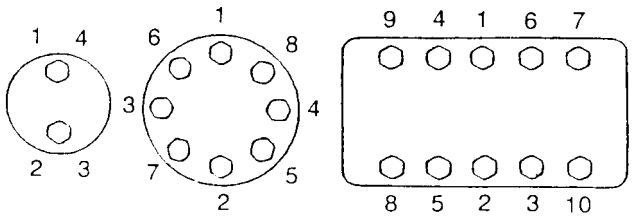
STANDARD TORQUE DATA FOR CAP SCREWS AND NUTS

Tightening of cap screws, nuts

Tighten alternately so that tightening torque can be applied evenly. The numbers in the figure below indicate the order of tightening.



JS00481A

Cap screws which have had Loctite used (white residue remains after removal) should be cleaned with loght oil or suitable cleaning solvent and dried. Apply 2-3 drops of Loctite to the thread portion of the cap screw and then tighten.

Torque table

Tighten cap screws and nuts according to the table below if there are no other special instructions.

Cap Screw Name Size (Size)			**M6**	**M8**	**M10**	**M12**	**M14**	**M16**	**M18**	**M20**
Hexagon Screw	Spanner	[mm]	10	13	17	19	22	24	27	30
		[in.]	0.39	0.51	0.67	0.75	0.87	0.95	1.06	1.18
	Tightening torque	[Nm]	6.9	19.6	39.2	58.8	98.1	156.9	196.1	294.2
		[lb-ft]	5.1	14.5	28.9	43.4	72.3	115.7	144.6	217
Hexagon Socket Head Cap Screw	Spanner	[mm]	5	6	8	10	12	14	14	17
		[in.]	0.20	0.24	0.32	0.39	0.47	0.55	0.55	0.67
	Tightening torque	[Nm]	8.8	21.6	42.1	78.5	117.7	176.5	245.2	343.2
		[lb-ft]	6.5	15.9	31.1	57.9	86.9	130.2	181	253.2

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SPECIFICATIONS

Main data

Model name ..... CX290B Hydraulic Excavator
Operating weight ..... 29800 kg (65698 lbs)
Engine output ..... 154 kW / 1800 rpm

Performance

Swing speed ..... 10.2 Tr/min.
Travel speed ..... Low Speed 3.2 km/h (1.99 mph)
..... High Speed 5.6 km/h (3.48 mph)
Maximum drawbar pull ..... 233.2kN (52425.45 lbf)
Grade ability ..... 70% (35°)
Ground pressure ..... 56 kPa (600 mm (23.62 in) grouser shoe)
..... 49 kPa (700 mm (27.56 in) grouser shoe)
..... 43 kPa (800 mm (31.50 in) grouser shoe)

Complete machine dimensions

	Arm (dipper)		
	3180 mm (125.20 in)	2650 mm (104.33 in)	3600 mm (141.73 in)
Lenght (without attachment)	5590 mm (220.08 in)	5590 mm (220.08 in)	5590 mm (220.08 in)
Lenght (with attachment)	10450 mm (411.4 in)	10480 mm (412.6 in)	10470 mm (412.2 in)
Height (with attachment)	3260 mm (128.35 in)	3340 mm (131.5 in)	3460 mm (136.22 in)

Main body dimensions

Main body width ..... See machine overall dimensions
Upper side swing body width ..... 2870 mm (112.99 in)
Cab width ..... 1000 mm (39.37 in)
Main body height ..... 3110 mm (122.44 in)
Engine displacement ..... 3160 mm (124.41 in)
Swing body tail distance ..... 3150 mm (124.01 in)
Swing body rear section bottom height ..... 1190 mm (46.85 in)
Distance between tumblers ..... 3980 mm (156.69 in)
Overall track length ..... 4850 mm (190.94 in)
Width of track shoe ..... 800 mm (31.50 in) (Optional: 600 mm (23.62 in) 700 mm (27.56 in)
Minimum ground clearance ..... 470 mm (18.50 in) (To bottom of lower frame)

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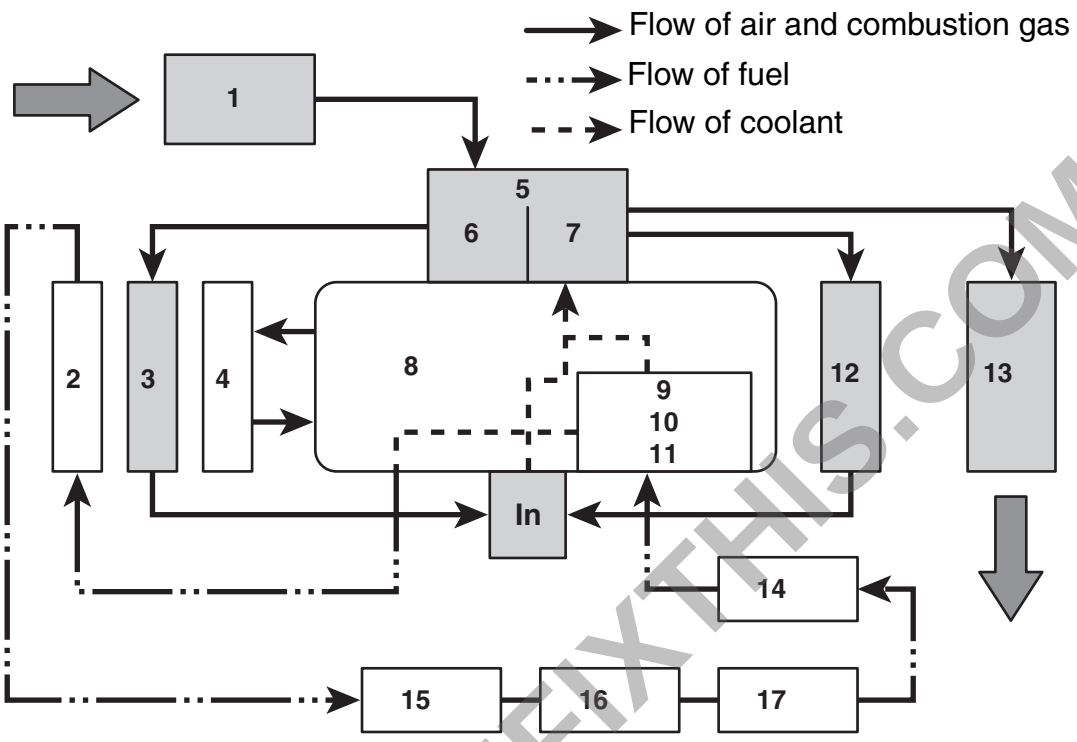
ENGINE SUMMARY

1. Engine System Diagram



1. Air cleaner
2. Fuel cooler
3. Inter cooler
4. Radiator
5. Turbo
6. Compressor side
7. Turbine side
8. Engine
9. Injector
10. Common rail
11. Supply pump
12. EGR cooler
13. Muffler
14. Fuel main filter
15. Fuel tank
16. Fuel prefilter
17. Charge fuel pump

