Manitowoc

SERVICE/MAINTENANCE MANUAL

This manual has been prepared for and is considered part of -

12000-1/12000E-1

Model Number

1200Ref

Serial Number

This Manual is Divided into the following Sections:

NOTICE

The serial number of the crane is the only method Manitowoc has of providing you with correct parts and service information.

Always furnish serial number of crane and its attachments when ordering parts or discussing service problems with your Manitowoc distributor or the factory.

⚠ WARNING

To prevent death or serious injury:

- Avoid unsafe operation and maintenance.

  Crane and attachments must be operated and maintained by trained and experienced personnel. Manitowoc is not responsible for qualifying these personnel.
- Do not operate or work on crane or attachments without first reading and understanding instructions contained in Operator Information Manual and Service Manual supplied with crane and applicable attachments.
- Store Operator Information Manual and Service Manual in operator's cab.

  If Operator Information Manual or Service Manual is missing from cab, contact your Manitowoc distributor for a new one.

Published 10-02-13, Control # 210-03

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SAFETY

1. REFERENCE MATERIALS

2. MAINTENANCE STANDARDS TEST PROCEDURES

3. GENERAL WORK STANDARD

4. POWER TRAIN

5. HYDRAULIC SYSTEM

11. AIR CONDITIONER

SAFETY

SAFETY INFORMATION

Most accidents, which occur during operation, are due to neglect of precautionary measures and safety rules. Sufficient care should be taken to avoid these accidents.
Erroneous operation, lubrication or maintenance services are very dangerous and may cause injury or death of personnel.
Thus, precautionary measures, or notes, written in this manual should be read and understood by personnel before starting each task.
Operation, inspection, and maintenance should be carefully carried out, and safety must be given the first priority.
Messages of safety are indicated with caution marks. The safety information contained in this manual is intended only general safety information.
Messages of safety appear in this manual and on the machine. All messages of safety are identified by the words "DANGER", "WARNING" and "CAUTION". These words mean the following:

DANGER Indicates an imminently hazardous situation which, if not avoided, will result in loss of life or serious injuries.

WARNING Indicates a potentially hazardous situation which, if not avoided, could result in loss of life or serious injuries.

CAUTION Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injuries. It may also be used to alert against possible damage to the machine and its components.

Note Supplementary explanation.

It is very difficult for us to forecast every danger that may occur during operation. However, safety can be ensured by operating this machine according to methods recommended by Manitowoc. While operating machine, be sure to perform work with great care, so as to not damage the machine, or let accidents occur.
Please continue studying this manual until proper operation is completely understood.

EXPLANATION OF WARNING LABELS IN THE MACHINE

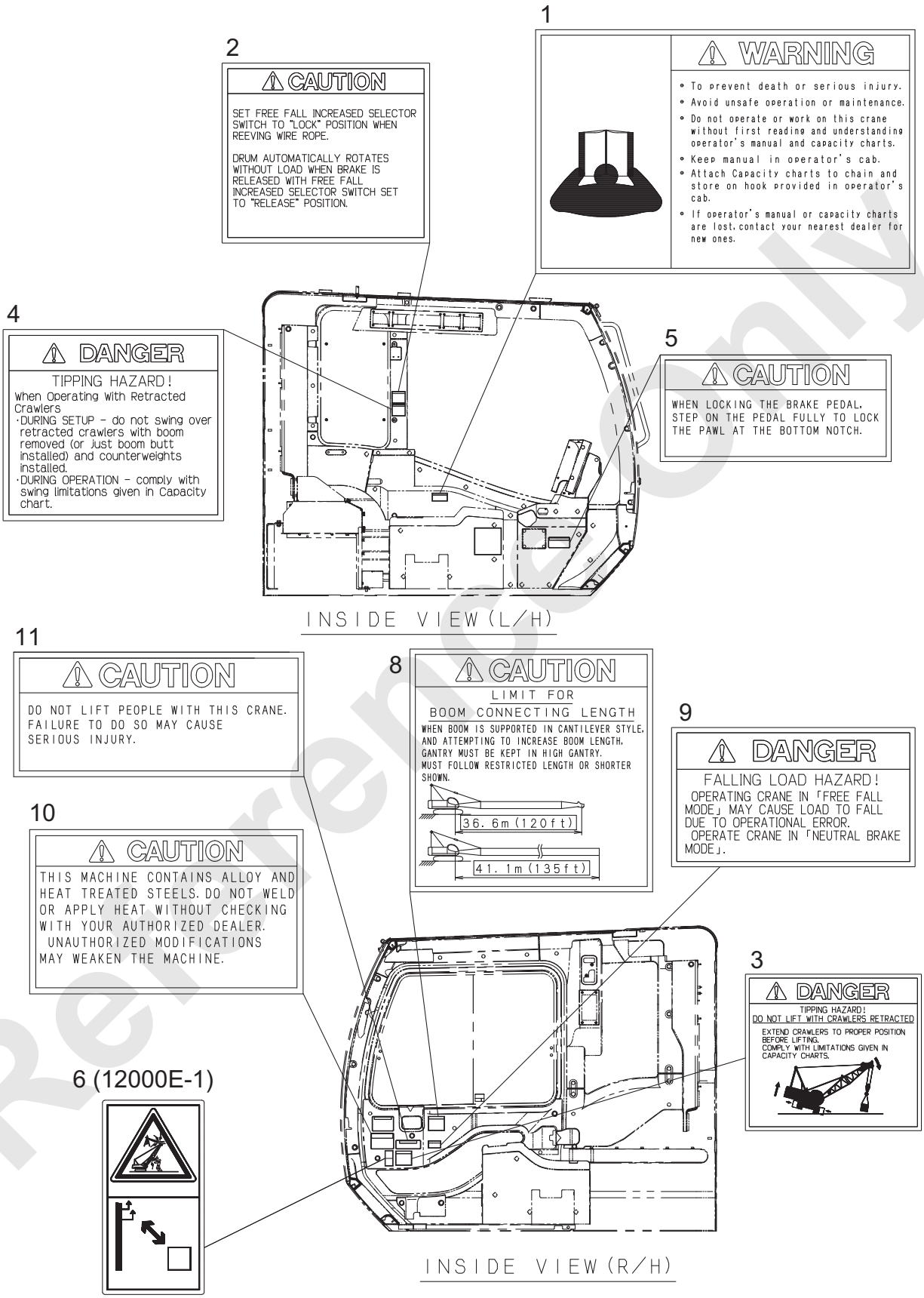
Since the warning labels are installed in the machine and indicated with the three stages in the same way as the warning description, confirm the positions and contents of all warning labels first.
Put them to the practical use to secure safety when operating, checking and performing maintenance.

HANDLING OF WARNING LABELS IN THE MACHINE

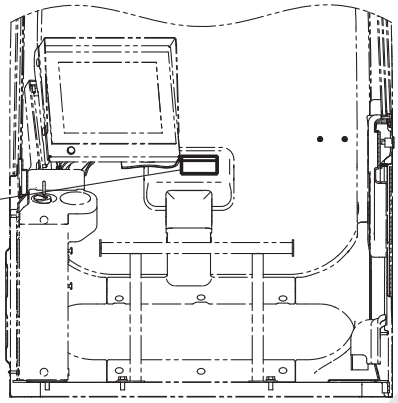
1. When the warning label is damaged or stained, order it to the designated service shop.
2. Do not remove the warning labels.
3. When the surface of the warning label is soiled and difficult to be seen, wipe it cleanly.

LABEL LAYOUT

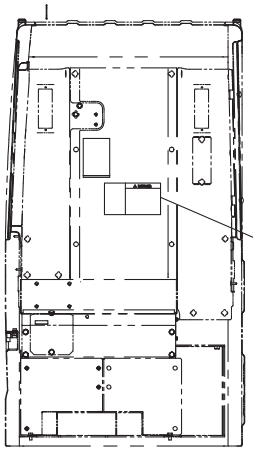
* Numbers in the drawings correspond with those in the label explanation detail after P.0-15.



32 (12000E-1)

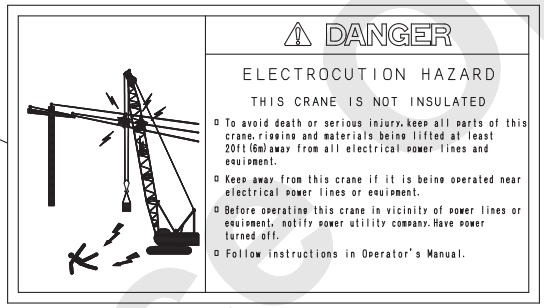


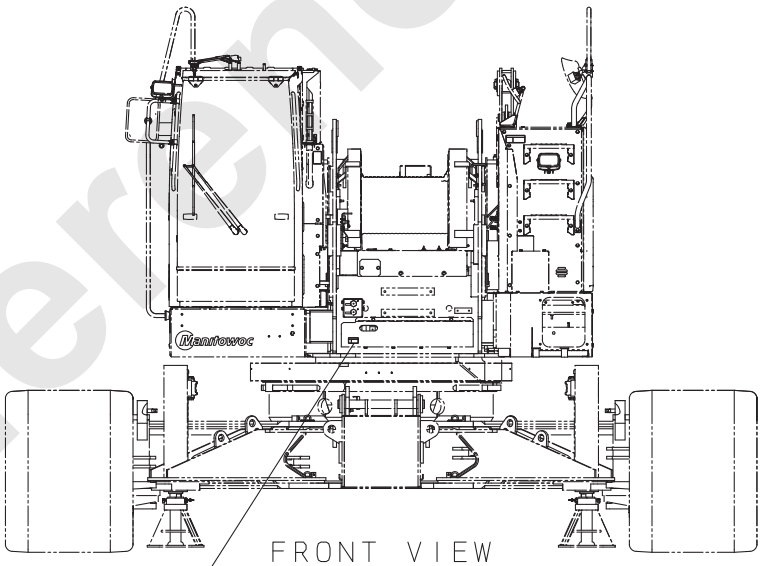
INSIDE VIEW
(FRONT)



CAB INSIDE VIEW
(REAR)

6





FRONT VIEW

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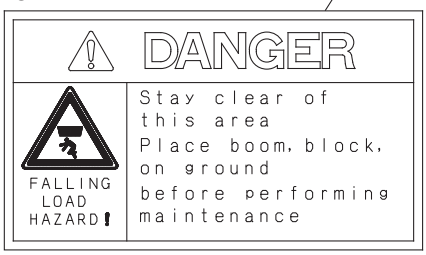
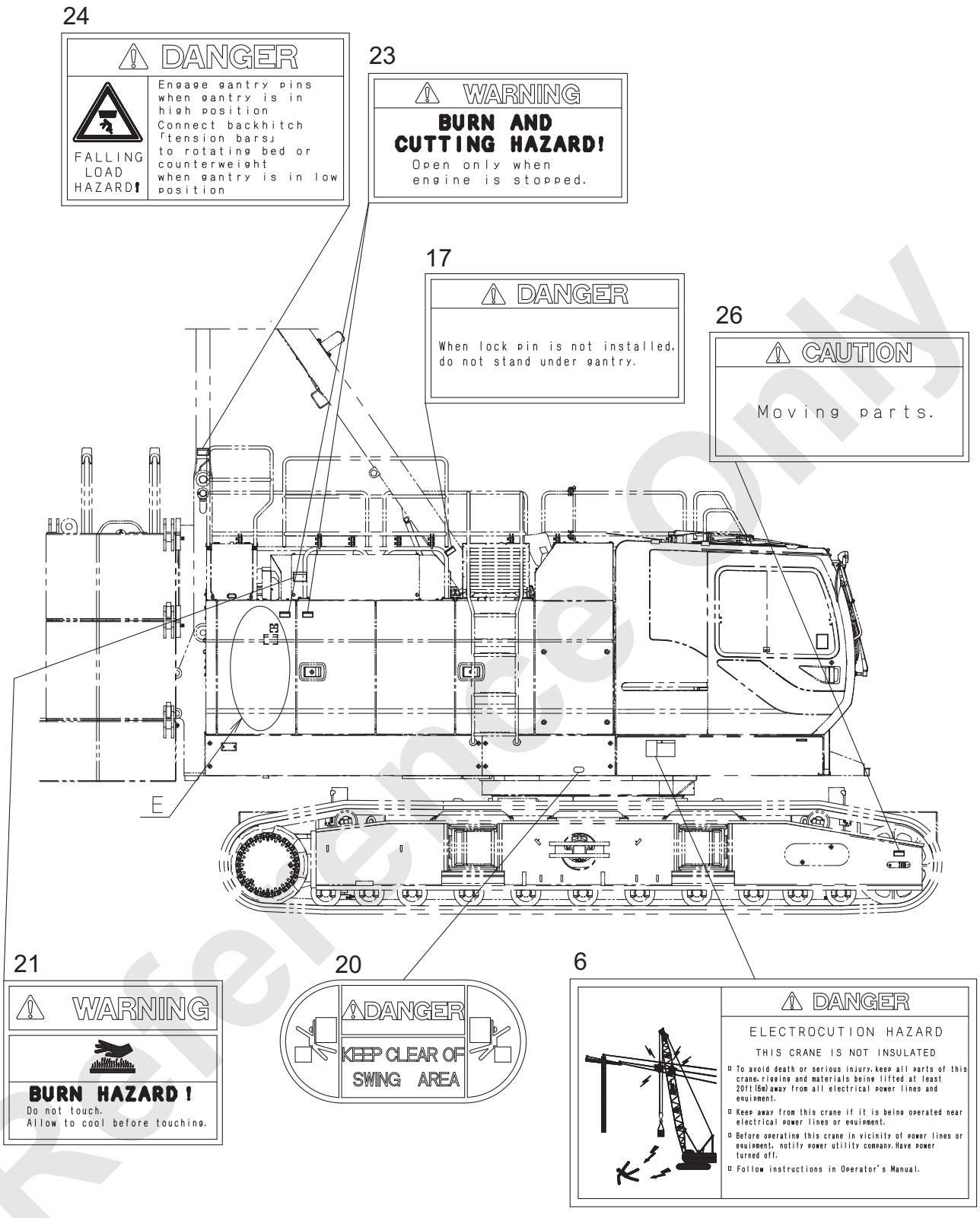
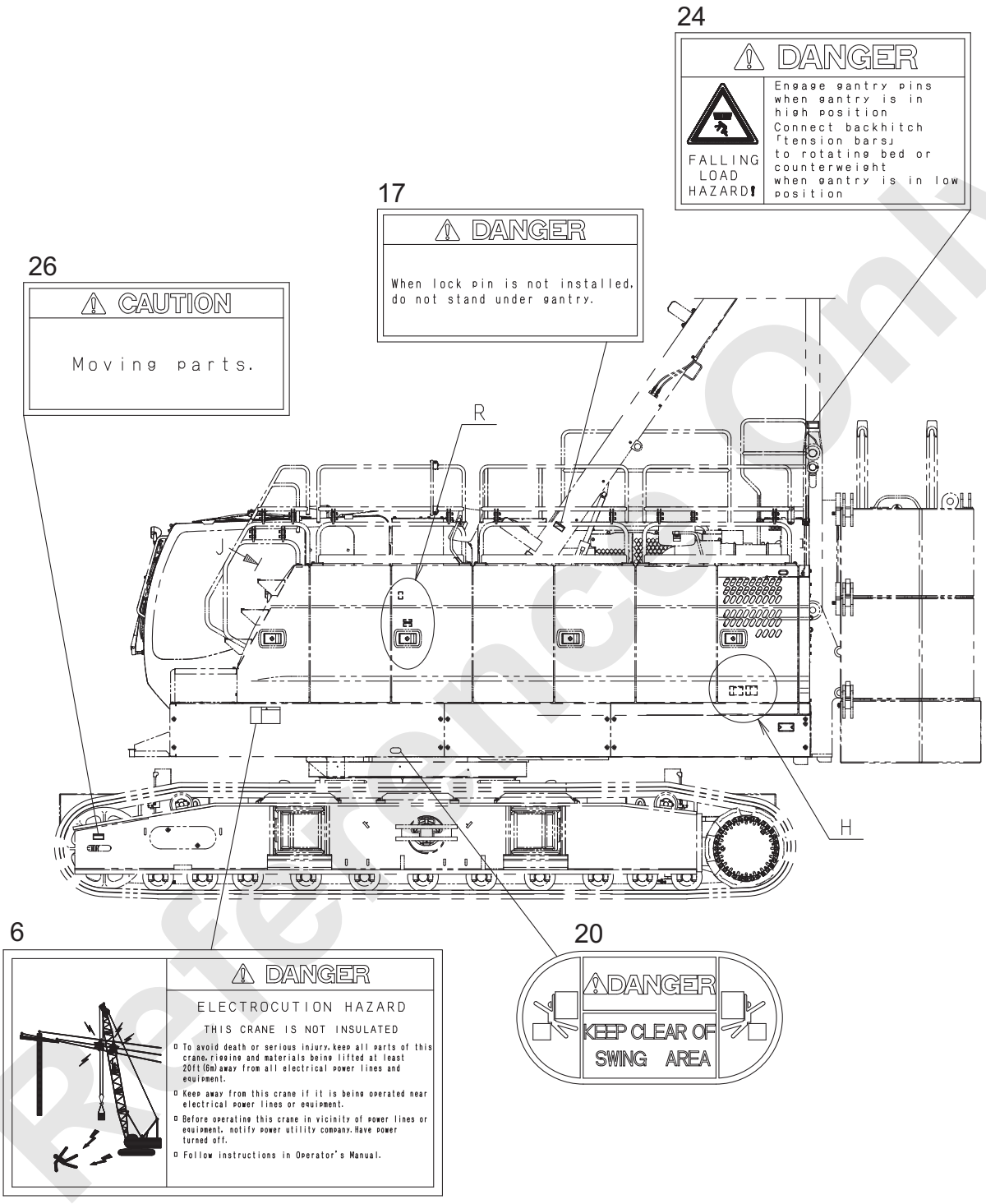
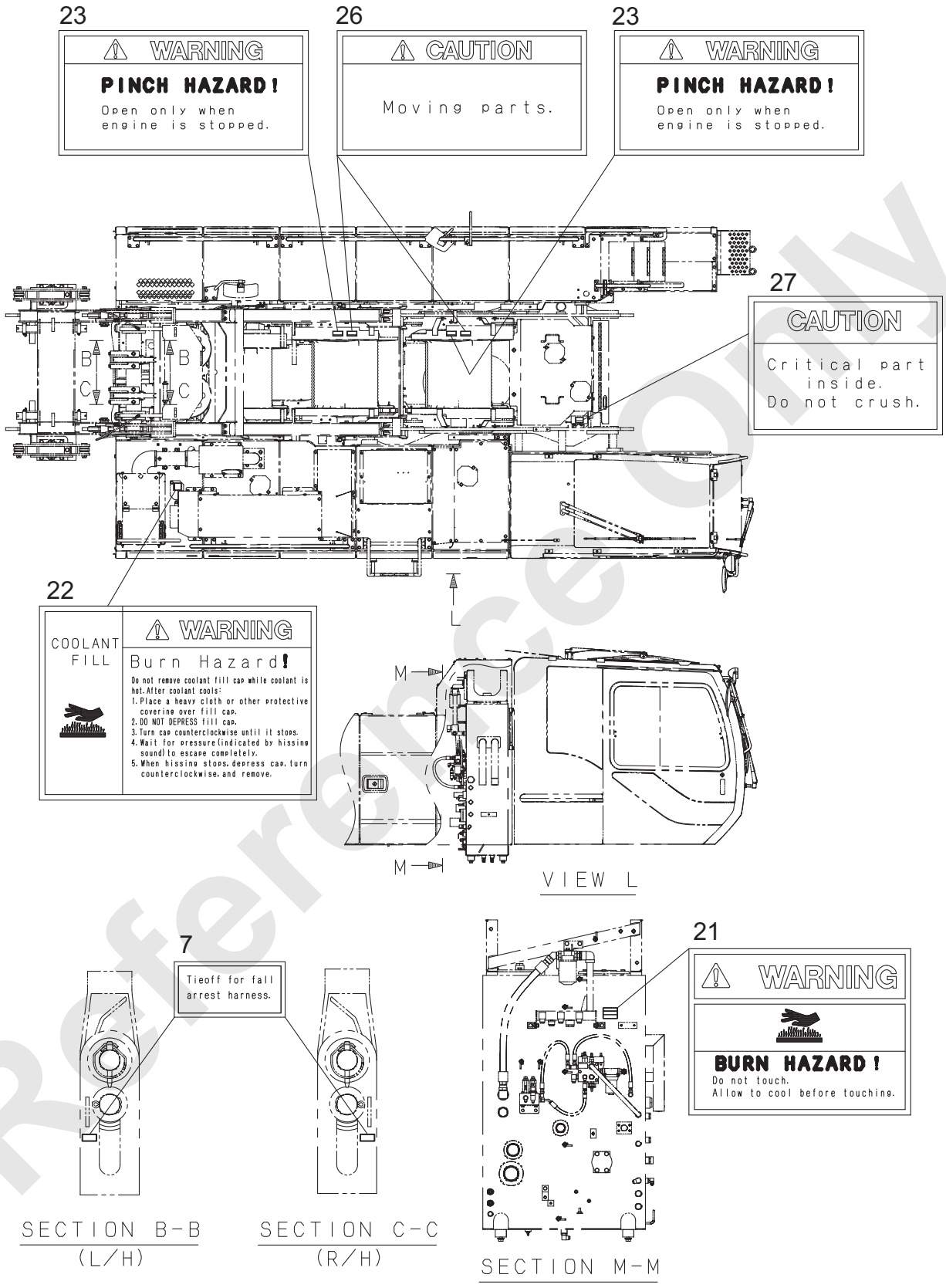
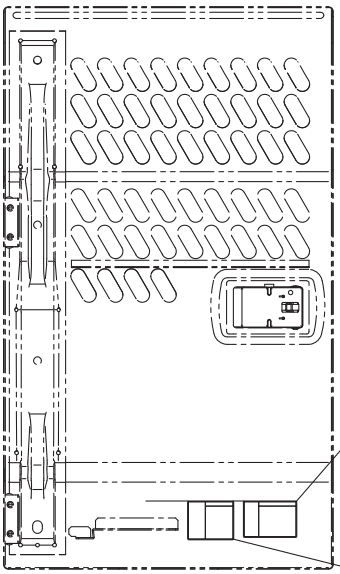








DETAIL H
(BATTERY)



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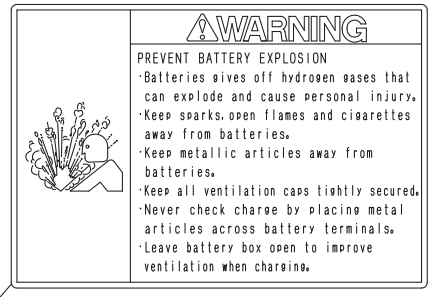

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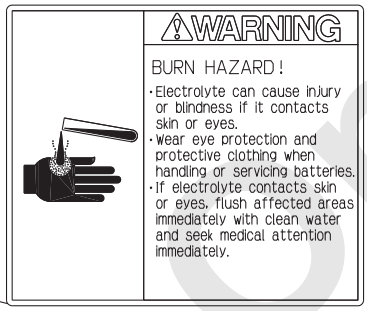

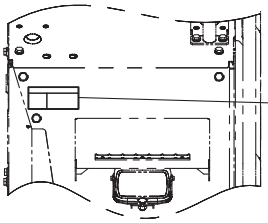

VIEW J

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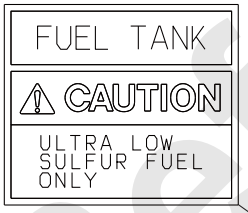
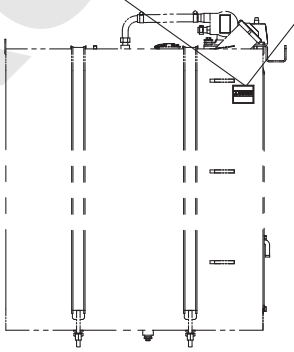
15 (12000E-1)

15 (12000-1 W/ J08-UV ENGINE)



16 (12000-1 W/ J08-VM ENGINE)



DETAIL R
(FUEL TANK)

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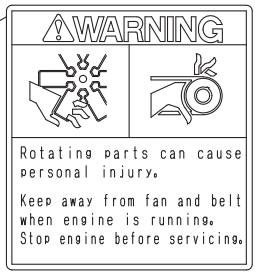

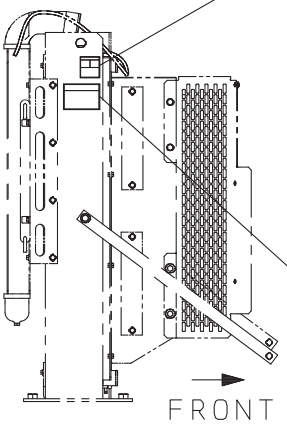

DETAIL E
(RADIATOR)

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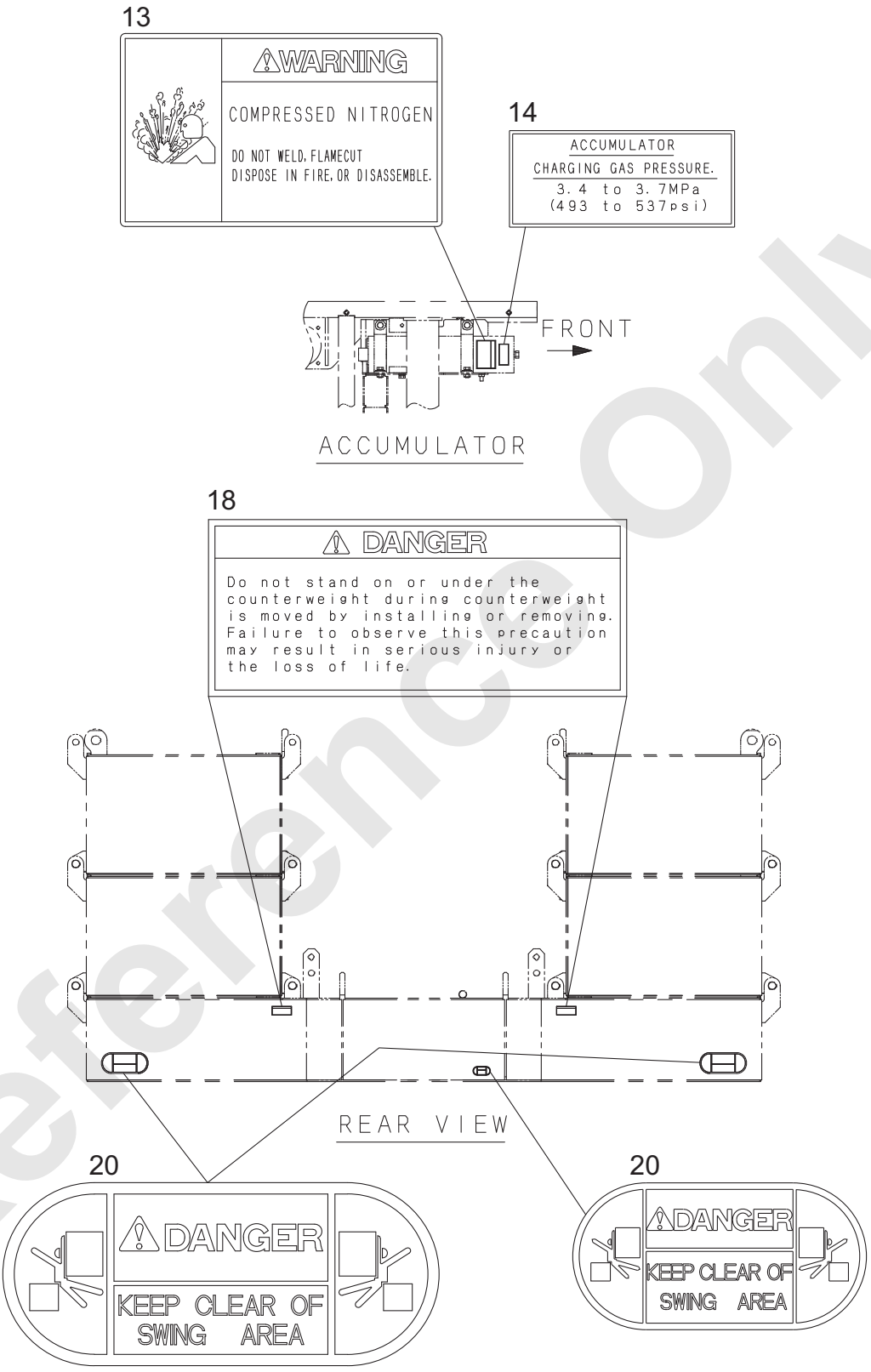

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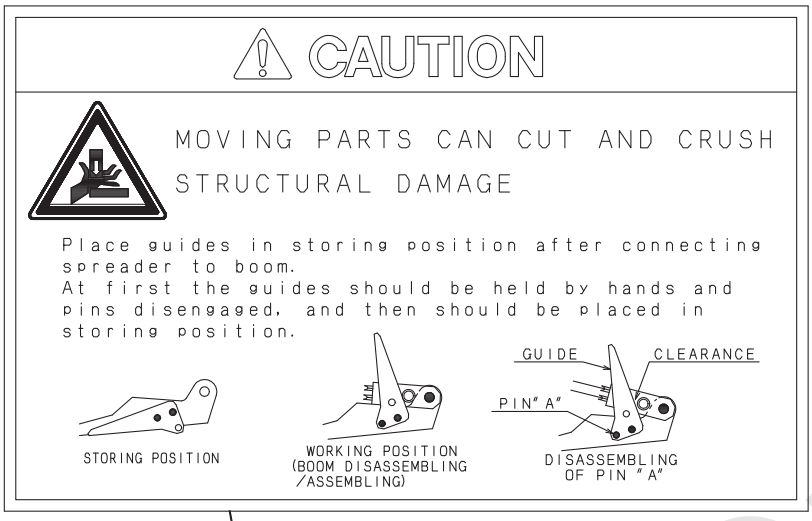

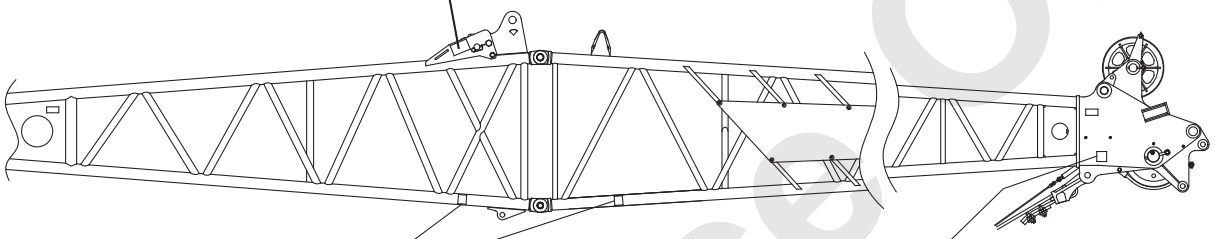

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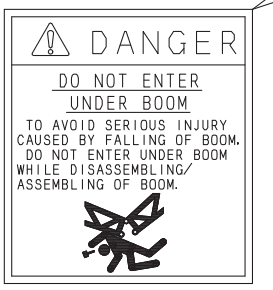

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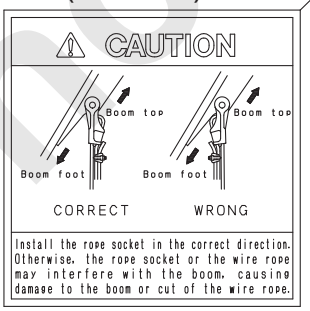

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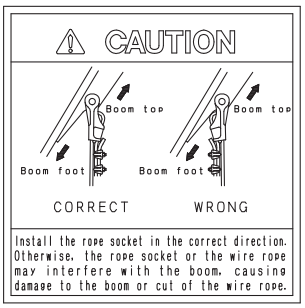

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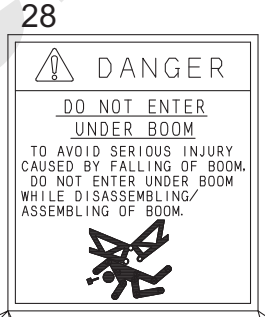
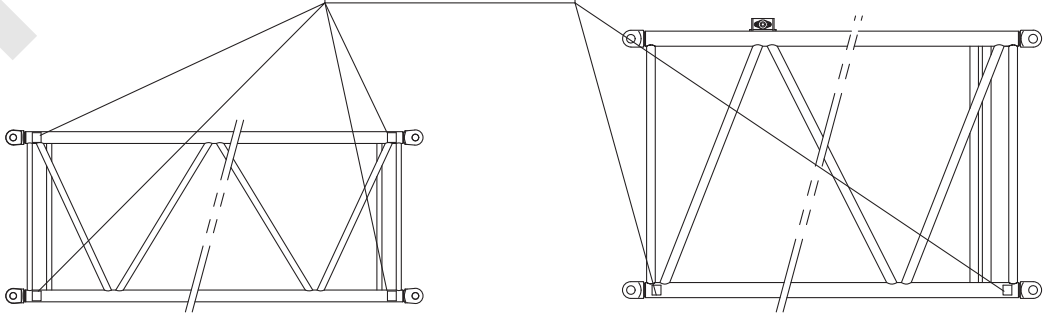
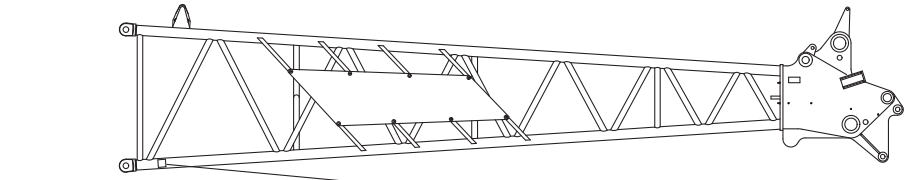




BOOM INSERT

BOOM INSERT



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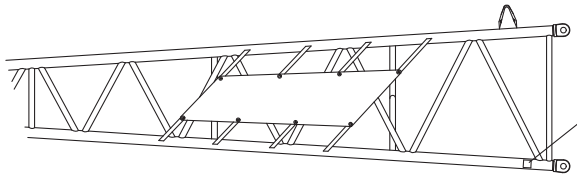

UPP JIB

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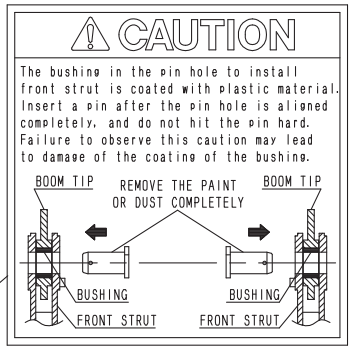

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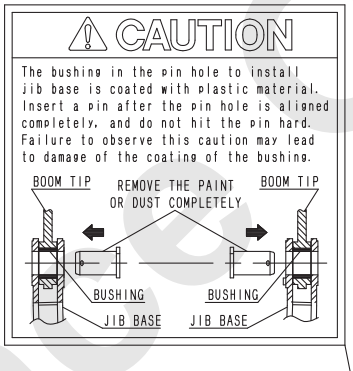
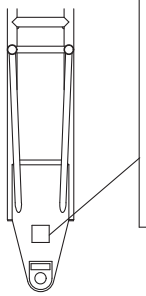
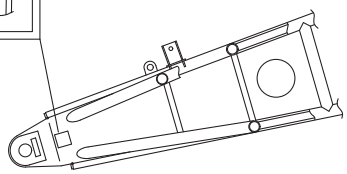


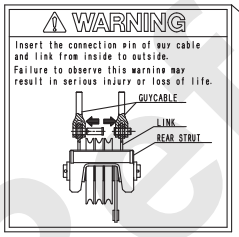


VIEW FROM INNER OF FR. STRUT



VIEW FROM INNER OF LOW JIB

41



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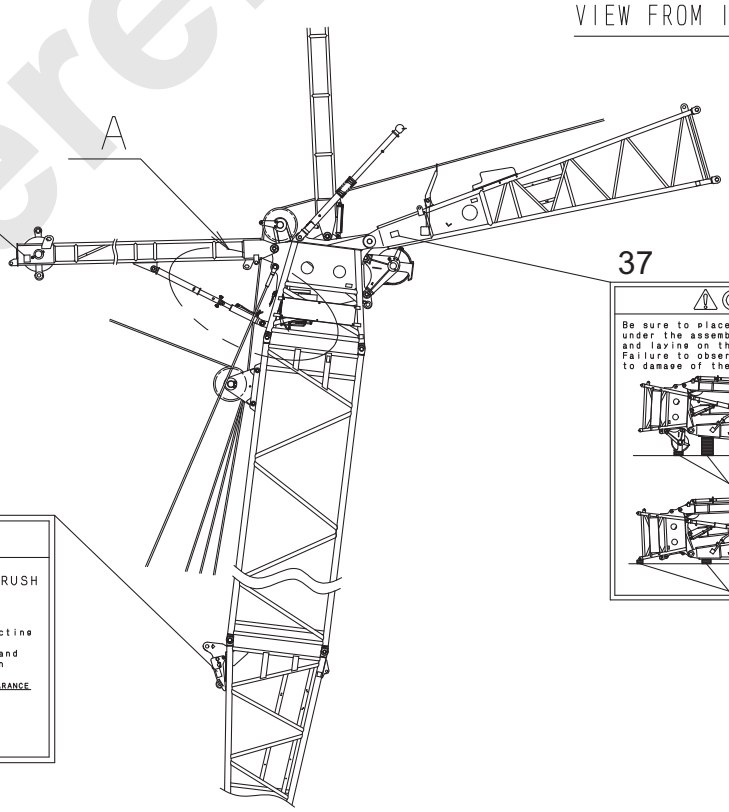

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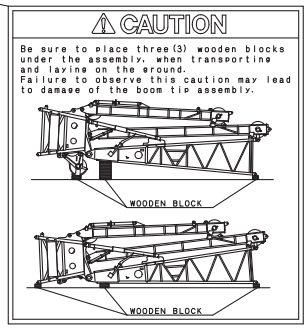

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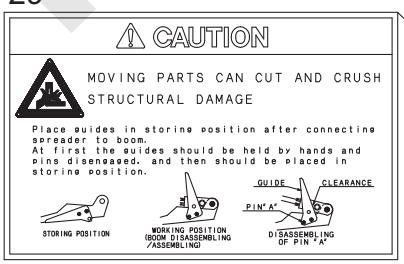

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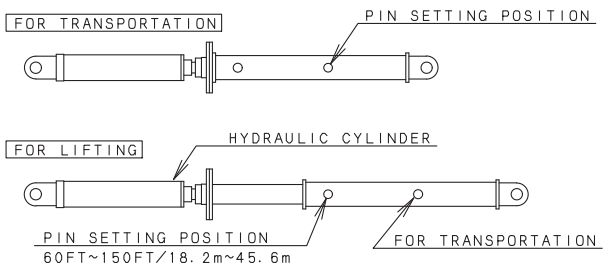
⚠ WARNING

SET THE STRUT BACKSTOP PIN IN THE CORRECT POSITION AS INDICATED. FAILURE TO DO SO WILL RESULT IN DAMAGE TO THE STRUT BACKSTOP, BOOM, JIB, AND/OR THE STRUTS.

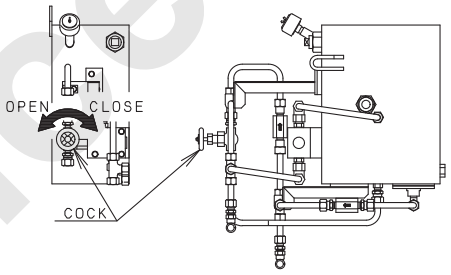
STRUT BACKSTOP PIN SETTING POSITION



40

⚠ WARNING

·Open the Cock on the hydraulic tank to make allow the strut backstop cylinders to freely extend or retract when installing the cylinders to the taper boom or dismantling the cylinders from the taper boom.
·Securely Close the Cock on the hydraulic tank after installing the strut backstop cylinders to the taper boom and keep the cock closed during crane operation, otherwise the Jib may pulled over. Failure to observe this warning may result in serious injury or loss of life.



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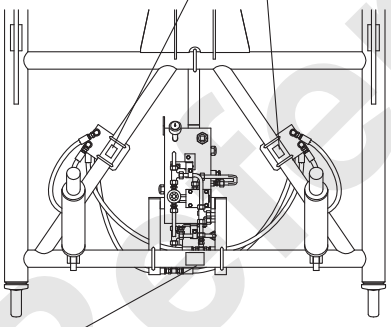
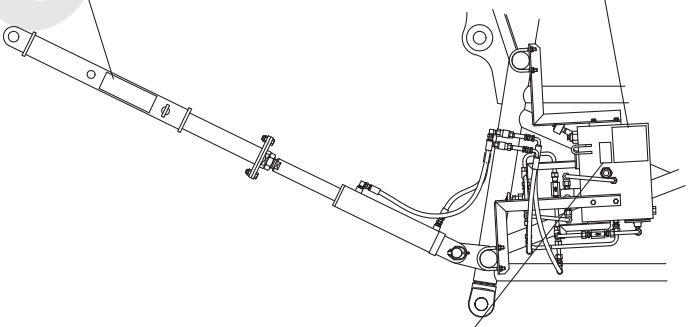
⚠ CAUTION

CONFIRM TO JOIN COUPLER SURELY





DETAIL A

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⚠ DANGER

CLOSE THE COCK ABOVE TANK SURELY. IF THE COCK IS OPEN, IT IS IN DANGER OF JIB OVERHOISTING BECAUSE OF CYLINDER SHRINKING

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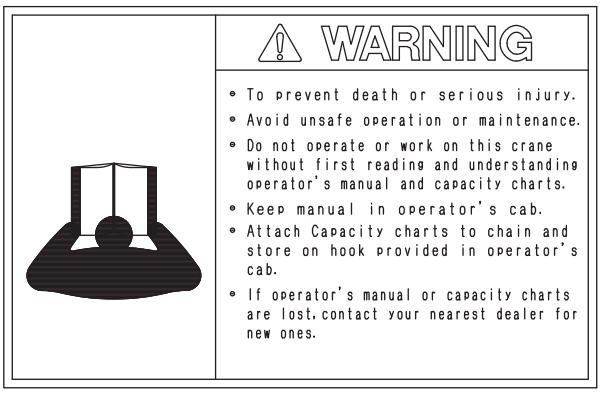
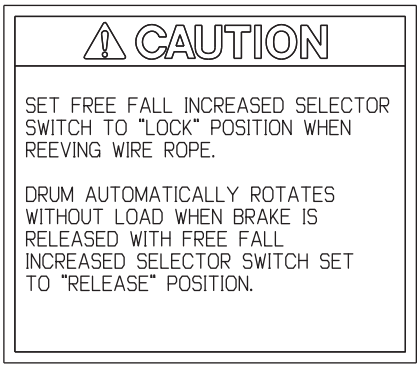
⚠ CAUTION

1. CHECK THE OIL FOR PROPER LEVEL BEFORE BOOM ERECTION TO PREVENT OVER FLOWING AND/OR MALFUNCTION.
2. PROPER OIL LEVEL IS CENTER OF GAUGE AFTER THE CYLINDER FULLY RETRACTED.

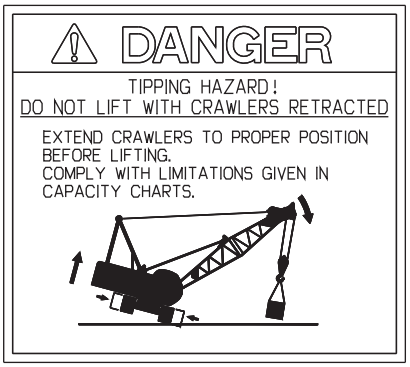
1. Ensure to read the operators manual before operation / handling, assembly, / disassembly, transportation, inspection / maintenance of the machine.



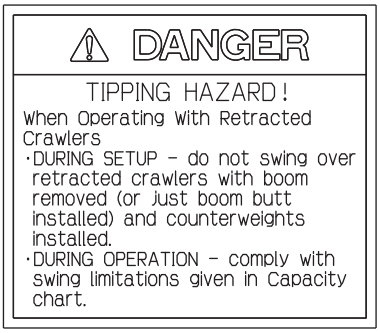
2. If the free fall speed select switch is in speed increase side and the brake is released and the drum may rotate automatically to lowering side even without lifting load and wire rope may be paid out to lower the hook and rough spooling may be caused. When paying out the wire rope from the drum, ensure to set the free fall select switch to normal side.



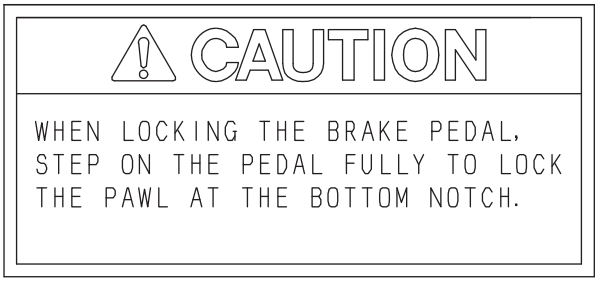
3. The crane may turn over during work based on machine condition.
Install the proper amount of the counterweight and secure them to make proper machine configuration.



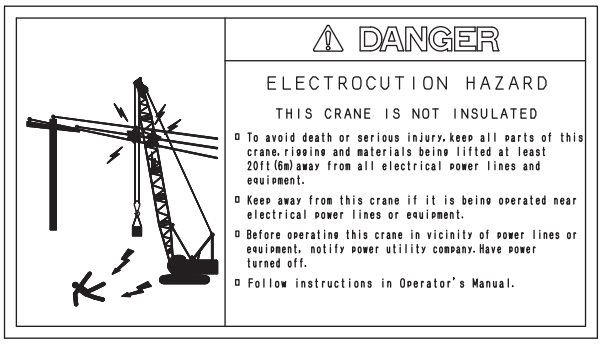
4. If machine swings or is assembled / disassembled with crawler retracted, main machinery may turn over to rear side.
Read the operator's manual carefully and set the crane to the proper configuration.



5. If the brake pedal lock is not completely engaged, lifting load or hook may be lowered unexpectedly and is very dangerous.
   When locking the brake pedal, press the brake pedal fully and confirm that the pedal is locked completely.

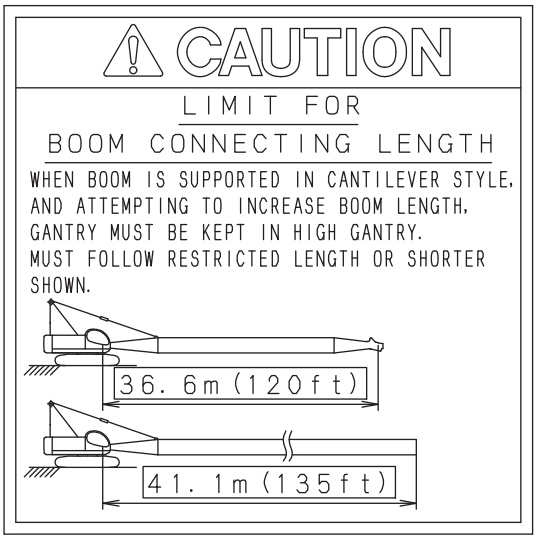


6. During crane work if the boom comes too close to the tower or power lines, electric shock may hit the crane.
   Keep the boom away from the tower or power lines for safety.

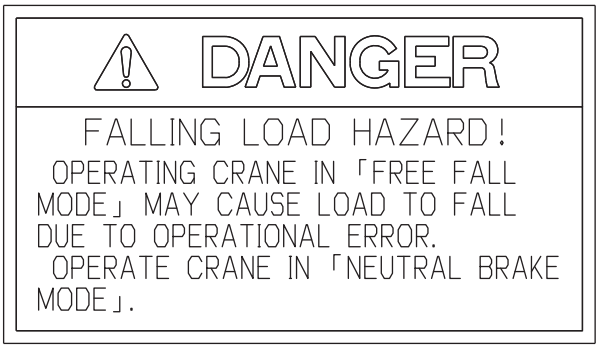


7. When work is done on the upper surface of the guard or counterweight, person may fall off by mistake.
   Ensure to engage the safety hook on the specified place.

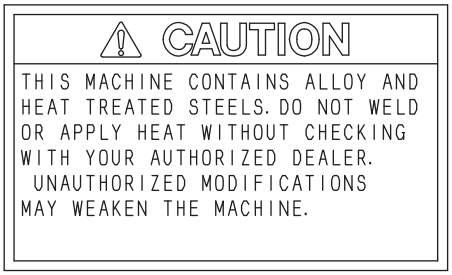
8. When the boom is assembled, disassembled, boom self erection / self lowering or crane work with the low gantry, the gantry or boom may be damaged and may fall off.
   Raise the gantry to the proper position for work.



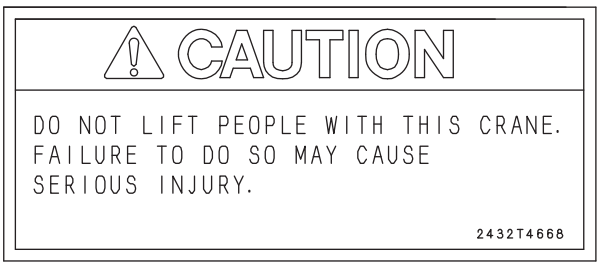
9. Free fall work of load may cause dropping the load by mishandling.
   Use power lowering of load in the crane work.
   (Even on neutral free side, power lowering is possible by turning the lever to lowering side.)



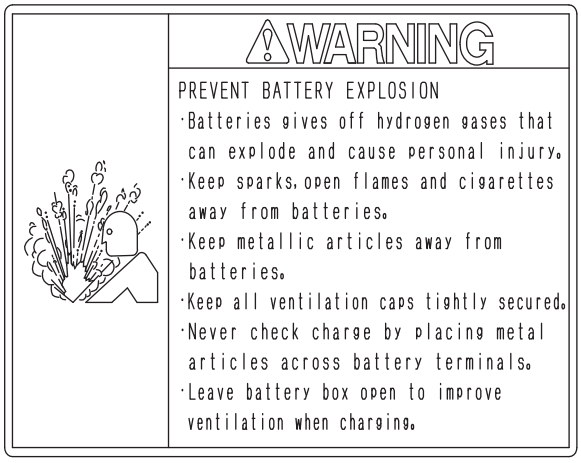
10. This machine contains alloy and heat treated steels.
    Do not weld or apply heat without checking with your authorized dealer.
    Unauthorized modifications may weaken the machine.



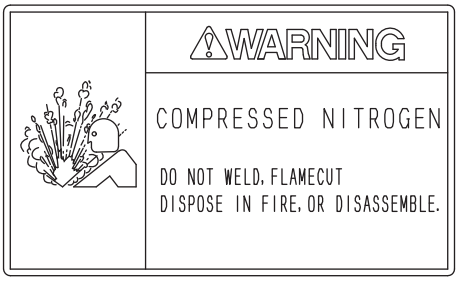
11. Do not lift people with this crane.
    Failure to do so may cause serious injury.



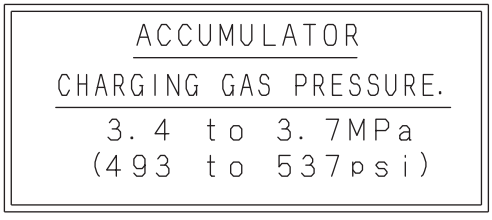
12. Wrong handling of battery may cause burns, blindness or explosion by inflammation.



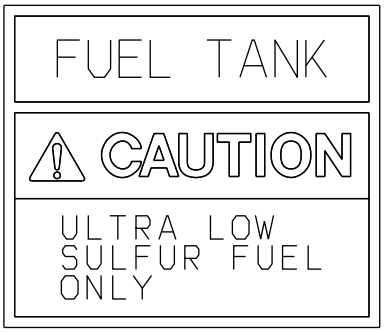
13. If accumulator is handled in wrong way, burns, loss of eyesight, explosion may be caused.
Take extra care in handling accumulator.
(Do not weld, flame cut, dispose or disassemble.)



14. The accumulator is charged with high pressure nitrogen gas.
Charge the nitrogen gas within the specified pressure.

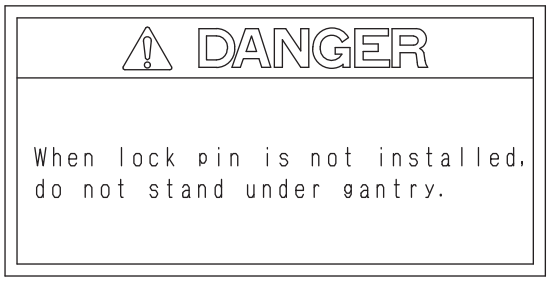


15. Using the engine fuel other than the specified diesel fuel may cause engine failure, fire or explosion.
    Ensure to use the diesel fuel in the fuel tank.
    Use ultra low sulfur diesel fuel only.
    (S50 : sulfur content lower than 50 ppm)

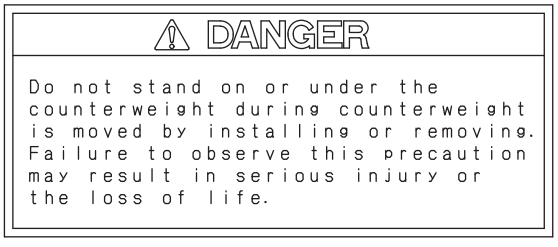


16. Using the engine fuel other than the specified diesel fuel may cause engine failure, fire or explosion.
    Ensure to use the diesel fuel in the fuel tank.
    Use diesel fuel only.

17. During raising the gantry, ensure to insert the gantry fixing pin.
    Otherwise the gantry may come off and the boom may drop off.



18. Handling the counterweight in wrong way is very dangerous.
    Never allow any person to enter under the lifting counterweight.



19. When working on the upper surface of the guard, person may fall off the upper surface of the guard.
During high place work on the upper surface of the guard, do not come close to the guard side face to prevent falling off.
During work on the upper surface of the guard, ensure to wear safety belt and hook the safety belt on the upper machinery and firmly stand on the guard.

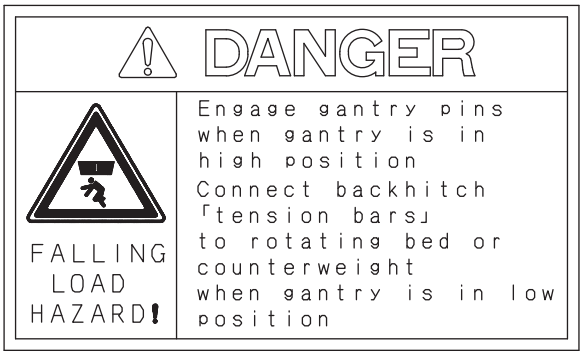
20. While the upper machinery is swinging, person may be crushed with the upper machinery.
Never allow anybody to enter the swing range.

21. During engine running or straight after the engine is stopped, hydraulic oil tank, engine and muffler are hot.
Touching them may cause burns.
Do not touch the hot area.

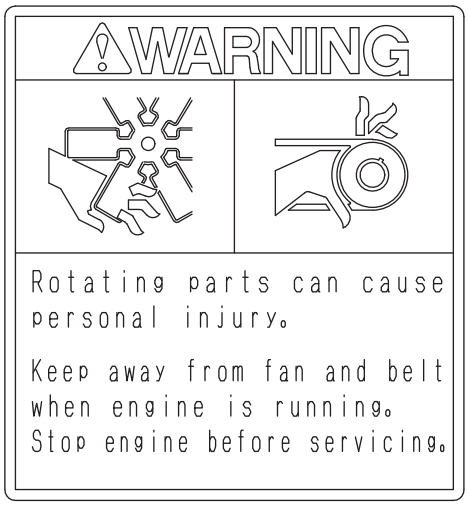
22. During engine running or straight after the engine is stopped, inside of the radiator becomes high pressure and hot.
    Person may get burns by hot water blow out when taking off the radiator cap.
    Take extra care of opening or closing of the radiator cap.

23. When inspection or work is done by removing the drum flange cover, serious injuries may be caused if the drum rotates unexpectedly.
    Stop the crane and then remove the drum cover.

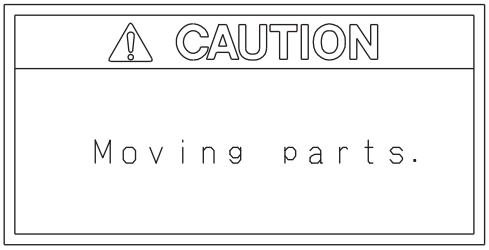
24. When the machine is transported with the low gantry, connect the tension bar to the revolving frame or counterweight.



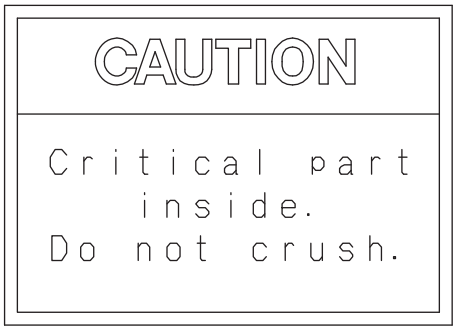
25. When working on the engine area for inspection and maintenance, person may be entangled with the fan belt and may get injured if the engine is running.
    Stop the engine when inspection or maintenance work is done.



26. There are some moving parts near.

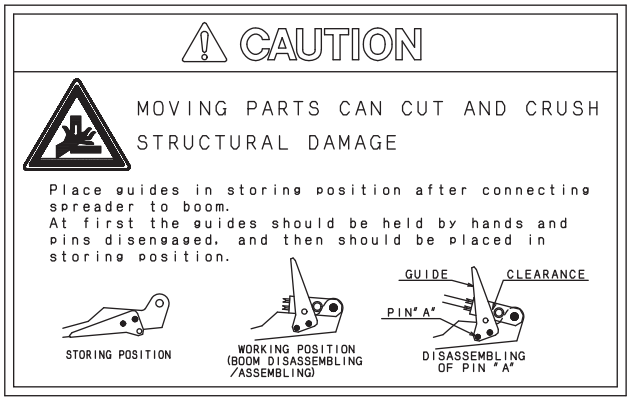


27. This is a connector cover of electrical wiring of safety device.
    Do not step on and crush.

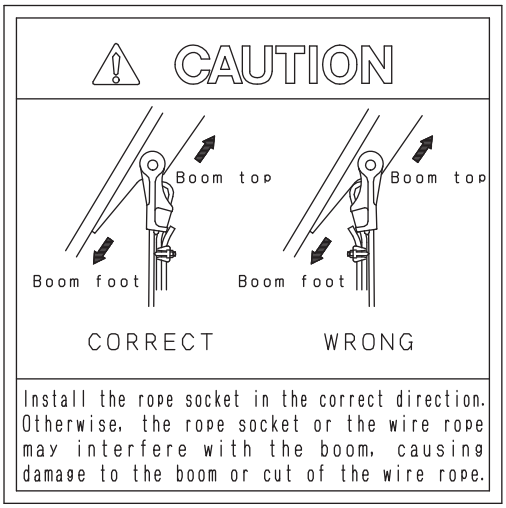


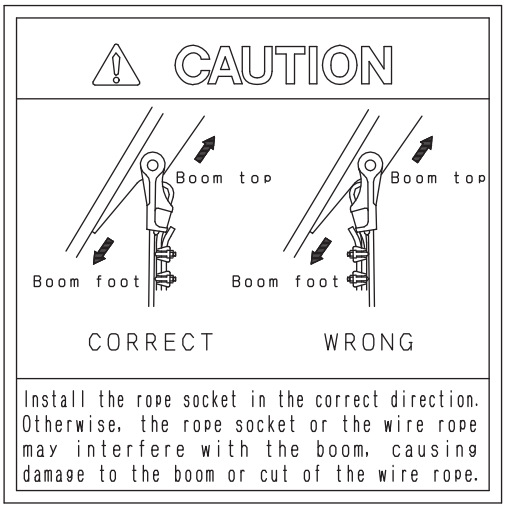
28. Taking wrong procedure in boom assembly or disassembly may cause boom falling off and person may get injured.
    Do not allow any person to enter the inside or under the boom during assembly or disassembly.

29. Taking wrong method in using the spreader guide installed on the boom base may damage the spreader guide.
    Set the spreader guide to the stowing position except when the upper spreader is connected is connected to the boom base.

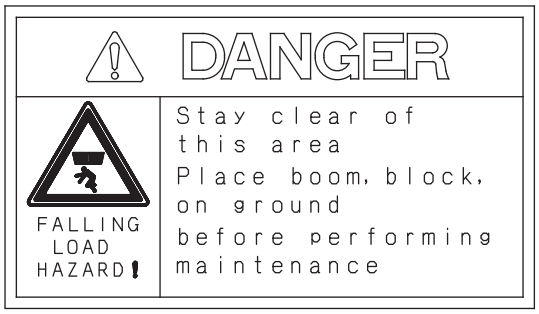


30. Taking the wrong installing direction when the rope sockets are installed to the boom tip and jib tip, may damage the boom or may break the wire rope.
    Install the rope socket in the proper direction.

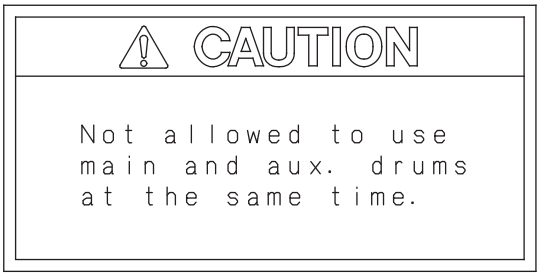




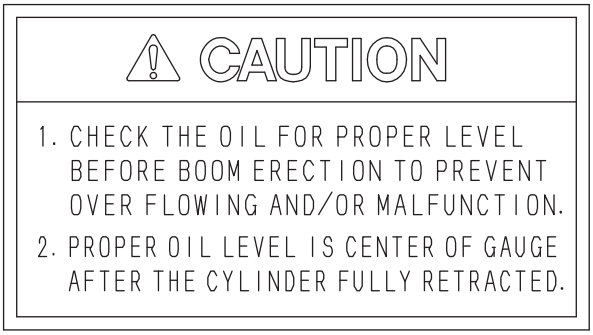
31. Free fall work of load may cause dropping the load by mishandling.
    Use power lowering of load in the crane work.
    (Even on neutral free side, power lowering is possible by turning the lever to lowering side.)



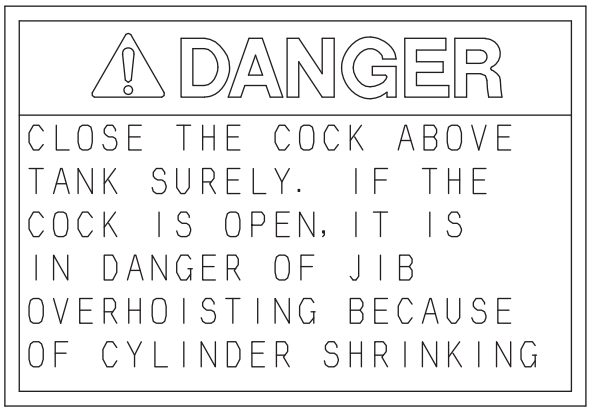
32. Simultaneous control of the front and the rear drum may results in serious accident.
    European regulation (EN13000) do not allow simultaneous control of the front and the rear drum.



33. If the oil level of the oil tank is not correct, oil overflow or malfunction may be caused.
    Check the oil level in the oil tank for proper level before raising the boom.
    If the oil level is in the center of level gauge under the cylinder fully retracted condition, the level is correct.

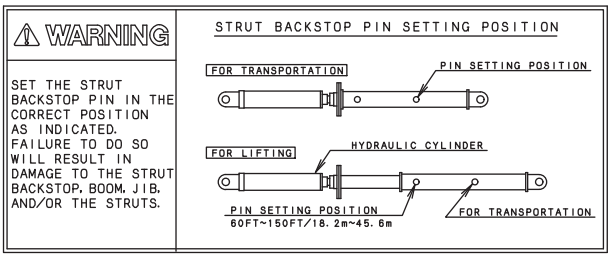


34. If the cock of the oil tank is open, the cylinder may retract and the jib may be over hoisted causing very dangerous condition.
    Ensure to check that the oil tank cock is closed firmly.

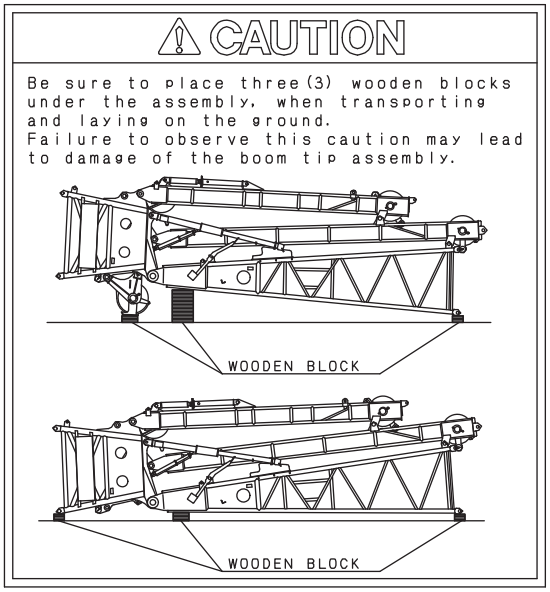


35. If connection of the hyd. coupler is not tight enough, the strut backstop may be damaged.
    Ensure to connect the piping coupler firmly.

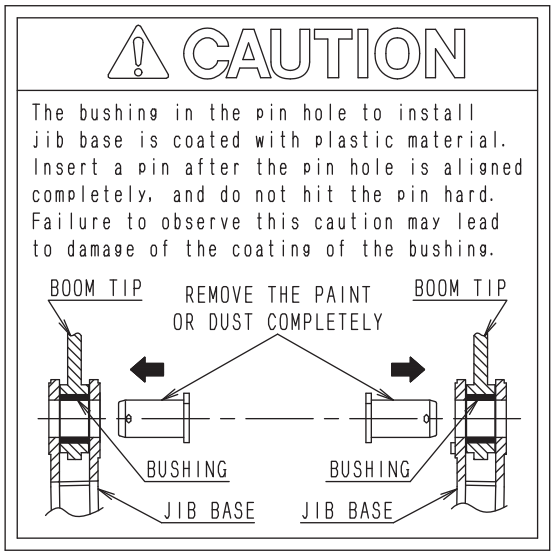
36. If the strut backstop pin is set in the wrong position, the strut backstop, the boom, the jib or the strut may be damaged and it may cause serious accident.
    Ensure to set the strut backstop pin in the proper position as shown.



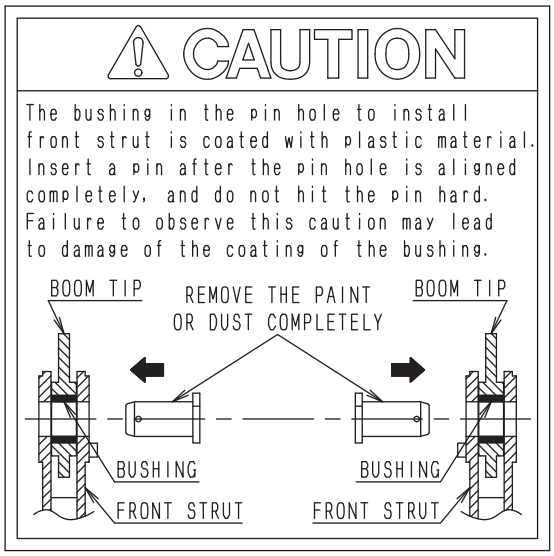
37. If the boom top is not placed properly, the boom top may be damaged.
    When the boom top or jib base are transported or placed on the ground, ensure to place three (3) wooden blocks under the boom top assembly as shown.



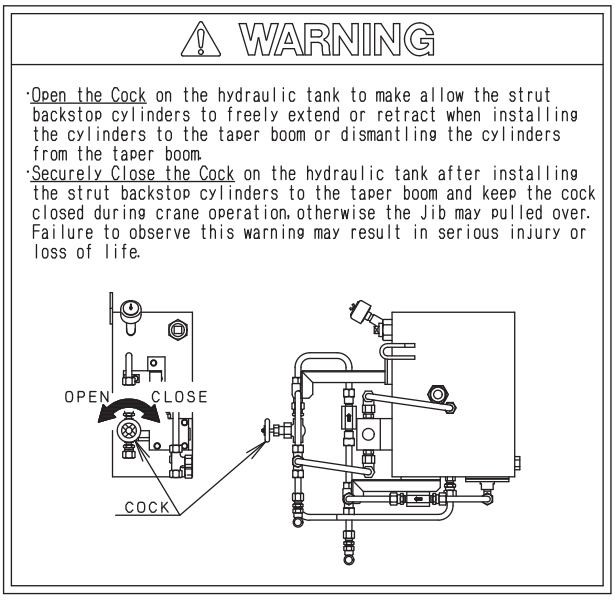
38. Inserting the installation pins of the jib base forcibly or by hitting hard may damage the bushing of the pin hole.
    Ensure to align the installation pin holes of the jib base and then insert the pins by lightly hitting.



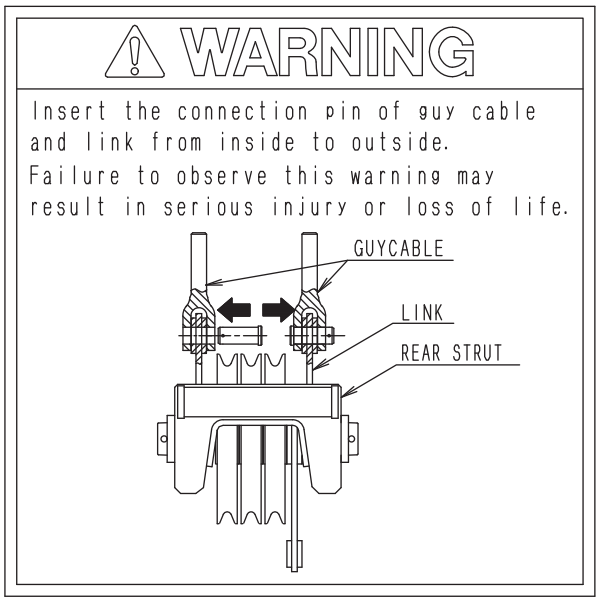
39. Inserting the installation pins of the jib base forcibly or by hitting hard may damage the bushing of the pin hole.
    Ensure to align the installation pin holes of the jib base and then insert the pins by lightly hitting.



40. If a mistake is made in opening or closing the oil tank cock, the strut or backstop may be damaged causing a dangerous condition.
    When installing or removing the cylinder from or to the taper boom, ensure to open the oil tank cock.
    Ensure to close the oil tank cock when the crane operation is to be done after the cylinder is installed to the taper boom.



41. Inserting the connection pin of the guy cable from outside of the link to inside may cause interference between the connection pin and the hoist rope. This may result in premature wear of the connection pin or falling off of the pin and is very dangerous.
    Ensure to insert the connection pin from inside of the link.



CAUTION LABEL

- Keep the caution label in good condition to read.
- Whenever they become dirty, wash them with water or detergent.
- Whenever they are damaged or missed, replace them with the new and same ones.

PRECAUTIONS FOR INSPECTION AND MAINTENANCE

1. Service and maintenance must be performed only by authorized personnel who are qualified in compliance with a relevant law or regulation.
2. Regular maintenance or inspection should be quickly performed after shutting down the machine and ensuring safety to personnel and equipment.
   Post an "INSPECTION IN PROGRESS. DO NOT START." warning sign on a readily visible location.

GENERAL SAFETY PRECAUTIONS

1. Wear safety shoes, helmets and clothing suitable for the job. Also use protective goggles, mask, gloves, etc., as required.
2. To ensure safe and correct maintenance, carefully study this SHOP MANUAL and get fully familiar with the instructions in it.
3. Place the machine in a safe place. Always maintain safe clearance around the machine.
4. Before starting crane operation, hold a safety meeting. Also, make agreement on standardized hand signals.
5. When inspecting or handling the battery or oil, do not use exposed flame nearby.
   To avoid fire accident, only use explosion-proof lighting equipment.
6. Start an inspection or maintenance work only after shutting down the engine.
7. Certain machine components remain hot immediately after the engine is shut down. Do not touch them.
8. Before removing the radiator cap, wait until the coolant water gets sufficiently cool. Next, carefully loosen the cap and release radiator pressure, and them remove the cap.
9. Before inspecting or maintaining an electrical system on the machine, turn the power off the machine by, for example, disconnecting the battery cables.
10. When working at a high lift area, always wear a safety belt.
11. When leaving the operator's cab for an inspection or maintenance work, post an "INSPECTION IN PROGRESS. DO NOT START." warning sign on a readily visible location. Also, lock the cab for security.
12. Before starting a cleaning or lubrication work on the machine, always shut down the engine.
13. Use genuine Manitowoc replacement parts and oils only.
14. Always keep the oil containers clean. Protect them against ingress of dust or moisture. Also, fill clean, fresh oils only.
15. Once a maintenance work is complete, clean the machine.
    Protect grease nipples, breathers, and oil level gages against ingress of dust.
16. Clean the inspection area to allow detecting faulty such as oil leak, crack or looseness easily if existed.
17. During car washing, do not allow high pressure steam to be directly applied to electrical components and connectors.
18. After removing O-rings, oil seals, gaskets, etc., clean the mounting seats. Then, install new O-rings, oil seals, gaskets, etc. Also, ensure to thinly apply oil to the seal faces of these parts before installation.
19. Before disconnecting pressurized piping, release the inside pressure.
20. CAUTIONs for repair work with welding: Turn OFF the key switch and disconnect the negative terminal on battery to power off the electrical circuit. Provide grounding within 1 meter from a weld area and remove electronic components (for example, controller) to prevent possible damage.
21. Dispose industrial wastes according to a relevant law or regulation.
22. Be extremely careful during an inspection or maintenance work under the carrier. Remember the possibility of being crashed.
    When jacking up the machine for an inspection or maintenance work, place blocks below to prevent accidental falling.
23. Provide positive ventilation when refilling oils or fuel, rinsing parts, or starting the engine.
24. To remove a heavy component (20kg or heavier), use a crane, etc. Always keep safety in mind.

25. Illegal, unauthorized, or nonconforming modification is strictly prohibited.
26. Do not allow oil or dust to deposit around the engine. Otherwise, fire accident can result.
    Clean the oil or dust adhered to.
27. Place removed attachments and components safely so that they do not drop or fall down.
28. Always use correct tools that have been well maintained.
29. To prevent personnel from being caught by a running fan, belt, shaft etc, shut down the engine before starting an inspection or maintenance work.
30. Battery fluid and oils are harmful to human health. If touching any of these materials, immediately wash it away.
31. When lifting a load with a crane, first confirm that a load is lifted off the ground surely and then continue lifting work.

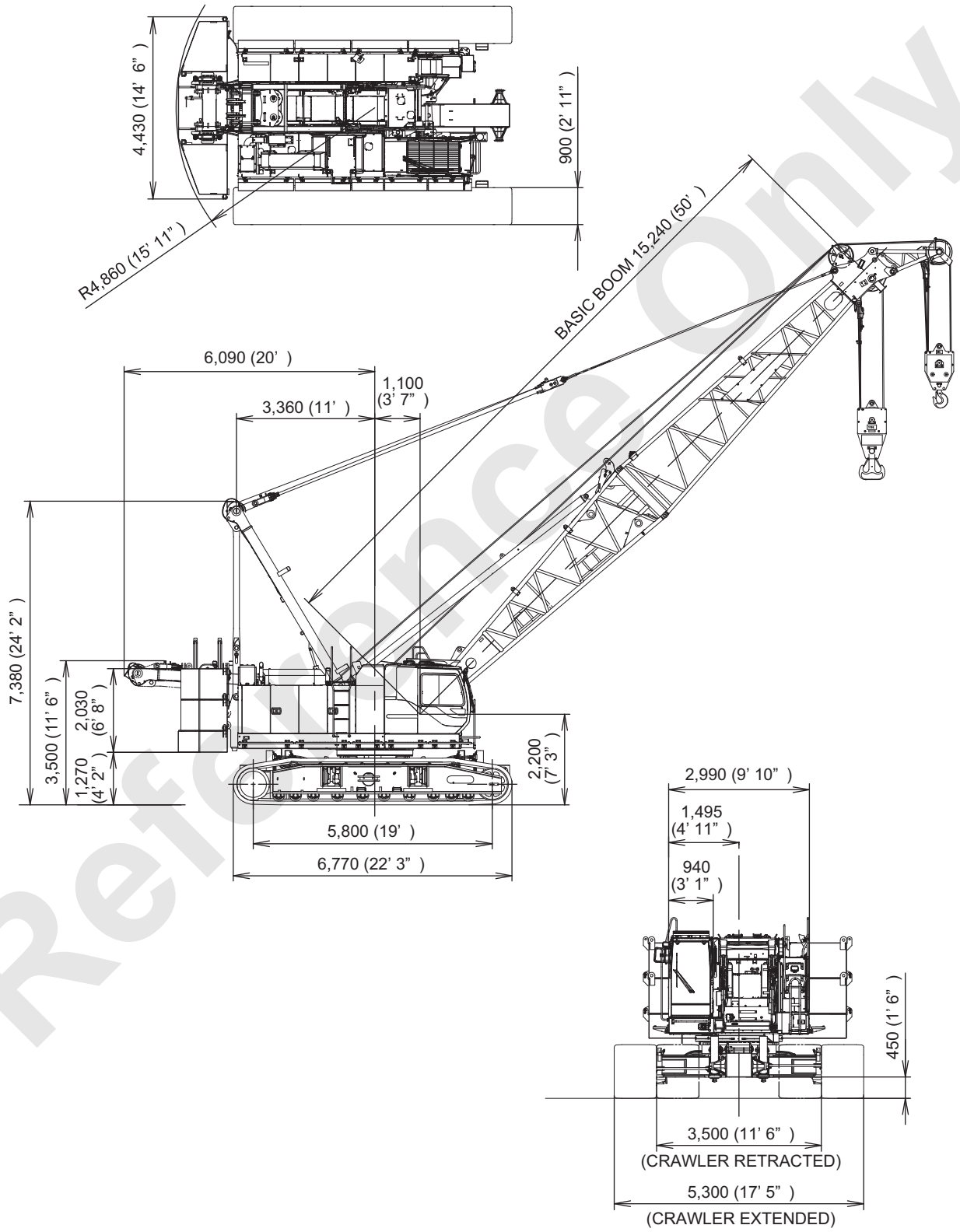
1. REFERENCE MATERIALS

1.1 12000-1 SPECIFICATION

1.1.1 OUTER DIMENSION

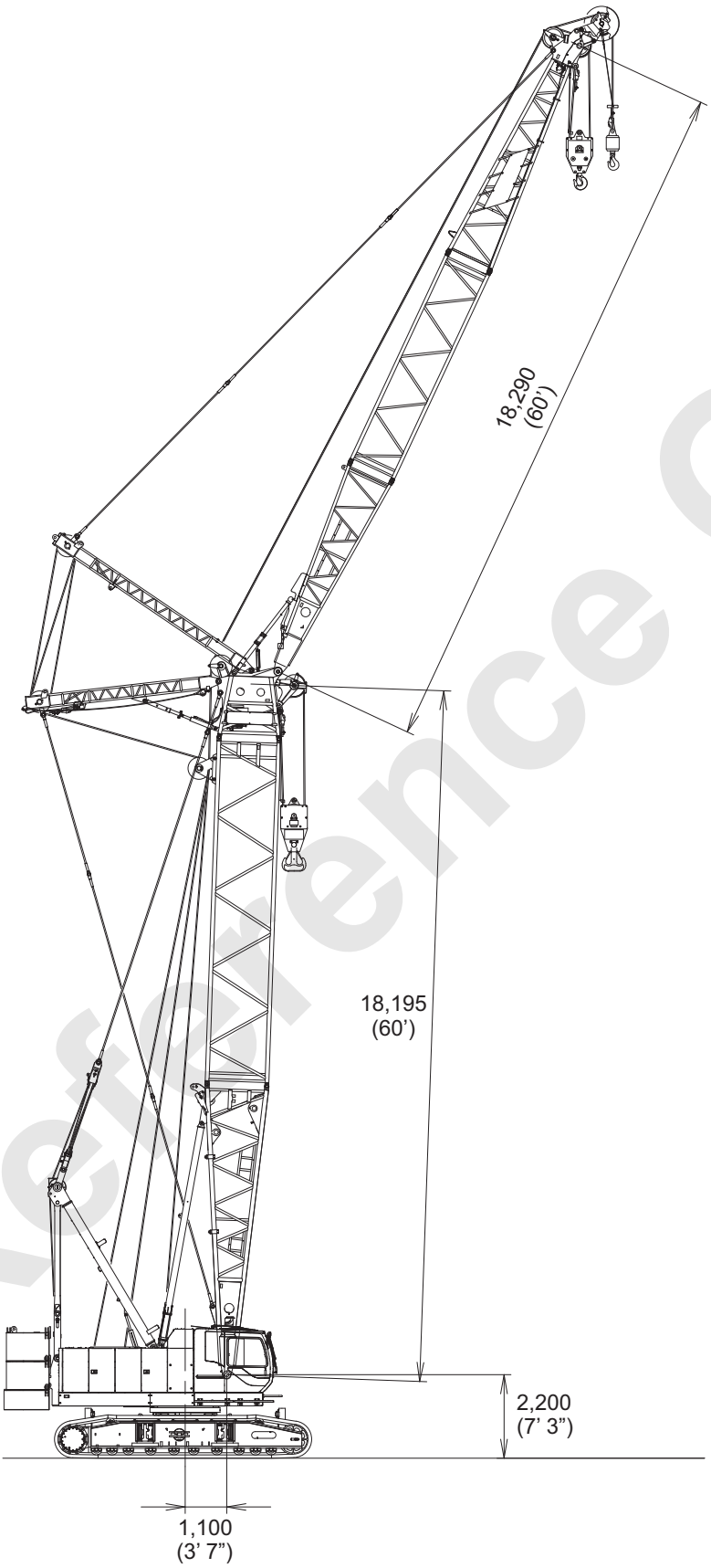
1. CRANE

UNIT : mm (ft-in)



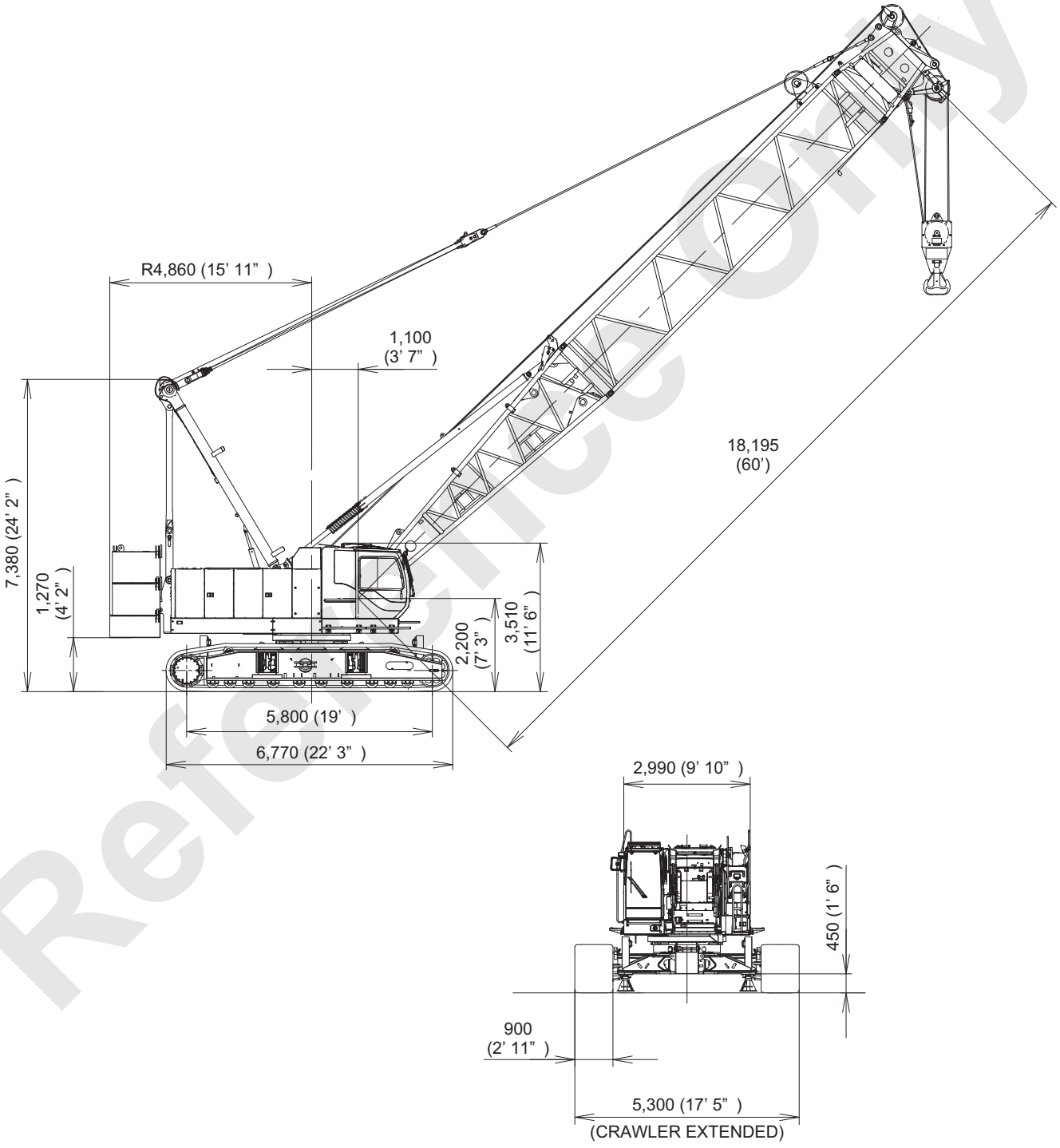
2. LUFFING JIB

UNIT : mm (ft-in)



3. LUFFING UPPER BOOM

UNIT : mm (ft-in)



1.1.2 CRANE SPECIFICATION, PERFORMANCE

- CRANE

Type		Full swing, crawler type		
Max. rated load × work radius		108.9 t × 3.65 m (240,000 lbs × 12 ft)		
Boom length	Basic boom	15.2 m (50 ft)		
	Maximum boom	70.1 m (230 ft)		
	Crane jib	9.1 m (30 ft) to 21.3 m (70 ft)		
	Maximum boom and jib	61 m (200 ft) Boom + 21.3 m (70 ft) Jib		
Work speed (wire rope)	Front / rear hoisting rope speed	120 m/min (390 ft/min)	Wire rope dia.	26 mm
	Front / rear lowering rope speed	120 m/min (390 ft/min)		
	Boom raising rope speed	48 m/min (160 ft/min)		20 mm
	Boom lowering rope speed	48 m/min (160 ft/min)		
	Third hoisting rope speed (Option)	120 m/min (390 ft/min)		26 mm
	Third lowering rope speed (Option)	120 m/min (390 ft/min)		
	Swing speed	3.2 min^{-1} (3.2 rpm)		
	Propel speed	1.4/1.0 km/h (0.87/0.62 mph)		
Gradability (tan θ)		40%		
Working weight *1		99.942 t (220,330 lbs)		
Average ground pressure *1		Approx. 93.9 MPa (13.6 psi)		
Engine	Engine name	Hino J08E-UV **OR** Hino J08E-VM		
	Engine out put	213 kW/2,100 min^{-1} (286 HP/2,100 rpm)		

*1 Crane (15.2 m (50 ft), Without rear drum rope, Without main hook, With self removal)

1. Each rope speed varies based on load.
2. Each rope speed is the value of the drum first layer's one.

- LUFFING JIB

Type	Full hydraulic type
Max. lifting capacity	36.2 t × 7.9 m (80,000 lbs × 26 ft)
Max. boom length & jib length	36.5 m + 51.8 m (120 ft + 170 ft) 42.6 m + 27.4 m (140 ft + 90 ft)
Working weight (with 18.2 m (60 ft) boom + 18.3 m (60 ft) jib + hook block)	Approx. 108 t (238,000 lbs)
Average ground pressure (with 18.2 m (60 ft) boom + 18.3 m (60 ft) jib)	Approx. 1.03 kg/cm^2 (101 kpa)
Main lifting / lowering rope speed	* 120 m/min (393 ft/min)
Auxiliary lifting / lowering rope speed	* 120 m/min (393 ft/min)
Boom raising rope speed	* 48 m/min (157 ft/min)
Boom lowering rope speed	* 48 m/min (157 ft/min)
Jib hoist line speed	* 60 m/min (197 ft/min)
Jib lowering speed	* 60 m/min (197 ft/min)

1. Above speeds based on single part of line and at first layer of rope drum.
2. The speed marked with * varies depending on the load.

