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TADANO

Publication No. GR-700EXL-1/S2-2E

Service Manual

02

Rough Terrain Crane

GR-700EX-1

Model **GR-700EXL-1**

Applicable Serial No. 545870 --

TADANO LTD.

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Safety

Most accidents that occur during machine operation and maintenance are caused by failure to observe basic safety rules and precautions. Before operating your machine or performing maintenance, read and become familiar with all the safety precautions and recommendations given in this section.
Remember that failure to observe even a single precaution could involve you and the people around the machine in a serious accident.

Foreseeing potential dangers is vital for preventing accidents. All personnel working with the machine, including the supervisor, machine operator and oiler, should be sensitive to potentially dangerous situations and take the necessary measures to prevent accidents.

Safety precautions and recommendations are outlined in this section and are also included in the operation and maintenance instructions given in subsequent sections. Warning labels are also provided on the machine.
The cautionary instructions in this manual are identified as "DANGER", "WARNING", "CAUTION" or "NOTICE". These terms are defined as follows:

⚠ DANGER

⚠DANGER indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.

⚠ WARNING

⚠WARNING indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

⚠ CAUTION

⚠CAUTION indicates a potentially hazardous situation, which, if not avoided, may result in a minor or moderate injury.

[NOTICE]

◆[NOTICE] indicates an important operational or maintenance procedure or condition, which, if not strictly observed, can result in damage to machine components or deteriorated machine performance.

It is virtually impossible to anticipate every situation that might present a hazard. The safety precautions given in this manual and on the machine labels are not exhaustive.
It is important, therefore, to strictly follow the instructions in this manual and be sensitive to potential dangers in order to prevent bodily injury and damage to the machine.

Remember that your most important duty is to ensure the safety of you, your co-workers and any other people in the area.

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1. Fundamental cautions

Servicemen inexperienced in the units of this machine should be cautious about safety operations. They must acquire sufficient knowledge about the equipment before dismounting and disassembling it. Before dismounting each component, a serviceman should read this service manual thoroughly and find out the weight of the component, then lift it by proper means.
The following are cautions to be observed all the time.

1. Before starting repairs, find out the origin of the problem. When it becomes clear that disassembly and maintenance are necessary, first of all read this manual and parts catalog and thoroughly understand the principle of operation and construction. Then carefully check and examine each portion. Don't disassemble portions unrelated to the problem. Unless taking all possible measures before starting disassembly, new troubles or decline in performance may be induced.

2. Before operating the machine, oiling or repairing, read warning labels and instructions on the machine and understand the contents.

3. Wear a safety helmet and safety shoes whenever you carry out maintenance operation around the machine. Be sure to wear safety goggles when you hit the machine or its attachments with a hammer. In welding operation, wear safety gears such as leather gloves, helmet, goggles, apron and proper working clothes, but don't wear loose or torn clothes. Take a ring and so on off your finger when you conduct maintenance or repair.

4. Park the machine on as level and hard ground as possible. Place chocks under wheels to prevent the vehicle from moving when doing maintenance on or below the machine.

5. Before starting maintenance, remove cables to the battery and allow the capacitors to discharge. Pull out the ignition key and hang a tag saying, "Don't start the engine." in the cab.

6. Don't carry out maintenance while lifting the vehicle with only a jack or a hoist. Sustain the vehicle positively with blocks and so on to prevent fatal accidents, as there is a possibility that the vehicle loses its balance and falls down on a worker in a dismounting process of certain units.

7. When the working is done on a team of more than one person, make arrangements about co-operation and communication between workers beforehand. Give a sign without fault and make sure that the sign has been transmitted to other workers before starting the next operation.

8. When it is inevitable to measure oil pressure, rotational speed, and temperature for machine inspection without stopping the engine, be careful not to be caught or pinched in rotating or moving parts such as a fan, fan belt. Make sure that there is no obstruction or no person around the machine before operating it.

2. Cautions in working

2.1 General

1. When hoisting up components weighing more than 20 kg, use hoist or the like to prevent injury to your lumbar or spine. For specific components, their weights are listed on the chapter for "service data" in this manual.

2. When using eyebolts, lift parts vertically so that only tension is applied to them.

3. Protect wire ropes and plastic lifting slings by covering corners with pads so that they are not bent sharply by directly contacting corners. Keep the sling angle of wire ropes within 60° and as vertical as possible.

4. Be careful about hot or heated portions when conducting repair or maintenance just after the vehicle has stopped or the machine operation has been finished or interrupted.

5. When hitting parts, be sure to either hit on a pad placed on the parts or use a plastic hammer.

6. Put units, especially similar parts, in order. Mark them with tags or marker if necessary.

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7.Put disassembled parts in order so that parts such as bolts are not left behind in the machine. And check that no parts run short at assembly.

8.Watch your step in the following cases:

When stepping up to or stepping down from the upper surface of a boom for replacing wire ropes and applying grease. Be careful not to stumble on protrusions on the upper surface of a boom.
When greasing at the root of a elevating cylinder
When checking engine oil, radiator coolant, or battery fluid.
When replacing a filter of air cleaner
When getting on and off the cab

Be careful not to slip in the above operations in winter as snow and ice may attach to the exterior of boom and it becomes very slippery.

2.2 Dismounting and disassembling

1.Before dismounting and disassembling, make sure of the construction and part sales unit by reading this manual and the separate parts catalog, then understand the procedures of dismounting and remounting and disassembling and reassembling.

2.When dismounting piping or equipment that may contain pressurized oil or air, be extremely cautious and dismount them only after discharging the confined pressure.

3.Before removing, clean the part to be dismounted and the area surround it. Seal the opening with a plug or tape, etc. to prevent foreign material from entering it.

4.Measure and record the data such as shim thickness adjustment and pre-load at disassembly that will be required at reassembly.

5.If required, before disassembling clearly put marks to avoid errors at reassembling.

6.If a part cannot be removed after removing bolts or nuts fixing it, don't apply too much force to it but check the part for the cause. Only after relieving the cause, proceed disassembling.

7.Use lifting slings appropriate for the weight and characteristics of a part. Lift up it in balanced condition.

In case that the position of the center of gravity is not clear and there is a possibility of swing of load after removing, use two hoists.

8.If a part cannot be lifted smoothly, make sure that all the fasteners are removed and other parts don't hinder removing.

2.3 Remounting and assembling

1.Before assembling, clean all the parts and repair or replace defective parts.

2.As dirt and soil adversely affect sliding portions and they may decrease the life of the machine, pay special attention to avoid intrusion of dirt and soil.

3.Use special tools for parts when specified to do so.

4.Remove dirt, soil, water, and resin completely from surfaces where liquid gasket will be applied.

5.After remounting, be sure to inspect the machine and verify that there is no error by oversight. If adjustment or air bleeding is required, conduct it according to instructions. Conduct function and performance test to verify its integrity.

3. Cautions in operation

3.1 Brake fluid replenishment

1.When the brake-warning lamp (for fluid level) is lighted, replenish brake fluid and check and make sure of the thickness of disk brake pads. (Refer to Chapter Y for periodical inspection periods.)

2.Check the thickness of disk brake pads whenever brake fluid is replenished.

3.2 Handling of battery

1.Erroneous handling of a battery may cause it to catch fire and explode.
Be extremely sure to avoid short circuits, sparks and fire of cigarettes and the like when using a jumper cable. They are very dangerous.
Charge up batteries and use them only in well ventilated places.

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2.Battery fluid (dilute sulfuric acid) may cause loss of sight or burn injury.
If battery fluid stains an eye, skin, or clothes, immediately wash down them with a great deal of water.
If battery fluid enters into an eye, immediately wash it down with water and see a doctor for medical aid.

3.When removing terminals, remove the minus (－) terminal first. When connecting terminals, connect minus (－) terminal last.

3.3 Handling of radiator

1.Don't open the radiator cap while the coolant is still hot.

2.Check the coolant at the reservoir tank.

3.If high-pressure water is used for radiator cleaning, fins may be damaged.

3.4 Cooling fan

1.Stop the engine completely before checking the tension of the engine fan belt.

2.The oil cooler fan may rotate the moment the engine is started. Be sure to pull out the ignition key before accessing the cooling fan.

4. About waste disposal

1.Waste oils, used filters, and other such petrochemical-related products, if disposed of thoughtlessly, will cause environmental contamination.

2.Obtain a proper-sized vessel before releasing waste oils from the machine. Never discharge waste oils on the ground or into rivers, lakes or marshes.

3.Follow all governing environmental rules and regulations when disposing of oils, fuels, cooling water, brake fluid, solvents, filters, batteries or any other damaging substances.

4.1 Gasoline

1.Spill or leak: Review fire and explosion hazards before proceeding with clean up. Use appropriate personal protective equipment during clean up. Dike spill. Prevent liquid from entering sewers, waterways, or low areas. Soak up with sawdust, sand, oil dry or other absorbent material. Shovel or sweep up.

2.Remove source of heat, sparks, flame, impact, friction or electricity including internal combustion engines and power tools. If equipment is used for spill cleanup, it must be explosion proof and suitable for flammable liquid and vapor.

Note: Vapors released from the spill may create an explosive atmosphere.

3.Waste disposal method: Treatment, storage, transportation and disposal must be in accordance with applicable federal, state, provincial, and local regulations. Do not flush to surface water or sanitary sewer system.

4.By itself, the liquid is expected to be a RCRA ignitable hazardous waste.

4.2 Hydraulic oil

1.Spill of leak: Contain spill immediately in smallest area possible. Recover as much of the product itself as possible by such methods as vacuuming, followed by soaking up of residual fluids by use of absorbent materials. Remove contaminated items including contaminated soil and place in proper containers for disposal. Avoid washing, draining or directing material to storm or sanitary sewers.

2.Waste disposal method: Recycle as much of the recoverable product as possible. Dispose of nonrecyclable material as a RCRA hazardous waste by such methods as incineration, complying with federal, state, and local regulations.

4.3 Motor oil

See HYDRAULIC OIL above.

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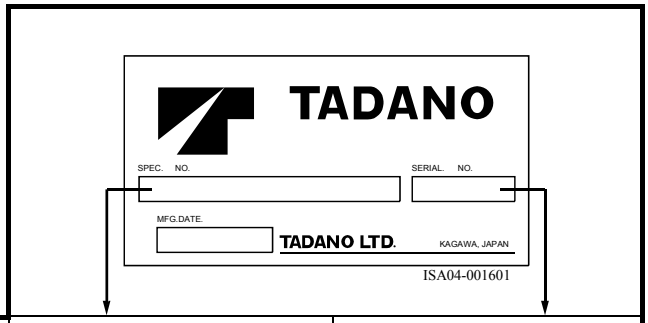
Foreword

This service manual describes the composition of the Model GR-700EXL-1 and GR-700EX-1 rough terrain crane, its repair, check and adjustment methods and other relevant matters. Note that this service manual does not provide the information in the separate service manuals given below.

This service manual applies to the cranes with the specification numbers given below. Check the specification number on the nameplate of your crane.

Read the separate operation and maintenance manual and the parts catalog for repair and maintenance of the crane in conjunction with this manual. If the parts needs to be replaced, check the disassemble units and sales units in the parts catalog before replacing them.

1. Applicable spec. No. / Crane model



Crane model	Spec. No.	Applicable serial No.
GR-700EXL-1	GR-700E-1-00211	545960 -- 546189
	GR-700E-1-00212	
GR-700EX-1	GR-700E-1-00211	546199--
	GR-700E-1-00212	546190--

2. Separate service manual

Separate Service Manual	Information No.
General Cautions	SA01-01-2E
Overload Prevention Device (AML)	W301-0215E
Multiplex Data Transmitter	W303-0257E
Torque Converter	W561-0101E
Transmission	
Driving Axle	W563-0053E

Please note that, for product improvement, some changes may have been incorporated in the machine that are not covered in this manual.

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3. Outline of specifications

Item			Spec. No.	
			GR-700E-1-00211 2M2D (Europe)	GR-700E-1-00212 2M2D (General Export)
No. of boom sections			5	
No. of jib stages			2	
Single top			Option	
Winch	Main winch		Fitted	
	Auxiliary winch		Fitted	
	Winch brake		Automatic brake (Neutral brake)	
	Drum rotation indicator	Visual-type	Option	
		Touch-type	Option	—
Weight	Counterweight		Removable type	
Overload Prevention Device (AML)			AML-LⅡB	
Auto. stop solenoid valve energizing type			Normally energized	
AML external indicator lamp			Fitted	
AML external buzzer			Fitted	—
Oil cooler			Fitted	
Emergency engine stop system			Fitted	—
Reversing steering compensator			Fitted	—
Air conditioner			Option	
Emergency steering			Fitted	Option
Steering pump warning lamp			Fitted	—
Over-unwinding prevention			Option	—
Outrigger control box (Both sides of carrier)			Option	—
Engine model			MITSUBISHI 6M60-TLA3B	
Tires			29.5 × 25 - 22PR, 29.5 × 25 - 28PR	

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4. Conversion table

Length

millimeter, mm	centimeter,	meter, m	inch, in, ”	foot, ft, ’
1	1×10^{-1}	1×10^{-3}	3.93701×10^{-2}	3.28084×10^{-3}
1×10	1	1×10^{-2}	3.93701×10^{-1}	3.28084×10^{-2}
1×10^{3}	1×10^{2}	1	3.93701×10	3.28084
2.54×10	2.54	2.54×10^{-2}	1	8.33333×10^{-2}
3.048×10^{2}	3.048×10	3.048×10^{-1}	1.2×10	1

mile, mi	kilometer,
1	1.60934
6.21373×10^{-1}	1

Area

square millimeter, mm^2	square centimeter, cm^2	square meter, m^2	square inch, in^2	square foot, ft^2
1	1×10^{-2}	1×10^{-6}	1.55×10^{-3}	1.07639×10^{-5}
1×10^{2}	1	1×10^{-4}	1.55×10^{-1}	1.07639×10^{-3}
1×10^{6}	1×10^{4}	1	1.55×10^{3}	1.07639×10
6.4516×10^{2}	6.4516	6.4516×10^{-4}	1	6.94444×10^{-3}
9.2903×10^{4}	9.2903×10^{2}	9.2903×10^{-2}	1.44×10^{2}	1

Volume

cubic centimeter, cm^3, cc	cubic meter, m^3	cubic inch, in^3	cubic foot, ft^3
1	1×10^{-6}	6.10237×10^{-2}	3.53147×10^{-5}
1×10^{6}	1	6.10237×10^{4}	3.53147×10
1.63871×10	1.63871×10^{-5}	1	5.78704×10^{-4}
2.83168×10^{4}	2.83168×10^{-2}	1.728×10^{3}	1

gallon, gal	cubic inch, in^3	liter, lit, L
1	2.31×10^{2}	3.78541
4.329×10^{-3}	1	1.63871×10^{-2}
2.64172×10^{-1}	6.10237×10	1

Mass

gram, g	kilogram, kg	ounce, oz	pound, lb	metric ton, ton, t	short ton, s. t
1	1×10^{-3}	3.5274×10^{-2}	2.20462×10^{-3}	1×10^{-6}	1.10231×10^{-6}
1×10^{3}	1	3.5274×10	2.20462	1×10^{-3}	1.10231×10^{-3}
2.83495×10	2.8349×10^{-2}	1	6.25×10^{-2}	2.83495×10^{-5}	3.12494×10^{-5}
4.53592×10^{2}	4.53592×10^{-1}	1.6×10	1	4.53592×10^{-4}	5×10^{-4}
1×10^{6}	1×10^{3}	3.5274×10^{4}	2.20462×10^{3}	1	1.10231
9.07185×10^{5}	9.07185×10^{2}	3.2×10^{4}	2×10^{3}	9.07185×10^{-1}	1

Pressure

Pa	kPa	MPa	kgf/cm^2	lbf/in^2, psi
1	1×10^{-3}	1×10^{-6}	1.01972×10^{-5}	1.45038×10^{-4}
1×10^{3}	1	1×10^{-3}	1.01972×10^{-2}	1.45038×10^{-1}
1×10^{6}	1×10^{3}	1	1.01972×10	1.45038×10^{2}
9.80665×10^{4}	9.80665×10	9.80665×10^{-2}	1	1.42233×10
6.89476×10^{3}	6.89476	6.89476×10^{-3}	7.03072×10^{-2}	1

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Work, energy

N-cm	N-m	kgf-cm	kgf-m	foot-pound, ft-lbf	inch-pound, in-lbf
1	1×10^{-2}	1.01972×10^{-1}	1.01972×10^{-3}	7.37562×10^{-3}	8.85074×10^{-2}
1×10^{2}	1	1.01972×10	1.01972×10^{-1}	7.37562×10^{-1}	8.85074
9.80665	9.80665×10^{-2}	1	1×10^{-2}	7.23301×10^{-2}	8.67961×10^{-1}
9.80665×10^{2}	9.80665	1×10^{2}	1	7.23301	8.67961×10
1.355818×10^{2}	1.355818	1.38255×10	1.38255×10^{-1}	1	1.2×10
1.12985×10	1.12985×10^{-1}	1.152513	1.15213×10^{-2}	8.33333×10^{-2}	1

Centigrade-Fahrenheit

°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C
-90	-67.78	-40	-40	10	-12.22	60	15.56	110	43.33	160	71.11
-80	-62.22	-30	-34.44	20	-6.67	70	21.11	120	48.89	170	76.67
-70	-56.67	-20	-28.89	30	-1.11	80	26.67	130	54.44	180	82.22
-60	-51.11	-10	-23.33	40	4.44	90	32.22	140	60	190	87.78
-50	-45.56	0	-17.78	50	10	100	37.78	150	65.56	200	93.33
Conversion equation: t°C=5(T°F-32)/9, T°F=(9×t°C+160)/5											

Force

N	kgf	lbf
1	1.01972×10^{-1}	2.24809×10^{-1}
9.80665	1	2.20462
4.44822	4.53592×10^{-1}	1

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GROUP INDEX

A

B Hydraulic Power Generating System

C Outrigger System

D Swing System

E Boom Elevating System

F Winch System

G Boom Telescoping System

H Safety System

I

J

K Cab

L Control System

M

N

O

P

Q

R

S Steering System

T Brake System

U Suspension System

V

W

X

Y Data, Adjustment and Checks

Z System Diagrams

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5. Contents

Chapter	Section	Spec. No.	
		GR-700E-1-00211 2M2D (Europe)	GR-700E-1-00212 2M2D (General Export)
General			
A	General Cautions	Refer to separate manual SA01-01-2E	
Hydraulic Power Generating System			
B	Hydraulic Power Generating System	B-1	
	Hydraulic Pump (Double Variable Displacement Pump)	B-2	
	Hydraulic Pump (Double Gear Pump)	B-3	
	Hydraulic Pump (Gear Pump, Emergency Steering)	B-4	
	Hydraulic Valve (Emergency Steering)	B-5	
	Flow Control Valve	B-6	
	Pressure Reducing Valve (Pilot Pressure)	B-7	
	Solenoid Control Valve (Outrigger)	B-8	
	Rotary Joint	B-9	
	Hydraulic Pilot Control Valve (Elevating, Telescoping, Winch)	B-10	
	Sequence Valve (Pilot Pressure)	B-11	
	Solenoid Valve (Pilot Pressure)	B-12	
	Solenoid Control Valve (Jib Set)	B-13	
	Pilot Check Valve (Jib Set)	B-14	
	Solenoid Valve (Oil Cooler)	B-15	
	Hydraulic Motor (Oil Cooler)	B-16	

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Chapter	Section		Spec. No. GR-700E-1-00211 2M2D (Europe)	Spec. No. GR-700E-1-00212 2M2D (General Export)
Hydraulic Power Generating System				
B	Jib Lock pin		B-17	
	Jib Offset Cylinder		B-18	
	Check valve (Gauge Isolator)		B-19	
Outrigger System				
C	Outrigger System		C-1	
	Jack Cylinder		C-2	
	Pilot Check Valve (Jack Cylinder Retracting Prevention)		C-3	
	Extension Cylinder		C-4	
	Solenoid Valve (Slide/Jack)	(UCHIDA)	C-5	
		(TOKIMEC)	C-6	
		(NACHI)	C-7	
	Check Valve (Outrigger Extending Prevention)		C-8	
	Outrigger Operation Box		C-9	
Swing System				
D	Swing System		D-1	
	Swing Assembly		D-2	
	Hydraulic Pilot Control Valve (Swing)		D-3	
	Hydraulic Motor (Swing)		D-4	

https://truckmanualshub.com/

Chapter	Section	Spec. No.	
		GR-700E-1-00211 2M2D (Europe)	GR-700E-1-00212 2M2D (General Export)
D	Swing Speed Reducer	D-5	
Boom Elevating System			
E	Elevating System	E-1	
	Elevating Cylinder	E-2	
	Counterbalance Valve (Elevating)	E-3	
Winch system			
F	Winch System	F-1	
	Winch	F-2	
	Hydraulic Motor (Winch)	F-3	
	Counterbalance Valve (Winch)	F-4	
	Hydraulic Valve (Winch Brake Release)	F-5	
Boom Telescoping system			
G	Telescoping System	G-1	
	Boom (Five-Section Boom)	G-2	
	Jib	G-3	
	Telescoping Cylinder	G-4	
	Counterbalance Valve (Telescoping)	G-5	
	Hose Reel	G-6	
	Hydraulic Valve	G-7	

https://truckmanualshub.com/

Chapter	Section	Spec. No.	
		GR-700E-1-00211 2M2D (Europe)	GR-700E-1-00212 2M2D (General Export)
Safety System			
H	Safety System	H-1	
	Overload prevention Device (AML)	Refer to separate manual W301-0215E	
	Boom Length and Angle Detector	H-2	
	Outrigger Extension Length Detector	H-3	
	Solenoid Valve (Auto Stop)	H-4	
Cab			
K	Crane Cab Glass	K-1	
	Air Conditioner (Option)	K-2	
	Hydraulic Motor (Air conditioner, Option)	K-3	
	Solenoid Valve (Air conditioner, Option) (--#546165)	K-4	
	Solenoid Valve (Air conditioner, Option) (#546166--)	K-5	
Control System			
L	Control System	L-1	
	Remote Control Valve (Lever)	L-2	
	Remote Control Valve (Pedal)	L-3	
	Shuttle Valve (Lever, Pedal)	L-4	
	Solenoid Valve (Boom Telescoping/Aux. Hoist)	L-5	
	Solenoid Control Relief Valve (Elevating Slow Stop)	L-6	
	Solenoid Valve (Air)	L-7	

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Chapter	Section	Spec. No.	
		GR-700E-1-00211 2M2D (Europe)	GR-700E-1-00212 2M2D (General Export)
Electrical System			
N	Multiplex Data Transmitter (MDT)	Refer to separate manual W303-0257E	
Driving Power Transmission System			
R	Torque Converter and Transmission	Refer to separate manual W561-0101E	
	Driving Axle	Refer to separate manual W563-0053E	
Steering System			
S	Steering System	S-1	
	Priority Valve	S-2	
	Orbitrol	S-3	
	Steering Cylinder	S-4	
	Solenoid Valve (Steering Mode)	S-5	
	Pilot Check Valve (Rear Steering Cylinder Lock)	S-6	
Brake System			
T	Brake System	T-1	
	Brake (Service Brake)	T-2	
	Brake Valve	T-3	
	Booster (Brake)	T-4	
	Air Dryer	T-5	
	Brake (Parking Brake)	T-6	
	Brake Chamber	T-7	
	Solenoid Valve (Air)	T-8	

https://truckmanualshub.com/

Chapter	Section	Spec. No.	
		GR-700E-1-00211 2M2D (Europe)	GR-700E-1-00212 2M2D (General Export)
Suspension System			
U	Suspension System	U-1	
	Suspension Lock Cylinder	U-2	
	Pilot Check Valve (Suspension Lock Cylinder)	U-3	
	Solenoid Valve (Suspension Lock Check Release)	U-4	
Data, Adjustment and Checks			
Y	Hydraulic Pressure Setting Table	Y-1	
	Air Pressure Setting Table	Y-2	
	Air Bleeding Procedure	Y-3	
	Electric Switch Adjustment	Y-4	
	Adjustment and Checks	Y-5	
	Check (Crane Operation)	Y-6	
	Check (Driving Operation)	Y-7	
	Oils and Grease Table	Y-8	
	Mass Table	Y-9	
	Specifications	Y-10	
	Boom Connecting Pin and Thread Size Table	Y-11	

https://truckmanualshub.com/

Chapter	Section	Spec. No.	
		GR-700E-1-00211 2M2D (Europe)	GR-700E-1-00212 2M2D (General Export)
System Diagrams			
Z	Hydraulic Circuit	Z-1	
	Torque Converter Circuit	Z-2	
	Brake Circuit (Pneumatic Circuit)	Z-3	
	Electric Circuit (AML, Crane)	Z-4	
	Electric Circuit (MDT, Carrier/Upper)	Z-5	
	Electric Circuit (MDT, Carrier/Lower)	Z-6	
	Location of Installation		
	Location of Hydraulic Parts (Upper)	Z-7	
	Location of Hydraulic Parts (Lower)	Z-8	
	Location of Air Parts	Z-9	
	Location of Electrical Parts (Inside Cab)	Z-10	
	Location of Electrical Parts (Swing Table, Boom)	Z-11	
	Location of Electrical Parts (Relay Assembly/Upper)	Z-12	
	Location of Electric Parts (AML)	Z-13	
	Location of Electric Parts (Lower)	Z-14	
	Location of Electric Parts (Box Assembly/Lower)	Z-15	
	Harness Diagrams		
	Harness (Connector No. Table)	Z-16	
	Harness (Inside Cab)	Z-17	
	Harness (Swing Table, Left)	Z-18	

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Chapter	Section	Spec. No.	
		GR-700E-1-00211 2M2D (Europe)	GR-700E-1-00212 2M2D (General Export)
Z	Harness (Swing Table, Right)	Z-19	
	Harness (Boom)	Z-20	
	Harness (AML, Upper)	Z-21	
	Harness (Overwind)	Z-22	
	Harness (Lower, Main)	Z-23	
	Harness (Lower, Sub)	Z-24	
	Harness (Lower, Electronic Governor)	Z-25	
	Outdoor Air (Minus 25°C or less) System	Z-26	
	Anemometer System	Z-27	

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Hydraulic Power Generating System

Contents

B-1 Hydraulic Power Generating System 1

1. General 1

B-2 Hydraulic Pump (Double Variable Displacement Pump) 5

1. Structure 5
2. Theory of operating of regulator section .. 11
3. Air bleeding procedure 13

B-3 Hydraulic Pump (Double Gear Pump) 14

1. Structure 14
2. Air bleeding procedure 16

B-4 Hydraulic Pump (Gear Pump, Emergency Steering) 17

1. Structure 17

B-5 Hydraulic Valve (Emergency Steering) (Option) 18

1. Structure 18

B-6 Flow Control Valve 20

1. Structure 20

B-7 Pressure Reducing Valve (Pilot Pressure) 21

1. Structure 21

B-8 Solenoid Control Valve (Outrigger) 22

1. Structure 22

B-9 Rotary Joint 27

1. Structure 27
2. Potentiometer 34
   - 2.1 Adjustment 34
   - 2.2 Soldering 34

B-10 Hydraulic Pilot Control Valve (Elevating, Telescoping, Winch) 35

1. Structure 35

B-11 Sequence Valve (Pilot Pressure) .. 47

1. Structure 47

B-12 Solenoid Valve (Pilot Pressure) 50

1. Structure 50

B-13 Solenoid Control Valve (Jib Set) ... 52

1. Structure 52

B-14 Pilot Check Valve (Jib Set) 58

1. Structure 58

B-15 Solenoid Valve (Oil Cooler) 59

1. Structure 59

B-16 Hydraulic Motor (Oil Cooler) 61

1. Structure 61
2. Air bleeding procedure 61

B-17 Jib Lock Pin 62

1. Structure 62

B-18 Jib Offset Cylinder 63

1. Structure 63

B-19 Check Valve (Gauge Isolator) 64

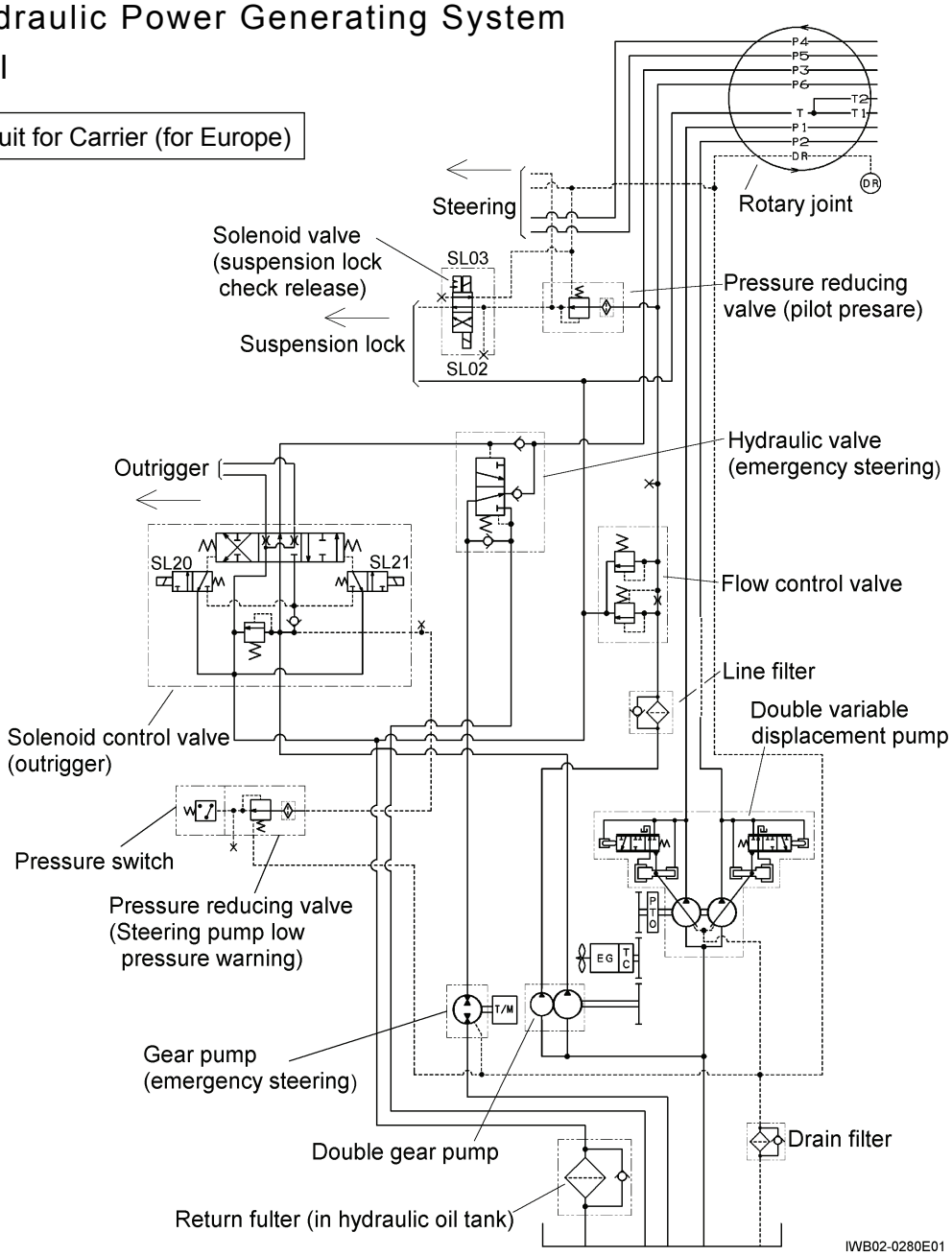
1. Structure 64

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B-1 Hydraulic Power Generating System

1. General

Hydraulic Circuit for Carrier (for Europe)



[NOTICE]

◆Emergency steering and steering pump low pressure warning are standard equipment for Europe.

1. The hydraulic power for this crane is generated by the double variable displacement pump, double gear pump, and gear pump for the emergency steering circuit.

2. The double variable displacement pump supplies oil to the circuits of elevating, telescoping, main winch, and auxiliary winch. This double variable displacement pump is driven only when the PTO switch is turned on.

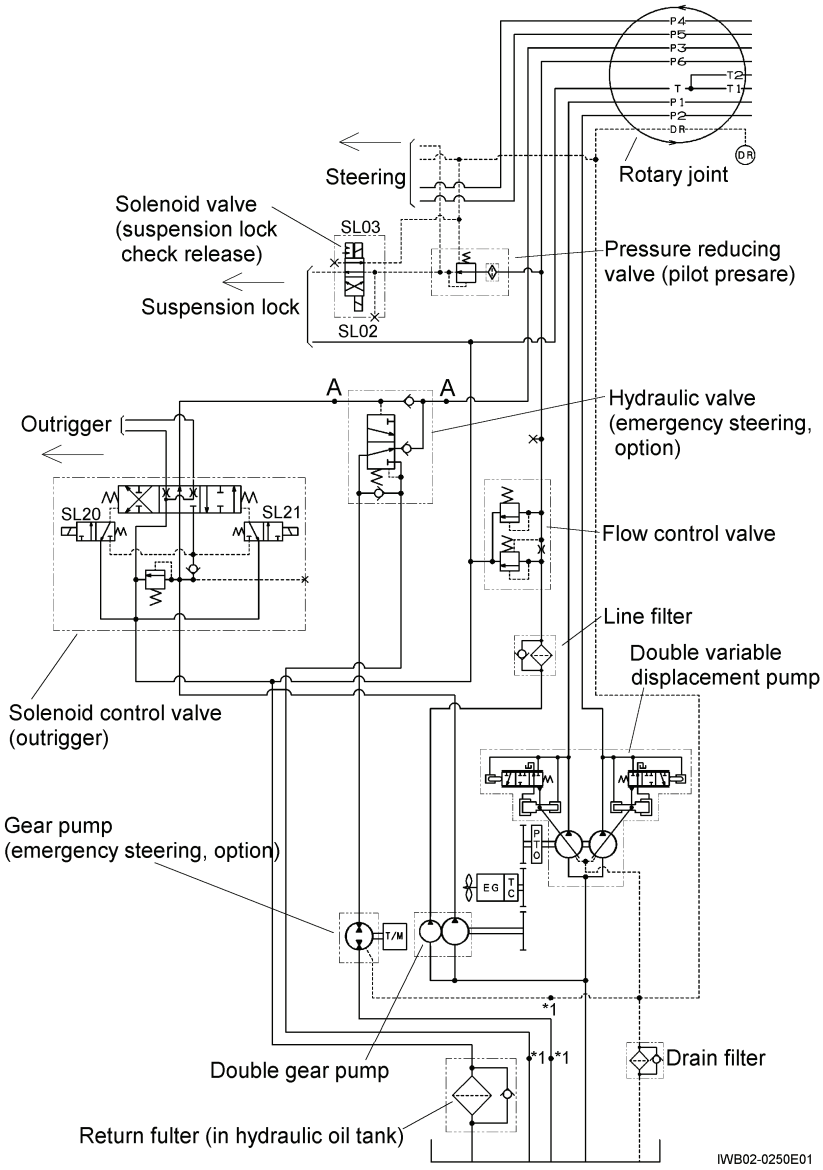
3. The double gear pump supplies oil to the circuits of outrigger,steering, swing, pilot pressure, jibset, air conditioner (option), and oil cooler.

4. The gear pump and the hydraulic valve in the emergency steering circuit are standard. They are provided for the case when the double gear pump malfunctions.

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Hydraulic Power Generating System

Hydraulic Circuit for Carrier (for General Export)



[NOTICE]

◆If the machine is not equipped with the optional emergency steering, two points "A" are directly joined and three portions "*1" are plugged.

1. The hydraulic power for this crane is generated by the double variable displacement pump, double gear pump, and optional gear pump for the emergency steering circuit.

2. The double variable displacement pump supplies oil to the circuits of elevating, telescoping, main winch, and auxiliary winch. This double variable displacement pump is driven only when the PTO switch is turned on.

3. The double gear pump supplies oil to the circuits of outrigger,steering, swing, pilot pressure, jibset, optional air conditioner, and oil cooler.

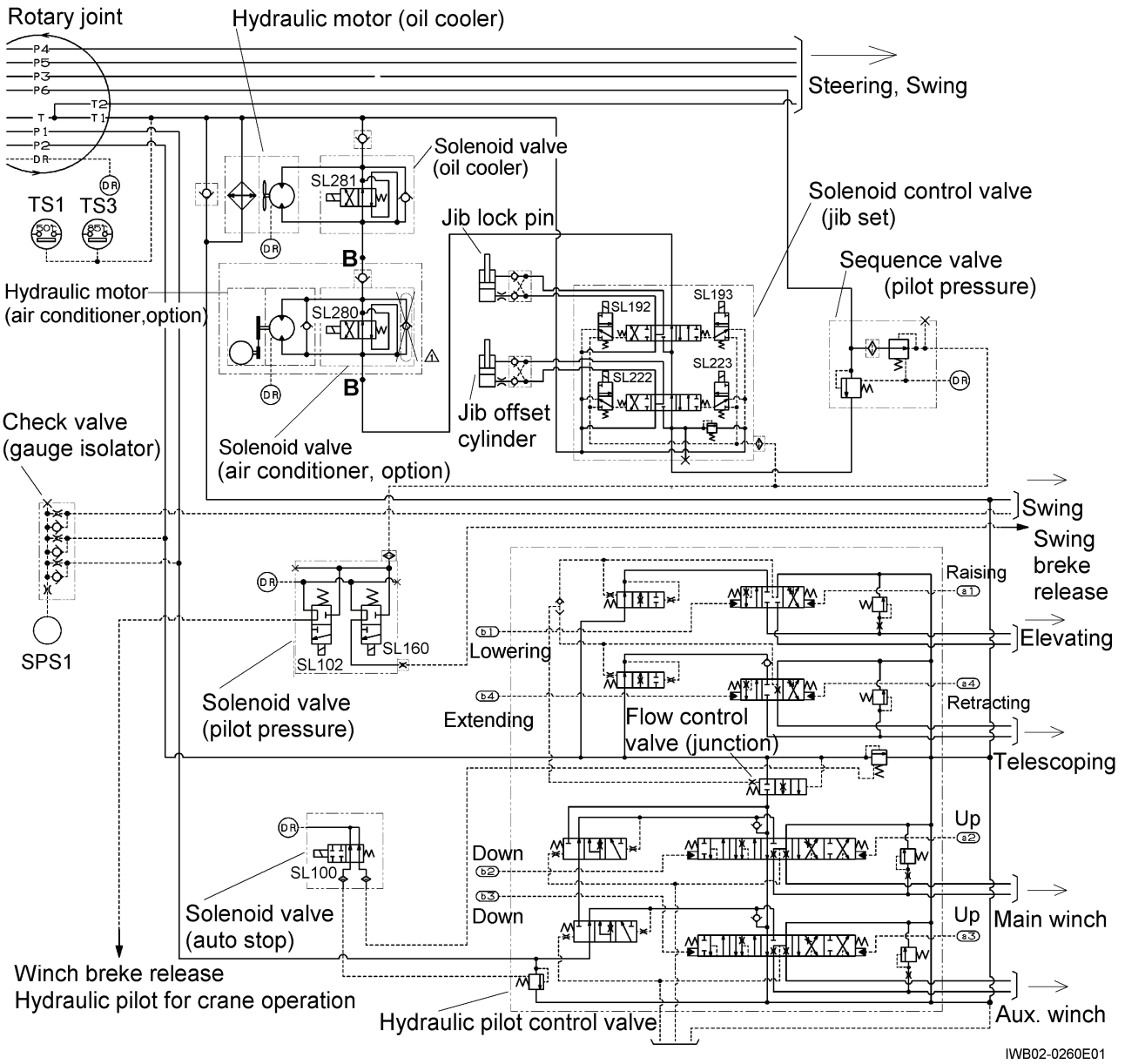
4. The gear pump and the hydraulic valve in the emergency steering circuit are optional. They are provided for the case when the double gear pump malfunctions.

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Hydraulic Power Generating System

Hydraulic Circuit for Crane

Applicable serial No. ⚠1 : 545520 ~



IWB02-0260E01

[NOTICE]

◆If the machine is not equipped with the optional air conditioner, two points "B" are directly joined.

Circuits for elevating, telescoping, main and auxiliary winches

1. The hydraulic oil provided from the pumps is controlled (onloaded/unloaded) by the solenoid valve for automatic stop. This solenoid valve for automatic stop is switched by the AML output to control the vent ports of the relief valve (elevating, telescoping) and the relief valve (main winch, auxiliary winch). When the PTO switch is turned on, the solenoid valve for automatic stop is shifted, making the condition of this circuit onloaded.

2. The pressurized oil delivered through the P1 port of the rotary joint is supplied to the circuits for the main winch and the auxiliary winch.
The pressurized oil delivered through the P2 port is provided to the circuits for elevating and telescoping. This oil, however, is supplied to the circuits for the main winch and the auxiliary winch while neither elevating nor telescoping operation is done.

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Circuit for pilot pressure, jibset, air conditioner(option), and oil cooler

1. The pressurized oil delivered through the P6 port of the rotary joint is supplied to these circuits. Pressurized oil reduced by the sequence valve is supplied to the circuit for the pilot pressure.
2. The pilot pressure is supplied to the swing brake release circuit, main winch brake release circuit, auxiliary winch brake release circuit, and pilot circuits for crane operations.
3. The pressurized oil delivered through the sequence valve is supplied to the circuits for the jibset, air conditioner(option), and oil cooler.

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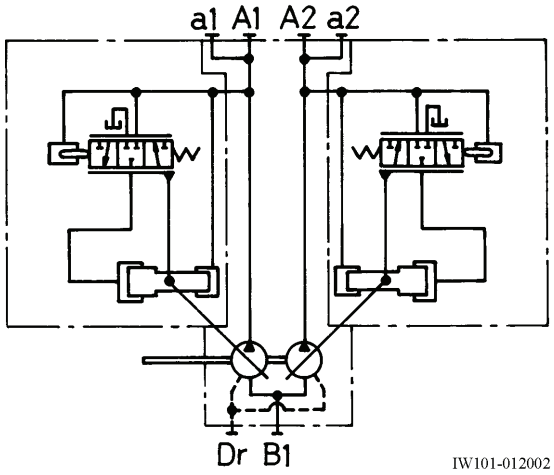
B-2 Hydraulic Pump (Double Variable Displacement Pump)

[NOTICE]

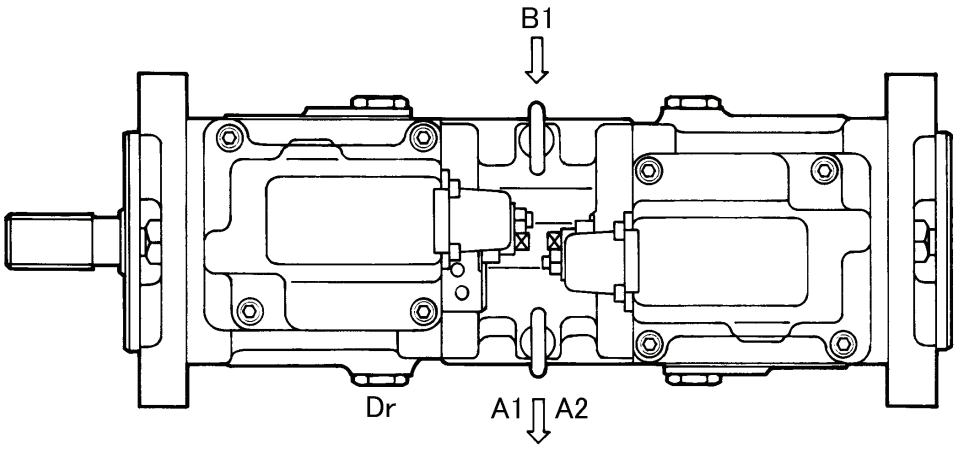
◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

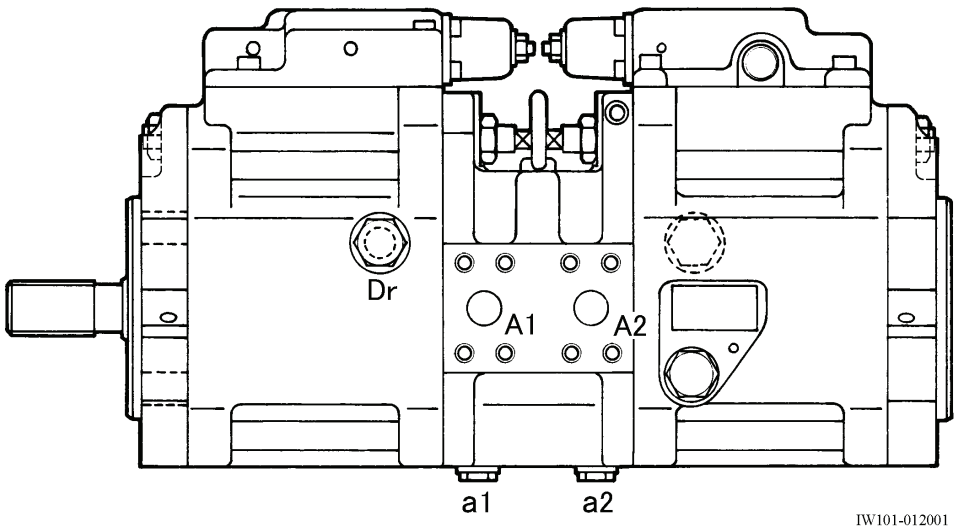
1. Structure

This pump is a variable displacement piston pump.
The angle of the swash plate is controlled by the regulator.



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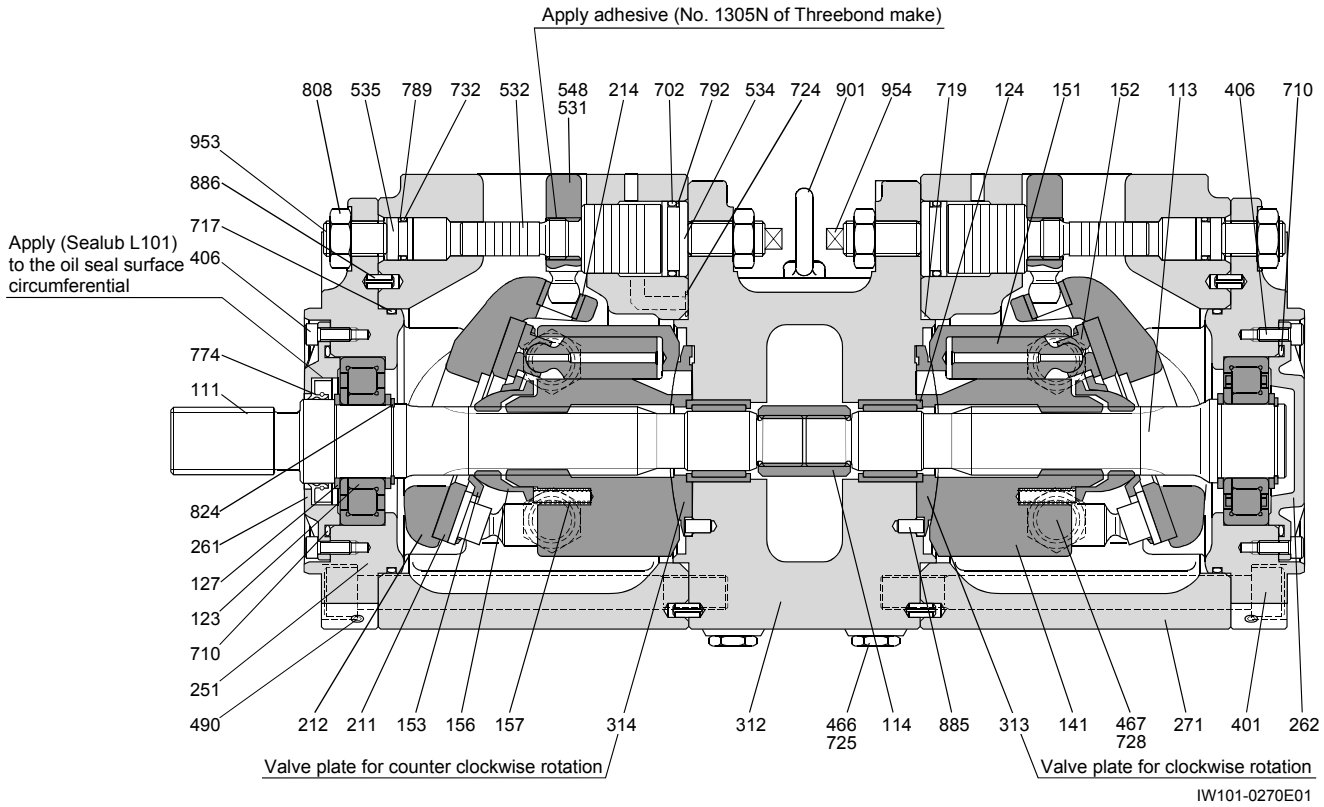


IW101-012001

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Hydraulic Pump (Double Variable Displacement Pump)

Main body



111.Drive shaft (F)
113.Drive shaft (R)
114.Spline coupling
123.Roller bearing
124.Needle bearing
127.Bearing spacer
141.Cylinder block
151.Piston
152.Shoe
153.Set plate
156.Spherical bush
157.Cylinder spring
211.Shoe plate
212.Swash plate
214.Tilting bush
251.Support
261.Seal cover (F)
262.Seal cover (R)
271.Pump casing
312.Valve block
313.Valve plate (R)
314.Valve plate (L)
401.Hex. socket head bolt
406.Hex. socket head bolt
466.Plug
467.Plug
490.Plug
531.Tilting pin
532.Servo piston
534.Stopper (L)
535.Stopper (S)
548.Feed back pin
702.O-ring
710.O-ring
717.O-ring
719.O-ring
724.O-ring
725.O-ring
728.O-ring
732.O-ring
774.Oil seal
789.Backup ring
792.Backup ring
808.Nut
824.Snap ring
885.Valve plate pin
886.Spring pin
901.Eye bolt
953.Hex. socket set screw
954.Set screw
981.Name plate
983.Pin

Thread size and tightening torque

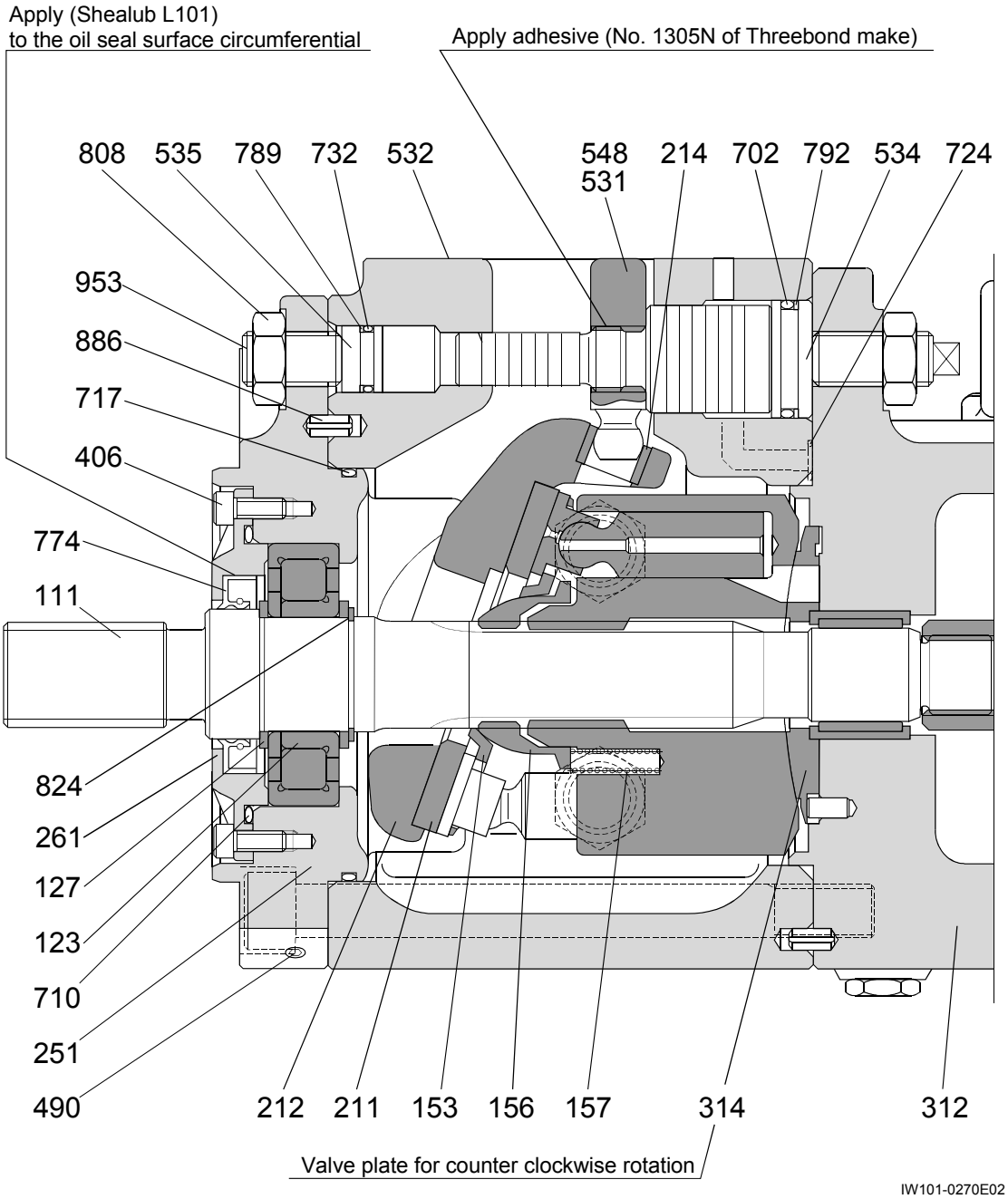
Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
401	M16	240	177
406	M6	12	8.8
466	G1/4	36	26.5
467	G1/2	110	81
490	NPTF1/16	8.8	6.5

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
531,532	M20x1.5	240	177
808	M16	130	96

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Hydraulic Pump (Double Variable Displacement Pump)

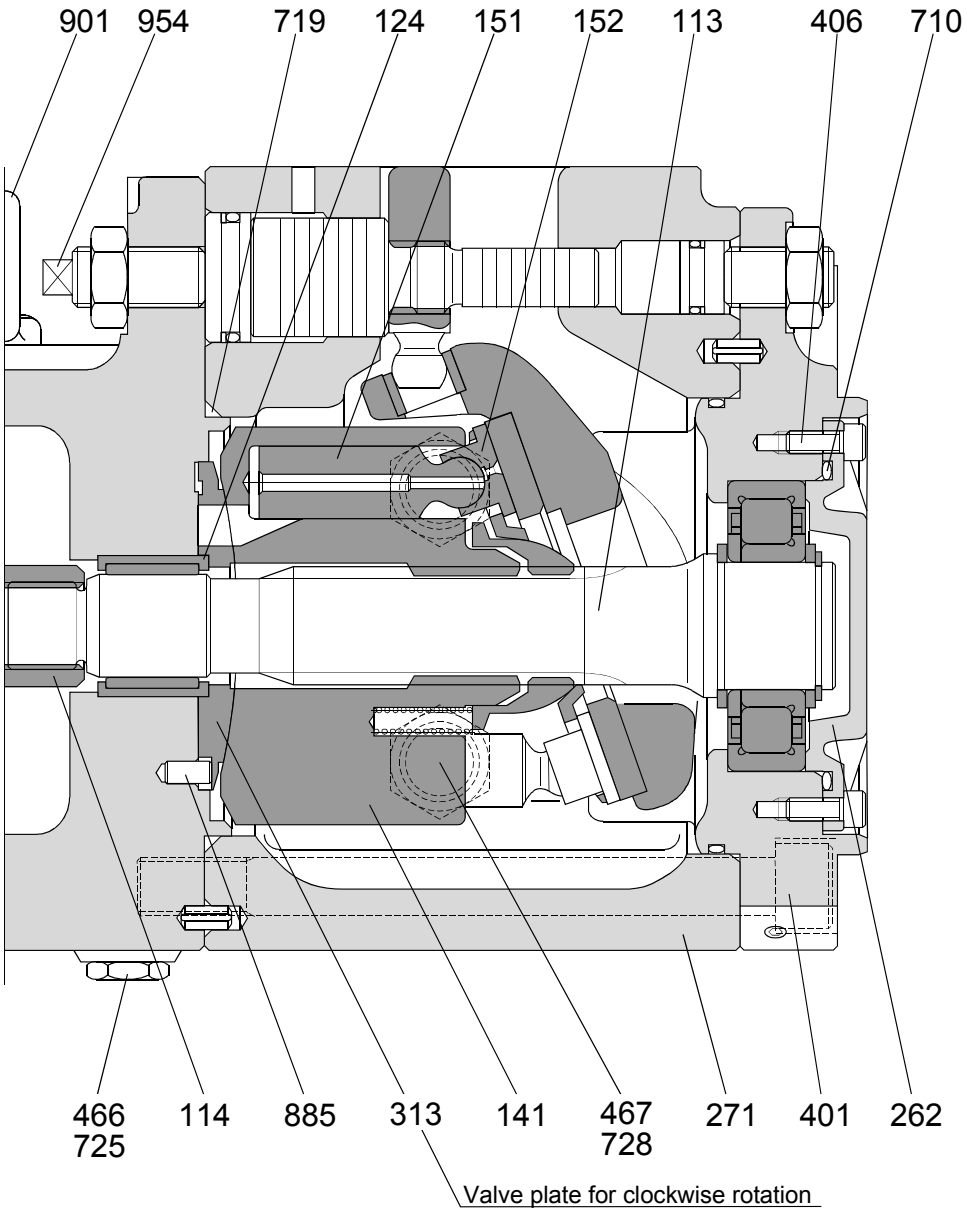
Enlarged view of the main body (the left side)



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Hydraulic Pump (Double Variable Displacement Pump)

Enlarged view of the main body (the right side)

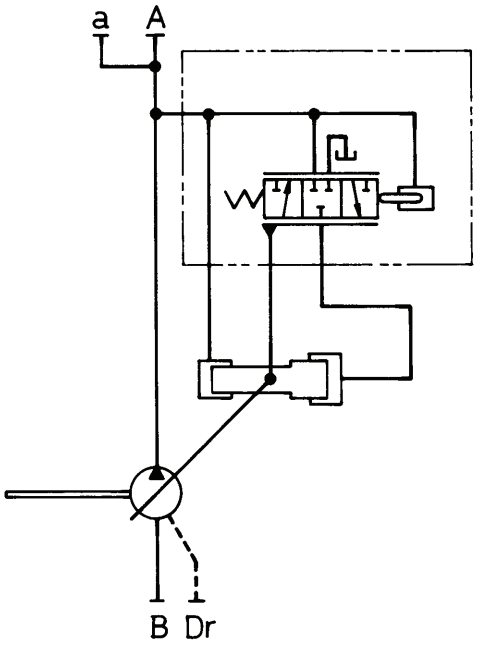


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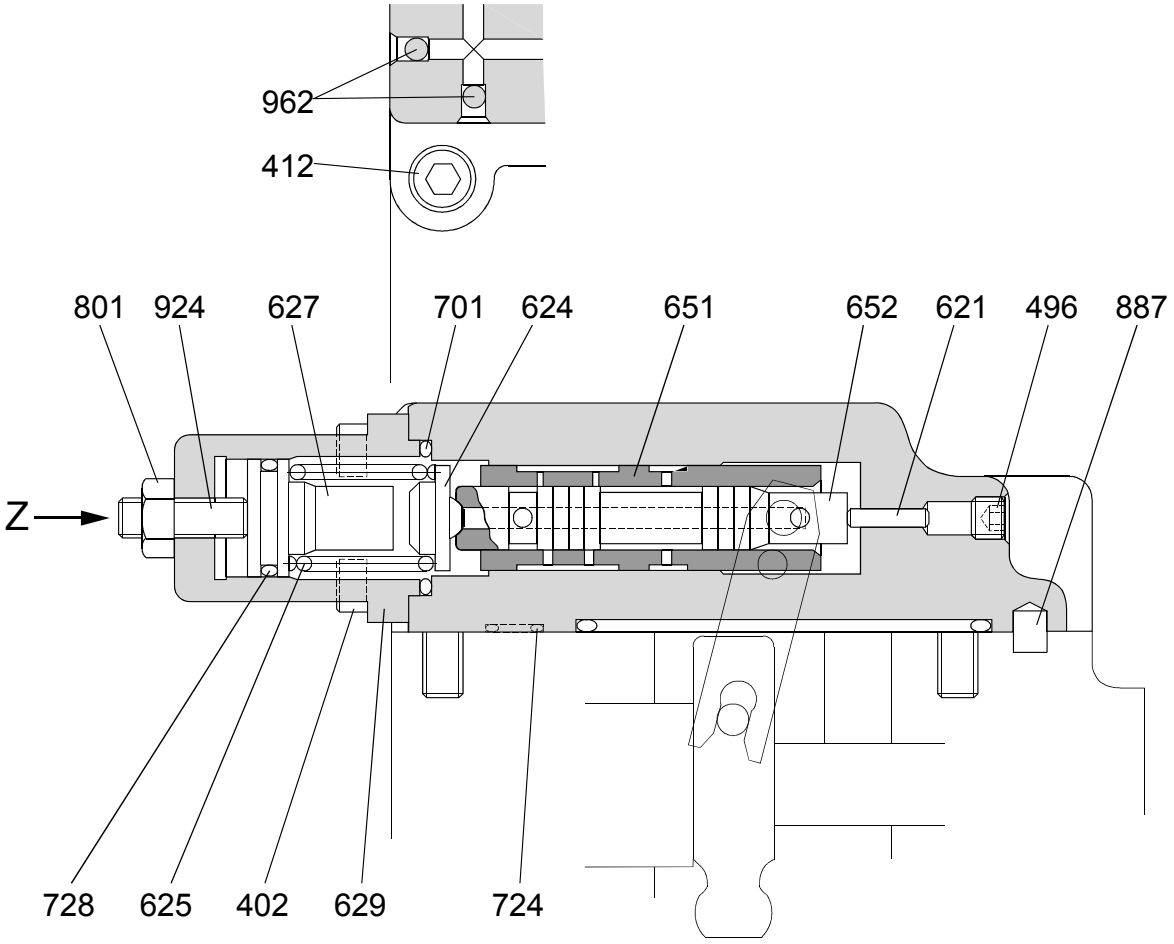
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Hydraulic Pump (Double Variable Displacement Pump)

Regulator



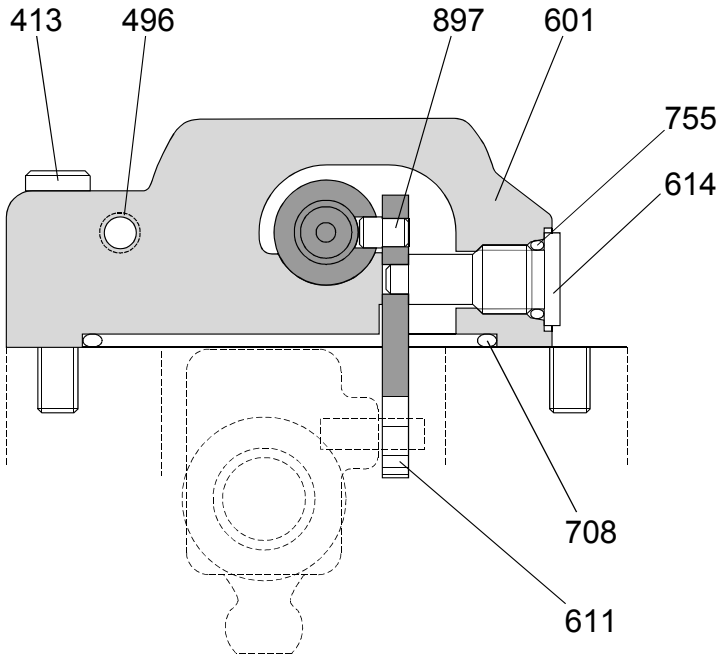
IW101-012005



IW101-012004

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Hydraulic Pump (Double Variable Displacement Pump)



View Z

IW101-012006

402.Hex. socket head bolt	614.Center plug	651.Sleeve	755.O-ring
412.Hex. socket head bolt	621.Compensator piston	652.Spool	801.Nut
413.Hex. socket head bolt	624.Spring seat	701.O-ring	887.Pin
496.Plug	625.Compensator spring	708.O-ring	897.Pin
601.Casing	627.Spring seat	724.O-ring	924.Hex. socket set screw
611.Feedback lever	629.Spring case	728.O-ring	962.Steel ball

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
402	M6	12	8.8
412,413	M8	29	24.1
496	NPTF1/16	8.8	6.5
614	G1/4	36	26.5
801	M8	17	12.5

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2. Theory of operating of regulator section

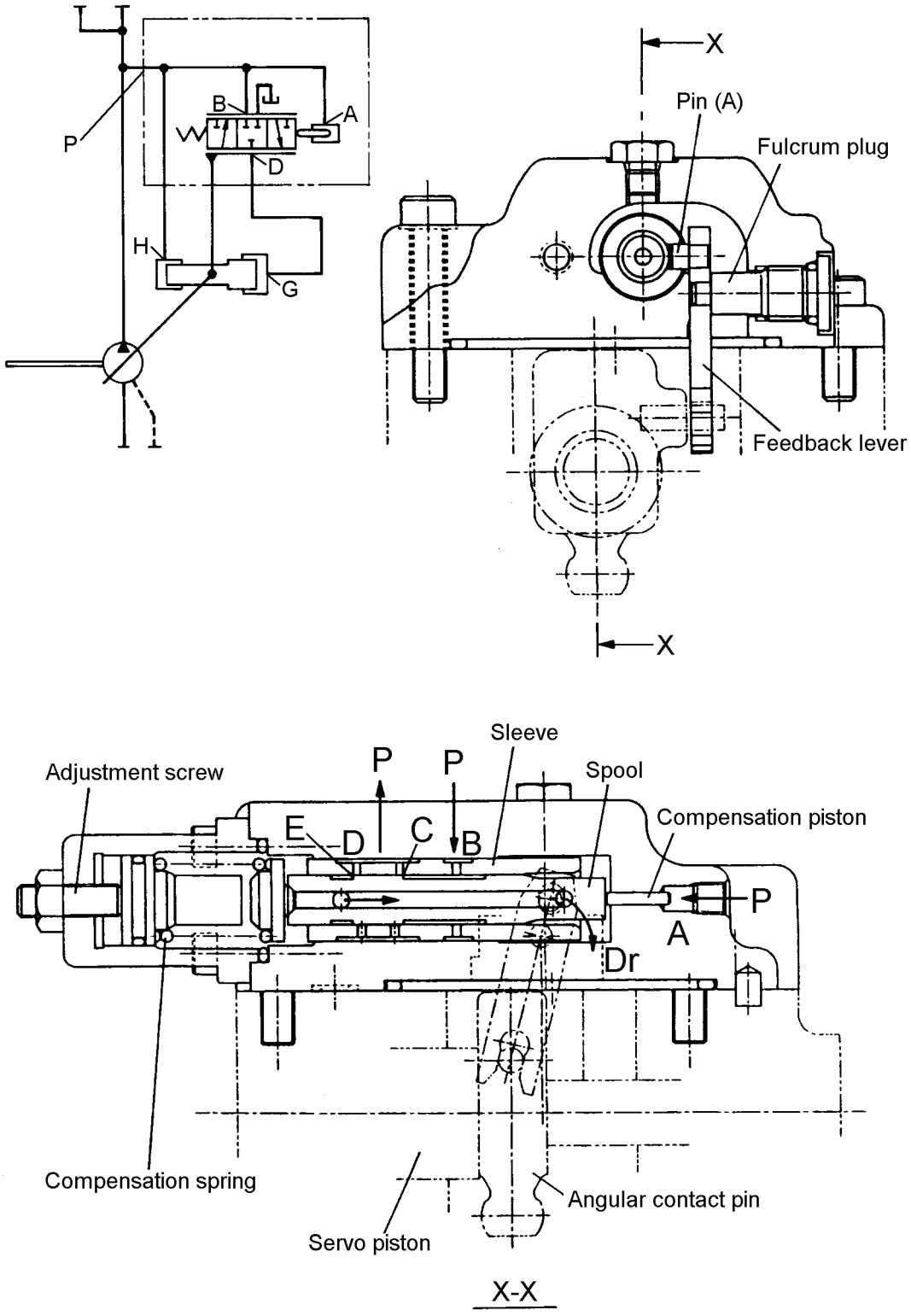


Fig. 1

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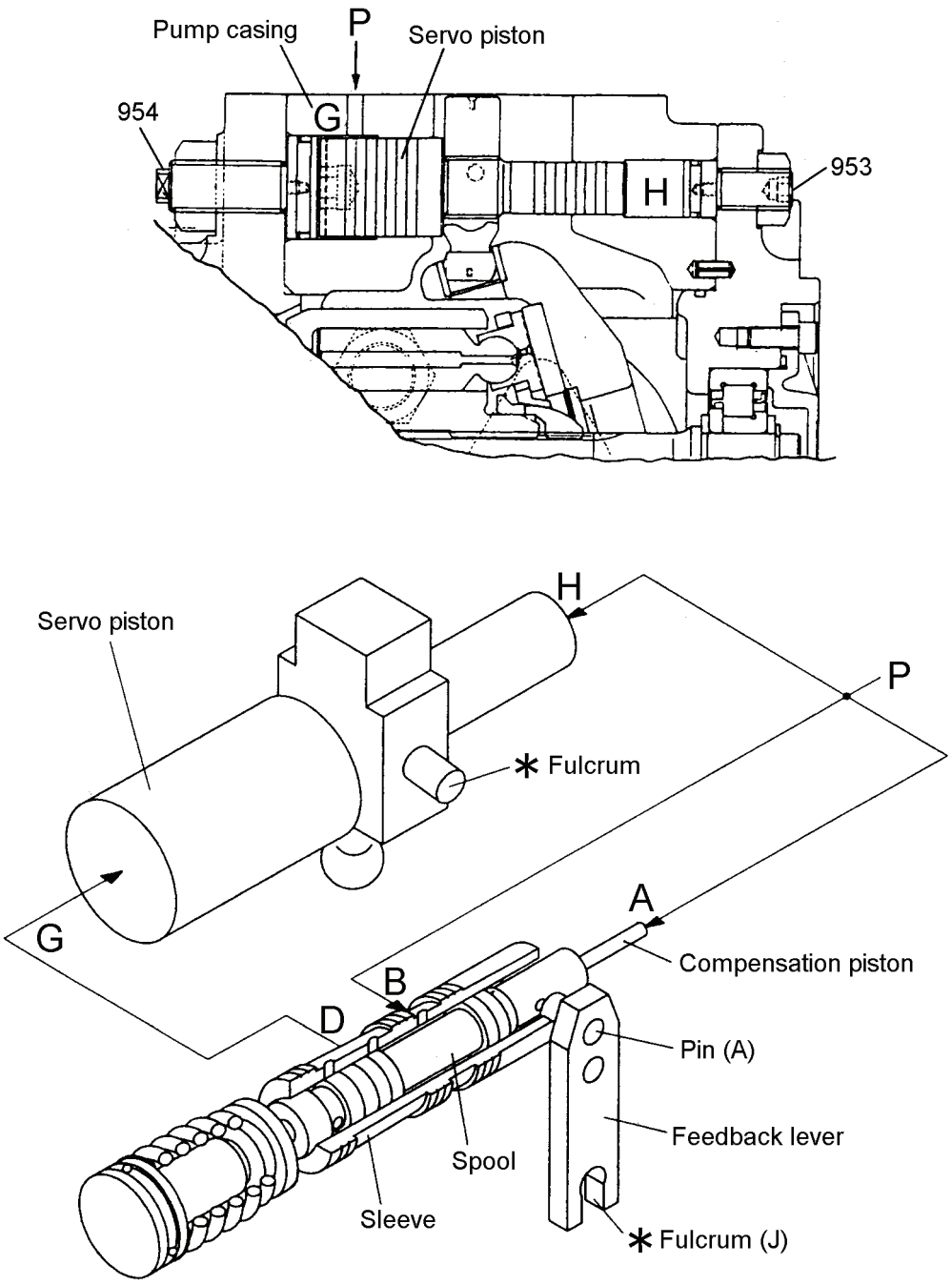


Fig. 2

IW101-0271E02

Hydraulic oil (P) from the pump flows to areas A and B shown in Figs. 1 and 2 via the path in the regulator casing.
The oil also flows to small-diameter end H of the servo piston.
The oil flowing to area A applies leftward pressure to the compensation piston.

When the pump pressure is below a certain level, the spool does not move because the leftward force of the compensation piston on the spool is less than the pressure of the compensation spring. In this situation, the seating area C closes and the seating area E opens. Therefore the oil at the servo piston's large-diameter end G flows out

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from the port D to the drain line via the spool. Then the servo piston's large-diameter end G is pushed by the pressure exerted on the small-diameter end H, to stay in the maximum discharge rate position.

When the pump pressure exceeds the 1st turning point (P1 in Fig. 3), the leftward force of the compensation piston on the spool overcomes the pressure of the compensation spring and the spool is moved to the left. As a result, seating area E closes, and seating area C opens. The hydraulic oil in area B flows to the servo piston's large-diameter end G via the port D pushing the servo piston to the right decreasing the discharge flow rate. The rightward movement of the servo piston is transferred to the feedback lever via the fulcrum J . The feedback lever revolves around the pin on the top of the fulcrum plug. A pin (A) is inserted in both the end of the feedback lever and the hole of the sleeve. When the feedback lever revolves, the sleeve moves to the left, and seating areas C and E open where the Hydraulic powers of the small and large-diameter ends of the servo piston are balanced. When the pump pressure decreases, the compensation spring pushes back the spool, causing seating area C to close and seating area E to open. The hydraulic oil at the servo piston's large-diameter end G is discharged into the drain line, causing the servo piston to move the left, increasing the discharge rate. The movement of the servo piston is transferred to the sleeve via the feedback lever, and seating areas C and E open or close so that the servo piston, under the pressures on both ends, follows the movement of the spool.

As explained above, the discharge rate of the pump is controlled by the balance of pressure on the spool, the pressure setting compensation spring, and the balance of pressure on the large and small-diameter ends of the servo piston. The maximum and minimum discharge rates are set by adjustment screws 954 and 953, respectively. The 1st turning point is set by the adjustment screws. Gradients of the pressure discharge lines are determined by the spring constant.

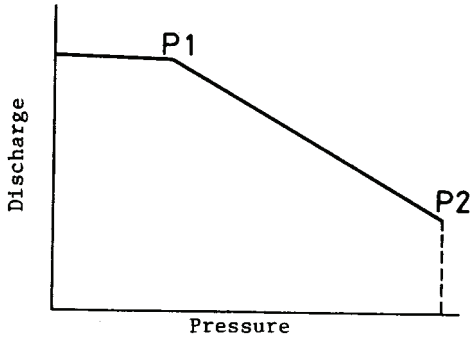


Fig. 3 IW101-012011

3. Air bleeding procedure

Refer to "Air Bleeding Procedure" in chapter Y.

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366-540-20000 △0

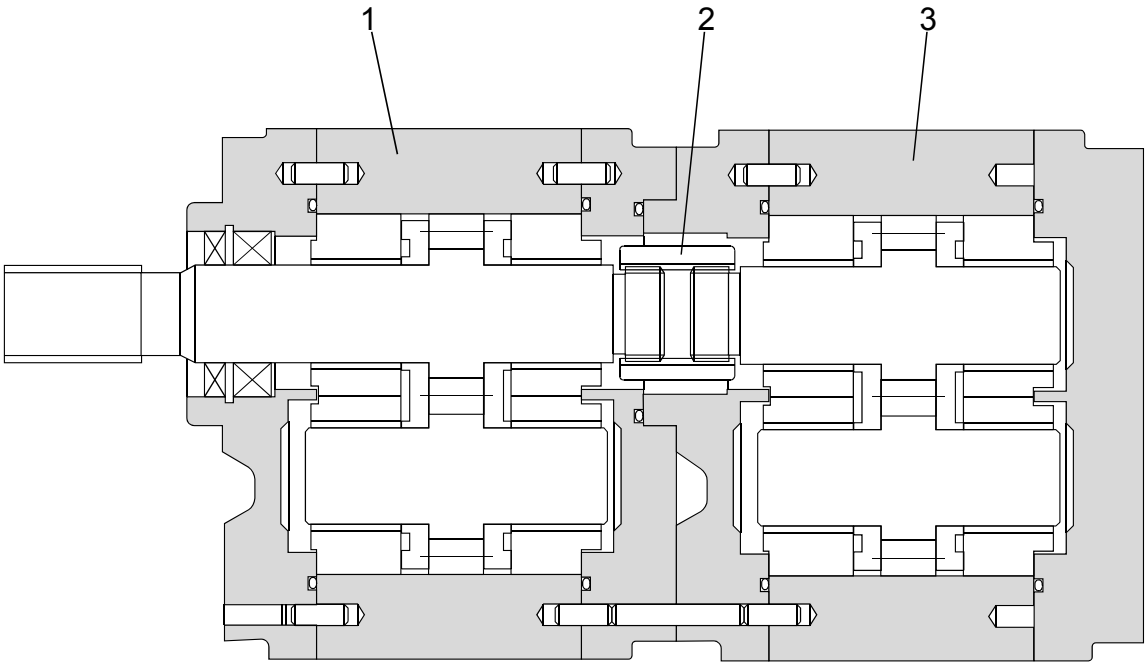
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B-3 Hydraulic Pump (Double Gear Pump)

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



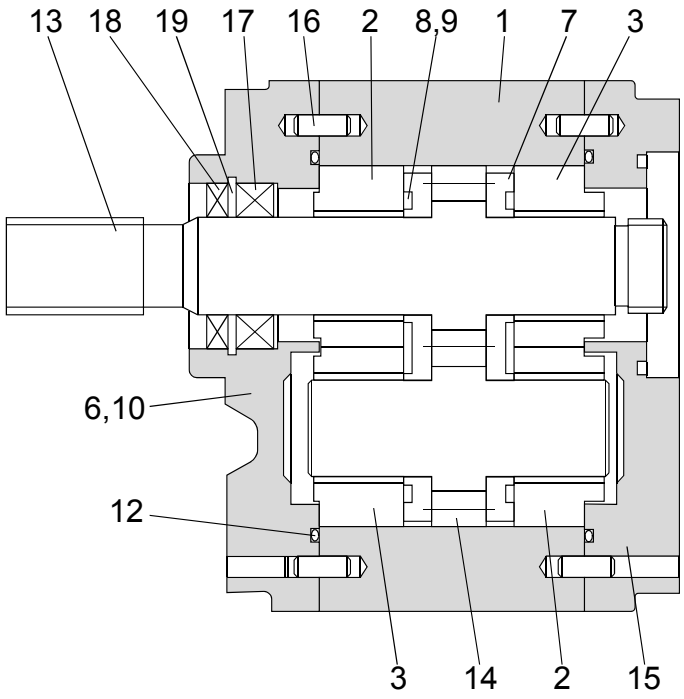
IW101-013001

1.Gear pump assy 2.Connecting section 3.Gear pump assy

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Hydraulic Pump (Double Gear Pump)

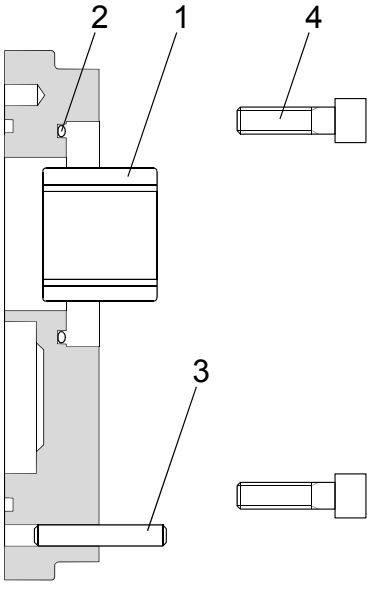
Gear pump assy-1



IW101-013002

1.Body	7.Side plate	12.O-ring	16.Dowel pin
2.Bearing box	8.Backup ring	13.Drive gear	17.Oil seal
3.Bearing box	9.Rubber string	14.Driven gear	18.Oil seal
6.Front cover	10.Hex. socket head bolt	15.Rear cover	19.Retaining ring

Connecting section-2

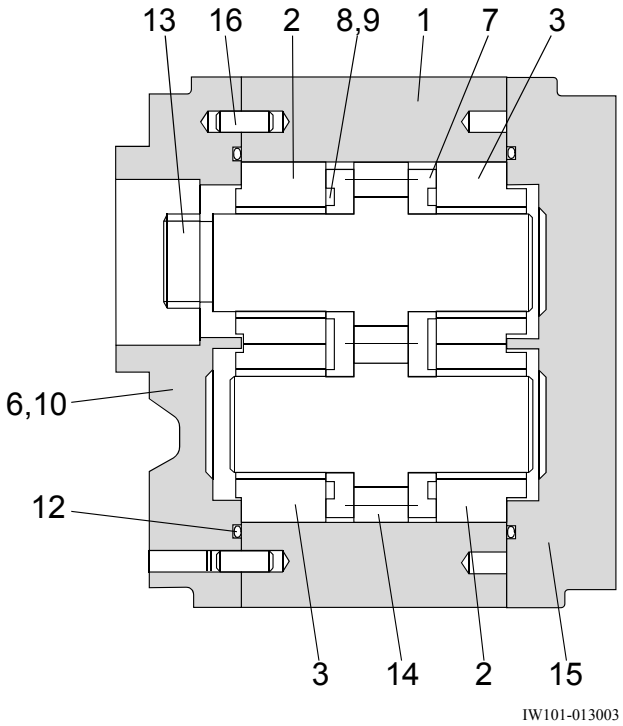


IW101-013004

1.Coupling	2.O-ring	3.Dowel pin	4.Hex. socket head bolt

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Gear pump assy-3



1.Body	7.Side plate	12.O-ring	16.Dowel pin
2.Bearing box	8.Backup ring	13.Drive gear	
3.Bearing box	9.Rubber string	14.Driven gear	
6.Front cover	10.Hex. socket head bolt	15.Rear cover	

2. Air bleeding procedure

Refer to “Air Bleeding Procedure” in chapter Y.

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366-519-00000 △0
366-531-70000 △0

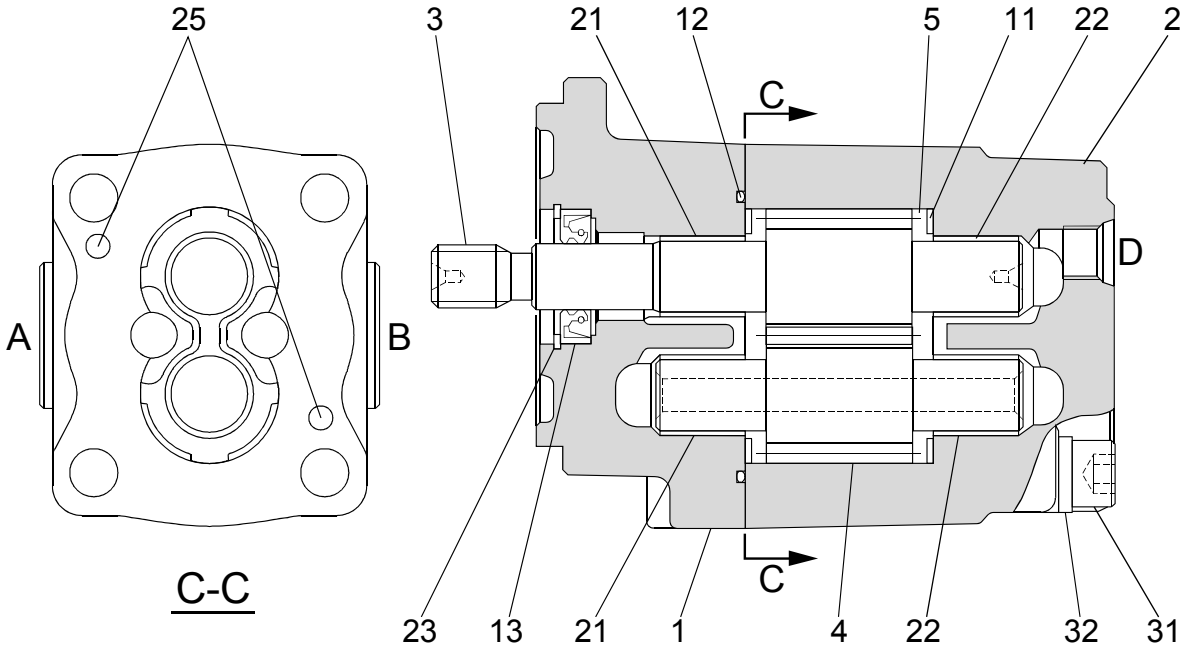
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B-4 Hydraulic Pump (Gear Pump, Emergency Steering)

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



IW101-014001

1.Front cover	5.Side plate	21.Bush (front cover)	31.Hexagon socket head bolt
2.Body	11.Gasket	22.Bush (body)	32.Plain washer
3.Drive gear	12.Gasket	23.Retaining ring	
4.Driven gear	13.Oil seal	25.Steel ball	

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
A, B	G3/4	62 - 75	46 - 56
D	G1/4	24 - 29	17 - 22
31	M10	48 - 51	35 - 38

366-535-20000 △2

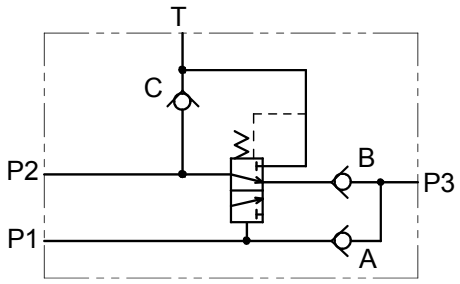
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B-5 Hydraulic Valve (Emergency Steering) (Option)

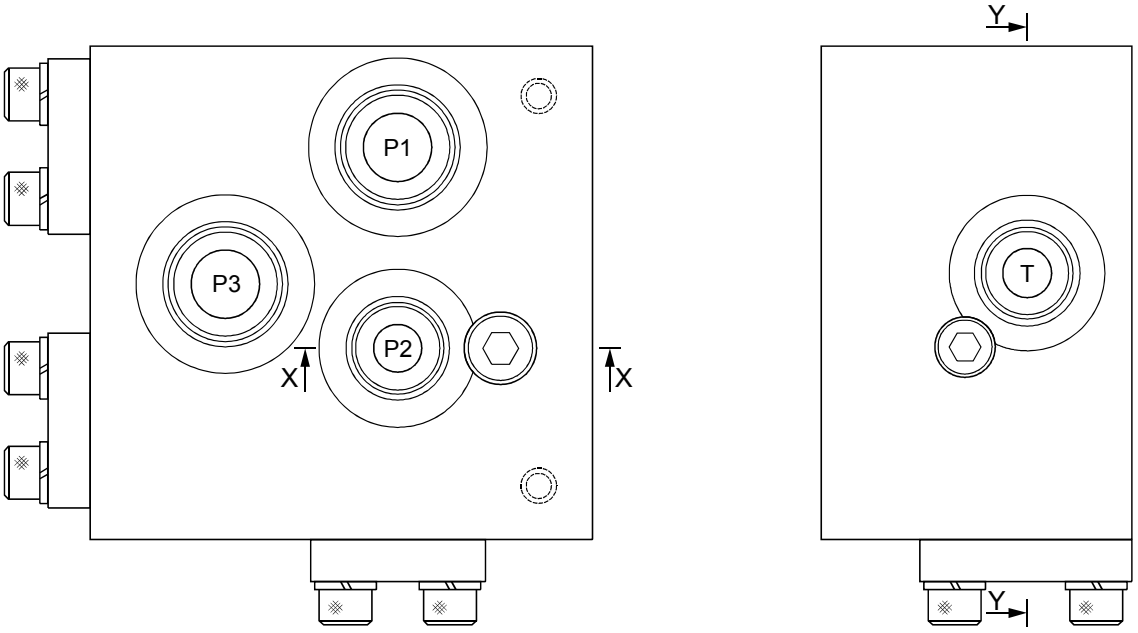
[NOTICE]

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1. Structure



IW123-016001



IW123-0260E01

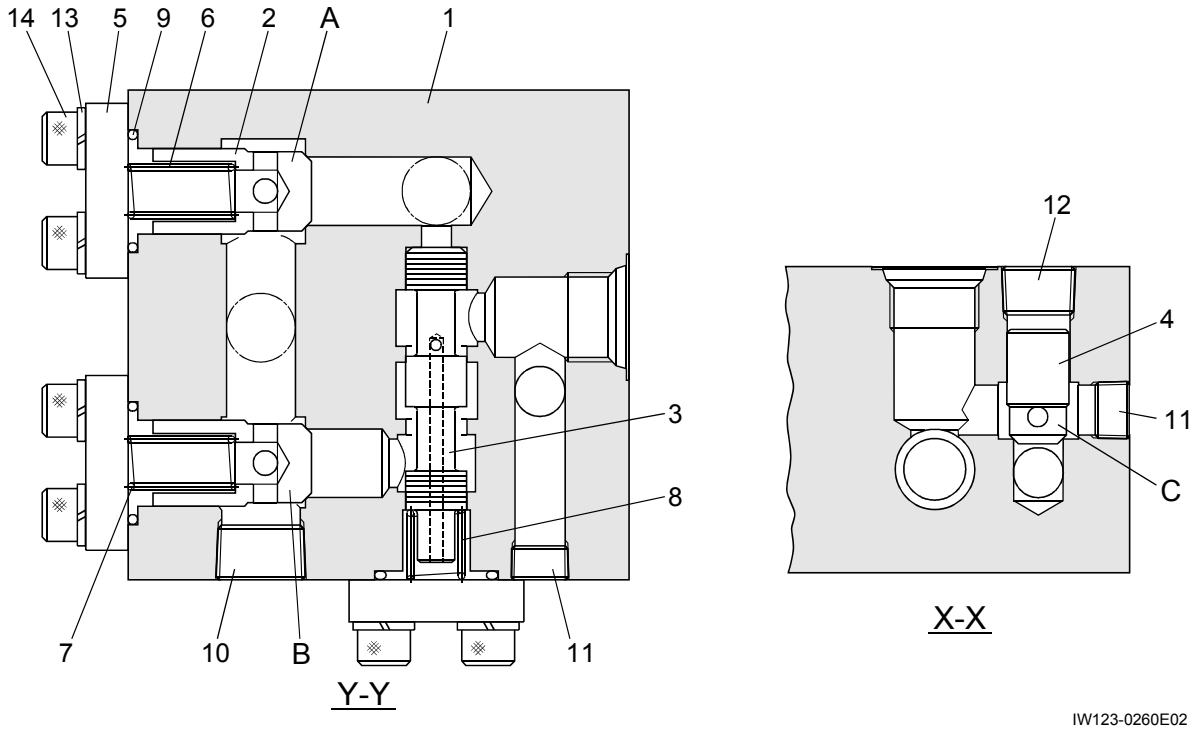
Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
P1, P3	G1	196	145
P2, T	G3/4	167	123

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Hydraulic Valve (Emergency Steering) (Option)

Cross section along the line X-X, Y-Y



1.Body	5.Cover	9.O-ring	13.Spring washer
2.Check valve	6.Spring	10.Plug	14.Hexagon socket head bolt
3.Spool	7.Spring	11.Plug	
4.Check valve	8.Spring	12.Plug	

366-406-60000 ⚠0

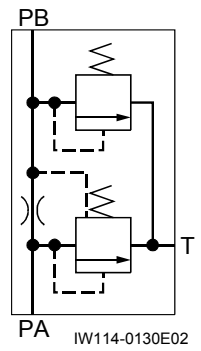
https://truckmanualshub.com/

B-6 Flow Control Valve

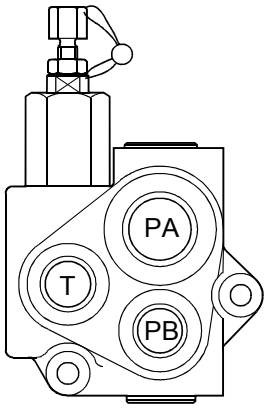
[NOTICE]

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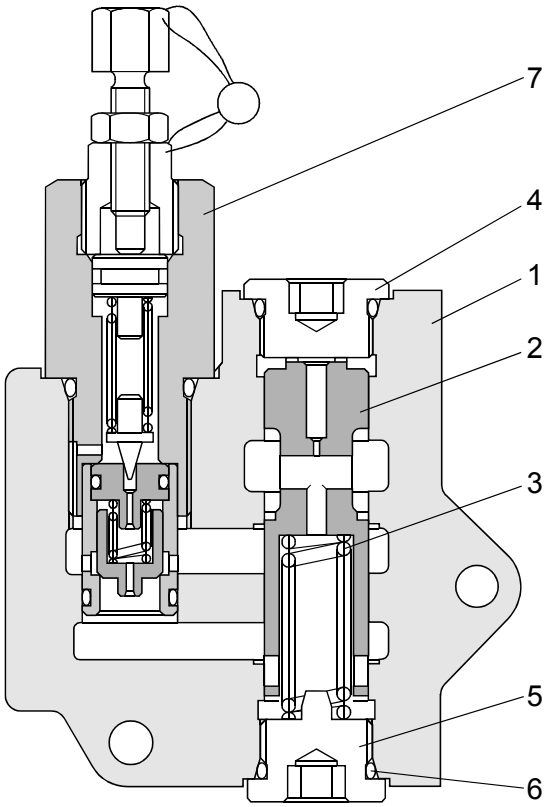
1. Structure



IW114-0130E02



IW114-0130E01



IW114-0130E03

1.Valve body
2.Spool
3.Spring
4.Plug
5.Plug
6.O-ring
7.Relief valve assy

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
PA	G3/4	167	123
T, PB	G1/2	98	72

366-104-20000 ⚠0

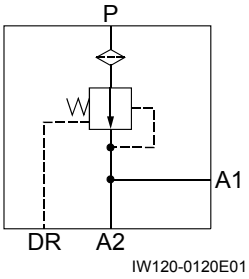
https://truckmanualshub.com/

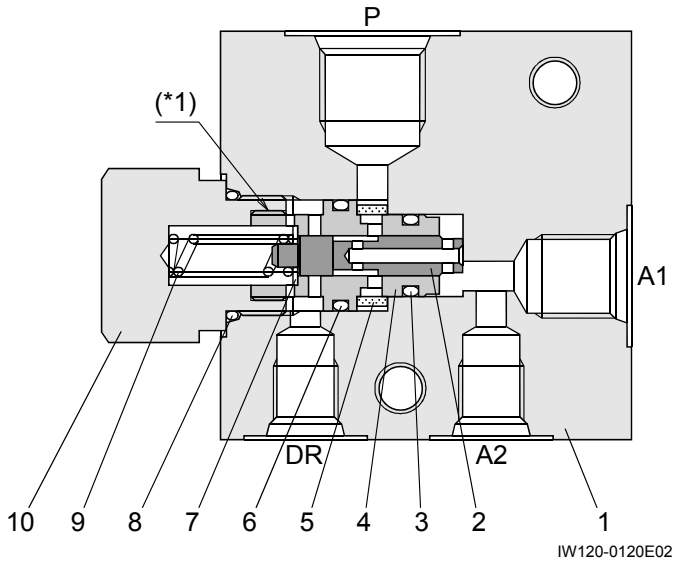
B-7 Pressure Reducing Valve (Pilot Pressure)

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure





(*1) : Apply the thread locking agent (LOCTITE 270 or the equivalent)

1.Body	4.Sleeve	7.Spacer	10.Plug
2.Spool	5.Filter	8.O-ring	
3.O-ring	6.O-ring	9.Spring	

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
P	G1/2	98	72
A1	G3/8	49	36
A2, Dr	G1/4	29.4	22

366-054-90000 △1

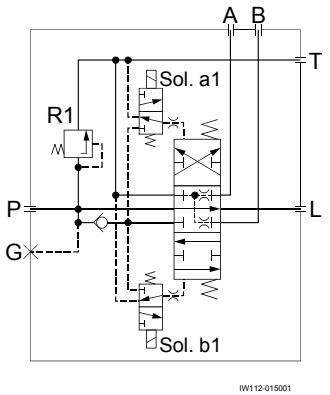
https://truckmanualshub.com/

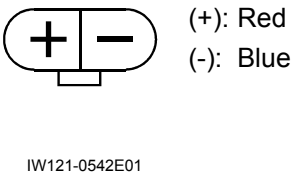
B-8 Solenoid Control Valve (Outrigger)

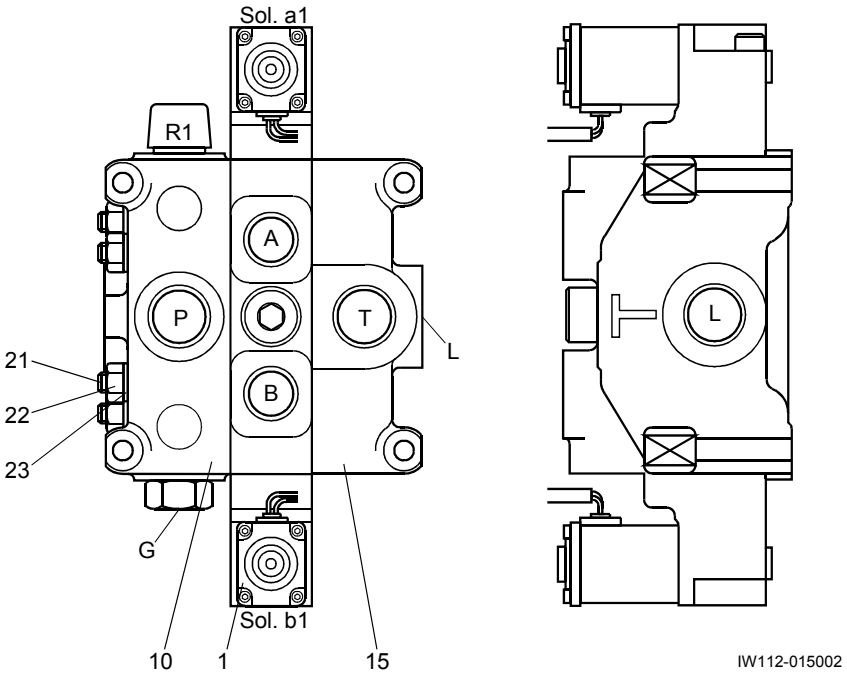
[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure







1.Body assy	15.T cover assy	22.Nut
10.P cover assy	21.Stud bolt	23.Spring washer

Thread size and tightening torque

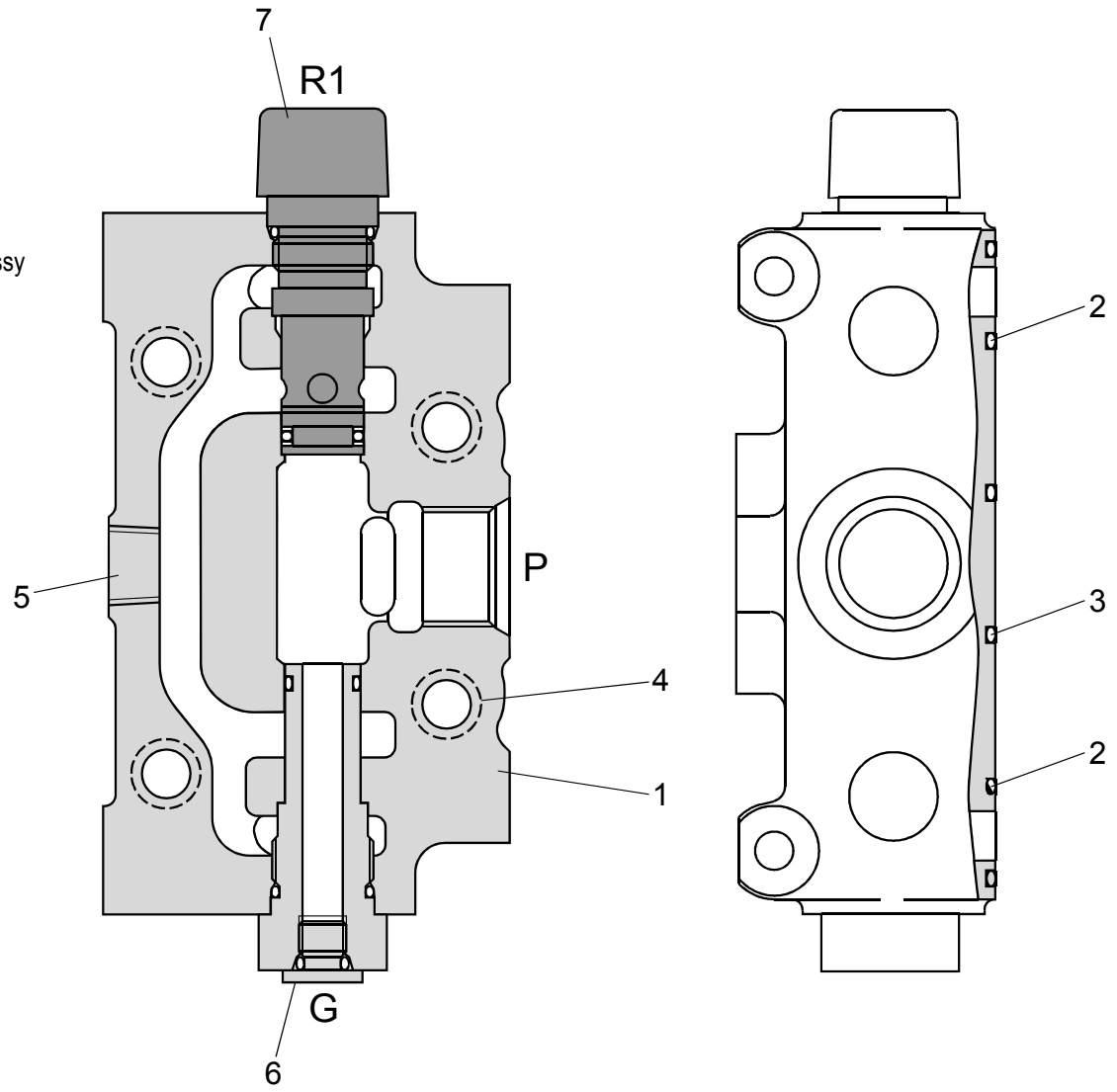
Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
P, T, L	G1	196	145
A, B	G3/4	167	123
G	G1/4	29.4	22

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Solenoid Control Valve (Outrigger)

P cover assy
(illustrated as 10 on page 21)

1.Cover
2.O-ring
3.O-ring
4.Shim
5.Plug
6.Plug assy
7.Relief valve assy

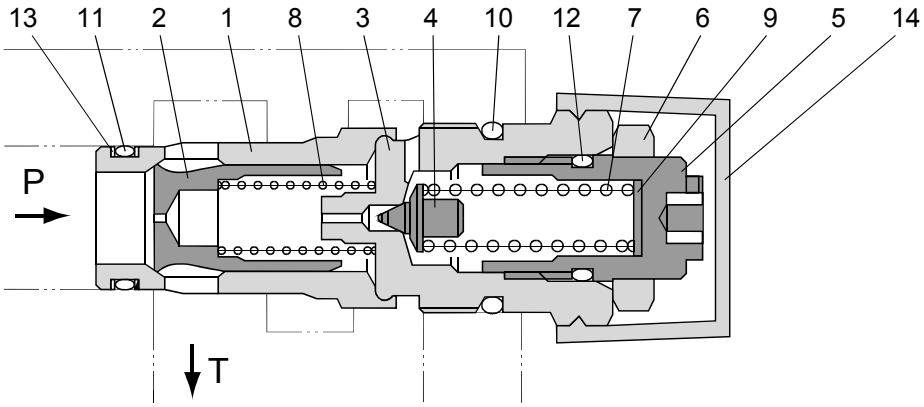


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Solenoid Control Valve (Outrigger)

P cover assy (2/2)
Relief valve (illustrated as 7 on page 23)



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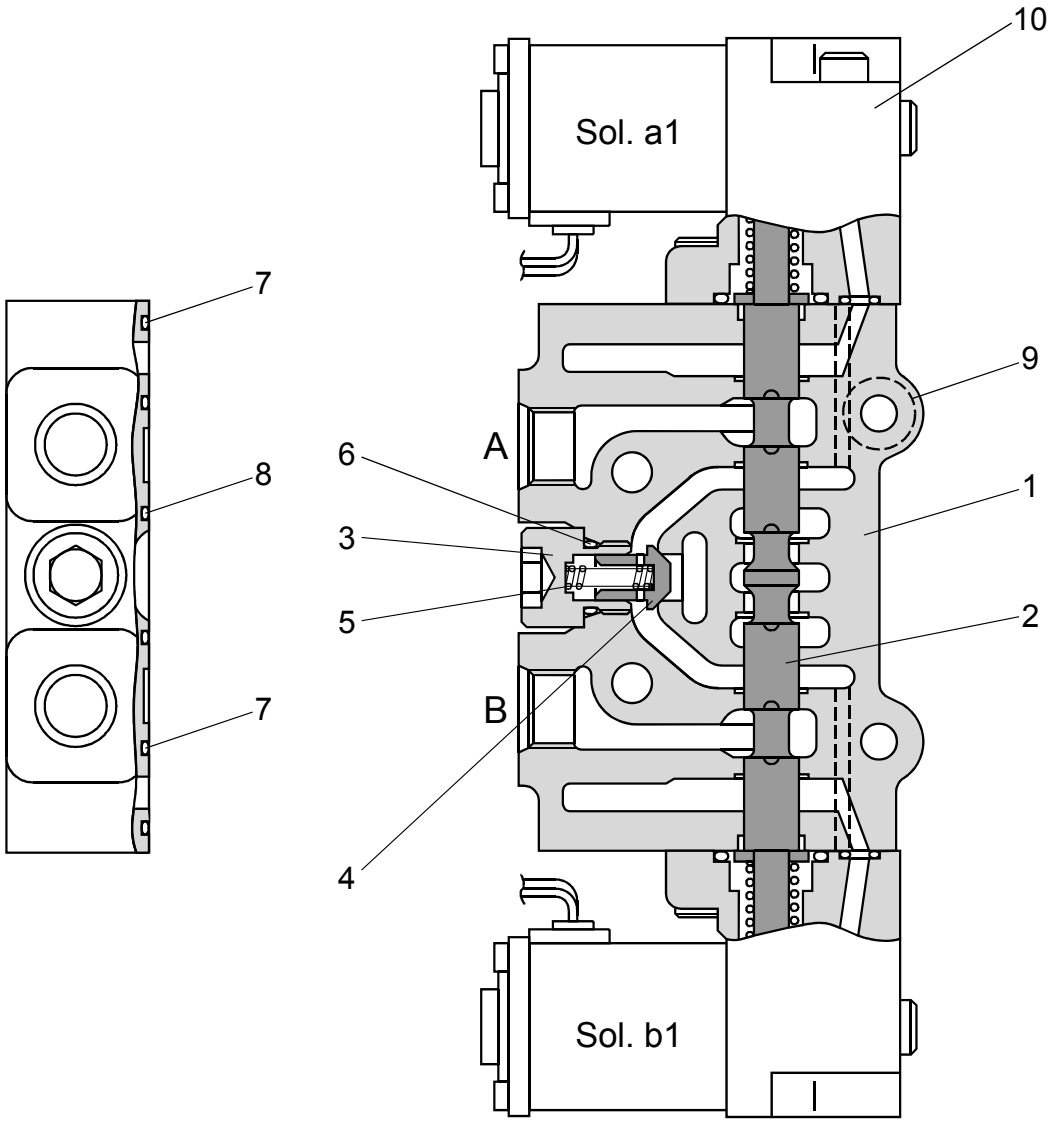
1.Body	5.Adjuster screw	9.Shim	13.Backup ring
2.Plunger	6.Nut	10.O-ring	14.Cap
3.Body	7.Spring	11.O-ring	
4.Poppet	8.Spring	12.O-ring	

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Solenoid Control Valve (Outrigger)

Body assy (1/2)
(illustrated as 1 on page 21)

1.Body
2.Spool
3.Plug
4.Plunger
5.Spring
6.O-ring
7.O-ring
8.O-ring
9.Shim
10.Pilot cover assy



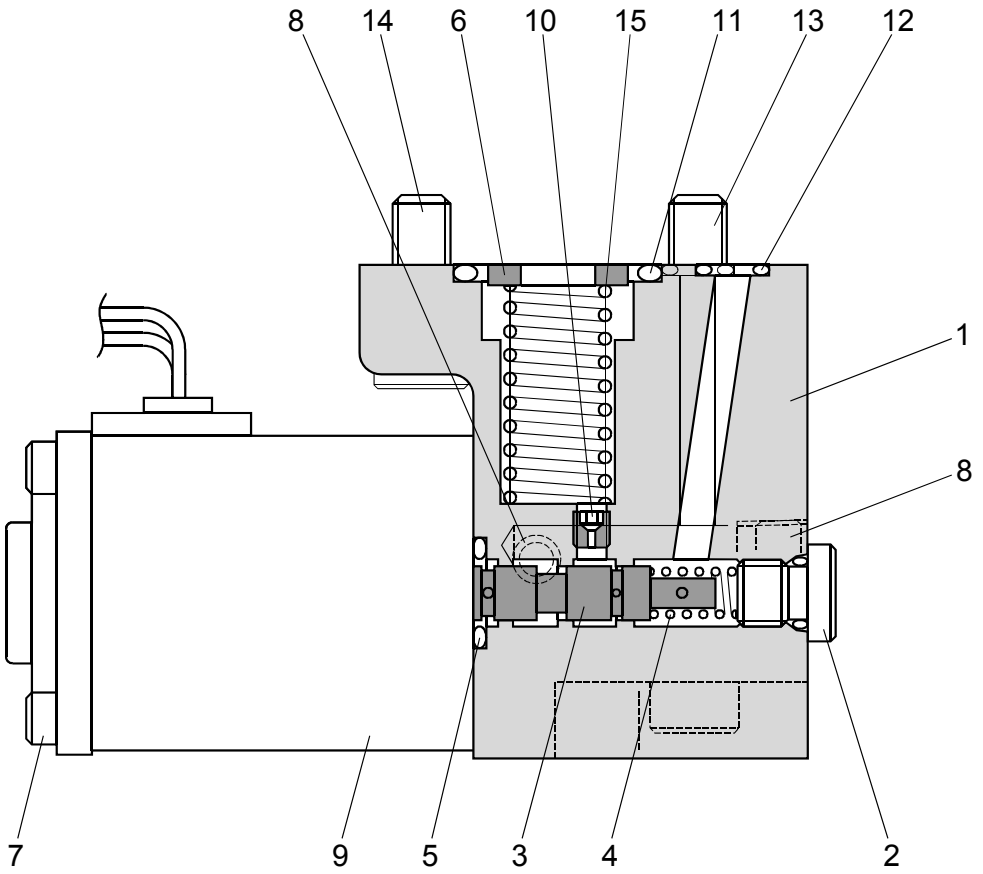
IW112-015004

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Solenoid Control Valve (Outrigger)

Body assy (2/2)
Pilot cover assy (illustrated as 10 on page 21)

1.Cover
2.Plug
3.Spool
4.Spring
5.O-ring
6.Spring seat
7.Hexagon socket head bolt
8.Plug
9.Solenoid (DC24V)
10.Orifice
11.O-ring
12.O-ring
13.Hexagon socket head bolt
14.Hexagon socket head bolt
15.Spring



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B-9 Rotary Joint

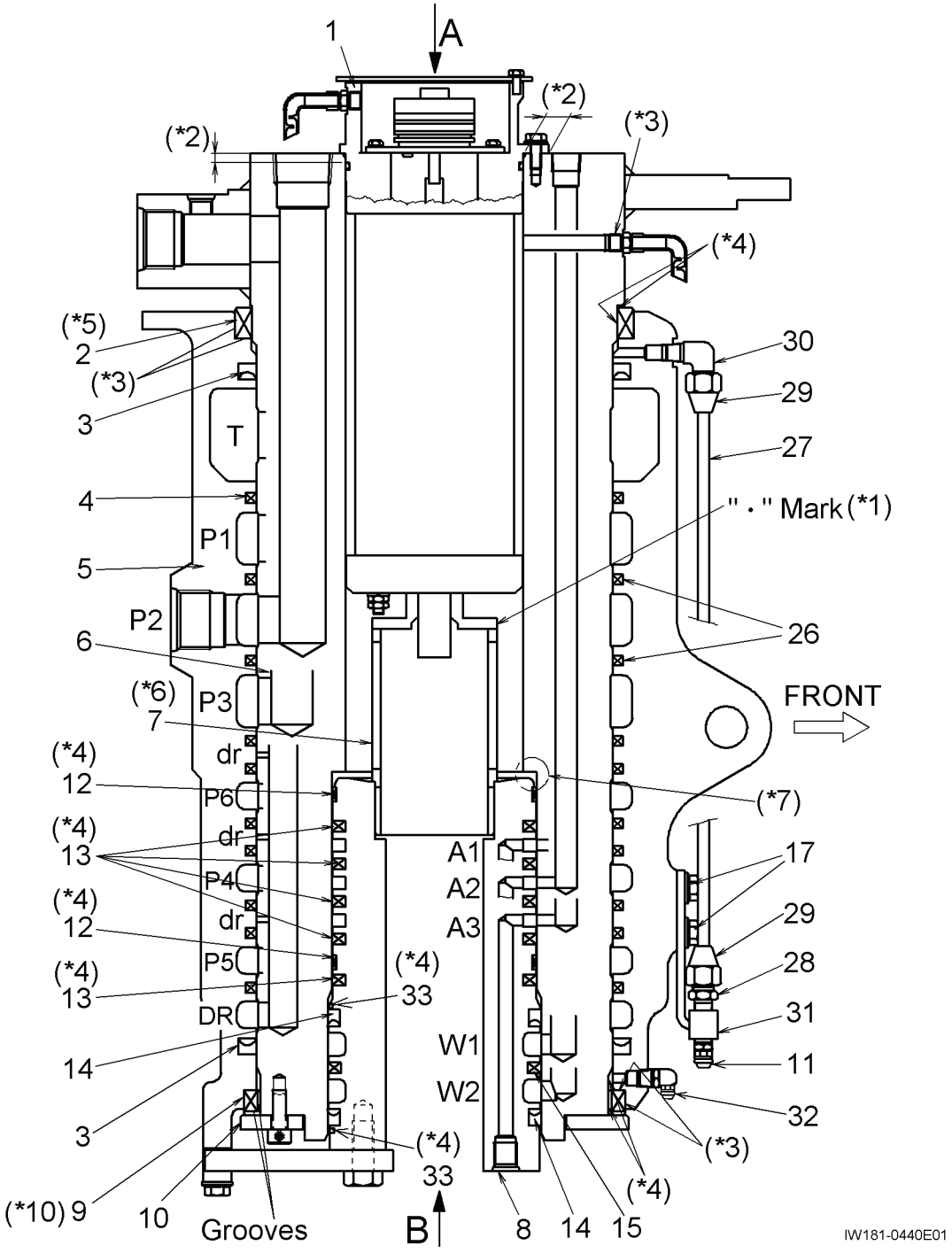
[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure

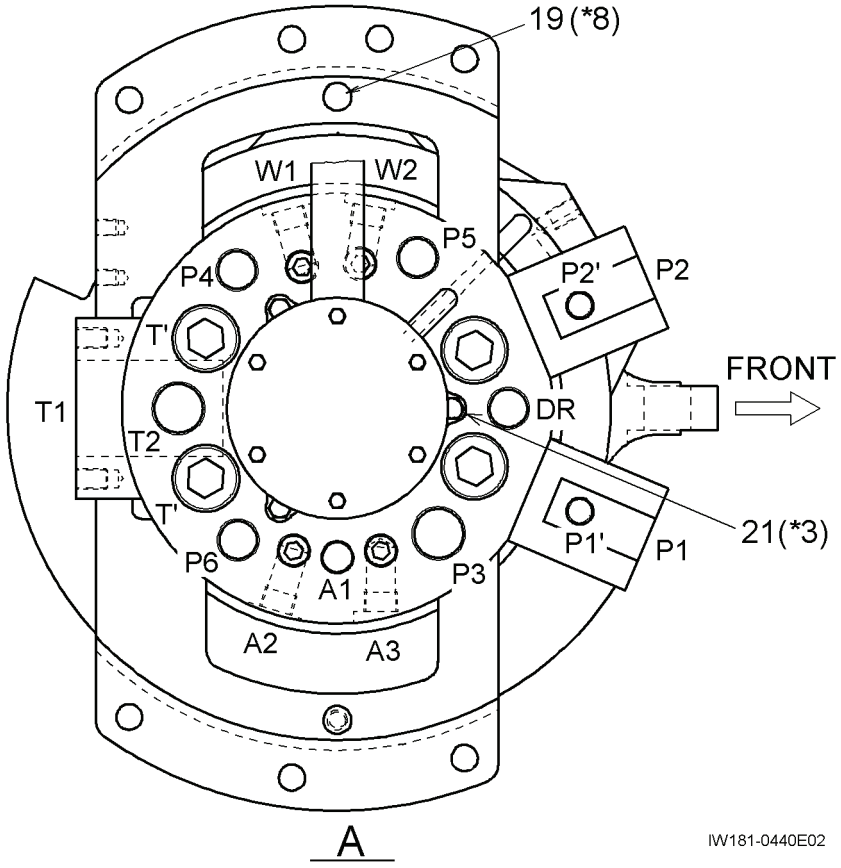
[NOTICE]

◆The parts marked with (*1) - (*10) require special attention for disassembling and assembling. The required attention is described in the "Attention" on page 37.

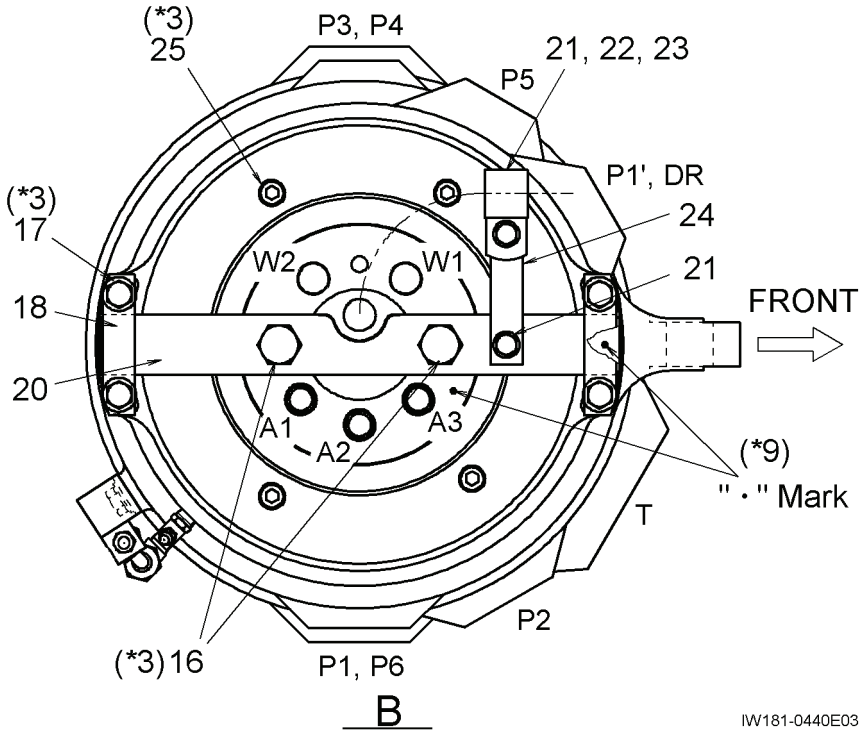


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Upper (view A)



Lower (view B)



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Rotary Joint

1.Slip ring assy
2.Plain bearing
3.Packing
4.Ring seal
5.Body
6.Core
7.Shaft
8.Core
9.Plain bearing
10.Support
11.Grease nipple
12.Plain bearing
13.Ring seal
14.Packing
15.Ring seal
16.Bolt
17.Flange bolt
18.Plate
19.Plug
20.Support
21.Flange bolt
22.Clamp
23.Nut
24.Plate
25.Hexagon socket head bolt
26.Ring seal
27.Pipe
28.Fitting
29.Flare nut
30.Elbow fitting
31.Support
32.Grease nipple
33.O-ring

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
16 *1	M12	74 - 82	55 - 61
17 *1 (to secure the plate [18])	M8	11.8 – 13.7	9 - 10
21 *1 (to secure the slip ring ass'y [1])	M6	4.4 – 5.4	3.5 - 4
25 *1	M8	23.5 – 27.5	17 - 20
29	-	16 - 24	12 - 17
*1: Apply thread locking agent equivalent to THREE BOND 1401 to the threaded sections.			

Hydraulic section

Sign / port		Thread size		Tightening torque	
				N-m	ft-lbf
P1	Winch	Upper	G1	196	145
		Lower			
	Outriggers pilot	Upper	-	-	-
		Lower	G1/4	29.4	22
P1'	Gauge	Upper	G1/4	29.4	22
		Lower	-	-	-
P2	Boom elevating, Boom telescoping	Upper	G1	196	145
		Lower			
P2'	Gauge	Upper	G1/4	29.4	22
		Lower	-	-	-
P3	Swing, Steering	Upper	G3/4	167	123
		Lower	G1	196	145
P4	Steering (left)	Upper	G1/2	98	72
		Lower			
P5	Steering (right)	Upper	G1/2	98	72
		Lower			
P6	Option	Upper	G1/2	98	72
		Lower			
T1	Tank	Upper	-	-	-
		Lower			
T2	Tank	Upper	G3/4	167	123
		Lower	-	-	-
DR	Drain	Upper	G1/2	98	72
		Lower			

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Pneumatic section

Sign / port		Thread size		Tightening torque	
				N-m	ft-lbf
A1	Air supply	Upper	Rc3/8	49 - 69	36 - 51
		Lower	G1/4	29.4	22
A2	Service brake (primary)	Upper	Rc3/8	49 - 69	36 - 51
		Lower	G1/4	29.4	22
A3	Service brake (secondary)	Upper	Rc3/8	49 - 69	36 - 51
		Lower	G1/4	29.4	22

L.L.C. section

Sign / port		Thread size		Tightening torque	
				N-m	ft-lbf
W1	Heater (IN)	Upper Lower	Rc3/8	49 - 69	36 - 51
W2	Heater (OUT)	Upper Lower	Rc3/8	49 - 69	36 - 51

Attention

(*1): Face the "･" mark toward FRONT.

(*2): Apply water-proof sealant equivalent to THREE BOND 4101. Do not apply grease.

(*3): Apply thread locking agent equivalent to THREE BOND 1401 to lock the threads.

(*4): Apply grease (EP2) when attaching.

(*5): Do not use an organic solvent.

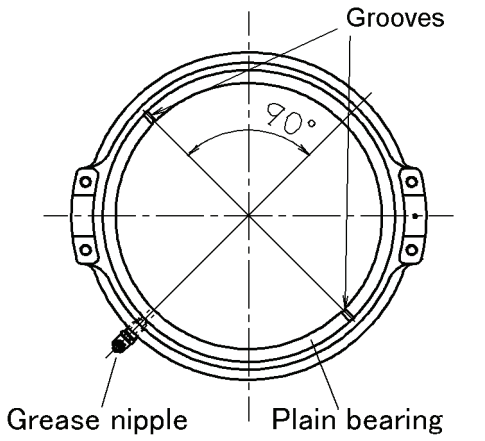
(*6): Do not remove the shaft (8) from the core (7). It is press-fit within the core.

(*7): To prevent rust, apply grease (EP2) when assembling.

(*8): Tapped hole (2 places) for slinging. The applicable thread size is M10.

(*9): The "･" marks must be directed as shown in the figure.

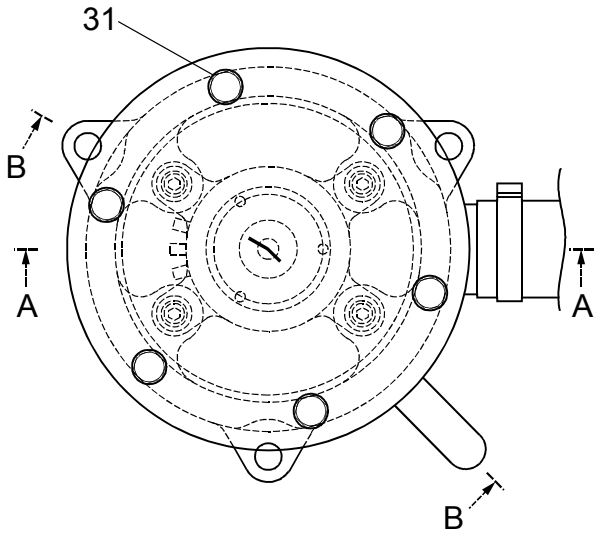
(*10): Do not use an organic solvent. The grease grooves must be directed as shown below.



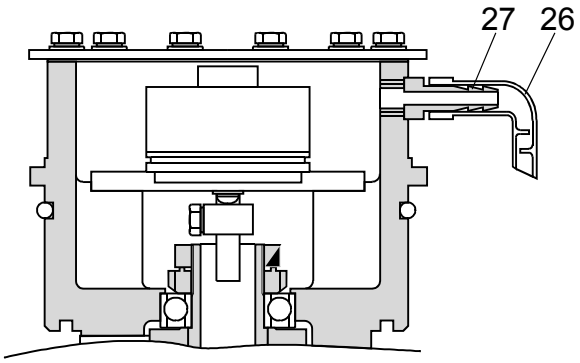
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Slip ring Assy

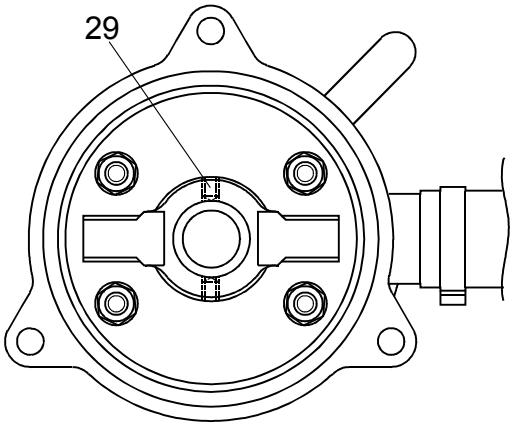


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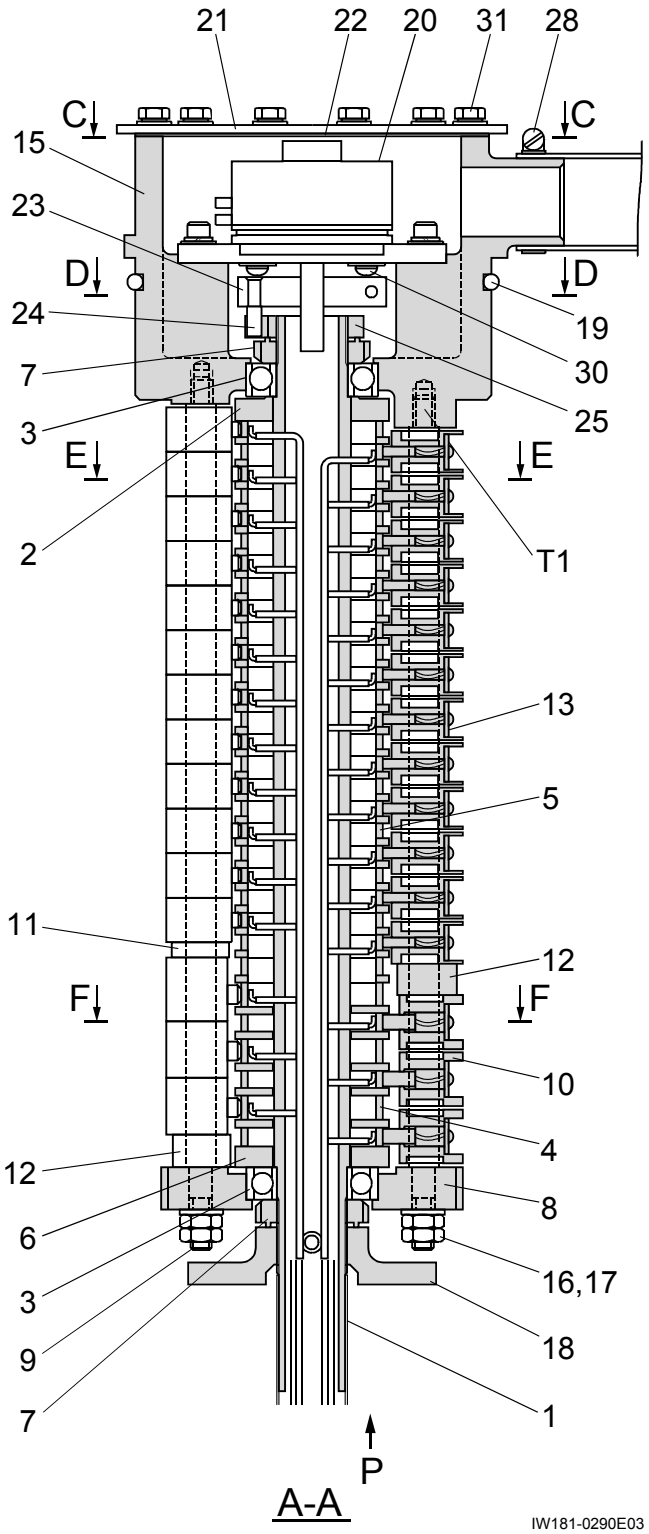
B-B

IW181-0260E04



P

IW181-0260E05

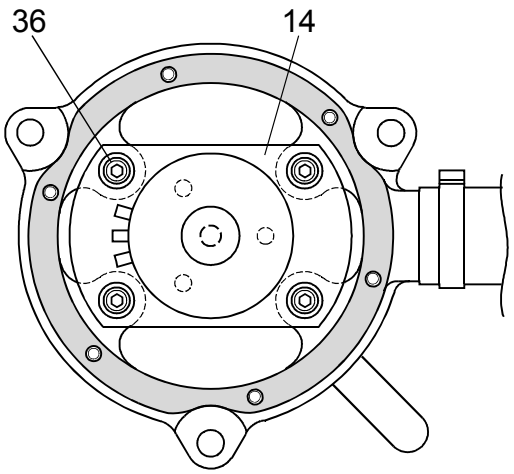


A-A

IW181-0290E03

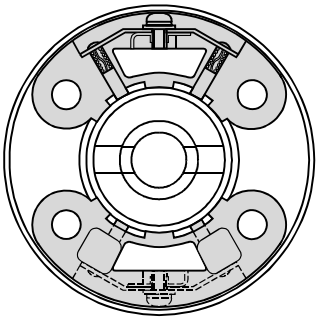
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Rotary Joint



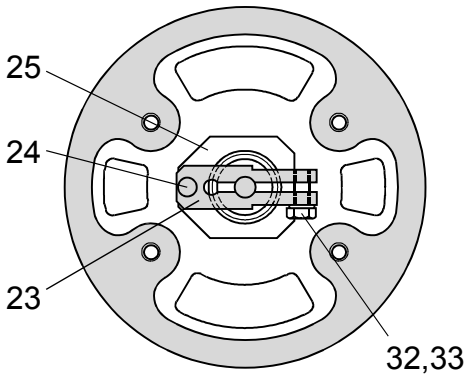
C-C

IW181-0260E07



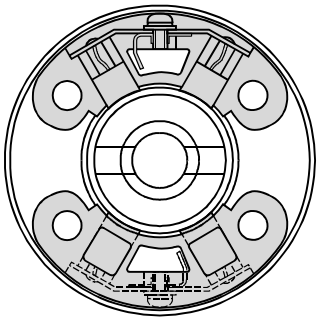
E-E

IW181-0260E09



D-D

IW181-0260E08



F-F

IW181-0260E10

1.Shaft	10.BH+CB	19.O-ring	28.Hose band
2.Ring set plate	11.Spacer	20.Potentiometer	29.Hexagon socket set screw
3.Bearing	12.Spacer	21.Cover	30.Machine screw
4.Ring	13.BH+CB	22.Packing	31.Bolt
5.Ring	14.Support	23.Lever	32.Bolt
6.Ring set plate	15.Base	24.Pin	33.Spring washer
7.U nut	16.Dry lock nut	25.Guide	36.Hexagon socket head bolt
8.Support	17.Coned disc spring	26.Air breather	
9.Stud bolt	18.Guide	27.Hose joint	

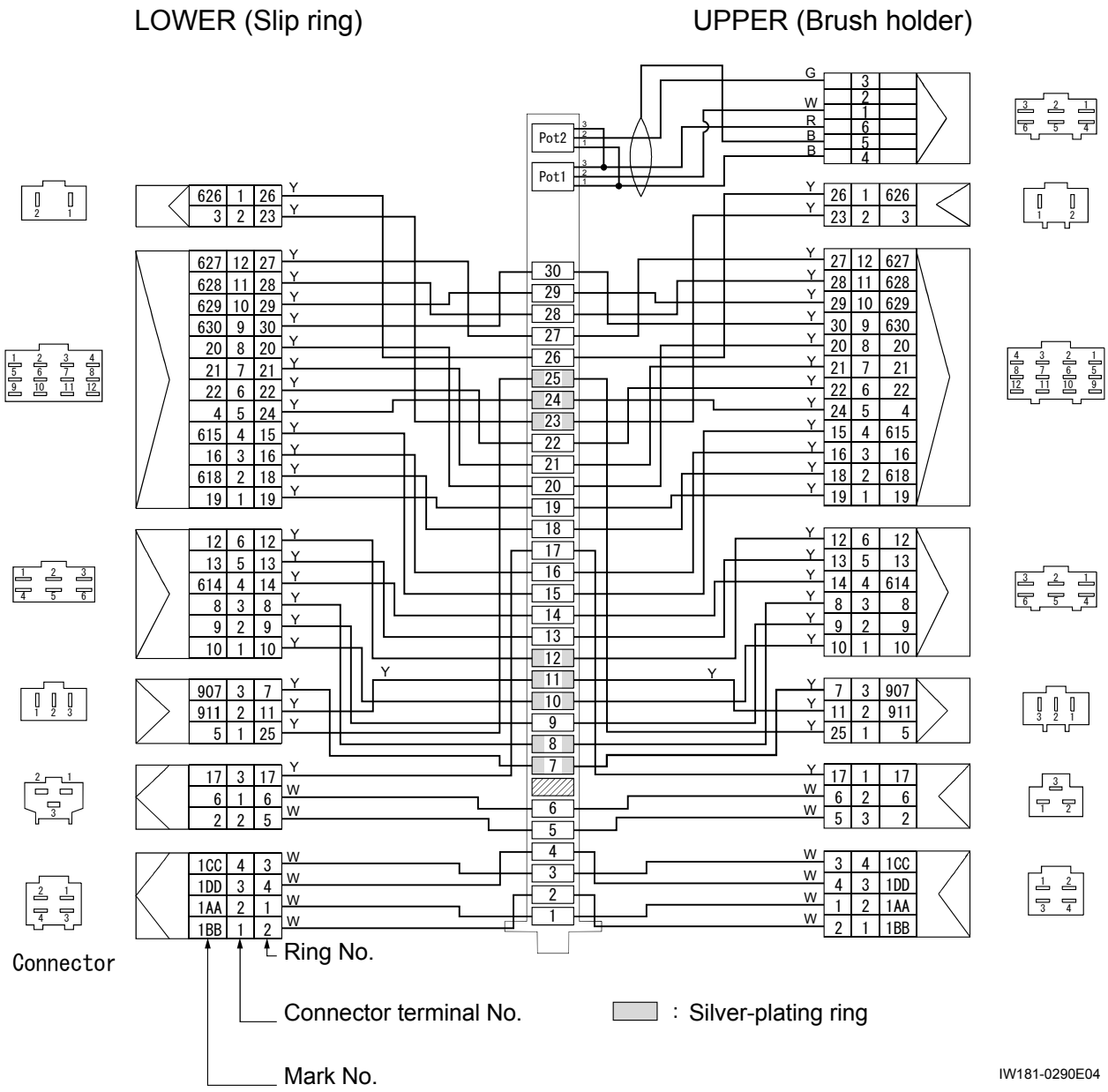
Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
16[*1], T1[*1]	M6	4.9	3.6
31, 32, 36	M4	1.5	1.1
30	M3	0.63	0.5
*1 : Apply LOCTITE 496 (strong quick-drying glue) to threaded sections.			

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Rotary Joint

Wiring diagram

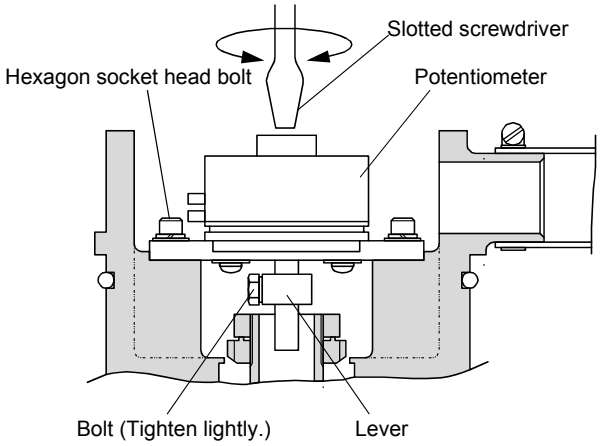


https://truckmanualshub.com/

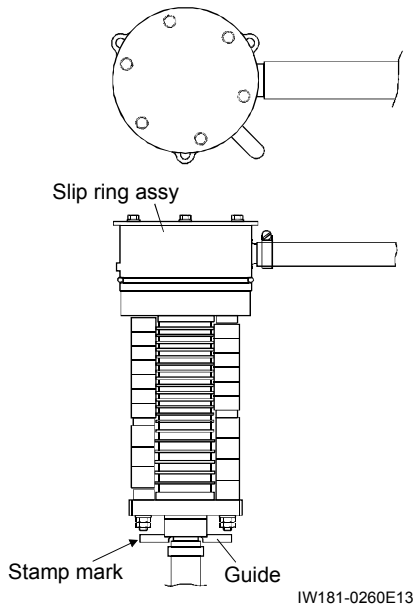
2. Potentiometer

2.1 Adjustment

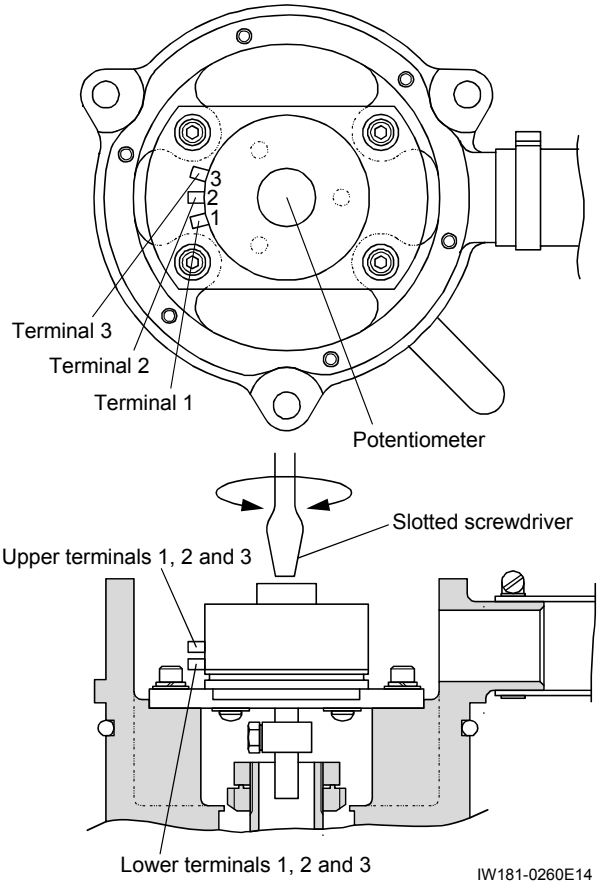
1. Install the potentiometer as shown in the figure below. However, tighten the bolt for fixing the lever lightly. (Do not fix the lever to the potentiometer shaft because you must turn the potentiometer shaft using the slotted screwdriver to adjust the position of the shaft.)



2. While keeping the stamp mark on the guide oriented as shown in the figure below, adjust the potentiometer as described in the following steps. (If you adjust the potentiometer with the slip ring assy installed on the crane, direct the boom over-left to orient the stamp mark as shown in the figure below.)



3. Turn the potentiometer shaft using a slotted screwdriver so that the resistance between the upper terminals 1 and 2 is minimum between 1 ohm and 15 ohm. Leave the terminals (6 pieces) of the potentiometer disconnected.



4. Remove the hexagon socket head bolts (4 pieces), take out the potentiometer and fully tighten the bolt for fixing the lever. Then install the potentiometer and make sure that the resistance between the upper terminals 1 and 2 is 15 ohm or less.

2.2 Soldering

1. After finishing the potentiometer adjustment, remove the hexagon socket head bolts (4 pieces) and take out the potentiometer. Then solder the wiring to the terminals (6 pieces).

2. To insulate the terminals (6 pieces) from one another, coat the terminal section with epoxy adhesive (equivalent to 3M DP-420).

346-305-71000 △7

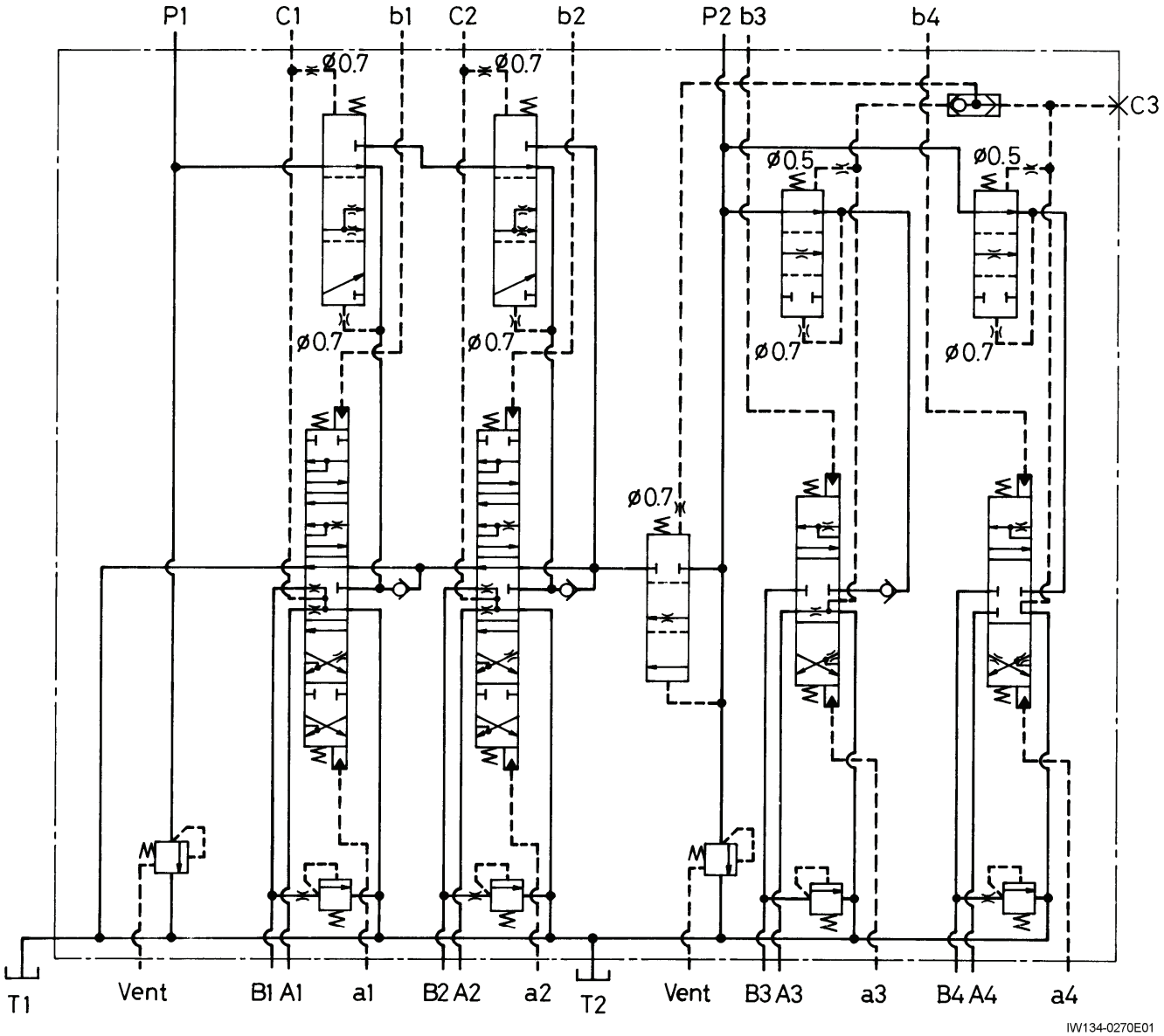
https://truckmanualshub.com/

B-10 Hydraulic Pilot Control Valve (Elevating, Telescoping, Winch)

[NOTICE]

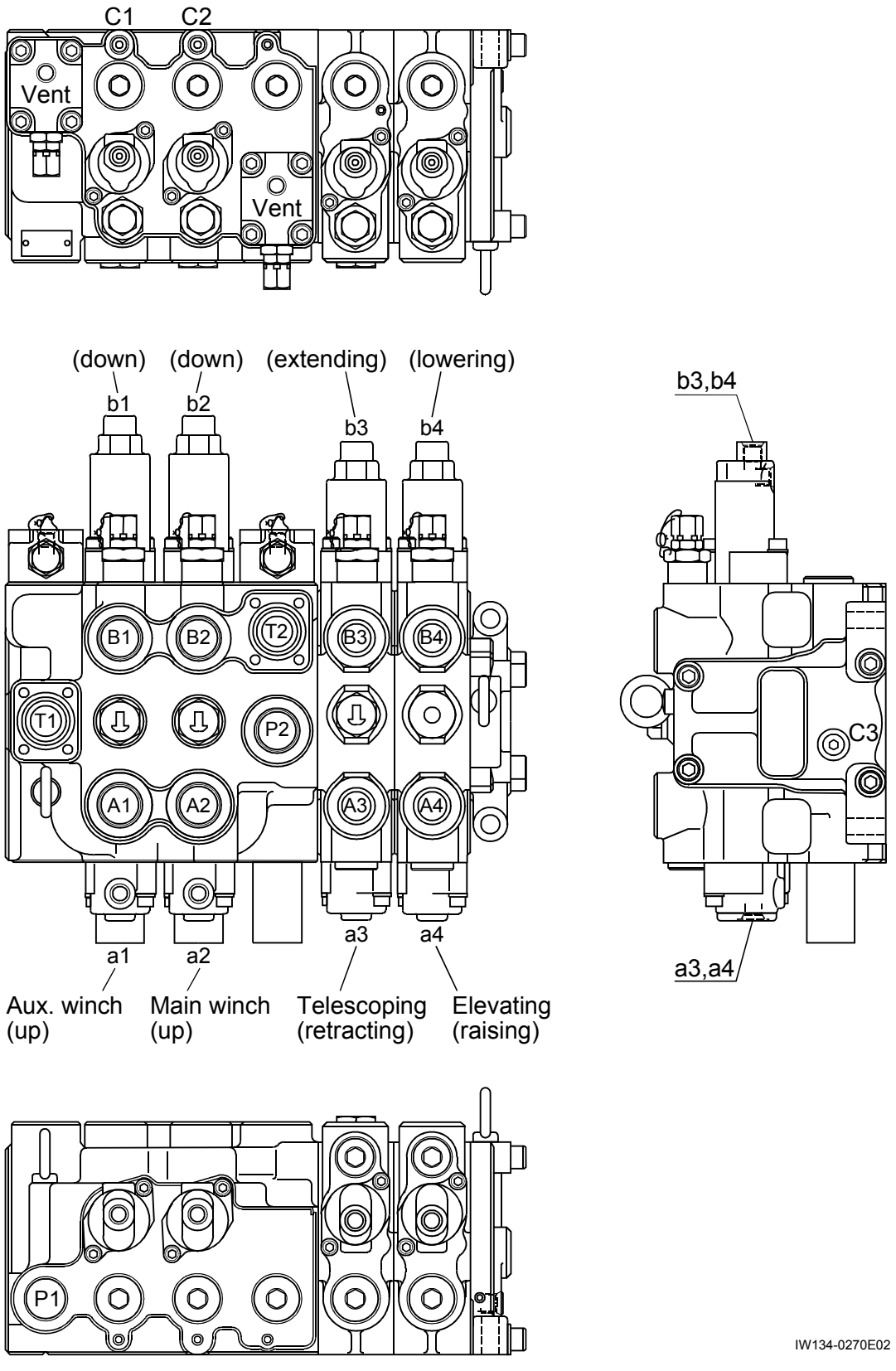
◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



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Hydraulic Pilot Control Valve (Elevating, Telescoping, Winch)



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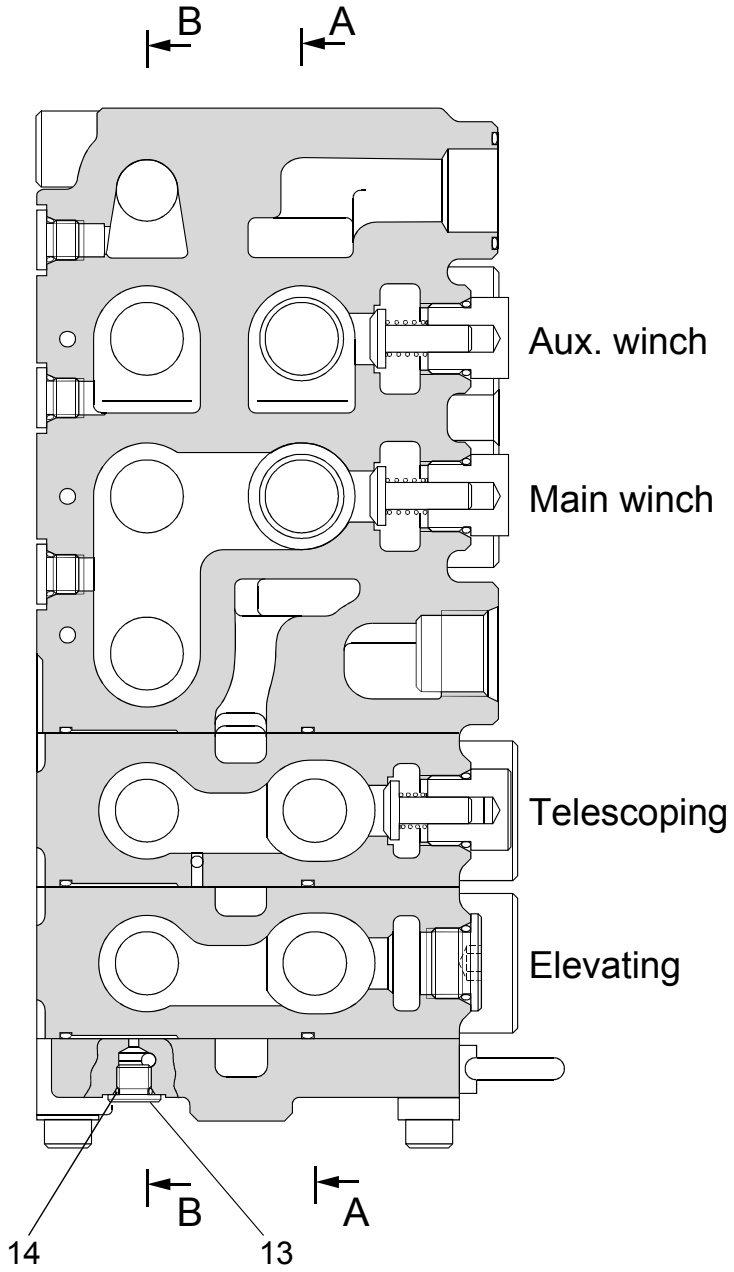
Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
C1,C2,C3,a1,a2,a3,a4,b1,b2,b3,b4,Vent	G1/4	29.4	22
A3,B3,A4,B4	G3/4	167	123
P1,P2,A1,B1,A2,B2	G1	196	145

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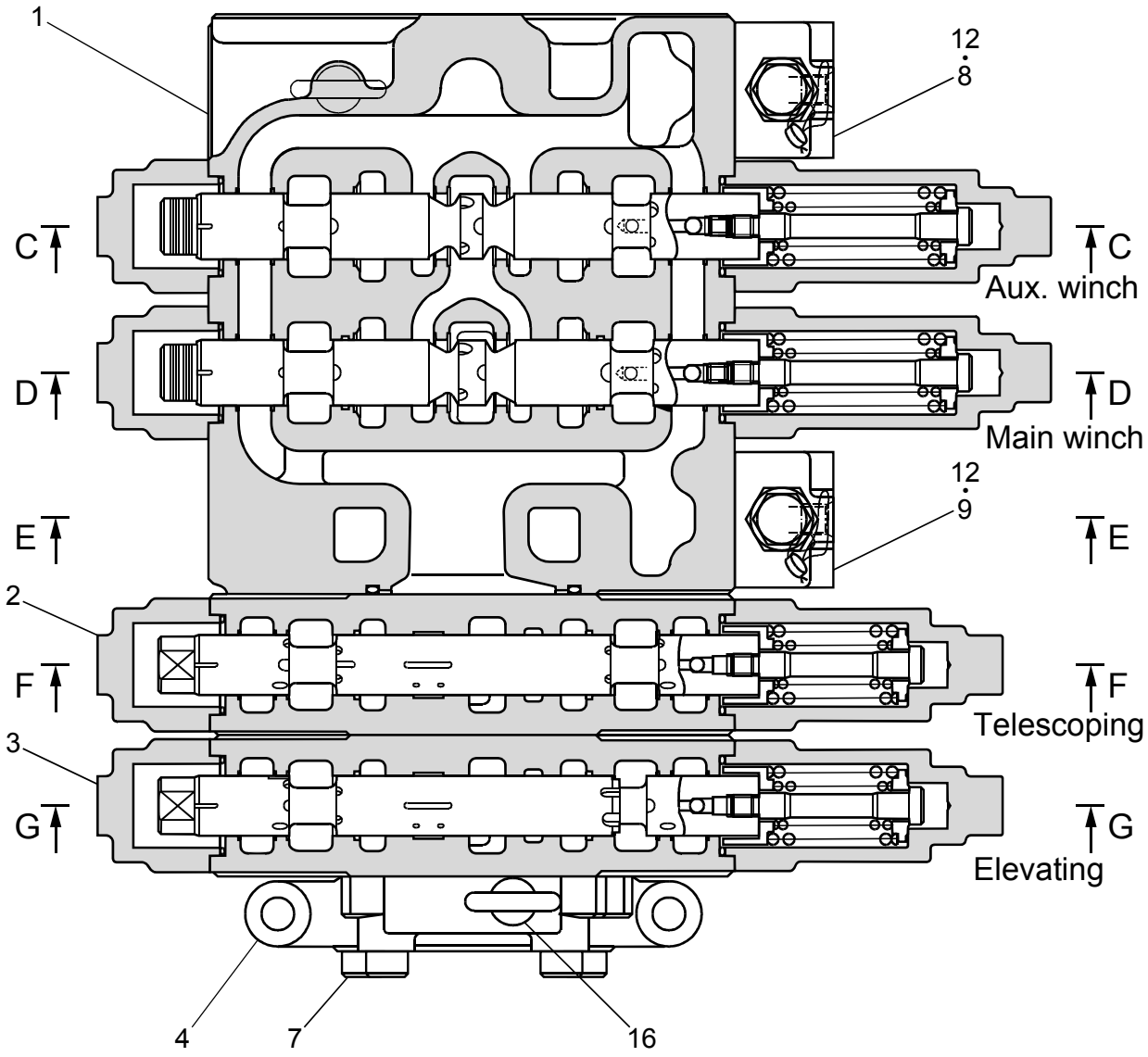
Hydraulic Pilot Control Valve (Elevating, Telescoping, Winch)

Cross section of whole body



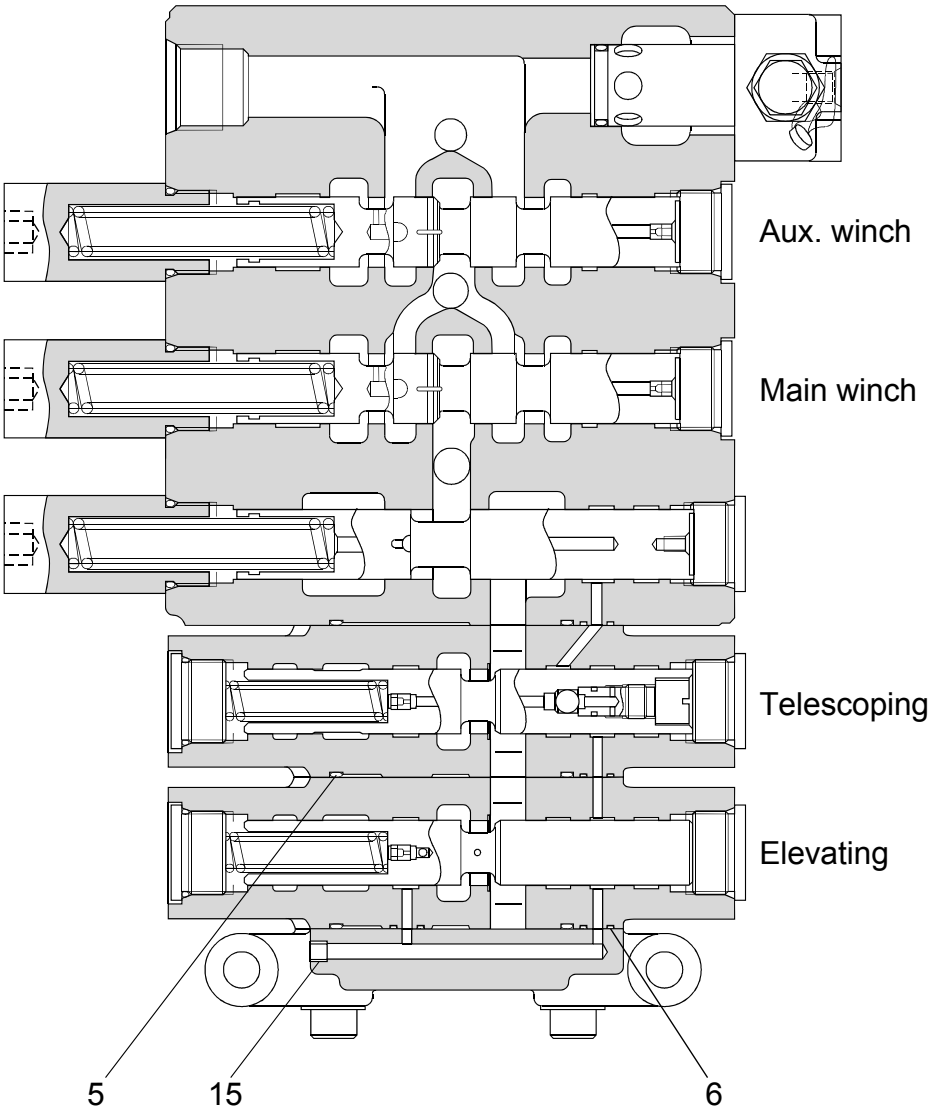
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Hydraulic Pilot Control Valve (Elevating, Telescoping, Winch)



B-B

IW134-011004

1.Winch selector valve	5.O-ring	9.Main relief valve	15.Plug
2.Telescoping selector valve	6.O-ring	12.Hex. socket head bolt	16.Eye bol
3.Elevating selector valve	7.Hex. socket head bolt	13.Plug	
4.End cover	8.Main relief valve	14.O-ring	

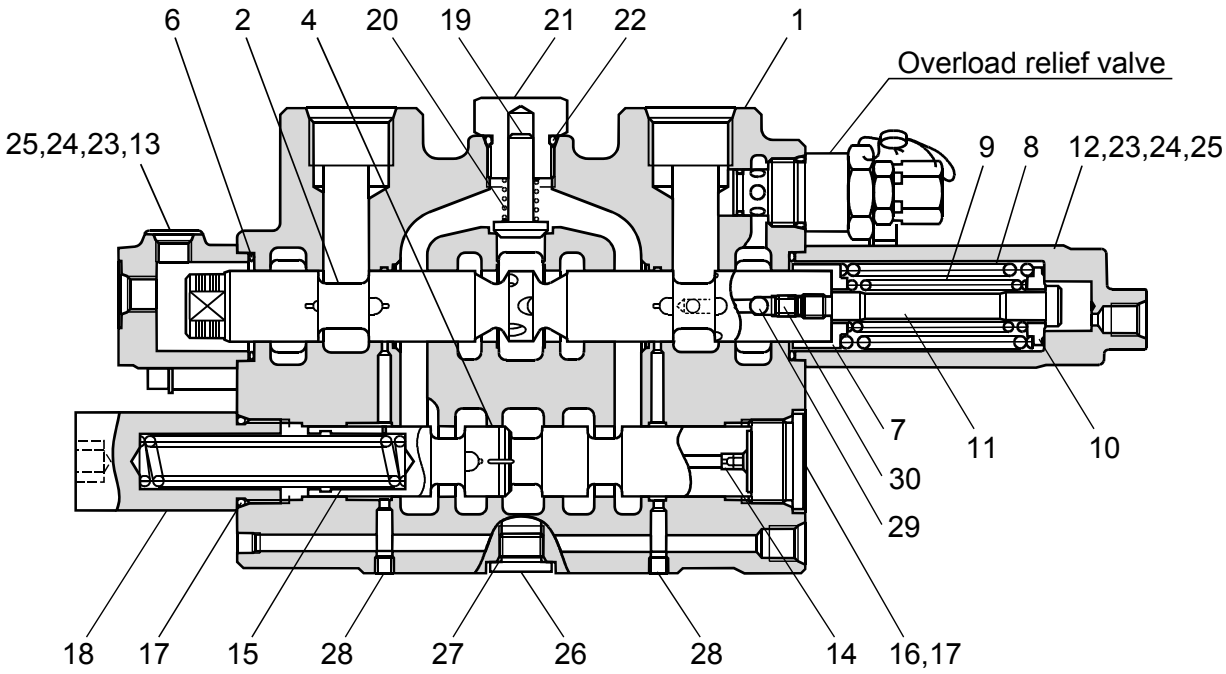
Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
7	M12	57 - 59	42 - 43
12	M10	44 - 49	32.5 - 36
13	G1/4	24.5 - 29.4	18 - 22
15	-	10 - 12	7 - 9

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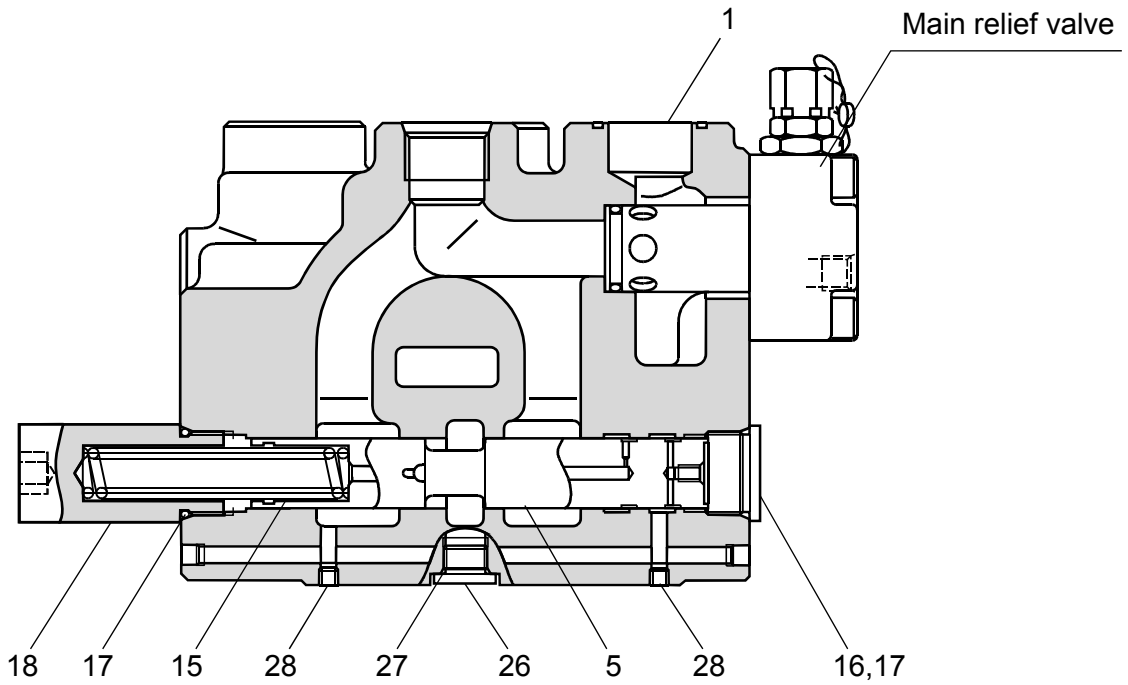
Hydraulic Pilot Control Valve (Elevating, Telescoping, Winch)

Winch selector valve



C-C (Aux. winch) , D-D (Main winch)

IW134-0270E04



E-E

IW134-0110E07

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Hydraulic Pilot Control Valve (Elevating, Telescoping, Winch)

1.Winch selector valve body
2.Spool (main,aux. winch)
3.----------
4.Flow control valve (main winch), (aux. winch)
5.Flow control valve (junction)
6.O-ring
7.Spring seat
8.Return spring
9.Return spring
10.Spring seat
11.Spool end
12.Pilot cover
13.Pilot cover
14.Orifice
15.Spring (flow control valve)
16.Plug
17.O-ring
18.Spring retainer (flow control valve)
19.Check valve
20.Spring (check valve)
21.Plug (check valve)
22.O-ring
23.Hex. socket head bolt
24.Plain washer
25.Spring washer
26.Plug
27.O-ring
28.Plug
29.Steel ball
30.Hex. socket set screw

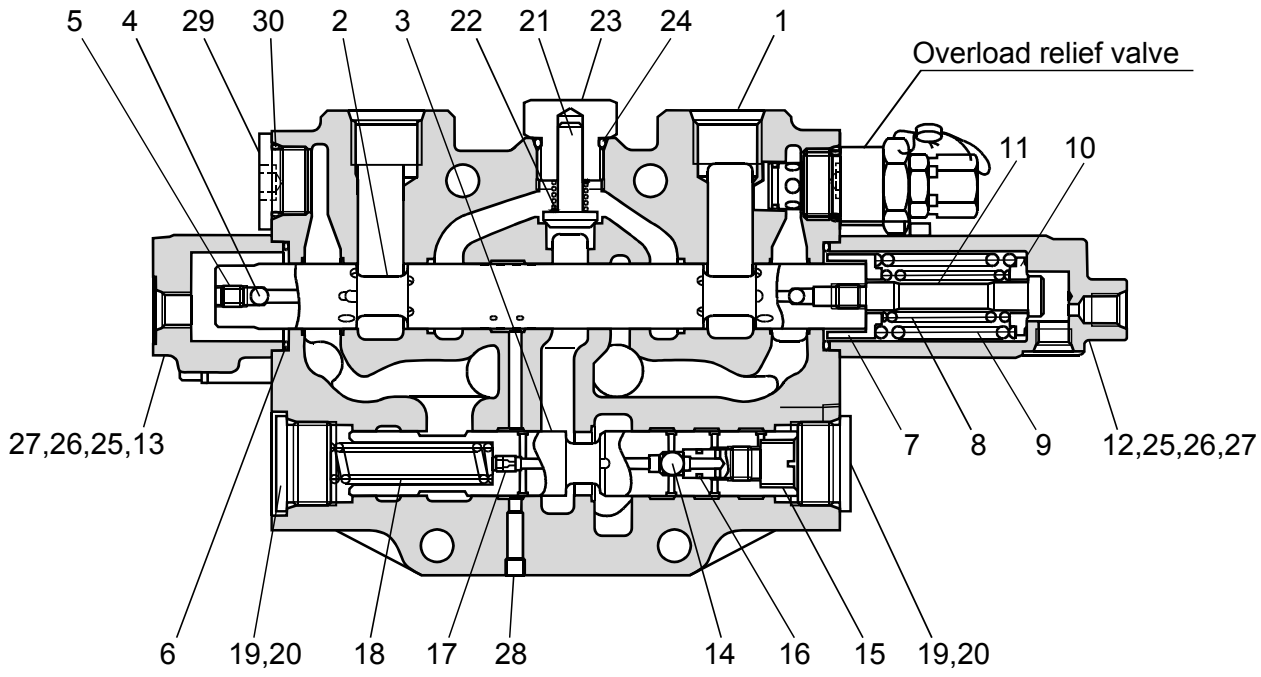
Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
Overload relief valve (Main winch), (Aux. winch)	M27×1.5	78 - 88	58 - 65
11*1	-	18 - 20	13 - 14
14*2	M6	5 - 6	3.5 - 4.5
30*1	M8	12 - 14	8.5 - 10
16	M33	98 - 118	72 - 87
18	-	98 - 118	72 - 87
21	-	78.5 - 88.3	58 - 65
23	M8	27.5 - 29.4	20 - 22
26	G 3/8	39.2 - 49	29 - 36
28	-	10 - 12	7 - 9
*1: Apply LOCTITE 242 (thread locking agent) to threaded sections. *2: Apply LOCTITE 270 (thread locking agent) to threaded sections.			

