

HW250 MH

Material Handler & Orange Grapple

This manual contains 2 contents as Material Handler and Orange Grapple.

Material Handler

(HW250 MH)

This manual was produced by Sun&Shield, Ltd. and some revisions have been
made in HYUNDAI CONSTRUCTION EQUIPMENT

INTRODUCTION

The intended use of **Material Handler Front** for Wheel or Track Excavators is for scrap and bulk material handling equipped with a grapple, clamshell bucket or magnet. **Material Handler Front** is used for improved operating visibility in the work area.

Two-piece Material Handler Fronts provide excellent lift performance and working range.

The purpose of this manual is to give users detail information about the method for assembling, operating, inspection, maintenance and adjustment of **Material Handler Front**

For the safe operation and maintenance of **Material Handler**.

1. Please, be sure to refer to this user manual before operating machine.
2. Please, operate safely by checking environment of worksite and by checking safety rules.

Please, contact Hyundai Construction Equipment or Hyundai Dealer if you have questions on this manual.

Model	
P/N	
Year of Manufacture	

CONTENTS of Material Handler

1. Safety	
1-1. Operation Cautions -----	05
1-2. Front Attachment Operation Caution -----	06
1-3. Emergency Lowering of Elevating Cabin -----	09
1-4. Safety Pin -----	10
1-5. Safety Bar (Option, Europe only) -----	11
2. Specification	
2-1. The Names of Each Part -----	12
2-2. Specification -----	13
2-3. Component Weight & Transportation Dimension -----	14
2-4. SAE Lift Capacities -----	15
3. Circuit Diagram	
3-1. Hydraulic Circuit Diagram -----	18
3-1. Hydraulic Parts Installation-----	19
3-2. Electric Circuit Diagram -----	20
4. Operation	
4-1. Control Devices for Operation -----	21
4-2. Cabin Elevating Operation -----	22
5. Maintenance	
5-1. Greasing -----	23
5-2. Hydraulic Oil Level Check -----	26
6. Troubleshooting -----	27

1. Safety

1-1. Operation Cautions

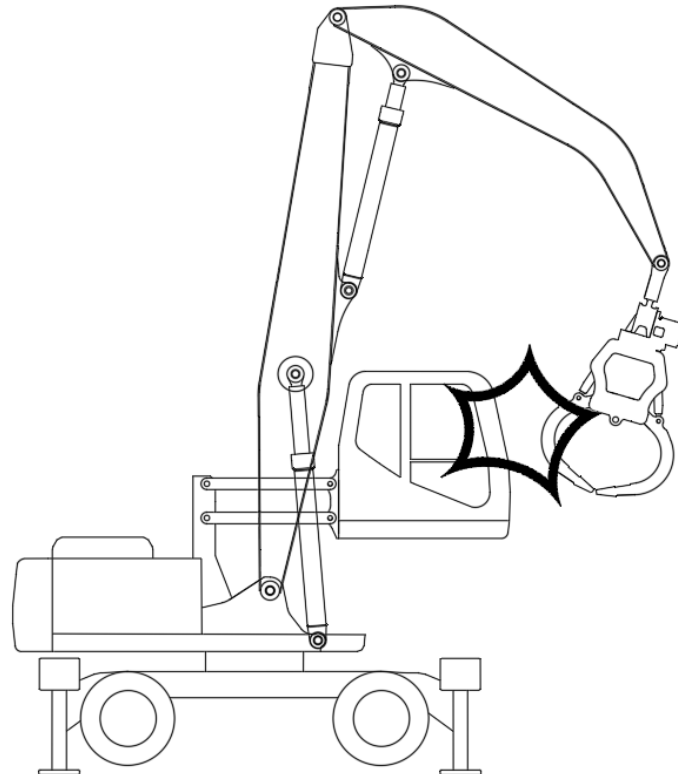
 **WARNING!**

1. Must check up the working area before operating our equipment.
2. Only operate our equipment on flat place because the working on inclined place causes falling down this equipment.
3. Only operate our equipment inside of allowed operating distance because the working over allowed operating range might cause falling down this equipment.
4. When working with the front of our equipment, operate our equipment as slowly as possible because a sudden change of operating lever might cause falling down this equipment.
5. All rated lift capacities are based on the machine and the load both remaining level at all times. **DO NOT EXCEED THE STATED LIFT CAPACITY.** Lifting loads greater than those shown in the rated capacity table can cause catastrophic equipment failure and/or structural collapse of the machine

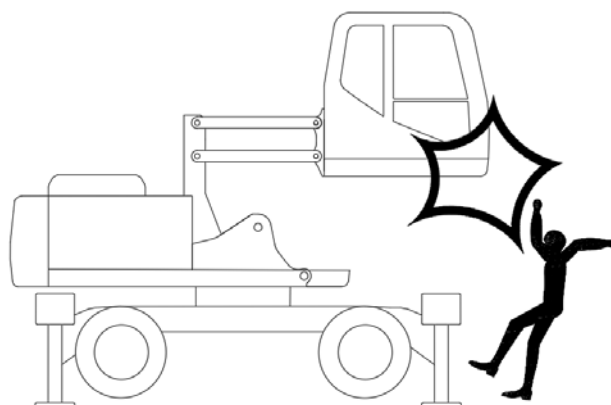
1-2. Front Attachment Operation Caution

Be careful with operating elevating cabin or front attachment.

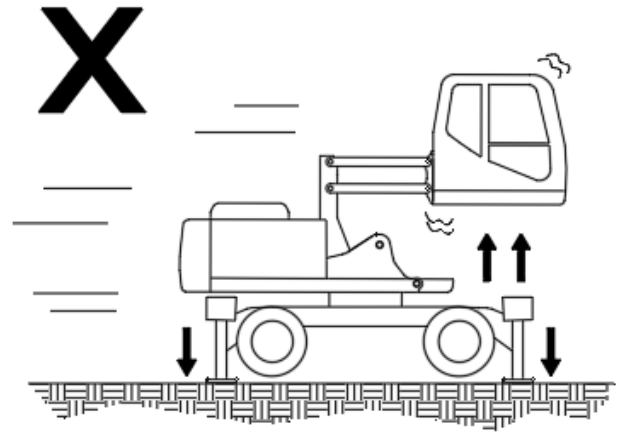
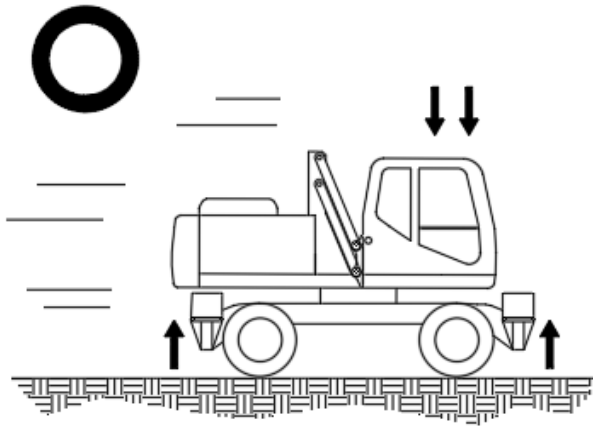
When you operate elevating cabin or front attachment, you should be careful to avoid crash between elevating cabin and front attachment. Serious personal injury or death may result from this crash.



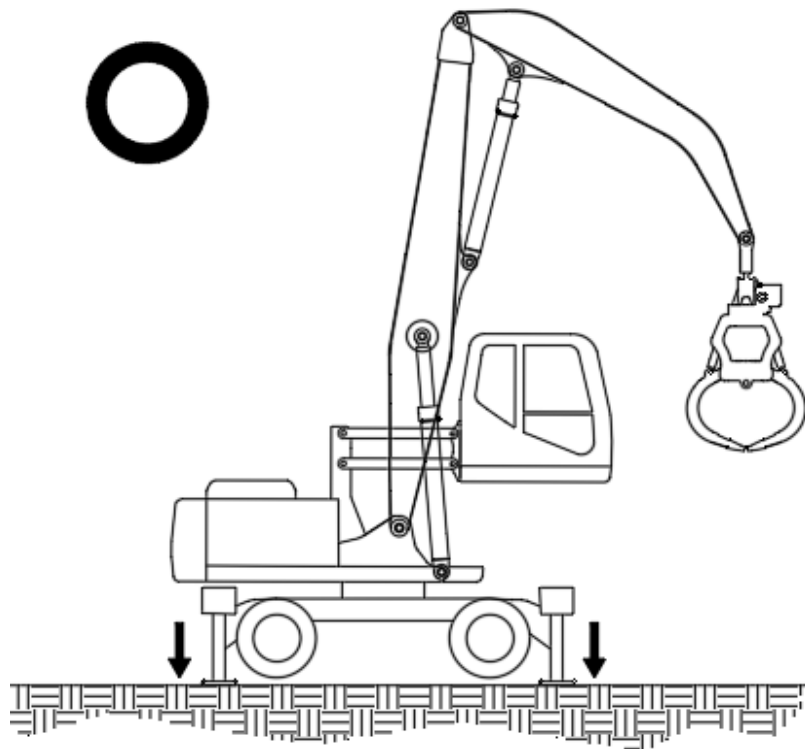
Be careful object or person when elevating cabin descends.



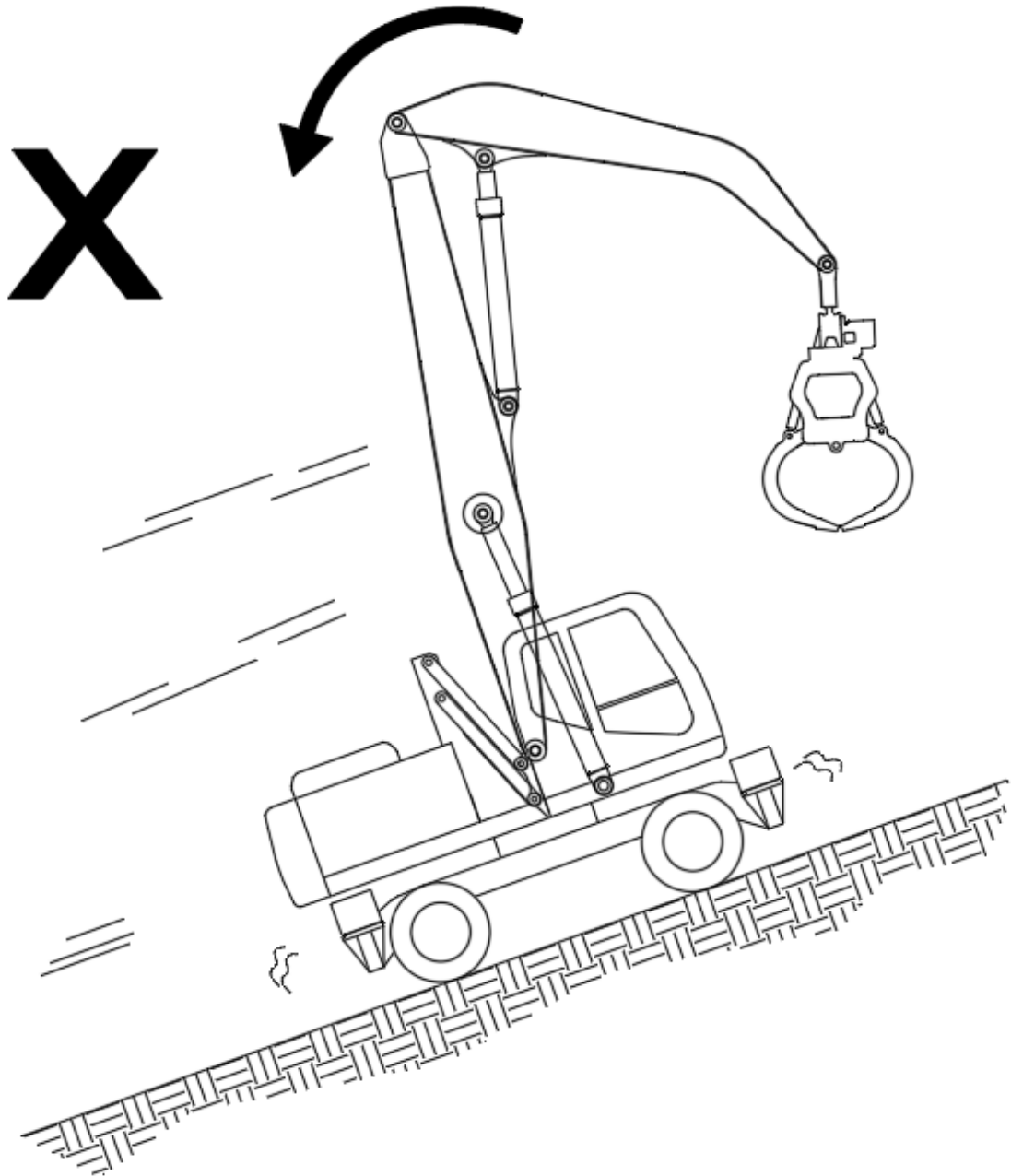
Only drive the machine in a state of Elevating Cabin down and outrigger up.



Only Work the machine in a state.

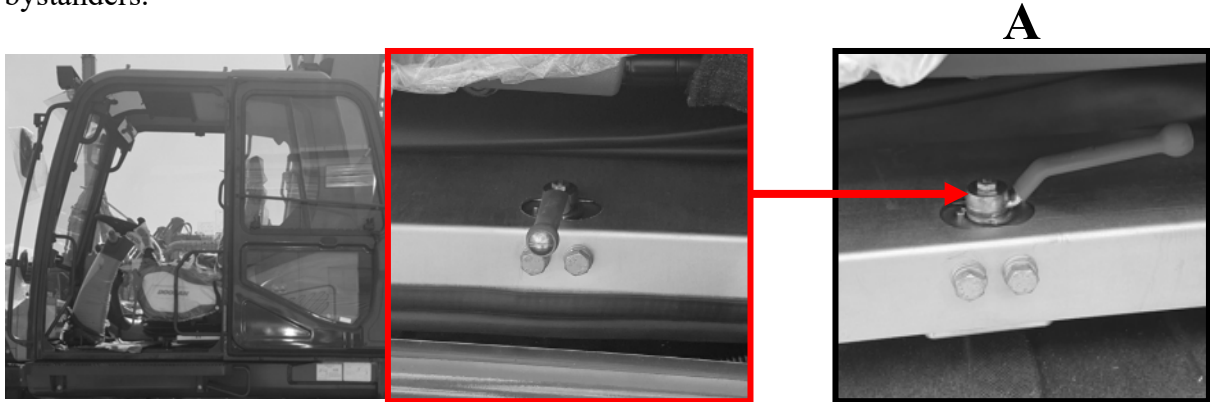


If equipment is used in a slope, the equipment should not be operated since the equipment is overturned.



1-3. Emergency Lowering of Elevating Cabin

Before lowering any equipment with the engine stopped, clear around the equipment of all bystanders.



