

**SERVICE MANUAL**

**WHEEL TYPE EXCAVATOR  
R200W-3**

**HYUNDAI**

# WHEEL TYPE EXCAVATOR [R200W-3]

<b>SECTION 1</b>	<b>GENERAL</b>
Group 1	Safety Hints
Group 2	Specifications
<b>SECTION 2</b>	<b>STRUCTURE AND FUNCTION</b>
Group 1	Pump Device
Group 2	Main Control Valve
Group 3	Swing Device
Group 4	Travel Motor
Group 5	RCV Lever
Group 6	Accelerator Pedal
Group 7	Brake Pedal(Valve)
Group 8	Transmission
Group 9	Transmission Control Valve
Group 10	Steering Valve
Group 11	Axle
<b>SECTION 3</b>	<b>HYDRAULIC SYSTEM</b>
Group 1	Hydraulic Circuit
Group 2	Main Circuit
Group 3	Pilot Circuit
Group 4	Single Operation
Group 5	Combined Operation
<b>SECTION 4</b>	<b>ELECTRICAL SYSTEM</b>
Group 1	Component Location
Group 2	Electrical Circuit
Group 3	Electrical Component Specification
Group 4	Connectors
<b>SECTION 5</b>	<b>MECHATROMICS SYSTEM</b>
Group 1	Outline
Group 2	Mode selection System
Group 3	Automatic Deceleration System
Group 4	Power Boost System
Group 5	Travel Speed Control System
Group 6	Automatic Warming Up Function
Group 7	Engine Overheat Prevention Function
Group 8	Max Flow Cut-Off Function
Group 9	Swing Speed Control System
Group 10	Arm Half Flow System
Group 11	Anti-Restart System
Group 12	Self-Diagnostic System
Group 13	Engine Control System
Group 14	EPPR(Electro Proportional Pressure Reducing)Valve
Group 15	Prolix Switch
Group 16	Monitoring System

**SECTION 6**

Group 1

Group 2

Group 3

Group 4

**TROUBLESHOOTING**

Before Troubleshooting

Hydraulic and Mechanical System

Electrical System

Mechatronics System

**SECTION 7**

Group 1

Group 2

Group 3

**MAINTENANCE STANDARD**

Operational Performance Test

Major Components

Work Equipment

**SECTION 8**

Group 1

Group 2

Group 3

Group 4

Group 5

Group 6

Group 7

Group 8

Group 9

Group 10

Group 11

Group 12

Group 13

Group 14

**DISASSEMBLY AND ASSEMBLY**

Precaution

Tightening Torque

Pump Device

Main Control Valve

Swing Device

Travel Motor

RCV Lever

Turning Joint

Steering Valve

Transmission-1

Transmission-2

Transmission-3

Front Axle-1

Front Axle-2

Rear Axle

Boom, Arm, Bucket and Dozer Cylinder

Work Equipment

## 1. STRUCTURE

This service manual has been prepared as an aid to improve the quality of repairs by giving the serviceman an accurate understanding of the product and by showing him the correct way to perform repairs and make judgements. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This service manual mainly contains the necessary technical information for operations performed in a service workshop.

For ease of understanding, the manual is divided into the following sections.

### SECTION 1 GENERAL

This section explains the safety hints and gives the specification of the machine and major components.

### SECTION 2 STRUCTURE AND FUNCTION

This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.

### SECTION 3 HYDRAULIC SYSTEM

This section explains the hydraulic circuit, single and combined operation.

### SECTION 4 ELECTRICAL SYSTEM

This section explains the electrical circuit, monitoring system and each component. It serves not only to give an understanding electrical system, but also serves as reference material for trouble shooting.

### SECTION 5 MECHATRONICS SYSTEM

This section explains the computer aided power optimization system and each component.

### SECTION 6 TROUBLESHOOTING

This section explains the troubleshooting charts correlating **problems to causes**.

### SECTION 7 MAINTENANCE STANDARD

This section gives the judgement standards when inspecting disassembled parts.

### SECTION 8 DISASSEMBLY AND ASSEMBLY

This section explains the order to be followed when removing, installing, disassembling or assembling each component, as well as precautions to be taken for these operations.

The specifications contained in this shop manual are subject to change at any time and without any advance notice. Contact your HYUNDAI distributor for the latest information.

## 2. HOW TO READ THE SERVICE MANUAL

### Distribution and updating

Any additions, amendments or other changes will be sent to HYUNDAI distributors.

Get the most up-to-date information before you start any work.

### Filing method

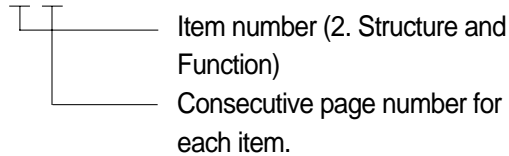
1. See the page number on the bottom of the page.

File the pages in correct order.

2. Following examples shows how to read the page number.

Example 1

2 - 3



3. Additional pages : Additional pages are indicated by a hyphen(-) and number after the page number. File as in the example.

10 - 4

10 - 4 - 1

10 - 4 - 2

10 - 5

Added pages

### Revised edition mark(①②③...)

When a manual is revised, an edition mark is recorded on the bottom outside corner of the pages.