OUTSIDE DIMENSIONS

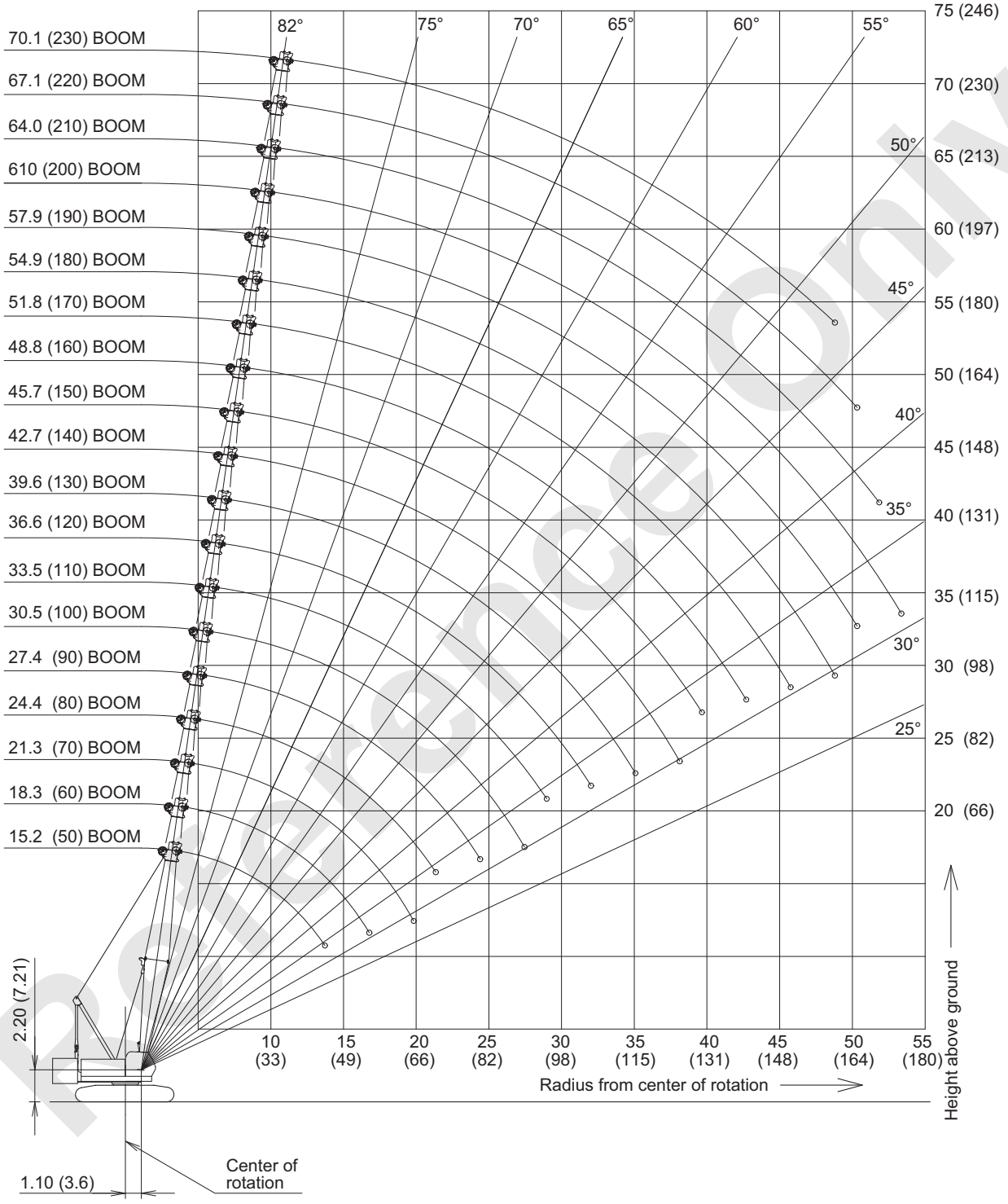
Unit : mm (ft-in)

Overall width of cab	2,990 (9’ 10”)
Radius of rear end (counterweight)	4,860 (15’ 11”)
Center of rotation to rear end (Low gantry position)	6,090 (20’)
Center of rotation to boom foot pin (from center of rotation)	1,100 (3’ 7”)
Height from ground to boom foot pin	2,200 (7’ 3”)
Height to top of gantry (Working position)	7,380 (24’ 2”)
Height to top of gantry (Low gantry position)	3,500 (11’ 6”)
Counterweight ground clearance	1,270 (4’ 2”)
Overall length of crawlers	6,770 (22’ 3”)
Distance between centers of tumblers	5,800 (19’)
Overall width of crawlers (Extend/Retract)	5,300 / 3,500 (17’ 5” / 11’ 6”)
Width of crawler shoe	900 (2’ 11”)
Ground clearance of carbody	450 (1’ 6”)

1.1.3 CRANE WORKING RANGES

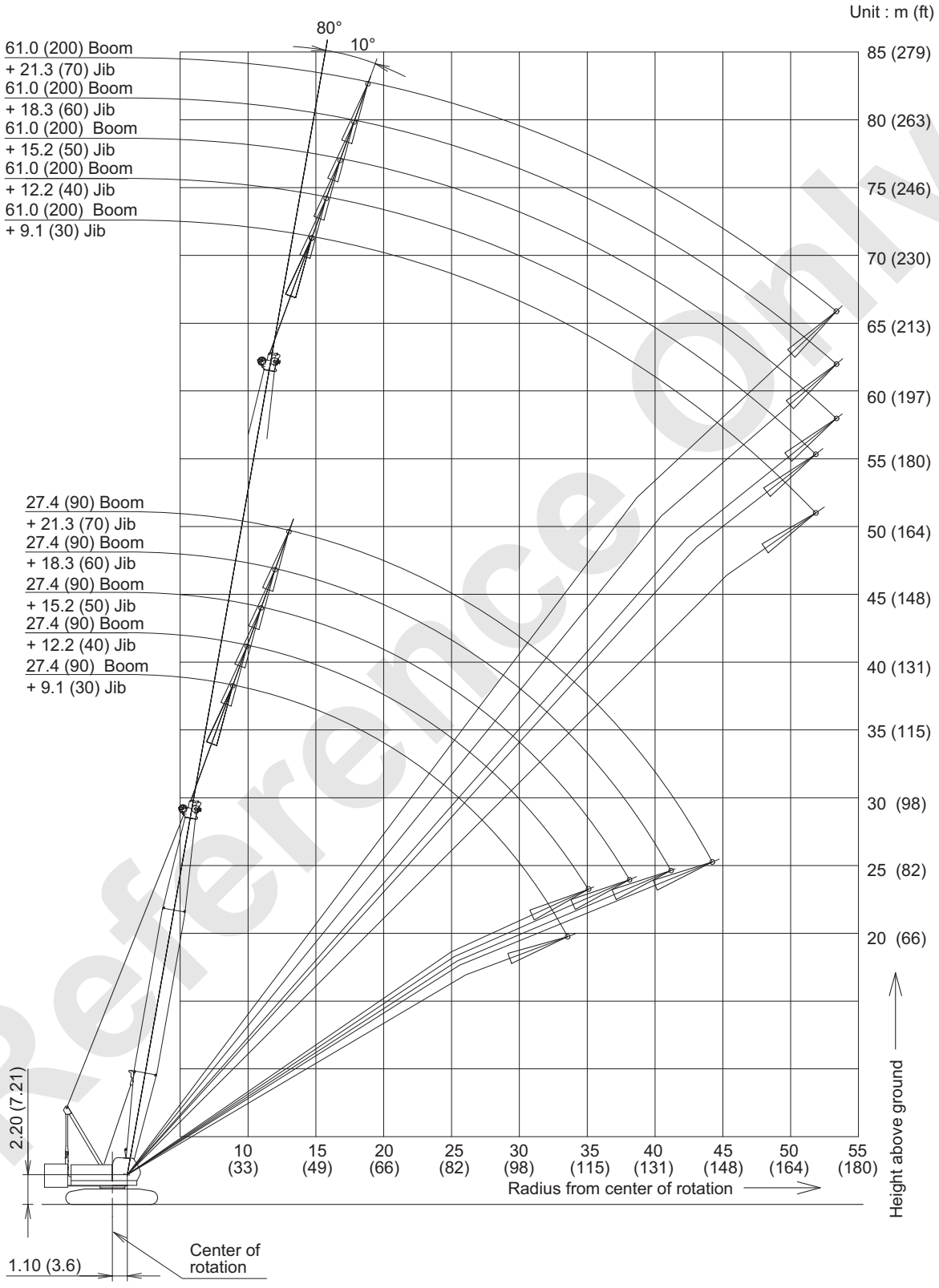
1. CRANE WORKING RANGES

Unit : m (ft)

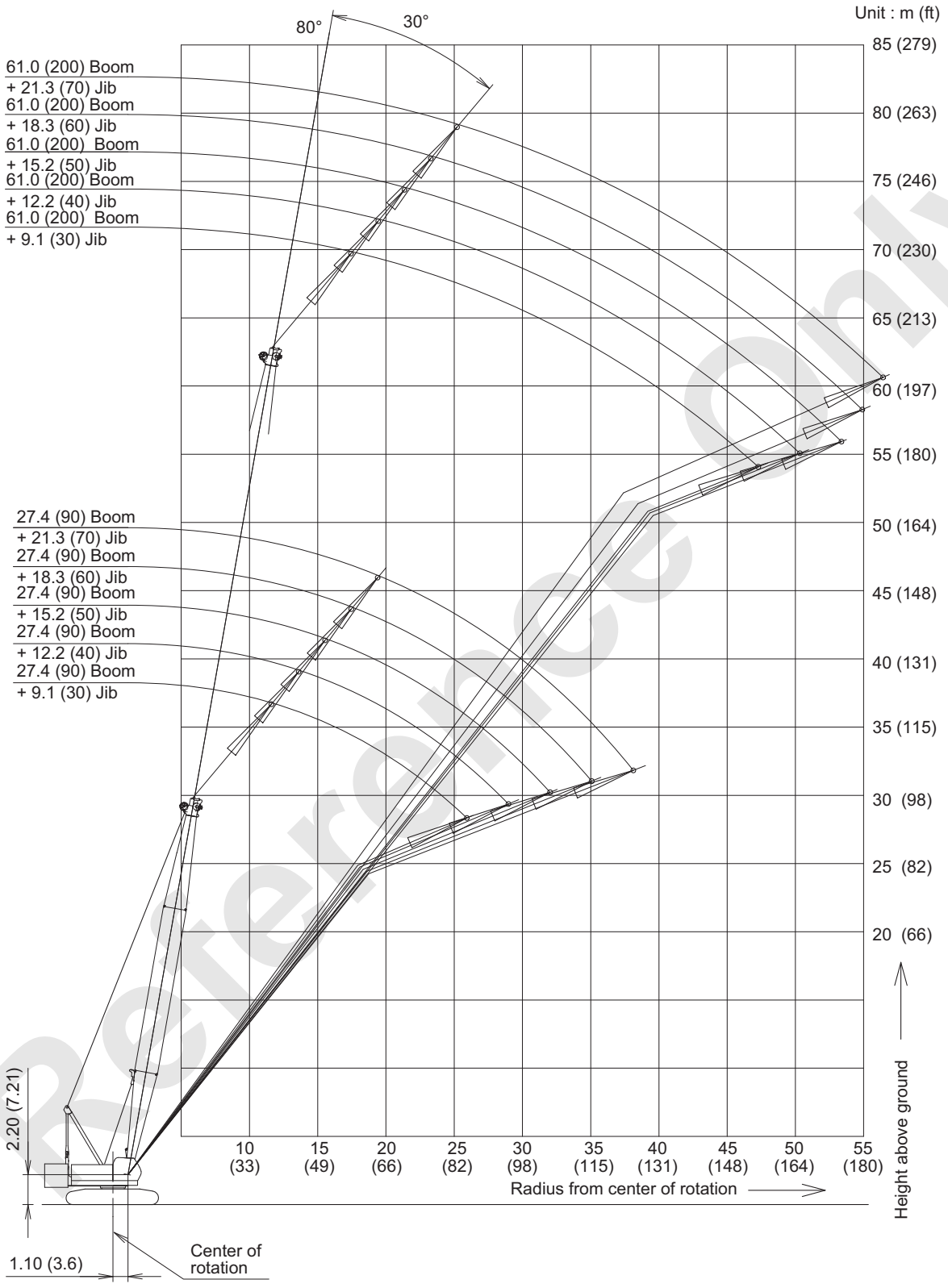


2. JIB WORKING RANGE

(1) Offset angle 10 degrees



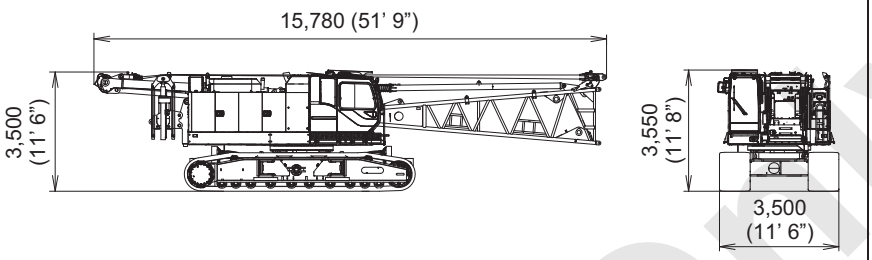
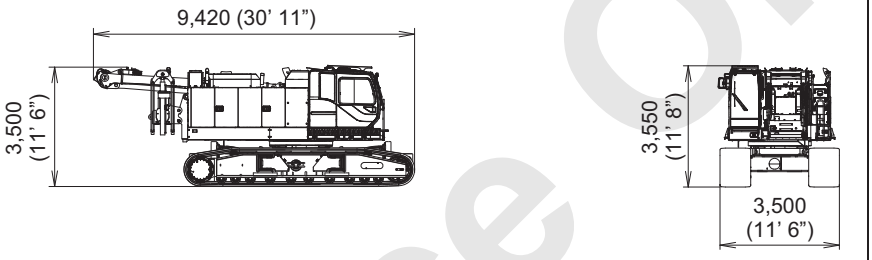
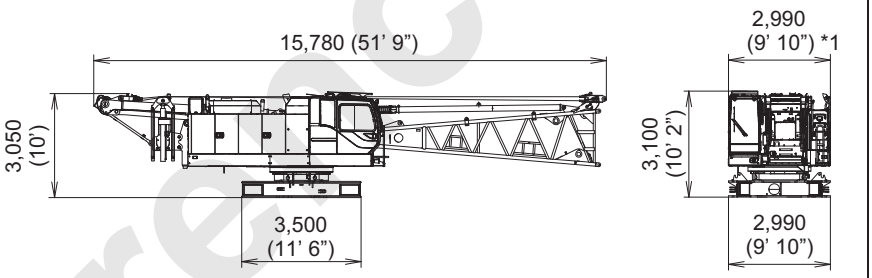
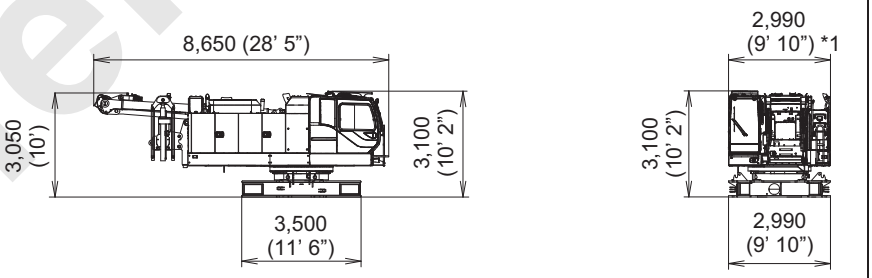
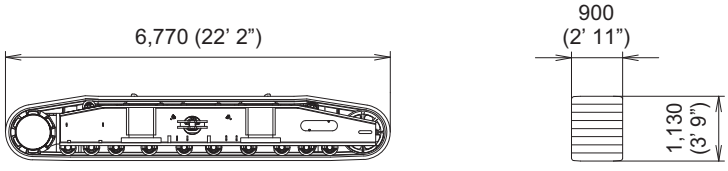
(2) Offset angle 30 degrees



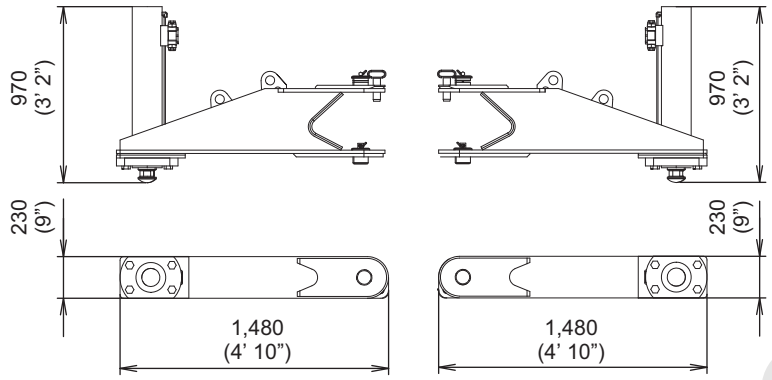
1.2 12000-1 DIMENSION, WEIGHT OF EACH COMPONENT

Dimension and weight of each component when disassembled is shown here.
Use this as reference value.

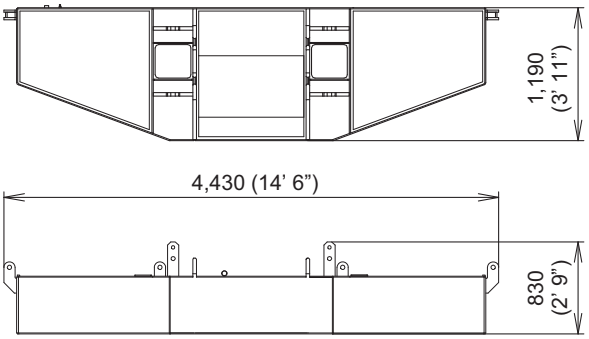
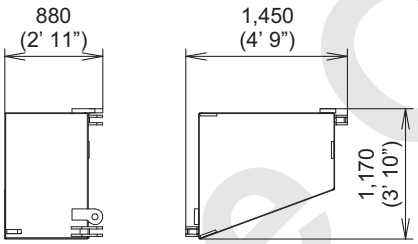
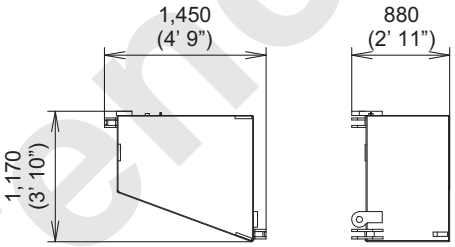
1.2.1 MAIN MACHINERY

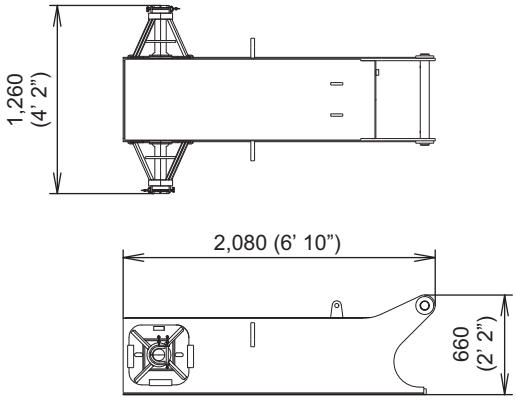
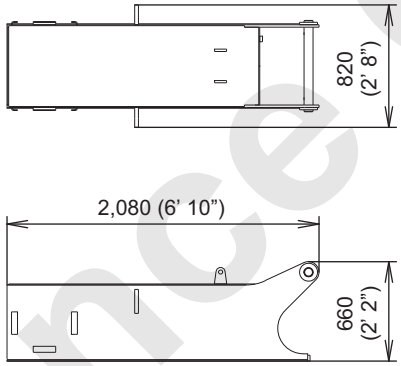
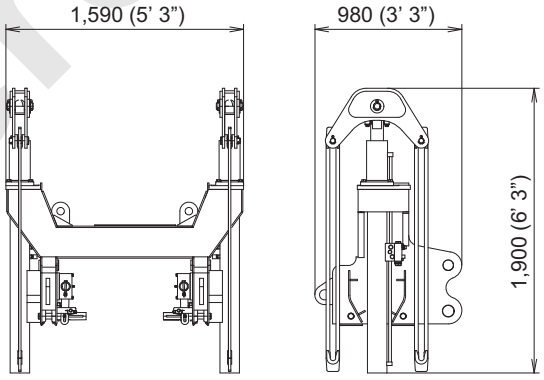
Name	Dimension mm (ft-in)	Weight kg (lbs)
Base Machine • Boom base • Gantry • Crawler • Wire rope (Front / rear / boom hoist)		57,520 (126,808)
Base Machine • Gantry • Crawler • Wire rope (Front / rear / boom hoist)		54,200 (119,489)
Base Machine • Boom base • Gantry • Wire rope (Front / rear / boom hoist) • Without crawler • Without side steps		33,660 (74,206)
Base Machine • Gantry • Wire rope (Front / rear / boom hoist) • Without crawler • Without side steps		30,340 (66,887)
Crawler		11,930 (26,301)

*1 With the side step on cabin side : 3,170 (10' 5")
With the side steps on the both side : 3,340 (11')

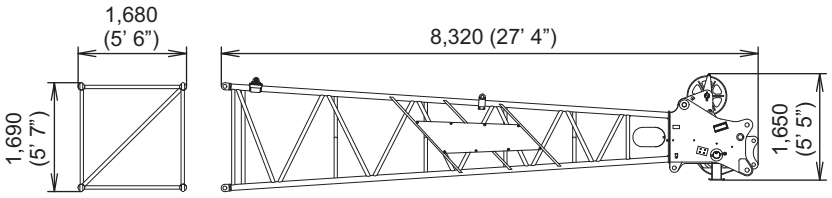
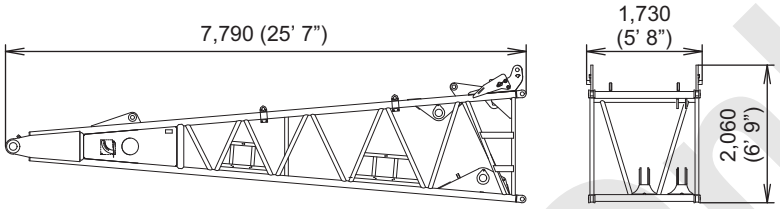
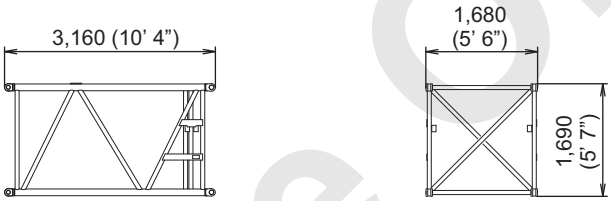
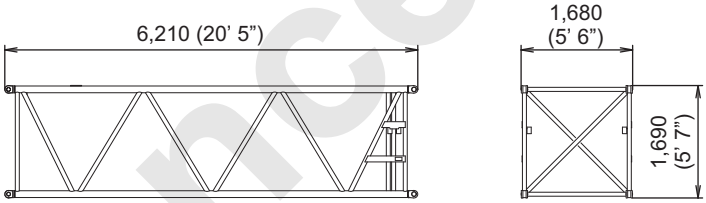
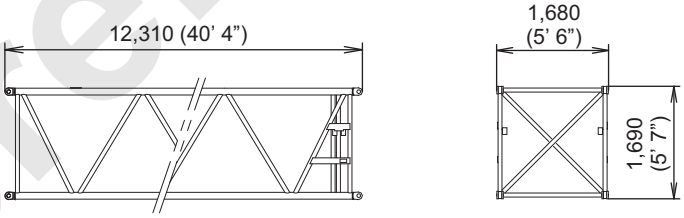
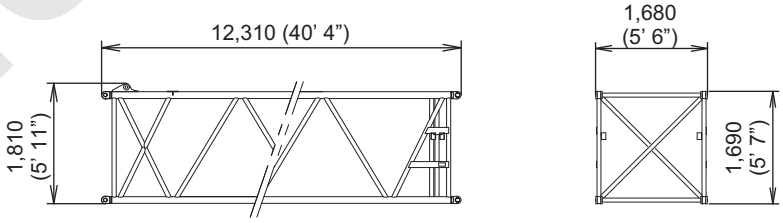
Name	Dimension mm (ft-in)	Weight kg (lbs)
Translifter		320 (705) /1piece

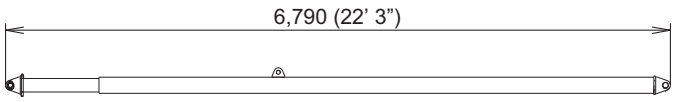
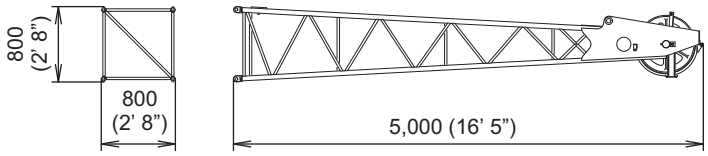
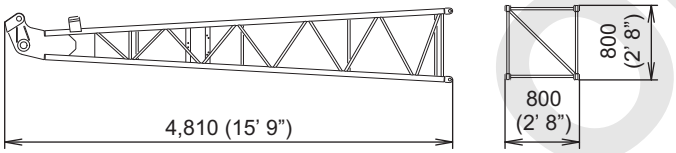
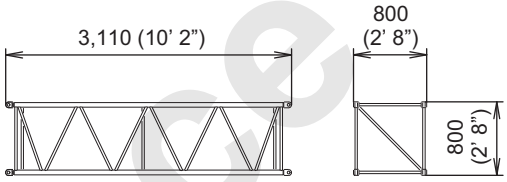
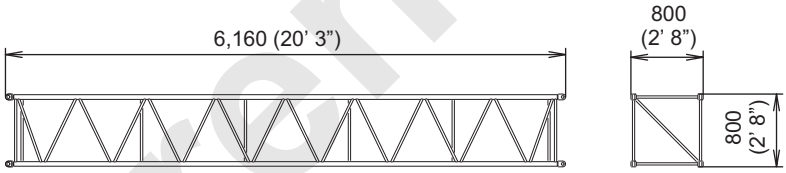
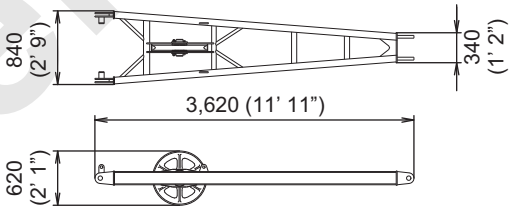
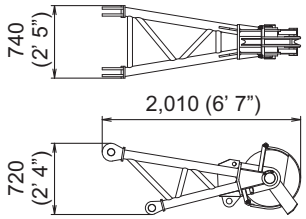
1.2.2 COUNTERWEIGHT

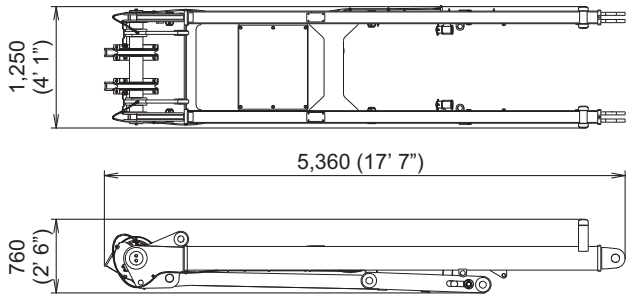
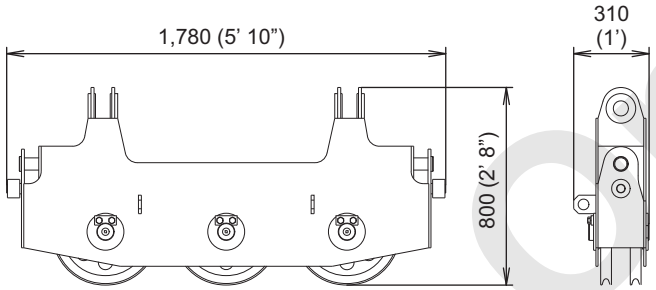
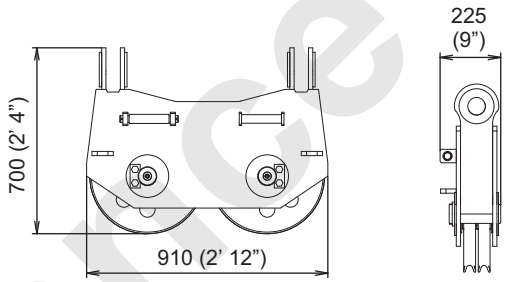
Name	Dimension mm (ft-in)	Weight kg (lbs)
No.1 Counterweight		11,600 (25,600)
No.2, No.3 Counterweight (R)		5,750 (12,680)
No.2, No.3 Counterweight (L)		5,750 (12,680)

Name	Dimension mm (ft-in)	Weight kg (lbs)
Carbody weight • With float		3,320 (7,319) /1piece
Carbody weight • Without float		3,250 (7,165) /1piece
Self removal unit		870 (1,918)

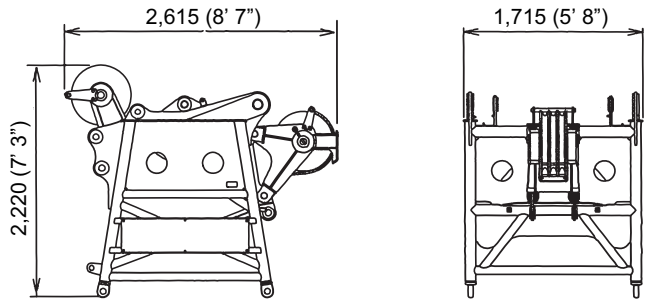
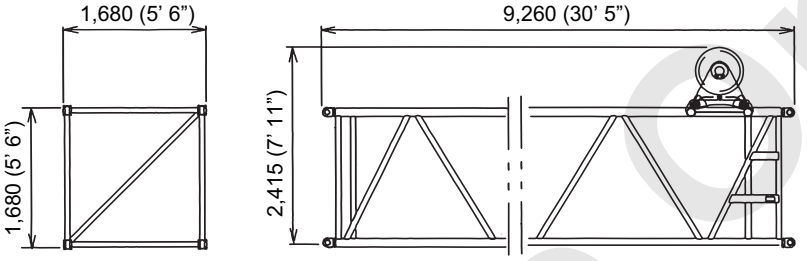
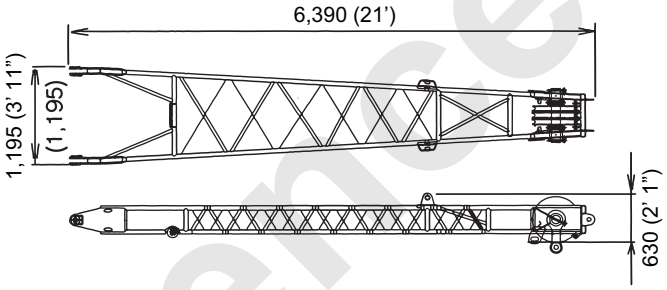
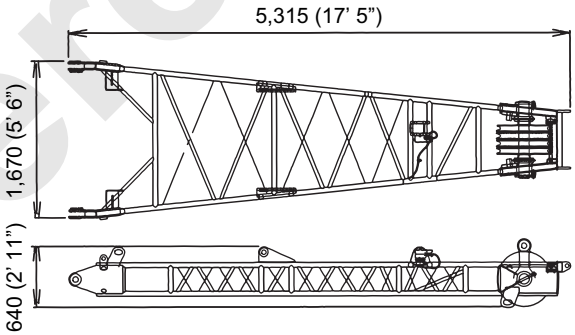
1.2.3 CRANE ATTACHMENT

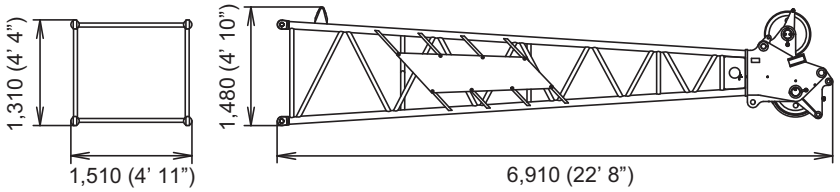
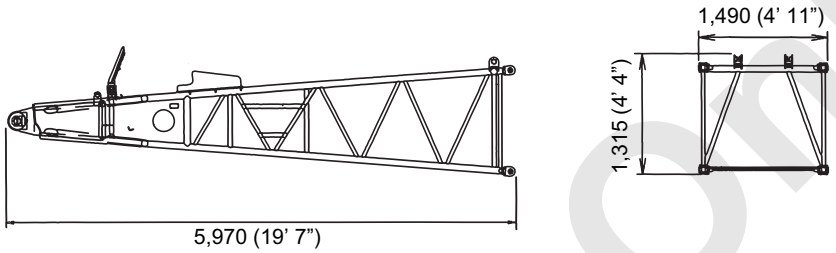
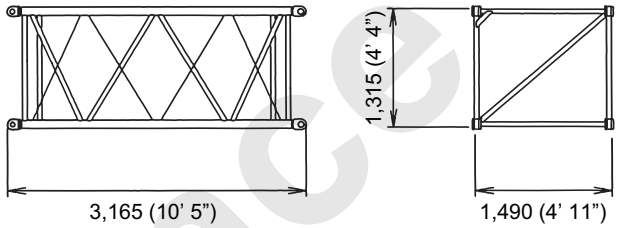
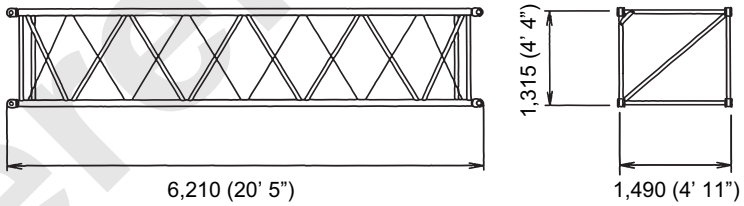
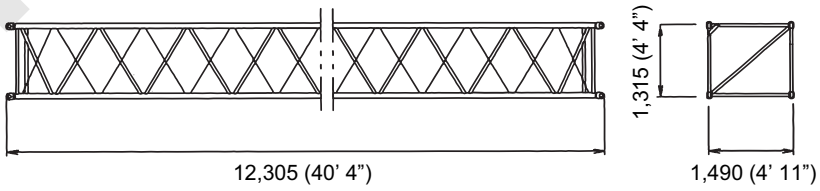
Name	Dimension mm (ft-in)	Weight kg (lbs)
Boom tip		1,525 (3,360)
Boom base		2,235 (4,927)
3.0 m Boom insert		380 (840)
6.1 m Boom insert		655 (1,445)
12.2 m Boom insert		1,195 (2,635)
12.2 m Boom insert (With lug)		1,220 (2,690)

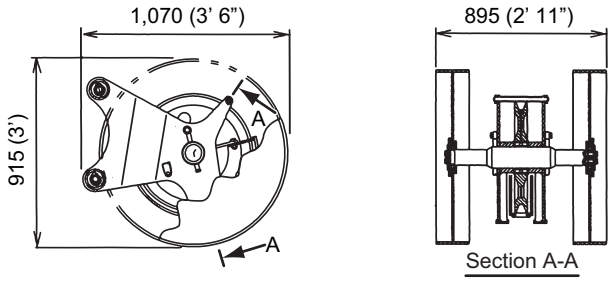
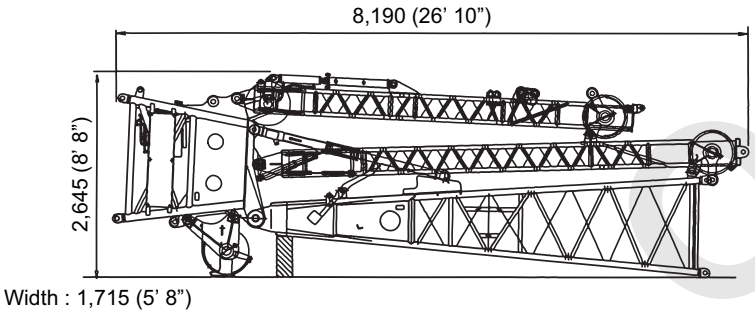
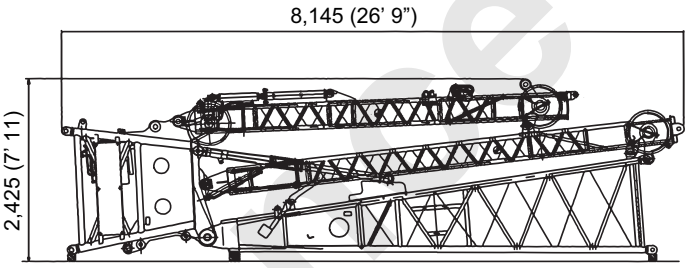
Name	Dimension mm (ft-in)	Weight kg (lbs)
Backstop		440 (970) (each)
Jib tip		280 (620)
Jib base		200 (440)
3.0 m Jib insert		100 (220)
6.0 m Jib insert		180 (400)
Strut		250 (550)
Auxiliary sheave		300 (660)

Name	Dimension mm (ft-in)	Weight kg (lbs)
Gantry		1,320 (2,910)
Upper spreader		300 (660)
Lower spreader		200 (440)

1.2.4 LUFFING ATTACHMENT

Name	Dimension mm (ft-in)	Weight kg (lbs)
Luffing boom tip		1,280 (2,830)
9.1 m Special boom insert		1,160 (2,558)
Front strut		545 (1,202)
Rear strut		600 (1,323)

Name	Dimension mm (ft-in)	Weight kg (lbs)
Jib tip		1,170 (2,580)
Jib base		863 (1,903)
3.0 m Jib insert		310 (684)
6.1 m Jib insert		520 (1,147)
12.2 m Jib insert		960 (2,117)

Name	Dimension mm (ft-in)	Weight kg (lbs)
Auxiliary sheave		380 (838)
Luffing boom tip assembly (With point sheave)	 Width : 1,715 (5' 8")	3,580 (7,895)
Luffing boom tip assembly (Without point sheave)	 Width : 1,715 (5' 8")	3,350 (7,390)

Note : Luffing jib winch (also used as 3rd winch) weight is 2,300 kg (5,080 lbs) (including wire rope).

1.3 12000-1 SWING AND PROPEL STABILITY

1. Without carbody weight

Attachment	Counterweight ton (lbs)	All-round swing			Propelling on slope	
		Crawler extend	Crawler retract	When jacked up without crawler	Forward	Backward
Without attachment (Base machine only)	0 (Without)	○	○	○	○	○
	11.6 (25,573) (No.1)	○	△(No abrupt lever control)	×	○	○
	23.1 (50,925) (No.1 to No.2)	○	×	×	×	○
	34.6 (76,277) (No.1 to No.3)	×	×	×	×	×
With boom base (Boom angle : 30 degrees or less	0 (Without)	○	○	○	○	○
	11.6 (25,573) (No.1)	○	○	×	○	○
	23.1 (50,925) (No.1 to No.2)	○	×	×	△ (Slope:8 deg. or less)	○
	34.6 (76,277) (No.1 to No.3)	△(No abrupt lever control)	×	×	×	△

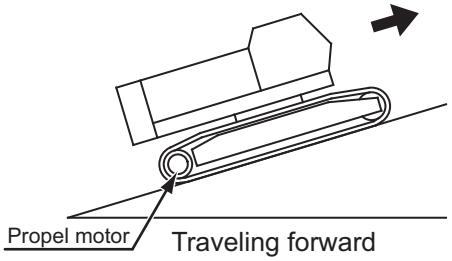
○ : Able to be operated
△ : Able to be operated with conditions
× : Unable to be operated

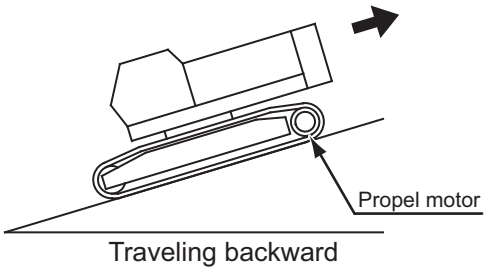
(1) The table above shows the values for operation on a firm ground.
On a weak ground, operate with care after curing the ground.

(2) As a principle, swinging on a trailer is prohibited.

(3) Maximum slope angle is 16.7 degrees (30%).
This may become lower depending on condition (ground, crane configuration).

(4) Travelling forward means the case where the counterweight is at the lower slope and the traveling backward where it is at the upper slope.





2. With carbody weight

Attachment	Counterweight ton (lbs)	All-round swing			Propelling on slope	
		Crawler extend	Crawler retract	When jacked up without crawler	Forward	Backward
Without attachment (Base machine only)	0 (Without)	○	○	○	○	○
	11.6 (25,573) (No.1)	○	○	×	○	○
	23.1 (50,925) (No.1 to No.2)	○	×	×	△ (Slope:5 deg. or less)	○
	34.6 (76,277) (No.1 to No.3)	△(No abrupt lever control)	×	×	×	△
With boom base (Boom angle : 30 degrees or less	0 (Without)	○	○	○	○	○
	11.6 (25,573) (No.1)	○	○	△(No abrupt lever control)	○	○
	23.1 (50,925) (No.1 to No.2)	○	×	×	△ (Slope:12 deg. or less)	○
	34.6 (76,277) (No.1 to No.3)	○	×	×	×	○

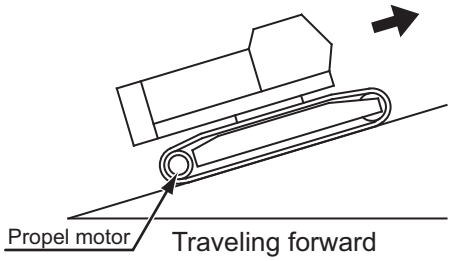
○ : Able to be operated
△ : Able to be operated with conditions
× : Unable to be operated

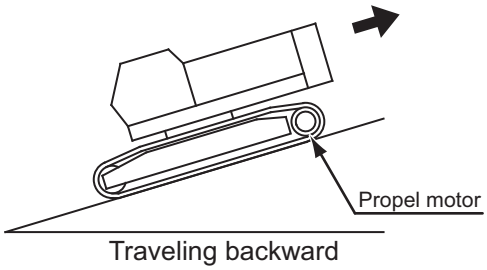
(1) The table above shows the values for operation on a firm ground.
On a weak ground, operate with care after curing the ground.

(2) As a principle, swinging on a trailer is prohibited.

(3) Maximum slope angle is 16.7 degrees (30%).
This may become lower depending on condition (ground, crane configuration).

(4) Travelling forward means the case where the counterweight is at the lower slope and the traveling backward where it is at the upper slope.





1.4 12000-1 PROPEL ALLOWABLE SLOPE ANGLE

1.4.1 CRANE ATTACHMENT INSTALLED : BOOM INSERT CONFIGURATION

CAUTION

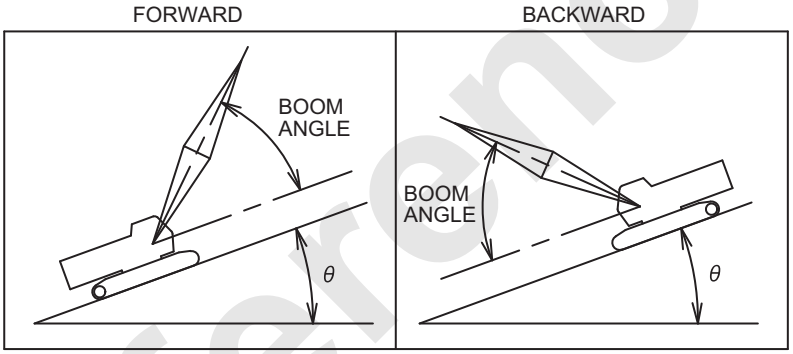
In the area showing [-] mark, do not propel.
Machine may overturn.
Failure to observe this precaution may result in serous injuries or loss of life.

If the machine has to propel by some reason, observe the following points.

- Do not propel with a load lifted.
- Propel with low speed and gently.
- Propel on the flat and firm ground.
- Ensure to check the ground condition and propel on the slope angle smaller than shown in the chart.
- Propel straight against slope.
- Provide the gentle slope at the beginning and end positions of slope.

Propel upward downward on slope

(θ : allowable angle)



1. 12000-1 CRANE PROPEL ALLOWABLE SLOPE ANGLE

(1) Without aux. sheave

(Unit : Degree)

Boom length m (ft)	Forward			Backward		
	Boom angle			Boom angle		
	35	40	50	40	50	60
15.2 (50)	7	7	5	8	8	8
18.3 (60)	8	8	6	8	8	8
21.3 (70)	8	8	7	8	8	8
24.4 (80)	8	8	7	8	8	8
27.4 (90)	8	8	7	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	8	8	8
45.7 (150)	8	8	8	8	8	8
48.8 (160)	8	8	8	7	8	8
51.8 (170)	8	8	8	5	6	8
54.9 (180)	8	8	8	3	5	6
57.9 (190)	8	8	8	1	3	5
61.0 (200)	8	8	8	-	2	4
64.0 (210)	8	8	8	-	-	2
67.1 (220)	8	8	8	-	-	1
70.1 (230)	8	8	8	-	-	-

(2) With aux. sheave

(Unit : Degree)

Boom length m (ft)	Forward			Backward		
	Boom angle			Boom angle		
	35	40	50	40	50	60
15.2 (50)	7	7	5	8	8	8
18.3 (60)	8	8	6	8	8	8
21.3 (70)	8	8	7	8	8	8
24.4 (80)	8	8	7	8	8	8
27.4 (90)	8	8	7	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	8	8	8
45.7 (150)	8	8	8	8	8	8
48.8 (160)	8	8	8	7	8	8
51.8 (170)	8	8	8	5	6	8
54.9 (180)	8	8	8	3	5	6
57.9 (190)	8	8	8	1	3	5
61.0 (200)	8	8	8	-	2	4
64.0 (210)	8	8	8	-	-	2
67.1 (220)	8	8	8	-	-	1

2. 12000-1 FIXED JIB PROPEL ALLOW SLOPE ANGLE

(Unit : Degree)

Jib length m (ft)	9.1 (30)					
Offset angle	10					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	7	8	8
45.7 (150)	8	8	8	5	6	8
48.8 (160)	8	8	8	4	5	7
51.8 (170)	8	8	8	2	4	5
54.9 (180)	8	8	8	-	2	4
57.9 (190)	8	8	8	-	-	3
61.0 (200)	8	8	8	-	-	1

(Unit : Degree)

Jib length m (ft)	9.1 (30)					
Offset angle	30					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	7	8	8
45.7 (150)	8	8	8	5	6	8
48.8 (160)	8	8	8	4	5	7
51.8 (170)	8	8	8	2	4	5
54.9 (180)	8	8	8	-	2	4
57.9 (190)	8	8	8	-	-	3
61.0 (200)	8	8	8	-	-	1

(Unit : Degree)

Jib length m (ft)	12.2 (40)					
Offset angle	10					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	7	7	8
45.7 (150)	8	8	8	4	6	7
48.8 (160)	8	8	8	3	5	6
51.8 (170)	8	8	8	1	3	5
54.9 (180)	8	8	8	-	1	4
57.9 (190)	8	8	8	-	-	2
61.0 (200)	8	8	8	-	-	1

(Unit : Degree)

Jib length m (ft)	12.2 (40)					
Offset angle	30					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	7	7	8
45.7 (150)	8	8	8	4	6	7
48.8 (160)	8	8	8	3	5	6
51.8 (170)	8	8	8	1	3	5
54.9 (180)	8	8	8	-	1	3
57.9 (190)	8	8	8	-	-	2
61.0 (200)	8	8	8	-	-	1

(Unit : Degree)

Jib length m (ft)	15.2 (50)					
Offset angle	10					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	6	7	8
45.7 (150)	8	8	8	4	5	7
48.8 (160)	8	8	8	3	4	6
51.8 (170)	8	8	8	1	3	5
54.9 (180)	8	8	8	-	1	3
57.9 (190)	8	8	8	-	-	2
61.0 (200)	8	8	8	-	-	1

(Unit : Degree)

Jib length m (ft)	15.2 (50)					
Offset angle	30					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	6	7	8
45.7 (150)	8	8	8	4	5	7
48.8 (160)	8	8	8	3	4	6
51.8 (170)	8	8	8	1	2	4
54.9 (180)	8	8	8	-	1	3
57.9 (190)	8	8	8	-	-	2
61.0 (200)	8	8	8	-	-	1

(Unit : Degree)

Jib length m (ft)	18.3 (60)					
Offset angle	10					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	7	8	8
42.7 (140)	8	8	8	5	6	8
45.7 (150)	8	8	8	3	4	6
48.8 (160)	8	8	8	2	4	6
51.8 (170)	8	8	8	-	2	4
54.9 (180)	8	8	8	-	-	3
57.9 (190)	8	8	8	-	-	1
61.0 (200)	8	8	8	-	-	-

(Unit : Degree)

Jib length m (ft)	18.3 (60)					
Offset angle	30					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	7	8	8
42.7 (140)	8	8	8	5	6	8
45.7 (150)	8	8	8	3	4	6
48.8 (160)	8	8	8	2	4	5
51.8 (170)	8	8	8	-	2	4
54.9 (180)	8	8	8	-	-	3
57.9 (190)	8	8	8	-	-	1
61.0 (200)	8	8	8	-	-	-

(Unit : Degree)

Jib length m (ft)	21.3 (70)					
Offset angle	10					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	7	7	8
42.7 (140)	8	8	8	5	6	7
45.7 (150)	8	8	8	2	4	6
48.8 (160)	8	8	8	1	3	5
51.8 (170)	8	8	8	-	1	3
54.9 (180)	8	8	8	-	-	2
57.9 (190)	8	8	8	-	-	1
61.0 (200)	8	8	8	-	-	-

(Unit : Degree)

Jib length m (ft)	21.3 (70)					
Offset angle	30					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	7	7	8
42.7 (140)	8	8	8	5	6	7
45.7 (150)	8	8	8	2	4	6
48.8 (160)	8	8	8	1	3	5
51.8 (170)	8	8	8	-	1	3
54.9 (180)	8	8	8	-	-	2
57.9 (190)	8	8	8	-	-	1
61.0 (200)	8	8	8	-	-	-

1.4.2 LUFFING JIB ATTACHMENT

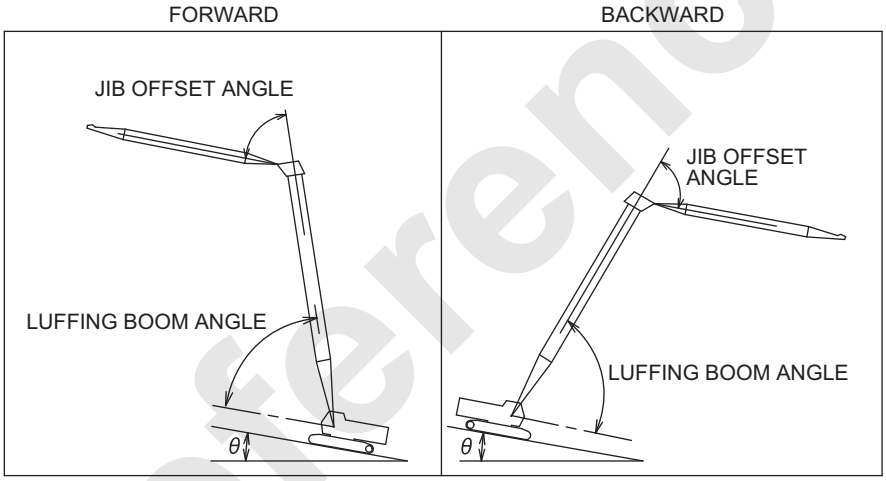
CAUTION

In the area showing [-] mark, do not propel.
Machine may overturn.
Failure to observe this precaution may result in serous injuries or loss of life.

If the machine has to propel by some reason, observe the following points.

- Do not propel with a load lifted.
- Propel with low speed and gently.
- Propel on the flat and firm ground.
- Ensure to check the ground condition and propel on the slope angle smaller than shown in the chart.
- Propel straight against slope.
- Provide the gentle slope at the beginning and end positions of slope.

Propel upward downward on slope
(θ : allowable angle)



1. 12000-1 LUFFING JIB PROPEL
ALLOW SLOPE ANGLE

Jib length m (ft)	18.3 (60)			
Jib offset angle	25°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	2°	3°	8°	7°
21.2 (70)	2°	3°	7°	6°
24.3 (80)	1°	3°	5°	5°
27.3 (90)	1°	2°	4°	4°
30.4 (100)	1°	2°	4°	3°
33.4 (110)	1°	2°	3°	2°
36.5 (120)	1°	2°	2°	1°
39.5 (130)	1°	2°	1°	-
42.6 (140)	1°	2°	1°	-

Jib length m (ft)	21.3 (70)			
Jib offset angle	25°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	2°	3°	7°	7°
21.2 (70)	2°	3°	6°	6°
24.3 (80)	2°	3°	5°	4°
27.3 (90)	2°	3°	4°	3°
30.4 (100)	1°	3°	3°	2°
33.4 (110)	1°	2°	3°	2°
36.5 (120)	1°	2°	2°	1°
39.5 (130)	1°	2°	1°	-
42.6 (140)	1°	2°	-	-

Jib length m (ft)	18.3 (60)			
Jib offset angle	30°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	2°	3°	8°	7°
21.2 (70)	2°	3°	6°	6°
24.3 (80)	2°	3°	5°	5°
27.3 (90)	2°	3°	4°	4°
30.4 (100)	1°	3°	4°	3°
33.4 (110)	1°	2°	3°	2°
36.5 (120)	1°	2°	2°	1°
39.5 (130)	1°	2°	1°	-
42.6 (140)	1°	2°	-	-

Jib length m (ft)	21.3 (70)			
Jib offset angle	30°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	2°	3°	7°	7°
21.2 (70)	2°	3°	6°	5°
24.3 (80)	2°	3°	5°	4°
27.3 (90)	2°	3°	4°	3°
30.4 (100)	2°	3°	3°	2°
33.4 (110)	1°	3°	2°	2°
36.5 (120)	1°	3°	1°	1°
39.5 (130)	1°	3°	1°	-
42.6 (140)	1°	2°	-	-

Jib length m (ft)	24.4 (80)			
Jib offset angle	25°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	2°	3°	7°	6°
21.2 (70)	2°	3°	5°	5°
24.3 (80)	2°	3°	4°	4°
27.3 (90)	2°	3°	3°	3°
30.4 (100)	2°	3°	3°	2°
33.4 (110)	1°	3°	2°	1°
36.5 (120)	1°	3°	1°	-
39.5 (130)	1°	3°	-	-
42.6 (140)	1°	2°	-	-

Jib length m (ft)	27.4 (90)			
Jib offset angle	25°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	2°	3°	6°	5°
21.2 (70)	2°	3°	5°	4°
24.3 (80)	2°	3°	4°	3°
27.3 (90)	2°	3°	3°	2°
30.4 (100)	2°	3°	2°	1°
33.4 (110)	2°	3°	2°	1°
36.5 (120)	1°	3°	1°	-
39.5 (130)	1°	3°	-	-
42.6 (140)	1°	3°	-	-

Jib length m (ft)	24.4 (80)			
Jib offset angle	30°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	2°	3°	7°	6°
21.2 (70)	2°	3°	5°	5°
24.3 (80)	2°	3°	4°	4°
27.3 (90)	2°	3°	3°	3°
30.4 (100)	2°	3°	3°	2°
33.4 (110)	2°	3°	2°	1°
36.5 (120)	1°	3°	1°	-
39.5 (130)	1°	3°	-	-
42.6 (140)	1°	3°	-	-

Jib length m (ft)	27.4 (90)			
Jib offset angle	30°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	3°	4°	6°	5°
21.2 (70)	2°	3°	5°	4°
24.3 (80)	2°	3°	4°	3°
27.3 (90)	2°	3°	3°	2°
30.4 (100)	2°	3°	2°	1°
33.4 (110)	2°	3°	1°	-
36.5 (120)	2°	3°	1°	-
39.5 (130)	1°	3°	-	-
42.6 (140)	1°	3°	-	-

Jib length m (ft)	30.5 (100)			
Jib offset angle	25°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	2°	3°	5°	5°
21.2 (70)	2°	3°	4°	3°
24.3 (80)	2°	3°	3°	2°
27.3 (90)	2°	3°	2°	1°
30.4 (100)	2°	3°	2°	1°
33.4 (110)	2°	3°	1°	-
36.5 (120)	2°	3°	-	-
39.5 (130)	1°	3°	-	-

Jib length m (ft)	33.5 (110)			
Jib offset angle	25°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	3°	4°	5°	4°
21.2 (70)	2°	3°	4°	3°
24.3 (80)	2°	3°	3°	2°
27.3 (90)	2°	3°	2°	1°
30.4 (100)	2°	3°	1°	-
33.4 (110)	2°	3°	1°	-
36.5 (120)	2°	3°	-	-
39.5 (130)	2°	3°	-	-

Jib length m (ft)	30.5 (100)			
Jib offset angle	30°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	3°	4°	5°	5°
21.2 (70)	3°	4°	4°	3°
24.3 (80)	2°	3°	3°	2°
27.3 (90)	2°	3°	2°	1°
30.4 (100)	2°	3°	1°	1°
33.4 (110)	2°	3°	1°	-
36.5 (120)	2°	3°	-	-
39.5 (130)	2°	3°	-	-

Jib length m (ft)	33.5 (110)			
Jib offset angle	30°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	3°	4°	5°	4°
21.2 (70)	3°	4°	4°	3°
24.3 (80)	2°	4°	3°	2°
27.3 (90)	2°	3°	2°	1°
30.4 (100)	2°	3°	1°	-
33.4 (110)	2°	3°	1°	-
36.5 (120)	2°	3°	-	-
39.5 (130)	2°	3°	-	-

Jib length m (ft)	36.6 (120)			
Jib offset angle	25°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	3°	4°	4°	4°
21.2 (70)	2°	4°	3°	2°
24.3 (80)	2°	3°	2°	1°
27.3 (90)	2°	3°	1°	-
30.4 (100)	2°	3°	1°	-
33.4 (110)	2°	3°	-	-
36.5 (120)	2°	3°	-	-
39.5 (130)	2°	3°	-	-

Jib length m (ft)	39.6 (130)			
Jib offset angle	25°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	3°	4°	4°	3°
21.2 (70)	3°	4°	3°	2°
24.3 (80)	2°	4°	2°	1°
27.3 (90)	2°	4°	1°	-
30.4 (100)	2°	3°	-	-
33.4 (110)	2°	3°	-	-
36.5 (120)	2°	3°	-	-
39.5 (130)	2°	3°	-	-

Jib length m (ft)	36.6 (120)			
Jib offset angle	30°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	3°	4°	4°	3°
21.2 (70)	3°	4°	3°	2°
24.3 (80)	3°	4°	2°	1°
27.3 (90)	2°	4°	1°	-
30.4 (100)	2°	4°	1°	-
33.4 (110)	2°	3°	-	-
36.5 (120)	2°	3°	-	-
39.5 (130)	2°	3°	-	-

Jib length m (ft)	39.6 (130)			
Jib offset angle	30°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	3°	4°	3°	3°
21.2 (70)	3°	4°	2°	2°
24.3 (80)	3°	4°	1°	1°
27.3 (90)	3°	4°	1°	-
30.4 (100)	2°	4°	-	-
33.4 (110)	2°	4°	-	-
36.5 (120)	2°	3°	-	-
39.5 (130)	2°	3°	-	-

Jib length m (ft)	42.7 (140)			
Jib offset angle	25°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	3°	4°	3°	2°
21.2 (70)	3°	4°	2°	1°
24.3 (80)	3°	4°	1°	-
27.3 (90)	2°	4°	-	-
30.4 (100)	2°	4°	-	-
33.4 (110)	2°	3°	-	-
36.5 (120)	2°	3°	-	-
39.5 (130)	2°	3°	-	-

Jib length m (ft)	45.7 (150)			
Jib offset angle	25°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	3°	4°	2°	2°
21.2 (70)	3°	4°	1°	1°
24.3 (80)	3°	4°	1°	-
27.3 (90)	2°	4°	-	-
30.4 (100)	2°	4°	-	-
33.4 (110)	2°	4°	-	-
36.5 (120)	2°	3°	-	-
39.5 (130)	2°	3°	-	-

Jib length m (ft)	42.7 (140)			
Jib offset angle	30°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	3°	5°	3°	2°
21.2 (70)	3°	4°	2°	1°
24.3 (80)	3°	4°	1°	-
27.3 (90)	3°	4°	-	-
30.4 (100)	3°	4°	-	-
33.4 (110)	2°	4°	-	-
36.5 (120)	2°	4°	-	-
39.5 (130)	2°	3°	-	-

Jib length m (ft)	45.7 (150)			
Jib offset angle	30°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	4°	5°	2°	1°
21.2 (70)	3°	5°	1°	-
24.3 (80)	3°	4°	-	-
27.3 (90)	3°	4°	-	-
30.4 (100)	3°	4°	-	-
33.4 (110)	3°	4°	-	-
36.5 (120)	2°	4°	-	-
39.5 (130)	2°	4°	-	-

Jib length m (ft)	48.8 (160)			
Jib offset angle	25°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	3°	4°	2°	1°
21.2 (70)	3°	4°	1°	-
24.3 (80)	3°	4°	-	-
27.3 (90)	3°	4°	-	-
30.4 (100)	2°	4°	-	-
33.4 (110)	2°	4°	-	-
36.5 (120)	2°	4°	-	-

Jib length m (ft)	51.8 (170)			
Jib offset angle	25°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	3°	5°	1°	-
21.2 (70)	3°	4°	-	-
24.3 (80)	3°	4°	-	-
27.3 (90)	3°	4°	-	-
30.4 (100)	3°	4°	-	-
33.4 (110)	2°	4°	-	-
36.5 (120)	2°	4°	-	-

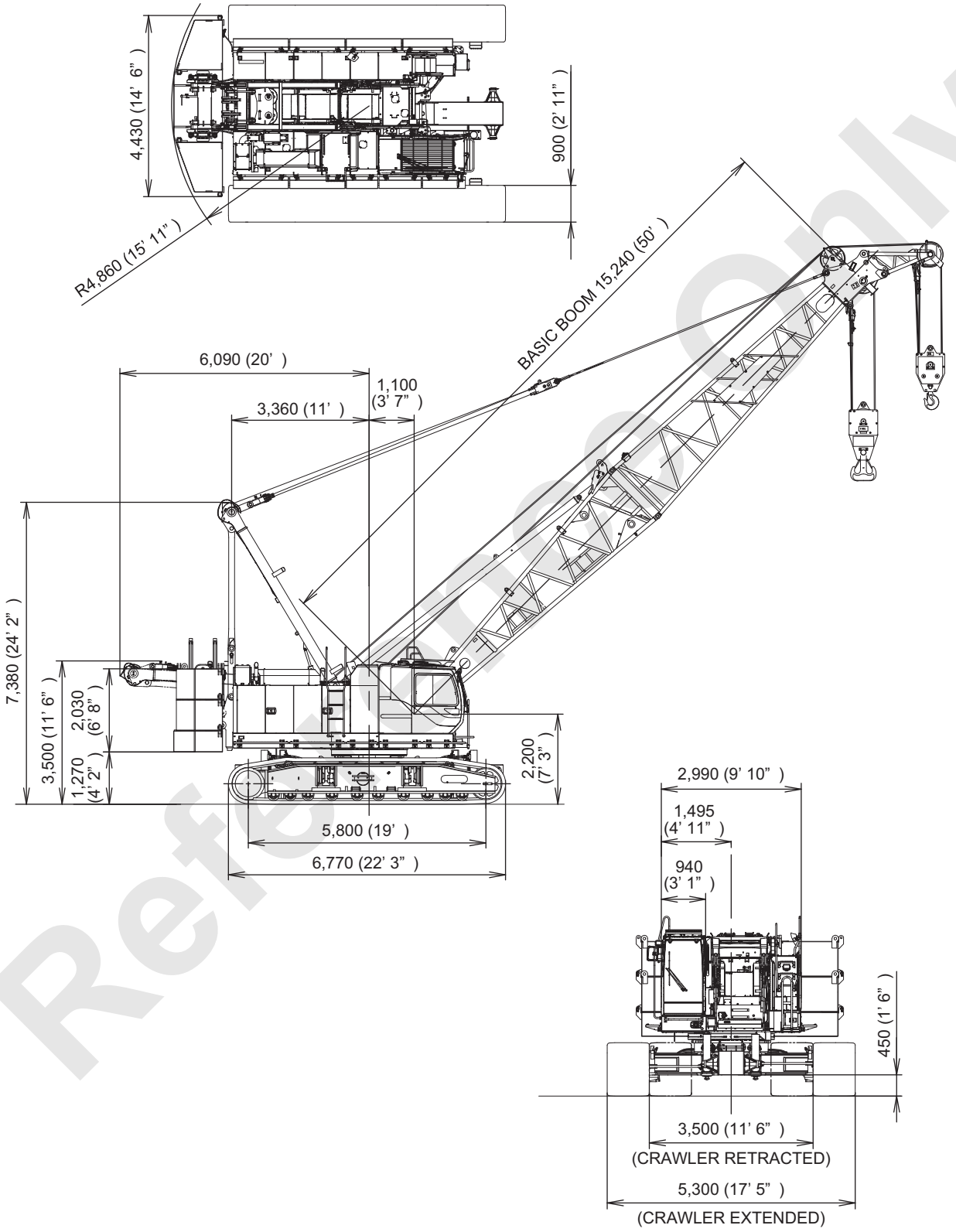
Jib length m (ft)	48.8 (160)			
Jib offset angle	30°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	4°	5°	1°	1°
21.2 (70)	3°	5°	1°	-
24.3 (80)	3°	4°	-	-
27.3 (90)	3°	4°	-	-
30.4 (100)	3°	4°	-	-
33.4 (110)	3°	4°	-	-
36.5 (120)	2°	4°	-	-

Jib length m (ft)	51.8 (170)			
Jib offset angle	30°			
Configuration	Forward		Backward	
Boom length m (ft)	Boom angle		Boom angle	
	75°	70°	75°	70°
18.2 (60)	4°	5°	1°	-
21.2 (70)	4°	5°	-	-
24.3 (80)	3°	5°	-	-
27.3 (90)	3°	4°	-	-
30.4 (100)	3°	4°	-	-
33.4 (110)	3°	4°	-	-
36.5 (120)	3°	4°	-	-

1.5 12000E-1 SPECIFICATION

1.5.1 CRANE OUTER DIMENSION

UNIT : mm (ft-in)



1.5.2 CRANE SPECIFICATION, PERFORMANCE

Type		Full swing, crawler type		
Max. rated load × work radius		110 t × 3.6 m (242,500 lbs × 11.8 ft)		
Boom length	Basic boom	15.2 m (50 ft)		
	Maximum boom	70.1 m (230 ft)		
	Crane jib	9.1 m (30 ft) to 21.3 m (70 ft)		
	Maximum boom and jib	61 m (200 ft) Boom + 21.3 m (70 ft) Jib		
Work speed (wire rope)	Front / rear hoisting rope speed	120 m/min (390 ft/min)	Wire rope dia.	26 mm
	Front / rear lowering rope speed	120 m/min (390 ft/min)		
	Boom raising rope speed	48 m/min (160 ft/min)		20 mm
	Boom lowering rope speed	48 m/min (160 ft/min)		
	Third hoisting rope speed (Option)	120 m/min (390 ft/min)		26 mm
	Third lowering rope speed (Option)	120 m/min (390 ft/min)		
	Swing speed	3.2 min^{-1} (3.2 rpm)		
	Propel speed	1.4/1.0 km/h (0.87/0.62 mph)		
Gradability (tan θ)		40%		
Working weight *1		101.6 t (224,040 lbs)		
Average ground pressure *1		Approx. 95.4 MPa (13.8 psi)		
Engine	Engine name	Hino J08E-UV		
	Engine out put	213 kW/2,100 min^{-1} (286 HP/2,100 rpm)		

*1 Crane (15.2 m (50 ft), Without rear drum rope, With main hook, With self removal)

1. Each rope speed varies based on load.
2. Each rope speed is the value of the drum first layer's one.

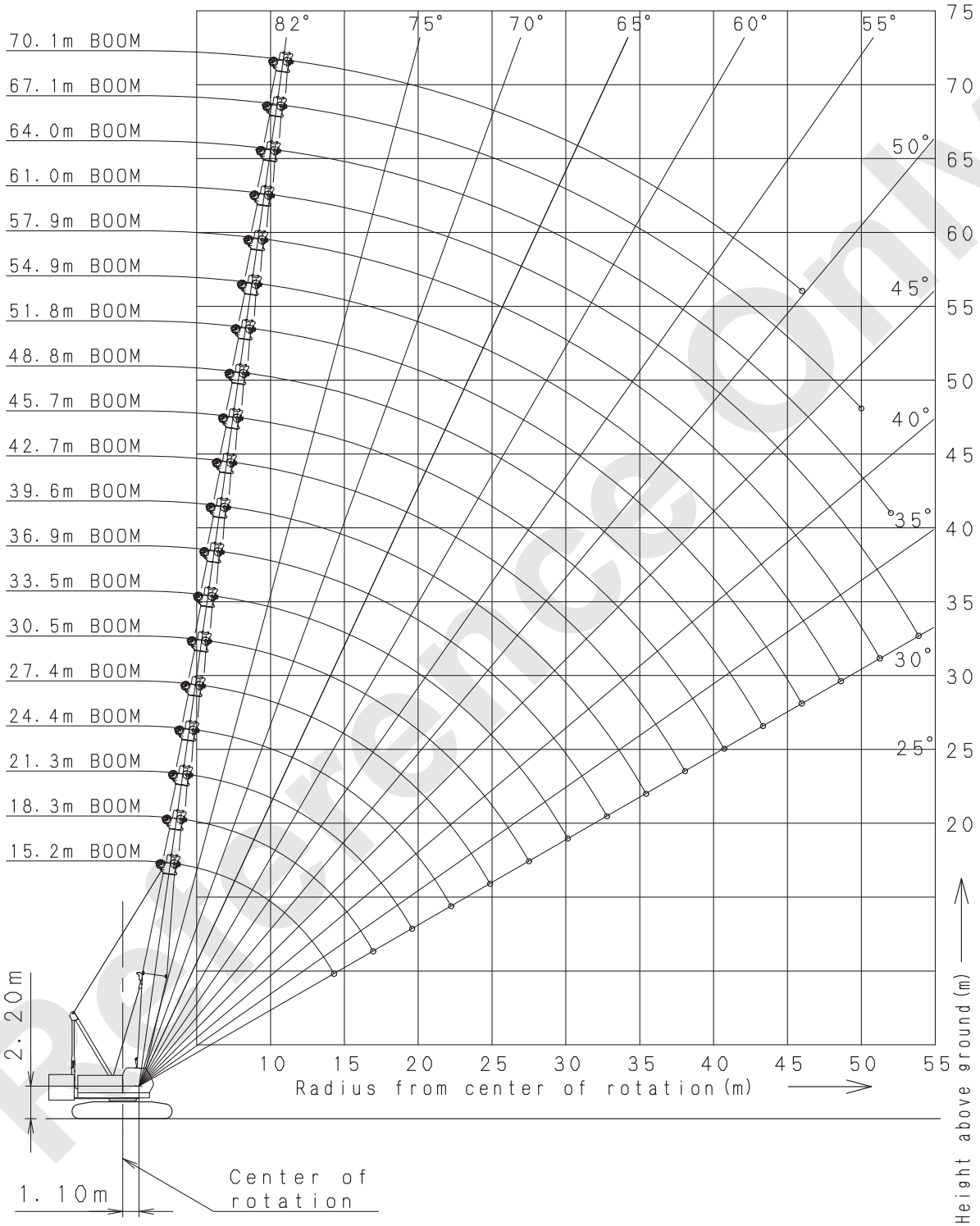
OUTSIDE DIMENSIONS

Unit : mm (ft-in)

Overall width of cab	2,990 (9' 10")
Radius of rear end (counterweight)	4,860 (15' 11")
Center of rotation to rear end (Low gantry position)	6,090 (20')
Center of rotation to boom foot pin (from center of rotation)	1,100 (3' 7")
Height from ground to boom foot pin	2,200 (7' 3")
Height to top of gantry (Working position)	7,380 (24' 2")
Height to top of gantry (Low gantry position)	3,500 (11' 6")
Counterweight ground clearance	1,270 (4' 2")
Overall length of crawlers	6,770 (22' 3")
Distance between centers of tumblers	5,800 (19')
Overall width of crawlers (Extend/Retract)	5,300 / 3,500 (17' 5" / 11' 6")
Width of crawler shoe	900 (2' 11")
Ground clearance of carbody	450 (1' 6")

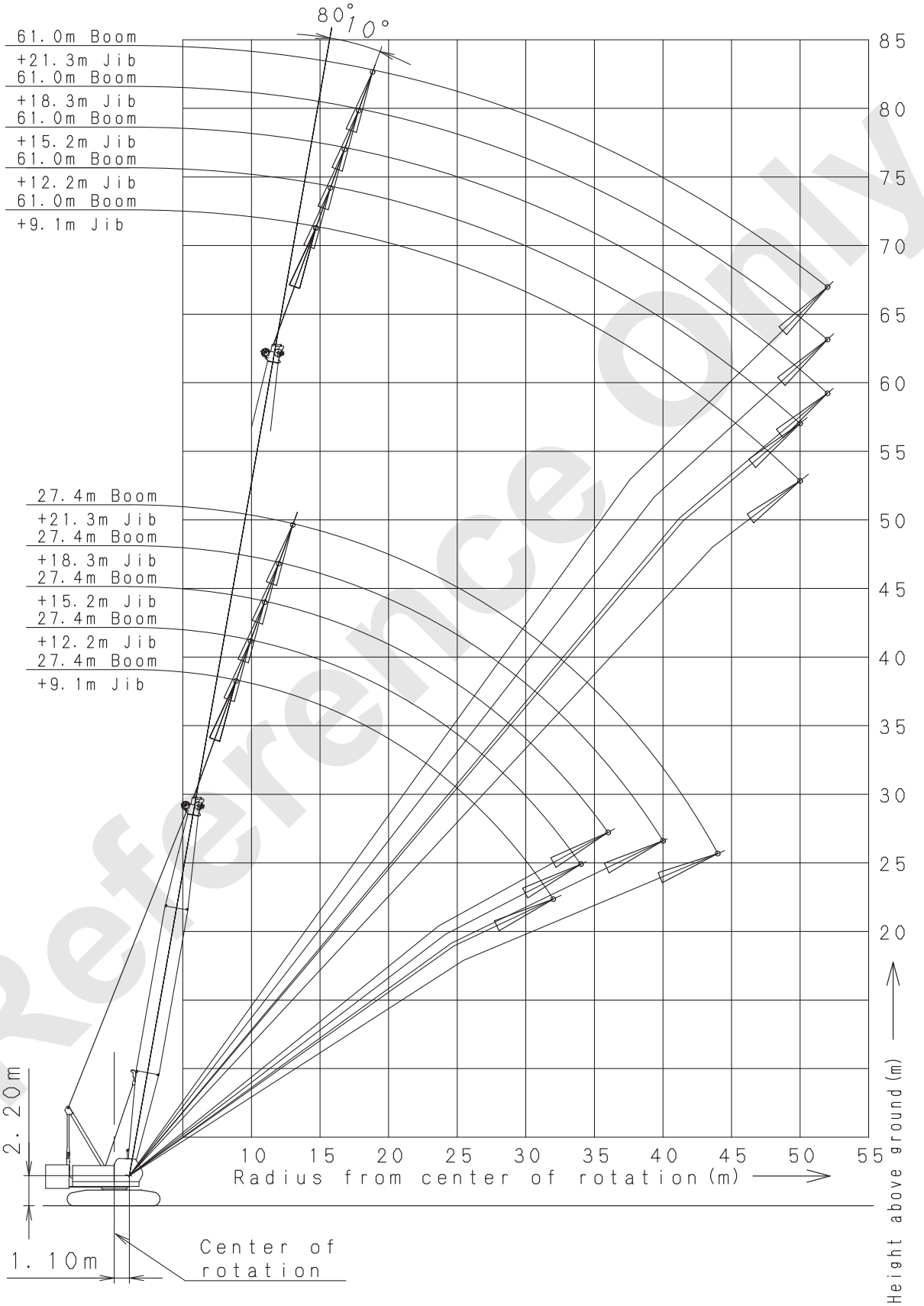
1.5.3 CRANE WORKING RANGES

1. CRANE WORKING RANGES

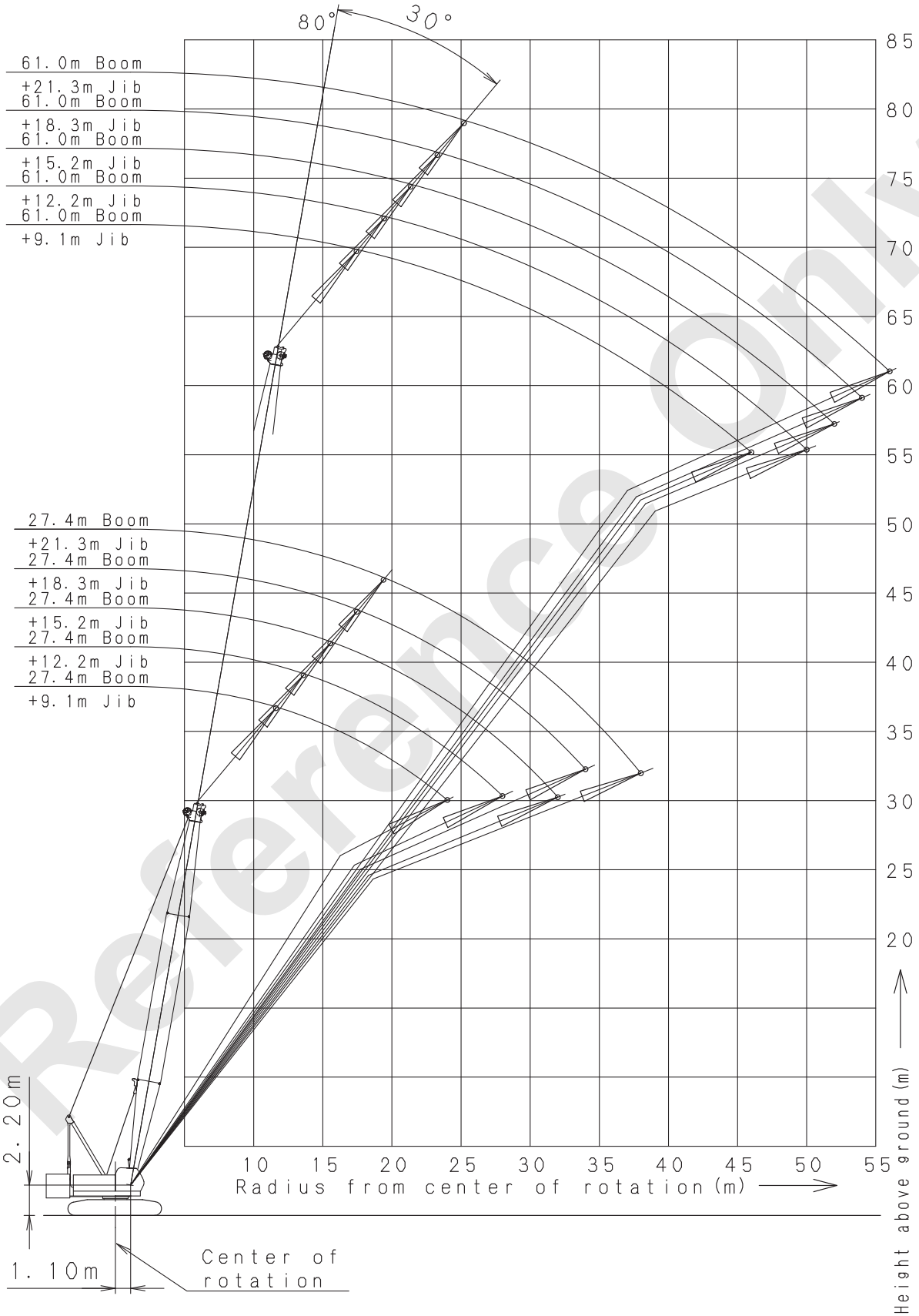


2. JIB WORKING RANGE

(1) Offset angle 10 degrees



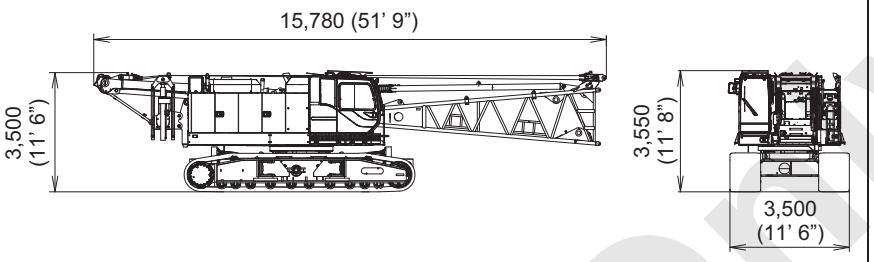
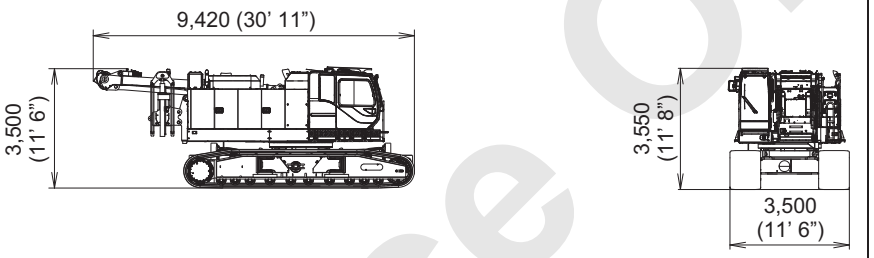
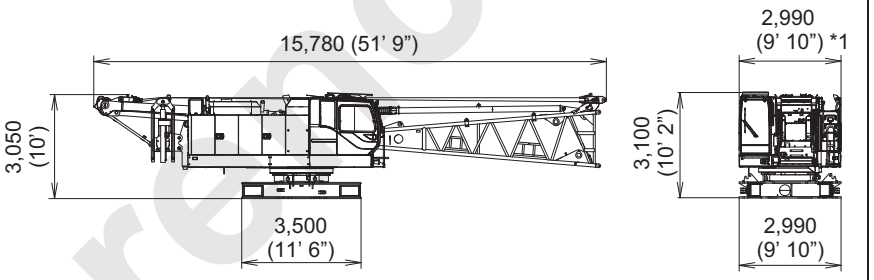
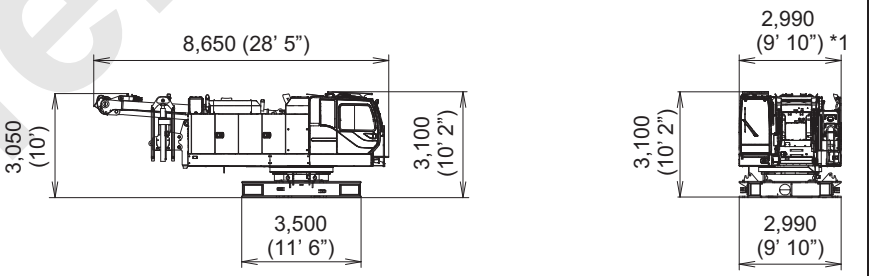
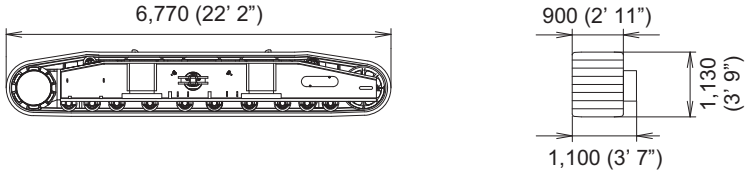
(2) Offset angle 30 degrees



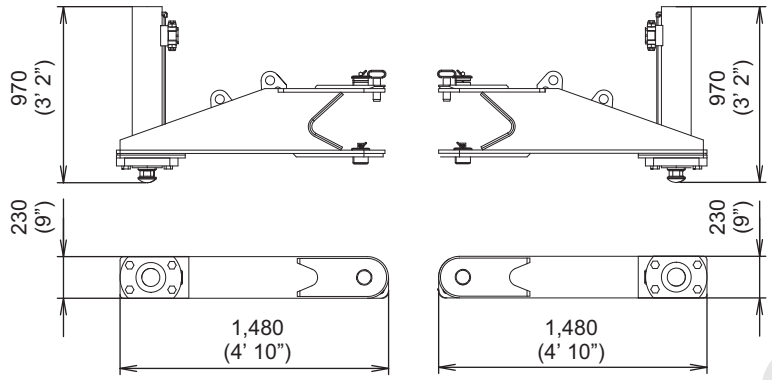
1.6 12000E-1 DIMENSION, WEIGHT OF EACH COMPONENT

Dimension and weight of each component when disassembled is shown here.
Use this as reference value.

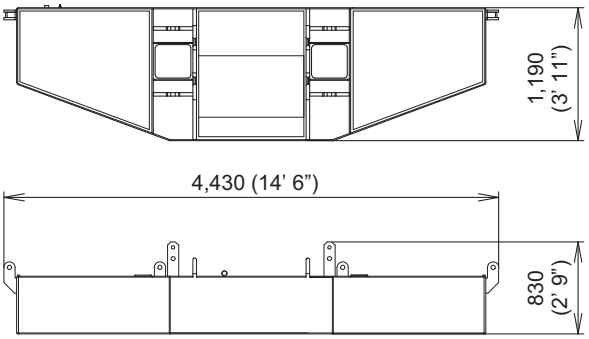
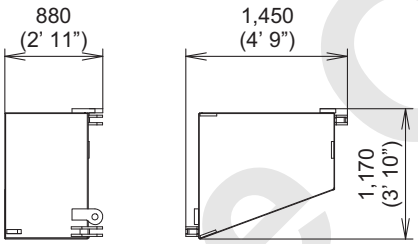
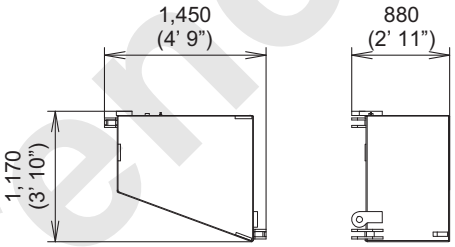
1.6.1 MAIN MACHINERY

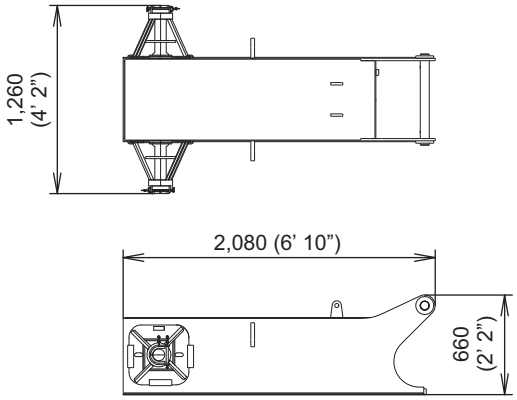
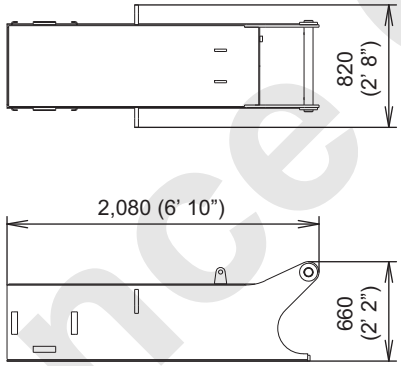
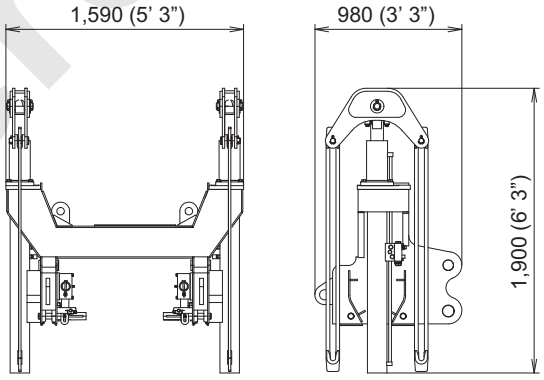
Name	Dimension mm (ft-in)	Weight kg (lbs)
Base Machine • Boom base • Gantry • Crawler • Wire rope (Front / rear / boom hoist)		57,410 (126,565)
Base Machine • Gantry • Crawler • Wire rope (Front / rear / boom hoist)		54,090 (119,246)
Base Machine • Boom base • Gantry • Wire rope (Front / rear / boom hoist) • Without crawler • Without side steps		33,550 (73,964)
Base Machine • Gantry • Wire rope (Front / rear / boom hoist) • Without crawler • Without side steps		30,230 (66,645)
Crawler		11,930 (26,301)

*1 With the side step on cabin side : 3,170 (10' 5")
With the side steps on the both side : 3,340 (11')

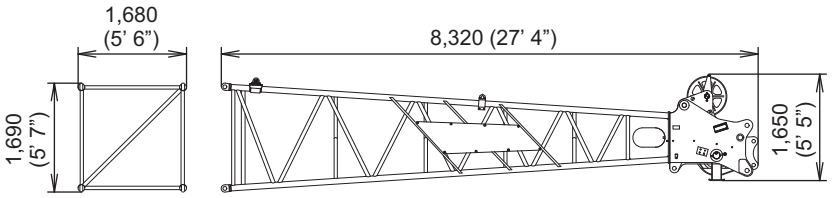
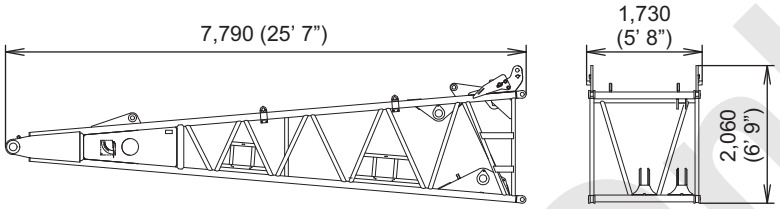
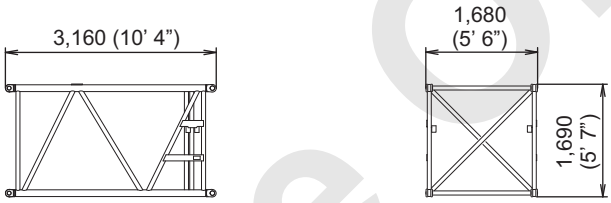
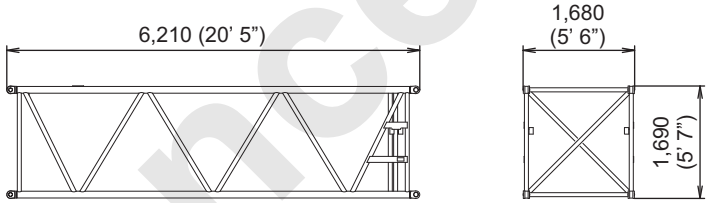
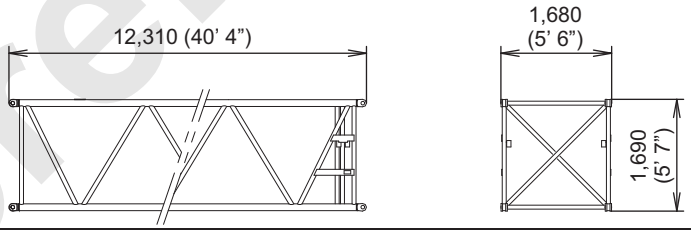
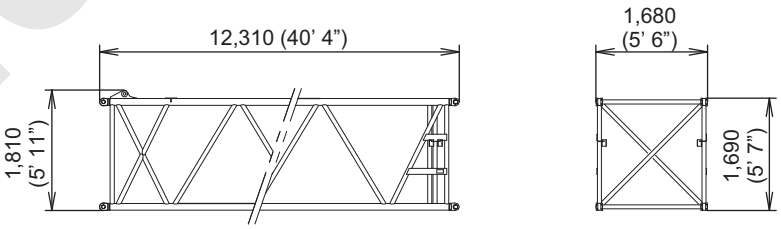
Name	Dimension mm (ft-in)	Weight kg (lbs)
Translifter		320 (705) /1piece

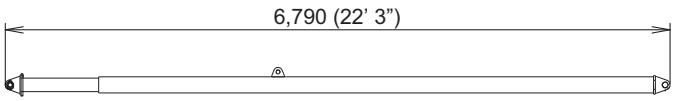
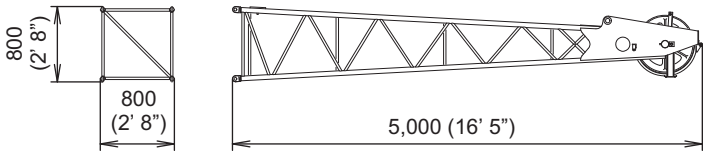
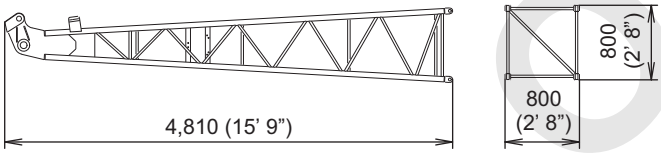
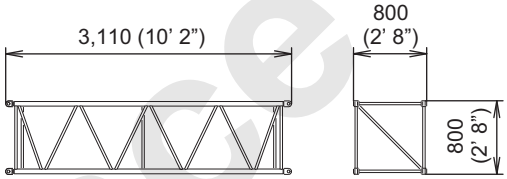
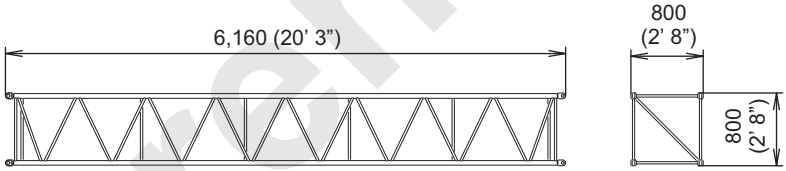
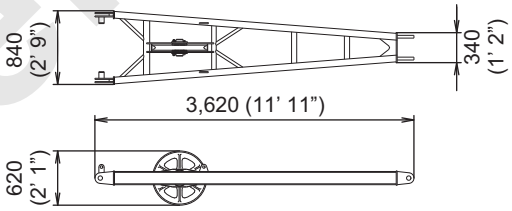
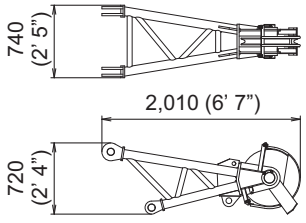
1.6.2 COUNTERWEIGHT

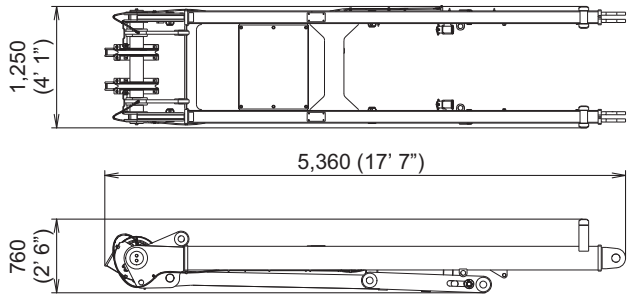
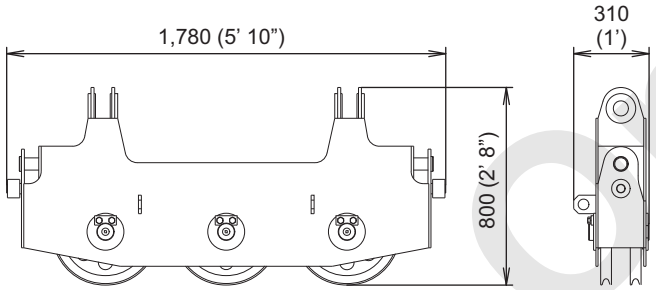
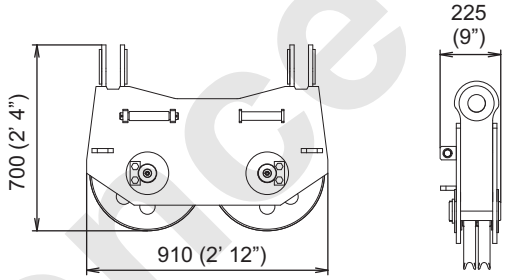
Name	Dimension mm (ft-in)	Weight kg (lbs)
No.1 Counterweight		11,600 (25,600)
No.2, No.3 Counterweight (R)		5,750 (12,680)
No.2, No.3 Counterweight (L)		5,750 (12,680)

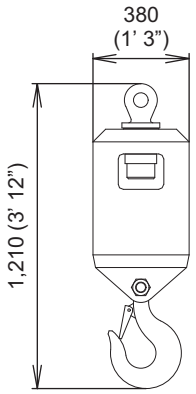
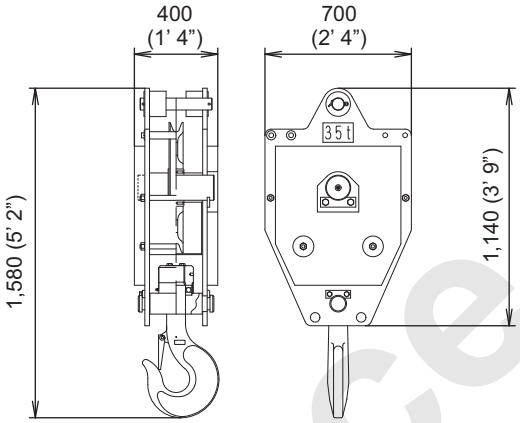
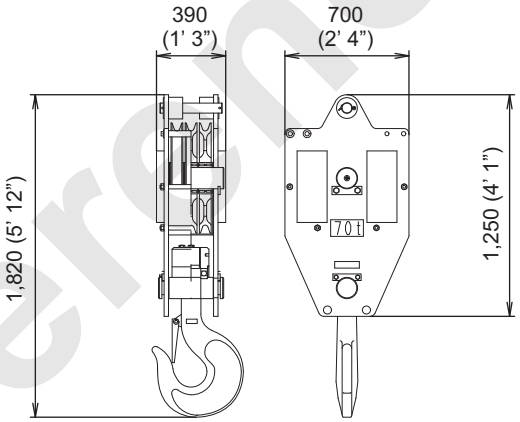
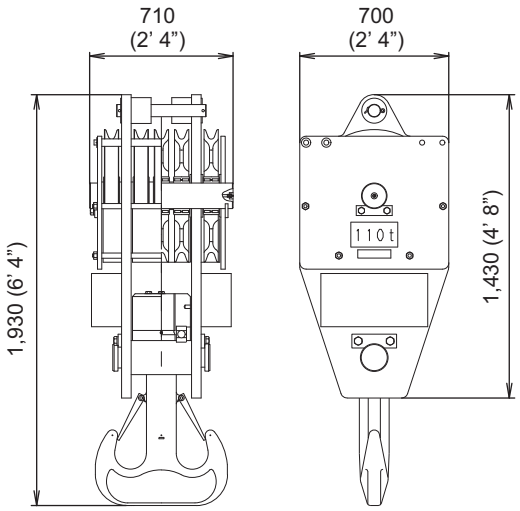
Name	Dimension mm (ft-in)	Weight kg (lbs)
Carbody weight • With float		3,320 (7,319) /1piece
Carbody weight • Without float		3,250 (7,165) /1piece
Self removal unit		870 (1,918)

1.6.3 ATTACHMENT

Name	Dimension mm (ft-in)	Weight kg (lbs)
Boom tip		1,525 (3,360)
Boom base		2,235 (4,930)
3.0 m Boom insert		380 (840)
6.1 m Boom insert		655 (1,445)
12.2 m Boom insert		1,195 (2,635)
12.2 m Boom insert (With lug)		1,220 (2,690)

Name	Dimension mm (ft-in)	Weight kg (lbs)
Backstop		440 (970) (each)
Jib tip		280 (620)
Jib base		200 (440)
3.0 m Jib insert		100 (220)
6.0 m Jib insert		180 (400)
Strut		250 (550)
Auxiliary sheave		300 (660)

Name	Dimension mm (ft-in)	Weight kg (lbs)
Gantry		1,320 (2,910)
Upper spreader		300 (660)
Lower spreader		200 (440)

Name	Dimension mm (ft-in)	Weight kg (lbs)
Ball hook		450 (990)
35t Hook		700 (1,545)
70t Hook		900 (1,985)
110t Hook		1,700 (3,750)

1.7 12000E-1 SWING AND PROPEL STABILITY

1. Without carbody weight

Attachment	Counterweight ton (lbs)	All-round swing			Propelling on slope	
		Crawler extend	Crawler retract	When jacked up without crawler	Forward	Backward
Without attachment (Base machine only)	0 (Without)	○	○	○	○	○
	11.6 (25,573) (No.1)	○	△(No abrupt lever control)	×	○	○
	23.1 (50,925) (No.1 to No.2)	○	×	×	×	○
	34.6 (76,277) (No.1 to No.3)	×	×	×	×	×
With boom base (Boom angle : 30 degrees or less	0 (Without)	○	○	○	○	○
	11.6 (25,573) (No.1)	○	○	×	○	○
	23.1 (50,925) (No.1 to No.2)	○	×	×	△ (Slope:8 deg. or less)	○
	34.6 (76,277) (No.1 to No.3)	△(No abrupt lever control)	×	×	×	△

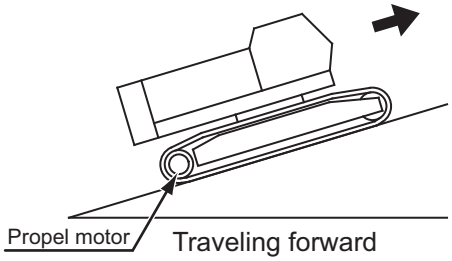
○ : Able to be operated
△ : Able to be operated with conditions
× : Unable to be operated

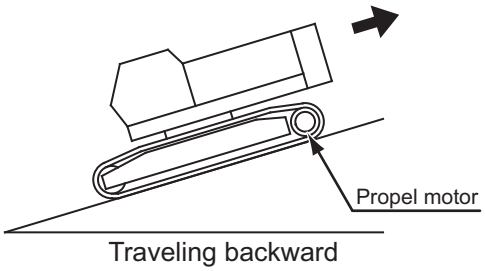
(1) The table above shows the values for operation on a firm ground.
On a weak ground, operate with care after curing the ground.