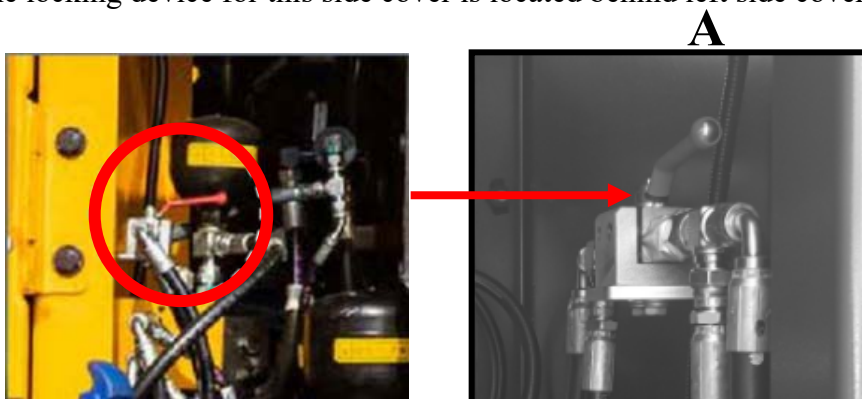
A - Emergency Cabin lowering : Inside the operator station

- Turn the lever (A) beside the rubber mat clockwise. The cabin slowly descending accordingly.
- On descending completed, return the lever to the original position, (see above photo)

B - Emergency Cabin lowering : from the outside

If the operator in the cab is not able to lower the cab, it is possible to lower the cab from the outside on the ground.

The locking device for this side cover is located behind left side cover.



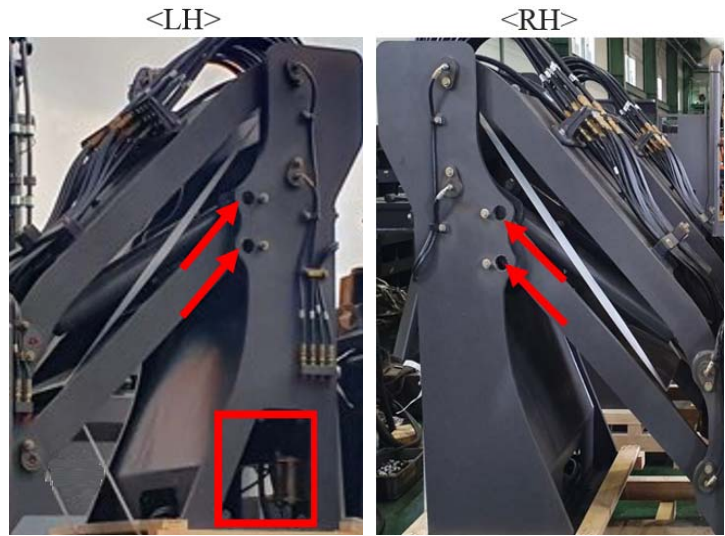
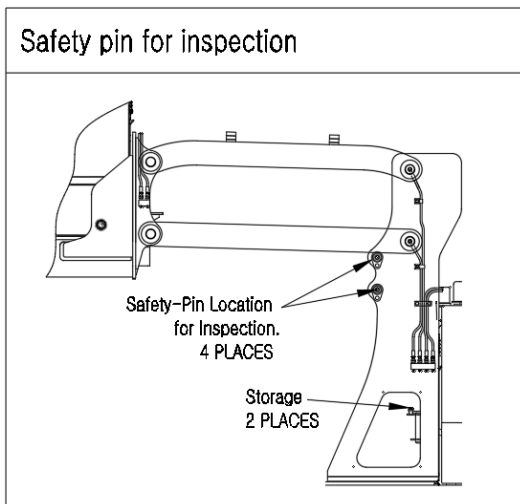
- Open the side cover of the cooler
- Turn the lever (A) until the cab starts lowering.
- When the cab is completely down, return the lever to the original position, see above Photo.

1-4. Safety pin

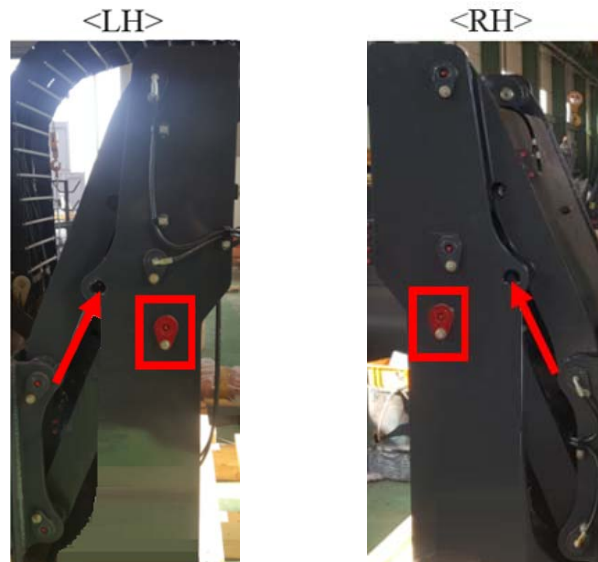
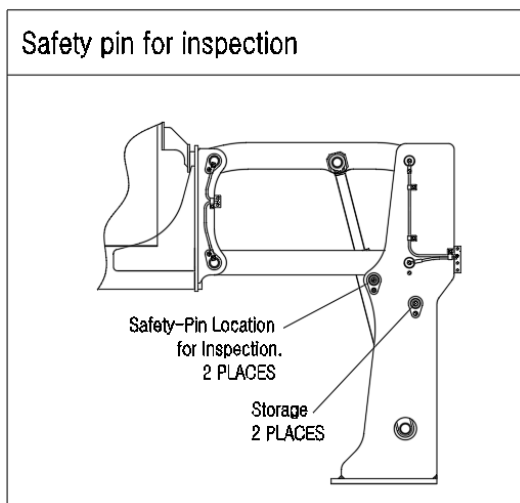
Safety pin is used to be fastened when repairing cabin elevating system.


Whenever inspecting & maintaining cabin elevating system, ensure safety pins are mounted on supporting hole properly.


***Elevated Height : 2.5m**



***Elevated Height : 2.0m**



 : The position of the safety pin.

 : The position of safety pins when inspection of cabin elevating system.

1-5. Safety Bar (Option, Europe only)

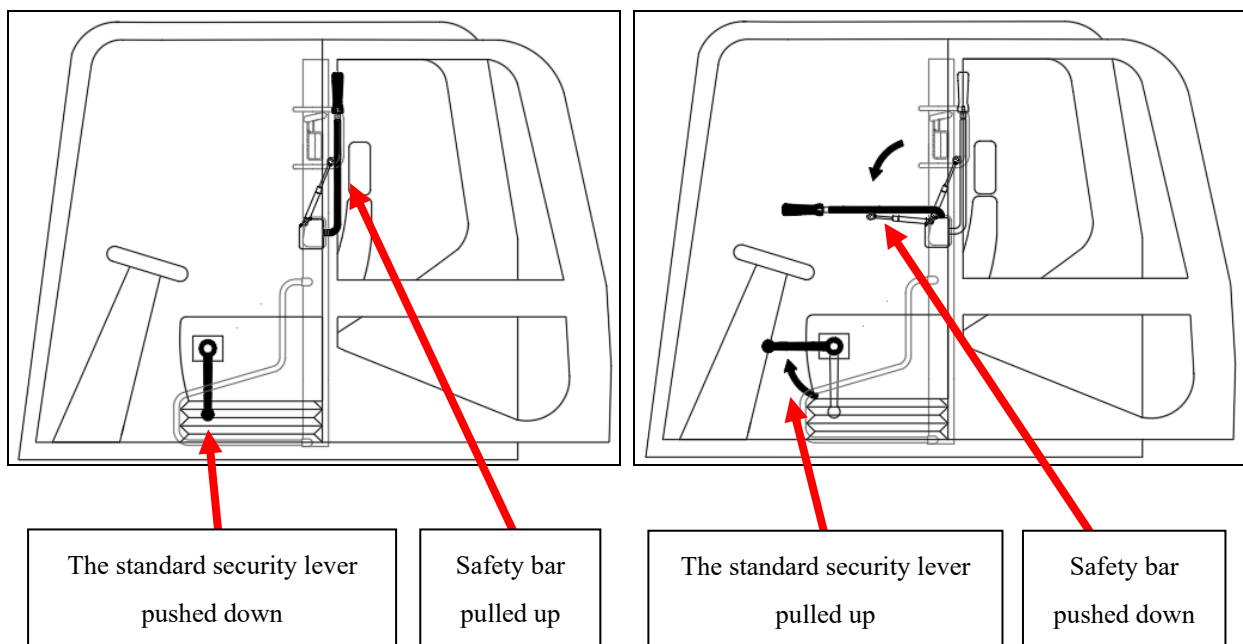
System to prevent from falling out from the cabin.

The machine is provided with an additional system to prevent the operator falling from the cabin when the cabin is not in the lowered position.

This prevention system is located on the left side of the cabin, and consists of Safety bar which functions together with the standard security lever. (see the Standard manual)

When the Safety bar of the elevated cabin is pushed down and the standard security lever is pulled up, the machine functions normally.

The two levers must be placed horizontally for the machine to operate.



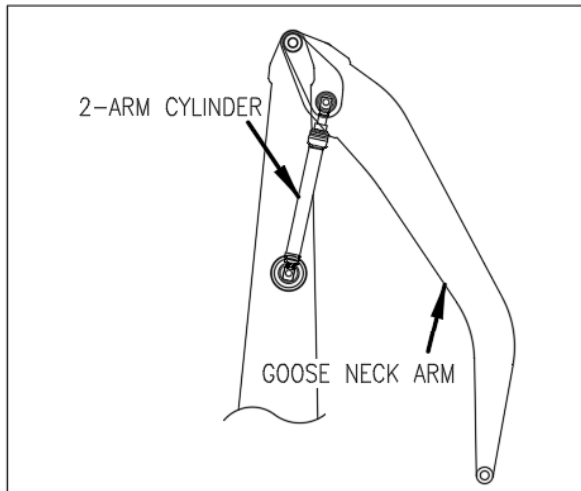
If either of the two levers is not engaged, no functions will be activated.

If the operator has to escape the cockpit for urgent reasons while the cabin is raised, the operator must unlock the guard at their own risk and peril, by pushing down the standard security lever.

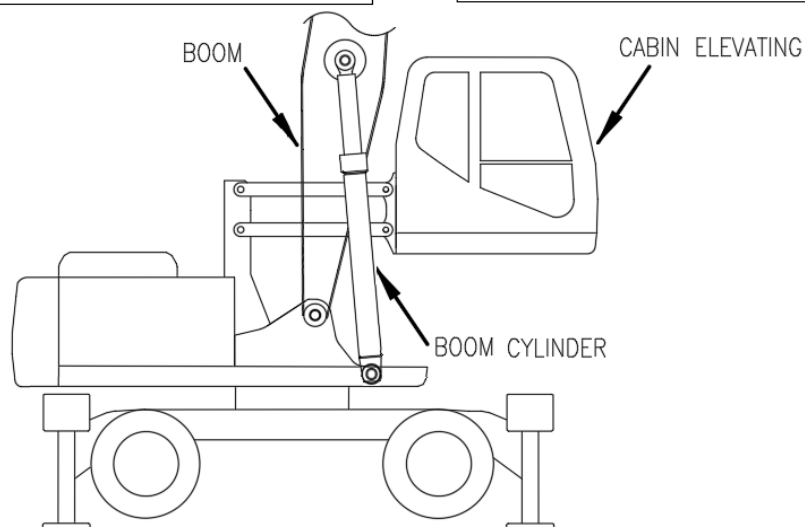
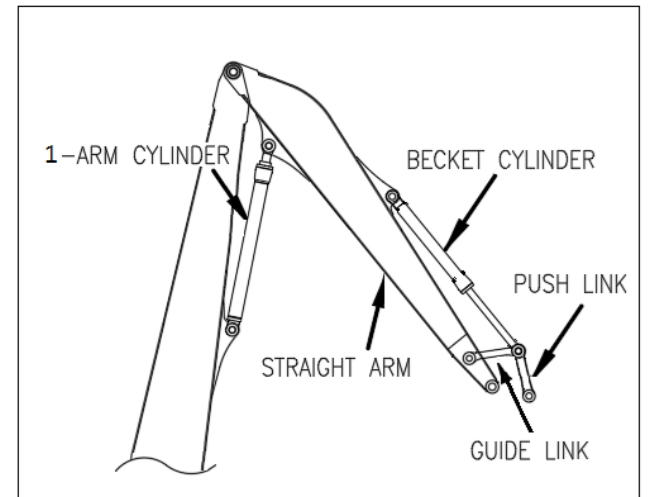
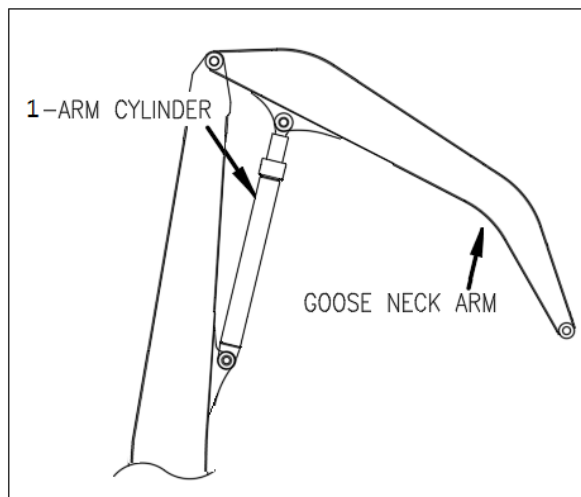
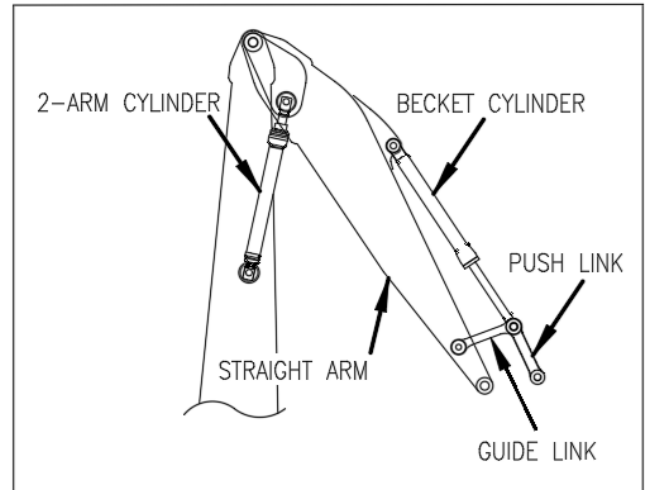
2. Specification

