PART NO. TOLAA-EN-01

HITACHI

Reliable solutions

Technical Manual
Operational Principle

ZX 140W-5B
Wheeled Excavator

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TOLAA-EN
Technical Manual (Troubleshooting)	: Vol. No.TTLAA-EN
Workshop Manual	: Vol. No.WLAA-EN
Engine Manual	: Vol. No.EDBE-EN

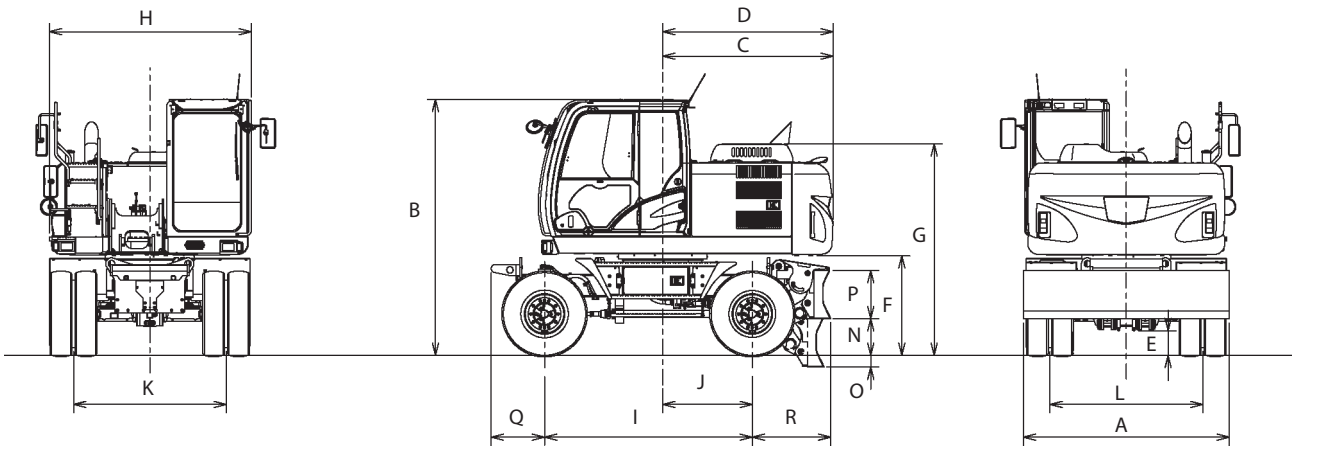
ZX140W-5B WHEELED EXCAVATOR TECHNICAL MANUAL OPERATIONAL PRINCIPLE

TOLAA-EN-01

Hitachi Construction Machinery Co., Ltd.
URL:http://www.hitachi-c-m.com

PRINTED IN JAPAN (K) 2014, 02

Specifications ZX140W-5B (Rear Blade)

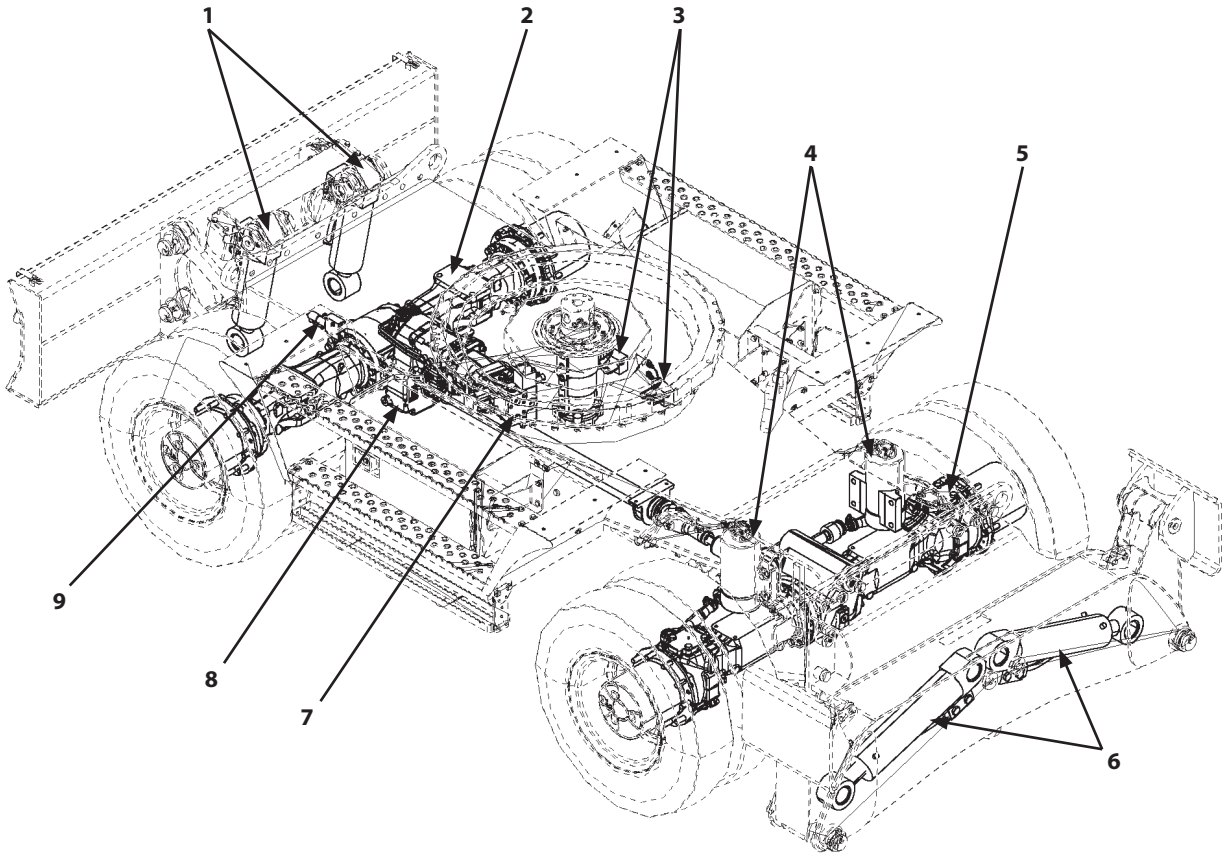


MLBA-12-001

Type of Front-End Attachment			Monoblock Boom	2-Piece Boom
Type of Arm		–	2.52 m (8 ft 3 in)	2.52 m (8 ft 3 in)
Bucket Capacity (Heaped)			PCSA 0.50 m^3 (0.65 yd^3), CECE 0.45 m^3	
Operating Weight		kg (lb)	14800 (32600)	15200 (33500)
Base Machine Weight		kg (lb)	12400 (27300)	12400 (27300)
Engine			ISUZU AM-4JJ1X	
Engine Power	SAE J1349 net ISO 9249 net EEC 80/1269 net		90.2 kW/2200 min^{-1} (123 PS/2200 rpm)	
A: Overall Width (Excluding Rearview Mirrors)		mm (ft·in)	2530 (8' 4")	
B: Cab Height		mm (ft·in)	3130 (10' 3")	
C: Rear End Swing Radius		mm (ft·in)	2120 (7' 0")	
D: Rear End Length		mm (ft·in)	2120 (7' 0")	
E: Minimum Ground Clearance		mm (ft·in)	300 (1' 0")	
F: Counterweight Clearance		mm (ft·in)	1215 (4' 0")	
G: Engine Cover Height		mm (ft·in)	2590 (8' 6")	
H: Overall Width of Upperstructure		mm (ft·in)	2480 (8' 2")	
I: Wheelbase		mm (ft·in)	2550 (8' 4")	
J: Swing-center to Rear Axle		mm (ft·in)	1100 (3' 7")	
K: Front Wheel Tread		mm (ft·in)	1875 (6' 2")	
L: Rear Wheel Tread		mm (ft·in)	1875 (6' 2")	
M: Outrigger Spread		mm (ft·in)	–	
N: Max. Raising Height		mm (ft·in)	445 (1' 6")	
O: Max. Digging Depth		mm (ft·in)	145 (6")	
P: Blade Height		mm (ft·in)	590 (1' 11")	
Q: Front Axle to Front of Chassis		mm (ft·in)	655 (2' 2")	
R: Rear Axle to Rear of Chassis		mm (ft·in)	965 (3' 2")	
Tire Size		–	10.00-20 14PR	
Swing Speed		min^{-1} (rpm)	11.9	
Travel Speed (Fast/Slow/Creeper) *		km/h (mph)	35/8.6/2.2 (21.7/5.3/1.4)	
Gradeability		Degree (%)	35 (70)	

*NOTE: * The specification not matching the local regulation is excluded.*

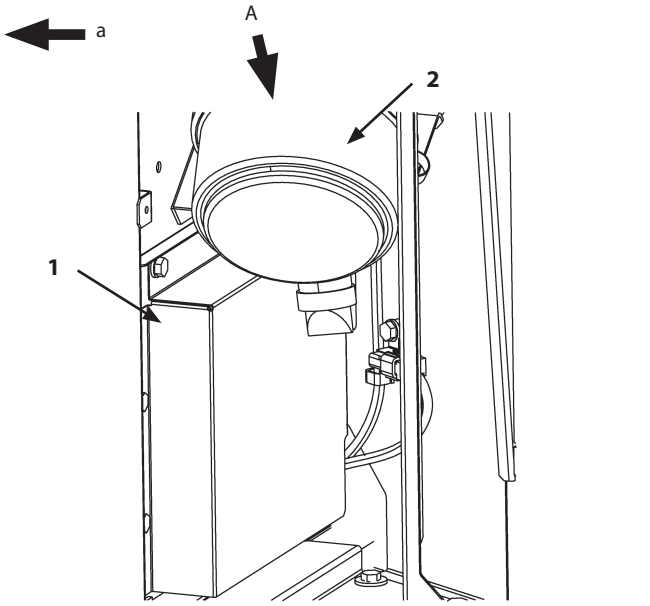
Undercarriage



TCJB-01-02-011

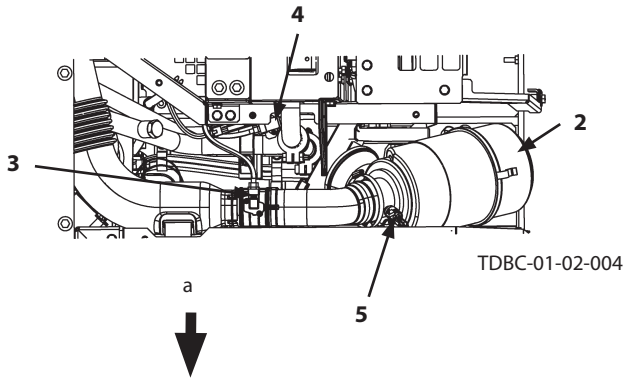
1- Blade Cylinder
2- Rear Axle
3- 2-Spool Solenoid Valve Unit (Blade / Outrigger Cylinder)
4- Axle Lock Cylinder
5- Front Axle
6- Outrigger Cylinder
7- Travel Motor
8- Transmission
9- Transmission Changeover Solenoid Valve

Electrical System (Around Air Cleaner)



TDBC-01-02-003

View A



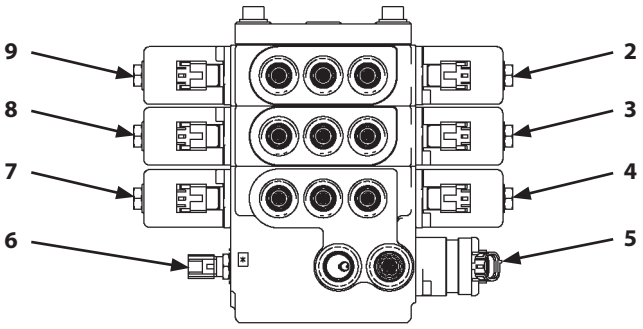
TDBC-01-02-004

a - Machine Front

1- ECM (Engine Controller)
2- Air Cleaner
3- MAF Sensor/Intake-Air Temperature Sensor
4- Atmospheric Pressure Sensor
5- Air Filter Restriction Switch

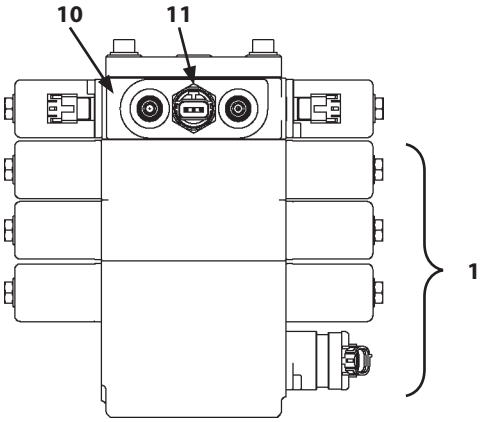
Solenoid Valve Unit

7-Spool Solenoid Valve Unit



TLAA-01-02-024

2-Spool Solenoid Valve Unit (Assist) (Optional)



TLAA-01-02-025

1- 7-Spool Solenoid Valve Unit
2- Positioning Solenoid Valve
3- Auxiliary Solenoid Valve
4- Blade / Outrigger Solenoid Valve
5- Pilot Cut-Off Solenoid Valve
6- Hydraulic Oil Temperature Sensor 2
7- Blade / Outrigger Solenoid Valve
8- Auxiliary Solenoid Valve
9- Positioning Solenoid Valve
10- 2-Spool Solenoid Valve Unit (Assist) (Optional)
11- Pressure Sensor (Assist)

Engine Accessories

RADIATOR ASSEMBLY	Type	Radiator, Oil Cooler Parallel Type, Intercooler Tandem Type
	Weight	85 kg (187 lb)

	Radiator	Oil Cooler	Intercooler
Air-Tight Test Pressure	100 kPa (1.02 kgf/cm^2, 14.5 psi)	1500 kPa (15.3 kgf/cm^2, 213 psi)	250 kPa (2.55 kgf/cm^2, 36 psi)
Cap Opening Pressure	49 kPa (0.5 kgf/cm^2, 7.1 psi)	–	–

BATTERY	Type	115E41L
	Voltage	12 V
	Capacity	88 Ah (5-Hour Rate)
	Weight	28 kg (62 lb) × 2

SECTION 2 SYSTEM

Group 1 Controller

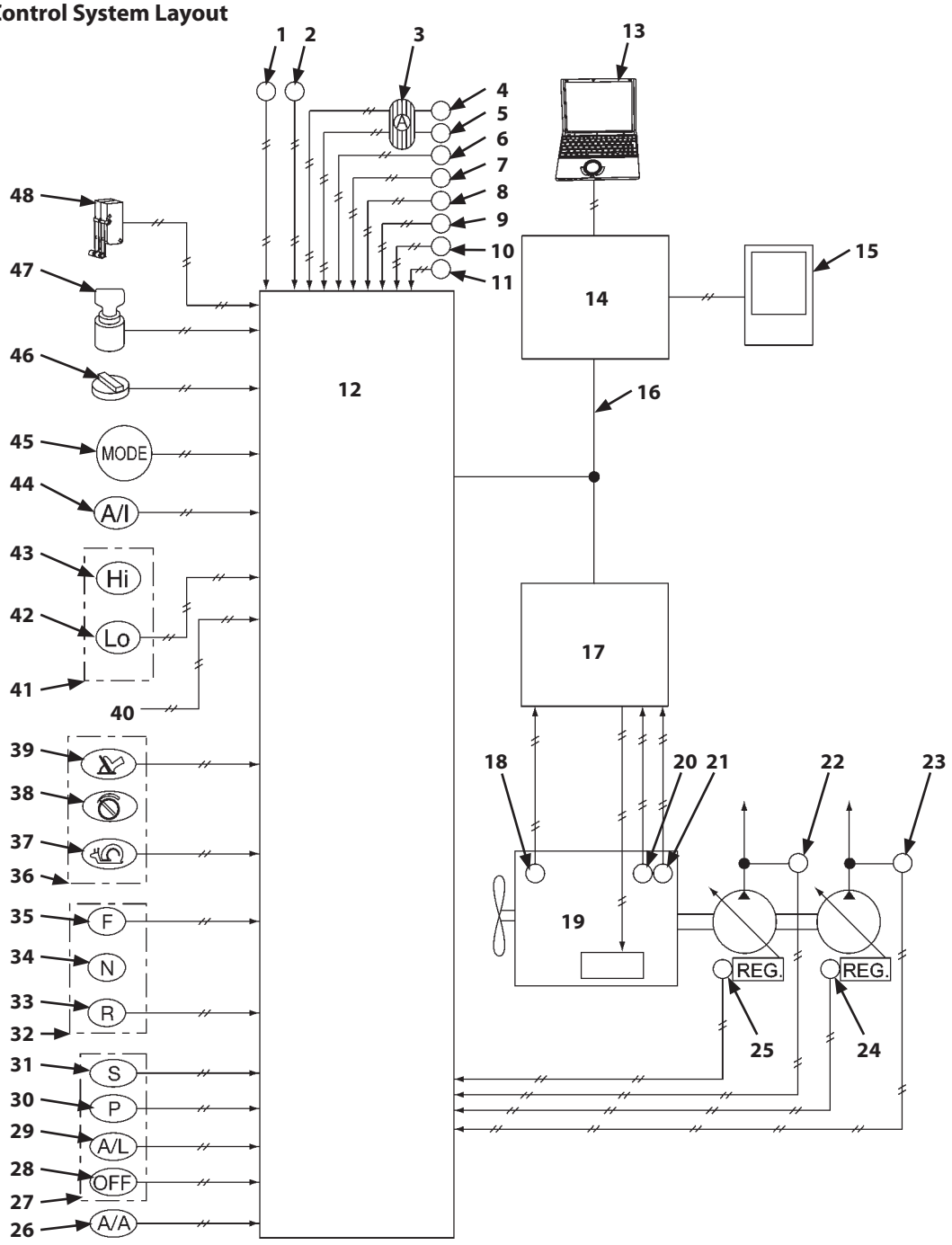
Outline

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 1	Controls the engine, pumps, and valves.	T2-2
MC 2	Controls the valves.	T2-2
ECM	Controls the actual engine speed.	T2-3
Monitor Controller	Displays the operating information and alarms on the monitor.	T5-2
Wiper / Light Controller	Controls the wipers and work lights.	T2-5
Air Conditioner Controller	Controls the air conditioner.	T2-5, T5-7
Radio Controller	Controls the radio.	T2-5
Communication Controller	Sends the mails and operating information.	T5-3

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

Engine Control System Layout



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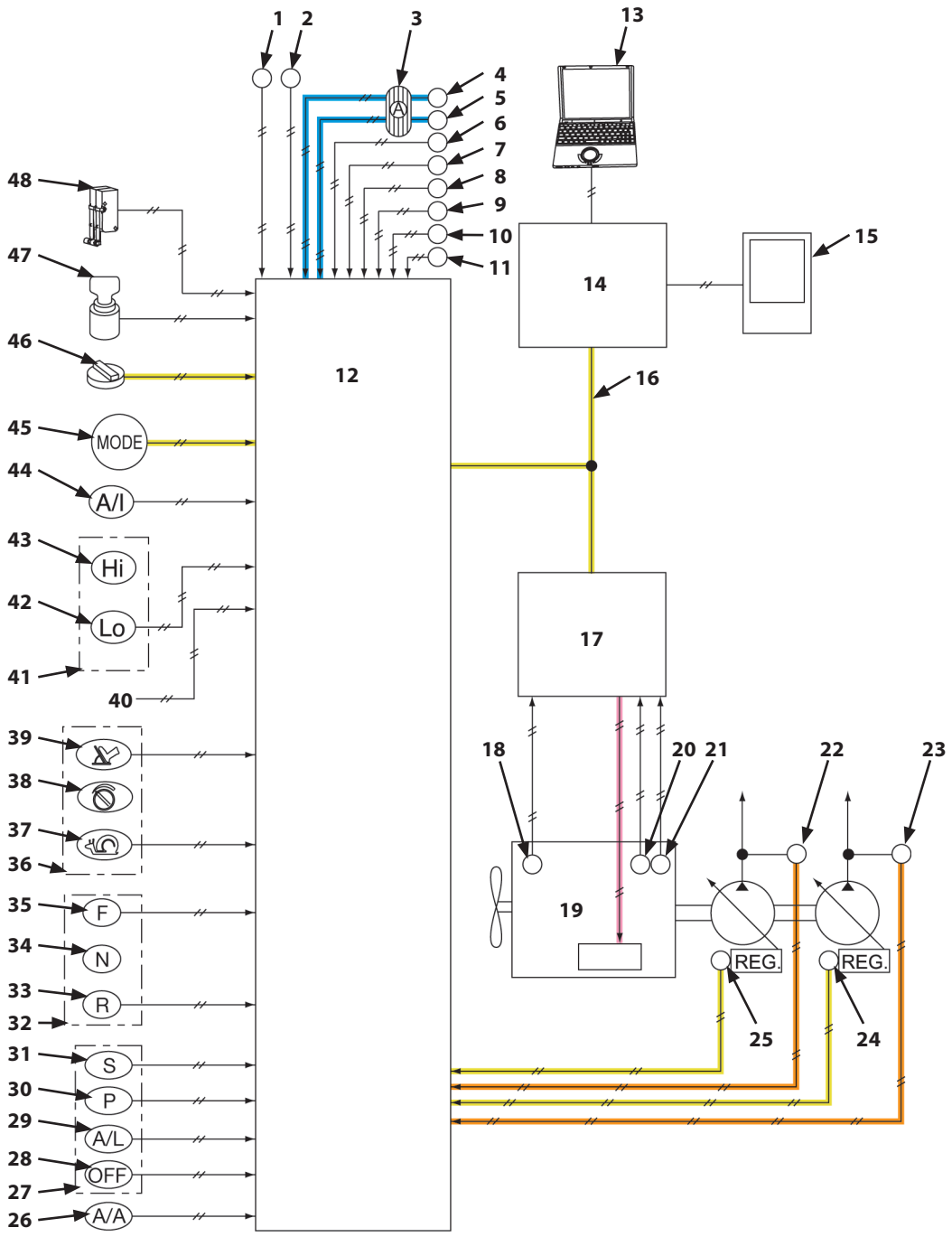
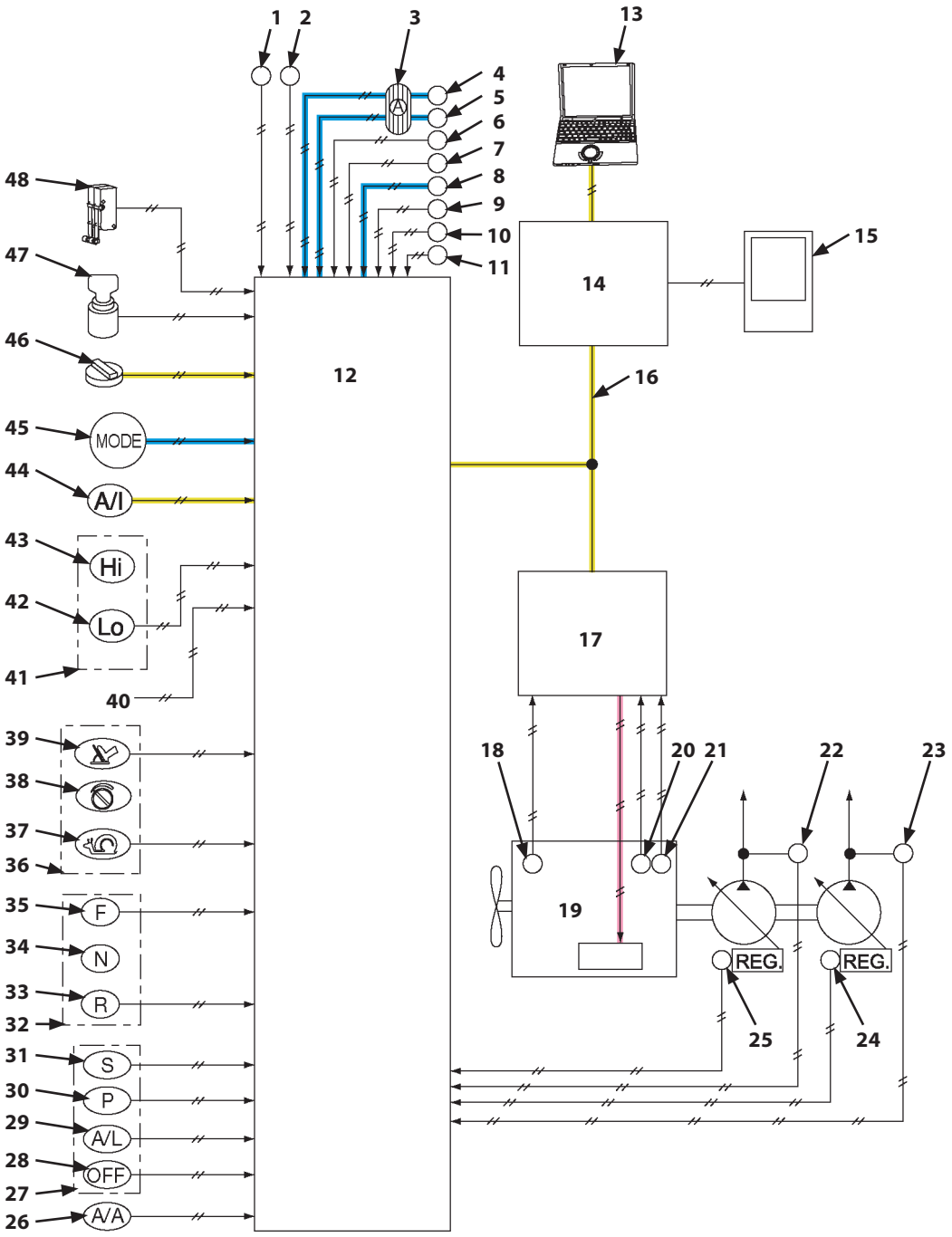


