Technical Manual

EX120-3

SECTION 01
SPECIFICATIONS

CONTENTS

FOREWORD

The hydraulic excavator consists of three main components. They are the FRONT ATTACHMENT, UPPERSTRUCTURE and UNDERCARRIAGE.

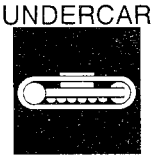
FRONT ATTACHMENT

1— Bucket Cylinder
2— Arm Cylinder
3— Boom Cylinder
4— Boom
6— Arm
6— Bucket

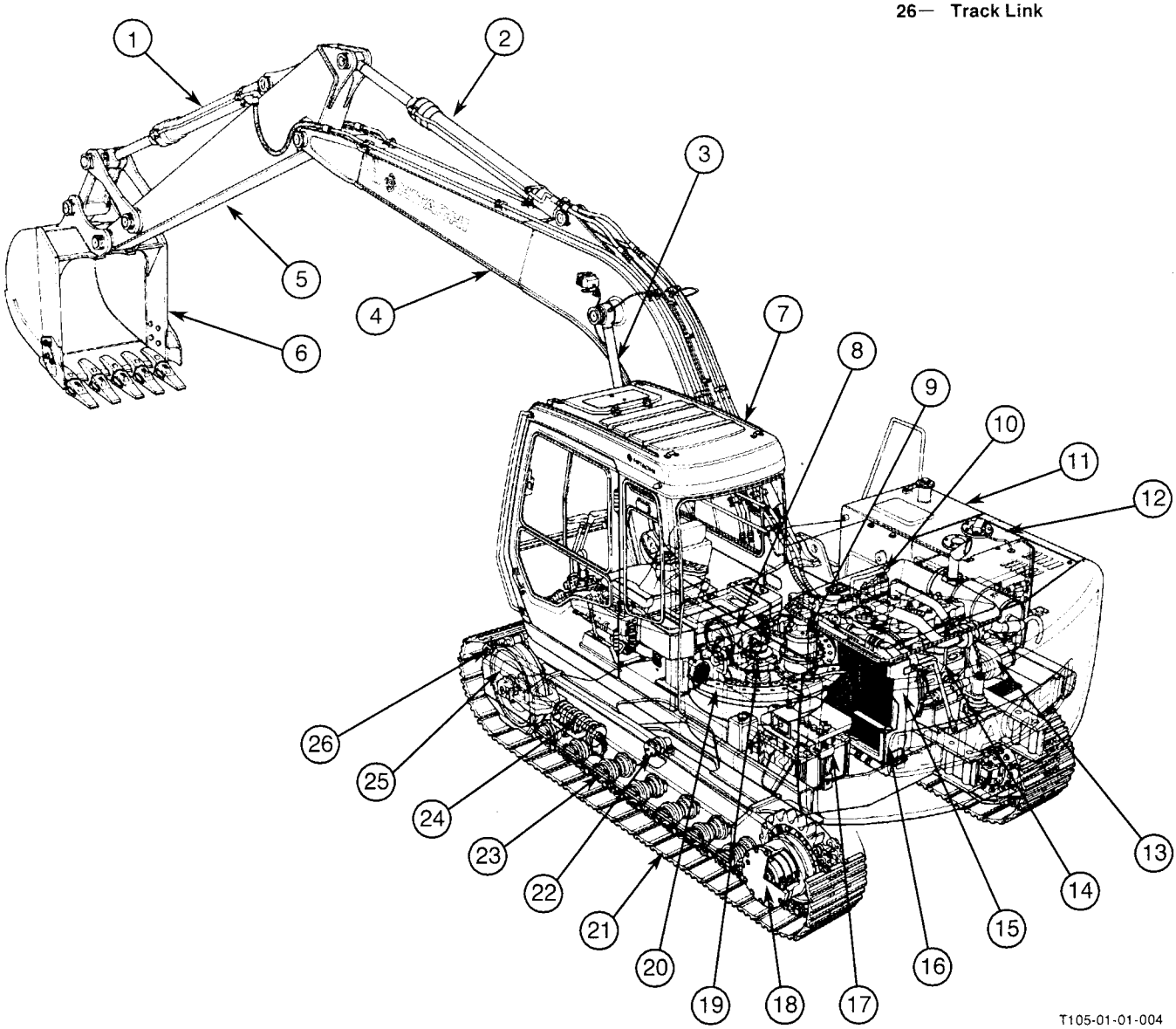
UPPERSTRUCTURE

7— Cab
8— Air Cleaner
9— Swing Device
10— Main Control Valve
11— Fuel Tank
12— Hydraulic Oil Tank
13— Main Pump
14— Engine
15— Radiator
16— Oil Cooler
17— Battery

UNDERCARRIAGE



18— Travel Device
19— Center Joint
20— Swing Bearing
21— Shoes
22— Upper Roller
23— Lower Roller
24— Track Adjuster
25— Front Idler
26— Track Link



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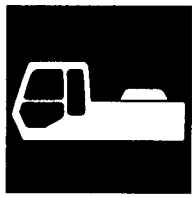
SECTION 02
UPPERSTRUCTURE

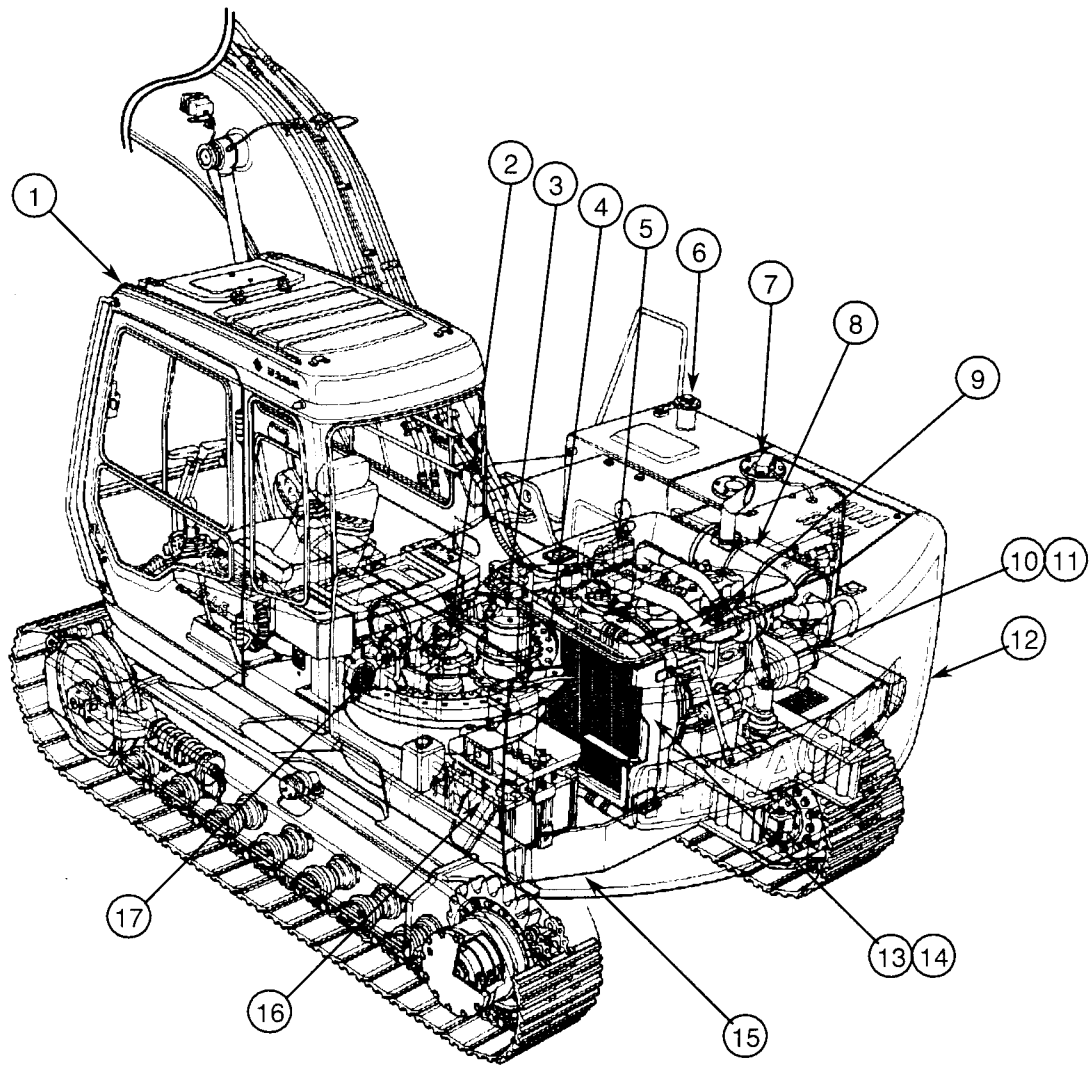


CONTENTS

LAYOUT OF THE UPPERSTRUCTURE

The upperstructure consists of main frame (15), engine (9), fuel tank (6), hydraulic oil tank (7), hydraulic components [main pump (10), pilot pump (11), control valve (5), swing device (3),etc.], operator's cab (1), and counterweight (12).

Counterweight (12) is bolted to the rear end of main frame (15) and balances the machine.
The front attachment is attached to main frame (15).