2-1. The Names of Each Part

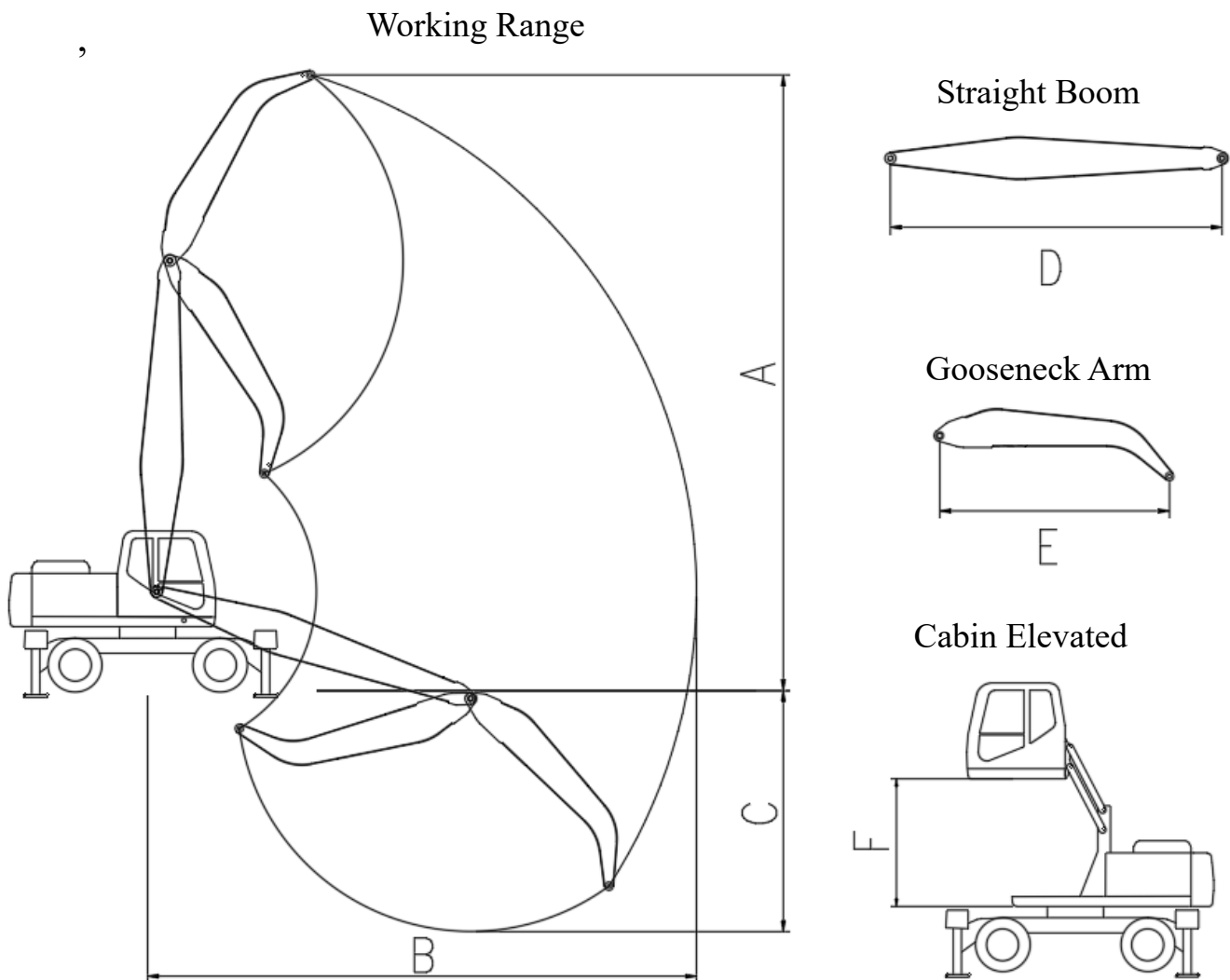
<Goose neck Arm>



<Straight Arm>



2-2. Specification



HW250 HM (SMH21-36-DG & SCE25)

Max. Pin Height (A)	12.1 m	Boom Length (D)	6.5 m
Max. Operation Reach (B)	10.7 m	Arm Length (E)	4.5 m
Max. Working Depth (C)	4.7 m	Elevated Height (F)	2.5 m
Additional Counter Weight	1.0 ton		
Lift Capacity at Max. Reach	Front : #3.4 ton / Side : 2.9 ton		

2-3. Component Weight & Transportation Dimension

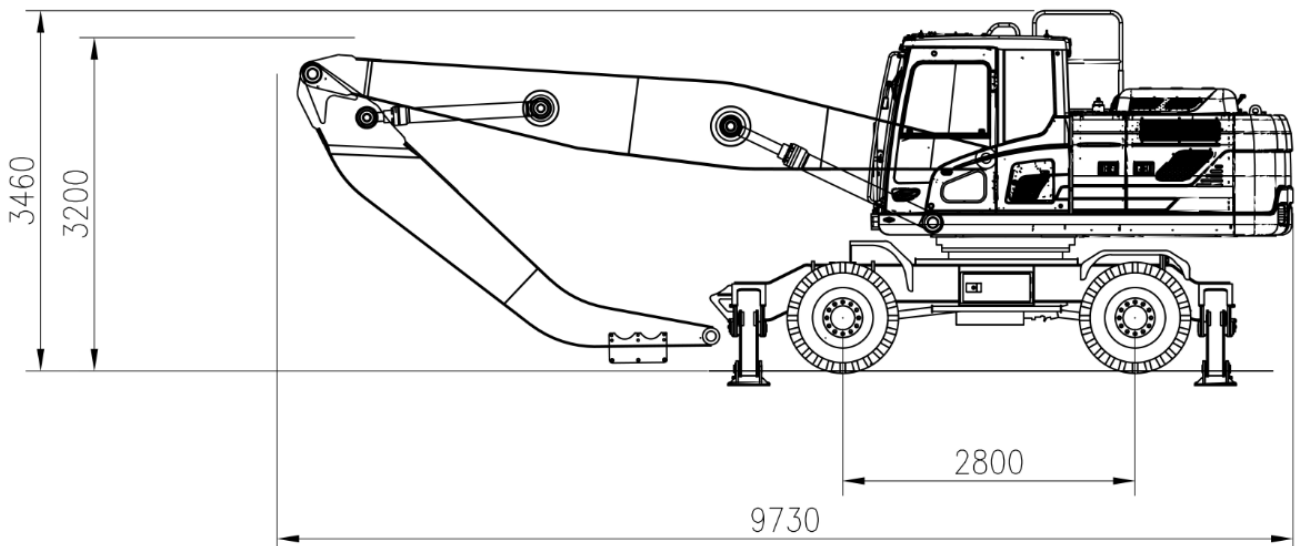
- Component Weight

Item	Unit	Weight	Remark
Upper Structure	kg	6,481.9	Without Counter Weight
Lower Structure	kg	8,641.8	
Counter Weight	kg	4,112.8	
Additional Counter Weight	kg	1,000	
Hydraulic Cabin Elevating	kg	2,060	
Boom	kg	1,830	Without cylinder
Boom cylinder	kg	388.6	2 EA
Arm cylinder	kg	290	2 EA
Arm	kg	1,248	
Orange Grapple	kg	1,460	
Total	kg	27,513.1	

- Transportation Dimension

Overall width : 3,340mm

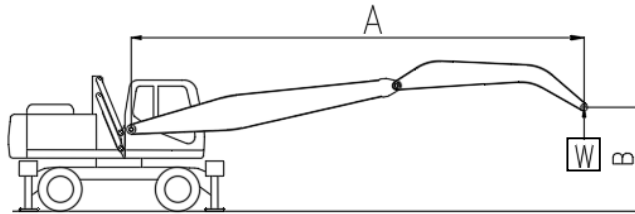
unit: mm



2-4. SAE Lift Capacities

BOOM: 6.5m

ARM: 4.5m



F: RATING OVER FRONT

S: RATING OVER SIDE OR 360°

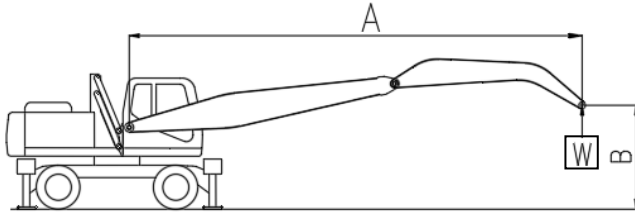
unit: kgf

B \ A	A							
	1m F	1m S	2m F	2m S	3m F	3m S	4m F	4m S
12m								
11m								
10m								
9m								
8m								
7m								
6m								
5m							#7350	#7350
4m					#10926	#10926	#8412	#8412
3m							#9543	#9543
2m							#10432	#10432
1m							#10038	#10038
0m					#5017	#5017	#8450	#8450
-1m					#5655	#5655	#8283	#8283
-2m					#6352	#6352	#8600	#8600

1. Lifting capacity is based on SAE J1097, ISO 10567.
2. Load point is the end pin point of front attachment.
3. Lifting capacity does not exceed 75% of tipping load or 87% of hydraulic capacity.
4. (#) indicates load limited by hydraulic capacity.

BOOM: 6.5m

ARM: 4.5m



F: RATING OVER FRONT

S: RATING OVER SIDE OR 360°

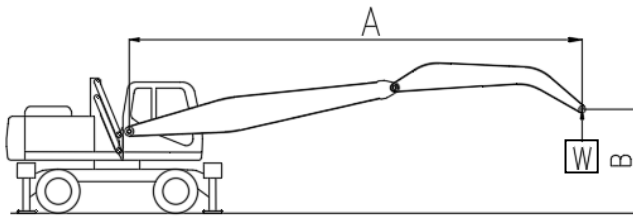
unit: kgf

B \ A	A							
	5m F	5m S	6m F	6m S	7m F	7m S	8m F	8m S
12m								
11m	#5838	#5838						
10m	#5539	#5539	#5139	#5139	#4245	#4245		
9m	#5340	#5340	#4956	#4956	#4662	#4662	#4009	#4009
8m	#5322	#5322	#4924	#4924	#4604	#4604	#4345	#4345
7m	#5476	#5476	#5020	#5020	#4649	#4649	#4343	#4343
6m	#5806	#5806	#5233	#5233	#4778	#4778	#4409	#4409
5m	#6301	#6301	#5542	#5542	#4973	#4973	#4522	#4522
4m	#6913	#6913	#5920	#5920	#5207	#5207	#4662	#4662
3m	#7560	#7560	#6313	#6313	#5447	#5447	#4803	4764
2m	#8100	#8100	#6640	#6640	#5648	#5648	#4917	4634
1m	#8403	#8403	#6844	#6844	#5769	5512	#4973	4516
0m	#8425	#8425	#6875	6751	#5775	5378	#4940	4420
-1m	#8140	#8140	#6705	6632	#5631	5285	#4787	4354
-2m	#7583	#7583	#6314	#6314	#5308	5235	#4484	4323

