GENERAL SAFETY INFORMATION

⚠ WARNING ⚠

Do not operate or perform any maintenance on this machine until all instructions found in the OPERATOR'S MANUAL and this MANUAL have been thoroughly read and understood.
Improper operation or maintenance of this machine may cause accidents and could result in serious injury or death.
Always keep the manual in storage.
If it is missing or damaged, place an order with an authorized our Distributor for a replacement.
If you have any questions, please consult an authorized our Distributor.

1. Most accidents, which occur during operation, are due to neglect of precautionary measures and safety rules. Sufficient care should be taken to avoid these accidents. Erroneous operation, lubrication or maintenance services are very dangerous and may cause injury or death of personnel. Therefore all precautionary measures, NOTES, DANGERS, WARNINGS and CAUTIONS contained in the manual and on the machine should be read and understood by all personnel before starting any work with or on the machine.
2. Operation, inspection, and maintenance should be carefully carried out, and safety must be given the first priority. Messages of safety are indicated with marks. The safety information contained in the manual is intended only to supplement safety codes, insurance requirements, local laws, rules and regulations.
3. Messages of safety appear in the manual and on the machine : All messages of safety are identified by either word of DANGER, WARNING and CAUTION.

   DANGER- Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury and is represented as follows:

⚠ DANGER ⚠

   WARNING- Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury and is represented as follows:

⚠ WARNING ⚠

   CAUTION- Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against possible damage to the machine and its components and is represented as follows:

⚠ CAUTION ⚠

4. It is very difficult to forecast every danger that may occur during operation. However, safety can be ensured by fully understanding proper operating procedures for this machine according to methods recommended by Manufacturer.
5. While operating the machine, be sure to perform work with great care, so as not to damage the machine, or allow accidents to occur.
6. Continue studying the manual until all Safety, Operation and Maintenance procedures are completely understood by all persons working with the machine.

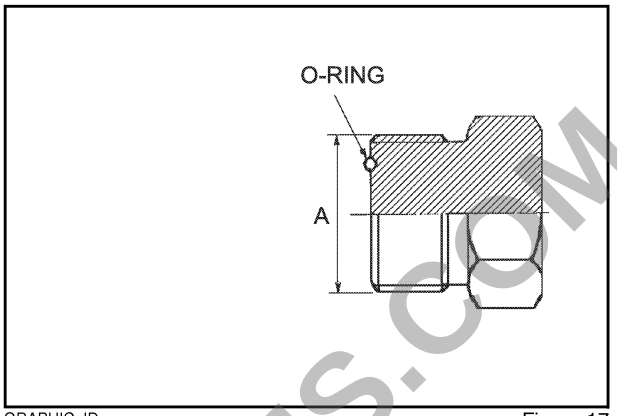
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4. Plug for ORS joints

Male

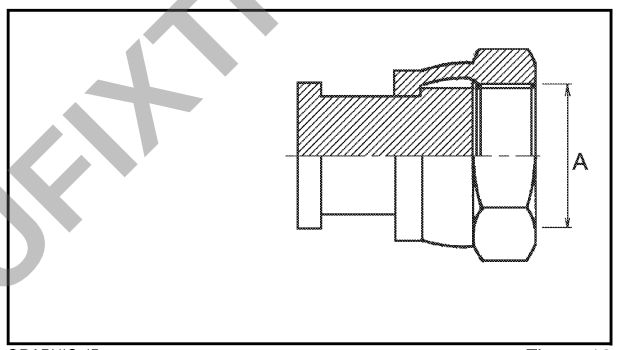
Screw size A	Hose O.D.	Plug parts No.	Opposing flats (Hex)	O-ring parts No.	Nominal O-ring
1-14 UNS	Ø21.7	YN01H01001P1	27	ZD12A01600	1B A16
1 3/16-12UN	Ø27.2	YN01H01002P1	36	ZD12A01800	1B A16
1 7/16-12UN	Ø34.0	YN01H01003P1	41	ZD12A02100	1B A21



GRAPHIC_ID Figure 17

Female

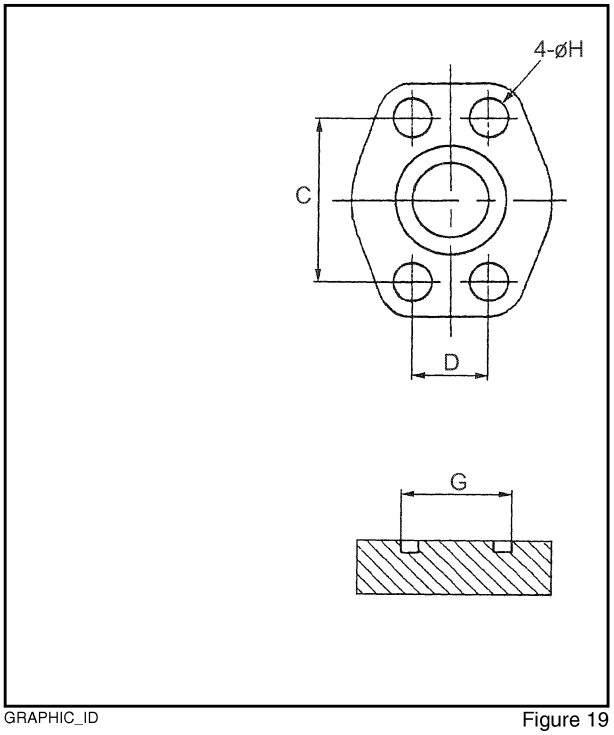
Screw size A	Applicable tube O.D.	Plug parts No.	Opposing flats (Hex)
1-14 UNS	Ø21.7	YN01H01004P1	32
1 3/16-12 UN	Ø27.2	YN01H01005P1	36
1 7/16-12 UN	Ø34.0	YN01H01006P1	41



GRAPHIC_ID Figure 18

5. Plug for half clamp

For standard pressure: 20.6 MPa (2990 psi)						
Size	Plug part No.	C mm (in.)	D mm (in.)	G mm (in)	H mm (in.)	O-ring part No.
1/2	ZE12Q08000	38.10 (1.50)	17.46 (0.69)	25.53-25.40 (1.00-0.99)	9	45Z91D2
3/4	ZE12Q12000	47.63 (1.875)	22.23 (0.875)	31.88-31.75 (1.26-1.25)	11	ZD12P02600
1	ZE12Q16000	52.37 (2.06)	26.19 (1.03)	39.75-39.62 (1.57-1.56)	11	ZD12P03400
1-1/4	ZE12Q20000	58.72 (2.31)	30.18 (1.19)	44.58-44.45 (1.76-1.75)	11	ZD12P03800
For high pressure: 41.2 MPa (5970 psi)						
Size	Plug part No.	C mm (in.)	D mm (in.)	G mm (in.)	H mm (in.)	O-ring part No.
1/2	ZE13Q08000	40.49 (1.59)	18.24 (0.72)	25.53-25.40 (1.00-0.99)	9	2445Z831D1
3/4	ZE13Q12000	50.80 (2.0)	23.80 (0.94)	31.88-31.75 (1.26-1.25)	11	ZD12P02600
1	ZE13Q16000	57.15 (2.25)	27.76 (1.09)	39.75-39.62 (1.57-1.56)	13	ZD12P03400
1-1/4	ZE13Q20000	66.68 (2.63)	31.75 (1.25)	44.58-44.45 (1.76-1.75)	15	ZD12P03800

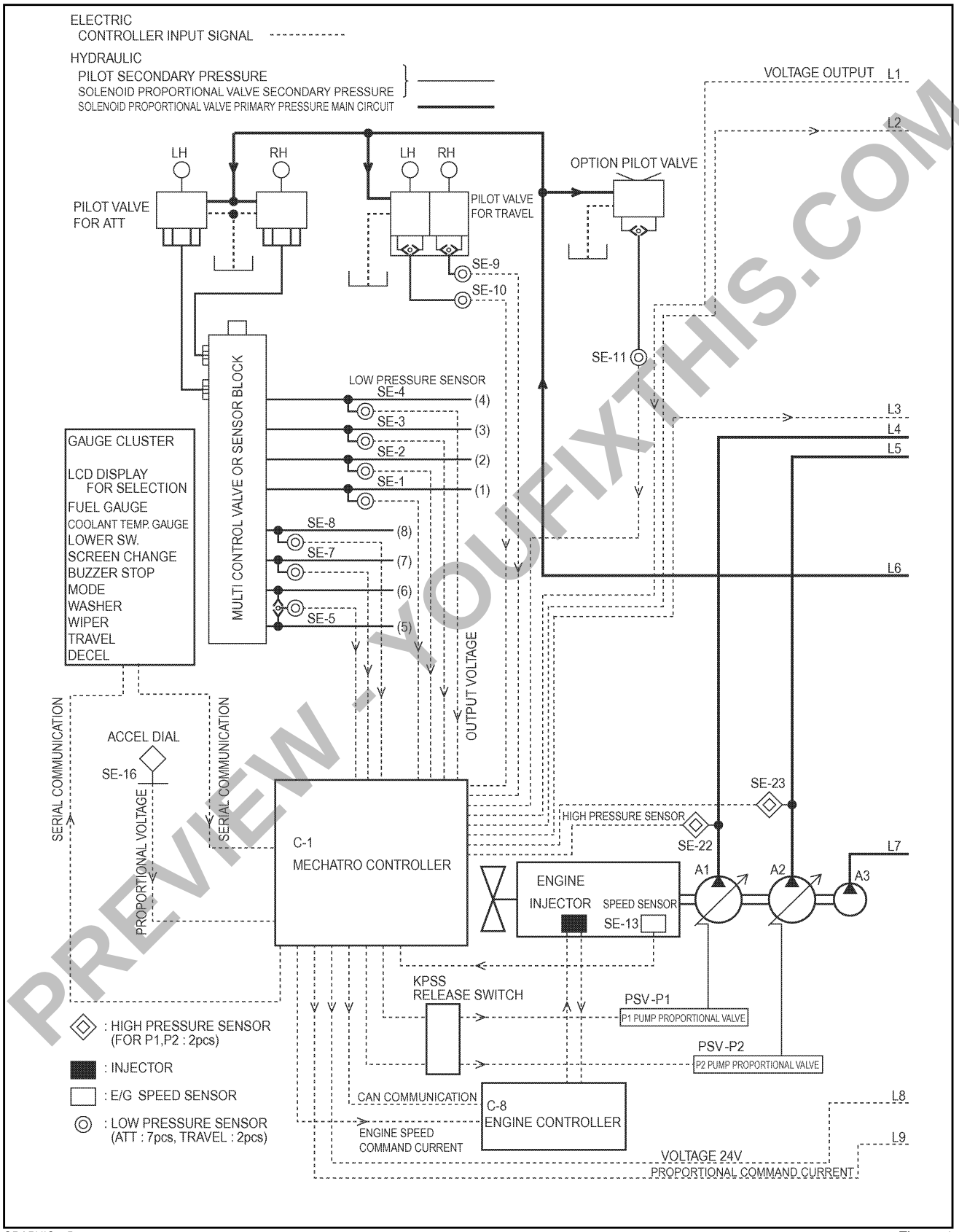


GRAPHIC_ID Figure 19

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SUMMARY OF MECHATRO CONTROL SYSTEM

