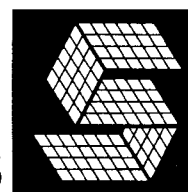


Technical Manual

EX120-3

SECTION 01 SPECIFICATIONS



CONTENTS

Group 01- General Information

Foreword	T01-01-01
Specifications	T01-01-02
Working Ranges	
· Transportation	T01-01-03
Shoe Types and Applications	T01-01-04
Weight	T01-01-05

Group 02- Fuels and Lubricants

Service Refill Capacities	T01-02-01
Fuel	T01-02-01
Greasing	T01-02-02
Engine Oil	T01-02-03
Gear Oil	T01-02-04
Hydraulic System	T01-02-05
Cooling System	T01-02-06

Group 03- Interchangeability

Interchangeability	T01-03-01
Installation of Attachments	T01-03-02

Group 04- Machine Numbers

Machine Numbers	T01-04-01
-----------------------	-----------

Group 05- Components Specifications

Engine	T01-05-01
Engine Accessories	T01-05-04
Hydraulic Devices	T01-05-04
Electrical Equipment	T01-05-06

SPECIFICATIONS / General Information

FOREWORD

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

FRONT ATTACHMENT



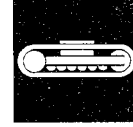
- 1— Bucket Cylinder
- 2— Arm Cylinder
- 3— Boom Cylinder
- 4— Boom
- 5— Arm
- 6— Bucket

UPPERSTRUCTURE

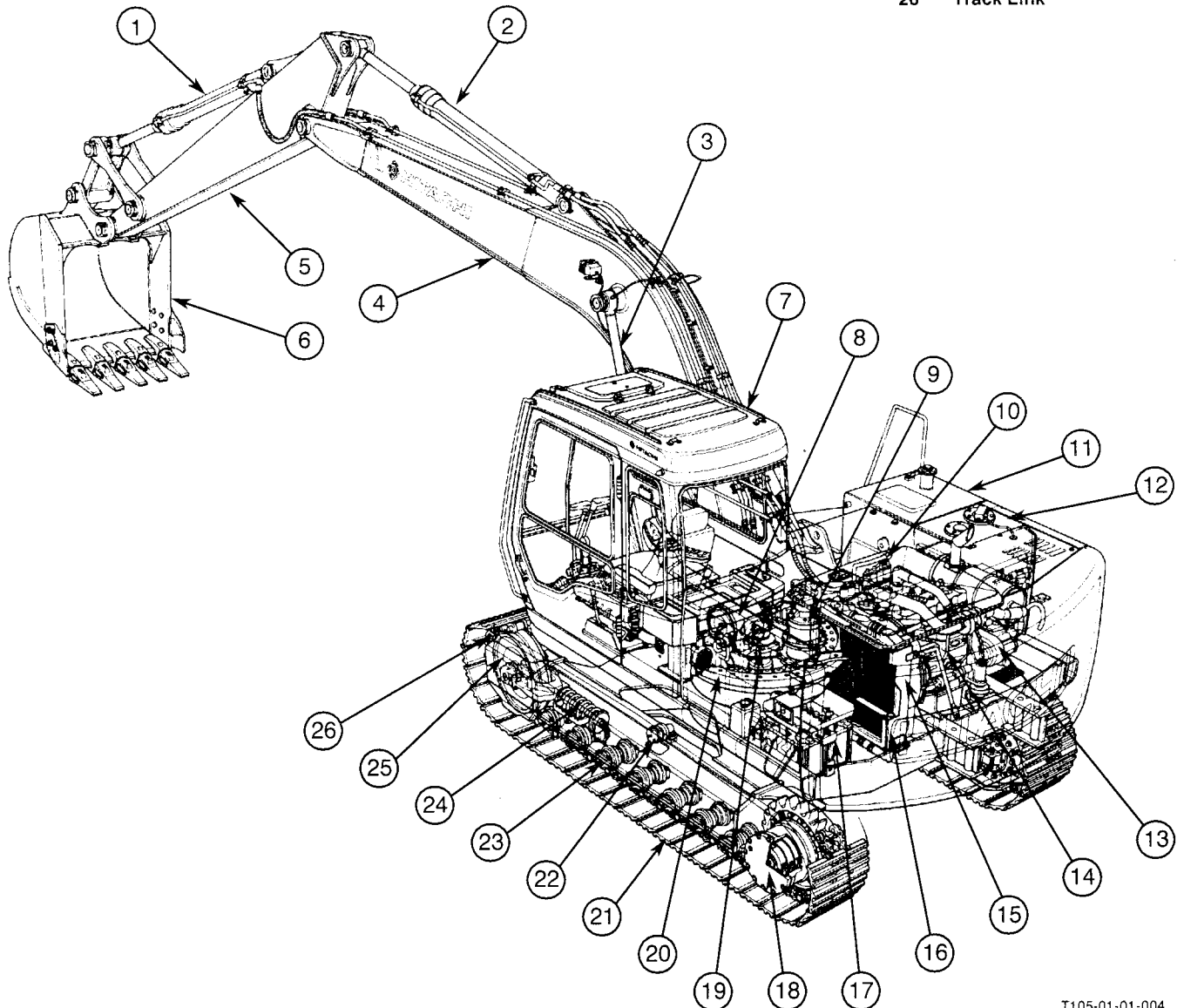


- 7— Cab
- 8— Air Cleaner
- 9— Swing Device
- 10— Main Control Valve
- 11— Fuel Tank
- 12— Hydraulic Oil Tank

UNDERCARRIAGE



- 13— Main Pump
- 14— Engine
- 15— Radiator
- 16— Oil Cooler
- 17— Battery
- 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



T105-01-01-004

T01-01-01

SECTION 02 UPPERSTRUCTURE



CONTENTS

Group 01- Layout

Layout of Upperstructure T02-01-01

Group 02- Tank

Hydraulic Oil Tank T02-02-01

Fuel Tank T02-02-01

Group 03- Pump Device

Outline T02-03-01

Main Pump T02-03-02

Pilot Pump T02-03-06

Engine Speed Sensor T02-03-06

Pressure Sensor T02-03-06

Pump Displacement Angle Sensor T02-03-06

Group 04- Swing Device

Outline T02-04-01

Swing Motor T02-04-02

Brake Valve T02-04-04

Swing Parking Brake T02-04-06

Swing Dampener Valve T02-04-07

Swing Reduction Gear T02-04-09

Group 05- Control Valve

Outline T02-05-01

Unloading Valve T02-05-04

Main Relief Valve T02-05-05

Overload Relief Valve T02-05-06

Variable Pressure

Compensated Valve T02-05-07

Shuttle Valve T02-05-08

Differential Pressure Sensor T02-05-09

Levers in Neutral T02-05-10

Boom or Arm Operation T02-05-12

Holding Valve T02-05-13

Group 06- Pilot Valve

Outline T02-06-01

Operation T02-06-05

Group 07- Others

Pilot Shut-off Valve T02-07-01

Shockless Valve T02-07-02

Accumulator T02-07-03

Solenoid Valve T02-07-04

Pump Displacement Solenoid

Valves T02-07-04

Swing Dampener Valve T02-07-05

Solenoid Valve Assembly T02-07-05

Proportional Solenoid Valve T02-07-06

Directional Solenoid Valve T02-07-07

Reducing Valve T02-07-08

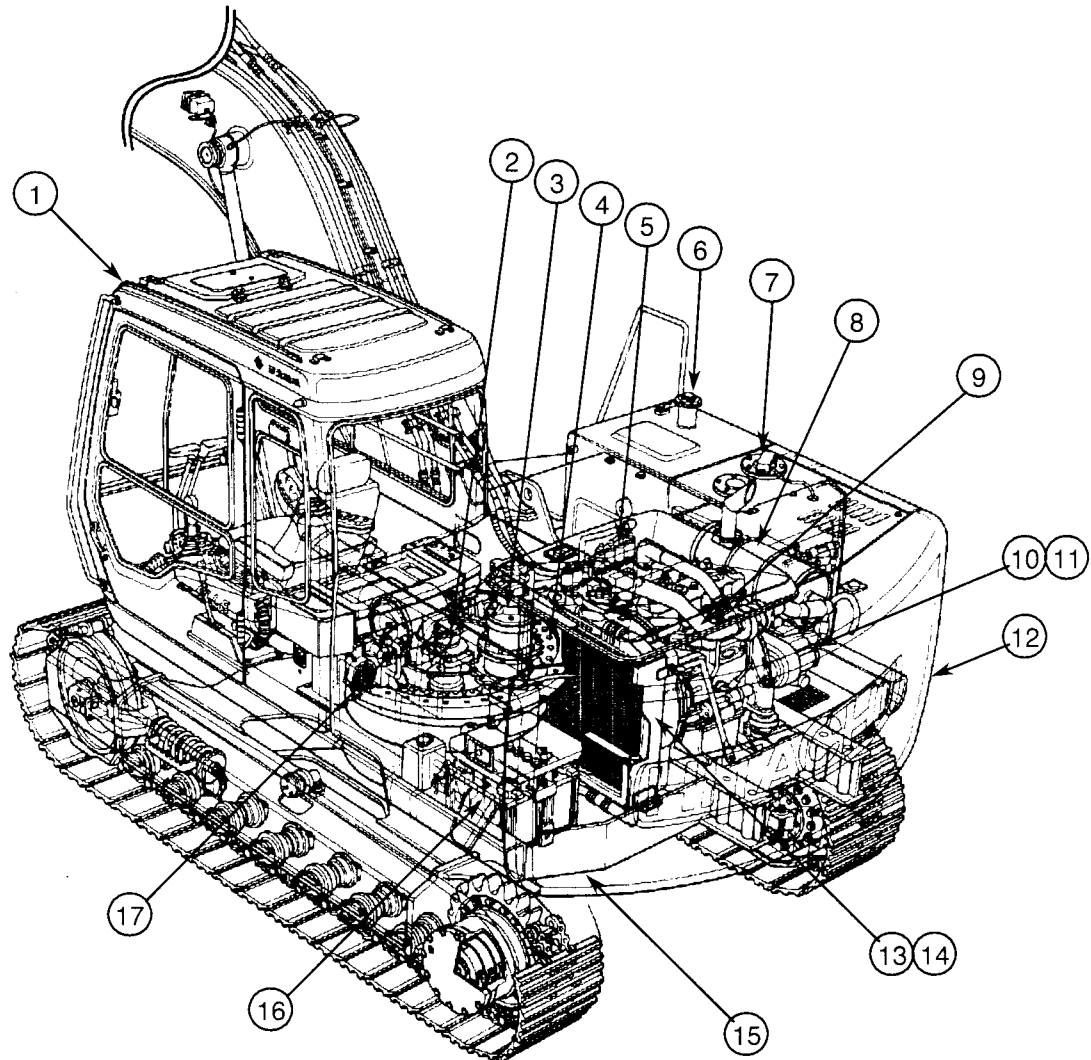
Pilot Relief Valve T02-07-08

UPPERSTRUCTURE / Layout

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).