(2) As a principle, swinging on a trailer is prohibited.

(3) Maximum slope angle is 16.7 degrees (30%).
This may become lower depending on condition (ground, crane configuration).

(4) Travelling forward means the case where the counterweight is at the lower slope and the traveling backward where it is at the upper slope.





2. With carbody weight

Attachment	Counterweight ton (lbs)	All-round swing			Propelling on slope	
		Crawler extend	Crawler retract	When jacked up without crawler	Forward	Backward
Without attachment (Base machine only)	0 (Without)	○	○	○	○	○
	11.6 (25,573) (No.1)	○	○	×	○	○
	23.1 (50,925) (No.1 to No.2)	○	×	×	△ (Slope:5 deg. or less)	○
	34.6 (76,277) (No.1 to No.3)	△(No abrupt lever control)	×	×	×	△
With boom base (Boom angle : 30 degrees or less	0 (Without)	○	○	○	○	○
	11.6 (25,573) (No.1)	○	○	△(No abrupt lever control)	○	○
	23.1 (50,925) (No.1 to No.2)	○	×	×	△ (Slope:12 deg. or less)	○
	34.6 (76,277) (No.1 to No.3)	○	×	×	×	○

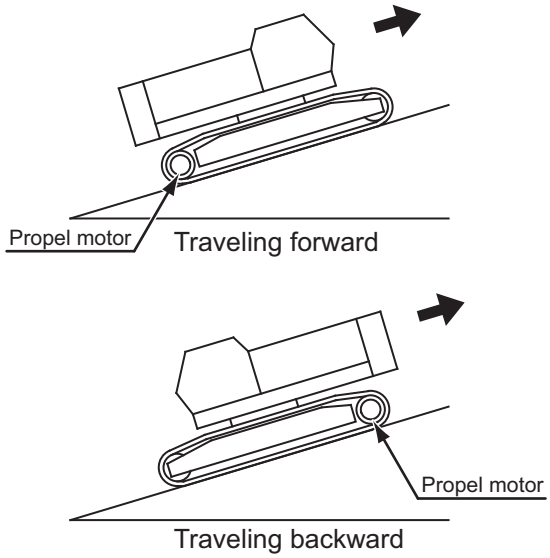
○ : Able to be operated
△ : Able to be operated with conditions
× : Unable to be operated

(1) The table above shows the values for operation on a firm ground.
On a weak ground, operate with care after curing the ground.

(2) As a principle, swinging on a trailer is prohibited.

(3) Maximum slope angle is 16.7 degrees (30%).
This may become lower depending on condition (ground, crane configuration).

(4) Travelling forward means the case where the counterweight is at the lower slope and the traveling backward where it is at the upper slope.



1.8 12000E-1 PROPEL ALLOWABLE SLOPE ANGLE

1.8.1 CRANE ATTACHMENT INSTALLED : BOOM INSERT CONFIGURATION

⚠CAUTION

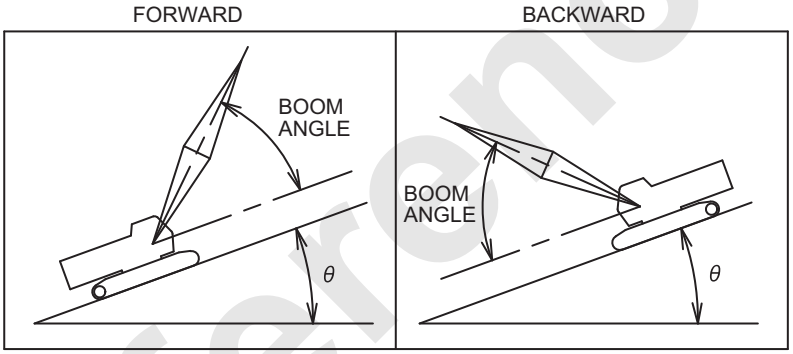
In the area showing [-] mark, do not propel.
Machine may overturn.
Failure to observe this precaution may result in serous injuries or loss of life.

If the machine has to propel by some reason, observe the following points.

- Do not propel with a load lifted.
- Propel with low speed and gently.
- Propel on the flat and firm ground.
- Ensure to check the ground condition and propel on the slope angle smaller than shown in the chart.
- Propel straight against slope.
- Provide the gentle slope at the beginning and end positions of slope.

Propel upward downward on slope

(θ : allowable angle)



1. 12000E-1 CRANE PROPEL ALLOWABLE SLOPE ANGLE

(1) Without aux. sheave

(Unit : Degree)

Boom length m (ft)	Forward			Backward		
	Boom angle			Boom angle		
	35	40	50	40	50	60
15.2 (50)	7	7	5	8	8	8
18.3 (60)	8	8	6	8	8	8
21.3 (70)	8	8	7	8	8	8
24.4 (80)	8	8	7	8	8	8
27.4 (90)	8	8	7	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	8	8	8
45.7 (150)	8	8	8	8	8	8
48.8 (160)	8	8	8	7	8	8
51.8 (170)	8	8	8	5	6	8
54.9 (180)	8	8	8	3	5	6
57.9 (190)	8	8	8	1	3	5
61.0 (200)	8	8	8	-	2	4
64.0 (210)	8	8	8	-	-	2
67.1 (220)	8	8	8	-	-	1
70.1 (230)	8	8	8	-	-	-

(2) With aux. sheave

(Unit : Degree)

Boom length m (ft)	Forward			Backward		
	Boom angle			Boom angle		
	35	40	50	40	50	60
15.2 (50)	7	7	5	8	8	8
18.3 (60)	8	8	6	8	8	8
21.3 (70)	8	8	7	8	8	8
24.4 (80)	8	8	7	8	8	8
27.4 (90)	8	8	7	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	8	8	8
45.7 (150)	8	8	8	8	8	8
48.8 (160)	8	8	8	7	8	8
51.8 (170)	8	8	8	5	6	8
54.9 (180)	8	8	8	3	5	6
57.9 (190)	8	8	8	1	3	5
61.0 (200)	8	8	8	-	2	4
64.0 (210)	8	8	8	-	-	2
67.1 (220)	8	8	8	-	-	1

2. 12000E-1 FIXED JIB PROPEL ALLOWABLE SLOPE ANGLE

(Unit : Degree)

Jib length m (ft)	9.1 (30)					
Offset angle	10					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	7	8	8
45.7 (150)	8	8	8	5	6	8
48.8 (160)	8	8	8	4	5	7
51.8 (170)	8	8	8	2	4	5
54.9 (180)	8	8	8	-	2	4
57.9 (190)	8	8	8	-	-	3
61.0 (200)	8	8	8	-	-	2

(Unit : Degree)

Jib length m (ft)	9.1 (30)					
Offset angle	30					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	7	8	8
45.7 (150)	8	8	8	5	6	8
48.8 (160)	8	8	8	4	5	7
51.8 (170)	8	8	8	2	4	5
54.9 (180)	8	8	8	-	2	4
57.9 (190)	8	8	8	-	-	3
61.0 (200)	8	8	8	-	-	2

(Unit : Degree)

Jib length m (ft)	12.2 (40)					
Offset angle	10					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	7	8	8
45.7 (150)	8	8	8	4	6	7
48.8 (160)	8	8	8	3	5	7
51.8 (170)	8	8	8	1	3	5
54.9 (180)	8	8	8	-	1	4
57.9 (190)	8	8	8	-	-	2
61.0 (200)	8	8	8	-	-	1

(Unit : Degree)

Jib length m (ft)	12.2 (40)					
Offset angle	30					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	7	8	8
45.7 (150)	8	8	8	4	6	7
48.8 (160)	8	8	8	3	5	6
51.8 (170)	8	8	8	1	3	5
54.9 (180)	8	8	8	-	1	4
57.9 (190)	8	8	8	-	-	2
61.0 (200)	8	8	8	-	-	1

(Unit : Degree)

Jib length m (ft)	15.2 (50)					
Offset angle	10					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	6	7	8
45.7 (150)	8	8	8	4	5	7
48.8 (160)	8	8	8	3	4	6
51.8 (170)	8	8	8	1	3	5
54.9 (180)	8	8	8	-	1	3
57.9 (190)	8	8	8	-	-	2
61.0 (200)	8	8	8	-	-	1

(Unit : Degree)

Jib length m (ft)	15.2 (50)					
Offset angle	30					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	8	8	8
42.7 (140)	8	8	8	6	7	8
45.7 (150)	8	8	8	4	5	7
48.8 (160)	8	8	8	3	4	6
51.8 (170)	8	8	8	1	3	5
54.9 (180)	8	8	8	-	1	3
57.9 (190)	8	8	8	-	-	2
61.0 (200)	8	8	8	-	-	1

(Unit : Degree)

Jib length m (ft)	18.3 (60)					
Offset angle	10					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	7	8	8
42.7 (140)	8	8	8	5	6	8
45.7 (150)	8	8	8	3	5	6
48.8 (160)	8	8	8	2	4	6
51.8 (170)	8	8	8	-	2	4
54.9 (180)	8	8	8	-	-	3
57.9 (190)	8	8	8	-	-	1
61.0 (200)	8	8	8	-	-	-

(Unit : Degree)

Jib length m (ft)	18.3 (60)					
Offset angle	30					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	7	8	8
42.7 (140)	8	8	8	5	6	8
45.7 (150)	8	8	8	3	5	6
48.8 (160)	8	8	8	2	4	6
51.8 (170)	8	8	8	-	2	4
54.9 (180)	8	8	8	-	-	3
57.9 (190)	8	8	8	-	-	1
61.0 (200)	8	8	8	-	-	-

(Unit : Degree)

Jib length m (ft)	21.3 (70)					
Offset angle	10					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	7	8	8
42.7 (140)	8	8	8	5	6	7
45.7 (150)	8	8	8	2	4	6
48.8 (160)	8	8	8	2	3	5
51.8 (170)	8	8	8	-	1	4
54.9 (180)	8	8	8	-	-	2
57.9 (190)	8	8	8	-	-	1
61.0 (200)	8	8	8	-	-	-

(Unit : Degree)

Jib length m (ft)	21.3 (70)					
Offset angle	30					
Configuration	Forward			Backward		
Boom length m (ft)	Boom angle			Boom angle		
	35	40	50	40	50	60
27.4 (90)	8	8	8	8	8	8
30.5 (100)	8	8	8	8	8	8
33.5 (110)	8	8	8	8	8	8
36.6 (120)	8	8	8	8	8	8
39.6 (130)	8	8	8	7	8	8
42.7 (140)	8	8	8	5	6	7
45.7 (150)	8	8	8	2	4	6
48.8 (160)	8	8	8	2	3	5
51.8 (170)	8	8	8	-	1	3
54.9 (180)	8	8	8	-	-	2
57.9 (190)	8	8	8	-	-	1
61.0 (200)	8	8	8	-	-	-

1.9 ENGINE MAIN SPECIFICATION

Engine	12000-1 : Hino Model J08E-UV diesel engine (complying with the Interim Tier4 & Stage IIIB Emission Regulations) 12000E-1 : Hino Model J08E-UV diesel engine (complying with the Interim Tier4 & Stage IIIB Emission Regulations) 12000-1 : Hino Model J08E-VM diesel engine
Configuration of engine	4 cycle, water cooled, vertical in-line 6, direct injection, turbo-charged, intercooled
Total poston displacement	7.684 Litter
Roted output	213 kW / 2,100 min-1
Max. torque	1,017 N •m / 1,600 min-1
Specific fuel consumption	212 g / kWh / 2,100 min-1
Dry engine weight	Approx. 735 kg

FUEL CONSUMPTION (REF)

Hourly fuel consumption at engine rated output when crawler crane is working.

Fuel consumption (L/hr)	At rated output	At crane work (*1)	At foundation work (*2)
12000-1: J08E-UV 12000E-1: J08E-UV 12000-1: J08E-VM	54.1	16.2	27.0

(*1) Is calculated with assumption that average load ratio is 30%
at crane work and fuel consumption is proportional to load.

(*2) Is calculated with assumption that average load ratio is 60%
at foundation work and fuel consumption is proportional to load.

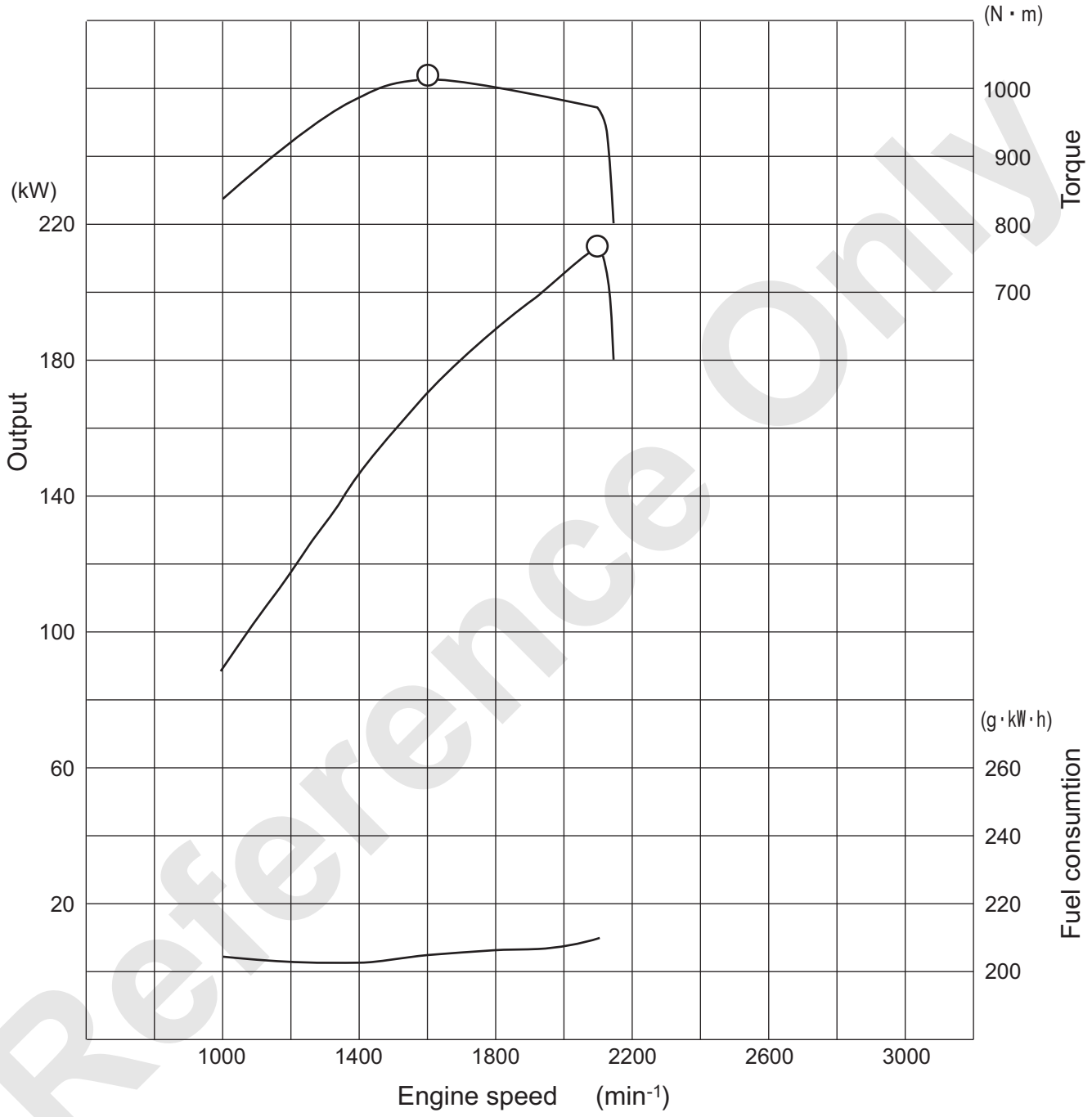
Since fuel consumption may vary depending on work content, operators technique and waiting time at actual work, the above figure is for reference only.

Fuel consumption based on energy saving function including G engine mode , G winch mode or auto-idling stop are not Included.

ENGINE PERFORMANCE CURVE

This indicates performance curve of single unit of engine.

This does not include performance lowering based on work load.



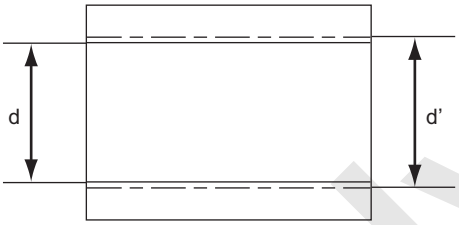
2. MAINTENANCE STANDARDS TEST PROCEDURES

2.1 MAINTENANCE STANDARD

2.1.1 PIN, BUSHING, SPRING, LINING AND SHEAVE

1. Pin, Bushing

PIN



Bushing

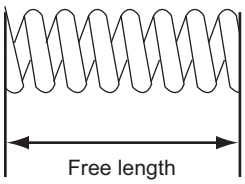
Unit : mm (inch)

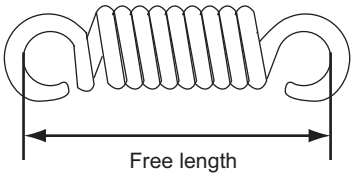
Name	Location		Item	Std. dimension D	Usable limit D'	Remedy	See figure
Pin	Pawl	Front/rear drum	2	44.0 (1.732)	43.82 (1.725)	Replace	Fig.2-1 (P.2-6)
		Boom drum	2	45.0 (1.772)	44.82 (1.765)		Fig.2-3 (P.2-7)
	Brake pedal		7	38.1 (1.5)	37.92 (1.493)	Replace	Fig.2-5 (P.2-8)
			8, 9	13.0 (0.512)	12.85 (0.506)		
			10	13.0 (0.512)	12.85 (0.506)		
			11, 12	10.0 (0.394)	9.96 (0.392)		
	Boom foot		2	114.7 (4.516)	114.04 (4.490)	Replace	Fig.2-6 (P.2-8)

Unit : mm (inch)

Name	Location	Item	Std. dimension d	Usable limit d'	Remedy	See figure
Bushing	Pawl (Front/rear)	2	44.0 (1.732)	44.26 (1.743)	Replace	Fig.2-1 (P.2-6)
	Pawl (Boom)	3	45.0 (1.772)	45.27 (1.782)	Replace	Fig.2-3 (P.2-7)
	Boom foot	3	115.0 (4.528)	115.35 (4.541)	Replace	Fig.2-6 (P.2-8)

2. Spring

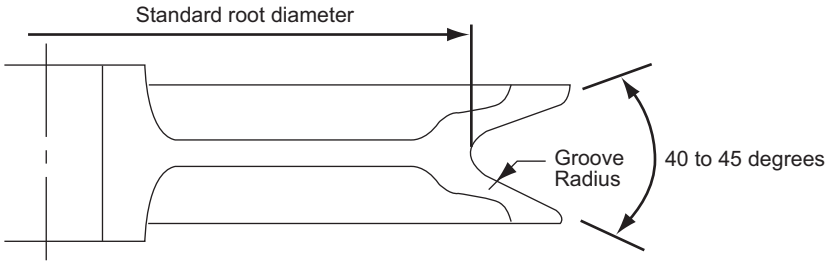




Unit : mm (inch)

Location	Item	Std. free length	Usable limit of free length	Remedy	See figure
Front/rear drum pawl	5	72 (2.835) (Compression)	68.4 (2.693)	Replace	Fig.2-1 (P.2-6)
Boom drum pawl	5	72 (2.835) (Compression)	68.4 (2.693)		Fig.2-3 (P.2-7)
Brake pedal	15	61.5 (2.421) (Tension)	63.9 (2.516)		Fig.2-5 (P.2-8)

3. Sheave



Unit : mm (inch)

Location	Item	Std. root diameter	Use limit	Remedy	Groove radius	See figure
Boom point	8	494 (19.449)	491 (19.331)	Replace or build-up	15.5 (0.610)	Fig.2-6 (P.2-8)
Idler sheave	9	549 (21.614)	546 (21.496)		15.5 (0.610)	
Auxiliary sheave	10	494 (19.449)	491 (19.331)		15.5 (0.610)	
Upper spreader	11	381 (15.000)	379.5 (14.941)		11.0 (0.433)	
Lower spreader	5	381 (15.000)	379.5 (14.941)		11.0 (0.433)	Fig.2-8 (P.2-9)
Jib point	12	549 (21.614)	546 (21.496)		14.0 (0.551)	Fig.2-7 (P.2-9)
Jib strut	13					
Gantry peak	6	381 (15.000)	379.5 (14.941)		11.5 (0.453)	Fig.2-8 (P.2-9)

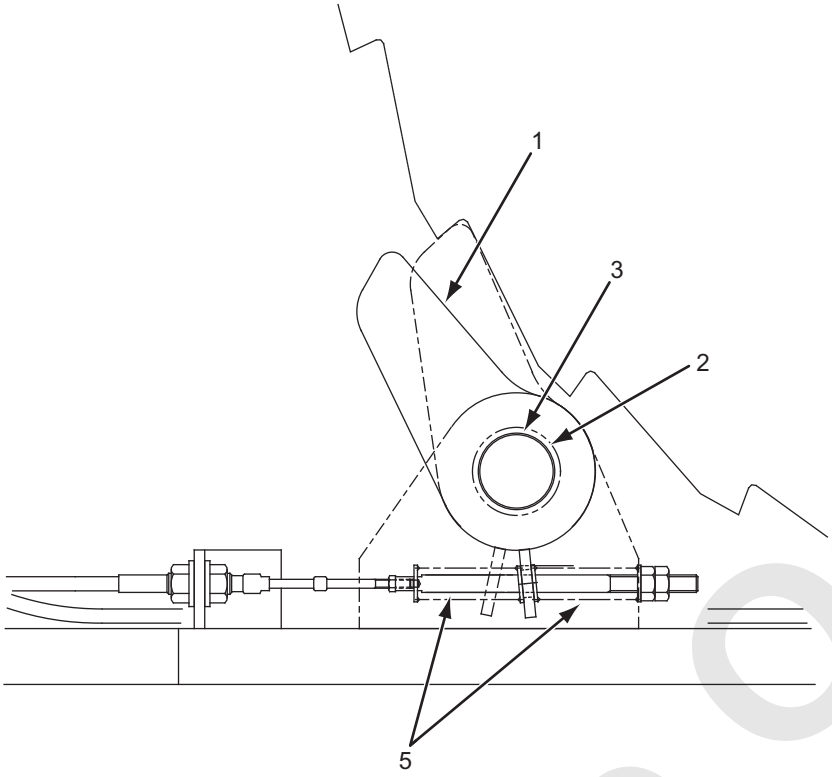


Fig.2-1 Front/rear drum lock assy

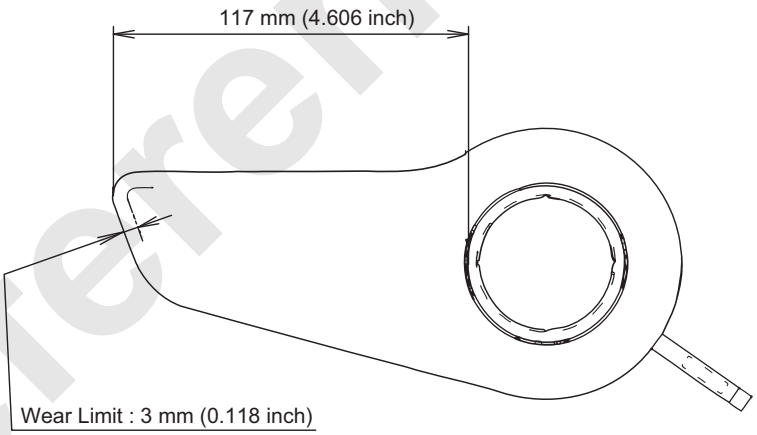


Fig.2-2 Pawl

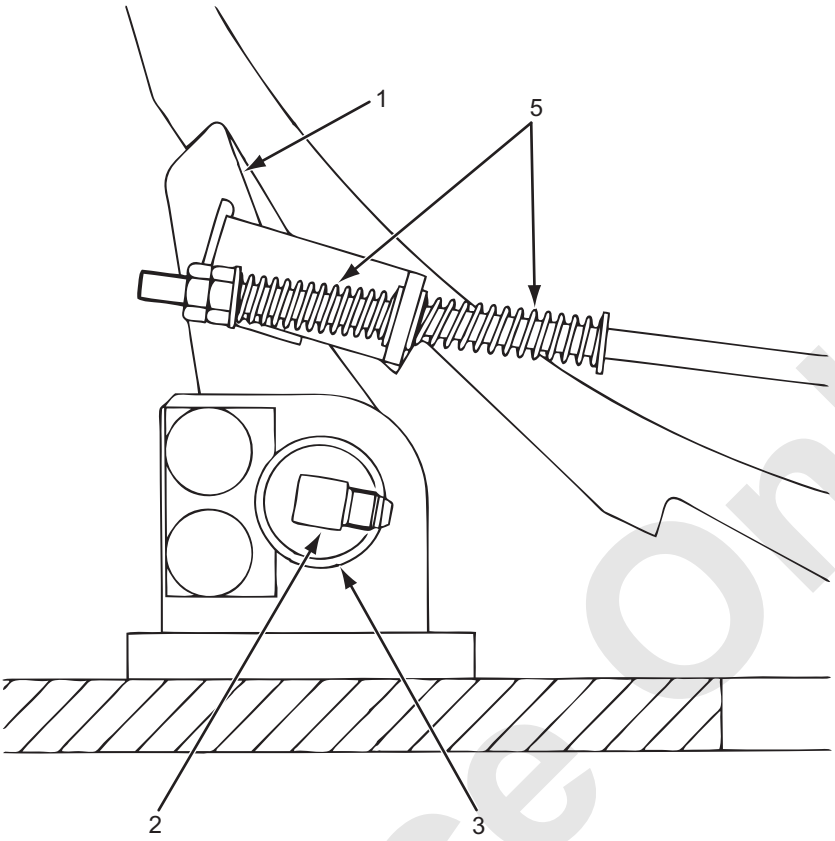


Fig.2-3 Boom drum lock assy

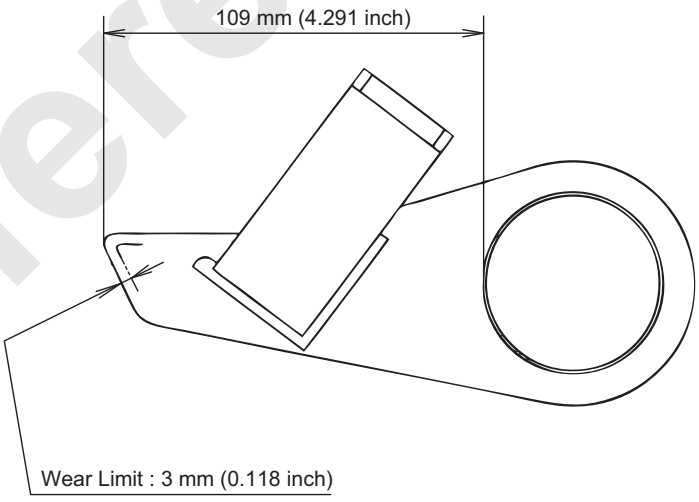


Fig.2-4 Pawl

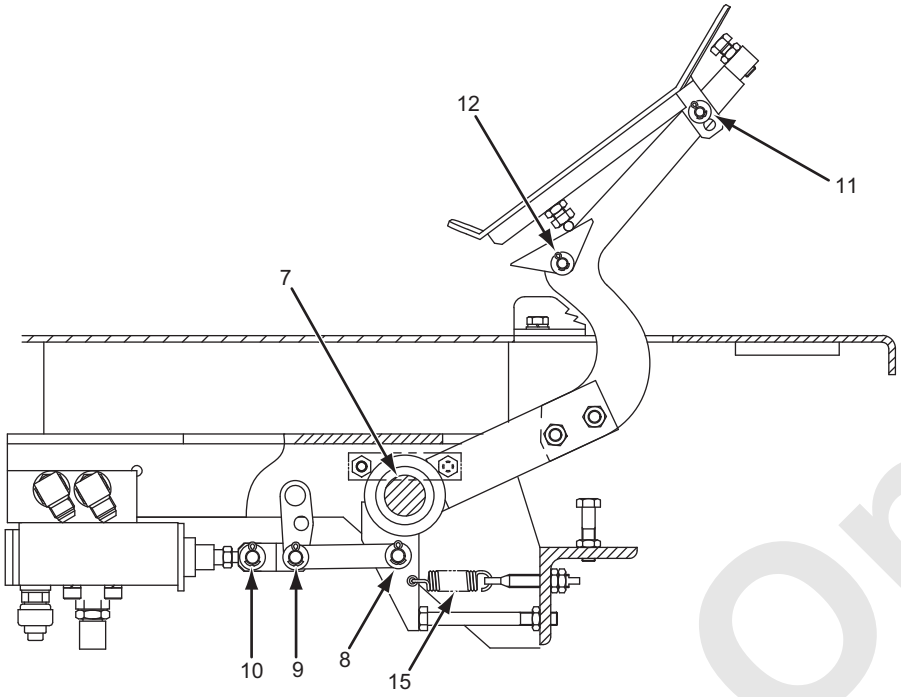


Fig.2-5 Brake pedal

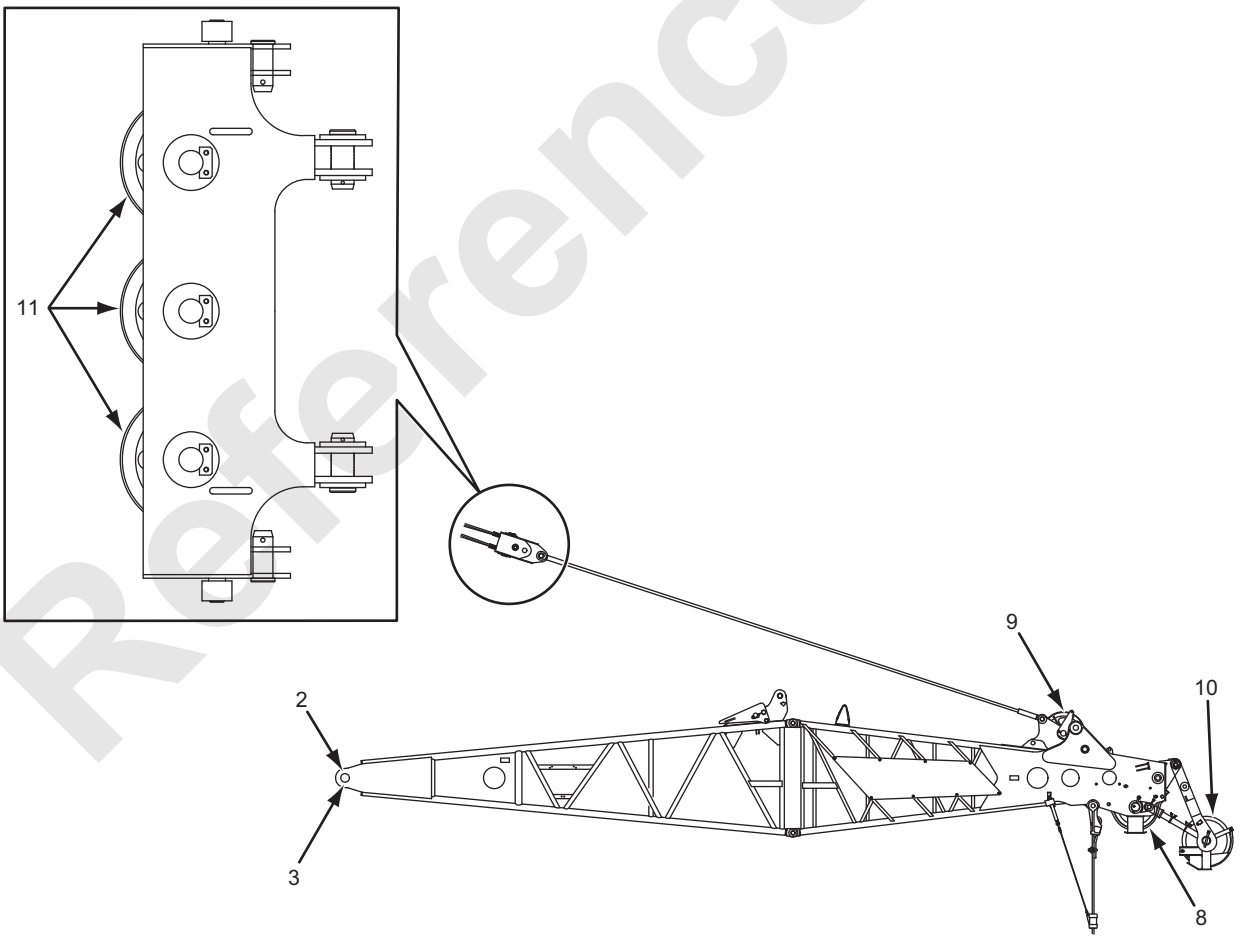


Fig.2-6 Crane assy

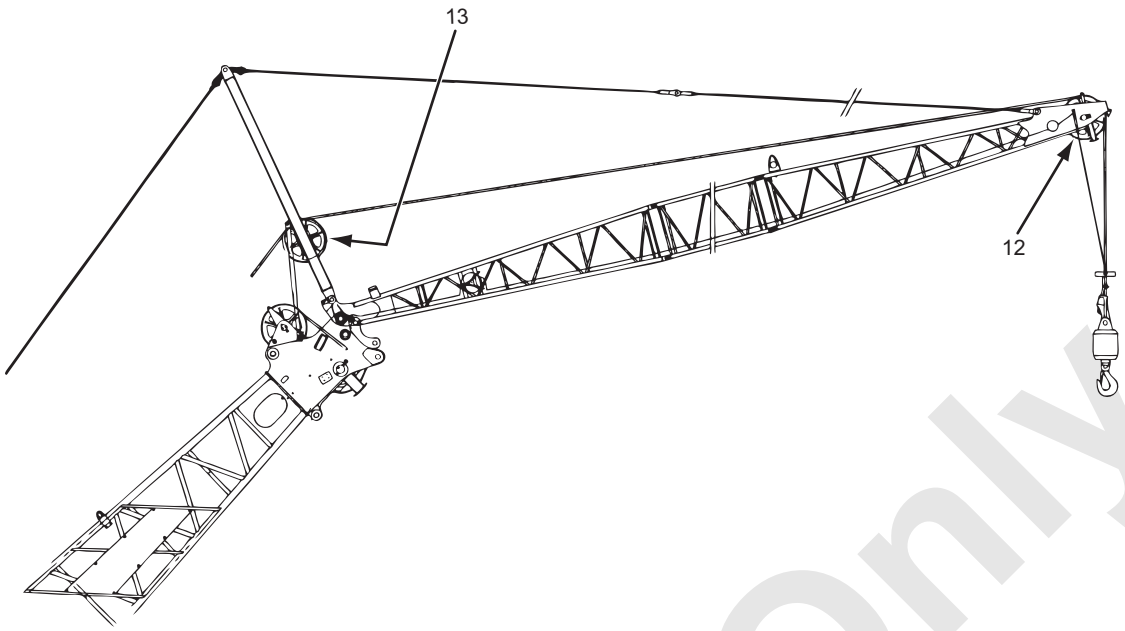


Fig.2-7 Jib assy

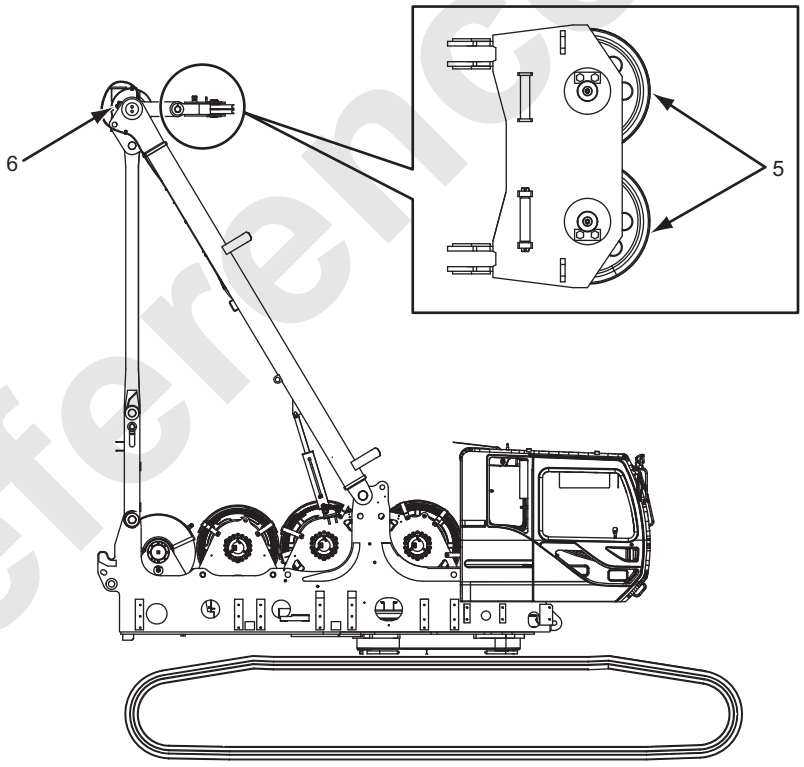
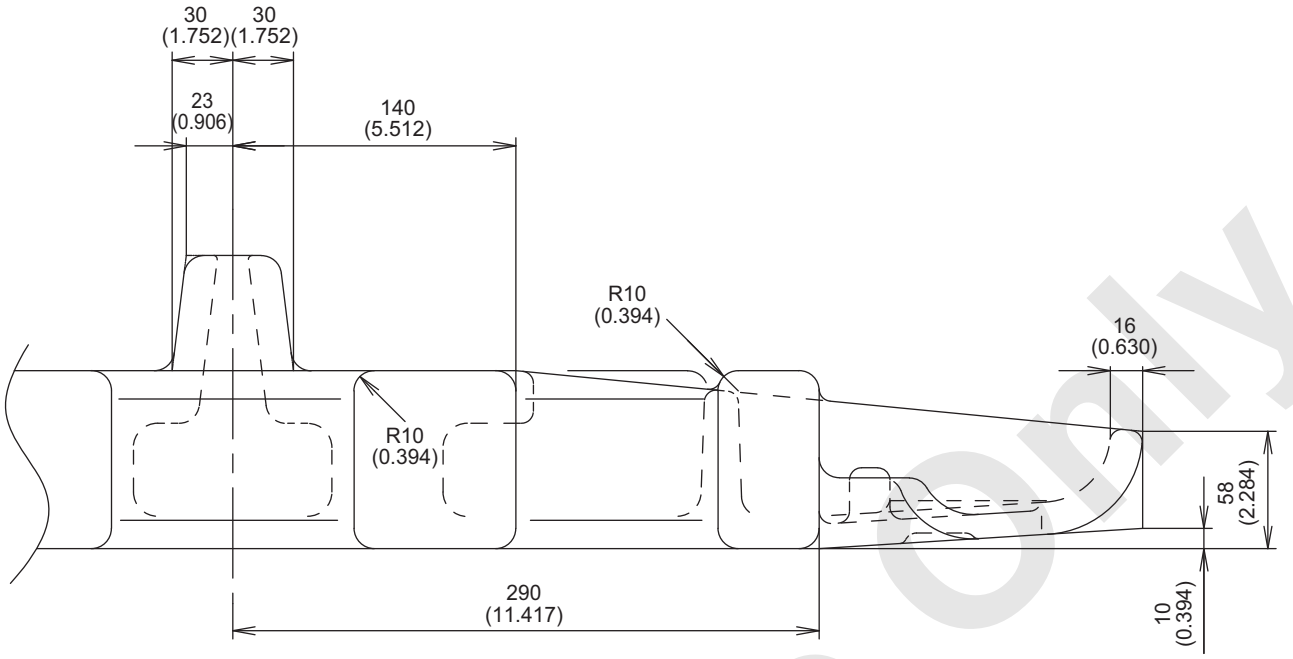
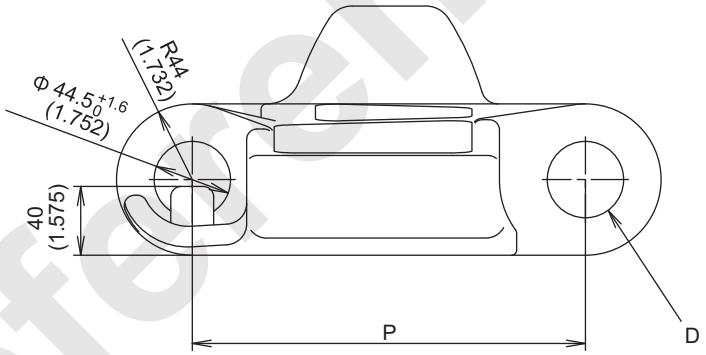


Fig.2-8 Gantry assy

2.1.2 PROPEL DEVICE

1. Crawler shoe





Wear limit : 2 mm (0.079 inch)
Remedy : Build-up or replace

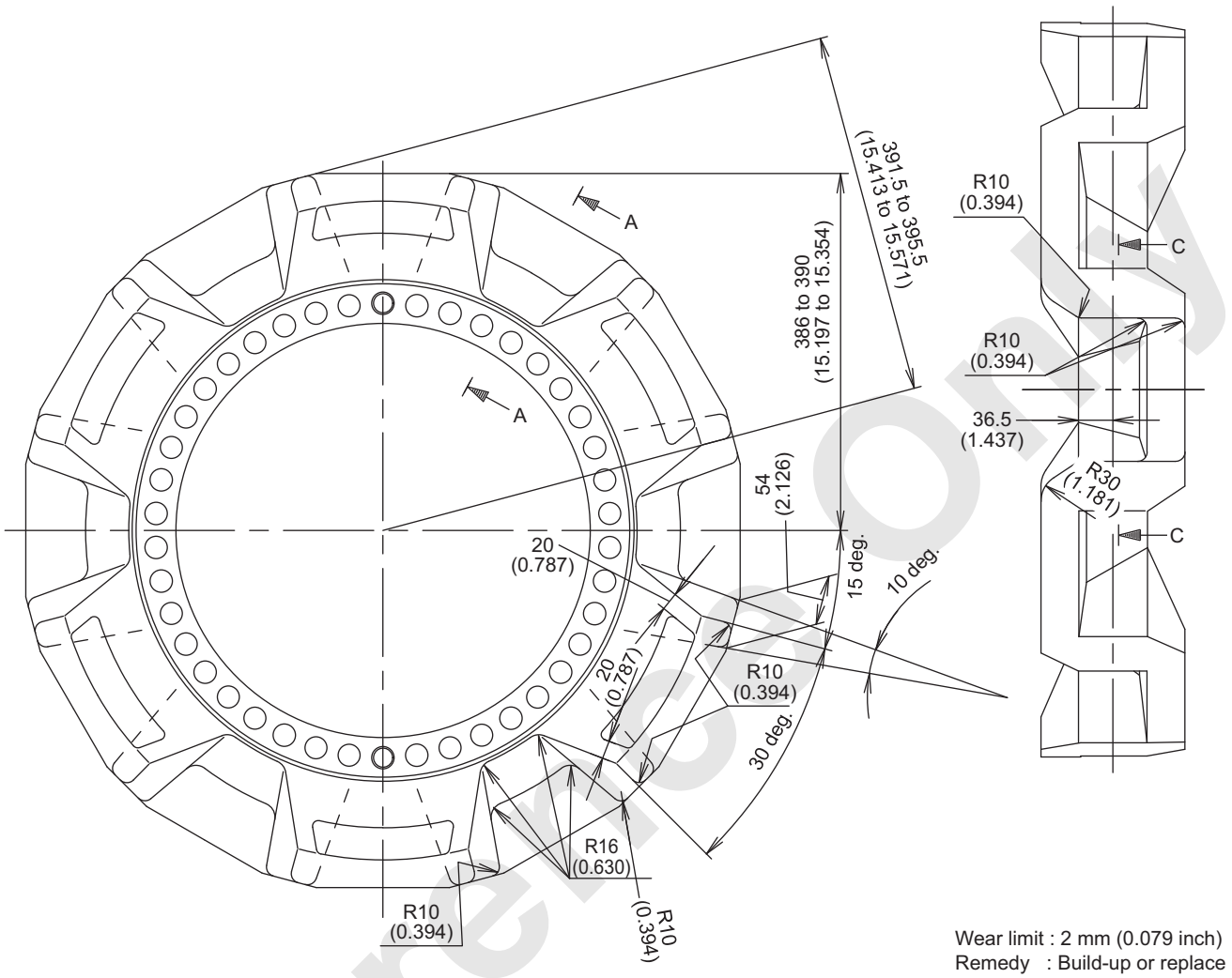
Unit : mm (inch)

Unit : mm(inch)

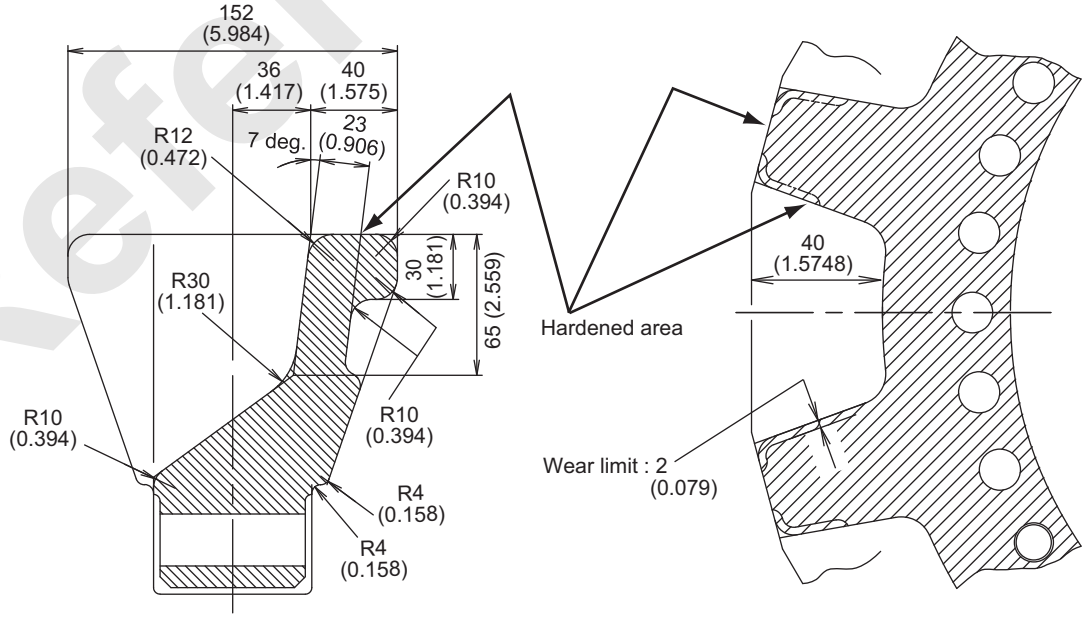
	Std. dimension	Usable limit	Remedy
Pin hole (D)	Φ45 (1.772)	Φ46.6 (1.835)	Build-up or replace
Pin	Φ44.45 (1.750)	Φ44.25 (1.742)	
Pitch (P)	228 (8.976)	234.6 (9.236)	

Distance between pins when 6 pcs of shoes are connected and tension applied : 1368 to 1378 mm (53.858 to 54.252 inch)

2. Drive tumbler



Wear limit : 2 mm (0.079 inch)
Remedy : Build-up or replace

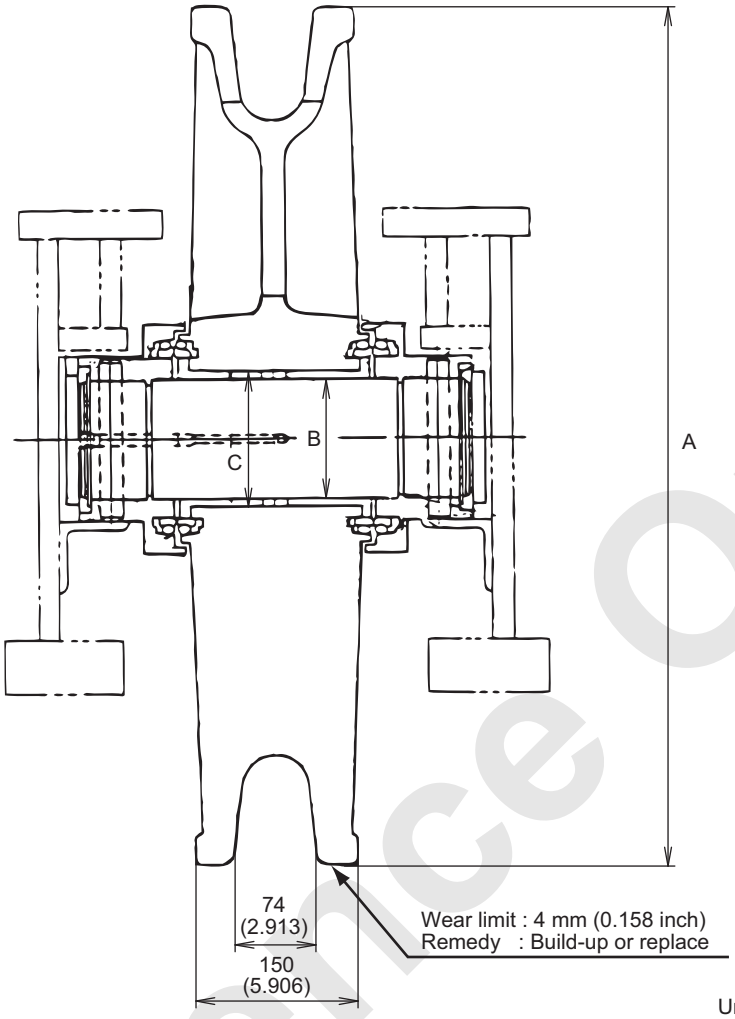


SECTION A - A

SECTION C - C

Unit : mm (inch)

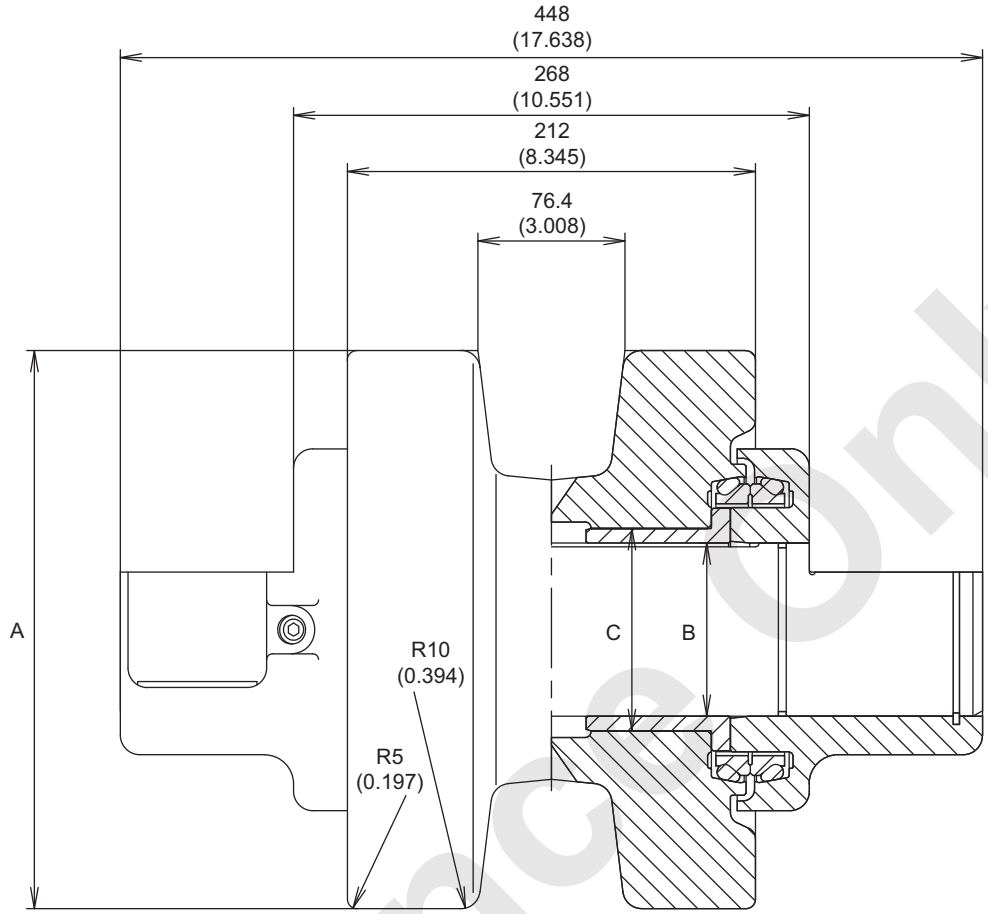
3. Idler



Unit : mm (inch)
Wear limit : 2 mm (0.079 inch)
Remedy : Build-up or replace

Symbol	Item	Std. dimension				Usable limit	Remedy
A	Outer diameter	Φ785 (30.906)				Φ777 (30.591)	Build-up or replace
B	Gap between shaft and bushing	Std. dimension	Tolerance		Standard	Allowable	Replacement of bushing
		Φ110 (4.331)	Shaft	-0.036 (-0.001) -0.071 (-0.003)	Gap 0.175 (0.007) to 0.232 (0.009)	Gap 0.1 (0.004)	
			Bore	+0.161 (+0.006) +0.139 (+0.006)			
C	Interference of sprocket and bushing	Φ125 (4.921)	Shaft	+0.117 (+0.005) +0.092 (+0.004)	Interference 0.057 (0.002) to 0.117 (0.005)	Interference 0 (0)	
			Bore	+0.047 (+0.002) +0 (+0)			

4. Track roller (Lower roller)

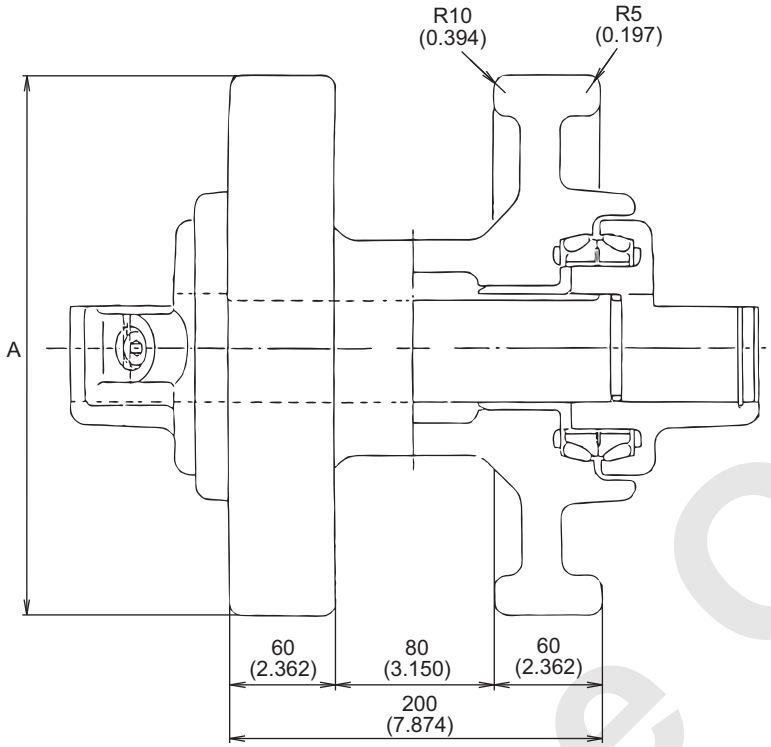


Unit : mm (inch)

Unit : mm (inch)

Symbol	Item	Std. dimension				Usable limit	Remedy
A	Outer deameter	Φ288 to 292 (11.339 to 11.496)				Φ282 (11.102)	Build-up or replace
B	Gap between of shaft and bushing	Std. dimension	Tolerance		standard	Allowable	Replacement of bushing
		Φ90 (3.543)	Shaft	-0.036 (-0.001) -0.090 (-0.004)	Gap 0.266 (0.011) to 0.37 (0.014)	Gap 0.8 (0.032)	
			Bore	+0.28 (+0.011) +0.23 (+0.009)			
C	Interference of roller and bushing	Φ105 (4.134)	Shaft	+0.12 (+0.005) +0.11 (+0.004)	Interference 0.075 (0.003) to 0.12 (0.005)	Interference 0 (0)	Replace
			Bore	+0.035 (+0.001) 0 (0)			

5. Guide roller (Upper roller)

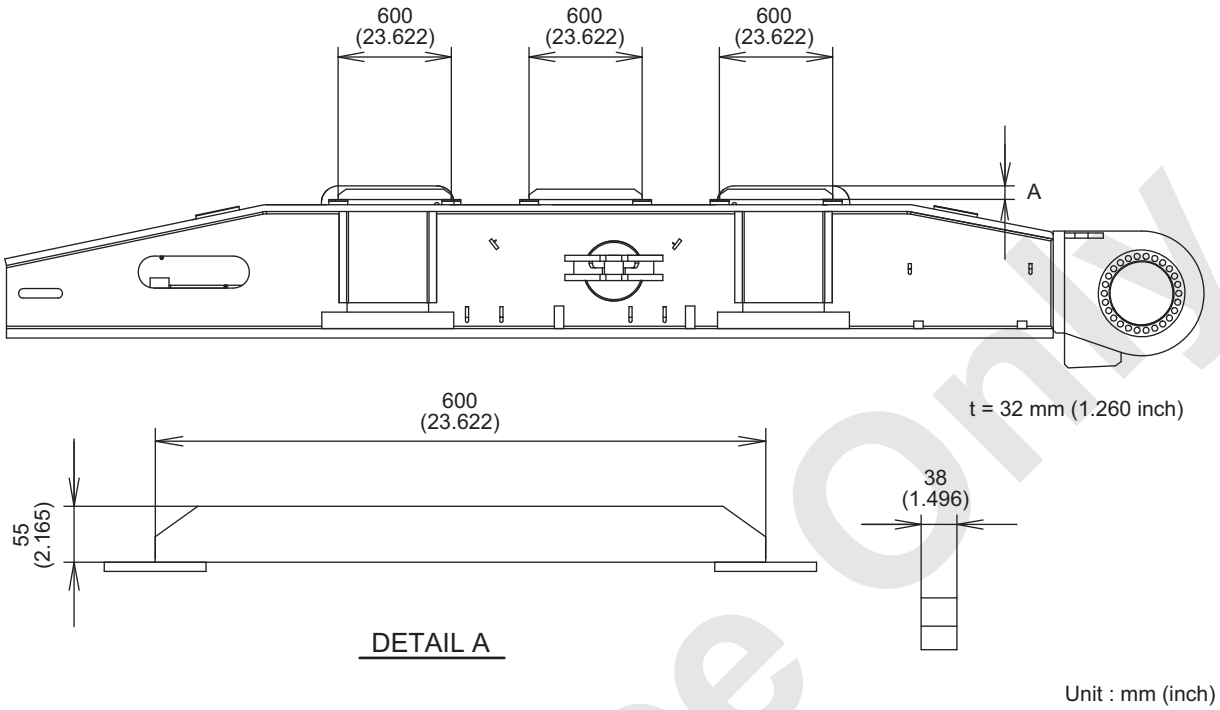


Unit : mm (inch)

Unit : mm (inch)

Symbol	Item	Std. dimension	Usable limit	Remedy
A	Outer diameter	Φ230 (9.056)	Φ222 (8.740)	Build-up or replace

6. Guide bar
   LEFT SIDE
   RIGHT SIDE

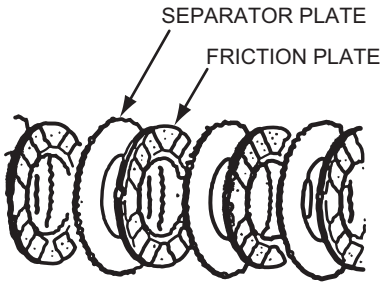


Unit : mm (inch)

Unit : mm (inch)

Symbol	Item	Std. dimension	Usable limit	Remedy
A	Height of guide bar	55 (2.165)	30 (1.181)	Build-up or replace

7. Propel brake plate



Name of plate	Number	Std. dimension (Total)	Wear limit (Total)	Std. brake torque
Friction plate	4	22.7 mm (0.894 inch)	21.2 mm (0.835 inch) Amount of wear : 1.5 mm (0.059 inch)	528 to 712 N-m (389 to 525 lbs-ft)
Separator plate	5			

2.2 PERFORMANCE STANDARD AND TEST PROCEDURE

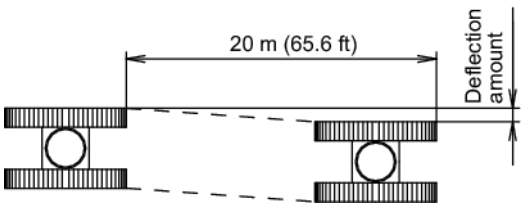
1. TERMINOLOGY
   Standard value : Standard of assembling new machine.
   When the value exceeds the standard, repair or replace the part as required to maintain machine performance and or safety.
   Temperature of oil : It means temperature of hydraulic oil.
2. As to the items of which limit of use is not shown, referring to standard value as the guidance, repair or replace the part as required.

WARNING

Operate the machine according to the sign from a designated personnel.
Draw the ropes around the area where the machine operates to keep out everyone.
Check that the overhoist prevention (for hook/boom) correctly operates.
Lock all functions that are not used.
Do not attempt sudden startup/sudden stop.

2.2.1 OPERATING SPEED

No.	Item	Test condition	Test procedure	Standard value
1	Boom hoist rope speed	Mode : Power mode Engine min^{-1} : High idling Temperature of oil : 45 to 55°C (113 to 131°F) Boom Length : Basic boom Loading : No load	Measure the time taken to rotate drum 10 times. (Start measuring after rotation becomes stable.) Take average of 3 times measuring.	17.9 to 21.1 sec
2	Front and rear drum rope speed	Mode : Power mode Engine min^{-1} : High idling Temperature of oil : 45 to 55°C (113 to 131°F) Loading : No load	Measure the time taken to rotate drum 10 times. (Start measuring after rotation becomes stable.) Take average of 3 times measuring.	Low = (Trimmer low) 34.1 to 39.9 sec High = (Trimmer high) 9.1 to 11.0 sec
3	Swing speed	Mode : Power mode Engine min^{-1} : High idling Temperature of oil : 45 to 55°C (113 to 131°F) Boom Length : Basic boom Loading : No load Swing mode : Free high	Measure the time taken to rotate machine one time. Measure the time for 2nd rotation after 1st preliminary rotation. Take average of 3 times measuring.	18.3 to 21.5 sec
4	Propel speed	Mode : Power mode Engine min^{-1} : High idling Temperature of oil : 45 to 55°C (113 to 131°F) Boom Length : Basic boom Place : Firm and level ground	Measure the time taken to propel machine the distance of 20 m (66 ft). Propel machine first preliminary more than 2 m (6.6 ft) before starting the measuring. Take average of 3 times measuring.	Low = 71.4 to 82.8 sec High = 48.6 to 56.5 sec
5	Propelling deflection	Mode : Standard mode Engine min^{-1} : High idling Temperature of oil : 45 to 55°C (113 to 131°F) Boom Length : Basic boom Place : Firm and level ground	Measure the deflection amount resulted from propelling the distance of 20 m (66 ft). Propel machine first preliminary more than 2 m (6.6 ft) before starting the measuring. Take average of 3 times measuring.	Within 600 mm (23.622 inch)

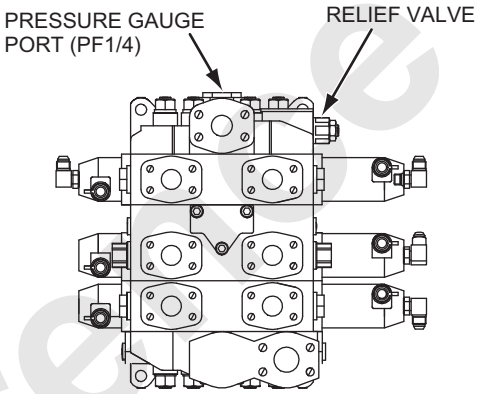


2.2.2 POINT AND METHOD OF MEASURING PRESSURE

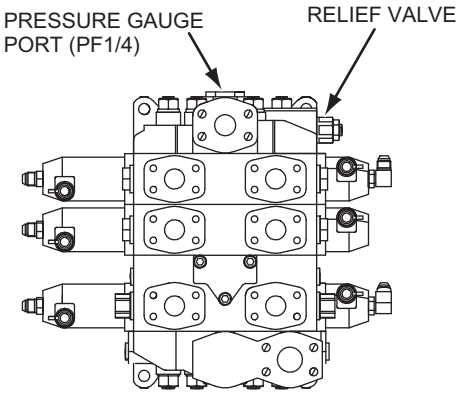
Use a pressure gauge which has a surplus of more than 10 MPa for pressures to be measured and which has passed the inspection.
Prior to pressure measurement, clean the port for pressure measurement so as to be free from oil and dust.

Connector and hose for measuring pressure. Connector: 9999406548 Hose: 9999429916

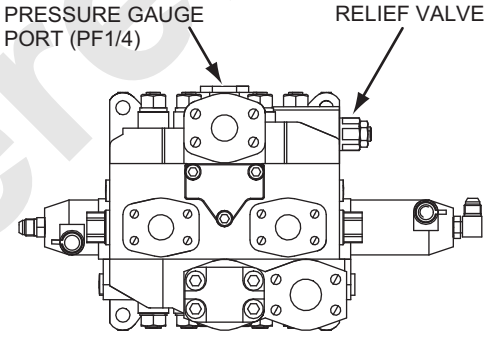
No.	Item	Test condition	Test procedure	Standard value
1	Main • Propel right • Rear drum	• Engine speed : High idling • Temperature of oil : 45 to 55° C (113 to 131° F) • Mode : Power mode	1. Lower the rear drum hook onto the ground. 2. Lock the rear winch drum with the drum lock. 3. Make the valve relieve by rear drum winch lowering operation.	31.9 MPa (4,627 psi)



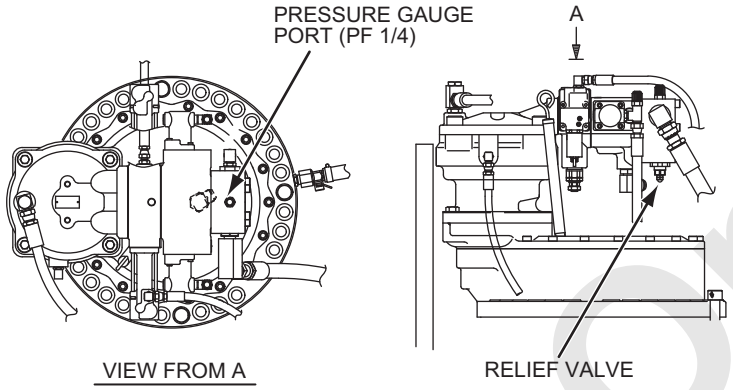
No.	Item	Test condition	Test procedure	Standard value
2	Main • Propel left • Front drum	• Engine speed : High idling • Temperature of oil : 45 to 55° C (113 to 131° F) • Mode : Power mode	1. Lower the front drum hook onto the ground. 2. Lock the front winch drum with the drum lock. 3. Make the valve relieved by front drum winch lowering operation.	31.9 MPa (4,627 psi)



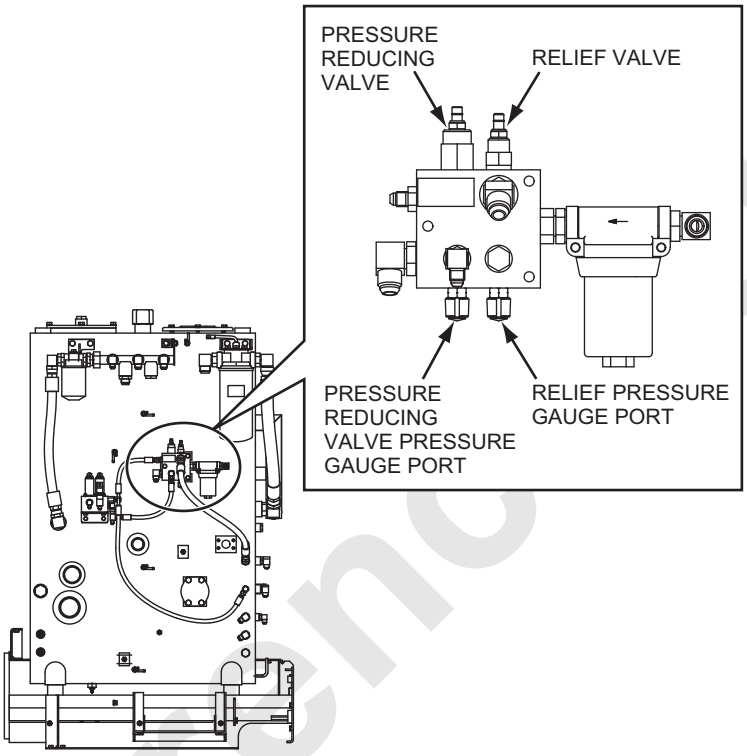
No.	Item	Test condition	Test procedure	Standard value
3	Boom	• Engine speed : High idling • Temperature of oil : 45 to 55° C (113 to 131° F) • Mode : Power mode	1. Lower the boom onto the ground. 2. Lock the boom drum. 3. Make the valve relieved by boom lowering operation.	31.9 MPa (4,627 psi)



No.	Item	Test condition	Test procedure	Standard value
4	Swing	• Engine speed : High idling • Temperature of oil : 45 to 55° C (113 to 131° F) • Swing mode : Free high • Mode : Power mode	1. Lock the upper not to turn with the swing lock pin and parking brake. 2. Make the valve relieved by swing operation.	27.5 MPa (3,989 psi)



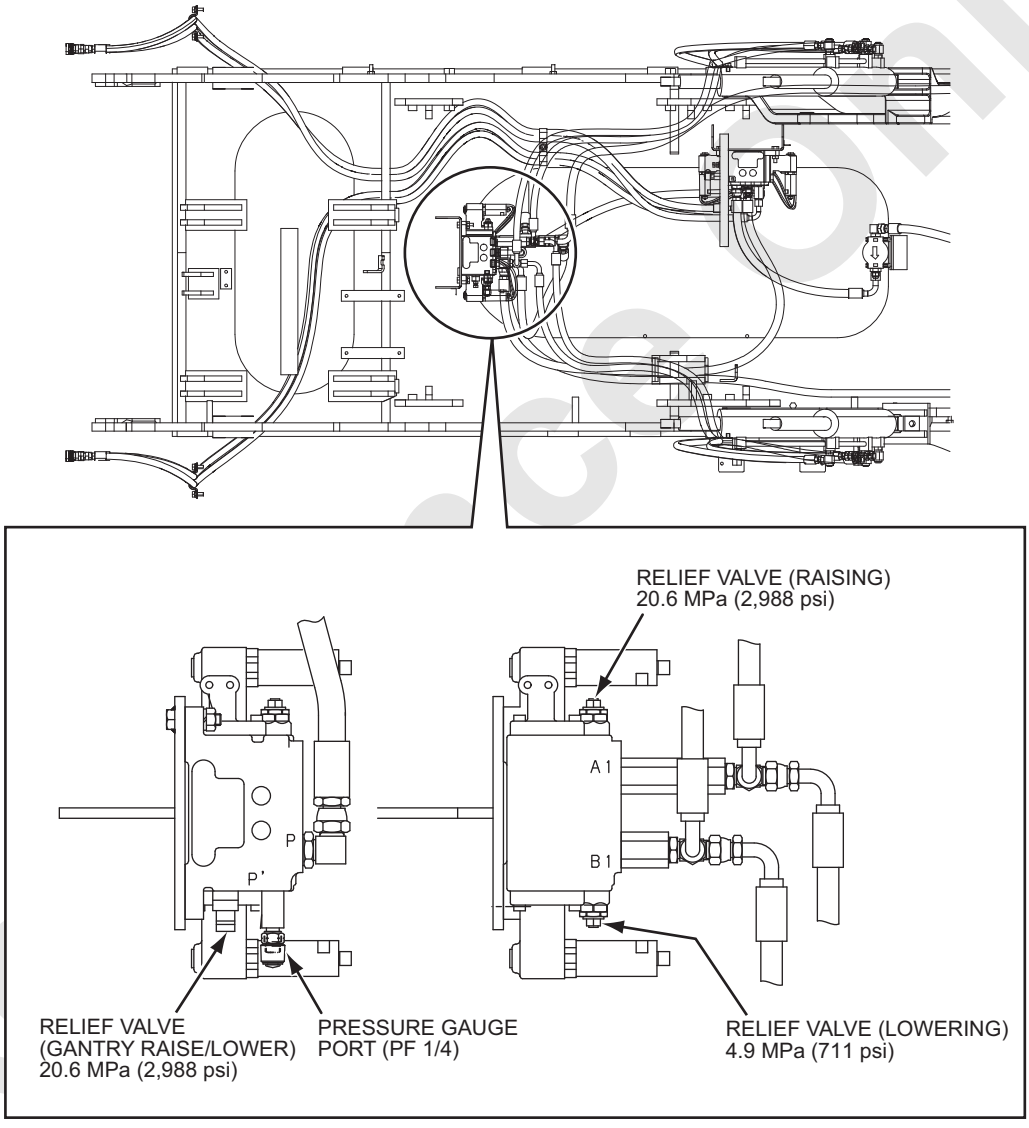
No.	Item	Test condition	Test procedure	Standard value
5	Control Circuit (Primary pressure)	• Temperature of oil : 45 to 55° C (113 to 131° F)	Remove the cap of plug installed in valve block, and instal the pressure gauge.	Relief valve : 7.0 MPa (1,015 psi) (Low idling) Reduction valve : 5.4 MPa (783 psi) (Low idling)



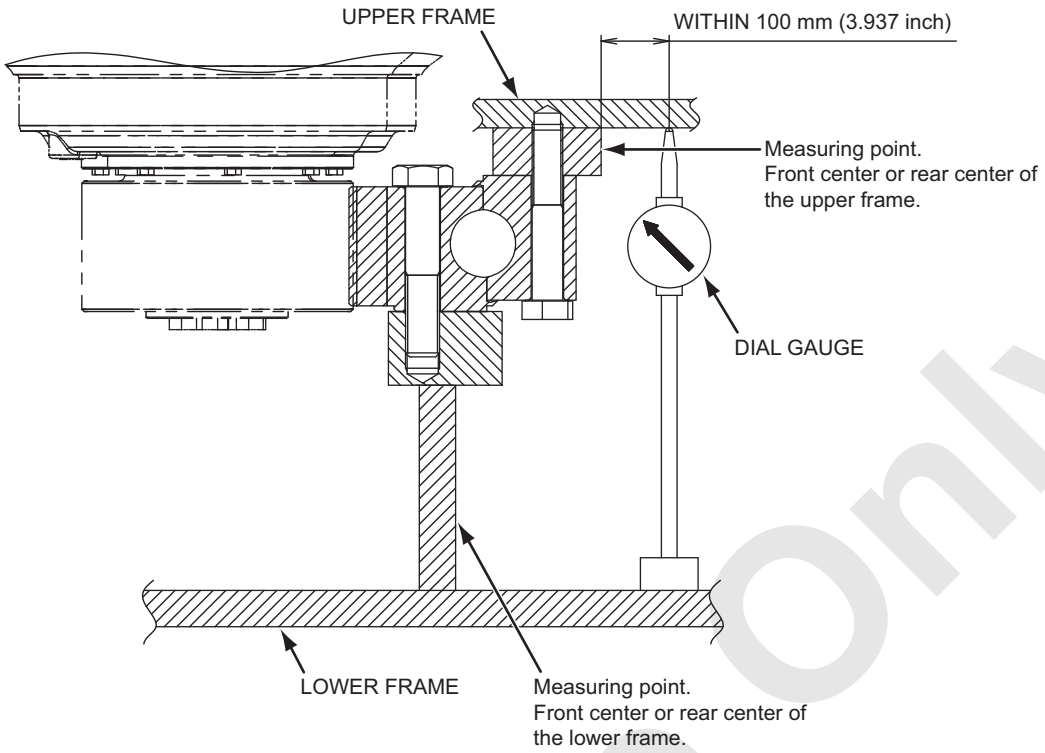
No.	Item	Test condition	Test procedure
6	Control Circuit (Secondary pressure)	• Engine speed : Low idling • Temperature of oil : 45 to 55° C (113 to 131° F)	Operate the control lever for the section to be measured. (Operate the speed adjusting knob to the Max. position)
			Take pressure out from the quick coupler of the control valve spool end.

Standard value	
Front/rear drum	2.65 to 2.94 MPa (384 to 426 psi)
Propel	1.42 to 1.62 MPa (206 to 235 psi)
Swing	1.62 to 1.92 MPa (235 to 278 psi)
Third drum	2.65 to 2.94 MPa (384 to 426 psi)
Boom	2.50 to 2.79 MPa (363 to 405 psi)

No.	Item	Test condition	Test procedure	Standard value
7	Gantry raising/ lowering	• Engine speed : High idling • Temperature of Hydraulic oil : 45 to 55° C (113 to 131° F)	1. Raise the gantry high, and fix it with the gantry fixing pin. 2. Make the valve relieved by raising or lowering the gantry operation.	Port relief set Raise : 20.6 MPa (2,988 psi) Lower : 4.9 MPa (711 psi) Lower Circuit : 20.6 MPa (2,988 psi)



2.2.3 SLEWING RING



COUNTERWEIGHT : FULL

Condition of measurement	Amount of play
Boom length : 15.2 m (50 ft)	Less than 3 mm (0.118 inch)
Radius : 9.14 m (30 ft)	
Load : 36.8 t (82,500 lbs)	

3. GENERAL WORK STANDARD

3.1 TIGHTENING TORQUE OF CAP SCREWS AND NUTS

3.1.1 STANDARD TIGHTENING TORQUE

Unless otherwise specified, torque all screws and nuts on this machine to the values shown in the following tables.

METRIC COARSE THREADS (PLATED)

Nominal size	Classification			
	4T		7T	
	Tightening torque N-m (ft-lbs)		Tightening torque N-m (ft-lbs)	
	Dry	Lubricated	Dry	Lubricated
M6	4.6 to 5.6 (0.47 to 0.57)	3.9 to 4.7 (0.40 to 0.48)	10 to 12.2 (1.02 to 1.24)	8.4 to 10.2 (0.85 to 1.05)
M8	11.1 to 12.2 (8.1 to 9.9)	10.3 to 10.5 (6.9 to 8.5)	24.4 to 30.1 (18.2 to 22.2)	20.2 to 24.8 (14.9 to 18.3)
M10	22 to 27 (16.3 to 19.9)	18.5 to 22.7 (13.7 to 16.7)	47.6 to 58.2 (35.1 to 42.9)	40.6 to 49.6 (29.9 to 36.5)
M12	37.1 to 45.3 (27.3 to 33.3)	32.7 to 39.9 (24 to 29.4)	81.0 to 99.2 (59.8 to 73)	68.8 to 84.0 (50.7 to 61.9)
M14	59.1 to 72.3 (43.6 to 53.2)	50.2 to 61.5 (37.1 to 45.3)	129 to 157 (94.5 to 115.5)	109 to 133 (79.9 to 97.7)
M16	90 to 110 (66.2 to 81)	75.9 to 92.7 (55.9 to 68.3)	194 to 238 (143 to 175)	163 to 199 (121 to 147)
M18	123 to 151 (91 to 111)	105 to 129 (77.3 to 94.5)	274 to 334 (202 to 246)	229 to 281 (169 to 207)
M20	174 to 212 (128 to 156)	146 to 178 (107 to 131)	379 to 463 (279 to 341)	318 to 388 (234 to 286)
M22	229 to 281 (169 to 207)	194 to 238 (143 to 175)	503 to 615 (371 to 453)	423 to 517 (312 to 382)
M24	300 to 366 (220 to 250)	238 to 292 (175 to 215)	643 to 787 (474 to 580)	520 to 636 (382 to 468)
M27	432 to 528 (319 to 389)	353 to 431 (260 to 318)	943 to 1153 (696 to 850)	768 to 938 (579 to 707)
M30	591 to 723 (436 to 532)	494 to 604 (364 to 444)	1279 to 1563 (942 to 1152)	1075 to 1315 (793 to 969)
M33	794 to 970 (585 to 715)	661 to 809 (488 to 596)	1721 to 2101 (1267 to 1549)	1446 to 1768 (1066 to 1302)
M36	1023 to 1251 (754 to 922)	856 to 1046 (630 to 770)	2205 to 2659 (1625 to 1985)	1843 to 2253 (1358 to 1660)

METRIC FINE THREADS (PLATED)

Nominal size	Classification			
	4T		7T	
	Tightening torque N-m (ft-lbs)		Tightening torque N-m (ft-lbs)	
	Dry	Lubricated	Dry	Lubricated
M8	11.6 to 14.2 (8.6 to 10.4)	9.8 to 12 (7.2 to 8.8)	25.6 to 31.2 (18.8 to 23)	21.1 to 25.9 (15.6 to 19)
M10	22.9 to 28.1 (16.9 to 20.7)	19.4 to 23.8 (14.3 to 17.5)	49.4 to 60.4 (36.4 to 44.4)	42.7 to 51.7 (31.2 to 38.2)
M12	40.6 to 49.6 (29.9 to 36.5)	34.4 to 42 (25.4 to 31.6)	87.3 to 106.7 (64.3 to 78.7)	73.2 to 89.4 (53.9 to 65.9)
M16	94 to 116 (69.6 to 85)	79.4 to 97 (58.5 to 71.5)	202 to 248 (149 to 183)	172 to 210 (127 to 155)
M20	185 to 227 (137 to 167)	157 to 191 (116 to 142)	406 to 496 (299 to 365)	335 to 409 (247 to 301)
M24	318 to 388 (234 to 286)	265 to 323 (195 to 239)	688 to 840 (507 to 619)	573 to 701 (422 to 516)
M30	635 to 777 (468 to 572)	529 to 647 (390 to 476)	1393 to 1703 (1027 to 1255)	1156 to 1412 (851 to 1103)
M36	1058 to 1294 (779 to 953)	882 to 1078 (650 to 794)	2311 to 2825 (1703 to 2081)	1922 to 2350 (1417 to 1731)

COARSE THREADS UNC

Nominal size	Classification					
	Coarse Threads UNC					
	Tightening torque N-m (ft-lbs)					
	Grade 2		Grade 5		Grade 8	
	Dry	Lubricated	Dry	Lubricated	Dry	Lubricated
1/4	7.8 (5.79)	6.9 (5.06)	12.7 (9.40)	10.8 (7.96)	17.7 (13.0)	14.7 (10.8)
5/16	15.7 (11.6)	13.7 (10.1)	25.5 (18.8)	21.6 (15.9)	35.3 (26.0)	30.4 (22.4)
3/8	28.4 (21.0)	23.5 (17.4)	44.1 (32.6)	37.3 (27.5)	61.8 (45.6)	52.0 (38.3)
7/16	44.1 (32.5)	37.3 (27.5)	68.6 (50.6)	57.9 (42.7)	97.1 (71.6)	81.4 (60.0)
1/2	68.6 (50.6)	57.9 (42.7)	105.9 (78.1)	89.2 (65.8)	149.1 (110)	125.5 (92.6)
9/16	98.1 (72.3)	82.4 (60.8)	152.0 (112)	127.5 (94.0)	215.7 (159)	180.4 (133)
5/8	137.3 (101)	115.7 (85.3)	215.7 (159)	178.5 (132)	304.0 (224)	255.0 (188)
3/4	245.2 (181)	205.9 (152)	372.7 (275)	313.8 (232)	529.6 (391)	441.3 (325)
7/8	284.4 (210)	245.2 (181)	598.2 (441)	500.1 (369)	843.4 (622)	706.1 (521)
1	343.2 (253)	294.2 (217)	892.4 (658)	745.3 (550)	1255.3 (926)	1059.1 (781)
1 1/8	500.1 (369)	421.7 (311)	1118.0 (825)	931.6 (687)	1804.4 (1331)	1510.2 (1114)
1 1/4	696.3 (514)	578.6 (427)	1559.3 (1150)	1304.3 (962)	2520.3 (1859)	2118.0 (1562)
1 3/8	912.0 (673)	764.9 (564)	2049.6 (1512)	1716.2 (1266)	3314.6 (2445)	2785.1 (2054)
1 1/2	1216.0 (897)	1019.9 (752)	2716.4 (2004)	2275.1 (1678)	4403.2 (3248)	3687.3 (2720)

FINE THREADS UNF

Nominal size	Classification					
	Fine Threads UNF					
	Tightening torque N-m (ft-lbs)					
	Grade 2		Grade 5		Grade 8	
	Dry	Lubricated	Dry	Lubricated	Dry	Lubricated
1/4	8.8 (6.51)	7.8 (5.79)	13.7 (10.1)	11.8 (8.68)	20.6 (15.2)	16.7 (12.3)
5/16	17.7 (13.2)	14.7 (10.8)	27.5 (20.3)	23.5 (17.4)	39.2 (28.9)	33.3 (24.6)
3/8	31.4 (23.1)	26.5 (19.5)	48.1 (35.4)	40.2 (29.7)	68.6 (50.6)	56.9 (42.0)
7/16	49.0 (36.2)	41.2 (30.4)	75.5 (55.7)	62.8 (46.3)	105.9 (78.1)	89.2 (65.8)
1/2	75.5 (55.7)	62.8 (46.3)	116.7 (86.1)	97.1 (71.6)	164.8 (122)	137.3 (101)
9/16	106.9 (78.8)	90.2 (66.5)	165.7 (122)	138.3 (102)	235.4 (174)	195.2 (144)
5/8	152.0 (112)	126.5 (93.3)	235.4 (174)	196.1 (145)	333.4 (246)	274.6 (203)
3/4	264.8 (195)	215.7 (159)	411.9 (304)	343.2 (253)	568.8 (420)	480.5 (354)
7/8	304.0 (224)	245.2 (181)	647.2 (477)	539.4 (398)	912.0 (673)	755.1 (557)
1	372.7 (275)	304.0 (224)	961.1 (709)	804.1 (593)	1353.3 (998)	1127.8 (832)
1 1/8	549.2 (405)	451.1 (333)	1216.0 (897)	1019.9 (752)	1971.1 (1454)	1647.5 (1215)
1 1/4	755.1 (557)	627.6 (463)	1500.4 (1107)	1402.4 (1034)	2736.1 (2018)	2275.1 (1678)
1 3/8	1010.1 (745)	843.4 (622)	2265.3 (1671)	1882.9 (1389)	3667.7 (2705)	3049.9 (2249)
1 1/2	1333.7 (984)	1108.2 (817)	2981.2 (2199)	2481.1 (1830)	4834.7 (3566)	4020.7 (2966)

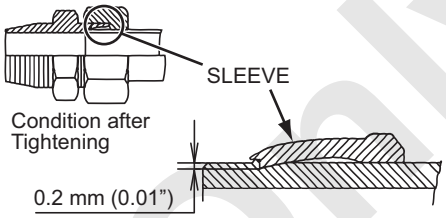
Use thread lock to prevent bolt and nut from loosening.
(LOCTITE #242)
Before using thread lock wash rust, dirt and oil on thread area and dry completely.

