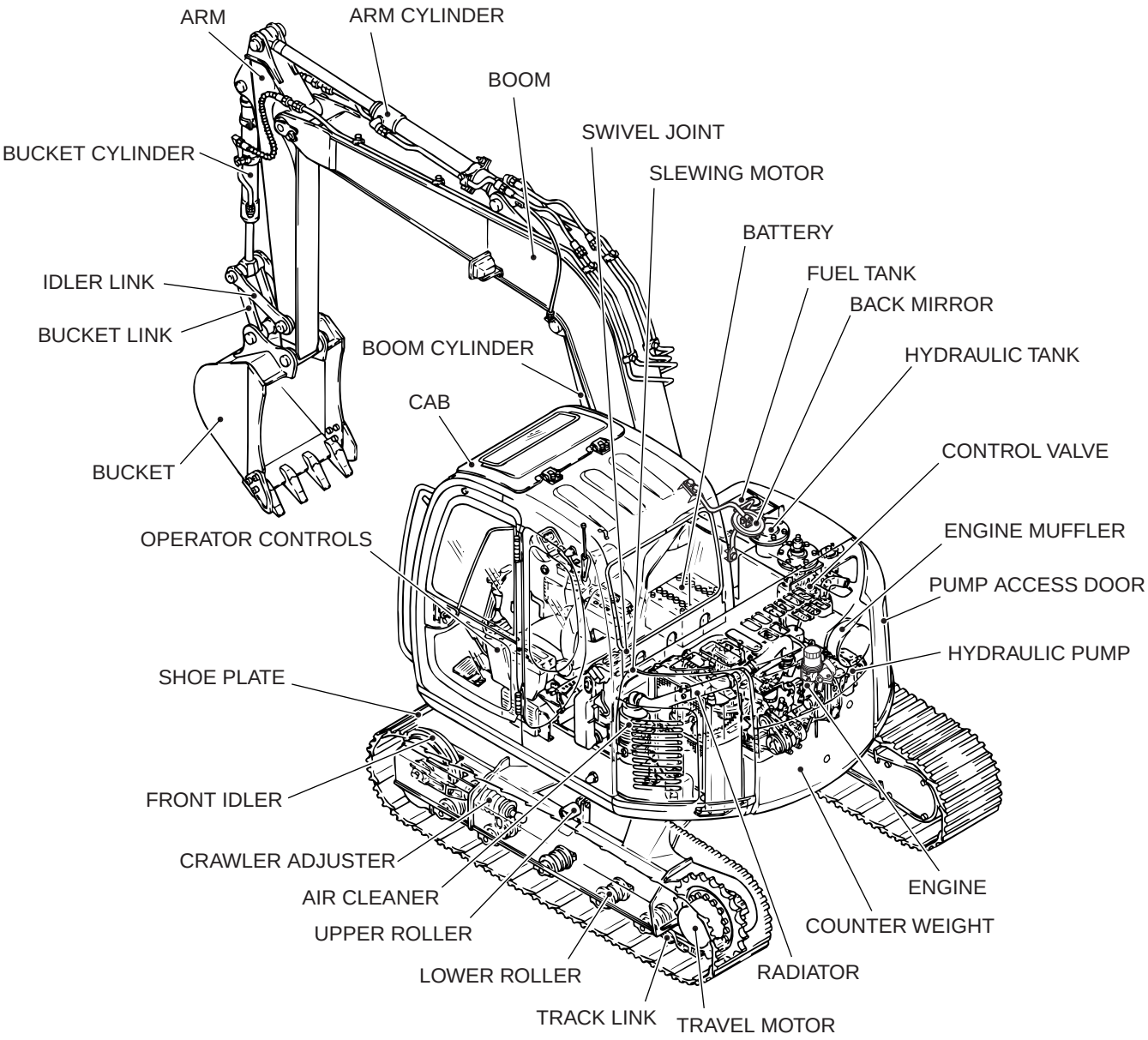
## 2.1 NAME OF COMPONENTS



## 2.4 TRANSPORTATION DIMENSION AND WEIGHT

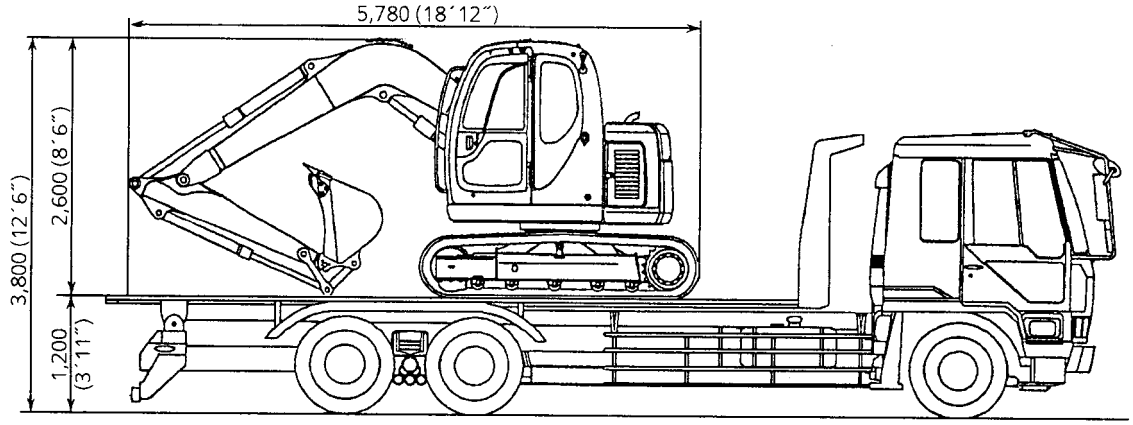
**OVERALL DIMENSIONS OF MACHINE ON A TRAILER**

**OVERALL DIMENSIONS OF A COMPLETE MACHINE ON A TRAILER**

| Item | Type | 2.07 M (6 ft-9 in) Arm + 600 mm (23.6 in) shoes | 2.07 M (6 ft-9 in) Arm + 450 mm (17.7 in) shoes |
|---|---|---|---|
| Width | m (ft-in) | 2,470 (8'1") | 2,320 (7'7") |
| Weight | kg (lb) | 6,920 (15,260) | 6,700 (14,770) |

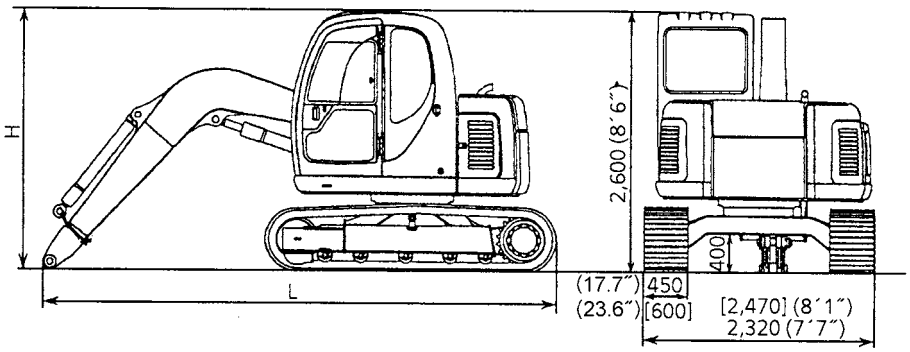
Specification :

- The parenthesis shows 2.07m arm model.
- Regarding 2.07m arm machine, put the arm cylinder rod in a transport position (B) by referring to the outside dimensions in 2.2 MACHINE DIMENSIONS.