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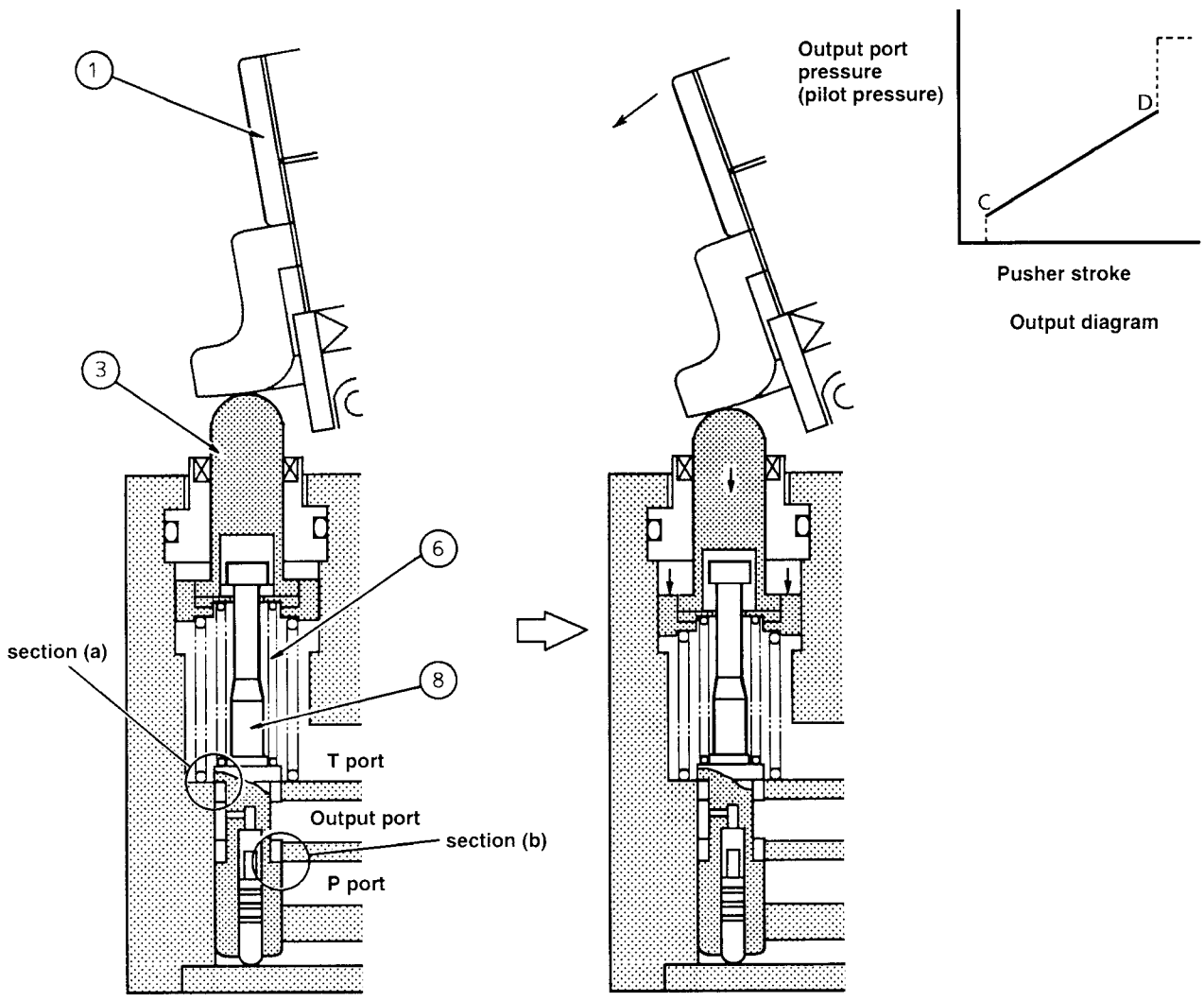
1— Operator's Cab
2— Center Joint
3— Swing Device
4— Swing Bearing
5— Control Valve
6— Fuel Tank
7— Hydraulic Oil Tank
8— Muffler
9— Engine
10— Main Pump
11— Pilot pump
12— Counterweight
13— Radiator
14— Oil Cooler
15— Main frame
16— Battery
17— Air Cleaner

- Operation corresponding to the control lever stroke (see area C to D in the output diagram)

As control lever (1) is moved further, to pushing pusher (3) downward, spool (8) is pushed down to open the notch at section (b), increasing oil pressure at the output port.
As pressure increases, force to push up spool (8) increases. Then, when force to push up spool (8) exceeds the setting force of balance spring (6), spool (8) starts to move upward, compressing balance spring (6).
When spool (8) moves upward until the clearance at section (a) opens, the output port is opened to port T, stopping oil pressure increase at the output port and stopping movement of spool (8).

Accordingly, when compressed by pusher (3), spring force of balance spring (6) increases in proportion to the pusher stroke. Then, oil pressure increases to counteract against this spring force, becoming output pressure from the output port.



1— Control Lever 3— Pusher 6— Balance Spring 8— Spool

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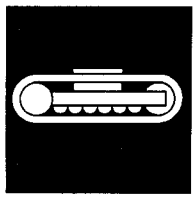
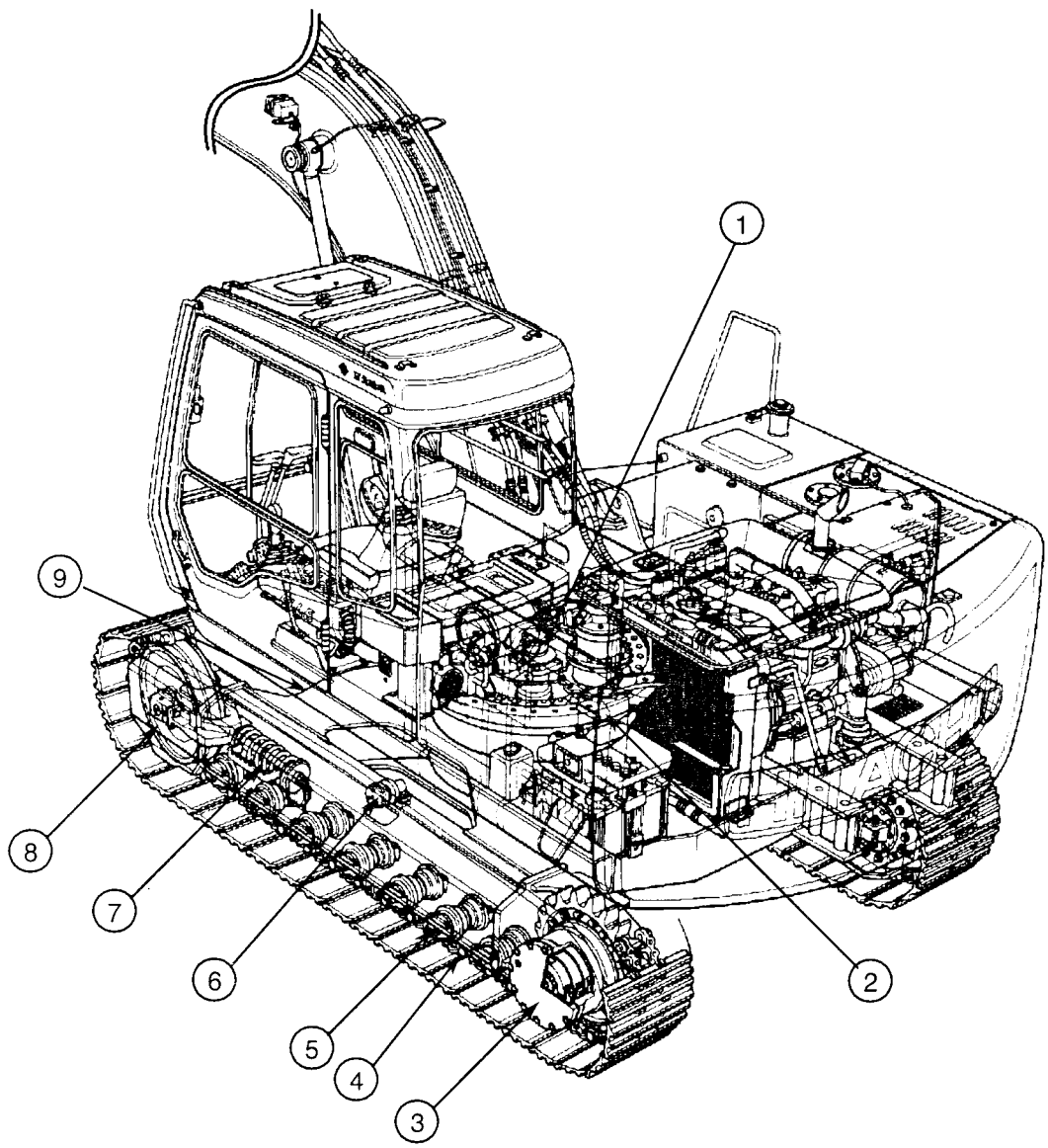
SECTION 03
UNDERCARRIAGE



CONTENTS

COMPONENT LOCATION

The undercarriage consists of track frame (9), center joint (1), swing bearing (2), front idler (8), adjuster (7), upper roller (6), lower roller (5), track link (4) and travel device (3).

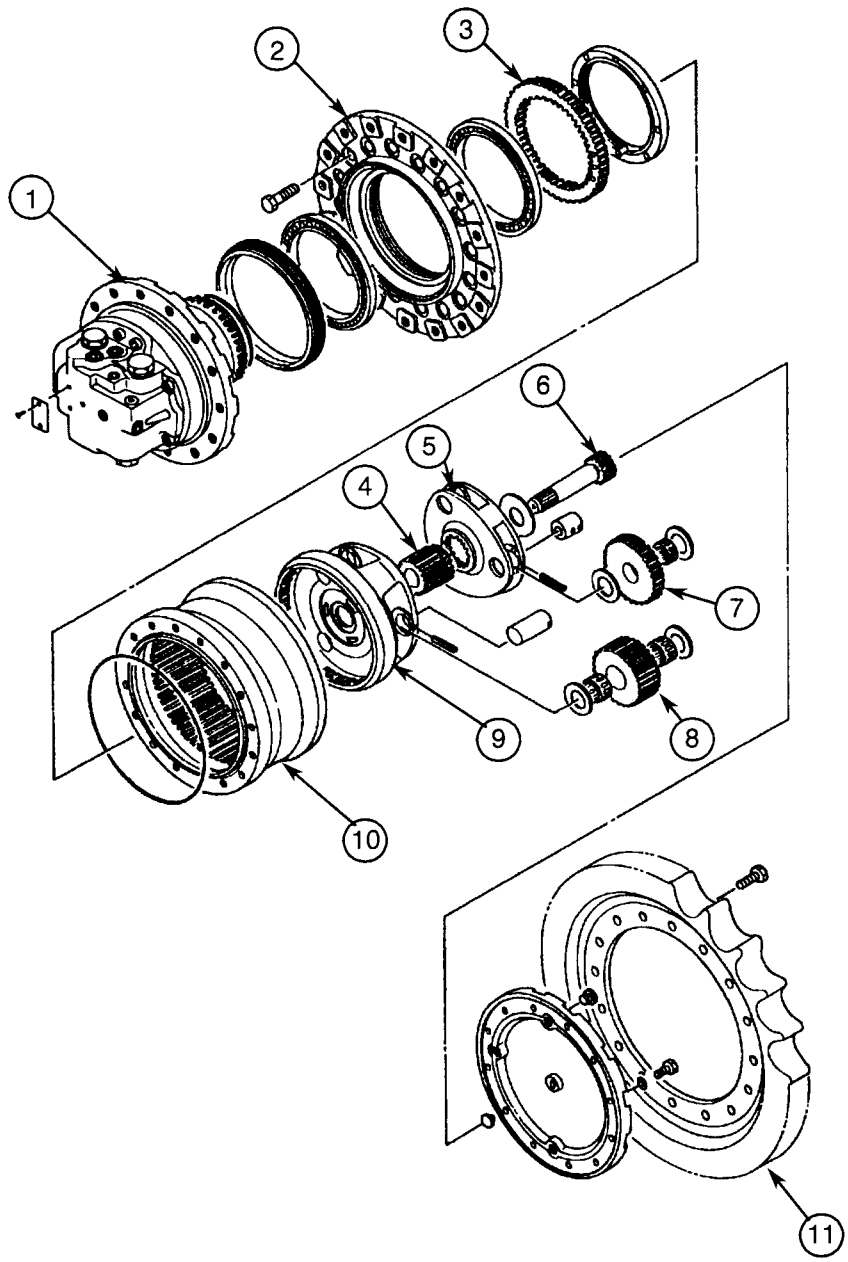


T135-02-01-001

1— Center Joint
2— Swing Bearing
3— Travel Device
4— Track Link Assembly
5— Lower Rollers
6— Upper Roller
7— Track Adjuster
8— Front Idler
9— Track Frame

OUTLINE

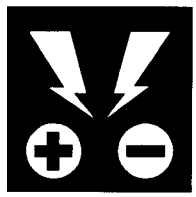
The travel device consists of travel motor (1), planetary reduction gears (3) to (10), and sprocket (11).