### Revisions

Revised pages are shown at the **list of revised pages** on the between the contents page and section 1 page.

### Symbols

So that the shop manual can be of ample practical use, important places for safety and quality are marked with the following symbols.

Symbol	Item	Remarks
	Safety	Special safety precautions are necessary when performing the work.
		Extra special safety precautions are necessary when performing the work because it is under internal pressure.
	Caution	Special technical precautions or other precautions for preserving standards are necessary when performing the work.

### 3) OPERATION OF ARM SPOOL

#### (1) Arm out

##### ① Pilot circuit

Since the arm1 spool(302) transfers and shuts off the side bypass path, the pressure at port Pw increases.

##### ② Main circuit

During the arm out operation, the pilot pressure enters through ports XBa1 and XBa2.

When the pressure enters through port XBa1, the spool transfers in the left direction as shown in the figure.

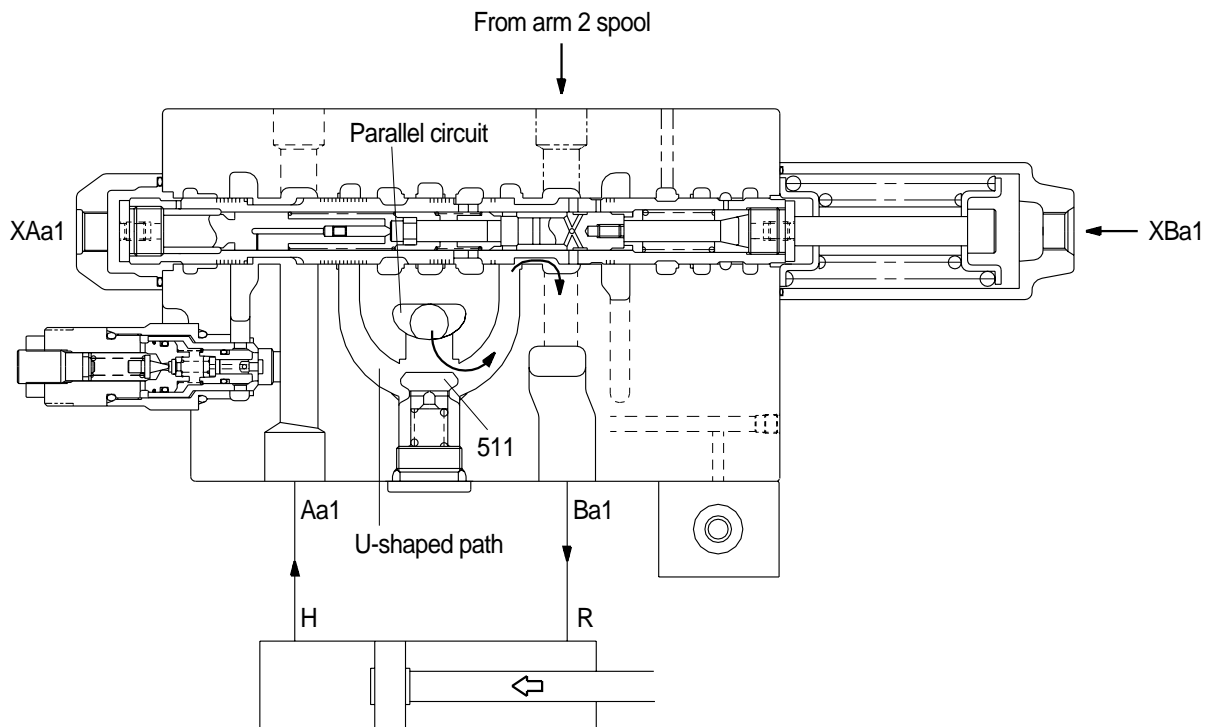
The hydraulic oil entering through port P1 passes through the main path(1) and flows to the bypass circuit(2), but the bypass circuit is shut off due to transfer of the arm1 spool.

Therefore, the hydraulic oil pushes open the check valve(511) from the parallel circuit and flows through the U-shaped path to the arm spool(302). Then, it flows around the periphery of the arm spool(302) to port Ba1, and is supplied to the arm cylinder rod side(R).

On the other hand, the oil entering through port P2 passes in the main path(3), and flows into the bypass circuit(2), but the bypass circuit is shut off due to transfer of the arm2 spool(306).

Therefore, the oil pushes open the check valve from the parallel circuit and flows through the U-shaped path to the arm spool(306). Then, it flows around the arm2 spool in the inside path and joins into port Ba1.

Besides, the return oil from the arm cylinder head side(H) passes through port Aa1 and returns the hydraulic oil tank through the tank port(R2).



## (2) Arm in

### ① Pilot circuit

Since the arm1 spool(302) transfers and shuts off the side bypass path, the pressure at port Pw increases. Then, the pressure enters also through port PaL and the release signal is sent to the lock valve.

### ② Main circuit

During the arm in operation, the pilot pressure enters through ports XAa1 and XAa2.