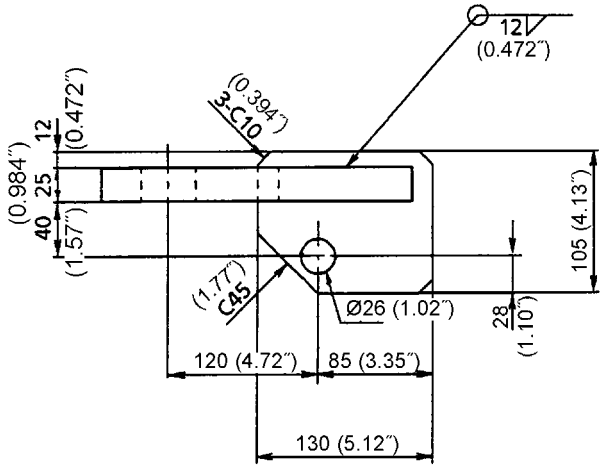

**OVERALL DIMENSIONS OF WITHOUT ARM AND BUCKET**

| Type / Combination | A : Shoe width mm (ft-in) | L : Length mm (ft-in) | H : Height mm (ft-in) | W : Width mm (ft-in) | Weight mm (ft-in) |
|---|---|---|---|---|---|
| Without arm and bucket | 600 (23.6") | 5,670 (18'7") | 2,600 (8'6") | 2,470 (8'1") | 6,440 (14,200) |
| | 450 (17.7") | 5,670 (18'7") | 2,600 (8'6") | 2,320 (7'7") | 6,220 (13,715) |