MANITOWOC GENUINE THREAD LOCK
(LOCTITE #242)

3.1.2 TIGHTENING TORQUE OF HYDRAULIC FITTINGS

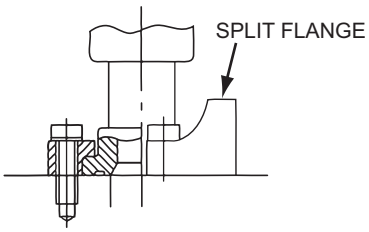
Excessive or insufficient tightening of hose or tube fittings can cause oil leak and deformation or damage to the metal fittings.
Therefore, to secure and obtain good fixing and performance of fittings it is necessary to tighten to the proper torque. The follows are the recommended torques.

(1) BITE TYPE TUBE FITTINGS

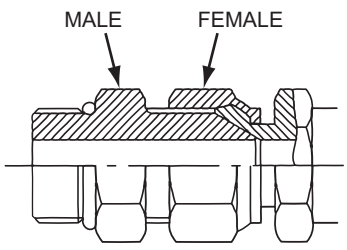
Size in mm (inch) (Outside diameter × thickness)	Tightening torque in N-m (ft-lbs)	Remarks
10 (0.364) X 1.5 (0.059)	49 to 69 (36 to 51)	
15 (0.591) X 2.0 (0.079)	127 to 157 (94 to 116)	
18 (0.709) X 2.5 (0.098)	157 to 167 (116 to 123)	
22 (0.866) X 3.0 (0.118)	196 to 216 (145 to 159)	
28 (1.102) X 4.0 (0.157)	245 to 284 (181 to 210)	
35 (1.378) X 5.0 (0.197)	324 to 353 (239 to 260)	

(2) SPLIT FLANGES

(From SAE Standard)

Size	Tightening torque in N-m (ft-lbs)		Remarks
	3000 psi (210 kg/cm²)	6000 psi (420 kg/cm²)	
1/2"	20 to 25 (14.5 to 19)	-	
3/4"	28 to 39 (21 to 29)	34 to 45 (25 to 33)	
1"	37 to 48 (27 to 35)	56 to 68 (42 to 50)	
1 1/4"	48 to 62 (35 to 45)	84 to 101 (62 to 74)	
1 1/2"	62 to 78 (45 to 58)	158 to 180 (116 to 133)	
2"	74 to 93 (54 to 69)	271 to 294 (200 to 217)	

(3) FLARE TYPE TUBE FITTINGS
(30° FLARE, PF THREADS)

Size	Tightening torque in N-m (ft-lbs)	Remarks
1/4"	25 to 34 (18 to 25)	
3/8"	49 to 69 (36 to 51)	
1/2"	59 to 78 (43 to 58)	
3/4"	118 to 157 (87 to 116)	
1"	147 to 186 (108 to 137)	
1 1/4"	167 to 226 (123 to 166)	
1 1/2"	216 to 275 (159 to 202)	
2"	255 to 333 (188 to 246)	

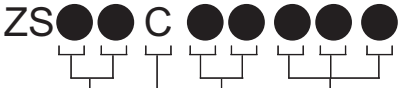
(4) Jubilee Clip (Low Pressure and Suction)

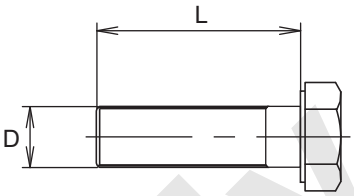
Nominal cord	Diameter		Recommended torque		Working pressure range	
BS5315	inches	mm	N-m	ft-lbs	kg/cm^2	psi
12	3/8" - 1/2"	9.5 - 12	3.4	2.5	56.0	796
16	1/2" - 5/8"	11 - 16	3.4	2.5	56.0	796
20	1/2" - 3/4"	13 - 20	3.4	2.5	56.0	796
22	5/8" - 7/8"	16 - 22	4.5	3.3	56.0	796
25	3/4" - 1"	18 - 25	4.5	3.3	56.0	796
30	7/8" - 1 1/8"	22 - 30	4.5	3.3	56.0	796
35	1" - 1 3/8"	25 - 35	4.5	3.3	56.0	796
40	1 1/8" - 1 5/8"	27 - 40	4.5	3.3	35.0	498
50	1 1/4" - 1 7/8"	35 - 50	4.5	3.3	35.0	498
55	1 1/2" - 2 1/8"	40 - 55	5.9	4.3	21.0	299
60	1 3/4" - 2 3/8"	45 - 60	5.9	4.3	21.0	299
70	2" - 2 3/4"	55 - 70	5.9	4.3	16.8	239
80	2 3/8" - 3 1/8"	60 - 80	5.9	4.3	16.8	239
90	2 3/4" - 3 1/2"	70 - 90	6.8	5.0	16.8	239
100	3 1/4" - 4"	85 - 100	6.8	5.0	16.8	239
120	3 3/4" - 4 1/2"	90 - 120	6.8	5.0	10.5	149
140	4 1/8" - 5 1/2"	110 - 140	6.8	5.0	10.5	149
150	5" - 5 3/4"	130 - 150	6.8	5.0	10.5	149
165	5 1/4" - 6 1/2"	135 - 165	6.8	5.0	9.8	139
190	6 1/4" - 7 1/2"	160 - 190	6.8	5.0	9.8	139
215	7 1/4" - 8 1/2"	185 - 215	7.6	5.6	9.0	128
240	8 1/4" - 9 1/2"	205 - 240	7.6	5.6	9.0	128
270	9 1/4" - 10 1/2"	235 - 270	7.6	5.6	9.0	128
290	10 1/4" - 11 1/2"	255 - 290	7.6	5.6	9.0	128
320	11 1/4" - 12 1/2"	285 - 320	7.6	5.6	9.0	128

3.2 STANDARD PARTS

3.2.1 BOLT

Size and kind of bolt can be identified as shown below.





This part indicates the nominal bolt length. (L)

This part indicates the nominal size of bolt. (D)

C indicates coarse thread.
F indicates fine thread.

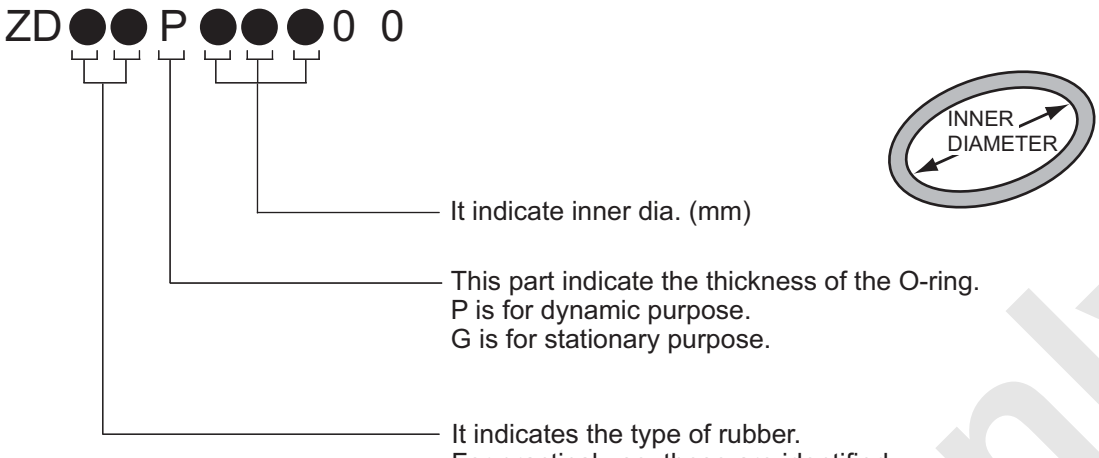
This part indicates the strength and type of the bolts.

In case of 11 or 16, it indicates 4T class.
In case of 12 or 17, it indicates 7T class.
In case of 13 or 18, it indicates 10T class.
In case of 23, it indicates Hexagon socket set screw.

4.8 (4T)	7T	10.9 (10T)
ZS11F ZS16F ZS11C ZS16C	ZS12F ZS17F ZS12C ZS17C	ZS13F ZS18F ZS13C ZS18C

3.2.2 O-RING

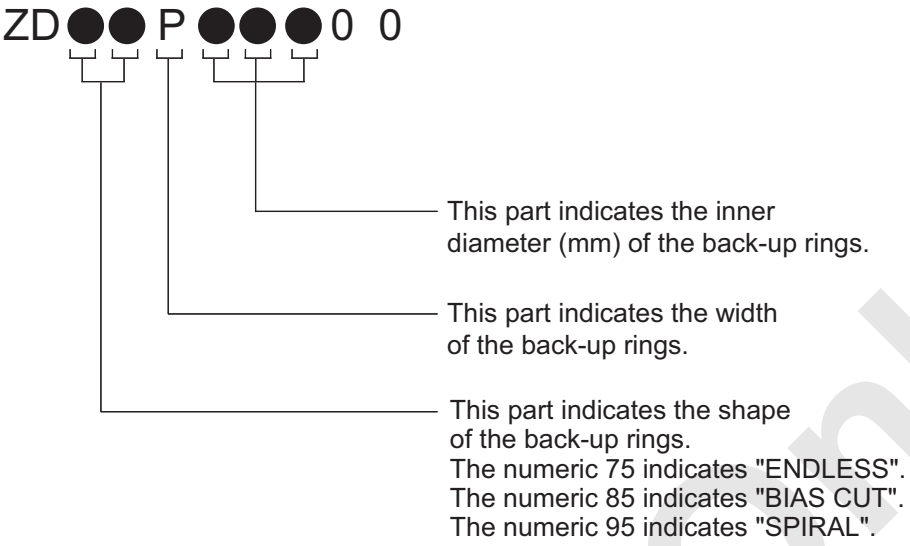
Size and kind of O-Ring are identified as shown below.

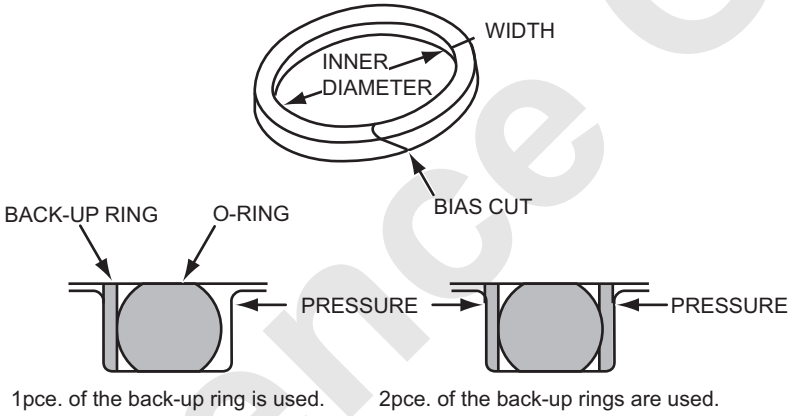


One blue dot	ZD11	Nitrile rubber	Hs70
Two blue dots	ZD12	Nitrile rubber	Hs90
One red dot		Nitrile rubber	Hs70
One yellow dot		Styrol rubber	Hs70
One green dot		Fluorine rubber	Hs70

3.2.3 BACK-UP RING

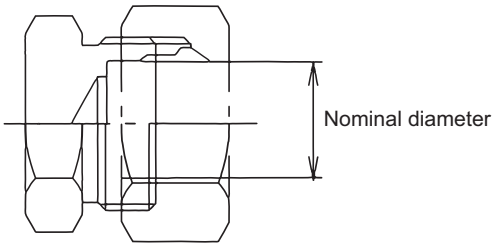
Size and kind of back-up ring are identified as shown below.





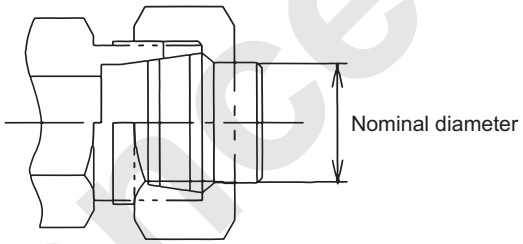
3.2.4 BITE TYPE FITTING

PLUG for tube

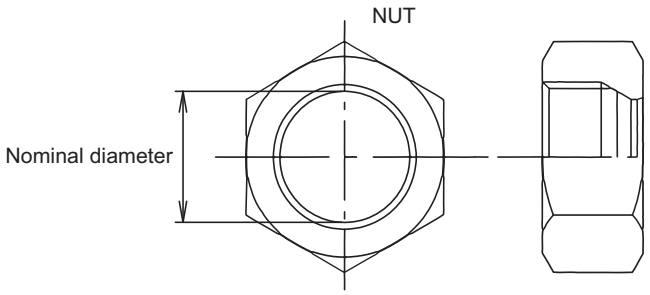


Nominal Diameter	Made by IHARA KOHATSU (ZF)	Made by NIHON AMC (ZA)
10	ZF83H10000	ZA82P10000
15	ZF83H15000	ZA82P15000
18	ZF83H18000	ZA82P18000
22	ZF83H22000	ZA82P22000
28	—	ZA82P28000
35	—	ZA82P35000

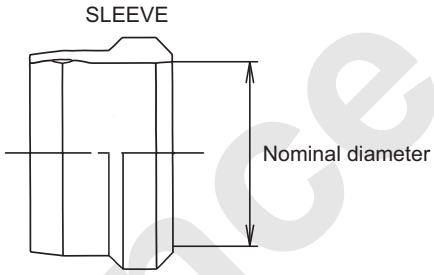
PLUG for connector



Nominal Diameter	Made by IHARA KOHATSU (ZF)	Made by NIHON AMC (ZA)
10	ZF83P10000	ZA83P10000
15	ZF83P15000	ZA83P15000
18	ZF83P18000	ZA83P18000
22	ZF83P22000	ZA83P22000
28	ZF83P28000	ZA83P28000
35	—	ZA83P35000



Nominal Diameter	Made by IHARA KOHATSU (ZF)	Made by NIHON AMC (ZA)
10	ZF93N10000	ZA93N10000
15	ZF93N15000	ZA93N15000
18	ZF93N18000	ZA93N18000
22	ZF93N22000	ZA93N22000
28	—	ZA93N28000
35	ZF93N35000	ZA93N35000



Nominal Diameter	Made by IHARA KOHATSU (ZF)	Made by NIHON AMC (ZA)
10	ZF93S10000	ZA93S10000
15	ZF93S15000	ZA93S15000
18	ZF93S18000	ZA93S18000
22	ZF93S22000	ZA93S22000
28	ZF93S28000	ZA93S28000
35	ZF93S35000	ZA93S35000

Tightening torque ZF Type

Nominal Diameter	10	15	18	22	28	35
Tightening Torque N-m (ft-lbs)	49 to 69 (36 to 50)	98 to 138 (73 to 101)	157 to 197 (116 to 144)	196 to 236 (146 to 174)	246 to 304 (180 to 220)	314 to 372 (233 to 273)

Tightening torque ZA Type

Nominal Diameter	10	15	18	22	28	35
Tightening Torque N-m (ft-lbs)	39 to 49 (28 to 36)	108 to 128 (80 to 94)	128 to 166 (94 to 122)	197 to 235 (146 to 174)	246 to 304 (180 to 220)	385 to 443 (291 to 319)

3.3 CONVERSION TABLE

3.3.1 UNIT CONVERSION

[Remarks] Figures in ( ) show number of zero down a decimal point
Example : 0.(2)1 = 0.001

1. Length

Unit	mm	cm	m	km	in	ft	yd	mile
mm	1	0.1	0.001	0.000001	0.03937	0.0032808	0.0010936	0.(6)6214
cm	10	1	0.01	0.00001	0.3937	0.032808	0.010936	0.(5)6214
m	1000	100	1	0.001	39.37	3.28083	1.0936	0.(3)6214
km	…	100000	1000	1	39370	3280.83	1093.61	0.62137
in	25.4	2.540	0.0254	0.(4)254	1	0.0833	0.02778	0.(4)1578
ft	304.8	30.48	0.3048	0.(3)3048	12	1	0.3333	0.(3)1894
yd	914.4	91.44	0.9144	0.(3)9144	36	3	1	0.(3)5682
mile	1609347.0	160934.70	1609.35	1.60935	63360	5280	1760	1

2. Capacity

Unit	cm^3	m^3	ltr.	kltr.	in^3	ft^3	yd^3	gal
cm^3	1	0.(5)1	0.001	0.(5)1	0.06102	0.(4)3531	0.(5)1308	0.(3)2642
m^3	1000000	1	1000	1	61020	35.31	1.308	264.2
ltr.	1000	0.001	1	0.001	61.02	0.03531	0.001308	0.2642
kltr.	1000000	1	1000	1	61020	35.31	1.308	264.2
in^3	16.39	0.(4)1639	0.01639	0.(4)1639	1	0.(3)5787	0.(4)2143	0.004329
ft^3	28320	0.02832	28.32	0.02832	1728	1	0.03704	7.48055
yd^3	764500	0.7645	764.5	0.7645	46660	27	1	201.974
gal (USA)	3785	0.003785	3.785	0.003785	231	0.1337	0.004951	1

3. Weight

Unit	kg	oz	lb	(2000 lbs) nt	(2240 lbs) gt	mt
kg	1	35.2740	2.20462	0.001102	0.(3)9842	0.001
oz	0.02835	1	0.06250	0.(4)3125	0.(4)2790	0.(4)2835
lb	0.45359	16	1	0.00050	0.(3)4460	0.(3)4536
nt	907.185	32000	2000	1	0.89286	0.90719
gt	1016.05	35840	2240	1.12	1	1.01605
mt	1000	35274	2204.6	1.10231	0.98421	1
[Remakes] mt : ton (Metric) nt : ton (U.s.unit) gt : (British Unit)						

3.3.2 MILLIMETER : INCH CONVERSION TABLE

1. mm (Millimeter) → in (Inch)

1 mm to 99 mm										
mm	0	1	2	3	4	5	6	7	8	9
	in									
0	0.0000	0.0394	0.0787	0.1181	0.1575	0.1969	0.2362	0.2756	0.3150	0.3543
10	0.3937	0.4331	0.4724	0.5118	0.5512	0.5906	0.6299	0.6693	0.7087	0.7480
20	0.7874	0.8268	0.8661	0.9055	0.9449	0.9843	1.0236	1.0630	1.1024	1.1417
30	1.1811	1.2205	1.2598	1.2992	1.3386	1.3780	1.4173	1.4567	1.4961	1.5354
40	1.5748	1.6142	1.6535	1.6929	1.7323	1.7717	1.8110	1.8504	1.8898	1.9291
50	1.9685	2.0079	2.0472	2.0866	2.1260	2.1654	2.2047	2.2441	2.2835	2.3228
60	2.3622	2.4016	2.4409	2.4803	2.5197	2.5591	2.5984	2.6378	2.6772	2.7165
70	2.7559	2.7953	2.8346	2.8740	2.9134	2.9528	2.9921	3.0315	3.0709	3.1102
80	3.1496	3.1890	3.2283	3.2677	3.3071	3.3465	3.3858	3.4252	3.4646	3.5039
90	3.5433	3.5827	3.6220	3.6614	3.7008	3.7402	3.7795	3.8189	3.8583	3.8976

25.4 mm = 1 inch

2. in (Inch) → mm (Millimeter)

in	0	1	2	3	4	5	6	7	8	9
	mm									
0	0.000	25.400	50.800	76.200	101.600	127.000	152.400	177.800	203.200	228.600
1/64	0.397	25.797	51.197	76.597	101.997	127.397	152.797	178.197	203.597	228.997
1/32	0.794	26.194	51.594	76.994	102.394	127.794	153.194	178.594	203.994	229.394
1/16	1.588	26.988	52.388	77.788	103.188	128.588	153.988	179.388	204.788	230.188
3/32	2.381	27.781	53.181	78.581	103.981	129.381	154.781	180.181	205.581	230.981
1/8	3.175	28.575	53.975	79.375	104.775	130.175	155.575	180.975	206.375	231.775
5/32	3.969	29.369	54.769	80.169	105.569	130.969	156.369	181.769	207.169	232.569
3/16	4.763	30.163	55.563	80.963	106.363	131.763	157.163	182.563	207.963	233.363
7/32	5.556	30.956	56.356	81.756	107.156	132.556	157.956	183.356	208.756	234.156
1/4	6.350	31.750	57.150	82.550	107.950	133.350	158.750	184.150	209.550	234.950
9/32	7.144	32.544	57.944	83.344	108.744	134.144	159.544	184.944	210.344	235.744
5/16	7.938	33.338	58.738	84.138	109.538	134.938	160.338	185.738	211.138	236.538
11/32	8.731	34.131	59.531	84.931	110.331	135.731	161.131	186.531	211.931	237.331
3/8	9.525	34.925	60.325	85.725	111.125	136.525	161.925	187.325	212.725	238.125
13/32	10.319	35.719	61.119	86.519	111.919	137.310	162.719	188.119	213.519	238.919
7/16	11.113	36.513	61.913	87.313	112.713	138.113	163.513	188.913	214.313	239.713
15/32	11.906	37.306	62.706	88.106	113.506	138.906	164.306	189.706	215.106	240.506
1/2	12.700	38.100	63.500	88.900	114.300	139.700	165.100	190.500	215.900	241.300
17/32	13.494	38.894	64.294	89.694	115.094	140.494	165.894	191.294	216.694	242.094
9/16	14.288	39.688	65.088	90.488	115.888	141.288	166.688	192.088	217.488	242.888
19/32	15.081	40.481	65.881	91.281	116.681	142.081	167.481	192.881	218.281	243.681
5/8	15.875	41.275	66.675	92.075	117.475	142.875	168.275	193.675	219.075	244.475
21/32	16.669	42.069	67.469	92.869	118.269	143.669	169.069	194.469	219.869	245.269
11/16	17.463	42.863	68.263	93.663	119.063	144.463	169.863	195.263	220.663	246.063
23/32	18.256	43.656	69.056	94.456	119.856	145.256	170.656	196.056	221.456	246.856
3/4	19.050	44.450	69.850	95.250	120.650	146.050	171.450	196.850	222.250	247.650
25/32	19.844	45.244	70.644	96.044	121.444	146.844	172.244	197.644	223.044	248.444
13/16	20.638	46.038	71.438	96.838	122.238	147.638	173.038	198.438	223.838	249.238
27/32	21.431	46.831	72.231	97.631	123.031	148.431	173.831	199.231	224.631	250.031
7/8	22.225	47.625	73.025	98.425	123.825	149.225	174.625	200.025	225.425	250.825
29/32	23.019	48.419	73.819	99.219	124.619	150.019	175.419	200.819	226.219	251.619
15/16	23.813	49.213	74.613	100.013	125.413	150.813	176.213	201.613	227.013	252.413
31/32	24.606	50.006	75.406	100.806	126.206	151.606	177.006	202.406	227.806	253.206

3.3.3 METER AND FOOT CONVERSION TABLE

Foot	Meter
5	1.52
10	3.05
15	4.57
20	6.10
25	7.62
30	9.14
35	10.67
40	12.19
45	13.72
50	15.24
55	16.76
60	18.29
65	19.81
70	21.34
75	22.86
80	24.38
85	25.91
90	27.43
95	28.96
100	30.48
105	32.00
110	33.53
115	35.05
120	36.58
125	38.10
130	39.62
135	41.15
140	42.67
145	44.20
150	45.72
155	47.24
160	48.77
165	50.29
170	51.82

Foot	Meter
175	53.34
180	54.86
185	56.39
190	57.91
195	59.44
200	60.96
205	62.48
210	64.01
215	65.53
220	67.06
225	68.58
230	70.10
235	71.63
240	73.15
245	74.68
250	76.20
255	77.72
260	79.25
265	80.77
270	82.30
275	83.82
280	85.34
285	86.87
290	88.39
295	89.92
300	91.44
305	92.96
310	94.49
315	96.01
320	97.54
325	99.06
330	100.58
335	102.11
340	103.63

Foot	Meter
345	105.12
350	106.68
355	108.20
360	109.73
365	111.25
370	112.78
375	114.30
380	115.82
385	117.35
390	118.87
395	120.40
400	121.92
405	123.44
410	124.97
415	126.49
420	128.02
425	129.54
430	131.06
435	132.59
440	134.11
445	135.64
450	137.16
455	138.68
460	140.21
465	141.73
470	143.26
475	144.78
480	146.30
485	147.83
490	149.35
495	150.88
500	152.40

1 foot = 0.3048 meter

3.3.4 GRADE CONVERSION TABLE

Degree (°)	%
1	1.8
2	3.5
3	5.2
4	7.0
5	8.8
6	10.5
7	12.3
8	14.1
9	15.8
10	17.6
11	19.4
12	21.3
13	23.1
14	24.9
15	26.8

Degree (°)	%
16	28.7
17	30.6
18	32.5
19	34.4
20	36.4
21	38.4
22	40.4
23	42.5
24	44.5
25	46.6
26	48.8
27	51.0
28	53.2
29	55.4
30	57.7

Degree (°)	%
31	60.1
32	62.5
33	64.9
34	67.5
35	70.0
36	72.7
37	75.4
38	78.1
39	81.0
40	83.9
41	86.9
42	90.0
43	93.3
44	96.6
45	100.0

3.3.5 UNIT WEIGHT TABLE

Material	Weight per Cub. Meter (t)
Lead	11.4
Copper	8.9
Steel	7.8
Cast iron	7.2
Aluminum	2.7
Concrete	2.3
Soil	2.0
Gravel	1.9

Material	Weight per Cub. Meter (t)
Sand	1.9
Coal cold	0.8
Coal powder	1.0
Coke	0.5
Oak	0.9
Cedar	0.4
Cypress	0.4
Paulownia	0.3

Note

Weight of wood is that of the dried.
Value shown in the table may well be taken for specific gravity.

3.3.6 SYSTEM INTERNATIONAL (SI) UNIT CONVERSION TABLE

No.	International System of Units (SI : System International Unit)			Conversion Formula CGS unit system to SI unit system
	Types	Unit symbols	Meaning	
1	Mass	kg	Kilogram	Mass (kg) = Weight (kgf) F = gravity
2	Force (Load)	N kN	Newton Kilonewton	1 (N) = 1 (kg) × 9.80 1 (kN) = 1 (N) ÷ 1000
3	Moment of force	N-m	-	1 (N-m) = 1 (N) × 1 (m)
4	Stress	N/mm^2	-	1 (N/mm^2) =1 (N) ÷ 1 (mm^2)
5	Pressure (hydraulic pressure, pneumatic pressure) ground pressure	Pa kPa MPa	Pascal Kilopascal Megapascal	1 (Pa) = 1 (N/mm^2) 1 (kPa) = 1 (Pa) ÷ 1000 1 (MPa) = 1 (kPa) ÷ 1000
6	Horsepower (motive power)	kW	Kilowatt	1 (kW) = 1 (PS) ÷ 0.7355 PS = horsepower
7	Energy	J	Joule	1 (J) = 1 (N-m)

GRAVIMETRIC UNIT	X ÷	SI UNIT
kgf	9.807	N
lbf	4.448	N
kgf−cm	0.0981	N−m
lbf−ft	1.356	N−m
lbt−in	0.113	N−m
kgf/cm^3	0.0981	MPa
atm	0.1013	MPa
lbf/in^2	0.0069	MPa
kgf/cm^3	98.1	kPa
atm	101.3	kPa
lbt/in^2	6.9	kPa
mm Hg	133.3	Pa

GRAVIMETRIC UNIT	X ÷	SI UNIT
in Hg	3386	Pa
kgf−m/s	0.00981	kW
lbf−ft/s	0.00136	kW
PS	0.7355	kW
HP	0.746	kW
kgf−m	9.807	J
kcal	4186	J
$kgf-s/cm^3$	98067	Pa−s
cP	0.001	Pa−s
P	0.1	Pa−s
cSt	1×10^{-6}	m^2/s
cSt	1	mm^2/s
St	0.0001	m^2/s
atm−cc/s	0.1013	$Pa-m^3/s$

4. POWER TRAIN

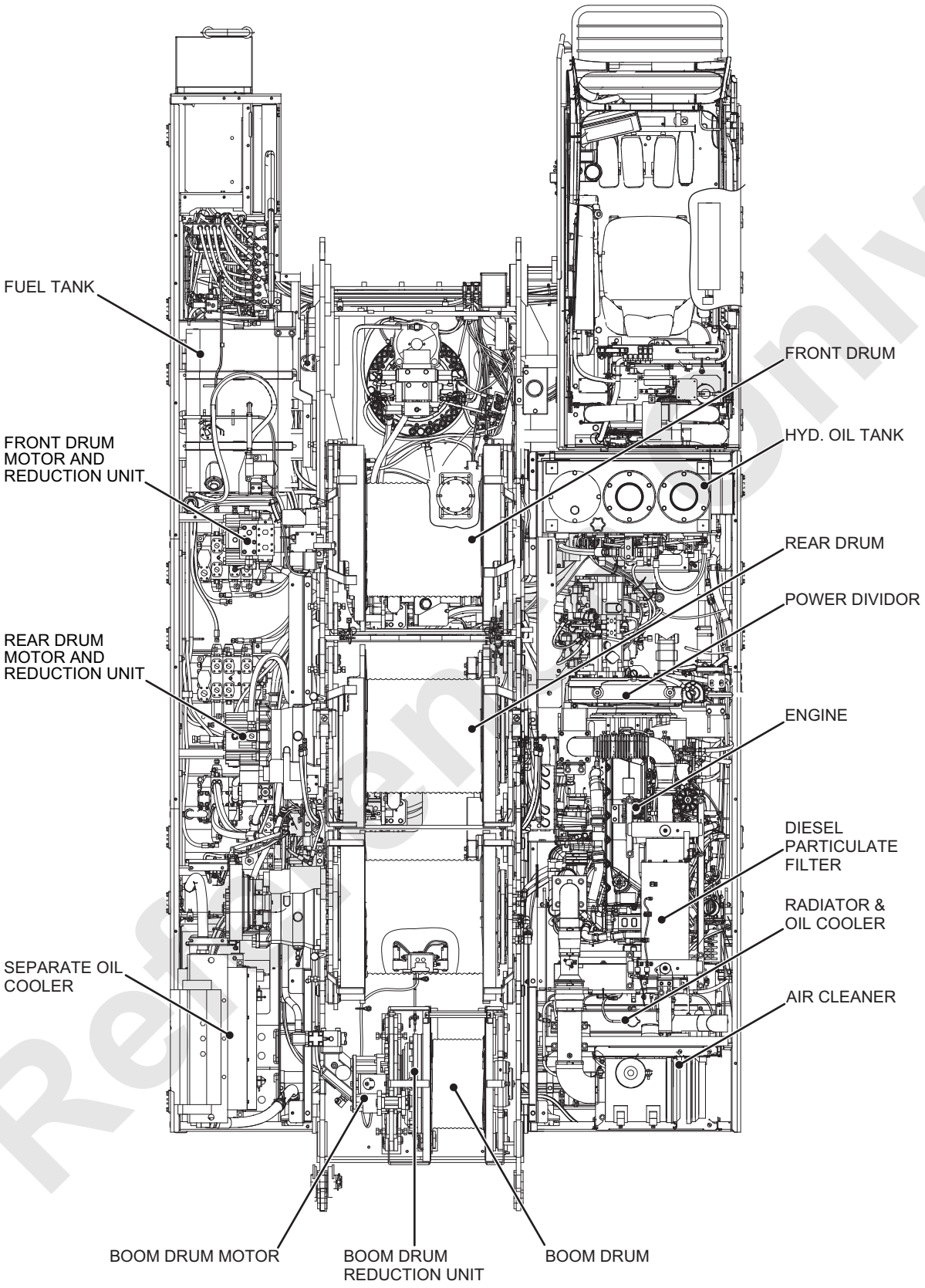
4.1 INTRODUCTION

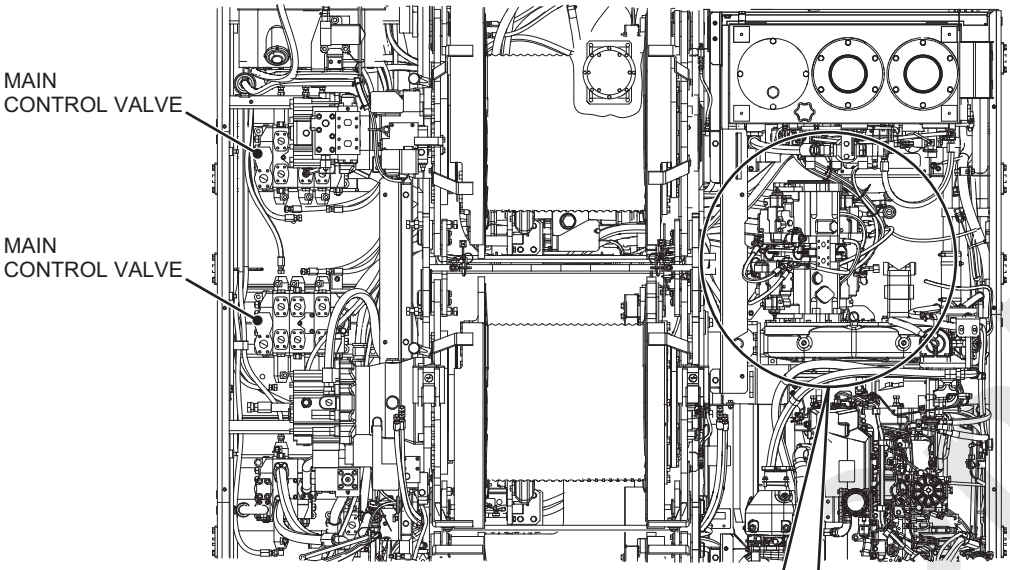
This crane is a full hydraulic crawler crane. The engine drives one set of the 2 section plunger type main pump and one plunger type swing pump and 2 section gear pump connected to the power divider and 2 section gear pump connected to swing pump through the power divider.

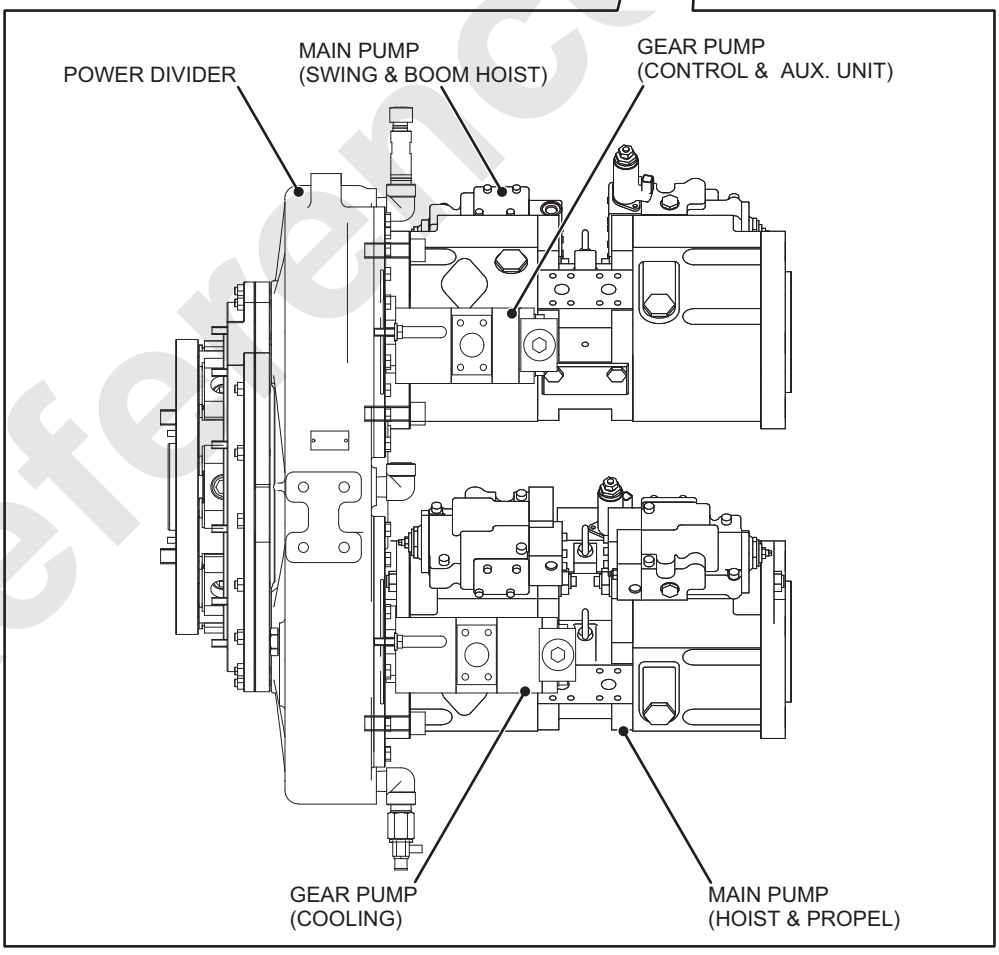
The 2 section main pump are variable displacement type pump and provides the power to left and right propel motors, boom hoist motor, each of front and rear hoist motors through the two control valves. Furthermore, by adding special control valve it provides power to the third hoist motor (option).
Each of the front, the rear and the third motor drives the drum shaft through the respective reduction unit and raise, lower or stop the respective drum through the drum built in clutch. The boom hoist motor drive the boom hoist drum through the respective reduction unit to raise, lower or stop the boom.
The left or right propel motor drives each drive tumbler through the respective reduction unit to propel the machine.

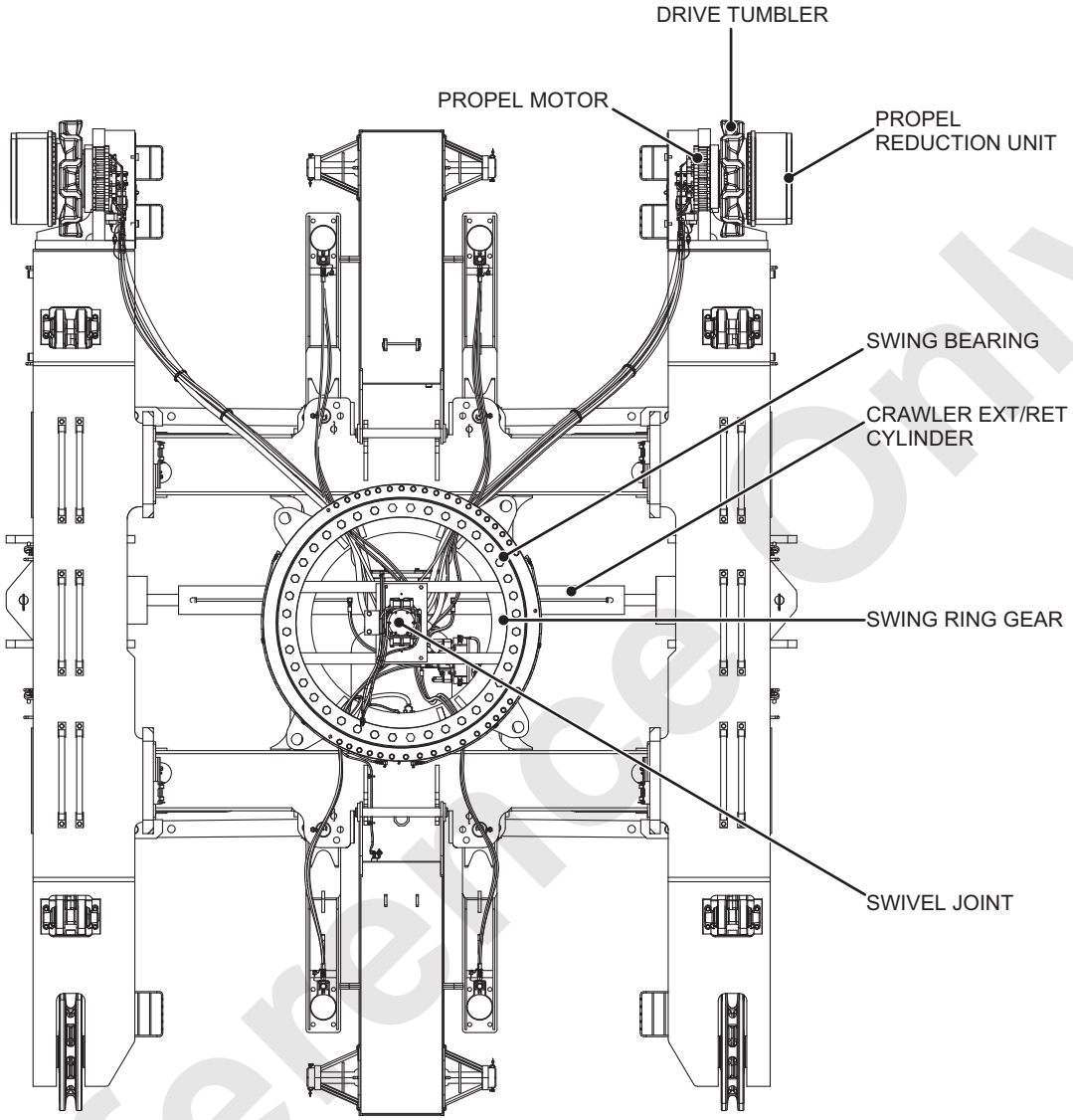
One other plunger pump provides the power to the swing motor. The swing motor swings the upper machinery through the reduction unit.

Inner one of the two gear pumps connected to the swing pump sends pressured oil to the control line and outer one sends the pressured oil to the gantry hoist cylinder, crawler ext/ret cylinder and tagline (option).
The 2 section gear pump (option) connected to the power divider provides the pressured oil to free fall brake cooling line of the front and rear drum.









4.2 ENGINE

4.2.1 INTRODUCTION

This chapter explains how to remove and re-install the engine.
Refer to the manual provided by the engine manufacturer for maintenance and repair details.

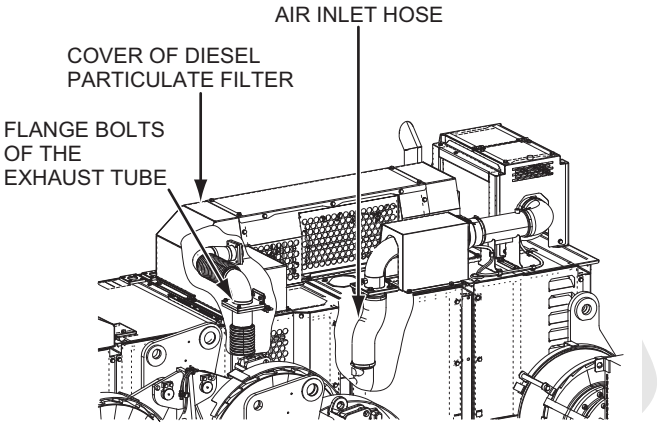
4.2.2 REMOVAL

Proceed as follows when removing the engine from the machine.

CAUTION

Remove the pump drive assembly with the engine.
It is dangerous to drain oil, water or to replace filter right after engine stop due to high temperature. Wait until temperature comes down. On the other hand, warm up oil to appropriate temperature (approx. 20 to 40° C) for oil drain if oil is cooled down.

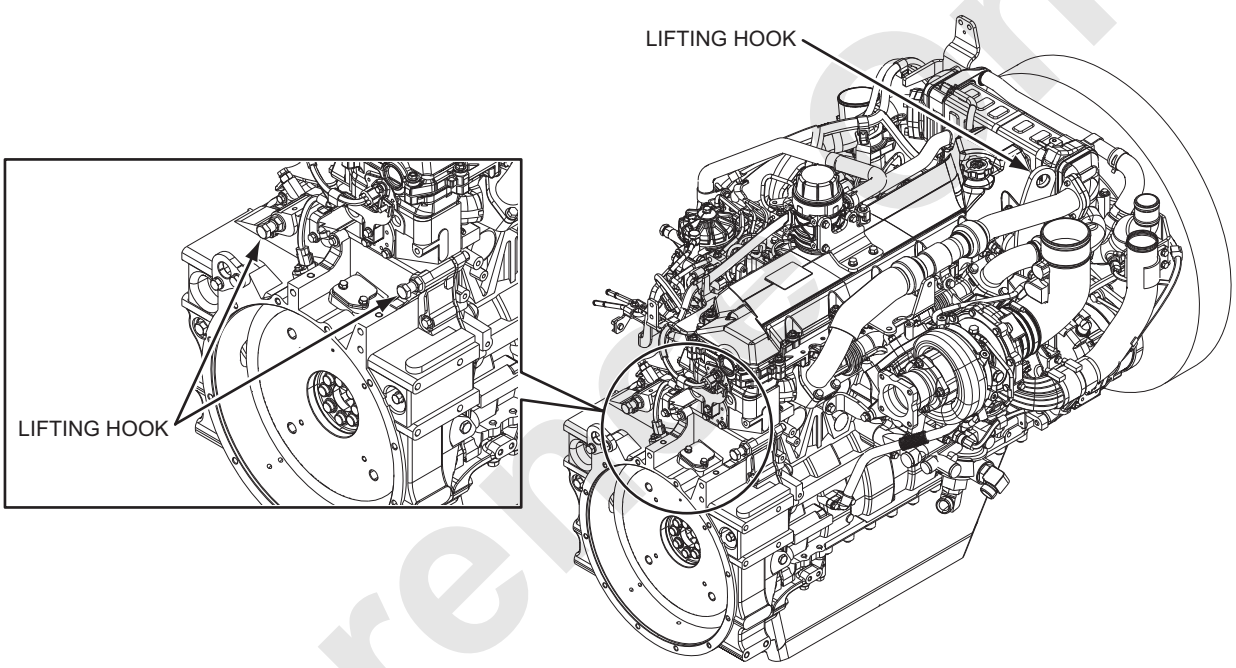
1. Lower the boom on the ground and secure the upper spreader to the boom base with pins.
   Set the gantry to the propel configuration.
2. Take out the ground cable first in the battery.
3. Remove the cover of the diesel particulate filter and remove the flange bolts (4 pcs.) of the exhaust tube.
4. Remove the air inlet hose from the engine.
5. The inter-cooler piping is secured on the guard beam. Remove these bolts.
6. Remove the electric wiring connectors which are connected to the diesel particulate filter and air cleaner.
7. Remove the guard and the engine hood assy. required to remove the engine and pump drive assy.
8. Drain the hydraulic oil, engine oil and cooling water.
9. Remove the fan shroud from the radiator.
10. Remove the hyd. pump piping and label them. Put the cover on all the port and hose to prevent dirty material getting in.
11. Label engine cooling piping, inter-cooler, fuel piping, and electric wiring and remove them. Put the caps on the cooling water piping, intercooler piping and fuel piping to prevent foreign material getting in.
12. Check that all the electric wiring, mechanical connection and fuel piping are disconnected and there would be no interference for removing the engine.



13. Install the appropriate capacity of lifting gear to the engine.
    (The engine has three lifting hooks.)
14. Remove the bolts and washers from the rubber mounts on the engine and the power divider.
15. Lift up the engine and pump drive assy. as one unit slowly and take out from the machine.
    Weight is approx. 1,250 kg (2,756 lbs).

⚠CAUTION

Take necessary action to prevent overturning of the engine.



16. Inspect the rubber mount and replace them if required.

4.2.3 REPAIR AND MAINTENANCE

Regarding the repair and maintenance of the engine, refer to the manual provided by the manufacturer.

The engine manufacturer : HINO MOTORS, LTD.
The engine model : J08E-UV

4.2.4 INSTALLATION

Proceed as follows when installing the engine.

1. Check to make sure that no fuel lines, coolant water hoses, mechanical connection parts or other items are left to interfere with the installation.
2. If the rubber mounts were removed, replace them.
3. Using a enough capacity lifting gear, lift the engine and place it onto the mounting place.
4. Use LOCTITE #271 on the rubber mount holding bolts and tighten to the specified torque.
   Front side : 504 to 616 N-m (372 to 454 lbs-ft)
   Rear side : 360 to 440 N-m (266 to 324 lbs-ft)
5. Install the fan shroud. The clearance between the fan shroud and the fan should be even all around.
6. Connect all the electric wirings that were disconnected when the engine was removed.
7. Install all the fuel and cooling piping that were removed when the engine was removed.
8. Install the guard, engine hood assembly and connect the battery cable.

WARNING

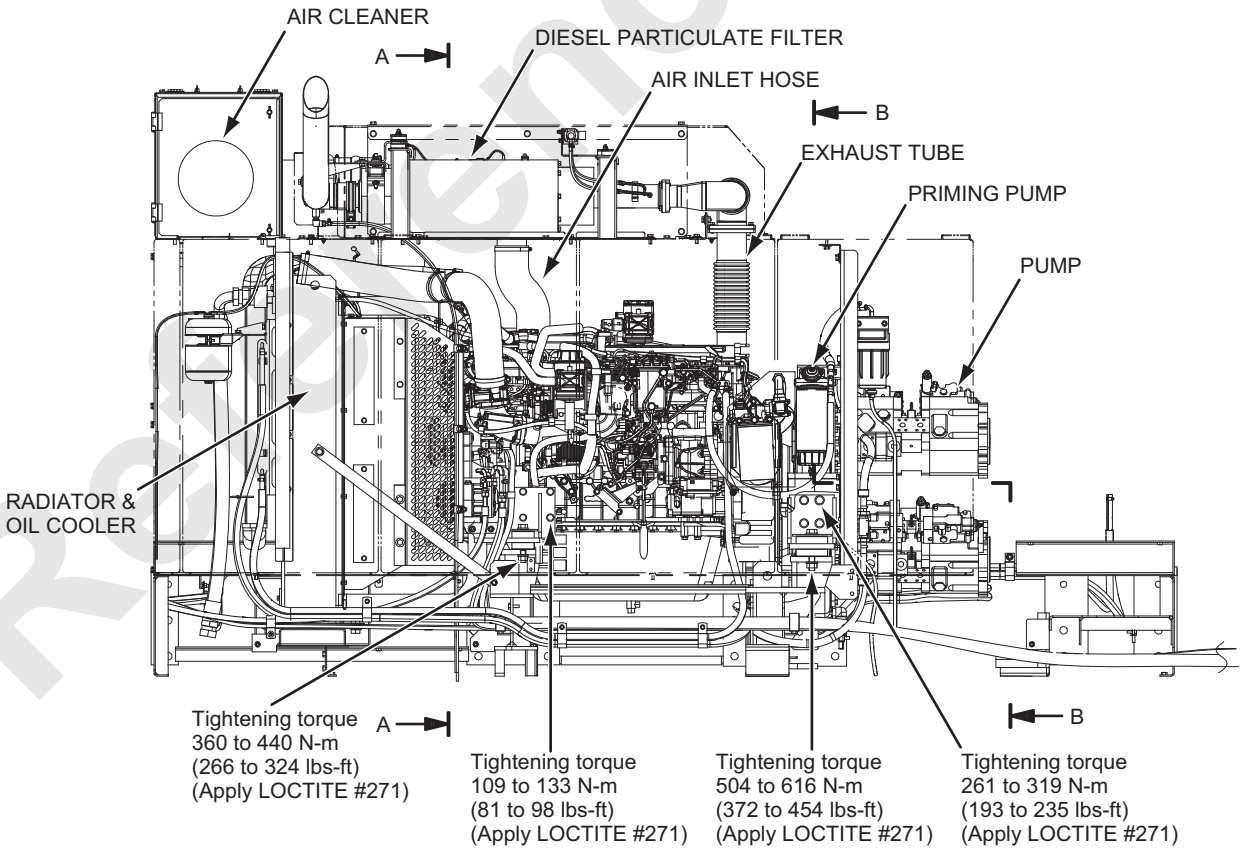
The battery generates flammable hydrogen gas. Never bring a flame close to the battery to prevent inflammation or explosion.
Do not place any metal objects such as tools on or around of the battery to prevent causing spark.
Ensure to properly use booster cables to prevent explosion sue to miss-use.

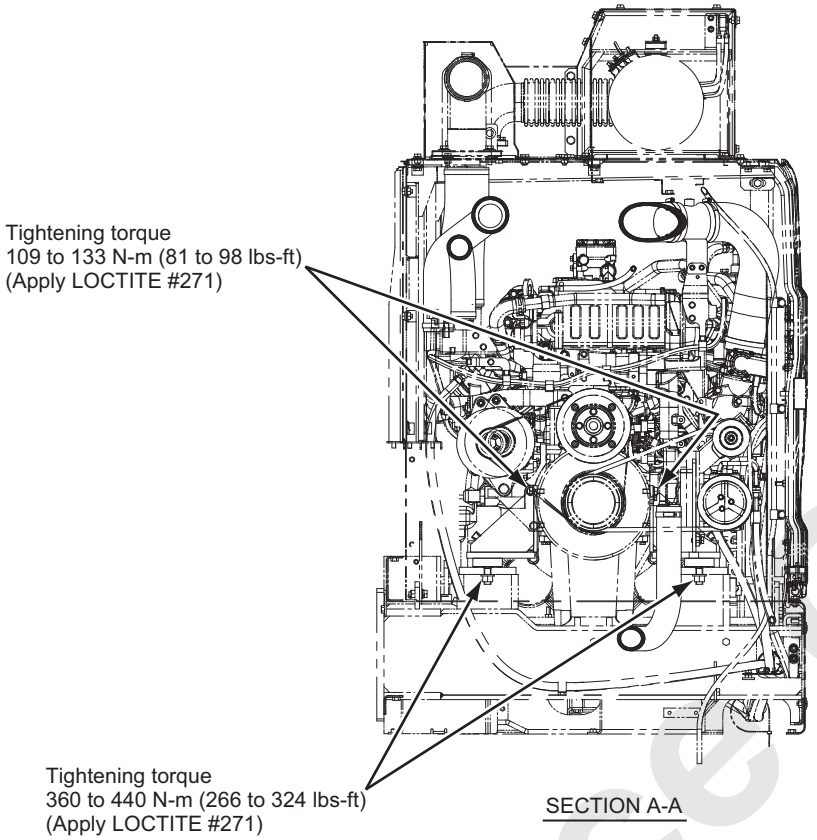
9. Install the air inter cooler hose that were removed when the engine was removed.
   Install the exhaust tube and the diesel particulate filter cover.
10. Install all the hydraulic hoses to the hydraulic pumps.
11. Refill the engine with coolant water and engine oil to the required levels.
12. Remove the air from the fuel lines.

⚠CAUTION

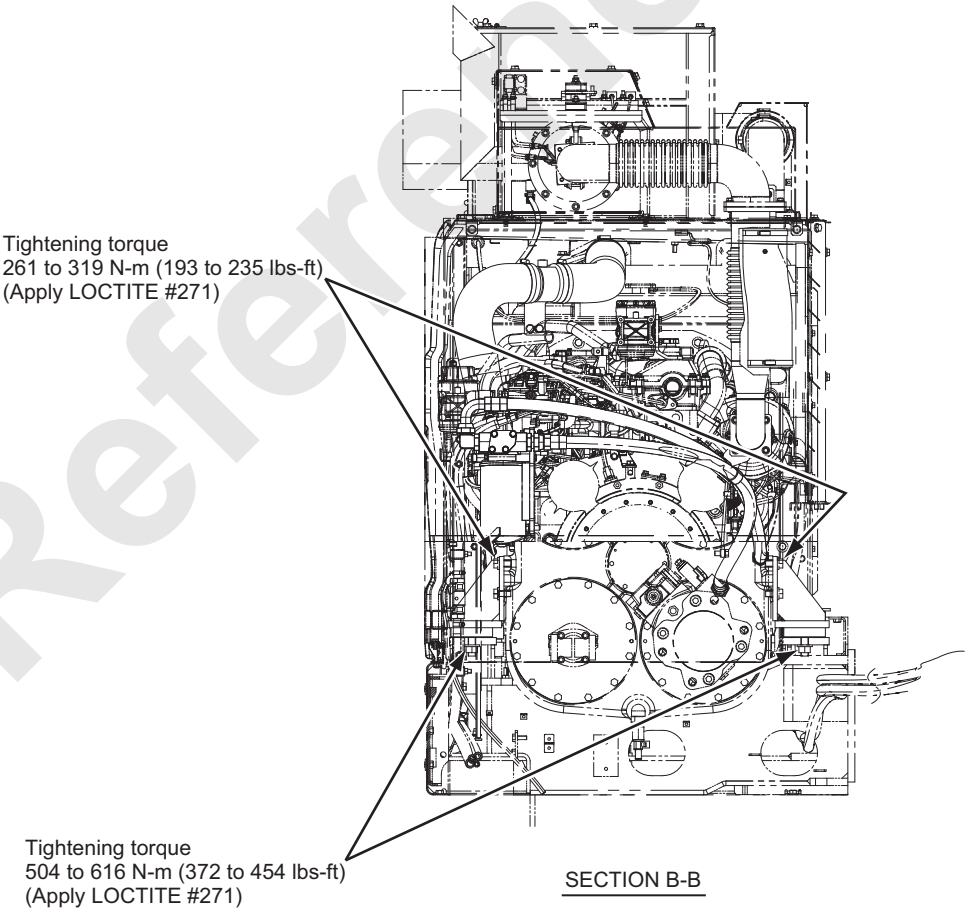
Before starting the engine, re-check all electrical, fuel, water and hydraulic connections as well as mechanical connections.
Be prepared to stop the engine immediately if something unusual develops.
Check that no person eel are around the engine before starting.

13. Start the engine and set it to low idle.
    Check for water and fuel leaks, and any strange noises.





SECTION A-A



SECTION B-B

4.3 PUMP DRIVE ASSEMBLY

4.3.1 INTRODUCTION

This chapter explains how to remove, inspect, repair and re-install the pump drive assembly.
The pump drive assembly is mounted directly onto the front of the engine. It consists of a coupling, a power divider, main pumps, and 2 section gear pumps for control and gantry hoist (aux. device), swing pump, and 2 section gear pumps for front/rear drum cooling.
The power of the engine is transferred from a flywheel through the coupling to the input shaft and the helical gear of the power divider.
The power then is divided by 4 sets of helical gears to the main pump shaft, swing pump shaft, control and gantry hoist pump shaft, cooling pump shaft.
(Closed with the flange when free less is selected.)
(See 4.3.2)

4.3.2 REMOVAL

Proceed as follows when removing the pump drive assembly. (See next page)

⚠CAUTION

Pump drive assembly should be removed from the engine according to the following procedure only after the engine has been removed from the machine as described in Section 4.2.

1. Drain the oil in the power divider through the port on the lower part of the power divider.
2. Remove the main pump and the swing pump (with gear pump) and the gear pump.

Main pump	143.0 kg (315.0 lbs)
Swing pump	124 kg (273.4 lbs)
2 section gear pump (For control and gantry hoist (aux. device))	7.4 kg (16.3 lbs)
2 section gear pump (When "with free" is selected)	8.4 kg (18.5 lbs)

3. Using an enough capacity lifting device, attach the lift riggings to lifting screws provided on the power divider.
   (screw holes : M16)
   Remove the nuts (M10 fine) in the power divider stand and move the power divider slowly toward the back of the engine and remove the power divider after disconnecting the coupling.
   Weight of the power divider :
   Approx. 260 kg (573 lbs)
4. The main part of this coupling will be removed with the power divider connected to its shaft.
   Remove the remaining coupling bushing (engine side) or element.

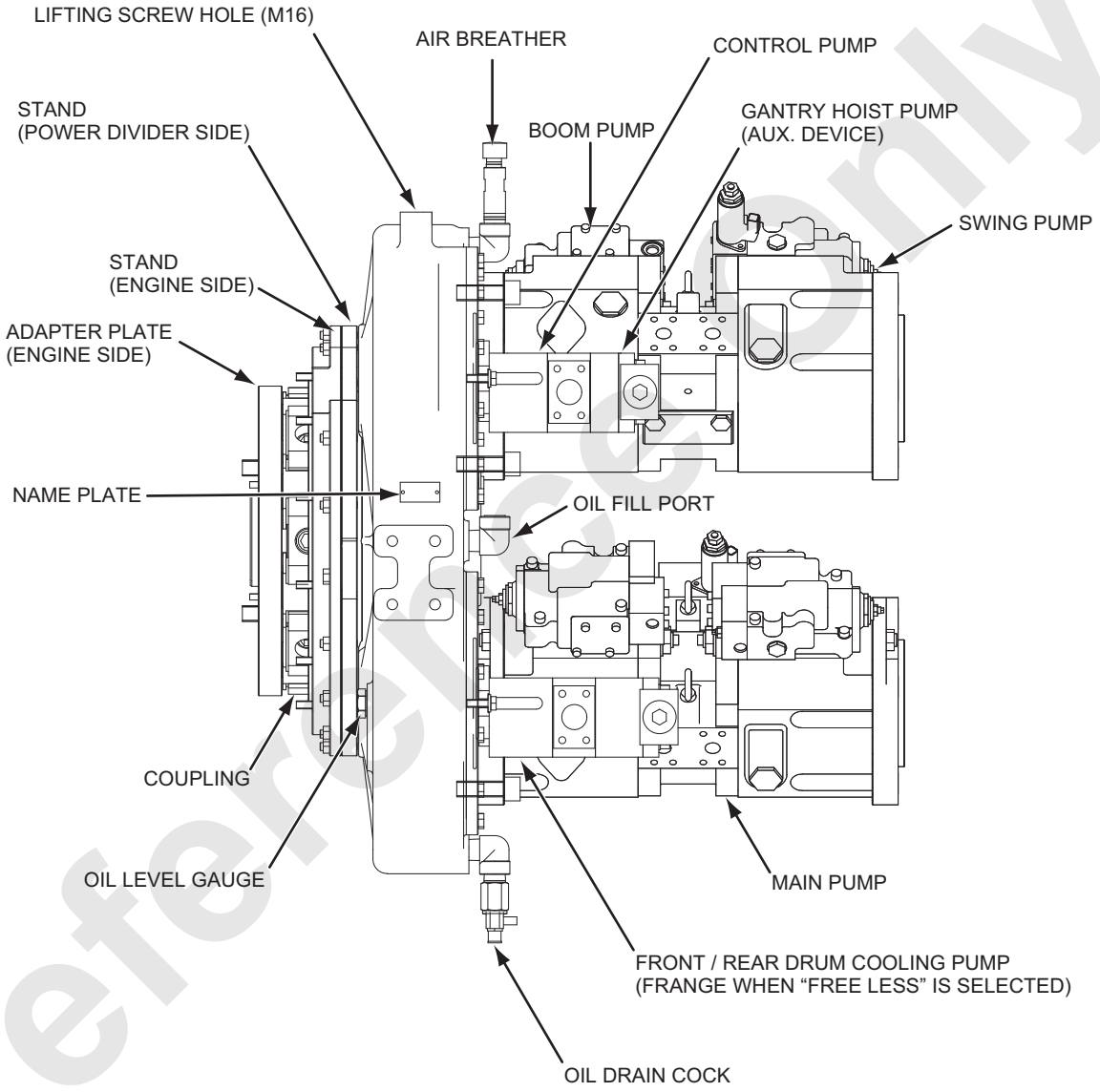


Fig.4-1 PUMP DRIVE (1/2)

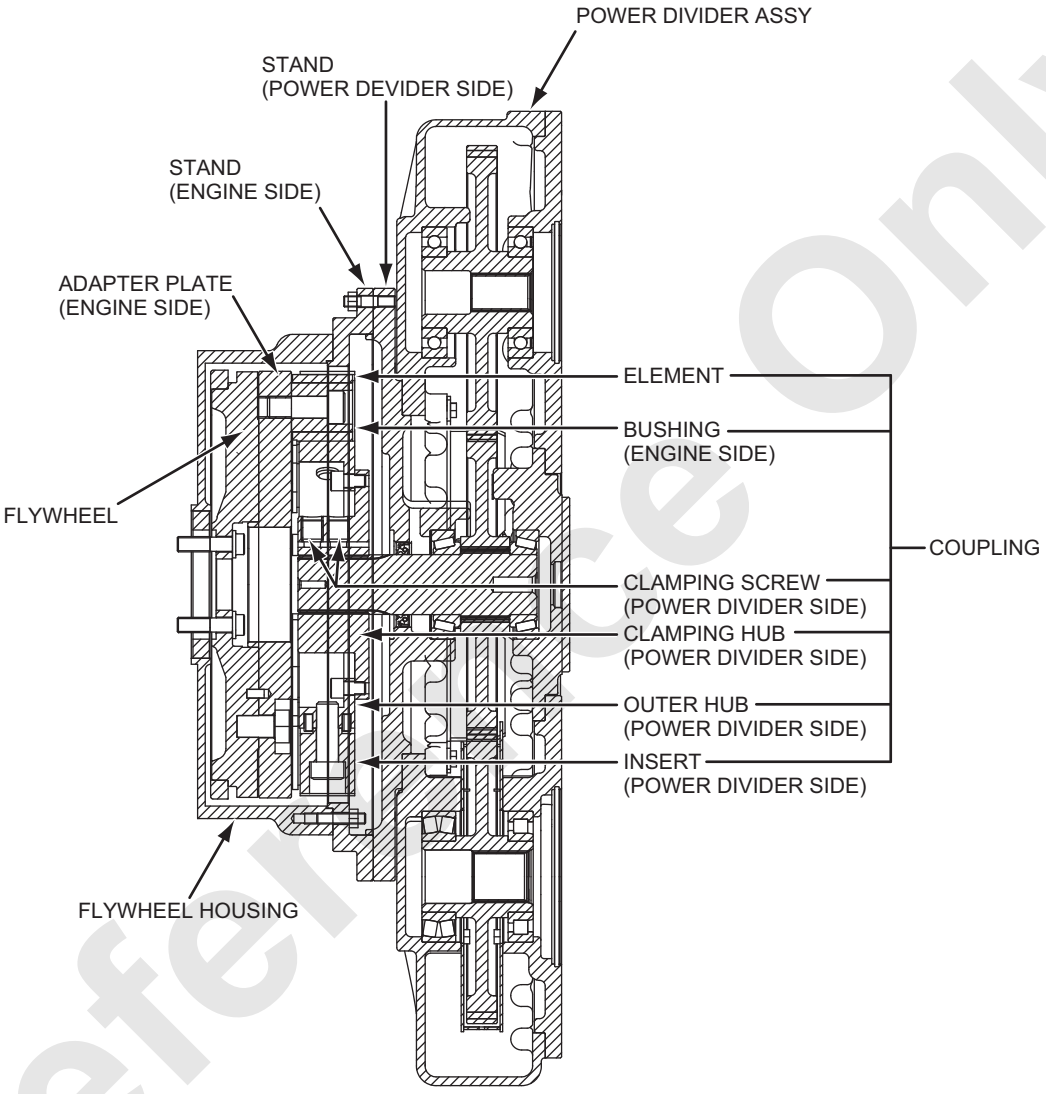


Fig.4-2 PUMP DRIVE (2/2)

4.3.3 DISASSEMBLING THE POWER DIVIDER

Proceed as follows when disassembling the power divider. (Refer to P.4-23 to 4-26 for corresponding numbers in the explanation below.)

1. Place the power divider on the block facing the flywheel side up.
2. Remove the cap screws (33) and remove the stand (2) using two pull out screw holes (M10) of the stand (2).
3. Remove the oil seal (28) and the outer lace of the taper roller bearing (27) from the stand (2) and then take out the shims (40), (41), and (42). In this time, keep the shim (40), (41), (42) as a set.
   If required, remove the screw (34) and the plates (16).
4. Remove the shaft (3) and drive gear (4) as an assy.
   If required, pull out the inner laces of both side taper roller bearings (27) and then pull out the drive gear (4).
5. Pull out the outer lace of the taper roller bearing (27) from the housing (1).
   If required, remove the screws (34) and the plate (20).
6. Place the power divider on the block facing the pump side up.
7. Remove the cap screws (33) and the support (45) using two pull out screw holes (M10) of the support (45).
8. Remove the cap screws (32) and the plate (15).
9. Remove the gear (43) and both side bearings (23), (26) if required.
10. Remove the cap screw (32) and the plate (47).
11. Remove the cap screws (33) and the support (9) using two pull out screw holes (M10) of the support (9).
    If required, remove the cap screws (32) and the plate (15).
12. Remove the gear (5) and both side bearings (21), (22) if required.
13. Remove the cap screw (32) and the plate (12).

14. Remove the cap screws (33) and remove the support (46) using two pull out screw holes (M10) of the support (46).
    If required, remove the screws (34) and the plate (48).
15. Remove the gear (44) and both side bearings (21), (24).
16. If required, remove the screws (34) and the plate (16).
17. Remove the cap screws (33) and the support (11) using two pull out screw holes (M10) of the support (11).
    If required, remove the screws (34) and the plate (18).
18. Remove the gear (7) and if required, remove both side bearing (25), (26).
19. If required, remove the screws (34) and the plate (19).
20. If required, remove the cap screws (32) and plates (14).

4.3.4 CHECK AND REPAIR OF THE POWER DIVIDER

Check all parts prior to reassembling the power divider. All questionable parts should be replaced to maximize the re-assembled power divider's service life and to avoid further break downs.
Checking should proceed in the following order.

1. Clean all the parts with fresh cleaning oil and blow them dry.
2. Check bearing balls, rollers, inner and outer races to see that they are free of pitching and scratches. Replace any defective ones.
3. Bearings with no pitching or scratches should be lightly lubricated, but replace any bearings that develop rattles due to excessive clearances toward the shaft or toward the external side should be replaced.
4. Check the bearings' outer and inner races. Replace any that show indications of slipping and/or rolling.
5. Check the teeth of all the gears and replace any that show pitching, scratch, signs of friction wear, peeling or cracking.
6. Check the shafts and replace any with signs of cracking, deformation, wear at contact surfaces or bearing slippage.
7. Check the splines of the shafts and gears. Replace or fix any that show cracking, signs of wear or impact damage.
8. Check the bearing casings and replace any that show slip wear or other deformations.
9. Check the gear casings and replace or fix any that show cracks, deformation or scratches.
10. All the O-rings and oil seals should be replaced with new ones.
11. Check cap screw threadings and screw hole threadings and replace or repair any that show signs of cross-threading and or strippage.
12. Take out the breather cap and clean in the pipe and check the orifice hole for clogging.

4.3.5 ASSEMBLING THE POWER DIVIDER

Assembling the power diver is in reverse order of disassembling. Take extra care on the following points in assembling.
(Refer to P.4-23 to 4-26 for corresponding numbers in the explanation below.)

1. Apply clean oil on each part and then assemble. But ensure to remove any oil on the mating face of the housing (1), the stand (2) and the support (9), (11), (45), (46) and apply LOCTITE #515 evenly on these face and also apply LOCTITE #242 on the cap screws (33) and tighten them to torque 63 to 77 N-m (46.5 to 56.7 lbs-ft).
2. When assembling the shaft (3), the drive gear (4), the taper roller bearing (27) and the stand (2), adjust the clearance shown in P.4-25 to become 0 to 0.15mm with the shim (40), (41), (42).
3. Install the stand (2) and the support (9), (11), (45), (46) to the housing (1) to make oil groove comes to the position as shown in P.4-23. (UP cast mark upward)
4. After assembly, check that the input shaft turns lightly by hand.

4.3.6 RE-INSTALLATION

Assemble the pump drive assy. as follows.
(Refer to P.4-27 for corresponding numbers in the explanation below.)

1. Apply grease on the spline area of the input shaft (1) and insert the clamping hub (2) to 65 mm point from the shaft end as shown in P.4-27 (the clamping hub touches lightly on spline step area). Apply LOCTITE #242 on the clamping screws (3) (LOCTITE not necessary with micro capsule coating) and tighten to 200 to 220 N-m (147.6 to 162.2 lbs-ft) torque.
   In case of micro capsule coating, if tightened once, remove completely first and then apply LOCTITE #242.
   Tighten alternately and for 3 sets or more, ensure to tighten evenly.
2. Apply LOCTITE #242 on the cap screws (16) and tighten outer hub (9) onto the clamping hub (2) with the tightening torque 85 to 94 N-m (62.7 to 69.3 lbs-ft) torque.
   (LOCTITE not necessary with micro capsule coating)
   In case of micro capsule coating, if tightened once, remove completely first and then apply LOCTITE #242. Install the spring pin (4) to the outer hub (9) and install the element (5), insert (6) in its order to the coupling.
3. Apply LOCTITE #242 on the cap screws (7) and tighten to 440 to 490 N-m (324.6 to 361.5 lbs-ft) torque. (LOCTITE not necessary with micro capsule coating) In case of micro capsule coating, if tightened once, remove completely first and then apply LOCTITE #242.
4. Install the spring pin (13) and the adapter (15) to the side face of the fly wheel (8).
   Apply LOCTITE #242 on the cap screws (14) and tighten to 504 to 616 N-m (371.7 to 454.3 lbs-ft) torque.
5. Install the bushing (10) to the adapter plate (15) and apply LOCTITE #242 on the cap screws (11) and then tighten to 440 to 490 N-m (324.6 to 361.5 lbs-ft) torque.
   (LOCTITE not necessary with micro capsule coating)
   In case of micro capsule coating, if tightened once, remove completely first and then apply LOCTITE #242.

6. Attach the appropriate capacity lifting gear to the power divider and insert the coupling side element of the power divider to the wheel side insert. Install the power divider to the stand (engine side) which is installed on the flange wheel housing.
7. Apply LOCTITE #242 to the nut (M10 fine thread) and tighten with 36.4 to 44.6 N-m (26.9 to 32.8 lbs-ft) torque.
8. Apply LOCTITE #242 to each cap screws and tighten the tandem type main pump with 279 to 341 N-m (205.8 to 251.5 lbs-ft) torque, swing pump with 279 to 341 N-m (205.8 to 251.5 lbs-ft) torque, the control pump with 22 to 28 N-m (16.2 to 20.6 lbs-ft) torque, the cooling pump with 22 to 28 N-m (16.2 to 20.6 lbs-ft) torque (flange when free less is selected).
9. Fill in the power divider with the specified gear oil #90 to the specified level (Red mark on the oil level gauge)
   (Approx. 10.0 ltr.)
10. Install the power divider with engine attached to the machine referring to [4.2 ENGINE]
11. Start the engine and check for unusual noise or oil leak during low idling speed.

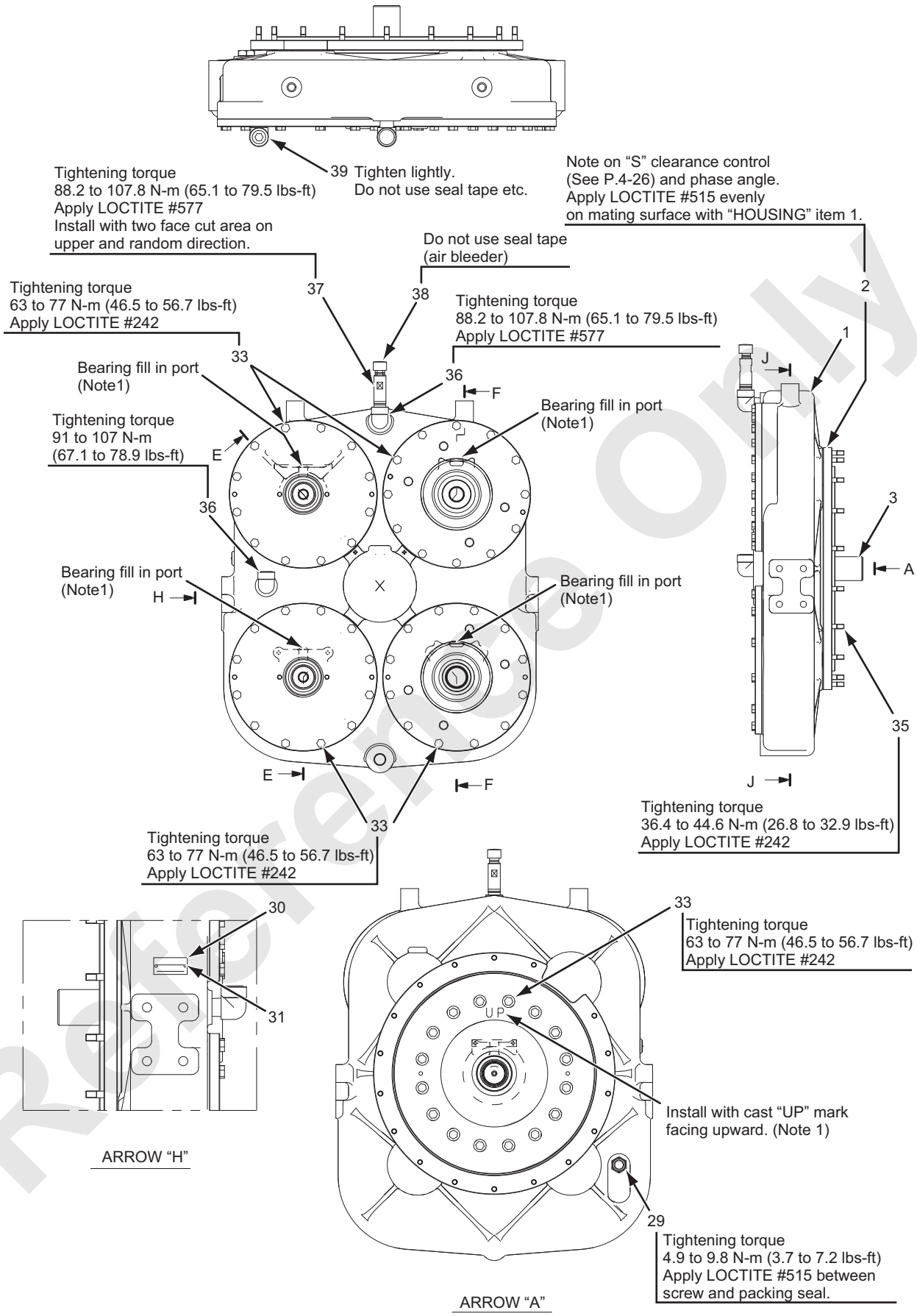


Fig.4-3 POWER DIVIDER (1/3)

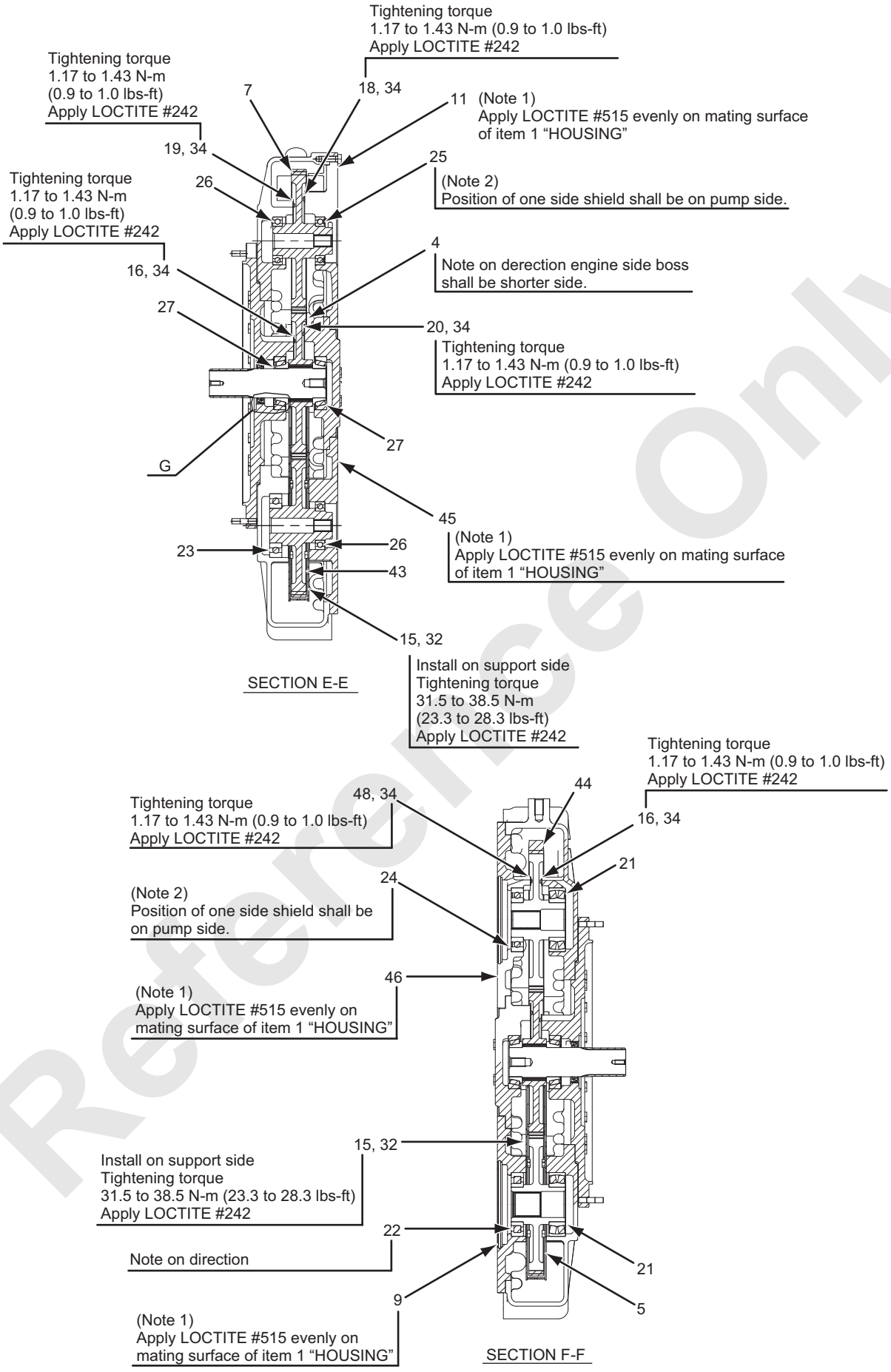
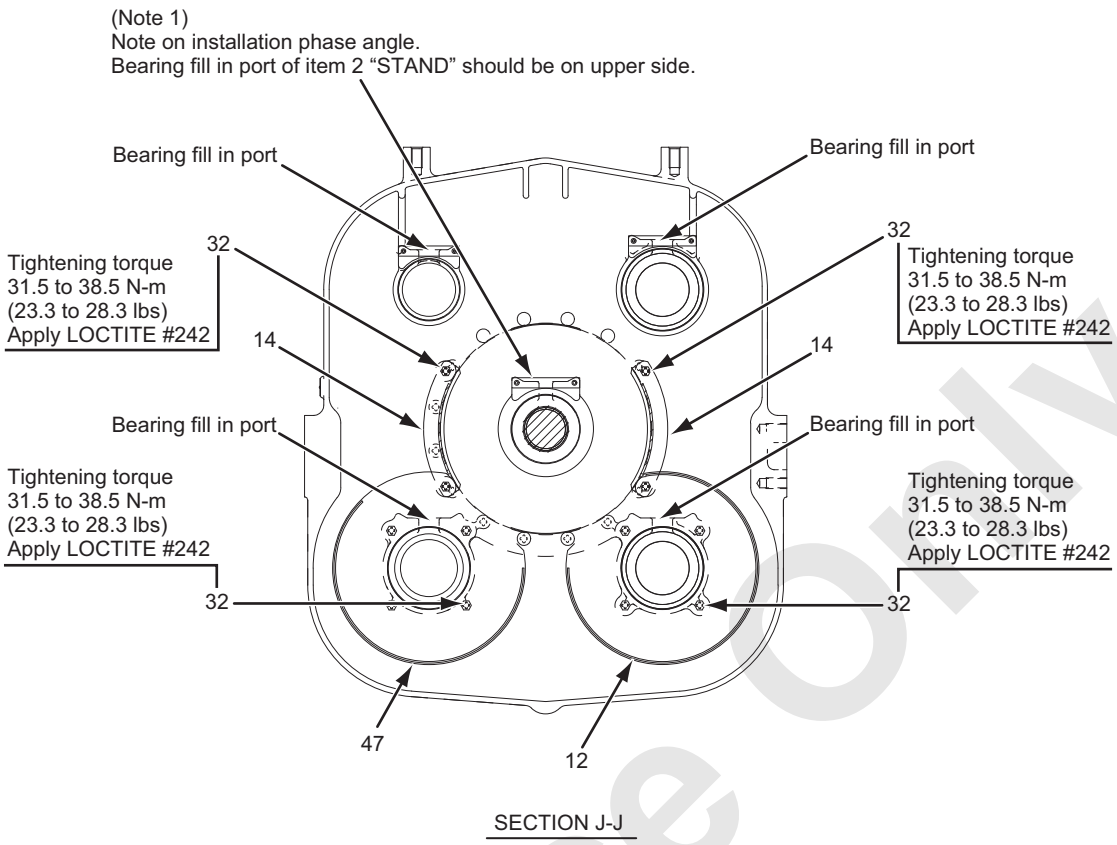
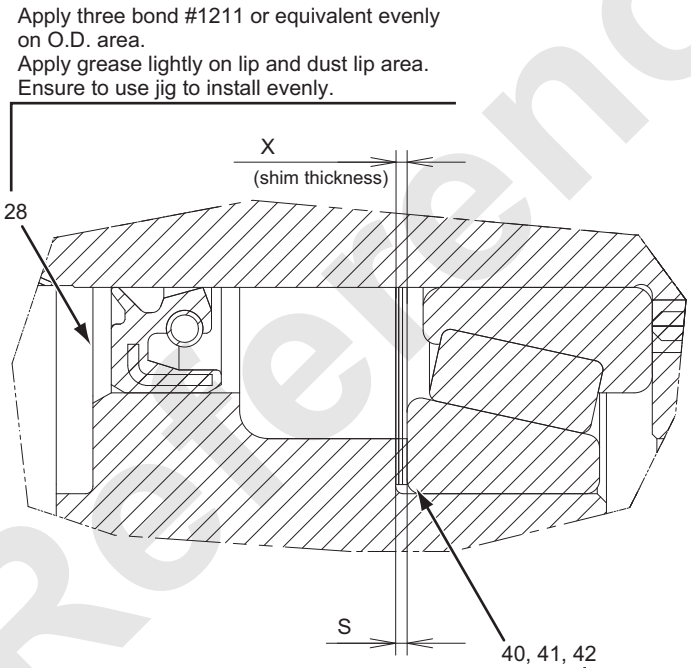


Fig.4-4 POWER DIVIDER (2/3)



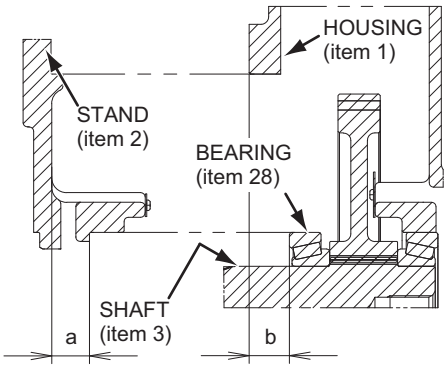
SECTION J-J



DETAIL OF “F”

SHIM (ITEM 40, 41, 42) ADJUSTING PROCEDURE

(1) Measure “a” and “b” dimensions as shown.



(2) Find difference between “a” and “b” dimensions and seek for required shim thickness to make clearance to become 0 to 0.15mm.
b - a = s
s - (0 to 0.15) = x

(3) Insert shim into stand and install bearing outerlace only.

(4) Install stand into housing

(5) Check for shim to be in right place before oil seal installation.

(6) Install oil seal.

Fig.4-5 POWER DIVIDER (3/3)

1. HOUSING
2. STAND
3. SHAFT
4. GEAR
5. GEAR
7. GEAR
9. SUPPORT
11. SUPPORT
12. PLATE
14. PLATE
15. PLATE
16. PLATE
18. PLATE
19. PLATE
20. PLATE
21. BEARING
22. ROLLER BEARING
23. BALL BEARING
24. BALL BEARING
25. BALL BEARING
26. BALL BEARING
27. ROLLER BEARING
28. OIL SEAL
29. OIL LEVEL GAUGE
30. PLATE
31. RIVET
32. CAPSCREW
33. CAPSCREW
34. MACHINE SCREW
35. STUD BOLT
36. 90 DEGREES ELBOW
37. TUBE
38. CAP
39. PLUG
40. SHIM
41. SHIM
42. SHIM
43. GEAR
44. GEAR
45. SUPPORT
46. SUPPORT
47. PLATE
48. PLATE

- (NOTE 1)
  Install taking note on installation phase angle of pump mounting bolt hole and bearing oil fill in port of item 2 STAND and item, 9, 11, 45, 46 SUPPORT. (See figure)
- (NOTE 2)
  Install item 24, 25 BEARING so that position of one side shield becomes on pump mounting side. (See figure)

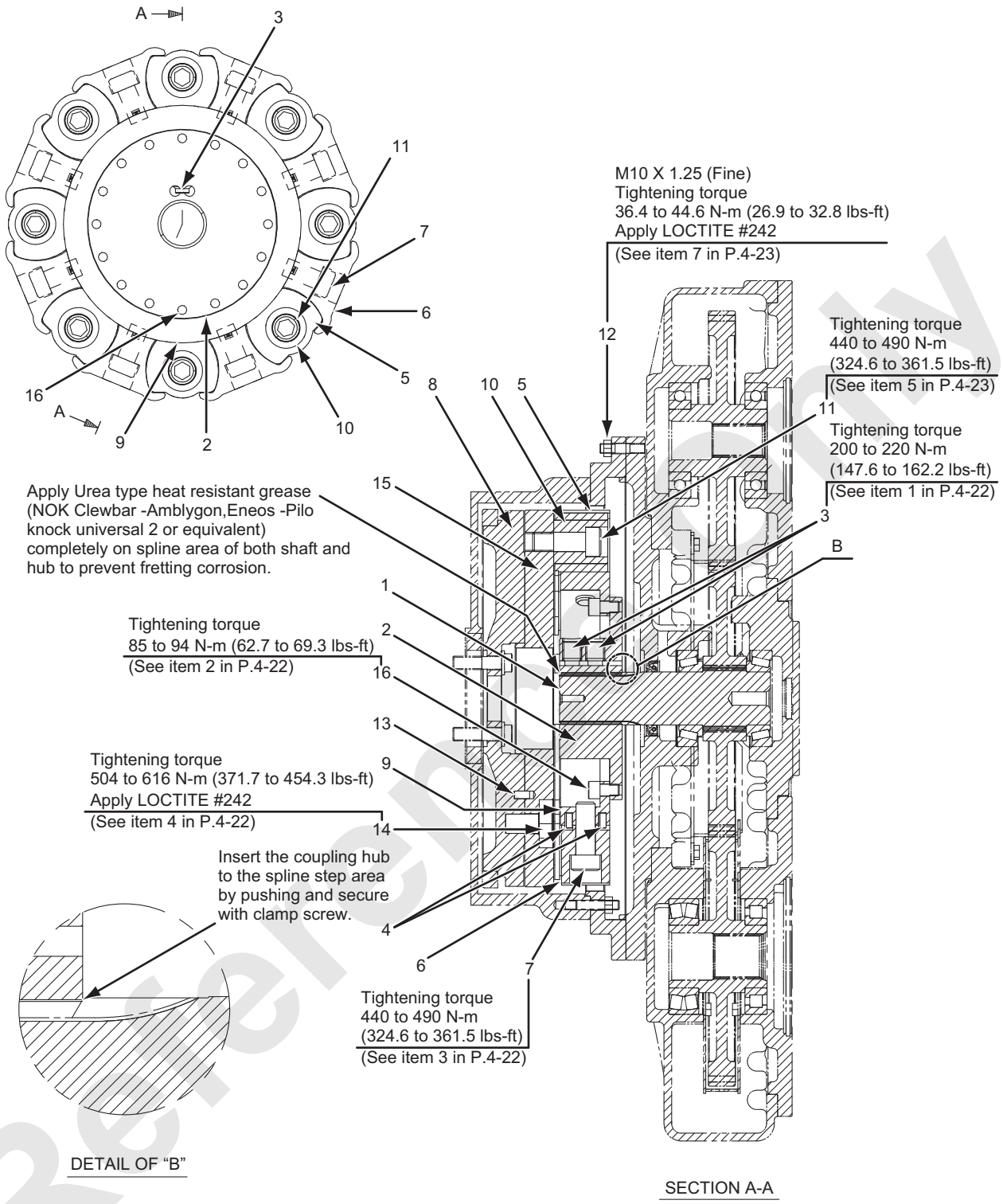
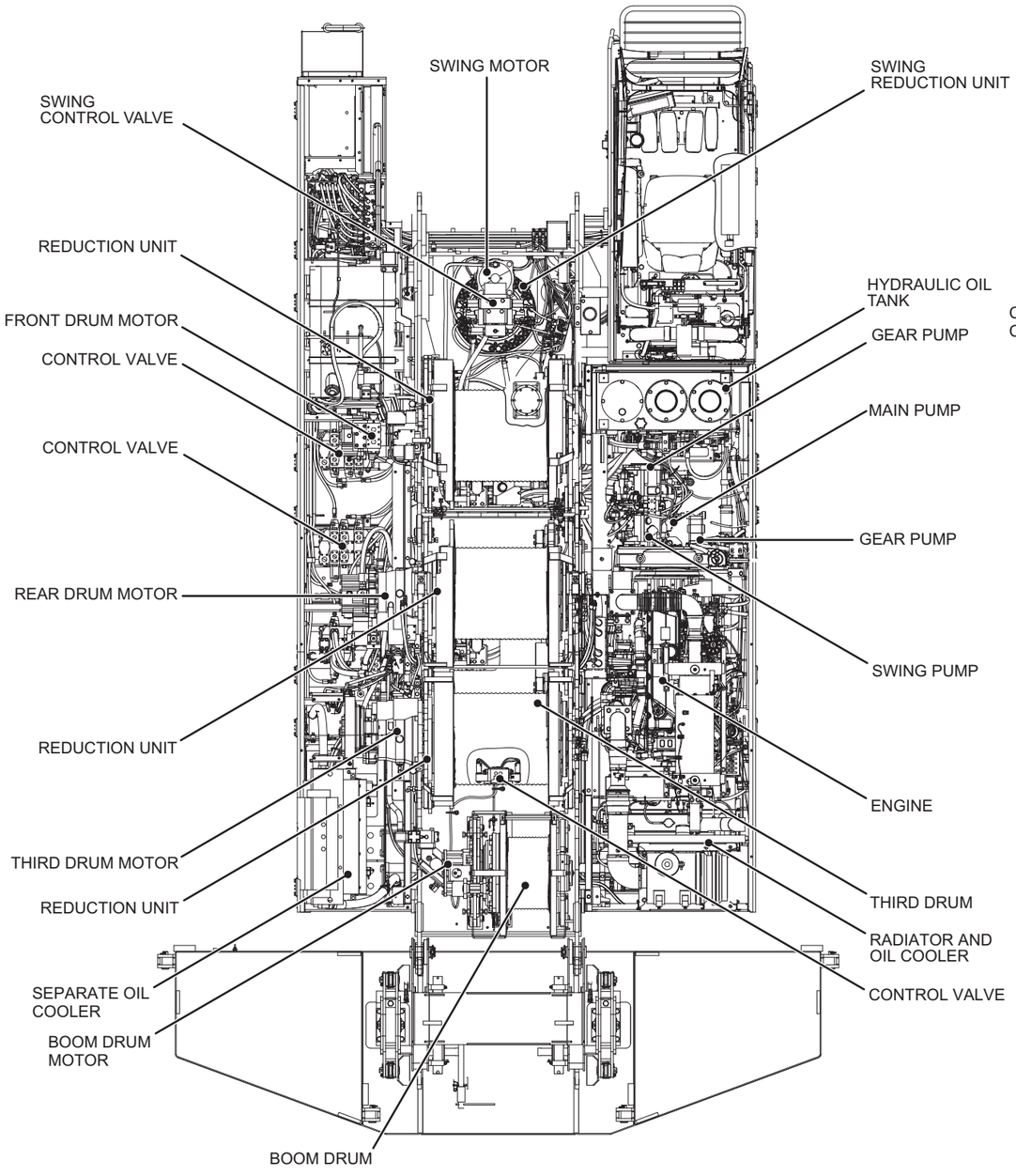


Fig.4-6 COUPLING

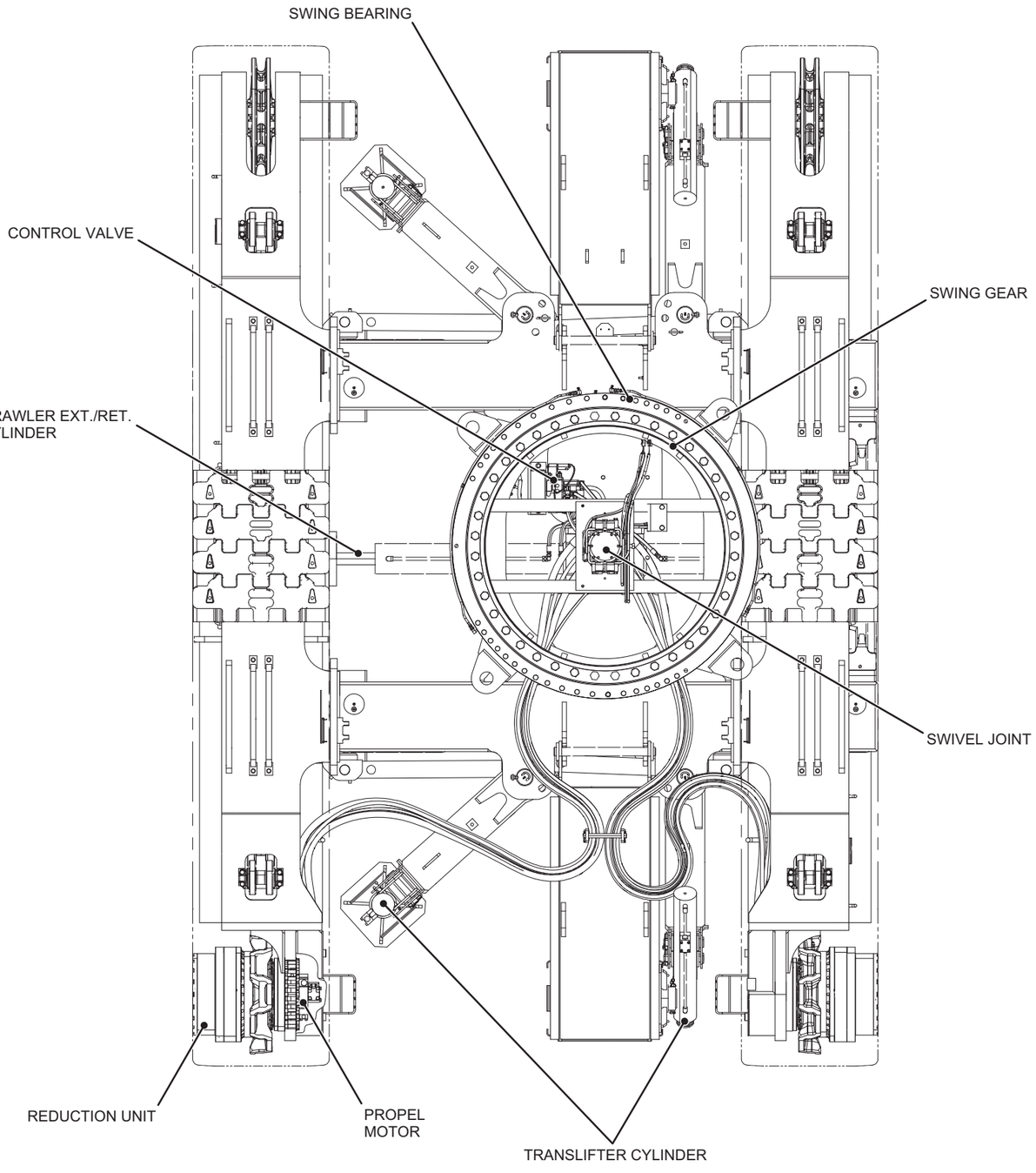
1. ELEMENT
2. INSERT
3. INSERT
4. HUB
5. CAPSCREW
6. SETSCREW
7. SPRING PIN
8. NUT

5. HYDRAULIC SYSTEM

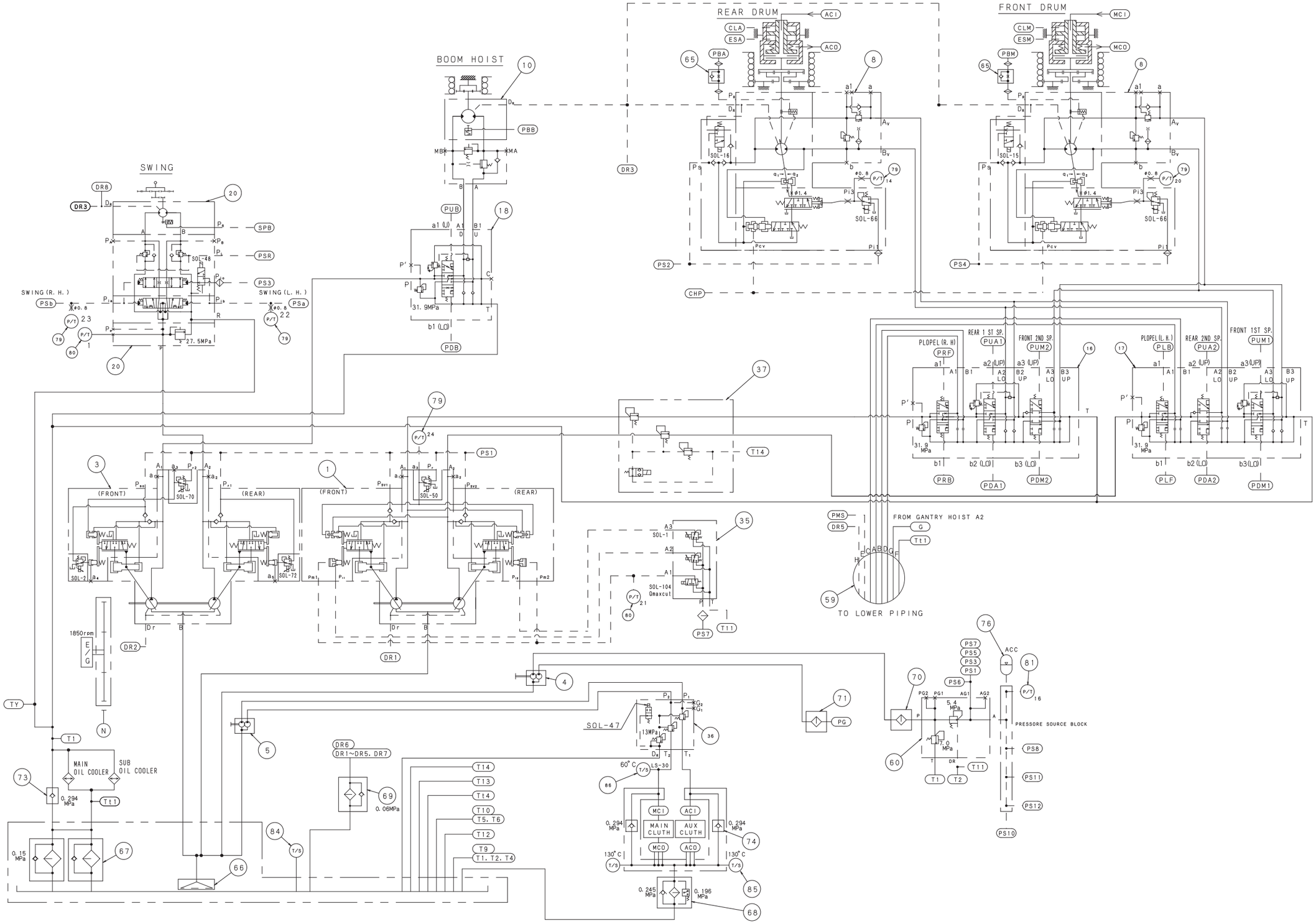
5.1 LOCATION OF MAIN HYDRAULIC COMPONENTS

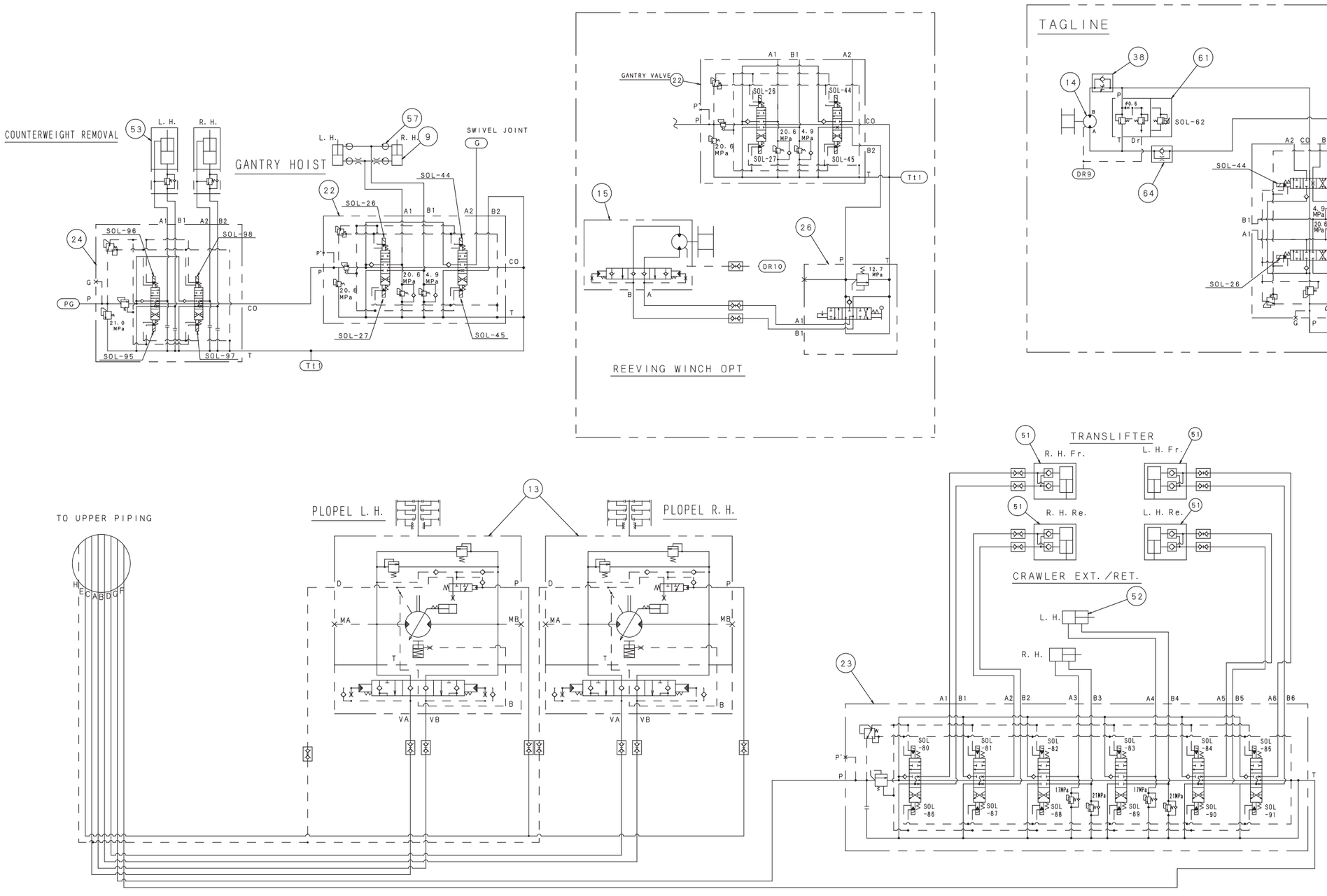


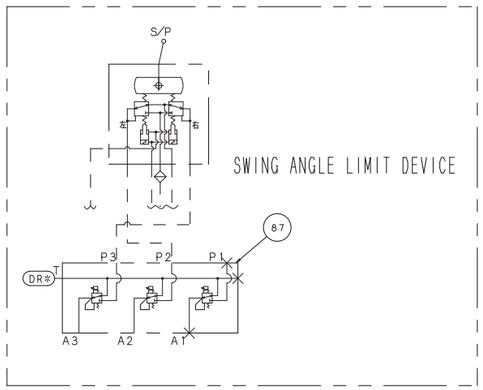
UPPER MACHINERY

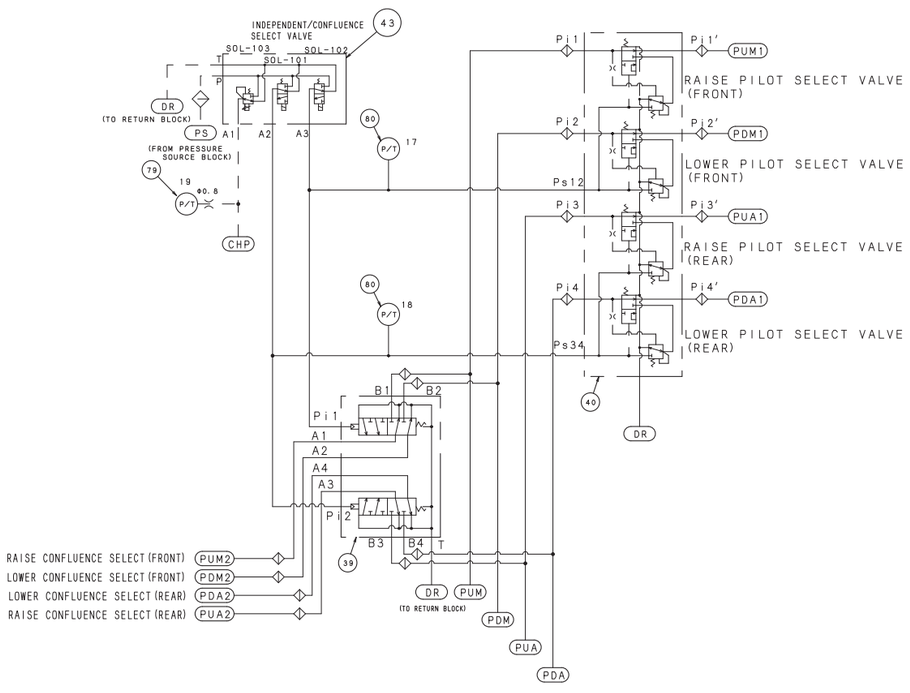


LOWER MACHINERY

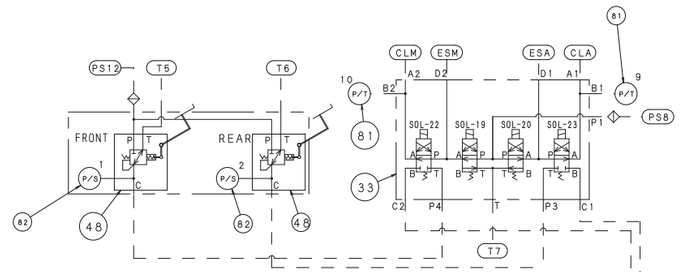

REAR DRUM
FRONT DRUM
BOOM HOIST
SWING
SWING (R. H.)
SWING (L. H.)
PLOPEL (R. H)
PLOPEL (L. H.)
REAR 1 ST SP.
REAR 2ND SP.
FRONT 2ND SP.
FRONT 1ST SP.
(FRONT)
(REAR)
MAIN OIL COOLER
SUB OIL COOLER
MAIN CLUTH
AUX CLUTH
FROM GANTRY HOIST A2
TO LOWER PIPING
PRESSORE SOURCE BLOCK
SOL-47
SOL-104 Qmaxcut
31. 9MPa
27. 5MPa
1850rpm

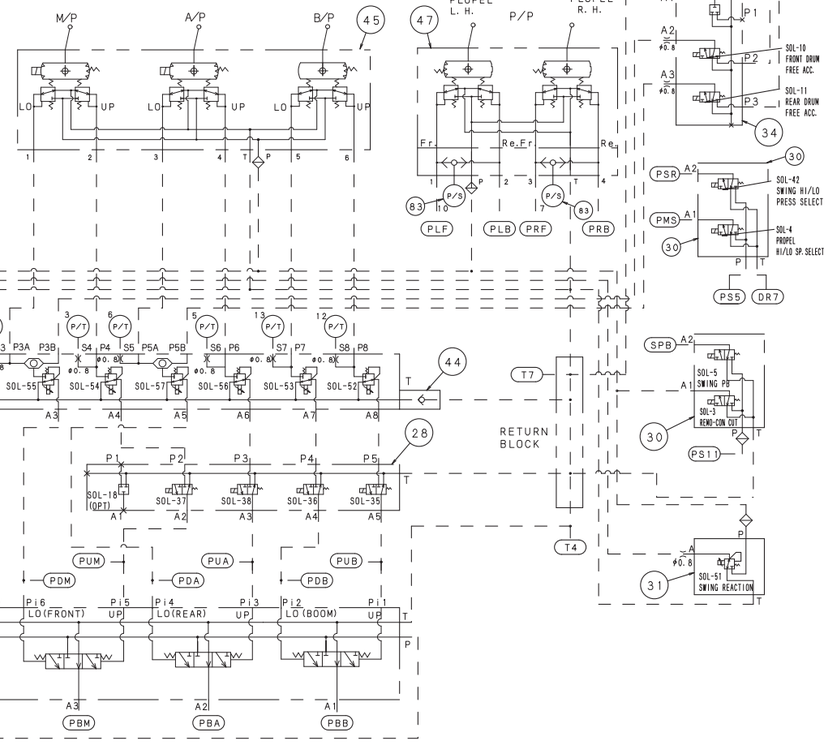

COUNTERWEIGHT REMOVAL
53
L. H.
R. H.
SOL-96
SOL-98
24
G
P
PG
21.0 MPa
SOL-95
SOL-97
T
CO
T t1
GANTRY HOIST
57
9
L. H.
R. H.
SWIVEL JOINT
G
SOL-44
22
SOL-26
A1
B1
A2
B2
P'
P
20.6 MPa
4.9 MPa
SOL-27
SOL-45
GANTRY VALVE
22
SOL-26
SOL-44
SOL-27
SOL-45
20.6 MPa
4.9 MPa
CO
B2
T
T t1
15
26
DR10
12.7 MPa
REEVING WINCH OPT
TAGLINE
38
61
14
SOL-62
T9
DR9
64
A2
CO
B2
SOL-44
SOL-45
4.9 MPa
20.6 MPa
SOL-26
SOL-27
TO UPPER PIPING
H
E
C
A
B
D
G
F
13
PLOPEL L. H.
PLOPEL R. H.
D
P
M
MA
MB
T
B
VA
VB
TRANSLIFTER
51
R. H. Fr.
L. H. Fr.
R. H. Re.
L. H. Re.
CRAWLER EXT. /RET.
52
L. H.
R. H.
23
A1
B1
A2
B2
A3
B3
A4
B4
A5
B5
A6
B6
SOL -80
SOL -81
SOL -82
SOL -83
SOL -84
SOL -85
SOL -86
SOL -87
SOL -88
SOL -89
SOL -90
SOL -91
17MPa
21MPa
P'
P
T

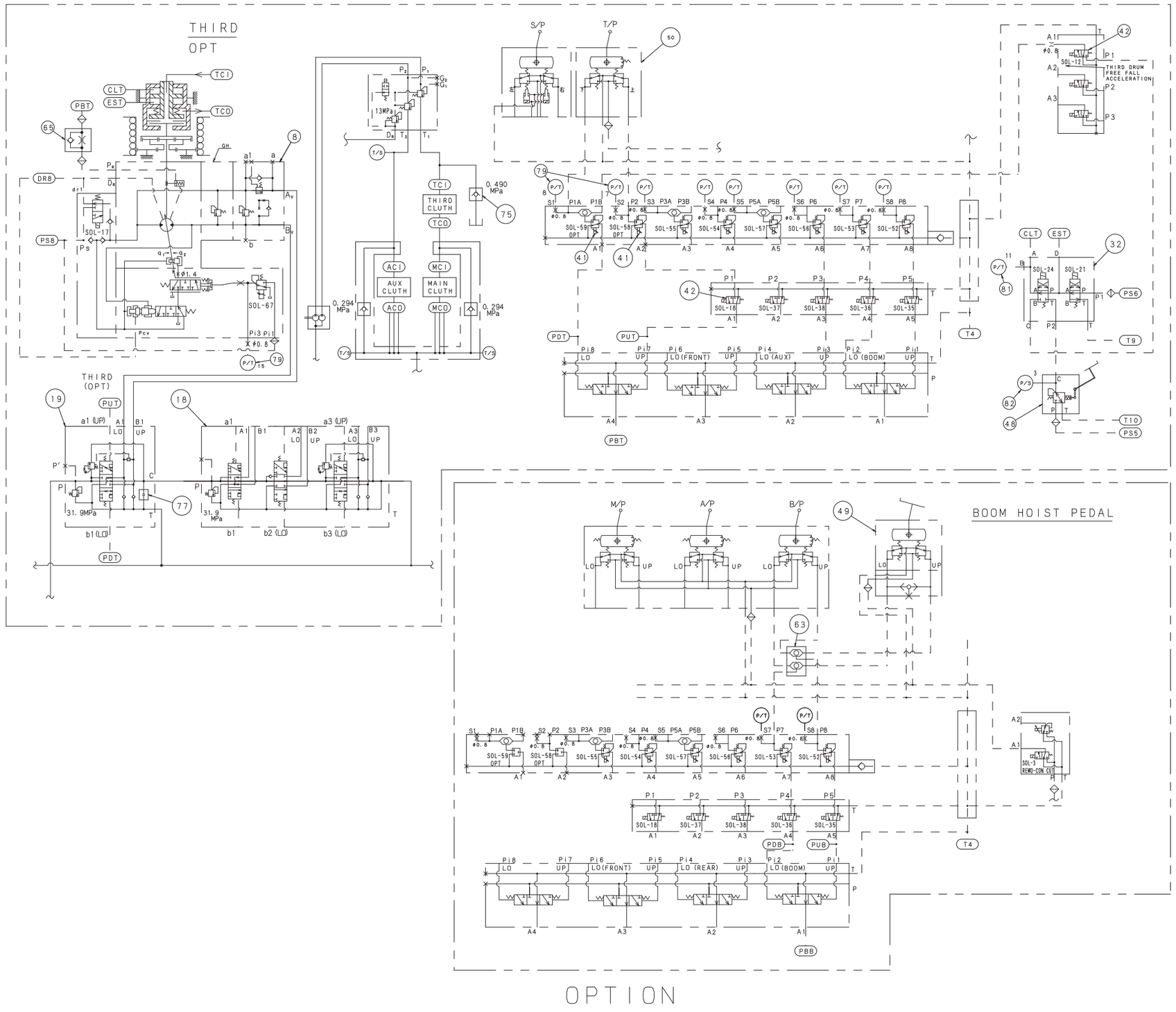

S/P
SWING ANGLE LIMIT DEVICE
87
P3
P2
P1
T
DR*
A3
A2
A1

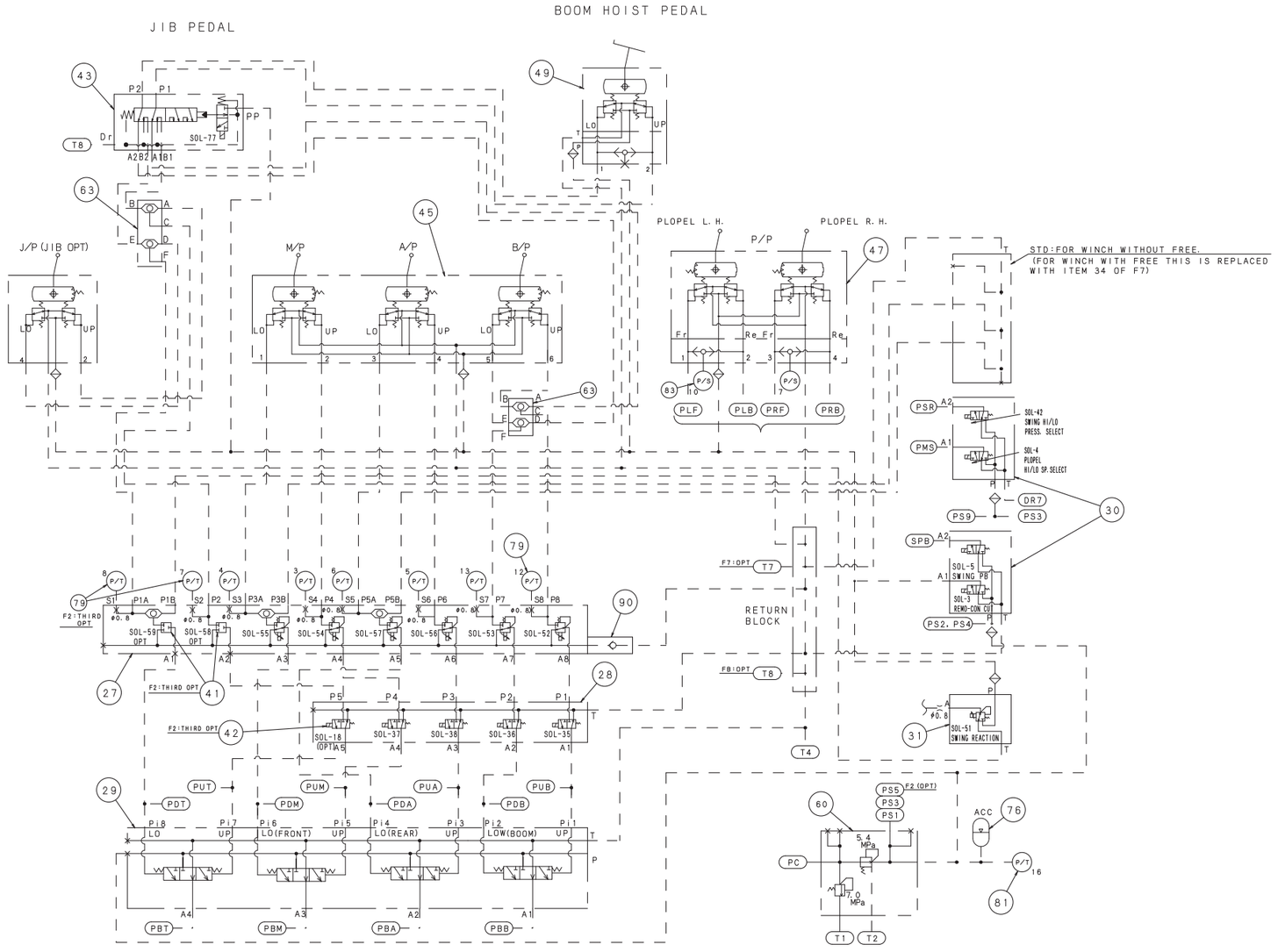

INDEPENDENT/CONFLUENCE SELECT VALVE
43
SOL-103
SOL-102
SOL-101
DR
(TO RETURN BLOCK)
PS
A1
A2
A3
(FROM PRESSURE SOURCE BLOCK)
79
19
φ0.8
P/T
CHP
80
17
18
Pi1
Pi1'
PUM1
RAISE PILOT SELECT VALVE (FRONT)
Pi2
Pi2'
PDM1
LOWER PILOT SELECT VALVE (FRONT)
Ps12
Pi3
Pi3'
PUA1
RAISE PILOT SELECT VALVE (REAR)
Pi4
Pi4'
PDA1
LOWER PILOT SELECT VALVE (REAR)
Ps34
40
DR
B1
B2
A4
B3
B4
39
RAISE CONFLUENCE SELECT (FRONT) PUM2
LOWER CONFLUENCE SELECT (FRONT) PDM2
LOWER CONFLUENCE SELECT (REAR) PDA2
RAISE CONFLUENCE SELECT (REAR) PUA2
PUM
PDM
PUA
PDA

46
S/P
L.H.
R.H.
PSa
PSb


PS12
T5
T6
FRONT
REAR
P/S
1
2
C
82
48
CLM
ESM
ESA
CLA
A2
D2
D1
A1
B2
B1
10
9
P/T
81
SOL-22
SOL-19
SOL-20
SOL-23
P1
PS8
33
C2
P4
T
P3
C1
T7


M/P
A/P
B/P
45
LO
UP
47
PLOPEL L. H.
P/P
PLOPEL R. H.
Fr
Re.Fr
Re
83
PLF
PLB
PRF
PRB
A1
P1
A2
A3
SOL-10 FRONT DRUM FREE ACC.
SOL-11 REAR DRUM FREE ACC.
34
30
PSR
SOL-42 SWING HI/LO PRESS SELECT
PMS
SOL-4 PROPEL HI/LO SP. SELECT
PS5
DR7
79
S1
P1A
P1B
S2
P2
S3
P3A
P3B
S4
P4
S5
P5A
P5B
S6
P6
S7
P7
S8
P8
SOL-59 OPT
SOL-58 OPT
SOL-55
SOL-54
SOL-57
SOL-56
SOL-53
SOL-52
44
27
28
SOL-18 (OPT)
SOL-37
SOL-38
SOL-36
SOL-35
RETURN BLOCK
T4
SPB
SOL-5 SWING PB
SOL-3 REMO-CON CUT
PS11
31
SOL-51 SWING REACTION
29
PUM
PDM
PUA
PDA
PUB
PDB
Pi8
Pi7
Pi6
LO (FRONT)
Pi5
Pi4
LO (REAR)
Pi3
Pi2
LO (BOOM)
Pi1
A4
A3
A2
A1
PBM
PBA
PBB
PS
PS4
PS2
PS10
PRESSURE SOURCE BLOCK


THIRD
OPT
TCI
CLT
EST
TCO
PBT
65
DR8
PS8
SOL-17
SOL-67
Pcv
8
GH
a1
a
Pi3 Pi1
ø0.8
P/T 15
79
S/P
T/P
50
13MPa
0.490 MPa
75
THIRD CLUTH
ACI
AUX CLUTH
ACO
MCI
MAIN CLUTH
MCO
0.294 MPa
T/S
THIRD (OPT)
19
18
PUT
a1 (UP)
a3 (UP)
LO
UP
31.9MPa
31.9 MPa
77
b1 (LO)
b1
b2 (LO)
b3 (LO)
PDT
S1 P1A P1B S2 P2 S3 P3A P3B S4 P4 S5 P5A P5B S6 P6 S7 P7 S8 P8
SOL-59 OPT
SOL-58 OPT
SOL-55
SOL-54
SOL-57
SOL-56
SOL-53
SOL-52
ø0.6K
P/T
41
42
P1 P2 P3 P4 P5
SOL-18
SOL-37
SOL-38
SOL-36
SOL-35
Pi8 LO
Pi7 UP
Pi6 LO (FRONT)
Pi5 UP
Pi4 LO (AUX)
Pi3 UP
Pi2 LO (BOOM)
Pi1 UP
PBT
T4
A1
SOL-12
THIRD DRUM FREE FALL ACCELERATION
P1
P2
P3
CLT
EST
32
11
81
SOL-24
SOL-21
PS6
T9
P/S
82
48
T10
PS5
M/P
A/P
B/P
49
BOOM HOIST PEDAL
63
SOL-3
REMO-CON CUT
PDB
PUB
PBB
OPTION


JIB PEDAL
BOOM HOIST PEDAL
J/P (JIB OPT)
M/P
A/P
B/P
PLOPEL L. H.
P/P
PLOPEL R. H.
RETURN BLOCK
STD:FOR WINCH WITHOUT FREE.
(FOR WINCH WITH FREE THIS IS REPLACED WITH ITEM 34 OF F7)
SOL-42 SWING HI/LO PRESS. SELECT
SOL-4 PLOPEL HI/LO SP. SELECT
SOL-5 SWING PB
SOL-3 REMO-CON CO
SOL-51 SWING REACTION
SOL-18 (OPT)
SOL-35
SOL-36
SOL-37
SOL-38
SOL-52
SOL-53
SOL-54
SOL-55
SOL-56
SOL-57
SOL-58 OPT
SOL-59 OPT
SOL-77
F2:THIRD OPT
F7:OPT
FB:OPT
LO
UP
LO(FRONT)
LO(REAR)
LOW(BOOM)
5.4 MPa
7.0 MPa
ACC

5.2 HYDRAULIC CIRCUITS AND COMPONENTS

5.2.1 COMPONENT SPECIFICATIONS

Item	Name of Component		Specification
1	Pump (Front and rear drum, propel, third)		Swash plate type, variable displacement Max. delivery :255ltr./min X 2 Max. working pressure :31.9MPa (325kgf/cm^2)
3	Pump (Boom, swing)		Swash plate type, variable displacement Max. delivery :177ltr./min Max. working pressure :27.5MPa (280kgf/cm^2)
4	Gear pump	4-1 Control	Max. delivery :61ltr./min Max. working pressure :7.0MPa (71kgf/cm^2)
		4-2 · Counterweight self removal · Gantry · Crawler ext./ret. · Translifter	Max. delivery :40ltr./min Max. working pressure :20.6MPa (210kgf/cm^2)
5	Gear pump (Front and rear drum brake cooling)		Max. delivery :73ltr./min Max. working pressure :1.0MPa (10kgf/cm^2)
8	Motor (Front and rear drum, third drum)		Swash plate type, variable displacement Max. delivery :255ltr./min Max. working pressure :31.9MPa (325kgf/cm^2)
9	Cylinder (Gantry hoist)		Φ100 X Φ50 X St480 X 2 Press Push :20.6MPa (210kgf/cm^2) Pull :4.9MPa (50kgf/cm^2)
10	Motor (Boom)		Bent axis type, fixed displacement Max. delivery :255ltr./min Max. working pressure :31.9MPa (325kgf/cm^2)
12	Motor (Swing)		Swash plate type, variable displacement Max. delivery :177ltr./min Max. working pressure :27.5MPa (280kgf/cm^2)
13	Motor (Propel)		Swash plate type, 2 speed motor Max. delivery :255ltr./min Max. working pressure :31.9MPa (325kgf/cm^2)

Item	Name of Component	Specification
14	Motor (Tagline) [Option]	Max. delivery :40ltr./min Relief pressure :13.7MPa (140kgf/cm^2)
15	Motor (Reeving)	Max. delivery :40ltr./min Max. working pressure :12.7MPa (130kgf/cm^2)
16	Control valve (Propel R. H., main2, aux.1)	Max. delivery :255ltr./min Max. working pressure :31.9MPa (325kgf/cm^2)
17	Control valve (Propel L. H., boom, main1, aux.2)	Max. delivery :255ltr./min Max. working pressure :31.9MPa (325kgf/cm^2)
18	Control valve (Boom)	Max. delivery :255ltr./min Max. working pressure :31.9MPa (325kgf/cm^2)
20	Control valve (Swing)	Max. working pressure :27.5MPa (280kgf/cm^2)
22	Control valve (Gantry)	Set pressure :20.6MPa / 4.9MPa :(210kgf/cm^2 / 50kgf/cm^2)
23	Control valve (Translifter / crawler ext.)	Crawler extending Press Push :17.0MPa (173kgf/cm^2) Pull :21.0MPa (214kgf/cm^2)
24	Control valve (Counterweight self removal)	Max. delivery :40ltr./min Max. working pressure :21.0MPa (214kgf/cm^2)
26	Control valve (Reeving winch)	Max. delivery :40ltr./min Max. working pressure :12.7MPa (130kgf/cm^2)
27	Valve block (8-section) (Automatic stop and speed control)	·Front drum hoist remote control pressure ·Front drum lowering remote control pressure ·Rear drum hoist remote control pressure ·Rear drum lowering remote control pressure ·Boom raise remote control pressure ·Boom lowering remote control pressure ·Third drum hoist remote control pressure (Option) ·Third drum lowering remote control pressure (Option)
28	Valve block (5-section) (Limit stop)	·Boom raise stop ·Boom lower stop ·Rear drum raise stop ·Front drum lower stop ·Third drum raise stop (Option)

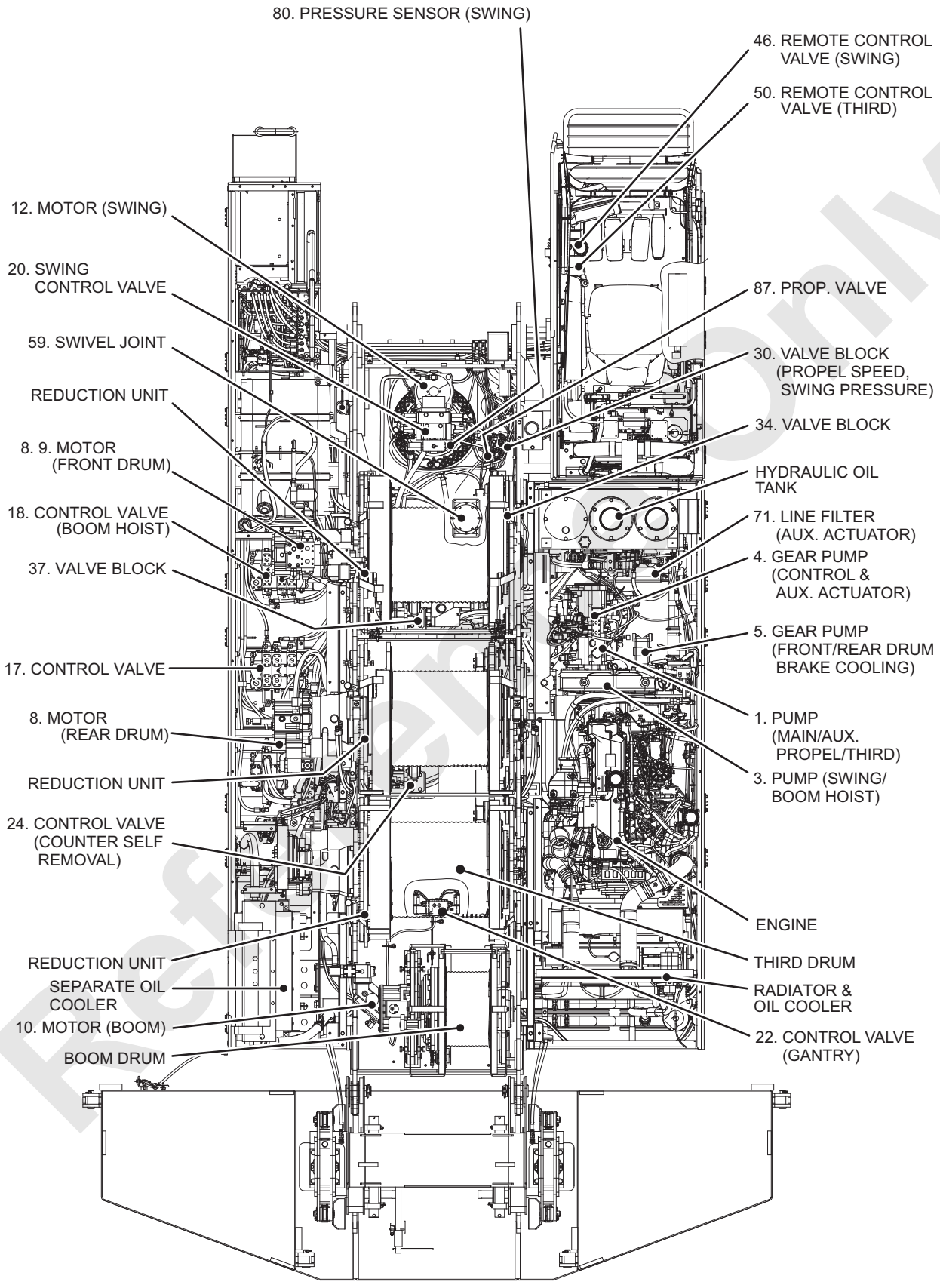
Item	Name of Component	Specification
29	Valve block (4-section) (Motor brake)	·Front drum motor parking brake ·Rear drum motor parking brake ·Boom drum motor parking brake ·Third drum motor parking brake
30	Valve block X 2 (2-section) (Remo-con press. source cut etc)	·Remo-con cut ·Swing parking brake ·Propel speed Hi/Low select ·Swing pressure select
31	Valve block (Swing reaction)	Swing reaction
32	Valve block (2-section)	·Third drum clutch ·Third drum emergency clutch
33	Valve block (4-section) (Wet type free fall)	·Rear drum clutch ·Rear drum emergency clutch ·Front drum emergency clutch ·Front drum clutch
34	Valve block (3-section) (Wet type free fall speed acceleration)	·Front drum free fall speed acceleration ·Rear drum free fall speed acceleration
35	Valve block	·Qmax cut / positive control
36	Valve block (For hyd. oil heat)	Hyd. oil heat
37	Valve block	DPF re-generation
38	Flow control valve (Tagline) [Option]	Flow control
39	Valve block	· Pilot change-over
40		· Pilot pressure change-over
41	Solenoid valve [Option]	·Third drum automatic stop
42	Solenoid valve [Option]	·Third drum limit stop
43	Solenoid valve	Independence, confluence select
44	Check valve (For valve block)	Check valve
45	Remote control valve (Front and rear drum, boom drum)	Front and rear drum :2.65 to 2.94MPa (27 to 30kgf/cm^2) Boom drum :2.50 to 2.79MPa (25.5 to 28.5kgf/cm^2)
46	Remote control valve (Swing)	Swing :1.62 to 1.92MPa (16.5 to 19.6kgf/cm^2)
47	Remote control valve (Propel)	Press :1.42 to 1.62MPa (14.5 to 16.5kgf/cm^2)

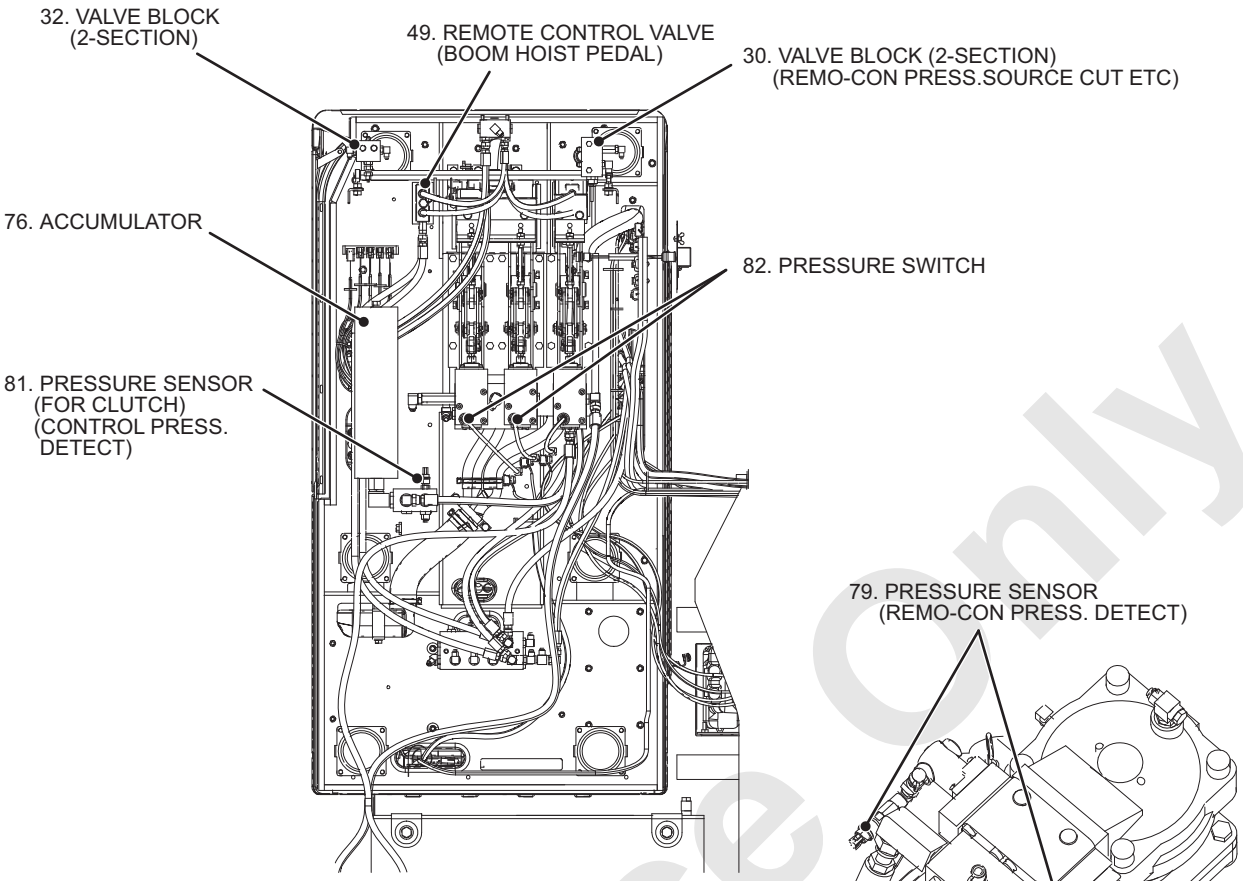
Item	Name of Component	Specification
48	Control valve (Brake)	4.9 to 5.6MPa (50 to 55kgf/cm^2)
49	Remote control valve (Boom hoist pedal) [Option]	2.2 to 2.4MPa (22 to 24 kgf/cm^2)
50	Remote control valve	Third :2.65 to 2.94MPa (27.0 to 30.0kgf/cm^2)
51	Cylinder (Translifter)	Φ140 X Φ100 X St700 X 4 Press Push :20.6MPa (210kgf/cm^2) Pull :20.6MPa (210kgf/cm^2)
52	Cylinder (Crawler Ext./Ret.)	Φ180 X Φ75 X St1246 X 2 Press Push :17.0MPa (173kgf/cm^2) Pull :21.0MPa (214kgf/cm^2)
53	Cylinder (Counterweight self removal)	Φ110 X Φ85 X St1330 X 2
57	Swivel joint	-
59	Swivel joint (8 port)	A, B, C, D : Propel E : Propel speed select F : Tank G : Crawler H : Drain
60	Relief valve / reducing valve (Control)	Relief pressure :7.0MPa (71kgf/cm^2) Reducing sec. pressure :5.4MPa (55kgf/cm^2)
61	Sol. prop relief valve (Tagline) [Option]	Mechanical relief pressure setting :14.7MPa (150kgf/cm^2) Proportional relief pressure setting :13.7MPa (140kgf/cm^2) (at 0.25 Amp.)
63	Shuttle valve [Option]	-
64	Slow return check valve (Tagline) [Option]	Φ2.0
65	Slow return check valve (For motor brake)	Φ0.8
66	Suction strainer	80 Mesh
67	Return filter	$\beta 10 \geqq 8$
68	Return filter (Wet type clutch)	10μ
69	Drain filter	10μ
70	Line filter (Control)	100 Mesh (149μ)
71	Line filter (Aux. actuator)	100 Mesh (149μ)
73	Bypass check valve (Oil cooler)	0.294MPa (3kgf/cm^2)

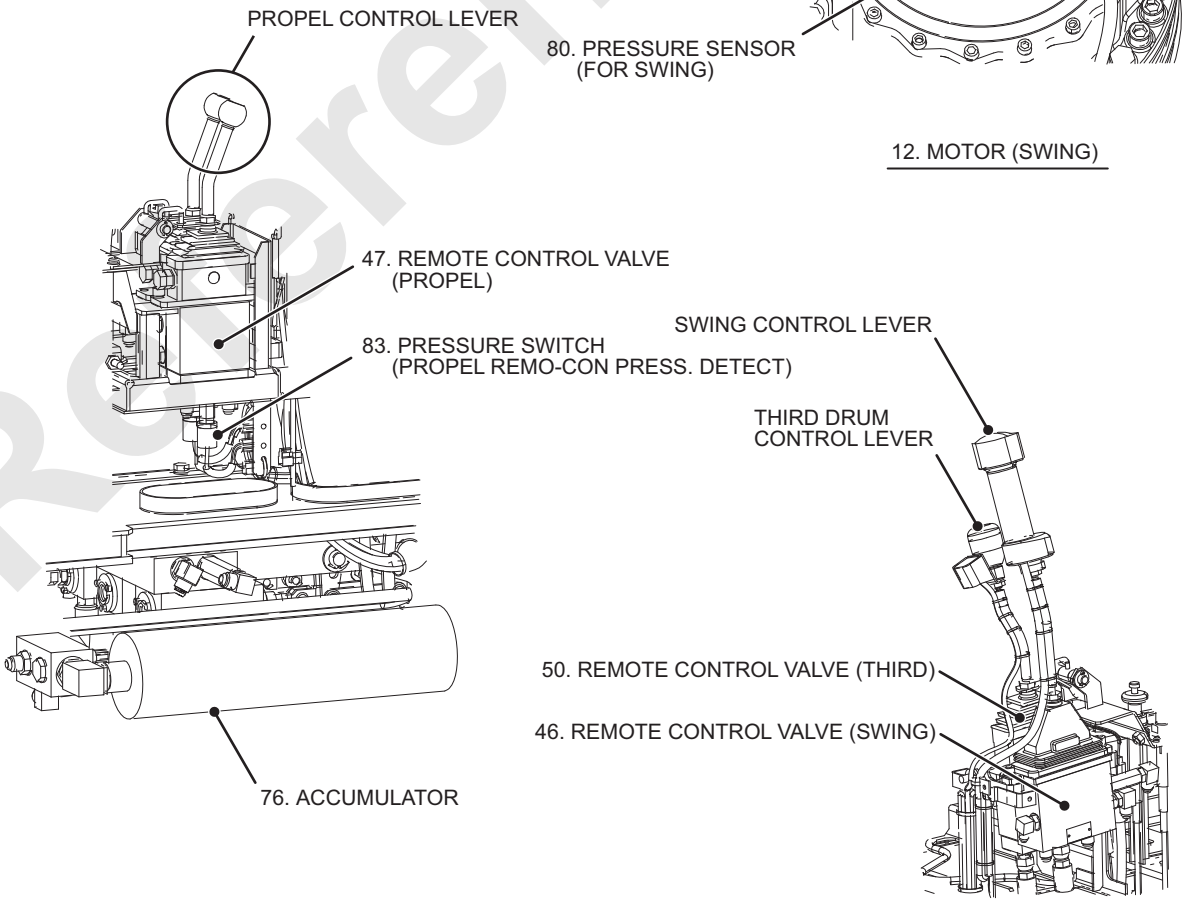
Item	Name of Component	Specification
74	Bypass check valve (Front, rear drum brake cooling)	0.294MPa (3kgf/cm^2)
76	Accumulator	2.9ltr.
79	Pressure sensor (Remo-con press. detect)	3.0MPa (3kgf/cm^2)
80	Pressure sensor (For swing)	50.0MPa (510kgf/cm^2)
81	Pressure sensor (For clutch)	19.6MPa (200kgf/cm^2)
82	Pressure switch (foot brake)	4.4MPa (45kgf/cm^2) (ON)
83	Pressure switch (Propel remo-con press. detect)	0.5MPa (5kgf/cm^2) (ON)
84	Hyd. oil temperature sensor (For hyd. oil tank)	-
85	Hyd. oil temperature switch (Front, rear drum brake cooling)	130℃ (266°F)
86	Hyd. oil temperature switch (For hyd. oil heat)	60℃ (140°F)
87	Prop. valve	3-section

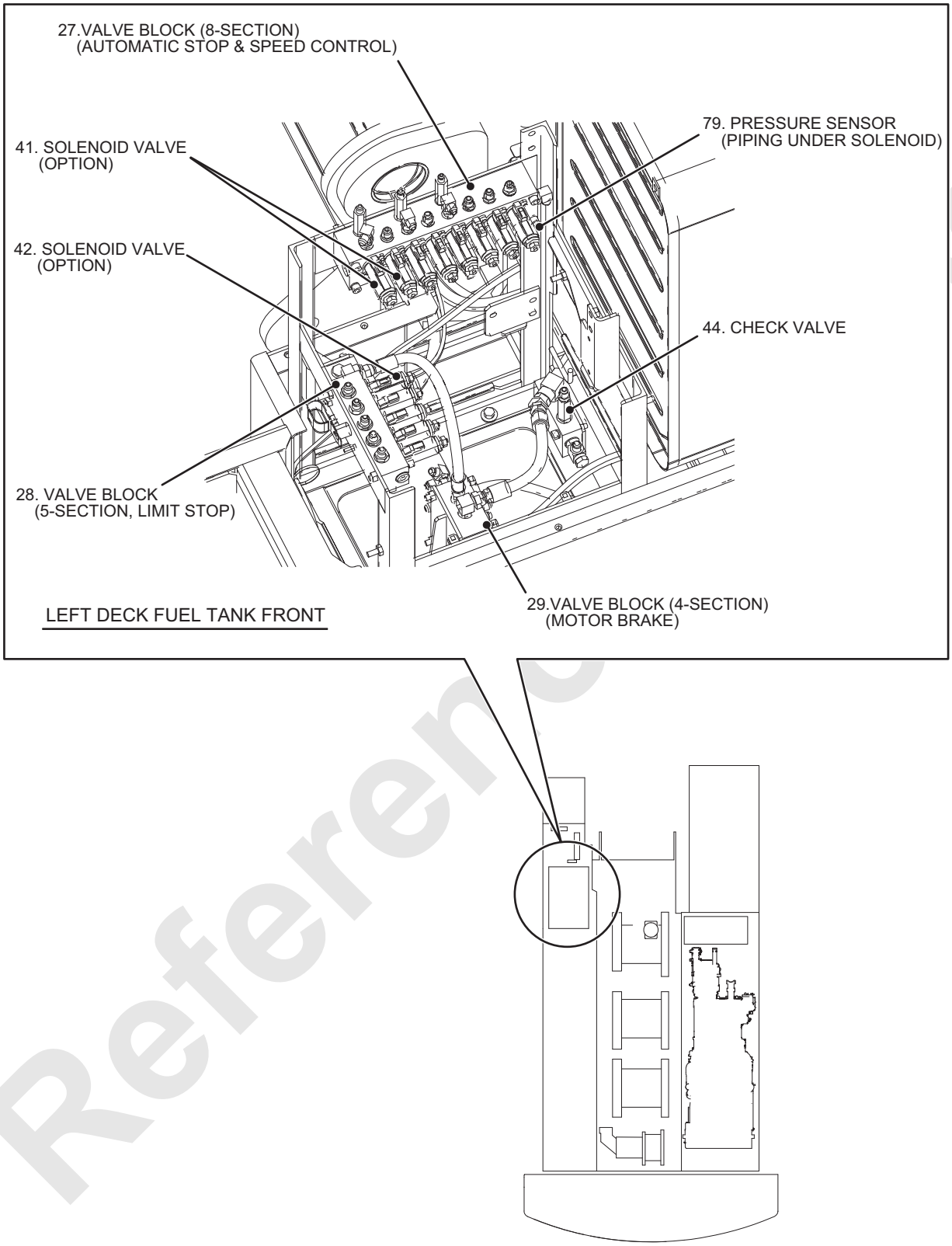
5.2.2 LAYOUT OF HYDRAULIC COMPONENTS

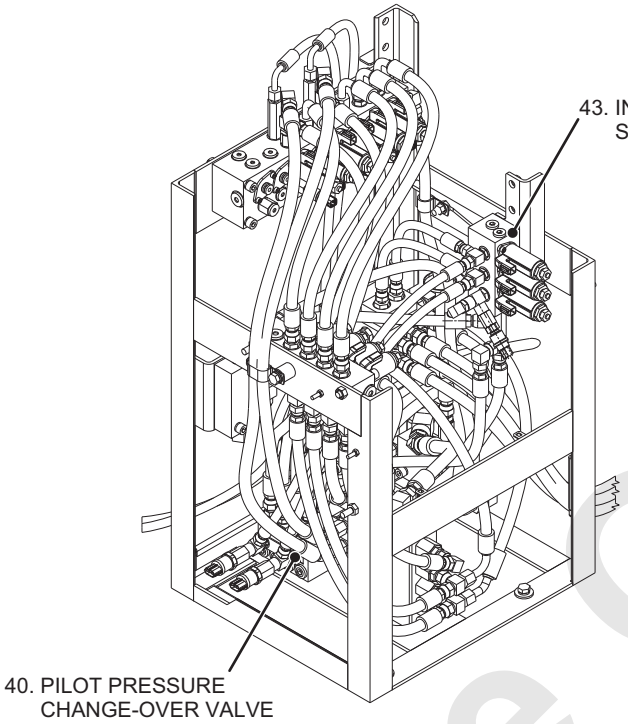
1. UPPER MACHINERY

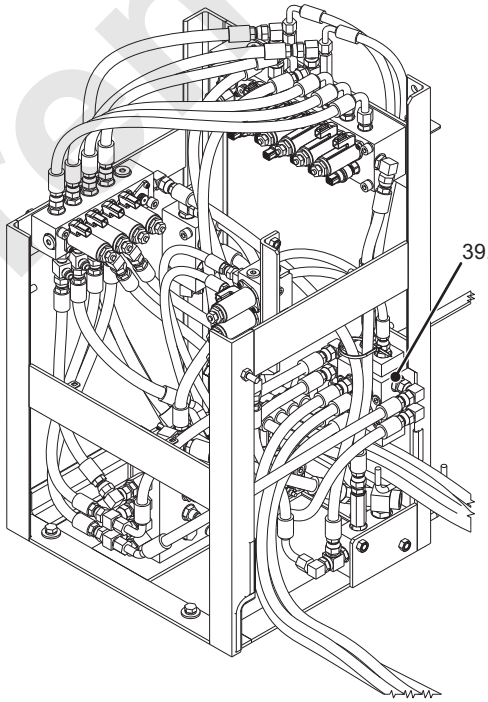


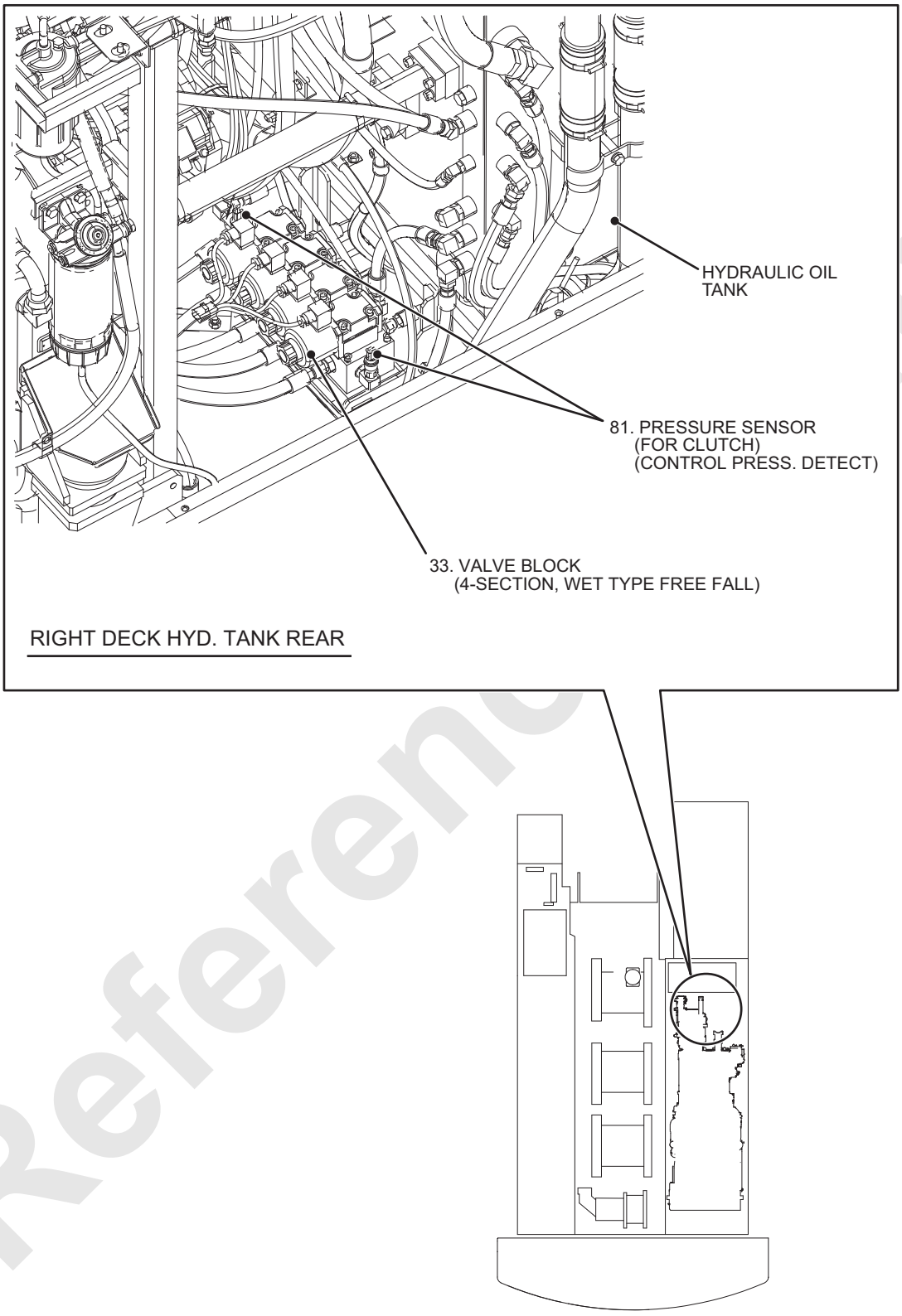


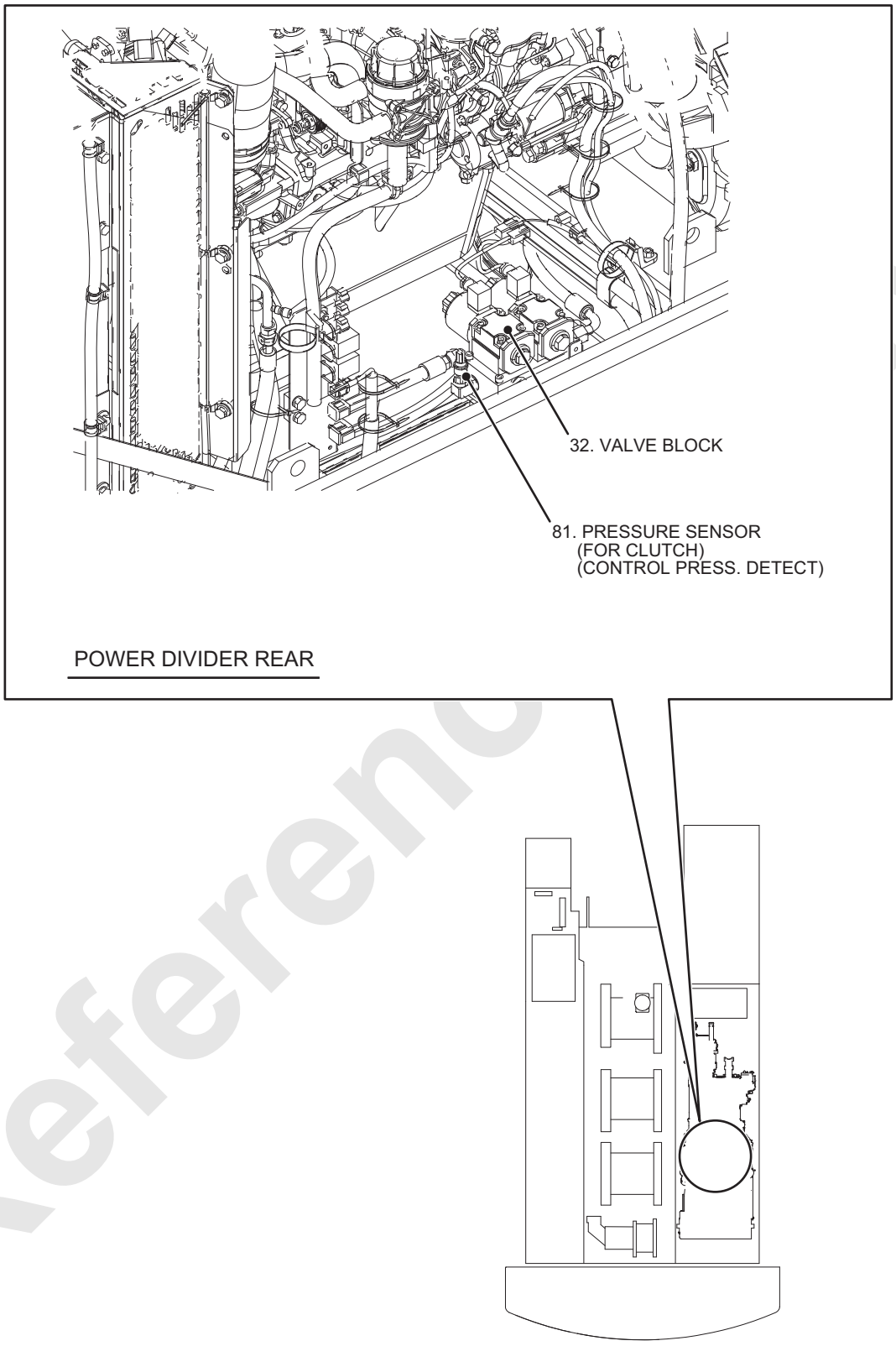




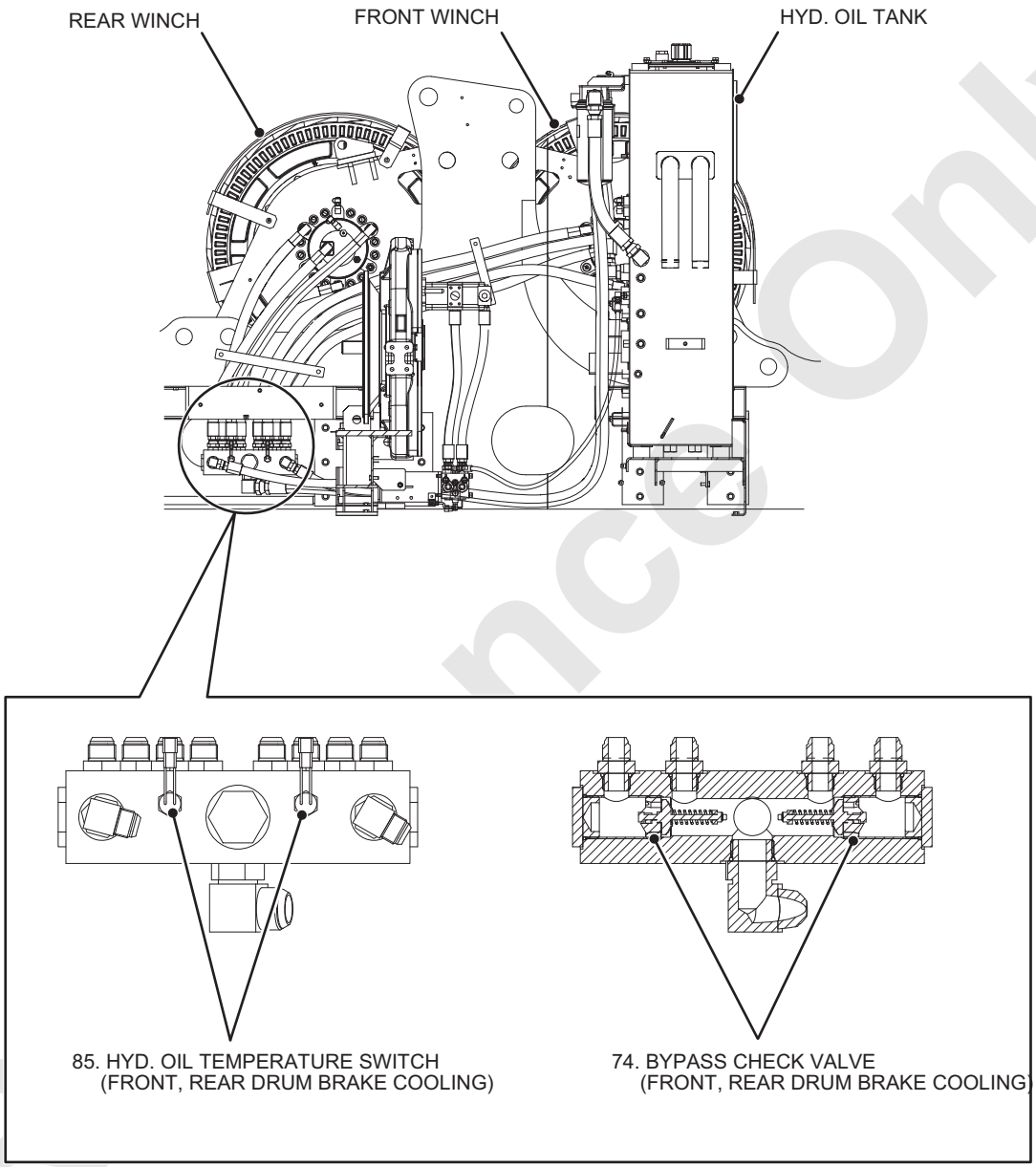


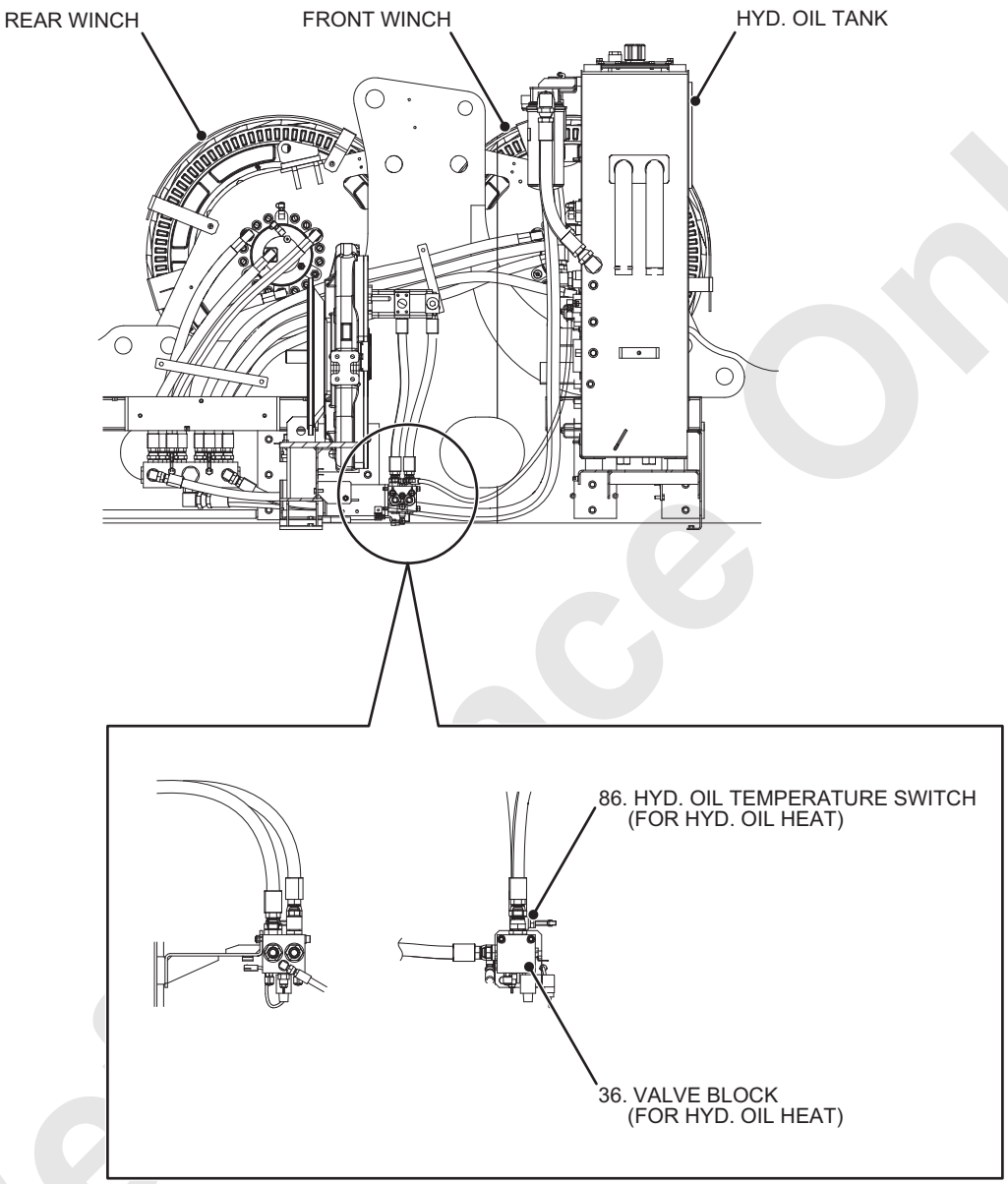




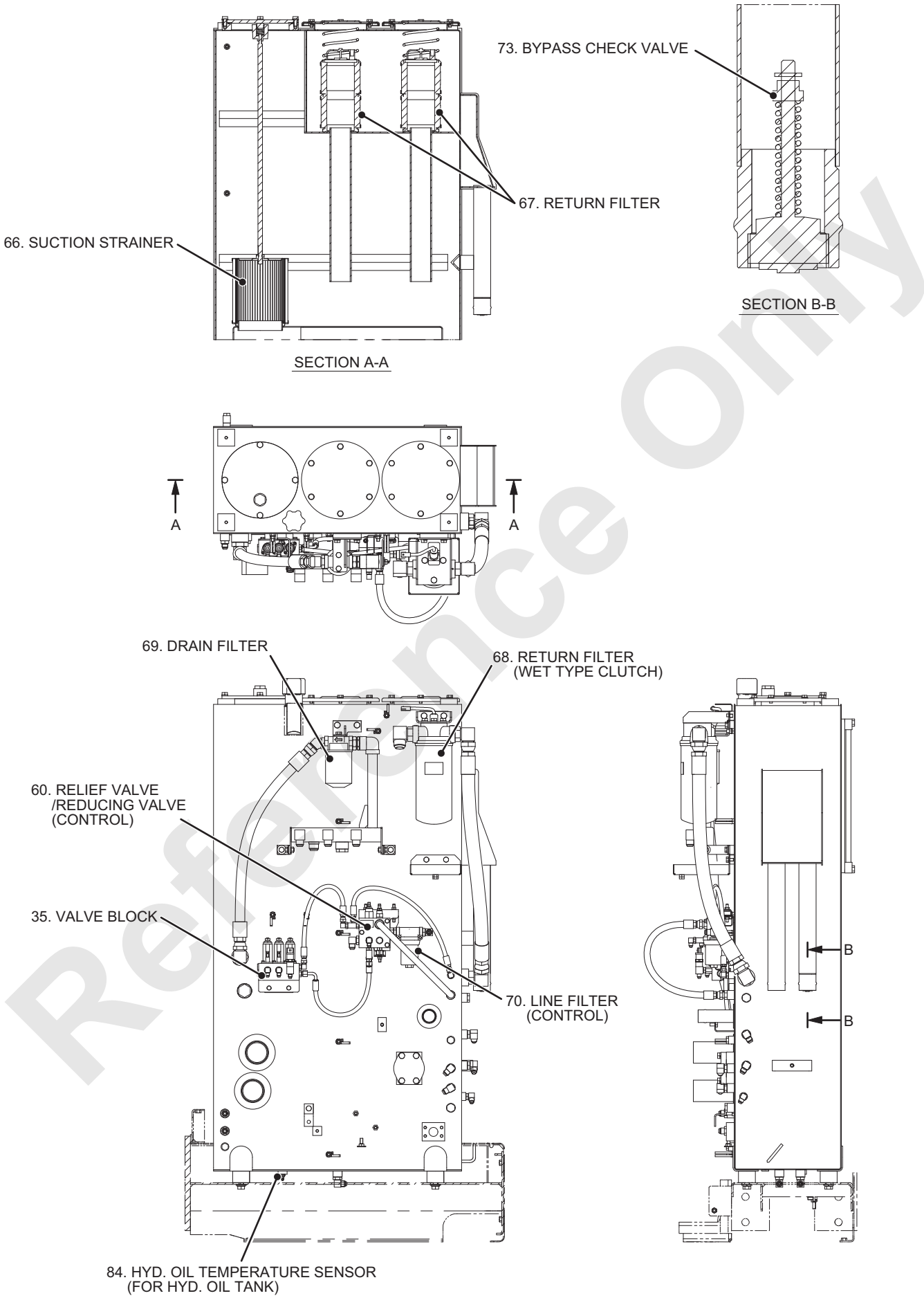


2. DRUM COOLING LINE

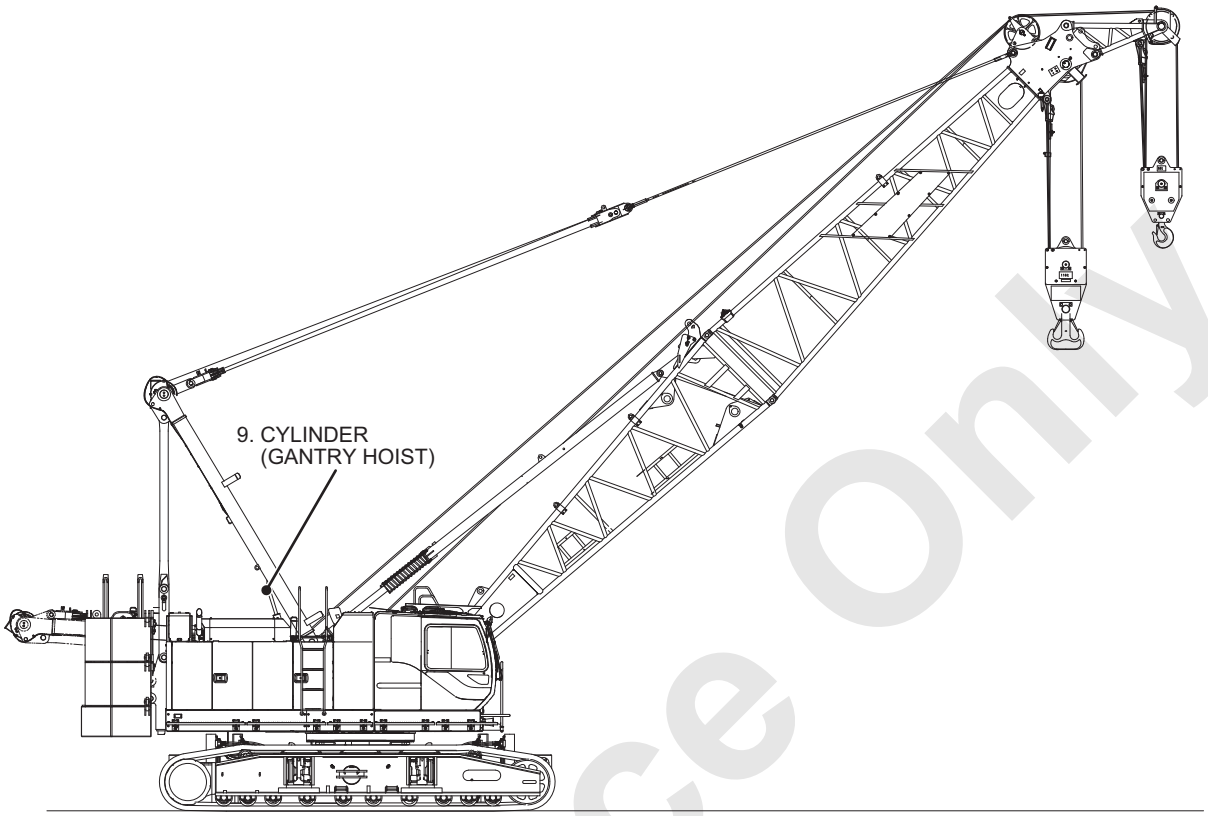


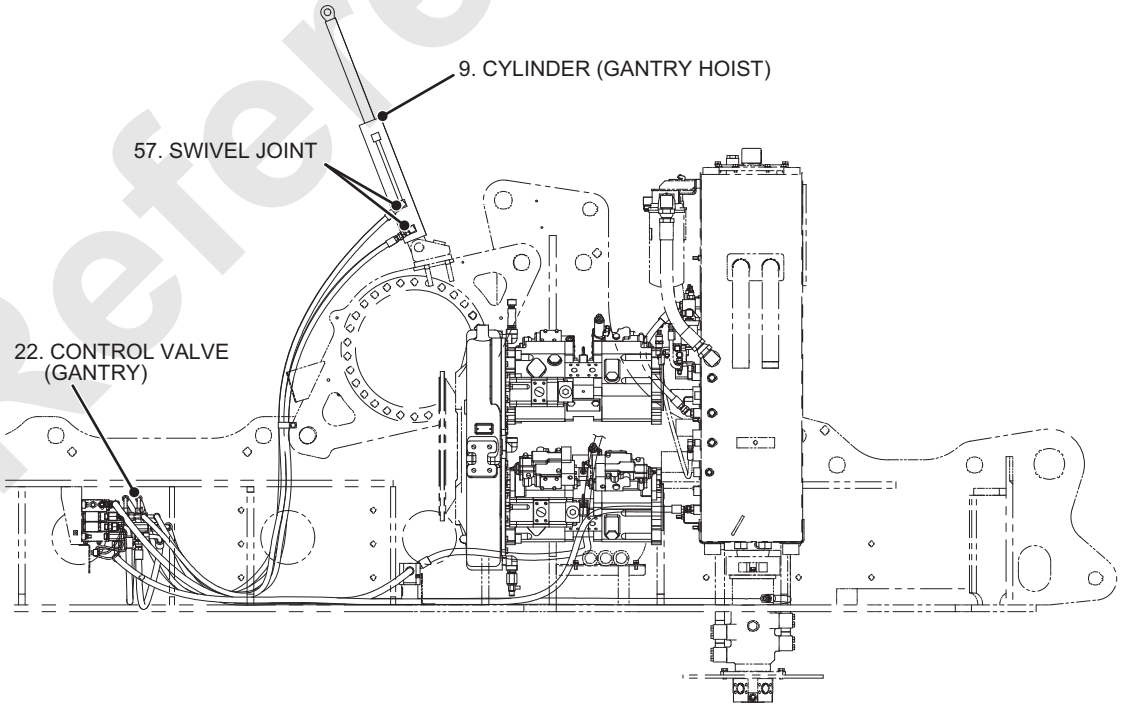


3. HYDRAULIC OIL TANK

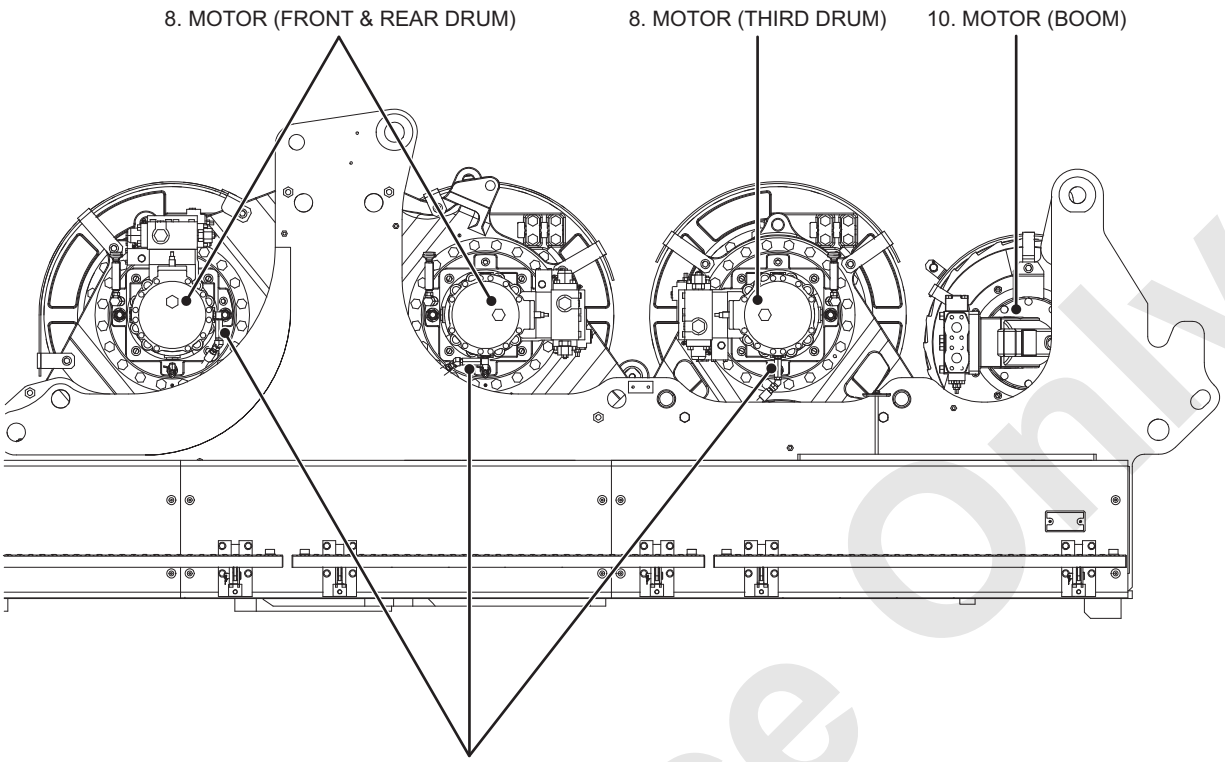


4. GANTRY

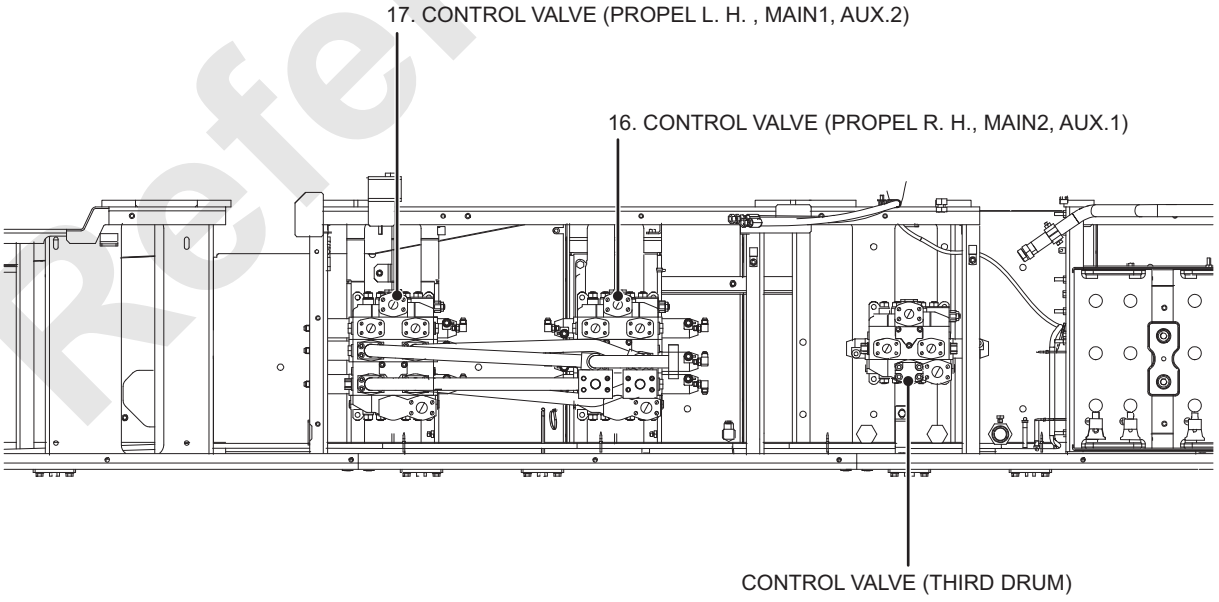




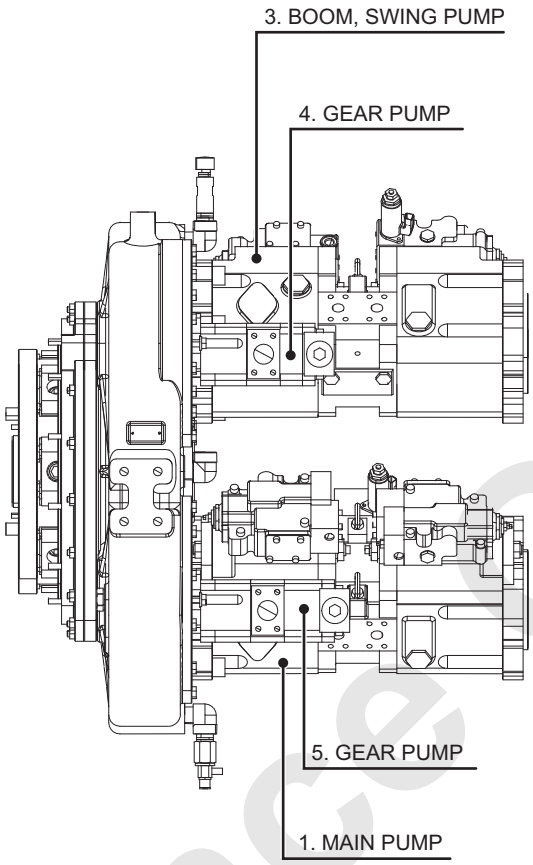
5. WINCH MOTOR



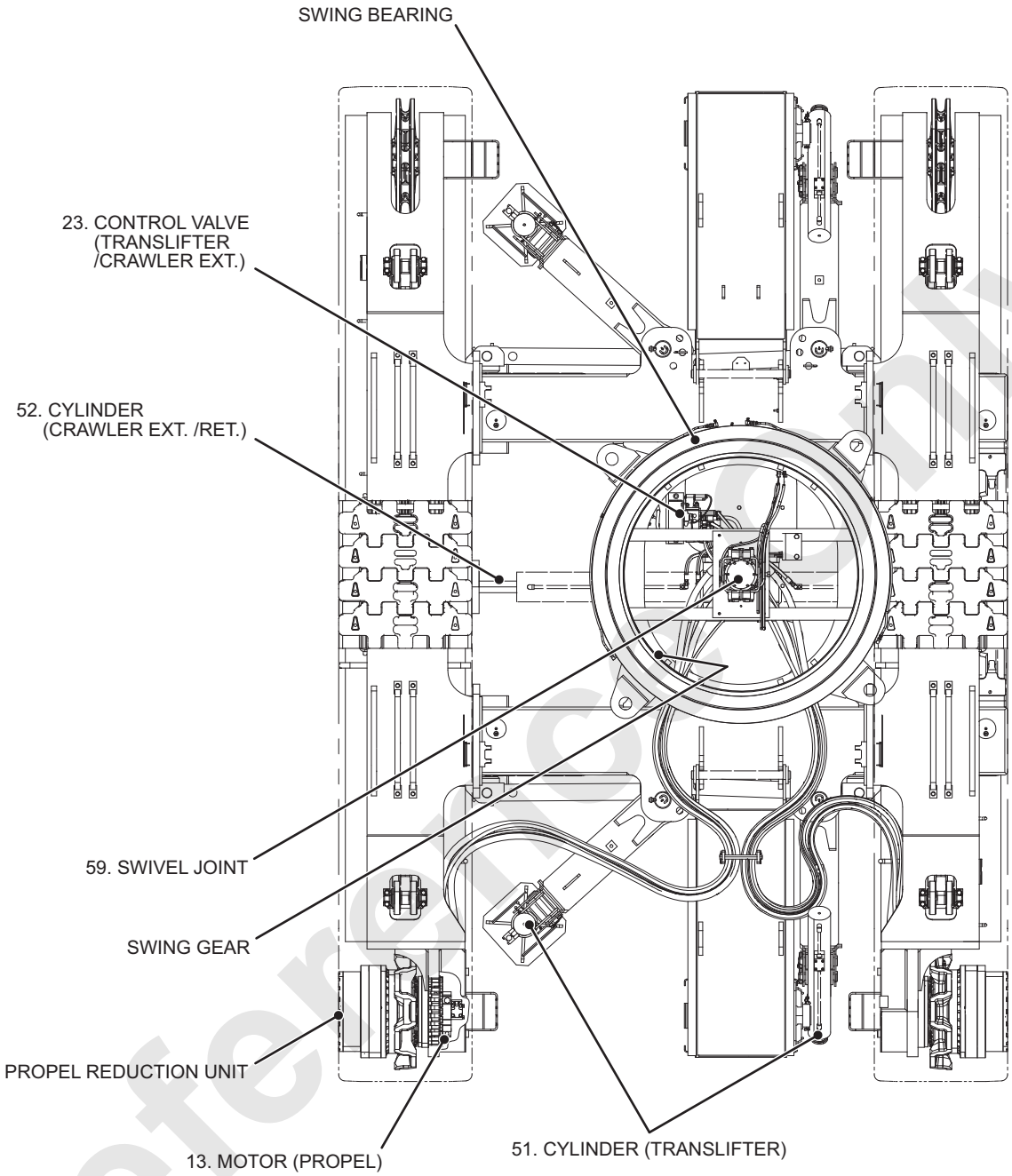
6. LEFT DECK



7. HYDRAULIC OIL PUMP



8. LOWER MACHINERY



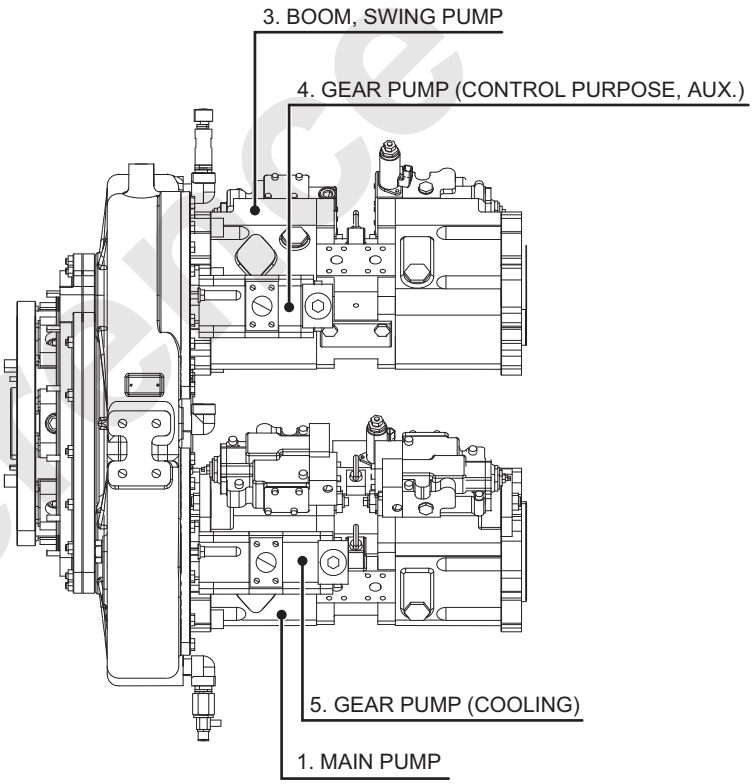
5.3 HYDRAULIC SYSTEM

5.3.1 PREFACE

This chapter provides a general outline of the overall hydraulic system.

5.3.2 OUTLINE

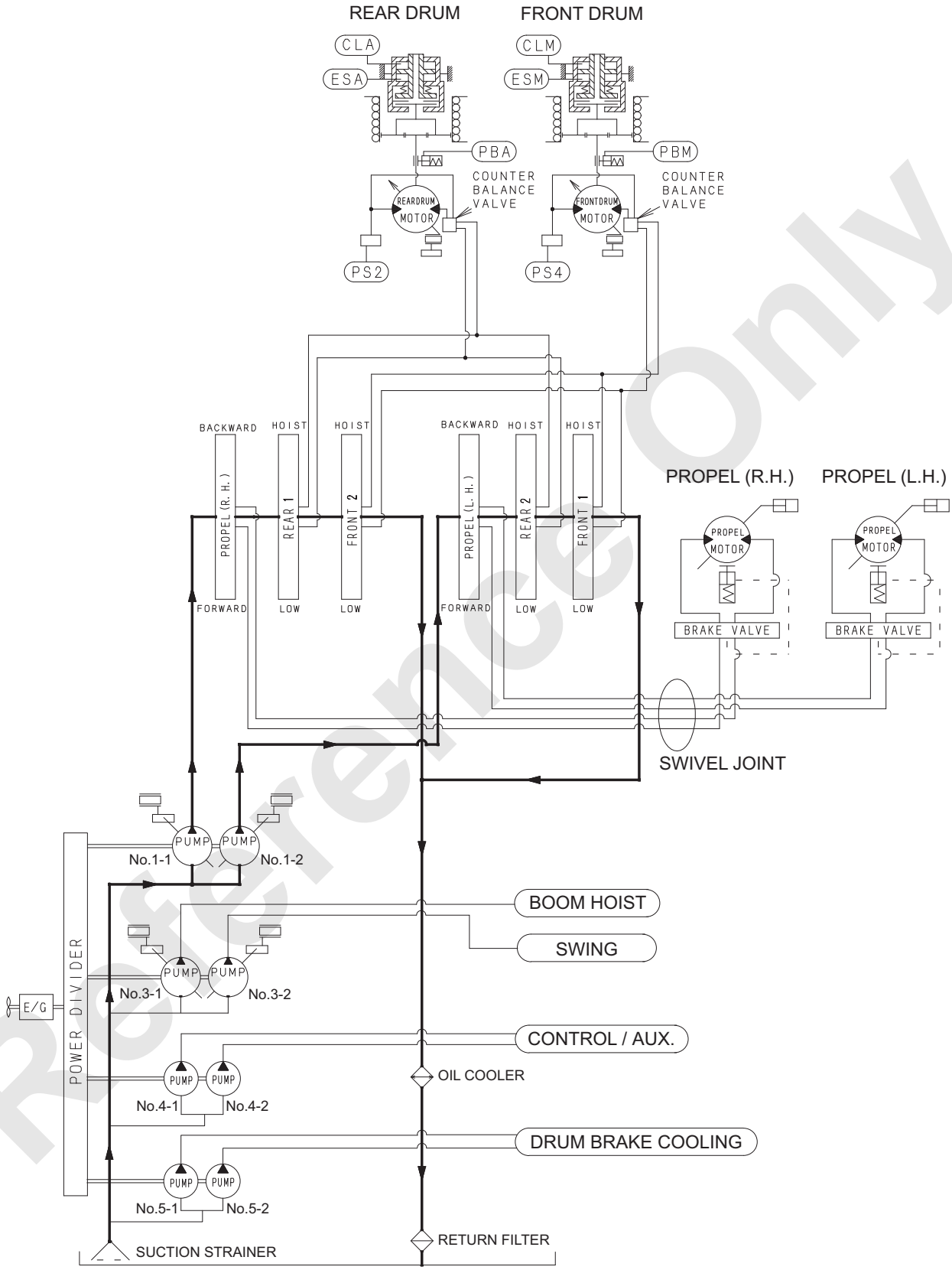
The pressurized oil in this circuit is supplied by the 4 variable displacement pumps driven with the power divider directly connected to the engine and 2 section gear pumps connected to power divider.
2 pumps (2 section) out of these 4 variable displacement pumps are for front drum, rear drum, boom drum and propel and swing.
Inner side pump out of 2 section gear pumps directly connected to the power divider is for control purpose and outer side one is for auxiliary units.
2 gear pumps directly connected with power divider are for front and rear drum brake cooling.



5.3.3 OIL FLOW FROM No.1-1, No.1-2

No.1-1 and No.1-2 pumps are main pumps and are tandem connected variable displacement double pumps.
At neutral, pressurized oil from No.1-1 pump flows into 3 section side control valve circuit (front / rear drum / right propel) At the same time, pressurized oil from No.1-2 pump flows into 3 section side control valve circuit (front / rear drum / left propel) and passes through each control valve and return to the oil tank without load.
When any of control valve spools is moved by pressurized control oil from the remote control vale, pressurized main pump oil is led to each actuator.
When the inching speed switch is handled, inching speed solenoid becomes energized to actuate the pump regulator and minimize oil delivery from the main pump.

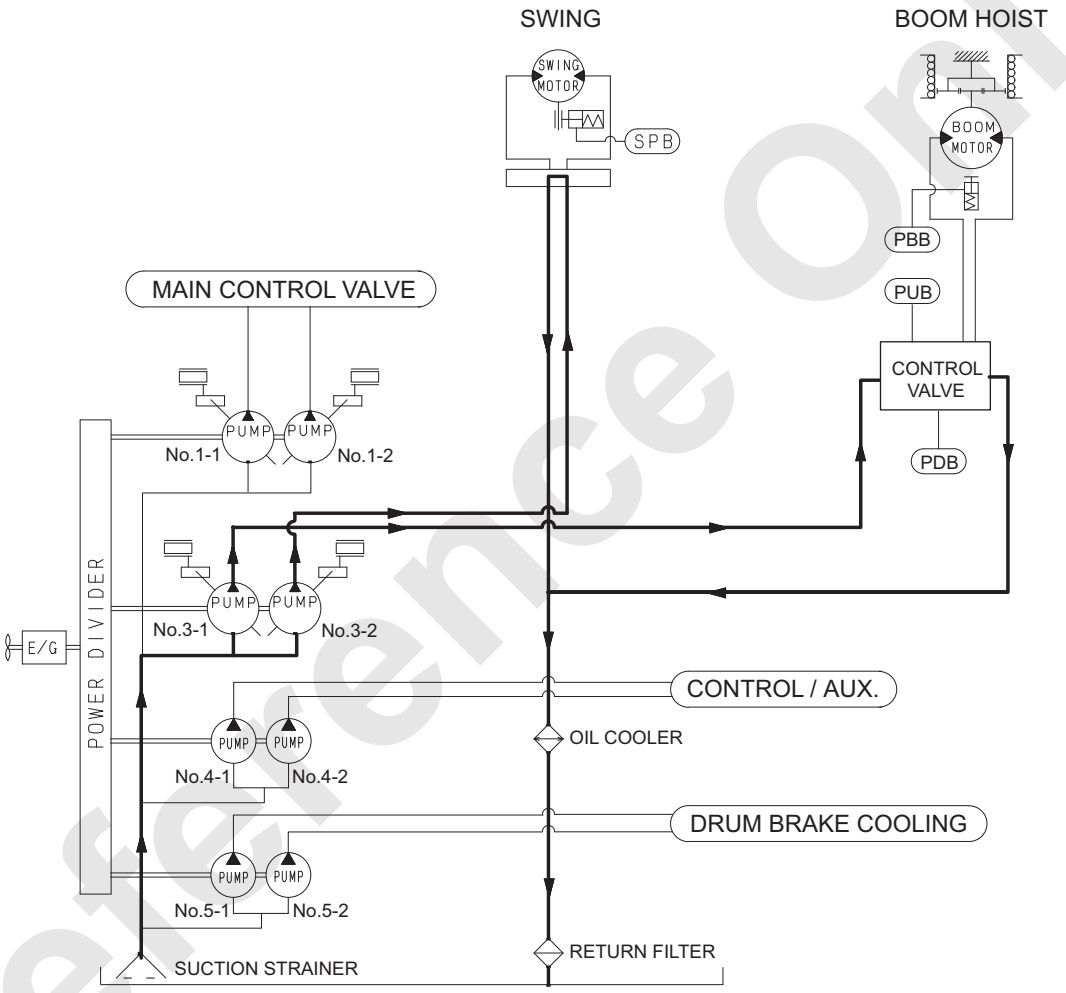
OIL FLOW FROM No.1-1, No.1-2



5.3.4 OIL FLOW FROM No.3-1, 3-2 PUMP

No.3-1 pump are main pumps and are tandem connected variable displacement double pumps.
At neutral, pressurized oil from No.3-1 pump flows into boom control valve and passes through control valve and return to the oil tank without load.
When any of control valve spools is moved by pressurized control oil from the remote control vale, pressurized No.3-1 pump oil is led to actuator.
When the inching speed switch is handled, inching speed solenoid becomes energized to actuate the pump regulator and minimize oil delivery from the main pump.
No.3-2 pump is swing pump and is variable displacement pump.
When the swing remote control valve is in neutral, pressurized oil from No.3-2 pump flows into the swing control valve and returns to oil tank without load.
When the swing control valve is actuated with the pressurized oil from the remote control valve, pressurized oil from the swing pump flows into the swing motor to swing the upper machinery.

OIL FLOW FROM No.3-1, 3-2 PUMP



5.3.5 OIL FLOW FROM No.4-1 PUMP

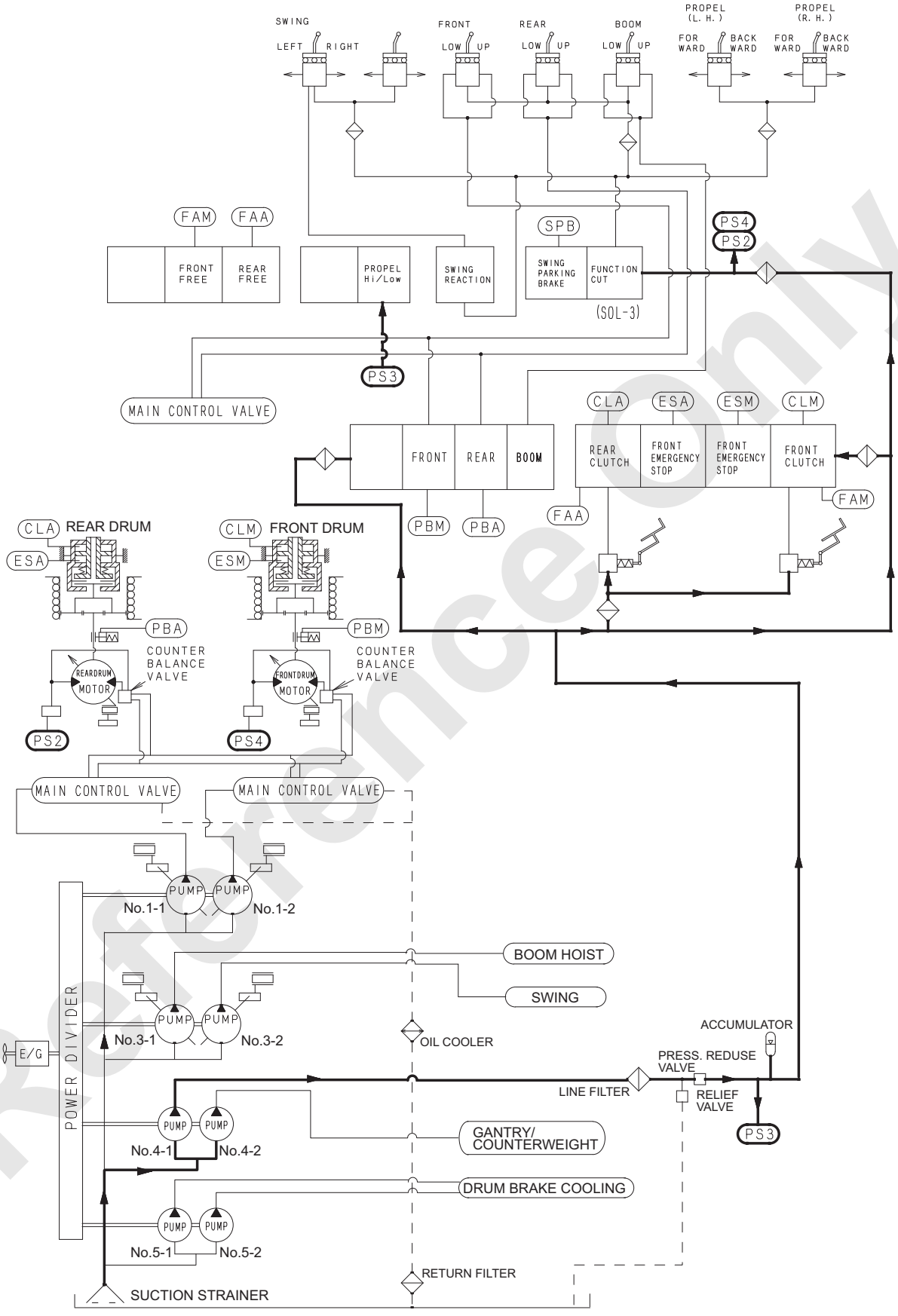
No.4-1 pump is gear pump and is used for control. Pressurized oil from the pump passes through the line filter and is pressure-reduced to 5.4 MPa and flows into the accumulator and then flows into 2 4-section valve and 2 2-section valve and the foot brake valve.

1. WHEN FUNCTION LOCK LEVER IS IN "LOCK" POSITION

When the function lock lever is in "LOCK" position, pressurized oil sent to 2-section valve is shut off with the function lock (Remo-con cut) solenoid valve (SOL-3) and is not sent to the remote control valve.

Therefore under this condition, even when the control valve is operated, control pressure would not be generated and the machine would not move.

OIL FLOW FROM No.4-1 PUMP (WHEN FUNCTION LOCK LEVER IS IN "LOCK" POSITION)

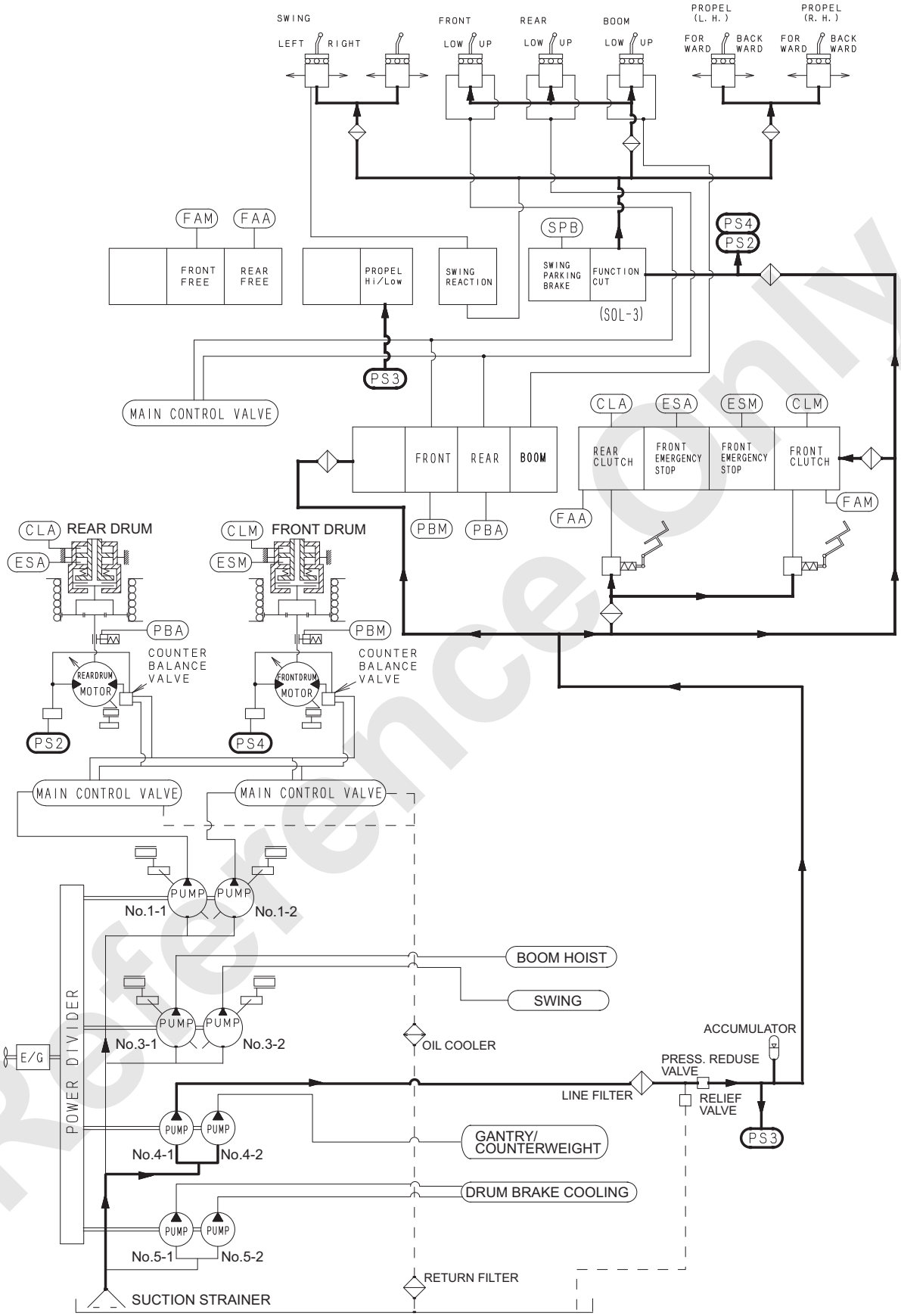


2. WHEN FUNCTION LOCK LEVER IS IN "WORK" POSITION

When the function lock lever is in "WORK" position, pressurized oil sent to 2-section valve passes through the function lock (Remo-con cut) solenoid valve (SOL-3) and flows into the remote control valve.

Under this condition, when the control valve is operated, remote control pressure is sent to the main control valve and make each actuator functioned.

OIL FLOW FROM No.4-1 PUMP (WHEN FUNCTION LOCK LEVER IS IN "WORK" POSITION

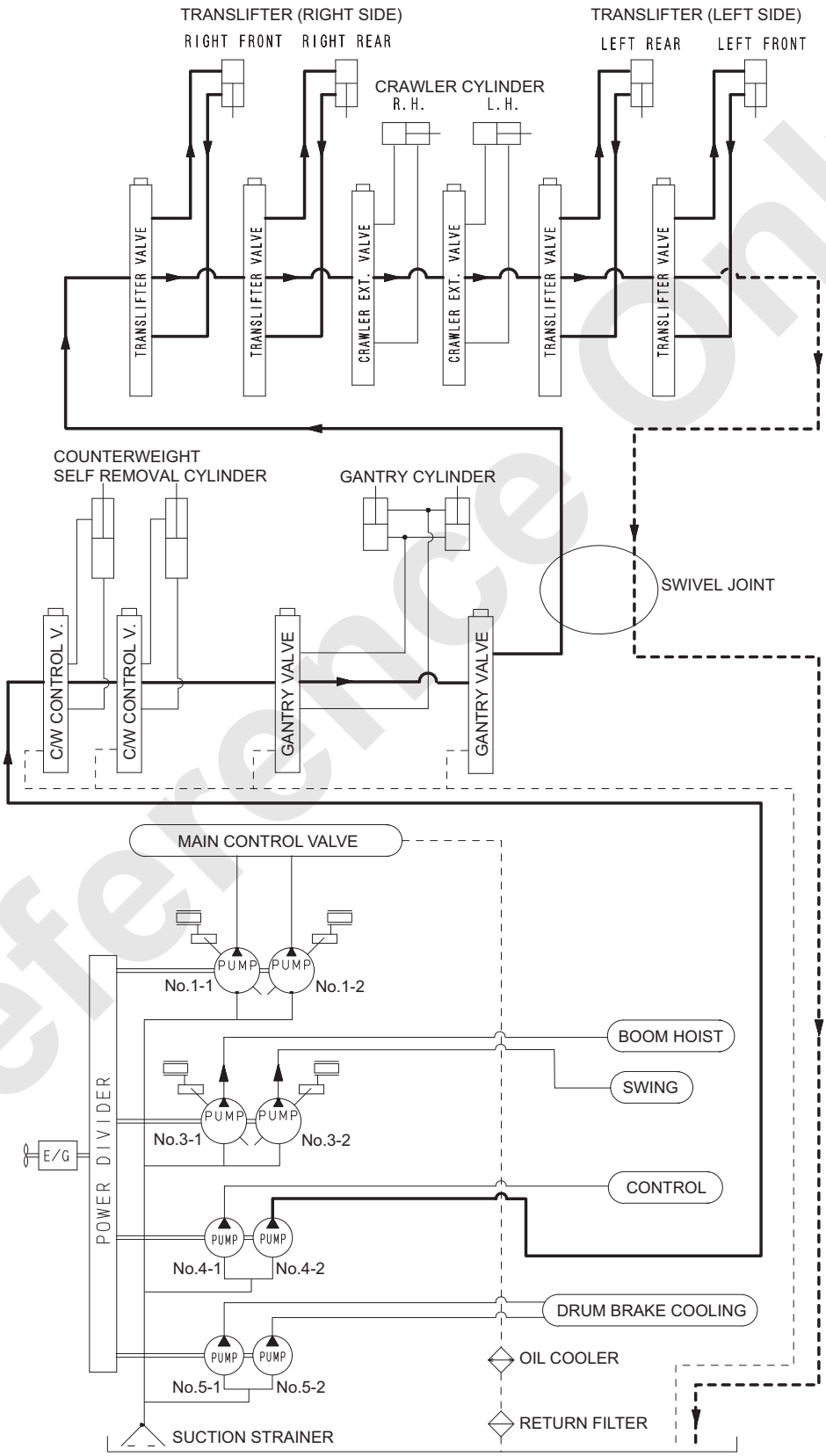


5.3.6 OIL FLOW FROM No.4-2 PUMP

1. CRAWLER EXTENDING CYLINDER
   No.4-2 pump (Aux. device pump) is fixed displacement gear pump and is used for crawler extending cylinder.
   When the lower pressure source valve located in the downstream side of the gantry hoist control valve is operated, the pressurized oil from the pump passes through the swivel joint and flows into the crawler extending valve.
   When the crawler extending cylinder is being operated, return oil from the cylinder passes through the swivel joint and returns to the tank.
2. TRANSLIFTER
   No.4-2 pump (Aux. device pump) is fixed displacement gear pump and is used for the translifter cylinder.
   When the lower pressure source valve located in the downstream side of the gantry hoist control valve is operated, the pressurized oil from the pump passes through the swivel joint and flows into the translifter valve.
   When the translifter cylinder is being operated, return oil from the cylinder passes through the swivel joint and returns to the tank.
3. GANTRY HOIST CYLINDER
   No.4-2 pump (Aux. device pump) is fixed displacement gear pump and is used for gantry hoist. The pressurized oil from the pump flows into the gantry hoist control valve. When the gantry hoist control valve is in neutral, the pressurized oil passes through the valve and returns to the tank without load.
4. COUNTERWEIGHT SELF REMOVAL CYLINDER
   No.4-2 pump (Aux. device pump) is fixed displacement gear pump and is used for counterweight self removal.
   The pressurized oil from the pump flows into the counterweight self removal control valve. When the counterweight self removal control valve is in neutral, the pressurized oil passes through the valve and returns to the tank without load.

OIL FLOW FROM No.4-2 PUMP

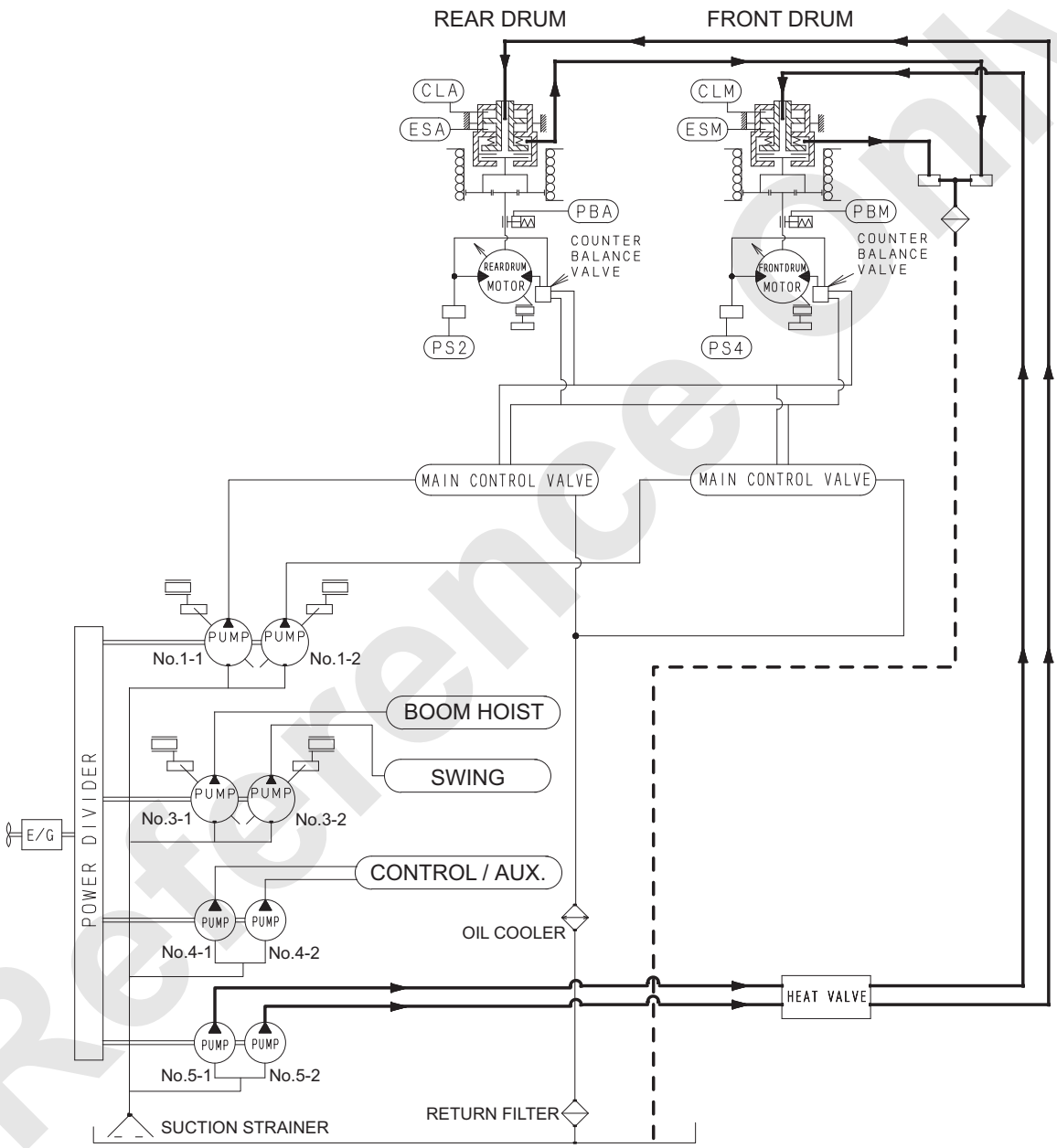
- **GANTRY HOIST CYLINDER**
- **TRANSLIFTER**
- **CRAWLER EXT./RET.**
- **COUNTERWEIGHT SELF REMOVAL CYLINDER**



5.3.7 OIL FLOW FROM No.5-1, 5-2 PUMP (CONTROL/AUX.ACTUATOR)

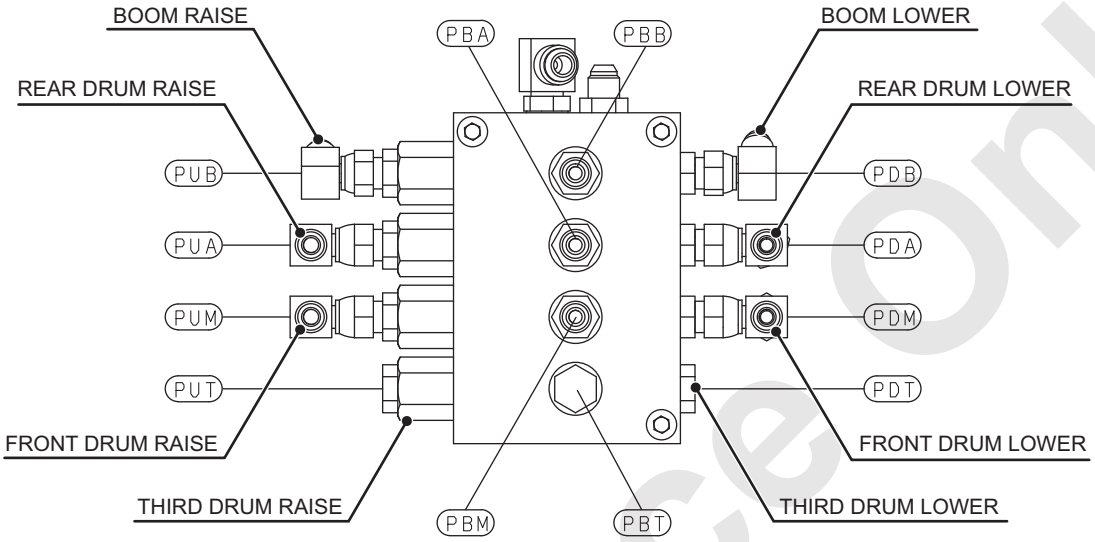
No.5-1 and No.5-2 pumps are gear pumps and are used for cooling of front and rear drum brake (clutch). The pressurized oil from both pumps passes through the front and rear drum brake (clutch) and returns to the tank through the filter.

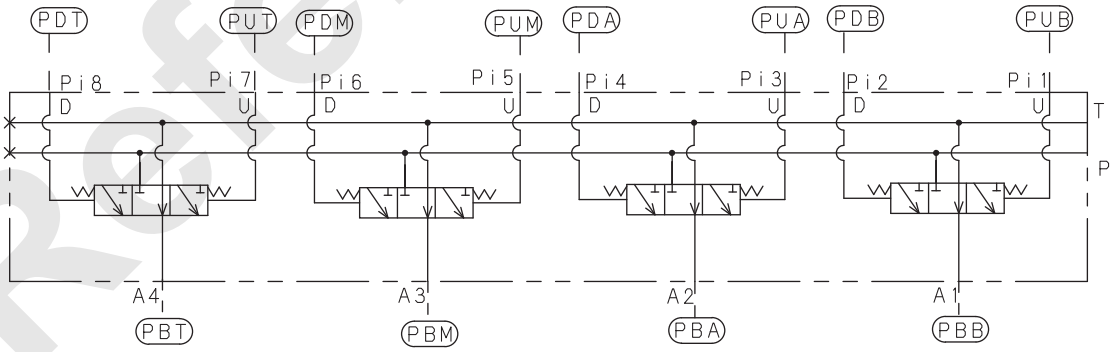
OIL FLOW FROM No.5-1, 5-2 PUMP (CONTROL/AUX.ACTUATOR)



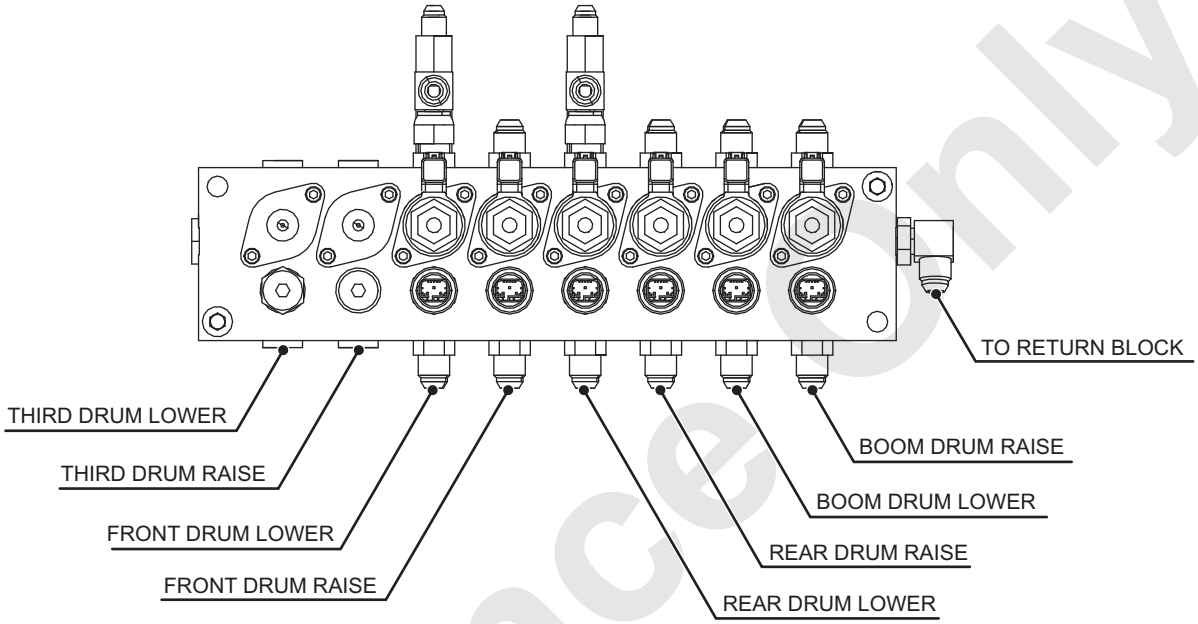
5.4 VALVE

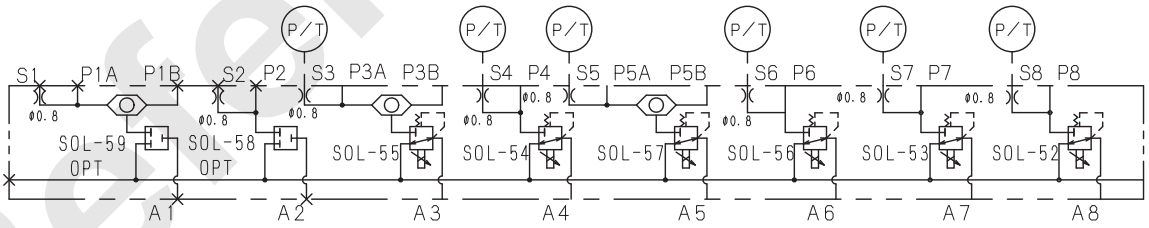
4-SECTION VALVE



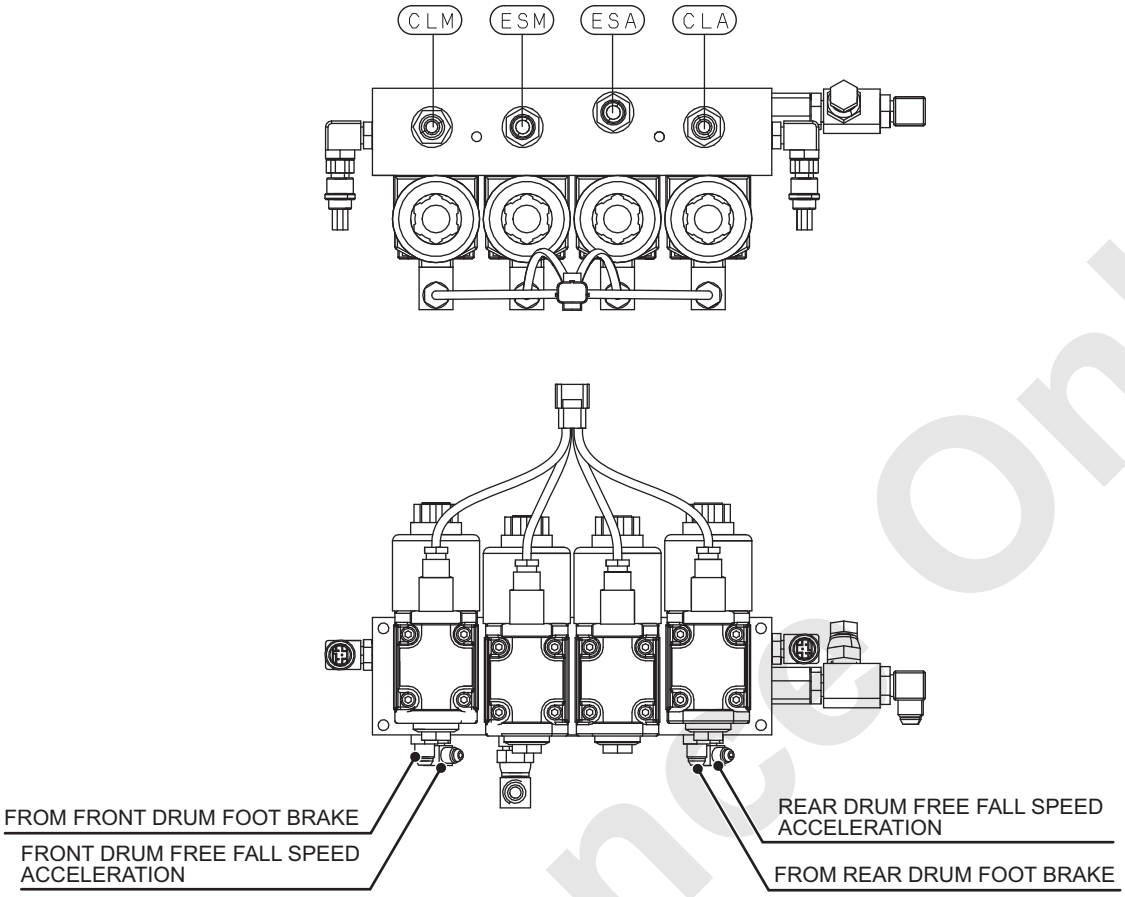


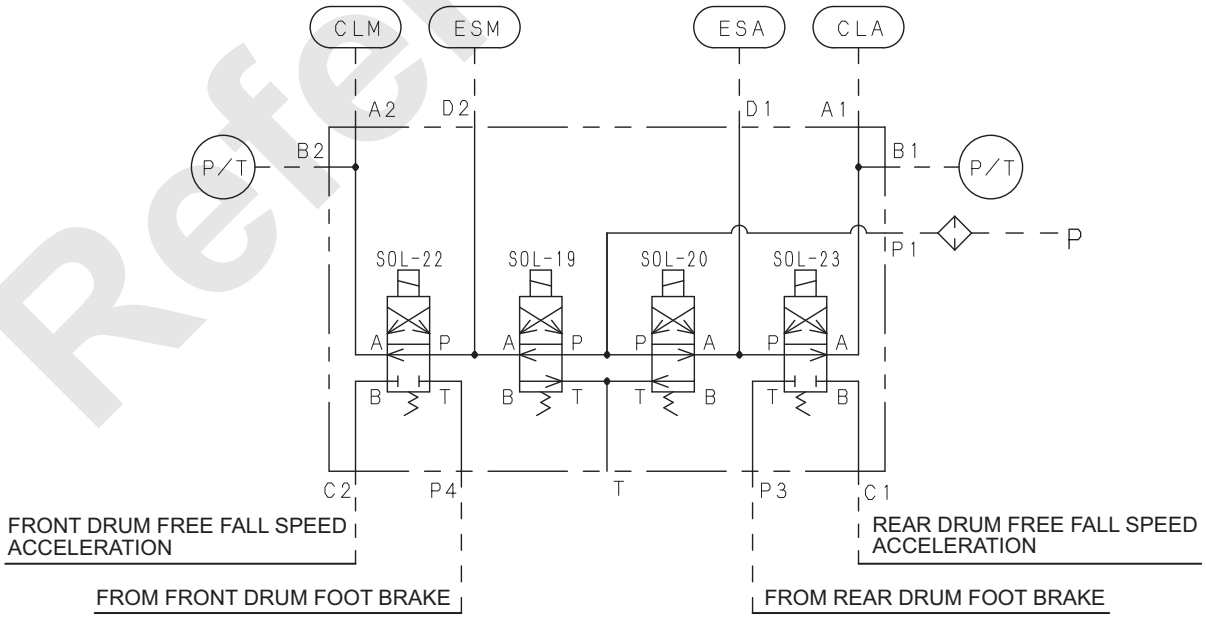
8-SECTION VALVE (WITH SHUTTLE VALVE)



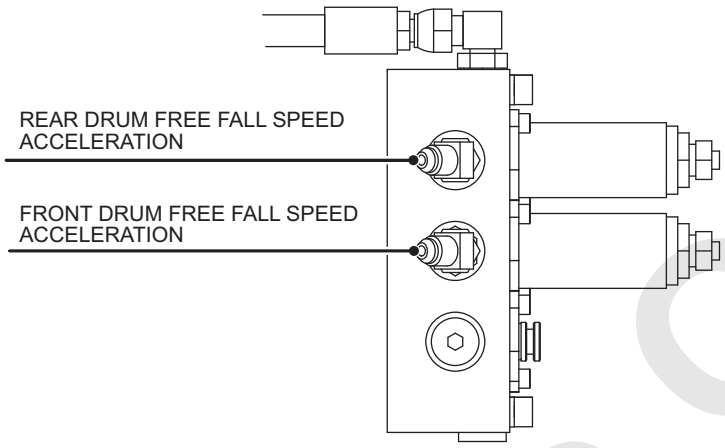


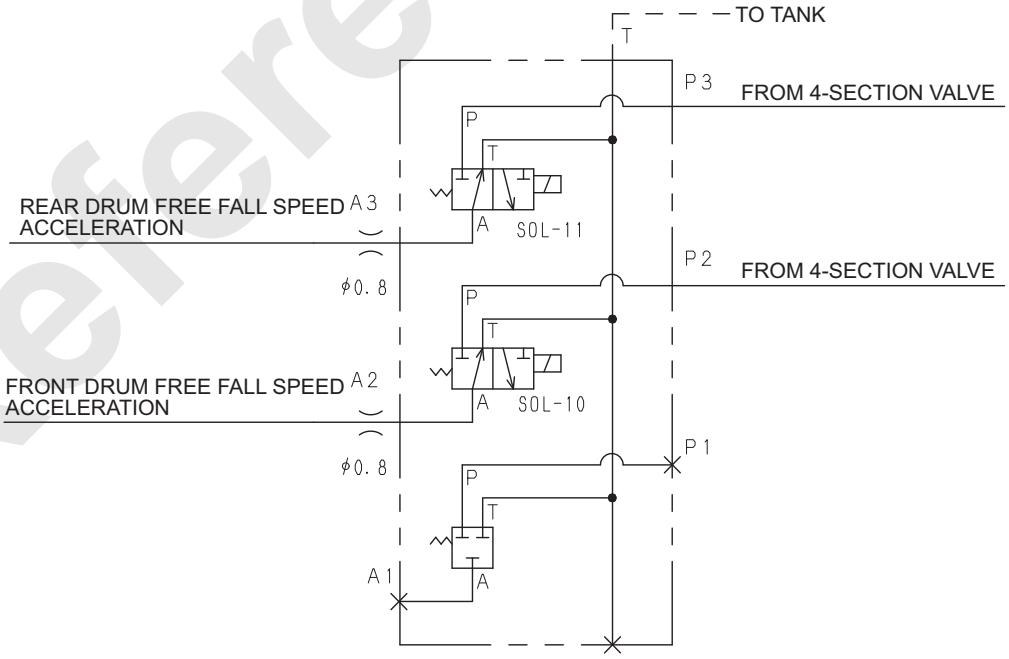
4-SECTION VALVE



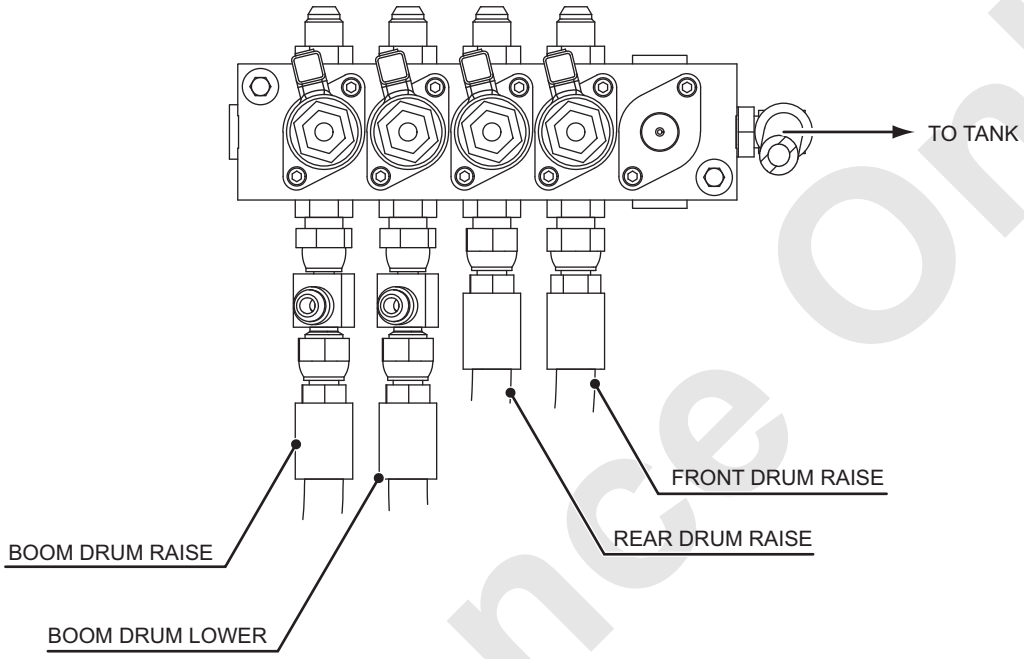


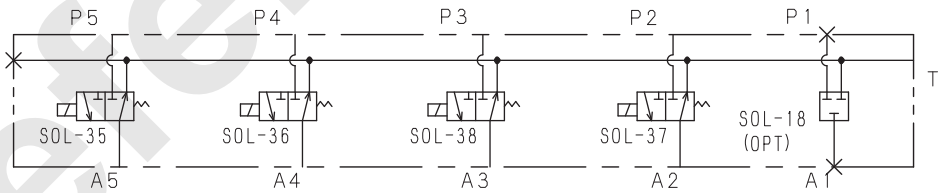
3-SECTION VALVE



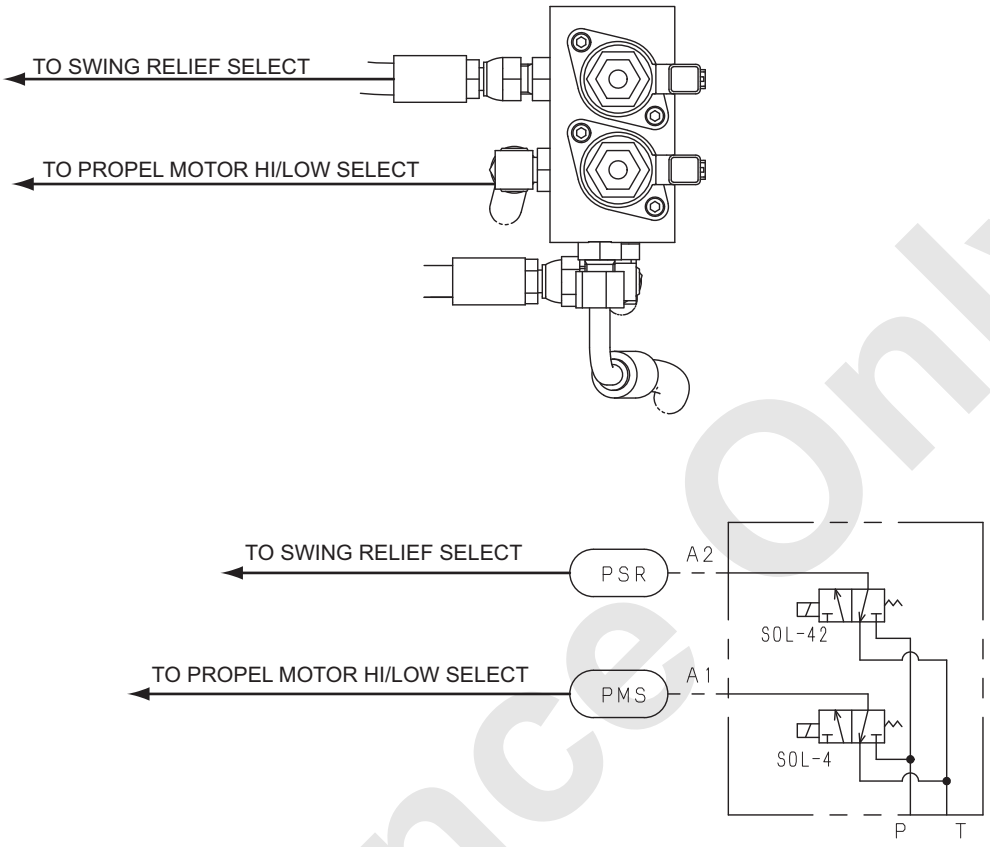


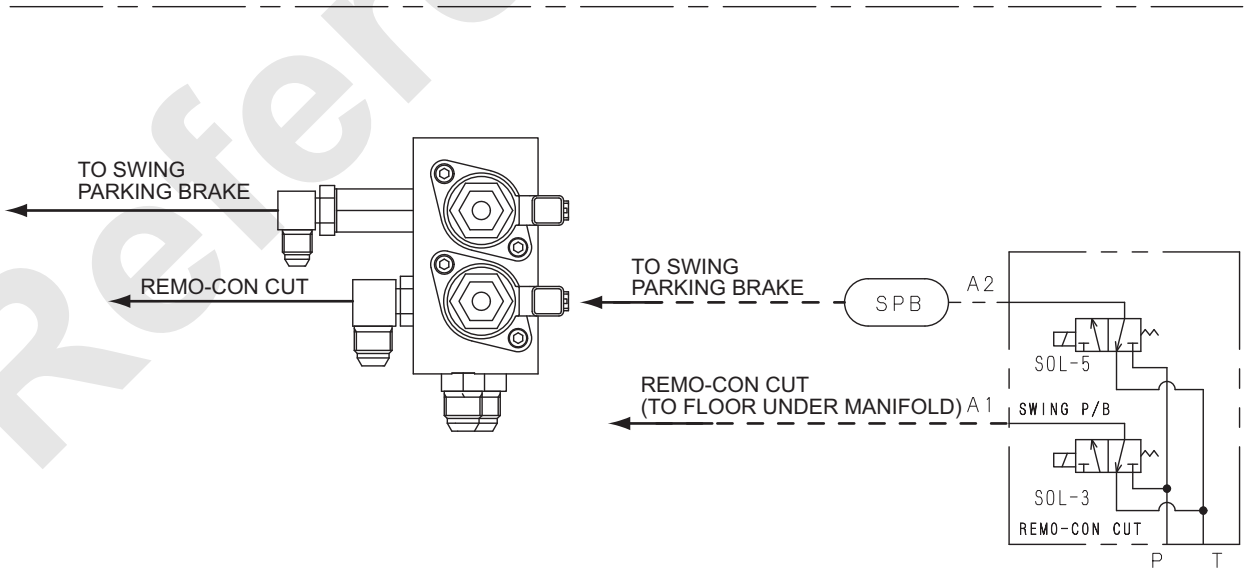
5-SECTION VALVE



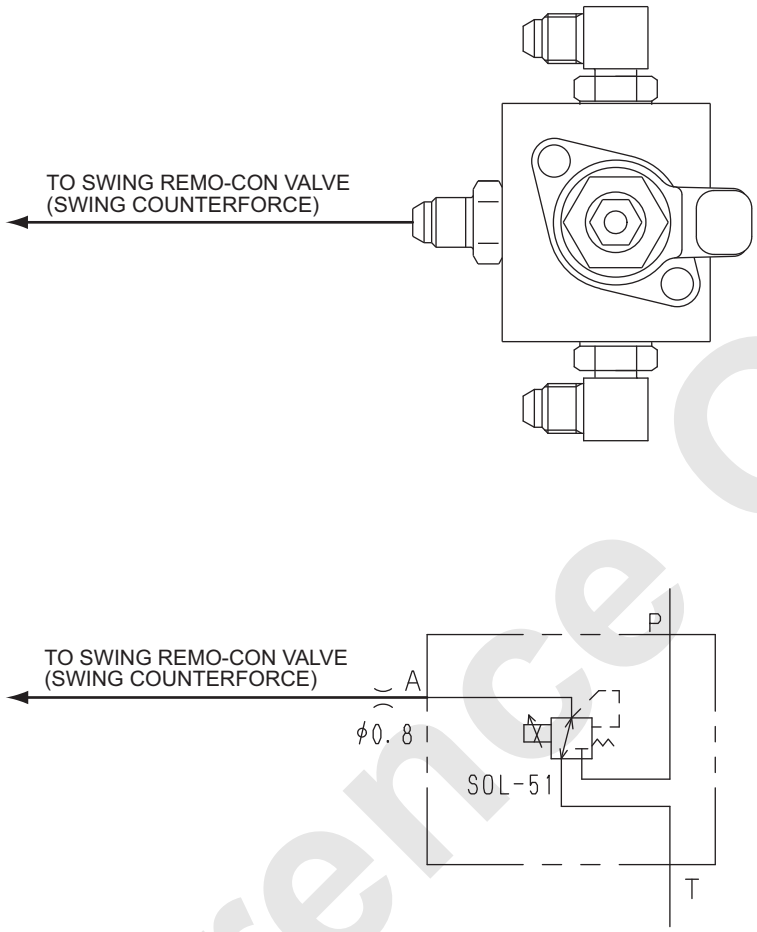


2-SECTION VALVE

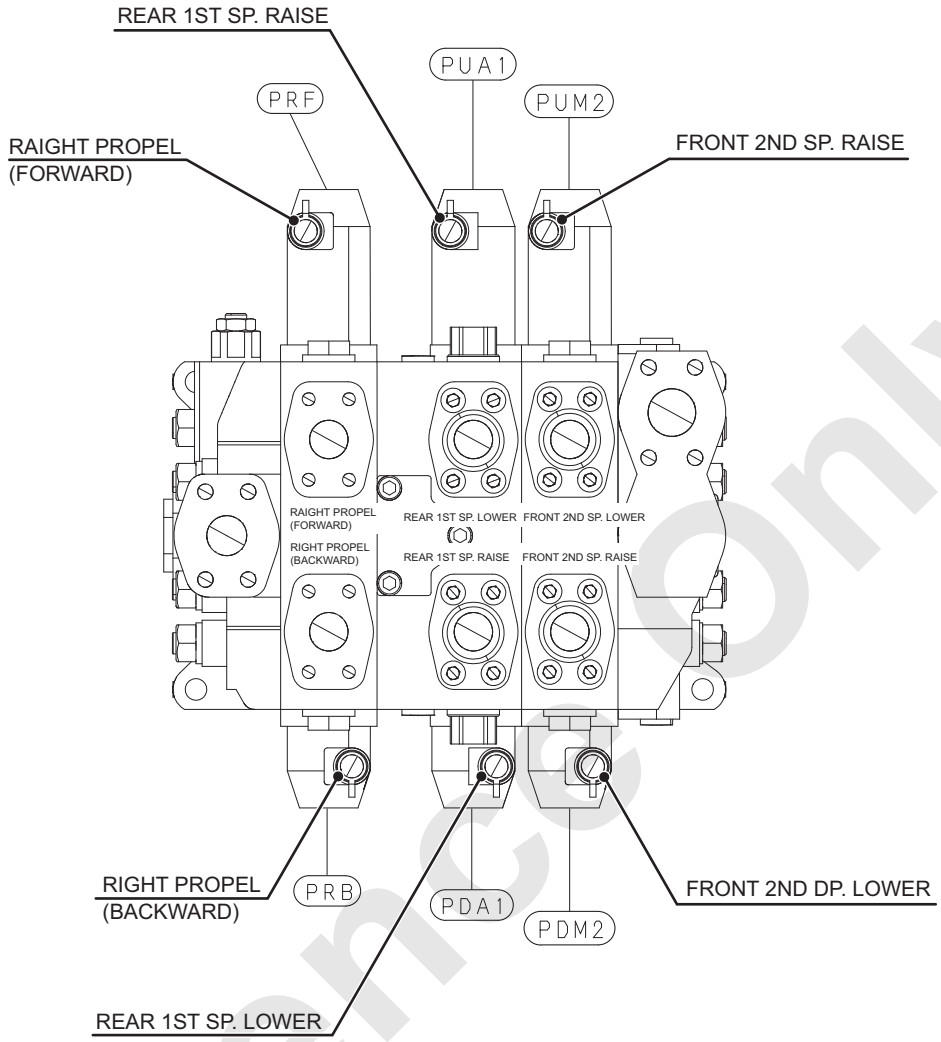


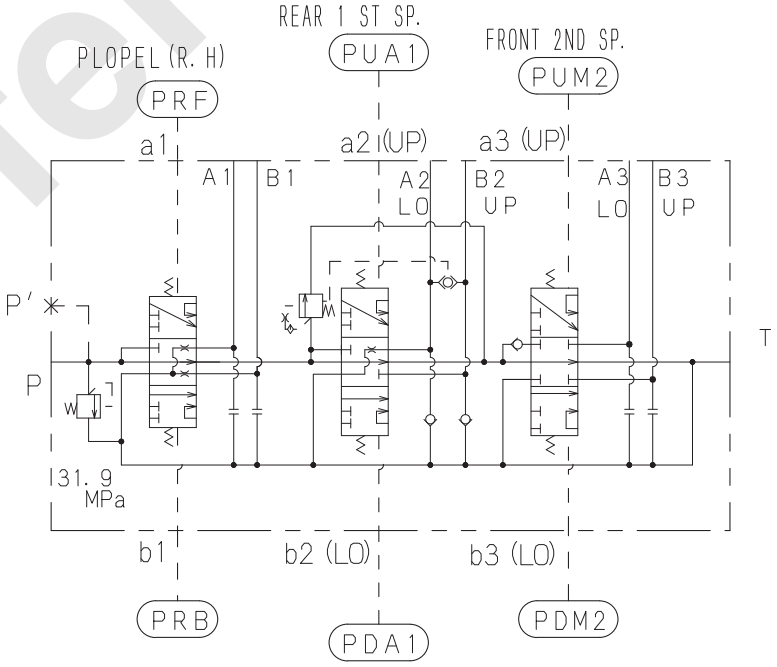


1-SECTION VALVE

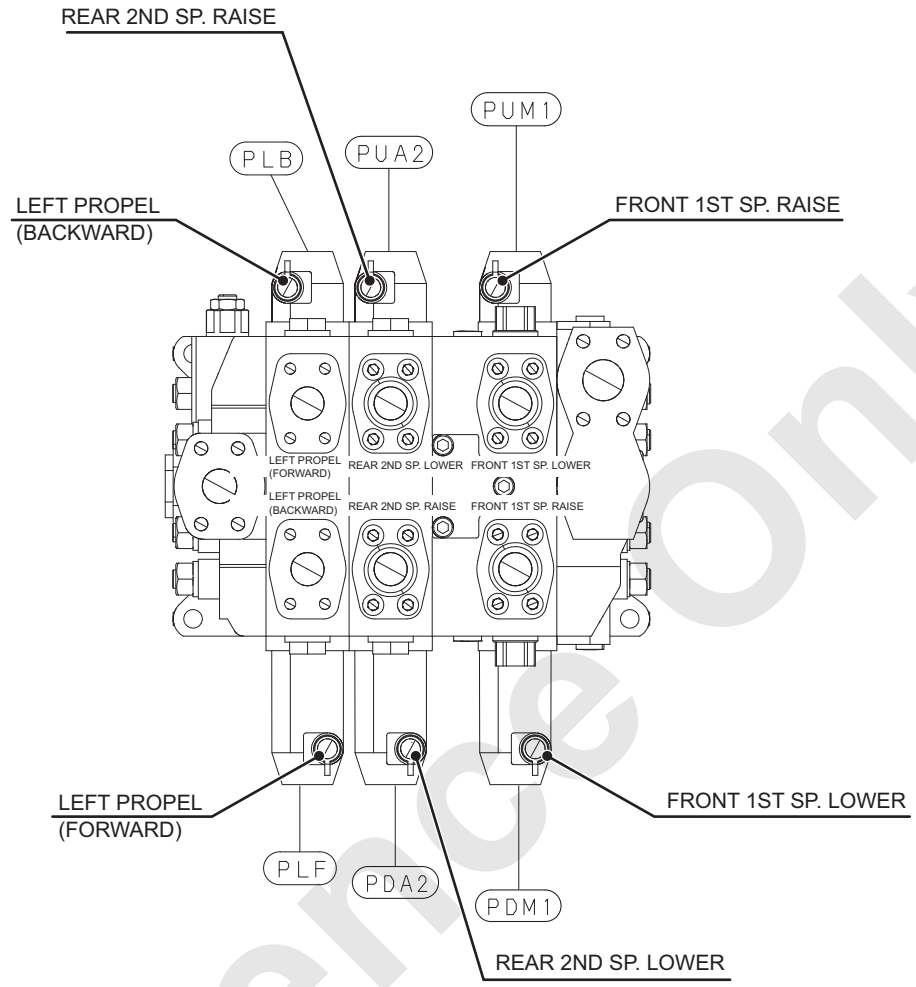


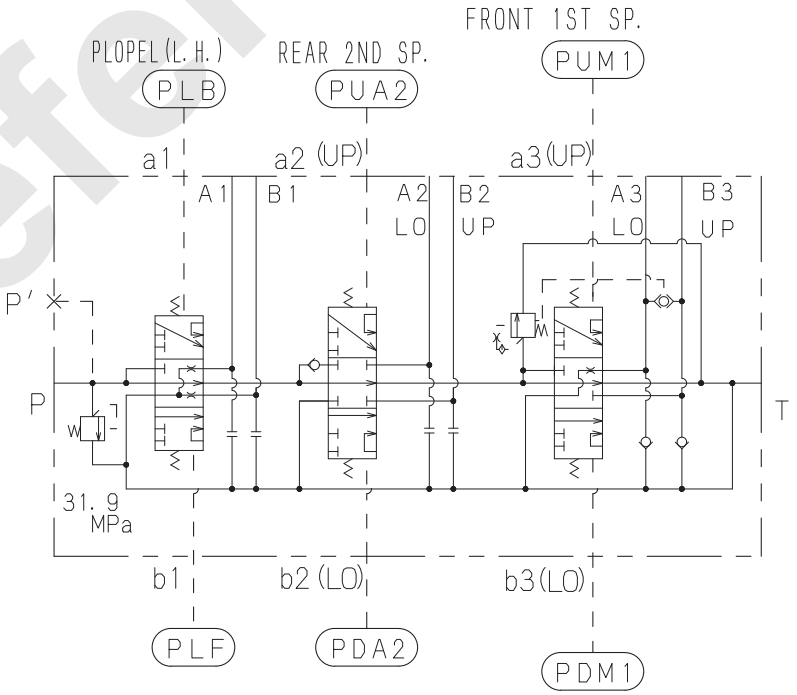
MAIN CONTROL VALVE (3-SECTION)



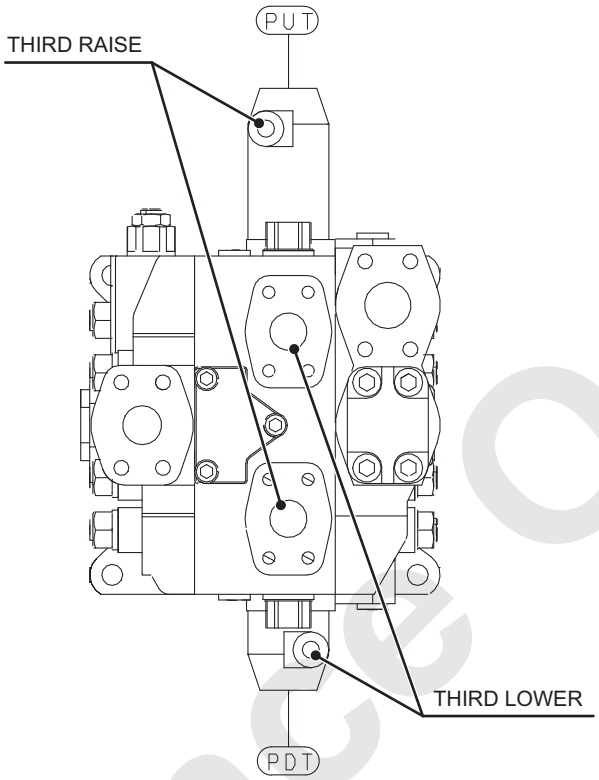


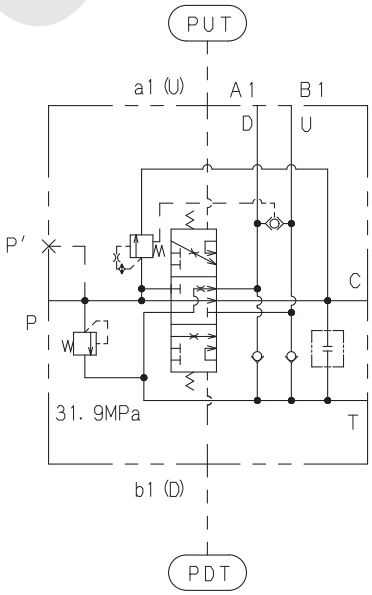
MAIN CONTROL VALVE (3-SECTION)



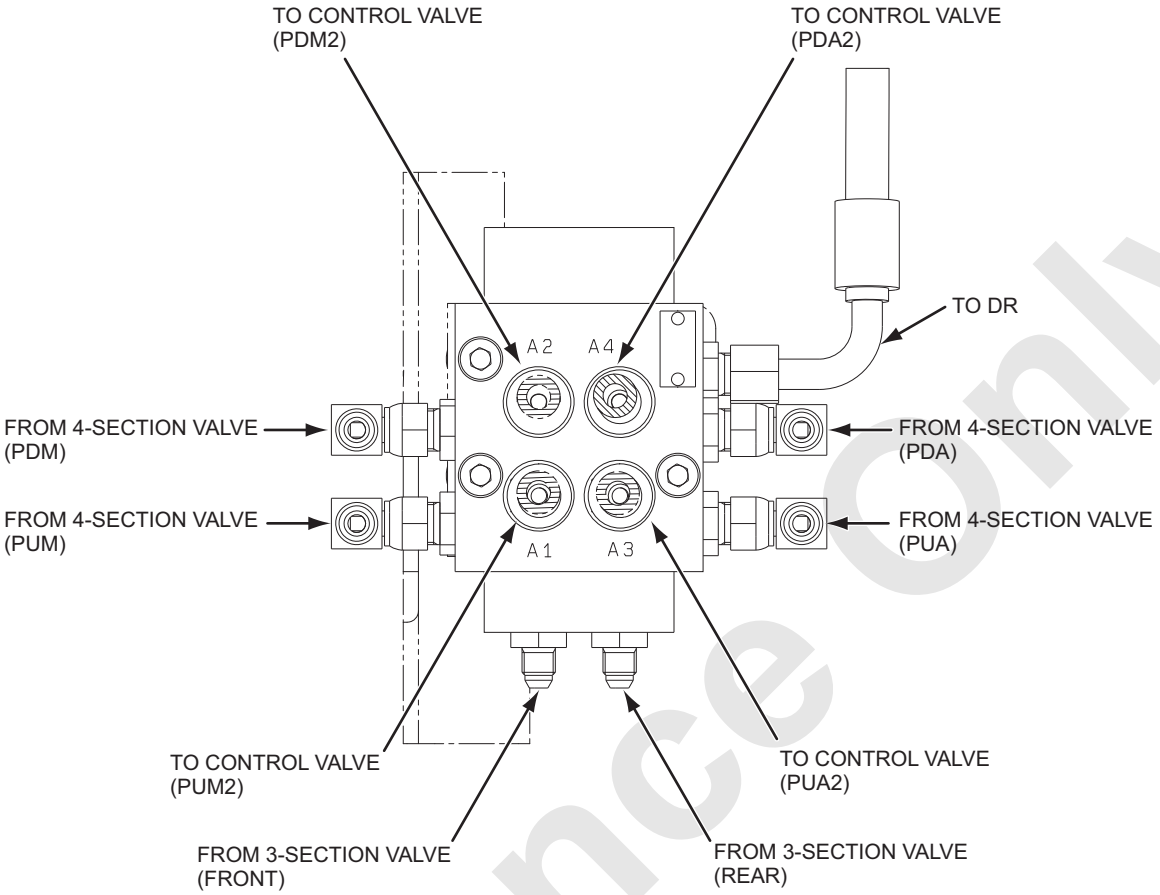


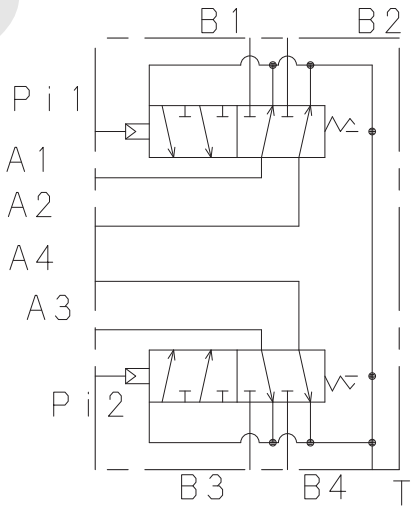
MAIN CONTROL VALVE (THIRD 1-SECTION)



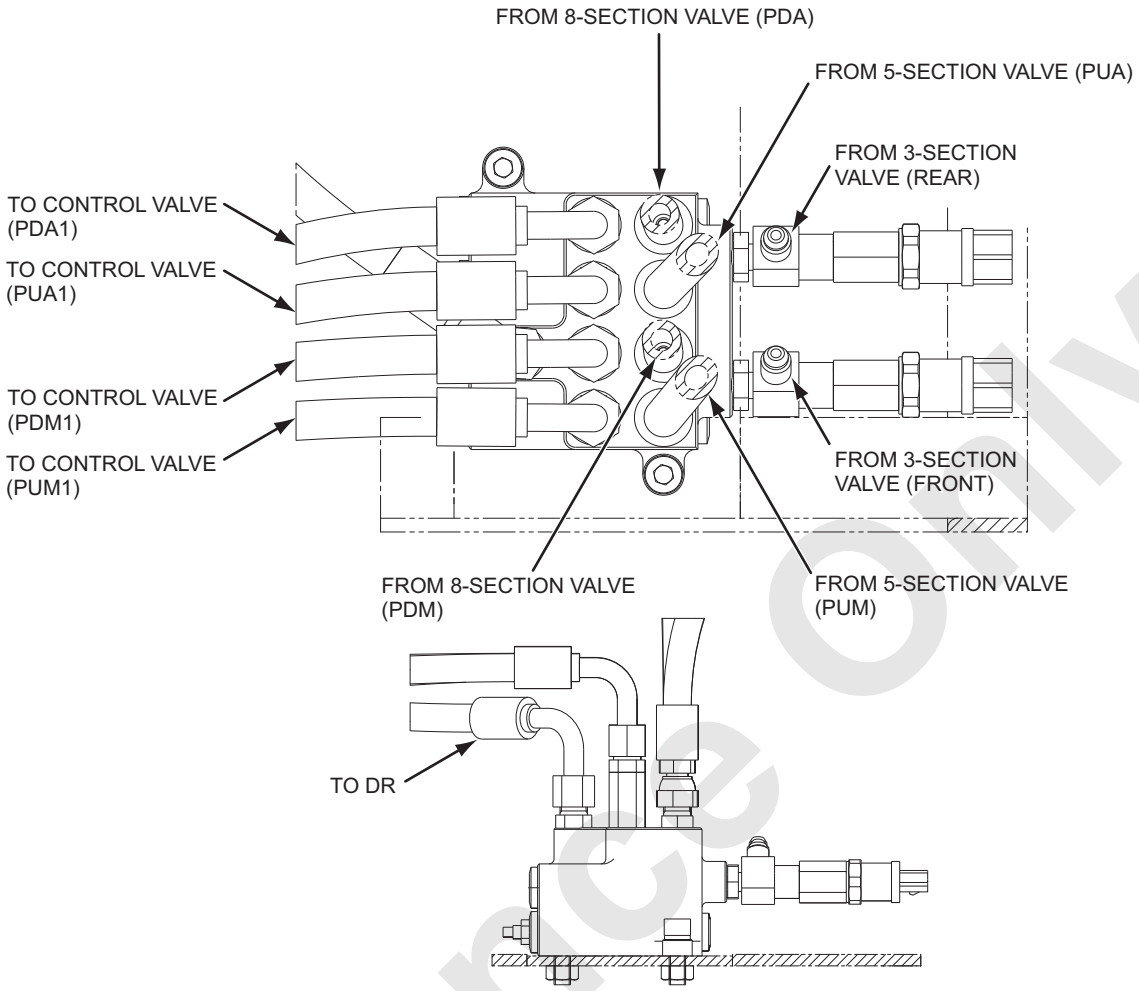


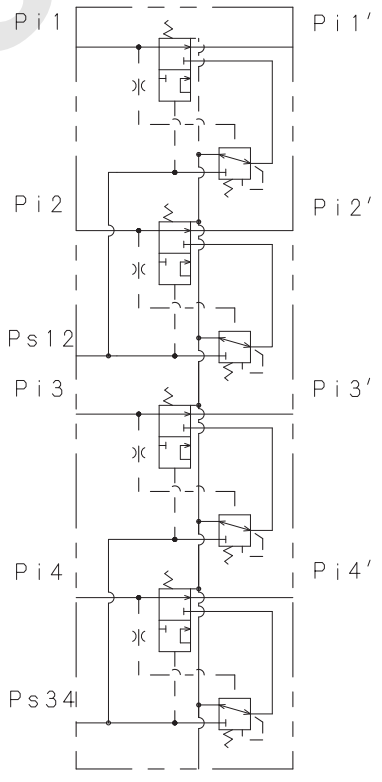
PILOT CHANGE-OVER VALVE



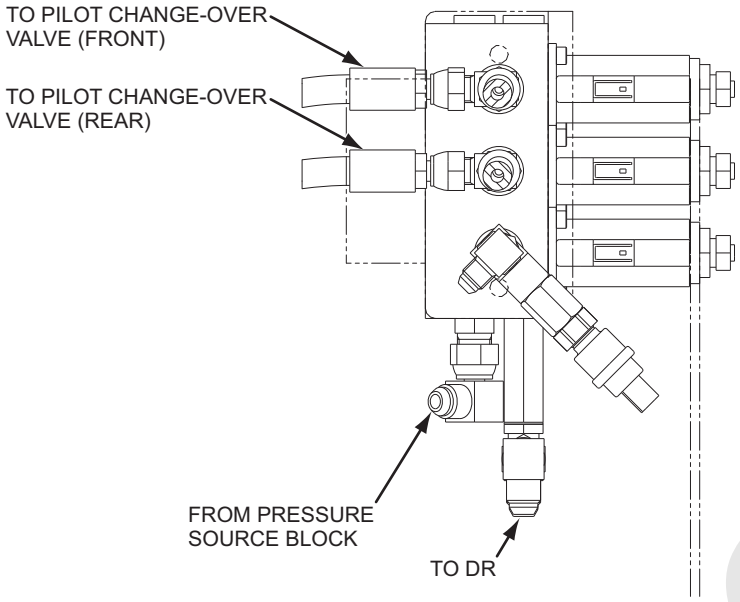


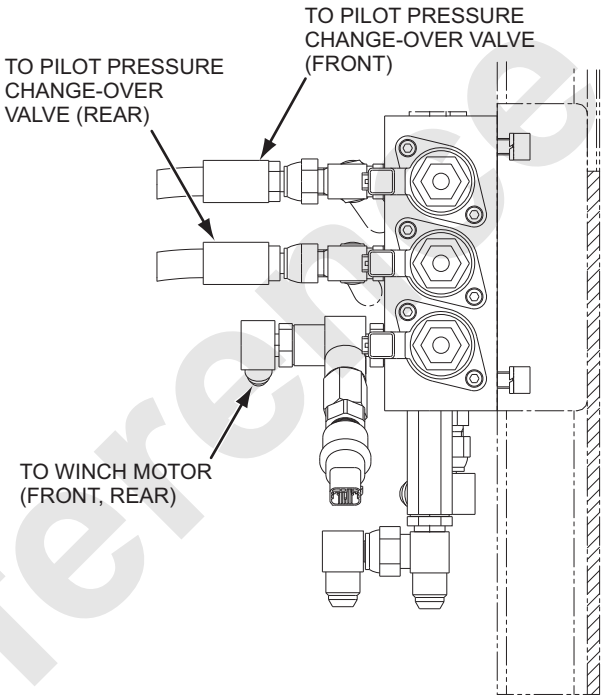
PILOT PRESSURE CHANGE-OVER VALVE

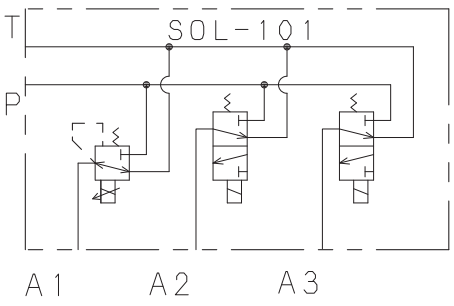




3-SECTION VALVE



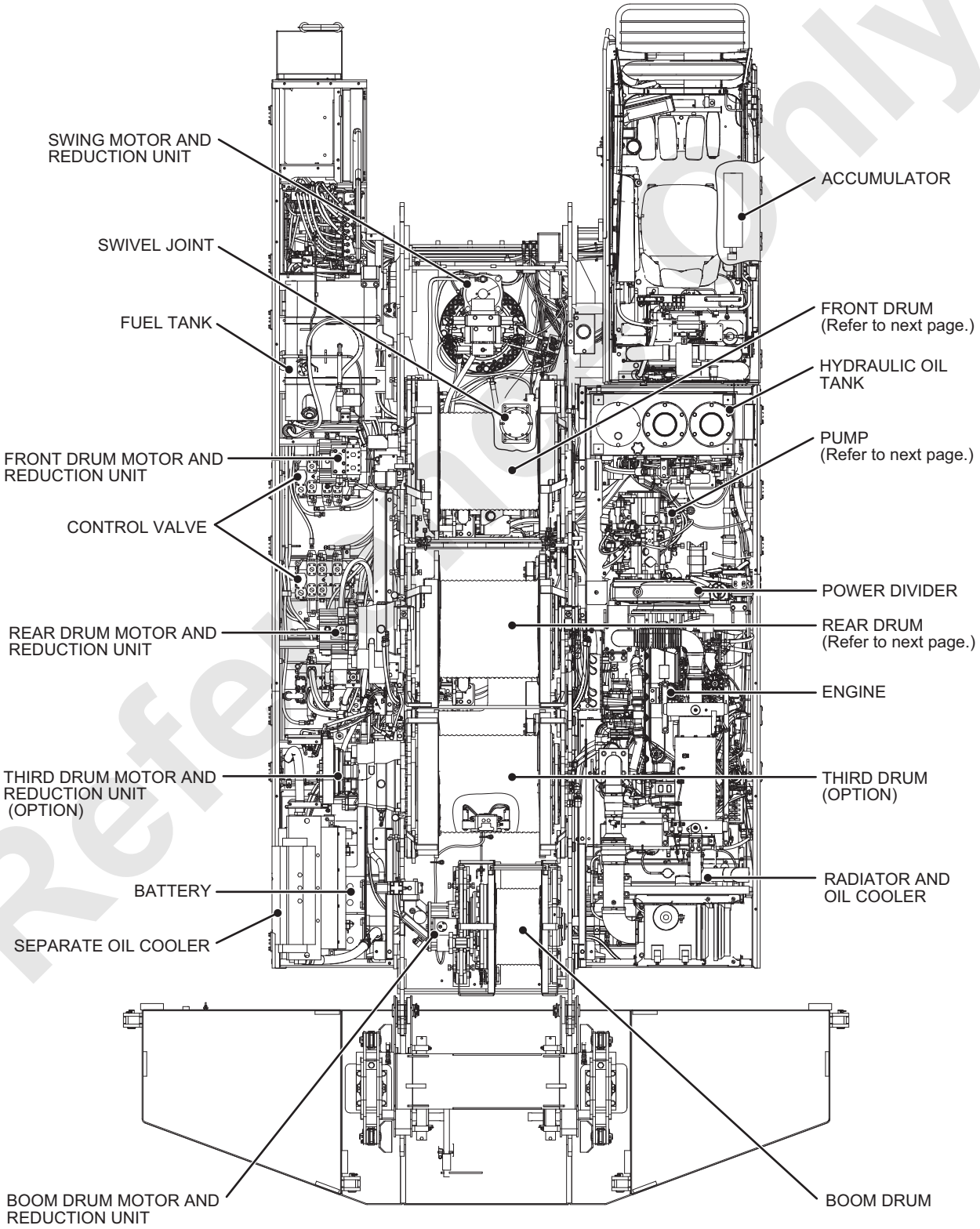




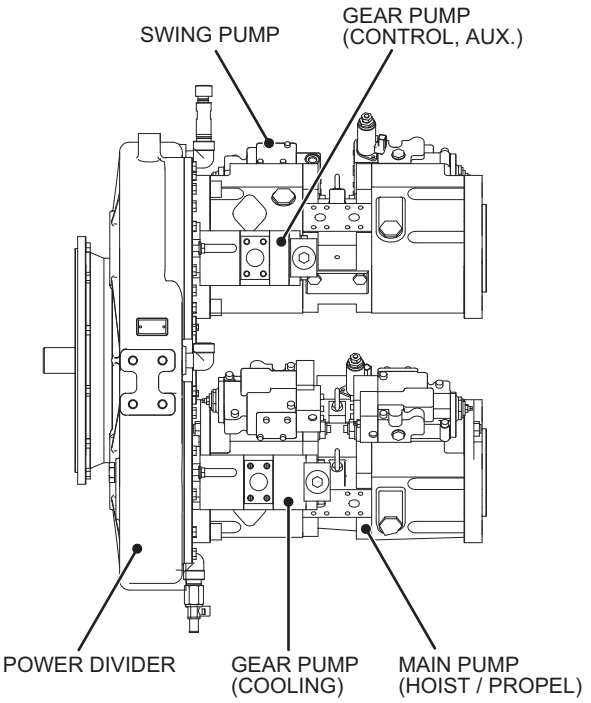
6. HOIST SYSTEM

6.1 APPARATUS AND LOCATION OF COMPONENTS

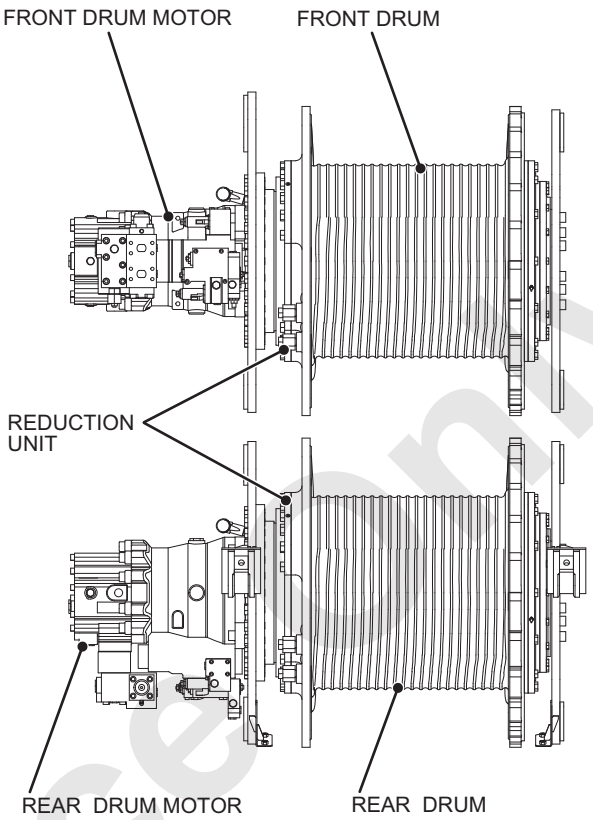
The hoist system consists of the front drum and rear drum assembly.
Each drum assy. consists of hoist motor (brake built in), reduction unit, drum clutch (common to free fall brake) and drum lock.
The pressured oil delivered from 2 main pumps (No.1, No.2) is controlled by the control valve and flaws into each motor.



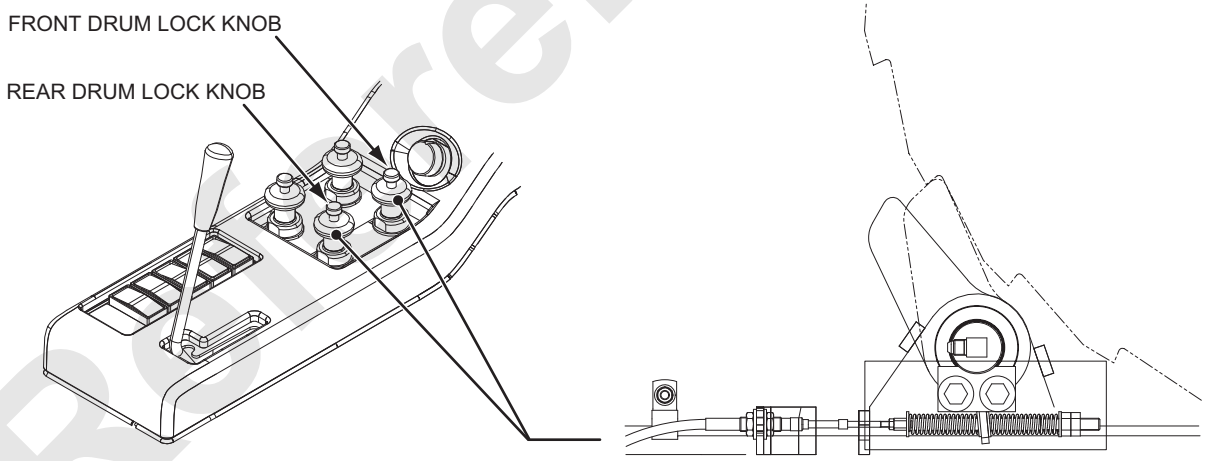
HYDRAULIC PUMP



WINCH



DRUM LOCK



⚠CAUTION

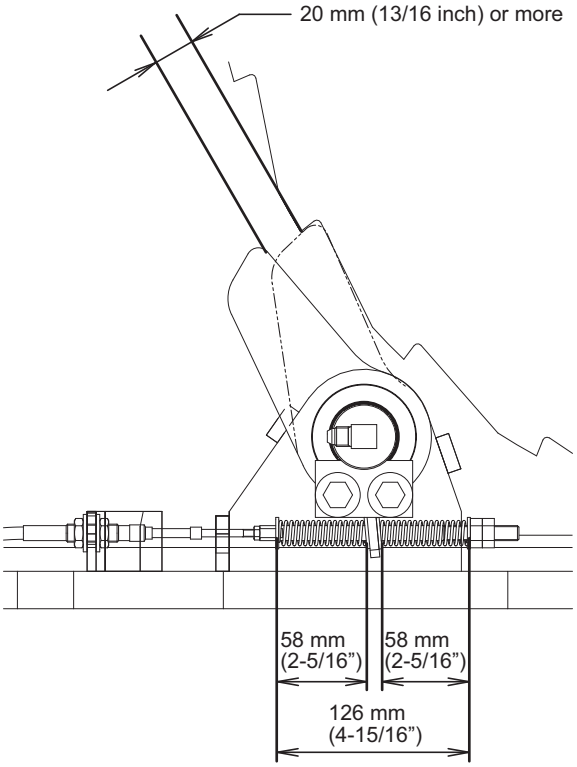
Refer to P.6-17 to 6-49 for circuit diagram and function.

6.2 ADJUSTMENT OF DRUM LOCK

WARNING

Do not adjust the drums locks until the boom, hook block, and load have been lowered to the ground. Failure to observe this precaution may result in serious injury or loss of life.

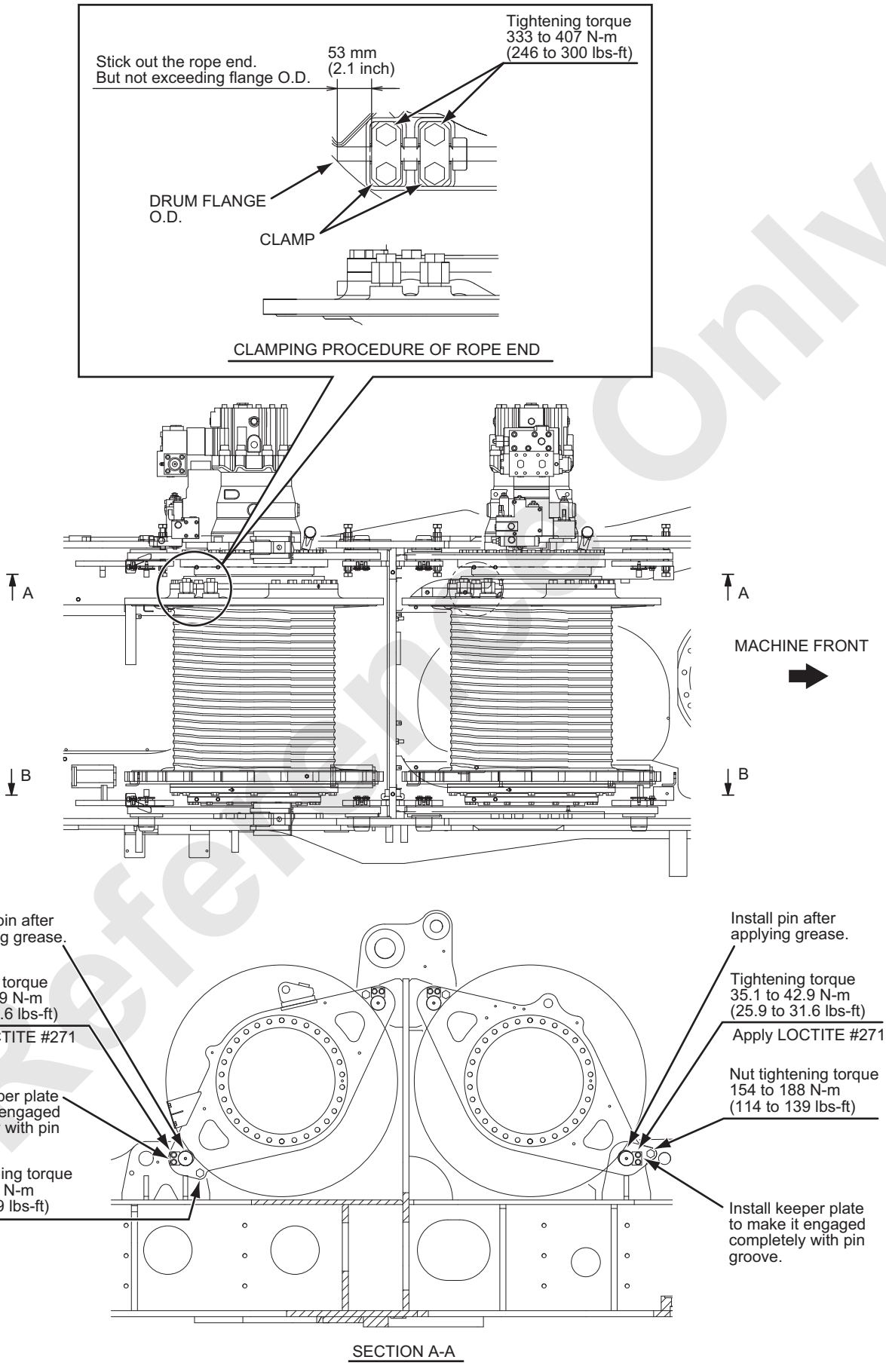
1. Pull the drum lock knob in the LOCK position and check to see that the pawl is engaged in the bottom of the drum ratchet.
   If the pawl is not engaged in the bottom of the ratchet, adjust the spring length to allow the pawl to be engaged in the bottom.
2. With the condition of step 1., adjust the respective dimension as shown in the figure.
3. Push the drum lock knob in the RELEASE position and check to see that the pawl is clear of the ratchet by at least 20 mm (13/16 inch).
   Operate the knob to the LOCK position and to the RELEASE position and confirm that the pawl moves smoothly.

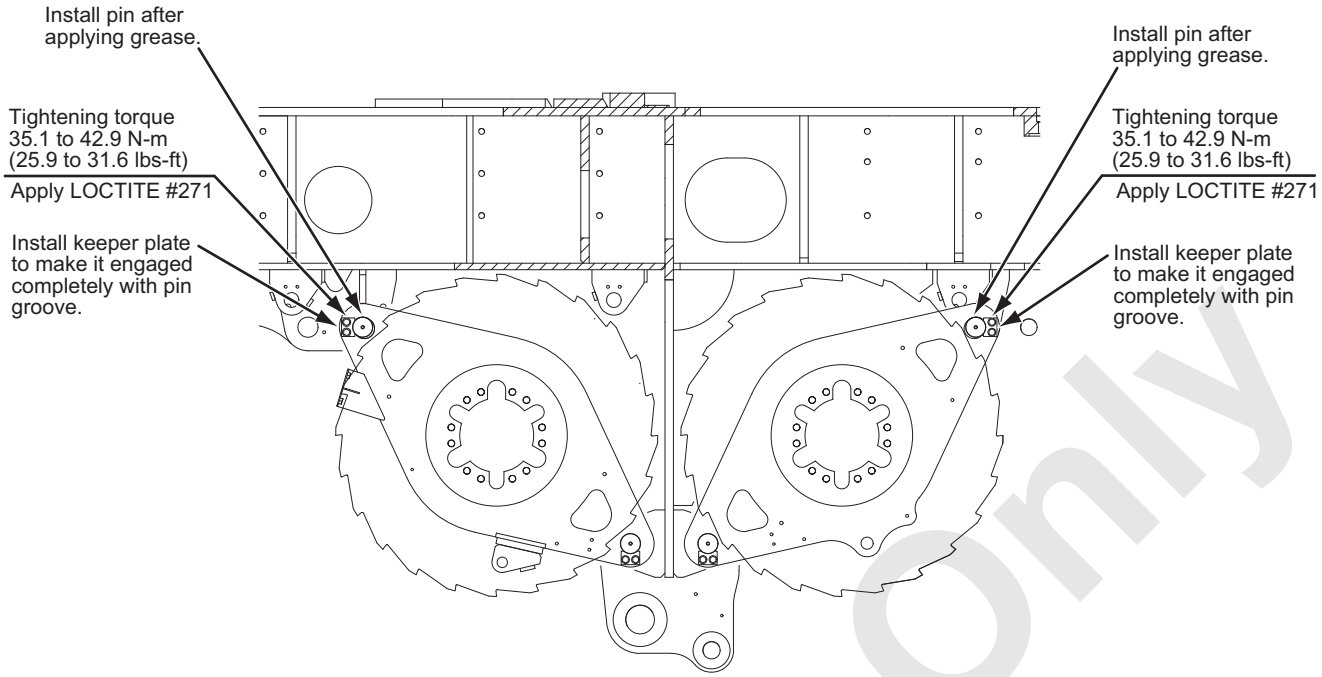


FRONT AND REAR DRUM LOCK

6.3 WINCH

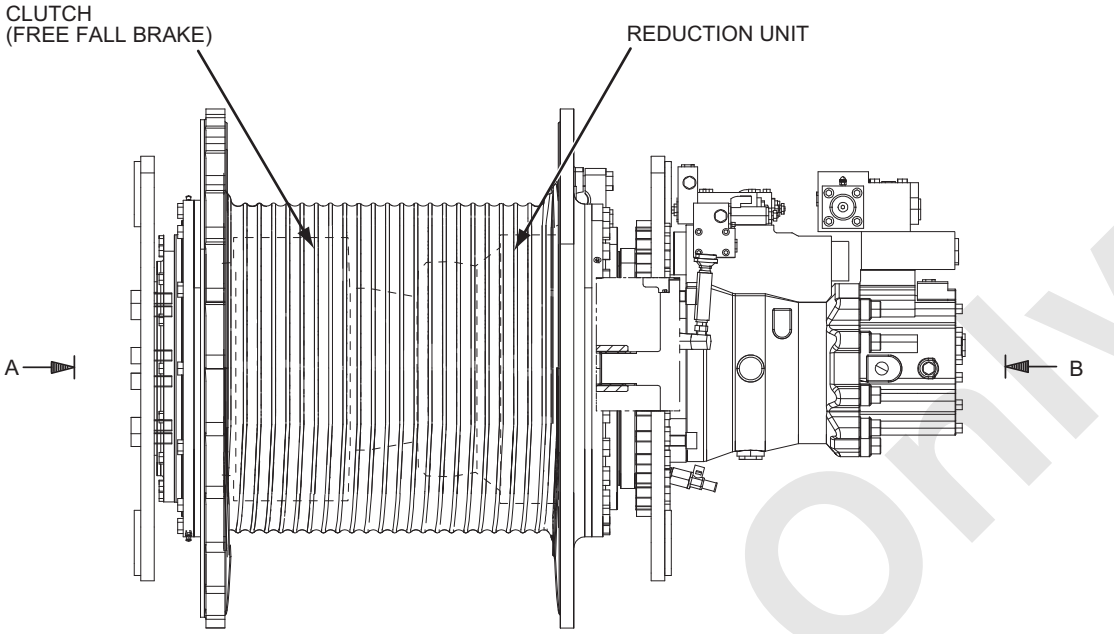
6.3.1 WINCH INSTALLATION

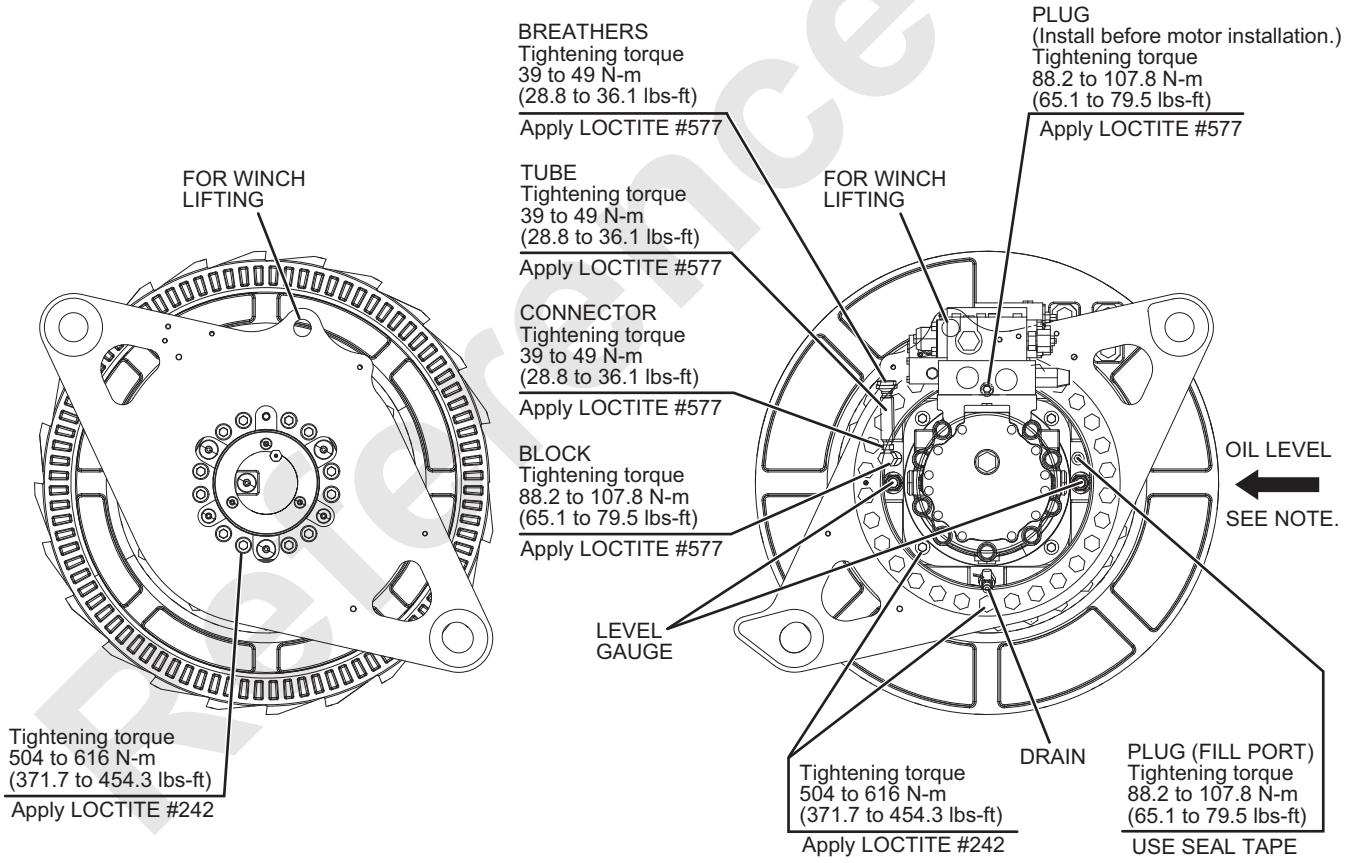




SECTION B-B

6.3.2 WINCH ASSEMBLY





NOTE : After assembly, fill oil to the specified level. (approx. 23 ltr.)
Higher than level gauge red point and within the oil :
Extreme pressure gear oil
SAE #80W-90 (APOLOIL GEAR HE MULTI-SPECIAL).

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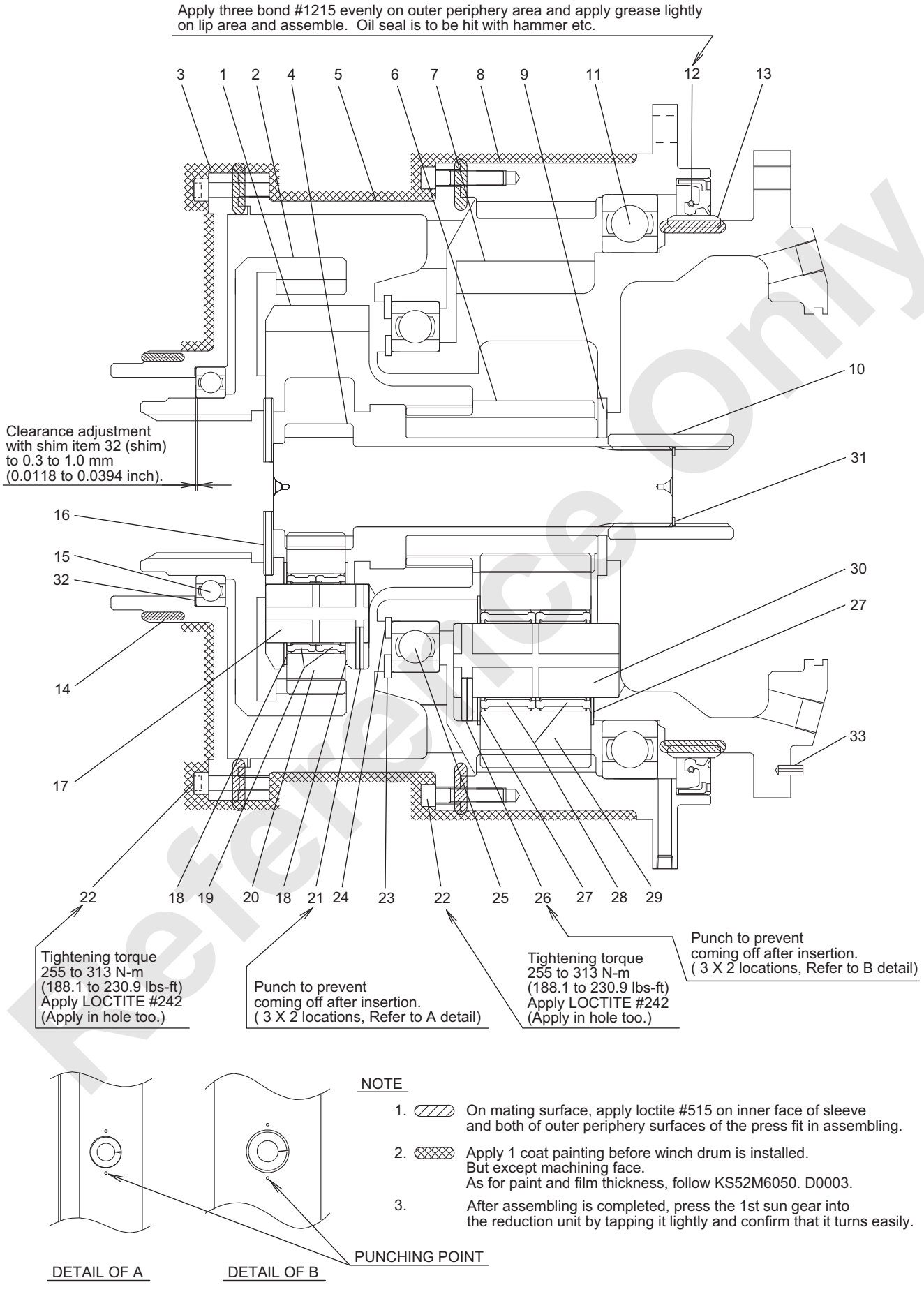
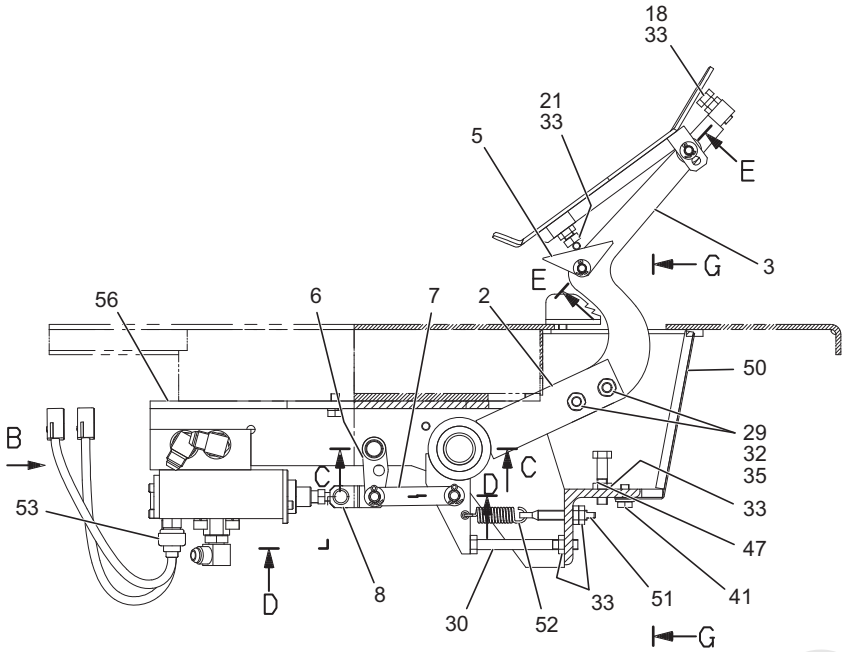
6.3.3 REDUCTION UNIT ASSEMBLY



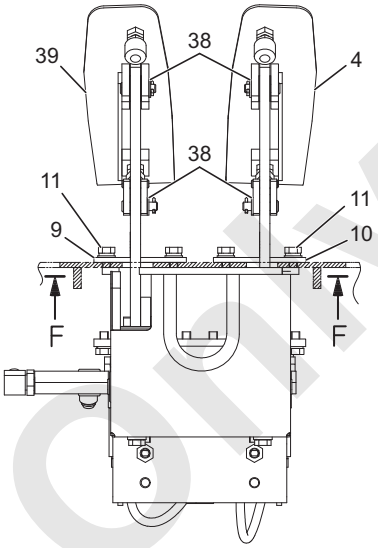
1. Carrier
2. Gear ring
3. Retainer
4. Sun gear
5. Support housing
6. Sun gear
7. Support
8. Ring gear
9. Spacer
10. Collar
11. Bearing
12. Oil seal
13. Sleeve
14. Sleeve
15. Bearing
16. Spacer
17. Pin
18. Thrust washer
19. Bearing
20. Pinion
21. Spring pin
22. Bolt
23. Snap ring
24. Snap ring
25. Bearing
26. Spring pin
27. Thrust washer
28. Bearing
29. Pinion
30. Pin
31. Snap ring
32. Shim
33. Pin

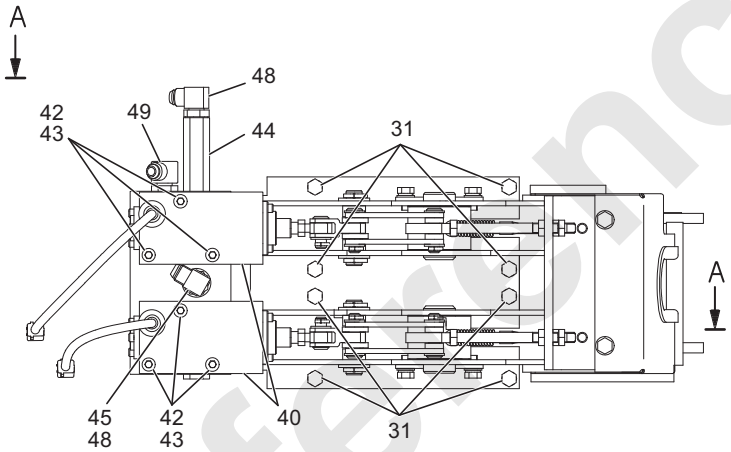
6.4 BRAKE PEDAL

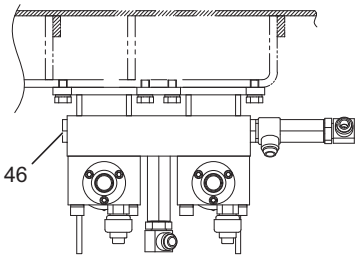
6.4.1 ASSEMBLY DRAWING



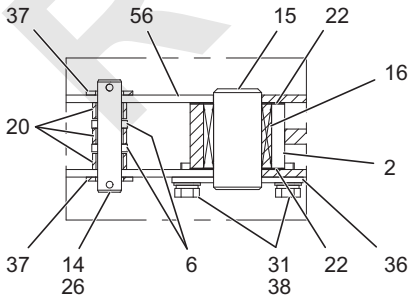
SECTION A-A



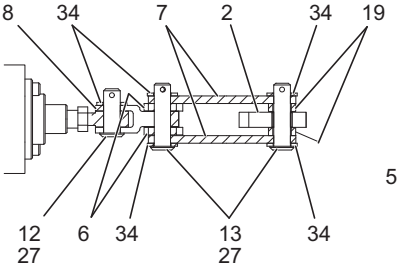




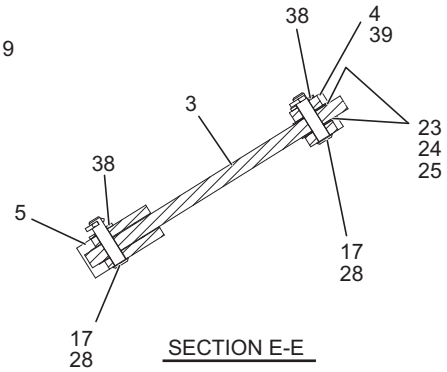
VIEW FROM B



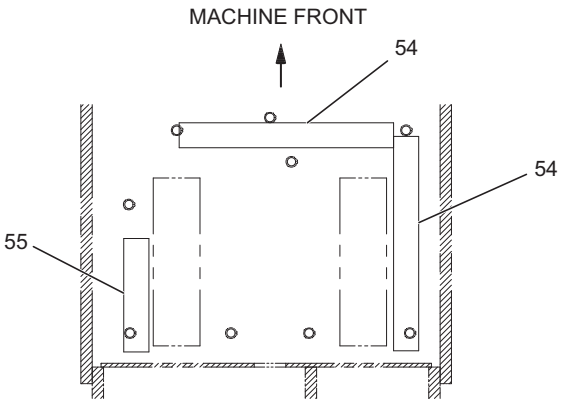
SECTION C-C



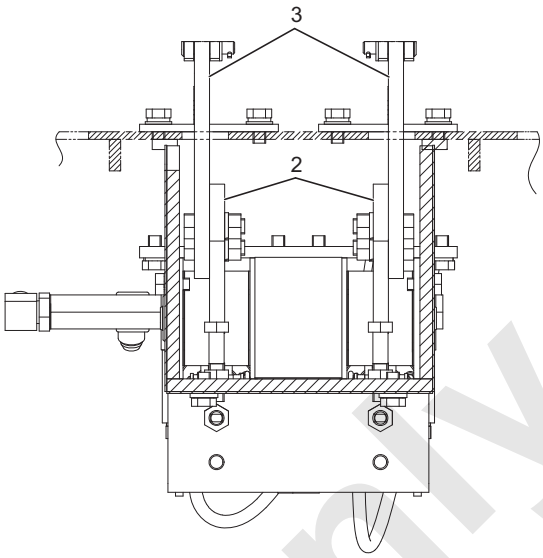
SECTION D-D



SECTION E-E



SECTION F-F



SECTION G-G

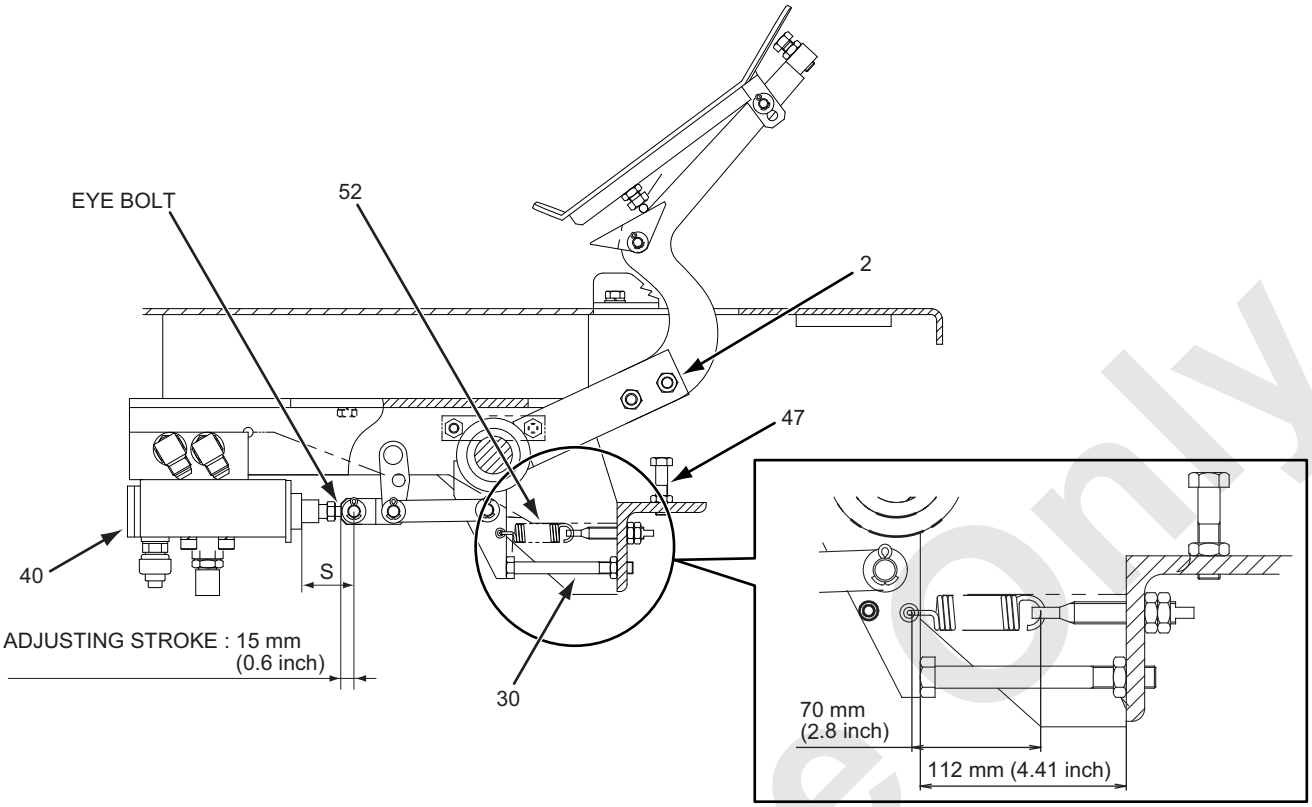
1. Bracket
2. Lever assembly
3. Link
4. Pedal
5. Pawl
6. Link
7. Link
8. Link
9. Bracket
10. Bracket
11. Sems bolt
12. Pin
13. Pin
14. Pin
15. Pin
16. Bearing
17. Pin
18. Bolt
19. Spacer
20. Spacer
21. Bolt
22. Spacer
23. Shim (0.4)
24. Shim (0.6)
25. Shim (0.9)
26. Cotter pin
27. Cotter pin
28. Cotter pin
29. Bolt
30. Bolt
31. Sems bolt
32. Nut
33. Nut
34. Washer
35. Lock washer
36. Plate
37. Washer
38. Washer
39. Pedal
40. Brake valve
41. Sems bolt
42. Capscrew
43. Lock washer
44. Connector
45. Connector
46. Plug
47. Capscrew
48. 90 degrees Elbow
49. 90 degrees Elbow
50. Cover assembly
51. Eye bolt
52. Spring
53. Pressure switch
54. Rubber
55. Rubber
56. Bracket

TIGHTENING TORQUE TABLE

Item	Name	Size	Tightening Torque
29	Bolt	M12 X 40	37.3 to 45.1 N-m (27.5 to 33.2 lbs-ft)
42	Capscrew	M10 X 70	30.4 to 38.2 N-m (22.4 to 28.2 lbs-ft)

- When installing item 16 bearing, fill in enough amount of grease.
- Apply MOLYKOTE on each rotating area.

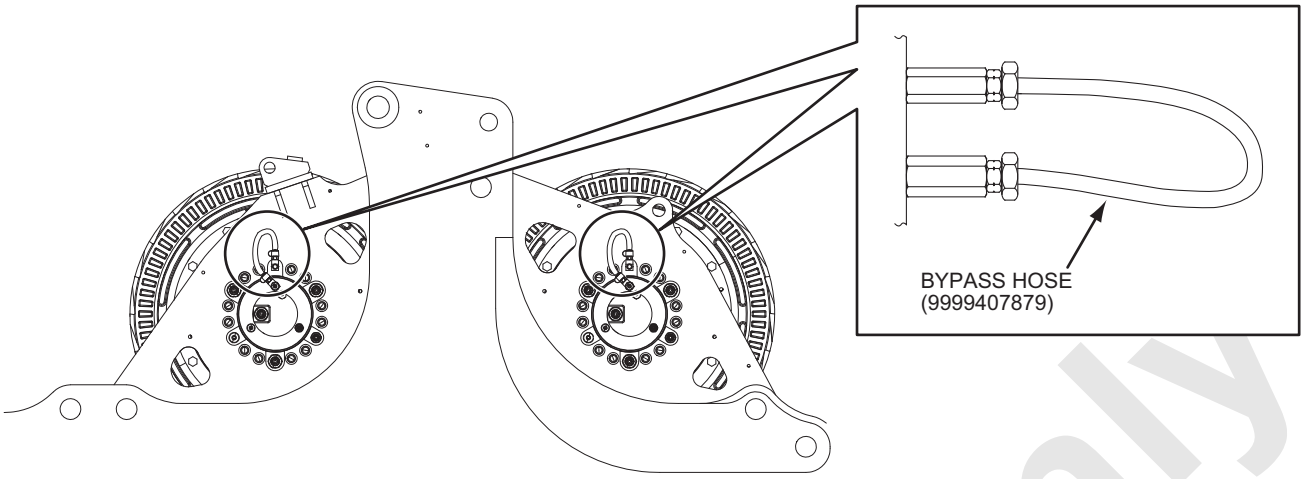
6.4.2 ADJUSTING THE BRAKE PEDAL



Adjustment

1. Adjust the eye bolt until the dimension S is 53 mm (2.09 inch).
2. Depress the brake pedal until the valve spool reaches the stroke end.
   (dimension S = 37.5 mm (1.48 inch))
3. Bring the bolt (No.47) into contact with the lever (No.2) in the status described in the 2 above, and loosen 3/4 turn (protrude upward) to adjust the dimension S until it is 38.0 mm (1.5 inch) to 38.3 mm (1.51 inch).
   Then, tighten the nut.
4. Raise the lever (No.2) up, and return the valve spool to the neutral position.
   (dimension S = 53 mm (2.09 inch))
   Bring the cap screw (No.30) into contact with the lever (No.2), and loosen 3/4 turn (protrude left).
   Then, tighten the nut.
   (dimension S = 52.3 mm (2.06 inch) to 52.5 mm (2.07 inch))
5. Adjust the spring (No.52) until the dimension L is 70 mm (2.76 inch) in the status described in the 4 above.
6. Ensure that the effective stroke of the valve (No.40) from the time when the pedal is depressed to the time it is released is 15 mm (0.6 inch).

6.5 BLEEDING AIR FROM BRAKE CIRCUIT



If air remains in the piping from the brake valve to the cylinder built in the winch, the brake response becomes poor.
If the brake valve and piping are removed, bleed air by the following sequences shown below.

WARNING

Be sure to lower the hook onto the ground, and select the "Neutral free" mode.
Then, ensure that the drum does not rotate even when you release your foot from the brake pedal.

1. Bypass the quick coupler of the winch brake section with a hose, while the engine is stopped.
   Hose used : 9999407879
2. Start the engine, and set the engine speed to the high idling.
3. Fully depress the brake pedal, and press the brake select switch to enter the "Free fall mode".
   * The free fall indicator lamp lights up.
4. Release your foot from the brake pedal, and wait for approx. 1 minute.
   At this time, air bleed.
5. Return to the "Neutral brake mode", and stop the engine.
   After the engine is stopped, wait until the control pressure is released (approx. 1 minute), and then, remove the bypass hose.

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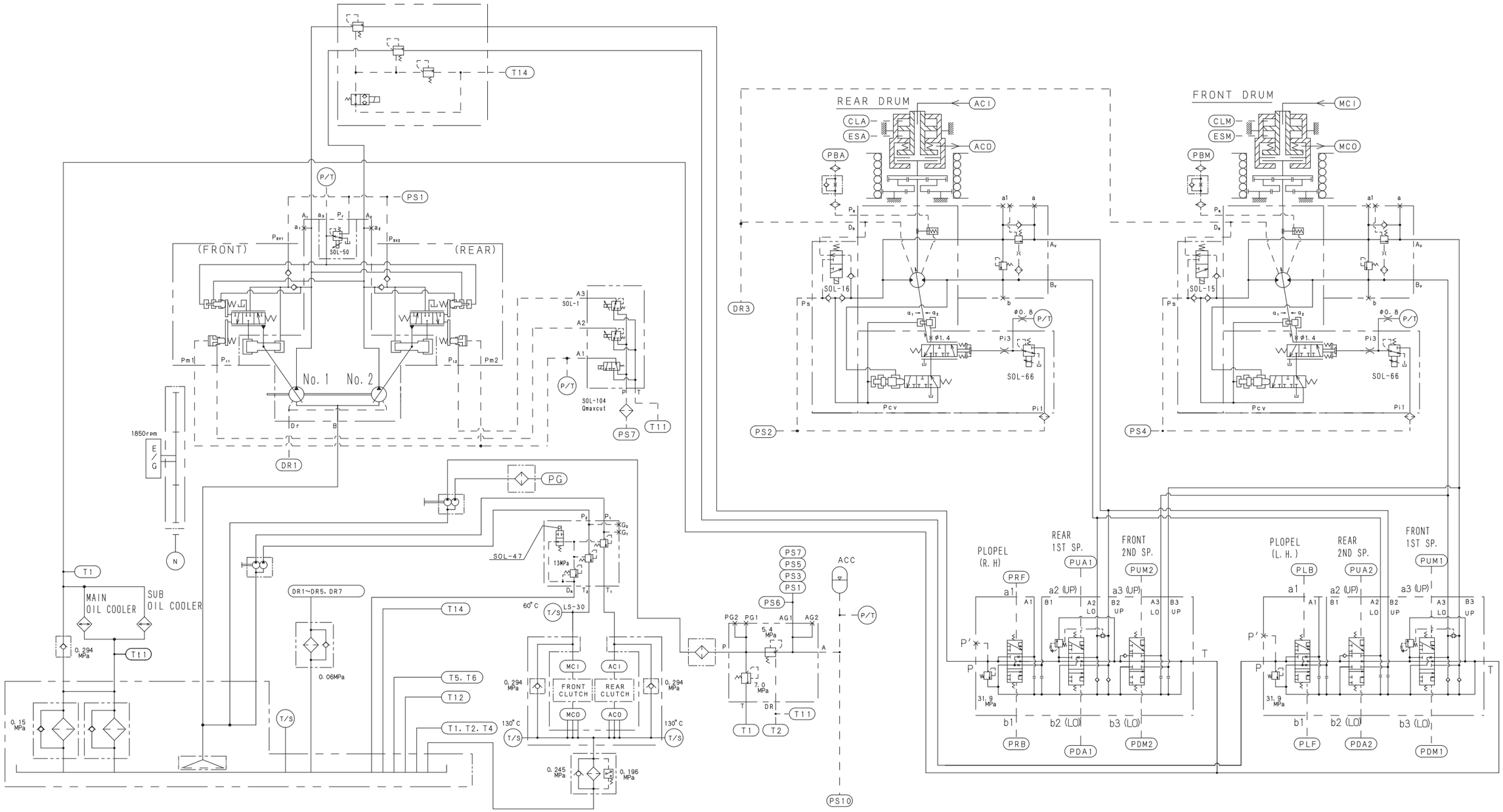
6.6 CONSTRUCTION AND FUNCTION

6.6.1 HYDRAULIC SCHEMATIC



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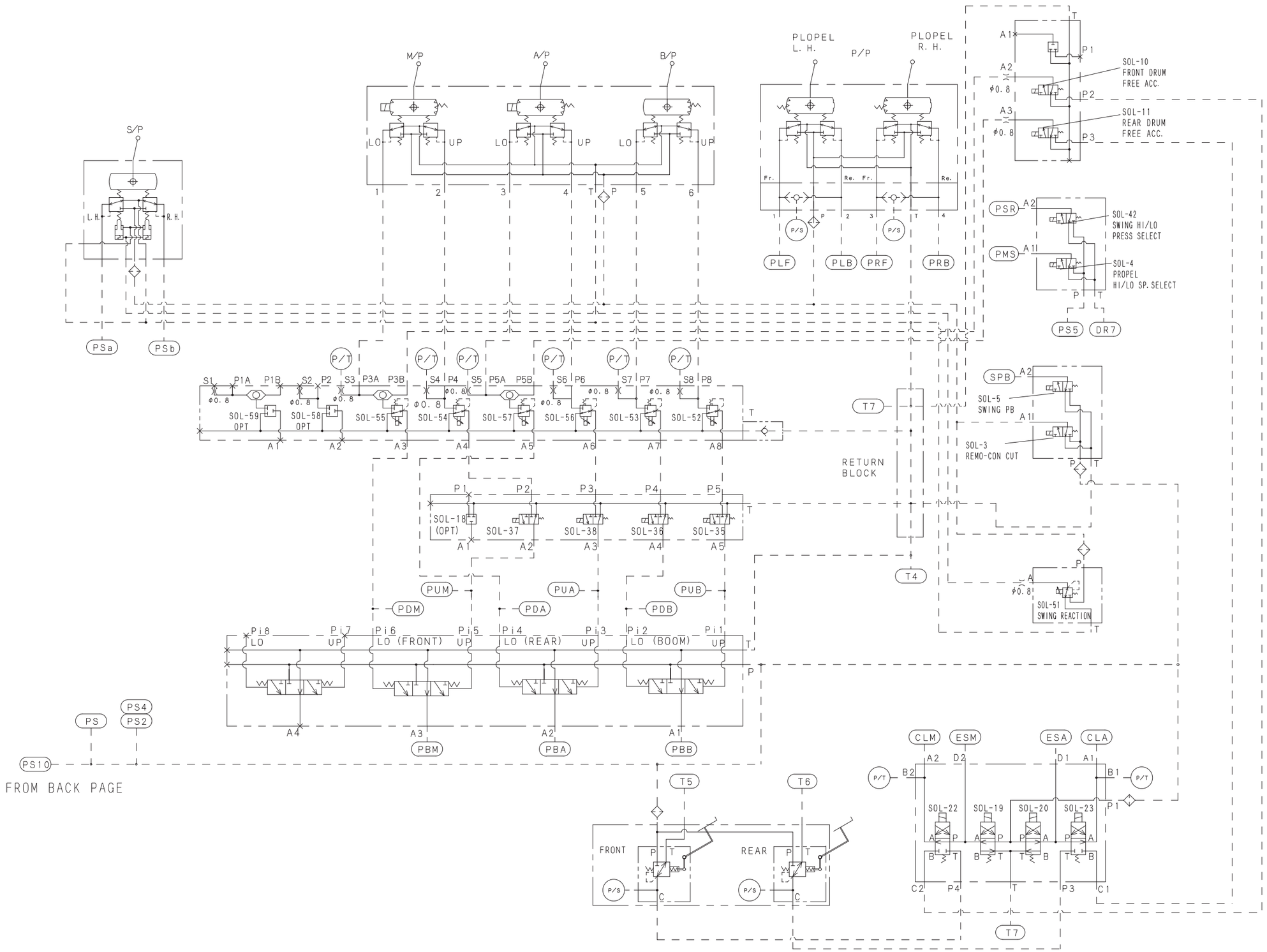
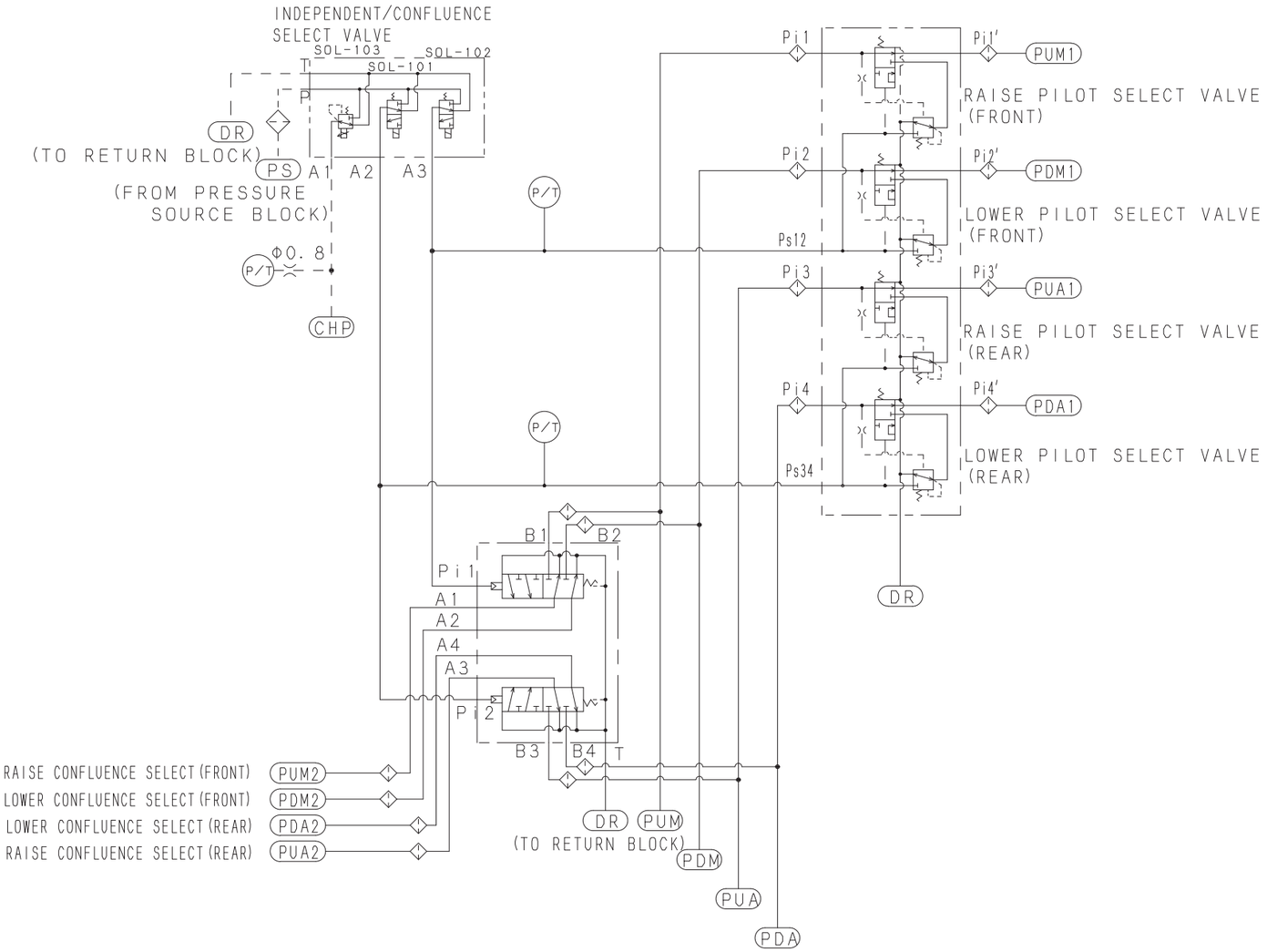

S/P
L.H.
R.H.
PSa
PSb
M/P
A/P
B/P
LO
UP
1
2
3
4
T
P
5
6
PLOPEL L. H.
P/P
PLOPEL R. H.
Fr.
Re.
P/S
PLF
PLB
PRF
PRB
A1
A2
A3
P1
P2
P3
T
φ0.8
SOL-10 FRONT DRUM FREE ACC.
SOL-11 REAR DRUM FREE ACC.
PSR
PMS
SOL-42 SWING HI/LO PRESS SELECT
SOL-4 PROPEL HI/LO SP. SELECT
PS5
DR7
SPB
SOL-5 SWING PB
SOL-3 REMO-CON CUT
SOL-51 SWING REACTION
P/T
S1
P1A
P1B
S2
P2
S3
P3A
P3B
S4
P4
S5
P5A
P5B
S6
P6
S7
P7
S8
P8
SOL-59 OPT
SOL-58 OPT
SOL-55
SOL-54
SOL-57
SOL-56
SOL-53
SOL-52
A4
A5
A6
A7
A8
T7
RETURN BLOCK
SOL-18 (OPT)
SOL-37
SOL-38
SOL-36
SOL-35
T4
PUM
PUA
PUB
PDM
PDA
PDB
Pi8
Pi7
Pi6
Pi5
Pi4
Pi3
Pi2
Pi1
LO
UP
LO (FRONT)
LO (REAR)
LO (BOOM)
PBM
PBA
PBB
PS
PS4
PS2
PS10
FROM BACK PAGE
T5
T6
FRONT
REAR
C
CLM
ESM
ESA
CLA
D2
D1
B2
B1
C2
C1
SOL-22
SOL-19
SOL-20
SOL-23
T7

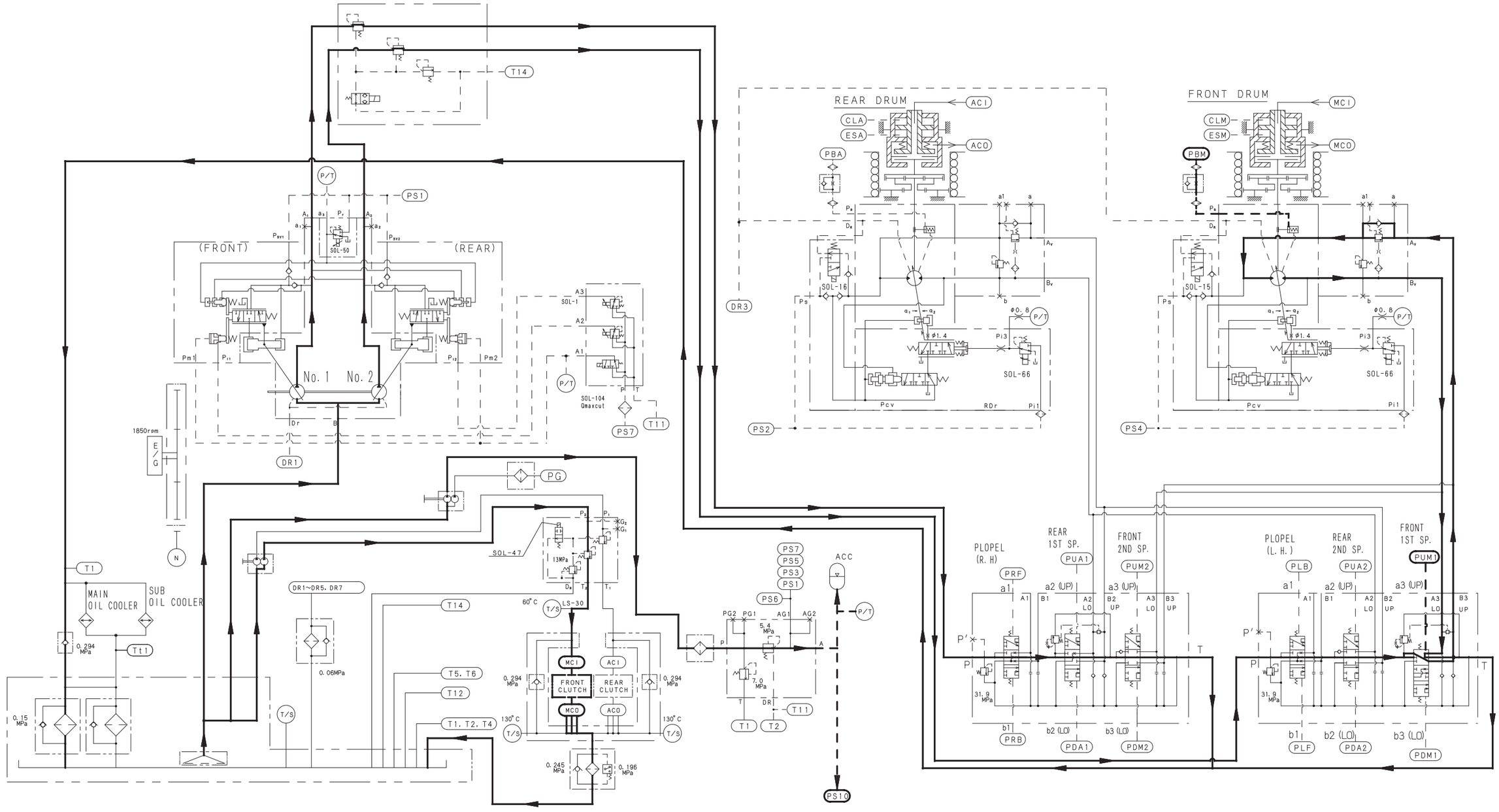

INDEPENDENT/CONFLUENCE
SELECT VALVE
SOL-103
SOL-102
SOL-101
T
P
DR
(TO RETURN BLOCK)
PS
A1
A2
A3
(FROM PRESSURE
SOURCE BLOCK)
P/T
φ0.8
CHP
Pi1
Pi1'
PUM1
RAISE PILOT SELECT VALVE
(FRONT)
Pi2
Pi2'
PDM1
LOWER PILOT SELECT VALVE
(FRONT)
Ps12
Pi3
Pi3'
PUA1
RAISE PILOT SELECT VALVE
(REAR)
Pi4
Pi4'
PDA1
LOWER PILOT SELECT VALVE
(REAR)
Ps34
DR
B1
B2
Pi1
A1
A2
A4
A3
Pi2
B3
B4
T
RAISE CONFLUENCE SELECT (FRONT)
PUM2
LOWER CONFLUENCE SELECT (FRONT)
PDM2
LOWER CONFLUENCE SELECT (REAR)
PDA2
RAISE CONFLUENCE SELECT (REAR)
PUA2
DR
PUM
(TO RETURN BLOCK)
PDM
PUA
PDA

6.6.2 LIFTING A LOAD

Function of the front drum and the rear drum are exactly same.
The front drum is explained here as an example.

While the function lock lever is in the "Work" position (SOL-3 : On position), oil pressure from the control pump flows through the accumulator and into the foot brake valve block, the clutch valve block, brake valve block (4-section pilot operated valve) and through the valve block (2-section solenoid valves) and into the remote control valve.
The pressurized oil is also fed to the both sides oil chambers of the front drum clutch cylinder ("CLM", "ESM") via the clutch valve block (4-section solenoid valves).
Since the cylinder thrust force by the pressurized oil is not generated, the clutch is connected with the spring.
When the front drum control lever is operated in the "hoist load" direction, it directs control pressure oil through the remote control valve and into the "PUM1" port of the main control valve where it moves the spool.

At the same time, the control pressurized oil flows into the "PBM" port of the brake cylinder built in the winch motor via the brake valve block (4-section pilot operated valves), and the motor brake is released.
As directed by the position of the spool, the main pump (No.2) oil flowing into the control valve is sent to the raising side of the hoist motor to drive the front drum and thereby raise the load.



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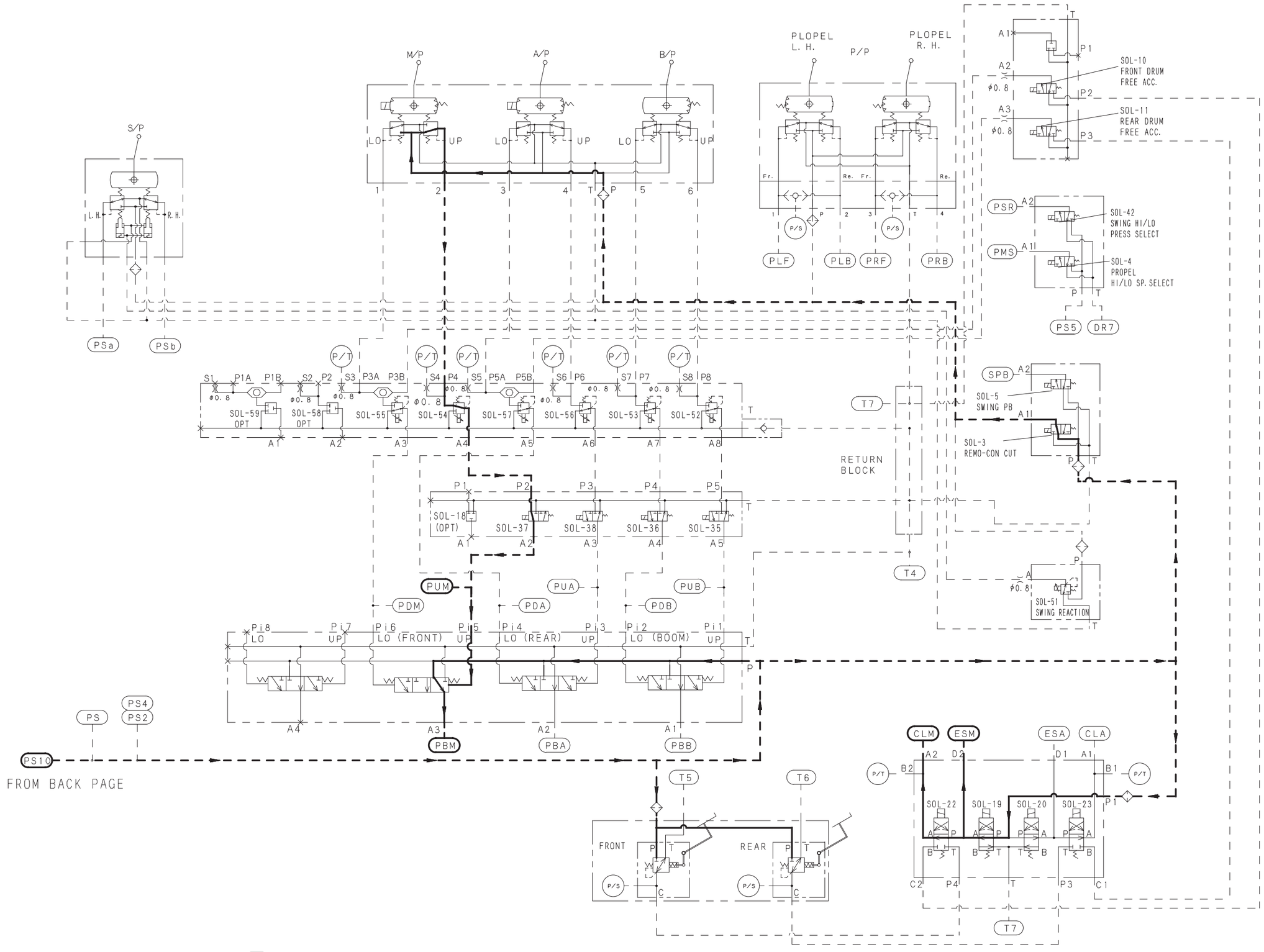
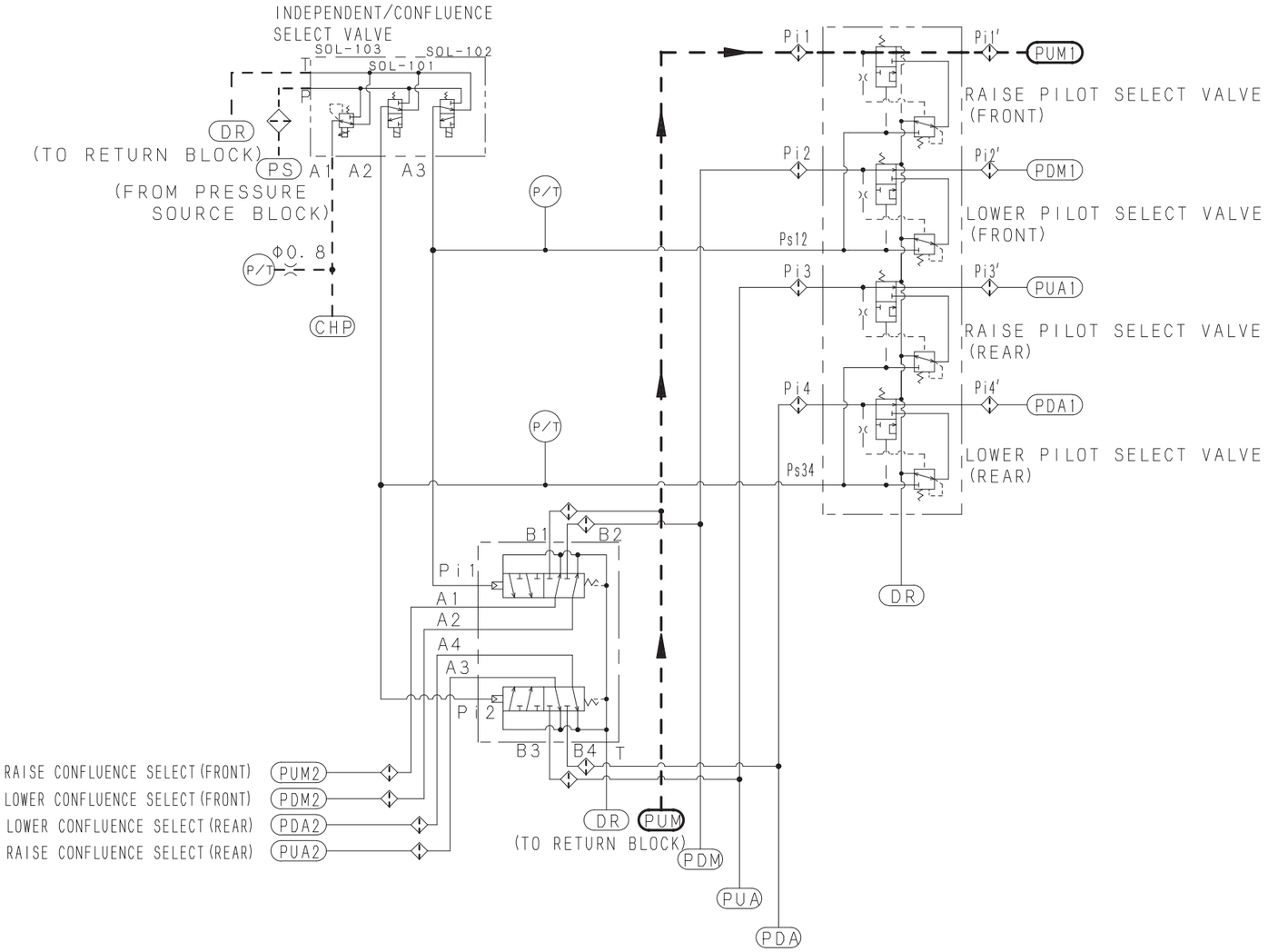
Lifting (1/3)


M/P
A/P
B/P
S/P
L.H.
R.H.
LO
UP
PLOPEL L. H.
P/P
PLOPEL R. H.
Fr.
Re.
P/S
PLF
PLB
PRF
PRB
SOL-10 FRONT DRUM FREE ACC.
SOL-11 REAR DRUM FREE ACC.
SOL-42 SWING HI/LO PRESS SELECT
SOL-4 PROPEL HI/LO SP. SELECT
PSR
PMS
PS5
DR7
SPB
SOL-5 SWING PB
SOL-3 REMO-CON CUT
SOL-51 SWING REACTION
T7
T4
RETURN BLOCK
P/T
SOL-59 OPT
SOL-58 OPT
SOL-55
SOL-54
SOL-57
SOL-56
SOL-53
SOL-52
SOL-18 (OPT)
SOL-37
SOL-38
SOL-36
SOL-35
PUM
PUA
PUB
PDM
PDA
PDB
LO (FRONT)
LO (REAR)
LO (BOOM)
PBM
PBA
PBB
PS
PS4
PS2
PS10
FROM BACK PAGE
T5
T6
FRONT
REAR
CLM
ESM
ESA
CLA
SOL-22
SOL-19
SOL-20
SOL-23

Lifting (2/3)

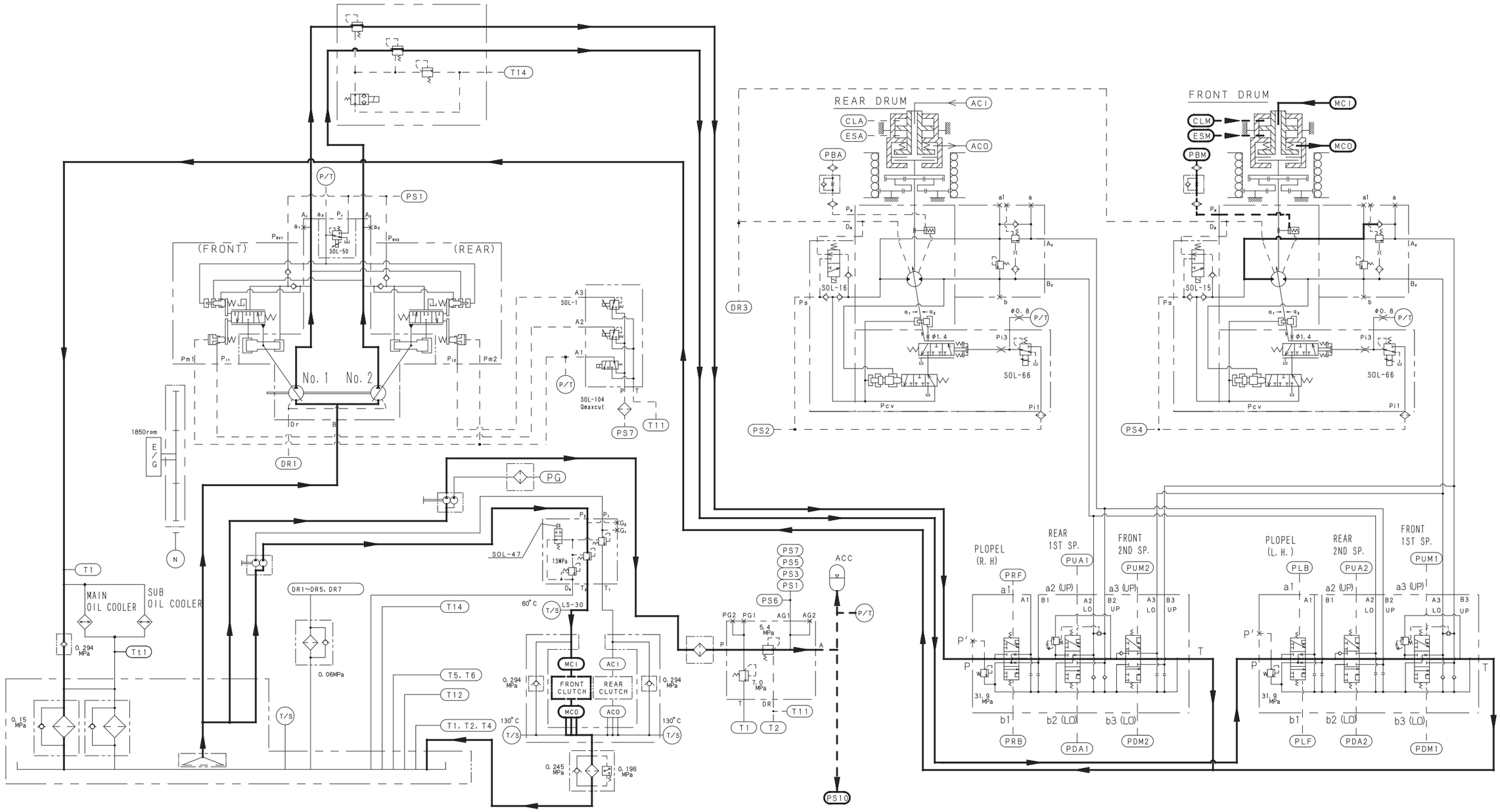

INDEPENDENT/CONFLUENCE
SELECT VALVE
SOL-103
SOL-102
SOL-101
T
P
DR
(TO RETURN BLOCK)
PS
A1
A2
A3
(FROM PRESSURE
SOURCE BLOCK)
P/T
φ0.8
CHP
Pi1
Pi1'
PUM1
RAISE PILOT SELECT VALVE
(FRONT)
Pi2
Pi2'
PDM1
LOWER PILOT SELECT VALVE
(FRONT)
Ps12
Pi3
Pi3'
PUA1
RAISE PILOT SELECT VALVE
(REAR)
Pi4
Pi4'
PDA1
LOWER PILOT SELECT VALVE
(REAR)
Ps34
B1
B2
Pi1
A1
A2
A4
A3
Pi2
B3
B4
T
RAISE CONFLUENCE SELECT (FRONT)
PUM2
LOWER CONFLUENCE SELECT (FRONT)
PDM2
LOWER CONFLUENCE SELECT (REAR)
PDA2
RAISE CONFLUENCE SELECT (REAR)
PUA2
DR
PUM
(TO RETURN BLOCK)
PDM
PUA
PDA

Lifting (3/3)

6.6.3 HOLDING A RAISED LOAD

With the main control lever turned back to its neutral position, the control pressure coming from the remote control valve is cut and the spool in the main control valve returns to its neutral position.
When the spool returns to neutral, the pressurized oil to the main motor is cut off and the motor stops.
Now, although the weight of the suspended load continues to pull on the drum, further rotation of the drum is prevented by a motor counterbalance valve that blocks the return of oil to the reservoir.

At the same time, the control oil pressure in the motor brake cylinder is directed back to the reservoir and the motor brake (nega-brake) actuates.
The pressurized oil is fed to the both sides oil chambers of the clutch cylinder ("CLM", "ESM"), and the cylinder thrust force by the pressurized oil is not generated.
Therefore, the clutch remains engaged with the spring.
The load is now held in suspension by the combined effects of the motor counterbalance valve, the motor brake and the clutch.



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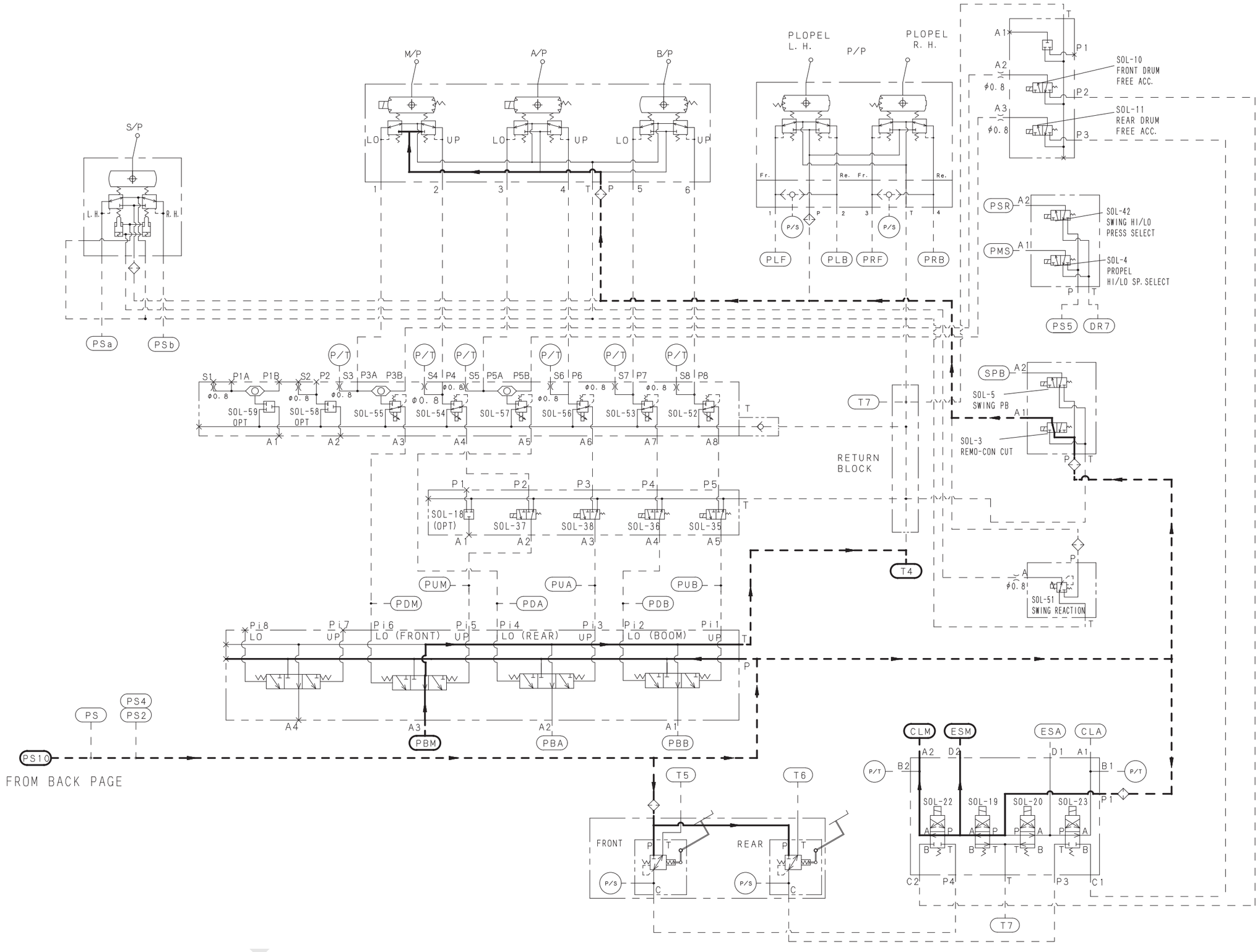
Holding (1/2)


S/P
L.H.
R.H.
PSa
PSb
M/P
A/P
B/P
LO
UP
1
2
3
4
T
P
5
6
PLOPEL L. H.
P/P
PLOPEL R. H.
Fr.
Re. Fr.
Re.
P/S
PLF
PLB
PRF
PRB
A1
P1
A2
SOL-10 FRONT DRUM FREE ACC.
P2
A3
SOL-11 REAR DRUM FREE ACC.
P3
PSR
SOL-42 SWING HI/LO PRESS SELECT
PMS
SOL-4 PROPEL HI/LO SP. SELECT
PS5
DR7
SPB
SOL-5 SWING PB
SOL-3 REMO-CON CUT
T7
RETURN BLOCK
T4
SOL-51 SWING REACTION
P/T
S1 P1A P1B S2 P2 S3 P3A P3B S4 P4 S5 P5A P5B S6 P6 S7 P7 S8 P8
SOL-59 OPT
SOL-58 OPT
SOL-55
SOL-54
SOL-57
SOL-56
SOL-53
SOL-52
P1 P2 P3 P4 P5
SOL-18 (OPT)
SOL-37
SOL-38
SOL-36
SOL-35
PUM
PUA
PUB
PDM
PDA
PDB
Pi8 Pi7 Pi6 Pi5 Pi4 Pi3 Pi2 Pi1
LO
UP
LO (FRONT)
LO (REAR)
LO (BOOM)
PBM
PBA
PBB
PS
PS4
PS2
PS10
FROM BACK PAGE
T5
T6
FRONT
REAR
CLM
ESM
ESA
CLA
SOL-22
SOL-19
SOL-20
SOL-23
T7

Holding (2/2)

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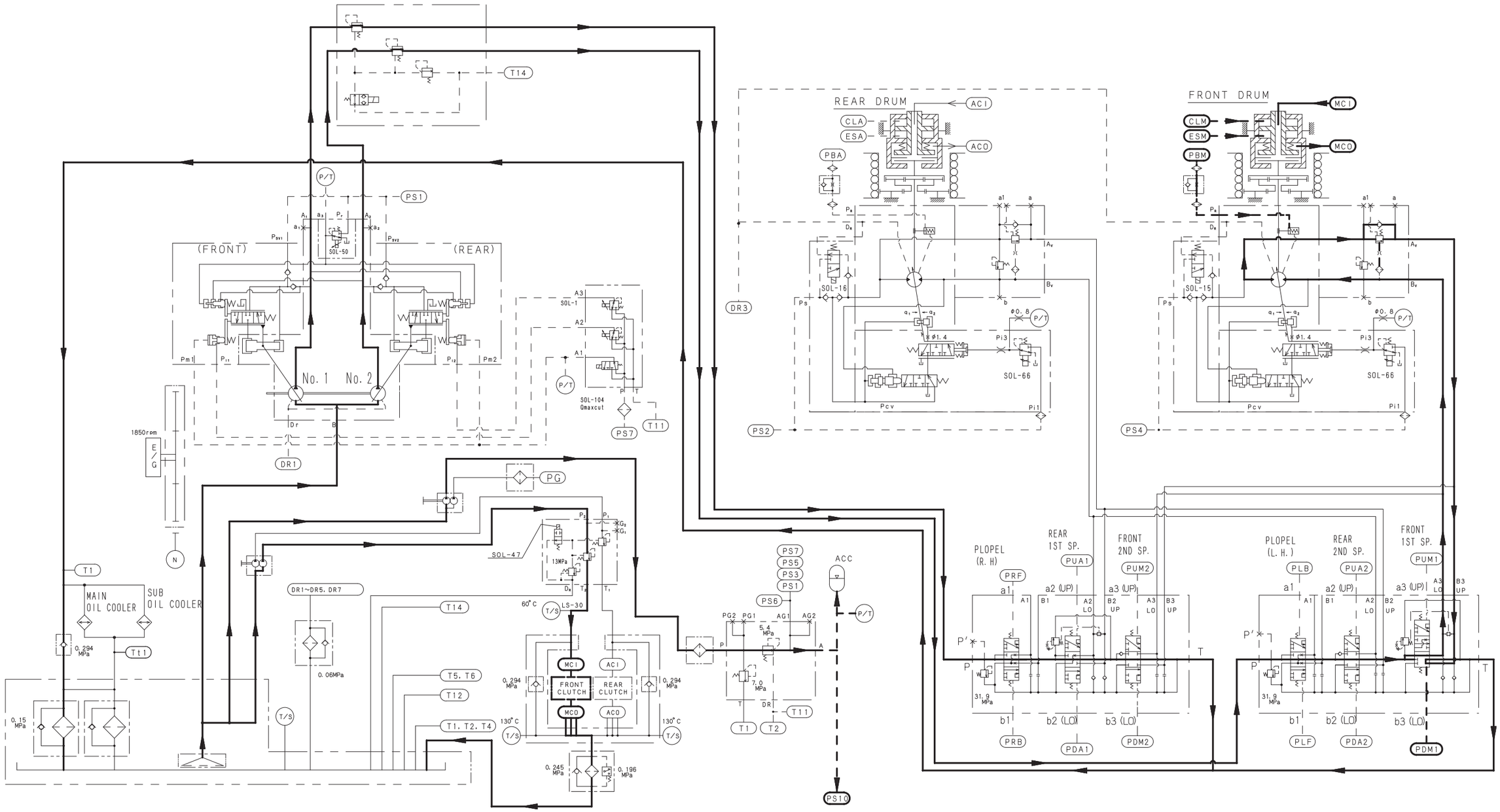
6.6.4 LOWERING A LOAD (POWER LOWERING)

Function of the front drum and the rear drum are exactly same.
The front drum is explained here as an example.

When the function lock lever is in the "Work" position (SOL-3 : ON position), oil pressure from the control pump flows past the accumulator and into the foot brake valve block, the clutch valve block, brake valve block (4-section pilot operated valve) and flows through the valve block (2-section solenoid valves) and into the remote control valve.
The pressurized oil is fed to the both sides oil chambers of the clutch cylinder ("CLM", "ESM") via the clutch valve block (4-section solenoid valves).
Since the cylinder thrust force by the pressurized oil is not generated, the clutch is engaged with the spring.
When the main control lever is operated to the "lower load" direction, this control oil pressure is directed by the remote control valve to flow into the port "PDM1" of the main control valve and it moves the spool.

At the same time, control pressure is also directed through the brake valve block (4-section pilot operated valve) to the "PBM" port of the motor brake cylinder.
It causes the motor brake to disengage.
Now the main pump (No.2) oil flowing into the control valve, as directed by the position of the spool, activates the hoist motor to drive the drum and thereby lower the load.
The counterbalance valve is opened by pilot pressure from the "running in" side to allow the main motor to rotate and lower the load.



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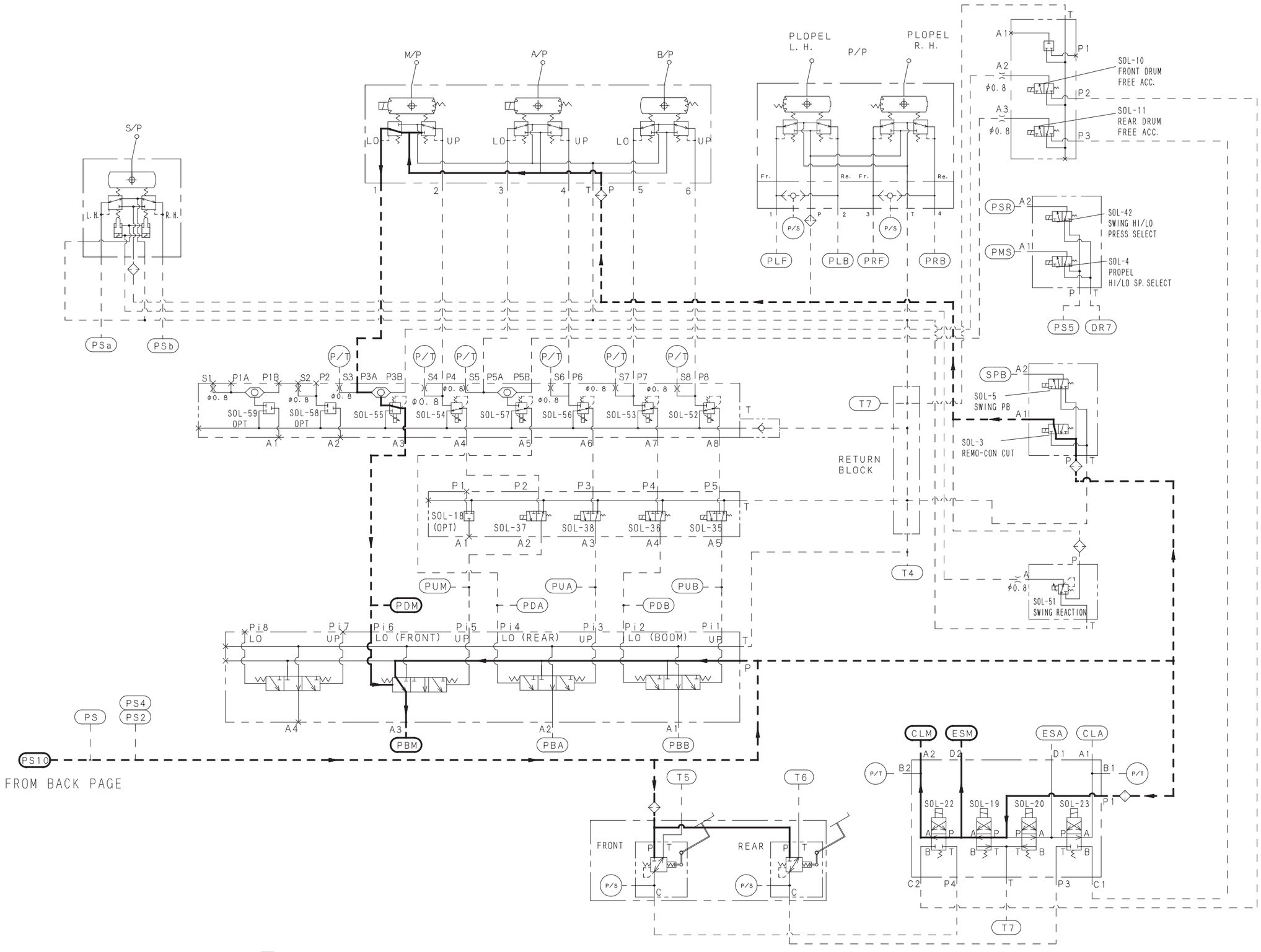
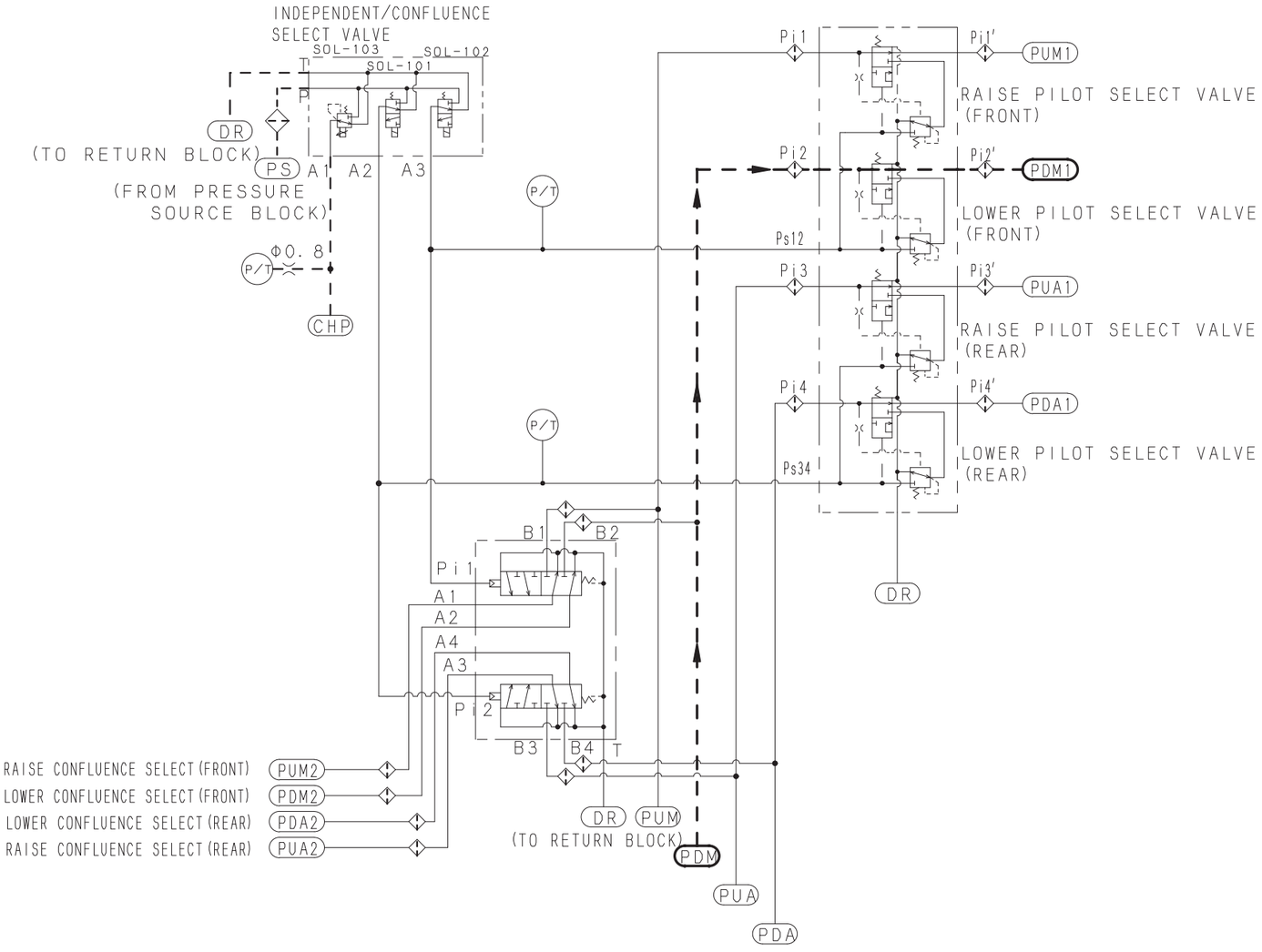
Lowering (Power lowering) (1/3)



Lowering (Power lowering) (2/3)



Lowering (Power lowering) (3/3)

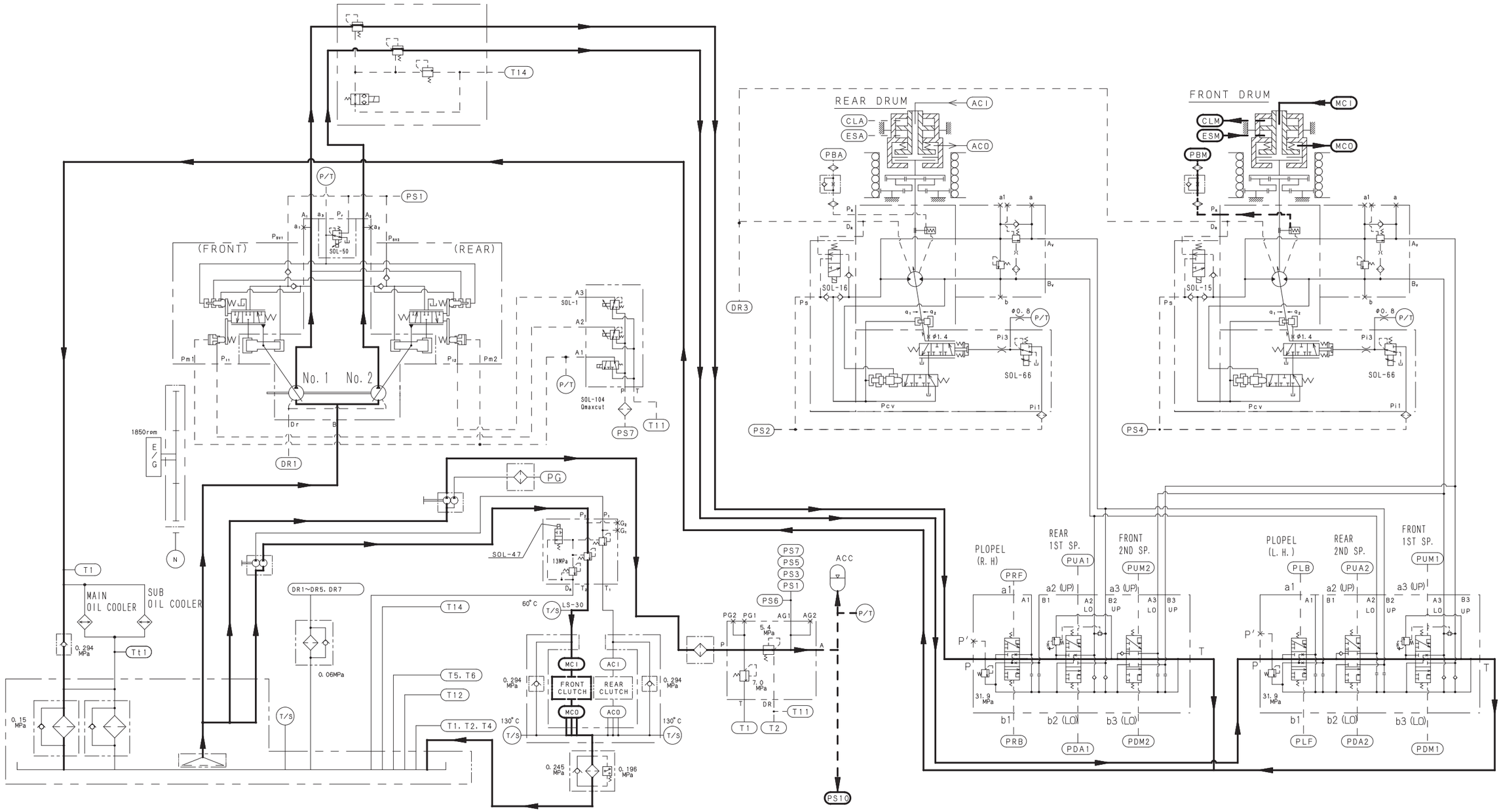
6.6.5 FREE FALL OPERATION

When the brake select switch is set to the "FREE FALL" side, the solenoid valve (SOL-22) in the clutch valve block (4-section solenoid valves) is switched over.