Mechatro Control System In General



GRAPHIC_1D

Figure 1

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HYDRAULIC SYSTEM

SUMMARY

The hydraulic circuits are built up with the following functions and features in order to achieve easy operability, safety, mass volume handling and low fuel consumption.

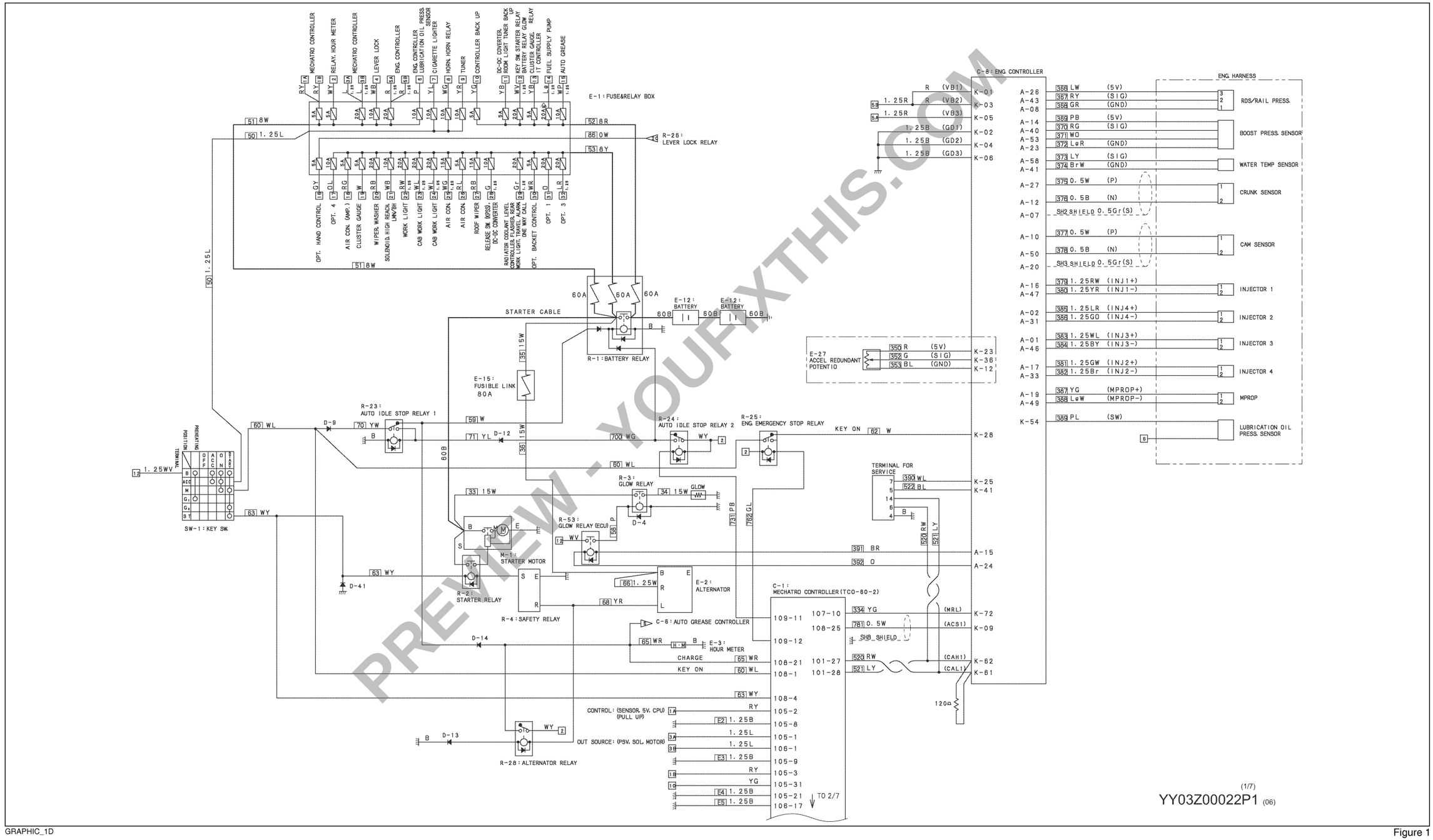
Performance	Device	Function	Features
Easy Operability And Safety	Travel	Travel straight	Travel straight at combined operation
		Travel 2-speed change & auto 1st (low) speed return	1-2 travel speed change and low speed/high torque at heavy duty
		Auto parking brake	Automatic braking when parking
		Motor overrun protection	Prevents overrunning of travel motor on the down hill slope
		Travel pilot operation	Prevents hunting by the built in travel shoddess mechanism
	Swing	Reverse rotation protective function	Easy positioning to protect it from swinging back when stops swinging
		Swing priority circuit (Simultaneous operation of arm in and swing motions)	Easy operation of stable swing speed, arm slanted leveling
		Automatic swing parking brake	Swing parking brake when operating at on a slope
		AB bypass valve function	Improvement of swing stop feeling
	Attachment	Hydraulic pilot control system	Light action with operating lever
		Pilot safety lock system	Cut out of pilot circuit by safety lock lever
		Lock valve (boom/arm)	Protect boom and arm from unexpected drop (natural fall)
		Boom/arm safety valve (option)	Prevention of boom and arm falling when boom head side and arm rod side pipings break
		Multi control valve (option)	Changeable to 4 operating pattern with 1 lever
	Others	Pressurized hydraulic oil tank	To prevent hydraulic oil from entering dust and to promote self suction ability of pump
		Suction strainer	Remove dust on suction side
		Line filter: pilot circuit	To prevent pilot operating circuit from malfunctioning
		Return circuit	To prevent hydraulic oil from contamination
		Cooling hydraulic oil by oil cooler	To prevent hydraulic oil from being deteriorated
		Pressure draining circuit	To release the main circuit pressure for piping repair work
		Main control valve with optional valve	Optional piping and additional work are easy
		Switching of return line for N&B machine in the cab (opt)	Switching of return line for N&B machine is able to change with a switch in the cab
Mass Handling capability	Pump	Electric flow controlled variable displacement pump	Pump delivery rate control by a current command to the solenoid proportional valve of the variable displacement pump
		Positive flow rate control	Flow control by positive pilot control pressure
	Attachment	Boom up conflux circuit	Speed up of boom up operation
		Arm conflux circuit	Speed up of arm operation
		Optimum operation by work mode select (H,S,A,B0	Efficient operation in all work modes
Low fuel Consumption	Micro computer	Auto accel	Reduce fuel consumption and noise by lowering engine speed when control lever is in neutral position.

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SECTION 3 - SYSTEMS
CHAPTER 3 - ELECTRIC SYSTEM