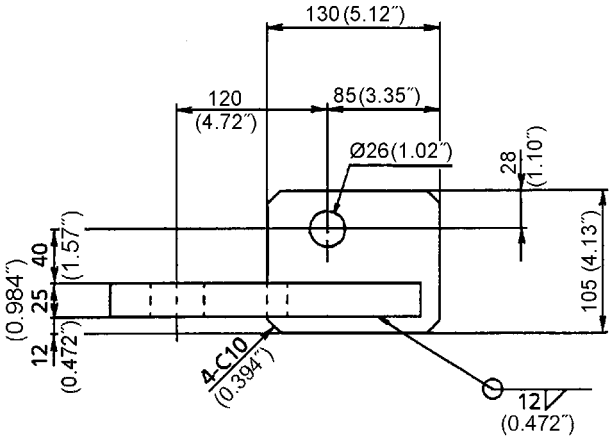


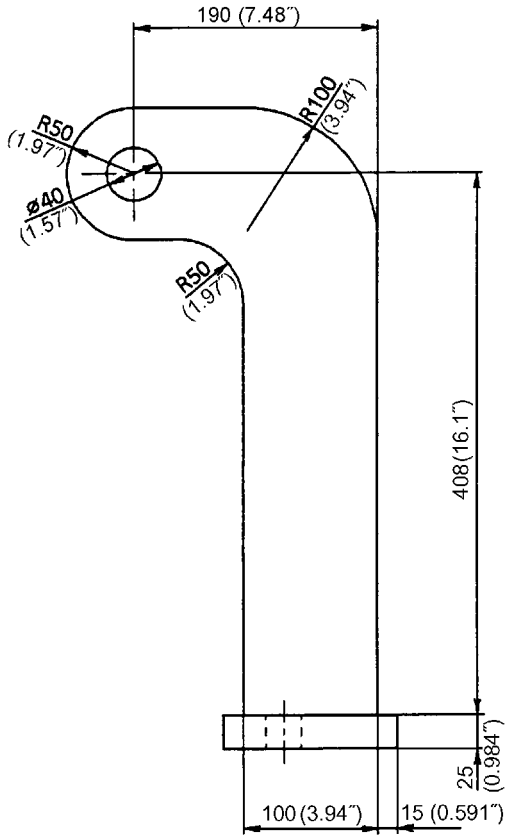
## 11.10 COUNTERWEIGHT LIFTING JIG

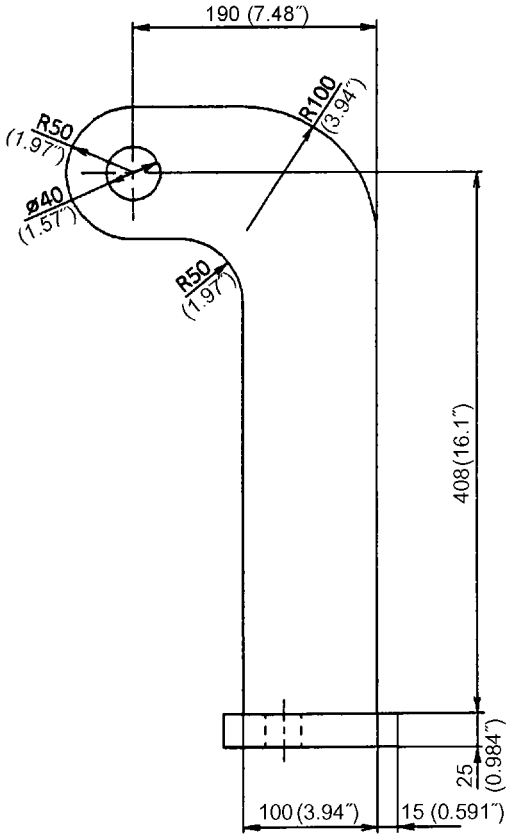
Bracket for left side




Bracket for right side



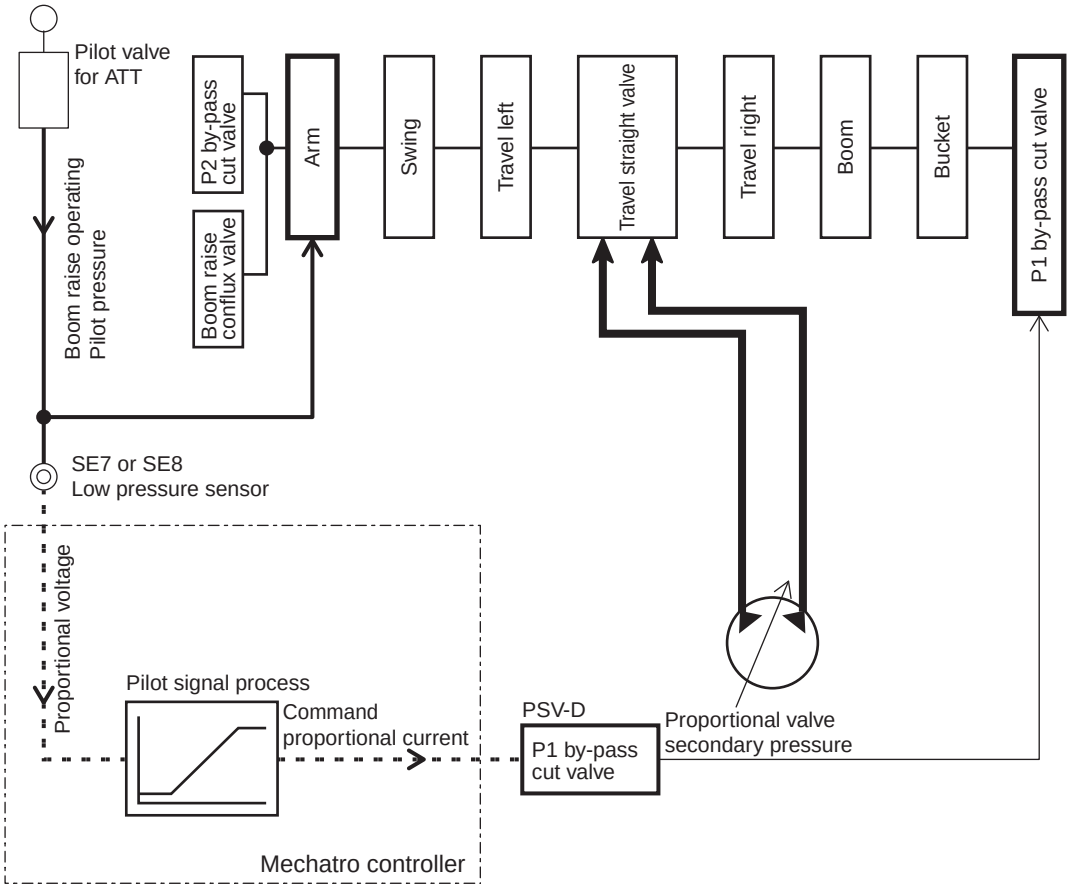



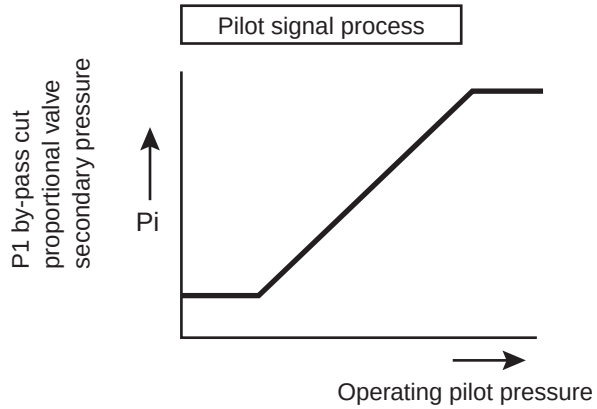




Material : Mild steel

**Fig. 11-3 Counterweight lifting bracket**

## 21.4 ARM IN / OUT CONFLUX MECHATRO CONTROL SYSTEM




(1) Start arm in and out operation simultaneously, and operation pilot pressure switches arm spool, and is input into low pressure sensor.

(2) The voltage output by low pressure sensor is input into mechatro controller, and the controller processe the pilot signal and outputs the command corresponding to input voltage to P1 by-pass cut valve.

(3) P1 by-pass cut valve outputs pilot secondary pressure corresponding to the command output by mechatro controller, and switches P1 by-pass cut valve of control valve.

(4) By switching arm main spool with operation spool pressure and switching P1 by-pass cut valve according to mechatro control command, the oil delivered by P1 and P2 pumps is confluxed during arm operation.

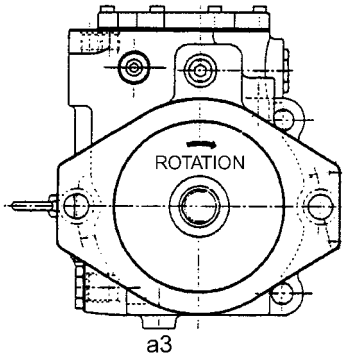
# 24.1 HYDRAULIC COMPONENTS

## 24.1.1 HYDRAULIC PUMP & REGULATOR

### 24.1.1.1 SUMMARY

(1) General view and hydraulic port

| Code | Port name | Size |
|---|---|---|
| A1, A2 | Delivery port | PF 3/4 |
| A3 | Delivery port | PF 3/8 |
| A4 | Relief port | PF 3/8 |
| A5 | Delivery port | PF 1/2 |
| a1, a2 | Gauge port | PF 1/4 |
| a3 | Air Bleed port | PF1/4 |
| B1 | Suction port | $\phi$48 |
| B2 | Suction port | PF 1 |
| Dr1, Dr2 | Drain port | PF 1/2 |
| P3 | Power shift port of the pilot pump | PF 1/4 |
| Pf | Power shift port of the Pilot Pressure | PF 1/4 |
| C2 | Pcl port | PF 1/4 |
| Pz | Power shift port | PF 3/8 |



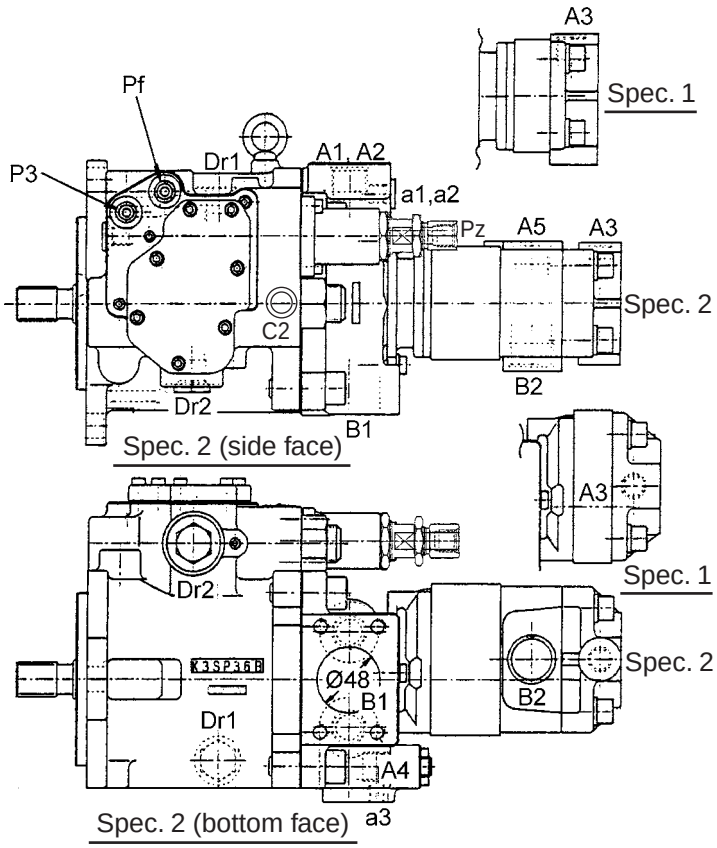




**Fig. 24-1 Hydraulic pump & regulator**

(2) Specifications

**Table 24-1**

| Specifications | | Spec. 1 | Spec. 2 | |
|---|---|---|---|---|
| Parts No. | | YT10V00008F1 | YT10V00009F1 | |
| Model | | K3SP36B-101R-1002 | K3SP36B-101R-2002 | |
| Main pump | Displacement capacity $cm^3/rev$ | 31.4 X 2 | ← | |
| | Max. pressure MPa (psi) | 29.4 (4270) | ← | |
| | Max. flow L/min (gal/min) | 66 (18) X 2 | ← | |
| Attached gear pump | Purpose of use | Pilot hydraulic pressure source (A3) | Dozer pressure source (A5) | Pilot hydraulic pressure source (A3) |
| | Displacement capacity $cm^3/rev$ | 9.5 | 23.1 | 9.5 |
| | Max. pressure MPa (psi) | 3.4 (500) | 19.6 (2840) | 3.4 (500) |
| | Max. flow L/min (gal/min) | 20 (5.3) | 48.5 (13) | 20 (5.3) |
| Revolution | ($min^{-1}$) rpm | Rate : 2100 (Clockwise as seen from the shaft), high idle : 2310 | | |
| Weight | kg (lbs) | 41 (90) | 44 (88) | |
| Oil quantity | L (gal) | 1.0 (0.26) | ← | |
| Control characteristics of regulator | | Simultaneous total horsepower, Power shift control of air-conditioner, Variable horsepower control | Simultaneous total horsepower, Power shift control of air-conditioner, Power shift control of the No.3 pump Variable horsepower control | |

(11)Function of over road relief valve

1) Pressurized oil P is filled up in chamber A through the inside of the piston built in the plunger G and choke B. The plunger G and the socket are sealed securely. The socket is sealed securely against the poppet as well.

