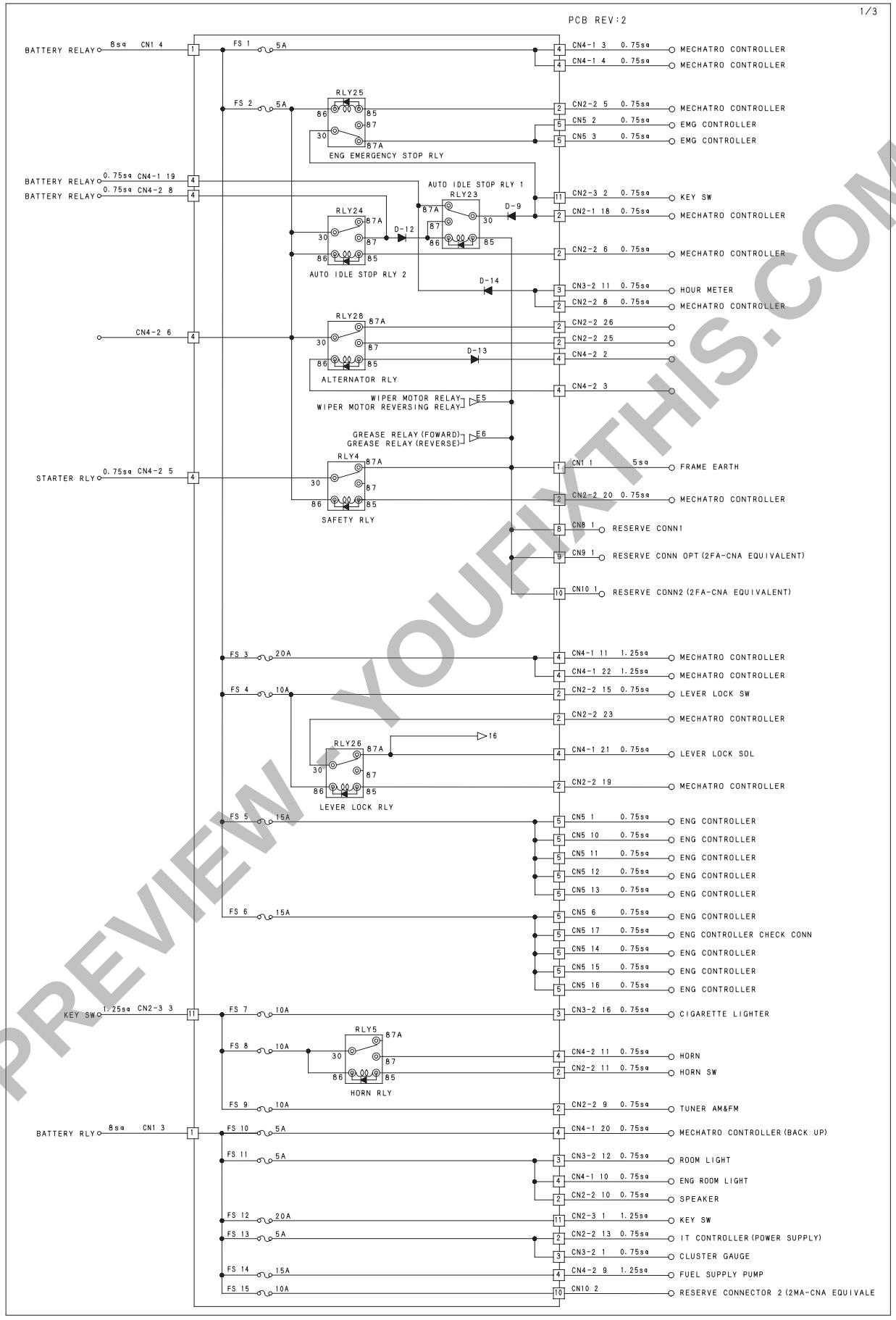
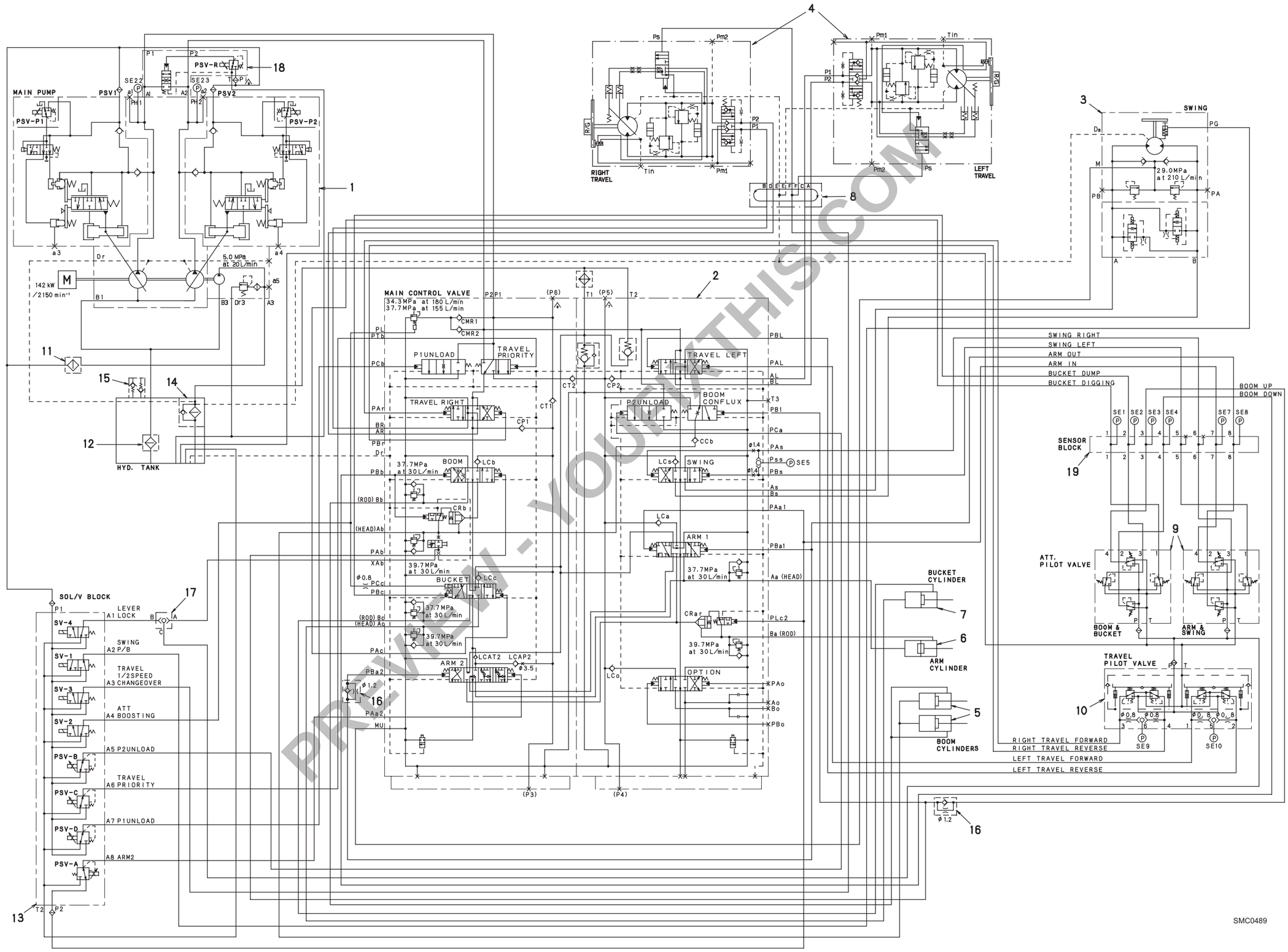
2) Circuit diagram



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HYDRAULIC CIRCUIT (MONOBLOCK VERSION) - SK260-9

