

MDA

MECHANIC'S DAILY SERVICE AID

Wheel Loader R Series

Kubota

PREAMBLE:

Developed for the Kubota dealers' network only, this MDA Book provides the key information for maintenance & service of Kubota wheel loaders.

The MDA Book is subject to regular updates. Make sure that you always have the current version at hand.

For any information missing from the MDA Book, see the original Kubota WSM (Workshop Manual).

TABLE OF CONTENTS

1 Maintenance	1-1
1.1 Maintenance schedule	1-1
1.2 Water and oil volumes	1-3
1.3 Position to check the hydraulic oil level	1-4
1.3.1 R065, R085, R082, R070, R090	1-4
1.4 Periodical check-item confirmation and operation after the periodical check execution	1-5
1.4.1 R065, R085, R082, R070, R090	1-5
1.5 Recommended lubricants	1-8
2 Hydraulic	2-1
2.1 Hydraulic circuits	2-1
2.1.1 R065	2-3
2.1.2 R085	2-4
2.1.3 R082	2-4.1
2.1.4 R070	2-4.2
2.1.5 R090	2-4.3
2.2 Hydraulic components main settings and control valve structure	2-5
2.2.1 R065	2-5
2.2.2 R085	2-7
2.2.3 R082	2-8.1
2.2.4 R070	2-8.3
2.2.5 R090	2-8.5
2.3 Internal leakage and rate	2-9
2.4 Towing in case of an engine failure	2-10
2.4.1 Releasing the parking brake	2-10
2.4.2 Bypassing the HST pump high pressure line	2-11
3 Electrical system	3-1
3.1 Electrical components layout	3-1
3.1.1 R065	3-1
3.1.2 R085	3-2
3.1.3 R082	3-2.1
3.1.4 R070 / R090	3-2.2
3.2 Electrical circuits	3-3
3.2.1 R065	3-3
3.2.2 R085	3-3
3.2.3 R082	3-3
3.2.4 R070	3-3
3.2.5 R090	3-3
3.3 Location of fuses & relays	3-7
3.3.1 R065	3-7
3.3.2 R085	3-10
3.3.3 R082	3-13
3.3.4 R070	3-14
3.3.5 R090	3-17
3.4 Table of battery specifications	3-20

4 Digital meter panel setting mode	4-1
4.1 User setting mode	4-1
4.1.1 R065	4-1
4.1.2 R082, R085	4-2
4.1.3 R070, R090	4-2.1
4.2 Dealer setting mode	4-3
4.2.1 R065, R082, R085	4-3
4.2.2 R070, R090	4-4.2
4.2.3 Service mode settings - R065, R082, R085	4-5
4.2.4 Service mode settings - R070, R090	4-7.1
4.3 Error codes	4-8
4.3.1 R065	4-8
4.3.2 R085	4-11
4.3.3 R082	4-16.1
4.3.4 R070, R090	4-16.4
4.3.5 Diesel Particle Filter (DPF) regeneration - Conditions and procedures	4-17
5 Miscellaneous, Engine	5-1
5.1 AUX lines	5-1
5.1.1 AUX flow rate R065	5-1
5.1.2 AUX flow rate R085	5-1
5.1.3 AUX flow rate R082	5-2
5.1.4 AUX port positions	5-3
5.2 Wheels	5-3
5.2.1 Tire pressure for different tires and pallet fork/bucket R065 up to #00278	5-3
5.2.2 Tire pressure for different tires and pallet fork/bucket R065HW as of #00279	5-4
5.2.3 Tire pressure for different tires and pallet fork/bucket R085	5-4
5.2.4 Tire pressure for different tires and pallet fork/bucket R082	5-4
5.2.5 Tire pressure for different tires and pallet fork/bucket R070	5-4
5.2.6 Tire pressure for different tires and pallet fork/bucket R090	5-4
5.3 Engine basic data	5-5
5.4 A/C pressure switch	5-5
5.5 Center pin play	5-6
6 Tightening torques	6-1
6.1 General tightening torques	6-1
6.1.1 Stud bolts	6-1
6.1.2 Torque for hydraulic hose fittings	6-2
6.1.3 Torques of lock nuts for elbows with male seats and adaptors with O-rings (Straight Threads)	6-2
6.2 Specific tightening torques	6-3
6.3 Torque conversion chart N·m to lbf·ft	6-4
7 Annex 1 - Inspection sheets	7-1

Revision history				
MDA Book version	Parts number updated pages from previous version	Date	Main relevant points and corrective measures	Person in charge
RY920-2367-0				
RY920-2367-1	RY910-2543-0	September 2017	Tire pressure for R065HW Changed cylinder speed Amended inspection sheets Inserted R065HW inspection sheet Wheel loader model R082 added. Revision of the maintenance schedule	Laubscher
RY920-2367-2	RY920-2647-0	April 2018	Exchange of recommended lubricant table R082 pressure settings corrected	Laubscher
RY920-2367-3	RY920-2869-0	December 2020	Wheel loader model R070 added. Wheel loader model R090 added	Laubscher

1 Maintenance

1.1 Maintenance schedule

Checkpoints	Measures	Models	Hour meter					Interval	
			50	250	500	750	1000		
Wheel nuts	Tighten	All models	●	○	○	○	○	every 250h	
V-belt	Adjust	All models		○	○	○	○	every 250h	
Engine oil and oil filter	Change	All models			○		○	every 500h	
Fuel filter	Replace	All models			○		○	every 500h	
Return filter	Replace	All models		●	○		○	every 500h	
Front and rear axle oil	Check	All models		○	○	○	○	every 500h	
	Change	All models		●			○	every 1000h	
Hydraulic oil and suction filter	Replace	All models					○	every 1000h	
Interior air filter	Replace	All models					○	every 1000h	*1
HST filter	Replace	All models					○	every 1000h	
Air filter	Replace	All models					○	every 1000h	*1
Oil separator filter	Replace	R085, R070, R090						every 1500h	
EGR cooler	Check	R085, R070, R090						every 1500h	
Fuel injectors	Check	All models						every 1500h	
Alternator and starter motor	Check	All models						every 2000h	
Fuel injection pump	Check	R065						every 3000h	
EGR system	Check	R085, R070, R090						every 3000h	
Turbo charger	Check	R085, R090						every 3000h	
Diesel particle filter	Clean	R085						every 3000h	
		R070, R090						every 6000h	
Safety inspection	Check	All models						annually	*3
Engine and electrical wiring harness	Check	All models						annually	
Boost pressure sensor	Check	R085, R090						annually	
Air mass flow sensor	Check	R085, R070, R090						annually	
Condition of particle filter case	Check	R085, R070, R090						annually	
DPF differential pressure sensor and the hoses and piping	Check	R085, R070, R090						annually	
Particle filter exhaust temperature sensor	Check	R085, R070, R090						annually	
EGR and EGR piping	Check	R085, R070, R090						annually	
Water hoses and hose clamps	Replace	All models						every 2 years	
Fuel lines and air intake hoses	Replace	All models						every 2 years	

Checkpoints	Measures	Models	Hour meter					Interval	
			50	250	500	750	1000		
Crankcase ventilation and hoses	Replace	R085, R070, R090						every 2 years	
Change DPF differential pressure sensor and hoses (front and rear)	Replace	R085						every 2 years	
Air mass flow sensor hose(s)	Replace	R085, R070, R090						every 2 years	
Charge pressure sensor rubber hoses	Replace	R085, R090						every 2 years	
EGR cooler	Replace	R085, R070, R090						every 2 years	
Coolant	Change	All models						every 2 years	
Hydraulic hoses	Replace	All models						every 6 years	
Air conditioning filter	Replace	All models with A/C						every 1000h	*1
Air conditioning belt	Adjust			○	○			every 250h	
Air conditioning pipes and hoses	Check							annually	
	Replace							every 2 years	
Refrigerant gas	Check							maintenance on demand	

* Maintenance tasks identified with ● must be carried out once the specified service hours after commissioning have been reached.

*1: Under heavy dust conditions, air filters and fresh air filters must be cleaned and/or replaced more often.

*2: Earlier if necessary.

*3: At least annually.

■ NOTE

See chapter 1.4 for information about resetting the maintenance prompt.

1.2 Water and oil volumes

Model	Item	Engine oil (including filter change) (l)	Cooling sys- tem and re- serve tank (l)	Oil tank (l)	Fuel tank (l)	Front axle		Rear axle			Brake flu- id reser- voir (l)	Refriger- ant circuit (kg)	A/C com- pressor (ml)
						Axle case (l)	Wheel gear case (l)	Axle case (l)	Reduc- tion gear case (l)	Wheel gear case (l)			
	Lubri- cant	Engine oil	LLC and dis- tilled water at 50:50 ratio	Engine oil	Fuel	Gear oil							Hydraulic oil
R065		9	6.8 + 1.1 Canopy 8.0 + 1.1 Cabin	55 (Oil lev- el gauge center)	70	4.5	0.9	4.5	0.6	0.9	0.3	0.7 ± 0.05	110-120
R082		9	6.8 + 1.1 Canopy 8.0 + 1.1 Cabin	57 (Oil lev- el gauge center)	70	4,5	0,9	4,5	0,6	0,9	0,3	0.7 ± 0.05	110-120
R085		9	6.8 + 1.1 Canopy 8.0 + 1.1 Cabin	57 (Oil lev- el gauge center)	70	4.5	0.9	4.5	0.6	0.9	0.3	0.7 ± 0.05	110-120
R070		9	6.8 + 1.1 Canopy 8.0 + 1.1 Cabin	57 (Oil lev- el gauge center)	70	4.5	0.9	4.5	0.6	0.9	0.3	0.7 ± 0.05	110-120
R090		9	6.8 + 1.1 Canopy 8.0 + 1.1 Cabin	57 (Oil lev- el gauge center)	70	4.5	0.9	4.5	0.6	0.9	0.3	0.7 ± 0.05	110-120

1.3 Position to check the hydraulic oil level

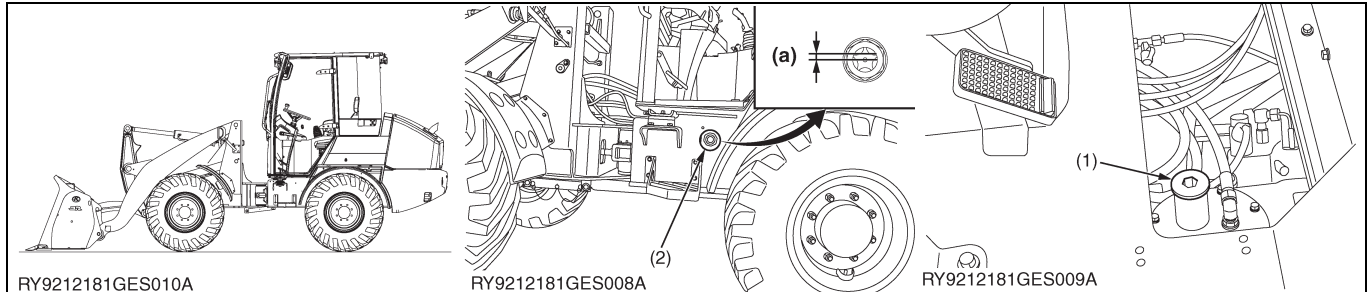
1.3.1 R065, R085, R082, R070, R090

Stop the machine on flat ground. Lower the lift arm, lower the bucket (w/ quick connector) to the ground and align the front frame straight.

With the hydraulic oil at a normal temperature (10 - 30°C), check the oil level gauge.

The oil level should at least reach the oil level gauge center (a).

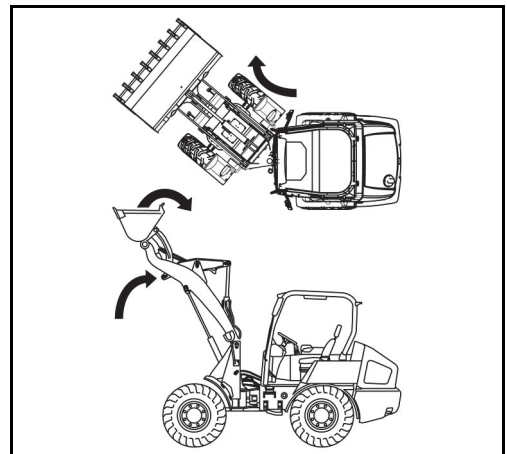
If it is too low, add oil via the filler port.



Negative pressure prevention

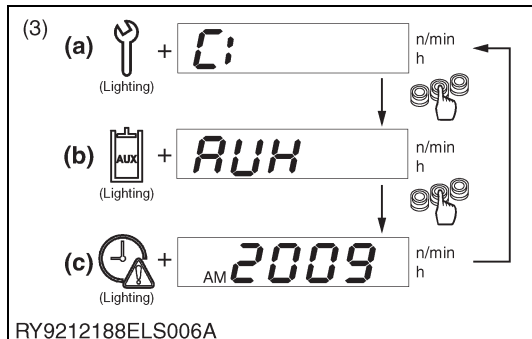
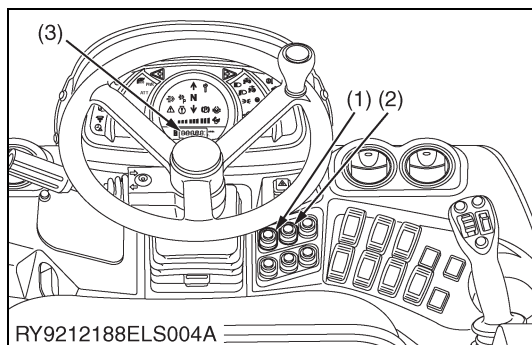
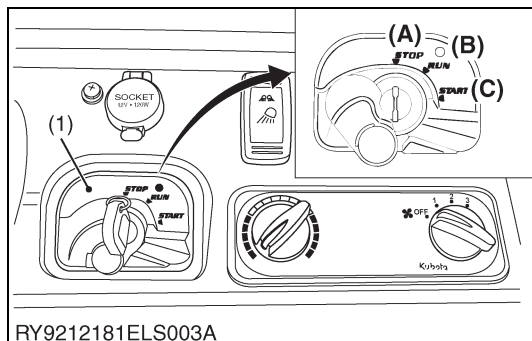
Before screwing in the oil filling screw, all hydraulic cylinders must be completely extended so that there is no negative pressure in the hydraulic oil tank.

- Start the engine and let it idle. The drive direction switch must be in neutral.
- Steer the front frame fully to the right.
- Completely lift arm.
- Fully tilt the bucket back.
- Install lift arm support.
- Screw in the oil filling screw and tighten.
- Tightening torque: 40-45 Nm
- Remove lift arm support.
- Operate all control lever functions of the hydraulic and the steering wheel for about 5 minutes.
- Switch off the engine and lower the attachment back to the ground.
- Check the hydraulic oil level, add oil if necessary.
- After reopening the oil filling screw, carry out negative pressure prevention once more.
- Close the leg room cover



1.4 Periodical check-item confirmation and operation after the periodical check execution

1.4.1 R065, R085, R082, R070, R090



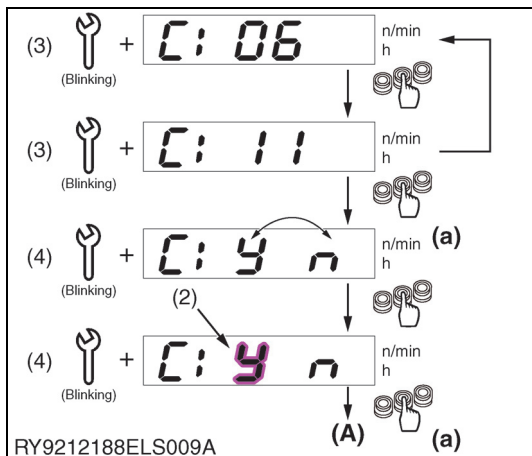
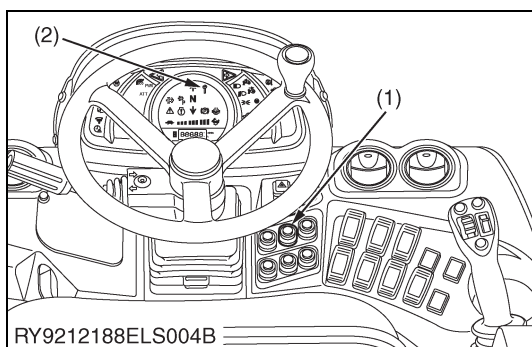
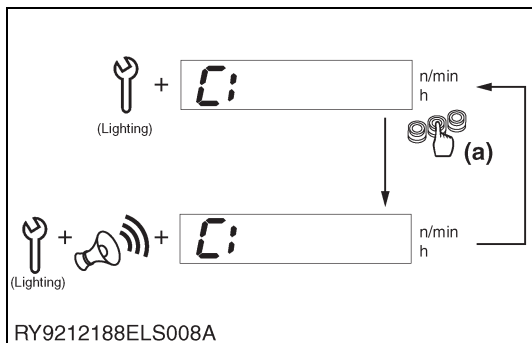
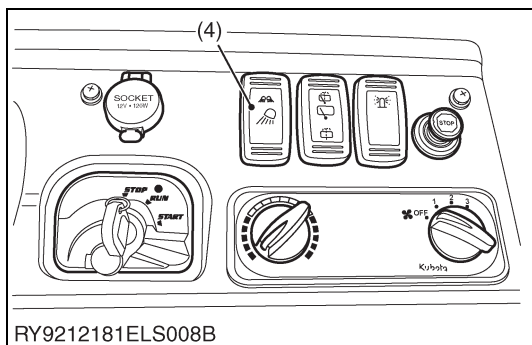
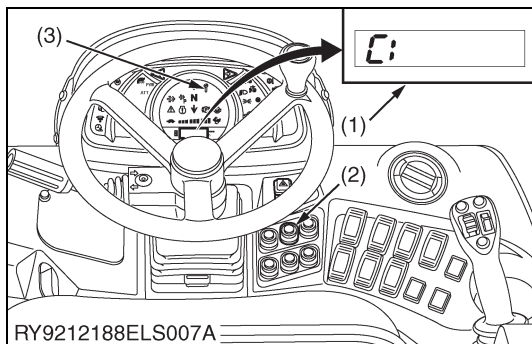
1. Turn the key switch to the RUN position.

- | | |
|----------------|-----------|
| (1) Key switch | (A) STOP |
| | (B) RUN |
| | (C) START |

2. Pressing SW1 switches from the normal mode to the user settings mode.

3. Pressing SW2 toggles the items displayed on the LCD screen in a loop.

- | | |
|-----------------------------------|--------------------------------------|
| (1) User setting switch (SW1) | (a) Periodic Inspection Display mode |
| (2) Display Changing Switch (SW2) | (b) AUX setting mode |
| (3) LCD screen | (c) Time setting mode |



Switching to the Periodic Inspection display screen

1. After switching to the User Settings mode, press SW2 and select the Periodic Inspection mode.
2. After turning the work lamp switch ON/OFF once, pressing and holding SW2 switches the display to the Periodic Inspection display screen.

- If there are no periodic inspection items, when SW2 is held down, the buzzer will beep two times and the screen display will not change.

- (1) Periodic Inspection mode
 - (2) Display changing switch (SW2)
 - (3) Periodic Inspection indicator
 - (4) Work lamp switch
- (a) Hold Down SW2

Final check and confirmation after the Inspection

1. When there are periodic inspection items, the Periodic Inspection indicator blinks and the code(s) of items to be inspected are displayed on the LCD screen. (For information on the codes displayed and the periodic inspection items, refer to "Table of Periodic Inspection Items.")
2. If there are multiple items to be inspected, pressing SW2 toggles the code display in a loop.
3. While the code of a periodic inspection item is displayed, pressing and holding SW2 switches the screen to the related menu item.
4. Pressing SW2 toggles the selection between YES and NO and the selected item blinks.
5. Once a periodic inspection is complete, select YES and then press and hold SW2 to confirm it. After the buzzer beeps several times and the inspection item disappears, return to the Normal mode.
6. Selecting N (No) and then pressing and holding SW2 to confirm allows the periodic inspection item to be displayed continuously.

- (1) Display changing switch (SW2)
 - (2) Flashing
 - (3) Periodic inspection item
 - (4) Checking inspection individually
- (a) Hold Down SW2
- (A) Normal mode

Table of Periodic Inspection Items

When the hour meter has reached the service hours circled in the maintenance schedule below, a message appears. The message shows up as follows:

R065, R082

No.	Checkpoints		Interval
C:01	Engine oil		every 500 h
C: 02	Hydraulic oil		every 1000 h
C: 03	Air filter element	Outer element	every 1000 h
		Inner element	every 1000 h
C: 04	Fuel filter		every 500 h
C: 05	Engine oil filter		every 500 h
C: 06	Front/rear axle oil		every 1000 h
C: 07	Hydraulic return filter		every 500 h
C: 08	Hydraulic oil and suction filter		every 1000 h
C: 09	HST oil filter		every 1000 h

R085, R070, R090

No.	Checkpoints		Interval
C:01	Engine oil		every 500 h
C: 02	Hydraulic oil		every 1000 h
C: 03	Air filter element	Outer element	every 1000 h
		Inner element	every 1000 h
C: 04	Fuel filter		every 500 h
C: 05	Engine oil filter		every 500 h
C: 06	Front/rear axle oil		every 1000 h
C: 07	Hydraulic return filter		every 500 h
C: 08	Hydraulic oil and suction filter		every 1000 h
C: 09	HST oil filter		every 1000 h
C:12	DPF		every 3000 h

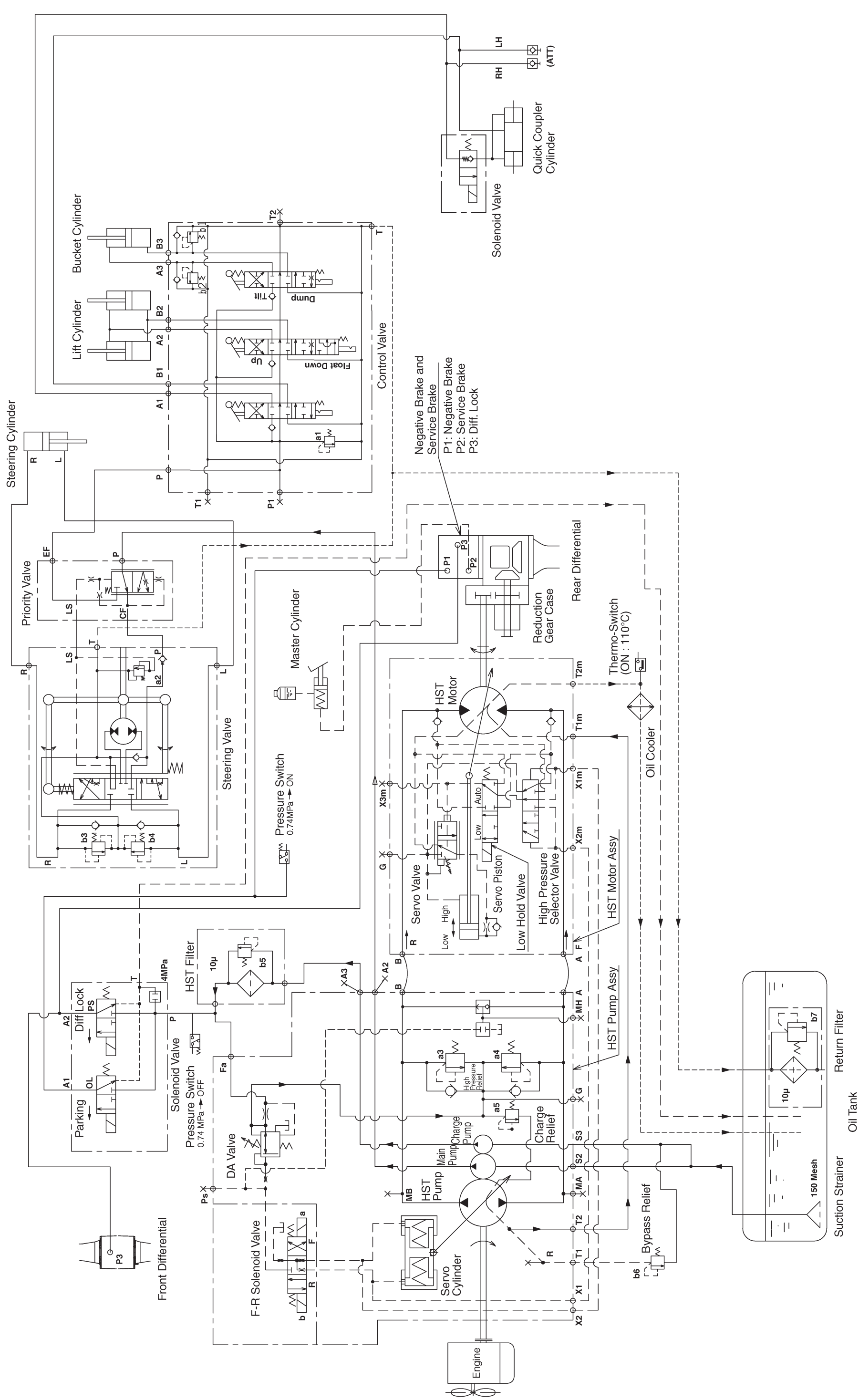
1.5 Recommended lubricants

	Ambient temperature	R065, R082				R085, R070, R090				Note
		Recommendation		Factory filling		Recommendation		Factory filling		
		Viscosity	Quality standard	Brand	Type	Viscosity	Quality standard	Brand	Type	
Engine oil	In winter or at low ambient temperatures	SAE 10W SAE 20W	API CF API CI-4 API CJ-4	ROWE	Hightec Formula GT API CF SAE 10W-40	SAE 10W SAE 20W	API CJ-4 API CK-4	ROWE	Q8T 760 API CJ-4 SAE 10W-30	
	In summer or at high ambient temperatures	SAE 30 SAE 40 SAE 50								
	All-weather	SAE 10W-40								
Coolant			SAE J1034 MB 325.0 ASTM D3306 ASTM D4985	ROWE	Hightec Antifreeze AN G48 (-37°C)		SAE J1034 MB 325.0 ASTM D3306 ASTM D4985	ROWE	Hightec Antifreeze AN G48 (-37°C)	Always use distilled water as the admixture for antifreeze. Refer to the respective coolant manufacturer's recommendations for the correct mixing ratio. Do not mix with other coolants.
Grease		NLGI-2	DIN 51825 KP2K-30	MOBIL	Mobilux EP2	NLGI-2	DIN 51825 KP2K-30	MOBIL	Mobilux EP2	To be used for the first 50 hours of operation at the greasing points of the front attachments.
		NLGI-1		WEICON	Antiseize Standard	NLGI-1		WEICON	Antiseize Standard	
Hydraulic oil	In winter or at low ambient temperatures	SAE 5W SAE 10W	API CF	ROWE	Hightec Formula GT API CF SAE 10W-40	SAE 5W SAE 10W	API CF	ROWE	Hightec Formula GT API CF SAE 10W-40	Engine oil is used in the hydraulic circuit of the wheel loader.
	In summer or at high ambient temperatures	SAE 30 SAE 40 SAE 50								
	All-weather	SAE 10W-40								
Gear oil	All-weather	SAE 80W	API GL-4	TOTAL	TRANSMISSION T.H.F.I. API GL-4 80W	SAE 80W	API GL-4	TOTAL	TRANSMISSION T.H.F.I. API GL-4 80W	Only use TOTAL TRANSMISSION T.H.F.I. or TOTAL DYNATRANS FR.
Brake fluid		VG 22		ROWE	Hightec HLP 22 VG 22	VG 22		ROWE	Hightec HLP 22 VG 22	Hydraulic oil is used in the brake circuit of the wheel loader.
	Fuel		EN 590				EN 590			The fuel filled at the factory is not winter diesel. When preparing the machine for the winter, fill the fuel tank with winter diesel and let the motor run for a few minutes.
Refrigerant			HFC134a R134a		HFC134a		HFC134a R134a		HFC134a	

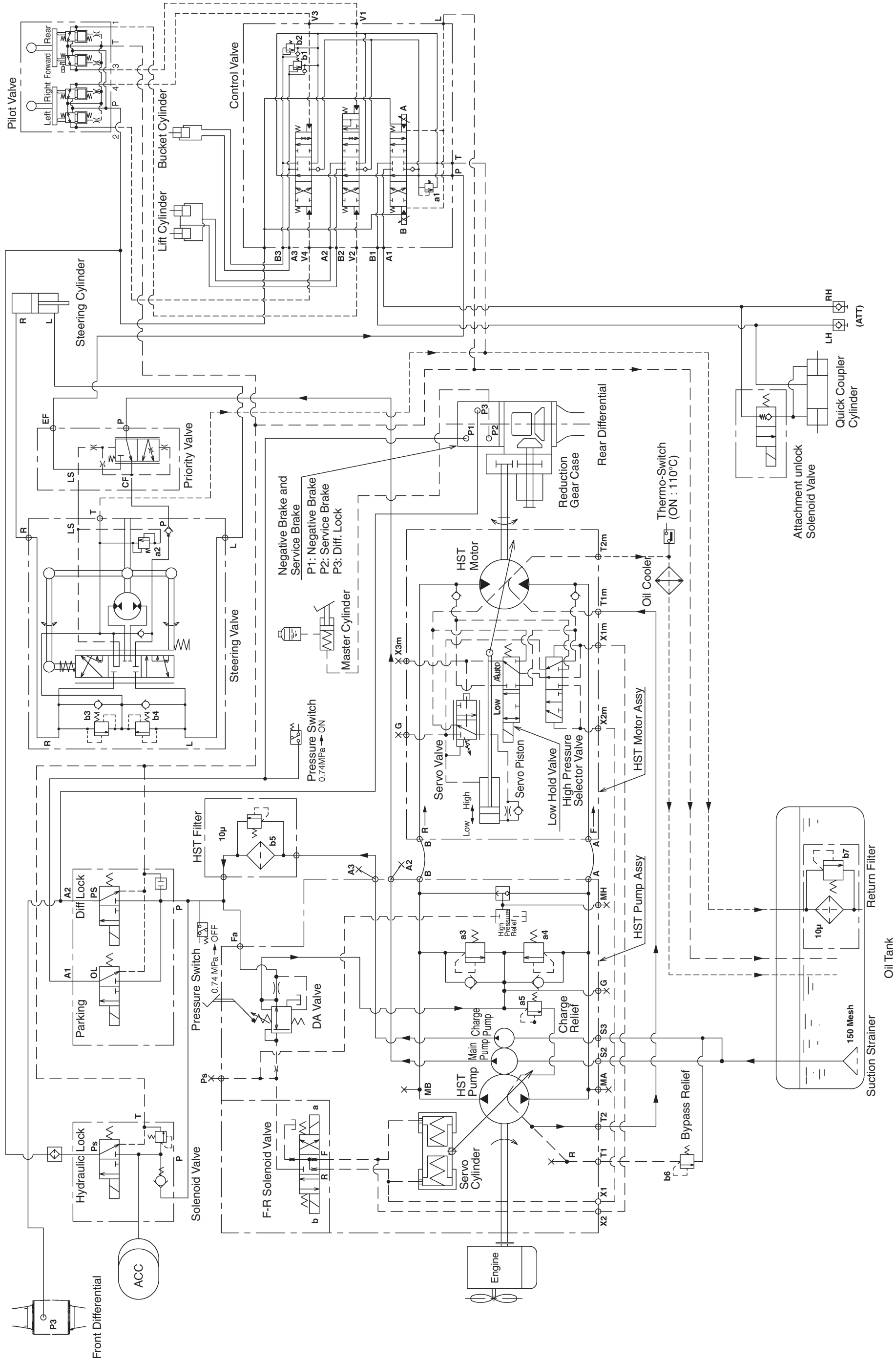
2 Hydraulic

2.1 Hydraulic circuits

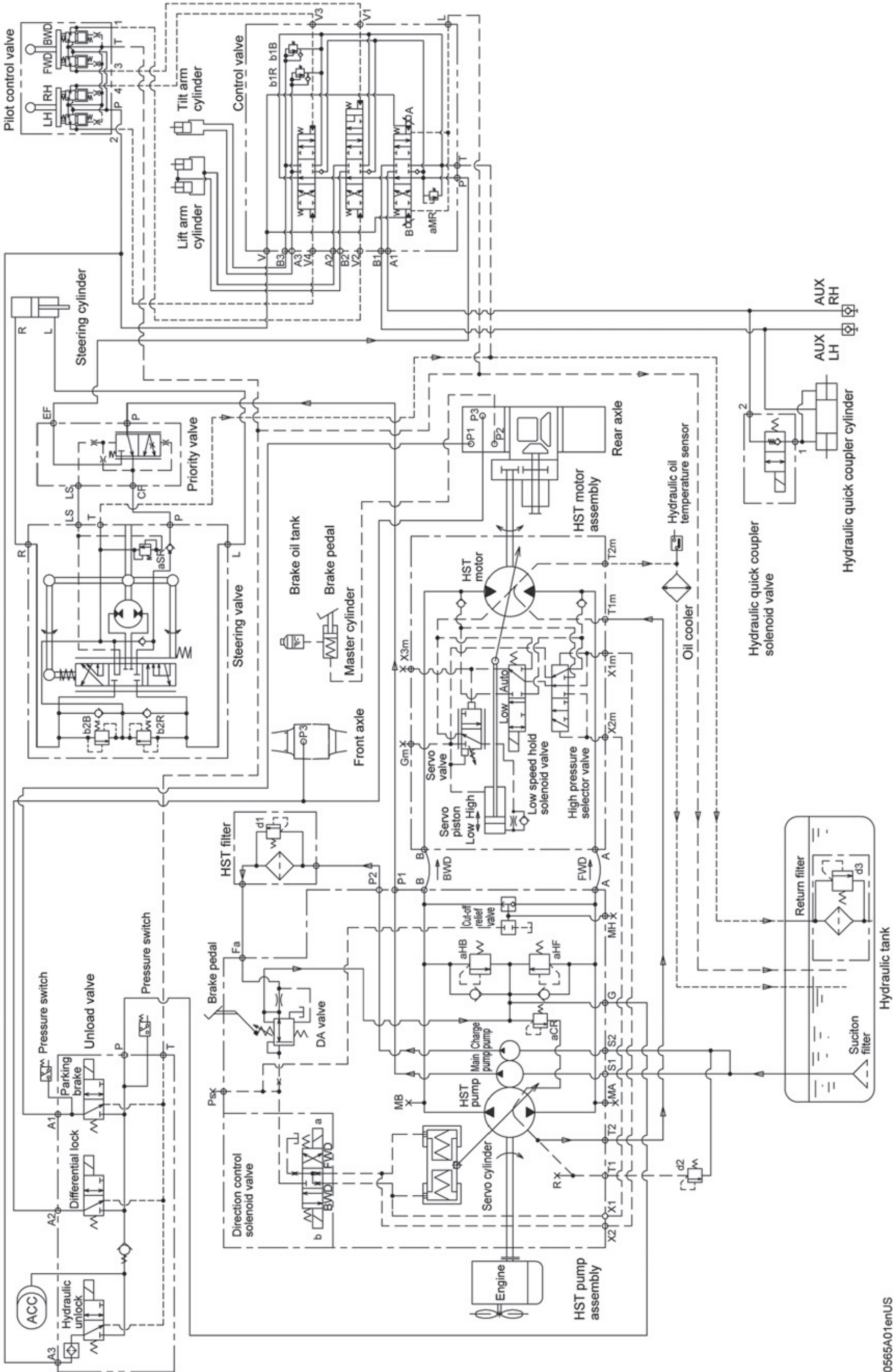
2.1.1 R065



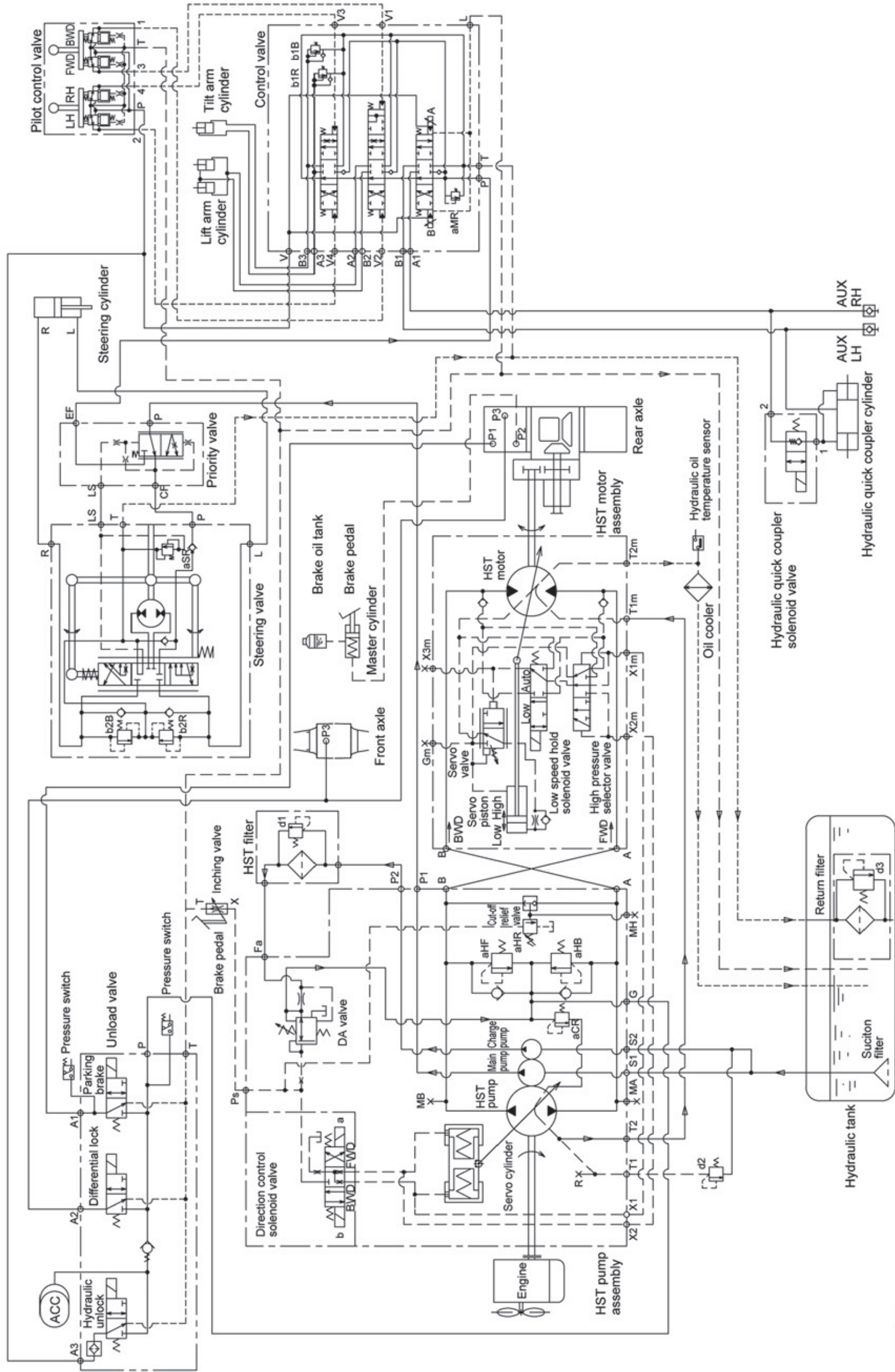




2.1.4 R070



2.1.5 R090

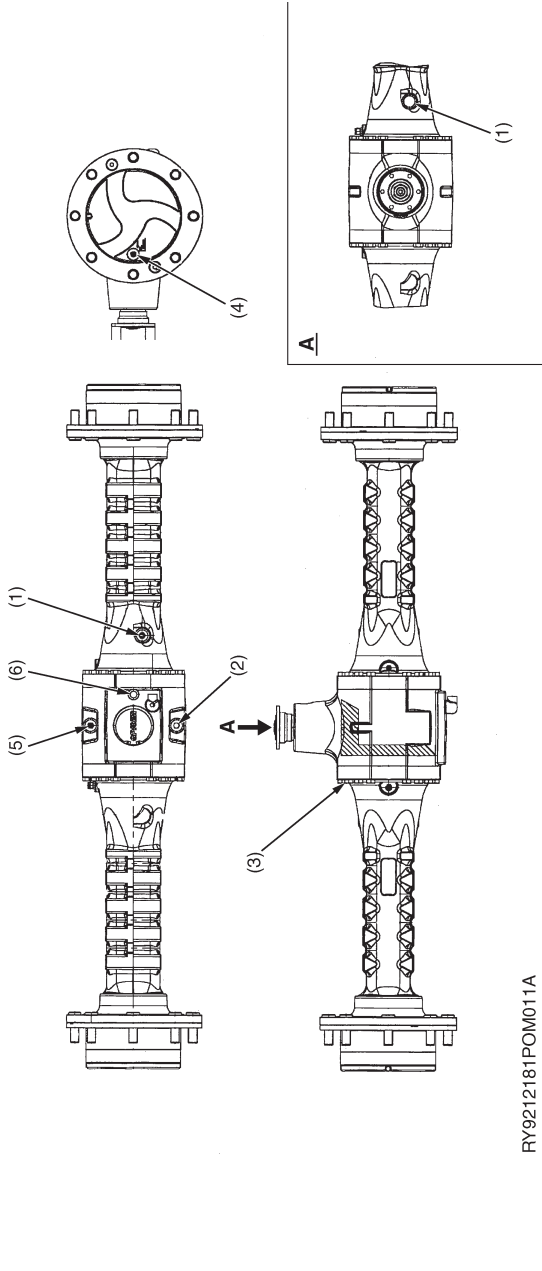


2.2 Hydraulic components main settings and control valve structure

2.2.1 R065

		Unit	R065	Notes
HST Pump & motor theoretical flow (l/min) at 2400rpm	HST Pump	l/min	67.2	
	HST Motor displacement	l/min	33.6 - 131.52	
	Main pump	l/min	53.7	
	Charge pressure pump	l/min	19.2	
Main relief valves setting (at max. engine rpm)	a1 Main pump	bar	196 ± 10	
	a2 Steering	bar	200 ± 10	
	a3 HST forward	bar	412 ± 10	Differential pressure
	a4 HST backward	bar	412 ± 10	Differential pressure
	a5 Charge pressure	bar	30 ± 3	
AUX theoretical flow, w/o load at 2400rpm	AUX1	l/min	53.8	
Overload relief valve setting	Bucket	Bottom (b1B)	220 ± 10	Test w/ "Engine OFF"
		Rod (b2R)	220 ± 10	
	Steering	LH (b2B)	220 ± 10	
		RH (b2R)	220 ± 10	
Parking brake operating pressure	Port P1	bar	15 - 30	
Service brake Max pressure	Port P2	bar	80	
Differential lock operating pressure	Port P3	bar	15 - 30	Front and rear axles

