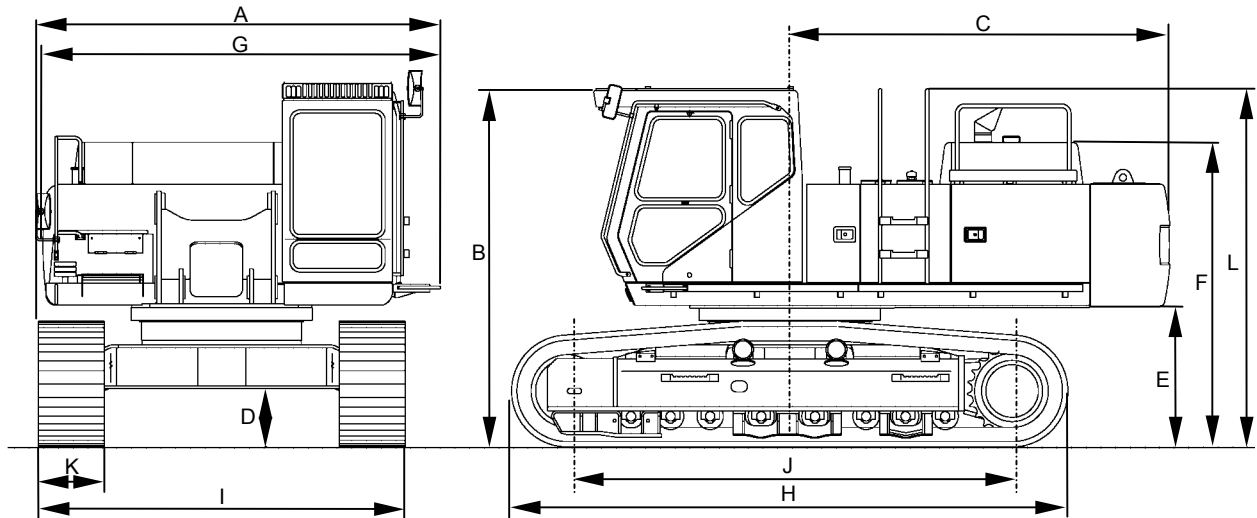
M16J-11-005

Model	ZX450 Hydraulic Excavator	ZX450LC Hydraulic Excavator
Type of Front-End Attachment	3.4 m (11 ft 2 in) Arm	
Bucket Capacity (Heaped)	PCSA 1.89 m <sup>3</sup> (2.47 yd <sup>3</sup> ), CECE 1.7 m <sup>3</sup>	PCSA 2.07 m <sup>3</sup> (2.71 yd <sup>3</sup> ), CECE 1.8 m <sup>3</sup>
Operating Weight	42500 kg (93700 lb)	44800 kg (98800 lb)
Basic Machine Weight	32700 kg (72100 lb)	34800 kg (76720 lb)
Engine	235 kW/1800 min <sup>-1</sup> (320 PS/1800 rpm)	
A: Overall Width (Excluding Rear View Mirrors)	3670 mm (12 ft 0 in)	3750 mm (12 ft 4 in)
B: Cab Height	3260 mm (10 ft 8 in)	3380 mm (11 ft 1 in)
C: Rear End Swing Radius	3480 mm (11 ft 5 in)	3480 mm (11 ft 5 in)
D: Minimum Ground Clearance	*496 mm (20 in)	*738 mm (29 in)
E: Counterweight Clearance	* 1230 mm (4 ft 0 in)	* 1350 mm (4 ft 5 in)
F: Engine Cover Height	* 2770 mm (9 ft 1 in)	* 2890 mm (9 ft 6 in)
G: Overall Width of Upperstructure	3610 mm (11 ft 10 in)	3610 mm (11 ft 10 in)
H: Undercarriage Length	5050 mm (16 ft 7 in)	5470 mm (17 ft 11 in)
I: Undercarriage Width	3340 mm (11 ft)	3490 mm (11 ft 5 in)/ 2990 mm (9 ft 10 in) (Extended/Retracted)
J: Sprocket Center to Idler Center	4050 mm (13 ft 3 in)	4470 mm (14 ft 8 in)
K: Track Shoe Width	600 mm (24 in) (Grouser shoe)	
L: Overall Hight	3250 mm (10 ft 8 in)	3370 mm (11 ft 1 in)
Ground Pressure	79 kPa (0.81 kgf/cm <sup>2</sup> , 11.5 psi)	76 kPa (0.77 kgf/cm <sup>2</sup> , 10.9 psi)
Swing Speed	9.0 min <sup>-1</sup> (rpm)	9.0 min <sup>-1</sup> (rpm)
Travel Speed (fast/slow)	5.5/3.4 km/h (3.4/2.1 mph)	
Gradeability	35° (tanθ = 0.70)	