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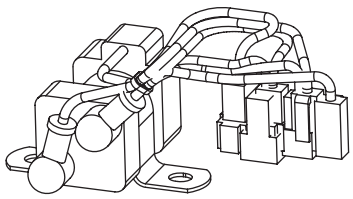
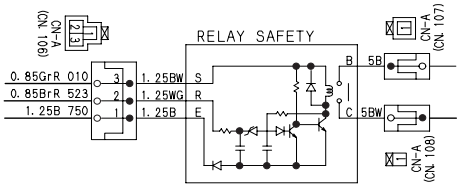
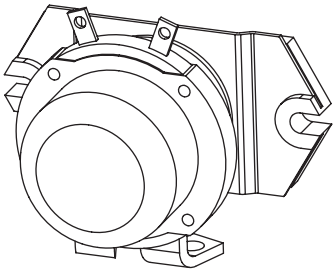
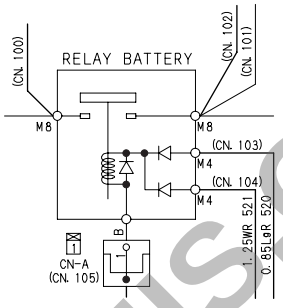
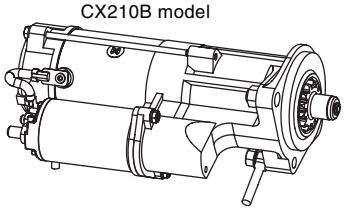
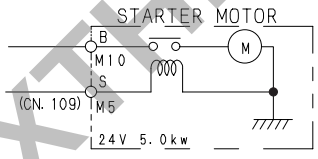
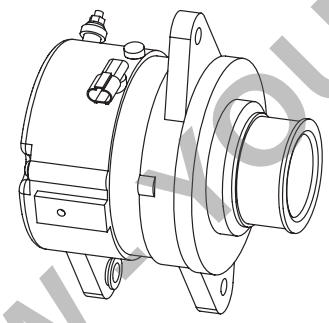
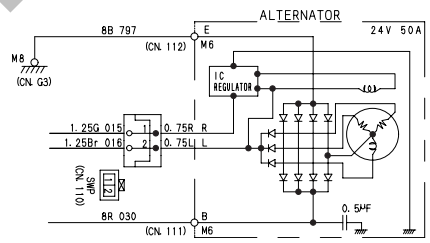
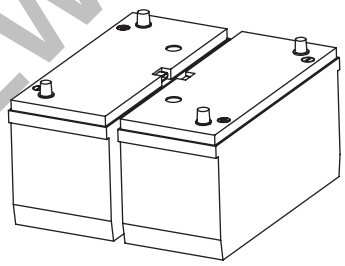
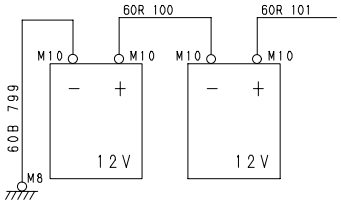
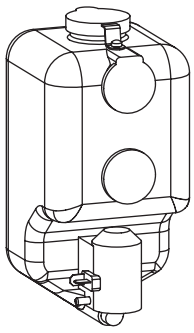
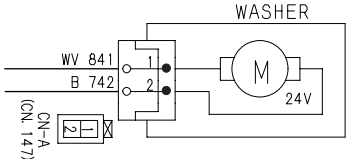
Stand-Alone Parts Diagram

Name	No.	Shape	Circuit	Remarks
Safety relay	K8			Model: 24 V DC
Battery relay	K7			For +24 V DC
Starter motor	M1	CX210B model 		5.0 kW-24 V
Alternator	G2	CX210B model 		50 A-24 V
Battery	G1			
Washer motor	M4			

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ITEM	DESCRIPTION	PRESSURE SETTING
A	MAIN RELIEF (STANDARD)	34.3 MPa / 343 bar / 4977 psi
A	MAIN RELIEF (BOOST)	37.3 MPa / 373 bar / 5410 psi
B	BOOM RAISING PORT SECONDARY RELIEF	39.2 MPa / 392 bar / 5685 psi
B1/B2	RELIEF ON BOOM HBCV	39.2 MPa / 392 bar / 5685 psi
C	BOOM LOWERING PORT SECONDARY RELIEF	29.4 MPa / 294 bar / 4264 psi
D	DIPPER OUT PORT SECONDARY RELIEF	39.2 MPa / 392 bar / 5685 psi
D1	RELIEF ON DIPPER HBCV	39.2 MPa / 392 bar / 5685 psi
E	DIPPER IN PORT SECONDARY RELIEF	39.2 MPa / 392 bar / 5685 psi
F	BUCKET OPEN PORT SECONDARY RELIEF	39.2 MPa / 392 bar / 5685 psi
G	BUCKET CLOSE PORT SECONDARY RELIEF	39.2 MPa / 392 bar / 5685 psi
H	PILOT PRESSURE RELIEF	3.92 MPa / 39.2 bar / 568 psi
I	RIGHT-HAND SWING PORT SECONDARY RELIEF	29.4 MPa / 294 bar / 4264 psi
J	LEFT-HAND SWING PORT SECONDARY RELIEF	29.4 MPa / 294 bar / 4264 psi
K1/K2	TRAVEL REVERSE PORT SECONDARY RELIEF	..... Mpa / ..... bar / ..... psi
L1/L2	TRAVEL FORWARD PORT SECONDARY RELIEF	..... Mpa / ..... bar / ..... psi
N1/N2	NEGATIVE CONTROL RELIEF	2.55 MPa / 25.5 bar / 370 psi
O/P	PORT SECONDARY RELIEF (2eme OPTION)	..... Mpa / ..... bar / ..... psi
R	MAIN RELIEF (2eme OPTION)	20.6 MPa / 206 bar / 2989 psi
W1/W2	CRUSHER OPTION SECONDARY RELIEF VALVE (factory)	..... Mpa / ..... bar / ..... psi
W4	BREAKER OPTION SECONDARY RELIEF VALVE (factory)	..... Mpa / ..... bar / ..... psi