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BOOM: 6.5m

ARM: 4.5m



F: RATING OVER FRONT

S: RATING OVER SIDE OR 360°

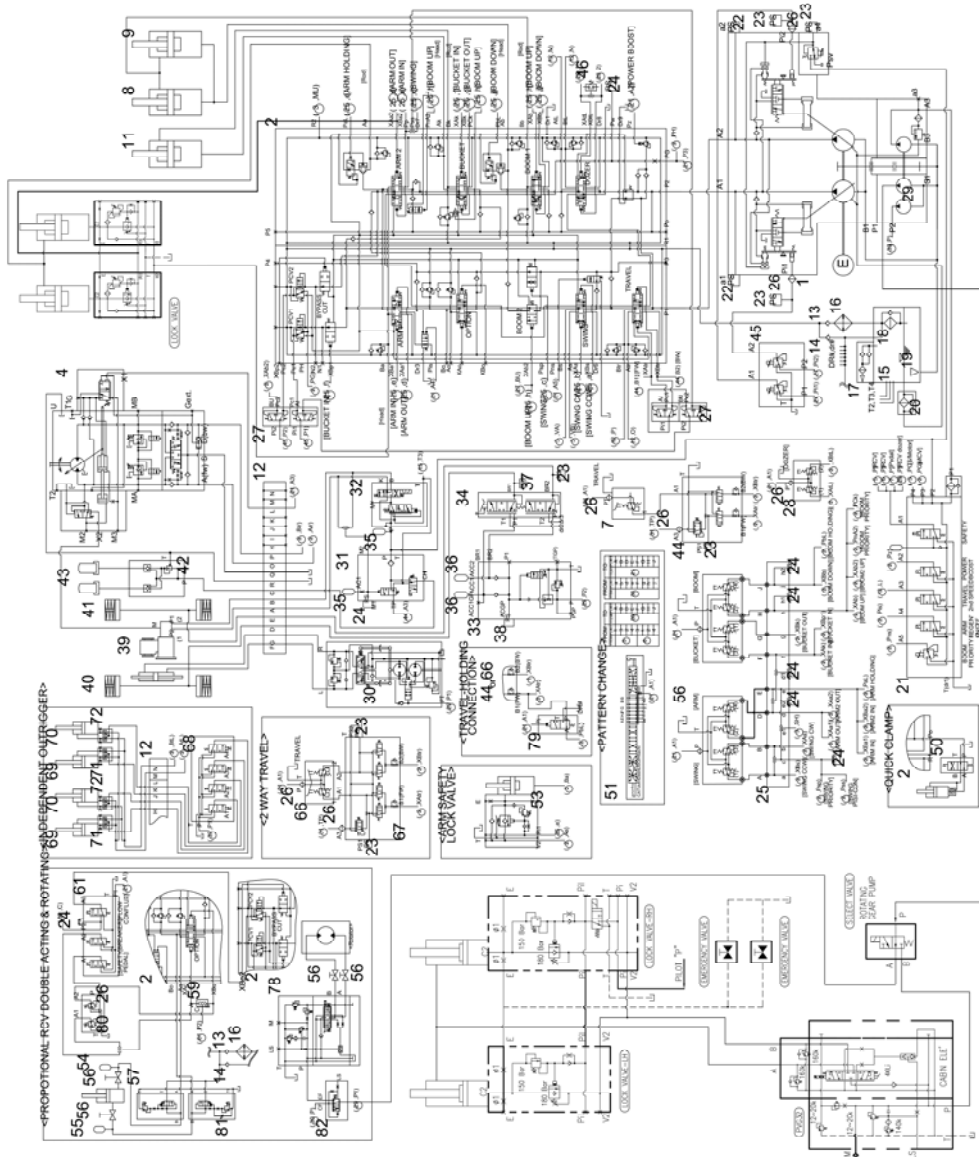
unit: kgf

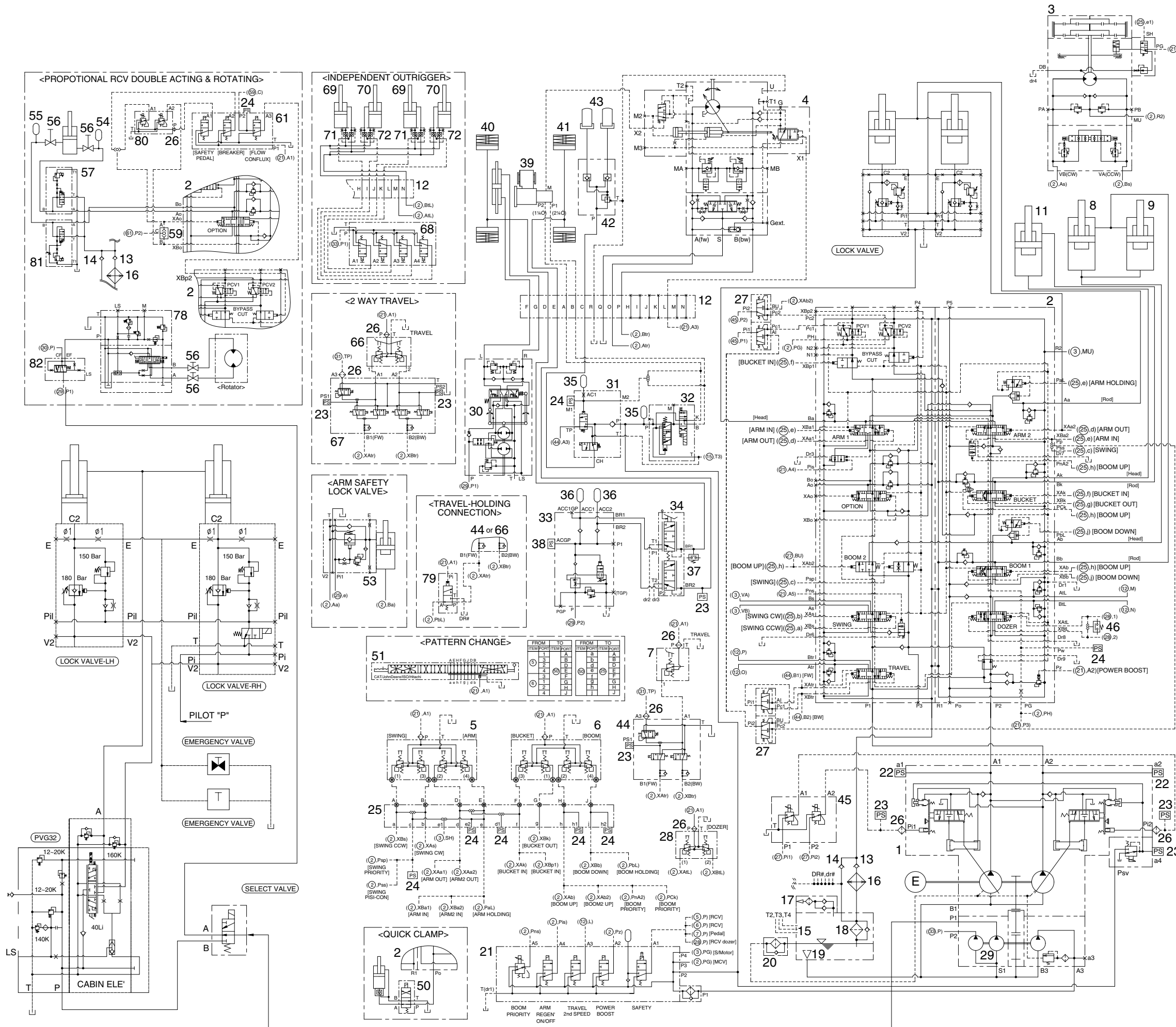
B \ A	A				Max. F	Max. S	Max. Reach(m)
	9m F	9m S	10m F	10m S			
12m					#5450	#5450	@3.78
11m					#4298	#4298	@5.83
10m					#3805	#3805	@7.17
9m					#3529	#3529	@8.17
8m					#3365	#3365	@8.94
7m	#4088	#4088			#3270	#3270	@9.54
6m	#4100	#4100	#3259	#3259	#3225	#3225	@10.01
5m	#4153	4117	#3828	3425	#3222	3214	@10.36
4m	#4224	4037	#3845	3381	#3255	3056	@10.59
3m	#4295	3950	#3857	3326	#3325	2955	@10.73
2m	#4342	3862	#3845	3271	#3435	2903	@10.78
1m	#4340	3782	#3785	3222	#3350	2897	@10.73
0m	#4263	3718	#3645	3185	#3243	2938	@10.58
-1m	#4077	3676	#3382	3168	#3109	3033	@10.33
-2m	#3742	3664			#2933	#2933	@9.98

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2. Load point is the end pin point of front attachment.
3. Lifting capacity does not exceed 75% of tipping load or 87% of hydraulic capacity.
4. (#) indicates load limited by hydraulic capacity.

3. Circuit Diagram

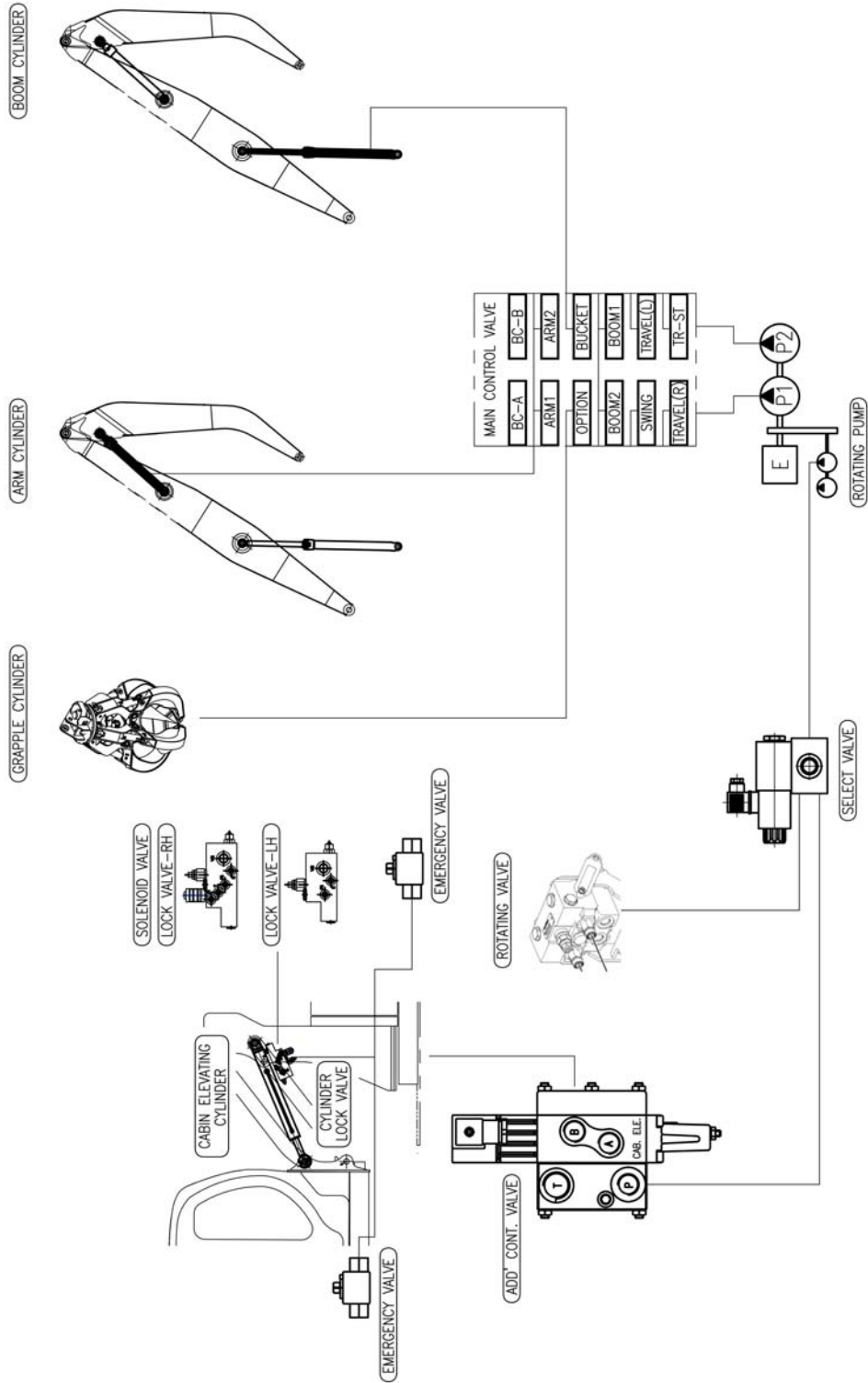
3-1. Hydraulic Circuit Diagram



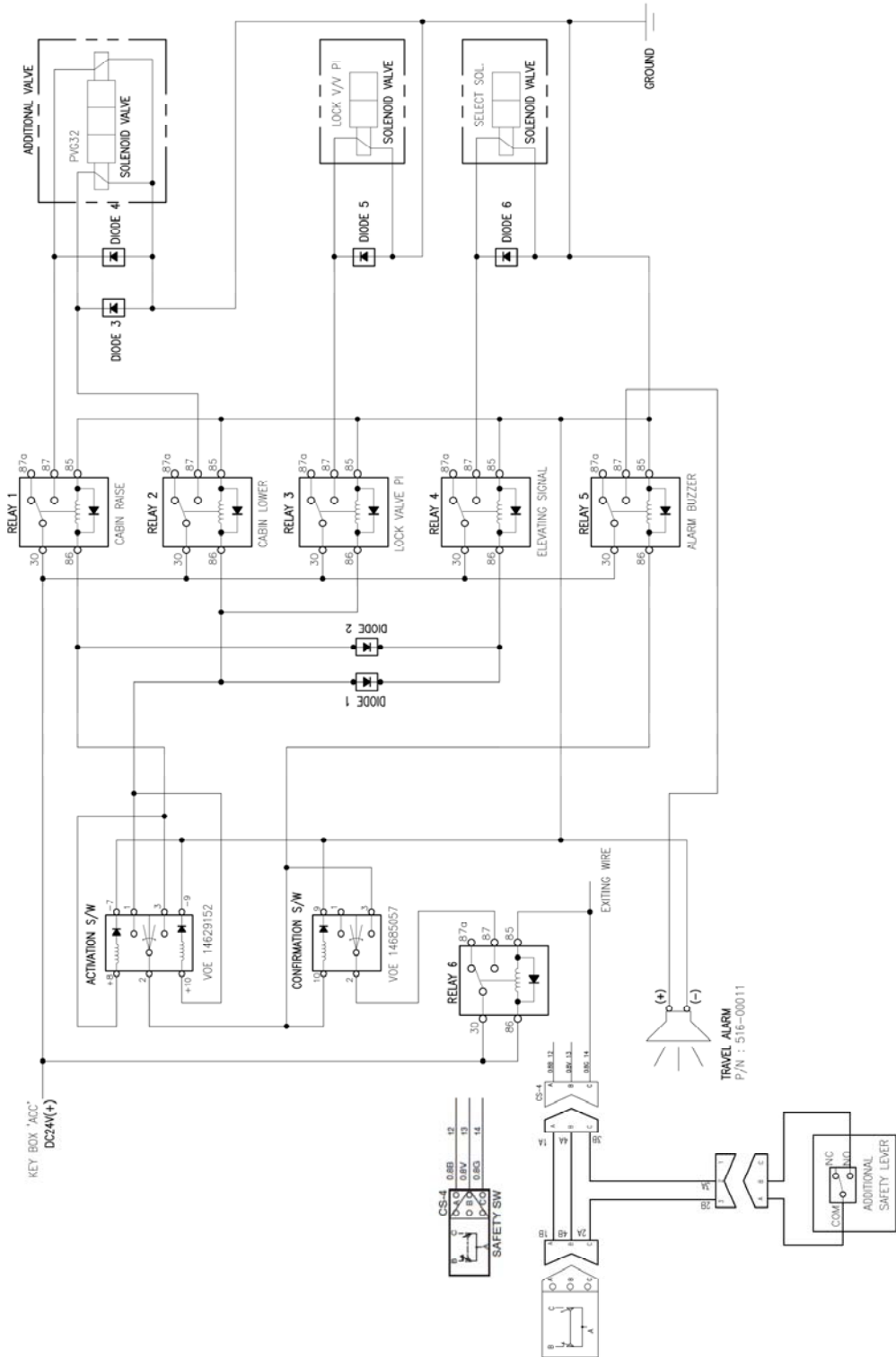


- 1 Main pump
- 2 Main control valve
- 3 Swing motor
- 4 Travel motor
- 5 RCV lever(LH)
- 6 RCV lever(RH)
- 7 RCV pedal
- 8 Boom cylinder(LH)
- 9 Boom cylinder(RH)
- 10 Arm cylinder
- 11 Bucket cylinder
- 12 Turning joint
- 13 Check valve
- 14 Check valve
- 15 Hydraulic tank
- 16 Oil cooler
- 17 Air breather
- 18 Bypass valve & return element
- 19 Strainer
- 20 Drain filter
- 21 Pilot filter & 5 solenoid valve
- 22 Pressure sensor
- 23 Pressure sensor
- 24 Pressure sensor
- 25 Shuttle block
- 26 Last guard filter
- 27 Shuttle valve
- 28 RCV dozer
- 29 Power train pump
- 30 Steering valve
- 31 Travel control valve
- 32 Transmission control valve
- 33 Brake supply valve
- 34 Brake valve
- 35 Accumulator
- 36 Accumulator
- 37 Pressure switch(5k)
- 38 Pressure sensor(200k)
- 39 Transmission
- 40 Front axle
- 41 Rear axle
- 42 Locking valve
- 43 Oscillating cylinder
- 44 3 solenoid valve
- 45 2 EPPR solenoid valve
- 46 Pressure switch
- 50 Quick clamp solenoid valve(option)
- 51 Pattern change valve(option)
- 52 Boom safety lock valve(option)
- 53 Arm safety lock valve(option)
- 54 Accumulator(option)
- 55 Accumulator(option)
- 56 Stop valve(option)
- 57 Proportional relief valve(option)
- 58 Solenoid valve(option)
- 59 Shuttle valve(option)
- 60 2 way pedal(option)
- 61 Solenoid valve(option)
- 64 Solenoid valve(option)
- 65 Solenoid valve(option)
- 66 RCV pedal(2 way, option)
- 67 5 solenoid valve(option)
- 68 4 solenoid valve(option)
- 69 Outrigger/dozer cylinder(LH, option)
- 70 Outrigger/dozer cylinder(RH, option)
- 71 Pilot check valve(LH, option)
- 72 Pilot check valve(RH, option)
- 73 Adjustable boom cylinder(option)
- 75 Control valve(option)
- 76 Proportional relief valve(option)
- 78 Proportional relief valve(option)
- 79 Pilot selector valve(option)
- 80 2 EPPR valve(option)
- 81 Proportional relief valve(option)
- 82 Priority valve(option)

3-2. Hydraulic Parts Installation



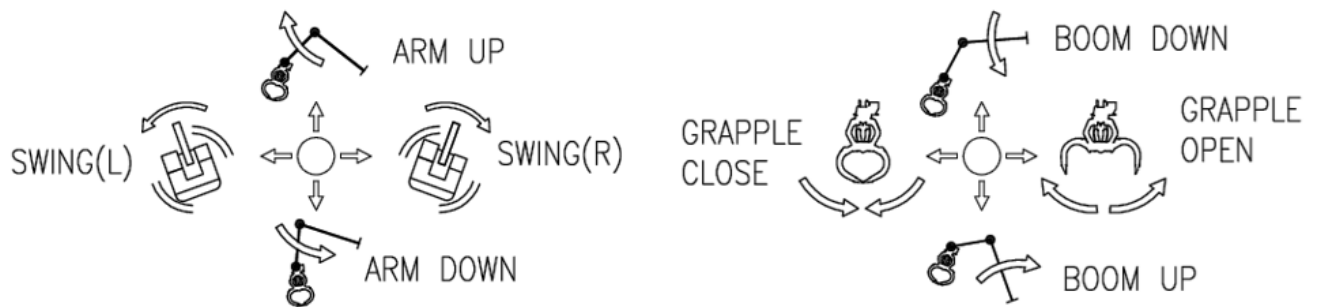
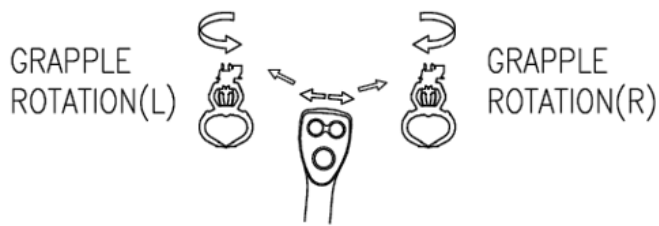
3-3. Electric Circuit Diagram



4. Operation

4-1. Control Devices for Operation

- Joystick



- Buttons



4-2. Cabin Elevating Operation



Elevating cab switch

Confirmation
Switch



Activation
Switch



Lifting the operator station.