**NOTE:** \* The dimensions do not include the height of the shoe lug.

## GENERAL / Specifications

### ZAXIS450H, ZAXIS450LCH (BACKHOE)



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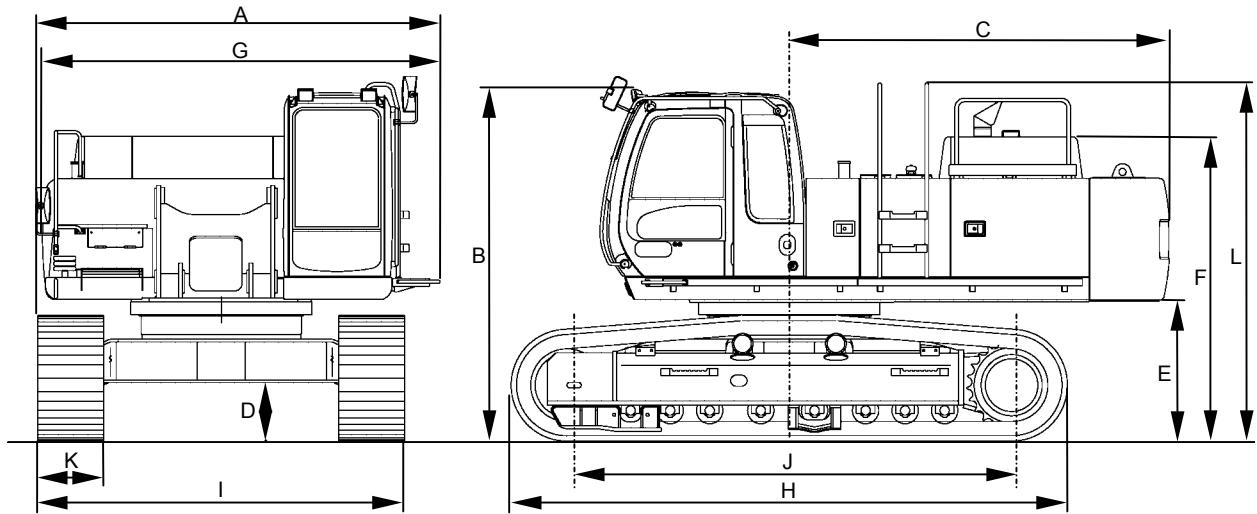
Model	ZX450H Hydraulic Excavator	ZX450LCH Hydraulic Excavator
Type of Front-End Attachment	3.4 m (11 ft 2 in) HD Arm	
Bucket Capacity (Heaped)	PCSA 1.89 m <sup>3</sup> (2.47 yd <sup>3</sup> ), CECE 1.7 m <sup>3</sup>	
Operating Weight	43800 kg (96600 lb)	45800 kg (101000 lb)
Basic Machine Weight	33100 kg (73000 lb)	35200 kg (77600 lb)
Engine	235 kW/1800 min <sup>-1</sup> (320 PS/1800 rpm)	
A: Overall Width (Excluding Rear View Mirrors)	3670 mm (12 ft 0 in)	3750 mm (12 ft 4 in)
B: Cab Height	3250 mm (10 ft 8 in)	3370 mm (11 ft 1 in)
C: Rear End Swing Radius	3480 mm (11 ft 5 in)	3480 mm (11 ft 5 in)
D: Minimum Ground Clearance	*496 mm (20 in)	*738 mm (29 in)
E: Counterweight Clearance	* 1230 mm (4 ft 0 in)	* 1350 mm (4 ft 5 in)
F: Engine Cover Height	* 2770 mm (9 ft 1 in)	* 2890 mm (9 ft 6 in)
G: Overall Width of Upperstructure	3610 mm (11 ft 10 in)	3610 mm (11 ft 10 in)
H: Undercarriage Length	5050 mm (16 ft 7 in)	5470 mm (17 ft 11 in)
I: Undercarriage Width	3340 mm (11 ft)	3490 mm (11 ft 5 in)/ 2990 mm (9 ft 10 in) (Extended/Retracted)
J: Sprocket Center to Idler Center	4050 mm (13 ft 3 in)	4470 mm (14 ft 8 in)
K: Track Shoe Width	600 mm (24 in) (Grouser shoe)	
L: Overall Height	3250 mm (10 ft 8 in)	3370 mm (11 ft 1 in)
Ground Pressure	81 kPa (0.82 kgf/cm <sup>2</sup> , 11.8 psi)	78 kPa (0.79 kgf/cm <sup>2</sup> , 11.4 psi)
Swing Speed	9.0 min <sup>-1</sup> (rpm)	9.0 min <sup>-1</sup> (rpm)
Travel Speed (fast/slow)	5.5/3.4 km/h (3.4/2.1 mph)	
Gradeability	35° (tanθ = 0.70)	

**NOTE:** \* The dimensions do not include the height of the shoe lug.




## GENERAL / Specifications

### ZAXIS450 (LOADING SHOVEL)



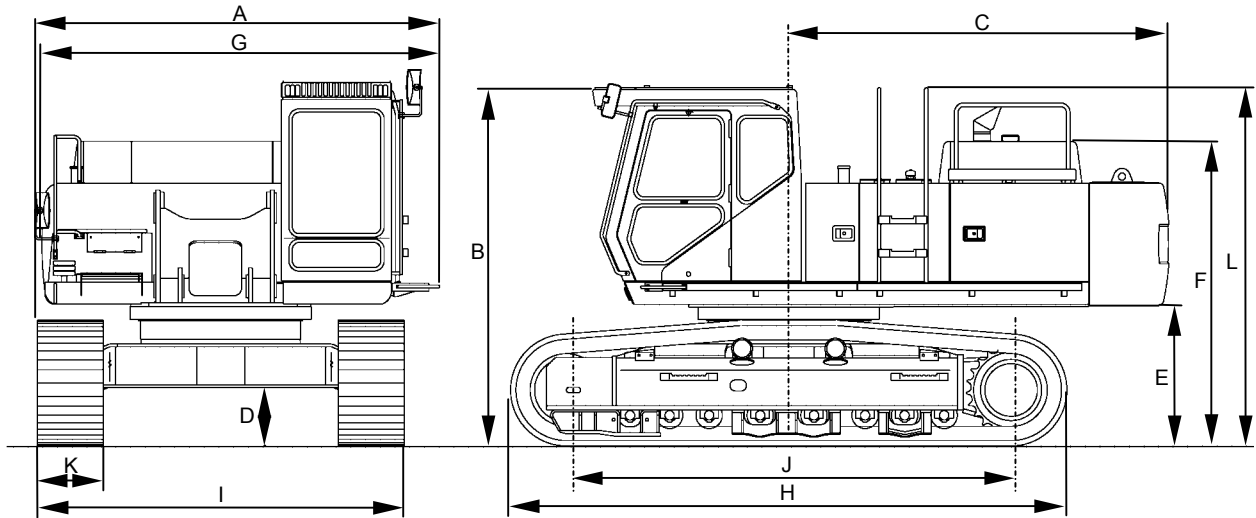
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Model	ZAXIS450 Hydraulic Excavator	
Type of Front-End Attachment	Loading shovel front attachment	
Bucket Capacity (Heaped)	2.6 m <sup>3</sup> (3.4 yd <sup>3</sup> )	2.8 m <sup>3</sup> (3.7 yd <sup>3</sup> )
Operating Weight	44000 kg (97000 lb)	43800 kg (96600 lb)
Basic Machine Weight	32700 kg (72800 lb)	
Engine	235 kW/1800 min <sup>-1</sup> (320 PS/1800 rpm)	
A: Overall Width (Excluding Rear View Mirrors)	3670 mm (12 ft 0 in)	
B: Cab Height	3260 mm (10 ft 8 in)	
C: Rear End Swing Radius	3480 mm (11 ft 5 in)	
D: Minimum Ground Clearance	*496 mm (20 in)	
E: Counterweight Clearance	*1230 mm (4 ft 0 in)	
F: Engine Cover Height	2770 mm (9 ft 1 in)	
G: Coverall Width of Upperstructure	3610 mm (11 ft 10 in)	
H: Undercarriage Length	5050 mm (16 ft 7 in)	
I: Undercarriage Width	3430 mm (11 ft 3 in)	
J: Sprocket Center to Idler Center	4050 mm (13 ft 3 in)	
K: Track Shoe Width	600 mm (24 in) (Grouser shoe)	
L: Overall Height	3250 mm (10 ft 8 in)	
Ground Pressure	82 kPa (0.84 kgf/cm <sup>2</sup> , 12 psi)	81 kPa (0.83 kgf/cm <sup>2</sup> , 12 psi)
Swing Speed	9.0 min <sup>-1</sup> (rpm)	
Travel Speed (Fast/Slow)	5.5/3.4 km/h (3.4/2.1 mph)	
Gradeability	35° (tan θ = 0.70)	