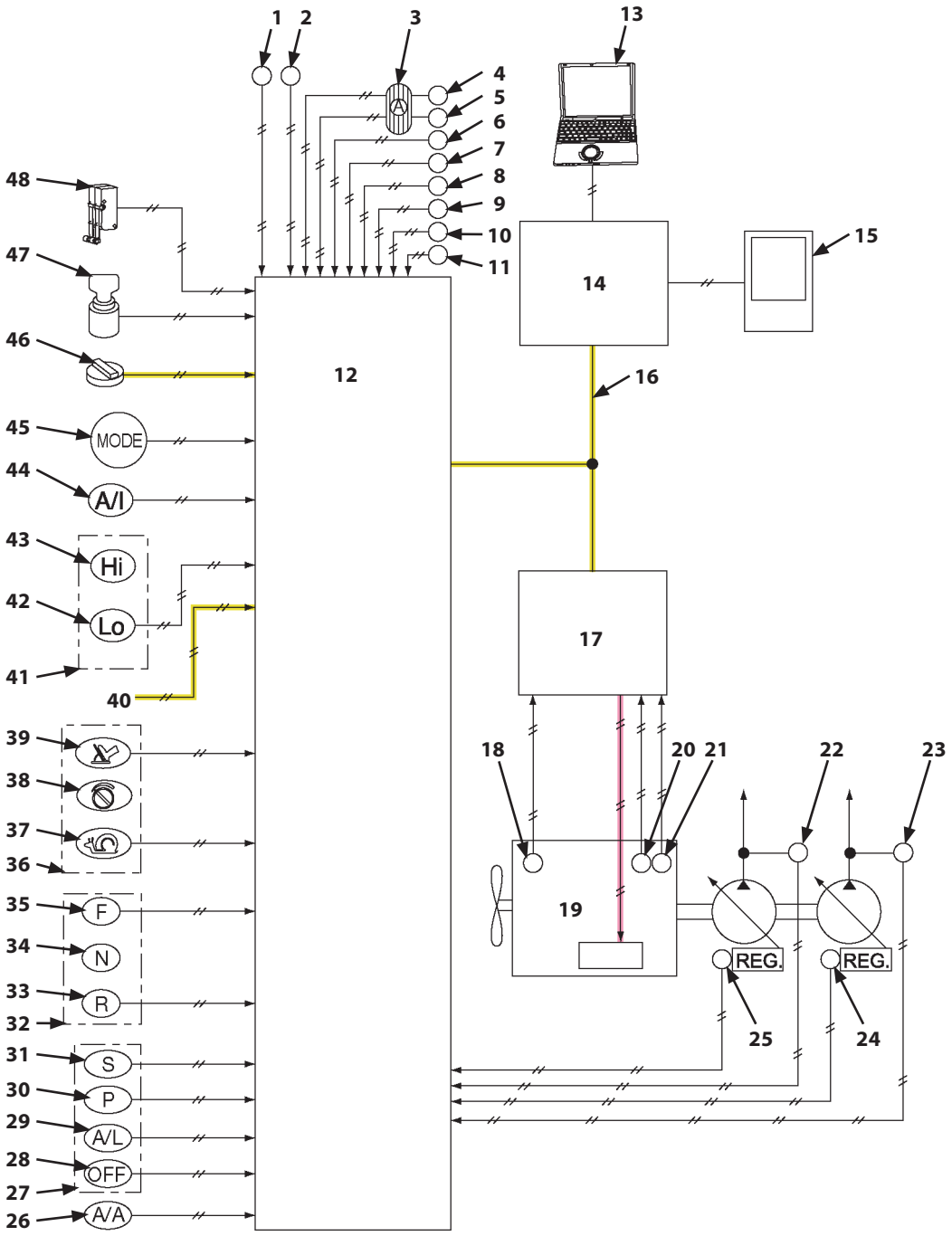
TLAA-02-02-006

4- Pressure Sensor (Travel Forward)
5- Pressure Sensor (Travel
12- MC1
16- CAN
17- ECM
19- Engine
22- Pump 2 Delivery Pressure Sensor
23- Pump 1 Delivery Pressure Sensor
24- Pump 1 Control Pressure Sensor
25- Pump 2 Control Pressure Sensor
45- Power Mode Switch
46- Engine Control Dial



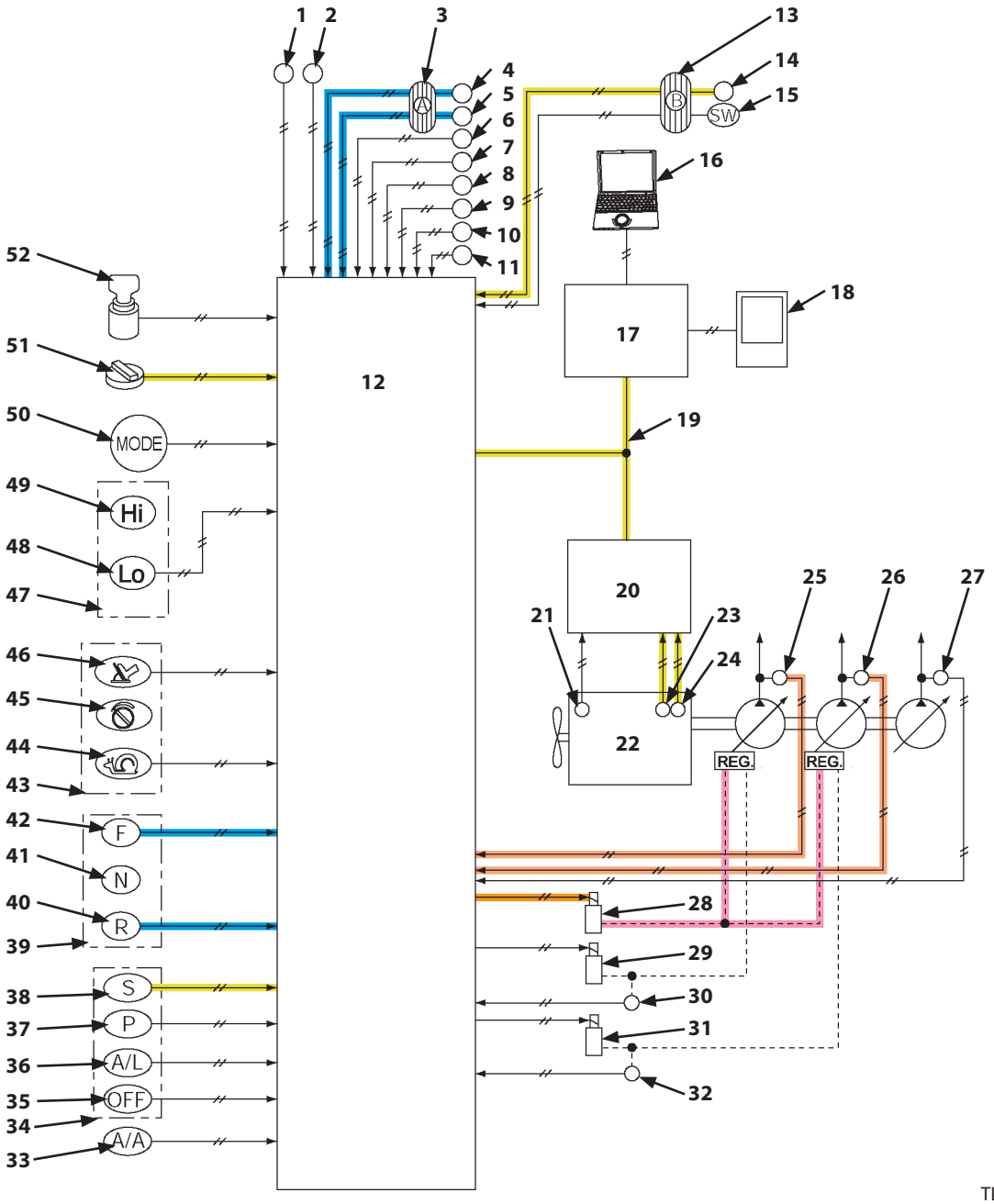
TLAA-02-02-012

4- Pressure Sensor (Travel Forward)
5- Pressure Sensor (Travel Reverse)
8- Pressure Sensor (Front Attachment)
12- MC1
13- MPDr.
14- Monitor Controller
16- CAN
17- ECM
19- Engine
44- Auto-Idle Switch
45- Power Mode Switch
46- Engine Control Dial



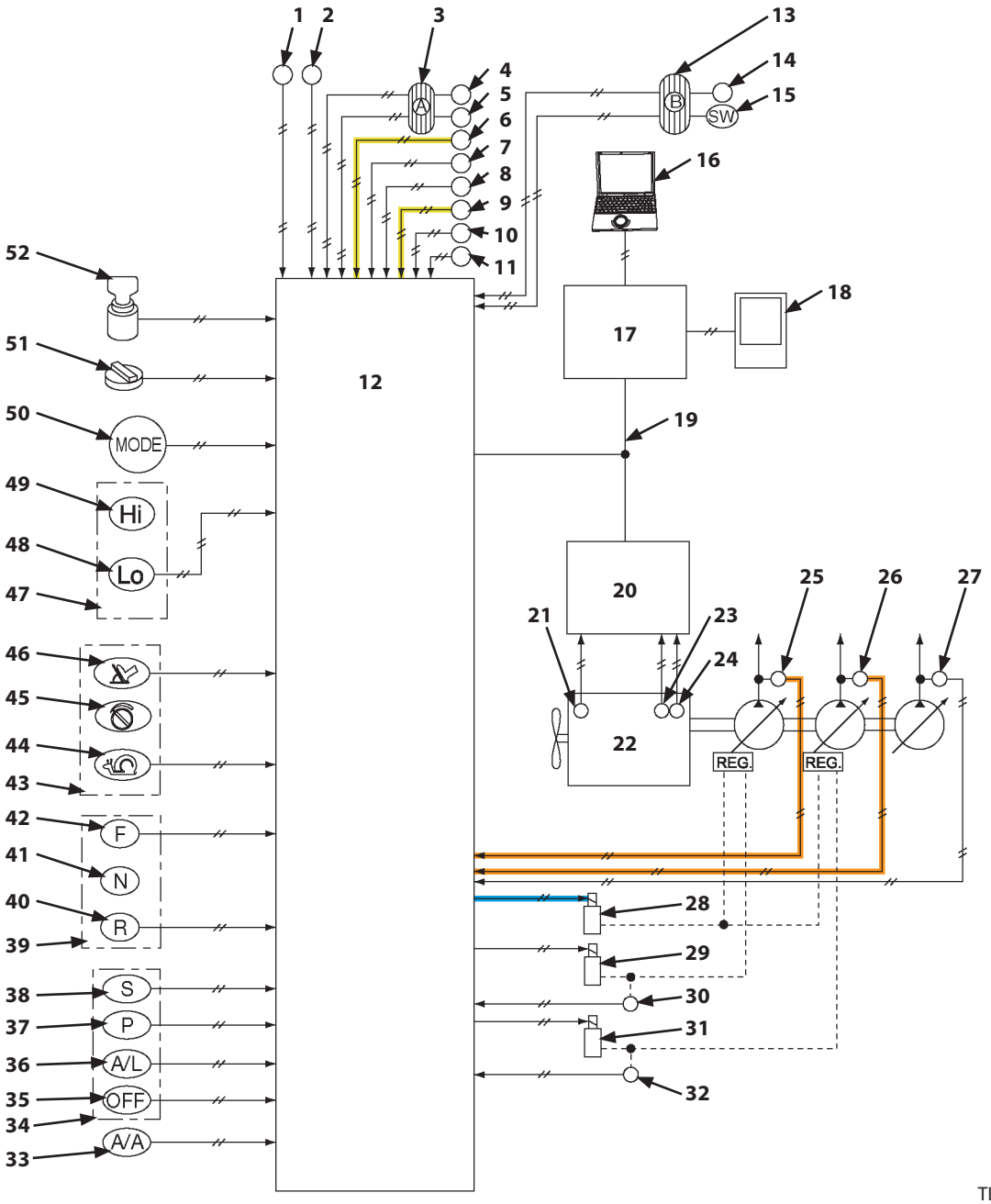
TLAA-02-02-018

12- MC1 16- CAN 17- ECM 19- Engine



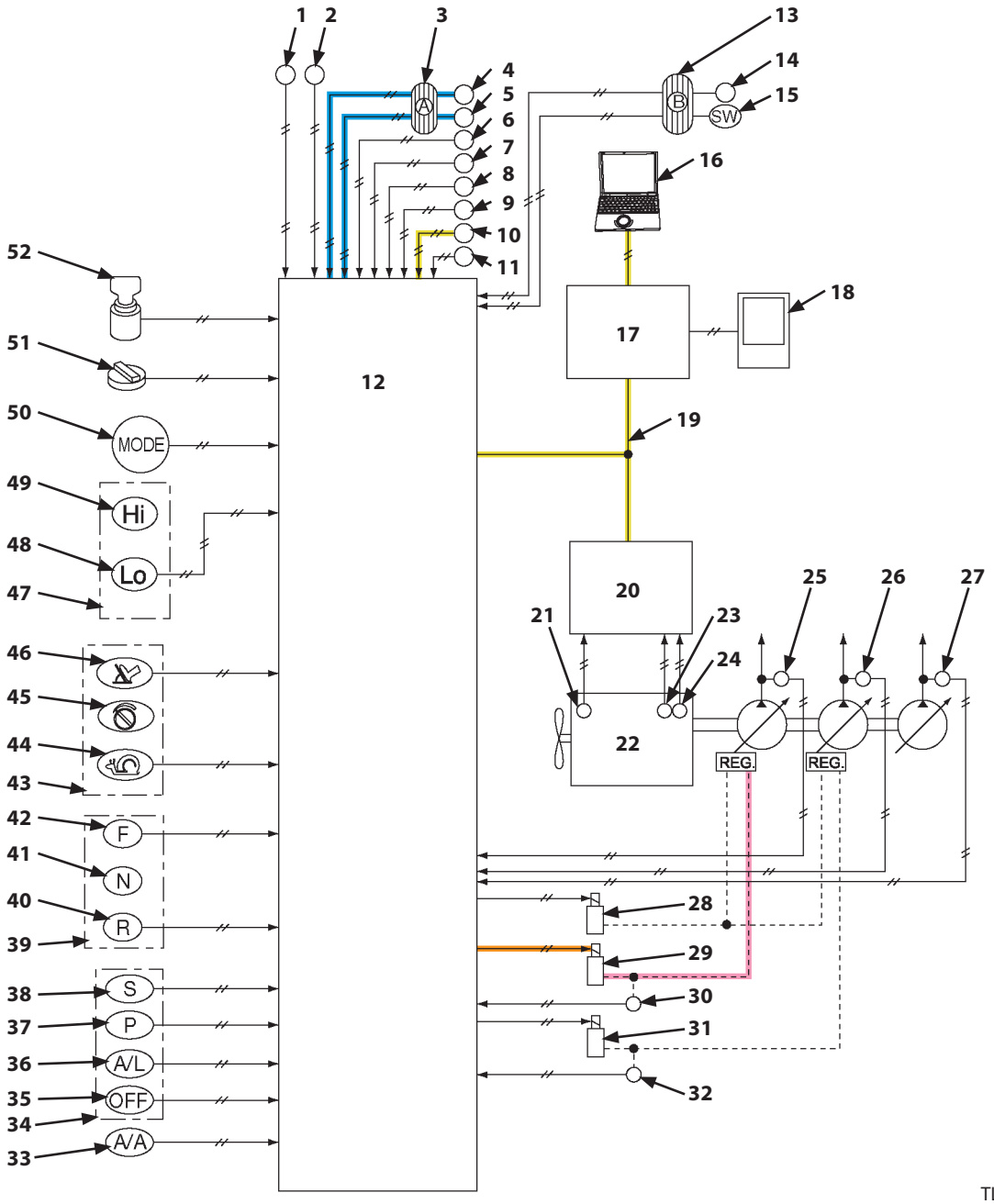
TLAA-02-02-102

4- Pressure Sensor (Travel Forward)
5- Pressure Sensor (Travel Reverse)
12- MC1
14- Brake Pressure Sensor
15- Work Brake Release Switch
19- CAN
20- ECM
22- Engine
23- Cam Angle Sensor
24- Crank Speed Sensor
25- Pump 2 Delivery Pressure Sensor
26- Pump 1 Delivery Pressure Sensor
28- Torque Control Solenoid Valve
34- Brake Switch
38- Work Brake Position
39- FNR Switch
40- Reverse Position
41- Neutral Position
51- Engine Control Dial



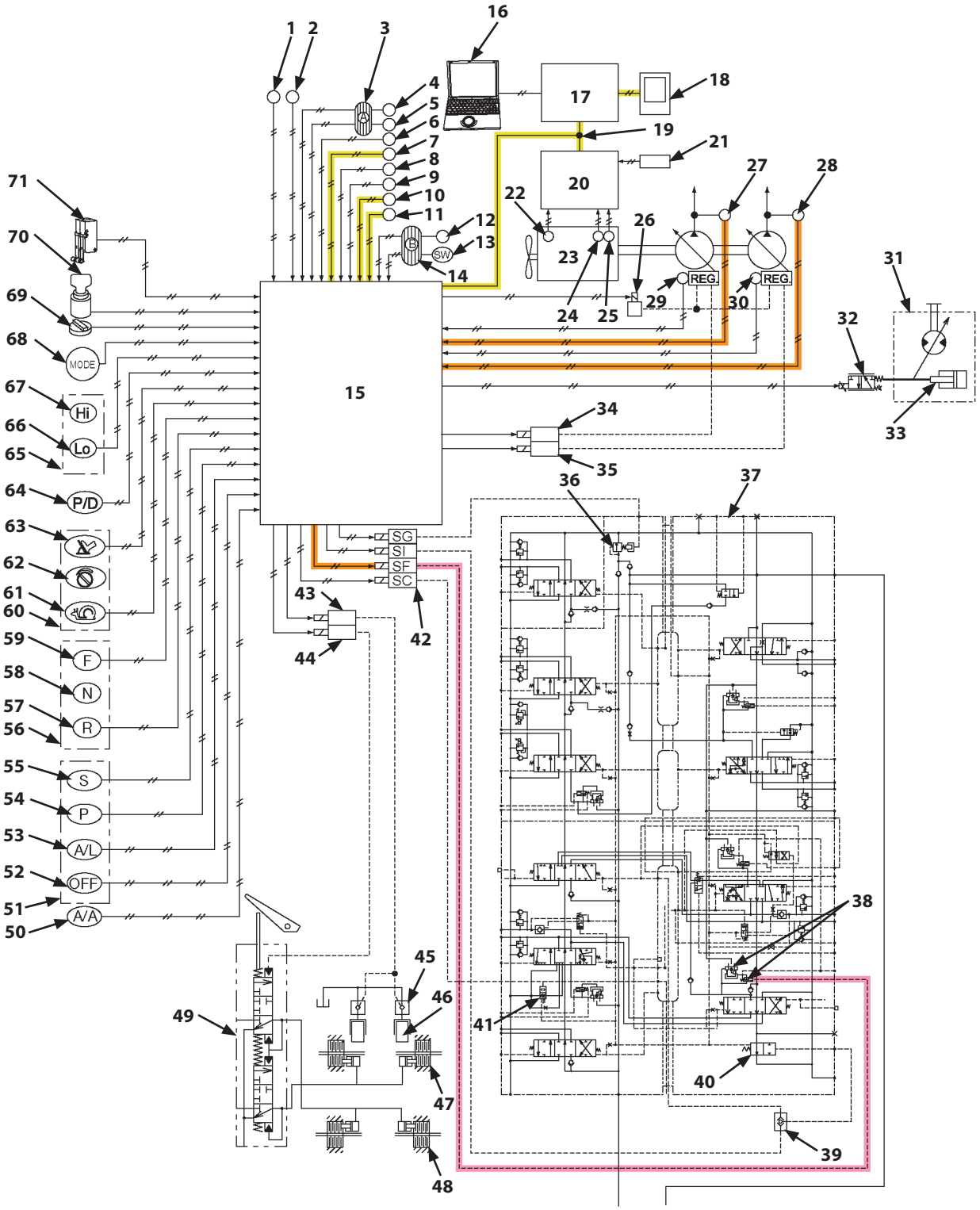
TLAA-02-02-107

6- Pressure Sensor (Boom Raise)
9- Pressure Sensor (Swing)
12- MC1
25- Pump 2 Delivery Pressure Sensor
26- Pump 1 Delivery Pressure Sensor
28- Torque Control Solenoid Valve