ITEM	DESCRIPTION
1	HYDRAULIC RESERVOIR
2	BREATHER
4	BY-PASS VALVE
5	SCREEN FILTER
6	RETURN FILTER
10	MAIN HYDRAULIC PUMP
15	MAIN CONTROL VALVE
16	HYDRAULIC SWIVEL
21	TRAVEL MOTOR
22	SWING MOTOR
23	TRAVEL MOTOR BRAKE
25	RIGHT BOOM CYLINDER
26	LEFT BOOM CYLINDER
27	DIPPER CYLINDER
28	BUCKET CYLINDER
29	BOOM SAFETY VALVE
30	DIPPER SAFETY VALVE
31	DIPPER LOAD HOLDING VALVE
32	BOOM LOAD HOLDING VALVE
42	OIL COOLER
44	OIL COOLER BY-PASS VALVE
45	NON-RETURN CHECK VALVE
51	ACCUMULATOR
53	BOOM & BUCKET CONTROL LEVER
54	SWING & DIPPER CONTROL LEVER
55	TRAVEL CONTROL PEDAL
56	DIPPER CONTROL SHOCK ABSORBER
57	BOOM & DIPPER CONTROL SHOCK ABSORBER
58	PILOT AND RETURN SYSTEM MANIFOLD
59	STOP VALVE
60	PILOT SYSTEM MANIFOLD
62	STRAIGHT LINE TRAVEL PEDAL
63	SHUTTLE VALVE BLOCK
65	CALIBRATED ORIFICE
71	SECOND OPTION CONTROL VALVE
72	CONTROL PEDAL (OPTIONAL)
73	SECOND OPTION CONTROL VALVE
75	HAMMER/CRUSHER SELECTOR
76	HAMMER/CRUSHER SELECTOR
82	PILOT CIRCUIT FILTER
83	SHUT-OFF VALVE (OPTIONAL)
85	PILOT FILTER
86	PILOT FILTER BY-PASS VALVE
90	HYDRAULIC BREAKER VERSION, PLUG
108	STRAIGHT TRAVEL VALVE
132	HAMMER/CRUSHER 2 SOLENOID VALVE BANK
133	1 SOLENOID VALVE BANK
134	2 SOLENOID VALVE BANK (SECOND OPTION)
139	2 SOLENOID VALVE BANK (OPTION 1)
140	2 SOLENOID VALVE BANK (OPTION 1)
141	1 SOLENOID VALVE BANK
B22	SWING PILOT PRESSURE SWITCH
B23	BREAKER / CRUSHER PILOT PRESSURE SWITCH
B26	UPPER PILOT PRESSURE SENSOR
B27	TRAVEL PILOT PRESSURE SENSOR
B28	SECOND OPTION PILOT CIRCUIT 1 PRESSURE SWITCH
B33	ARM CLOSE PRESS. SENSOR
B40	PRESSURE SENSOR (NEGA-CONT.P2)
B42	PUMP PRESSURE SENSOR (P1)
B43	PRESSURE SENSOR (NEGA-CONT.P1)
B44	PUMP PRESSURE SENSOR (P2)
B45	OVERLOAD INDICATOR PRESSURE SWITCH
571	PRESS.SWITCH + FILTER INDICATOR (BREAKER OPTION)
Y2	PILOT PRESSURE SOLENOID VALVE
Y3	SWING BRAKE SOLENOID VALVE
Y4	2 STAGE TRAVEL SOLENOID VALVE
Y5	POWER-UP SOLENOID VALVE
Y6	POWER SAVE SOLENOID VALVE
Y7	MAIN PUMP POWER PROPORTIONAL SOLENOID
Y9	CRUSHER/BREAKER OPTION TWO FLOW SOLENOID VALVE
Y11	MAIN PUMP FLOW PROPORTIONAL SOLENOID
Y18	FREE SWING SOLENOID VALVE)
Y23	OPTION 1 SOLENOID VALVE (RED BAND)
Y24	OPTION 1 SOLENOID VALVE (BLUE BAND)
Y25	OPTION 2 SOLENOID VALVE
Y26	OPTION 2 SOLENOID VALVE
Y27	HAMMER RETURN CIRCUIT SOLENOID VALVE

LEGEND

- P1 PUMP
- P2 PUMP
- PILOT SYSTEM PUMP
- RETURN TO RESERVOIR
- LEAK-OFF RETURN
- SUPPLY CIRCUIT
- PILOT SYSTEM CIRCUIT
- COMPONENT BOUNDARY
- HOSE
- PIPING CONNECTION
- PIPING CROSS-OVER
- 41 — COMPONENT ITEM NO.
- COMPONENT NUMBER
- 9 (alt) — CONNECTION ITEM NO.
- * OPTIONAL ITEM NO.

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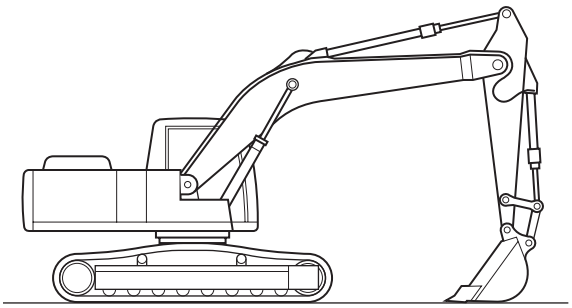
CX290B EXCAVATOR
HYDRAULIC SCHEMATIC

CX290B EXCAVATOR
HYDRAULIC SCHEMATIC
Number 87601004NA

HYDRAULIC PUMP FLOW MEASUREMENT PROCEDURE

Work preparations

1. Check that the main unit is in its work posture (arm-vertical).

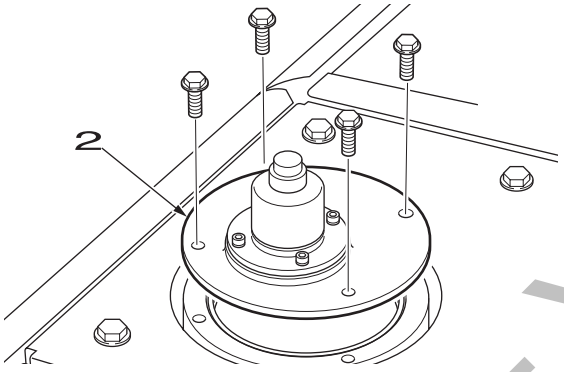


RST-09-02-001B

2. Bleed out the pressure. (See the details on Bleeding Pressure in the Pressure Measurement and Adjustment Procedures.)

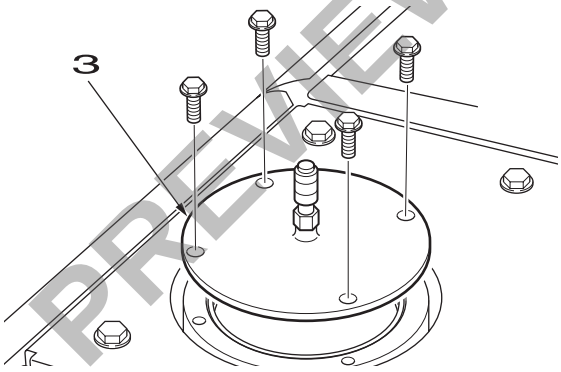
NOTE: *Check the swing stop.*

3. Use a spanner (17 mm, 0.67 in) to remove the feed port cover (2).



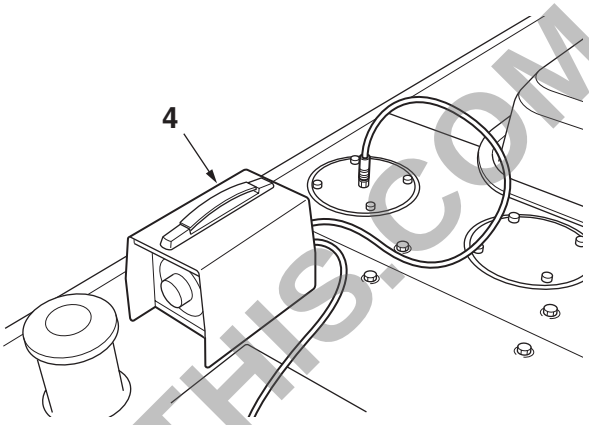
RST-09-02-001C

4. Use the bolts removed in step 3 to install the hydraulic oil tank lid (3).



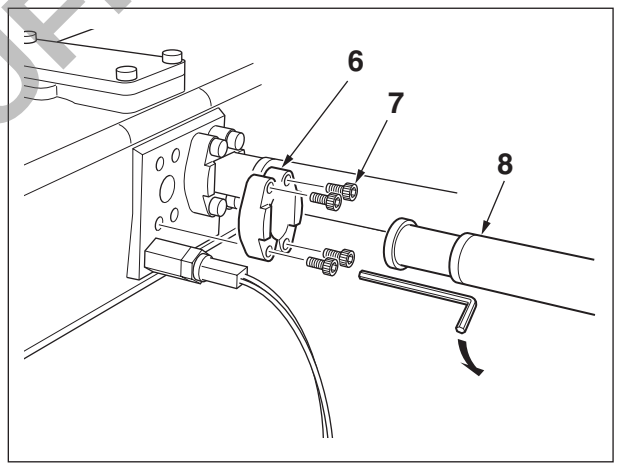
RST-09-02-001D

5. Install the vacuum pump (4) on the hydraulic oil tank lid (3).
6. After setting the vacuum pump (4), switch on the power. (If the cable is too short, use an extension cable.)