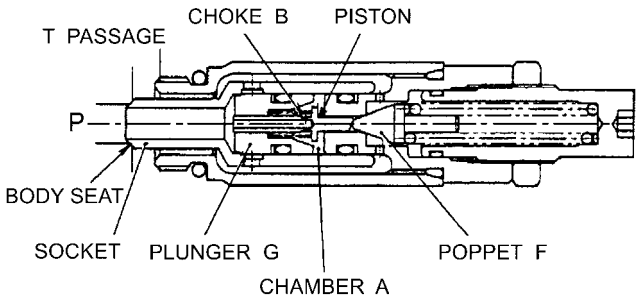



**Fig. 24-54**

2) When the hydraulic pressure at port P arrives at a set value of spring C, it pushes the piston which in turn opens the poppet F.
On that occasion, the hydraulic pressure goes through the inside of the piston → choke B → chamber A → annular orifice D and drilled hole E goes around the outer circumference of the socket and flows out to the tank passage.

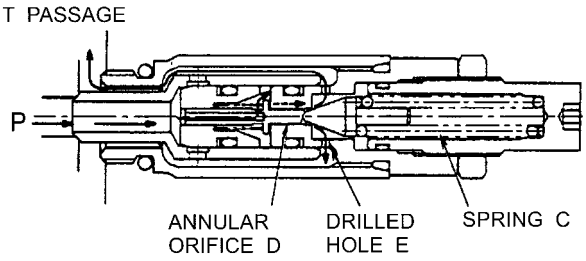



**Fig. 24-55**

3) If the poppet F opens, the pressure of chamber A falls. Then the plunger G opens and the pressure of port P flows directly to the tank T passage through drilled hole H.

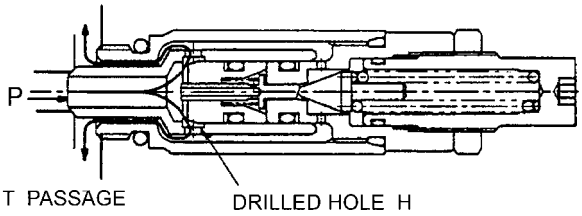



**Fig. 24-56**

4) If the pressure at port P falls below a set value of spring C, the poppet F is pressed against the seat by the action of spring C. As the result, the pressure of chamber A equals that of port P. This presses the plunger G against the socket seat and brings it back where it was. (Fig. 24-54)

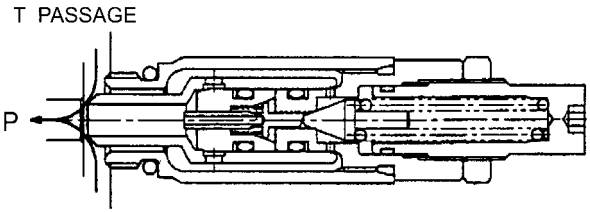
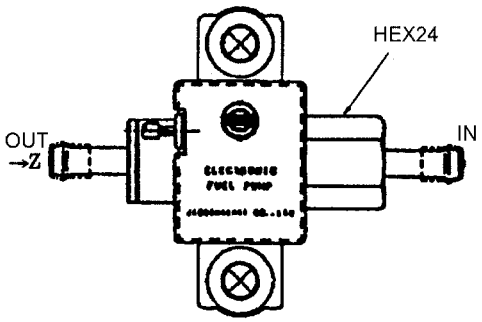


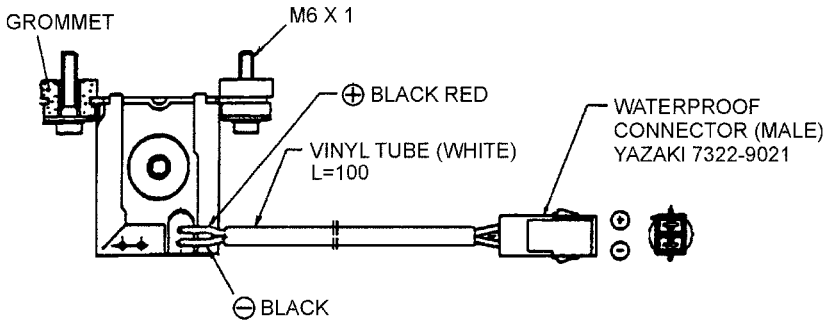

**Fig. 24-57**

5) Function of anti-cavitation
This function supplies oil from the T (tank) path in case negative pressure occurs at port P. When the tank path pressure gets higher than that of port P, the socket is subject to a force that pushes it up. This creates a space between the body seat and the socket. The oil from the T path (tank) flows into port P, and fills up the space.

| Code No.<br>Parts Name<br>Parts No.<br>Use<br>Applicable Machine | Specifications | Description |
|---|---|---|
| M-9<br>Motor (pump)<br>YR22P00001P1<br>Fuel pump<br>YR02801~<br>YT00101~<br>YT02-04001~<br>YT03-05432~<br>YT04-07001~ | | |

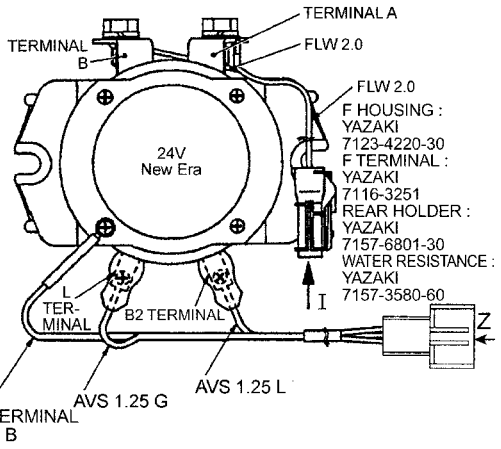
| | |
|---|---|
| Maker's part No. | 375-01016 |
| Rated voltage | DC 24 V |
| Current | Less than 1.5 A |
| Operating fluid | Light oil |
| Discharge rate (open circuit) | More than 200 cc/min |