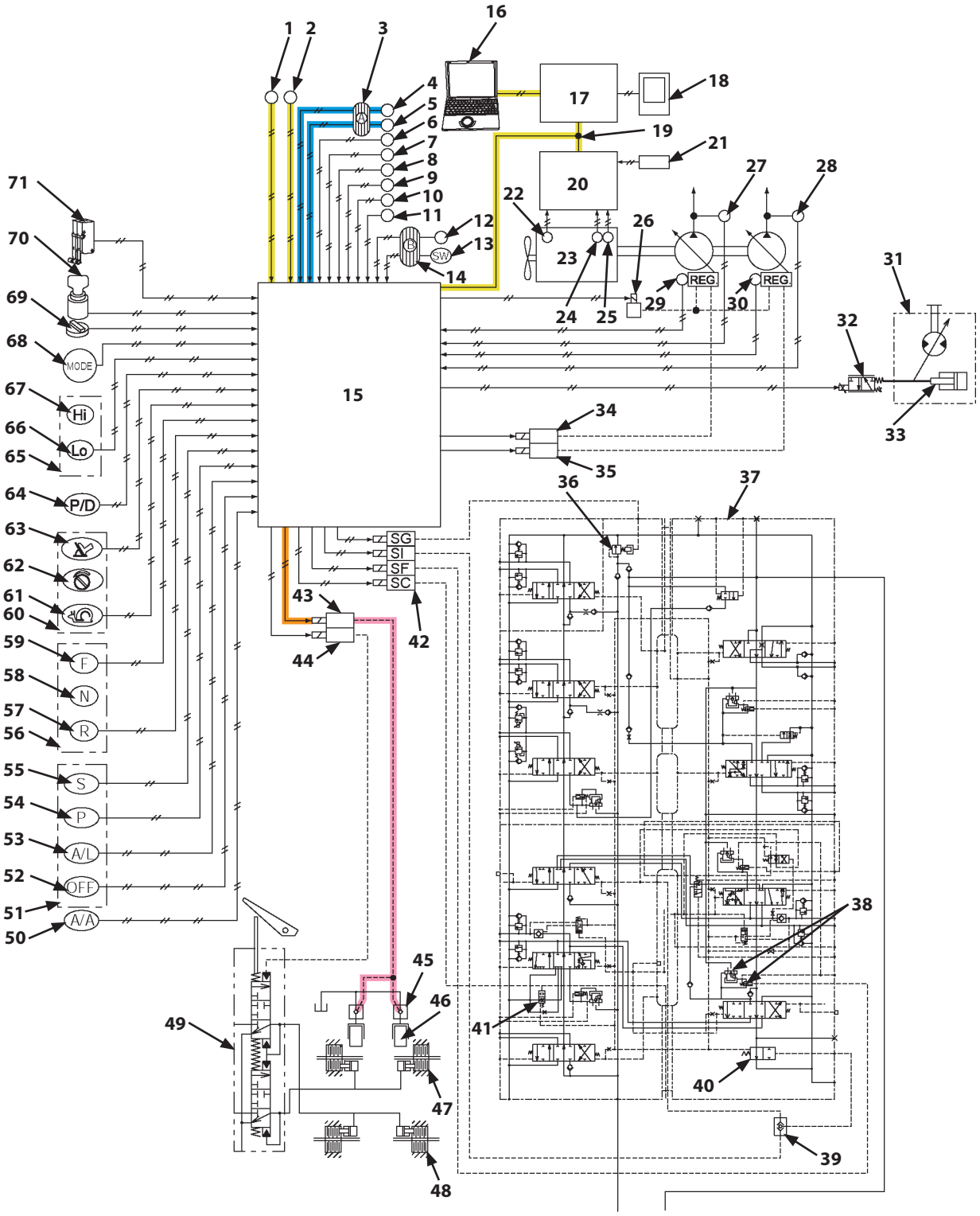
TLAA-02-02-112

3- Accelerator Pedal
10- Pressure Sensor (Auxiliary) (OP)
12- MC1
16- MPDr.
17- Monitor Controller
19- CAN
29- Maximum Pump 2 Flow Rate Limit Control Solenoid Valve



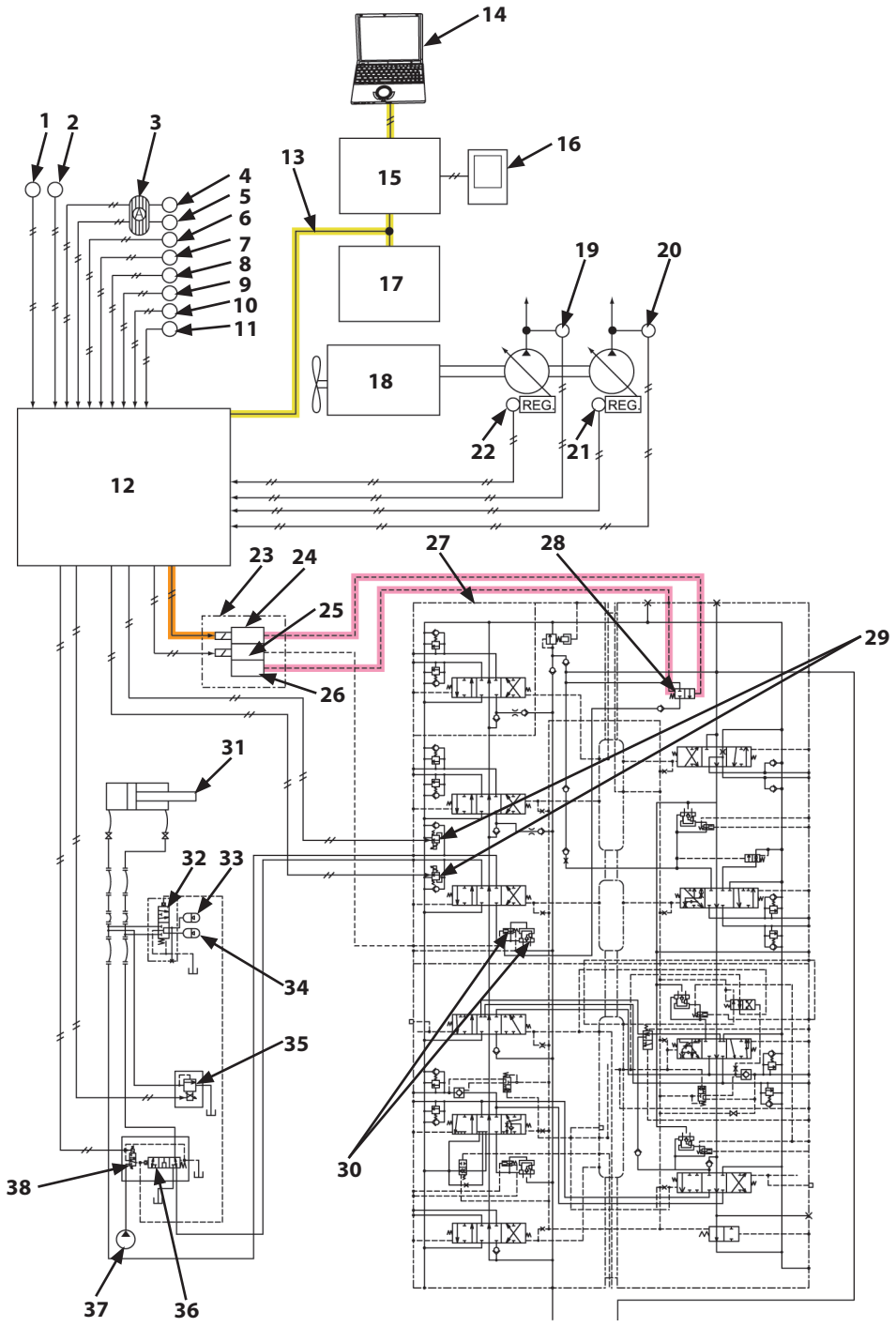
TLAA-02-02-205

7- Pressure Sensor (Arm Roll-In)
10- Pressure Sensor (Auxiliary)
11- Pressure Sensor (Arm Roll-Out) (OP)
15- MC1
17- Monitor Controller
18- Monitor
27- Pump 2 Delivery Pressure Sensor
28- Pump 1 Delivery Pressure Sensor
38- Arm 2 Flow Rate Control Valve
42- 4-Spool Solenoid Valve Unit



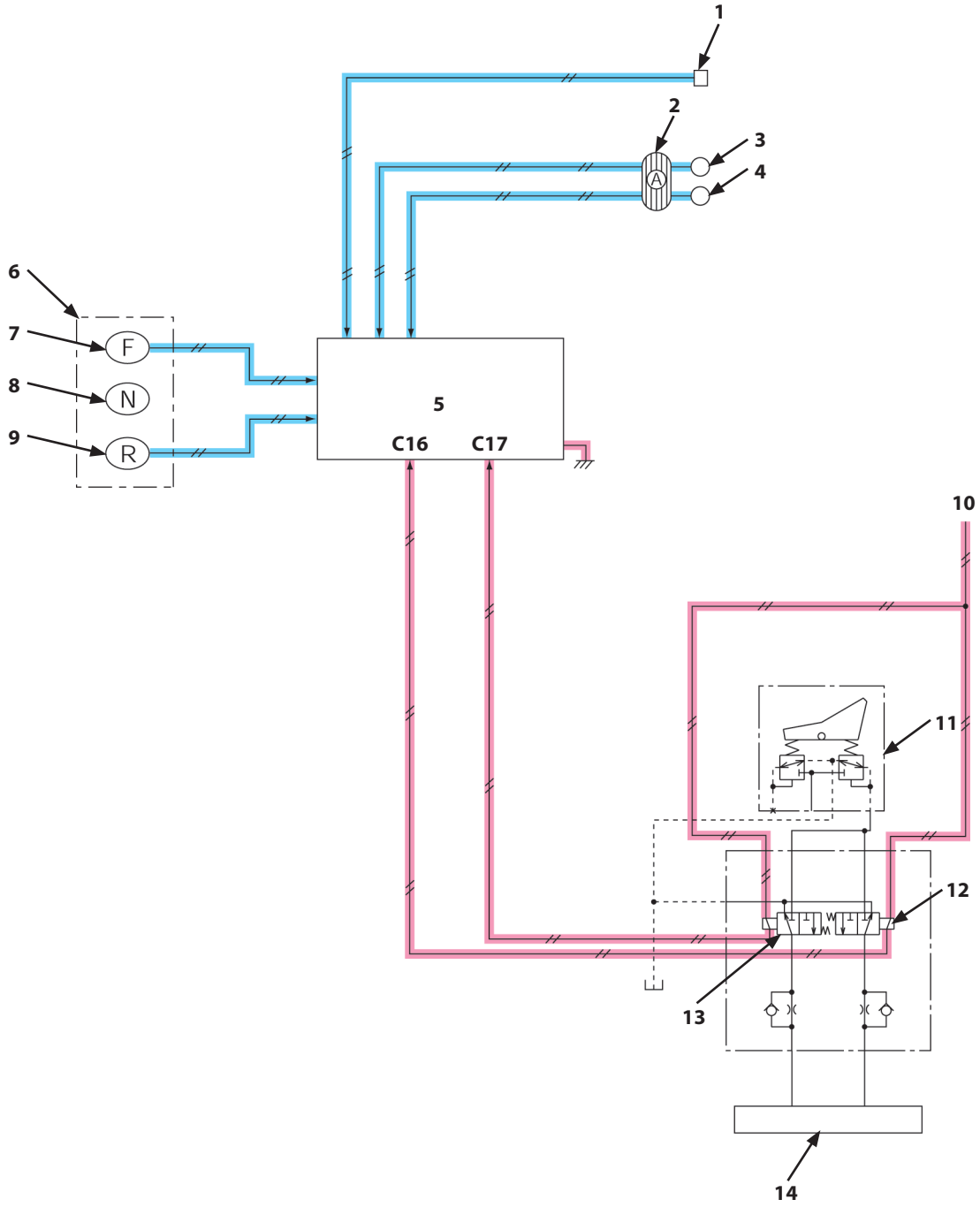
TLAA-02-02-210

2- Travel N Sensor
3- Accelerator Pedal
4- Pressure Sensor (Travel Forward)
5- Pressure Sensor (Travel Reverse)
15- MC1
16- MPDr.
19- CAN
43- Axle Lock Solenoid Valve
45- Operate Check Valve
46- Axle Lock Cylinder
50- Auto Axle Lock Switch
51- Brake Switch
52- OFF Position



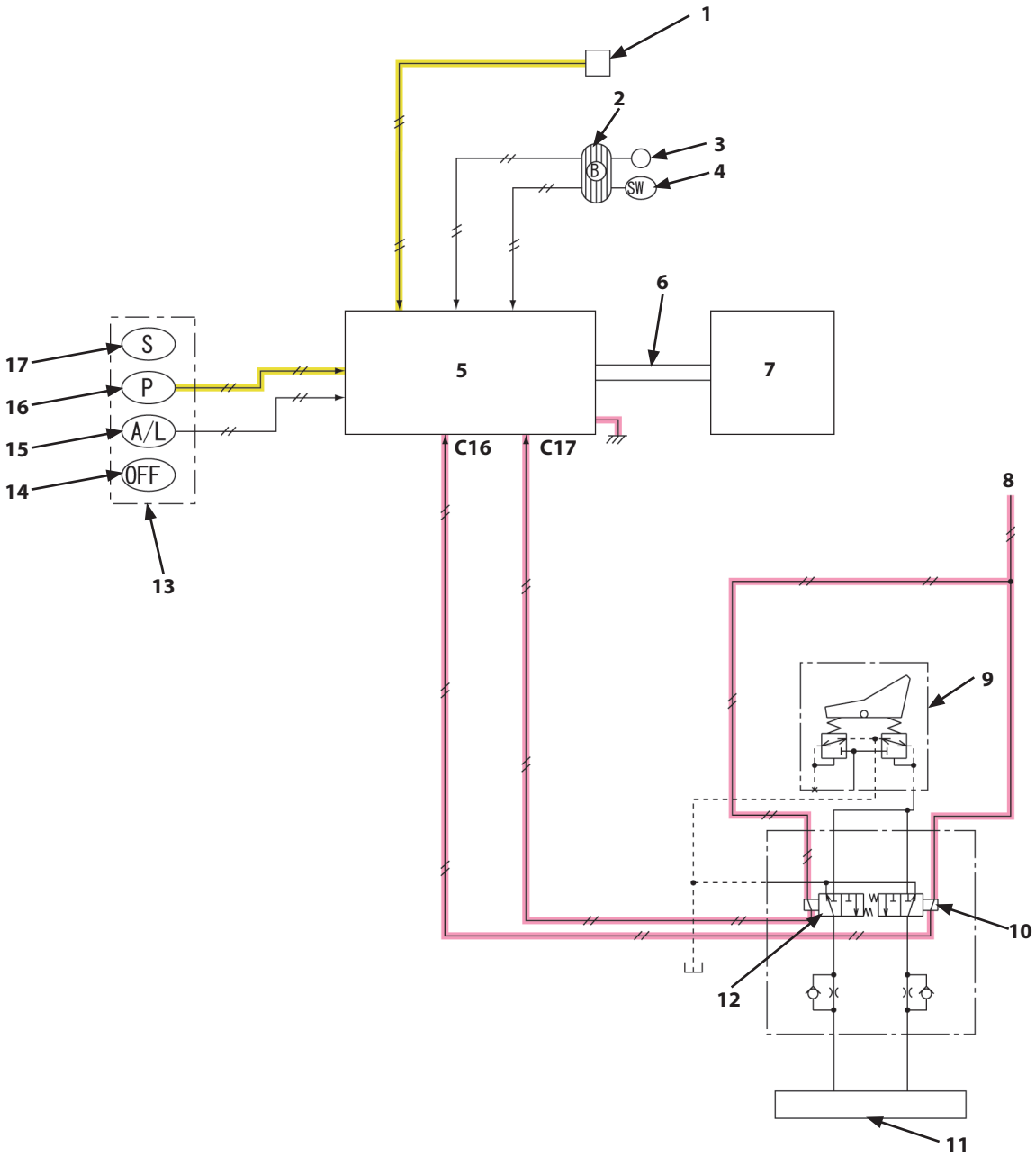
TLAA-02-02-303

12- MC1
13- CAN
14- MPDr.
15- Monitor Controller
24- Auxiliary Flow Combiner Control Solenoid Valve
26- Pressure Reducing Valve
28- Auxiliary Flow Combiner Valve



TLAA-02-02-402

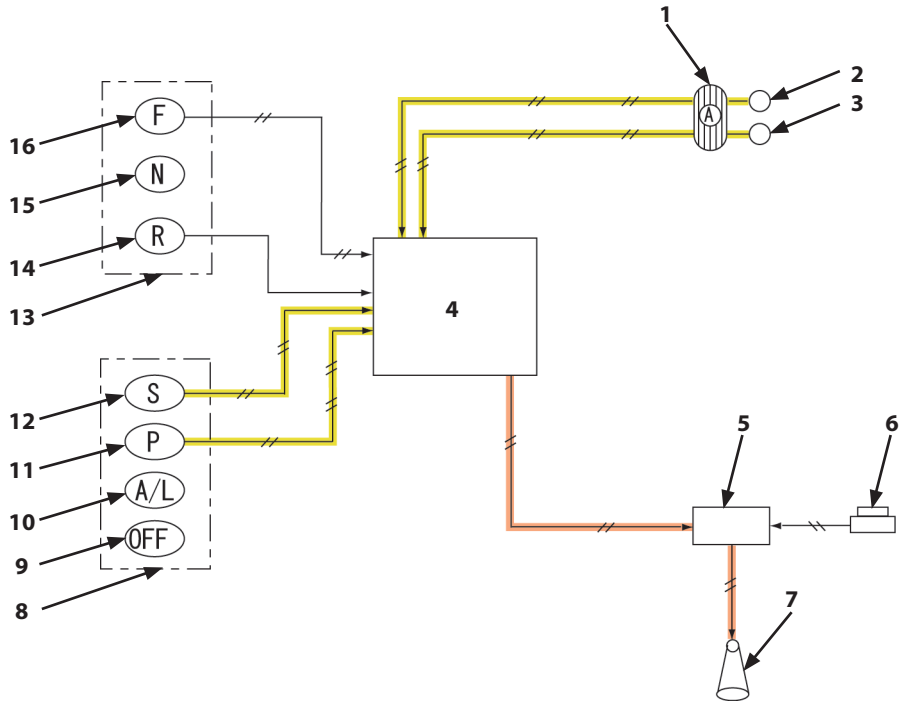
1- Travel N Sensor
2- Accelerator Pedal
3- Pressure Sensor (Travel Forward)
4- Pressure Sensor (Travel Reverse)
5- MC1
6- FNR Switch
7- Forward Position
8- Neutral Position
9- Reverse Position
10- From Fuse #29
11- Travel Pilot Valve
12- Travel Forward Pi Cut Solenoid Valve
13- Travel Reverse Pi Cut Solenoid Valve
14- Signal Control Valve



TLAA-02-02-407

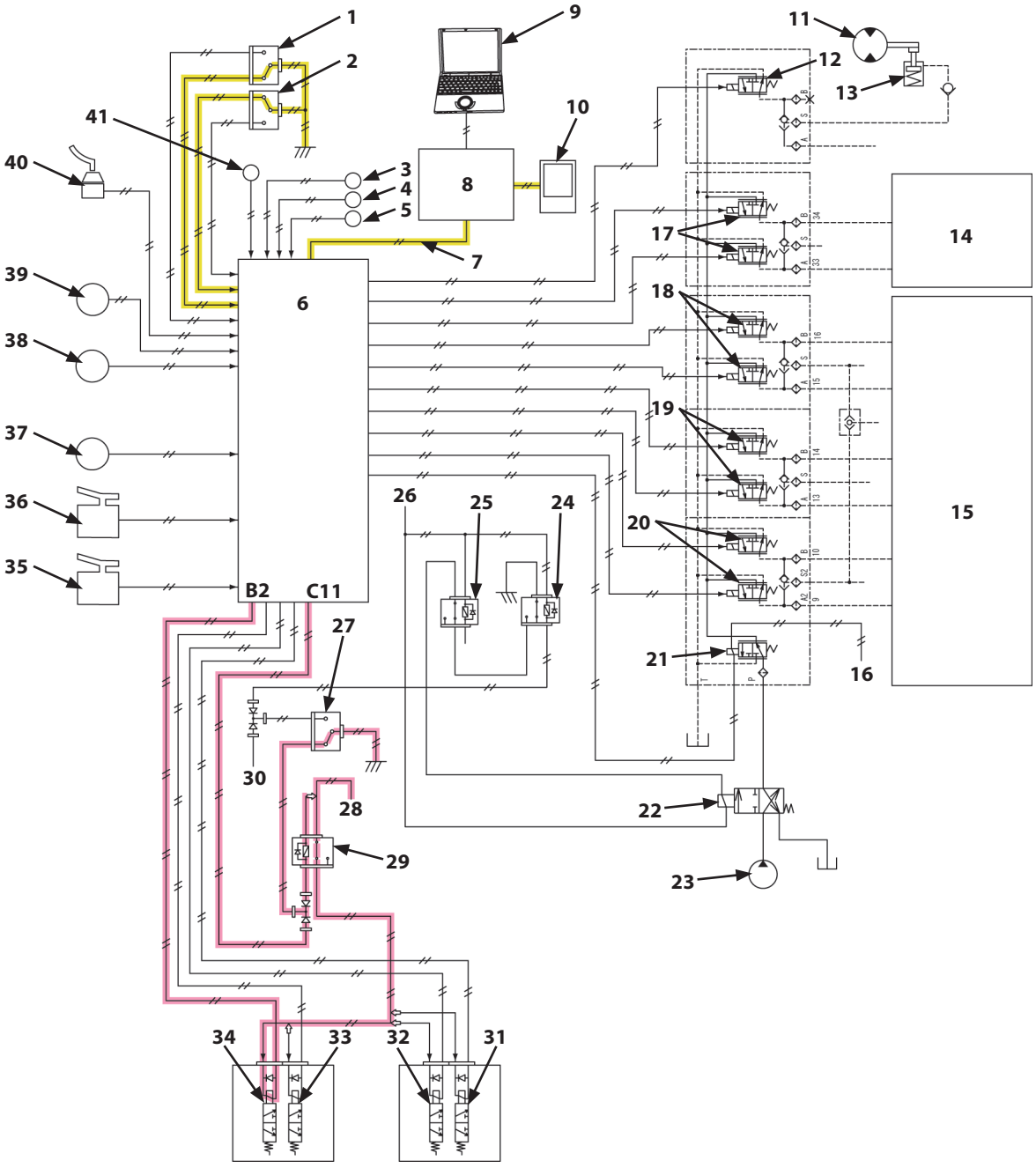
NOTE: The illustration shows the operation when the switch is in the following position. Brake Switch (13): Parking brake position (16)