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Hydraulic Pilot Control Valve (Elevating, Telescoping, Winch)

Telescoping selector valve



F-F (Telescoping)

IW134-0270E03

1.Telescoping selector valve body	7.Spring seat	15.Plug (shuttle valve)	23.Plug (check valve)
2.Spool (telescoping)	8.Return spring	16.O-ring	24.O-ring
3.Flow control valve (telescoping)	9.Return spring	17.Orifice	25.Hex. socket head bolt
4.Steel ball	10.Spring seat	18.Spring (flow control valve)	26.Plain washer
5.Hex. socket set screw	11.Spool end	19.Plug	27.Spring washer
6.O-ring	12.Pilot cover	20.O-ring	28.Plug
	13.Pilot cover	21.Check valve	29.Plug
	14.Steel ball	22.Spring (check valve)	30.O-ring

Thread size and tightening torque

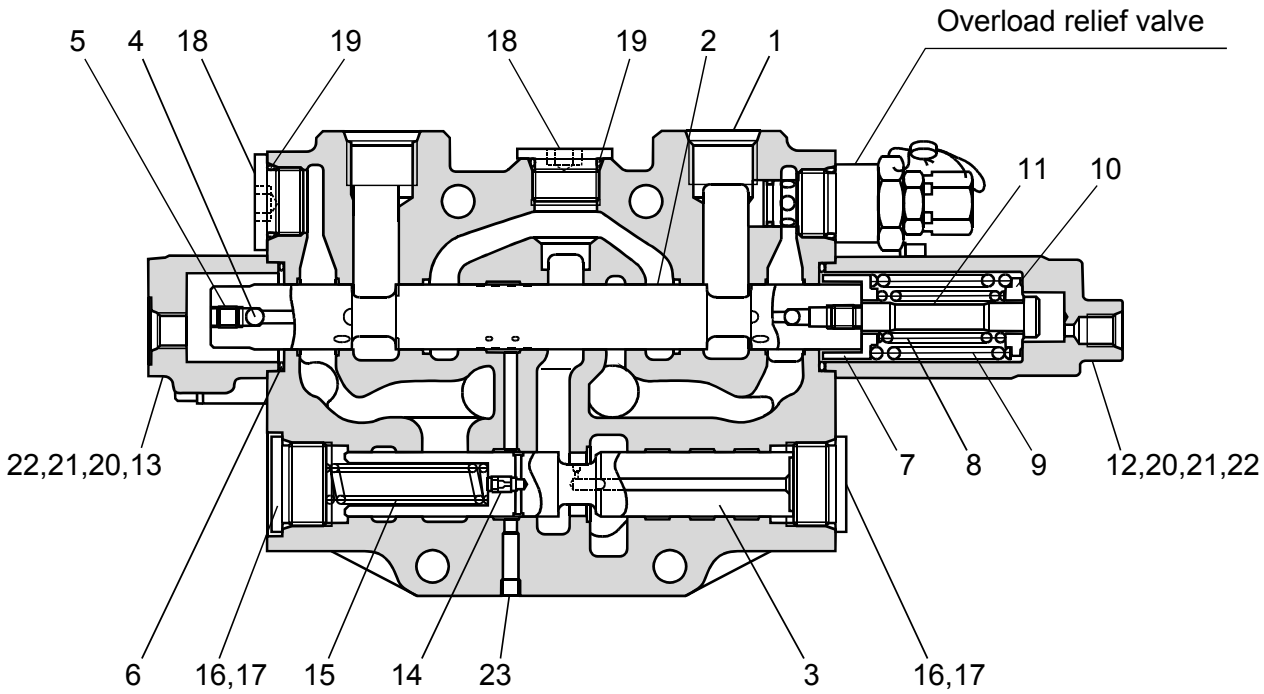
Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
Overload relief valve (Telescoping)	M27×1.5	77 - 88	58 - 65
5*1	M8	12 - 14	8.5 - 10
11*1	-	18 - 20	13 - 14
15*1	-	18 - 20	13 - 14
17*2	M6	5 - 6	3.5 - 4.5
19	M33	98 - 118	72 - 87
23	-	78.5 - 88.3	58 - 65
25	M8	27.5 - 29.4	20 - 22
28	-	10 - 12	7 - 9
29	G3/4	78.5 – 88.3	58 - 65

*1: Apply LOCTITE 242 (thread locking agent) to threaded sections.
*2: Apply LOCTITE 270 (thread locking agent) to threaded sections.

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Hydraulic Pilot Control Valve (Elevating, Telescoping, Winch)

Elevating selector valve



G-G (Elevating)

IW134-0110E09

1.Elevating selector valve body
2.Spool (elevating)
3.Flow control valve (elevating)
4.Steel ball
5.Hex. socket set screw
6.O-ring
7.Spring seat
8.Return spring
9.Return spring
10.Spring seat
11.Spool end
12.Pilot cover
13.Pilot cover
14.Orifice
15.Spring (flow control valve)
16.Plug
17.O-ring
18.Plug
19.O-ring
20.Hex. socket head bolt
21.Plain washer
22.Spring washer
23.Plug

Thread size and tightening torque

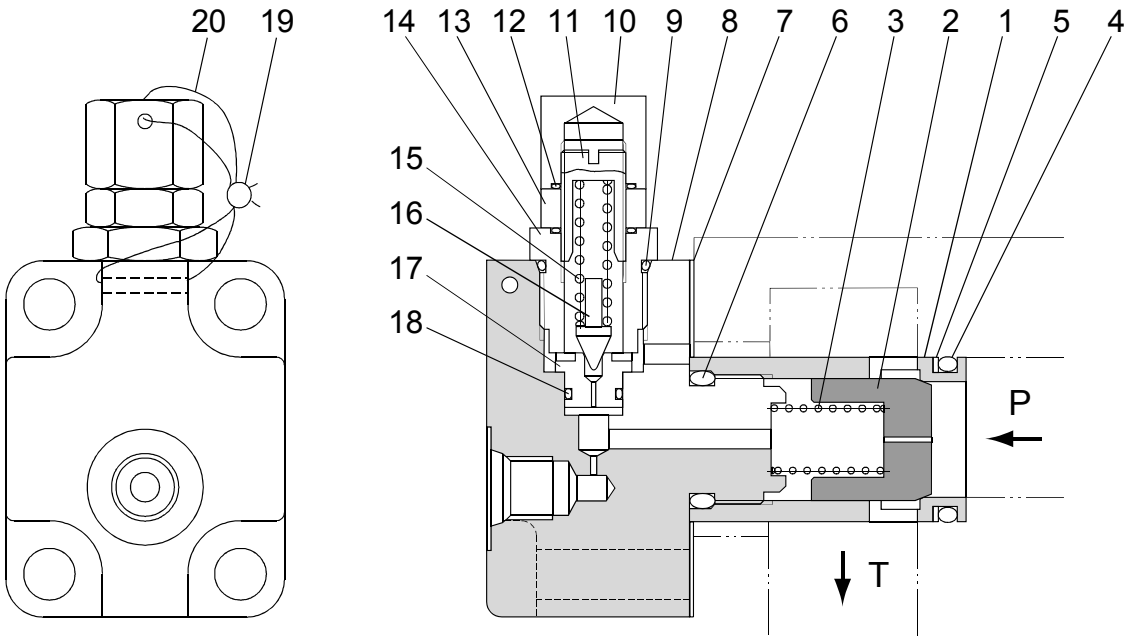
Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
Overload relief valve (Elevating)	M27×1.5	78 - 88	58 - 65
5*1	M8	12 - 14	8.5 - 10
11*1	-	18 - 20	13 - 14
14*2	M6	5 - 6	3.5 - 4.5
16	M33	98 - 118	72 - 87
18	G3/4	78.5 - 88.3	58 - 65
20	M8	27.5 - 29.4	20 - 22
23	-	10 - 12	7 - 9

*1: Apply LOCTITE 242 (thread locking agent) to threaded sections.
*2: Apply LOCTITE 270 (thread locking agent) to threaded sections.

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Hydraulic Pilot Control Valve (Elevating, Telescoping, Winch)

Main relief valve
(Main winch, Aux. winch), (Elevating, Telescoping)



IW134-011010

1.Socket	6.O-ring	11.Adjust screw	16.Valve
2.Valve	7.Packing	12.O-ring	17.Valve seat
3.Spring	8.Body	13.Nut	18.O-ring
4.O-ring	9.O-ring	14.Body	19.Seal lead
5.Backup ring	10.Cap nut	15.Spring	20.Tie up wire

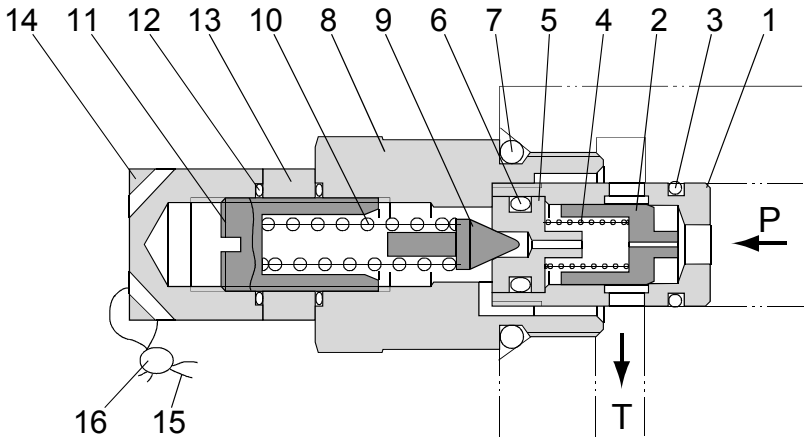
Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
1	-	28.4 - 30.4	21 - 22.4
10	M14×1	18.6 - 20.6	13.7 - 15.2
13	M14×1	18.6 - 20.6	13.7 - 15.2
14	-	38.2 - 40.2	28.2 - 29.6

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Hydraulic Pilot Control Valve (Elevating, Telescoping, Winch)

Overload relief valve
(Main winch), (Aux. winch), (Elevating), (Telescoping)



IW134-011011

1.Socket	5.Valve seat	9.Valve	13.Nut
2.Valve	6.O-ring	10.Spring	14.Cap nut
3.O-ring	7.O-ring	11.Adjust screw	15.Tie up wire
4.Spring	8.Body	12.O-ring	16.Seal lead

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
1	-	18.6 - 20.6	13.7 - 15.2
8	M27×1.5	78.5 - 88.3	58 - 65
13	M14×1	18.6 - 20.6	13.7 - 15.2
14	M14×1	18.6 - 20.6	13.7 - 15.2

366-405-40000 △0

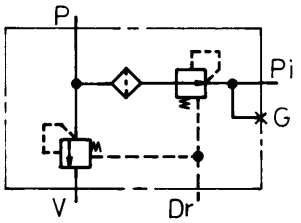
https://truckmanualshub.com/

B-11 Sequence Valve (Pilot Pressure)

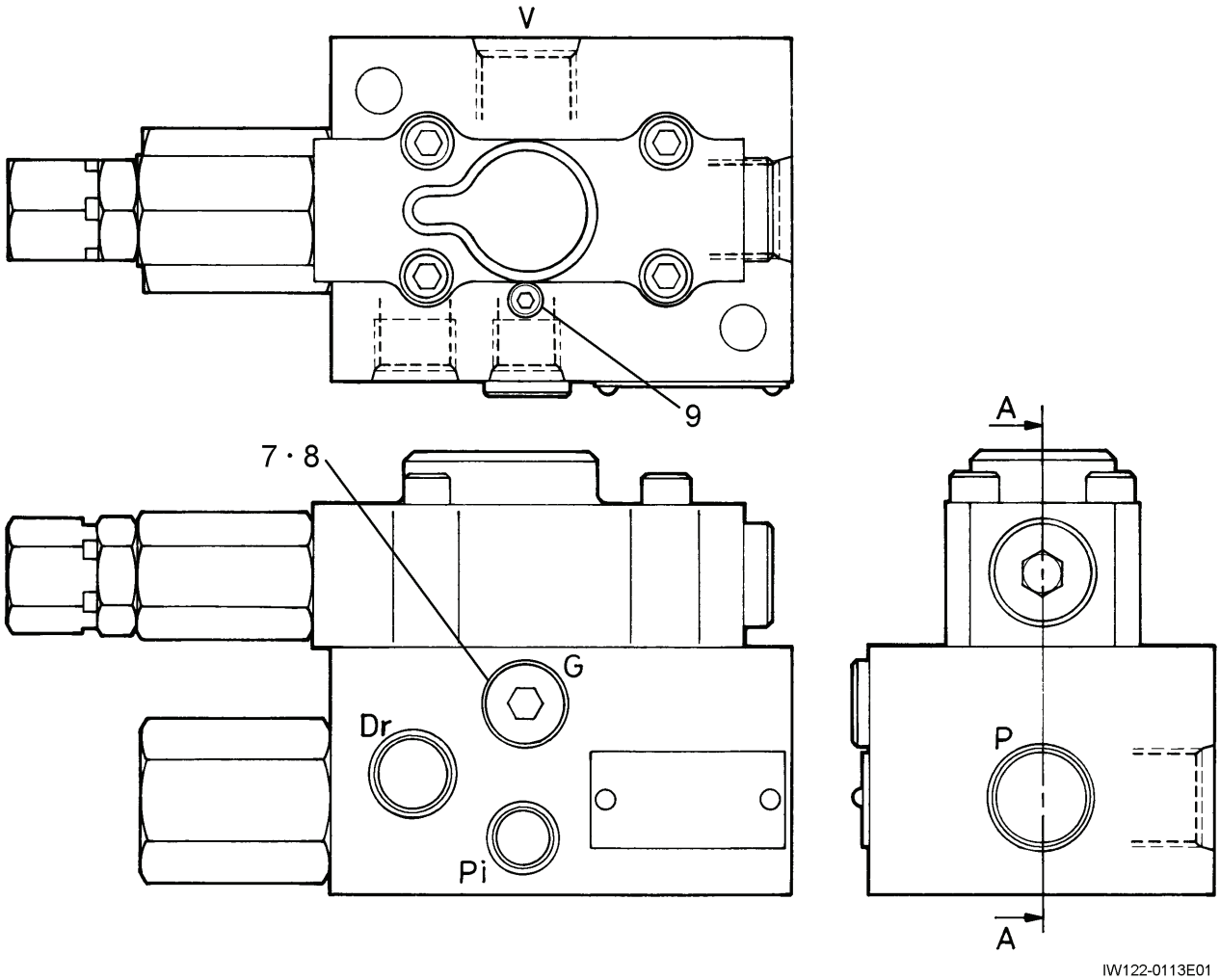
[NOTICE]

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1. Structure



IW122-011002



IW122-0113E01

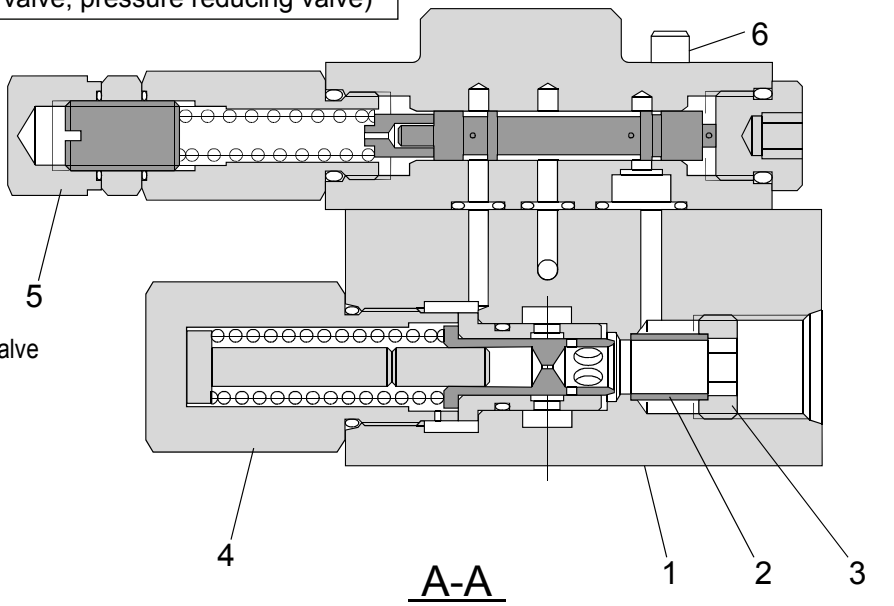
Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
P, V	G1/2	98	72
Dr	G3/8	49	36
Pi, G	G1/4	29.4	22

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Sequence Valve (Pilot Pressure)

Cross section along the line A-A
(back pressure regulating valve, pressure reducing valve)



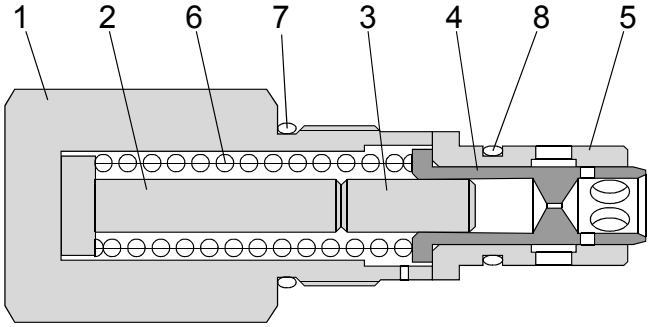
IW122-0112E01

1.Body
2.Filter
3.Filter retainer
4.Back pressure regulating valve
5.Pressure reducing valve
6.Hexagon socket head bolt
7.Plug
8.O-ring
9.Plug

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
3	G1/2	9.81 - 11.8	7.2 - 8.7
6	M6	9.81 - 10.8	7.2 - 8

Back pressure regulating valve
(illustrated as 4 in the cross section along the line A-A)



IW122-011004

1.Spring cover
2.Stopper
3.Piston
4.Valve
5.Socket
6.Spring
7.O-ring
8.O-ring

Thread size and tightening torque

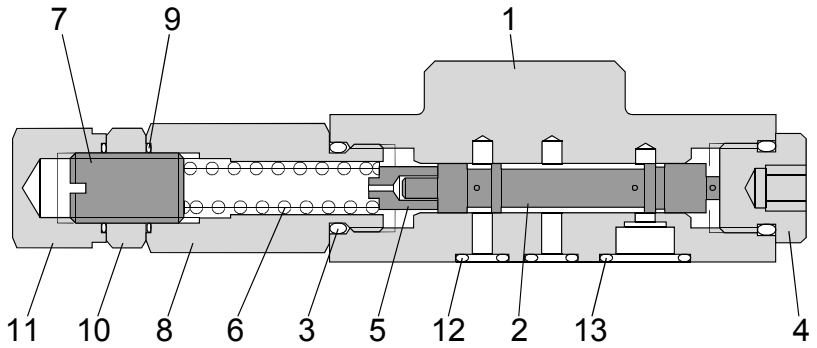
Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
1	M24×1.5	58.8 – 68.6	43.4 – 50.6

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Sequence Valve (Pilot Pressure)

Pressure reducing valve

(illustrated as 5 in the cross section along the line A-A)



IW122-011005

1.Body	5.Spring seat	9.O-ring	13.O-ring
2.Spool	6.Spring	10.Nut	
3.O-ring	7.Adjust screw	11.Cap nut	
4.Plug	8.Body	12.O-ring	

366-038-80000 △0

366-060-30000 △0

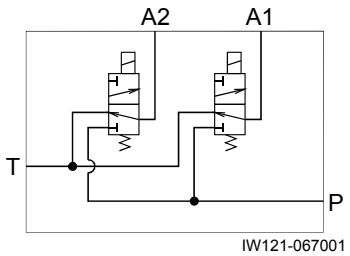
https://truckmanualshub.com/

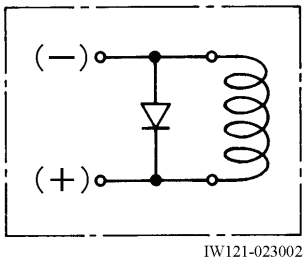
B-12 Solenoid Valve (Pilot Pressure)

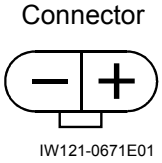
[NOTICE]

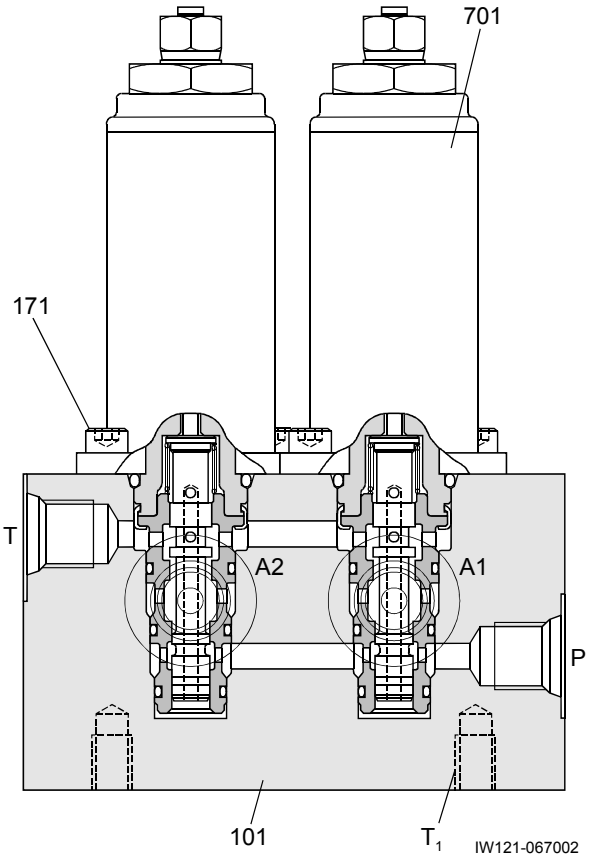
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1. Structure









101.Casing
171.Hexagon socket head bolt
701.Solenoid valve (DC24V)

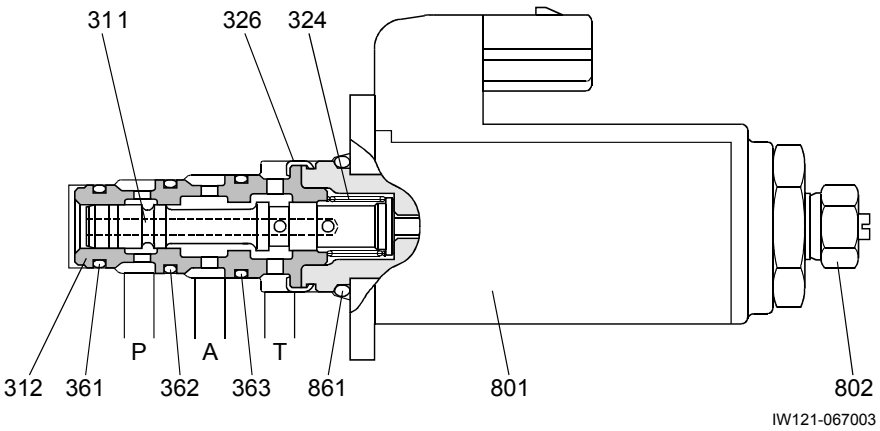
Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
P,T,A1,A2	G1/4	34 - 38	25 - 28
171	M5	6 - 8	4.5 - 6
T1	M8	26 - 32	20 - 24

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Solenoid Valve (Pilot Pressure)

Solenoid valve assy



311.Spool
312.Sleeve
324.Spring
326.Retaining ring
361.O-ring
362.O-ring
363.O-ring
801.Solenoid valve
802.Seal nut
861. O-ring

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
802	M6	6.9 - 7.9	5.1 - 5.8

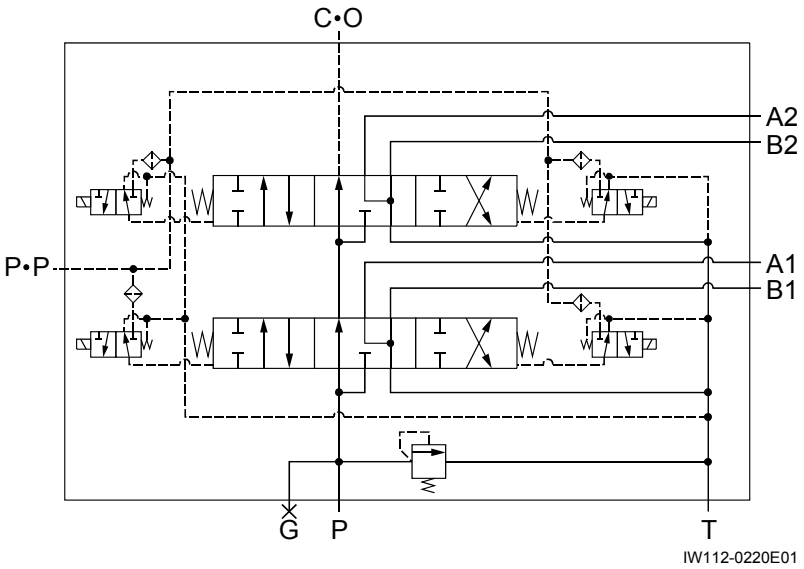
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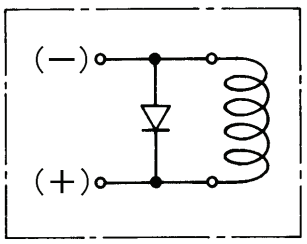
B-13 Solenoid Control Valve (Jib Set)

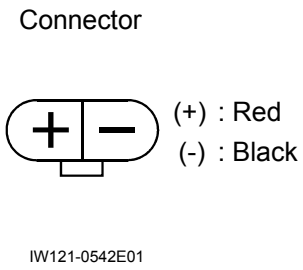
[NOTICE]

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1. Structure

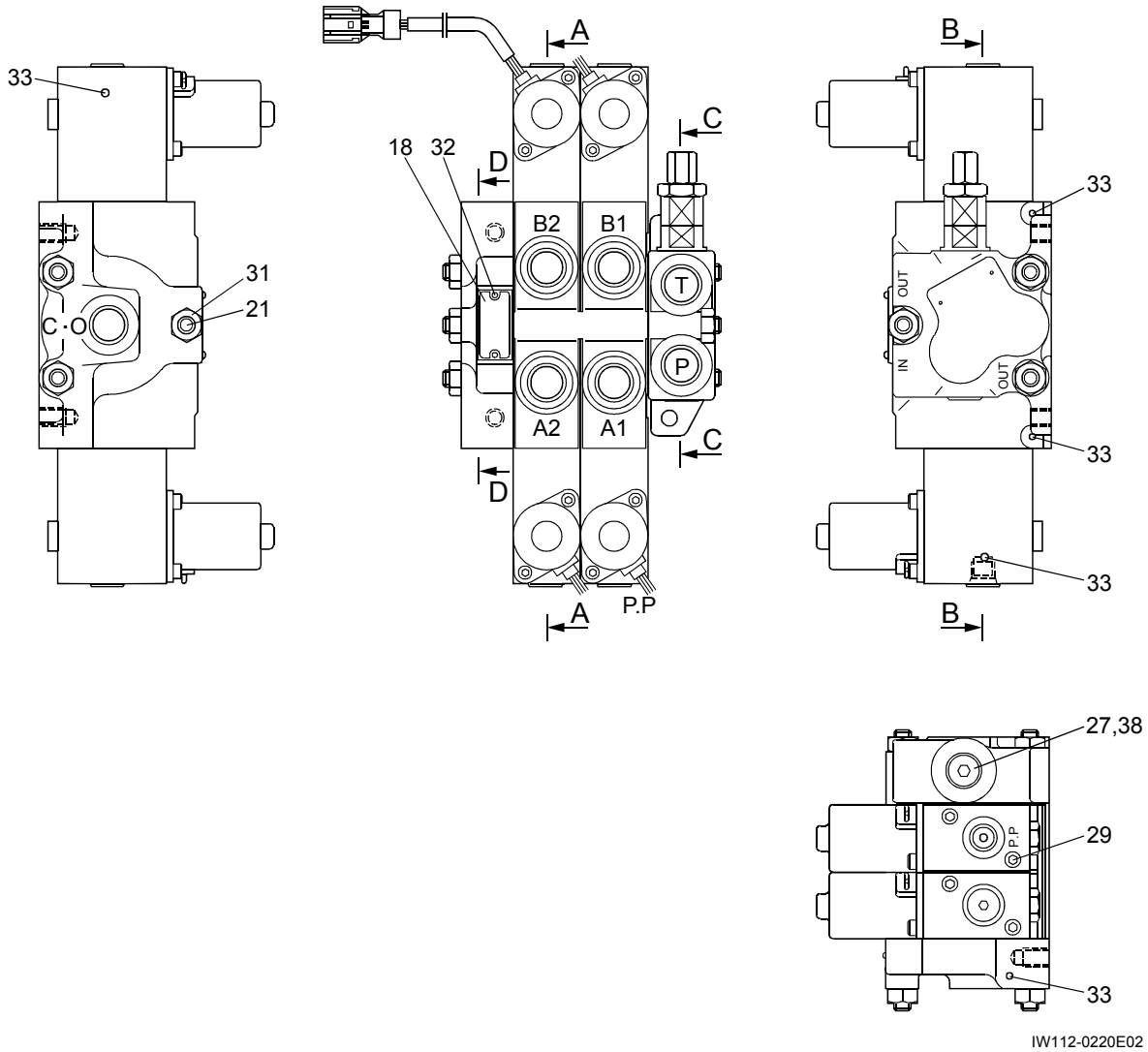






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Solenoid Control Valve (Jib Set)



IW112-0220E02

18.Name plate	27.Plug	31.Nut	33.Ball
21.Tigh rod	29.Hexagon socket head bolt	32.Ribbet screw	38.O-ring

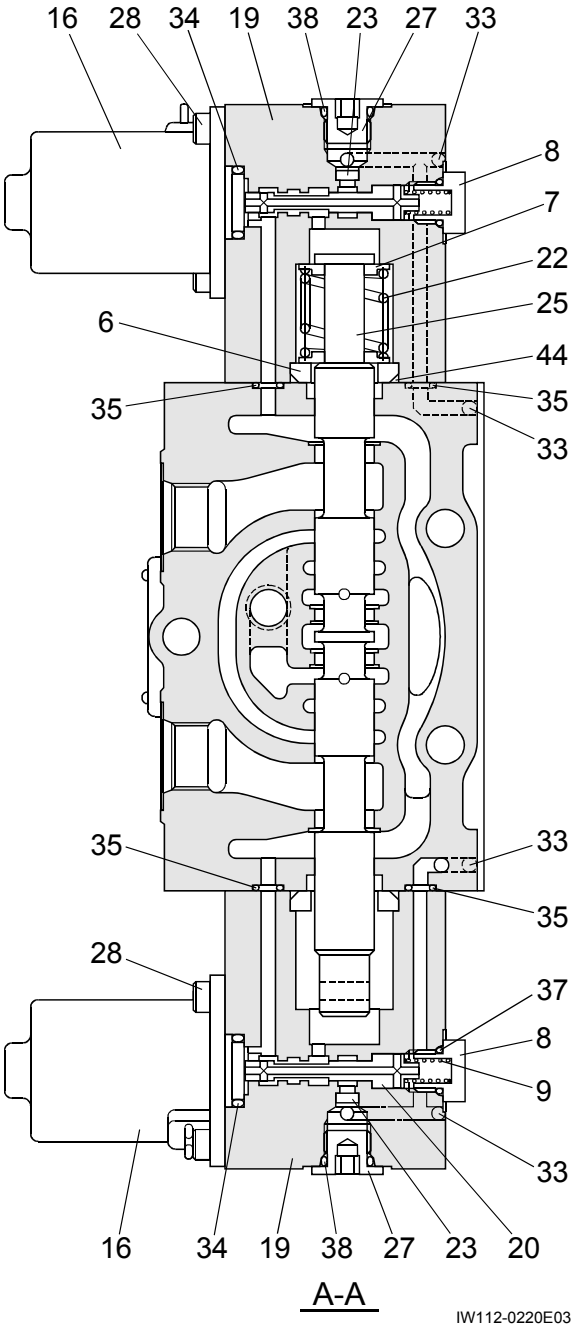
Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
P, T	G1/2	98	72
A1, B1, A2, B2	G3/8	49	36
C•O	G1/2	98	72
P•P	G1/4	29.4	22

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Solenoid Control Valve (Jib Set)

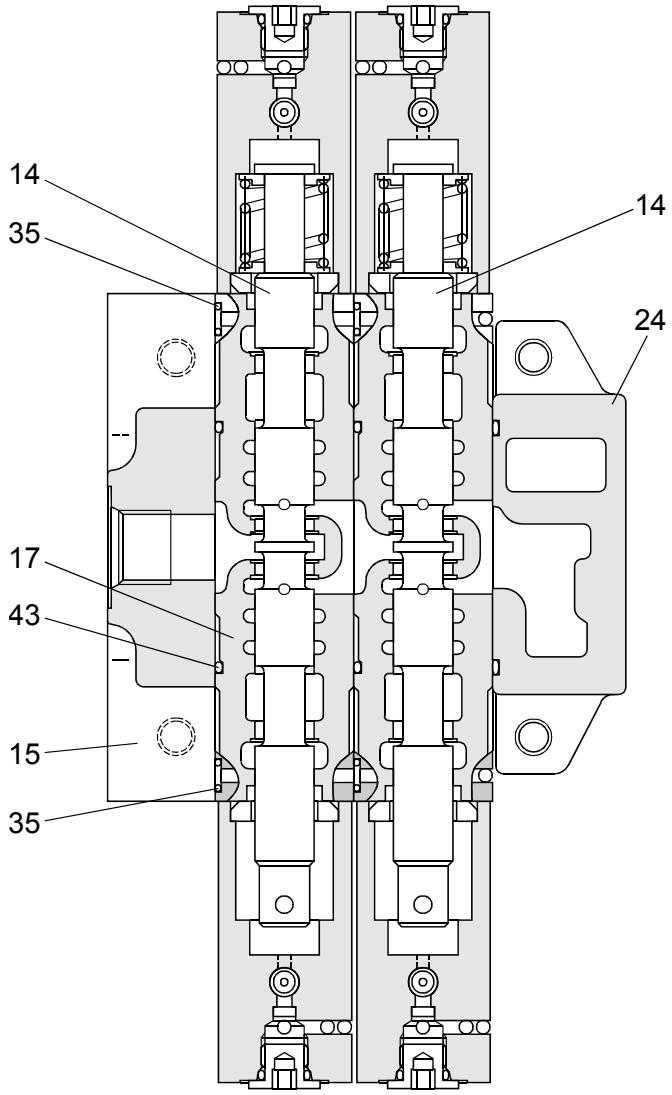
6.Collar
7.Spring folder
8.Plug
9.Spring
16.Solenoid
19.Body
20.Spring
22.Spring
23.Filter
25.Spool end
27.Plug
28.Hexagon socket head bolt
33.Ball
34.O-ring
35.O-ring
37.O-ring
38.O-ring
44.O-ring



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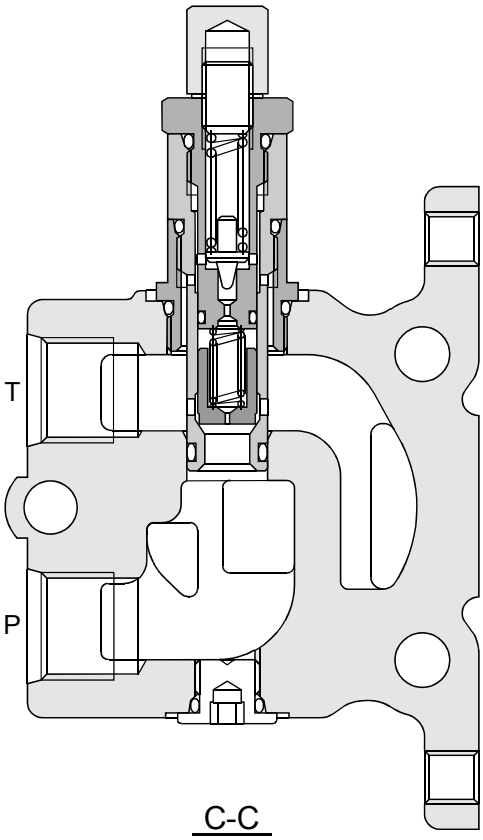
Solenoid Control Valve (Jib Set)

14.Spol
15.Housing
17.Housing plunger
24.Housing
35.O-ring
43.O-ring



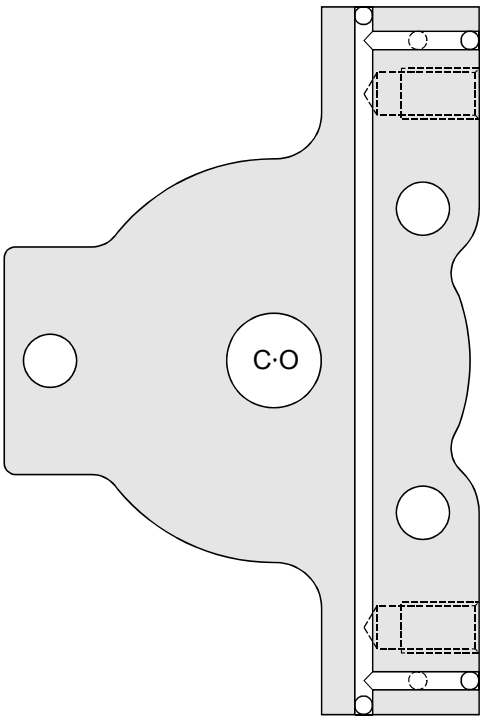
https://truckmanualshub.com/

Solenoid Control Valve (Jib Set)



C-C

IW112-0220E05



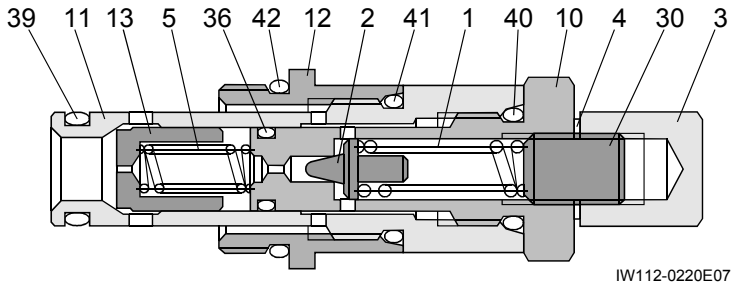
D-D

IW112-0220E06

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Solenoid Control Valve (Jib Set)

Relief valve



1.Spring	5.Spring	13.Poppet	40.O-ring
2.Needle valve	10.Housing	30.Screw	41.O-ring
3.Nut	11.Sleeve	36.O-ring	42.O-ring
4.Gasket	12.Sleeve	39.O-ring	

366-489-20000 0

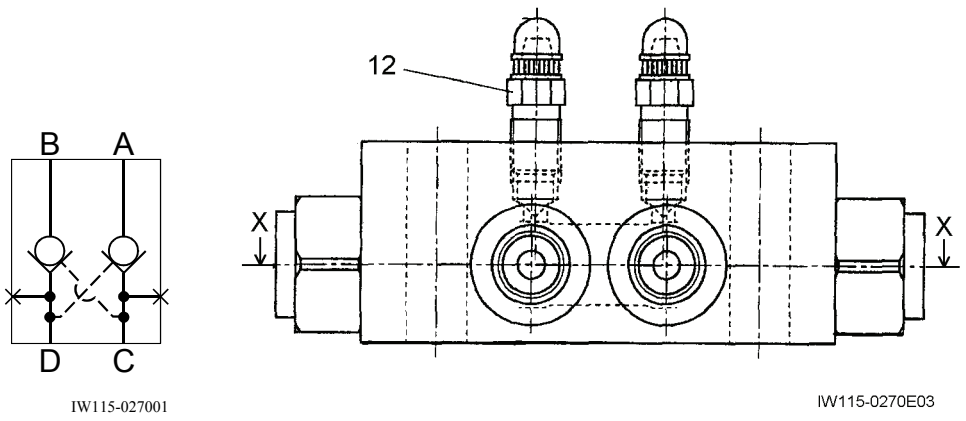
https://truckmanualshub.com/

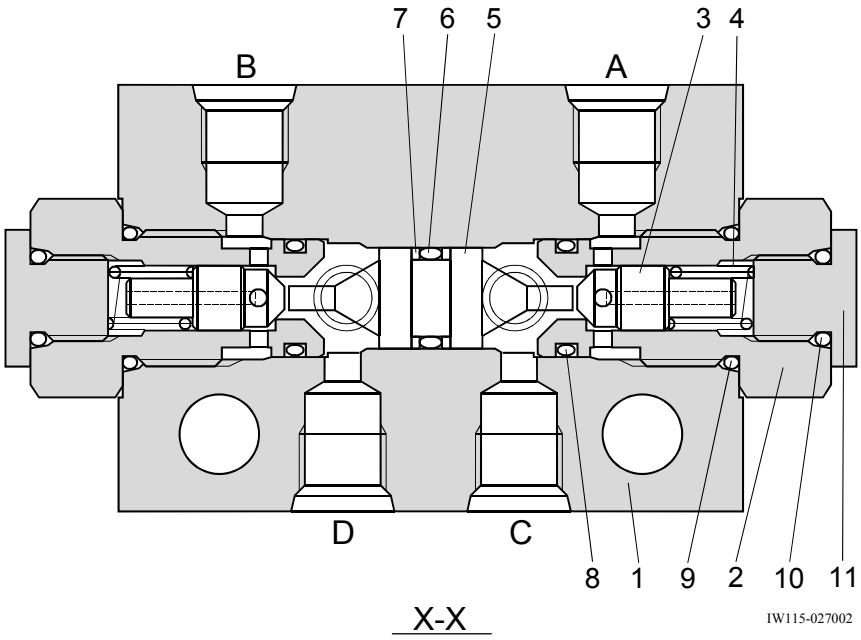
B-14 Pilot Check Valve (Jib Set)

[NOTICE]

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1. Structure





1.Body	4.Spring	7.Backup ring	10.O-ring
2.Sleeve	5.Piston	8.O-ring	11.Plug
3.Poppet	6.O-ring	9.O-ring	12.Plug

Thread size and tightening torque

Sign /port	Thread size	Tightening torque	
		N-m	ft-lbf
A,B,C,D	G1/4	29.4	22

366-241-40000 ⚠1

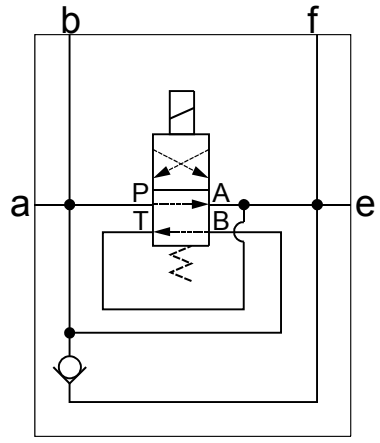
https://truckmanualshub.com/

B-15 Solenoid Valve (Oil Cooler)

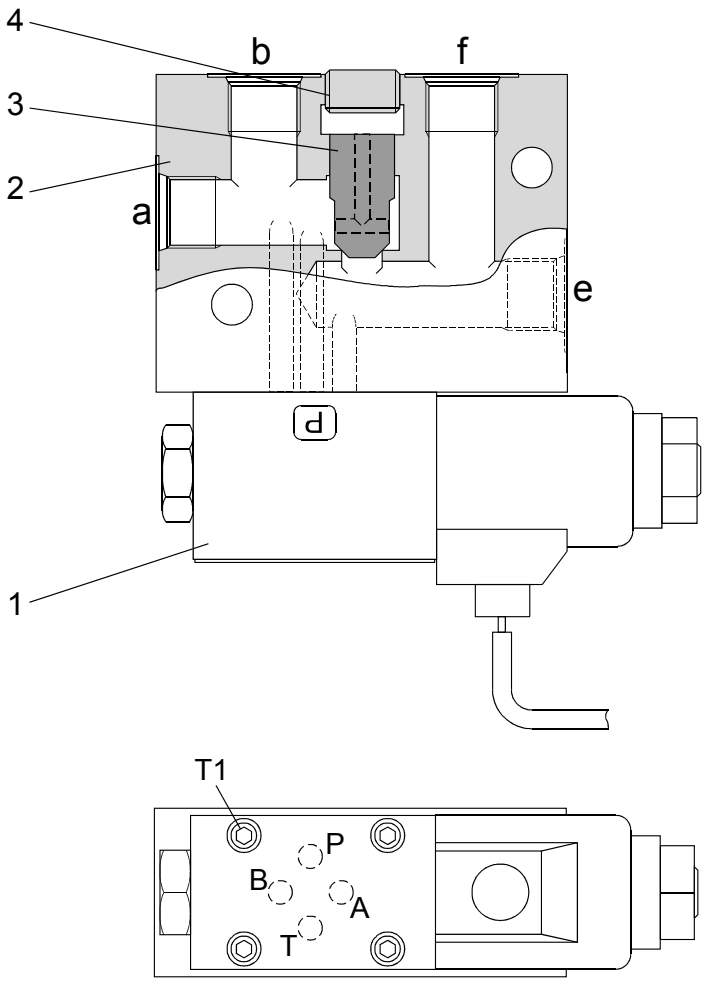
[NOTICE]

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1. Structure



IW121-025001



IW121-025002

1.Solenoid valve assy 2.Body 3.Valve 4.Plug

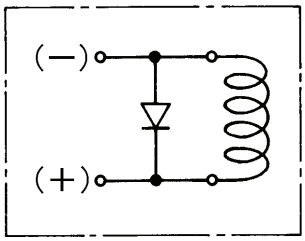
Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
a, b, e, f	G1/2	98	72
T1	M5	7 - 8	5 - 6

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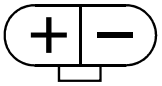
Solenoid Valve (Oil Cooler)

Solenoid valve assy



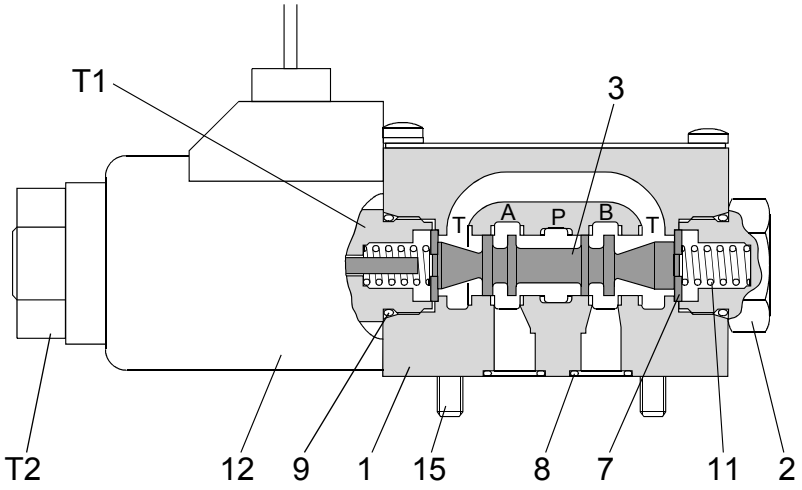
IW121-023002

Connector



(+): Red
(-): Blue

IW121-0542E01



IW121-025003

1.Body	7.Spring seat	11.Spring
2.Plug	8.Square ring	12.Solenoid (DC24V)
3.Spool	9.O-ring	15.Hexagon socket head bolt

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
2	-	44 - 49	32 - 36
15	M5	7	5
T1	-	39 - 49	29 - 36
T2	-	4.4 – 5.4	3 - 4

366-457-50000 ⚠1

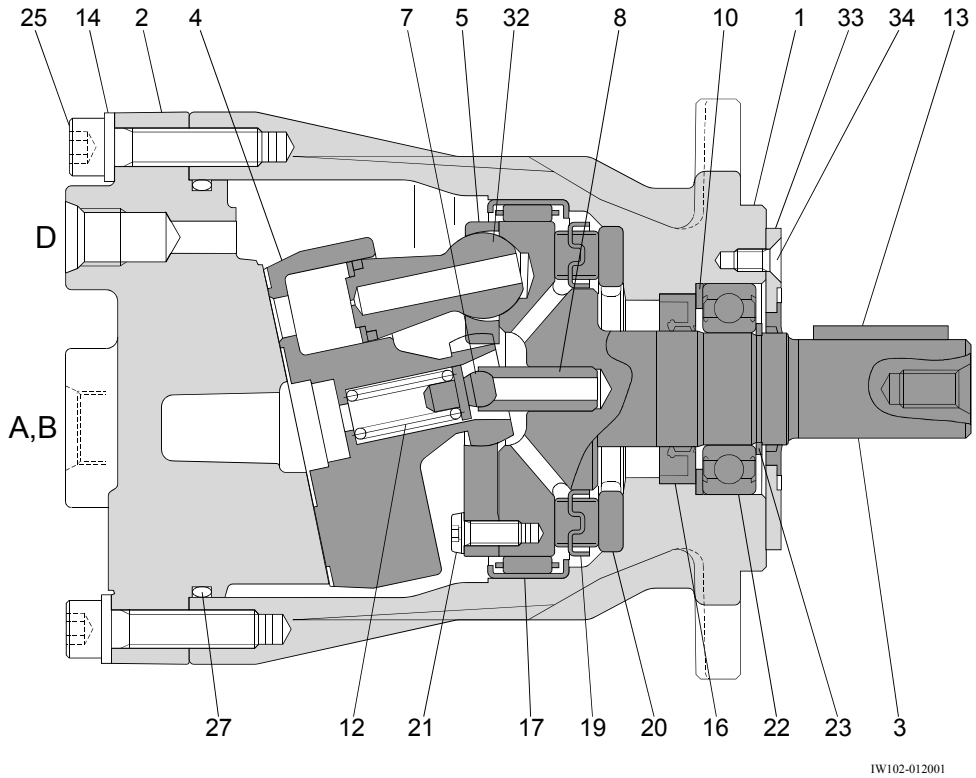
https://truckmanualshub.com/

B-16 Hydraulic Motor (Oil Cooler)

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



1.Front case	8.Spherical pin	17.Needle bearing	23.Retaining ring
2.Rear case	10.Collar	19.Thrust roller bearing	25.Hexagon socket head bolt
3.Shaft	12.Spring	20.Thrust plate	27.O-ring
4.Cylinder block	13.Straight key	21.Hexagon socket head but bolt	32.Piston assy
5.Piston retainer	14.Plain washer		33.Seal plate
7.Spherical retainer	16.Oil seal	22.Ball bearing	34.Flat head machine screw

Thread size and tightening torque

Sign /port	Thread size	Tightening torque	
		N-m	ft-lbf
A, B	G3/8	64	47
D	G1/4	40	30
21	M5	4 - 6	2.9 - 4.3
25	M8	34 - 39	25 - 29
34	M5	2 - 3	1.4 - 2.2

2. Air bleeding procedure

Refer to “Air Bleeding Procedure” in chapter Y.

366-632-60000 △0
366-631-10000 △0
366-631-20000 △0

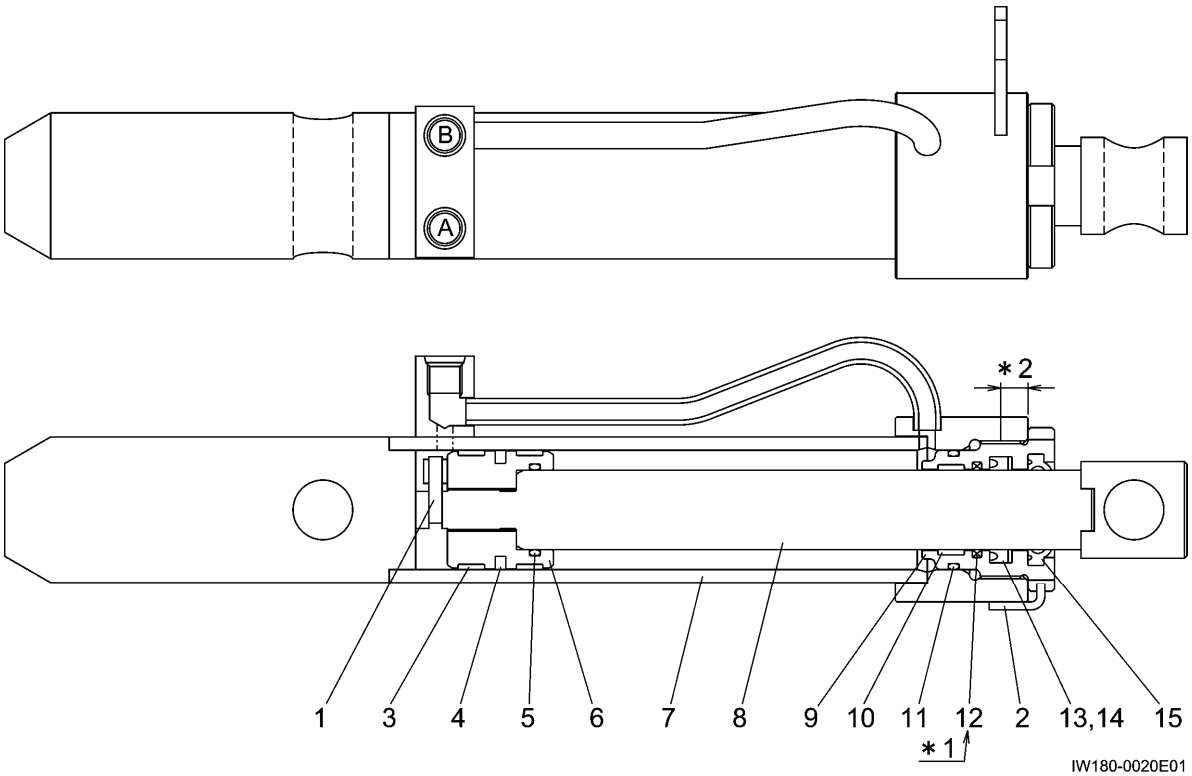
https://truckmanualshub.com/

B-17 Jib Lock Pin

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



1.Spring pin	5.O-ring	9.Rod cover	13.Packing
2.plate	6.Piston	10.Plain bearing	14.Backup ring
3.Plain bearing	7.Cylinder	11.O-ring	15.Dust seal
4.Ring seal	8.Rod	12.Damper ring	

*1 : Face the notch or the lip toward the pressurized side.

*2 : Apply sealant equivalent to three bond 1104.

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
A, B	G1/4	29.4	22

360-531-60000 ⚠0

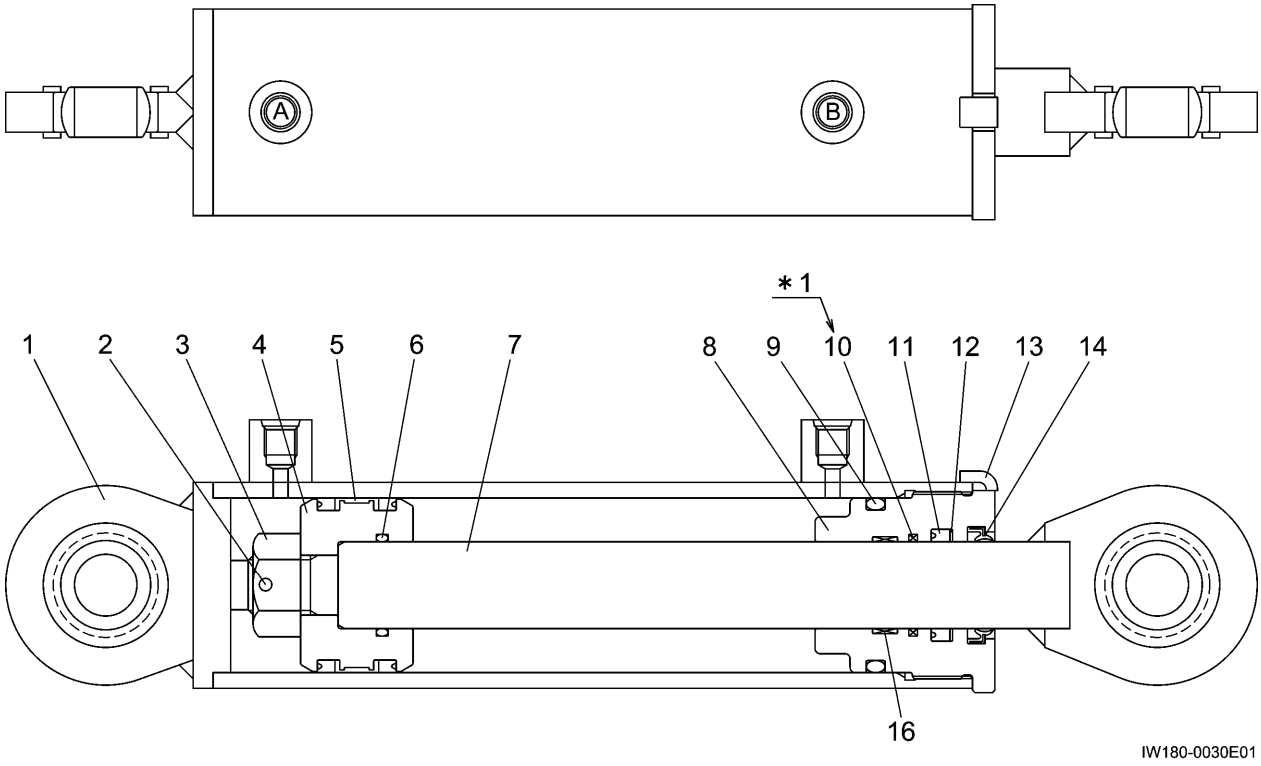
https://truckmanualshub.com/

B-18 Jib Offset Cylinder

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



1.Cylinder	5.Plain bearing	9.O-ring	13.Plate
2.Split pin	6.O-ring	10.Damper ring	14.Dust seal
3.Nut	7.Rod	11.packing	15.---
4.Piston	8.Rod cover	12.Backup ring	16.Plain bearing

*1 : Face the notch or the lip toward the pressurized side.

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
A, B	G1/4	29.4	22

360-520-90000 ⚠0

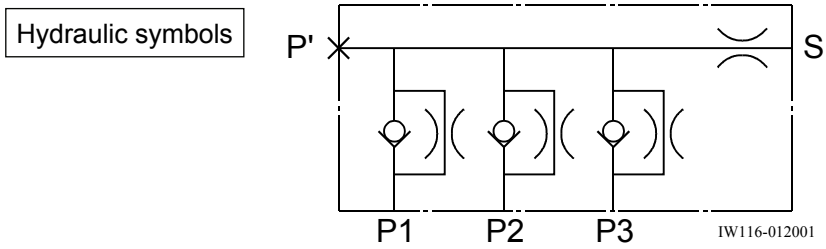
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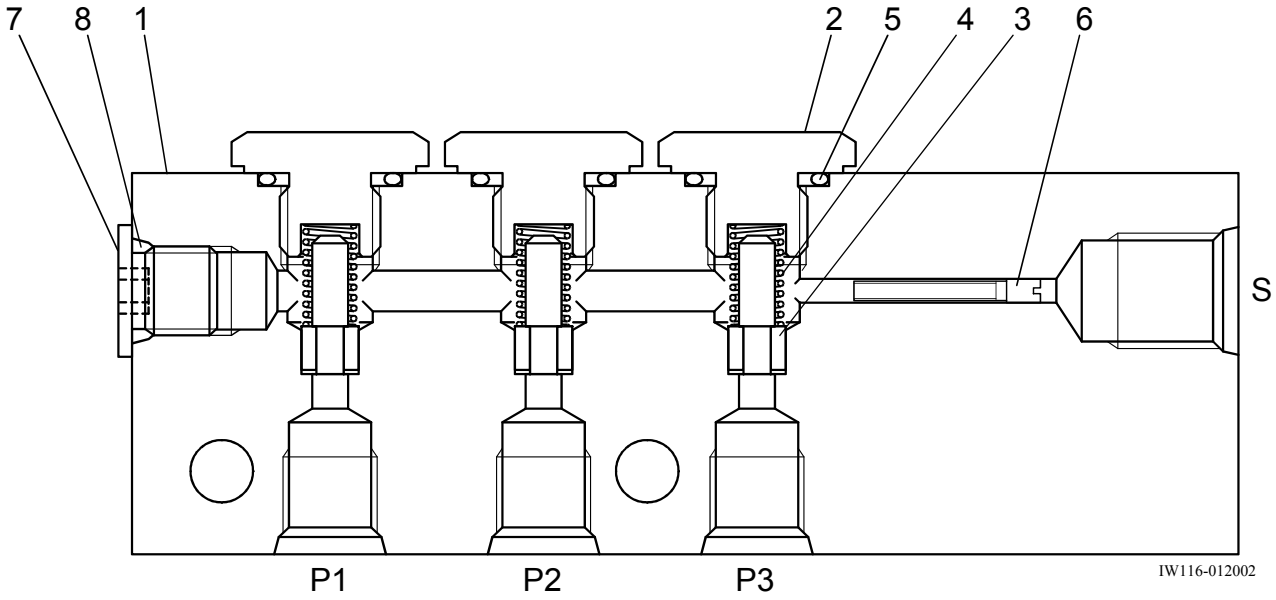
B-19 Check Valve (Gauge Isolator)

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure





Thread size and tightening torque

Sign / port	Thread size	Tightening torque		Remark
		N-m	ft-lbf	
P1, P2, P3, P'	G 1/4	29.4	22	
S	G 3/8	49.0	36	
	M18×1.5	127 - 147	93 - 108	TT-300XL-1 only
Mounting bolt	M8	13 - 15	9.6 - 11.0	

1. Body
2. Plug
3. Poppet
4. Spring
5. O-ring
6. Screw
7. Plug
8. O-ring

366-244-50000 △1
366-251-20000 △0

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C

Outrigger System

Contents

C-1 Outrigger System 1

1. General 1

C-2 Jack Cylinder 5

1. Structure 5

C-3 Pilot check Valve (Jack Cylinder Retracting Prevention) 6

1. Structure 6

C-4 Extension Cylinder 7

1. Structure 7

C-5 Solenoid Valve (Slide/Jack) (UCHIDA) 8

1. Structure 8

C-6 Solenoid Valve (Slide / Jack) (TOKIMEC) 9

1. Structure 9

C-7 Solenoid Valve (Slide/Jack) (NACHI) 10

1. Structure 10

C-8 Check Valve (Outrigger Extending Prevention) 11

1. Structure 11

C-9 Outrigger Operation Box 12

1. Structure 12

2. Connector diagram 13

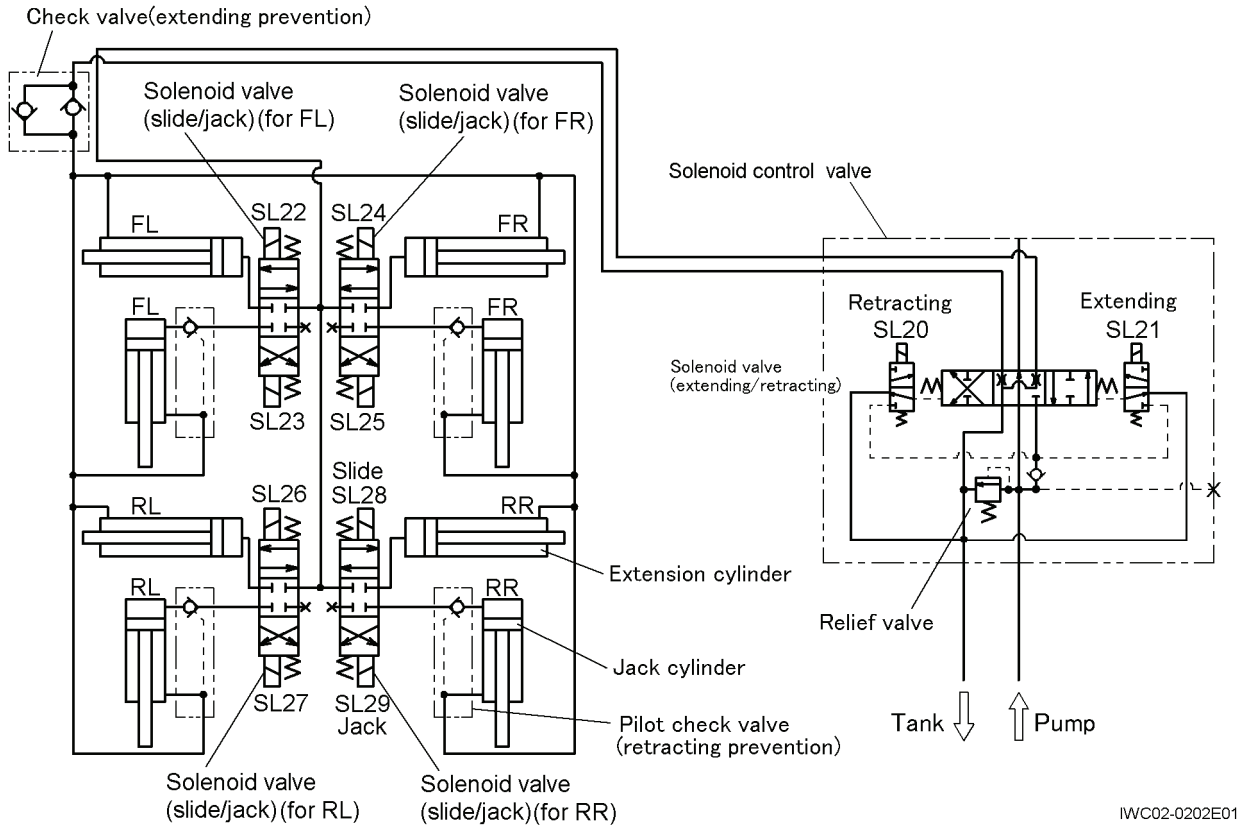
3. Specifications 13
   - 3.1 General 13
   - 3.2 Bipolar toggle switch 13
   - 3.3 Monopolar toggle switch 13
   - 3.4 Push switch 13
   - 3.5 Diode 13
   - 3.6 Lamp assembly 13

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C-1 Outrigger System

1. General

Hydraulic Circuit

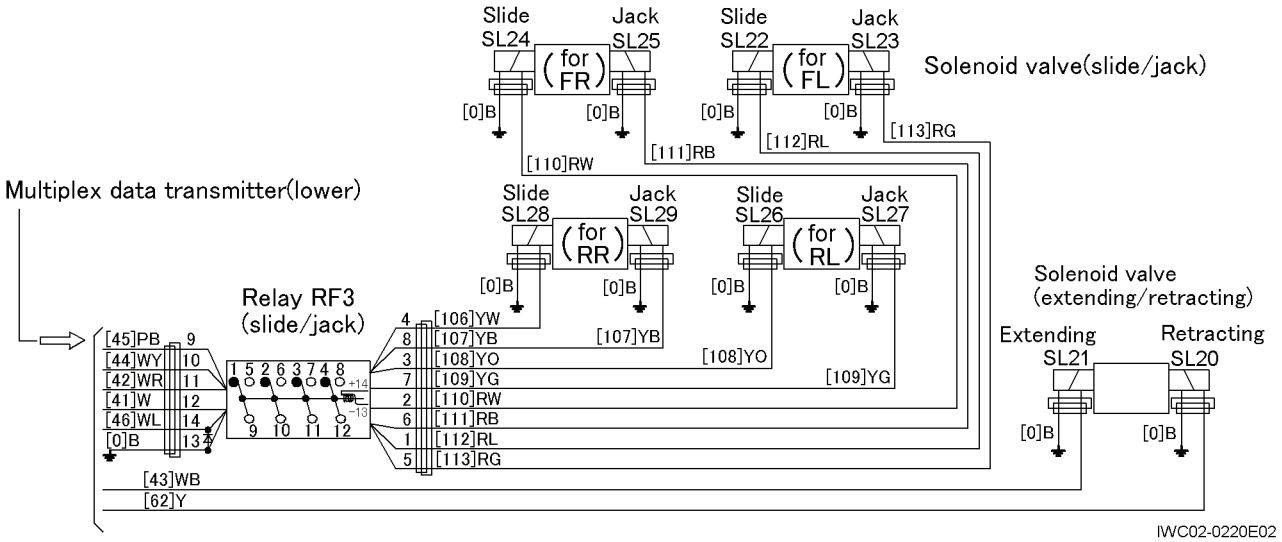


1. The outrigger controls use the solenoid control valve to select between extension or retraction for each cylinder. The solenoid valve selects between operation of the extension cylinder and the jack cylinder.
2. During outrigger extension, the pressure oil from the pump passes through the solenoid control valve and solenoid valve to enter the cylinders.
3. At this time, back pressure is generated in the return oil by the pilot check valve. The return oil then passes through the solenoid control valve and returns to the tank.
4. During outrigger retraction, the pressure oil passes through the solenoid control valve and pilot check valve, and operates on the retraction side of the extension and jack cylinders. Only the circuit of the cylinder selected by the solenoid valve retracts.
5. The maximum puressure in the outrigger hydraulic circuit is regulated by the relief valve.

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Outrigger System

Electric Circuit (Relay RF3, Solenoid Valve)

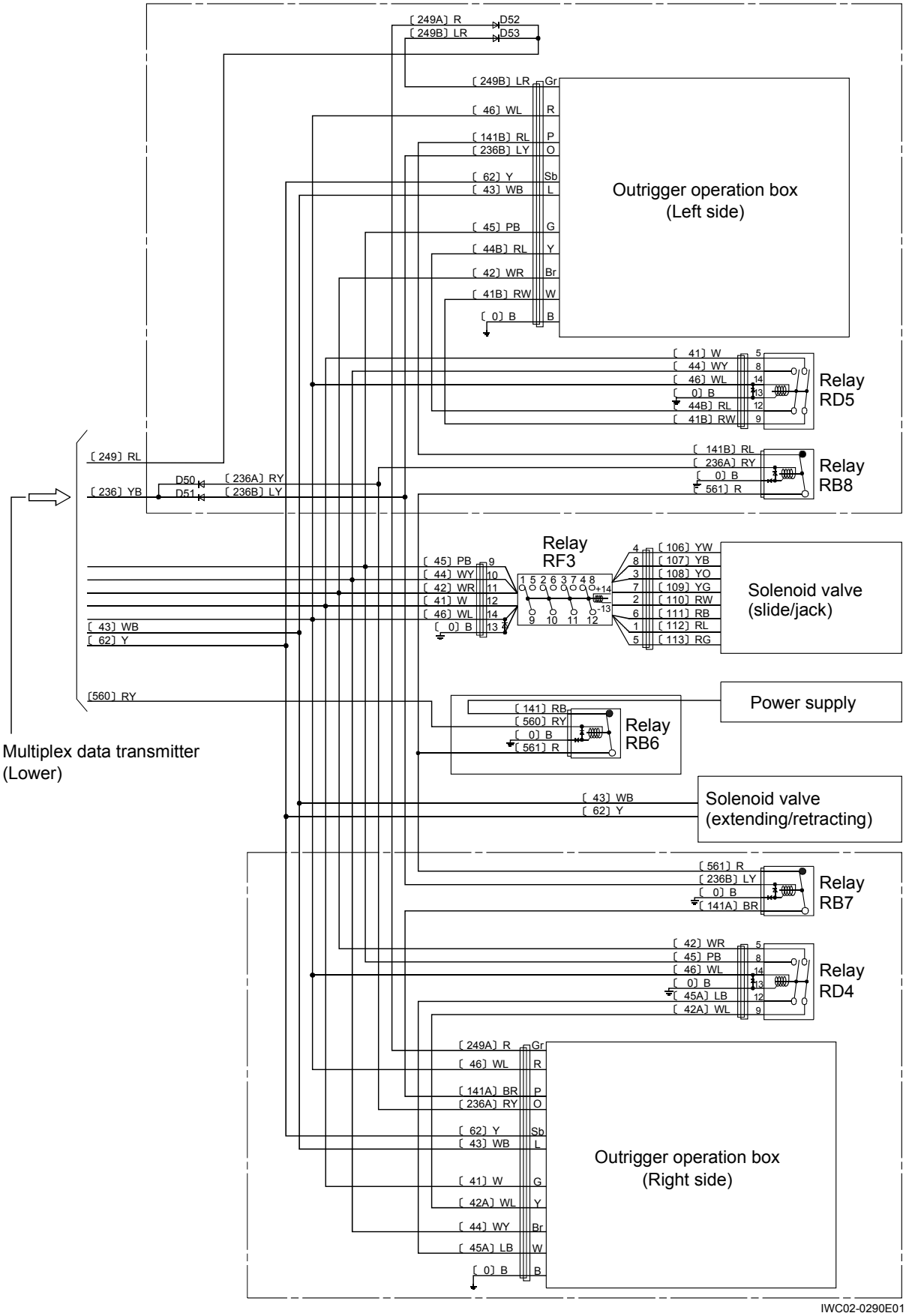


1. The solenoid valve (extending/retracting) and the four solenoid valves (slide/jack) are switched according to the outputs from the multiplex data transmitter (lower). The outputs to the four solenoid valves (slide/jack) are transmitted via the relay RF3.

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Outrigger System

Electric Circuit For Europe



IWC02-0290E01

https://truckmanualshub.com/

[In case of for Europe only, the control outside the cab is applied.]

1. The controls are located at the both sides of the carreir.
2. You can extend or retract only the sliders in the same side of the crane as the controls operated.

Relay RD5: Selector relay for left side [SLIDE]

RD5 relay coil	a-contact	selected	operation
energized	close	jack	operates any jacks
de-energized	open	slide	operates left slide only

Relay RD4: Selector relay for right side [SLIDE]

RD4 relay coil	a-contact	selected	operation
energized	close	jack	operates any jacks
de-energized	open	slide	operates right slide only

3. If the right and left controls are opetated simultaneously, the switch pressed first becomes activated.
   Relay RB7: Power supply selector relay
   (This contact [CLOSES] when right side ext./ret. switch's selection is selected before the left side one)
   Relay RB8: Power supply selector relay
   (This contact [CLOSES] when left side ext./ret. switch's selection is selected before the right side one)
4. The Lower outrigger controls cannot be used while the upper outrigger controls are in use.

Relay RB6: Power supply control relay for both lower outrigger operation box.

outrigger ext./ret. operating switch selection timing	RB6 relay coil	b-contact	priority
lower is before upper	de-energized	close	lower outrigger operation
upper is before lower	energized	open	upper outrigger operation

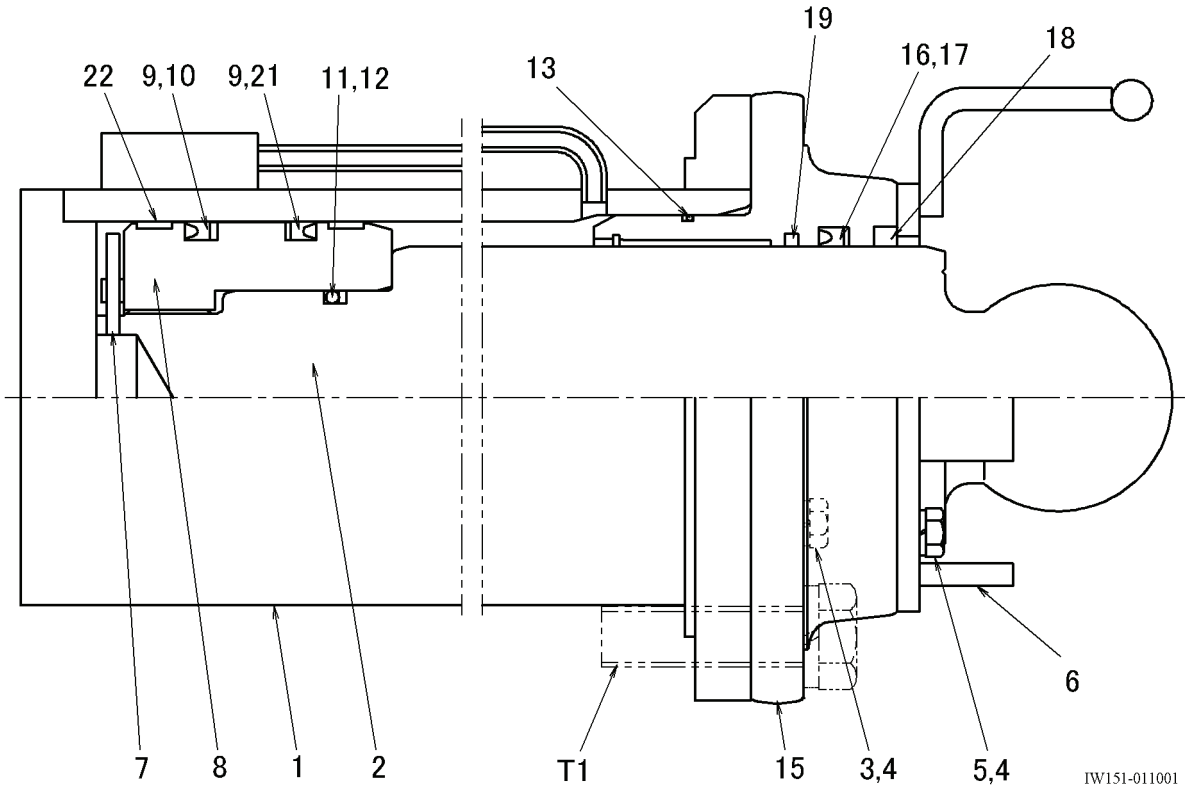
https://truckmanualshub.com/

C-2 Jack Cylinder

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



1.Cylinder	6.Stopper	11.O-ring	17.Backup ring
2.Rod	7.Spring pin	12.Backup ring	18.Dust seal
3.Bolt	8.Piston	13.O-ring	19.Damper ring
4.Spring washer	9.Packing	15.Rod cover assy	21.Backup ring
5.Bolt	10.Backup ring	16.Packing	22.Plain bearing

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
3,5	M10	22 - 25	16 - 18
T1	M24	588 - 666	434 - 492

360-302-90000 ⚠8

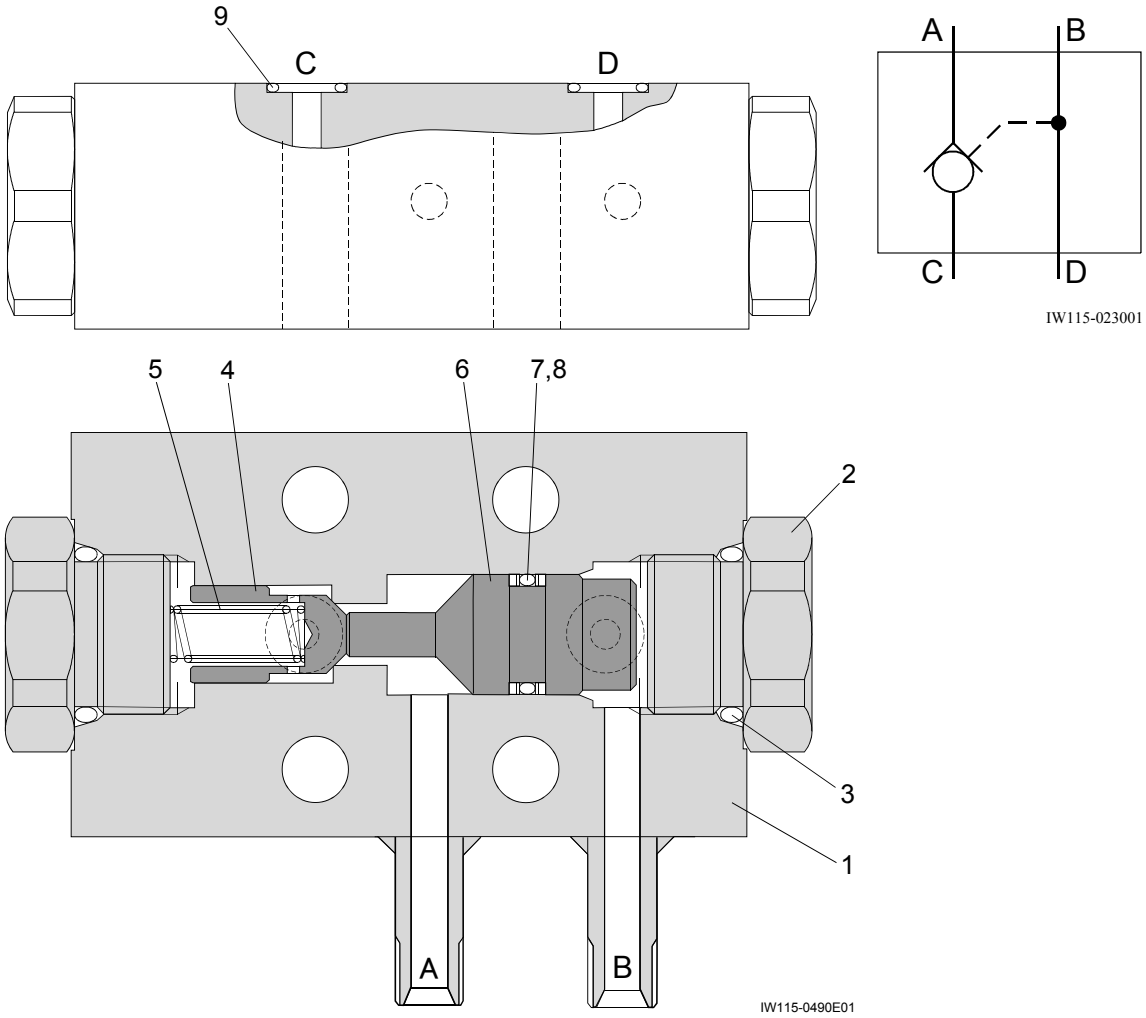
https://truckmanualshub.com/

C-3 Pilot check Valve (Jack Cylinder Retracting Prevention)

[NOTICE]

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1. Structure



1.Valve body	4.Valve	7.O-ring
2.Plug	5.Spring	8.Backup ring
3.O-ring	6.Piston	9.O-ring

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
A	G1/4	29.4	22
B	G1/4	29.4	22
Mounting bolt	M10	43 - 49	32 - 36

366-200-00000 ⚠1

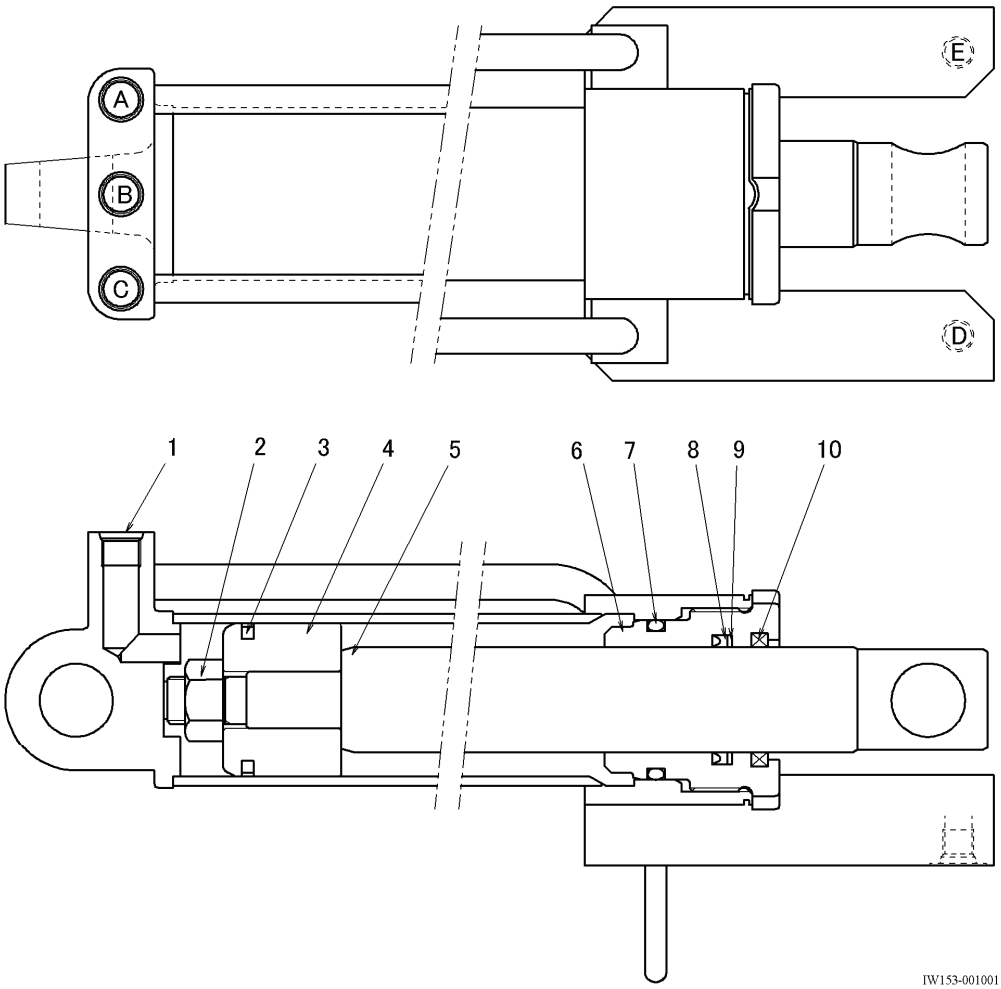
https://truckmanualshub.com/

C-4 Extension Cylinder

[NOTICE]

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1. Structure



1.Cylinder	4.Piston	7.O-ring	10.Dust seal
2.Nut	5.Rod	8.Packing	
3.Seal ring	6.Rod cover	9.Backup ring	

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
A, B, C	G3/8	49	36
D, E	G1/4	29.4	22
2	M20	176 - 196	130 - 145

360-424-20000 ⚠1

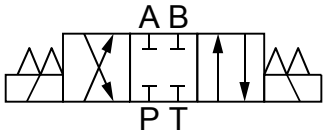
https://truckmanualshub.com/

C-5 Solenoid Valve (Slide/Jack) (UCHIDA)

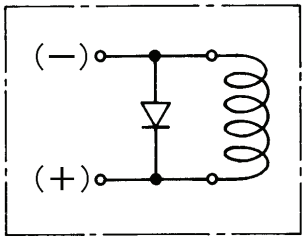
[NOTICE]

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1. Structure

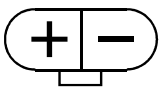


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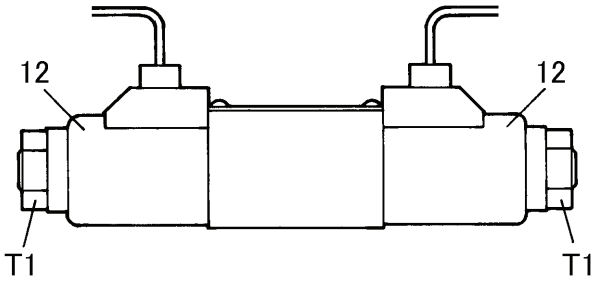
IW121-023002

Connector

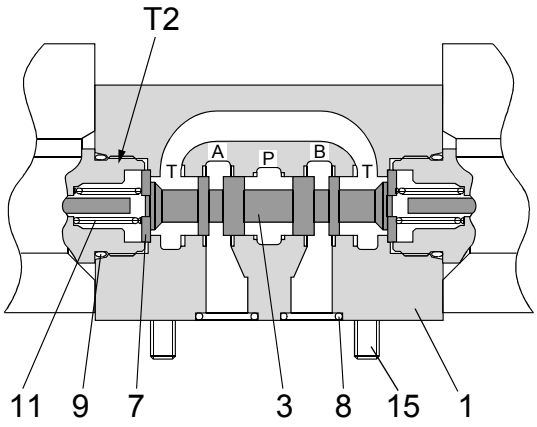


(+): Red
(-): Blue

IW121-0542E01



IW121-026002



IW121-026003

1.Body	7.Spring seat	9.O-ring	12.Solenoid (DC24V)
3.Spool	8.Square ring	11.Spring	15.Hex. socket head bolt

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
15	M5	6.9 - 8.9	5.1 - 6.5
T1	-	3.9 - 4.9	2.9 - 3.6
T2	-	38.3 - 41.2	28.3 - 30.4

366-478-90000 ⚠1

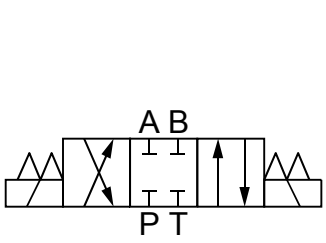
https://truckmanualshub.com/

C-6 Solenoid Valve (Slide/Jack) (TOKIMEC)

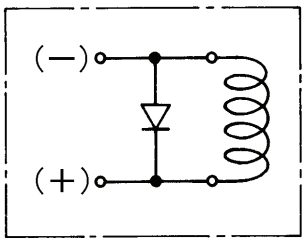
[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure

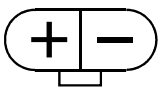


IW121-026001



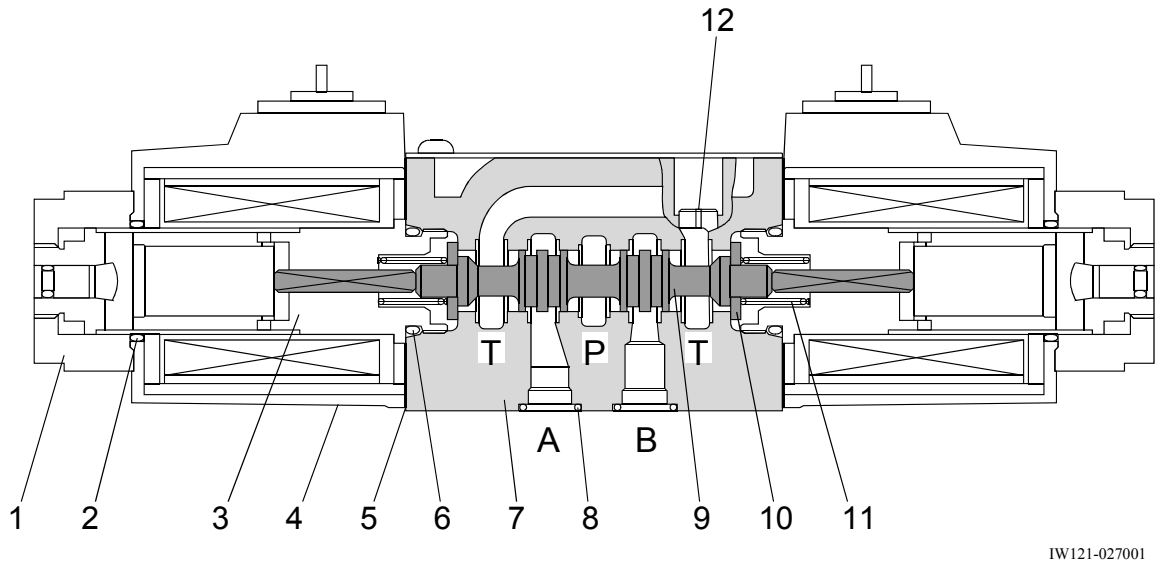
IW121-023002

Connector



(+): Red
(-): Black

IW121-0542E01



IW121-027001

Note: Install the centering washer (10) with its slit directed toward the body (7).

1.Nut	4.Solenoid coil (DC24V)	7.Body	10.Centering washer
2.O-ring	5.Packing	8.O-ring	11.Spring
3.Solenoid core (DC24V)	6.O-ring	9.Spool	12.Spring pin

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
1	-	8.8 - 10.8	6.5 - 8
3	-	18 - 22	13.3 - 16.2
Mounting bolt	M5	6.9 - 7.8	5 - 6

366-465-40000 ⚠

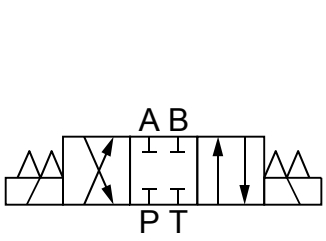
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C-7 Solenoid Valve (Slide/Jack) (NACHI)

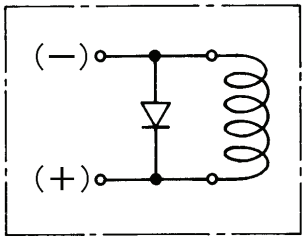
[NOTICE]

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1. Structure

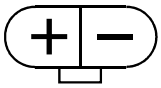


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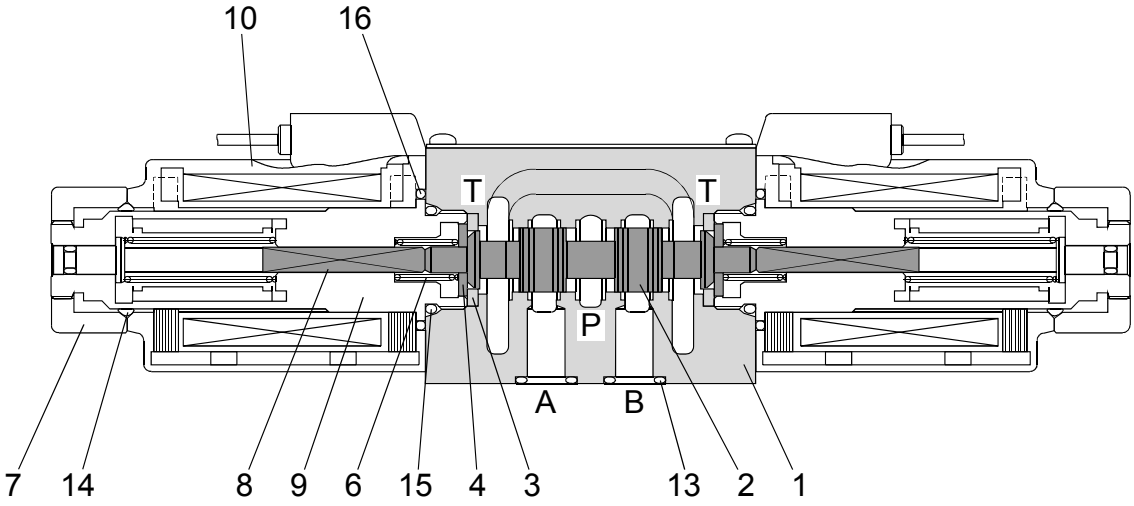
IW121-023002

Connector



(+): White
(-): Black

IW121-0542E01



IW121-028001

1.Body	6.Spring	10.Solenoid coil (DC24V)	16.O-ring
2.Spool	7.Nut	13.O-ring	
3.Retainer	8.Rod	14.O-ring	
4.Retainer	9.Solenoid guide (DC24V)	15.O-ring	

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
7	-	5 - 7	3.7 - 5.1
Mounting bolt	M5	6 - 8	4.4 - 5.9

366-457-31000 ⚠1

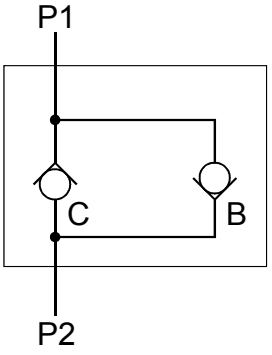
https://truckmanualshub.com/

C-8 Check Valve (Outrigger Extending Prevention)

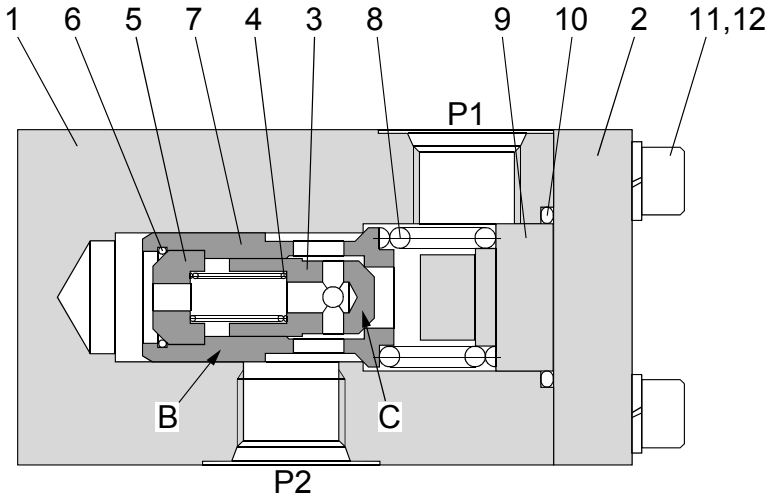
[NOTICE]

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1. Structure



IW116-011001



IW116-011002

1.Body	4.Spring	7.Valve	10.O-ring
2.Cover	5.Stopper	8.Spring	11.Hexagon socket head bolt
3.Valve	6.Stop ring	9.Stopper	12.Spring washe

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
P1	G1/2	98	72
P2	G1/2	98	72

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C-9 Outrigger Operation Box

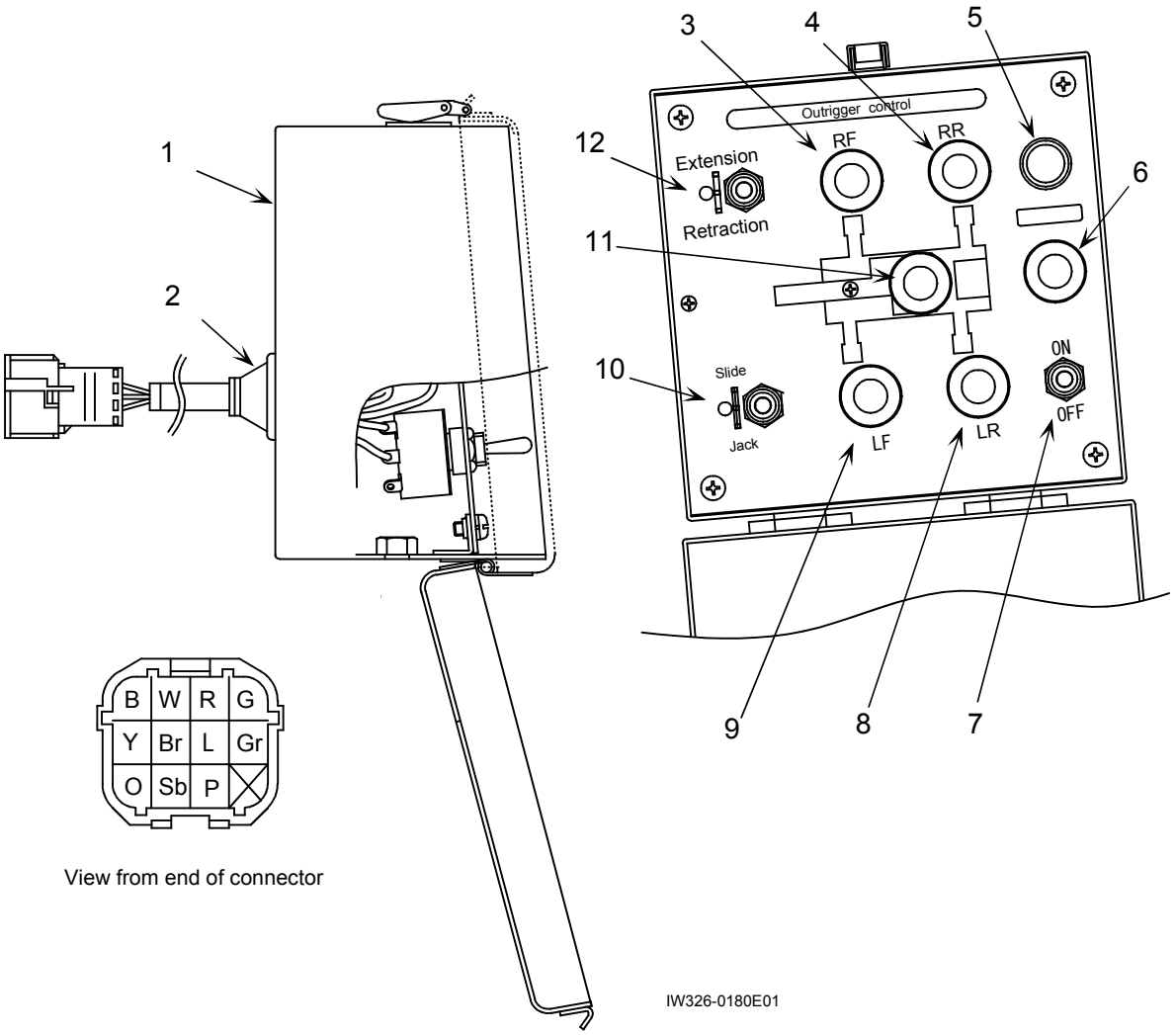
[NOTICE]

- There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure

[NOTICE]

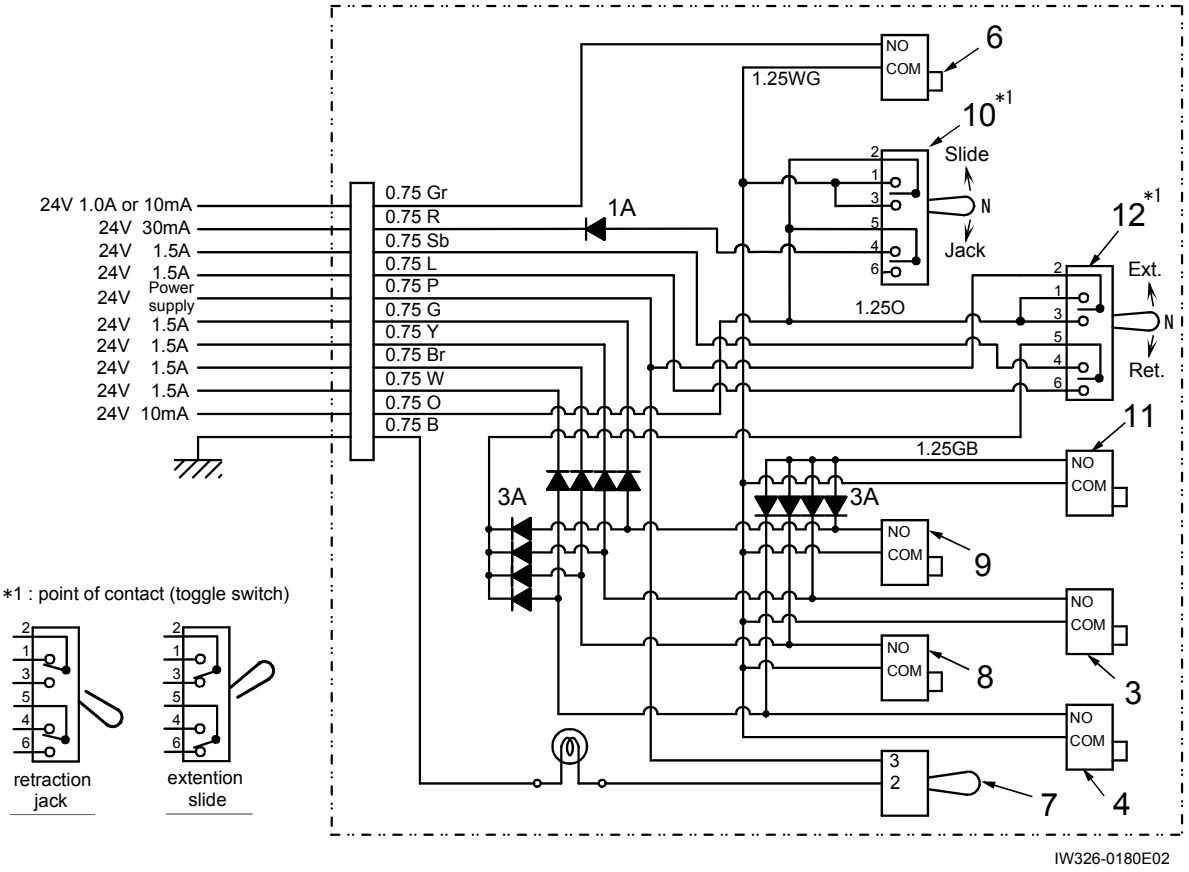
- The illustration below shows the left side of the vehicle.
- For the controls on the right side, the arrangement of the switches are different.



1.Box assy	5.Lamp assy	9.Push switch (RF)	12.Toggle switch (extension/retraction)
2.Gromment	6.Push switch (accelerator)	10.Toggle switch (slide/jack)	
3.Push switch (RF)	7.Toggle switch (lights)	11.Push switch (all)	
4.Push switch (RR)	8.Push switch (LR)		

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2. Connector diagram



3. Specifications

3.1 General

Power voltage: DC20V ~ 30V
Service temp. range: -25° ~ +70°C

3.2 Bipolar toggle switch

Current capacity: Resistance load 20 A
Inducatance load 10 A

Contact connection resistance:
10mΩ or less (initial)

3.3 Monopolar toggle switch

Current capacity: Lamp load 2 A

Contact connection resistance:
10mΩ or less (initial)

3.4 Push switch

Current capacity: Resistance load 10 A
Inducatance load 4 A

3.5 Diode

12-diode sect.: Average rectified current: 3A
Peak inverse voltage: 600V

1-diode sect. : Average rectified current: 1A
Peak inverse voltage: 600V

3.6 Lamp assembly

Rating: 24V, 3W

[NOTICE]

◆Coat the full surface of all diodes (13 total) with ThreeBond #2901 or equivalent product.

347-314-21000 ⚠
347-314-22000 ⚠

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D

Swing System

Contents

D-1 Swing System.....1

1. General 1

D-2 Swing Assmbly 3

1. Structure 3

2. Swing bearing mounting bolt 4
   2.1 Bearing Inner ring bolts 4
   2.2 Bearing outer ring bolts 5

D-3 Hydraulic Pilot Control Valve (Swing) 6

1. Structure 6

D-4 Hydraulic Motor (Swing).....12

1. Structure 12

D-5 Swing Speed Reducer 14

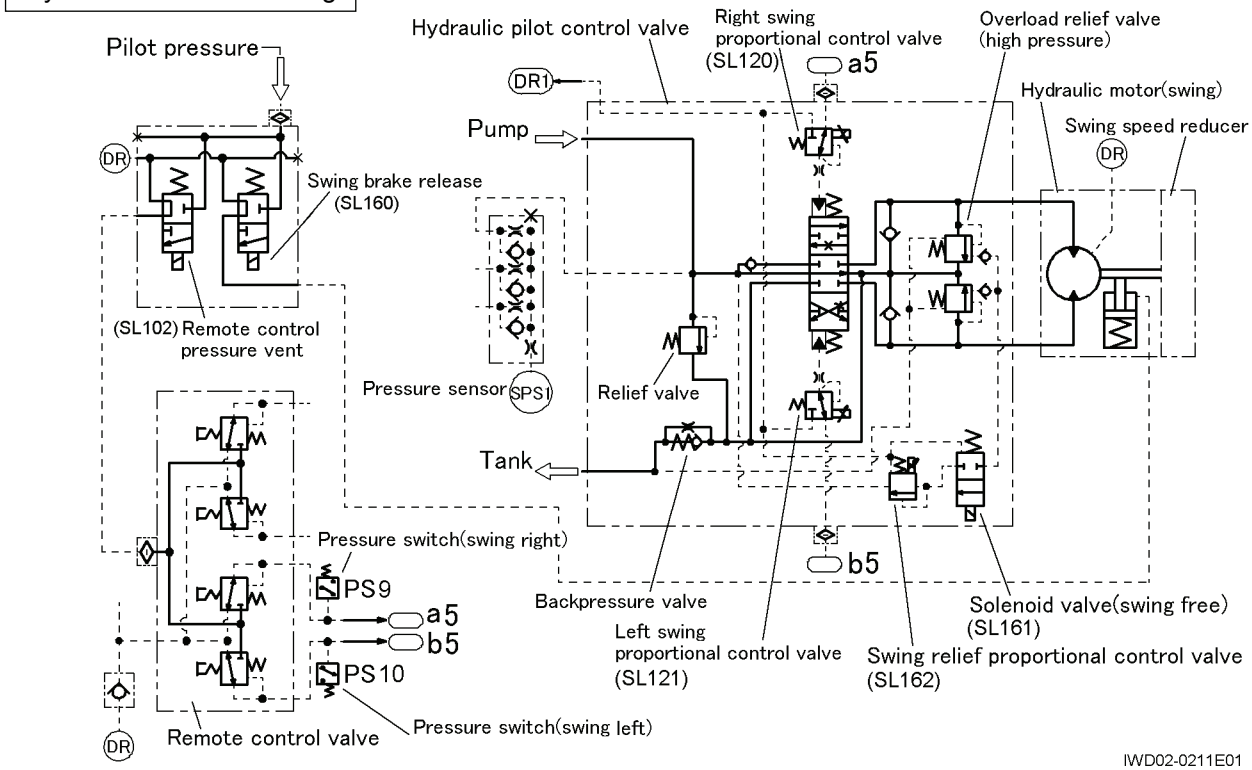
1. Structure 14

https://truckmanualshub.com/

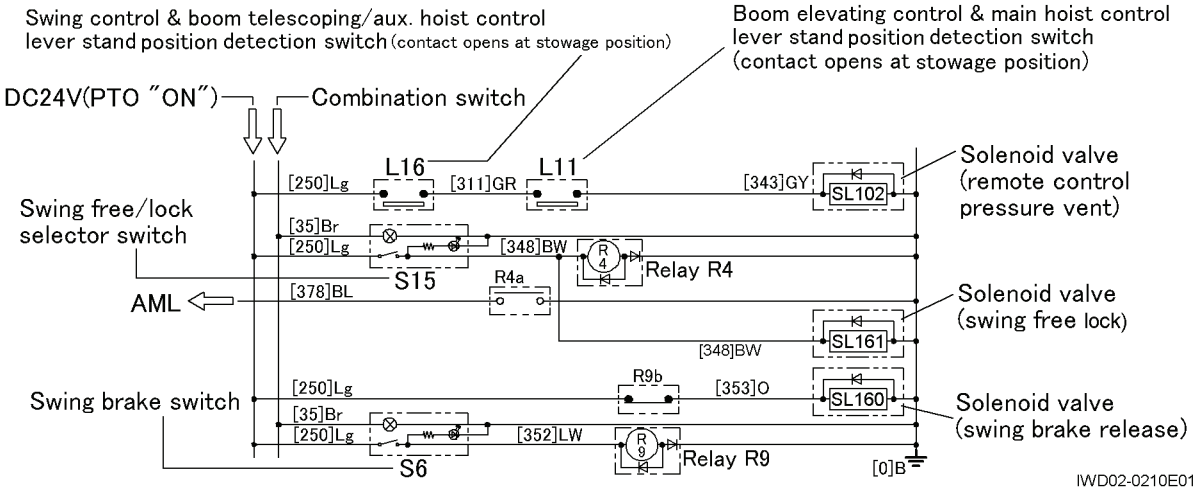
D-1 Swing System

1. General

Hydraulic Circuit for Swing



Remote Control Pressure Vent, Swing Free, Swing Brake Release



[NOTICE]

◆The remote control valve and the hydraulic pilot control valve are connected at the two points having the same symbols such as "a5" and "b5".

1. The swing operation is controlled by the hydraulic pilot method. The pilot pressure from the remote control valve controls the hydraulic pilot control valve.

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2. The maximum pressure in the swing circuit is regulated by the relief valve. In case of sudden stoppage of swing movement, the overload relief valve (high pressure) in the circuit with unusually high pressure operates to protect the hydraulic motor for swing operation.

3. Circuit for free swing
   In this hydraulic circuit, the solenoid valve (swing free) and the swing relief proportional control valve control the vent ports of the two overload relief valves (high pressure). As the set pressure of the swing relief proportional control valve is low, the overload relief valve (high pressure) in the circuit with internal pressure higher than the set pressure is activated at low pressure. The overload relief valve (high pressure) is activated at low pressure only when the swing control lever is located at the neutral position.

4. Circuit for swing automatic stop
   The right swing proportional control valve, the left swing proportional control valve and the swing relief proportional control valve serve to automatically stop the swing movement. These valves control the swing operation according to the output from the AML. The swing relief proportional control valve automatically stops the swing movement only when the swing free/lock selector switch is set to “FREE” side.

5. Circuit for swing brake release
   In this hydraulic circuit, the solenoid valve (swing brake release) controls the pilot pressure to the brake release port of the hydraulic motor for swing operation.

6. Circuit for remote control pressure vent
   In this hydraulic circuit, the solenoid valve (remote control pressure vent) controls the pilot pressure to the remote control valve.

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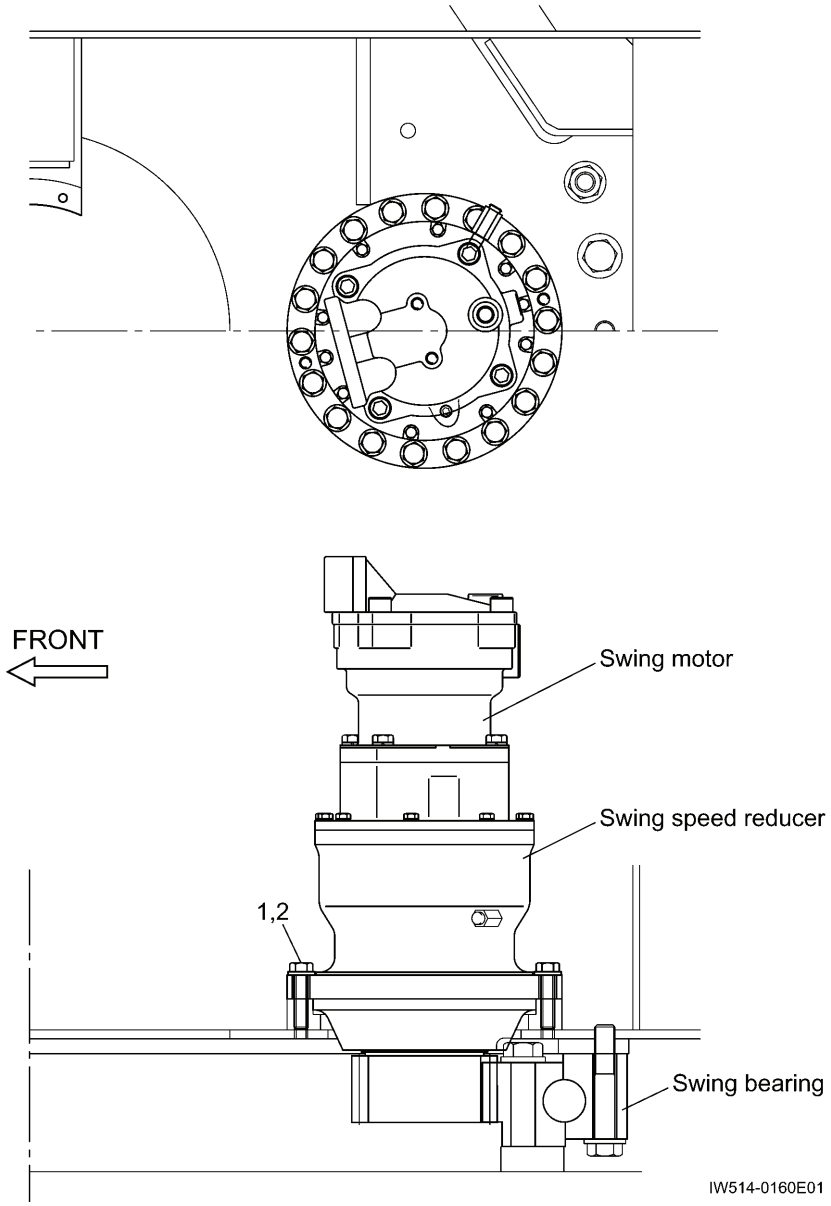
D-2 Swing Assembly

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure

1.Bolt
2.Plain washer



[NOTICE]

◆Apply torque control agent to the threaded sections of the bolts.

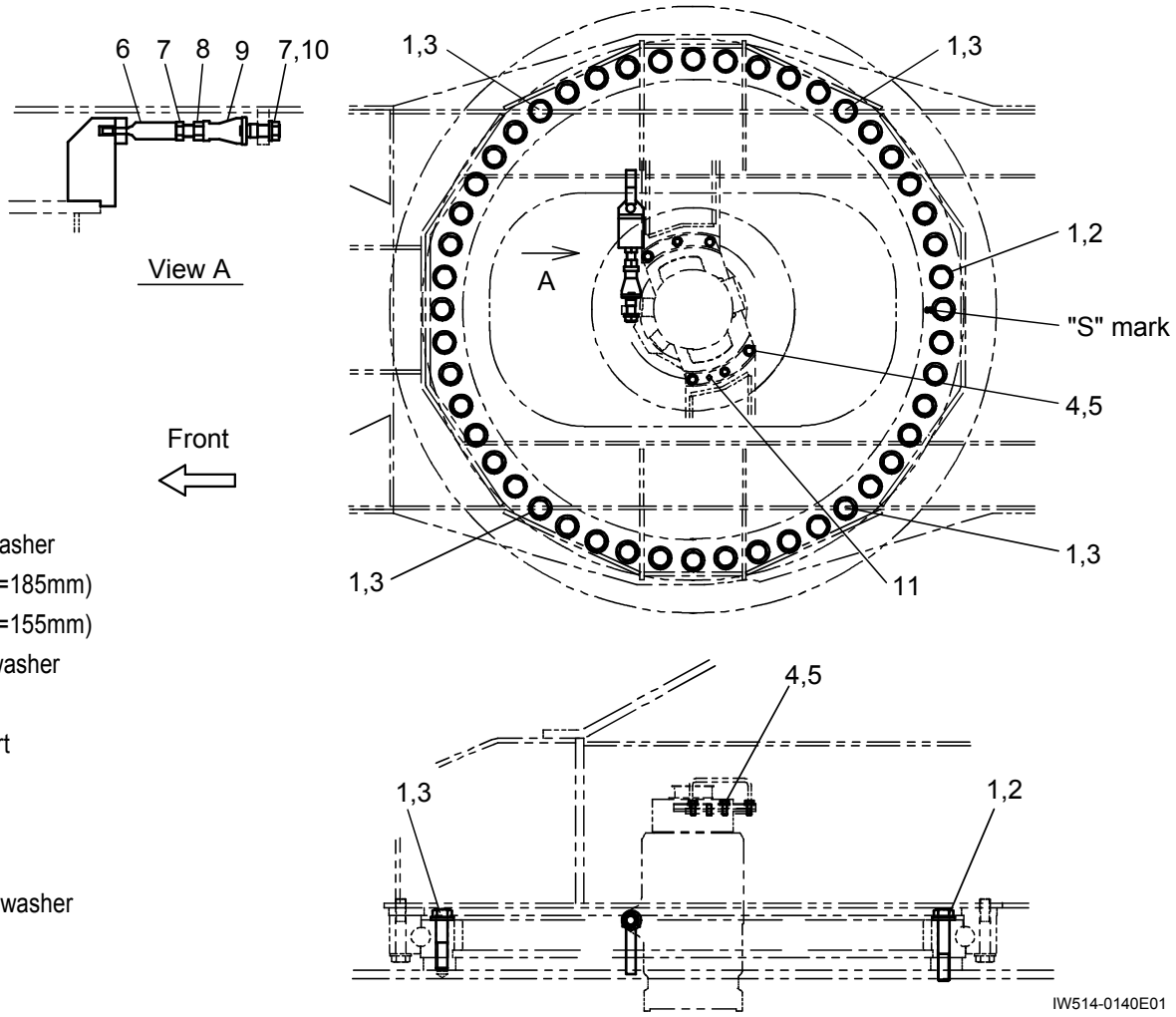
Thread size and tightening torque

Sign/port	Thread size	Tightening torque	
		N-m	ft-lbf
1	M18	294 - 343	217 - 253

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2. Swing bearing mounting bolt

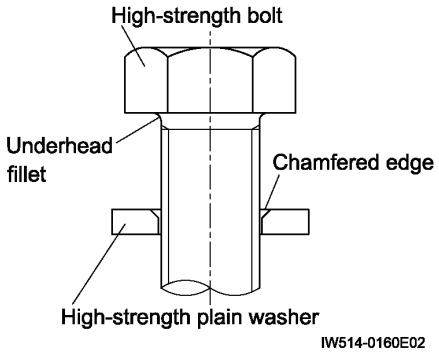
2.1 Bearing Inner ring bolts



1.Pain washer
2.Bolt (L=185mm)
3.Bolt (L=155mm)
4.Plain washer
5.Bolt
6.Support
7.Nut
8.Bolt
9.End
10.Spring washer
11.Pin

[NOTICE]

- ◆Install the bearing inner ring with the "S" mark facing the rear of the carrier.
- ◆Apply torque control agent to the threaded sections of the bolts.
- ◆Install the plain washer, orienting its chamfer on the internal periphery as shown below.



Thread size and tightening torque

Sign/port	Thread size	Tightening torque	
		N-m	ft-lbf
2 (44 points)	M30	1620 - 1810	1195 - 1335
3 (4 points)			
5	M12	69 - 82	51 - 60

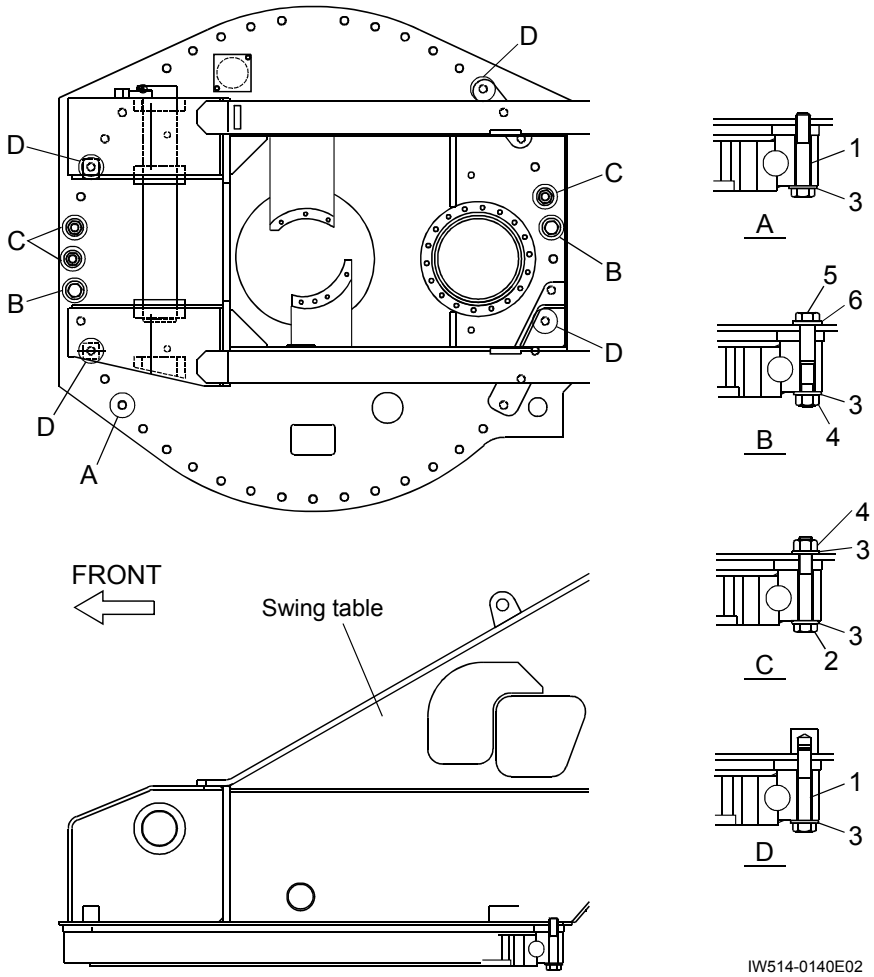
https://truckmanualshub.com/

2.2 Bearing outer ring bolts

Applicable serial No. △2 : 545543 --

△2 168

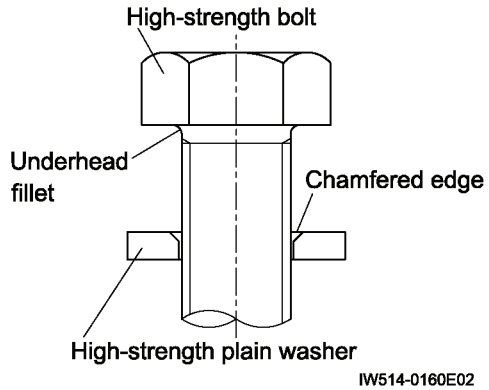
1.Bolt (L=~~160~~mm)
2.Bolt (L=190mm)
3.Plain washer (50points)
4.Nut (5points)
5.Reamer bolt (L=185mm)
6.Plain washer (2points)



IW514-0140E02

[NOTICE]

- ◆Apply torque control agent to the threaded sections of the bolts.
- ◆Install the plain washer, orienting its chamfer on the internal periphery as shown below.



IW514-0160E02

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
1 (42 points)	M27	1177 - 1275	868 - 940
2 (3 points)			
5 (2 points)			

343-007-20000 △1
347-621-32000 △0
342-310-40000 △2

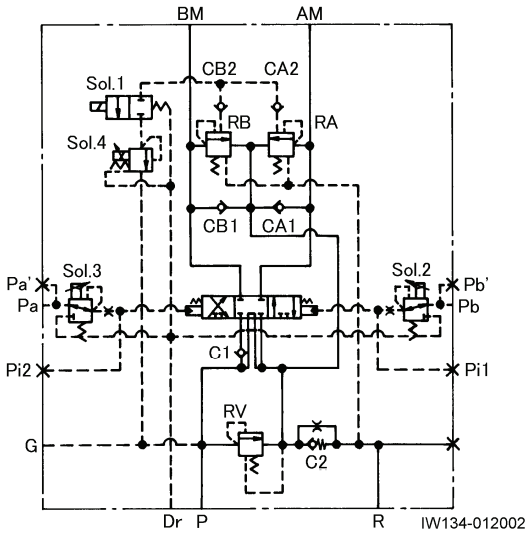
https://truckmanualshub.com/

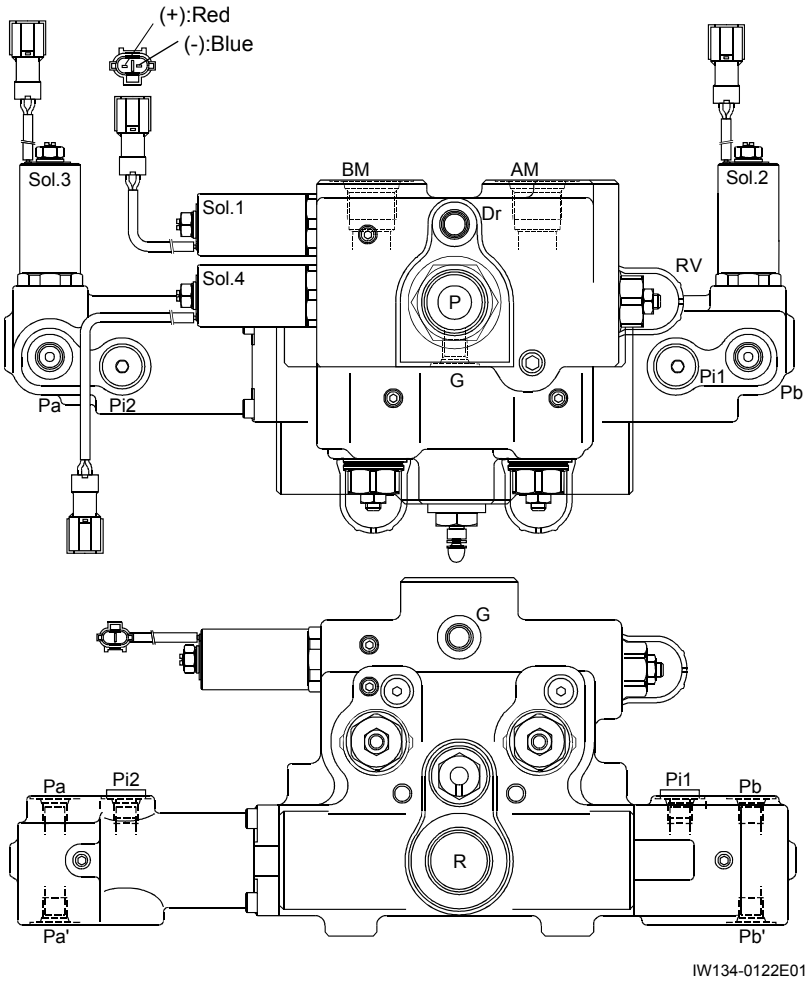
D-3 Hydraulic Pilot Control Valve (Swing)

[NOTICE]

- There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure





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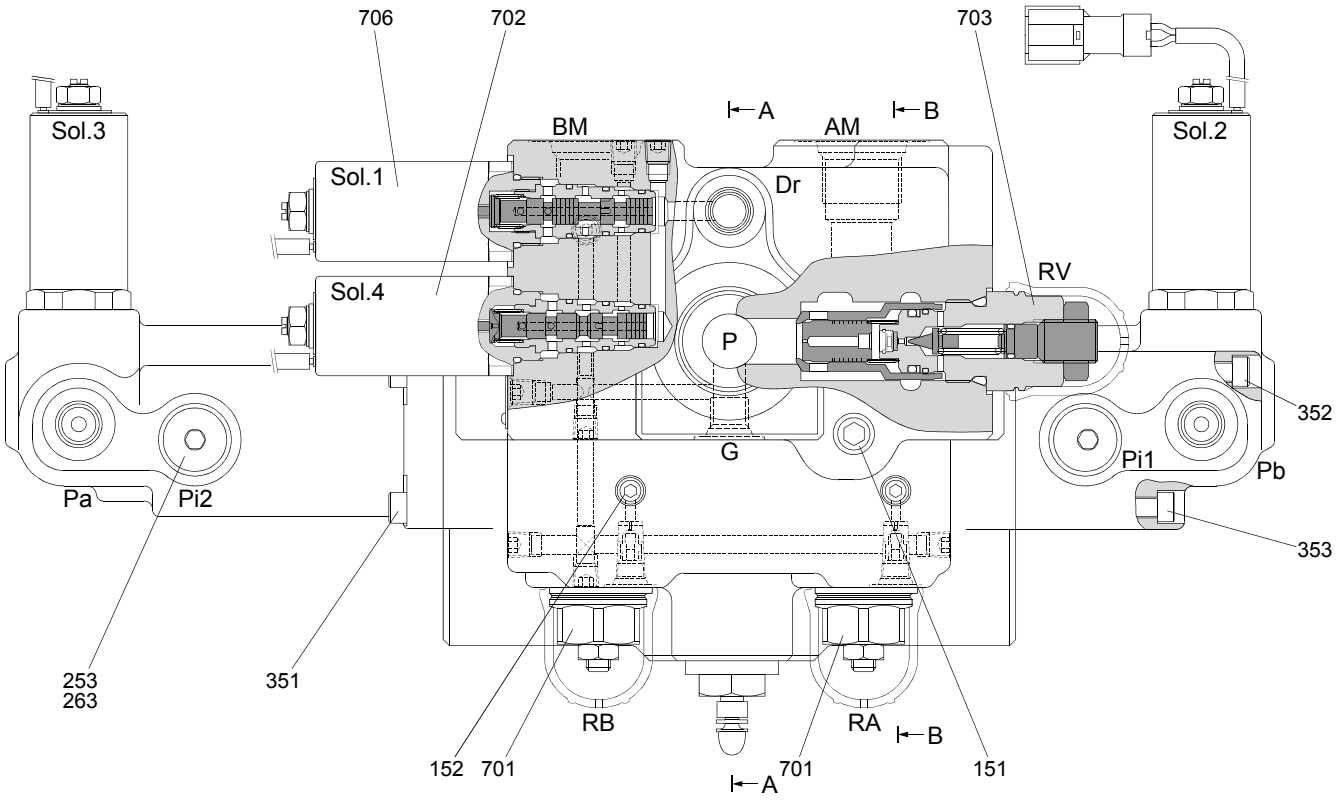
Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
P, R	G1	200 - 240	145 - 174
AM, BM	G3/4	150 - 180	108 - 130
G, Pa, Pb, Pa', Pb', Pi1, Pi2	G1/4	34 - 38	25 - 28
Dr	G1/4	34 - 38	25 - 28

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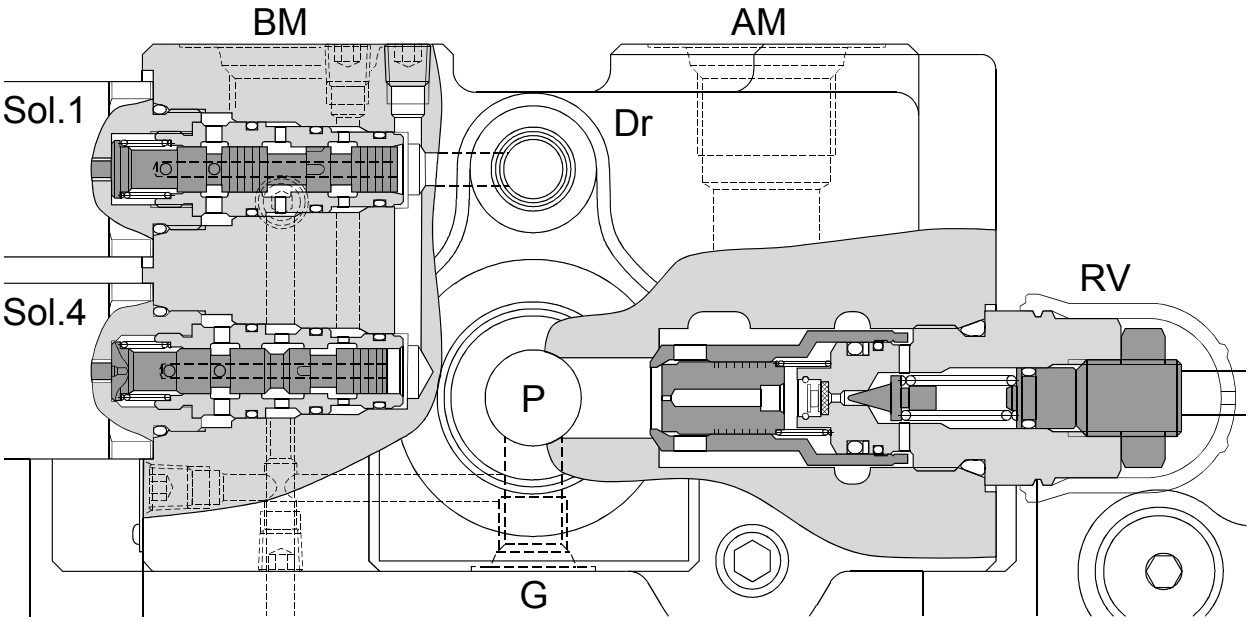
Hydraulic Pilot Control Valve (Swing)

Cross section



IW134-012003

Enlarged view (Sol.1, Sol.4, RV)

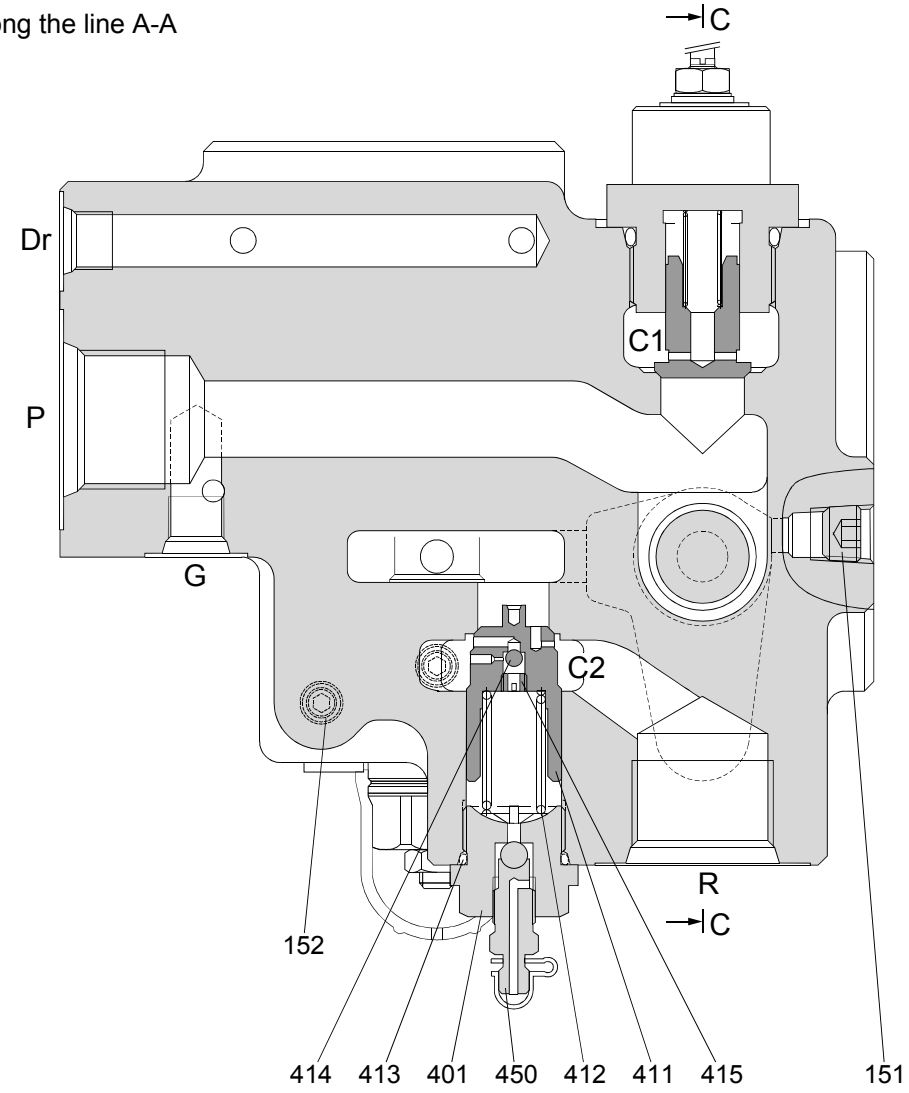


IW134-012007

https://truckmanualshub.com/

Hydraulic Pilot Control Valve (Swing)

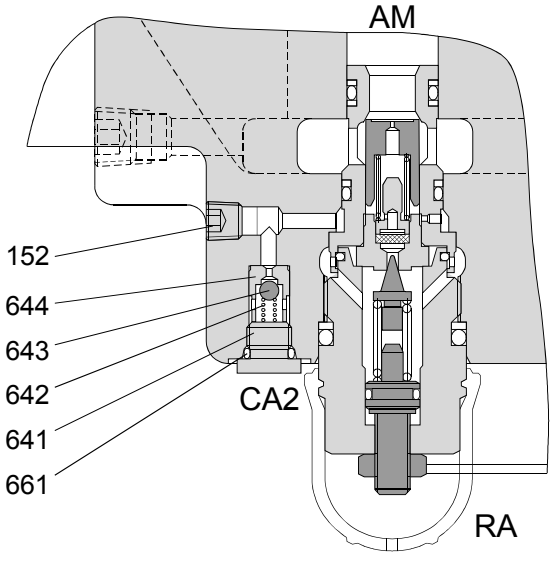
Cross section along the line A-A



A-A

IW134-012004

Cross section along the line B-B



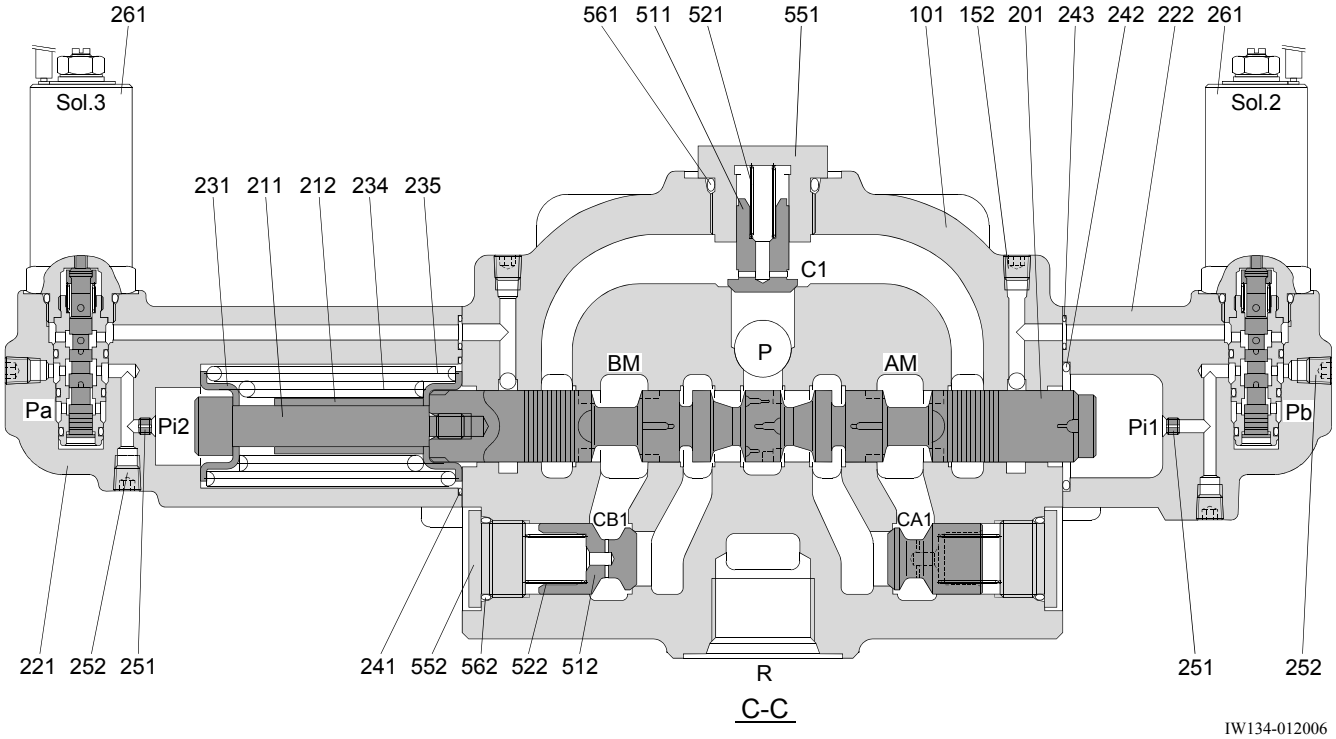
B-B

IW134-012005

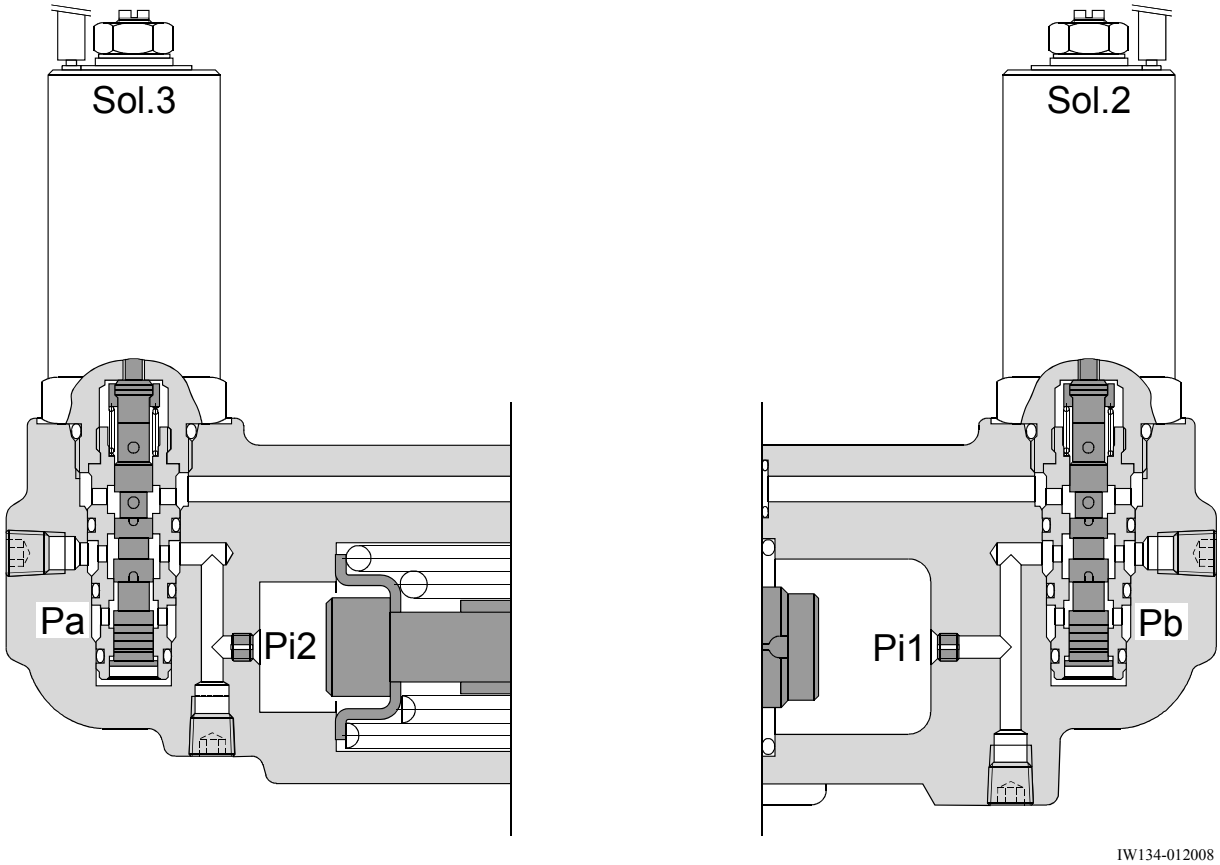
https://truckmanualshub.com/

Hydraulic Pilot Control Valve (Swing)

Cross section along the line C-C



Enlarged view (Sol.2, Sol.3)



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Hydraulic Pilot Control Valve (Swing)

101.Casing
151.Plug
152.Plug
201.Spool
211.Spacer bolt
212.Stopper
221.Cover
222.Cover
231.Spring seat
234.Spring
235.Spring
241.O-ring
242.O-ring
243.O-ring
251.Orifice
252.Plug
253.Plug
261.Solenoid
inverse-proportional
reducing valve
263.O-ring
351.Hex. socket head bolt
352.Hex. socket head bolt
353.Hex. socket head bolt
401.Plug
411.Plunger
412.Spring
413.O-ring
414.Steel ball
415.Stopper
450.Air bleeder screw
511.Poppet
512.Poppet
521.Spring
522.Spring
551.Cap
552.Plug
561.O-ring
562.O-ring
641.Spring seat
642.Spring
643.Steel ball
644.Seat
661.O-ring
701.Relief valve
702.Solenoid relief valve
703.Relief valve
706.Solenoid valve (DC24V)

Thread size and tightening torque

Sing / port	Thread size	Tightening torque	
		N-m	ft-lbf
151	R1/4	20 - 24	14 - 17
152, 252	NPTF1/16	6 - 8	4.5 - 6
211 *1	M8	16 - 18	12 - 13
251 *1	M5	3.5 - 4.5	2.5 - 3.5
253	G1/4	34 - 38	25 - 28
261	M22	39 - 49	29 - 36
351, 352, 353	M6	10.5 - 13.5	8 - 10
401	M24	58 - 70	43 - 51
450	M10	14.5 - 17.5	10.5 - 12.5
551	M33	190 - 210	140 - 155
552	M24	120 - 140	88 - 103
641	G1/8	8 - 10	6 - 7
701	M30	110 - 130	81 - 96
702	M22	39 - 49	29 - 36
703	M27	69 - 79	51 - 58
706	M22	39 - 49	29 - 36
*1: Apply LOCTITE 241 (thread locking agent) to threaded sections.			

366-461-30000 △1
366-489-70000 △0

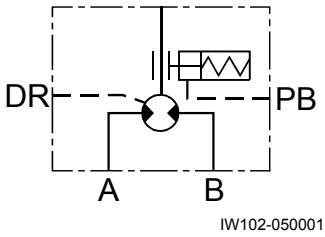
https://truckmanualshub.com/

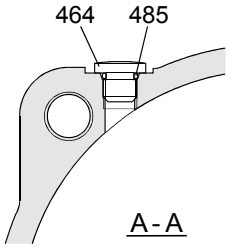
D-4 Hydraulic Motor (Swing)

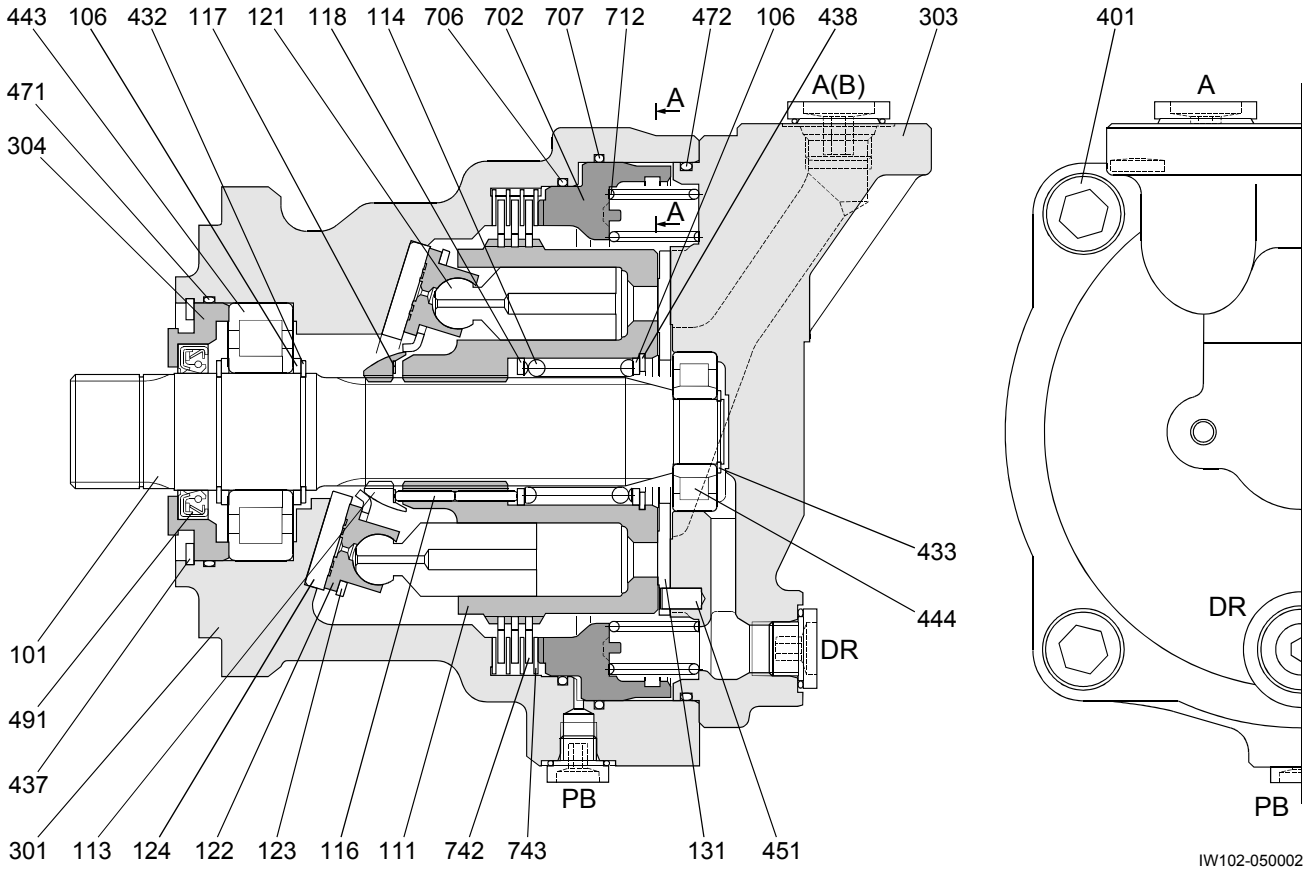
[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure







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101.Drive shaft
106.Spacer
111.Cylinder
113.Spherical bush
114.Cylinder spring
116.Push rod
117.Spacer
118.Spacer
121.Piston
122.Shoe
123.Guide plate
124.Shoe plate
131.Valve plate
301.Casing
303.Valve cover
304.Font cover
401.Hex. socket head bolt
432.Stop ring
433.Stop ring
437.locking ring
438.locking ring
443.Roller bearing
444.Roller bearing
451.Spring pin
464.Plug
471.O-ring
472.O-ring
485.O-ring
491.Oil seal
702.Brake piston
706.O-ring
707.O-ring
712.Brake plate
742.Friction plate
743.Separator plate

Thread size and tightening torque

Sing / port	Thread size	Tightening torque	
		N-m	ft-lbf
PB	G1/4	36	26.6
A, B	G3/4	167	123
DR	G1/2	108	80
464	G1/4	36	26.6
401	M20	430	317

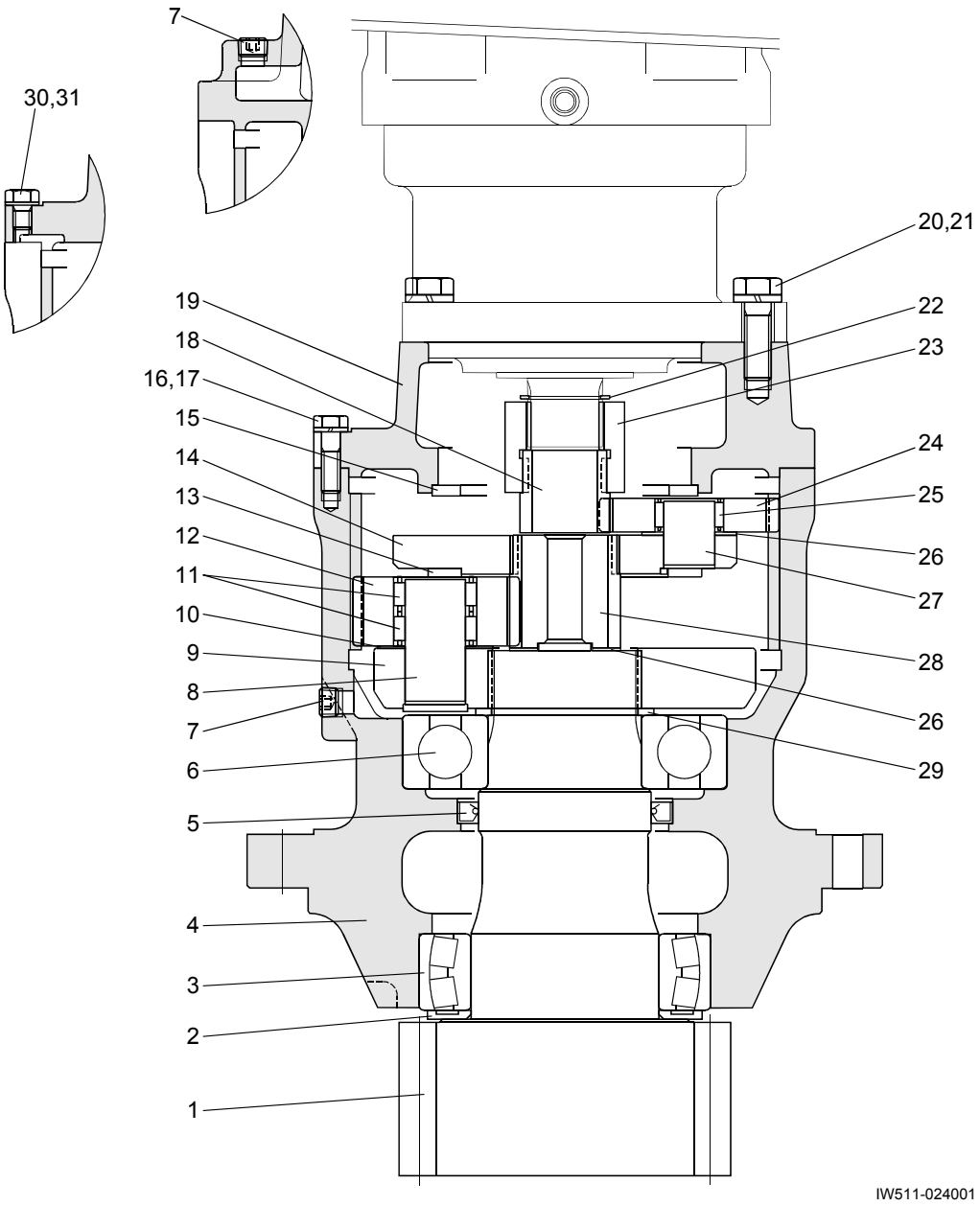
https://truckmanualshub.com/

D-5 Swing Speed Reducer

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



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Swing Speed Reducer

[NOTICE]

- ◆Apply THREE BOND 1215 to the mating faces of the hydraulic motor casing and the swing speed reducer bracket (19).
- ◆Inject lithium based grease to the mating faces of the retainer (2) and the roller bearing (3).
- ◆After applying THREE BOND 1215 to the outer circumference of oil seal(5), insert the oil seal(5) into casing(4).
- ◆Apply lithium based grease to the inner circumference of oil seal(5).
- ◆The amount of the gear oil is approx. 1 gal (US). (3.8 L).
- ◆Do not disassemble the king pins (8), (27) nor spacer (13).