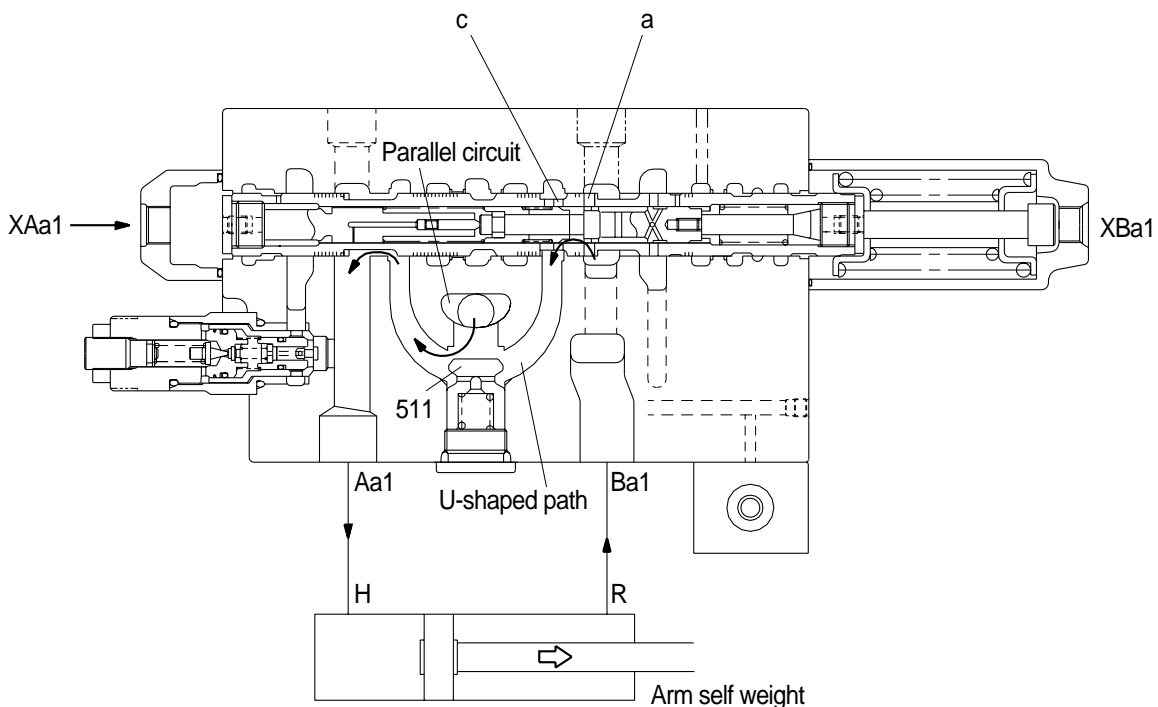
When the pressure enters through port XAa1, the spool transfers in the right direction as shown in the figure.

#### • During light load only

The hydraulic oil entering through port P1 passes through the main path(1) and flows to the bypass circuit(2), but the bypass circuit is shut off due to transfer of the arm1 spool.

Therefore, the hydraulic oil pushes open the check valve(511) from the parallel circuit and flows through the U-shaped path to the arm1 spool(302). Then, it flows around the periphery of the arm1 spool to port Aa1, and is supplied to the arm cylinder head side(H).

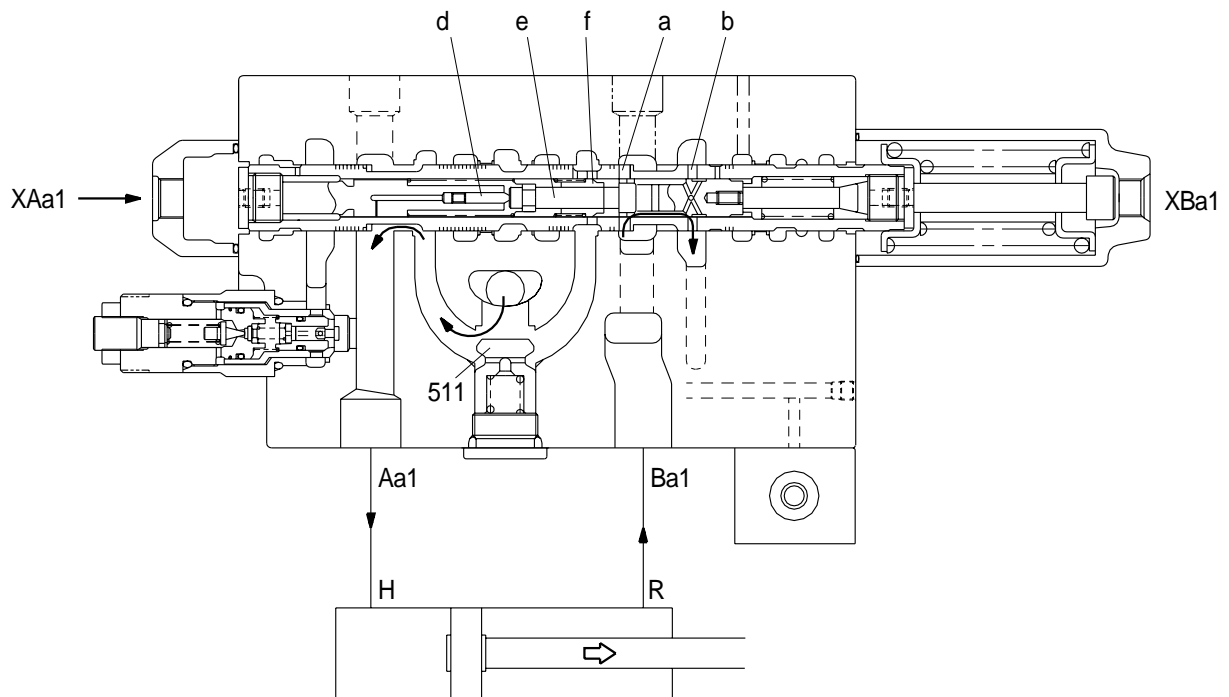
On the other hand, the return oil in the arm cylinder rod side(R) is pressurized self-weight of the arms and so on, and returns to port Ba1. The pressurized oil returning to port Ba1 enters into the spool through the outside hole(a) of the arm1 spool(302). During a light load only, it pushes open the sleeve check valve, flows the U-shaped path reversely from the spool hole(c) and joins into port Aa1. This is called the **arm regeneration function**.