1. Close the door and fasten the seat belt.
2. Lock the pilot cutoff lever.
3. Start the engine.
4. Lower the stabilizers and ensure the machine stability.
5. Turn the confirmation switch on (and buzzer starts).
6. Press and hold cabin elevating switch forward.
7. When the station arrives intended height, release the elevating switch.
8. Turn the confirmation switch off (and buzzer stops).

**** When you lower the cabin, please turn off the parking switch.**

Lowering the operator station

1. Close the door and fasten the seat belt.
2. Lock the pilot cutoff lever.
3. Lower the stabilizers and ensure the machine stability.
4. Turn the confirmation switch on (and buzzer starts)
5. Press and hold cabin elevating switch downward.
6. After lowering completed, release the elevating switch.
7. Turn the confirmation switch off (and buzzer stops).

**** When you operate elevating cabin, you should check the mirrors on the bottom to avoid crash between cabin and Lower Equipment.**

5. Maintenance

5-1. Greasing

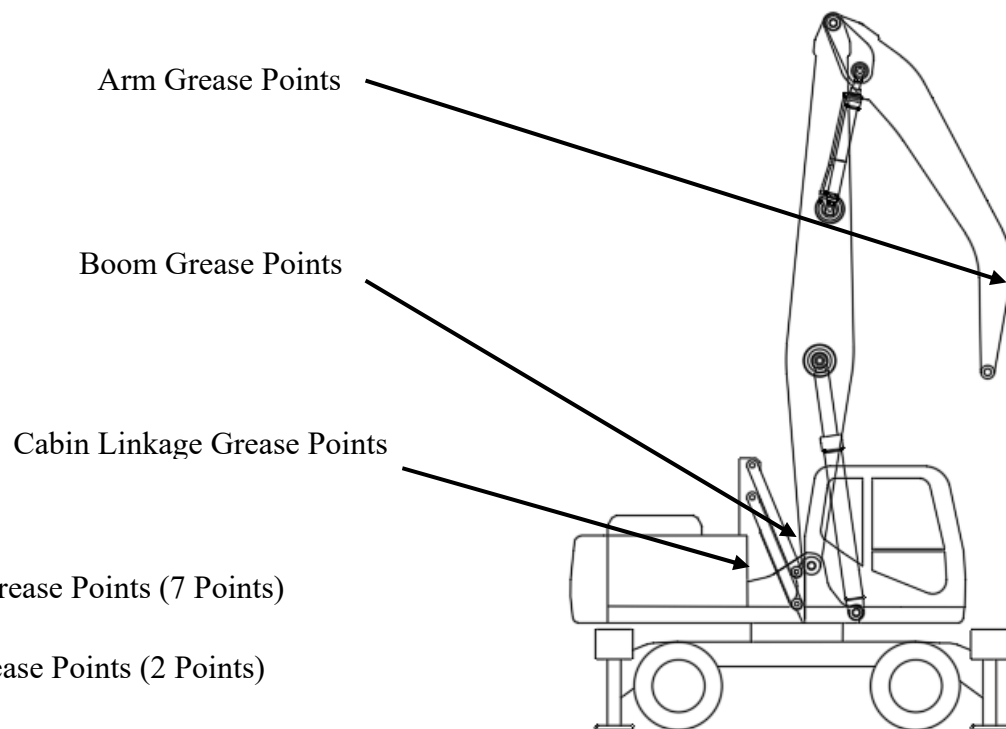
50 HOUR/WEEKLY SERVICE

- PERFORM ALL 10 HOUR/DAILY SERVICE CHECKS
- GREASE BOOM, ARM AND FRONT ATTACHMENT PINS

Grease every 10 hours for first 100 hours and every 50 hours thereafter.

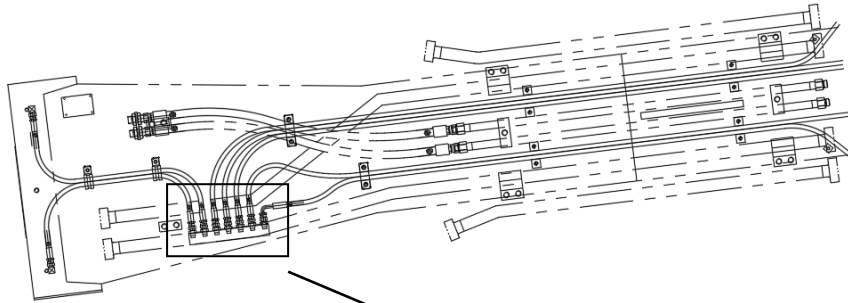
NOTE: If the equipment has been run in water, the front attachment should be greased on a 10 hour/Daily basis.

- Position machine as shown below and lower the front attachment on the ground and stop the engine
- Press the grease fitting and inject grease gun on the marked point
- After injection, clean off the old grease that has been purged

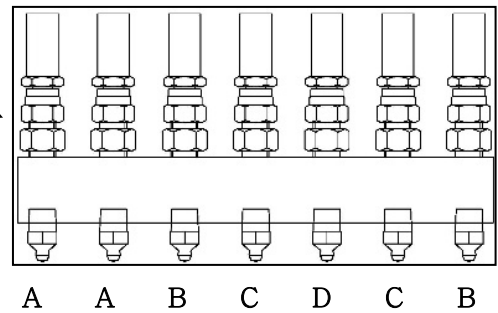


1. Boom Grease Points (7 Points)
2. Arm Grease Points (2 Points)
3. Cabin Linkage Grease Points (8 Points)

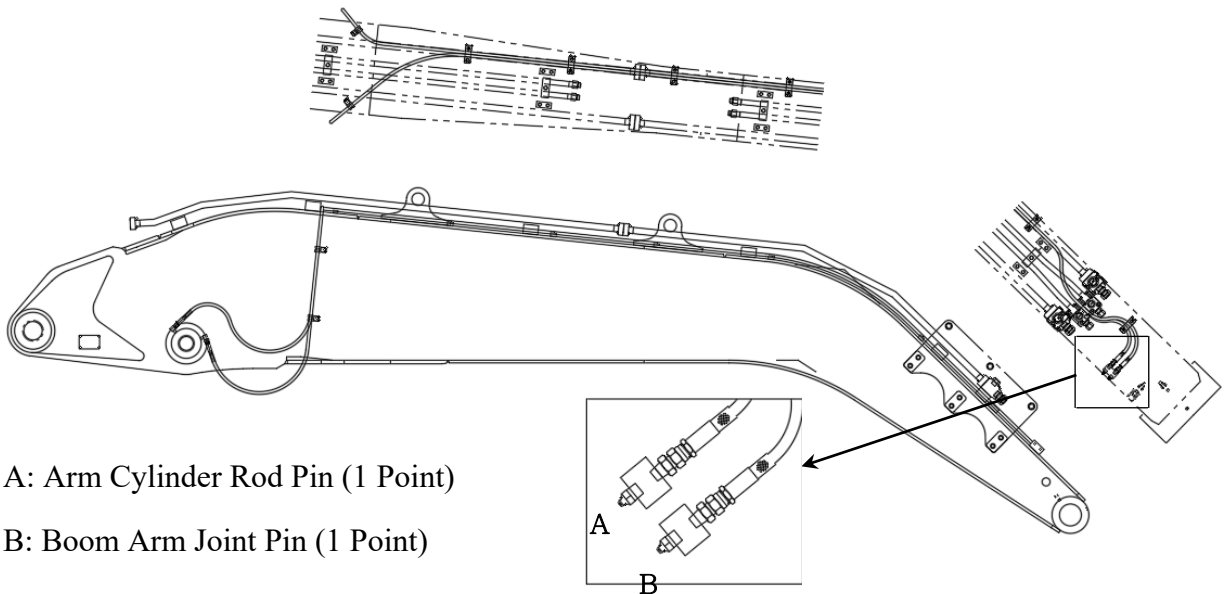
1. Boom Grease Points (7 Points)



- A : Boom Foot Pin (2Points)
- B : Boom Cylinder Rod Pin (2Points)
- C : Arm Cylinder Bore Pin (2Point)
- D : Boom Arm Joint Pin (1 Point)

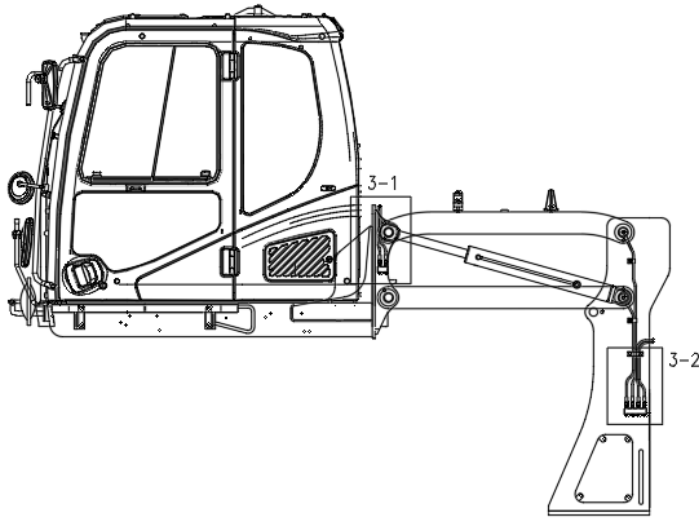


2. Arm Grease Points (2 Points)

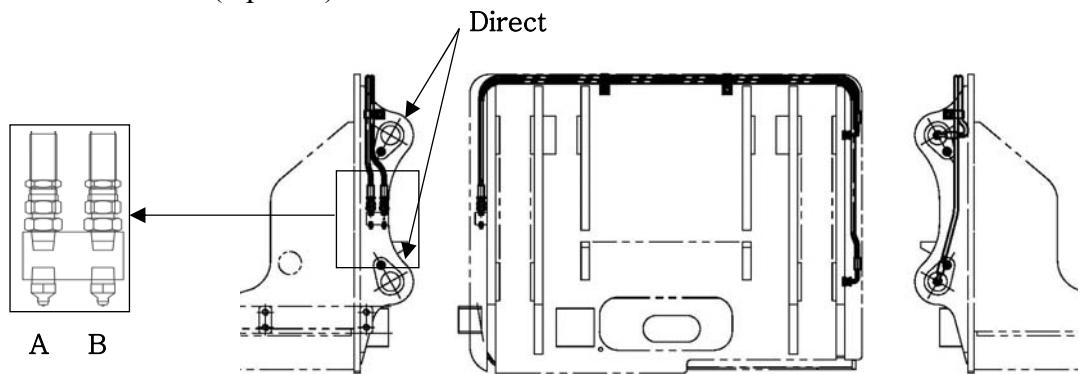


- A: Arm Cylinder Rod Pin (1 Point)
- B: Boom Arm Joint Pin (1 Point)

3. Cabin Linkage Grease Points (8 Points)



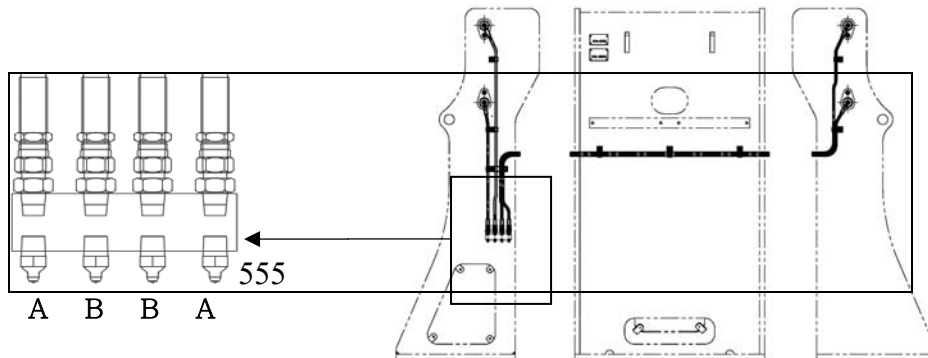
3-1. Bed Frame Grease (4 points)



A : Bed Frame & Cabin Link Joint Pin (1 Point)

B : Bed Frame & Guide Link Joint Pin (1 Point)

3-2. Support Frame Grease (4 points)

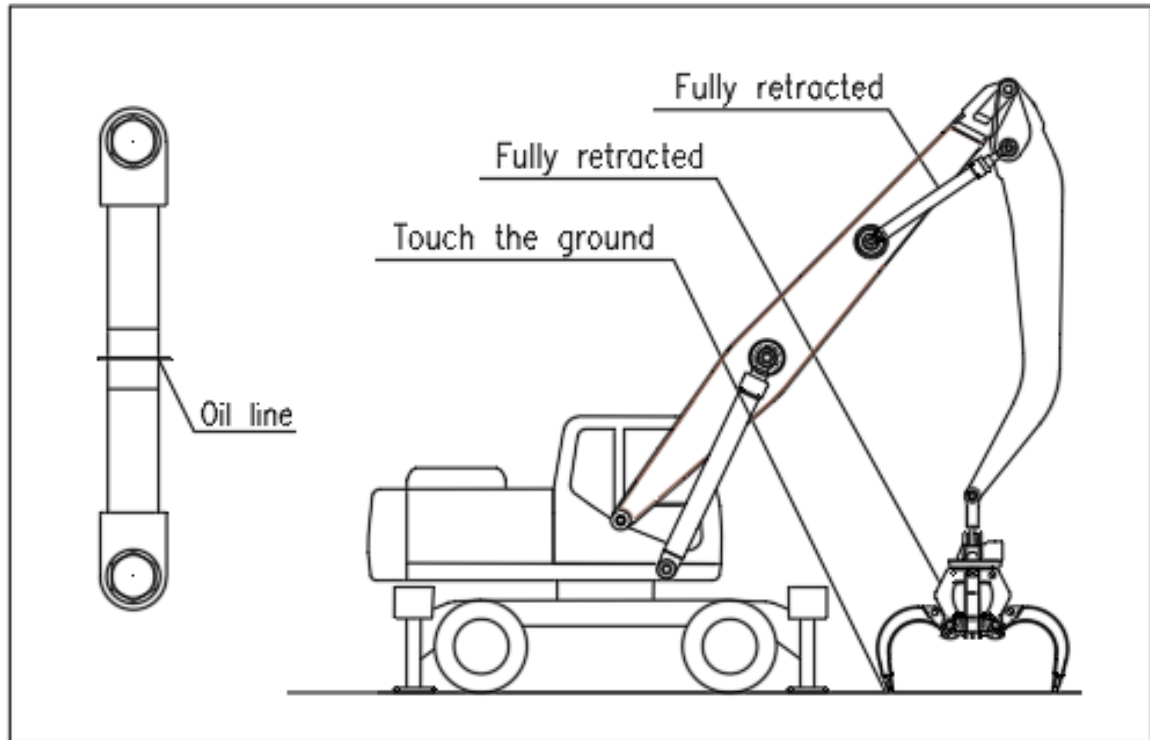


A : Support Frame & Guide Link Joint Pin (2 Points)

B : Support Frame & Cabin Link Joint Pin (2 Points)

5-2. Hydraulic Oil Level Check

1) Posture for hydraulic system oil level check



The hydraulic tank is on the right side of the machine.