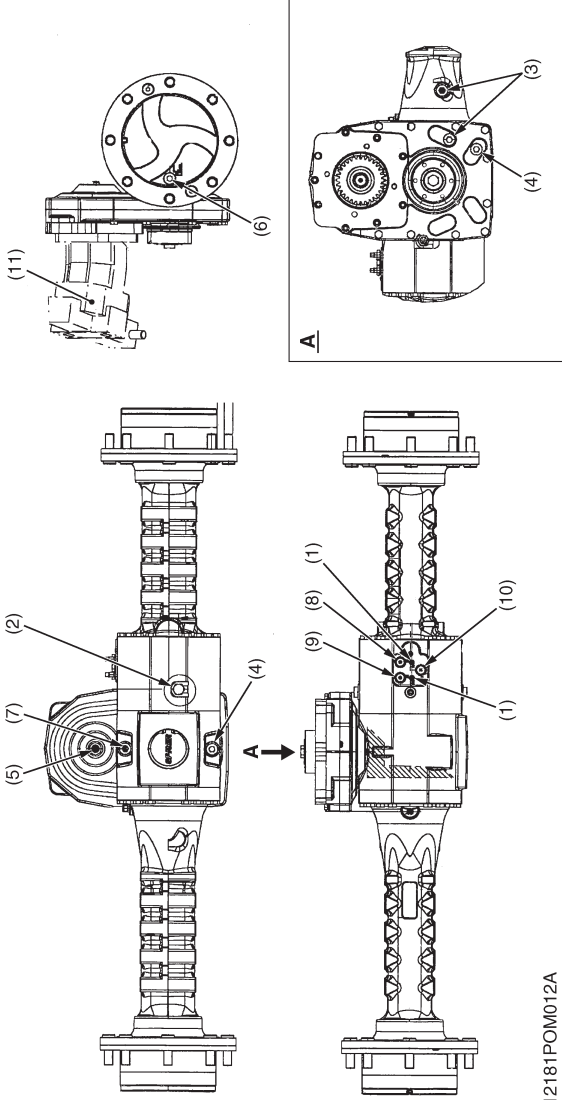
Front axle



RY9212181POM011A

- [1] Oil fill plug
- [2] Drain plug
- [3] Air bleeder
- [4] Oil fill plug
- [5] Oil fill plug
- [6] Port P3

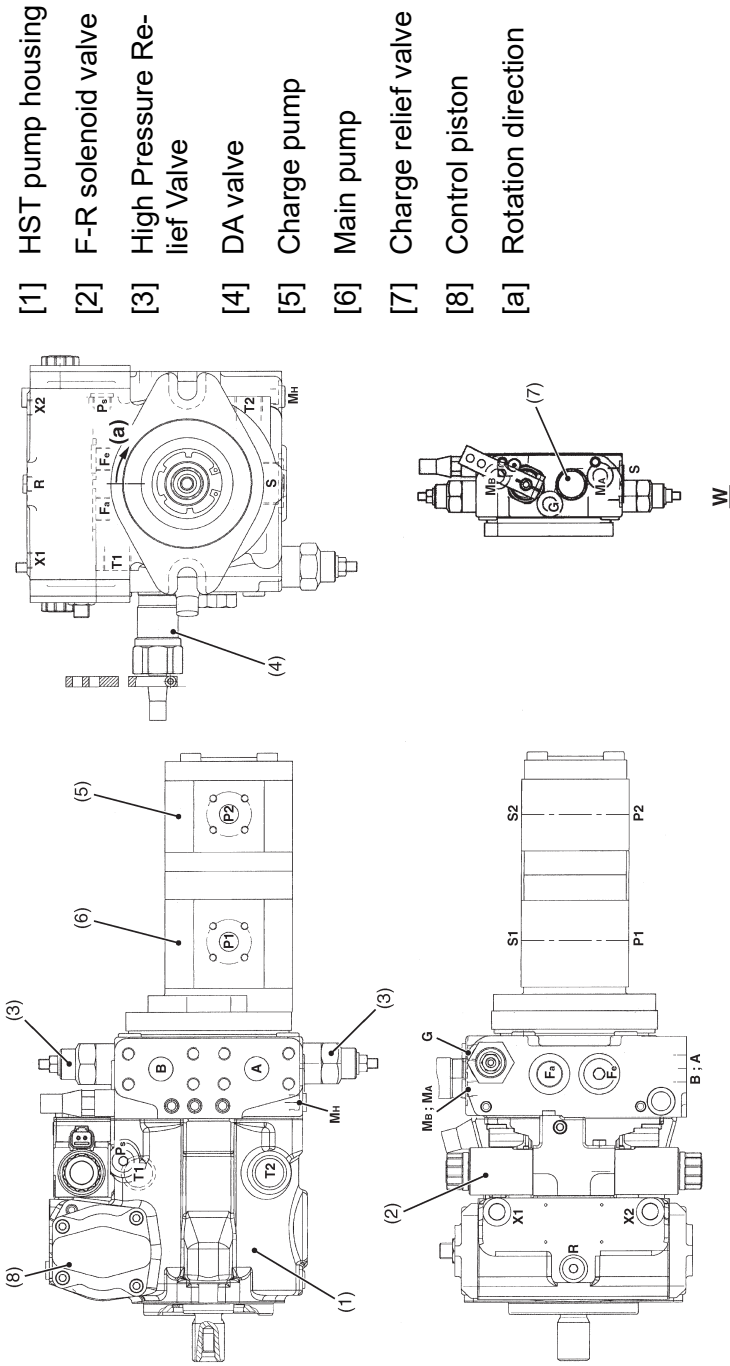
Rear axle



RY9212181POM012A

- [1] Air bleeder plug
- [2] Parking brake release bolt
- [3] Oil fill plug
- [4] Oil drain port
- [5] Air bleeder
- [6] Oil fill plug
- [7] Oil fill port
- [8] Port P1
- [9] Port P2
- [10] Port P3
- [11] HST Motor

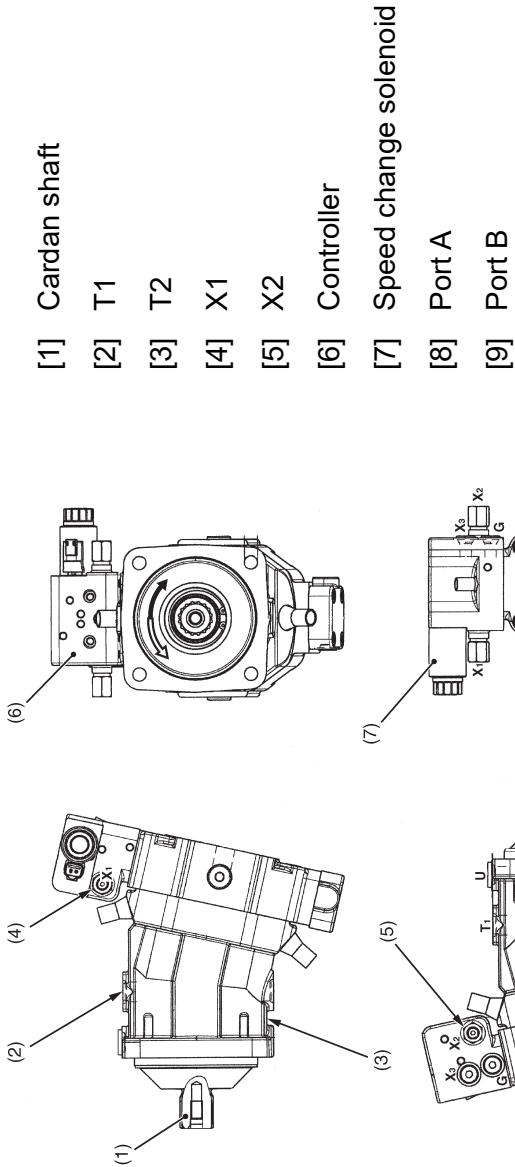
HST Pump



RY9212181HYM001A

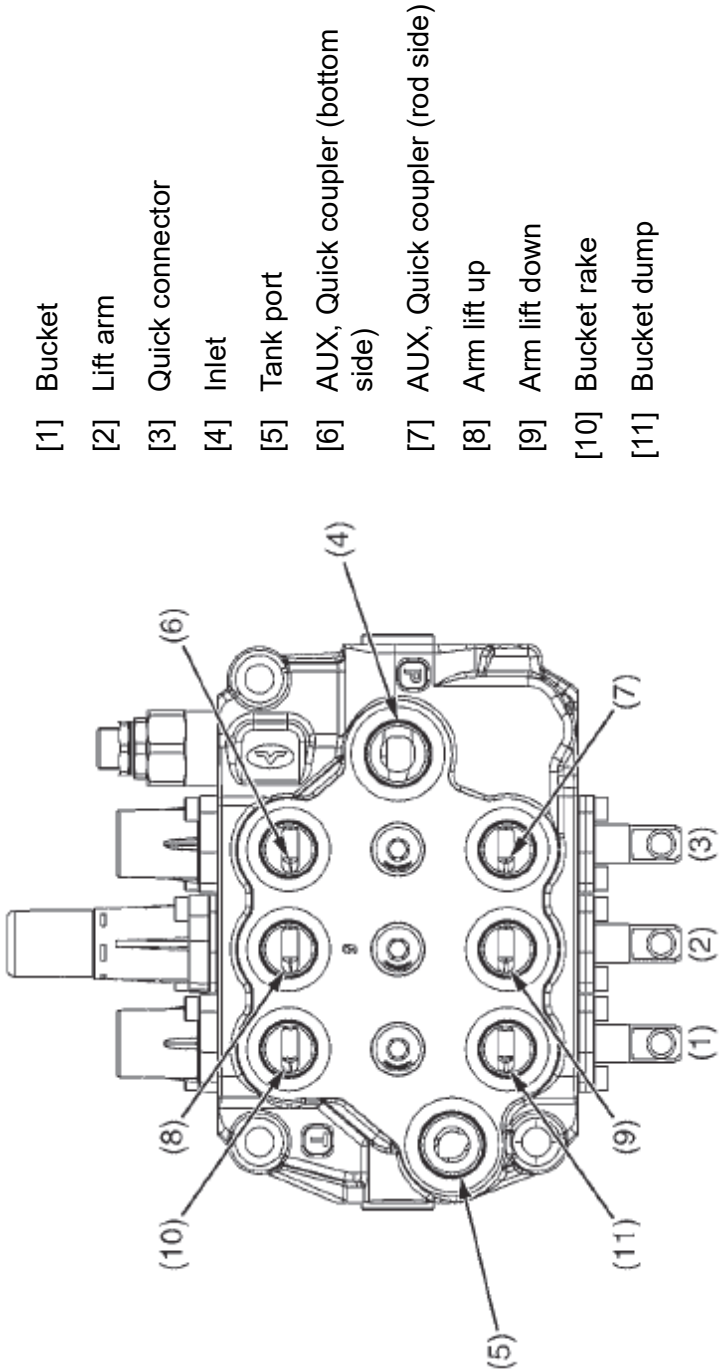
- [1] HST pump housing
- [2] F-R solenoid valve
- [3] High Pressure Relief Valve
- [4] DA valve
- [5] Charge pump
- [6] Main pump
- [7] Charge relief valve
- [8] Control piston
- [a] Rotation direction

HST Motor



RRY9212181HYM002A

Control Valve

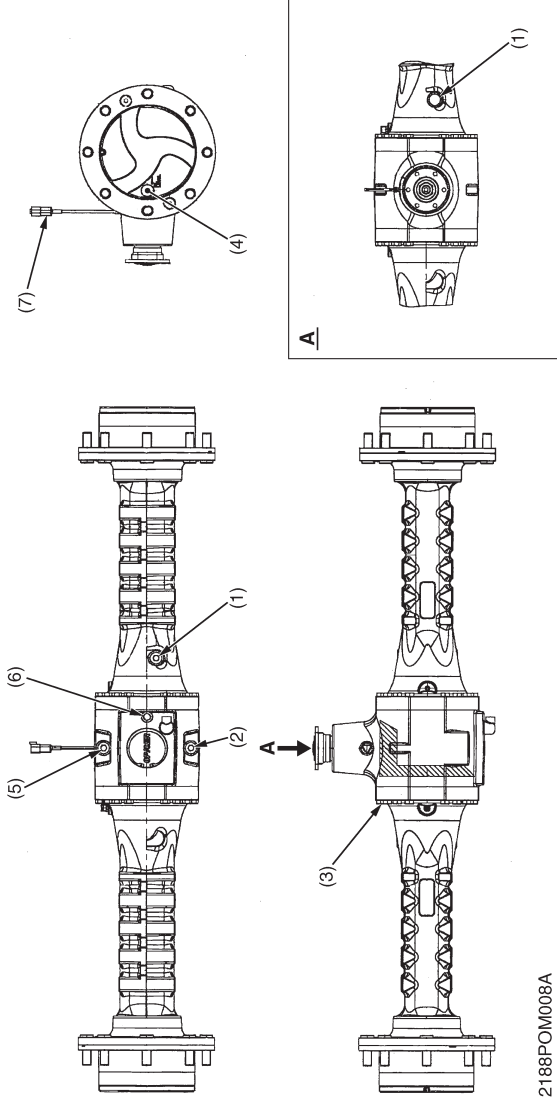
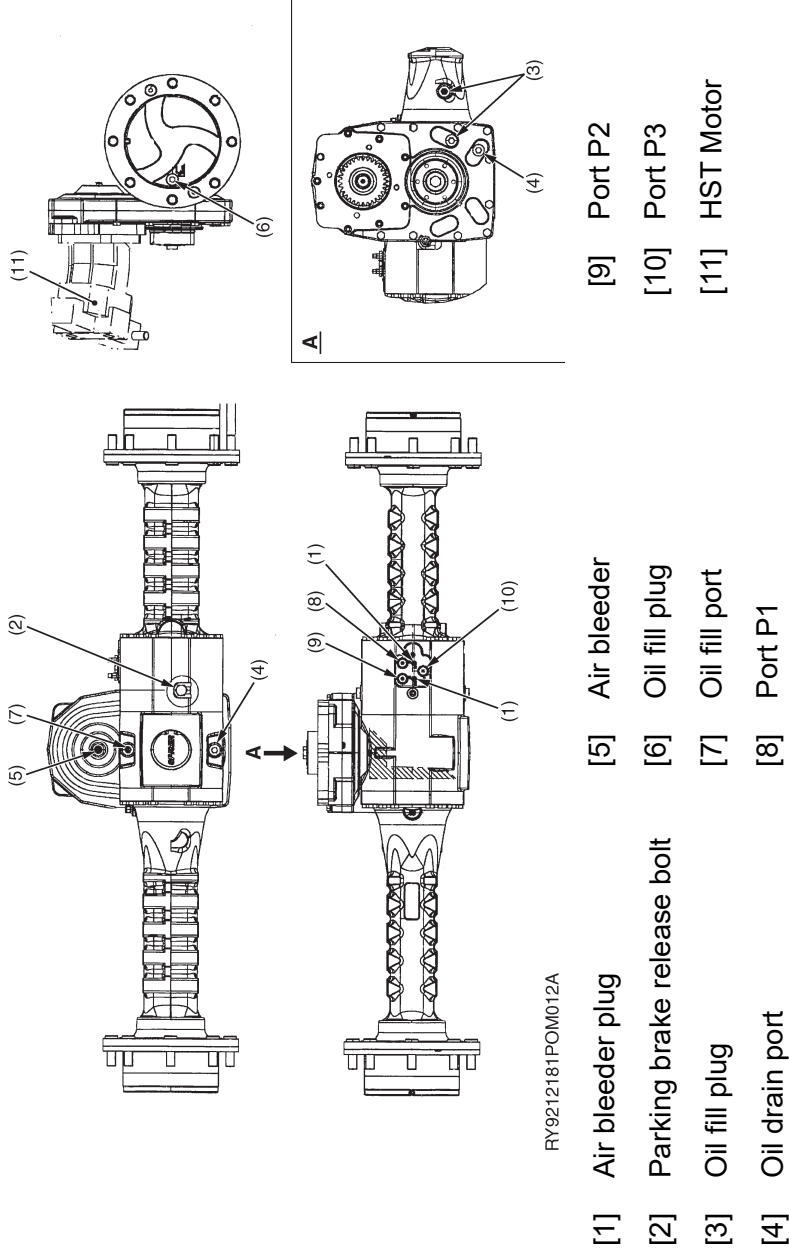


2.2.2 R085

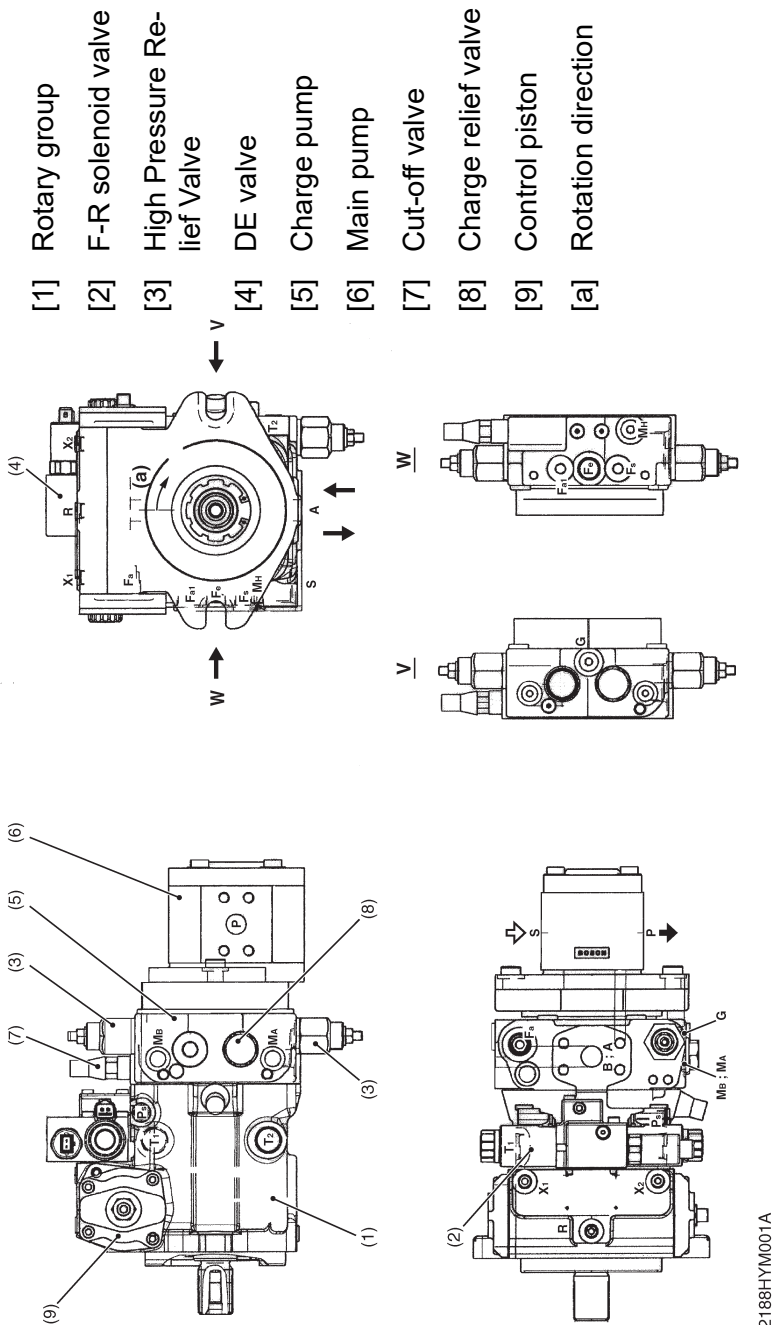
Rear axle

		HST Pump	Unit	R085	Notes
HST Pump & motor theoretical flow (l/min) at 2400rpm	HST Pump		l/min	96	
	HST Motor displacement		l/min	48-192	
	Main pump		l/min	67.2	
	Charge pressure pump		l/min	20.6	
Main relief valves setting (at max. engine rpm)	a1 Main pump		bar	216 ± 10	
	a2 Steering		bar	200 ± 10	
	a3 HST forward		bar	----	
	a4 HST backward		bar	----	
	a5 Charge pressure		bar	31.5 ± 3	
	a6 HST Cut-off valve		bar	368 ± 20	Differential pressure
AUX theoretical flow, w/o load at 2400rpm	AUX1		l/min	67.2	
Overload relief valve setting	Bucket	Bottom (b1B)	bar	220 ± 10	Test w/ "Engine OFF"
		Rod (b2R)	bar	220 ± 10	
Steering	Steering	Bottom (b2B)	bar	220 ± 10	
		Rod (b2R)	bar	220 ± 10	
Parking brake operating pressure	Port P1		bar	15 - 30	
Service brake Max pressure	Port P2		bar	80	
Differential lock operating pressure	Port P3		bar	15 - 30	Front and rear axles

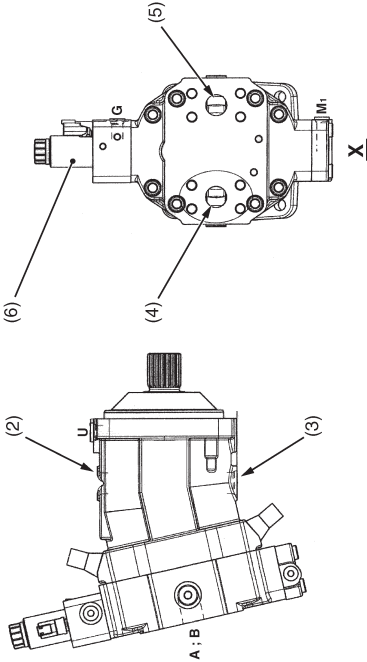
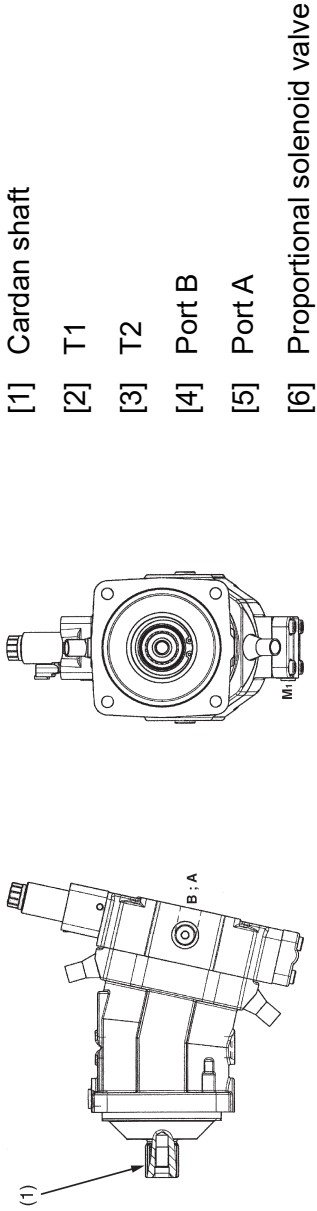
Front axle



HST Pump

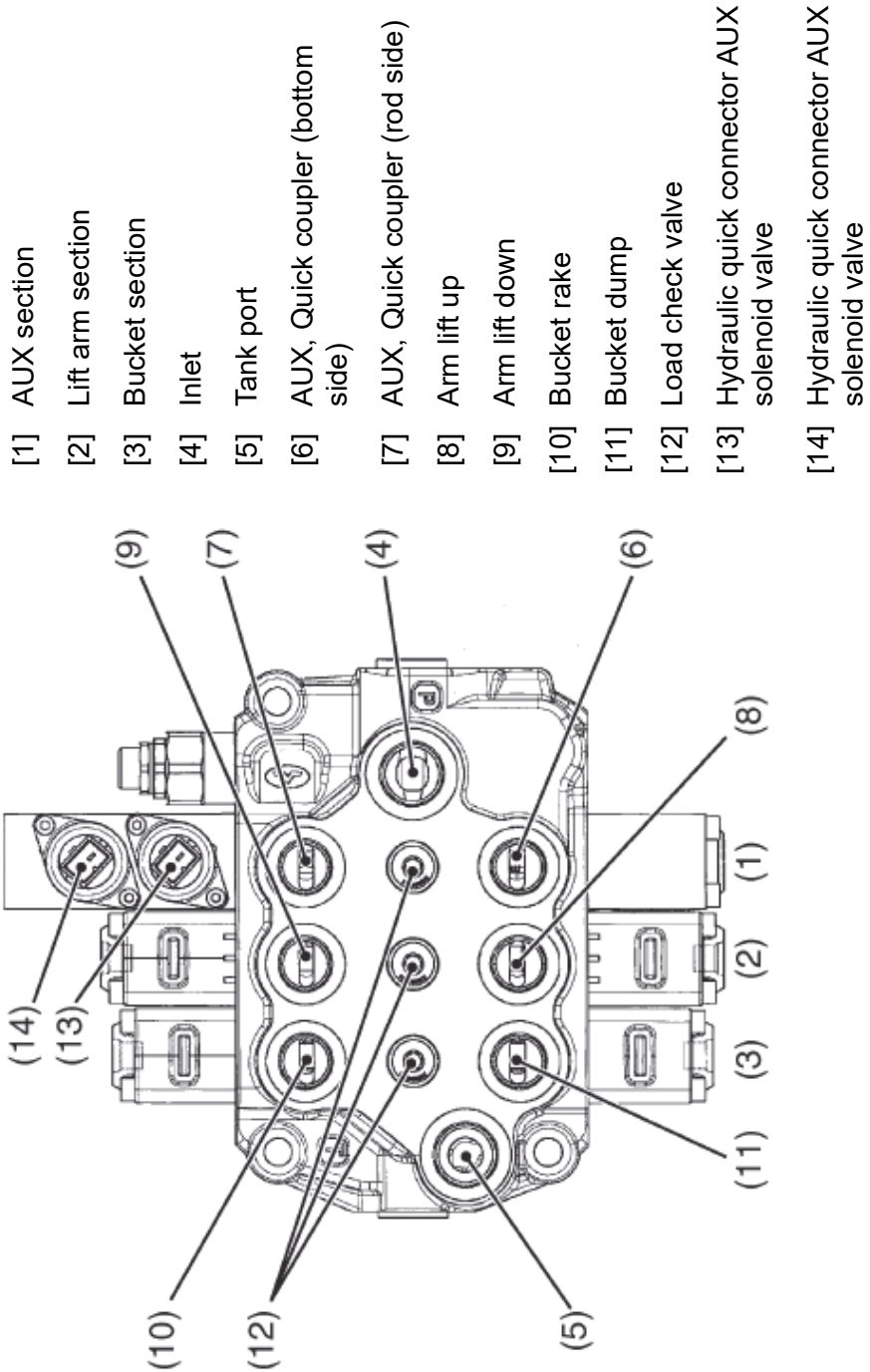


HST Motor



RY9212188HYM002A

Control Valve

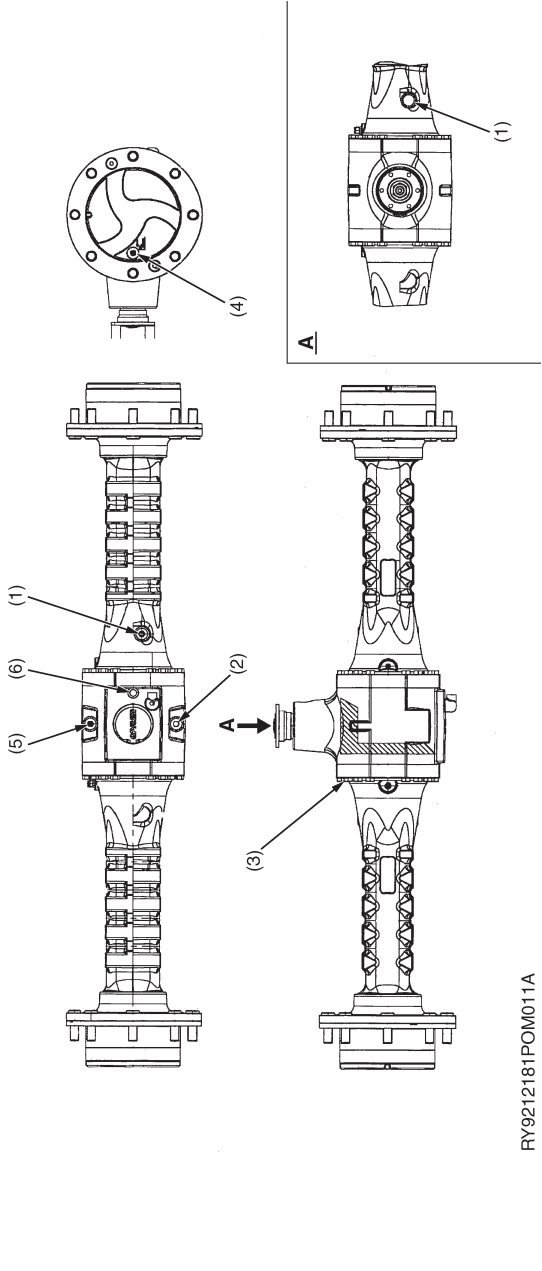


2.2.3 R082

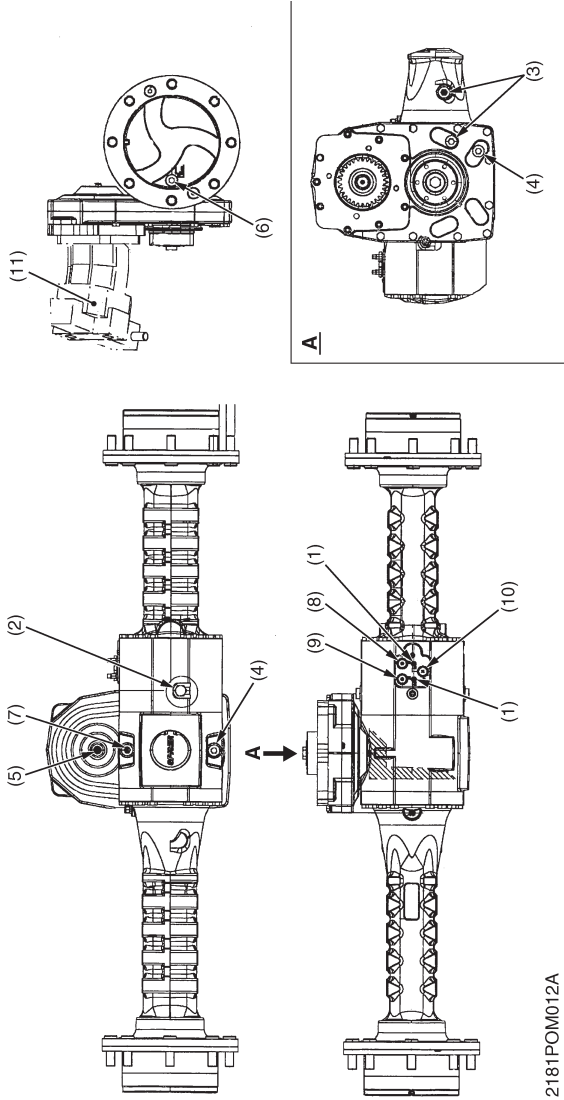
Rear axle

			Unit	R082	Notes
HST Pump & motor theoretical flow (l/min) at 2400rpm	HST Pump		l/min	67,2	
	HST Motor displacement		l/min	33,6 - 131,52	
	Main pump		l/min	67,2	
	Charge pressure pump		l/min	19,2	
Main relief valves setting (at max. engine rpm)	a1 Main pump		bar	201 ± 10	
	a2 Steering		bar	192 ± 10	
	a3 HST forward		bar	412 ± 10	Differential pressure
	a4 HST backward		bar	412 ± 10	Differential pressure
	a5 Charge pressure		bar	30 ± 3	
AUX theoretical flow, w/o load at 2400rpm	AUX1		l/min	70	
Overload relief valve setting	Bucket	Bottom (b1B)	bar	241 ± 10	Test w/ "Engine OFF"
		Rod (b2R)	bar	241 ± 10	
	Steering	LH (b2B)	bar	240 ± 10	
		RH (b2R)	bar	240 ± 10	
Parking brake operating pressure	Port P1		bar	15 - 30	
Service brake Max pressure	Port P2		bar	80	
Differential lock operating pressure	Port P3		bar	15 - 30	Front and rear axles

Front axle

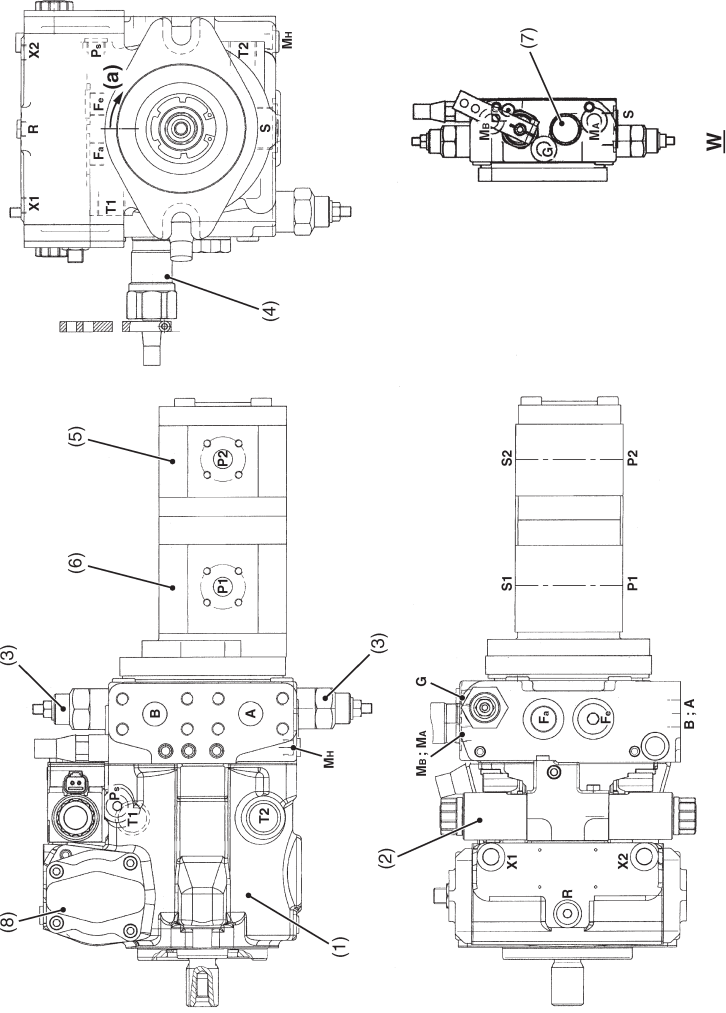


- [1] Oil fill plug
[2] Drain plug
[3] Air bleeder
[4] Oil fill plug
[5] Oil fill plug
[6] Port P3



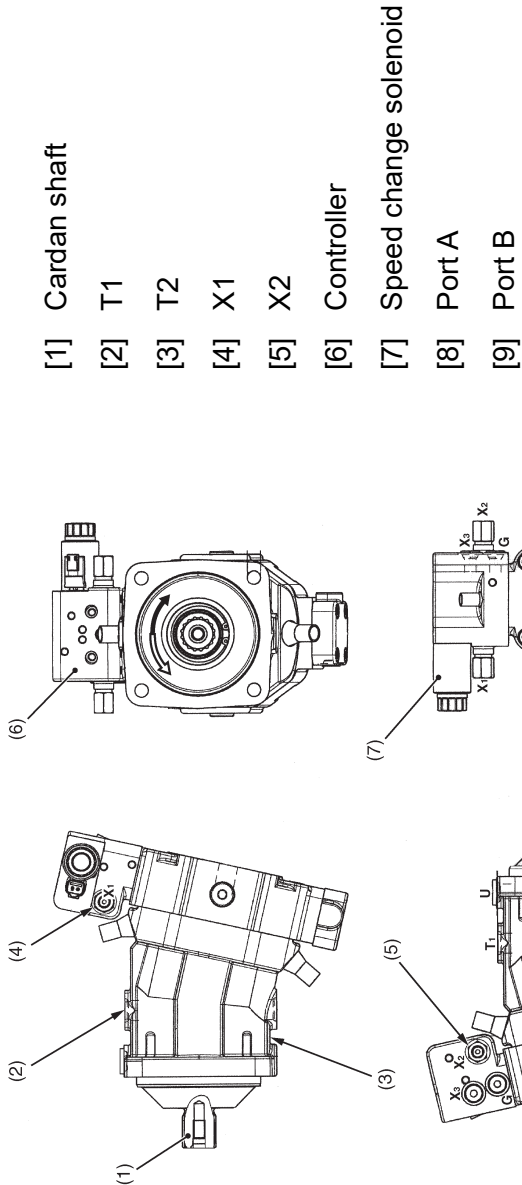
- [1] Air bleeder plug
[2] Parking brake release bolt
[3] Oil fill plug
[4] Oil drain port
[5] Air bleeder
[6] Oil fill plug
[7] Oil fill port
[8] Port P1
[9] Port P2
[10] Port P3
[11] HST Motor

HST Pump



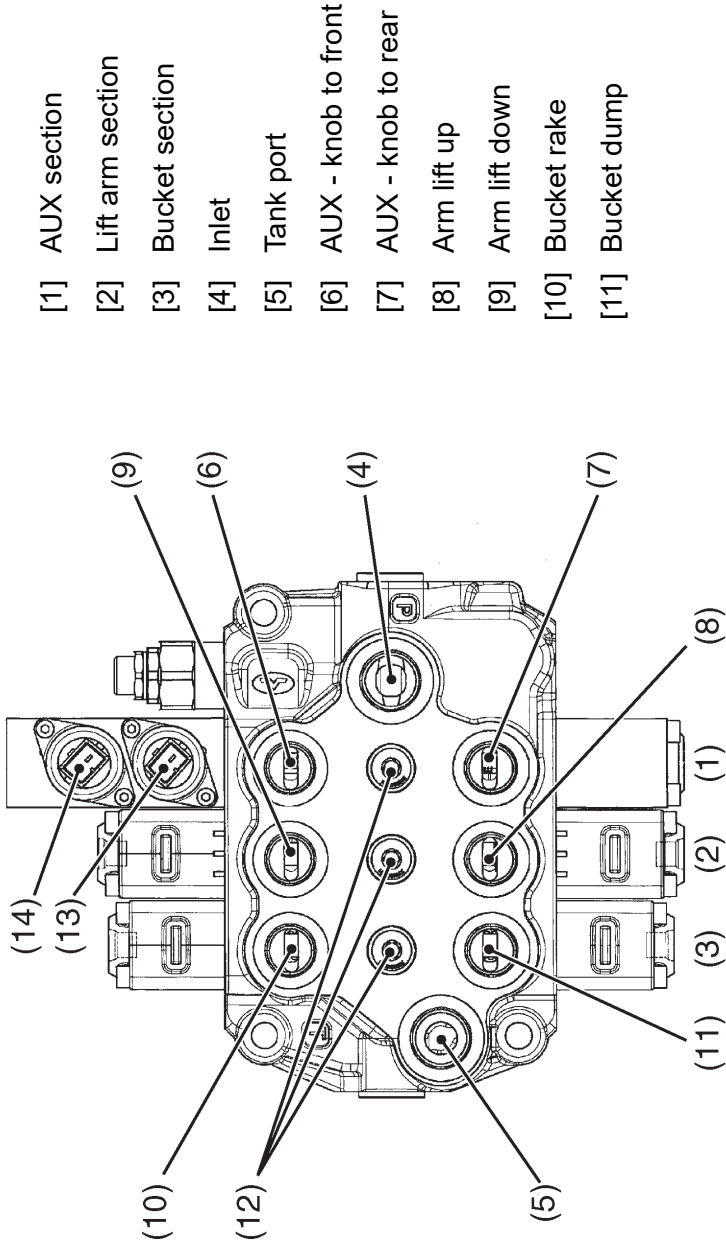
- [1] HST pump housing
[2] F-R solenoid valve
[3] High Pressure Relief Valve
[4] DA valve
[5] Charge pump
[6] Main pump
[7] Charge relief valve
[8] Control piston
[a] Rotation direction