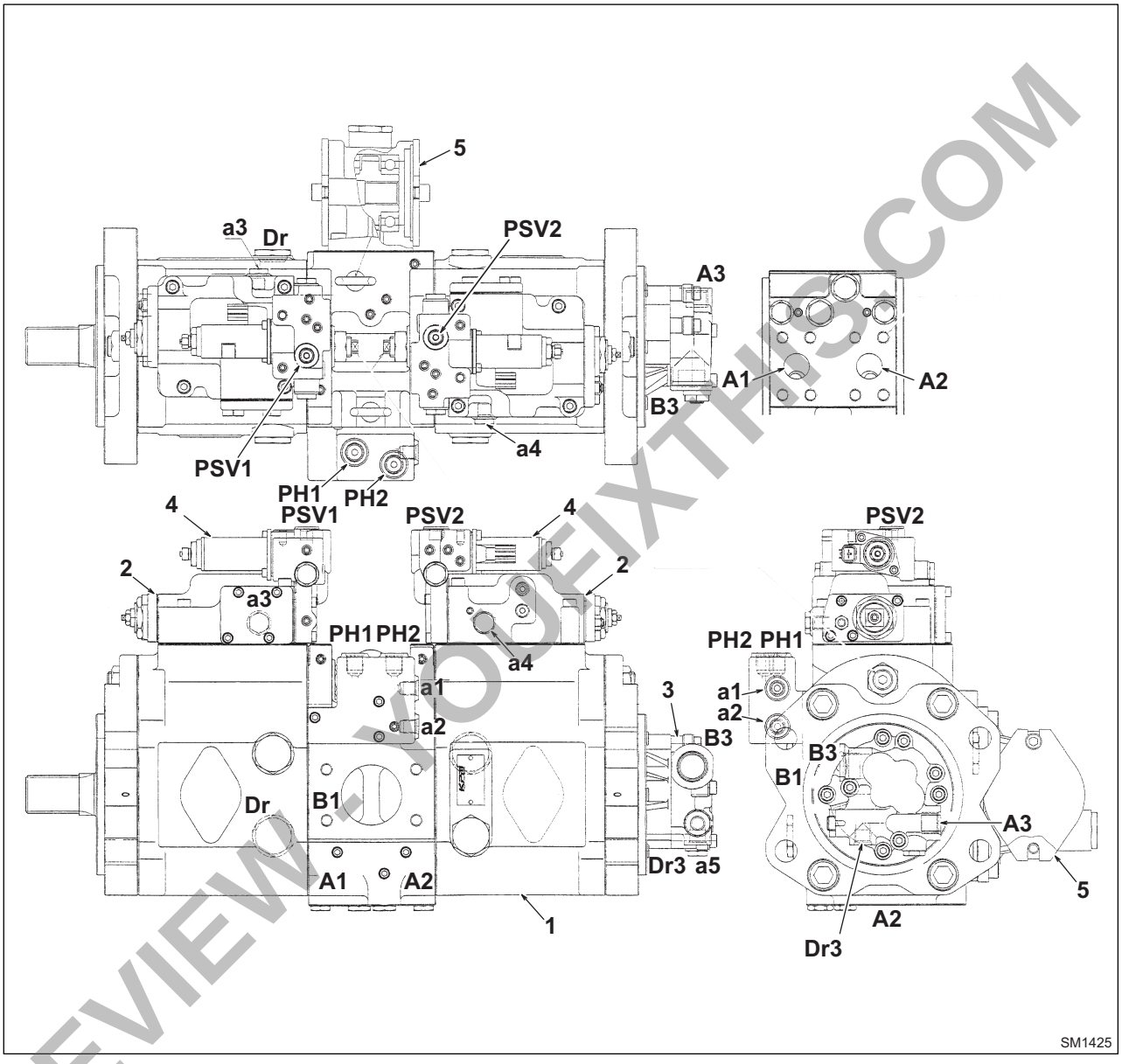


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OUTLINE

General view and hydraulic ports



1 - Main pump assembly
2 - Regulator assembly (Q.ty 2)
3 - Gear pump assembly (for pilot)
4 - Solenoid proportional reducing valve (Q.ty 2)
5 - PTO unit
A1 - Delivery port SAE 6000 psi 1"
A2 - Delivery port SAE 6000 psi 1"
B1 - Suction port SAE 2500 psi 2 1/2"
Dr - Drain port G 3/4-20
PSV1 - Servo assist port G 1/4-13
PSV2 - Servo assist port G 1/4-13
PH1 - Pressure sensor port G 3/8-17
PH2 - Pressure sensor port G 3/8-17
a1 - Gauge port G 1/4-15
a2 - Gauge port G 1/4-15
a3 - Gauge port G 1/4-15
a4 - Gauge port G 1/4-15
a5 - Gauge port G 1/4-14
A3 - Delivery port of gear pump G 1/2-19
B3 - Suction port of gear pump G 3/4-20.5
Dr3 - Drain port of gear pump G 3/8-15

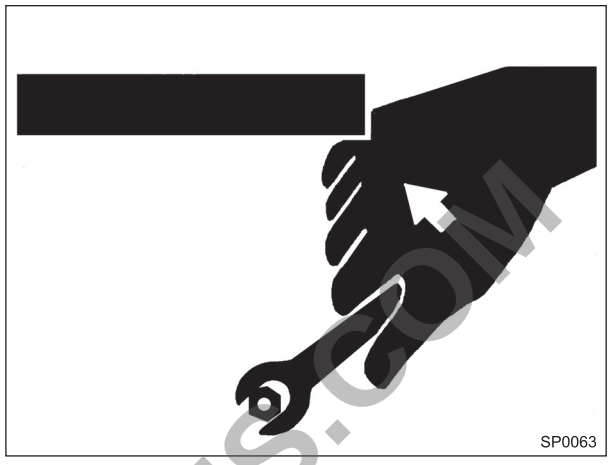
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TORQUE CHART

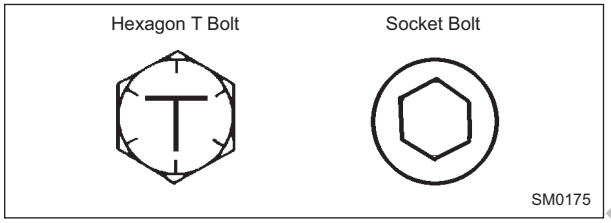
WARNING

Use tools appropriate for the work to be done. Makeshift tools and procedures can create safety hazards. For loosening and tightening nuts and bolts, use the correct tools. Avoid bodily injury caused by slipping wrenches.



Bolt Types

Tighten nuts or bolts correctly to torque specifications. Two kinds of bolts, hexagon bolts T and socket bolt, each made of different material, are used. Make sure to employ the correct bolts and tighten them to specification when assembling the machine or components.



Specified Tightening Torque Chart

Bolt Dia.	Wrench Size	Hexagon Wrench Size	T Bolt, Socket bolt (Nm)
M18	13	6	29.5
M10	17	8	64
M12	19	10	108
M14	22	12	175
M16	24	14	265
M18	27	14	390
M20	30	17	540
M22	32	17	740
M24	36	19	930
M27	41	19	1370
M30	46	22	1910
M33	50	24	2550
M36	55	27	3140

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Table 13

Error code	**B023**		
Trouble	Boom down pressure sensor Open-circuit.		
Judging condition	The input voltage from boom down pressure sensor is 0.1 V or less.		
Symptom	The boom down operability becomes poor.		
Control in the event of failure	Set proportional valve output rate of P1 pump to constant current. (Current when all operation is in neutral.) Only on independent operation of boom-up, set output of P1 unload proportional valve to 750mA.		
Returned in normal condition	It returns automatically in normal condition.		
Service diagnosis checking screen	Screen No.	5	B-2 BOOM LOWER
	Screen No.		
	Screen No.		

	Checking object	Checking contents and remedy
1	• Boom down pressure sensor SE-4	When B023 is cancelled and another error occurs after exchanging the connector with another sensor. Check sensor unit for possible failure. If failure found, replace it.
2	• Wiring between boom down pressure sensor and controller CN-127F CN-101F	When B023 is displayed after the connector is exchanged with another sensor. Check wiring for possible failure according to the wire checking procedure and repair it if necessary.
3	• Mechatro controller	Check that the error is corrected after replacement of controller.

Table 14

Error code	**B024**		
Trouble	Boom down pressure sensor's power source is short-circuited.		
Judging condition	The input voltage from boom down pressure sensor is 4.7 V or more.		
Symptom	The boom down operability becomes poor.		
Control in the event of failure	Set proportional valve output rate of P1 and P2 pumps to constant current. (Current when all operation is in neutral.) Only on independent operation of boom-up, set output of P1 unload proportional valve to 750mA.		
Returned in normal condition	It returns automatically in normal condition.		
Service diagnosis checking screen	Screen No.	5	B-2 BOOM LOWER
	Screen No.		
	Screen No.		

	Checking object	Checking contents and remedy
1	• Boom down pressure sensor SE-4	When B024 is cancelled and another error occurs by turning the ignition on after exchanging the connector with another sensor. Check sensor unit for possible failure. If failure found, replace it.
2	• Wiring between boom down pressure sensor and controller CN-127F CN-101F	When B024 is displayed with the ignition on after the connector is exchanged with another sensor. Check wiring for possible failure according to the wire checking procedure and repair it if necessary.
3	• Mechatro controller	Check that the error is corrected after replacement of controller.

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REMOVAL AND INSTALLATION OF HYDRAULIC PUMP DEVICE

WARNING

Possible leakages of fluids under pressure could penetrate the skin, causing serious injuries.Prevent these dangers, discharging the pressure before disconnecting hydraulic pipes or other pipes.
Hydraulic oil, at the end of a work shift, can be very hot and can cause, when spilling, potentially serious burns. Prior to beginning any intervention, make sure that the oil and components are cooled-off.
The hydraulic oil tank cap can be ejected, if the pressure is not released from the tank. Press the valve located on the hydraulic oil tank to release any residual pressure present in the tank itself.
Check that the lifting devices (hooks, chains, etc.) are in perfect conditions without any sign of excessive wear and appropriate to hold the weight of load.

Preparation

1. Park the machine on a firm, level surface.
2. To drain the hydraulic pressure from the Hydraulic System, refer to procedure “Releasing the hydraulic pressure” at page T2-1-60.
3. Turn engine OFF. Press valve on hydraulic oil cap to release pressure in tank.

Removal

1. Remove all access panels and doors to Hydraulic Pump Device.
2. Disconnect all electrical connectors.
3. Remove hoses and collector from hydraulic pump device.
   : 19, 22, 30, 36 mm
   : 8, 10 mm
4. Fasten hydraulic pump device by means of hoist and lifting ropes.

NOTE: *hydraulic pump device weight: 147 kg (324 lbs).*

5. Remove the fixing bolts of hydraulic pump device and draw it from engine.
   : 17 mm

Installation

1. Lift the hydraulic pump using hoist and ropes.

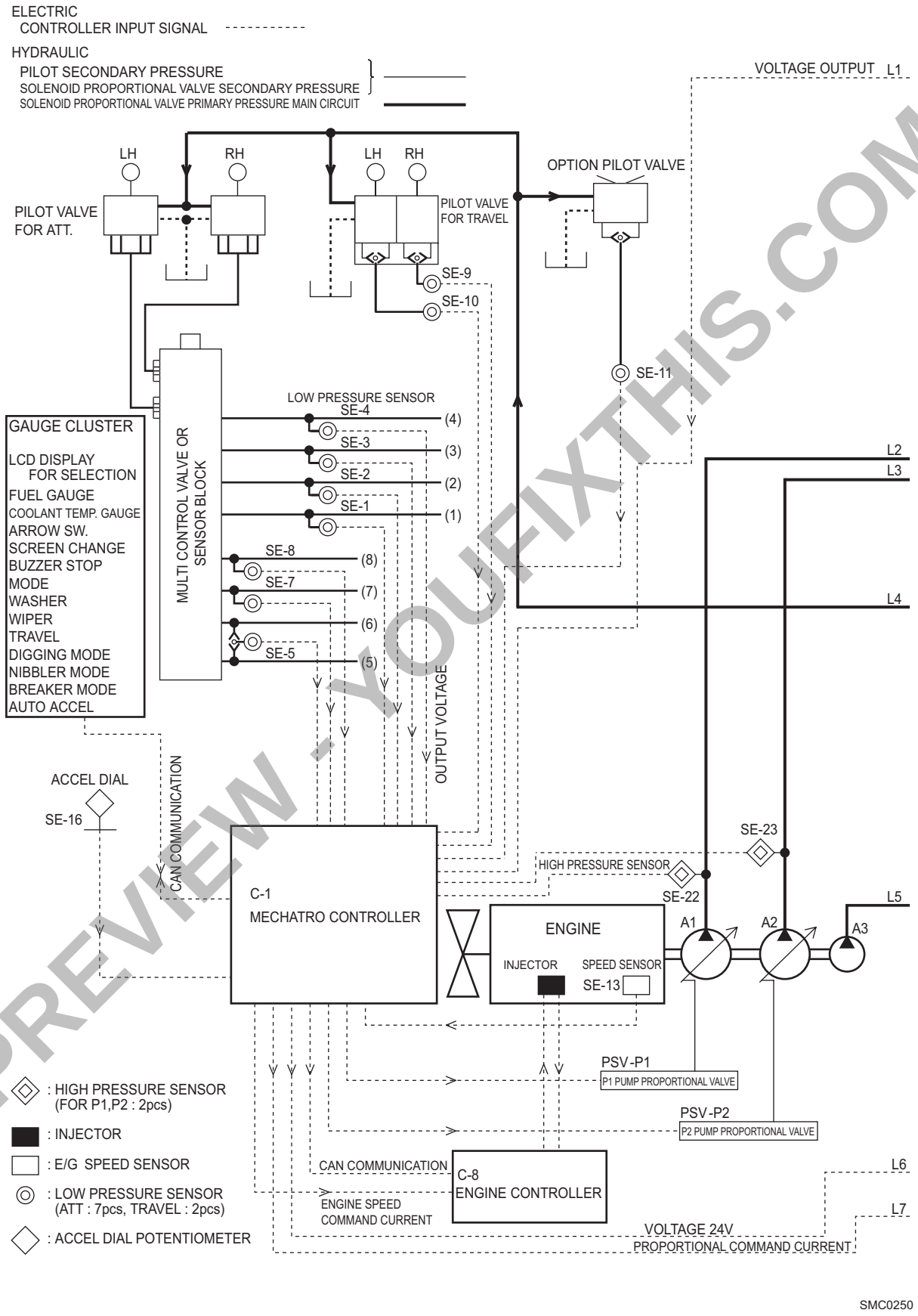
NOTE: *Hydraulic pump device weight: 147 kg (324 lbs).*