T105-02-01-002

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

T02-01-01

UPPERSTRUCTURE / Pilot Valve

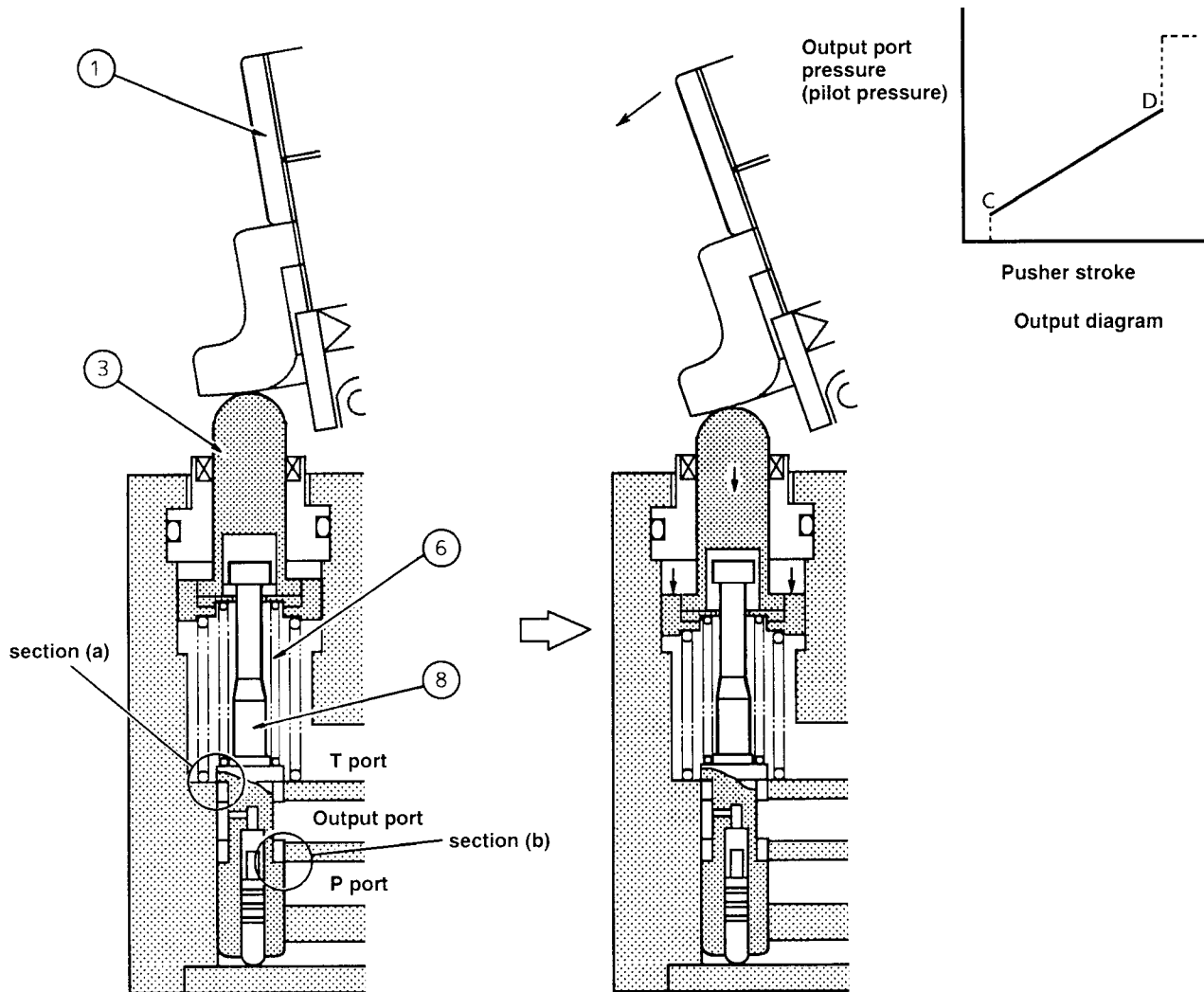
- Operation corresponding to the control lever stroke (see area C to D in the output diagram)

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

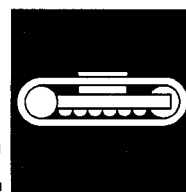
6— Balance Spring

8— Spool

T110-02-07-004

T02-06-07

SECTION 03 UNDERCARRIAGE



CONTENTS

Group 01- Outline

Component Location T03-01-01

Group 02- Travel Device

Outline T03-02-01

Travel Reduction Gears T03-02-02

Travel Motor T03-02-03

Travel Speed Selection T03-02-07

Travel Brake Valve T03-02-10

Parking Brake T03-02-14

Group 03- Others

Construction Swing Bearing T03-03-01

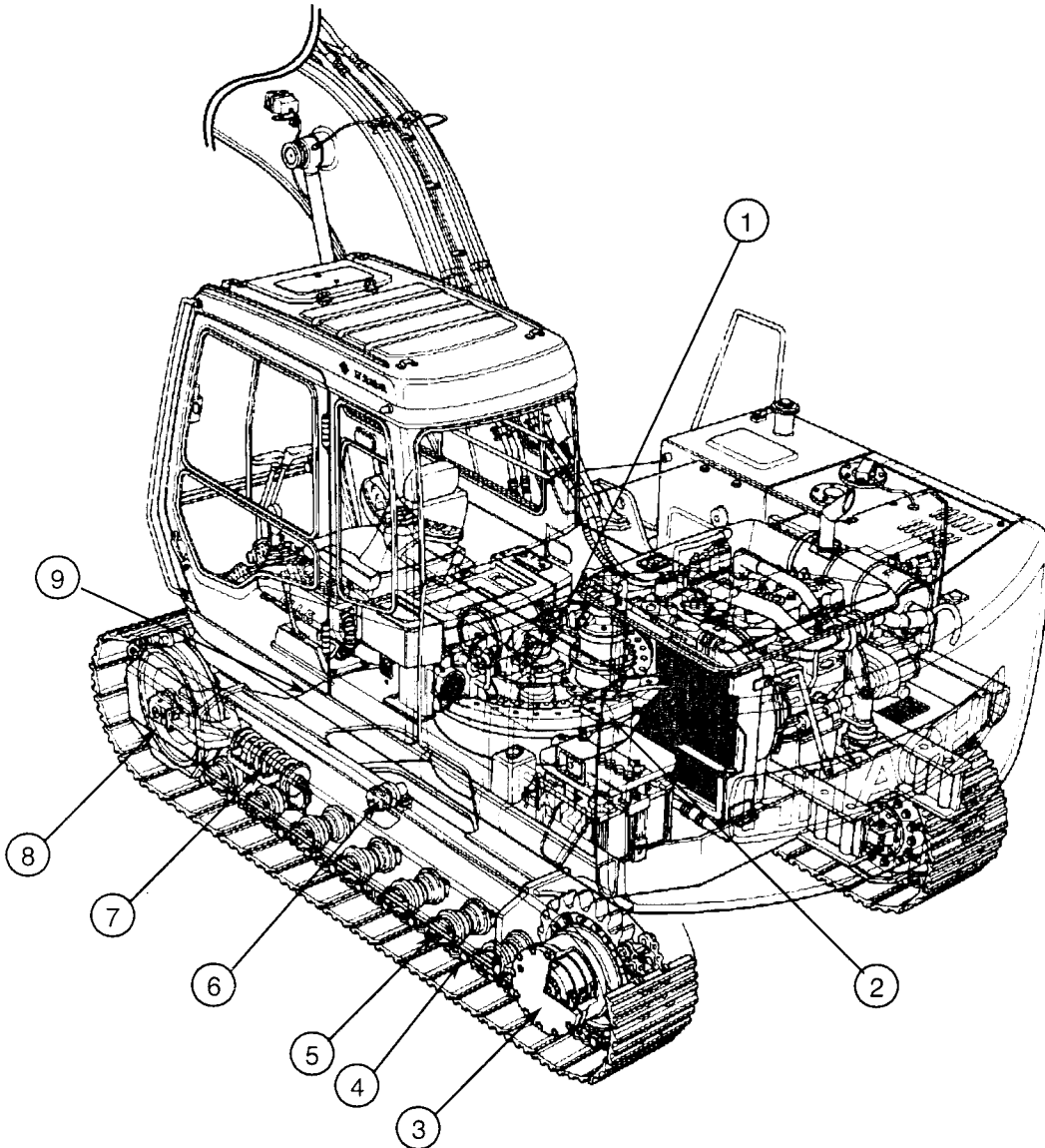
Construction Center Joint T03-03-02

Construction Track Adjuster T03-03-03

UNDERCARRIAGE / Outline

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

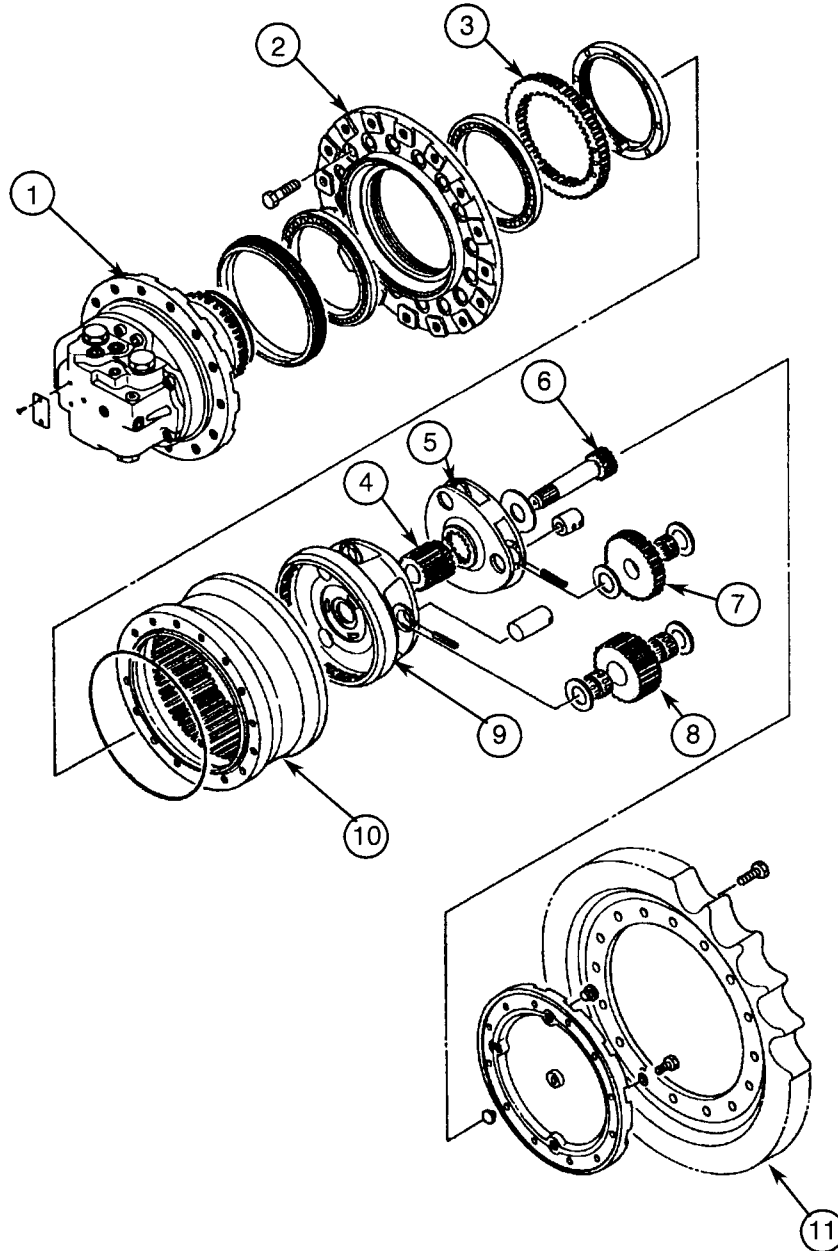
- | | | | |
|------------------|------------------------|-------------------|----------------|
| 1— Center Joint | 4— Track Link Assembly | 6— Upper Roller | 8— Front Idler |
| 2— Swing Bearing | 5— Lower Rollers | 7— Track Adjuster | 9— Track Frame |
| 3— Travel Device | | | |

T03-01-01

UNDERCARRIAGE / Travel Device

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 | 4— Second Stage Sun Gear | 7— First Stage Planetary Gear | 10— Ring Gear |
| 2— Drum | 5— First Stage Carrier | 8— Second Stage Planetary Gear | 11— Sprocket |
| 3— Hub | 6— Propeller Shaft | 9— Second Stage Carrier | |

T03-02-01

SECTION 04 ELECTRICAL SYSTEM



CONTENTS

Group 01- Component Location

Component Location	T04-01-01
Relays	T04-01-03
Monitor and Switch Panel	T04-01-04
Characteristics of the Electrical System	T04-01-05

Group 02- Main Circuit

Outline	T04-02-01
Power Circuit	T04-02-02
Preheat Circuit	T04-02-04
Engine Start Circuit	T04-02-06
Charging Circuit	T04-02-08
Surge Voltage Prevention Circuit ..	T04-02-12
Accessory Circuit	T04-02-14
Engine Stop Circuit	T04-04-15

Group 03- Control System

Outline of the Control System	T04-03-01
Summary of Engine Control Circuits	T04-03-02
Summary of Pump and Valve Control Circuits	T04-03-04
Summary of Other Control Circuits	T04-03-06
Diagnosing Function	T04-03-09
Engine Control System	T04-03-10
Function	T04-03-13