1.Spur gear	9.Carrier	17.Spring washer	25.Needle bearing
2.Retainer	10.Bearing washer	18.Sun gear	26.Bearing washer
3.Roller bearing	11.Needle bearing	19.Bracket	27.King pin
4 Casing	12.Planetary gear	20.Bolt	28.Sun gear
5.Oil seal	13.Spacer	21.Spring washer	29.Snap ring
6.Ball bearing	14.Carrier	22.Snap ring	30.Bolt
7.Plug	15.Bearing washer	23.Coupling	31.Seal washer
8.King pin	16.Bolt	24.Planetary gear	

Thread size and tightening torque

Sing / port	Thread size	Tightening torque	
		N-m	ft-lbf
20	M16	206	152
Mounting bolt (*1)	M18	294 - 343	217 - 253
*1: Apply torque control agent to threaded sections.			

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E

Boom Elevating System

Contents

E-1 Elevating System 1

1. General 1

E-2 Elevating Cylinder 3

1. Structure 3

E-3 Counterbalance Valve (Elevating) .. 5

1. Structure 5

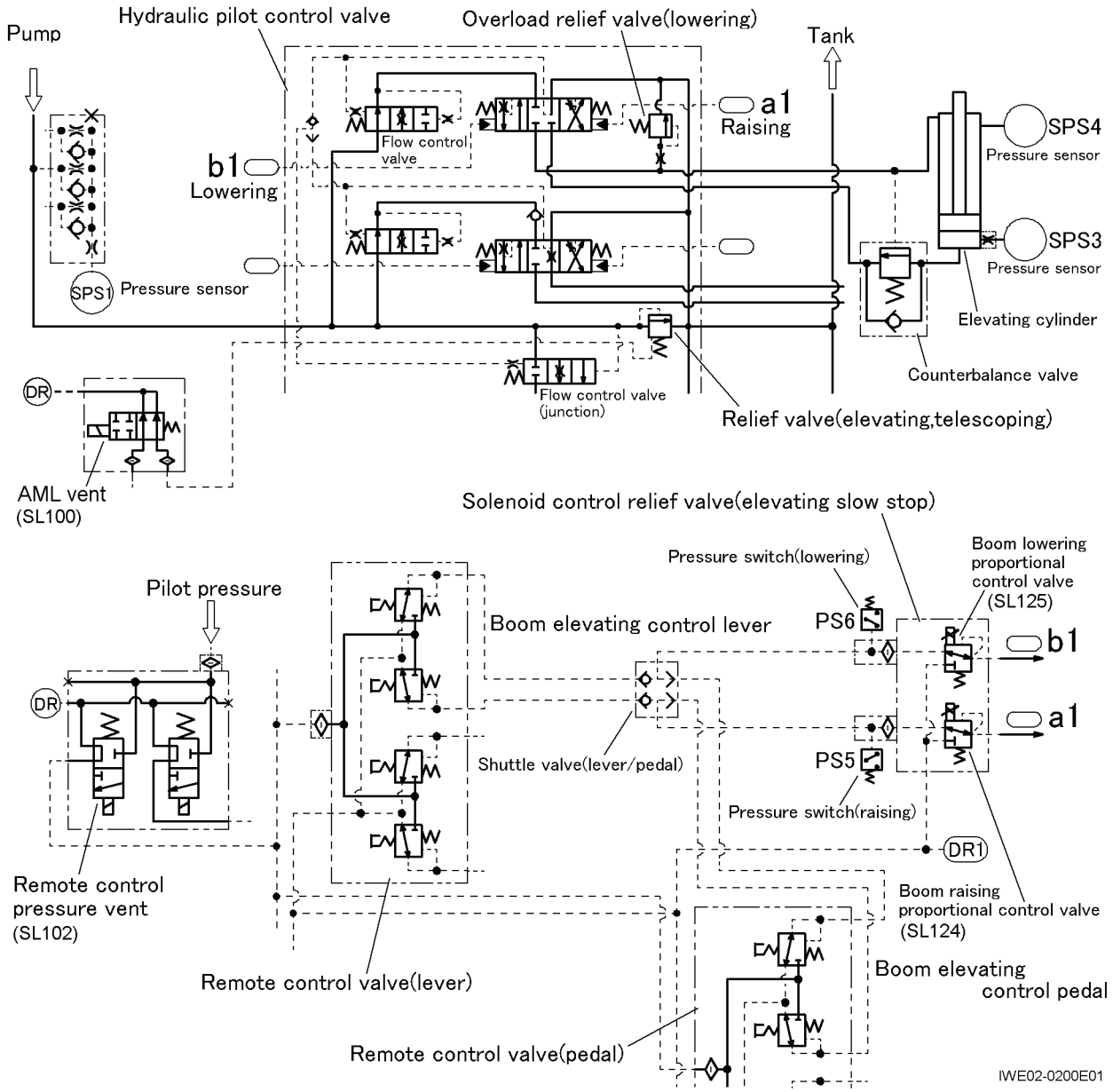
2. Function 7
   - 2.1 When control valve is at the neutral position 7
   - 2.2 While actuator is being pushed up 7
   - 2.3 While actuator descends 7

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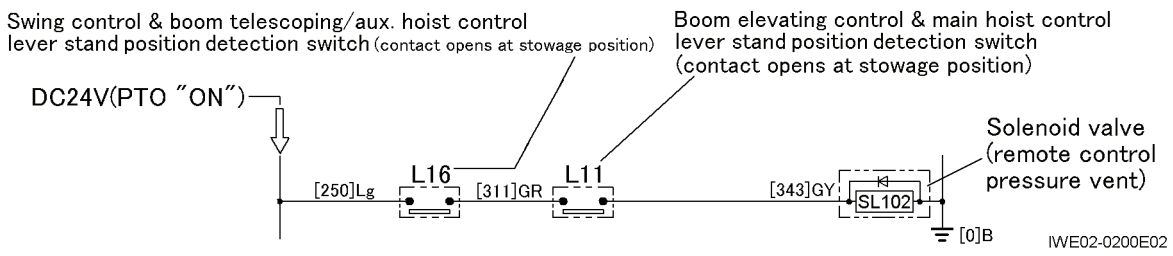
E-1 Elevating System

1. General

Hydraulic Circuit for Boom Elevating



Remote Control Pressure Vent



https://truckmanualshub.com/

Elevating System

[NOTICE]

◆The solenoid control relief valve and the hydraulic pilot control valve are connected at the two points having the same symbols such as "a1" and "b1".

1. The boom elevating operation is controlled by the hydraulic pilot method. The pilot pressure from either the remote control valve (boom elevating control lever) or the remote control valve (boom elevating control pedal) controls the hydraulic pilot control valve.

2. The maximum pressure in the elevating hydraulic circuit is regulated by the relief valve (elevating, telescoping). The maximum pressure in the boom lowering circuit is regulated by the overload relief valve activated at low pressure to prevent the boom from hunting.

3. Circuit for boom elevating slow stop
   The boom raising proportional control valve and the boom lowering proportional control valve make the boom elevating movement stop slowly. These valves control the boom elevating operation according to the output from the AML.

4. Circuit for remote control pressure vent
   In this hydraulic circuit, the solenoid valve (remote control pressure vent) controls the pilot pressure to the remote control valve for boom elevating control lever and the remote control valve for boom elevating control pedal.

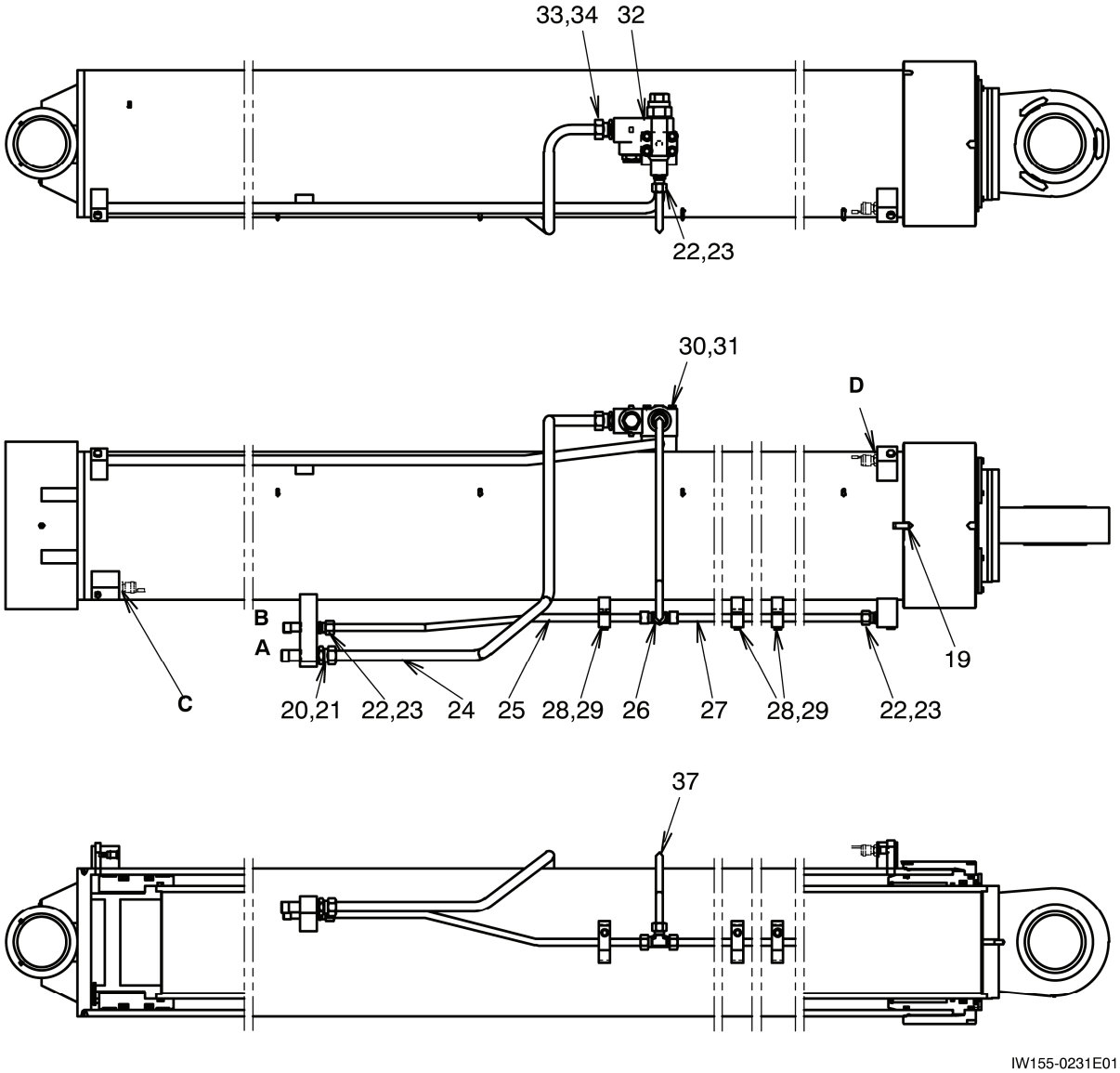
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E-2 Elevating Cylinder

[NOTICE]

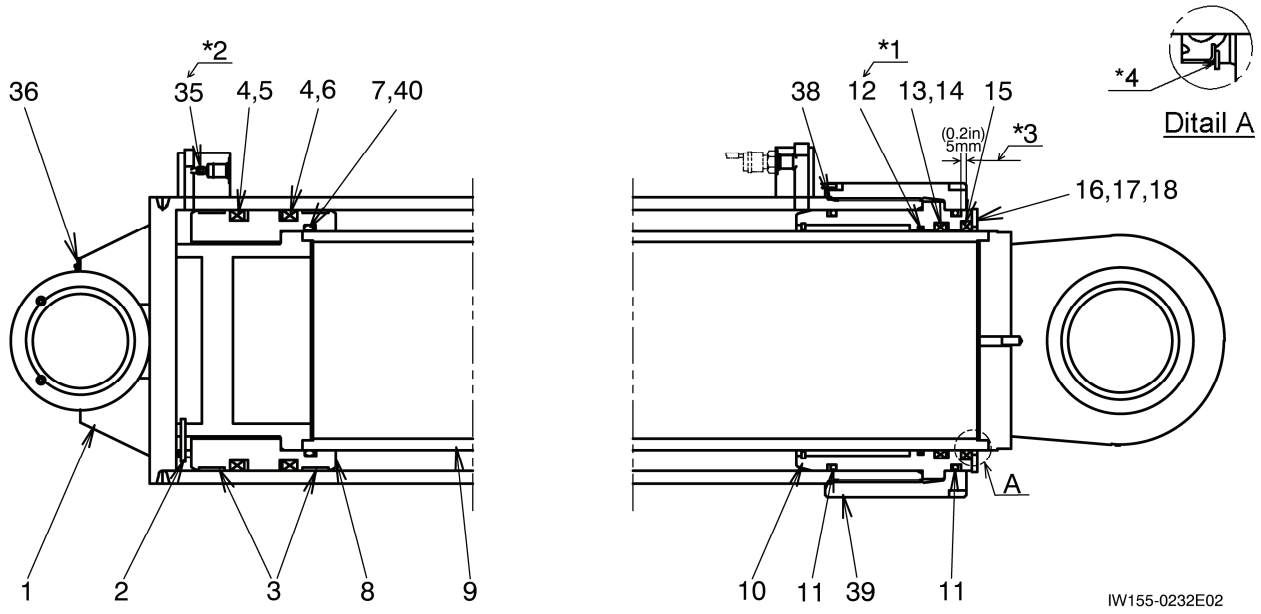
◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



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Elevating Cylinder



1.Cylinder	11.O-ring	21.O-ring	31.Spring washer
2.Spring pin	12.Damper ring	22.Fitting	32.Counter balance valve assy
3.Plain bearing	13.Packing	23.O-ring	33.Fitting
4.Packing	14.Backup ring	24.Pipe	34.O-ring
5.Backup ring	15.Dust seal	25.Pipe	35.Orifice
6.Backup ring	16.Retainer	26.T-fitting	36.Grease nipple
7.O-ring	17.Spring washer	27.Pipe	37.Pipe
8.Piston	18.Bolt	28.Clamp assy	38.O-ring
9.Rod assy	19.Support	29.Sleeve	39.Head cover
10.Rod cover assy	20.Fitting	30.Bolt	40.Backup ring

*1:Face the notch or the lip toward the pressurized side.
*2:Apply Three-bond 1401 or equivalent.
*3:Apply Three-bond 1104 or equivalent.
*4:Apply KONISHI car body sealer or equivalent (waterproof), however it is not possible to paint on the rubber side of dust seal.

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
A	G3/4	108 - 123	80 - 90
B	G1/2	54 - 64	40 - 47
C, D	G3/8	25 - 30	18.5 - 22.0
30	M8	24 - 27	17 - 20

360-267-50000 ⚠0

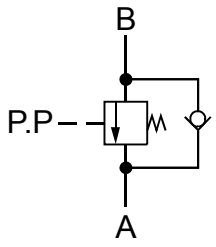
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E-3 Counterbalance Valve (Elevating)

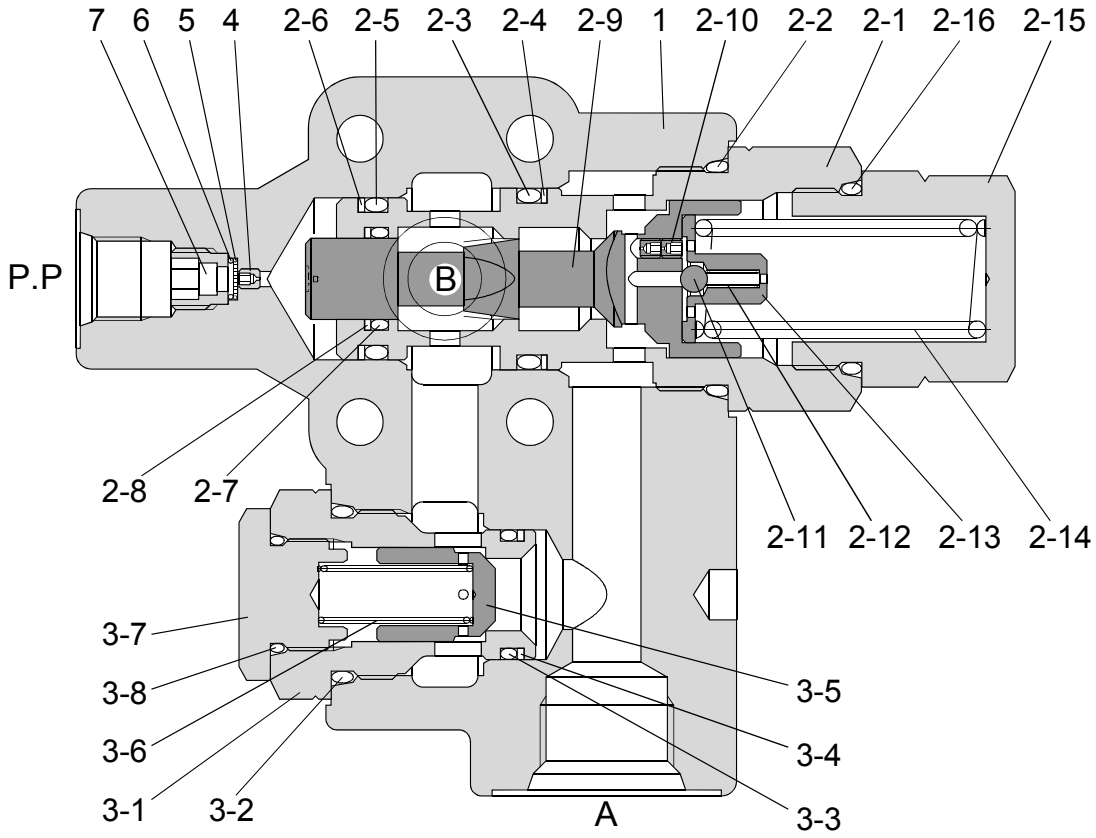
[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



IW119-021001



IW119-021002

1.Valve block	2-8.Backup ring	2-16.O-ring	3-8.O-ring
2-1.Valve seat	2-9.Spool	3-1.Valve seat	4.Orifice
2-2.O-ring	2-10.Orifice	3-2.O-ring	5.Filter element
2-3.O-ring	2-11.Steel ball	3-3.O-ring	6.Snap ring
2-4.Backup ring	2-12.Spring	3-4.Backup ring	7.Stopper
2-5.O-ring	2-13.Holder	3-5.Poppet	
2-6.Backup ring	2-14.Spring	3-6.Spring	
2-7.O-ring	2-15.Cap	3-7.Cap	

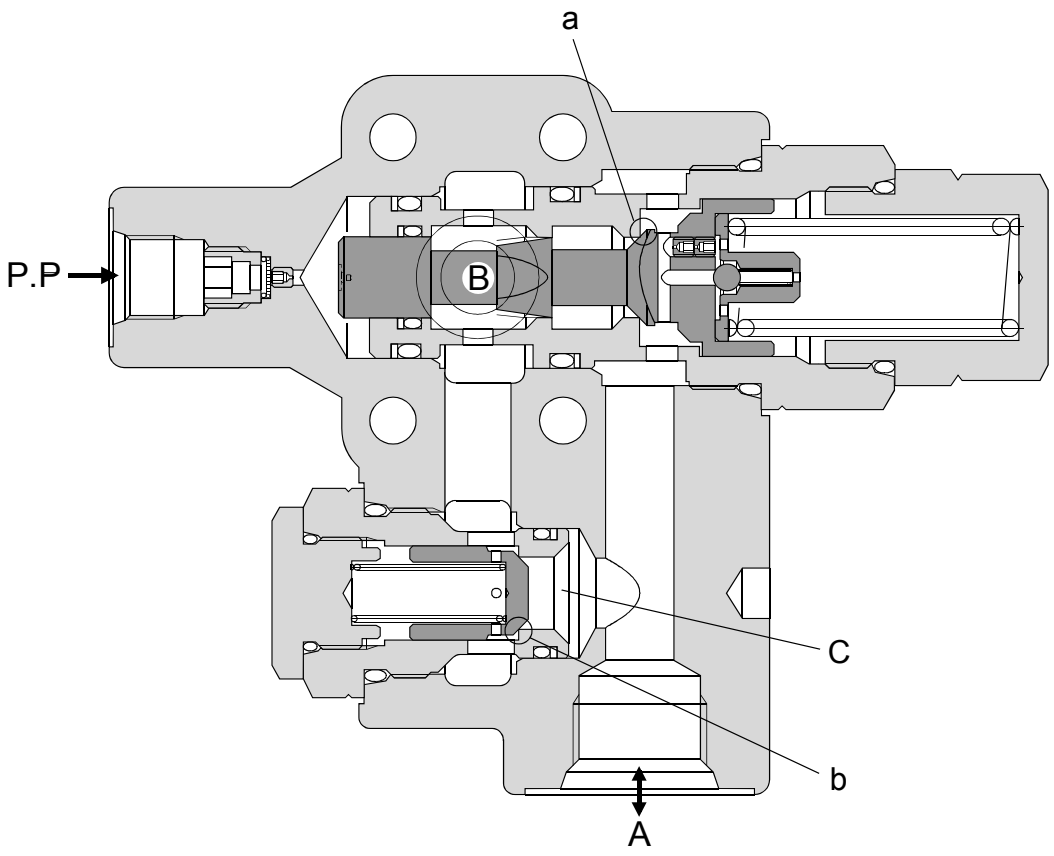
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Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
A	G3/4	167	123
P.P	G3/8	49	36
2-1	-	177 - 196	130 - 145
2-15	-	127 - 147	94 - 108
3-1	-	108 - 127	80 - 94
3-7	-	59 - 78	43 - 58
Mounting bolt	M8	24 - 27	17 - 20

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2. Function



IW119-021003

This counterbalance valve prevents the actuator from being driven by the load and its own weight faster than the speed corresponding to the oil supply rate.

2.1 When control valve is at the neutral position

The actuator holding pressure is sealed by seat “a” of the main spool and seat “b” of the check valve.

2.2 While actuator is being pushed up

1. The pressurized oil entering through port A of the control valve enters chamber C, flows out through port B by opening the check valve, and enters the holding side of the actuator.
2. At this time, since port PP is connected to the tank circuit, the main spool is kept forced to the valve body by the spring, and remains inactive.

2.3 While actuator descends

1. The hydraulic oil directly flowing from the control valve to the actuator also enters through port PP to exert force to the main spool to move the main spool.
2. Consequently, the holding hydraulic pressure in port B is vented to port A.
3. At this time, the main spool motion is smoothened by orifices.

366-051-70000 △2

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F

Winch System

Contents

F-1 Winch System 1

1. General 1

F-2 Winch 4

1. Structure 4

F-3 Hydraulic Motor (Winch) 6

1. Structure 6

2. Air bleeding procedure 8

F-4 Counterbalance Valve (Winch) 9

1. Structure 9

2. Function 10
   2.1 Balancing and holding functions 10
   2.2 Overload relief function 10

3. Principle of operation 11
   3.1 When control valve is in neutral 11
   3.2 Hoisting up 11
   3.3 Hoisting down 11

F-5 Hydraulic Valve (Winch Brake Release) 12

1. Structure 12

https://truckmanualshub.com/

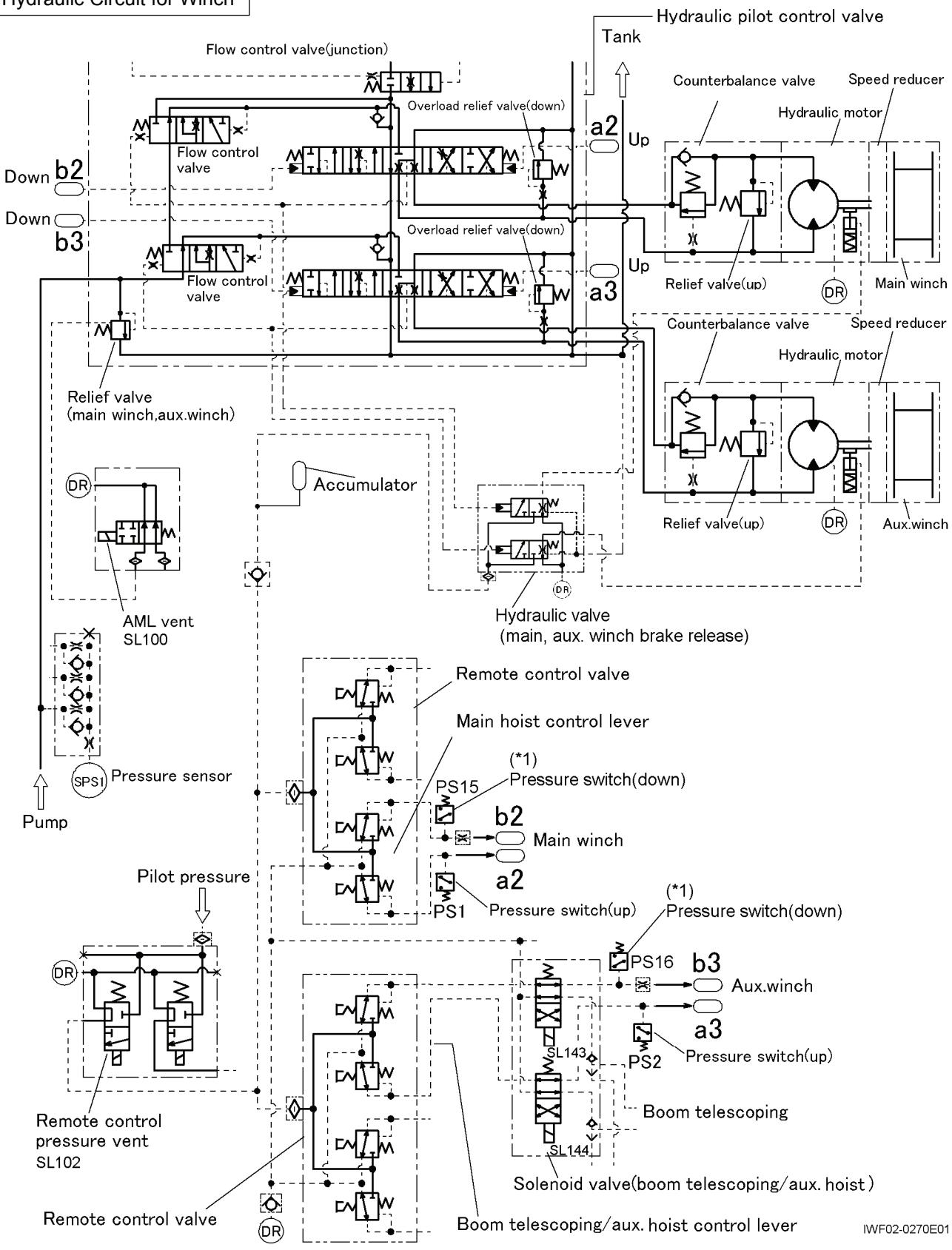
F-1 Winch System

1. General

(*1): Application

Europe	Option
General Export	—

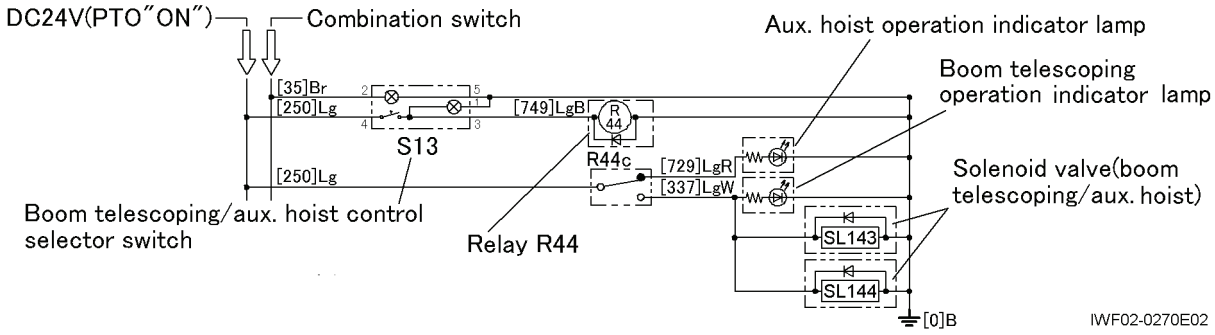
Hydraulic Circuit for Winch



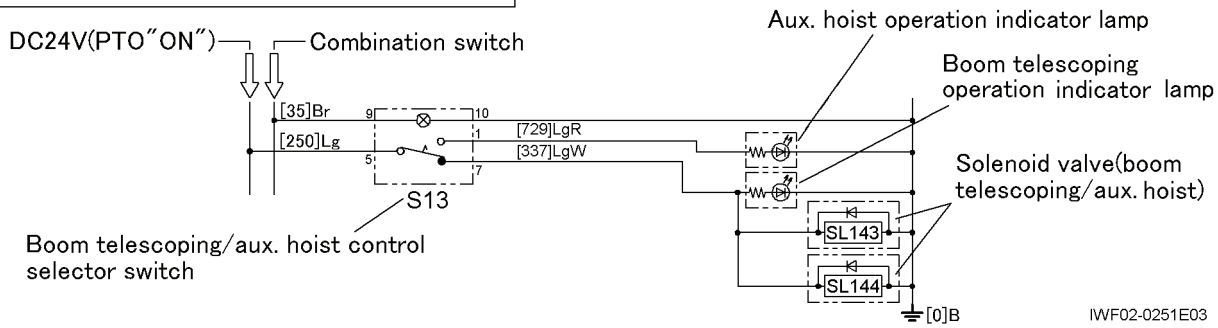
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Winch System

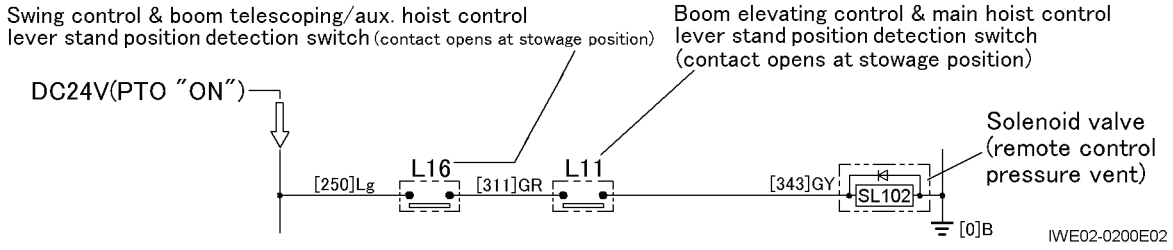
Boom Telescoping/Auxiliary Hoist (~#545522)



Boom Telescoping / Auxiliary Hoist (#545523~)



Remote Control Pressure Vent



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Winch System

[NOTICE]

◆The remote control valve and the solenoid valve are connected to the hydraulic pilot control valve at the points having the same symbols such as "a2", "a3", "b2", and "b3".

1. The main winch is controlled by the hydraulic pilot method. The pilot pressure from the remote control valve (main hoist control lever) controls the hydraulic pilot control valve. The auxiliary winch employs a similar hydraulic pilot method.

2. The maximum pressure in the main and auxiliary winch hydraulic circuits is regulated by the relief valve (main winch, auxiliary winch).

3. The overload relief valve (down) regulates the maximum pressure in the hoist-down circuit for the main winch. This valve suppresses the surge pressure that may occur in a sudden hoist-down operation so as to assure a smooth hoist-down movement. In case of sudden stoppage of hoist-down movement, the relief valve integrated in the counterbalance valve operates to protect the hydraulic motor for the main winch. The auxiliary winch employs a similar hoist-down circuit.

4. Circuit for boom telescoping/auxiliary hoist
   In this hydraulic circuit, the two solenoid valves (boom telescoping/auxiliary hoist) switch the pilot circuit from the remote control valve (boom telescoping/auxiliary hoist control lever) to the hydraulic pilot control valve to either the boom telescoping pilot circuit or the auxiliary winch pilot circuit.

5. Circuit for remote control pressure vent
   In this hydraulic circuit, the solenoid valve (remote control pressure vent) controls the pilot pressure to the remote control valve (main winch), the remote control valve (boom telescoping/auxiliary hoist control lever), the hydraulic valve (main winch brake release), and the hydraulic valve (auxiliary winch brake release).

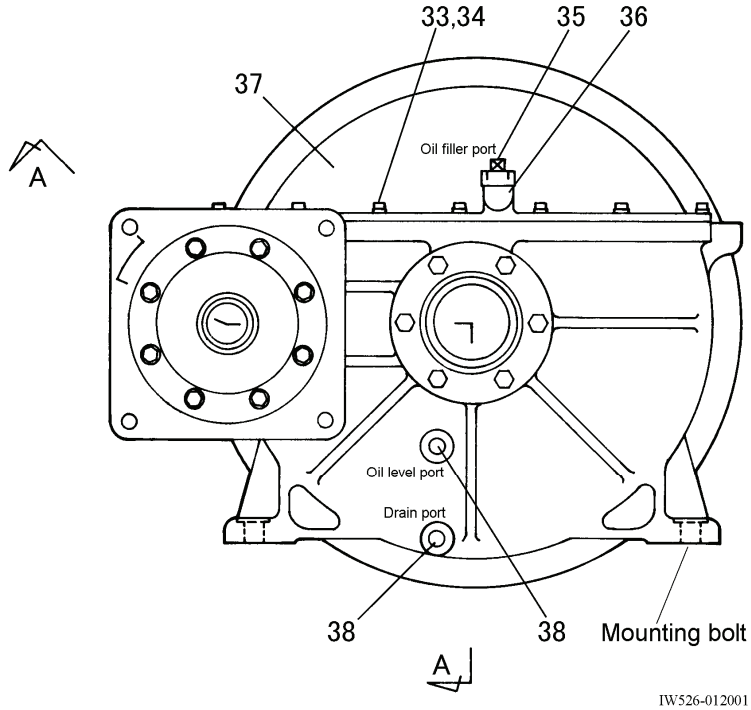
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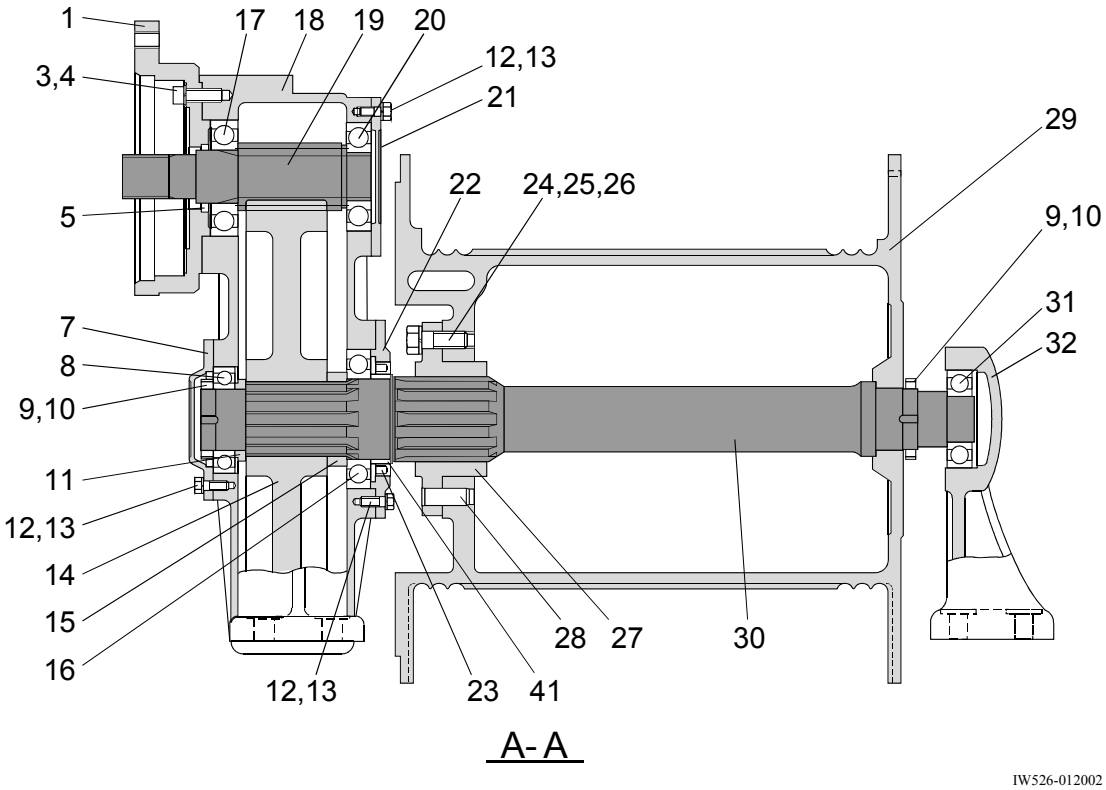
F-2 Winch

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure





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Winch

Note: Apply THREE-BOND 1104 to the following 5 places: mating face of the gear case (18) and the gear case cover (37); mating face of the gear case (18) and the bracket (1); mating face of the gear case (18) and the bearing retainer (7); mating face of the gear case (18) and the bearing retainer (21); mating face of the gear case (18) and the bearing retainer (22). When installing the oil seals (5) and (23), apply THREE-BOND 1215 to their external periphery and inject lithium based grease to their internal periphery. Apply NEVER-SEEZ to the following 2 places: toothed mating face of the drum shaft (30) and the drum boss (27); cylindrical mating face of the drum shaft (30) and the drum (29). The amount of the gear oil is approx. 1.1 gal. (4 L). Do not disassemble the sleeve (41).

1.Bracket
3.Bolt
4.Spring washer
5.Oil seal
7.Bearing retainer
8.Ball bearing
9.Nut
10.Washer
11.Collar
12.Bolt
13.Spring washer
14.Drum gear
15.Collar
16.Ball bearing
17.Ball bearing
18.Gear case
19.Spur gear
20.Ball bearing
21.Bearing retainer
22.Bearing retainer
23.Oil seal
24.Bolt
25.Spring washer
26.Lock plate
27.Drum boss
28.Pin
29.Drum
30.Drum shaft
31.Ball bearing
32.Bearing stand
33.Bolt
34.Spring washer
35.Plug
36.Elbow joint
37.Gear case cover
38.Plug
41.Sleeve

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
3 *1	M14	177 - 190	130 - 140
12	M12	69 - 82	51 - 61
24	M20	353 - 392	260 - 289
33	M8	32 - 34	24 - 25
35 *2	R3/4	106 - 132	78 - 98
38 *3	R3/8	44 - 62	33 - 46
Mounting bolt	M20	431 - 471	318 - 347
*1: Apply THREE-BOND 1305 to threaded sections. *2: Oil filler port. *3: Oil level port on the top and drain port on the bottom.			

360-730-30000 △0
360-731-80000 △0

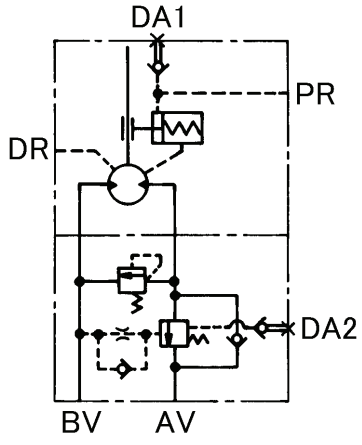
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F-3 Hydraulic Motor (Winch)

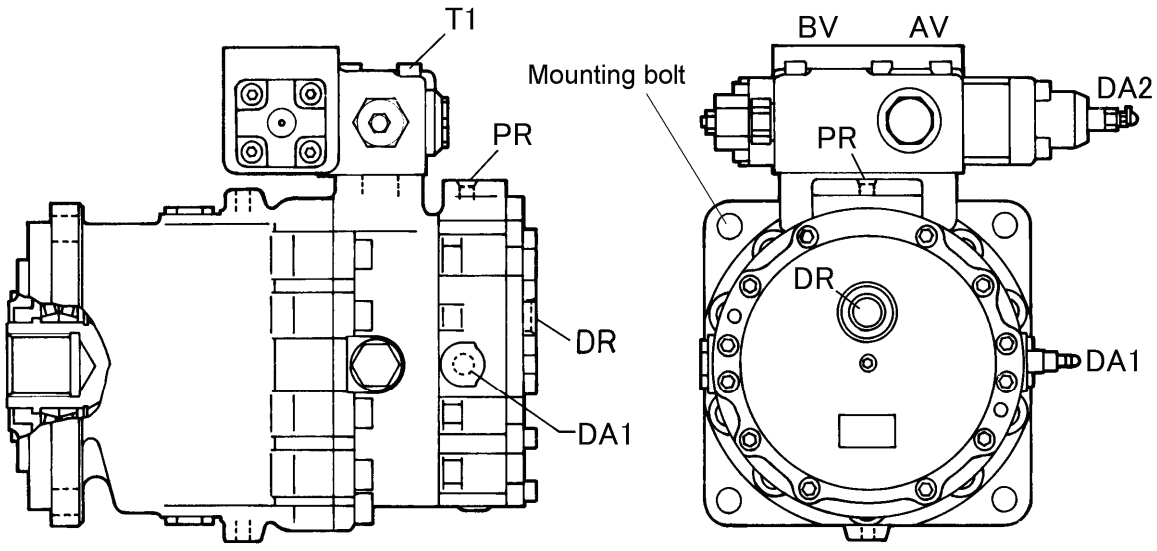
[NOTICE]

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1. Structure



IW102-013001



IW102-013002

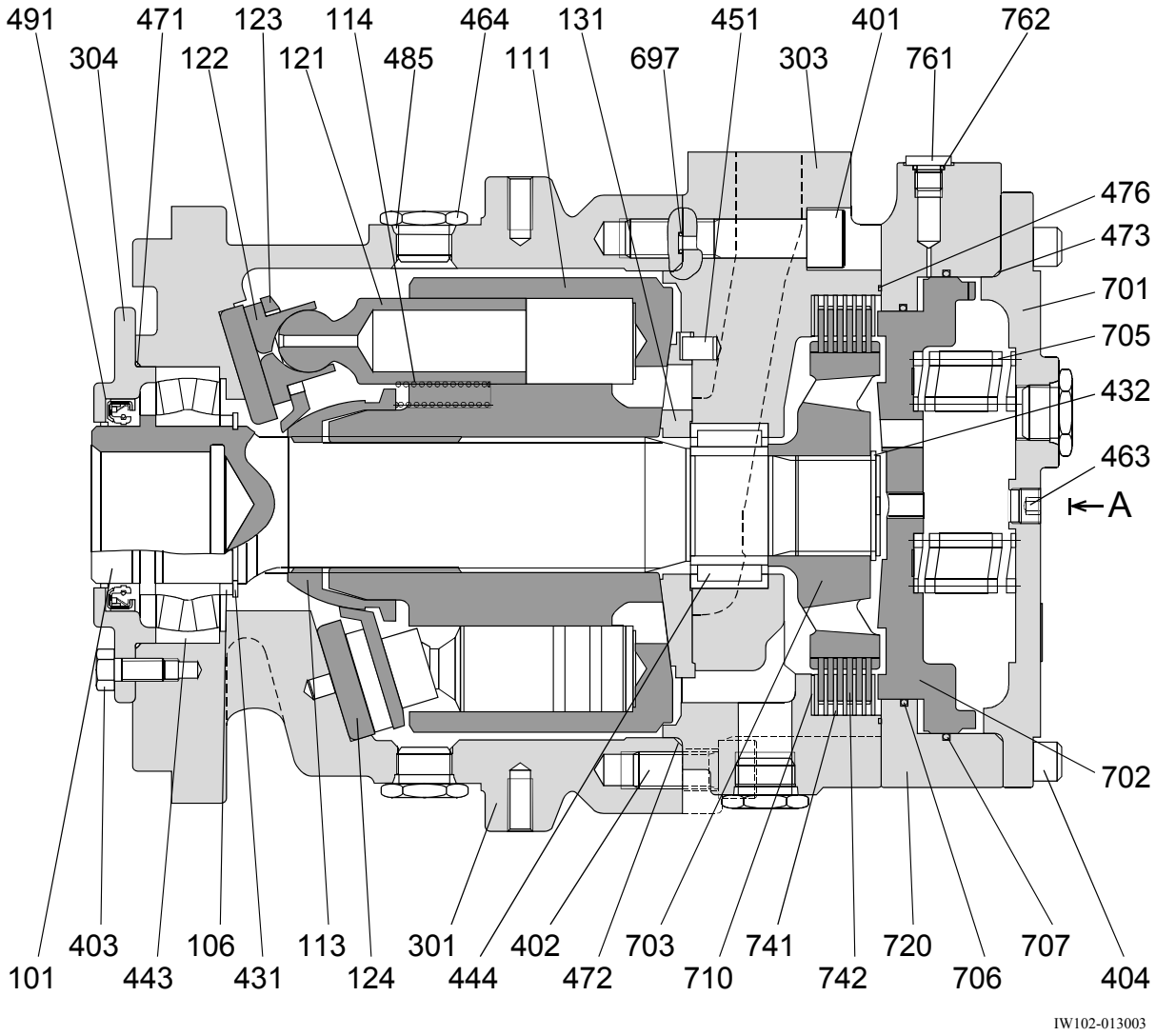
Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
DR	G3/4	167	123
PR	G1/4	36	27
DA1	M10x1.25	16	12
DA2	M10x1.25	16	12
T1	M12	69	51
Mounting bolt	M20	431 - 470	318 - 347

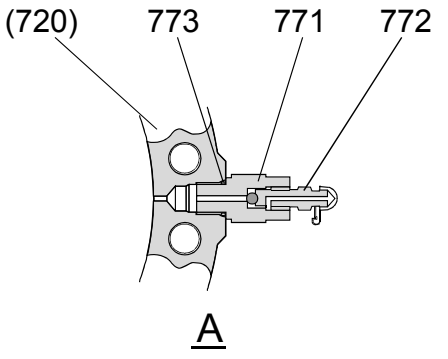
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Hydraulic Motor (Winch)

Cross section of the hydraulic motor



IW102-013003



IW102-013004

https://truckmanualshub.com/

121.Piston
122.Shoe
111.Cylinder
131.Valve plate
303.Valve cover
451.Pin
101.Drive shaft
106.Spacer
113.Spherical bush
114.Cylinder spring
123.Set plate
124.Shoe plate
301.Casing
304.Front cover
401.Hex. socket head bolt
402.Hex. socket head bolt
403.Bolt
404.Hex. socket head bolt
431.Stop ring
432.Stop ring
443.Self-aligning roller bearing
444.Needle bearing
463.Plug
464.Plug
471.O-ring
472.O-ring
473.O-ring
476.O-ring
485.O-ring
491.Oil seal
697.O-ring
701.Brake cover
702.Brake piston
703.Coupling
705.Brake spring
706.O-ring
707.O-ring
710.Brake shim
720.Brake casing
741.Separater plate
742.Friction plate
761.Plug
762.O-ring
771.Air breeder screw seat
772.Air breeder screw
773.O-ring

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
401	M18	333	246
402	M18	333	246
403	M10	57	42
404	M12	98	72
463	R3/8	44	33
464	G3/4	167	123
761	G1/4	36	27
771	G1/4	36	27
772	M10	16	12

2. Air bleeding procedure

Refer to “Air Bleeding Procedure” in chapter Y.

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366-635-50000 △0

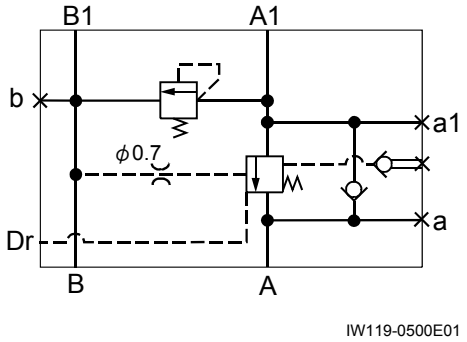
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F-4 Counterbalance Valve (Winch)

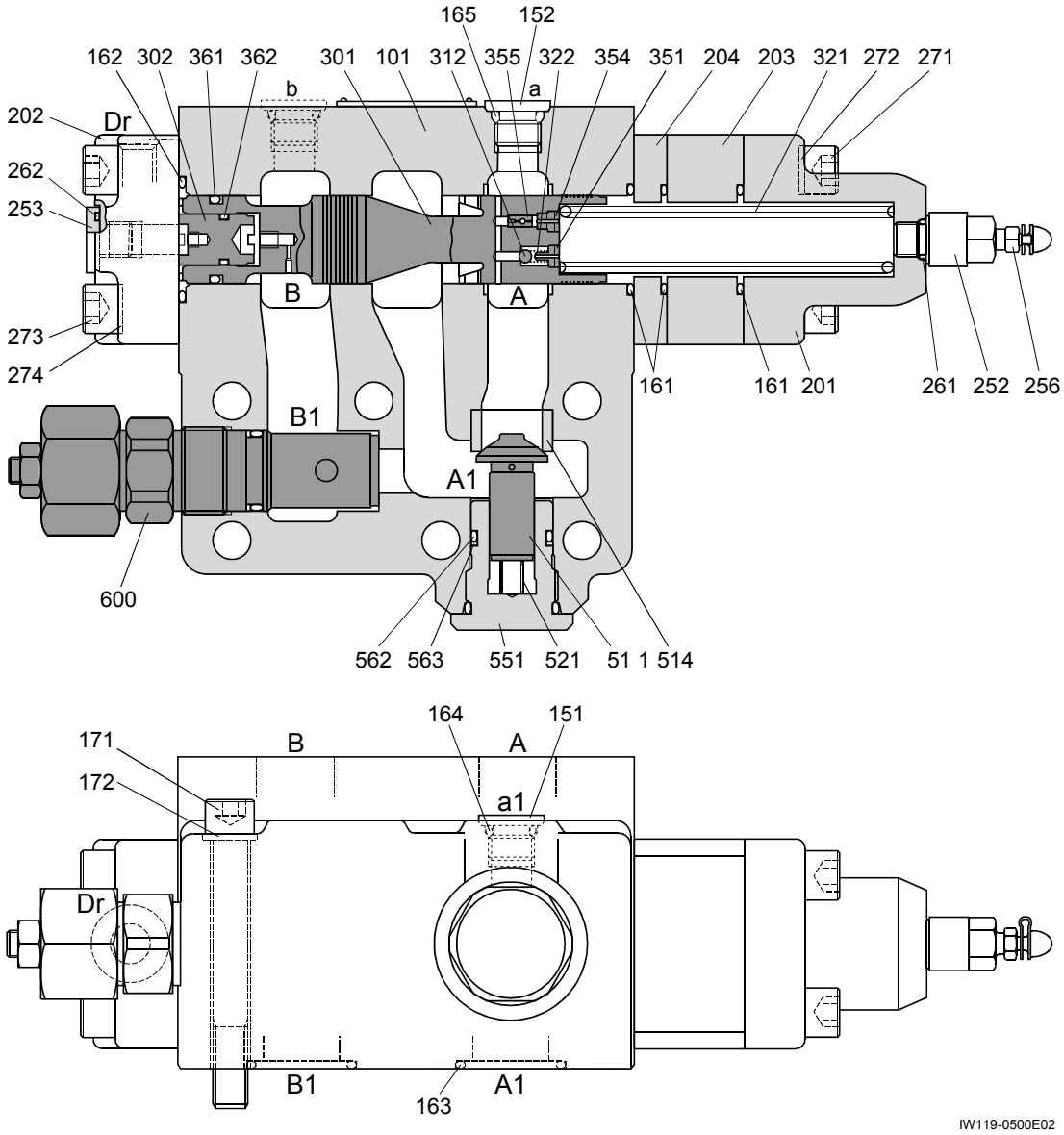
[NOTICE]

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1. Structure



IW119-0500E01



IW119-0500E02

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101.Casing
151.Plug
152.Plug
161.O-ring
162.O-ring
163.O-ring
164.O-ring
165.O-ring
171.Hex. socket head bolt
172.Square spring washer
201.Cover
202.Cover
203.Spacer
204.Spacer
252.Air bleeder screw seat
253.Plug
256.Air bleeder screw
261.O-ring
262.O-ring
271.Hex. socket head bolt
272.Square spring washer
273.Hex. socket head bolt
274.Square spring washer
301.Spool
302.Pilot piston
312.Steel ball
321.Spring
322.Spring
351.Orifice
354.Orifice
355.Orifice
361.O-ring
362.O-ring
511.Plunger
514.Seat
521.Spring
551.Plug
562.O-ring
563.Backup ring
600.Relief valve

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
151, 152	G3/8	69 - 79	51 - 58
171	M12	64 - 74	47 - 54
252	G1/4	34 - 38	25 - 28
253	G1/4	34 - 38	25 - 28
256	M10	14 - 18	10 - 13
271, 273	M12	88 - 108	65 - 80
551	M33	181 - 211	134 - 156
600	M33	166 - 186	123 - 137

2. Function

2.1 Balancing and holding functions

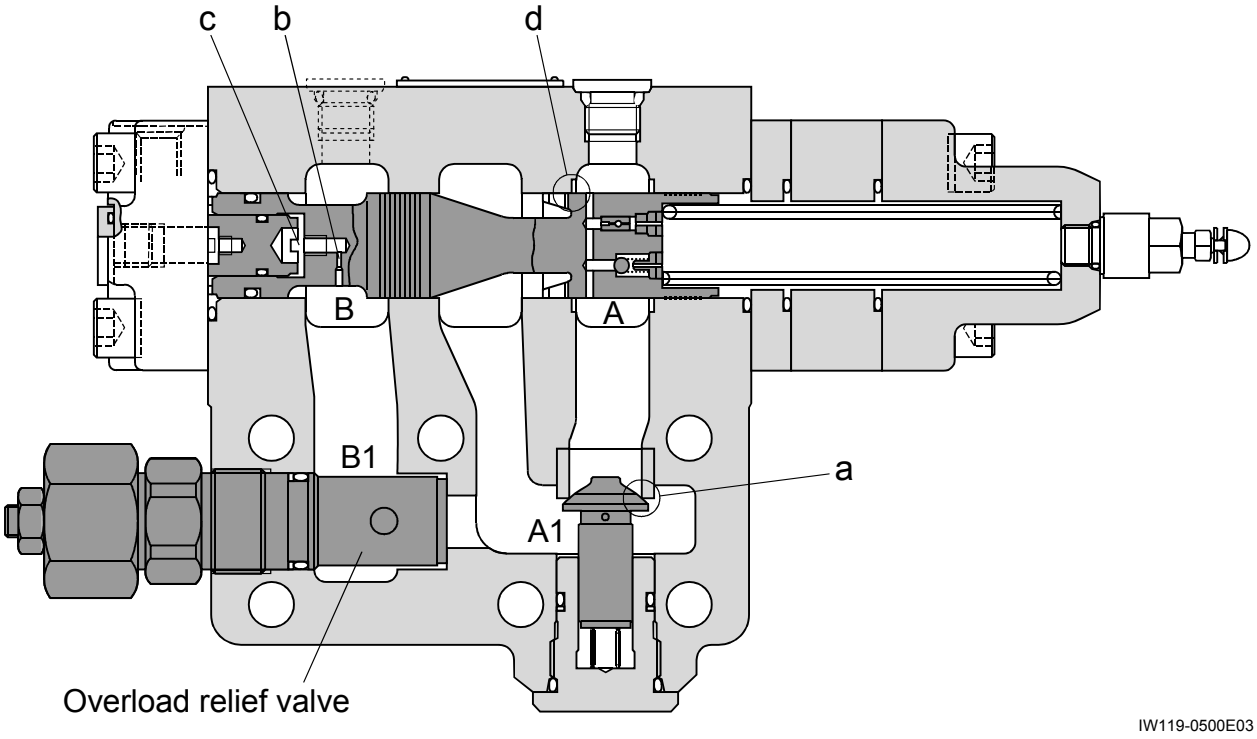
1. During hoisting down, this valve selectively opens and closes the motor outlet passage in accordance with the pressure level of the motor inlet pressure to control the speed of the load and to prevent the load from falling under weight faster than the hydraulic motor driving speed.
2. When the inlet pressure is below a certain level, this valve closes the return passage to hold the load at a desired position.

2.2 Overload relief function

When the circuit pressure rises above the preset overload relief level, this valve vents it to protect the circuit.

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3. Principle of operation



3.1 When control valve is in neutral

The holding pressure of the hydraulic motor is locked by the seat area a of the check valve, the land area d of the spool and the overload relief valve.

3.2 Hoisting up

1. When the control valve sends oil to port A, the oil pushes open the check valve and flows to port A1 connected to the motor.
2. On the other hand, the return oil from the motor port enters through port B1, and then, is discharged through port B to the control valve.

3.3 Hoisting down

1. As oil is sent to port B by the control valve, it flows to the motor via port B1.
2. The return oil from the motor is blocked at port A1, to raise the pressure at port B.
3. This pressure flows through choke b in the spool, enters into chamber c, where it pushes the plunger to the right by overcoming the spring force, and opens land d.
4. As a result, the return oil from the motor is discharged to the control valve via land d to drive the motor.
5. When the load tends to pull the motor faster than the speed corresponding to the flow rate to port B, the pressure in chamber c drops.
6. Maintaining balance with the spring force to automatically adjust the oil passage area in land d to prevent the load from falling at speeds faster than the motor drive speed.

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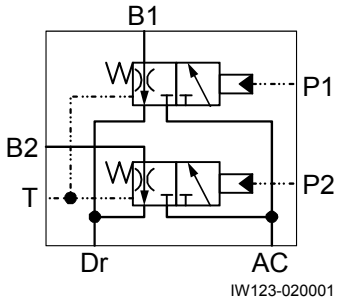
https://truckmanualshub.com/

F-5 Hydraulic Valve (Winch Brake Release)

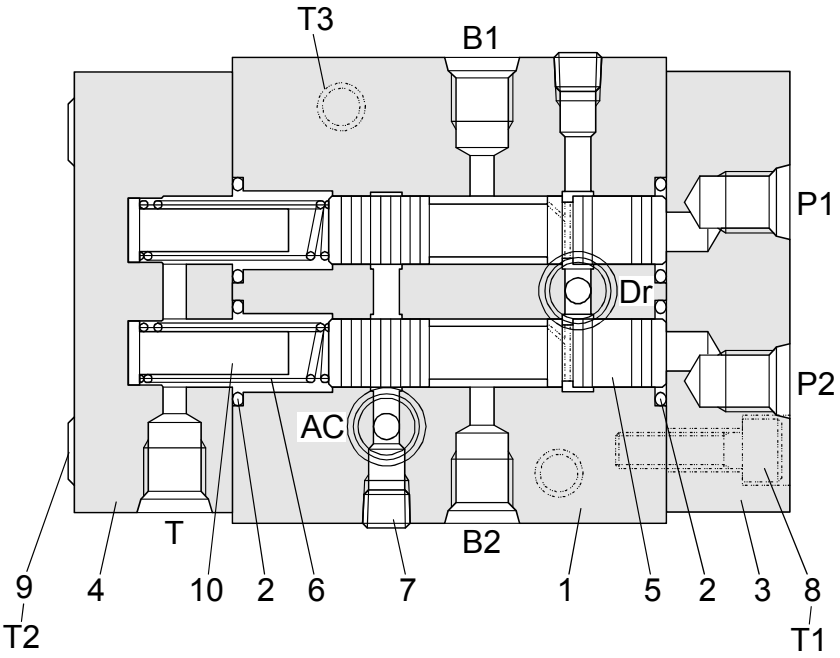
[NOTICE]

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1. Structure



IW123-020001



IW123-020002

1.Valve body	4.Side cover	7.Plug	10.Spring seat
2.O-ring	5.Spool	8.Hex. socket head bolt	
3.Side cover	6.Spring	9. Hex. socket head bolt	

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
AC, B1, B2, Dr T, P1, P2	G1/4	29.4	22
T1, T2	M8	23 - 27	17 - 20
T3	M10	23 - 27	17 - 20

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G

Boom Telescoping System

Contents

G-1 Telescoping System 1

1. General 1

2. Description of telescoping system (Refer to the circuit diagram in Chapter Z.) ... 4
   - 2.1 Extension circuit 4
   - 2.2 Retraction circuit 4

3. Boom telescoping mechanism 5
   - 3.1 Extension 5
   - 3.2 Retraction 6

G-2 Boom (Five-Section Boom) 8

1. Structure 8

2. Disassembly 11
   - 2.1 Removing the 2nd boom section 11
   - 2.2 Removing the 3rd boom section 12
   - 2.3 Removing the 4th boom section 13
   - 2.4 Removing the top boom section 13

3. Check 15
   - 3.1 Boom 15
   - 3.2 Slide plate 15
   - 3.3 Sheave 15
   - 3.4 Boom telescoping wire rope 15

4. Reassembly 15
   - 4.1 Greasing 15
   - 4.2 Install anti-buckling bolts for telescoping cylinder 15
   - 4.3 Installing lower slide plates 16
   - 4.4 Installing slide plates onto sides of rear end 16

5. Adjustment 16
   - 5.1 Adjusting clearance for the boom 16
   - 5.2 Adjusting boom telescoping wire rope 16

6. Test 17
   - 6.1 Operation test 17
   - 6.2 Boom lateral warp test 17
   - 6.3 Other functional test 17

G-3 Jib 18

1. Structure 18
   - 1.1 Location of Jib 18
   - 1.2 Jib main body 20

2. Adjustment 22
   - 2.1 Adjusting jib 1-2 connecting spring pin 22
   - 2.2 Adjusting jib inclination 22
   - 2.3 Adjusting inclination of jib 2 23

G-4 Telescoping Cylinder 24

1. Structure 24

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G-5 Counterbalance Valve (Telescoping) 26

1. Structure 26

2. Function 27
   2.1 When control valve is at the neutral position 27
   2.2 While actuator is being pushed up 27
   2.3 While actuator descends 27

G-6 Hose Reel 28

1. Structure 28

2. Dismounting 29

3. Mounting 29

4. Disassembly 29

5. Reassembly 29

G-7 Hydraulic Valve 31

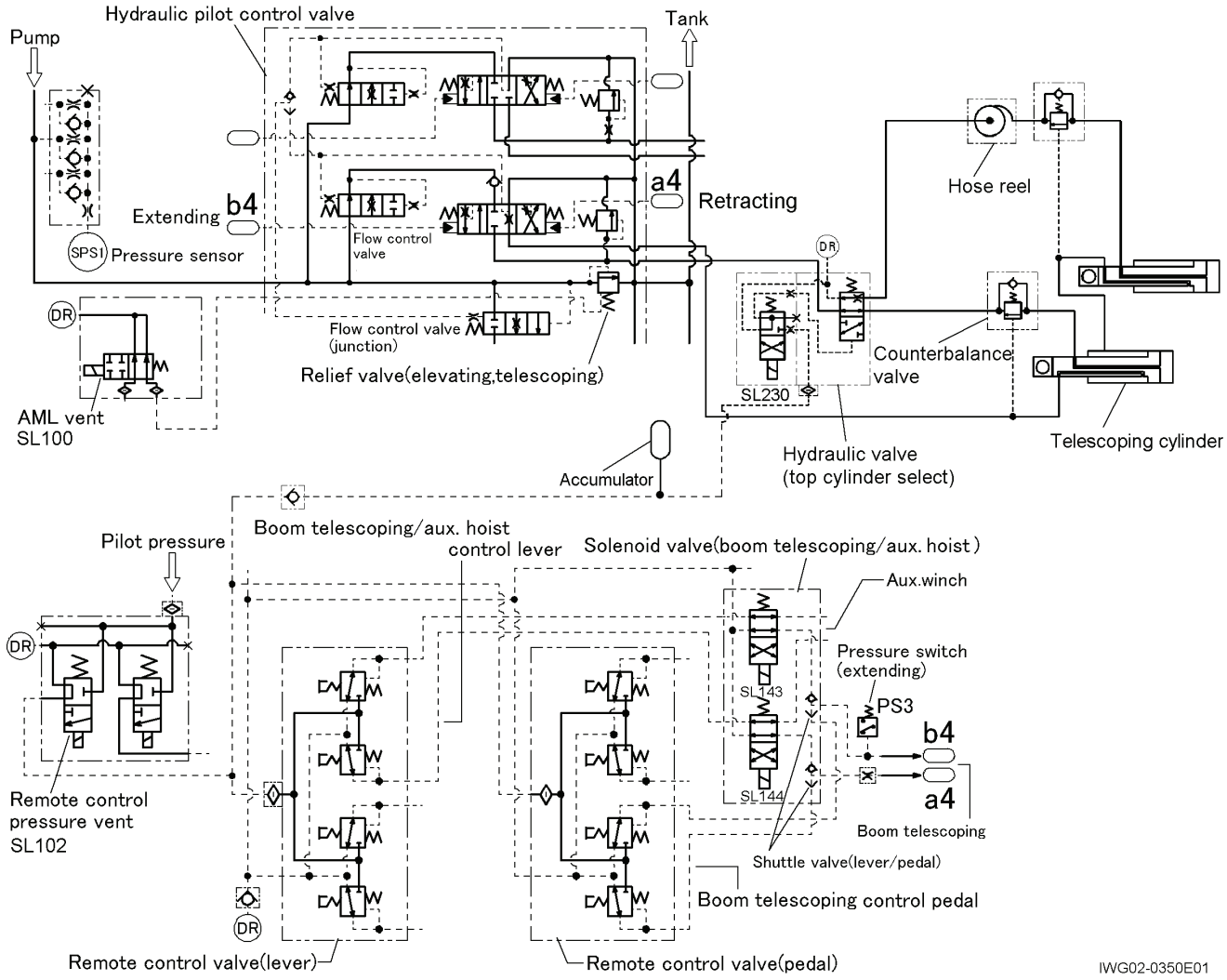
1. Structure 31

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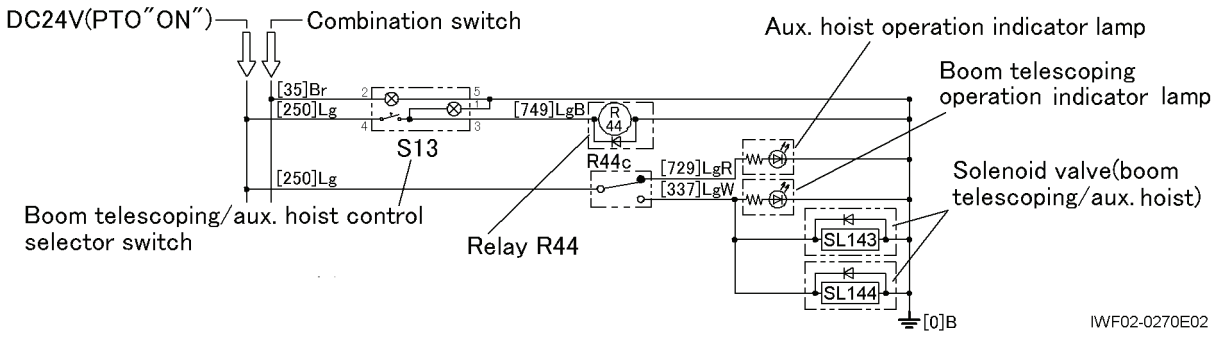
G-1 Telescoping System

1. General

Hydraulic Circuit for Boom Telescoping (2M2D)



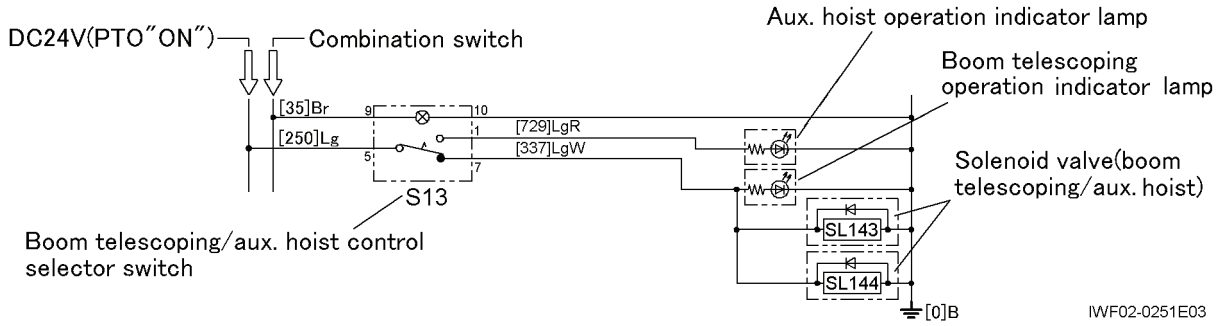
Boom Telescoping/Auxiliary Hoist (--#545522)



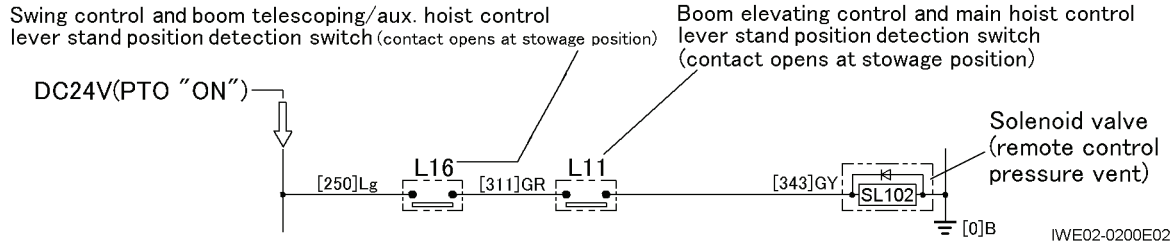
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Telescoping System

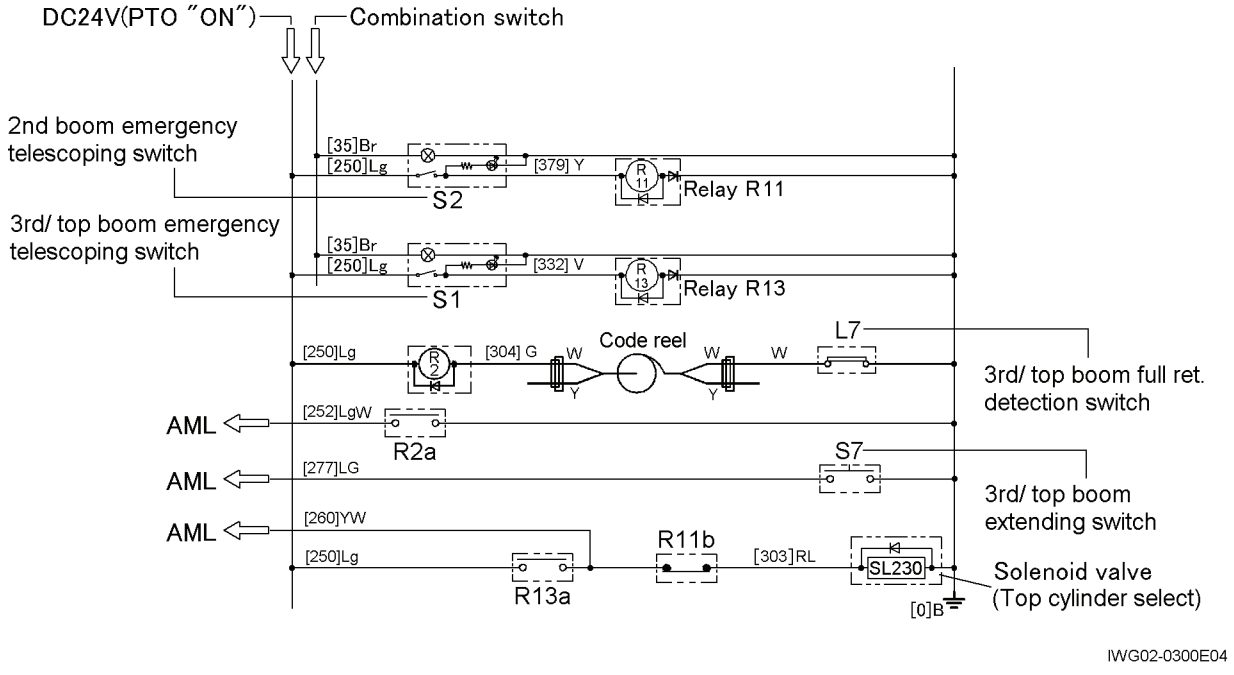
Boom Telescoping/Auxiliary Hoist (#545523--)



Remote Control Pressure Vent



Top Cylinder Select



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Telescoping System

[NOTICE]

◆The solenoid valve and the hydraulic pilot control valve are connected at the two points having the same symbols such as "a4" and "b4".

1. The telescoping operation is controlled by the hydraulic pilot method. The pilot pressure from the remote control valve (boom telescoping/auxiliary hoist control lever) or the remote control valve (boom telescoping control pedal) controls the hydraulic pilot control valve.

2. The maximum pressure in the boom telescoping hydraulic circuits is regulated by the relief valve (elevating, telescoping).

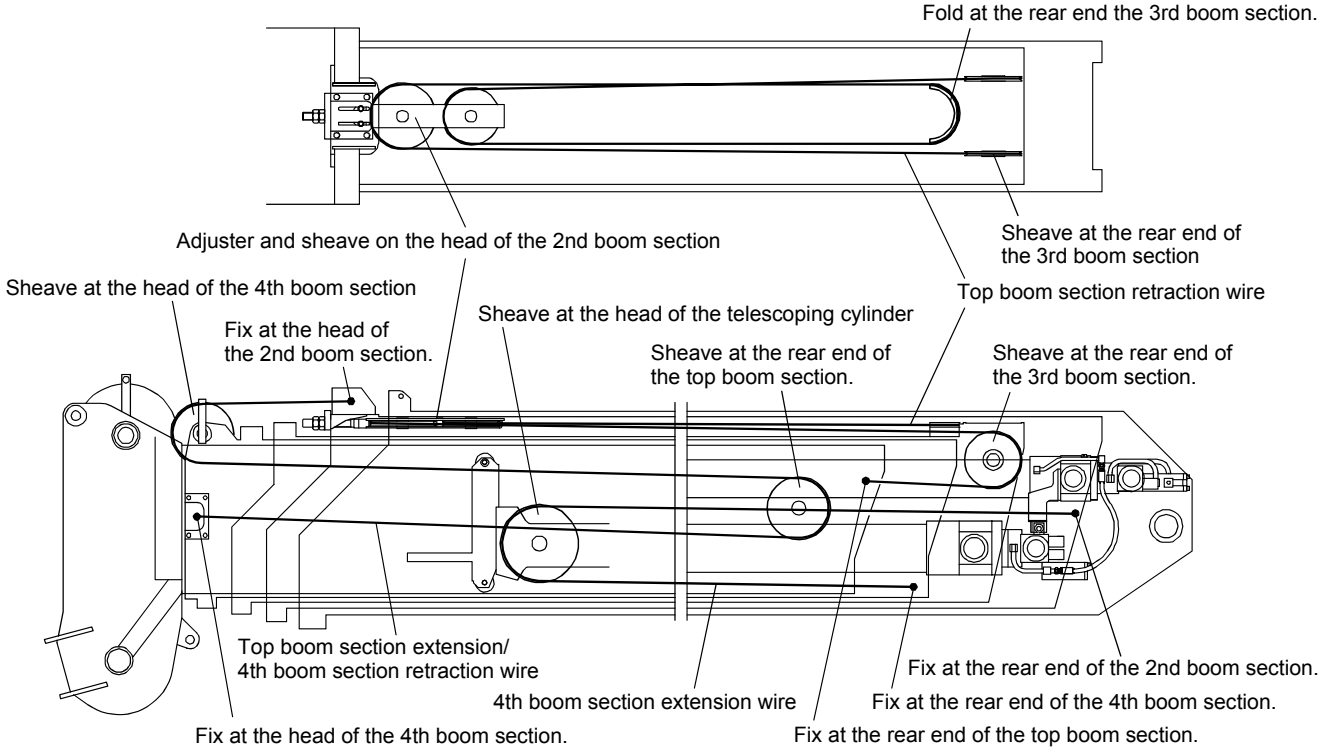
3. Circuit for boom telescoping/auxiliary hoist
   In this hydraulic circuit, the two solenoid valves (boom telescoping/auxiliary hoist) switch the pilot circuit from the remote control valve (boom telescoping/auxiliary hoist control lever) to the hydraulic pilot control valve to either the boom telescoping pilot circuit or the auxiliary winch pilot circuit.

4. Circuit for remote control pressure vent
   In this hydraulic circuit, the solenoid valve (remote control pressure vent) controls the pilot pressure to the remote control valve (boom telescoping/auxiliary hoist control lever) and the remote control valve (boom telescoping control pedal).

5. Circuit for top cylinder select
   In this hydraulic circuit, the solenoid valve (top cylinder select) controls the hydraulic valve which delivers the pressurized oil from the hydraulic pilot control valve to the No.1 cylinder circuit or the No.2 cylinder circuit.

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2. Description of telescoping system (Refer to the circuit diagram in Chapter Z.)



IWG02-0260E01

2.1 Extension circuit

1. When the boom telescoping lever (linked to the remote control valve) is operated to the extension side, pilot pressure is led to the hydraulic pilot control valve, shifting the telescoping control valve to extension side and delivering the pressurized oil from the hydraulic pump to the selector valve.
2. The pressurized oil is sent to the No. 1 telescoping cylinder, making the 2nd boom section extend.
3. After the 2nd boom section is fully extended, press the next section extension switch while keeping the boom telescoping lever operated. The hydraulic valve will be energized, the pressurized oil will be sent to the No. 2 telescoping cylinder and the 3rd boom section will extend.
4. In this case, you need not keep pressing the next section extension switch when the No. 2 telescoping cylinder extends slightly because the boom full retraction switch is shifted and the solenoid self-holding circuit for the hydraulic valve is established.
5. The 4th and top boom sections are extended by the wire-rope mechanism linked to the No. 2 telescoping cylinder.

2.2 Retraction circuit

1. Pressurized oil for boom retraction is delivered from the hydraulic pilot control valve to the No. 1 and No. 2 telescoping cylinder directly.
2. While the No. 2 telescoping cylinder is extended, the solenoid of the selector valve is energized due to the boom full retraction detector switch. Consequently the return circuit of the No. 1 telescoping cylinder is closed and only the No. 2 telescoping cylinder retracts, resulting in retraction of the 3rd boom section.
3. At the same time, the 4th and top boom sections retract by the wire-rope mechanism.
4. When the No. 2 telescoping cylinder is almost fully retracted, the boom full retraction detector switch is activated and disestablishes the solenoid self-holding circuit for the hydraulic valve. Consequently the selector valve automatically shifts, the No. 1 telescoping cylinder retracts and the 2nd boom section retracts.

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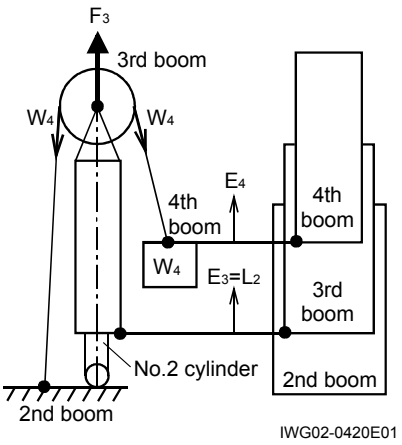
3. Boom telescoping mechanism

3.1 Extension

1. 2nd boom section
   Extended by No.1 cylinder
   (L_1: No.1 cylinder stroke)
   2nd boom section travel (E_2)=L_1

2. 3rd boom section
   Extended by No.2 cylinder
   (L_2: No.2 cylinder stroke)
   3rd boom section travel (E_3)=L_2

3. 4th boom section
   Extended by the wire rope mechanism that synchronizes with the extension of No.2 cylinder.



IWG02-0420E01

E_4 : 4th boom section travel
E_3 : 3rd boom section travel
(=L_2: No.2 cylinder stroke)
F_3 : 3rd boom section force
(=No.2 cylinder force)
W_4 : 4th boom section weight

Balance of force : $F_3 = 2W_4$

Equation of workload : $W_4 \times E_4 = F_3 \times E_3$

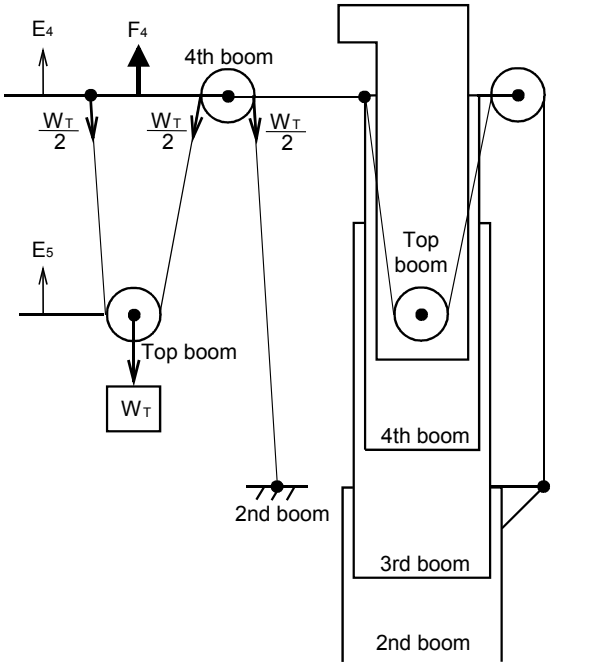
$$\therefore E_4 = F_3 \times \frac{E_3}{W_4}$$

$$= 2W_4 \times \frac{E_3}{W_4}$$

$$= 2E_3 \quad = 2L_2 \quad \text{- - - (a)}$$

4th boom section travel (E_4) = $2L_2$

4. Top boom section
   Extended by the wire rope mechanism that synchronizes with the extension of 4th boom section



IWG02-0420E02

E_5 : top boom section travel
E_4 : 4th boom section travel
F_4 : 4th boom section fotce
W_T : Top boom section weight

Balance of force : $F_4 = 3 \times \frac{W_T}{2}$

Equation of workload : $W_T \times E_5 = F_4 \times E_4$

$$\therefore E_5 = F_4 \times \frac{E_4}{W_T}$$

$$= 3 \times \frac{W_T}{2} \times \frac{E_4}{W_T}$$

$$= \frac{3}{2} E_4$$

From equation (a)

$$E_5 = \frac{3}{2} \times 2L_2 = 3L_2$$

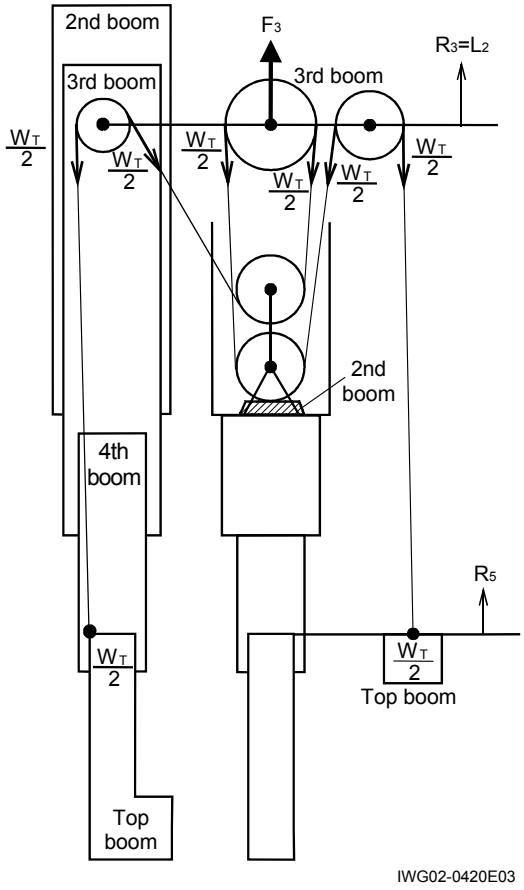
Top boom section travel (E_5) = $3L_2$

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3.2 Retraction

1. Top boom section

Retracted by the wire rope mechanism that synchronizes with the retraction of 3rd boom section.



R_5 : Top boom section travel
R_3 : 3rd boom section travel
(=L_2: No.2 cylinder stroke)
F_3 : 3rd boom section force
(=No.2 cylinder force)
W_T : Top boom section weight

Balance of force : $F_3 = 6 \times \frac{W_T}{2} = 3W_T$

Equation of workload : $W_T \times R_5 = F_3 \times R_3$

$$\therefore R_5 = F_3 \times \frac{R_3}{W_T}$$

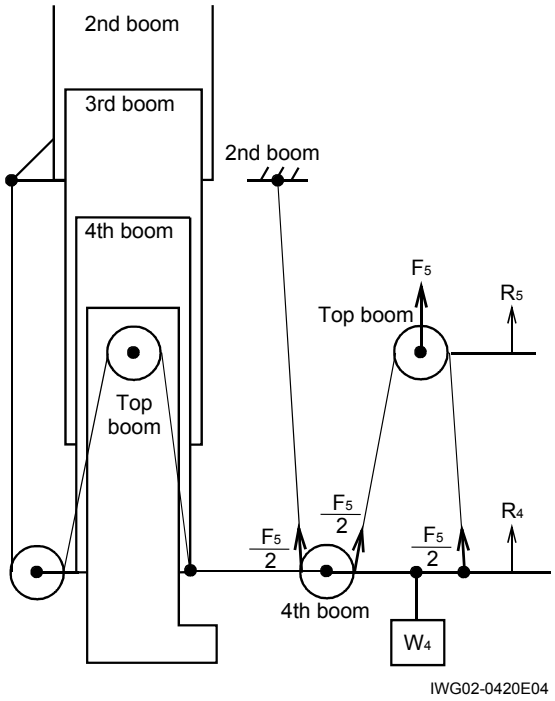
$$= 3W_T \times \frac{R_3}{W_T}$$

$$= 3R_3 \quad = 3L_2 \quad \text{- - - (b)}$$

Top boom section travel (R_5) = $3L_2$

2. 4th boom section

Retracted by the wire rope machanism that synchronizes with the retraction of top boom section.



R_4 : 4th boom section travel
R_5 : Top boom section travel
F_5 : Top boom section force
W_4 : 4th boom section weight

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Balance of force : $3 \times \frac{F_5}{2} = W_4$

$$\therefore F_5 = \frac{2W_4}{3}$$

Equation of workload : $W_4 \times R_4 = F_5 \times R_5$

$$\therefore R_4 = F_5 \times \frac{R_5}{W_4}$$
$$= \frac{2W_4}{3} \times \frac{R_5}{W_4}$$
$$= \frac{2}{3} R_5$$

From equation (b)

$$R_4 = \frac{2}{3} \times 3L_2$$
$$= 2L_2$$

4th boom section travel (R_4) = $2L_2$

3. 3rd boom section
   Retracted by No.2 cylinder
   3rd boom section travel (R_3) = L_2

4. 2nd boom section
   Retraction by No.1 cylinder
   2nd boom section travel (R_2) = L_1

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Boom (Five-Section Boom)

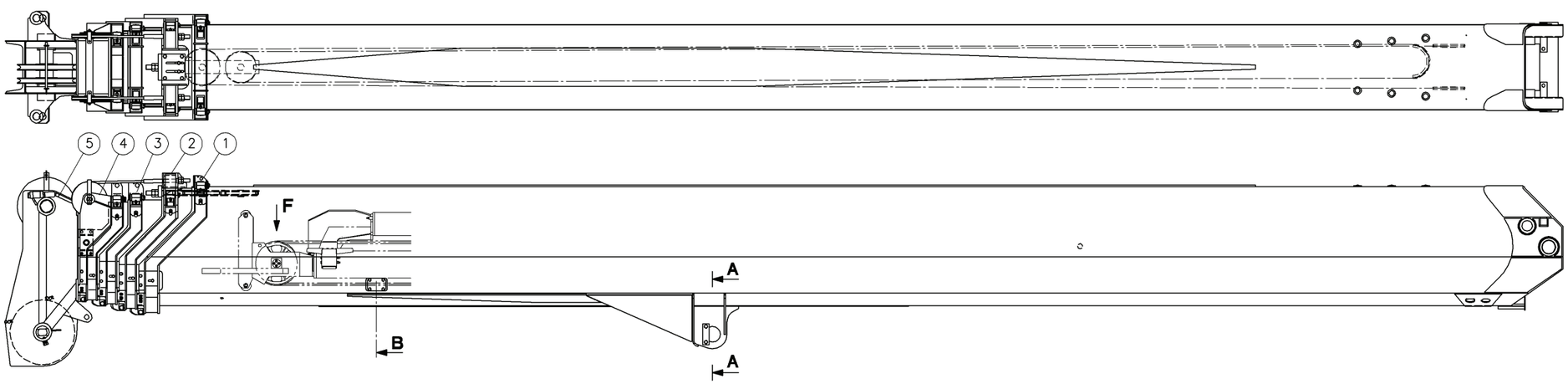
Applicable serial No. △7 : 545611 - -

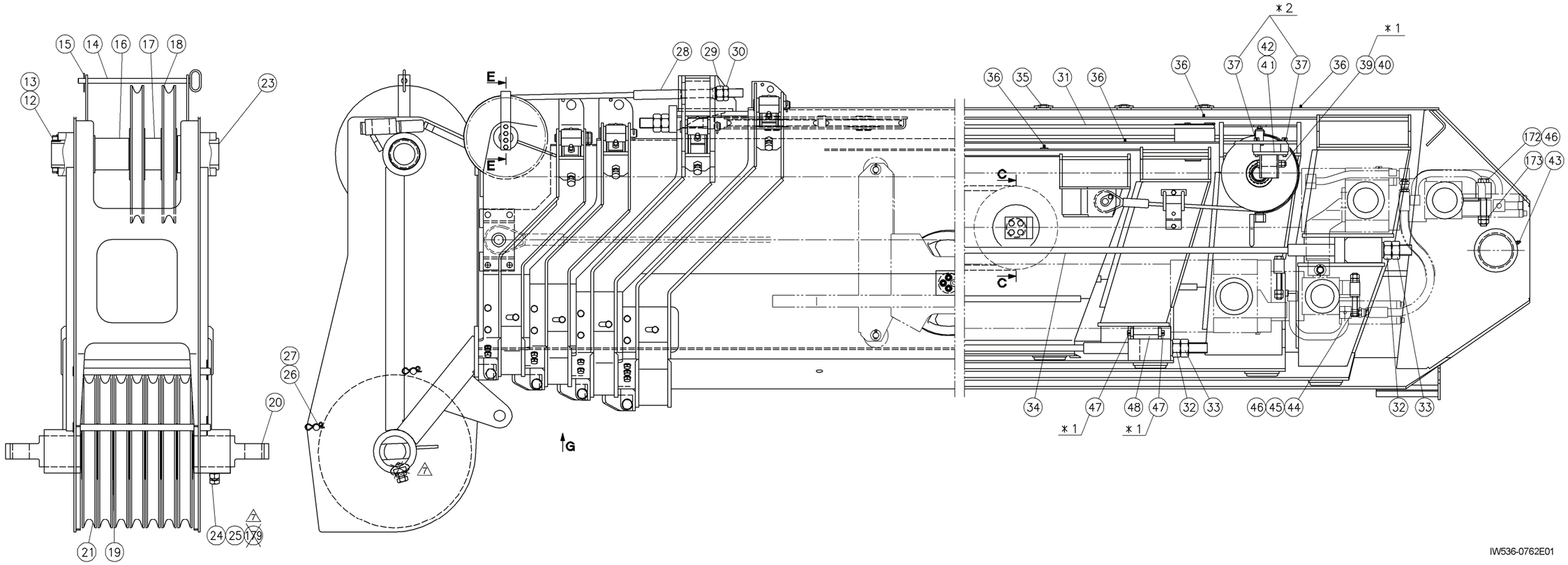
G-2 Boom (Five-Section Boom)

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



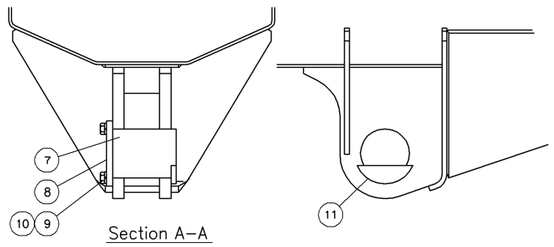


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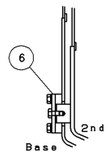
https://truckmanualshub.com/

Boom (Five-Section Boom)

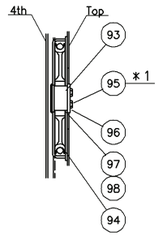
Applicable serial No. △6 : 545561 - -



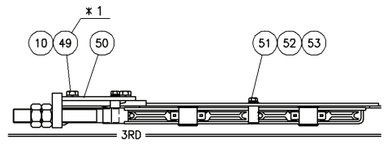
Section A–A



View B



Section C–C

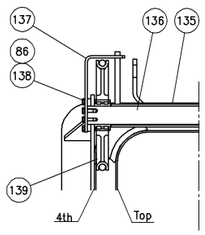


View D

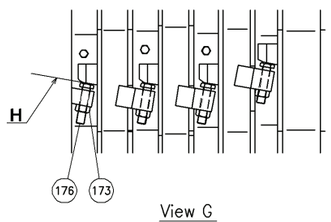
(∗1) : Apply the screw locking agent.
(∗2) : Apply the screw locking agent equivalent to THREE–BOND 1305.
(∗3) : Avoid that the bolt tip protrudes beyond the upperface of the retainer.
Make sure that the engaging length between the bolt and retainer is 6mm (0.236in) or more.

Thread size and tightening torque

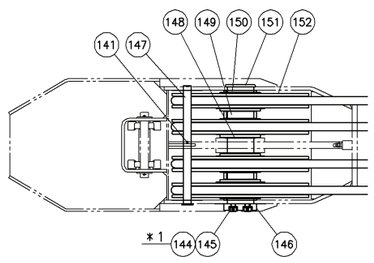
Thread	Thread size	N–m	ft–lbf
(47)	M10	43–49	31.7–36.1
(37)	M10	43–49	31.7–36.1
(95)	M12	49–59	36.1–43.5
(69)	M8	24–27	17.7–19.9
(142)	M12	49–59	36.1–43.5
(144)	M10	43–49	31.7–36.1



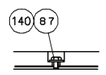
Section E–E



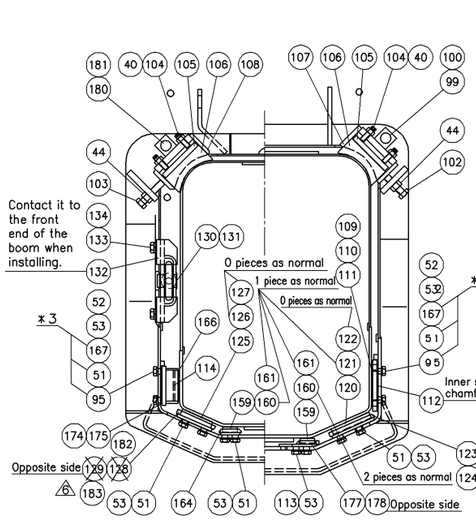
View G



View F

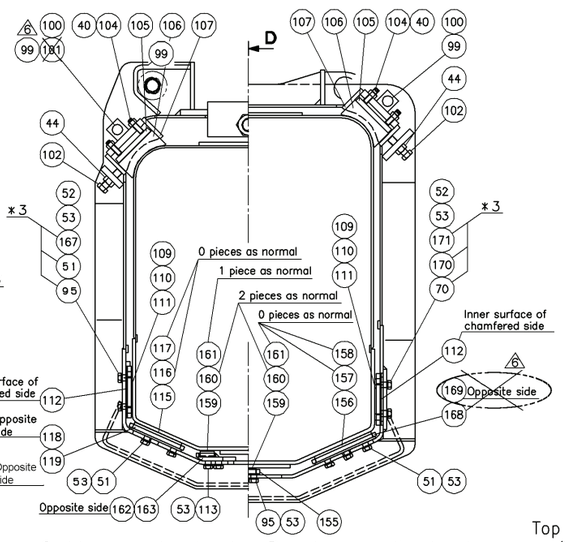


Center of the lower slide plate



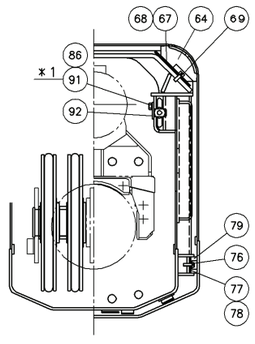
4th boom section head

3rd boom section head



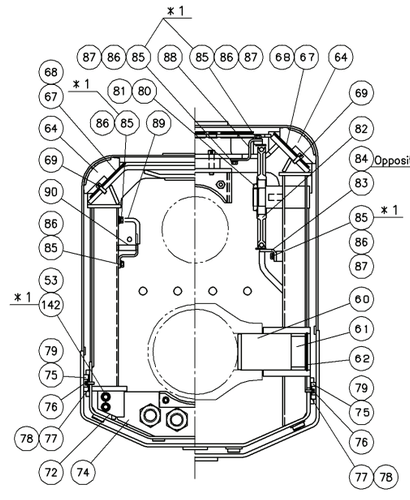
2nd boom section head

Base boom section head



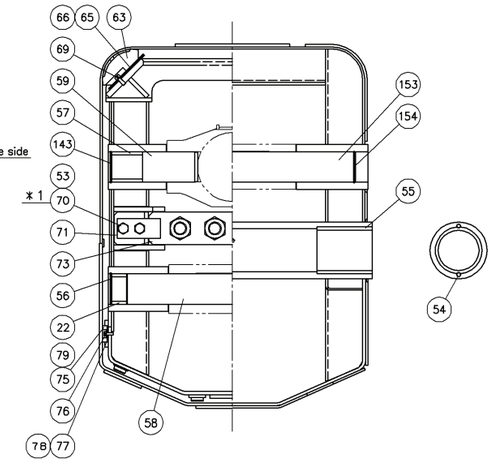
Top boom section head

Top boom section bottom



4th boom section bottom

3rd boom section bottom



2nd boom section bottom

Base boom section bottom

IW536-0762E02

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Boom (Five-Section Boom)

Applicable serial No. △6 : 545561 - - △7 : 545611 - -

1.Base boom section
2.Second boom section
3.Third boom section
4.Fourth boom section
5.Top boom section
6.Slide plate
7.Pin
8.Plate
9.Bolt
10.Spring washer
11.Plate
12.Nut
13.Tooth washer
14.Pin
15.Snap pin
16.Spacer
17.Spacer
18.Sheave assy
19.Spacer
20.Pin
21.Sheave assy
22.Spacer
23.Pin
24.Bolt
25.Nut
26.Pin
27.Snap pin
28.Wire rope
29.Nut
30.Nut
31.Wire rope
32.Nut
33.Nut
34.Wire rope
35.Plug
36.Grease nipple
37.Hexagon socket head bolt
38. ----------
39.Bolt
40.Nut
41.Support
42.Slide plate
43.Grease nipple
44.Nut
45.Bolt
46. ----------
47.Hexagon socket head bolt
48.Slide plate
49.Bolt
50.Adjuster assy
51.Bolt
52.Plain washer
53.Spring washer
54.Set screw
55.Plain bearing
56.Retaining ring
57.Spacer
58. Pin
59.Pin
60.Pin
61.Spacer
62.Retaining ring
63.Slide plate
64.Slide plate
65.Plate
66.Plate
67.Plate
68.Plate
69.Hexagon socket head bolt
70.Bolt
71.Plate
72.Plate
73.Support
74.Support
75.Slide plate
76.Hexagon socket head bolt
77.Shim
78.Shim
79.Slide plate
80.Nut
81.Tooth washer
82.Sheave assy
83.Guide
84.Guide
85.Bolt
86.Spring washer
87.Plain washer
88.Support
89.Guide
90.Pin
91.Bolt
92.Pin
93.Pin
94.Sheave assy
95.Bolt
96.Plate
97.Spacer
98.Spacer
99.Pin
100.Split pin
101.~~Pin~~ △6 ---
102.Bolt
103.Bolt
104.Set screw
105.Plate
106.Slide plate
107.Retainer
108.Retainer
109.Slide plate
110.Plate
111.Plate
112.Retainer
113.Bolt
114.Retainer
115.Slide plate
116.Plate
117.Plate △6
118.Retainer ~~assy~~ (L)
119.Retainer ~~assy~~ (R)
120.Slide plate
121.Plate
122.Plate △6
123.Retainer ~~assy~~ (L)
124.Retainer ~~assy~~ (R)
125.Slide plate
126.Plate
127.Plate
128.---
129.---
130.Pin
131.Retaining ring
132.Support
133.Bolt
134.Spring washer
135.Spacer
136.Pin
137.Guide
138.Bolt
139.Sheave assy
140.Bolt
141.Split pin
142.Hexagon socket head bolt
143.Retaining ring
144.Hexagon socket head bolt
145.Spring washer
146.Support
147.Pin
148.Plate
149.Spacer
150.Spacer
151.Pin
152.Sheave assy
153.Pin
154.Retaining ring
155.Retainer
156.Slide plate
157.Plate
158.Plate
159.Slide plate
160.Plate
161.Plate
162.Retainer (L)
163.Retainer (R)
164.Retainer
165. ----------
166. Slide plate
167.Bolt △6
168.Retainer ~~assy (L)~~
169.~~Retainer assy (R)~~ △6 ---
170.Bolt
171.Bolt
172.Bolt
173.Nut
174.Plate
175.Plate
176.Bolt
177.Retainer (L)
178.Retainer (R)
179.~~Plate~~ △7 ---
180.Pin
181.Split pin
△6 182.Retainer(R)
△6 183.Retainer(L)

342-016-60000 △9

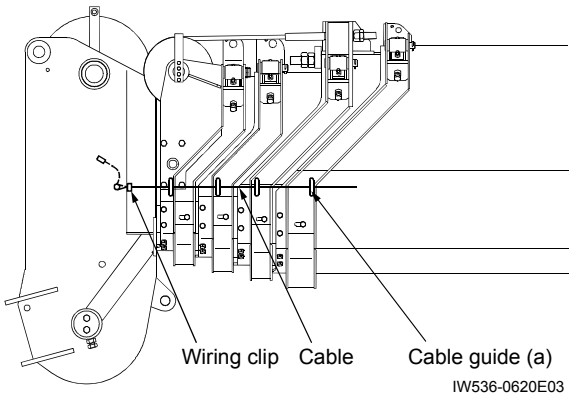
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2. Disassembly

The procedure to remove the 2nd boom section and further sections as an assembly is described below.

2.1 Removing the 2nd boom section

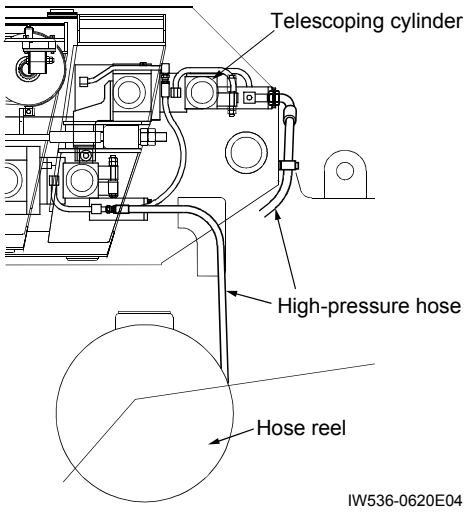
1. Retract the boom fully and set the crane level.
2. Remove the hook block and the rope socket. Wind up the wire rope on the drum.
3. Swing the boom to place where there is enough clearance, then lower the boom to 0° and stop the engine.
4. Remove the wiring connector, loosen the wiring clip and secure the cable end using a tape at the cable guide (a) located closest to the cord reel.



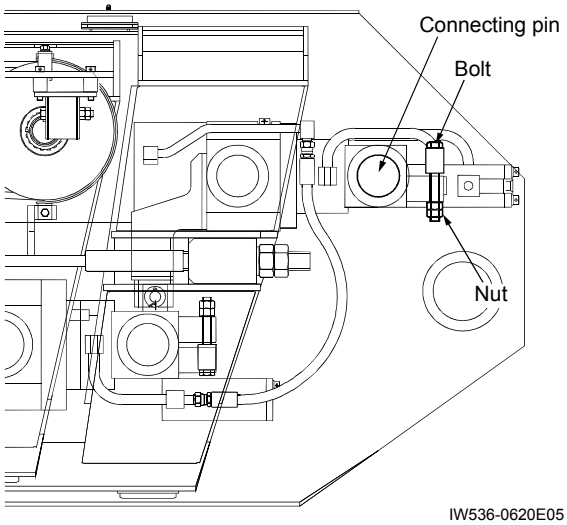
5. Remove the high-pressure hoses (2 pieces) and the hose leading to the hose reel from the telescoping cylinder.

[NOTICE]

◆To prevent the hose reel from spinning, attach a wire to the hose to the pipe sleeve of the hose and secure the wire to the swing frame.



6. Pull out the connecting pin that connects the base boom section and the No. 1 telescoping cylinder by removing the retaining ring. Then loosen the nut and remove the bolt.



7. After removing the retainer on the top of the base boom section head and removing the slide plate, pull out the 2nd boom section by approx. 1 m.
8. While lifting up the 2nd boom section slightly, remove the retainer from the bottom of the base boom section head.
9. Lift up and pull out the 2nd boom section using a crane, and place it on a level platform.

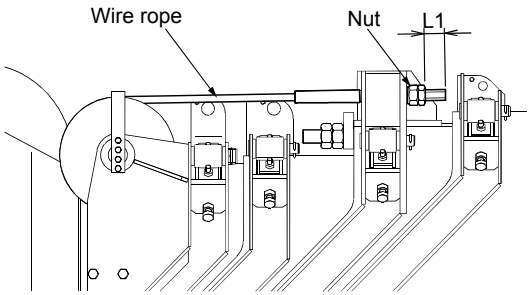
https://truckmanualshub.com/

2.2 Removing the 3rd boom section

1 Remove the wire rope for top boom section extension/4th boom section retraction located on the top of the 2nd boom head by loosening the nut.

[NOTICE]

◆Before loosening the nut, measure the length of the wire rope protrusion (L1) as a guide for reassembly.



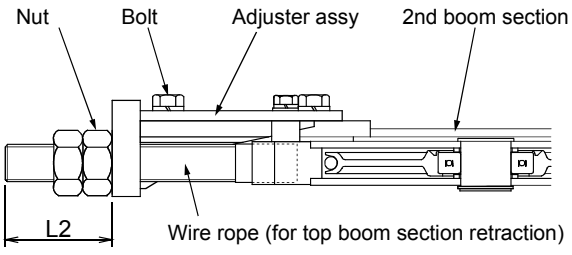
IW536-0620E06

2. Remove the wire rope for top boom section located on the top of the 2nd boom head by loosening the nut.

[NOTICE]

◆Before loosening the nut, measure the length of the wire rope protrusion (L2) as a guide for reassembly.

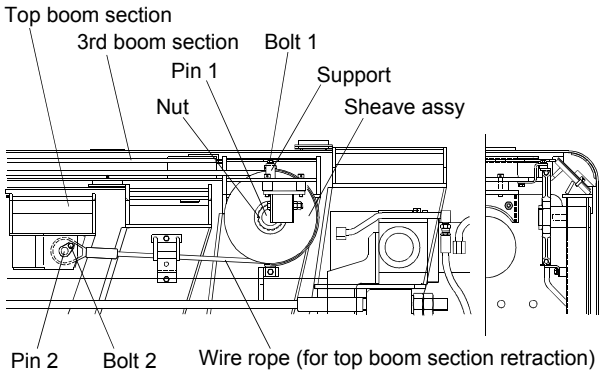
3. Remove the adjuster assy from the 2nd boom section by loosening the bolt.



IW536-0620E07

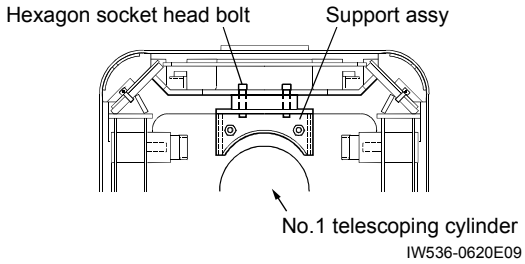
4. Remove the supports (on both sides of the rear end of the 3rd boom section) by loosening the bolt 1, and remove the pin and sheave assy by loosening the nut.

5. Remove the pin from the rear end of the top boom section by loosening the bolt 2 and remove the wire ropes for top boom section retraction (2 pieces).



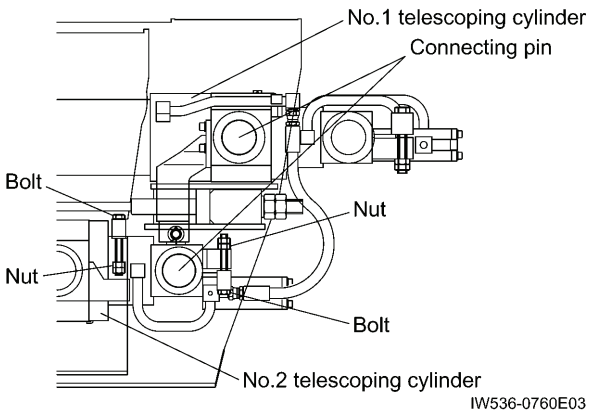
IW536-0620E08

6. Remove the support assy of the No. 1 telescoping cylinder located at the rear end of the 3rd boom section by loosening the hexagon socket head bolt.



IW536-0620E09

7. After removing the retaining ring, remove the pin that secures the No. 1 telescoping cylinder and No. 2 telescoping cylinder to the 2nd boom section. Then loosen the nut and remove the bolt.



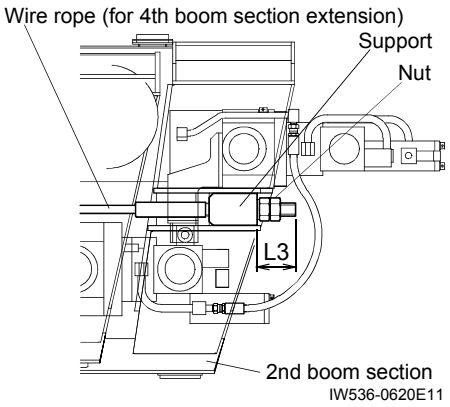
IW536-0760E03

8. Remove the nut for the wire rope (for 4th boom section extension) located on the rear end of the 2nd boom section, then loosen the bolt and remove the support.

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[NOTICE]

◆Before loosening the nut, measure the length of the wire rope protrusion (L3) as a guide for reassembly.



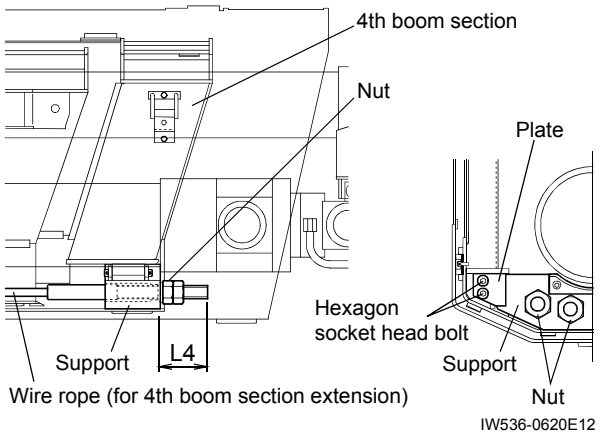
9. After removing the retainer on the top of the 2nd boom section head and removing the slide plate, pull out the 3rd boom section by approx. 1 m.
10. While lifting the 3rd boom section slightly, remove the retainer from the bottom of the 2nd boom section head.
11. Lift and pull out the 3rd boom section using a crane, and place it on a level platform.

2.3 Removing the 4th boom section

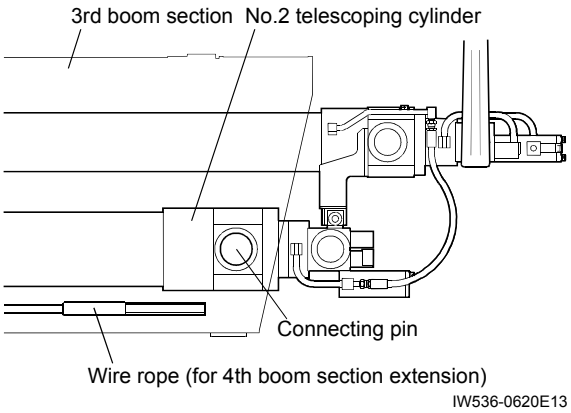
1. Remove the nut for the wire rope (for 4th boom section extension) located on the rear end of the 4th boom section, loosen the hexagon head bolt, and remove the plate and support.

[NOTICE]

◆Before loosening the nut, measure the length of the wire rope protrusion (L4) as a guide for reassembly.



2. Lift up the rear end of the telescoping cylinder slightly using a crane and pull out the connecting pin that connects the 3rd boom section and the No. 2 telescoping cylinder by removing the retaining ring.
3. Lift up the telescoping cylinder using a crane and pull it out rearward together with the wire rope for 4th boom section extension.

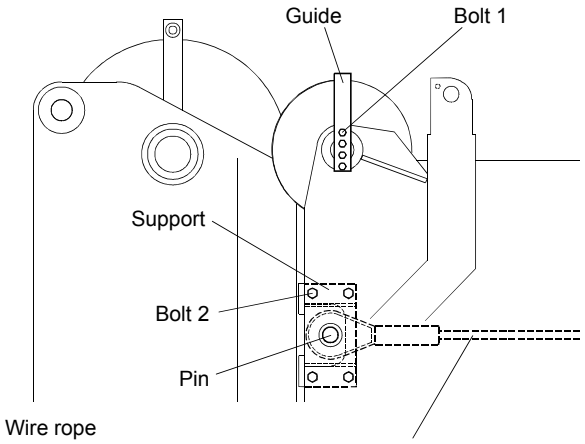


4. After removing the retainer on the top of the 3rd boom section head and removing the slide plate, pull out the 4th boom section by approx. 1 m.
5. While lifting the 4th boom section slightly, remove the retainer from the bottom of the 3rd boom section head.
6. Lift and pull out the 4th boom section using a crane, and place it on a level platform.

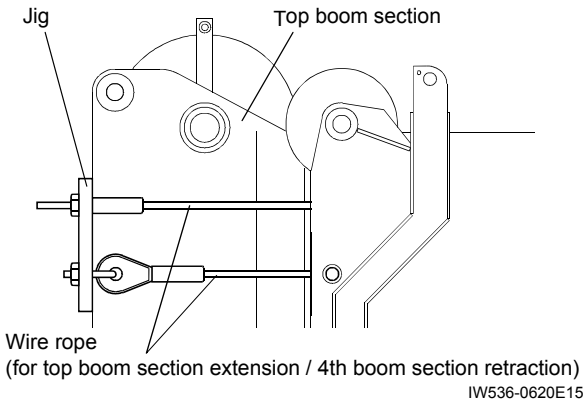
2.4 Removing the top boom section

1. Remove the four bolts and detach the guide.
2. Remove support by loosening the bolts 2 (4 pieces) on both sides of the 4th boom section head, draw out the wire rope forward by approx. 0.5 m, remove the retaining ring, detach the pin and separate the wire rope from the support.

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3. To prevent damage to the wire rope, secure it to the head of the top boom section using a jig.



4. After removing the retainer on the top of the 4th boom section head and removing the slide plate, pull out the top boom section by approx. 1 m.
5. While lifting up the top boom section slightly, remove the retainer from the bottom of the 4th boom section head.
6. Lift up and pull out the top boom section using a crane.
7. Remove the wire rope for top boom section extension/4th boom section retraction from the rear end of the top boom section.

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3. Check

3.1 Boom

Check the boom for twist, deformation, wrap, and cracks.

3.2 Slide plate

Check the slide plates for cracks and wear, and replace when these conditions are excessive.

3.3 Sheave

Check the sheaves for damage, deformation and wear, and replace them when these conditions are excessive.

3.4 Boom telescoping wire rope

Wire rope in the condition described below must not be used.

- Deformation or corrosion
- Kinking
- 10% or more broken wire (filler wires excluded) in one lay of the wire rope
- diameter reduction exceeding 7% of the nominal diameter.
- Evidence of any heat damage from any cause.

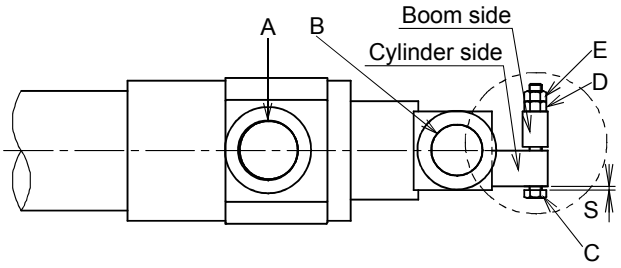
4. Reassembly

4.1 Greasing

- When installing unplated pins, apply grease beforehand.
- Apply TNR-2 Grease sufficiently to the sliding surfaces of the slide plates, the booms and telescoping cylinders.

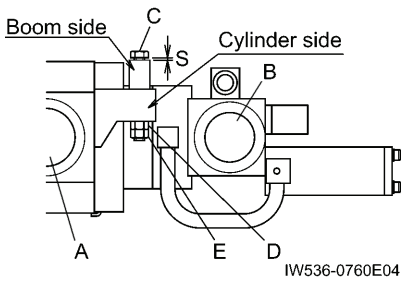
4.2 Install anti-buckling bolts for telescoping cylinder

Base and 2nd boom section



IW536-0680E12

3rd boom section



IW536-0760E04

1. Connect the boom and telescoping cylinder using the pins A and B.
2. Adjust the bolt C locked with nuts D and E so that it can be turned by hand and the clearance (S) is 0.5mm (0.02in) or less.(Apply thread locking agent.)

[NITICE]

◆Refer to normal insert directions of bolt•C shown on [2.Disassembly]

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4.3 Installing lower slide plates

1. Apply thread locking agent to the bolt, tighten it lightly and turn it in reverse for a quarter turn.
2. If the tip of the bolt protrudes beyond the bottom of the retainer, scrape it off with a grinder.

4.4 Installing slide plates onto sides of rear end

Apply thread locking agent to the bolt, tighten it lightly and turn it in reverse for a quarter turn.

5. Adjustment

5.1 Adjusting clearance for the boom

1. Lateral clearance at the bottom of the boom rear end

   Place shims so that the total clearance (distributed to right and left) is 0.5 mm.

2. Upper clearance on boom rear end

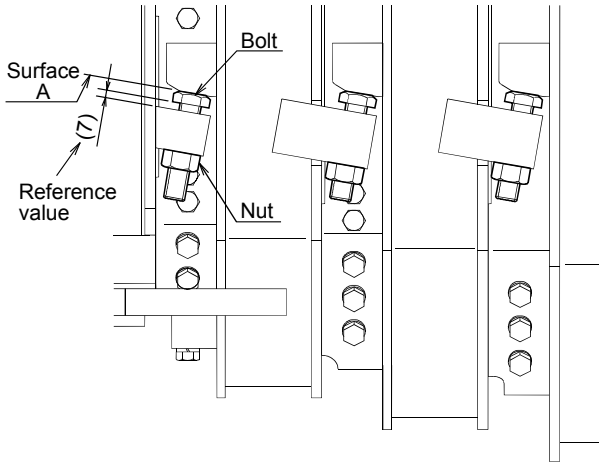
   Place shims that the lateral deviation of center is ±1.5 mm, and vertical deviation is 3-5 mm.

3. Lateral clearance at boom head

   Place shims so that the total clearance is 0.5 mm when the boom is 1 m longer than that of full retraction.

4. Adjusting the bolt on the bottom of each boom section head

   After retracting each boom section fully, lock the bolt with a nut while it is lightly pressed against the A surface. Apply thread locking agent.



IW536-0630E15

5.2 Adjusting boom telescoping wire rope

See the "Adjusting boom telescoping wire ropes" section in the Y chapter.

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6. Test

[NOTICE]

◆Bleed the telescoping cylinders completely and apply grease to the boom sliding surfaces before starting the tests.

6.1 Operation test

Telescope the boom several times, and make sure that the telescoping operation is in order.

6.2 Boom lateral warp test

[Conditions]

・Crane levelness : ± 6' max.

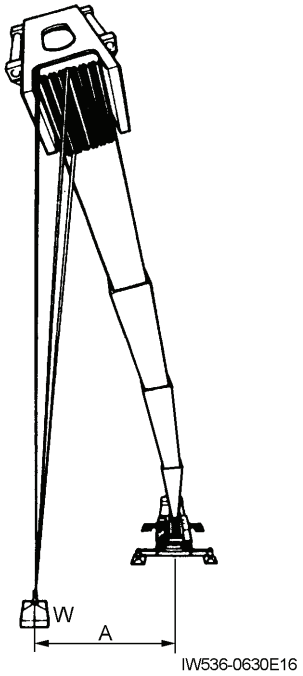
・Boom length : Full extension

・Boom elevation : Maximum

・Boom direction : Over-front, Over-rear, Over-right, Over-left

・Other conditions: Free from solar heat and wind

1. The hook displacement (A in sketch) under the above test conditions under no load must be brought within 200mm (7.9 in) in all boom directions by shim adjustment.
2. After shim adjustment, the hook displacement (A in sketch) under the above test conditions under the total rated load must be within the specified of 500mm (19.7 in).
   When the displacement is more than the specified limit, readjust the shim.



6.3 Other functional test

Check all the electric and electric parts (boom length & angle detector, etc.) that are influenced by boom dismounting, for function and accuracy.

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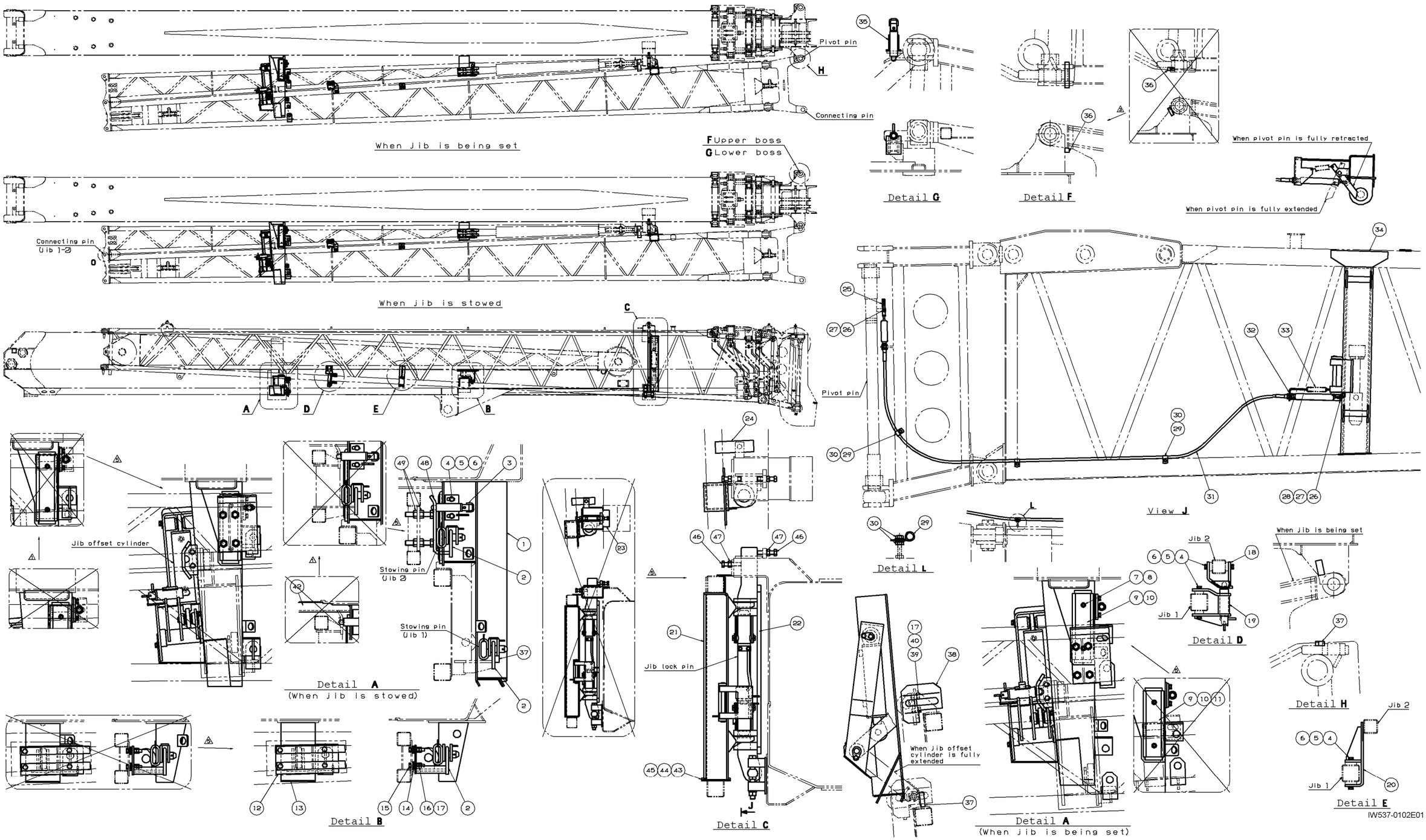
Jib

Applicable serial No. △1 : 545419,545430~,475327~
△2 : 545410~,475326~
△3 : 545419,545430~,475330~
△4 : 545419,545457~,475330~
△5 : 545511~,475349~,437366~

G-3 Jib

1. Structure

1.1 Location of Jib



IW537-0102E01

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Jib

1.Support assy
2.Plate
3.Pin assy
4.Bolt
5.Spring washer
6.Plain washer
7.Bolt
8.Plain washer
9.Slide plate
10.Shim
11.~~Slide plate~~ △5
12.Support assy
13.Support
14.Plate
15.Bolt
16.Nut
17.Plain washer
18.Support
19.Pin assy
20.Support
21.Support assy
22.Support assy
23.~~Support assy~~ △5
24.Plate
25.End
26.Pin
27.Split pin
28.Plain washer
29.Clamp
30.Flange nut
31.Control cable
32.Support
33.Spring
34.Plate
35.Pin assy
36.Stopper
37.Stopper
38.Stopper
39.Bolt
40.Spring washer
41.----------
42.----------
△5 43.Plate
△5 44.Plate
△5 45.Plate
△5 46.Bolt
△5 47.Nut
△5 48.Support
△5 49.Nut

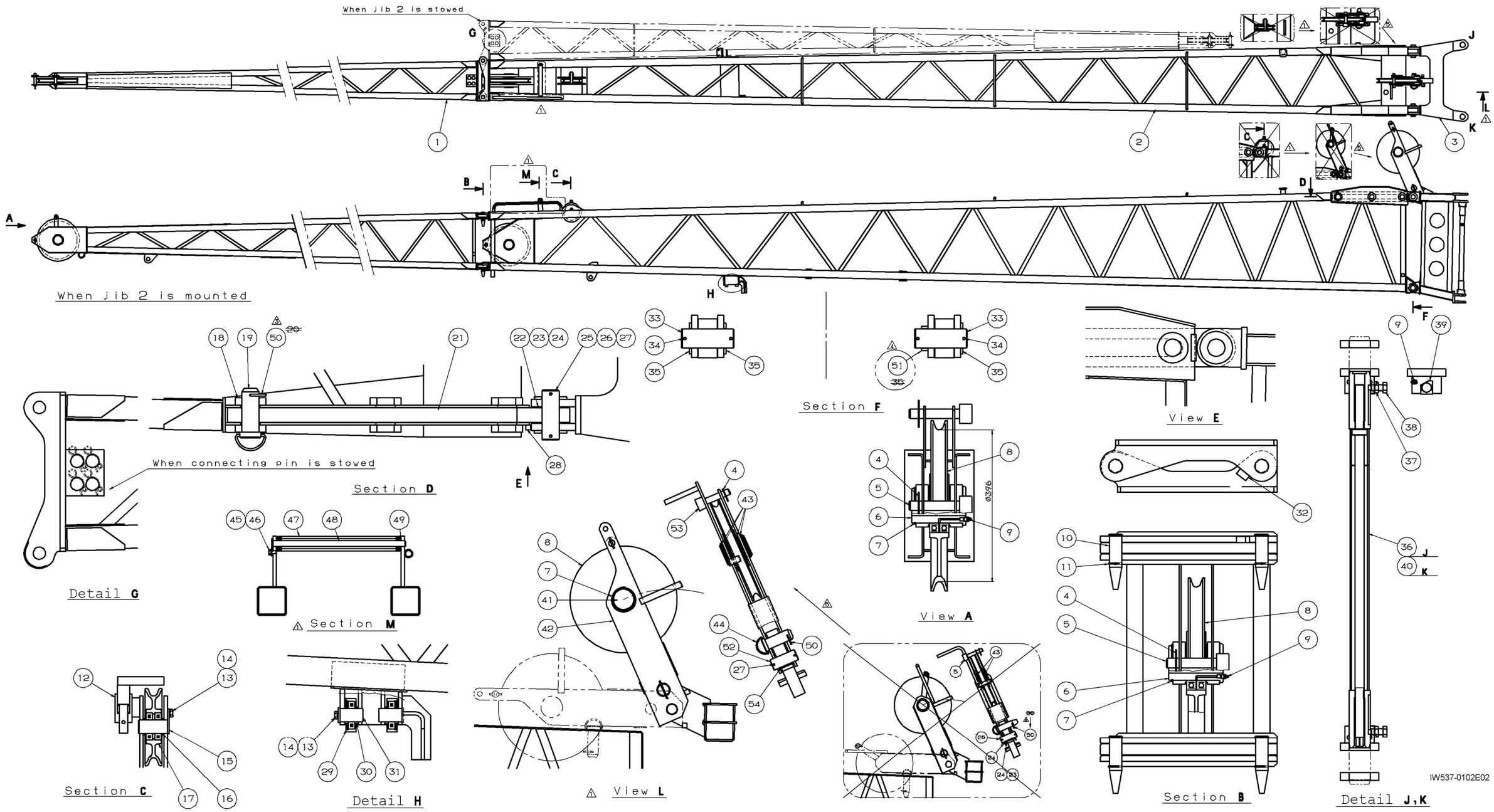
342-215-40500 △5

https://truckmanualshub.com/

Jib

Applicable serial No. △1 : 545410~,475326~ △4 : 545419,545457~,475330~
△2 : 545410~,475326~ △5 : 545511~,475349~,437353~
△3 : 545410~,475326~

1.2 Jib main body



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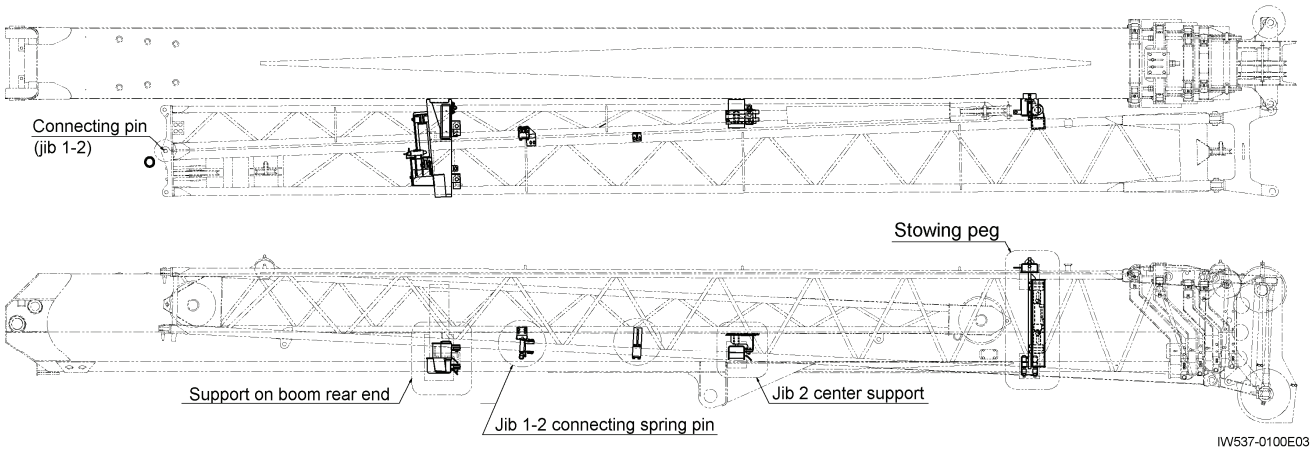
Jib

1.Jib 2
2.Jib1
3.Support
4.Snap pin
5.Pin
6.Pin
7.Retaining ring
8.Sheave assy
9.Grease nipple
10.Pin
11.Snap pin
12.Guide assy
13.Bolt
14.Spring washer
15.Pin assy
16.Spacer
17.Sheave assy
18.Plate
19.Pin
20.----------
21.Link
22.Plate
23.Plate
24.Plate
25.Pin
26.Plain washer
27.Split pin
28.Stopper
29.Roller assy
30.Spacer
31.Pin
32.Bar
33.Pin
34.Split pin
35.Plate
36.Pin assy
37.Nut
38.Bolt
39.Plate
40.Pin assy
41.Pin
42.Support
43.Spacer
44.Pin
45.Bolt
46.Spring washer
47.Roller assy
48.Pin
49.Spacer
50.Snap pin
51.Spacer
△5 52.Pin
△5 53.Pin
△5 54.Spacer

342-215-42000 △5

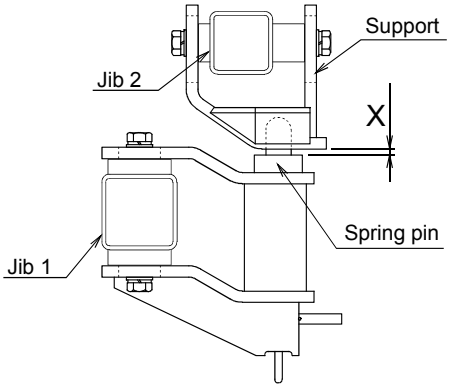
https://truckmanualshub.com/

2. Adjustment



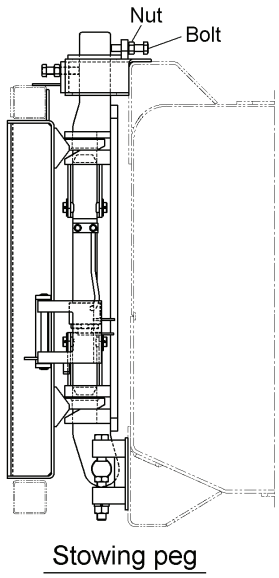
2.1 Adjusting jib 1-2 connecting spring pin

Make sure that the clearance (X) between the support and spring pin is 2 mm (0.08 in) while the jib 1 supports the jib 2.



2.2 Adjusting jib inclination

In order to facilitate inserting and removing the elevating pin, adjust the jib inclination by using a bolt and secure the bolt with a nut.



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2.3 Adjusting inclination of jib 2

Adjust the inclination to facilitate inserting and removing the jib 1-2 connecting pin.

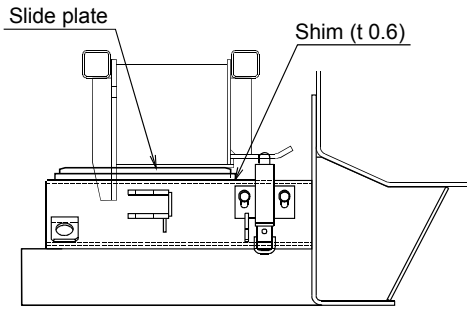
1) If the rear end of the jib 2 is too low for the pin to be inserted and removed easily, apply shims (t0.6 mm (t0.02 in)) to the slide plate on the support on the boom rear end.

2) If the rear end of the jib 2 is too high for the pin to be inserted and removed easily, remove a shim (t0.6 mm (t0.02 in)) one by one from the slide plate on the support on the boom rear end until the pin can be inserted and removed easily.

3) Add or remove shims (t0.6 mm (t0.02 in)) on the support on the boom rear end and shims (t3 mm (t0.12 in)) on the center support of the jib 2 to facilitate the jib 1-2 connecting pin.

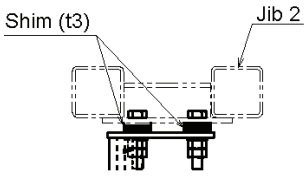
[NOTICE]

- Boom rear end support: The rear end of the jib 2 is raised when shims are added; lowered when shims are removed.
- Center support on jib 2: The rear end of the jib 2 is lowered when shims are added; raised when shims are removed.



Support on boom rear end

IW537-0100E05



Jib 2 Center support

IW537-0100E06

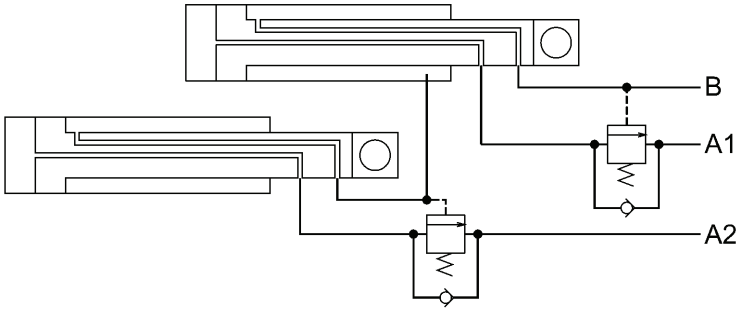
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G-4 Telescoping Cylinder

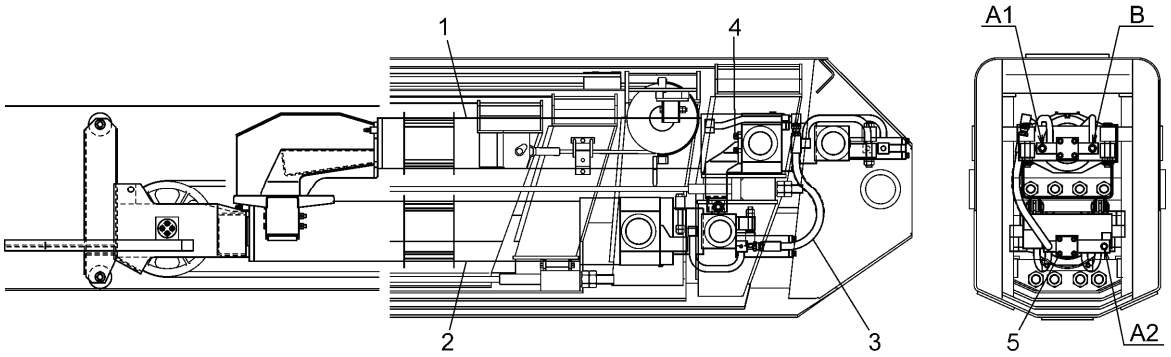
[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



IW157-0400E01



IW157-0401E01

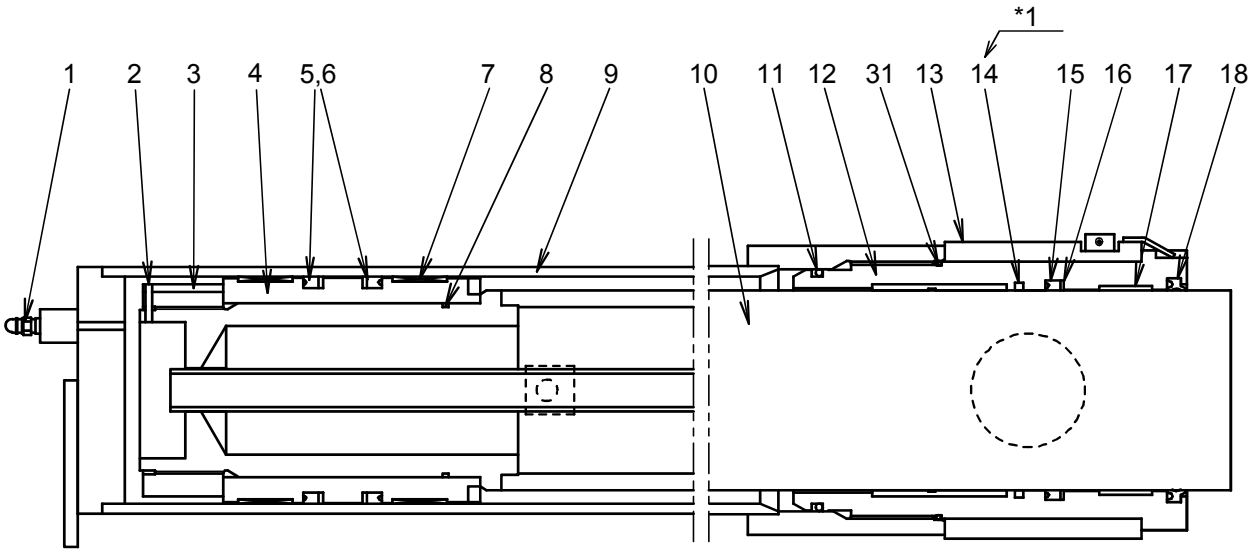
1. No.1 cylinder
2. No.2 cylinder
3. Hose
4. Hexagon socket head bolt
5. Bolt

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
A1, B	G3/4	108 - 123	80 - 90
A2	G1/2	54 - 64	40 - 47
4	M12	68.6 - 82.4	50.6 - 60.7
5	M10	43 - 49	32 - 36

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Telescoping Cylinder



IW157-0390E03

1.Plug	6.Packing	11.O-ring	16.Backup ring
2.Spring pin	7.Plain bearing	12.Rod cover assy	17.Plain bearing
3.Nut	8.O-ring	13.Support	18.Dust seal
4.Piston	9.Cylinder	14.Damper ring	31.O-ring
5.Backup ring	10.Rod	15.Packing	

*1: Face the notch or the lip toward the pressurized side.

360-171-10000 △1
360-171-20000 △2
360-169-10000 △1
360-169-20000 △2

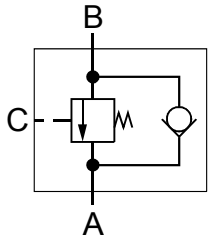
https://truckmanualshub.com/

G-5 Counterbalance Valve (Telescoping)

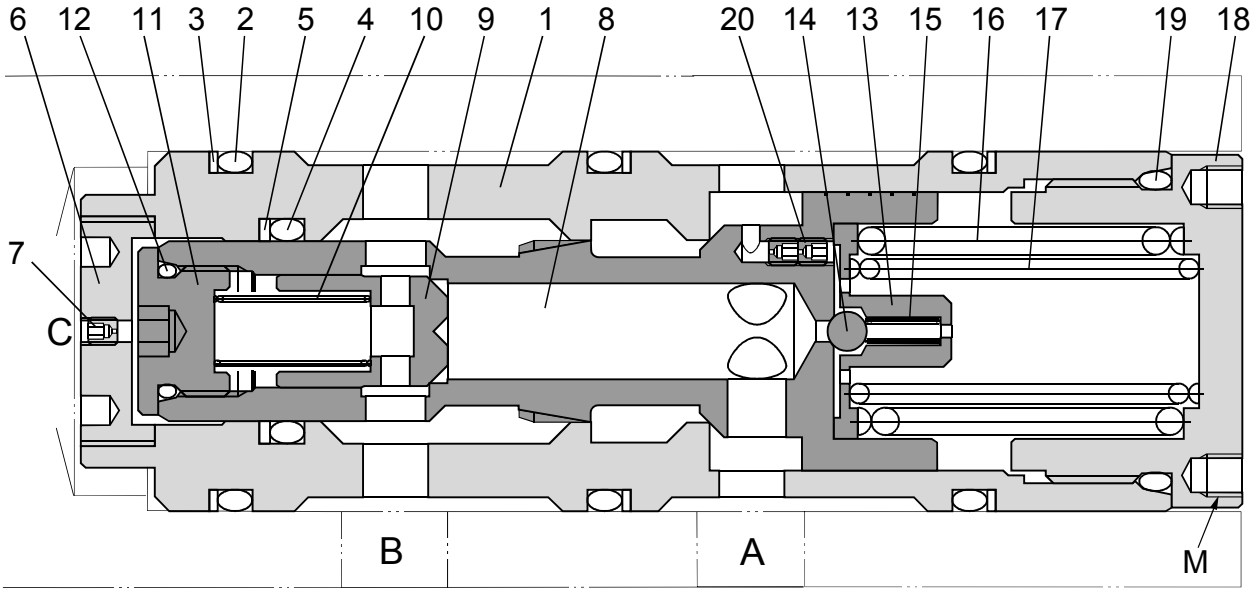
[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



IW119-022001



IW119-022002

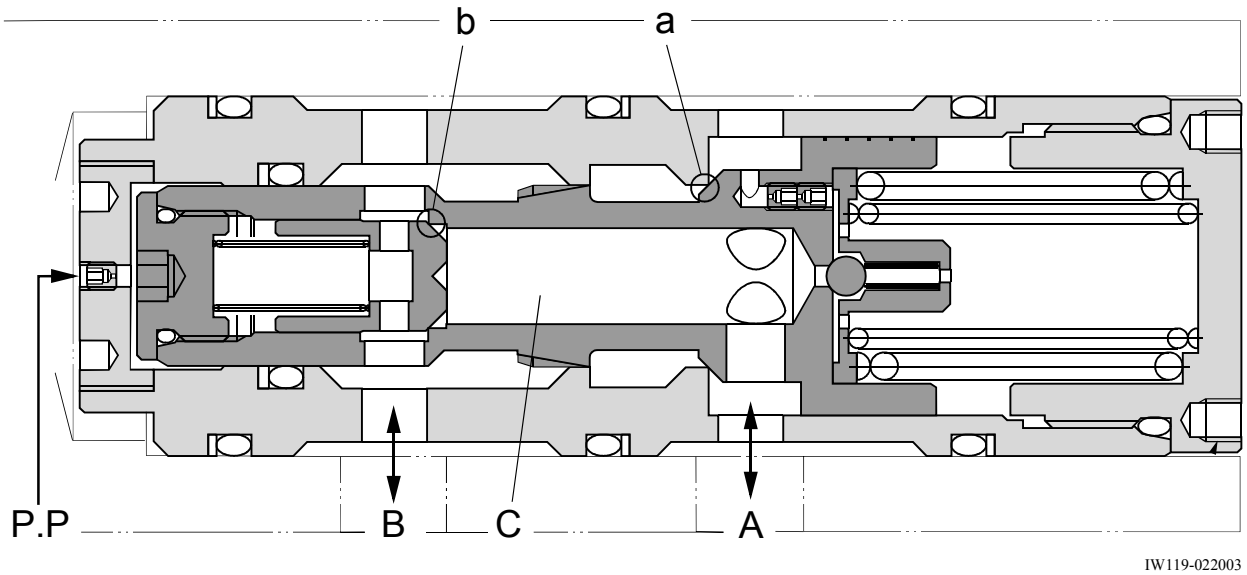
1.Body	6.Cap	11.Cap	16.Spring
2.O-ring	7.Orifice	12.O-ring	17.Spring
3.Backup ring	8.Spool	13.Holder	18.Cap
4.O-ring	9.Poppet	14.Steel ball	19.O-ring
5.Backup ring	10.Spring	15.Spring	20.Orifice

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
6	-	29 - 49	22 - 36
7	-	1 - 1.2	0.7 - 0.9
11	-	56 - 62	41 - 46
18	-	78 - 98	58 - 72
20	-	1 - 1.2	0.7 - 0.9
M	M6x1	-	-

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2. Function



This counterbalance valve prevents the actuator from being driven by the load and its own weight faster than the speed corresponding to the oil supply rate.

2.1 When control valve is at the neutral position

The actuator holding pressure is sealed by seat “a” of the main spool and seat “b” of the check valve.

2.2 While actuator is being pushed up

1. The pressurized oil entering through port A of the control valve enters chamber C, flows out through port B by opening the check valve, and enters the holding side of the actuator.
2. At this time, since port PP is connected to the tank circuit, the main spool is kept forced to the valve body by the spring, and remains inactive.

2.3 While actuator descends

1. The hydraulic oil directly flowing from the control valve to the actuator also enters through port PP to exert force to the main spool to move the main spool.
2. Consequently, the holding hydraulic pressure in port B is vented to port A.
3. At this time, the main spool motion is smoothened by orifices.

366-054-80000 △0

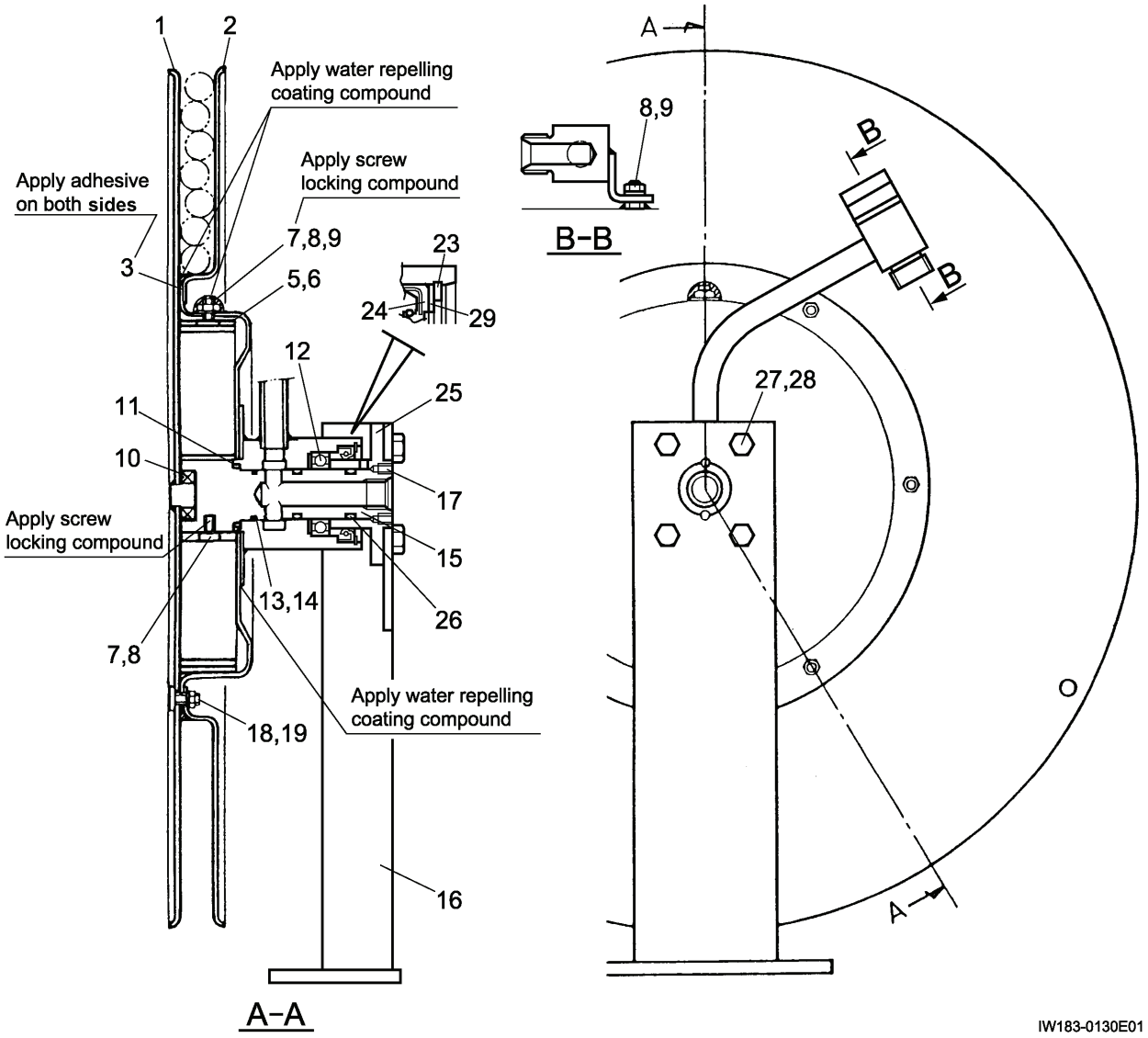
https://truckmanualshub.com/

G-6 Hose Reel

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



1.Drum plate
2.Drum plate
3.Seat packing
4.Spring case
5.Spring
6.Aux. spring
7.Special bolt
8.Spring washer
9.Nut
10.Bearing
11.Bush
12.Bearing
13.Seal ring
14.Backup ring
15.Pin
16.Support
17.Set screw
18.Nut
19.Spring washer
20.Plate
21. Bolt
22. --------
23.Retaining ring
24.Oil seal
25.Spacer
26.O-ring
27.Bolt
28.Spring washer
29.Stop Plate

https://truckmanualshub.com/

2. Dismounting

[NOTICE]

◆When the circuit is suspected to retain high pressure oil, be sure to vent pressure before dismounting the hose reel.

◆Since the spring force for extra winding turns is applied to the hose, hold the drum when disconnecting the hose.

3. Mounting

[NOTICE]

◆After installation and bleeding the circuit and the device, test the operation check and check any abnormality.

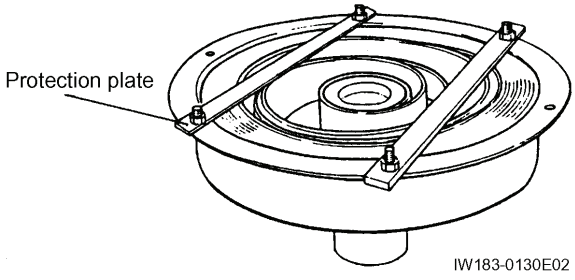
1. After making sure that the whole hose is reeled in, turn the reel further (for 4.5 - 5.5 turns).
2. Draw out the hose and install it.

4. Disassembly

[NOTICE]

◆This process is very dangerous. Take extreme caution in executing it to secure safety.

1. Unscrew hexagon socket set screws, and remove support from spring case .
2. Unscrew nuts, and remove drum plates from spring case.
3. After attaching protection plates as shown, utilizing the case mounting holes, to prevent spring from hurtling out, unscrew special bolt on the pin side, and extract pin.



4. To replace spring, remove it from spring case as follows:
   1) Remove the protection plate from the case 4 and secure the case 4 in a sufficiently wide space.
   2) Tie one end of a wire of a sufficient length to the inner end of the spring 5 and pull the other end of the wire by hand to take out the spring 5.

5. Reassembly

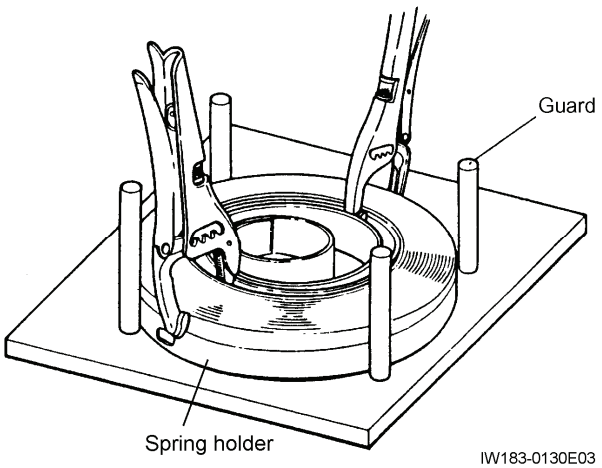
1. Install seal rings and backup rings on pin, apply grease thinly on these rings and their surrounding areas,and install the pin in spring case.
2. To reinstall spring in case proceed as follows:

[NOTICE]

◆If the spring recoils, it may hurt personnel. Be sure to clamp it securely with vice pliers.

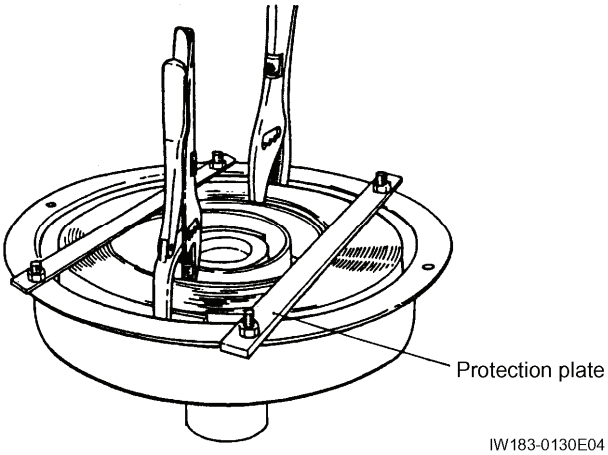
◆Clamp with vice pliers, paying attention to the installation orientation of the spring.

   1) With spring clamped by vice pliers, remove the spring holder constricting the spring.



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2) With the lower side coated with grease, place spring in case clamped in a vise, and install the protection plates.



3) Fasten spring and pin with special bolt coated with screw locking compound.

4) Remove the vise pliers on the outer end side of spring and attach auxiliary spring.

5) Fasten the spring to spring case with special bolt coated with screw locking compound.

6) After installation, apply water repellent compound to nut.