1- Travel N Sensor
2- Brake Pedal
3- Brake Pressure Sensor
4- Work Brake Release Switch
5- MC1
6- CAN
7- ECM
8- From Fuse #29
9- Travel Pilot Valve
10- Travel Forward Pi Cut Solenoid Valve
11- Signal Control Valve
12- Travel Reverse Pi Cut Solenoid Valve
13- Brake Switch
14- OFF Position
15- Axle Lock Position
16- Parking Brake Position
17- Work Brake Position



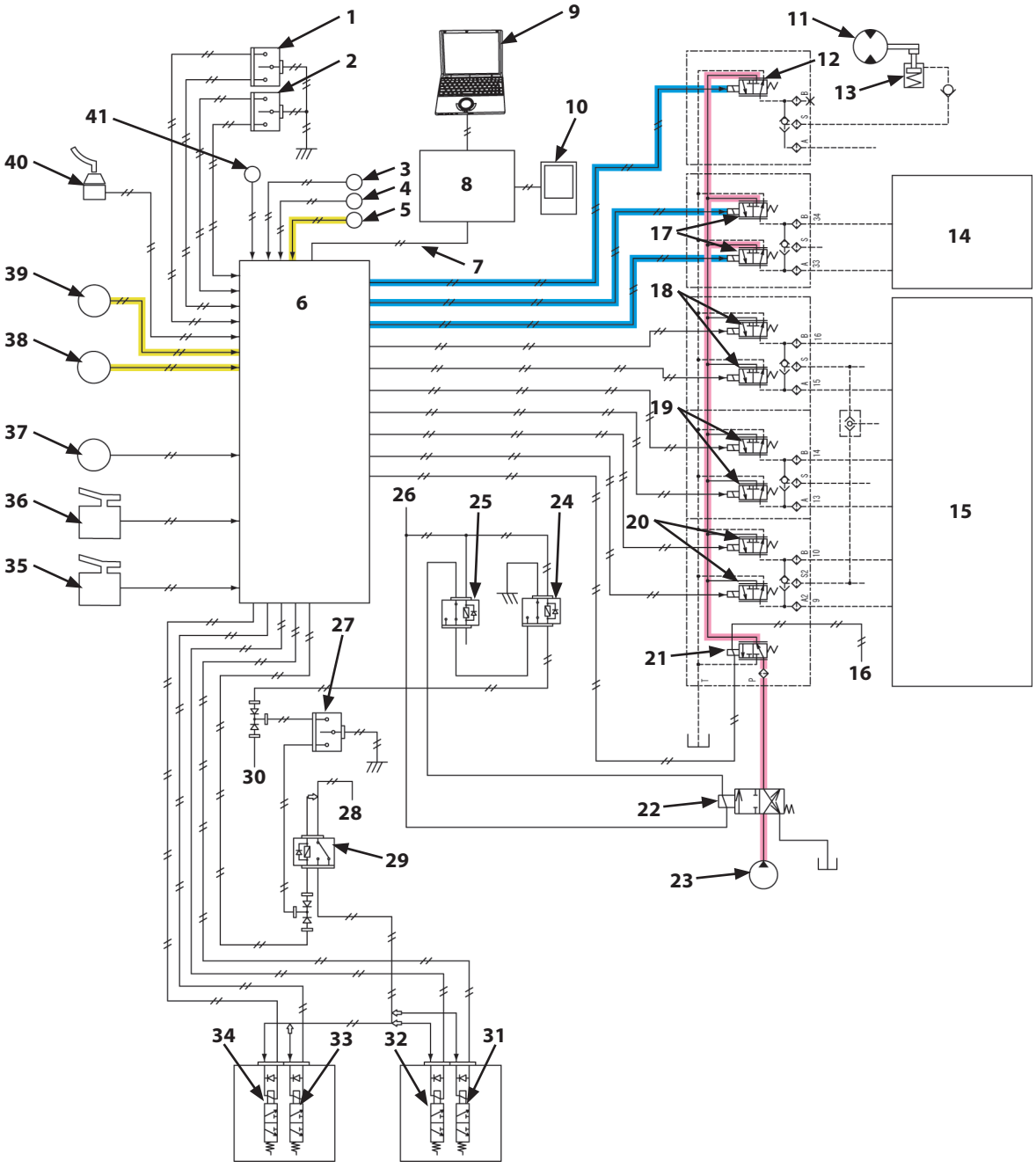
TLAA-02-02-410

1- Accelerator Pedal
2- Pressure Sensor (Travel Forward)
3- Pressure Sensor (Travel Reverse)
4- MC1
5- Travel Alarm Device (OP)
6- Buzzer Deactivation Switch (OP)
7- Buzzer (OP)
8- Brake Switch
9- OFF Position
10- Axle Lock Position
11- Parking Brake Position
12- Work Brake Position
13- FNR Switch
14- Reverse Position
15- Neutral Position
16- Forward Position



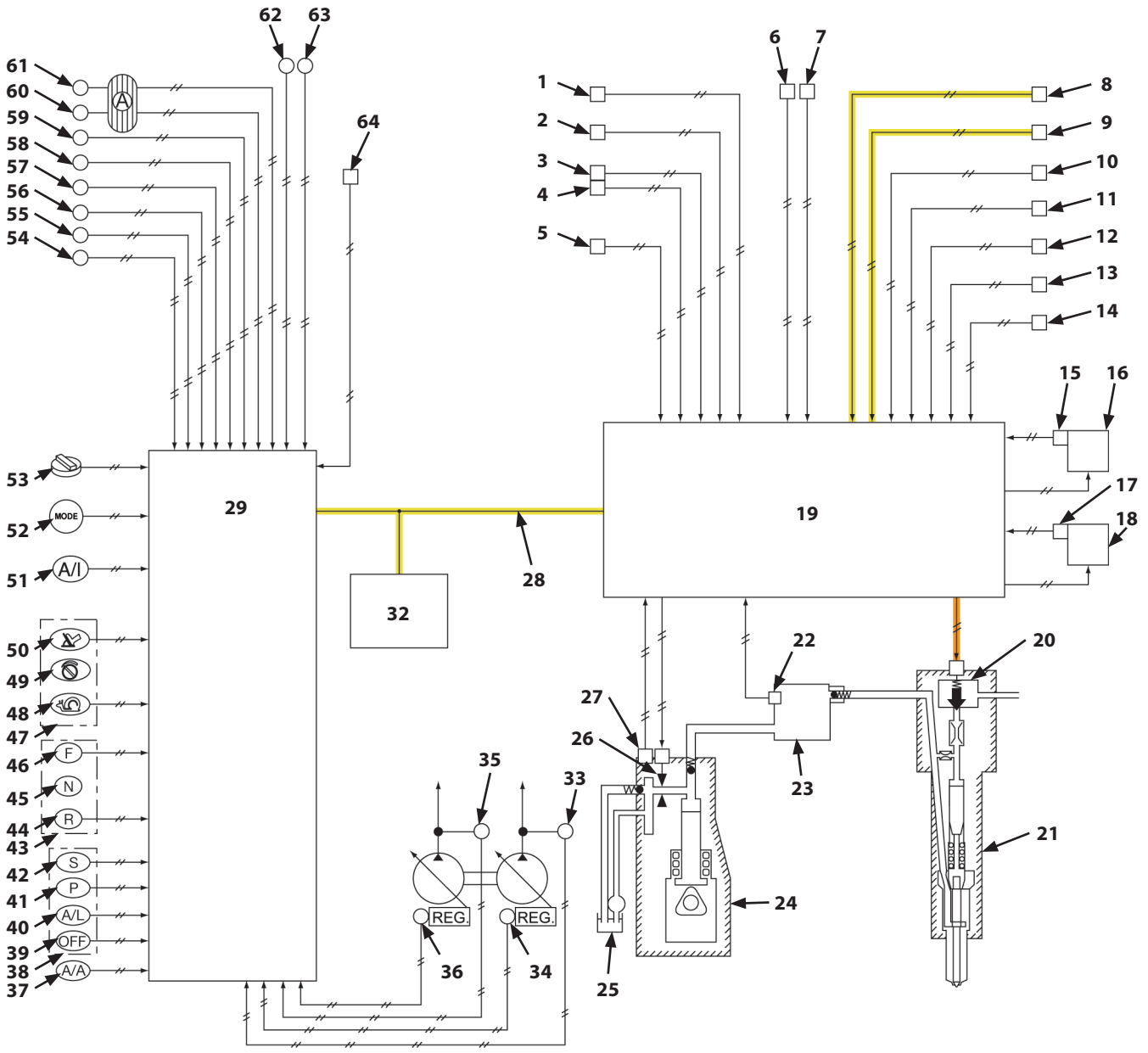
TLAA-02-02-504

1- Outrigger Left-Right Selection Switch
2- Outrigger Front-Rear Selection Switch
6- MC2
7- CAN
8- Monitor Controller
15- Control Valve
23- Pilot Pump
27- Blade/Outrigger Selector Switch
28- From Fuse #29
29- Blade/Outrigger Relay
40- Blade/Outrigger Lever



TLAA-02-02-513

5- Pressure Sensor (Assist)
6- MC2
12- Swing Parking Brake Release Solenoid Valve (only 220 W)
17- Assist Solenoid Valve
23- Pilot Pump
38- Assist Switch 2 (OP)
39- Assist Switch 1 (OP)

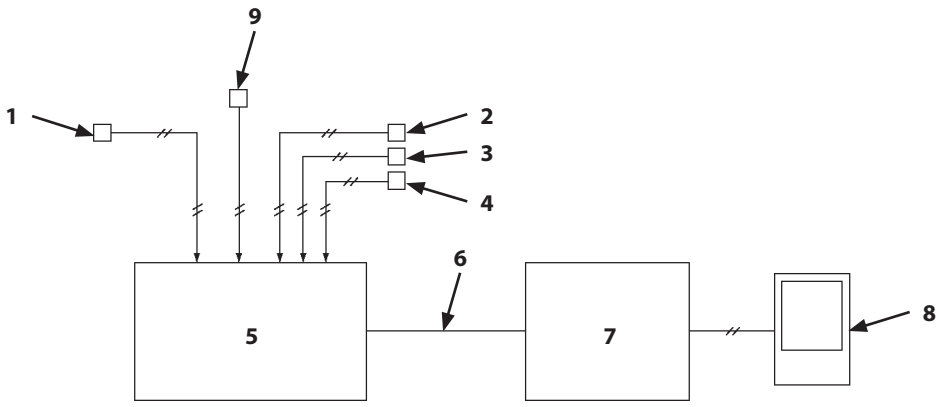


TLAA-02-03-001

Alarm Control

Operation:

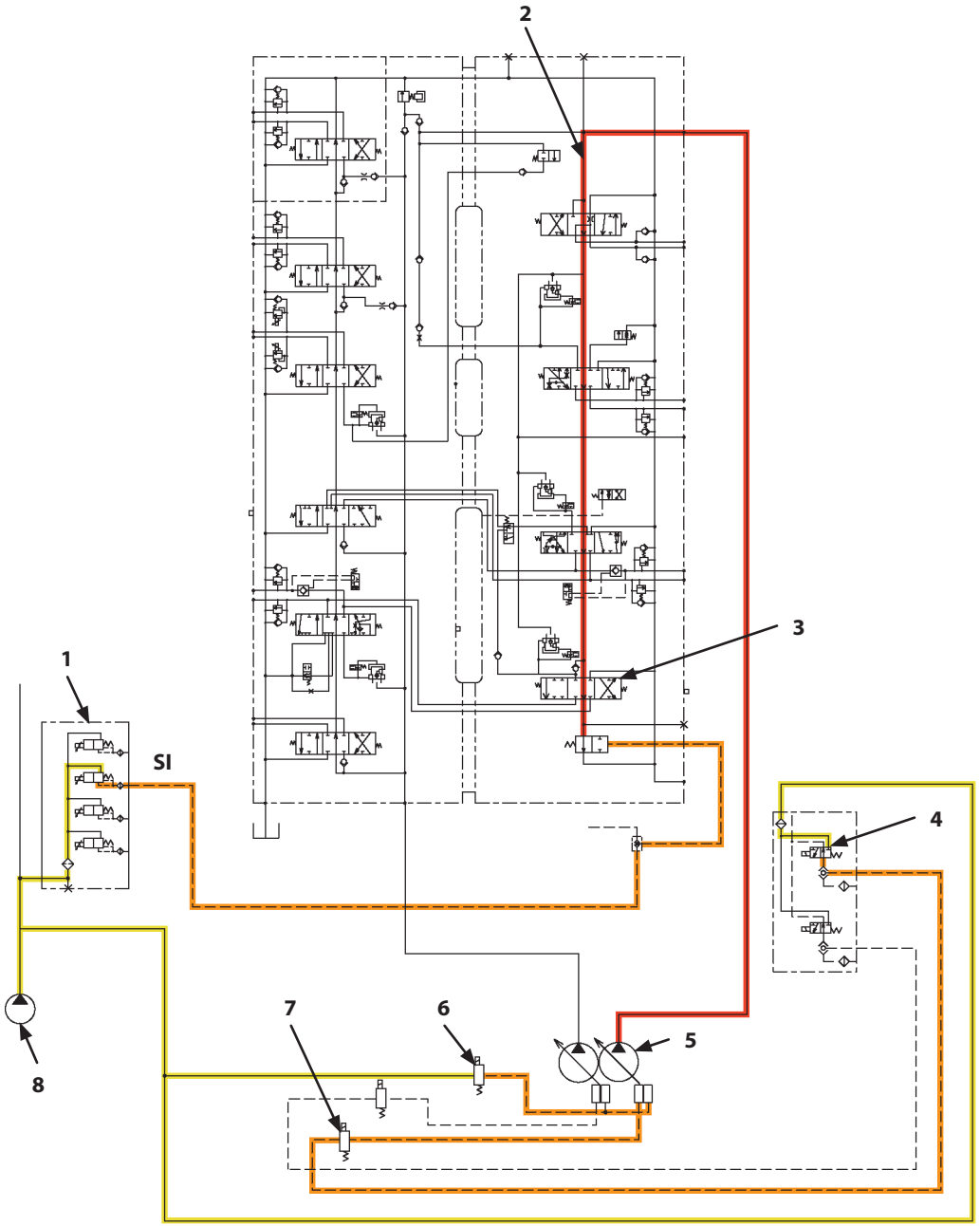
1. ECM (5) receives the signals from engine oil pressure sensor (3), boost temperature sensor (2), fuel temperature sensor (4), CSF exhaust temperature sensor (9), and fuel filter differential pressure sensor (1).
2. ECM (5) sends the signals to monitor controller (7) according to the signals from each sensor by using CAN communication (6).
3. Monitor controller (7) displays each alarm on monitor (8).



TDAA-02-03-035

1- Fuel Filter Differential Pressure Sensor
2- Boost Temperature Sensor
3- Engine Oil Pressure Sensor
4- Fuel Temperature Sensor
5- ECM
6- CAN
7- Monitor Controller
8- Monitor
9- CSF Exhaust Temperature Sensor

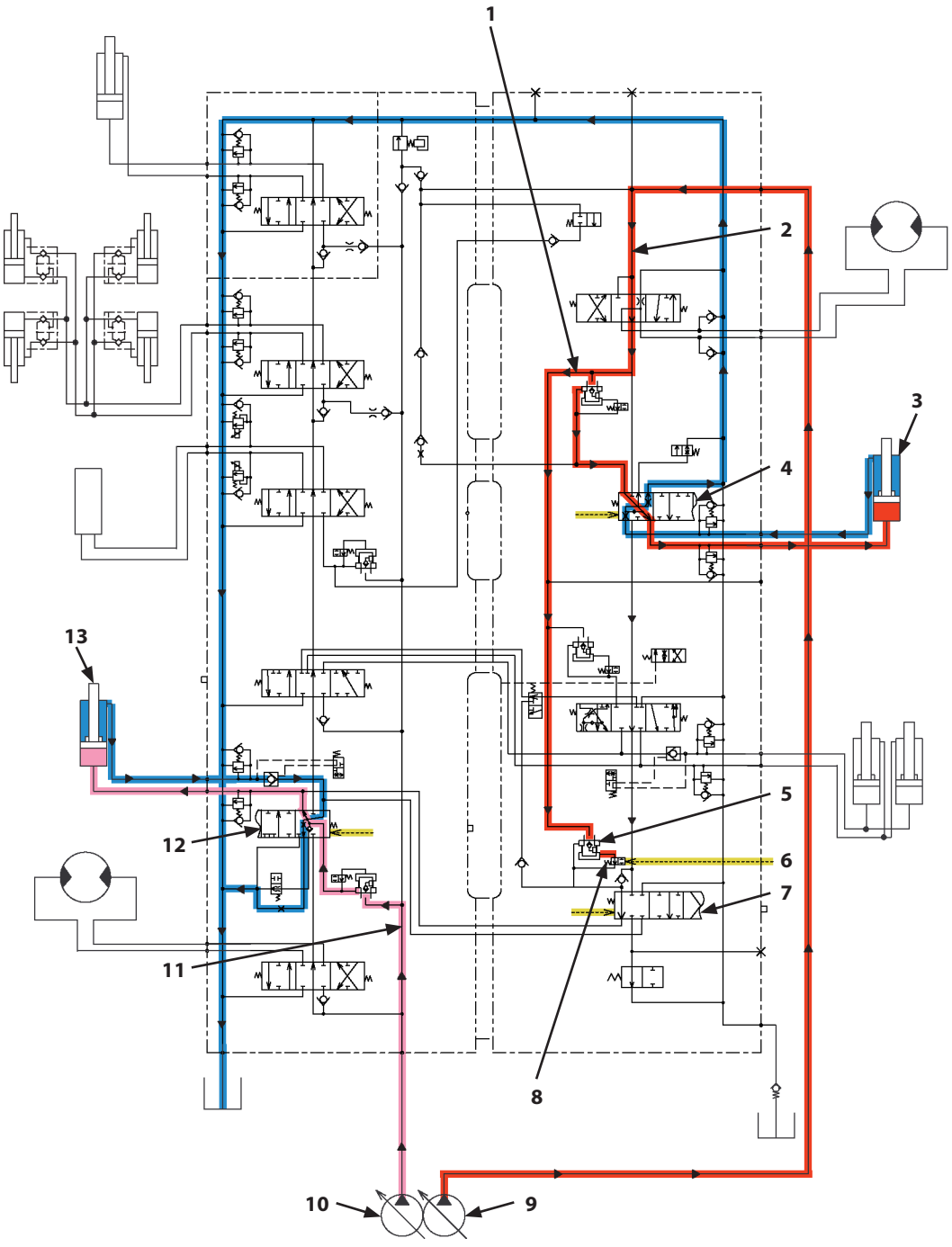
(Blank)



TLAA-02-04-005

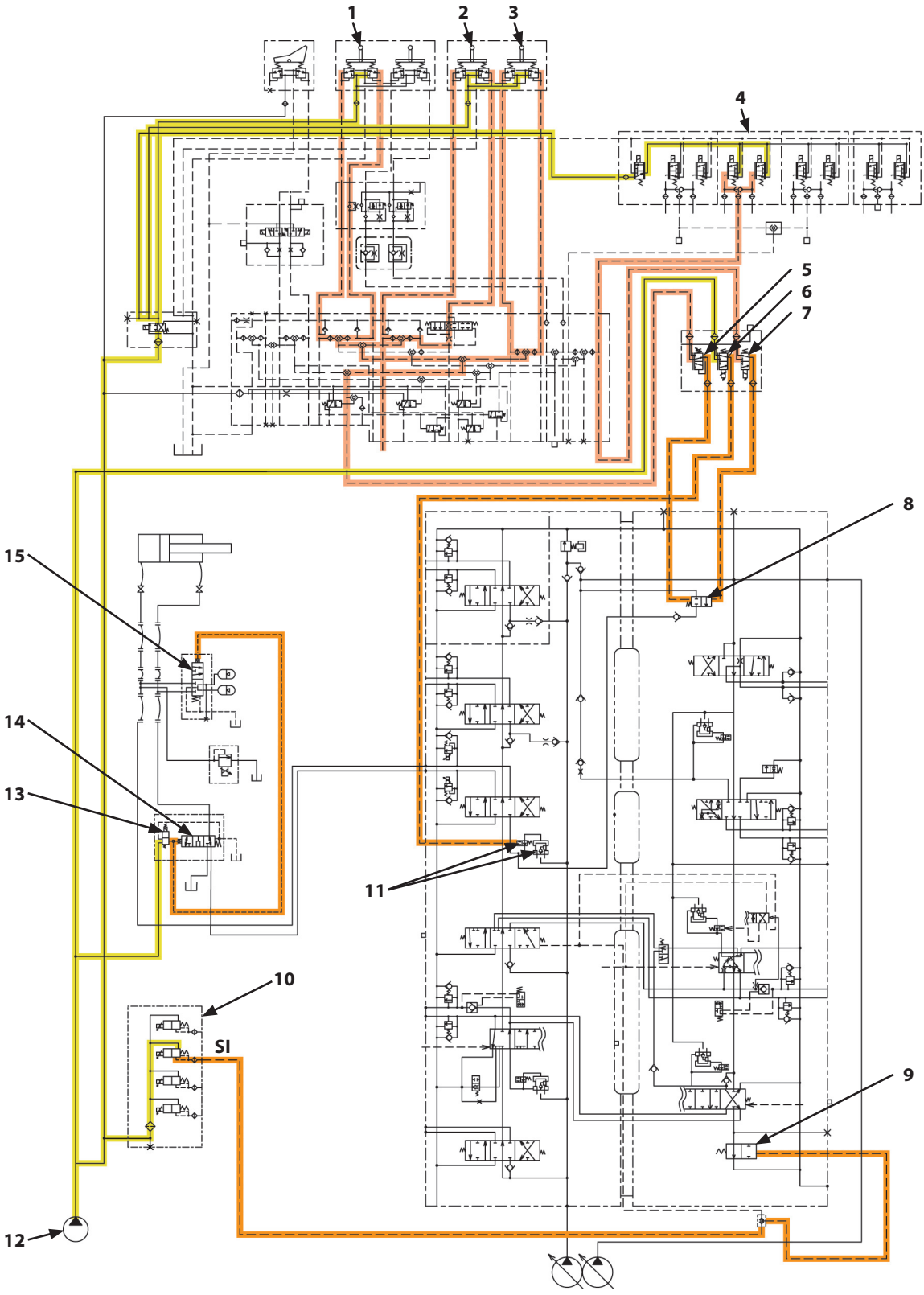
1- 4-Spool Solenoid Valve Unit
2- Neutral Circuit
3- Bypass Shut-Out Valve
4- Pump 1 Flow Rate Control Solenoid Valve
5- Pump 1
6- Torque Control Solenoid Valve
7- Maximum Pump 1 Flow Rate Limit Control Solenoid Valve
8- Pilot Pump

(Blank)



TLAA-02-04-015

1- Parallel Circuit (Pump 1)
2- Neutral Circuit (Pump 1)
3- Bucket Cylinder
4- Bucket Spool
5- Arm 2 Flow Rate Control Valve (Poppet Valve)
6- Pilot Pressure from 4-Spool Solenoid Valve Unit (SF)
7- Arm 2 Spool
8- Arm 2 Flow Rate Control Valve (Selector Valve)
9- Pump 1
10- Pump 2
11- Parallel Circuit (Pump 2)
12- Arm 1 Spool
13- Arm Cylinder



TLAA-02-04-020

Outline

The electrical circuit is broadly divided into the main circuit, monitor circuit, accessory circuit, lamplight circuit, and control circuit.