2. Install the hydraulic pump device to the engine by means of related bolts.
   : 17 mm
   : 431 ± 43.1 Nm (318 ± 31.8 lbf·ft)
3. Install hoses and collector to hydraulic pump device.
   : 19 mm
   : 29.4 Nm (21.7 lbf·ft)
   : 22 mm
   : 39.2 Nm (29 lbf·ft)
   : 30 mm
   : 137.2 Nm (101.2 lbf·ft)
   : 36 mm
   : 156.9 Nm (115.7 lbf·ft)
   : 8 mm
   : 64 Nm (47 lbf·ft)
   : 10 mm
   : 108 Nm (80 lbf·ft)
4. Connect all electrical connectors.
5. Install access panels and doors.

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2 SUMMARY OF MECHATRO CONTROL SYSTEM

2.1 MECHATRO CONTROL SYSTEM GENERAL INFORMATION



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TROUBLESHOOTING BY SYMPTOM

1. HYDRAULIC SYSTEM

Preface:
The following list contains troubleshooting categories numbered from 1 to 22.
Identify your current symptom and follow the troubleshooting table in the order listed.

1. Controls do not function/slow
2. Engine shutting down/stalled
3. Unit moving while in the neutral position
4. Precise operator controls not functioning properly
5. Slow boom up, insufficient power
6. Slow boom down, insufficient power for lifting up body
7. Slow arm in, insufficient power
8. Slow independent arm out (in the air)
9. Slow bucket digging
10. Slow bucket dumping
11. Swing operation not functioning/slow
12. Noise during swing operation
13. Swing drifts on a slope while swing control lever is in neutral position
14. Swing drifts when swing operation is stopped
15. Travel speed is slow/poor
16. Travel deviation
17. Travel 1st/2nd speed cannot be switched
18. Unit does not hold position on a slope
19. Machine does not travel straight when both the crawler and attachment are operated simultaneously
20. Slow breaker (crusher) operation, low power
21. Selector valve for option malfunctions: Breaker circuit is not obtained
22. Selector valve for option malfunctions: Nibbler circuit is not obtained

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HYDRAULIC COMPONENTS SK260-9

HYDRAULIC PUMP

Item			Main pump	Gear pump for pilot
Pump			K3V112DTP1L9R-YT3K-V	ZX10LGRZ2-07G
Type			Variable displacement plunger pump: regulator attached type	Fixed displacement type gear pump
Max. displacement capacity		cm^3 (in^3)	117 (7.13) x 2	10 (0.6)
Revolution	Rated	rpm (Clockwise seen from shaft end)	2100	←
Pressure	Rated	MPa (psi)	34.3 (4980)	5.0 (725)
	ATT boost		37.8 (5480)	
Max. flow		L/min (gal/min)	210 (56) x 2 at 7.8 MPa (1130 psi)	21 (5.5)
Max. input Power (at 2100 rpm)		kW (PS)	136 (193)85	3.4 (4.6)
Max. input torque (at 1400 rpm)		N·m (lbf·ft)	618 (456)	14.7 (10.8)
Regulator		Model	KR3G-YT3K-HV	
		Control function	Electric flow control, positive flow control, total power control at emergency mode and power shift control	
		Others	With solenoid proportional reducing valve (KDRDE5K-31/ 30C50)	
Mass		kg (lb)	147 (324)	

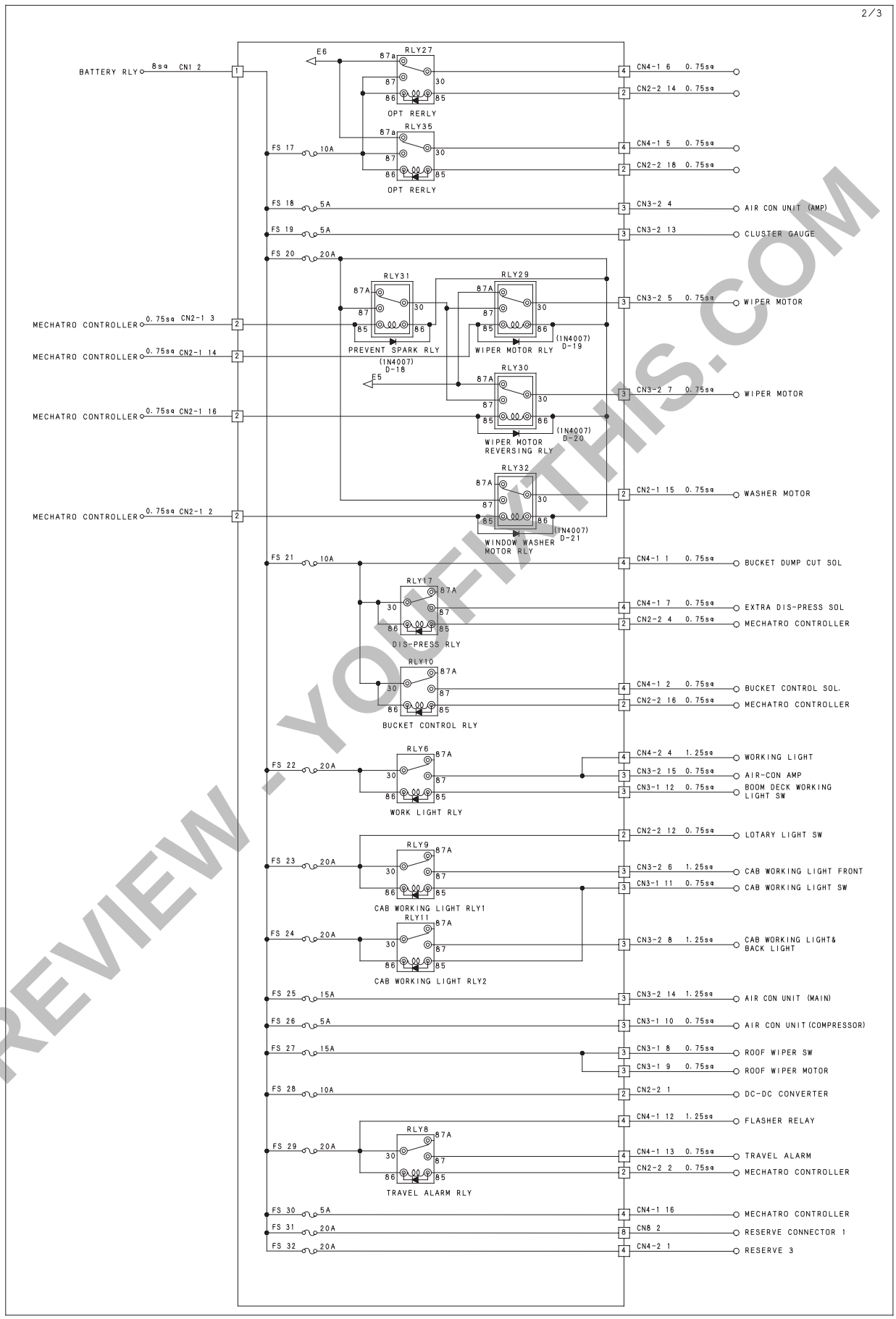
NOTE: *The max. input power and the max. input torque of the main pump include those of the gear pump.*

CONTROL VALVE

Item		STD VALVE
Model		KMX15YE / B44151
Max. flow rate	L/min (gal/min)	210 (56) x 2
Main relief valve set pressure	MPa (psi)	34.3 (4970) at 90 x 2 L/min (23.8 x 2 gal/min)
When power boost pressure		37.8 (5480) at 80 x 2 L/min (22.2 x 2 gal/min)
Over load relief valve set pressure	MPa (psi)	
Boom H, Bucket H, Arm R		39.7 (5760) at 30 L/min (8 gal/min)
Boom R, Bucket R, Arm H		37.8 (5480) at 30 L/min (8 gal/min)
Mass	kg (lb)	235 (518.2)

Item		OPT VALVE
Model		KADV22Y / 501103A
Over load relief valve set pressure	MPa (psi)	
Positioner R		39.7 (5760) at 30 L/min (8 gal/min)
Positioner H		37.8 (5480) at 30 L/min (8 gal/min)
Mass	kg (lb)	11 (24.2)

