PART NO. TOJBE-EN-00

HITACHI

Reliable solutions

Technical Manual
Operational Principle

ZX
870-5G
870LC-5G
870H-5G
870LCH-5G
870LCR-5G
Hydraulic Excavator

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TOJBE-EN
Technical Manual (Troubleshooting)	: Vol. No.TTJBE-EN
Workshop Manual	: Vol. No.WJBE-EN

ZX870-5G • 870LC-5G • 870H-5G • 870LCH-5G • 870LCR-5G HYDRAULIC EXCAVATOR TECHNICAL MANUAL OPERATIONAL PRINCIPLE

TOJBE-EN-00

Hitachi Construction Machinery Co., Ltd.

URL:http://www.hitachi-c-m.com

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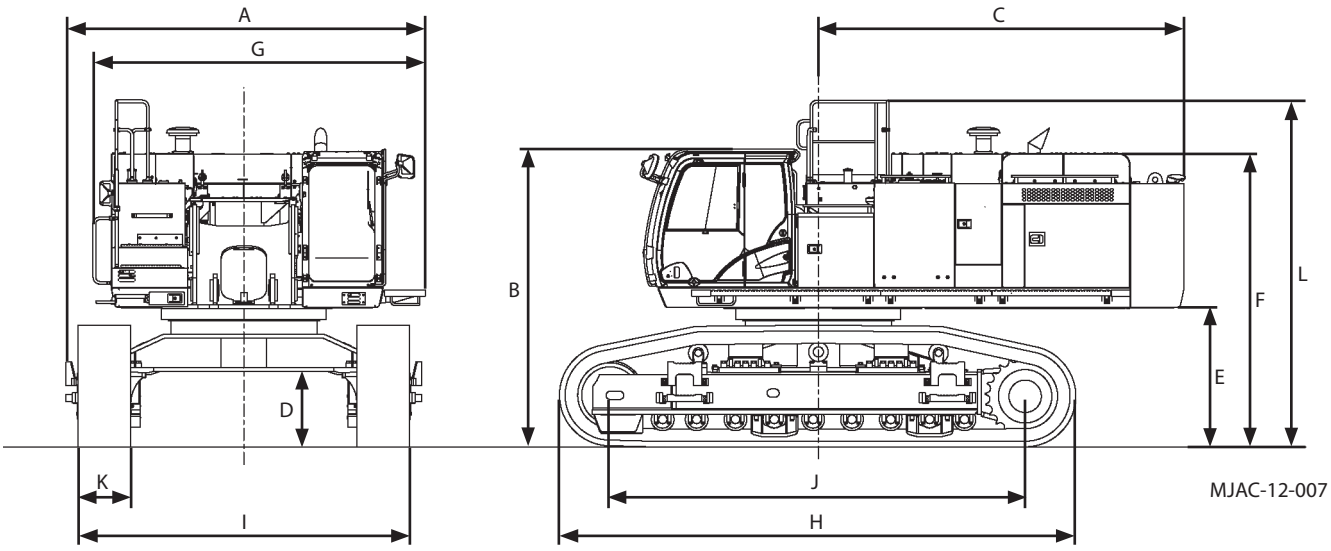
Specifications

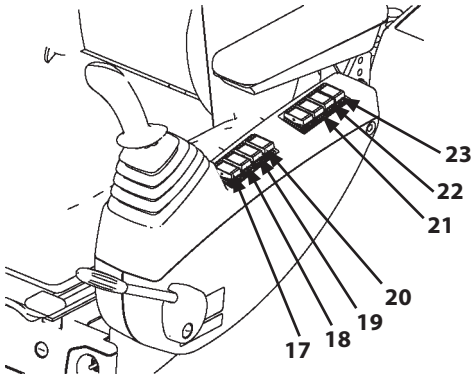
ZX870-5G, 870LC-5G



Model		ZX870-5G	ZX870LC-5G
Type of Front-End Attachment	-	3.7 m Arm	
Bucket Capacity (Heaped)	m^3	3.4 (3.0: CECE)	3.5 (3.1: CECE)
Operating Weight	kg	80800	82600
Base Machine Weight	kg	61100	62900
Engine	-	360 kW/1800 min^{-1} (490 PS/1800 rpm)	
A: Overall Width	mm	4450	
B: Cab Height	mm	3690	
C: Rear End Swing Radius	mm	4600	
D: Minimum Ground Clearance	mm	*890	
E: Counterweight Clearance	mm	*1680	
F: Engine Cover Height	mm	3630	
G: Overall Width of Upperstructure	mm	4120	
H: Undercarriage Length	mm	5840	6360
I: Undercarriage Width (Extended/ Retracted)	mm	4100/3480	
J: Sprocket Center to Idle Center	mm	4590	5110
K: Track Shoe Width	mm	650 (Grouser shoe)	
L: Overall Height	mm	4290	
Ground Pressure	kPa (kgf/cm^2)	121 (1.23)	112 (1.14)
Swing Speed	min^{-1} (rpm)	7.4	
Travel Speed (fast/slow)	km/h	4.5/3.0	
Gradeability	% (Degree)	70 (35)	

*NOTE: *The dimensions do not include the height of the shoe lug.*

Electrical System (Switch Panel)



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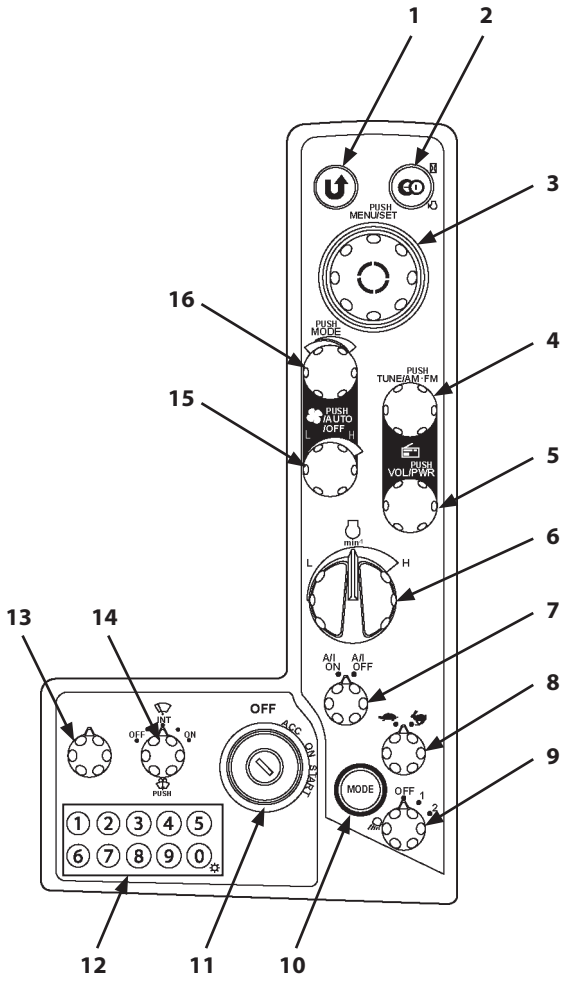
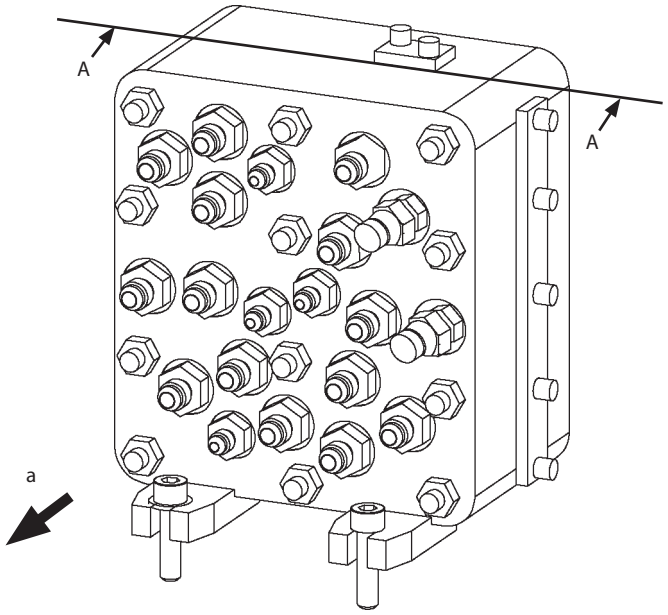


TDAA-05-02-059

1- Return to Previous Screen Switch
2- Return to Basic Screen/Level Switch
3- Selector/Set Switch
4- AM·FM Switch/Tuning Switch
5- Power Switch/Volume Control Switch
6- Engine Control Dial
7- Auto-Idle Switch
8- Travel Mode Switch
9- Work Light Switch
10- Power Mode Switch
11- Key Switch
12- TEN-key Switch
13- Overhead Window Wiper/ Overhead Window Washer Switch (Option)
14- Wiper/Washer Switch
15- AUTO/OFF Switch/Blower Switch
16- Temperature Control Switch/ MODE Switch
17- Travel Alarm Cancel Switch (Optional)
18- Seat Heat Switch (Optional)
19- Boom Mode Selector Switch
20- Auto-Lubrication Switch (Optional)
21- Swing Alarm Cancel Switch (Optional)
22- Rear Work Light Switch (Optional)
23- Beacon Light Switch (Optional)



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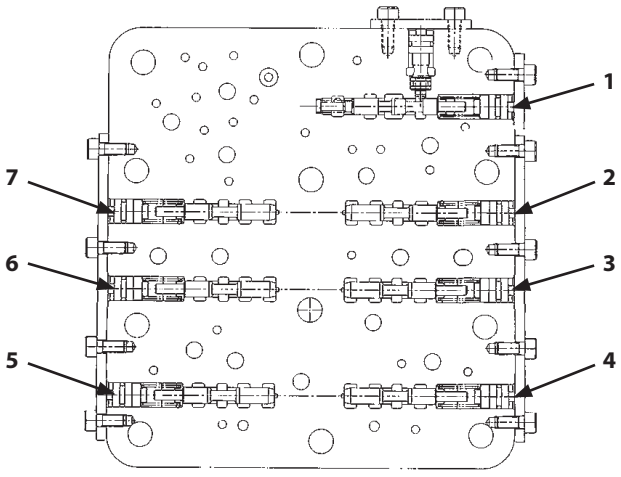
Section A-A



T178-03-06-002

a- Pilot Valve Side

1- Shockless Valve
2- Arm Flow Rate Control Valve Control Spool
3- Pump 1 Flow Rate Control Valve
4- Flow Combiner Valve Control Spool
5- Swing Parking Brake Release Spool
6- Pump 2 Flow Rate Control Valve
7- Auxiliary

Hydraulic Component

PUMP DEVICE	Drive Gear Ratio	Pump1 and 2: 57/53 Fan Pump: 1 Pilot Pump: 1
MAIN PUMP	Type	Variable Displacement Swash Plate Tandem Plunger Pump
	Theoretical Displacement	270 cm^3/rev (18.3 in^3/rev)×2
	Rated Pressure	31.9 MPa (325 kgf/cm^2, 4627 psi)
REGULATOR	Type	Pump Control Solenoid Valve Operated Type
FAN PUMP	Type	Variable Displacement Swash Plate Plunger Pump
	Maximum Flow (Theoretical Value)	100.8 L/min (27 US gpm)
REGULATOR	Type	Pump Control Solenoid Valve Operated Type
PILOT PUMP	Type	SGP1A27F2H5-R693
	Model	Fixed Displacement Type Gear Pump
	Theoretical Displacement	27.8 cm^3/rev (1.7 in^3/rev)×2
CONTROL VALVE	Type	Pilot Pressure Operated Type (4-Spools + 5-Spools)
	Main Relief Set-Pressure	Normal: 31.9 MPa (325 kgf/cm^2, 4627 psi) at 365 L/min (96 US gpm)
		Increases Pressure: 34.3 MPa (350 kgf/cm^2, 4975 psi) at 500 L/min (132 US gpm)
	Overload Relief Set-Pressure	35.3 MPa (360 kgf/cm^2, 5120 psi) at 110 L/min (29 US gpm) (Boom, Arm, Bucket)
		33.3 MPa (340 kgf/cm^2, 4830 psi) at 110 L/min (29 US gpm) (Auxiliary Open , Auxiliary Close)