- **The pressure in the arm cylinder head side(H) increases.**

When the pressure in the arm cylinder head side(H) increases, the piston(d) and sub-spool(e) are transferred in the right direction, and at the same time the sleeve check valve(f) is closed by its back-pressure. This shuts off the arm regeneration function, and the return oil from the arm cylinder rod side(R) enters from port Ba1 through the periphery hole(a) of the arm1 spool into the spool, flows out through the periphery hole(b) of the spool and returns through the tank port(R2) to the hydraulic oil tank.

On the other hand the pressurized oil entering through port P2 joins into port Aa1 through the inside path similarly to the case of the arm out operation.





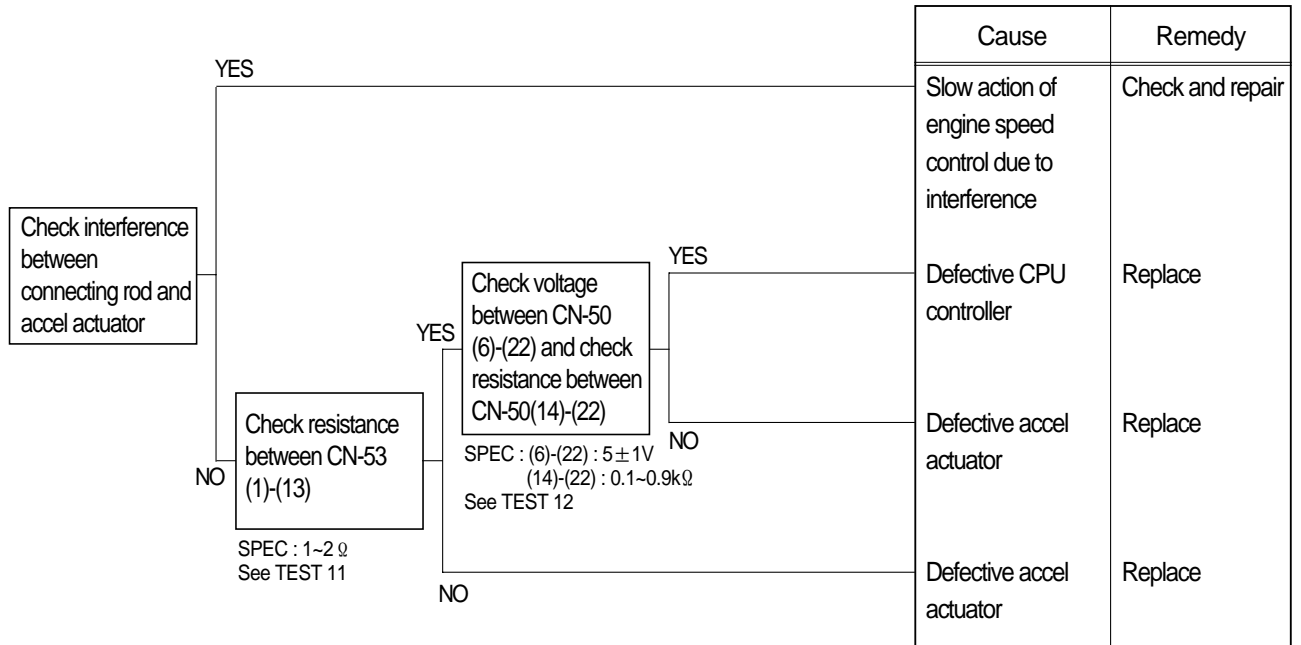
## 2) DESCRIPTION OF MONITORING DISPLAY

Group	Display	Name	Description
<b>Group 0</b>	<b>2450 rpm</b>	Engine speed	It displays current engine speed detected by engine speed sensor from 500 to 3000rpm. Range : 500~3000rpm by 10rpm
	<b>TIME 12 : 30</b>	Time	It displays current time(12 is hour and 30 is minute) Range : Hour(1~12), minute(00~59)
	<b>P1 : 100bar</b> (Option)	Front pump pressure	It displays front pump pressure of 100bar which is detected by pressure sensor. Range : 000~ 500bar by 10bar
	<b>P2 : 200bar</b> (Option)	Rear pump pressure	It displays rear pump pressure of 200bar which is detected by pressure sensor. Range : 000~ 500bar by 10bar
	<b>P3 : 30bar</b> (Option)	Pilot pump pressure	It displays pilot pump pressure of 30bar which is detected by pressure sensor. Range : 00~50bar by 1bar
<b>Group 1</b>	<b>b24 : 8</b>	Battery voltage	It shows that battery power of 24.8V is supplied into CPU controller. Range : 00.0~48.0V by 0.1V