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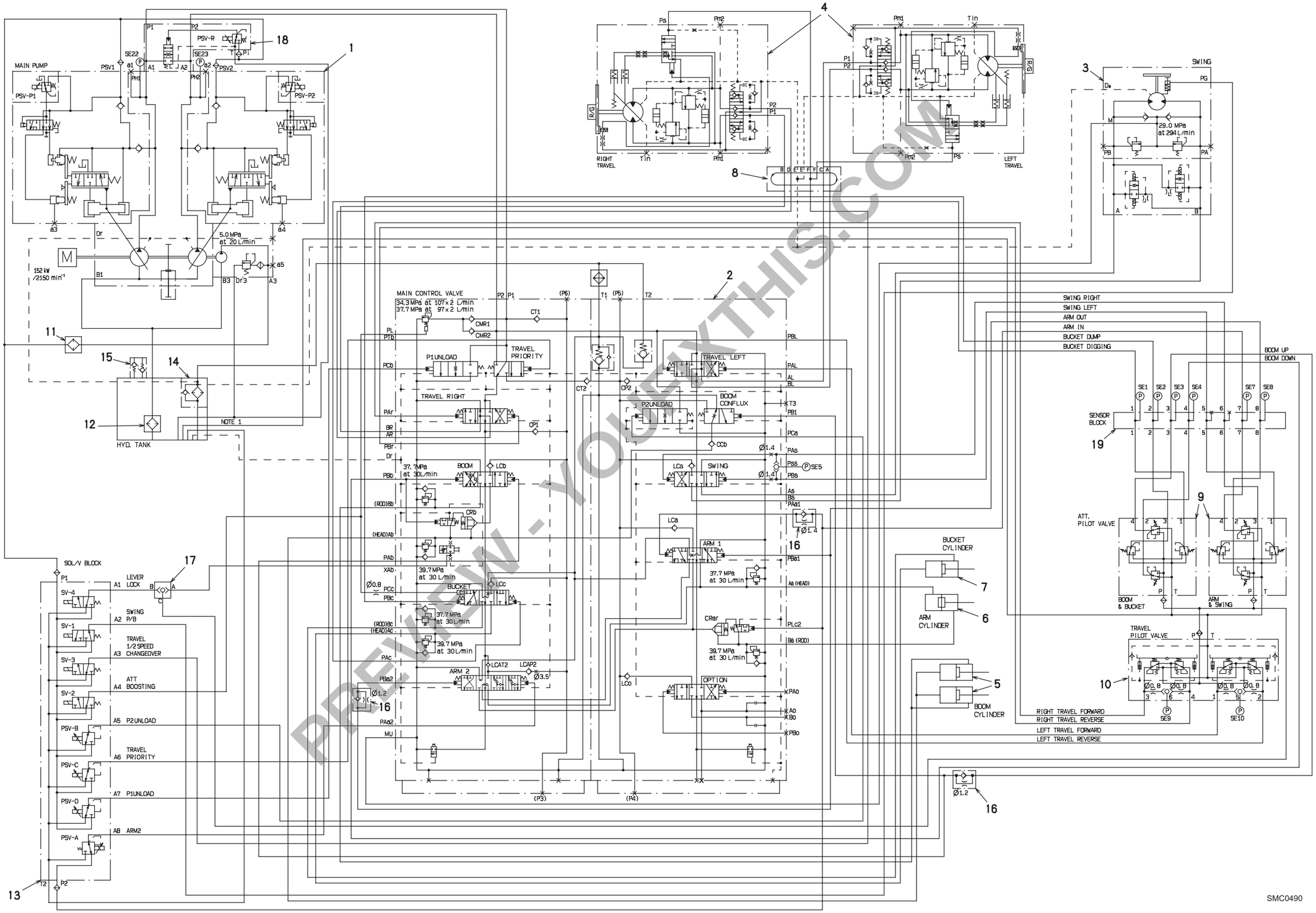


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HYDRAULIC CIRCUIT (MONOBLOCK VERSION) - SK295-9

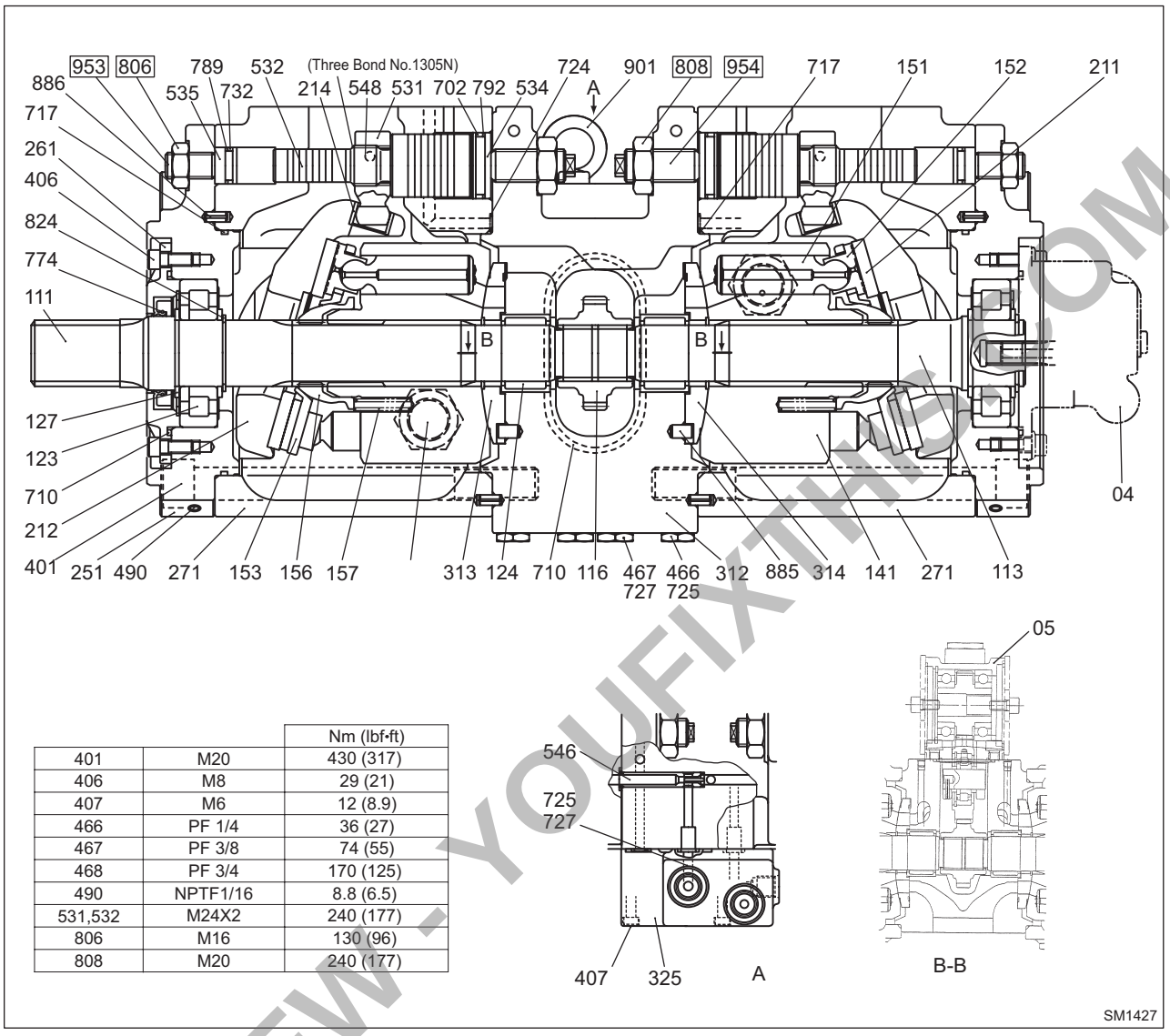


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HYDRAULIC PUMP

MAIN PUMP



		Nm (lbf·ft)
401	M20	430 (317)
406	M8	29 (21)
407	M6	12 (8.9)
466	PF 1/4	36 (27)
467	PF 3/8	74 (55)
468	PF 3/4	170 (125)
490	NPTF1/16	8.8 (6.5)
531,532	M24X2	240 (177)
806	M16	130 (96)
808	M20	240 (177)

111 Drive shaft (F)
113 Drive shaft (G)
116 Gear #1
123 Roller bearing (Q.ty 2)
124 Needle bearing (Q.ty 2)
127 Bearing spacer (Q.ty 4)
141 Cylinder block (Q.ty 2)
151 Piston (Q.ty 18)
152 Shoe (Q.ty 18)
153 Retainer plate (Q.ty 2)
156 Spherical bushing (Q.ty 2)
157 Cylinder spring (Q.ty 18)
211 Shoe plate (Q.ty 2)
212 Swash plate (Q.ty 2)
214 Tilting bushing (Q.ty 2)
251 Swash plate support (Q.ty 2)
261 Seal cover (F)
271 Pump casing (Q.ty 2)
312 Valve block
313 Valve plate (R)
314 Valve plate (L)
325 Sensor block
401 Socket bolt; M20X210 (Q.ty 8)
406 Socket bolt; M8X20 (Q.ty 4)
407 Socket bolt; M6X55 (Q.ty 3)
466 VP plug; PF1/4 (Q.ty 2)
467 VP plug; PF3/8 (Q.ty 2)
468 VP plug; PF3/4 (Q.ty 4)
490 VP plug; NPTF1/16 (Q.ty 32)
531 Tilting pin; M24X2 (Q.ty 2)
532 Servo piston M24×2 (Q.ty 2)
534 Stopper (L) (Q.ty 2)
535 Stopper (S) (Q.ty 2)
546 Spacer (Q.ty 2)
548 Feed back pin (Q.ty 2)
702 O-ring; 1B G35 (Q.ty 2)
710 O-ring; 1B G95 (Q.ty 2)
717 O-ring; 1B G145 (Q.ty 4)
724 O-ring; 1B P8 (Q.ty 16)
725 O-ring; 1B P11 (Q.ty 9)
727 O-ring; 1B P14 (Q.ty 3)
728 O-ring; 1B P24 (Q.ty 4)
732 O-ring; 1B P18 (Q.ty 2)
774 Oil seal
789 Back up ring; P18 (Q.ty 2)
792 Back up ring; G35 (Q.ty 2)
806 Nut; M16 (Q.ty 2)
808 Nut; M20 (Q.ty 2)
824 Snap ring (Q.ty 2)
885 Valve plate pin (Q.ty 2)
886 Spring pin (Q.ty 4)
901 Eye bolt M10 (Q.ty 2)
953 Socket screw; M16X35 (Q.ty 2)
954 Set screw; M20 (Q.ty 2)
04 Gear pump
05 PTO unit

The codes in a rectangle represent an adjustment item. Avoid making adjustments unless absolutely necessary.