RST-09-02-001F

7. Use a hexagon wrench (8 mm, 0.31 in) to remove the split flange and hydraulic hose. (This explanation uses flow measurement at the P2 pump.)



RST-09-02-001G

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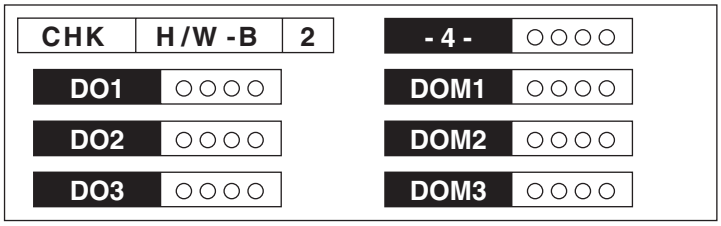
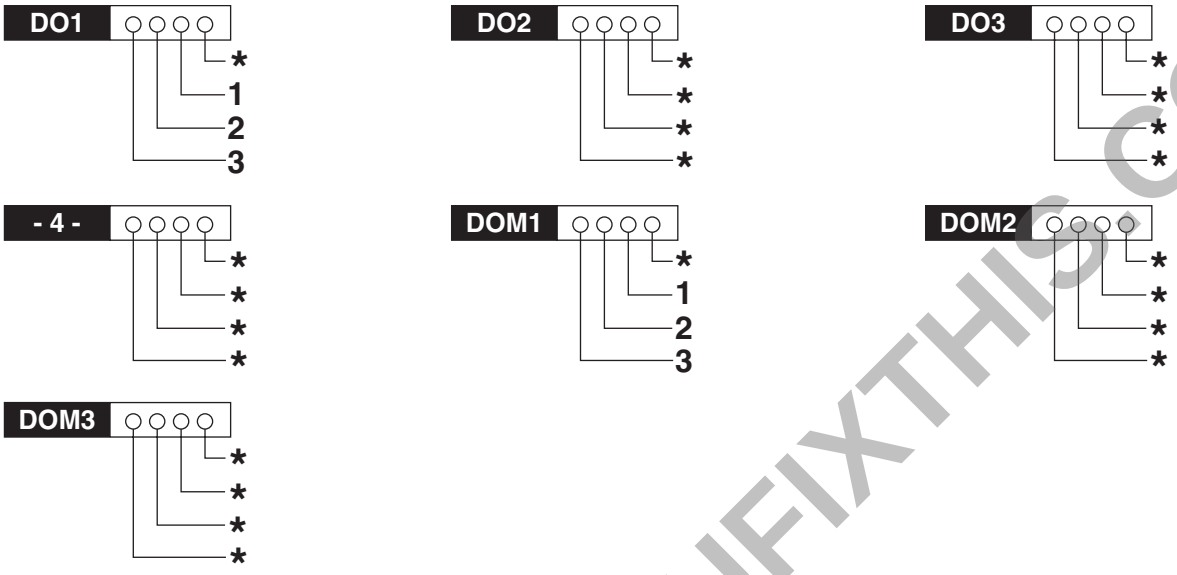
2) Digital output / output monitor

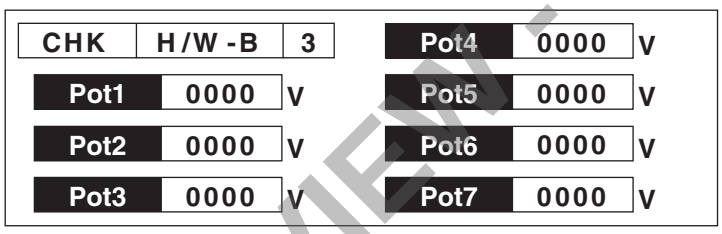


Input /output state (○ = OFF, ● = ON)



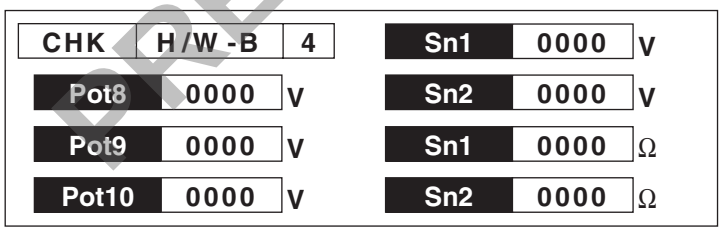
1	Solenoid; Lever lock
2	Rotating light and bucket lock
3	Buzzer; Crane

3) Potentio-meter voltage



Pot1 : Sensor; Angle boom
Pot2 : Sensor; Angle arm
Pot3 : Sensor; Angle offset
Pot4 : Sensor; Pressure bottom
Pot5 : Sensor; Pressure rod
Pot6 : *
Pot7 : *

4) Potentio-meter and sensor voltage (resistance)



Pot8 : *
Pot9 : *
Pot10 : *
Sn1 : *
Sn2 : *
Sn1 : *
Sn2 : *

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Air Conditioning troubleshooting

The blow temperature does not go down

When the AUTO switch or AC switch is pressed, HL. E is displayed in the panel set temperature display section.

NO

"HL.*" is displayed on the panel set temperature display section.
(*) is a number 0 to 9.

NO

The panel snow mark flashes.

YES

The panel snow mark flashes.

NO

1) Inside air sensor or harness disconnection or short
2) The inside air sensor connector is disconnected or has a contact defect

See the «Monitor Mode» item too.

Inspect and repair or replace the parts

YES

1) Inside air sensor and evaporator sensor simultaneous disconnection or short.
2) Computer breakdown.

See the «Monitor Mode» item too.

YES

1) The air mix motor actuator connector is disconnected or has a contact defect.
2) Air mix motor actuator defect.
3) E Main harness conduction defect.

Inspect and repair or replace the parts

NO

When the setting temperature is set to 18.0 and the blow mode is set to vent mode, the blow temperature drops.

NO

The air mix damper is at the COOLMAX position.

NO

If motor actuator operation stops midway, find the cause and correct it, measure the operating force. Is it 1.5 kgf or less?

NO

1) Inspect, repair, or replace the motor actuator lever link section.
2) Clean the lever link section, then apply grease.