ELECTRIC CIRCUIT DIAGRAMS



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GRAPHIC_1D

Figure 1

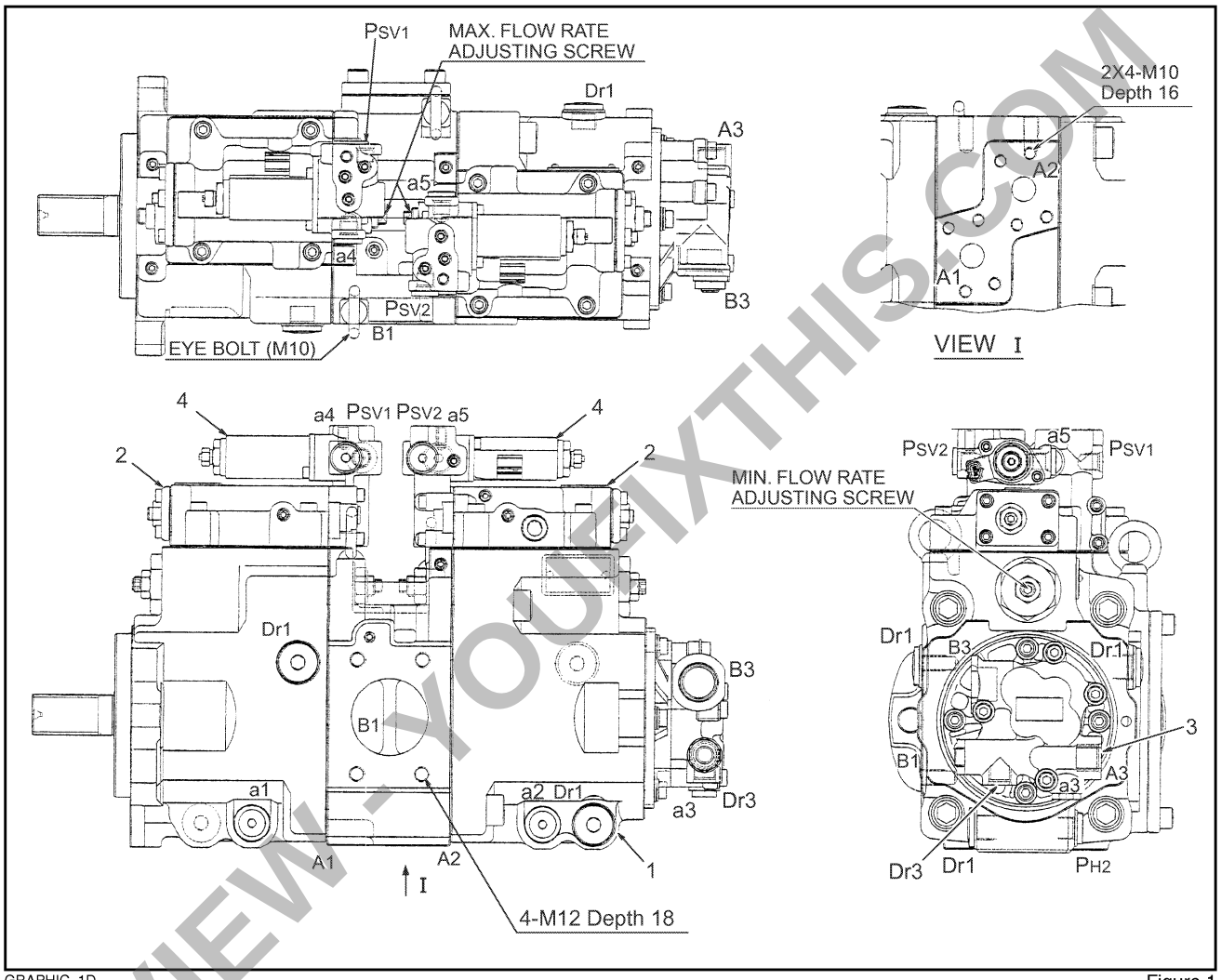
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HYDRAULIC COMPONENTS

HYDRAULIC PUMP - REGULATOR

Summary

1. Outside view and Hydraulic port



GRAPHIC_1D

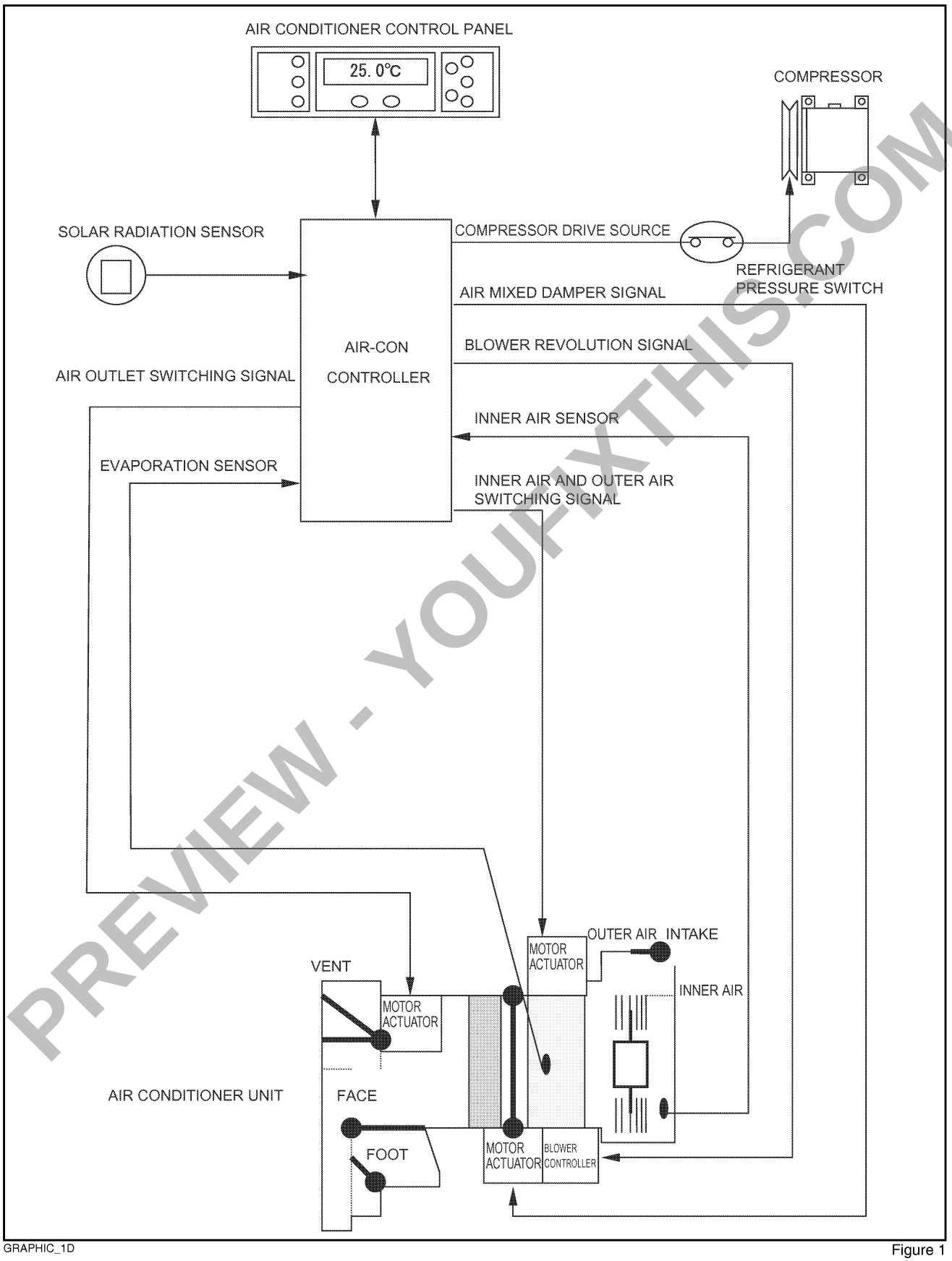
Figure 1

Hydraulic ports		
Code	Ports Name	Size
A1,2	Delivery port	SAE 6000 psi 3/4 in.
B1	Suction port	SAE 2500 psi 2 1/2 in.
Dr1	Drain port	PF 1/2-19
Psv1,2	Servo assist port	PF 1/1-13
PH1,2	Pressure sensor port	PF 3/8-17
a1,a2	Gauge port	PF 1/4-15
a3	Gauge port	PF 1/4-14
a4,a	Gauge port	PF 1/4-13
A3	Delivery port of gear pump	PF 1/2-19
B3	Suction port of gear pump	PF 3/4-20.5
Dr3	Drain port of gear pump	PF 3/8-15

No.	Parts	Qty
1	Main pump assy	1
2	Regulator assy	2
3	Gear pump	1
4	Solenoid proportional reducing valve	2

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AUTO AIR CONDITIONER SYSTEM OUTLINE



GRAPHIC_1D

Figure 1

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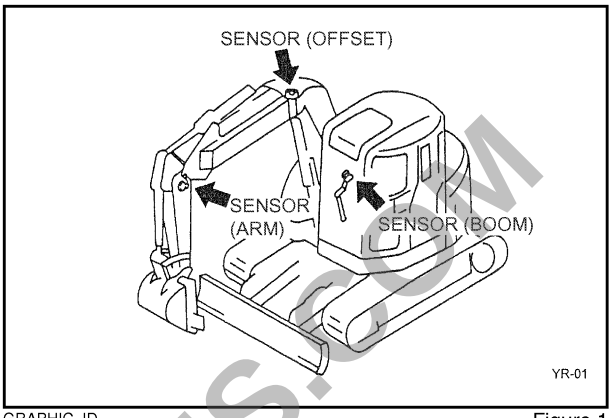
CAB INTERFERENCE PREVENTION SYSTEM

OUTLINE AND FUNCTIONS

Outline

(1)When the bucket is closing to the interference area, the display of interference prevention appears. And the motion of bucket stops automatically.
This cab interference prevention system has following 5 functions.

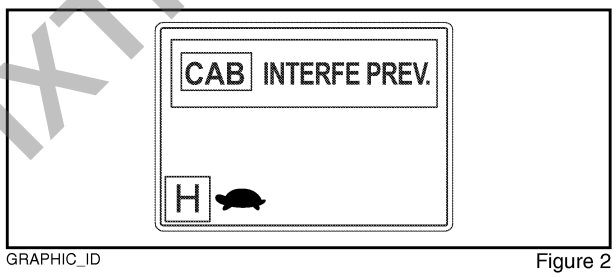
1. Cab interference prevention function.
2. Height/depth display function.
3. Height limitation function.
4. Depth limitation function.
5. Off-set L/H limitation function.



GRAPHIC_ID Figure 1

Cab Interference Prevention Equipment

(1)Operation
When the bucket is in the cab interference area and the starter switch key is turned ON or START, the right display appears. This display means that the cab interference prevention system is working properly.
Even if the switch is not pressed, this function is normally on.