HST Motor



RRY9212181HYM002A

Control Valve

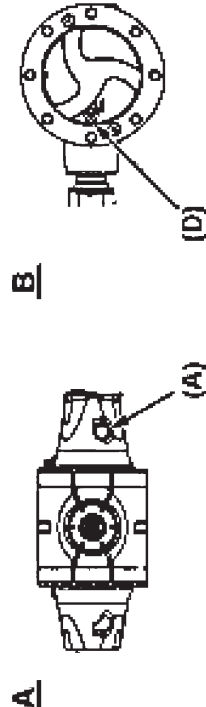
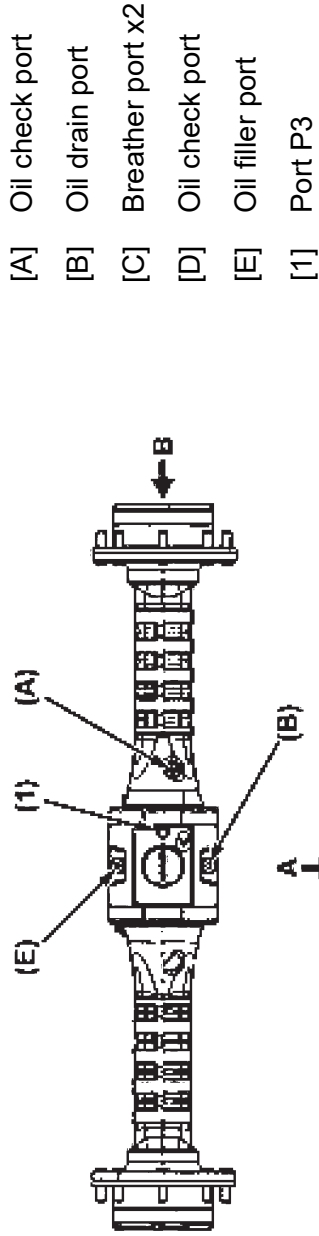


2.2.4 R070

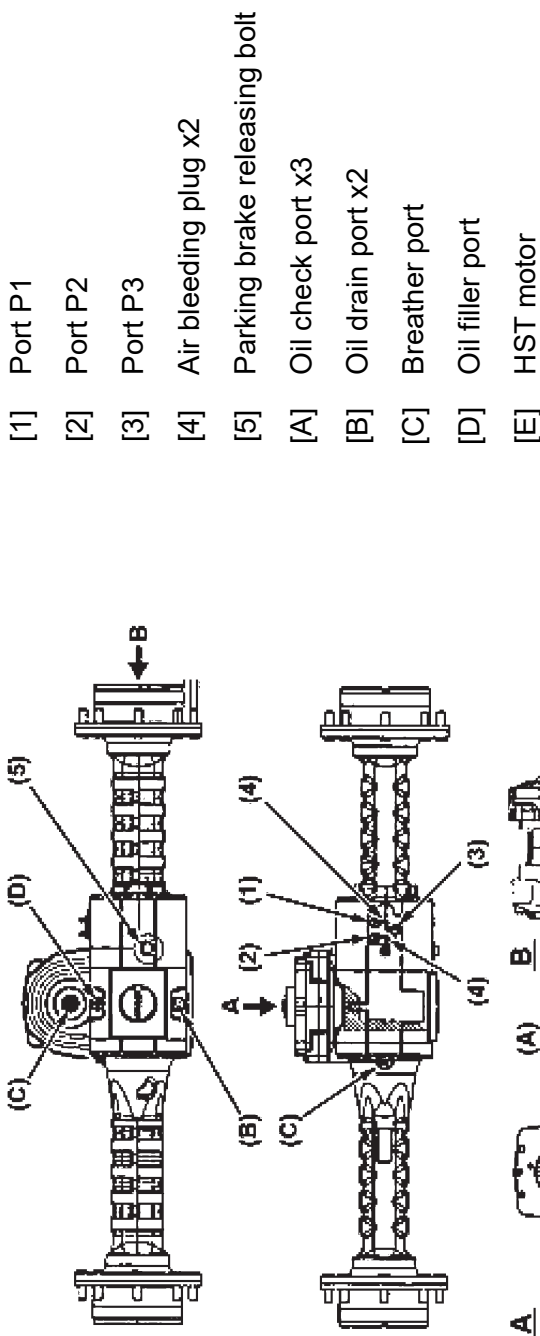
Rear axle

		Unit	R070	Notes
HST Pump & motor theoretical flow (l/min) at 2400rpm	HST Pump	l/min	67,2	
	HST Motor displacement	l/min	33,6 - 131,52	
	Main pump	l/min	54,5	
	Charge pressure pump	l/min	19,2	
Main relief valves setting (at max. engine rpm)	a1 Main pump	bar	196 ± 10	
	a2 Steering	bar	195 ± 10	
	a3 HST forward	bar	412 ± 10	Differential pressure
	a4 HST backward	bar	412 ± 10	Differential pressure
	a5 Charge pressure	bar	31 ± 3	
AUX theoretical flow, w/o load at 2400rpm	AUX1	l/min	54	
Overload relief valve setting	Bucket	bar	235 ± 10	Test w/ "Engine OFF"
	Rod (b2R)	bar	235 ± 10	
	LH (b2B)	bar	240 ± 10	
	RH (b2R)	bar	240 ± 10	
Parking brake operating pressure	Port P1	bar	15 - 30	
Service brake Max pressure	Port P2	bar	80	
Differential lock operating pressure	Port P3	bar	15 - 30	Front and rear axles

Front axle

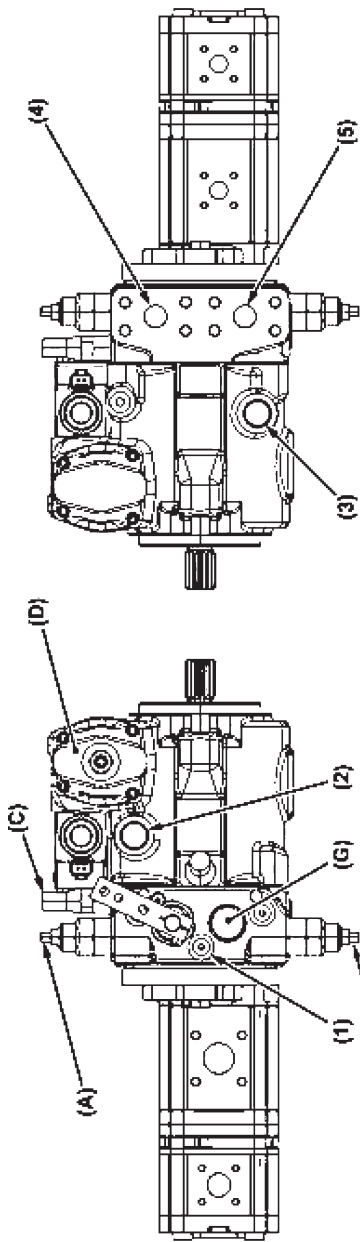


2MPUB00482A01



2MPUB00483A01

HST Pump



2MPUB00471A01

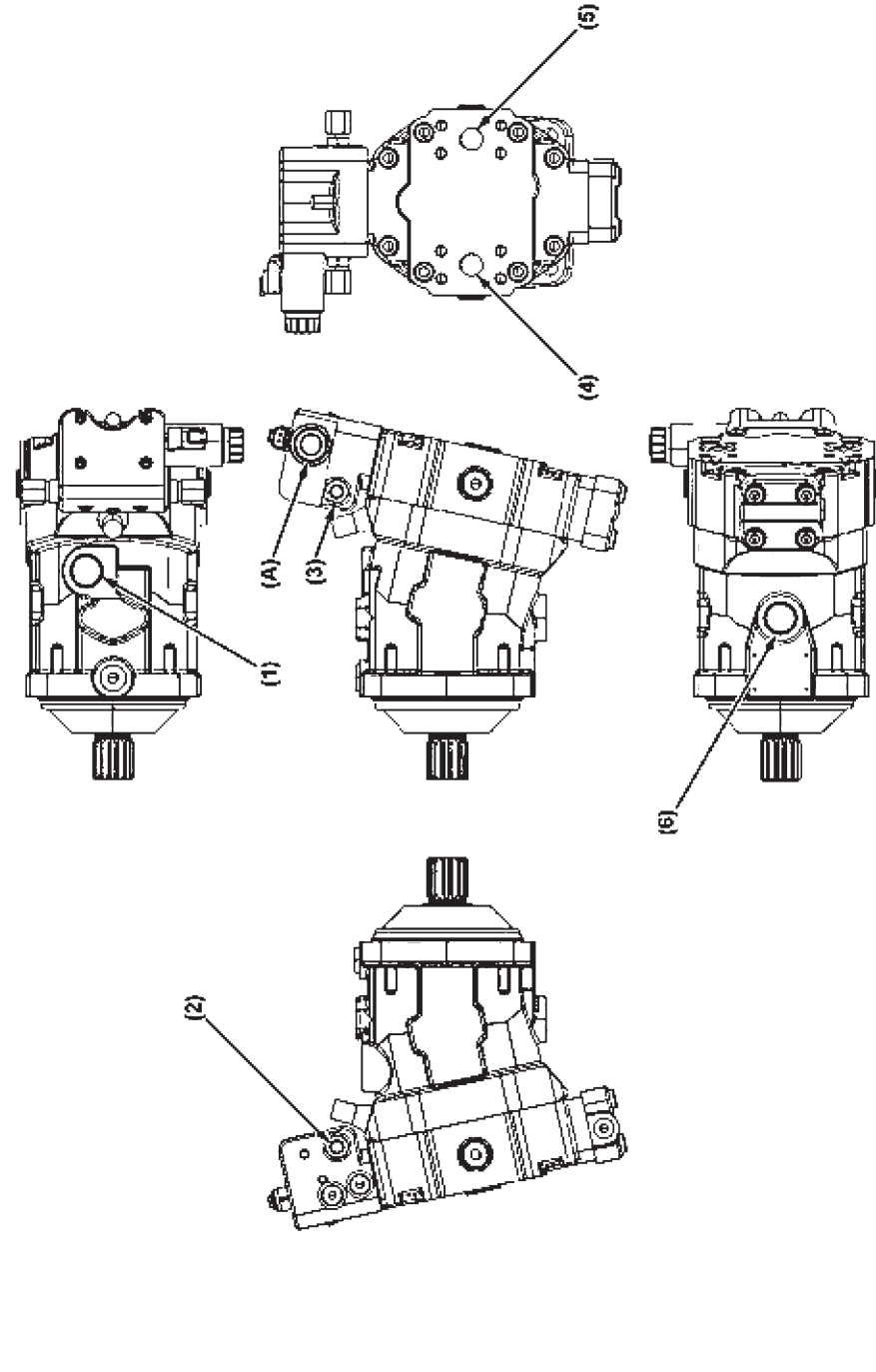
- [A] High pressure relief valve (aHF)
- [B] High pressure relief valve (aHB)
- [C] Cut-off valve (plugged)
- [D] Servo cylinder
- [E] DA valve

- [F] Direction control solenoid valve
- [G] Charge relief valve
- [1] Unload valve (Port P)
- [2] Hydraulic oil tank
- [3] HST motor (Port T1m)
- [4] HST motor (Port B) "Travel backward"

- [5] HST motor (Port A) "Travel forward"
- [6] HST filter (Outlet)
- [7] HST motor (Port X2m) "Travel forward"
- [8] HST motor (Port X1m) "Travel backward"

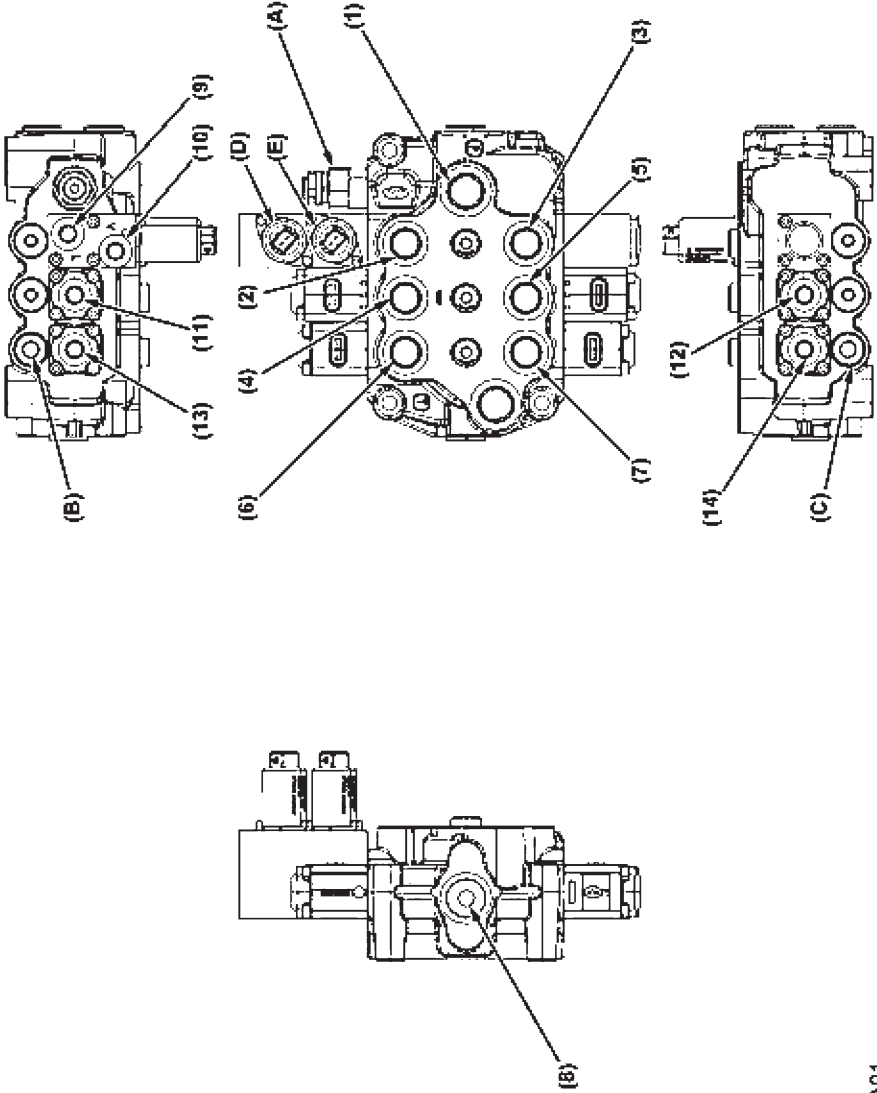
HST Motor

Control Valve



2MPUB00472A01

2MPUB00474A01



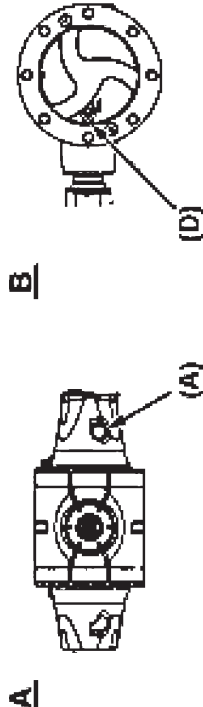
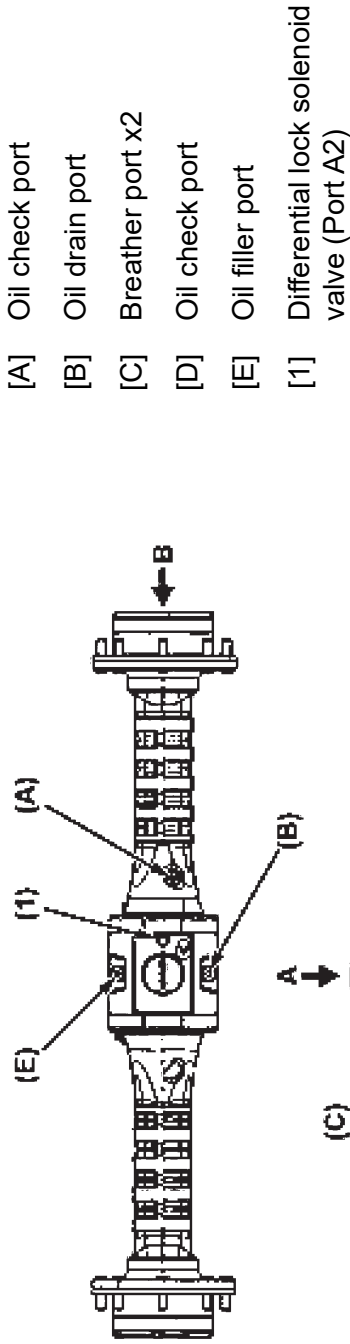
- [A] Main relief valve (aMR)
- [B] Overload relief valve (b1R)
- [C] Overload relief valve (b1B)
- [D] AUX proportional solenoid LH
- [E] AUX proportional solenoid RH
- [1] Priority valve (Port EF)
- [2] AUX port RH Hydraulic quick coupler solenoid valve
- [3] HST pump (Port X2) "Travel backward"
- [4] HST pump (Port B) "Travel backward"
- [5] HST pump (Port A) "Travel forward"
- [6] Hydraulic oil cooler

- [3] AUX port LH Hydraulic quick coupler cylinder (Center)
- [4] Lift arm cylinder (Rod) "Lift arm lower"
- [5] Lift arm cylinder (Bottom) "Lift arm raise"
- [6] Tilt arm cylinder (Rod) "Tilt arm dump"
- [7] Tilt arm cylinder (Bottom) "Tilt arm crowd"
- [8] Hydraulic oil tank
- [9] Hydraulic oil tank
- [10] Unload valve (Port A3) "AUX operation"
- [11] Pilot control valve (Port 3) "Lift arm lower"
- [12] Pilot control valve (Port 1) "Lift arm raise"
- [13] Pilot control valve (Port 4) "Tilt arm dump"
- [14] Pilot control valve (Port 2) "Tilt arm crowd"

2.2.5 R090

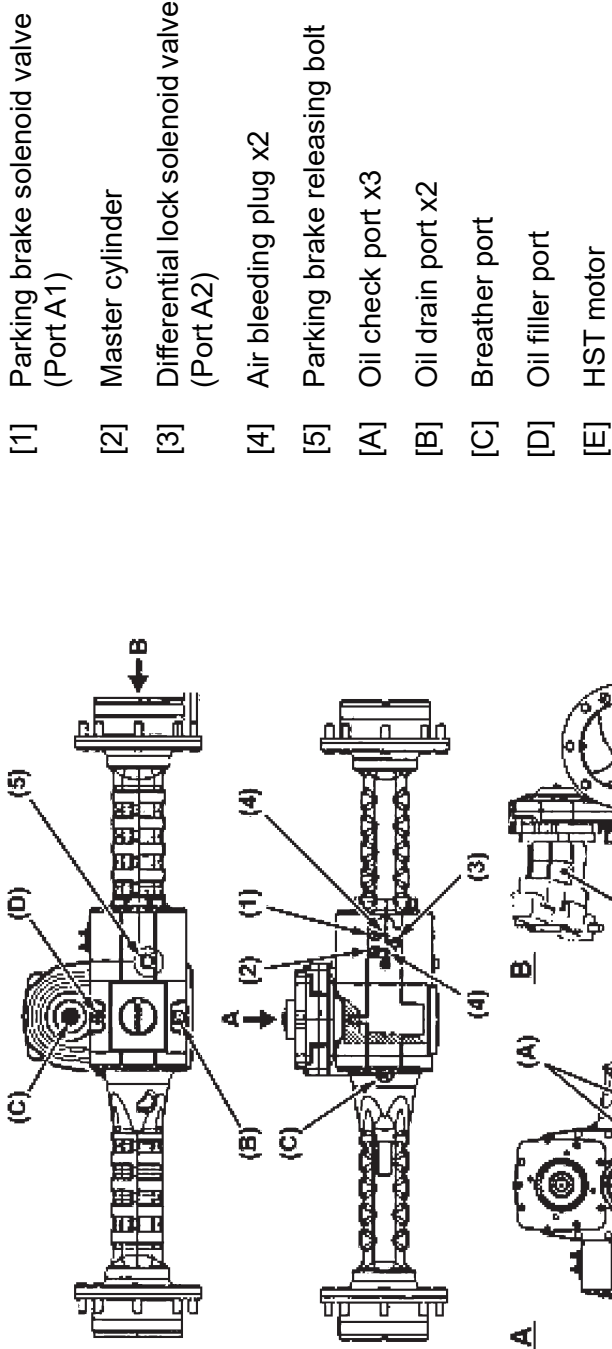
		Unit	R090	Notes
HST Pump & motor theoretical flow (l/min) at 2400rpm	HST Pump	l/min	97,7	
	HST Motor displacement	l/min	48 - 192	
	Main pump	l/min	67,8	
	Charge pressure pump	l/min	19,6	
Main relief valves setting (at max. engine rpm)	a1 Main pump	bar	216 ± 10	
	a2 Steering	bar	195 ± 10	
	a3 HST forward	bar	----	Differential pressure
	a4 HST backward	bar	----	Differential pressure
	a5 Charge pressure	bar	31 ± 2	
	a6 Cut-off valve HST	bar	368 ± 20	
AUX theoretical flow, w/o load at 2400rpm	AUX1	l/min	67,5	
Overload relief valve setting	Bucket	Bottom (b1B)	235 ± 10	Test w/ "Engine OFF"
		Rod (b2R)	235 ± 10	
		LH (b2B)	240 ± 10	
		RH (b2R)	240 ± 10	
Parking brake operating pressure	Port P1	bar	15 - 30	
Service brake Max pressure	Port P2	bar	80	
Differential lock operating pressure	Port P3	bar	15 - 30	Front and rear axles

Front axle



2MPUB000482A01

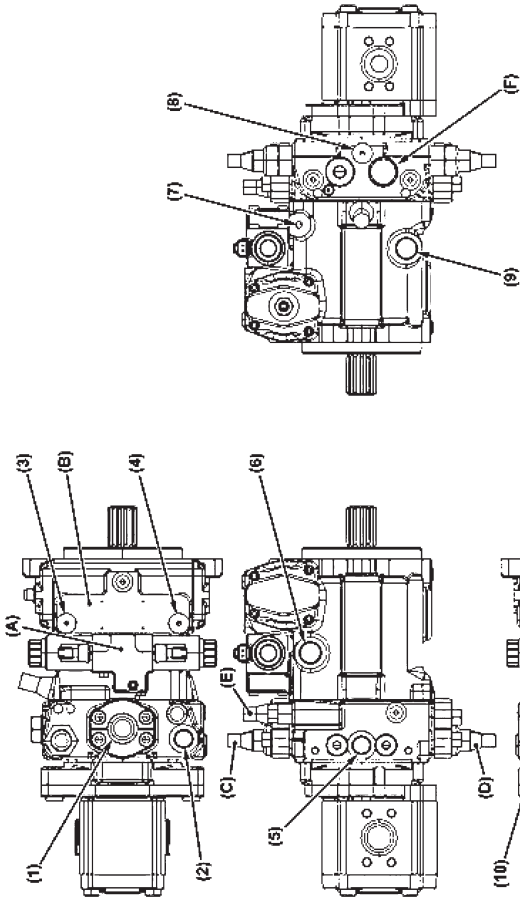
Rear axle



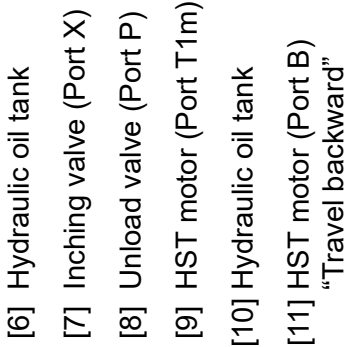
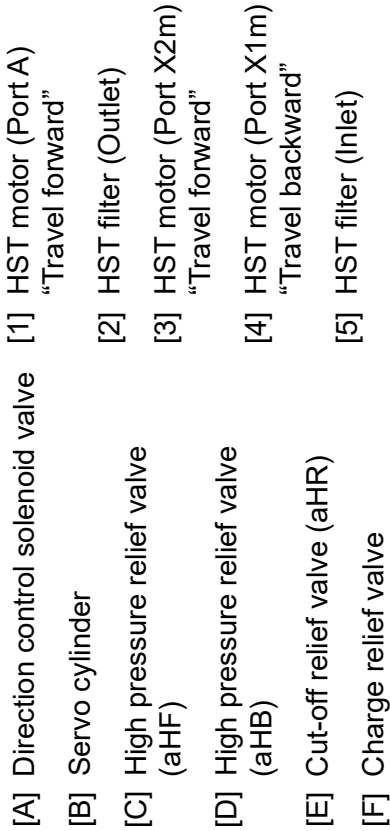
A

2MPUB000483A01

HST Pump

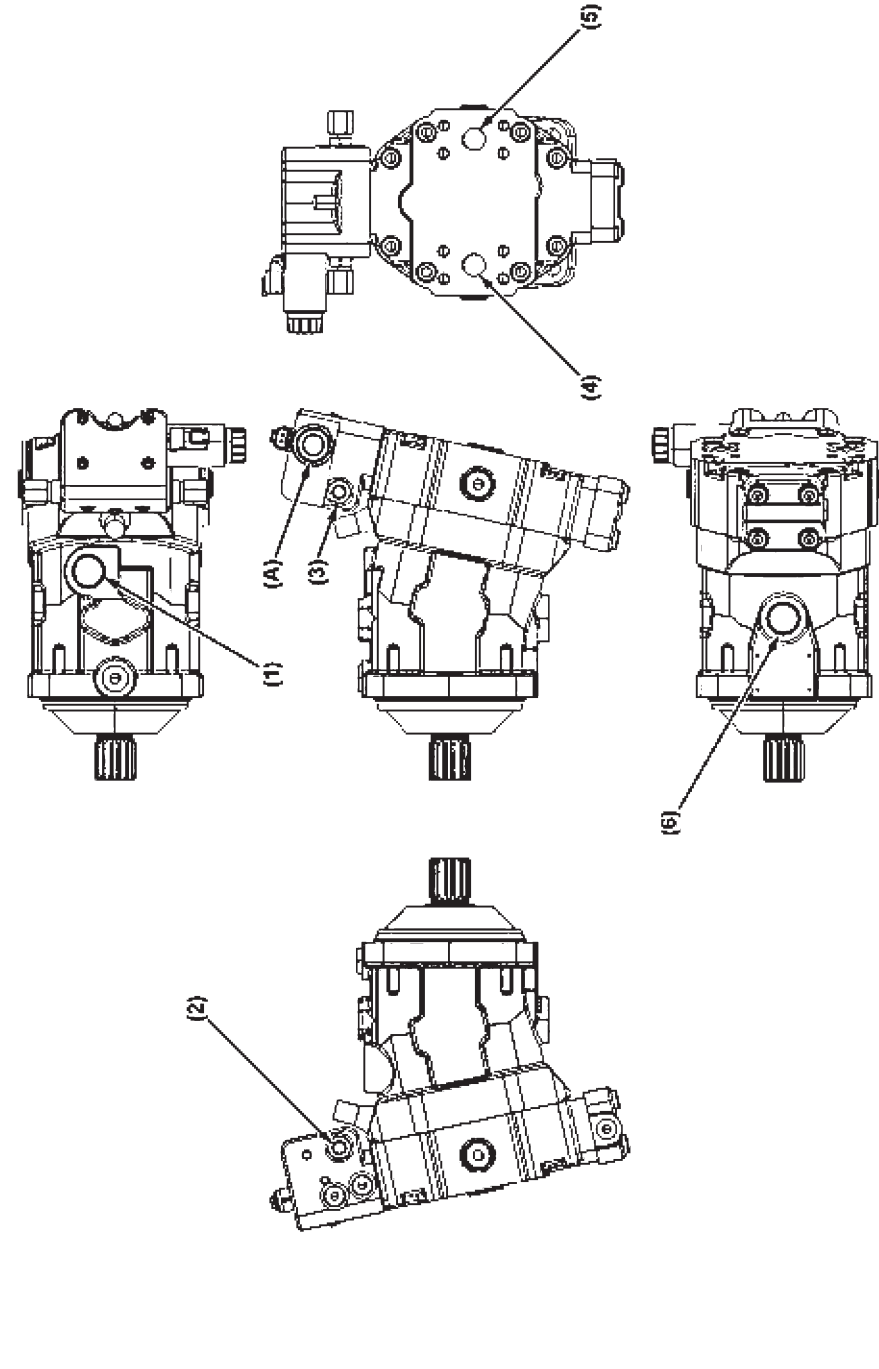


22FTS00002A01



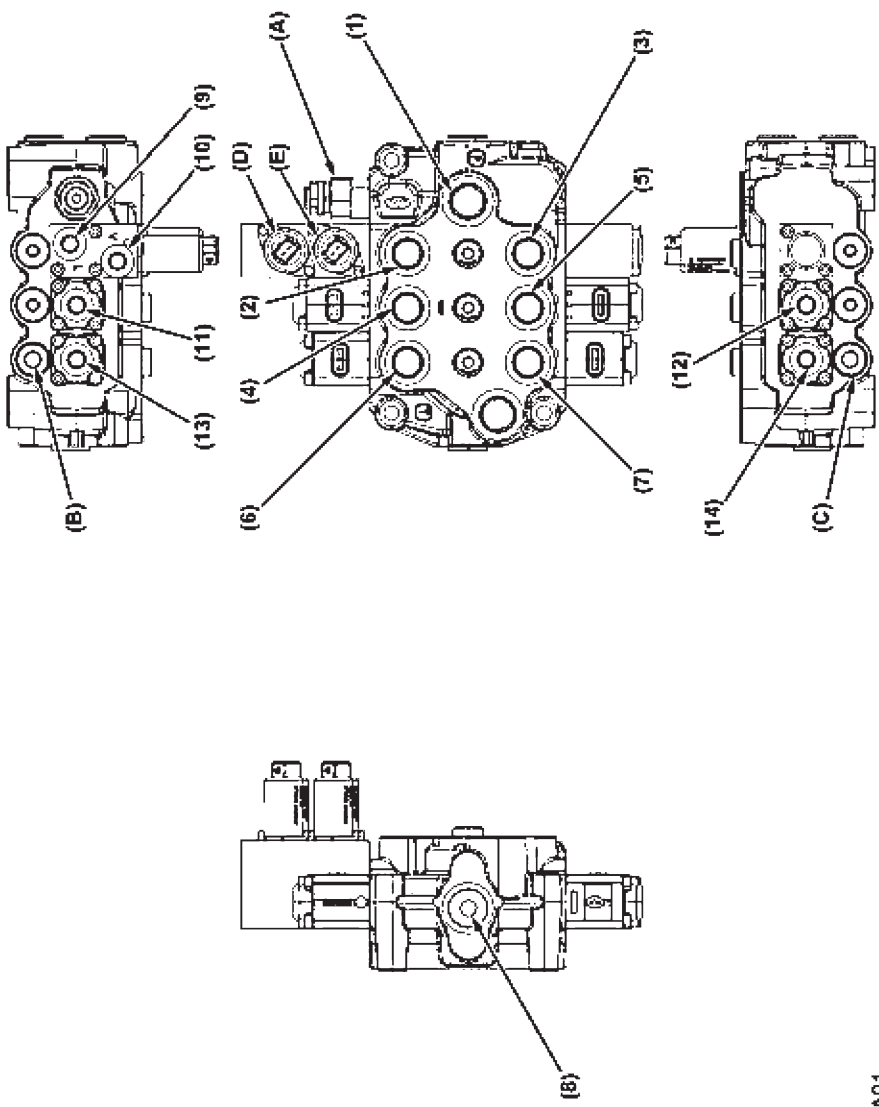
HST Motor

Control Valve



2MPUB00472A01

- [A] Low speed hold solenoid valve
- [1] HST pump (Port T2)
- [2] HST pump (Port X2) "Travel backward"
- [3] HST pump (Port X1) "Travel forward"
- [4] HST pump (Port A) "Travel backward"
- [5] HST pump (Port B) "Travel forward"
- [6] Hydraulic oil cooler



2MPUB00474A01

- [A] Main relief valve (aMR)
- [B] Overload relief valve (b1R)
- [C] Overload relief valve (b1B)
- [D] AUX proportional solenoid LH
- [E] AUX proportional solenoid RH
- [1] Priority valve (Port EF)
- [2] AUX port RH Hydraulic quick coupler solenoid valve
- [3] AUX port LH Hydraulic quick coupler cylinder (Center)
- [4] Lift arm cylinder (Rod) "Lift arm lower"
- [5] Lift arm cylinder (Bottom) "Lift arm raise"
- [6] Tilt arm cylinder (Rod) "Tilt arm dump"
- [7] Tilt arm cylinder (Bottom) "Tilt arm crowd"
- [8] Hydraulic oil tank
- [9] Hydraulic oil tank
- [10] Unload valve (Port A3) "AUX operation"
- [11] Pilot control valve (Port 3) "Lift arm lower"
- [12] Pilot control valve (Port 1) "Lift arm raise"
- [13] Pilot control valve (Port 4) "Tilt arm dump"
- [14] Pilot control valve (Port 2) "Tilt arm crowd"

2.3 Internal leakage and rate

			Unit	R065	R085	R082	R070	R090
		Total weight (w/ bucket load)	kg	890	1260	1260	empty bucket	empty bucket
Internal leakage	Cylinder deflection (over 10 min, w/ specific bucket load)	Lift arm	mm	20	20	20	20	20
			mm	100	100	100	100	100
		Bucket cylinder	mm	20	20	20	20	20
			mm	100	100	100	100	100
Speed	Bucket		s	2.1 ±0.3	2.2 ± 0.3	1.9 ± 0.3	2.3 ± 0.3	2.0 ± 0.3
			s	2.9 ±0.3	3.0 ± 0.3	2.1 ± 0.3	3.2 ± 0.3	2.9 ± 0.3
	Lift arm		s	6.0 ±0.5	6.0 ± 0.5	5.6 ± 0.5	6.5 ± 0.5	6.0 ± 0.5
			s	3.9 ±0.5	4.3 ± 0.5	4.1 ± 0.5	4.5 ± 0.5	4.3 ± 0.5

2.4 Towing in case of an engine failure

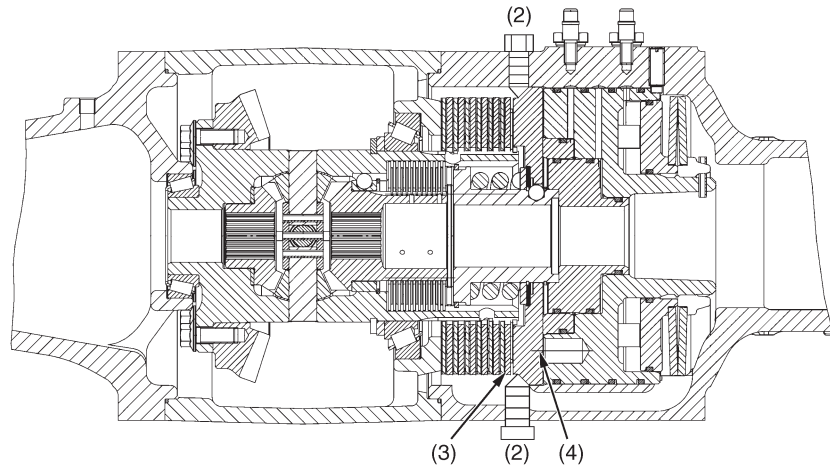
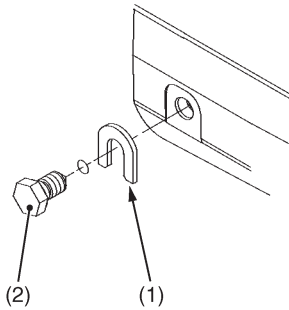
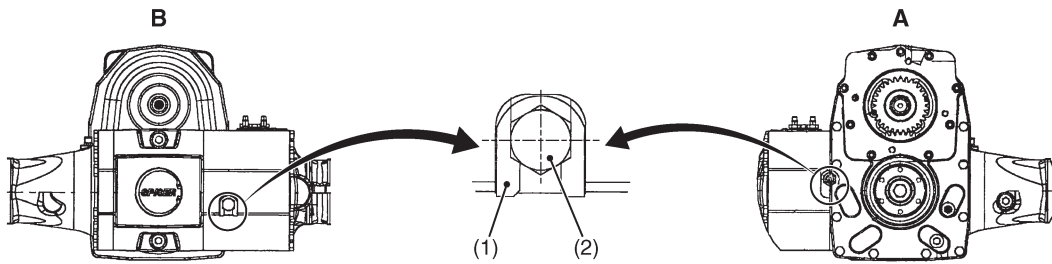
If the machine must be towed with another vehicle due to an engine failure, the following procedures must be followed.

1. Release the parking brake.
2. Bypass the HST high pressure circuit.

When towing, make sure to adhere to the following rules.

1. Confirm that the service brake is released.
2. The towing speed must be within 1km/h.
3. Towing over long distances is not allowed.

2.4.1 Releasing the parking brake



RY9212188POM009A

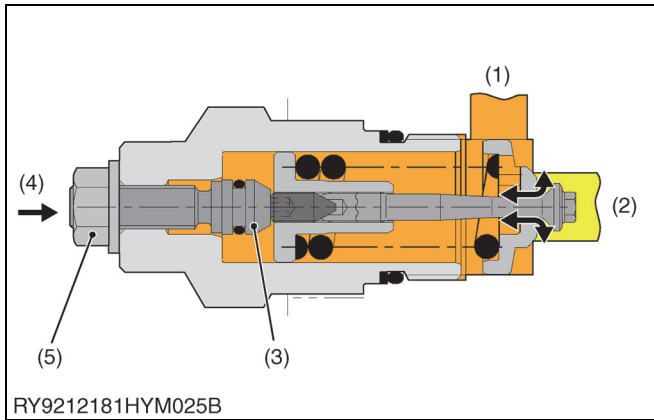
- [1] U-Snap shim
[2] Release bolt

- [3] Service brake
[4] Intermediary disk

- [A] Front side
[B] Rear side

1. Loosen the release bolt (2) on the front of the rear axle, remove the U-snap shim (1) and re-fasten the release bolt (2).
2. Loosen the release bolt (2) on the rear of the rear axle, remove the U-snap shim (1) and re-fasten the release bolt (2).
3. After completing step 1 and 2, insert the release bolt (2) between the intermediary disk (4) and the service brake (3) and forcefully release the service brake.
4. After towing, make sure that the U-snap shims are mounted again and the U-snap rings and release bolts are replaced in their original condition.

2.4.2 Bypassing the HST pump high pressure line



[1] Main line

[3] Poppet A

[5] Nut (M8)

[2] Charge pressure line

[4] Bolt/nut

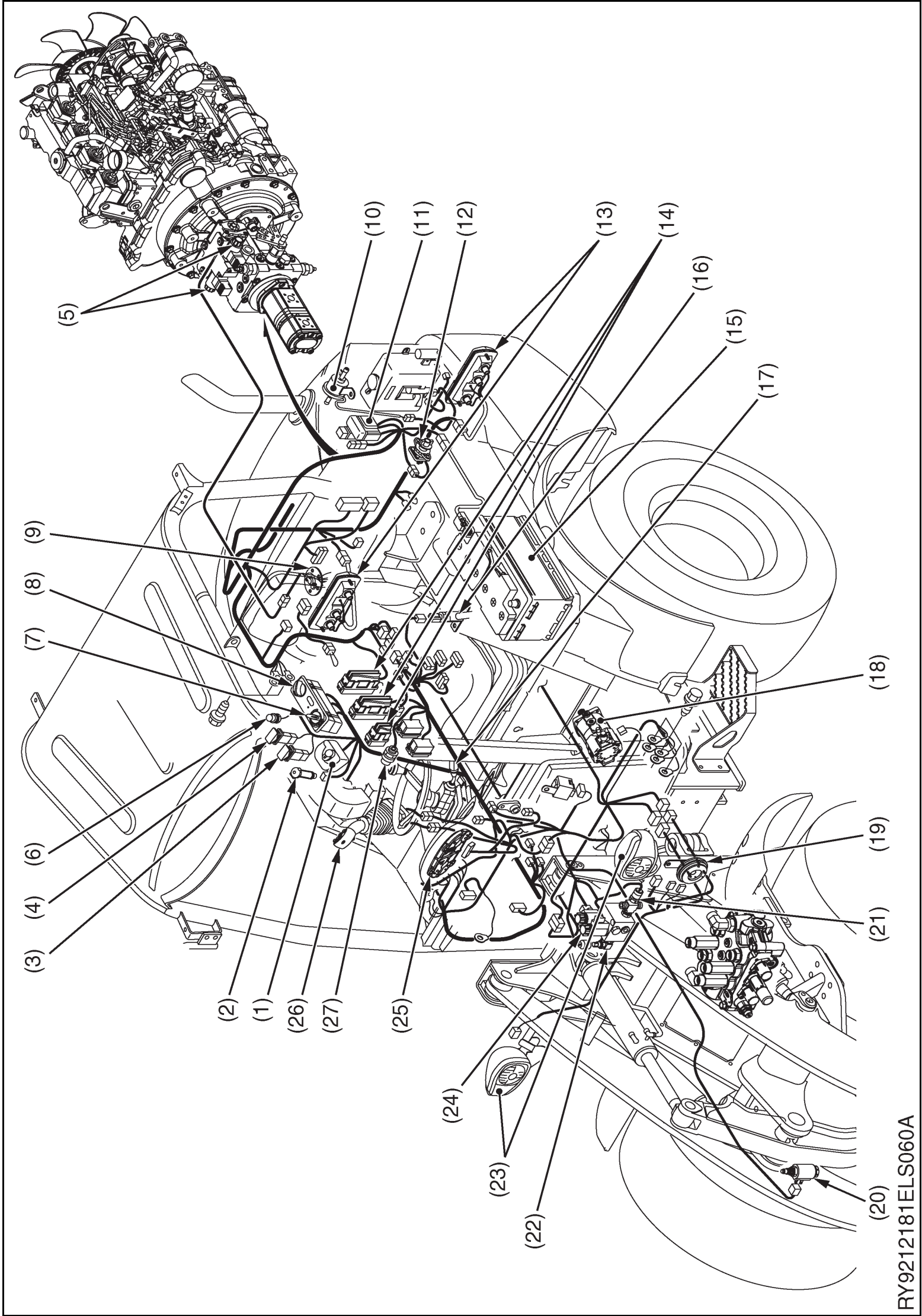
Bypass the high pressure circuit.