 **NOTE:** \* The dimensions do not include the height of the shoe lug.

## GENERAL / Specifications

### ZAXIS450H (LOADING SHOVEL)



M16J-11-006

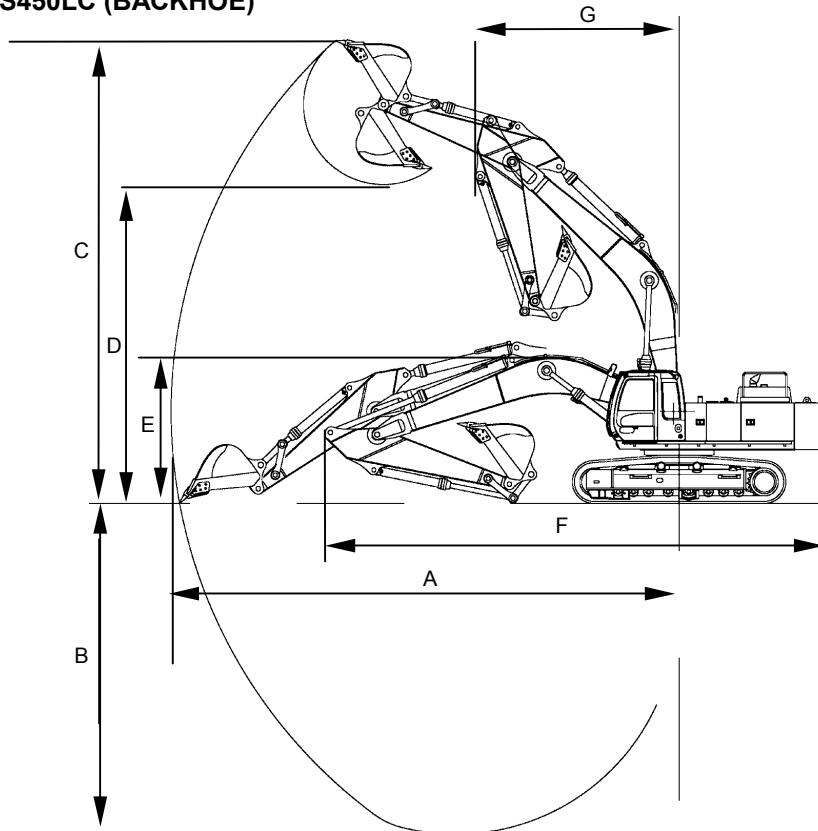
Model	ZAXIS450H Hydraulic Excavator	
Type of Front-End Attachment	Loading shovel front attachment	
Bucket Capacity (Heaped)	2.3 m <sup>3</sup> (3.0 yd <sup>3</sup> )	2.6 m <sup>3</sup> (3.4 yd <sup>3</sup> )
Operating Weight	44800 kg (98800 lb)	44200 kg (97400 lb)
Basic Machine Weight	33100 kg (72800 lb)	
Engine	235 kW/1800 min <sup>-1</sup> (320 PS/1800 rpm)	
A: Overall Width (Excluding Rear View Mirrors)	3670 mm (12 ft 0 in)	
B: Cab Height	3250 mm (10 ft 8 in)	
C: Rear End Swing Radius	3450 mm (11 ft 4 in)	
D: Minimum Ground Clearance	*496 mm (20 in)	
E: Counterweight Clearance	*1230 mm (4 ft 0 in)	
F: Engine Cover Height	2770 mm (9 ft 1 in)	
G: Coverall Width of Upperstructure	3610 mm (11 ft 10 in)	
H: Undercarriage Length	5050 mm (16 ft 7 in)	
I: Undercarriage Width	3340 mm (11 ft)	
J: Sprocket Center to Idler Center	4050 mm (13 ft 3 in)	
K: Track Shoe Width	600 mm (24 in) (Grouser shoe)	
L: Overall Height	3250 mm (10 ft 8 in)	
Ground Pressure	83 kPa (0.85 kgf/cm <sup>2</sup> , 12 psi)	82 kPa (0.84 kgf/cm <sup>2</sup> , 12 psi)
Swing Speed	9.0 min <sup>-1</sup> (rpm)	
Travel Speed (Fast/Slow)	5.5/3.4 km/h (3.4/2.1 mph)	
Gradeability	35° (tan θ = 0.70)	