7) Remove the remaining vice pliers.

3. Temporarily install drum plate, to spring case, install support to pin, and fasten with set screws.

4. Remove the protection plates, install seat packing, coated with adhesive on both sides, aligning with the bolt holes to spring case.

5. Install drum plates to the spring case with nuts.

6. Apply water repellent compound to the mating surfaces of drum plates.

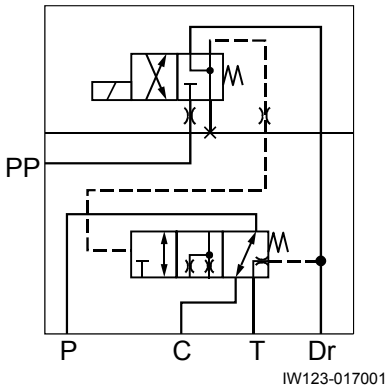
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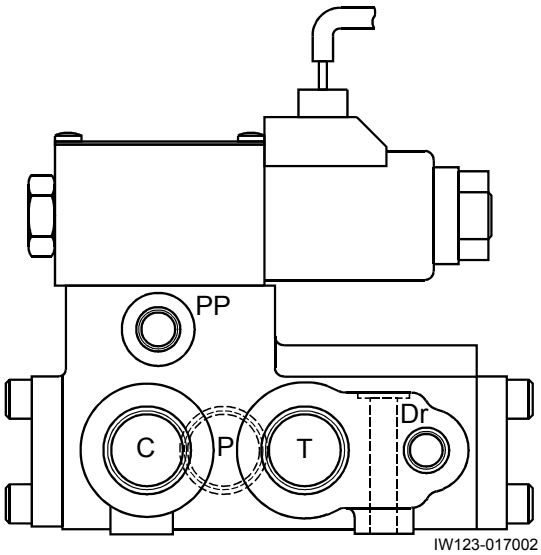
G-7 Hydraulic Valve

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure

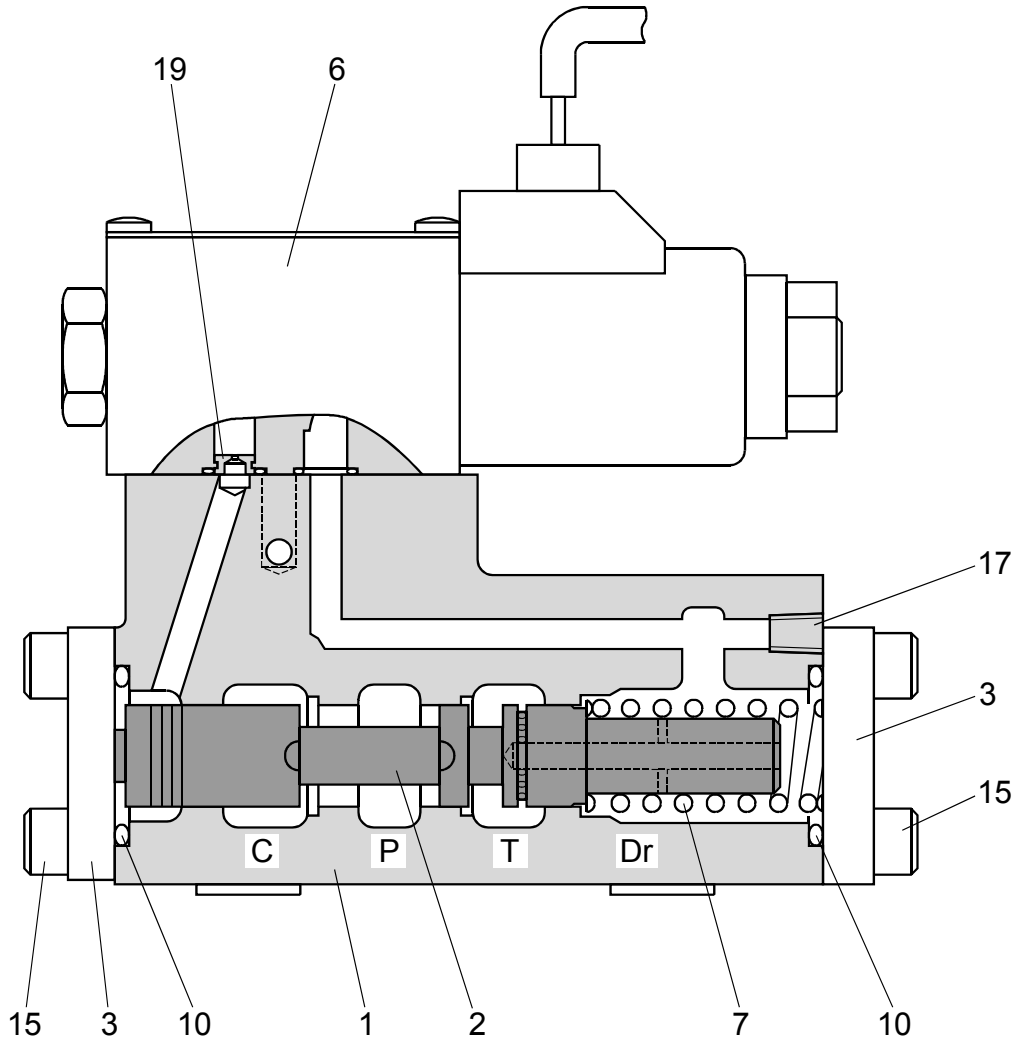




Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
P, C, T	G3/4	167	123
PP, Dr	G1/4	29.4	22

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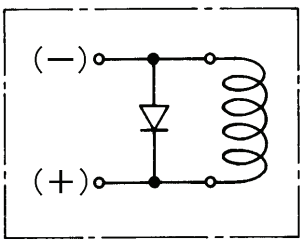
1.Body
2.Spool
3.Cover
6.Solenoid valve
7.Spring
10.O-ring
15.Hex. socket head bolt
17.Plug
19.Orifice

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
Mounting bolt (for solenoid valve.6)	M5	7	5

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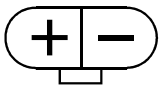
Solenoid valve assy



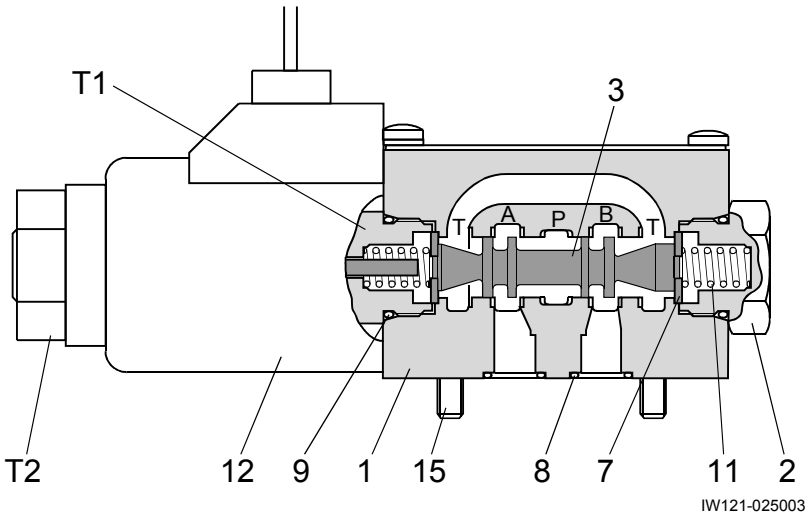
IW121-023002

Connector

(+): Red
(-): Blue



IW121-0542E01



IW121-025003

1.Body	7.Spring seat	11.Spring
2.Plug	8.Square ring	12.Solenoid
3.Spool	9.O-ring	15.Hexagon socket head bolt

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
2	-	44 - 49	32.5 - 36
15	M5	6.9 - 8.9	5 - 6.5
T1	-	39 - 49	28.8 - 36
T2	-	4.4 - 5.4	3.3 - 4

366-497-50000 ⚠1
366-463-10000 ⚠1

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H

Safety System

Contents

H-1 Safety System 1

1. General 1
   - 1.1 Pressure sensor 1
   - 1.2 Boom length and angle detector 1
   - 1.3 Outrigger extension width detector..... 1
   - 1.4 Other detectors and switches..... 1
   - 1.5 AML (Load moment indicator) main body .. 1
   - 1.6 Overwind cutout (Anti-twoblock) device 1
   - 1.7 Solenoid valve 1

2. Description of system 1

H-2 Boom Length and Angle Detector .. 2

1.Structure and function..... 2

2. Disassembly and reassembly 4
   - 2.1 Removing the cord 4
   - 2.2 Installing the cord 4
   - 2.3 Replacing spiral spring 6
   - 2.4 Disassembling the potentiometer (for boom length detector)..... 6
   - 2.5 Reassembling potentiometer..... 7
   - 2.6 Replacing the boom angle detector 7

3. Adjustment..... 7

H-3 Outrigger Extension Length Detector 8

1. Structure and function..... 8

2. Disassembly 9

3. Reassembly..... 10

H-4 Solenoid Valve (Auto Stop) 12

1. Structure 12

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H-1 Safety System

1. General

1.1 Pressure sensor

1. A retraction pressure sensor and an extension pressure sensor are incorporated in the elevating cylinders.
2. They convert the elevation pressure into the electric signal and transmit it to AML (Load moment indicator) main body, making the limiter calculate the total moment created by the lifted load and the mass of the boom.

1.2 Boom length and angle detector

The Boom length and angle detector is installed on the boom side, and uses the potentiometer inside the detector to convert the extended boom length and the angle of the boom relative to the ground into an electric signal that is transmitted to AML main body.

1.3 Outrigger extension width detector

It is installed on the rear end of the outrigger outer case. The potentiometer in the detector converts the outrigger extension width into the electric signal and transmits it to AML main body.

1.4 Other detectors and switches

The outer detectors and switches convert the crane operation modes and working conditions into an electric signal that is transmitted to AML main body.

1.5 AML (Load moment indicator) main body

1. AML main body calculates the moment being generated on the crane based on signals from the pressure sensor and the Boom length and angle detector.
2. The calculation result is compared with the rated moment and,when it reaches 90% and 100% of the rating, AML sends alarm and auto. stop signals, respectively, to prevent the crane from being overloaded.

1.6 Overwind cutout (Anti-twoblock) device

The anti-twoblock device prevents damage to the crane that would be caused by pulling the hook block into the boom head. When the hook block approaches the boom head, single top or jib, the overwind cutout device sends a signal to AML, which then stops any further crane action toward the critical condition.

1.7 Solenoid valve

1. If AML malfunctions or if the actual moment reaches 100% of the rated moment or the hook block is over-hoisted, an electric signal (auto. stop) is sent from AML main body to this valve.
2. When the solenoid valve is deenergizied, this solenoid valve contents the vent line of the relief valve mounted on the hydraulic pilot control valve to the tank. The solenoid valve by allowing the pressurized oil from the pump to escape through the relief valve to the tank, therefore the crane operation stops.

2. Description of system

Refer to the repair manual of AML-L.

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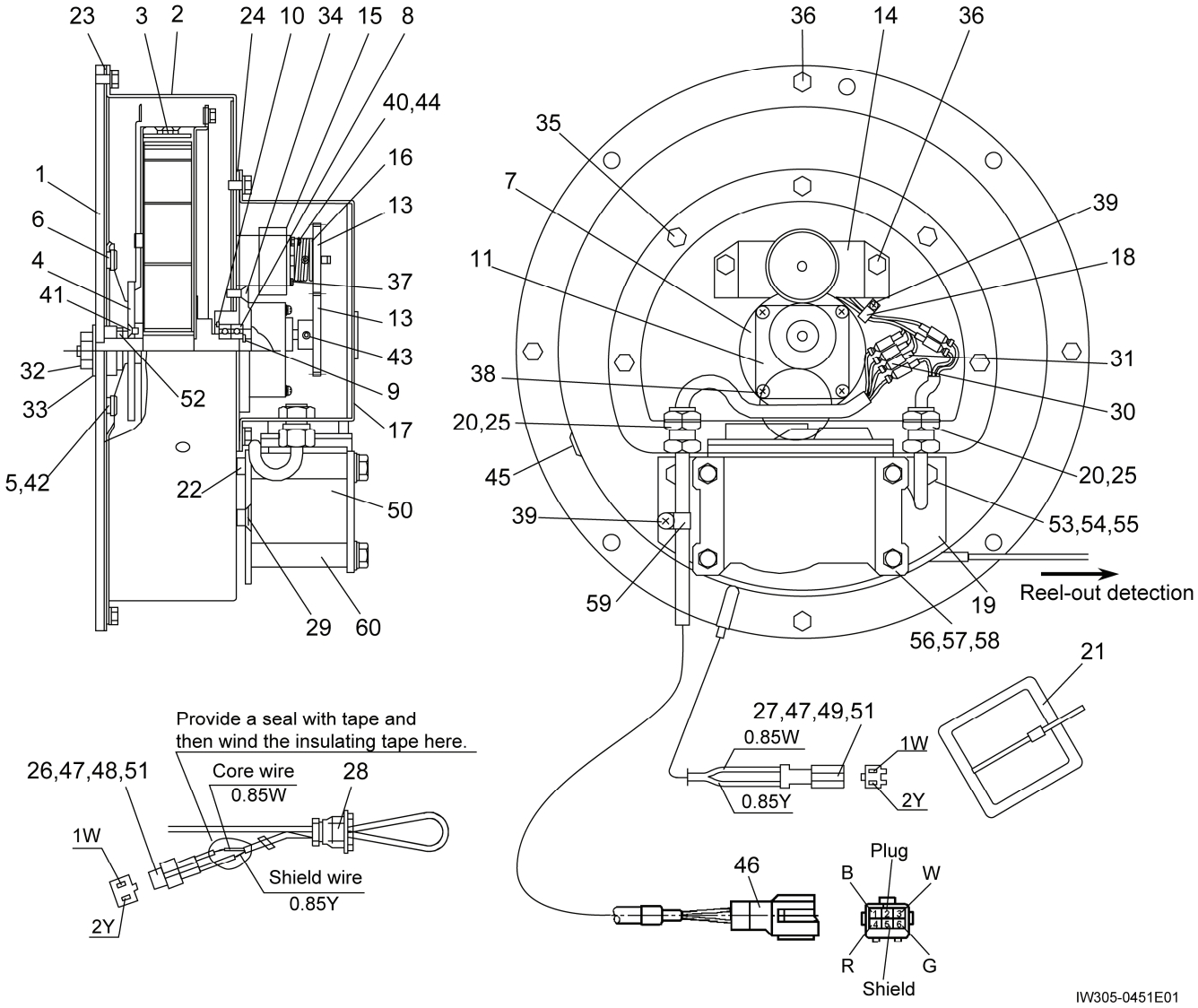
H-2 Boom Length and Angle Detector

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1.Structure and function

1. The boom length and angle detector consists of a recoil spring, cord, reduction gear, potentiometer (for boom length detection), and boom angle detector.
2. The cord wound on the drum is unwound and rewound by the recoil spring after the extension and retraction of the boom.The resultant drum rotation is reduced by the reduction gear,which in turn rotates the shaft of the potentiometer.
3. The electric resistance of the potentiometer shaft varies proportional to the reduction of the shaft rotation,and the change in electric resistance is transmitted to the AML main body to detect the boom length.



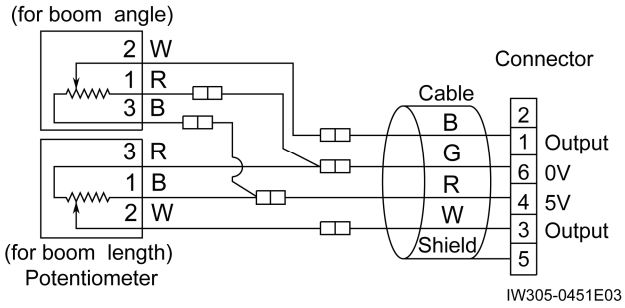
https://truckmanualshub.com/

Boom Length and Angle Detector

1.Plate	16.Spring	31.Pin terminal	46.Cable
2.Case	17.Cover	32.Nut	47.Holder
3.Drum assy	18.Clip	33.Washer	48.Terminal
4.Slip ring assy	19.Support	34.Screw	49.Terminal
5.Contact assy	20.Clamp	35.Bolt	50.Angle detector
6.Contact assy	21.Cord guide	36.Bolt	51.Plug
7.Bearing case	22.Collar	37.Screw	52.Collar
8.Bearing	23.Packing	38.Screw	53.Bolt
9.Retaining ring	24.Packing	39.Screw	54.Spring washer
10.Retaining ring	25.Packing	40.Screw	55.Plain washer
11.Speed reducer	26.Connector	41.Screw	56.Bolt
12. --------	27.Connector	42.Screw	57.Plain washer
13.Gear	28.Cord lock	43.Set screw	58.Spring washer
14.Bracket	29.Screw	44.Nut	59.Clip
15.Potentiometer	30.Pin terminal	45.Rubber bush	60.Collar

Potentiometer (for boom length detection)	Resistance : 5000 ± 750Ω Electric turning angle : 347-352° Mechanical turning angle : 360°, continuous rotation
Potentiometer (for boom angle detection)	Resistance : 1000±200Ω Electric angle : 120 ± 1.8°

Electric Symbol

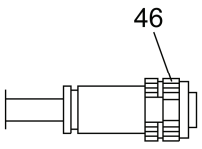


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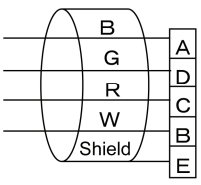
[NOTICE]

◆About the connector applicable to serial No. up to 437648.
- 437648 (GT-550E-1)
- 437572 (GT-600-1)
- 475370 (GT-700E-1, GT-800-1)
- 545760 (GR-600-1, GR-700E-1, GR-800-1)

Connector external



Electric symbol



IW305-0480E03

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2. Disassembly and reassembly

2.1 Removing the cord

1. Remove the connector and the cord lock from the end of the cord. Wind up the cord on the drum slowly until no tension of the spiral spring is applied on the cord.
2. Loosen the clamp and remove the cover (2 place).
3. Disconnect the cable, potentiometer and angle detector from the terminal, and remove the cover and the cable together.
4. Loosen the set screw and remove the gear. Then remove the screw and detach the speed reducer.

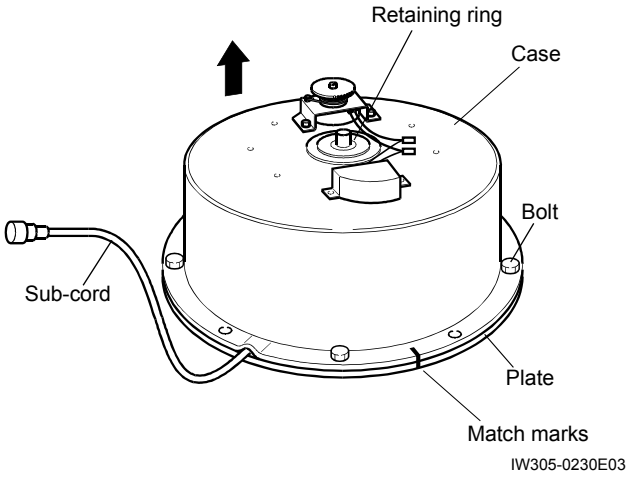
[NOTICE]

◆Remove the speed reducer straight upward. Do not twist it while removing.

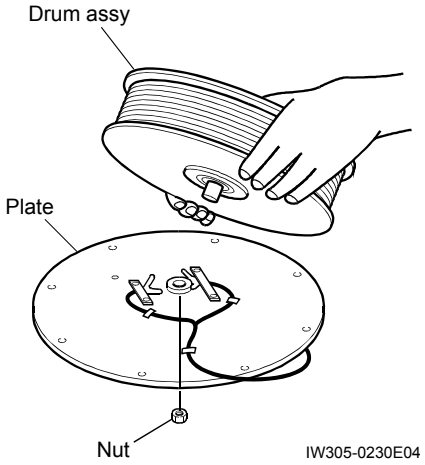
5. Remove the retaining ring and bolt, and separate the case from the drum assembly.

[NOTICE]

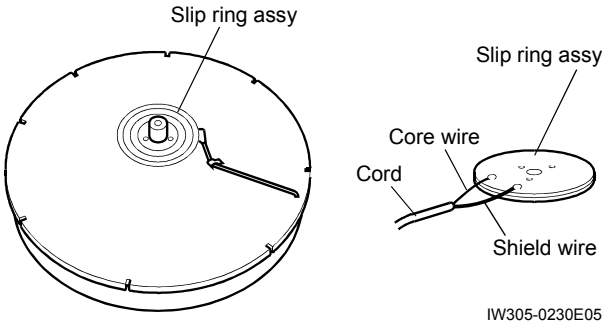
◆Put match marks on the case and the plate to identify the direction for removing the sub-cord.



6. Remove the nut and separate the drum assy from the plate.



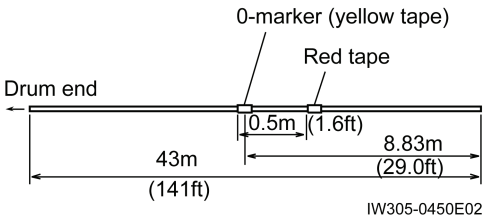
7. Remove the slip ring assy from the drum assy. Then remove the solder that bonds the slip ring and the cord.



8. Detach the whole old cord from the drum assy.

2.2 Installing the cord

1. Wind a yellow tape around the new cord as a 0-marker.



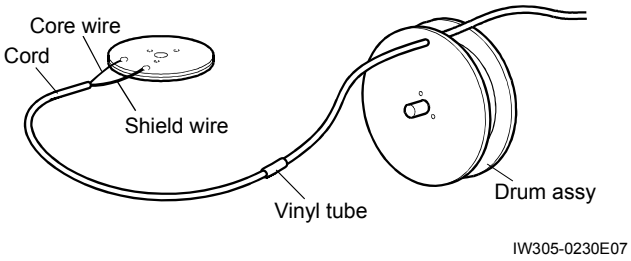
2. Pass the new cord through the hole of the drum assy. Solder it on the slip ring assy.

[NOTICE]

◆Attach the cord core wire to the inner slip ring. Attach the shield wire to the outer slip ring.

◆Completely insulate the soldered section.

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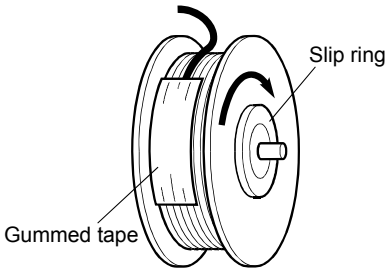
IW305-0230E07

3. Install the slip ring assy so that the cord is not slackened.

4. Wind the new cord around the drum assy while taking up slack in the cord. When the 0-marker on the 8.83 m (29.0ft) point of the cord shows on the drum, wind the cord 13 turns more and fix it with gummed tape to prevent slackening.

[NOTICE]

◆Wind the cord around the drum assy clockwise as seen from the slip ring.



IW305-0230E08

5. Insert the shaft of the drum assy into the boss hole of the plate and fix it with a nut.

6. Put the case over the drum assy, leading the sub-cord outside through the hole of the case and the cord end outside through the opening of the cord guide.

7. Secure the case and the plate with a bolt and attach the retaining ring.

8. Apply sealant agent thinly on the bottom of the speed reducer. Then install the speed reducer on the case.

9. Inset the gear on the shaft of the speed reducer. Loosen the set screw on the potentiometer side to allow both gears to idle.
   Check that the gear is spring-returned to the original position after it is rotated a quarter turn by finger and released. If it is not returned, loosen the bolt and adjust the position of the bracket.

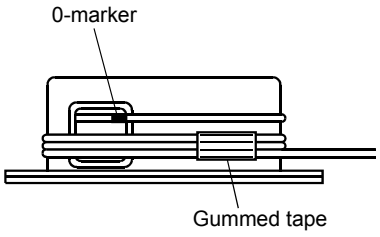
[NOTICE]

◆If the potentiometer is faulty, replace it referring to the "Replacing the potentiometer (boom length detector)" described later.

10. Fix the gear in the notched section of the speed reducer shaft using a set screw. Apply thread locking agent to the set screw.

    Tightening torque : 1.18 N-m {0.87ft-lbf}

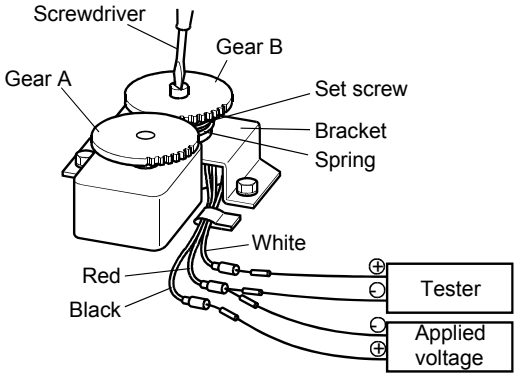
11. Take out the new cord from the guide hole of the cord reel and draw it out completely. Then wind it again the drum. When the 0-marker comes to the edge of the cord guide, fix the cord there as shown in the figure.



IW305-0230E09

12. Applied voltage DC 5V to the potentiometer (for boom length detector) as shown in the figure and turn the gear using a screwdriver until the output voltage between the red and white terminals is 0.5 ± 0.06 V. Then fix the gear using a set screw. Apply thread-locking agent to the set screw.

    Tightening torque : 1.18N-m {0.87ft-lbf }



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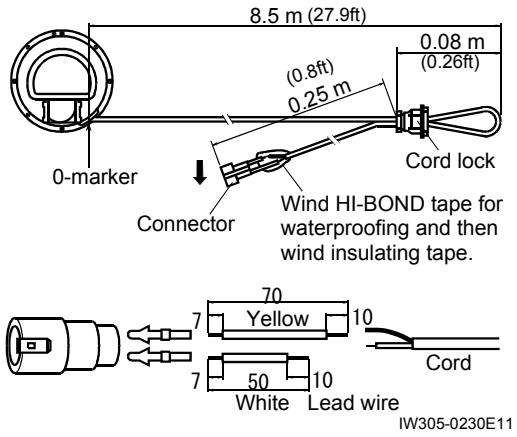
13. Draw out the cord slightly from the drum and make sure that the resistance between the red and white terminals increases smoothly.

14. Connect the cable to the terminals for the potentiometer and angle detector.

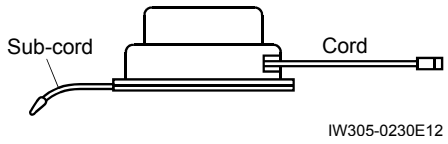
15. Attach the cover.

16. Pull the cable to eliminate slack, and tighten the clamp. (2 places)

17. Install the cord lock on the cord end and install the lead wires and the connector close to the cord end. Completely insulate the soldered connections.



18. Check for conduction and shortcircuit between the terminals of the sub-cord connector and the cord connector.



2.3 Replacing spiral spring

[NOTICE]

◆If the spiral spring is broken, replace the whole drum assy. For removing and installing the spring, refer to the "Removing the cord" and "Installing the cord" above mentioned.

2.4 Disassembling the potentiometer (for boom length detector)

[NOTICE]

◆If both the cord and spiral spring are faulty, remove the detector assy from the boom.

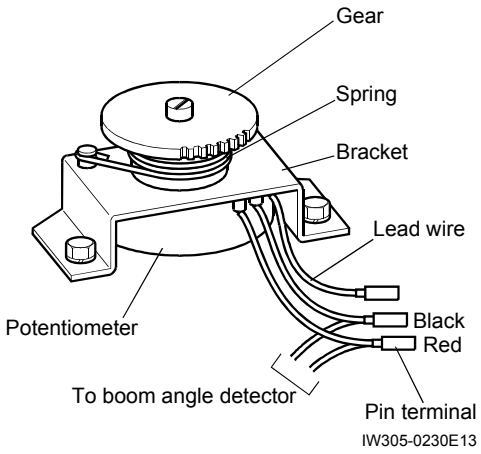
◆If only the potentiometer is faulty, it is not necessary to remove the detector.

1. Loosen the 2 clamps and remove the bolt and cover.

2. Disconnect the lead wire terminals (3 pieces) and cable terminal from the potentiometer, and remove the potentiometer together with the bracket.

[NOTICE]

◆Before replacement, disconnect the wiring to the boom angle detector from the pin terminal section to disconnect the lead wires (red and black) from the boom angle detector.



3. Remove the gear and the spring, and detach the potentiometer from the bracket.

4. Remove the connector and the cord lock from the end of the cord. Wind up the cord on the drum slowly until no tension of the spring is applied on the cord.

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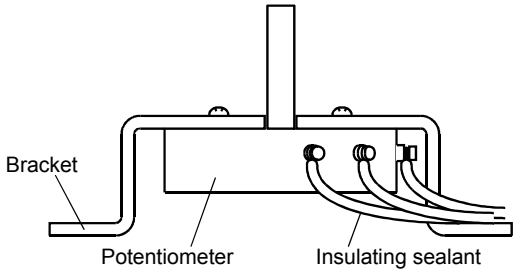
2.5 Reassembling potentiometer

1. Install a new potentiometer.

[NOTICE]

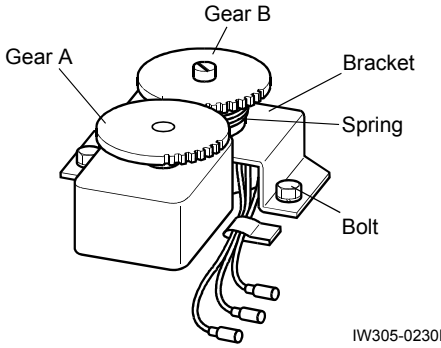
- ◆To avoid exposing the potentiometer to high temperature for a long time, solder the potentiometer terminal and the lead wires quickly.
- ◆Fix the potentiometer terminal including the lead wires to the bracket using insulating sealant.

Recommended sealant: Shin-Etsu Silicone KE45RTV (Shin-Etsu Chemicals Industry)



IW305-0230E14

2. Loosen the set screws on the reducer side and potentiometer side to allow both gears to idle. Check that the gear on the potentiometer side is spring-returned to the original position after it is rotated a quarter turn by finger and released. If it is not returned, loosen the bolt and adjust the position of the bracket.



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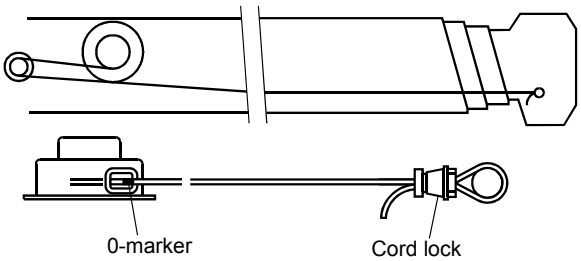
3. Fix the gear in the notched section of the speed reducer shaft using a set screw. Apply thread locking agent to the set screw.
   Tightening torque : 1.18N-m {0.87ft-lbf}
4. Follow the same procedure as described in the step 12. and below of the "Installing the cord" section.

2.6 Replacing the boom angle detector

Disconnect the lead wires to the boom angle detector from the pin terminal section, and replace the boom angle detector assy.

3. Adjustment

1. Adjust the cord lock so that the 0-marker on the cord is on the edge of the cord guide when the boom is fully retracted.



IW305-0230E16

2. Adjust the boom length display of the AML. (Refer to the repair manual of the AML.)

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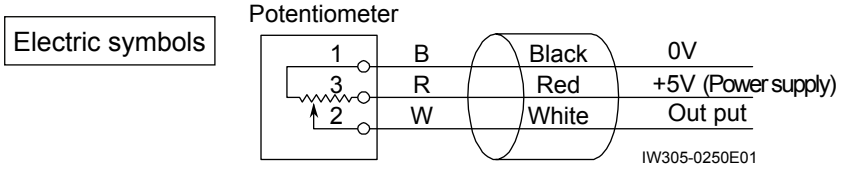
H-3 Outrigger Extension Length Detector

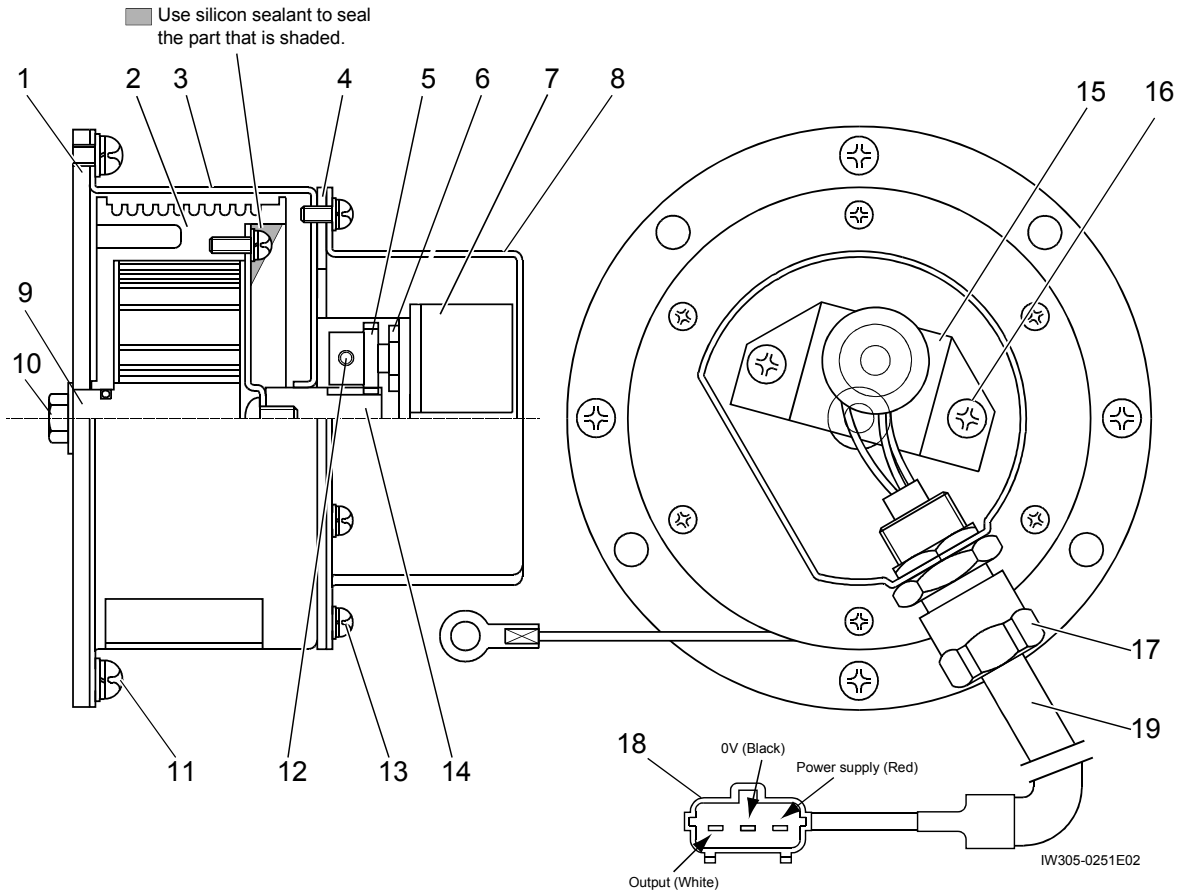
[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure and function

1. The detector consists of the following major components: a spiral spring, wire, and potentiometer.
2. The wire wound around the drum is unwound or rewound by the action of the spiral spring as the cylinder extends or retracts.
3. The consequent rotation of the drum drives the potentiometer shaft through gears which reduce the speed to 5/6.
4. The rotation of the shaft causes a proportional change in the electrical resistance of the potentiometer. This change is supplied by the multiplex data transmission (MDT) system to the AML (Load Moment Indicator) unit for detection of the outrigger extension length.
5. When the wire is reeled out, the gears, potentiometer, and potentiometer brush either rotate or move.





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1. Base plate
2. Drum assy
3. Case
4. Packing
5. Gear•A
6. Nut
7. Potentiometer
8. Cover
9. Shaft
10. Bolt
11. Screw
12. Set screw
13. Screw
14. Gear•B
15. Bracket
16. Screw
17. Clamp
18. Connector
19. Cable

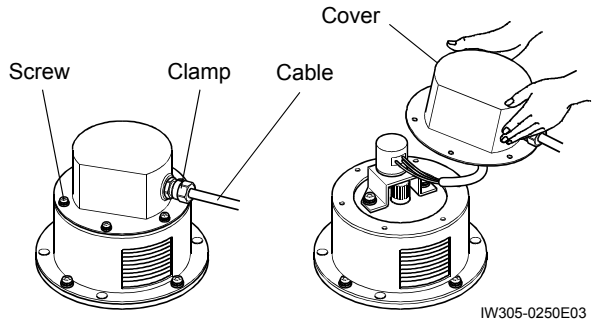
Specification

Item	Specifications
Gear ratio	6/5
Potentiometer	Resistance: 2kΩ ± 5%
	Mechanical rotating angle: 360°

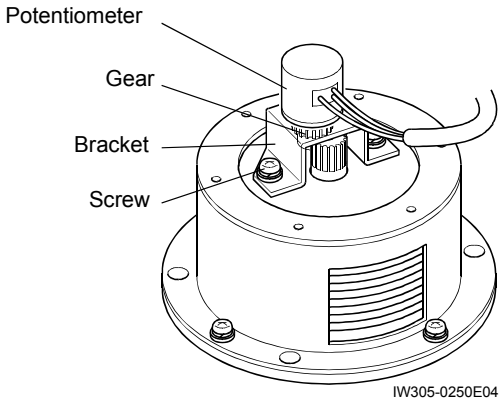
2. Disassembly

1. Get the wire slowly rewound round the drum until the power spring loses its power.

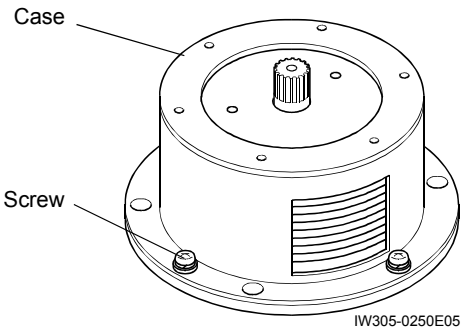
2. Remove screw and loosen clamp to remove cover.



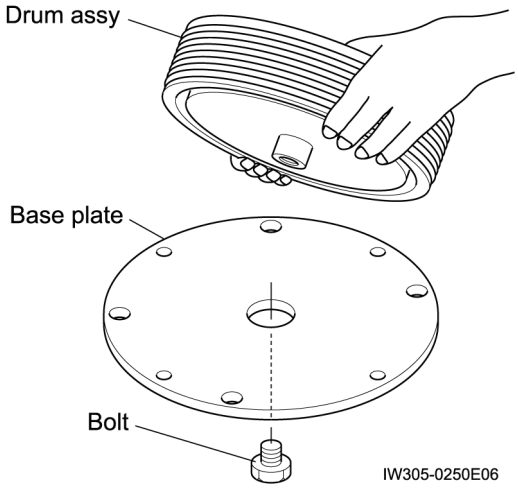
3. Remove screw and remove potentiometer and gear together with bracket.



4. Remove screw to remove case .



5. Remove bolt and separate drum assy and base plate.

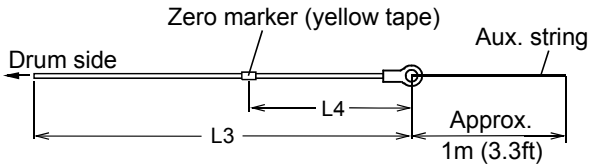


6. Remove the wire from the drum assy.

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3. Reassembly

1. Put a zero marker on a new wire by winding a yellow tape on it. Then tie an auxiliary string of about 1.0 m (3.3 ft) in length to the terminal of the wire.



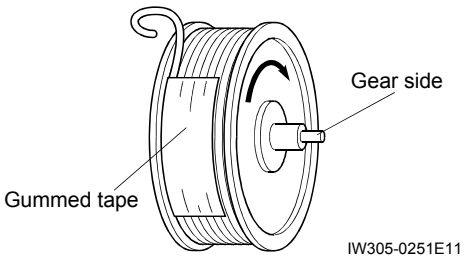
IW305-0251E10

L3 : 2.72 m (8.9ft)
L4 : 0.08m (0.26ft)

2. Wind the wire round drum assy until the yellow tape position. Then wind it three additional turns an secure the wire with a packing tape to prevent it from getting loose.

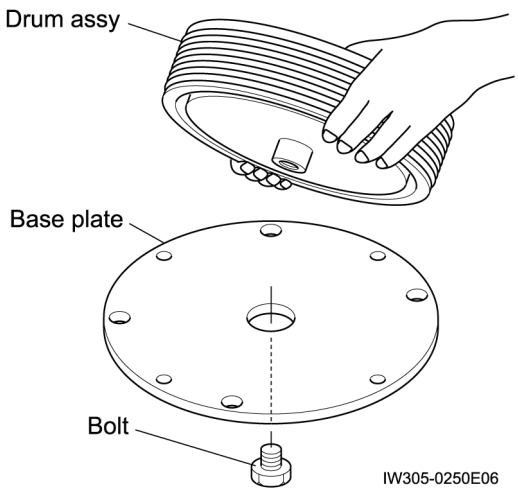
[NOTICE]

◆The wire winding direction should be clockwise as viewed from the shaft end.



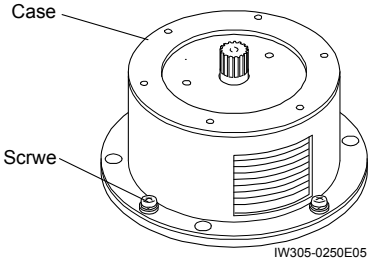
IW305-0251E11

3. Mount base plate on drum assy with bolt.



IW305-0250E06

4. Apply grease (Molyspeed Grease No.0) to the bearing of case and put the case over drum assy. In this time, lead the end of the auxiliary string out through the opening of the cord guide.

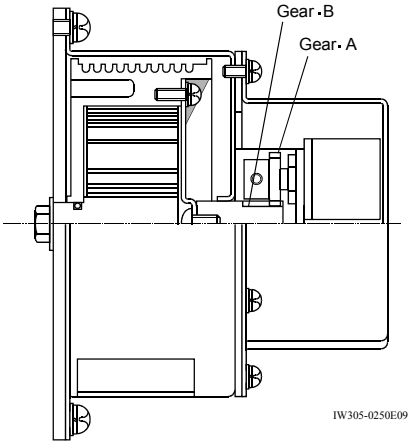


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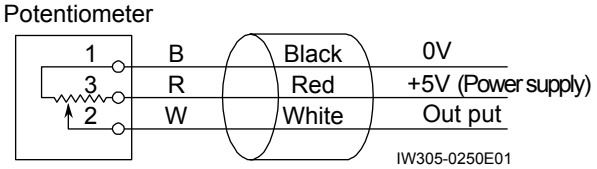
5. Secure case on base plate with screw.

6. Draw out the wire from the guide window of the reel. After the wire has been extended to the 0-point mark (yellow tape), secure the wire to the case with gummed tape.

7. Rotate gear•A of the potentiometer by hand. At the position where the resistance between B and W is 200 ± 30Ω, mesh gears•A and B, and install the potentiometer.



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IW305-0250E01

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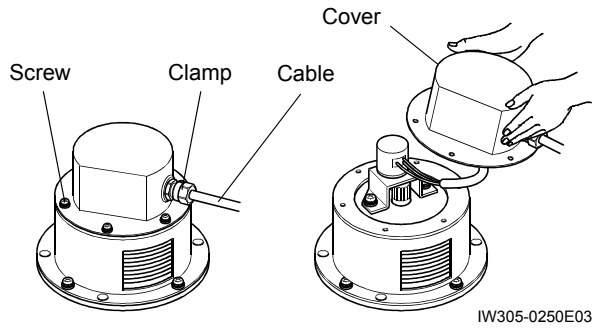
When replacing the potentiometer with a new one, mount it onto the bracket, then solder the cable to the potentiometer terminal.

[NOTICE]

- ◆Finish soldering the wire to the potentiometer terminal as quick as possible (max. 5 seconds) to minimize undesirable heat transmission to the potentiometer.
- ◆Apply insulation sealant to the terminal of the potentiometer.
  Recommended sealant: Shin-Etsu Chemical's Shin-Etsu Silicon KE45TRV

8. Slightly draw out the wire from the drum. Check to verify that the resistance between B and W decreases smoothly.

9. Mount cover, while positioning clamp on the opposite side of the potentiometer.



10. Pull cable to take up the slack and then tighten clamp.

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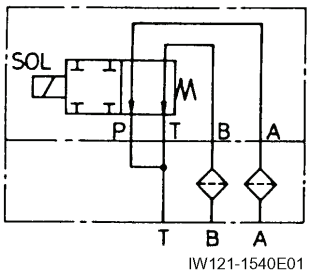
H-4 Solenoid Valve (Auto Stop)

[NOTICE]

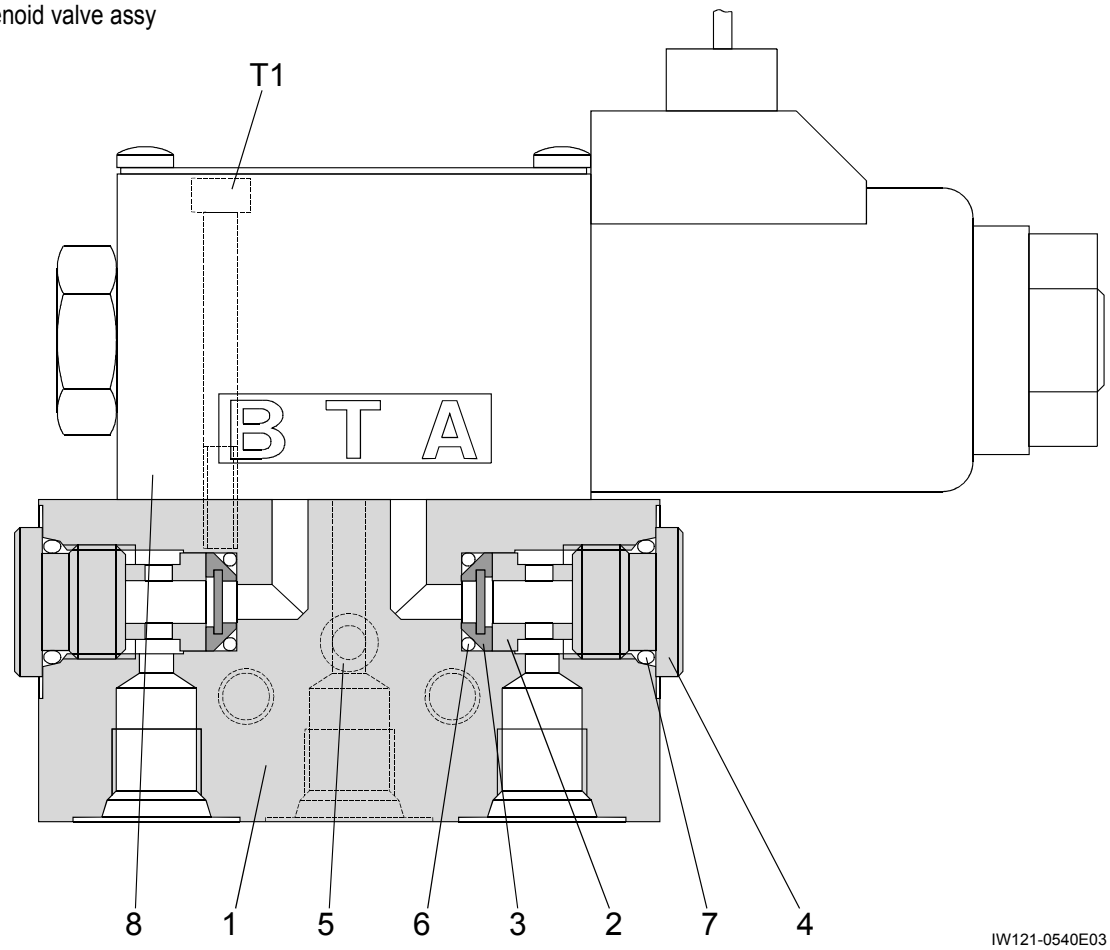
◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure

1.Body
2.Distance piece
3.Filter element
4.Plug
5.Plug
6.O-ring
7.O-ring
8.Solenoid valve assy



IW121-1540E01



IW121-0540E03

Thread size and tightening torque

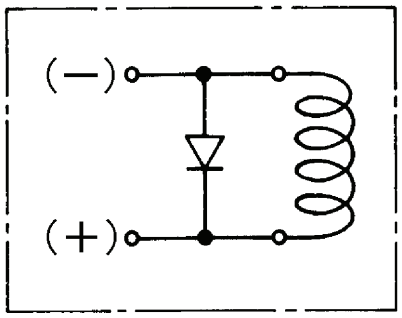
Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
A, B, T	G1/4	29.4	22
4	G3/8	30 - 37	22.1 - 27.3
T1	M5	7 – 9	5 – 6.5

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Solenoid Valve (Auto Stop)

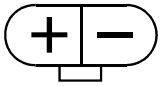
Solenoid valve assy

1.Body
2.Plug
4.Spool
7.Spring seat
8.Square ring
9.O-ring
11.Spring
12.Solenoid (DC24V)



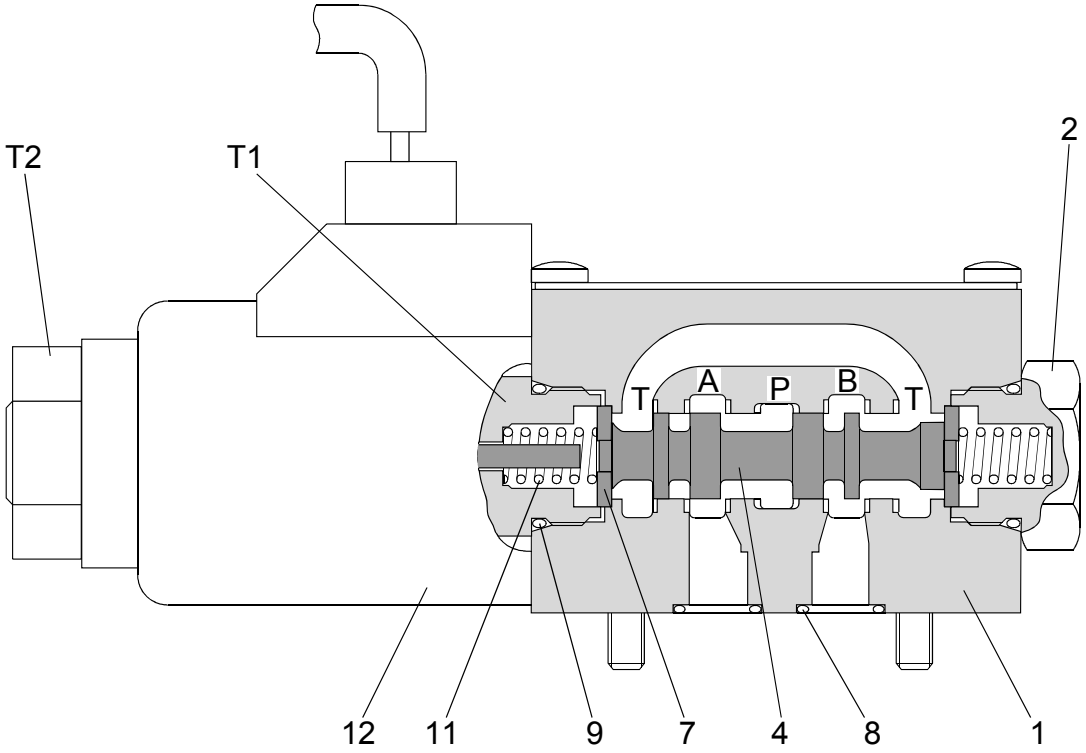
IW121-0540E02

Connector



(+): Red
(-): Blue

IW121-0542E01



IW121-0540E04

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
2	-	44 - 49	32 - 36
T1	-	39 - 49	29 - 36
T2	-	4.4 – 5.4	3 - 4

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K

Cab

Contents

K-1 Crane Cab Glass 1

1. Glass replacement procedure 1

2. Bonding the joint between windshield glass and roof glass 2

K-2 Air Conditioner 3

1. Component parts 3

2. Introduction to air conditioning 4
   - 2.1 Principle of air conditioning 4

3. Basic refrigeration cycle 5
   - 3.1 Structure 5
   - 3.2 Conditions for air conditioning equipment 6
   - 3.3 Refrigerant 7
   - 3.4 Refrigeration cycle of a car air conditioner 8
   - 3.5 Comparison with a household air conditioner 8
   - 3.6 Receiver functions 9
   - 3.7 Reheat method 10
   - 3.8 Components 11

4. Layout 13
   - 4.1 Overall layout 13
   - 4.2 Overall layout 14
   - 4.3 Evaporator section 15

5. Compressor Assy 16

6. Evaporator Assy 17

7. Condenser Assy 18

8. Electric 19
   - 8.1 Electric circuit 19
   - 8.2 Main harness A 20
   - 8.3 Main harness B 21

9. Important points for assembly (Layout) ... 22
   - 9.1 Evacuation 22
   - 9.2 Charging with refrigerant 22
   - 9.3 Check for gas leakage and amount of refrigerant charge 23
   - 9.4 Heated water circuit 23
   - 9.5 Run-in operation 23
   - 9.6 Bolt size and tightening torque 23

10. How to charge air conditioner gas 24
   - 10.1 Charging gas in automatic operation 24
   - 10.2 How to charge air conditioner gas 26
   - 10.3 How to check air conditioner 28

11 Diagnosis table 29
   - 11.1 Car air conditioner system diagnosis table I (Refrigeration circuit) 29
   - 11.2 Car air conditioner system diagnosis table II (External causes other than insufficient cooling and abnormal pressure) 32
   - 11.3 Car air conditioner system diagnosis table III (Electrical system) 34
   - 11.4 Car air conditioner system diagnosis table IV (Electronic thermo system) 36

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12. Compressor 38
12.1 Compressor abnormal sound diagnosis chart 38
12.2 Compressor diagnosis chart..... 39

13.Troubleshooting 41

14.Control table 47

K-3 Hydraulic Motor (Air Conditioner) (Option) 48

1. Structure 48

K-4 Solenoid Valve (Air Conditioner) (Option) (--#546165)..... 50

1. Structure 50

K-5 Solenoid Valve (Air Conditioner) (Option) (#546166--)..... 52

1. Structure 52

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K-1 Crane Cab Glass

1. Glass replacement procedure

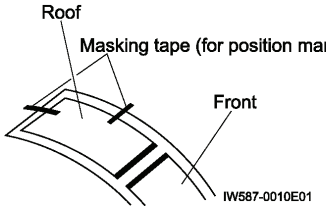
Follow the procedure described below to replace the fixed windshield window glass, roof glass, front right window glass (quarter window glass) and rear right window glass of the crane cab.

1. Remove the glass to replace and the adhesive from the cab body, and clean the window opening surfaces.
2. Fit a trim all around the glass bonding frame of the cab body.

[NOTICE]

◆Make adjustments so that the glass and the rubber dam of the trim will make even contact with each other.

3. Temporarily set a new glass on the cab, attach pieces of masking tape across the glass and frame in more than two places to mark their relative positions, and then remove the glass.
(Example) Roof glass



4. Clean and degrease the glass bonding surfaces of the cab body with a new gauze soaked with white gasoline or acetone. Wait for more than a minute to let them dry.

[NOTICE]

◆Shake the primer bottle well and then apply the primer with a brush, while making sure that there is no portion left uncoated.

◆Prevent the primer coated surfaces from any contact with hand, brush hairs, dust, water drops, etc.

◆The primer deposited on a surface other than the glass bonding surfaces should be immediately wiped away with a cloth soaked with white gasoline.

5. Apply a 5 to 20μm (0.0002 to 0.0008 inch) thick coat of primer C to the glass bonding surfaces of the cab body.
   • Primer C:
   AR Primer for cab (clear)
   Cemedine Co., Ltd.
6. Let the primer C coated surfaces dry for more than 15 minutes.
7. Clean and degrease the bonding surfaces of the new glass with a gauze soaked with white gasoline or acetone.
   Leave it more than 1 minute to dry.

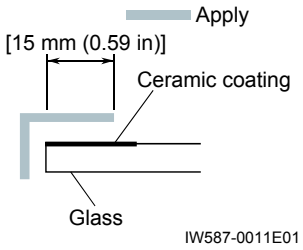
[NOTICE]

◆Shake the primer bottle well and then apply the primer with a brush. While making sure that there is no portion left uncoated or blurred, apply the primer evenly.

◆Prevent the primer coated surfaces from any contact with hand, brush hairs, dust, water drops, etc.

◆The primer deposited on a surface other than the glass bonding surfaces should be immediately wiped away with a cloth soaked with white gasoline.

8. Apply 5 to 20μm (0.0002 to 0.0008 inch) thick coat of primer B to the non-ceramic coated portion on the outer circumference of the new glass.
   • Primer B:
   AR Primer for glass (black)
   Cemedine Co., Ltd.

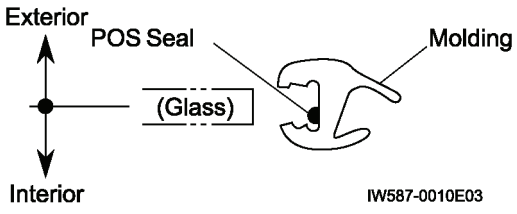


9. Let the primer B coated surfaces dry for more than 15 minutes.

[NOTICE]

◆Apply the POS seal to the cab interior side of the molding, to a point inner than the center.

10. Apply the POS Seal (Cemedine product) to the glass fitting groove of the molding.

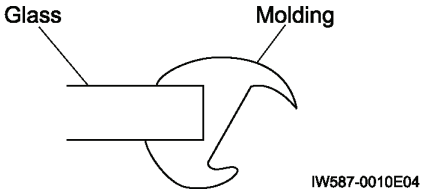


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[NOTICE]

◆Wipe away any excessive adhesive.

11. Fit the molding on the circumference of the new glass and bond its end joint with an instant aneous adhesive.



[NOTICE]

◆Apply the adhesive so that its cross sectional form is as shown in the figure by shaping it with a spatula.

◆For a portion where there is a clearance between the glass and rubber dam, apply the adhesive to a bead height of more than 5 mm (0.2 in).

◆Install the glass in less than 30 minutes after application of the adhesive.

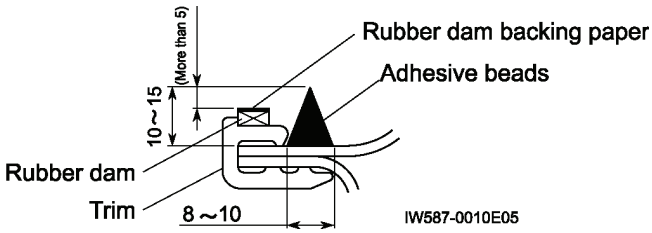
12. After installing the trim on the glass bonding portion frame of the cab body, apply the adhesive to the glass bonding surfaces.

• Adhesive:

S-511A [Black paste to use when room temperature is higher than 15°C (59°F)]

S-511F-1 [Black paste to use when room temperature is lower than 15°C (59°F)]

Cemedine Co., Ltd.



Unit : mm (1mm = 0.039 in)

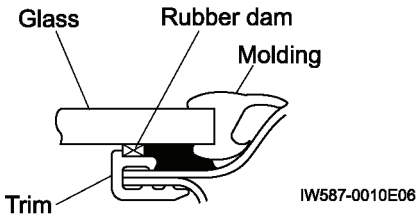
13. Remove the rubber dam backing paper. (Refer to the figure.)

[NOTICE]

◆When the glass installed, press it only once. Do not press it repeatedly (This can form air bubbles).

◆Excess adhesive must be wiped away with a spatula and white gasoline.

14. Set and press the new glass against the cab while aligning the marks (masking tape pieces put in Step 3) on the glass with those on the cab body.



2. Bonding the joint between windshield glass and roof glass

1. Bond 50 mm (1.95 in) wide pieces of masking tape to places 1 to 2 mm (0.039 to 0.078 in) away from the edges of windshield glass and roof glass.

2. Remove the rubber dam backing paper.

3. Install and press the new glass while aligning the marks with those on the cab body.

4. Secure the windshield glass and roof glass on the cab body with an adhesive tape.

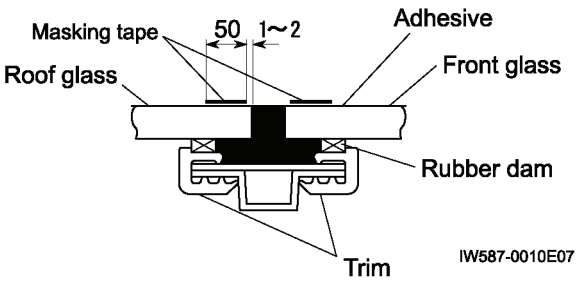
5. Fill the space between the windshield glass and roof glass with the adhesive (cemedine's S-511A or S-511F-1) and reshape it with a spatula so that it will be flush with the glass.

[NOTICE]

◆After the glass has been bonded, allow a curing period of more than two hours. Don't move the glass.

◆After the glass has been bonded, secure the glass on the cab body with a rubber tape or elastic cord, or by other suitable means.

6. Remove the masking tapes and wipe away excessive adhesive using white gasoline or acetone.



Unit : mm (1mm = 0.039 in)

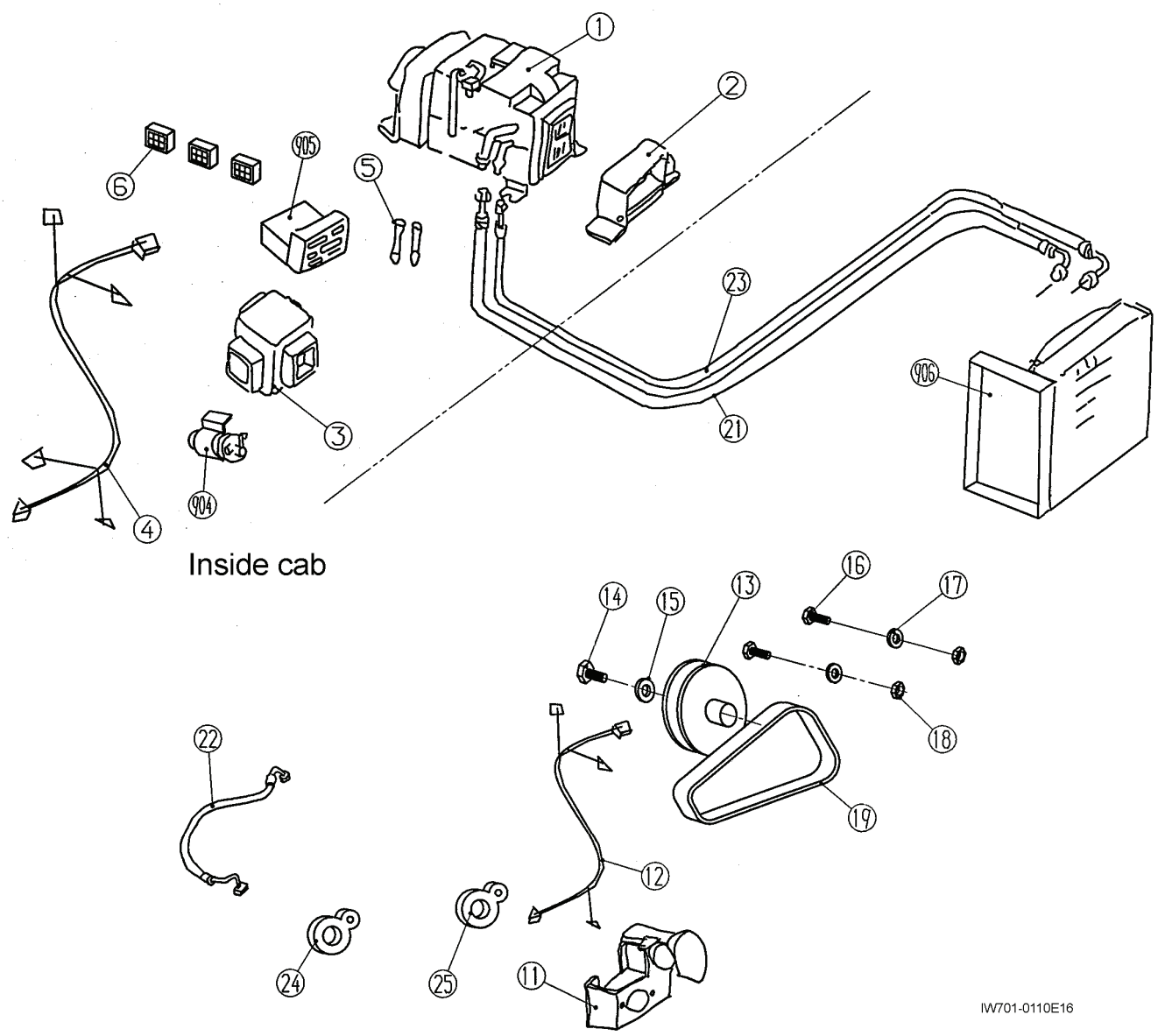
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K-2 Air Conditioner

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Component parts



1. Air conditioner assy	11. Compressor assy	17. Washer	24. Bush
2. Box assy	12. Harness	18. Nut	25. Bush
3. Air distributor	13. Pulley	19. V-belt	904. Pump assy
4. Harness	14. Bolt and washer	21. Suction hose	905. Control panel assy
5. Drain hose	15. Washer	22. Discharge hose	906. Condenser assy
6. Outlet grill	16. Bolt and washer	23. Liquid hose	

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2. Introduction to air conditioning

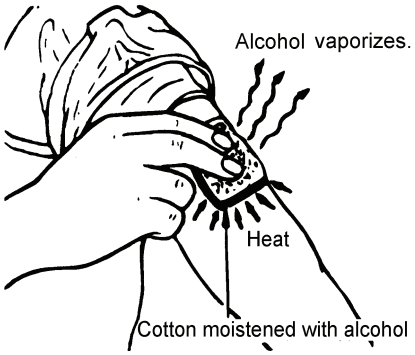
[NOTICE]

◆This section explains the fundamentals of the car air conditioner. Difficult concepts and special mechanisms have been omitted where possible, and only contents which focus on the basic functions have been included.

2.1 Principle of air conditioning

1. When alcohol is applied to your skin, it feels cool, and when your garden is watered in the summertime, you also feel cooler air. This is because when alcohol or water vaporizes, it absorbs heat (known as latent heat) from its surroundings. As a liquid (such as alcohol and water) changes into a vapor (such as alcohol vapor and water vapor), it requires heat (evaporation heat). The substance surrounding the liquid is cooled as heat is absorbed from it.

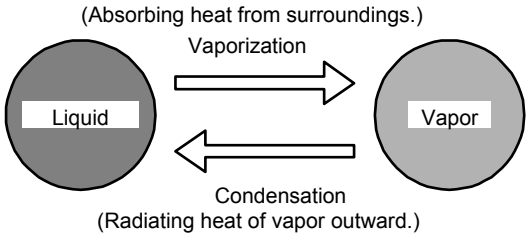
2. This natural phenomenon explains in brief the principle of the air conditioning that is used when we need to lower the temperature in the cab.



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3. However, if the vaporized liquid used for cooling is simply disposed of into the air, it must be constantly replenished with more liquid. As this is not practical, in the actual cooling system the vapor is cooled and returned to liquid form (condensed).

4. To condense the vapor, it is necessary to absorb heat from it. At this time if the vapor is compressed to higher pressure, condensation will take place relatively easily.



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5. A compressor is needed to compress the vapor, and a condenser is needed to absorb heat from it.

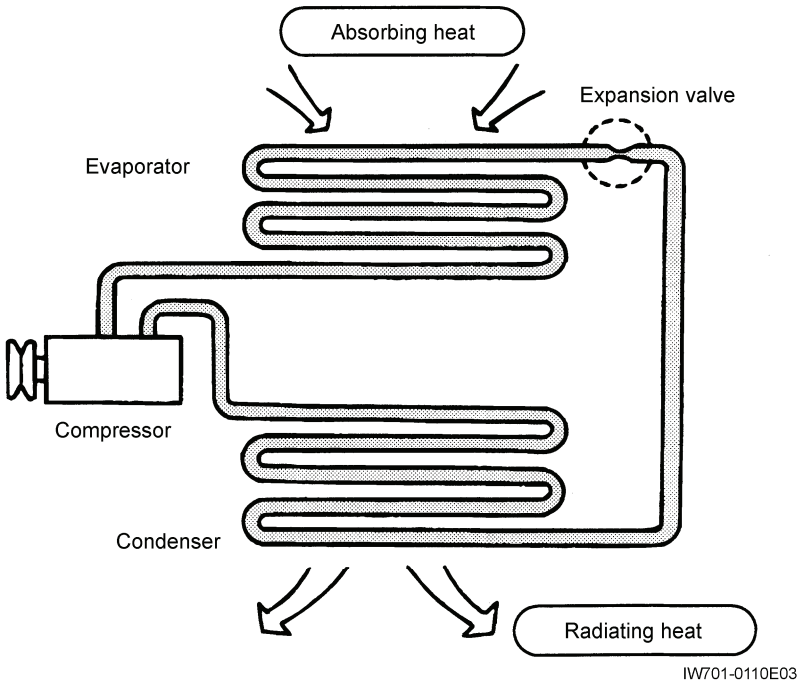
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3. Basic refrigeration cycle

3.1 Structure

An ordinary air conditioner circulates a volatile liquid (called a refrigerant) that is contained in piping. In this piping, the refrigerant is repeatedly vaporized and condensed.
This device is made up of the following components.

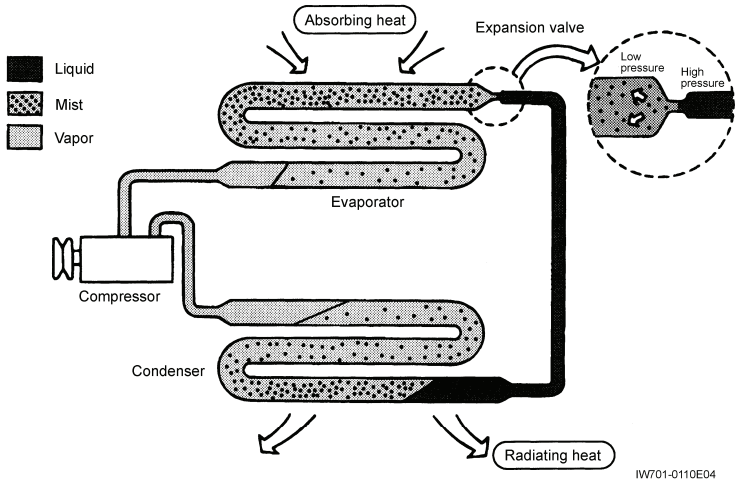
1. Evaporator
   In this component, the refrigerant vaporizes and absorbs heat from around the pipes, thus cooling the room.
2. Compressor
   This component absorbs the gaseous refrigerant that was vaporized in the evaporator, and compresses it to higher pressure so that it can be more easily liquefied in the condenser.
3. Condenser
   In this component, the high-temperature high-pressure refrigerant gas that was compressed by the compressor is cooled and liquefied.
4. Expansion valve
   This is a kind of throttle valve which functions as a barrier to keep the inside of the evaporator at low pressure. It sprays the high-pressure liquid refrigerant from the condenser into the evaporator through a tiny opening, forming a low-pressure low-temperature mist that is can easily and rapidly vaporize.



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3.2 Conditions for air conditioning equipment

The conditions required for a high-performance air conditioner are the following.
Refrigerant vaporizes at the lowest temperature possible.
Refrigerant liquefies easily.
The largest possible quantity of refrigerant vaporizes in the evaporator.



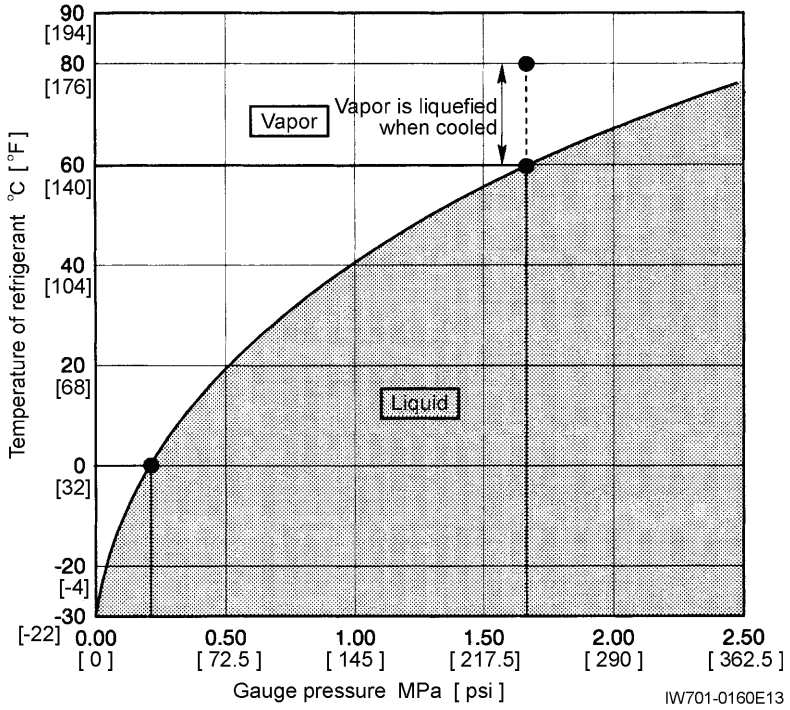
1. When we look at the conditions of the refrigerant within the refrigeration cycle, we find that the refrigerant which was compressed by the compressor becomes a high-temperature high-pressure gas.
2. The refrigerant next enters the condenser, where it is cooled and changed from gas to liquid form as it passes through. All of the refrigerant must be changed to liquid form when it reaches the condenser outlet. If the condenser cooling is insufficient, some refrigerant remains in gas form, and will result in degraded cooling performance.
3. When the liquid refrigerant passes through the expansion valve, it is atomized.
   The expansion valve is also known as a throttle valve. It sprays the high-pressure liquid through a small nozzle to create a refrigerant mist. This allows the refrigerant to vaporize easily.
4. In the evaporator, the refrigerant mist absorbs heat from the cab and vaporizes rapidly. By the time it reaches the evaporator outlet, the refrigerant has been completely transformed to a vapor.
5. If the amount of refrigerant is insufficient, it completely evaporates in the middle as it passes through the evaporator. This results in degraded performance of the evaporator.
6. On the other hand, if there is too much refrigerant, it cannot vaporize in the evaporator, and some remains in liquid form when it enters the compressor. If this occurs, there is the possibility that compressing liquid instead of vapor will damage the compressor.
7. For these reasons, the amount of refrigerant must be adjusted according to meet a variety of conditions.
8. The purpose of the air conditioner is to provide a comfortable environment not only by lowering the cab temperature, but also by reducing the humidity. This is accomplished by cooling the hot air in the cab, and condensing the moisture in it when it passes the evaporator.
9. In this way, the moisture in the air is removed, reducing the humidity. The water droplets that adhere to the fins are led to the outside of the vehicle through a hose.

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3.3 Refrigerant

1. The substance that circulates through the refrigeration cycle, and functions to transmit heat, is known as the refrigerant. In our air conditioning system, HFC134a is used. It is a freon-based refrigerant, but does not contain chlorine.

2. As shown in the figure below, the refrigerant HFC134a remains in liquid form at relatively high temperatures when it is strongly compressed. However, at low pressures it vaporizes at temperatures as low as 0°C (32°F) or -10°C (14°F).



3. This means, for example, that if the refrigerant vaporizes at 0°C (32°F), then the evaporator is also at 0°C (32°F). The air that passes through this evaporator should be cooled.

4. If the pressure is reduced so that the refrigerant evaporates at -5°C (23°F), the evaporator is also maintained at -5°C (23°F). This results in the formation of frost, which inhibits the flow of air through the evaporator and prevents cooling.

5. The vaporized refrigerant must then be liquefied. However, it is impossible to obtain a temperature as low as 40°C (104°F) in a hot summer environment.

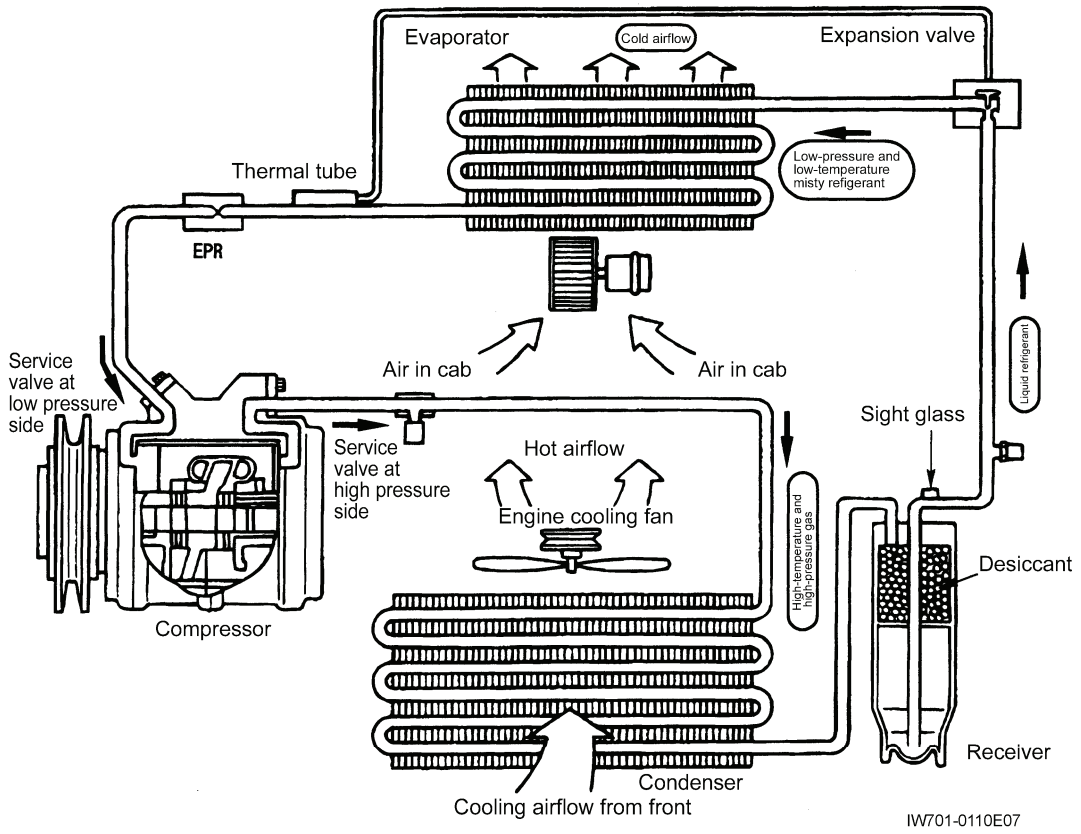
6. If 60°C (140°F) is possible, HFC134a will become a liquid at 60°C (140°F) if the pressure is approximately 1.7 MPa (246.5 psi) or above. When the gaseous refrigerant is compressed to 1.7 MPa (246.5 psi) (by the compressor), the gas temperature rises to approximately 80°C (176°F).

7. Therefore, the temperature of the gas as it enters the condenser is 80°C (176°F). The curve above shows that when the refrigerant gas is cooled by 20°C (68°F), it becomes a liquid at approximately 60°C (140°F) by the time it reaches the condenser outlet.

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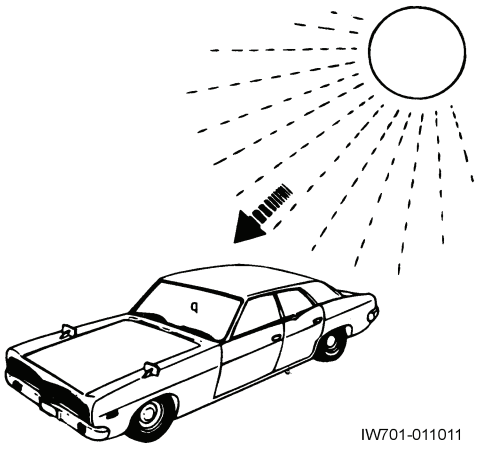
3.4 Refrigeration cycle of a car air conditioner

1. The refrigeration cycle of a car air conditioner comprises a compressor, condenser, receiver, expansion valve, and evaporator. The refrigerant circulates within this cycle, with the heat in the cab being absorbed by the evaporator and radiated outside the vehicle by the condenser, cooling the cab.
2. Compared with the basic refrigeration cycle described earlier, this cycle has an expansion valve with a different construction, and adds a receiver.
3. To increase the cooling capacity of an air conditioner, the largest possible amount of refrigerant must be vaporized inside the evaporator. The refrigerant must also be completely vaporized when it reaches the evaporator outlet.



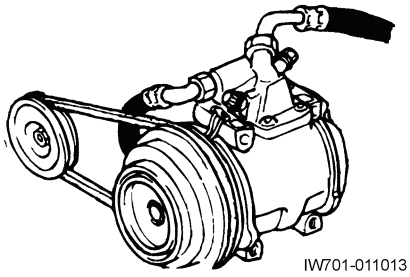
3.5 Comparison with a household air conditioner

1. Larger temperature variation
   The temperature in the cab is greatly influenced by the outside air temperature. The cab temperature is very high, especially when the vehicle is parked under the burning sun.
   This means:
   The required amount of refrigerant within the cycle varies greatly.



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2. Large variations in compressor speed
   The compressor of a household air conditioner is maintained at a constant motor speed. The compressor in a car air conditioner is driven by the engine, and its speed varies largely.
   This means:
   The amount of refrigerant circulating in the cycle varies greatly.


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3. For these reasons, the expansion valve is not a simple throttle valve, but automatically adjusts the flow in response to changes in the compressor speed and cooling load, in order to always maintain the optimal amount of refrigerant in the cycle.
   For this purpose, a receiver is installed to temporarily store excess refrigerant.

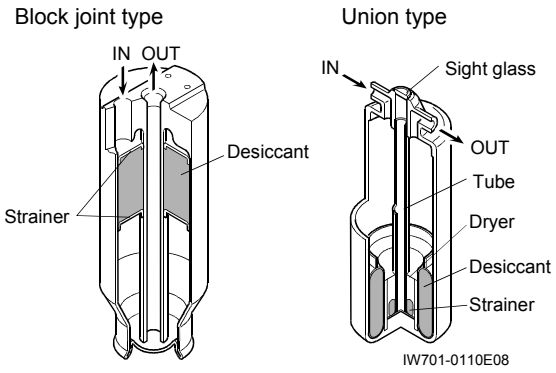
4. In an actual air conditioning system, various controllers to adjust temperature and airflow are included to keep the inside of the cab comfortable.

3.6 Receiver functions

1. The receiver is installed between the condenser and the expansion valve. It temporarily stores the refrigerant after it has been liquefied by the condenser, so that the refrigerant can be supplied as needed to the evaporator according to the cooling load.

2. Inside the receiver is a strainer and a desiccant, which remove dust and moisture from the cooling cycle.
   If moisture enters the cycle, it will cause corrosion of functioning parts, and will freeze in the hole of the expansion valve, inhibiting the flow of refrigerant.

3. There are two types of receivers – block joint type and union type. The difference is the means of connecting the pipes.

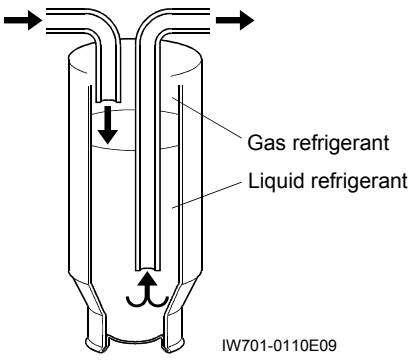


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   In addition to temporarily storing the refrigerant, the receiver also functions to separate gas and liquid refrigerant.

4. Depending on the outside air conditions, not all of the refrigerant may be liquefied when it is cooled by the condenser.
   If refrigerant gas is sent to the expansion valve, it will degrade the cooling capacity.

5. Inside the receiver, liquid refrigerant is stored in the lower part, while gas refrigerant is stored in the upper part. Because the receiver exit pipe takes only liquid refrigerant from the bottom, the gas and liquid are kept separated.

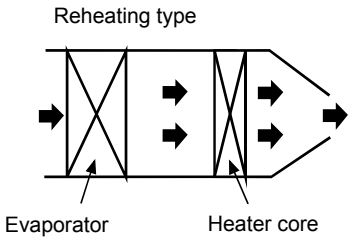


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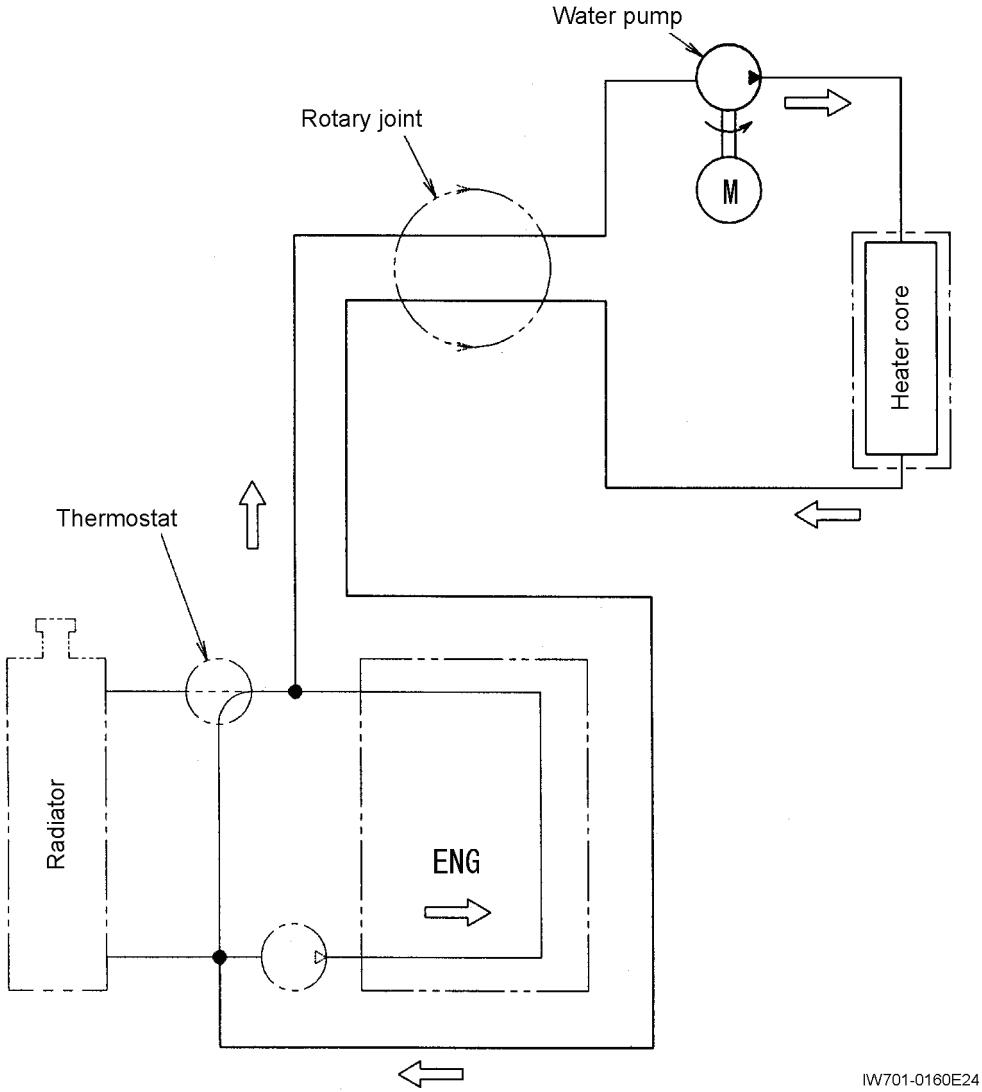
3.7 Reheat method

1. The air which cools (or heats) the cab is taken in from outside (or inside) by a blower motor, and then passes through the cooler unit and heater unit before being blown out from each of the ducts. The temperature control type at this time is the reheat method.



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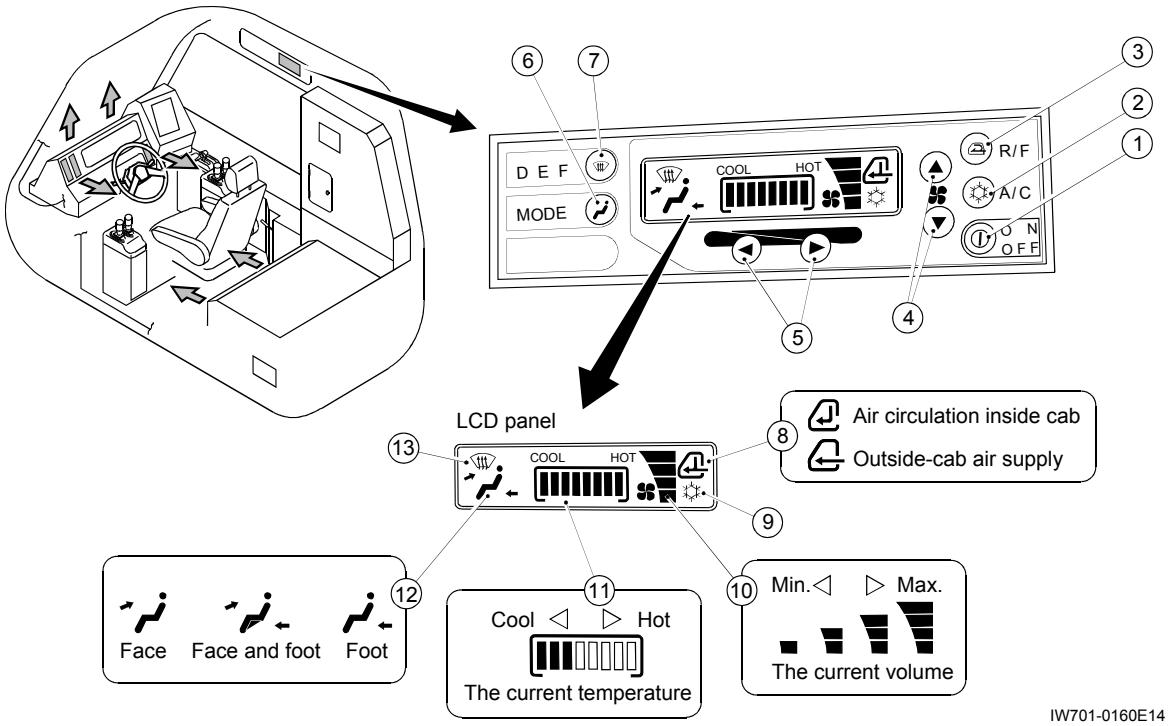
Air conditioning system (hot water circuit diagram)



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3.8 Components



Switches

1.Power switch
2.Air conditioner switch
3.Inside/outside air selector switch
4.Air flow switches
5.Temperature control switches
6.Air outlet changeover switch
7.Defroster switch

Sign on the LCD panel

8.Sign of air supply selection
9.Sign of air conditioner operation (Snow-shaped sign)
10.Sign of air flow volume
11.Sign of air temperature
12.Sign of air blowing direction
13.Sign of the defroster switch

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⚠ WARNING

⚠While the engine and the air conditioner are running, be sure not to touch the rotating objects (fan belt, condenser fan, etc).

[NOTICE]

◆Operate the air conditioner after starting the engine. Before stopping the engine, turn off the power switch of the air conditioner.

◆Do not place an obstructive object at the front of the louvers.

◆The compressor of the air conditioner stops during outrigger operation and suspension lock operation.

Power switch

As this switch is pressed, the power to the air conditioner is turned on or off repeatedly.
While the switch is on, signs are shown on the liquid crystal display.

Air conditioner switch

This switch is used to start up the compressor and to activate the cooling/dehumidification function.
As it is pressed, it is turned on or off repeatedly.
While the switch is on, the snow-shaped sign appears on the display.

Inside/outside air selector switch

This switch is used to select air supply between outside-cab air supply and air circulation inside cab.
As it is pressed, the air supply changes between outside-cab air supply and air circulation inside cab repeatedly.
The current air supply is shown on the display.

Air flow switches

These switches are used to select air flow volume among four steps.
The current volume is shown on the display.

Temperature control switches

These switches are used to adjust the temperature of the air from the air conditioner among eight steps.
The current temperature is shown by the bargraph on the display.

Air outlet changeover switch

This switch is used to select the air blowing direction. As it is pressed, the direction changes Face ⟶ Face and foot ⟶ Foot in sequence repeatedly.
The current direction is shown on the display.

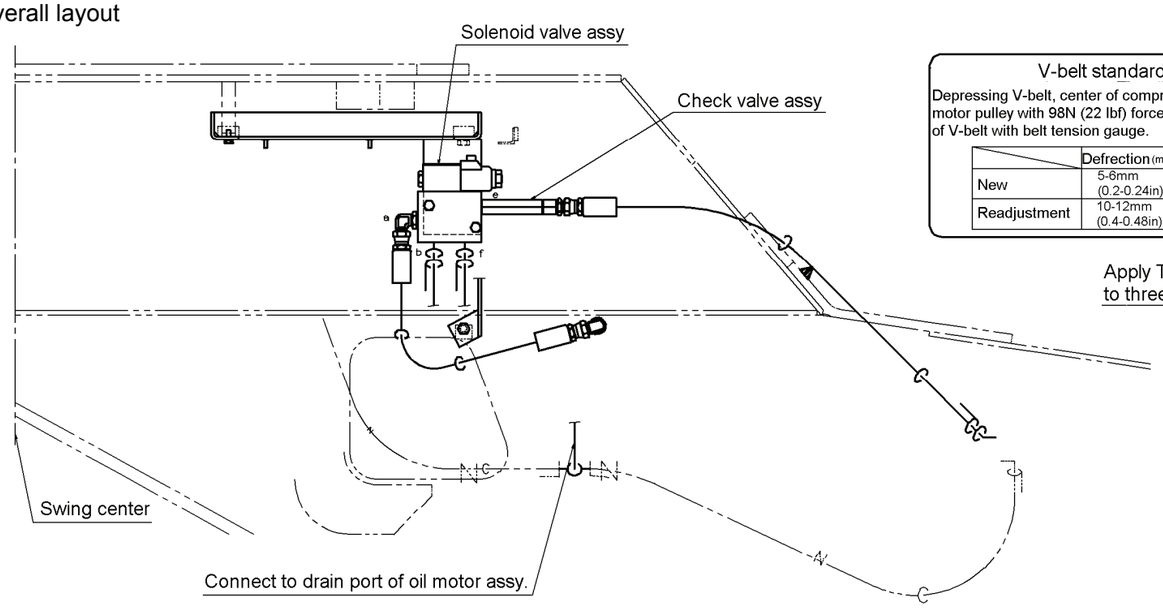
Defroster switch

This switch is used to set the air flow coming out of the defroster.
To cancel the defroster mode, press this switch again or press the air outlet changeover switch. The air flows will come out in the direction last selected.
While the defroster is used, the corresponding sign is shown on the display.

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4. Layout

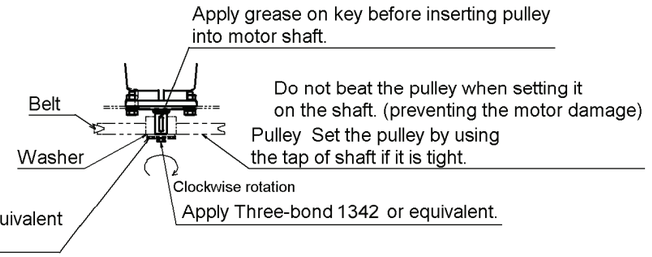
4.1 Overall layout



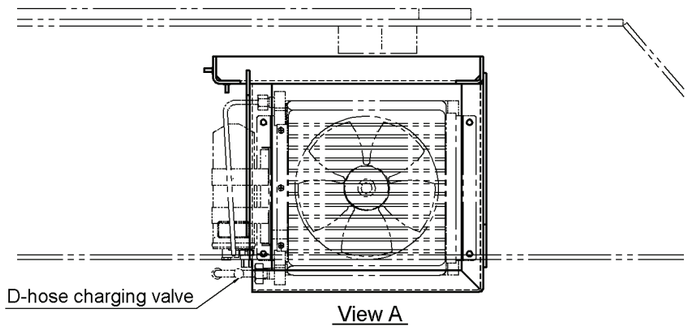
V-belt standard slack

Depressing V-belt, center of compressor pulley and motor pulley with 98N (22 lbf) force,measure center-slack of V-belt with belt tension gauge.

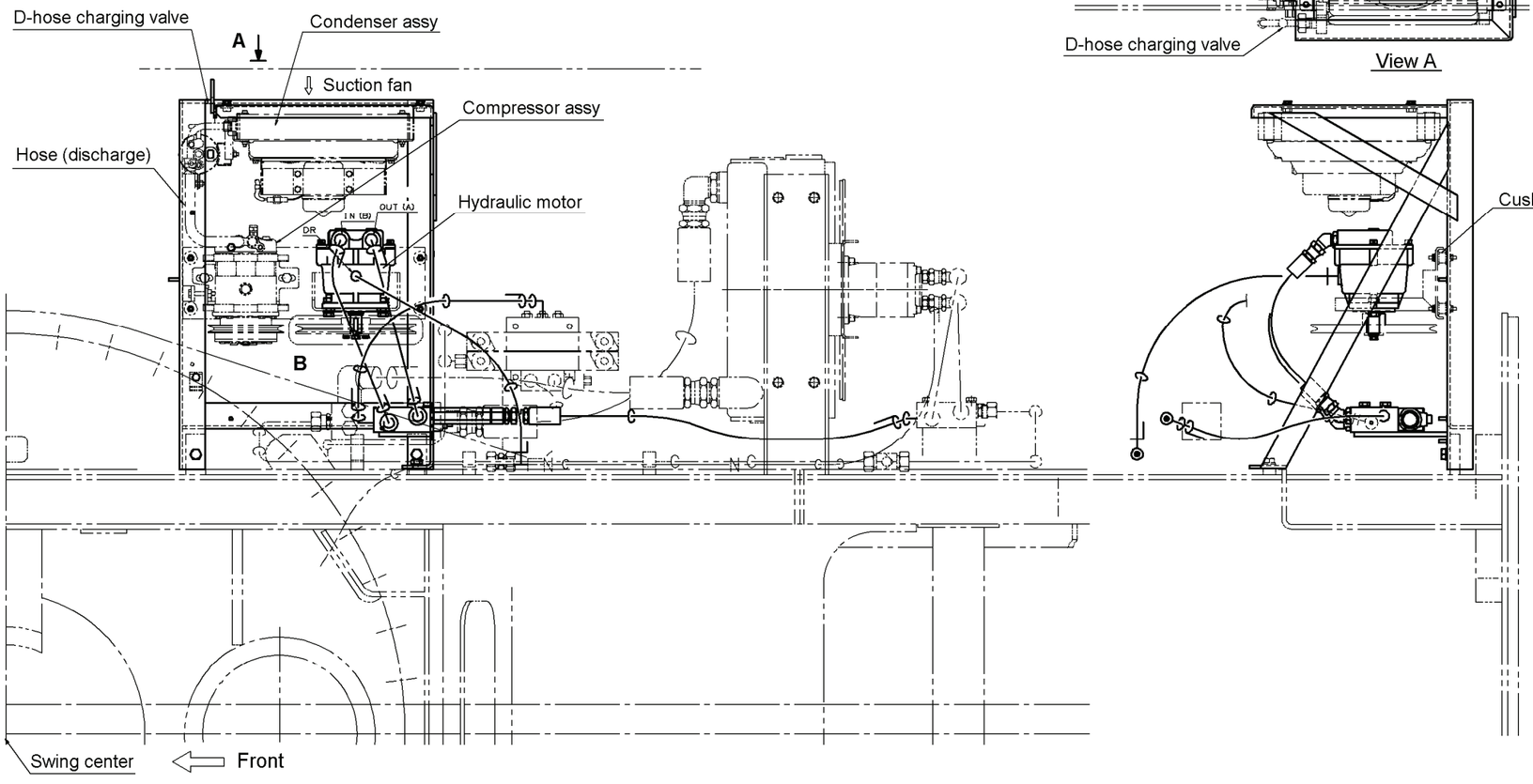
	Defrection (mm)	Tension
New	5-6mm (0.2-0.24in)	441-539N (99-121 lbf)
Readjustment	10-12mm (0.4-0.48in)	196-343N (44-77 lbf)

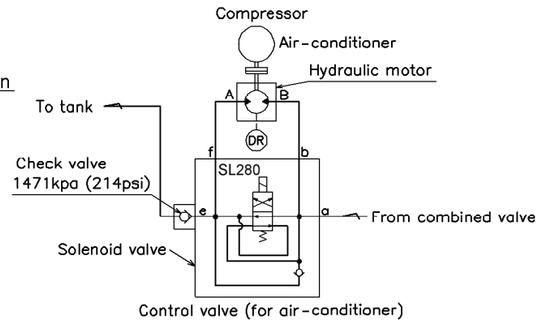


Section B



View A



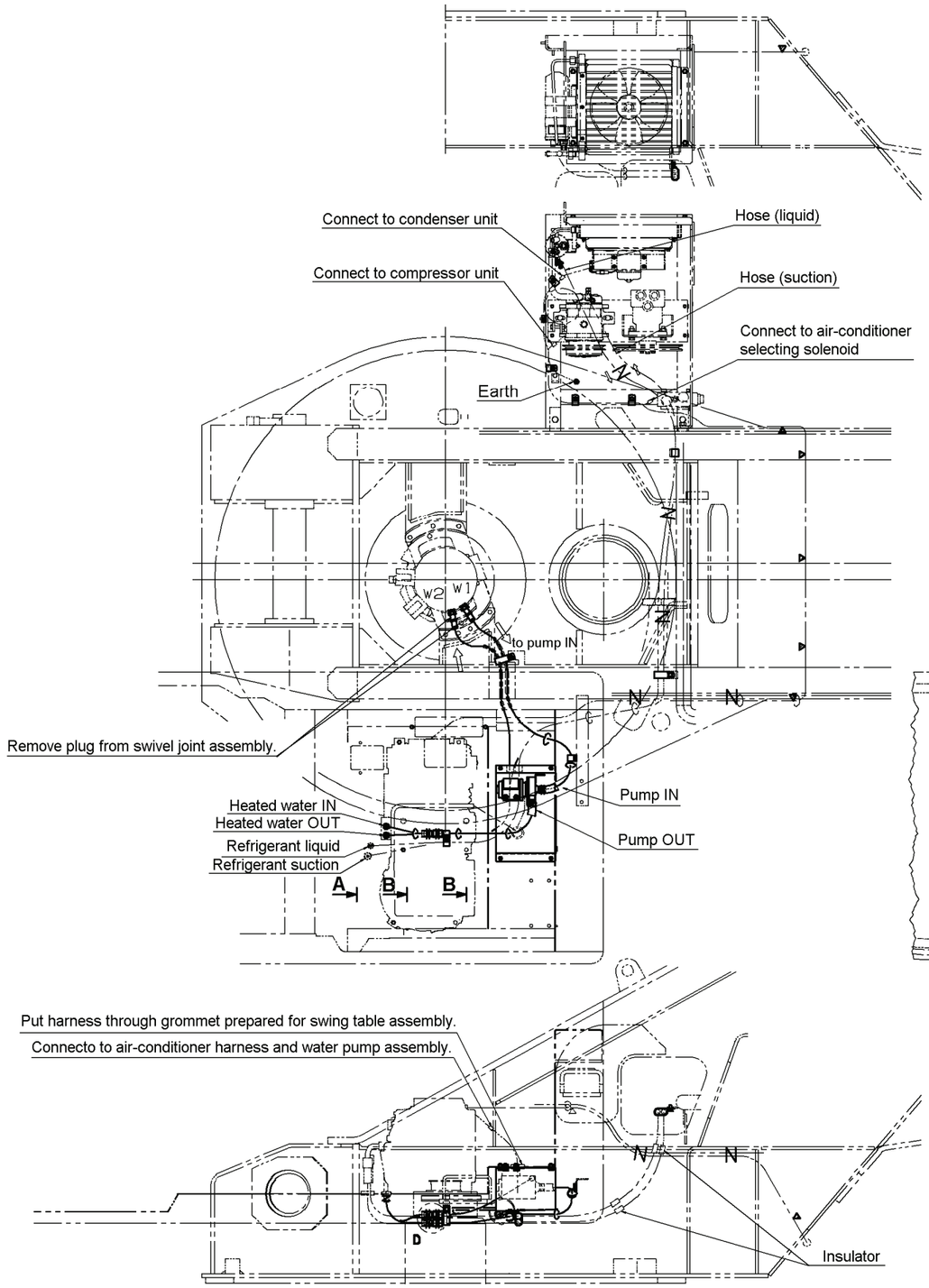


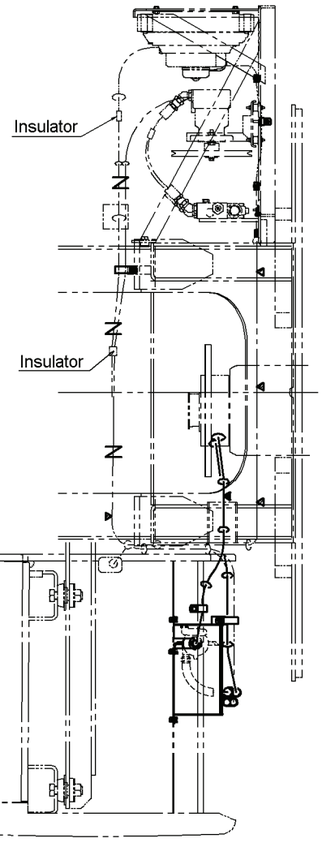
Hydraulic circuit

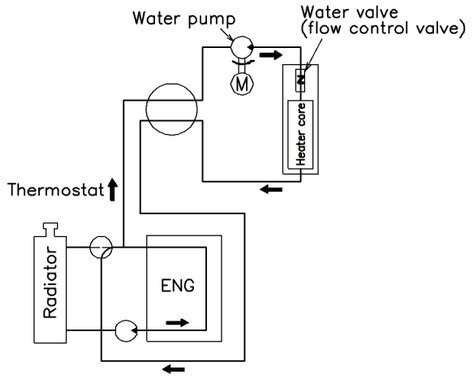
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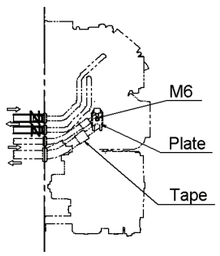
4.2 Overall layout



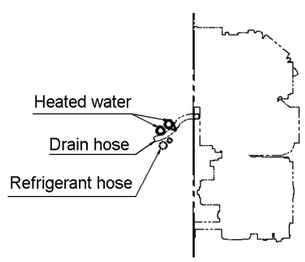




Hot water circuit



View A



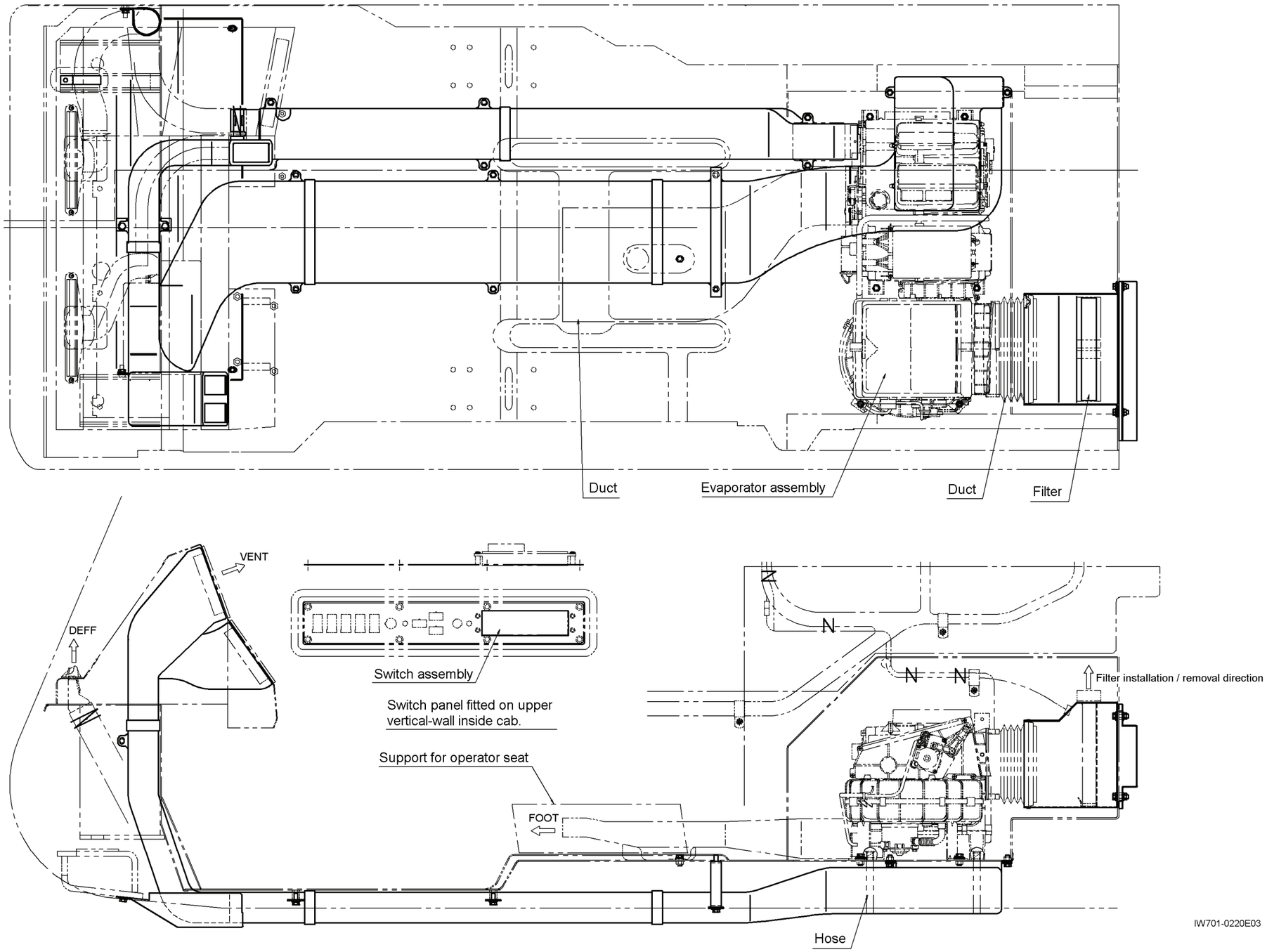
View B

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345-110-73000 2

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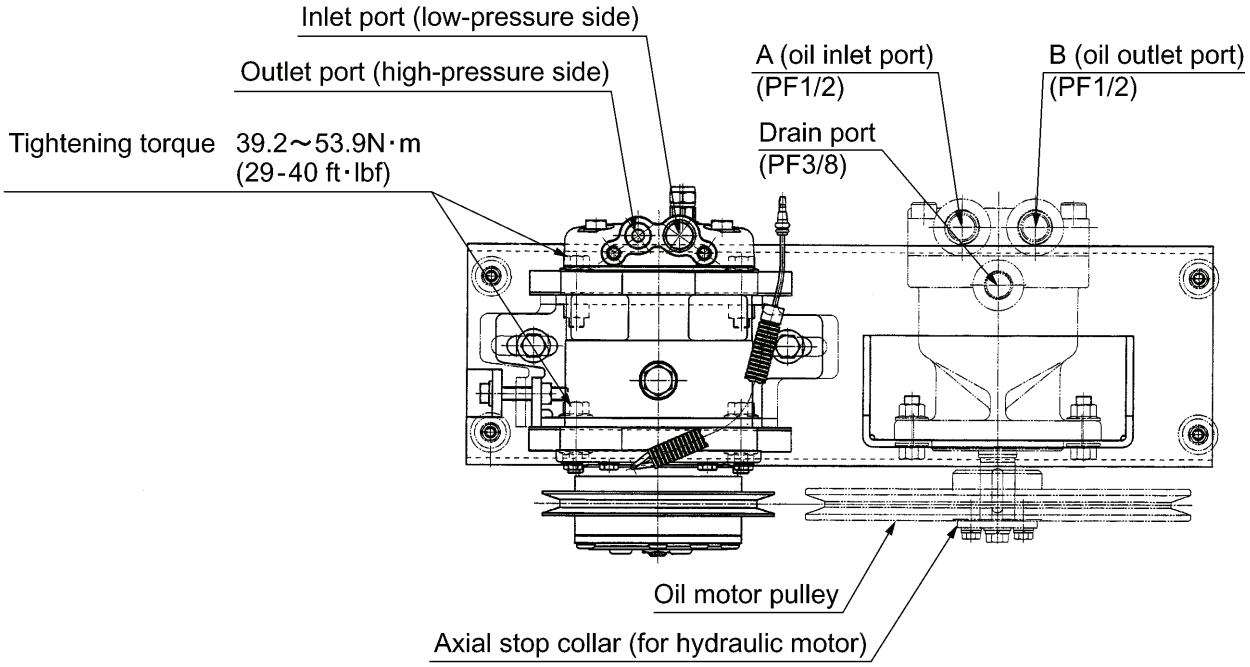
4.3 Evaporator section

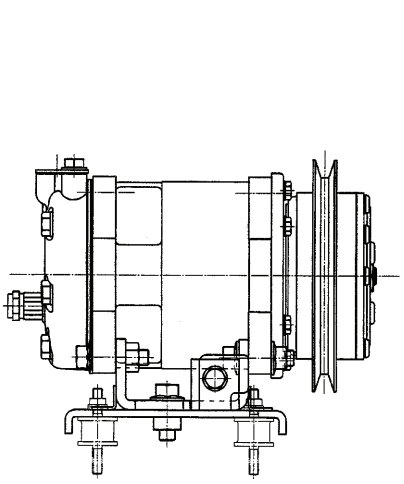


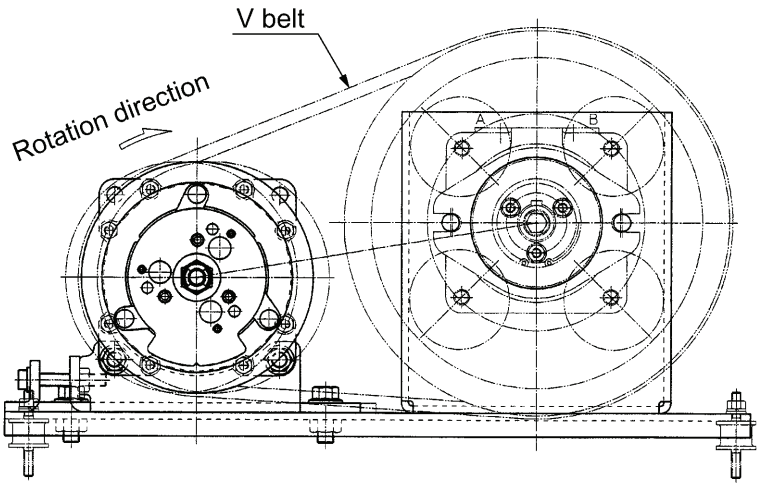
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5. Compressor Assy

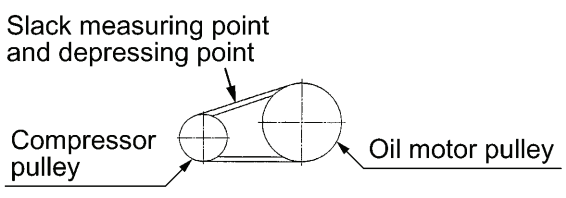






・V-belt standard slack
Depressing force : 98N (22 lbf)

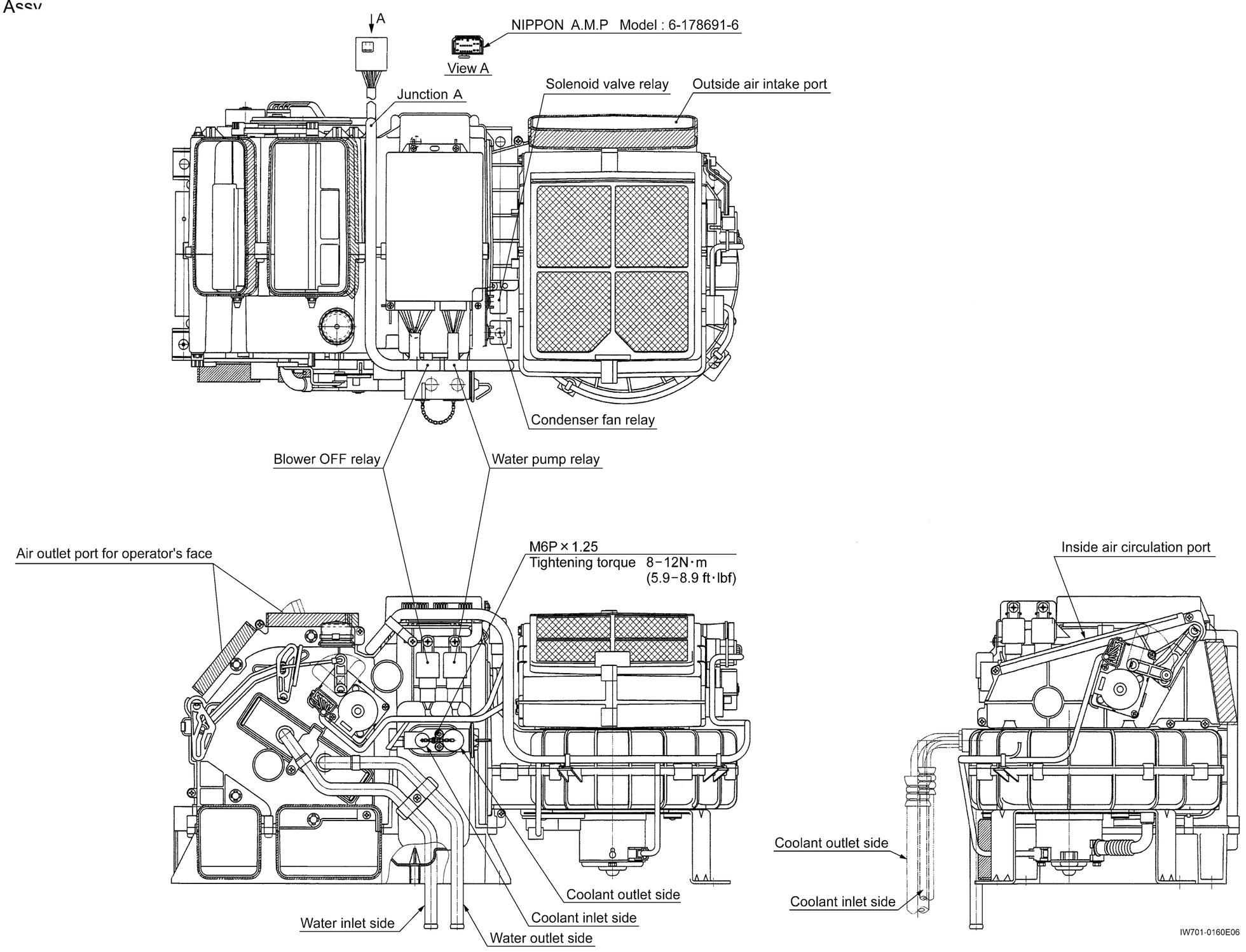
	Slack	Reference V-belt tension
New	5-6mm (0.2-0.24 inch)	441-539 N (99-121 lbf)
Readjustment	10-12mm (0.4-0.48 inch)	196-343 N (44-77 lbf)



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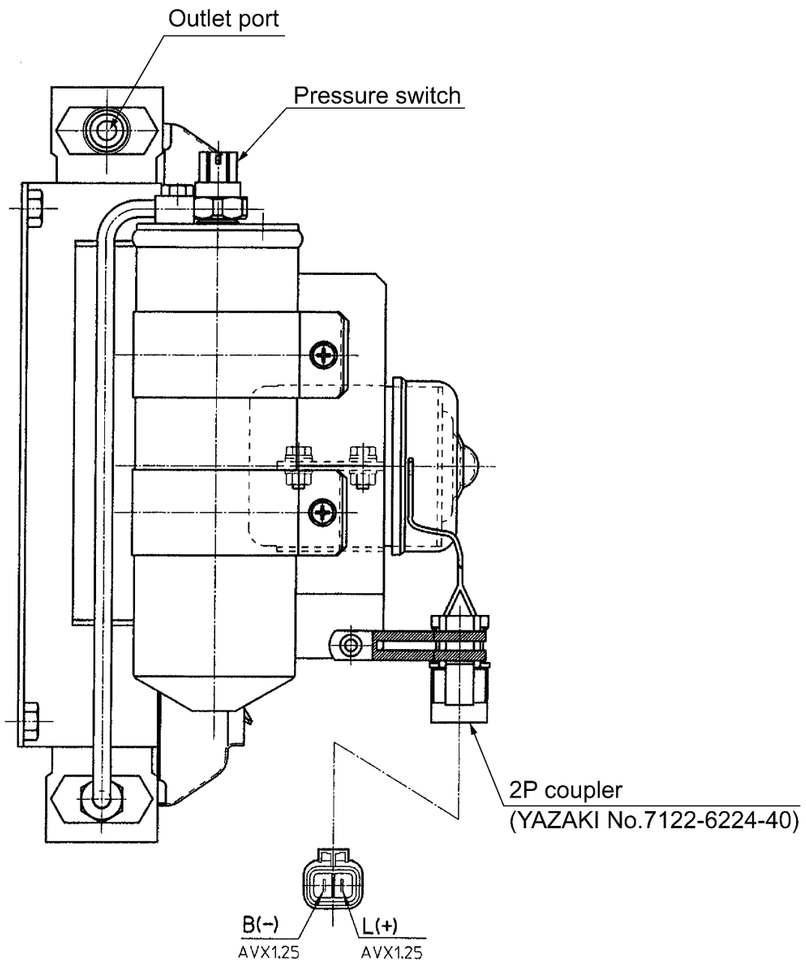
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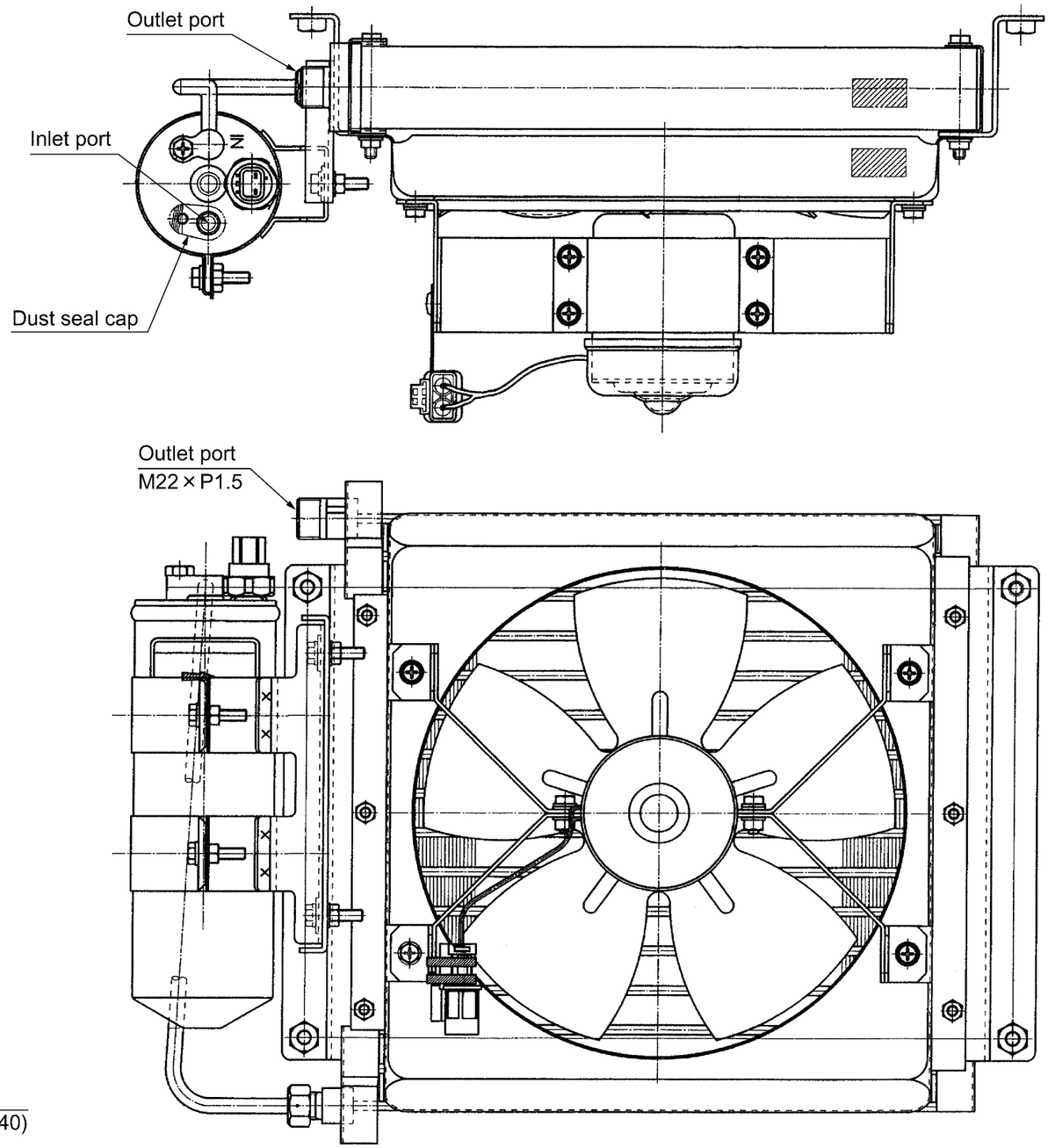
6. Evaporator Assy



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7. Condenser Assy



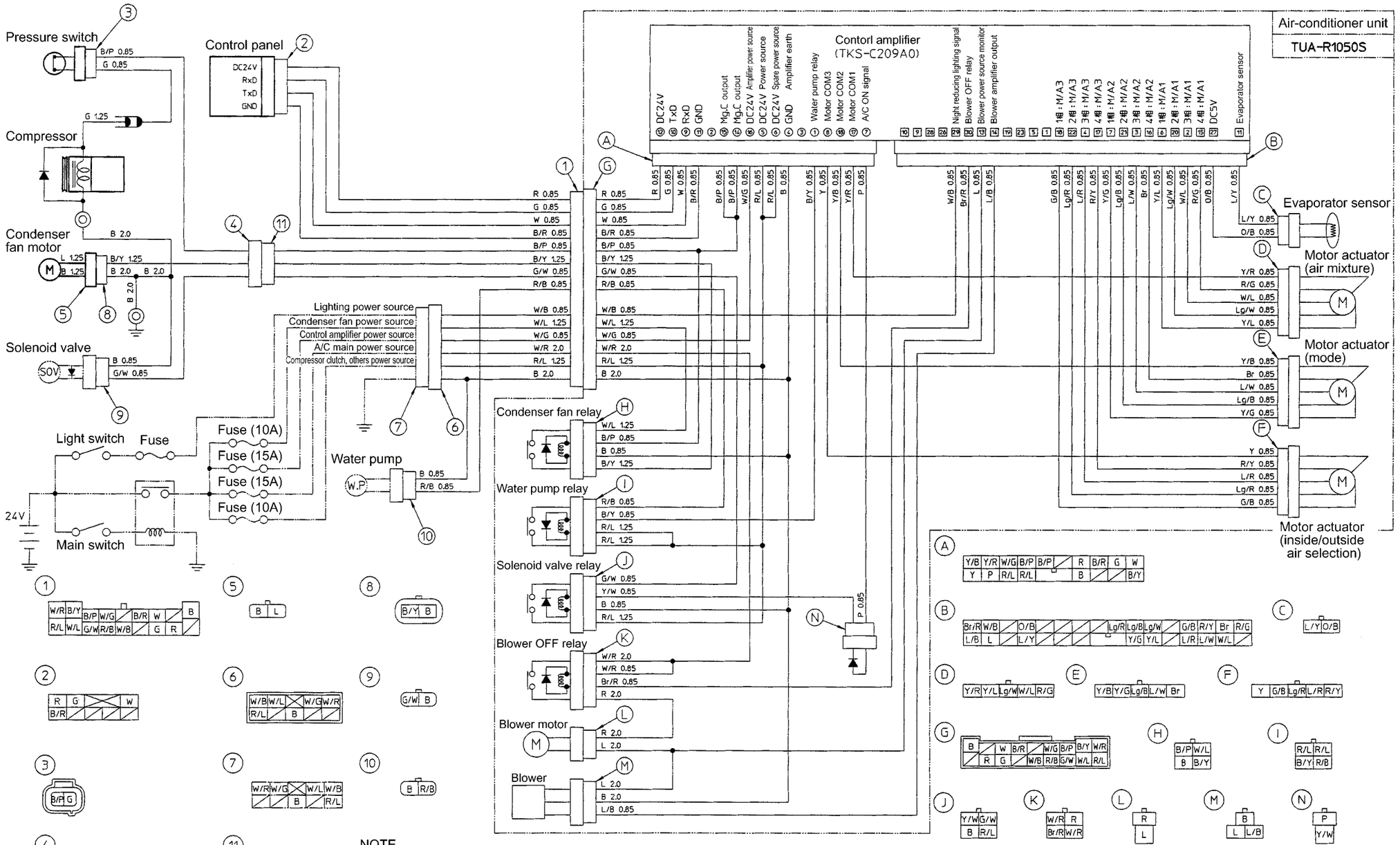


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8. Electric

8.1 Electric circuit



NOTE

1) Two points chain lines stand for the wiring on the vehicle side.
2) Wire color codes given for each connector stand for the colors of wires viewed from the connection side.

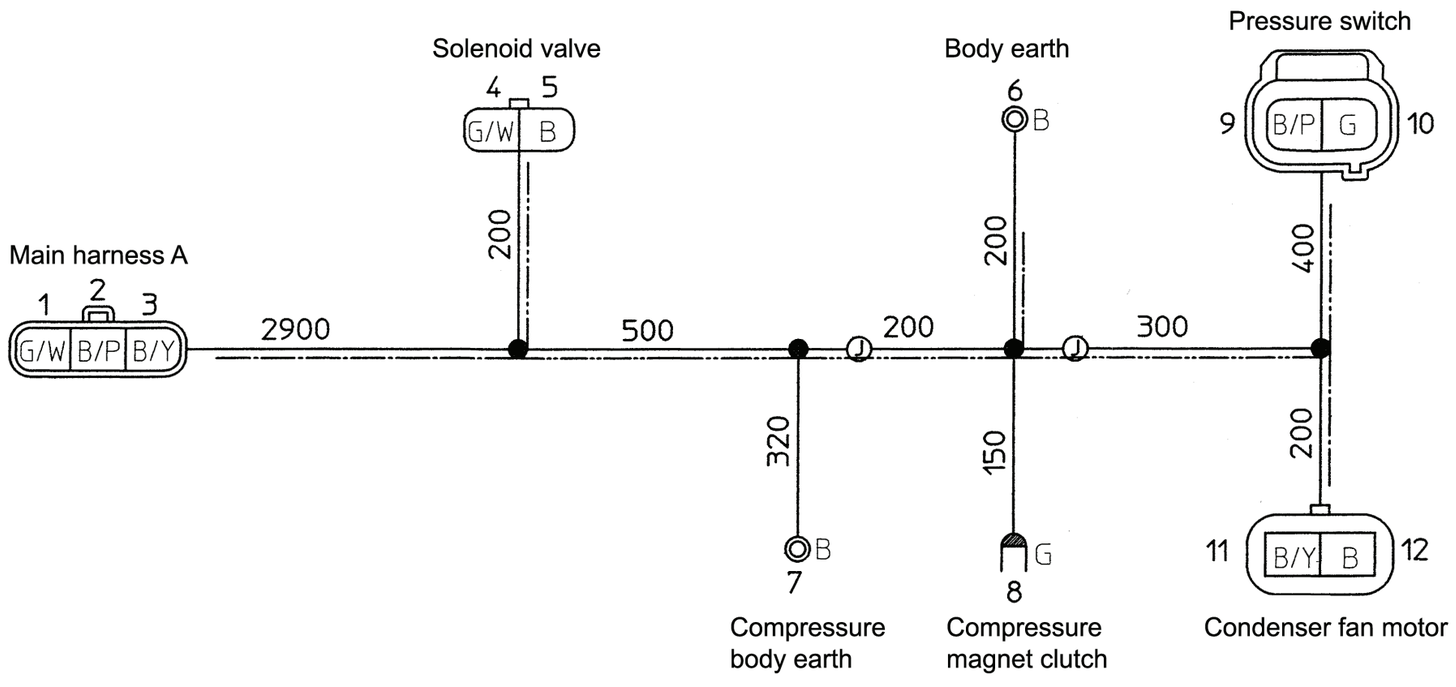
P	W	B	R	Y	G	L	Br	Lg	O
Pink	White	Black	Red	Yellow	Green	Blue	Brown	Light green	Orange

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8.2 Main harness A



Wlre colors are based on this table.

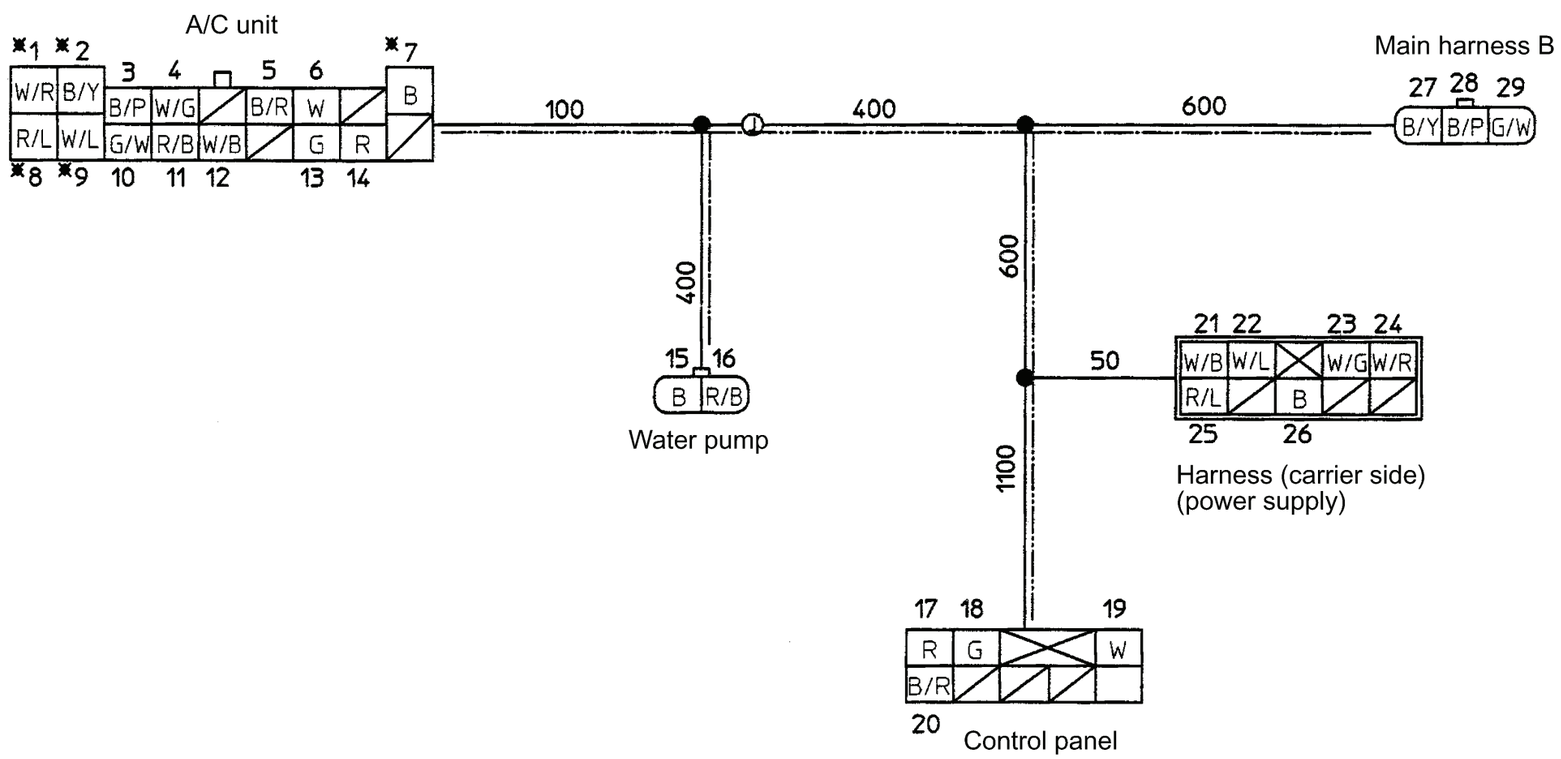
P	W	B	Y	G
Pink	White	Black	Yellow	Green

Cord name	Diameter	Color	Length	Connection table
A	0.85	G/W	3070	1 —— 4
B	0.85	B/P	4270	2 —— 9
C	1.25	B/Y	4070	3 —— 11
D	0.85	B	710	5
E	2.0	B	990	7 — J J — 12
F	2.0	B	210	6
G	0.85	G	820	8 —— 10

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8.3 Main harness B



Wire colors are based on this table.

P	W	B	R	Y	G	L
Pink	White	Black	Red	Yellow	Green	Blue

Cord name	Diameter	Color	Length	Connection table
A	2.0	W/R	1120	1 — 24
B	1.25	B/Y	1070	2 — 27
C	0.85	B/P	1070	3 — 28
D	0.85	W/G	1120	4 — 23
E	0.85	B/R	2170	5 — 20
F	0.85	W	2170	6 — 19
G	2.0	B	1120	7 — 26
H	0.85	B	410	15
I	1.25	R/L	1120	8 — 25
J	1.25	W/L	1120	9 — 22
K	0.85	G/W	1070	10 — 29
L	0.85	R/B	470	11 — 16
M	0.85	W/B	1120	12 — 21
N	0.85	G	2170	13 — 18
O	0.85	R	2170	14 — 17

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9. Important points for assembly (Layout)

9.1 Evacuation

[NOTICE]

◆If moisture and air are not fully eliminated from the cycle, they will cause problems such as cooling trouble and clogs in the cycle.

1. Evacuate by applying vacuum to the high- and low-pressure service valves. Continue applying vacuum for at least 10 minutes after the pressure reaches 101 kPa (14.6 psi).

2. Airleakage check
   After evacuation is completed, leave for 5 minutes or longer, and then check that there are no abnormal gauge readings (pressure increases).

9.2 Charging with refrigerant

⚠ CAUTION

⚠ Never inject refrigerant from the high-pressure side while the cycle is operating. This is extremely dangerous; the refrigerant will flow in reverse, and the gas can or hose may rupture.

[NOTICE]

◆Never inject liquid refrigerant from the low-pressure side, regardless of whether the cycle is operating or not. This will harm the compressor.

1. Injecting liquid
   Be sure to inject from the high-pressure side, without operating the cycle.
   (1100 g or 2.42 lb)

2. Injecting gas (additional charge)
   Inject gas from the low-pressure side while operating the cycle.

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9.3 Check for gas leakage and amount of refrigerant charge

[NOTICE]

◆Never check using a halide-torch type leak detector.

1. Insert refrigerant in gas form until the gauge pressure reads 98.1 kPa (14.2 psi). Then use a leak tester and check for leaks.

[NOTICE]

◆An excess or insufficient amount of refrigerant can result in the following trouble.
Excess amount: Cooling trouble resulting from operation of the pressure switch
Insufficient amount: Cooling trouble or malfunction resulting from compressor lubrication failure

2. When the sight glass bubbles disappear, control the refrigerant to +100 - 200 g.
(Conditions)
Doors : Open
Blower : Hi
Engine speed : Idle
A/C switch : ON
Temp. control : Max. cool

9.4 Heated water circuit

1. When connecting the heated water piping, be careful not to incorrectly assemble the IN and OUT piping.

2. In order to prevent damage resulting from freezing of the water inside the heated water circuit, in the wintertime use antifreeze in a concentration appropriate for the outside temperature.

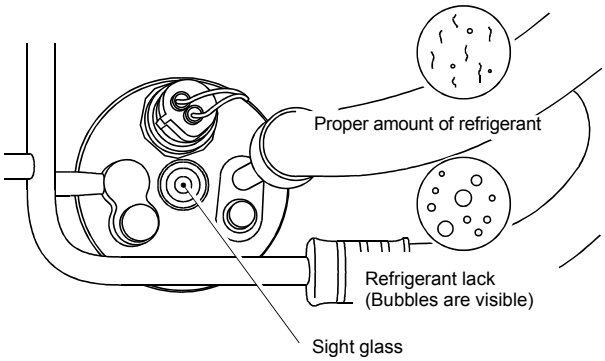
3. The pressure which is applied to the heated water circuit heater core is 196 kPa (28.4 psi) or less when the circuit is in use. However the usual pressure is 98 kPa (14.2 psi) or less.

9.5 Run-in operation

Operate the A/C for 5 minutes or more under the conditions below to perform the initial run-in operation.
Engine speed :Idle
(High-speed starting is especially prohibited.)
Temp. control :Max. cool
Blower :Hi

9.6 Bolt size and tightening torque

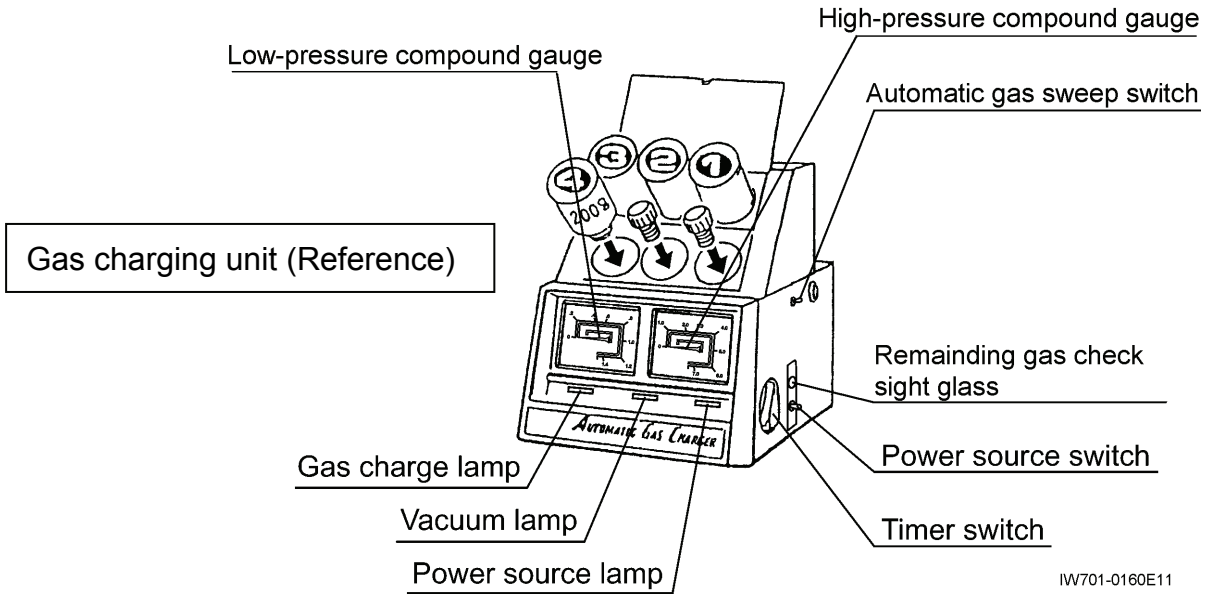
Bolt	Tightening torque	
	N•m	ft•lbf
Compressor installation	24.5 - 29.4	18.1 – 21.7
Idle pulley center bolt	31.4 - 47.1	23.2 – 34.7

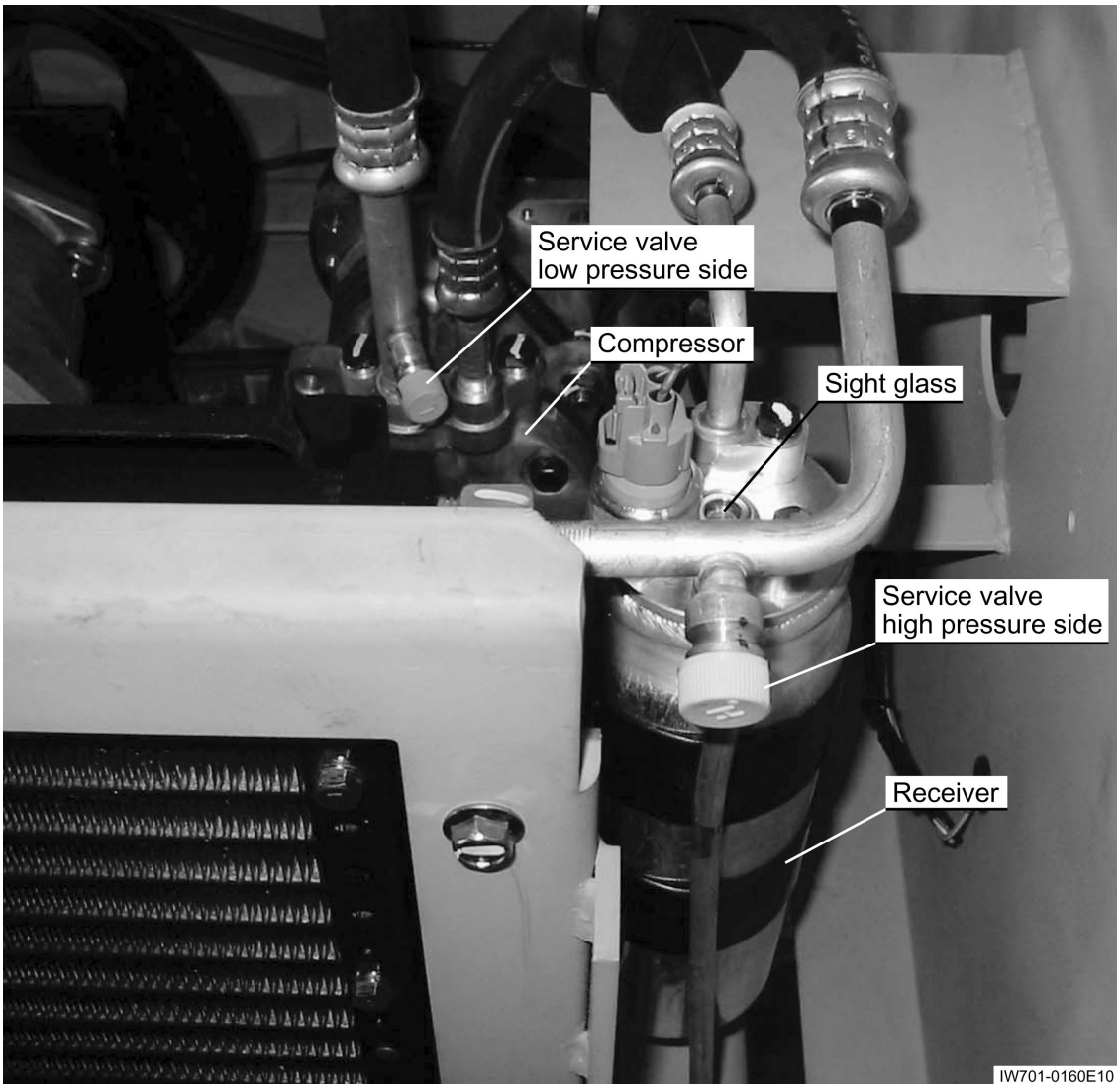


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10. How to charge air conditioner gas

10.1 Charging gas in automatic operation





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Flow No.	Procedure	Safety point	Jigs and tools
1	Plug the power supply cord of the main unit.		
2	Connect the coupler of the high-pressure side (red hose) and the low-pressure side with the compressor main body sequentially. Purge residual pressure before connecting because the connection of coupler becomes firm if there is residual pressure in the unit. (Usually it has been performed at work end. Refer to Flow No.14.)	Be careful to the scaffold	
54453	Attach all freon cans. (6 cans) Tighten as it is though the gas leaks a little when attaching.	Be careful that gas liquor does not splash	
4	Turn ON the automatic gas sweep switch. (to increase degree of vacuum) (If the gas is insufficient, turning OFF is allowed.)		
5	Set the time switch to "20 minutes". (Set to longer period if there is a time.)		
6	Turn the power switch to the automatic side. (starts vacuum)		
7	Vacuum operation is finished when the buzzer sounds 15-20 minutes later. ⇒ Starts gas charging.		
8	Engine start is allowed when buzzer sound stops. (Turn ON the air conditioner switch.) (Keep idling for at least 10 minutes --- specified by DENSO.)	Make sure to check surroundings	
9	Turn OFF the power switch when the gas disappears from the remainder gas sight glass of the main unit.		
10	Check the air-conditioning capability Temperature control: : Maximum cool Blower: : Hi Engine speed : Approx. 2000 rpm The blowing temperature must be in the graphic chart value. (Refer to the graphic chart.) (Near the outside air temperature scale in the gauge is a standard pressure.)		
11	Stop the engine	Pull out the key	
12	Wait for two minutes until pressure falls, and detach the high-pressure side and low-pressure side quick couplers.	Be careful to the scaffold	
13	Test gas leakage. (for all hose connections) (Check the gas leakage from the lower side because the freon is heavier than air.) Compressor: 2 places Compressor charge coupler: 2 places Receiver: 2 places Condenser Assy: 2 places Main body of air conditioner: 2 places Pressure switch hose connections : 1 place 11 places in total	Be careful to the scaffold	Gas leak tester
14	Detach the empty gas can, and purge pressure in the hose. 1) Set the timer knob to the vacuum side. 2) Set the power switch to the automatic or manual. 3) Turn OFF the power switch when the high/low-pressure gauge indicates approx. "0" pressure-value after a few seconds.		
15	Finish the work. Unplug the power supply cord, and put away the gas charge unit.		

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10.2 How to charge air conditioner gas

Flow No.	Procedure	Safety point	Jigs and tools
1	Plug the power supply cord of the main unit.		
2	Connect the coupler of the high-pressure side (red hose) and the low-pressure side with the compressor main body sequentially. Purge residual pressure before connecting because the connection of coupler becomes firm if there is residual pressure in the unit. (Usually it has been performed at work end. Refer to Flow No.16.)	Be careful to the scaffold	
3	Attach one freon can. (Put the blind caps to the couplers which gas-can has not been attached.) Tighten as it is though the gas leaks a little when attaching.	Be careful that gas liquor does not splash	
4	Set the time switch to the position of gas replenishment.		
5	Turns the power switch to the manual side. (with 3 seconds automatic air purge)		
6	Start the engine. - Engine speed: Idling - Temperature control: Maximum cool - Blower: Lo-Hi	Make sure to check surroundings	
7	Check the condition of bubble in the sight glass. (Check whether the bubble disappears.)	Make sure to check surroundings	
8	Turn OFF the power switch when the gas disappears from the remainder gas sight glass of the main unit.	Be careful to the scaffold	
9	Detach the empty gas can, and attach another gas can.	Be careful that gas liquor does not splash	
10	Turns the power switch to the manual side. (with 3 seconds automatic air purge) - Repeat Flow No.7 until the bubble disappears. (The charging amount should be 200g±50g after the bubble disappears.)		
11	Turn OFF the power switch when the gas disappears from the remainder gas sight glass of the main unit.		
12	Check the air-conditioning capability Temperature control: : Maximum cool Blower: : Hi Engine speed : Approx. 2000 rpm The blowing temperature must be in the graphic chart value. (Refer to the graphic chart.) (Near the outside air temperature scale in the gauge is a standard pressure.)		
13	Stop the engine	Pull out the key	
14	Wait for two minutes until pressure falls, and detach the high-pressure side and low-pressure side quick couplers.	Be careful to the scaffold	
15	Test gas leakage. (for all hose connections) (Check the gas leakage from the lower side because the freon is heavier than air.) Compressor: 2 places Compressor charge coupler: 2 places Receiver: 2 places Condenser Assy: 2 places Main body of air conditioner: 2 places Pressure switch hose connections : 1 place 11 places in total	Be careful to the scaffold	Gas leak tester

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Flow No.	Procedure	Safety point	Jigs and tools
16	Detach the empty gas can, and purge pressure in the hose. 1) Set the timer knob to the vacuum side. 2) Set the power switch to the automatic or manual. 3) Turn OFF the power switch when the high/low-pressure gauge indicates approx. "0" pressure-value after a few seconds.		
17	Finish the work. Unplug the power supply cord, and put away the gas charge unit.		

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10.3 How to check air conditioner

Flow No.	Procedure	Check point	Jigs and tools
1	Illumination lamp check (for control panel) 1) The lamp lights with the working lamp switch ON. (Two lamps on upper and lower of center in the panel.) 2) The lamp turns off with the working lamp switch OFF.	Lights both 2 lamps.	
2	Cooler temperature control switch. (Check with blower "HI".) 1) The cooler operates by setting to "COOL". (With maximum cooling.) (The cooler will be hard to operate if the ambient temperature is low. The checking becomes easy when raising the cabin temperature to about 25°C.) 2) The cooler stops by setting to "OFF".	Must be a cold blow Must be a natural blow.	
3	Heater temperature control switch (Check with blower "HI" and engine speed maximum.) 1) Warm blow must come with maximum. 2) The heater stops by setting to "OFF".	Must be a warm blow Must be a natural blow.	
4	1) The blower stops by setting to "OFF". 2) LO: Low, ME: Medium, and HI: High	There must be a change in three levels	
5	Mode selector switch 1) Left position: Blows down from the duct. 2) Right position: Blows down from the windshield.		
6	Electric fan for condenser 1) Must synchronize with the compressor.		
7	Cooler performance check Refer to the graphic chart in the instruction manual which is for charging an air conditioner gas. - Blower switch is HI. - Temperature control is maximum COOL. - Engine speed is MAX. - All doors are opened. (All closes in winter.) - Tmperature of air inhalation vent must be 25-35 °C. (The standard of temperatures fluctuate is about 10-17°C.) * Raise the cabin temperature with the heater as much as possible in the winter. (Check with your hand that the cold blow is output.---Compressor must be operating.)	Check with your hand in the winter. Avoid performing in the low ambient temperature period as much as possible.	

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11 Diagnosis table

11.1 Car air conditioner system diagnosis table I (Refrigeration circuit)

A/C system trouble phenomenon	Status explanation of A/C system pressure	Phenomenon explanation to consider other factors	Diagnosis result (phenomenon of principal cause)	Possible cause	Measures (specific part name and repair method)
Insufficient cooling.	Pressure at high pressure side is high	Sight glass is transparent with liquid refrigerant.	Bubble does not appear easily to sight glass when dripping water on condenser.	Refrigerant overcharge	Discharge refrigerant up to proper amount.
			Liquid level in sight glass does not fall even if about two seconds have passed since A/C OFF.		
		When idling, pressure at high pressure side is high.	There is a spot where hot air enters in front of condenser.	Hot air of condenser outlet air and radiator outlet air flows in front of condenser.	Install packing or rubber sheet to a part where hot air hits.
		----------	----------	Much air contaminates in refrigeration circuit.	Deflate from circuit and fill refrigerant. Replace receiver drier (R/D).
		Ventilation to condenser is bad.	Dirt or blocking in condenser fin.	----------	Wash condenser.
			Air volume of condenser fan is few.	Condenser fan failure.	Replace condenser fan.
No cooling	High pressure is high, and low pressure is low.	Pressure at high pressure side rises immediately after A/C ON. Bubbles appear in sight glass. (High pressure side is uncertain for vehicle with charge valve following R/D.)	----------	Blocking in high-pressure circuit between COMP. and R/D.	Remove blocked foreign object, or replace part.
Insufficient cooling.	Both pressures at high pressure side and low pressure side are low.	Bubbles appear in sight glass.	Oil blots to the piping and parts. Gas detector detects.	Gas leakage from piping joint and parts.	Check joint looseness and re-tighten, or replace part.
		Bubbles appear in sight glass, then it changes transparently.	----------	TXV adjustment failure (reduced too much), or gas leakage in therms sensor tube.	TXV readjustment or replace.

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A/C system trouble phenomenon	Status explanation of A/C system pressure	Phenomenon explanation to consider other factors	Diagnosis result (phenomenon of principal cause)	Possible cause	Measures (specific part name and repair method)
Insufficient cooling.	Both high pressure and low pressure low.	Bubble appears in sight glass, then it changes transparently.	----------	TXV failure (blocking)	Remove blocked foreign object, or replace TXV and R/D.
			Will not get cold when driving continuously, and repeats getting cold after a while. Blow air volume does not change.	Freezing of TXV by contamination of water.	Replace R/D. Deflate from circuit and fill refrigerant.
			No air blow or air volume is few.	Evaporator dirt and blocking.	Wash or replace.
				Air leakage between cooling unit and heater unit.	Seal the joint with repair tape or packing agent.
				Blower electric circuit or blower motor failure.	Check and repair circuit, or replace.
No cooling.	High pressure is low, and low pressure is high.	High-pressure side and low-pressure side will be balanced after stopping compressor.	----------	Compressor discharge failure.	Repair or replace compressor.
Insufficient cooling.	Low pressure is high.	Low-pressure piping is abnormally cold and frosting. (refrigerant returning)	----------	TXV therms sensor tube contacts to piping, or heat insulation failure.	Improve contact of therms sensor part. Correct heat insulation. Replace therms sensor tube fixation clip.
			----------	TXV adjustment failure (raise too much)	Readjust or replace TXV.
Insufficient cooling. (Normal cooling at beginning, and gradually reduce cooling later.)	----------	Blowing air volume changes gradually. When A/C is OFF, and blower is ON, much water is drained from drain hose.	Evaporator is frosting. Thermistor is not cold. If louver blowing temperature gets cold enough, compressor will be OFF tentatively.	Turning OFF temperature of thermostat has lowered.	Check thermistor, thermo amp., and mechanical thermo.

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A/C system trouble phenomenon	Status explanation of A/C system pressure	Phenomenon explanation to consider other factors	Diagnosis result (phenomenon of principal cause)	Possible cause	Measures (specific part name and repair method)
Insufficient cooling. (Normal cooling at beginning, and gradually reduce cooling later.)	----------	Blowing air volume changes gradually. When A/C is OFF, and blower is ON, much water is drained from drain hose.	Evaporator is frosting. Thermistor is not cold. If louver blowing temperature gets cold enough, compressor will be OFF tentatively.	Installation position failure of thermo therms sensor (thermistor and mechanical thermo capillary).	Check that thermo therms sensor is in proper position. Move it to proper position in case of NG.
	----------		Evaporator is frosting. Thermistor is cold. If louver blowing temperature gets cold enough, compressor will not be OFF.	Thermistor or thermo amp. failure (will not turn OFF).	Check thermo system wiring, or replace parts.
	----------	Air volume is small from the beginning.	Evaporator frost formation.	Gas leakage from evaporator case.	Seal with repair tape or packing agent.
	----------			Gas leakage from joint of heater unit and evaporator unit.	Affix packing again.
	----------	Air volume does not decrease.	Freezing of TXV	Water intrusion in circuit.	Deflate from circuit and fill refrigerant.
Insufficient cooling.	Normal	Blowing temperature is high and it does not get cold (refrigeration circuit is normal).	----------	Outside air intrusions to inside, though inside circulation.	Adjust inside and outside air switch dumper.
			----------	Warmed with heater. (Water valve adjustment failure or leakage, and air mix dumper does not close completely.)	Check and adjust water valve and air mix dumper.
			----------	Thermostat operating temperature failure.	Check thermostat. (Check mechanical thermo, thermistor, thermo amp., and thermo VR.)
		Air volume is few and does not get cold, though blowing temperature is cold.	----------	Blocking of evaporator fin.	Wash or replace evaporator.
			----------	Blower motor revolution is slow.	Check and replace blower motor.
				Blocking of blower inhalation vent.	Check and repair.