1. Remove the high pressure relief valve cap.
2. Loosen the M8 nut (13mm spanner).
3. Turn the high pressure release bolt six times. (4mm Allen wrench)
4. Turn back 6 times to reset (until it reaches the original position).
5. After towing has finished, make sure that the valve is reset to its original position.

3 Electrical system

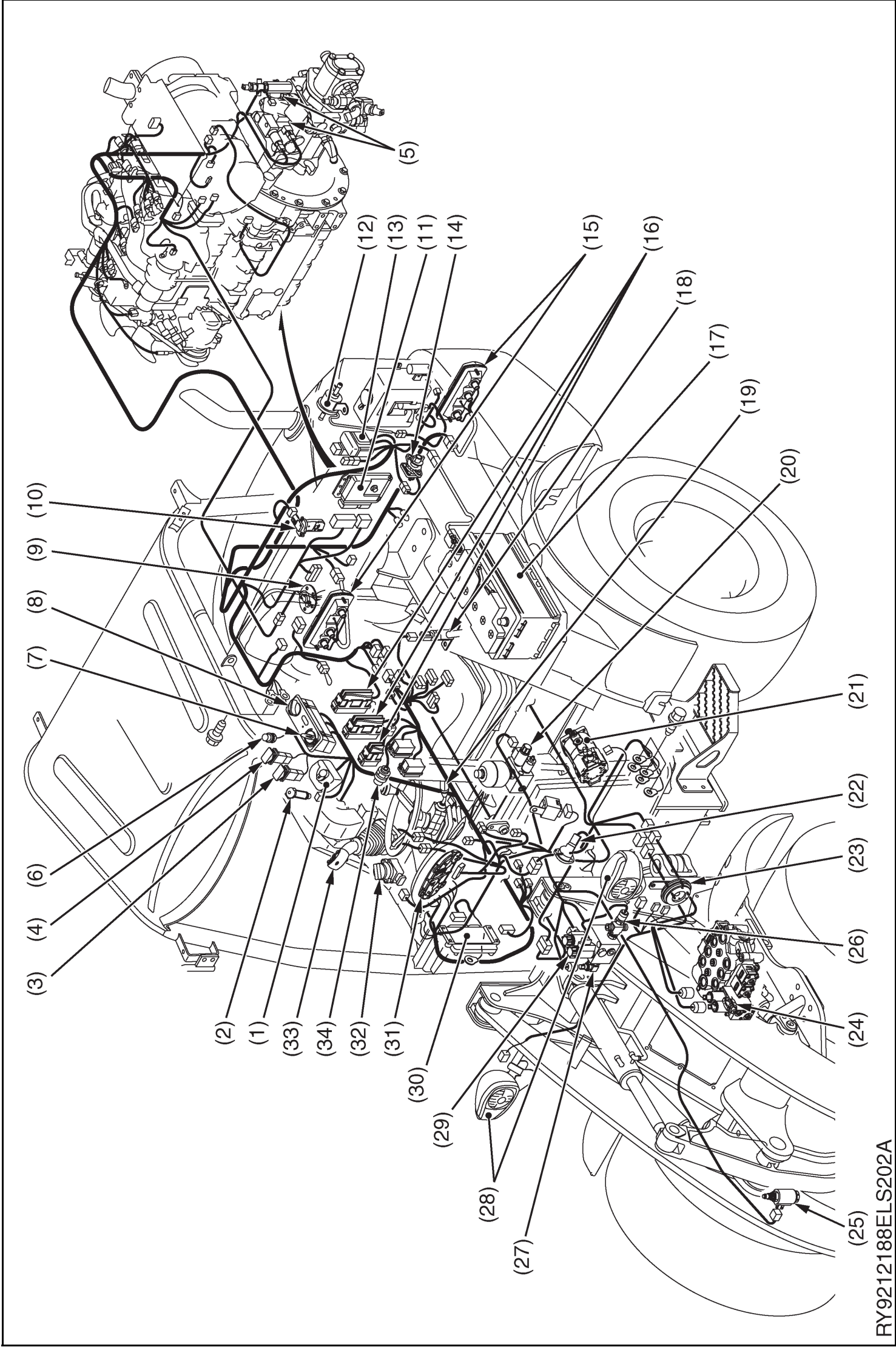
3.1 Electrical components layout

3.1.1 R065



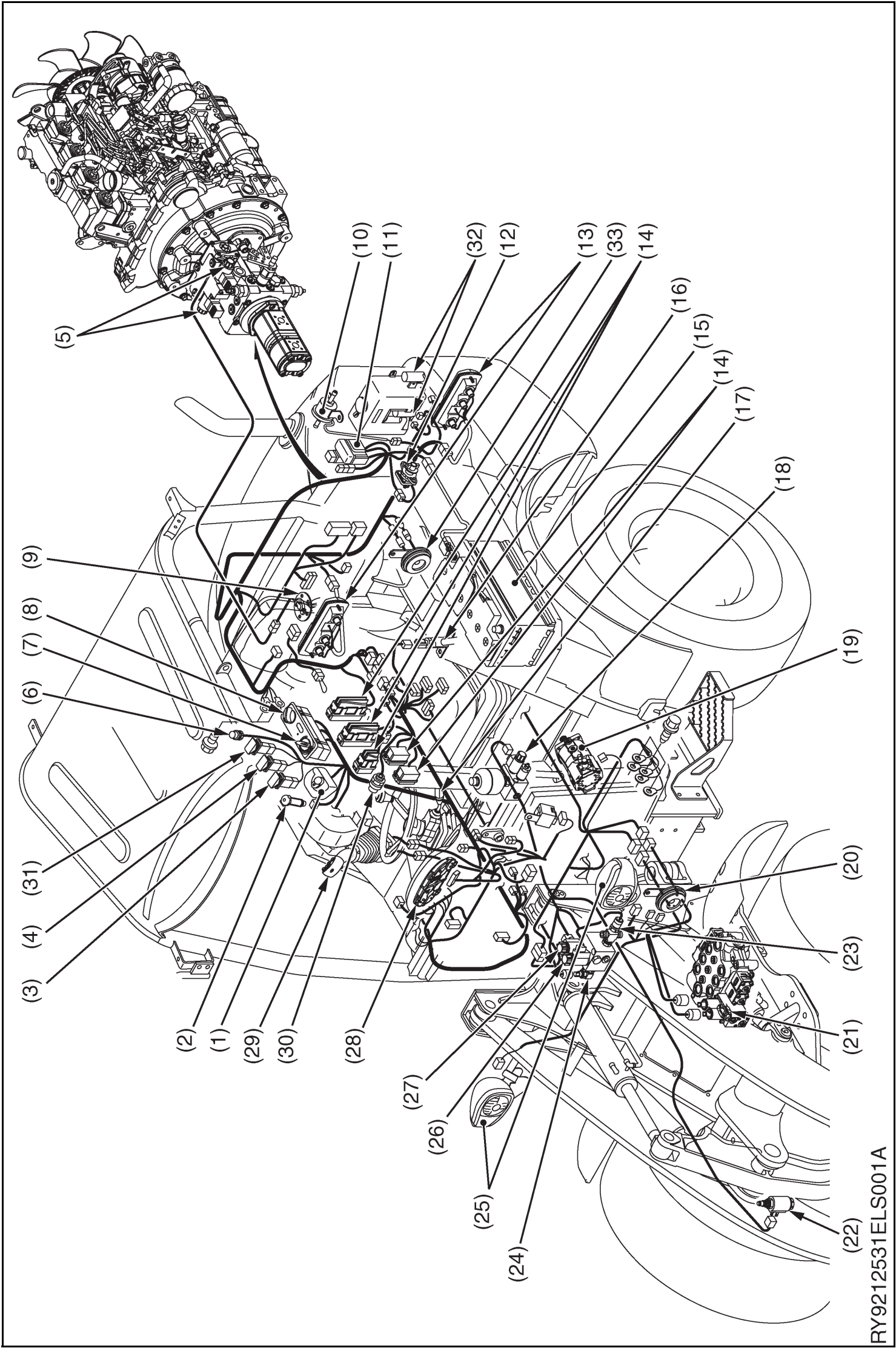
No.	Part name
(1)	Key switch
(2)	Power socket
(3)	Work lamp switch
(4)	Rear wiper/washer switch
(5)	HST pump direction change valve
(6)	Engine stop knob
(7)	Temperature control
(8)	Blower switch
(9)	Fuel sensor
(10)	Fuel pump
(11)	Fuse box
(12)	Battery isolator
(13)	Rear combination light
(14)	Fuse box
(15)	Battery
(16)	Oil temperature sensor
(17)	Flasher switch
(18)	Speed control solenoid
(19)	Horn
(20)	Quick connector solenoid
(21)	Differential lock pressure switch
(22)	Parking brake pressure switch
(23)	Headlight
(24)	Solenoid (differential lock/parking brake)
(25)	Meter panel
(26)	Control lever
(27)	Fuel Tank Full signal switch

3.1.2 R085



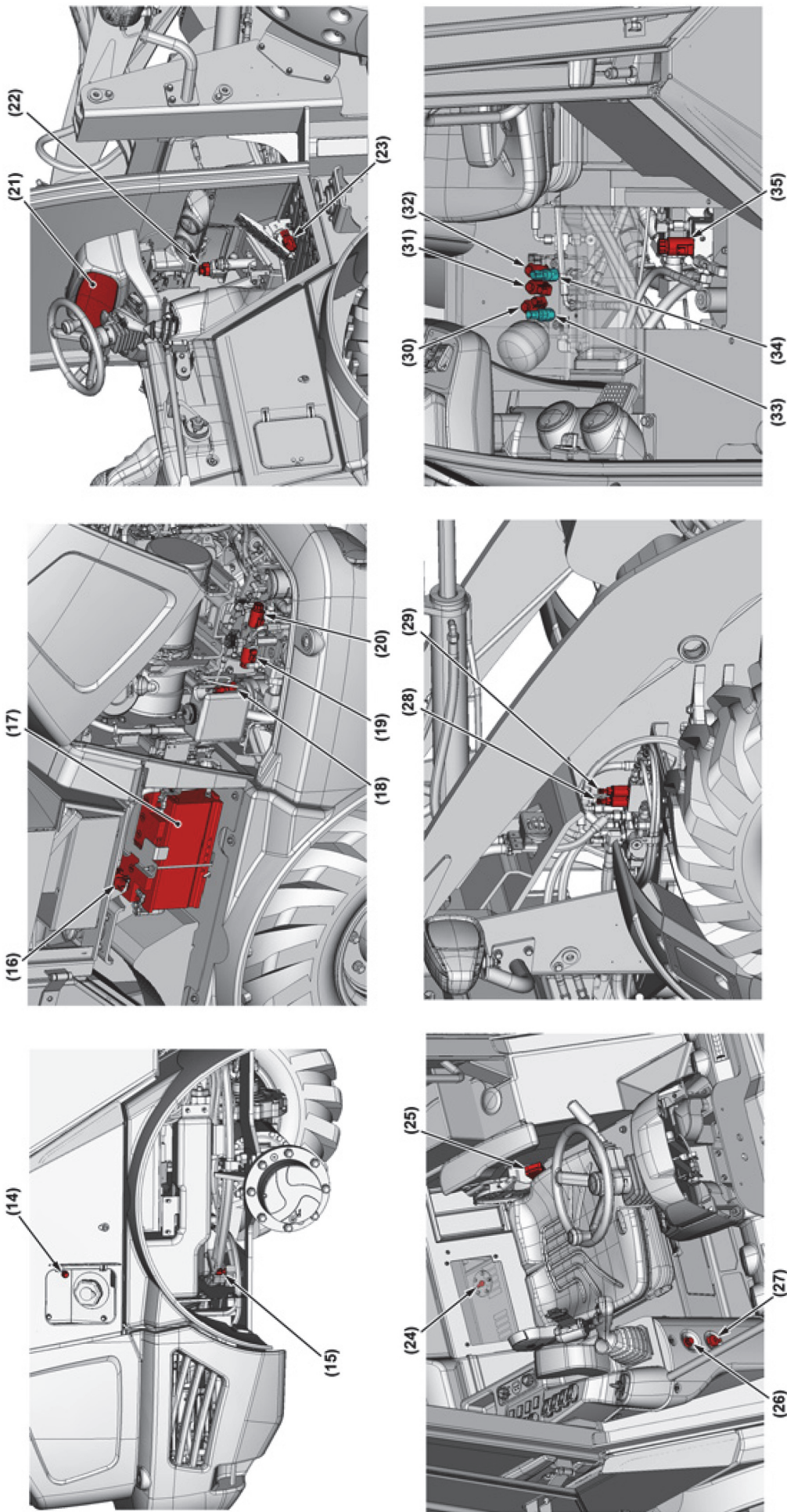
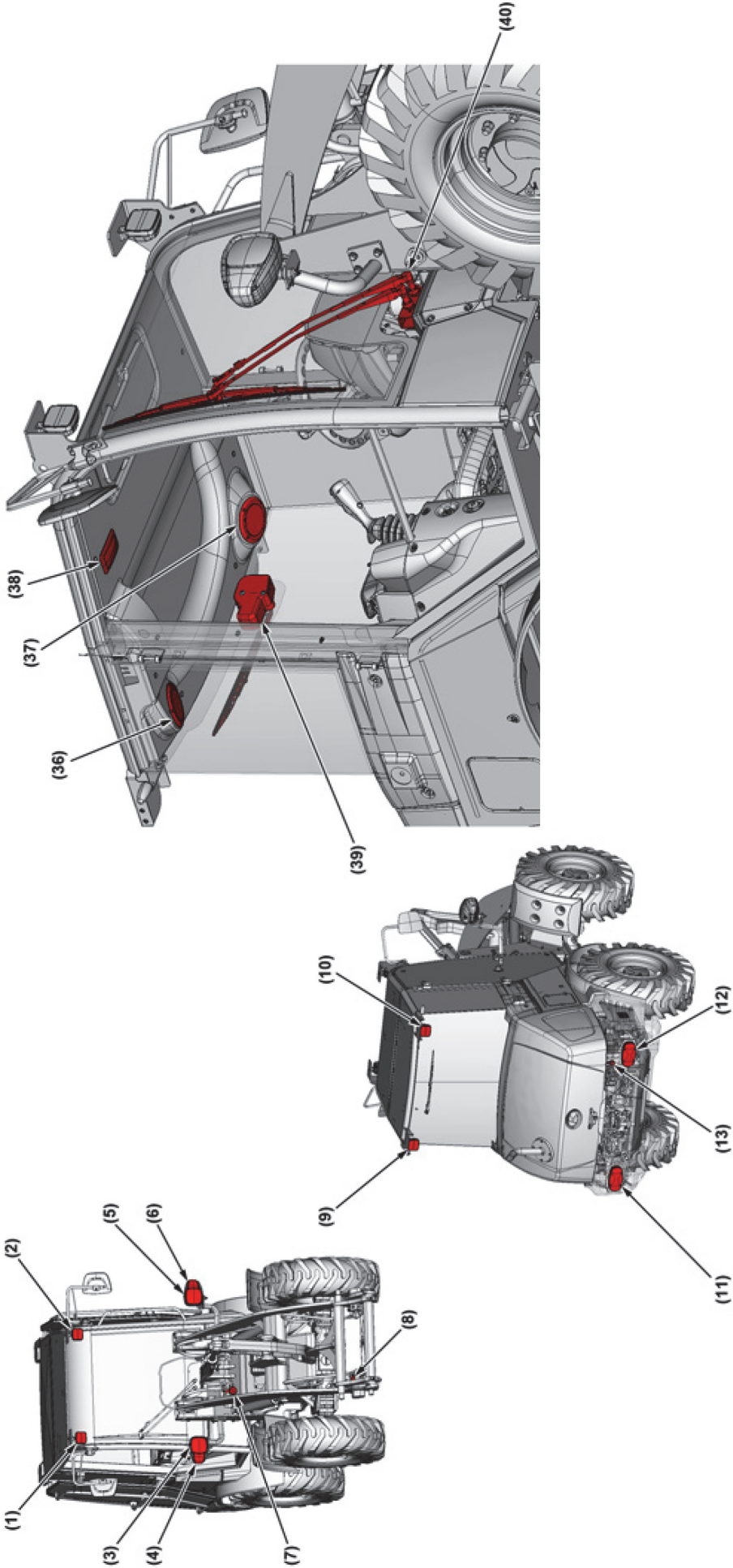
No.	Part name
(1)	Key switch
(2)	Power socket
(3)	Work lamp switch
(4)	Rear wiper/washer switch
(5)	HST pump direction change valve
(6)	Engine stop knob
(7)	Temperature control
(8)	Blower switch
(9)	Fuel sensor
(10)	Charge pressure sensor
(11)	Engine ECU
(12)	Fuel pump
(13)	Fuse box
(14)	Battery isolator
(15)	Rear combination light
(16)	Fuse box
(17)	Battery
(18)	Oil temperature sensor
(19)	Flasher switch
(20)	Unload valve (solenoid)
(21)	Speed control solenoid
(22)	Potentiometer
(23)	Horn
(24)	AUX solenoid valve
(25)	Quick connector solenoid
(26)	Differential lock pressure switch
(27)	Parking brake pressure switch
(28)	Headlight
(29)	Solenoid (differential lock/parking brake)
(30)	HST ECU
(31)	Meter panel
(32)	Accelerator
(33)	Control lever
(34)	Fuel Tank Full signal switch

3.1.3 R082



No.	Part name
(1)	Key switch
(2)	Power socket
(3)	Work lamp switch
(4)	Rear wiper/washer switch
(5)	HST pump direction change valve
(6)	Engine stop knob
(7)	Temperature control
(8)	Blower switch
(9)	Fuel sensor
(10)	Fuel pump
(11)	Slow-blow fuse
(12)	Battery isolator
(13)	Rear combination light
(14)	Fuse box
(15)	Battery
(16)	Oil temperature sensor
(17)	Multifunction lever (working light / flasher)
(18)	Unload valve
(19)	EP solenoid valve / speed change solenoid
(20)	Horn
(21)	AUX solenoid valve
(22)	Quick connector solenoid
(23)	Charge pump pressure switch
(24)	Parking brake pressure switch
(25)	Head, combi, LH light
(26)	Parking brake solenoid valve
(27)	Differential lock solenoid
(28)	Meter panel
(29)	Control lever
(30)	Fuel level audible indication switch
(31)	Beacon light switch
(32)	Washer tank motor
(33)	Travel backwards buzzer

3.1.4 R070 / R090



No.	Part name
(1)	Front work light RH
(2)	Front work light LH
(3)	Head light RH
(4)	Front combination lamp RH
(5)	Head light LH
(6)	Front combination lamp LH
(7)	Horn
(8)	Hydraulic quick coupler solenoid
(9)	Rear work light LH
(10)	Rear work light RH
(11)	Rear combination lamp LH
(12)	Rear combination lamp RH
(13)	Back-up buzzer
(14)	Fuel indication switch
(15)	Hydraulic oil temperature sensor
(16)	Battery isolator switch
(17)	Battery
(18)	Washer motor
(19)	Direction control solenoid (forward)
(20)	Direction control solenoid (backward)
(21)	Meter panel
(22)	Brake oil tank switch
(23)	Accelerator sensor
(24)	Fuel level sensor
(25)	Seat belt switch
(26)	Engine stop switch
(27)	Cigarette socket
(28)	AUX proportional solenoid RH
(29)	AUX proportional solenoid LH
(30)	Hydraulic unlock solenoid
(31)	Differential lock solenoid
(32)	Parking brake solenoid
(33)	HST control pressure switch
(34)	Parking brake pressure switch
(35)	Low speed hold solenoid
(36)	Speaker RH
(37)	Speaker LH
(38)	Room light
(39)	Rear wiper
(40)	Front wiper

3.2 Electrical circuits

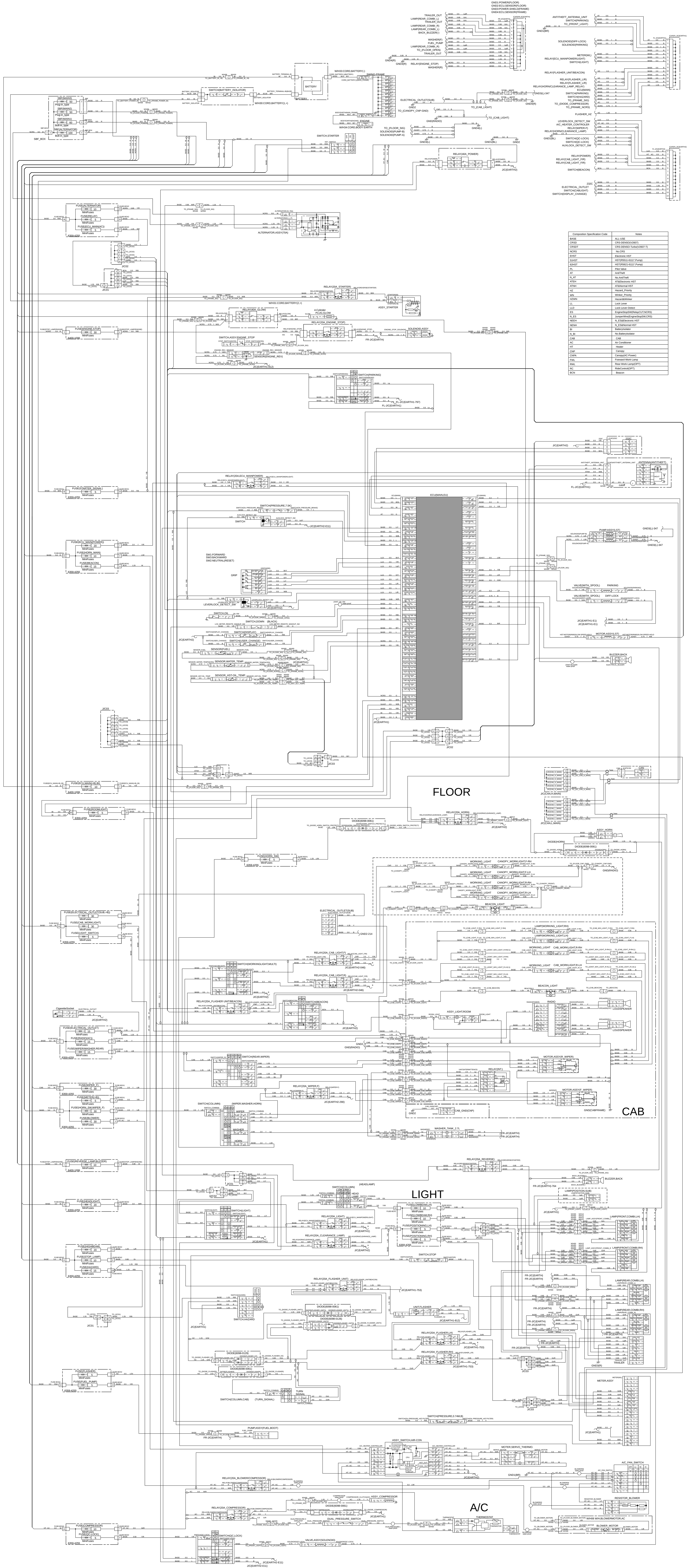
3.2.1 R065

3.2.2 R085

3.2.3 R082

3.2.4 R070

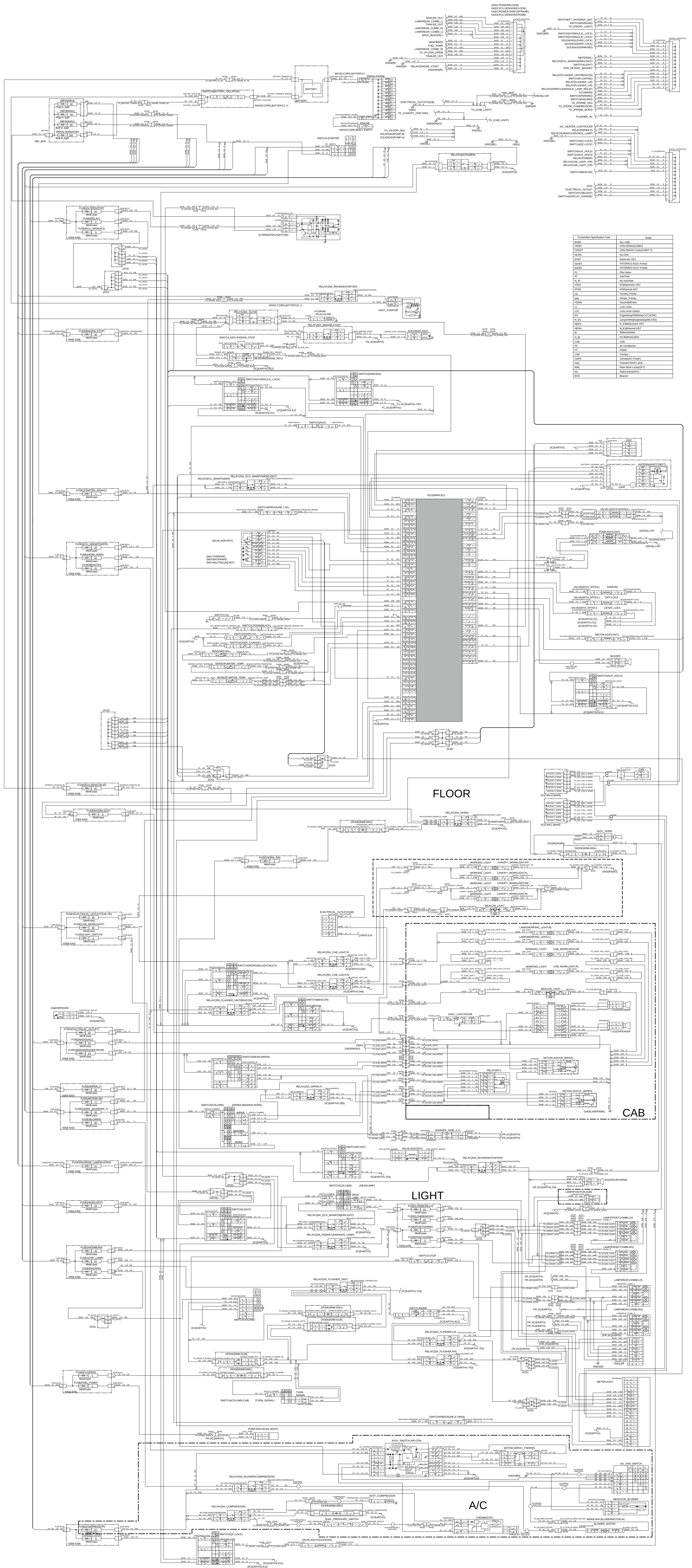
3.2.5 R090



ELECTRICAL CIRCUIT DIAGRAM (R065_EU)

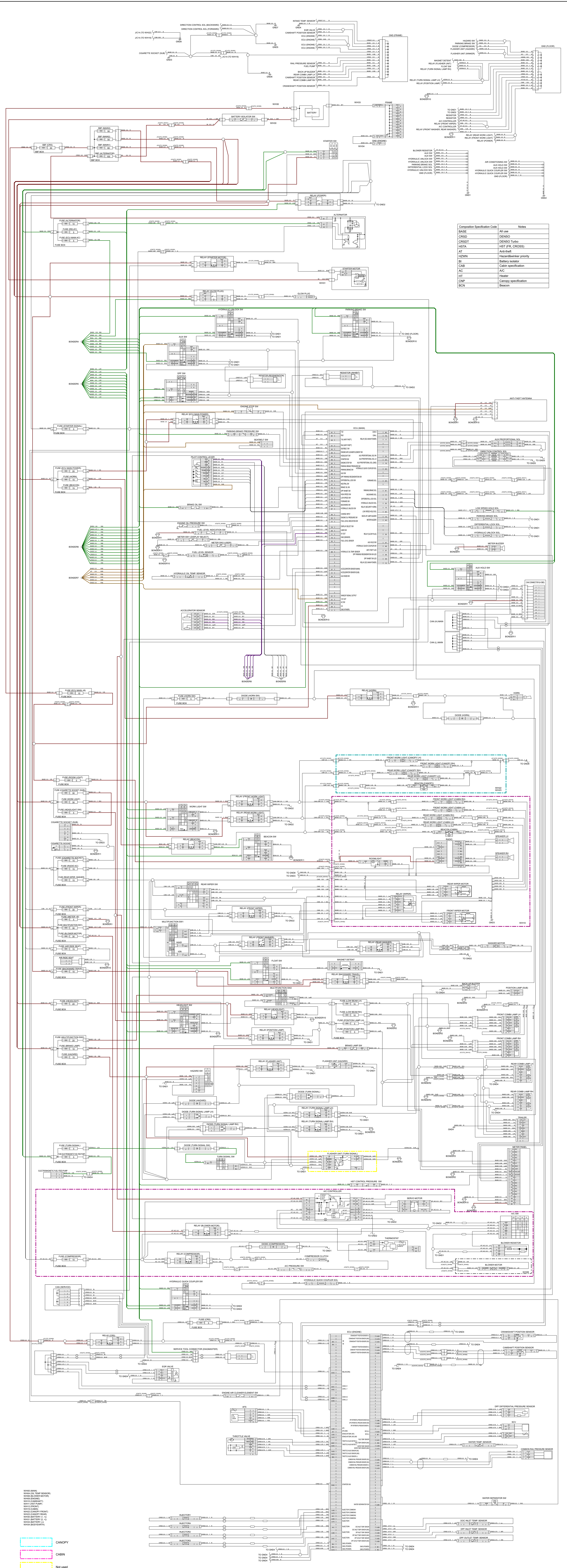


- | | Not used R085 | |
|----|------------------|---------------------|
| 1 | WH09 R2535-5341* | WH(FRAME.NCRS) |
| 2 | WH09 R2535-5341* | WH(FRAME.CRS) |
| 3 | WH00 R2535-5342 | WH(FLOOR.NCRS.CAB) |
| 4 | WH00 R2535-5362* | WH(FLOOR.NCRS.CNP) |
| 5 | WH00 R2535-5362* | WH(FLOOR.NCRS.CAB) |
| 6 | WH00 R2535-5362* | WH(FLOOR.NCRS.CNP) |
| 7 | WH00 R2545-5342 | WH(FLOOR.NCRS) |
| 8 | WH00 R2531-5342* | WH(FLOOR.CRS) |
| 9 | WH00 R2531-5342* | WH(FLOOR.CRS) |
| 10 | WH06 R2539-5391 | WH(LOWER.MOTOR.A/C) |
| 11 | WH10 R2531-5349* | WH(GS.RSR) |
| 12 | WH11 R2531-5349* | WH(HF_JOINT.R085) |
| 13 | WH11 R2531-5349* | WH(HF_JOINT.R085) |
| 14 | WH12 R2031-5343* | WH(J.FRONT) |
| 15 | WH13 R2031-5344* | WH(J.FRONT) |
| 16 | WH13 R2031-5344* | WH(J.FRONT) |
| 17 | WH22 R2531-5362* | WH(CNP) |
| 18 | WH22 R2531-5365* | WH(CNP.CAB) |
| 19 | WH25 R2531-5362* | WH(BEACON.CNP) |
| 20 | WH25 R2531-5362* | WH(BEACON.CNP) |
| 21 | WH30 R2535-5322* | CORD.BATTERY(1,+) |
| 22 | WH31 R2535-5323* | CORD.BATTERY(2,+) |
| 23 | WH33 R2531-5325* | CORD.BATTERY(1) |
| 24 | WH33 R2531-5325* | CORD.BODY.EARTH |



1	WH09	R2535-5341*	WH(FRAME.NCRS)	13	WH11	R2631-5347*	WH(FR.JOINT,R085)
2	WH09	R2631-5341*	WH(FRAME.CRS)	14	WH12	R2631-5343*	WH(1.FRONT)
3	WH00	R2535-5342*	WH(FLOOR.NCRS.CAB)	15	WH13	R2631-5344*	WH(2.FRONT)
4	WH00	R2535-5342*	WH(FLOOR.NCRS.CAB)	16	WH19	R611-4761*	WH(MAIN,CAB)
5	WH00	R2531-5342*	WH(FLOOR.CRS.CAB)	17	WH22	R2631-5364*	WH(CNP)
6	WH00	R2531-5362*	WH(FLOOR.CRS.CNP)	18	WH23	R2631-5365*	WH(CNP,REAR)
7	WH00	R2645-5342*	WH(FLOOR.NCRS)	19	WH25	R2631-	WH(BEACON,CNP)
8	WH00	R2631-5342*	WH(FLOOR.CRS)	20	WH30	R2631-5322*	CORD.BATTERY(1-)
9	WH04	R2631-5349*	WH(OIL.TEMP.SSR)	21	WH50	R2635-5322*	CORD.BATTERY(1-)
10	WH06	R0829-53391	WH(BLOWER.MOTOR,A/C)	22	WH31	R2635-5323*	CORD.BATTERY(2-)
11	WH10	R2631-5349*	WH(GS.CRS)	23	WH33	R2631-5325*	CORD.BATTERY(1-)
12	WH11	R2531-5347*	WH(FR.JOINT,R085)	24	WH34	R2631-5326*	CORD.BODY.EARTH

ELECTRICAL CIRCUIT DIAGRAM (R082)

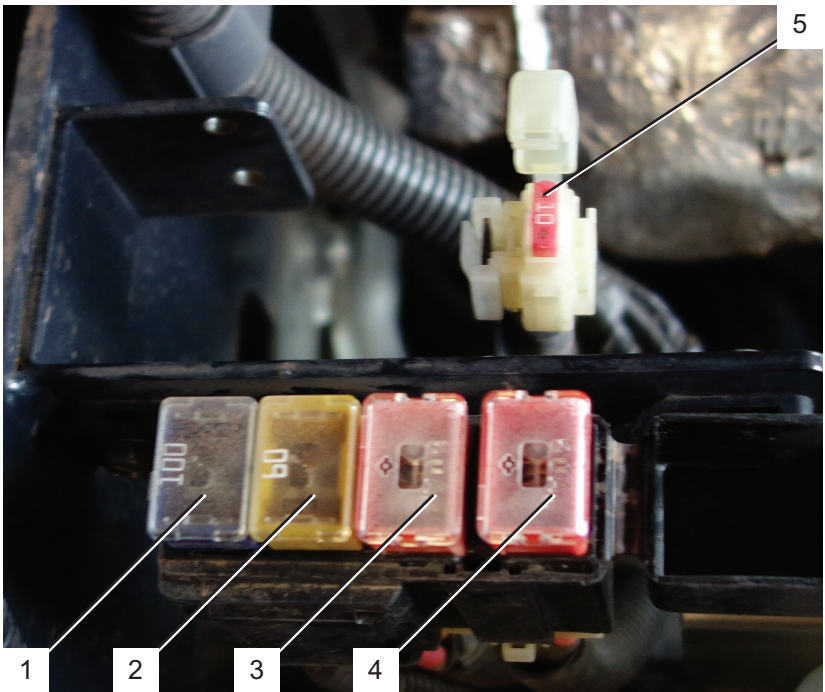
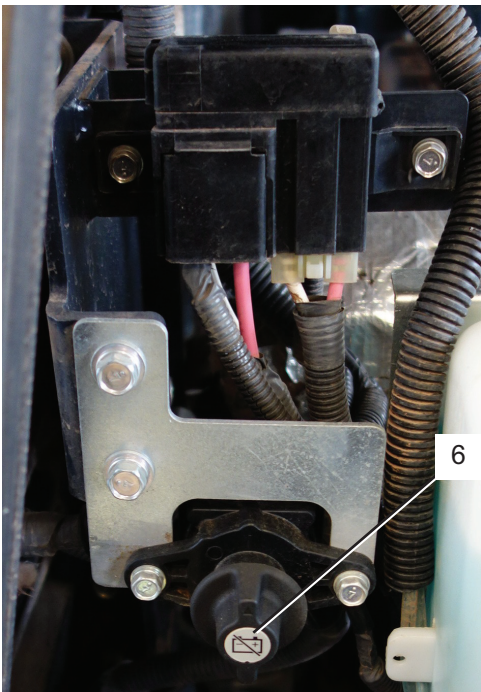


Composition Specification Code	Notes
BASE	All use
CRSD	DENSO
CRSDT	DENSO Turbo
HSTA	HST (H. CROSS)
AT	Anti-lock
HZWN	Hazard&wiper priority
BI	Battery isolator
CAB	Cabin specification
HT	Heater
CNP	Canopy specification
BCN	Beacon

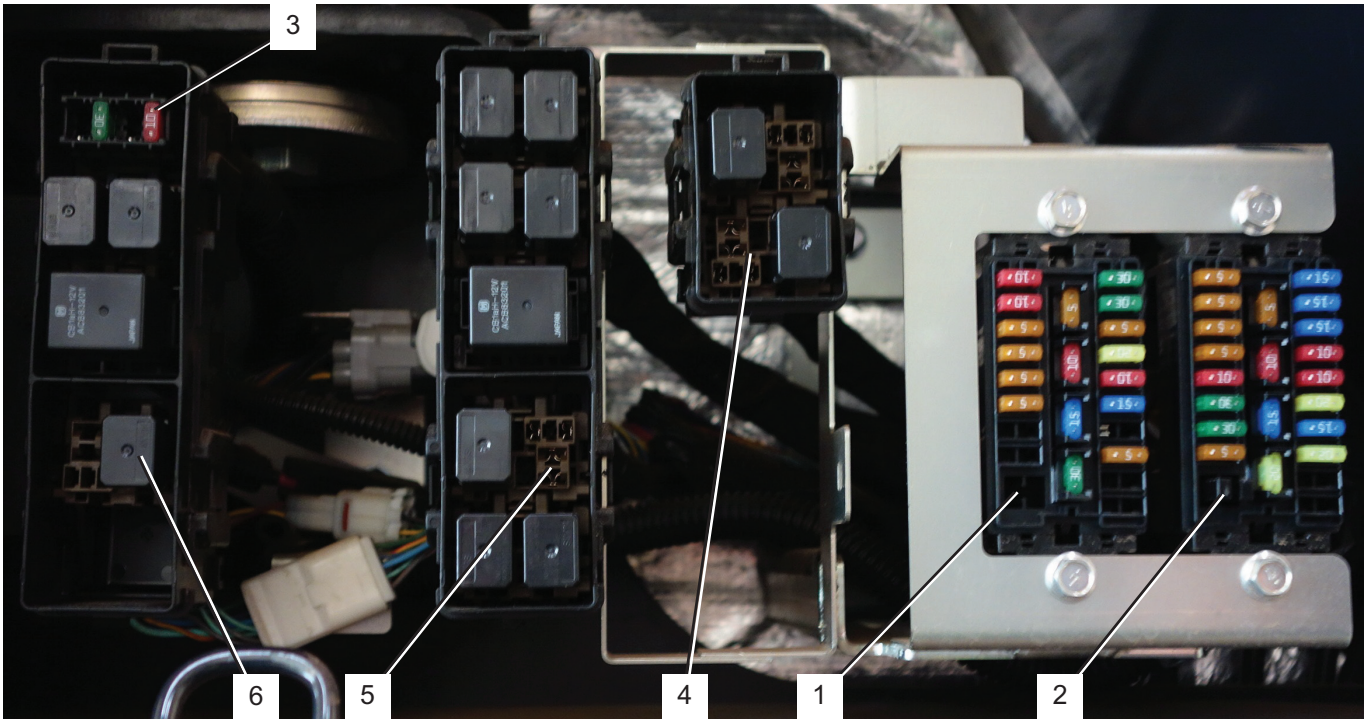
ELECTRICAL CIRCUIT DIAGRAM (R070)

3.3 Location of fuses & relays

3.3.1 R065



1	Alternator (100A)	3	Main circuit 2 (50A)	5	Main ECU (+B)
2	Main circuit 1 (60 A)	4	Main circuit 3 (50A)	6	Battery Isolator