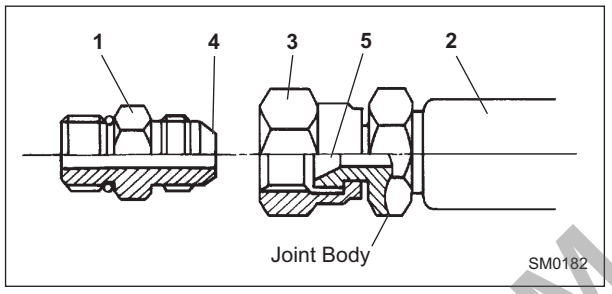
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PIPING JOINT

Pipe Thread Connection / Union Joint Tightening Torque Specifications

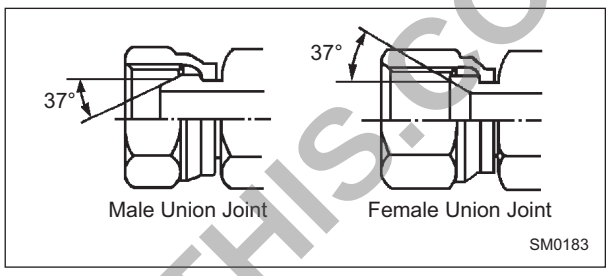
Union Joint

Metal sealing faces (**4**) and (**5**) of adaptor (**1**) and hose (**2**) fit together to seal pressure oil. Union joints are used to join small-diameter lines.



ATTENTION

1. *Do not over-tighten union nut (**3**). Excessive force will be applied to metal sealing surfaces (**4**) and (**5**), possibly cracking adaptor (**1**). Be sure to tighten union nut (**3**) to specifications.*
2. *Scratches or other damage to sealing surfaces (**4**) or (**5**) will cause oil leakage at the joint. Take care not to damage them when connecting /disconnecting.*



Type	Wrench Size		Tightening Torque
	Union Nut	Joint Body	(Nm)
37° Union Joint	19	17	29
	22	19	39
	27	22	78.5
	36	30, 32	157
	41	36	205
	50	46	323.6

NOTE: *Tightening torque for the non-union type 37° male joint is the same as the 37° female union joint.*

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Error Code	Trouble	Described page
B042	Incorrect output of arm in pressure sensor	T5-1-13
B043	Open-circuit of arm in pressure sensor	T5-1-14
B044	Short-circuit of arm in pressure sensor	T5-1-15
B052	Incorrect output of bucket digging pressure sensor	T5-1-16
B053	Open-circuit of bucket digging pressure sensor	T5-1-16
B054	Short-circuit of bucket digging pressure sensor	T5-1-17
B062	Incorrect output of bucket dump pressure sensor	T5-1-17
B063	Open-circuit of bucket dump pressure sensor	T5-1-18
B064	Short-circuit of bucket dump pressure sensor	T5-1-18
B072	Incorrect output of swing pressure sensor	T5-1-19
B073	Open-circuit of swing pressure sensor	T5-1-19
B074	Short-circuit of swing pressure sensor	T5-1-20
B092	Incorrect output of travel right pressure sensor	T5-1-20
B093	Open-circuit of travel right pressure sensor	T5-1-21
B094	Short-circuit of travel right pressure sensor	T5-1-22
B102	Incorrect output of travel left pressure sensor	T5-1-23
B103	Open-circuit of travel left pressure sensor	T5-1-23
B104	Short-circuit of travel left pressure sensor	T5-1-24
B113	Open-circuit of pressure sensor of optional selector positioning	T5-1-25
B114	Short-circuit of pressure sensor of optional selector positioning	T5-1-26
B162	Incorrect output of P1 optional side pressure sensor	T5-1-26
B163	Open-circuit of P1 side optional pressure sensor	T5-1-27
B164	Short-circuit of P1 side optional pressure sensor	T5-1-28
B172	Incorrect output of P2 optional side pressure sensor	T5-1-28
B173	Open-circuit of P2 side optional pressure sensor	T5-1-29
B174	Short-circuit of P2 side optional pressure sensor	T5-1-29
C012	Incorrect output of P1 pump pressure sensor	T5-1-30
C013	Open-circuit of P1 pump pressure sensor	T5-1-30
C014	Short-circuit of P1 pump pressure sensor	T5-1-31
C022	Incorrect output of P2 pump pressure sensor	T5-1-31
C023	Open-circuit of P2 pump pressure sensor	T5-1-32
C024	Short-circuit of P2 pump pressure sensor	T5-1-32
C033	Open-circuit of boom head pressure sensor	T5-1-33
C034	Short-circuit of boom head pressure sensor	T5-1-33
C043	Open-circuit of boom rod pressure sensor	T5-1-34
C044	Short-circuit of boom rod pressure sensor	T5-1-34
D012	Failure of output transistor ON at P1 unload proportional valve	T5-1-35
D013	Open-circuit of P1 unload proportional valve	T5-1-35
D022	Failure of output transistor ON at P2 unload proportional valve	T5-1-36
D023	Open-circuit of P2 unload proportional valve	T5-1-37
D032	Failure of output transistor ON at travel straight proportional valve	T5-1-37
D033	Open-circuit of travel straight proportional valve	T5-1-38
D062	Failure of output transistor ON at arm in high speed proportional valve	T5-1-39
D063	Open-circuit of arm in high speed proportional valve	T5-1-40
D152	Proportional bypass valve and output transistor ON failure	T5-1-40
D153	Proportional bypass valve Open-circuit	T5-1-41

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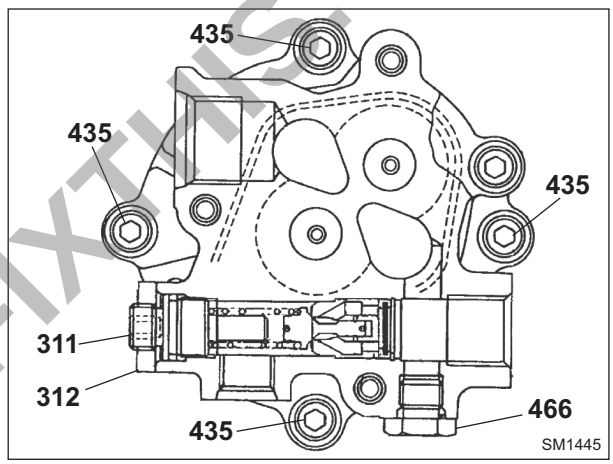
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DISASSEMBLY HYDRAULIC PUMP DEVICE

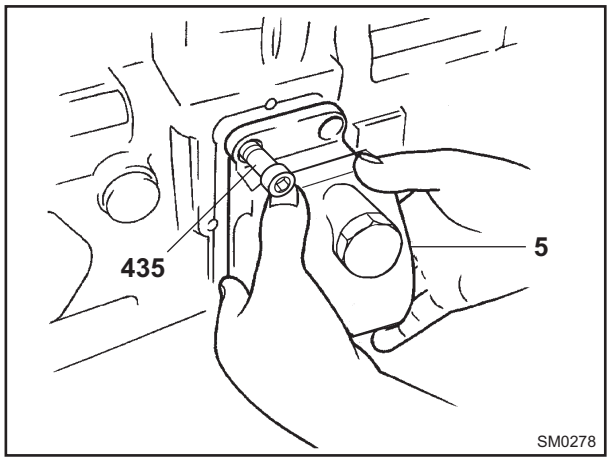
- Ensure disassembly operations are done in clean environment.
  Spread rubber sheet or cloth on work bench to protect parts.
- Clean parts removing dust and rust, etc. on pump surface with wash oil.
- Drain oil from pump casing by by removing drain port plugs (**466** and **468**).
  :19, 36 mm