YES

Motor actuator or computer breakdown

Replace

YES

Switch compressor clutch ON/OFF and inspect and repair the power supply circuit

See the cooling cycle troubleshooting.

YES

Cool air is blowing into the inside air sensor section

NO

Computer breakdown or inside air sensor defect

Inspect and replace

YES

Inspect the duct or eliminate the cause of the cool air infiltration.

YES

1) The evaporator sensor connector is disconnected or there is a contact defect
2) Evaporator sensor simultaneous disconnection or short

See the «Monitor Mode» item too.

Inspect and repair or replace the parts

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CRAWLER EXCAVATOR
CX290B
SCHEMATIC SET
LEP 87637610A

TABLE OF CONTENTS

SECTION	SECTION No.	REFERENCE No.
Safety, General Information and Standard Torque Data	1001	7-27691NA
General Specifications and Special Torque Settings	1002	SC290B1002-0NA
Elecrical and Engine Functions & Service Support	4001	SC210B4001-1NA
Elecrical Equipment and Electrical Circuit Diagrams	4020	SC210B4020-0NA
Specifications, Troubleshooting, Checks and Hydraulic Pressure Settings	8001	SC290B8001-0NA
Hydraulic Functions	8020	SC290B8020-0NA
Hydraulic Component Functions	8030	SC290B8030-0NA
Air Conditioner Functions and Troubleshooting	9006	SC210B9006-0NA
Large Size Hydraulic Schematics	Pocket	87601004A
Large Size Electrical Schematics	Pocket	87601010A

NOTE: CNH Company reserves the right to make changes in the specification and design of the machine without prior notice and without incurring any obligation to modify units previously sold.

The description of the models shown in this manual has been made in accordance with the technical specifications known as of the date of design of this document.

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700 State Street
Racine, WI 53404 U.S.A.

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SAFETY

This symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED. The message that follows the symbol contains important information about safety. Carefully read the message. Make sure you fully understand the causes of possible injury or death.

To prevent injury always follow the Warning, Caution and Danger notes in this section and throughout the manual.

Put the warning tag shown below on the key for the keyswitch when servicing or repairing the machine. One warning tag is supplied with each machine. Additional tags Part Number 331-4614 are available from your service parts supplier

.

WARNING: *Read the operator's manual to familiarize yourself with the correct control functions.*

WARNING: *Operate the machine and equipment controls from the seat position only. Any other method could result in serious injury.*

WARNING: *This is a one man machine, no riders allowed.*

WARNING: *Before starting engine, study Operator's Manual safety messages. Read all safety signs on machine. Clear the area of other persons. Learn and practice safe use of controls before operating.*
It is your responsibility to understand and follow manufacturers instructions on machine operation, service and to observe pertinent laws and regulations. Operator's and Service Manuals may be obtained from your Case dealer.

WARNING: *If you wear clothing that is too loose or do not use the correct safety equipment for your job, you can be injured. Always wear clothing that will not catch on objects. Extra safety equipment that can be required includes hard hat, safety shoes, ear protection, eye or face protection, heavy gloves and reflector clothing.*

WARNING: *When working in the area of the fan belt with the engine running, avoid loose clothing if possible, and use extreme caution.*

WARNING: *When doing checks and tests on the equipment hydraulics, follow the procedures as they are written. DO NOT change the procedure.*

WARNING: *When putting the hydraulic cylinders on this machine through the necessary cycles to check operation or to remove air from a circuit, make sure all people are out of the way.*

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Section

1001

SAFETY, GENERAL INFORMATION AND TORQUE SPECIFICATIONS

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2. Solenoid Sticking Prevention

a) Target solenoid

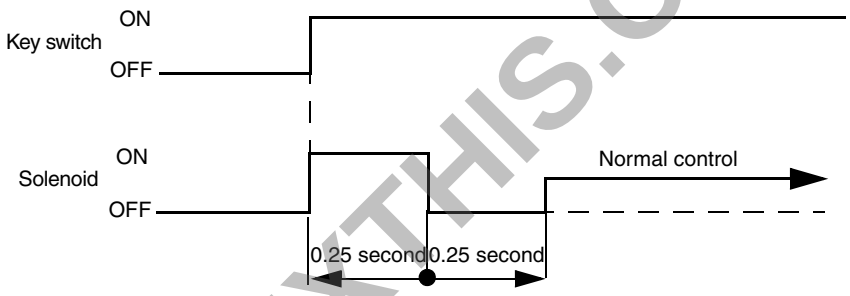
- Travel high-speed switchover solenoid
- Boost solenoid
- Option switchover solenoid
- Fan reverse solenoid (only for models with hydraulic drive fan)
- Free swing solenoid
- Bucket lock solenoid (only lift crane application machines)

Because the swing brake, power save solenoid, and electromagnetic proportional solenoid go ON and OFF frequently in regular work, they are not subject to control.

b) Operation

When key ON, switched ON / OFF for 0.25 second.

After that, control is normal control. Control ends before the engine starts, so the machine does not operate accidentally.



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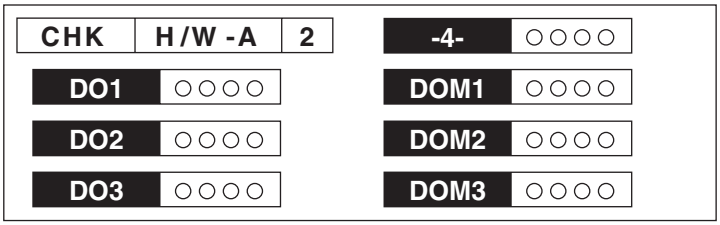
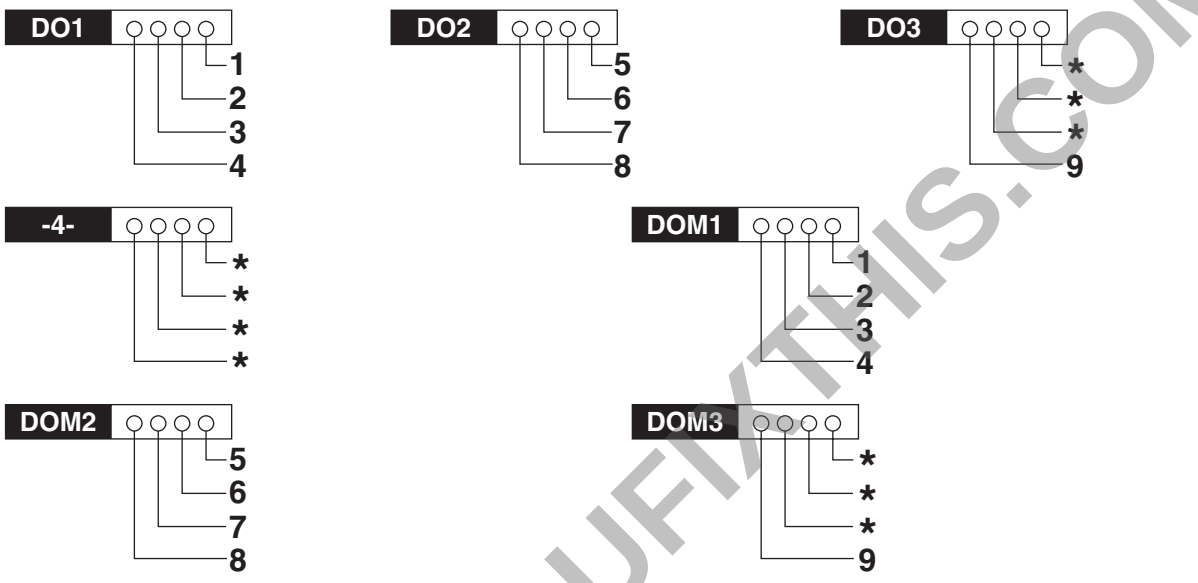
2) Digital output / output monitor