T135-03-04-001

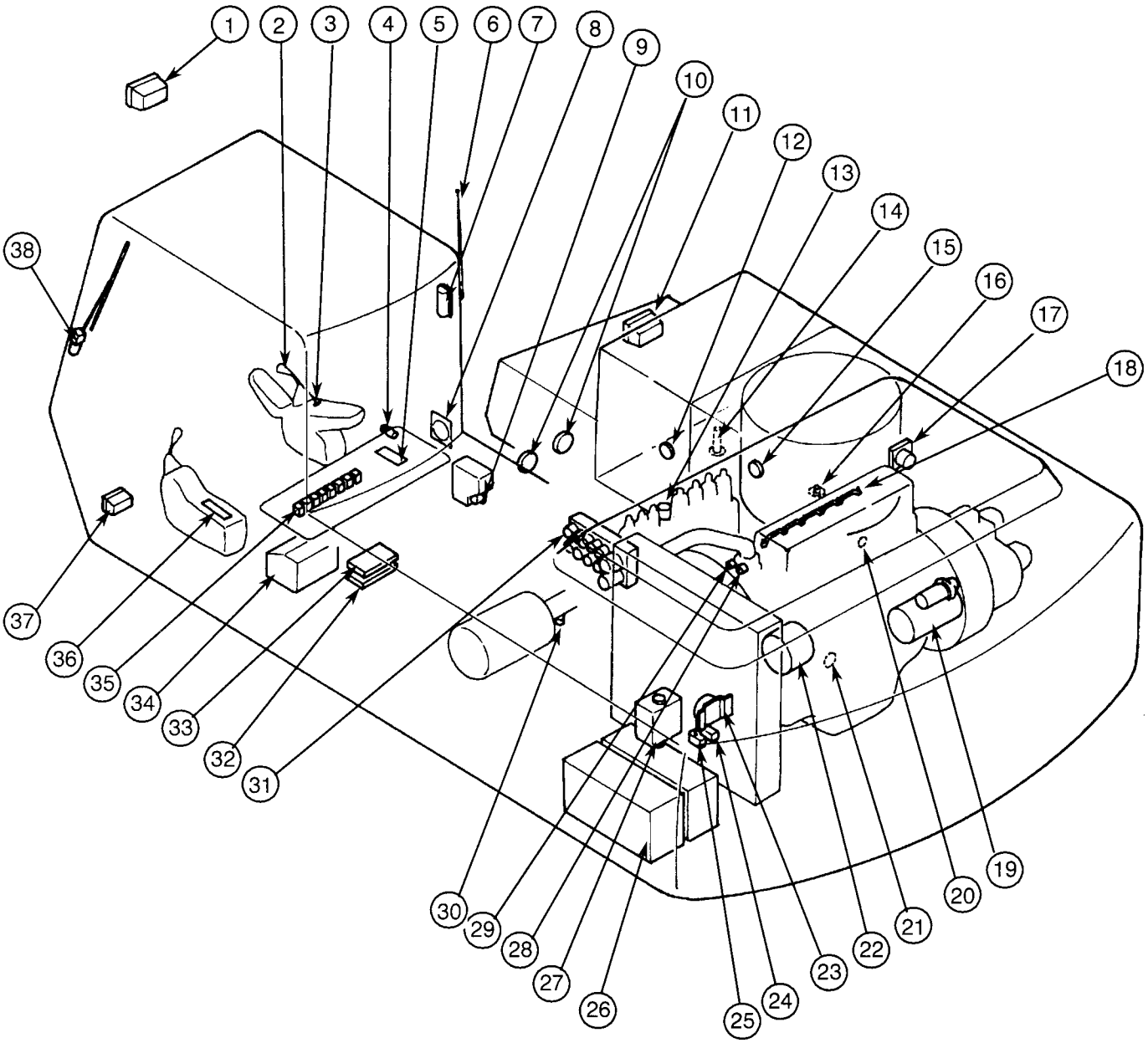
1— Travel Motor
2— Drum
3— Hub
4— Second Stage Sun Gear
5— First Stage Carrier
6— Propel Shaft
7— First Stage Planetary Gear
8— Second Stage Planetary Gear
9— Second Stage Carrier
10— Ring Gear
11— Sprocket

SECTION 04
ELECTRICAL SYSTEM



CONTENTS

COMPONENT LOCATION-1

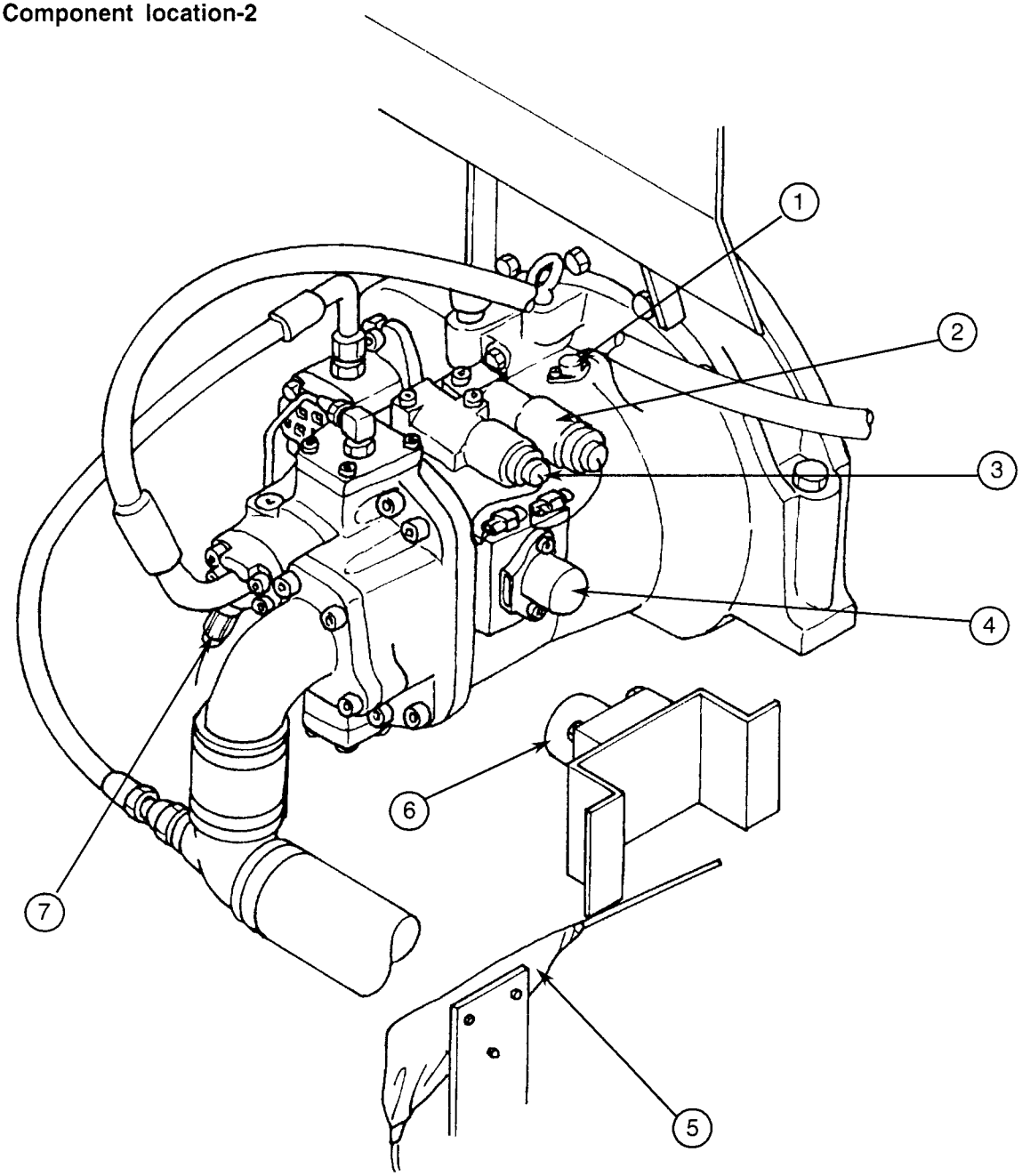


T107-04-01-001

1— Work light (Boom)
2— Power boost switch
3— Key switch
4— Cigar lighter
5— Fuse box
6— Antenna
7— Dome light
8— Speaker (Radio)
9— Washer
10— Horn
11— Work light (Base)
12— Fuel sending unit
13— Differential pressure sensor
14— Low fuel level switch
15— Hydraulic oil level switch
16— Hydraulic temperature sensor
17— EC motor (EC sensor)
18— Glow plugs
19— Starter
20— Engine oil pressure switch
21— Engine oil level switch
22— Alternator
23— Battery relay
24— Glow plug relay
25— Fusible link
26— Batteries
27— Coolant level switch
28— Overheat switch
29— Coolant temperature sensor
30— Air filter restriction switch
31— Solenoid valve assembly
32— Pump and valve controller (PVC)
33— Engine controller (EC)
34— Heater
35— Relays
36— Radio
37— Work light (Base)
38— Wiper

T04-01-01

Component location-2



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1— Engine speed sensor (N-sensor)
2— Pump displacement solenoid valve No.2
3— Pump displacement solenoid valve No.1
4— Pump displacement angle sensor (A-sensor)
5— Engine stop motor
6— Engine control motor / sensor
7— Pressure sensor (P-sensor)