SECTION 2 SYSTEM

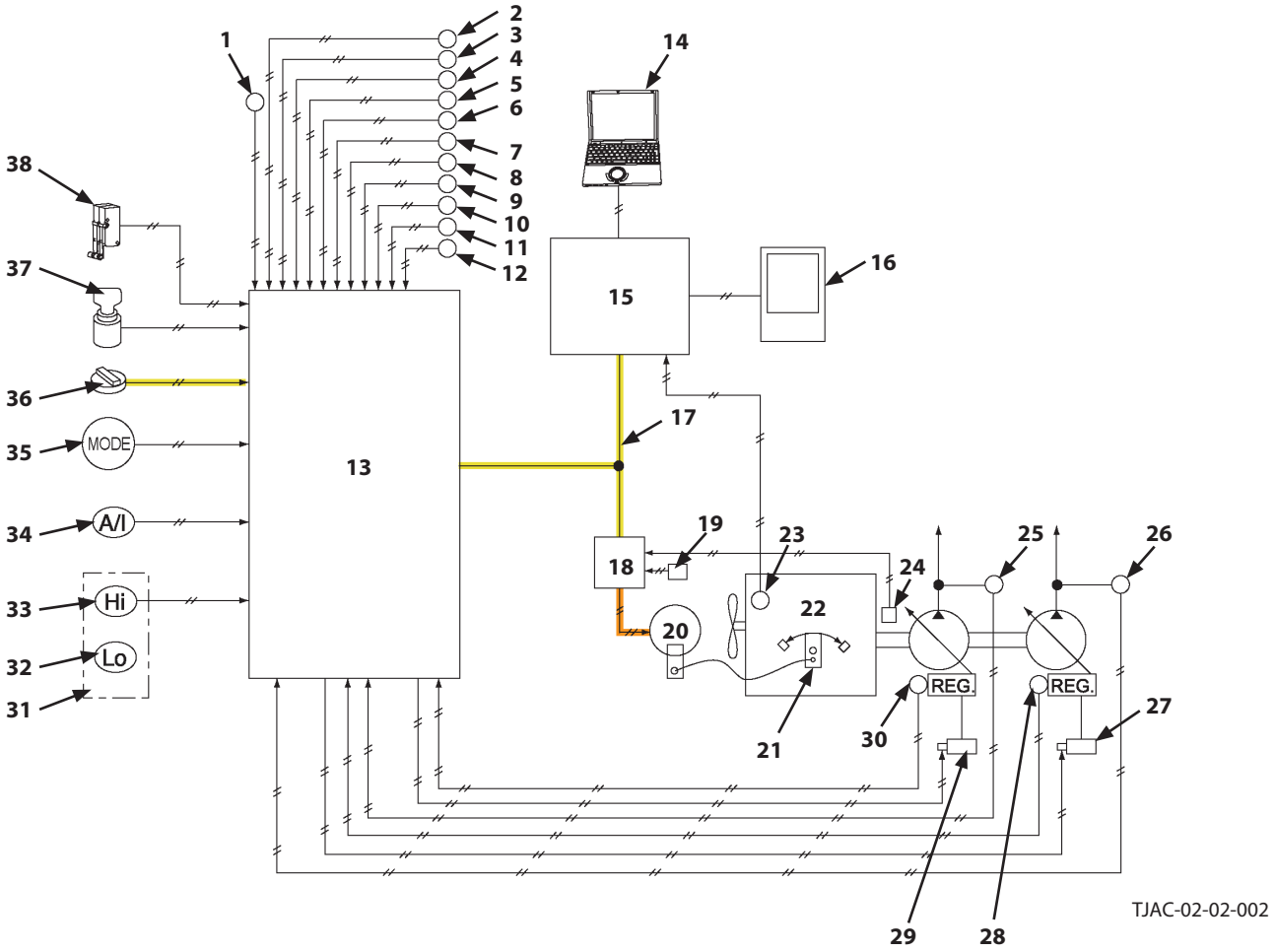
Group 1 Controller

Outline

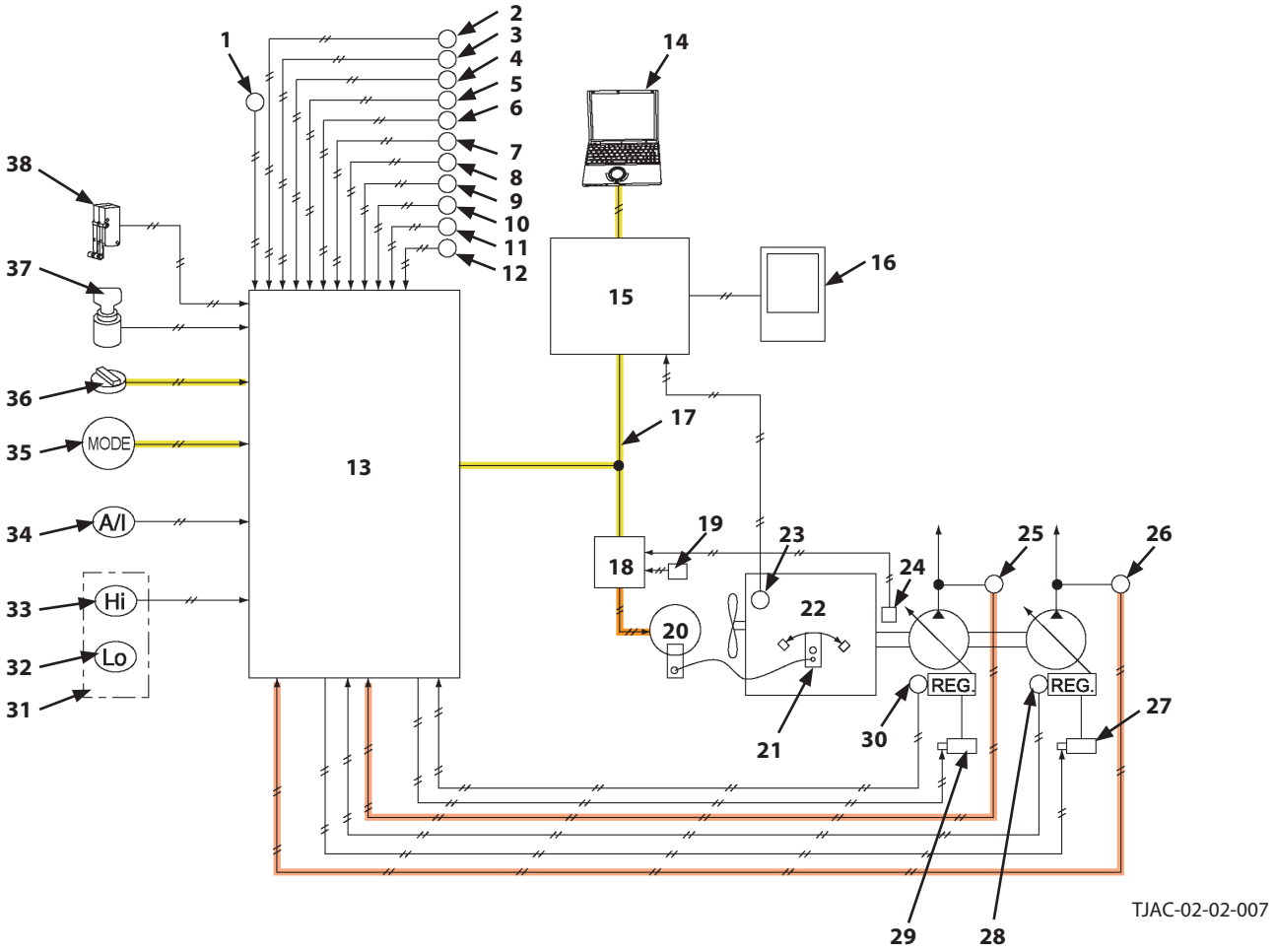
The following controllers are provided in this machine in order to control functions. Each controller excluding the communication controller communicates by using the CAN circuit and sends or receives the required signal.

Controller	Control	Comment on Control
MC	Controls the engine, pumps, and valves.	T2-2
ECF	Controls the actual engine speed.	T2-2
Monitor Controller	Displays the operating information and alarms on the monitor.	T5-2
Wiper / Light Controller	Controls the wipers and work lights.	T2-4
Air Conditioner Controller	Controls the air conditioner.	T2-4, T5-7
Radio Controller	Controls the radio.	T2-4
Communication Controller	Sends the mails and operating information.	T5-4

NOTE: Refer to the corresponding group for details of each controller control.

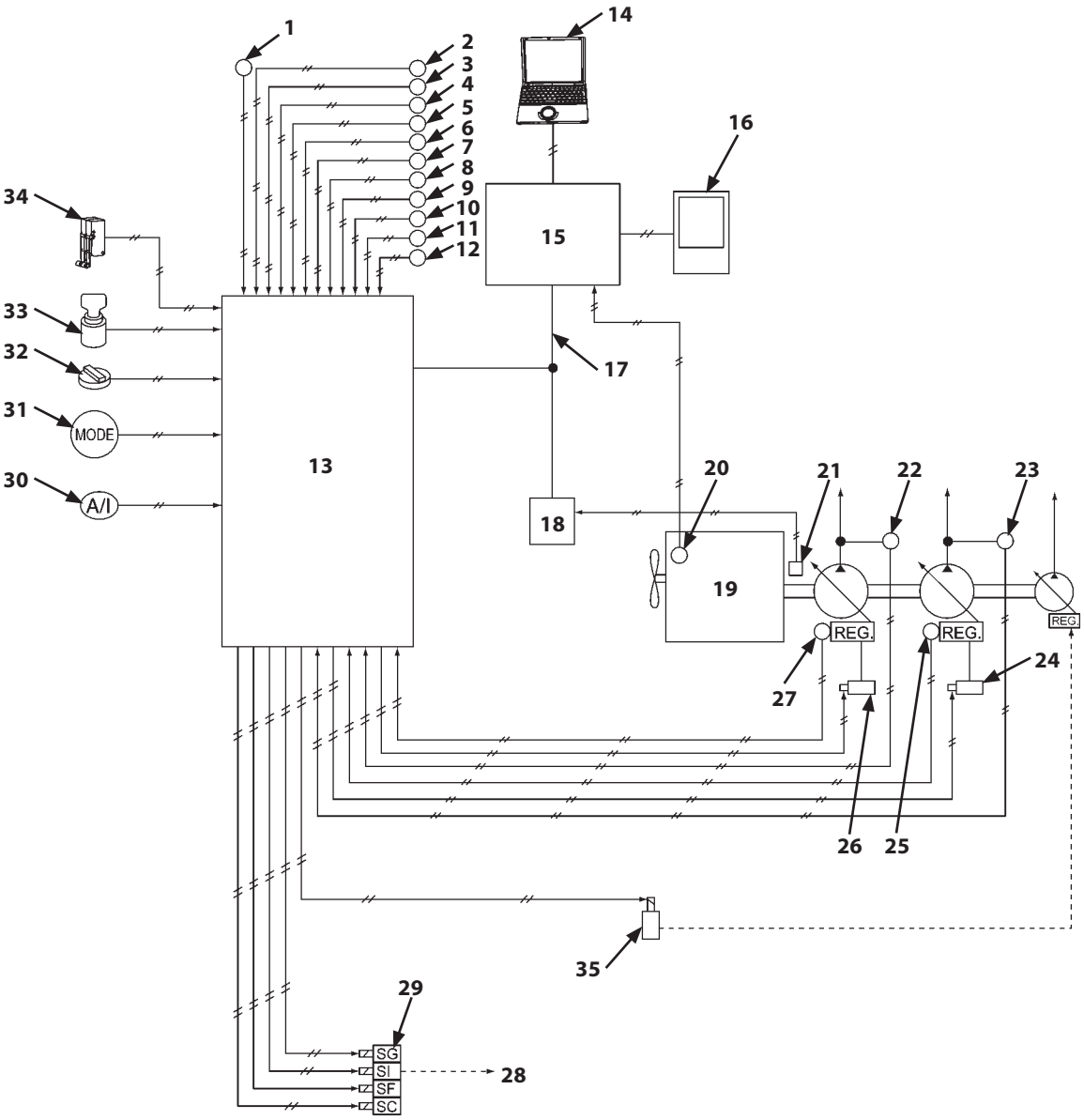


1- Hydraulic Oil Temperature Sensor
2- Pressure Sensor (Boom Raise)
3- Pressure Sensor (Boom Lower)
4- Pressure Sensor (Arm Roll-In)
5- Pressure Sensor (Arm Roll-Out)
6- Pressure Sensor (Bucket Roll-In)
7- Pressure Sensor (Bucket Roll-Out)
8- Pressure Sensor (Swing)
9- Pressure Sensor (Travel)
10- Pressure Sensor (4-Spool Side)
11- Pressure Sensor (5-Spool Side)
12- Pressure Sensor (Attachment) (OP)
13- MC
14- MPDr.
15- Monitor Controller
16- Monitor
17- CAN
18- ECF
19- EC Sensor
20- EC Motor
21- Governor Lever
22- Engine
23- Coolant Temperature Sensor
24- N Sensor
25- Pump 1 Delivery Pressure Sensor
26- Pump 2 Delivery Pressure Sensor
27- Pump 2 Control Solenoid Valve
28- Pump 2 Control Pressure Sensor
29- Pump 1 Control Solenoid Valve
30- Pump 1 Control Pressure Sensor
31- Travel Mode Switch
32- Slow Speed Position
33- Fast Speed Position
34- Auto-Idle Switch
35- Power Mode Switch
36- Engine Control Dial
37- Key Switch
38- Pilot Shut-Off Switch



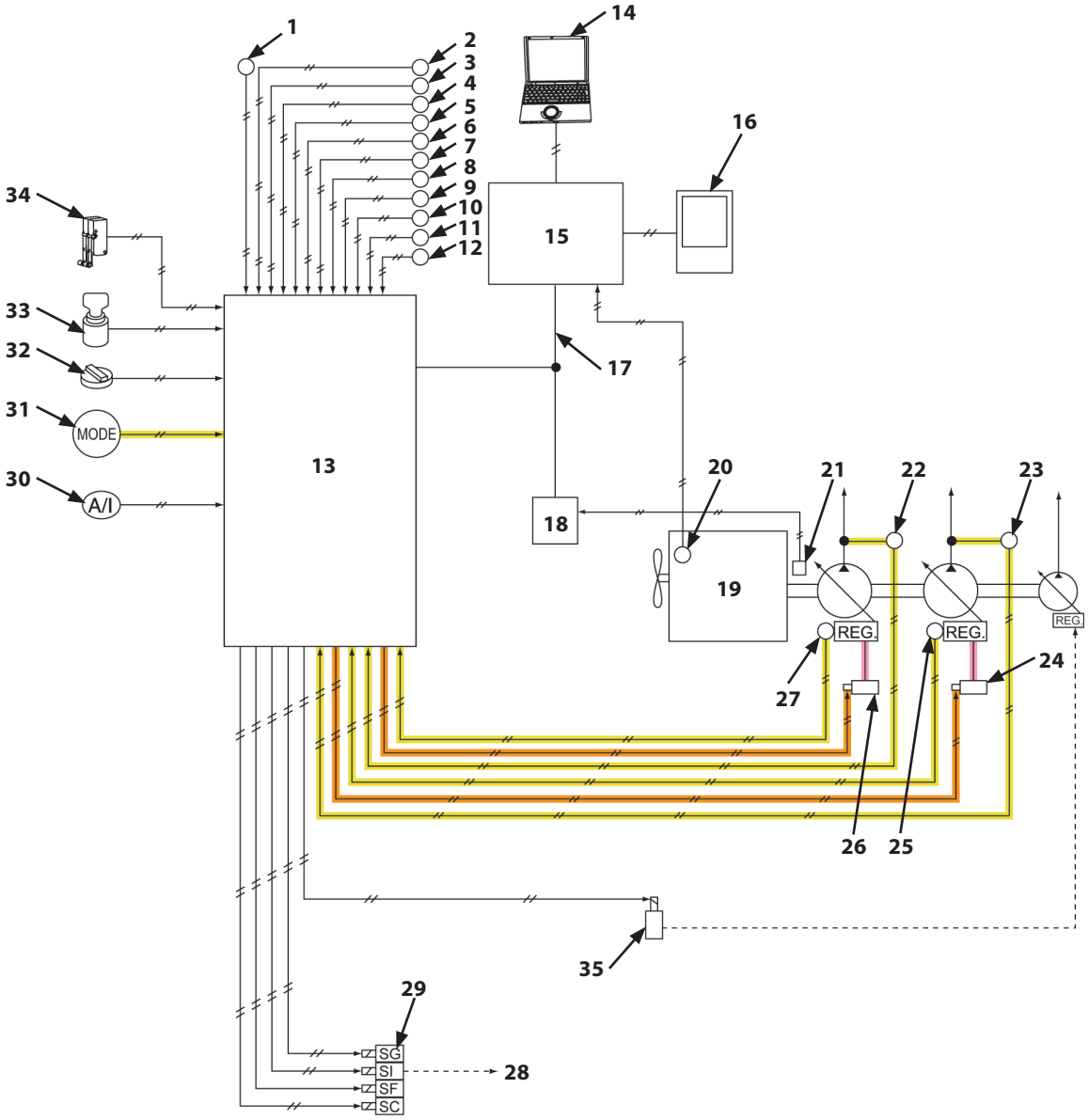
1- Hydraulic Oil Temperature Sensor
2- Pressure Sensor (Boom Raise)
3- Pressure Sensor (Boom Lower)
4- Pressure Sensor (Arm Roll-In)
5- Pressure Sensor (Arm Roll-Out)
6- Pressure Sensor (Bucket Roll-In)
7- Pressure Sensor (Bucket Roll-Out)
8- Pressure Sensor (Swing)
9- Pressure Sensor (Travel)
10- Pressure Sensor (4-Spool Side)
11- Pressure Sensor (5-Spool Side)
12- Pressure Sensor (Attachment) (OP)
13- MC
14- MPDr.
15- Monitor Controller
16- Monitor
17- CAN
18- ECF
19- EC Sensor
20- EC Motor
21- Governor Lever
22- Engine
23- Coolant Temperature Sensor
24- N Sensor
25- Pump 1 Delivery Pressure Sensor
26- Pump 2 Delivery Pressure Sensor
27- Pump 2 Control Solenoid Valve
28- Pump 2 Control Pressure Sensor
29- Pump 1 Control Solenoid Valve
30- Pump 1 Control Pressure Sensor
31- Travel Mode Switch
32- Slow Speed Position
33- Fast Speed Position
34- Auto-Idle Switch
35- Power Mode Switch
36- Engine Control Dial
37- Key Switch
38- Pilot Shut-Off Switch

Pump Control System Layout



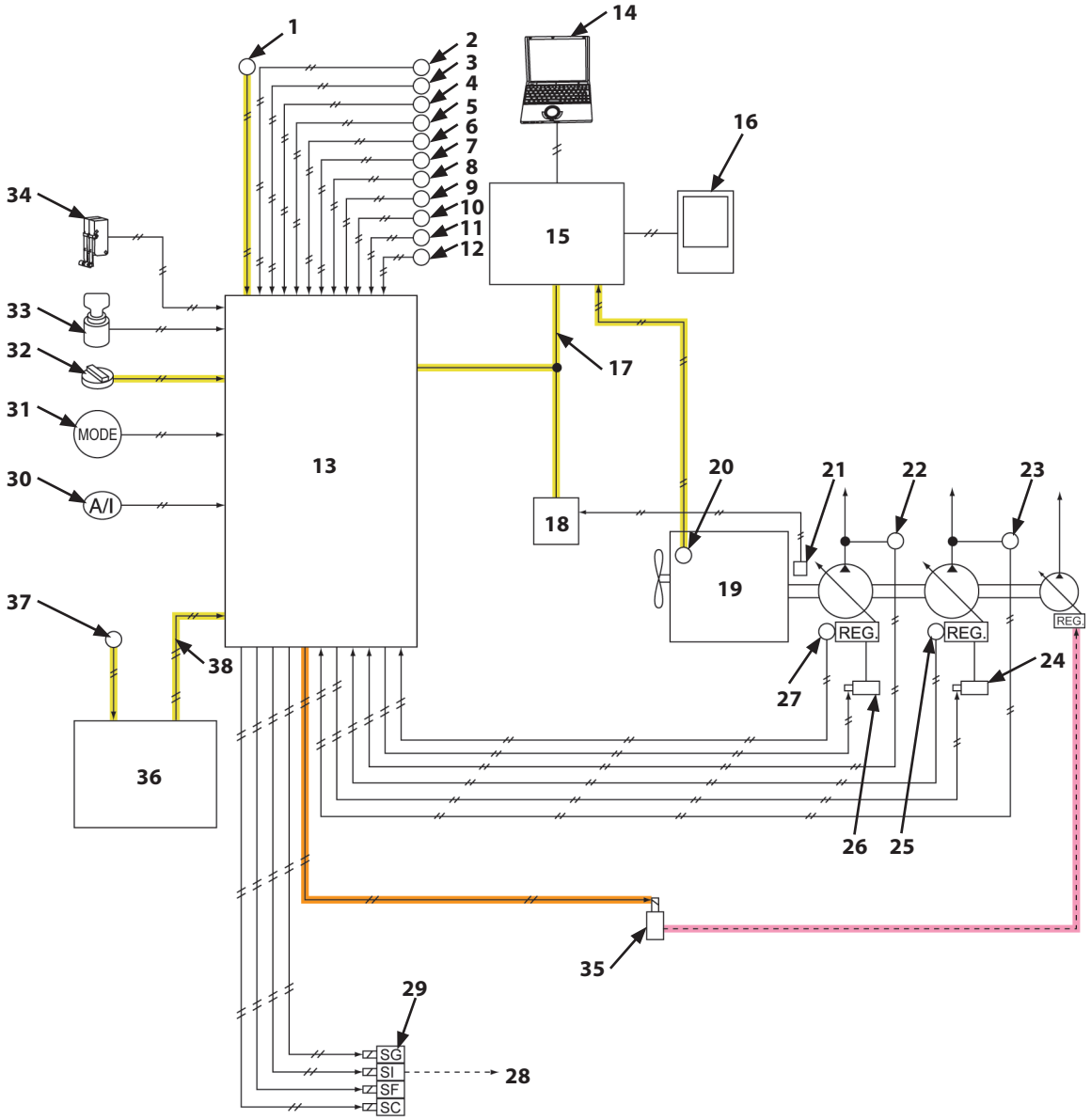
TJBE-02-02-001

1- Hydraulic Oil Temperature Sensor
2- Pressure Sensor (Boom Raise)
3- Pressure Sensor (Boom Lower)
4- Pressure Sensor (Arm Roll-In)
5- Pressure Sensor (Arm Roll-Out)
6- Pressure Sensor (Bucket Roll-In)
7- Pressure Sensor (Bucket Roll-Out)
8- Pressure Sensor (Swing)
9- Pressure Sensor (Travel)
10- Pressure Sensor (4-Spool Side)
11- Pressure Sensor (5-Spool Side)
12- Pressure Sensor (Attachment) (OP)
13- MC
14- MPDr.
15- Monitor Controller
16- Monitor
17- CAN
18- ECF
19- Engine
20- Coolant Temperature Sensor
21- N Sensor
22- Pump 1 Delivery Pressure Sensor
23- Pump 2 Delivery Pressure Sensor
24- Pump 2 Control Solenoid Valve
25- Pump 2 Control Pressure Sensor
26- Pump 1 Control Solenoid Valve
27- Pump 1 Control Pressure Sensor
28- To Main Relief Valve
29- 4-Spool Solenoid Valve Unit
30- Auto-Idle Switch
31- Power Mode Switch
32- Engine Control Dial
33- Key Switch
34- Pilot Shut-Off Switch
35- Fan Pump Control Solenoid Valve



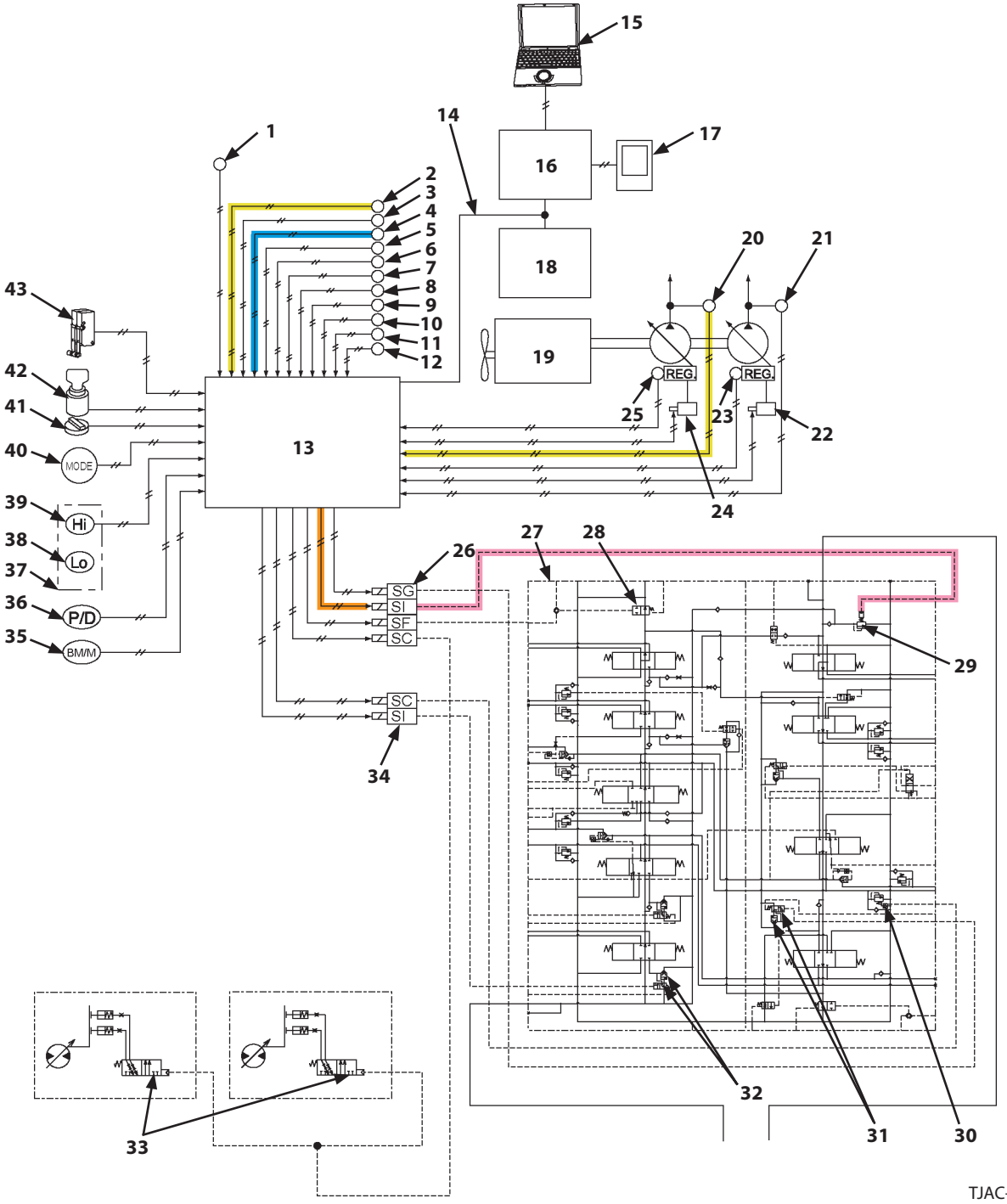
TJBE-02-02-006

1- Hydraulic Oil Temperature Sensor
2- Pressure Sensor (Boom Raise)
3- Pressure Sensor (Boom Lower)
4- Pressure Sensor (Arm Roll-In)
5- Pressure Sensor (Arm Roll-Out)
6- Pressure Sensor (Bucket Roll-In)
7- Pressure Sensor (Bucket Roll-Out)
8- Pressure Sensor (Swing)
9- Pressure Sensor (Travel)
10- Pressure Sensor (4-Spool Side)
11- Pressure Sensor (5-Spool Side)
12- Pressure Sensor (Attachment) (OP)
13- MC
14- MPDr.
15- Monitor Controller
16- Monitor
17- CAN
18- ECF
19- Engine
20- Coolant Temperature Sensor
21- N Sensor
22- Pump 1 Delivery Pressure Sensor
23- Pump 2 Delivery Pressure Sensor
24- Pump 2 Control Solenoid Valve
25- Pump 2 Control Pressure Sensor
26- Pump 1 Control Solenoid Valve
27- Pump 1 Control Pressure Sensor
28- To Main Relief Valve
29- 4-Spool Solenoid Valve Unit
30- Auto-Idle Switch
31- Power Mode Switch
32- Engine Control Dial
33- Key Switch
34- Pilot Shut-Off Switch
35- Fan Pump Control Solenoid Valve



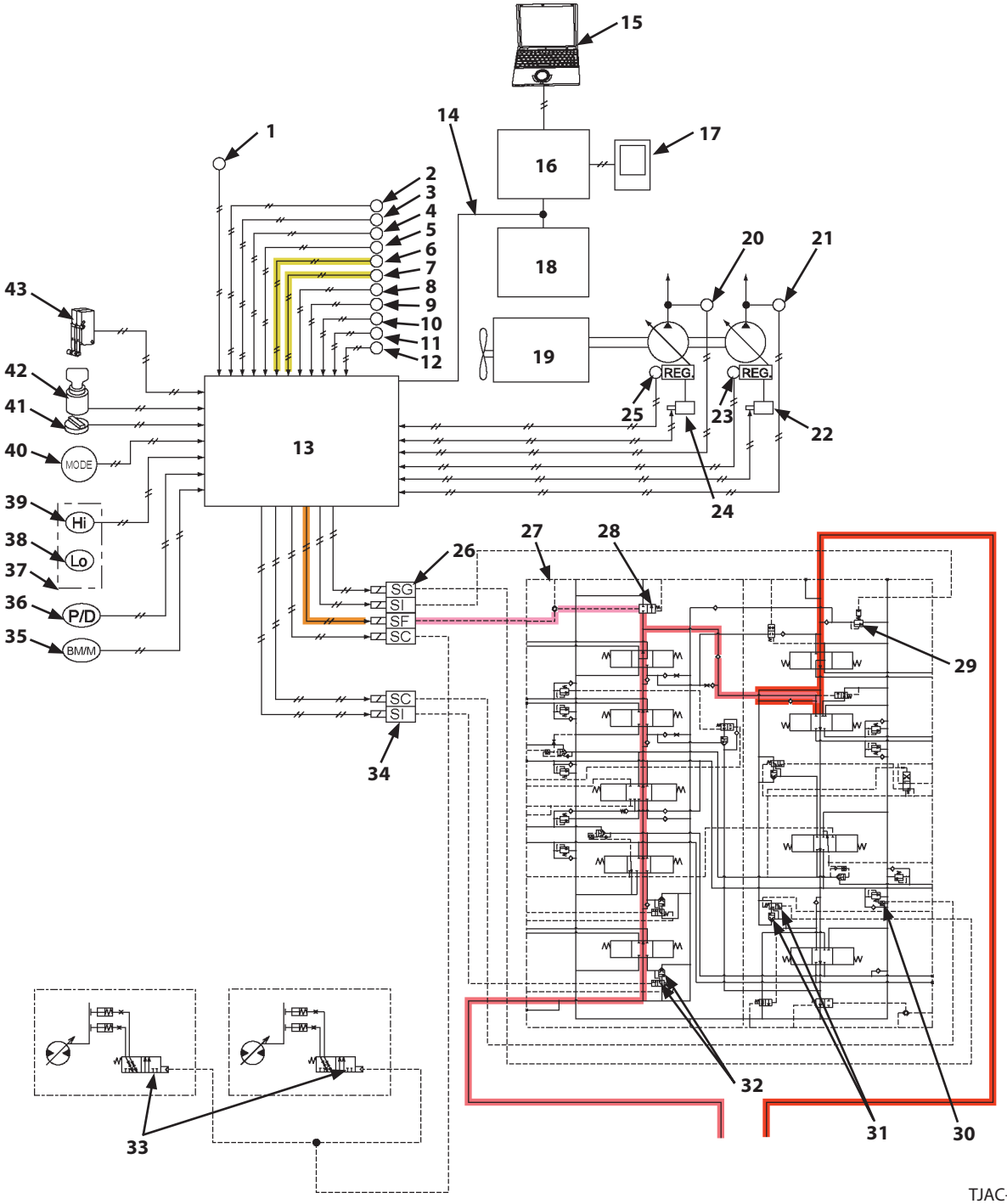
TJBE-02-02-011

1- Hydraulic Oil Temperature Sensor
2- Pressure Sensor (Boom Raise)
3- Pressure Sensor (Boom Lower)
4- Pressure Sensor (Arm Roll-In)
5- Pressure Sensor (Arm Roll-Out)
6- Pressure Sensor (Bucket Roll-In)
7- Pressure Sensor (Bucket Roll-Out)
8- Pressure Sensor (Swing)
9- Pressure Sensor (Travel)
10- Pressure Sensor (4-Spool Side)
11- Pressure Sensor (5-Spool Side)
12- Pressure Sensor (Attachment) (OP)
13- MC
14- MPDr.
15- Monitor Controller
16- Monitor
17- CAN
18- ECF
19- Engine
20- Coolant Temperature Sensor
21- N Sensor
22- Pump 1 Delivery Pressure Sensor
23- Pump 2 Delivery Pressure Sensor
24- Pump 2 Control Solenoid Valve
25- Pump 2 Control Pressure Sensor
26- Pump 1 Control Solenoid Valve
27- Pump 1 Control Pressure Sensor
28- To Main Relief Valve
29- 4-Spool Solenoid Valve Unit
30- Auto-Idle Switch
31- Power Mode Switch
32- Engine Control Dial
33- Key Switch
34- Pilot Shut-Off Switch
35- Fan Pump Control Solenoid Valve
36- Air Conditioner Unit
37- Ambient Temperature Sensor
38- CAN1



TJAC-02-02-025

1- Hydraulic Oil Temperature Sensor
2- Pressure Sensor (Boom Raise)
3- Pressure Sensor (Boom Lower)
4- Pressure Sensor (Arm Roll-In)
5- Pressure Sensor (Arm Roll-Out)
6- Pressure Sensor (Bucket Roll-In)
7- Pressure Sensor (Bucket Roll-Out)
8- Pressure Sensor (Swing)
9- Pressure Sensor (Travel)
10- Pressure Sensor (4-spool Side)
11- Pressure Sensor (5-spool Side)
12- Pressure Sensor (Attachment) (OP)
13- MC
14- CAN
15- MPDr.
16- Monitor Controller
17- Monitor
18- ECF
19- Engine
20- Pump 1 Delivery Pressure Sensor
21- Pump 2 Delivery Pressure Sensor
22- Pump 2 Control Solenoid Valve
23- Pump 2 Control Pressure Sensor
24- Pump 1 Control Solenoid Valve
25- Pump 1 Control Pressure Sensor
26- 4-Spool Solenoid Valve Unit
27- Control Valve
28- Bypass Shut-Out Valve
29- Main Relief Valve
30- Boom Overload Relief Selection Valve
31- Arm 2 Flow Rate Control Valve
32- Swing Flow Rate Control Valve
33- Travel Motor Displacement Angle Control Valve
34- 2-Spool Solenoid Valve Unit
35- Boom Mode Selector Switch
36- Power Digging Switch
37- Travel Mode Switch
38- Slow Speed Position
39- Fast Speed Position
40- Power Mode Switch
41- Engine Control Dial
42- Key Switch
43- Pilot Shut-Off Switch



TJAC-02-02-030

1- Hydraulic Oil Temperature Sensor
2- Pressure Sensor (Boom Raise)
3- Pressure Sensor (Boom Lower)
4- Pressure Sensor (Arm Roll-In)
5- Pressure Sensor (Arm Roll-Out)
6- Pressure Sensor (Bucket Roll-In)
7- Pressure Sensor (Bucket Roll-Out)
8- Pressure Sensor (Swing)
9- Pressure Sensor (Travel)
10- Pressure Sensor (4-spool Side)
11- Pressure Sensor (5-spool Side)
12- Pressure Sensor (Attachment) (OP)
13- MC
14- CAN
15- MPDr.
16- Monitor Controller
17- Monitor
18- ECF
19- Engine
20- Pump 1 Delivery Pressure Sensor
21- Pump 2 Delivery Pressure Sensor
22- Pump 2 Control Solenoid Valve
23- Pump 2 Control Pressure Sensor
24- Pump 1 Control Solenoid Valve
25- Pump 1 Control Pressure Sensor
26- 4-Spool Solenoid Valve Unit
27- Control Valve
28- Bypass Shut-Out Valve
29- Main Relief Valve
30- Boom Overload Relief Selection Valve
31- Arm 2 Flow Rate Control Valve
32- Swing Flow Rate Control Valve
33- Travel Motor Displacement Angle Control Valve
34- 2-Spool Solenoid Valve Unit
35- Boom Mode Selector Switch
36- Power Digging Switch
37- Travel Mode Switch
38- Slow Speed Position
39- Fast Speed Position
40- Power Mode Switch
41- Engine Control Dial
42- Key Switch
43- Pilot Shut-Off Switch

Outline

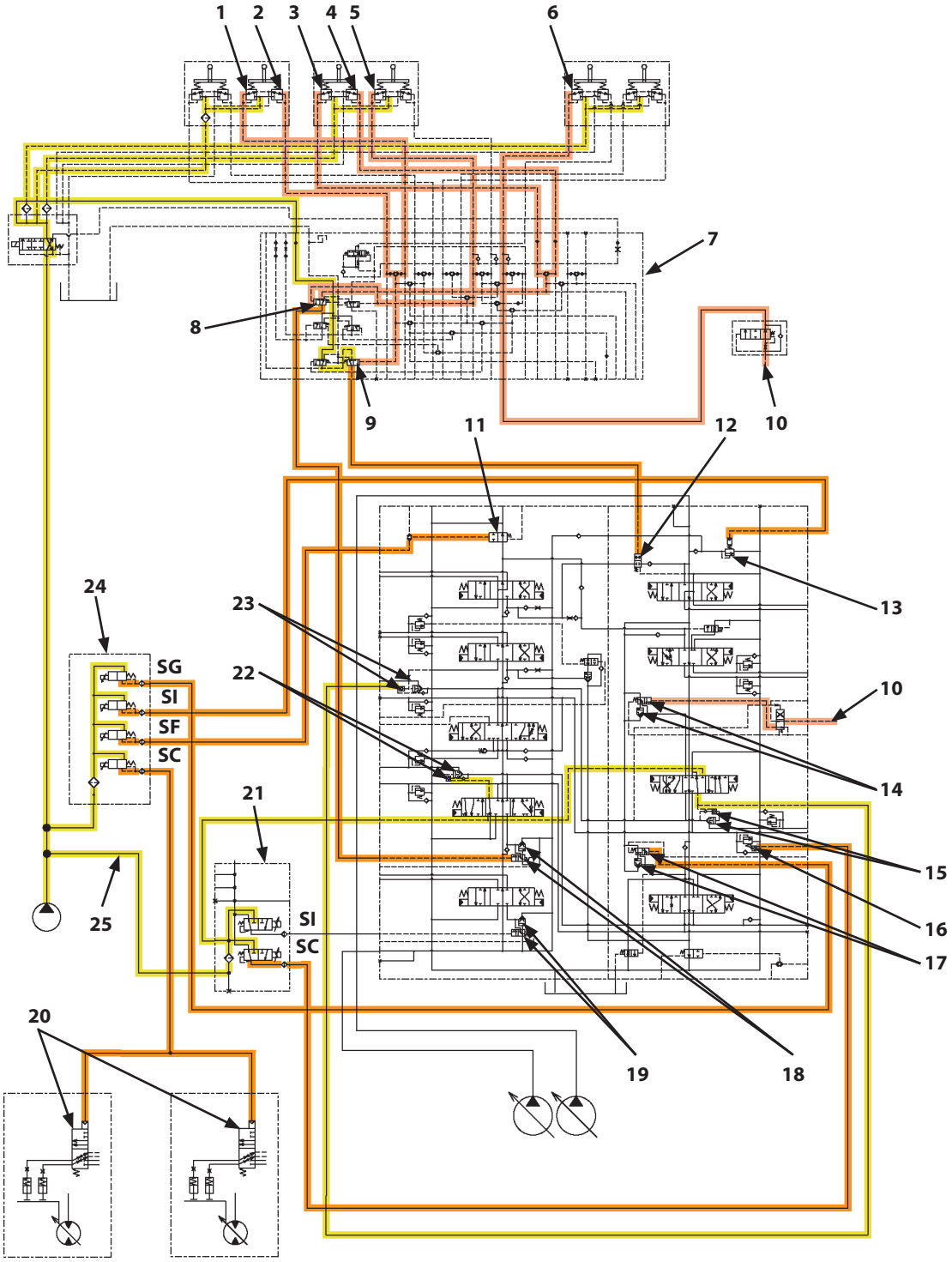
The hydraulic system mainly consists of the pilot circuit, main circuit, and breaker/pulverizer/crusher circuit.

Pilot Circuit:

Power Source	Controller	Supplied to
Pilot Pump	Pilot Valve	Operation Control Circuit
	Pump Regulator	Pump Control Circuit
	4-Spool Solenoid Valve Unit	
	2-Spool Solenoid Valve Unit	Bucket Flow Combiner Circuit
	Fan Pump Control Solenoid Valve	Valve Control Circuit
	Signal Control Valve	Travel Motor Displacement Angle Control Circuit
	Accumulator	Swing Parking Brake Release Circuit
		Hydraulic Oil Heat Circuit Emergency Boom Lower Circuit

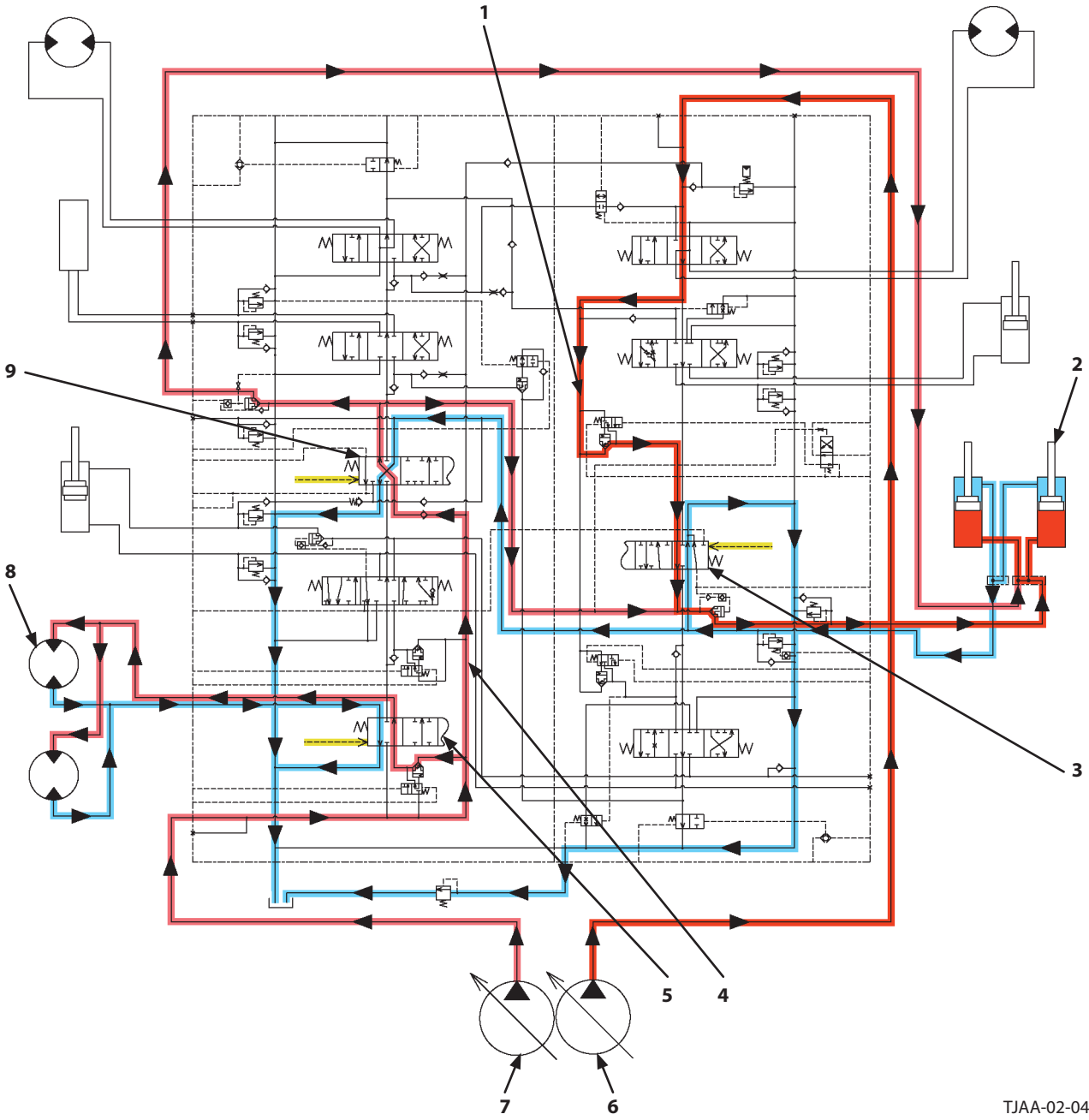
Main Circuit:

Power Source	Controller	Supplied to
Main Pump	Control Valve	Motor
Fan Pump		Cylinder



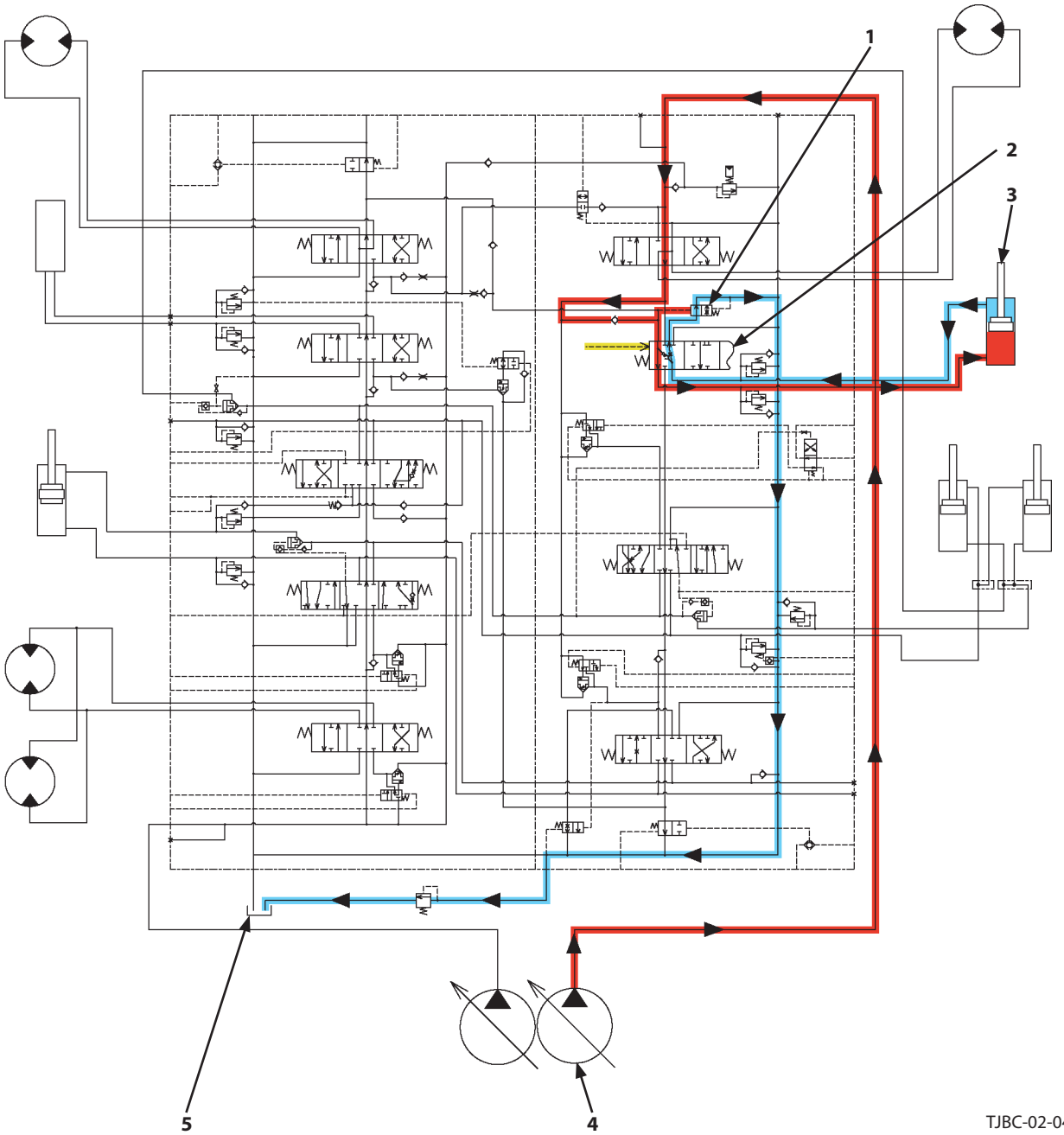
TJBC-02-04-003

1- Travel Right Reverse
2- Travel Right Forward
3- Swing (Right)
4- Swing (Left)
5- Arm Roll-In
6- Boom Lower
7- Signal Control Valve
8- Arm Flow Rate Control Valve Control Spool
9- Flow Combiner Valve Control Spool
10- Boom Lower Pilot Pressure
11- Bypass Shut-Out Valve
12- Flow Combiner Valve
13- Main Relief Valve
14- Boom Flow Rate Control Valve
15- Boom 1 Anti-Drift Valve
16- Boom Overload Relief Control Valve
17- Arm 2 Flow Rate Control Valve
18- Arm 1 Flow Rate Control Valve
19- Swing Flow Rate Control Valve
20- Travel Motor Displacement Angle Control Valve
21- 2-Spool Solenoid Valve Unit
22- Arm 1 Anti-Drift Valve
23- Boom 2 Anti-Drift Valve
24- 4-Spool Solenoid Valve Unit
25- Pilot Pressure from Pilot Pump



TJAA-02-04-010

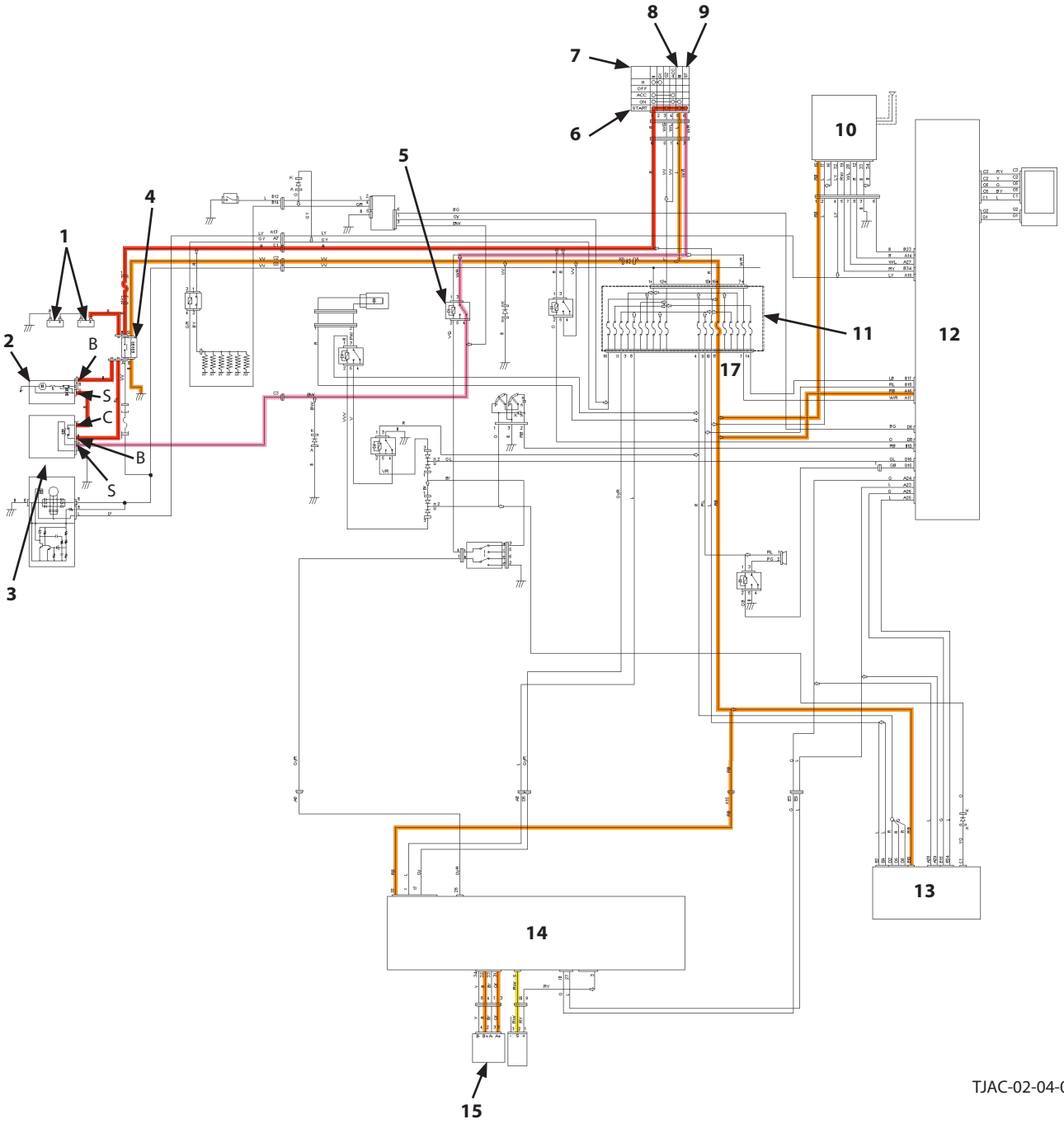
1- Parallel Circuit (Pump 1)
2- Boom Cylinder
3- Boom 1 Spool
4- Parallel Circuit (Pump 2)
5- Swing Spool
6- Pump 1
7- Pump 2
8- Swing Motor
9- Boom 2 Spool



TJBC-02-04-009

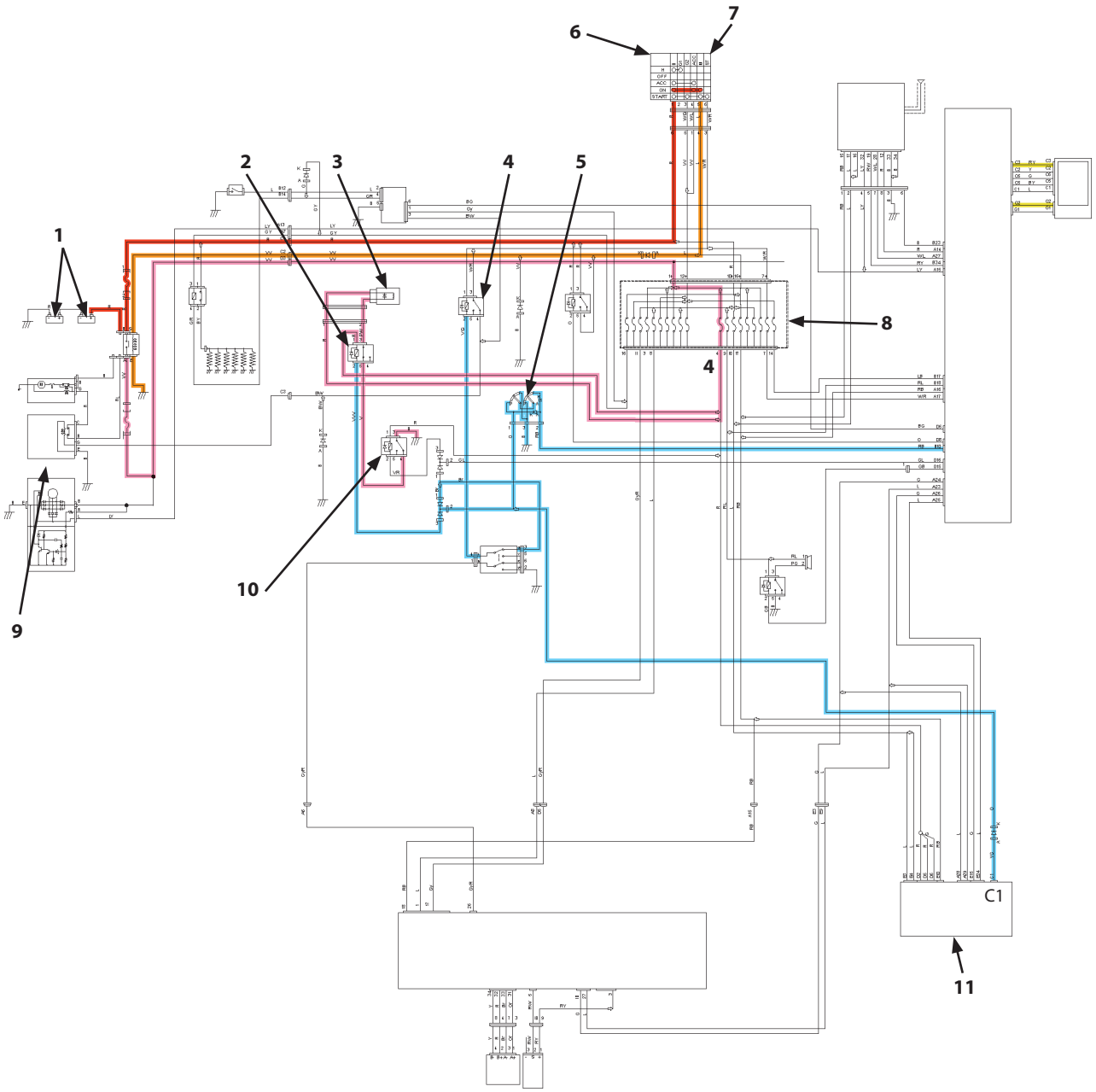
1- Bucket Regeneration Cut Valve
2- Bucket Spool
3- Bucket Cylinder
4- Pump 1
5- Hydraulic Oil Tank

(Blank)



TJAC-02-04-004

1- Battery
2- Starter
3- Starter Relay 2
4- Battery Relay
5- Starter Cut Relay
6- START Position
7- Key Switch
8- Terminal M
9- Terminal ST
10- GSM
11- Fuse Box 1
12- Monitor Controller
13- MC
14- ECF
15- EC Motor



TJAC-02-04-007

1- Battery
2- Pilot Shut-Off Relay
3- Pilot Shut-Off Solenoid Valve
4- Starter Cut Relay
5- Pilot Shut-Off Switch (Pilot Shut-Off Lever)
6- Key Switch
7- Terminal ST
8- Fuse Box 1
9- Starter Relay 2
10- Security Relay
11- MC

Accessory Circuit

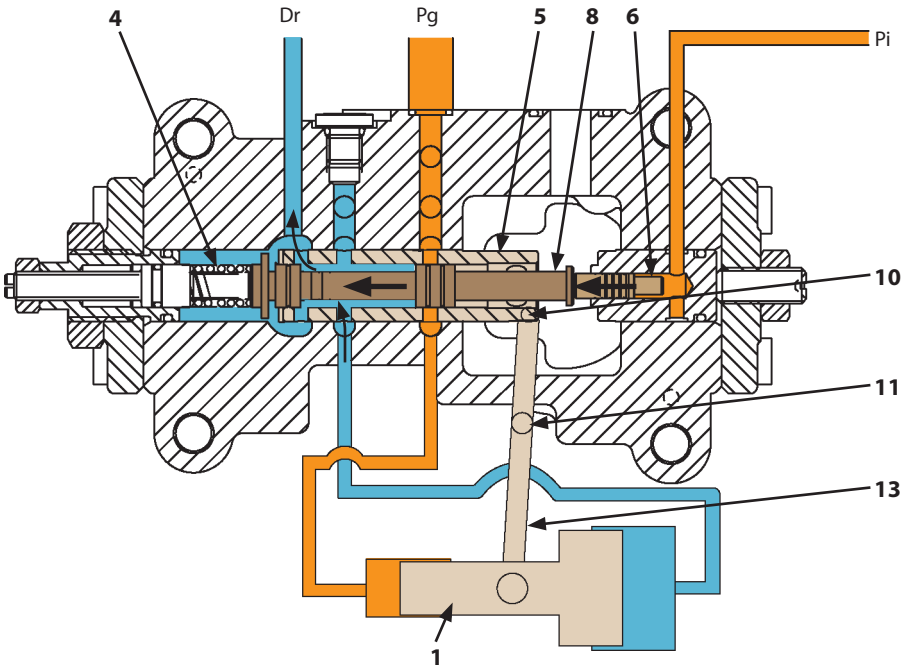
The major functions and circuits in the accessory circuit are as follows.

- Work Light Circuit:
  Turns on the work light and boom light.
  (Wiper/Light Controller, Switch Panel, Work Light Relay)
- Wiper Circuit:
  Operates the intermittent operation of wiper and the washer.
  (Wiper/Light Controller, Switch Panel, Wiper Relay, Washer Relay)
- Cab Light Circuit:
  Turns on/off the cab light by shifting the switch or by opening/shutting the door.

SECTION 3

COMPONENT OPERATION

CONTENTS



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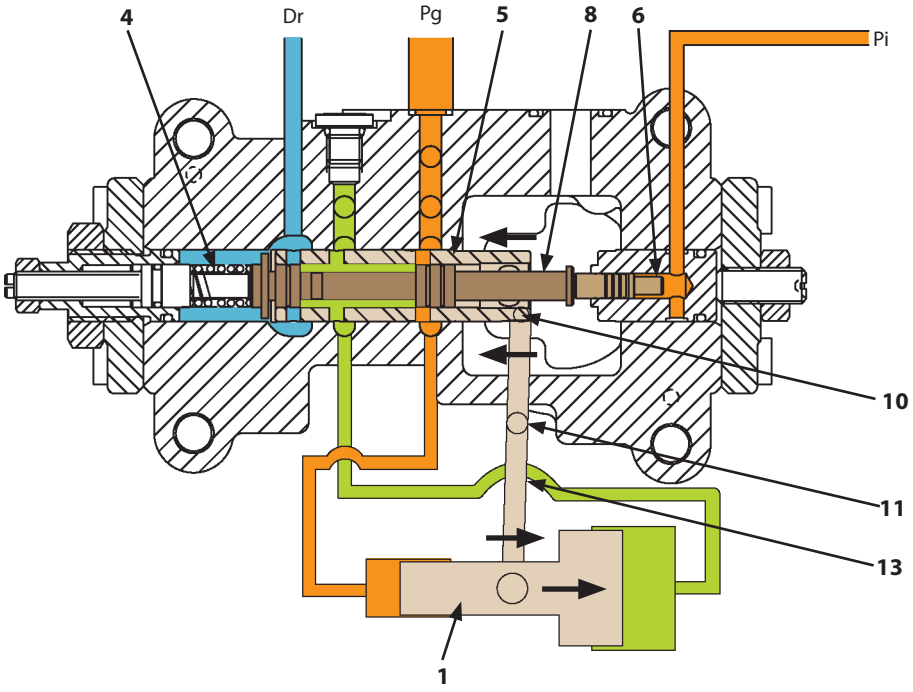
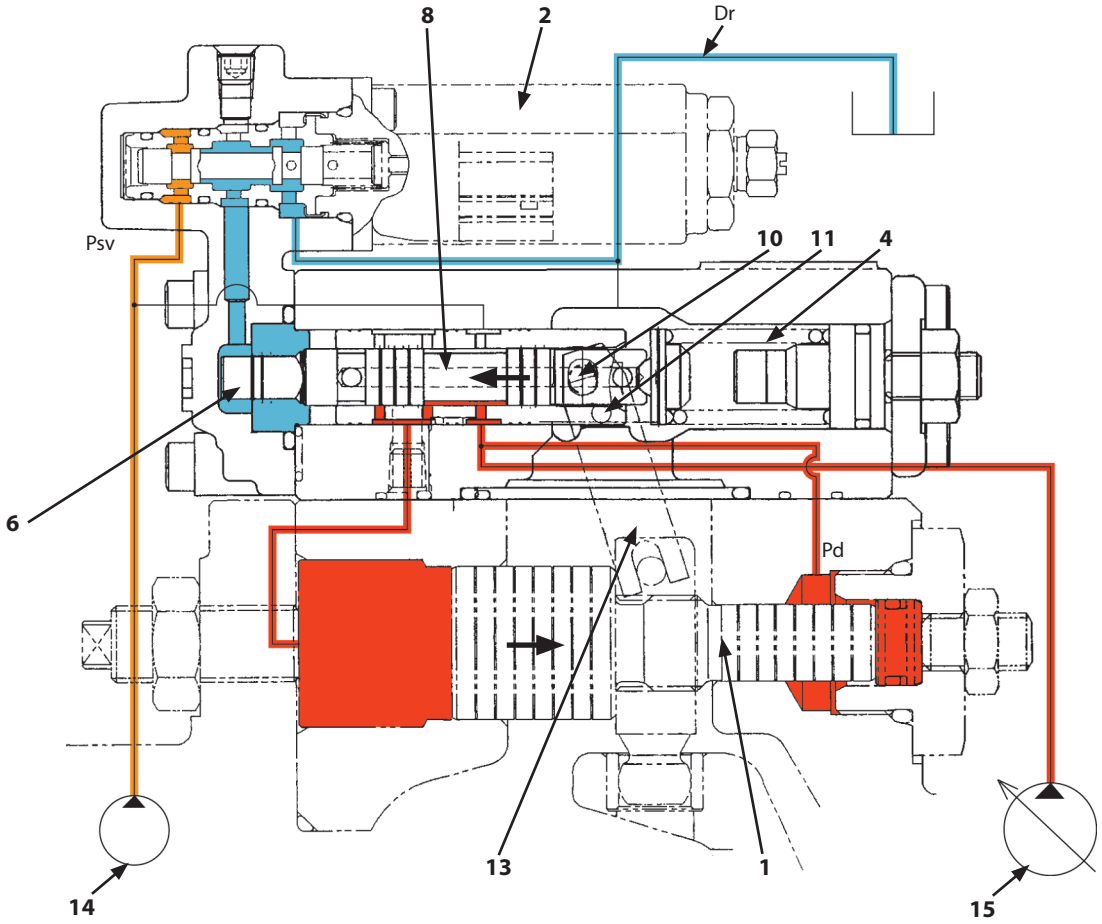


TJBA-03-01-024

Dr- Returning to Hydraulic Oil Tank
Pi- Flow Rate Control Pressure
Pg- Primary Pilot Pressure (From Pilot Pump)

1- Servo Piston
4- Spring
5- Sleeve
6- Piston
8- Spool
10- Pin
11- Pin
13- Link



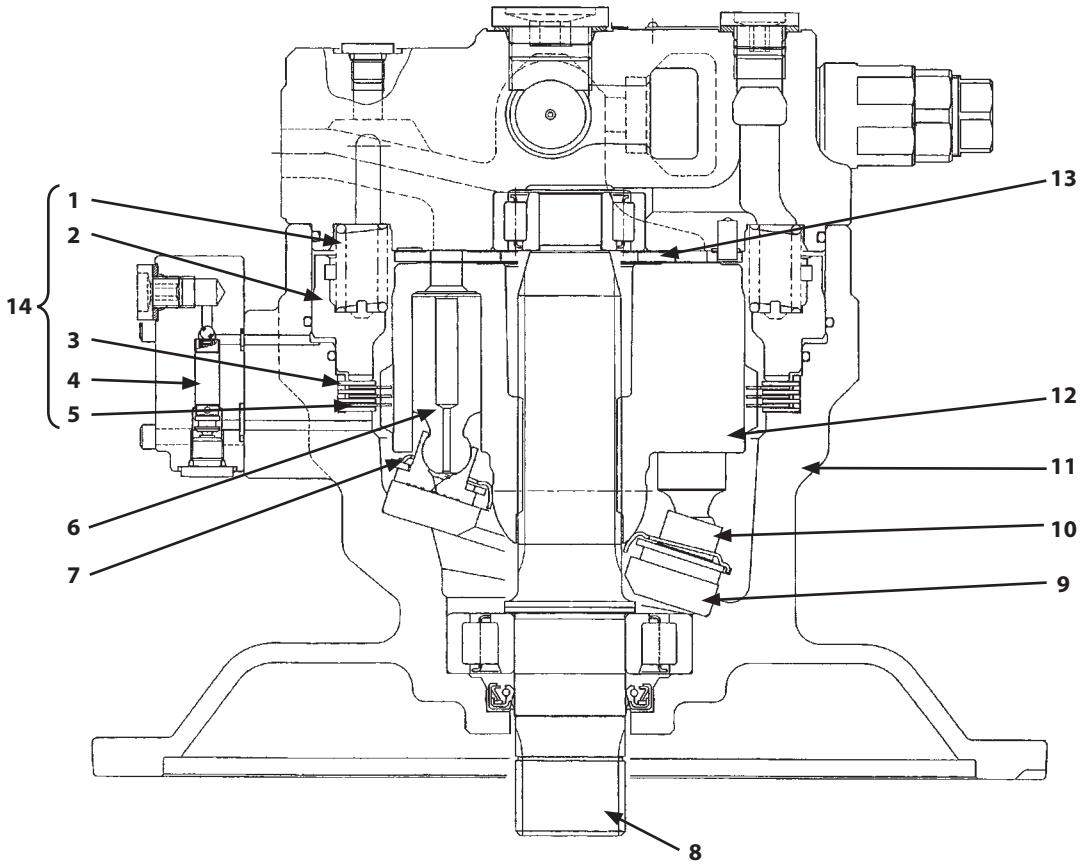
Pd- Pump Delivery Pressure
Dr- Returning to Hydraulic Oil Tank
Psv- Primary Pilot Pressure
Pi- Flow Rate Control Pressure

1- Servo Piston
2- Pump Control Solenoid Valve
4- Spring
5- Sleeve
6- Piston
8- Spool
10- Pin
11- Pin
13- Link
14- Pilot Pump
15- Fan Pump

Swing Motor

The swing motor consists of swash plate (9), rotor (12), plunger (6), valve plate (13), housing (11), and swing parking brake (14) (spring (1), brake piston (2), plates (3), friction plates (5), and swing parking brake selection valve (4)).
Shaft (8) is connected to rotor (12) by a spline joint, and into plunger (6) is inserted into rotor (12).

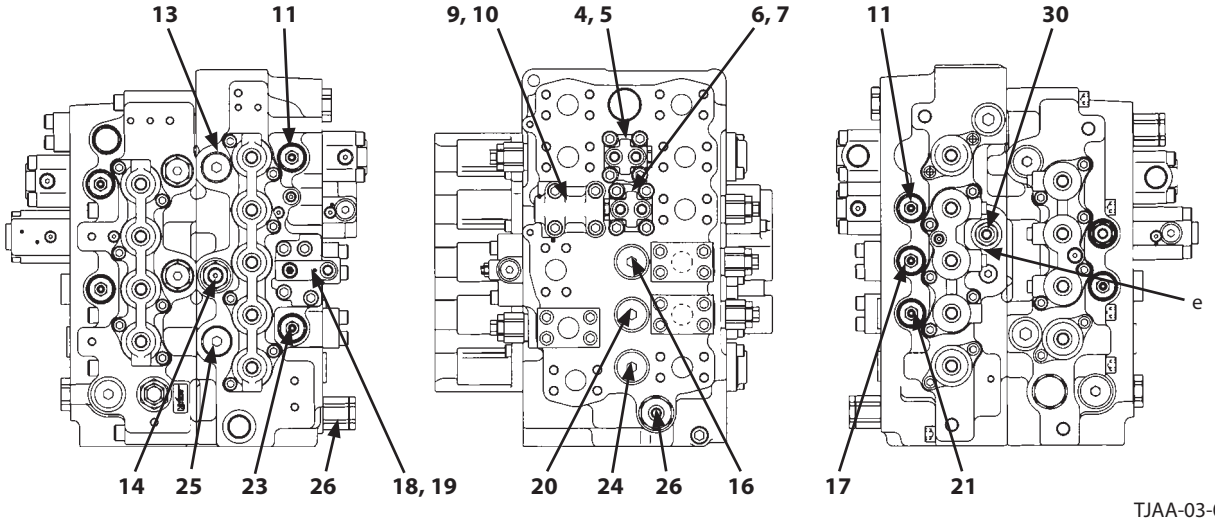
When pressure oil is supplied from the pump, plunger (6) is pushed. As swash plate (9) is inclined, shoe (10) on the end of plunger (6) slides along swash plate (9) and rotor (12) rotates.
The end of shaft (8) is connected to the first stage sun gear in the swing reduction gear by a spline joint. Therefore, the rotation of shaft (8) is transmitted to the swing reduction gear.



TJBC-03-02-001

1- Spring
2- Brake Piston
3- Plate
4- Swing Parking Brake Selection Valve
5- Friction Plate
6- Plunger
7- Retainer
8- Shaft
9- Swash Plate
10- Shoe
11- Housing
12- Rotor
13- Valve Plate
14- Swing Parking Brake

B Side

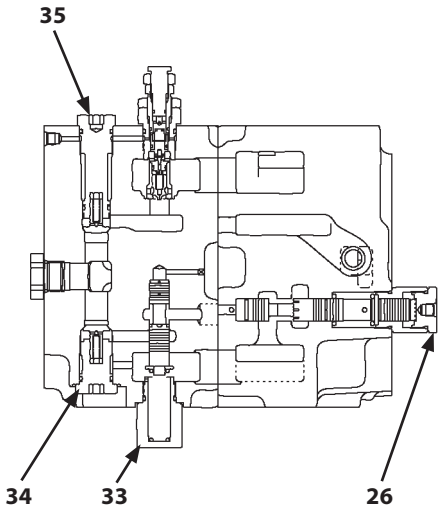


TJAA-03-03-007

e - Boom Lower Pressure Sensor Connecting Position

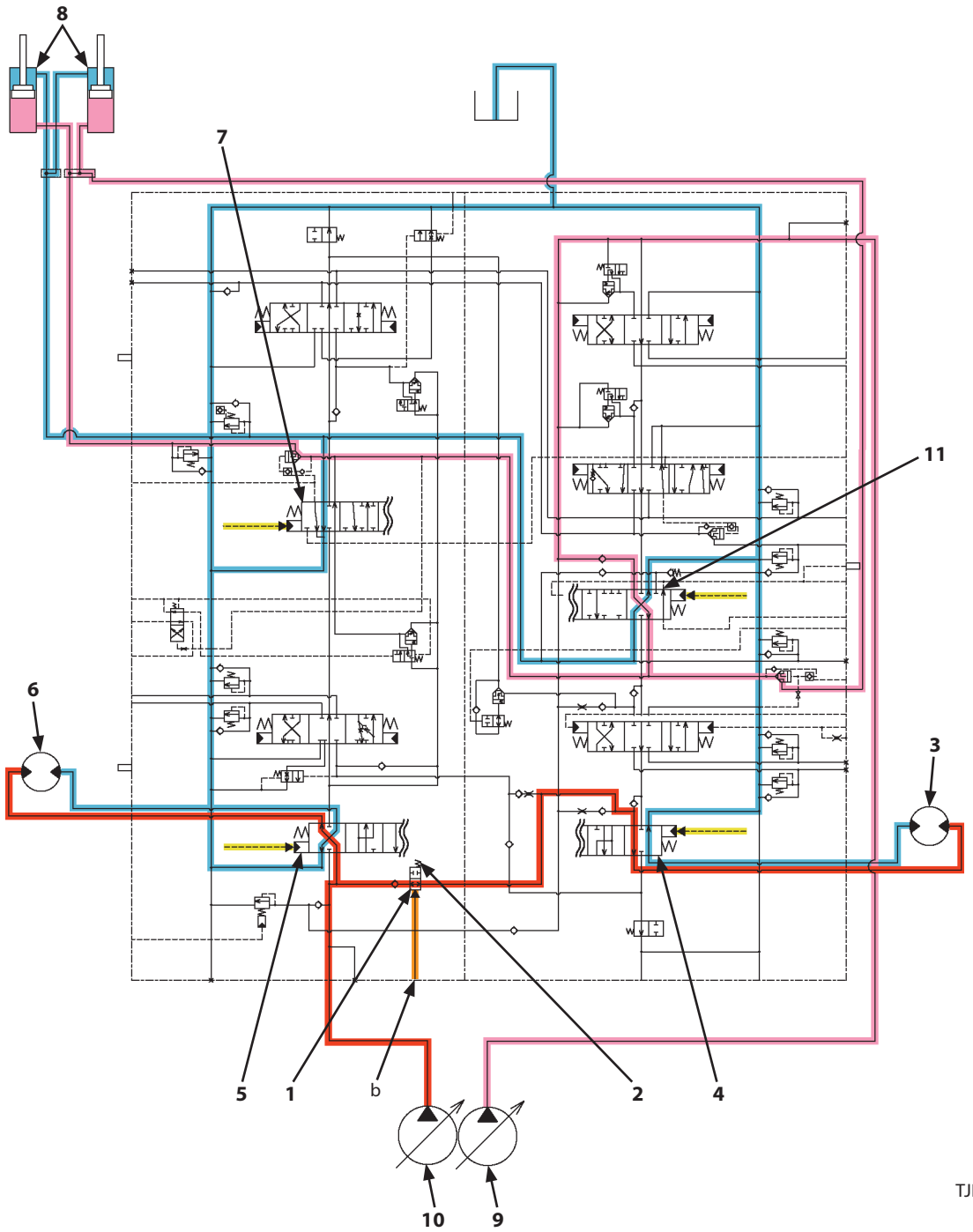
1- Check Valve (Arm Make-Up)
2- Bypass Shut-Out Valve (A Side)
3- Arm Regeneration Cut Valve
4- Swing Flow Rate Control Valve (Selector Valve)
5- Swing Flow Rate Control Valve (Poppet Valve)
6- Arm 1 Flow Rate Control Valve (Selector Valve)
7- Arm 1 Flow Rate Control Valve (Poppet Valve)
8- Arm Regenerative Valve
9- Arm Rod Anti-Drift Valve (Check Valve)
10- Arm Rod Anti-Drift Valve (Selector Valve)
11- Overload Relief Valve (Arm: Bottom Side)
12- Overload Relief Valve (Arm: Rod Side)
13- Load Check Valve (Arm 1 Tandem Circuit)
14- Boost Check Valve (Boom Regeneration Back Pressure Valve)
15- Load Check Valve (Boom 2 Parallel Circuit)
16- Check Valve (Boom 2 Regenerative Circuit)
17- Overload Relief Valve (Boom 2: Rod Side)
18- Boom 2 Anti-Drift Valve (Selector Valve)
19- Boom 2 Anti-Drift Valve (Check Valve)
20- Load Check Valve (Auxiliary Tandem Circuit)
21- Overload Relief Valve (Auxiliary)
22- Load Check Valve (Auxiliary Parallel Circuit)
23- Overload Relief Valve (Auxiliary)
24- Load Check Valve (Travel (Left) Tandem Circuit)
25- Load Check Valve (Travel (Left) Parallel Circuit)
26- Bypass Shut-Out Valve (B Side)
27- Check Valve (Bucket Flow Combiner Circuit)
28- Check Valve (Bucket Flow Combiner Circuit)
29- Check Valve (Main Relief Circuit)
30- Auxiliary Flow Combiner Valve (Selector Valve)
31- Auxiliary Flow Combiner Valve (Poppet Valve)
32- Check Valve (Auxiliary Flow Combiner Circuit)
33- Flow Combiner Valve
34- Check Valve (Flow Combiner Circuit)
35- Check Valve (Main Relief Circuit)
36- Main Relief Valve
37- Load Check Valve (Bucket Parallel Circuit)
38- Bucket Regeneration Cut Valve
39- Overload Relief Valve (Bucket: Rod Side)
40- Overload Relief Valve (Bucket: Bottom Side)
41- Boom Flow Rate Control Valve (Selector Valve)
42- Boom Flow Rate Control Valve (Poppet Valve)
43- Boom Lower Meter-In Cut Valve
44- Overload Relief Valve (Boom 1: Bottom Side)
45- Boom 1 Anti-Drift Valve (Selector Valve)
46- Boom 1 Anti-Drift Valve (Check Valve)
47- Boom Overload Relief Valve (Low Pressure) (Boom 1: Rod Side)
48- Boom Overload Relief Control Valve
49- Load Check Valve (Arm 2 Tandem Circuit)
50- Arm 2 Flow Rate Control Valve (Selector Valve)
51- Arm 2 Flow Rate Control Valve (Poppet Valve)
52- Bucket Regenerative Valve
53- Pump 1
54- Pump 2
55- Boom Regenerative Valve

Section H-H



TJAA-03-03-016

1- Check Valve (Arm Make-Up)
2- Bypass Shut-Out Valve (A Side)
3- Arm Regeneration Cut Valve
4- Swing Flow Rate Control Valve (Selector Valve)
5- Swing Flow Rate Control Valve (Poppet Valve)
6- Arm 1 Flow Rate Control Valve (Selector Valve)
7- Arm 1 Flow Rate Control Valve (Poppet Valve)
8- Arm Regenerative Valve
9- Arm Rod Anti-Drift Valve (Check Valve)
10- Arm Rod Anti-Drift Valve (Selector Valve)
11- Overload Relief Valve (Arm: Bottom Side)
12- Overload Relief Valve (Arm: Rod Side)
13- Load Check Valve (Arm 1 Tandem Circuit)
14- Boost Check Valve (Boom Regeneration Back Pressure Valve)
15- Load Check Valve (Boom 2 Parallel Circuit)
16- Check Valve (Boom 2 Regenerative Circuit)
17- Overload Relief Valve (Boom 2: Rod Side)
18- Boom 2 Anti-Drift Valve (Selector Valve)
19- Boom 2 Anti-Drift Valve (Check Valve)
20- Load Check Valve (Auxiliary Tandem Circuit)
21- Overload Relief Valve (Auxiliary)
22- Load Check Valve (Auxiliary Parallel Circuit)
23- Overload Relief Valve (Auxiliary)
24- Load Check Valve (Travel (Left) Tandem Circuit)
25- Load Check Valve (Travel (Left) Parallel Circuit)
26- Bypass Shut-Out Valve (B Side)
27- Check Valve (Bucket Flow Combiner Circuit)
28- Check Valve (Bucket Flow Combiner Circuit)
29- Check Valve (Main Relief Circuit)
30- Auxiliary Flow Combiner Valve (Selector Valve)
31- Auxiliary Flow Combiner Valve (Poppet Valve)
32- Check Valve (Auxiliary Flow Combiner Circuit)
33- Flow Combiner Valve
34- Check Valve (Flow Combiner Circuit)
35- Check Valve (Main Relief Circuit)
36- Main Relief Valve
37- Load Check Valve (Bucket Parallel Circuit)
38- Bucket Regeneration Cut Valve
39- Overload Relief Valve (Bucket: Rod Side)
40- Overload Relief Valve (Bucket: Bottom Side)
41- Boom Flow Rate Control Valve (Selector Valve)
42- Boom Flow Rate Control Valve (Poppet Valve)
43- Boom Lower Meter-In Cut Valve
44- Overload Relief Valve (Boom 1: Bottom Side)
45- Boom 1 Anti-Drift Valve (Selector Valve)
46- Boom 1 Anti-Drift Valve (Check Valve)
47- Boom Overload Relief Valve (Low Pressure) (Boom 1: Rod Side)
48- Boom Overload Relief Control Valve
49- Load Check Valve (Arm 2 Tandem Circuit)
50- Arm 2 Flow Rate Control Valve (Selector Valve)
51- Arm 2 Flow Rate Control Valve (Poppet Valve)
52- Bucket Regenerative Valve
53- Pump 1
54- Pump 2
55- Boom Regenerative Valve

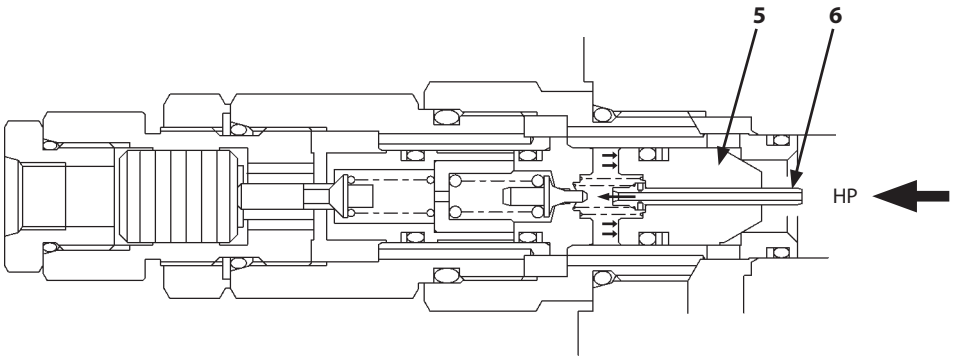


TJBA-03-03-012

b - Pilot Pressure from Flow Combiner Valve Control Spool

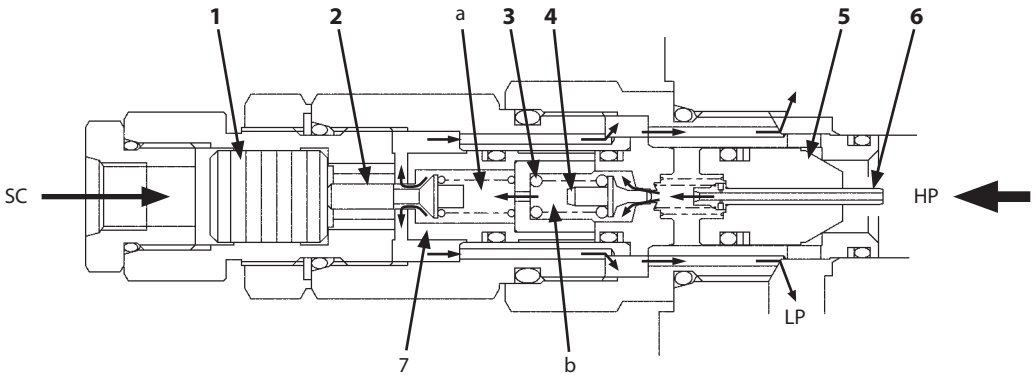
1- Spool (Flow Combiner Valve)
2- Spring
3- Travel Motor (Left)
4- Travel (Left) Spool
5- Travel (Right) Spool
6- Travel Motor (Right)
7- Boom 1 Spool
8- Boom Cylinder
9- Pump 2
10- Pump 1
11- Boom 2 Spool

During Normal Operation:

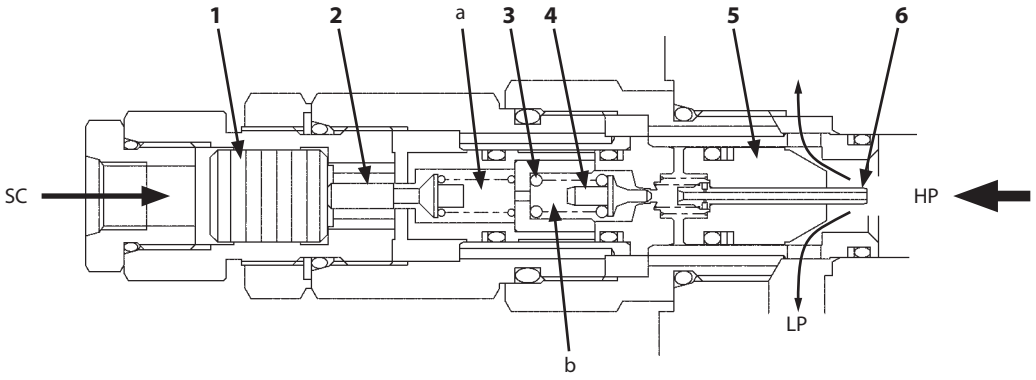


TJAA-03-03-047

During Relief Operation:



T1J1-03-03-006

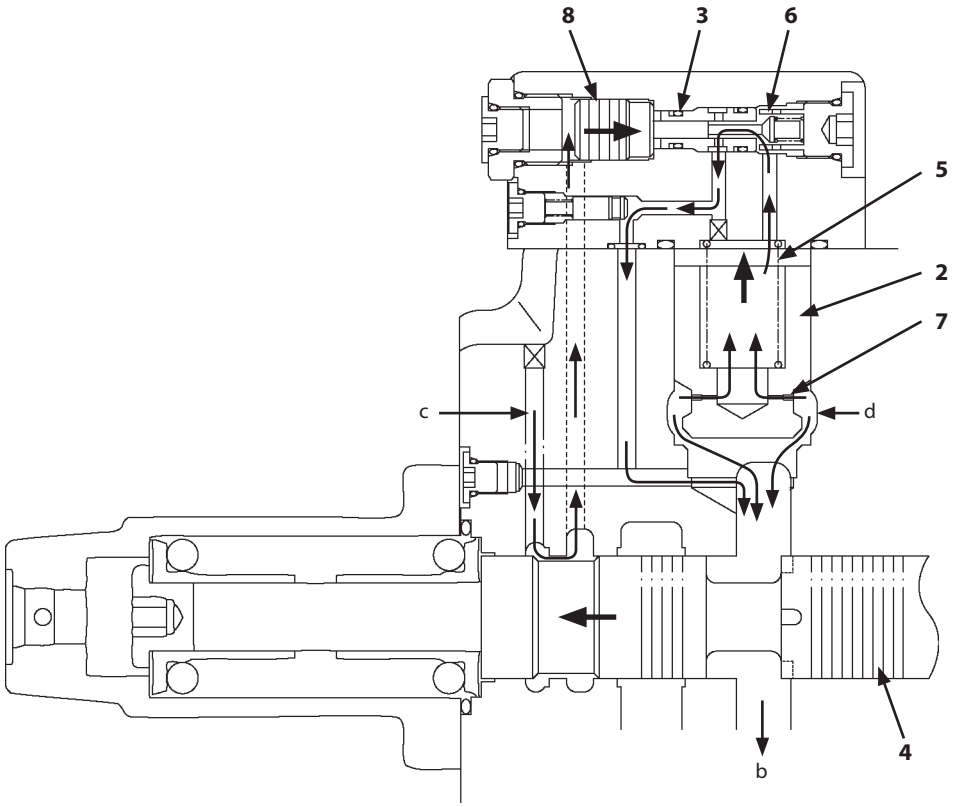


T1J1-03-03-007

HP - Actuator Circuit
LP - Hydraulic Oil Tank
SC - Pilot Pressure from 2-Spool Solenoid Valve Unit (SC)

a - Chamber a
b - Chamber b
c - Chamber c

1- Piston
2- Poppet
3- Spring
4- Pilot Poppet
5- Main Poppet
6- Piston
7- Sleeve

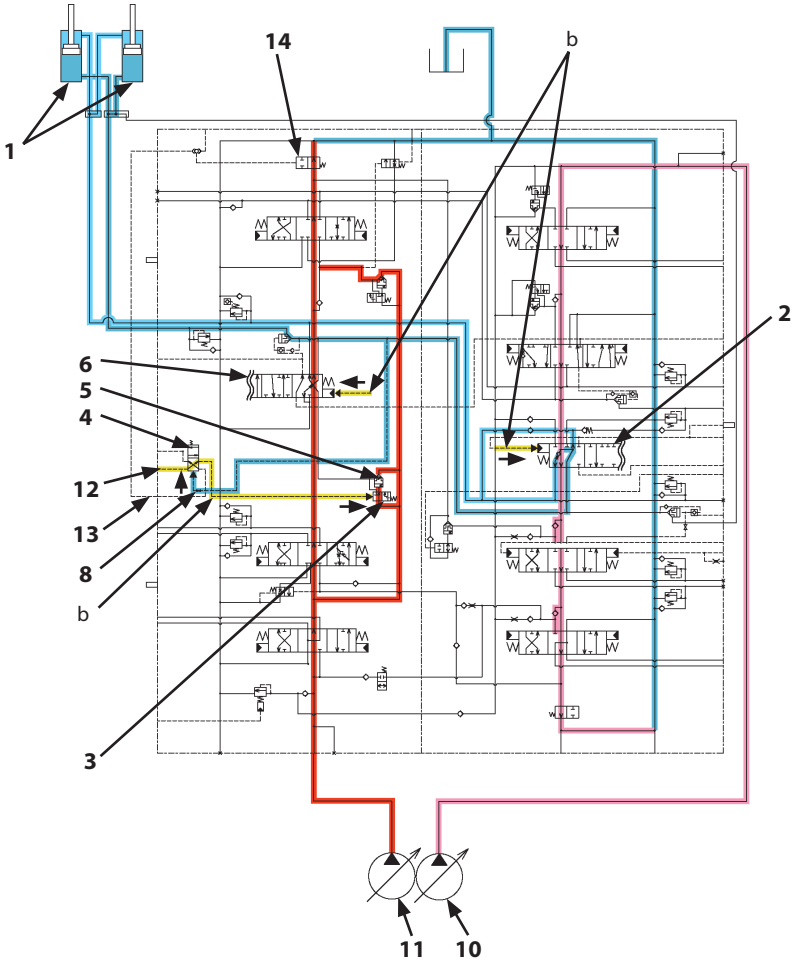


TJAA-03-03-022

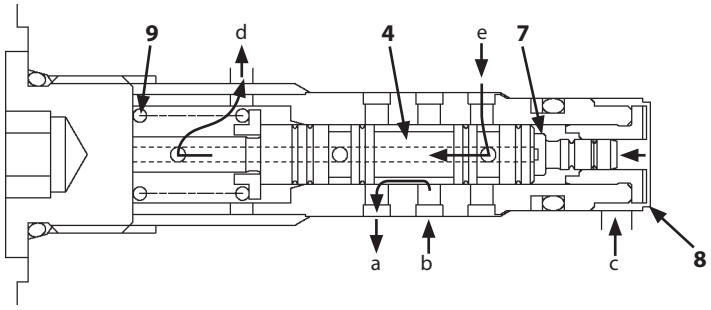
b - To Hydraulic Oil Tank
c - Pressure Oil from Pilot Pump
d - Returning Oil from Arm Cylinder (1)

2 - Anti-Drift Valve (Check Valve)
3 - Anti-Drift Valve (Selector Valve)
4 - Arm 1 Spool
5 - Spring
6 - Spring
7 - Orifice
8 - Piston

During Boom Lower with Front Attachment above Ground:



TJBA-03-03-008

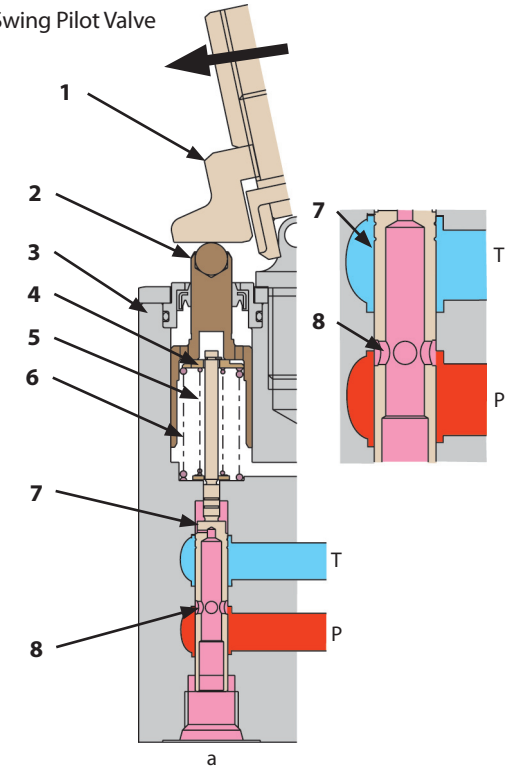


TJAA-03-03-005

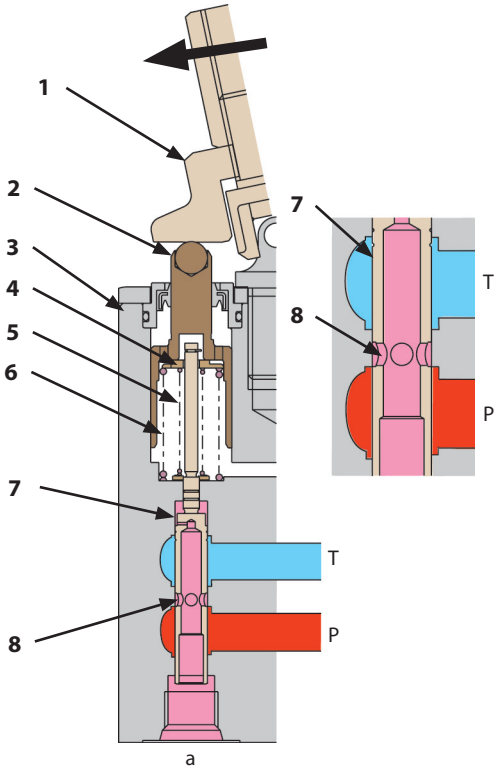
a - To Boom Flow Rate Control Valve (Selector Valve)
b - Boom Lower Pilot Pressure
c - Pressure Oil from Boom Cylinder Bottom Side
d - To Hydraulic Oil Tank
e - To Bypass Shut-Out Valve (4-Spool Side)

1- Boom Cylinder
2- Boom 2 Spool
3- Boom Flow Rate Control Valve (Selector Valve)
4- Spool (Boom Lower Meter-In Cut Valve)
5- Boom Flow Rate Control Valve (Poppet Valve)
6- Boom 1 Spool
7- Piston
8- Orifice
9- Spring
10- Pump 2
11- Pump 1
12- Port 4PC11
13- Port 4PC12
14- Bypass Shut-Out Valve (4-Spool Side)

Front Attachment /
Swing Pilot Valve

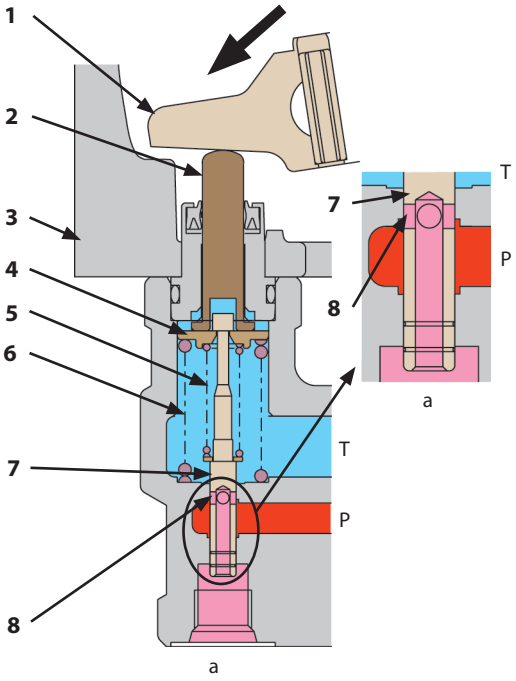


TPPP-03-04-007

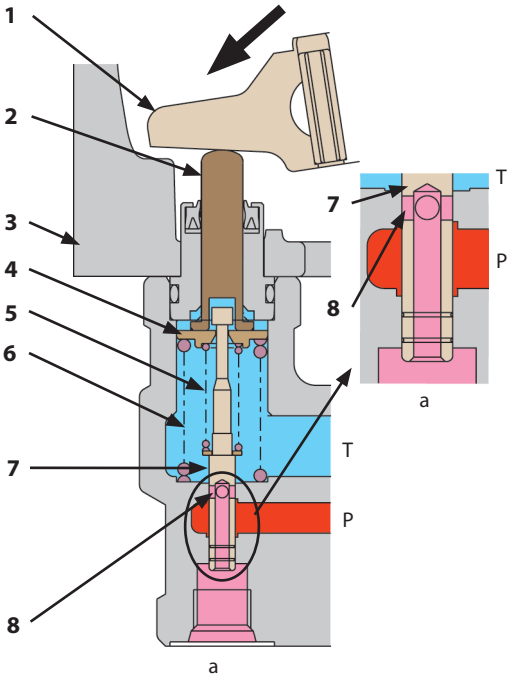


TPPP-03-04-008

Travel Pilot Valve



TPPP-03-04-012



TPPP-03-04-013

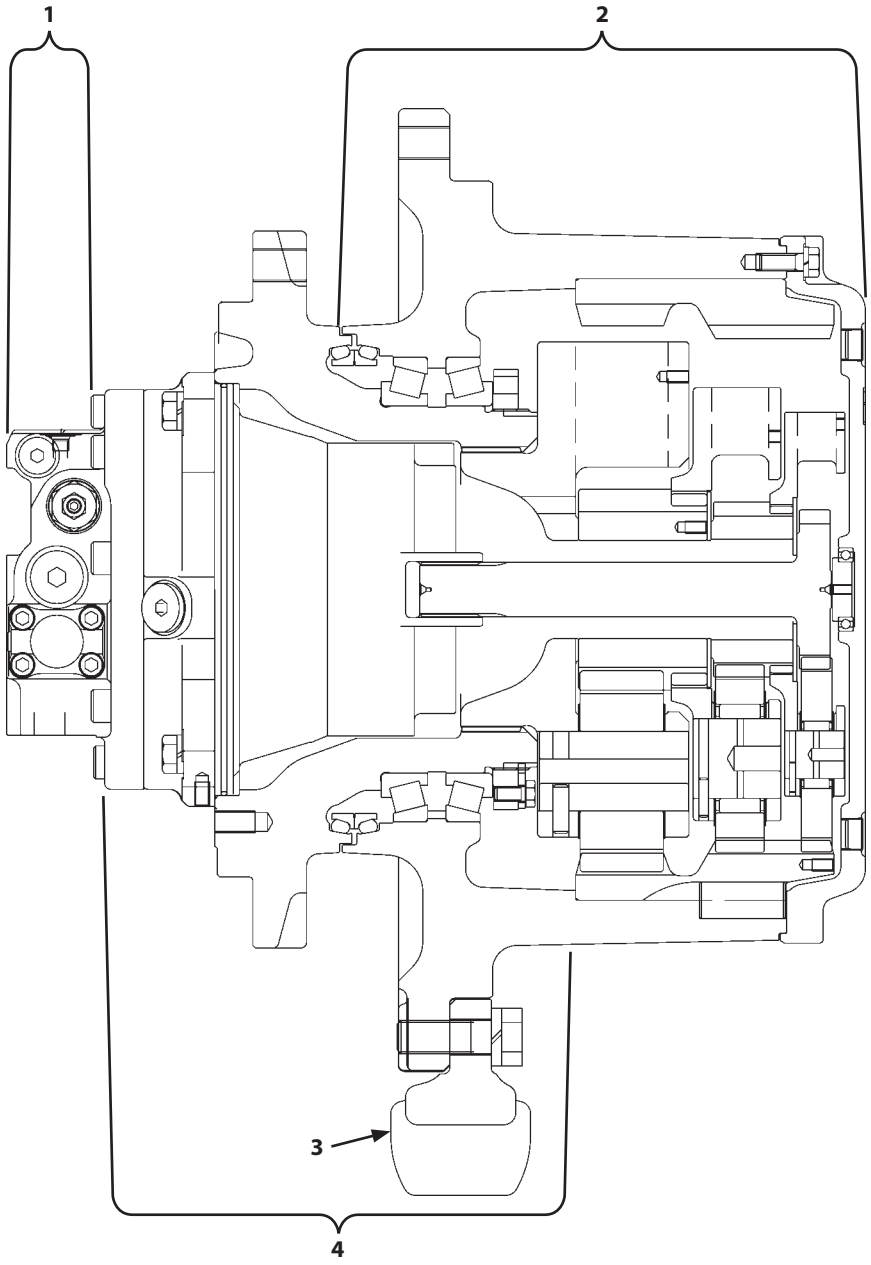
P- Port P
T- Port T
a- Output Port

1- Cam
2- Pusher
3- Casing
4- Spring Guide
5- Balance Spring
6- Return Spring
7- Spool
8- Hole

Outline

The travel device consists of travel motor (4), travel reduction gear (2), and travel brake valve (1).
Travel motor (4) is a swash plate type variable displacement axial plunger motor and equipped with a parking brake (a wet-type spring set hydraulic released multi-disc brake). Travel motor (4) is driven by pressure oil from the pump and transmits the rotation power to travel reduction gear (2).

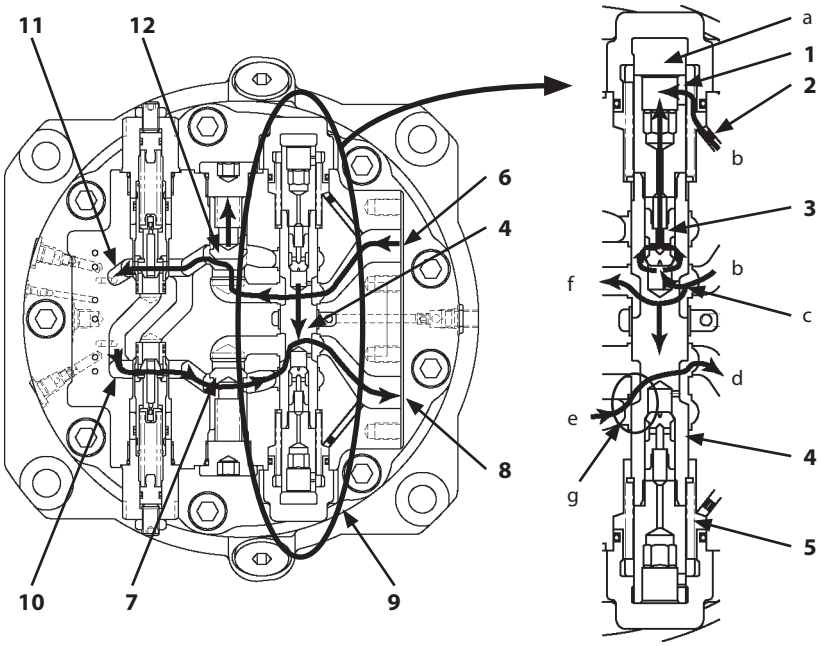
Travel reduction gear (2) is a three-stage planetary reduction gear, converts the travel motor (4) rotation power to a slow-large torque, and rotates sprocket (3) and the track.
Travel brake valve (1) protects the travel circuit from being overloaded and prevents the occurrence of cavitation.



T1J7-03-05-001

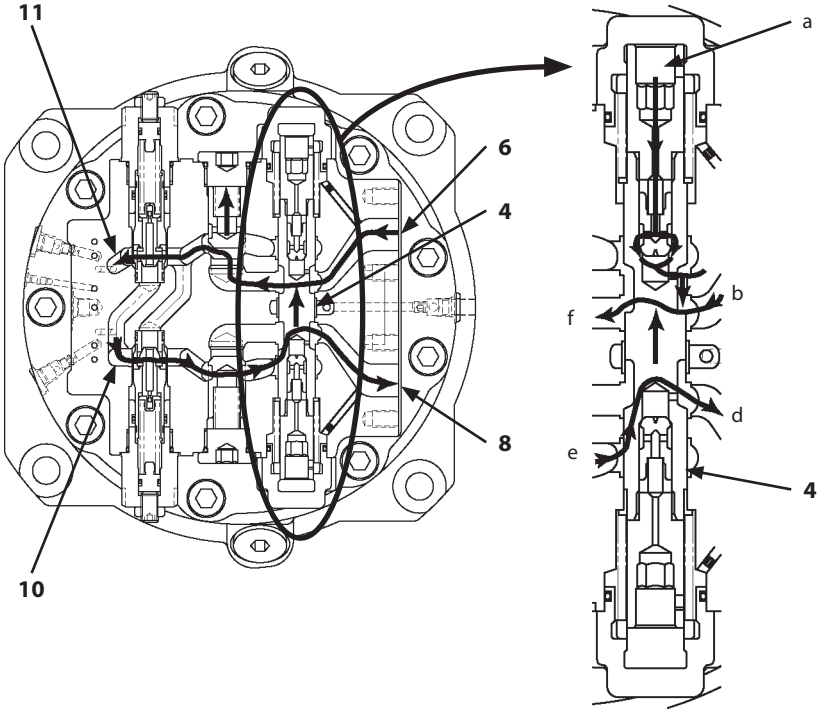
1- Travel Brake Valve
2- Travel Reduction Gear
3- Sprocket
4- Travel Motor

- While Traveling



TJBA-03-05-005

- While Descending a Slope

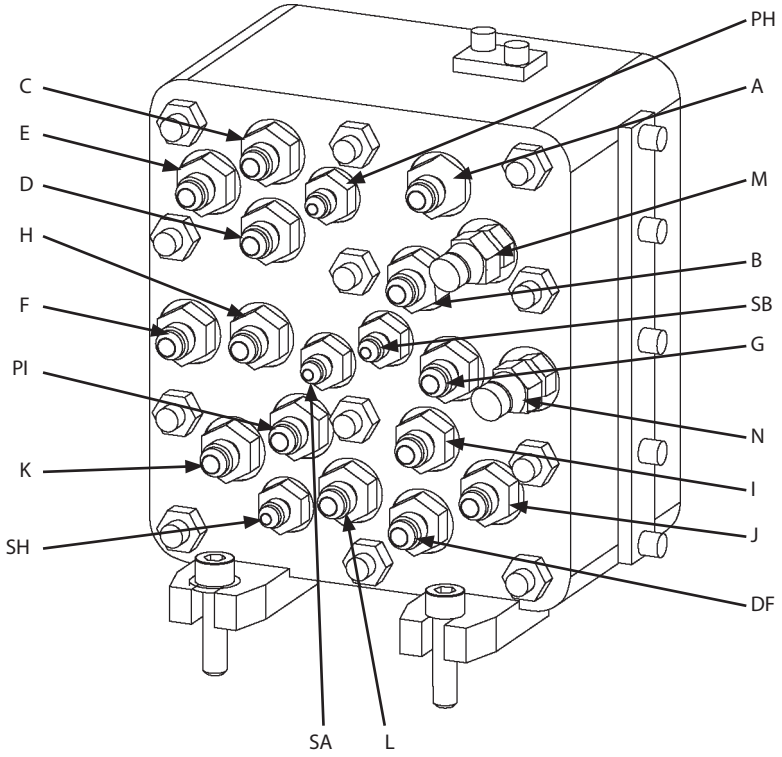


TJBA-03-05-006

a- Chamber G
b- From Port P1
c- Oil Passage F
d- To Port P2
e- From Port AM
f- To Port BM

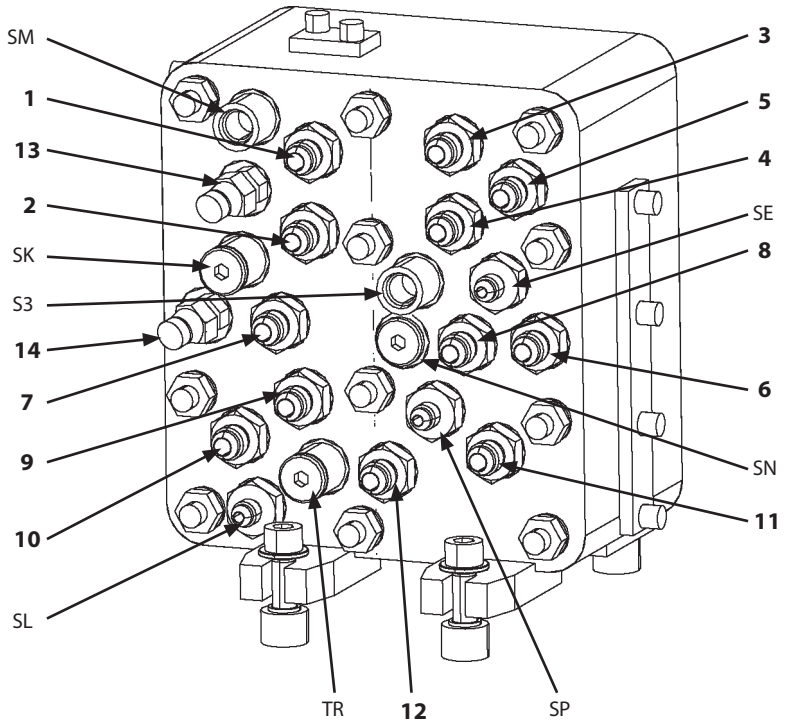
1- Orifice A
2- Orifice
3- Check Valve
4- Spool
5- Spring
6- Port P1
7- Check Valve
8- Port P2
9- Counterbalance Valve
10- Port AM
11- Port BM
12- Check Valve

Pilot Valve Side



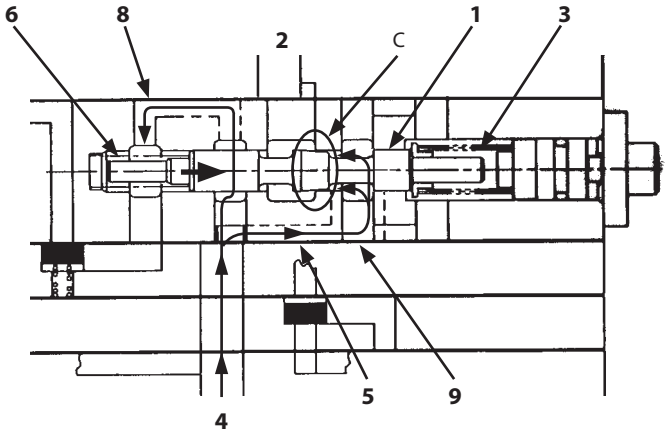
TJAA-03-06-002

Control Valve Side

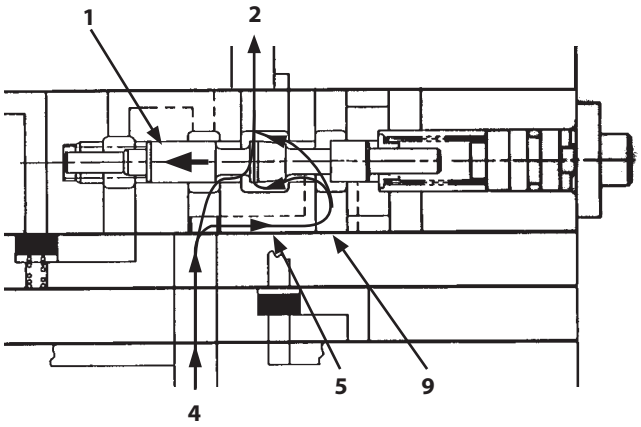


TJAA-03-06-003

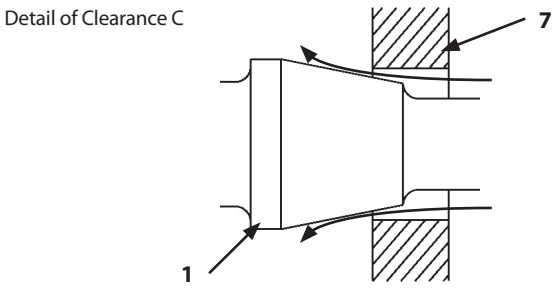
During boom lower operation or when stopping boom raise operation (shock reducing operation)



T183-03-06-005



T183-03-06-004

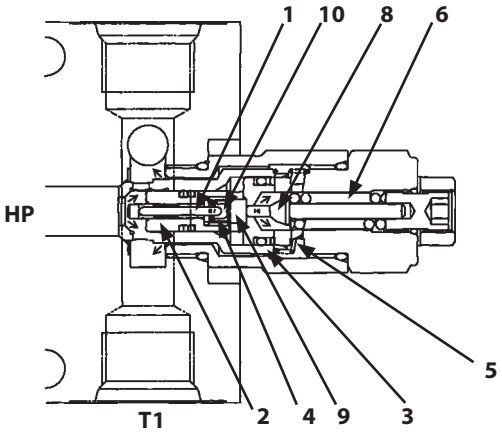


T1V1-03-06-008

1- Spool
2- Port A
3- Spring B
4- Port 1
5- Inner Passage 2
6- Spring A
7- Housing
8- Inner Passage 1
9- Oil Chamber

Relief Operation

1. Pressure in port HP (fan circuit) is routed to pilot poppet (8) through orifice (1) of piston (10).
2. When pressure in port HP reaches the set pressure of spring B (6), pilot poppet (8) is opened, pressure oil from passage A (5) flows along the external circumference of sleeve (3), and flows to port T1 (hydraulic oil tank).
3. At this time, a pressure difference occurs between port HP and spring chamber (9) due to orifice (1).
4. When this pressure difference reaches the set pressure of spring A (4), piston (10) and main poppet (2) are opened and pressure oil from port HP flows to port T1.
5. Consequently, the fan circuit pressure decreases.
6. When the fan circuit pressure decreases to the specified level, piston (10) and main poppet (2) are closed by the force of spring A (4).



TJAA-03-07-003

HP- Fan Circuit

T1- Port T1(To Hydraulic Oil Tank)

1- Orifice
2- Main Poppet
3- Sleeve
4- Spring A
5- Passage A
6- Spring B
8- Pilot Poppet
9- Spring Chamber
10- Piston