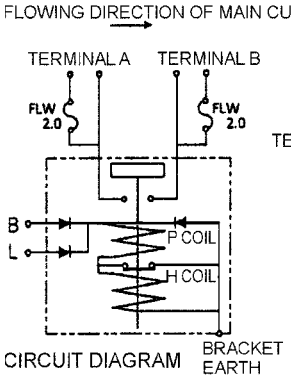


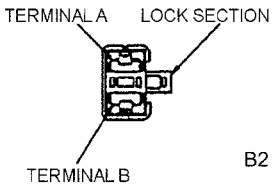

VIEW Z

| | |
|---|---|
| Reted valtage / current | At start 24 V 2000 A (0.1 sec.)<br>At charge 28 V120 A (continuous) |
| Exciting current | Less than 0.4 A / 24 V |
| Contact pressure | More than3.8 kgf (8.4 lbf) |
| Closed circuit voltage | Less than 16 V |
| Open circuit voltage | Less than 7 V |
| Insulation resistance | More than 3 MΩ / 500 V megger |

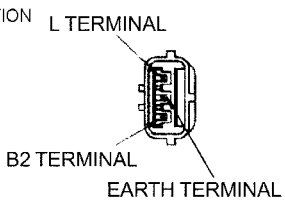



CIRCUIT DIAGRAM




VIEW I




VIEW Z

HOUSING AMP
174359-2
RETAINER AMP
1-174360-1
TERMINAL AMP
171661-1
WIRE SEAL AMP
172888-2

(5) Pressure Switch (Attached to Receiver Dryer)

1) Contents of checking (specification)

**Low pressure side OFF pressure** :
0.2 ± 0.02 MPa (28 ± 3 psi)

**Low pressure side return pressure** :
OFF pressure + 0.03 MPa (4.3 psi) or below

**High pressure side OFF pressure** :
3.1 ± 0.2 MPa (455 ± 28 psi)

**High pressure side return pressure** :
OFF pressure -0.59 ± 0.02 MPa (-85 ± 2.8psi)

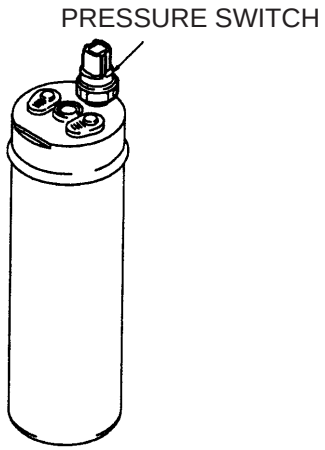
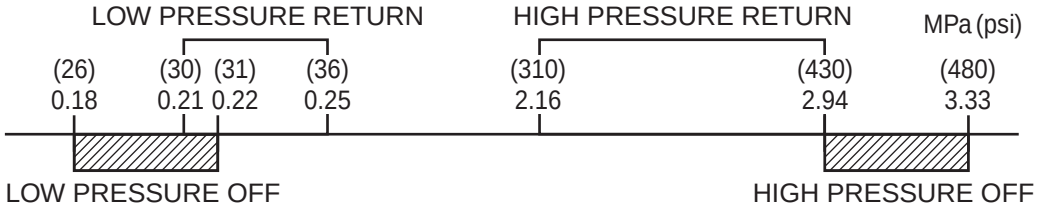



**Fig. 25-38 Pressure switch**




2) Performance

**Low pressure side** :
To prevent actuation of the compressor clutch where refrigerant is deficient

**High pressure side** :
To prevent actuation of the compressor clutch where pressure rises abnormally because of the clogging of the refrigeration circuit, etc.

(6) Thermistor (C19)

1) Contents of checking (specification)
Resistance across terminals

at 0°C (32°F) : 7.2 K1/2
at 25°C (77°F) : 2.2 K1/2

**Note**

Normally check that there is no shortcircuit or disconnection.

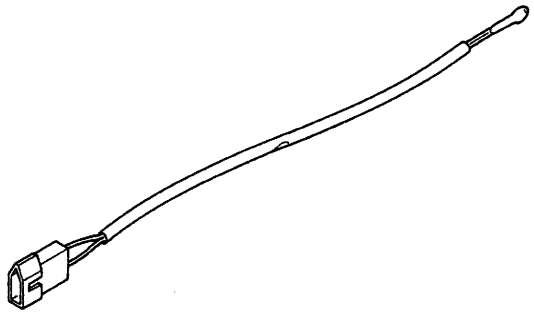


**Fig. 25-39 Thermistor**

2) Performance
In order to prevent freezing of the evaporator, the blowoff air temperature of the evaporator is controlled by turning the compressor clutch ON and OFF. The thermistor operates as the sensor of the control.

### 32.2.1.4.2 ASSEMBLING ROD COVER ASSY

(1) Press fit bushing (4) in rod cover (3) applying plate on the section. After press-fitting, check that the bushing is not projected from the end surface (A). (See Fig. 32-46)

(2) Fit snap ring (5).

(3) Fit backup ring (8) on U-ring groove.

(4) Apply hydraulic oil on U-ring (7) and fit it on the U-ring groove.

**Note**

- The U-ring is harder than other seals, so fit it in the groove by hand first, then press in with pushing bar until it is fitted with a click.
- Fitting U-ring paying attention to the direction.
- After fitting backup ring (8) and U-ring (7), check that they are free from the permanent set.

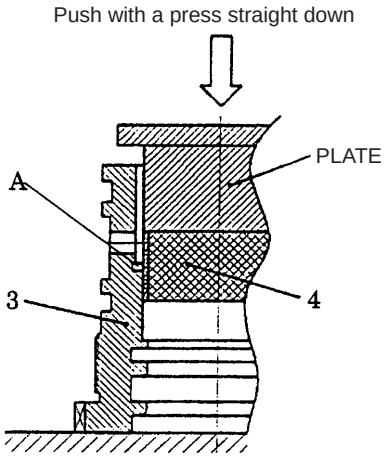



**Fig. 32-46 Pressing in bushing**

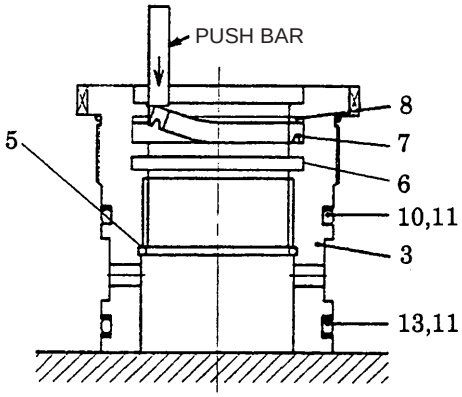



**Fig. 32-47 Fitting U-ring**

(5) Installing buffer ring assy
Buffer ring assy (6) is equipped with square ring and slide ring.

1) Fit square ring on the groove.

2) Depress slide ring in U shape by hand to house it in groove, and fit it pushing out to periphery.

**Note**

- Depress it R 6 mm (0.24 in) or more, because if the depressed R is too small, it may remain wrinkled.
- After fitting, check that it is free from wrinkles.
- Fit it giving attention to the seal fitting direction. Reverse fitting produces high pressure between U-ring and seal and may cause the deformation of rod cover.
- Fit slide ring so that the groove matches to the root section of square ring.