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11.2 Car air conditioner system diagnosis table II (External causes other than insufficient cooling and abnormal pressure)

Trouble phenomena other than A/C system	Disorder section	Phenomenon explanation to consider other factors	Diagnosis result (phenomenon of principal cause)	Possible cause	Measures (specific part name and repair method)
Water leak is found.	Cooling unit	Leaks at normal operation.	Water leak from cooling case.	Drain hose for blocking, bend, or coming off failure. Delivery valve blocking, bend, coming off, or opening at end. Blocking in outlet under case. Crack under case.	Install drain hose, grommets, and heat insulators appropriately, or replace case and failed components.
Noise sounds.	Inside cabin.	Gas leakage sound is heard.	----------	Gas leakage between evaporator unit and blower motor heater unit.	Seal with packing or packing material.
		Something is heard from blower motor fan relation.	----------	Abnormal sound from motor or bearing.	Replace the one with large sound.
			----------	Foreign object intrusion in fan case.	Remove foreign object.
		Refrigerant gas sound (sound 'Goooo!') is heard.	----------	Gas vibration sound (flow sound or pulse sound)	Remove interference between refrigeration piping and vehicle frame or hood, if there is.
		Something is heard from TXV relation (whistle sound or gas flow sound).	Whistle sound.	----------	Replace parts for the one with large whistle sound.
			Gas flow sound	Gas flow sound may be generated at insufficient refrigerant or at air/refrigerant mixed condition.	Check refrigerant level, and charge refrigerant.
				----------	Gas flow sound is generated somewhat, and check sound level, then replace if it is noisy.
	Engine room side	Sound is generated when compressor and electromagnetic clutch are OFF.	----------	Clutch bearing or idle pulley bearing is failure.	Replace bearing and idle pulley. Longevity will be shortened if belt is over-tensioned.
			----------	Loosening of idle pulley mounting nut.	Re-tighten screw.
		Sound is generated when compressor starts.	----------	Compressor noise failure.	Repair or replace in case of failure.

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Trouble phenomena other than A/C system	Disorder section	Phenomenon explanation to consider other factors	Diagnosis result (phenomenon of principal cause)	Possible cause	Measures (specific part name and repair method)
Noise sounds.	Engine room side	Sound is generated when compressor starts.	----------	Vibration or slip by belt looseness (continuous sound 'Quuuu!'). Screw looseness failure.	Tension belt, replace, or re-tighten screw.
		Sound is generated from radiator fan and condenser fan.	----------	Motor-fan shaft shaking, bearing breakdown, fan damage, or fan/shroud come in contact.	Repair or replace.
		Sound is generated from parts installation section (shaking when touching).	----------	Dropout of fixed bolt, looseness, or damage of brackets.	Tighten appropriately, or replace brackets.
Vehicle overheats easily.	Condenser unit	Condenser is set in front of radiator.	Blocking in condenser fin.	----------	Wash condenser fin.
			Revolution of condenser fan is slow.	Condenser fan failure.	Replace condenser fan motor.
			High-pressure is high. (High pressure is high at idling.)	Same cause as refrigeration circuit system-I. (Hot air flows in condenser.)	Same measures as refrigeration circuit system-I
Vehicle overheats easily.	Vehicle side	Trouble around radiator.	Blocking in radiator fin.		Wash or replace radiator fin.
			----------	Dirt inside radiator. Radiator filler cap failure. Water pump failure. Blocking in water thermo.	Check and replace.
			Radiator coolant is shortage.	----------	Check leakage and replenish, or replace radiator.
			Fan belt and water pump belt are slippage.	----------	Adjust belt tension or replace belts.
			Revolution of radiator cooling fan is slow, or slippage.	Radiator fan failure.	Replace
Engine (revolutions) is overrun.	Vehicle side	Engine revolution adjusting device	----------	Raising idling speed too much or overheat.	Adjust idling speed to a regulated value, and adjust engine. Take measures for overheat.
Smells unpleasant.	Cooling unit	----------	----------	Smoke of Tabaco, dust, and mold, etc. are adhered or deposited to the evaporator fin.	Wash evaporator.

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11.3 Car air conditioner system diagnosis table III (Electrical system)

Operation trouble phenomenon of functional parts	First operation check and confirmation	Second operation check and confirmation	Diagnosis result (phenomenon of principal cause)	Possible cause	Measures (specific part name and repair method)
1) Neither compressor clutch nor blower motor operate.	Check of fuse blowing.	----------	No fuse blowing (normal).	----------	Measures from diagnosis of 2) and 4).
		----------	Fuse blowing.	Short-circuit of compressor clutch or blower motor system wiring.	Repair
2) Only compressor clutch does not suck. (Others are operating.)	Connect battery directly to clutch terminal.	Clutch does not suck.	----------	Clutch failure.	Replace
		Clutch does suck. → Short-circuit both ends of thermo amp. bypass connector, pressure SW, and thermistor.	Clutch does suck.	Either of thermo amp., pressure SW, or thermistor is failure.	Check and replace parts.
			Clutch does not suck. → Check voltage of clutch relay connector.	0 (zero) V → Either of clutch relay signal circuit or vehicle side electronic control amplifier is failure.	Check parts, and repair or replace parts.
			Clutch does not suck. → Check voltage of clutch relay connector.	Approx. 12V → Either of clutch relay or clutch power circuit (disconnection) is failure.	Check parts, and repair or replace parts.
3) Compressor clutch suction does not stop.	Remove thermistor from thermo amp.	Clutch does not suck.	----------	Thermistor failure.	Replace
		Clutch does suck. → Remove thermo amp. power supply connector.	Clutch does not suck.	Thermo amp. failure.	Replace
			Clutch does suck.	Clutch relay contact failure.	Replace
4) Only blower motor does not work.	Connect battery directly to "+" terminal of blower motor.	Blower motor does not work.	----------	Blower motor failure.	Replace
		Blower motor works. → Connect L.M.H of blower switch directly to battery terminal.	Blower motor works.	Blower switch failure.	Replace
			Blower motor does not work.	Blower system cords disconnection.	Repair
				Rresistor failure.	Replace
5) Condenser fan motor does not work.	Connect battery directly to "+" terminal of fan motor.	Fan motor does not work.	----------	Fan motor failure.	Replace
		Fan motor works. → Check voltage of condenser fan relay connector.	0 (zero) V	Signal circuit is open, and thermo amp. failure.	Check parts, and repair or replace parts.
			Approx. 12V	Condenser fan relay contact failure or fan motor power circuit open.	Check parts, and repair or replace parts.
6) Compressor clutch slips.	Check air gap.	----------	----------	Air gap is large.	Adjust air gap.

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Operation trouble phenomenon of functional parts	First operation check and confirmation	Second operation check and confirmation	Diagnosis result (phenomenon of principal cause)	Possible cause	Measures (specific part name and repair method)
6) Compressor clutch slips.	Measure clutch suction voltage.	----------	----------	Clutch suction voltage is low (7V or less).	Repair or replace parts.
	Try to turn compressor shaft manually.	----------	----------	Compressor shaft does not turn smoothly.	Repair or replce parts.

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11.4 Car air conditioner system diagnosis table IV (Electronic thermo system)

Operation trouble phenomenon of functional parts	Guessing of trouble functional parts	Check and confirmation of operational parts	Diagnosis result (Refer to temperature characteristic for thermistor.)	Possible cause	Measures (Thermistor amplifier replacement, and connector repair.)
Compressor clutch stayed ON.	Check thermistor.	Measure resistance of thermistor connector.	Resistance is small. (Abnormal if resistance is about 7kΩ or less.)	Thermistor failure.	Replace thermistor.
			Resistance is about 2kΩ (25℃).	Thermistor is normal.	----------
	Check thermo volume.	Turn OFF thermo volume.	Compressor clutch is turned OFF.	Thermo volume is short-circuited.	Replace thermo volume.
	Check relay contact and thermo amp.	Remove connector of thermistor.	Compressor clutch cannot be turned OFF. (Stayed ON)	Relay contact joining. Thermo amp. failure.	Replace relay or thermo amp.
Compressor clutch stayed OFF.	Check thermistor.	Measure resistance of thermistor connector.	Resistance is about 7kΩ or more.	Thermistor failure.	Replace thermistor.
	Check thermo volume.	Measure resistance of thermo volume terminal.	Resistance is ∞ (infinity).	Thermo volume is disconnected.	Replace thermo volume.
	Check relay contact and thermo amp.	Detach connector of thermistor, and short-circuit thermo amp. side connector.	Compressor clutch cannot be turned ON.	Relay contact joining. Thermo amp. failure.	Replace relay or thermo amp.
Compressor clutch does chattering.	Check thermo switch.	Check conduction in thermo volume terminal.	Tester indicator changes if applying shock to thermo volume.	Contact failure in thermo switch.	Replace thermo switch.
			Tester indicator does not change even if applying shock to thermo volume.	Thermo switch is normal.	----------
	Check thermo amp.	Remove thermistor, and short-circuit thermo amp. side connector.	When applying shock to thermo amp., compressor clutch does chattering.	Soldering failure (or, caulking failure) in thermo amp.	Replace thermo amp.
	Check contact condition in wiring connector.	Twist connectors.	Compressor clutch does chattering.	Connector failure.	Repair connector.
Insufficient cooling. (Clutch works ON and OFF.)	Replaces thermistor with new one.	Gets cold normally.	Thermistor failure.	Deterioration of thermistor.	Replace thermistor.

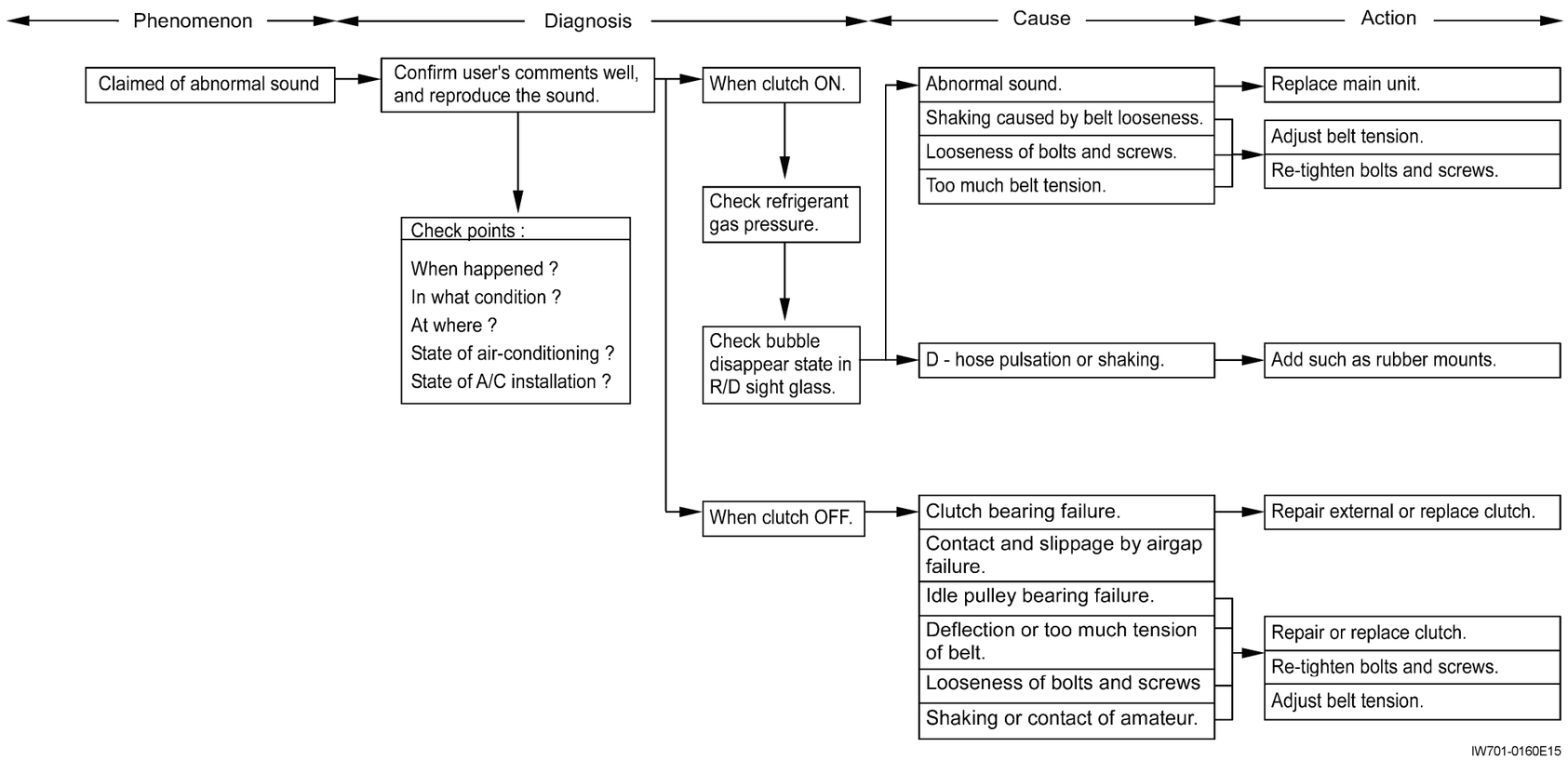
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Operation trouble phenomenon of functional parts	Guessing of trouble functional parts	Check and confirmation of operational parts	Diagnosis result (Refer to temperature characteristic for thermistor.)	Possible cause	Measures (Thermistor amplifier replacement, and connector repair.)
Insufficient cooling. (Clutch works ON and OFF.)	Replaces thermistor with new one.	Insufficient cooling status does not change.	----------	Thermo amp. internal failure.	Replace thermo amp.
	Check installation condition of thermistor.	Positioned correctly.	----------	Thermistor failure.	Replace thermistor.
		Incorrect position or comes off.	----------	----------	Install thermistor in correct position.
Insufficient cooling. (Clutch stayed ON)	Refer to other diagnosis tables. (Excluding the cause of electronic thermo system.)	----------	----------	----------	----------

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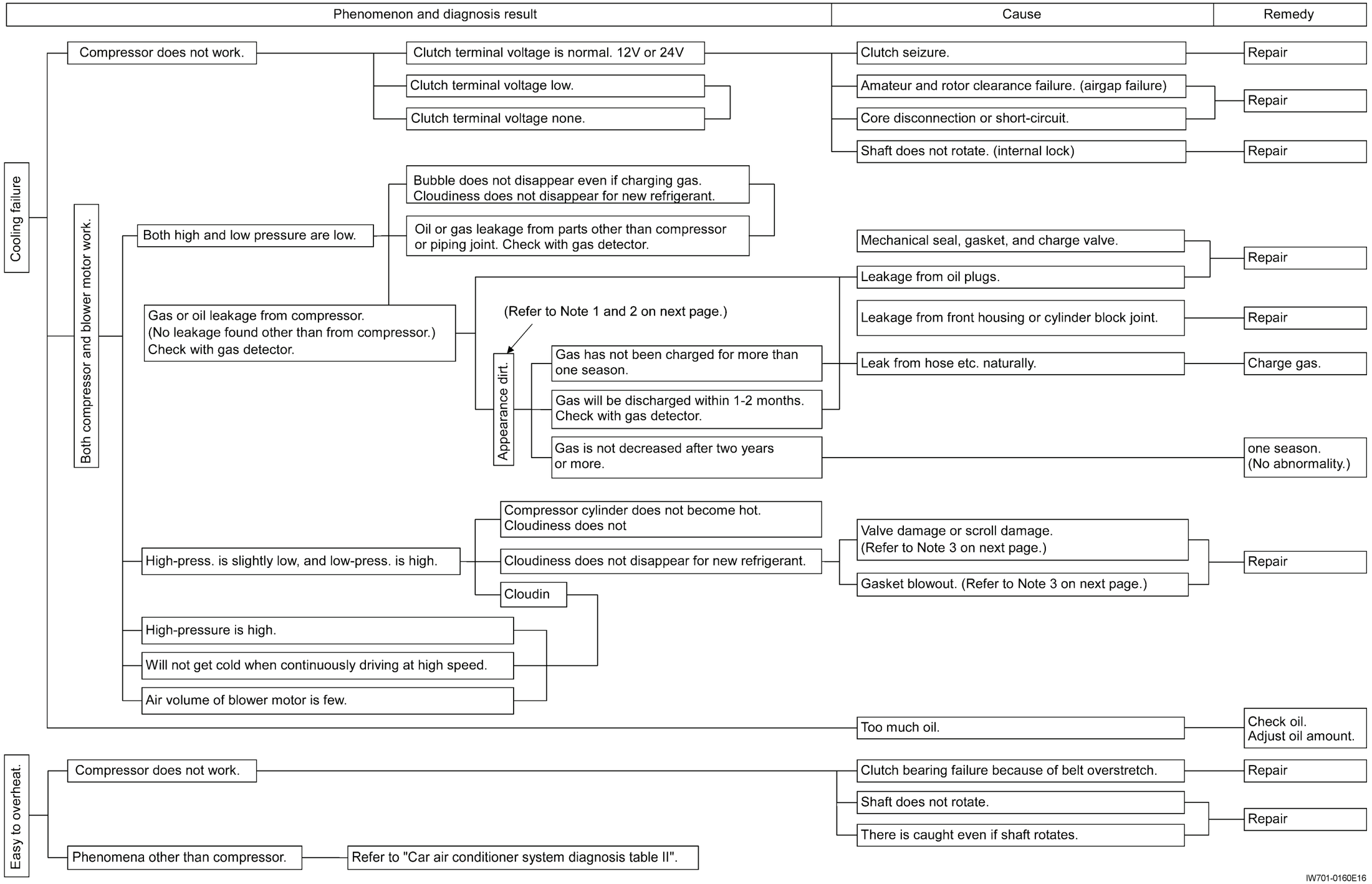
12. Compressor

12.1 Compressor abnormal sound diagnosis chart



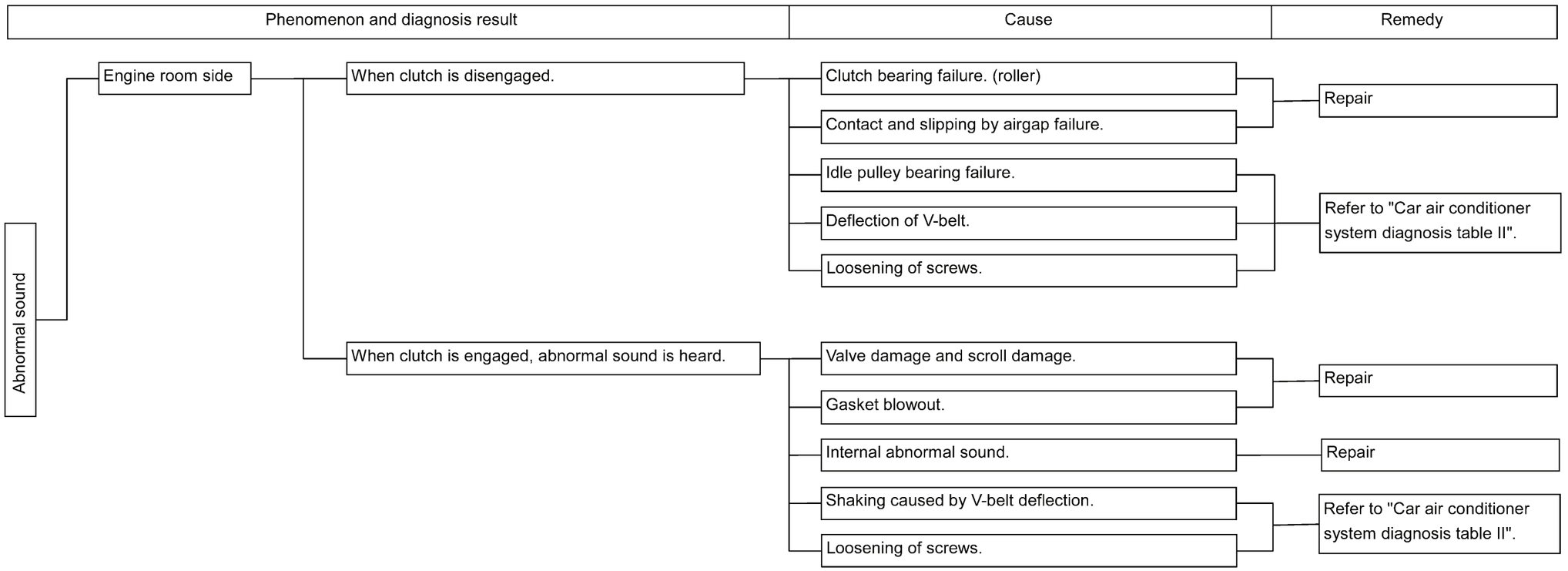
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12.2 Compressor diagnosis chart (1/2)



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Compressor diagnosis chart (2/2)



Note 1. Do not judge dirt around the clutch and gasket to be a leakage.
Some blot of oil will be seen due to the sealing mechanism.
Oil blot will not cause any problem in the mechanism.
Therefore, judge whether it is leakage or oil blot accurately.

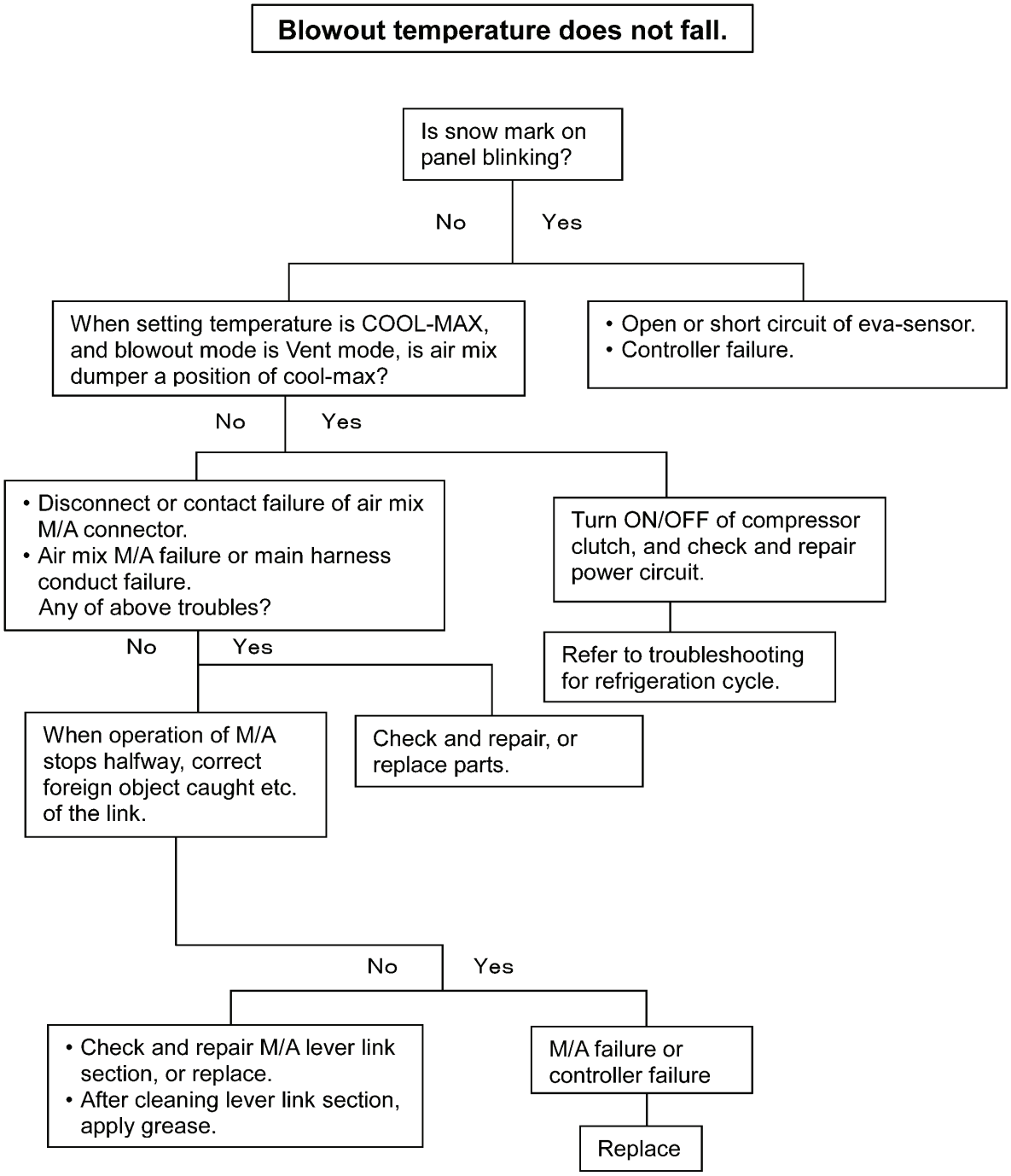
Note 2. Though a natural leakage from rubber hose is occasionally detected
in the high sensitivity range of gas detector according to the condition;
There is no problem when using the standard rubber hose.
(However, a hose failure should be considerable if leaking abnormally much.)

Note 3. When running the compressor for 10-15 minutes in idling, the pressure difference
of high and low pressure will be 490 kpa (71 psi) or less, and the high and low pressure will be balanced
within 10 seconds when the clutch is disengaged.

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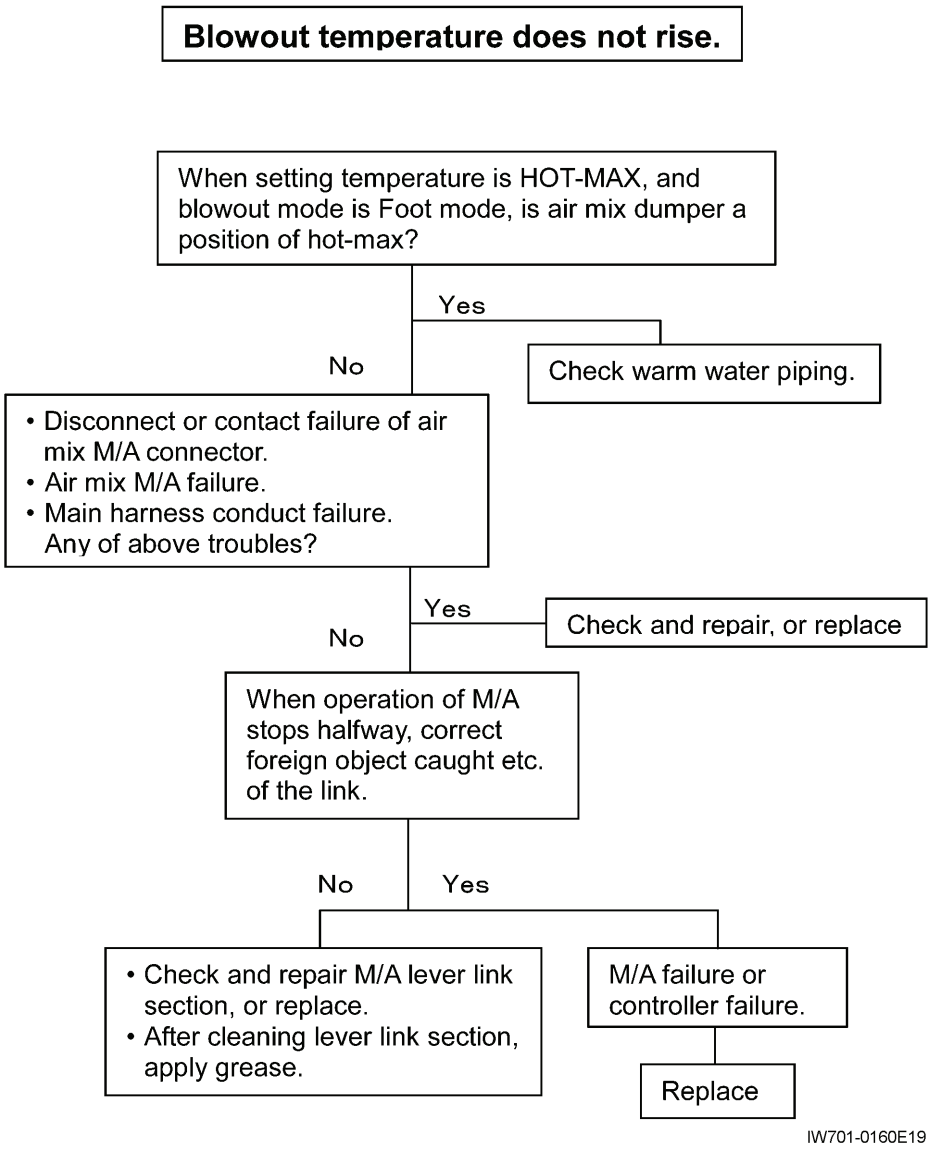
13.Troubleshooting



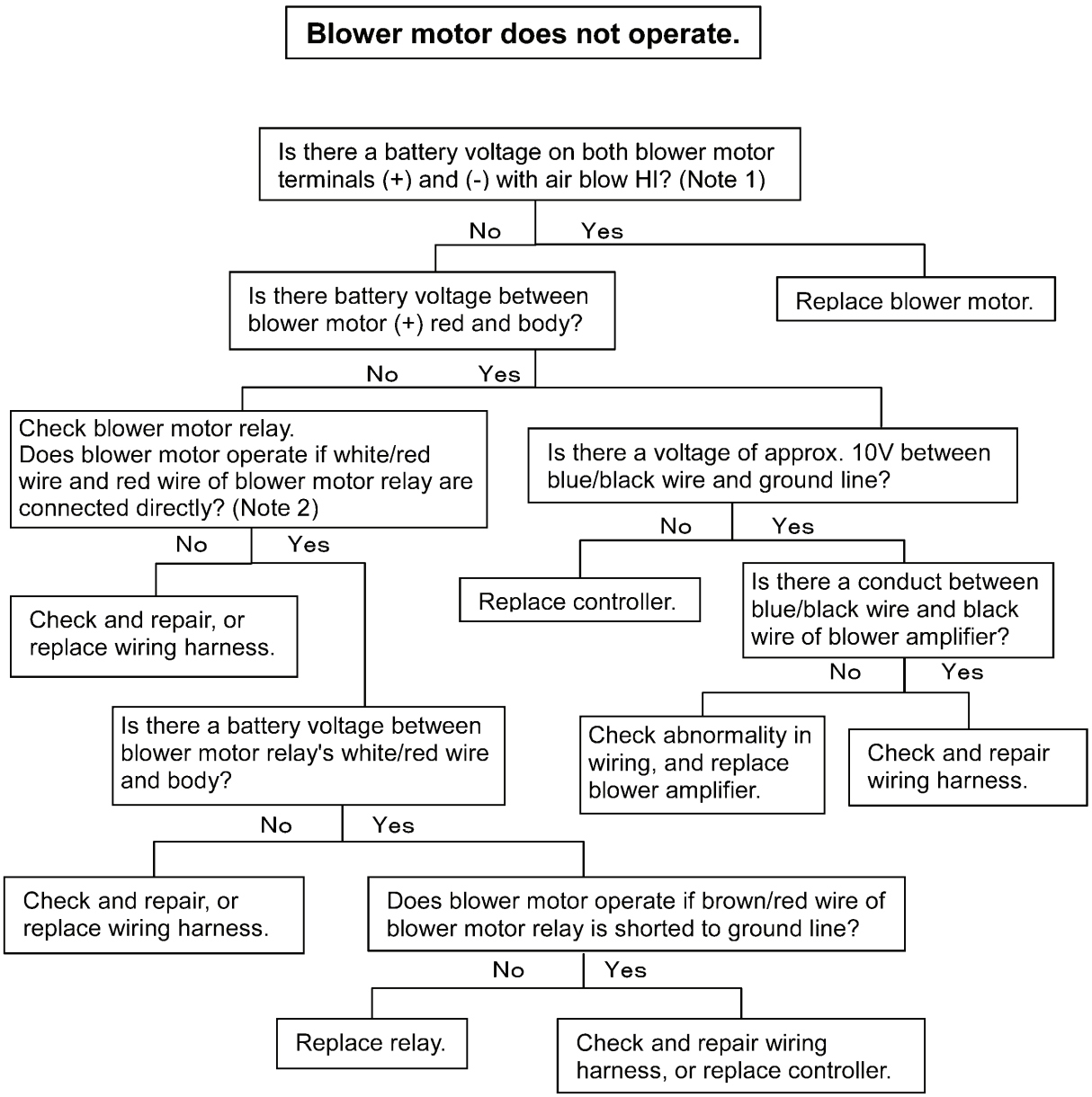
M/A: Motor Actuator

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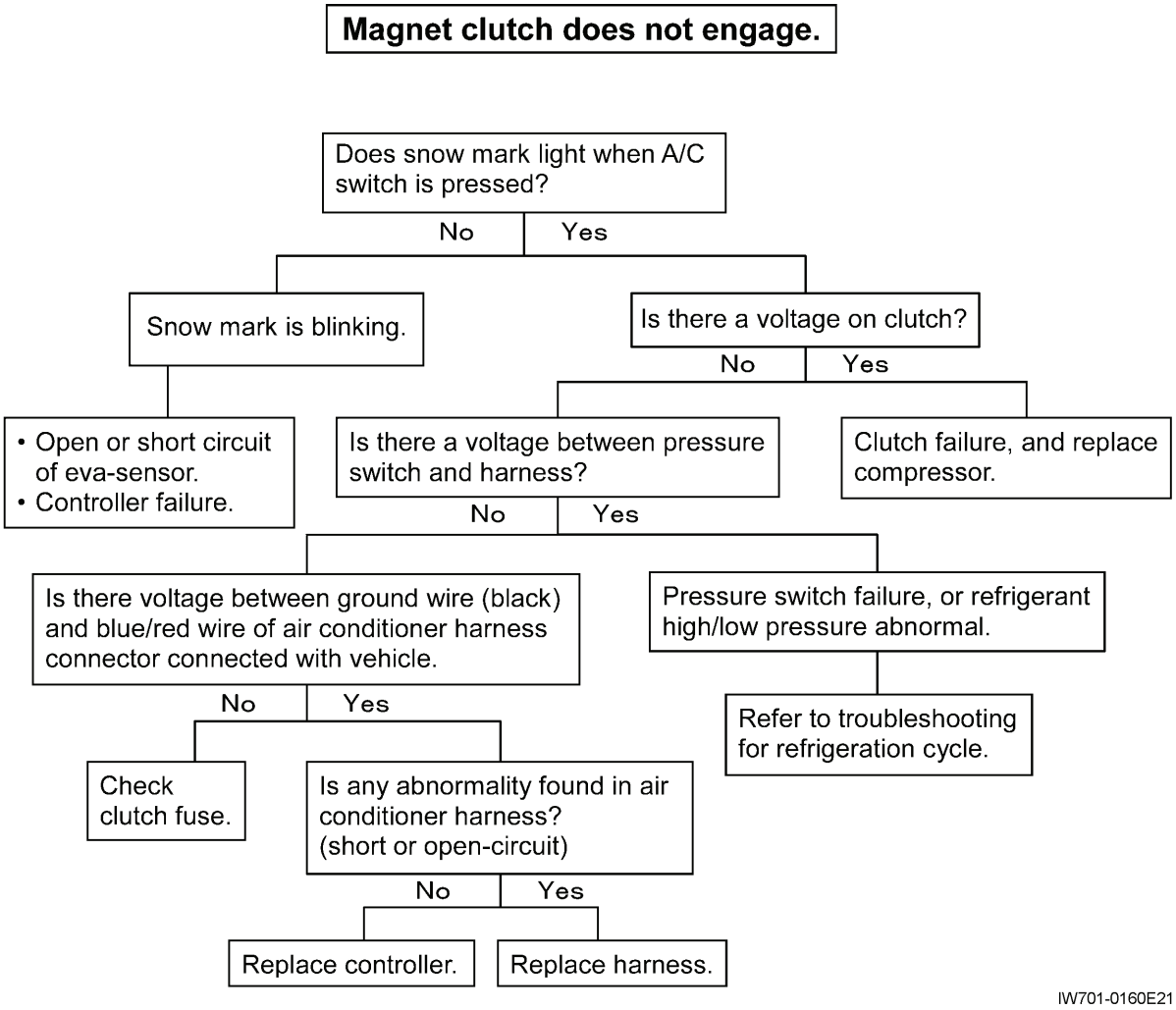
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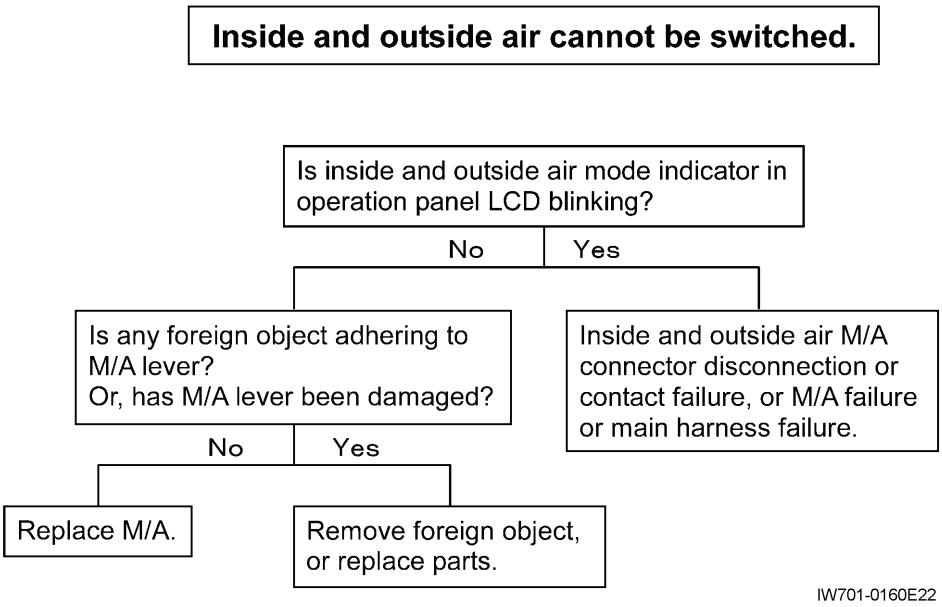
(Note 1) Measure it with connector connected.
(Note 2) Turn OFF the air conditioner, vehicle key switch, and light switch for safety while connecting wires directly.

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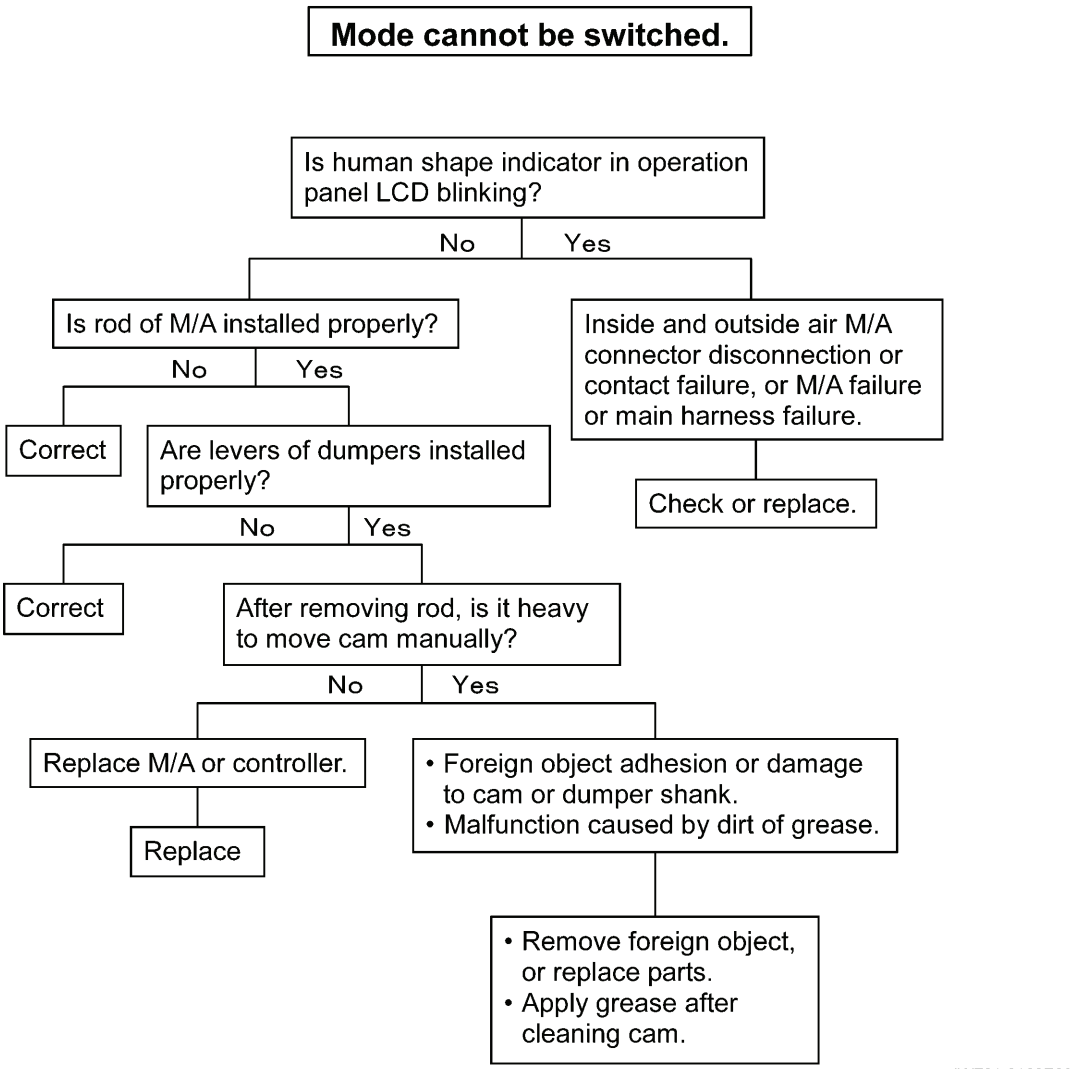
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14.Control table

CONTROL \ INPUT/OUTPUT				Input															Output																						
				Input from Panel															M/A			LCD display on panel																			
				ON/OFF Switch		Temp. UP switch	Temp. DOWN switch	Blowout mode change switch			DEF mode switch	Air blow UP switch	Air blow DOWN switch	In/outside air switch		A/C switch		Eva sensor				Blowout mode				In/outside air mode		Air blow mode				A/C sign	Temp. control display	Relay	
				OFF	ON			VENT	B/L	FOOT				Circulated air	Fresh air	ON	OFF		For air mix	For blowout mode	For inside and outside air mode	FACE	B/L	FOOT	DEF	Circulated air	Fresh air	Lo	M_1	M_2	Hi			For compressor clutch	For water pump
	Initial settings (first power ON)			-	ON	-	-	-	-	-	-	-	-	-	-	-	-	-	COOL MAX	FACE position	Circulated ait position	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF	ON	COOL MAX (display one bar)	—	OFF
Air mix M/A control	COOL→WARM			OFF	Status before turning OFF is held.	ON	OFF	-	-	-	-	-	-	-	-	-	-	-	Operates to WARM	-	-	-	-	-	-	-	-	-	-	-	-	-	Bar increases from left	-	-
	WARM→COOL			OFF		OFF	ON	-	-	-	-	-	-	-	-	-	-	-	Operates to COOL	-	-	-	-	-	-	-	-	-	-	-	-	-	Bar decreases from right	-	-
Blowout mode M/A control	FACE mode			OFF		-	-	ON	OFF	←	←	-	-	-	-	-	-	-	-	FACE pos.	-	ON	OFF	←	←	-	-	-	-	-	-	-	-	-	-
	B/L mode			OFF		-	-	OFF	ON	OFF	←	-	-	-	-	-	-	-	-	B／L pos.	-	OFF	ON	OFF	←	-	-	-	-	-	-	-	-	-	-
	FOOT mode			OFF		-	-	OFF	←	ON	OFF	-	-	-	-	-	-	-	-	FOOT pos.	-	OFF	←	ON	OFF	-	-	-	-	-	-	-	-	-	-
	DEF mode			OFF		-	-	OFF	←	←	ON	-	-	-	-	-	-	-	-	DEF pos.	-	OFF	←	←	ON	-	-	-	-	-	-	-	-	-	-
Inside and outside air M/A control	Circulated air mode			OFF		-	-	-	-	-	-	-	-	ON	OFF	-	-	-	-	-	Circ. air	-	-	-	-	ON	OFF	-	-	-	-	-	-	-	-
	Fresh air mode			OFF		-	-	-	-	-	-	-	-	OFF	ON	-	-	-	-	-	Fresh air	-	-	-	-	OFF	ON	-	-	-	-	-	-	-	-
Blower amplifier control	Lo			OFF		-	-	-	-	-	-	Opera -tes to HI	Opera -tes to LO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ON	OFF	←	←	-	-	-	-
	M_1			OFF		-	-	-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	OFF	ON	OFF	←	-	-	-	-
	M_2			OFF		-	-	-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	OFF	←	ON	OFF	-	-	-	-
	Hi			OFF		-	-	-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	OFF	←	←	ON	-	-	-	-
Compressor clutch control	Thermo operation			OFF		-	-	-	-	-	-	-	-	-	-	ON	OFF	Note1	-	-	-	-	-	-	-	-	-	-	-	-	-	ON	-	Note1	-
	Frost formation detection			OFF		-	-	-	-	-	-	-	-	-	-	ON	OFF	Note2	-	-	-	-	-	-	-	-	-	-	-	-	-	ON	-	Note2	-
	Fretting prevention			OFF		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	OFF	OFF	ON	ON	-	-	Note3	-
Water pump relay control	Bars displayed on LCD are eight.		Water pump relay ON	OFF		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Eight bars display	-	ON
	Bars displayed on LCD are seven or less.		Water pump relay OFF	OFF		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Seven or less bars display	-	OFF
A/C ON signal output	Signal output at A/C ON			OFF		-	-	-	-	-	-	-	-	-	-	ON	OFF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ON	-	ON	-
Abnormal detection and subsequent control	Abnormality of M/A and its I/O circuit	Open circuit detection	Air mix M/A	OFF	ON	-	-	-	-	-	-	-	-	-	-	-	-	-	OFF	-	-	-	-	-	-	-	-	-	-	-	-	-	Blinking of HOT sign	-	-
			Blowout mode M/A	OFF	ON	-	-	-	-	-	-	-	-	-	-	-	-	-	-	OFF	-	Blinking of human character sign				-	-	-	-	-	-	-	-	-	-
			In/outside air mode M/A	OFF	ON	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	OFF	-	-	-	-	Blinking in/outside air		-	-	-	-	-	-	-	-
	Abnormality of sensors and their input circuits	Open or short-circuit detection	Eva sensor	OFF	ON	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Blinking of A/C sign	-	OFF	-
	Abnormality of communication		Between operation panel and control amplifier	OFF	ON	-	-	-	-	-	-	-	-	-	-	-	-	-	OFF	OFF	OFF	-	-	-	-	-	-	-	-	-	-	-	Blinking of bar display "Frame"	OFF	OFF

Note 1. OFF temperature: 4-6℃(39.2-42.8°F), ON temperature: 5.5-8.5℃(41.9-47.3°F)
Note 2. Timer set temperature:6-10℃(42.8-50°F), Timer cancellation temperature:6-12℃(42.8-53.6°F), Count up time: 10±1 minutes, Timer reset temperature: 7-13℃(44.6-55.4°F)
Note 3. When compressor clutch is never turned ON after power ON of vehicle main key, also when compressor clutch is turned ON only once when air blow M2 or higher continues for five minutes. This control is cleared by main key power OFF in the vehicle, and starts the control again by turning it ON. Compressor clutch ON time: 1±0.6 seconds

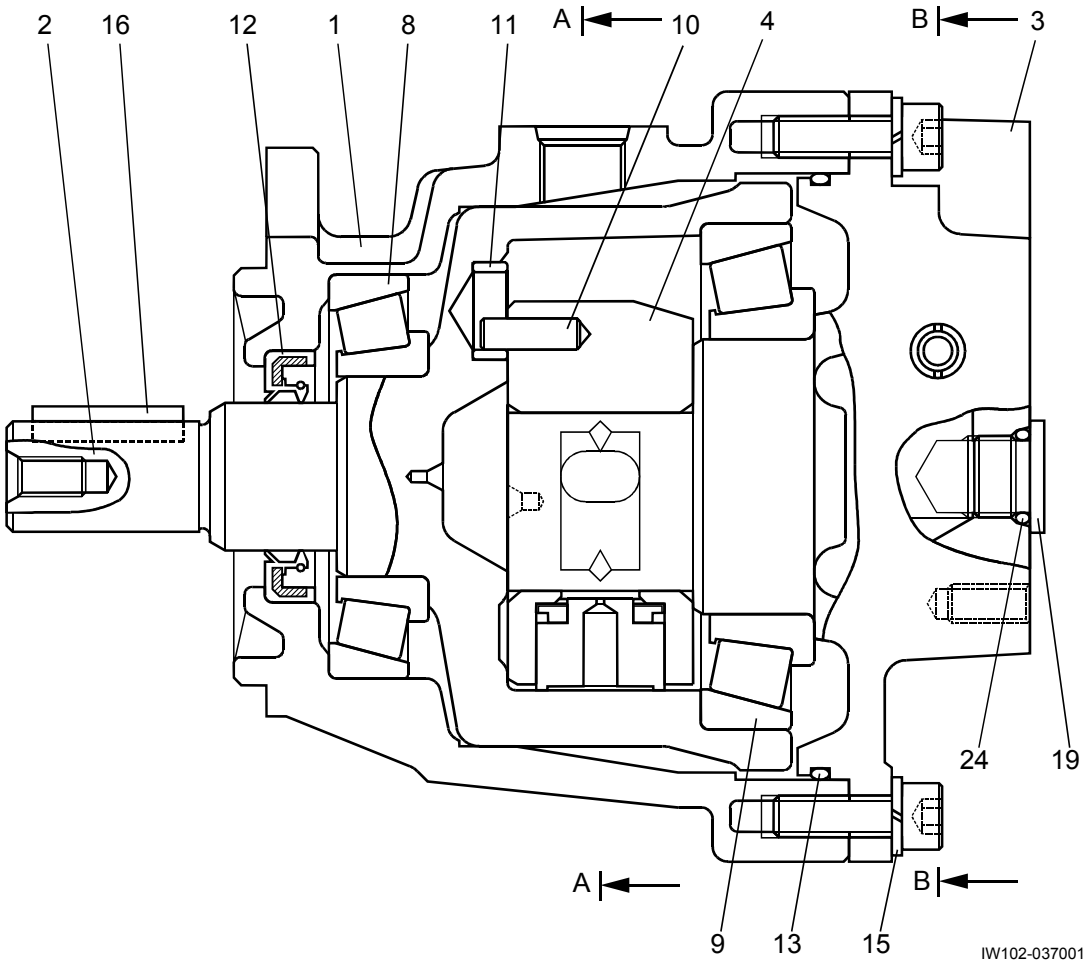
https://truckmanualshub.com/

K-3 Hydraulic Motor (Air Conditioner) (Option)

[NOTICE]

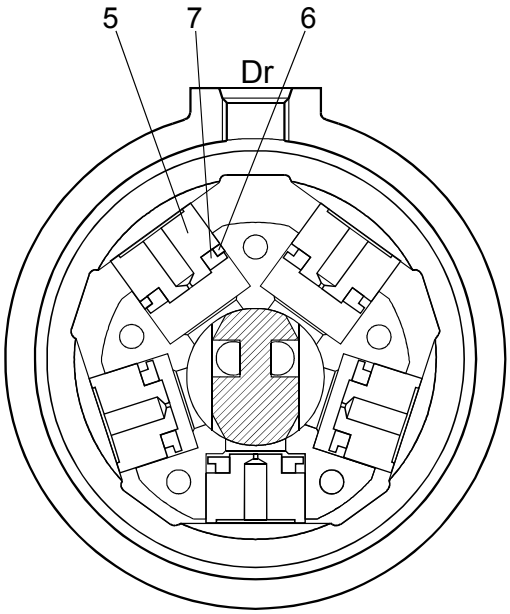
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1. Structure

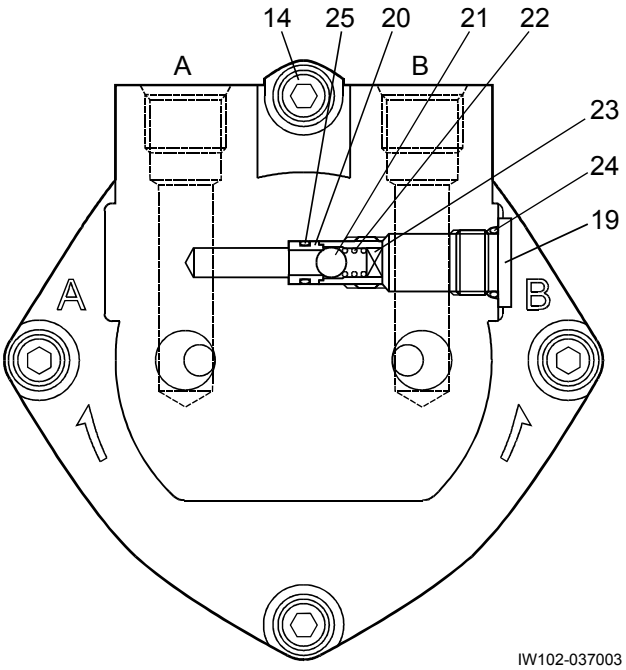


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Hydraulic Motor (Air Conditioner) (Option)



IW102-037002



IW102-037003

1.Casing	8.Tapered roller bearing	15.Spring washer	22.Spring
2.Drive shaft	9.Tapered roller bearing	16.Key (7×7×30)	23.Spring retainer
3.Pintle	10.Timing pin	17….	24.O-ring
4.Cylinder block	11.Timing ring	18….	25.O-ring
5.Piston	12.Oil seal	19.Plug	
6.Piston ring	13.O-ring	20.Seat	
7.Pistonring retainer	14.Hex. socket head bolt	21.Steel ball 5/16	

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366-634-40002 △0
366-634-40001 △0

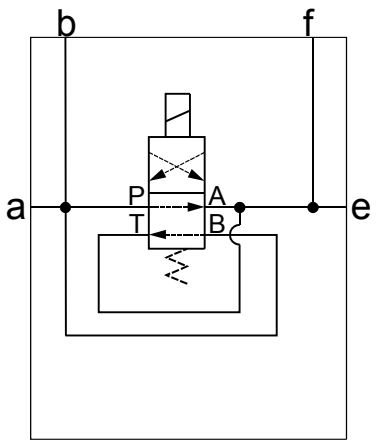
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K-4 Solenoid Valve (Air Conditioner) (Option) (--#546165)

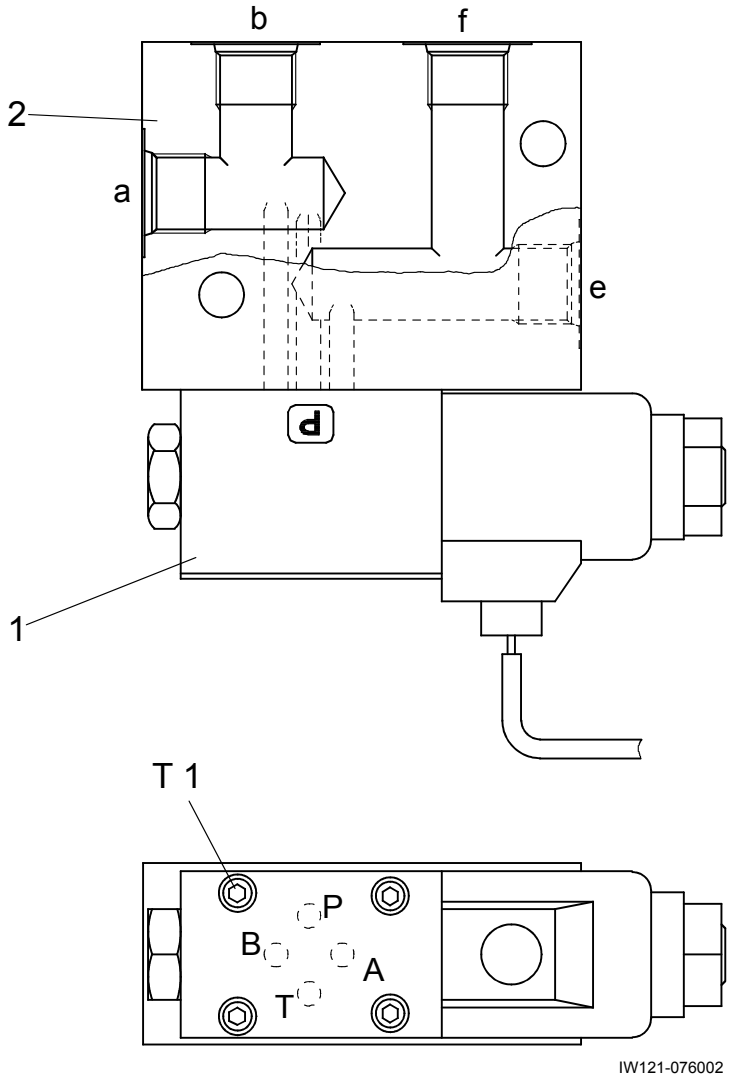
[NOTICE]

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1. Structure



IW121-076001



IW121-076002

1.Solenoid valve assy 2.Body

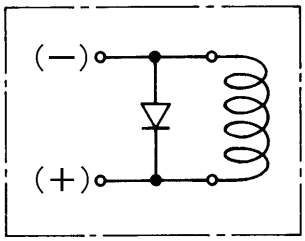
Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
a, b, e, f	G1/2	98	72
T1	M5	7 - 8	5 - 6

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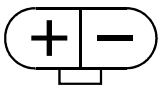
Solenoid Valve (Air Conditioner) (Option) (--#546165)

Solenoid valve assy



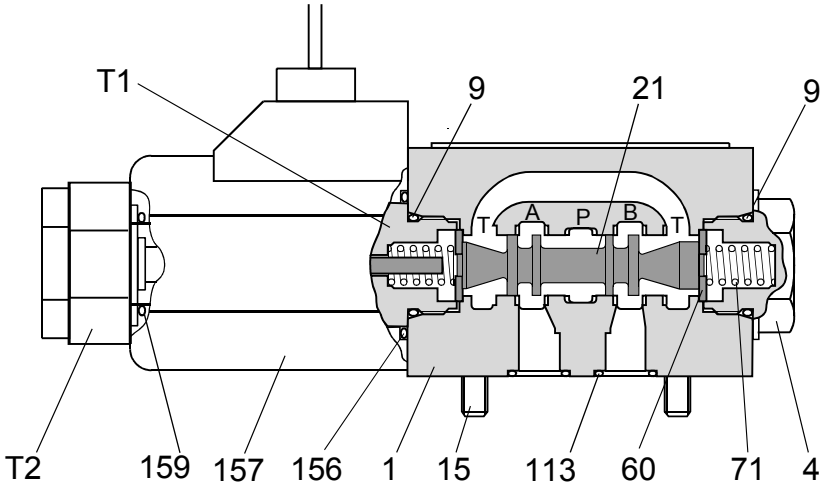
IW121-023002

Connector



(+): Red
(-): Blue

IW121-0542E01



IW121-076003

1.Body	15.Hex. socket head bolt	71.Spring	157.Solenoid (DC24V)
4.Plug	21.Spool	113.Square ring	159.O-ring
9.O-ring	60.Spring seat	156.O-ring	

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
4	-	23 - 28	17 - 21
15	M5	7 - 8	5 - 6
T1	-	38 - 41	28 - 30
T2	-	4 – 5	3 - 4

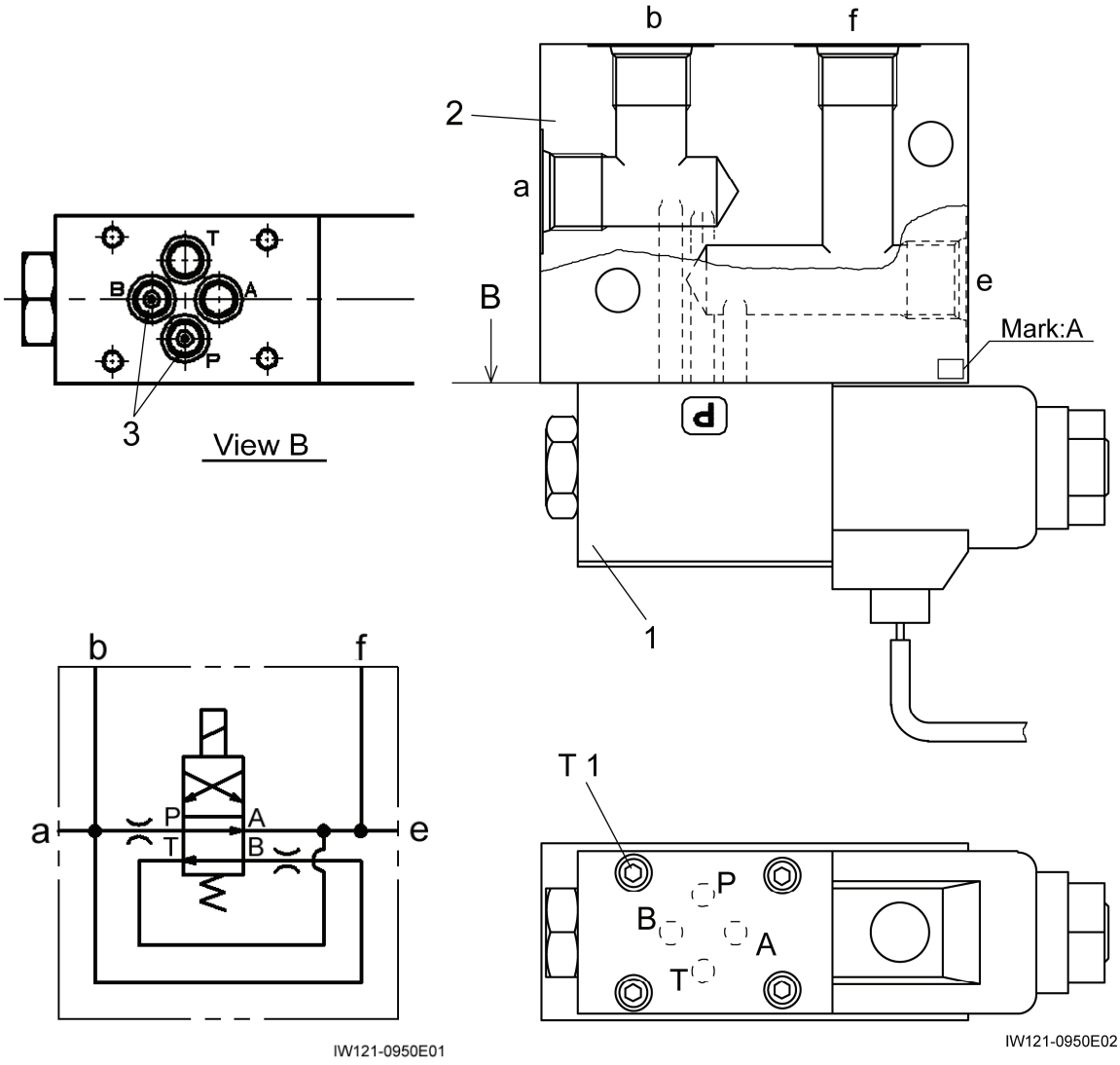
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K-5 Solenoid Valve (Air Conditioner) (Option) (#546166--)

[NOTICE]

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1. Structure



1. Solenoid valve assy 2. Body 3. Orifice

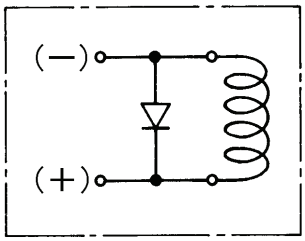
Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
a, b, e, f	G1/2	98	72
T1	M5	7 - 8	5 - 6

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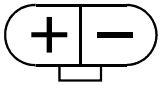
Solenoid Valve (Air Conditioner) (Option) (#546166--)

Solenoid valve assy



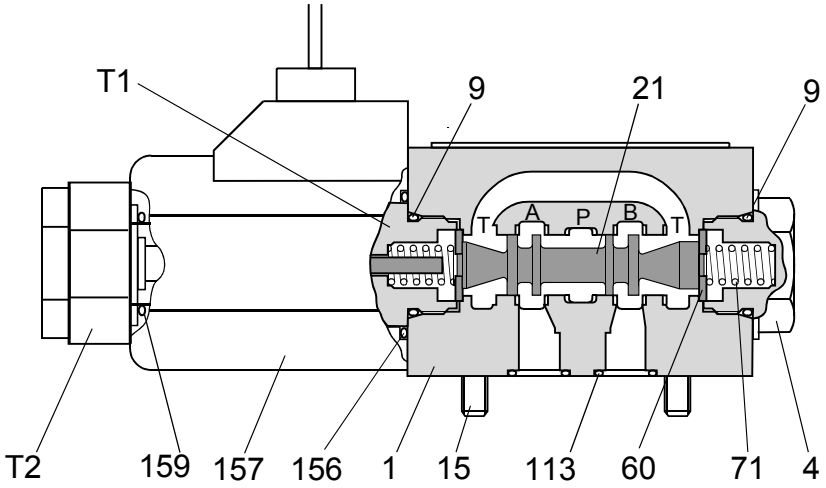
IW121-023002

Connector



(+): Red
(-): Blue

IW121-0542E01



IW121-076003

1.Body	15.Hex. socket head bolt	71.Spring	157.Solenoid (DC24V)
4.Plug	21.Spool	113.Square ring	159.O-ring
9.O-ring	60.Spring seat	156.O-ring	

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
4	-	23 - 28	17 - 21
15	M5	7 - 8	5 - 6
T1	-	38 - 41	28 - 30
T2	-	4 – 5	3 - 4

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L

Control System

Contents

L-1 Control System 1

1. General of hydraulic pilot system..... 1

2. General of pneumatic control devices 2

L-2 Remote Control Valve (Lever)..... 3

1. Structure 3

L-3 Remote Control Valve (Pedal)..... 6

1. Structure 6

L-4 Shuttle Valve (Lever / Pedal)..... 9

1. Structure 9

L-5 Solenoid Valve (Boom Telescoping / Aux. Hoist) 10

1. Structure 10

L-6 Solenoid Control Relief Valve (Elevating Slow Stop)..... 12

1. Structure 12

L-7 Solenoid Valve (Air) 14

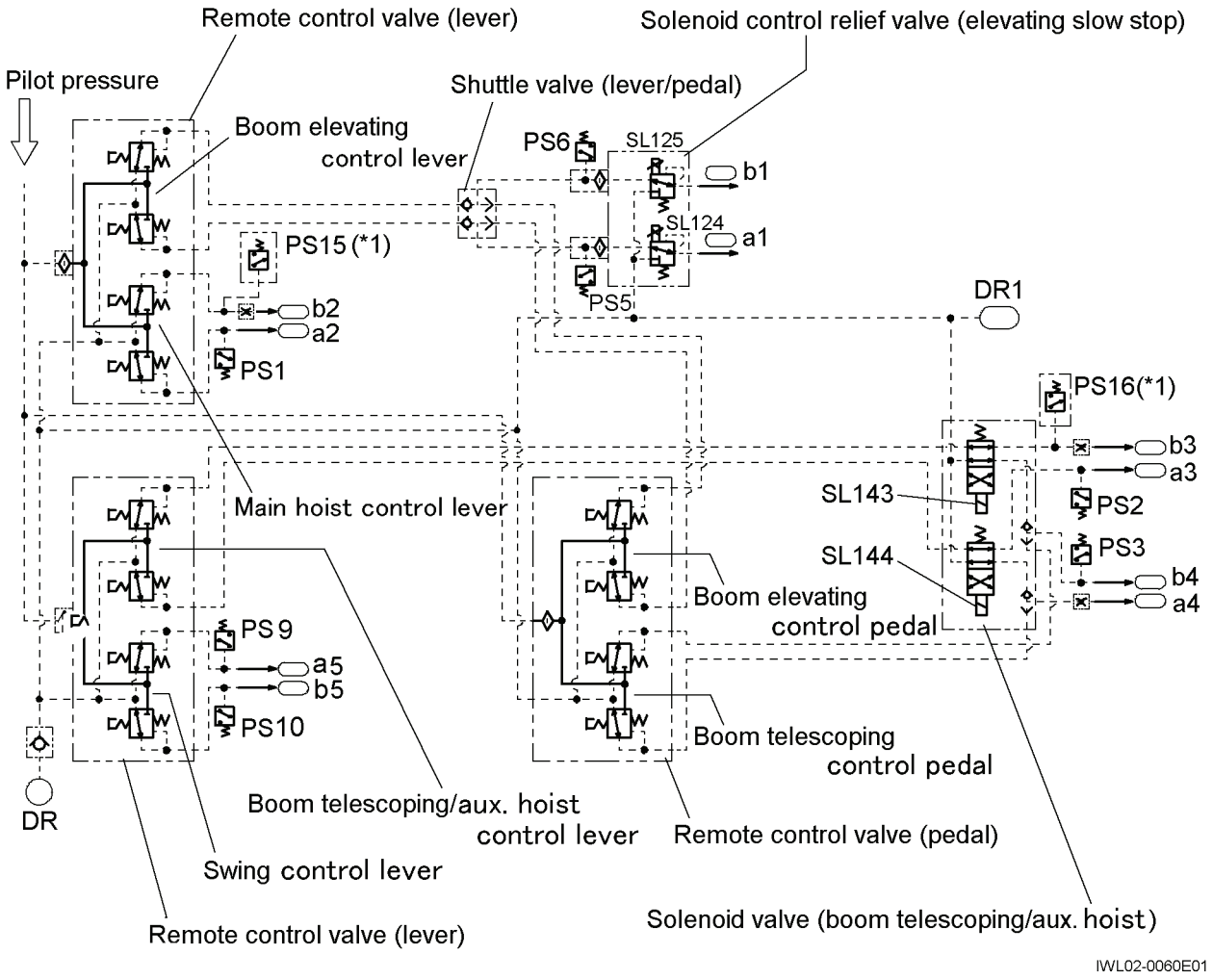
1. Structure 14

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L-1 Control System

1. General of hydraulic pilot system

Hydraulic Pilot Circuit



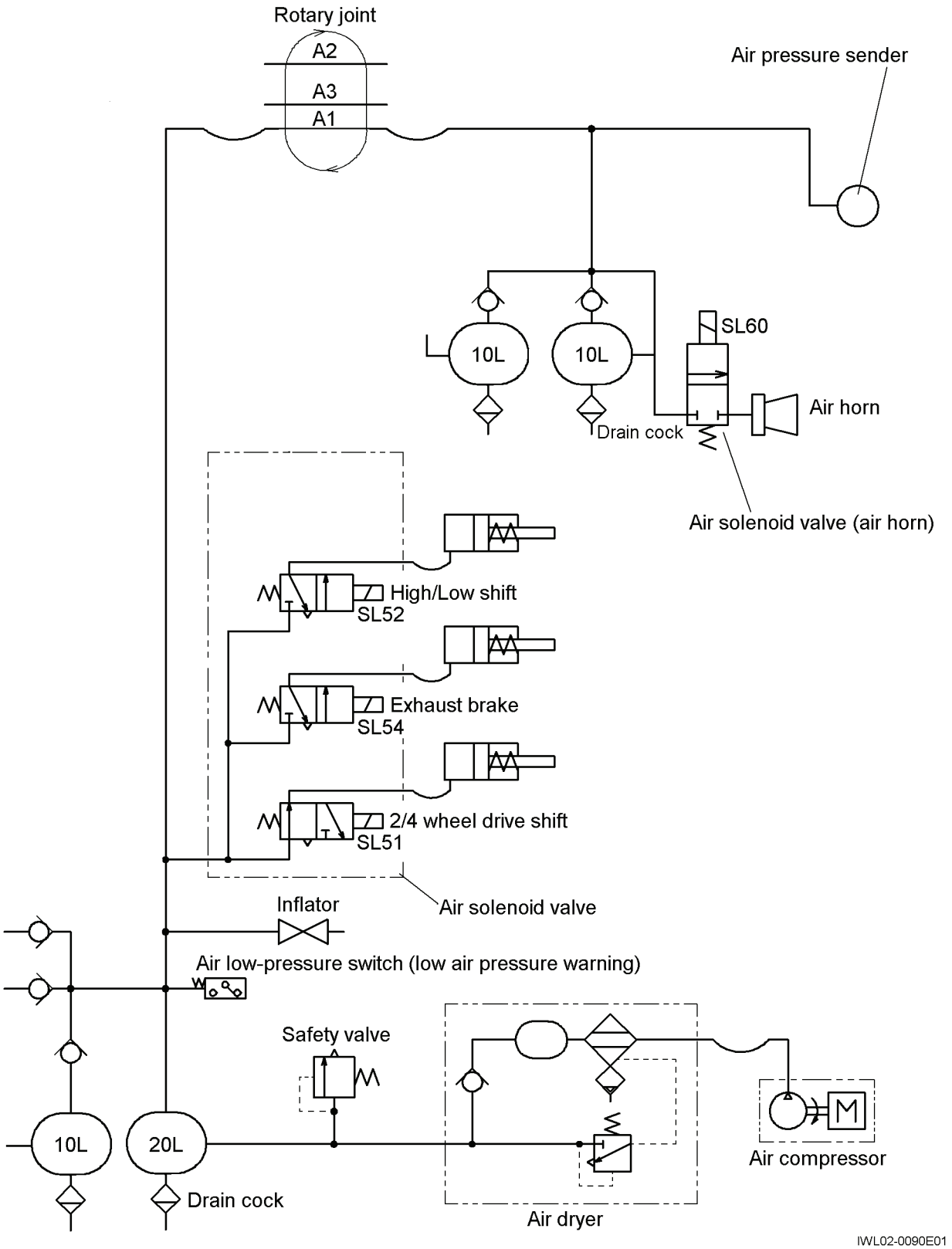
(*1) : application

Europe	Option
Greneral Export	—

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2. General of pneumatic control devices

Pneumatic Circuit



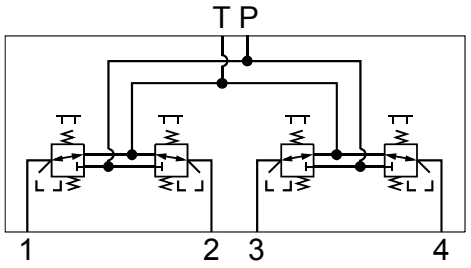
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L-2 Remote Control Valve (Lever)

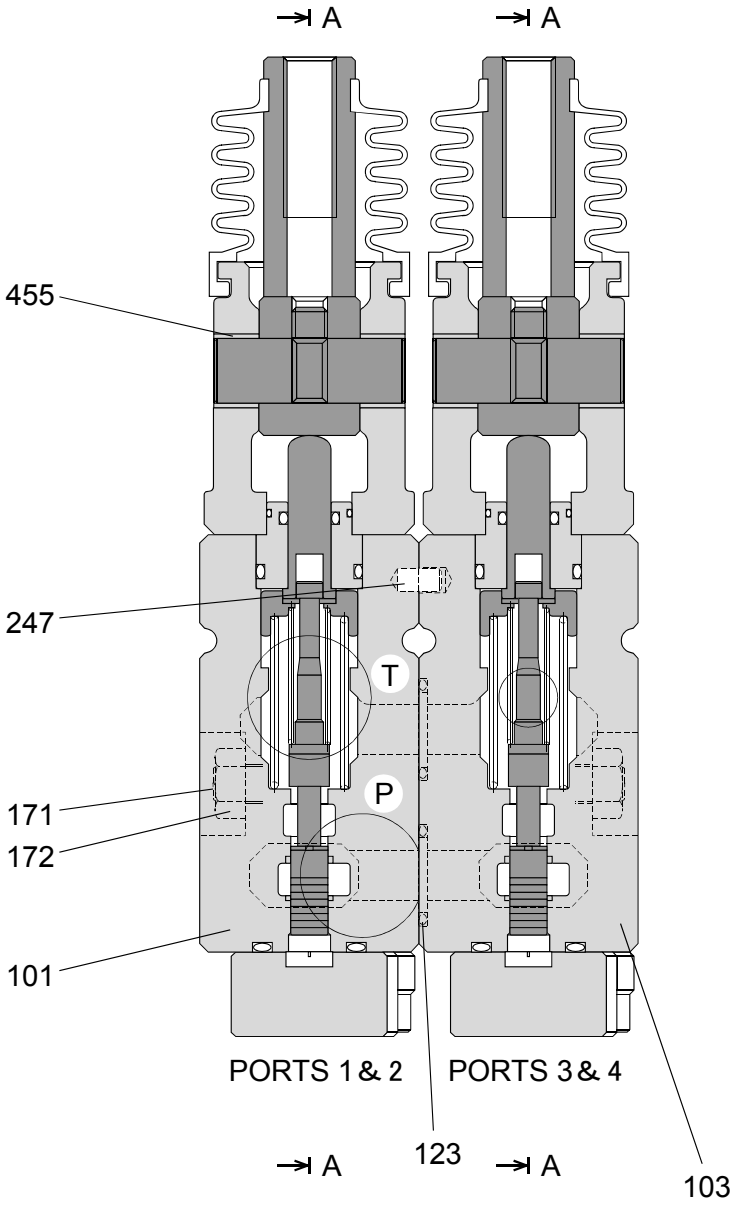
[NOTICE]

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1. Structure



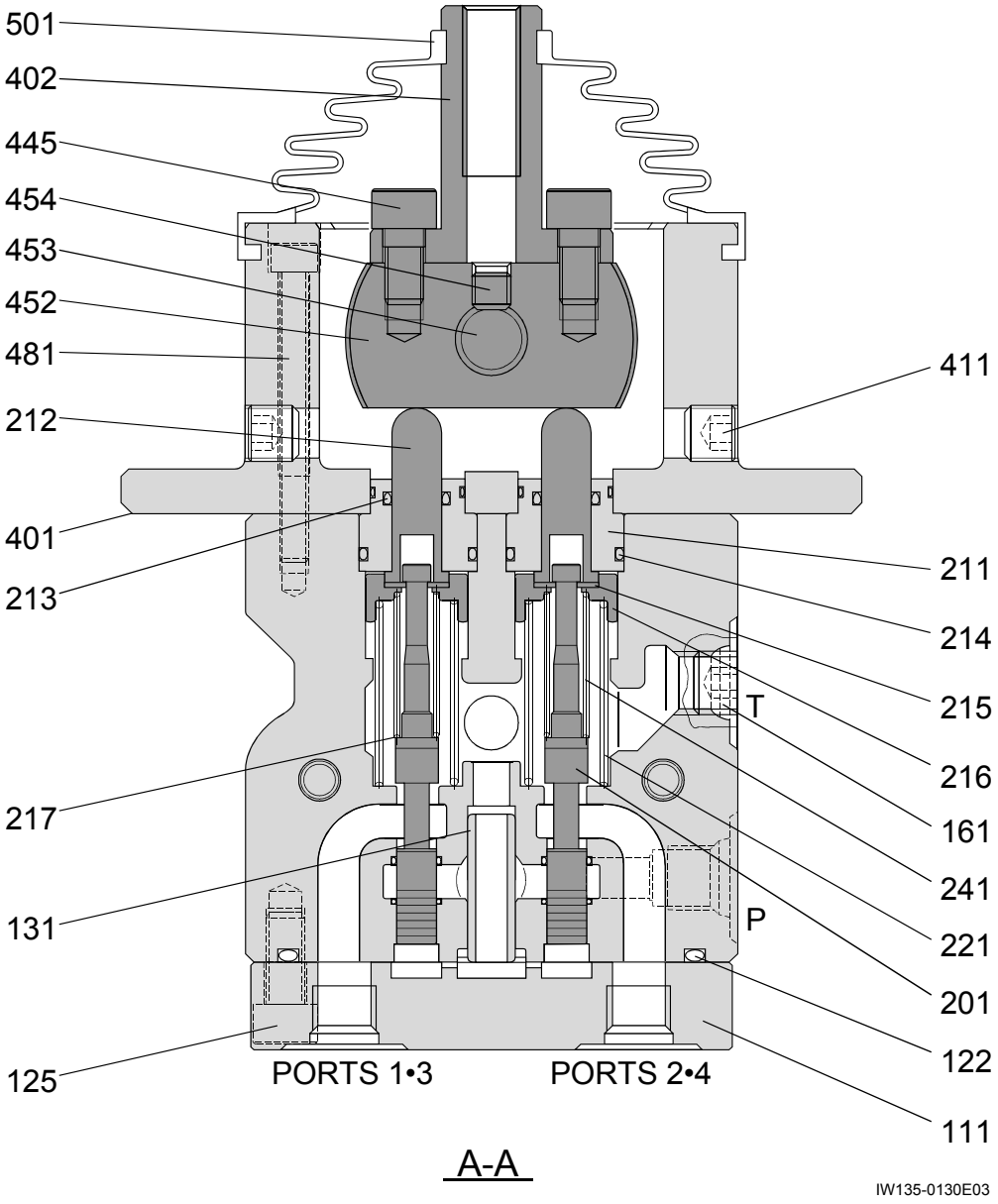
IW135-013001



IW135-0130E02

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Cross section along the line A-A



A-A

IW135-0130E03

101.Casing	171.Bolt	216.Spring seat	445.Hexagon socket head bolt
103.Casing	172.Nut	217.Washer	452.Disc
111.Port plate	201.Spool	221.Spring	453.Cam shaft
122.O-ring	211.Plug	241.Spring	454.Set screw
123.O-ring	212.Push rod	247.Spring pin	455.Bush
125.Hexagon socket head bolt	213.Seal	401.Upper cover	481.Hexagon socket head bolt
131.Bush	214.O-ring	402.Lever	501.Boot
161.Plug	215.Washer	411.Set screw	

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Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
P, T	G1/4	34 - 38	25 - 28
PORTS 1, 2, 3, 4	G1/4	34 - 38	25 - 28
125	M8	27 - 31	20 - 23
161	R1/4	20 - 24	14 - 17
172	M8	16 - 18	12 - 13
411	M12	27 - 31	20 - 23
445	M8	27 - 31	20 - 23
454 *1	M8	16 - 18	12 - 13
481	M6	11 - 13	8 - 9.4
*1: Apply LOCTITE 241 (thread locking agent) to threaded sections.			

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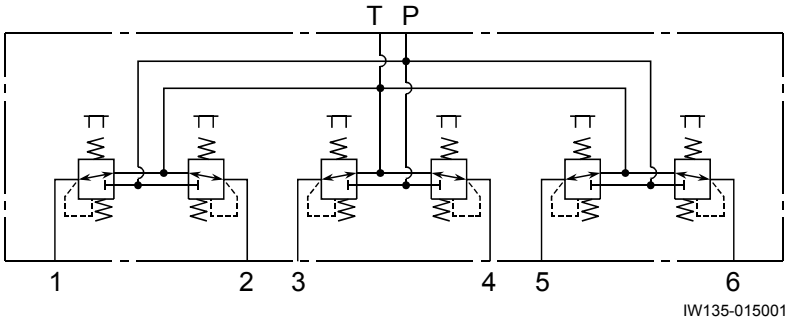
L-3 Remote Control Valve (Pedal)

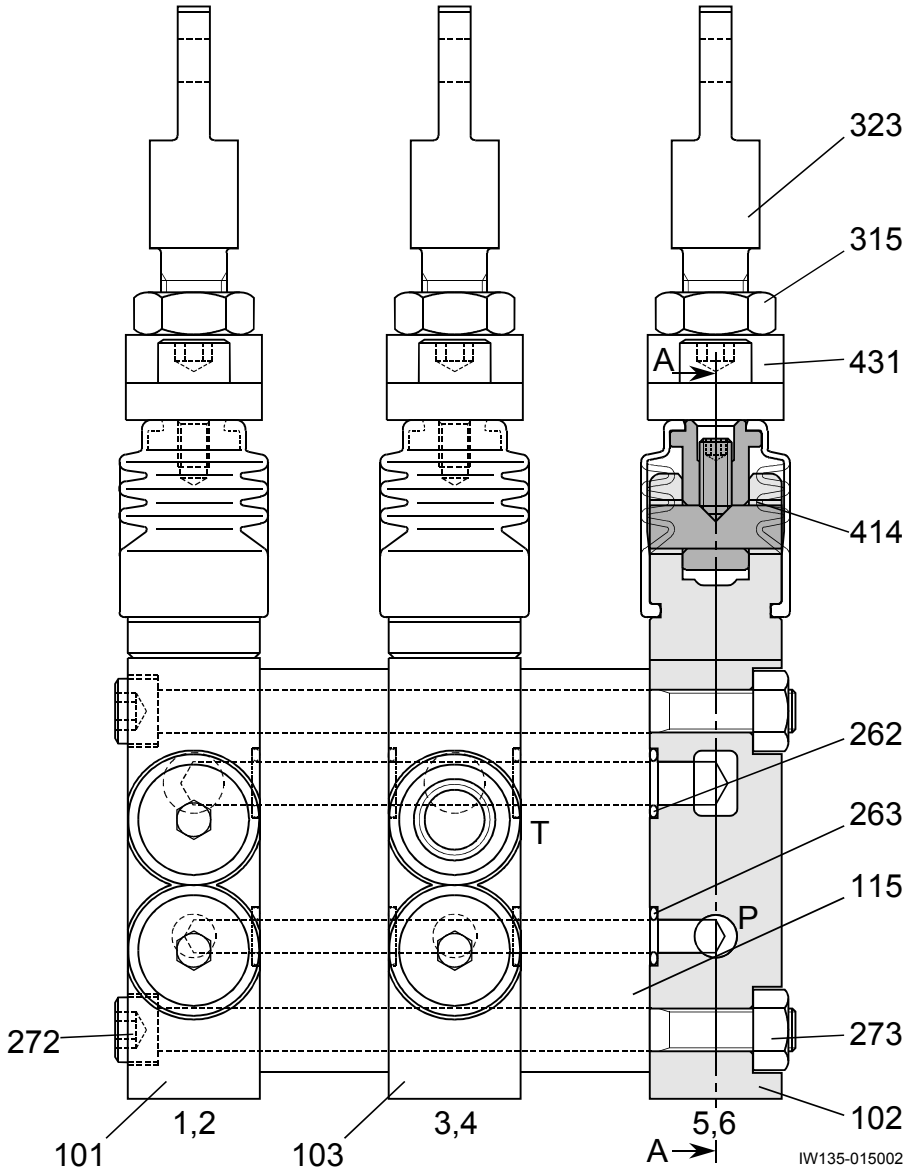
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1. Structure

[NOTICE]
This structure shows the triple-bank valve.
The structure of the double-bank valve is similar to the triple-bank valve.

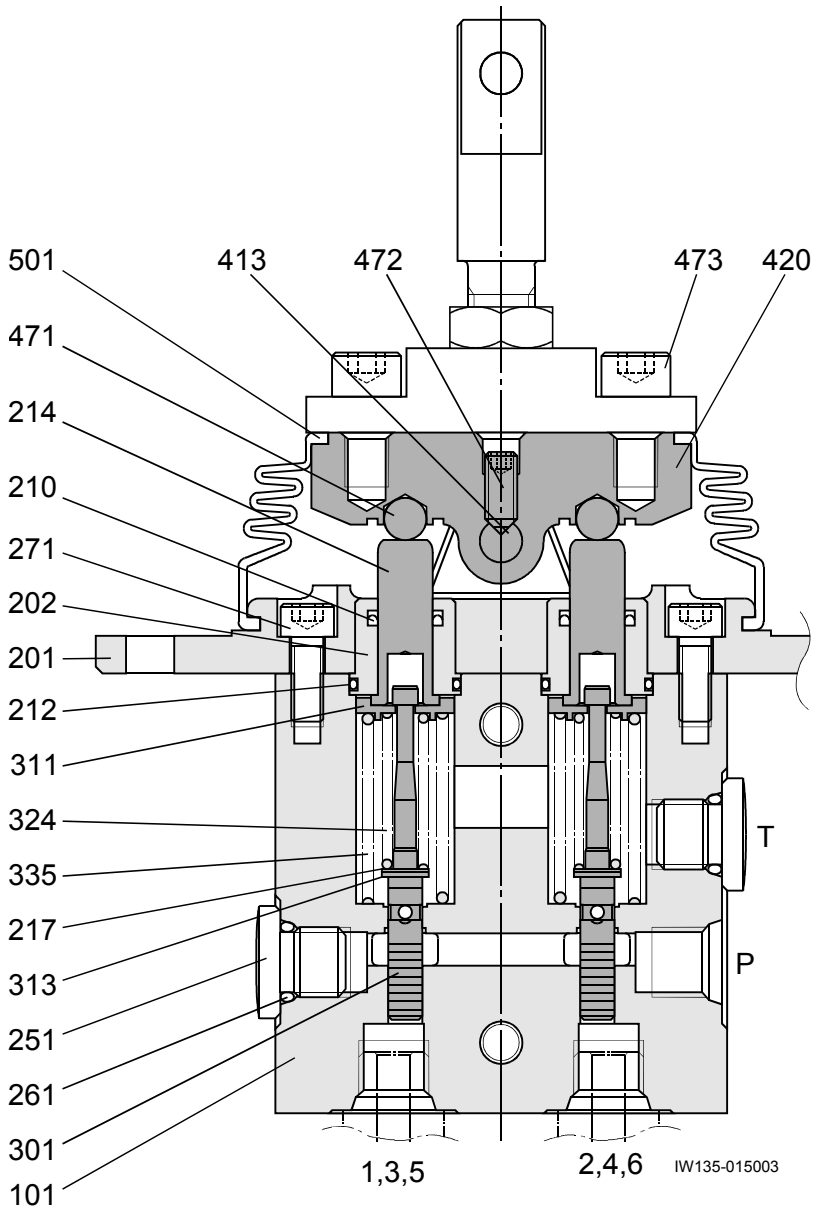




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Remote Control Valve (Pedal)

Section A-A



101.Casing
102.Casing
103.Casing
115.Plate
201.Cover
202.Plug
210.Seal
212.O-ring
214.Push rod
217.Shim
251.RO plug
261.O-ring
262.O-ring
263.O-ring
271.Hexagon Socket head bolt
272.Hexagon Socket head bolt
273.Nut
301.Spool
311.Spring seat
313.Washer
315.lock nut
323.lever
324.Spring
335.Spring
413.Cam shaft
414.Bush
420.Cam
431.Block
471.Ball
472.Set screw
473.Hexagon socket head bolt
501.Boot

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Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
272	M8	19.1 - 22.1	14.1 - 16.3
271	M6	8.7 - 8.9	6.4 - 6.6
251	G1/4	27.4 - 31.4	20.2 - 23.2
315	M12	56.3 - 61.3	41.5 - 45.2
472	M6	5.9 - 7.9	4.4 - 5.8
		Apply LOCTITE 241	
473	M8	15.2 - 18.2	11.2 - 13.4
P, T	G1/4	27.4 - 31.4	20.2 - 23.2
Port 1,2,3,4,5,6	G1/4	27.4 - 31.4	20.2 - 23.2

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366-377-50000 △2

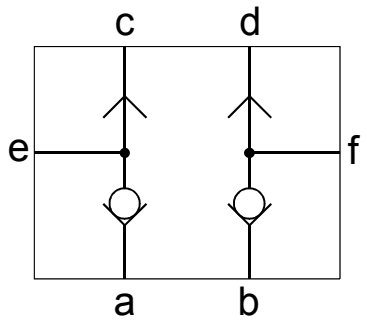
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L-4 Shuttle Valve (Lever / Pedal)

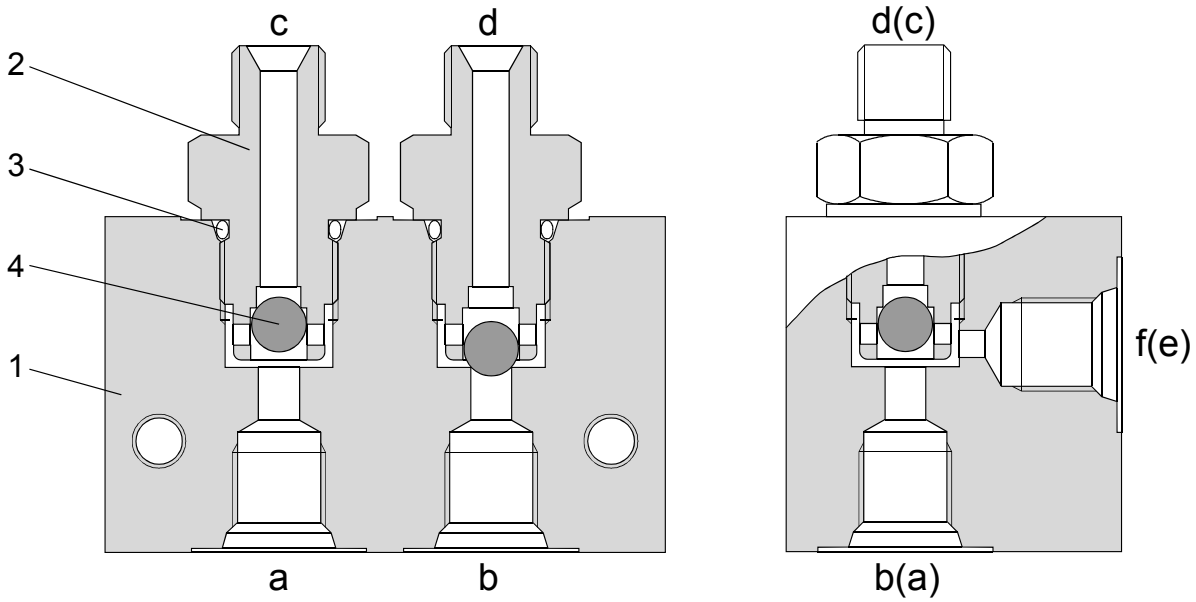
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1. Structure



IW128-011001



IW128-011002

1.Body 2.Joint 3.O-ring 4.Steel ball

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
a, b, e, f	G1/4	29.4	22
c, d	G1/4	24 - 29	18 - 22
2	G3/8	49	36

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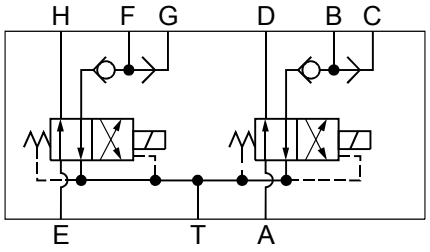
https://truckmanualshub.com/

L-5 Solenoid Valve (Boom Telescoping / Aux. Winch)

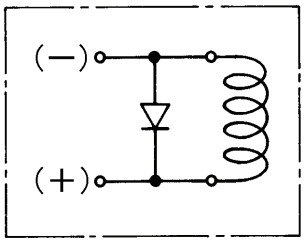
[NOTICE]

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1. Structure

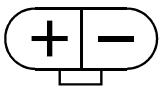


IW121-031001



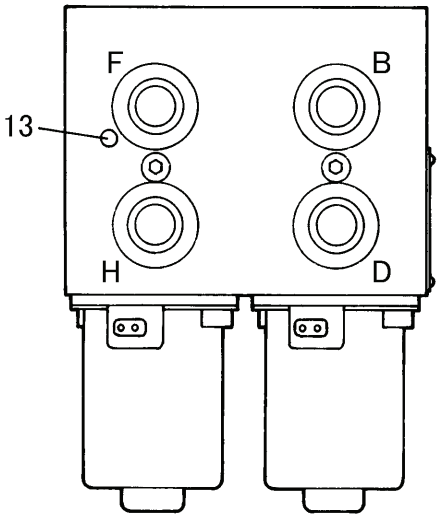
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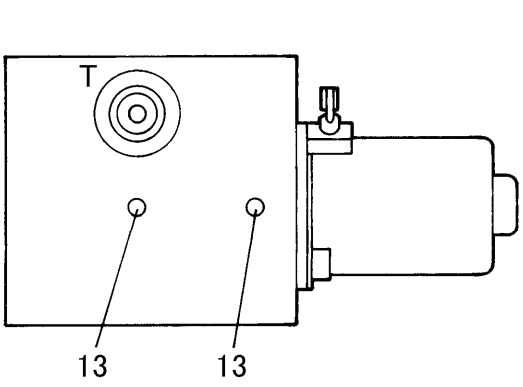
Connector

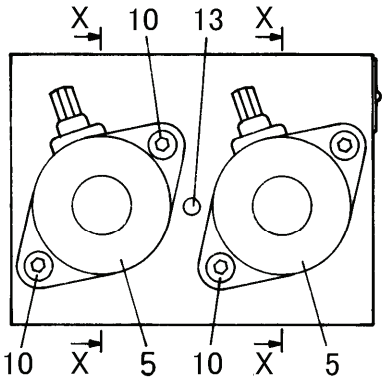


(+): Red
(-): Black

IW121-0542E01





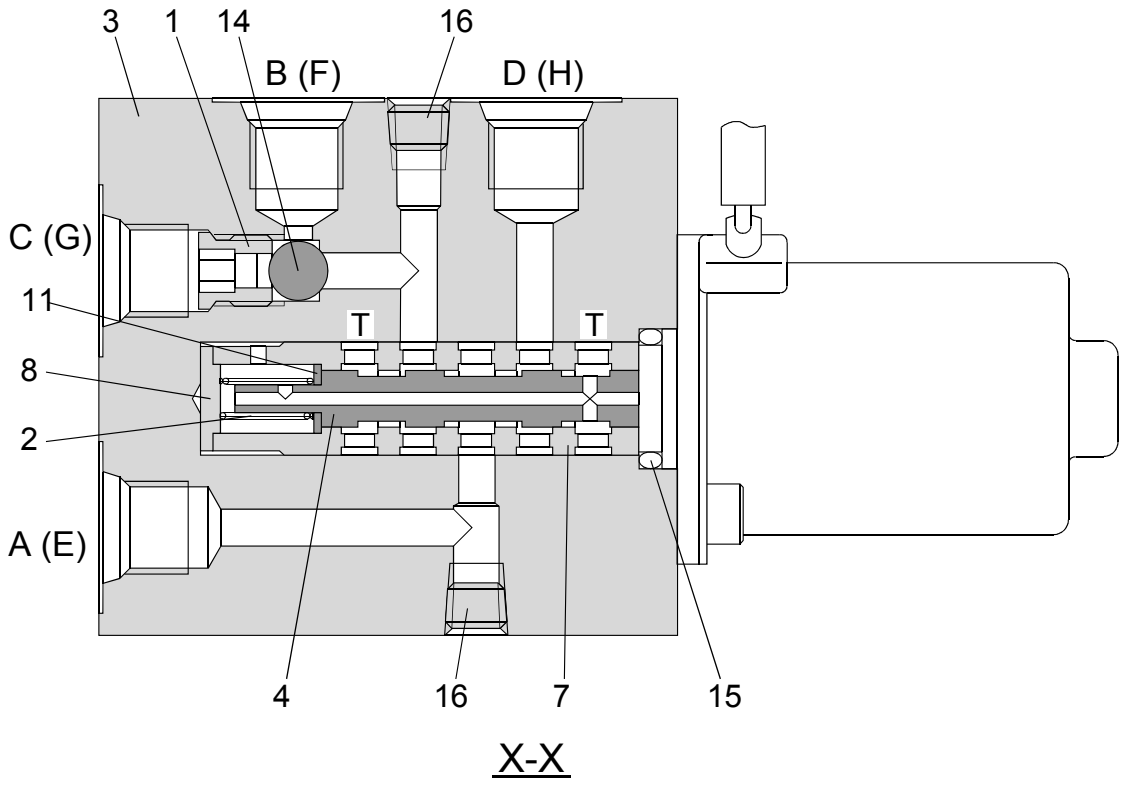


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Solenoid Valve (Boom Telescoping/Aux. Winch)

Cross section along the line X-X



IW121-031003

Note: Apply LOCTITE 262 (thread locking agent) to the threaded section of the seat (1).

1.Seat	5.Solenoid (DC24V)	11.Plain washer	16.Plug
2.Spring	7.Sleeve	13.Steel ball	
3.Body	8.Stopper	14.Steel ball	
4.Spool	10.Hexagon socket head bolt	15.O-ring	

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
A, B, C, D	G1/4	29.4	22
E, F, G, H	G1/4	29.4	22
T	G1/4	29.4	22

366-481-30000 ⚠1

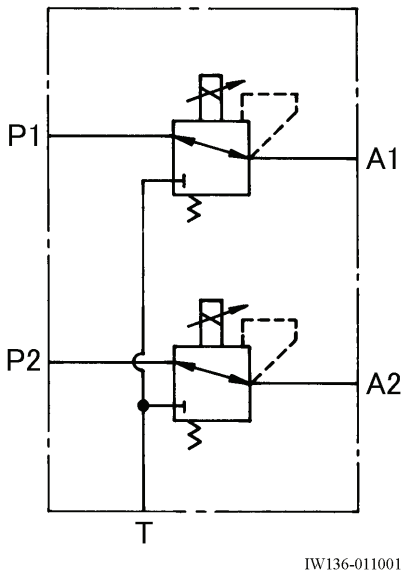
https://truckmanualshub.com/

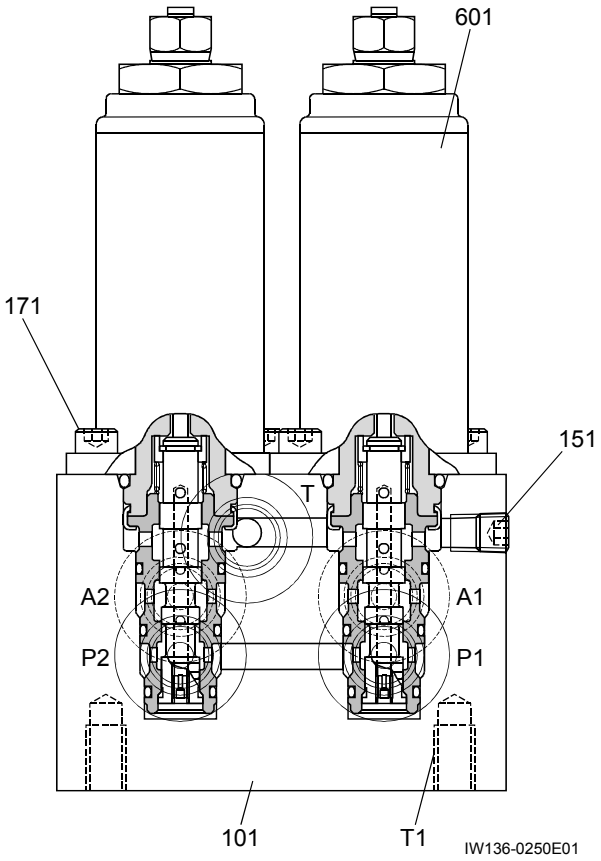
L-6 Solenoid Control Relief Valve (Elevating Slow Stop)

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure





101.Casing
151.Plug
171.Hexagon socket head bolt
601.Proportional reducing valve

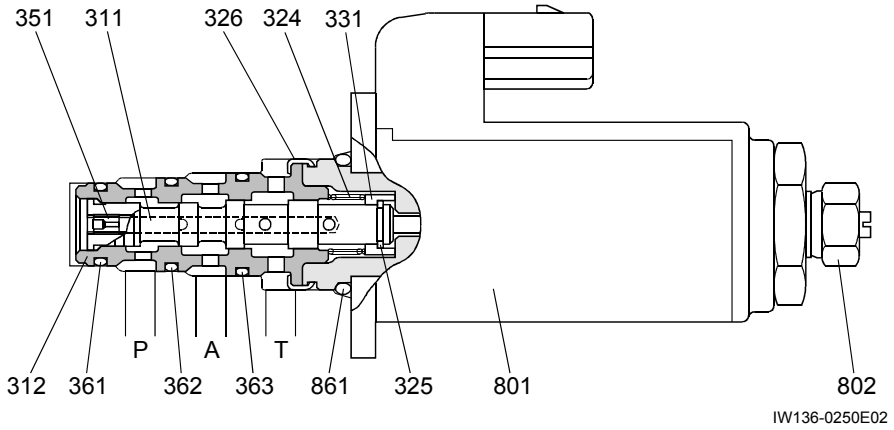
Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
P1, P2, T, A1, A2	G1/4	34 - 38	25 - 28
151	R1/16	6 - 8	4 - 6
171	M5	6 - 8	4 - 6
T1	M8	26 - 32	20 - 24

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Solenoid Control Relief Valve (Elevating Slow Stop)

Proportional Reducing Valve



311.Spool
312.Sleeve
324.Spring
325.C-ring
326.Retaining ring
331.Spring seat
351.Orifice
361.O-ring
362.O-ring
363.O-ring
801.Proportional reducing valve
802.Seal nut
861.O-ring

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
351	M3	0.5 - 0.7	0.37 - 0.52
802	M6	6.9 - 7.9	5.1 – 5.8

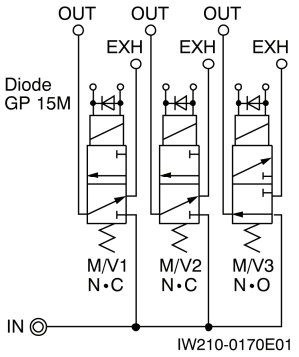
https://truckmanualshub.com/

L-7 Solenoid Valve (Air)

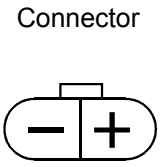
[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

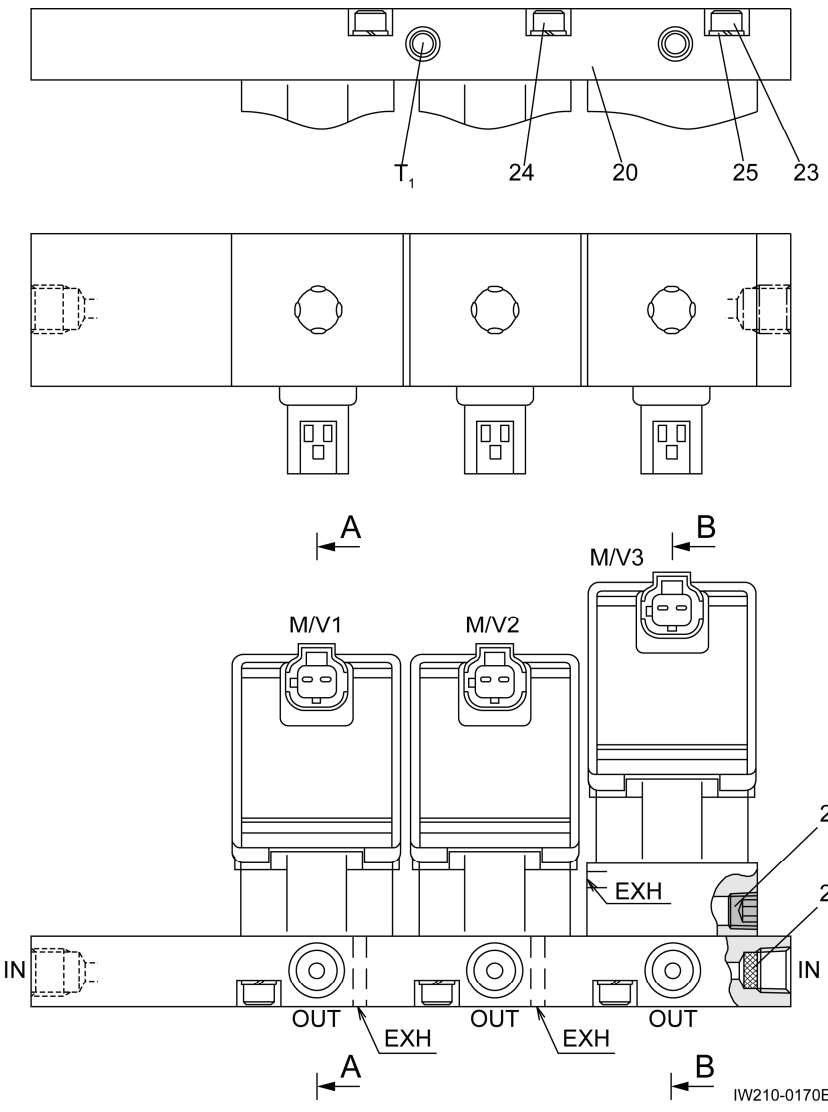
1. Structure



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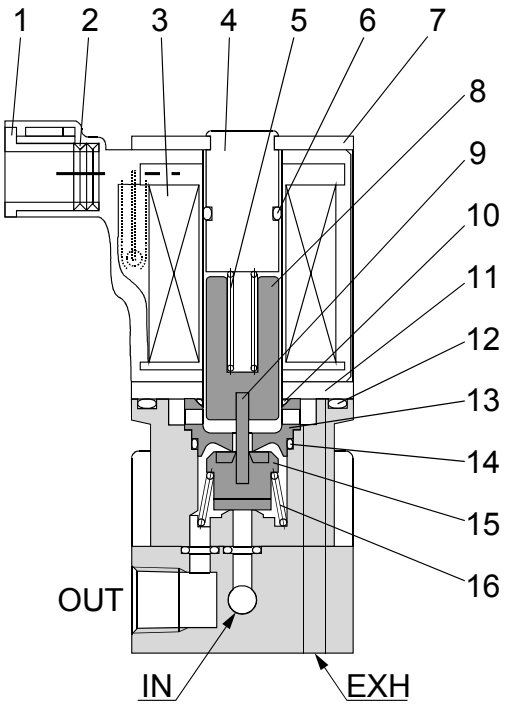
IW210-0151E01



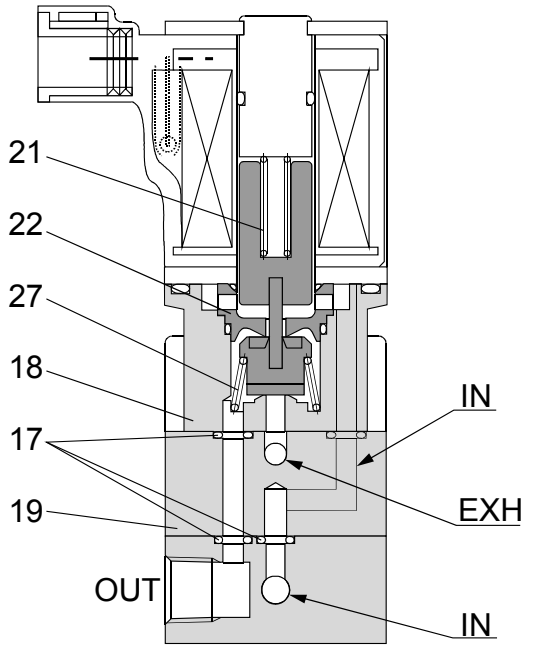
IW210-0170E02

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Solenoid Valve (Air)



IW210-0170E03



IW210-0170E04

1.Packing holder	8.Plunger	15.Valve	22.Valve seat
2.Packing	9.Rod	16.Spring	23.Bolt
3.Coil assy (DC24V)	10.O-ring	17.O-ring	24.Bolt
4.Core	11.Coil cover	18.Body	25.Spring washer
5.Spring	12.O-ring	19.Body	26.Filter
6.O-ring	13.Valve seat	20.Housing	27.Spring
7.Case	14.O-ring	21.Spring	28.Plug

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
IN, OUT	Rc1/4	15 - 29	11 - 22
23	-	2 - 3	1.5 - 2.0
T1	M8x1.25	8 - 12	6 - 9

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S

Steering System

Contents

S-1 Steering System 1

1. General 1

S-2 Priority Valve 2

1. Structure 2

2. Function 2

3. Principle of operation 3
   - 3.1 Neutral state 3
   - 3.2 Right steering 3
   - 3.3 Right steering to the end 3

S-3 Orbitrol 4

1. Structure 4

2. Function 7

S-4 Steering Cylinder 8

1. Structure 8

S-5 Solenoid Valve (Steering Mode) 9

1. Structure 9

S-6 Pilot Check Valve (Rear Steering Cylinder Lock) 12

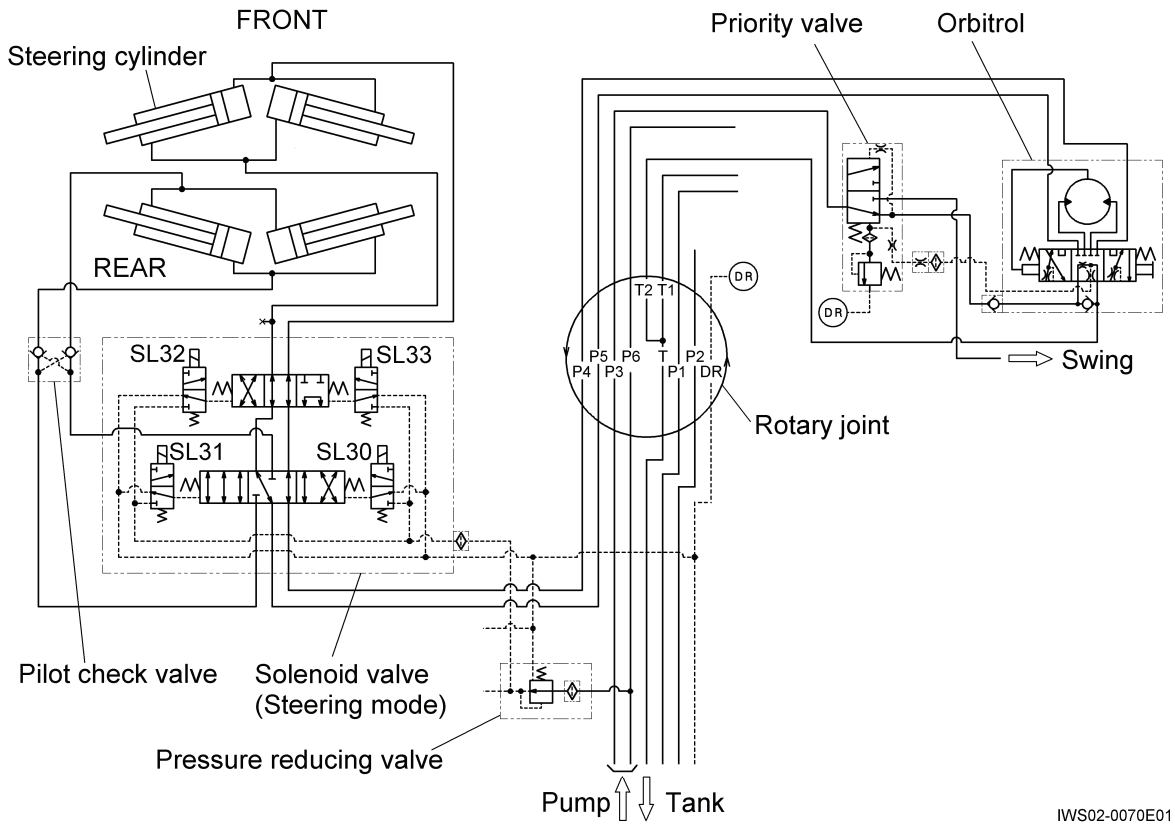
1. Structure 12

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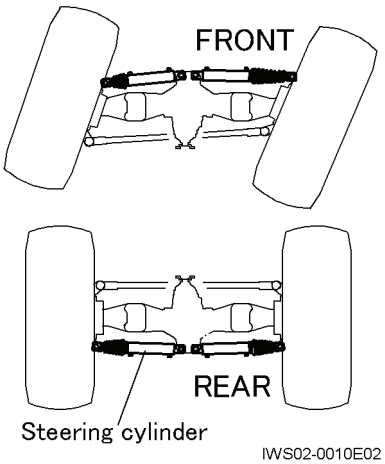
S-1 Steering System

1. General

Hydraulic Circuit for Steering



Layout of Steering Cylinders
(Right steering)



[NOTICE]

◆Two "*R"s and two "*L"s of the two front steering cylinders represent the right steering port and the left steering port respectively.

1. The steering wheel is coupled with the orbitrol.
2. The orbitrol, together with the priority valve, supplies the steering cylinders with oil at the rate corresponding to the rotational speed of the steering wheel. Surplus oil is supplied to the swing circuit.
3. The solenoid valve (steering mode) is switched according to the outputs from the multiplex data transmitter (lower).
4. The maximum pressure in the steering hydraulic circuit is regulated by the relief valve in the priority valve. The emergency steering can be provided to the steering system as an option. (Refer to the "Hydraulic Circuit for Carrier" in the "Hydraulic Power Generating System" for detailed information.)

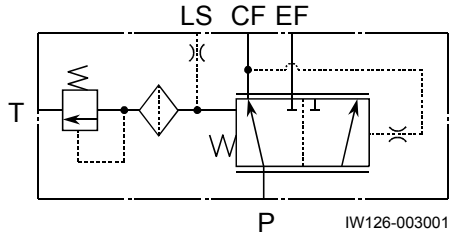
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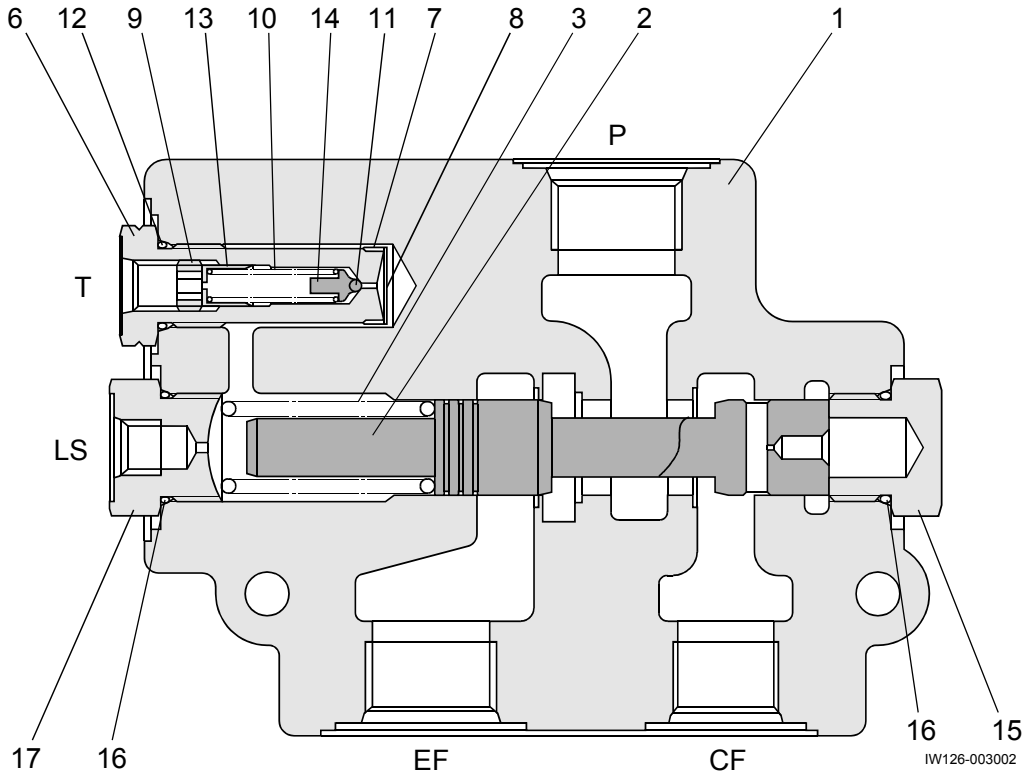
S-2 Priority Valve

[NOTICE]

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1. Structure





1.Housing	7.Ring	11.Boll	15.Plug
2.Spool	8.Screen	12.O-ring	16.O-ring
3.Spring	9.Screw	13.Guide	17.Plug
6.Body	10.Spring	14.Boll Holder	

Thread size and tightening torque

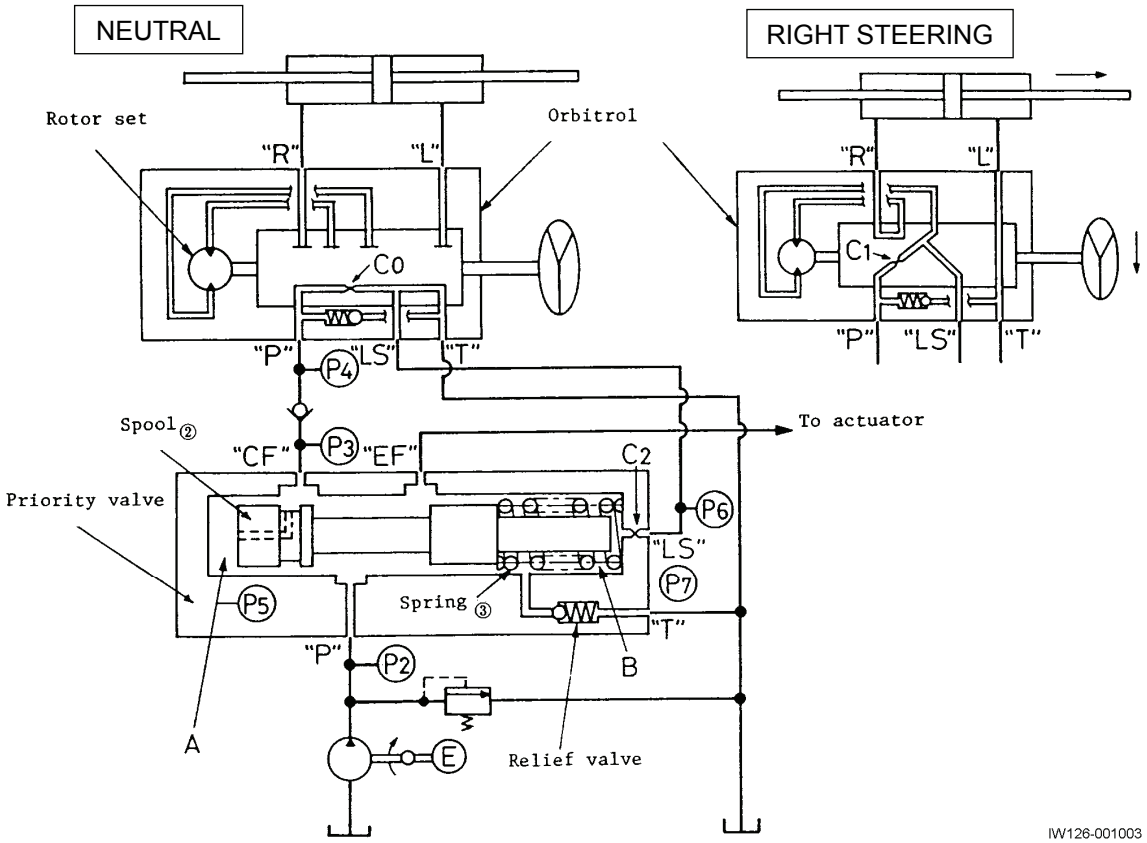
Sign/ port	Thread size	Tightening torque	
		N-m	ft-lbf
T, LS	7/16 - 20UNF - 2B	20 - 24	15 - 18
P, EF	1•1/16 -12UN - 2B	78 - 88	58 - 65
CF	3/4 - 16UNF - 2B	54 - 66	40 - 48

2. Function

This valve serves to allow the hydraulic oil to flow to the Orbitrol only in the flow rate required by the steering operation, and all the excess oil to flow to other actuators.

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3. Principle of operation



The above figure is for illustrating the principle. The construction of the actual machine may differ from the figure.

3.1 Neutral state

While the engine is standing still, spool 2 in the priority valve is pushed to the left end by spring 3, fully opening port CF and fully closing port EF. When the engine is started, the hydraulic oil delivered from the hydraulic pump flows through port P and port CF of the priority valve to port P of the Orbitrol. As the hydraulic pressure in circuit CF rises in this way, pressure P5 in pressure chamber A of the priority valve also rises. At this time, pressure chamber B is connected to the tank line via port LS and port T of the Orbitrol, and when the pressure difference (P5 – P6) between chamber A and chamber B rises to overcome the force of spring 3, the spool moves towards right until port EF becomes almost fully opened, and port CF becomes slightly open. The spool remains stable in this position, and the pump delivery oil mostly flows through port EF.

3.2 Right steering

When the steering wheel is turned clockwise, the hydraulic oil routes inside the Orbitrol are switched over, causing the oil entering through port P of the Orbitrol to flow through orifice C1. Then, the pressures across orifice C1 are transferred to pressure chambers A and B. The spool is moved until the pressure difference (P5 – P6) becomes balanced by spring 3.

3.3 Right steering to the end

When the steering cylinder piston is moved to the stroke end, the relief valve in the priority valve actuates, producing oil flow through orifice C2 in line LS of the priority valve. The pressure difference across C2 is transferred to pressure chambers A and B and the spool is further moved towards right until it becomes stable with port CF slightly open, and route EF almost fully open.

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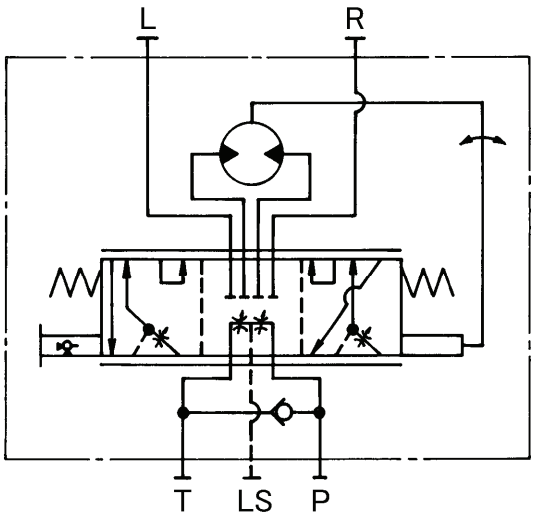
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S-3 Orbitrol

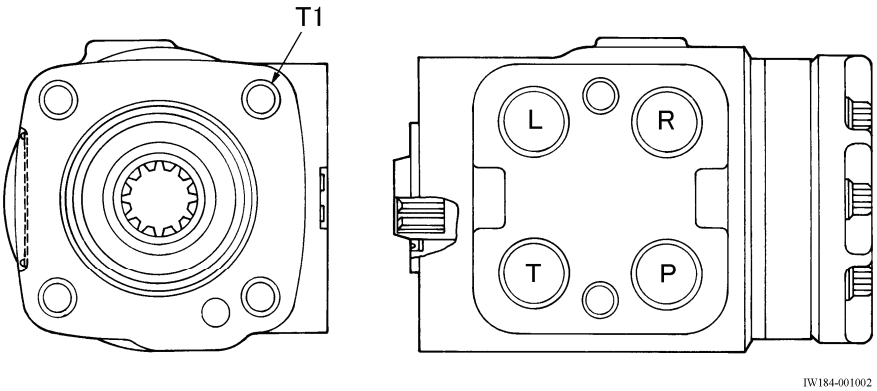
[NOTICE]

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1. Structure



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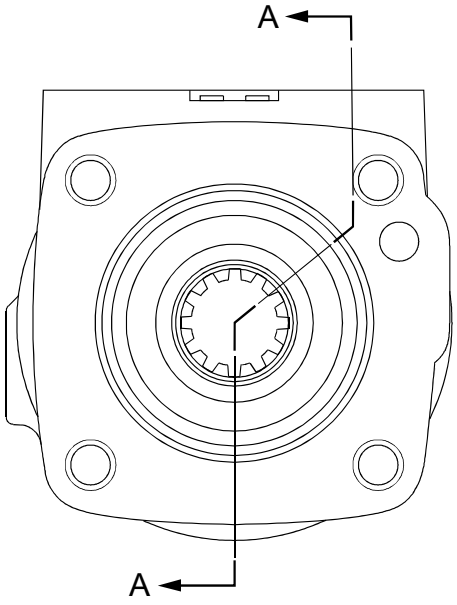
IW184-001002

Thread size and tightening torque

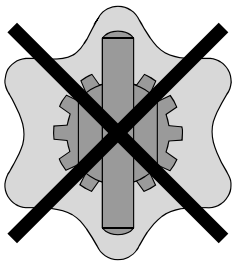
Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
P, T, L, R	3/4-16UNF-2B	54 - 66	40 - 48
LS	7/16-20UNF	20 - 24	15 - 18
T1	3/8-16UNC	43 - 49	32 - 36

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Cross section

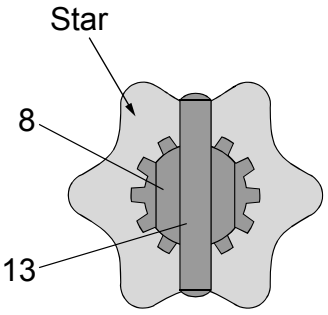


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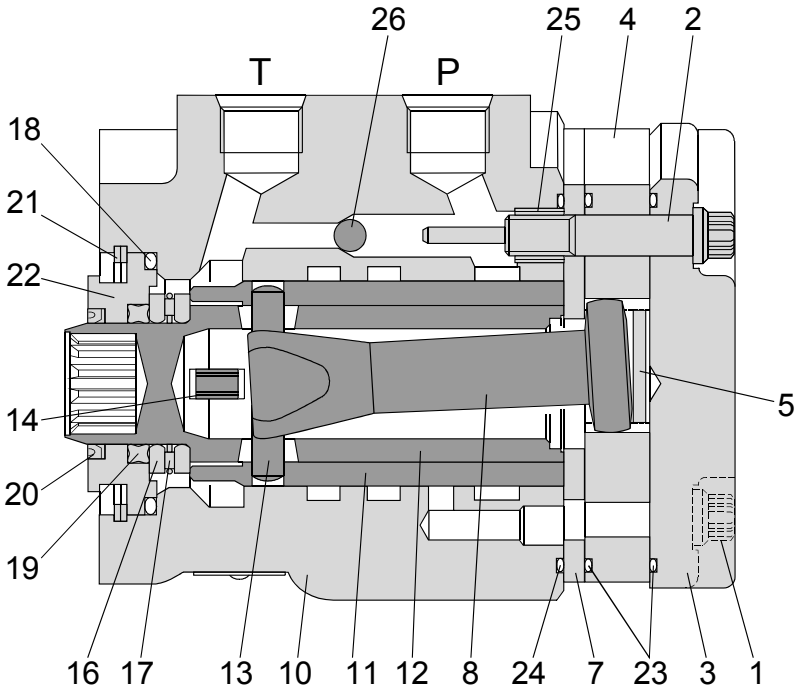
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OK

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A-A

IW184-001004

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[NOTICE]

◆Orient the star of the rotor set (4), drive (8) and pin (13) as shown in the "OK" figure.

1.Screw	8.Drive	16.Race bearing	22.Seal gland bushing
2.Retainer screw assy	10.Housing	17.Thrust needle	23.O-ring
3.End cap	11.Sleeve	18.O-ring	24.O-ring
4.Rotor set	12.Spool	19.Oil seal	25.Adapter screw
5.Spacer	13.Pin	20.Dust seal	26.Ball
7.Spacer plate	14.Centering spring	21.Retaining ring	

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
1, 2	-	24	17

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2. Function

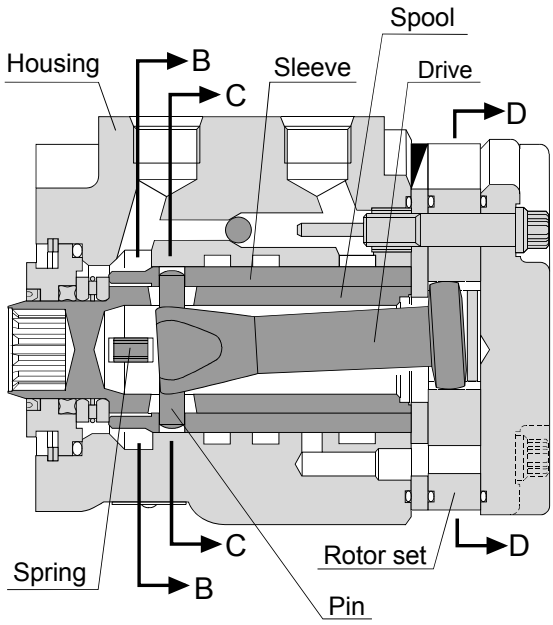
The machine is equipped with a load-sensing type orbitrol consisting of the following main components:

1. Housing
   The housing has five piping ports: P, T, R, L and LS.

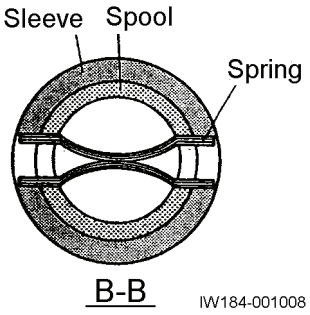
2. Spool and sleeve
   Spool is splined to the steering wheel, and serves to switch over hydraulic circuits by its relative position to sleeve.
   Spool and sleeve are mechanically connected at two positions, as shown in section B-B and section C-C.
   In section B-B, spring is installed in the recess grooves in spool and sleeve, so that while the steering wheel is stationary, spool and sleeve are kept in the neutral position relative to each other as shown in section B-B by the force of spring. In the area around section C-C, spool, sleeve and drive are connected by pin. Here, sleeve and drive are connected by pin without clearance, but spool has oval holes in which pin can move through small angles.

3. Drive
   The drive serves to transmit the motion of the star of rotor set to sleeve through pin.

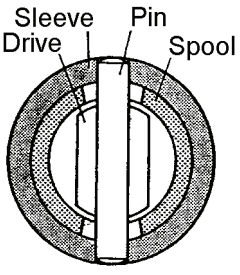
4. Rotor set
   This consists of a ring possessing seven internal teeth and a star internally in mesh with the ring, possessing six teeth.



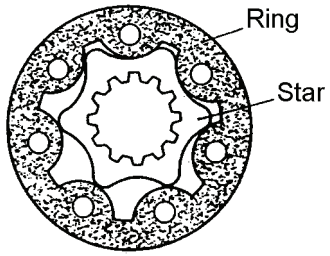
IW184-001007



B-B IW184-001008



C-C IW184-001009



D-D IW184-001010

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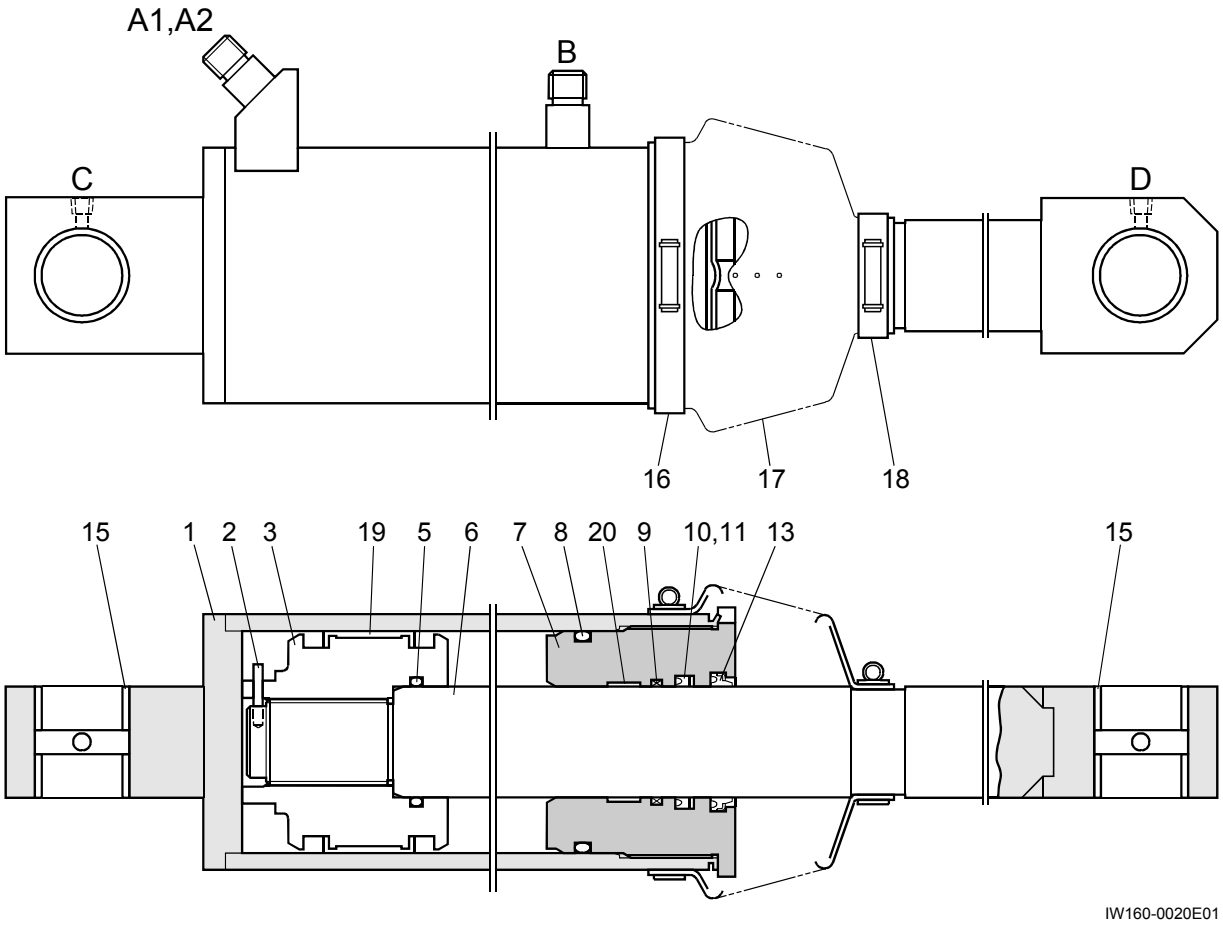
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S-4 Steering Cylinder

[NOTICE]

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1. Structure



1.Cylinder	7.Rod cover	13.Dust seal	19.Plain bearing
2.Spring pin	8.O-ring	15.Plain bearing	20.Plain bearing
3.Piston	9.Damper ring	16.Clip	
5.O-ring	10.Packing	17.Boot	
6.Rod	11.Backup ring	18.Clip	

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
A1, A2, B	G3/8	49	36
C, D	Rc1/8	9 - 12	6.5 - 9

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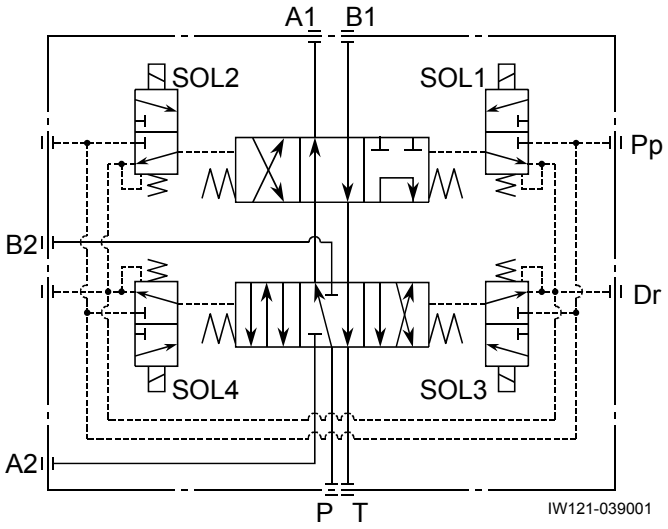
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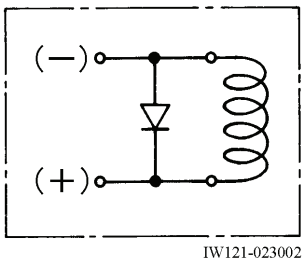
S-5 Solenoid Valve (Steering Mode)

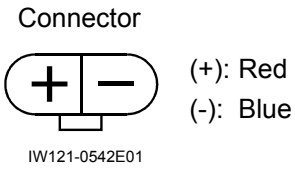
[NOTICE]

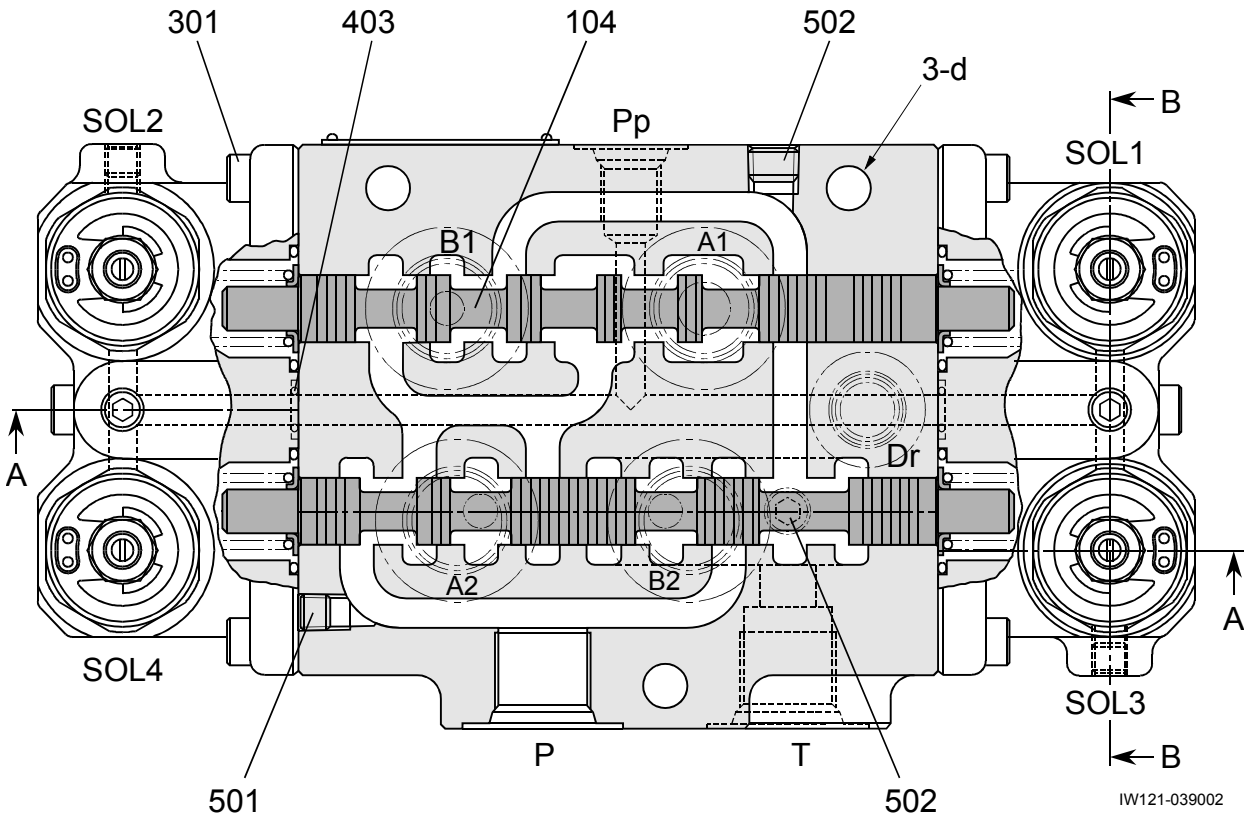
◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure







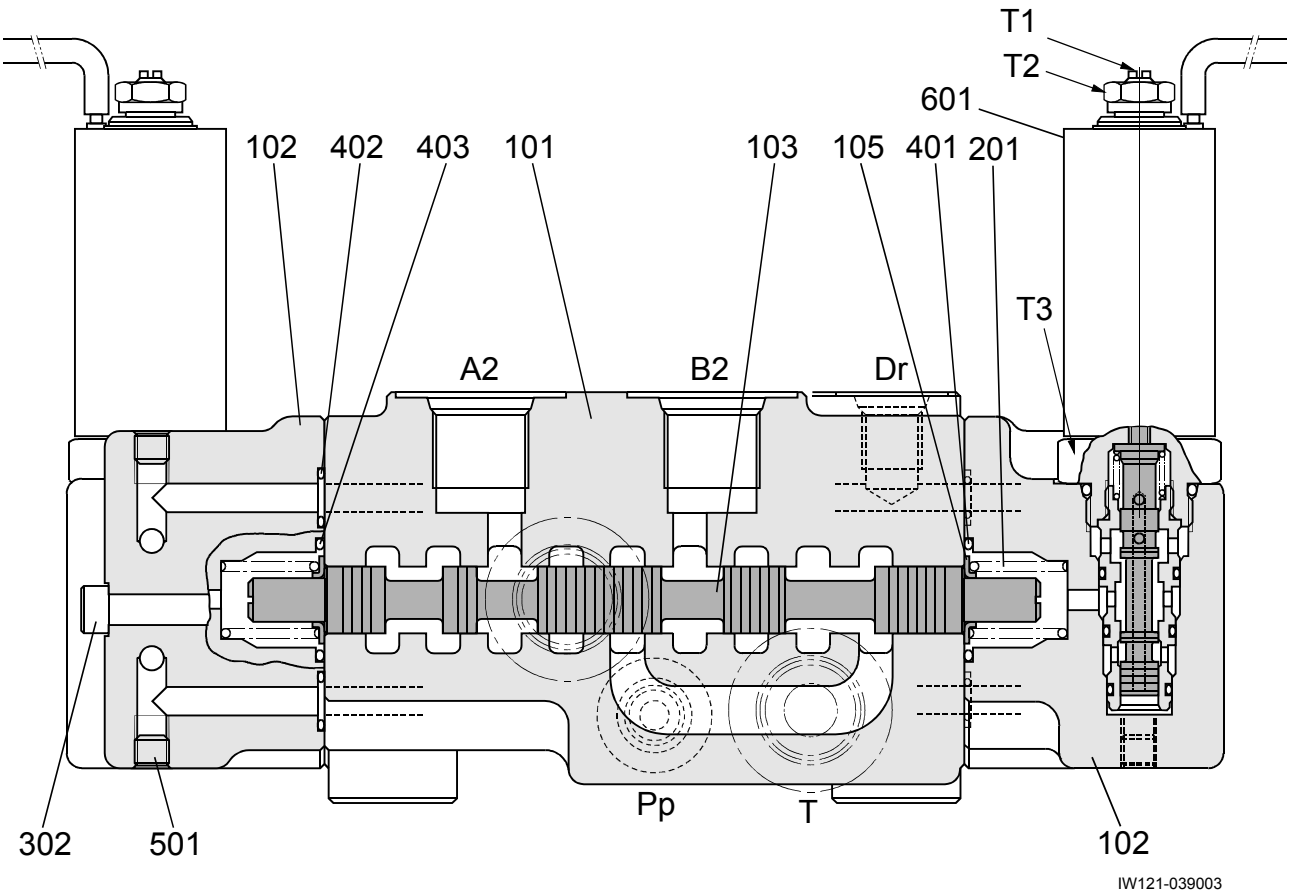


104.Spool
301.Hexagn socket head bolt
403.O-ring
501.Plug
502.Plug

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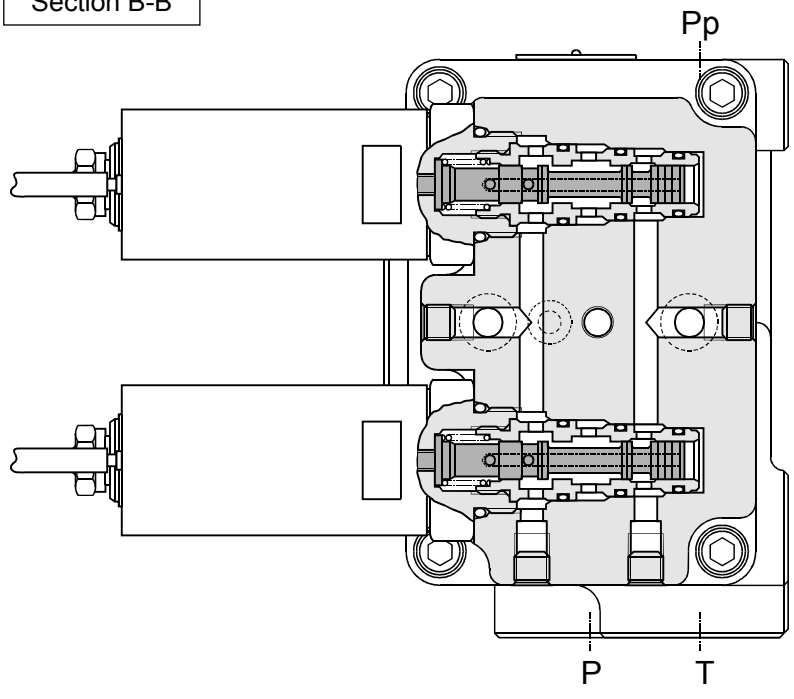
Solenoid Valve (Steering Mode)

Section A-A



IW121-039003

Section B-B



IW121-039004

101.Casing
102.Cover
103.Spool
105.Spring seat
201.Spring
302.Hexagon socket head bolt
401.O-ring
402.O-ring
403.O-ring
601.Solenoid valve assy

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Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
d(mounting bolt)	M8	29.5 ± 3	22 ± 2.2
T1	-	2 or less	1.5 or less
T2	-	5.4 ± 0.5	4 ± 0.4
T3	-	44 ± 5	32.5 ± 3.7
302	-	11.8 ± 1.5	9 ± 1.1
501	-	6.9 ± 1	5 ± 0.7
502	-	9.8 ± 1.5	7 ± 1.1
P, A1, A2, B1, B2, T	G 1/2	98	72
Pp, Dr	G 1/4	29.4	22

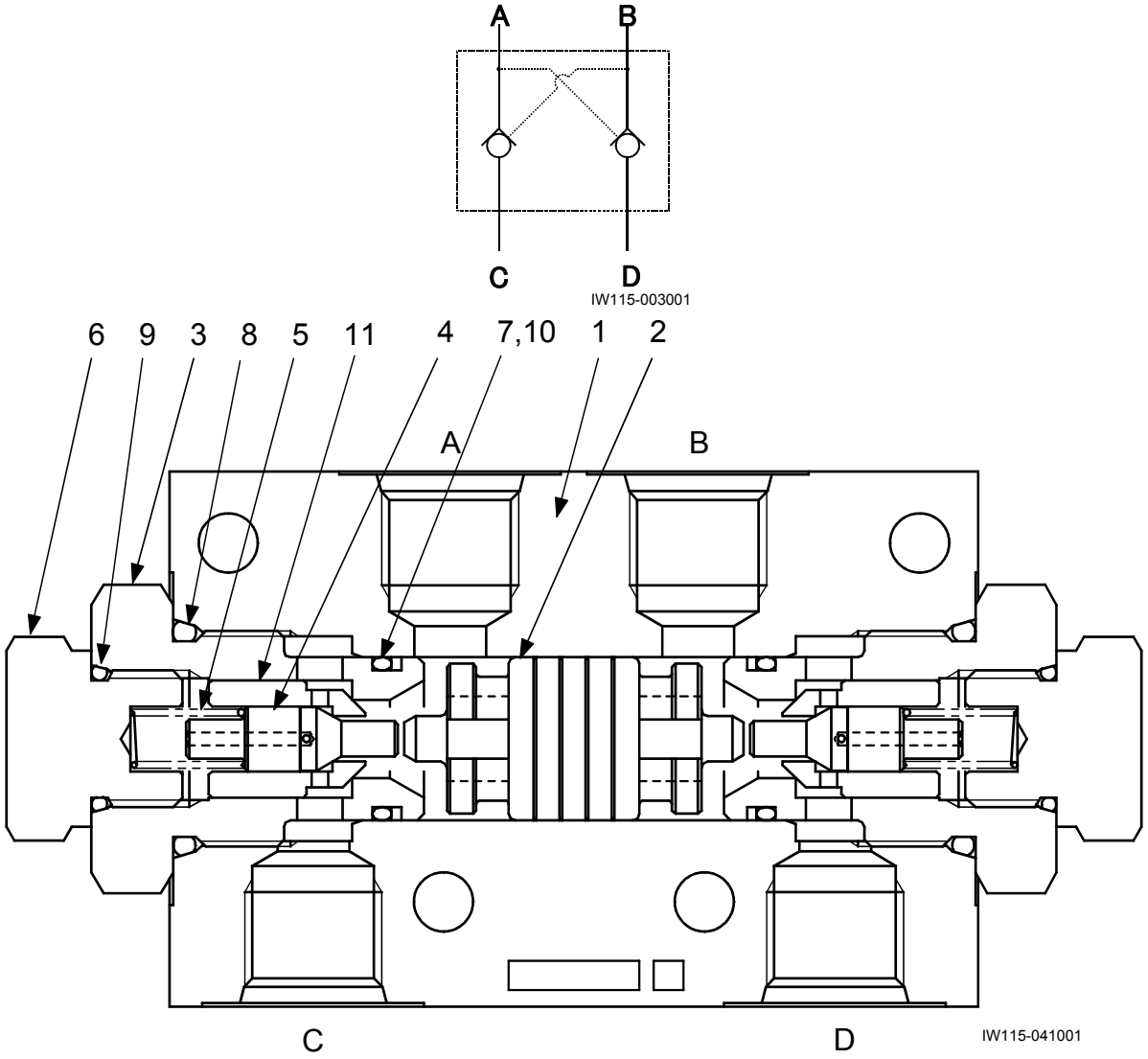
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S-6 Pilot Check Valve (Rear Steering Cylinder Lock)

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



1.Body	4.Poppet	7.O-ring	10.Backup ring
2.Piston	5.Spring	8.O-ring	11.Valve
3.Sleeve	6.Plug	9.O-ring	

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
A, B, C, D	G 1/2	98	72
Mounting bolt	M8	14 ± 1	10 ± 0.7

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T

Brake System

Contents

T-1 Brake System 1

1. General 1

T-2 Brake (Service Brake) 2

1. Structure and function 2
   1.1 Principle of operation 3
2. Checking the pad assy 3
3. Checking the disc plate 3
4. Replacing the pad assy 4
5. Disassembly 5
6. Washing and checking 5
   6.1 Washing 5
   6.2 Checking 5
7. Reassembly 6
8. Maintenance standards 6

T-3 Brake Valve 7

1. Structure and function 7
2. Description of operation 9
   2.1 Generation of air pressure 9
   2.2 Stabilization of air pressure 9
   2.3 Release of air pressure 10
   2.4 Operation under piping rupture 11
3. Dismouting and remounting 11
4. Disassembly 11
   4.1 Disassembly of the mount plate 12
   4.2 Disassembly of the body 12
5. Cleaning and checking 13
   5.1. Cleaning 13
   5.2 Checking 14
6. Reassembly 14
   6.1 Reassembly of the secondary side 14
   6.2 Reassembly of the primary side 14
   6.3 Reassembly of the mount plate 16
7. Test 16
   7.1 Air leakage through supply valve and exhaust valve 16
   7.2 Air leakage in other parts 16
   7.3 Operation test 16
   7.4 Performance test 16
8. Maintenance standards 17
   8.1 600-hour check 17
   8.2 2000-hour or 1-year check 17

T-4 Booster (Brake) 18

1. Structure 18
2. Function 21

https://truckmanualshub.com/

3. Principles of operation 22
3.1 Relay valve 22
3.2 Cylinder 24

T-5 Air Dryer 25

1. Structure 25

2. Function 29
2.1 Dehumidification 29
2.2 Regeneration 30
2.3 Intake position 31
2.4 Release position 31

3. Precautions for handling 32

4. Maintenance and inspections 32
4.1 Daily inspection 33
4.2 Inspection and part replacement every 1 year or 100,000 km (62140mi) of driving ... 33

5. Disassembly 33
5.1 Removing DU-3 33
5.2 Disassembly of cartridge 33

6. Reassembly 35
6.1 Cartridge (lower) 35
6.2 Tapping 36
6.3 Cartridge (upper) 36

7. Troubleshooting 37

T-6 Brake (Parking Brake) 40

1. Structure and function 40

2. Replacing pad 41

3. Remounting 42
3.1 Connecting parking brake to spring chamber 42
3.2 Adjusting parking brake clearance 42

4. Check 43

T-7 Brake Chamber 44

1. Structure 44

2. Function 45

3. Disassembly 45

4. Cleaning and checking 46
4.1 Cleaning 46
4.2 Checking 46

5. Reassembly 47

6. Test 47
6.1 Air leak test 47

7. Maintenance standards 47
7.1 2000-hr or 1-year check 47

T-8 Solenoid Valve (Air) 48

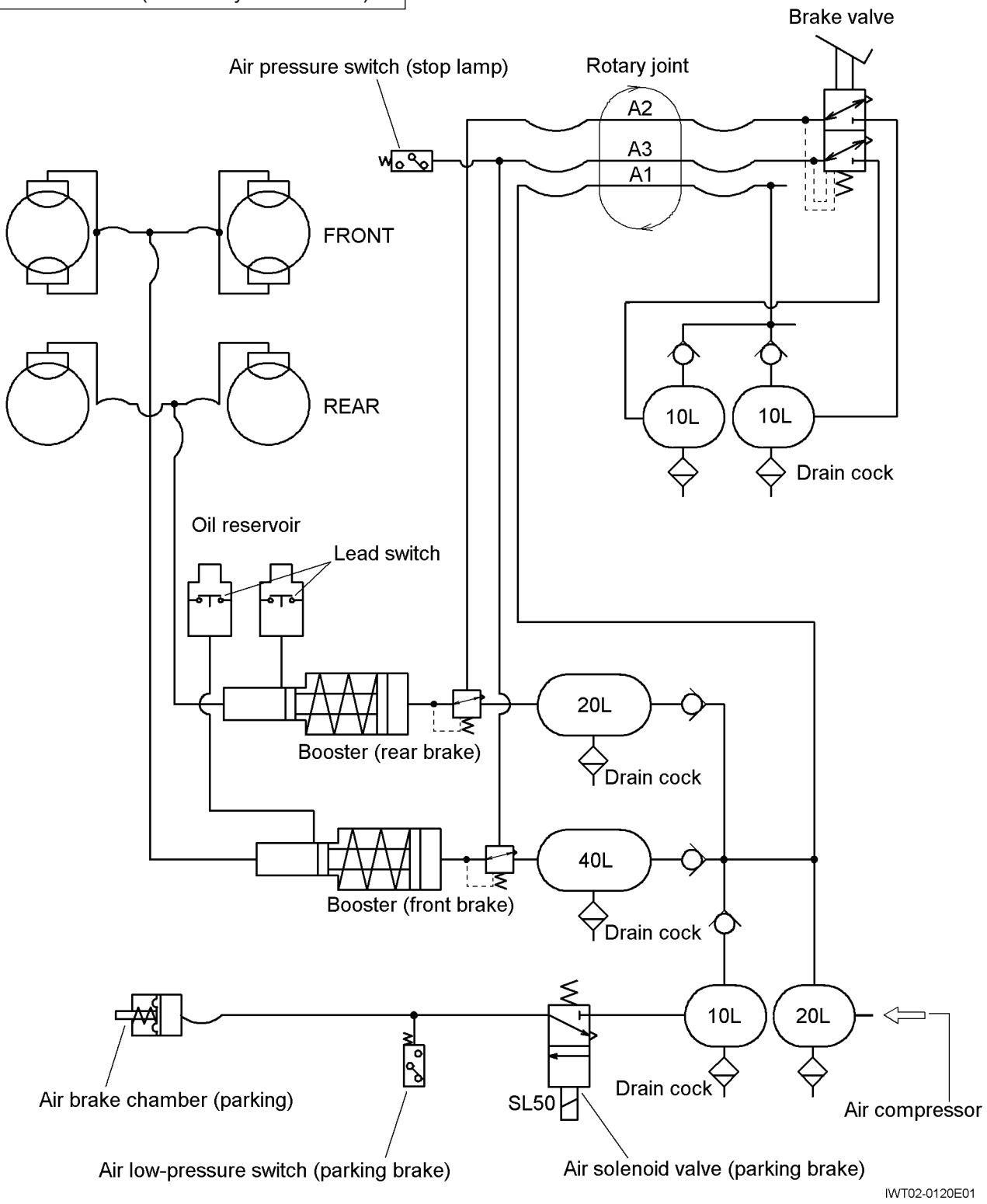
1. Structure 48

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T-1 Brake System

1. General

Brake Circuit (air over hydraulic brake)



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T-2 Brake (Service Brake)

[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure and function

The brake system employs an opposed piston type disc brake, using one each pad assy on both sides of each disc plate to pinch it between them, as shown here.

The disc plate turns together with the wheel, and pads are incorporated in a torque plate which is fixed to the knuckle.

The torque plate incorporates pistons to force the pad assy onto the disc plate to brake its motion.

The clearance between the pad assy and the disc plate are maintained constant by means of the piston seals.

Although 4-piston type and 6-piston type brakes are used in the crane, the service procedures and the maintenance standards for the two types are identical. In the following explanation, the 4-piston type is mainly explained.