	<b>Po : 2 : 5</b>	Potentiometer voltage	It shows that potentiometer signal voltage is 2.5V. Range : 0.0~5.0V by 0.1V
	<b>Hd : 50</b>	Hydraulic oil temperature	It shows that hydraulic oil temperature detected by temperature sensor is 50°C. Range : Lo(Below 20°C) ; 30~90°C by 10°C, Hi(Above 100°C).
	<b>EPr : 10bar</b>	Power shift pressure of EPPR valve	It shows that pump power shift pressure of EPPR valve being controlled by the CPU controller is 10bar. Range : 00~50bar by 1bar
	<b>02C : 10</b>	Model and CPU program version	It shows that machine model(R200W-3) and the program version of the CPU controller is 1.0. Version display range : 0.0~9.9 by 0.1
<b>Group 2</b>	<b>Err : 03</b>	Current error	It shows that current error of 03(Short circuit in pump EPPR valve 2 lines) is diagnosed by self diagnosis system in the CPU controller. If more than 2 errors, each error code is displayed for 2 seconds and changes to other error codes continuously. Range : 00~47
	<b>TIME Err : 03</b>	Recorded error	It shows recorded error code of 03 which is diagnosed before. If more than 2 error codes, each error code is displayed for 2 seconds and changes to other error codes continuously. Range : 00~47
	<b>TIME Err : 00</b>	Recorded error deletion	It shows all recorded error codes are removed in the CPU controller memory.

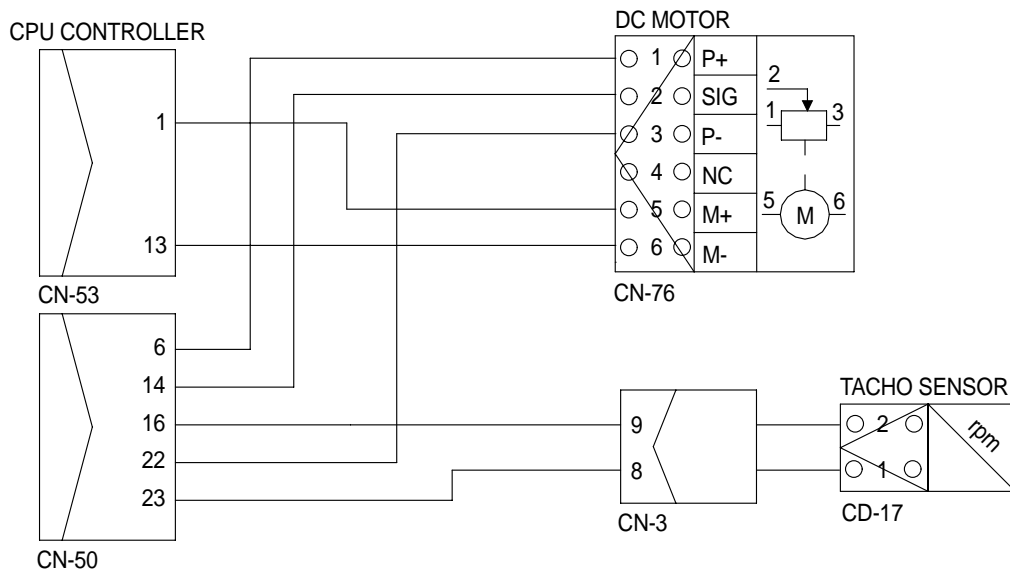
## 5. SLOW ACTION OF ENGINE SPEED CHANGE WHEN CHANGE THE MODE

※ Before carrying out below procedure, check all the related connectors are properly inserted.

### 1) INSPECTION PROCEDURE



### Wiring diagram

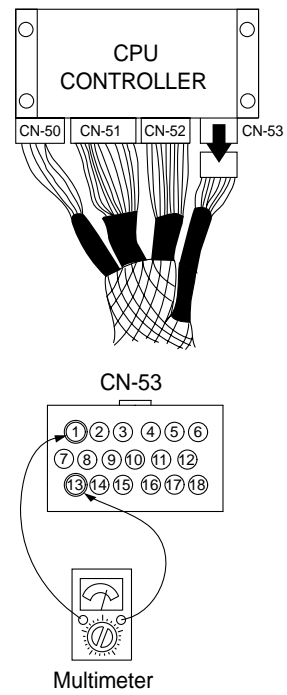


## 2) TEST PROCEDURE

(1) **Test 11** : Check resistance.

- ① Starting key OFF.
- ② Disconnect connector CN-53 from CPU controller.
- ③ Check resistance between CN-53(1)-(13) as figure.