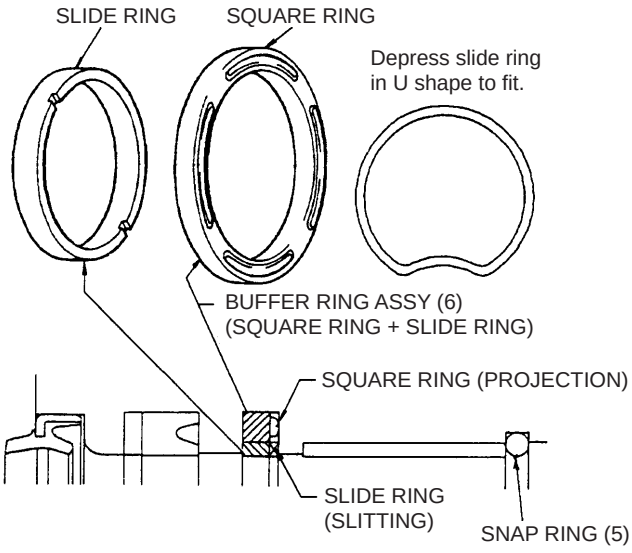



**Fig. 32-48 Installing buffer ring assy (6)**

(4) Remove guard (B4)

1) Remove three capscrews (B19) M8.

2) Remove guard (B4).

: 13 mm

(5) Remove water hose (B6)

1) Loosen the hose band (B12).

2) Remove hose (B6).

: Flat-blade screwdriver

(6) Remove main radiator (C1)

Remove four capscrews (A3) M12 × 30.

: 19 mm

: 19 mm

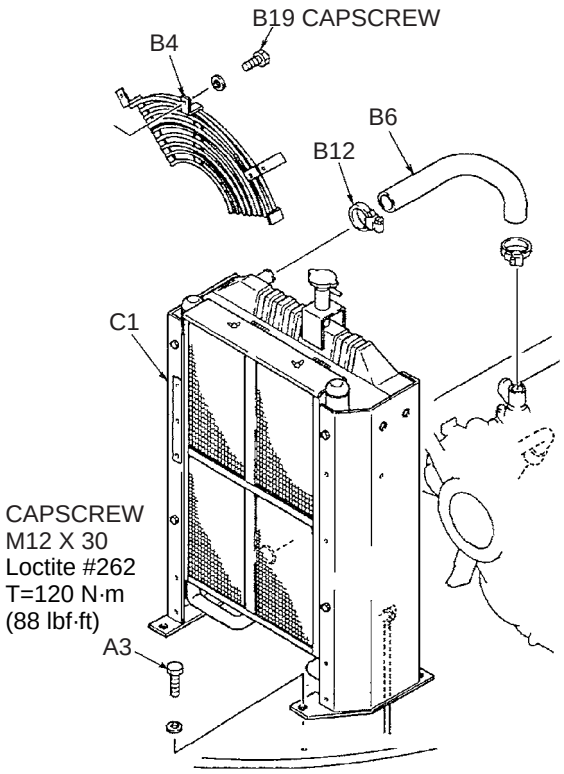



**Fig. 33-64 Removing radiator**

(7) Removing connection coupling for hydraulic oil (Oil cooler)

1) Remove 4 bolts M8 of coupling (17) just below the radiator.

2) Put oil pan under the coupling (17), remove coupling and let oil out.

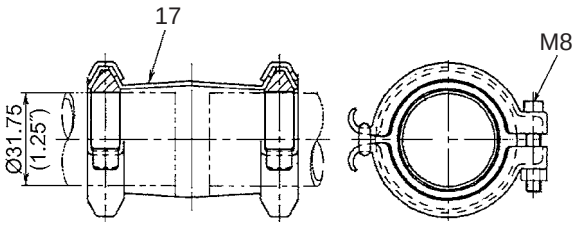



**Fig. 33-65 Removing coupling**

(8) Disconnecting hydraulic oil pipe

1) Shift radiator outward.

2) Plug up pipe ends with rag, etc.

(9) Disconnecting water lower hose (B5)

1) Loosen the hose band (B13).

2) Pulling out hose (B5).

**Note**

Remove the hose while sliding the radiator little by little.

(10) Removing radiator

Remove radiator assy by power of men or with crane.

Weight : 48 kg (106 lbs)

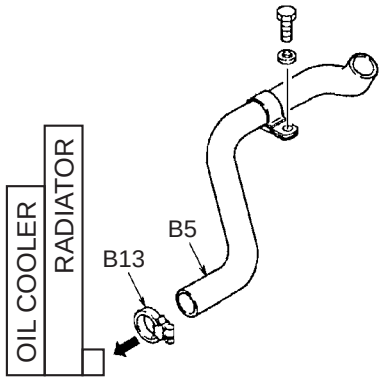
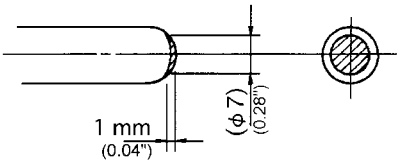



**Fig. 33-66 Removing water lower hose (B5)**

### 33.2.3.5 Maintenance standard

| Maintenance item | Standard | Remarks |
|---|---|---|
| Amount of leakage | Replace with a complete set of pilot valve when the amount of leakage reaches more than 1000 cc/min (61 cu•in/min) or 2000 cc/min (122 cu•in/min) at the neutral position of the handle or during operation, respectively. | Condition :<br>Primary pressure : 2.94MPa (427 psi)<br>Oil viscosity : 23 $mm^2/s$ |
| Spool | Replace with a complete set of pilot valve when an amount of wear at the sliding section is more than 10 μm (0.0004") in comparison with the non-sliding section. | The wear condition to the left is considered to correspond to the above amount of leakage. |
| Push rod | Replace when a wear amount of the tip is more than 1 mm (0.04").<br>  | |
| Unnecessary play in operation section | Replace when a play more than 2 mm(0.079") due to wear and so on is found on the disk (302) or joint section (301) of the operation section. | A play generated by loosening of tightening portion should be adjusted. |
| Action stability | Replace with a complete set of pilot valve when abnormal noise, hunting or primary pressure drop is generated during operation and the trouble cannot be remedied according to Section 33.2.3.6 TROUBLESHOOTING. | |

**Note**

Replace seal such as O-ring with new ones after every disassembly.

### 33.2.3.6 TROUBLESHOOTING

| Phenomenon | Possible Cause | Corrective action |
|---|---|---|
| Secondary pressure does not rise. | 1) Primary pressure is insufficient.<br>2) Springs (241-1, 241-2) are broken or fatigued.<br>3) Clearance between spool (201-1, 201-2) and valve body (101) is abnormally large.<br>4) Play of handle portion is too much. | 1) Secure primary pressure.<br>2) Replace with new ones.<br>3) Replace assembly.<br>4) Disassembly and reassembly or replace handle portion. |
| Secondary pressure is unstable. | 1) Sliding parts are caught.<br>2) Tank line pressure varies.<br>3) Air has contained into pipeline. | 1) Correct.<br>2) Return directly to oil tank.<br>3) Release air. |
| Secondary pressure is high. | 1) Tank line pressure is high.<br>2) Sliding parts are caught. | 1) Return directly to oil tank.<br>2) Correct. |