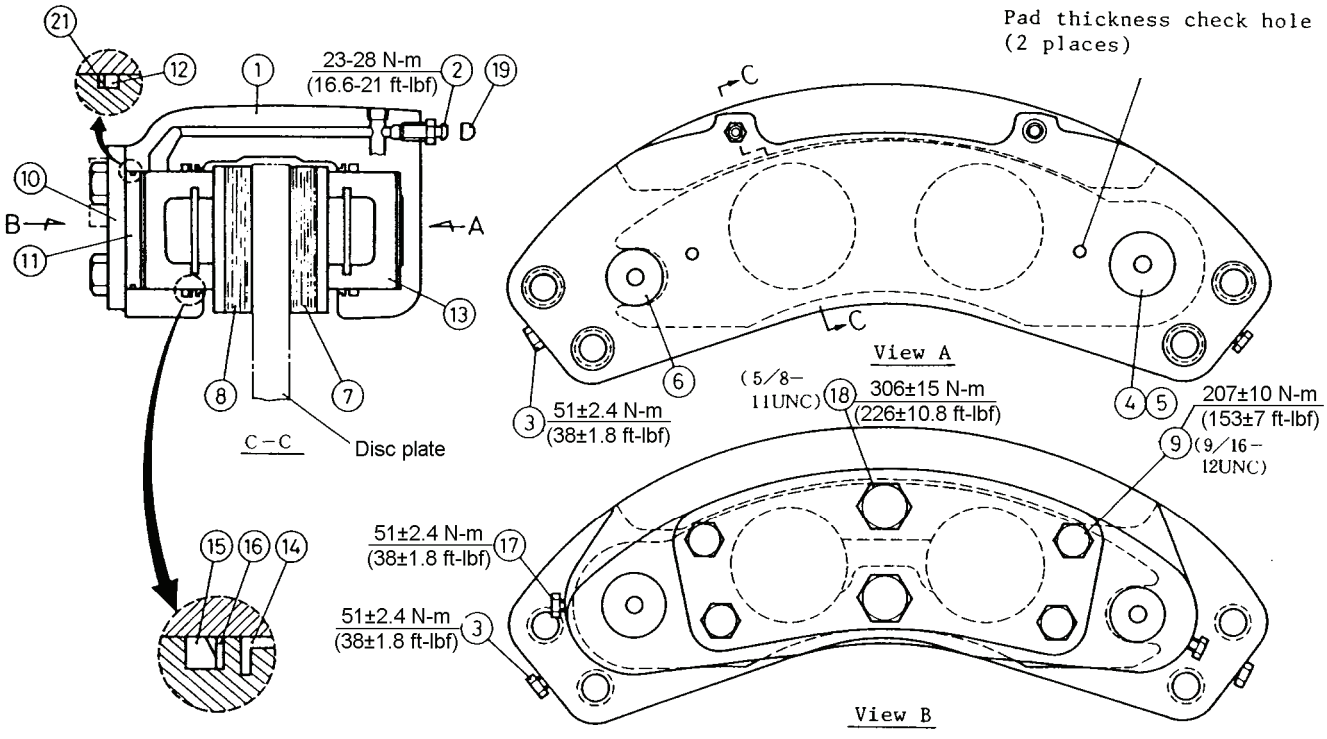


Fig. 1 IW577-015001

1. Torque plate	6. Torque pin (smaller)	11. Piston plug	16. Backup ring
2. Bleeder valve	7. Pad assy	12. Cap seal	17. Bolt
3. Bolt	8. Pad assy	13. Piston	18. Cap bolt
4. Torque pin (larger)	9. Cap bolt	14. Scraper ring	19. Cap
5. O-ring	10. Cover plate	15. Piston seal	21. Backup ring

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1.1 Principle of operation

1. When hydraulic pressure is applied

The pistons exert force to the pad assy by deforming the piston seals. (Fig. 2)

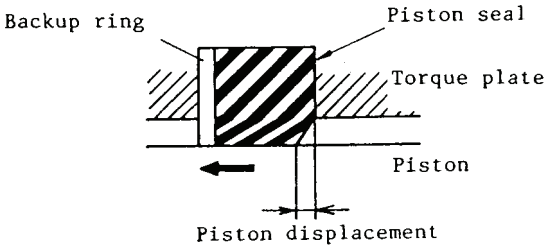


Fig. 2 IW577-015002

2. When hydraulic pressure is removed

The seals recover the original shape to push the pistons back, creating clearance between the disc plate and the pad assy. (Fig. 3)

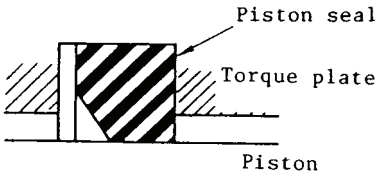


Fig. 3 IW577-015003

3. When pad assy wears

The piston displacement distance increases beyond the seal deformation limit, and the pistons slip relative to the seals, but when the hydraulic pressure is removed, the pistons are pulled back by the seals through the same distance as before the occurance of wear, giving the same clearances.

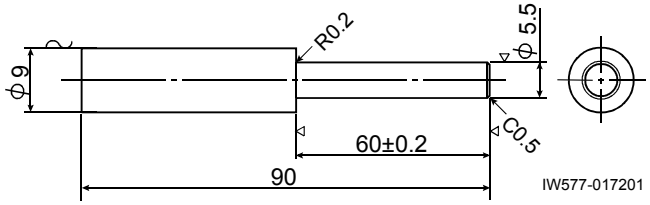
2. Checking the pad assy

[NOTICE]

◆The brake caliper must be disassembled to check the remained pad thickness. However, the check gauge may use to check.

The simple check method of pad assy is shown as follows:

Check the pad thickness by inserting a check gauge as shown below in the check holes in the torque plate.



(Unit: mm) (1mm=0.039inch)

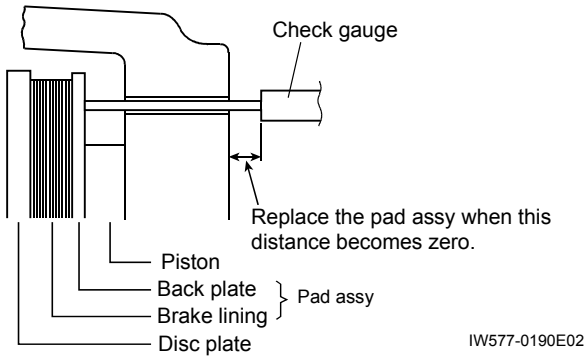
[NOTICE]

◆When one of the pad assy is found to have worn to the use limit, all the other ones are also worn to the same limit in most cases.
Replace the pad assy for the right and the left wheels or even for all the four wheels simultaneously.

◆Thickness of the brake lining of the Pad assy

	Thickness of the brake lining
New parts	14 mm (0.56in)
Use limit	4 mm (0.16in)

◆The regular check is necessary to prevent from deteriorating brake function and from the brake damage since the thickness of the brake lining exceeding the limit results in serious damage.



3. Checking the disc plate

Check the disc plate for the thickness and damage. If it is excessively damaged or the thickness is below 17.5 mm (0.689 in), replace the disc plate. (Thickness of new disc plate: 20 mm (0.787 in))

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4. Replacing the pad assy

When the thickness of the brake lining has reduced to 4 mm (0.16 in) , replace the pad assy.

1. Set the outriggers, and remove the tire. (To remove the brake assy as a unit, unscrew the 4 mounting bolts. When remounting it, tighten the mounting bolts to 480 - 578N-m (355 - 427ft - lbf)).
2. Apply an 11mm box wrench on bleeder valve 2, connect a transparent vinyl tube (Inside diameter : 7 - 7.5 mm (0.276 - 0.295 in)) to the bleeder valve, and open the bleeder valve by turning the wrench.
3. Insert a piston return lever as shown below between pad assy 7, 8 and the disc plate, and push all pistons 13 fully home. Then, close bleeder valve 2.

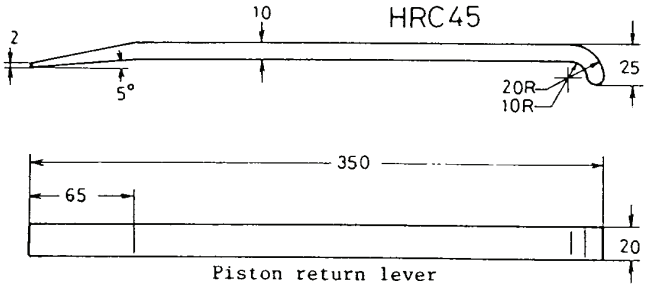


Fig. 5 IW577-015005

(Unit : mm) (1mm = 0.039inch)

4. Unscrew bolts 3 and 17 on the side of larger torque pin 4 approx. 4 turns, and extract torque pin 4 .
5. Remove pad assy 7, 8, and install new pad assy in their places.
6. Check O-ring 5 of torque pin 4, and replace it if damaged or defective otherwise.
7. Push in torque pin 4 in its hole after applying grease to both. At this time, adjust the clearance between the disc plate and torque pin 4 to 1.5 - 3 mm (0.06 - 0.12 in).
   Check that the torque pin on the brake mounting side is not protruding adove the mounting surface.

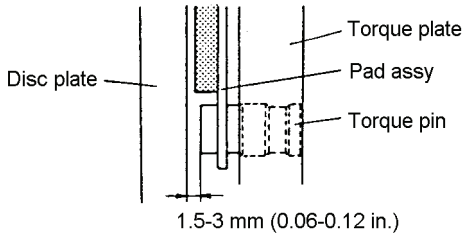


Fig. 6 IW577-015006

[NOTICE]

◆When tightening bolts 3 and 17, make sure the bolt end is fully in the groove in torque pin.

8. Clamp torque pin 4 with bolt 3 (or 17).

   Tightening torque of bolts 3 and 17: 49 - 54 N-m (36.2 - 39.8 ft-lbf)

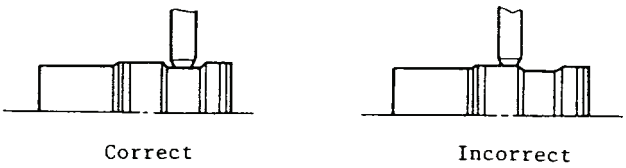


Fig. 7 IW577-015007

9. Bleed the brake circuits as explained in “Air Bleeding Procedure” in Chapter Y.
10. Mount the tires.

    Hub nut torque:
    490 - 588 N-m (362 - 434 ft-lbf)

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5. Disassembly

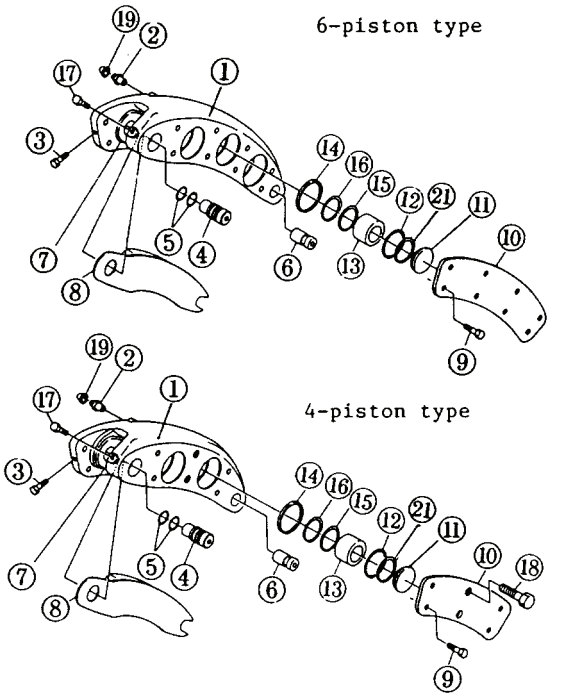


Fig. 8 IW577-015008

1. Loosen bolts 3 and 17, extract torque pins 4 and 6, and remove pad assy 7 and 8.
2. Remove cover plate 10, push out piston plugs 11 and pistons 13 on the cover plate side. Pull out pistons 13 on the opposite side.
3. Remove scraper rings 14. Remove piston seals 15 and backup rings 16 with a hooked wire.

6. Washing and checking

6.1 Washing

⚠ CAUTION

⚠Never use mineral oil.

Wash the metal parts in trichloroethylene or brake fluid. After washing, blow air into the holes and grooves in the torque plate and wipe off all residual liquid with clean cloth.

6.2 Checking

1. Torque plate
   Check the torque plate, and if it is damaged in the areas indicated below, correct the surface with No. 180 sandpaper.
   If the damage is beyond repair, replace the torque plate.

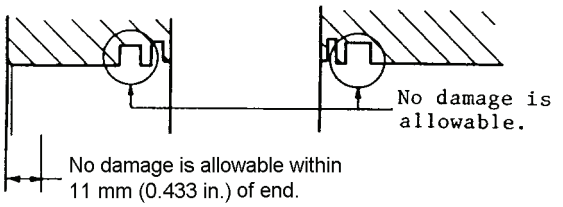


Fig. 9 IW577-015009

2. Pad assy
   Replace the pad assy when its wear lining has been worn to 4 mm (0.16 in) or less.
3. Piston
   When the sliding surface is damaged, dented or the plated layer has been worn, replace the piston.
4. Torque pin
   Replace the pin if the portion in contact with the back plate of the pad assy is excessively worn.
5. Seal kit (Sealing parts)
   Replace the seal kit (cap seal, scraper ring, piston seal, and backup ring) once a year or once in 1000 hours.
   In addition, be sure to replace them whenever they are disassembled.

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7. Reassembly

1. Apply the rust preventive lubricant found in the seal kit to piston seal 15, backup rings 16, pistons 13 and to the cylinder bores.

[NOTICE]

◆Take care to install the piston seal in the correct orientation. (See Fig.1)

◆Be sure to install the pistons from the inner side of the torque plate.

2. Install backup ring 16, piston seal 15 and scraper ring 14 in this order in the grooves in the bore of torque plate 1. Then push in piston 13.

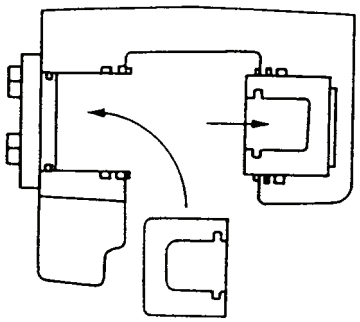


Fig. 10 IW577-015010

3. Apply the rust preventive lubricant to backup ring 21 and cap seal 12, and install them in the grooves in piston plug 11. Then install piston plug 11 in torque plate 1 with the cap seal on the piston side.

4. Thoroughly clean the mating surfaces of torque plate 1 and cover plate 10, and install the cover plate on the torque plate with bolts 9 (18) with the stamped part number of the cover plate out.

   Torque for bolts 9:
   197 - 217 N-m (146 - 160 ft-lbf)
   Torque for bolts 18:
   291 - 320 N-m (215.2 - 236.8 ft-lbf)

[NOTICE]

◆For the installing procedure, see " Replacing the pad assy " .

5. Install torque pins 4, 6, pad assy 7, 8, and bolts 3, 17.

6. After mounting the brake assy on the axle, readjust the clearance between the torque pins and the disc plate to 1.5 - 3.0 mm (0.06 - 0.12 in).

8. Maintenance standards

Item	Maintenance standards
6 month check	Check the worn thickness of the pads, and replace them if worn beyond the use limit (thickness of wear material: 4 mm (0.16 in)). When the liquid level in the reservoir sinks to a warning level, through leakage, pad wear, etc., the brake lamp lights during traveling. Check for leakage and pad wear immediately.
1000 hour or 1 year check	Disassemble and check all the parts. Replace the sealing parts with a seal kit.

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T-3 Brake Valve

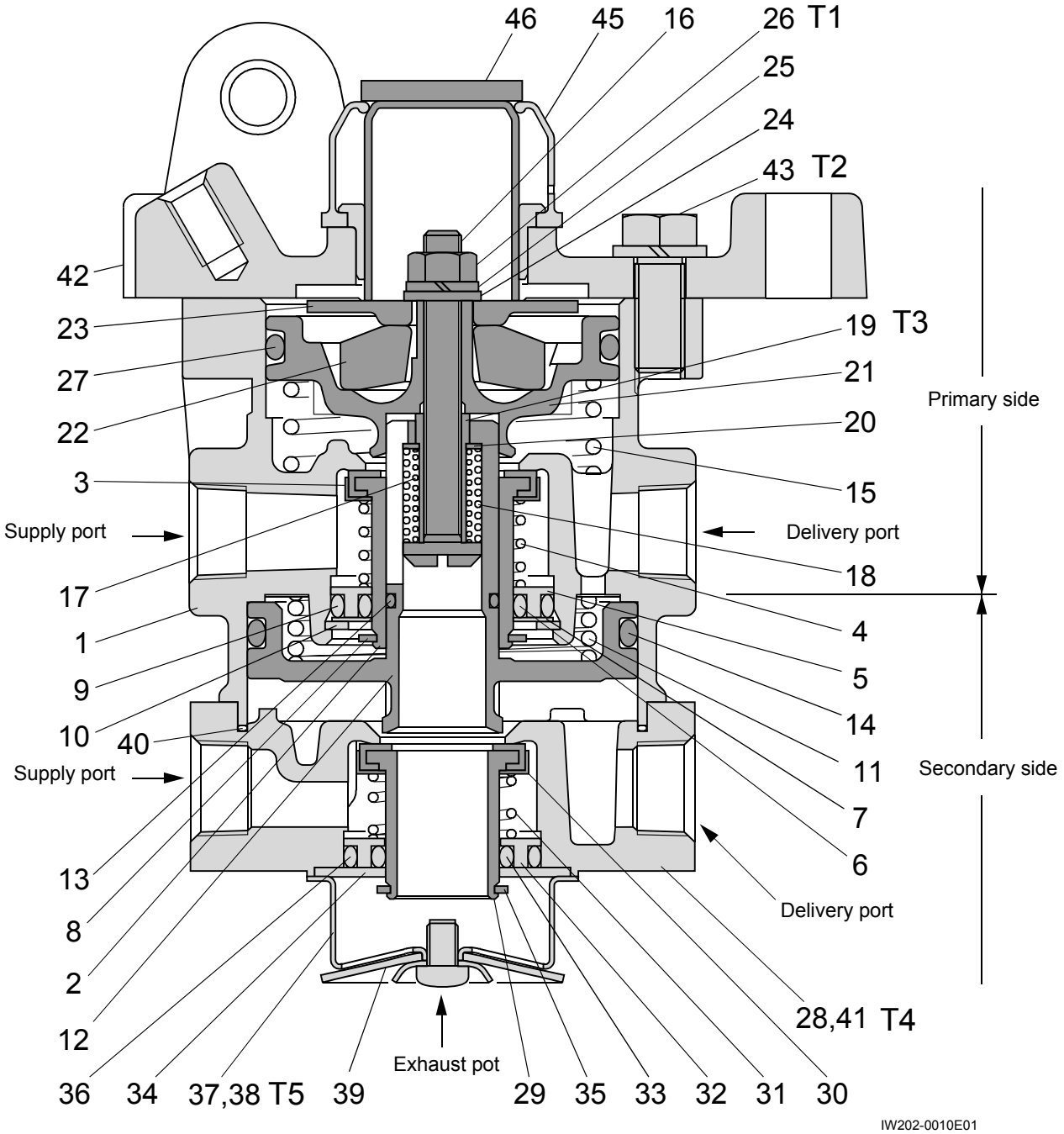
[NOTICE]

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1. Structure and function

This brake valve is a dual circuit rubber spring type brake valve for air brake systems.

It delivers air at pressures determined by the position of the brake pedal to two systems, Even when one of the systems fails, the other system remains operational to brake the vehicle.



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Brake Valve

1. Upper body
2. Upper valve
3. Valve retainer
4. Valve spring
5. Retainer
6. O-ring
7. Special washer
8. Retaining ring
9. O-ring
10. Retaining ring
11. Spring
12. Relay piston
13. O-ring
14. O-ring
15. Return spring
16. Stem
17. Inner spring
18. Outer spring
19. Sleeve
20. Stem washer
21. Piston
22. Rubber spring
23. Spring seat
24. Special washer
25. Spring washer
26. Nut
27. O-ring
28. Lower body
29. Lower valve
30. Valve retainer
31. Valve spring
32. Retainer
33. O-ring
34. Special washer
35. Retaining ring
36. O-ring
37. Exhaust cover
38. Screw and washer
39. Exhaust check
40. O-ring
41. Bolt and washer
42. Mount plate
43. Bolt and washer
44. —
45. Plunger boot
46. Plunger

Thread size and tightening torque

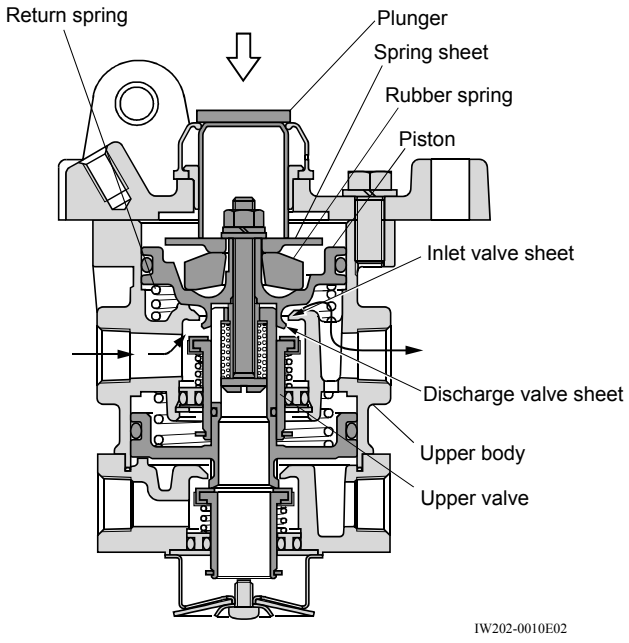
Sign / Port	Thread size	tightening torque	
		N-m	ft-lbf
T1	—	3.9 - 6.9	2.9 - 5.1
T2	—	8.8 - 13.7	6.5 - 10.1
T3	—	3.9 - 6.9	2.9 - 5.1
T4	—	3.9 - 6.9	2.9 - 5.1
T5	—	1.3 - 2.5	1 - 1.8
Pipe port	Rc 3/8	29.4 - 39.2	21.7 - 28.9

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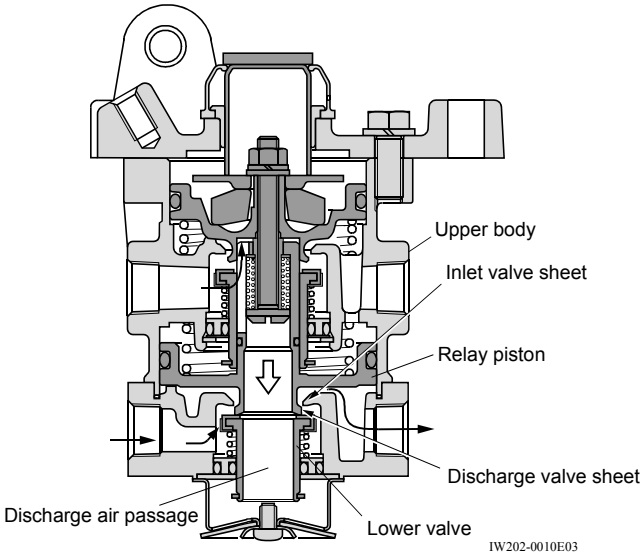
2. Description of operation

2.1 Generation of air pressure

1. When the pedal is depressed, the depressing force is transmitted through the plunger, spring seat, and rubber spring to the piston. The piston moves down, compressing the return spring.
2. The discharge valve seat at the bottom of the piston makes contact with the upper valve, closing the discharge passage at the center.
3. As the piston further compresses the return spring, it moves the upper valve, opening the air inlet valve seat on the upper body.
4. The pressurized air supplied from the primary supply port flows through the delivery port to the brake in the primary system.



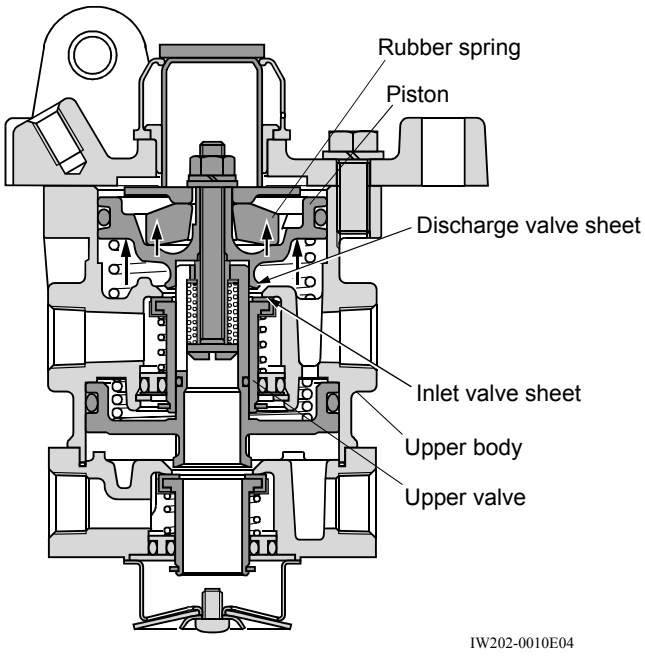
5. On the other hand, as the primary system becomes operational, part of its pressurized air flows through the passage in the upper body into the space above the relay piston in the secondary system. This pushes the relay piston down.
6. The discharge valve seat at the bottom of the relay piston comes into contact with the lower valve, closing the discharge passage at the center.
7. The lower valve moves further down, opening the air inlet valve seat on the lower body. This allows pressurized air from the secondary supply port to flow through the delivery port into the brake chamber of the secondary system.

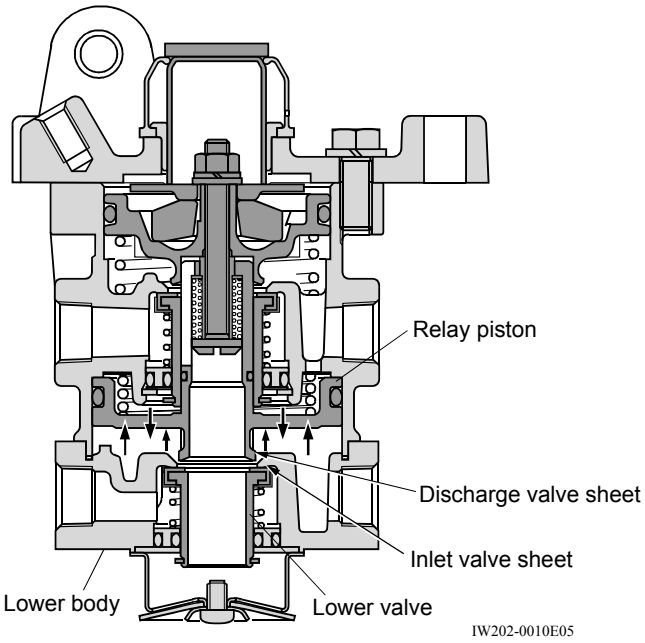


2.2 Stabilization of air pressure

1. When the pedal is depressed to a certain extent, and kept stationary at that position, the air pressure is stabilized at a level corresponding to that pedal position as follows:
2. As the pedal is depressed, the discharge valve closes and the inlet valve opens to deliver air to the system.
3. This air also exerts upward pressure on the underside of piston.
4. With the pedal maintained at a certain depressed position, the air under piston pushes up piston by compressing rubber spring above the piston.
5. Piston , while keeping contact with upper valve, rises until upper valve comes into contact with the inlet valve seat to stop the delivery of air.
6. Then, with the discharge valve seat in contact with upper valve, the air pressure remains stable.

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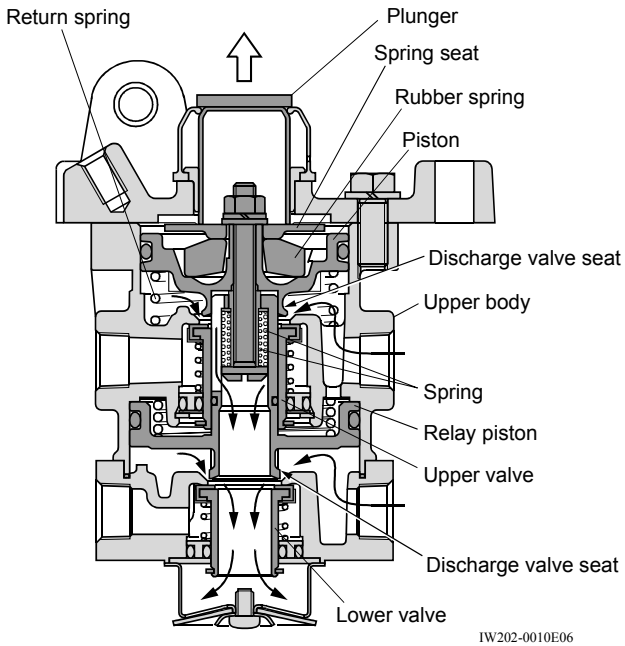


7. In the secondary air system, relay piston lowers in proportion to the air pressure in the primary system to generate air pressure in the secondary system. The generated pressure is also applied to the underside of relay piston.
8. As this pressure on the underside of relay piston becomes balanced with the primary system pressure applied on the top of the relay piston, it is no more pushed down, but moves up while keeping contact with lower valve.
9. As lower valve comes into contact with the inlet valve seat of lower body, the air supply through the supply port is stopped.
10. In this state, since the discharge valve seat is in contact with lower valve, the air pressure stabilizes.
11. Thus, the pressure in the secondary system is kept stable at a level equal to that of the primary system. Spring serves to minimize the pressure difference between the two systems.

2.3 Release of air pressure

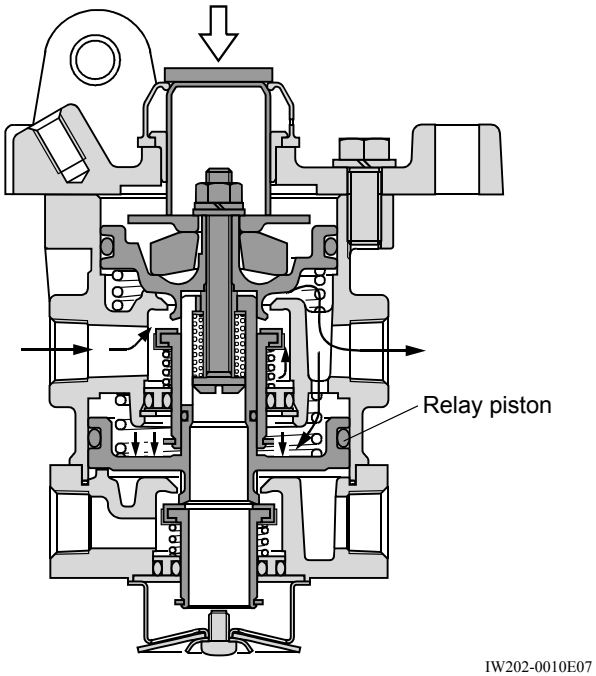
1. As the pedal is released, the plunger and piston are pushed up by the return spring and by the primary air pressure.
2. The discharge air seat at the bottom of the piston disengages from the upper valve, opening the discharge passage at the center. This allows the primary system air pressure to be discharged from the discharge port.
3. On the other hand, as the pressure in the primary system drops, relay piston is pushed up by the secondary system air pressure and springs, and the discharge valve seat at the bottom of relay piston disengages from lower valve to open the central discharge passage.
4. Thus the secondary system pressure discharges into the discharge port.

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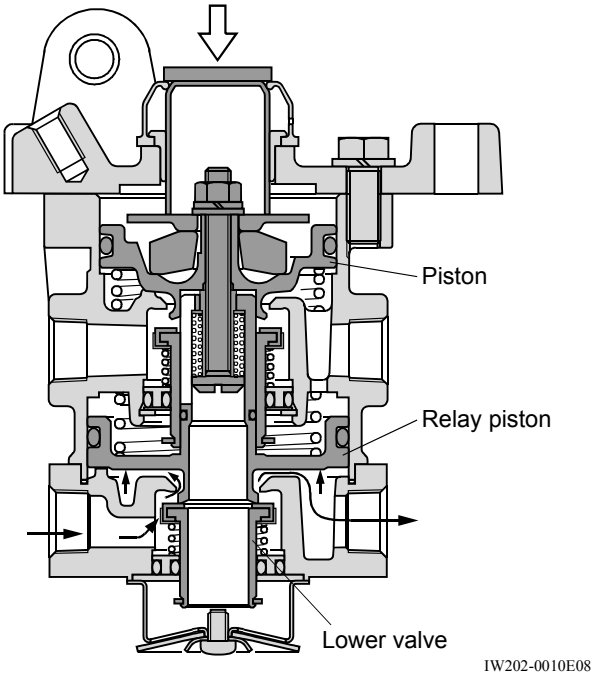


2.4 Operation under piping rupture

1. Operation with only primary system
   When the secondary brake system is broken, the primary system remains operational, because relay piston separates it from the secondary system.



2. Operation with only secondary system
   When the primary brake system is damaged, no air pressure is generated in the primary system, so that no primary air pressure is available to work on the relay piston for actuation of the secondary system. However, in this case, depressing the pedal further down brings the lower end of piston in contact with the top of relay piston, causing the discharge valve seat of relay piston to directly push lower valve to cause the secondary system to operate in the same way as the primary system in the normal state, generating air pressure, stabilizing, and releasing it.



3. Dismouting and remounting

1. Dismount the valve after immobilizing the vehicle and discharging the compressed air from the reservoir by opening the drain cock.
2. Tighten the pipe fitting: 29 - 39 N-m (21.4 - 28.8 ft-lbf)

4. Disassembly

[NOTICE]

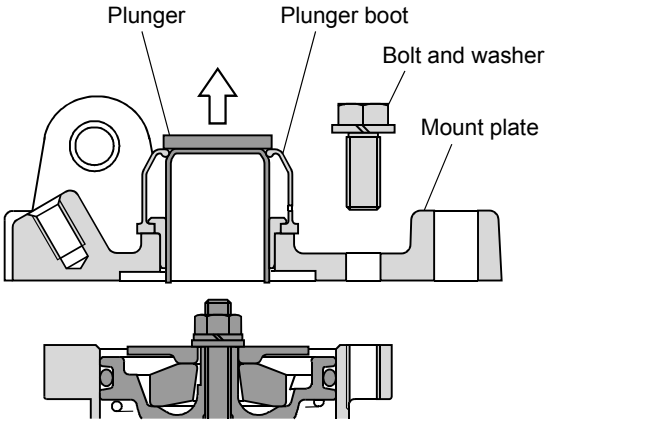
- ◆When disassembling, remove mud, dust, water etc. from the outside surface to avoid their entry into the interior.
- ◆Prior to disassembly, mark the joints to facilitate correct reassembly.

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◆Place the disassembled parts in neat order to facilitate reassembly.

4.1 Disassembly of the mount plate

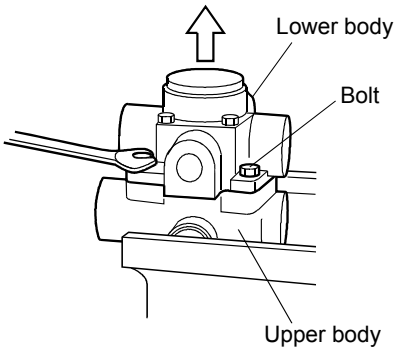
1. Remove three bolts and washers, and remove mount plate, plunger, and plunger boot.



IW202-0010E09

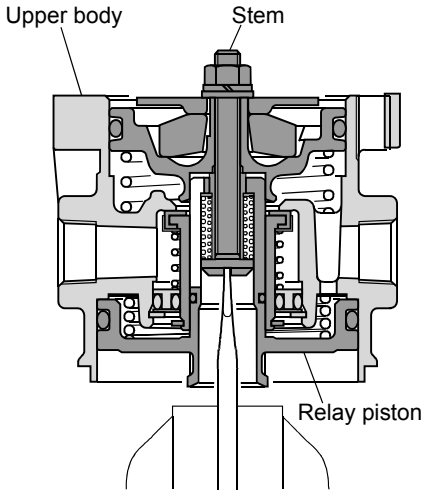
4.2 Disassembly of the body

1. Clamp the body in a vise, with lower body up; unscrew four bolts, and remove the lower body assembly from upper body.



IW202-0010E10

2. Clamp a screwdriver in a vise, pass it through the discharge passage of relay piston and place the blade in the alit in the stem.

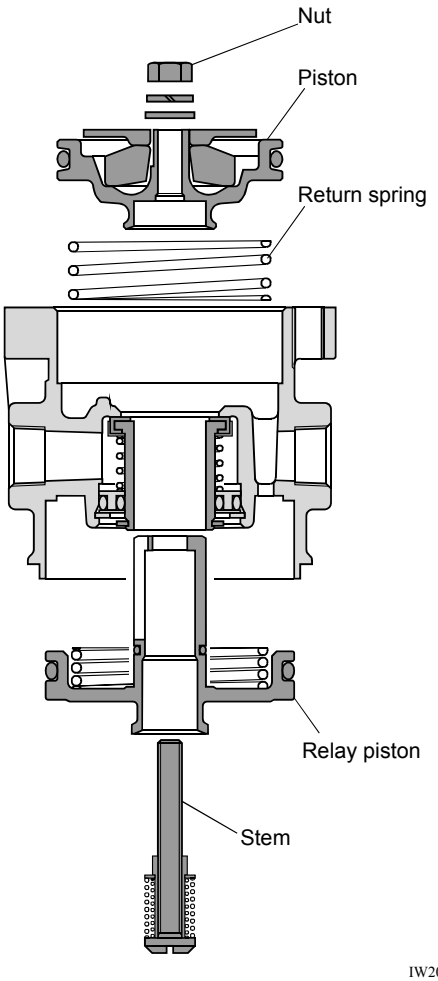


IW202-0010E11

3. Unscrew nut at the top of piston, and remove piston, return spring, relay piston, spring, and stem.

[NOTICE]

◆At this time, hold the piston to prevent it from being popped out by the return spring.

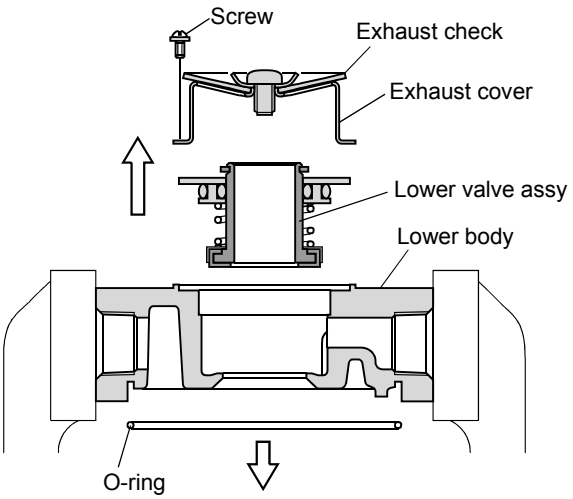


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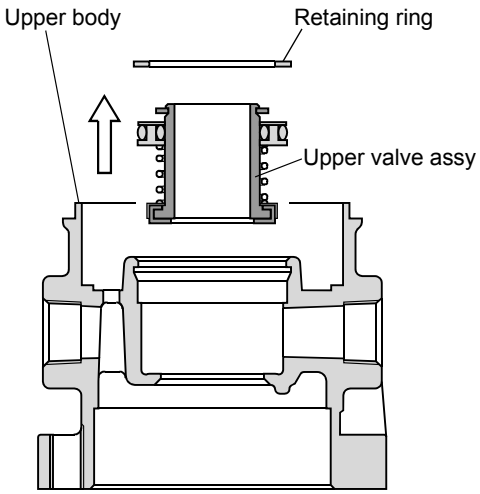
4. Remove the O-ring from between the upper body and lower body. Clamp the lower body in a vise, with the exhaust check facing up.

5. Unscrew the 4 screws, and remove the exhaust cover and lower valve assy.



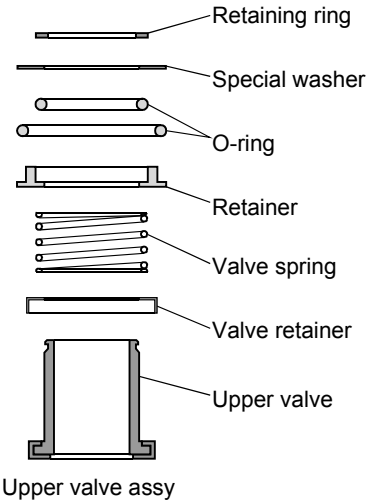
IW202-0010E13

6. Remove retaining ring from the groove inside upper body, and take out the upper valve assy.

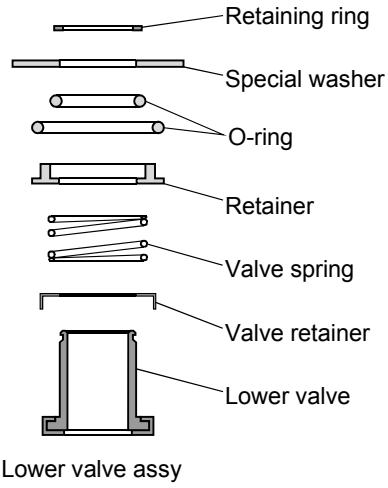


IW202-0010E14

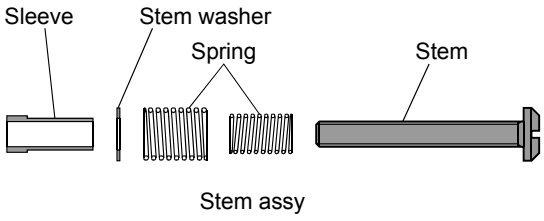
7. Disassemble the upper valve assy lower valve assy and the stem assy.



IW202-0010E15



IW202-0010E16



IW202-0010E17

5. Cleaning and checking

5.1 Cleaning

1. Cleaning the rubber parts by wiping with a cloth dampened with alcohol.

2. Wash all metal parts, except the mount plate, with trichloroethylene or other suitable cleaning agents.

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3.The mount plate incorporates an oilless alloy bush. Wash it with kerosene and dry it with compressed air.

5.2 Checking

1. Check the parts for cracks, deformation, etc., and check the sliding surfaces for dents; replace any faulty parts.
2. Examine the springs for corrosion, and replace if faulty.

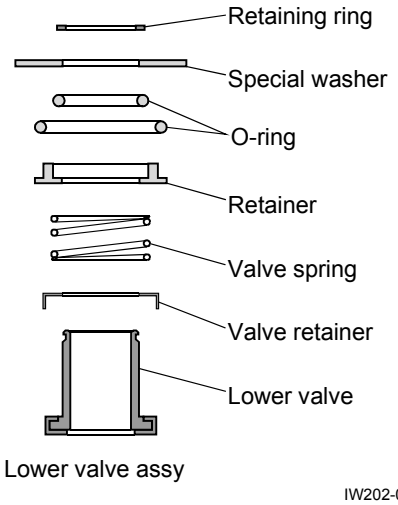
6. Reassembly

[NOTICE]

- ◆Apply lithium base grease (Idemitsu Daphne Coronex Grease EP2, or equivalent) to the valve sliding surface, body sliding surface, and the relay piston sliding surface.
- ◆When inserting O-rings, be sure to apply lithium base grease to them, (Idemitsu Daphne Coronex Grease EP2) and fill the O-ring groove with grease in advance.
- ◆Apply lithium base grease containing MoS_2 (bearing grease No.3 by Nippon Molybdenum, or equivalent) to the sliding surfaces of the plunger, and to the roller and fulcrums.

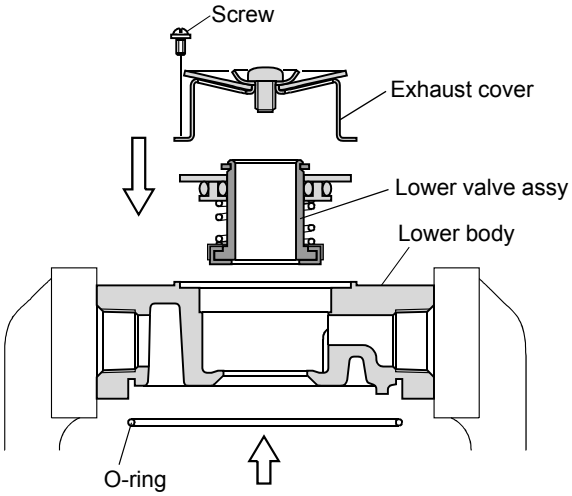
6.1 Reassembly of the secondary side

1. Place lower valve on the work bench with the valve seal side down; install valve retainer, valve spring, retainer with O-rings, and special washer, and secure with retaining ring.



IW202-0010E16

2. Build the lower valve assy into lower body.
3. Install exhaust cover, and secure with screw and washers. Pack grease in the groove in the surface of lower body which mates with upper body; install O-ring coated with grease.



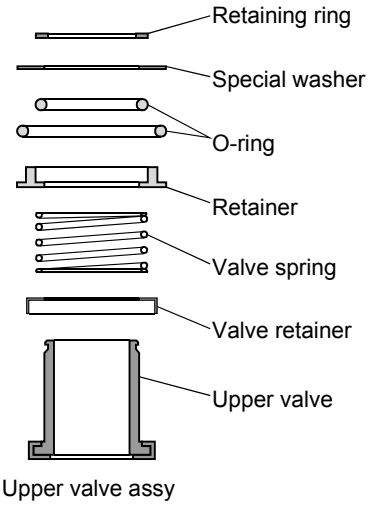
IW202-0010E18

6.2 Reassembly of the primary side

1. Place the upper valve on the work bench with the valve seat side down.
2. Install the valve retainer, valve spring, retainer with 2 O-rings, and special washer in sequence. Secure these parts with the retaining ring.

[NOTICE]

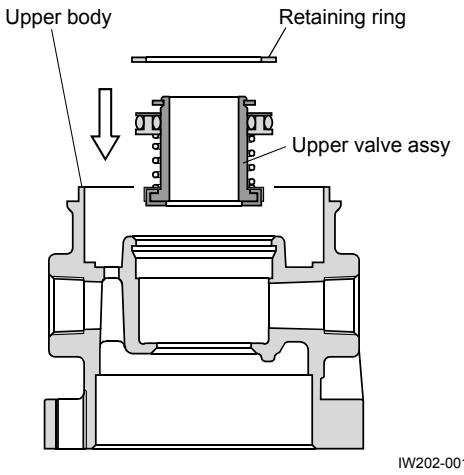
- ◆Apply grease to the O-ring.



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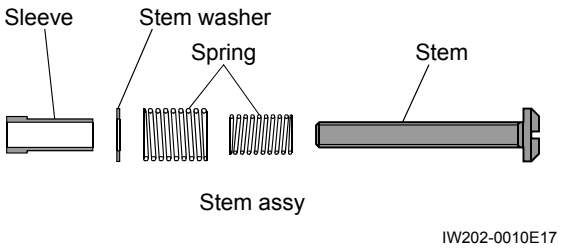
3. Insert the upper valve assy in upper body, and secure with retaining ring.



4. Put the springs, stem washer, and sleeve onto the stem, and tighten the sleeve.

[NOTICE]

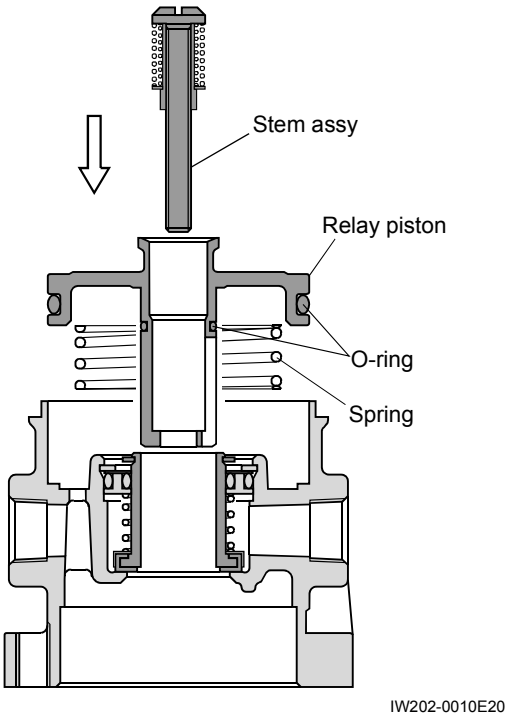
◆Apply grease to the springs.



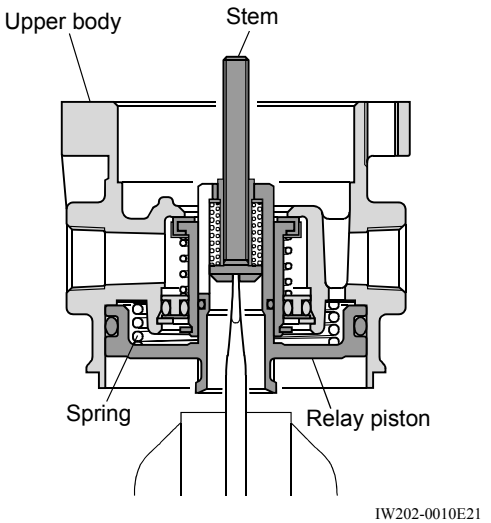
5. Install O-rings and on relay piston; insert spring, relay piston and the stem assy in this sequence into upper valve previously placed in upper body.

[NOTICE]

◆Be sure to apply grease amply to the O-ring and to their sliding surfaces.

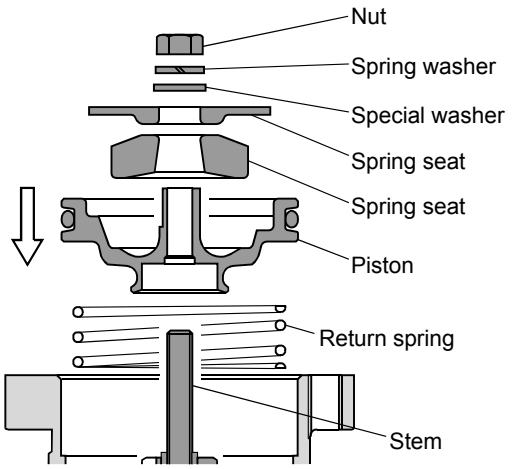


6. Holding relay piston by hand to prevent it from being pushed loose by spring, apply the screwdriver slit of stem to the blade of a screwdriver clamped in a vise.



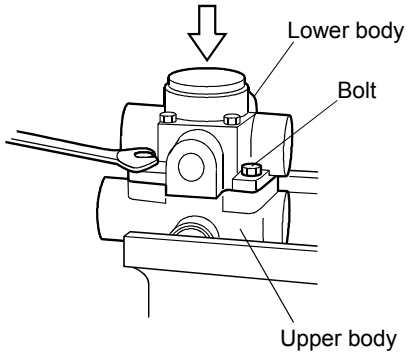
7. Install return spring, piston, rubber spring, spring seat, special washer, and spring washer in this sequence, and clamp them with nut.

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8. Clamp the upper body assy in a vise, put the lower body assy on it, and clamp them with bolts and washers.



IW202-0010E23

6.3 Reassembly of the mount plate

1. With the plunger boot on, install plunger in mount plate, and clamp them to upper body with three bolts and washers.

7. Test

[NOTICE]

- Test the brake valve for leaks and performance, with a pressure gauge measuring up to 981 kPa {142psi} or so connected to the delivery side, and with the supply pressure adjust to 684 kPa {100psi}.
- First, in the fully released state, make sure that the delivery pressure is zero for both upper lower sides. Then, check the following items for both upper and lower sides.

7.1 Air leakage through supply valve and exhaust valve

In the fully released state, the air leakage to the delivery port and the exhaust port combined should be less than 100 cm^3/min {6.1in^3/min}.
In the fully depressed state, the leakage to the exhaust port should also be less than 100 cm^3/min {6.1in^3/min}.

7.2 Air leakage in other parts

In the fully depressed state, there should be no leakage from the body, valve cap, and their joints.

7.3 Operation test

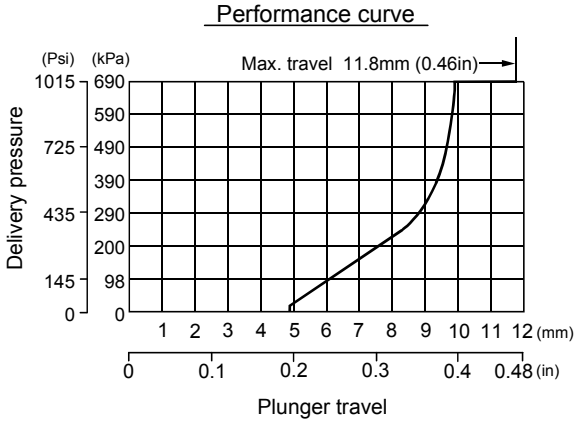
Thrust the plunger speedily into the fully depressed position, and then release speedily; the delivery pressure should rise and fall smoothly.

7.4 Performance test

Depress the pedal slowly from the free state to the fully depressed position, checking that the delivery pressure changes smoothly, roughly tracing the performance curve shown below.

Also check that when the upper delivery port pressure is at 98.1 kPa {14.2psi}, the lower delivery port pressure is over 78.5 kPa {11.4psi}. If these criteria are not met, the cause may be lack of grease on sliding parts or weakened springs.

Performance curve



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8. Maintenance standards

8.1 600-hour check

Disassemble the parts above the mount plate, wash and check them. Replace defective parts, and apply grease to the sliding surfaces.

8.2 2000-hour or 1-year check

Disassemble the valve, and clean all the parts. Replace all rubber parts. Replace metal parts that are scratched, worn, or otherwise damaged. Execute all the tests specified.

366-010-00001 ⚠1
366-045-10000 ⚠0

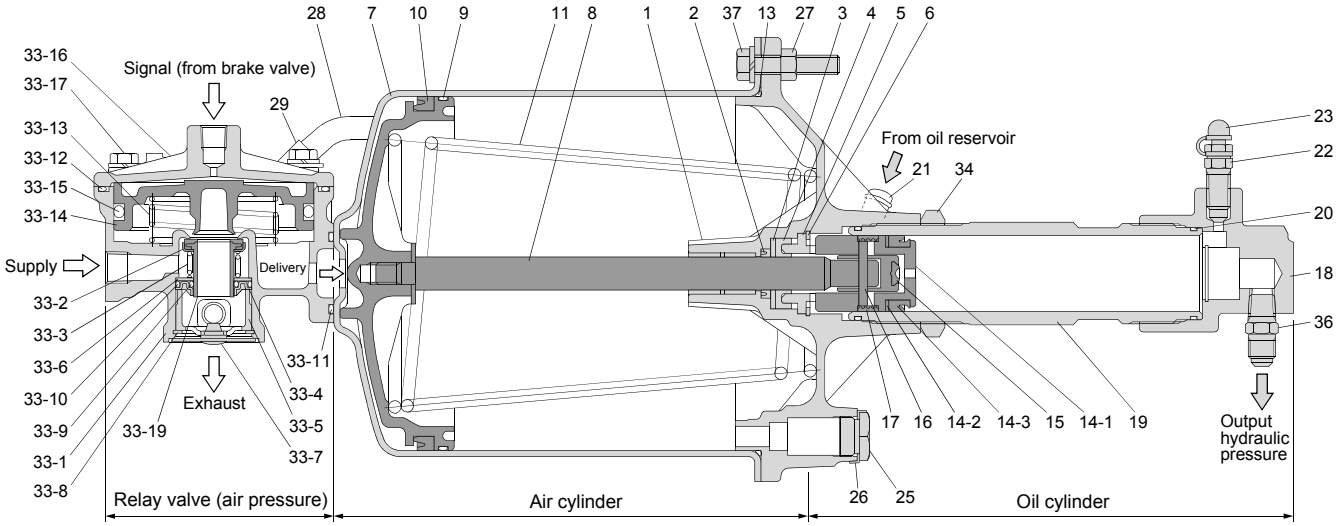
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T-4 Booster (Brake)

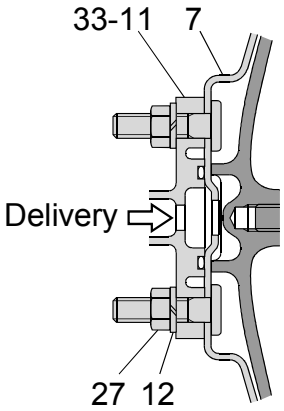
[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure

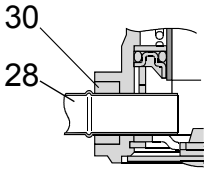


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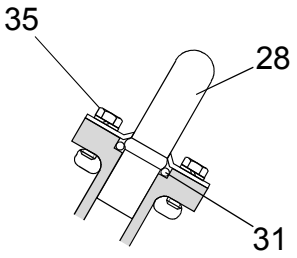
Joint section of relay valve and air cylinder

IW404-0010E02



Relay valve side of exhaust pipe (28)

IW404-0010E04

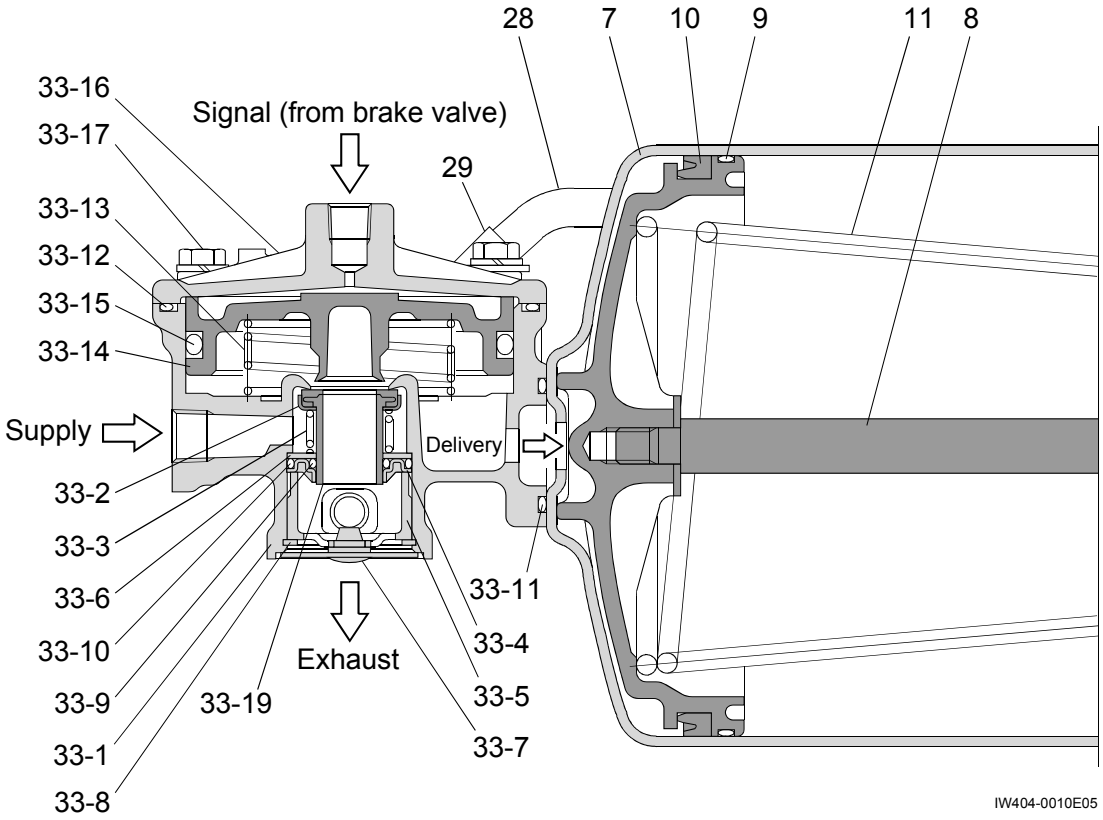


Air cylinder side of exhaust pipe (28)

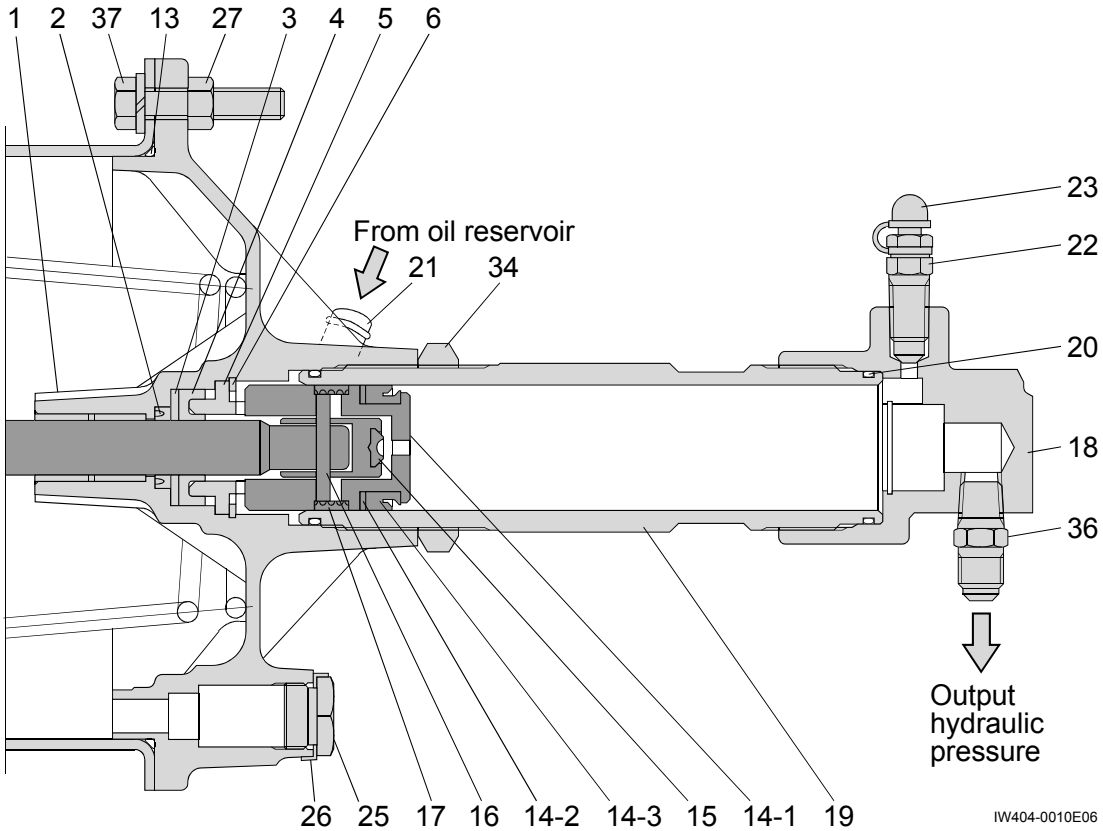
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Enlarged view of relay valve



Enlarged view of oil cylinder



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Booster (Brake)

[NOTICE]

◆When assembling the relay valve, apply appropriate amount of the silicon grease to the following places: sliding surfaces of the air piston (33-14) and valve (33-19); O-rings; O-ring grooves. When assembling the air cylinder, apply appropriate amount of silicon grease to the inner surface of the air cylinder (7), the outer surface of the air piston assy (8), air piston ring (9), and the air piston ring (10). When assembling the oil cylinder, apply appropriate amount of NIPPON GREASE NIGLUBE RX-2 to the outer surface of the air piston assy (8) rod, the inner surface of the casing (1) bush, the seal cups (2) and (4). Apply appropriate amount of CCI CCI #20 to the outer surface of the oil piston (14-1), backup ring (14-2), piston cup (14-3), inner surface of the oil cylinder (19) and oil cylinder O-ring (20).

1.Casing
2.Seal cup
3.Backup ring
4.Seal cup
5.Support ring
6.C-ring
7.Air cylinder
8.Air piston assy
9.Air piston ring
10.Air piston seal
11.Return spring
12.Spring washer
13.Cylinder seal
14-1.Oil piston
14-2.Backup ring
14-3.Piston cup
15.Valve
16.Piston pin
17.Pin holder
18.End cap
19.Oil cylinder
20.Oil cylinder o-ring
21.Pipe connector
22.Air bleeder screw
23.Cap
25.Plug
26.Lock washer
27.Nut
28.Exhaust pipe
29.Pipe holder
30.Seal rubber
31.O-ring
33-1.Body
33-2.Valve retainer
33-3.Valve spring
33-4.Valve holder
33-5.Valve spacer
33-6.Valve holder plate
33-7.Dust seal rubber
33-8.C-ring
33-9.O-ring
33-10.Valve holder o-ring
33-11.O-ring
33-12.O-ring
33-13.Return spring
33-14.Air piston
33-15.O-ring
33-16.Cover
33-17.Bolt
33-19.Valve
34.Lock nut
35.Bolt
36.Nipple
37.Bolt

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
18	-	118 - 147	87 - 108
21	-	20 - 39	14 - 29
22	-	12 - 20	9 - 14
25	-	20 - 29	14 - 22
27, 37	M10	25 - 29	18 - 22
33-17	M8	10 - 20	7 - 14
34	M50	118- 147	87- 108
35	M4	1.5 – 2.5	1 – 2
36	-	20 - 39	14 - 29

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2. Function

This booster receives pressurized air from the relay valve into the air cylinder, and outputs hydraulic pressure in proportion to the pneumatic pressure to the wheel cylinders and other members of the brake system. It comprises the following three major components.

1. Air cylinder
   The air cylinder incorporates air piston assy 8, return spring 11. The return spring side is always open to the atmosphere, and the opposite side is subject to the output pressure of the relay valve.

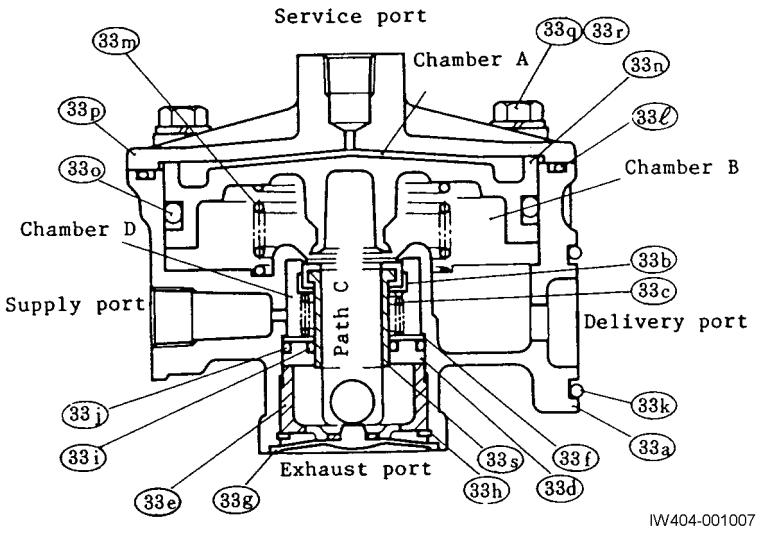
2. Oil cylinder
   Oil piston 14-1 is connected to air piston assy 8 by piston pin 16, via valve 15, and pin holder 17 prevents the pin from coming off. The pressurized oil in the oil cylinder is sealed by a tight fit between the valve in valve 15 and oil piston 14-1.

3. Relay valve
   This valve serves to make the brake applied and released quickly.

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3. Principles of operation

3.1 Relay valve



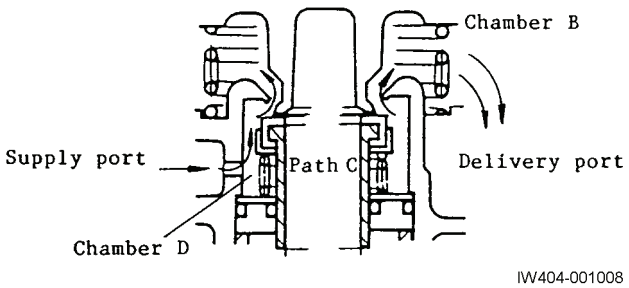
1. Booster not in operation

   The above figure shows the state of the relay valve when the booster is not in operation. Since chamber A is open to the atmosphere via the brake valve, piston 33n is held in its raised position by return spring 33m. In this state, chamber B is also open to the atmosphere through path C.

2. Booster in operation for assisting braking

   When the brake pedal is depressed, the signal pressure is applied to the service port. This pressure acts on piston 33n and the piston compresses return spring 33m, bringing the piston seat in contact with valve assy 33s. This causes chamber B to shut off path C, and simultaneously the valve assy is pressed down. As a result, the body seat opens, allowing compressed air to flow from chamber D to chamber B, to delivery port, and then to the air cylinder.

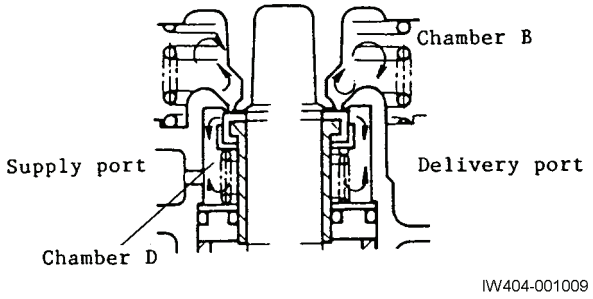
Booster in operation



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When the inside pressure in chamber B reaches the signal pressure level (same level as pressure in chamber A), the body seat comes in contact with valve assy 33s, shutting off the passage between chamber D and chamber B. Therefore, the pressure in chamber B does not increase.

Pressure in balance



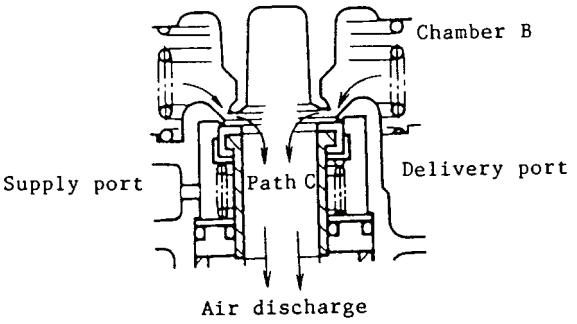
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When the signal pressure becomes higher, the above sequence is repeated, increasing the outlet pressure proportionately with the increase in signal pressure. In this manner, the pressure in chamber A is constantly balanced with that in chamber B during operation.

3. Booster in operation when releasing brakes

When the brake pedal is released slightly, the pressure in chamber A becomes lower than that in chamber B, causing piston 33n to be moved up. As a result, the piston clears from valve assy 33s, and the compressed air in chamber B is discharged to the atmosphere through path C, thereby decreasing pressure in the air cylinder. When the compressed air is discharged until the pressure in chamber A becomes equal to that in chamber B, piston 33n comes in contact with valve assy 33s again.
In this manner, the pressure in chamber A is constantly balanced with that in chamber B also when the air is discharged.

When brakes are released



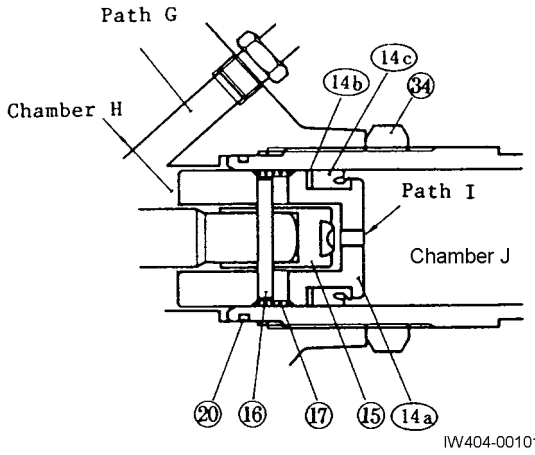
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4. Brakes completely released

When the brake pedal is released completely, the signal pressure becomes zero. The compressed air having been supplied to the air cylinder is discharged from chamber B to atmosphere through path C.
The relay valve is now in the booster non-operation state.

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3.2 Cylinder



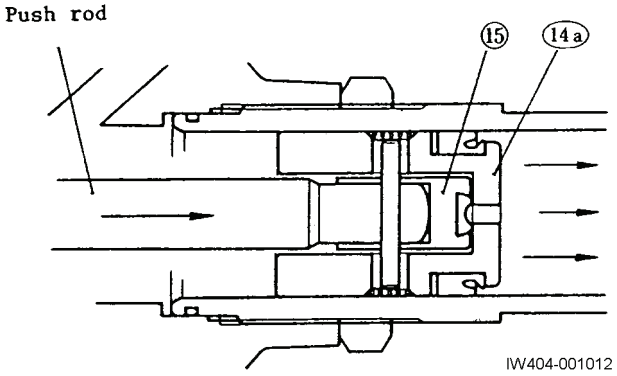
IW404-001011

1. Booster not in operation

When the booster is not in operation, the air cylinder are open to the atmosphere and air piston assy 8, therefore, is pushed toward the left of air cylinder 7 by return spring 11.
Under this condition, the valve 15 is clear of oil piston 14a, allowing brake fluid from the oil reservoir tank to flow to oil cylinder chamber J through path G, chamber H, clearance between oil piston 14a and valve 15, and path I.

2. Booster in operation

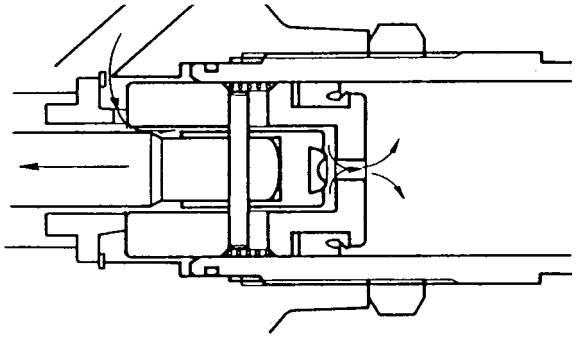
When the compressed air flows from the relay valve to the air cylinder, the air pressure causes air piston assy 8 to shift rightward. Valve 15 connected to the end of the push rod of air piston assy is moved rightward together with the air piston assy, and it comes into contact with oil piston 14a. This closes the center hole of the oil piston, closing the passage between the oil reservoir and chamber J.
As a result, according to the air pressure from the relay valve, a fluid pressure proportionate to the ratio of air cylinder diameter to oil cylinder diameter is generated.



IW404-001012

3. Brakes are released

When the compressed air in the air cylinder becomes open to the atmosphere through the relay valve, air piston assy 8, valve 15 and oil piston 14a are brought back to the positions corresponding to the booster non-operation state by return spring 11.
The brakes are now released.


IW404-001013

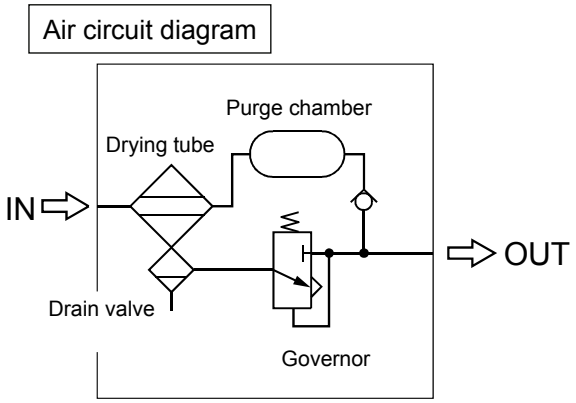
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T-5 Air Dryer

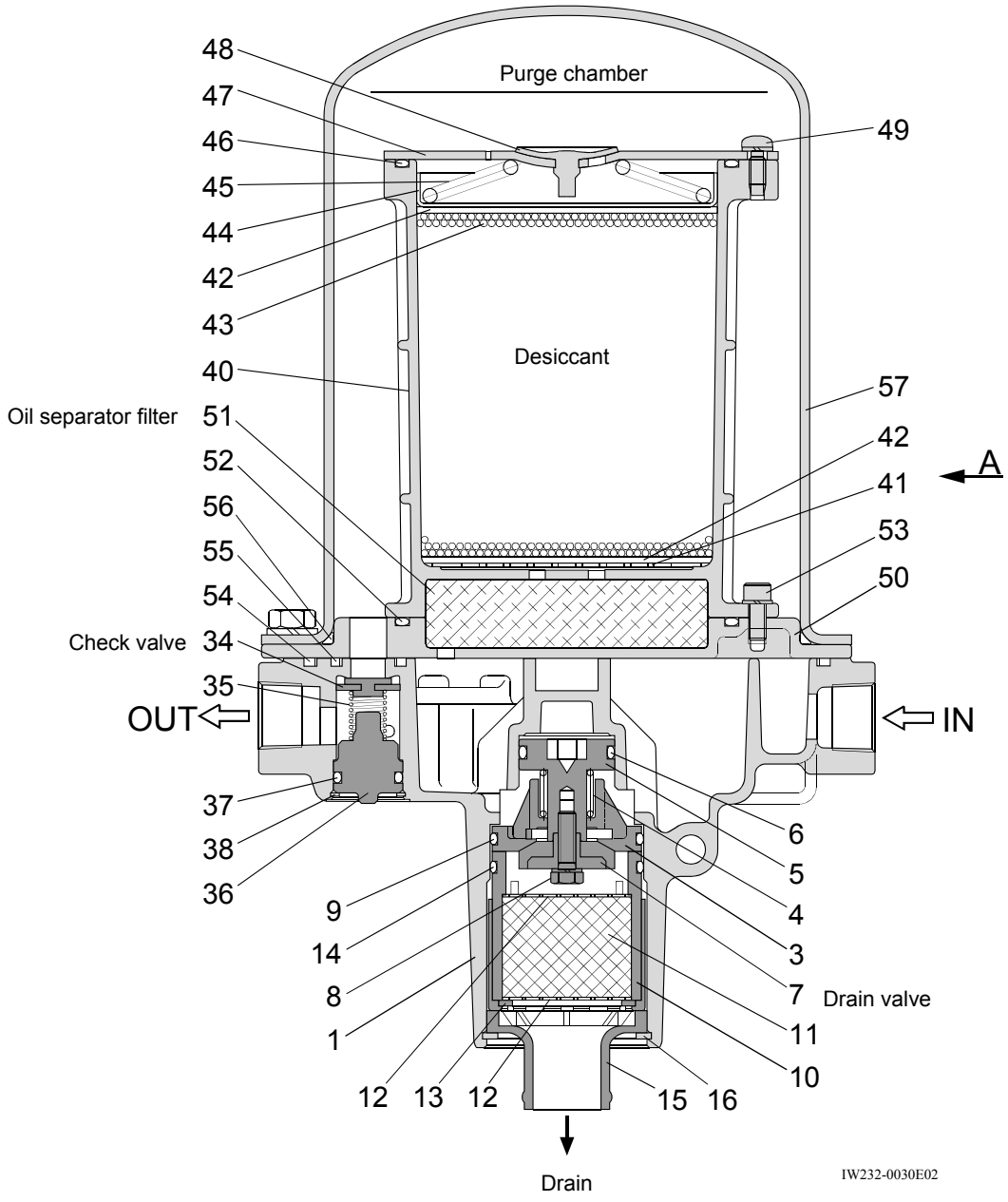
[NOTICE]

◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



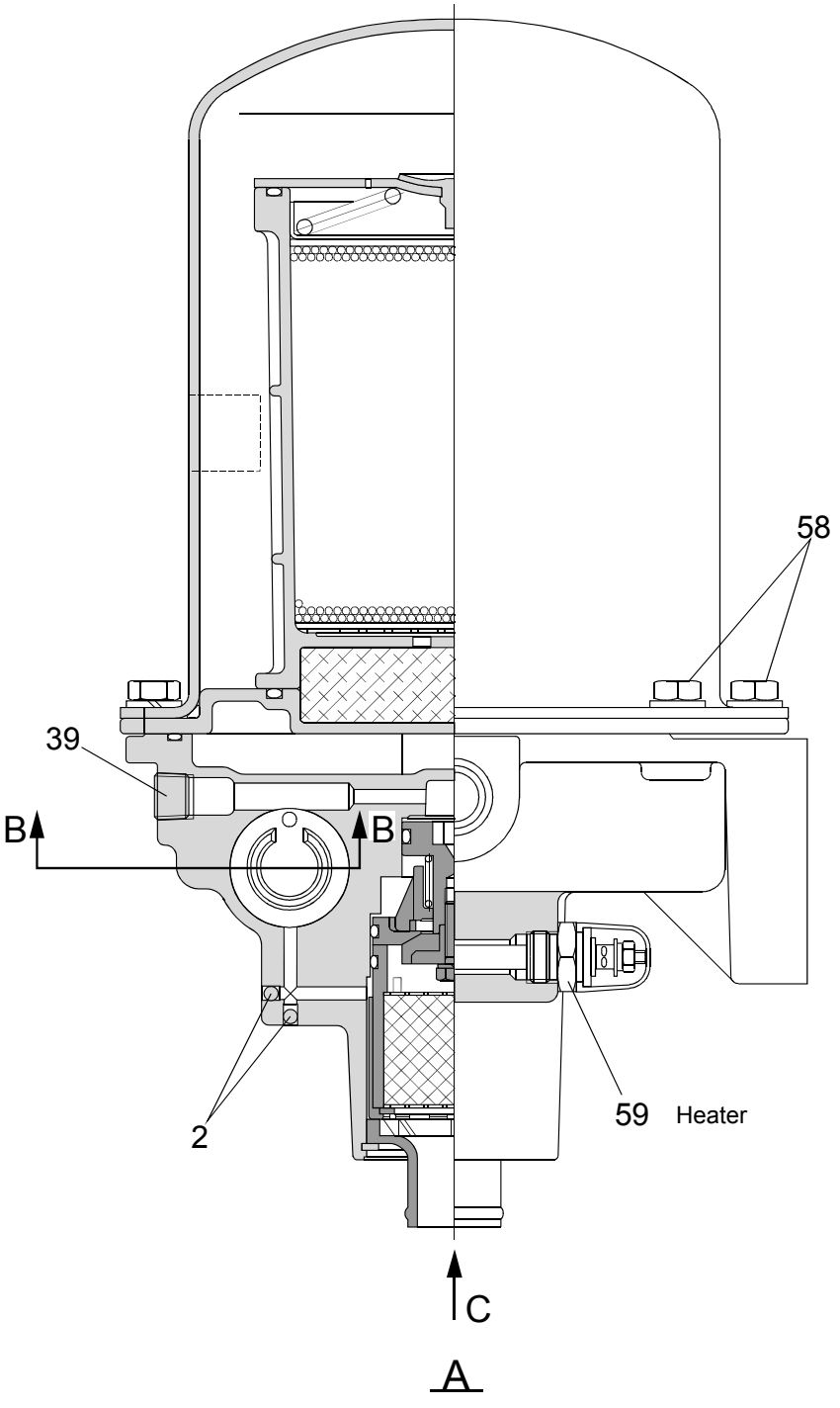
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IW232-0030E02

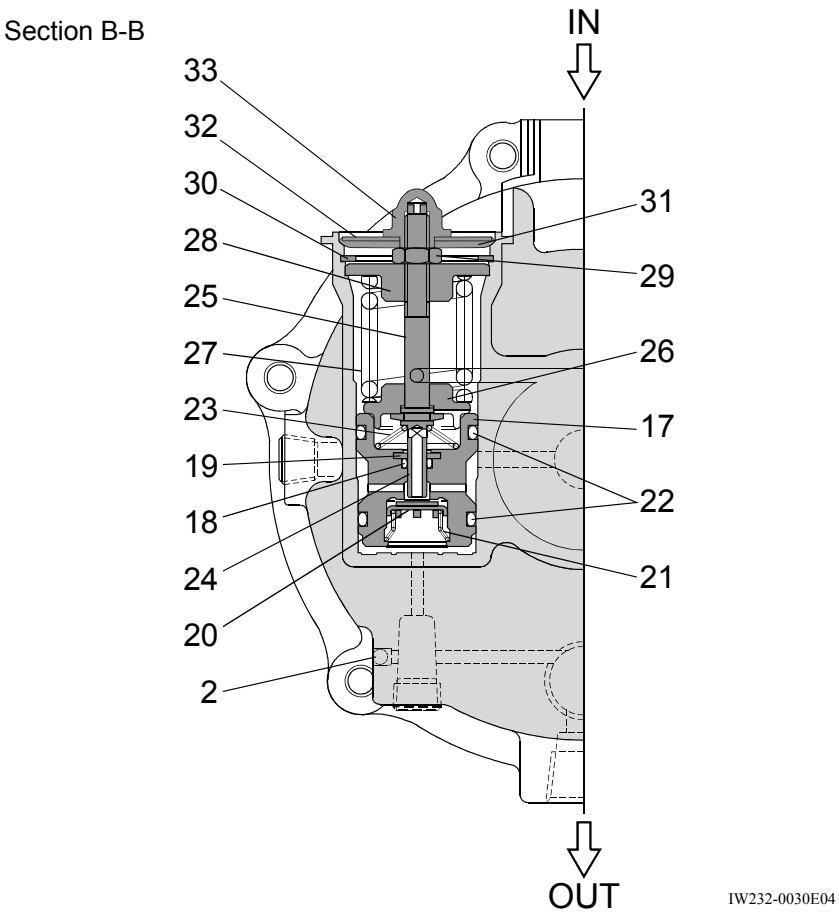
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View A

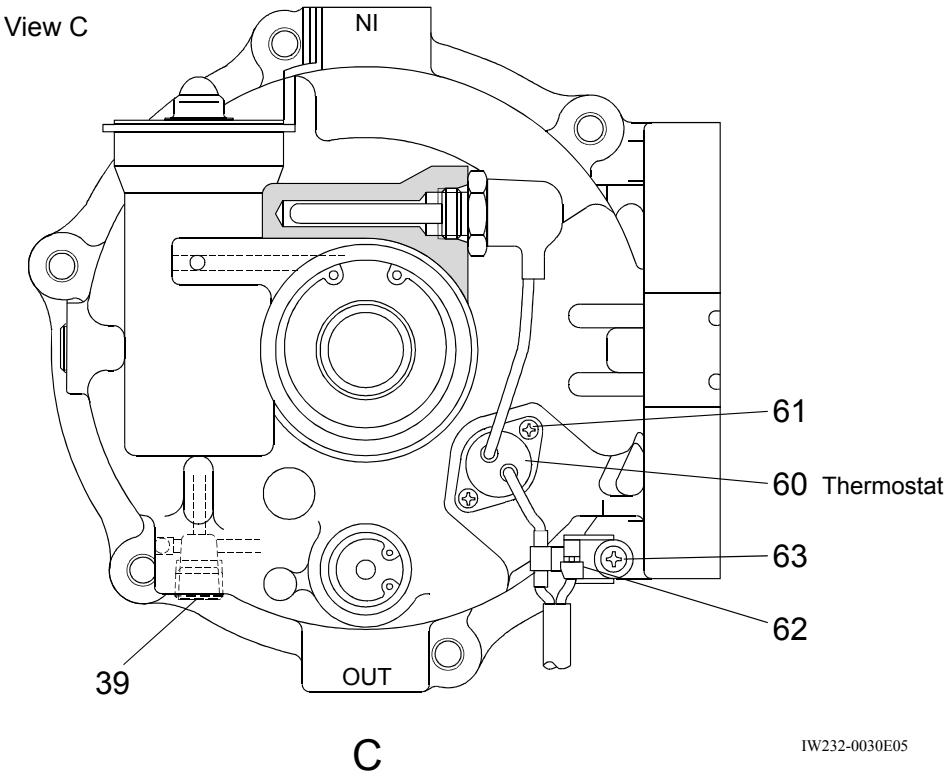


IW232-0030E03

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IW232-0030E04



C

IW232-0030E05

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1. Body
2. Steel ball
3. Valve body
4. Valve spring
5. Piston
6. O-ring
7. Valve
8. Bolt and washer
9. O-ring
10. Silencer case
11. Silencer
12. Silencer plate
13. Retaining ring
14. O-ring
15. Exhaust cover
16. Retaining ring
17. Piston
18. O-ring
19. Special washer
20. Governor valve
21. Valve spring
22. O-ring
23. Exhaust stem spring
24. Exhaust stem
25. Adjusting screw
26. Spring seat
27. Spring
28. Spring seat
29. Nut
30. Retaining ring
31. Seat
32. Plate
33. Cap nut
34. Check valve
35. Check valve spring
36. Check valve stopper
37. O-ring
38. Retaining ring
39. Plug
40. Case
41. Filter plate
42. Filter
43. Absorbent
44. Filter plate
45. Set spring
46. O-ring
47. Case cover
48. Check valve
49. Screw and washer
50. Cover
51. Oil separator filter
52. O-ring
53. Hexagon socket head bolt and washer
54. Gasket ring
55. Gasket ring
56. O-ring
57. Purge chamber
58. Bolt and washer
59. Heater
60. Thermostat
61.Screw
62. Cord clamp plate
63. Screw

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N - m	ft - lbf
IN, OUT	Rc 1/2	44 - 59	32.5 - 43.5
8	—	4 - 7	3 - 5
29	—	7 - 8	5 - 6
33	—	5 - 6	3.5 - 4.5
39	—	15 - 25	11 - 18
49	—	2 - 4	1.5 - 3
53	—	2 - 4	1.5 - 3
58	—	18 - 27	13 - 20.5
59	—	20 - 29	14.5 - 21.5
61	—	0.5 - 1	0.4 - 0.7
63	—	1 - 1.5	0.7 - 1.1
Mounting bolt	M10 × 1.25	15 - 23	11 - 16.5

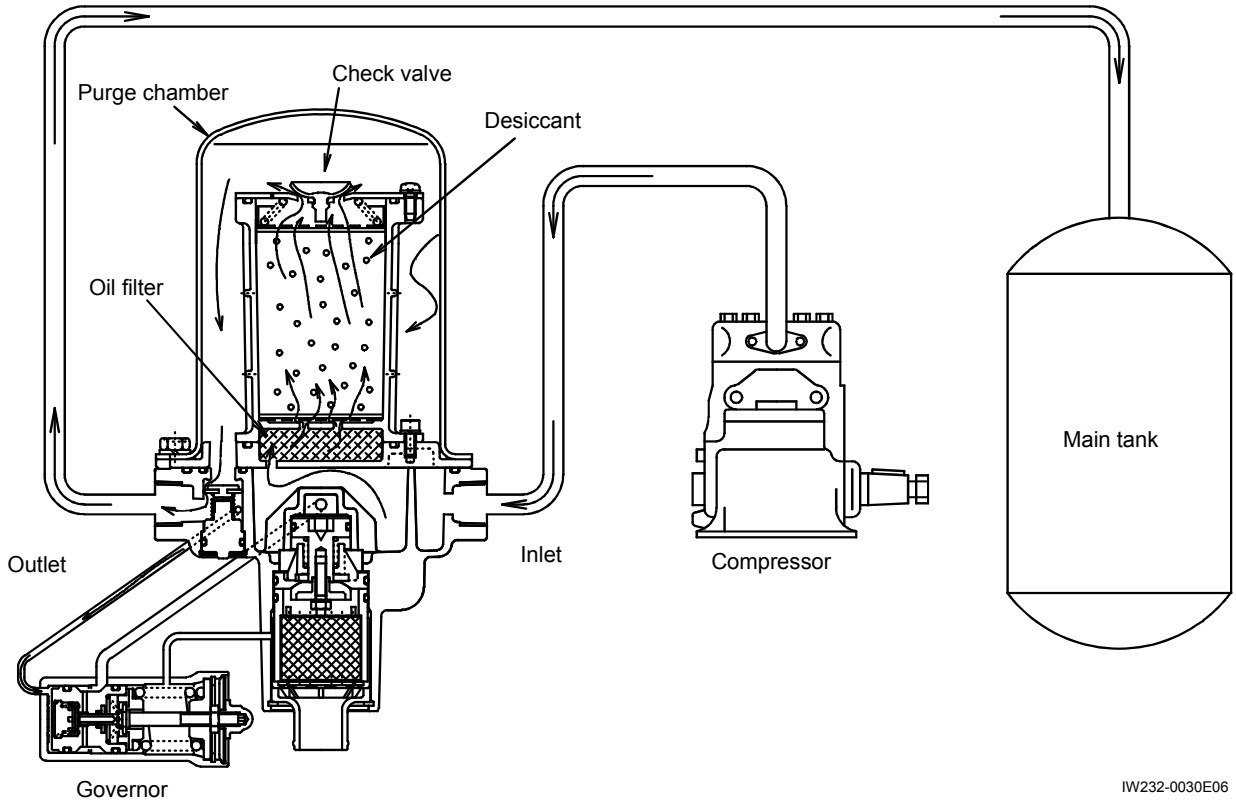
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2. Function

1. When the air pressure at the air dryer outlet port (air tank air pressure) reaches the specified release pressure, this governor sends that pressurized air to the control port, opening the air dryer drain valve.
2. When the air pressure at the air dryer outlet port has dropped to the specified intake pressure, the pressurized air at the control port is released to the atmosphere, closing the drain valve.

2.1 Dehumidification

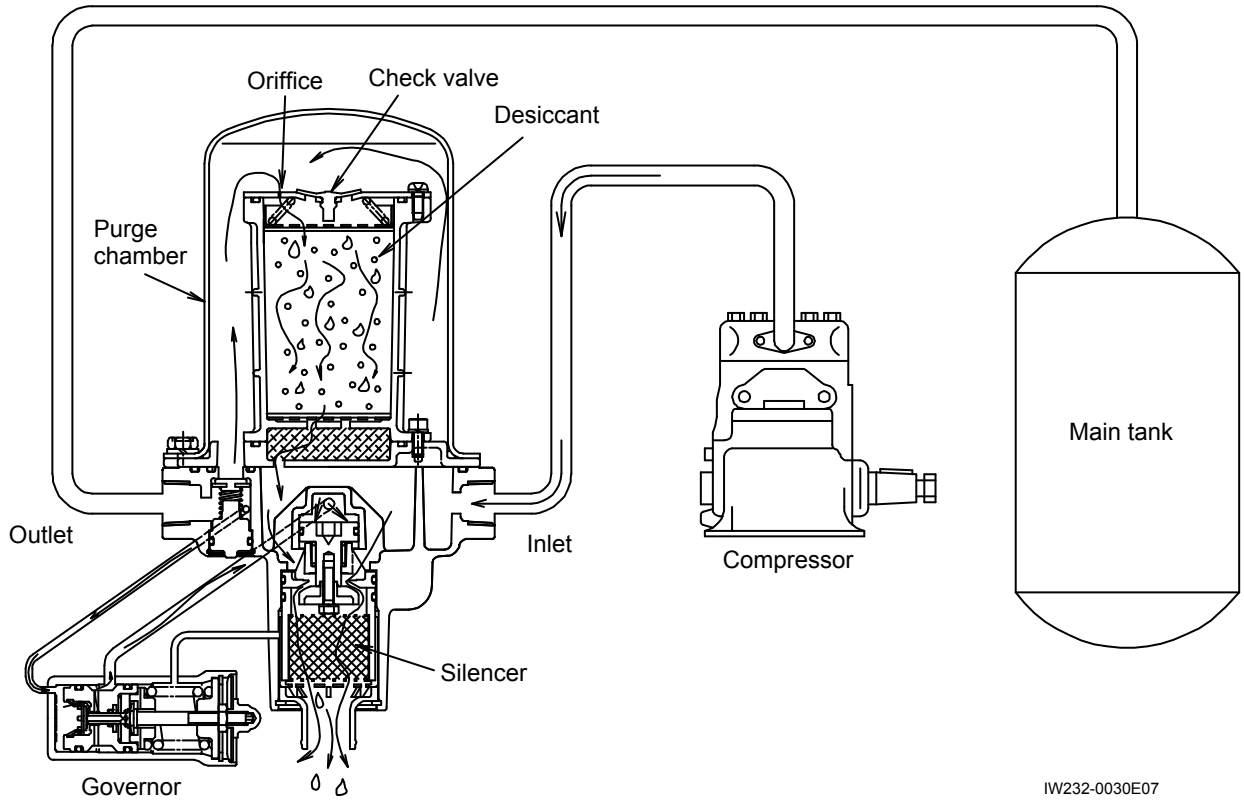
1. During the compressor load cycle, the air from the compressor enters the air dryer inlet port. The compressed air is cooled down as it flows along the body walls. This results in moisture and oil accumulating at the bottom of the body.
2. The air flows through a filter which includes an oil mist separator, which removes minute oil droplets and dust before the air enters the drying tube.
3. In the drying tube, the moisture in the air is removed by a desiccant that has a strong affinity for water.
4. As the air proceeds from the bottom of the drying tube to the top, it contacts a stronger desiccant, which further reduces the moisture. When the air reaches the top of the drying tube, it is dry air.
5. This dry air passes through the check valve and purge chamber at the top of the drying tube, and is supplied to the governor chamber and main tank via the outlet port check valve.



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2.2 Regeneration

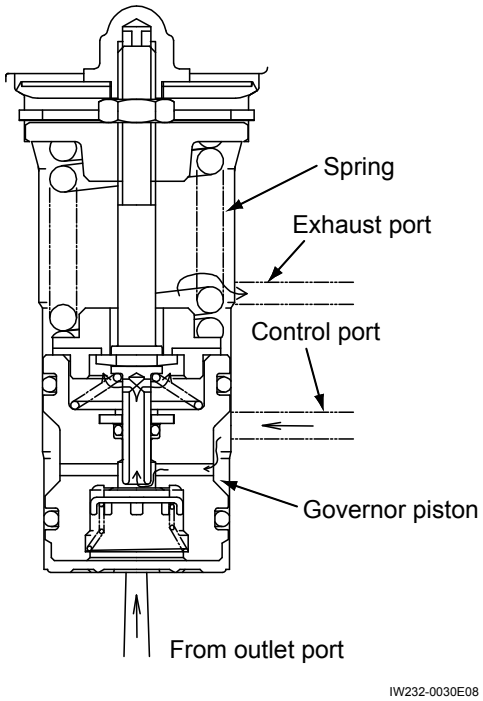
1. When the air pressure in the system reaches the upper limit pressure of the governor, the governor control pressure passes through the control line and opens the drain valve
2. At this time, the air in the drying tube is released into the atmosphere. Because it is released suddenly, the pressure in the drying tube cleans the oil filter and ejects the oil and water condensate into the atmosphere.
3. After the sudden decrease in pressure, the dry air in the purge chamber passes through the orifice, decompressing and expanding. It becomes super-dry air, which flows backwards through the drying tube, absorbing moisture from the desiccant carrying it out into the atmosphere, completing the regeneration of the desiccant.
4. In addition, because there is no feedback command to the compressor, the compressor continues to supply pressure. For this reason, this pressure is also ejected from the dryer into the atmosphere by the opening of the drain valve.
5. When the load cycle begins again, a command from the governor closes the drain valve, and the dehumidifying process starts.



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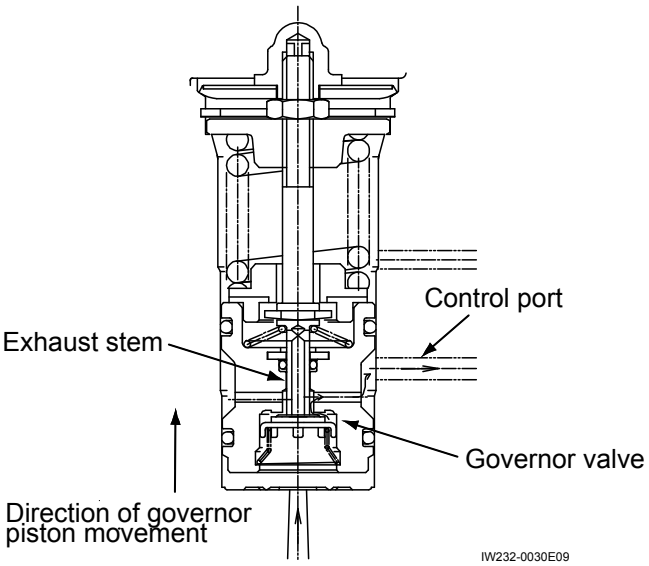
2.3 Intake position

1. The pressurized air from the air dryer outlet port (air tank pressurized air) travels through the passage and acts on the bottom of the governor piston.
2. When the air pressure is at or below the specified pressure, the governor piston is kept pressed down by the spring.
3. Under these conditions, the pressurized air in the control port passes through the exhaust stem and is released into the atmosphere.



2.4 Release position

1. When the outlet port air pressure (air tank air pressure) increases, and the force acting on the bottom of the governor piston becomes stronger than the force of the spring, the governor piston moves toward the spring side.
2. The exhaust stem is closed by the governor valve, and the control port air is cut off from the atmosphere.
3. When the outlet port pressure increases further, and reaches the release pressure, the governor piston moves farther to the spring side, and the governor valve is opened by the exhaust stem.
4. The pressurized air from the outlet port passes through the governor valve, and is delivered from the control port to the top of the air dryer drain valve, pressing the drain valve open.



5. The outlet port air pressure (air tank air pressure) gradually decreases. When it drops to the intake pressure, the governor piston is pressed back by the spring.
6. This closes the governor valve. The exhaust stem is disconnected from the governor valve, and the control port pressurized air passes through the exhaust stem to be released into the atmosphere. This closes the drain valve.

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3. Precautions for handling

⚠ WARNING

⚠ Never touch the desiccant with wet hands, or put the desiccant in your mouth. Doing so will cause heating of the desiccant, and can result in burns.

[NOTICE]

- ◆Be certain to use the desiccant specified by NABCO (part No. 41213640010), and replace it with an amount that is within the specified range.
- ◆Use of a desiccant other than that specified, or in amounts less than those specified, will not only reduce the moisture-absorption capability of the dryer, but can lead to degradation and loss of the desiccant and can greatly increase the likelihood of vehicle malfunctions.
- ◆Be aware that the desiccant used in DU-3 is of a different type than the desiccant used in DR-41, DR-42, and DU-4.
- ◆Be sure to perform tapping when inserting the desiccant.

1. If the vehicle has been parked for several hours in a cold location (-10°C (14°F) or below), wait at least 10 minutes before driving after starting the engine. (It takes time for the temperature to rise after the heater turns ON.)

2. Make sure that the unload time is 50 seconds or longer.
   (If the regeneration process is not performed, the moisture-removal capability of the desiccant is decreased, and the dryer function is lost.)

3. During unloading, air is continuously discharged from the air dryer exhaust port.
   This is normal, and is not a problem of air leakage.

4. Replace the desiccant every 1 year or 100,000 km (62140mi) of travel, whichever occurs sooner.

5. If drainage occurs from the air tank, disassemble the dryer, and replace the desiccant if 1/5 or more of the total desiccant is seeped in oil.
   (If the desiccant becomes seeped in oil, its ability to absorb moisture is decreased. Because this greatly affects dryer function, be sure to replace the desiccant if this occurs.)

4. Maintenance and inspections

⚠ WARNING

⚠ When performing inspections, use caution to prevent dirt from entering the eyes.

4.1 Daily inspection

1. Check for air leakage around the body, at pipe openings, and other locations.

2. To check that the air dryer is operating normally, open the drain cock on the air tank, and check that there is no drainage.
   (A small amount of drainage may accumulate if the temperature around the air tank has decreased by more than 17°C (62.6°F)).

3. In cases other than the above (drainage resulting from temperature change), if a small amount of drainage occurs, check the precautions for handling again.

[NOTICE]

- ◆If the desiccant becomes seeped in oil or other substance, its ability to absorb moisture is decreased. Because this greatly affects dryer function, be sure to replace the desiccant if this occurs.
- ◆It is recommended that you replace the filter at the same time as the desiccant.

4. If no abnormalities are found, disassemble the air dryer and check whether or not the desiccant is seeped in oil or other impurities. If 1/5 or more of the total desiccant is seeped in such substances, replace the desiccant.

[NOTICE]

- ◆Oil (liquid oil and carbonized oil) is contained in the compressed air that enters the air dryer. This will accumulate in the compressor and dryer piping, and inside the dryer itself. Because this oil may burn, be sure to perform cleaning periodically.

5. Pay attention to the drainage from the air dryer exhaust port. If an abnormal amount of oil is drained, inspect the compressor and take steps to prevent increases in the amount of oil.

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6. Use the on-board air pressure gauge to check that the pressure governor is operating at the specified pressure. Also check that there is no decrease in pressure when the brakes are not in use.

Governor switching pressure:

Load → Unload: 861 - 910 kPa {129.4 - 132.2psi}
Unload → Load: 740 - 780 kPa {106.7 -113.8psi}

4.2 Inspection and part replacement every 1 year or 100,000 km (62140mi) of driving

1. Disassemble the air dryer. Replace the desiccant, oil filter, filter, and all rubber parts, regardless of whether or not scratches or wear is visible on these parts.
2. Check that there are no abnormalities in the piping and wiring.

[NOTICE]

- Corrosion of metal parts can result in air leakage when the corrosion falls off and becomes caught in the valves.
- These inspections and maintenance are to be performed when either the travel distance or installation time is reached, whichever occurs first.

3. Check all metal parts for corrosion. Repair or replace them as necessary.

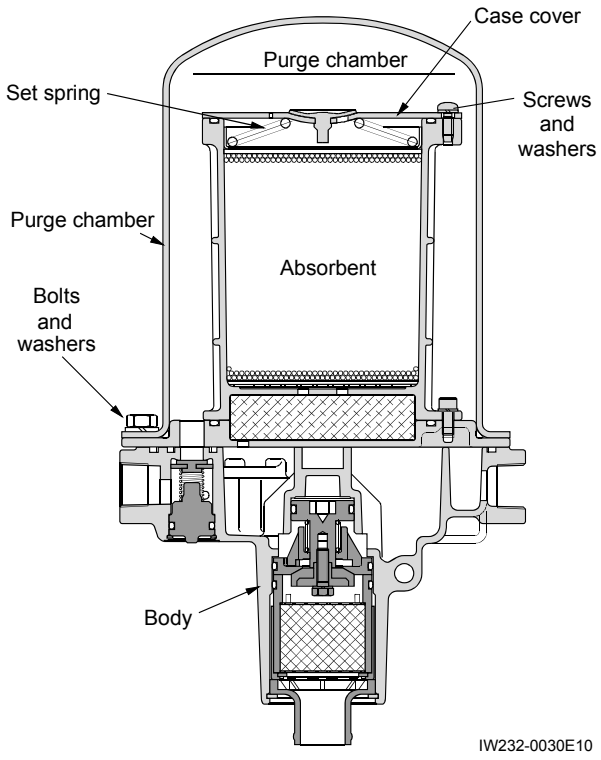
5. Disassembly

5.1 Removing DU-3

1. Block the wheels without using the pneumatic circuit.
2. Open the drain cock on the air tank. Discharge the air from the brake piping.
3. Disconnect the thermostat wiring.
4. Disconnect all the wires (IN, OUT, CONTROL) from the air dryer.
5. Loosen the three bolts to remove the UD-3.

5.2 Disassembly of cartridge

1. Anchor the DU-3 body-1 in a vise. Unscrew the bolts and washers that fasten the purge chamber to the body, and remove the purge chamber.



2. When the purge chamber is removed, cartridge assy through containing the desiccant is exposed. Directly remove the cartridge assy upward by hand.

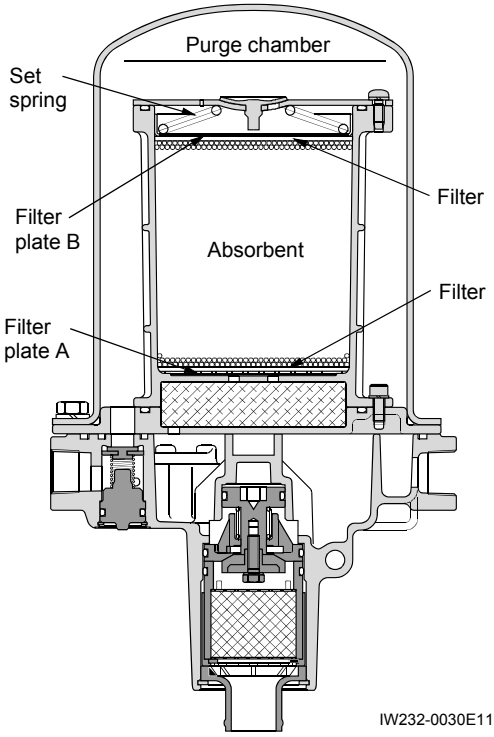
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CAUTION

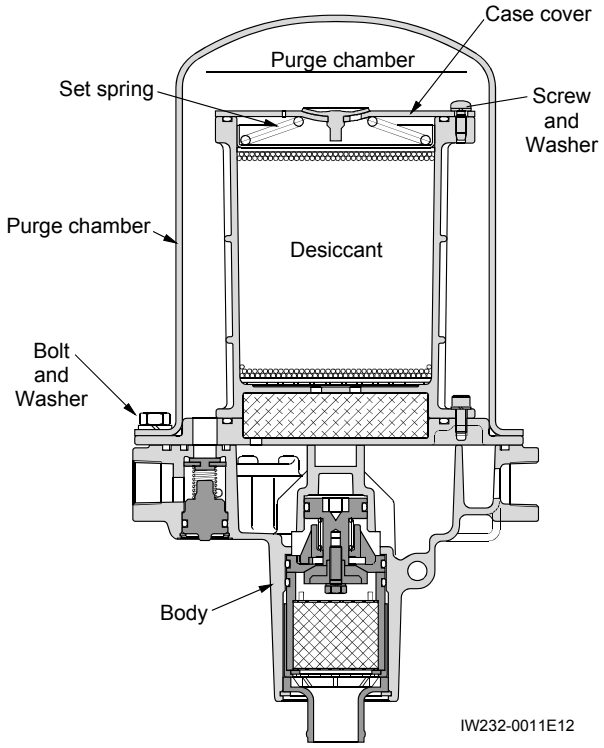
⚠ Keep pressing on the case cover with your hand until all screws and washers have been removed.
The case cover can be extremely dangerous if the set spring inside causes the cover to jump up and strike a person in the face or other body part.

3. Use your hand and press from above on the case cover attached to the desiccant case. At the same time, use a Phillips screwdriver to unscrew and remove the 4 screws and washers.

4. Remove set spring, filter plate B, filter, desiccant, filter and filter plate A from above the case.



5. Use a 4 mm hex wrench to unscrew and remove the 4 hexagon socket head bolts and washers.



6. Press the cover with your hand, and lift the case up to remove it. Remove the oil separator filter that is inside.

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6. Reassembly

[NOTICE]

◆With the exception of rubber parts and the desiccant, wash all disassembled parts well with clean oil and wipe off all adhering substances.

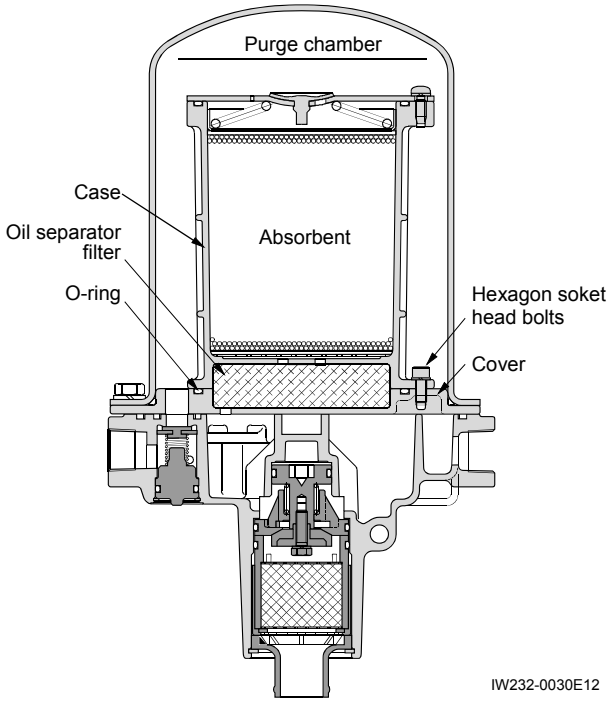
⚠ WARNING

⚠ Be certain to use the specified NABCO desiccant (41213640010).
Use of a desiccant other than that specified is extremely dangerous. It can result in the desiccant deteriorating and being lost, with pieces blocking the brake piping and preventing normal brake operation.

⚠ The desiccant used is different than that used for NABCO DR-41, DR-42, and DU-4. Be careful not to use the wrong type.

6.1 Cartridge (lower)

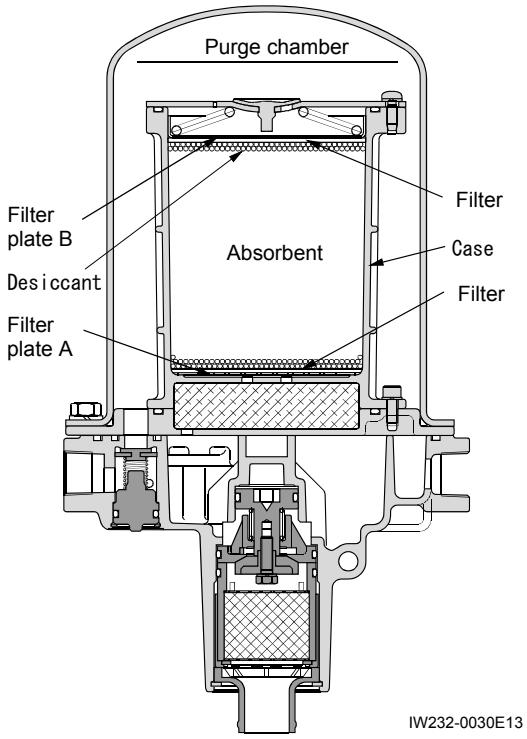
1. Install the oil separator filter in the center of the cover, and install the O-ring into the groove.



2. Place the case in position, and use a 4 mm hex wrench to tighten the hexagon socket head bolts and washers.

Tightening torque: 2.0 - 3.9 N-m
(1.5 - 2.9 ft-lbf)

3. Insert filter plate A and the filter into the case. Insert the filter so that the soft surface is on top.



4. Insert the specified amount of desiccant. The specified amount is 590 - 619 cm^3 (36 - 37.8in^3) [480g (1.06lb)]. Insert the entire bag of desiccant that was purchased for use with the repair kit.

⚠ DANGER

⚠ If less than the specified amount of desiccant is used, the desiccant may deteriorate and be lost, with pieces blocking the brake piping and preventing normal brake operation. Be sure to insert the specified amount.

5. Next insert the second filter, this time with the soft surface on the bottom. Then place filter plate B in position and perform tapping.

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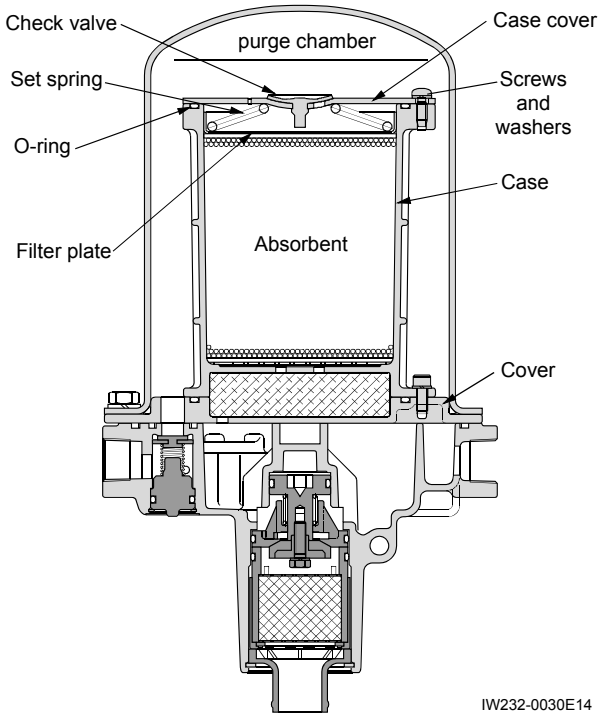
6.2 Tapping

⚠ DANGER

⚠ When tapping is not performed, the desiccant may deteriorate and be lost, with pieces blocking the brake piping and preventing normal brake operation.
Be sure to follow the procedure below when performing tapping.

[NOTICE]

- When tapping, place 2, 3 sheets of shopcloth or other soft cloth on top of one another at the tapping location to prevent the cover from being scratched.



1. While pressing on filter plate B with both hands, lift the entire case up approximately 10 cm (4in).
2. Next, gently tap the raised case against the workbench. At this time, do not let go, and lower your hands with the case.
3. Repeat steps 1 and 2 approximately 30 times. Check that the position of filter plate B is 4 - 6 mm (1.5 – 2.4in) below where it was initially. When this is verified, the work is complete.

6.3 Cartridge (upper)

[NOTICE]

- Applying grease to the raised part of the check valve will allow it to be inserted more easily.
- Use NABCO grease (grease pack 45499030090, grease weight: approximately 10 g (0.022lb).

1. Fit the check valve into the case cover by pressing on the center bulge with your thumb.
2. Install the O-ring onto the case, then insert the set spring. Tighten the screws and washers while pressing down on the case cover with your hand.
   Tightening torque: 2.0 - 3.9 N-m
   (1.5 - 2.9 ft-lbf)

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7. Troubleshooting

[NOTICE]

- ◆Be sure to perform daily inspections and periodic maintenance, as described in 4. Maintenance and Inspections.
- ◆If any of the below symptoms or malfunctions occur, follow the remedy procedures listed below to inspect and correct the problem

Symptom	Probable cause	Remedy
Condensate flows out from the air tank.	The amount of oil increase in the compressor is abnormally large. 1/5 or more of the desiccant is seeped in oil and its ability to absorb moisture has decreased.	Replace the desiccant. Also take steps to prevent the increase of oil.
	Because the amount of desiccant is too little, its ability to absorb moisture is insufficient.	Insert the specified amount of desiccant. (Specified amount: 590 - 610 cm^3 (36 - 37.2in^3))
	Because the type of desiccant is wrong, its ability to absorb moisture is insufficient.	Insert the specified type of desiccant. (Be aware that the type is different than that used with DR-41, DR-42, and DU-4.)
	The amount of air consumed is too large, and has exceeded the moisture-absorbing capability range of the desiccant.	Reduce the amount of air consumed in 1 loading/unloading cycle. {The maximum amount of air that can be processed for moisture-removal is 93 L [25gal(us)] /cycle.}
	The drain valve is not opening, and regeneration of the desiccant is not being performed.	Check the governor discharge pressure. If it differs from the specified value, adjust or replace the governor. • Disassemble and inspect the valve operation parts. Remove any foreign substances that are found. • If the drain valve is frozen, check for a open circuit in the heater, thermostat failure, missing wire, or other problem. Replace parts or connect wires securely.
	If the dryer inlet temperature is higher than 60°C (140°F), moisture absorption will be insufficient.	Make arrangement to reduce the inlet temperature to less than 60 °C (140°F).
	If the desiccant has not been replaced for a long time, and 1/5 or more is seeped in oil, its ability to absorb moisture will decrease.	Replace the desiccant every 1 year or 100,000 km (62140mi) of travel, whichever occurs sooner.

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Symptom	Probable cause	Remedy
Condensate flows out from the air tank.	If the purge time is too short, the desiccant regeneration capability will be reduced.	Inspect the check valve and O-ring. (Purge time should be approximately 35 seconds from 890 kPa (129psi) to 0 kPa (0psi).)
	If the pressure in the purge chamber is too low, the desiccant regeneration capability will be reduced.	Check the governor discharge pressure. If it is different from the specified value, adjust or replace the governor.
No condensate is discharged from the exhaust port.	The drain valve is frozen and will not open.	If there is an open circuit in the heater, replace the heater. (Check the continuity with a tester.) • If there is a thermostat failure, replace the thermostat. (Leave at 0°C (32°F) or less, then check the continuity with a tester.) • Check that no wires have been disconnected. • If left for a long time in a cold environment, time will be required for the temperature to rise after the heater is turned ON. (Approximately 15 - 20 minutes to rise -20°C - 0°C (-4°F - 32°F.)
	If the governor discharge pressure is 490 kPa (71psi) or less, the drain valve will not open.	Check the governor discharge pressure. If it differs from the specified value, adjust or replace the governor.
	A foreign substance (carbonized oil) has entered during the valve operation, preventing valve operation.	Disassemble and inspect the valve operation parts. Remove any foreign substances that are found.
Air leaks from the exhaust port.	The drain valve is frozen and will not close.	If there is an open circuit in the heater, replace the heater. • If there is a thermostat failure, replace the thermostat. • Check that no wires have been disconnected. • If left for a long time in a cold environment, time will be required for the temperature to rise after the heater is turned ON.
	A foreign substance has been caught in the valve, preventing it from sealing.	Disassemble and inspect the valve, and remove any foreign substances. If the valve seal surface is scratched, replace the valve component or valve body.

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Symptom	Probable cause	Remedy
Main tank pressure drops abnormally when the compressor is unloaded.	If the air dryer outlet check valve fails to function, the air in the main tank flows backwards and out through the air dryer.	Disassemble and inspect the air dryer outlet check valve. If necessary, replace the check valve.

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T-6 Brake (Parking Brake)

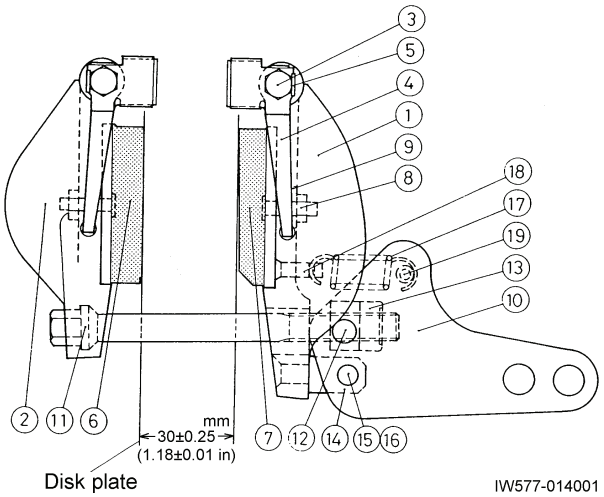
[NOTICE]

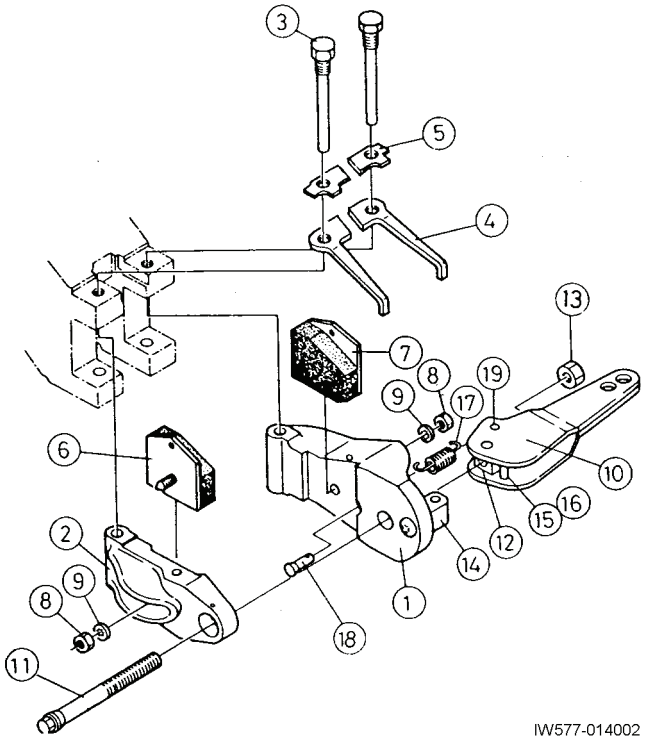
◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure and function

Inner pad carrier 1 and outer pad carrier 2 are mounted to the mounting bracket by means of respective pad carrier bolts 3, and pad assy 6 and 7 are mounted to the respective pad carriers with special bolts integral with the pads and nuts 8. Lever assy 10 is connected to inner pad carrier 1 with pivot seat 14, and lever assy 10 incorporates trunnion 12 and spring support pin 19. Hand brake bolt 11 is screwed into self lock nut 13 to serve as an element in the actuating train for pad assy 6 and 7. Return spring 17 between inner pad carrier 1 and lever assy 10 serves to return lever assy 10.

The clearance of pad assy 6 and 7 is automatically adjusted by means of the elastic-plastic property of retraction plates 4, which must be replaced when the pads are replaced.





1. Inner pad carrier
2. Outer pad carrier
3. Pad carrier bolt
4. Retraction plate
5. Tab washer
6. Pad assy
7. Pad assy
8. Nut
9. Toothed lock washer
10. Lever assy
11. Hand brake bolt
12. Trunnion
13. Self lock nut
14. Pivot seat
15. Pin
16. Cotter pin
17. Return spring
18. Spring anchor
19. Spring support pin

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2. Replacing pad

⚠ WARNING

⚠Be sure to immobilize the vehicle before starting to work.

⚠ CAUTION

⚠Make sure that the run out of the disk plate is less than 0.15 mm (0.006 in) at the center of the pad sliding surface.

[NOTICE]

◆The pads should preferably be replaced in a set of two. If only fully worn one is replaced, the other one would require replacement soon, and in this way, the checking and changing intervals would become short.

1. With the parking brake lever in the release position and the brake chamber in the extension sided stroke end, disconnect lever assy 10 from the brake chamber push rod.
2. Move the parking brake lever to the braking position to return the brake chamber push rod.
3. Loosen hand brake bolt 11 to free retraction plate 4.
4. Unfold the tab of tab washer 5, unscrew pad carrier bolts 3 with a wrench, and remove them together with retraction plate 4.
5. Remove one of the pad carriers from the mounting bracket and replace the pad with a new pad. To replace the pad, first, unscrew hexagon nut 8 with a wrench and remove together with toothed lock washer 9, and then, withdraw the worn pad along the fixed bolt hole. Install a new pad by reversing the procedure. Replace also the toothed lock washer 9 and hexagon nut 8.
6. Replace the other pad similarly.

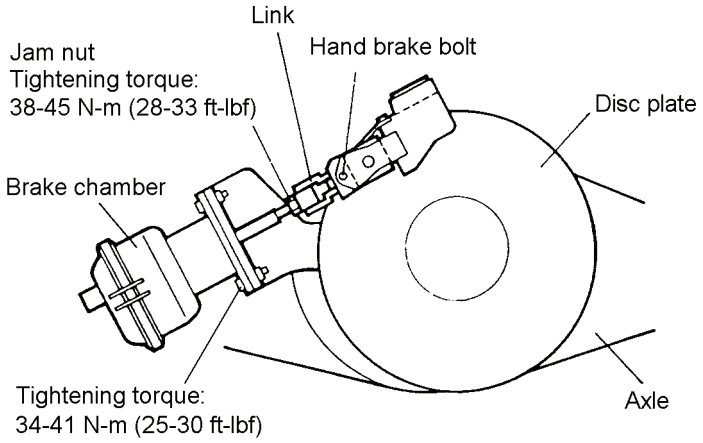
[NOTICE]

◆At this time, if the clearance between the pad and the disc plate is too narrow to adjust, loosen the hand brake bolt.

7. Set pad carrier 1 and 2 with new pads to the mounting bracket, and install pad carrier bolts 3 together with new retraction plates 4 and tab washers 5.
8. Fold one tab of tab washers 5 to lock pad carrier bolts 3.

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3. Remounting



3.1 Connecting parking brake to spring chamber

1. Adjust the clearance between the pad and the disc plate to approximately 0.15 mm (0.006 in) per side with the hand brake bolt.
2. Move the lever to release the parking brake and bring the brake chamber to the extension stroke end, and connect the link to the lever by adjusting its position. Then, check the clearance between the pad and the disc plate. It must be approx. 0.15 mm (0.006 in) per side. If the clearance is correct lock it with the jam nut.

3.2 Adjusting parking brake clearance

1. Move the parking brake lever to the release position to bring the brake chamber into the extension side stroke end.
2. Screw the hand brake bolt in accordance with the pad wear, until the clearance between the pad and the disc plate becomes approx. 0.15 mm (0.006 in) per side.
   when it becomes impossible to adjust the clearance by the hand brake bolt, readjust the brake in accordance with the preceding paragraph, “ 3.1 Connecting parking brake to spring chamber ”

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4. Check

⚠ WARNING

⚠When the brake has been used as emergency brake, adjust the pad clearance as soon as the use is terminated.

⚠When the clearance between the pad and the disk plate is set to 0.15 mm (0.006 in) per side before starting to use, the brake can be used without adjusting the hand brake bolt, until the pad wears approx. 2.0 mm (0.079 in).
When the brake wears more, the trunnion fouls the pivot seat to make the brake ineffective, and at the same time, undue force is applied to the pivot seat to break it. Adjust the clearance in time.

1. The pad assy consists of a backing plate and wear material, and they are 3.2 mm (0.126 in) and 10.5 mm (0.413 in) respectively in thickness when new (total: 13.7 mm (0.539 in)).
   Since change in thickness by wear changes the stroke, adjust the hand brake bolt according to the pad wear from time to time.

⚠ CAUTION

⚠If the wearing condition is not regularly checked, the inner and outer pad carriers may foul the disk plate to damage it, making its replacement necessary.

2. The use limit of the pad assy is considered to be reached when the remaining thickness of the wear material has become 3.8 mm (0.150 in), that is, the total thickness has become 7 mm (0.276 in), at any part.

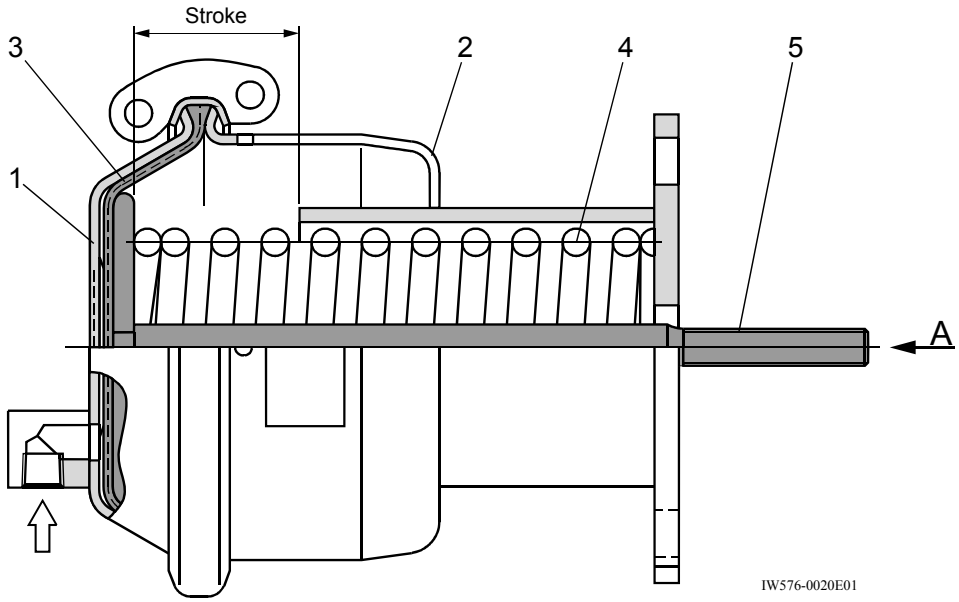
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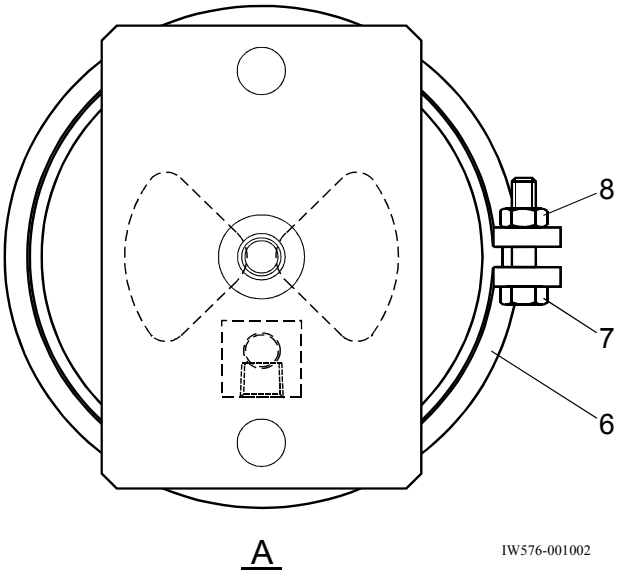
T-7 Brake Chamber

[NOTICE]

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1. Structure





1. Pressure plate
2. Non pressure plate
3. Diaphragm
4. Spring
5. Push rod
6. Clamp ring
7. Bolt
8. Nut

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N - m	ft - lbf
7, 8	—	9.8 - 14.7	7.2 - 10.8

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2. Function

1. When compressed air is introduced behind the diaphragm, it pushed the diaphragm, and the push rod to release the brake.
2. When the compressed air is freed to the outside air, the push rod is pushed back by a strong return spring, puling the brake lever to effect the parking brake.

⚠ DANGER

⚠Never attempt to disassemble without using the special jig. Doing so is extremely dangerous.

⚠The spring is powerful. Be sure to use the special jig to pull the push rod out approximately 5 mm before disassembling.

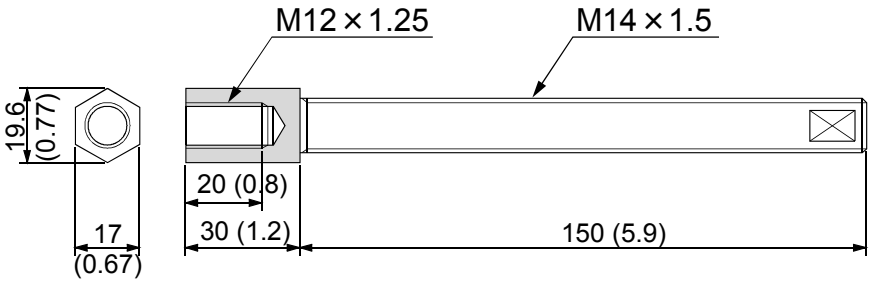
3. Disassembly

[NOTICE]

◆Mark the clamp bolts, non-pressure plate, and pressure plate with alignment marks before disassembling, so that they can be aligned correctly during reassembly.

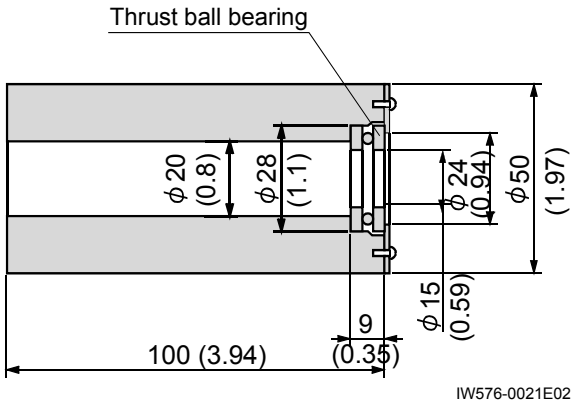
Dimensions of special jig (sample) (Unit : mm) (1mm＝0.039in)

Rod



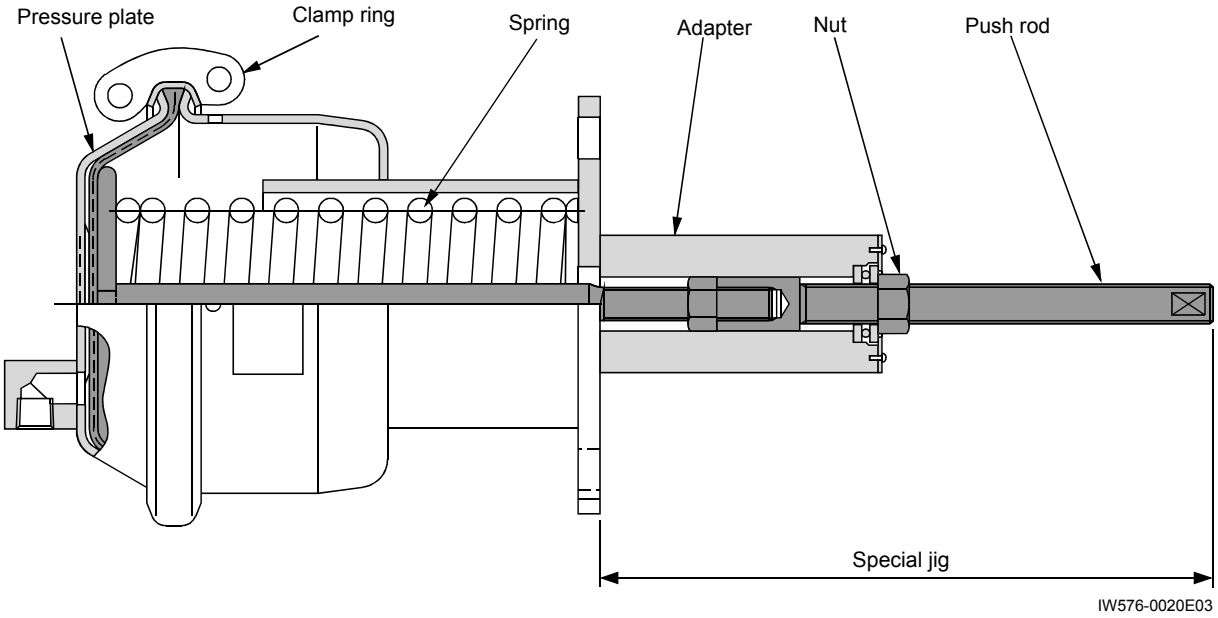
IW576-0021E01

Adapter

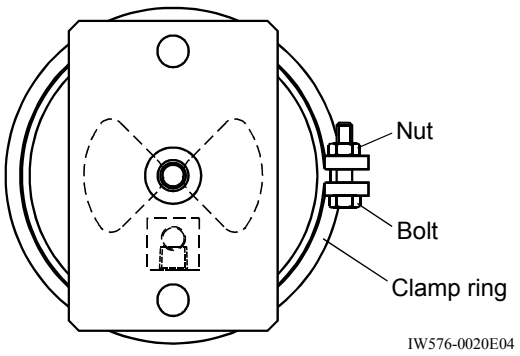


IW576-0021E02

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1. The diaphragm and clamp ring are pressed against the pressure plate by a spring.
2. In order to neutralize this force, use the special jig to first pull out the push rod by approximately 5 mm (0.2in) and fix it in place.
3. Remove bolts by unscrewing two clamp ring nuts, and remove clamp ring by expanding.



4. Gradually loosen the nut of the special jig to unload the spring, and remove push rod and spring from non-pressure plate.

4. Cleaning and checking

4.1 Cleaning

1. Wash all parts in kerosine thoroughly, and dry them by blowing with compressed air.
2. Don’t wash the diaphragm, but wipe it with dry cloth, and then, blow with air.

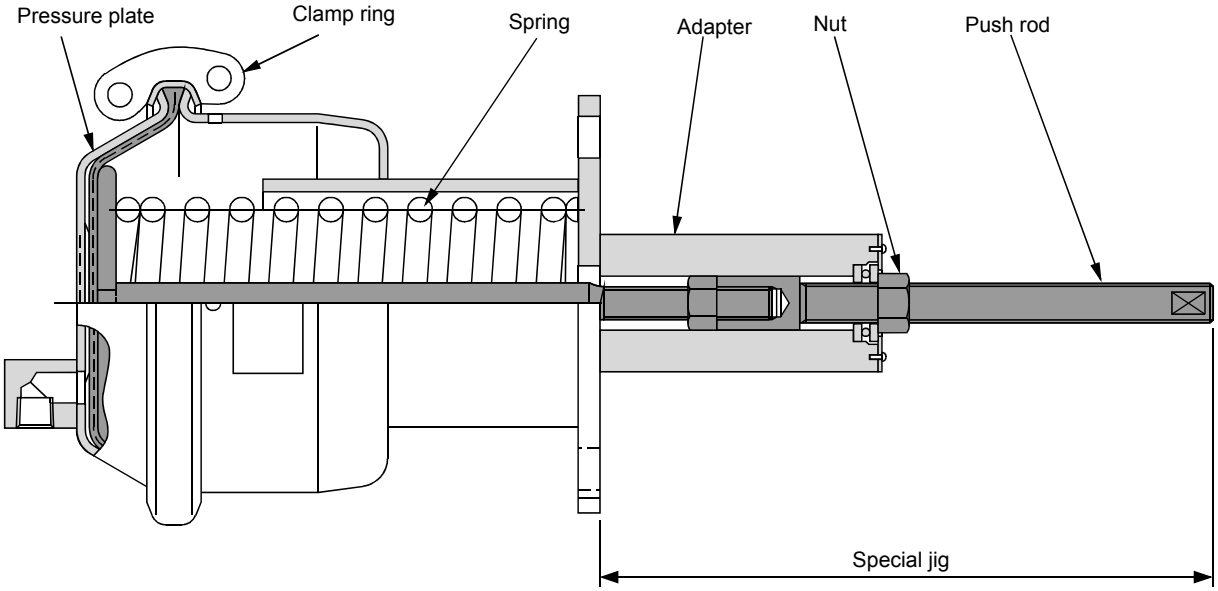
4.2 Checking

1. Pressure plate
   Check for deformation (dents, etc.) and damage, and replace if excessive defects are found.
2. Diaphragm
   Replace it after using for one year.
   When it has not been used one year, check it for cracks, breaks and excessive wear, and replace it if these defects are found.
3. Spring
   Replace, if broken or rusted substantially.
4. Other parts
   Check all the parts for breaks and other defects, and replace all defective parts.

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5. Reassembly

1. Set push rod vertically on a flat bench, with its end up.
2. Put spring and non-pressure plate over the push rod.
3. Tighten the nut of the special jig to compress spring, and keep it compressed.
4. Hook clamp ring on the edge of non-pressure plate by expanding the ring, and align the marks.
5. Align diaphragm and pressure plate to non-pressure plate, hook clamp ring on the edge of the pressure plate by expanding the ring, and align the marks.
6. Clamp clamp ring with clamp bolts and nuts just sufficient to stop air leaking.
   Tightening torque : 9.8 - 14.7 N-m
   (7.2 - 10.8 ft-lbf)
7. Loosen the nut of the special jig, and remove the rod, nut, and the adapter.



6. Test

6.1 Air leak test

1. Apply soapy water to the entire surface of the pressure plate, and to the gaps between the clamps, non-pressure plate, and push rod.
2. Apply compressed air at 0.5 - 0.8 MPa (72.5 - 116psi) to the inlet port, and check for air leakage.

7. Maintenance standards

7.1 2000-hour or 1-year check

1. Disassemble the spring chamber, and replace damaged or cracked parts.
2. Replace the diaphragm. Conduct the air leak test, as described above.

367-001-40000 △1
367-001-80000 △0
367-001-50000 △1
367-000-10000 △1

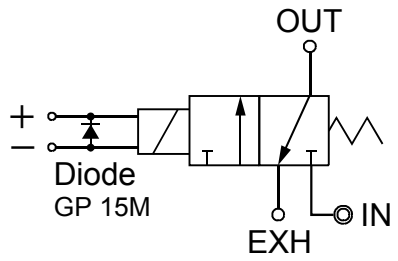
https://truckmanualshub.com/

T-8 Solenoid Valve (Air)

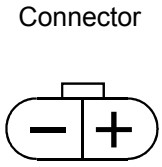
[NOTICE]

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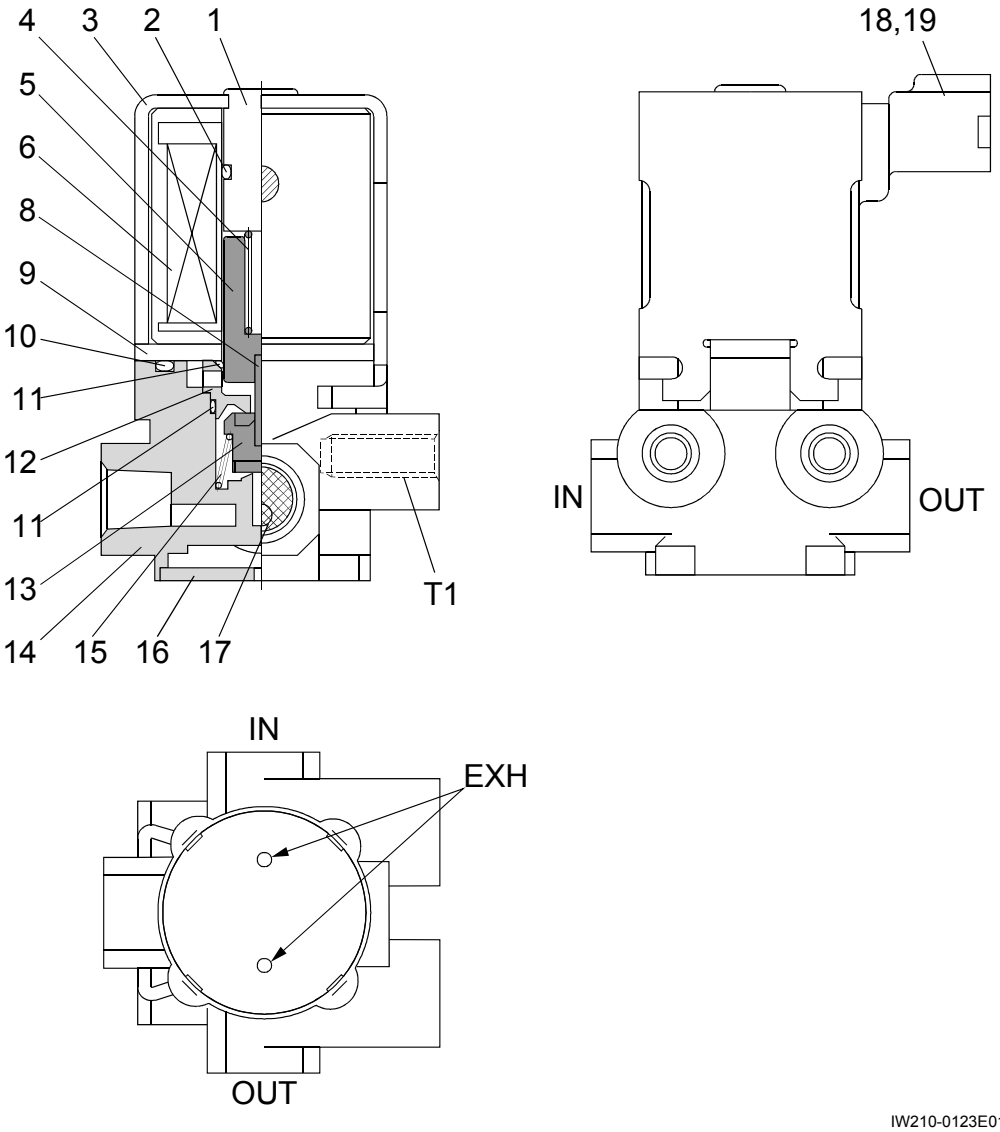
1. Structure



IW210-0120E01



IW210-0151E01



IW210-0123E01

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Solenoid Valve (Air)

1.Core	6.Coil assy (DC24V)	12.Valve seat	17.Filter
2.O-ring	8.Rod	13.Valve	18.Packing
3.Case	9.Coil cover	14.Body	19.Packing holder
4.Spring	10.O-ring	15.Spring	
5.Plunger	11.O-ring	16.Cover	

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
IN, OUT	Rc1/4	15 - 29	11 - 22
T1	M8x1.25	8 - 12	6 - 9

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U

Suspension System

Contents

U-1 Suspension System 1

1. General 1

U-2 Suspension Lock Cylinder 2

1. Structure 2

U-3 Pilot Check Valve (Suspension Lock Cylinder) 3

1. Structure 3

U-4 Solenoid Valve (Suspension Lock Check Release) 4

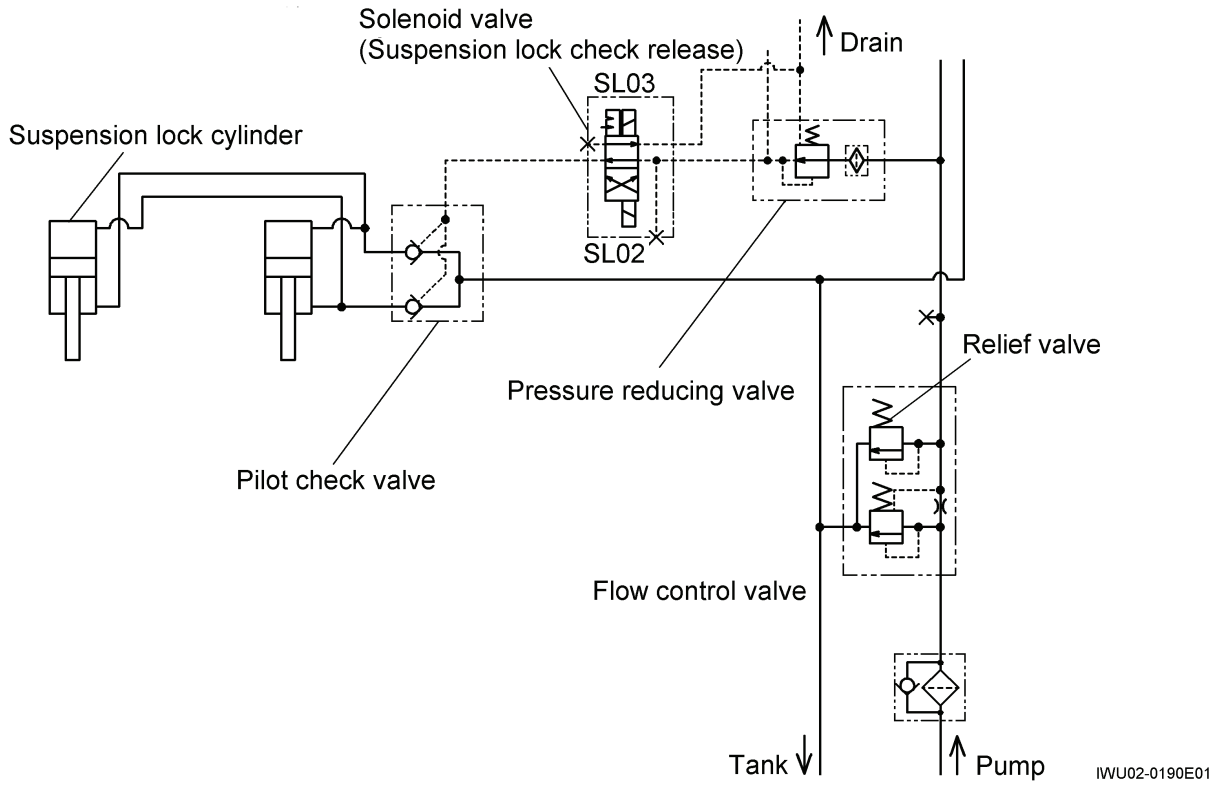
1. Structure 4

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U-1 Suspension System

1. General

Hydraulic Circuit for Suspension Lock



1. The suspension lock function is either activated or released by the two suspension lock cylinders installed between the carrier frame and rear axles. These two suspension lock cylinders are hydraulically controlled by the solenoid valve (suspension lock check release). This solenoid valve is switched according to the outputs from the multiplex data transmitter (lower).
2. There are two kinds of pressure controlling valves in the suspension lock hydraulic circuit, namely a flow control valve and a pressure reducing valve. The relief valve in the flow control valve limits the highest pressure in the circuit, and the pressure reducing valve supplies the pilot pressure to the solenoid valve (suspension lock check release).

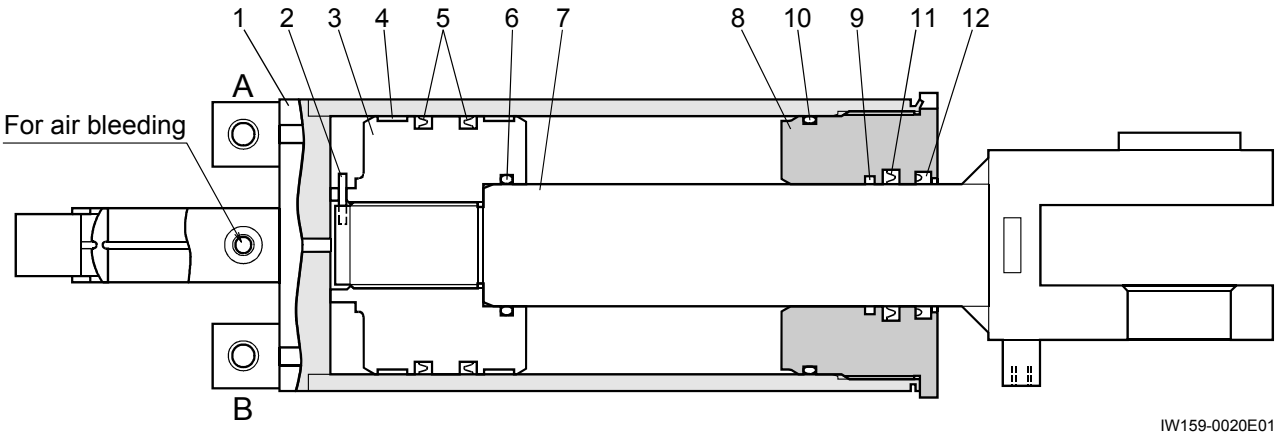
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U-2 Suspension Lock Cylinder

[NOTICE]

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1. Structure



1.Cylinder	4.Plain bearing	7.Rod	10.O-ring
2.Spring pin	5.Packing	8.Rod cover	11.Packing
3.Piston	6.O-ring	9.Damper ring	12.Dust seal

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
A, B	G3/8	49	36
-	-	-	-

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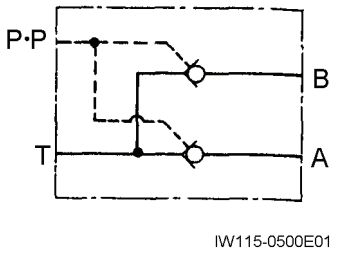
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U-3 Pilot Check Valve (Suspension Lock Cylinder)

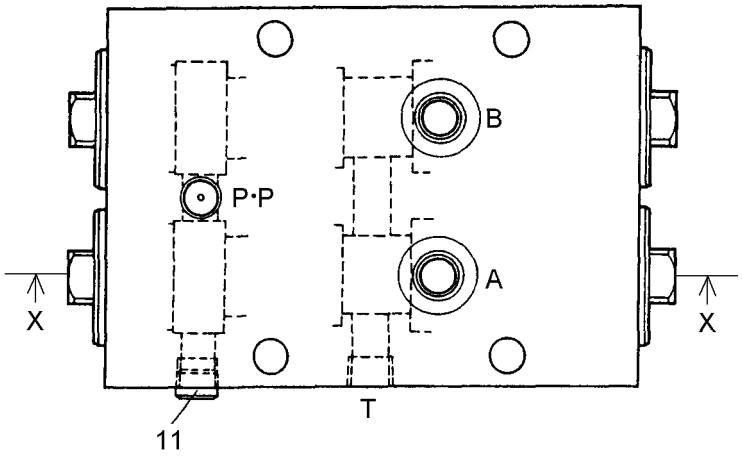
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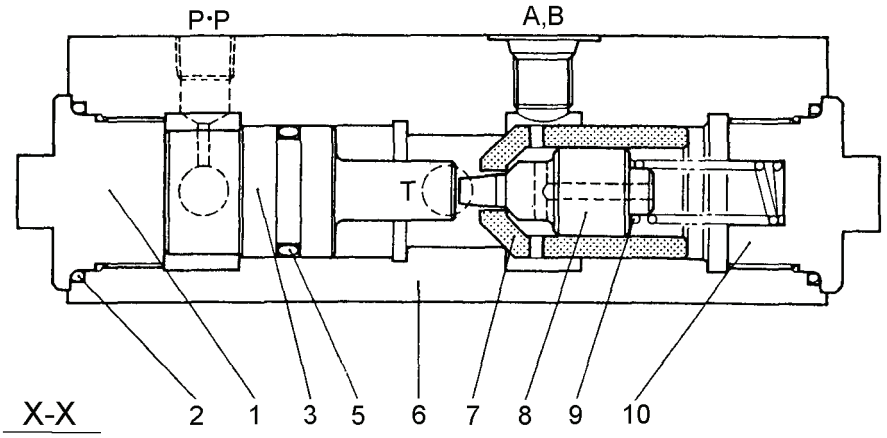
◆There is a case that the appearance and so on differ from the parts for this machine. Although there is not so much difference in functions and disassembly procedures, make sure of the serial number of this machine and the part sales unit described in the parts catalog before starting disassembling operations.