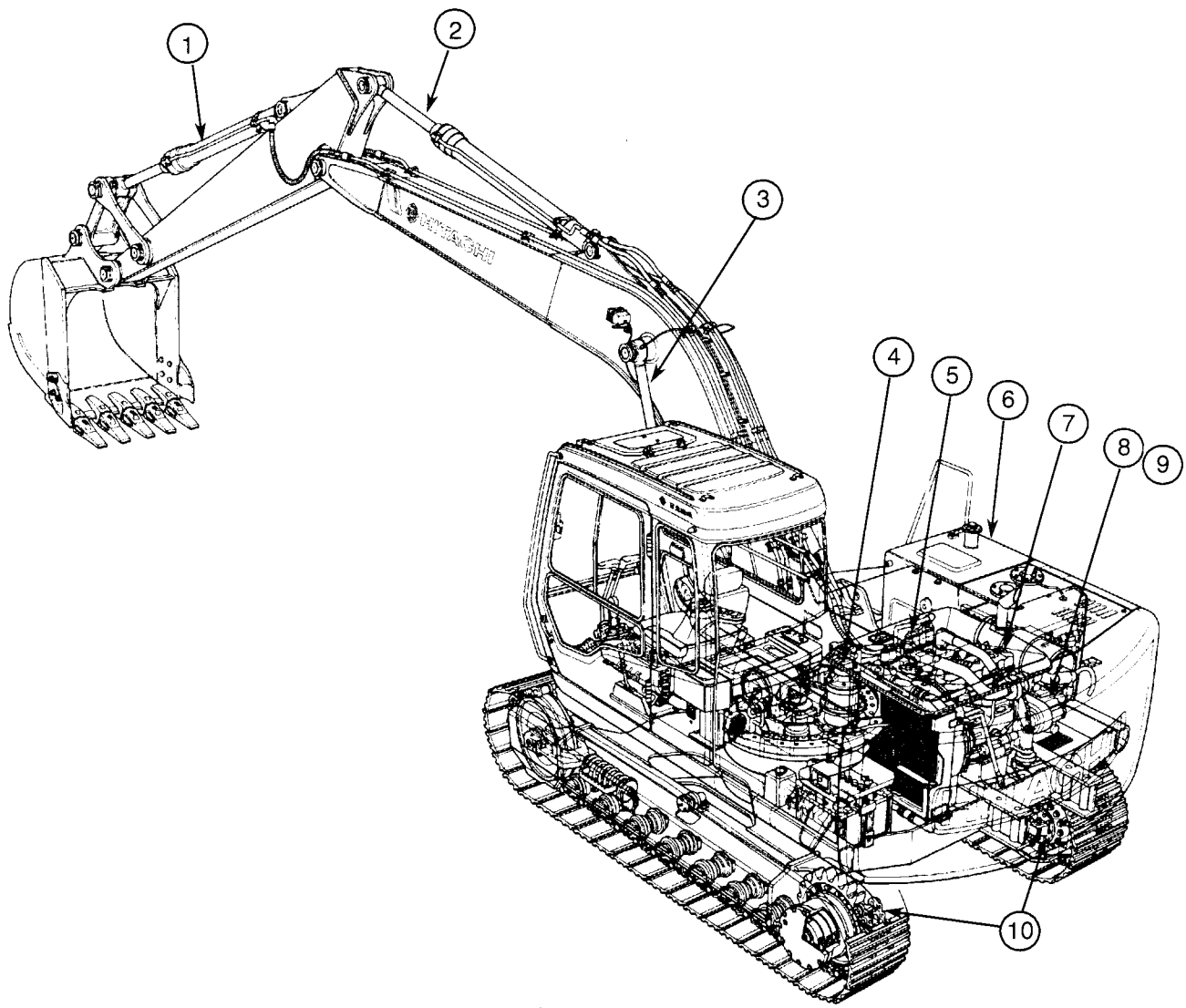
T04-01-02

SECTION 05
HYDRAULIC SYSTEM

CONTENTS

GENERAL

The hydraulic system consists of main pump (8), pilot pump (9), control valve (5), bucket cylinder (1), arm cylinder (2), two boom cylinders (3), swing motor (4), two travel motors (10), hydraulic oil tank (6), and pipings.



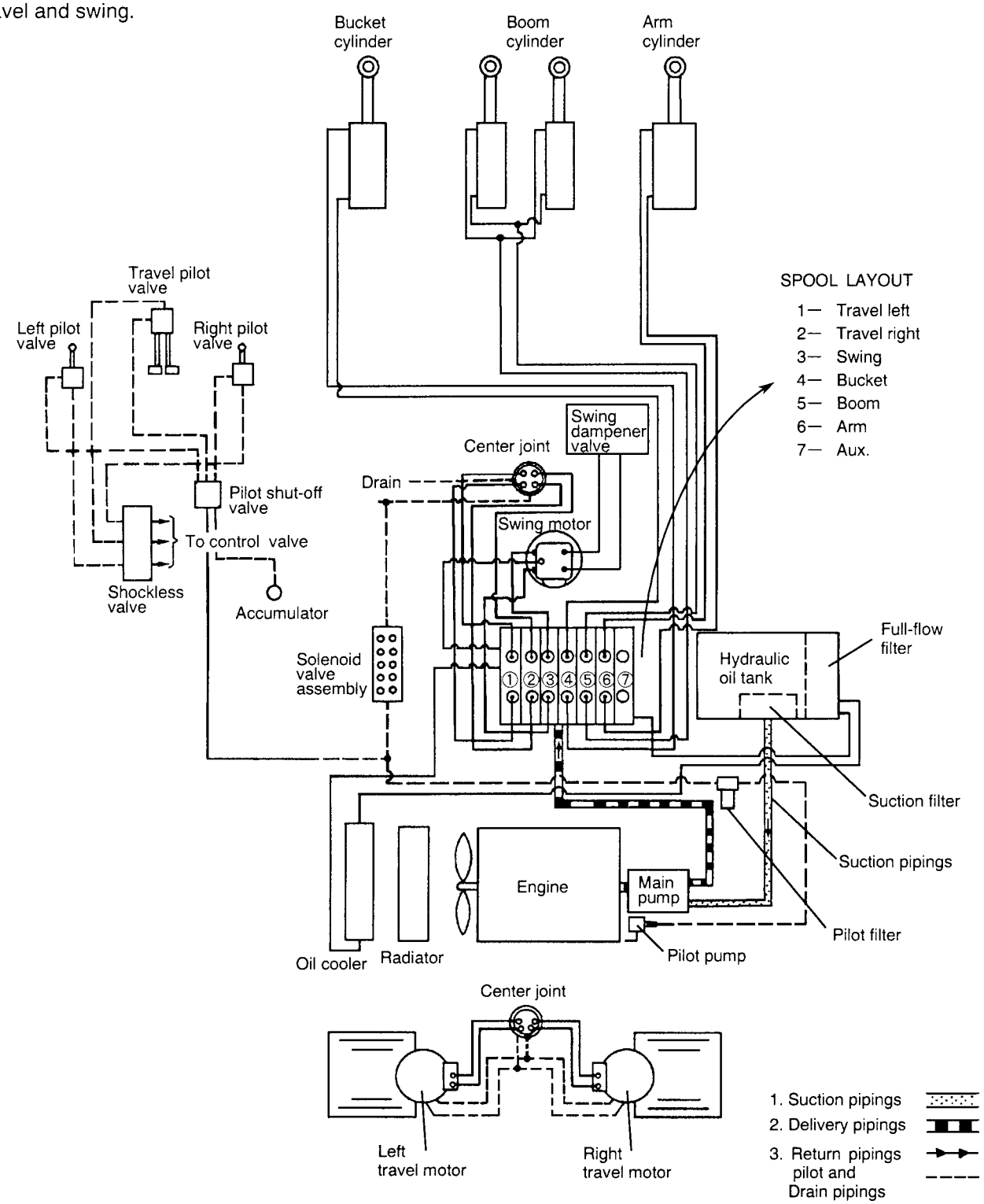
T105-01-01-001

1— Bucket Cylinder
2— Arm Cylinder
3— Boom Cylinder
4— Swing Motor
5— Control Valve
6— Hydraulic Oil Tank
7— Engine
8— Main Pump
9— Pilot Pump
10— Travel Motor

HYDRAULIC CIRCUIT

The hydraulic circuit consists of the main circuit and the pilot circuit.
The main circuit supplies pressure oil from the main pump to actuate the cylinders and motors to dig, travel and swing.

The main function of the pilot circuit is to transmit the control lever and pedal movements to the control valve so as to control the pilot system.



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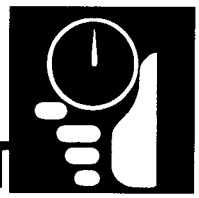
SECTION 06
OPERATIONAL PERFORMANCE TEST



CONTENTS

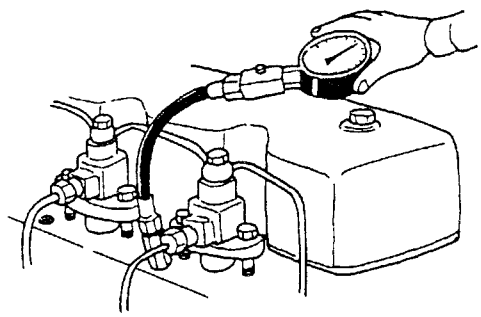
Group 06- Standard

2.2 ENGINE COMPRESSION PRESSURE

1. Measure compression pressure in the cylinders to check for a decline in engine power.
2. Check exhaust gas color and the amount of blow-by gas from the crankcase. Keep track of engine oil consumption.
3. Check for abnormalities in the intake system, including the air filter.

Preparation:

1. Confirm that valve clearances are correct.
2. Confirm that the batteries are charged properly.
3. Run the engine until the coolant temperature gauge reaches the operating range.
4. Stop the engine. Remove glow plugs from each cylinder.
5. Install an adaptor and compression gauge in place of the glow plug in one cylinder. (Be sure to sufficiently tighten the adaptor and compression gauge to prevent air leakage.)



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Measurement:

1. Turn the starter to crank the engine. Record the compression pressure of each cylinder.
2. Repeat measurement three times for each cylinder and calculate the mean values.

Evaluation:

Refer to Group -06 in this section.

Remedy:

Refer to engine shop manual.

SECTION 07
TROUBLESHOOTING

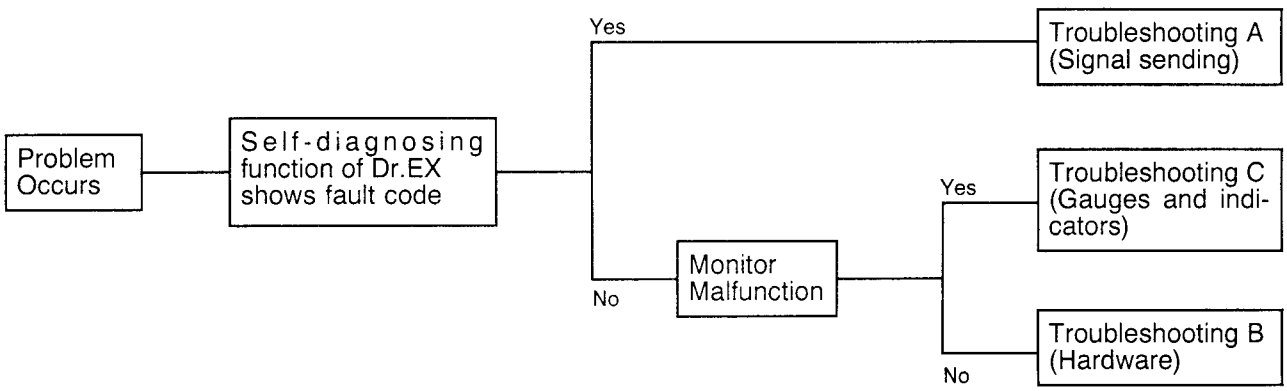
CONTENTS

Group 05 - Harness Check

INTRODUCTION

Flow charts are provided in this section in order to make inspection and troubleshooting procedures easy to follow.
Use these charts to guide you in locating the source of any problems that may arise.