**NOTE:** \* The dimensions do not include the height of the shoe lug.

## GENERAL / Specifications

### WORKING RANGE

#### ZAXIS450, ZAXIS450LC (BACKHOE)



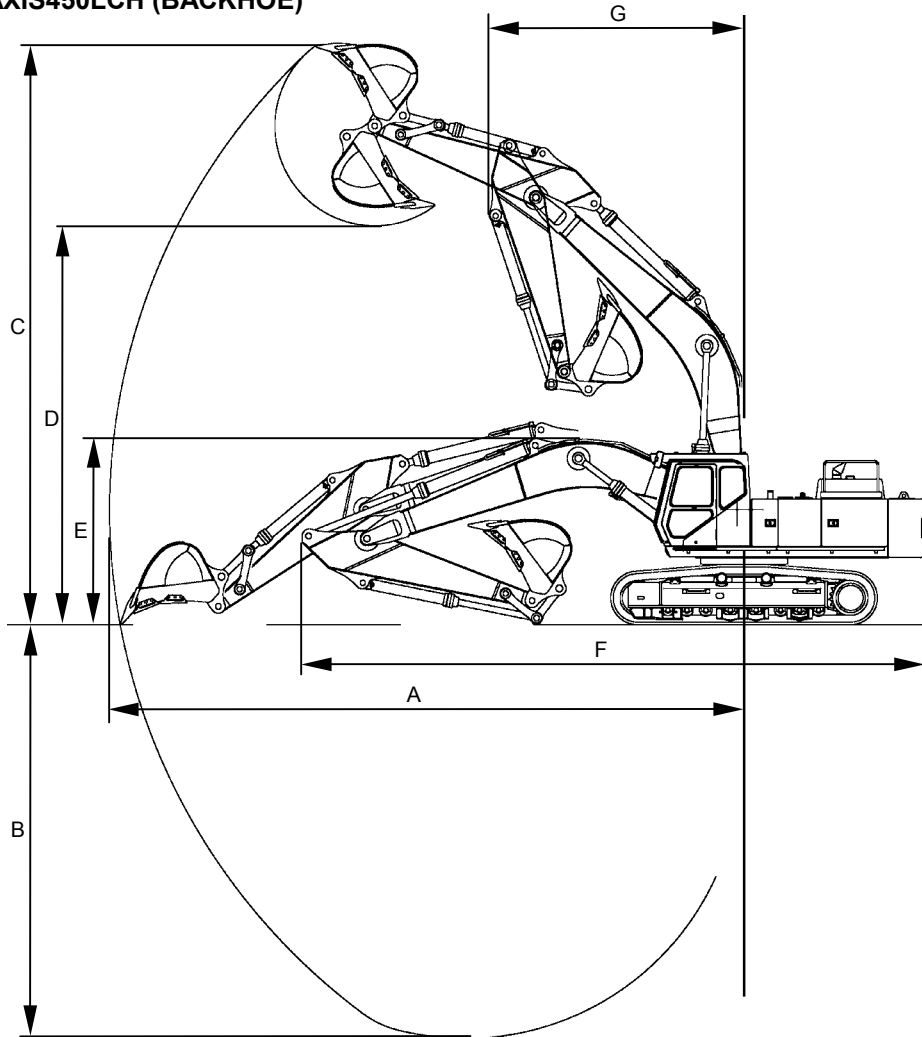
M16J-11-001

Item	Category	7.0 m (23 ft 0 in) Boom								8.2 m (26 ft 9 in) Boom	
		2.9 m (9 ft 6 in) Arm		3.4 m (11 ft 2 in) Arm		3.9 m (12 ft 10 in) Arm		4.9 m (16 ft 1 in) Arm		(16 ft 1 in) Arm	
		Backhoe		Backhoe		Backhoe		Backhoe		Backhoe	
		ZX450	ZX450LC	ZX450	ZX450LC	ZX450	ZX450LC	ZX450	ZX450LC	ZX450	ZX450LC
A: Maximum Digging Reach	mm (ft·in)	11390 (37' 4")	11420 (37' 6")	12050 (39' 6")	12050 (39' 6")	12480 (40' 11")	12480 (40' 11")	13340 (43' 9")	13340 (43' 9")	14510 (47' 7")	14510 (47' 7")
B: Maximum Digging Depth	mm (ft·in)	7390 (24' 3")	7300 (23' 11")	7890 (25' 11")	7760 (25' 6")	8390 (27' 6")	8260 (27' 1")	9240 (30' 4")	9110 (29' 11")	10360 (34' 0")	10230 (33' 6")
C: Maximum Cutting Height	mm (ft·in)	10150 (33' 4")	10270 (33' 8")	10950 (35' 11")	11080 (36' 4")	11050 (36' 3")	11180 (36' 8")	11610 (38' 1")	11730 (38' 6")	12110 (39' 8")	12230 (40' 2")
D: Maximum Dumping Height	mm (ft·in)	6910 (22' 8")	7040 (23' 1")	7540 (24' 9")	7660 (25' 2")	7660 (25' 2")	7780 (25' 6")	8540 (28' 0")	8670 (28' 5")	9090 (29' 10")	9210 (30' 3")
E: Transport Height	mm (ft·in)	*3560 (11' 8")	*3600 (11' 10")	*3450 (11' 4")	*3480 (11' 5")	*3470 (11' 5")	*3480 (11' 5")	*4660 (15' 3")	*4660 (15' 3")	*4390 (14' 5")	*4430 (14' 6")
F: Overall Transport Length	mm (ft·in)	*11930 (39' 1")	*11910 (39' 0")	*11850 (38' 9")	*11920 (38' 8")	*11850 (38' 9")	*11920 (38' 8")	*11660 (38' 2")	*11730 (38' 5")	*13010 (42' 8")	*13050 (42' 10")
G: Minimum Swing Radius	mm (ft·in)	4920 (16' 2")	4920 (16' 2")	4840 (15' 11")	4840 (15' 11")	4810 (15' 9")	4810 (15' 9")	4820 (15' 10")	4820 (15' 10")	5880 (19' 4")	5880 (19' 4")

NOTE: \* The dimensions include the height of the shoe lug.

## GENERAL / Specifications

### ZAXIS450H, ZAXIS450LCH (BACKHOE)



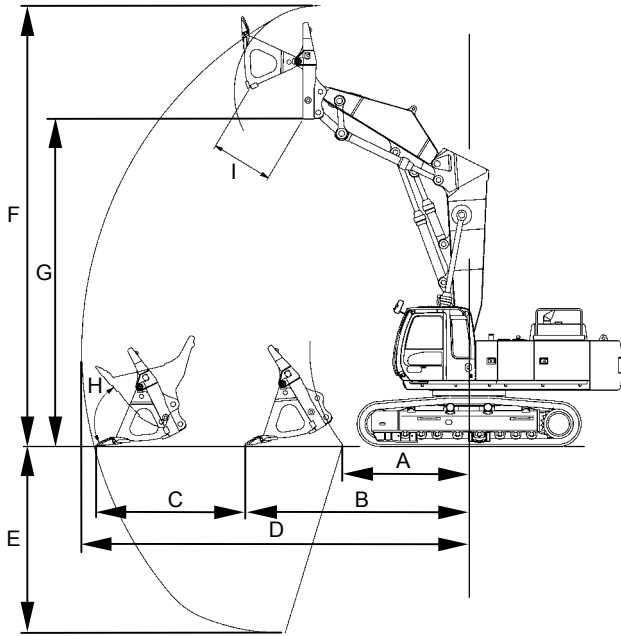
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Item	Category	3.4 m (11 ft 2 in) HD Arm	
		Backhoe	
		ZX450	ZX450LCH
A: Maximum Digging Reach	mm (ft·in)	12050 (39' 6")	12050 (39' 6")
B: Maximum Digging Depth	mm (ft·in)	7890 (25' 11")	7760 (25' 6")
C: Maximum Cutting Height	mm (ft·in)	10950 (35' 11")	11080 (36' 4")
D: Maximum Dumping Height	mm (ft·in)	7540 (24' 9")	7660 (25' 2")
E: Transport Height	mm (ft·in)	*3450 (11' 4")	*3480 (11' 5")
F: Overall Transport Length	mm (ft·in)	*11850 (38' 11")	*11820 (38' 9")
G: Minimum Swing Radius	mm (ft·in)	4840 (15' 11")	4840 (15' 11")

**NOTE:** \* The dimensions include the height of the shoe lug.

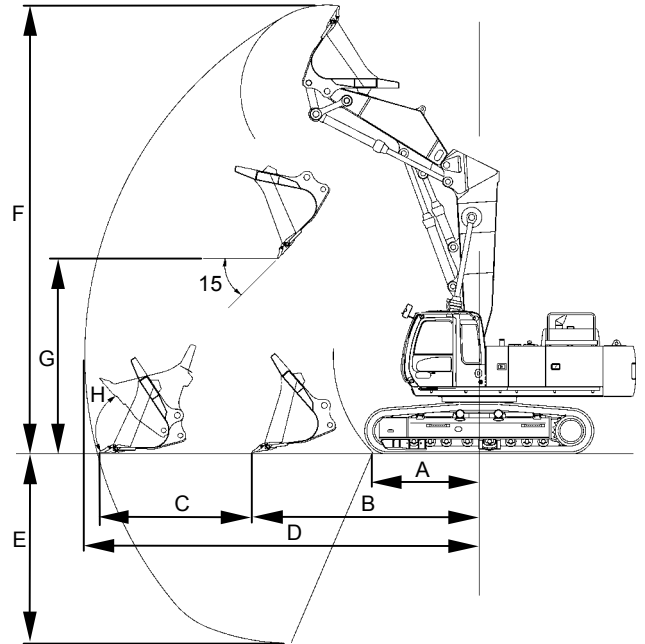
## GENERAL / Specifications

### ZAXIS450, ZAXIS450H (LOADING SHOVEL)



Bottom Dump Type

M16J-11-003



Tilt dump Type

M16J-11-004

Item	Bucket Type	Bucket Type	
		Bottom dump type	Tilt dump type
A: Min. digging distance	mm (ft·in)	2860 (9' 4")	2360 (7' 10")
B: Min. Level crowding distance	mm (ft·in)	5070 (16' 8")	5030 (16' 6")
C: Level crowding distance	mm (ft·in)	3340 (11' 0")	3370 (11' 1")
D: Max. digging reach	mm (ft·in)	8760 (28' 9")	8720 (28' 7")
E: Max. digging depth	mm (ft·in)	4260 (14' 0")	4230 (13' 11")
F: Max. cutting height	mm (ft·in)	9940 (32' 7")	9900 (32' 6")
G: Max. dumping height	mm (ft·in)	7370 (24' 3")	4290 (14' 1")
H: Max. bucket tilting angle on ground	(°)	54°	51°
I: Max. bucket opening width	mm (ft·in)	1390 (4' 7")	—

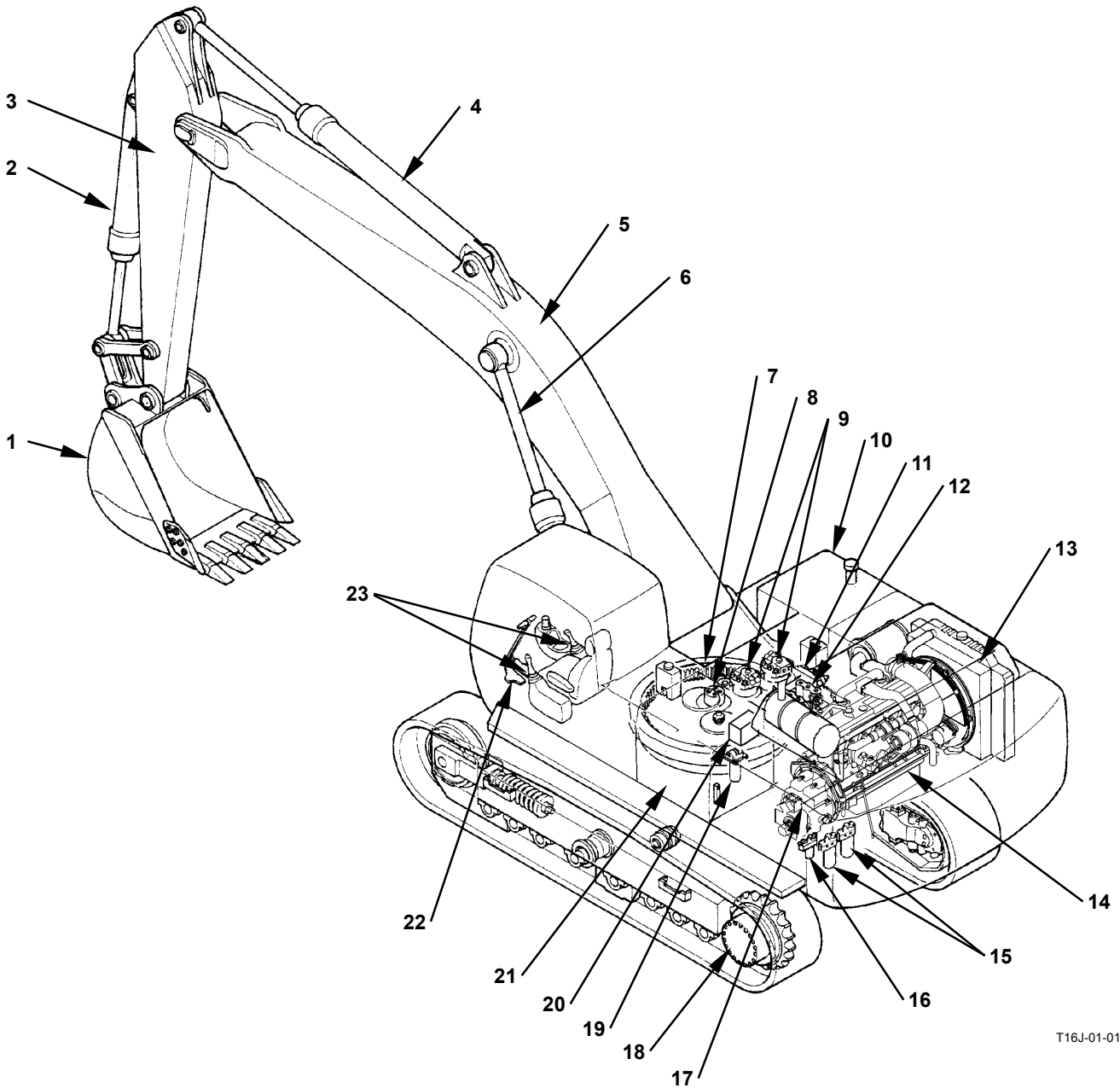
## GENERAL / Specifications

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# GENERAL / Component Layout

## MAIN COMPONENT LAYOUT

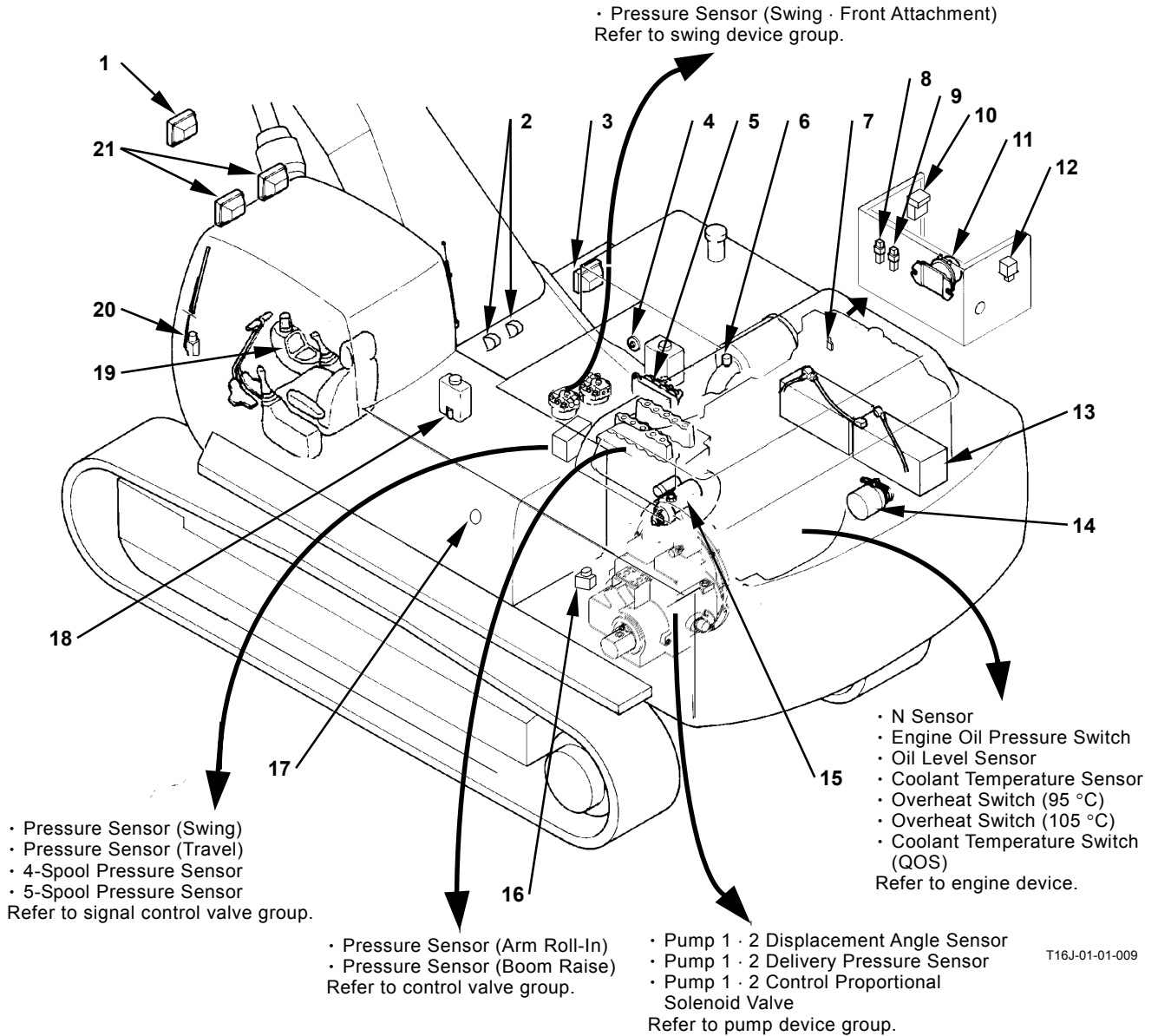


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- |                     |                          |   |  |
|---------------------|--------------------------|---|--|
| 1 - Bucket          | 7 - Swing Bearing        | 13 - Radiator / Oil Cooler /<br>Air Condenser | 19 - Pump Dram Filter                      |
| 2 - Bucket Cylinder | 8 - Center Joint         | 14 - Engine                                   | 20 - Signal Control Valve                  |
| 3 - Arm             | 9 - Swing Device         | 15 - Oil Filter                               | 21 - Hydraulic Tank                        |
| 4 - Arm Cylinder    | 10 - Fuel Tank           | 16 - Pilot Filter                             | 22 - Travel Pilot Valve                    |
| 5 - Boom            | 11 - Solenoid Valve Unit | 17 - Pump Device                              | 23 - Front Attachment Swing<br>Pilot Valve |
| 6 - Boom Cylinder   | 12 - Control Valve       | 18 - Travel Device                            |  |

# GENERAL / Component Layout

## ELECTRICAL COMPONENT LAYOUT (Overview)



1 - Work Light (Boom)

2 - Horn

3 - Work Light

4 - Fuel Sensor

5 - Solenoid Valve Unit

6 - Air Cleaner Restriction Switch

7 - Outside Temperature Sensor

8 - Fusible Link (45 A)

9 - Fusible Link (75 A)