1. Structure



IW115-0500E01





IW115-0500E02

1.Plug	5.O-ring	8.Valve	11.Plug
2.O-ring	6.Body	9.Spring	
3.Plunter	7.Valve	10.Plug	

Thread size and tightening torque

Sign / port	Thread size	Tightening torque	
		N-m	ft-lbf
T, P•P, A, B	G1/4	29.4	22
1, 10	M34×1.5	93 - 103	68.7 – 75.9

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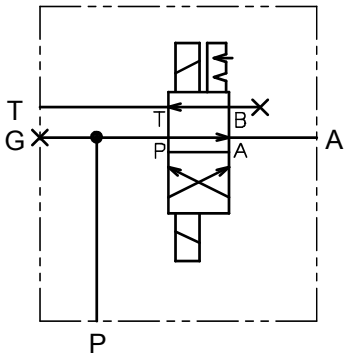
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U-4 Solenoid Valve (Spring Lock Check Release)

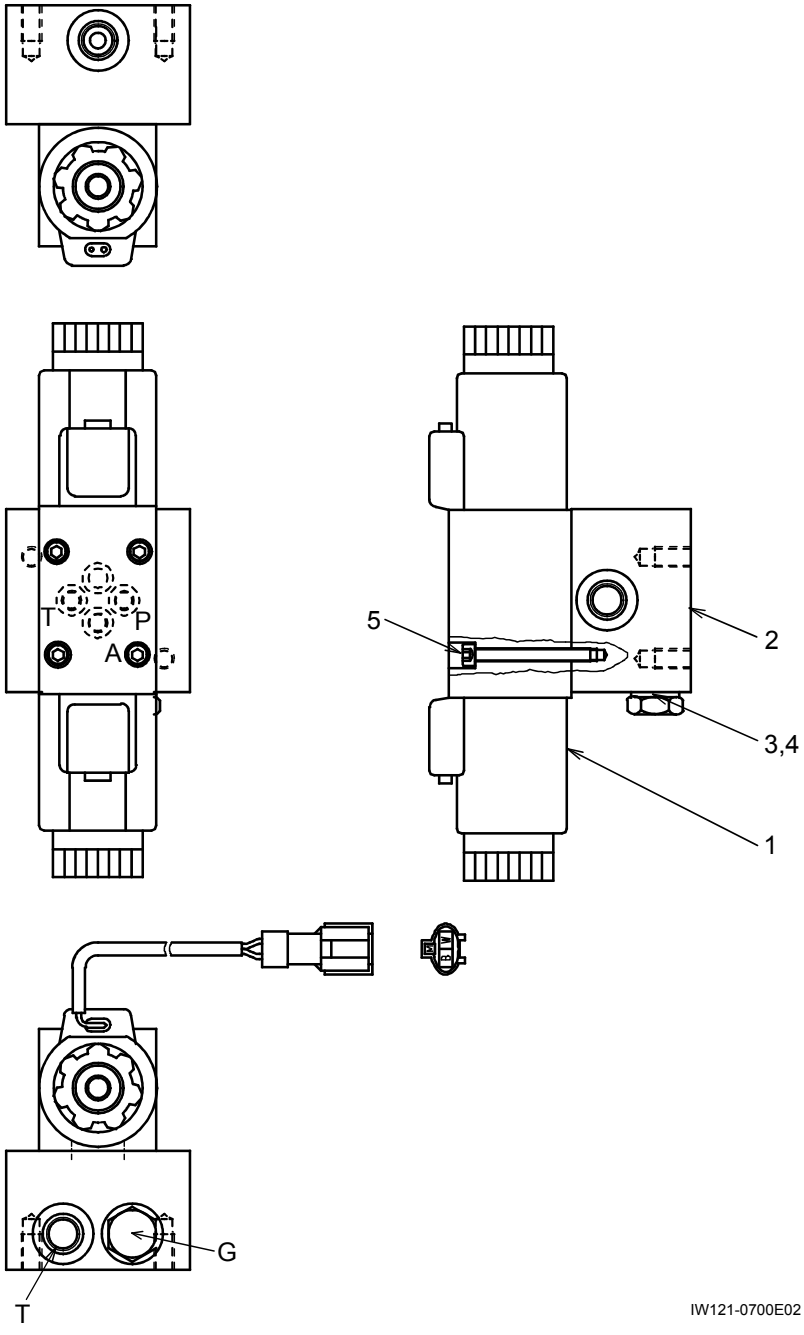
[NOTICE]

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1. Structure



IW121-0700E01



1.Solenoid valve (DC24V)
2.Body
3.Plug
4.O-ring
5.Hexagon socket head bolt

IW121-0700E02

Thread size and tightening torque

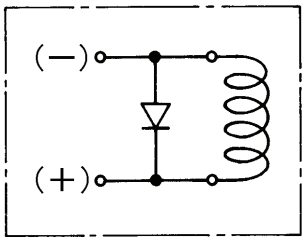
Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
A, P, T, G	G1/4	34 - 38	25 - 28
5	M5	4.9 – 6.9	3.6 – 5.1

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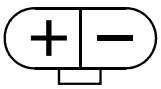
Solenoid Valve (Spring Lock Check Release)

Solenoid valve assy



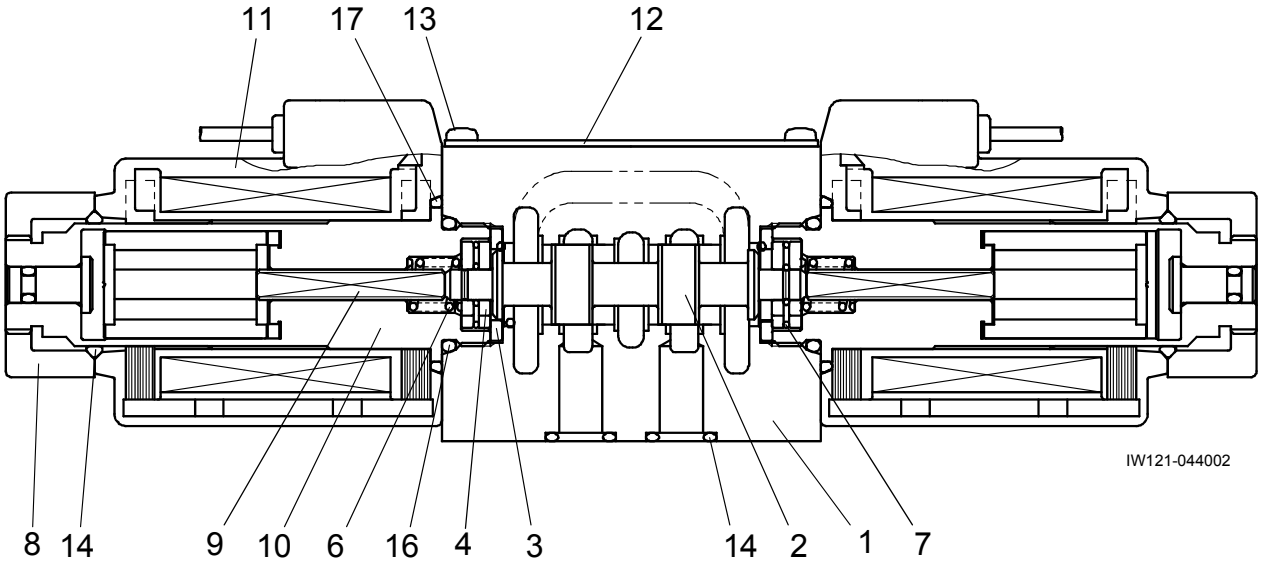
IW121-023002

Connector



(+): White
(-): Black

IW121-0542E01



IW121-044002

1.Body	6.Spring	10.Solenoid guide	14.O-ring
2.Spool	7.Detent spring	11.Solenoid coil	15.O-ring
3.Retainer	8.Nut	12.Name plate	16.O-ring
4.Retainer	9.Rod	13.Screw	17.O-ring

Thread size and tightening torque

Sign / Port	Thread size	Tightening torque	
		N-m	ft-lbf
8	-	5 – 7	3.6 – 5.1

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Y

Data, Adjusting and Checks

Contents

Y-1 Hydraulic Pressure Setting Table ... 1

1. Winch 1
2. Telescoping and Elevating 2
3. Steering 3
4. Swing 4
5. Outrigger 5
6. Lower pilot pressure 6
7. Pilot pressure 7
8. Flow control valve 8
9. Torque converter oil pressure 8
10. Pressure reducing valve [for Europe and Canada (option)] 9

Y-2 Air Pressure Setting Table 10

1. Air pressure setting table 10

Y-3 Air Bleeding Procedure 11

1. Starting pump 11
   - 1.1 Before starting the engine 11
   - 1.2 Shakedown of the pump 11
   - 1) Steering, winch brake pilot pressure pump (double gear pumps) 11
   - 2) Main pump 11
   - 3) Others 11
2. Service brake circuit 12
3. Swing circuit 12
   - 3.1 Swing motor 12
   - 3.2 Swing hydraulic pilot control valve 12
4. Winch circuit (main and aux.) 13
   - 4.1 Winch motor 13
   - 4.2 Winch counterbalance valve 13
   - 4.3 Winch brake release circuit 13
5. Jib lock pin and jib offset cylinder 14
6. Suspension lock cylinder 15
7. Hydraulic pilot circuit 16
   - 7.1 Swing 16
   - 7.2 Elevating 16
   - 7.3 Telescoping 16
   - 7.4 Winch (main and aux.) 16
8. Oil cooler motor 16
9. Air condition motor (option) 16

Y-4 Electric Switch Adjustment 17

1. 3rd / top boom full retraction detection switch (CN859) 17
2. 2nd boom full retraction detection switch (CN553) 17
3. Jib stowed detection proximity switch (CN572) 17
4. Jib lock pin retraction detection switch (CN573) 18
5. Main winch drum rotation detection proximity switch (CN591) (option) 18
6. Aux. winch drum rotation detection proximity switch (CN592) (option) 18
7. Over-front detection proximity switch (CN521) 18
8. Control lever stand position detection switch (Swing control and boom telescoping/aux. hoist) (CN529) 19
9. Straight ahead detection proximity switch (CN408) 19
10. Counterweight equipped detection proximity switch (CN994) 19
11. Over-rear detection proximity switch (CN518) [for Europe only] 20

https://truckmanualshub.com/

Y-5 Adjustment and Checks 21
1. Service brake adjustment 21
1.1 Adjusting the brake pedal..... 21
1.2 Tightening the cap of reserve tank of service brake fluid..... 21
2. Accelerator adjustment 21
2.1 Accelerator pedal 21
3. Parking brake adjustment 22
3.1 Adjusting the parking brake clearance (between pad and disc plate)..... 22
3.2 Connecting the parking brake and spring chamber 22
4. Tire steering angle adjustment..... 22
4.1 Tire air pressure 22
4.2 Adjusting the tire Steering angle 22
5. Engine speed (and governor setting)..... 23
6. Torque converter and transmission..... 23
6.1 Maximum allowable speed 23
6.2 Adding oil to the torque converter and transmission 23
7. Braking force 24
7.1 Parking brake force 24
7.2 Service brake force 24
8. Adjusting the headlight light axes 24
9. Adjusting boom telescoping wire ropes 25

Y-6 Check (Crane Operation).....29
1. Outrigger status indicator..... 29
2. Hoisting 30
3. Backward stability control..... 30
4. Outrigger emergency setting..... 30
5. Jib 30
6. Boom Telescoping Control 31
7. Alarms 32
8. Outrigger slide plate adjustment 32

Y-7 Check (Driving Devices).....33
1 Exhaust brake (EXB)..... 33
2. Automatic transmission..... 33
3. Steering mode change 34
4. Emergency switches 34
5. Overshift prevention..... 35
6. Warnings 35
7. Speed limiter (For Europe) 36
8. Reverse steering (For Europe).....36

Y-8 Oil and Grease Table 37

Y-9 Mass Table.....38

Y-10 Specifications.....39
1. Engine speed.....39
1.1 Idling speed.....39
1.2 MAX. speed (unload) 39
1.3 Stall speed.....39
2. Hydraulic pump (for crane) (Double Variable Displacement Pump) 39
2.1 Pump speed.....39
2.2 Pump displacement 39
3. Hydraulic pump (for steering) (Double Gear Pump).....39
3.1 Pump speed.....39
3.2 Pump displacement 39
4. Charging pump (for torque converter).....39
4.1 Pump speed.....39
4.2 Pump displacement 39
5. Emergency steering pump (option) 39
5.1 Pump speed.....39
5.2 Pump displacement 39
6. Winch motor.....39
7. Swing driving unit 39
7.1 Swing motor 39
7.2 Swing speed reducer 39

Y-11 Boom Connecting Pin and Thread Size Table 40

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Y-1 Hydraulic Pressure Setting Table

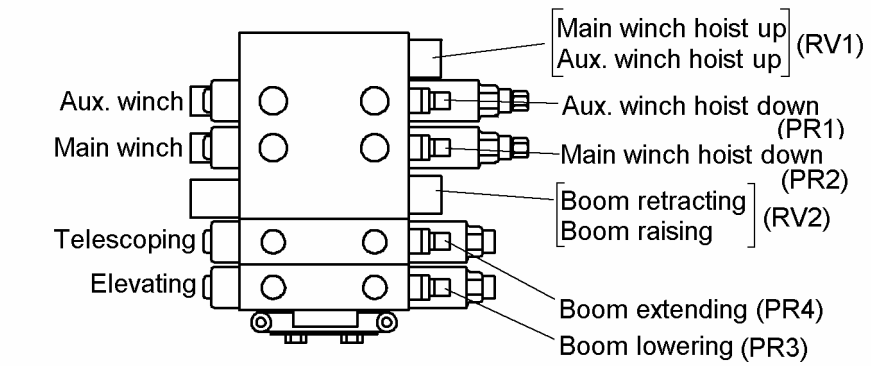
1. Winch

[NOTICE]

- ◆Oil temperature: 50±5°C (113 - 131°F) (Hydraulic oil: TADANO Hydraulic oil LL)
- ◆Confirm set pressure on AML (load moment indicator) moment display
- ◆Shift the elevation slow stop cancel switch to OFF side

Item	Set pressure		Engine speed (min^{-1})	Check procedure
	MPa	psi		
Main winch hoisting up (RV1) Aux. winch hoisting up (RV1)	27.5±0.5	3980±70	2150 (MAX.)	1. Place the main winch brake in the hold state. *1 2. Turn the PTO switch ON. 3. Move the main winch control lever fully to the hoist up position while the boom elevating control lever is fully moved to the boom lowering position. In this state, set the engine speed to 2150 min^{-1} and check the pressure.
Aux. winch hoisting down (PR1)	8.8±0.5	1280±70	(IDL.) 670	1. Place the auxiliary winch brake in the hold state. *1 2. Turn the PTO switch ON. 3. Move the boom telescoping /auxiliary winch control lever fully to the hoist down position while the boom elevating control lever is fully moved to the boom lowering position. In this state, check the pressure.
Main winch hoisting down (PR2)	8.8±0.5	1280±70	(IDL.) 670	1. Place the main winch brake in the hold state. *1 2. Turn the PTO switch ON. 3. Move the main winch control lever fully to the hoist down position while the boom elevating control lever is fully moved to the boom lowering position. In this state, check the pressure.

(*1): When the winch brake is in the hold state, the winch brake will not be released and winch drum will not rotate by hoist up or hoist down operation. To have the winch brake placed in the hold state, remove the pipes for the winch brake release to the hydraulic motor for winch. The pilot pressure for the winch brake release will be produced during the hoist up or hoist down operation, therefore, fit on the cap to avoid the oil leak. (After checking the pressure, return the pipes to the original position and bleed the winch brake release circuit.)



Hydraulic pilot control valve (elevating, telescoping, winch)

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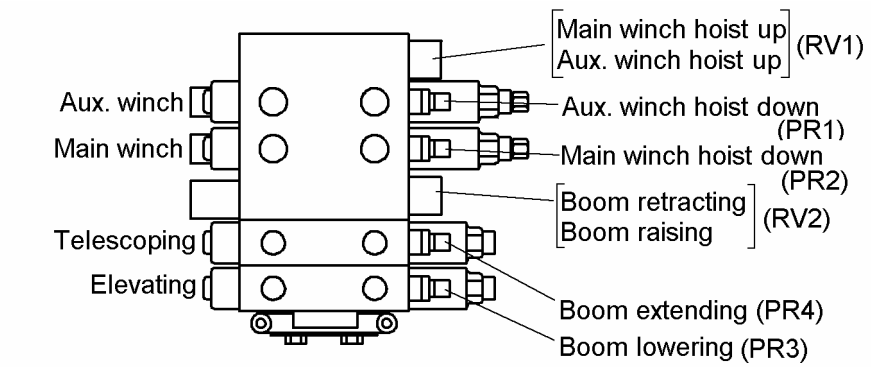
2. Telescoping and Elevating

[NOTICE]

◆Oil temperature: 50±5°C (113 - 131°F) (Hydraulic oil: TADANO Hydraulic oil LL)

◆Confirm set pressure on AML (load moment indicator) moment display

Item	Set pressure		Engine speed (min^{-1})	Check procedure
	MPa	psi		
Boom extending (PR4)	19.6±0.5	2840±70	2150 (MAX.)	1. Turn the PTO switch ON. 2. Fully extend the boom. 3. Move the boom telescoping control lever fully to the boom extension position. In this state, set the engine speed to 2150 min^{-1} and check the pressure.
Boom retracting (RV2)	23.5±0.5	3410±70	2150 (MAX.)	1. Turn the PTO switch ON. 2. Fully retract the boom. 3. Move the boom telescoping control lever fully to the boom retraction position. In this state, set the engine speed to 2150 min^{-1} and check the pressure.
Boom raising (RV2)	23.5±0.5	3410±70	2150 (MAX.)	1. Turn the PTO switch ON 2. Shift the elevation slow stop cancel switch to OFF side. 3. Fully extend the boom elevating cylinder. 4. Move the boom elevating control lever fully to the boom raising position. In this state, set the engine speed to 2150 min^{-1} and check the pressure.
Boom lowering (PR3)	$2.9^{+0.5}_{0}$	420^{+70}_{0}	(IDL.) 670	1. Turn the PTO switch ON. 2. Shift the elevation slow stop cancel switch to OFF side. 3. Fully retract the boom elevating cylinder. 4. Move the boom elevating control lever fully to the boom lowering position. In this state, check the pressure.



Hydraulic pilot control valve (elevating, telescoping, winch)

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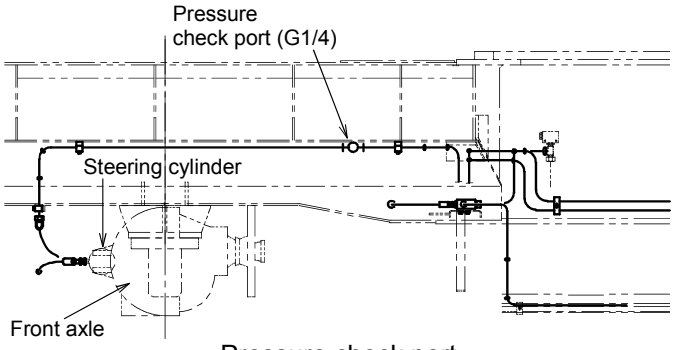
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3. Steering

[NOTICE]

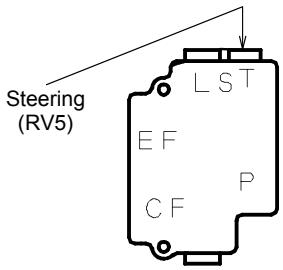
◆Oil temperature: 50±5°C (113 - 131°F) (Hydraulic oil: TADANO Hydraulic oil LL)

Item	Set pressure		Engine speed (min^{-1})	Check procedure
	MPa	psi		
Steering (RV5)	13.7±1	1990±140	2600 (MAX.)	1. Connect a pressure gauge to the pressure check port. 2. Turn the PTO switch OFF. 3. With the outriggers stowed, turn the steering wheel to the right to bring the steering cylinders to the travel ends. (Do steering as to get lightly to travel end.) In this state, set the engine speed to 2600 min^{-1} and check the pressure by the pressure gauge. (Adjusting the relief pressure is impossible)



Pressure check port

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Priority valve (Steering)

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4. Swing

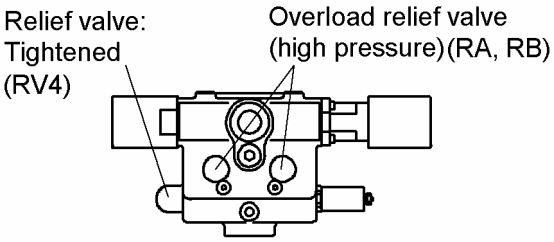
[NOTICE]

◆Oil temperature: 50±5°C (113 - 131°F) (Hydraulic oil: TADANO Hydraulic oil LL)

◆Confirm set pressure on AML (load moment indicator) moment display

Item		Set pressure		Engine speed (min^{-1})	Check procedure
		MPa	psi		
Swing	*1 (RV4)	(21.1)	(3060)	-	Unable to be checked. (The pressure is preset by the valve manufacturer.)
	*2 (RA, RB)	(26.0)	(3770)	-	

*1 : Relief valve
*2 : Overload relief valve (high pressure)



Hydraulic pilot control valve (swing)

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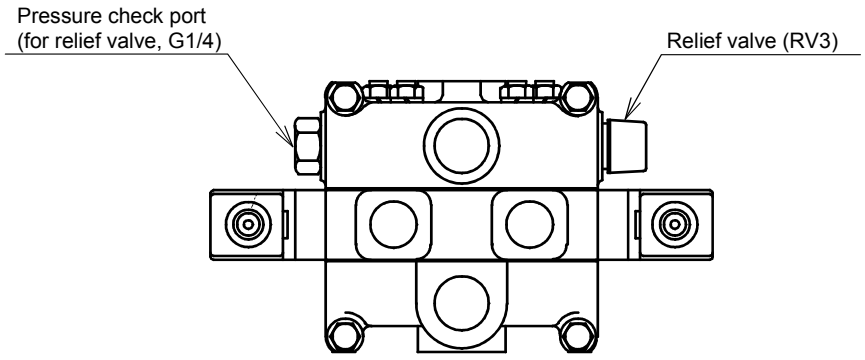
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5. Outrigger

[NOTICE]

◆Oil temperature: 50±5°C (113 - 131°F) (Hydraulic oil: TADANO Hydraulic oil LL)

Item	Set pressure		Engine speed (min^{-1})	Check procedure
	MPa	psi		
Outrigger (RV3)	20.6±0.5	2990±70	2600 (MAX.)	1. Connect a pressure gauge to the pressure check port. 2. Turn the PTO switch OFF. 3. Extend all the jack cylinders fully. And again press the outrigger collective control switch. In this state, set the engine speed to 2600 min^{-1} and check the pressure by the pressure gauge.



Solenoid control valve (Outrigger)

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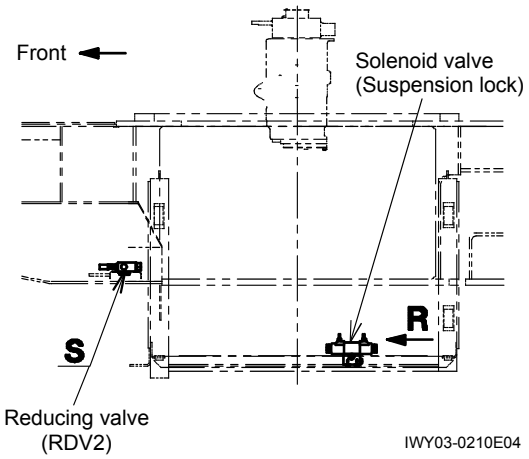
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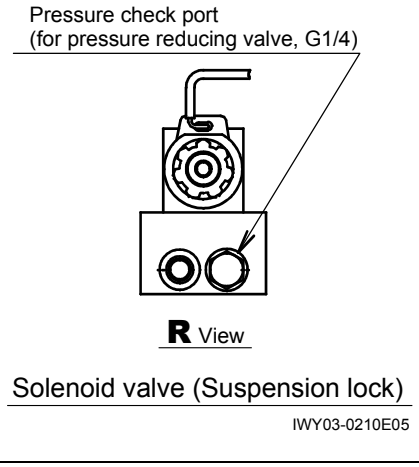
6. Lower pilot pressure

[NOTICE]

◆Oil temperature: 50±5°C (113 - 131°F) (Hydraulic oil: TADANO Hydraulic oil LL)

Item	Set pressure		Engine speed (min^{-1})	Check procedure
	MPa	psi		
Lower Pilot pressure (RDV2)	3.6±0.5	522±70	(IDL.) 670	1. Connect a pressure gauge to the pressure check port. 2. Turn the PTO switch ON. 3. Select the jib set status on the AML. 4. Retract the jib lock pin fully to stroke end. 5. Since this valve is unable to adjust the pressure, abnormal pressure valve indicates the valve is defective. Renew the reducing valve if the abnormal pressure is defected.





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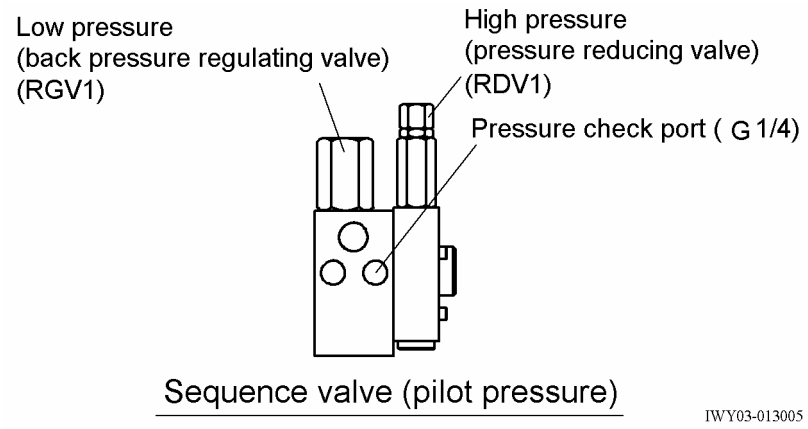
7. Pilot pressure

[NOTICE]

◆Oil temperature: 50±5 (113 - 131°F) (Hydraulic oil: TADANO Hydraulic oil LL)

Item		Set pressure		Engine speed (min^{-1})	Check procedure
		MPa	psi		
Pilot pressure	*1 (RGV1)	2.5 or over	360 or over	(IDL.) 670	1. Connect a pressure gauge to the pressure check port. 2. Turn the PTO switch ON. 3. Remove the solenoid connector for the oil cooler to prevent the oil cooler from operating. 4. Turn the power switch of the air conditioner (option) OFF. 5. Make sure that constant pressure is being produced while engine is running. And check the pressure by the pressure gauge. Since this valve is unable to adjust the pressure, abnormal pressure value indicates the valve is defective. Renew the valve if the abnormal pressure is detected.
	*2 (RDV1)	3.4 or less	500 or less	2150 (MAX.)	1. Connect a pressure gauge to the pressure check port. 2. Turn the PTO switch ON. 3. Turn the oil cooler switch ON. Then, set the engine speed to 2150 min^{-1} and check the pressure by the pressure gauge.

*1: Low pressure
*2: High pressure



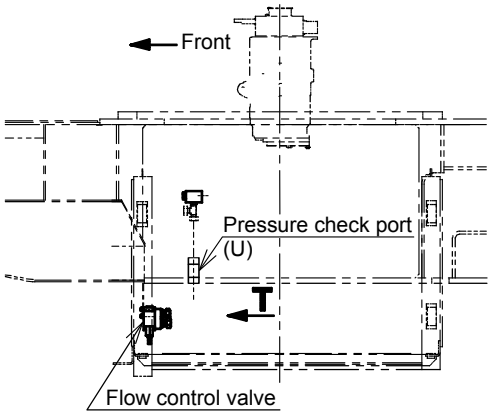
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8. Flow control valve

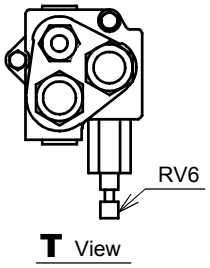
[NOTICE]

◆Oil temperature: 50±5°C (113 – 131°F) (Hydraulic oil: TADANO Hydraulic oil LL)

Item	Set pressure		Engine speed (min^{-1})	Check procedure
	MPa	psi		
Flow control valve (RV6)	18.1±0.5	2630±70	2150 (MAX)	1. Connect a pressure gauge to the pressure check port (U). 2. Turn the PTO switch ON. 3. Retract the jib lock pin fully to stroke end.



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Flow control valve

IWY03-0210E07

9. Torque converter oil pressure

Item	Set pressure		Engine speed (min^{-1})	Check procedure
	MPa	psi		
Torque converter oil pressure	1.7 or over	250 or over	(IDL.) 670	1. Turn the PTO switch OFF. 2. Check the pressure at the torque converter oil pressure gauge on the combination meter.
	2.0 - 2.3	290 - 340	2600 (MAX.)	

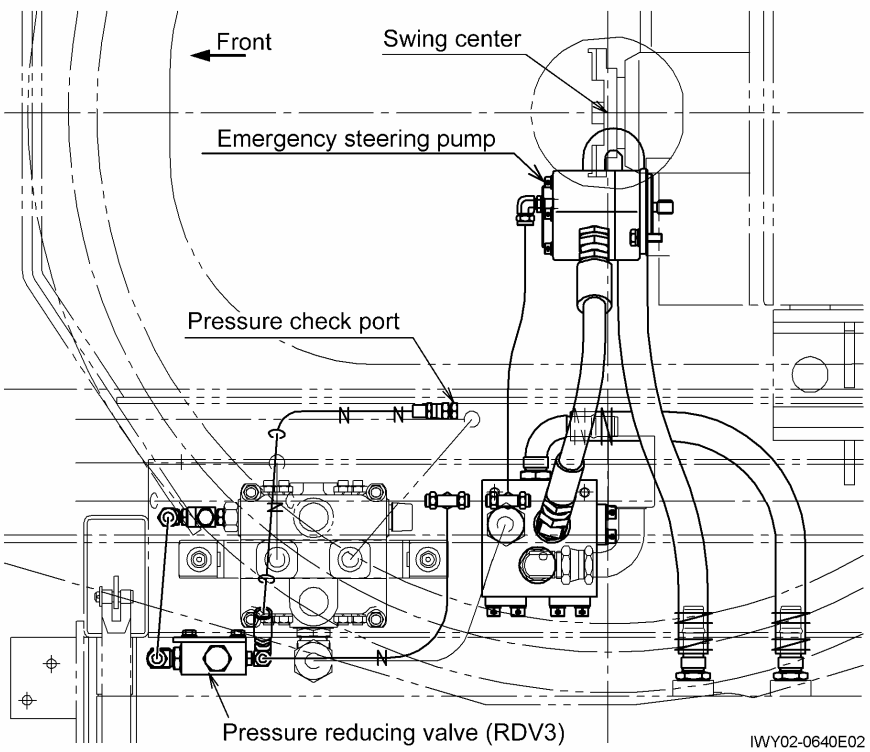
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10. Pressure reducing valve [for Europe and Canada (option)]

[NOTICE]

◆Oil temperature: 50±5°C (113 - 131°F) (Hydraulic oil: TADANO Hydraulic oil LL)

Item	Set pressure		Engine speed (min^{-1})	Check procedure
	MPa	psi		
Pressure reducing valve (RDV3)	4.9 or less	711 or less	2600 (MAX.)	1. Connect a pressure gauge to the pressure check port. 2. Turn the PTO switch OFF. 3. Retract the jack fully to stroke end. 4. Since this valve is unable to adjust the pressure, abnormal pressure valve indicates the valve is defective. Renew the reducing valve if the abnormal pressure is defected.



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347-320-30000 △1

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Y-2 Air Pressure Setting Table

1. Air pressure setting table

Item		Pressure	
		KPa	psi
Pressure regulator	Turning on pressure	745±20	108±3
	Turning off pressure	833±20	121±3
Safety valve	Cracking pressure	853	124
	Full opening pressure	951±20	138±3
Air low-pressure switch (low air pressure warning)	Light-on pressure	539^{+10}_{-49}	$78^{+1.5}_{-7}$
	Light-off pressure	539^{+59}_{-49}	$78^{+8.5}_{-7}$
Air pressure switch (stop lamp)	Operating pressure	29^{+20}_{-10}	$4.2^{+3}_{-1.5}$
Air low-pressure switch (parking brake)	Operating pressure	372±20	54±3

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Y-3 Air Bleeding Procedure

1. Starting pump

1.1 Before starting the engine

Make sure that
- PTO switch is turned OFF.
- The oil cooler is not functioning (due to the hydraulic oil temperature below 50°C (122°F)).

1.2 Shakedown of the pump

1) Steering, winch brake pilot pressure pump (double gear pumps)

1. Fill the oil tank with hydraulic oil.
2. With the engine stopped, loosen the air-bleed plug on the suction flange of the main pump. After bleeding air from the suction side, tighten the plug again.
3. Start the engine (with PTO OFF) and run it at idle (approx. 700 min^{-1}) while bleeding the air from the circuit for 1 minute.
4. Start the engine, and run-in the engine for 10 minutes at idle.

2) Main pump

1. Fill the oil tank with hydraulic oil. (If the suction section was disassembled for repair or other reasons, bleed air from the air-bleed plug on the suction side, as described above.)

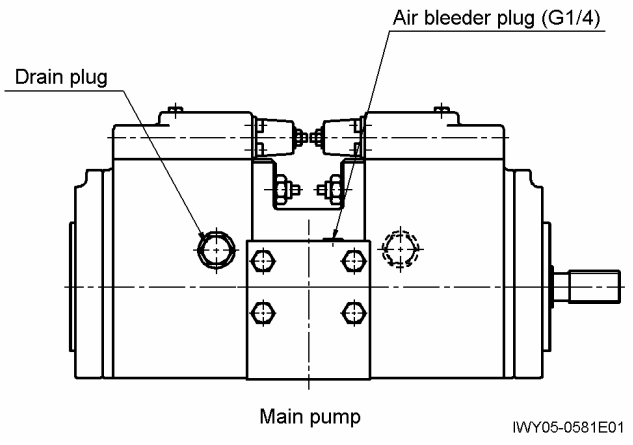
[NOTICE]

◆If the tank is to be pressurized, pressurize it at a pressure of 15 kPa {2.2 psi} or less.

2. Bleed the air from the pump case. Remove the drain plug or drain hose from the pump. Inject oil into this location until it overflows, then reinsert the plug.
3. Start the engine, with PTO ON, and run-in the engine at idle for 5 minutes.

3) Others

- After the shakedown of the pump, do not let the engine speed exceed the middle range (1000 min^{-1}) if you bleed the cylinders.
  When you try to raise the oil temperature in order to adjust the hydraulic pressure, make sure that there is no bubbles caused by the bleeding in the tank.



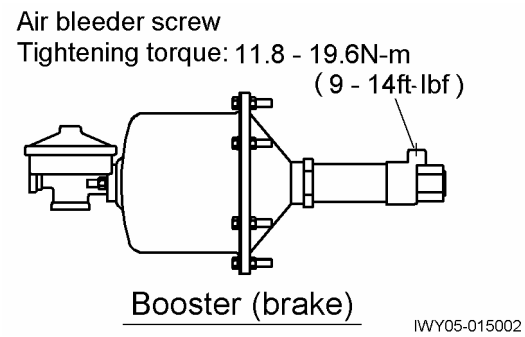
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2. Service brake circuit

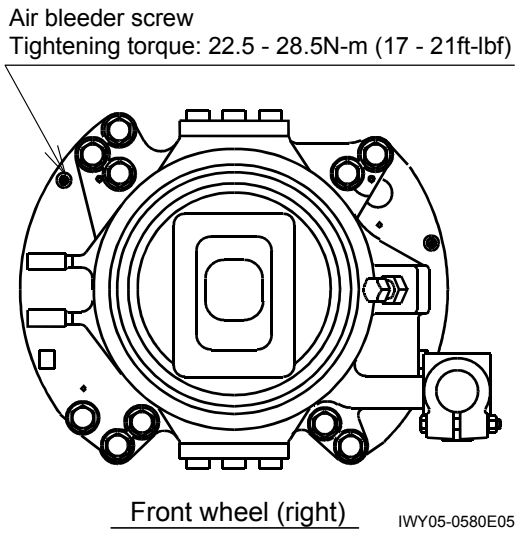
[NOTICE]

- ◆The vehicle has two boosters; one for the front wheel brakes and the other for the rear wheel brakes.
- ◆Four air bleeder screws are on the calipers for the front wheel brakes, and two are on those for the rear wheel brakes.
- ◆Take care of the spill of the brake fluid and the fluid level in the fluid reservoir while bleeding.

1. With the sufficient air in the air reservoir, depress the brake pedal and loosen the air bleeder screw on the booster. Then tighten the air bleeder screw before releasing the brake pedal. Repeat the above steps until the flowing brake fluid contains no air bubbles. After the air bubbles go out, tighten the air bleeder screw while letting the oil flow out.



2. Bleed the calipers of the axles as the step 1 above.



3. Swing circuit

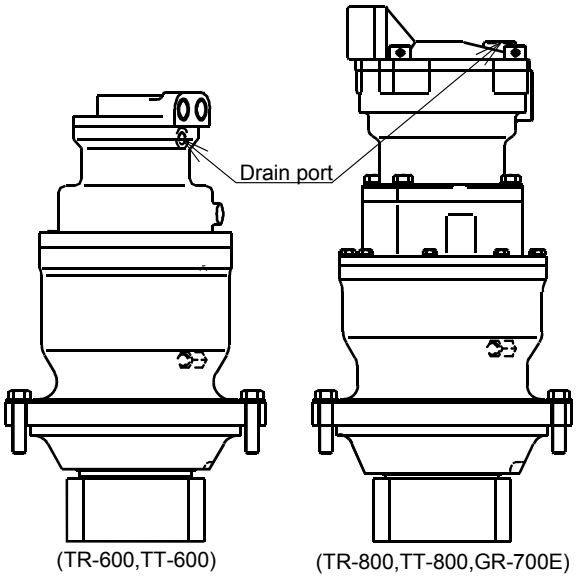
3.1 Swing motor

Bleed the swing motor by following either (1), (2) or (3).

(1) Pour the hydraulic oil through the drain port into the casing until the oil flows out.

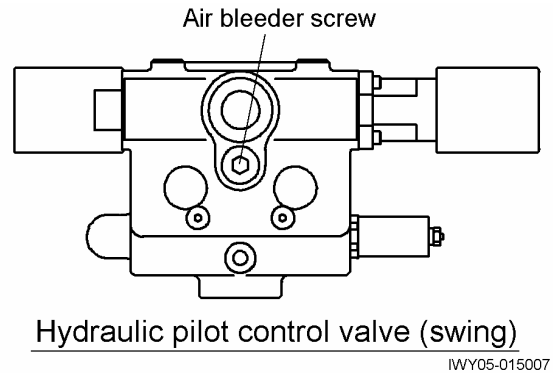
(2) Perform the right or left swing operation slowly for approx. one minute.

(3) Set the swing brake switch to ON. Perform the right or left swing operation and keep the swing circuit hydraulic pressure at approx. 4.9MPa (710 psi) for approx. 30 seconds.



3.2 Swing hydraulic pilot control valve

Set the PTO switch and the swing brake switch to ON, and set the engine speed to the maximum (2150 min^{-1}). Repeat the rapid swing operation to the right or the left until no more air bubbles come out of the air bleeder screw.

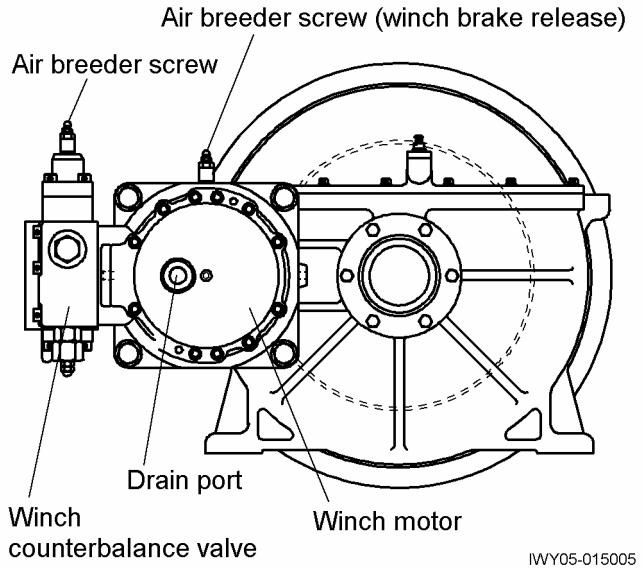


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4. Winch circuit (main and aux.)

[NOTICE]

◆Bleed the main and auxiliary winch circuits by following the procedures below. The procedures are common to the both circuits.



4.1 Winch motor

Bleed the winch motor by following either (1) or (2).

(1) Pour the hydraulic oil through the drain port into the casing until the oil flows out.

(2) Perform the slow hoist-up or hoist-down operation for approx. 1 minute.

4.2 Winch counterbalance valve

Repeat the slow hoist-up and slow hoist-down operations, while increasing the engine speed gradually to the maximum (2150 min^{-1}) until no more air bubbles come out of the air bleeder screw.

4.3 Winch brake release circuit

Repeat the slow hoist-up and slow hoist-down operations with the engine idling until no more air bubbles come out of the air bleeder screw.

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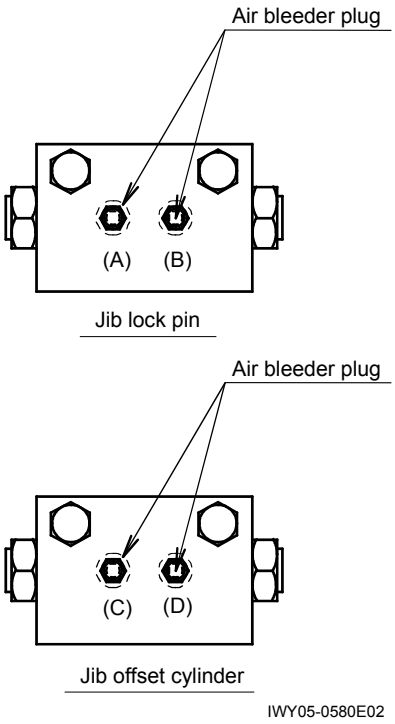
5. Jib lock pin and jib offset cylinder

[NOTICE]

◆Bleed the jib lock pin, jib offset cylinder as follows.

(1) Start the engine, turn the PTO switch ON, and raise the engine speed to approx. 2,150 min^{-1}.

(2) Attach a hose to the bleeder screw (A).and loosen the bleeder screw. In this condition, repeat the rapid jibset operation to the retract or the extend until no more air bubbles come out of the air bleeder screw.



[NOTICE]

◆Bleed in the order of bleeder plugs, (A), (B), (C) and (D).

(3) After air-bleeding is over, fasten the bleeder plug and remove the hose.

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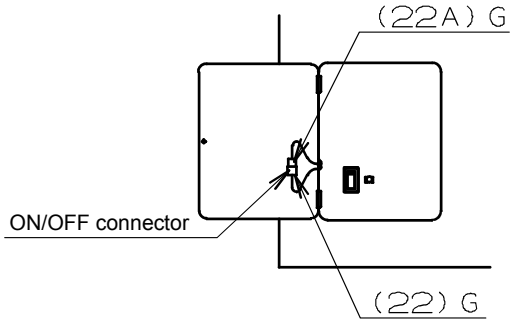
6. Suspension lock cylinder

[NOTICE]

◆Bleed the suspension lock cylinder as follows.

(1) Set the crane in the traveling configuration on level ground.

(2) Keep the starter switch to OFF, open the door of the inside-cab relay box, and disconnect the on/off connector.



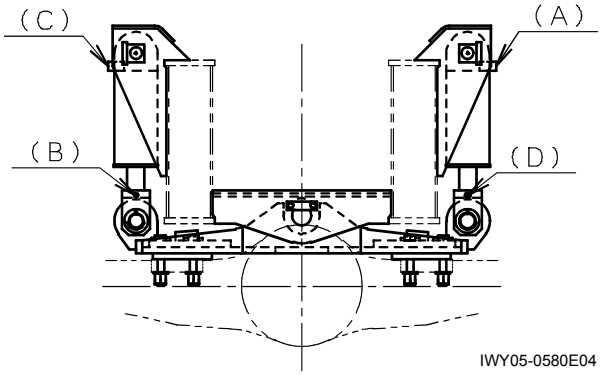
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(3) Start the engine, turn the PTO switch on, and raise the engine speed to approx. 2,150 min^{-1}.

(4) Attach a hose to the bleeder screw (A).and loosen the bleeder screw. In this condition, bleed the axle for approx. one minute.

[NOTICE]

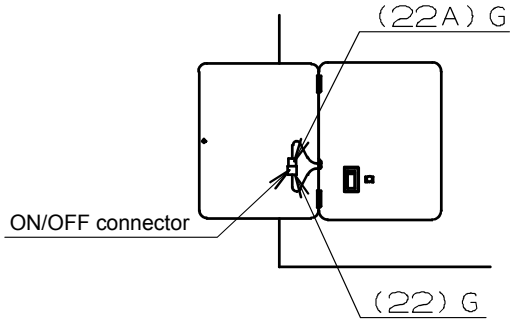
◆Bleed in the order of bleeder screws, (A), (B), (C) and (D).



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(5) After air-bleeding is over, fasten the bleeder screw and remove the hose.

(6) Turn off the starter switch and connect the on/off connector in the inside-cab relay box.



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(7) Turn on the starter switch. Turn the PTO switch on. Make sure then the suspension lock indicator lamp lights.

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7. Hydraulic pilot circuit

7.1 Swing

Set the hydraulic oil temperature to 50°C (122°F) or higher, set the PTO switch and the swing brake switch to ON, let the engine idle, and move the swing control lever fully to the right-swing side. Keep the above conditions for 20 seconds or more for bleeding. Proceed the same steps by moving the swing control lever to the left-swing side.

7.2 Elevating

Pull out the connector of the AML vent solenoid. Set the hydraulic oil temperature to 50°C (122°F) or higher, set the PTO switch to ON, let the engine idle, and move the boom elevating control lever fully to the boom lowering side. Keep the above conditions for 20 seconds or more for bleeding. Proceed the same steps by moving the boom elevating control lever to the boom raising side.

7.3 Telescoping

Pull out the connector of the AML vent solenoid. Set the hydraulic oil temperature to 50°C (122°F) or higher, set the PTO switch to ON, let the engine idle, and move the boom telescoping control lever fully to the retraction side. Keep the above conditions for 20 seconds or more for bleeding. Proceed the same steps by moving the boom telescoping control lever to the boom extension side.

7.4 Winch (main and aux.)

[NOTICE]

◆Bleed the main and auxiliary winch circuits by following the procedures below. The procedures are common to the both circuits.

Pull out the connector of the AML vent solenoid. Set the hydraulic oil temperature to 50°C (122°F) or higher, set the PTO switch to ON, let the engine idle, and move the hoist control lever fully to the hoist-up side. Keep the above conditions for 20 seconds or more for bleeding. Proceed the same steps by moving the hoist control lever to the hoist-down side.

8. Oil cooler motor

Pour the hydraulic oil through the drain port into the casing until the oil flows out.

9. Air condition motor (option)

Pour the hydraulic oil through the drain port into the casing until the oil flows out.

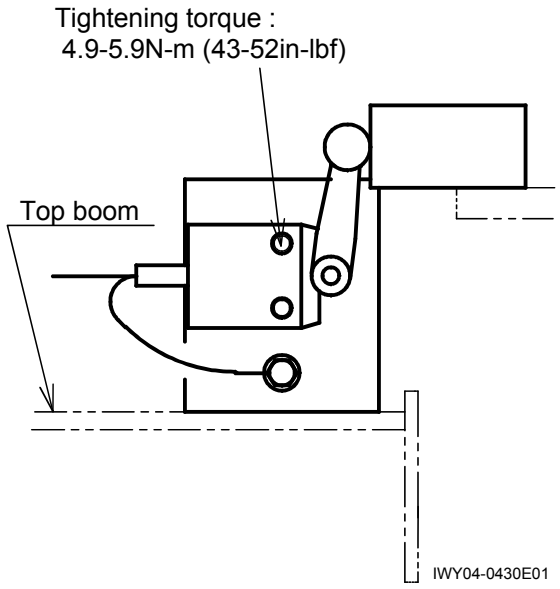
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Y-4 Electric Switch Adjustment

1. 3rd / top boom full retraction detection switch (CN859)

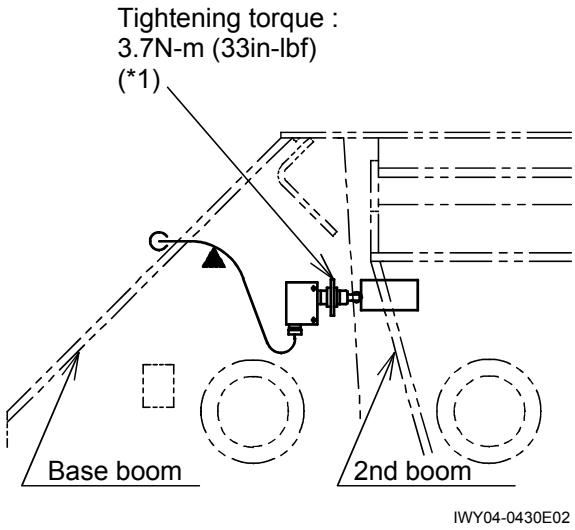
Adjust the switch position so that its contact is shifted (opened/closed) when the top boom section is extended/retracted beyond the position where it is 5-8 mm (0.2-0.31 in) longer than its fully retracted length.



2. 2nd boom full retraction detection switch (CN553)

Adjust the switch position so that its contact is shifted (opened/closed) when the 2nd boom section is extended/retracted beyond theposition where it is 2-3 mm (0.08-0.12 in) linger than its fully retracted length.

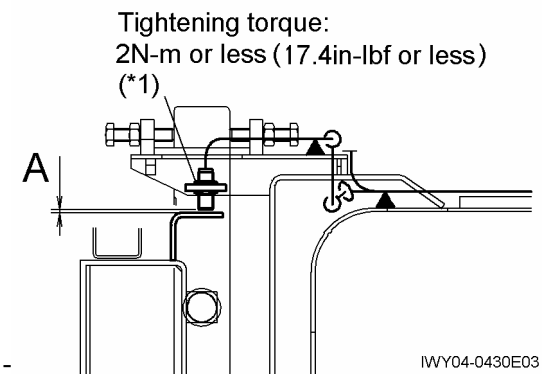
(*1): Apply the screw locking agent (Three-Bond 1401 or the equivalent).



3. Jib stowed detection proximity switch (CN572)

Adjust the switch position so that the dimension A becomes 4^{+1}_{0} mm ($0.16^{+0.04}_{0}$ in) with the jib stowed.

(*1): Apply the screw locking agent (Three-Bond 1401 or the equivalent).

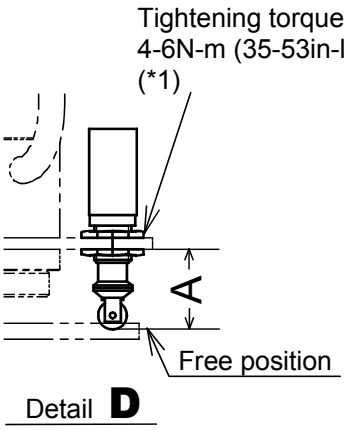


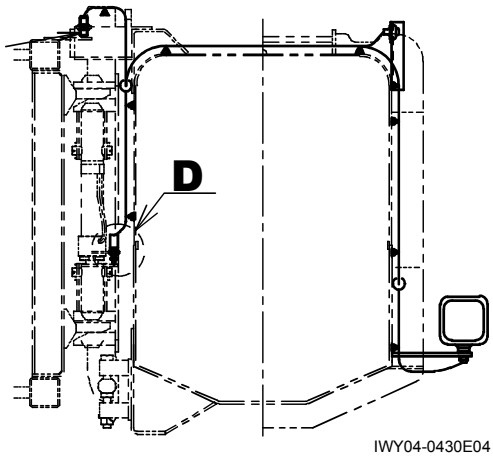
https://truckmanualshub.com/

4. Jib lock pin retraction detection switch (CN573)

Adjust the switch position so that the dimension A becomes 30.5^{+1}_{0}mm ($1.2^{+0.04}_{0}$ in) with the switch in free position.

(*1): Apply the screw locking agent (Three-Bond 1401 or the equivalent).

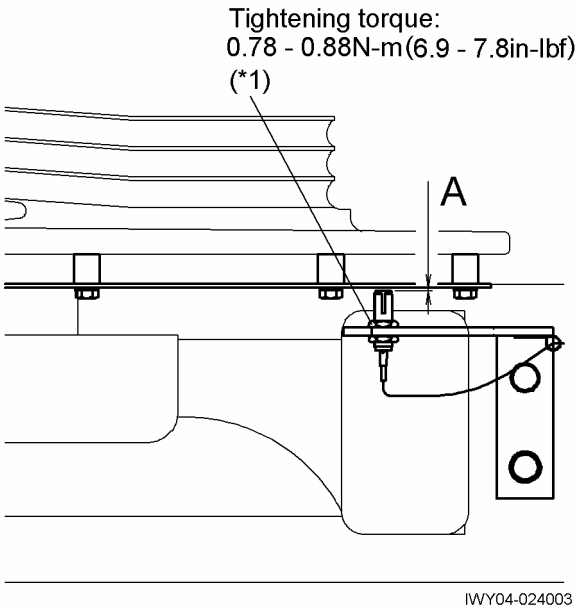




5. Main winch drum rotation detection proximity switch (CN591) (option)

Adjust the switch position so that the dimension A becomes 2.5±0.5 mm (0.1±0.02 in).

(*1): Apply the screw locking agent (Three-Bond 1401 or the equivalent).



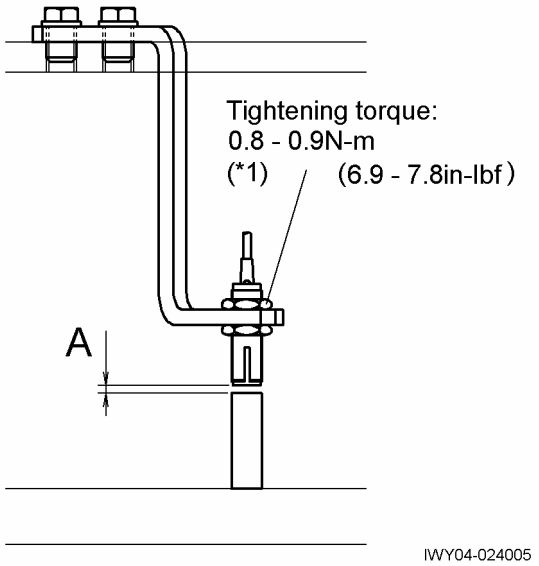
6. Aux. winch drum rotation detection proximity switch (CN592) (option)

Fullow the same procedure as that in MAIN WINCH DRUM ROTATION DETECTION PROXIMITY SWITCH (CS13).

7. Over-front detection proximity switch (CN521)

Fully retract the boom and swing it to the over-front. Insert the swing lock pin and set the boom angle to 0°. Then, adjust the switch position so that the dimension A becomes $3^{0}_{-0.5}$ mm ($0.12^{0}_{-0.02}$ in).

(*1): Apply the screw locking agent (Three-Bond 1401 or the equivalent).

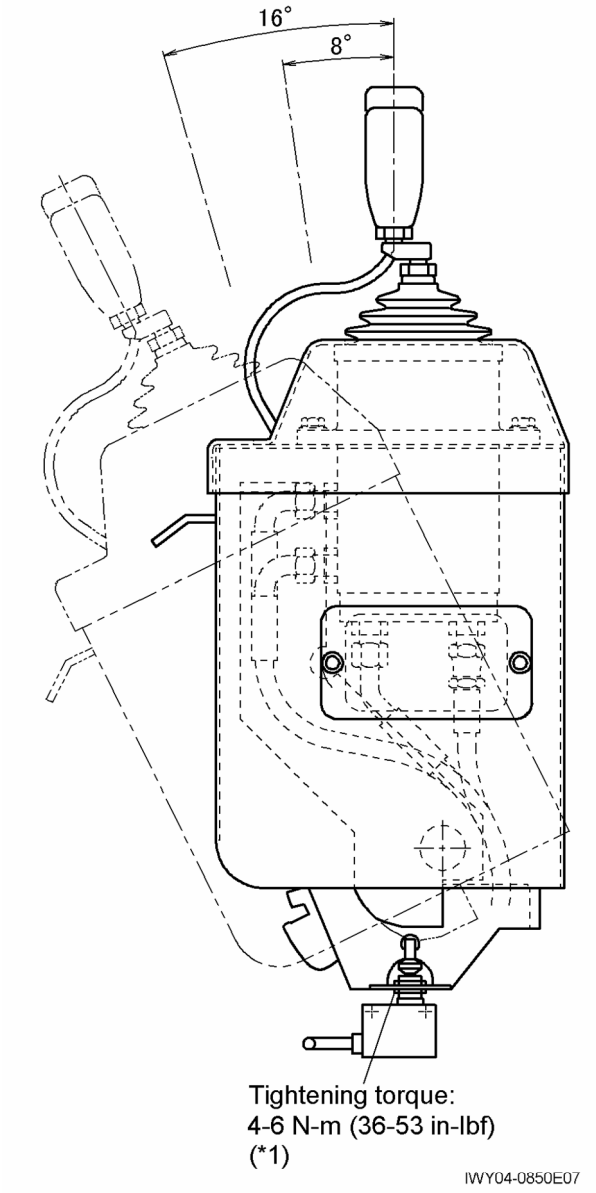


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8. Control lever stand position detection switch (Swing control and boom telescoping/aux. hoist) (CN529)

Before the adjustments below, tilt the lever stand by the angle of 16°. Squeeze the switch upward and secure it temporarily where its contact is shifted (opened/closed). Then, lower the switch by 1 mm (0.039 in) from the temporary secured position and secure it. (A rotation of the switch mounting nut makes the switch move upward or downward by approx. 1 mm (0.039 in)).

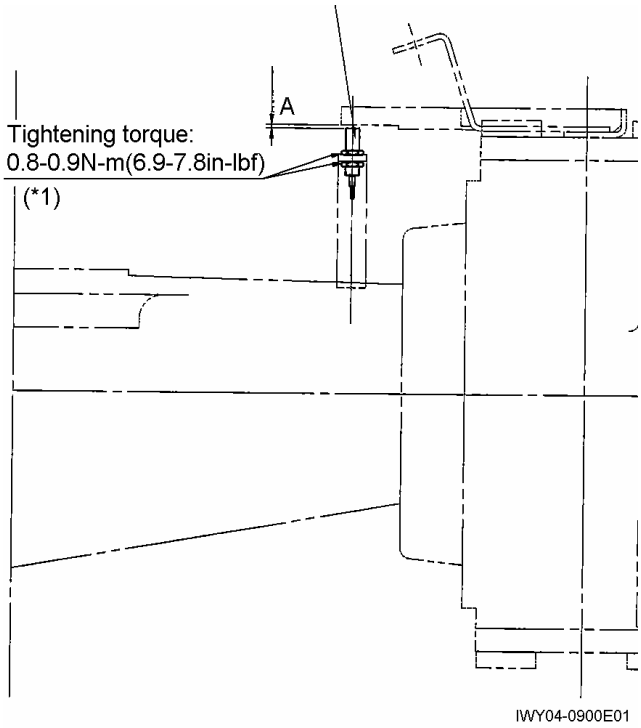
(*1): Apply the screw locking agent (Three-Bond 1401 or the equivalent).



9. Straight ahead detection proximity switch (CN408)

Set the rear wheels in a straight-forward position, and adjust the switch position so that the dimension A becomes $3^{0}_{-0.5}$ mm ($0.12^{0}_{-0.02}$ in).

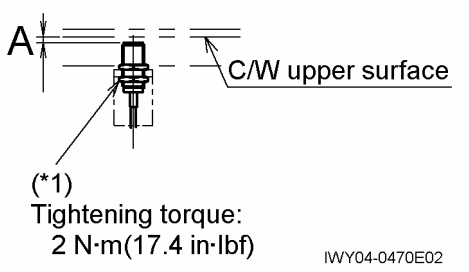
(*1): Apply the screw locking agent (Three-Bond 1401 or the equivalent).



10. Counterweight equipped detection proximity switch (CN994)

Adjust the switch position so that the dimension A becomes 5±1 mm (0.2±0.04 in)

(*1): Apply the screw locking agent (Three-Bond 1401 or the equivalent).

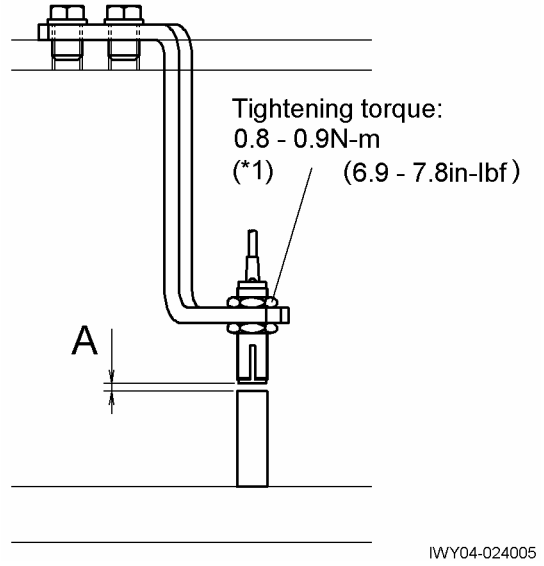


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11. Over-rear detection proximity switch (CN518) [for Europe only]

Fully retract the boom and swing it to the over-rear. Set the boom angle to 0°. Then, adjust the switch position so that the dimension A becomes $3^{0}_{-0.5}$ mm ($0.12^{0}_{-0.02}$ in).

(*1): Apply the screw locking agent (Three-Bond 1401 or the equivalent).



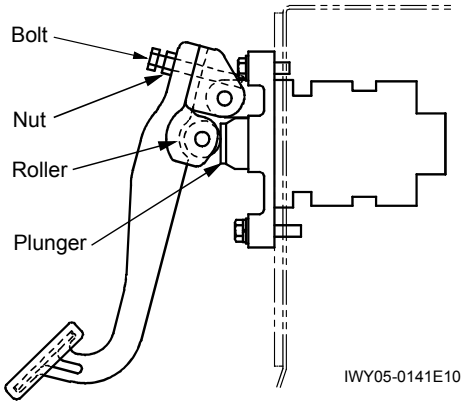
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Y-5 Adjustment and Checks

1. Service brake adjustment

1.1 Adjusting the brake pedal

With the pedal weight causing the roller to contact the plunger, adjust the bolt until it contacts the stopper, then use the nut to lock it in place.



1.2 Tightening the cap of reserve tank of service brake fluid

After bleeding air, pour the brake fluid up to a required level, and tighten the cap until it stops at the stopper. At this time, the position of tank body and cap should be as shown in Fig.1. In addition, tighten the cap until the mark is aligned with the mark on tank as shown in Fig.2.
The stopper might be broken when tightening the cap too much.

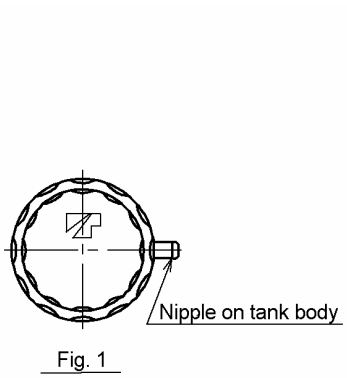


Fig. 1

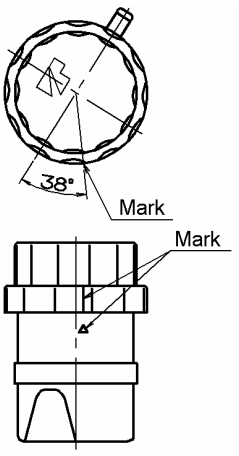
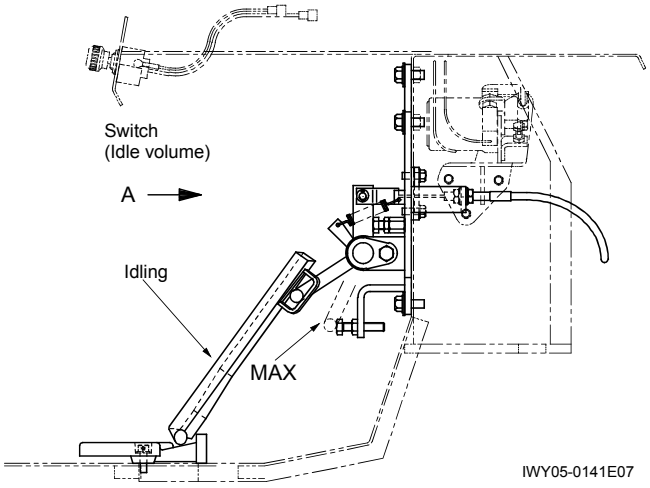


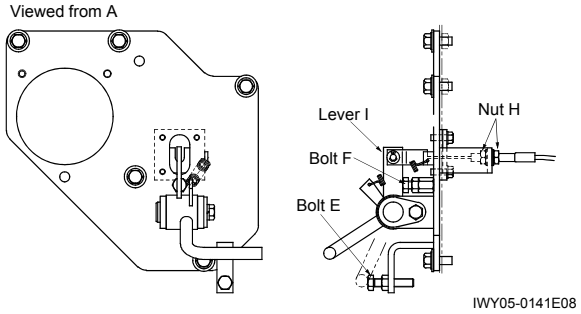
Fig. 2 IWY05-1390E01

2. Accelerator adjustment

2.1 Accelerator pedal



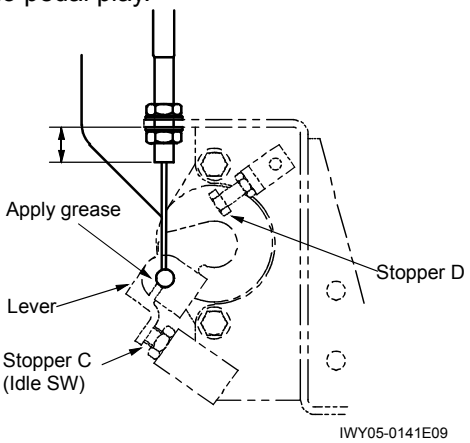
1. Adjust bolt F so that lever I is vertical, then lock the bolt with the nut.



[NOTICE]

◆Be sure to check that the idle SW operates reliably.

2. Move the accelerator sensor lever so that it contacts stopper C. Then adjust nut H until there is no pedal play.



3. When at Max. position (accelerator sensor lever in contact with stopper D), place bolt E in contact with the lever on the underside of the pedal, and lock in place with the nut.

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3. Parking brake adjustment

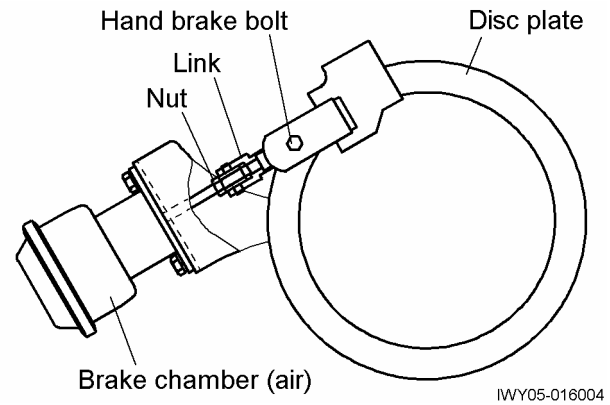
3.1 Adjusting the parking brake clearance (between pad and disc plate)

Adjust so that the clearance between pad and disc plate becomes approx. 0.15 mm (0.006 in) per side.

3.2 Connecting the parking brake and spring chamber

(1) Move the spring chamber to the end of its stroke. (Use air pressure to move it to the end of its extension stroke.) Then adjust the position of Link, connect the chamber and brake lever.

(2) After connecting, check so that the clearance between the pad and disc plate becomes apporox. 0.15 mm (0.006 in) per side. Then lock in place with the nut.



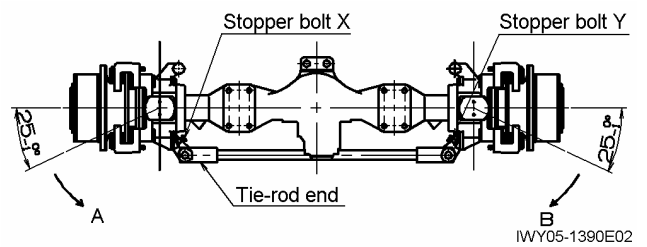
4. Tire steering angle adjustment

4.1 Tire air pressure

unit: kPa {psi}

Tire size	Traveling	On-tire operation
29.5 - 25 - 22PR	350^{+100}_{0} ($50.75^{+14.5}_{0}$)	420±20 (60.9±2.9)
29.5 - 25 - 28PR	330^{+100}_{0} ($47.85^{+14.5}_{0}$)	450±20 (65.25±2.9)

4.2 Adjusting the tire Steering angle



1. Jack up the vehicle. Operate the steering cylinder 2 to 3 times with 4-wheel steering (to bleed air out from the cylinder).
2. Before adjusting the tire turning angle, use a side-slip tester to check that the amount of tire side-slip is no more than ± 5 mm (0.197 in) for both the front and rear tires.
3. If it is more than ± 5 mm (0.197 in), loosen the bolts that fasten the left and right tie-rod ends. Then rotate the tie-rod and adjust the toe-in..
4. Jack up the vehicle on a level road surface (so that the height of the left and right tires is the same). Use a tire turning angle measurement jig to adjust the turning angle in direction A to 24° - 25° at stopper bolt X, and in direction B to 24° - 25° at stopper bolt Y.
5. Adjust the rear wheels as the procedures of the front wheels.

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5. Engine speed (and governor setting)

[NOTICE]

◆Before checking the engine speed, run the engine to warm it up. (Light weight grease should reach approximately 50°C (122°F).)

1. No-load Max. speed
   - PTO - OFF : 2860 ± 40 min^{-1}
   - PTO - ON : 2150 $^{+50}_{0}$ min^{-1}

2. Idling speed : 670 ± 25 min^{-1} (PTO - OFF)

3. Stall speed

(1) Set the switches and levers as described below.
   - PTO switch : OFF
   - Shift lever : 2nd gear
   - Drive speed selector switch : 4WD Hi
   - Service brake : ON

(2) Depress the accelerator pedal all the way. Check the speed when the engine speed has stabilized.
Max. speed standard when stalled:
Approx. 2160 min^{-1}

6. Torque converter and transmission

6.1 Maximum allowable speed

Units: MPH (km/h)

Shift position	Hi position	Lo position
1	5.5 (8.9)	1.6 (2.5)
2	11.6 (18.5)	3.2 (5.1)
D	22.5 (36.2)	6.2 (10.0)
R	3.9 (6.2)	1.6 (2.5)

[NOTICE]

◆Engine speed: 2600 min^{-1}

◆Gauge display

◆Pay attention to the tachometer and do not overrun the engine.
(Max. 2900 min^{-1})

◆Drive-speed selection must be done with the vehicle at a complete stop and with the brakes not applied.

◆The mechanism does not allow 2WD selection in Lo position.

6.2 Adding oil to the torque converter and transmission

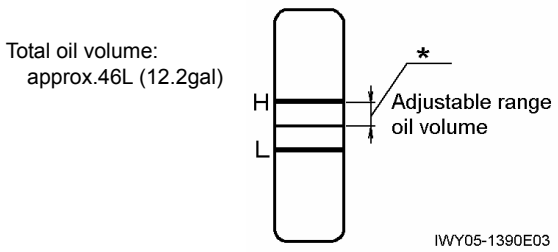
[NOTICE]

◆When checking the oil level, turn PTO OFF. Check at an oil temperature of 50°C, once the oil level has stabilized after the engine is started.

◆Do not add too much or too little oil.
Do not allow dust or water to enter when adding oil.

1. With the engine stopped, add oil to the oil injection port in the top of the T/C, to the prescribed level on the T/M oil level gauge.

2. Put the T/M in neutral and start the engine. While idling (670 min^{-1}), continue to add oil. Check that the oil level has stabilized within the range indicated by the * mark on the T/M oil level gauge.



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7. Braking force

7.1 Parking brake force

1. Must be 20% or more of the vehicle weight. Check that both the front and rear braking forces.

	Braking force
GR-800-1	94.7 kN or more {9663 kgf} (21307 lbf)
GR-700E-1	95.0 kN or more {9697 kgf} (21382 lbf)
TR-600-1	84.2 kN or more {8596 kgf} (18954 lbf)
GR-550E-1	84.6 kN or more {8630 kgf} (19029 lbf)

7.2 Service brake force

1. Check that the difference in braking force between the left and right wheels is 8% or less of axle load.

	Braking force
GR-800-1 GR-700E-1	19.4 kN or less {1976 kgf} (4357 lbf)
TR-600-1 GR-550E-1	18.0 kN or more {1840 kgf} (4057 lbf)

Check that the difference in braking force between the left and right wheels is 6.86kN {700 kgf}.

2. Check the braking force
   - FRONT .... 75 kN{7700 kgf}(16980 lbf) or more
   - REAR..... 45 kN{4600 kgf}(10140 lbf) or more

8. Adjusting the headlight light axes

(1) Turn the switch to the high beam side.

(2) Use a tester and adjust as following.
Left-right direction: 0°
Up-down direction: 0°

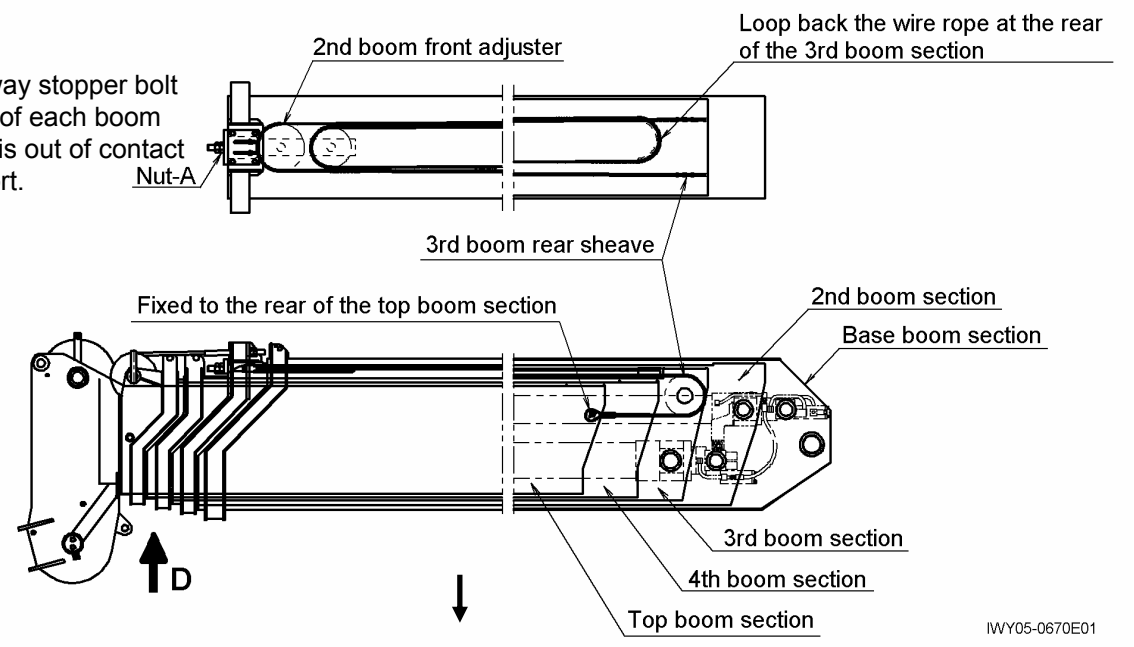
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9. Adjusting boom telescoping wire ropes

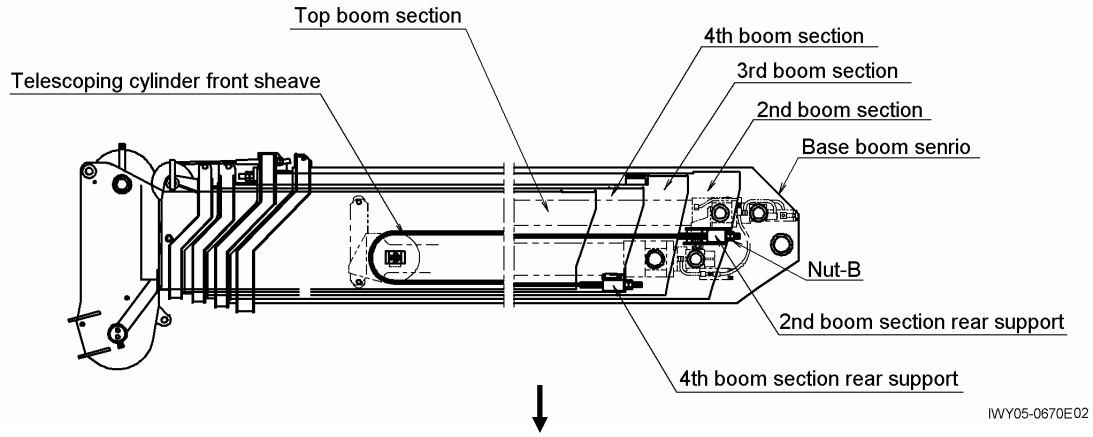
1. With the boom fully retracted, tighten the nut-A until a tension is placed on the top boom section retraction wire rope (to keep the boom fully retracted).

[NOTICE]

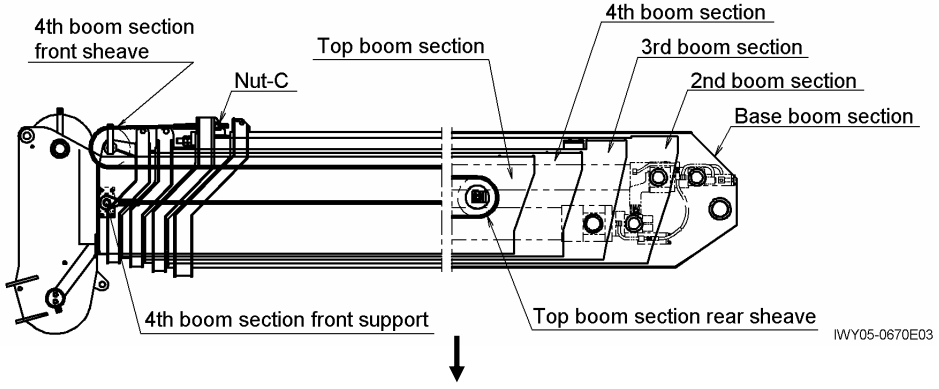
◆Loosen the sway stopper bolt on the bottom of each boom section until it is out of contact with the support.



2. Tighten the four nut-B's equally until the 4th boom section extends by 1-5 mm (0.04-0.2 in) from the 3rd boom section.

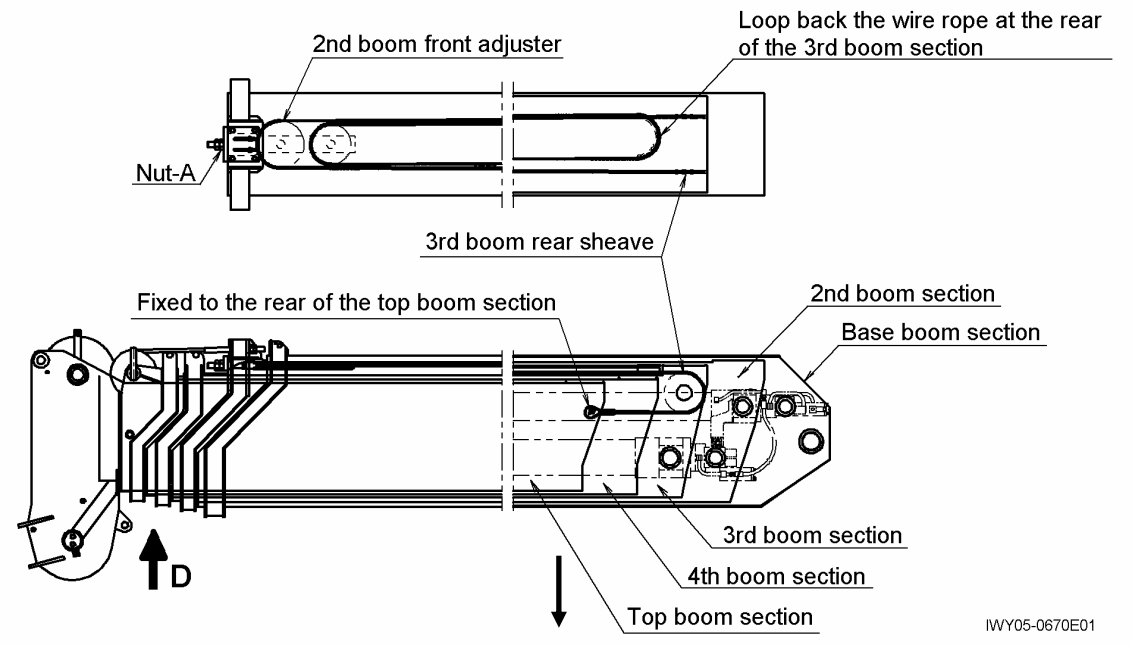


3. Tighten the two nut-C's equally until the top boom section extends by 1-5 mm (0.04-0.2 in) from the 4th boom section.



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4. Tighten the nut-A until the top and 4th boom sections are fully retracted.



5. Extend the boom by 200-300 mm (8-12 in) by operating the boom telescoping control lever and then retract it fully. Check the boom is fully retracted.

NG

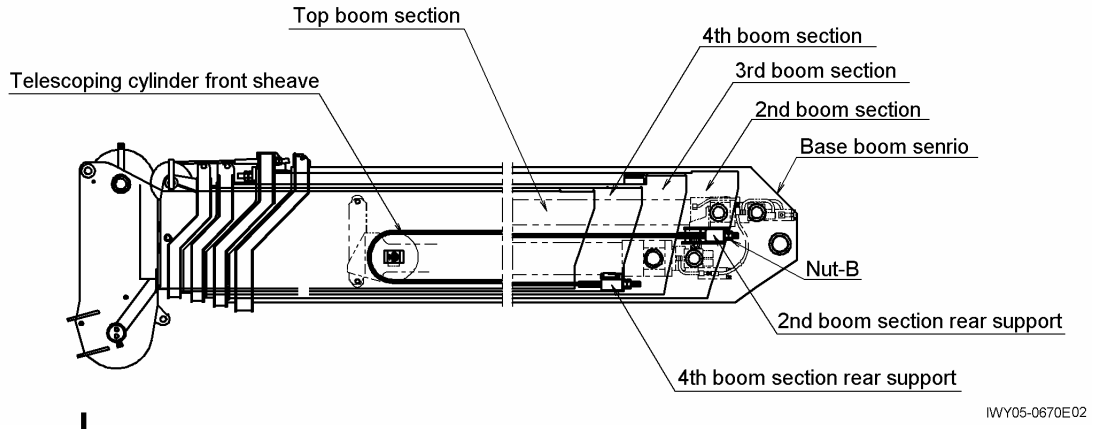
OK → END

6. Check the tension of the two 4th boom section extension wire ropes.

7. When the wire rope is slack:

8. When the wire rope is tense:

7.1 Tighten the two nut-B's by approx. a third turn equally.



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7.2 Extend the boom by 200-300 mm (8-12 in) by operating the boom telescoping control lever and then retract it fully. Check the boom is fully retracted.

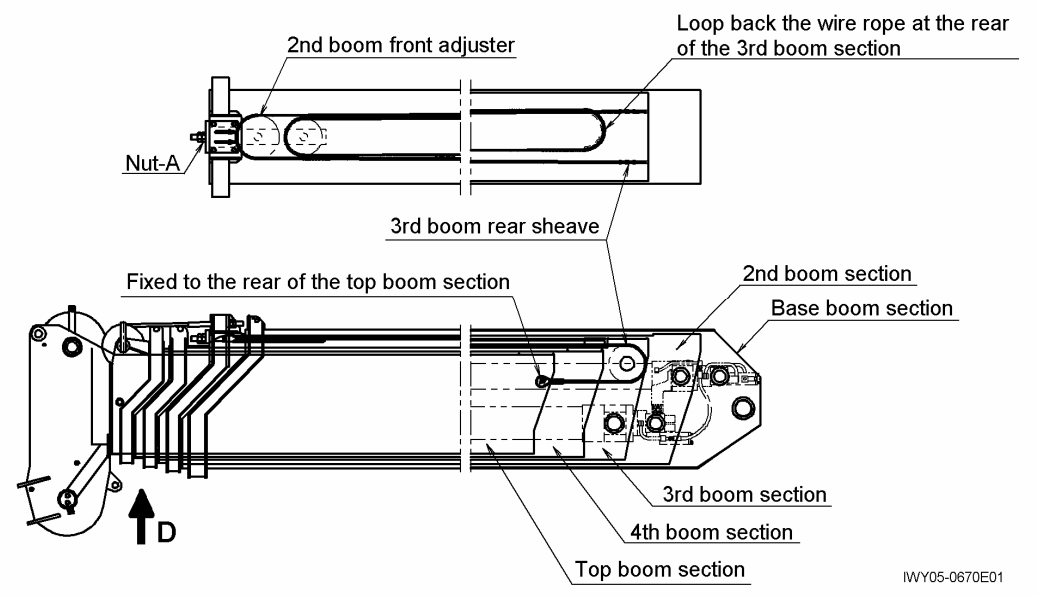
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8. When the wire rope is tense:

8.1 Tighten nut-A by approx. a third turn.



8.2 Extend the boom by 200-300 mm (8-12 in) by operating the boom telescoping control lever and then retract it fully. Check the boom is fully retracted.

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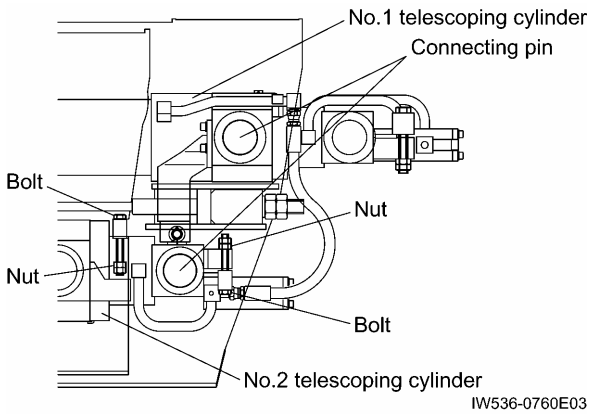
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OK

END

9. When only the 4th boom section is not fully retracted:

9.1 Tighten two nut-C's by approx. a third turn equally.



9.2 Extend the boom by 200-300mm (8-12 in) by operating the boom telescoping control lever and then retract it fully. Check the boom is fully retracted.

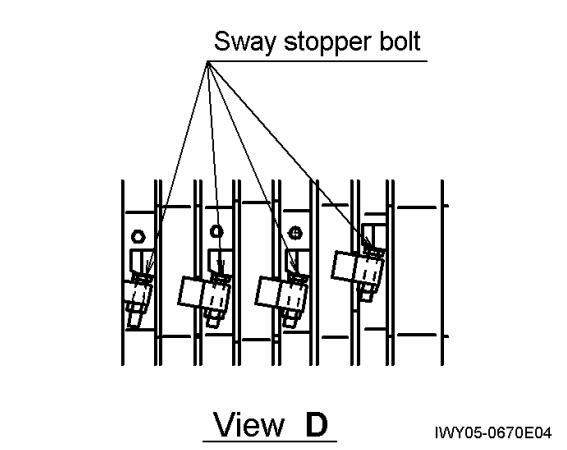
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OK

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10. Adjust the sway stopper bolt for the each boom section.



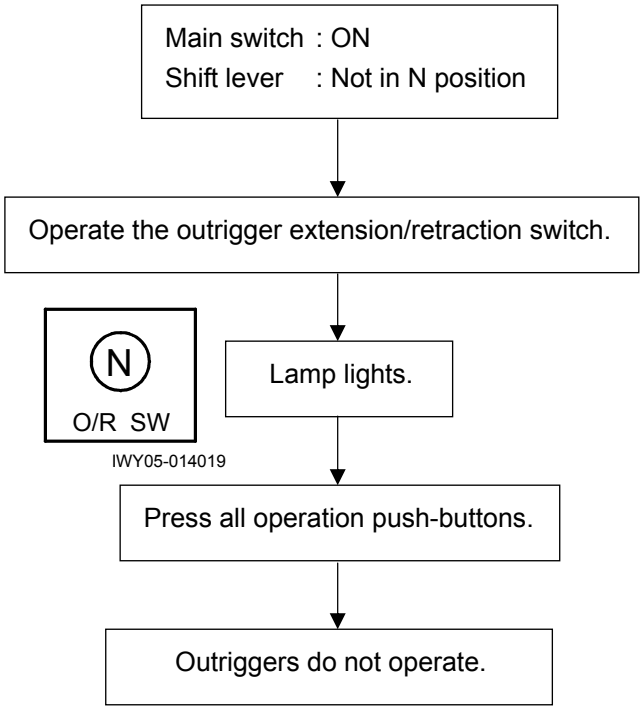
[NOTICE]

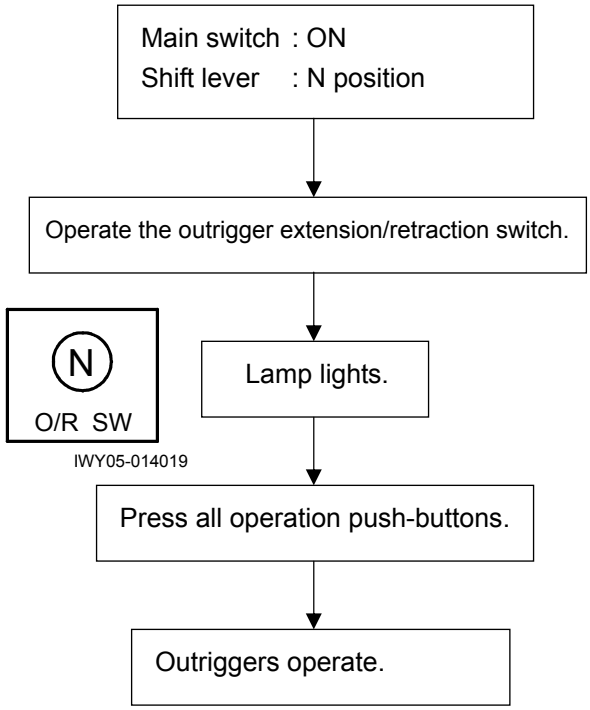
◆Refer to “Adjusting the bolt on the bottom of each boom section head” in chapter G.

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Y-6 Check (Crane Operation)

1. Outrigger status indicator





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2. Hoisting

[Condition]

- Load :None
- Engine speed :Approx.670 min^{-1} to medium speed

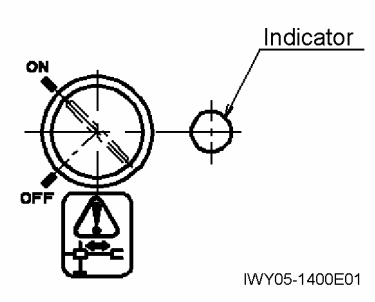
[Procedure]

1. Shift the boom telescoping lever to full stroke first.
2. Make sure that the main winch moves slowly while the auxilialy winch lever is slightly operated.
3. Make sure that the main winch does not move while the auxilialy winch lever is operated to full stroke.

3. Backward stability control

Select the on-tires for outrigger set status on the AML.
The boom raising operation must be stopped at 69° automatically.
The boom lowering must be operated.

4. Outrigger emergency setting

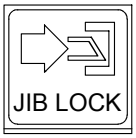


IWY05-1400E01

1. Turn the switch of the upper right panel in the cab ON.
2. Make sure that the indicator lights up.
3. Check that the extension width can be changed on AML manually regardless of current extension width (360-degree same).

5. Jib

1. Make sure that the two-blocking function does not work while the jib set status is registered.
2. Check the jib lock indicator lamp.
   - Make sure that the lamp is lit when the jib slides out of the center support on the boom.



Lamp is lit

IWY04-0510E01

3. Check the operation of the jib mounting/stowing cylinder.
   (1) Make sure that the jib mounting/stowing cylinder can be moved while the boom is retracted fully.
   (2) Make sure that the jib mounting/stowing cylinder does not move when the 2nd boom section extends by 100 mm (3.94 in).
   (3) Make sure that the jib mounting/stowing cylinder does not move when the 3rd to top boom sections extend by 100 mm (3.94 in).

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6. Boom Telescoping Control

[Boom length: 11.5 - 44.0 m (37.7 - 144.4 ft)]

S_1: Emergency telescoping switch for 3rd to top boom sections

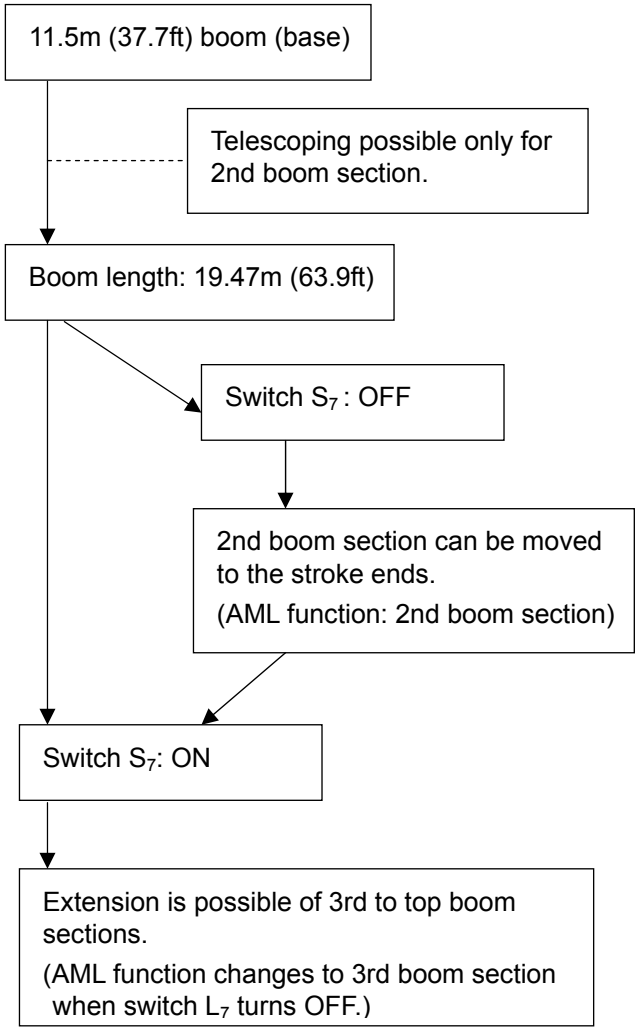
S_2: Emergency telescoping switch for 2nd boom section

S_7: Extension switch for 3rd to top boom sections

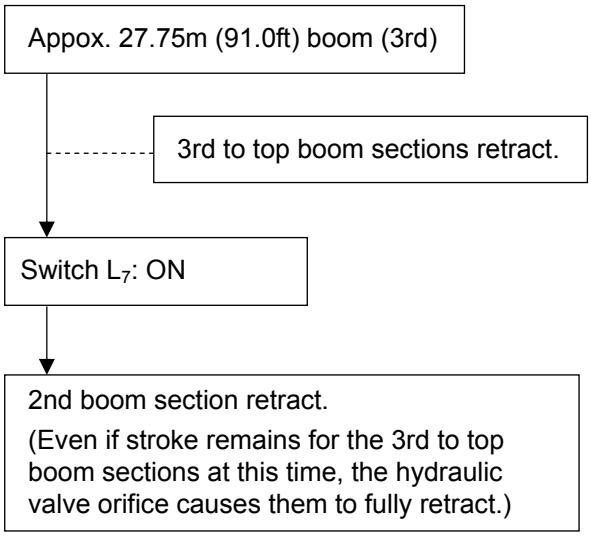
L_7: Full-retraction detection limit switch for 3rd to top boom sections

L_8: Full-retraction detection limit switch for 2nd boom section

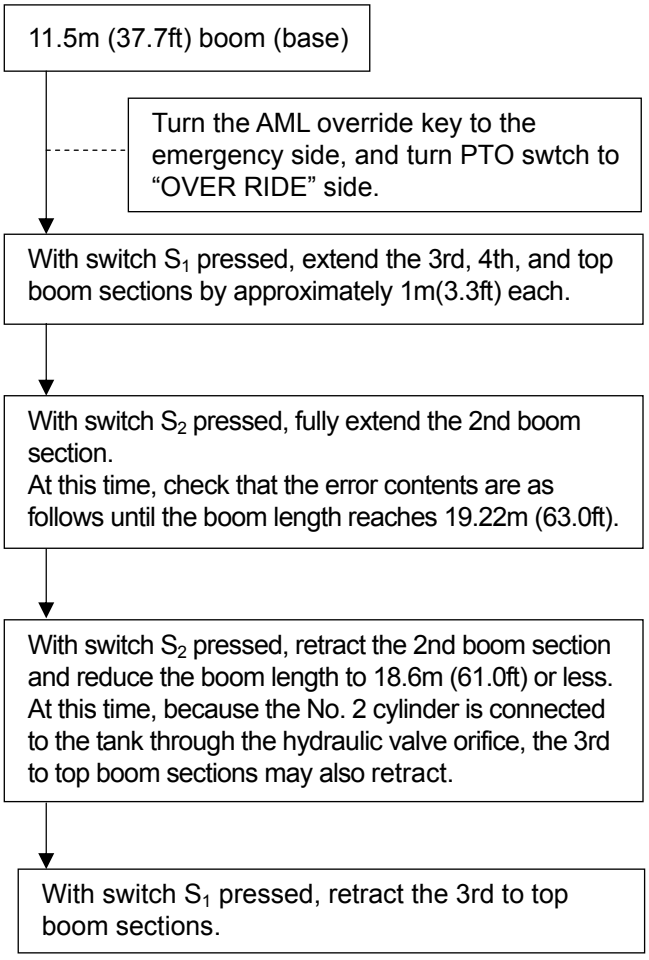
Extension



Retraction



Emergency telescoping

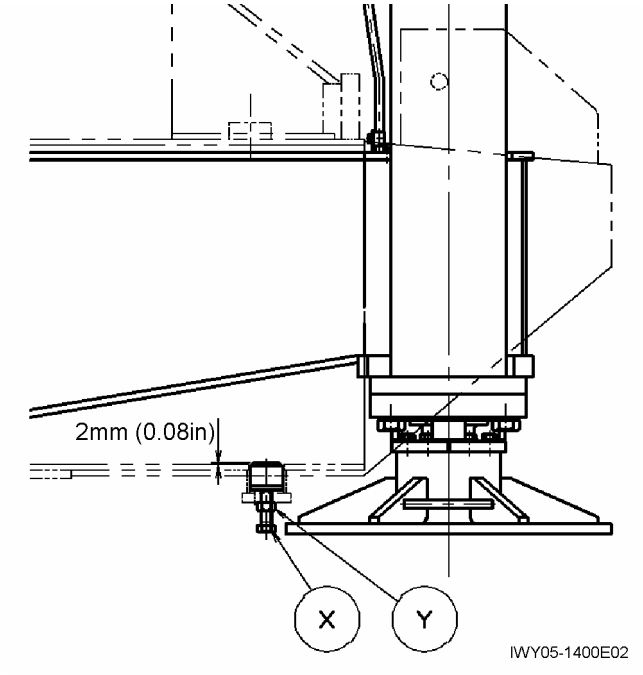


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7. Alarms

Item	Type of alarm	Sound	Checking procedure
AML limit	Electronic buzzer	• 280Hz • continous low tone	Occurs at 100% when main switch is ON and PTO switch is (|) ON. (Intermittent low tone sound occurs at 90% and above.)
Overwind warning	Electronic buzzer	• 2300Hz • continous high-low tones	Occurs when the overwind switch of either the main or auxiliary winch is turned ON by winch hoist-up operation.
Outrigger operation switch detection	Electronic buzzer	• 2300Hz • Intermittent beeping	Sounds when either the outrigger extension/retraction or jack slide selector switch has been left in any position other than neutral 10 seconds after operation is completed.
E/G cover interference automatic stop	Electronic buzzer	• AML buzzer: sounds 3 seconds	When main switch is ON and PTO switch is (I) ON, make sure that the operation stops while boom angle is 8° or less and swing angle is between 135° and 220°.

8. Outrigger slide plate adjustment



1. With the outriggers fully retracted, install the slide plate and the plate into the outrigger box.
2. Adjust the slide plate with the bolt X so that the slide plate is 2mm away from the upper surface of outrigger box bottom plate.
3. Tighten the nut Y to secure the bolt X in position.

9. Lower outrigger operation

1. Only the right (left) side sliders can be controlled from the right (left) side of lower structure.
   Both individual jack and all jacks controls must be controlled from either right and left side.
2. When retracting the slider from the cab side, the operation must not be affected even if extending the jack from right or left of lower structure side.
   (O/R accelerator switch OFF)
3. When retracting the slider from the right (left) of lower structure side, the operation must not be affected even if extending the jack from cab side.
   (O/R accelerator switch OFF)
4. When retracting the slider from the right (left) of lower structure side, the operation must not be affected even if extending the jack from the left (right) of lower structure side.
   (O/R accelerator switch OFF)
5. When retracting the slider from the right (left) of lower structure side with the accelerator switch ON, the operation must not be affected even if controlling the jack (extend/retract selector switch OFF) from the left (right) of lower structure side with the O/R accelerator switch ON.

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Y-7 Check (Driving Devices)

1 Exhaust brake (EXB)

1. Turn the EXB switch ON.
   Engine speed is idling.
   (The pilot lamp illuminates.)

2. Check pattern

[NOTICE]

◆Check whether or not EXB is operating from the engine noise and from the movement of the air cylinder.

Seq.		EXB
1	With the shift lever in the N position.	OFF
2	Move the shift lever from the N position to the D position.	ON
3	Depress the accelerator pedal.	OFF
4	Release your foot from the accelerator pedal.	ON
5	Use the service brake to reduce speed to 1 km/h or less.	OFF
6	Release your foot from the service brake pedal.	ON
7	Move the shift lever to the N position.	OFF

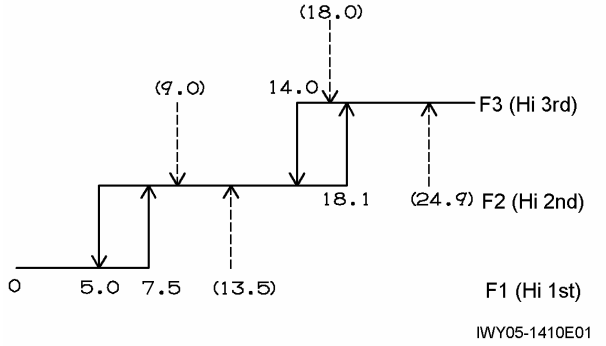
2. Automatic transmission

[NOTICE]

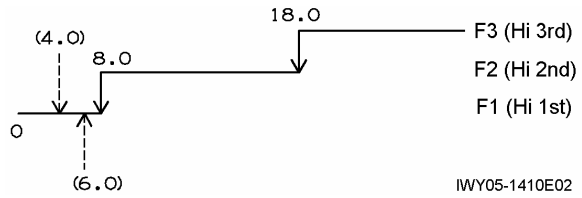
◆Numbers indicate speedometer readings (units: km/h)

◆<----- ( ) Indicates lock-up ON and OFF values.

[High position]



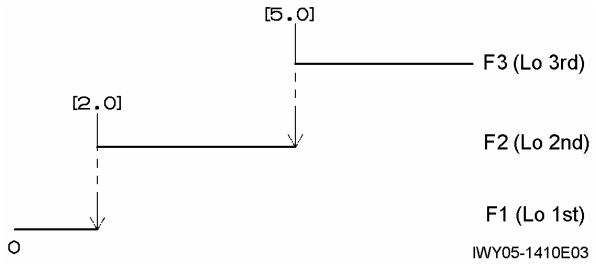
Manual shift



[Low position]

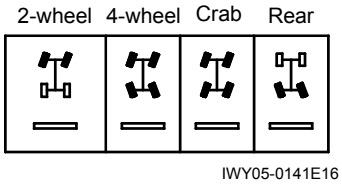
[NOTICE]

◆No automatic shift in Low position.



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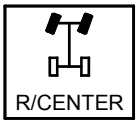
3. Steering mode change



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Change the steering mode switch to 4-wheel, crab, or rear steering.

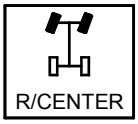
Turn the steering wheel, and check the steering.



IWY05-014016

Check that the lamp is ON, except when it is straight advancement of the state of the rear tire.

Match the rear tire in the state of straight advancement.



IWY05-014016

Check that the lamp is OFF.

Change the steering mode switch to 2-wheel steering.

4. Emergency switches

1. Emergency gear shifting procedure
   After turning the emergency transmission switch to ON, make sure that gear shift lever position “D”, “2” and ”1” are assigned to the 3rd gear, 2nd gear and 1st gear respectively for traveling.

2. Emergency accelerator
   Turn the emergency accelerator switch to ON, and make sure the engine revolution rises to maximum when the accelerator pedal is dipressed even slightly.

3. Emergency engine stop
   Make sure that the engine stops when the emergency engine stop switch is pulled.

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5. Overshift prevention

[NOTICE]

◆Jack up the vehicle and shift to 4WD Hi position. Perform the operations below and check the shift position with the combination meter.

1. Move the shift lever to “D” and increase speed to 18 km/h or more. Check that transmission shifts to 3rd gear (display: D).
2. Gradually reduce speed. Maintain a speed of 20 km/h. Move the shift lever to “2.” Check that transmission does not downshift (display: D).
3. Gradually reduce speed. Check that transmission downshifts to 2nd gear when the speed is 18 km/h (display: 2).
4. Maintain a speed of 10 km/h. Move the shift lever to “1.” Check that transmission does not downshift (display: 2).
5. Gradually decrease speed. Check that transmission downshifts to 1st gear at 8 km/h (display: 1).

	Meter speed	Combination meter display
a	18	D
b	18	2
c	10	2
d	8	1

6. Warnings

Item	Warning type	Identification	Check conditions
Low air pressure and parking	Electronic buzzer	• 2300 Hz • Continuous beep	Buzzer does not sound when the following conditions are met. It sounds at all other times. 1.Air pressure is 540 kPa {5.5 kgf/cm^2} or less. From parking OFF, main switch is turned ON. 2.Parking and brake lock are ON, shift lever is in D position, and speed is 1 km/h or less.
Engine overrun	Electronic buzzer	• 2300 Hz • Intermittent beeping	The mechanism sounds at engine speed of 3030 min^{-1}. There is not need to check it. Turns OFF at 2800 min^{-1}.
Speed warning	Electronic buzzer	• 2300 Hz • Continuous and intermittent sounds	Attach a step-up gear to the vehicle speed detection gear box. Accelerating: Speedometer reading 41 km/h: Intermittent sound 43 km/h: Continuous sound Decelerating: Speedometer reading 40 km/h: Intermittent sound 36 km/h: OFF
Torque converter low pressure	Electronic buzzer	• 2300 Hz • Continuous beep	Buzzer sounds if the parking brake is OFF, and the torque converter pressure is 1.0 MPa (10.0 kgf/cm^2) or less.
2WD/4WD select	Electronic buzzer	• 2300 Hz • Continuous beep	Sounds if vehicle speed exceeds 0.6MPH when 2-/4-wheel switch condition is differ from 2-/4-wheel indication in the meter panel.
Hi/Lo select	Electronic buzzer	• 2300 Hz • Continuous beep	Sounds if vehicle speed exceeds 0.6MPH when Hi/Lo selector switch condition is differ from Hi/Lo indication in the meter panel.
Torque converter oil temperature	Electronic buzzer	• 2300 Hz • Continuous beep	Check is unnecessary because structurally sounds when oil temperature exceeds 110℃ if vehicle speed exceeds 0.6MPH. No sound when oil temperature is below 100℃ or vehicle is stop.

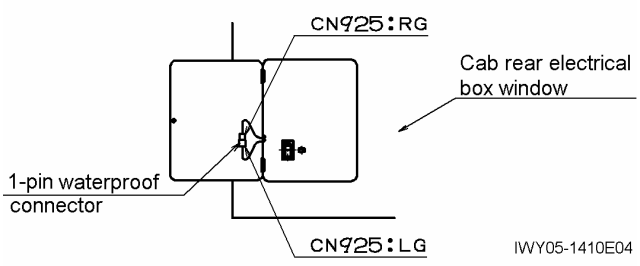
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7. Speed limiter (For Europe)

[NOTICE]

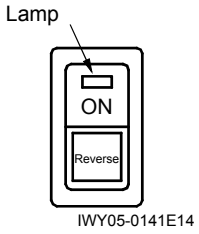
- ◆Check this together with “2. Automatic transmission”.
- ◆Jack up the vehicle and shift to 4WD Hi position. Perform the operations below.

1. Keep the starter switch to OFF, open the door of the inside-cab relay box, and connect the on/off connector.
2. Check that T/M is not shifted up to 3rd at Hi range of “2. Automatic transmission”.
3. After checking, remove the connector in the condition of starter switch OFF.
   After removing the connector, check that T/M is restored to Hi range of “2. Automatic transmission” (shift up to 3rd and locked).



8. Reverse steering (For Europe)

1. Face the boom to the rear of the vehicle.
2. Check that when the boom is within a range of 18° ± 3° from the direct rear of the vehicle, and the reverse steering switch is ON, the lamp illuminates (boom direct rear area detection is ON).



3. Turn the steering wheel and check that the tires turn in the opposite direction from when the vehicle is moving forwards.
4. With the boom outside the rear range (boom direct rear area detection OFF), turn the reverse steering switch ON and check that the lamp flashes and the warning buzzer sounds intermittently.

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Y-8 Oil and Grease Table

Item				Quantity :L (gaL)		Remarks
Hydraulic oil				995 (263)		TADANO Hydraulic oil LL (*2): #22
Gear oil	Swing assy			3.8 (1.0)		Mobil Gear 632 ISO VG 320 API Service Class GL-3
	Winch assy		Main	4.0 (1.06)		
			Aux.	4.0 (1.06)		
	Axle	Carrier axle		24 (6.3)	It has enclosed it in the maker	APOROIL gear oil HE90S SAE 90 API Service Class GL-5
		Planetary gear		5 (1.3) × 2		
Brake fluid				1.7 (0.45)		TADANO Genuine Brake Fluid DOT 5.1
Torque converter oil				46 (12.15)		Mobil ATF: GM Dexlon II
Engine oil				13 - 15 (3.44 - 3.96) (Full level 11 (2.9) Low level 9 (2.4) Oil Filter 4 (1.06))		Mobil Delvac 1330 SAE 30 API Service Class CD (*2) Mobil Delvac Super 1300 SAE 10W-30 API Service Class CD
Grease				1 (0.26)		Daphne Coronex Grease EP No.2
Fuel tank				300 (79.3)		Light Oil (JIS K 2204 2)
Cooling water (*1)	Engine			13 (3.44)		Amount approx. 30 (7.9)
	Radiator			8.8 (2.3)		
	Connecting hose			8.5 (2.2)		

(*1): Applicable to a machine equipped with an air conditioner

1. Turn the starter switch to ON and shift the temperature adjustment switch fully toward the Hot side.
2. Press the air conditioner shutdown switch and then start the switch.
3. Bleed the circuit from the engine via the radiator to the rotary joint completely.
4. Bleed the circuit with the 1st step of the wind volume and the air conditioner switch turned ON.
   (Engine speed: idling)
5. Check the cooling water level after bleeding.

(*2): Canada Specification

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Y-9 Mass Table

Part Name		Spec. No.	
		GR-700E-1-00211 2M2D (Europe)	GR-700E-1-00212 2M2D (General Export)
Boom	Boom assy (including telescoping cylinder, jib-1 and jib-2)	11470kg (25290lbf)	
	Telescoping cylinder (No.1)	790kg (1740lbf)	
	Telescoping cylinder (No.2)	880kg (1940lbf)	
	Jib-1	560kg (1230lbf)	
	Jib-2	280kg (620lbf)	
Elevating cylinder		950kg (2090lbf)	
Swing table assy (excluding boom and elevating cylinder, swing bearing, counter weight)		5150kg (11360lbf)	
Swing bearing		630kg (1390lbf)	
Swing speed reducer and swing motor		210kg (460lbf)	
Rotary joint		180kg (400lbf)	
Winch	Main winch assy (including winch motor)	640kg (1410lbf)	
	Auxiliary winch assy (including winch motor)	640kg (1410lbf)	
	Winch motor (main/auxiliary)	150kg (330lbf)	
Weight	Counterweight 1	7900kg (17420lbf)	
Outrigger	Outrigger inner case assy (including jack cylinder and extension cylinder)	800kg (1760lbf)	
	Jack cylinder	170kg (370lbf)	
	Extension cylinder	60kg (130lbf)	
Front axle		1570kg (3460lbf)	
Rear axle		1460kg (3220lbf)	
Engine		630kg (1390lbf)	
Torque converter		230kg (510lbf)	
Transmission		450kg (990lbf)	
Wheel assy (tires: 29.5×25-22PR)		790kg (1740lbf)	

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Y-10 Specifications

1. Engine speed

- Engine model : MITSUBISHI 6M60-TLA3B
- T/C model : RF80C-76F4

1.1 Idling speed

670±25min^{-1} (PTO: OFF)

1.2 MAX. speed (unload)

2860±40min^{-1} (PTO: OFF)

2150^{+50}_{0}min^{-1} (PTO: ON)

1.3 Stall speed

Approx. 2160min^{-1} (measured value for reference)

Measuring conditions:
PTO switch: OFF
Gearshift position: 2nd
Drive mode select switch: H/4WD
Service brake: Fully applied
Accelerator pedal: Fully operation

2. Hydraulic pump (for crane) (Double Variable Displacement Pump)

2.1 Pump speed

$$\text{(Pump speed} = \frac{\text{Engine speed}}{0.918}\text{)}$$

Idling speed: 730±27min^{-1}

Max. speed: 2342^{+54}_{0}min^{-1}

2.2 Pump displacement

82 + 82cm^3/rev (5 + 5in^3/rev)

3. Hydraulic pump (for steering) (Double Gear Pump)

3.1 Pump speed

$$\text{(Pump speed} = \frac{\text{Engine speed}}{1.066}\text{)}$$

Idling speed: 629±23min^{-1}

Max. speed: 2683±38min^{-1}

3.2 Pump displacement

52.2 + 31.1cm^3/rev (3.18 + 1.9in^3/rev)

4. Charging pump (for torque converter)

4.1 Pump speed

$$\text{(Pump speed} = \frac{\text{Engine speed}}{1.066}\text{)}$$

Idling speed: 629±23min^{-1}

Max. speed: 2683±38min^{-1}

4.2 Pump displacement

33.2cm^3/rev (2.03in^3/rev)

5. Emergency steering pump (option)

5.1 Pump speed

Pump speed (min^{-1})

$$= \frac{\text{Transmission output shaft revolution}}{1.439}$$

5.2 Pump displacement

14.56cm^3/rev (0.89in^3/rev)

6. Winch motor

Displacement: 533cm^3/rev (32.5in^3/rev)

7. Swing driving unit

7.1 Swing motor

Displacement: 169.4cm^3/rev (10.33in^3/rev)

7.2 Swing speed reducer

Reduction ratio: 33.68

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Y-11 Boom Connecting Pin and Thread Size Table

(mm)

Applicable spec. No.		GR-450-1-*****, GR-500-1-*****		GT-250C-1-*****, GT-350C-1-*****	
Part Name		Diameter	Thread size	Diameter	Thread size
Elevating cylinder	Rod end pin	Φ100	M30×3.5	Φ100	M30×3.5
	Base pin	Φ90	M30×3.5	Φ90	M30×3.5
Boom base pin		Φ90	M16×2.0 (Qty:4)	Φ100	M18×2.5 (Qty:4)

(mm)

Applicable spec. No		GR-550E-1-*****, GR-600-1-*****, GR-700E-1-*****, GR-800-1-*****,	GT-550E-1-*****, GT-600-1-*****, GT-700E-1-*****, GT-800-1-*****, GT-900-1-*****
Part Name		Diameter	Thread size
Elevating cylinder	Rod end pin	Φ120	M33×3.5
	Base pin	Φ110	M30×3.5
Boom base pin		Φ100	M18×2.5 (Qty:4)

(mm)

Applicable spec. No		TR-300-4-*****, GR-300E-1-*****,		TL-300E-3-*****	
Part Name		Diameter	Thread size	Diameter	Thread size
Elevating cylinder	Rod end pin	Φ100	M30×3.5	Φ100	M30×3.5
	Base pin	Φ110	M30×3.5	Φ100	M30×3.5
Boom base pin		Φ100	M30×3.5	Φ100	M30×3.5

(mm)

Applicable spec. No		TT-300-1-*****		TR-150-4-*****	
Part Name		Diameter	Thread size	Diameter	Thread size
Elevating cylinder	Rod end pin	Φ90	M30×3.5	Φ60	-
	Base pin	Φ90	M30×3.5	Φ70	M24×3.0
Boom base pin		Φ90	M30×3.5	Φ60	M10×1.5

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Z

System Diagrams

Contents

Z-1 Hydraulic Circuit 1

1. For Europe 1

2. For general export 3

Z-2 Torque Converter Circuit 5

Z-3 Brake Circuit (Pneumatic Circuit) ... 6

Z-4 Electric Circuit (AML, Crane) 7

Z-5 Electric Circuit (MDT, Carrier/Upper) 9

Z-6 Electric Circuit (MDT, Carrier/Lower) 11

Z-7 Location of Hydraulic Parts (Upper) 13

1. Cab and swing table 13

2. Boom 16

Z-8 Location of Hydraulic Parts (Lower) 17

1. Carrier 17
   - 1.1 Front 18
   - 1.2 Center 19
   - 1.3 Rear 20

Z-9 Location of Air Parts 21

1. Cab and swing table 21

2. Carrier 22

Z-10 Location of Electric Parts (Inside cab) 24

Z-11 Location of Electric Parts (Swing Table, Boom) 25

Z-12 Location of Electric Parts (Relay Assembly / Upper) 26

Z-13 Location of Air Parts (AML) 27

Z-14 Location of Electric Parts (Lower) 28

https://truckmanualshub.com/

Z-15 Location of Electric Parts (Box Assembly / Lower) 29

Z-16 Harness (Connector No. Table) 30

Z-17 Harness (Inside Cab) 33

Z-18 Harness (Swing Table, Left) 34

Z-19 Harness (Swing Table Right) 35

Z-20 Harness (Boom) 36

Z-21 Harness (AML, Upper) 37

Z-22 Harness (Overwind) 38

Z-23 Harness (Lower, Main) 39

Z-24 Harness (Lower, Sub) 40

Z-25 Harness (Lower, Electronic Governor) 41

Z-26 Outdoor Air (Minus 25°C or less) System 42

1. Structure 42
2. Harness 43

Z-27 Anemometer System 44

1. Structure 44
2. Harness 45
3. Cord reel 46

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Z-1 Hydraulic Circuit

Applicable serial No. △1 : 545520 - -

1. For Europe

1.Engine
2.Torque converter
3.Double variable displacement pump
4.Double gear pump
5.Gear pump (emergency steering, option)
6.Drain filter
7.Hydraulic oil tank
8.Return filter (in hydraulic oil tank)
9.Line filter
10.Flow control valve
11.Hydraulic valve (emergency steering, option)
12.Solenoid control valve (outrigger)
13.Check valve (outrigger extending prevention)
14.Solenoid valve (slide/jack)
15.Extension cylinder
16.Jack cylinder
17.Pilot check valve (jack cylinder retracting prevention)
18-1.Pressure reducing valve (pilot pressure)
18-2.Pressure reducing valve (emergency steering)
19.Solenoid valve (suspension lock check release)
20.Pilot check valve (suspension lock cylinder)
21.Suspension lock cylinder
22.Filter
23.Solenoid valve (steering mode)
24.Pilot check valve (rear steering cylinder lock)
25.Steering cylinder
26.Steering cylinder
27.Rotary joint
28.Thermo switch [50°C (122°F)]
29.Thermo switch [85°C (185°F)]
30.Check valve (gauge isolator)
31.Pressure sensor
32.Check valve
33.Oil cooler
34.Hydraulic motor (oil cooler)
35.Check valve △1
36.Solenoid valve ~~(air conditioner, option)~~, (oil cooler)
37.Check valve
38.Hydraulic motor (air conditioner, option)
39.Jib offset cylinder
40.Pilot check valve (jibset)
41.Joint (orifice)
42.Jib lock pin
43….
44….
45….
46.Solenoid control valve (jib set)
47.Sequence valve (pilot pressure)
48.Priority valve
49.Check valve
50.Joint (orifice)
51….
52.Orbitrol
53.Hydraulic pilot control valve (swing)
54.Hydraulic motor (swing)
55.Swing speed reducer
56.Solenoid valve (pilot pressure)
57.Solenoid valve (auto stop)
58.Check valve
59.Check valve
60.Accumulator
61.Remote control valve (lever)
62.Shuttle valve (lever/pedal)
63.Pressure switch
64.Joint (orifice)
65.Solenoid control relief valve (elevating slow stop)
66.Remote control valve (pedal)
67.Solenoid valve (boom telescoping/aux. hoist)
68.Hydraulic pilot control valve (elevating, telescoping, winch)
69.Filter
70.Hydraulic valve (winch brake release)
71.Pressure sensor
72.Elevating cylinder
73.Orifice
74.Counterbalance valve (elevating)
75.Telescoping cylinder (no.1)
76.Telescoping cylinder (no.2)
77.Counterbalance valve (telescoping)
78Hose reel
79.Hydraulic valve (Top cyl. select)
80.Hydraulic motor (winch)
81.Winch
82.Pressure switch (emergency steering)
△1 89.Solenoid valve (air conditioner, option)

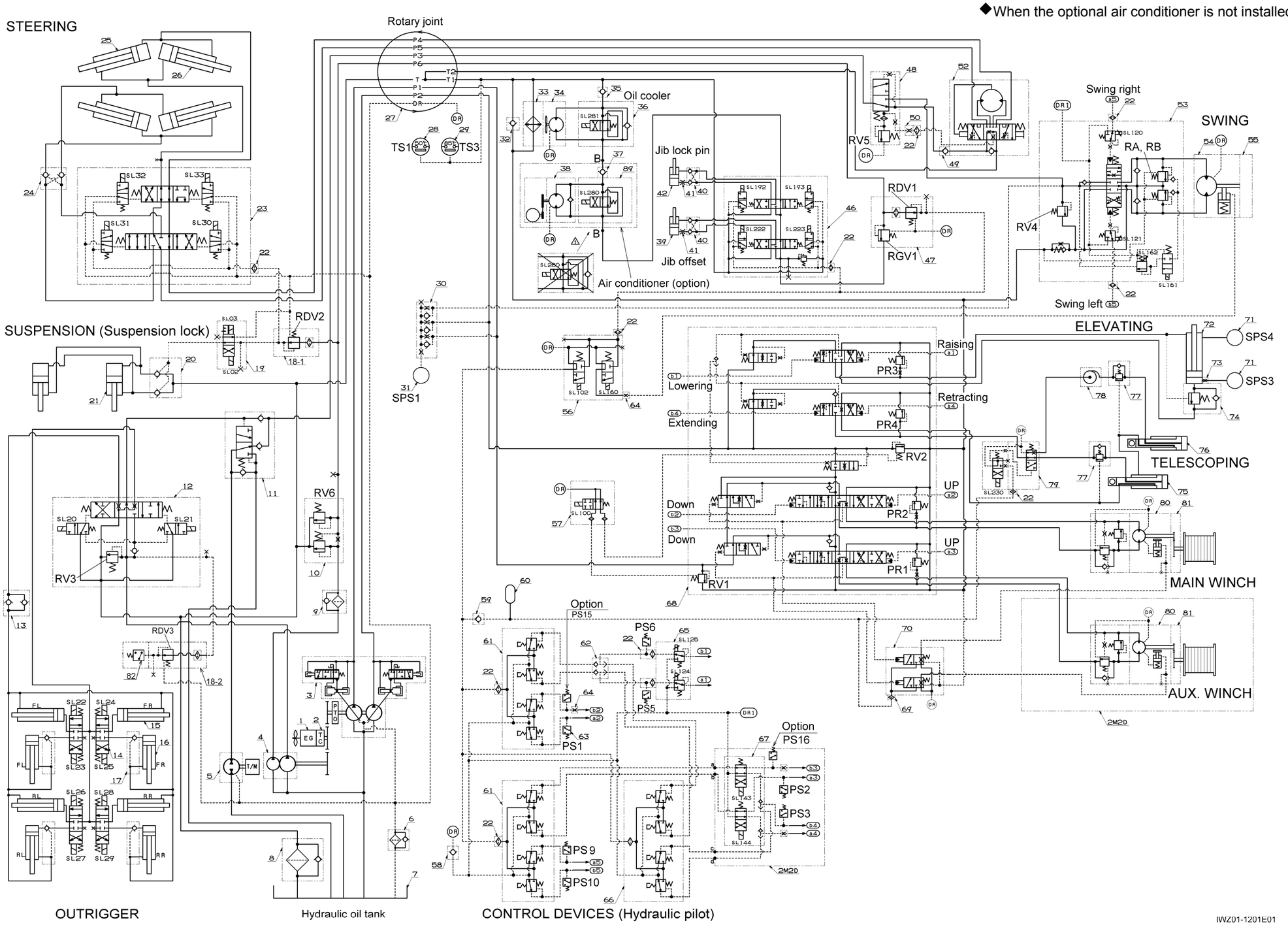
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Hydraulic Circuit

For Europe

[NOTICE]

◆When the optional air conditioner is not installed, two points "B" are directly joined.



IWZ01-1201E01

344-019-70000 ⚠

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2. For general export

1.Engine
2.Torque converter
3.Double variable displacement pump
4.Double gear pump
5.Gear pump (emergency steering, option)
6.Drain filter
7.Hydraulic oil tank
8.Return filter (in hydraulic oil tank)
9.Line filter
10.Flow control valve
11.Hydraulic valve (emergency steering, option)
12.Solenoid control valve (outrigger)
13.Check valve (outrigger extending prevention)
14.Solenoid valve (slide/jack)
15.Extension cylinder
16.Jack cylinder
17.Pilot check valve (jack cylinder retracting prevention)
18.Pressure reducing valve (pilot pressure)
19.Solenoid valve (suspension lock check release)
20.Pilot check valve (suspension lock cylinder)
21.Suspension lock cylinder
22.Filter
23.Solenoid valve (steering mode)
24.Pilot check valve (rear steering cylinder lock)
25.Steering cylinder
26.Steering cylinder
27.Rotary joint
28.Thermo switch [50°C (122°F)]
29.Thermo switch [85°C (185°F)]
30.Check valve (gauge isolator)
31.Pressure sensor
32.Check valve
33.Oil cooler
34.Hydraulic motor (oil cooler)
35.Check valve △1
36.Solenoid valve ~~(air conditioner, option)~~, (oil cooler)
37.Check valve
38.Hydraulic motor (air conditioner, option)
39.Jib offset cylinder
40.Pilot check valve (jibset)
41.Joint (orifice)
42.Jib lock pin
43….
44….
45….
46.Solenoid control valve (jib set)
47.Sequence valve (pilot pressure)
48.Priority valve
49.Check valve
50.Joint (orifice)
51….
52.Orbitrol
53.Hydraulic pilot control valve (swing)
54.Hydraulic motor (swing)
55.Swing speed reducer
56.Solenoid valve (pilot pressure)
57.Solenoid valve (auto stop)
58.Check valve
59.Check valve
60.Accumulator
61.Remote control valve (lever)
62.Shuttle valve (lever/pedal)
63.Pressure switch
64.Joint (orifice)
65.Solenoid control relief valve (elevating slow stop)
66.Remote control valve (pedal)
67.Solenoid valve (boom telescoping/aux. hoist)
68.Hydraulic pilot control valve (elevating, telescoping, winch)
69.Filter
70.Hydraulic valve (winch brake release)
71.Pressure sensor
72.Elevating cylinder
73.Orifice
74.Counterbalance valve (elevating)
75.Telescoping cylinder (no.1)
76.Telescoping cylinder (no.2)
77.Counterbalance valve (telescoping)
78Hose reel
79.Hydraulic valve (Top cyl. select)
80.Hydraulic motor (winch)
81.Winch
△1 89.Solenoid valve (air conditioner, option)

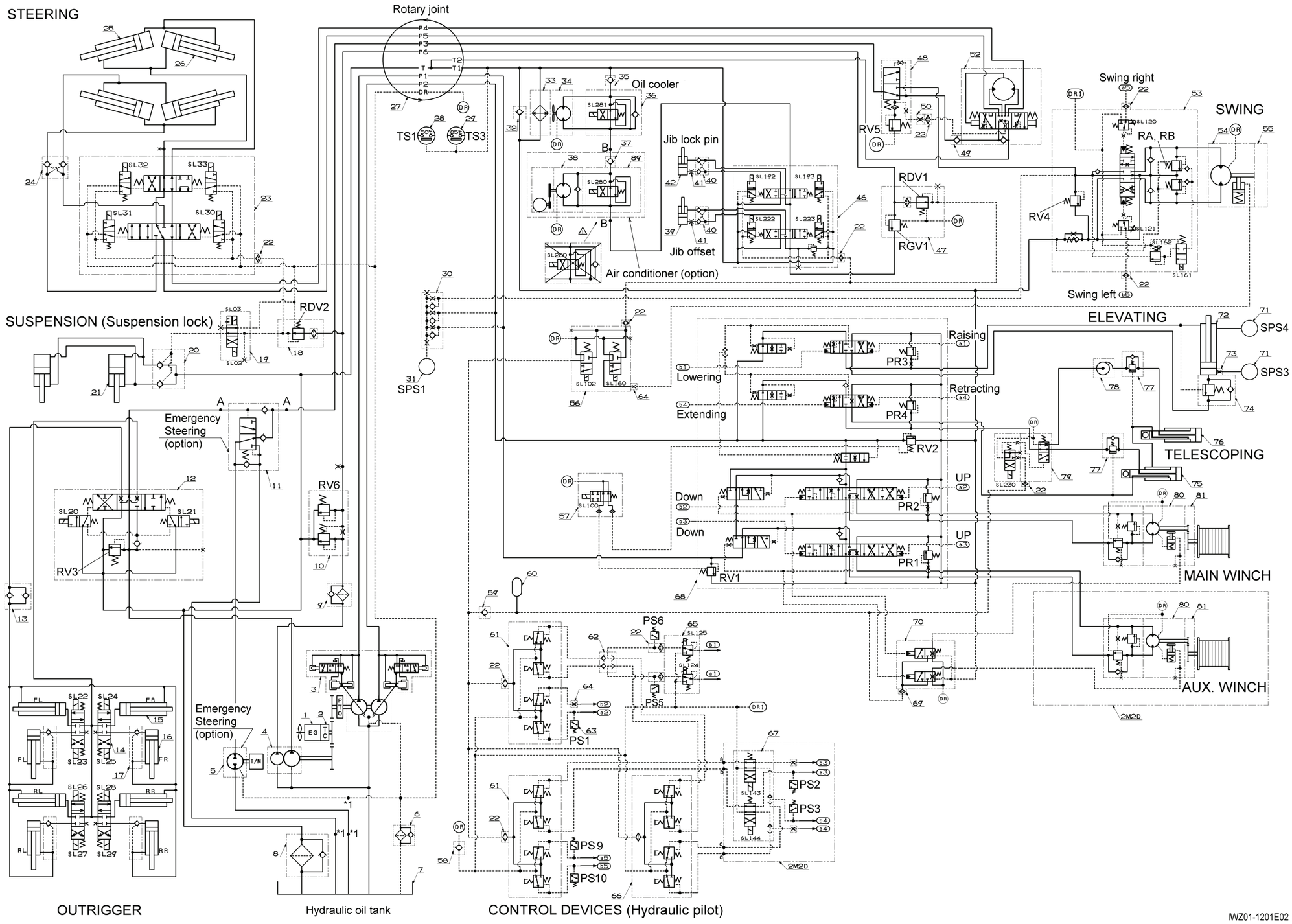
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Hydraulic Circuit

For general export

[NOTICE]

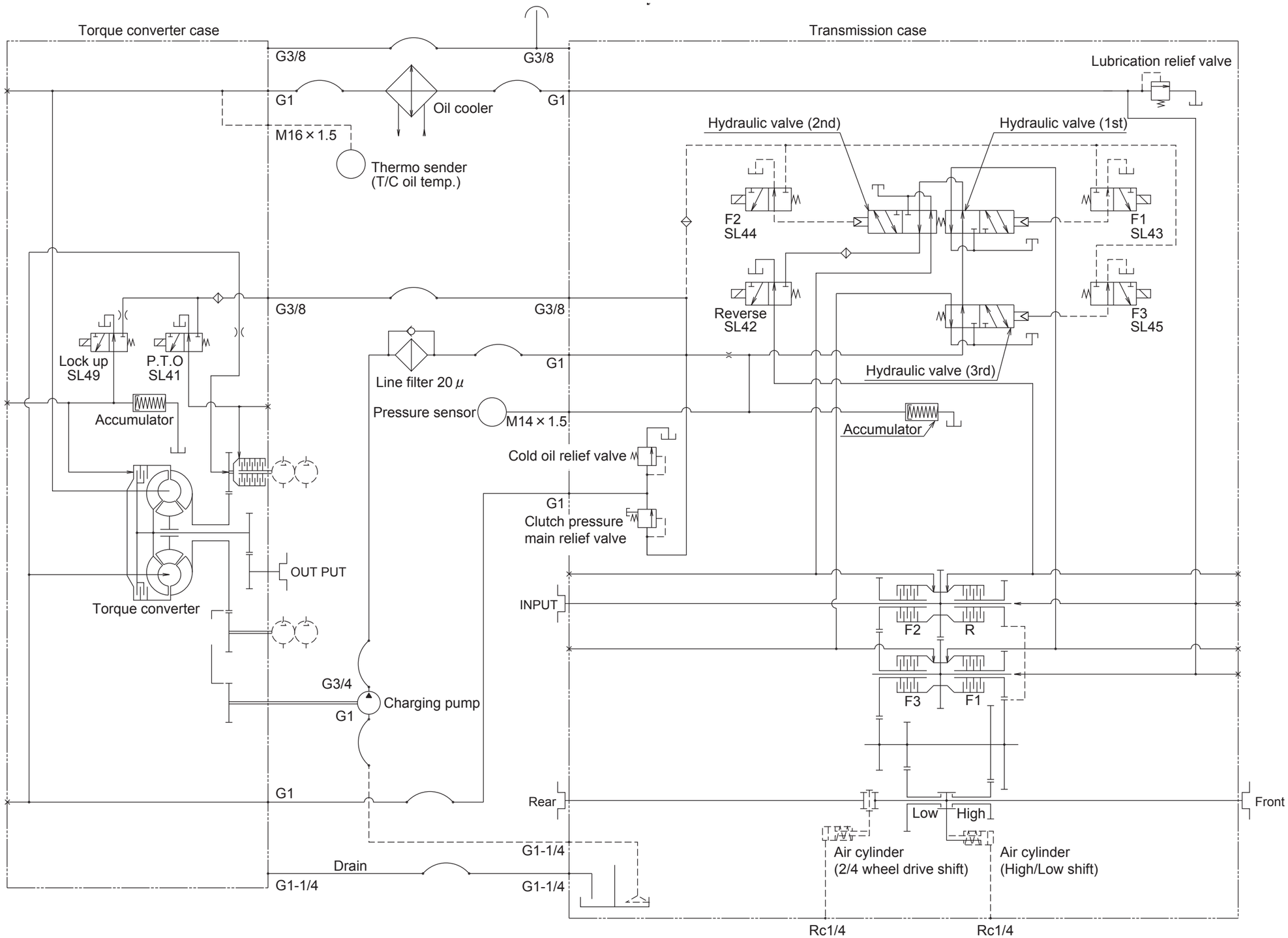
- When the optional emergency steering is not installed, two points "A" are directly joined and three portions "*1" are plugged.
- When the optional air conditioner is not installed, two points "B" are directly joined.



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Torque Converter Circuit

Z-2 Torque Converter Circuit

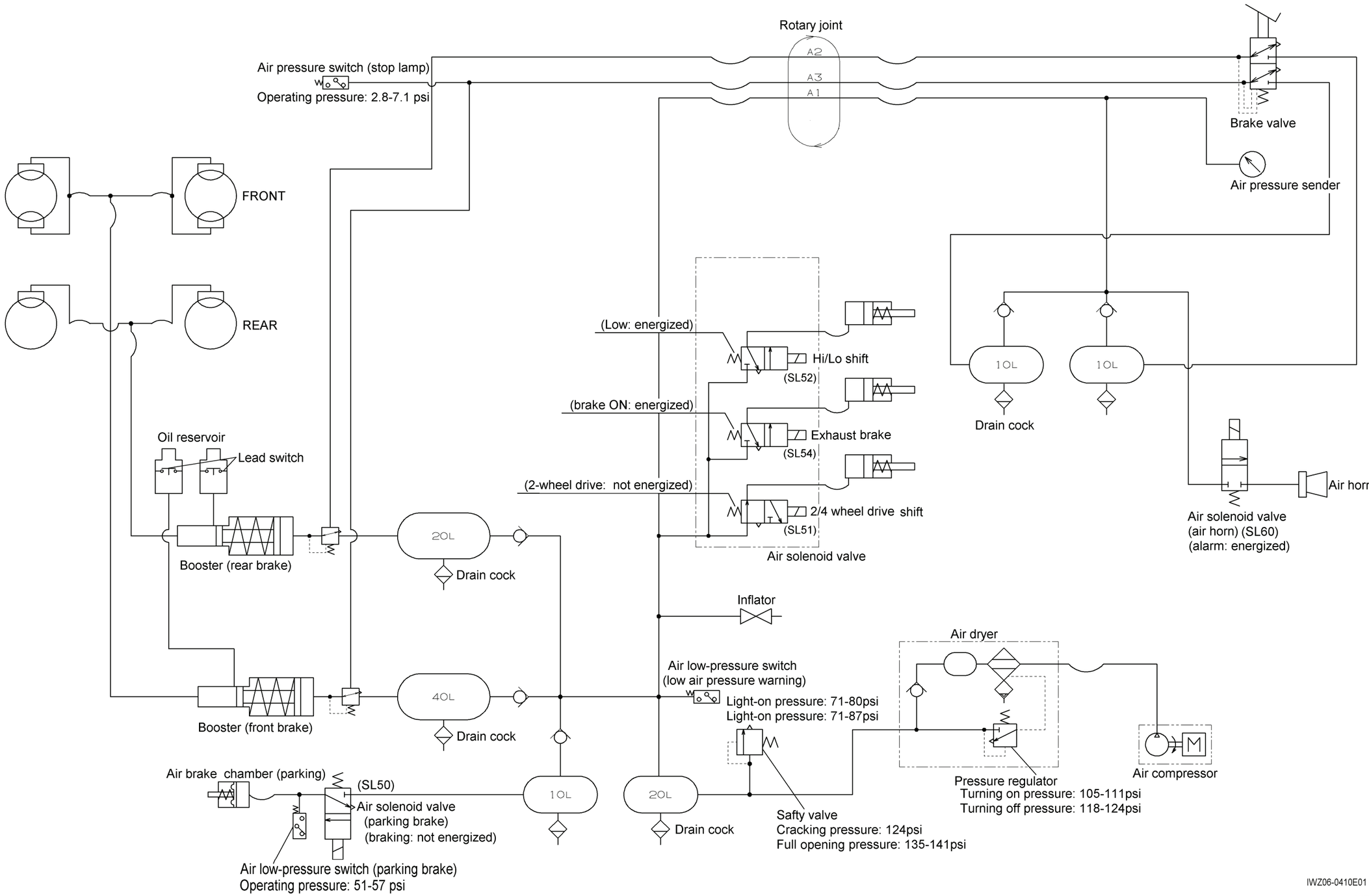


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IWZ05-0331E01

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Brake Circuit (Pneumatic Circuit)

Z-3 Brake Circuit (Pneumatic Circuit)



IWZ06-0410E01

347-411-50000 ⚠0

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Electric Circuit (AML, Crane)

Applicable serial No. ⚠1 : 546049 - -

Z-4 Electric Circuit (AML, Crane)

CN No.	Usage	Coordinates	Page
60	Air solenoid valve（air horn）	F-2	
100	AML (Load moment indicator) vent solenoid valve	H-5	
102	Remote control pressure vent solenoid valve	I-2	
120	Swing right proportional control valve	H-5	
121	Swing left proportional control valve	H-4	
124	Boom raising proportional control valve	I-3	
125	Boom lowering proportional control valve	I-3	
143	Boom telescoping/aux. hoist control selector solenoid valve	I-2	
144	Boom telescoping/aux. hoist control selector solenoid valve	I-2	
160	Swing brake release solenoid valve	H-5	
161	Swing free/lock solenoid valve	H-4	
162	Swing relief proportional control valve	H-4	
192	Jib lock pin extending solenoid valve	C-5	
193	Jib lock pin retracting solenoid valve	C-5	
222	Jib mounting solenoid valve	C-4	
223	Jib stowing solenoid valve	C-4	
230	Top cylinder selector solenoid valve	H-6	
238	Protection of NO.2 cylinder retraction while mode Ⅱ select solenoid valve	C-5	
281	Oil cooler solenoid valve	C-3	
380	Visible type winch drum indicator (option)	O-19	
484	Swing brake switch	G-16	
485	Boom telescoping/aux. hoist control selector switch	M-7	Next
486	Swing stop cancel switch	G-16	page
487	Swing free/lock selector switch	L-7	
488	Jib mounting / stowing switch	D-2	
491	Elevating slow stop cancel switch	H-16	
503	3rd/top boom emergency telescoping switch	K-7	
504	2nd boom emergency telescoping switch	L-7	
505	Overwind cutout (anti-twoblock) disable switch	F-16	
506	3rd/top boom extending switch (ISO array)	B-9	
507	3rd/top boom extending switch (TDN array)	D-9	
518	Over-rear detection proximity switch	F-2	
521	Over-front detection proximity switch	E-2	
529	Control lever stand position detection switch	C-9	
530	Connector	C-9	
531	Swing horn switch	B-9	
532	Main winch hoisting up detection switch	K-2	
533	Aux. winch hoisting up detection switch	L-2	
534	Boom extending detection switch	K-2	
536	Boom raising detection switch	L-2	
537	Boom lowering detection switch	L-2	
540	Swing right detection switch	L-2	
541	Swing left detection switch	M-2	
546	Main winch hoisting down detection switch (option)	K-2	
547	Aux. winch hoisting down detection switch (option)	K-2	
553	2nd boom full retraction detection switch	B-4	
555	Thermo switch (50°C/122°F)	G-4	
556	Thermo switch (85°C/185°F)	F-4	
558	AML override switch	J-2	
572	Jib stowed detection proximity switch	A-2	
573	Jib lock pin retracting detection switch	A-3	
574	Oil cooler switch	K-7	

CN No.	Usage	Coordinates	Page
576	Boom length and angle detector	B-18	
580	Swing angle detector	C-18	
581	Pressure sender (main pressure)	C-17	
583	Pressure sender (air pressure)	G-6	
584	Pressure sender (elevating cylinder, boom raising)	F-18	
585	Pressure sender (elevating cylinder, boom lowering)	F-18	
591	Main winch drum rotation detection proximity switch (option)	H-2	
592	Aux. winch drum rotation detection proximity switch (option)	H-2	
595	Main rope run-out detection switch (option)	G-2	
596	Aux. rope run-out detection switch (option)	G-2	
665	AML connector 1	C-20	
666	AML connector 2	I-20	
667	AML connector 3	K-20	
817	Buzzer 4 (overwind (two-blocking) alarm)	H-16	
818	Buzzer 3 (AML alarm)	H-16	
820	For reducing the main pressure	G-10	
821	AML vent solenoid valve	G-10	
828	AML external indicator lamp (yellow)	E-1	
829	AML external indicator lamp (red)	E-1	
837	Condenser (C2) (washer motor)	P-4	
849	Washer motor (roof)	P-4	Next
850	Washer motor (front)	P-4	page
852	Working lamp	G-4	
853	Working lamp (boom)	A-4	
858	Cord reel (boom length detector)	B-4	
859	3rd/top boom full retraction detection switch	B-3	
886	Harness (AML)	E-18	
887	Harness (boom, base)(for separated transport of boom and swing table)	A-6	
888	Harness (boom, top)	A-4	
889	Harness (Swing table, right)	E-6	
890	Harness (Swing table, right)	F-6	
891	Harness (Swing table, right)	D-6	
892	Harness (AML)	D-18	
893	Harness (Swing table, left)	N-2,H-6	
⚠1 894	Harness (Swing table, left)	I-6	
896	Harness (AML)	I-18	
897	Harness (AML)	K-18	
898	Harness (AML)	L-18	
899	Harness (AML)	K-18	
904	Jib state switch	M-18	
905	Jib removed indicator lamp	N-17	
906	Jib removed indicator lamp	N-18	
907	Emergency outrigger state register switch	N-19	
908	Emergency outrigger state control indicator lamp	N-17	
909	Emergency outrigger state control indicator lamp	N-18	
916	Controller (outdoor air temperature sensor)	N-4	
917	Emergency crane operation switch	N-4	
918	For emergency jib operation	F-10	
919	For emergency jib operation	F-10	
922	Boom telescoping/aux. hoist control indicator lamp	M-7	
923	Boom telescoping operation indicator lamp	M-7	
924	Aux. winch operation indicator lamp	N-7	

CN No.	Usage	Coordinates	Page
931	Touch-type winch drum indicator controller (option)	N-19	
932	Touch-type main winch drum indicator solenoid (ISO array)(option)	D-8	
933	Touch-type main winch drum indicator solenoid (ISO array)(option)	D-8	
934	Touch-type aux. winch drum indicator solenoid (ISO array)(option)	C-7	
935	Touch-type aux. winch drum indicator solenoid (ISO array)(option)	C-7	
936	Touch-type aux. winch drum indicator solenoid (TDN array) (option)	D-7	
937	Touch-type aux. winch drum indicator solenoid (TDN array) (option)	D-7	
938	For air bleeding of suspension lock cylinder	G-10	
939	Rope run-out release switch (option)	M-19	
949	Buzzer 5 (external alarm)	G-2	
964	Harness (AML)	M-18	
965	Winch selector switch	F-16	
966	Winch selector indicator lamp	F-16	
967	Winch selector indicator lamp	F-16	
968	Fuse (for drum indicator) (main)	C-8	
969	Fuse (for drum indicator) (aux.)	C-8	
976	Telescoping mode Ⅰ/Ⅱ switch	N-7	
977	Telescoping mode Ⅰ indicator lamp	0-7	
978	Telescoping mode Ⅱ indicator lamp	N-7	
991	For separated transport of boom and swing table	F-19	Next
992	For separated transport of boom and swing table	F-19	page
993	For separated transport of boom and swing table	B-18	
994	Counterweight equipped detection proximity switch	F-2	
995	Jib lock pin switch	D-2	
999	Jib mounting / stowing operationality indicator lamp	C-1	
KR27	Telescoping mode Ⅰ/Ⅱ selector relay	O-8	
R1	AML power supply relay 1	O-12	
R11	2nd boom emergency telescoping relay	O-9	
R13	3rd/top boom emergency telescoping relay	O-10,O-4	
R2	Boom full ret. detection relay	C-10	
R22	AML lamp assy relay	G-8	
R23	AML lamp assy relay	G-8	
R26	AML power supply relay 2	O-11	
R29	Oil cooler relay	G-8	
R33	Elevating slow stop cancel relay	H-17	
R36	Overwind (two-blocking) relay	C-10	
R4	Swing free selector relay	O-10	
R46	Telescoping mode Ⅰ/Ⅱ selector (diode) relay	O-9	
R47	Remote control pressure vent relay	O-4	
R53	Telescoping mode Ⅰ/Ⅱ selector relay	O-9	
R8	AML emergency switch relay	H-10	
R9	Swing brake relay	H-17	

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Electric Circuit (AML, Crane)

Applicable serial No. △1 :546049- -

【Notice】 (1) This program includes options ; is based on the following conditions :
1.Crane : traveling condition
2.PTO switch : OFF
3.Boom : fully retracted, over-the-front
4.Hook blocks : overwound
5.Starter switch : OFF
6.Control levers : neutral positions

(2) Wire specification codes are based on JIS D607.
(3) Wire gauges of inside cab are CAVS 0.5mm² (0.0008in²) or AVS 0.85mm²- (0.0014in²-).
Wire gauges of swing table and boom are AVS.
(Size not shown are 0.5mm² (0.0008in²)).

(4) The wiring numbers 900～999 show 12-voltage system, the other show 24-voltage system.
(5) Following sign indicates the connection of the same number mutually.
Receiving side of power supply : ——— < Supply side :
Receiving side of signal and load : ——— < Supply side :
(It becomes it for the negative-type logic circuit contrary to the electric current direction of the load.)

(6) Applicable model list Mark (–) is not applied. Mark (○) is applied. Mark (△) is option

		TR-800-4 North America	TR-800-4 North America	GR-700E-1 00211 Europe	GR-700E-1 00212 General Export	GR-550E-1 00211 Europe	GR-550E-1 00212 General Export
Rope run-out	Rope run-out release	–	–	△	–	△	–
	Main and Aux. rope run-out detection	–	–	△	–	△	–
	Main and Aux. hoisting down detection	–	–	△	–	△	–
External alarm (Buzzer 5)		–	–	○	–	○	–
Drum indicator	Touch-type controller	△	△	–	–	–	–
	Touch-type SOL (Main/Aux.)	△	△	–	–	–	–
	Visible type indicator	–	–	△	△	△	△
	Main/Aux. winch drum rotation detection proximity switch	△	△	△	△	△	△
Reverse steering		–	–	○	–	○	–
Indicator assy (outdoor air temperature indicator)		–	–	△	–	△	–
Telescoping mode select		–	○	–	–	–	–
Counterweight removable type		–	○	–	–	–	–
Counterweight fitted type		○	–	○	○	○	○

Relay

1pole	Make contact	R1,2,4,8,13,22,23,26, R29,33,36,47
	Break contact	R9,11,53
	C contact	R46
2poles		KR27
4poles		*

Diode

For 1A	*
For 3A	*

Resistance

*

Condenser

C2

Upper MDT Electric Circuit

IWZ03-3291E01

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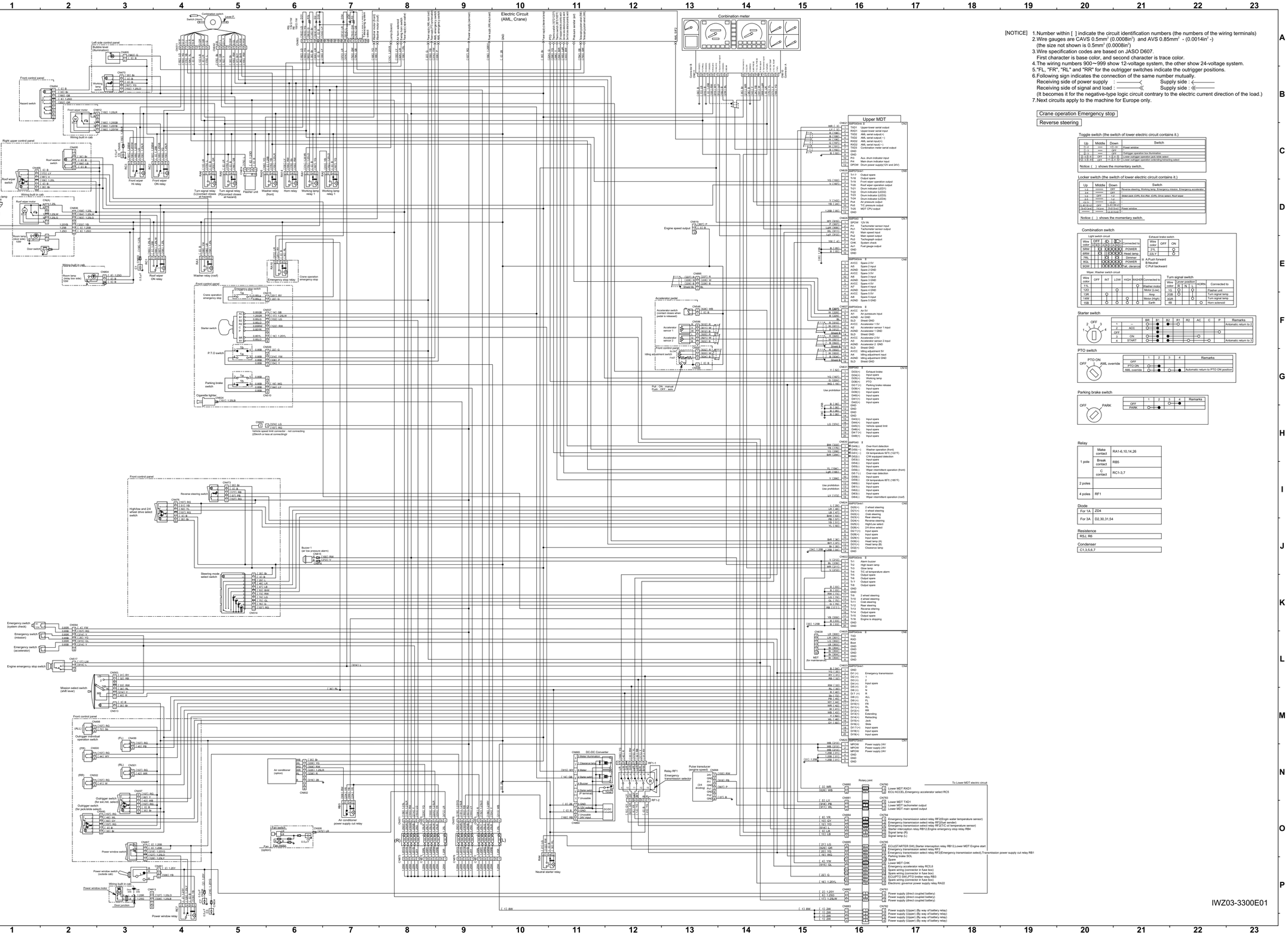
Z-5 Electric Circuit (MDT, Carrier/Upper)

CN No.	Usage	Coordinates	Page
461	Power window switch (outside cab)	P-4	
467	Power window switch	O-3	
468	Roof wiper switch	C-1	
470	Working lamp switch	B-3	
473	Reverse steering switch	I-5	
476	High/low and 2/4wheel drive select switch	I-4	
480	Outrigger switch (for jack/slide select)	O-3	
494	Hazard switch	B-2	
495	Roof washer switch	C-2	
497	Outrigger switch (for ext./ret. select)	N-3	
498	Outrigger Individual operation switch (ALL)	M-3	
499	Outrigger Individual operation switch (FL)	M-3	
500	Outrigger Individual operation switch (FR)	N-3	
501	Outrigger Individual operation switch (RL)	N-3	
502	Outrigger Individual operation switch (RR)	N-3	
509	P.T.O switch	F-6	
510	Parking brake switch	G-6	
511	Combination switch	A-4	
513	Mission select switch (shift lever)	M-3	
514	Steering mode select switch	K-5	
517	Engine emergency stop switch	L-2	
548	Accelerator switch	F-13	
557	Starter switch	F-6	
562	Combination switch	A-5	
563	Mission select switch (shift lever)	L-3	
564	Emergency switch (system check, mission, accelerator)	K-2	
586	Accelerator sensor	F-13	Next page
587	Idling adjustment switch	F-13	
588	Idling adjustment switch	G-13	
620	MDT (upper) CN1	M-16	
621	MDT (upper) CN2	C-16	
622	MDT (upper) CN3	J-16	
623	MDT (upper) CN4	L-16	
624	MDT (upper) CN5	I-16	
625	MDT (upper) CN6	L-16	
626	MDT (upper) CN7	D-16	
627	MDT (upper) CN8	F-16	
629	MDT (upper) CN9	C-16	
630	MDT (upper) CN10-1	H-16	
631	MDT (upper) CN10-2	G-16	
639	MDT (upper) (for maintenance)	L-15	
780	Rotary joint	N-16	
781	Rotary joint	P-16	
782	Rotary joint	P-16	
783	Rotary joint	N-16	
784	Rotary joint	O-16	
785	Rotary joint	O-16	
802	Air conditioner (option)	N-6	
804	Room lamp	E-3	
805	Bubble level (illumination)	A-3	
806	Harness with cab (room lamp, roof wiper motor, working lamp)	D-2	
810	Combination meter	B-15	
811	Combination meter	B-13	
812	Front wiper motor	B-3	

CN No.	Usage	Coordinates	Page
813	Door junction	P-4	
814	Flasher unit	C-5	
815	Buzzer 1 (air low pressure alarm)	J-6	
816	Buzzer 1 (air low pressure alarm)	J-6	
819	Engine speed output	D-13	
824	Cigarette lighter	G-5	
833	Condenser (C1) (roof wiper motor)	E-3	
834	Condenser (C3) (power window motor)	P-5	
835	Condenser (C5) (front wiper motor)	C-3	
836	Condenser (C7) (power window motor)	P-4	
863	Terminal assy	A-6	
864	DC-DC converter	O-11	
865	DC-DC converter	N-11	
870	Fuse box (right)	O-8	
871	Fuse box (right)	O-8	
872	Fuse box (right)	P-8	
873	Fuse box (right)	P-8	
875	Fuse box (left)	O-9	
876	Fuse box (left)	O-9	
877	Fuse box (left)	P-9	
878	Fuse box (left)	P-9	
880	Rotary joint	N-16	
881	Rotary joint	N-16	
882	Rotary joint	P-16	Next page
883	Rotary joint	P-16	
884	Rotary joint	O-16	
885	Rotary joint	O-16	
895	Swing table harness (air)	E-13	
915	Crane operation emergency stop switch	F-6	
925	Vehicle speed limit	H-5	
926	Fan (switch, motor) (option)	O-6	
998	Pulse transducer (engine speed)	N-14	
RA1	Working lamp relay 1	C-6	
RA2	Working lamp relay 1	C-7	
RA10	Emergency stop relay	E-6	
RA14	Horn relay	C-6	
RA26	Washer relay (front)	C-5	
RA3	Washer relay (roof)	E-4	
RA4	Neutral starter relay	P-10	
RA5	Turn signal relay (R)	C-5	
RA6	Turn signal relay (L)	C-4	
RB5	Air conditioner power supply cut relay	O-7	
RC1	Roof wiper ON relay	E-3	
RC2	Front wiper ON relay	C-3	
RC3	Front wiper Hi relay	C-3	
RC7	Power window relay	P-4	
RF1-1	Emergency transmission selector relay	N-12	
RF1-2	Emergency transmission selector relay	O-12	

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Electric Circuit (MDT, Carrier/Upper)



[NOTICE]
1. Number within [ ] indicate the circuit identification numbers (the numbers of the wiring terminals)
2. Wire gauges are CAVS 0.5mm² (0.0008in²) and AVS 0.85mm² - (0.0014in² -) (the size not shown is 0.5mm² (0.0008in²)
3. Wire specification codes are based on JASO D607. First character is base color, and second character is trace color.
4. The wiring numbers 900~999 show 12-voltage system, the other show 24-voltage system.
5. "FL, "FR", "RL" and "RR" for the outrigger switches indicate the outrigger positions.
6. Following sign indicates the connection of the same number mutually.
   Receiving side of power supply : Supply side :
   Receiving side of signal and load : Supply side :
   (It becomes it for the negative-type logic circuit contrary to the electric current direction of the load.)
7. Next circuits apply to the machine for Europe only.

Crane operation Emergency stop

Reverse steering

Toggle switch (the switch of lower electric circuit contains it.)

Up	Middle	Down	Switch
○–2	——	×3–○	Power window
○–3	——	OFF	Head lamp
4–○–5	OFF	4–○–6	Outrigger operation box illumination
7–○–8	OFF	7–○–9	Lower outrigger operation work-lights select
10–○–11	OFF	10–○–12	Lower outrigger operation extending/retracting select

Notice: (○) shows the momentary switch.

Locker switch (the switch of lower electric circuit contains it.)

Up	Middle	Down	Switch
1–○	——	OFF	Reverse steering, Working lamp, Emergency mission, Emergency accelerator
2–○	——	OFF	
3–○	OFF	1–2	Indicator (CAN), Kol. Ref. (CAN), Drive select, Roof wiper
4–○–5	OFF	4–○–6	Air pressure
7–○–8	OFF	7–○–9	Power window
10–○–11	OFF	10–○–12	Power window

Notice: (○) shows the momentary switch.