1. Park machine on firm and level ground. Lower attachment on ground as shown in Figure.
2. Lower outriggers and dozer blade to ground, to displace oil into hydraulic oil tank.
3. Set parking brake switch to “I” (APPLIED) position.
4. Move engine speed to “LOW IDLE”.
5. Move safety lever to “LOCK” position

6. Troubleshooting

Trouble	Probable Cause
Poor hydraulic system performance	● Hydraulic oil not at operating temperature.
	● Engine speed too low.
	● Reservoir low on oil
	● Restrictions in lines
	● Cooling circuit, pump control system and/or pilot control circuit defective.
	● Internal leakage (control blocks, valves or power units.)
	● Pressure lines twisted or kinked
	● Spool not in full stroke.
	● Relief valve defective, or out of adjustment.
	● Worn cylinders.
	● Defective hydraulic pump.
Jerky motion of power cylinders	● Piston rod bent
	● Piston sticking
	● Inside diameter of cylinder tube partially increased or scored
	● Air in control circuit
	● Oil too cold
	● Valve spool sticking, centering springs defective
	● Pump and/or engine control system defective
	● Valve of power circuit defective
Noisy operation	● Incorrect lubricant or oil level too low
	● Bearings scored or damaged.
	● Sun gear teeth excessively worn or damaged
	● Bearings of planetary pinions worn

* In the event of equipment failure stop all work, move the equipment to a safe place, and contact the Hyundai Construction Equipment or Hyundai dealer.

Version: 2.4

Orange Grapple

(HW250 MH)

This manual was produced by Sun&Shield, Ltd. and some revisions have been

made in HYUNDAI CONSTRUCTION EQUIPMENT

Introduction

The use of the **Orange Grapple** is loading and unloading metal scrap, industrial waste and garbage. It has excellent working ability for continuous operation and for hazardous waste areas and is specially designed for Excavator or Material Handler.

This manual is provided to users for detail information about assembling, operating, fueling, inspection, maintenance and adjustment of the **Orange Grapple**.

For the safe operation and maintenance of the **Orange Grapple**,

1. Please read this manual carefully and familiarize yourself with information.
2. Please check environment of worksite and safety rules for safe operation.

Please, contact Hyundai Construction Equipment or Hyundai Dealer if you have questions on this manual.

Model	
P/N	
Year of Manufacture	

Contents of Orange Grapple

1	Safety -----	05
1.1	Safety assurance -----	05
1.2	Symbol mark of “Safety Caution” -----	05
1.3	Safety Alert Symbol -----	05
1.4	Cautions for basic items -----	05
1.5	Hazard Operation -----	08
2	Specifications -----	09
2.1	Hydraulic Cylinder -----	09
2.2	Dimensions -----	10
3	Structure & Installation -----	11
3.1	Name of each part -----	11
3.2	Installation to Arm -----	12
4	Check and Maintenance -----	15
4.1	General items -----	15
4.2	Directions when checking or having maintenance -----	15
4.3	Preparations before starting repair -----	15
4.4	Regular replacement of major parts -----	16
4.5	Locations where greases are to be inserted -----	16

5	Operation and Caution -----	18
5.1	Operation for new attachment -----	18
5.2	Operating precautions -----	18
6	Troubleshooting -----	19

1. Safety

1.1. Safety assurance

This manual describes the basic items related to safety. ‘Caution’ mark is attached where safety shall be ensured.

1.2. Symbol mark of “Safety Caution”

This symbol mark indicates 『Safety Caution』. Please pay attention to safety when you identify this mark in the nameplate of caution or this manual. Safe operation and proper management is recommended by taking preventive measures according to the descriptions.

1.3. Safety Alert Symbol

The words 『DANGER』 『WARNING』 and 『CAUTION』 used in this manual and on decals on the machine indicate degree of risk of hazards or unsafe practices. All three degrees of risk indicate that safety is involved. Observe precautions indicated whenever you see the Safety Alert “Triangle”, no matter which signal word appears next to the “Exclamation Point” symbol.

『DANGER』 indicates imminent hazard of a situation that, if not avoided, is very likely to cause death or extremely serious injury.

『WARNING』 indicates potential of a hazardous situation that, if not avoided, could result in serious injury or death.

『CAUTION』 indicates potential of a hazardous situation that, if not avoided, could result in minor or moderate injury.

1.4. Cautions for basic items

Read this manual and nameplate for caution on the Orange Grapple, and fully understand it.

- The Orange Grapple shall be maintained so that it always has normal state.
- It is not permitted to any modifications on Orange Grapple.
- The functions and durability of Orange Grapple will be decreased if safety is not ensured.
- Special attention shall be paid to safety-related matters other than those described in this manual.

1) Prohibition of modification of Orange Grapple

Any modification made without authorization or written approval from Hyundai Construction Equipment can create a safety hazard, for which the machine owner must be held responsible. If you need any modifications, please consult Hyundai Construction Equipment.

2) *Caution for handling oil*

- Oil is dangerous because it is inflammable.
- Do not place heat or fire near the oil.
- High-inflammable oil must be kept away from flames.
- Do not stock dust-cloth which is stained with oil because there is potential to occur spontaneous combustion.

3) *Burn prevention*

- Inspection or maintenance work must be performed when the machine is fully cooled after turning engine off.
- Pay full attention not to have burn with hot oil.
- High-pressure hoses, pipes and etc become hot.

4) *Furnishing fire-fighting equipment*

- Prepare for the possible damages or fires.
- An emergency medical kit and a fire extinguisher must be equipped. Particularly, you must have a full knowledge of a fire extinguisher.
- Memorize the emergency telephone number of emergency hospital, emergency vehicle, fire house and so on.

5) *Injury due to attachment and work tools*

- Be careful that body such as hands, arms is not inserted into movable parts such as gaps between work attachment and machine and between work attachment and cylinder.
- Serious injury may occur if the gap is changed by the moves of work attachment.

6) *Windows must be closed when operating the machine*

When operation, people other than necessary operator must be separated from the site where drop and scattering from the machine may occur.

7) *Assure safety at the work site*

- Check whether there are risks at the worksite before starting work.
- Determine optimum safe work method after checking working conditions at the worksite.
- If there is slope at the worksite, make machine flat before starting work.

8) *Fire protection*

- Remove any the inflammables around the machine.
- Check the leakage of hydraulic oil.
- Be assure where the extinguisher and how to use it.

9) *Collision of front attachment shall be prevented*

- If the machine is in any limited place of overhead, make sure that there is adequate overhead clearance for differ front.

10) *Ensuring sufficient sight*

- Be careful when working in dark area, use the additional working lamp if the light is insufficient from the machine.

11) *Machine stop*

- Park the machine on flat and hard place.

12) *Cautions when checking or repairing hydraulic parts*

- Park the machine where plat and stable place.
- Down the bucket on the ground and stop engine.
- Right after working, waiting and repairing until devices temperature down.
- If you hurry to start repair within the machine still hot and remaining pressure, there will be serious damaged with burning or outburst of hot oil.
- Get rid of the pressure from hydraulic oil tank before repairing the hydraulic devices.
- Get rid of the pressure from hydraulic circuit with fully operate joystick lever on several time.
- Must be careful, when disconnect the hydraulic lines, plugs or fittings. Keep your face at a distance from the possible leakage point.

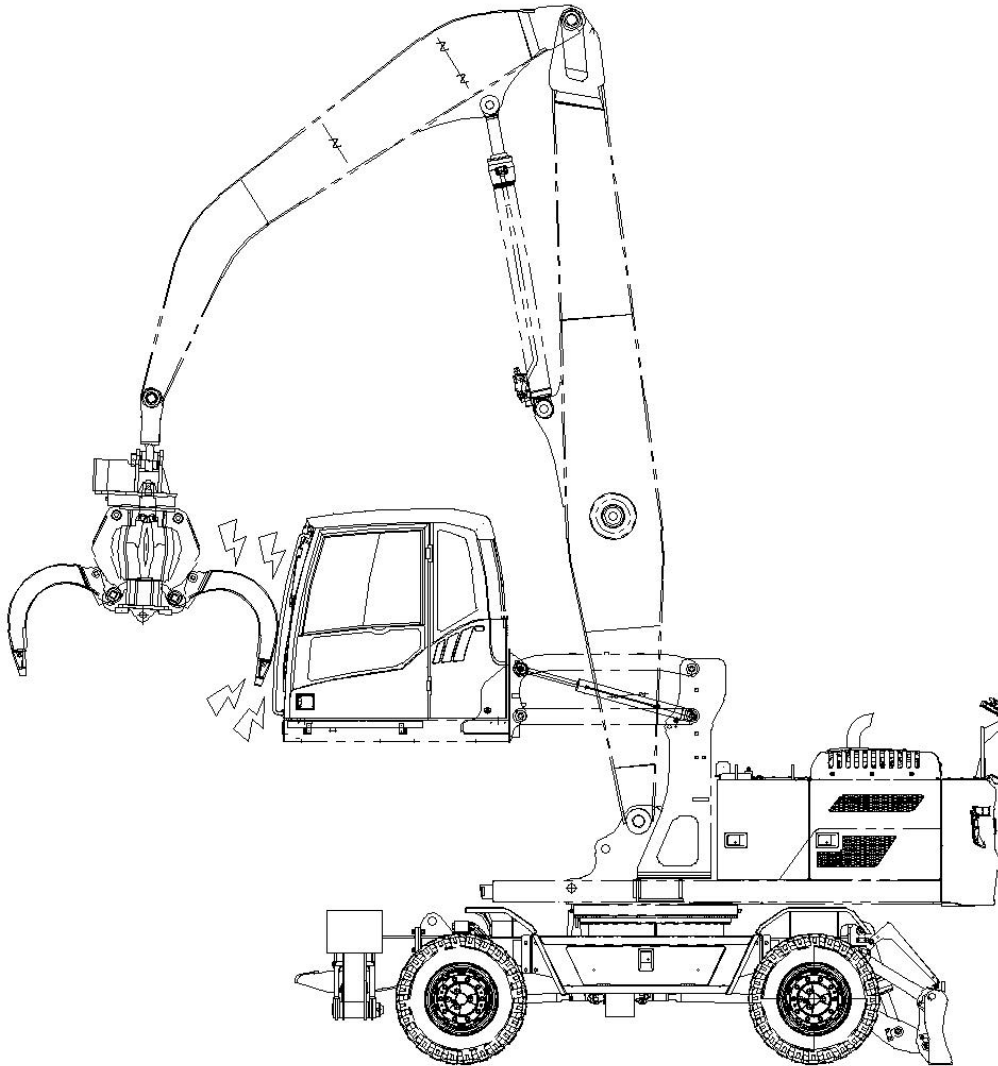
13) *Warning indication during checking or repairing*

- Put the sign of “checking” or “repairing” on the operating room or the operating lever to prevent somebody operates during the repairing.

14) *Use of proper tool*

15) *Stop the machine when checking or repairing it*

1.5. Hazard Operation



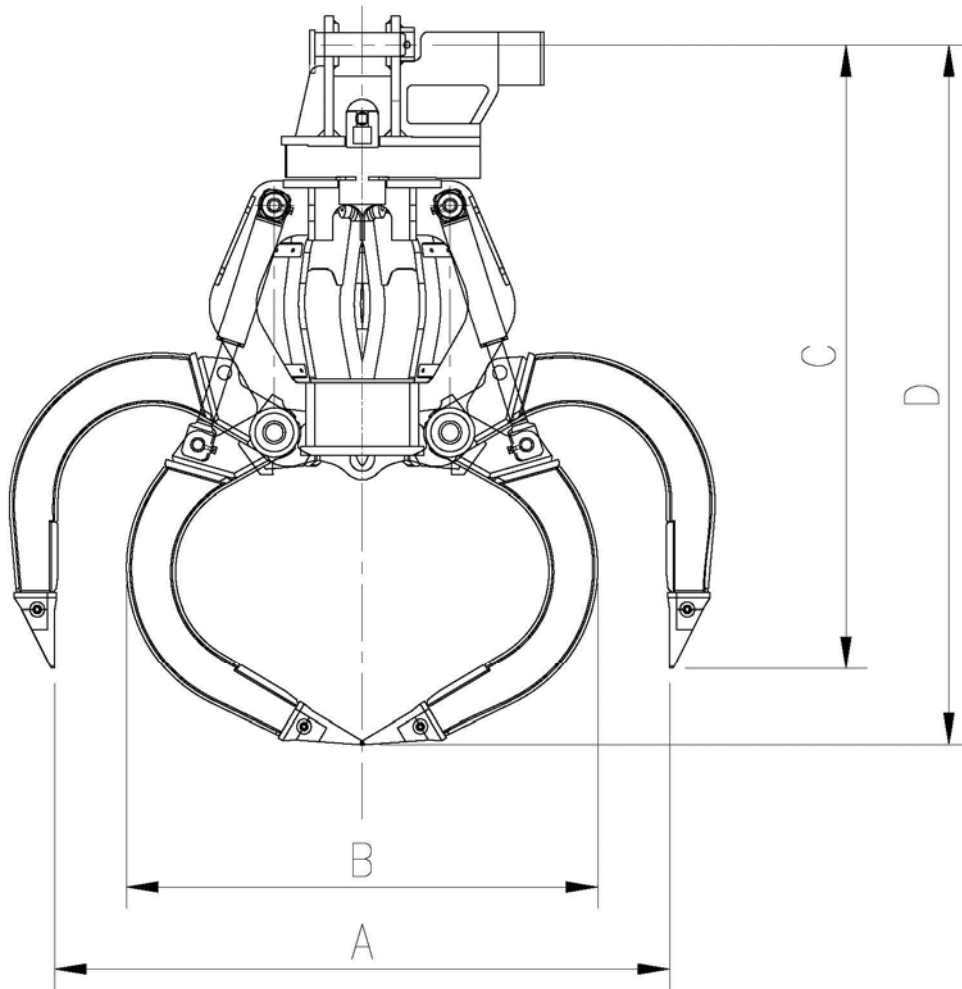
Be careful not to hit each other when moving ATTACHMENT and CABIN on the front. Also, make sure that OUTTRIGGER and DOZER are firmly attached to the ground before you make a complaint. Otherwise, equipment is likely to overturn.