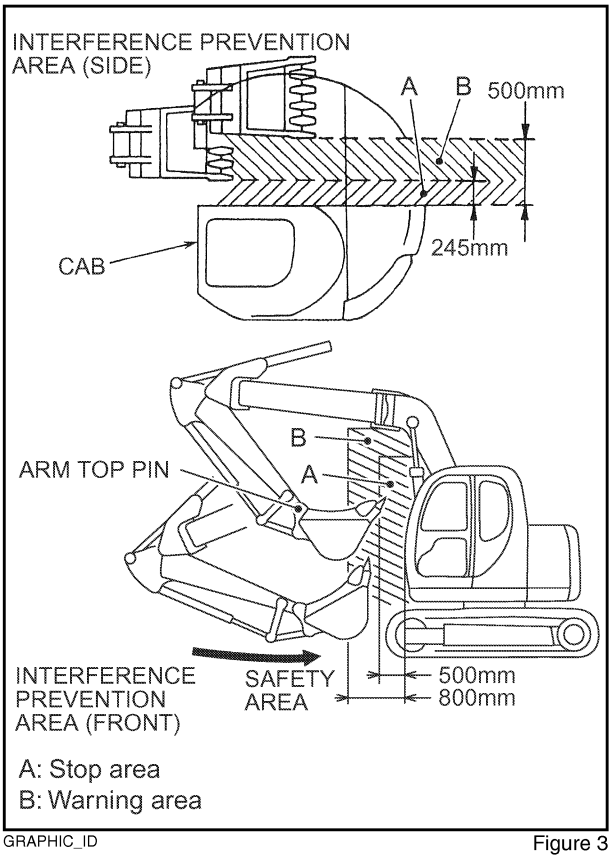


GRAPHIC_ID Figure 2

1. Movement of "B" area
When attachment is closing to cab, and bucket teeth enter warning area "B", operator will be noted by intermitted warning buzzer and machine speed will be reduce.
2. When bucket teeth is closing to stop area "A", operator will be alerted by continuous warning buzzer, and machine is automatically stopped. Warning buzzer will be stopped after 5 seconds.

NOTE: *Travel/swing / dozer blade / offset (R/H) / boom lower / arm out are not automatically stopped. Offset (L/H) will be automatically stopped when the bucket is closed to 245 mm (9.65 in.). Arm in and boom up will be automatically stopped too.*

NOTE: *Stopping position of attachment is based on arm top pin position. The nearest distance between bucket teeth and cab is shown In right figure.*

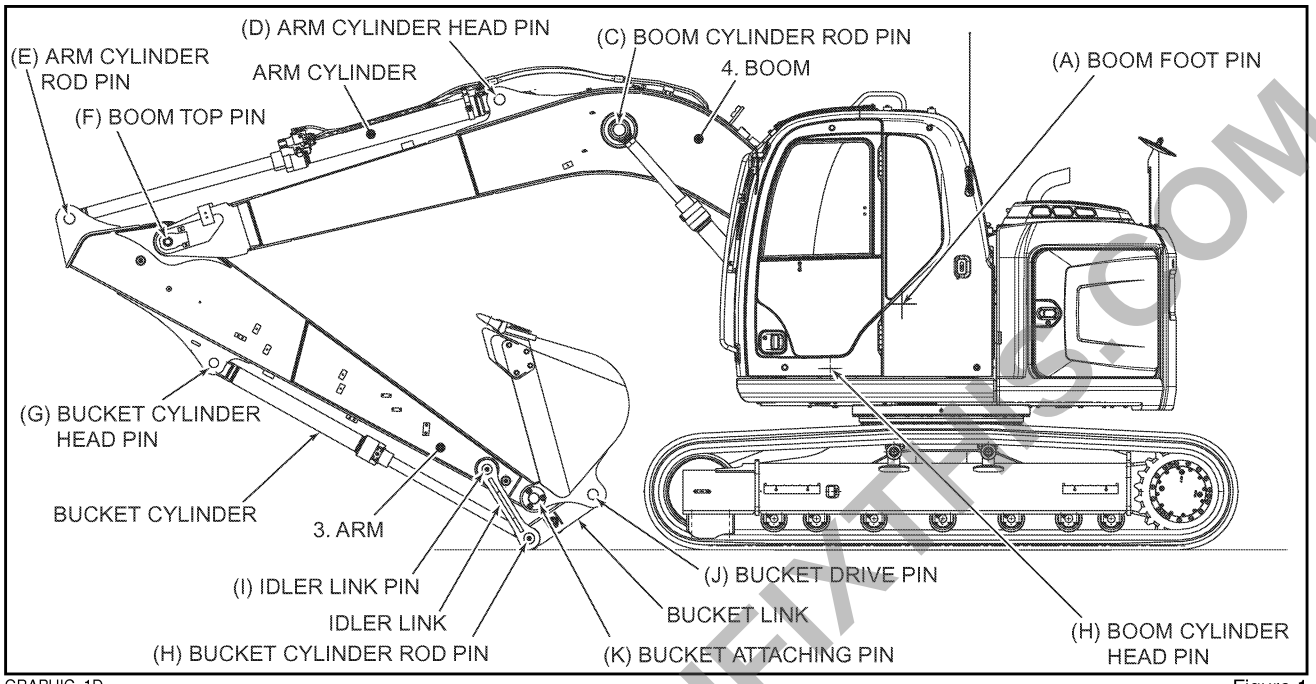


GRAPHIC_ID Figure 3

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REMOVING AND INSTALLING

ATTACHMENT ASSEMBLY



GRAPHIC_1D

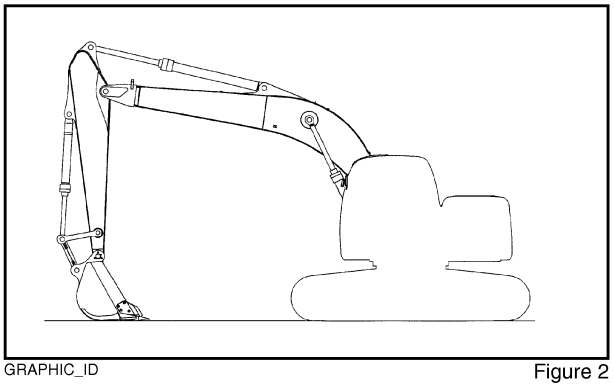
Figure 1

1	Bucket Link	D	Arm Cylinder Head Pin
2	Idler Link	E	Arm Cylinder Rod Pin
3	Arm	F	Boom Top Pin
4	Boom	G	Bucket Cylinder Head Pin
5	Arm Cylinder	H	Bucket Cylinder Rod Pin
6	Bucket Cylinder	I	Idler Link Pin
A	Boom Foot Pin	J	Bucket Drive Pin
B	Boom Cylinder Head Pin	K	Bucket Attaching Pin
C	Boom Cylinder Rod Pin		

BUCKET

Removing Bucket

1. Put the machine in position to remove bucket.



GRAPHIC_ID

Figure 2

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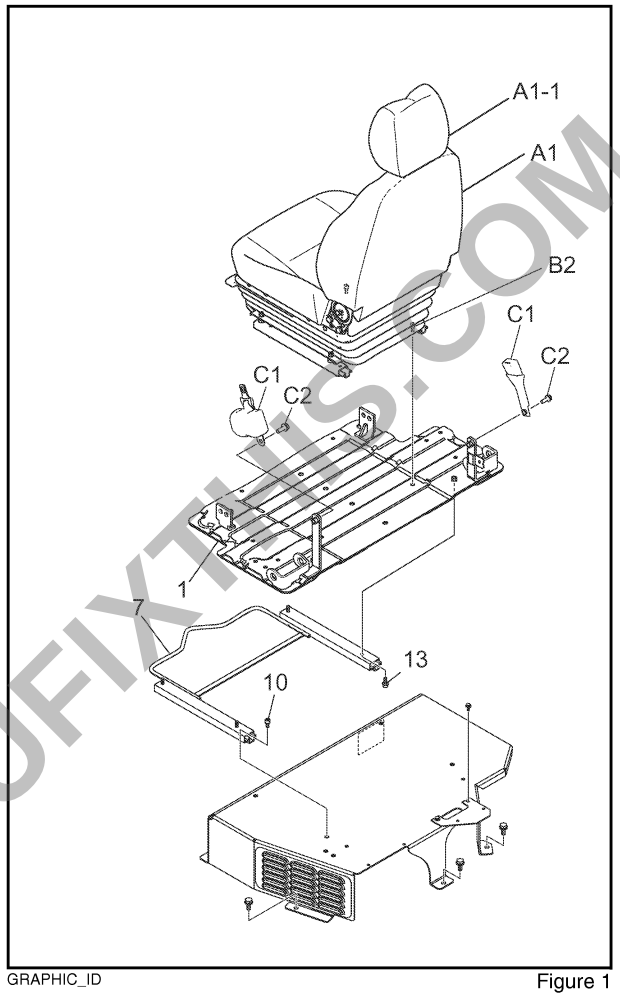
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REMOVING AND INSTALLING

OPERATOR SEAT

Removal

1. Preparation for removal
   A. Remove the head rest (A1-1) of the operator's seat (A1) to ease handling.
   B. Move the whole control stand to its foremost position.
   C. Move the operator's seat to its forward end.
   D. Incline the reclining seat as forward as possible.
2. Remove operator's seat. (Include upper rail.)
   A. With the above-mentioned condition, remove two cap screws (B2) M8×20 from the upper rail. Then move the control stand to its rear most end and remove two capscrews (B2) M8×20.
   B. Remove the operator's seat, about 28kg (62 lbs).
   Carry out the following operations as required.
   C. Remove seat belt (C1).
   D. Remove armrest (A3)(A4).
   E. Remove bracket assy (1), rail (7).



GRAPHIC_ID Figure 1

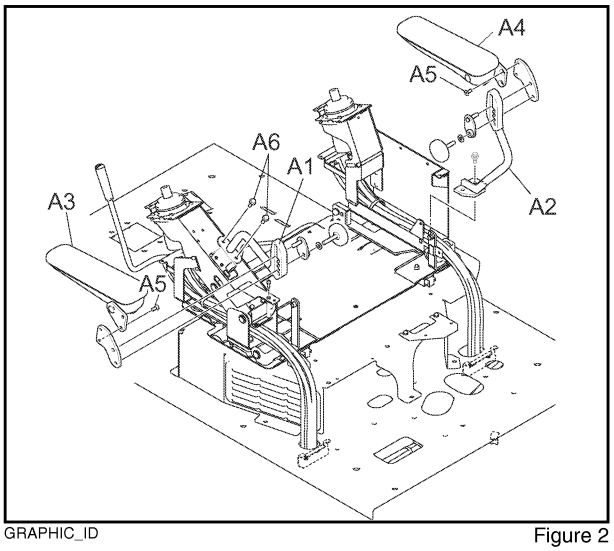
DISASSEMBLING AND ASSEMBLING SEAT

Installation

Install it in reverse procedure of removing according to the tightening torque table.