Potential problems are roughly divided into three groups as shown below; namely, those in signal sending (Group A), machine hardware (Group B), and gauges and indicators (Group C).



TROUBLESHOOTING A (Signal sending)

Use these charts when the self-diagnosing function of Dr.EX shows any fault code. (Controllers automatically diagnose and memorize malfunctions that have occurred in the signal sending system.)
Example: Wire disconnection in the Differential Pressure Sensor (DP sensor)

TROUBLESHOOTING B (Hardware)

Use these charts when the machine is exhibiting trouble but no fault code is shown on Dr.EX's display.
Example: Slow travel speed.

TROUBLESHOOTING C (Gauges and indicators)

Use these charts when any gauges or indicators malfunction.
Example: The fuel gauge does not operate.

DIAGNOSING PROCEDURE

These six basic steps are essential for efficient troubleshooting:

1. Study the system.
2. Ask the operator.
3. Inspect the machine.
4. Operate the machine yourself.
5. Perform troubleshooting.
6. Trace possible causes.

1. Study the system

Study the machine's technical manuals. Know the system and how it works, and what the construction, functions and specifications of the system components are.

T107-07-01-001

2. Ask the operator

Before inspecting, get the full story of malfunctions from your star witness --- the operator.

(a) How is the machine being used? (Find out if the machine is being operated correctly)

(b) When was the trouble noticed, and what types of work the machine doing at that time?

(c) What are the details of the trouble? Is the trouble getting worse, or did it appear suddenly for the first time?

(d) Did the machine have any other troubles previously? If so, which parts were repaired before?

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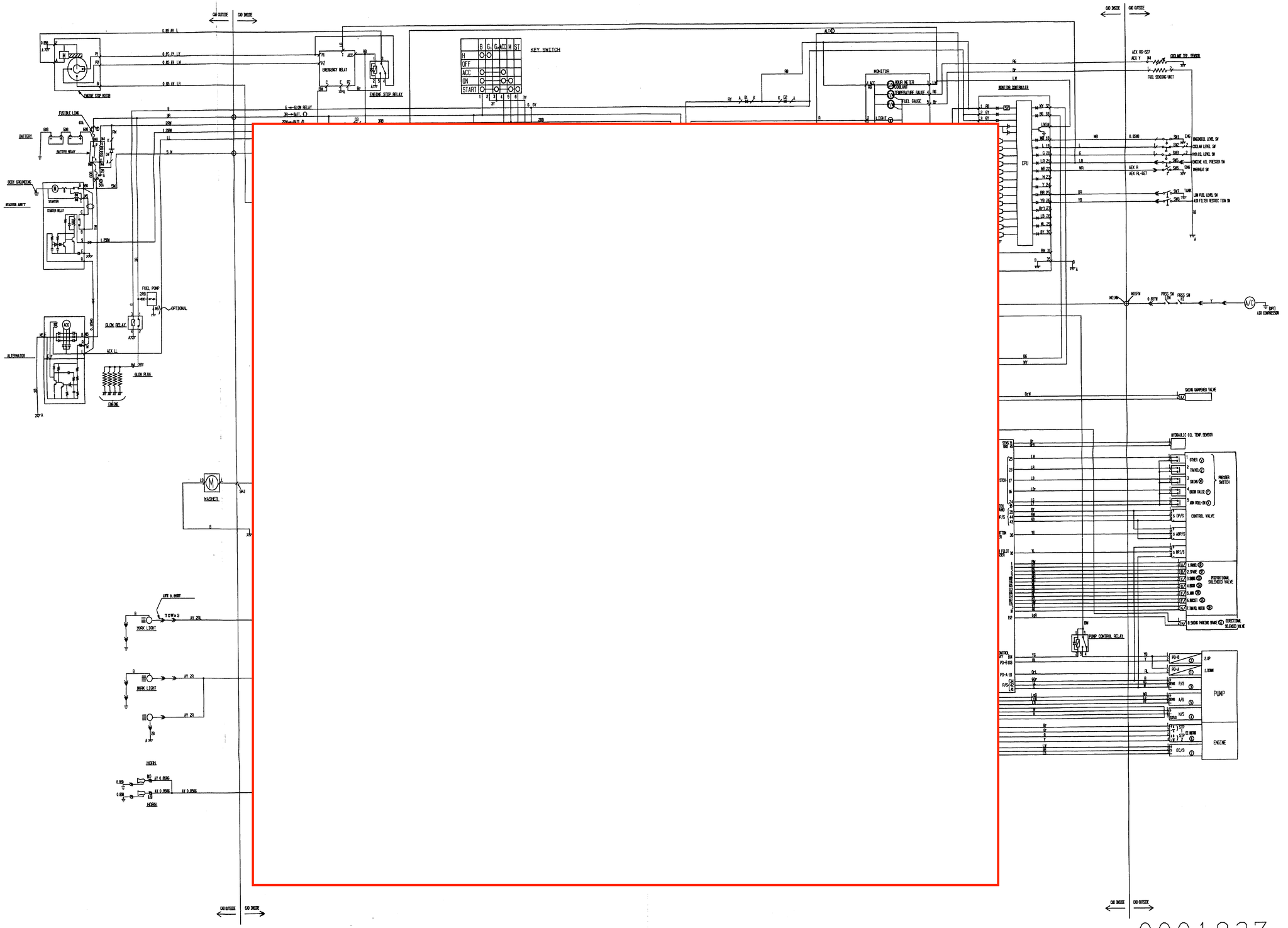
EX120-3 Electric wiring diagram



EX100-3E

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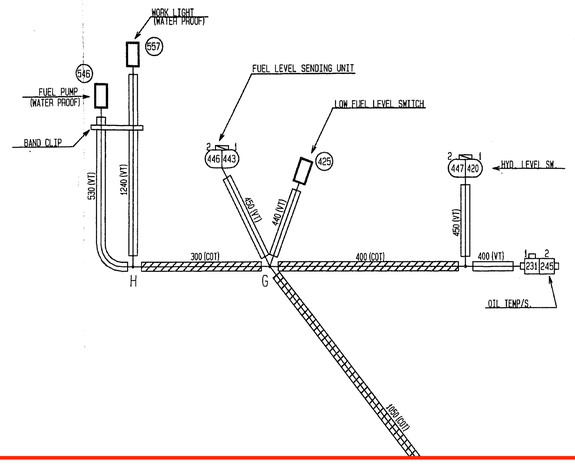
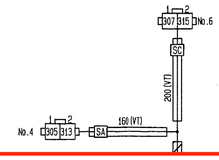
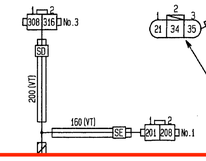
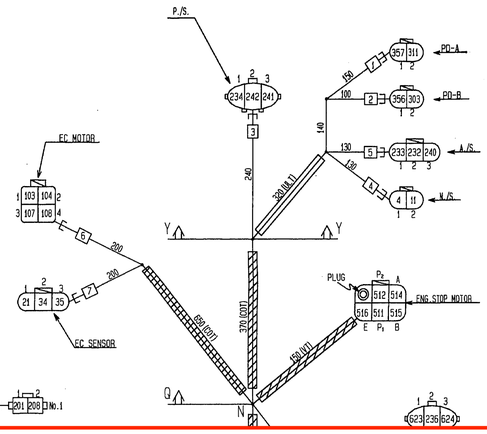
EX120-3 ENGING HARNESS

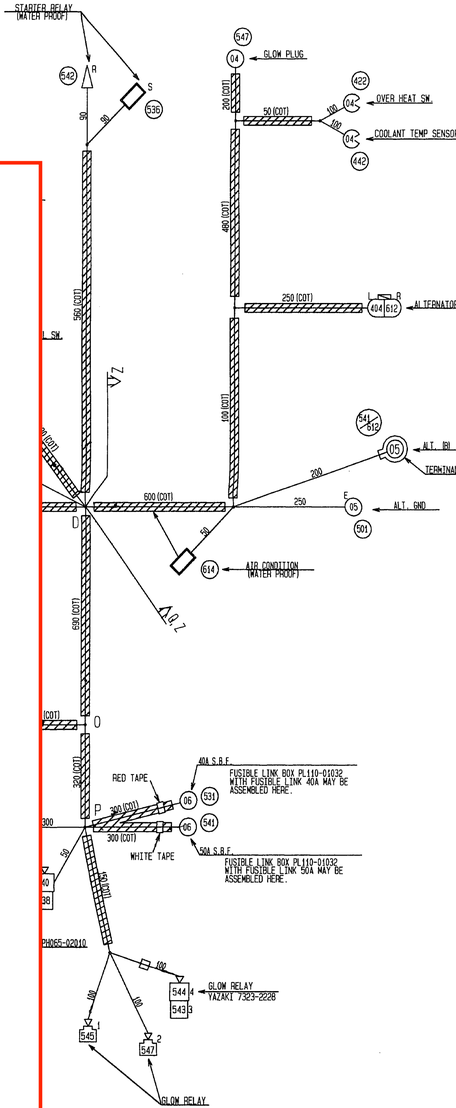
NO.	SIZE	COLOR	CIRCUIT FROM	CIRCUIT TO	COMMENT
4	0.5	W	CAB/H	N/S 1	INSIDE WIRE AE SHIELD WIRE
5	0.5	LgB	–〃–	SWING DAMPENER VALVE 2	
11	0.5	B	–〃–	N/S 2	INSIDE WIRE AE SHIELD WIRE
21	0.5	LW	–〃–	EL/S 1	
34	0.5	GR	–〃–	–〃– 2	
35	0.5	LB	–〃–	–〃– 3	
103	0.5	LY	–〃–	EC MOTOR 1	CHAVX
104	0.3	R	–〃–	–〃– 2	CHAVX
107	0.3	WR	–〃–	–〃– 3	CHAVX
108	0.5	Y	–〃–	–〃– 4	CHAVX
201	0.5	BW	–〃–	SOL.1-1	
202	0.5	BG	–〃–	–〃– 2-1	
203	0.5	GY	–〃–	–〃– 7-1	
206	0.5	BY	–〃–	–〃– 1-2	
209	0.5	WB	–〃–	–〃– 2-2	
210	0.5	GB	–〃–	–〃– 7-2	
216	0.5	LOr	–〃–	P/SW 4-1	
217	0.5	LB	–〃–	–〃– 3-1	
218	0.5	LY	–〃–	–〃– 5-2	
223	0.5	LR	–〃–	–〃– 2-1	
224	0.5	LG	–〃–	–〃– 5-1	
225	0.5	LW	–〃–	–〃– 1-1	
230	0.5	YL	–〃–	BOOM PILOT PRESSURE SENSOR 2	
231	0.5	Or	–〃–	OIL TEMP SENSOR 1	
232	0.5	LG	–〃–	A/S 2	CHAVX
233	0.5	WR	–〃–	–〃– 1	CHAVX
234	0.5	R	–〃–	P/S 1	CHAVX
235	0.5	GY	–〃–	DP/S 1	CHAVX
236	0.5	YG	–〃–	ARM BOTTOM PRESSURE SENSOR 2	CHAVX
240	0.5	RY	–〃–	A/S 3	CHAVX
241	0.5	W	–〃–	P/S 3	CHAVX
242	0.5	RG	–〃–	–〃– 2	CHAVX
243	0.5	GB	–〃–	DP/S 3	CHAVX
244	0.5	GW	–〃–	–〃– 2	CHAVX