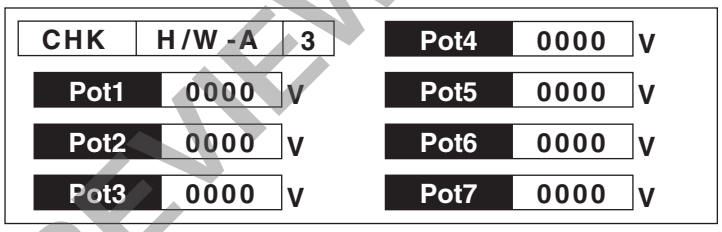


Input /output state (○ = OFF, ● = ON)



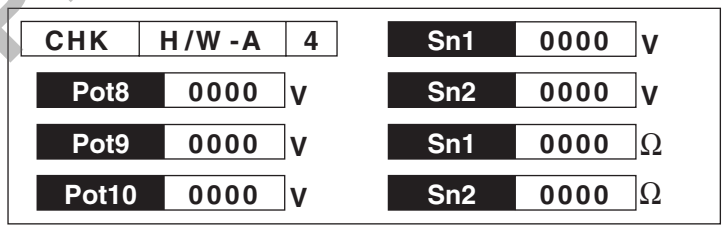
1	Solenoid; Power save	**6**	Solenoid; Option line switchover
2	Solenoid; Boost	**7**	Solenoid; Free swing (North America)
3	Solenoid; Travel high-speed switchover	**8**	Solenoid; Fan reverse (large machine only)
4	Solenoid; Swing brake	**9**	Relay; Feed pump
5	Buzzer; Travel Alarm (North America)		

3) Potentio-meter voltage



Pot1 : Sensor pressure P1
Pot2 : Sensor pressure P2
Pot3 : Sensor pressure N1
Pot4 : Sensor pressure N2
Pot5 : Sensor pressure Swing
Pot6 : Sensor pressure Upper
Pot7 : Sensor pressure Travel

4) Potentio-meter and sensor voltage (Resistance)



Pot8 : Sensor pressure Arm in
Pot9 : Sensor throttle
Pot10 : Sensor pressure Overload
Sn1 : Sensor temperature Hydraulic oil
Sn2 : Sensor level Fuel
Sn1 : Sensor temperature Hydraulic oil
Sn2 : Sensor level Fuel

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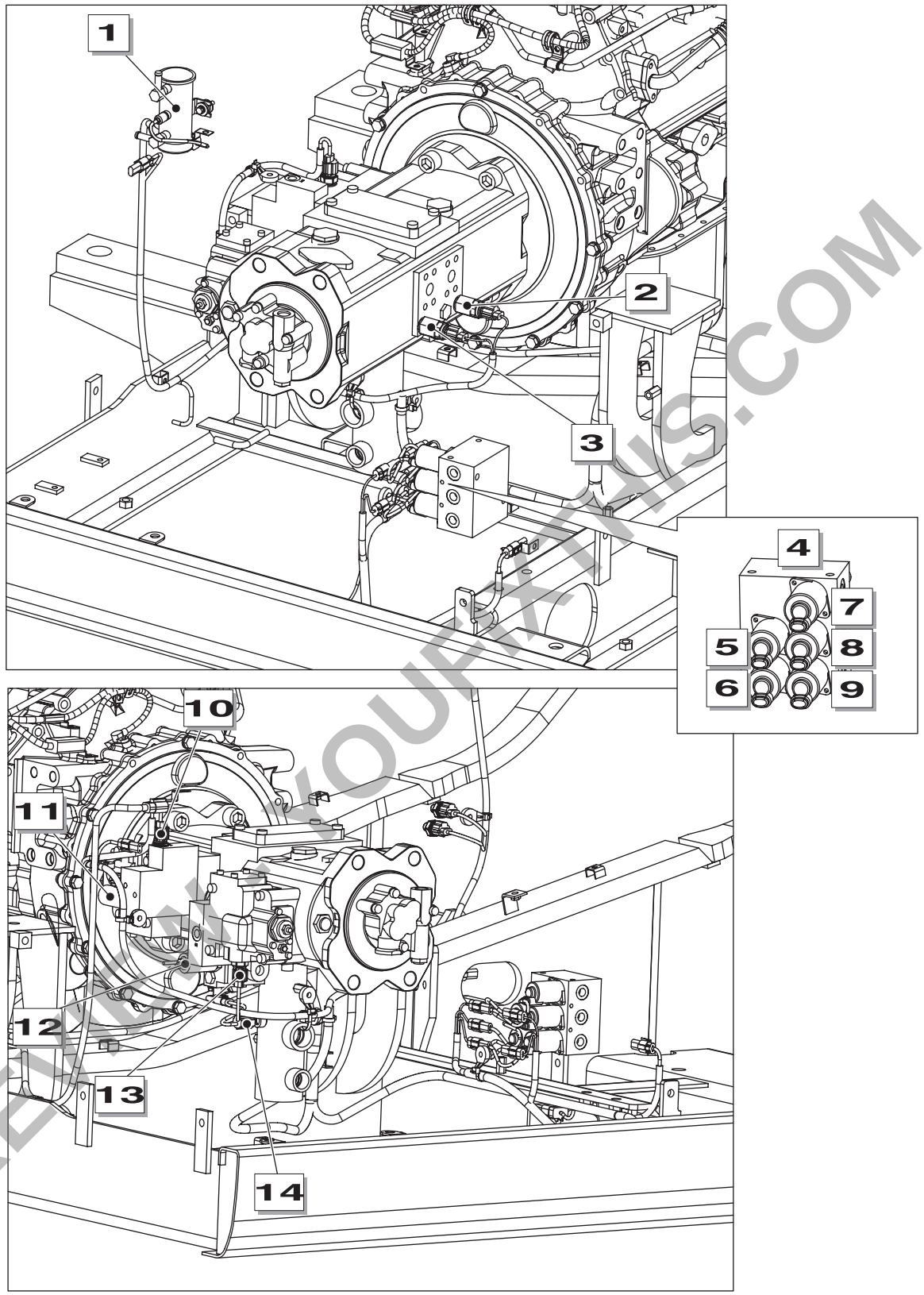
b) CX210B, CX240B



1	Electromagnetic fuel pump	8	Power save
2	P1 pressure sensor	9	Lever lock
3	P2 pressure sensor	10	N1 pressure sensor
4	5-way solenoid valve	11	P1 flow control proportional valve
5	Boosted pressure	12	Horsepower control proportional valve
6	Travel speed	13	N2 pressure sensor
7	Swing lock	14	Oil temperature sensor