Group 04- Monitor

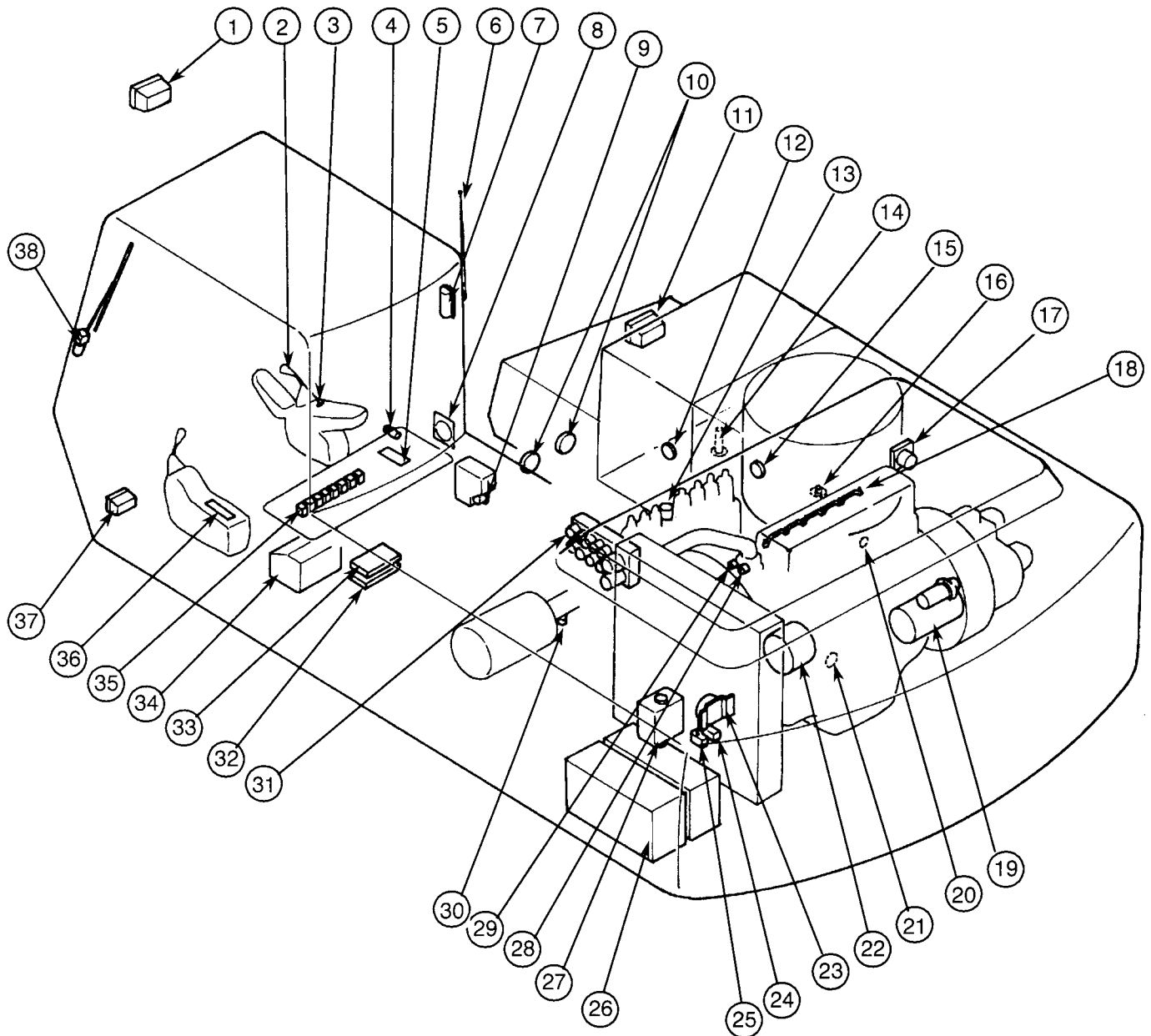
Outline of the Monitor	T04-04-01
Monitor Panel	T04-04-02
Monitor Function	T04-04-03
Monitor Check Procedure	T04-04-09

Group 05- Inspection and Maintenance

Precautions for Inspection and Maintenance	T04-05-01
Fuse Continuity Test	T04-05-02
Inspection and Replacement of Fusible Link	T04-05-03
How to Troubleshoot Malfunctions of Alternator	T04-05-04
Installation and Adjustment of the A - Sensor	T04-05-06
Positioning and Voltage Adjustment of the EC Sensor ...	T04-05-07
Taking Apart Connector	T04-05-08
Connector Type	T04-05-10
List of EC Related Fault Codes ...	T04-05-18
List of PVC Related Fault Codes ..	T04-05-19
Dr. EX Monitor Function	T04-05-20

ELECTRICAL SYSTEM / Component location

COMPONENT LOCATION-1



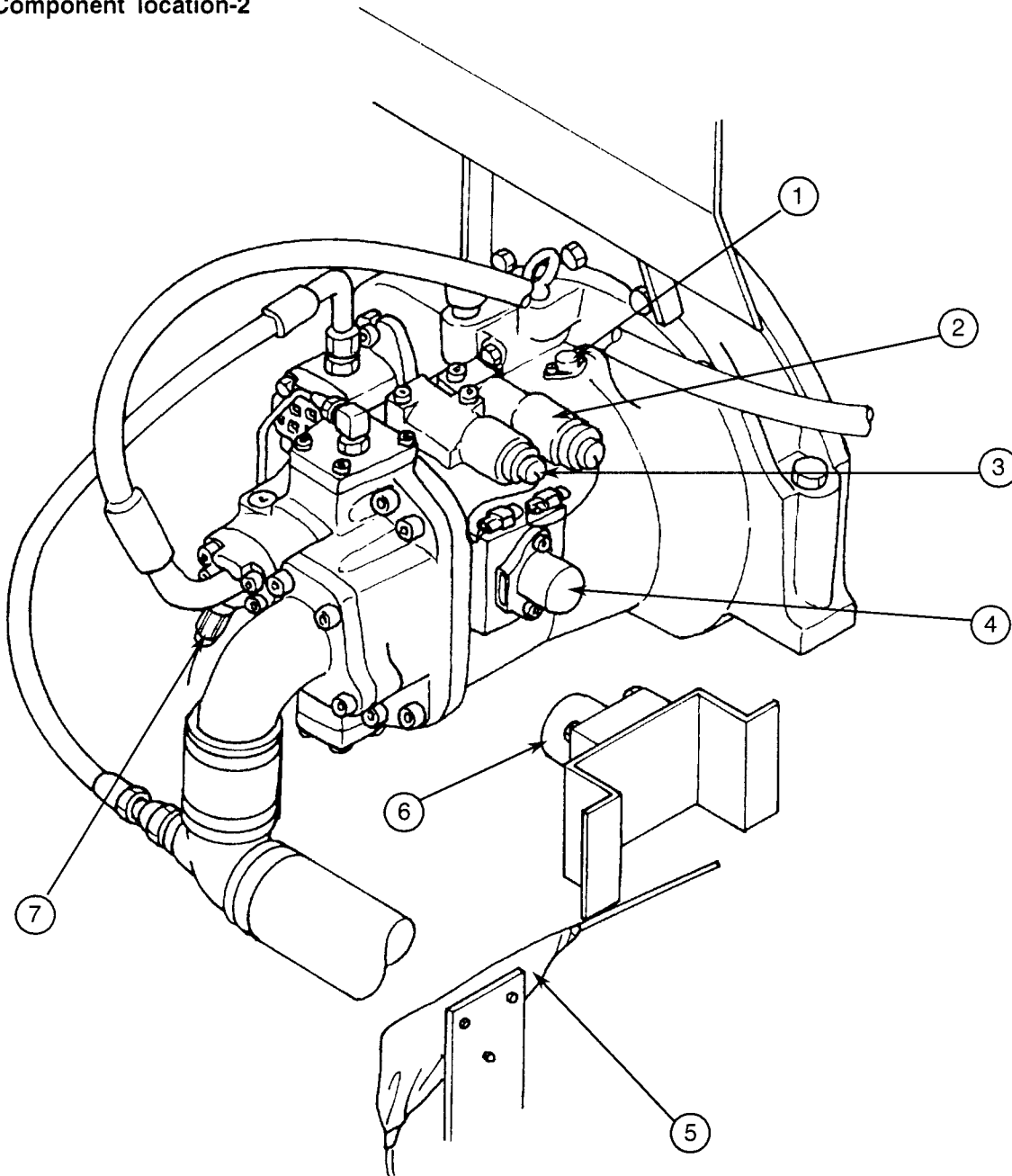
T107-04-01-001

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

T04-01-01

ELECTRICAL SYSTEM / Component Location

Component location-2



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)

T135-04-01-001

T04-01-02

SECTION 05 HYDRAULIC SYSTEM



CONTENTS

Group 01- General

General	T05-01-01
Hydraulic Circuit	T05-01-02
Main Circuit	T05-01-03
Pilot Circuit	T05-01-04

Group 02- Control System

General	T05-02-01
Pump Control	T05-02-02
Valve Control	T05-02-10
Other Controls	T05-02-13