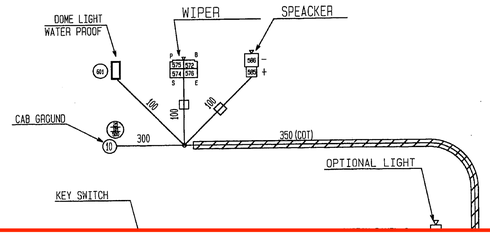


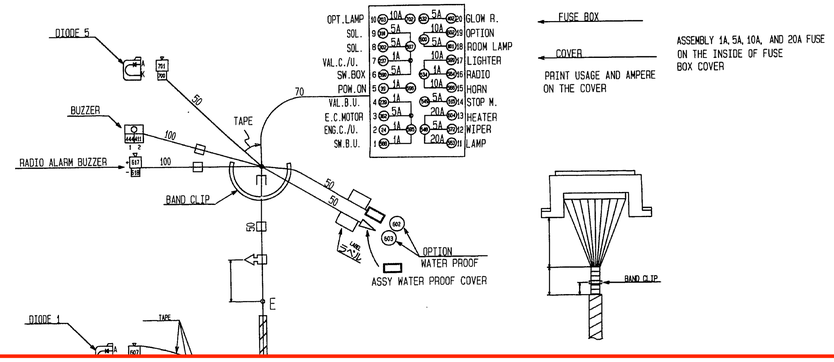
E 1 ENG/H

EX120-3 CAB HARNESS DIAGRAM

NO.	SIZE	COLOR	CIRCUIT FROM	CIRCUIT TO	COMMENT
1	0.5	LO	E. C 1	EC MOTOR RELAY 2	
2	0.5	BW	E. C 2	PVC 11	
3	0.5	BY	E. C 3	PVC 5	
4	0.5	W	E. C 4	ENG/H	
5	0.5	LGR	E. C 5	ENG/H	
6	0.5	WR	E. C 6	SWITCH PANEL 2-10	
7	0.5	WG	E. C 7	SWITCH PANEL 2-14	
9	0.5	BR	E. C 9	PVC 4	
10	0.5	BL	E. C 10	PVC 12	
11	0.5	B	E. C 11	ENG/H	
13	0.5	WP	E. C 13	SWITCH PANEL 2-11	
15	0.5	GY	E. C 15	SWITCH PANEL 2- 9	
16	0.5	GR	E. C 16	SWITCH PANEL 2- 7	
17	0.5	G	E. C 17	SWITCH PANEL 2- 4	
18	0.5	GW	E. C 18	SWITCH PANEL 2-12	
20	0.5	LY	E. C 20	SWITCH 1	
21	0.5	LW	E. C 21	ENG/H	
22	0.5	LG	E. C 22	E.L/S.1-1	
23	0.5	LY	E. C 23	E.L/S.1-2	
24	0.5	BW	E. C 24	FUSE 2	
25	0.5	B	E. C 25	CAB GROUND	

NO.	SIZE	COLOR	CIRCUIT FROM	CIRCUIT TO	COMMENT
411	0.5	GL	MON./C. 11	79- 2	
412	0.5	YB	MON./C. 12	MONITOR 12	
413	0.5	BrW	MON./C. 13	MONITOR 13	
414	0.5	GR	MON./C. 14	MONITOR 14	
415	0.5	YG	MON./C. 15	MONITOR 15	
416	0.5	BrB	MON./C. 16	MONITOR 16	
417	0.5	GR	MON./C. 17	MONITOR 17	
418	0.5	WB	MON./C. 18	ENG/H	
419	0.5	L	MON./C. 19	ENG/H	
420	0.5	G	MON./C. 20	ENG/H	
421	0.5	LR	MON./C. 21	ENG/H	
422	0.5	WR	MON./C. 22	ENG/H	
425	0.5	BR	MON./C. 25	ENG/H	
426	0.5	YR	MON./C. 26	ENG/H	
432	0.5	WY	MON./C. 32	SWITCH PANEL 1- 6	
433	0.5	RG	MON./C. 33	SWITCH PANEL 1- 5	
434	0.5	LW	MON./C. 34	LOAD DUMP RELAY 2	
435	0.5	R	MON./C. 35	(500)	
441	0.5	LY	MONITOR 3	(434)	
442	0.5	RG	MONITOR 4	ENG/H	
443	0.5	RG	MONITOR 5	ENG/H	
444	0.5	RB	BUZZER 1	(401)	
449	0.5	LR	MONITOR 18	(500)	
500	3	R	LIGHTER	CAB GROUND	
501	3	R	(500)	ENG/H	
511	0.85	LY	EMERGENCY RELAY P1	ENG/H	AV
512	0.85	L	EMERGENCY RELAY P2	ENG/H	AV
513	0.85	LY	(511)	ENGINE STOP RELAY 4	AV
514	0.85	L	ENG/H	ENGINE STOP RELAY 3	AV
515	0.85	LR	ENG/H	FUSE 14	AV
517	0.5	LR	EMERGENCY RELAY T	(434)	
518	0.5	RB	EMERGENCY RELAY ACC	ACC (435)	

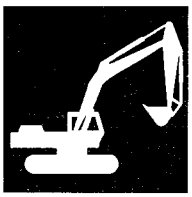




Workshop Manual

EX120-3

SECTION 01
GENERAL IMFORMATION



CONTENTS

PRECAUTIONS FOR DISASSEMBLING AND ASSEMBLING

Preparations for Disassembling

• Clean the Machine

Remove soil, mud and debris from the machine and thoroughly wash the machine before bringing it into the shop. Bringing a dirty machine into the shop may cause machine components to be contaminated during disassembling/assembling, resulting in damage to machine components, as well as decreased efficiency in service work.

• Inspect the Machine

Be sure to thoroughly understand disassembling procedures beforehand, to help avoid incorrect disassembling of components as well as the perchase of unnecessary service parts.
Record the items listed below to help prevent problems from occurring in the future.
- The machine model, machine serial number, and hour meter reading,
- Observed phenomenon, failed parts, and causes,
- Dirty, clogged filters and oil or air leakages, if any,
- Levels and degrees of deterioration of lubricants,
- Loose or damaged parts.

• Prepare and Clean Tools and Disasembly Area

Prepare tools to be used and areas for disassembling as well as for disassembled parts. Clean the tools and areas.

Precautions for Disassembling and Assembling

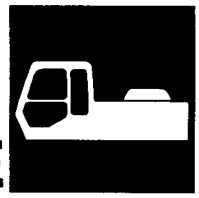
• Precautions for Disassembling

- Be sure to provide appropriate containers for draining fulids.
- Use aligning marks for easier reassembling.
- Be sure to use specified special tools, when so instructed.
- If a part or component cannot be removed after removing its securing nuts and bolts, do not attempt to remove it forcibly. Find the cause(s), then take appropriate measures to remove it.
- Orderly arraenge disassembled parts. Mark and/or put tags on them as necessary.
- Orderly arrange common parts, such as nuts and bolts, by placing them in designated places. Keep common parts used on different parts or components separate, and record the number of common parts used, so as to help prevent common parts from becoming lost.
- Inspect contact or sliding surfaces of disassembled parts for abnormal wear, sticking, or other damage.
- Measure and record degrees of wear and clearances.

• Precautions for Assembling

- Be sure to clean all parts and inspect them for any damage. If any damage is found, repair or replace with new ones.
- Dirt or debris on contact or sliding surfaces may shorten the service life of the machine. Take care not to contaminate any contact or sliding surfaces of the parts to be assembled.
- Be sure that liquid-gasket-applied surfaces are clean and dry.
- Thoroughly wash new parts to be used to remove anti-corrosive agent from the surfaces.
- Utilize aligning marks when assembling.
- Be sure to use designated tools to assemble bearings, bushings and oil seals.
- Keep a record of the number of tools used for disassembling/assembling. After assembling is complete, count the number of tools, so as to make sure that no tolls are left in the assembled components.

SECTION 02
UPPERSTRUCTURE



CONTENTS

Group 08- Pilot Shut-Off Valve

Group 09- Shockless Valve

Group 10- Accumulator

Group 11- Solenoid Valve

Group 12- Shuttle Valve

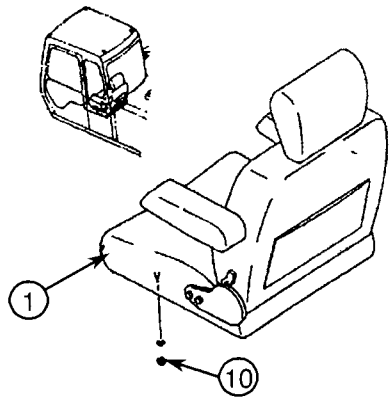
Group 13- Swing Dampener valve

REMOVE AND INSTALL CAB

Remove Cab

1. Remove nuts (10) and seat (1).

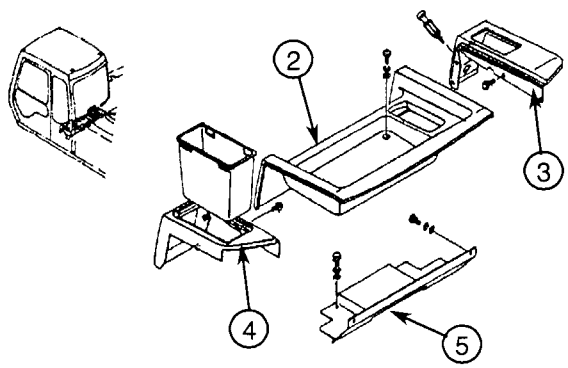
: 13 mm



W105-02-01-001

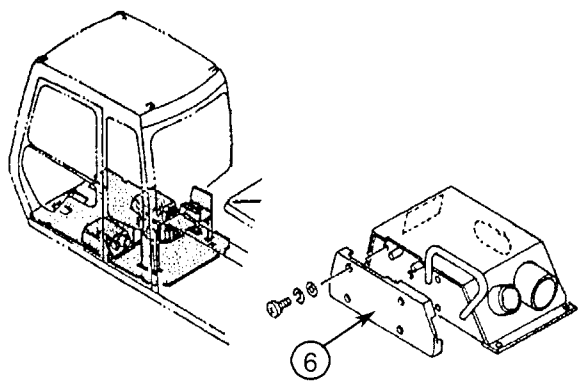
2. Remove covers (2), (3), (4) and (5).