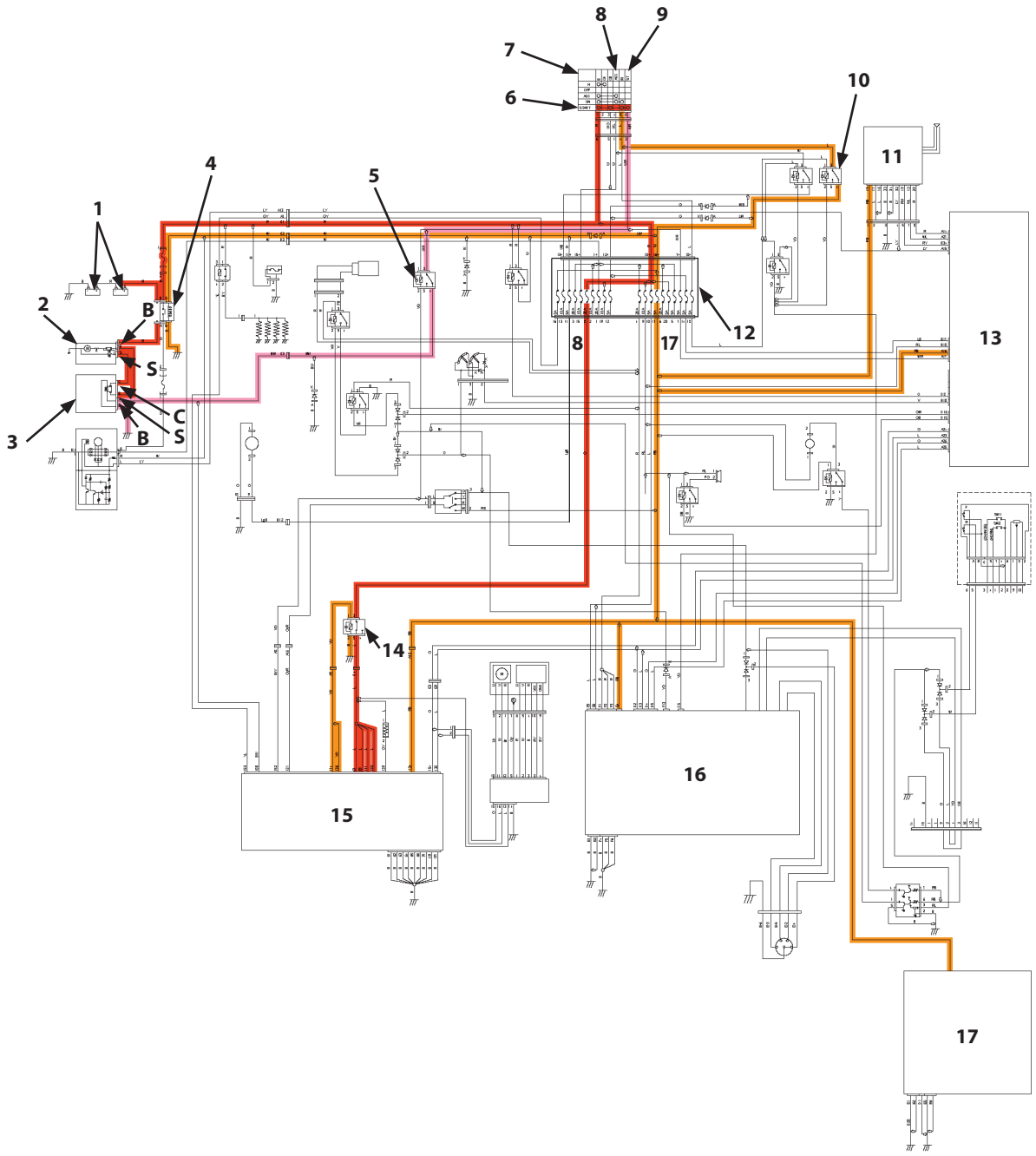
- Main Circuit:
  Operates the engine and the accessory related circuits.

- Monitor Circuit:
  Displays the machine operating conditions. Consists of monitor controller, monitor, relays, and switches.

- Accessory Circuit:
  Operates the accessory circuit. Consists of wiper/light controller, relays, and switches.

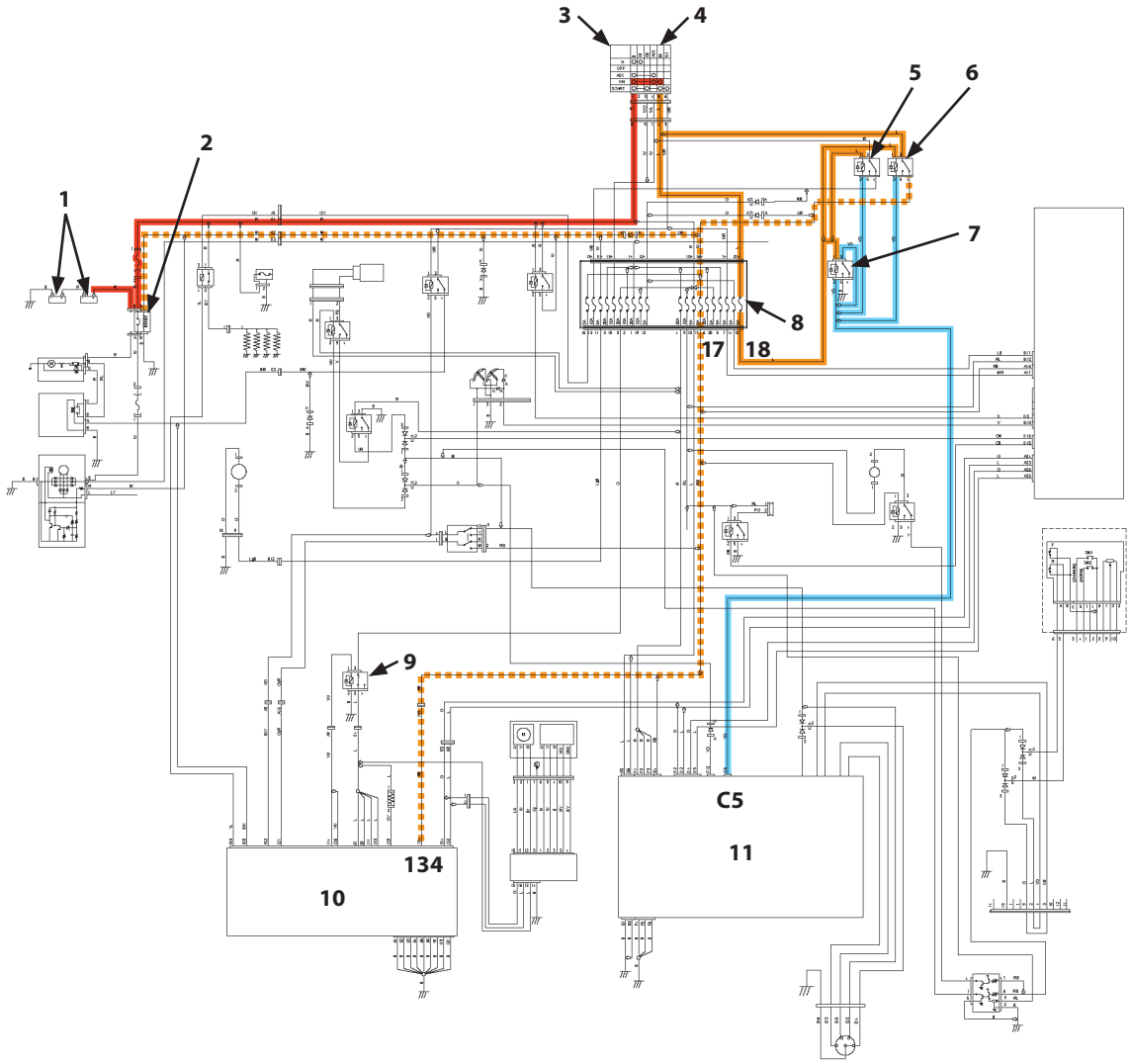
- Light Circuit:
  Uses for traveling and working (composed of head lights, work lights, turn signals, brake lights, and horn)

- Control Circuit:
  Controls the engine, pump, and valve. Consists of the actuators such as solenoid valves, MC1, MC2, ECM, sensors, and switches.
  (Refer to SYSTEM / Control System.)



TLAA-02-05-004

1- Battery
2- Starter
3- Starter Relay 1
4- Battery Relay
5- Starter Cut Relay
6- START Position
7- Key Switch
8- Terminal M
9- Terminal ST
10- Key Switch ON Cut Relay
11- GSM
12- Fuse Box 1
13- Monitor Controller
14- ECM Main Relay
15- ECM
16- MC1
17- MC2



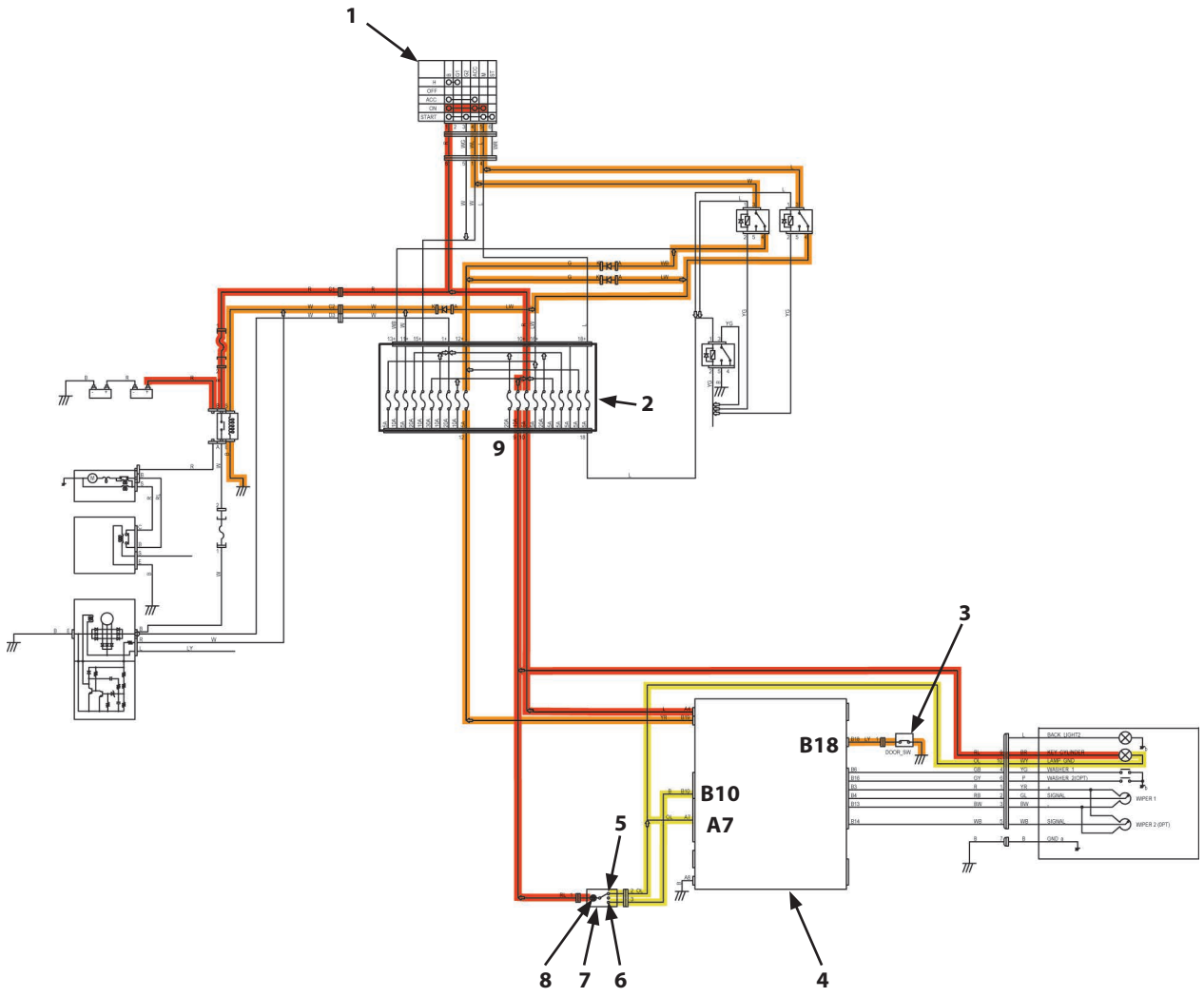
TLAA-02-05-008

1- Battery
2- Battery Relay
3- Key Switch
4- Terminal M
5- ACC Cut Relay
6- Key Switch ON Cut Relay
7- Auto Shut-Down Relay
8- Fuse Box 1
9- ECM Main Relay
10- ECM
11- MC1

Accessory Circuit

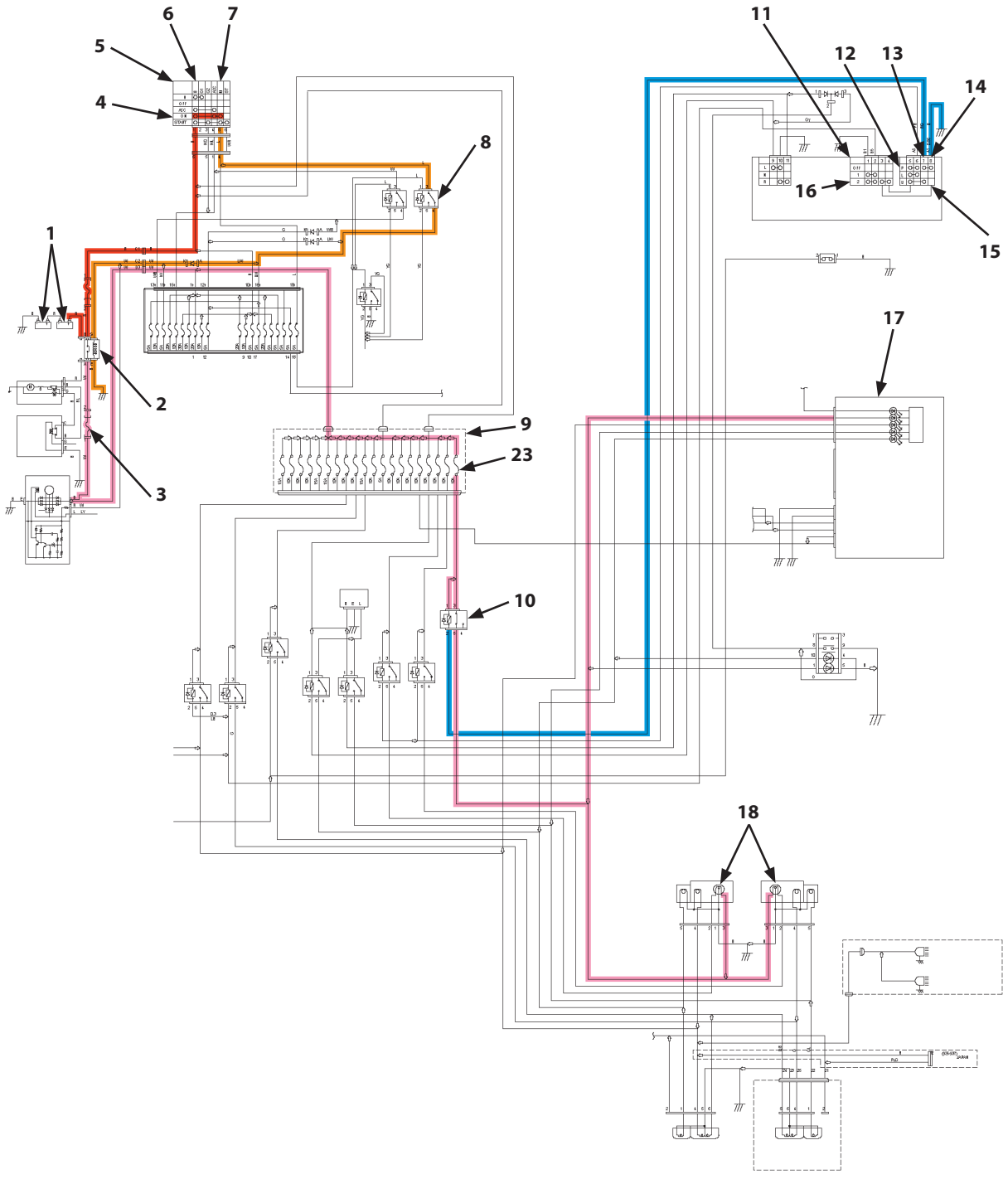
The major functions and circuits in the accessory circuit are as follows.

- Work Light Circuit:
  Turns on the work light (boom) and work light (cab) (optional).
  (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.



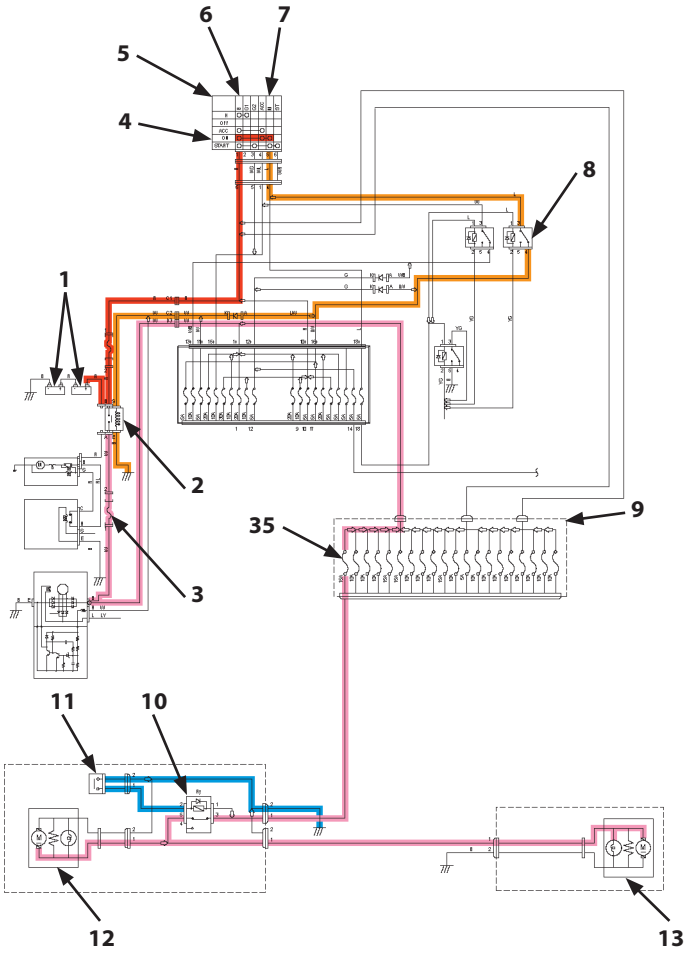
TDAA-02-05-016

1- Key Switch
2- Fuse Box
3- Door Open/Close Switch
4- Wiper/Light Controller
5- ON Position
6- Door Interlocking Position
7- Cab Light Switch
8- Cab Light



TLAA-02-05-016

1- Battery
2- Battery Relay
3- Fusible Link (65A)
4- ON Position
5- Key Switch
6- Terminal B
7- Terminal M
8- Key Switch ON Cut Relay
9- Fuse Box 2
10- High Beam Relay
11- Light Switch
12- P (Passing) Position
13- Terminal #7
14- Terminal #8
15- Dimmer Switch
16- 2 Position
17- Column Display
18- High Beam

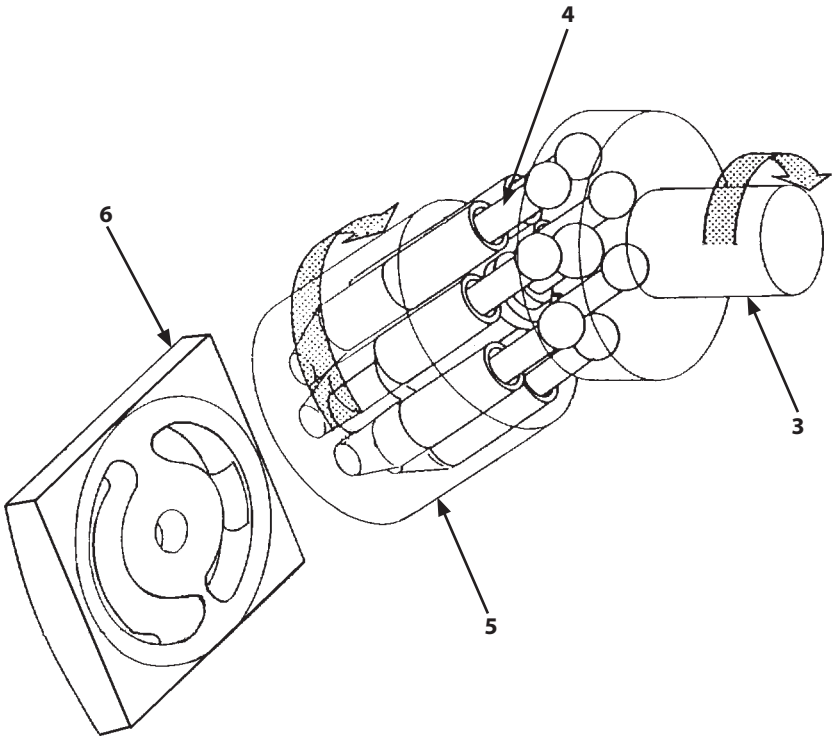


TLAA-02-05-021

1- Battery
2- Battery Relay
3- Fusible Link (65A)
4- ON Position
5- Key Switch
6- Terminal B
7- Terminal M
8- Key Switch ON Cut Relay
9- Fuse Box 2
10- Beacon Light Relay
11- Beacon Light Switch
12- Beacon Light (Cab)
13- Beacon Light (Counterweight)

Operational Principle

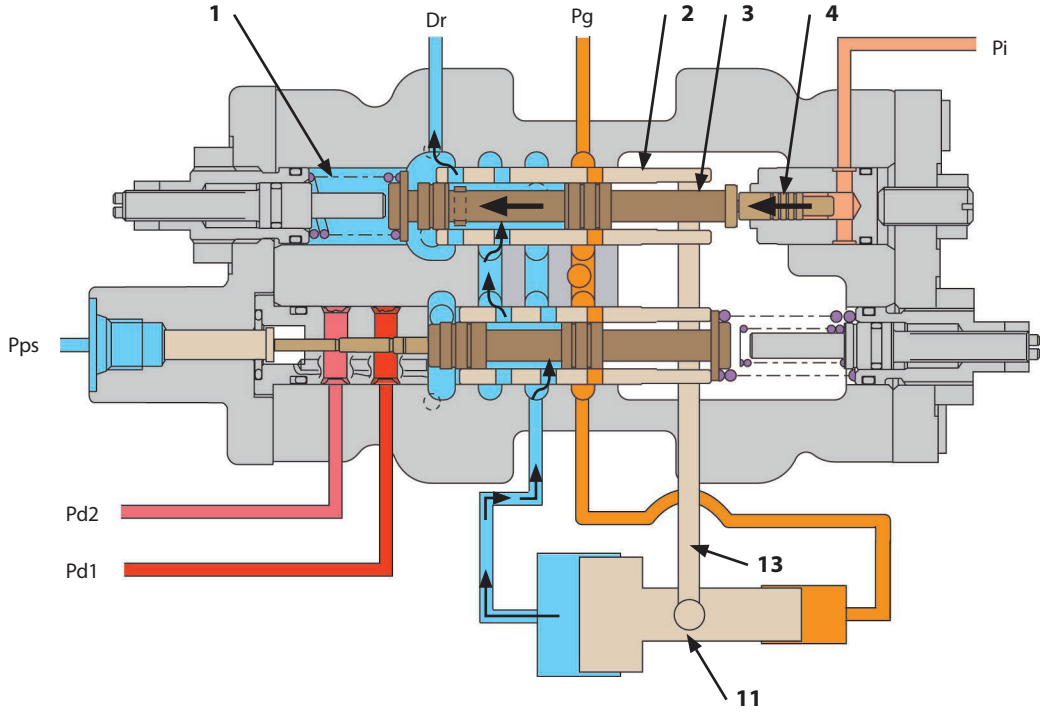
Engine torque is transferred to shaft (3) and seven plungers (4), and causes cylinder block (5) to rotate while sliding along the valve plate (6) surface. Plunger (4) reciprocates in the cylinder block (5) bore and alternately hydraulic oil is drawn and delivered.