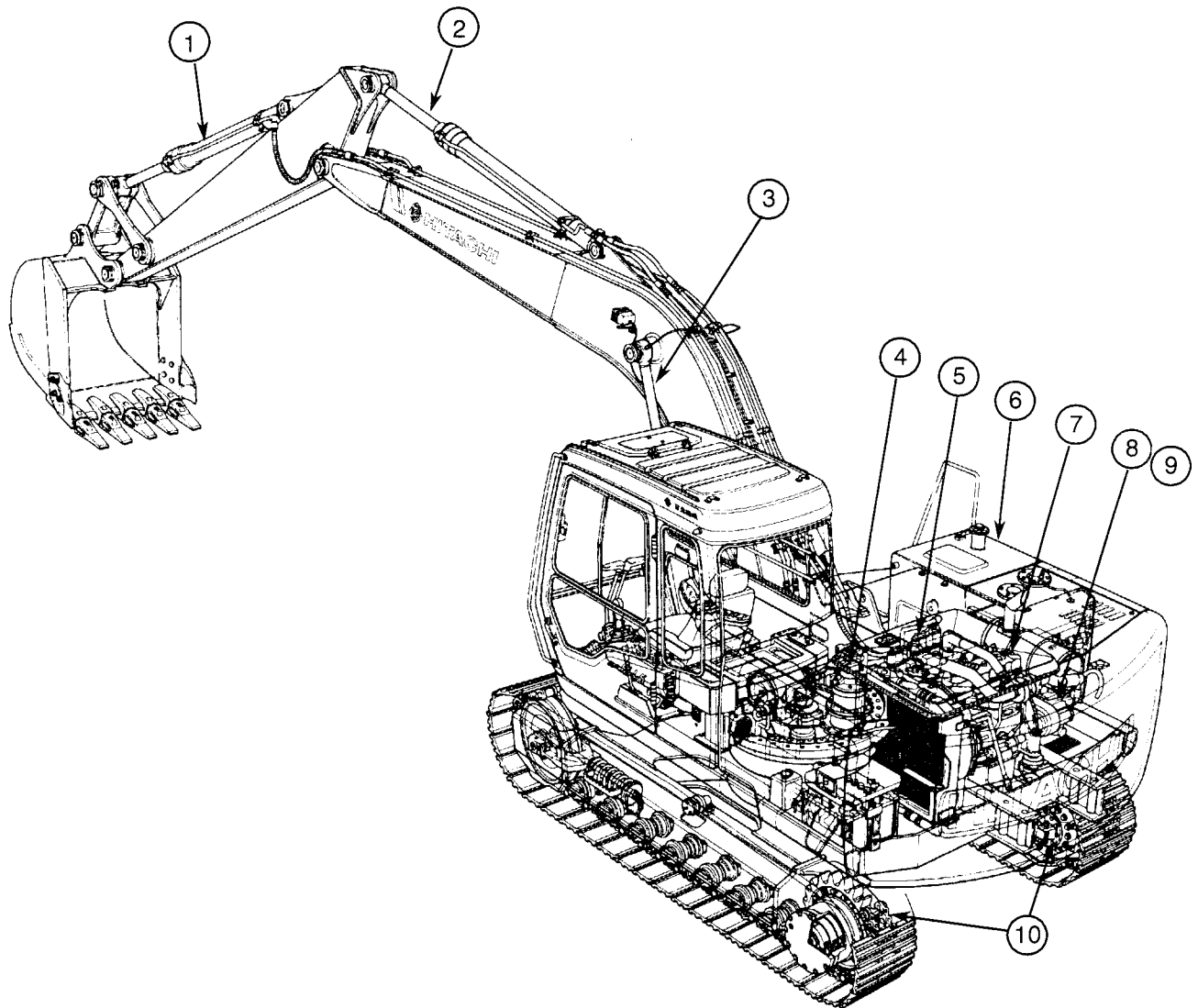
Group 03- Control Circuit

Neutral Circuit	T05-03-01
Combined Operation	T05-03-02

HYDRAULIC SYSTEM / General

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

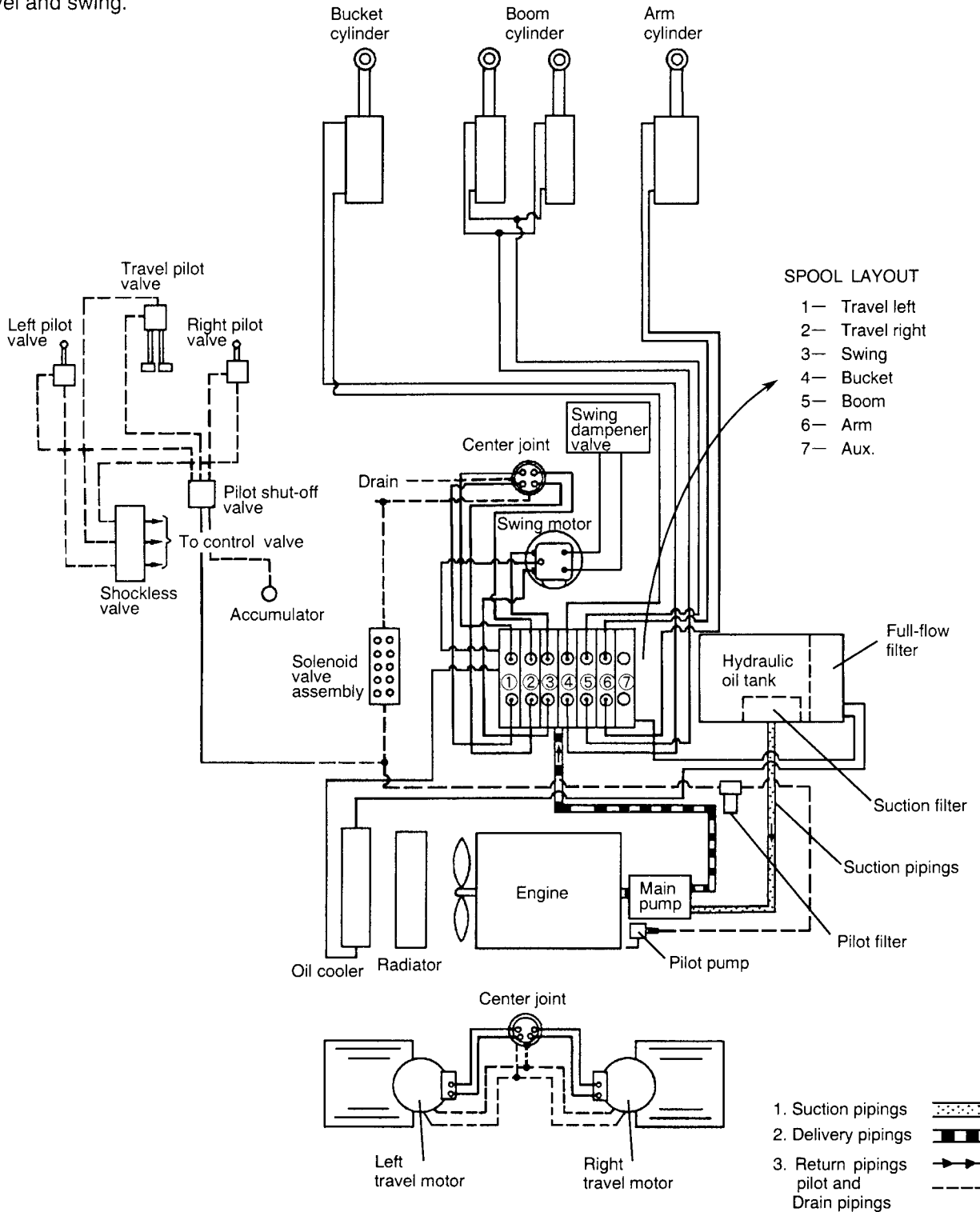
T05-01-01

HYDRAULIC SYSTEM / General

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.



T105-02-05-001

T05-01-02

SECTION 06 OPERATIONAL PERFORMANCE TEST



CONTENTS

Group 01- Introduction

Purpose	T06-01-01
Terminology	T06-01-01
Preparation For Performance	
Tests	T06-01-02

Group 02- Engine Test

2-1.Engine Speed	T06-02-01
2-2.Engine Compression Pressure	T06-02-03
2-3.Valve Clearance Adjustment .	T06-02-04
2-4.Nozzle Check	T06-02-06
2-5.Injection Timing	T06-02-08

Group 03- Excavator Test

3-1.Travel Speed	T06-03-01
3-2.Track Revolution Speed ...	T06-03-02
3-3.Mistrack Check	T06-03-03
3-4.Travel Parking Function Check	T06-03-04
3-5.Swing Speed	T06-03-05
3-6.Swing Function Drift Check .	T06-03-06
3-7.Swing Motor Leakage	T06-03-07
3-8.Swing Bearing Play	T06-03-08
3-9.Hydraulic Cylinder Cycle Time	T06-03-09
3-10.Dig Function Drift Check ..	T06-03-10
3-11.Control Lever Operating Force	T06-03-11
3-12.Control Lever Stroke	T06-03-12
3-13.Combined Boom Raise/Arm Roll-In Functions Check	T06-03-13
3-14.Combined Boom Raise/Swing Functions Check	T06-03-14

Group 04- Hydraulic Component Test

4-1.Pilot Primary Pressure	T06-04-01
4-2.Pilot Secondary Pressure ...	T06-04-03
4-3.Proportional Solenoid Valve Pressure (PC Pressure)	T06-04-04
4-4.Swing Parking Brake Releasing Pressure	T06-04-07
4-5.Reducing Valve Pressure Setting (PI Pressure)	T06-04-08
4-6.Main Pump Delivere Pressure (Control Levers in Neutral)	T06-04-10
4-7.Main Relief Pressure ReliefSeting	T06-04-11
4-8.Overload Relief Valve Pressure Setting	T06-04-15
4-9.Main Pump Flow Test	T06-04-17
4-10.Swing Motor Drainage	T06-04-19
4-11.Travel Motor Drainage	T06-04-21

Group 05- Basic Performance Check

Basic Operational Performance Check with the Dr. EX	T06-05-01
5-1.Pressure (P) switch Check ..	T06-05-02
5-2.Performance Check with Control Lever in the Neutral Position, and at Relief Pressure	T06-05-03
5-3.A sensor (Pump Displacement Angle Sensor) Check	T06-05-05
5-4.Single Operation Check	T06-05-05

Combined Operation	
5-5.Combined Boom Raise and Arm Roll-In Operation	T06-05-07
5-6.Combined Bucket Roll-In Relief and Boom Raise Check	T06-05-09
5-7.Combined Bucket Roll-In and Boom Raise Check	T06-05-11
5-8.Combined Travel and Arm Roll-In Relief Check	T06-05-12
5-9.Swing Check with Precision Mode (M4)	T06-05-14

Group 06- Standard

Operational Performance Standard	T06-06-01
---	-----------

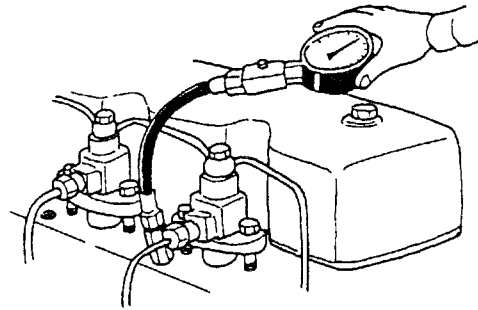
OPERATIONAL PERFORMANCE TEST / Engine Test

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.)



T105-06-02-001

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 01- Diagnosing Procedure

Introduction	T07-01-01
Diagnosing Procedure	T07-01-02
Start-up Procedure of Dr.EX	T07-01-07
Reterial "B"	T07-01-09
Self-Diagnosis Function	T07-01-10

Group 02- Troubleshooting A

List of EC Relating Fault Codes ..	T07-02-01
List of PVC Relating Fault Codes ..	T07-02-02
Fault Codes 01,02,03,04 and 06 ..	T07-02-03
Fault Code 05	T07-02-04
Fault Codes 09 and 10	T07-02-06
Fault Code 13	T07-02-08
Fault Codes 17,18,19 and 21 ..	T07-02-10
Fault Code 20	T07-02-11
Fault Codes 22	T07-02-12
Fault Codes 25 and 26	T07-02-16
Fault Codes 27 and 28	T07-02-18
Fault Codes 29 and 30	T07-02-20
Fault Codes 31 and 32	T07-02-22
Fault Codes 33 and 34	T07-02-24
Fault Codes 35 and 36	T07-02-26

Group 03 - Troubleshooting B

Outline	T07-03-01
Effect of Electronic Component Malfunctions on Machine Operations	T07-03-02
Machine Malfunctions and possible Causes	T07-03-07
Engine Troubleshooting	T07-03-10
Actuators Troubleshooting	T07-03-20
Front Attachments Troubleshooting ..	T07-03-24
Swing Troubleshooting	T07-03-30
Travel Troubleshooting	T07-03-34
Others Troubleshooting	T07-03-43

Group 04 - Troubleshooting C

Monitor Panel, Switch and Sensor Location	T07-04-01
Malfunction of Coolant Temperature Gauge	T07-04-02
Malfunction of Fuel Gauge	T07-04-04
Malfunction of Level Check Switch	T07-04-06
Malfunction of Engine Oil Level Indicator	T07-04-08
Malfunction of Coolant Level Indicator	T07-04-10
Malfunction of Hydraulic Oil Level Indicator	T07-04-12
Malfunction of Alternator Indicator	T07-04-14
Malfunction of Engine Oil Pressure Indicator	T07-04-16
Malfunction of Overheat Indicator	T07-04-18
Malfunction of Fuel Level Indicator	T07-04-20

Malfunction of Air Filter Restriction Indicator	T07-04-22
Malfunction of Buzzer	T07-04-24
Malfunction of Hour Meter	T07-04-26

Group 05 - Harness Check

Electrical Test Precautions	T07-05-01
Continuity Check	T07-05-02
Voltage Check	T07-05-03
5 Volt Circuit	T07-05-04
Check Using False Signal	T07-05-05
Resistance Check	T07-05-07
Lamp Harness Check	T07-05-08

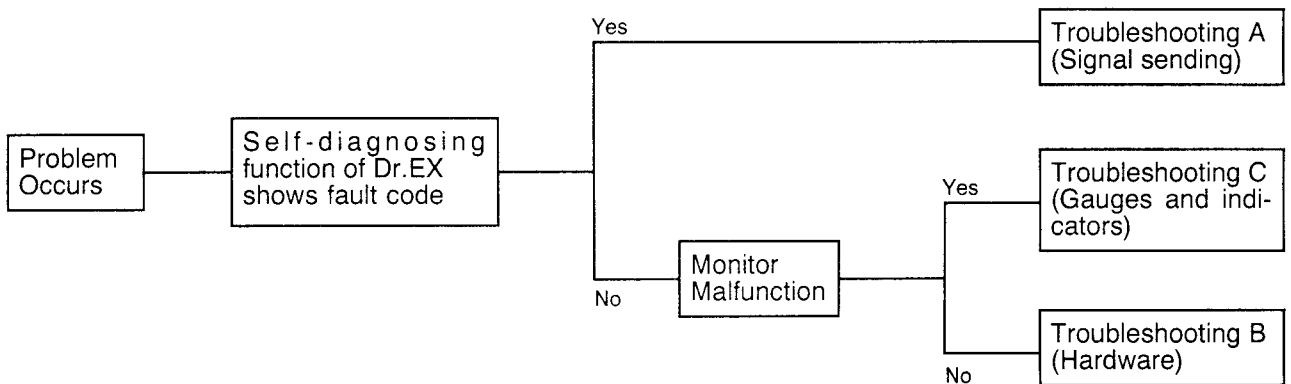
TROUBLESHOOTING / Diagnosing Procedure

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.

TROUBLESHOOTING / Diagnosing Procedure

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

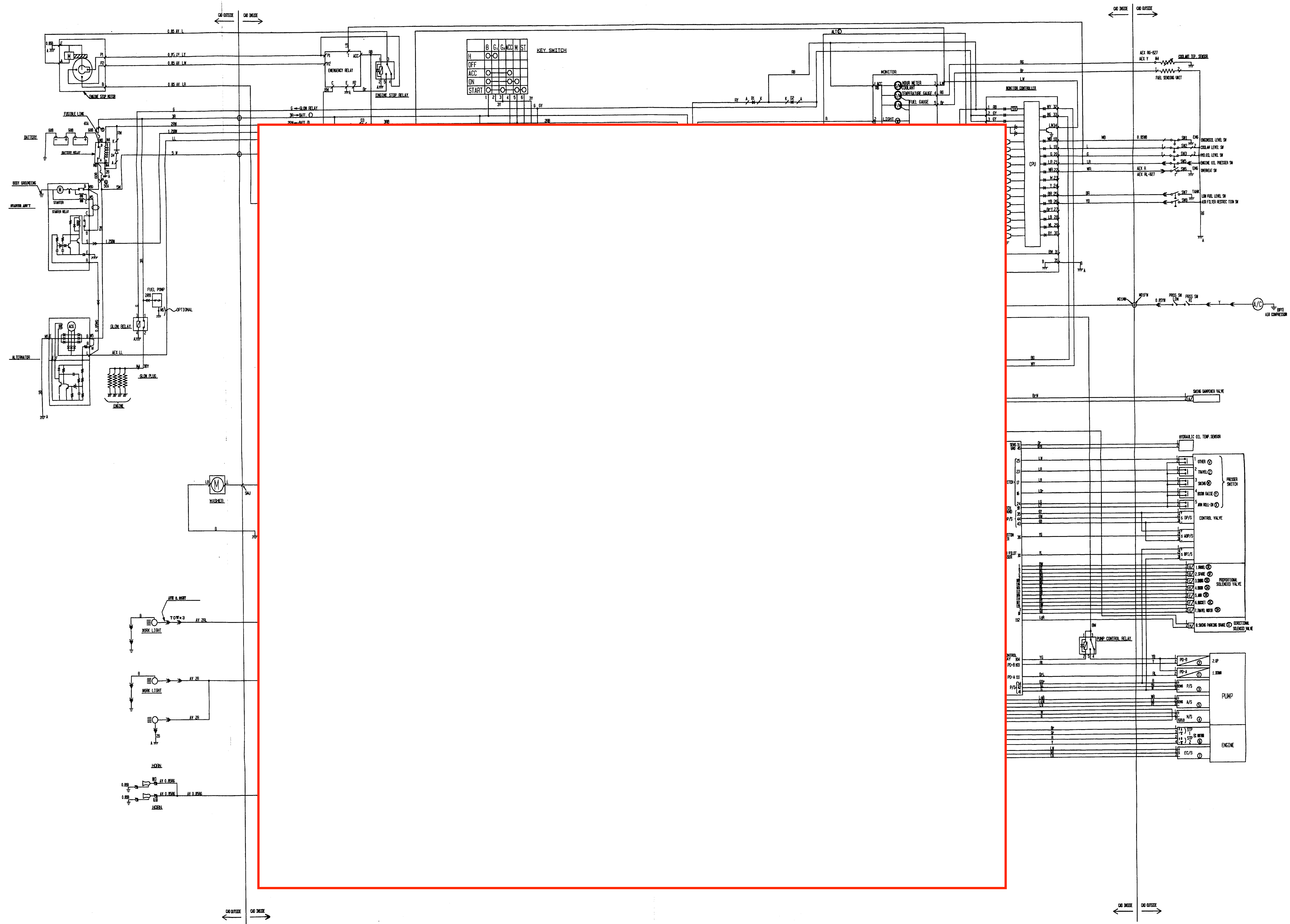
Before inspecting, get the full story of malfunctions from your star witness --- the operator.