NOTE: *Drain oil from the plugs of the front pump and the rear pump.*

1. Removing pilot pump.
   Remove the socket bolts (**435**) to remove pilot pump (**4**).
   : 6 mm

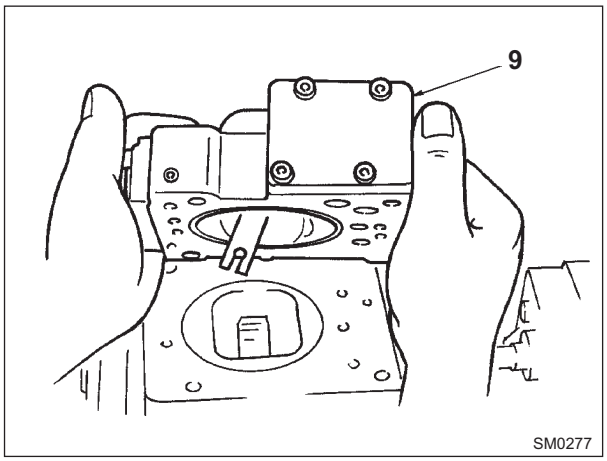


2. Removing PTO gear casing.
   Remove socket bolts (**435**), then remove PTO gear casing (**5**).
   : 8 mm

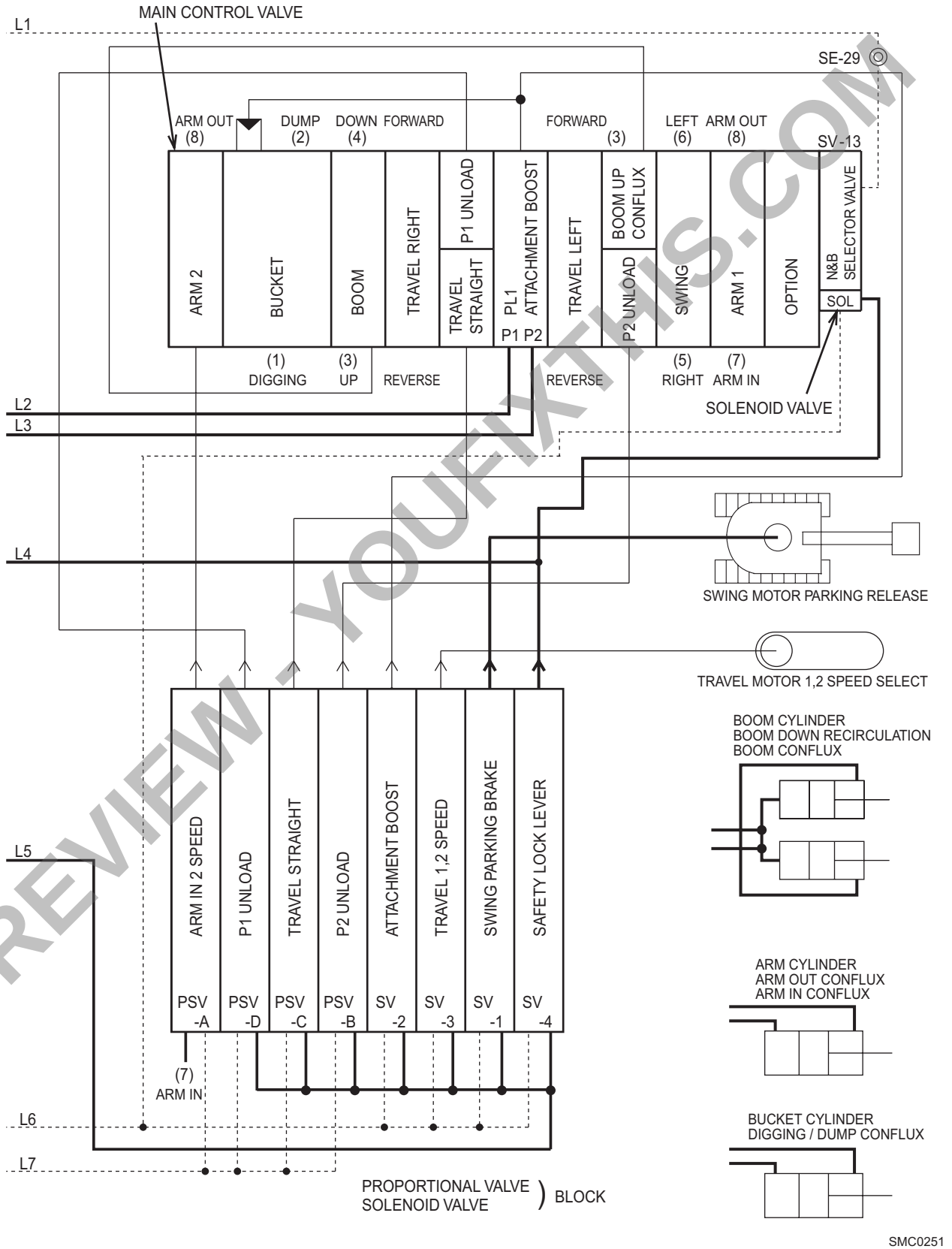


3. Removing regulator.
   Remove the socket bolts (**412**) and (**413**), then remove regulator (**9**).
   : 6 mm

***NOTE**: Socket bolts (412 and 413) are shown in figure SM0296 on page W2-2-14.*



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1. Controls do not function/slow

No.	Sections	Contents/normal value		Corrective action, others
1	Fuse	Check fuse No.4 (10 A)	If the fuse is blown, check on the short-circuited section.	
2	Safety lever lock switching	Carry out service diagnosis	No.4 K-4 switch: Push down on the lever and it turns on, push up and it turns off.	Check action of switch by tester, or check that the power voltage is lowered by pushing the lever down.
3	Safety lever lock switching	Check that the solenoid is switched correctly	Measure both terminals on the solenoid connector. 24 V by pushing the lever down, 0 V by pushing it up	Check solenoid unit for possible failure. Check harness for possible failure.
4	Safety lever lock relay	Carry out service diagnosis	No.4 K-4 lock lever: Push down on the lever and it turns off, push up and it turns on.	Check action of relay by tester
5	Pilot pressure sensor	• Stop engine and turn key to on position. All pilot low pressure sensors are 0 MPa to 0.1 MPa.	Check 5 V power for controller	
6	Solenoid valve for safety lock lever	Measure pressure of solenoid A1 port	About 0 MPa by pushing the lever up, and 4 MPa or more by push it down.	Replace solenoid valve
7	Pilot line filter	Disassemble and check it visually	Check if filter is clogged	Clean filter
8	Pilot gear pump	Measure pilot primary pressure at gear pump	Check that it is 4 MPa or more when idling high	Check gear pump and the relief valve for possible failure
9	Multi control valve (in case that travel is operable)	Change position	Since all are blocked due to poor switching performance, check that the lever select pattern is set to the proper position.	
10	Measuring current value of P1/P2 unload proportional valve	Carry out service diagnosis	• No.7 D-1 P1 unload valve (cut valve) D-1 P2 unload valve (cut valve) • See Service Diagnosis Data List Operation No.3 Boom up full lever & relief	If a large difference in readings from the actual measured value occurs, check proportional valve and controller for possible failure.
11	Secondary pressure of P1, P2 unload proportional valve	Measure the proportional valve secondary pressure directly at the ports A7 and A5 of 8 section solenoid block	Check that P1/P2 unload secondary pressures are within the range of 0.5 to 1.2 MPa in boom up full lever and high idling operation	Replace proportional valve
12	Measuring current value of P1/P2 pump proportional valve	Carry out service diagnosis.	• No.6 E-1 P1 pump E-2 P2 pump • See Service Diagnosis Data List Operation No.18 Travel right full lever & idling Operation No.19 Travel left full lever & idling	If a large difference in readings from the actual measured value occurs, check proportional valve and controller for possible failure.

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PILOT VALVE

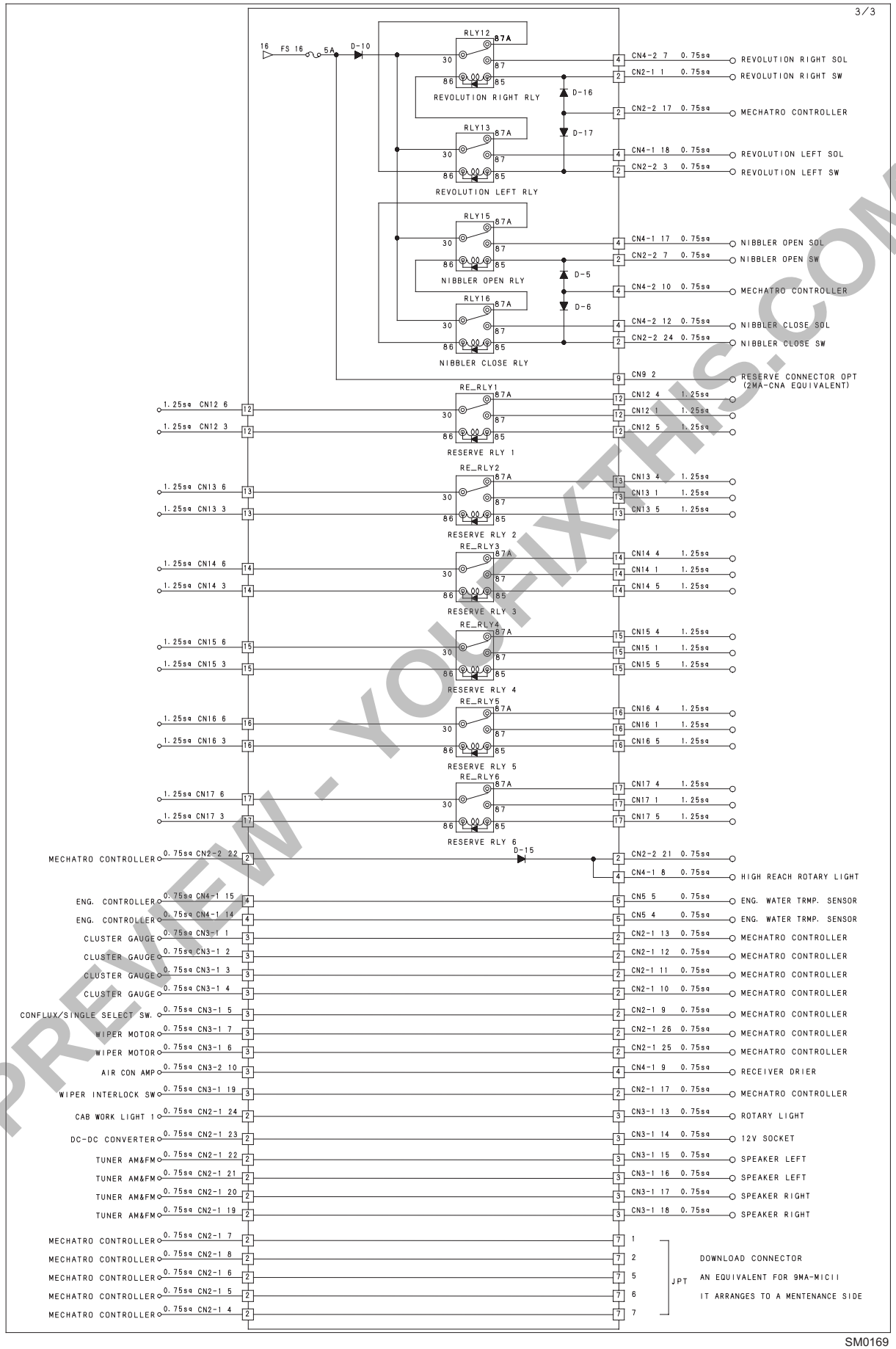
	ATTACHMENT	TRAVEL
Model	PV48K2058	6TH6NRZ
Primary pressure	5.0 MPa (725 psi)	4.9 MPa (710.5 psi)
Secondary pressure	0.6 ~ 3.2 MPa (87 ~ 464 psi)	0.54 ~ 2.35 MPa (78.3 ~ 340.7 psi)
Rated flow	20 L/min (5.3 gal/min)	25 L/min (6.6 gal/min)
Mass	Approx. 2 kg (4.4 lb)	Approx. 8 kg (17.6 lb)

SWING MOTOR UNIT

Hydraylic motor	Model		M5X130CHB–10A–54A/295-F
	Type		Swash-plate type, fixed-displacement plunger motor
	Displacement	cm^3 (in^3)	129.2 (7.88)
	Working pressure	MPa (psi)	32.4 (4700)
	Max. flow	L/min (gal/min)	210 (55.5)
	Braking torque	N·m (lbf·ft)	655 (483)
	Release pressure	MPa (psi)	2.5~5.0 (362 ~ 725)
	Relief set pressure	MPa (psi)	29 (4205)
	Mass	kg (lbs)	47 (103.6)
Antireaction valve block	Type		2KAR6P72/240-712
	Mass	kg (lbs)	2.5 (5.5)
Hydraulic motor assy mass		kg (lbs)	49.5 (109)
Reduction unit	Speed reduction type		Planetary 2-stage
	Reduction ratio		19.286
	Lubricate oil		Gear oil SAE 80W/90 (API GL-4 Class or GL-5 Class)
	Lubricate oil volume	L (gal)	12 (3.2)
	Mass	kg (lbs)	225 (496)
Total mass		kg (lbs)	Approx. 275 (606)