Tightening position	Allen Wrench Hex (mm)	Tightening torque Nm (pound-ft)
Capscrew (B2)	6	23.5 (17.3)
Sems bolt (C2)	17	46.1 (34)
Capscrew (A5)	13	23 (17)
Sems bolt (A6)	13	23 (17)

Reference : Movement on rail
Upper rail …… Fixed on lower surface of seat
[Forward 80mm (0.26in), backward 80mm (0.26in)]
Lower rail …… Fixed on seat stand.
[Forward 60mm (0.19in), backward 60mm (0.19in)]
Amount of adjustment of seat height
[Up; 23mm (0.07in), down; 37mm (0.16in)]
Suspension stroke
[Up; 37.5mm (1.48in), down; 37.5mm (1.48in)]



GRAPHIC_ID Figure 2

DISASSEMBLING AND ASSEMBLING ARMREST

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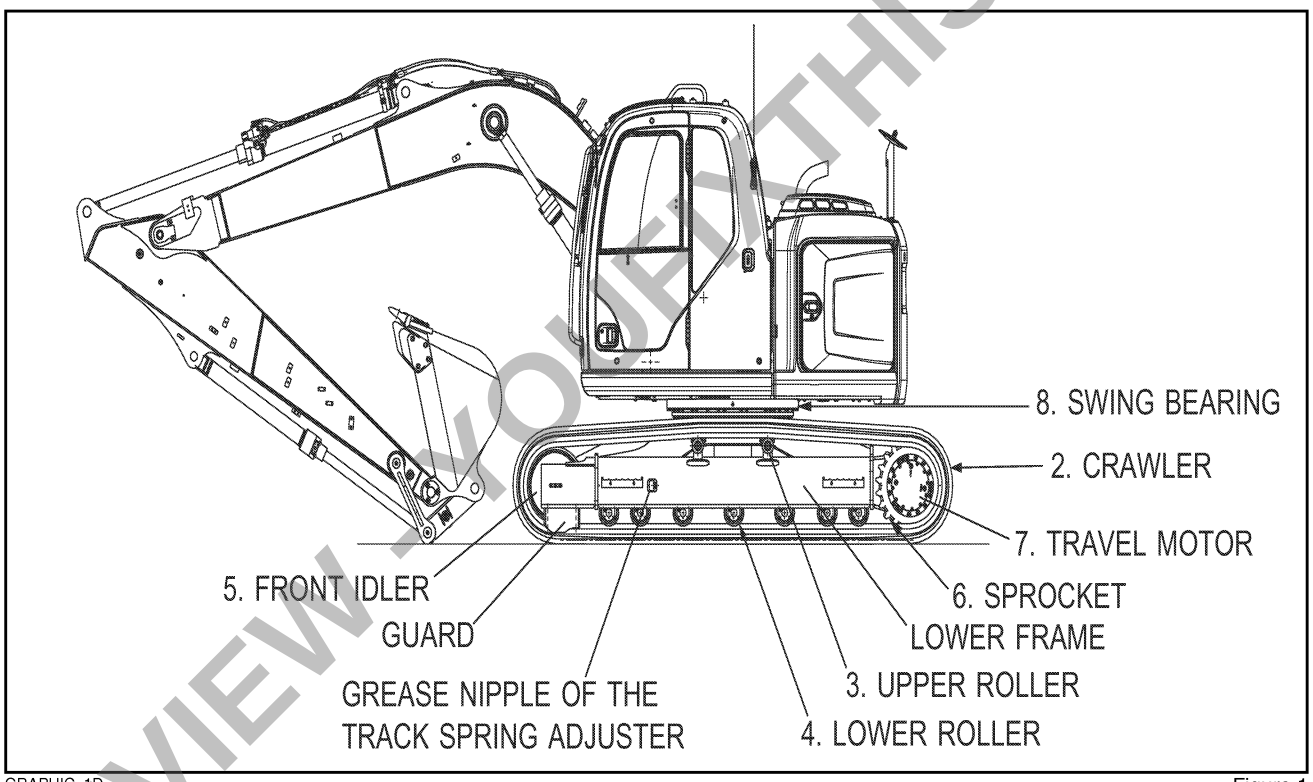
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TRAVEL SYSTEM

PREFACE

1. This Manual describes all the procedures from removing to attaching, arranging them by item.
2. This Manual consists of: Removal and Installation and Disassembling and Assembling.
3. The removing and attaching can be performed in the procedure specified in Table of Contents, but in view of actual repairing or time saving some process can be omitted.
4. The removing and attaching procedure does not completely cover all possible situations because of differences of field condition and defective section.
5. Please be aware that the procedure to be followed must be determined according to the above conditions. When disassembly and assembly are required, select the necessary section, itemize the work contents with good understanding, then starts working.

TRAVEL SYSTEM



GRAPHIC_1D

Figure 1

1. GREASE NIPPLE OF THE TRACK SPRING ADJUSTER
2. CRAWLER
3. UPPER ROLLER
4. LOWER ROLLER
5. FRONT IDLER
6. SPROCKET
7. TRAVEL MOTOR
8. SWING BEARING
9. GUARD
10. LOWER FRAME

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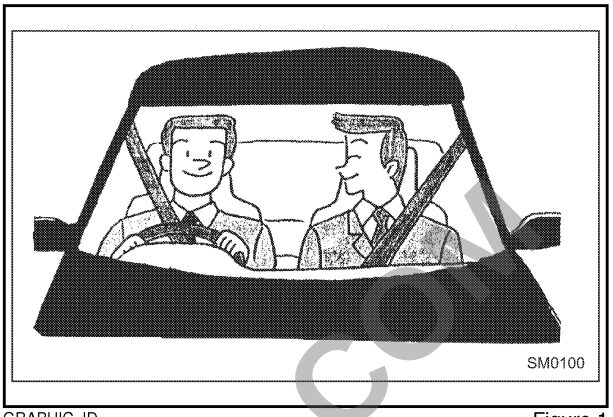
TROUBLESHOOTING OUTLINE

Troubleshooting provides process locating for the cause of trouble in the order that trouble occurred. This manual describes how to solve the specific phenomenon systematically as early as possible. For troubleshooting concerning the inside of equipment, refer to troubleshooting for each manual of equipment.

JUDGMENT OF ACTUAL EQUIPMENT AT SITE

Get to the Site as Quickly as Possible

Verify model, serial number, situation of trouble and field, and notify person of arrival time.



GRAPHIC_ID Figure 1

ATTENDING THE FIELD TO VERIFY ACTUAL THING

Verify Background of Trouble Occurred

1. Model name and serial number
2. Kind of attachment.

   Check that the combination of attachment is proper or that the operating method is not unreasonable.
3. Operating time by hour-meter
4. History of trouble occurred and additional works.
5. Recurrence of past trouble, or problems on the additional works.

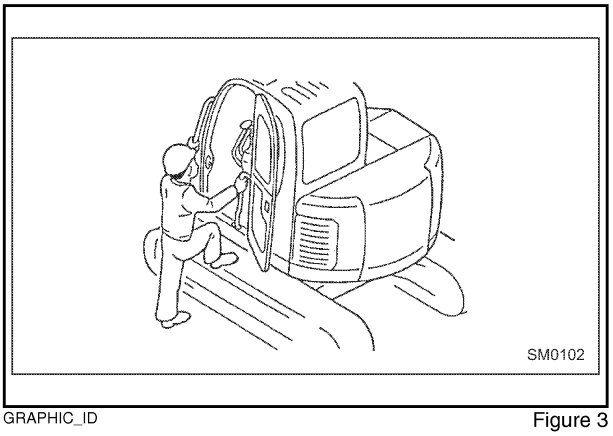


GRAPHIC_ID Figure 2

VERIFYING BACKGROUND OF TROUBLE OCCURRED

How to Diagnose Trouble

1. Verify defective part
2. Make the condition of trouble again
3. Where defective parts can not be verified, surmise causes systematically.
4. Verify reasons for surmise
5. Report methods, procedure, and period for repairing to user.



GRAPHIC_ID Figure 3

CONFIRM THE SYMPTOMS OF THE TROUBLE

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How to use this manual

This service manual consists of several Groups, which are arranged so as to allow you to make reference quickly to specifications, maintenance standards, adjustment procedures and service procedures including methods for disassembly, inspection, repair and reassembly of the Mitsubishi Diesel Engine (standard model for land use).
A short summary describing the content of each Group is given in the General Contents page, and there is also a detailed table of contents at the beginning of each Group.
Regarding the procedures for operation and periodical maintenance of the engine, refer to the Operation and Maintenance Manual. For information on the engine components and ordering of service parts, refer to the Parts Catalogue. Structure and function of the engine are described in the relevant training manuals.

Methods of presentation

(1) Index numbers allotted to parts in exploded views are not only a call-out of part names listed in the text but also an indication of the sequence of disassembly.
(2) Inspections to be conducted during disassembly process are indicated in boxes in the relevant exploded views.
(3) Maintenance standards required for inspection and repair works are indicated in the appropriate positions in the text. They are also collectively indicated in Group 2, the General Contents group.
(4) Fasteners to be tightened in “wet” condition, or with engine oil applied, are identified by [Wet] placed after tightening torque values. If no such indication is suffixed, the fastener should be tightened in “dry” condition, or without lubricating with engine oil.
(5) In this manual, important safety or other cautionary instructions are emphasized with the following marks headed.