- (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?



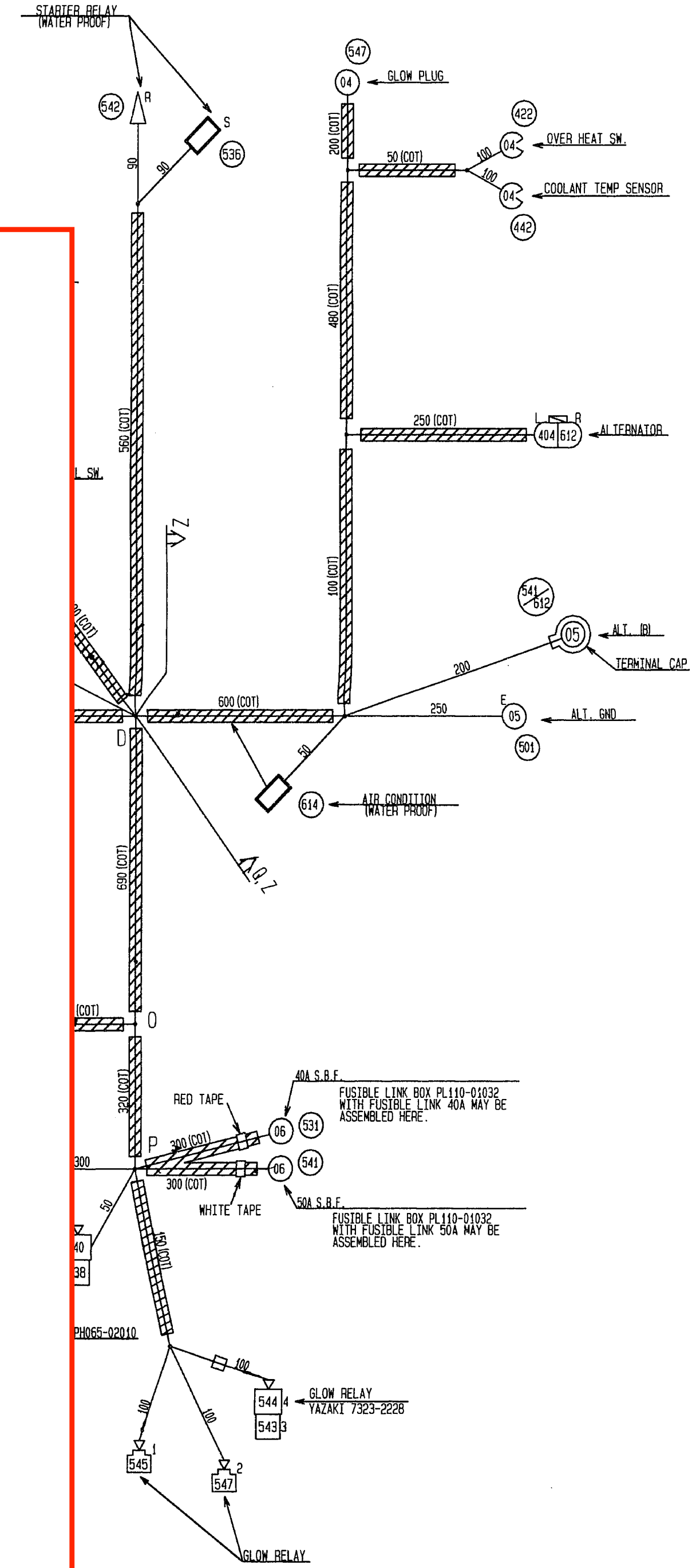
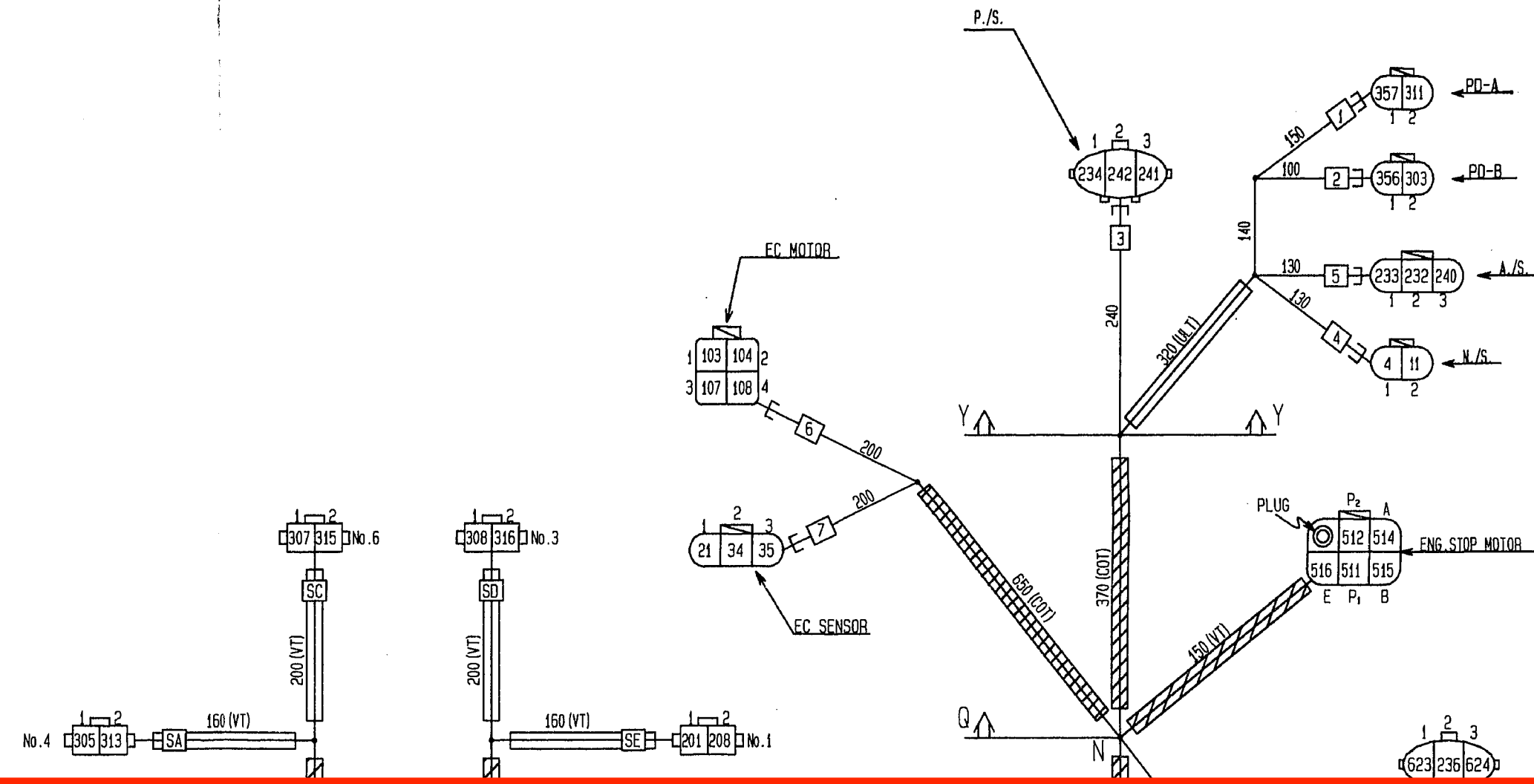
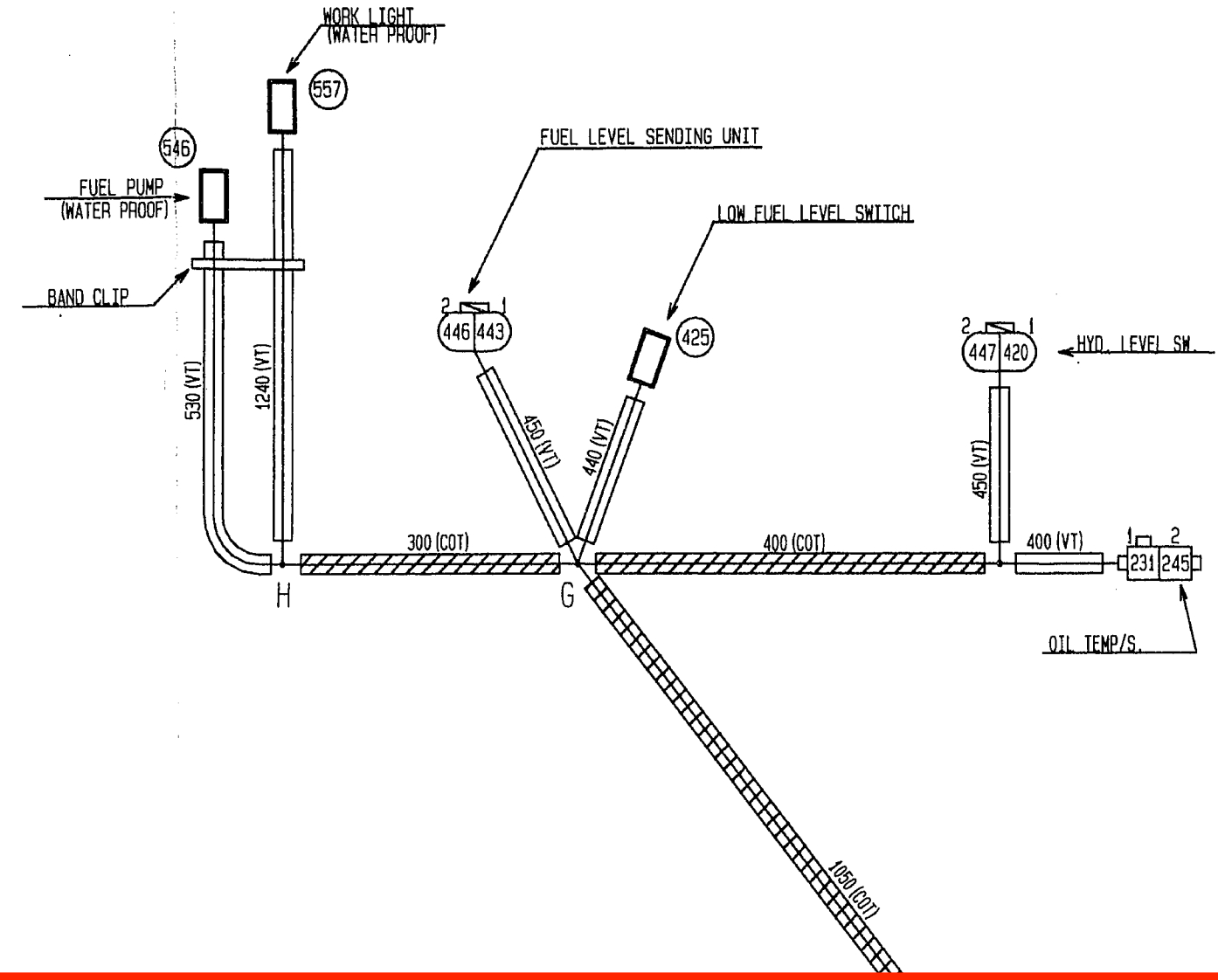
T107-07-01-002