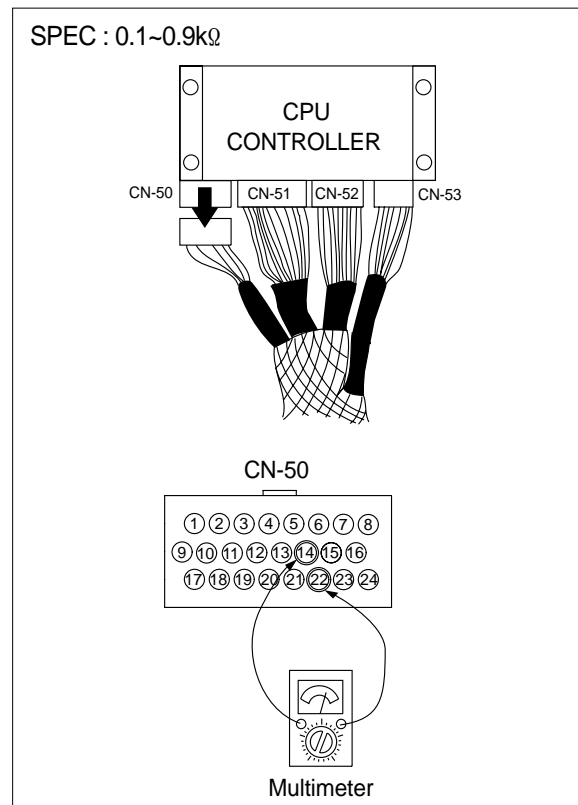
SPEC : 1~2  $\Omega$



(2) **Test 12** : Check voltage and resistance.

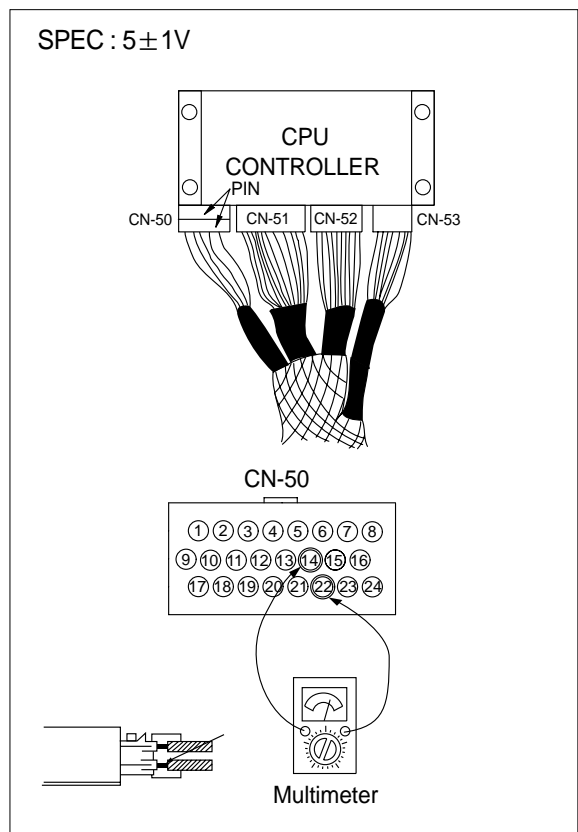
① Check resistance between CN-50(14)-(22).

- Starting key OFF.
- Disconnect connector CN-50 from CPU controller.
- Check resistance value with multimeter as figure.



② Check voltage between CN-50(6) and CN-50(22).

- Prepare 2 pieces of thin sharp pin, steel or copper.
- Starting key ON.
- Insert prepared pins to rear side of connectors : One pin to CN-50(6)  
Other pin to CN-50(22)
- Check voltage.

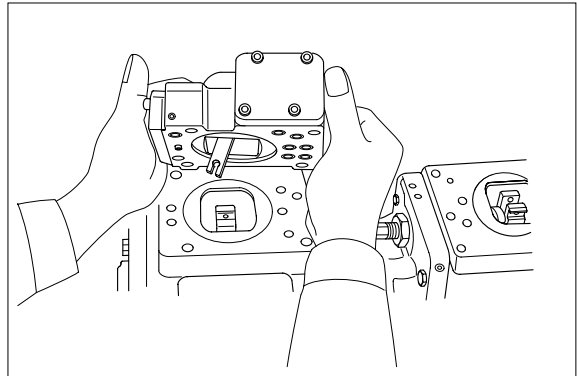


### 3) DISASSEMBLY

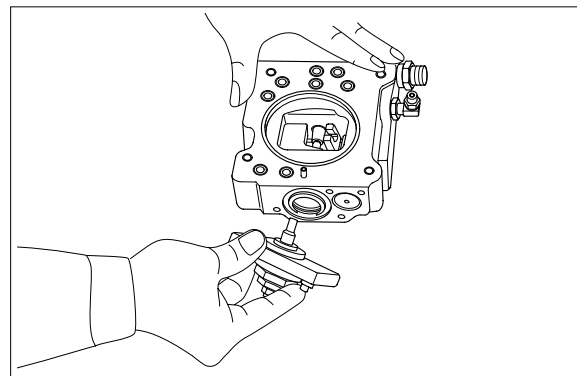
Since the regulator consists of small precision finished parts, disassembly and assembly are rather complicated.

For this reason, replacement of a regulator assembly is recommended, unless there is a special reason, but in case disassembly is necessary for an unavoidable reason, read through this manual to the end before starting disassembly.

- (1) Choose a place for disassembly.
  - ※ Choose a clean place.
  - ※ Spread rubber sheet, cloth, or so on on top of work-bench to prevent parts from being damaged.
- (2) Remove dust, rust, etc. from surfaces of regulator with clean oil.
- (3) Remove hexagon socket head screw (412, 413) and remove regulator main body from pump main body.
  - ※ Take care not to lose O-ring.