1	Fuse box A	3	Fuse box C	5	Relay Box B
2	Fuse box B	4	Relay Box A	6	Relay Box C

Fuse specifications and related circuits

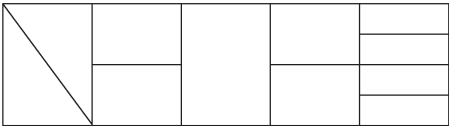
Fuse box A

	Capacity	Related circuits
(1)	30 A	Front wiper/washer
(2)	30 A	Blower motor
(3)	5 A	Meter panel (+B)
(4)	20 A	Main ECU (power)
(5)	10 A	Horn
(6)	15 A	Beacon
(7)		Not used
(8)	5 A	Interior lamp
(9)		Not used
(10)		Not used
(11)	10 A	Headlight (LH)
(12)	10 A	Headlight (RH)
(13)	5 A	Clearance light (LH), back light (LH)
(14)	5 A	Clearance light (RH), back light (RH)
(15)	5 A	Starter signal
(16)	5 A	Horn
(17)		Not used
(18)		Not used
(19)	5 A	Spare
(20)	10 A	Spare
(21)	15 A	Spare
(22)	20 A	Spare

Fuse box B

	Capacity	Related circuits
(23)	15 A	Rear wiper/washer
(24)	15 A	Radio (AC)
(25)	15 A	Power socket
(26)	10 A	Compressor
(27)	10 A	Stop light
(28)	20 A	High beam
(29)	15 A	Hazard
(30)	20 A	Work lamp
(31)		Not used
(32)		Not used
(33)	5 A	Flasher
(34)	5 A	Fuel pump
(35)	5 A	Float relay
(36)	5 A	Main ECU (AC)
(37)	10 A	Alternator
(38)	30 A	Cab work lamp
(39)	30 A	Power socket (sub, +B)
(40)	5 A	Work lamp switch
(41)		Fuse extractor
(42)	5 A	Spare
(43)	10 A	Spare
(44)	15 A	Spare
(45)	30 A	Spare

Fuse box C

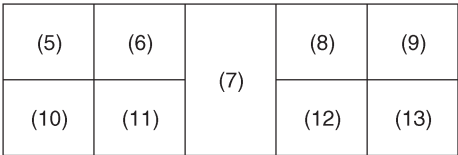
		Capacity	Related circuits
 RY9212188ELS141A	(46)		Not used
	(47)	30 A	Engine stop
	(48)		Not used
	(49)	10 A	Reversing light, back travel buzzer

Relay specifications and related circuits

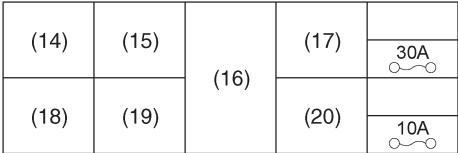
Relay Box A

		Capacity	Circuit
 RY9212188ELS143A	(1)	20 A	A/C compressor
	(2)	20 A	Front work light
	(3)	20 A	Blower motor
	(4)	20 A	Rear work light

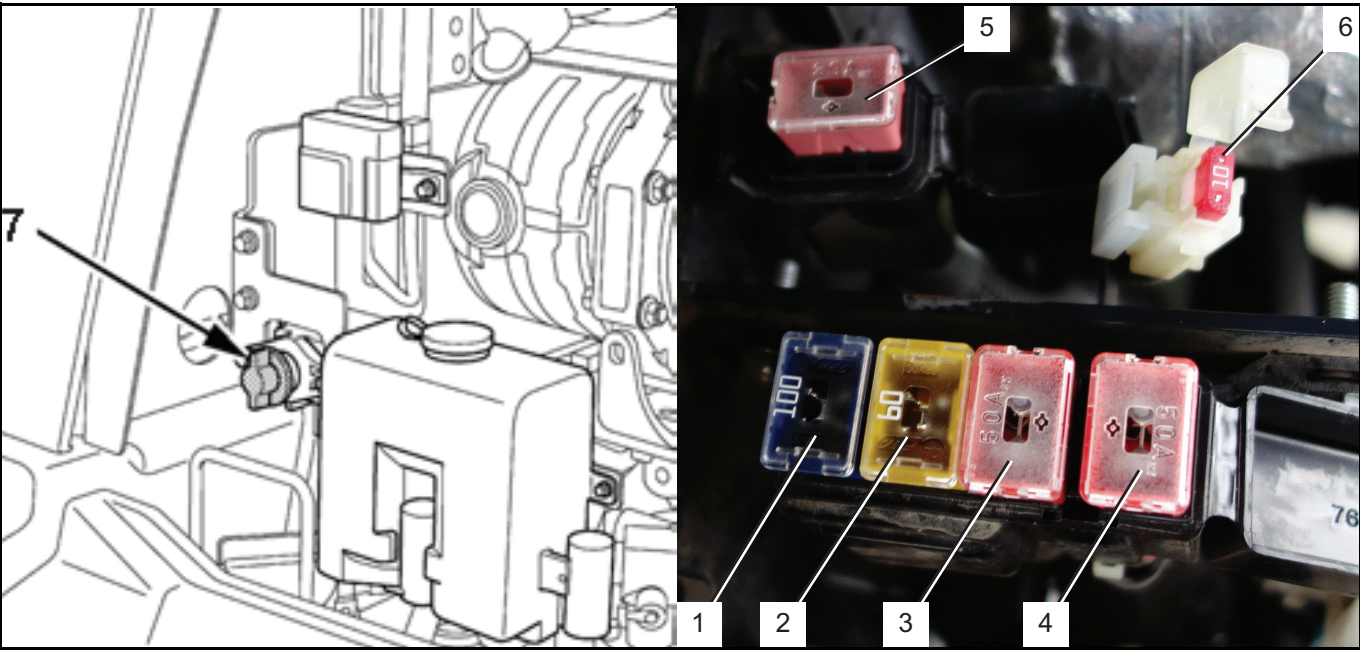
Relay Box B

		Capacity	Circuit
 RY9212188ELS144A	(5)	20 A	Flasher (LH)
	(6)	20 A	Flasher unit
	(7)	40 A	Power
	(8)	20 A	Clearance light
	(9)	20 A	Main ECU
	(10)	20 A	Flasher (RH)
	(11)	20 A	Beacon
	(12)	20 A	Horn
	(13)	20 A	Headlight

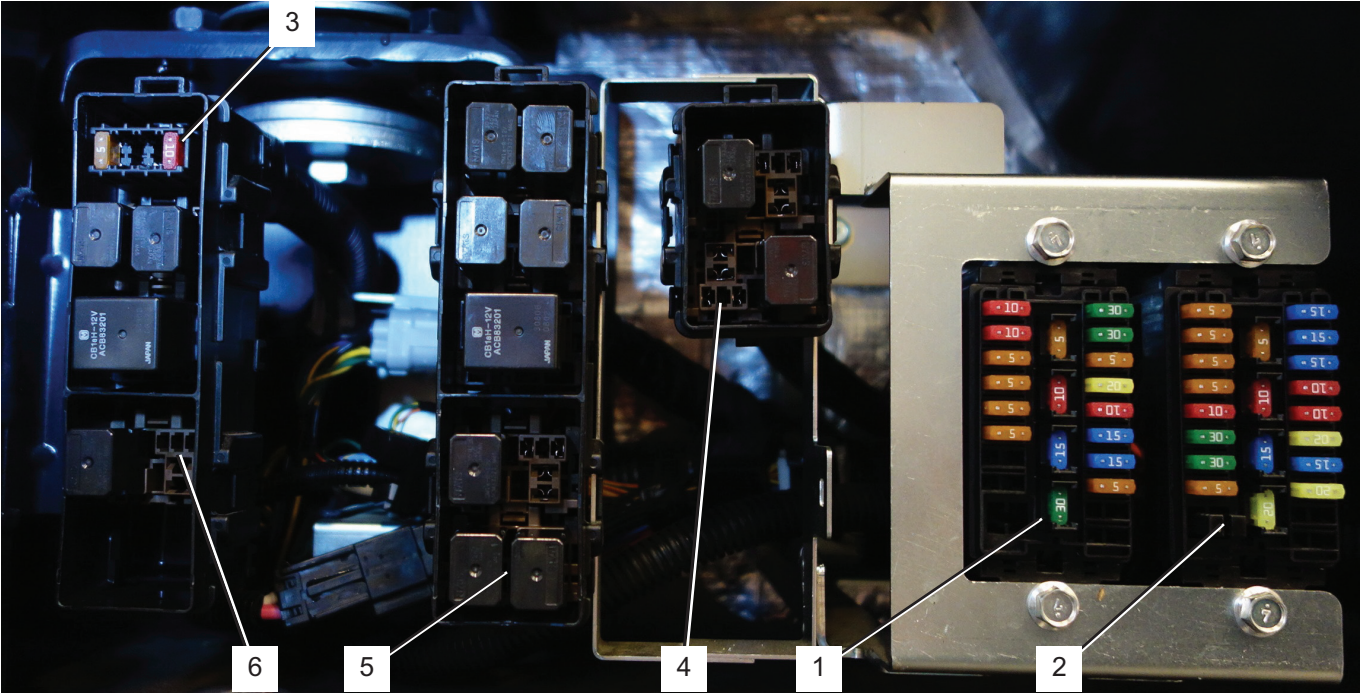
Relay Box C

		Capacity	Circuit
 RY9212181ELS031A	(14)		Not used
	(15)		Not used
	(16)	40 A	Glow
	(17)	20 A	Starter motor
	(18)		Not used
	(19)	20 A	Engine stop
	(20)	20 A	Reversing light, back travel buzzer

3.3.2 R085



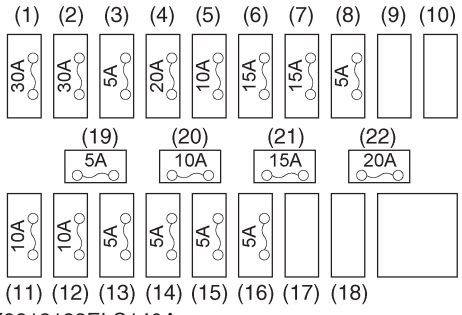
1	Alternator (100A)	4	Main circuit 3 (50A)	6	Main ECU (+B)
2	Main circuit 1 (60 A)	5	Engine ECU	7	Battery isolator
3	Main circuit 2 (60 A)				



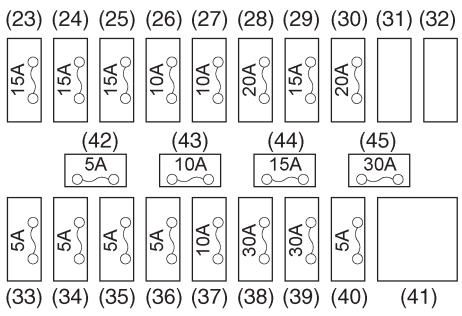
1	Fuse box A	3	Fuse box C	5	Relay Box B
2	Fuse box B	4	Relay Box A	6	Relay Box C

Fuse specifications and related circuits

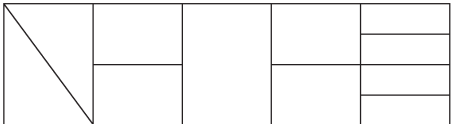
Fuse box A

	Capacity	Related circuits
 RY9212188ELS140A	(1) 30 A (2) 30 A (3) 5 A (4) 20 A (5) 10 A (6) 15 A (7) 15 A (8) 5 A (9) (10) (11) 10 A (12) 10 A (13) 5 A (14) 5 A (15) 5 A (16) 5 A (17) (18) (19) 5 A (20) 10 A (21) 15 A (22) 20 A	Front wiper/washer Blower motor Meter panel (+B) Main ECU (power) Horn Beacon HST ECU Interior lamp Not used Not used Headlight (LH) Headlight (RH) Clearance light (LH), back light (LH) Clearance light (RH), back light (RH) Starter signal Horn Not used Not used Spare Spare Spare Spare

Fuse box B

	Capacity	Related circuits
 RY9212188ELS152A	(23) 15 A (24) 15 A (25) 15 A (26) 10 A (27) 10 A (28) 20 A (29) 15 A (30) 20 A (31) (32) (33) 5 A (34) 5 A (35) 5 A (36) 5 A (37) 10 A (38) 30 A (39) 30 A (40) 5 A (41) (42) 5 A (43) 10 A (44) 15 A (45) 30 A	Rear wiper/washer Radio (AC) Power socket Compressor Stop light High beam Hazard Work lamp Not used Not used Flasher Fuel pump Float relay Main ECU (AC) Alternator Cab work lamp Power socket (sub, +B) Work lamp switch Fuse extractor Spare Spare Spare Spare

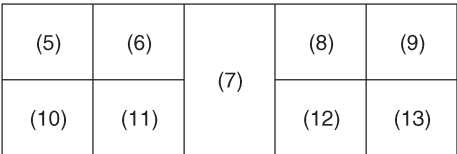
Fuse box C

		Capacity	Related circuits
 RY9212188ELS141A	(46)	5 A	Engine ECU
	(47)	30 A	Engine stop
	(48)		Not used
	(49)	10 A	Reversing light, back travel buzzer

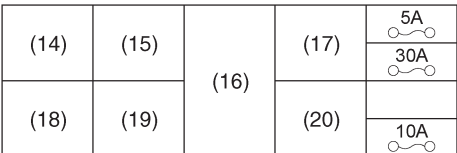
Relay specifications and related circuits**Relay Box A**

		Capacity	Circuit
 RY9212188ELS143A	(1)	20 A	A/C compressor
	(2)	20 A	Front work light
	(3)	20 A	Blower motor
	(4)	20 A	Rear work light

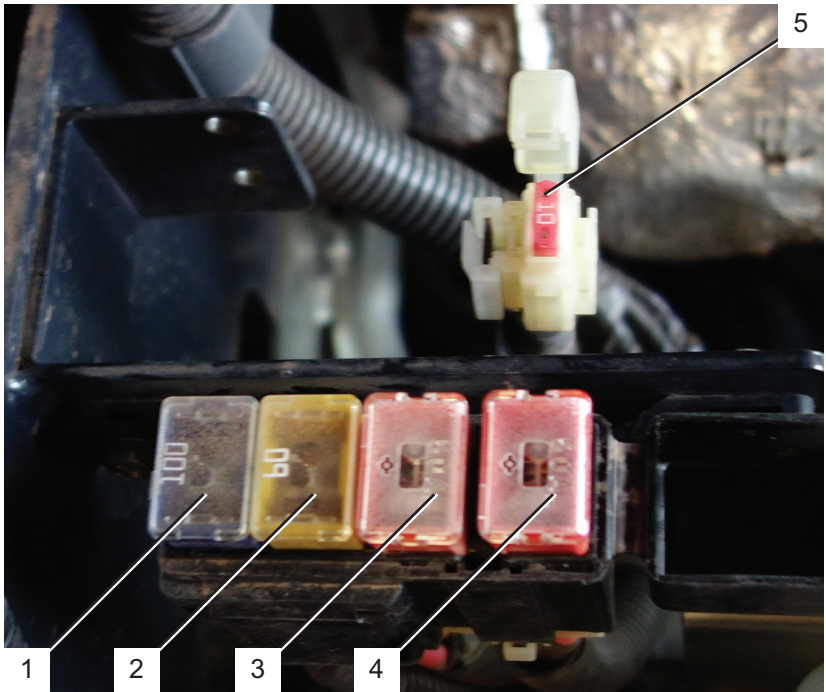
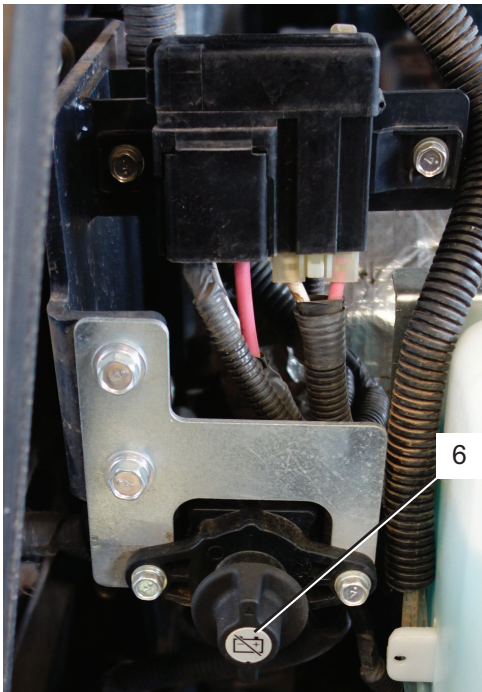
Relay Box B

		Capacity	Circuit
 RY9212188ELS144A	(5)	20 A	Flasher (LH)
	(6)	20 A	Flasher unit
	(7)	40 A	Power
	(8)	20 A	Clearance light
	(9)	20 A	Main ECU
	(10)	20 A	Flasher (RH)
	(11)	20 A	Beacon
	(12)	20 A	Horn
	(13)	20 A	Headlight

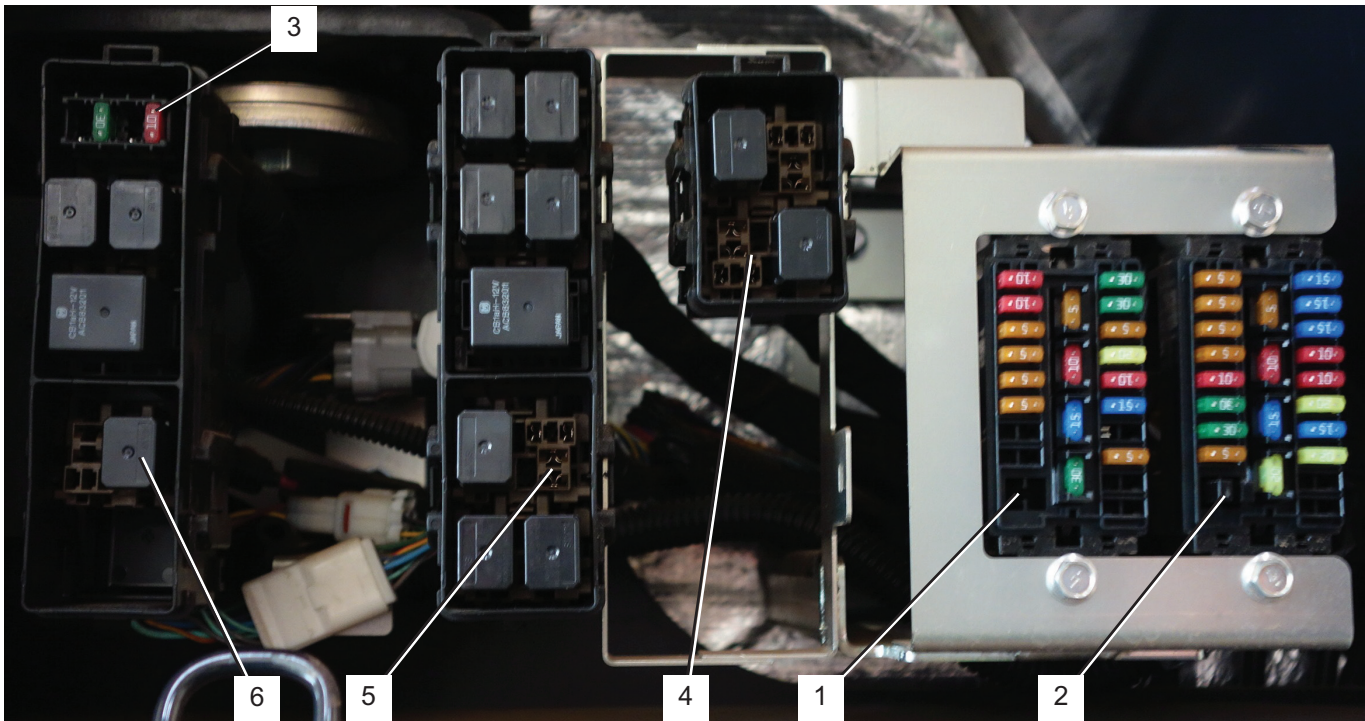
Relay Box C

		Capacity	Circuit
 RY9212188ELS145A	(14)		Not used
	(15)	20 A	Engine ECU
	(16)	40 A	Glow
	(17)	20 A	Starter motor
	(18)		Not used
	(19)	20 A	Engine stop
	(20)	20 A	Reversing light, back travel buzzer

3.3.3 R082



1	Alternator (100A)	3	Main circuit 2 (50A)	5	Main ECU (+B)
2	Main circuit 1 (60 A)	4	Main circuit 3 (50A)	6	Battery Isolator



1	Fuse box A	3	Fuse box C	5	Relay Box B
2	Fuse box B	4	Relay Box A	6	Relay Box C

Fuse specifications and related circuits

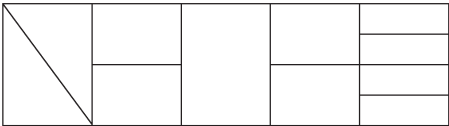
Fuse box A

	Capacity	Related circuits
(1)	30 A	Front wiper/washer
(2)	30 A	Blower motor
(3)	5 A	Meter panel (+B)
(4)	20 A	Main ECU (power)
(5)	10 A	Horn
(6)	15 A	Beacon
(7)		Not used
(8)	5 A	Interior lamp
(9)		Not used
(10)		Not used
(11)	10 A	Headlight (LH)
(12)	10 A	Headlight (RH)
(13)	5 A	Clearance light (LH), back light (LH)
(14)	5 A	Clearance light (RH), back light (RH)
(15)	5 A	Starter signal
(16)	5 A	Horn
(17)		Not used
(18)		Not used
(19)	5 A	Spare
(20)	10 A	Spare
(21)	15 A	Spare
(22)	20 A	Spare

Fuse box B

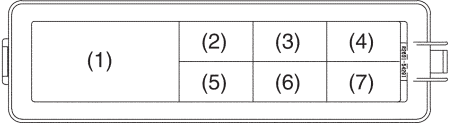
	Capacity	Related circuits
(23)	15 A	Rear wiper/washer
(24)	15 A	Radio (AC)
(25)	15 A	Power socket
(26)	10 A	Compressor
(27)	10 A	Stop light
(28)	20 A	High beam
(29)	15 A	Hazard
(30)	20 A	Work lamp
(31)		Not used
(32)		Not used
(33)	5 A	Flasher
(34)	5 A	Fuel pump
(35)	5 A	Float relay
(36)	5 A	Main ECU (AC)
(37)	10 A	Alternator
(38)	30 A	Cab work lamp
(39)	30 A	Power socket (sub, +B)
(40)	5 A	Work lamp switch
(41)		Fuse extractor
(42)	5 A	Spare
(43)	10 A	Spare
(44)	15 A	Spare
(45)	30 A	Spare

Fuse box C

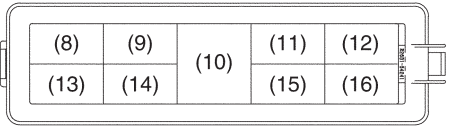
		Capacity	Related circuits
 RY9212188ELS141A	(46)		Not used
	(47)	30 A	Engine stop
	(48)		Not used
	(49)	10 A	Reversing light, back travel buzzer
	(50)		

Relay specifications and related circuits

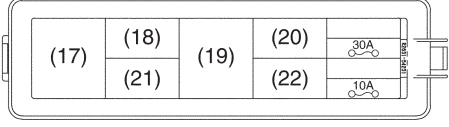
Relay Box A

		Capacity	Circuit
 RY9212181ELS092A	(1)		Not used
	(2)	20 A	Front wiper
	(3)	20 A	A/C compressor
	(4)	20 A	Front work light
	(5)		Not used
	(6)	20 A	Blower motor
	(7)	20 A	Rear work light

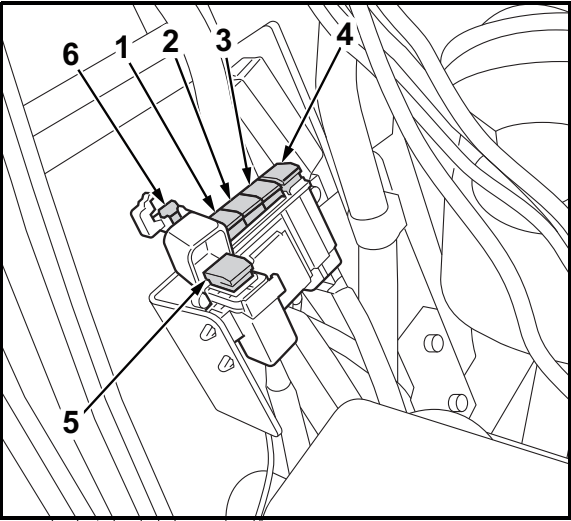
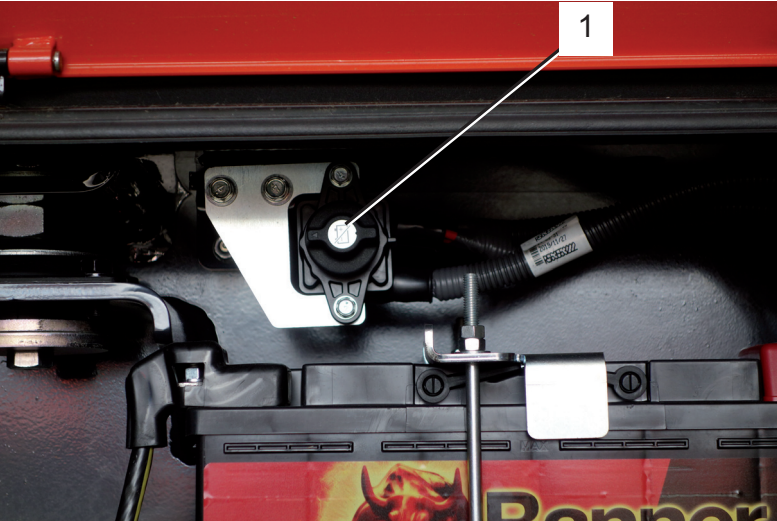
Relay Box B

		Capacity	Circuit
 RY9212181ELS093A	(8)	20 A	Flasher (LH)
	(9)	20 A	Flasher unit
	(10)	40 A	Power
	(11)	20 A	Clearance light
	(12)	20 A	Main ECU
	(13)	20 A	Flasher (RH)
	(14)	20 A	Beacon
	(15)	20 A	Horn
	(16)	20 A	Headlight

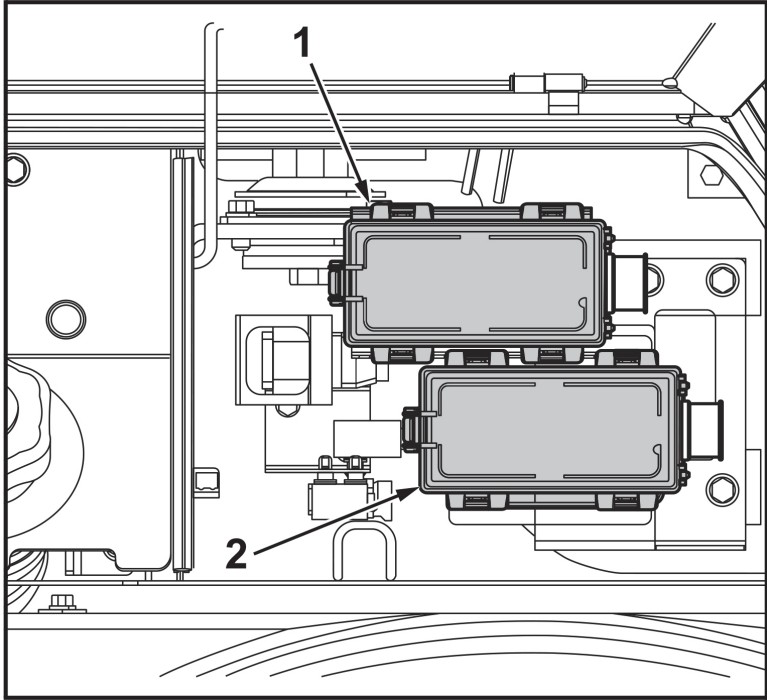
Relay Box C

		Capacity	Circuit
 RY9212181ELS094A	(17)		Not used
	(18)		Not used
	(19)	40 A	Glow plug
	(20)	20 A	Starter motor
	(21)	20 A	Engine stop
	(22)	20 A	Reversing light, back travel buzzer

3.3.4 R070



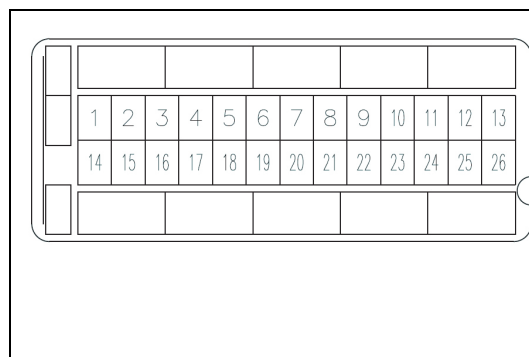
1	Battery Isolator	3	Main circuit 2 (50A)	5	Engine ECU (30A)
		4	Main circuit 3 (50A)	6	Main ECU (+B) (10A)



1	Fuse box A
2	Fuse box B

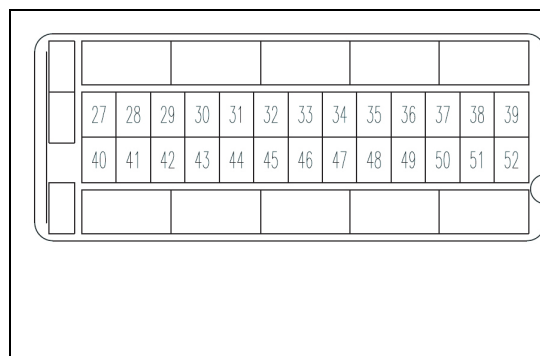
Fuse specifications and related circuits

Fuse box A



	Capacity	Related circuits
(1)	30 A	Front wiper switch / Horn switch
(2)	30 A	Blower motor
(3)	5 A	Instrument panel (+B)
(4)	20 A	Main ECU (power)
(5)	10 A	Horn
(6)	15 A	Beacon light
(7)		Not used
(8)	5 A	Interior lamp
(9)		Not used
(10)	30 A	Front wiper
(11)		Not used
(12)		Not used
(13)		Not used
(14)	10 A	Head lamp LH
(15)	10 A	Head lamp RH
(16)	5 A	Clearance lamp (LH), Tail lamp (LH)
(17)	5 A	Clearance lamp (RH), Tail lamp (RH)
(18)	5 A	Starter (signal)
(19)	5 A	Horn (sub)
(20)		Not used
(21)	15 A	Air ride power
(22)		Not used
(24)		Not used
(25)		Not used
(26)		Not used

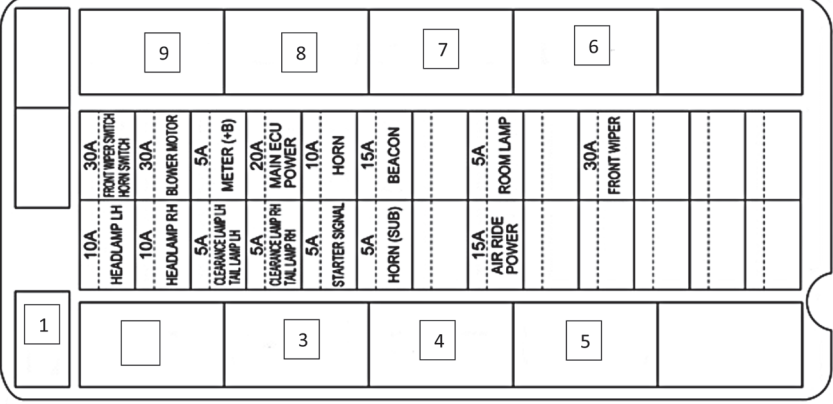
Fuse box B



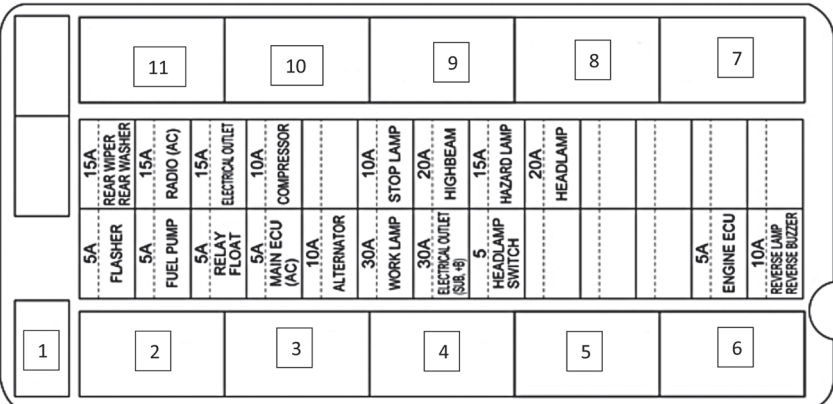
	Capacity	Related circuits
(27)	15 A	Rear wiper/washer
(28)	15 A	Radio (AC)
(29)	15 A	Electrical outlet
(30)	10 A	Compressor
(31)		Not used
(32)	10 A	Stop lamp
(33)	20 A	High beam
(34)	15 A	Hazard lamp
(35)	20 A	Head lamp
(36)		Not used
(37)		Not used
(38)		Not used
(39)		Not used
(40)	5 A	Flasher
(41)	5 A	Fuel pump
(42)	5 A	Relay float
(43)	5 A	Main ECU (AC)
(44)	10 A	Alternator
(45)	30 A	Work lamp
(46)	30 A	Electrical outlet (SUB, +B)
(47)	5 A	Headlamp switch
(48)		Not used
(49)		Not used
(50)		Not used
(51)	5 A	Engine ECU
(52)	10 A	Reverse lamp / Reverse buzzer

Relay specifications and related circuits

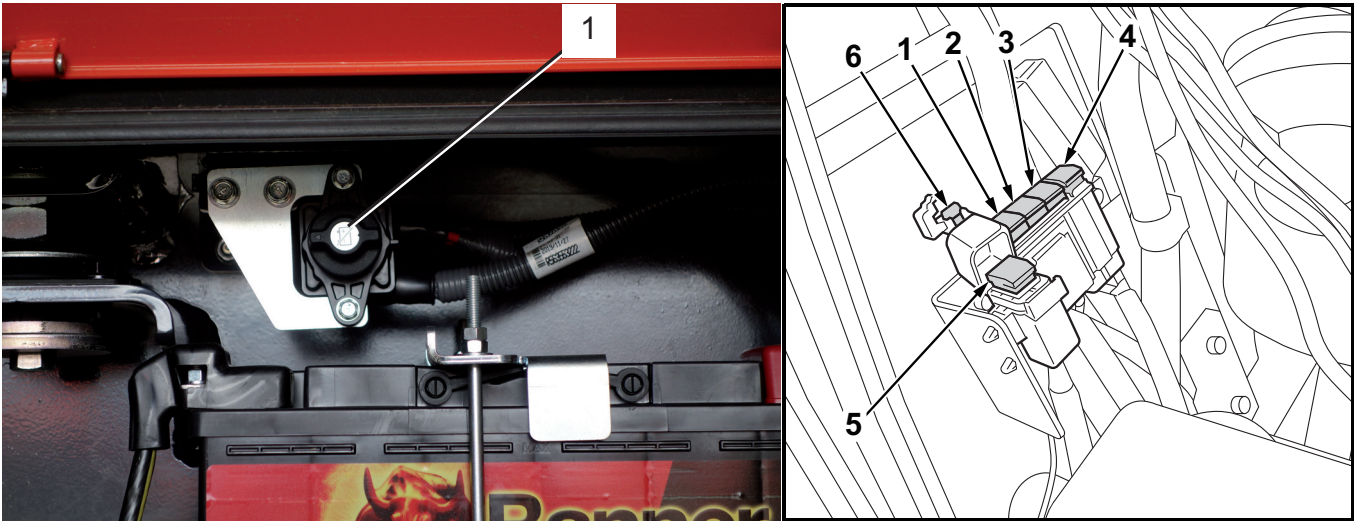
Relay Box 1

					Circuit
					(1) Power
					(2) Horn
					(3) Clearance lamp
					(4) Headlamp
					(5) ECU main power
					(6) Beacon
					(7) Fasher unit
					(8) Flasher RH
					(9) Fasher LH

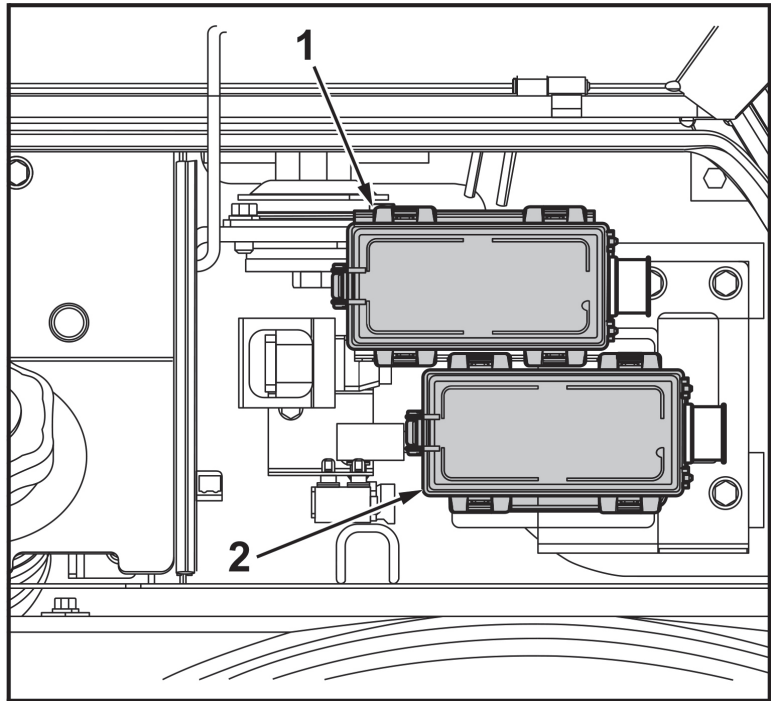
Relay Box 2

					Circuit
					(1) Glow
					(2) Engine ECU
					(3) Reverse lamp, reverse buzzer
					(4) Starter
					(5) Wiper washer front
					(6) Wiper washer rear
					(7) Work lamp rear
					(8) Work lamp front
					(9) Blower motor
					(10) Compressor
					(11) Front wiper

3.3.5 R090



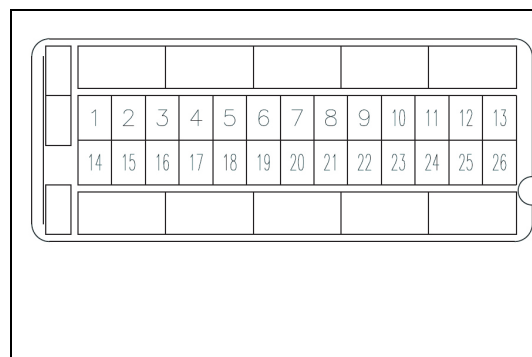
1	Battery Isolator	3	Main circuit 2 (50A)	5	Engine ECU (30A)
2		4	Main circuit 3 (50A)	6	Main ECU (+B) (10A)



1	Fuse box A
2	Fuse box B

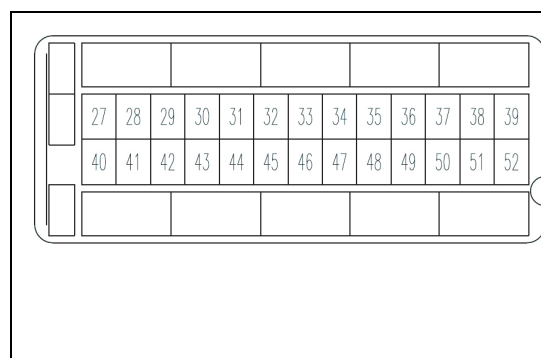
Fuse specifications and related circuits

Fuse box A



	Capacity	Related circuits
(1)	30 A	Front wiper switch / Horn switch
(2)	30 A	Blower motor
(3)	5 A	Instrument panel (+B)
(4)	20 A	Main ECU (power)
(5)	10 A	Horn
(6)	15 A	Beacon light
(7)		Not used
(8)	5 A	Interior lamp
(9)		Not used
(10)	30 A	Front wiper
(11)		Not used
(12)		Not used
(13)		Not used
(14)	10 A	Head lamp LH
(15)	10 A	Head lamp RH
(16)	5 A	Clearance lamp (LH), Tail lamp (LH)
(17)	5 A	Clearance lamp (RH), Tail lamp (RH)
(18)	5 A	Starter (signal)
(19)	5 A	Horn (sub)
(20)		Not used
(21)	15 A	Air ride power
(22)		Not used
(24)		Not used
(25)		Not used
(26)		Not used

Fuse box B



	Capacity	Related circuits
(27)	15 A	Rear wiper/washer
(28)	15 A	Radio (AC)
(29)	15 A	Electrical outlet
(30)	10 A	Compressor
(31)		Not used
(32)	10 A	Stop lamp
(33)	20 A	High beam
(34)	15 A	Hazard lamp
(35)	20 A	Head lamp
(36)		Not used
(37)		Not used
(38)		Not used
(39)		Not used
(40)	5 A	Flasher
(41)	5 A	Fuel pump
(42)	5 A	Relay float
(43)	5 A	Main ECU (AC)
(44)	10 A	Alternator
(45)	30 A	Work lamp
(46)	30 A	Electrical outlet (SUB, +B)
(47)	5 A	Headlamp switch
(48)		Not used
(49)		Not used
(50)		Not used
(51)	5 A	Engine ECU
(52)	10 A	Reverse lamp / Reverse buzzer