EX120-3 Electric wiring diagram



EX120-3 ENGINE HARNESS

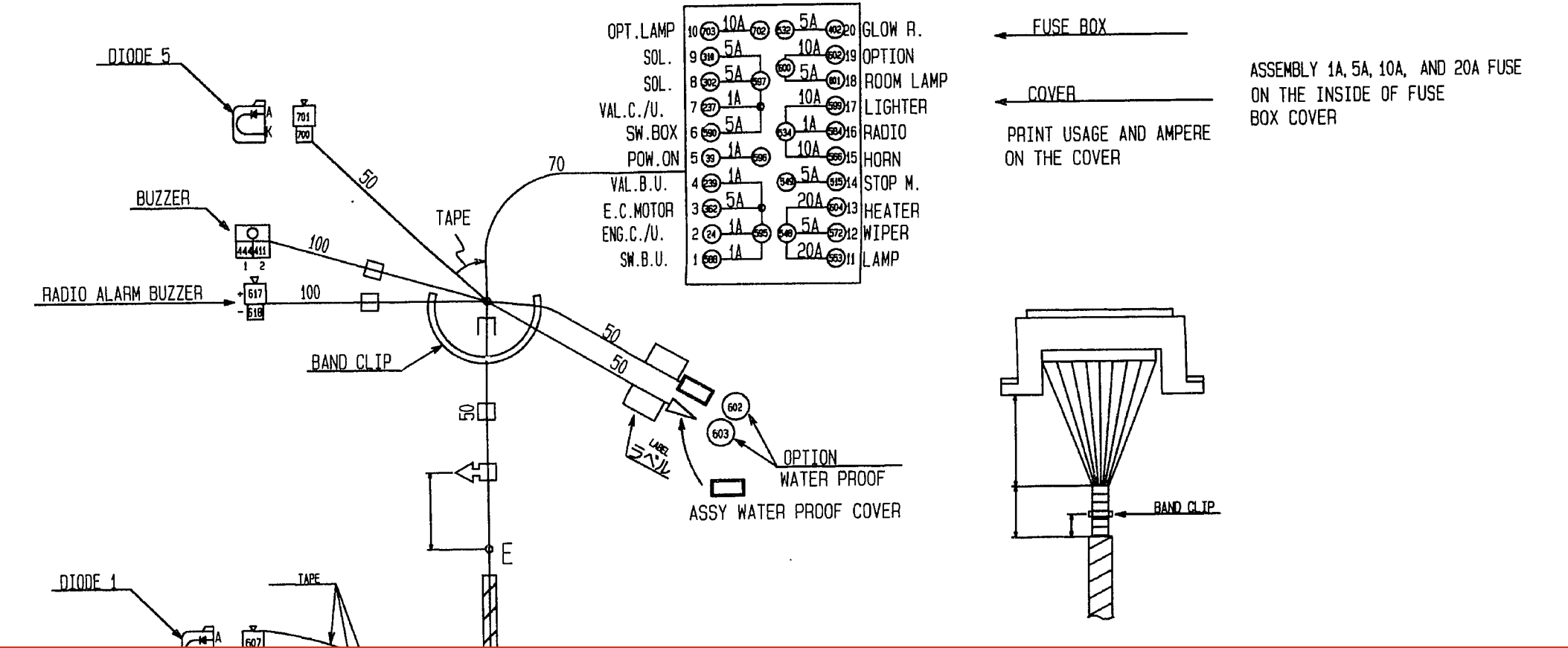
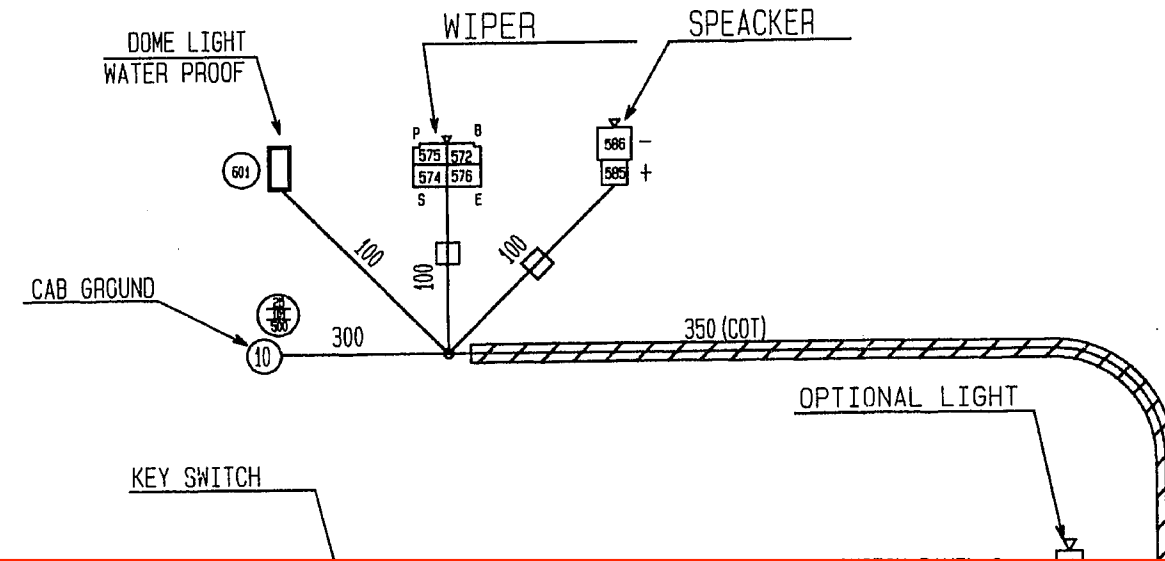
NO.	SIZE	COLOR	CIRCUIT		COMMENT
			FROM	TO	
4	0.5	W	CAB/H	N/S 1	INSIDE WIRE OF SHEATH WIRE
5	0.5	LGB	-	SPRINGS DAMPER VALVE	
11	0.5	B	-	N/S 2	INSIDE WIRE OF SHEATH WIRE
21	0.5	LW	-	EL/S 1	
34	0.5	GR	-	-	2
35	0.5	LB	-	-	3
103	0.5	LY	-	EC MOTOR 1	CHAVX
104	0.5	R	-	-	2
107	0.5	WR	-	-	3
108	0.5	Y	-	-	4
201	0.5	BW	-	SOL. 1-1	
202	0.5	BG	-	-	2-1
203	0.5	GY	-	-	7-1
208	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	LH	-	-	2-1
224	0.5	LG	-	-	5-1
225	0.5	LW	-	-	1-1
230	0.5	YL	-	RAW 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
234	0.5	R	-	P/S 1	CHAVX
235	0.5	GY	-	DP/S 1	CHAVX
236	0.5	YG	-	RAW 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
243	0.5	GB	-	DP/S 3	CHAVX
244	0.5	GW	-	-	2



EX120-3 CAB HARNESS DIAGRAM

CIRCUIT				
NO.	SIZE	COLOR	FROM	TO
1	0.5	LD	E C 1	SW. RELAY 2
2	0.5	DN	E C 2	PVC 11
3	0.5	BY	E C 3	PVC 5
4	0.5	WE	E C 4	ENG/H
5	0.5	LD	E C 5	ENG/H
6	0.5	WT	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	WH	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	GN	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	LB	E C 22	F.L/S 1-1
23	0.5	LY	E C 23	F.L/S 1-2
24	0.5	DN	E C 24	FUSE 2
25	0.5	DN	E C 25	CAB GROUND

CIRCUIT				
NO.	SIZE	COLOR	FROM	TO
411	0.5	GI	MON /C 11	MONITOR 12
412	0.5	YR	MON /C 12	MONITOR 13
413	0.5	RCM	MON /C 13	MONITOR 14
414	0.5	GN	MON /C 14	MONITOR 15
415	0.5	YG	MON /C 15	MONITOR 16
416	0.5	BR	MON /C 16	MONITOR 17
417	0.5	GR	MON /C 17	ENG/H
418	0.5	WH	MON /C 18	ENG/H
419	0.5	LI	MON /C 19	ENG/H
420	0.5	G	MON /C 20	ENG/H
421	0.5	LA	MON /C 21	ENG/H
422	0.5	WH	MON /C 22	ENG/H
423	0.5	BR	MON /C 23	ENG/H
424	0.5	YR	MON /C 24	ENG/H
425	0.5	WH	MON /C 25	ENG/H
426	0.5	YR	MON /C 26	ENG/H
432	0.5	WM	MON /C 32	SWITCH PANEL 1-5
433	0.5	BR	MON /C 33	SWITCH PANEL 1-5
434	0.5	LW	MON /C 34	LOAD DUMP RELAY 2
435	0.5	B	MON /C 35	(GND)
441	0.5	LW	MONITOR 3	(GND)
442	0.5	BR	MONITOR 4	ENG/H
443	0.5	WH	MONITOR 5	ENG/H
444	0.5	BR	BUZZER 1	(GND)
445	0.5	B	MONITOR 1B	(GND)
500	3	B	IGNITION	CAB GROUND
501	3	B	(GND)	ENG/H
511	0.05	L	EMERGENCY RELAY P1	ENG/H AV
512	0.05	L	EMERGENCY RELAY P2	ENG/H AV
513	0.05	LY	(GND)	ENGINE STOP RELAY 4 AV
514	0.05	LY	(GND)	ENGINE STOP RELAY 3 AV
515	0.05	L	ENG/H	FUSE 14 AV
517	0.5	L	EMERGENCY RELAY 1	(GND)
518	0.5	BR	EMERGENCY RELAY ACC	ACC/GND



Workshop Manual

EX120-3

SECTION 01 GENERAL INFORMATION



CONTENTS

Group 01- Precautions for Disassembling and Assembling

Precautions for Disassembling and
Assembling W01-01-01

Group 02- Tightening Torque

Tightening Torque Specification . W01-02-01
Torque Chart W01-02-02

GENERAL INFORMATION / Precautions for Disassembling and Assembling

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/assembly, 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 purchase 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 Disassembly 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 fluids.
- Use aligning marks for easier reassembly.
- 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 arrange 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/assembly. After assembly is complete, count the number of tools, so as to make sure that no tools are left in the assembled components.

SECTION 02 UPPERSTRUCTURE



CONTENTS

Group 01- Cab

Remove and Install Cab	W02-01-01
Dimensions of the Cab Glass ...	W02-01-05

Group 02- Counterweight

Remove and Install Counterweight	W02-02-01
---	-----------

Group 03- Main Frame

Remove and Install Main Frame	W02-03-01
--	-----------

Group 04- Pump Device

Remove and Install Pump Device	W02-04-01
Disassemble Pump Device	W02-04-02
Assemble Pump Device	W02-04-07
Disassemble Main Pump	W02-04-12
Assemble Main Pump	W02-04-18
Disassemble and Assemble Pilot Pump	W02-04-26

Group 05- Control Valve

Remove and Install Control Valve	W02-05-01
Disassemble Four Section Control Valve	W02-05-03
Disassemble Three Section Control Valve	W02-05-15
Assemble Four Section Control Valve	W02-05-23
Assemble Three Section Control Valve	W02-05-31

Disassemble Unloading Valve ..	W02-05-40
Assemble Unloading Valve	W02-05-42
Adjustment DP Sensor	W02-05-44

Group 06- Swing Device

Remove and Install Swing Device	W02-06-01
Disassemble Swing Device	W02-06-02
Assemble Swing Device	W02-06-09
Remove and Install Swing Motor	W02-06-19
Disassemble Swing Motor	W02-06-20
Assemble Swing Motor	W02-06-27
Maintenance Standard	W02-06-35
Disassemble Brake Valve	W02-06-37
Assemble Brake Valve	W02-06-40

Group 07- Pilot Valve

Remove and Install Left Pilot Valve	W02-07-01
Remove and Install Right Pilot Valve	W02-07-02
Disassemble Right and Left Pilot Valve	W02-07-03
Assemble Right and Left Pilot Valve	W02-07-07
Remove and Install Travel Pilot Valve	W02-07-13
Disassemble Travel Pilot Valve ..	W02-07-14
Assemble Travel Pilot Valve	W02-07-19

Group 08- Pilot Shut-Off Valve

Remove and Install	
Pilot Shut-off Valve	W02-08-01
Disassemble Pilot Shut-off Valve	W02-08-02
Assemble Pilot Shut-off Valve ..	W02-08-04

Group 09- Shockless Valve

Remove and Install	
Shockless Valve	W02-09-01
Disassemble and Assemble	
Shockless Valve	W02-09-02

Group 10- Accumulator

Remove and Install Accumulator ..	W02-10-01
-----------------------------------	-----------

Group 11- Solenoid Valve

Remove and Install	
Solenoid Valve Unit	W02-11-01
Disassemble Swing Parking	
Brake Solenoid Valve	W02-11-03
Assemble Swing Parking	
Brake Solenoid Valve	W02-11-05
Disassemble	
Proportional Solenoid Valve	W02-11-08
Assemble	
Proportional Solenoid Valve	W02-11-11
Disassemble Relife Valve	W02-11-14
Assemble Relife Valve	W02-11-17
Disassemble and Assemble	
Reducing Valve	W02-11-20