10 - Safety Relay

11 - Battery Relay

12 - Glow Plug

13 - Battery

14 - Alternator

15 - Starter

16 - EC Motor

17 - Hydraulic Temperature Sensor

18 - Washer Motor

19 - Monitor

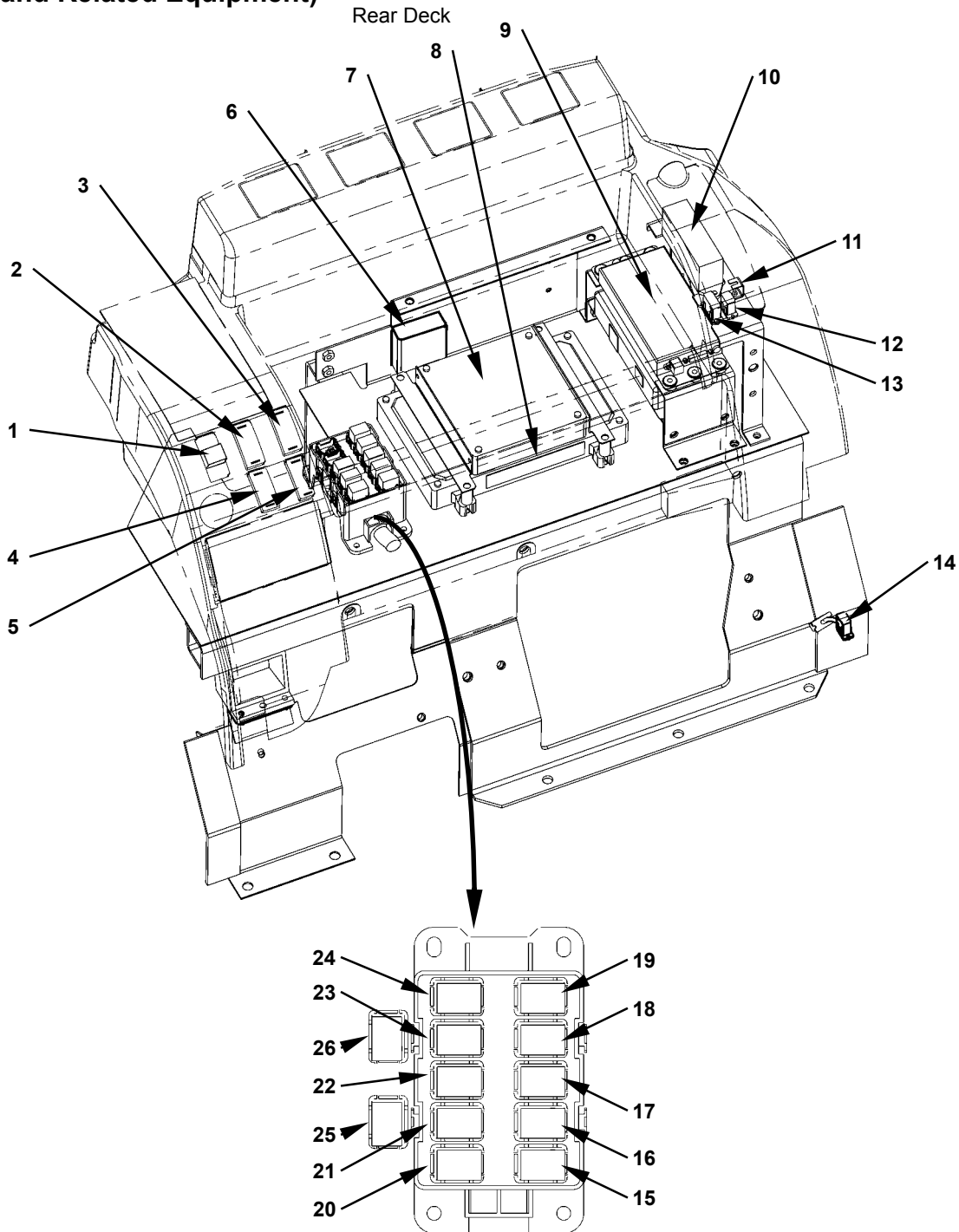
20 - Wiper Motor

21 - Work Light



# GENERAL / Component Layout

## ELECTRICAL SYSTEM (Relays and Related Equipment)



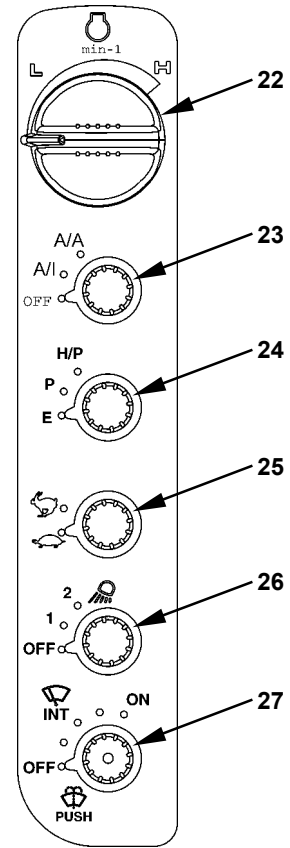
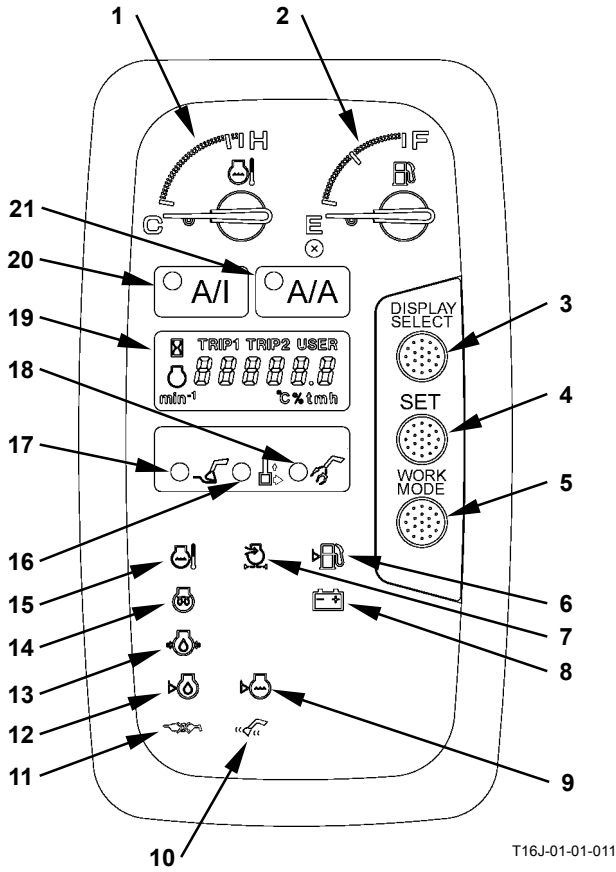
T16J-01-02-001

T16J-01-01-010

- |  |   |                              |  |
|--|---|------------------------------|--|
| 1 - GPS ON/OFF Switch<br>(Satellite Navigation System<br>Equipped Machines Only) | 8 - MC (Main Controller)  | 15 - Load Damp Relay (R1)    | 21 - Wiper Relay A (R7)                              |
| 2 - Boom Mode Switch   | 9 - GPS Controller (Optional)   | 16 - Washer Relay (R2)       | 22 - Wiper Relay B1 (R8)                             |
| 3 - Auto-Lubrication Switch  | 10 - Fuse Box   | 17 - Work Light Relay 3 (R3) | 23 - Wiper Relay B2 (R8)                             |
| 4 - Precision Mode Switch  | 11 - Learning Switch  | 18 - Work Light Relay 2 (R3) | 24 - Wiper Relay B3 (R9)                             |
| 5 - Swing Alarm Deactivation<br>Switch (Optional)                                | 12 - Dr.EX Connector to MC  | 19 - Work Light Relay 1 (R5) | 25 - Auto-Lubrication Normal<br>Rotation Relay (R11) |
| 6 - QOS Controller   | 13 - Download Connector (Not<br>Provided on GPS Equipped<br>Machines) | 20 - Horn Relay (R6)         | 26 - Auto-Lubrication Reverse<br>Rotation (R12)      |
| 7 - ICX (Information Controller)   | 14 - Dr.EX Connector to ICX   |                              |  |

## GENERAL / Component Layout

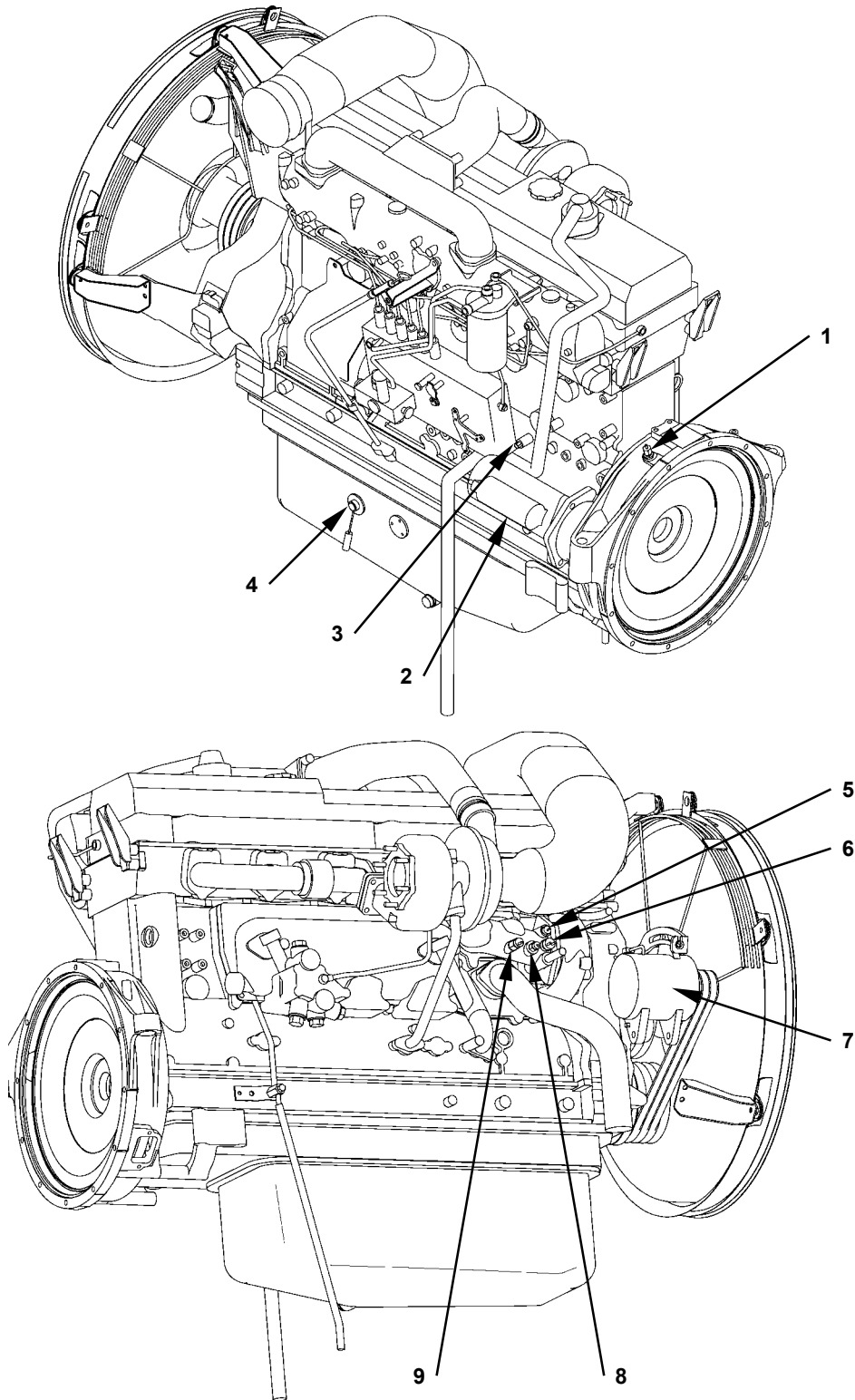
### ELECTRICAL SYSTEM (Monitors and Switches)