: 13 mm



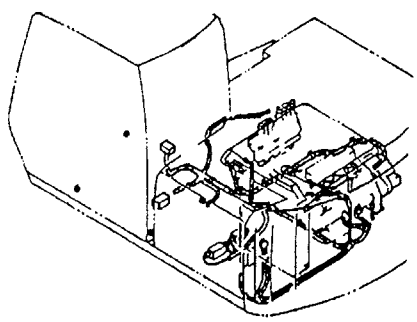
W105-02-01-002

3. Remove cover (6).



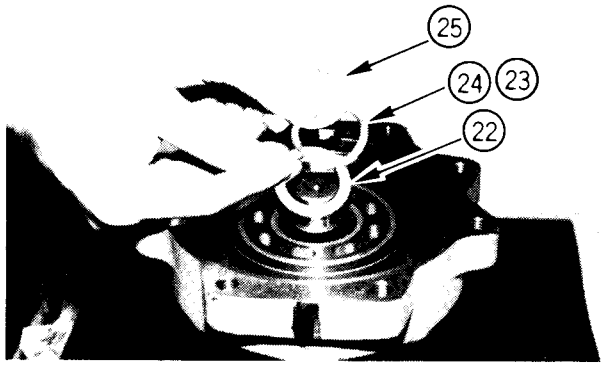
W105-02-01-003

4. Disconnect wire harness junction box and connectors, and ground. (Wiper motor, radio antenna, cab ground and dome light.)



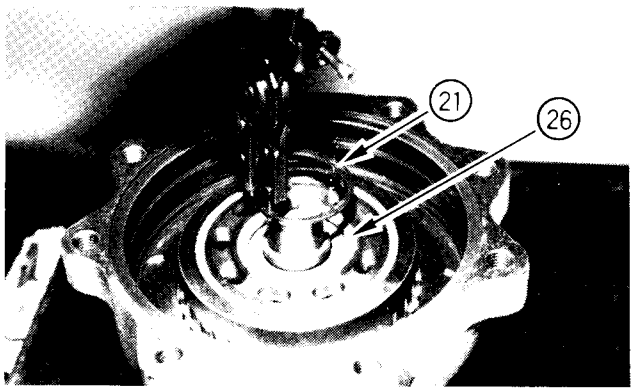
W105-02-01-004

12. Install spring washer (22), springs (23) and (24) and spring washer (25).



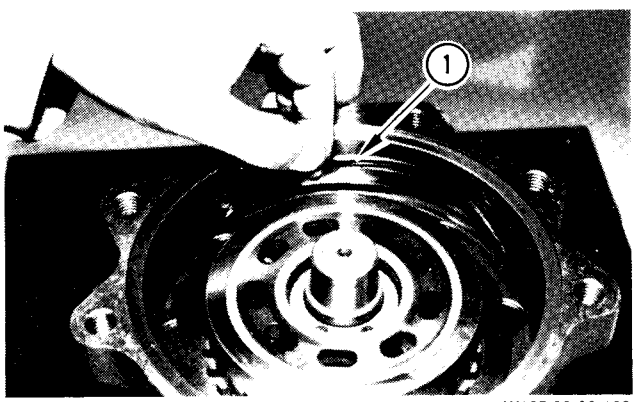
W105-02-06-106

13. Install retaining ring (21) on cylinder block (26).



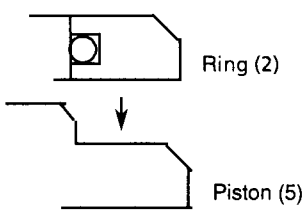
W105-02-06-107

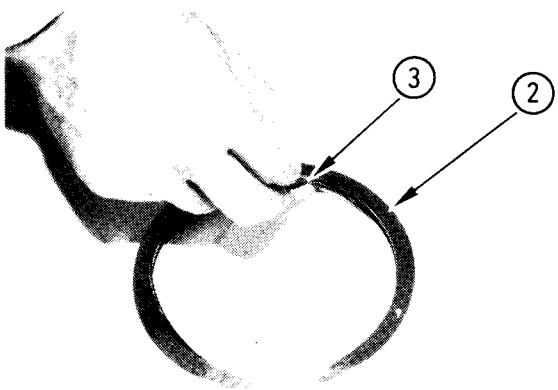
14. Install O-ring (1) into housing (35).



W105-02-06-108

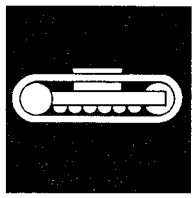
15. Install O-ring (3) to ring (2) and install them to piston (5).





W105-02-06-109

SECTION 03
UNDERCARRIAGE

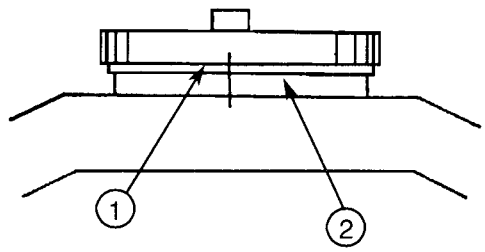


CONTENTS

REMOVE AND INSTALL SWING BEARING

Remove Swing Bearing

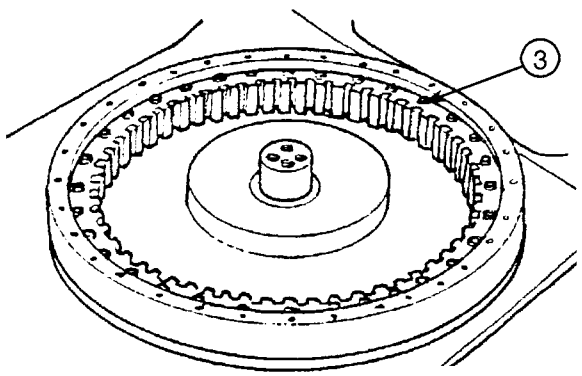
1. Put alignment marks on swing bearing (1) and track frame (2).



W105-03-01-001

2. Remove bolts (3).

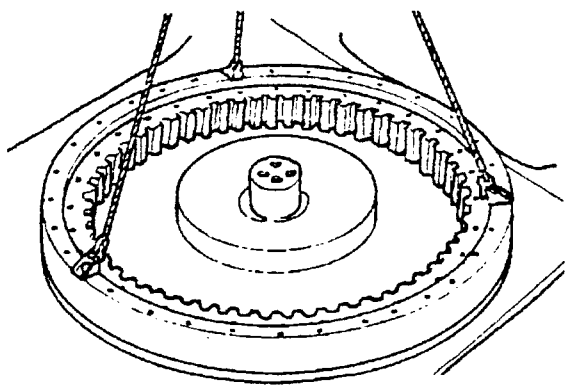
: 24 mm



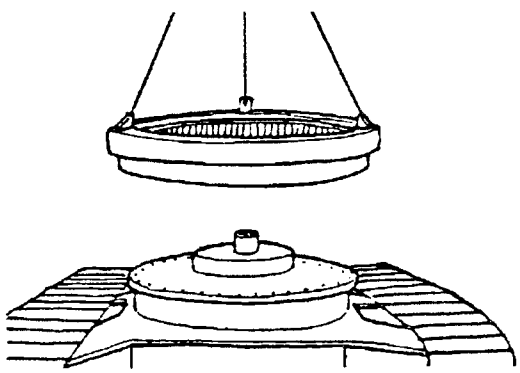
W105-03-01-002

3. Attach lifting tools (ST 0050), hoist the swing bearing and remove it.

CAUTION : Approximate weight of swing bearing : 155 kg (340 lb).



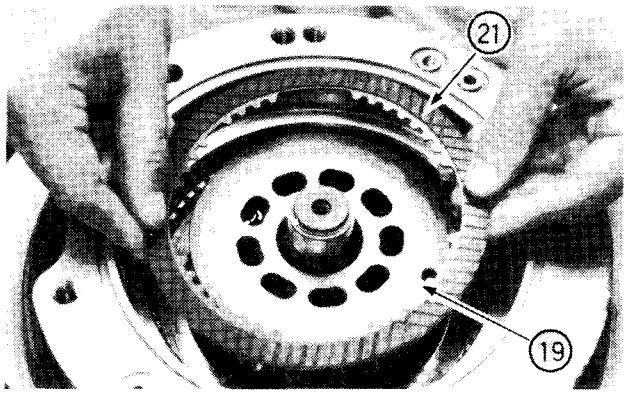
W105-03-01-003



W105-03-01-004

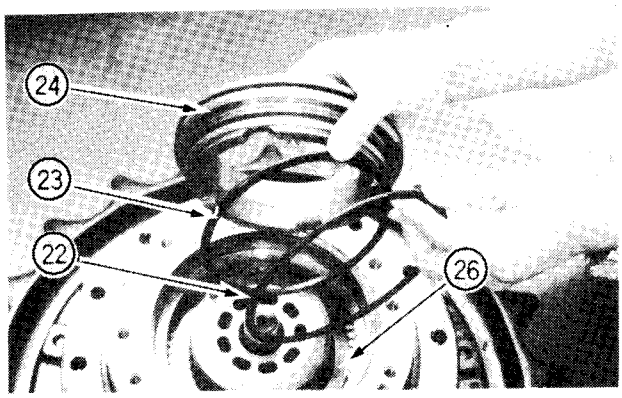
19. Install friction plates (21) onto rotor (19) with the splines and notches aligned.

NOTE: Starting with a plate (26) shown in Step 20, alternately install four plates (26) and three friction plates (21).

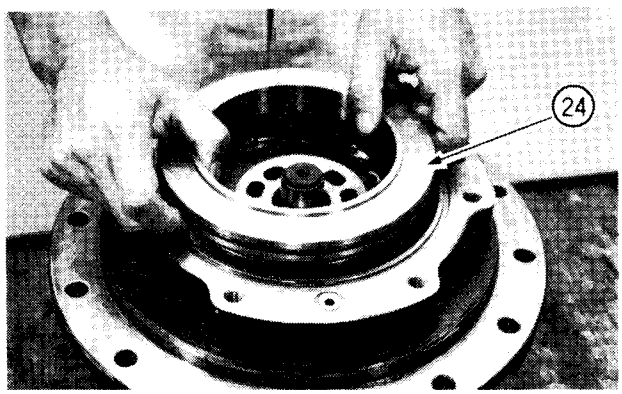


W105-03-02-128

20. Install D-rings (22) and (23) on brake piston (24). Be sure to apply grease to peripheral surface of D-rings (22) and (23) before installing.