## 34.2 DISASSEMBLING AND ASSEMBLING

### 34.2.1 TRAVEL MOTOR

#### 34.2.1.1 CONSTRUCTION

(1) General view

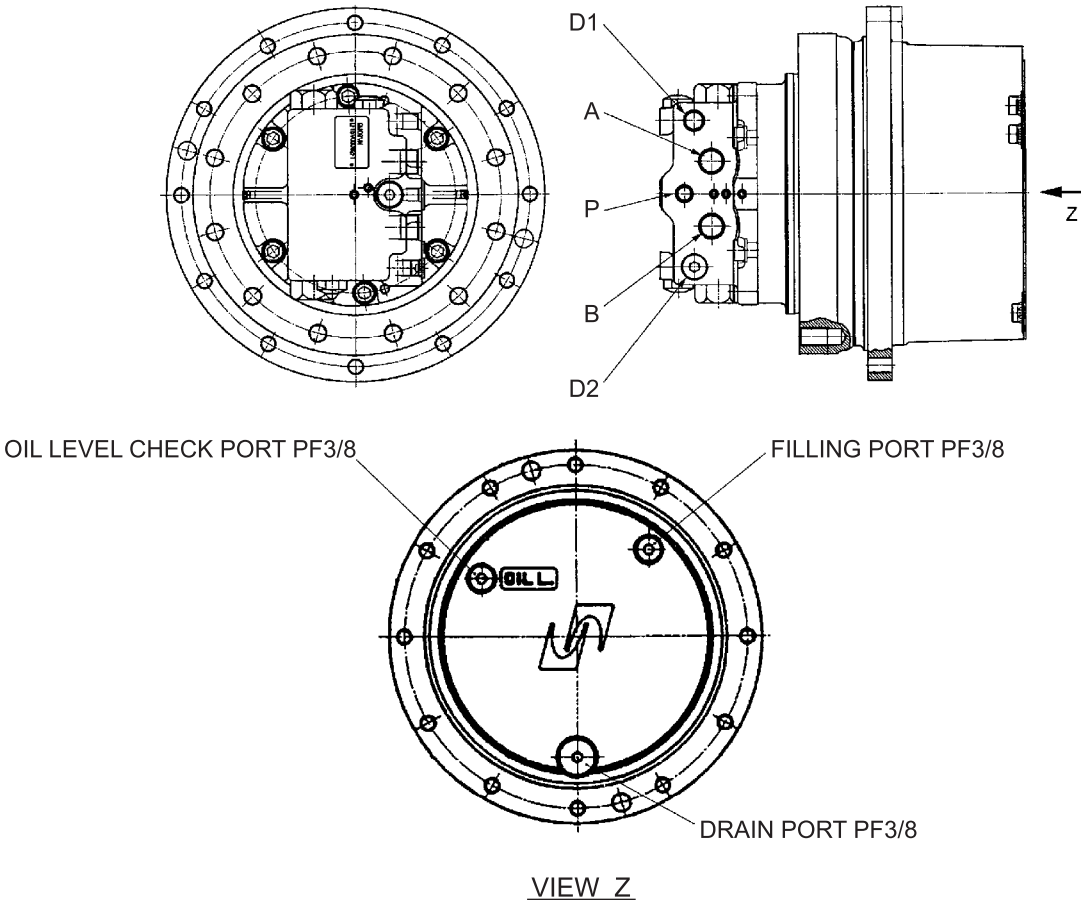
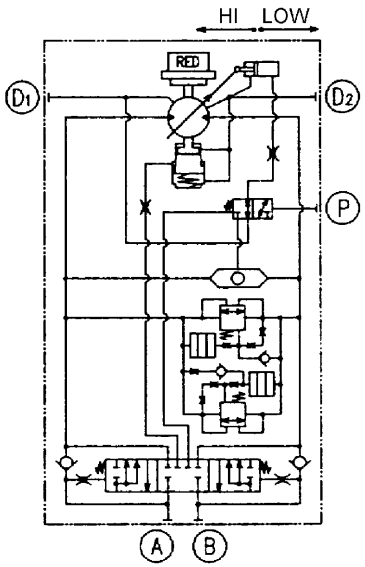



**Fig. 34-91**

**HYDRAULIC CIRCUIT**




PORT NAME AND SIZE

| No. | Ports | Size |
|---|---|---|
| A | Hydraulic oil filling / drain port | PF 1/2 |
| B | Hydraulic oil filling / drain port | |
| D1 | Drain port | PF 3/8 |
| D2 | Drain port | |
| P | 1st / 2nd speed select port | PF 1/4 |

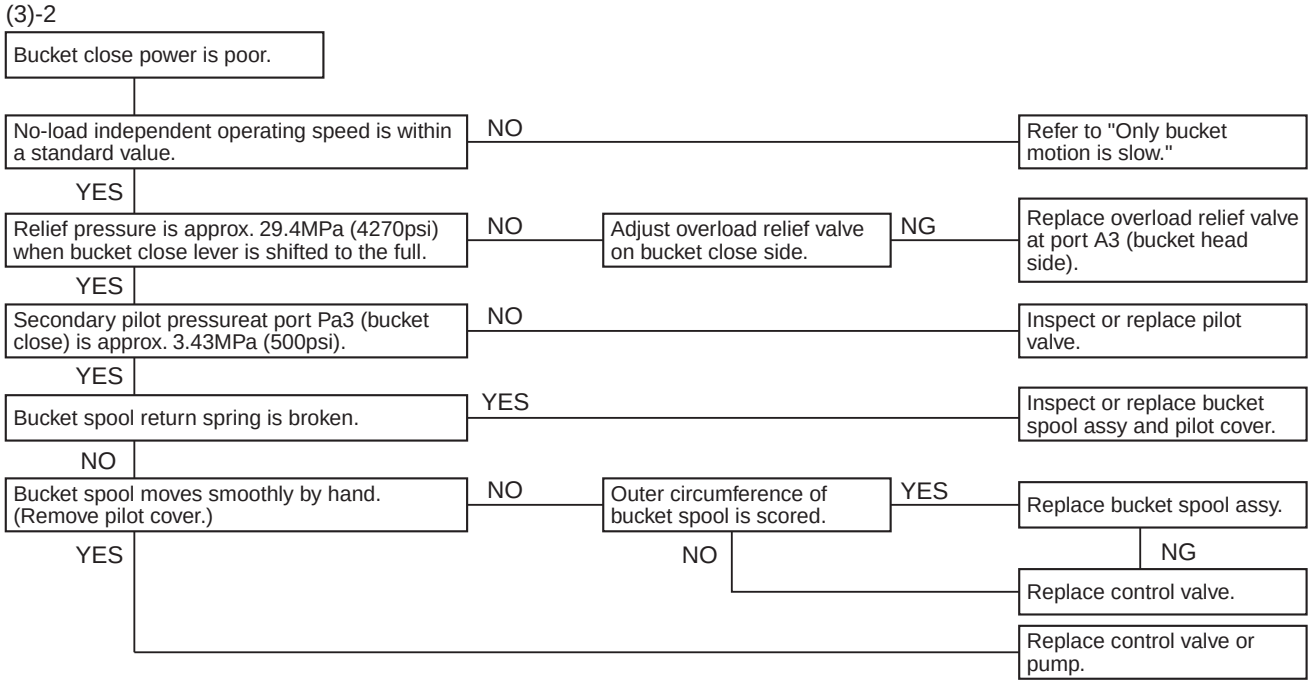
ROTATIONAL DIRECTION (Viewed from Z side)
INLET B PORT, OUTLET A PORT, CW
INLET A PORT, OUTLET B PORT, CCW