Group 12- Shuttle Valve

Remove and Install	
Travel shuttle valve	W02-12-01
Disassemble and Assemble	
Travel shuttle valve	W02-12-02
Remove and Install	
Swing / Bucket shuttle valve ..	W02-12-04
Disassemble and Assemble	
Swing / Bucket shuttle valve ..	W02-12-05

Group 13- Swing Dampener valve

Remove and Install	
Swing Dampener Valve	W02-13-01
Disassemble	
Swing Dampener Valve	W02-13-02
Assemble	
Swing Dampener Valve	W02-13-06
Disassemble Valve	W02-13-11
Assemble Valve	W02-13-13

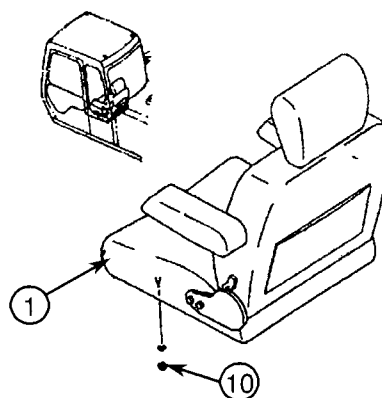
UPPERSTRUCTURE / Cab

REMOVE AND INSTALL CAB

Remove Cab

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

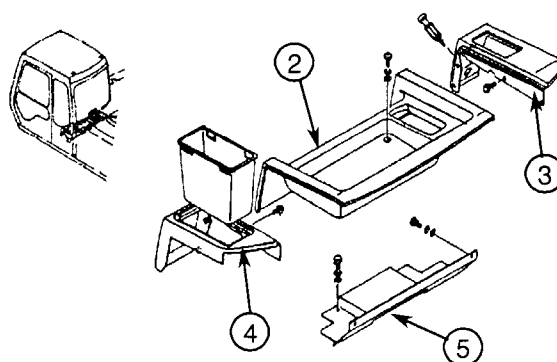
 : 13 mm



W105-02-01-001

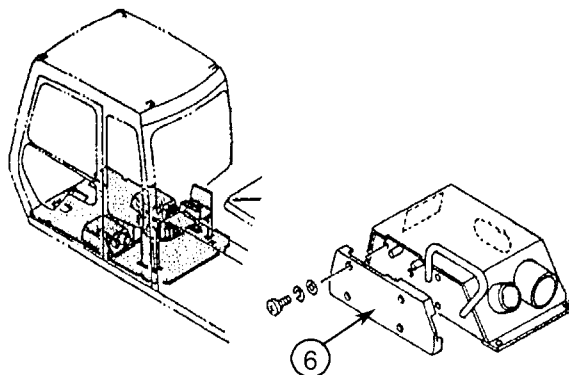
2. Remove covers (2), (3), (4) and (5).

 : 13 mm



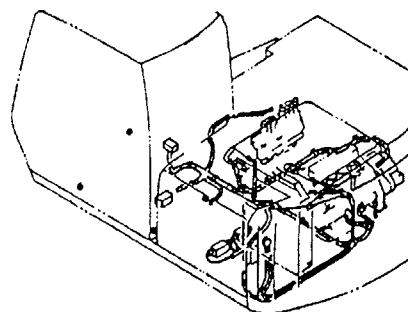
W105-02-01-002

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.)

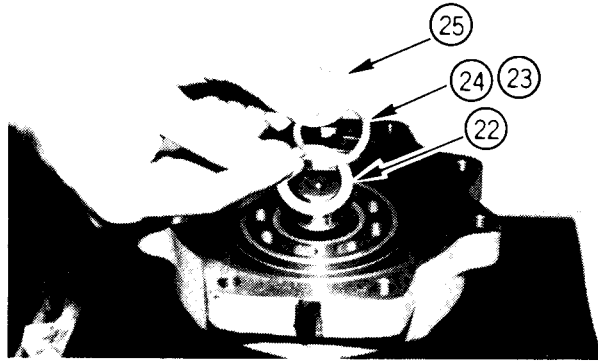


W105-02-01-004

W02-01-01

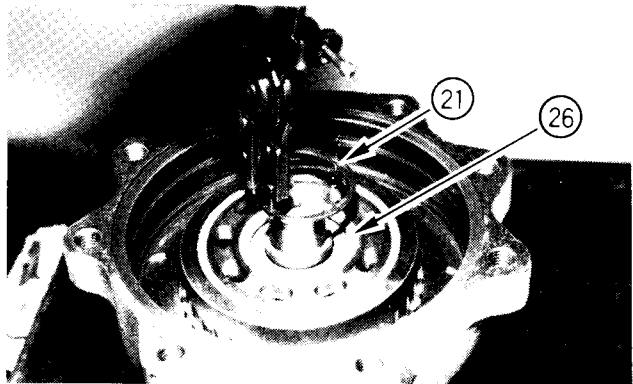
UPPERSTRUCTURE / Swing Device

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



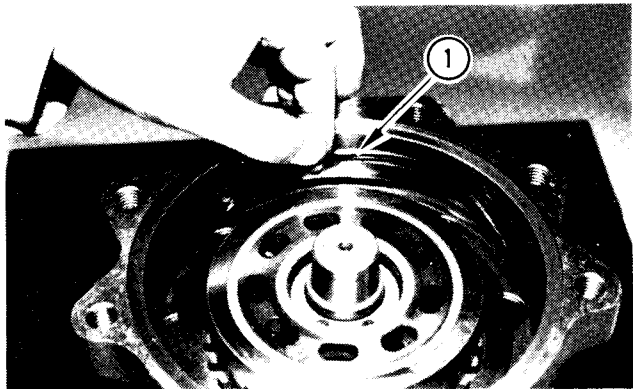
W105-02-06-106

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



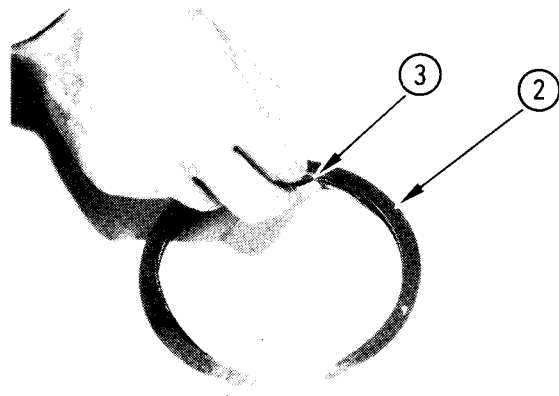
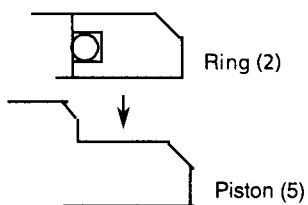
W105-02-06-107

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



W105-02-06-108

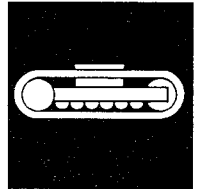
15. Install O-ring (3) to ring (2) and install them to piston (5).



W105-02-06-109

W02-06-32

SECTION 03 UNDERCARRIAGE



CONTENTS

Group 01- Swing Bearing

Remove and Install	
Swing Bearing	W03-01-01
Disassemble Swing Bearing	W03-01-03
Assemble Swing Bearing	W03-01-05

Group 02- Travel Device

Remove and Install	
Travel Device	W03-02-01
Disassemble Travel Device	W03-02-02
Assemble Travel Device	W03-02-11
Disassemble Travel Motor	W03-02-23
Assemble Travel Motor	W03-02-32
Disassemble and Assemble	
Brake Valve	W03-02-44
Maintenance Standard	W03-02-54

Group 03- Center Joint

Remove and Install Center Joint ..	W03-03-01
Disassemble Center Joint	W03-03-05
Assemble Center Joint	W03-03-09
Maintenance Standard	W03-03-15

Group 04- Track Adjuster

Remove and Install	
Track Adjuster	W03-04-01
Disassemble Track Adjuster	W03-04-02
Assemble Track Adjuster	W03-04-09

Group 05- Front Idler

Remove and Install Front Idler ...	W03-05-01
Disassemble Front Idler	W03-05-03
Assemble Front Idler	W03-05-06
Maintenance Standard	W03-05-09

Group 06- Upper and Lower Roller

Remove and Install	
Upper Roller	W03-06-01
Remove and Install	
Lower Roller	W03-06-04
Disassemble Upper Roller	W03-06-07
Assemble Upper Roller	W03-06-10
Disassemble Lower Roller	W03-06-13
Assemble Lower Roller	W03-06-16
Maintenance Standard	W03-06-19

Group 07- Track Link

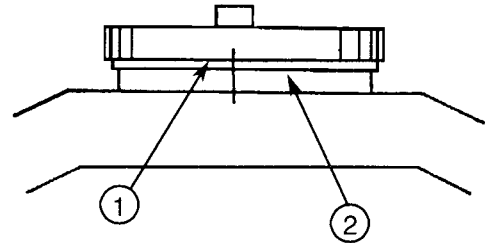
Remove and Install Track Link ...	W03-07-01
Maintenance Standard	W03-07-07

UNDERCARRIAGE / Swing Bearing

REMOVE AND INSTALL SWING BEARING


Remove Swing Bearing

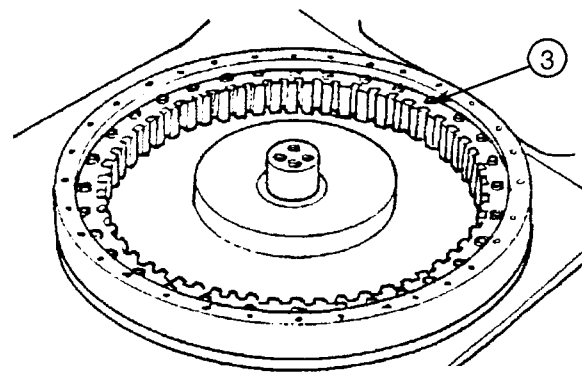
1. Put alignment marks on swing bearing (1) and track frame (2).



W105-03-01-001


2. Remove bolts (3).

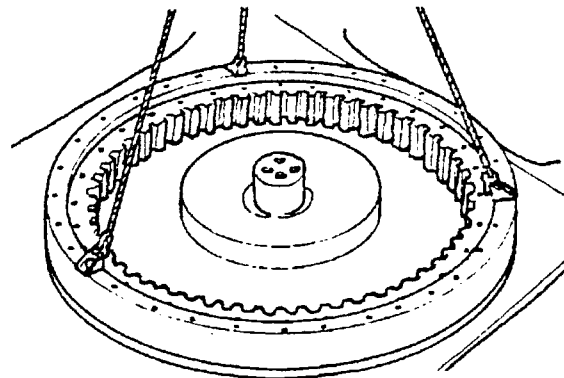
 : 24 mm



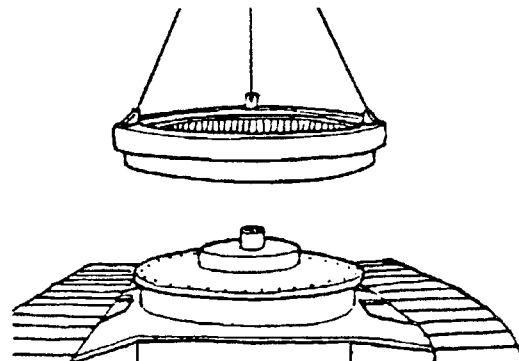
W105-03-01-002

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



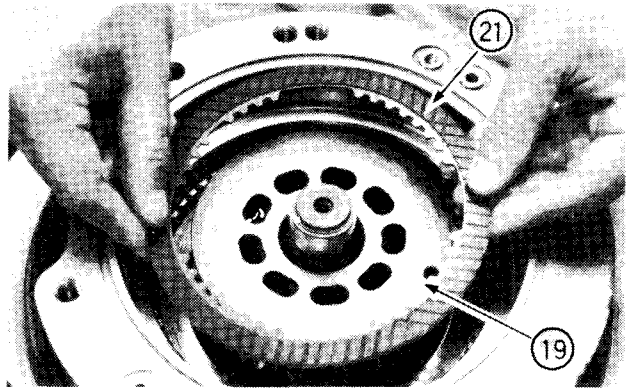
W105-03-01-004

W03-01-01

UNDERCARRIAGE / Travel Device

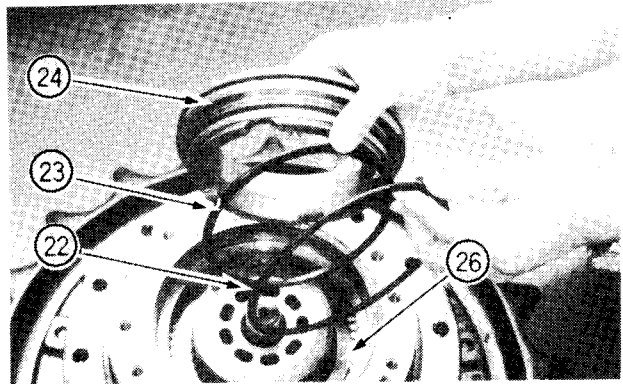
19. Install friction plates (21) onto rotor (19) with the splines and notches aligned.