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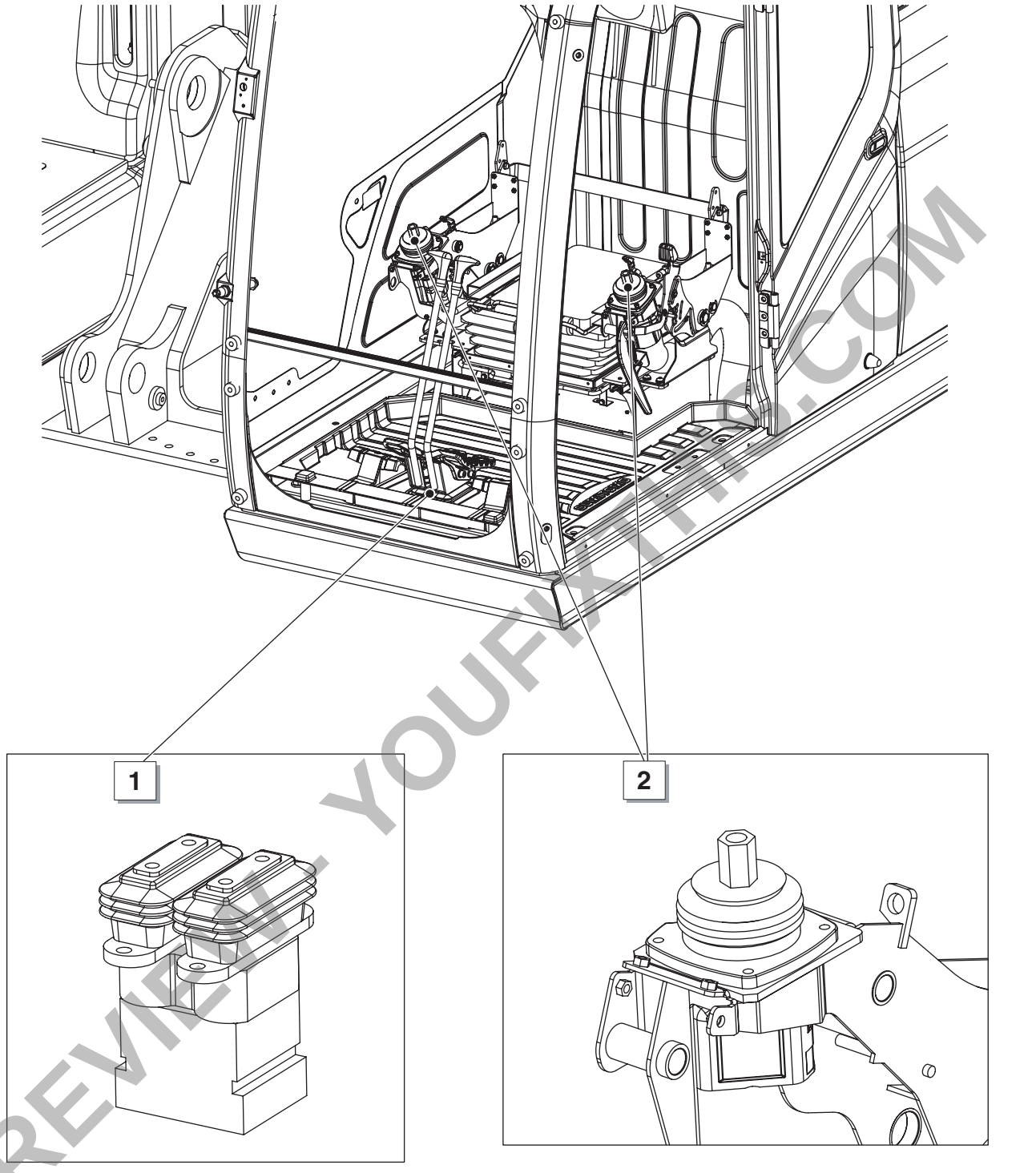
Cab



RST-04-01-001E

1	Travel remote control valve
2	Upper operation remote control valve

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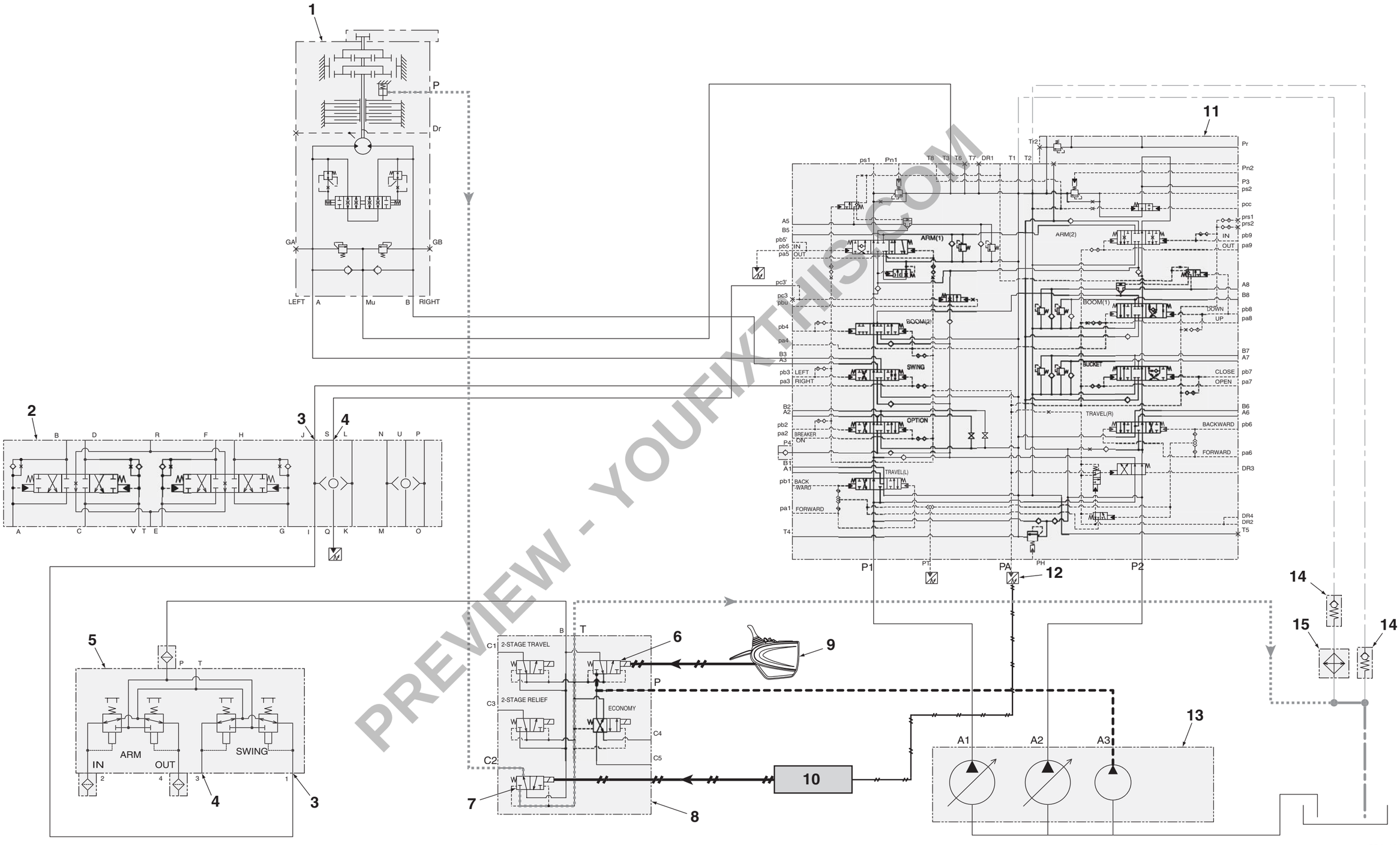
Swing Parking Circuit (lever in neutral)