**Fig. 34-92**

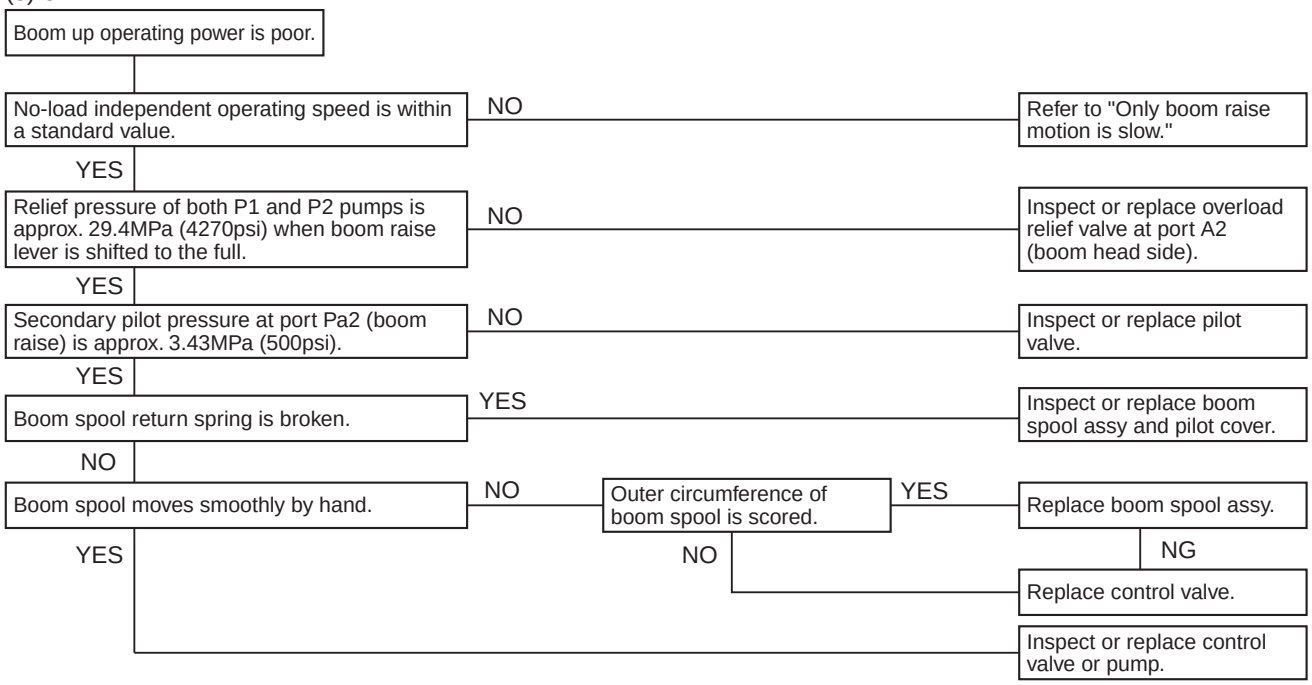
## 41.2 TABLE OF ACTUATOR FOR TROUBLESHOOTING : MECHATRO CONTROL

| Actuator / Opeating condition | | Electric | | | | | | | | Hydraulic | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Low pressure sensor | P2 bypass cut proportional valve | Travel straight proportional valve | P1 bypass cut proportional valve | Swing P / B solenoid valve | Travel 1-2speed solenoid valve | Safety lock lever solenoid valve | Travel boost-up solenoid valve | | |
| | | SE1~10 | PSV-B | PSV-C | PSV-D | SV-1 | SV-3 | SV-4 | SV-8 | P1 pump | P2 Pump |
| Indenpendent operation | Boom up inching operation | ○ | | | | | | ○ | | ○ | |
| | Boom up full lever operation | ○ | ○ | | | | | ○ | | ○ | ○ |
| | Boom down operation | ○ | | | | | | ○ | | ○ | |
| | Arm out inching operation | ○ | | | | | | ○ | | | ○ |
| | Arm out full lever operation | ○ | | | ○ | | | ○ | | ○ | ○ |
| | Arm in inching operation | ○ | | | | ○ | | ○ | | | ○ |
| | Arm in full lever operation | ○ | | | ○ | ○ | | ○ | | ○ | ○ |
| | Bucket digging | ○ | | | | | | ○ | | ○ | |
| | Bucket dump | ○ | | | | | | ○ | | ○ | |
| | Swing operation | ○ | ○ | | | ○ | | ○ | | | ○ |
| | Travel LH / RH operation (1st. speed) | ○ | | | | | | ○ | ○ | ○ | ○ |
| | Travel LH / RH operation (2nd. speed) | ○ | | | | | ○ | ○ | ○ | ○ | ○ |
| Combined operation | Travel right operation + Boom operation | ○ | ○ | ○ | | | | ○ | ○ | ○ | ○ |
| | Travel right operation + Bucket operation | ○ | ○ | | | | | ○ | ○ | ○ | ○ |
| | Travel right operation + Arm operation | ○ | | | ○ | | | ○ | ○ | ○ | ○ |
| | Travel right operation + Swing operation | ○ | ○ | | | ○ | | ○ | ○ | ○ | ○ |
| | Travel left operation + Boom operation | ○ | ○ | | | | | ○ | ○ | ○ | ○ |
| | Travel left operation + Bucket operation | ○ | | | | | | ○ | ○ | ○ | ○ |
| | Travel left operation + Arm operation | ○ | | ○ | ○ | ○ | | ○ | ○ | ○ | ○ |
| | Travel left operation + Swing operation | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ |
| | Travel LH / RH operation + Boom up operation | ○ | ○ | ○ | ○ | | | ○ | ○ | ○ | ○ |

(3)-2


Bucket close power is poor.
No-load independent operating speed is within a standard value.
NO
Refer to "Only bucket motion is slow."
YES
Relief pressure is approx. 29.4MPa (4270psi) when bucket close lever is shifted to the full.
NO
Adjust overload relief valve on bucket close side.
NG
Replace overload relief valve at port A3 (bucket head side).
YES
Secondary pilot pressureat port Pa3 (bucket close) is approx. 3.43MPa (500psi).
NO
Inspect or replace pilot valve.
YES
Bucket spool return spring is broken.
YES
Inspect or replace bucket spool assy and pilot cover.
NO
Bucket spool moves smoothly by hand. (Remove pilot cover.)
NO
Outer circumference of bucket spool is scored.
YES
Replace bucket spool assy.
NG
YES
NO
Replace control valve.
Replace control valve or pump.

(3)-3


Boom up operating power is poor.
No-load independent operating speed is within a standard value.
NO
Refer to "Only boom raise motion is slow."
YES
Relief pressure of both P1 and P2 pumps is approx. 29.4MPa (4270psi) when boom raise lever is shifted to the full.
NO
Inspect or replace overload relief valve at port A2 (boom head side).
YES
Secondary pilot pressure at port Pa2 (boom raise) is approx. 3.43MPa (500psi).
NO
Inspect or replace pilot valve.
YES
Boom spool return spring is broken.
YES
Inspect or replace boom spool assy and pilot cover.
NO
Boom spool moves smoothly by hand.
NO
Outer circumference of boom spool is scored.
YES
Replace boom spool assy.
NG
YES
NO
Replace control valve.
Inspect or replace control valve or pump.

## Fuel Injection System

N·m (kgf·m/lb.ft)