DANGER

Indicates an immediately hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates an immediately hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, can result in property damage.

Note:

Emphasizes important matter, or indicates information useful for operation or maintenance of the engine.

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140SR ACERA SERVICE MANUAL

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CHAPTER 3

140SR ACERA EXCAVATOR TIER 3

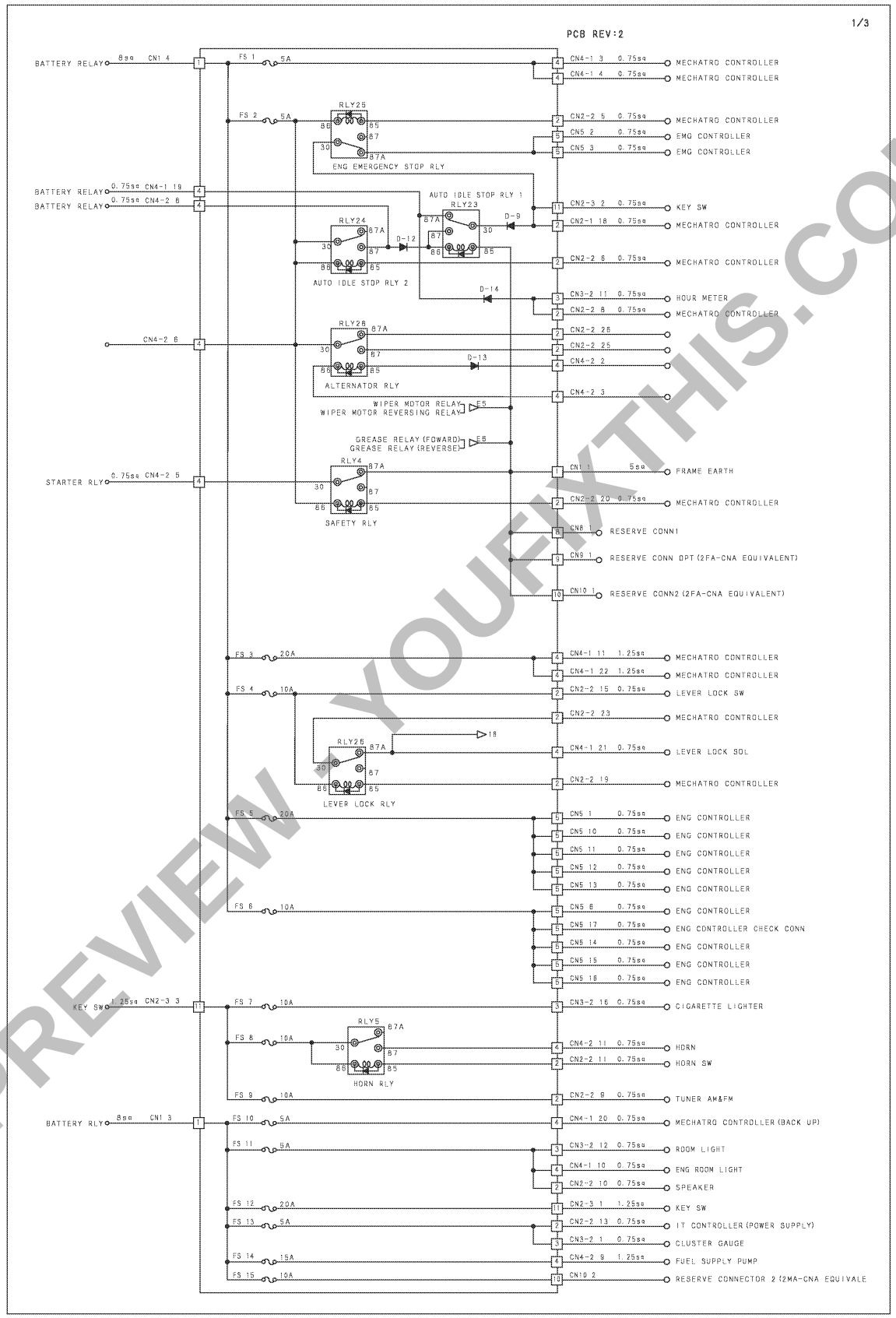
MAINTENANCE STANDARD AND TEST PROCEDURE

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2. Circuit diagram

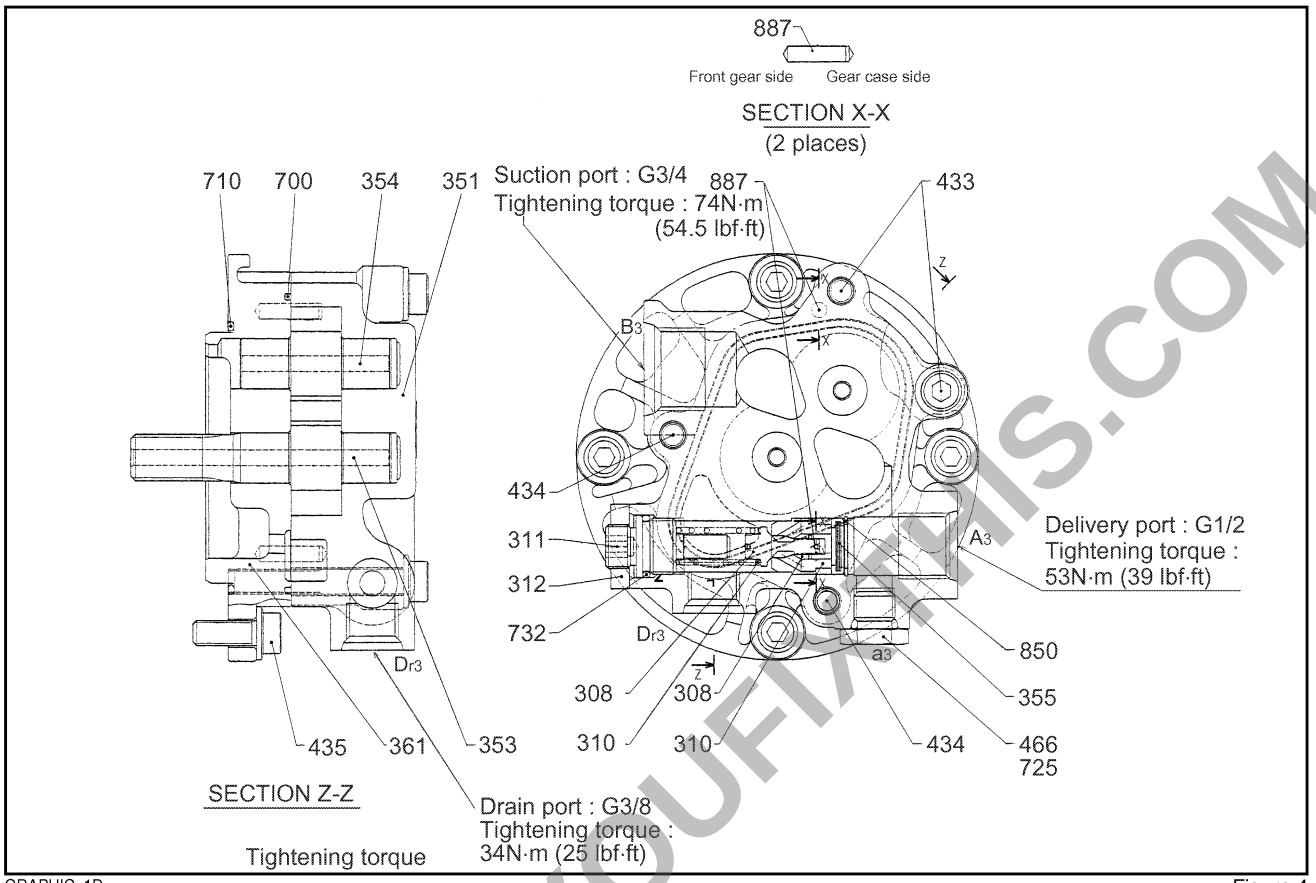


GRAPHIC_1D

Figure 58

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2. Gear pump (For pilot)



GRAPHIC_1D

Figure 4

NO.	PARTS	QTY	NO.	PARTS	QTY
307	Poppet	1	433	Flange socket; M8×40	2
308	Seat	1	434	Flange socket; M8×55	2
309	Ring	1	435	Flange socket; M8×20	4
310	Spring	1	466	VP plug ; PF1/4	1
311	Adjust screw	1	700	Ring	1
312	Lock nut ; M14×1.5	1	710	O-ring	1
351	Gear case	1	725	O-ring ; 1B P11	1
353	Drive gear	1	732	O-ring ; 1B P16	1
354	Driven gear	1	850	Locking ring	1
355	Filter	1	887	Pin	2
361	Front case	1			

Item No.	Thread size	Tightening torque
		Nm (pound-ft)
312	M14x1.5	29 (21)
433,434	M8	17 (13)
435		
466	PF 1/4	16 (11)

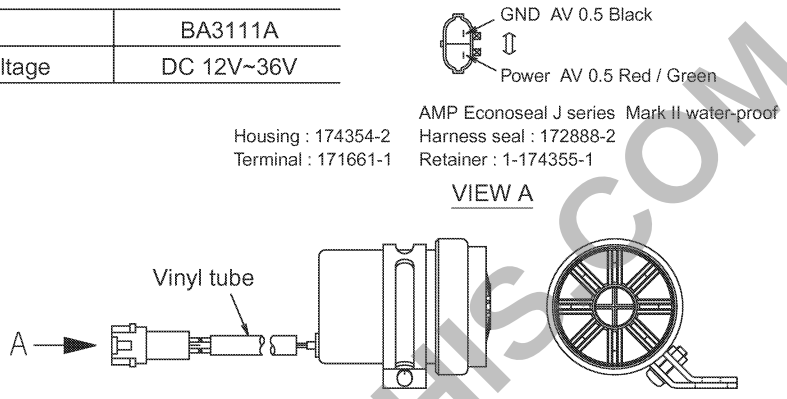
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File No. Name of part Part No. Use Applicable Machine	Specification	Description