- |                                   |                                    |                                    |  |
|-----------------------------------|------------------------------------|------------------------------------|--|
| 1 - Coolant Temperature Gauge     | 8 - Alternator Indicator           | 15 - Overheat Indicator            | 22 - Engine Control Dial               |
| 2 - Fuel Gauge                    | 9 - Coolant Level Indicator        | 16 - Trench Digging Mode Indicator | 23 - Auto-Idle / Acceleration Selector |
| 3 - Display Selection Switch      | 10 - Precision Mode Indicator      | 17 - Digging Mode Indicator        | 24 - Power Mode Switch                 |
| 4 - SET Switch                    | 11 - Auto-Lubrication Indicator    | 18 - Attachment Mode Indicator     | 25 - Travel Mode Switch                |
| 5 - Work Mode Switch              | 12 - Engine Oil Level Indicator    | 19 - Liquid Crystal Display        | 26 - Work Light Switch                 |
| 6 - Fuel Level Indicator          | 13 - Engine Oil Pressure Indicator | 20 - Auto-Idle Indicator           | 27 - Wiper / Washer Switch             |
| 7 - Air Filter Restriction Switch | 14 - Preheat Indicator             | 21 - Auto-Acceleration Indicator   |  |

# GENERAL / Component Layout

## ENGINE



1 - N Sensor

4 - Oil Level Sensor

6 - Overheat Switch (95 °C)

8 - Coolant Temperature  
Switch (QOS)

2 - Starter

5 - Coolant Temperature  
Sensor

7 - Alternator

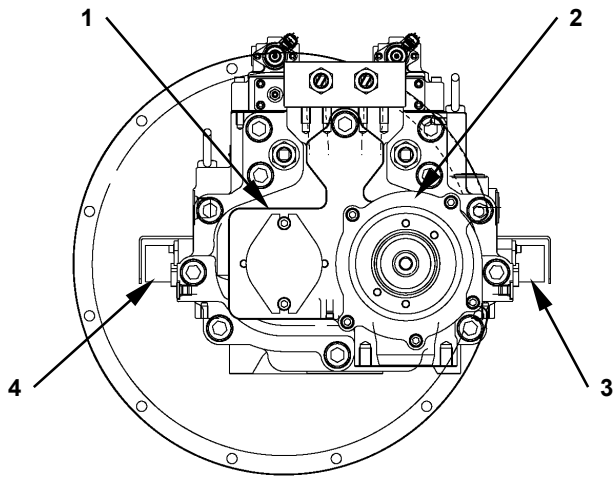
9 - Overheat Switch (105 °C)

3 - Engine Oil Pressure Switch

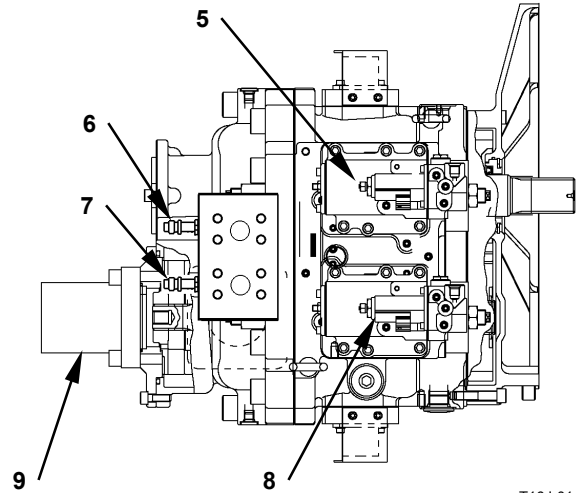
T16J-01-01-008

## GENERAL / Component Layout

### PUMP DEVICE

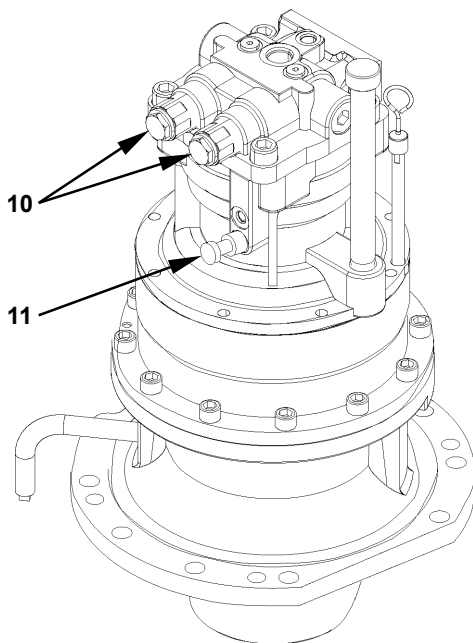


T16J-01-01-002



T16J-01-01-003

### SWING DEVICE



T16J-03-02-001

- |                                      |  |  |   |
|--------------------------------------|--|--|---|
| 1 - Pump 2                           | 4 - Pump 2 Displacement Angle Sensor           | 7 - Pump 1 Delivery Pressure Sensor            | 10 - Swing Relief Valve                         |
| 2 - Pump 1                           | 5 - Pump 2 Control Proportional Solenoid Valve | 8 - Pump 1 Control Proportional Solenoid Valve | 11 - Pressure Sensor (Swing · Front Attachment) |
| 3 - Pump 1 Displacement Angle Sensor | 6 - Pump 2 Delivery Pressure Sensor            | 9 - Pilot Pump                                 |   |