Combination switch

Light switch circuit

Wire color	OFF	1	2	3	Connected to
SRW					POWER
SRR					Head lamp
YBL					Dimmer
RGL					POWER
SGW					Ref. clearance

Wiper, Washer switch circuit

Wire color	OFF	INT	LOW	HIGH	WASHER	Connected to
11L				○	○	Washer motor
12O			○	○		Motor (Low)
13R		○	○	○		Amp
14W					○	Motor (High)
15B	○	○	○	○	○	Earth

Exhaust brake switch

Wire color	OFF	ON
21L		○
22LY	○	

Turn signal switch

Wire color	Lever position			HORN	Connected to
	R	N	L		
1G	◇		◇		Flasher unit
2GB	◇		◇		Turn signal lamp
3GR			○		Turn signal lamp
4B				○	Horn solenoid

Starter switch

	BR	B1	B2	B1	R2	AC	C	P	Remarks
1	○								Antomatic return to 3
2 ACC									
OFF									
3 ON									
4 START									Antomatic return to 3

PTO switch

	1	2	3	4	Remarks
OFF					
PTO ON	○				
AML override	○		○		Automatic return to PTO ON position

Parking brake switch

	1	2	3	4	Remarks
OFF					
PARK	○				

Relay

	Make contact	RA1-6,10,14,26
1 pole	Break contact	RB5
	C contact	RC1-3,7
2 poles		
4 poles	RF1	

Diode

For 1A	ZD4
For 3A	D2,30,31,54

Resistence

RSJ, R8

Condenser

C1,3,5,6,7

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Z-6 Electric Circuit (MDT, Carrier/Lower)

CN No.	Usage	Coordinates	Page
Suspension lock selector solenoid valve			
02	Suspension lock	J-6	
03	Suspension free	J-7	
Outrigger ext./ret. selector solenoid valve			
20	Retracting	H-15	
21	Extending	H-15	
22	Slide (for FL)	J-18	
23	Jack (for FL)	J-18	
24	Slide (for FR)	J-17	
25	Jack (for FR)	J-17	
26	Slide (for RL)	J-17	
27	Jack (for RL)	J-18	
28	Slide (for RR)	J-16	
29	Jack (for RR)	J-17	
Steering mode selector solenoid valve			
30	Crab,	K-7	
31	4 wheel,	K-6	
32	Reverse,	K-6	
33	Rear select	K-6	
Transmission selector solenoid valve			
42	R	L-12	
43	F1	L-11	
44	F2	L-11	
45	F3	L-11	
41	PTO solenoid valve	N-13	
49	Lockup solenoid valve	M-13	
50	Air solenoid valve (parking brake)	G-15	
51	Air solenoid valve (2/4 wheel drive shift)	F-15	
52	Air solenoid valve (High/Low select)	F-15	
54	Air solenoid valve (exhaust brake)	F-15	
408	Straight ahead detection proximity switch	D-6	
409	Low pressure switch (Engine oil)	E-19	
410	Air Low-pressure switch	F-15	
411	Air low-pressure switch (parking brake)	F-15	
413	Lead switch (4WD detection)	C-4	
414	Lead switch (reservoir assy)	F-16	
415	Lead switch (reservoir assy)	F-16	
416	Water in fuel sensor	E-6	
419	Pressure sender (torque converter oil pressure)	C-4	
420	Main speed sensor	A-4	
421	Pickup sensor (sub. speed)	A-4	
422	Outrigger length detector (FL)	B-4	
423	Outrigger length detector (FR)	B-4	
424	Outrigger length detector (RL)	B-4	
425	Outrigger length detector (RR)	C-4	
426	Engine water temperature thermo sender	M-11	
427	Torque converter oil temp. thermo sender	M-12	
428	Fuel sender	G-16	
434	Lower outrigger operation box (R)	L-16	
440	Lead switch (High/Low detection)	C-4	
568	Pressure switch (stop lamp)	G-15	
569	Pressure switch (stop lamp)	G-15	
600	MDT (lower) CN1-1	F-3	
601	MDT (lower) CN1-2	D-3	
602	MDT (lower) CN2	G-3	
603	MDT (lower) CN3	M-3	
604	MDT (lower) CN4	A-3	
605	MDT (lower) CN5	G-3	
606	MDT (lower) CN6	B-3	

Next page

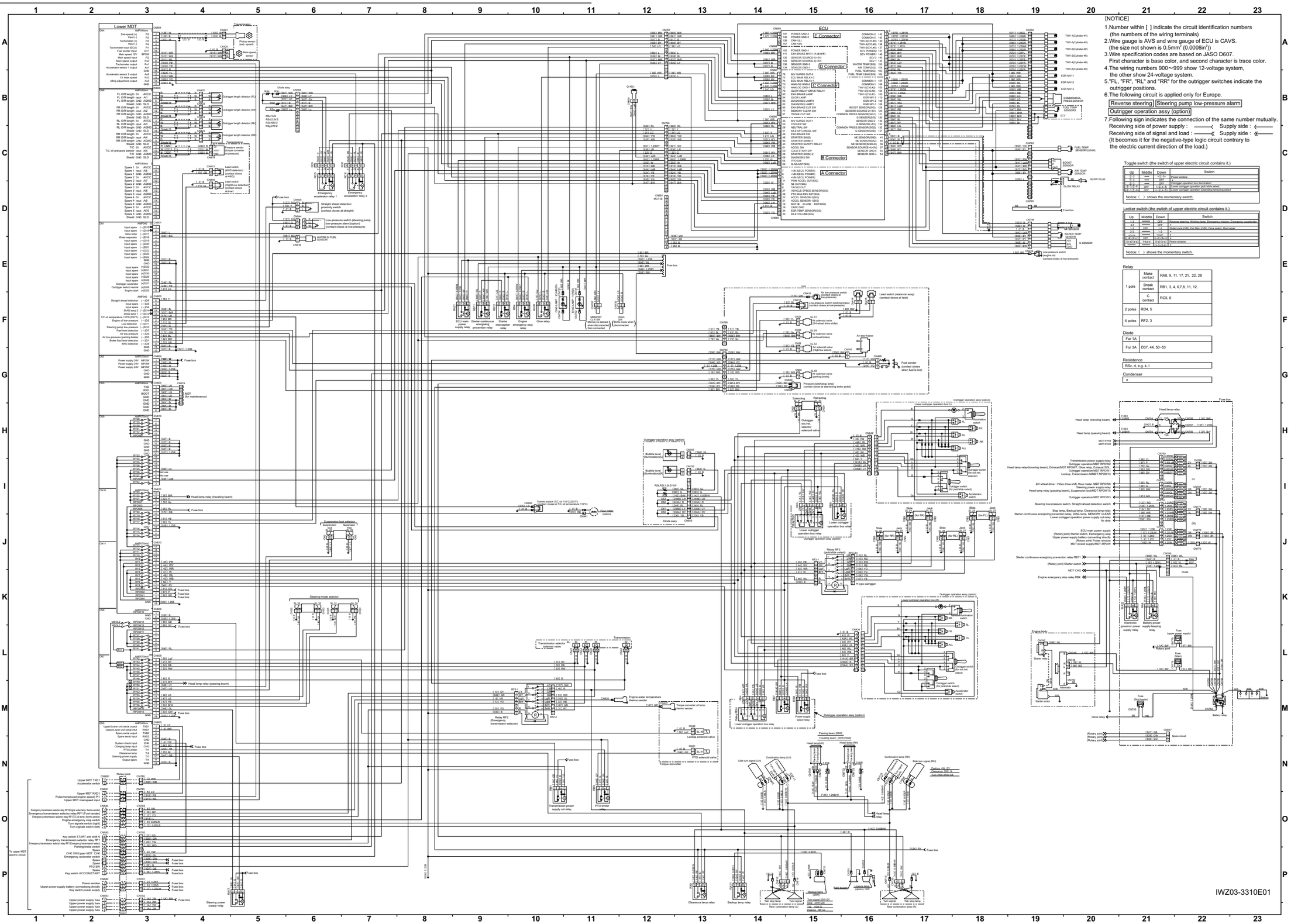
CN No.	Usage	Coordinates	Page
608	MDT (lower) CN7	L-3	
609	MDT (lower) CN8	K-3	
610	MDT (lower) CN9	H-3	
611	MDT (lower) CN10	I-3	
612	MDT (lower) CN11	J-3	
619	MDT (for maintenance)	G-4	
685	ECU (A connector)	D-14	
686	ECU (B connector)	B-14	
687	ECU (C connector)	B-14	
688	ECU (D connector)	A-14	
689	ECU (E connector)	A-14	
690	Q-ADJ	B-12	
691	MUT-Ⅲ	D-12	
700	Head lamp (LH)	N-15	
701	Head lamp (LH)	N-15	
702	Head lamp (RH)	N-16	
703	Head lamp (RH)	N-16	
704	Head lamp relay	H-21	
705	Head lamp relay	H-21	
706	Head lamp relay	H-22	
707	Head lamp relay	H-22	
708	Head lamp relay	H-22	
709	Combination lamp (RH)	N-16	
710	Combination lamp (RH)	N-16	
711	Combination lamp (LH)	N-15	
712	Combination lamp (LH)	N-14	
717	Rear combination lamp (L)	P-14	
718	Rear combination lamp (L)	P-15	
719	Rear combination lamp (R)	P-16	
720	Rear combination lamp (R)	P-16	
721	Backup lamp	P-15	
723	License lamp (option)	P-16	
726	Bubble level (illumination) (R) (option)	I-13	
730	DIAG switch	F-11	
731	ECU DIAG lamp-1 (red)	F-11	
732	ECU DIAG lamp-1 (red)	F-11	
733	ECU DIAG lamp-2 (umber)	F-10	
734	ECU DIAG lamp-2 (umber)	F-10	
745	Air drier heater	G-16	
747	Starter relay (SW)	L-19	
748	Alternator (R terminal, L terminal)	L-20	
749	Alternator (B terminal)	L-20	
750	Alternator (P terminal)	L-20	
751	Back buzzer	P-16	
755	Fuse (Grid heater) (70A)	M-21	
758	Battery relay	M-22	
759	Battery relay	M-22	
760	Battery relay	M-22	
761	Battery relay	M-22	
762	Battery relay	M-22	
763	Battery relay	M-22	
765	Diode assy	B-6	
766	Diode (fuse box)	J-21	
767	Fuse box (L)	I-22	
768	Fuse box (L)	I-22	
769	Fuse box (L)	H-21	
770	Fuse box (L)	I-21	
771	Fuse box (R)	I-22	
772	Fuse box (R)	J-22	

Next page

CN No.	Usage	Coordinates	Page
773	Fuse box (R)	J-22	
774	Fuse box (R)	I-21	
775	Fuse box (R)	J-21	
778	Fuse (upper power supply) (75A)	L-21	
779	Fuse (main) (75A)	L-21	
780	Rotary joint	N-3	
781	Rotary joint	P-3	
782	Rotary joint	P-3	
783	Rotary joint	N-3	
784	Rotary joint	O-3	
785	Rotary joint	O-3	
788	Sub. harness	F-13	
789	Sub. harness	G-13	
790	Harness (electronic governor)	B-12	
791	Harness (electronic governor)	A-12	
792	Harness (engine)	A-19	
793	Harness (engine)	C-19	
794	Harness (engine)	D-19	
795	Harness (engine)	D-19	
797	MEMORY CLEAR	F-11	
880	Rotary joint	N-2	
881	Rotary joint	N-2	
882	Rotary joint	P-2	
883	Rotary joint	P-2	
884	Rotary joint	O-2	
885	Rotary joint	O-2	
940	Thermo switch (T/C oil 110°C/230°F)	I-10	
941	Hour meter (option)	J-11	
942	Lower outrigger operation box (L) (option)	H-16	
943	Bubble level (illumination) (L) (option)	H-13	
944	Low-pressure switch (steering pump low-pressure alarm) (option)	D-6	
945	Side turn signal (LH)	N-14	
946	Side turn signal (RH)	N-17	
957	Spare circuit	M-21	
959	Diode assy (lower outrigger operation) (option)	J-13	
RA11	Backup lamp relay	P-14	
RA17	Steering power supply relay	P-4	
RA8	Clearance lamp relay	P-13	
RA9	Battery power supply keeping relay	K-21	
RA21	ECU main power supply relay	F-9	
RA22	Electronic governor power supply relay	K-21	
RA28	Glow relay	F-10	
RB1	Transmission power supply cut relay	O-10	
RB3	PTO limiter relay	O-11	
RB4	Engine emergency stop relay	F-10	
RB6	Lower outrigger power supply select relay	M-15	
RB7	Lower outrigger operation box relay	M-14	
RB8	Lower outrigger operation box relay	I-15	
RB11	Starter continuous energizing prevention relay	F-9	
RB12	Starter interception relay	F-9	
RC5	Emergency accelerator relay 1	C-6	
RC6	Emergency accelerator relay 2	C-7	
RD4	Lower outrigger operation box relay	M-14	
RD5	Lower outrigger operation box relay	I-15	
RF2-1	Emergency transmission selector relay	M-10	
RF2-2	Emergency transmission selector relay	M-10	
RF3-1	Outrigger jack/slide select relay	J-15	
RF3-2H	Outrigger jack/slide select relay	J-16	

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Electric Circuit (MDT, Carrier/Lower)

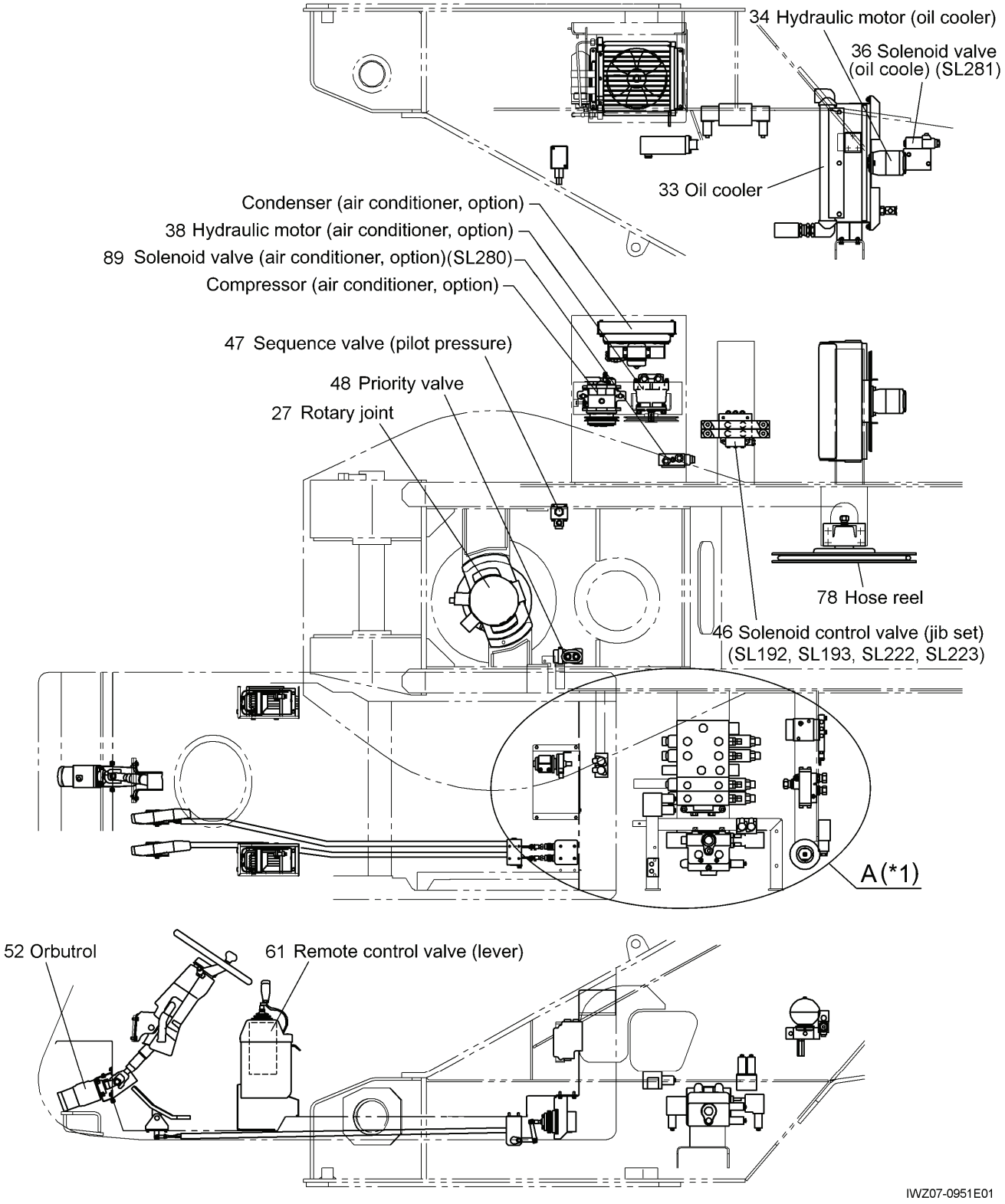


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Z-7 Location of Hydraulic Parts (Upper)

1. Cab and swing table

(*1) : For the A section in the figure below, see the enlarged view on the following page.



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Location of Hydraulic Parts (Upper)

List of components illustrated in the “Cab and swing table” figure (in alphabetical order)

Compressor (air conditioner, option)

Condenser (air conditioner, option)

78.Hose real

38.Hydraulic motor (air conditioner, option)

34.Hydraulic motor (oil cooler)

33.Oil cooler

52.Orbitrol

48.Priority valve

61.Remote control valve (lever)

27.Rotary joint

47.Sequence valve (pilot pressure)

46.Solenoid control valve (jib set) (SL192, SL193, SL222, SL223)

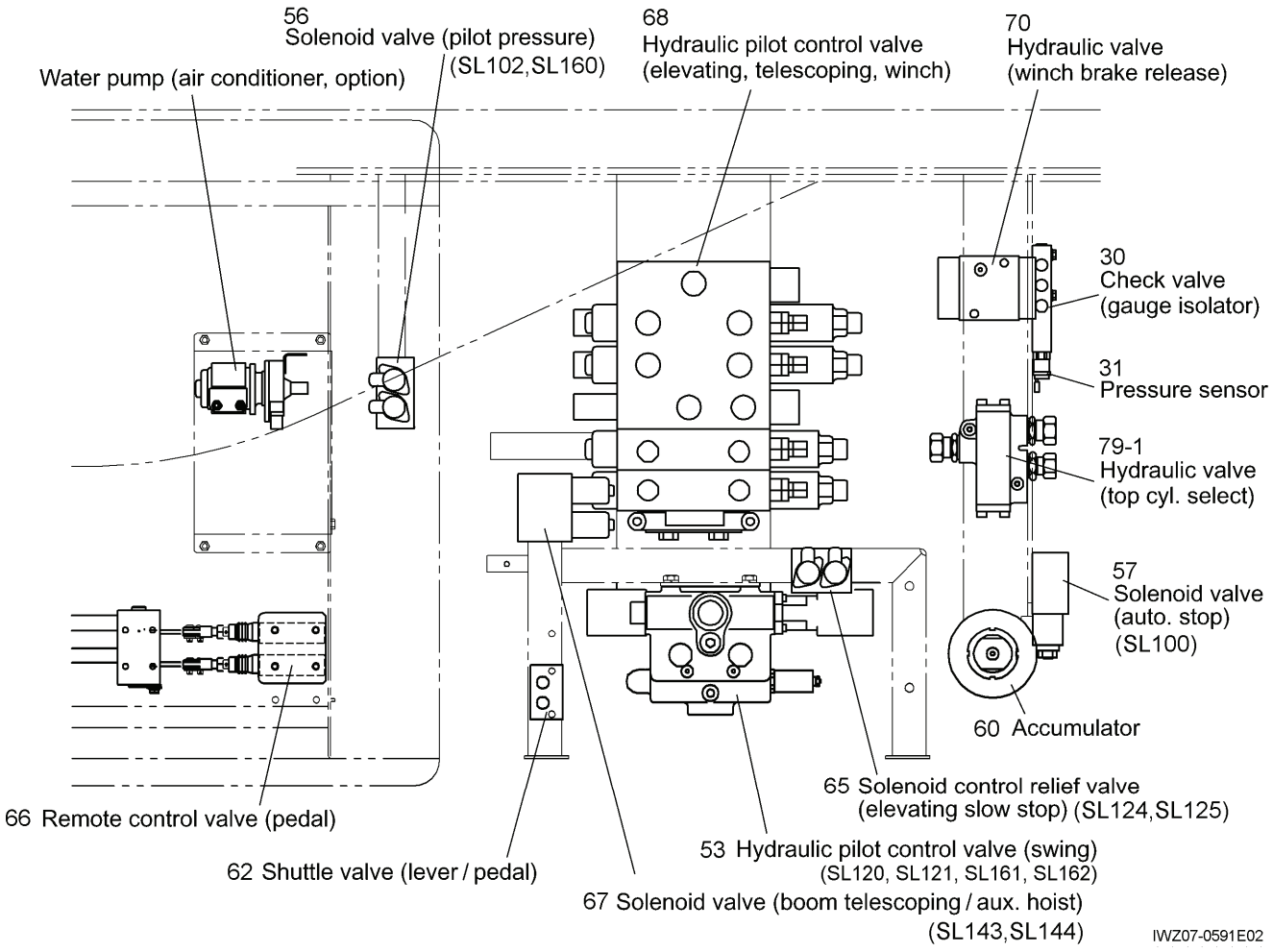
89.Solenoid valve (air conditioner, option) (SL280)

36.Solenoid valve (oil cooler) (SL281)

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Location of Hydraulic Parts (Upper)

A section (behind cab)



List of components illustrated in the “A section” figure (in alphabetical order)

60.Accumulator

30.Check valve (gauge isolator)

68.Hydraulic pilot control valve (elevating, telescoping, winch)

53.Hydraulic pilot control valve (swing) (SL120, SL121, SL161, SL162)

70.Hydraulic valve (winch brake release)

79-1.Hydraulic valve (top cyl. select)

31.Pressure sensor

66.Remote control valve (pedal)

62.Shuttle valve (lever/pedal)

65.Solenoid control relief valve (elevating slow stop) (SL124,SL125)

57.Solenoid valve (auto stop) (SL100)

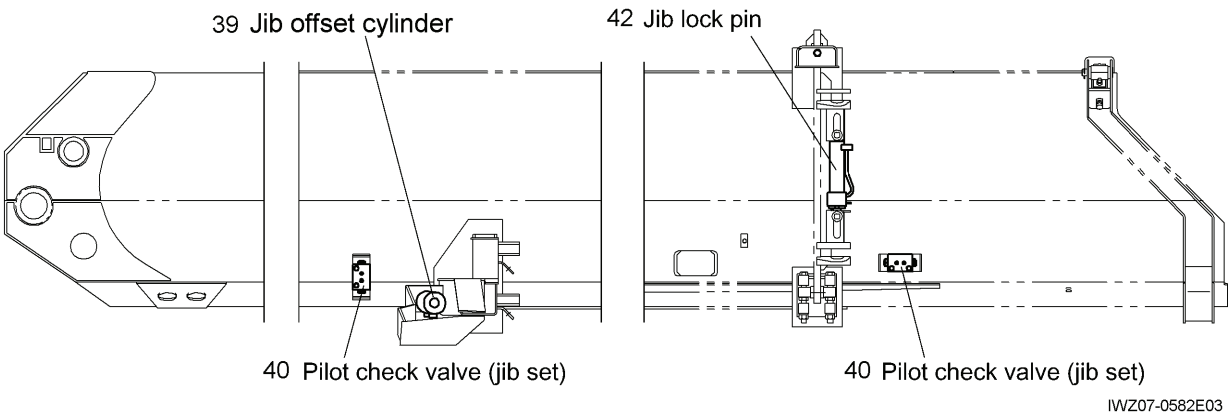
67.Solenoid valve (boom telescoping/aux. hoist) (SL143,SL144)

56.Solenoid valve (pilot pressure) (SL102,SL160)

Water pump (air conditioner, option)

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2. Boom



List of components illustrated in the “Boom” figure (in alpha betical ovder)

42.Jib lock pin

39.Jib offset cylinder

40.Pilot check valve (jib set)

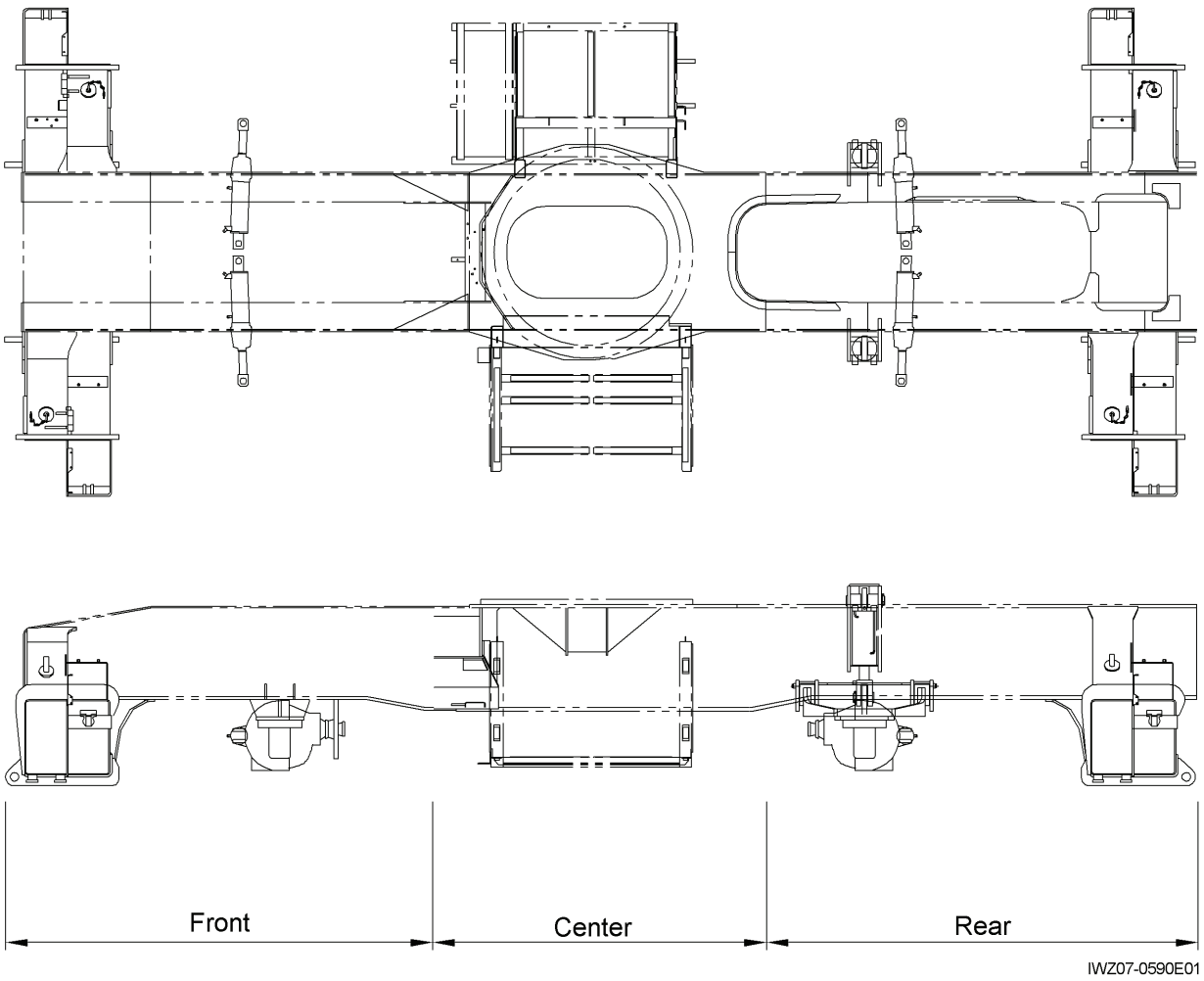
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Z-8 Location of Hydraulic Parts (Lower)

1. Carrier

[NOTICE]

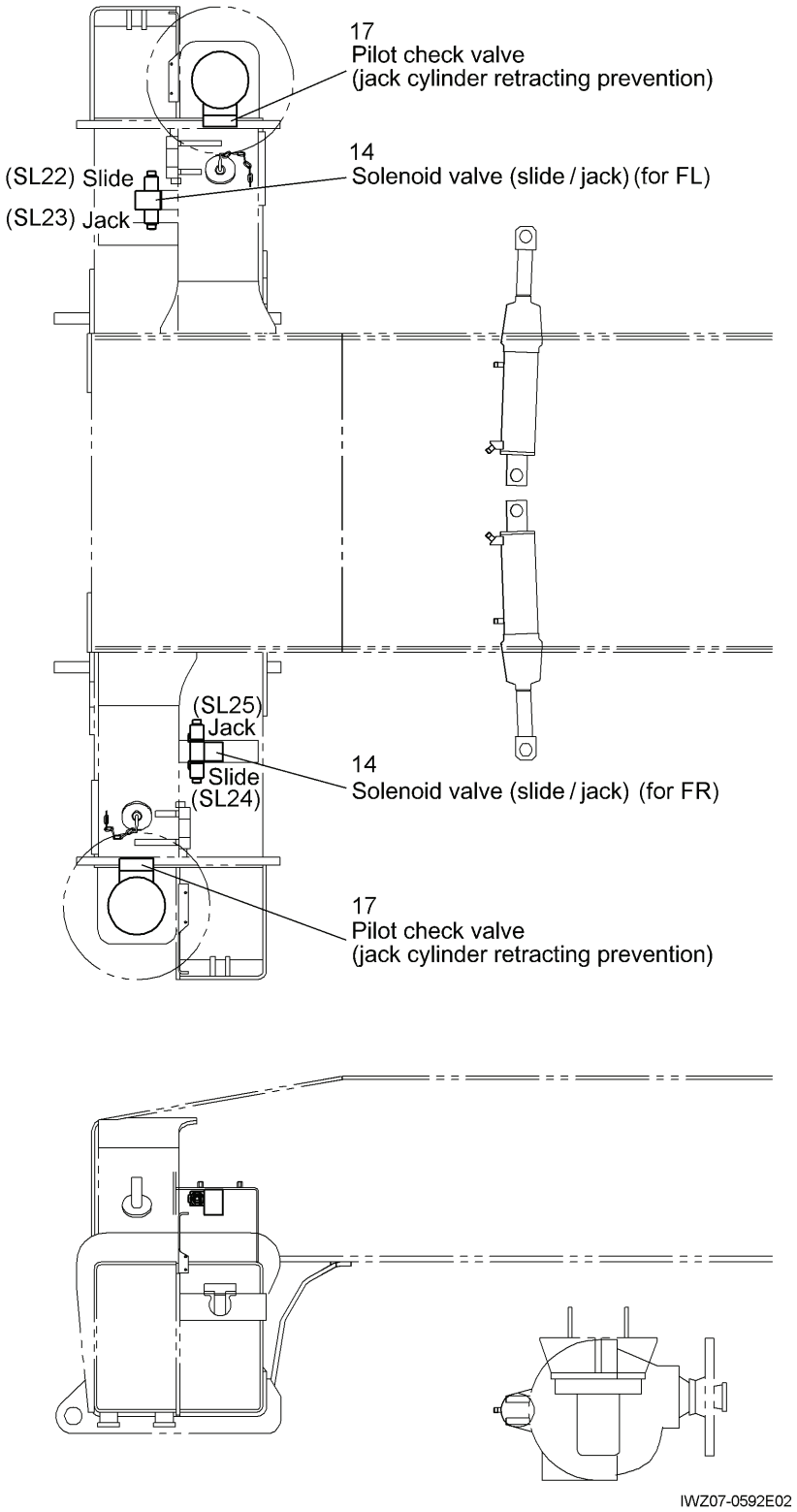
◆The parts on the carrier are divided in to Front, Center and Rear and magnified of each is shown on the following pages.



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Location of Hydraulic Parts (Lower)

1.1 Front



List of components illustrated in the “Front” figure (in alphabetical order)

17.Pilot check valve (jack cylinder retracting prevention)

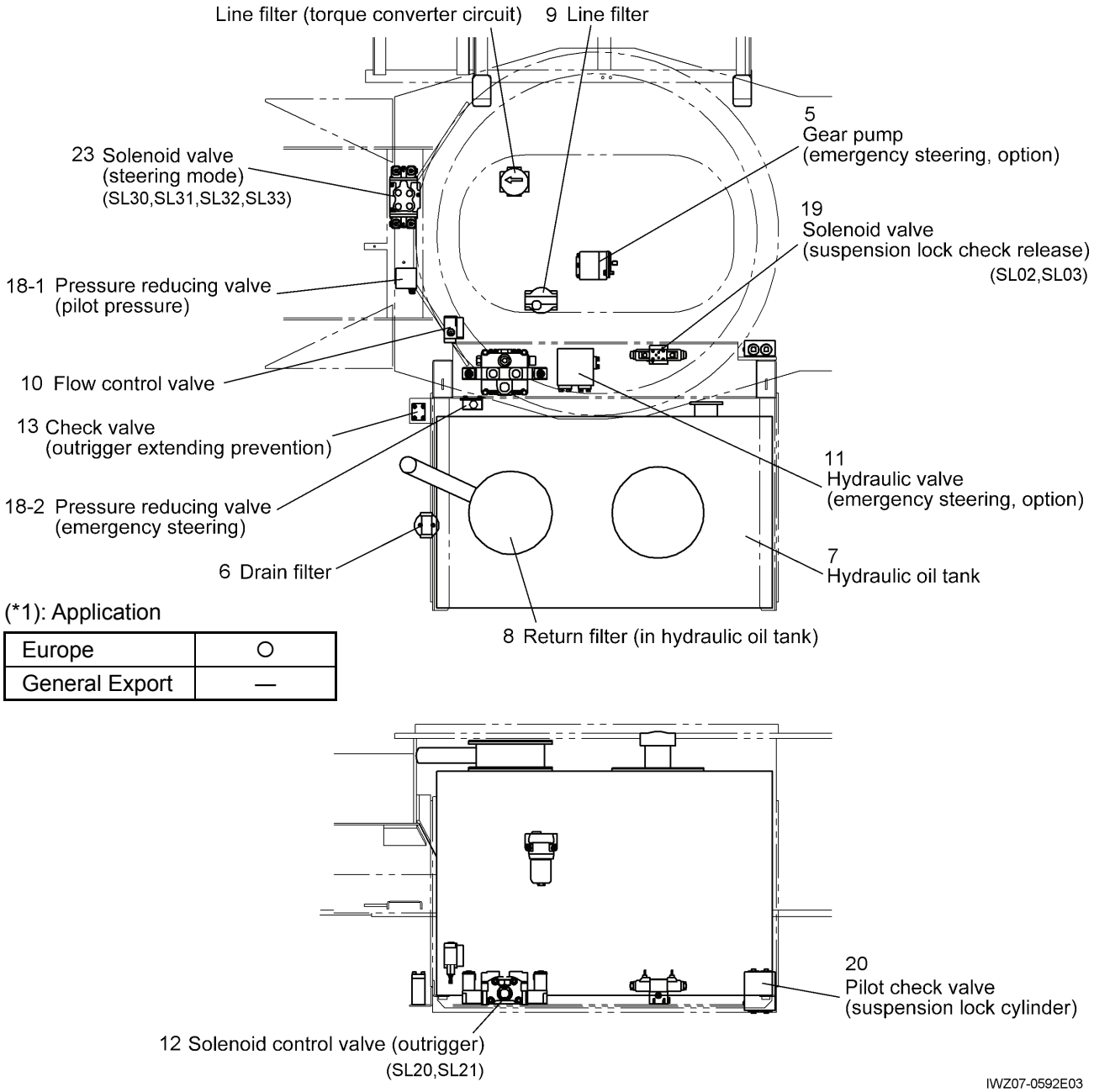
14.Solenoid valve (slide/jack) (for FL) (SL22,SL23)

14.Solenoid valve (slide/jack) (for FR) (SL24,SL25)

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Location of Hydraulic Parts (Lower)

1.2 Center



(*1): Application

Europe	O
General Export	—

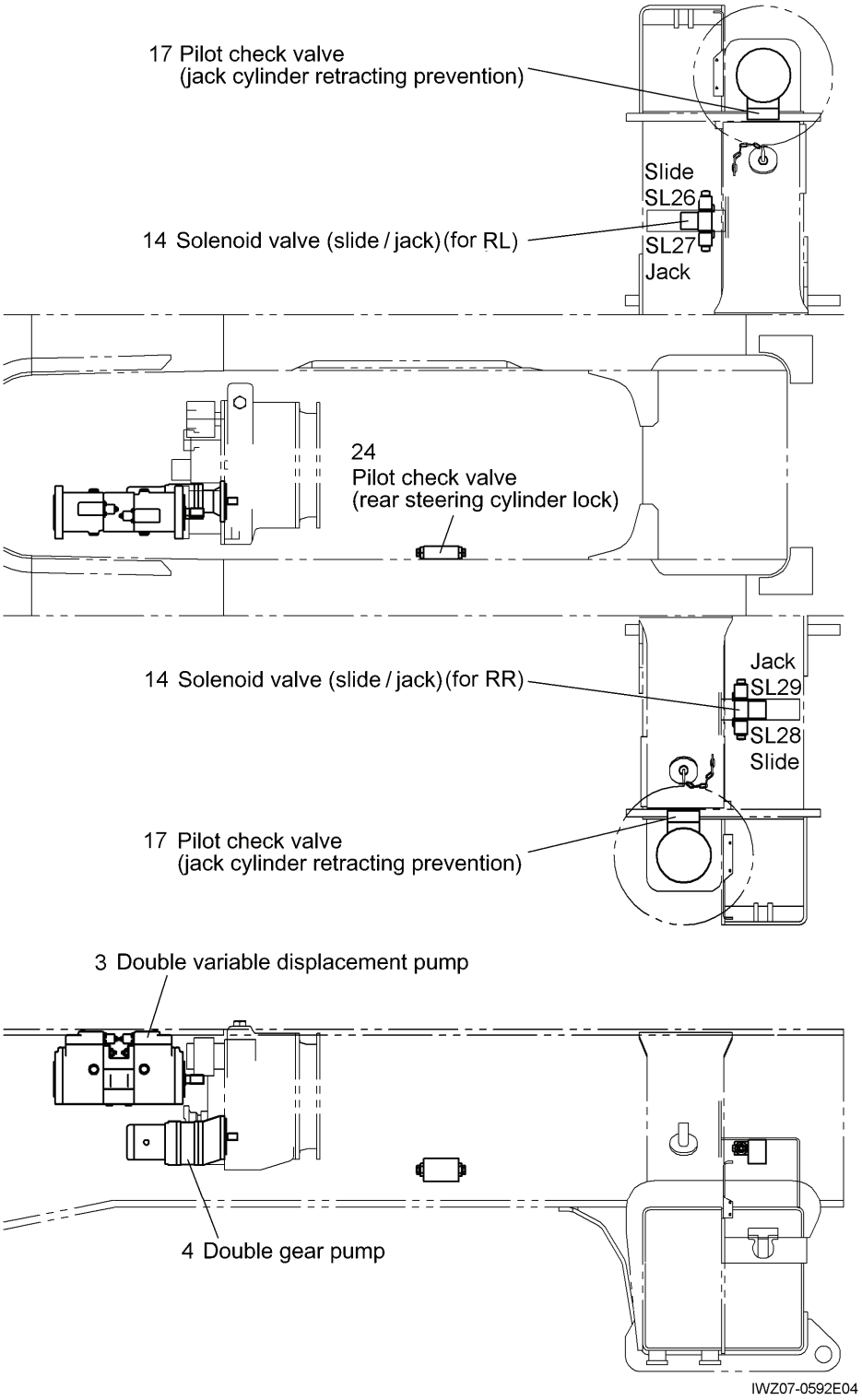
List of components illustrated in the “Center” figure (in alphabetical order)

13.Check valve (outrigger extending prevention)
6.Drain filter
10.Flow control valve
5.Gear pump (emergency steering, option)
7.Hydraulic oil tank
11.Hydraulic valve (emergency steering, option)
9.Line filter
Line filter (torque converter circuit)
20.Pilot check valve (suspension lock cylinder)
18-1.Pressure reducing valve (pilot pressure)
18-2.Pressure reducing valve (emergency steering)(*1)
8.Return filter (in hydraulic oil tank)
12.Solenoid control valve (outrigger) (SL20, SL21)
23.Solenoid valve (steering mode)
(SL30, SL31, SL32, SL33)
19.Solenoid valve (suspension lock check release)
(SL02, SL03)

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Location of Hydraulic Parts (Lower)

1.3 Rear



List of components illustrated in the “Rear” figure (in alphabetical order)

4.Double gear pump

3.Double variable displacement pump

17.Pilot check valve (jack cylinder retracting prevention)

24.Pilot check valve (Rear steering cylinder lock)

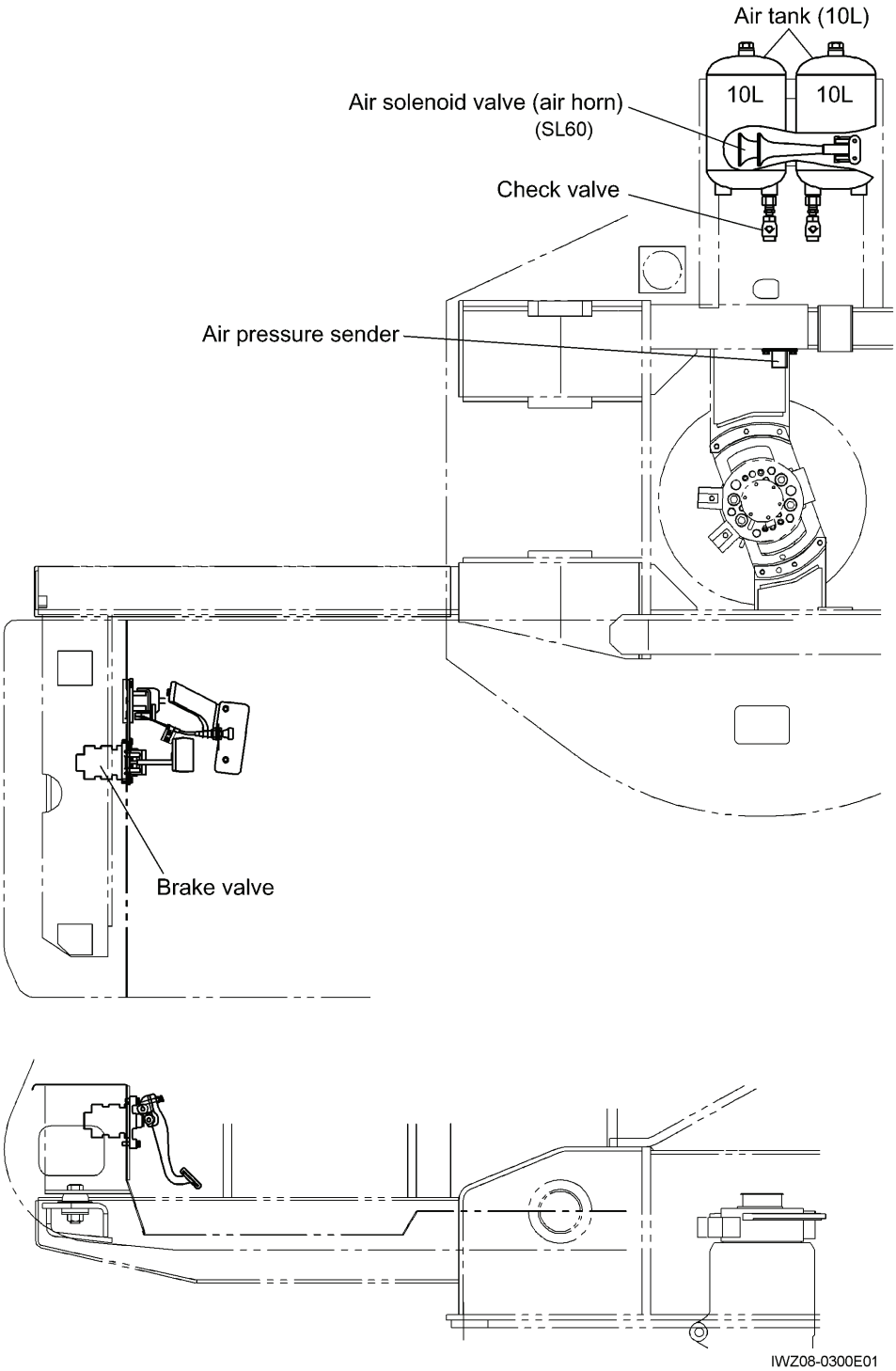
14.Solenoid valve (slide/jack) (for RL) (SL26, SL27)

14.Solenoid valve (slide/jack) (for RR) (SL28, SL29)

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Z-9 Location of Air Parts

1. Cab and swing table



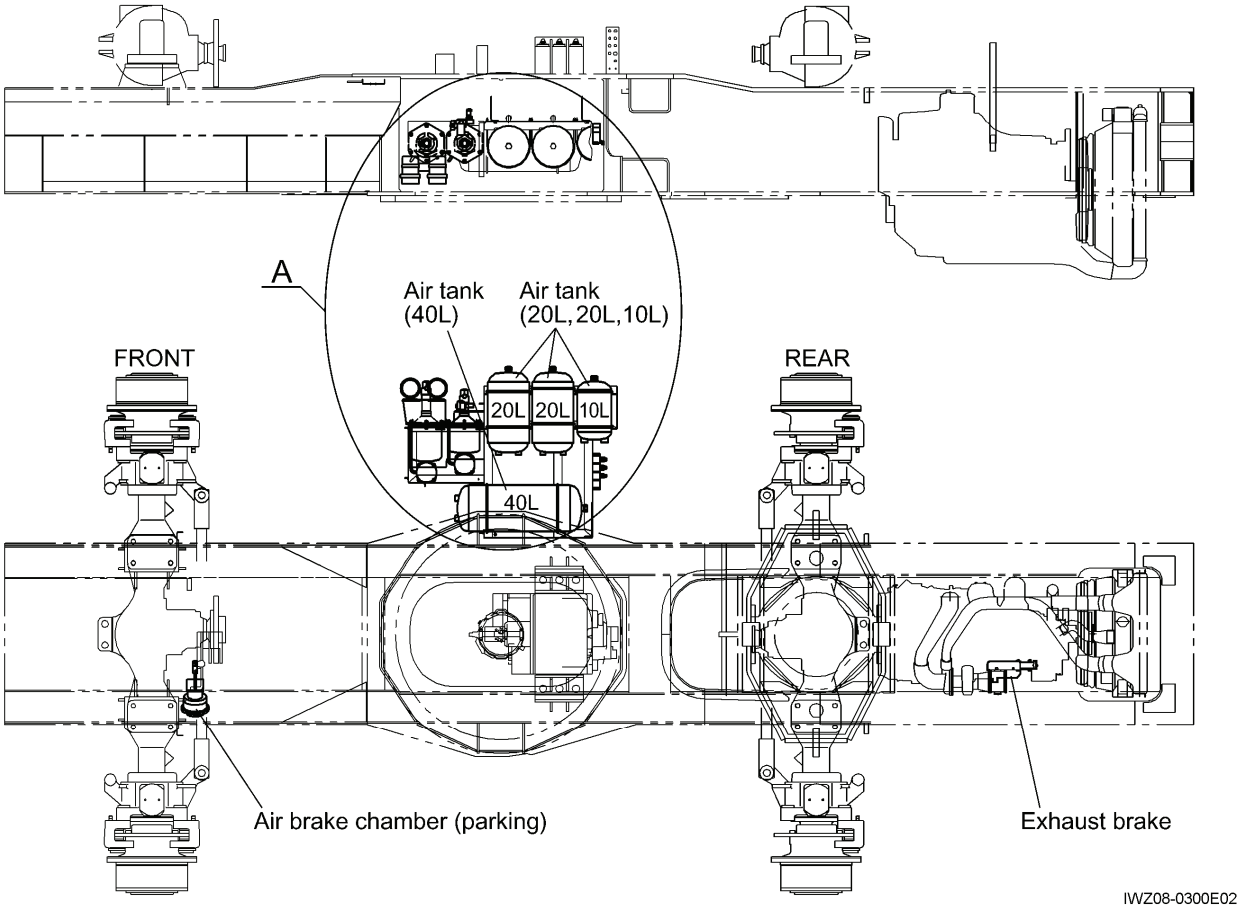
List of components illustrated in the “Cab and swing table” figure (in alphabetical order)

Air pressure sender
Air solenoid valve (air horn) (SL60)
Air tank (10L)
Brake valve
Check valve

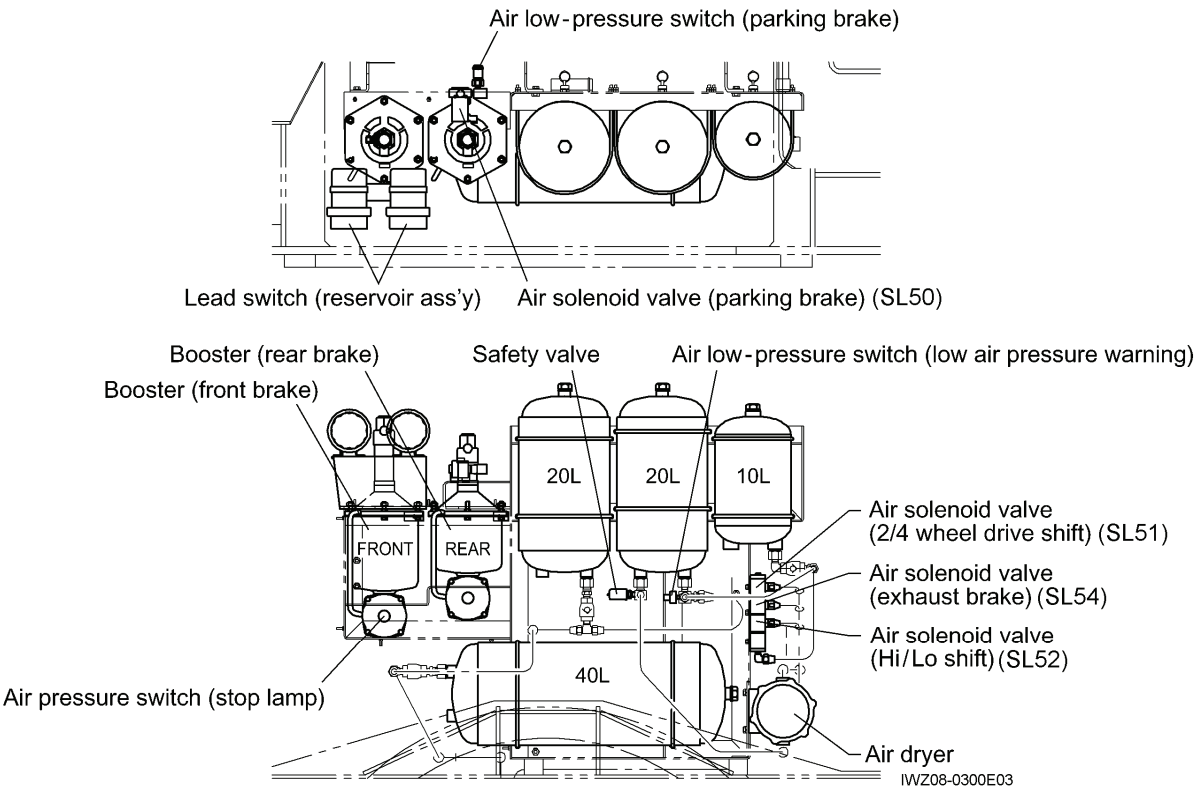
347-112-70000 △0
347-219-30000 △0
343-453-10000 △0

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2. Carrier



Enlarge view of A (center of the carrier's right hand)



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Location of Air Parts

List of components illustrated in the “Carrier” figure (in alphabetical order)

Air brake chamber (parking)

Air dryer

Air low-pressure switch (low air pressure warning)

Air Low-pressure switch (parking brake)

Air pressure switch (stop lamp)

Air solenoid valve (2/4 wheel drive shift) (SL51)

Air solenoid valve (exhaust brake) (SL54)

Air solenoid valve (Hi/Lo shift) (SL52)

Air solenoid valve (parking brake) (SL50)

Air tank (10L)

Air tank (20L)

Air tank (40L)

Booster (front brake)

Booster (rear brake)

Exhaust brake

Lead switch (reservoir assy)

Safety valve

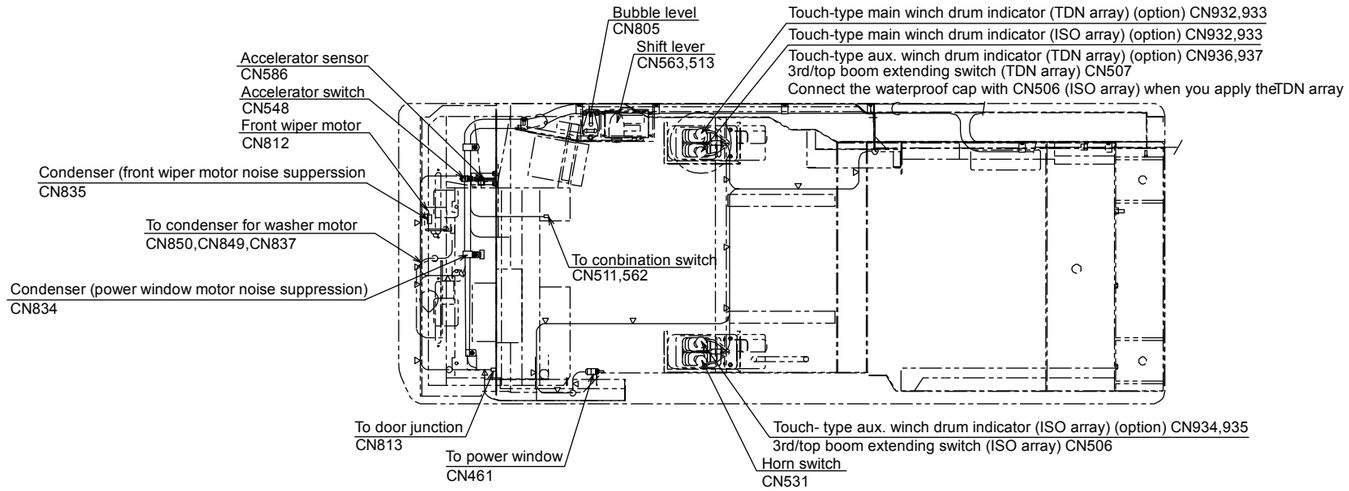
349-221-60000 ⚠1
349-221-70000 ⚠1

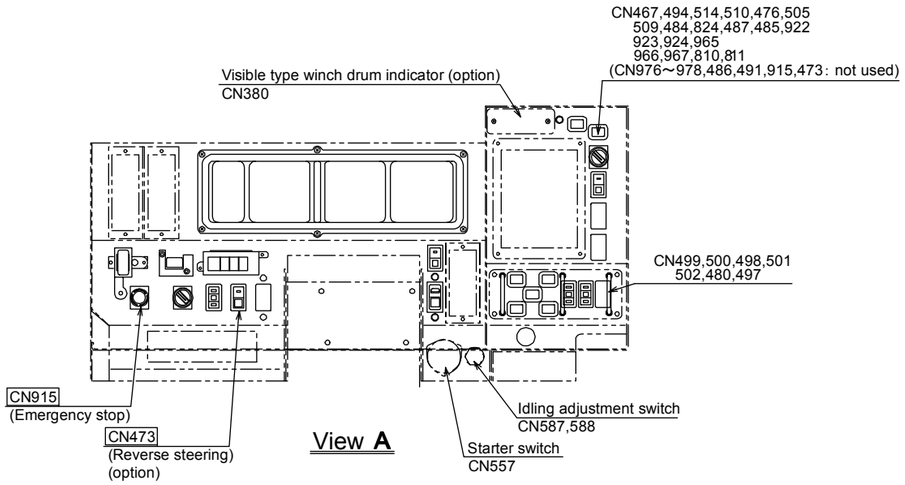
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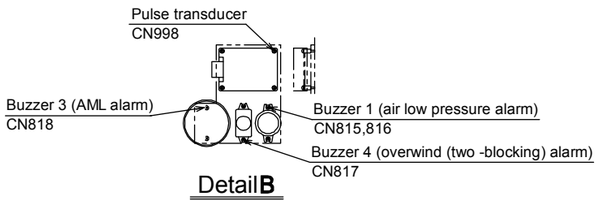
Location of Electric Parts (Inside cab)

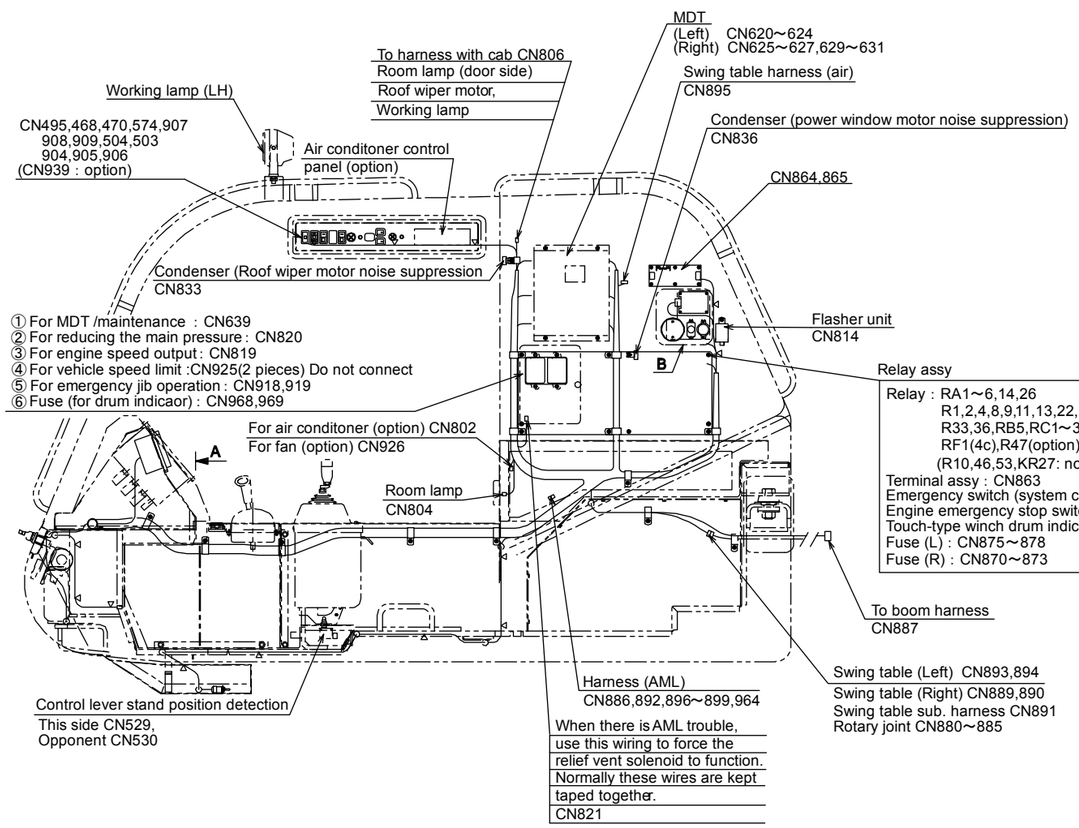
Z-10 Location of Electric Parts (Inside cab)

[NOTICE]
◆CN473, CN915 are applied only for Europe.









IWZ02-3111E01

343-532-31000 ⚠1
343-536-61000 ⚠1

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Location of Electric Parts (Swing Table, Boom)

Z-11 Location of Electric Parts (Swing Table, Boom)

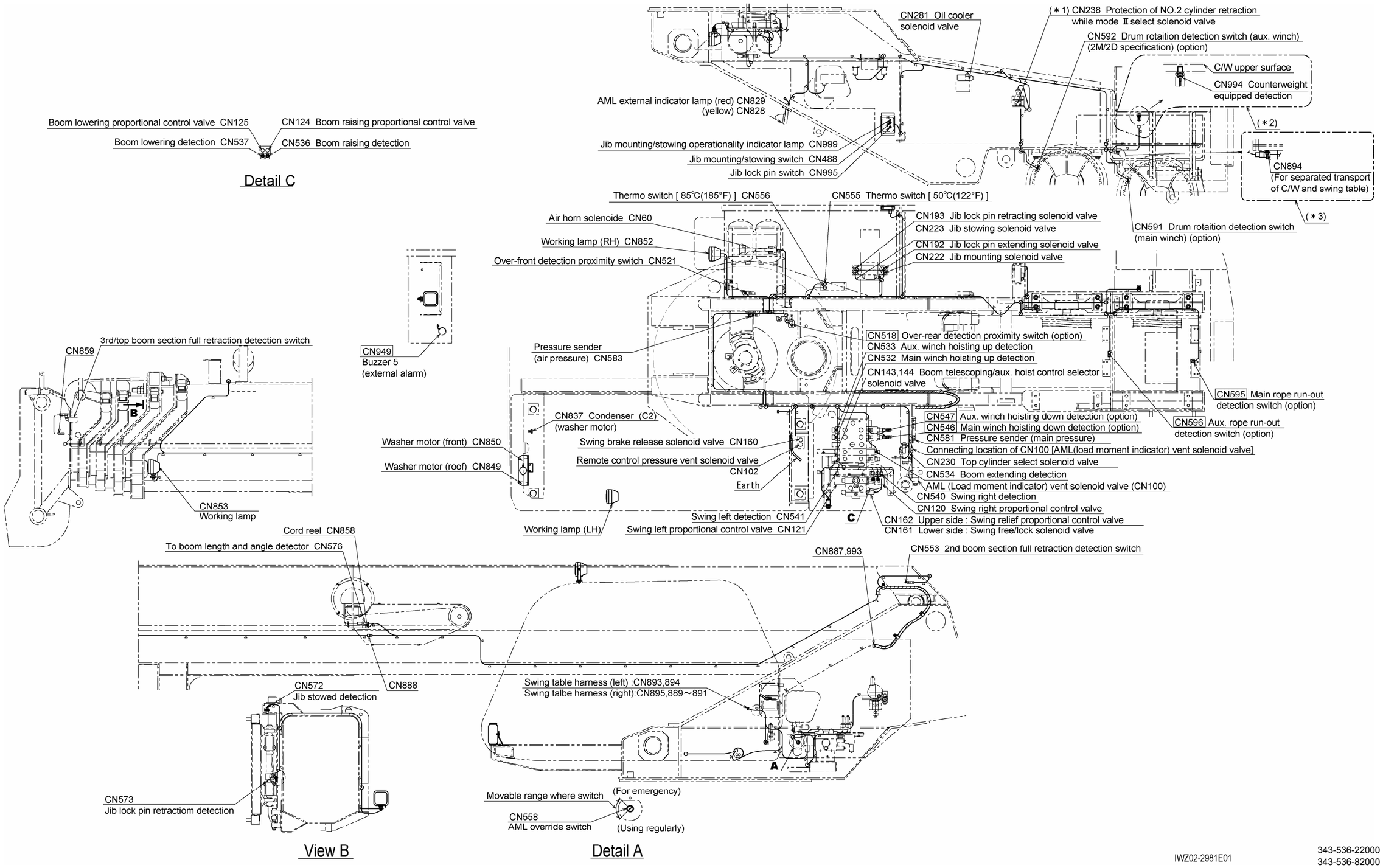
[NOTICE]

◆The connection in frame ( ) in figure is applied only for Europe: CN546,547,595,596,CN518,CN949

(*1): CN238 is applied for GR-800XXL-1 and GR-550EX-1.

(*2): CN994 is applied for GR-800XXL-1 and GR-700EXL-1.

(*3): CN894 is applied only for GR-550EX-1.



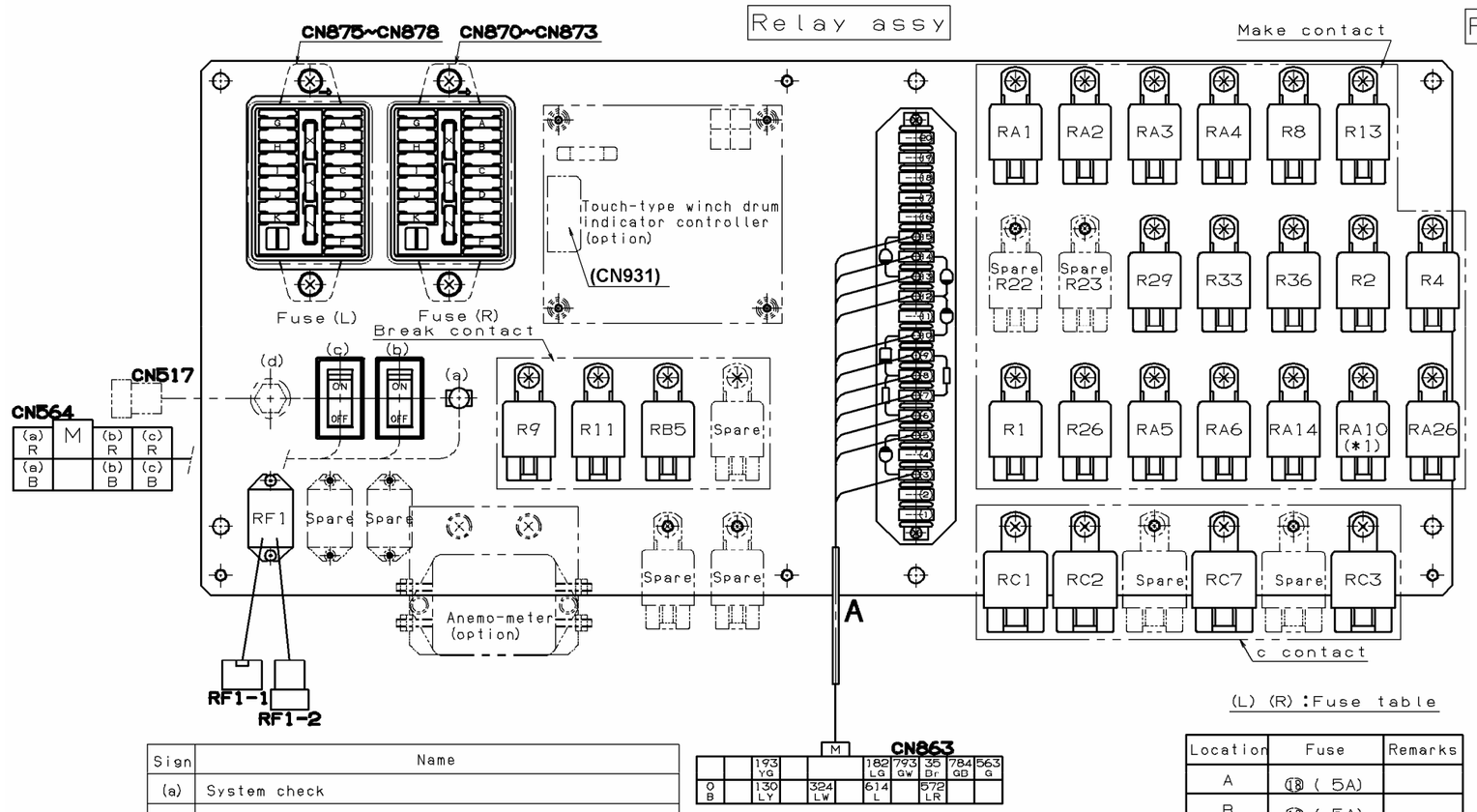
IWZ02-2981E01

343-536-22000 ③
343-536-82000 ②

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Location of Electric Parts (Relay Assembly / Upper)

Z-12 Location of Electric Parts (Relay Assembly / Upper)



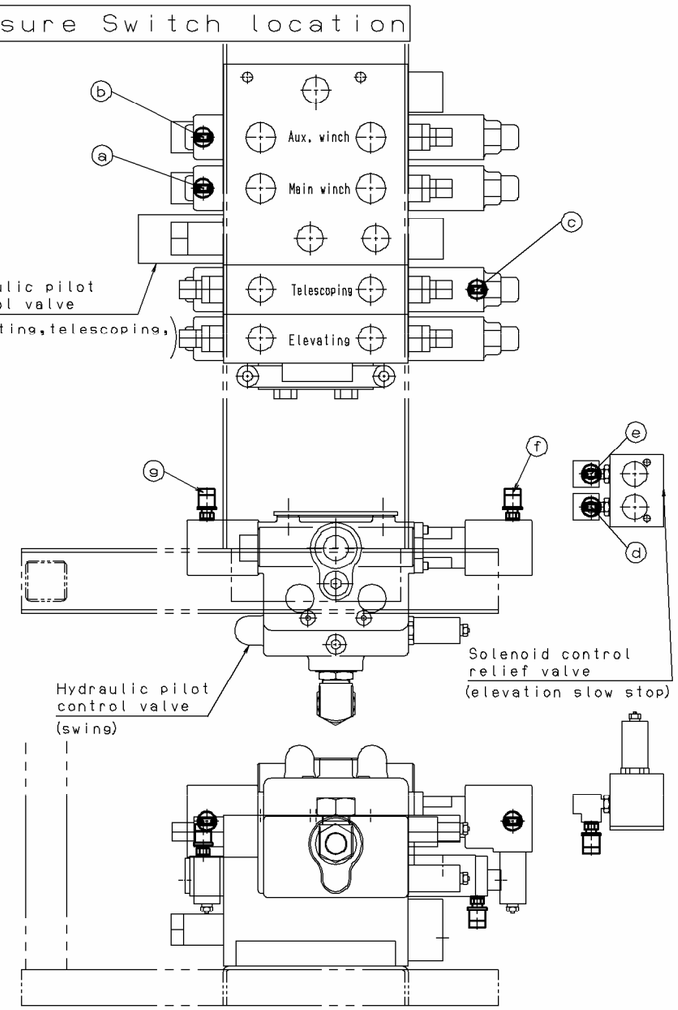
Sign	Name	
(a)	System check	
(b)	Emergency transmission	
(c)	Emergency accelerator	
(d)	Engine emergency stop	Pull:Engine emergency stop Push:normal condition

Diode section connection diagrom

(L) (R) :Fuse table

Location	Fuse	Remarks
A	⑱ (5A)	
B	⑱ (5A)	
C	⑳ (15A)	
D	⑲ (10A)	
E	⑳ (15A)	
F	⑲ (10A)	
G	⑲ (10A)	
H	⑲ (10A)	
I	⑲ (10A)	
J	⑳ (15A)	
K	⑳ (15A)	
X	⑱ (5A)	Spare
Y	⑲ (10A)	Spare
Z	⑳ (15A)	Spare

(*1) :RA10 is applied only for Europe.



Switch ON/OFF table

Name		Lever operating			Remarks
		Pull	Neutral	Push	
Main winch	ⓐ	OFF	ON	ON	hoisting up detection
Aux. winch	ⓑ	OFF	ON	ON	hoisting up detection
Telescoping	ⓒ	ON	ON	OFF	Boom extending detection
Elevating	ⓓ	OFF	ON	ON	Boom raising detection
	ⓔ	ON	ON	OFF	Boom lowering detection
Swing	ⓕ	ON	ON	OFF	Swing right detection
	ⓖ	OFF	ON	ON	Swing left detection

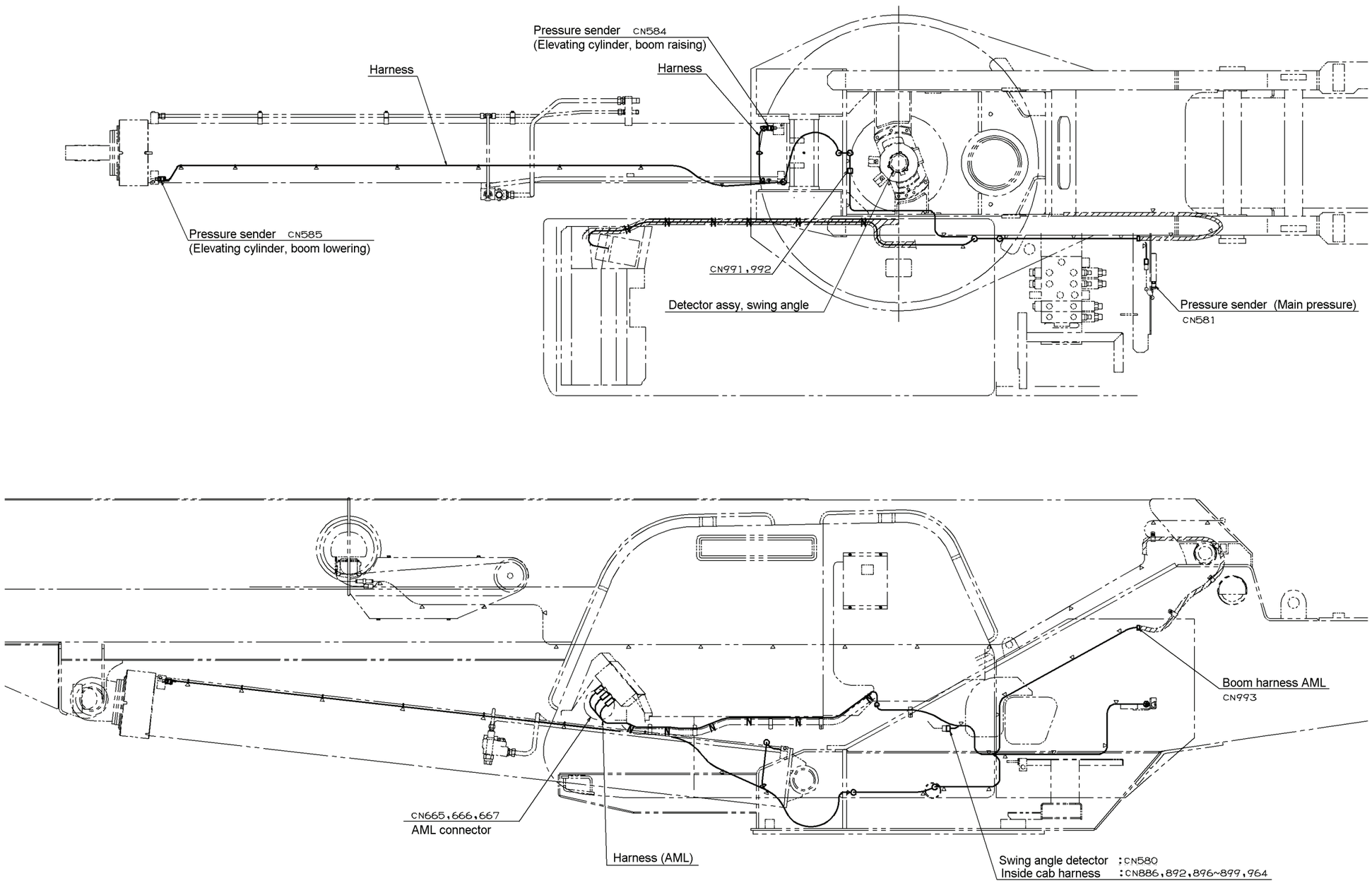
「ON-OFF」shows energizing the point of contact

IWZ02-3120E01
343-536-61500 ⚠0
343-632-33000 ⚠0
343-532-31000 ⚠1

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Location of Air Parts (AML)

Z-13 Location of Air Parts (AML)



IWZ02-3000E01

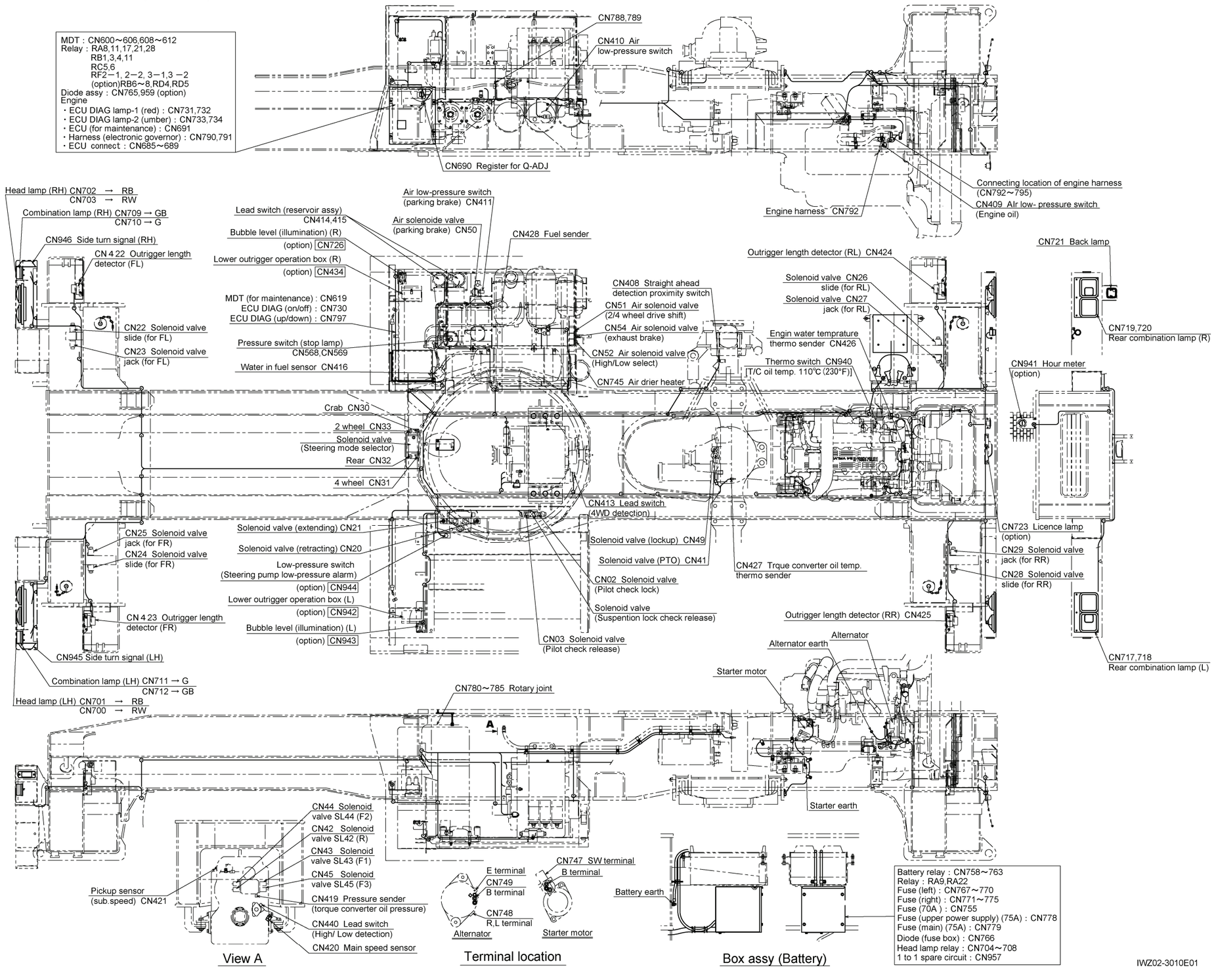
343-632-81000 ⚠0
343-632-31000 ⚠0

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Location of Electric Parts (Lower)

Z-14 Location of Electric Parts (Lower)

[NOTICE]
◆The connection in frame (▭) in figure is applied only for Europe.



IWZ02-3010E01

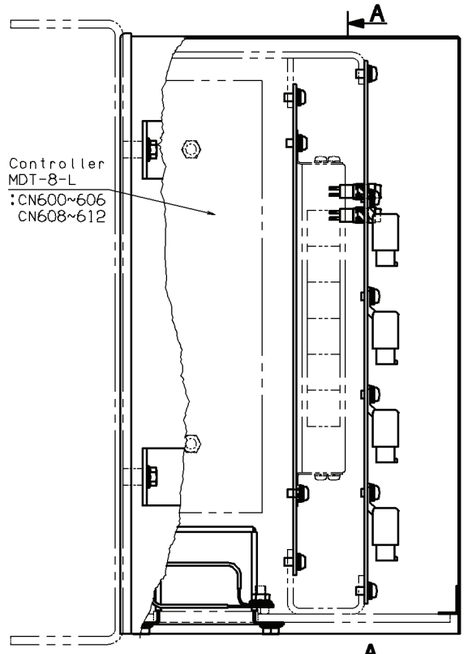
349-310-00000 ⚠2

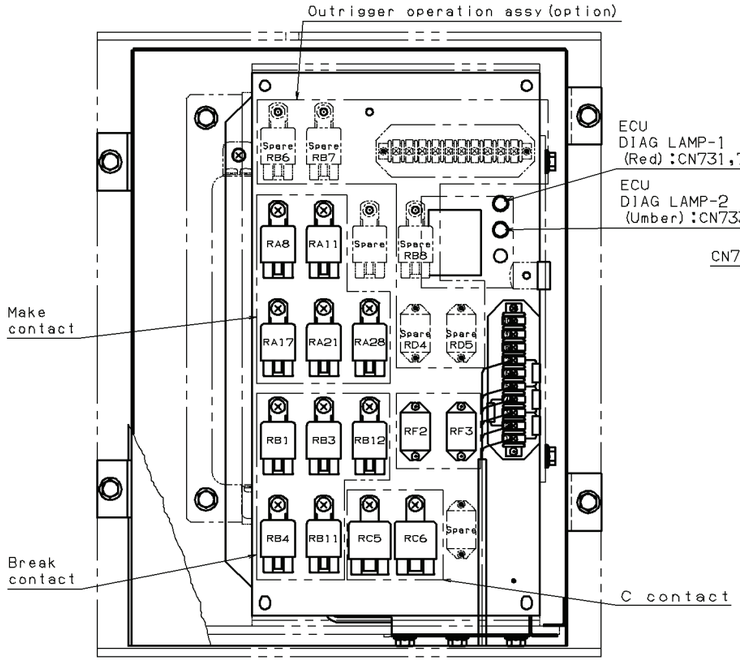
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Location of Electric Parts (Box Assembly / Lower)

Z-15 Location of Electric Parts (Box Assembly / Lower)

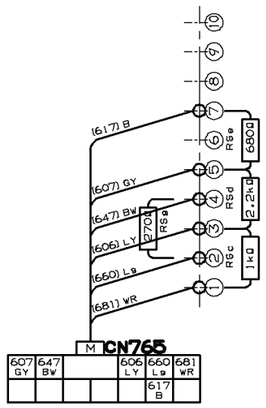
Box assy (Electric unit)



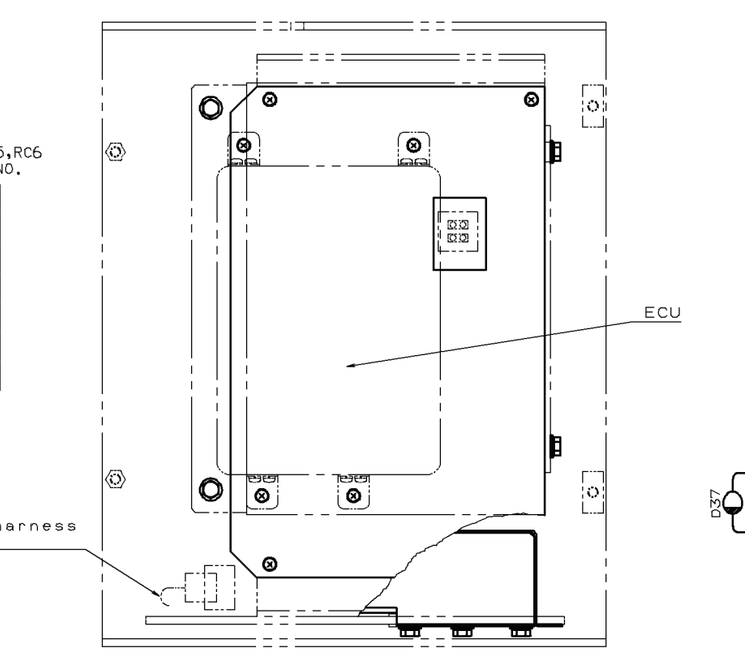




Reray	Pole	CN.NO
RF2	7-M	**RF2-1**
	9-F	**RF2-2**
RF3	7-M	**RF3-1**
	9-F	**RF3-2**
RC5	6-M	**RC5**
RC6	6-M	**RC6**

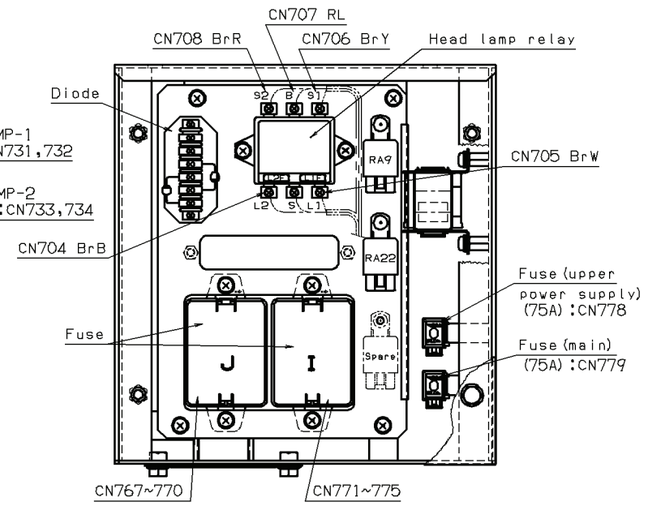


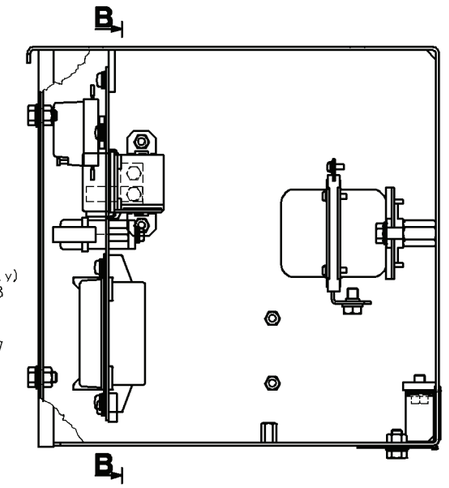
Terminal section connection diagram

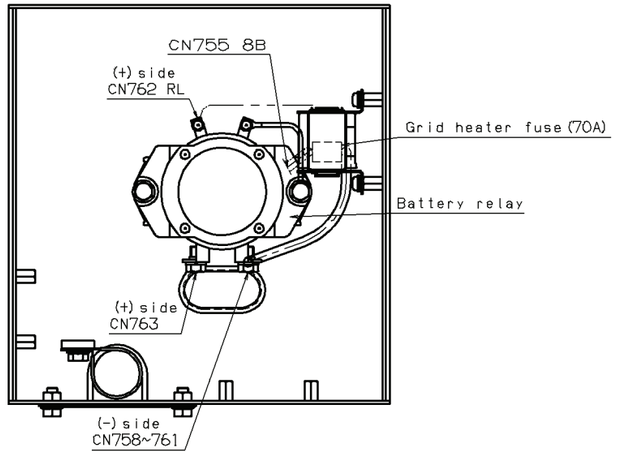


View **A–A**

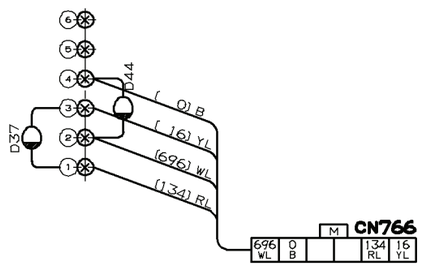
Box assy (Battery)



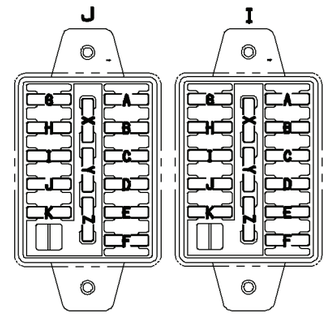




View **B–B**



Diode section connection diagram



Fuse location diagram

J: Fuse table

Location	Fuse	Remarks
A	③ (5A)	
B	③ (5A)	
C	③ (5A)	
D	③ (5A)	
E	③ (5A)	
F	③ (5A)	
G	③ (5A)	
H	③ (5A)	
I	③ (5A)	
J	③ (5A)	
K	③ (5A)	
X	③ (5A)	Spare
Y	③ (5A)	Spare
Z	③ (5A)	Spare

I: Fuse table

Location	Fuse	Remarks
A	③ (5A)	
B	⑤ (15A)	
C	④ (10A)	
D	④ (10A)	
E	④ (10A)	
F	④ (10A)	
G	⑤ (15A)	
H	⑤ (15A)	
I	⑤ (15A)	
J	⑤ (15A)	
K	③ (5A)	
X	④ (10A)	Spare
Y	⑤ (15A)	Spare
Z	⑤ (15A)	Spare

IWZ02-3020E01

349-310-02000 ⓪ 349-310-01000 ⓪
349-310-02300 ① 349-310-01300 ⓪

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Z-16 Harness (Connector No. Table)

CN No.	Usage	Coordinates	Page
Suspension lock selector solenoid valve			
02	Suspension lock	J-4	39
03	Suspension release	J-5	
Outrigger ext./ret. selector solenoid valve			
20	Retracting	J-5	39
21	Extending	J-5	
22	Slide (for FL)	F-3	
23	Jack (for FL)	F-2	
24	Slide (for FR)	I-3	
25	Jack (for FR)	I-2	
26	Slide (for RL)	B-14	
27	Jack (for RL)	B-15	
28	Slide (for RR)	I-11	
29	Jack (for RR)	I-11	
Steering mode selector solenoid valve			
30	Crab,	I-4	39
31	4 wheel,	I-4	
32	Reverse,	I-4	
33	Rear select	J-4	
Transmission selector solenoid valve			
42	R	E-8	39
43	F1	E-9	
44	F2	E-9	
45	F3	E-9	
41	PTO solenoid valve	K-5	39
49	Lockup solenoid valve	K-4	
50	Air solenoid valve (parking brake)		40
51	Air solenoid valve (2/4 wheel drive shift)		
52	Air solenoid valve (High/Low select)		
54	Air solenoid valve (exhaust brake)		
60	Air solenoid valve （air horn）		35
100	AML (Load moment indicator) vent solenoid valve		34
102	Remote control pressure vent solenoid valve		
120	Swing right proportional control valve		
121	Swing left proportional control valve		
124	Boom raising proportional control valve		
125	Boom lowering proportional control valve		
143	Boom telescoping/aux. hoist control selector solenoid valve		
144	Boom telescoping/aux. hoist control selector solenoid valve		
160	Swing brake release solenoid valve		
161	Swing free/lock solenoid valve		
162	Swing relief proportional control valve		
192	Jib lock pin extending solenoid valve		35
193	Jib lock pin retracting solenoid valve		
222	Jib mounting solenoid valve		
223	Jib stowing solenoid valve		
230	Top cylinder selector solenoid valve		34
238	Protection of NO.2 cylinder retraction while mode Ⅱ select solenoid valve		35
281	Oil cooler solenoid valve		
380	Visible type winch drum indicator (option)	D-1	33

CN No.	Usage	Coordinates	Page
408	Straight ahead detection proximity switch	B-11	39
409	Low pressure switch (Engine oil)	B-12	
410	Air Low-pressure switch		40
411	Air low-pressure switch (parking brake)		
413	Lead switch (4WD detection)	K-5	39
414	Lead switch (reservoir assy)		40
415	Lead switch (reservoir assy)		
416	Water in fuel sensor	D-6	39
419	Pressure sender (torque converter oil pressure)	K-9	
420	Main speed sensor	K-7	
421	Pickup sensor (sub. speed)	C-10	
422	Outrigger length detector (FL)	G-2	
423	Outrigger length detector (FR)	J-2	
424	Outrigger length detector (RL)	B-14	
425	Outrigger length detector (RR)	I-12	
426	Engine water temperature thermo sender	G-10	
427	Torque converter oil temp. thermo sender	K-3	
428	Fuel sender		40
434	Lower outrigger operation box (R)	B-7	39
440	Lead switch (High/Low detection)	K-9	
461	Power window switch (outside cab)	K-8	33
467	Power window switch	J-4	
468	Roof wiper switch	A-2	
470	Working lamp switch	A-3	
473	Reverse steering switch	K-4	
476	High/low and 2/4wheel drive select switch	J-2	
480	Outrigger switch (for jack/slide select)	D-6	
484	Swing brake switch	C-3	
485	Boom telescoping/aux. hoist control selector switch	C-4	
486	Swing stop cancel switch	C-4	
487	Swing free/lock selector switch	E-4	
488	Jib mounting / stowing switch		35
491	Elevating slow stop cancel switch	C-5	33
494	Hazard switch	J-5	
495	Roof washer switch	A-1	
497	Outrigger switch (for ext./ret. select)	D-6	
498	Outrigger Individual operation switch (all)	E-6	
499	Outrigger Individual operation switch (FL)	F-5	
500	Outrigger Individual operation switch (FR)	F-6	
501	Outrigger Individual operation switch (RL)	E-6	
502	Outrigger Individual operation switch (RR)	F-5	
503	3rd/top boom emergency telescoping switch	B-6	
504	2nd boom emergency telescoping switch	B-6	
505	Overwind cutout (anti-twoblock) disable switch	C-2	
506	3rd/top boom extending switch (ISO array)	J-6	
507	3rd/top boom extending switch (TDN array)	I-6	
509	P.T.O switch	C-3	
510	Parking brake switch	K-4	
511	Combination switch	D-2	
513	Mission select switch (shift lever)	H-3	

CN No.	Usage	Coordinates	Page
514	Steering mode select switch	J-2	33
517	Engine emergency stop switch	G-6	
518	Over-rear detection proximity switch		35
521	Over-front detection proximity switch		
529	Control lever stand position detection switch	J-8	33
530	Connector	I-8	
531	Swing horn switch	K-6	
532	Main winch hoisting up detection switch		34
533	Aux. winch hoisting up detection switch		
534	Boom extending detection switch		
536	Boom raising detection switch		
537	Boom lowering detection switch		
540	Swing right detection switch		
541	Swing left detection switch		
546	Main winch hoisting down detection switch (option)		
547	Aux. winch hoisting down detection switch (option)		
548	Accelerator switch	I-1	33
553	2nd boom full retraction detection switch		36
555	Thermo switch (50°C/122°F)		35
556	Thermo switch (85°C/185°F)		
557	Starter switch	C-2	33
558	AML override switch		34
562	Combination switch	E-2	33
563	Mission select switch (shift lever)	H-3	
564	Emergency switch (system check, mission, accelerator)	F-7	
568	Pressure switch (stop lamp)		40
569	Pressure switch (stop lamp)		
572	Jib stowed detection proximity switch		36
573	Jib lock pin retracting detection switch		
574	Oil cooler switch	A-4	33
576	Boom length and angle detector		36
580	Swing angle detector		37
581	Pressure sender (main pressure)		
583	Pressure sender (air pressure)		35
584	Pressure sender (elevating cylinder, boom raising)		37
585	Pressure sender (elevating cylinder, boom lowering)		
586	Accelerator sensor	I-1	33
587	Idling adjustment switch	D-3	
588	Idling adjustment switch	D-2	
591	Main winch drum rotation detection proximity switch		35
592	Aux. winch drum rotation detection proximity switch		
595	Main rope run-out detection switch (option)		
596	Aux. rope run-out detection switch (option)		
600	MDT (lower) CN1-1	H-4	39
601	MDT (lower) CN1-2	H-4	
602	MDT (lower) CN2	G-5	
603	MDT (lower) CN3	G-5	
604	MDT (lower) CN4	G-5	
605	MDT (lower) CN5	F-5	
606	MDT (lower) CN6	F-4	

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Harness (Connector No. Table)

CN No.	Usage	Coordinates	Page
608	MDT (lower) CN7	H-6	39
609	MDT (lower) CN8	G-6	
610	MDT (lower) CN9	G-7	
611	MDT (lower) CN10	F-6	
612	MDT (lower) CN11	F-6	
619	MDT (for maintenance)	B-6	
620	MDT (upper) CN1	B-9	33
621	MDT (upper) CN2	B-9	
622	MDT (upper) CN3	B-10	
623	MDT (upper) CN4	C-9	
624	MDT (upper) CN5	C-9	
625	MDT (upper) CN6	A-12	
626	MDT (upper) CN7	A-12	
627	MDT (upper) CN8	A-12	
629	MDT (upper) CN9	B-12	
630	MDT (upper) CN10-1	B-12	
631	MDT (upper) CN10-2	C-12	
639	MDT (upper) (for maintenance)	E-7	
665	AML connector 1		37
666	AML connector 2		
667	AML connector 3		
685	ECU (A connector)		41
686	ECU (B connector)		
687	ECU (C connector)		
688	ECU (D connector)		
689	ECU (E connector)		
690	Q-ADJ	D-5	39
691	MUT-III		41
700	Head lamp (LH)	K-1	39
701	Head lamp (LH)	J-1	
702	Head lamp (RH)	F-1	
703	Head lamp (RH)	F-1	
704	Head lamp relay	H-14	
705	Head lamp relay	H-14	
706	Head lamp relay	H-13	
707	Head lamp relay	H-13	
708	Head lamp relay	H-13	
709	Combination lamp (RH)	E-1	
710	Combination lamp (RH)	E-1	
711	Combination lamp (LH)	K-1	
712	Combination lamp (LH)	K-2	
717	Rear combination lamp (L)	J-11	
718	Rear combination lamp (L)	J-12	
719	Rear combination lamp (R)	B-15	
720	Rear combination lamp (R)	B-15	
721	Backup lamp	A-16	
723	License lamp (option)	D-16	
726	Bubble level (illumination) (R) (option)	E-7	
730	DIAG switch	B-6	
731	ECU DIAG lamp-1 (red)	B-1	
732	ECU DIAG lamp-1 (red)	B-1	
733	ECU DIAG lamp-2 (umber)	B-2	

CN No.	Usage	Coordinates	Page
734	ECU DIAG lamp-2 (umber)	B-2	39
745	Air drier heater		40
747	Starter relay (SW)	C-13	39
748	Alternator (R terminal, L terminal)	H-9	
749	Alternator (B terminal)	H-9	
751	Back buzzer	C-15	
755	Fuse (Grid heater) (70A)	E-14	
758	Battery relay	F-15	
759	Battery relay	F-15	
760	Battery relay	F-16	
761	Battery relay	E-15	
762	Battery relay	E-15	
763	Battery relay	E-16	
765	Diode assy	D-3	
766	Diode (fuse box)	F-14	
767	Fuse box (L)	G-12	
768	Fuse box (L)	G-12	
769	Fuse box (L)	H-12	
770	Fuse box (L)	H-12	
771	Fuse box (R)	F-12	
772	Fuse box (R)	F-12	
773	Fuse box (R)	G-12	
774	Fuse box (R)	F-12	
775	Fuse box (R)	G-12	
778	Fuse (upper power supply) (75A)	F-14	
779	Fuse (main) (75A)	G-14	
780	Rotary joint	F-9	
781	Rotary joint	F-9	
782	Rotary joint	G-9	
783	Rotary joint	F-9	
784	Rotary joint	F-9	
785	Rotary joint	G-9	
788	Sub. harness	B-8	
	To main harness		40
789	Sub. harness	B-9	39
	To main harness		40
790	Harness (electronic governor)	E-4	39
	To main harness		41
791	Harness (electronic governor)	E-4	39
	To main harness		41
792	Harness (engine)		
793	Harness (engine)		
794	Harness (engine)		
795	Harness (engine)	B-11	39
797	MEMORY CLEAR	B-6	
802	Air conditioner (option)	H-7	33
804	Room lamp	H-7	
805	Bubble level (illumination)	H-6	
806	Harness with cab (room lamp, roof wiper motor, working lamp)	A-8	
810	Combination meter	F-2	
811	Combination meter	F-2	
812	Front wiper motor	I-1	

CN No.	Usage	Coordinates	Page
813	Door junction	I-2	33
814	Flasher unit	D-16	
815	Buzzer 1 (air low pressure alarm)	C-16	
816	Buzzer 1 (air low pressure alarm)	C-15	
817	Buzzer 4 (overwind (two-blocking) alarm)	C-15	
818	Buzzer 3 (AML alarm)	C-14	
819	Engine speed output	E-8	
820	For reducing the main pressure	F-8	
821	AML vent solenoid valve	G-5	
824	Cigarette lighter	E-6	
828	AML external indicator lamp (yellow)		35
829	AML external indicator lamp (red)		
833	Condenser (C1) (roof wiper motor)	A-9	33
834	Condenser (C3) (power window motor)	G-2	
835	Condenser (C5) (front wiper motor)	H-1	
836	Condenser (C7) (power window motor)	C-11	
837	Condenser (C2) (washer motor)	H-1	
849	Washer motor (roof)	G-1	
850	Washer motor (front)	G-2	
852	Working lamp		35
853	Working lamp (boom)		36
858	Cord reel (boom length detector)		
859	3rd/top boom full retraction detection switch		38
863	Terminal assy	F-10	33
864	DC-DC converter	B-15	
865	DC-DC converter	B-16	
870	Fuse box (right)	D-10	
871	Fuse box (right)	D-11	
872	Fuse box (right)	D-9	
873	Fuse box (right)	E-9	
875	Fuse box (left)	E-9	
876	Fuse box (left)	F-9	
877	Fuse box (left)	F-9	
878	Fuse box (left)	F-8	
880	Rotary joint	I-12	
881	Rotary joint	I-13	
882	Rotary joint	I-13	
883	Rotary joint	J-13	
884	Rotary joint	J-12	
885	Rotary joint	J-12	
886	Harness (AML)	I-9	
	To inside cab harness		37
887	Harness (boom, base)(for separated transport of boom and swing table)	H-15	33
	To inside cab harness		36
888	Harness (boom, top)		
889	Harness (Swing table, right)	J-15	33
	To inside cab harness		35
890	Harness (Swing table, right)	J-15	33
	To inside cab harness		35
891	Harness (Swing table, right)	J-15	33
	To inside cab harness		35

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Harness (Connector No. Table)

Applicable serial No. △2 : 546049 - -

CN No.	Usage	Coordinates	Page
892	Harness (AML)	I-9	33
	To inside cab harness		37
893	Harness (Swing table, left)	I-15	33
	To inside cab harness		34
894	Harness (Swing table, left)	I-15	33
	To inside cab harness		34
△2 894	Harness (for separated transport of C/W and swing table)		35
895	Swing table harness (air)	A-14	33
	To inside cab harness		35
896	Harness (AML)	J-9	33
	To inside cab harness		37
897	Harness (AML)	J-9	33
	To inside cab harness		37
898	Harness (AML)	K-9	33
	To inside cab harness		37
899	Harness (AML)	J-9	33
	To inside cab harness		37
904	Jib state switch	A-7	33
905	Jib removed indicator lamp	A-6	
906	Jib removed indicator lamp	A-6	
907	Emergency outrigger state register switch	A-5	
908	Emergency outrigger state control indicator lamp	A-5	
909	Emergency outrigger state control indicator lamp	A-5	
915	Crane operation emergency stop switch	J-2	
916	Controller (outdoor air temperature sensor)		43
917	Emergency crane operation switch		
918	For emergency jib operation	C-7	33
919	For emergency jib operation	D-7	
922	Boom telescoping/aux. hoist control indicator lamp	D-4	
923	Boom telescoping operation indicator lamp	D-3	
924	Aux. winch operation indicator lamp	D-4	
925	Vehicle speed limit	E-9	
926	Fan (switch, motor) (option)	H-8	
931	Touch-type winch drum indicator controller (option)	D-13	
932	Touch-type main winch drum indicator solenoid (ISO array)(option)	J-6	
933	Touch-type main winch drum indicator solenoid (ISO array)(option)	J-6	
934	Touch-type aux. winch drum indicator solenoid (ISO array)(option)	J-7	
935	Touch-type aux. winch drum indicator solenoid (ISO array)(option)	J-7	
936	Touch-type aux. winch drum indicator solenoid (TDN array) (option)	I-7	
937	Touch-type aux. winch drum indicator solenoid (TDN array) (option)	I-7	
938	For air bleeding of suspension lock cylinder	G-7	
939	Rope run-out release switch (option)	A-6	
940	Thermo switch (T/C oil 110°C/230°F)	C-12	39
941	Hour meter (option)	D-14	
942	Lower outrigger operation box (L) (option)	I-7	
943	Bubble level (illumination) (L) (option)	I-6	
944	Low-pressure switch (steering pump low-pressure alarm) (option)	K-7	
945	Side turn signal (LH)	K-2	
946	Side turn signal (RH)	E-2	
949	Buzzer 5 (external alarm)		35
959	Diode assy (lower outrigger operation) (option)	A-3	39

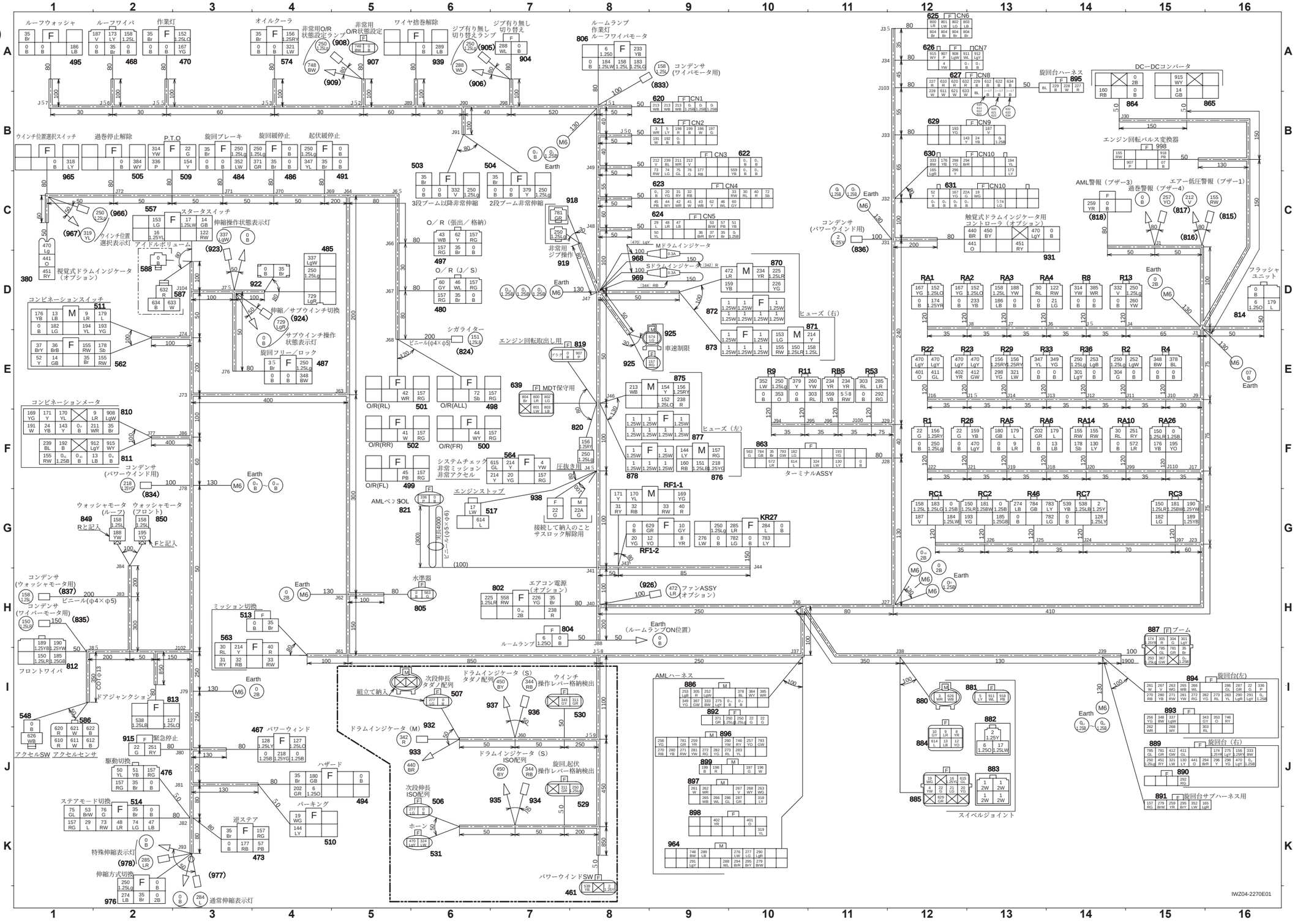
CN No.	Usage		Coordinates	Page
964	Harness (AML)		K-9	33
	To inside cab harness			37
965	Winch selector switch		C-1	33
966	Winch selector indicator lamp		C-2	
967	Winch selector indicator lamp		C-1	
968	Fuse (for drum indicator) (main)		D-8	
969	Fuse (for drum indicator) (aux.)		D-8	
976	Telescoping mode Ⅰ/Ⅱ switch		K-2	
977	Telescoping mode Ⅰ indicator lamp		K-3	
978	Telescoping mode Ⅱ indicator lamp		K-2	
991	For separated transport of boom and swing table			37
992	For separated transport of boom and swing table			
993	For separated transport of boom and swing table	To harness (AML)		36
		To harness (boom)		37
994	Counterweight equipped detection proximity switch			35
995	Jib lock pin switch			
998	Pulse transducer (engine speed)		B-15	33
999	Jib mounting / stowing operationality indicator lamp			35
R1	AML power supply relay 1		F-12	33
R11	2nd boom emergency telescoping relay		E-10	
R13	3rd/top boom emergency telescoping relay		D-14	
R2	Boom full ret. detection relay		E-15	
R22	AML lamp assy relay		E-12	
R23	AML lamp assy relay		E-12	
R26	AML power supply relay 2		F-12	
R29	Oil cooler relay		E-13	
R33	Elevating slow stop cancel relay		E-13	
R36	Overwind (two-blocking) relay		E-14	
R4	Swing free selector relay		E-15	
R46	Telescoping mode Ⅰ/Ⅱ selector (diode) relay		G-13	
R47	Remote control pressure vent relay			43
R53	Telescoping mode Ⅰ/Ⅱ selector relay		E-11	33
R8	AML emergency switch relay		D-14	
R9	Swing brake relay		E-10	
RA1	Working lamp relay 1		D-12	
RA10	Emergency stop relay		F-14	
RA11	Backup lamp relay		A-4	39
RA14	Horn relay		F-14	33
RA17	Steering power supply relay		B-4	39
RA2	Working lamp relay 1		D-12	33
RA21	ECU main power supply relay		B-4	39
RA22	Electronic governor power supply relay		G-16	
RA26	Washer relay (front)		F-15	33
RA28	Glow relay		B-3	39
RA3	Washer relay (roof)		D-13	33
RA4	Neutral starter relay		D-13	
RA5	Turn signal relay (R)		F-13	
RA6	Turn signal relay (L)		F-13	
RA8	Clearance lamp relay		A-4	39
RA9	Battery power supply keeping relay		H-15	
RB1	Transmission power supply cut relay		C-4	

CN No.	Usage	Coordinates	Page
RB11	Starter continuous energizing prevention relay	C-4	39
RB12	Starter interception relay	C-3	
RB3	PTO limiter relay	C-4	
RB4	Engine emergency stop relay	C-4	
RB5	Air conditioner power supply cut relay	E-11	33
RB6	Lower outrigger power supply select relay	A-4	39
RB7	Lower outrigger operation box relay	A-4	
RB8	Lower outrigger operation box relay	A-3	
RC1	Roof wiper ON relay	G-12	33
RC2	Front wiper ON relay	G-13	
RC3	Front wiper Hi relay	G-15	
RC5	Emergency accelerator relay 1	D-2	39
RC6	Emergency accelerator relay 2	D-1	
RC7	Power window relay	G-14	33
RD4	Lower outrigger operation box relay	C-2	39
RD5	Lower outrigger operation box relay	C-3	
RF1-1	Emergency transmission selector relay	F-9	33
RF1-2	Emergency transmission selector relay	G-9	
RF2-1	Emergency transmission selector relay	D-2	39
RF2-2	Emergency transmission selector relay	D-1	
RF3-1	Outrigger jack/slide select relay	C-1	
RF3-2H	Outrigger jack/slide select relay	C-1	
KR27	Telescoping mode Ⅰ/Ⅱ selector relay	G-10	33

https://truckmanualshub.com/

Harness (Inside Cab)

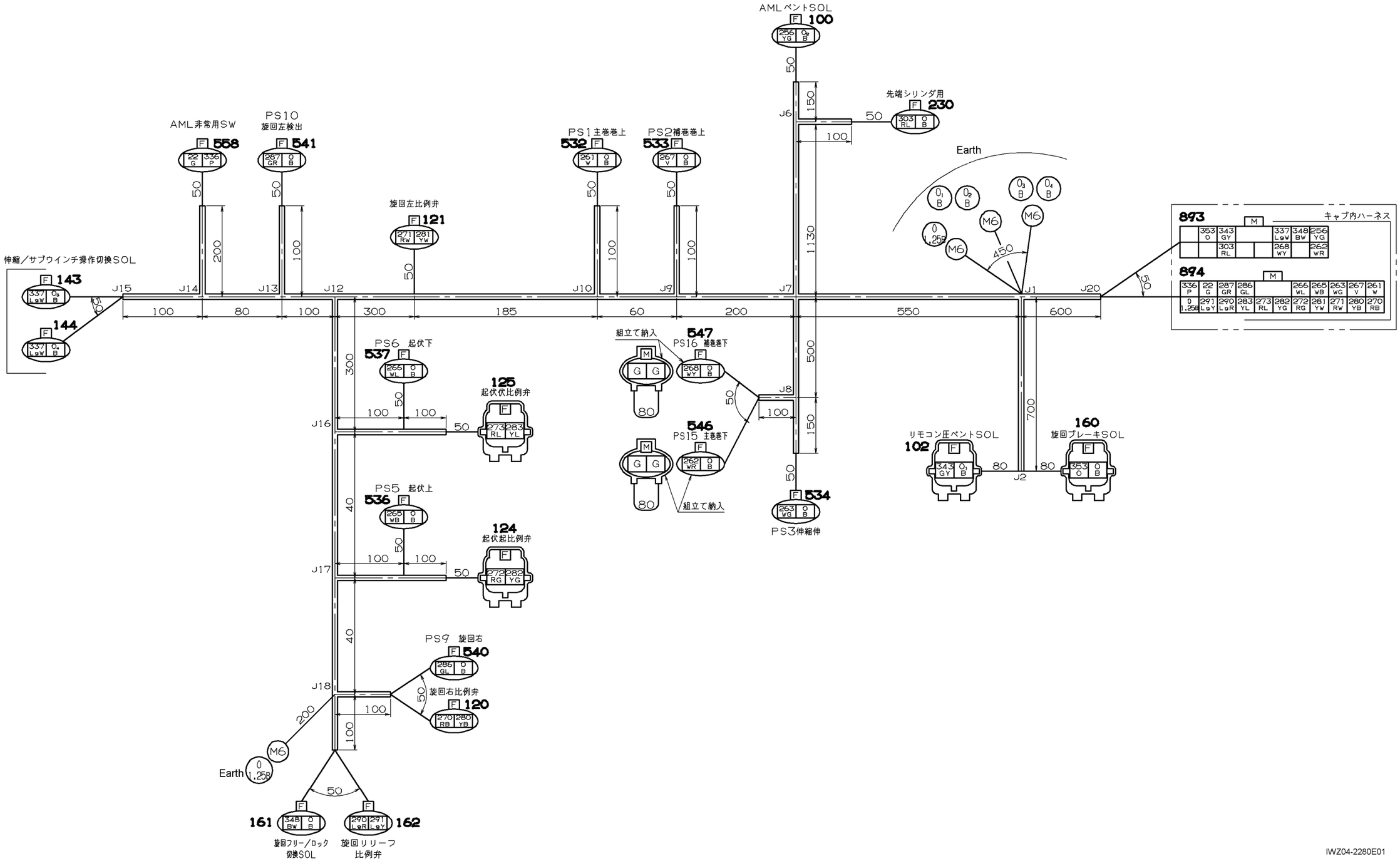
Z-17 Harness (Inside Cab)



https://truckmanualshub.com/

Harness (Swing Table, Left)

Z-18 Harness (Swing Table, Left)



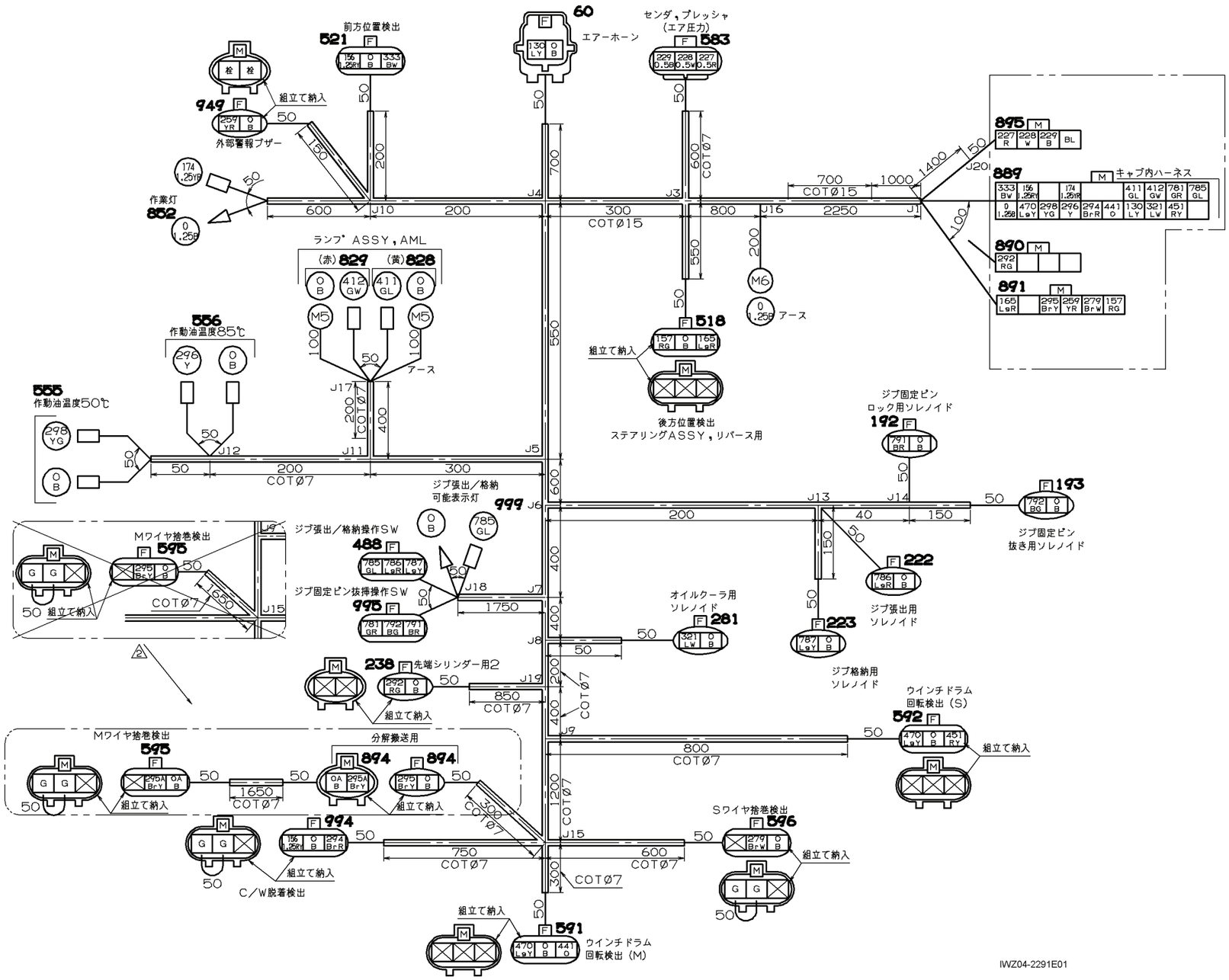
IWZ04-2280E01

343-536-22020 ⚠1

https://truckmanualshub.com/

Harness (Swing Table Right)

Z-19 Harness (Swing Table Right)

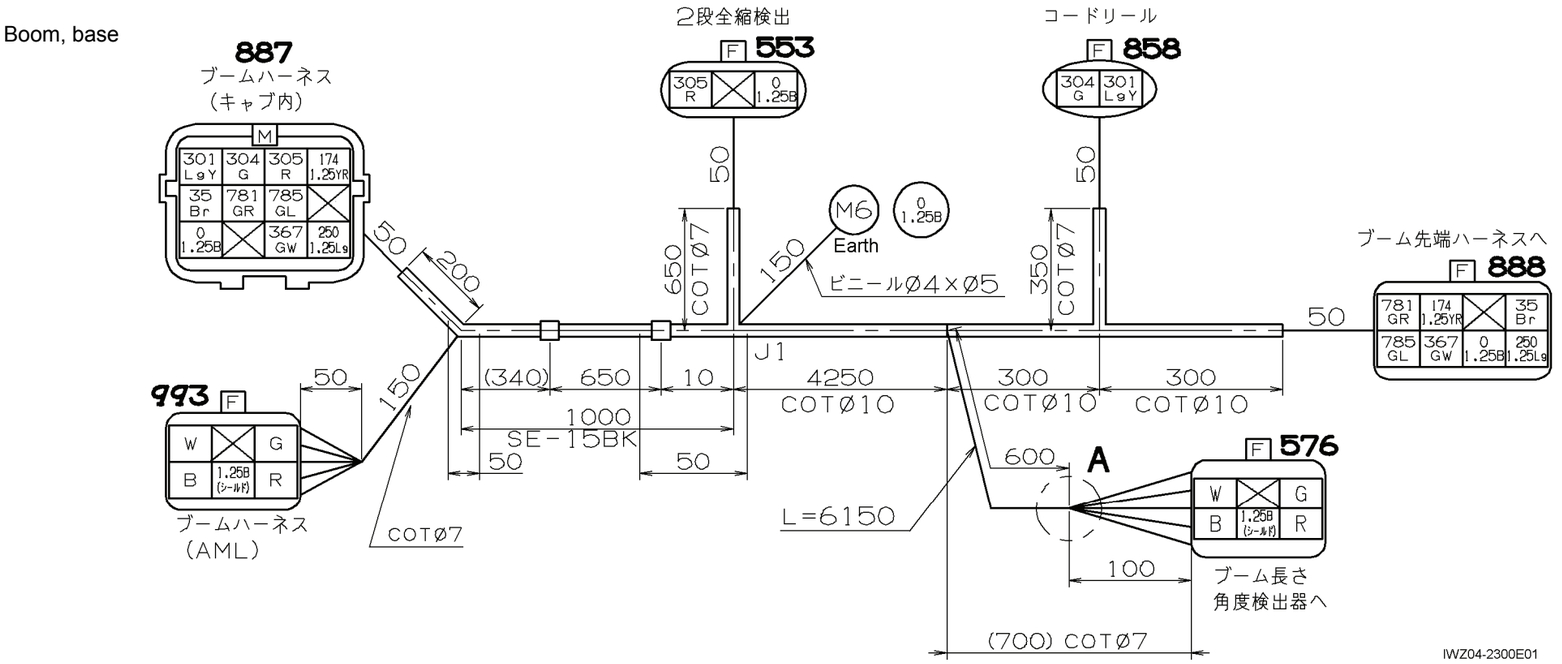


https://truckmanualshub.com/

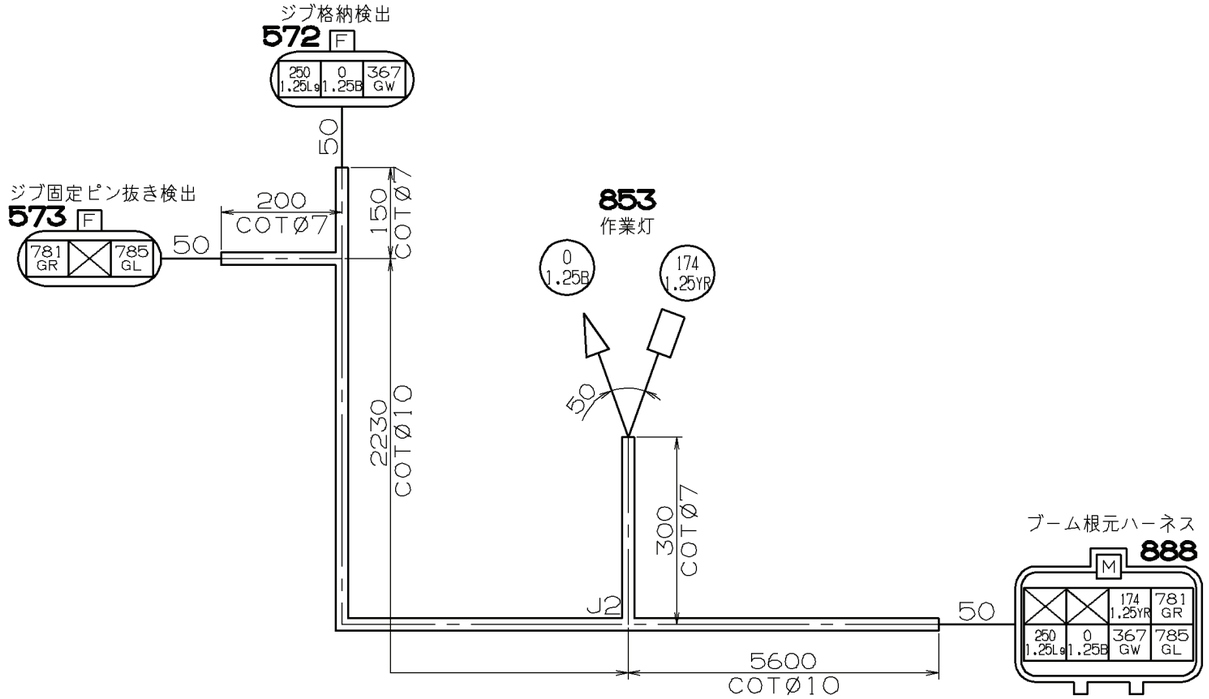
Harness (Boom)

Z-20 Harness (Boom)

Boom, base



Boom, top

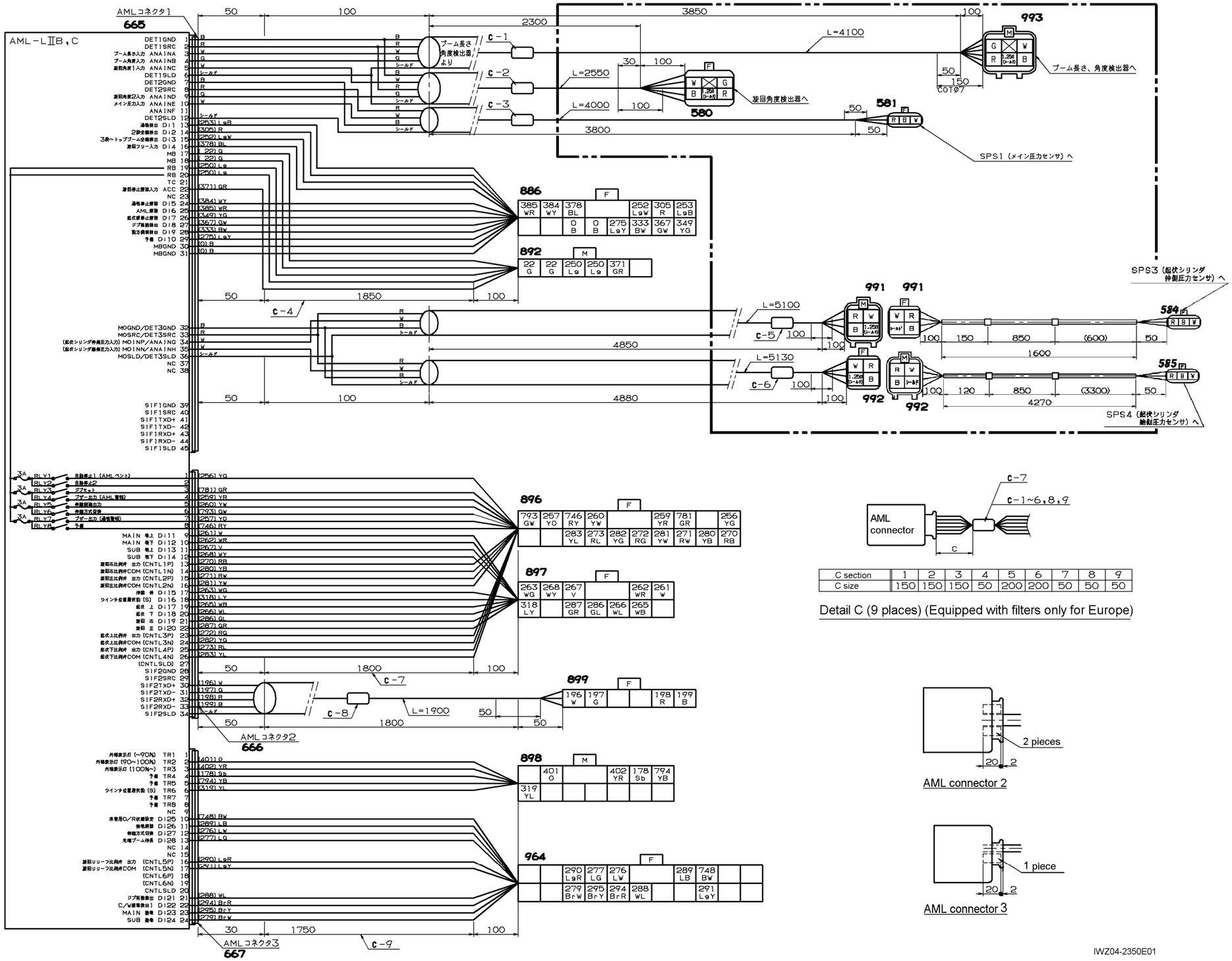


343-536-22030 △0
343-536-22040 △0

https://truckmanualshub.com/

Harness (AML, Upper)

Z-21 Harness (AML, Upper)



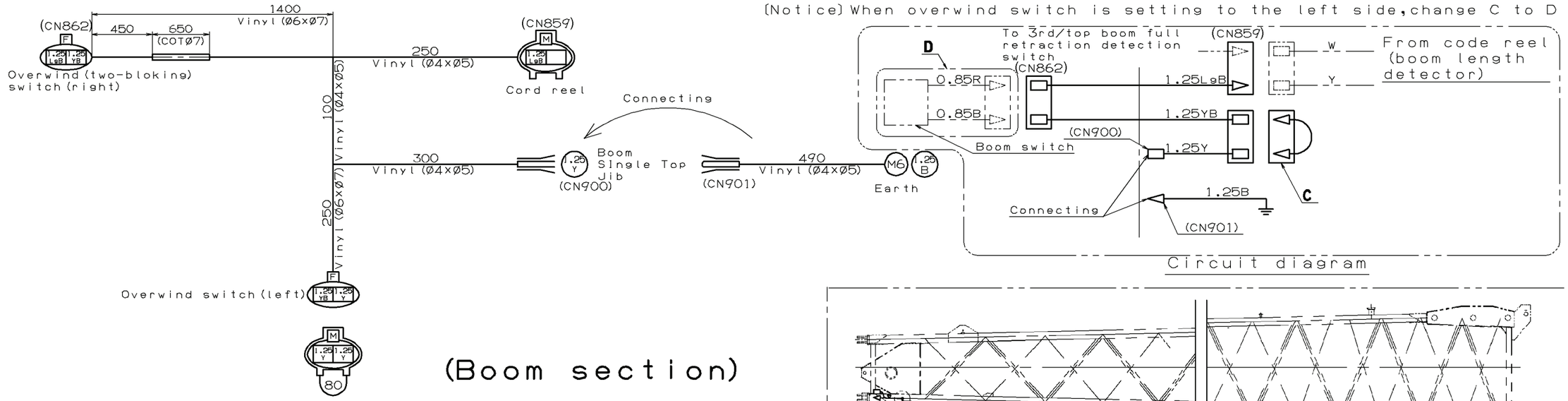
IWZ04-2350E01

343-632-31300 1
343-632-31200 1
343-632-81100 0
343-632-31100 1

https://truckmanualshub.com/

Harness (Overwind)

Z-22 Harness (Overwind)



IWZ04-2320E01

343-724-40000 ③
343-724-40010 ①
343-721-83000 ①
343-723-61000 ②

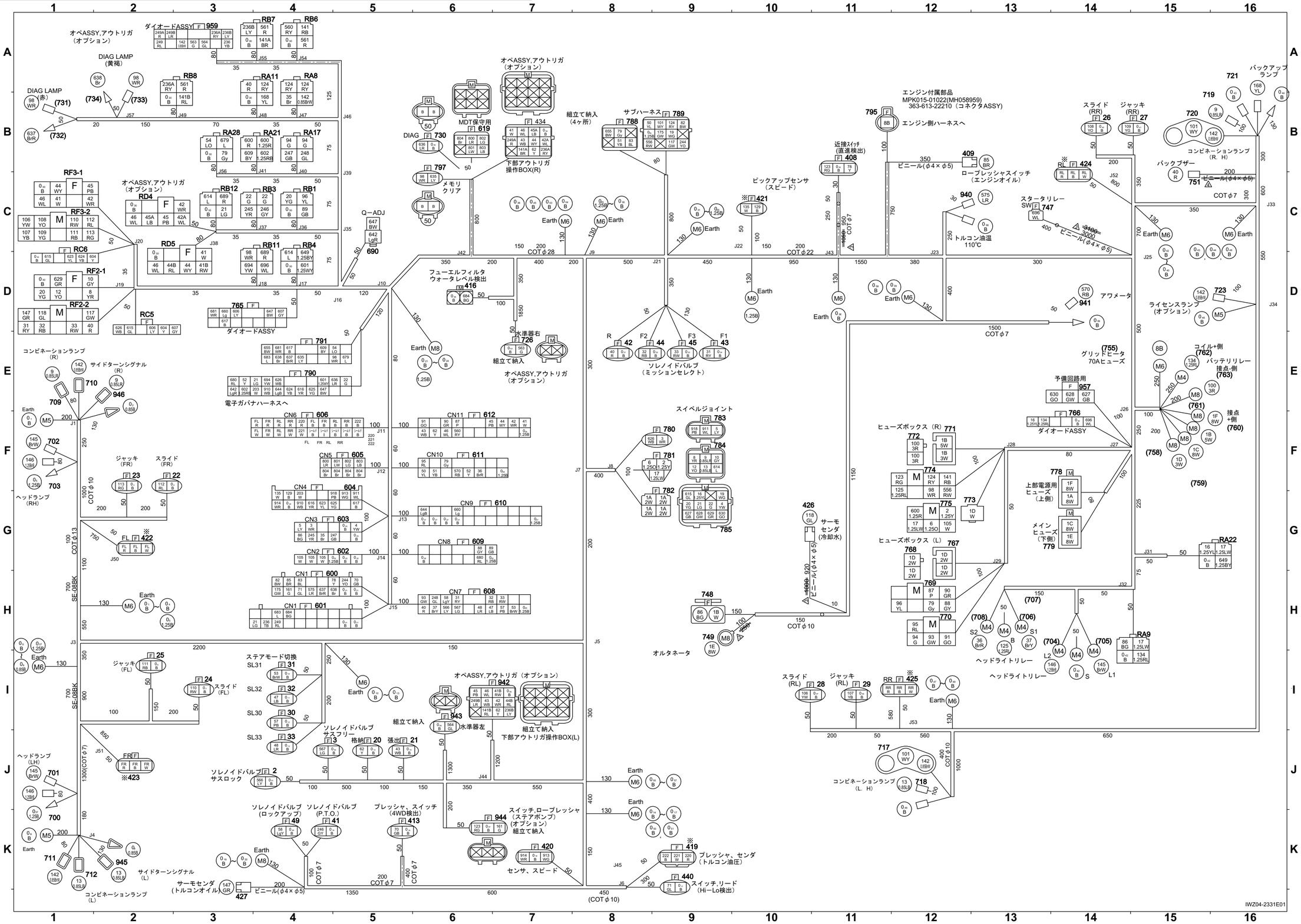
https://truckmanualshub.com/

Harness (Lower, Main)

△4 :546173 - -

Applicable serial No. △3 :546027 - -

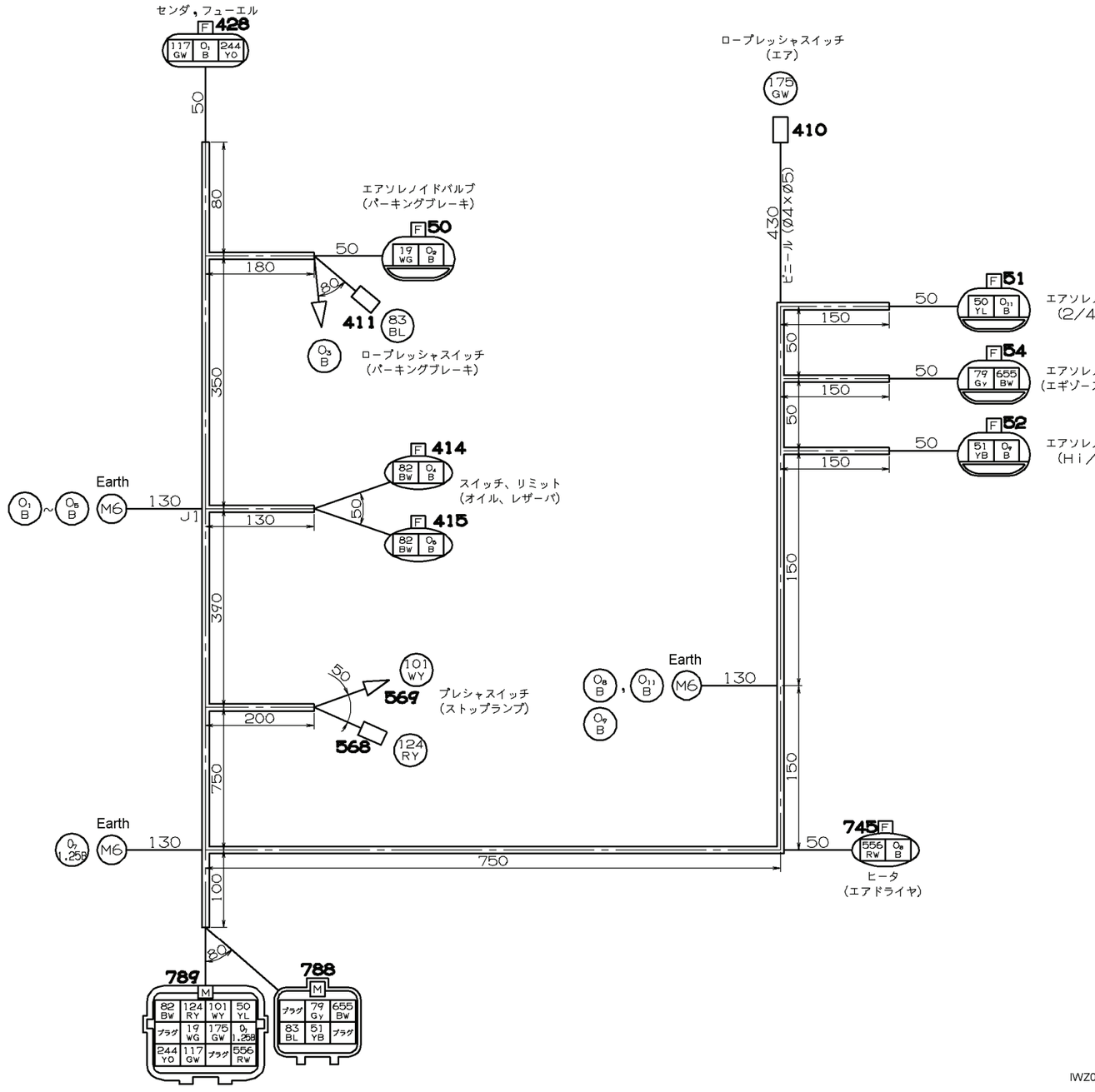
Z-23 Harness (Lower, Main)



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Harness (Lower, Sub)

Z-24 Harness (Lower, Sub)



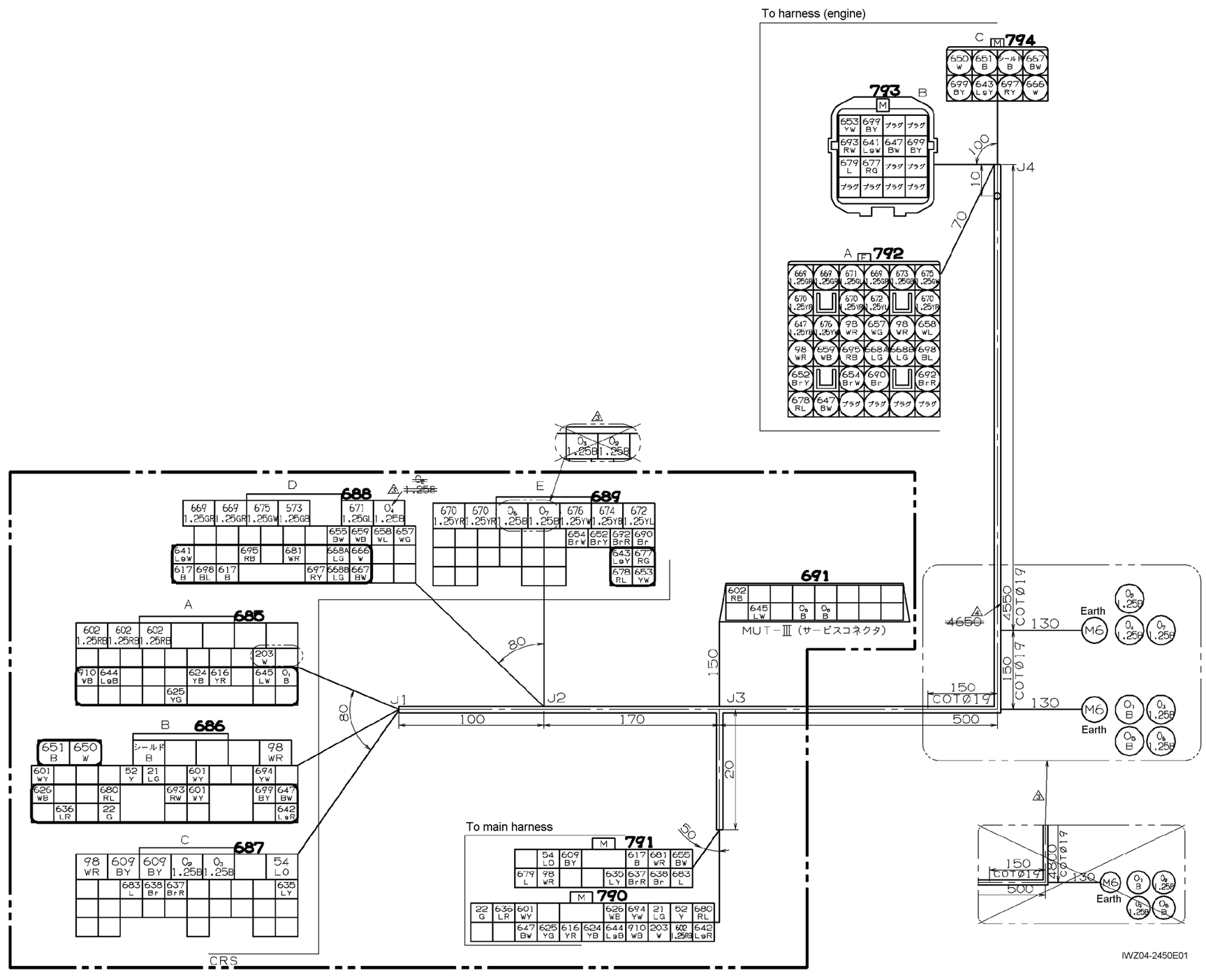
IWZ04-2340E01

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Harness (Lower, Electronic Governor)

△2 : 560870, 545960 - - △4 : 546030 - -
Applicable serial No. △1 : 545870, 545960 - - △3 : 545979 - -

Z-25 Harness (Lower, Electronic Governor)



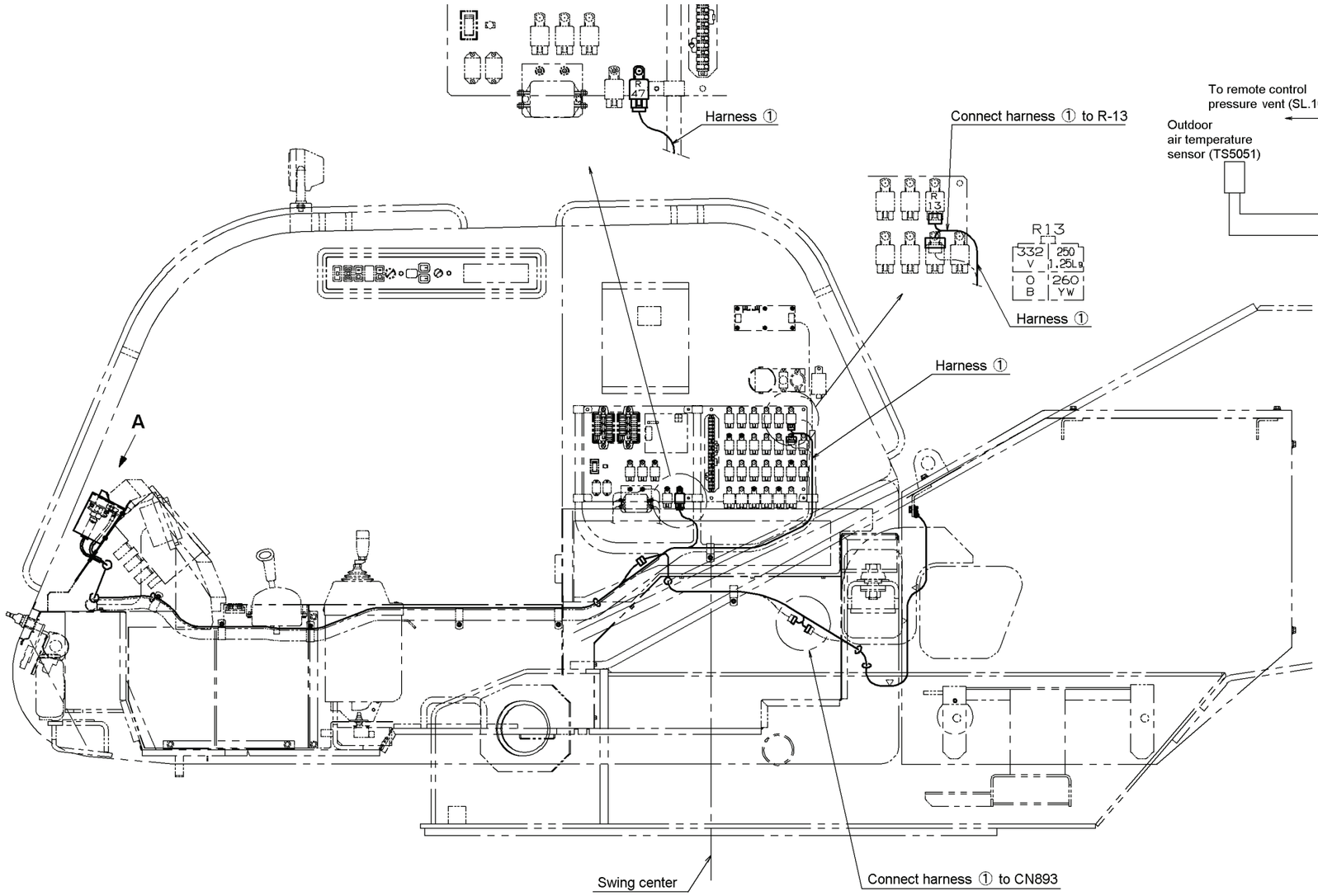
IWZ04-2450E01

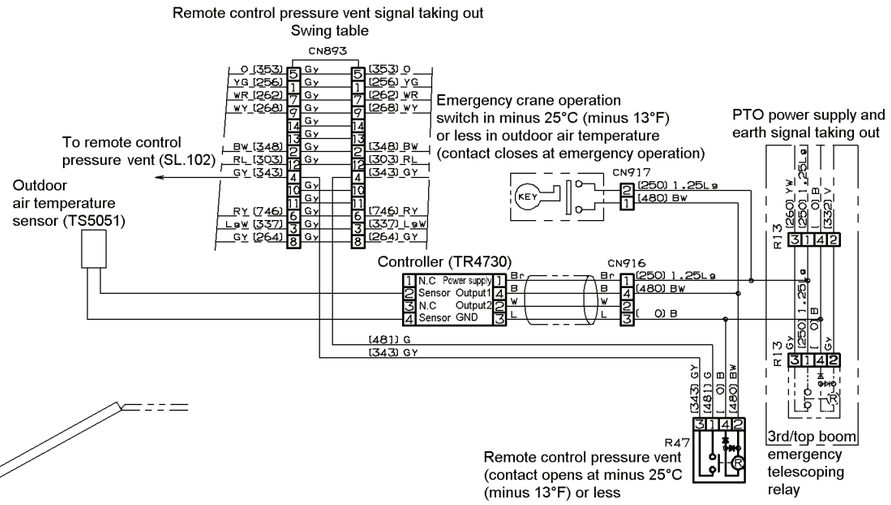
349-310-00300 △4

https://truckmanualshub.com/

Z-26 Outdoor Air (Minus 25°C or less) System

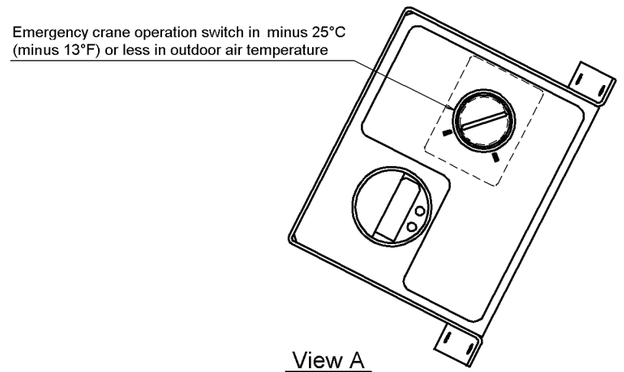
1. Structure





Electric circuit

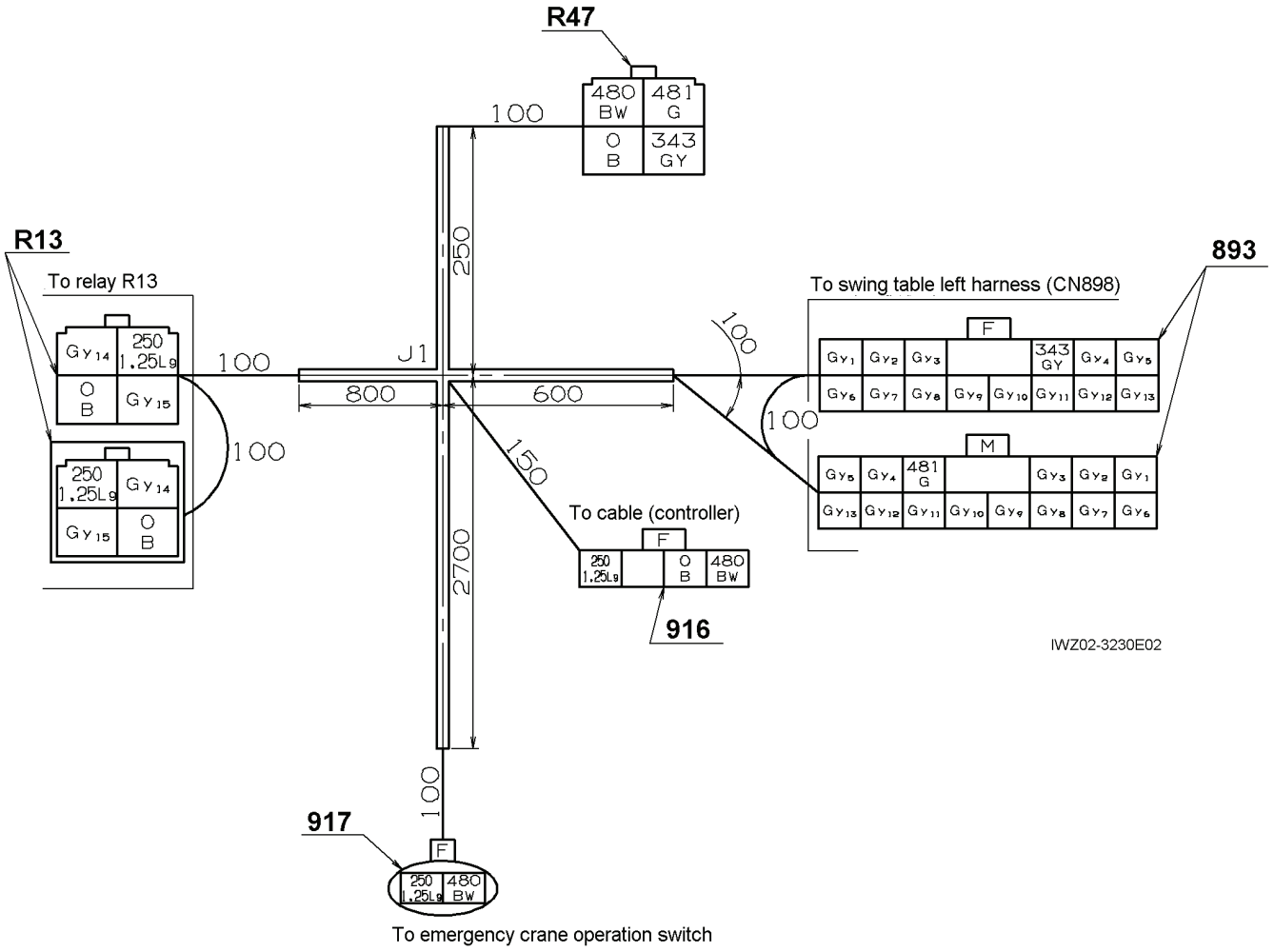
(when outdoor air temperature becomes minus 25°C or less, crane operation is stopped.)



IWZ02-3230E01

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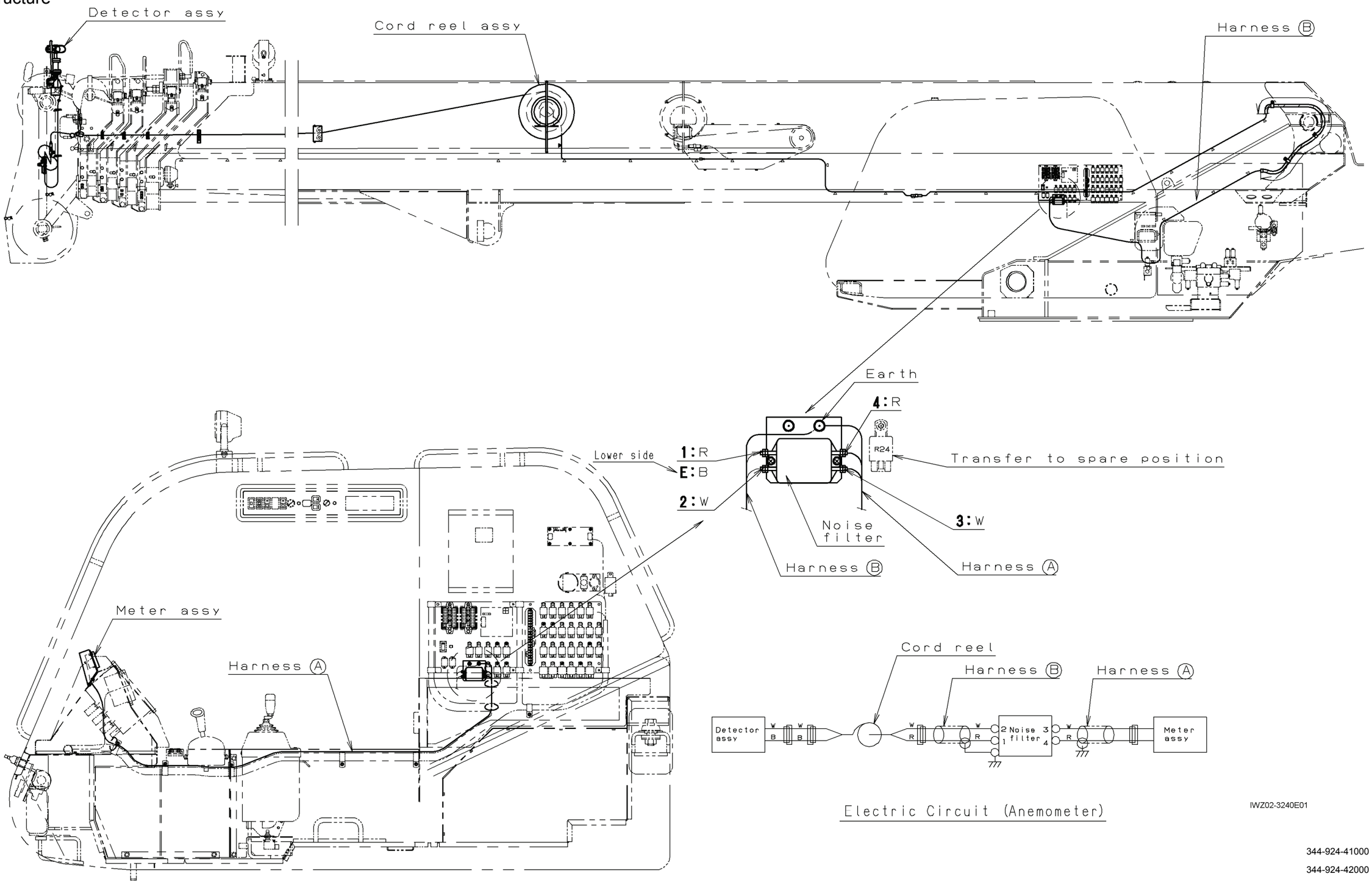
2. Harness



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Z-27 Anemometer System

1. Structure



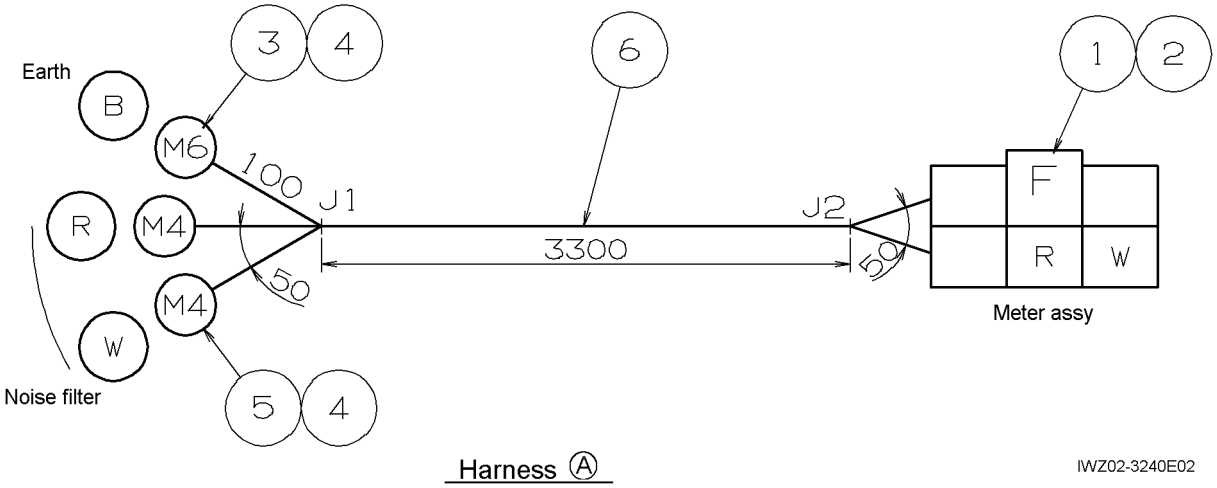
Electric Circuit (Anemometer)

IWZ02-3240E01

344-924-41000 ⓪
344-924-42000 ①

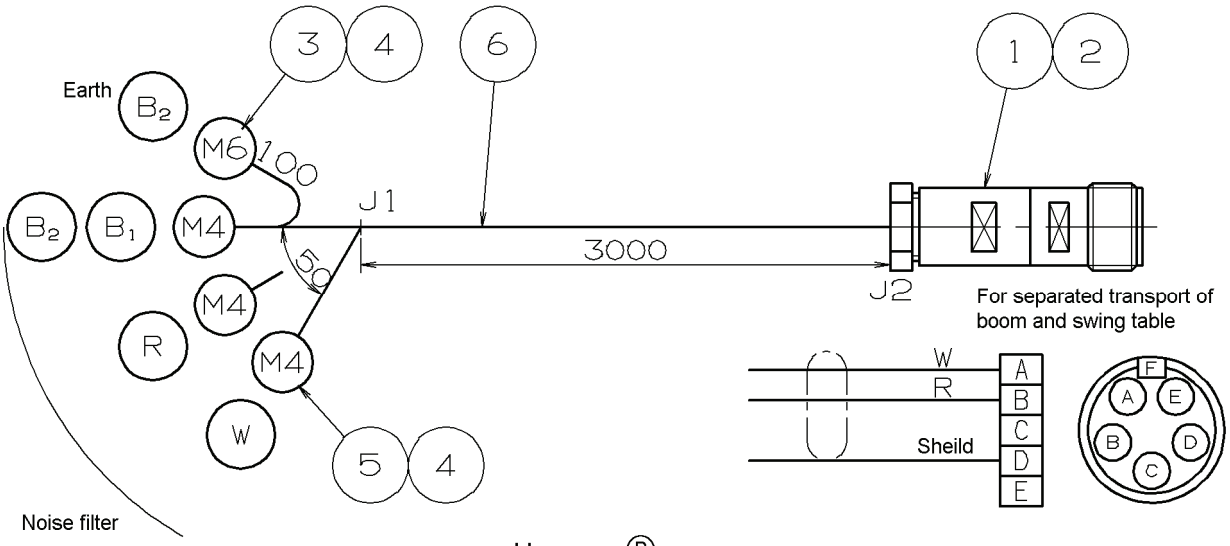
https://truckmanualshub.com/

2. Harness



Harness Ⓐ

IWZ02-3240E02



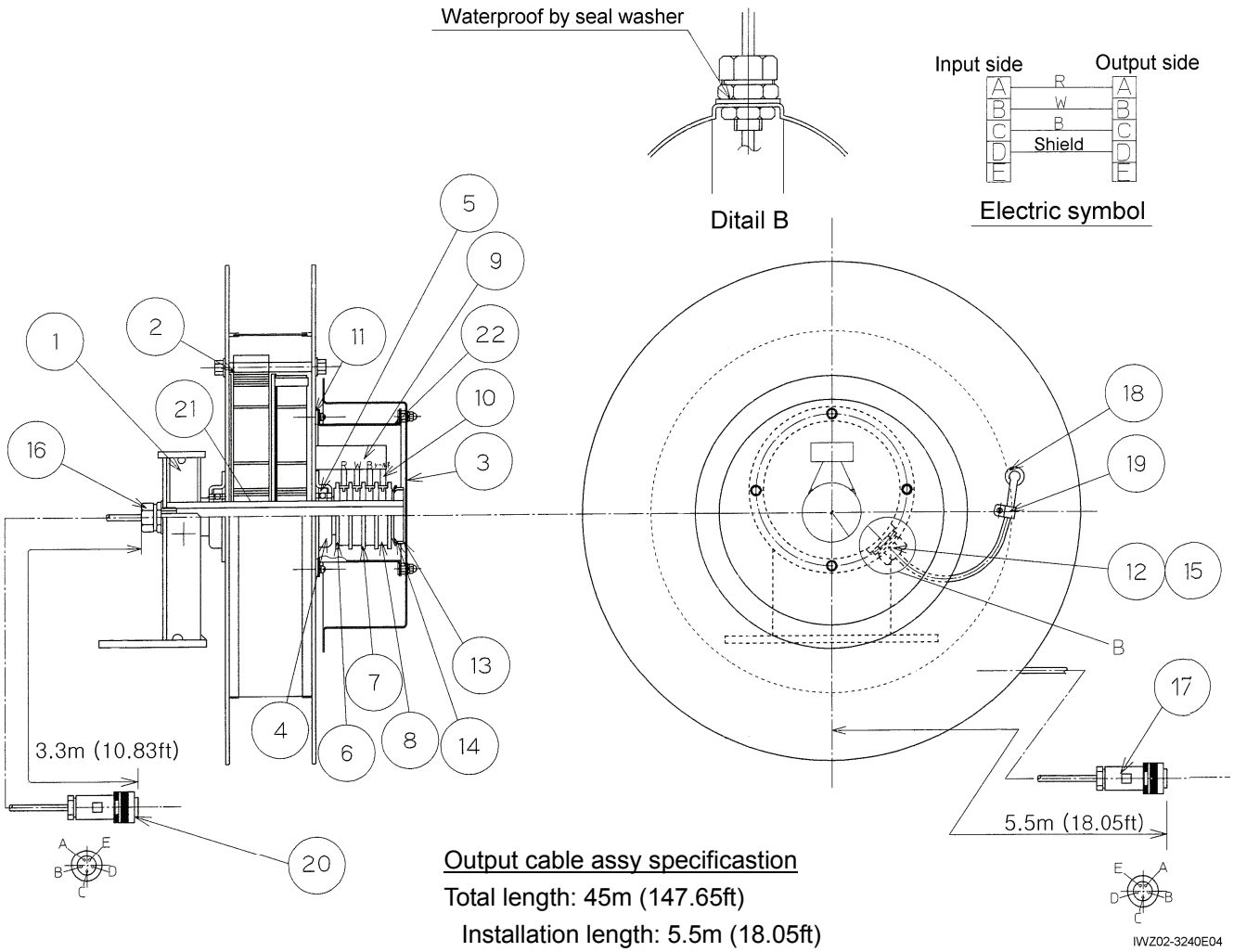
Harness Ⓑ

IWZ02-3240E03

344-915-91100 ⚠0
344-924-42100 ⚠0

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3. Cord reel



Output cable assy specificastion

Total length: 45m (147.65ft)

Installation length: 5.5m (18.05ft)

Stroke: 38m (124.68ft)

Extra turns remain on the drum: 1.5m (4.92ft)

1.Frame	7.Coller	13.Bearing nut	19.Clip
2.Drum assy	8.Ring	14.Bearing washer	20.Input cable assy
3.Cover (outer)	9.Holder	15.Cord clamp	21.Liner bearing
4.Bearing case	10.Contact point	16.Cord clamp	22.Cover (inner)
5.Bearing	11.Packing	17.Output cable assy	
6.Coller	12.Seal washer	18.Rubber bush	

https://truckmanualshub.com/

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History of revision		
1		
2		
3		
4		
5		