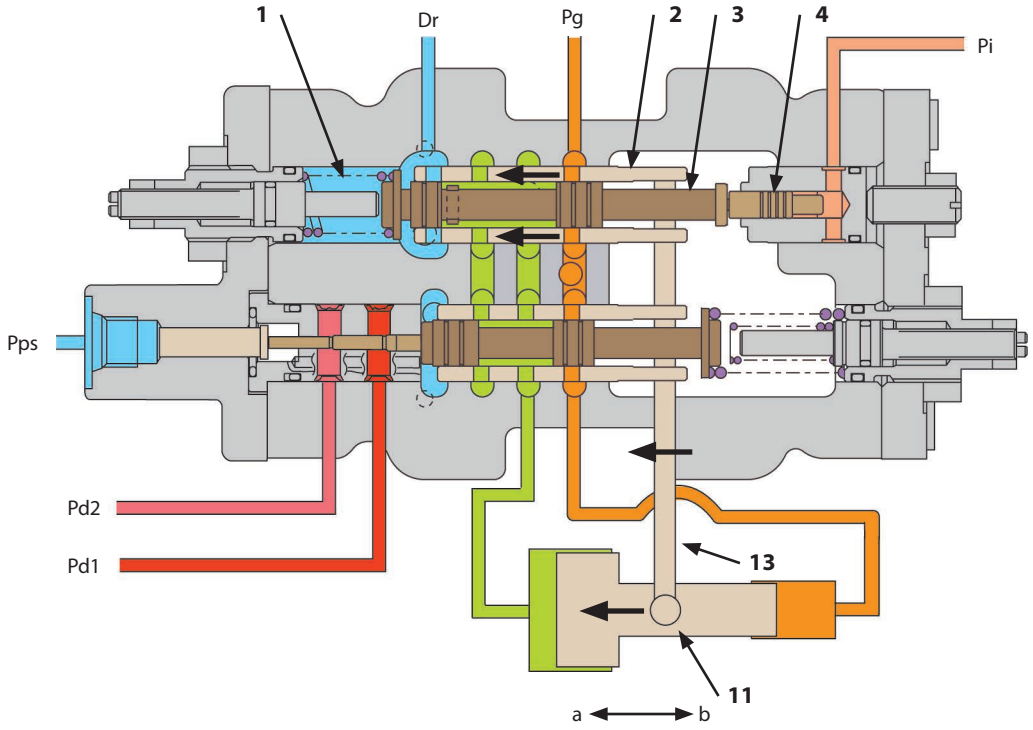
T105-02-03-002

3- Shaft
4- Plunger
5- Cylinder Block
6- Valve Plate

NOTE: The illustration shows the pump1 regulator.



TPPP-03-01-016



TPPP-03-01-017

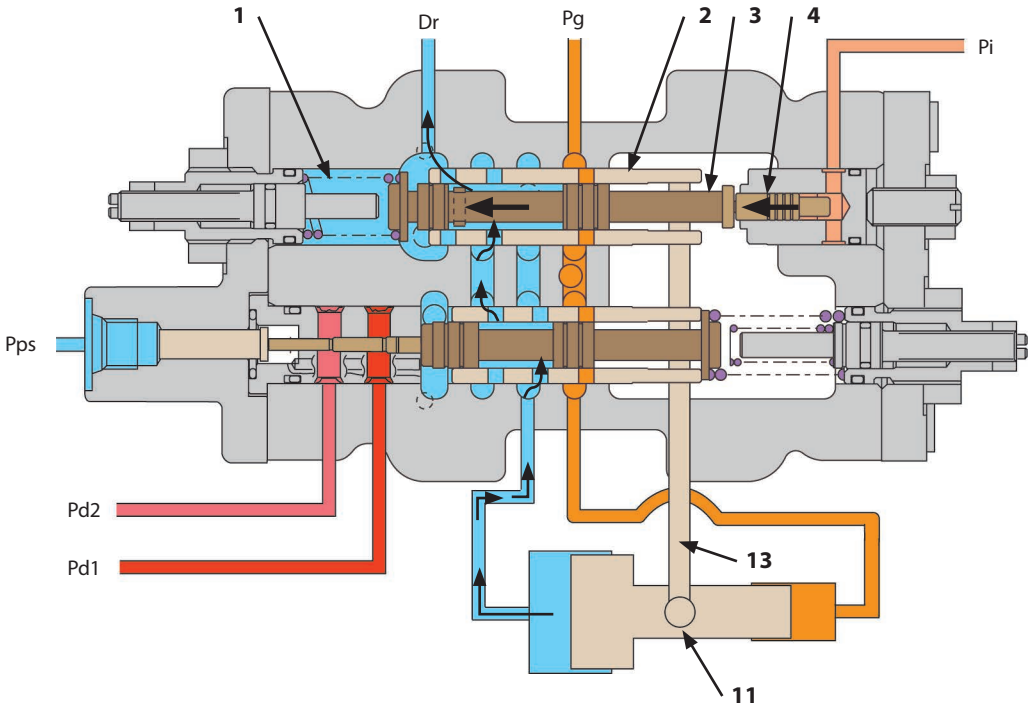
Pd1- Pump 1 Delivery Pressure
Pd2- Pump 2 Delivery Pressure

Dr- Returning to Hydraulic Oil Tank

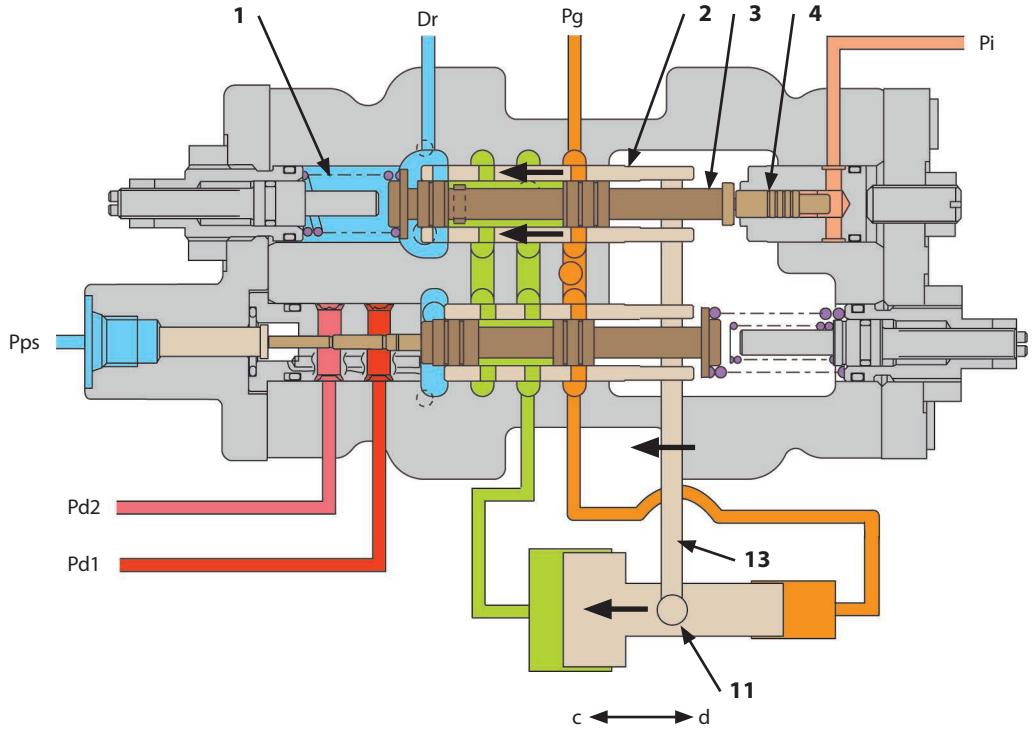
Pi- Pump Control Pressure
Pps- Torque Control Pressure

Pg- Primary Pliot Pressure (From Pilot Pump)

1- Spring
2- Sleeve A
3- Spool A
4- Piston
11- Servo Piston
13- Link



TPPP-03-01-024



TPPP-03-01-025

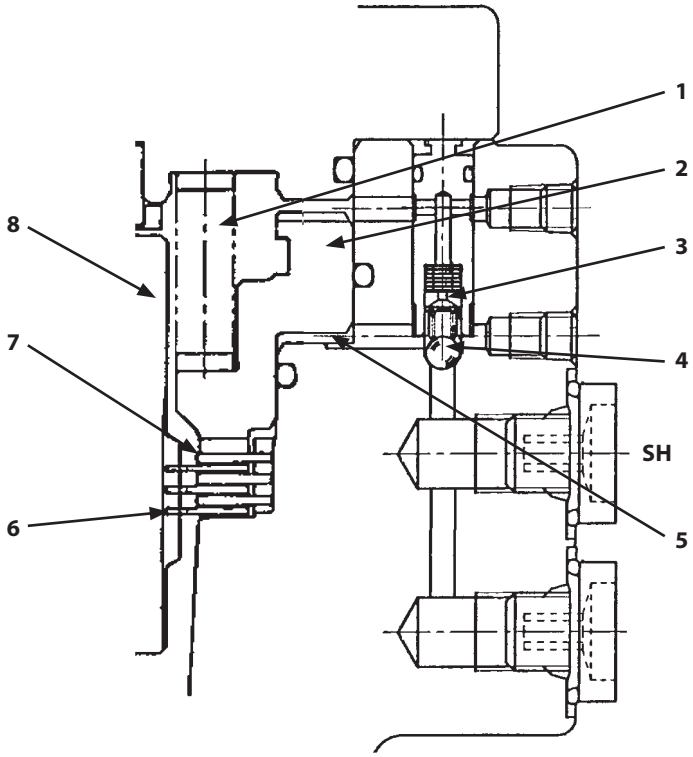
Pd1- Pump 1 Delivery Pressure
Pd2- Pump 2 Delivery Pressure

Dr- Returning to Hydraulic Oil Tank

Pi- Pump Control Pressure Regulated by Maximum Pump 2 Flow Rate Limit Control Solenoid Valve

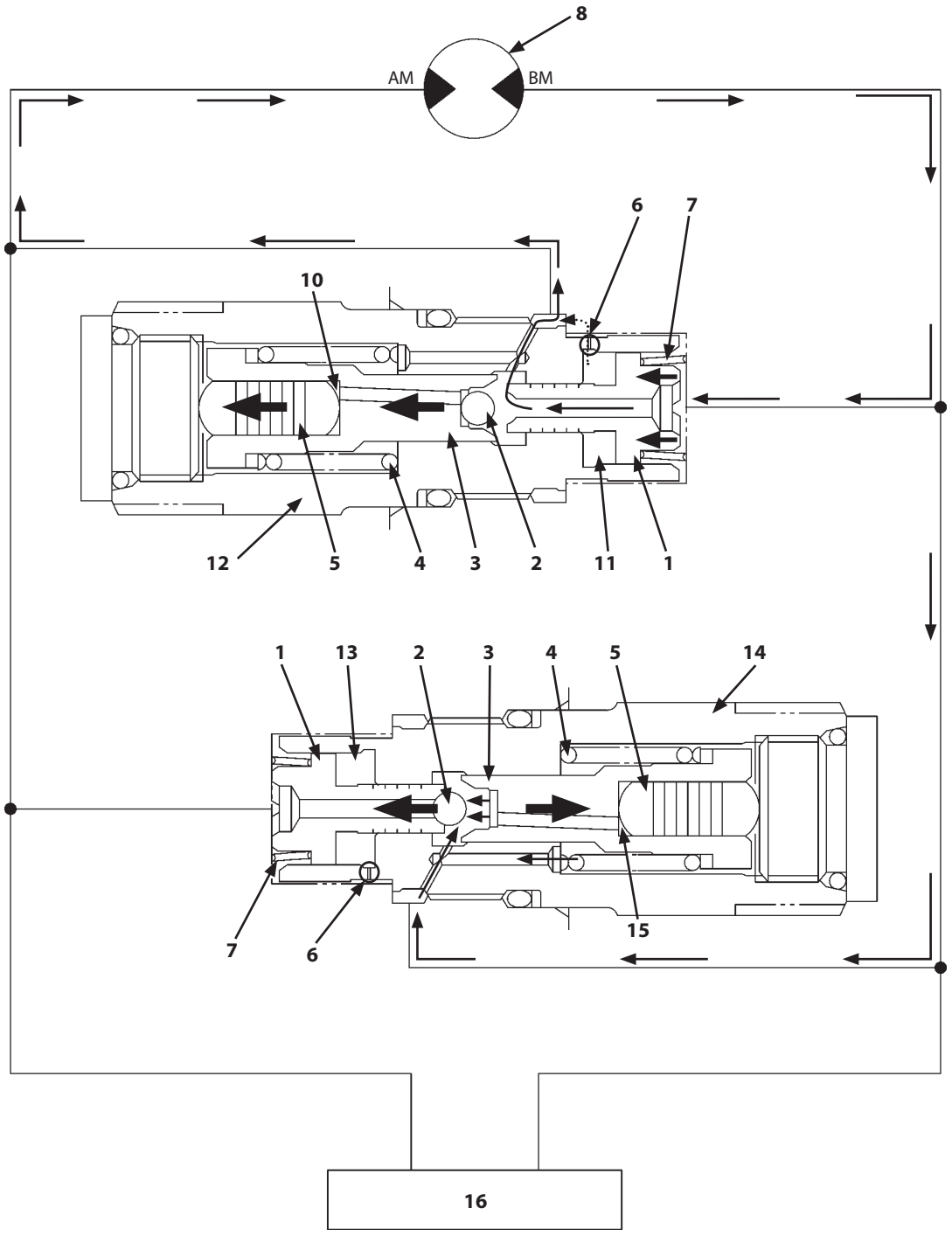
Pps- Torque Control Pressure
Pg- Primary Pilot Pressure (From Pilot Pump)

1- Spring
2- Sleeve A
3- Spool A
4- Piston
11- Servo Piston
13- Link



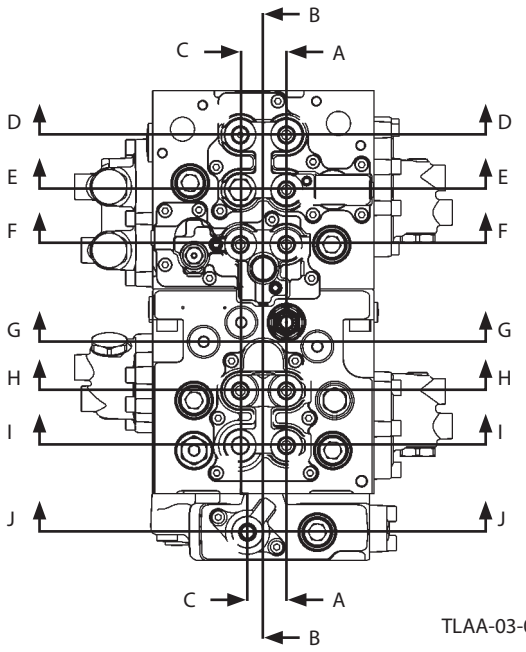
T178-03-02-003

1- Spring
2- Brake Piston
3- Orifice
4- Check Valve
5- Brake Piston Chamber
6- Friction Plate
7- Plate
8- Rotor



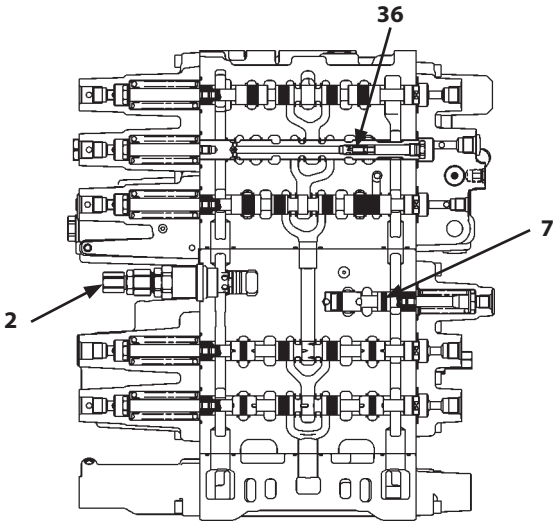
T1V1-03-02-015

1- Poppet
2- Ball
3- Plunger
4- Spring
5- Piston
6- Orifice
7- Spring
8- Swing Motor
10- Chamber N
11- Chamber M
12- Combination Valve A
13- Chamber M
14- Combination Valve B
15- Chamber N
16- Control Valve



TLAA-03-03-007

Section A-A



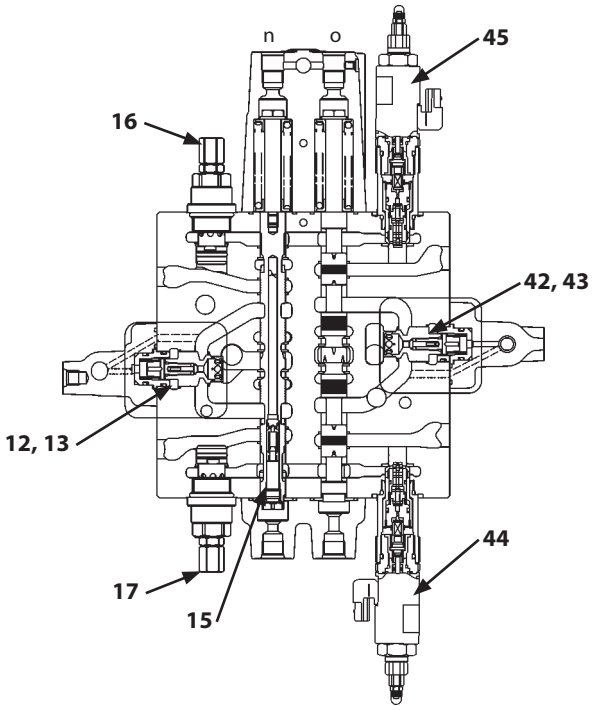
TLAA-03-03-008

a- Machine Upper Side

c- Machine Lower Side

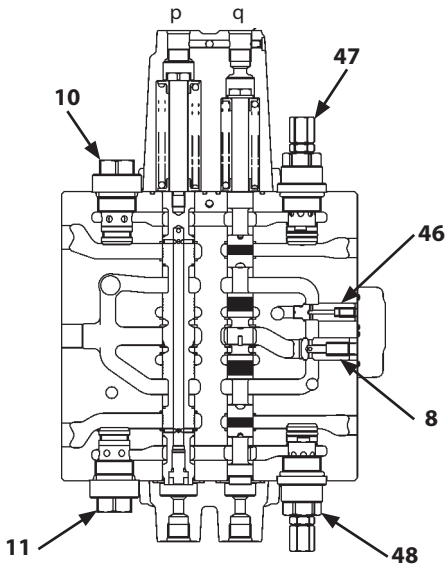
1- Check Valve (Main Relief Circuit)
2- Main Relief Valve
3- Check Valve (Main Relief Circuit)
4- Load Check Valve (Positioning/ Auxiliary 2 Parallel Circuit)
5- Load Check Valve (Bucket Parallel Circuit)
6- Check Valve (Auxiliary Flow Combiner Circuit)
7- Auxiliary Flow Combiner Valve
8- Load Check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

Section H-H



TLAA-03-03-015

Section I-I

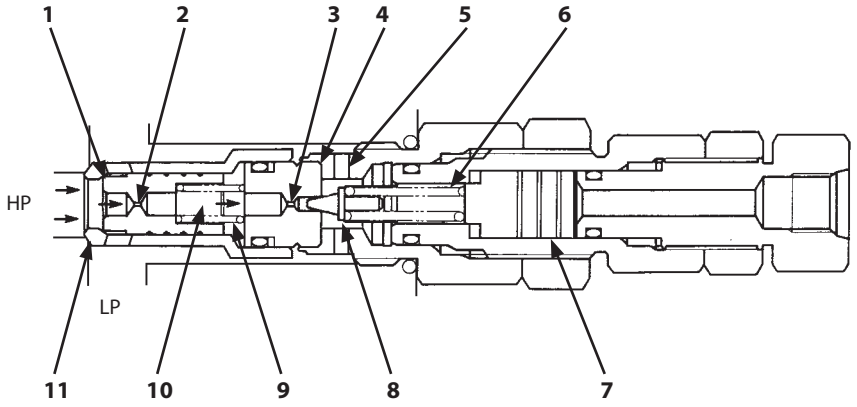


TLAA-03-03-016

a- Machine Upper Side
c- Machine Lower Side
n- Bucket
o- Auxiliary
p- Travel
q- Blade/Outrigger

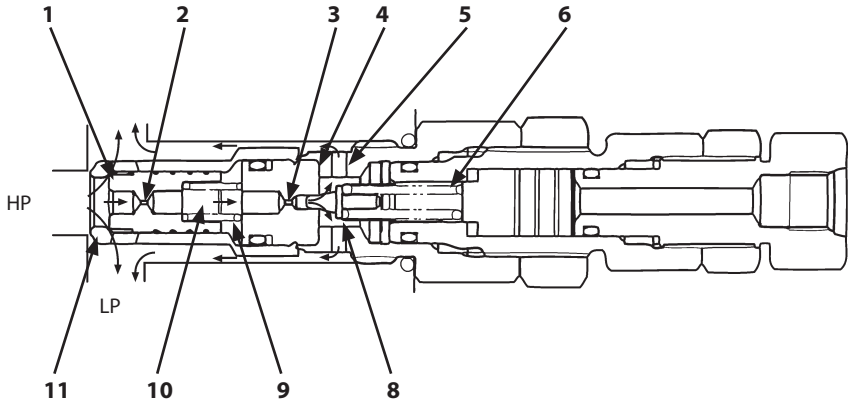
1- Check Valve (Main Relief Circuit)
2- Main Relief Valve
3- Check Valve (Main Relief Circuit)
4- Load Check Valve (Positioning/ Auxiliary 2 Parallel Circuit)
5- Load Check Valve (Bucket Parallel Circuit)
6- Check Valve (Auxiliary Flow Combiner Circuit)
7- Auxiliary Flow Combiner Valve
8- Load Check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