Relay specifications and related circuits

Relay Box 1

		Circuit
	(1)	Power
	(2)	Horn
	(3)	Clearance lamp
	(4)	Headlamp
	(5)	ECU main power
	(6)	Beacon
	(7)	Fasher unit
	(8)	Flasher RH
	(9)	Fasher LH

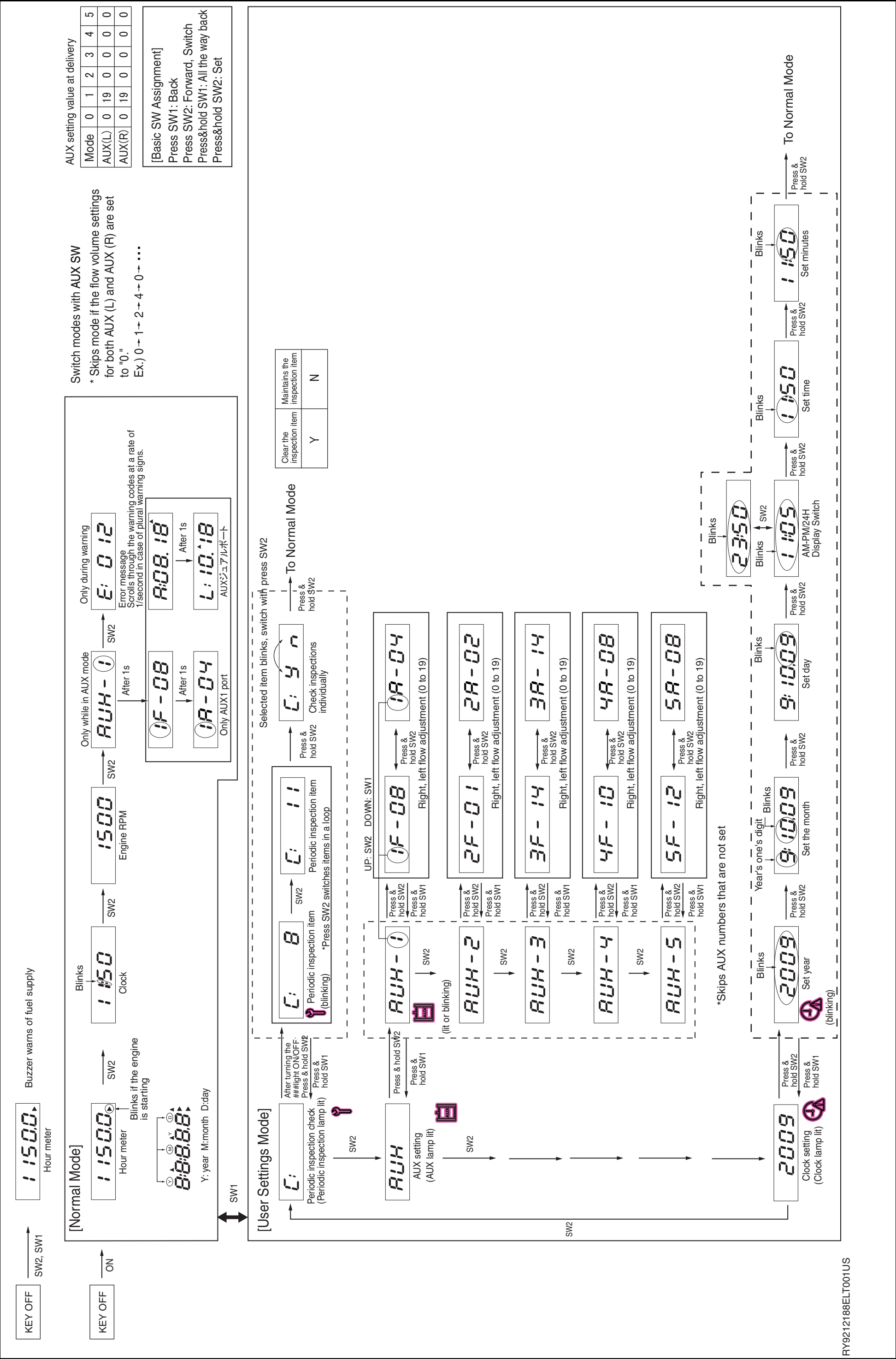
Relay Box 2

		Circuit
	(1)	Glow
	(2)	Engine ECU
	(3)	Reverse lamp, reverse buzzer
	(4)	Starter
	(5)	Wiper washer front
	(6)	Wiper washer rear
	(7)	Work lamp rear
	(8)	Work lamp front
	(9)	Blower motor
	(10)	Compressor
	(11)	Front wiper

3.4 Table of battery specifications

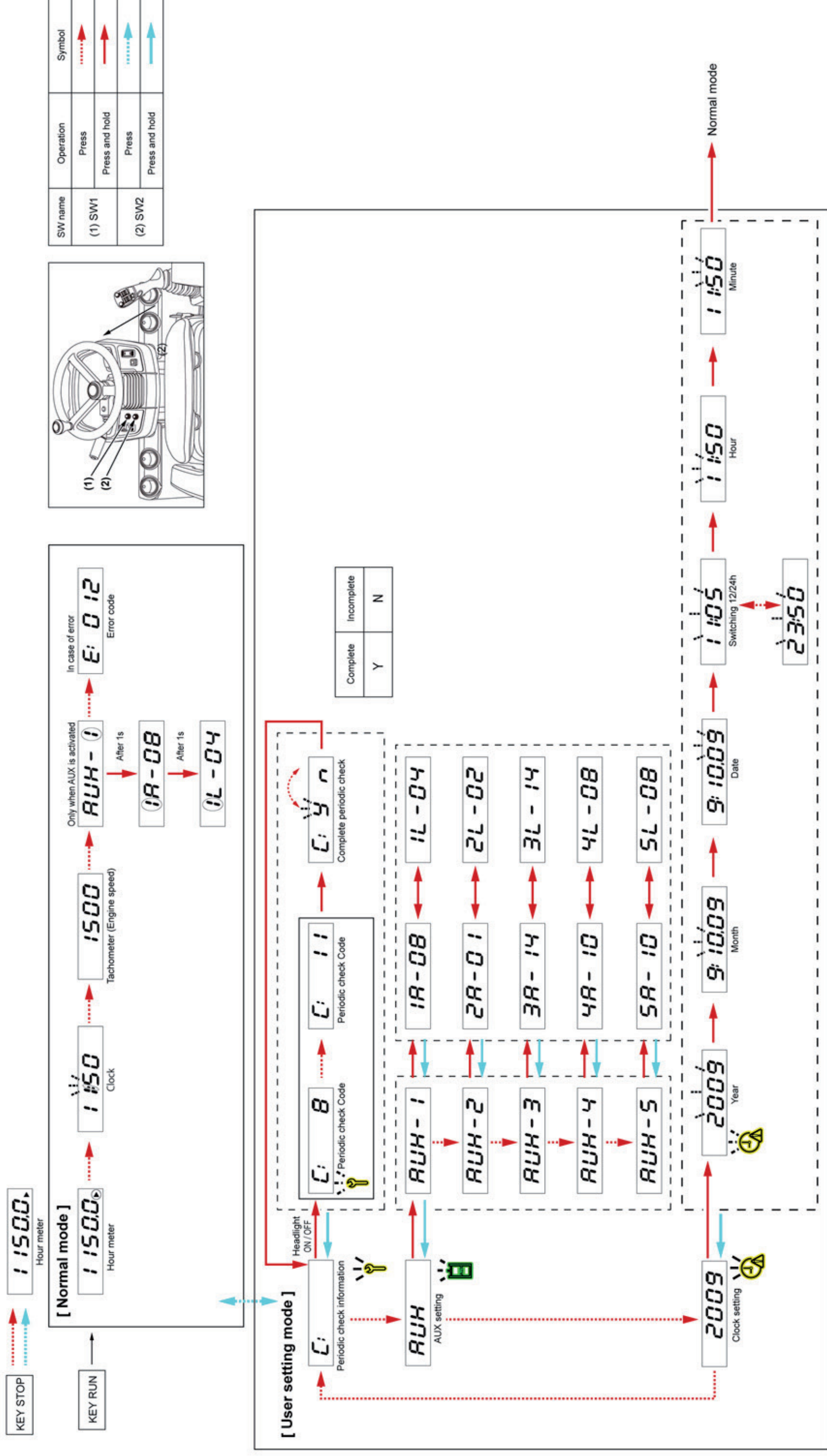
Model	R065, R082, R085, R070, R090
Battery Indentification	DIN EN 50342, DIN IEC 60095-2 12 V 95 Ah (K20)

4.1.2 R082, R085

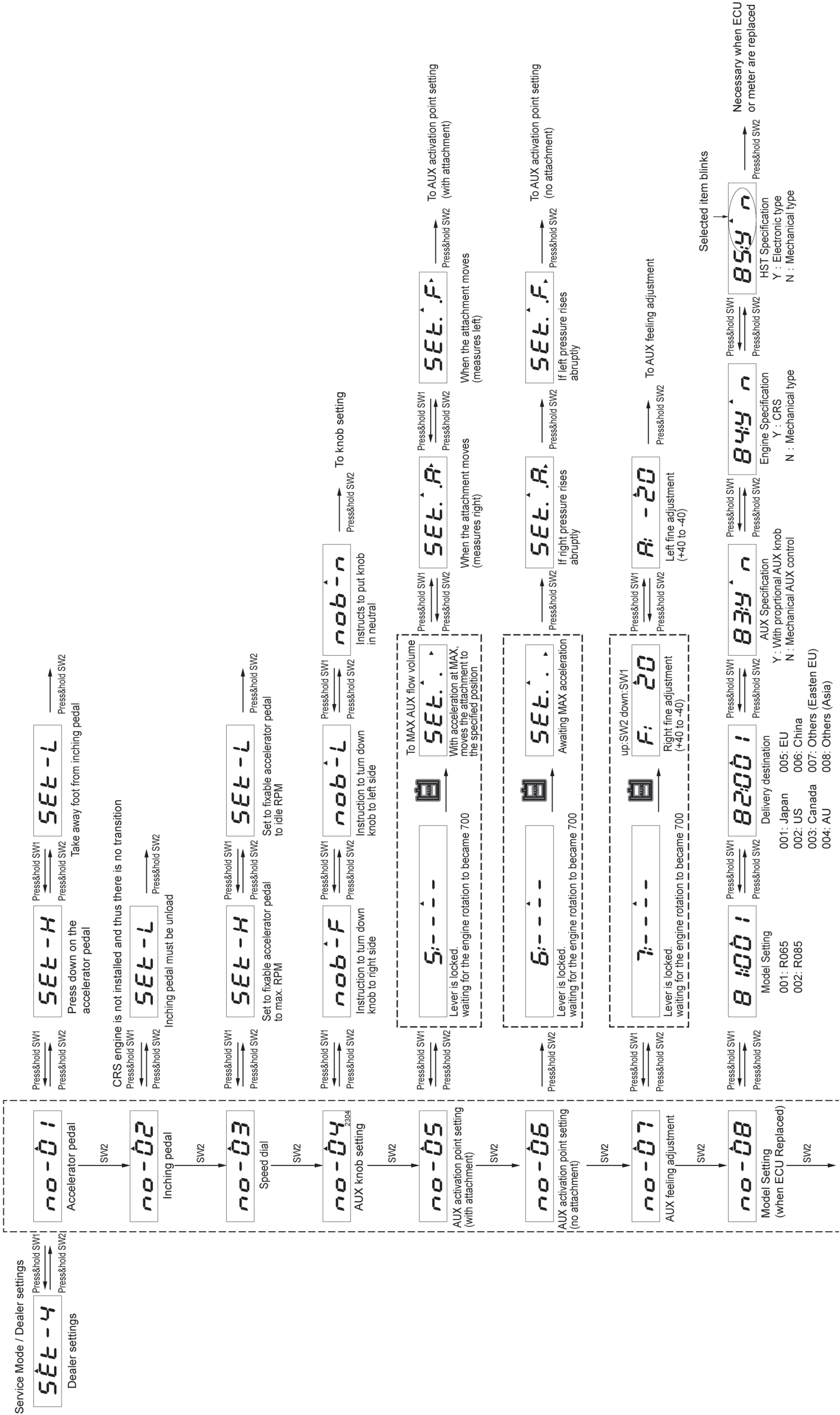


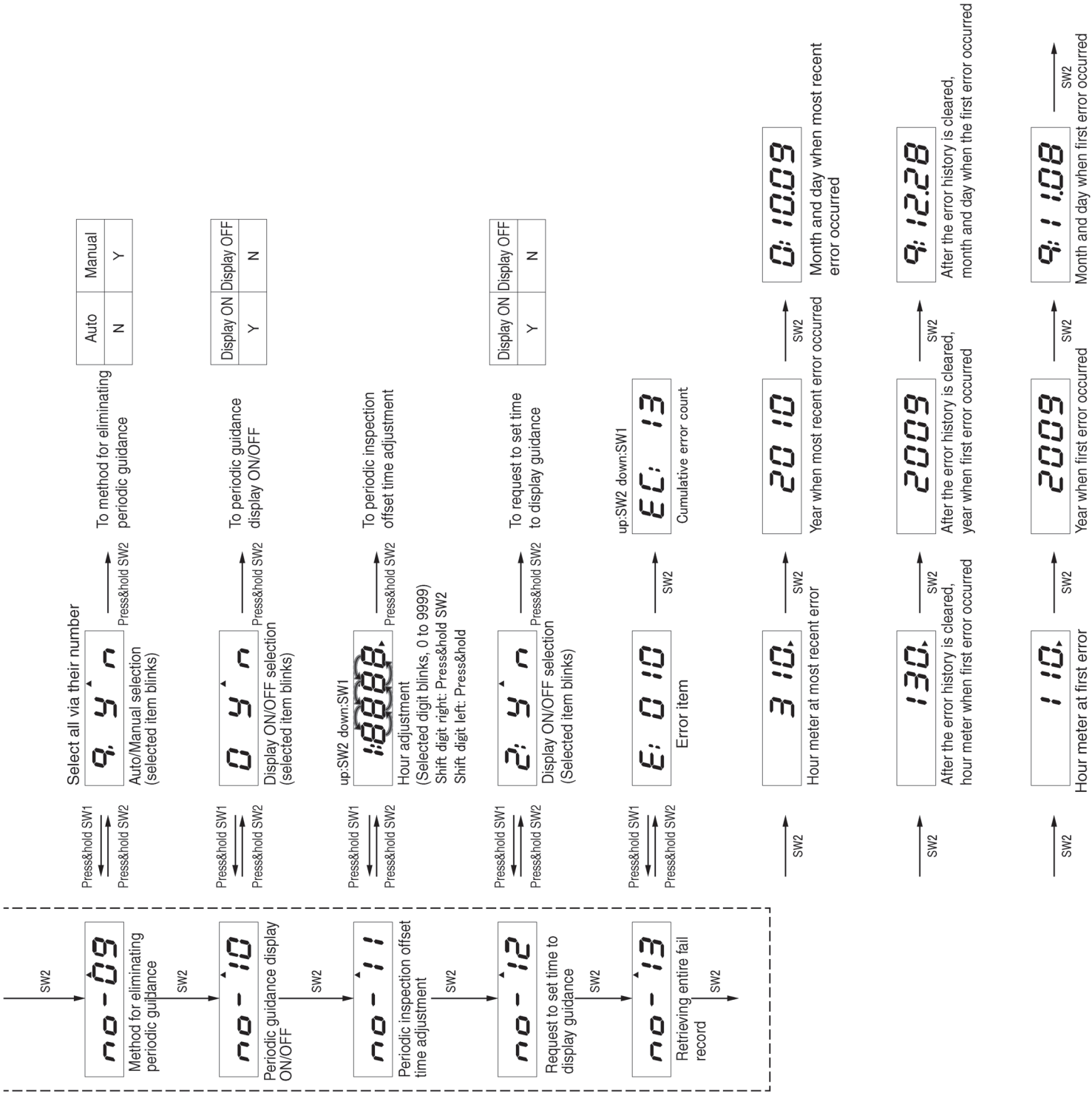
RY9212188ELT001US

4.1.3 R070, R090

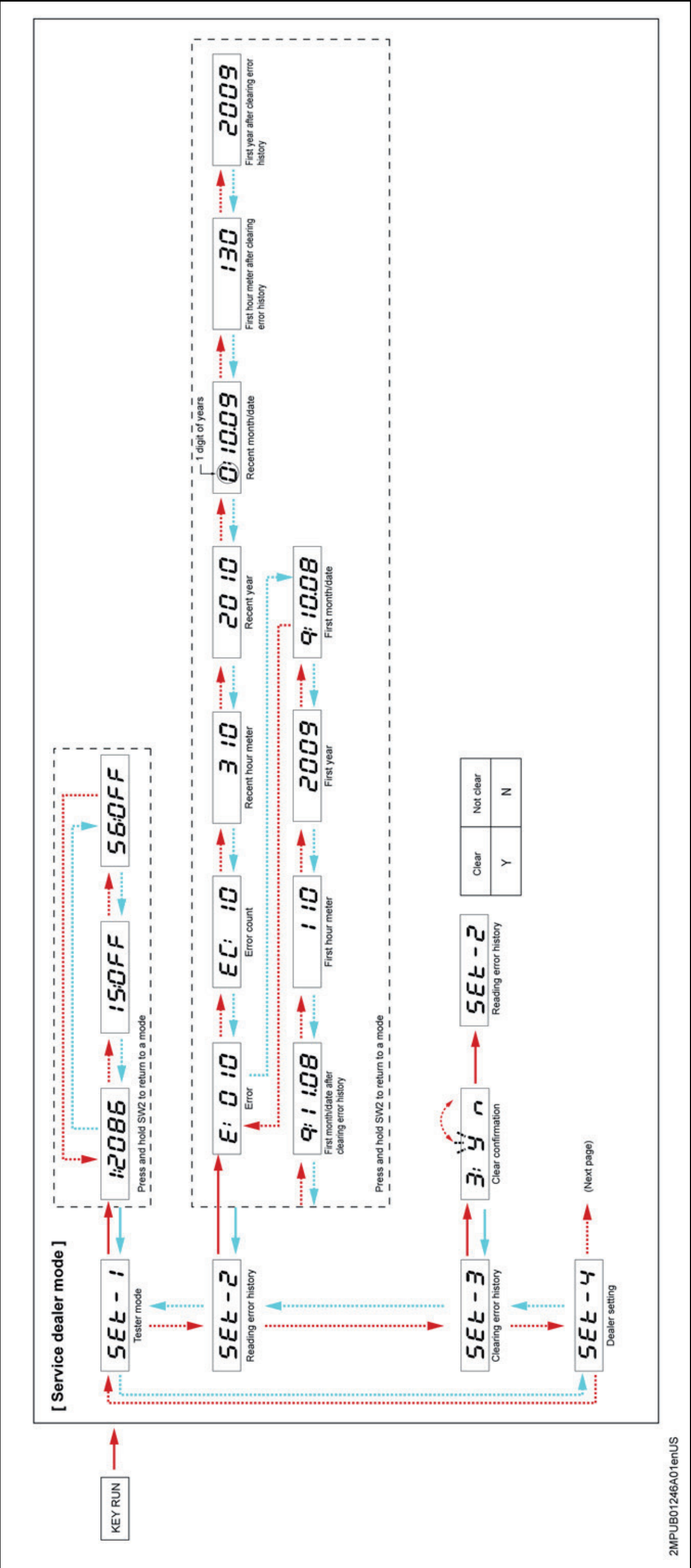


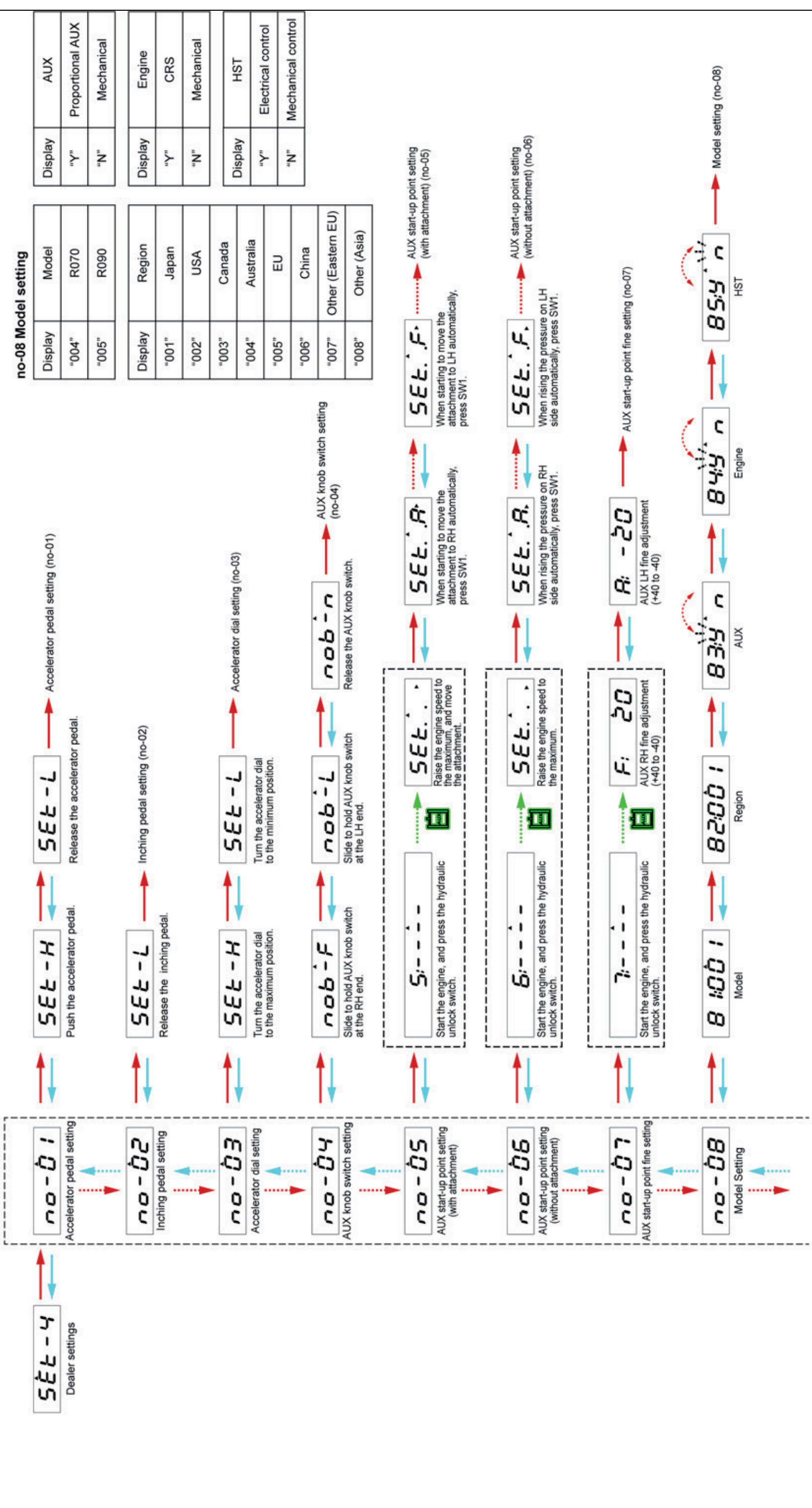
2MPUB01245A01enUS





4.2.2 R070, R090





no-08 Model setting

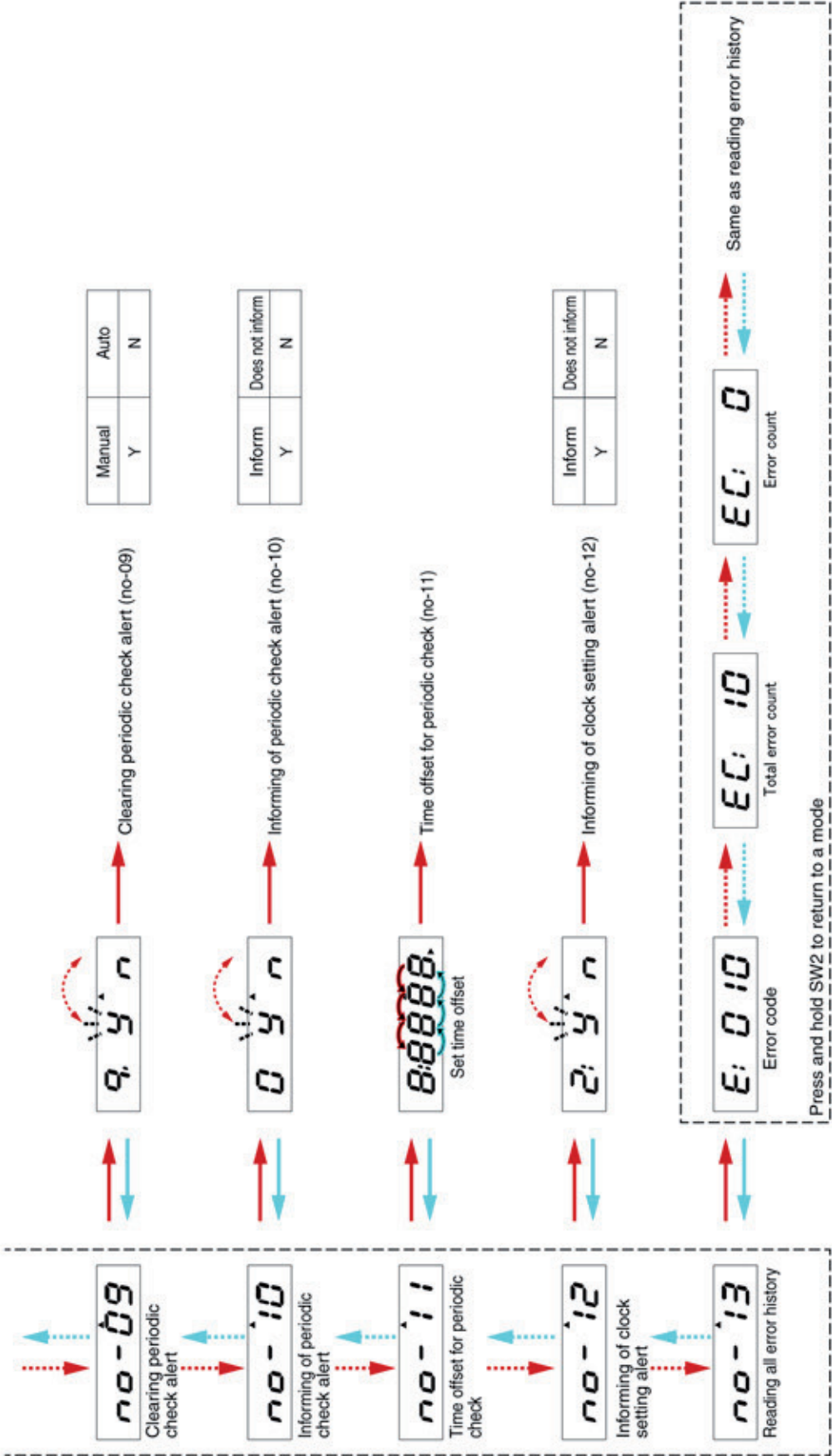
Display	Model
"004"	R070
"005"	R090

Display	Region
"001"	Japan
"002"	USA
"003"	Canada
"004"	Australia
"005"	EU
"006"	China
"007"	Other (Eastern EU)
"008"	Other (Asia)

Display	AUX
"Y"	Proportional AUX
"N"	Mechanical

Display	Engine
"Y"	CRS
"N"	Mechanical

Display	HST
"Y"	Electrical control
"N"	Mechanical control



4.2.3 Service mode settings - R065, R082, R085

	No.	Item	Display	Notes
[A] Tester (SET-1)	1	Engine rpm	0000	rpm
	2	Battery voltage	00.0	V
	3	Oil	ON/OFF	
	4	Charging voltage	ON/OFF	
	5	Key switch position	ON/OFF	
	6	Headlight	ON/OFF	
	7	Water temperature	0.00	°C
	8	Oil Temperature	00	°C
	9	Fuel voltage	0.00	V
	10	Fuel resistance	000	Ω
	11	Fuel supply switch	ON/OFF	
	12	Speed-up Switch	ON/OFF	
	13	Speed-down Switch	ON/OFF	
	14	Speed change solenoid	ON/OFF	
	15	Hydraulic lock switch	ON/OFF	
	16	Hydraulic lock solenoid	ON/OFF	
	17	Fixed accelerator dial MAIN (current value)	0.00	V
	18	Accelerator MAIN (setting value MIN)	0.00	V
	19	Fixed accelerator dial MAIN (setting value MAX.)	0.00	V
	20	Fixed accelerator dial SUB (current value)	0.00	V
	21	Accelerator SUB (setting value MIN)	0.00	V
	22	Fixed accelerator dial SUB (setting value MAX.)	0.00	V
	23	Accelerator opening	000	%
	24	Inching MAIN (current value)	0.00	V
	25	Inching MAIN (setting value IDLE)	0.00	V
	26	Inching MAIN (setting value MAX.)	0.00	V
	27	Inching SUB (current value)	0.00	V
	28	Inching SUB (setting value IDLE)	0.00	V
	29	Inching SUB (setting value MAX.)	0.00	V
	30	Inching opening	000	%
	31	Fixed accelerator dial MAIN (current value)	0.00	V
	32	Fixed accelerator dial MAIN (setting value IDLE)	0.00	V
	33	Fixed accelerator main sensor (setting value MAX.)	0.00	V
	34	Fixed accelerator dial SUB (current value)	0.00	V

	No.	Item	Display	Notes
[A] Tester (SET-1)	35	Fixed accelerator SUB (setting value IDLE)	0.00	V
	36	Fixed accelerator sub sensor (setting value MAX.)	0.00	V
	37	Fixed accelerator mandatory speed	000	x 10rpm
	38	Neutral	ON/OFF	
	39	Forward switch	ON/OFF	
	40	Forward solenoid	ON/OFF	
	41	Backward switch	ON/OFF	
	42	Backward solenoid	ON/OFF	
	43	Parking switch	ON/OFF	
	44	Parking solenoid	ON/OFF	
	45	Differential lock switch	ON/OFF	
	46	Differential lock solenoid	ON/OFF	
	47	AUX knob MAIN (current value)	0.00	V
	48	AUX knob SUB (current value)	0.00	V
	49	AUX knob (MAX setting value)	0.00	V
	50	AUX Knob (Neutral setting value)	0.00	V
	51	AUX knob (MIN setting value)	0.00	V
	52	AUX amperage	0.0	A
	53	AUX hold switch	ON/OFF	
	54	AUX enable switch	ON/OFF	
	55	AUX setting value MAX	000	x 10mA
	56	AUX setting value MIN	000	x 10mA
	57	Engine stop knob	ON/OFF	
	58	Brake pressure switch	ON/OFF	
	59	Parked regeneration switch	ON/OFF	
	60	DPF regeneration inhibit switch	ON/OFF	
	61	Water separator switch	ON/OFF	
	62	Key type	0	0: Unknown, 1: Red, 2: Black, 3: Yellow, 4: Green
	63	Key matching (registered key)	ON/OFF	ON: registered, OFF: non-registered
	64	Anti-theft mode	ON/OFF	ON: anti-theft disabled, OFF: anti-theft enabled
	65	Key Yes/No	ON/OFF	ON: Yes, OFF: No
	66	Anti-theft antenna	ON/OFF	ON: Error

	No.	Item	Display	Notes
[A] Tester (SET-1)	67	Power mode switch	ON/OFF	
	68	ECO mode switch	ON/OFF	
	69	ATT mode switch	ON/OFF	
	70	Travel speed	○○.○	km/h
	71	RPM limit	○○○	%
	72	Motor output signal	○○○	%
	73	Motor output current	○○○	x 10mA
	74	Pump output signal	○○○	%
	75	Pump output current	○○○	x 10mA
[B] Retrieve failure record (SET-2)			E:○○○	Error entry
[C] Clear all records (SET- 3)			3: Y/N	Y: Yes, N: No
[D] Dealer set- ting (SET-4)	No-01	Fixed accelerator dial	set-H	
	No-02	Inching	set-L	
	No-03	Fixed accelerator locked	set-H	
	No-04	AUX knob setting	nob-F	
	No-05	AUX start point setting (w/ attachment)	5:— — — —	
	No-06	AUX start point setting (w/o attachment)	6:— — — —	
	No-07	AUX feeling adjustment	7:— — — —	
	no-08	Model setting	8 1:○○○	When replac- ing the ECU
	no-09	Periodic Guidance clearing method	9: Y/N	Y: Yes, N: No
	No-10	Periodic Guidance display method	10: Y/N	Y: Yes, N: No
	No-11	Periodic check offset time adjustment (hours)	11: ○○○○	h
	No-12	Clock adjustment guidance display ON/OFF	12: Y/N	Y: Yes, N: No
	No-13	Retrieve entire failure record	13: Y/N	Y: Yes, N: No

4.2.4 Service mode settings - R070, R090

No.	Item	Display	Notes
1	Engine speed	○○○○ rpm	• Present engine speed
2	Battery voltage	○○.○ V	• Engine is stopped: approximately 12.0 V • Engine is running: approximately 14.0 V
3	Engine oil pressure switch	ON/OFF	• Engine is stopped: ON • Engine is running: OFF
4	Battery charge switch	ON/OFF	• Engine is stopped: ON • Engine is running: OFF
5	Starter switch	ON/OFF	• Starter switch is at [START]: ON • Starter switch is at [RUN] or [STOP]: ?
6	Head light switch	ON/OFF	• While switch is pressed: ON • Switch is released: OFF
7	Water temperature sensor	○.○○ °C	• Present water temperature • Higher than 121 °C (250 °F): engine overheating error
8	Hydraulic oil temperature sensor	○.○○ °C	• Present hydraulic oil temperature • Higher than 110 °C (230 °F): hydraulic oil overheating error • Lower than -50 °C (-58 °F) or higher than 150 °C (302 °F): hydraulic oil temperature sensor error
9	Fuel level sensor (voltage)	○.○○ V	• Present voltage of the fuel level sensor
10	Fuel level sensor (resistance)	○○○ Ω	• Present resistance of the fuel level sensor • Higher than 135 Ω: fuel level sensor error
11	Fuel level indication switch	ON/OFF	• Switch is pressed: ON • Switch is released: OFF
12	High speed switch	ON/OFF	• Switch is pressed: ON • Switch is released: OFF
13	Low speed switch	ON/OFF	• Switch is pressed: ON • Switch is released: OFF
14	Low speed hold solenoid	ON/OFF	• While in low speed mode: ON • While in high speed mode: OFF
15	Hydraulic unlock switch	ON/OFF	• Switch is released: ON • Switch is pressed: OFF
16	Hydraulic unlock solenoid	ON/OFF	• Hydraulic unlock switch is released: ON • Hydraulic unlock switch is pressed: OFF
17	Accelerator main (present voltage)	○.○○ V	• Present accelerator output voltage (main)
18	Accelerator main (setting voltage at idling speed)	○.○○ V	• Set at the factory
19	Accelerator main (setting voltage at maximum speed)	○.○○ V	• Set at the factory

No.	Item	Display	Notes
20	Accelerator sub (present voltage)	○.○○ V	Present accelerator output voltage (sub)
21	Accelerator sub (setting voltage at idling speed)	○.○○ V	Set at the factory
22	Accelerator sub (setting voltage at maximum speed)	○.○○ V	Set at the factory
23	Accelerator pedal operating ratio	○.○○ %	- Present ratio of accelerator pedal operation - Pedal is released: 0% - Pedal is fully pushed: 100%
24	Neutral switch	ON/OFF	- Switch is pressed: ON - Switch is released: OFF
25	Direction control switch (forward)	ON/OFF	- Switch is in forward: ON - Switch is in neutral or backward: OFF
26	Direction control solenoid (forward)	ON/OFF	- Accelerator pedal is pushed while in forward traveling mode: ON - While in neutral mode or backward traveling mode: OFF
27	Direction control switch (backward)	ON/OFF	- Switch is in backward: ON - Switch is in neutral or forward: OFF
28	Direction control solenoid (backward)	ON/OFF	- Accelerator pedal is pushed while in backward traveling mode: ON - While in neutral mode or forward traveling mode: OFF
29	Parking brake switch	ON/OFF	- Switch is pressed: ON - Switch is released: OFF
30	Parking brake solenoid	ON/OFF	- Parking brake is released: ON - Parking brake is activated: OFF
31	Differential lock switch	ON/OFF	- Switch is pressed: ON - Switch is released: OFF
32	Differential lock solenoid	ON/OFF	- Differential lock switch is pressed in low speed mode: ON - Differential lock is not activated: OFF
33	Hydraulic quick coupler switch	ON/OFF	- Switch is pressed: ON - Switch is released: OFF
34	Hydraulic quick coupler solenoid	ON/OFF	- Hydraulic quick coupler switch is pressed: ON - Hydraulic quick coupler switch is released: OFF
35	Engine air cleaner element switch	ON/OFF	- Engine air cleaner element is clogged: ON - Normal: OFF
36	Brake oil warning switch	ON/OFF	- Brake oil level is low in the brake oil tank: ON - Normal: OFF
37	Seat belt switch	ON/OFF	- Seat belt is fastened: ON - Seat belt is unfastened: OFF
38	AUX knob main (present voltage)	○.○○ V	Present AUX knob switch output voltage (main)

No.	Item	Display	Notes
39	AUX knob main (setting voltage at operating LH)	○.○○ V	• Value which is adjusted in the service dealer mode (no-04: AUX knob switch setting)
40	AUX knob main (setting voltage at neutral)	○.○○ V	• Value which is adjusted in the service dealer mode (no-04: AUX knob switch setting)
41	AUX knob main (setting voltage at operating RH)	○.○○ V	• Value which is adjusted in the service dealer mode (no-04: AUX knob switch setting)
42	AUX operating output current	○.○○ A	• Present output current applied on the AUX proportional solenoids
43	AUX hold switch	ON/OFF	• Switch is pressed: ON • Switch is released: OFF
44	AUX switch	ON/OFF	• Switch is pressed: ON • Switch is released: OFF
45	AUX top setting value	○.○○ x10 mA	• Set at the factory
46	AUX bottom setting value	○.○○ x10 mA	• Set at the factory
47	Engine stop switch	ON/OFF	• Normal: ON • Switch is pulled: OFF
48	Parking brake pressure switch	ON/OFF	• While the engine is running and parking brake is released: ON • While parking brake is activated: OFF
49	DPF parking regeneration switch	ON/OFF	• Switch is pressed: ON • Switch is released: OFF
50	DPF regeneration prohibition switch	ON/OFF	• Switch is pressed: ON • Switch is released: OFF
51	Water separator switch	ON/OFF	• Water separator is filled with water: ON • Normal: OFF
52	Key type	0 1 2 3 4 5 6	• Unknown • Red • Black • Yellow • Green • Red yellow • Red green
53	Anti-theft key analysis (registered key)	ON/OFF	• Matched: ON • Mismatched: OFF
54	Anti-theft mode	ON/OFF	• Deactivated: ON • Activated: OFF
55	Communication between anti-theft key and anti-theft antenna	ON/OFF	• Activated: ON • Deactivated: OFF
56	Anti-theft antenna	ON/OFF	• Error: ON • Normal: OFF

4.3 Error codes

4.3.1 R065

List of error codes										
No.	Error code number	Item	Problem (description)	Accelerator limiter	Engine output limiter	Engine stop	Impact on the machine	LED lamp	Buzzer	See WSM chapter 7, section
1	E : 001	Meter panel CAN communication		—	—	—	None	Warning indicator flashing Red	Pi Pi Pi	
2	E : 014	Oil Temperature	HST oil temperature high	—	—	—	None	Hydraulic oil temperature lamp blinking	Continuous beeping intervals Pi Pi Pi	
3	E : 016	Fuel	Fuel sensor - open	—	—	—	None	Warning indicator flashing Red	Pi Pi Pi	7.5.1
4	E : 018	Oil Temperature	Oil temperature sensor - disconnection/short	—	—	—	None	Warning indicator flashing Red	Pi Pi Pi	7.5.2
5	E : 023	Speed low hold	Speed low hold solenoid — open/short				Speed low hold solenoid - failure	Warning indicator flashing Red	Pi Pi Pi	7.5.3
6	E : 024	Differential lock	Differential lock solenoid — open/short	—	—	—	Differential lock solenoid - failure	Warning indicator flashing Red	Pi Pi Pi	7.5.4
7	E : 025	Parking	Parking brake solenoid — open/short	—	—	—	Solenoid - failure. Parking brake remains engaged.	Warning indicator flashing Red	Pi Pi Pi	7.5.5