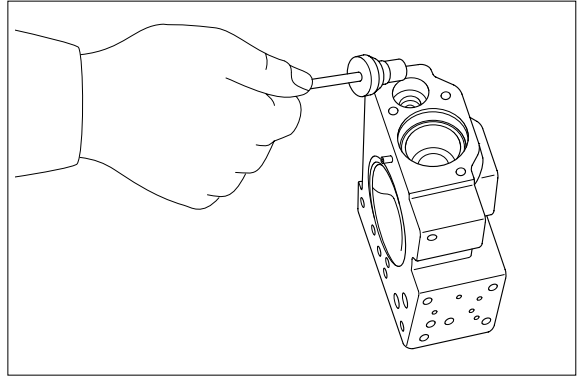
- (4) Remove hexagon socket head screw (438) and remove cover(C,629)
  - ※ Cover(C) is fitted with adjusting screw (C,QI) (628, 925), adjusting ring(C, 627), lock nut(630), hexagon nut(801) and adjusting screw(924).  
Do not loosen these screws and nuts.  
If they are loosened, adjusted pressure-flow setting will vary.



- (5) After removing cover(C, 629) subassembly, take out outer spring(625), inner spring (626) and spring seat(C, 624) from compensating section.

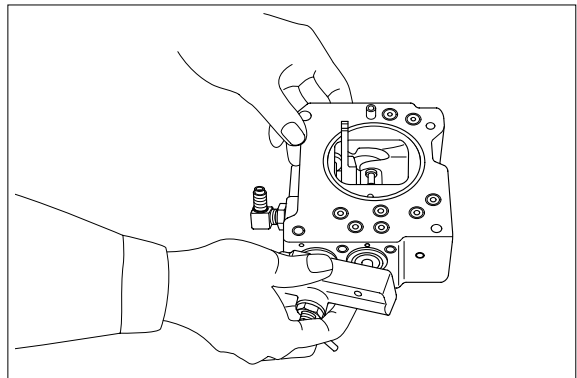
Then draw out adjusting ring(Q, 645), pilot spring(646) and spring seat(644) from pilot section.

- ※ Adjusting ring(Q,645) can easily be drawn out with M4 bolt.



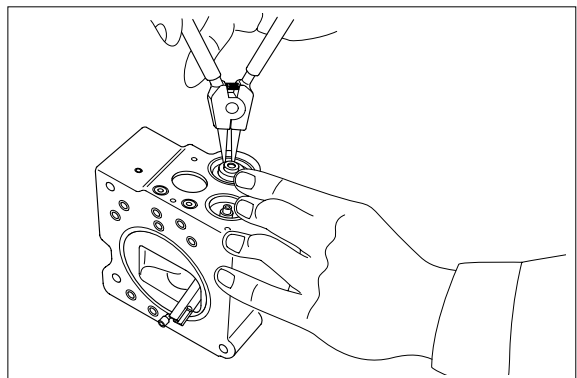
- (6) Remove hexagon socket head screws (436, 438) and remove pilot cover(641).

After removing pilot cover, take out set spring(655) from pilot section.



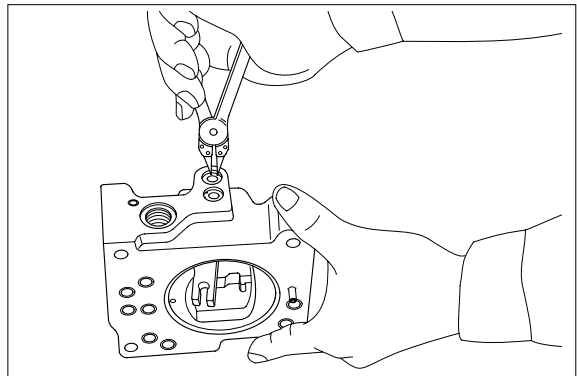
- (7) Remove snap ring(814) and take out spring seat(653), return spring(654) and sleeve(651).

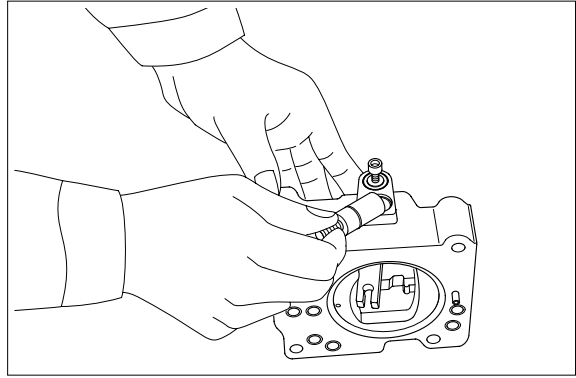
- ※ Sleeve(651) is fitted with snap ring(836).
- ※ When removing snap ring(814), return spring(654) may pop out. Take care not to lose it.