E - 13
Alarm
YN53S00004F1
Travel alarm

YN11 - 45001 ~
YQ11 - 06001 ~
LC10 - 07001 ~
YC10 - 03501 ~
YF05 - 02001 ~
YU05 - 02001 ~
YY05 - 12001 ~
YH05 - 07001 ~

Model	BA3111A
Rated voltage	DC 12V~36V

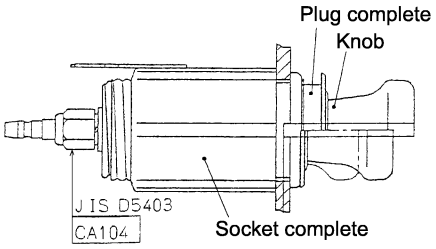


GRAPHIC_1D
Figure 120

E - 14
Cigarette lighter
YN81S00003P1
Cigarette lighter

YN11 - 45001 ~
YQ11 - 06001 ~
LC10 - 07001 ~
YC10 - 03501 ~
YF05 - 02001 ~
YU05 - 02001 ~
YY05 - 12001 ~
YH05 - 07001 ~

Model	409137-0000A
Rated voltage	DC 24V
Max. current	5A
Recovery time	Less than 18sec
Insulation resistance	More than 3MΩ /500V megger
Thermal fuse	Fusing temp.180~250℃



GRAPHIC_1D
Figure 121

E - 15
Fusible link
YY73S00003P1
Fuse

YY05 - 12001 ~
YH05 - 07001 ~

Type	Slow blow fuse
Allowable current	80A

GRAPHIC_1D
Figure 122

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CHAPTER 1

140SR ACERA EXCAVATOR TIER 3

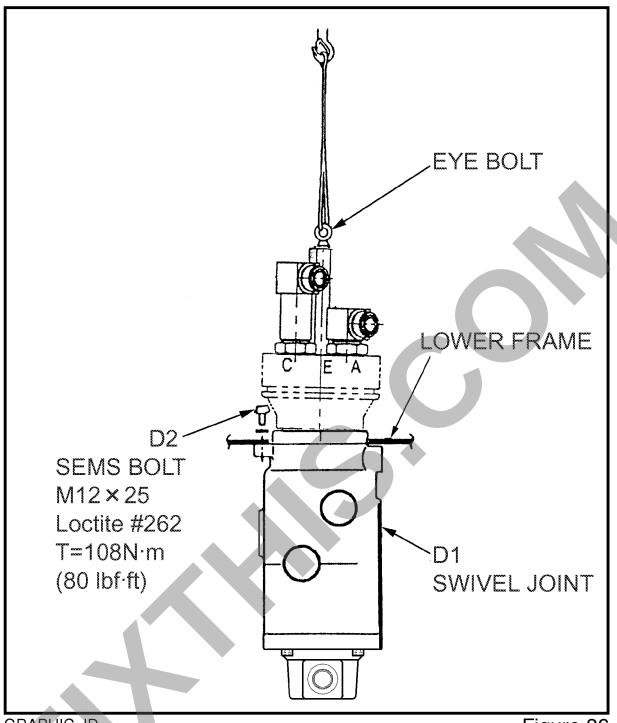
ATTACHMENTS

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6. Remove sems bolts for installation
   Attach eye bolt, lift it up temporarily, and remove 3 sems bolts (D2) M12×25.
   (See SPECIAL TOOLS No.9 Plug)
7. Slinging the swivel joint
   Weight : Approx. 63kg (139 lbs)



GRAPHIC_ID Figure 86

Installation

1. Installing is done in the reverse order of removing.
   Piping tightening torque

Size PF	Tool Hex	Tightening torque Nm (pound-ft)	
		O-ring type connector	Hydraulic hose
1/4	19	36 (27)	29 (22)
3/8	22	74 (54)	49 (36)
1/2	27	108 (80)	78 (58)
3/4	36	162 (120)	118 (87)
1	41	255 (180)	137 (100)
1-14UNS	32	-	137 (100)

2. Check for oil leak and the hydraulic oil level.
3. Check for operating.

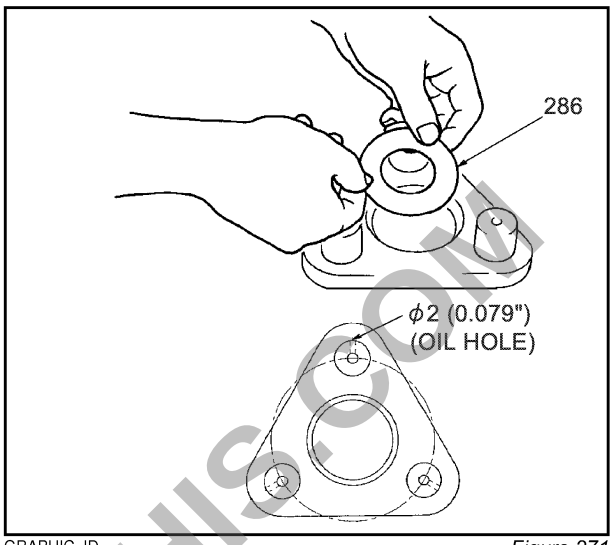
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D. After removing three No.1 planetary gears (210), remove thrust washer (286) in the center.

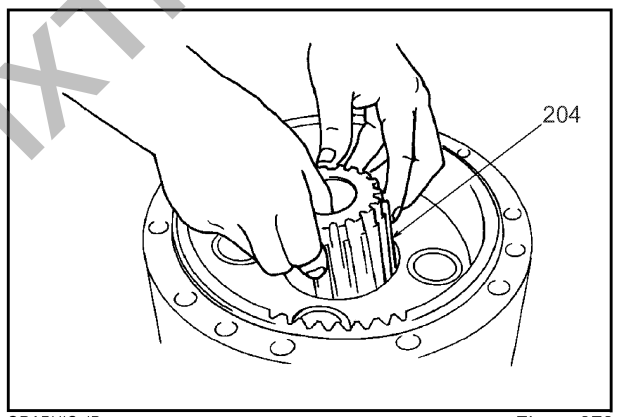
NOTE: *Do not remove No.1 pin (283) from No.1 carrier (231) unless there is anything wrong.*

If the No.1 pin is removed, you need a special caulking tool at assembly.
However, make sure that the ø2 (0.079in) oil hole of No.1 pin (283) is directed outwards with respect to the center of No.1 carrier (231).



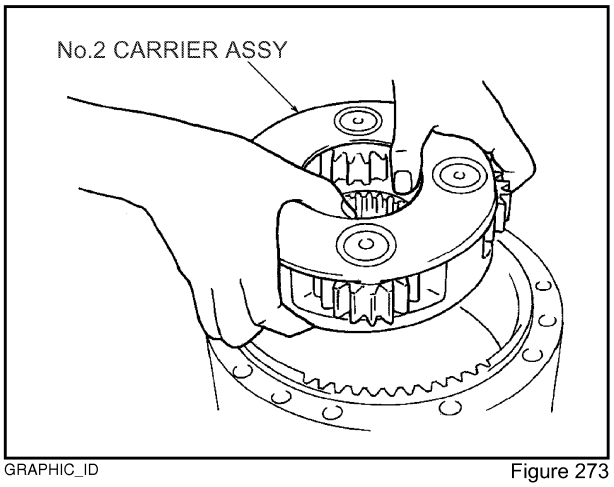
GRAPHIC_ID *Figure 271*

6. Remove No.2 sun gear (204)



GRAPHIC_ID *Figure 272*

7. Remove No.2 carrier assy



GRAPHIC_ID Figure 273

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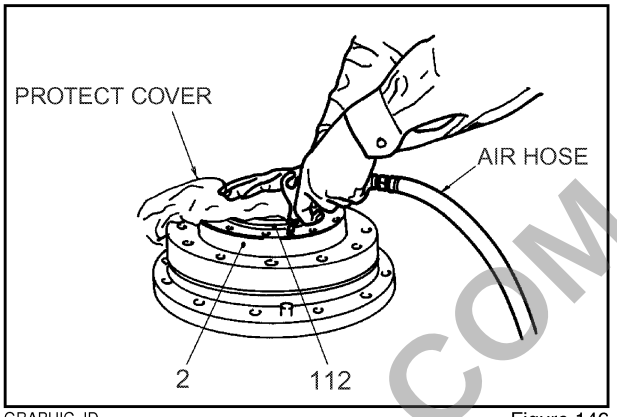
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19. Disassembling parking brake

⚠ CAUTION ⚠

The sudden blowing of compressed air may cause parts to fly out incurring the danger of injury. Cover piston (112) for protection.

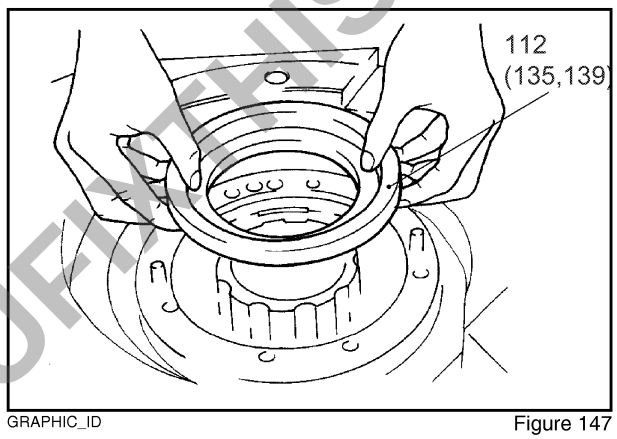
A. Blow jet air into the passage hole for the parking brake of the spindle (2) and remove the piston (112) from the spindle (2).