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

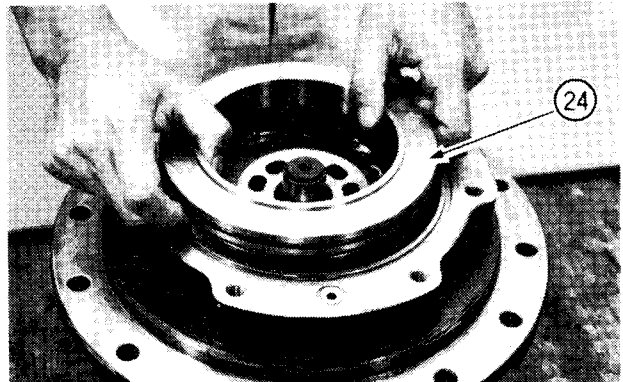


W105-03-02-128

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.

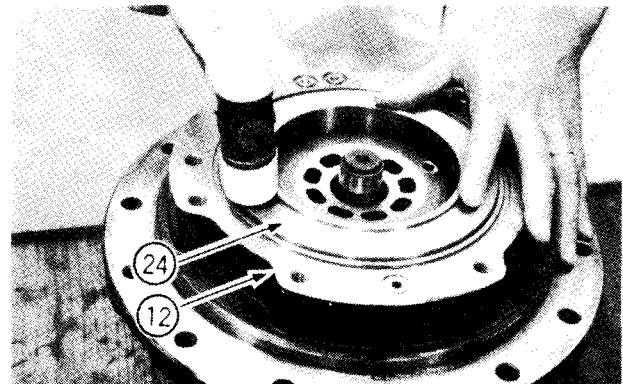


W105-03-02-129



W105-03-02-130

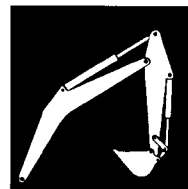
21. Install brake piston (24) into housing (12) using a plastic hammer.



W105-03-02-131

W03-02-38

SECTION 04 FRONT ATTACHMENT



CONTENTS

Group 01- Front Attachment

Remove and Install	
Front Attachment	W04-01-01
Maintenance Standard	W04-01-06

Group 02- Cylinder

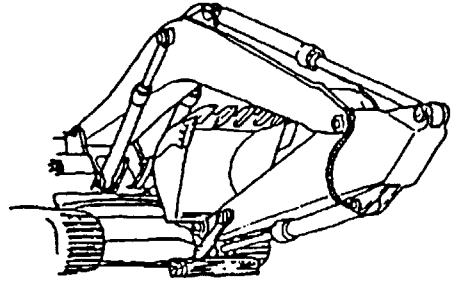
Remove and Install Cylinder	W04-02-01
Disassemble Cylinder	W04-02-14
Assemble Cylinder	W04-02-20
Maintenance Standard	W04-02-28

FRONT ATTACHMENT / Front Attachment

REMOVE AND INSTALL FRONT ATTACHMENT

Front Attachment Removal

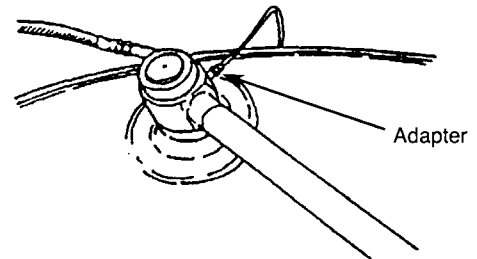
1. Place the excavator on ground.
Lower bucket to the ground.
Stop the engine.



W105-04-01-001

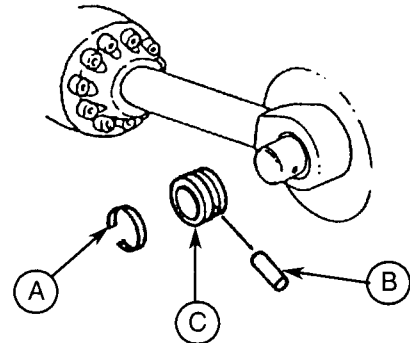
2. Disconnect lubrication hoses from both boom cylinder rod ends.

 : 19 mm




W105-04-01-002

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



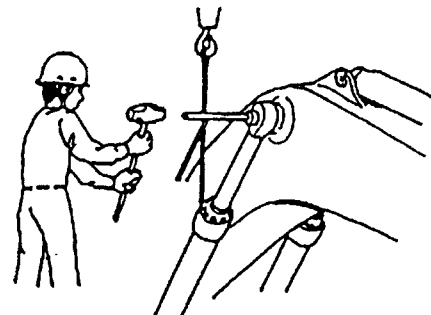
W105-04-01-003

-  **CAUTION:** Take care not injury from flying 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.

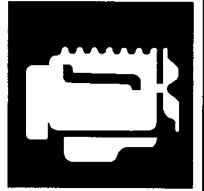
-  **CAUTION:** Boom cylinder weight: 107 kg (236 lb)



W105-04-01-004

W04-01-01

SECTION 06 ENGINE AND ACCESSORY



CONTENTS

Group 01- General Information

General Information	W06-01-01
Notes on the Format of Engine	
Section	W06-01-01
Main Data & Specifications	W06-01-05
Desing Features & General Outline	W06-01-09
Tightening Torque Specifications	W06-01-12
Anglular Nut & Bolt Tightening	
Method	W06-01-13
Major Parts Fixing Nuts & Bolts .	W06-01-15
Identifications	W06-01-26

Group 02- Maintenance

Lubricating System	W06-02-01
Fuel System	W06-02-02
Cooling System	W06-02-06
Valve Clearance Adjustment	W06-02-06
Injection Timing	W06-02-08
Compression Pressure	
Measurement	W06-02-14
Turbocharger Inspection	W06-02-15
Engine Repair Kit	W06-02-16
Recommended Lubricants	W06-02-18
Engine Oil Viscosity Chart	W06-02-18

Group 03- Engine Disassembly

External Parts	W06-03-01
Major Components	W06-03-09
Rocker Arm & Rocker Arm Shaft	W06-03-11
Cylinder Head	W06-03-12
Piston & Connecting Rod	W06-03-13

Group 04- Inspection & Repair

Cylinder Head	W06-04-01
Valve Guide	W06-04-02
Valve Spring	W06-04-05
Tappet	W06-04-06
Push Rod	W06-04-07
Rocker Arm Shaft & Rocker Arm	W06-04-07
Idler Gear & Idler Shaft	W06-04-08
Cam Shaft	W06-04-09
Cylinder Body & Liner	W06-04-10
Piston & Piston Ring	W06-04-15
Piston Pin	W06-04-16
Connecting Rod	W06-04-17
Crank Shaft	W06-04-19
Flywheel & Flywheel Housing ...	W06-04-27
Timing Gear Case Case Cover ..	W06-04-28

Group 05- Engine assembly

Piston & Connecting Rod	W06-05-01
Cylinder Head	W06-05-03
Rocker Arm & Rocker Arm Shaft	W06-05-07
Major Components	W06-05-08
External Parts	W06-05-18
Engine Tuning Operation	W06-05-25
Engine Section View	W06-05-27

Group 06- Lubricating System

General Description	W06-06-01
Oil Pump	W06-06-02
Main Oil Filter	W06-06-04
Oil Cooler	W06-06-06

Group 07- Cooling System

General Description	W06-07-01
Water Pump	W06-07-02
Thermostat	W06-07-07

Group 08- Fuel System

General Description	W06-08-01
Fuel Filter	W06-08-02
Injection Nozzle	W06-08-04
Injection Pump Calibration Data ..	W06-08-09

Group 09- Turbo Charger

General Description	W06-09-01
Identification	W06-09-02
Roter Shaft Play Inspection	W06-09-03

Group 10- Air Compressor

General Description	W06-10-01
Disassembly	W06-10-02
Inspection & Repair	W06-10-03
Assembly	W06-10-05

Group 11- Engine Electricals

Starter Motor	W06-11-01
Alternator	W06-11-06

Group 12- Troubleshooting

Hard Starting	W06-12-01
Unstable Low Idling	W06-12-05
Insufficient Power	W06-12-08
Excessive Fuel Consumption ...	W06-12-11
Overheating	W06-12-14
White Exhaust Smoke	W06-12-16
Darkish Exhaust Smoke	W06-12-17
Not Rising Oil Pressure	W06-12-18
Abnormal Engine Noise	W06-12-20

Group 13- Special Tool

Special Tool	W06-13-01
--------------------	-----------

ENGINE / General information

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

<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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.

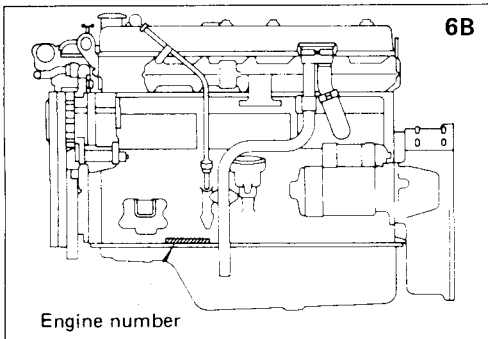
Removal of unnumbered parts is unnecessary unless replacement is required.

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.

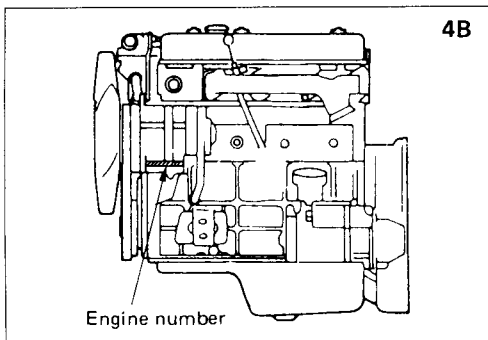
IDENTIFICATIONS



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

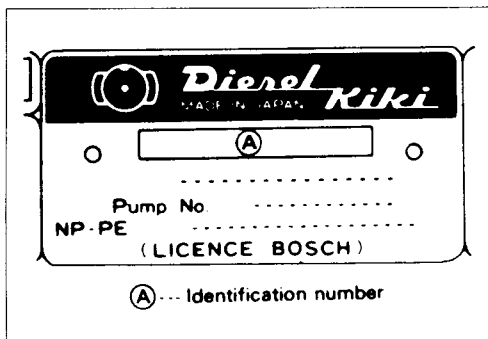
Injection volume should be adjusted after referring to the adjustment data applicable to the injection pump installed.

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.

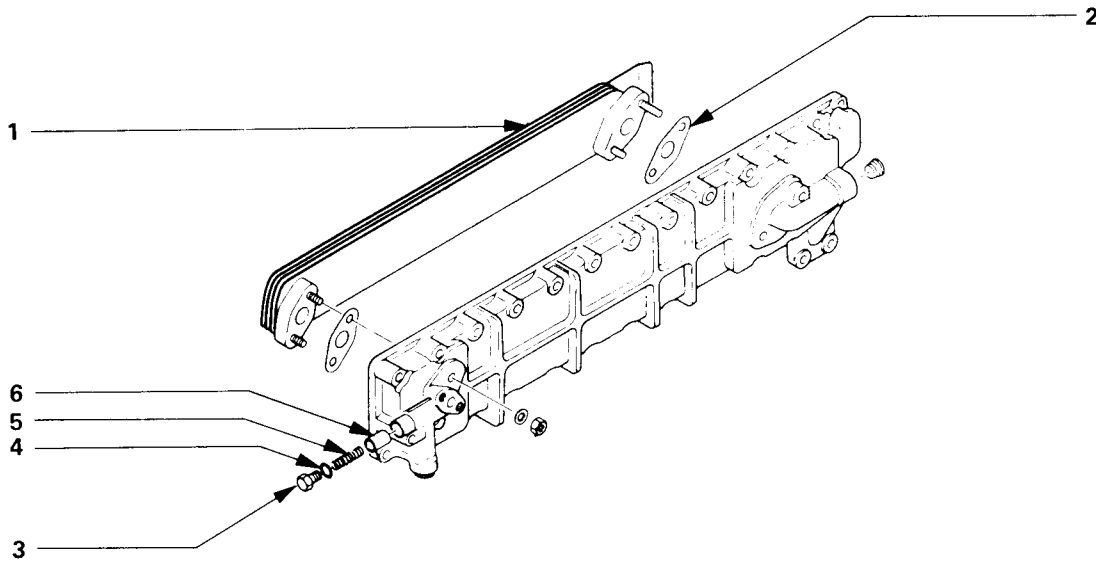
Applicable service data will vary according to the identification number. Use of the wrong service data will result in reduced engine performance and engine damage.



OIL COOLER



DISASSEMBLY



OK482

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.