List of error codes										
No.	Error code number	Item	Problem (description)	Accelerator limiter	Engine output limiter	Engine stop	Impact on the machine	LED lamp	Buzzer	See WSM chapter 7, section
8	E : 026	Forward solenoid	Forward solenoid – open/short	–	–	–	Solenoid stuck in Forward position Neutral return (Backward solenoid is controlled normally)	Warning indicator flashing Red	Pi Pi Pi	7.5.6
9	E : 027	Backward solenoid	Backward solenoid – open/short	–	–	–	Solenoid stuck in Backward position Neutral return (Forward solenoid is controlled normally)	Warning indicator flashing Red	Pi Pi Pi	7.5.7
10	E : 028	Forward/backward switch	Forward/backward switch – water in enclosure	–	–	–	Stuck in Neutral position	Warning indicator flashing Red	Pi Pi Pi	
11	E : 033	Power	Overvoltage	–	–	–	AUX disabled	Warning indicator flashing Red	Pi Pi Pi	7.5.8
12	E : 034	Sensor power error	External 5V - short	–	–	–	None	Warning indicator flashing Red	Pi Pi Pi	7.5.9
13	E : 035	Anti-theft	Emergency engine start	–	–	–	Starter relay forced output Stop relay forced output Lever lock normal control Parking brake normal control	Warning indicator flashing yellow	Alarm	
14	E : 037	Brake	Drag prevention	–	–	–	Switch parking solenoid off Neutral reset	Warning indicator flashing Red	Pi Pi Pi	7.5.10

List of error codes										
No.	Error code number	Item	Problem (description)	Accelerator limiter	Engine output limiter	Engine stop	Impact on the machine	LED lamp	Buzzer	See WSM chapter 7, section
15	E : 9104	Engine system error	Water temperature sensor – open/short	○	○	–	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	7.5.11
16	E : 9115	Water temperature	Overheating	–	–	–	None	Water temperature gauge flashing/engine warning indicator flashing	Pi Pi Pi	
17	E : 9118	Engine system error	Engine oil pressure error	–	–	–	Warning indicator lights up	Oil lamp lights lighting/Engine warning indicator flashing	Pi Pi Pi	7.5.12
18	E : 9119	Engine system error	Charging error	–	–	–	None	Charging indicator light/Engine warning indicator flashing	Pi Pi Pi	
19	–	Indicator	Flasher unit faulty	–	–	–	Clearance lights flashing to fast or too slow	–	–	

4.3.2 R085

List of error codes										
No.	Error code number	Item	Problem (description)	Accelerator limiter	Engine output limiter	Engine stop	Impact on the machine	LED lamp	Buzzer	WSM section
1	E : 001	Meter panel CAN communication		—	—	—	None	Warning indicator flashing Red	Pi Pi Pi	
2	E : 014	Oil Temperature	HST oil temperature high	—	—	—	None	Hydraulic oil temperature lamp blinking	Continuous Pi - Pi intervals	
3	E : 016	Fuel	Fuel sensor - open	—	—	—	None	Warning indicator flashing Red	Pi Pi Pi	7.5.1
4	E : 018	Oil Temperature	Oil temperature sensor - disconnection/short	—	—	—	None	Warning indicator flashing Red	Pi Pi Pi	7.5.2
5	E : 019	Fixed accelerator dial	Accelerator sensor - open/short (caused by water)	○	—	—	Travel failure (idle fixed other than in ATT mode)	Warning indicator flashing Red	Pi Pi Pi	7.5.3
6	E : 020	Inching	Inching sensor - open/short (caused by water)	—	—	—	Inching opening 0%, travel failure	Warning indicator flashing Red	Pi Pi Pi	7.5.4
7	E : 021	Accelerator	Fixed accelerator sensor - open/short (caused by water)	○	—	—	Engine rpm idle fixed while in ATT mode	Warning indicator flashing Red	Pi Pi Pi	7.5.5
8	E : 022	Lever lock	Lever lock solenoid — open/short	—	—	—	Lever lock solenoid - failure.	Warning indicator flashing Red	Pi Pi Pi	7.5.6
9	E : 024	Differential lock	Differential lock solenoid — open/short	—	—	—	Differential lock solenoid — failure.	Warning indicator flashing Red	Pi Pi Pi	7.5.7

List of error codes										
No.	Error code number	Item	Problem (description)	Accelerator limiter	Engine output limiter	Engine stop	Impact on the machine	LED lamp	Buzzer	WSM section
10	E : 025	Parking	Parking brake solenoid – open/short	–	–	–	Solenoid - failure. Parking brake remains engaged	Warning indicator flashing Red	Pi Pi Pi	7.5.8
11	E : 026	Forward solenoid	Forward solenoid – open/short	–	–	–	Solenoid stuck in Forward position Neutral return (Backward solenoid is controlled normally)	Warning indicator flashing Red	Pi Pi Pi	7.5.9
12	E : 027	Backward solenoid	Backward solenoid – open/short	–	–	–	Solenoid stuck in Backward position Neutral return (Forward solenoid is controlled normally)	Warning indicator flashing Red	Pi Pi Pi	7.5.10
13	E : 028	Forward/backward switch	Forward/backward switch – water in enclosure	–	–	–	Stuck in Neutral position	Warning indicator flashing Red	Pi Pi Pi	
14	E : 029	AUX	AUX knob – open/short	–	–	–	AUX solenoid - disabled	Warning indicator flashing Red	Pi Pi Pi	7.5.11
15	E : 031	AUX	AUX right solenoid - open	–	–	–	AUX solenoid - disabled	Warning indicator flashing Red	Pi Pi Pi	7.5.13
16	E : 032	AUX	AUX left solenoid - open	–	–	–	AUX solenoid - disabled	Warning indicator flashing Red	Pi Pi Pi	7.5.12
17	E : 033	Power	Overvoltage	–	–	–	AUX disabled	Warning indicator flashing Red	Pi Pi Pi	7.5.14

List of error codes										
No.	Error code number	Item	Problem (description)	Accelerator limiter	Engine output limiter	Engine stop	Impact on the machine	LED lamp	Buzzer	WSM section
18	E : 034	Sensor power - error	External 5V - short	—	—	—	None	Warning indicator flashing Red	Pi Pi Pi	7.5.15
19	E : 035	Anti-theft	Emergency engine start	—	—	—	Starter relay forced output Stop relay forced output Lever lock normal control Parking brake normal control	Warning indicator flashing yellow	Alarm	
20	E : 036	CRS	CRS CAN communication error	●	—	—	Idle fixed, travel failure	Warning indicator flashing Red	Pi Pi Pi	
21	E : 037	Brake	Drag prevention	—	—	—	Switch parking solenoid off Parking brake remains engaged	Warning indicator flashing Red	Pi Pi Pi	7.5.16
22	E : 1001	HST	CAN communication error	○	—	—	After 0.2 seconds: travel stops After 5 seconds: idle fixed	Warning indicator flashing Red	Pi Pi Pi	
23	E : 1002	HST	EP motor proportional output error	—	—	—	Travel failure	Warning indicator flashing Red	Continuous Pi - Pi intervals	7.5.17
24	E : 1003	HST	DE pump output error	—	—	—	Travel failure	Warning indicator flashing Red	Pi Pi Pi	7.5.18
25	E : 1004	HST	HST low voltage error	—	—	—	Travel failure	Warning indicator flashing Red	Pi Pi Pi	
26	E : 1005	HST	HST high voltage error	—	—	—	Travel failure	Warning indicator flashing Red	Pi Pi Pi	

List of error codes										
No.	Error code number	Item	Problem (description)	Accelerator limiter	Engine output limiter	Engine stop	Impact on the machine	LED lamp	Buzzer	WSM section
27	E : 9001	DPF regeneration	LEVEL 3	–	●	–	50% horsepower DPF regeneration not possible	Engine warning indicator flashing	–	
28	E : 9003	DPF regeneration	LEVEL 4	–	●	–	50% horsepower DPF regeneration not possible	Engine warning indicator lights up	Engine oil sound (Pi Pi)	
29	E : 9004	DPF regeneration	LEVEL 5	–	●	–	50% horsepower DPF change required	Engine warning indicator lights up	Engine oil sound (Pi Pi)	
30	E : 9010	Engine system error	After DPF protection engine stop				Engine OFF	Engine warning indicator flashing	Pi Pi Pi	
31	E : 9100	Engine system error	Speed sensor system error	○	○	–	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	
32	E : 9101	Engine system error	Fuel/Common-Rail pressure system	●	●	●	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	
33	E : 9102	Engine system error	SCV system	●	●	–	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	
34	E : 9103	Engine system error	Air intake temperature sensor system	–	–	–	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	
35	E : 9104	Engine system error	Water temperature sensor – open/short	●	●	–	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	7.5.19
36	E : 9105	Engine system error	Fuel temperature sensor system	–	–	–	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	

List of error codes										
No.	Error code number	Item	Problem (description)	Accelerator limiter	Engine output limiter	Engine stop	Impact on the machine	LED lamp	Buzzer	WSM section
37	E : 9106	Engine system error	Injector error	●	●	○	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	
38	E : 9107	Engine system error	Intake air pressure sensor error	–	○	–	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	
39	E : 9108	Engine system error	Battery voltage error	●	●	○	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	
40	E : 9109	Engine system error	Sensor voltage system error	●	●	○	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	
41	E : 9110	Engine system error	Main relay system error	–	–	–	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	
42	E : 9112	Engine system error	Atmospheric pressure sensor system error	–	○	–	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	
43	E : 9113	Engine system error	EGR valve system error	–	●	–	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	
44	E : 9114	Engine system error	Emission warning	–	–	–	Warning shows up	Water temperature lamp flashing	Pi Pi Pi	
45	E : 9115	Engine system error	Overheating	–	○	–	Warning shows up	Water temperature lighting Red Engine warning indicator flashing	Continuous Pi - Pi intervals	

List of error codes										
No.	Error code number	Item	Problem (description)	Accelerator limiter	Engine output limiter	Engine stop	Impact on the machine	LED lamp	Buzzer	WSM section
46	E : 9117	Engine system error	Air heater system error	–	–	–	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	
47	E : 9118	Engine system error	Engine oil pressure - error	–	–	–	Warning shows up	Oil lamp lighting Engine warning indicator flashing	Continuous Pi - Pi - Pi intervals	7.5.20
48	E : 9119	Engine system error	Charging error	–	–	–	None	Charging indicator lighting/Engine warning indicator flashing	Pi Pi Pi	
49	E : 9120	Engine system error	“Water separator full” warning or shorted line	–	–	–	None	Water Separator indicator lighting	Pi Pi Pi	
50	–	HST	Speed Sensor – open/short	–	–	–	Maintains speed at a constant level	–	–	
51	–	Indicator	Flasher unit faulty	–	–	–	Clearance lights flashing to fast or too slow	–	–	

●: Sure to happen

○: May happen

4.3.3 R082

List of error codes										
No.	Error code number	Item	Problem (description)	Accelerator limiter	Engine output limiter	Engine stop	Impact on the machine	LED lamp	Buzzer	See WSM chapter 7, section
1	E : 001	Meter panel CAN communication		–	–	–	None	Warning indicator flashing Red	Pi Pi Pi	
2	E : 014	Oil Temperature	HST oil temperature high	–	–	–	None	Hydraulic oil temperature lamp blinking	Continuous beeping intervals Pi Pi Pi	
3	E : 016	Fuel	Fuel sensor - open	–	–	–	None	Warning indicator flashing Red	Pi Pi Pi	7.5.1
4	E : 018	Oil Temperature	Oil temperature sensor - disconnection/short	–	–	–	None	Warning indicator flashing Red	Pi Pi Pi	7.5.2
5	E: 022	Lever lock	Lever lock solenoid – open/short	–	–	–	Lever lock solenoid - failure	Warning indicator flashing Red	Pi Pi Pi	7.5.3
6	E : 023	Speed low hold	Speed low hold solenoid – open/short				Speed low hold solenoid - failure	Warning indicator flashing Red	Pi Pi Pi	7.5.4
7	E : 024	Differential lock	Differential lock solenoid – open/short	–	–	–	Differential lock solenoid - failure	Warning indicator flashing Red	Pi Pi Pi	7.5.5
8	E : 025	Parking	Parking brake solenoid – open/short	–	–	–	Solenoid - failure. Parking brake remains engaged.	Warning indicator flashing Red	Pi Pi Pi	7.5.6

List of error codes										
No.	Error code number	Item	Problem (description)	Accelerator limiter	Engine output limiter	Engine stop	Impact on the machine	LED lamp	Buzzer	See WSM chapter 7, section
9	E : 026	Forward solenoid	Forward solenoid – open/short	–	–	–	Solenoid stuck in Forward position Neutral return (Backward solenoid is controlled normally)	Warning indicator flashing Red	Pi Pi Pi	7.5.7
10	E : 027	Backward solenoid	Backward solenoid – open/short	–	–	–	Solenoid stuck in Backward position Neutral return (Forward solenoid is controlled normally)	Warning indicator flashing Red	Pi Pi Pi	7.5.8
11	E : 028	Forward/backward switch	Forward/backward switch – water in enclosure	–	–	–	Stuck in Neutral position	Warning indicator flashing Red	Pi Pi Pi	
12	E: 029	AUX	AUX knob – open/short	–	–	–	AUX solenoid - disabled	Warning indicator flashing Red	Pi Pi Pi	7.5.9
13	E: 031	AUX	AUX right solenoid - open	–	–	–	AUX solenoid - disabled	Warning indicator flashing Red	Pi Pi Pi	7.5.10
14	E: 032	AUX	AUX left solenoid - open	–	–	–	AUX solenoid - disabled	Warning indicator flashing Red	Pi Pi Pi	7.5.11
15	E : 033	Power	Overvoltage	–	–	–	AUX disabled	Warning indicator flashing Red	Pi Pi Pi	7.5.12
16	E : 034	Sensor power - error	External 5V - short	–	–	–	None	Warning indicator flashing Red	Pi Pi Pi	7.5.13

List of error codes										
No.	Error code number	Item	Problem (description)	Accelerator limiter	Engine output limiter	Engine stop	Impact on the machine	LED lamp	Buzzer	See WSM chapter 7, section
17	E : 035	Anti-theft	Emergency engine start	–	–	–	Starter relay forced output Stop relay forced output Lever lock normal control Parking brake normal control	Warning indicator flashing yellow	Alarm	
18	E : 037	Brake	Drag prevention	–	–	–	Switch parking solenoid off Neutral reset	Warning indicator flashing Red	Pi Pi Pi	7.5.14
19	E : 9104	Engine system error	Water temperature sensor – open/short	●	●	–	Warning shows up	Engine warning indicator flashing	Pi Pi Pi	7.5.15
20	E : 9115	Water temperature	Overheating	–	–	–	None	Water temperature gauge flashing/engine warning indicator flashing	Pi Pi Pi	
21	E : 9118	Engine system error	Engine oil pressure error	–	–	–	Warning indicator lights up	Oil lamp lights lighting/ Engine warning indicator flashing	Pi Pi Pi	7.5.16
22	E : 9119	Engine system error	Charging error	–	–	–	None	Charging indicator lighting/ Engine warning indicator flashing	Pi Pi Pi	
23	–	Indicator	Flasher unit faulty	–	–	–	Clearance lights flashing to fast or too slow	–	–	7.5.17

4.3.4 R070, R090

Red lamp

List of error codes					
No.	Display	Error	Causes	Remark(s)	See WSM chapter 8, section servicing
1	E: 001	CAN communication error	There is no communication between the main ECU and the meter panel.	–	8.2.1
2	E: 014	Hydraulic oil temperature error	Hydraulic oil temperature is higher than 111 °C (232 °F) while the engine is running.	The hydraulic oil temperature lamp blinks on the meter panel.	8.2.2
3	E: 016	Fuel level sensor error	- The fuel level sensor is broken. - Due to the broken wiring or short circuit, fuel level sensor resistance is displayed as higher than 135 Ω	The fuel gauge warning lamp is not displayed on the meter panel.	8.2.3
4	E: 018	Hydraulic oil temperature sensor error	- The hydraulic oil temperature sensor is broken. - Due to the broken wiring or short circuit, hydraulic oil temperature is displayed as lower than -50 °C (-58 °F) or higher than 150 °C (302 °F).	The hydraulic oil temperature warning lamp is not displayed on the meter.	8.2.4
5	E: 019	Accelerator sensor error	- The accelerator sensor is broken. - Due to the broken wiring or short circuit, the accelerator sensor main voltage is displayed as lower than 0.25 V or higher than 4.75 V. - Due to the broken wiring or short circuit, the total voltage of accelerator sensor main and sub is lower than 4.5 V or higher than 5.5 V.	The engine speed is limited at idling.	8.2.5
6	E: 022	Hydraulic unlock solenoid error	There is a short circuit or broken harness in the hydraulic unlock solenoid line.	The hydraulic unlock solenoid is disabled.	8.2.6
7	E: 023	Low speed hold solenoid error	There is a short circuit or broken harness in the low speed hold solenoid line.	The low speed hold solenoid is disabled.	8.2.7
8	E: 024	Differential lock solenoid error	There is a short circuit or broken harness in the differential lock solenoid line.	The differential lock solenoid is disabled.	8.2.8
9	E: 025	Parking brake solenoid error	There is a short circuit or broken harness in the parking brake solenoid line.	- The parking brake solenoid is disabled. - The traveling direction returns to the neutral mode.	8.2.9

List of error codes					
No.	Display	Error	Causes	Remark(s)	See WSM chapter 8, section servicing
10	E: 026	Direction control solenoid (forward) error	There is a short circuit or broken harness in the direction control solenoid (forward) line.	- The direction control solenoid (forward) is disabled. - The traveling direction returns to the neutral mode. - The machine can travel backward.	8.2.10
11	E: 027	Direction control solenoid (backward) error	There is a short circuit or broken harness in the direction control solenoid (backward) line.	- The direction control solenoid (backward) is disabled. - The traveling direction returns to the neutral mode. - The machine can travel forward.	8.2.11
12	E: 028	Direction control switch error	Water has infiltrated into the direction control switch.	The traveling direction is fixed to the neutral mode.	8.2.12
13	E: 029	AUX knob switch error	There is a short circuit in the AUX knob switch line.	AUX proportional solenoids are disabled.	8.2.13
14	E: 031	AUX proportional solenoid RH error	There is a short circuit in the AUX proportional solenoid RH line.	AUX proportional solenoids are disabled.	8.2.14
15	E: 032	AUX proportional solenoid LH error	There is a short circuit in the AUX proportional solenoid LH line.	AUX proportional solenoids are disabled.	8.2.15
16	E: 033	Battery overcharging error	The battery is overcharged more than 18 V.	AUX knob switch is disabled.	8.2.16
17	E: 034	5 V short error	There is a short circuit in the 5 V line.	–	8.2.17
18	E: 036	CRS CAN communication error	There is no communication between the main ECU and the engine ECU.	- The engine speed is limited at idling. - The machine cannot travel.	8.2.18
19	E: 037	Parking brake system error	The parking brake solenoid is ON, and the parking brake pressure switch is OFF.	- The traveling direction returns to the neutral mode. - The parking brake solenoid is ON.	8.2.19

Yellow lamp

List of error codes				
No.	Display	Error	Causes	Remark(s)
1	E : 035	Emergency engine start error	The machine has started the engine in an emergency	–

See WSM
chapter 8,
section
servicing

Remark(s)

Engine system error (Red lamp)

List of error codes				
No.	Display	Error		See WSM chapter 8, section servicing
1	E : 9001	DPF regeneration request (level 3)		
2	E : 9003	DPF regeneration request (level 4)		
3	E : 9004	DPF regeneration request (level 5)		
4	E : 9010	Engine stop for DPF protection		
5	E : 9100	Engine rotation speed sensor system error		
6	E : 9101	Fuel/Rail pressure system error		
7	E : 9102	SCV system error		
8	E : 9103	Intake air temperature sensor system error		
9	E : 9104	Water temperature sensor error		
10	E : 9105	Fuel temperature sensor system error		
11	E : 9106	Injector system error		
12	E : 9107	Intake air pressure sensor system error		

See WSM
chapter 8,
section
servicing

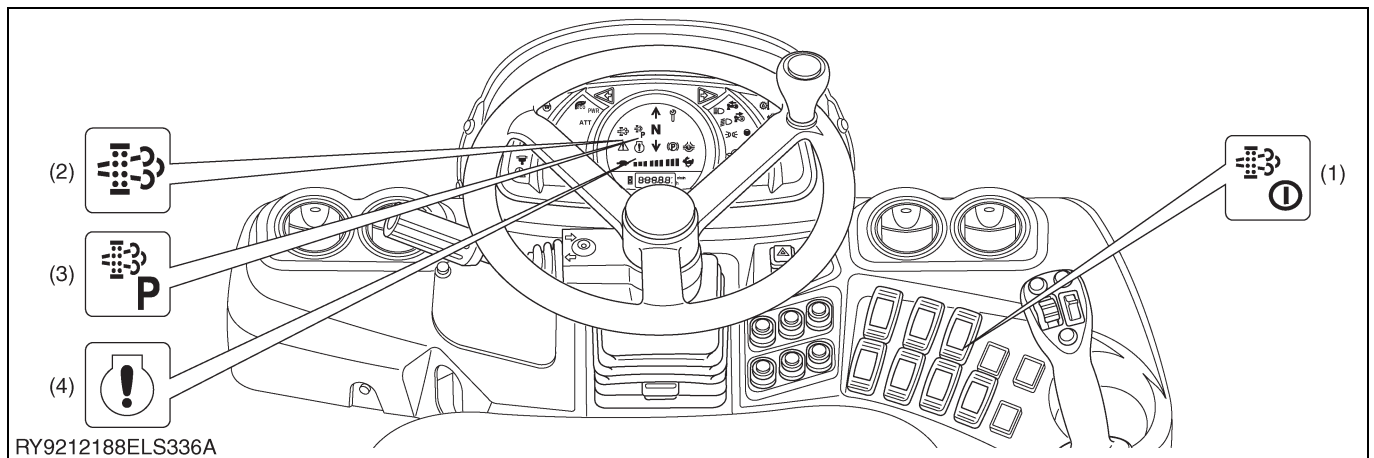
Error

List of error codes		
No.	Display	Error
13	E: 9108	Battery voltage error
14	E: 9109	Sensor voltage system error
15	E: 9110	Main relay system error
16	E: 9112	Atmospheric pressure sensor system error
17	E: 9113	EGR valve system error
18	E: 9114	Engine emission warning
19	E: 9115	Engine overheat error
20	E: 9117	Air heater system error
21	E: 9118	Engine oil pressure error
22	E: 9119	Battery charging error
23	E: 9120	Water separator warning
24	E: 9121	Engine ECU error
25	E: 9122	CAN communication error
26	E: 9200	AFS system error
27	E: 9203	Throttle valve error
28	E: 9204	Differential pressure sensor error
29	E: 9205	Exhaust gas temperature sensor error (DOC inlet)
30	E: 9206	Exhaust gas temperature sensor error (DOC outlet)
31	E: 9207	Exhaust gas temperature sensor error (DPF outlet)
32	E: 9208	Simultaneous disconnection error for all exhaust gas temperature sensors
33	E: 9211	DOC reaction error
34	E: 9212	DPF regeneration time-up error
35	E: 9213	Insufficient water temperature for DPF regeneration error

List of error codes		
No.	Display	Error
36	E: 9214	Frequent DPF regeneration error
37	E: 9300	Pressure limiter valve opening error
38	E: 9301	Excessively high rail pressure error
39	E: 9302	Fuel leakage (high rail pressure) error
40	E: 9303	SCV stuck error
41	E: 9304	Supply pump high pressure error
42	E: 9305	Insufficient intake air error
43	E: 9306	Insufficient boost pressure error
44	E: 9307	Exhaust gas temperature error (T0)
45	E: 9308	Exhaust gas temperature error (T1)
46	E: 9309	Exhaust gas temperature error (T2)
47	E: 9310	Starter motor driving prohibition error
48	E: 9320	DPF removal error
49	E: 9321	DPF function loss error
50	E: 9400	Other error
		See WSM chapter 8, section servicing

4.3.5 Diesel Particle Filter (DPF) regeneration - Conditions and procedures

Operating procedure for Auto Regeneration mode



1. DPF Parked regeneration switch 2. Regeneration indicator 3. Parked regeneration indicator 4. Engine warning indicator

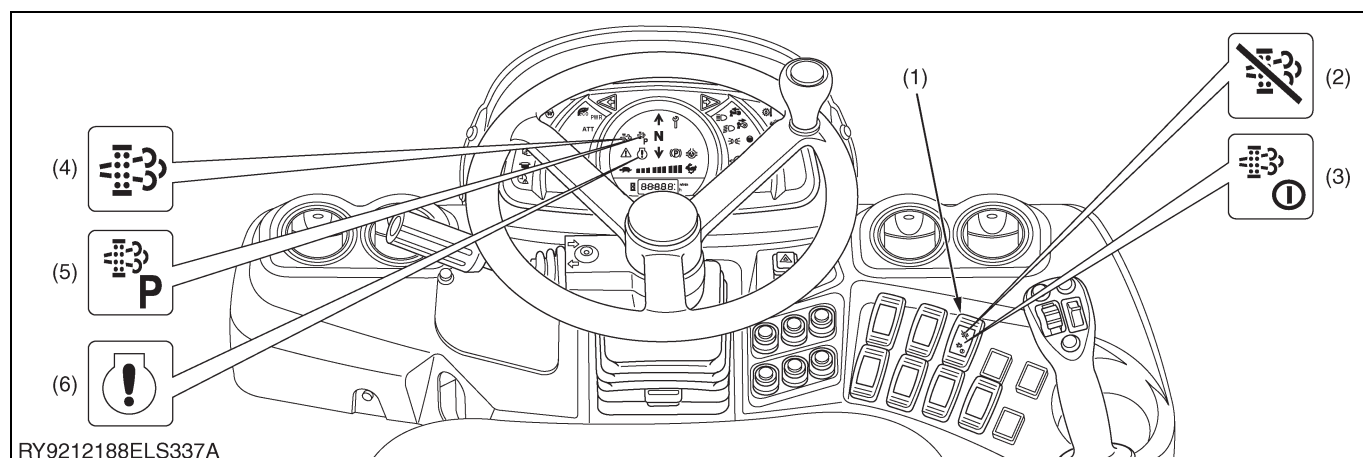
PM warning level	Warning indicator	Buzzer	Horsepower limiter	Meter panel display	Symptoms and measures
Level 0	Off	—	—	—	—
Level 1	 The regeneration indicator starts flashing. (before regeneration)	—	—	—	When soot is accumulated in DPF, lamp (2) lights up and Auto-Regeneration is performed under heavy load conditions. Continue operation and take care about the environment - exhaust temperature increases!
	 The regeneration indicator will stop flashing and remain ON constantly. (during regeneration)	.. Pi Pi Pi .. (every 60 seconds)			
Level 2	 The regeneration indicator starts flashing.	.. Pi Pi Pi .. (every 60 seconds)	—	—	Indicators (3) and (4) start flashing and a continuous beep is produced due to the problem in regeneration behavior. Engage the hydraulic lock switch (lock front hydraulics); put travel in neutral, parking, idling, and press the Parked regeneration switch. Caution! The exhaust temperature will raise. (auto-regeneration possible)
	 The parked regeneration indicator starts flashing. (parked regeneration possible)				
	 The regeneration indicator will stop flashing and remain ON constantly.				

PM warn- ing lev- el	Warning indicator		Buzzer	Horse- pow- er lim- iter	Meter panel display	Symptoms and measures
Level 3		The regeneration indi- cator starts flashing.	.. Pi Pi Pi .. (Emergen- cy opera- tion buzzer) (except dur- ing regener- ation)	50%	E : 9001	If regeneration is not com- pleted, lamp (2), (3), and (4) start flashing, beeping continues and horsepower becomes restricted at the same time. Display screen E: 9001. Engage the hy- draulic lock switch; put travel in neutral, parking, idling, and press the parked regeneration switch. (auto-regeneration possible)
		The regeneration indi- cator starts flashing.				
		The parked regenera- tion indicator starts flashing.				
		The regeneration indi- cator will stop flashing and remain ON con- stantly.				
		The regeneration indi- cator starts flashing.				
Level 4		The engine warning in- dicator remains ON.	.. Pi Pi Pi .. (continuous- ly)	50%	E : 9003	If the operator still ignores the warning, indicator (4) lights up, beeping contin- ues, and horsepower be- comes restricted at the same time. Display screen E: 9003. Park the machine at a safe place immediately and perform parked regen- eration using the Engine Diagnosis Tool. Regenera- tion can only be done with the KUBOTA Diagmaster software tool.
Level 5		The engine warning in- dicator remains ON.	.. Pi Pi Pi .. (continuous- ly)	50%	E : 9004	If the operator still ignores the warning, indicator (4) lights up, beeping contin- ues, and horsepower be- comes restricted at the same time. Display screen E: 9004. Change the Die- sel particle filter (DPF).

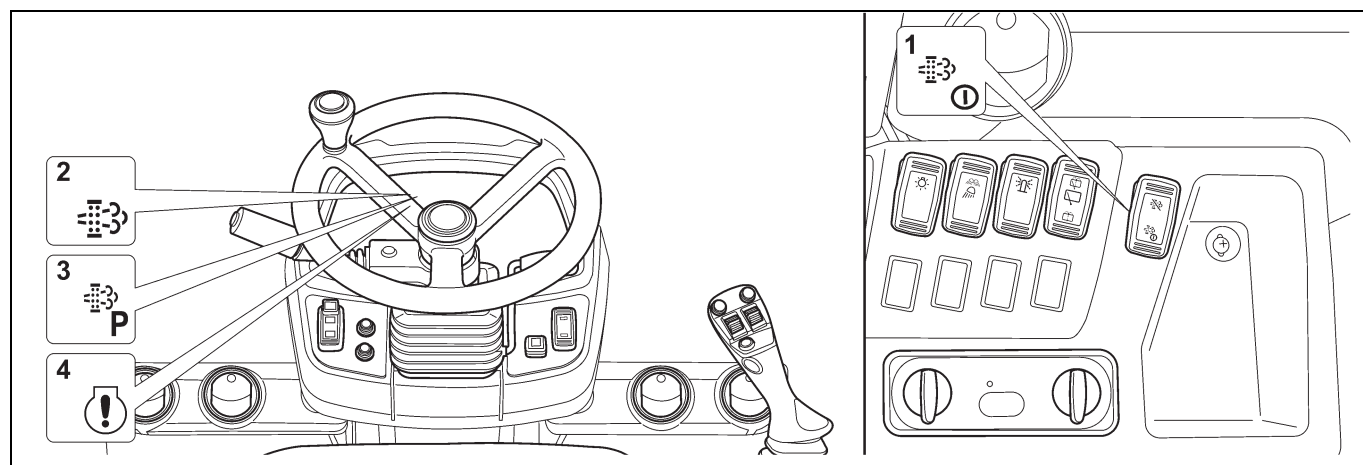
Operating Procedure for Parked regeneration mode

1		Park the machine in a safe area away from buildings, people, and animals.
2		Press the parking brake switch.
3		Disable the hydraulic lock switch.
4		Make sure the Inhibit mode is disabled (regeneration allowed).
5		Set the engine rpm to idle speed.
6		The parked regeneration indicator starts flashing.
7		Press the Parked regeneration side of the Parked regeneration switch to start the regeneration cycle. (The switch lamp will remain ON during the cycle.)
8		The engine rpm rises automatically and the regeneration process starts.
9	 	Make sure the indicators stay ON while regenerating the DPF. They will turn OFF when completing the regeneration cycle.
During the regeneration cycle, do not touch the above levers and switches nor change the engine rpm. Otherwise, the regeneration will be interrupted. Never leave the machine when parked regeneration process is activated. Once regeneration process is complete, the machine may be moved and returned to work.		

- If the parked regeneration cycle is interrupted, the engine rpm is fixed at the idling level for about 30 seconds.
- For this period, keep the accelerator pedal at the idle position. Do not change the rpm. After 30 seconds, you can resume normal operation.

Operating procedure when DPF regeneration is disabled by DPF Inhibit Switch.**Instrument panel R085**

- | | | | |
|-------------------------------|----------------------------------|----------------------------------|-----------------------------|
| 1. Parked Regeneration Switch | 3. Parked Regeneration indicator | 5. Parked regeneration indicator | 6. Engine warning indicator |
| 2. Inhibit warning indicator | 4. Regeneration indicator | | |

Instrument panel R070, R090

- | | | | |
|--|---------------------------|--|-----------------------------|
| 1. Diesel particulate filter regeneration switch | 2. Regeneration indicator | 3. Parked diesel particulate filter regeneration indicator | 4. Engine warning indicator |
|--|---------------------------|--|-----------------------------|

PM warn- ing level	Warning indicator		Buzzer	Horse- power limiter	Meter panel display	Symptoms and measures
Level 0	—		—	—	—	—
Level 1		The indicator starts flashing.	—	—	—	Indicator (4) flashing when soot is accumulated in DPF. Press Auto-Regeneration Permit switch.
		Inhibit warning indicator remains ON.				
Level 2		The indicator starts flashing.	—	—	—	Indicators (4) and (5) flashing due to the problem in regeneration behavior. Engage the hydraulic lock switch; put travel in neutral, parking, idling, and press the parked regeneration switch.
		The parked regeneration indicator starts flashing. (parked regeneration possible)				
		Inhibit warning indicator starts flashing.				
Level 3		The indicator starts flashing.	· · Pi Pi Pi · · (Emergency operation buzzer) (except during regeneration)	50%	E : 9001	If regeneration is not completed, lamp (2), (5), and (4) start flashing, beeping continues and horsepower becomes restricted at the same time. Display screen E: 9001. Engage the hydraulic lock switch; put travel in neutral, parking, idling, and press the parked regeneration switch.
		The regeneration indicator starts flashing.				
		The parked regeneration indicator starts flashing.				
		Inhibit warning indicator starts flashing.				
		The regeneration indicator will stop flashing and remain ON constantly.				
		The regeneration indicator starts flashing.				
Level 4		The engine warning indicator remains ON.	· · Pi Pi Pi · · (continuously)	50%	E : 9003	If the operator still ignores the warning, indicator (6) lights up, beeping continues, and horsepower becomes restricted at the same time. Display screen E: 9003. Park the machine at a safe place immediately. Regeneration can only be done with the KUBOTA Diagmaster software tool.
		Inhibit warning indicator remains ON.				
Level 5		The engine warning indicator remains ON.	· · Pi Pi Pi · · (continuously)	50%	E : 9004	If the operator still ignores the warning, indicator (6) lights up, beeping continues, and horsepower becomes restricted at the same time. Display screen E: 9004. Change the Diesel particle filter (DPF).
		Inhibit warning indicator remains ON.				

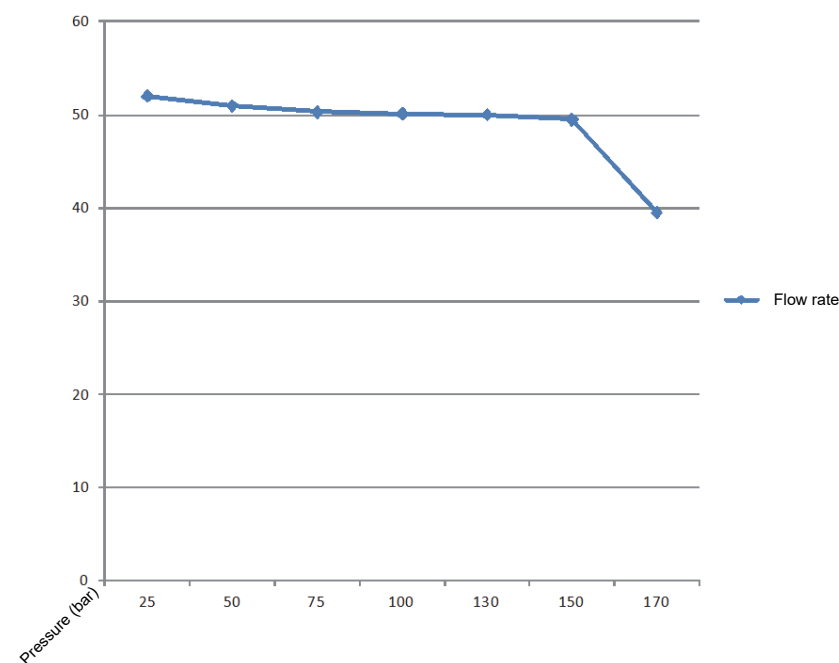
5 Miscellaneous, Engine

5.1 AUX lines

AUX line	AUX	R065, R082, R085, R070, R090
Thread size	1	PT 1/2" *

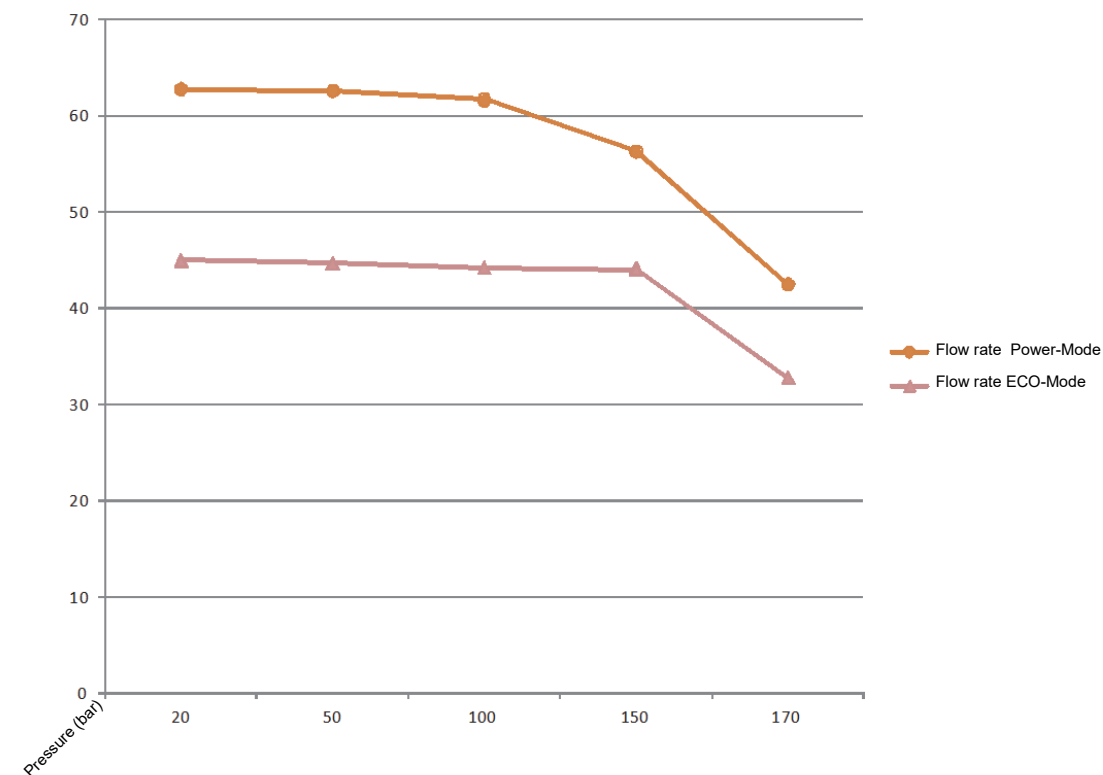
* Do not use NPT 1/2"!

5.1.1 AUX flow rate R065



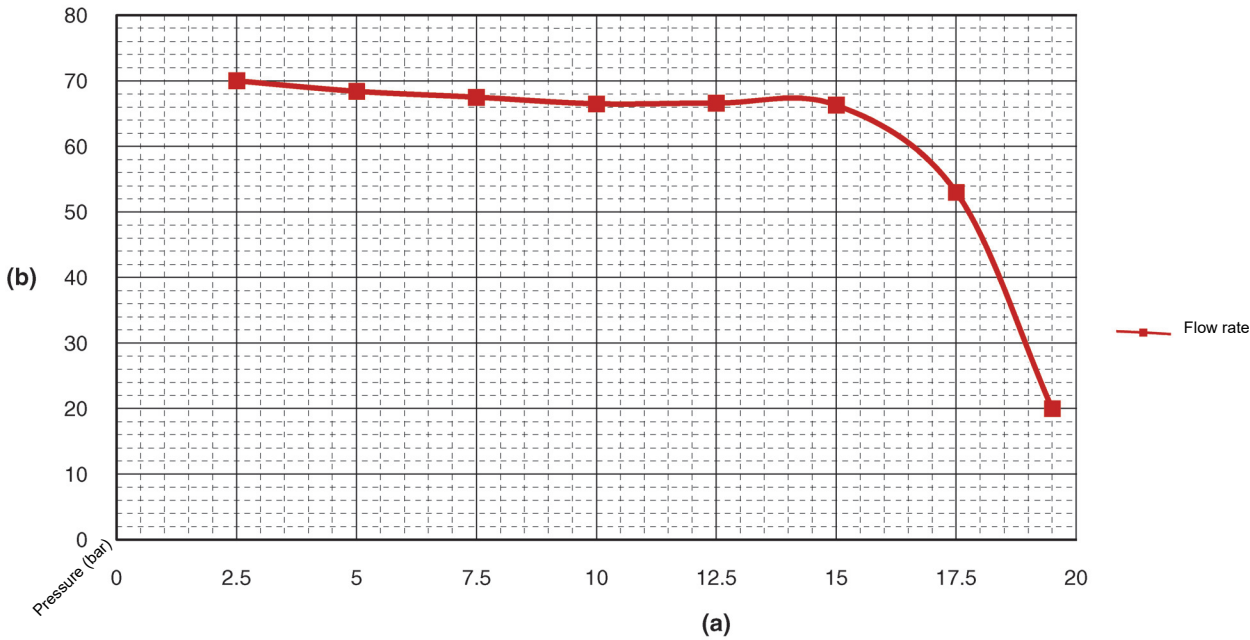
All values in the chart above are reference values measured on the machine.