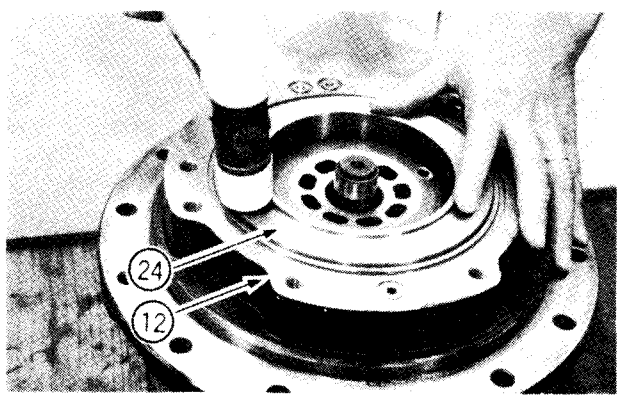


W105-03-02-129

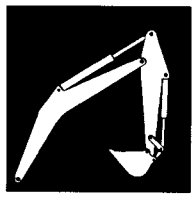


W105-03-02-130

21. Install brake piston (24) into housing (12) using a plastic hammer.



W105-03-02-131



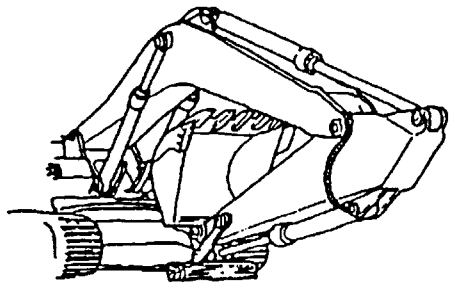
SECTION 04
FRONT ATTACHMENT

CONTENTS

REMOVE AND INSTALL FRONT ATTACHMENT

Front Attachment Removal

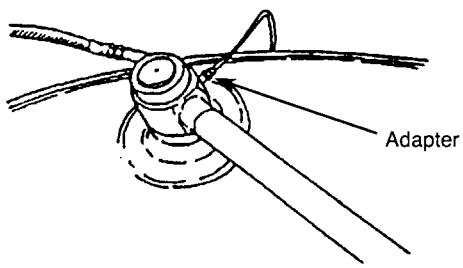
1. Place the excavator on ground.
   Lower bucket to the ground.
   Stop the engine.



W105-04-01-001

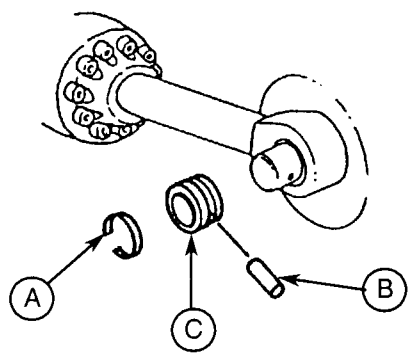
2. Disconnect lubrication hoses from both boom cylinder rod ends.

: 19 mm



W105-04-01-002

3. Remove retaining rings (A), stopper pins (B) and stoppers (C) from both boom cylinder rod ends.

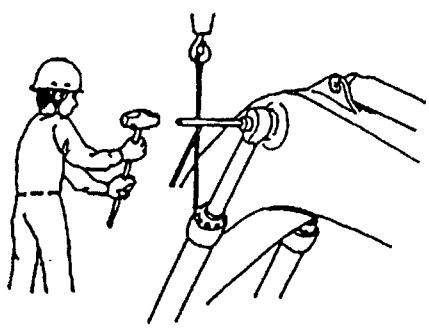


W105-04-01-003

CAUTION: Take care not injury from frying pieces of metal, when hammering.
To avoid injury, grind of hammer and bar.

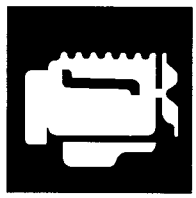
4. Attach each boom cylinder to hoist.
   Remove cylinder rod end pin using a hammer and bar.

CAUTION: Boom cylinder weight: 107 kg (236 lb)



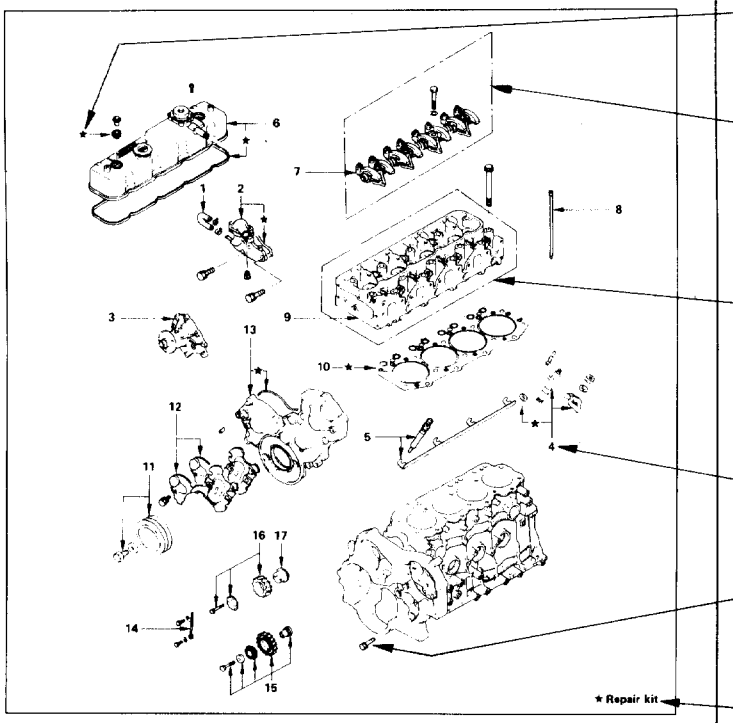
W105-04-01-004

SECTION 06
ENGINE AND ACCESSORY



CONTENTS

6. Each service operation section in this Workshop Manual begins with an exploded view of the applicable area. A brief explanation of the notation used follows.



Disassembly Steps - 2

1. Water by-pass hose
2. Thermostat housing
3. Water pump
▲ 4. Injection nozzle holder
5. Glow plug and glow plug connector
6. Cylinder head cover
▲ 7. Rocker arm shaft and rocker arm
8. Push rod
▲ 9. Cylinder head
10. Cylinder head gasket
▲ 11. Crankshaft damper pulley with dust seal
12. Timing gear case cover
13. Timing gear cover
14. Timing gear oil pipe
15. Idler gear "B" and shaft
▲ 16. Idler gear "A"
▲ 17. Idler gear shaft

Inverted Engine

Parts marked with an asterisk (*) are included in the repair kit.

Parts within a square frame are to be removed and installed as a single unit.

All parts within an irregularly shaped frame form a single assembly. They are considered a "major component".

Individual parts within the irregularly shaped frame are considered "minor components".

The number tells you the service operation sequence.

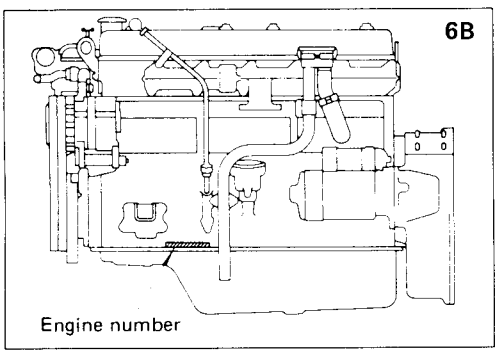
Removal of unnumbered parts is unnecessary unless replacement is required.

The "* Repair Kit" indicates that a repair kit is available.

The parts listed under "Reassembly Steps" or "Installation Steps" are in the service operation sequence.

The removal or installation of parts marked with a triangle (▲) is an important operation. Detailed information is given in the text.

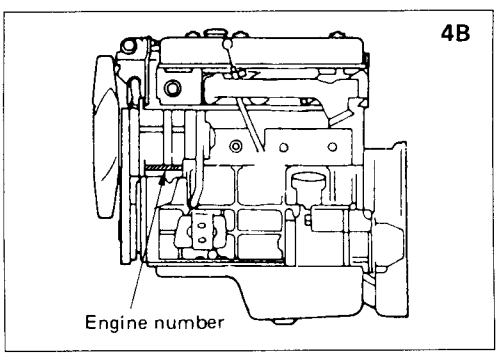
IDENTIFICATIONS



MODEL IDENTIFICATION

Engine Serial Number

The engine number is stamped on the front left hand side of the cylinder body.



INJECTION PUMP IDENTIFICATION

Injection Pump Number

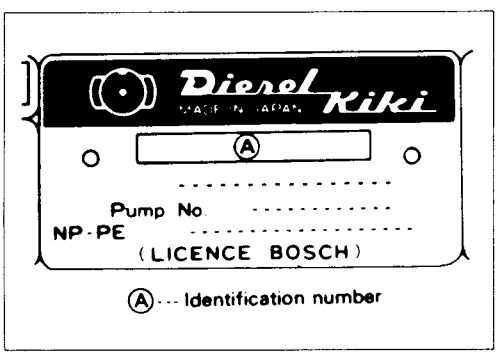
Injection volume should be adjusted after referring to the adjustment data applicable to the injection pump installed.

The injection pump identification number (A) is stamped on the injection pump identification plate.

Note:

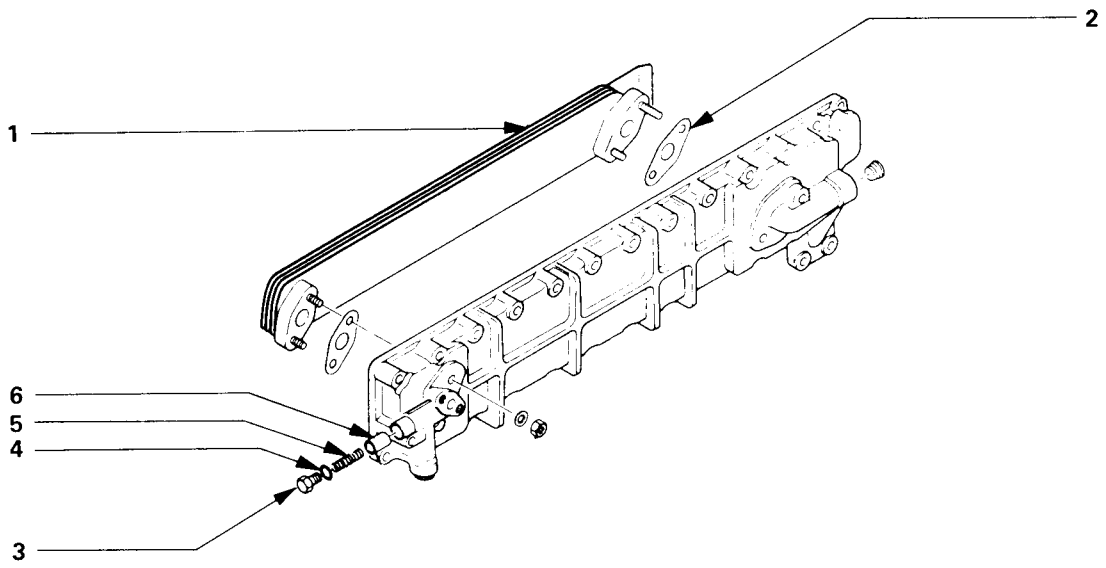
Always check the identification number before beginning a service operation.

Applicable service data will vary according to the identification number. Use of the wrong service data will result in reduced engine performance and engine damage.



OIL COOLER

DISASSEMBLY



0K482

Disassembly Steps

1. Oil cooler element
2. Element gasket
3. By-pass valve plug
4. O-ring ; plug
5. By-pass valve spring
6. By-pass valve

INSPECTION AND REPAIR

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.