2. Specification

2-1. Hydraulic Cylinder

ITEM	UNIT	SPECIFICATION
MAX. OPERATING PRESSURE	kgf/cm ²	280
CLOSED LENGTH	Mm	490
STROKE	mm	235
BORE DIAMETER	mm	Ø65

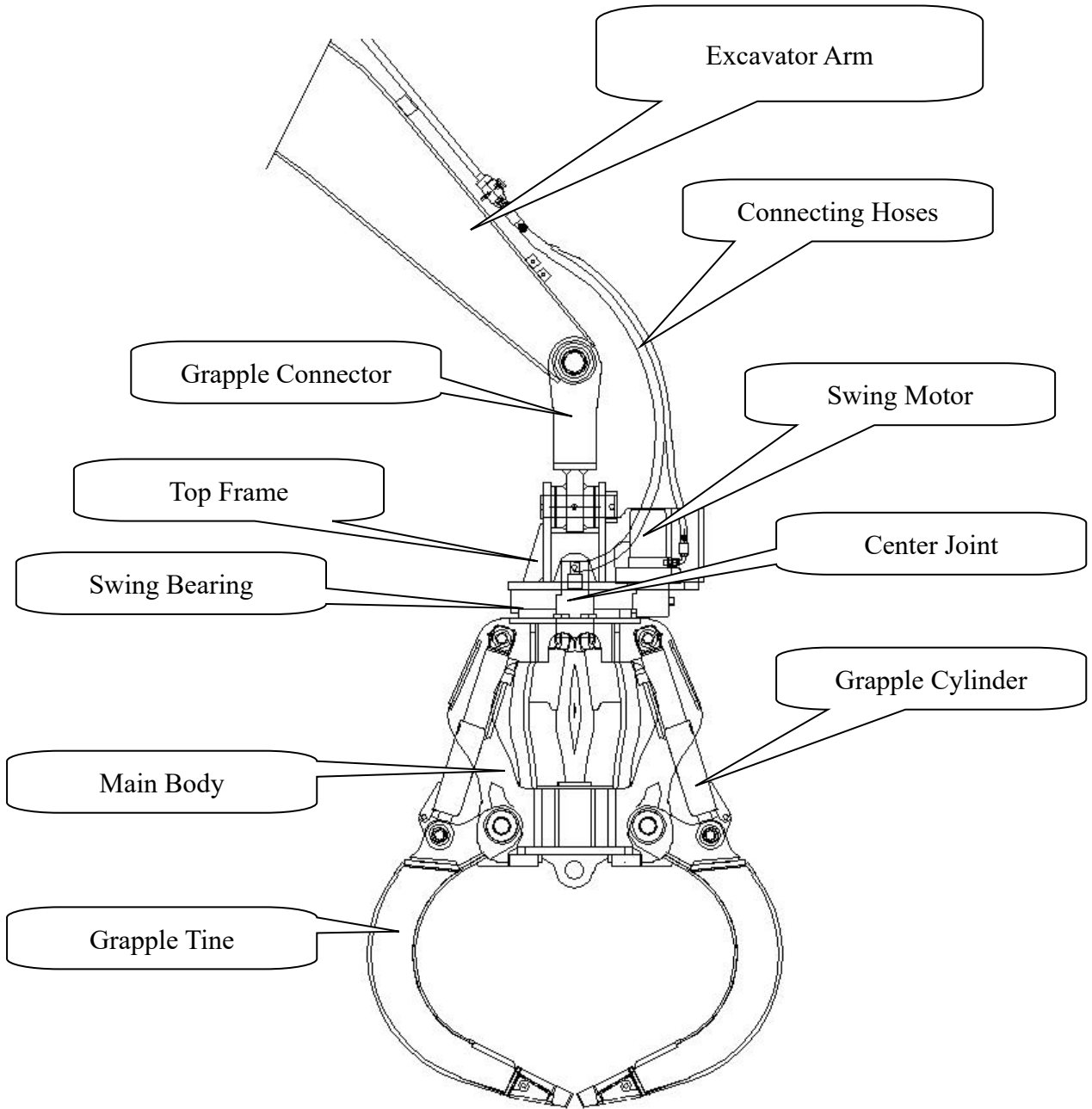
2-2. Dimensions



MODEL	UNIT	SPECIFICATION
A	mm	1,933
B	mm	1,526
C	mm	1,806
D	mm	2,119
EXCAVATOR CLASS	ton	15~20

3. Structure & Installation

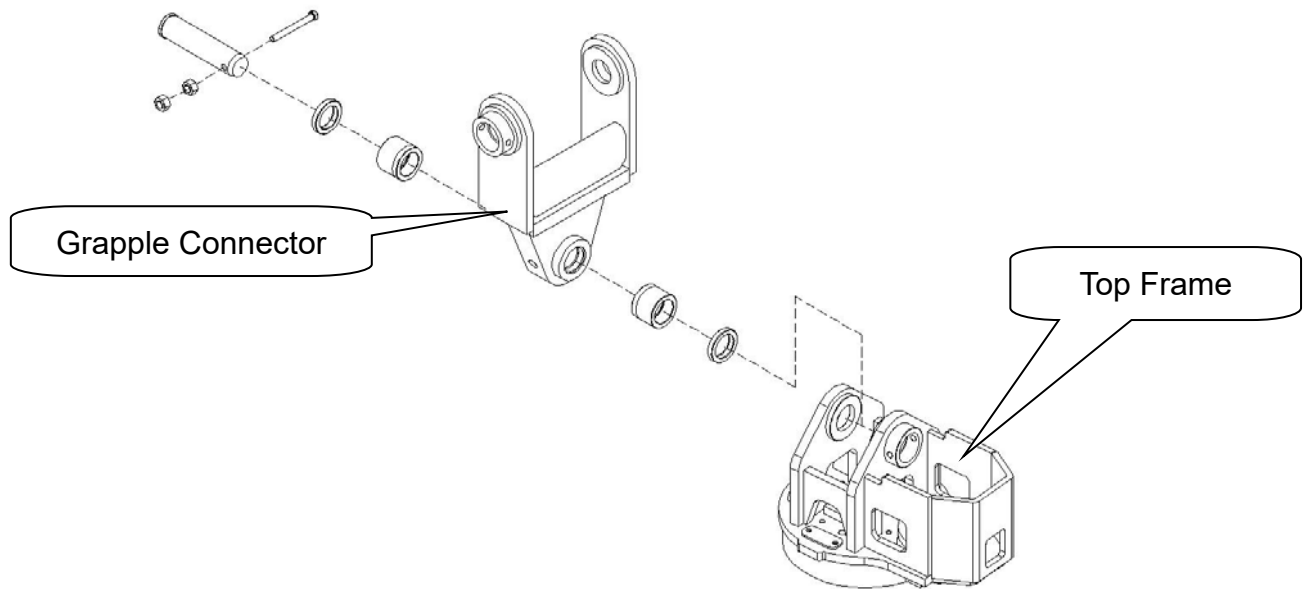
3.1 Names of Each Part



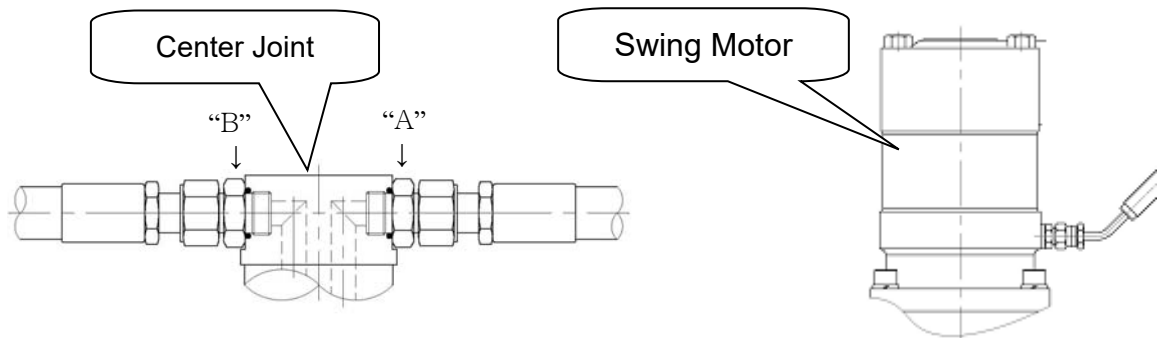
3.2 Installation to Arm

1) Preparation of Installation

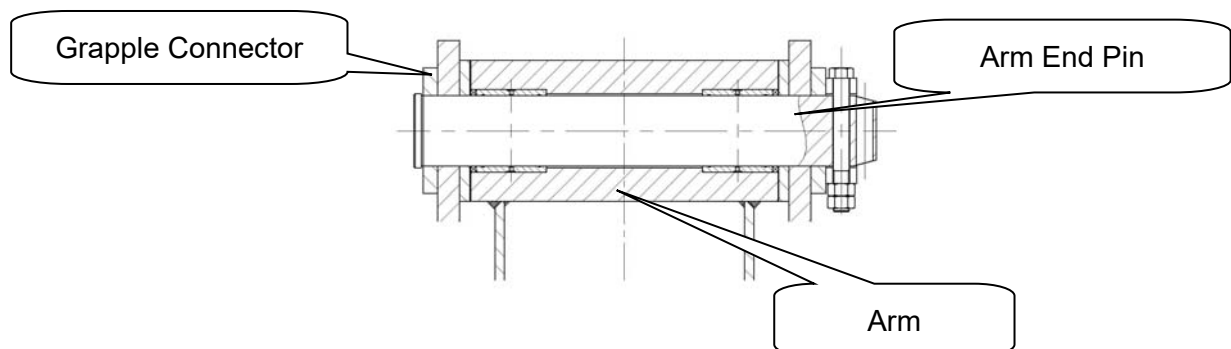
- Attach Grapple Connector to Top Frame.



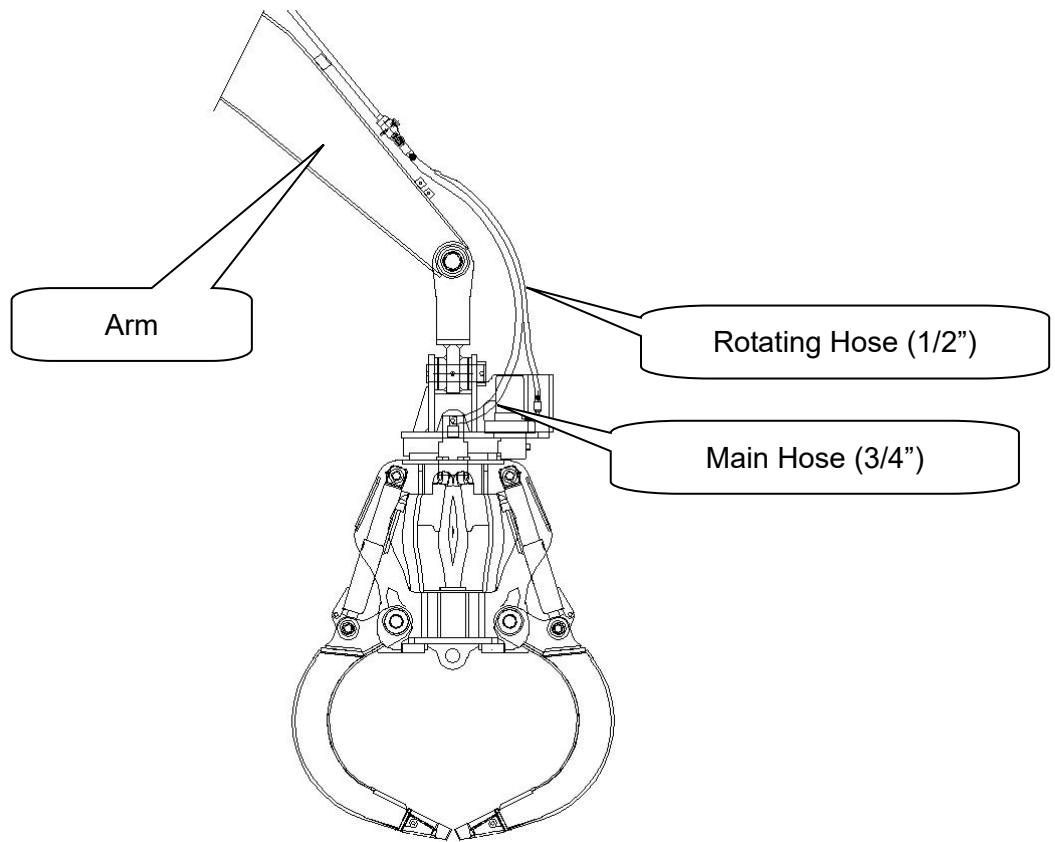
- Connect hoses to Center joint and Swing motor



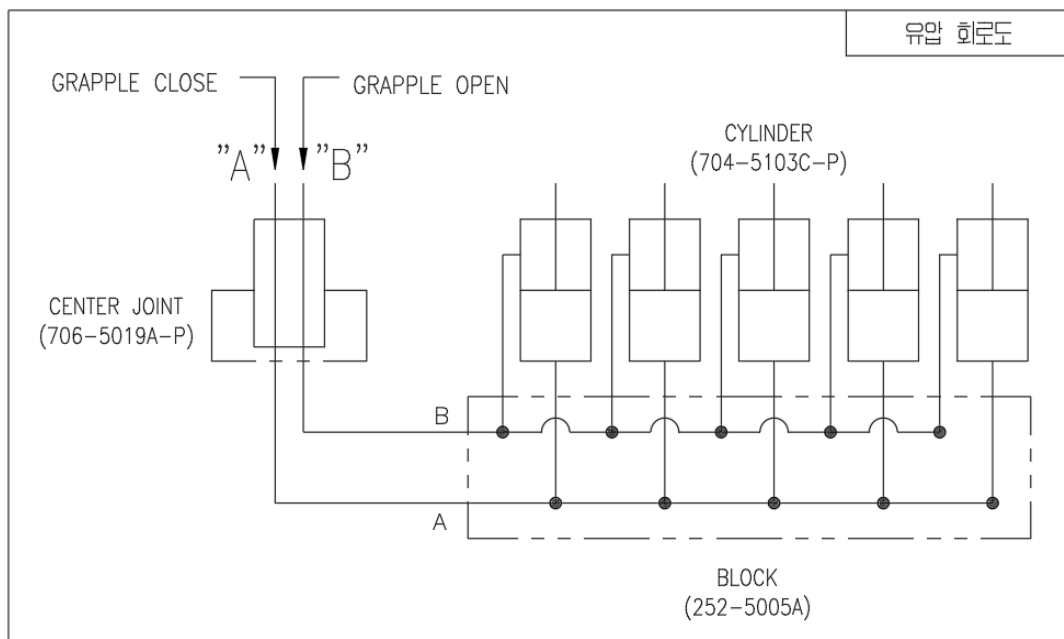
2) Connect the Grapple Connector to Arm with Arm End Pin.