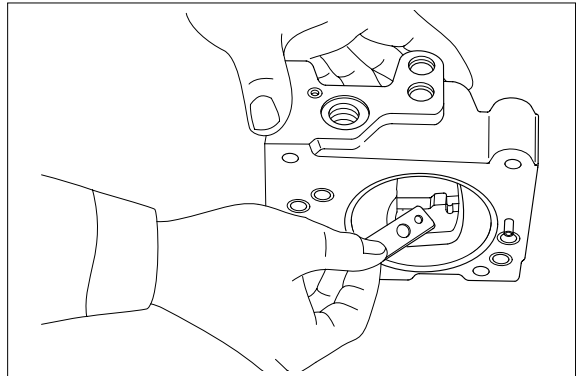
- (8) Remove snap ring(858) and take out fulcrum plug(614) and adjusting plug (615).

- ※ Fulcrum plug(614) and adjusting plug (615) can easily be taken out with M6 bolt.

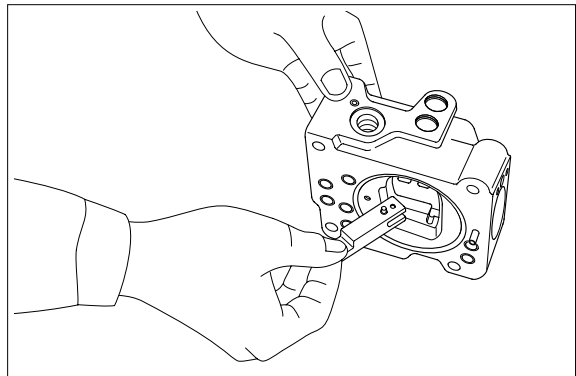
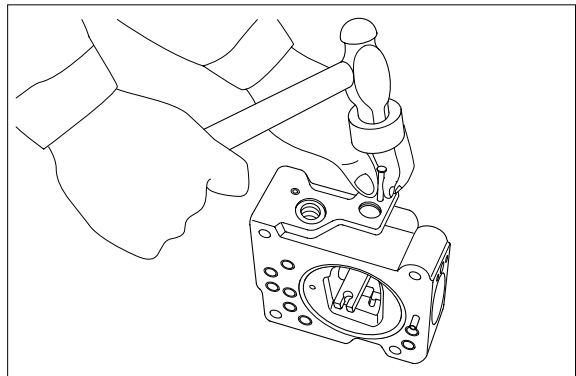




- (9) Remove lever(2, 613). Do not draw out pin(875).  
※ Work will be promoted by using pincers or so on.



- (10) Draw out pin(874) and remove feedback lever(611).  
※ Push out pin(874, 4mm in dia.) from above with slender steel bar so that it may not interfere with lever(1, 612).



(11) Remove lever(1, 612). Do not draw out pin(875).

(12) Draw out pilot piston(643) and spool(652).

(13) Draw out piston case(622), compensating piston(621) and compensating rod(623).

※ Piston case(622) can be taken out by pushing compensating rod(623) at opposite side of piston case.

This completes disassembly.



Diesel Engines

ABS	Agco-Sisu
Akasaka	Baudouin
BMW	Bukh
Caterpillar	CHN 25/34
Cummins	Daihatsu
Detroit	Deutz
Doosan-Daewoo	Fiat
Ford	GE
Grenaa	Guascor
Hanshin	Hatz
Hino	Honda
Hyundai	Isotta
Isuzu	Iveco
John-Deere	Kelvin
Kioti	Komatsu
Kubota	Liebherr
Lister	Lombardini
MAK	MAN B&W
Mercedes	Mercruiser
Mirrlees BS	Mitsubishi
MTU	MWM
Niigata	Paxman
Perkins	Pielstick
Rolls / Bergen	Ruggerini
Ruston	Scania
Shibaura	Sisu-Valmet
SKL	Smit-Bolnes
Sole	Stork
VM-Motori	Volvo
Volvo Penta	Westerbeke
Wichmann	Yanmar

Machinery

ABG	Airman
Akerman	Ammann
Astra	Atlas Copco
Atlas Weyha.	Atlet
Bell	Bendi
Bigjoe	Bobcat
Bomag	BT
Carelift	Case
Caterpillar	Cesab
Challenger	Champion
Claas	Clark
Combilift	Crown
Daewoo-Doosan	Demag
Deutz-Fahr	Dressta

Machinery

Drott	Dynapack
Extec	Faun
Fendt	Fiat
Fiatallis	Flexicoil
Furukawa	Gehl
Genie	Grove-gmk
Halla	Hamm
Hangcha	Hanix
Hanomag	Hartl
Haulpack	Hiab
Hidromek	Hino truck
Hitachi	Hyster
Hyundai	IHI
Ingersoll-rand	JCB
JLG	John-Deere
Jungheinrich	Kalmar
Kato	Kioti
Kleeman	Kobelco
Komatsu	Kramer
Kubota	Lamborghini
Landini	Liebherr
Linde	Link-belt
Manitou	Massey-Ferg.
Mccormick	MDI-Yutani
Mitsubishi	Moxy
Mustang	Neusson
New-Holland	Nichiyu
Nissan	OK
OM-Pimespo	others-tech
Pel-Job	PH-mining
Poclain	Powerscreen
Same	Samsung
Sandvik	Scania
Schaefer	Schramm
Sennebogen	Shangli
Shibaura	Steiger
Steinbock	Steyr
Still	Sumitomo
Super-pac	Tadano
Takeuchi	TCM
Terex	Toyota
Valpadana	Venieri
Versatile	Vogele
Volvo	Weidemann
Wirtgen	Yale
YAM	Yanmar