5.1.2 AUX flow rate R085



All values in the chart above are reference values measured on the machine.

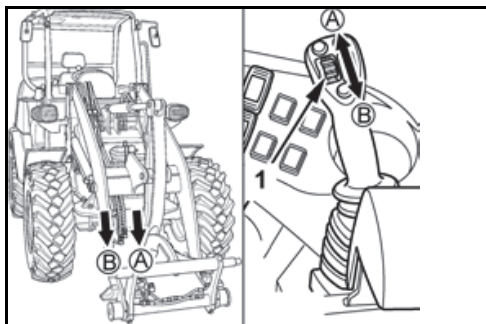
5.1.3 AUX flow rate R082



All values in the chart above are reference values measured on the machine.

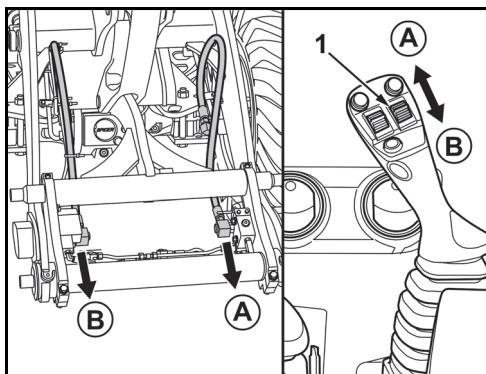
5.1.4 AUX port positions

R065, R082, R085



- A AUX - knob to front
- B AUX - knob to rear

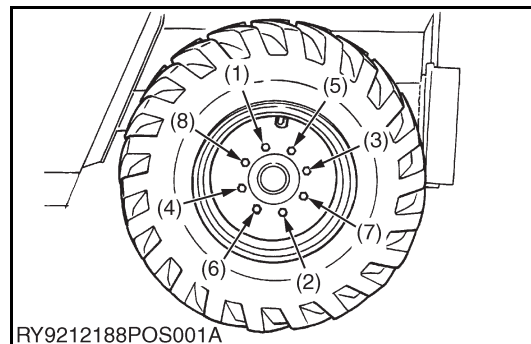
R070, R090



- A AUX - knob to front
- B AUX - knob to rear

5.2 Wheels

Model	Wheel nuts torque	
		N·m
R065		490
R082		490
R085		490
R070		490
R090		490



5.2.1 Tire pressure for different tires and pallet fork/bucket R065 up to #00278

Tire size	12.5-18	12.5-20	365/70 R18	340/80 R20
Front tire pressure (bar) (Bucket/pallet fork)	2.5 / 3.0	2.5 / 3.0	3.0 / 3.5	2.6 / 3.2
Rear tire pressure (bar)	2.0	2.0	2.0	2.0

5.2.2 Tire pressure for different tires and pallet fork/bucket R065HW as of #00279

Tire size	12.5-18	12.5-20	365/70 R18	405/70 R18	340/80 R18	400/70 R20
Front tire pressure (bar) (Bucket/pallet fork)	2,5 / 3,0	2,5 / 3,0	3,5 / 3,75	3,5 / 3,5	3,0 / 3,5	3,0 / 3,0
Rear tire pressure (bar)	2,0 / 2,0	2,0 / 2,0	3,0 / 3,0	3,0 / 2,5	2,5 / 2,5	2,5 / 2,5

5.2.3 Tire pressure for different tires and pallet fork/bucket R085

Tire size	12.5-18	12.5-20	405/70 R18	400/70 R20
Front tire pressure (bar) (bucket/pallet fork)	3.0 / 3.5	3.0 / 3.5	3.0 / 3.5	2.6 / 3.2
Rear tire pressure (bar)	2.0	2.0	2.0	2.0

5.2.4 Tire pressure for different tires and pallet fork/bucket R082

Tire size	12.5-18	12.5-20	405/70 R18	400/70 R20
Front tire pressure (bar) (bucket/pallet fork)	2,5 / 3,0	2,5 / 3,5	3,5 / 3,75	3,0 / 3,5
Rear tire pressure (bar)	2,0	2,0	3,0 / 2,5	2,5

5.2.5 Tire pressure for different tires and pallet fork/bucket R070

Tire size	12.5-18	12.5-20	365/70 R18	405/70 R18	340/70 R18	400/70 R20
Front tire pressure (bar) (bucket/pallet fork)	2,5 / 3,0	2,5 / 3,5	3,5 / 3,75	3,5	3,0 / 3,5	3,0
Rear tire pressure (bar)	2,0	2,0	3,0	3,0 / 2,5	2,5	2,5

5.2.6 Tire pressure for different tires and pallet fork/bucket R090

Tire size	12.5-18	12.5-20	405/70 R18	400/70 R20
Front tire pressure (bar) (bucket/pallet fork)	2,5 / 3,0	2,5 / 3,5	3,5 / 3,75	3,0 / 3,5
Rear tire pressure (bar)	2,0	2,0	3,0 / 2,5	2,5

5.3 Engine basic data

Model	Engine type	Compression pressure (bar)		Valve clearance (mm)	Engine rpm				V-belt tension mm/ 98N
		New engine	Allowable limit		Idle	Start-up rpm	Max. rpm *	ECO mode	
R065	V2607-DI-E3-WL	~ 39.2	~ 29	0,13~0,17	1025~1075	~ 1350 ± 50	< 2600	---	10~12
R082	V2607-DI-E3-WL	~39.2	~29	0,13~0,17	980~1050	~ 1350 ± 50	< 2550	---	10~12
R085	V2607-CR-TE4-WL	~ 32	~ 22	0,13~0,17	1025~1075	~ 1150 ± 50	< 2425	< 1800	10~12
R070	V2607-CR-E5-WL	~ 32	~ 22	0,13~0,17	1025~1075	~ 1300 ± 100	< 2425	---	10~12
R090	V2607-CR-E5-WL	~ 32	~ 22	0,13~0,17	1025~1075	~ 1250 ± 100	< 2425	---	10~12

* No-load max RPM.

5.4 A/C pressure switch

Model	A/C pressure switch (bar)		Refrigerant amount (kg)
	Low pressure	High pressure	
R065	1.96	31.4	0,700
R082	1.96	31.4	0,700
R085	1.96	31.4	0,700
R070	1,96	31,4	0,700 ± 0,050
R090	1,96	31,4	0,700 ± 0,050

5.5 Center pin play

Model	R065	R082	R085	R070	R090
Unit	(mm)				
Play*	17	17	17	15	15

*The detailed measuring method is described in the WSM of the machine

6 Tightening torques

6.1 General tightening torques

Indication on top of bolt	 4 No-grade or 4T						 7T						 9T		
Indication on top of nut	  No-grade or 4T												   6T		
Material of opponent part	Normal			Aluminum			Normal			Aluminum			Normal		
Unit	N·m	kgf· m	lbf·ft	N·m	kgf· m	lbf·ft	N·m	kgf· m	lbf·ft	N·m	kgf· m	lbf·ft	N·m	kgf· m	lbf·ft
M6	7.9	0.80	5.8	7.9	0.80	5.8	9.81	1.00	7.24	7.9	0.80	5.8	12.3	1.25	9.05
	~ 9.3	~ 0.95	~ 6.8	~ 8.8	~ 0.90	~ 6.5	~ 11.2	~ 1.15	~ 8.31	~ 8.8	~ 0.90	~ 6.5	~ 14.2	~ 1.45	~ 10.4
M8	18	1.8	13	17	1.7	13	24	2.4	18	18	1.8	13	30	3.0	22
	~ 20	~ 2.1	~ 15	~ 19	~ 2.0	~ 14	~ 27	~ 2.8	~ 20	~ 20	~ 2.1	~ 15	~ 34	~ 3.5	~ 25
M10	40	4.0	29	32	3.2	24	48	4.9	36	40	4.0	29	61	6.2	45
	~ 45	~ 4.6	~ 33	~ 34	~ 3.5	~ 25	~ 55	~ 5.7	~ 41	~ 44	~ 4.5	~ 32	~ 70	~ 7.2	~ 52
M12	63	6.4	47				78	7.9	58	63	6.4	47	103	10.5	76.0
	~ 72	~ 7.4	~ 53	~ —	~ —	~ —	~ 90	~ 9.2	~ 66	~ 72	~ 7.4	~ 53	~ 117	~ 12.0	~ 86.7
M14	108	11.0	79.6				124	12.6	91.2				167	17.0	123
	~ 125	~ 12.8	~ 92.5	~ —	~ —	~ —	~ 147	~ 15.0	~ 108	~ —	~ —	~ —	~ 196	~ 20.0	~ 144
M16	167	17.0	123				197	20.0	145				260	26.5	192
	~ 191	~ 19.5	~ 141	~ —	~ —	~ —	~ 225	~ 23.0	~ 166	~ —	~ —	~ —	~ 304	~ 31.0	~ 224
M18	246	25.0	181				275	28.0	203				344	35.0	254
	~ 284	~ 29.0	~ 209	~ —	~ —	~ —	~ 318	~ 32.5	~ 235	~ —	~ —	~ —	~ 402	~ 41.0	~ 296
M20	334	34.0	246				368	37.5	272				491	50.0	362
	~ 392	~ 40.0	~ 289	~ —	~ —	~ —	~ 431	~ 44.0	~ 318	~ —	~ —	~ —	~ 568	~ 58.0	~ 419

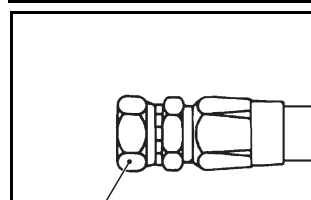
6.1.1 Stud bolts

Material of opponent part	Normal			Aluminum		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
8 mm	12 ~ 15	1.2 ~ 1.6	8.7 ~ 11	8.9 ~ 11	0.90 ~ 1.2	6.5 ~ 8.6
10 mm	25 ~ 31	2.5 ~ 3.2	18 ~ 23	20 ~ 25	2.0 ~ 2.6	15 ~ 18
12 mm	30 ~ 49	3.0 ~ 5.0	22 ~ 36	31	3.2	23
14 mm	62 ~ 73	6.3 ~ 7.5	46 ~ 54	—	—	—
16 mm	98.1 ~ 112	10.0 ~ 11.5	72.4 ~ 83.1	—	—	—
18 mm	172 ~ 201	17.5 ~ 20.5	127 ~ 148	—	—	—

6.1.2 Torque for hydraulic hose fittings

Connecting nuts	
1 / 8	7.8 ~ 11.8 N·m 0.8 ~ 1.2 kgf·m 5.7 ~ 8.7 lbf·ft
1 / 4	24.5 ~ 29.2 N·m 2.5 ~ 3.0 kgf·m 18.1 ~ 21.7 lbf·ft
3 / 8	37.2 ~ 42.1 N·m 3.8 ~ 4.3 kgf·m 27.5 ~ 31.1 lbf·ft
1 / 2	58.8 ~ 63.7 N·m 6.0 ~ 6.5 kgf·m 43.4 ~ 47.0 lbf·ft
3 / 4	117.6 ~ 127.4 N·m 12.0 ~ 13.0 kgf·m 86.8 ~ 94.0 lbf·ft
1	181.3 ~ 191.1 N·m 18.5 ~ 19.5 kgf·m 133.8 ~ 141.0 lbf·ft
1-1/4	220.5 ~ 230.3 N·m 22.5 ~ 23.5 kgf·m 162.8 ~ 170.0 lbf·ft
9/16UNF (ORFS)	35.2 ~ 43.1 N·m 3.6 ~ 4.4 kgf·m 26.0 ~ 31.8 lbf·ft
11/16UNF (ORFS)	60.0 ~ 73.5 N·m 6.1 ~ 7.5 kgf·m 44.3 ~ 54.2 lbf·ft
13/16UNF (ORFS)	70.6 ~ 86.2 N·m 7.2 ~ 8.8 kgf·m 52.1 ~ 63.6 lbf·ft
1-14UNS (ORFS)	105.8 ~ 129.4 N·m 10.8 ~ 13.2 kgf·m 78.0 ~ 98.4 lbf·ft

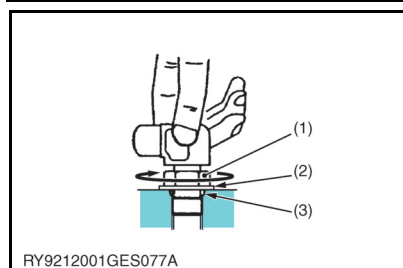
Connecting nuts (metric thread)			
DN 4 - 1 / 8	M12 × 1.5	14 mm	15 - 20 N·m 1.5 - 2.0 kgf·m 11.1 ~ 14.8 lbf·ft
DN 6 - 1 / 4	M14 × 1.5	17 mm	15 - 20 N·m 1.5 - 2.0 kgf·m 11.1 ~ 14.8 lbf·ft
DN 8 - 5 / 16	M16 × 1.5	19 mm	30 - 35 N·m 3.1 - 3.6 kgf·m 22.1 ~ 25.8 lbf·ft
DN 10 - 3 / 8	M18 × 1.5	22 mm	40 - 45 N·m 4.1 - 4.6 kgf·m 29.5 ~ 33.2 lbf·ft
DN 12 - 1 / 2	M22 × 1.5	27 mm	50 - 55 N·m 5.1 - 5.6 kgf·m 36.9 ~ 40.6 lbf·ft
DN 19 - 3 / 4	M30 x P2.0	36 mm	150 - 160 N·m 15.3 - 16.3 kgf·m 111 ~ 118 lbf·ft



(1) Connecting nuts

6.1.3 Torques of lock nuts for elbows with male seats and adaptors with O-rings (Straight Threads)

Lock nuts and adaptors with O-rings			
1 / 8	M10 × 1.0	14 mm	15 - 20 N·m 1.5 - 2.0 kgf·m 11.1 ~ 14.8 lbf·ft
1 / 8	M12 × 1.5	17 mm	25 - 35 N·m 2.6 - 3.6 kgf·m 18.4 ~ 25.8 lbf·ft
1 / 4	M14 × 1.5	19 mm	34 - 45 N·m 3.5 - 4.6 kgf·m 25.1 ~ 33.2 lbf·ft
1 / 4	M16 × 1.5	19 - 22 mm	40 - 55 N·m 4.1 - 5.6 kgf·m 29.5 ~ 40.6 lbf·ft
3 / 8	M18 × 1.5	22 - 24 mm	45 - 65 N·m 4.6 - 6.6 kgf·m 33.2 ~ 47.9 lbf·ft
1 / 2	M22 × 1.5	27 mm	70 - 80 N·m 7.1 - 8.2 kgf·m 51.6 ~ 59.0 lbf·ft
1 / 2	M24 × 1.5	27 - 30 mm	80 - 90 N·m 8.2 - 9.2 kgf·m 59.0 ~ 66.4 lbf·ft
3 / 4	M26 × 1.5	32 mm	100 - 120 N·m 10.2 - 12.2 kgf·m 73.8 ~ 88.5 lbf·ft
1	M30 x P2.0	36 mm	120 - 140 N·m 12.2 - 14.3 kgf·m 88.5 ~ 103.3 lbf·ft



RY9212001GES077A

- (1) Lock nut (3) Seal (O-ring)
(2) Washer

6.2 Specific tightening torques

Model	Engine					Hydraulics		
	Engine head cover (N·m)	Injector line union nut (N·m)	Engine head bolts (N·m)	Engine mounts (N·m)	Glow plug (N·m)	Pump coupling to flywheel (N·m)	HST pump to motor (N·m)	HST motor to rear axle (N·m)
R065	9,81 ~ 11,2	23 ~ 36	147 ~ 156	196,1 ~ 225,6	7,7 ~ 9,3	85 ~ 94	123,6 ~ 147,1	77,2 ~ 90,2
R085	9,81 ~ 11,2	30 ~ 40	147 ~ 156	196,1 ~ 225,6	7,7 ~ 9,3	85 ~ 94	196,1 ~ 225,6	77,2 ~ 90,2
R082	9,81 ~ 11,2	23 ~ 36	147 ~ 156	196,1 ~ 225,6	7,7 ~ 9,3	85 ~ 94	196,1 ~ 225,6	77,2 ~ 90,2
R070	9,81 ~ 11,2	22,45 ~ 36,26	155 ~ 165	196,1 ~ 225,6	7,65 ~ 9,35	85 ~ 94	123,6 ~ 147,1	75,5 ~ 90,2
R090	9,81 ~ 11,2	22,45 ~ 36,26	155 ~ 165	196,1 ~ 225,6	7,65 ~ 9,35	85 ~ 94	196,1 ~ 225,6	75,5 ~ 90,2

Model	Body						
	Drive shaft (N·m)	Axle mount (N·m)			Additional weights front axle		
		Serial number	Serial number	Serial number	Serial number	Serial number	Serial number
R065	29,4 ~ 34,3	≤ 00822	440 ~ 540	≥ 00823	600 ~ 700	-----	-----
R065HW	29,4 ~ 34,3	≤ 00822	440 ~ 540	≥ 00823	600 ~ 700	440 ~ 540	≥ 00823 600 ~ 700
R085	29,4 ~ 34,3	≤ 00398	440 ~ 540	≥ 00399	600 ~ 700	-----	-----
R082		≤ 20122	440 ~ 540	≥ 20123	600 ~ 700	-----	-----
R070	29,4 ~ 34,3	≤ 10001	450 ± 40	-----	-----	-----	-----
R090	29,4 ~ 34,3	≤ 10001	450 ± 40	-----	-----	-----	-----

6.3 Torque conversion chart N·m to lbf·ft

Newton meter (N·m)	Pound foot (lbf·ft)	Newton meter (N·m)	Pound foot (lbf·ft)	Newton meter (N·m)	Pound foot (lbf·ft)	Newton meter (N·m)	Pound foot (lbf·ft)	Newton meter (N·m)	Pound foot (lbf·ft)
1	0.7	32	23.6	63	46.0	94	69.3	125	92.2
2	1.5	33	24.3	64	47.2	95	70.1	126	92.9
3	2.2	34	25.1	65	47.9	96	70.8	127	93.7
4	3.0	35	25.8	66	48.7	97	71.5	128	94.4
5	3.7	36	26.6	67	49.4	98	72.3	129	95.1
6	4.4	37	27.3	68	50.2	99	73.0	130	95.9
7	5.2	38	28.0	69	50.9	100	73.8	131	96.6
8	5.9	39	28.8	70	51.6	101	74.5	132	97.4
9	6.6	40	29.5	71	52.4	102	75.2	133	98.1
10	7.4	41	30.2	72	53.1	103	76.0	134	98.8
11	8.1	42	31.0	73	53.8	104	76.7	135	99.6
12	8.9	43	31.7	74	54.6	105	77.4	136	100.3
13	9.6	44	32.5	75	55.3	106	78.2	137	101.0
14	10.3	45	33.2	76	56.1	107	78.9	138	101.8
15	11.1	46	33.9	77	56.8	108	79.7	139	102.5
16	11.8	47	34.7	78	57.5	109	80.4	140	103.3
17	12.5	48	35.4	79	58.3	110	81.1	141	104.0
18	13.3	49	36.1	80	59.0	111	81.9	142	104.7
19	14.0	50	36.9	81	59.7	112	82.6	143	105.5
20	14.8	51	37.6	82	60.5	113	83.3	144	106.2
21	15.5	52	38.4	83	61.2	114	84.1	145	106.9
22	16.2	53	39.1	84	62.0	115	84.8	146	107.7
23	17.0	54	39.8	85	62.7	116	85.6	147	108.4
24	17.7	55	40.6	86	63.4	117	86.3	148	109.2
25	18.4	56	41.3	87	64.2	118	87.0	149	109.9
26	19.2	57	42.0	88	64.9	119	87.8	150	110.6
27	19.9	58	42.8	89	65.6	120	88.5	151	111.4
28	20.7	59	43.5	90	66.4	121	89.2	152	112.1
29	21.4	60	44.3	91	67.1	122	90.0	153	112.8
30	22.1	61	45.0	92	67.9	123	90.7	154	113.6
31	22.9	62	45.7	93	68.6	124	91.5	155	114.3
Conversion formula: Pound foot = Newton meter x 0.73756									

7 Annex 1 - Inspection sheets

Date _____
Examiner _____

Inspection sheet R065



Reference: KTSE version 01.09.2017

Service hours: _____ Serial number: _____ Accessories/Implements: _____
Dealer: _____ Customer: _____

	Tested	Changed		Tested	Changed		Tested	Changed
Air filter	☐	☐	Pilot filter	☐	☐	Rear axle oil	☐	☐
Hydr. return filter		☐	Engine oil level	☐		Interior air filter		☐
Hydr. suction filter		☐	Engine oil		☐	Fuel filter/water separator	☐	☐
HST filter		☐	Engine oil filter		☐	V-belt tension	☐	
Hydraulic oil	☐	☐	Front axle oil	☐	☐			

All hydraulic tests should be performed at a hydraulic oil temperature of 50°C ± 5°C.

Set pressure	Component	Unit	Current	Spec.	Comments
Relief valve a1	Main pump	bar		196 ± 10	
Relief valve a2	Steering	bar		200 ± 10	
Relief valve a3	HST	bar		412 ± 20	Differential pressure
Relief valve a4	HST	bar		412 ± 20	Differential pressure
Relief valve a5	Charge pressure pump	bar		30 ± 3	
Relief valve a6	HST Cut-off valve	bar		---	

Relief valves	Unit	Current	Spec.	Comments	Pump displacement volume	Unit	Current	Spec.	Usable limit 80%
Bucket	Bottom (b1B)	bar	220 ± 10	Test w/ engine stopped	Main pump	l/min		54.8	43.84
	Rod (b1R)	bar	220 ± 10		Charge pressure pump	l/min		19	15.2
Steering	Bottom (b2B)	bar	220 ± 10						
	Rod (b2R)	bar	220 ± 10						

P-Q graph test values at 2400rpm								
HST Pump			HST motor			Main pump		
Pressure [bar]	Flow rate [l/min]	Current	Pressure [bar]	Flow rate [l/min]	Current	Pressure [bar]	Flow rate [l/min]	Current
160	64		160	66		27	54.8	
200	61		200	65		50	53.7	
260	50		250	52		100	52.1	
300	42		310	40		150	51.3	
340	40		---	---		200	51	

Engine	Unit	Current	Spec.	Conditions
Idling rpm	rpm		1015 ± 25	Check when the engine is warm, without cold running boost
Start-up rpm	rpm		1350 ± 50	
max. rpm	rpm		< 2620	
Valve clearance	mm		0.13-0.17	Adjust only when engine is cold

Internal leakage of cylinders	Unit	Current	New Machine	Usable Limit
Lift arm	mm		≤ 20	≤ 100
Bucket	mm		≤ 20	≤ 100

Test conditions
Hydraulic oil temperature 50°C ± 5°C, see WSM for test position, with standard bucket and 890 kg attached weight. Measure hydraulic cylinder drift after 10 minutes

Speed	Unit	Current		Spec.	
		lift/rake	lower/dump	lift/rake	lower/dump
Bucket	s			2.9 ± 0.3	2.1 ± 0.3
Lift arm	s			6.0 ± 0.5	3.9 ± 0.5

Travel speed (20m, max rpm, oil temperature 50°C)	Tire size	Unit	Actual Value	Nominal Value	Actual Value	Nominal Value
			Low speed		High speed	
	12.5 - 18 10PR	s		13.09 ~ 16.00		3.53 ~ 4.14
	12.5 - 20 10PR	s		12.20 ~ 14.69		3.30 ~ 3.83
	365/70R18 132 A4	s		13.33 ~ 16.36		3.56 ~ 4.19
	340/80 R18 132 A4	s		13.09 ~ 16.00		3.53 ~ 4.14

Comments:

Date _____
Examiner _____

Inspection sheet R065HW



Reference: KTSE version 01.09.2017

Service hours: _____ Serial number: _____ Accessories/ _____
Dealer: _____ Customer: _____ Implements: _____

	Tested	Changed		Tested	Changed		Tested	Changed
Air filter	☐	☐	Pilot filter	☐	☐	Rear axle oil	☐	☐
Hydr. return filter		☐	Engine oil level	☐		Interior air filter		☐
Hydr. suction filter		☐	Engine oil		☐	Fuel filter/water separator	☐	☐
HST filter		☐	Engine oil filter		☐	V-belt tension	☐	
Hydraulic oil	☐	☐	Front axle oil	☐	☐			

All hydraulic tests should be performed at a hydraulic oil temperature of 50°C ± 5°C.

Set pressure	Component	Unit	Current	Spec.	Comments
Relief valve a1	Main pump	bar		196 ± 10	
Relief valve a2	Steering	bar		200 ± 10	
Relief valve a3	HST	bar		412 ± 20	Differential pressure
Relief valve a4	HST	bar		412 ± 20	Differential pressure
Relief valve a5	Charge pressure pump	bar		30 ± 3	
Relief valve a6	HST Cut-off valve	bar		---	

Relief valves	Unit	Current	Spec.	Comments	Pump displacement volume	Unit	Current	Spec.	Usable limit 80%
Bucket	Bottom (b1B)	bar	220 ± 10	Test w/ engine stopped	Main pump	l/min		54.8	43.84
	Rod (b1R)	bar	220 ± 10		Charge pressure pump	l/min		19	15.2
Steering	Bottom (b2B)	bar	220 ± 10						
	Rod (b2R)	bar	220 ± 10						

P-Q graph test values at 2400rpm								
HST Pump			HST motor			Main pump		
Pressure [bar]	Flow rate [l/min]	Current	Pressure [bar]	Flow rate [l/min]	Current	Pressure [bar]	Flow rate [l/min]	Current
160	64		160	66		27	54.8	
200	61		200	65		50	53.7	
260	50		250	52		100	52.1	
300	42		310	40		150	51.3	
340	40		---	---		200	51	

Engine	Unit	Current	Spec.	Conditions
Idling rpm	rpm		1015 ± 25	Check when the engine is warm, without cold start device
Start-up rpm	rpm		1350 ± 50	
max. rpm	rpm		< 2620	
Valve clearance	mm		0.13-0.17	Adjust only when engine is cold

Internal leakage of cylinders	Unit	Current	New Machine	Usable Limit	Test conditions
Lift arm	mm		≤ 20	≤ 100	Hydraulic oil temperature 50°C ± 5°C, see WSM for test position, with standard bucket and 890 kg attached weight. Measure hydraulic cylinder drift after 10 minutes
Bucket	mm		≤ 20	≤ 100	

Speed	Unit	Current		Spec.	
		lift/rake	lower/dump	lift/rake	lower/dump
Bucket	s			2.9 ± 0.3	2.1 ± 0.3
Lift arm	s			6.0 ± 0.5	3.9 ± 0.5

Travel speed (20m, max rpm, oil temperature 50°C)	Tire size	Unit	Actual Value	Nominal Value	Actual Value	Nominal Value
			Low speed		High speed	
	12.5 - 18 10PR	s		13.09 ~ 16.00		3.53 ~ 4.14
	12.5 - 20 10PR	s		12.20 ~ 14.69		3.30 ~ 3.83
	365/70R18 132 A4	s		13.33 ~ 16.36		3.56 ~ 4.19
	340/80 R18 132 A4	s		13.09 ~ 16.00		3.53 ~ 4.14
	405/70 R18 132 A4	s		12.60 ~ 15.28		3.40 ~ 3.83
	400/70 R20 132 A4	s		12.26 ~ 14.78		3.30 ~ 3.83

Comments:

Date _____
Examiner _____

Inspection sheet R085



Reference: KTSE version 01.09.2017

Service hours: _____ Serial number: _____ Accessories/
Dealer: _____ Customer: _____ Implements: _____

	Tested	Changed		Tested	Changed		Tested	Changed
Air filter	☐	☐	Pilot filter	☐	☐	Rear axle oil	☐	☐
Hydr. return filter		☐	Engine oil level	☐		Interior air filter		☐
Hydr. suction filter		☐	Engine oil		☐	Crankcase ventilation		☐
HST filter		☐	Engine oil filter		☐	Fuel filter/water separator	☐	☐
Hydraulic oil	☐	☐	Front axle oil	☐	☐	V-belt tension	☐	

All hydraulic tests should be performed at a hydraulic oil temperature of 50°C ± 5°C.

Set pressure	Component	Unit	Current	Spec.	Comments
Relief valve a1	Main pump	bar		216 ± 10	
Relief valve a2	Steering	bar		200 ± 10	
Relief valve a3	HST	bar		--- ± ---	Not adjustable
Relief valve a4	HST	bar		--- ± ---	Not adjustable
Relief valve a5	Charge pressure pump	bar		31.5 ± 3	
Relief valve a6	HST Cut-off valve	bar		368 ± 20	Differential pressure

Relief valves		Unit	Current	Spec.	Comments	Pump displacement volume	Unit	Current	Spec.	Usable limit 80%
Bucket	Bottom (b1B)	bar		220 ± 10	Test w/ engine stopped	Main pump	l/min		67.2	53.76
	Rod (b1R)	bar		220 ± 10		Charge pressure pump	l/min		20.6	16.48
Steering	Bottom (b2B)	bar		220 ± 10						
	Rod (b2R)	bar		220 ± 10						

P-Q graph test values at 2400rpm								
HST Pump			HST motor			Main pump		
Pressure [bar]	Flow rate [l/min]	Current	Pressure [bar]	Flow rate [l/min]	Current	Pressure [bar]	Flow rate [l/min]	Current
160	93		170	92		30	64	
200	92		200	91		50	62.8	
260	89		250	87		100	61.8	
300	74		300	71		150	60.7	
350	60		350	51		200	60	

Engine	Unit	Current	Spec.	Conditions
Idling rpm	rpm		1050 ± 25	Check when the engine is warm, without cold start device
Start-up rpm	rpm		1150 ± 50	
max. rpm	rpm		< 2400	
Valve clearance	mm		0.13-0.17	Adjust only when engine is cold

Internal leakage of cylinders	Unit	Current	New Machine	Usable Limit	Test conditions
Lift arm	mm		≤ 20	≤ 100	Hydraulic oil temperature 50°C ± 5°C, see WSM for test position, with standard bucket and 1260 kg attached weight. Measure hydraulic cylinder drift after 10 minutes
Bucket	mm		≤ 20	≤ 100	

Speed	Unit	Current		Spec.	
		lift/rake	lower/dump	lift/rake	lower/dump
Bucket	s			3.0 ± 0.3	2.2 ± 0.3
Lift arm	s			6.0 ± 0.5	4.3 ± 0.5

Travel speed (20m, max rpm, oil temperature 50°C)	Tire size	Unit	Actual Value	Nominal Value	Actual Value	Nominal Value
			Low speed		High speed	
	12.5 - 18 10PR	s		14.12 ~ 17.56		3.67 ~ 4.34
	12.5 - 20 10PR	s		13.33 ~ 16.36		3.44 ~ 4.02
	405/70 R18 132 A4	s		13.58 ~ 16.74		3.53 ~ 4.14
	400/70 R20 132 A4	s		13.33 ~ 16.36		3.44 ~ 4.02

Comments:

Date: _____
 Examiner: _____

Inspection sheet R082



Reference: KTSE version 01.09.2017

Service hours: _____ Serial number: _____ Accessories/ _____
 Dealer: _____ Customer: _____ Implements: _____

	Tested	Changed		Tested	Changed		Tested	Changed
Air filter	☐	☐	Pilot filter	☐	☐	Rear axle oil	☐	☐
Hydr. return filter		☐	Engine oil level	☐		Interior air filter		☐
Hydr. suction filter		☐	Engine oil		☐	Fuel filter/water separator	☐	☐
HST filter		☐	Engine oil filter		☐	V-belt tension	☐	
Hydraulic oil	☐	☐	Front axle oil	☐	☐			

All hydraulic tests should be performed at a hydraulic oil temperature of 50°C ± 5°C.

Set pressure	Component	Unit	Current	Spec.	Comments
Relief valve a1	Main pump	bar		216 ± 10	
Relief valve a2	Steering	bar		192 ± 10	
Relief valve a3	HST	bar		412 ± 20	Differential pressure
Relief valve a4	HST	bar		412 ± 20	Differential pressure
Relief valve a5	Charge pressure pump	bar		30 ± 3	
Relief valve a6	HST Cut-off valve	bar		---	

Relief valves	Unit	Current	Spec.	Comments	Pump displacement volume	Unit	Current	Spec.	Usable limit 80%
Bucket	Bottom (b1B)	bar	241 ± 10	Test w/ engine stopped	Main pump	l/min		67.2	53.76
	Rod (b1R)	bar	241 ± 10		Charge pressure pump	l/min		19	15.2
Steering	Bottom (b2B)	bar	240 ± 10						
	Rod (b2R)	bar	240 ± 10						

P-Q graph test values at 2400rpm								
HST Pump			HST motor			Main pump		
Pressure [bar]	Flow rate [l/min]	Current	Pressure [bar]	Flow rate [l/min]	Current	Pressure [bar]	Flow rate [l/min]	Current
150	70.3		40	66.1		40	67.6	
200	69.4		100	64.3		50	67.0	
250	68.5		150	63.2		100	65.3	
300	55.1		200	51.4		150	64.6	
350	46.0		250	41.2		200	63.1	
---	---		300	36.7		---	---	
---	---		350	27.6		---	---	

Engine	Unit	Current	Spec.	Conditions
Idling rpm	rpm		1115 ± 35	Check when the engine is warm, without cold start device
Start-up rpm	rpm		1350 ± 50	
max. rpm	rpm		< 2550	
Valve clearance	mm		0.13-0.17	Adjust only when engine is cold

Internal leakage of cylinders	Unit	Current	New Machine	Usable Limit	Test conditions
Lift arm	mm		≤ 20	≤ 100	Hydraulic oil temperature 50°C ± 5°C, see WSM for test position, with standard bucket and 1260 kg attached weight. Measure hydraulic cylinder drift after 10 minutes
Bucket	mm		≤ 20	≤ 100	

Speed	Unit	Current		Spec.	
		lift/rake	lower/dump	lift/rake	lower/dump
Bucket	s			2.8 ± 0.3	1.9 ± 0.3
Lift arm	s			5.6 ± 0.5	4.1 ± 0.5

Travel speed (20m, max rpm, oil temperature 50°C)	Tire size	Unit	Actual Value	Nominal Value	Actual Value	Nominal Value
			Low speed		High speed	
	12.5 - 18 10PR	s		13.09 ~ 16.00		3.53 ~ 4.14
	12.5 - 20 10PR	s		12.26 ~ 14.78		3.30 ~ 3.83
	405/70 R18 132 A4	s		12.60 ~ 15.28		3.40 ~ 3.96
	400/70 R20 132 A4	s		12.26 ~ 14.78		3.30 ~ 3.83

Comments:

Date _____
Examiner _____

Inspection sheet R070



Reference: KTSE version 31.12.2020

Service hours: _____ Serial number: _____ Accessories/
Dealer: _____ Customer: _____ Implements: _____

	Tested	Changed		Tested	Changed		Tested	Changed
Air filter	☐	☐	Pilot filter	☐	☐	Rear axle oil	☐	☐
Hydr. return filter		☐	Engine oil level	☐		Interior air filter		☐
Hydr. suction filter		☐	Engine oil		☐	Fuel filter/water separator	☐	☐
HST filter		☐	Engine oil filter		☐	V-belt tension	☐	
Hydraulic oil	☐	☐	Front axle oil	☐	☐			

All hydraulic tests should be performed at a hydraulic oil temperature of 50°C ± 5°C.

Set pressure	Component	Unit	Current	Spec.	Comments
Relief valve a1	Main pump	bar		196 ± 10	
Relief valve a2	Steering	bar		195 ± 10	
Relief valve a3	HST	bar		412 ± 20	Differential pressure
Relief valve a4	HST	bar		412 ± 20	Differential pressure
Relief valve a5	Charge pressure pump	bar		31 ± 2	
Relief valve a6	HST Cut-off valve	bar		---	

Relief valves	Unit	Current	Spec.	Comments	Pump displacement volume	Unit	Current	Spec.	Usable limit 80%
Bucket	Bottom (b1B)	bar	235 ± 10	Test w/ engine stopped	Main pump	l/min		54.5	43.6
	Rod (b1R)	bar	235 ± 10		Charge pressure pump	l/min		19.2	15.36
Steering	Bottom (b2B)	bar	240 ± 10		HST pump	l/min		67.1	53.7
	Rod (b2R)	bar	240 ± 10		HST motor	l/min		67.4	53.9

Engine	Unit	Current	Spec.	Conditions
Idling rpm	rpm		1050 ± 25	Check when the engine is warm, without cold start device
Start-up rpm	rpm		1350 ± 50	
max. rpm	rpm		< 2425	
Valve clearance	mm		0.13-0.17	Adjust only when engine is cold

Internal leakage of cylinders	Unit	Current	New Machine	Usable Limit	Test conditions
Lift arm	mm		≤ 20	≤ 100	Hydraulic oil temperature 50°C ± 5°C, see WSM for test position, with standard bucket and no attached weight. Measure hydraulic cylinder drift after 10 minutes
Bucket	mm		≤ 20	≤ 100	

Speed	Unit	Current		Spec.	
		lift/rake	lower/dump	lift/rake	lower/dump
Bucket	s			3.2 ± 0.3	2.3 ± 0.3
Lift arm	s			6.5 ± 0.5	4.5 ± 0.5

Travel speed (20m, max rpm, oil temperature 50°C)	Tire size	Unit	Actual Value	Nominal Value	Actual Value	Nominal Value
			Low speed		High speed	
	12.5 - 18 10PR	s		13.85 ~ 17.14		3.67 ~ 4.34
	12.5 - 20 10PR	s		13.09 ~ 16.00		3.47 ~ 4.06
	365/70 R18 132 A4	s		13.98 ~ 17.35		3.71 ~ 4.39
	340/80 R18 132 A4	s		13.85 ~ 17.14		3.67 ~ 4.34
	405/70 R18 132 A4	s		13.33 ~ 16.36		3.53 ~ 4.15
	400/70 R20 132 A4	s		12.97 ~ 15.82		3.44 ~ 4.01

Comments:

Date _____
Examiner _____

Inspection sheet R090



Reference: KTSE version 31.12.2020

Service hours: _____ Serial number: _____ Accessories/ Implements: _____
Dealer: _____ Customer: _____

	Tested	Changed		Tested	Changed		Tested	Changed
Air filter	☐	☐	Pilot filter	☐	☐	Rear axle oil	☐	☐
Hydr. return filter		☐	Engine oil level	☐		Interior air filter		☐
Hydr. suction filter		☐	Engine oil		☐	Crankcase ventilation		☐
HST filter		☐	Engine oil filter		☐	Fuel filter/water separator	☐	☐
Hydraulic oil	☐	☐	Front axle oil	☐	☐	V-belt tension	☐	

All hydraulic tests should be performed at a hydraulic oil temperature of 50°C ± 5°C.

Set pressure	Component	Unit	Current	Spec.	Comments
Relief valve a1	Main pump	bar		216 ± 10	
Relief valve a2	Steering	bar		195 ± 10	
Relief valve a3	HST	bar		--- ± ---	Not adjustable
Relief valve a4	HST	bar		--- ± ---	Not adjustable
Relief valve a5	Charge pressure pump	bar		31 ± 2	
Relief valve a6	HST Cut-off valve	bar		368 ± 20	Differential pressure

Relief valves	Unit	Current	Spec.	Comments	Pump displacement volume	Unit	Current	Spec.	Usable limit 80%
Bucket	Bottom (b1B)	bar	235 ± 10	Test w/ engine stopped	Main pump	l/min		67.8	54.24
	Rod (b1R)	bar	235 ± 10		Charge pressure pump	l/min		19.6	15.68
Steering	Bottom (b2B)	bar	240 ± 10		HST pump	l/min		97.7	78.16
	Rod (b2R)	bar	240 ± 10		HST motor	l/min		97.9	78.32

Engine	Unit	Current	Spec.	Conditions
Idling rpm	rpm		1050 ± 25	Check when the engine is warm, without cold start device
Start-up rpm	rpm		1250 ± 50	
max. rpm	rpm		< 2425	
Valve clearance	mm		0.13-0.17	Adjust only when engine is cold

Internal leakage of cylinders	Unit	Current	New Machine	Usable Limit	Test conditions
Lift arm	mm		≤ 20	≤ 100	Hydraulic oil temperature 50°C ± 5°C, see WSM for test position, with standard bucket and no attached weight. Measure hydraulic cylinder drift after 10 minutes
Bucket	mm		≤ 20	≤ 100	

Speed	Unit	Current		Spec.	
		lift/rake	lower/dump	lift/rake	lower/dump
Bucket	s			2.9 ± 0.3	2.0 ± 0.3
Lift arm	s			6.0 ± 0.5	4.3 ± 0.5

Travel speed (20m, max rpm, oil temperature 50°C)	Tire size	Unit	Actual Value	Nominal Value	Actual Value	Nominal Value
			Low speed		High speed	
	12.5 - 18 10PR	s		13.85 ~ 17.14		3.67 ~ 4.34
	12.5 - 20 10PR	s		13.35 ~ 16.39		3.47 ~ 4.06
	405/70 R18 132 A4	s		13.60 ~ 16.76		3.53 ~ 4.15
	400/70 R20 132 A4	s		13.23 ~ 16.21		3.44 ~ 4.01

Comments: