

Technical Manual

(Operational Principle)

ZAXIS

160LC

180LC

180LCN

Excavator

Service Manual (Manual No. KM-1F1E) consists of the following three separate volumes;

Technical Manual (Operational Principle)	: Vol. No. TO1F1E
Technical Manual (Troubleshooting)	: Vol. No. TT1F1E
Workshop Manual	: Vol. No. W1F1E

HITACHI

INTRODUCTION

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, or 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 use.):
Publications Marketing & Product Support
Hitachi Construction Machinery Co. Ltd.
TEL: 81-298-32-7173
FAX: 81-298-31-1162

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

MANUAL COMPOSITION

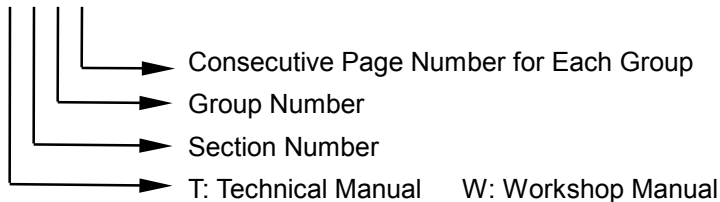
- This manual consists of three portions: the Technical Manual (Operational Principle), the Technical Manual (Troubleshooting) and the Workshop Manual.
- Information included in the Technical Manual (Operational Principle):
technical information needed for redelivery and delivery, operation and activation 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.

INTRODUCTION

PAGE NUMBER


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



Example : T 1-3-5



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.

INTRODUCTION

UNITS USED

- SI Units (International System of Units) are used in this manual.

MKSA system units and English units are also indicated in parentheses just behind SI units.

Example : 24.5 MPa (250 kgf/cm², 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 ²	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 ³	yd ³	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 ⁻¹	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				

INTRODUCTION

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SECTION AND GROUP CONTENTS

TECHNICAL MANUAL (Operational Principle)

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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 5 Troubleshooting C
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.

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Group 2 Counterweight
Group 3 Main Frame
Group 4 Pump Device
Group 5 Control Valve
Group 6 Swing Device
Group 7 Pilot Valve
Group 8 Pilot Shut-Off Valve
Group 9 Signal Control Valve
Group 10 Solenoid Valve

SECTION 3 UNDERCARRIAGE

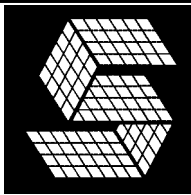
Group 1 Swing Bearing
Group 2 Travel Device
Group 3 Center Joint
Group 4 Track Adjuster
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SECTION 4 FRONT ATTACHMENT

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SECTION 1 GENERAL



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Electrical System T1-2-4
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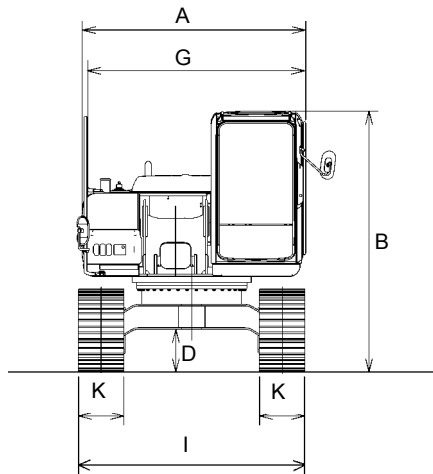
Engine T1-3-1
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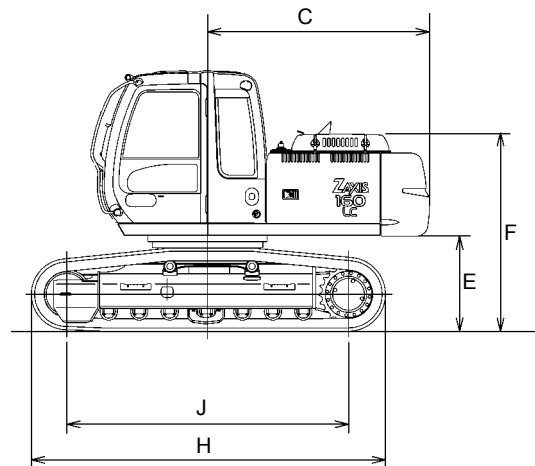
GENERAL / Specifications

SPECIFICATION

ZAXIS160LC,180LC,180LCN



T1F1-01-01-001



M1F1-12-002

Model	Std.		
	ZAXIS160LC Hydraulic Excavator	ZAXIS180LC Hydraulic Excavator	ZAXIS180LCN Hydraulic Excavator
Type of Front-End Attachment	2.58 m (8 ft 6 in) Arm		2.70 m (8 ft 10 in) Arm
Bucket Capacity (Heaped)	m ³ (yd ³)	PCSA 0.60 m ³ (0.80 yd ³), CECE 0.55 m ³	PCSA 0.70 m ³ (0.92 yd ³), CECE 0.60 m ³
Operating Weight	kg (lb)	15600 (34400)	17800 (39200) 17500 (38300)
Basic Machine Weight	kg (lb)	12100 (26700)	13800 (30400) 13500 (29800)
Engine	ISUZU AA-4BG1TC 74 kW (100 PS)/1950 min ⁻¹ (rpm) *81 kW (110 PS)/2150 min ⁻¹ (rpm)		ISUZU AA-4BG1TC 87.4 kW (118.8 PS)/2000 min ⁻¹ (rpm) *90.2 kW (123 PS)/2200 min ⁻¹ (rpm)
A : Overall Width (Excluding Rearview Mirrors)	mm (ft-in)	2500 (8' 2")	2590 (8' 6")
B : Cab Height	mm (ft-in)	2880 (9' 5")	2880 (9' 5")
C : Rear End Swing Radius	mm (ft-in)	2440 (8' 0")	2440 (8' 0")
D : Minimum Ground Clearance	mm (ft-in)	* 470 (1' 7")	* 450 (1' 6")
E : Counterweight Clearance	mm (ft-in)	* 1000 (3' 3")	* 1000 (3' 3")
F : Engine Cover Height	mm (ft-in)	* 2141 (7' 0")	* 2141 (7' 0")
G : Overall Width of Upperstructure	mm (ft-in)	2460 (8' 1")	2460 (8' 1")
H : Undercarriage Length	mm (ft-in)	3920 (12' 10")	4170 (13' 8")
I : Undercarriage Width	mm (ft-in)	2490 (8' 2")	2800 (9' 2") 2490 (8' 2")
J : Sprocket Center to Idle Center	mm (ft-in)	3100 (10' 2")	3370 (11' 1")
K : Track Shoe Width	mm (ft-in)	500 (Grouser Shoe) (20")	600 (Grouser Shoe) (24") 500 (Grouser Shoe) (20")
Ground Pressure	kPa (kgf/cm ²) (psi)	45 (0.46) (6.5)	39 (0.40) (5.7) 47 (0.48) (6.8)
Swing Speed	min ⁻¹ (rpm)	13.6 (13.6)	12.9 (12.9)
Travel Speed (fast/slow)	km/h (mph)	5.3/3.1 (3.3/1.9)	5.0/3.0 (3.1/1.9)
Gradeability	degree (%)	35 (70)	35 (70)

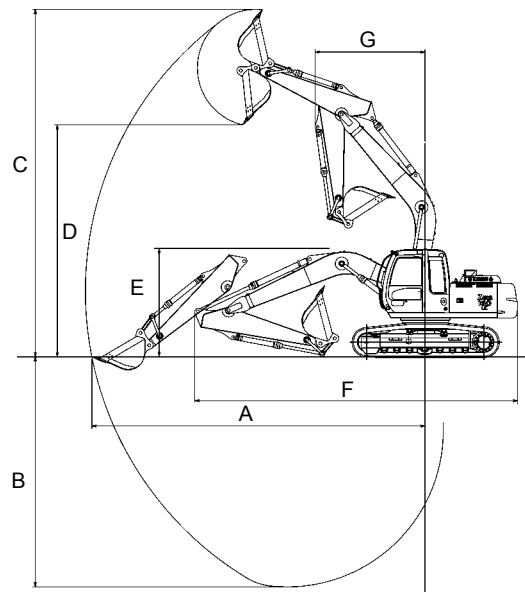
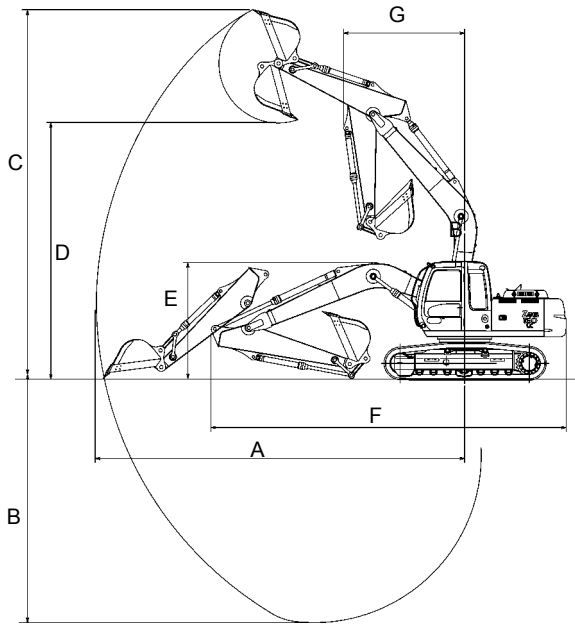
NOTE: * H/P mode

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

GENERAL / Specifications

WORKING RANGE

ZAXIS160LC,180LC,180LCN



M1F1-12-004

M1F1-12-003

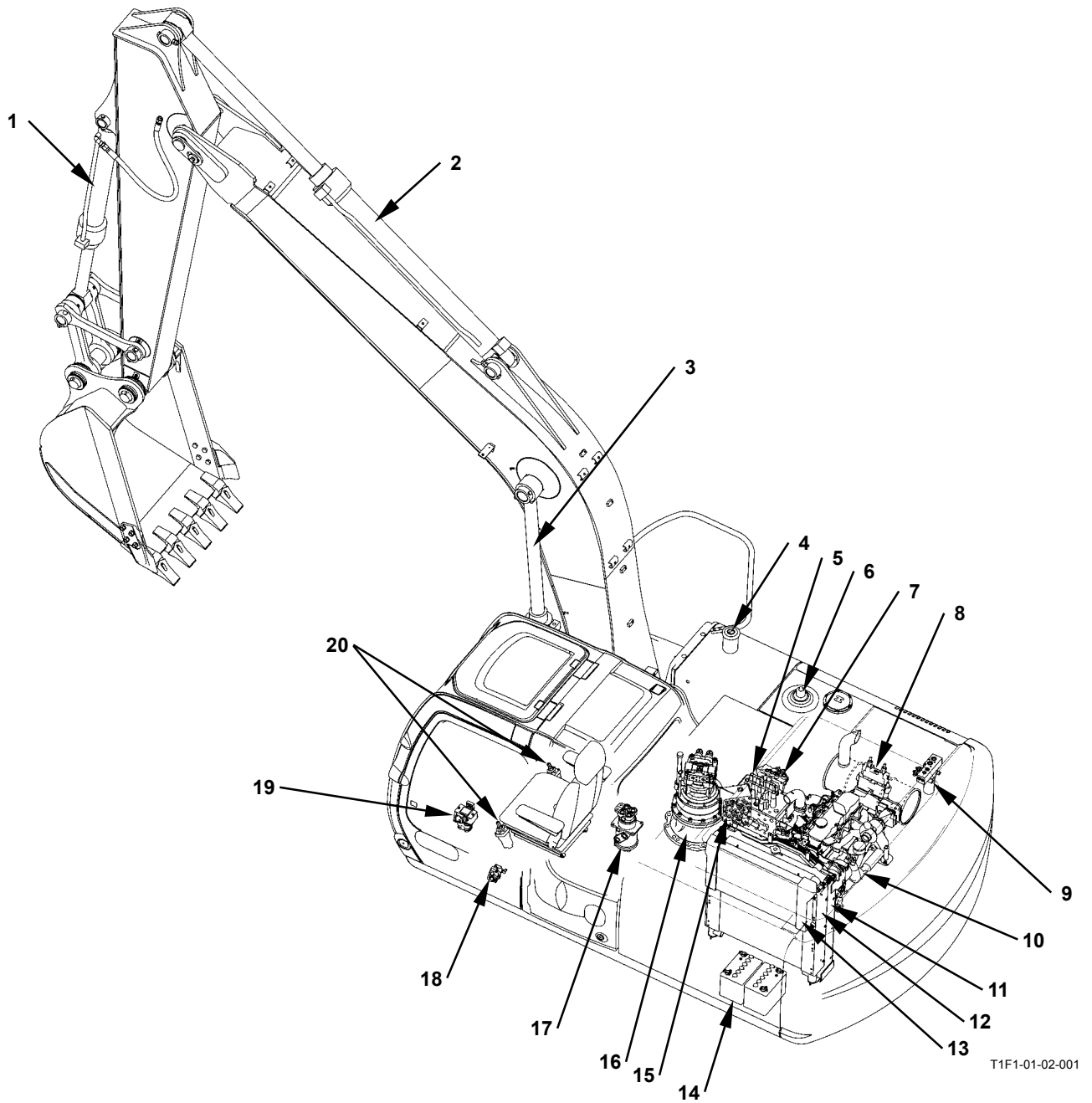
Model		ZX160LC					
Item	Category	2.58 m (8' 6") Standard Arm		3.10 m (10' 2") Arm		2.01 m (6' 7") Arm	
		Backhoe	Shovel	Backhoe	Shovel	Backhoe	Shovel
A : Maximum Digging Reach	mm (ft-in)	8870 (29' 1")	8980 (29' 6")	9330 (30' 7")	9440 (30' 12")	8340 (27' 4")	8460 (27' 9")
* B : Maximum Digging Depth	mm (ft-in)	5980 (19' 7")	6100 (20' 0")	6490 (21' 4")	6600 (21' 8")	5410 (17' 9")	5530 (18' 2")
* C : Maximum Cutting Height	mm (ft-in)	8880 (29' 2")	9130 (29' 11")	9120 (29' 11")	9370 (30' 9")	8540 (28' 0")	8840 (29' 0")
* D : Maximum Dumping Height	mm (ft-in)	6170 (20' 3")	6090 (19' 12")	6400 (20' 12")	6330 (20' 9")	5870 (19' 3")	5770 (18' 11")
E : Transport Height	mm (ft-in)	2880 (9' 6")	2860 (9' 5")	3110 (10' 2")	3110 (10' 2")	3120 (10' 3")	3120 (10' 3")
F : Overall Transport Length	mm (ft-in)	8530 (27' 12")	8530 (27' 12")	8560 (28' 1")	8560 (28' 1")	8630 (28' 4")	8630 (28' 4")
G : Minimum Swing Radius	mm (ft-in)	2910 (9' 7")	2910 (9' 7")	2920 (9' 7")	2920 (9' 7")	3250 (10' 8")	3250 (10' 8")

Model		ZX180LC, 180LCN					
Item	Category	2.70 m (8' 10") Standard Arm		3.20 m (10' 6") Arm		2.25 m (7' 4") Arm	
		Backhoe	Shovel	Backhoe	Shovel	Backhoe	Shovel
A : Maximum Digging Reach	mm (ft-in)	9420 (30' 11")	9420 (30' 11")	9930 (32' 7")	9930 (32' 7")	9060 (29' 9")	9060 (29' 9")
* B : Maximum Digging Depth	mm (ft-in)	6560 (21' 6")	6560 (21' 6")	7050 (23' 2")	7050 (23' 2")	6110 (20' 1")	6110 (20' 1")
* C : Maximum Cutting Height	mm (ft-in)	9390 (30' 10")	9390 (30' 10")	9780 (32' 1")	9780 (32' 1")	9280 (30' 5")	9280 (30' 5")
* D : Maximum Dumping Height	mm (ft-in)	6580 (21' 7")	6580 (21' 7")	6950 (22' 10")	6950 (22' 10")	6460 (21' 2")	6460 (21' 2")
E : Transport Height	mm (ft-in)	3080 (10' 1")	3080 (10' 1")	3390 (11' 1")	3390 (11' 1")	3100 (10' 2")	3100 (10' 2")
F : Overall Transport Length	mm (ft-in)	8950 (29' 4")	8950 (29' 4")	8950 (29' 4")	8950 (29' 4")	8980 (29' 6")	8980 (29' 6")
G : Minimum Swing Radius	mm (ft-in)	3130 (10' 3")	3130 (10' 3")	3120 (10' 3")	3120 (10' 3")	3140 (10' 4")	3140 (10' 4")

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

GENERAL / Component Layout

MAIN COMPONENT LAYOUT



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- 1 - Bucket Cylinder
- 2 - Arm Cylinder
- 3 - Boom Cylinder
- 4 - Fuel Tank
- 5 - Control Valve

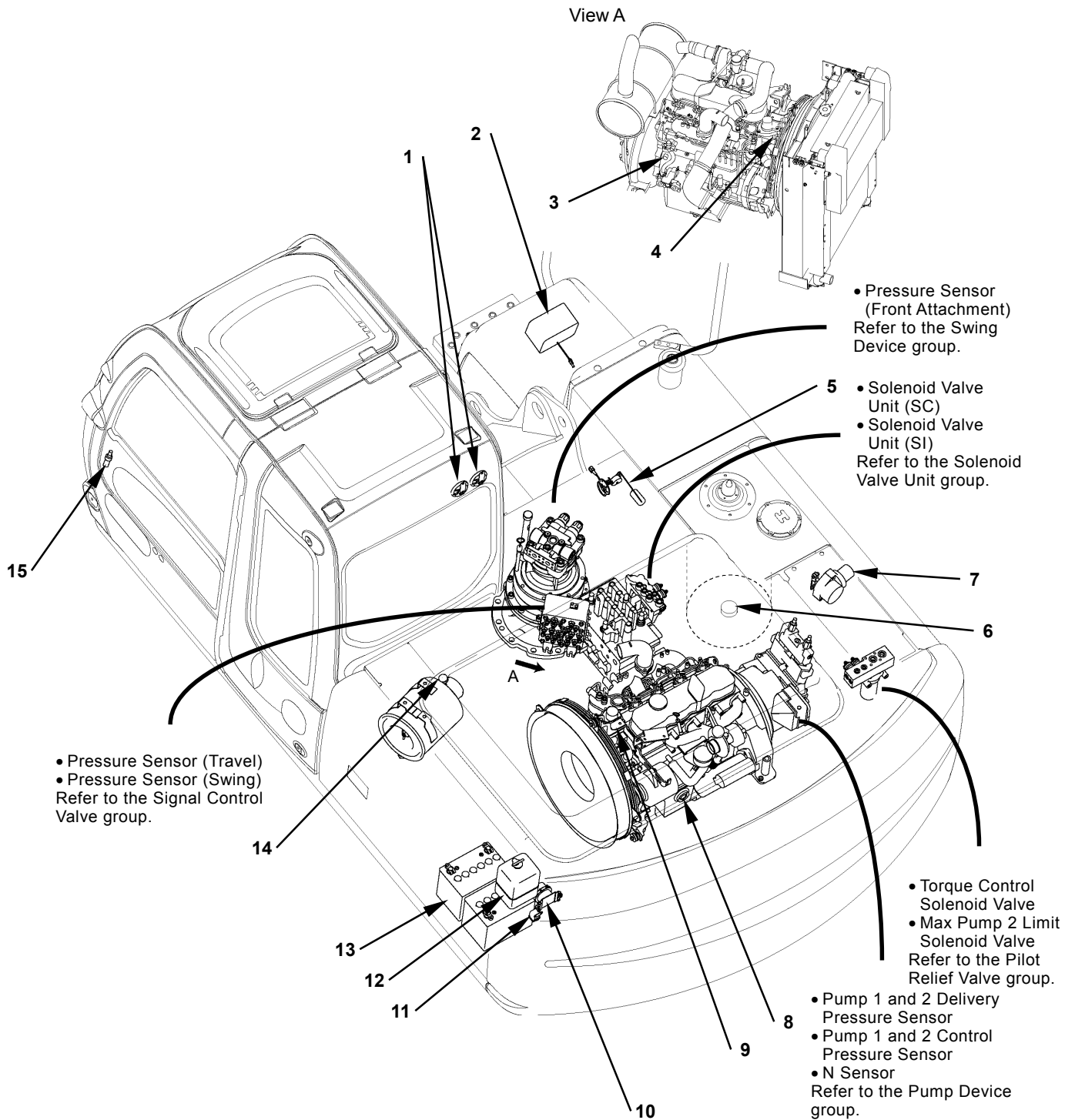
- 6 - Hydraulic Oil Tank
- 7 - Solenoid Valve Unit
- 8 - Pump Device
- 9 - Pilot Filter and Pilot Relief Valve
- 10 - Engine

- 11 - Radiator
- 12 - Oil Cooler
- 13 - Intercooler
- 14 - Battery
- 15 - Signal Control Valve

- 16 - Swing Device
- 17 - Center Joint
- 18 - Pilot Shut-Off Valve
- 19 - Travel Pilot Valve
- 20 - Front Attachment/Swing Pilot Valve

GENERAL / Component Layout

ELECTRICAL COMPONENT LAYOUT (Overview)

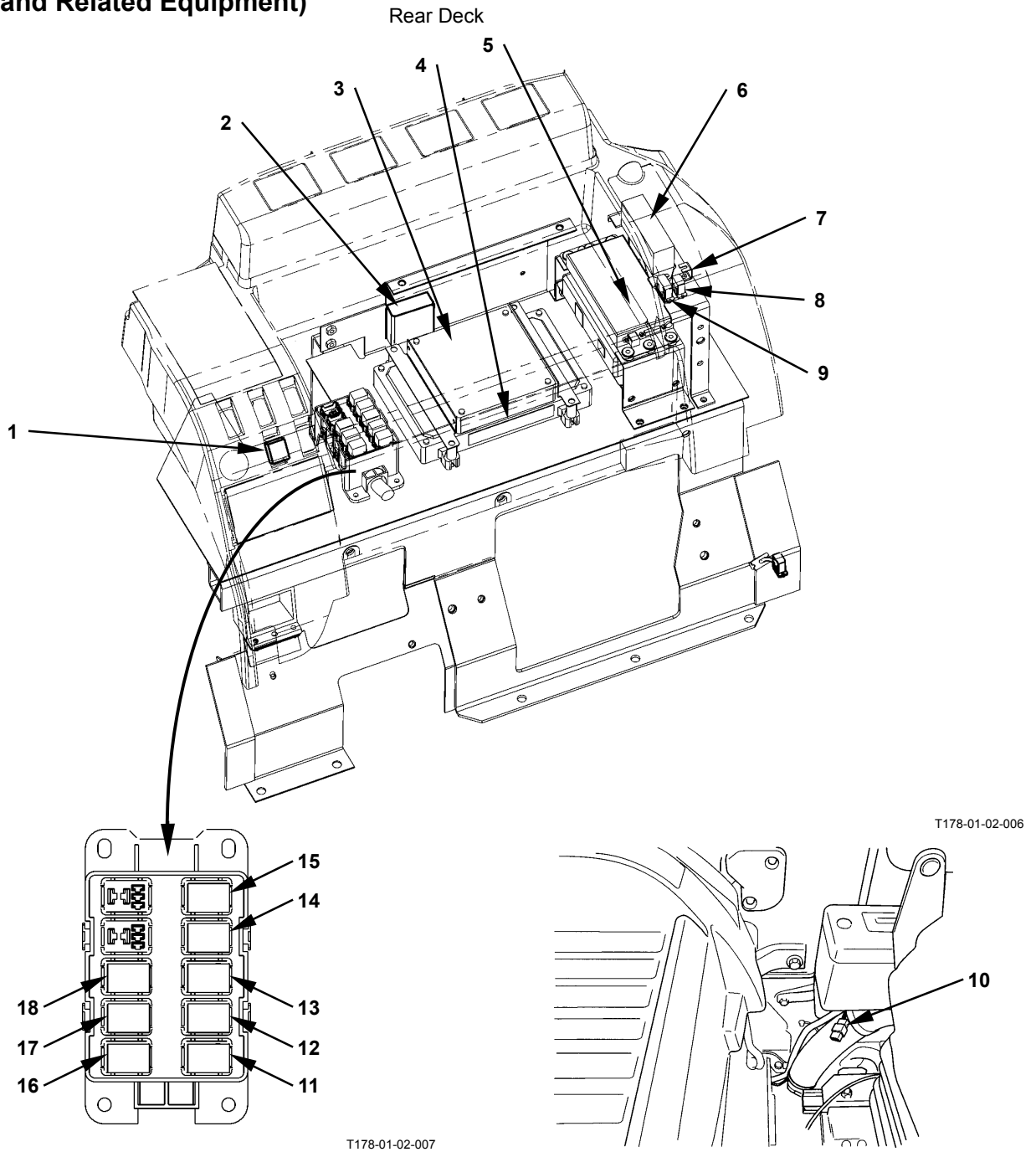


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- | | | | |
|--------------------------------|--|--|-------------------------------------|
| 1 - Horn | 5 - Fuel Sensor | 9 - Overheat Switch | 13 - Battery |
| 2 - Work Light | 6 - Hydraulic Oil Temperature Sensor | 10 - Battery Relay | 14 - Air Cleaner Restriction Switch |
| 3 - Engine Oil Pressure Switch | 7 - EC Motor and EC Sensor | 11 - Glow Plug Relay | 15 - Wiper Motor |
| 4 - Coolant Temperature Sensor | 8 - Engine Oil Level Switch (ZAXIS160LC; Up to Serial No.005065) | 12 - Coolant Level Switch (ZAXIS160LC; Up to Serial No.005065) | |

GENERAL / Component Layout

ELECTRICAL SYSTEM (Relays and Related Equipment)



- 1- Mail Switch (Satellite Terminal Equipped Machines only)
- 2- QOS Controller
- 3- ICX (Information Controller)
- 4- MC (Main Controller)
- 5- Satellite Terminal (Optional)

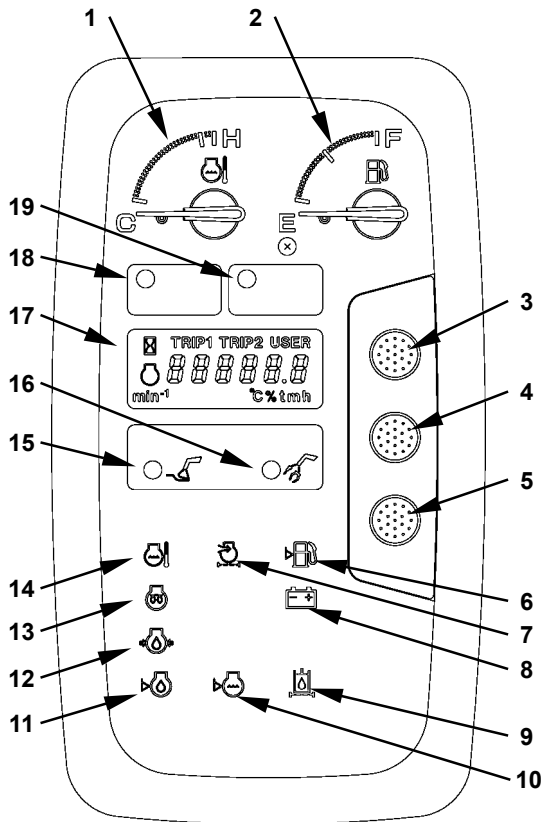
- 6- Fuse Box
- 7- Learning Switch
- 8- Dr. EX Connector to MC
- 9- Download Connector (Not connected on Satellite Terminal Equipped Machines)
- 10- Dr. EX Connector to ICX

- 11- Load Damp Relay (R1)
- 12- Washer Relay (R2)
- 13- Work Light Relay 2 (R3)
- 14- Work Light Relay 1 (R4)
- 15- Horn Relay (R5)

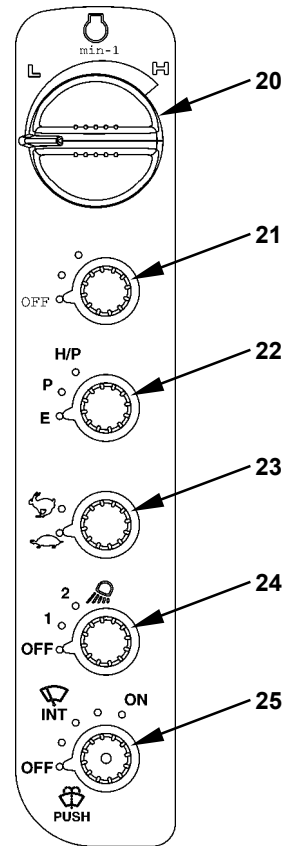
- 16- Wiper Relay A (R6)
- 17- Wiper Relay B (R7)
- 18- Wiper Relay C (R8)

GENERAL / Component Layout

ELECTRICAL SYSTEM (Monitors and Switches)



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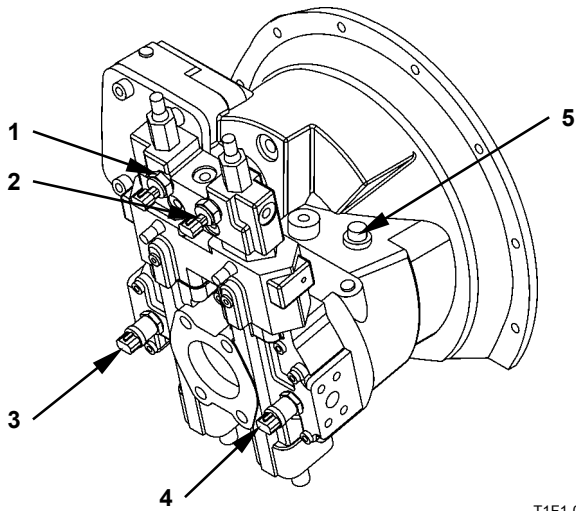


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|-----------------------------------|--|----------------------------------|--------------------------------------|
| 1 - Coolant Temperature Gauge | 8 - Alternator Indicator | 14 - Overheat Indicator | 20 - Engine Control Dial |
| 2 - Fuel Gauge | 9 - Hydraulic Oil Filter Indicator (Optional) | 15 - Digging Mode Indicator | 21 - Auto-Idle/Acceleration Selector |
| 3 - Display Selection Switch | 10 - Coolant Level Indicator (ZAXIS160LC; Up to Serial No.005065) | 16 - Attachment Mode Indicator | 22 - Power Mode Switch |
| 4 - SET Switch | 11 - Engine Oil Level Indicator (ZAXIS160LC; Up to Serial No.005065) | 17 - Liquid Crystal Display | 23 - Travel Mode Switch |
| 5 - Work Mode Switch | 12 - Engine Oil Pressure Indicator | 18 - Auto-Idle Indicator | 24 - Work Light Switch |
| 6 - Fuel Level Indicator | 13 - Preheat Indicator | 19 - Auto-Acceleration Indicator | 25 - Wiper/Washer Switch |
| 7 - Air Filter Restriction Switch | | | |

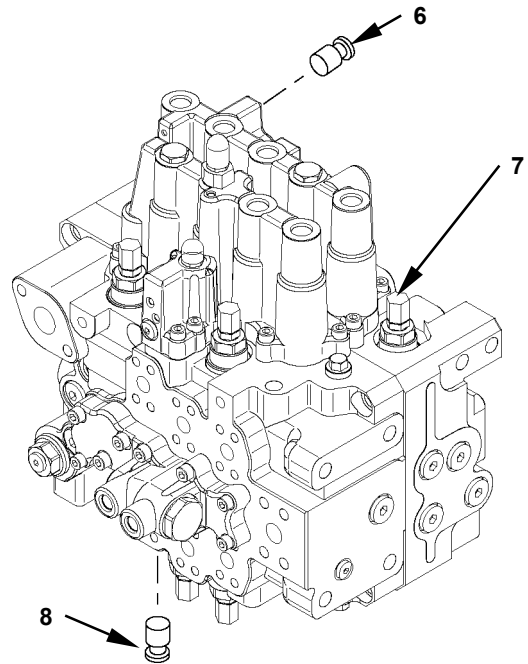
GENERAL / Component Layout

PUMP DEVICE



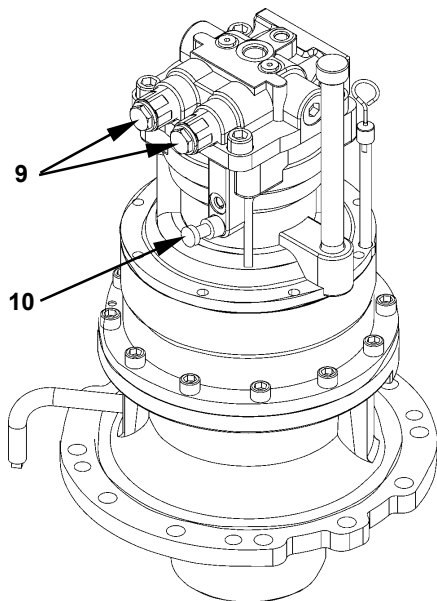
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CONTROL VALVE



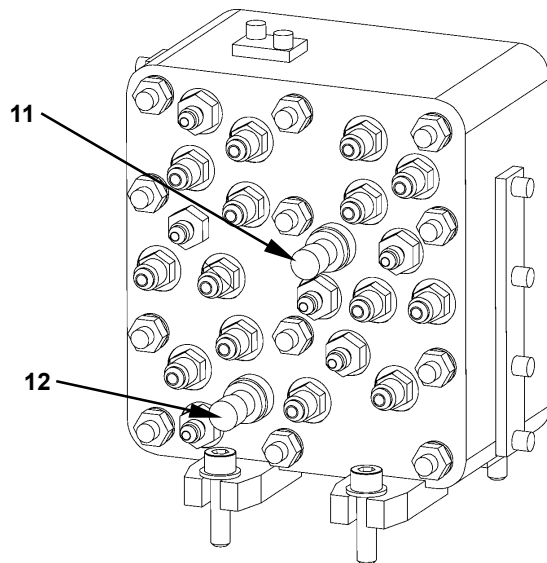
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SWING DEVICE



T178-03-02-001

SIGNAL CONTROL VALVE



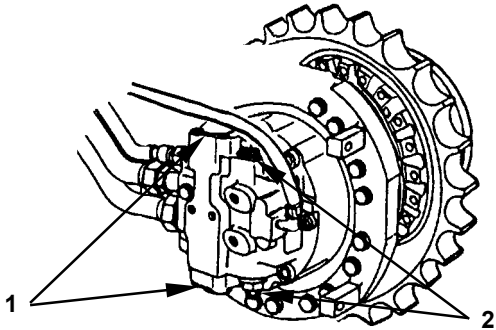
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|-------------------------------------|-------------------------------------|----------------------------------|---|
| 1 - Pump 2 Control Pressure Sensor | 4 - Pump 1 Delivery Pressure Sensor | 7 - Main Relief Valve | 10 - Pressure Sensor (Front Attachment) |
| 2 - Pump 1 Control Pressure Sensor | 5 - N Sensor | 8 - Pressure Sensor (Boom Raise) | 11 - Pressure Sensor (Swing) |
| 3 - Pump 2 Delivery Pressure Sensor | 6 - Pressure Sensor (Arm Roll-In) | 9 - Swing Relief Valve | 12 - Pressure Sensor (Travel) |

GENERAL / Component Layout

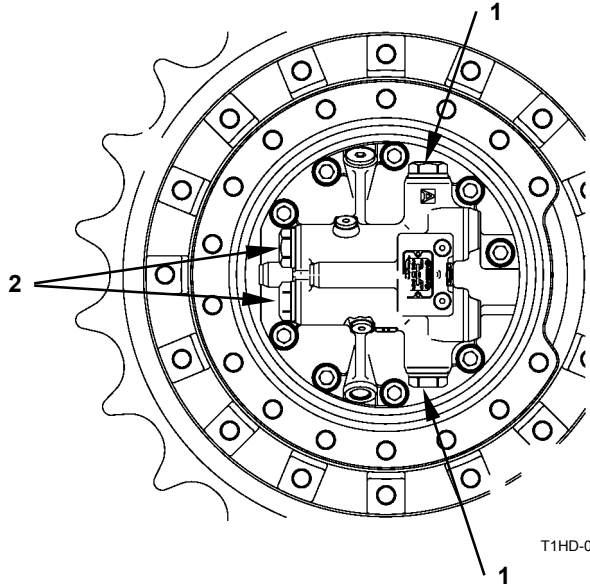
TRAVEL DEVICE

ZAXIS160LC



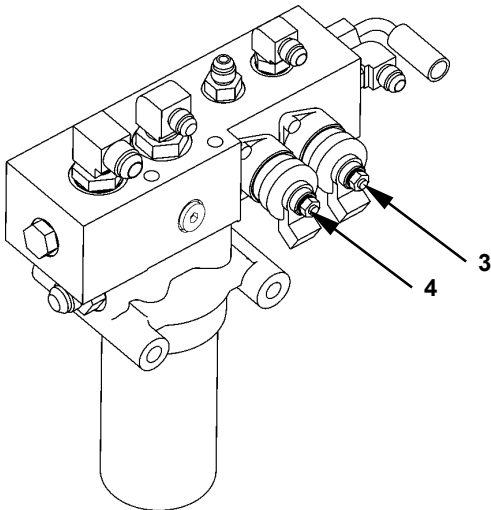
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ZAXIS180LC,180LCN



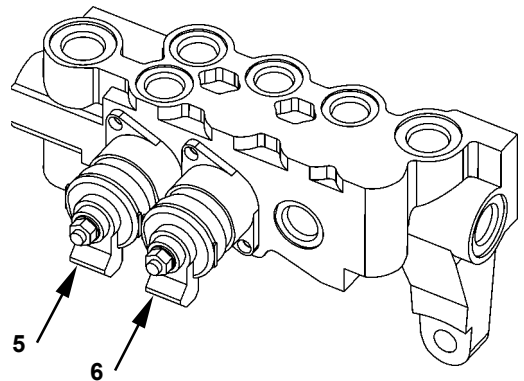
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PILOT RELIEF VALVE



T1F1-01-02-004

SOLENOID VALVE UNIT



T176-03-07-002

1 - Counter Balance Valve

2 - Travel Relief Valve

3 - Pump 2 Flow Rate Control Solenoid Valve

4 - Torque Control Solenoid Valve

5 - Solenoid Valve Unit (SC)

6 - Solenoid Valve Unit (SI)

GENERAL / Component Specifications

ENGINE

Manufacturer	ISUZU
Model	AA-4BG1TCG
Type	Diesel, 4-Cycle, Water-cooled, Inline, Direct Injection
Cyl. No.- Bore × Stroke	4-105 mm×125 mm (4.13 in×4.92 in)
Piston Displacement	4329 cm ³ (264 in ³)
Rated Output	ZAXIS160LC: 74 kW/1950 min ⁻¹ (100 PS/1950 rpm) HP Mode: 81 kW/2150 min ⁻¹ (110 PS/2150 rpm) ZAXIS180LC,180LCN: 87.4 kW/2000 min ⁻¹ (118.8 PS/2000 rpm) HP Mode: 90.2 kW/2200 min ⁻¹ (123 PS/2200 rpm)
Compression Ratio	18:0
Dry Weight	362 kg (798 lb)
Firing Order	1-3-4-2
Rotation Direction	Clockwise (Viewed from fan side)

COOLING SYSTEM

Cooling Fan	Dia. 600 mm (21.7 in), 7 Blades (N-Type Blade, Unequal Pitch), Draw-in Type
Fan Pulley Ratio	ZAXIS160LC: Engine rpm × 0.80 ZAXIS180LC,180LCN: Engine rpm × 0.84
Thermostat	Cracking Temperature at Atmospheric Pressure: 82 °C (180 °F) Full Open (Stroke: 10 mm or more) Temperature: 95 °C (203 °F)
Water Pump	Centrifugal Belt Driven Type

GENERAL / Component Specifications

LUBRICATION SYSTEM

Lubrication Pump Type Gear Pump
Oil Filter Full-Flow Paper Element Type with Bypass
Oil Cooler Water Cooled Integral Type

STARTING SYSTEM

Motor Magnetic Pinion Shift Reduction Type
Voltage / Output 24 V / 4.5 kW

PREHEAT SYSTEM

Preheating Method Glow Plug (QOS 2 Type)

ENGINE STOP SYSTEM

Stop Method Fuel Shut-Off

ALTERNATOR

Type Regulator Integrated AC Type
Voltage / Output 24 V / 50 A (Brushless)

SUPERCHARGING SYSTEM

Type Exhaust-Turbocharger Type TD04HL