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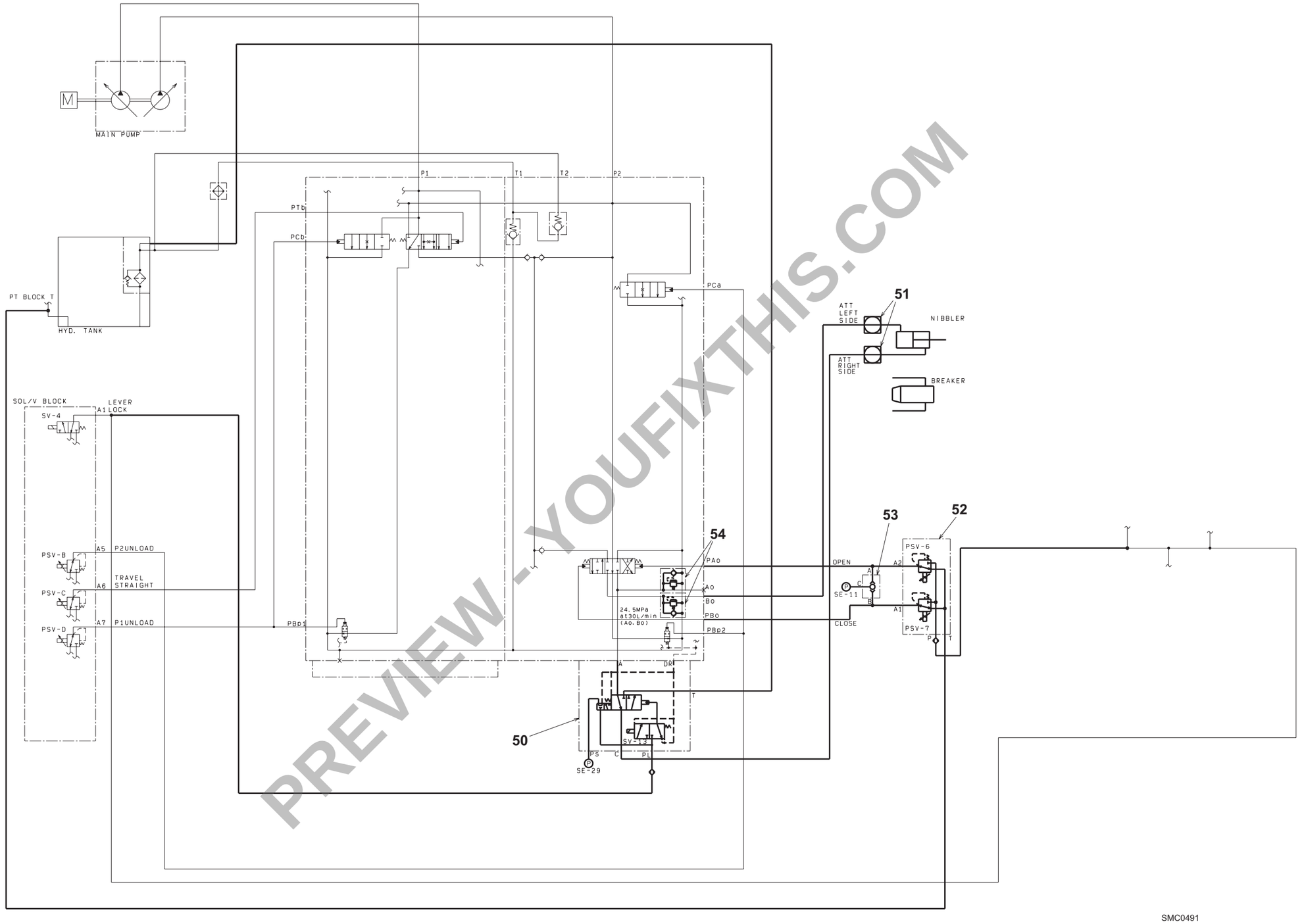
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PROPORTIONAL HAND CONTROL N&B HYDRAULIC CIRCUIT

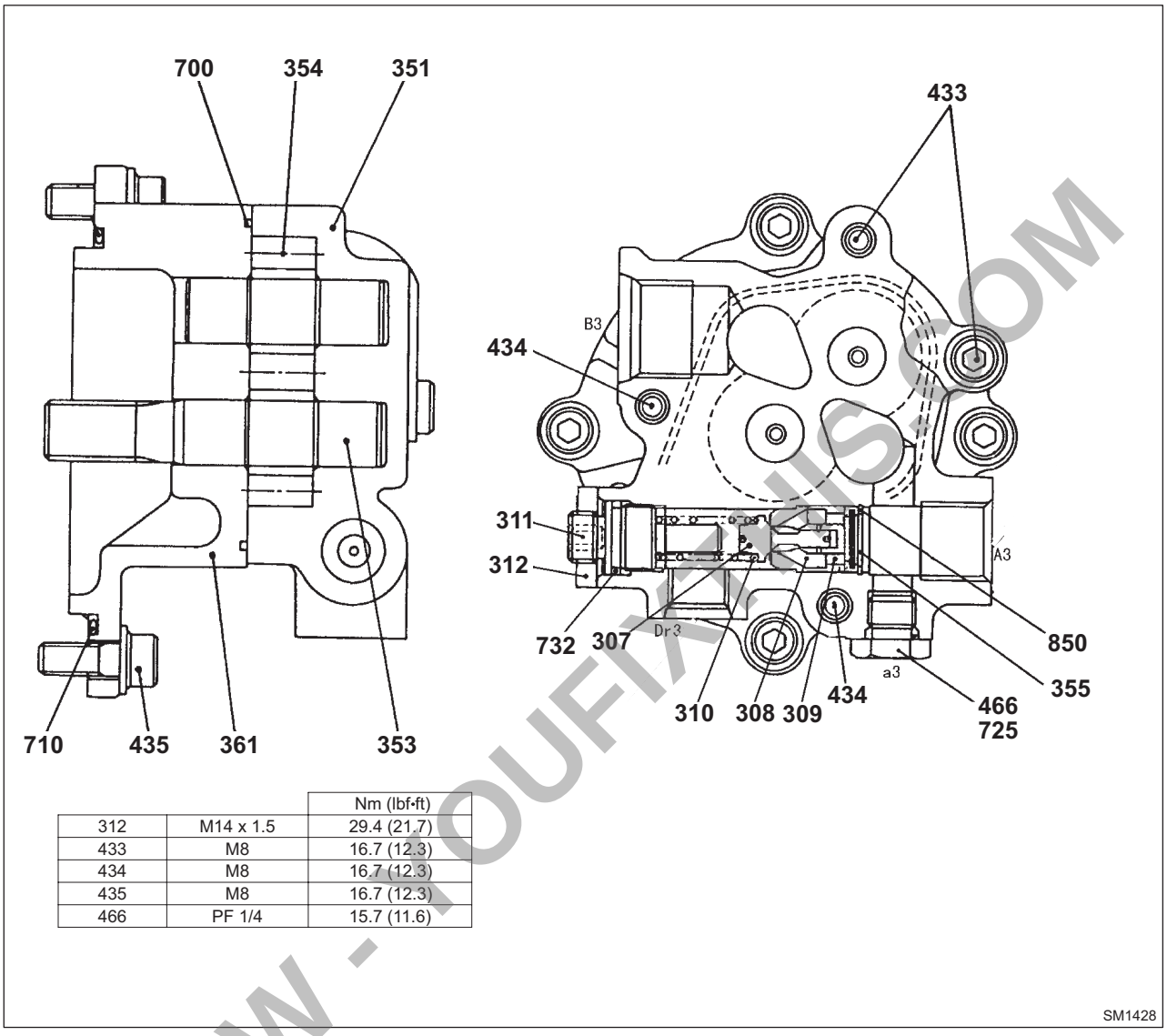


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GEAR PUMP (FOR PILOT)



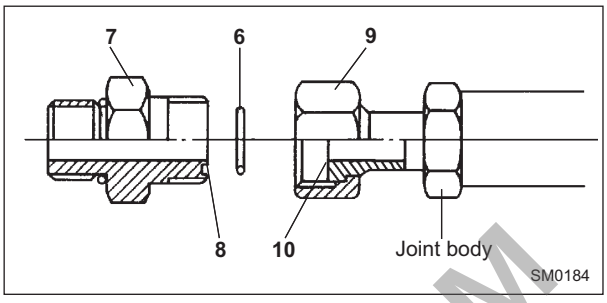
		Nm (lbf·ft)
312	M14 x 1.5	29.4 (21.7)
433	M8	16.7 (12.3)
434	M8	16.7 (12.3)
435	M8	16.7 (12.3)
466	PF 1/4	15.7 (11.6)

307 - Poppet
308 - Seat
309 - Ring
310 - Spring
311 - Adjust screw
312 - Lock nut; M14×1.5
351 - Gear case
353 - Drive gear
354 - Driven gear
355 - Filter
361 - Front case
433 - Flange socket; M8×40 (Q.ty 2)
434 - Flange socket; M8×55 (Q.ty 2)
435 - Flange socket; M10×35 (Q.ty 2)
466 - Vp plug; PF1/4
700 - Ring
710 - O-Ring
725 - O-Ring
728 - O-Ring
732 - O-Ring
850 - Locking ring
a3 - Gauge port; PF1/4 16 Nm (11.8 lbf·ft)
A3 - Delivery port; PF 1/2 53 Nm (39.1 lbf·ft)
B3 - Suction port; PF 3/4 73.5 Nm (54.2 lbf·ft)
Dr3 - Drain port; PF 3/8 34.3 Nm (25.3 lbf·ft)

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O-Ring Seal Joint

O-Ring (**6**) seats against the end face of adaptor (**7**) to seal pressure oil.