During Normal Operation:



TDAB-03-03-020

During Relief Operation:



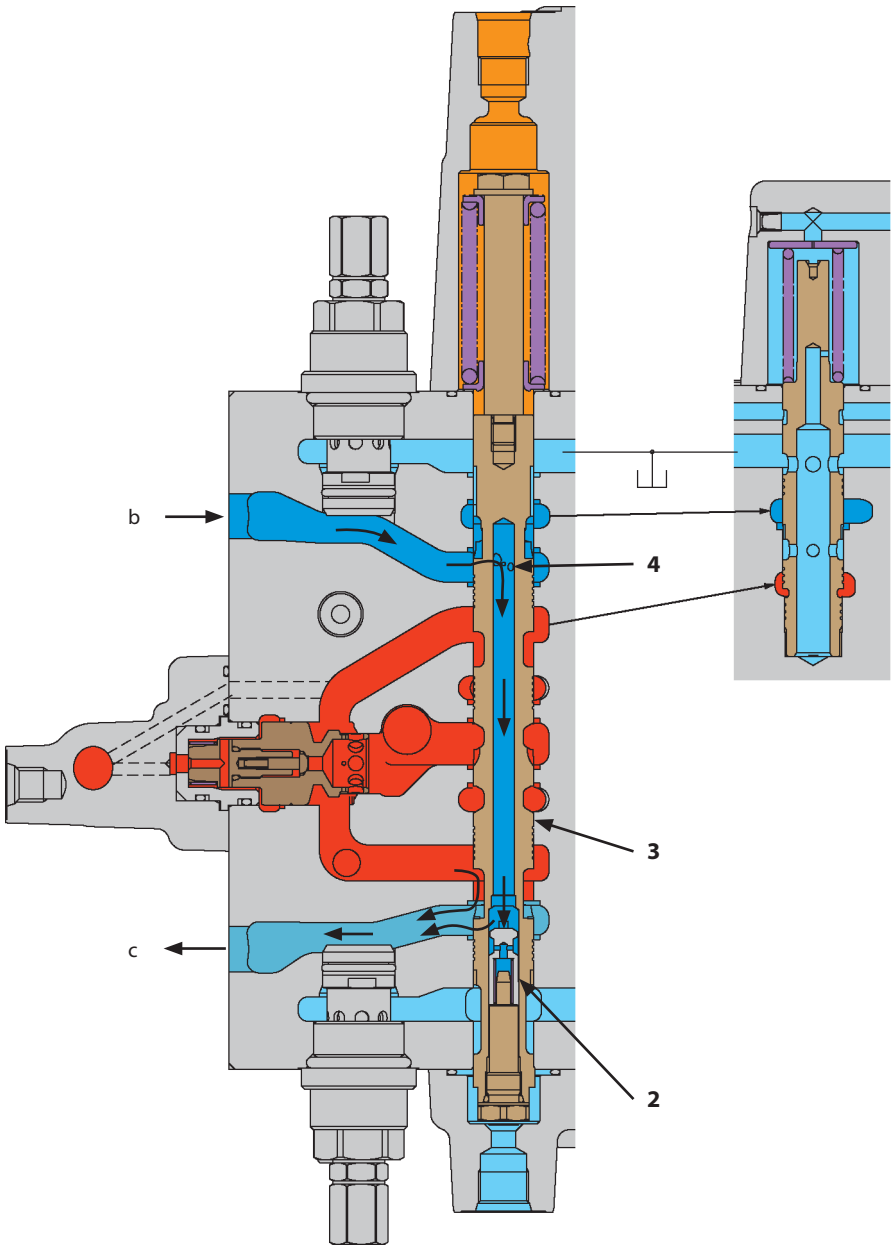
TDAB-03-03-021

HP - Main Circuit

LP - Hydraulic Oil Tank

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

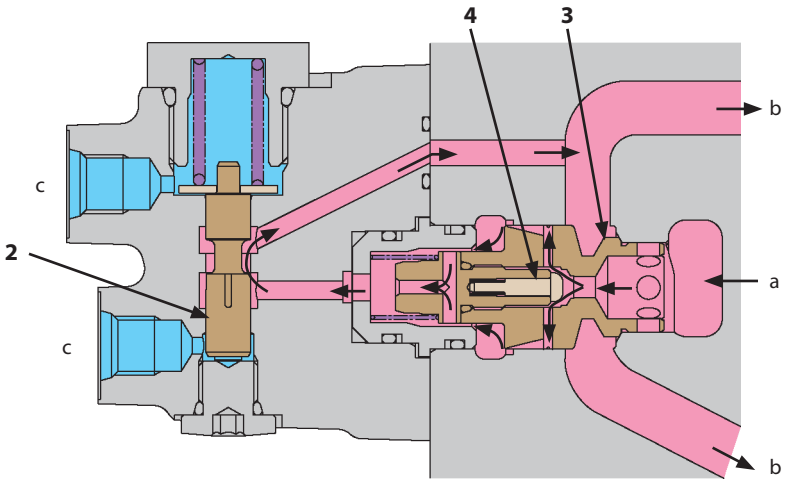
During Bucket Regenerative Operation:



TLAA-03-03-025

b- Returning Oil from Cylinder (1) Rod Side
c- Pressure Oil to Cylinder (1) Bottom Side
2- Check Valve
3- Bucket Spool
4- Hole

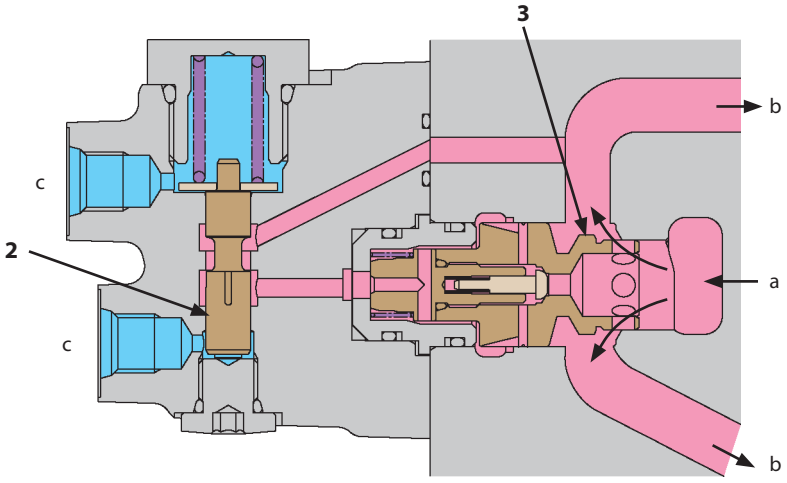
Normal Operation (During Low Load)



TLAA-03-03-028

a- Pressure Oil from Pump 2
b- To Arm 1 Spool
c- To Hydraulic Oil Tank
2- Selector Valve
3- Poppet Valve
4- Check Valve

Normal Operation (During High Load)



TLAA-03-03-029

a- Pressure Oil from Pump 2
b- To Arm 1 Spool
c- To Hydraulic Oil Tank
2- Selector Valve
3- Poppet Valve

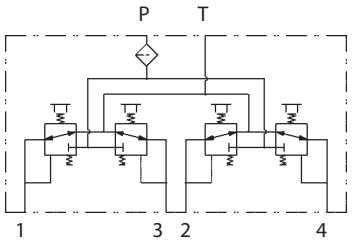
Outline

The pilot valve controls pilot pressure oil in order to move the spool in the control valve.
The pilot valve outputs pressure according to the control lever stroke by PPC (Pressure Proportional Control Valve) function and moves the spool in the control valve.
The 4-port pilot valves for front attachment / swing is standard.
The 2-port pilot valve is for travel.

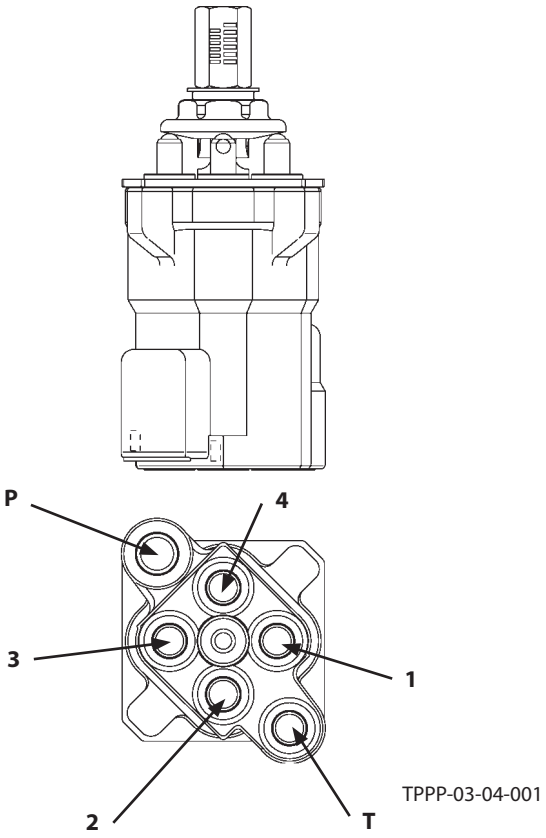
- Front Attachment / Swing Pilot Valve

	Port No.	ISO Control Pattern	Hitachi Pattern
Right	1	Bucket Roll-Out	←
	2	Boom Lower	←
	3	Bucket Roll-In	←
	4	Boom Raise	←
Left	1	Swing (Right)	Arm Roll-In
	2	Arm Roll- Out	Swing (Right)
	3	Swing (Left)	Arm Roll- Out
	4	Arm Roll-In	Swing (Left)

Hydraulic Symbol



TPPP-03-04-002



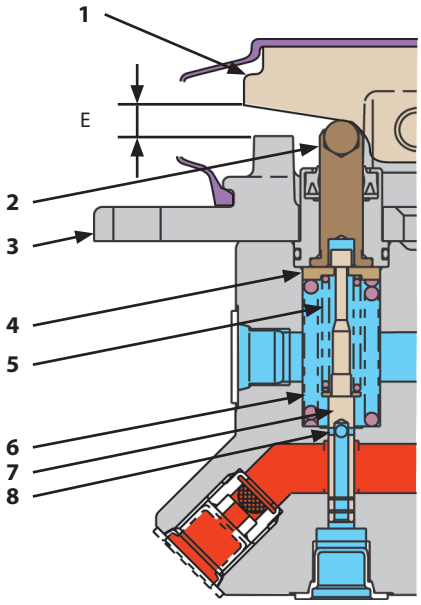
TPPP-03-04-001

P- Port P (Pressure Oil from Pilot Pump)
T- Port T (To Hydraulic Oil Tank)

Operation (Travel Pilot Valve)

The spool (7) head comes in contact with the upper surface of spring guide (4). Spring guide (4) is kept raised by return spring (6).

NOTE: Total lever stroke is determined by stroke dimension (E) of cam (1).

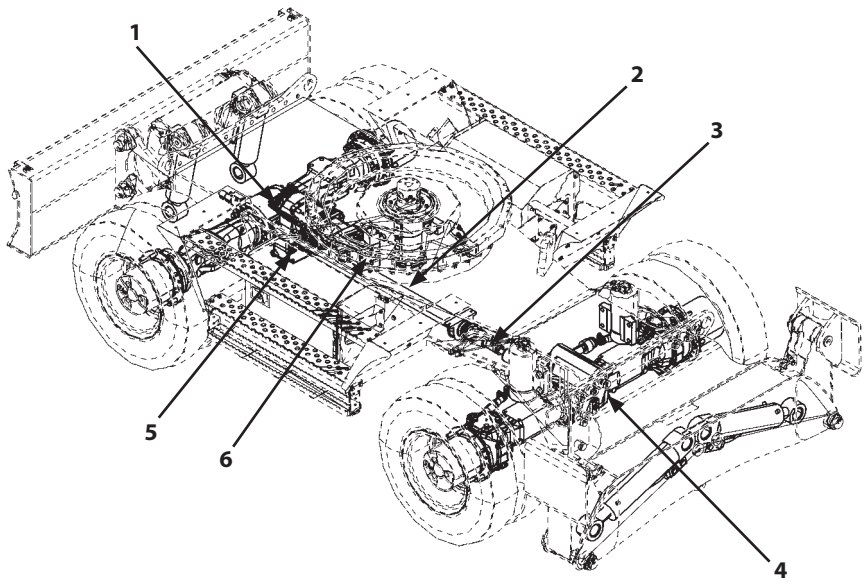


TDAA-03-04-001

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

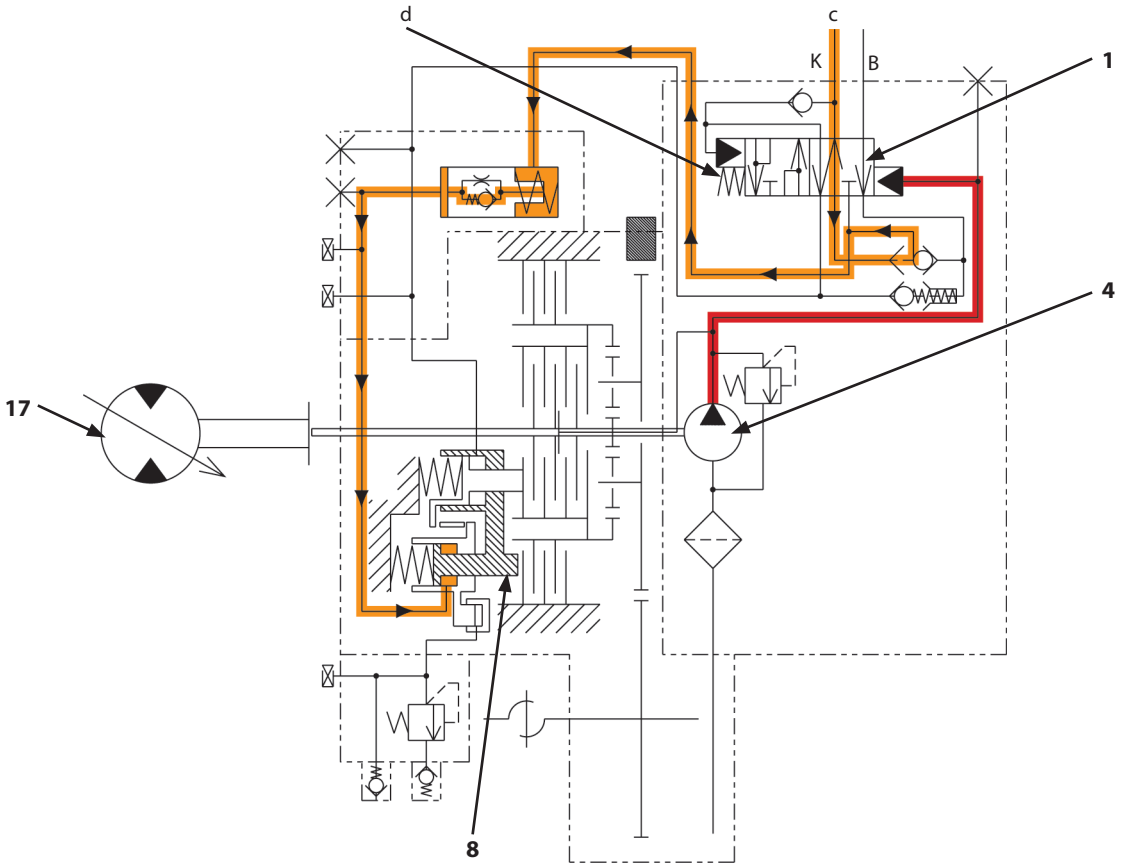
Outline

The travel device consists of travel motor (6), transmission (5), front propeller shaft (3), rear propeller shaft (2), front axle (4) and rear axle (1). Travel motor (6) is a variable displacement bent axis type axial plunger motor. The motor is driven by the pressure oil from the pump and rotates transmission (5). A regulator is provided on travel motor (6) in order to regulate the torque, which is transferred to transmission (5). The travel modes (fast and slow) are selected at transmission (5) by the pressure oil from the pilot pump. Travel motor (6) rotation is transferred to propeller shafts (2, 3) and axles (1, 4).



TLAA-03-06-001

1- Rear Axle
2- Rear Propeller Shaft
3- Front Propeller Shaft
4- Front Axle
5- Transmission
6- Travel Motor



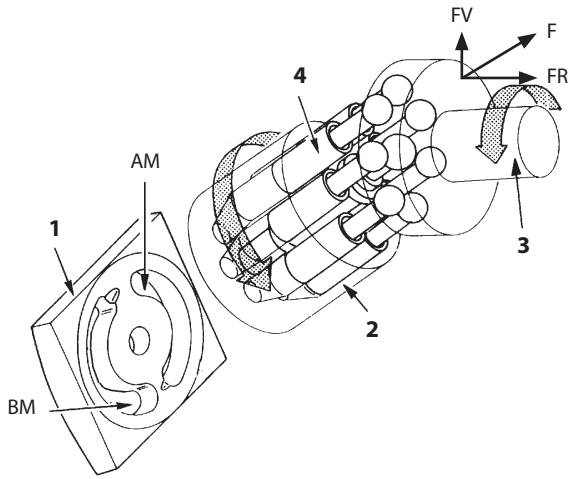
T21W-03-05-006

1- Gearshift Piston
4- Rotary Pump
8- Brake Piston
17- Travel Motor
c- Pressure Oil
d- Spring

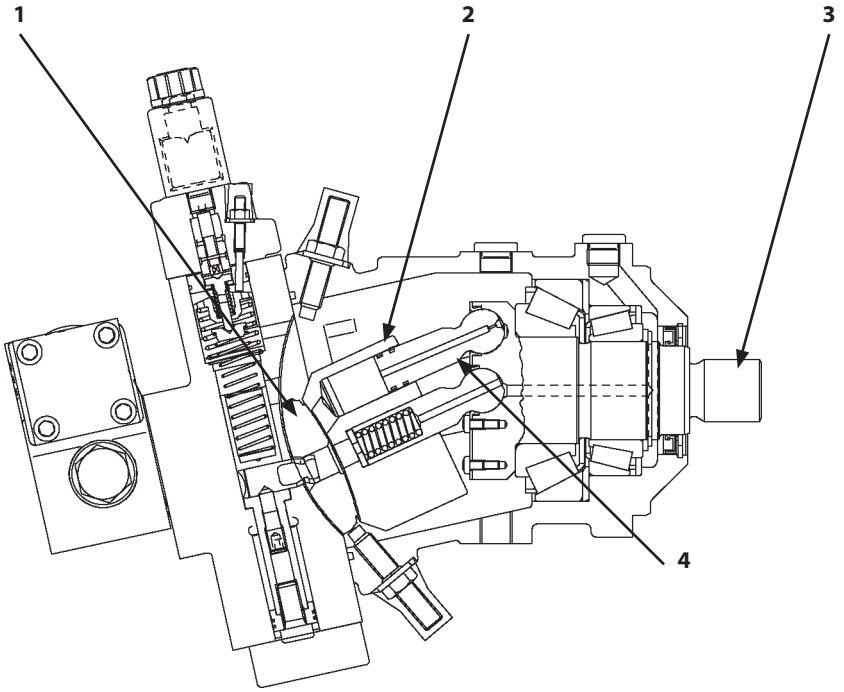
(Blank)

Rotor Section

The rotor section consists of valve plate (1), rotor (2), drive shaft (3) and plungers (4). When pressure oil is routed to port AM on valve plate (1), pressure oil flows into the half side of rotor (2) so that plungers (4) are pushed. The component force (FV) of plunger pushing force (F) rotates drive shaft (3). As drive shaft (3) rotates, rotor (2) is also rotated. Then, when plunger (4) is rotated up to port BM in sequence, pressure oil in rotor (2) is returned to the hydraulic oil tank. Supplying pressure oil to either port AM or BM can achieve forward and reverse travel direction change.