3) Connect hydraulic hoses to arm



4) Hydraulic circuit diagram



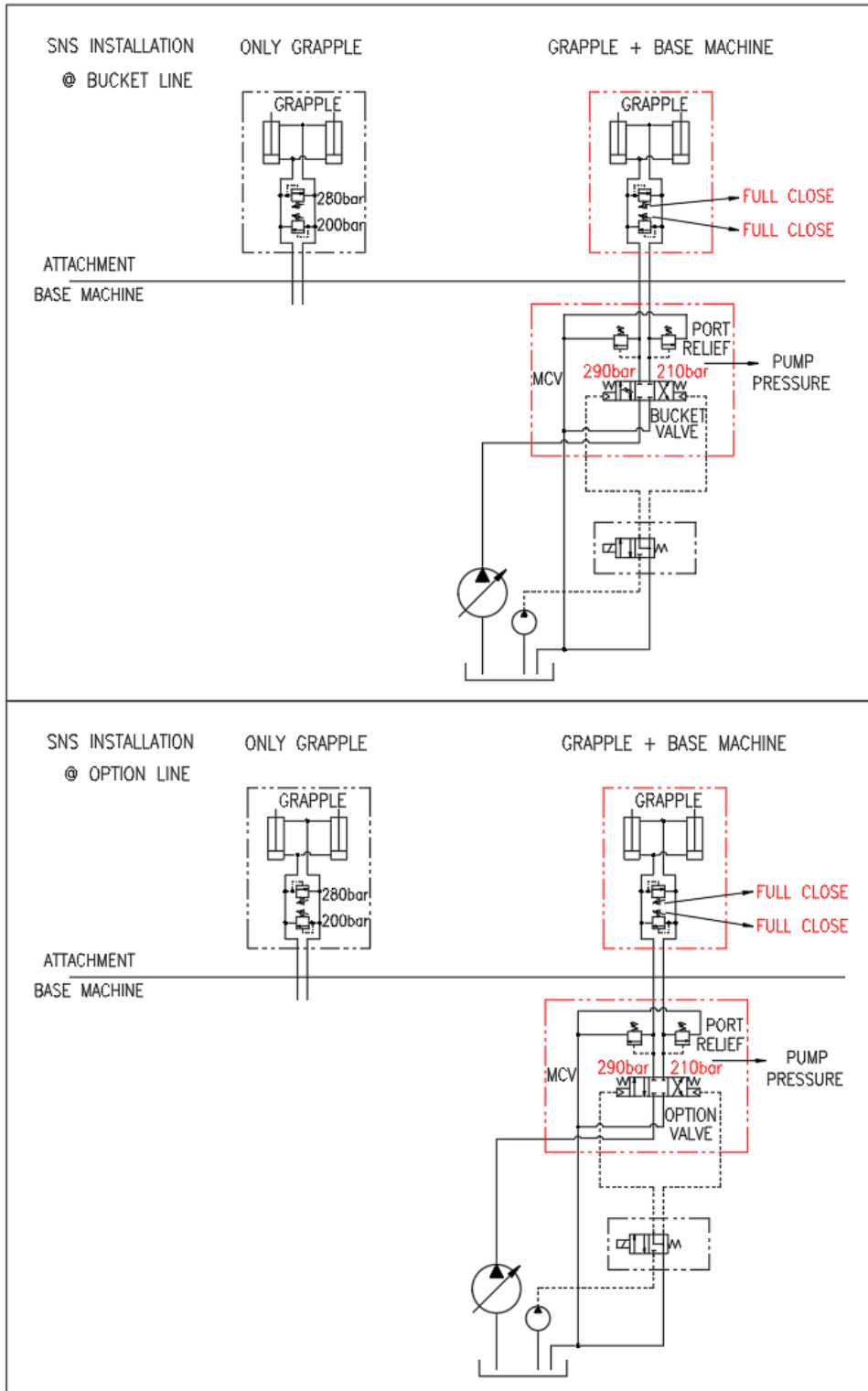
5) Pressure setting of the relief valve

After installing attachment (Grapple or bucket),

As shown in the attached picture, fully close the relief valve on the attachment (Grapple or bucket),

And Check the port relief valve of the MCV and bucket pressure set check on the monitor display in the cabin.

※ MCV can be different depending on the Base Machine.



4. Check and Maintenance

Only the person who was authorized or trained by our company can repair and maintain the orange grapple.

4.1 General Items

Perfect checking and maintenance make machine's functionalities fully operational and extend a length of machine's life.

Particularly, pay a special attention to the following items when operating the machine.

- 1) *Operating devices, gauges and etc are normal?*
- 2) *Are there any abnormalities in appearance? Are there any strange noise, heat generation, and etc?*
- 3) *Are there any loose of bolts or nuts?*
- 4) *Are there any damages, wears and disassemblies of structures or components?*
- 5) *Is the operation of each part OK?*

If disorders are found during checking or operation, please grasp the reason and repair them immediately.

If the reason is unclear or hydraulic parts have problems, please contact us.

4.2 Directions when checking or having maintenance

- 1) *Pay close attention to safety*
- 2) *Make a plan suitable for the operating condition or environment so that the checks and repairs are executed effectively*
- 3) *Use proper lubricating oil*
- 4) *Use parts approved by the manufacturer*
- 5) *Any changes or modifications of the machine are not permitted.*

4.3 Preparations before starting repair

Before starting repairs described in this manual, the machine should be stopped as follows, except otherwise described.

- 1) *Orange Grapple should be placed on the safe place.*
- 2) *Make 'Lock' status by raising control stand of machine*
- 3) *A message label of 'No start-up' should be attached on the control lever*

4.4 Regular replacement of important parts

The machine should be inspected regularly to secure safety when working or operating.

Furthermore, particularly the following parts related to fire should be replaced regularly for higher safety. These parts, if particular abnormalities are not found after used for specific period, should be replaced with the new ones to keep their full functionalities, since wear, heat deterioration and fatigue in these parts are to be occurred and their degree of damage is hard to be decided only by regular maintenance. Furthermore, when the deformations, cracks or so on in the hose clamps are occurred at the hose connections, clamps should be replaced simultaneously. O-RINGS and GASKETS are recommended to be replaced together with the hose.

For the replacement of important parts, please contact Hyundai Construction Equipment or Hyundai dealer..

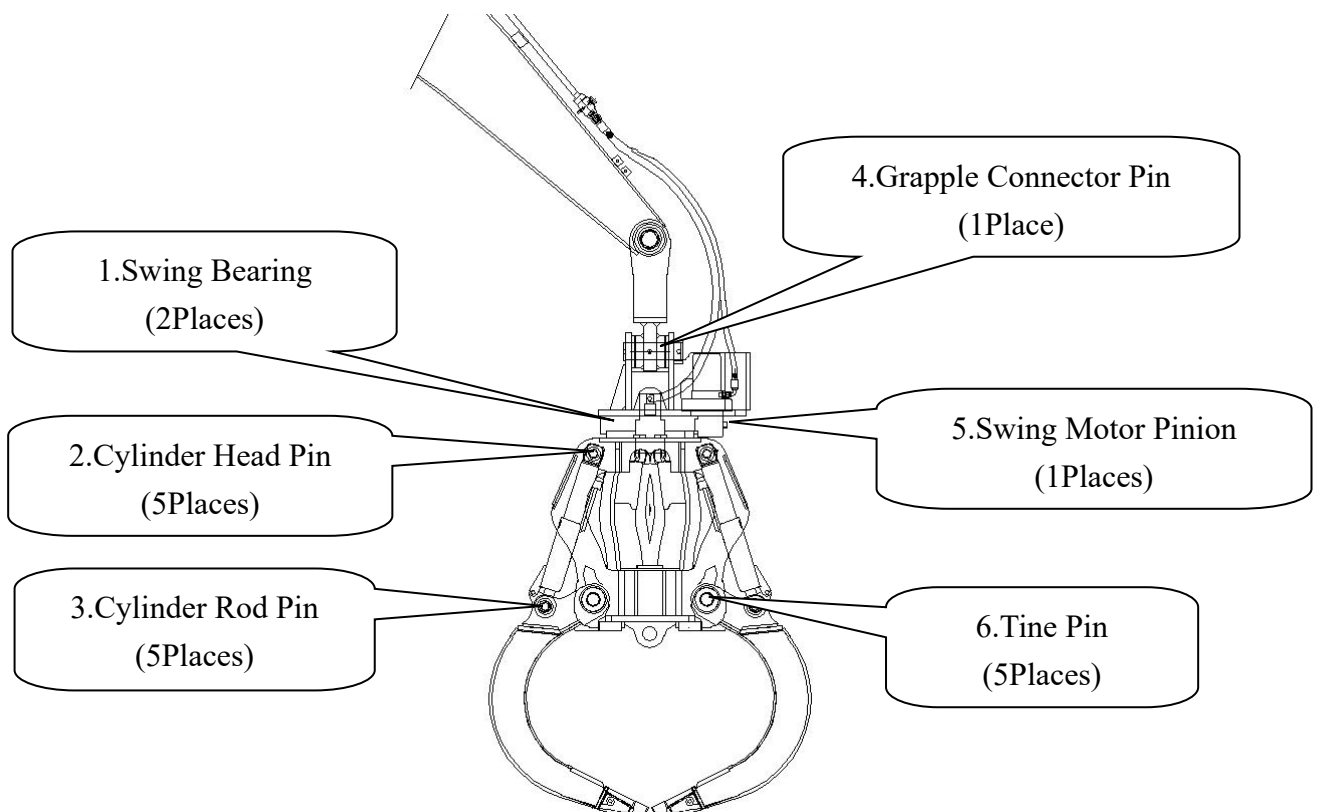
4.5 Locations where greases are to be inserted

They should be inserted at every 50 hours (If during initial 100 hours, it should be inserted everyday)

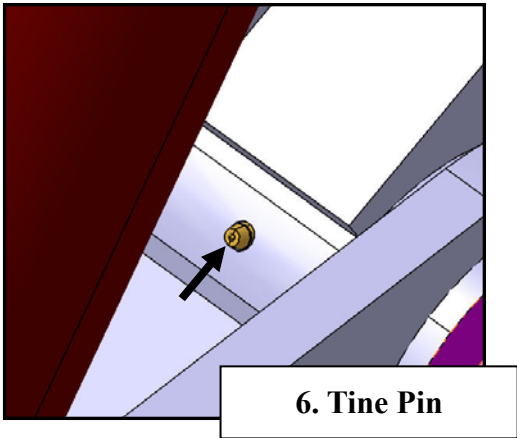
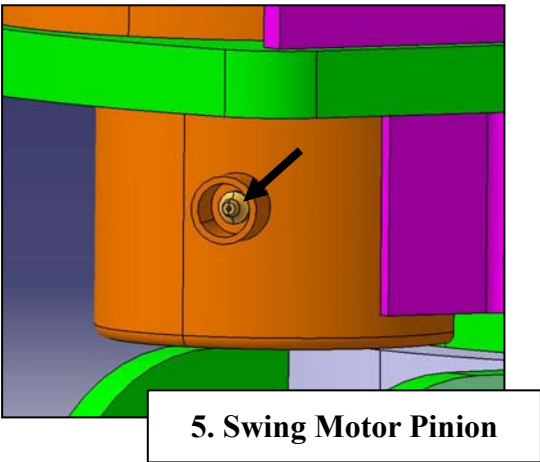
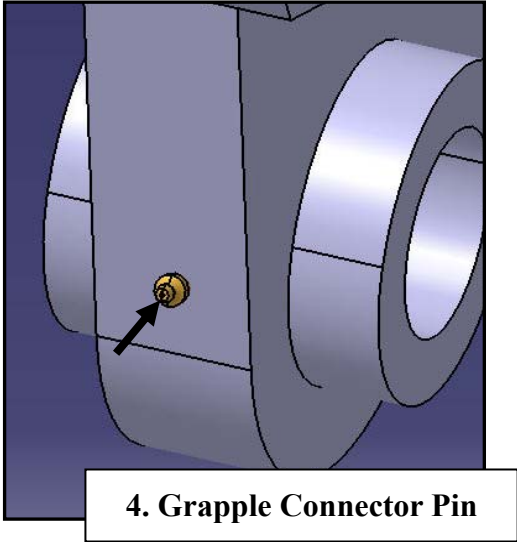
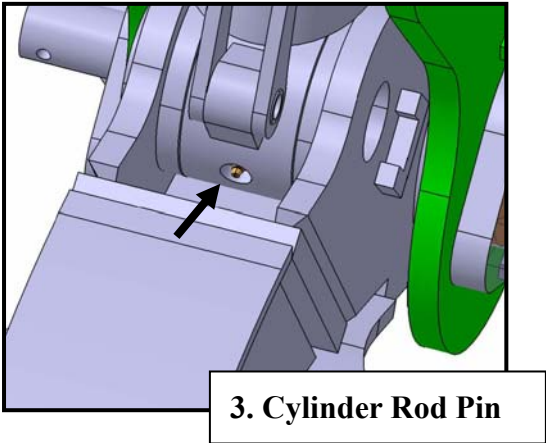
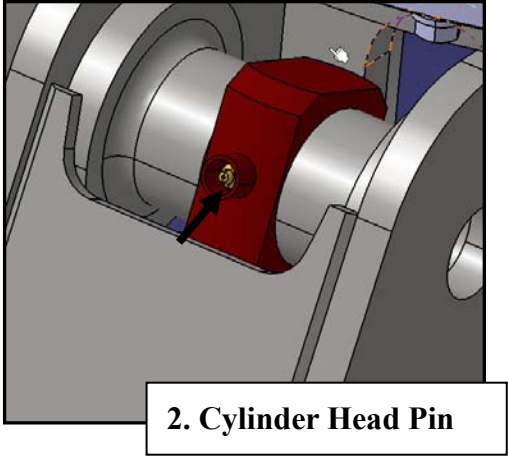
1) *Pose the machine according to following figures, and then lower the front attachment on the ground and stop the engine.*

2) *Push the grease fittings indicated in the following figures by using grease gun.*

3) *Wash out clearly the old grease coming out after inserting new grease.*



Location of Nipples for Greasing



5. Operation and Caution

5.1 Operation for new attachment

The orange grapple is required that the operator follow these two steps during initial break-in period. Failure to follow these two steps may result in damage to the equipment or reduced performance.

OPERATION HOUR	LOAD
FIRST 50 HOURS	Maintain about 80% load of full capacity(Engine RPM: 80% of rated RPM)
AFTER 50 HOURS	Full load

Note:

1. Check daily for leakage of hydraulic oil.
2. Inspect all lubricants daily and add as required.
3. During operation, monitor all instruments and gauges from time to time.
4. Operate unit at 80% load until engine and all other components are at operating temperature.
5. Check that equipment is working normally during operation.
6. After assemble the orange grapple, fully remove air inside hydraulic line.

5.2 Operating precautions

1) Before starting work

- ① Keep attention when working where there is a possibility of falling objects.
- ② Check the operating of orange grapple is normal or not.
- ③ Check any leakage of coolant or oil.

2) During work

- ① Make sure nothing remain inside machine working range.
- ② These are unique noise of the orange grapple not in trouble.
 - There is sharp noise sometime when the actuator break-in working. These sounds are cracking sounds from relief valves when sudden start or stop.
- ③ Add more additional counter weight when the stability of machine is not normal during the work. (Make an inquiry to our office when modify the machine.)

3) After work

- ① Check any leakage, any damage on hoses or pipes and loosening of bolt/nut etc.
- ② Check hydraulic level from the tank.
- ③ Keep clean the machine.

6. Troubleshooting

Trouble	Probable cause	Remedy
The grapple does not work	Make-up check hydraulic line leaking	Repair or replace as required.
	Relief pressure too low	Reset pressure.
	Hydraulic pump failed	Contact your dealer.
	Low hydraulic oil level	Add hydraulic oil as required.
The grapple has poor power	Relief pressure too low.	Reset pressure.
	Low hydraulic oil level.	Add hydraulic oil as required.
	Hydraulic pump faulty.	Contact your dealer.
The grapple speed is too low	Make-up check hydraulic line leaking	Repair or replace as required.

* In the event of equipment failure stop all work, move the equipment to a safe place, and contact the Hyundai Construction Equipment or Hyundai dealer.