ATTENTION

1. *Be sure to replace O-Ring (**6**) with a new one when reconnecting.*
2. *Before tightening union nut (**9**), confirm that O-Ring (**6**) is seated correctly in O-Ring groove (**8**). Tightening union nut (**9**) with O-Ring (**6**) displaced will damage O-Ring, resulting in oil leakage.*
3. *Take care not to damage O-Ring groove (**8**) or sealing face (**10**). Damage to O-Ring (**6**) will cause oil leakage.*
4. *If union nut (**9**) is found to be loose, causing oil leakage, do not tighten it to stop the leak. Instead, replace O-Ring (**6**) with a new one, then tighten union nut (**9**) after confirming that O-Ring (**6**) is securely seated in place.*

Wrench Size		Tightening Torque
Union Nut	Joint Body	(Nm)
19	17	29.4
22	19	68.6
27	22	93
30	27	137.3
36	30	175
41	36	205
50	46	320

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Error Code	Trouble	Described page
E012	Failure of output transistor ON at P1 pump proportional valve	T5-1-41
E013	Open-circuit of P1pump proportional valve	T5-1-42
E022	Failure of output transistor ON at P2 pump proportional valve	T5-1-43
E023	Open-circuit of P2 pump proportional valve	T5-1-43
E032	Optional relief adjusting proportional valve 1 and output transistor ON failure	T5-1-44
E033	Optional relief adjusting proportional valve1 Open-circuit	T5-1-45
E042	Optional relief adjusting proportional valve 2 and output transistor ON failure	T5-1-45
E043	Optional relief adjusting proportional valve2 Open-circuit	T5-1-46
F011	Failure of output transistor OFF and GND short of attachment boost SOL valve	T5-1-46
F013	Failure of output transistor ON or Open-circuit of attachment boost SOL valve	T5-1-47
F021	Failure of output transistor OFF and GND short of swing parking SOL valve	T5-1-48
F023	Failure of output transistor ON or Open-circuit of swing parking SOL valve	T5-1-48
F031	Failure of output transistor OFF and GND short of travel 1-2 speed SOL valve	T5-1-49
F033	Failure of output transistor ON or Open-circuit of travel 1-2 speed SOL valve	T5-1-50
F041	Failure of output transistor OFF and GND short of optional selector SOL valve	T5-1-50
F043	Failure of output transistor ON or Open-circuit of optional selector SOL valve	T5-1-51
G032	Overrun of speed sensor input to Mechatro-controller	T5-1-52
G033	Open-circuit of speed sensor input to Mechatro-controller	T5-1-52
G042	Overrun of speed sensor input to Mechatro-controller and received data from E/G controller.	T5-1-53
G043	Open-circuit of speed sensor input to Mechatro-controller and received data from E/G controller.	T5-1-53
H013	Open-circuit of acceleration potentiometer	T5-1-54
H014	Power short-circuit of acceleration potentiometer	T5-1-54
H023	Open-circuit of boom angle potentiometer	T5-1-55
H024	Power short-circuit of boom angle potentiometer	T5-1-56
H033	Open-circuit of arm angle potentiometer	T5-1-57
H034	Power short-circuit of arm angle potentiometer	T5-1-58
H091	Failure of GND short-circuit of fuel sensor	T5-1-59
H093	Open-circuit of fuel sensor	T5-1-59
I111	Received error of CAN1 communication (passive error)	T5-1-60
I113	Received error of CAN1 communication (time-out)	T5-1-60
I121	Transmission of CAN1 communication is abnormal (Busoff)	T5-2-61
I211	Reception of CAN1 communication is abnormal (passive error)	T5-2-61
I213	Reception of CAN2 communication is abnormal (passive error)	T5-2-62
I221	Transmission of CAN2 communication is abnormal (Busoff)	T5-2-62
K014	Adhesion of battery relay terminal	T5-1-63
R014	Failure of arc prevention relay of wiper motor	T5-1-64
R024	Failure of normal rotation relay of wiper motor	T5-1-65
R034	Failure of reverse rotation relay of wiper motor	T5-1-66
R044	Failure of washer motor relay	T5-1-67
R134	Failure of swing flasher relay	T5-1-68
R144	Failure of swing flasher relay	T5-1-69
R154	Failure of travel alarm relay	T5-1-70
R164	Failure of auto idling stop relay 2	T5-1-71
R174	Failure of engine forcible stop relay	T5-1-72

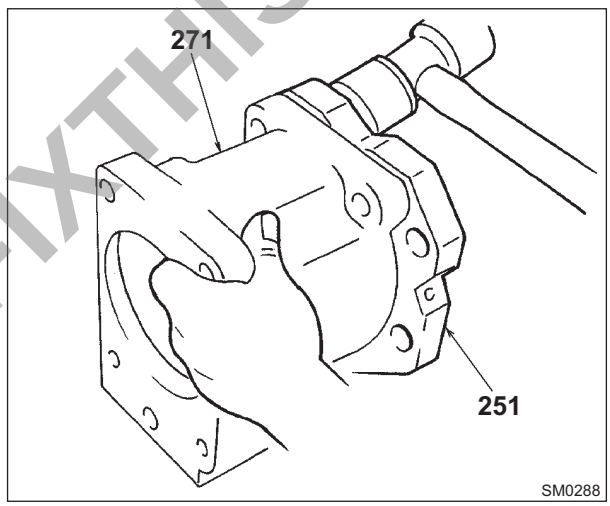
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Assembly

1. When reassembling, note the following:
   - Repair or replace damage parts prior to assembly.Wash parts sufficiently in cleaning oil and dry them with jet air.
   - Coat sliding areas and bearings with clean hydraulic oil.
   - Replace O-Rings and oil seals.
   - Tighten socket bolts and plugs to specified torques. Use a torque wrench as required.
   - Ensure front pump components are kept separate from rear pump parts.

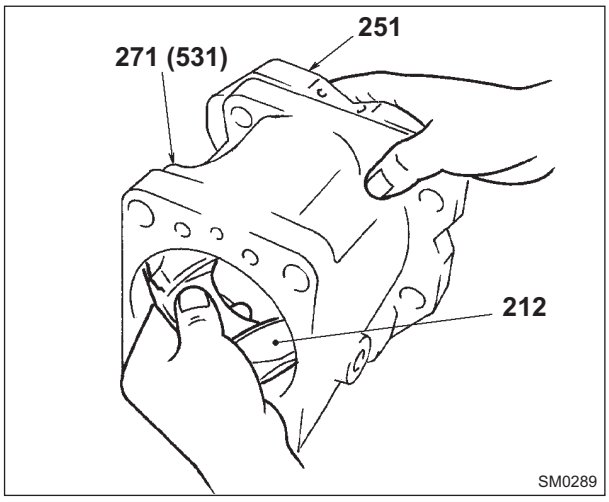
2. Attach swash plate support (**251**) to pump casing (**271**). Lightly tap swash plate support using plastic hammer.

NOTE: *Install servo piston, tilting pin, and stoppers to pump casing.*
Use a jig to tighten servo piston and tilting pin to prevent damage to tilting pin and feedback pin.
Coat screwed part with Loctite 262.



3. Install swash plate placing the pump casing with its mounting surface of the regulator facing down. Insert the tilting bushing of the swash plate into tilting pin (**531**), and fit swash plate (**212**) to swash plate support (**251**) properly.

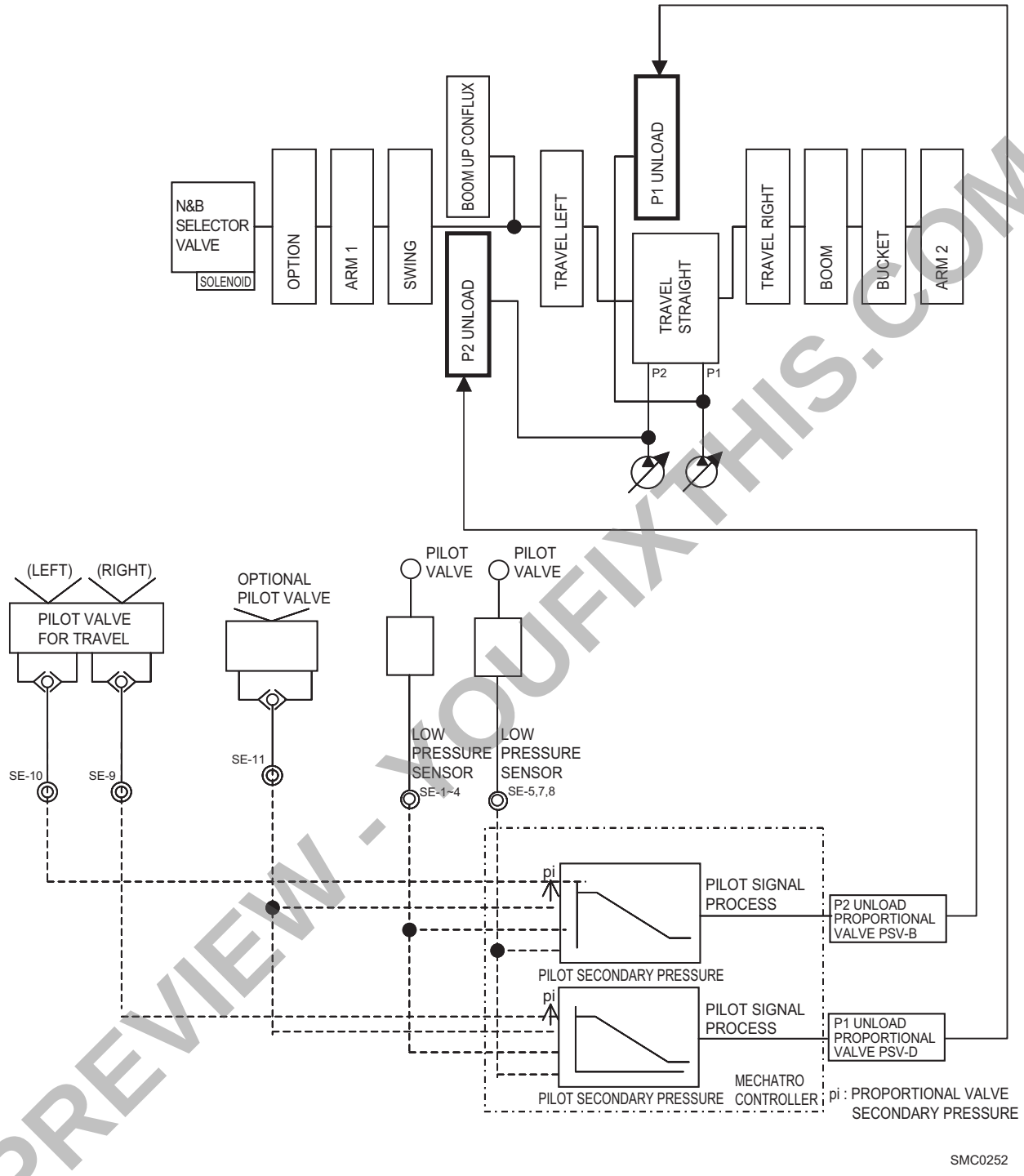
NOTE: *Ensure swash plate moves smoothly.*
To ease shaft installation, apply grease to sliding parts of swash plate and support.
Do not damage the sliding surfaces of shoe plate.



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2.2 UNLOAD VALVE CONTROL



1. Upon starting any operation, secondary pilot pressure is supplied to valve spools and respective low pressure sensors.
2. The output voltage of low pressure sensor is supplied to the mechatro controller. The mechatro controller processes the pilot signal and outputs a command, according to the sensor voltage, to each unload pressure proportional valve.
3. Each unload pressure proportional valve outputs pilot secondary pressure according to the mechatro controller command output, and switches each unload spool.
4. During operation, manipulation of the lever controls the bleed opening, consequently pump pressure which is used to drive each actuator is delivered and makes each actuator start operating.

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