GRAPHIC_ID Figure 146

B. Remove O-ring (135),(139) from piston (112).

NOTE: *Do not reuse removed O-ring (135), (139).*



GRAPHIC_ID Figure 147

20. Disassembling the hydraulic motor section

NOTE: *When placing the travel motor on its side, oil spills ; place a container under the travel motor.*

A. Lay down the travel motor turning 90 degrees.

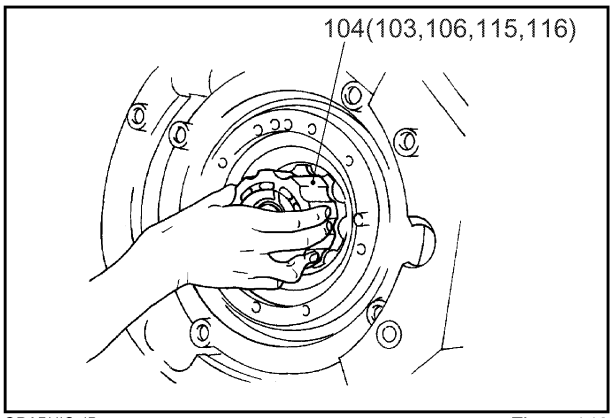
B. Drain out the oil of the travel motor.

C. Hold cylinder block (104) by hand, turn it both ways a few times alternately and separate shoe (106) from swash plate (103).

NOTE: *If cylinder block (104) is drawn out in that condition, shoe (106) stays with swash plate (103). Then parts (pistons, shoes, etc.) attached to cylinder block (104) come off from cylinder block (104) and fall into spindle (2). Care should be used about it.*

D. Hold the cylinder block (104) and remove the shaft (102).

NOTE: *Also, friction plate (115) and separator plate (116) are also removed with cylinder block (104).*

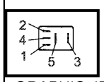


GRAPHIC_ID Figure 148

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Table 93

Error code		R174		
Trouble		Engine forcibly stop relay error		
Judging condition		The mechatro controller output line to engine forcibly stop is short-circuited with the power source.		
Symptom		When key switch is turned off but engine does not stop. Engine auto idle stop function does not actuate.		
Control in the event of failure		Relay output is stopped.		
Returned in normal condition		When the power is OFF		
Service diagnosis checking screen		Screen No.	4	K-3 ENG STOP
		Screen No.		
		Screen No.		
Checking object				Checking contents and remedy
1	Engine forcibly stop relay R-25			When error is cancelled after removing of engine forcibly stop relay, check relay unit for failure, replace it with new one if failed. When resistance between relays (1) and (2) is 0 Ω, it is in abnormal condition.  GRAPHIC_ID Figure 13
2	Wiring between engine forcibly stop relay and controller CN-109F, CN2-2 Fuse & relay box E-1			When R174 is left displayed with the relay removed Check that no power 24V is produced on relay (-) line according to the wiring checking procedure and replace it if necessary. When no failure found after checking on wiring and R174 is left displayed. Replace fuse/relay box.
3	Mechatro controller			Check that the error is corrected after replacement of controller.

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Table 2-2 Maintenance service data table - Basic engine (3 / 4) Unit: mm [in.]

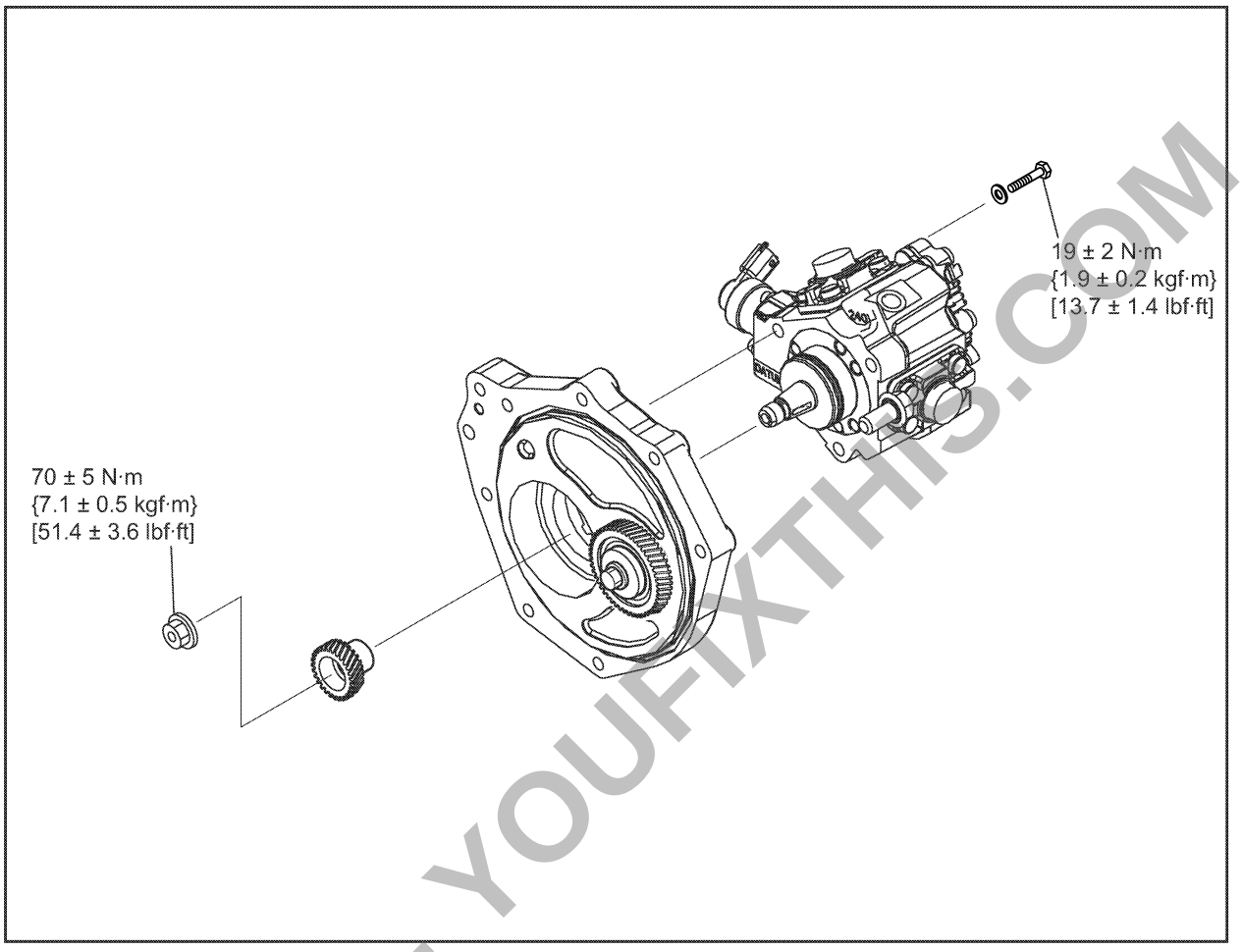
Inspection point			Nominal	Standard	Limit	Remark
Crank-shaft	Runout			0.04 [0.0016] or less	0.10 [0.0039]	TIR
	Crank journal outside diameter		ø 90 [3.54]	89.95 to 89.97 [3.5413 to 3.5421]	89.85 [3.5374]	If the diameter is the limit or more, replace bearing. If the diameter is less than the limit, grind the journal and use undersize bearing. Service limit: 89.10 [3.5079]
	Crankpin outside diameter		ø 65 [2.56]	64.945 to 64.965 [2.5569 to 2.5577]	64.800 [2.5512]	
	Distance between centers of journal and crankpin		65 [2.56]	± 0.05 [± 0.002]		
	Parallelism between journal and crankpin			Pin maximum defection: 0.01 [0.0004] or less		
	Roundness of journals and crankpins (diameter difference)			0.01 [0.0004] or less	0.03 [0.0012]	
	Cylindericity of journals and crankpins (diameter difference)			0.01 [0.0004] or less	0.03 [0.0012]	
	Fillet radius of journal		R3 [0.12]	± 0.2 [± 0.008]		
	Fillet radius of pin		R4 [0.16]	± 0.2 [± 0.008]		
	End play			0.100 to 0.264 [0.0039 to 0.0104]	0.300 [0.0118]	If end play is less than the limit, replace thrust plates. If end play exceeds the limit, replace with oversize thrust plates.
Piston	Outside diameter (at piston skirt)	STD	ø 102 [4.02]	101.915 to 101.945 [4.0124 to 4.0136]	101.730 [4.0051]	
		0.25 [0.0098]/ OS		102.165 to 102.195 [4.0222 to 4.0234]	101.980 [4.0150]	
		0.50 [0.0197]/ OS		102.415 to 102.445 [4.0321 to 4.0333]	102.230 [4.0248]	
	Protrusion from crankcase			0.8 [0.031]		Bearing clearance check. Gasket compressed (installed) thickness: 1.7 ± 0.05 [0.067 ± 0.0020]
	Clearance between piston pin hole and piston pin			0.005 to 0.021 [0.0002 to 0.0008]	0.050 [0.0020]	
	Weight difference in one engine			5.0 g [0.2 oz.] or less		
	Clearance between piston ring and ring groove	No.1 compression ring		0.08 to 0.12 [0.0031 to 0.0047]	0.200 [0.0079]	
		No.2 compression ring		0.08 to 0.12 [0.0031 to 0.0047]	0.150 [0.0059]	
		Oil ring		0.025 to 0.065 [0.0010 to 0.0026]	0.150 [0.0059]	
Piston ring	End gap	Compression rings		0.30 to 0.45 [0.0118 to 0.0177]	1.50 [0.0591]	
		Oil ring		0.30 to 0.50 [0.0118 to 0.0197]		

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6. Installing fuel system

6.1 Installing fuel system (Part 1)



Installing fuel system (Part 1)

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