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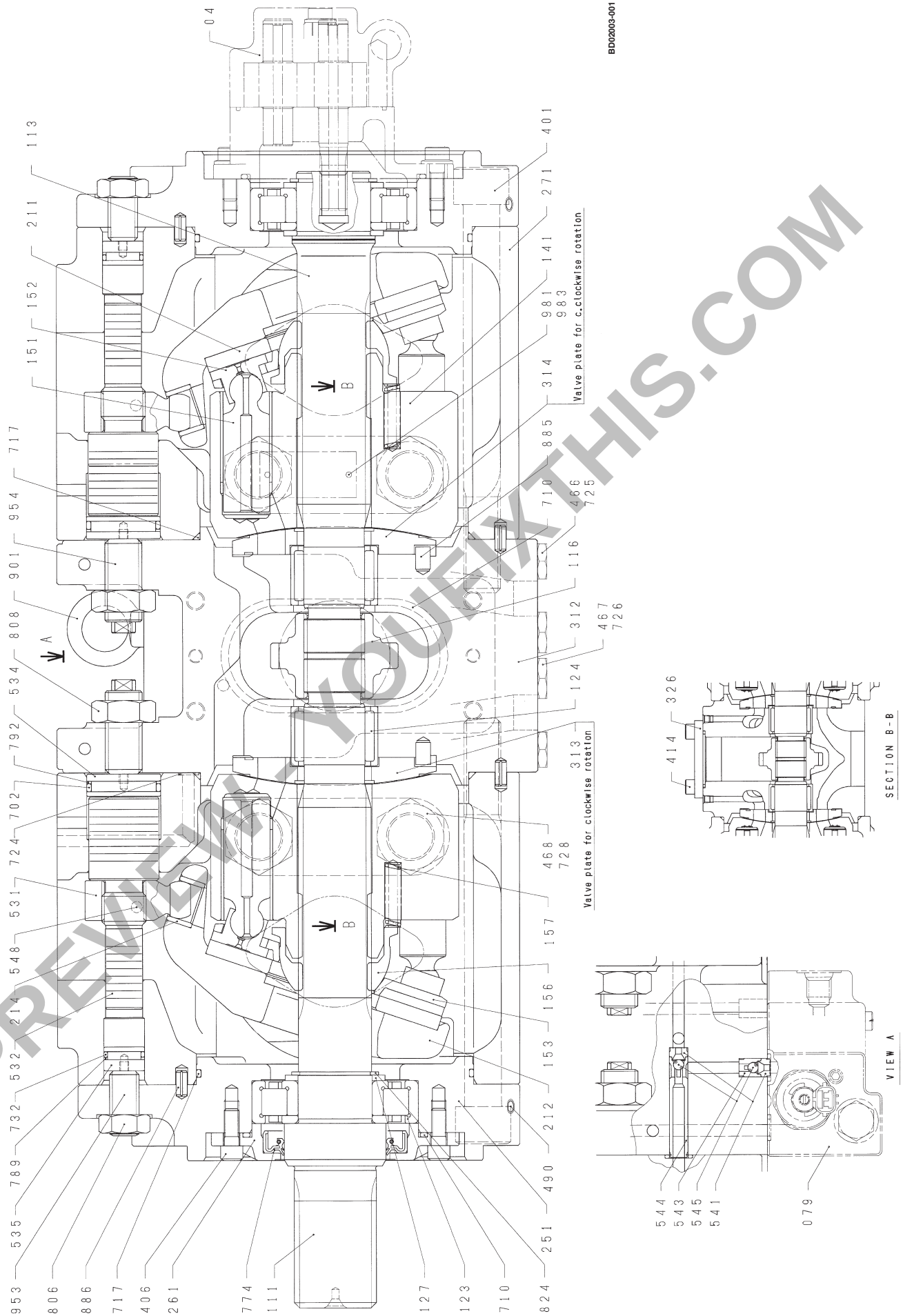

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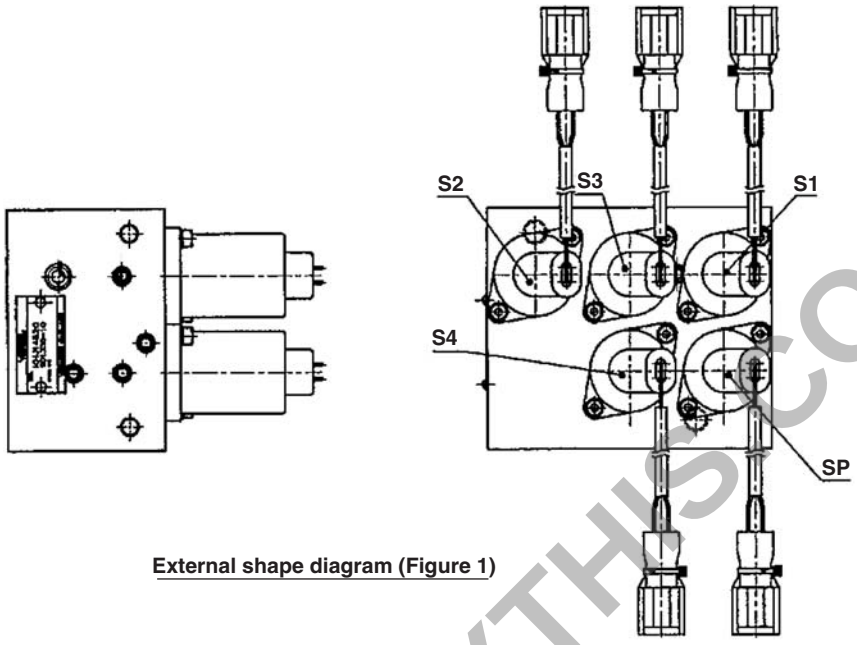
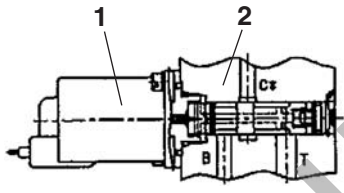
2. 5 Stack Solenoid Valve Operation Explanation

1) External shape diagram (Figure 1) and configuration diagram (Figure 2)



External shape diagram (Figure 1)



Normal closed type Solenoid; SP, S1, S3

Structural diagram (Figure 2)

RST-04-02-001by

1	Electromagnetic switch valve
2	body

2) Main component parts

This valve is made up of the body and the electromagnetic switch valve.

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