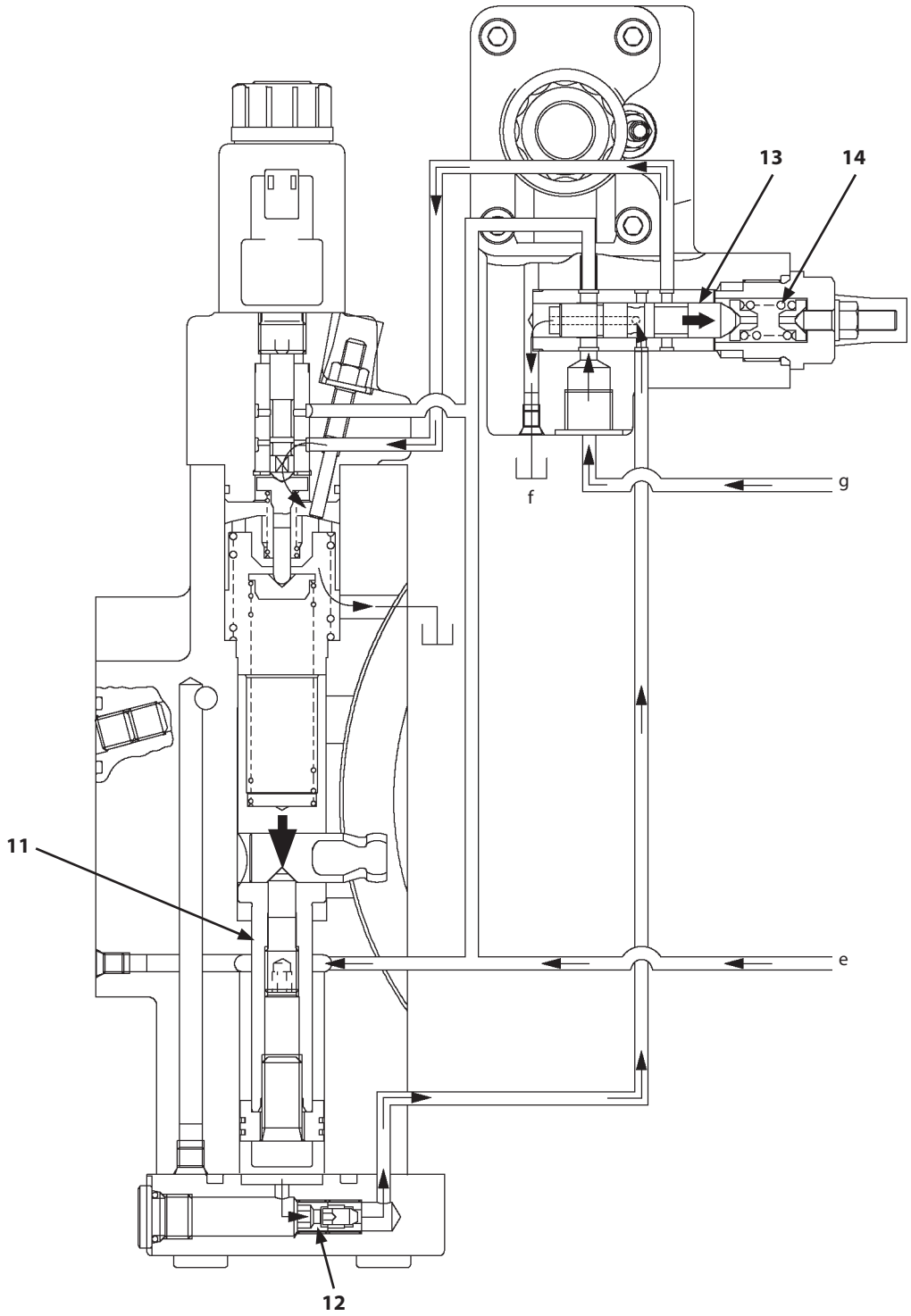


T216-03-05-015



TCJB-03-07-005

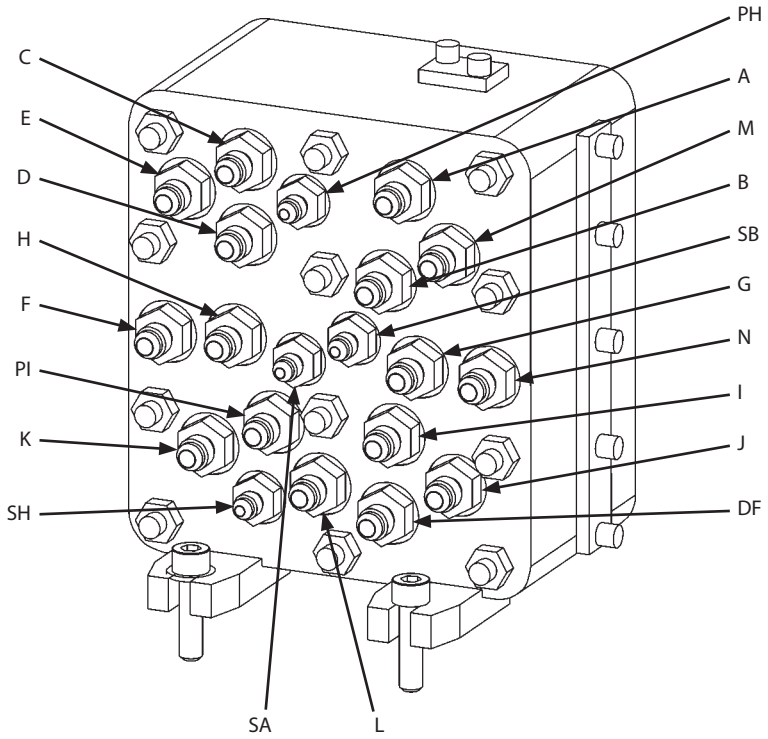
1- Valve Plate
2- Rotor
3- Drive Shaft
4- Plunger



TCJB-03-07-014

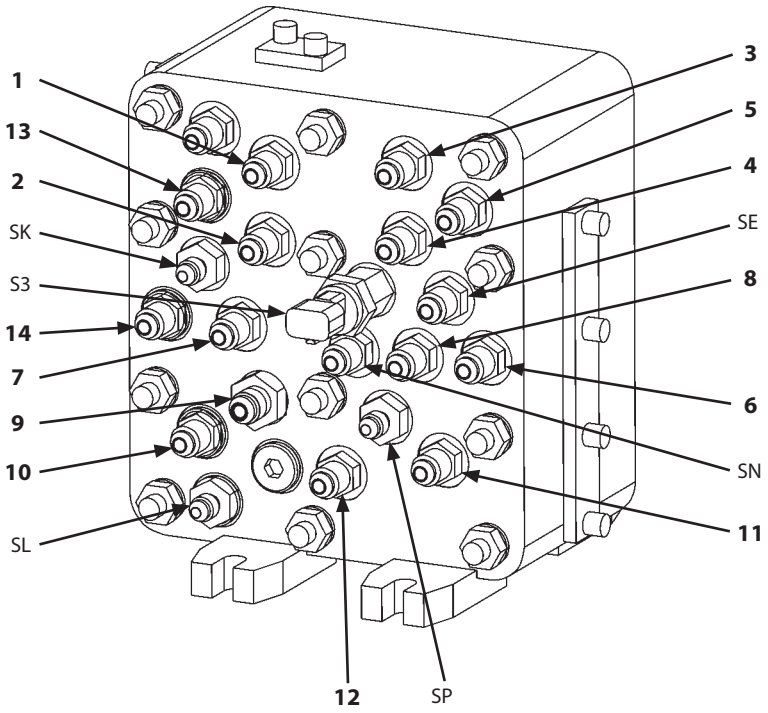
11- Servo Piston
12- Orifice
13- Pilot Piston
14- Spring
e- Motor Circuit Pressure
f- Hydraulic Oil Tank
g- Motor Driving Oil Pressure

Pilot Valve Side

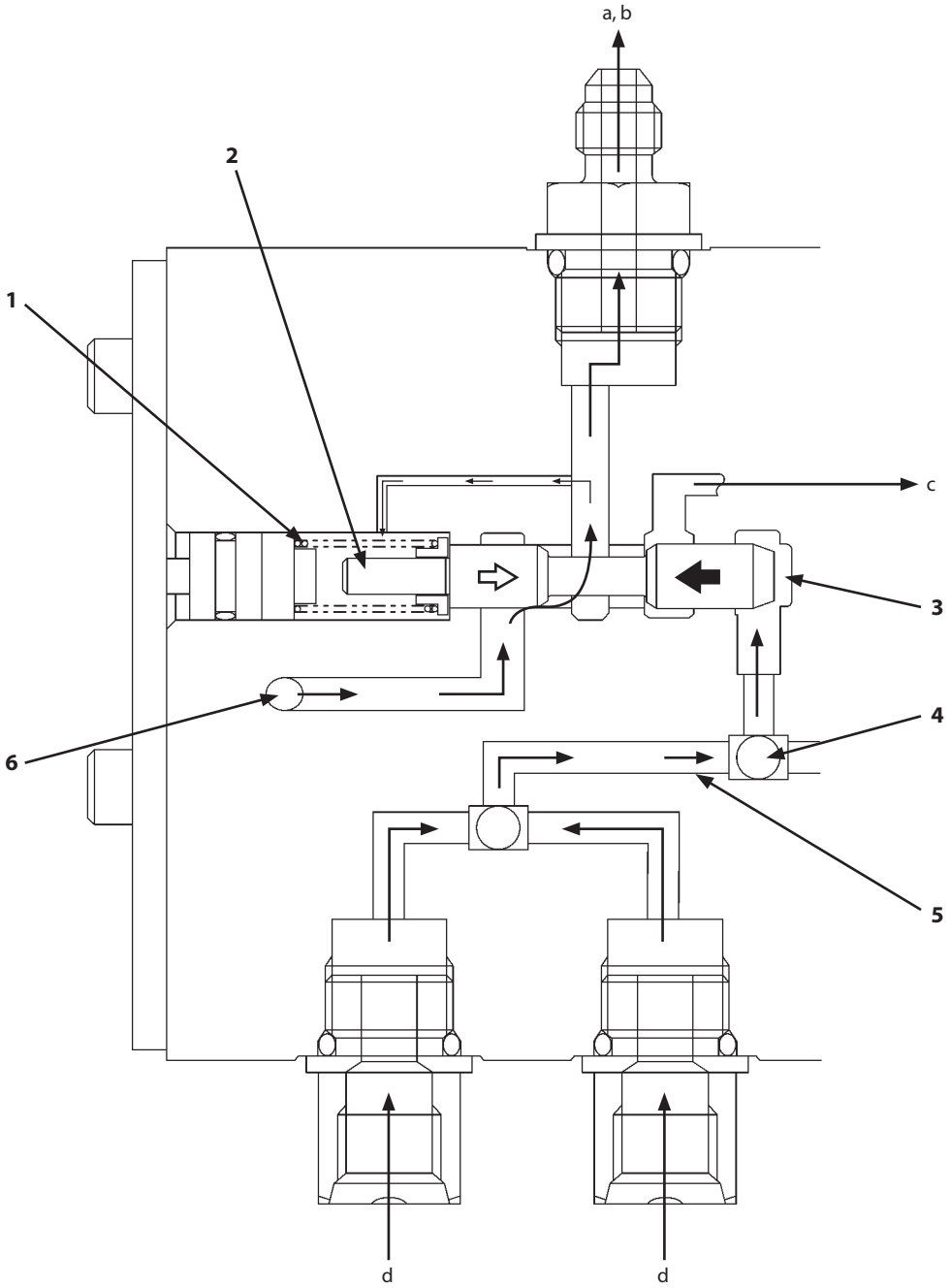


TLAA-03-09-001

Control Valve Side



TLAA-03-09-002

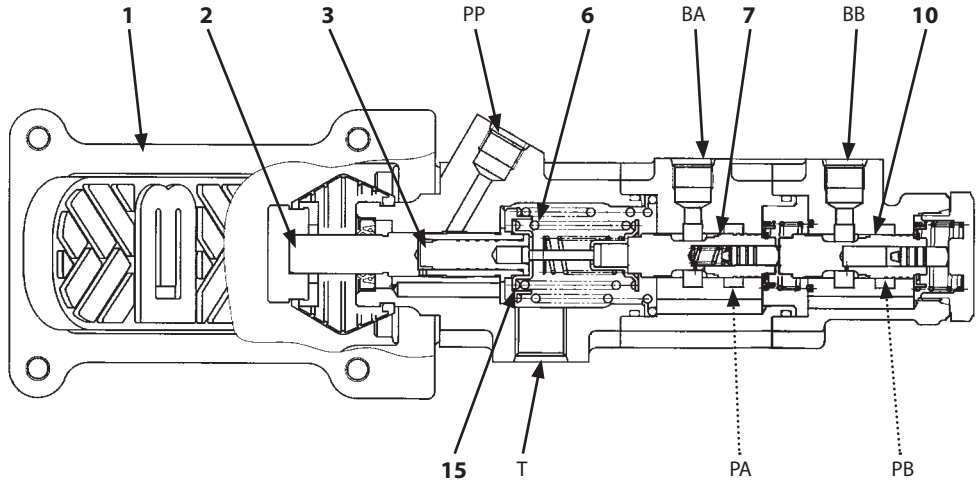


T1V1-03-06-005

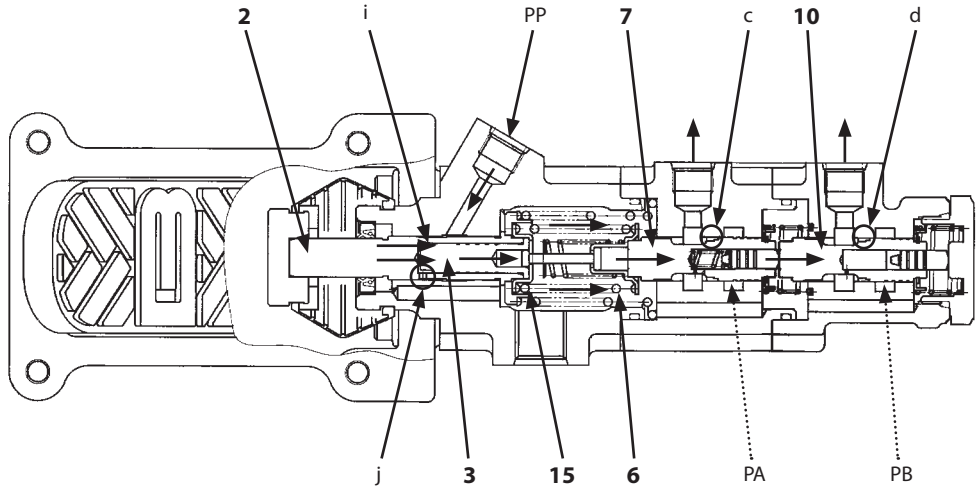
a- To Port SA
b- To Port SB
c- To Hydraulic Oil Tank
d- From Pilot Valve

1- Spring
2- Spool
3- Chamber A
4- Shuttle Valve
5- Pilot Pressure
6- Primary Pilot Pressure

(Blank)



T1F3-03-09-002



T1F3-03-09-002

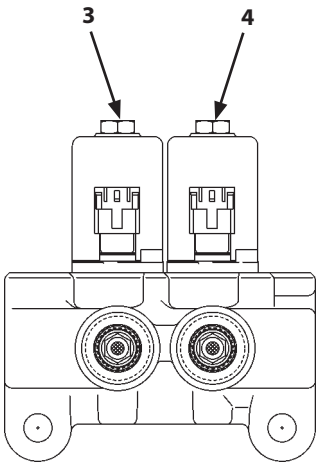
PP- Port PP	BA Prot BA	BB- Port BB	T- Port T
PA- Prot PA	PB- Port PB	c- Notch	d- Notch
i- Pilot Chamba	j- Hole		

1- Brake pedal	3- Pilot Piston	7- Spool	15- Retainer
2- Push Rod	6- Balance Spring	10- Spool	

Pump 1/Pump 2 Flow Rate Control Solenoid Valve Unit

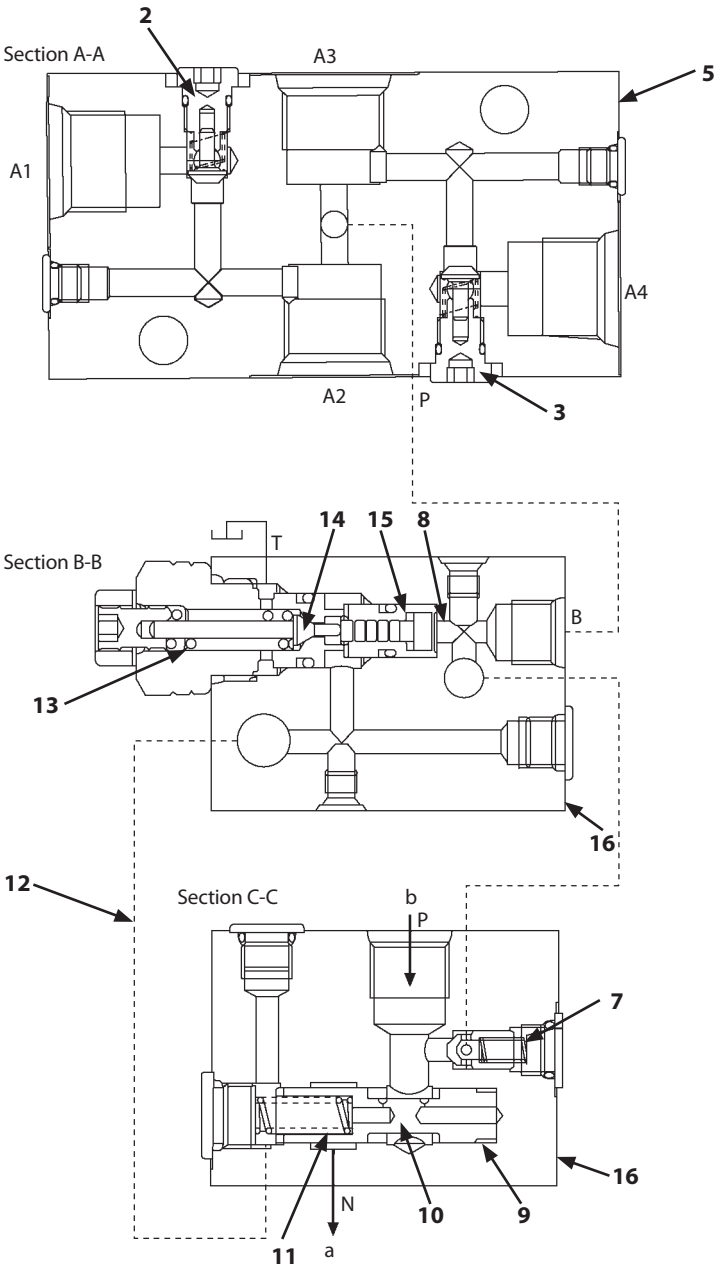
The pump 1/pump 2 flow rate control solenoid valve unit controls the pump delivery flow rate according to the signal from MC1 (Main Controller 1). (Refer to SYSTEM/Control System.)
The pump 1/pump 2 flow rate control solenoid valve unit consists of two proportional solenoid valves.

Pump 1 flow rate control solenoid valve (4)	:	Controls pump 1 pump control pressure.
Pump 2 flow rate control solenoid valve (3)	:	Controls pump 2 pump control pressure.



TLAA-01-02-001

3- Pump 2 Flow Rate Control Solenoid Valve
4- Pump 1 Flow Rate Control Solenoid Valve

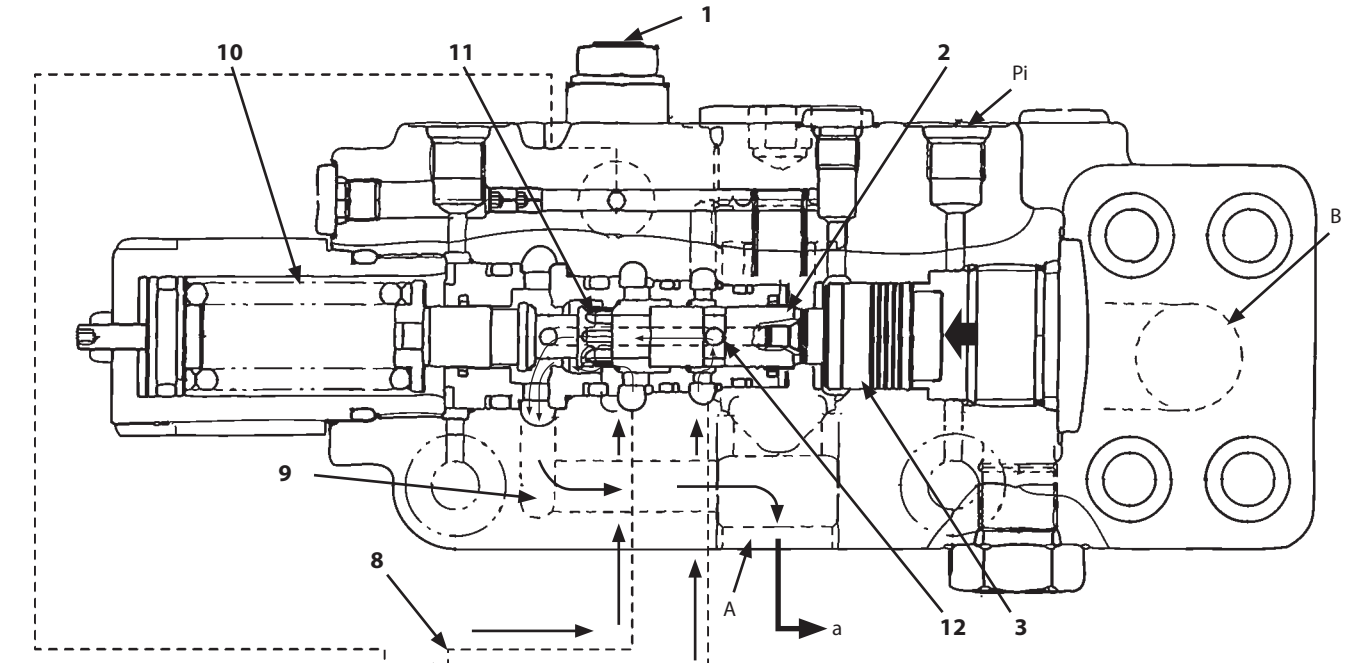


TLAA-03-12-007

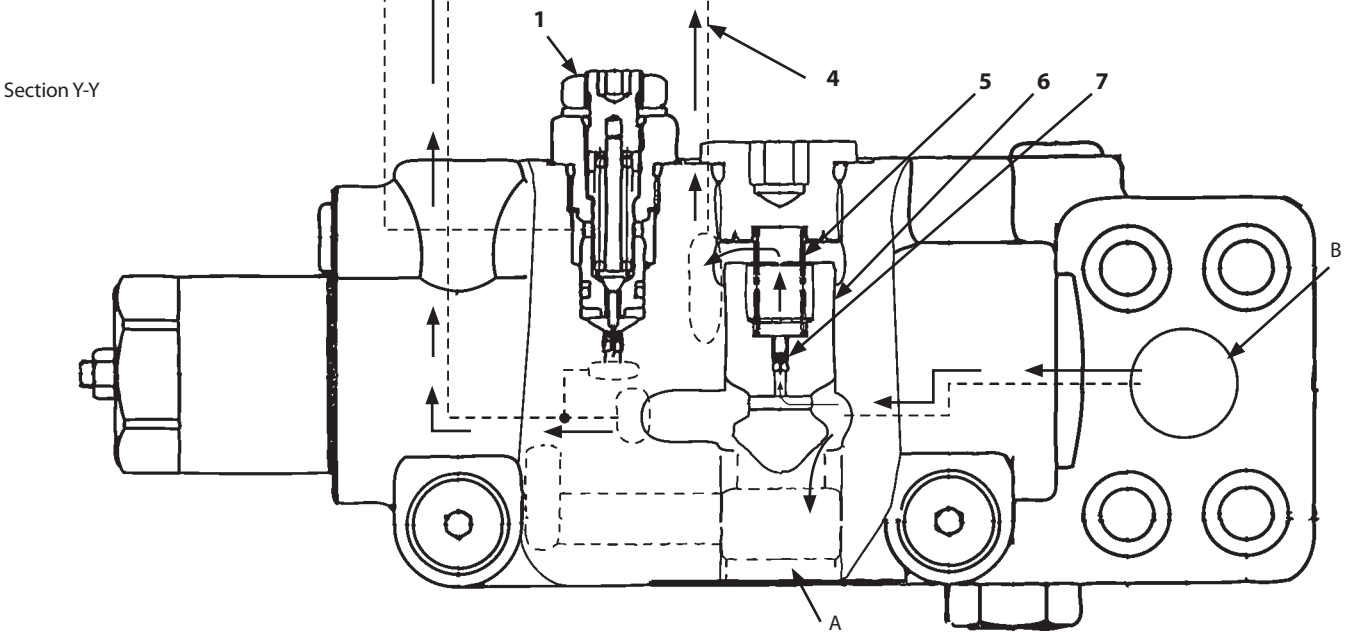
a- Primary Pliot Pressure
b- From Pilot Pump

1- Brake Valve
2- Check Valve
3- Check Valve
4- Accumulator
5- Accumulator Manifold
6- Accumulator
7- Check Valve
8- Passage
9- Chamber A
10- Spool
11- Spring
12- Passage
13- Spring
14- Pilot Piston
15- Piston
16- Accumulator Charging Valve
17- Accumulator
18- Accumulator

Section X-X



Section Y-Y



TDAA-03-07-010

A- Port A
B- Port B
a- To Control Valve Spool

1- Relief Valve
2- Spool
3- Piston
4- Passage C
5- Spring
6- Poppet
7- Orifice
8- Passage E
9- Passage D
10- Spring
11- Orifice
12- Hole