When the solenoid valve is switched over and the front drum foot brake is released, the pressurized oil in the "CLM" side oil chamber of the front drum clutch cylinder returns to the tank, and the cylinder thrust force is generated against the spring to release the clutch.

As a result, the load falls freely (free fall), and the brake can be applied with the foot brake.

When the brake pedal is operated, the control pressurized oil flows into the "CLM" side oil chamber of the clutch cylinder through the front drum foot brake valve, and the cylinder thrust force is decreased to actuate the brake (braking with the clutch).



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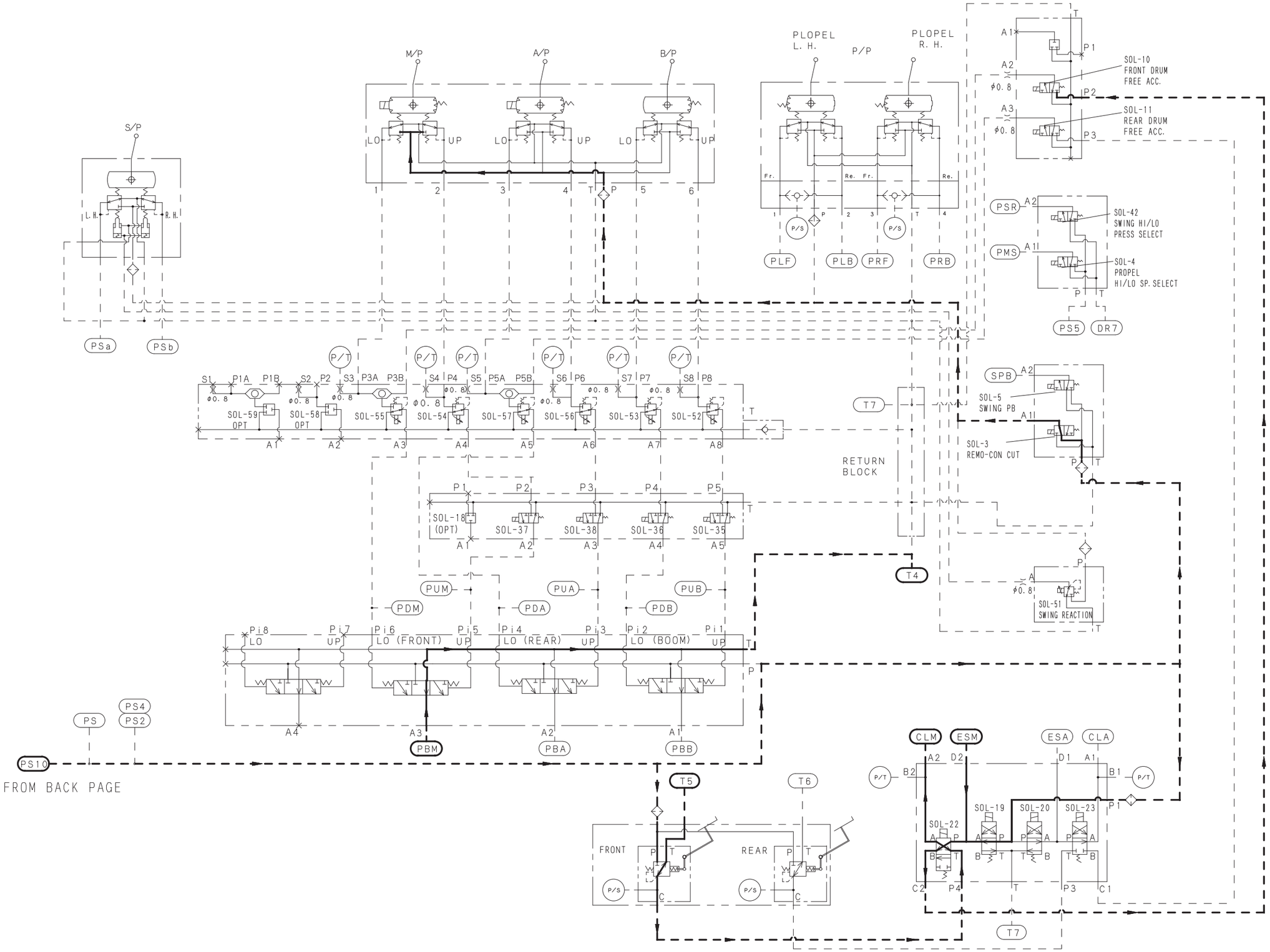
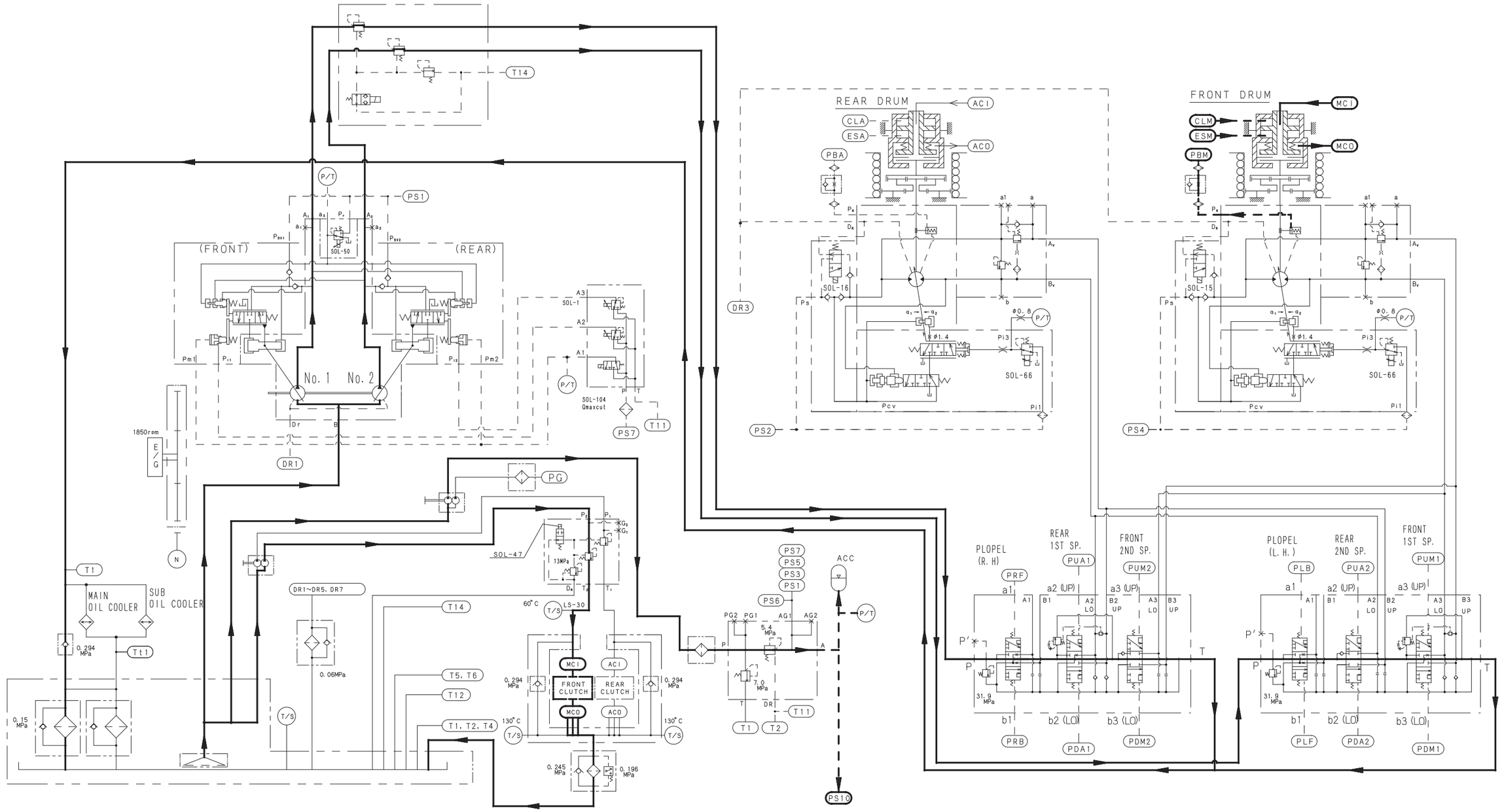
Free Fall (1/2)


S/P
L. H.
R. H.
PSa
PSb
M/P
A/P
B/P
LO
UP
1
2
3
4
T
P
5
6
PLOPEL
L. H.
P/P
PLOPEL
R. H.
Fr.
Re.
P/S
PLF
PLB
PRF
PRB
A1
A2
A3
P1
P2
P3
SOL-10
FRONT DRUM
FREE ACC.
SOL-11
REAR DRUM
FREE ACC.
PSR
PMS
SOL-42
SWING HI/LO
PRESS SELECT
SOL-4
PROPEL
HI/LO SP. SELECT
PS5
DR7
SPB
SOL-5
SWING PB
SOL-3
REMO-CON CUT
SOL-51
SWING REACTION
T4
T7
P/T
S1
P1A
P1B
S2
P2
S3
P3A
P3B
S4
P4
S5
P5A
P5B
S6
P6
S7
P7
S8
P8
φ0.8
SOL-59
OPT
SOL-58
OPT
SOL-55
SOL-54
SOL-57
SOL-56
SOL-53
SOL-52
A4
A5
A6
A7
A8
T
RETURN
BLOCK
SOL-18
(OPT)
SOL-37
SOL-38
SOL-36
SOL-35
PUM
PUA
PUB
PDM
PDA
PDB
Pi8
Pi7
Pi6
Pi5
Pi4
Pi3
Pi2
Pi1
LO (FRONT)
LO (REAR)
LO (BOOM)
PBM
PBA
PBB
PS
PS4
PS2
PS10
FROM BACK PAGE
T5
T6
FRONT
REAR
CLM
ESM
ESA
CLA
B2
B1
D2
D1
SOL-22
SOL-19
SOL-20
SOL-23
C2
C1

Free Fall (2/2)



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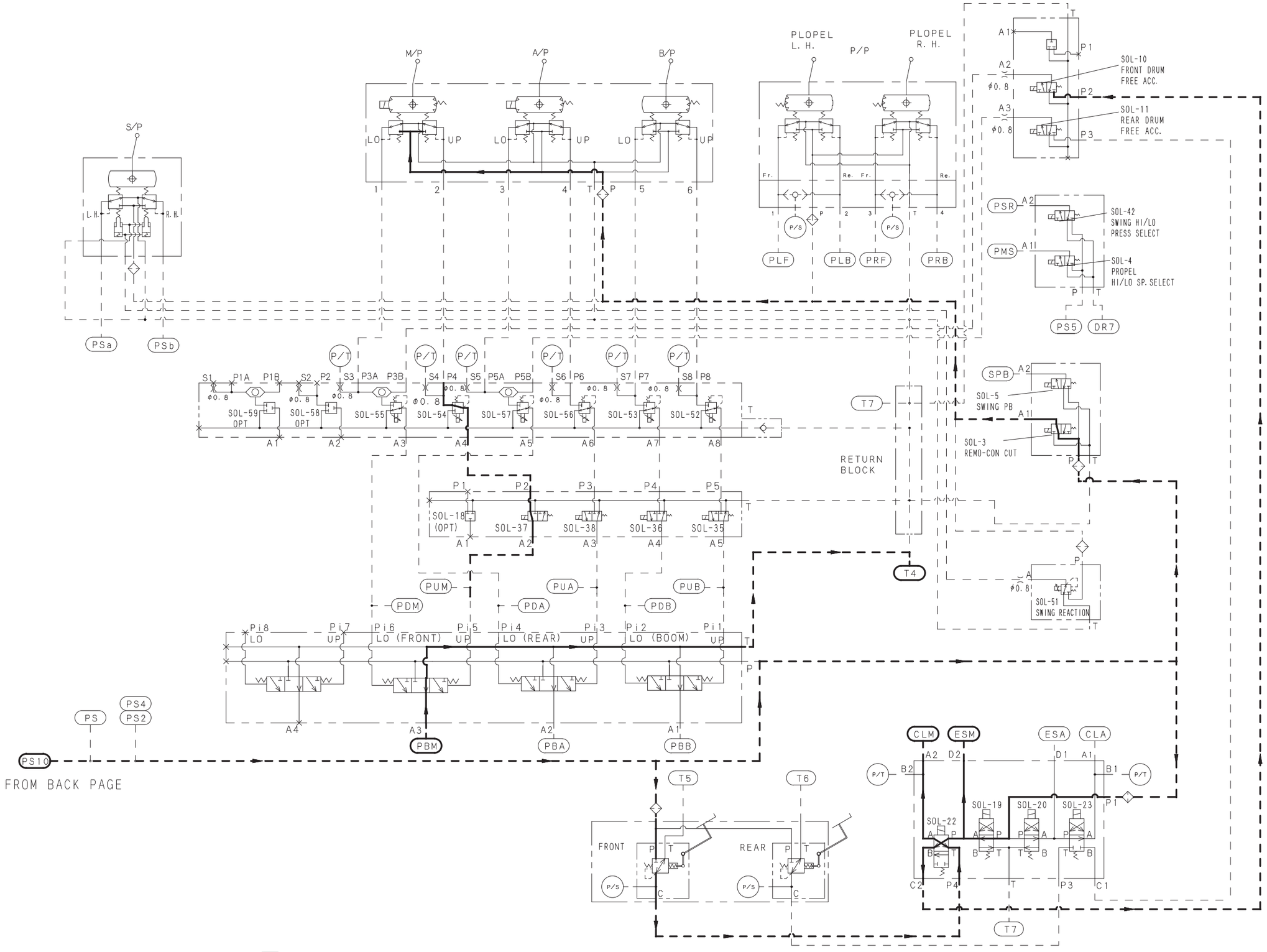
Free Fall Control (1/2)



Free Fall Control (2/2)

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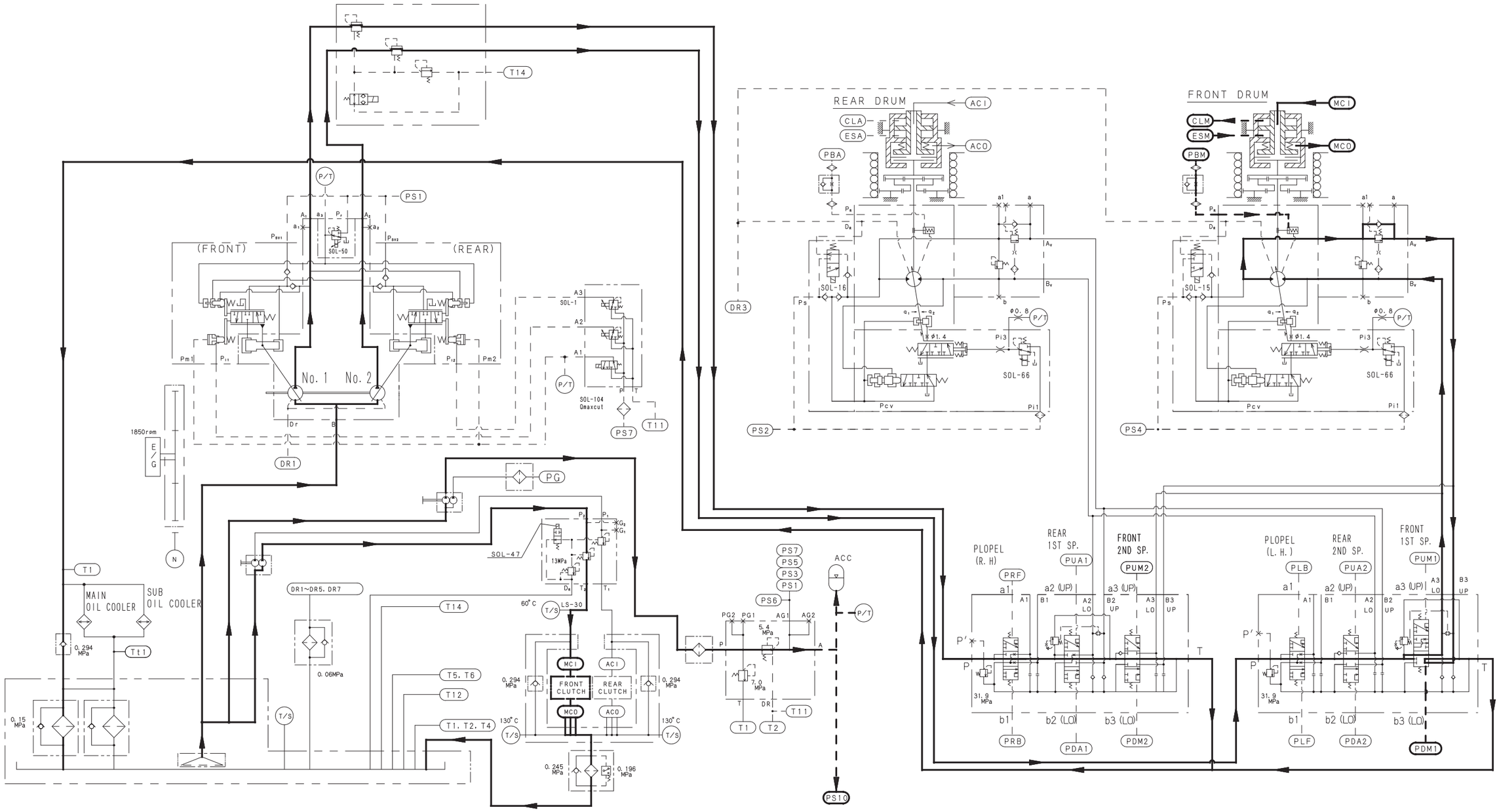
FREE FALL ACCELERATION

Free fall with the "FREE FALL SPEED SELECT SWITCH" on the left upper switch panel set to the "HIGH" position.

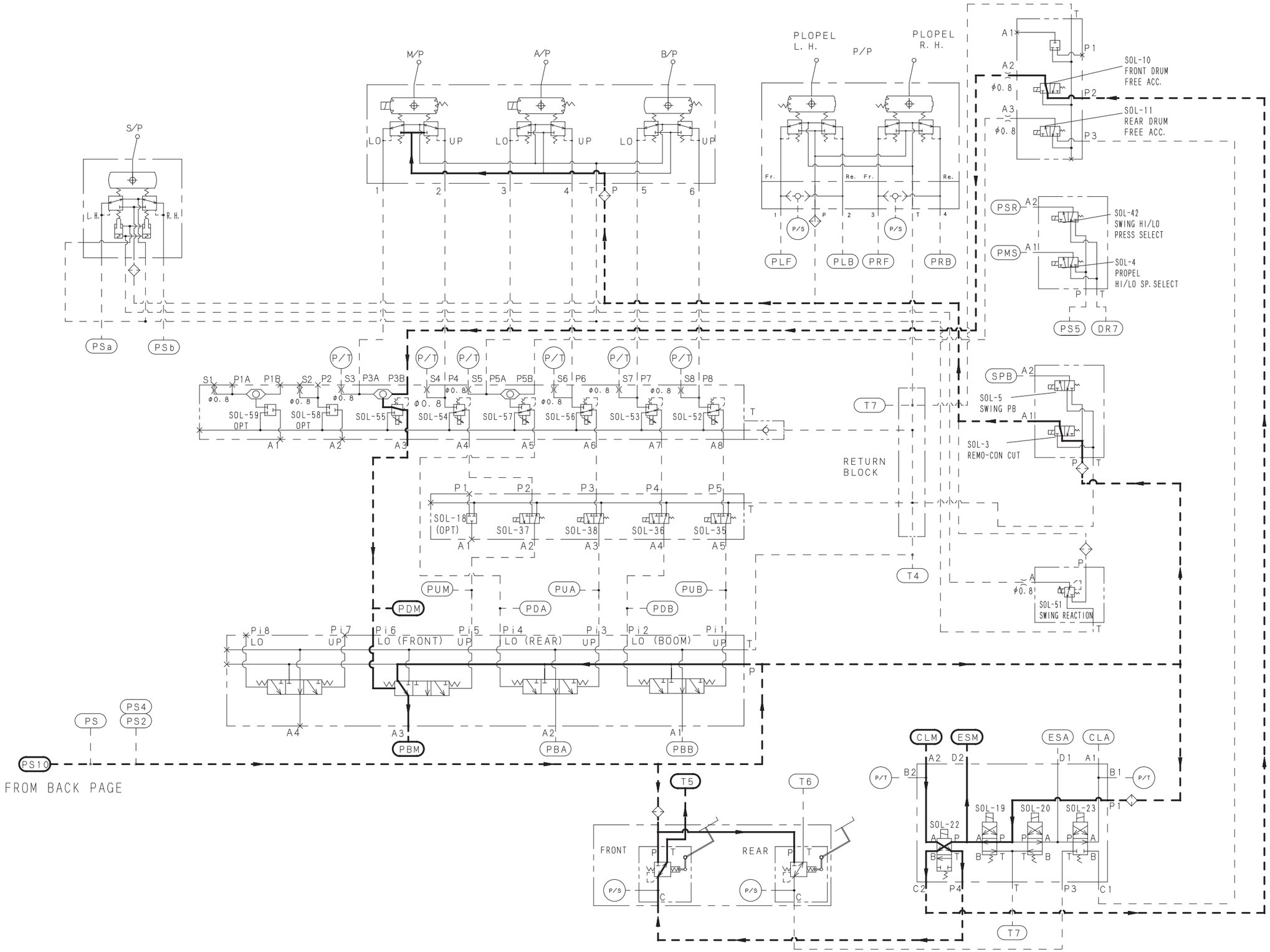
When the front drum foot brake pedal is released, the solenoid valve (SOL-10) is switched over, and pressurized oil from the clutch valve block (4-section SOL) flows into the "PDM1" port of the main control valve through the shuttle valve and solenoid proportional valve (SOL-55) to move the spool.

At the same time, the oil also goes into the brake cylinder "PBM" port of the winch motor through the brake valve block (4-section pilot operated valves) to release the motor brake.
Then, the motor rotates to the lowering direction. Though the clutch is released while the "FREE FALL" mode is selected and the foot brake is released, the rotation of the winch motor is transmitted to the drum, and the free fall speed is increased by the power lowering, because the rotation resistance of the clutch is larger than that of the drum.
In this status, the drum can rotate without any load.

When the brake pedal is depressed, pressurized oil is fed to the "CLM" side of the clutch cylinder through the front drum foot brake valve.
Then, the cylinder thrust force is decreased to slow down the free fall speed, and the control pressure from the solenoid valve (SOL-10) in the 3-section valve block is also decreased by the proportional valve (SOL-55) and the solenoid valve (SOL-10) to return the main control valve spool to the neutral position.
When the spool is returned to the neutral position, pressurized oil to the motor is shut off, and the main motor stops rotating.



Free Fall Speed Acceleration (1/2)



Free Fall Speed Acceleration (2/2)

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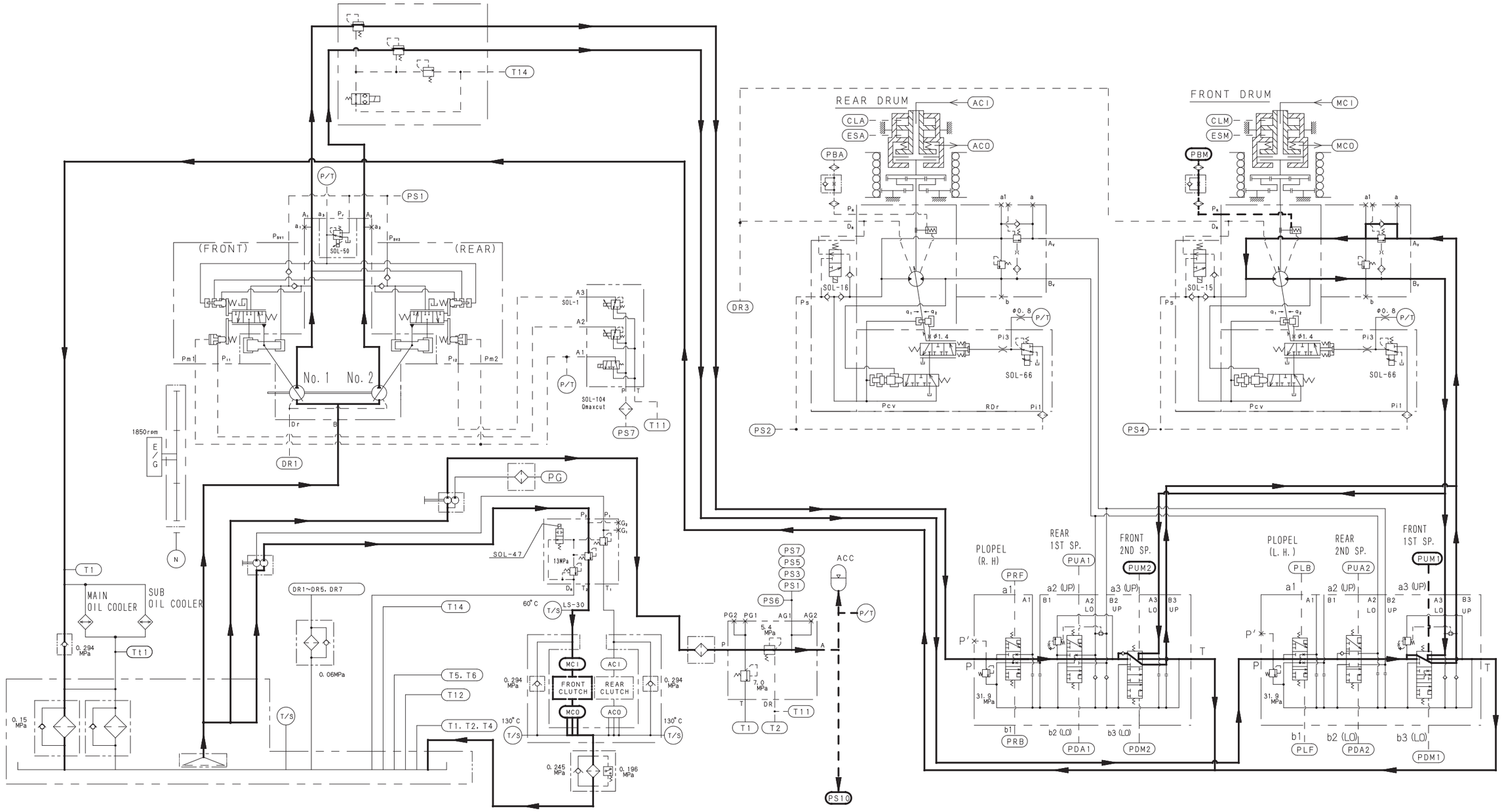
6.6.6 G WINCH MODE LIFTING

Refer to ELECTRIC CONTROL for condition of switching over to G winch mode.
Function of the front drum and the rear drum are exactly same.
The front drum is explained here as an example.

While the function lock lever is in the "Work" position (SOL-3 : On position), oil pressure from the control pump flows through the accumulator and into the foot brake valve block, the clutch valve block, brake valve block (4-section pilot operated valve) and through the valve block (2-section solenoid valves) and into the remote control valve.
The pressurized oil is also fed to the both sides oil chambers of the front drum clutch cylinder ("CLM", "ESM") via the clutch valve block (4-section solenoid valves).
Since the cylinder thrust force by the pressurized oil is not generated, the clutch is connected with the spring.
When the front drum control lever is operated in the "hoist load" direction, it directs control pressure oil through the remote control valve and this control oil pressure is supplied to "PDM1" port via pilot pressure select valve and "PDM2" port via pilot select valve port of the main control valve where it moves the spool.

At the same time, the control pressurized oil flows into the "PBM" port of the brake cylinder built in the winch motor via the brake valve block (4-section pilot operated valves), and the motor brake is released.
As directed by the position of the spool, the main pump (No.1, No.2) oil flowing into the control valve is sent to the raising side of the hoist motor to drive the front drum and thereby raise the load.



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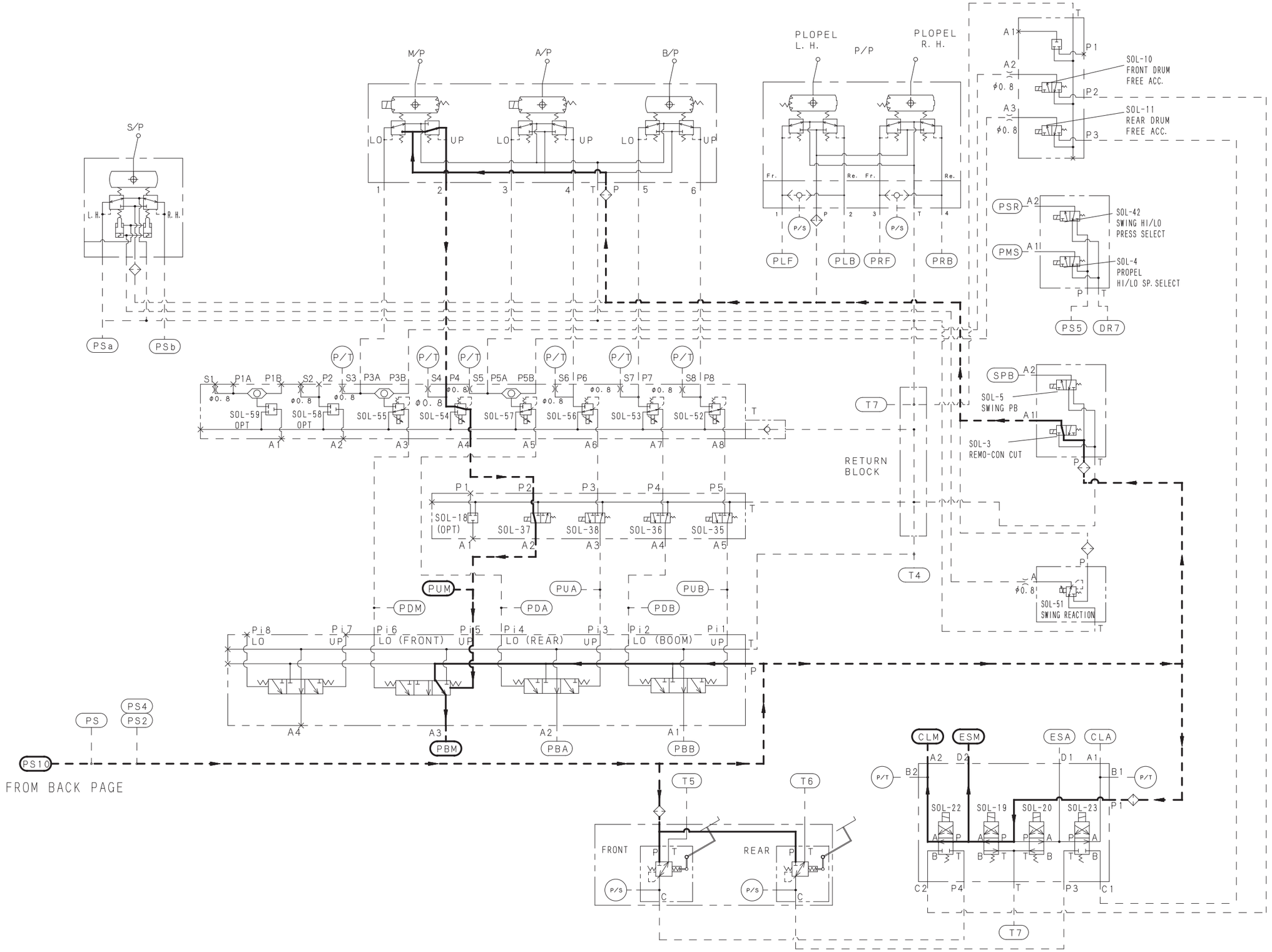
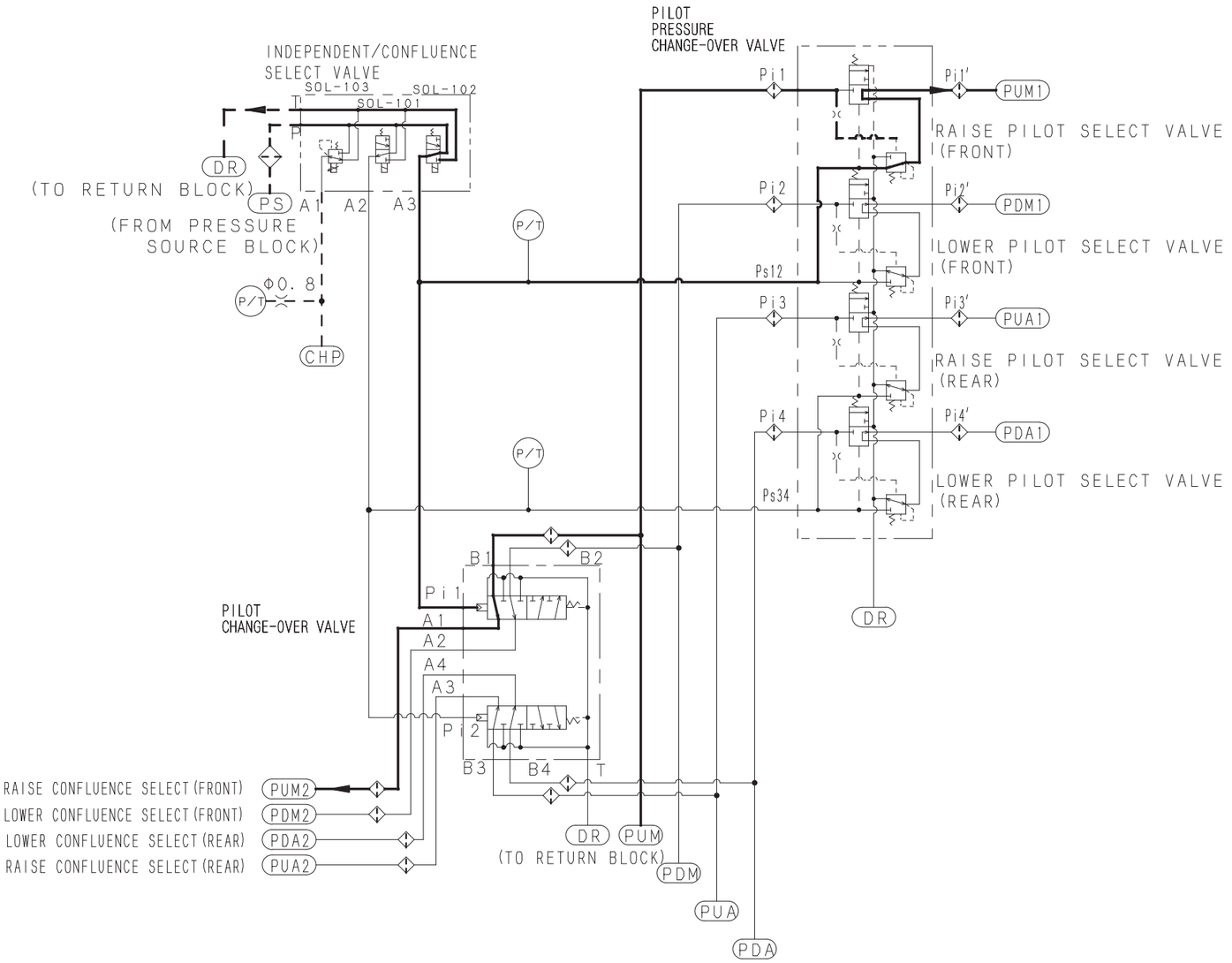
Lifting (1/3)


S/P
L.H.
R.H.
PSa
PSb
M/P
A/P
B/P
LO
UP
1
2
3
4
T
P
5
6
PLOPEL L. H.
P/P
PLOPEL R. H.
Fr.
Re.
P/S
PLF
PLB
PRF
PRB
A1
A2
A3
P1
P2
P3
T
SOL-10 FRONT DRUM FREE ACC.
SOL-11 REAR DRUM FREE ACC.
φ0.8
PSR
PMS
SOL-42 SWING HI/LO PRESS SELECT
SOL-4 PROPEL HI/LO SP. SELECT
PS5
DR7
SPB
SOL-5 SWING PB
SOL-3 REMO-CON CUT
P/T
S1
P1A
P1B
S2
P2
S3
P3A
P3B
S4
P4
S5
P5A
P5B
S6
P6
S7
P7
S8
P8
SOL-59 OPT
SOL-58 OPT
SOL-55
SOL-54
SOL-57
SOL-56
SOL-53
SOL-52
A4
A5
A6
A7
A8
T7
RETURN BLOCK
T4
SOL-51 SWING REACTION
SOL-18 (OPT)
SOL-37
SOL-38
SOL-36
SOL-35
PUM
PUA
PUB
PDM
PDA
PDB
Pi8
Pi7
Pi6
Pi5
Pi4
Pi3
Pi2
Pi1
LO
LO (FRONT)
LO (REAR)
LO (BOOM)
PBM
PBA
PBB
PS
PS4
PS2
PS10
FROM BACK PAGE
T5
T6
FRONT
REAR
CLM
ESM
ESA
CLA
SOL-22
SOL-19
SOL-20
SOL-23
C1
C2
P4
P3

Lifting (2/3)


PILOT
PRESSURE
CHANGE-OVER VALVE
INDEPENDENT/CONFLUENCE
SELECT VALVE
SOL-103
SOL-102
SOL-101
P
T
DR
(TO RETURN BLOCK)
PS
A1
A2
A3
(FROM PRESSURE
SOURCE BLOCK)
P/T
φ0.8
CHP
Pi1
Pi1'
PUM1
RAISE PILOT SELECT VALVE
(FRONT)
Pi2
Pi2'
PDM1
LOWER PILOT SELECT VALVE
(FRONT)
Ps12
Pi3
Pi3'
PUA1
RAISE PILOT SELECT VALVE
(REAR)
Pi4
Pi4'
PDA1
LOWER PILOT SELECT VALVE
(REAR)
Ps34
B1
B2
Pi1
A1
A2
A4
A3
Pi2
B3
B4
T
PILOT
CHANGE-OVER VALVE
RAISE CONFLUENCE SELECT (FRONT)
PUM2
LOWER CONFLUENCE SELECT (FRONT)
PDM2
LOWER CONFLUENCE SELECT (REAR)
PDA2
RAISE CONFLUENCE SELECT (REAR)
PUA2
DR
PUM
(TO RETURN BLOCK)
PDM
PUA
PDA

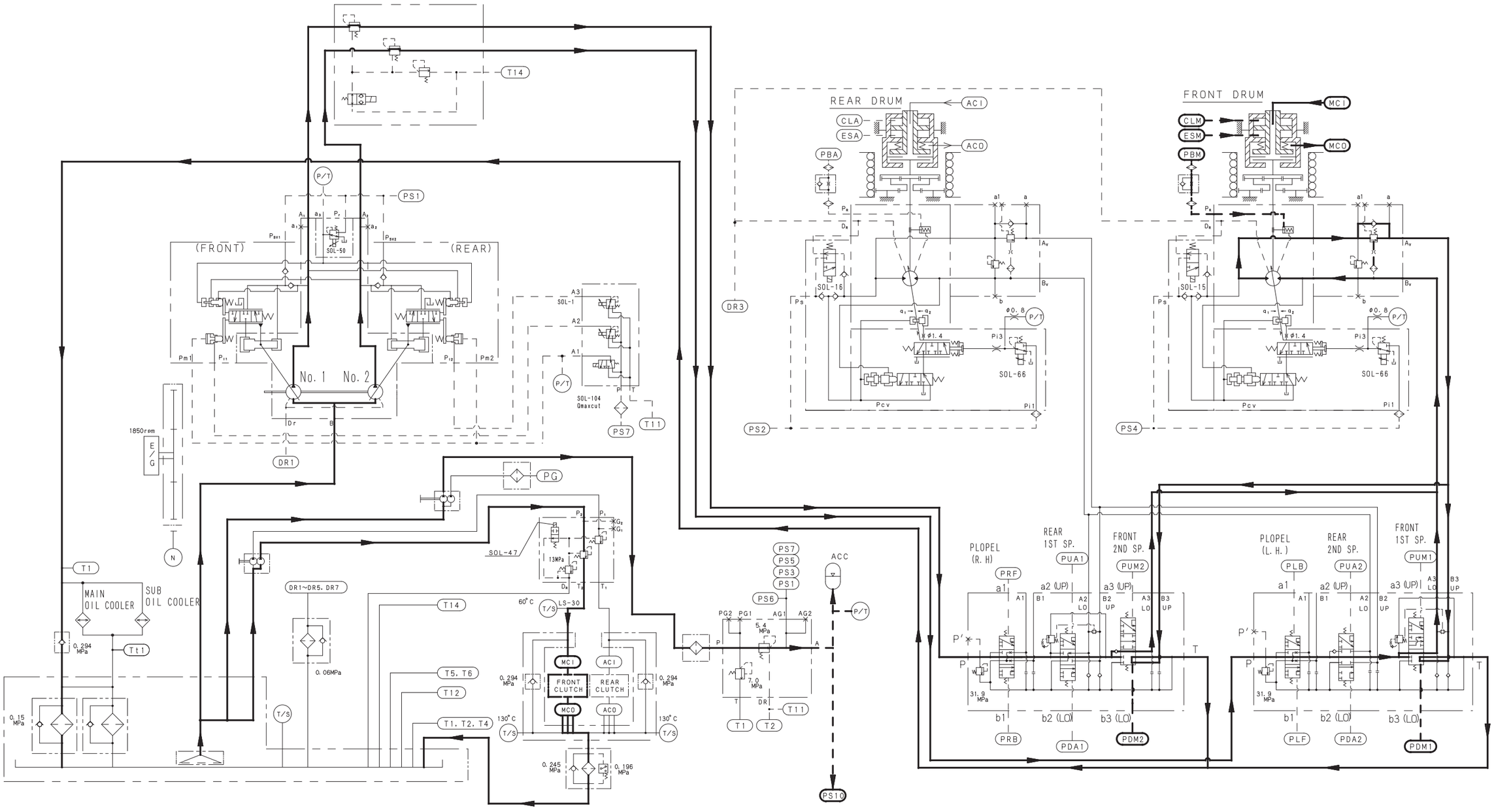
Lifting (3/3)

6.6.7 G WINCH MODE LOWERING

Refer to ELECTRIC CONTROL for condition of switching over to G winch mode.
Function of the front drum and the rear drum are exactly same.
The motions are same for the front drum and the rear drum.
The front drum motion is explained here as example.

When the function lock lever is in the "Work" position (SOL-3 : ON position), oil pressure from the control pump flows past the accumulator and into the foot brake valve block, the clutch valve block, brake valve block (4-section pilot operated valve) and flows through the valve block (2-section solenoid valves) and into the remote control valve.
The pressurized oil is fed to the both sides oil chambers of the clutch cylinder ("CLM", "ESM") via the clutch valve block (4-section solenoid valves).
Since the cylinder thrust force by the pressurized oil is not generated, the clutch is engaged with the spring.
When the main control lever is operated to the "lower load" direction, this control oil pressure is directed by the remote control valve this control oil pressure is supplied to "PDM1" port via pilot pressure select valve and "PDM2" port via pilot select valve of the main control valve and it moves the spool.

At the same time, control pressure is also directed through the brake valve block (4-section pilot operated valve) to the "PBM" port of the motor brake cylinder.
It causes the motor brake to disengage.
Now the main pump (No.1, No.2) oil flowing into the control valve, as directed by the position of the spool, activates the hoist motor to drive the drum and thereby lower the load.
The counterbalance valve is opened by pilot pressure from the "running in" side to allow the main motor to rotate and lower the load.



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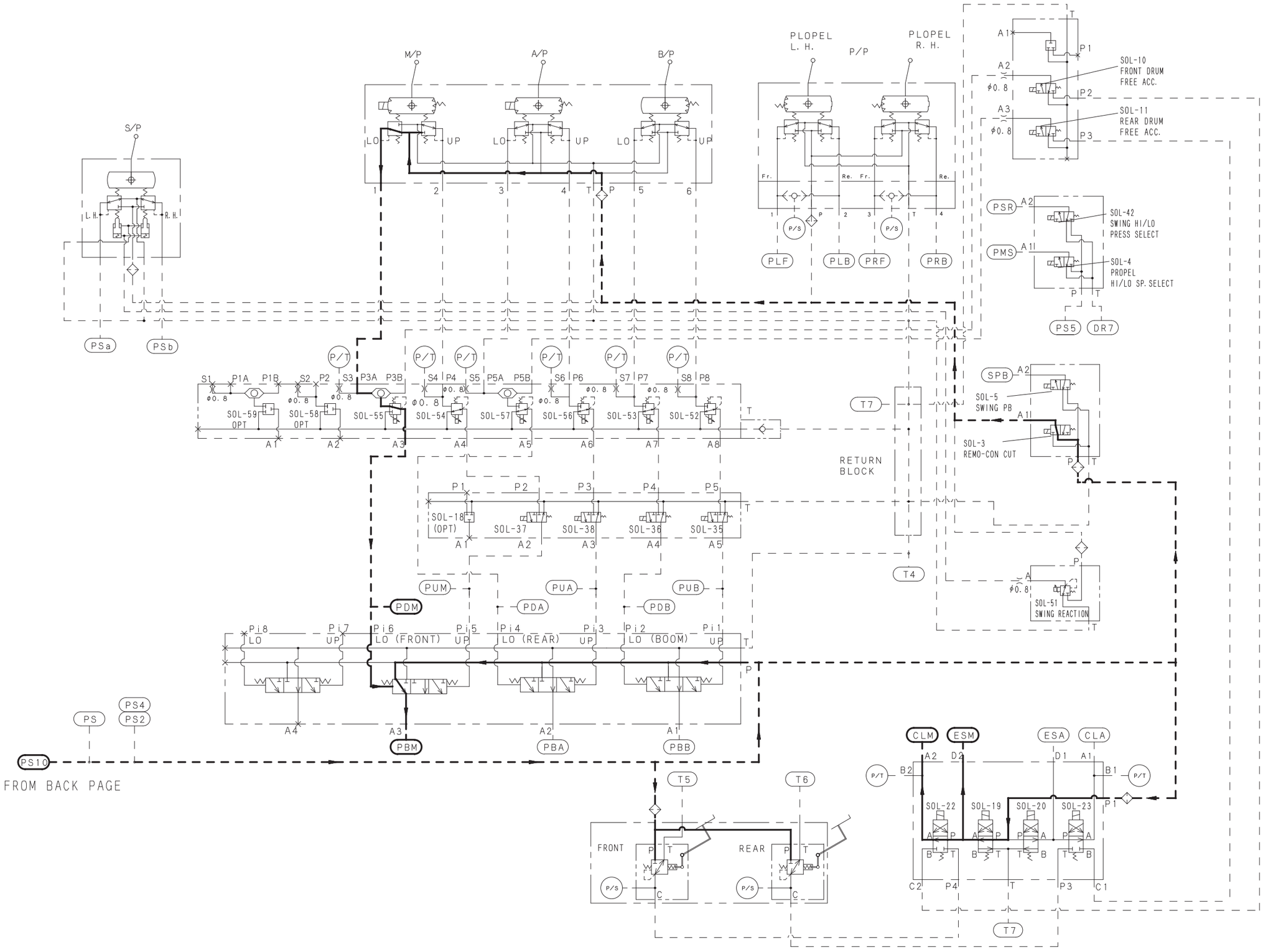
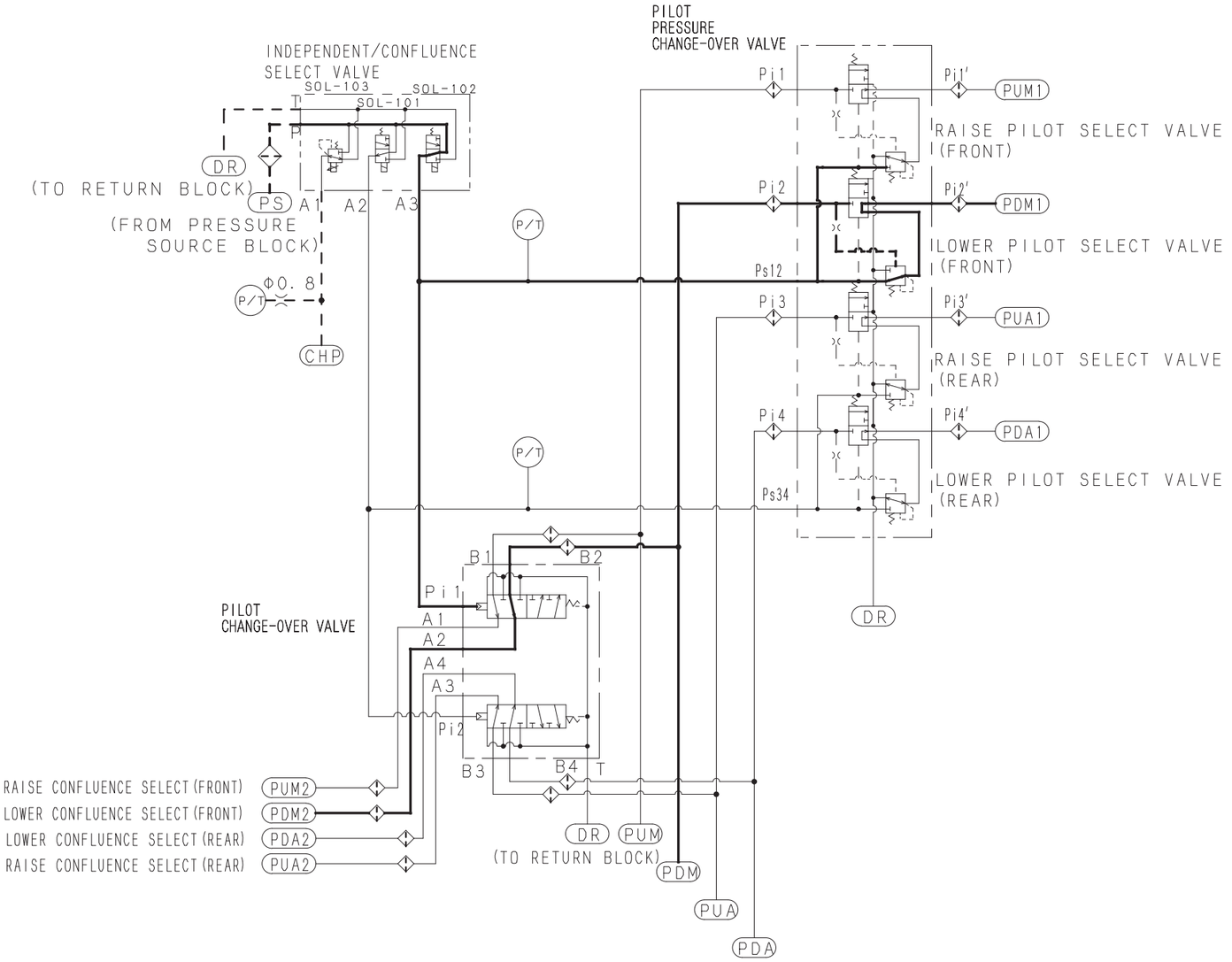
Lowering (1/3)


S/P
L. H.
R. H.
PSa
PSb
M/P
A/P
B/P
LO
UP
PLOPEL L. H.
P/P
PLOPEL R. H.
Fr.
Re.
P/S
PLF
PLB
PRF
PRB
T
A1
A2
A3
P1
P2
P3
SOL-10 FRONT DRUM FREE ACC.
SOL-11 REAR DRUM FREE ACC.
φ0.8
PSR
PMS
SOL-42 SWING HI/LO PRESS SELECT
SOL-4 PROPEL HI/LO SP. SELECT
PS5
DR7
SPB
SOL-5 SWING PB
SOL-3 REMO-CON CUT
SOL-51 SWING REACTION
P/T
S1
P1A
P1B
S2
P2
S3
P3A
P3B
S4
P4
S5
P5A
P5B
S6
P6
S7
P7
S8
P8
SOL-59 OPT
SOL-58 OPT
SOL-55
SOL-54
SOL-57
SOL-56
SOL-53
SOL-52
T7
RETURN BLOCK
T4
P1
P2
P3
P4
P5
SOL-18 (OPT)
SOL-37
SOL-38
SOL-36
SOL-35
PUM
PUA
PUB
PDM
PDA
PDB
Pi8
Pi7
Pi6
Pi5
Pi4
Pi3
Pi2
Pi1
LO (FRONT)
LO (REAR)
LO (BOOM)
PBM
PBA
PBB
PS
PS4
PS2
PS10
FROM BACK PAGE
T5
T6
FRONT
REAR
CLM
ESM
ESA
CLA
SOL-22
SOL-19
SOL-20
SOL-23
B1
B2
C1
C2
D1
D2

Lowering (2/3)


PILOT
PRESSURE
CHANGE-OVER VALVE
INDEPENDENT/CONFLUENCE
SELECT VALVE
SOL-103
SOL-102
SOL-101
DR
(TO RETURN BLOCK)
PS
A1
A2
A3
(FROM PRESSURE
SOURCE BLOCK)
P/T
φ0.8
CHP
Pi1
Pi1'
PUM1
RAISE PILOT SELECT VALVE
(FRONT)
Pi2
Pi2'
PDM1
LOWER PILOT SELECT VALVE
(FRONT)
Ps12
Pi3
Pi3'
PUA1
RAISE PILOT SELECT VALVE
(REAR)
Pi4
Pi4'
PDA1
LOWER PILOT SELECT VALVE
(REAR)
Ps34
B1
B2
Pi1
A1
A2
A4
A3
Pi2
B3
B4
T
PILOT
CHANGE-OVER VALVE
RAISE CONFLUENCE SELECT (FRONT)
LOWER CONFLUENCE SELECT (FRONT)
LOWER CONFLUENCE SELECT (REAR)
RAISE CONFLUENCE SELECT (REAR)
PUM2
PDM2
PDA2
PUA2
DR
PUM
(TO RETURN BLOCK)
PDM
PUA
PDA

Lowering (3/3)

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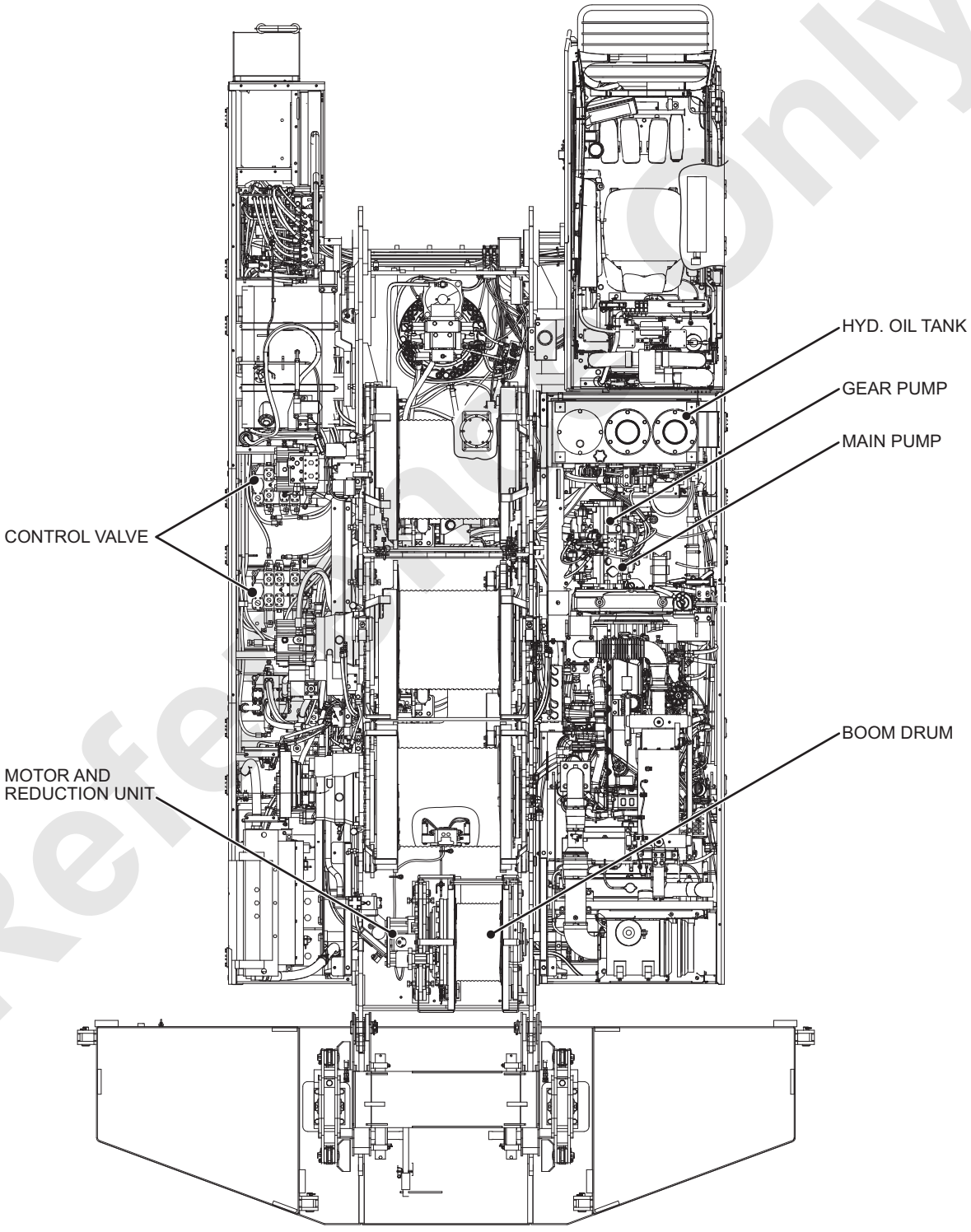
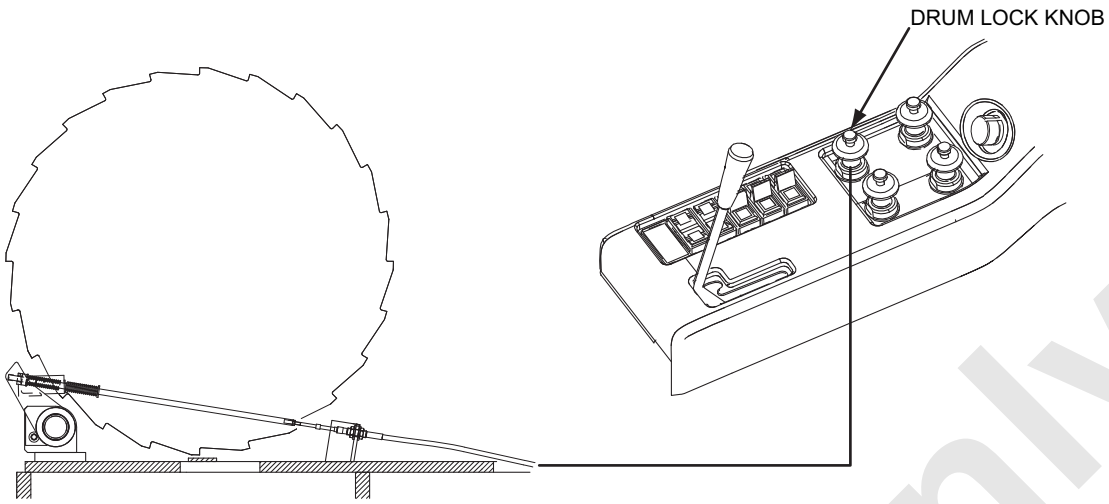
7. BOOM HOIST SYSTEM

7.1 APPARATUS AND LOCATION OF COMPONENTS

The boom hoist system consists of the main pump, the main control valve, the boom drum motor, the reduction unit, the boom drum and the drum lock mechanism. The pressurized oil for the boom hoist system is supplied by the main pump (No.1) installed on the engine's power divider. From this pump, the oil flows through the 4 section side control valve to drive the motor of the boom drum.





As for raising, neutral and lowering circuit and functions, refer to P.7-11 to 7-17.

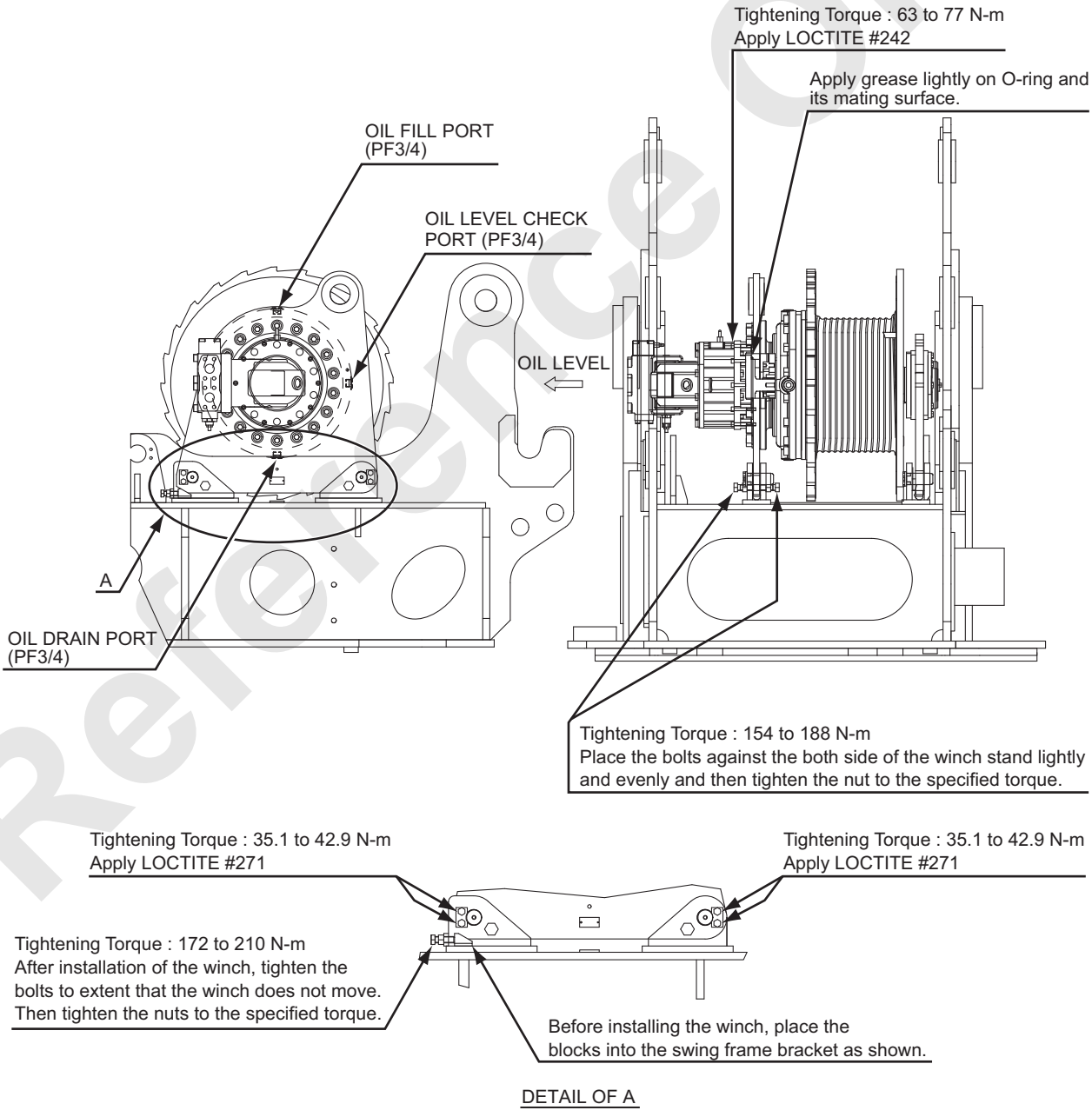
7.2 BOOM HOIST WINCH INSTALLATION

When boom hoist winch is to be installed or removed, perform work observing the following tightening torque and note.

Note

When replacing the gear oil, use the specified type of oil and fill in to the specified level.

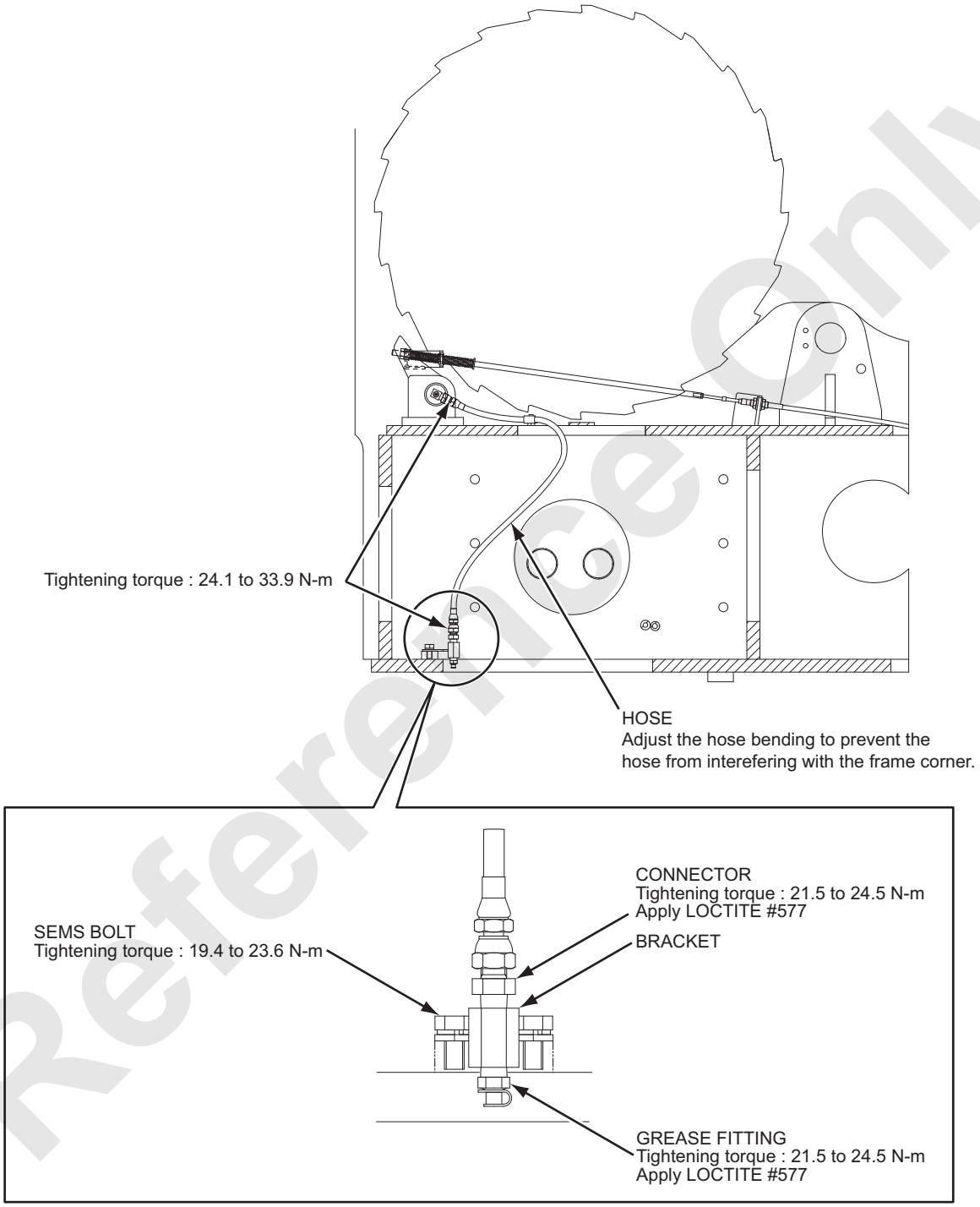
Specified type of oil : Extreme pressure gear oil SAE#90 (API-GL4) or SAE#80W-90
Specified volume : Approx. 8 ltr.



7.3 BOOM DRUM LOCK

7.3.1 ASSEMBLY DRAWING

When the assembly is complete, fill grease until it is squeezed out from the clearances of the pawl.

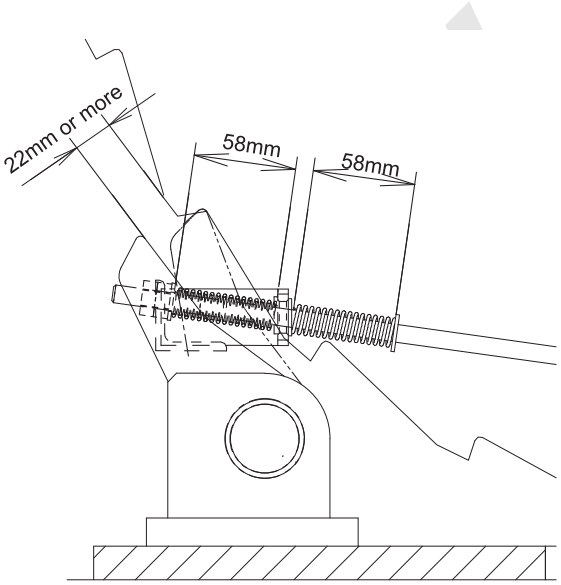


7.3.2 ADJUSTING THE BOOM DRUM LOCK

WARNING

Ensure to adjust the boom hoist drum lock while the boom has been lowered to the ground. Failure to observe this precaution may result in serious injury or loss of life.

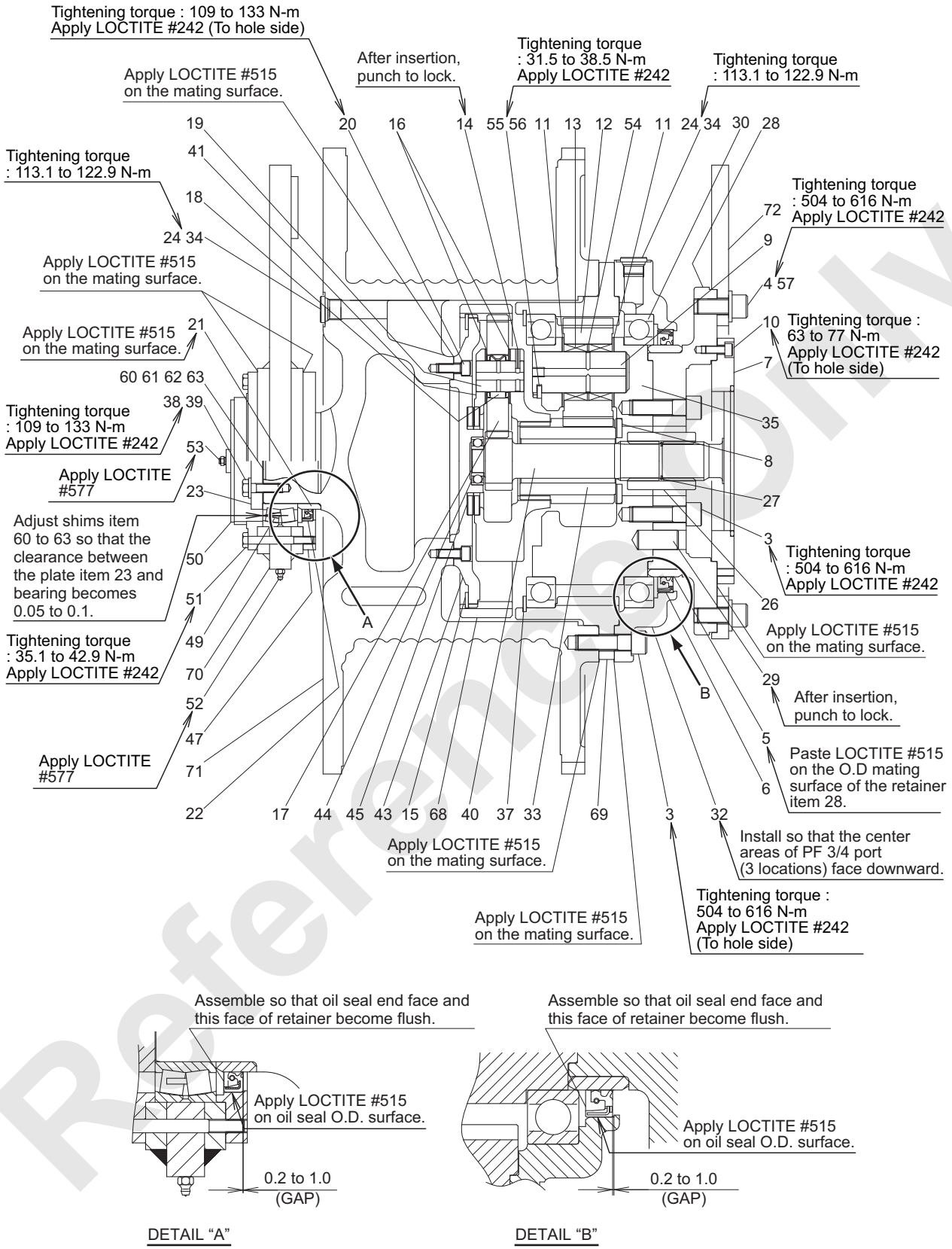
1. Turn the boom hoist lever to neutral and pull the drum lock knob in the LOCK position and check to see that the pawl is engaged in the bottom of the drum ratchet.
   If the pawl is not engaged in the bottom of the ratchet, adjust the spring dimension to allow the pawl to be engaged in the bottom.
2. Push the drum lock knob fully and check to see that the pawl is clear of the ratchet by at least 22 mm. Operate the knob to push and pull for a few times and confirm that the pawl moves smoothly.
3. Push and pull the knob for a several times to check for the smooth movement of the pawl.



WARNING

Keep hands and clothing clear of the rotating drum. Failure to observe this precaution may result in serious injury or loss of life.

7.4 REDUCTION UNIT



DETAIL "A"

DETAIL "B"

3. Capscrew
4. Capscrew
5. Sleeve
6. Oil seal
7. Retainer
8. Spacer
9. Pin
10. Capscrew
11. Thrust washer
12. Pinion
13. Needle bearing
14. Spring pin
15. Retaining ring
16. Thrust washer
17. Pinion
18. Needle bearing
19. Pin
20. Capscrew
21. Collar
22. Oil seal
23. Plate
24. O-ring
26. Collar
27. Retaining ring
28. Retainer
29. Pin
30. Bearing
32. Retainer
33. Sun gear
34. Plug
35. Spider
37. Retaining ring
38. Capscrew
39. Washer
40. Sun gear
41. Spider
43. Cover
44. Bearing
45. Spacer
47. Retainer
49. Bearing
50. Retainer
51. Capscrew
52. Grease fitting
53. Breather
54. Thrust washer
55. Keeper plate
56. Capscrew
57. Washer
58. Plate
60. Shim (t=0.1)
61. Shim (t=0.2)
62. Shim (t=0.5)
63. Shim (t=1.0)
68. Ring gear
69. Ring gear
70. Plate
71. Winch drum
72. Plate

TIGHTENING TORQUE TABLE

Item	Name	Size	Tightening Torque (N-m)
3	Capscrew	M20 X 70	504 to 616
4	Capscrew	M20 X 45	504 to 616
10	Capscrew	M10 X 25	63 to 77
20	Capscrew	M12 X 30	109 to 133
34	Plug	PF3/4	113.1 to 122.9
38	Capscrew	M12 X 40	109 to 133
51	Capscrew	M10 X 85	35.1 to 42.9
56	Capscrew	M8 X 20	31.5 to 38.5

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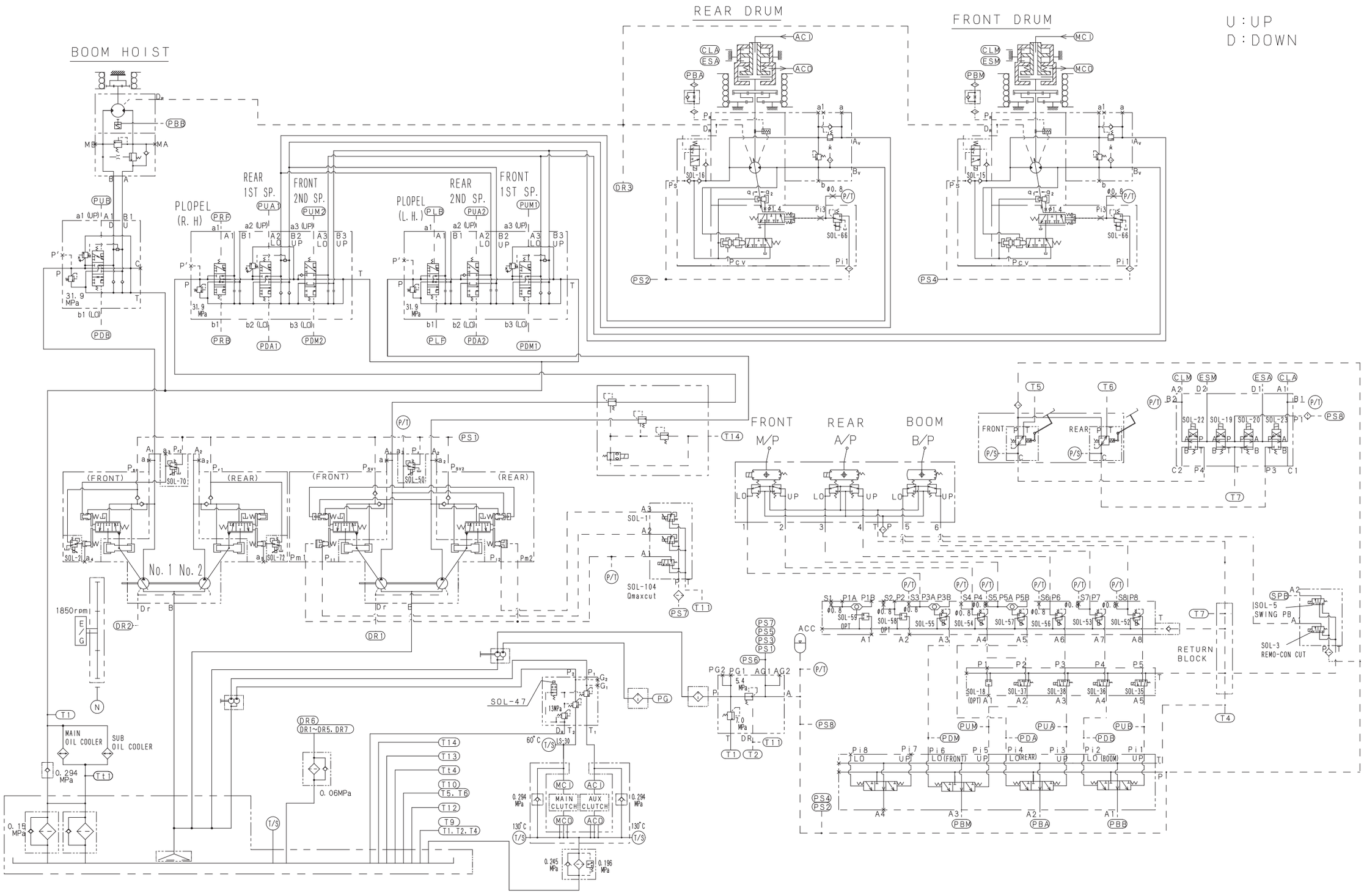
7.5 CONSTRUCTION AND FUNCTION

7.5.1 HYDRAULIC SCHEMATIC

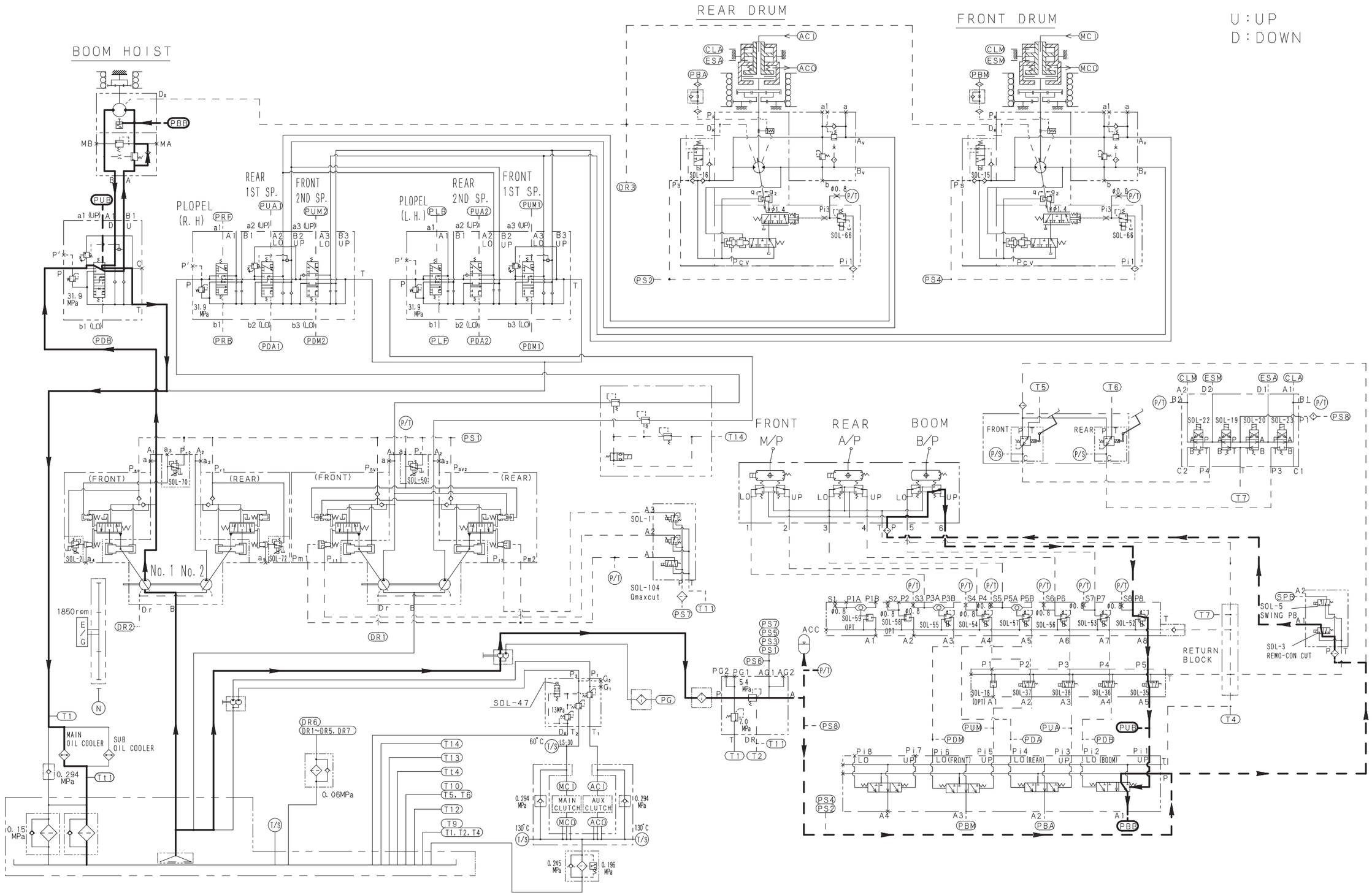


BOOM HOIST HYD. CIRCUIT

7.5.2 RAISING THE BOOM

Pressurized hydraulic oil from the main pump (No.1) flows into 1 section side of the main control valve.
The control pressurized oil from the control valve flows into the valve block and remote control valve through the accumulator. (Function lock lever is in WORK POSITION : 2 section valve block SOL-3 is CHANGING POSITION)
At this time, turning the control lever to raising side make the control pressured oil pass through the remote control valve, 8 section valve, 5 section valve and 1 section valve and enter into the PUB port of the control valve to move the boom section spool.
At the same time, control pressured oil also enters into the negative brake cylinder through the valve block (4 section hyd. selecting valve) and the motor brake is released.

Main pressured oil flown into the control valve enters into the raising side of the boom drum motor by the boom section spool and the boom is raised.



BOOM RAISING

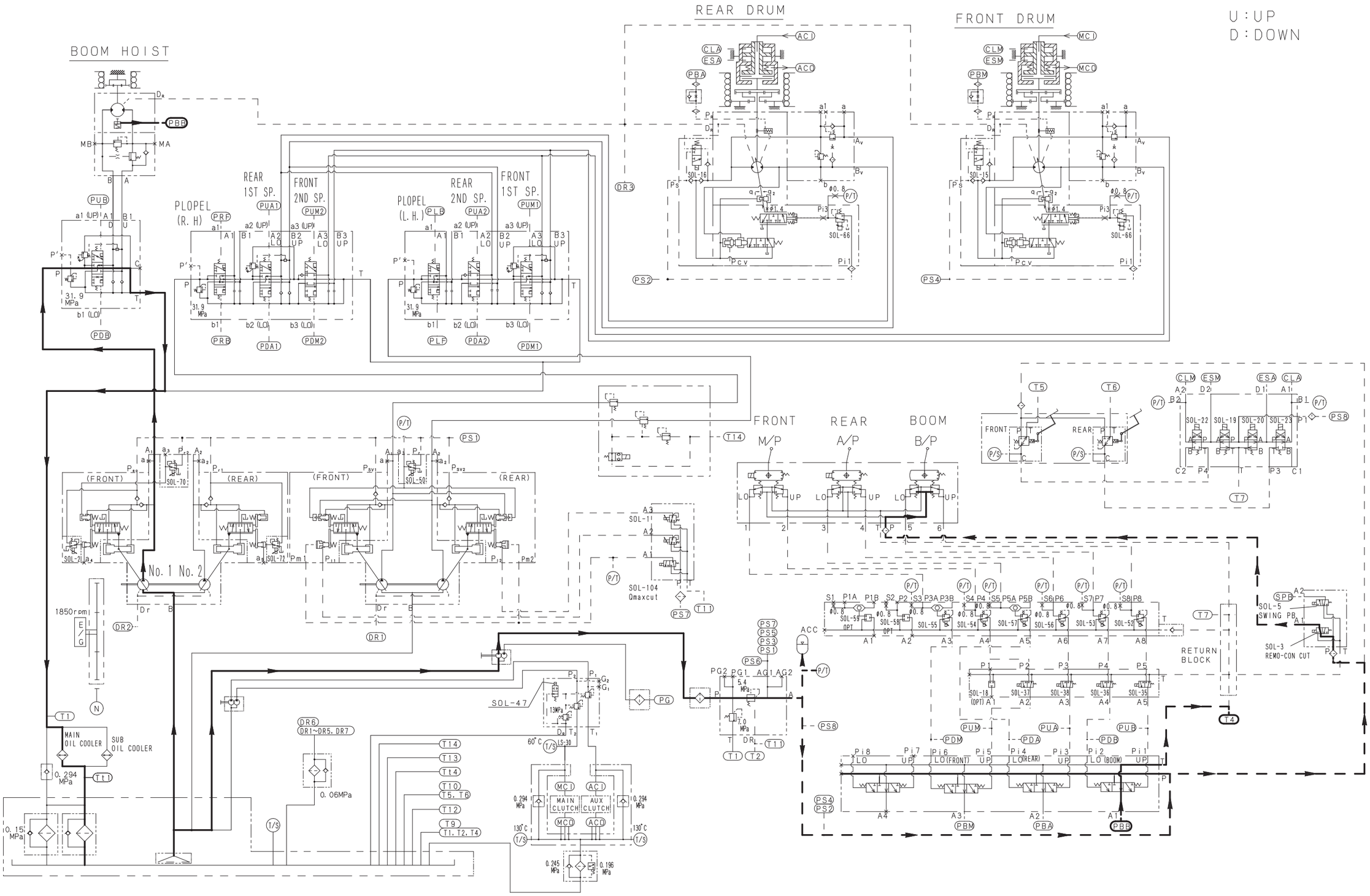
7.5.3 NEUTRAL (HOLDING BOOM)

When the control lever is returned to neutral, control pressure of the remote control valve is shut off and main control valve spool returns to neutral and pressured oil from the main pump (No.1) passes through the control valve and returns to the tank without load. The stopped motor tends to rotate toward lowering side by boom weight. But the return oil is shut off by the counterbalance valve and motor does not rotate.

At the same time, pressured oil flown into the boom drum motor brake cylinder returns to the tank through the valve block (4 section hyd. selecting valve) and the motor brake becomes actuated.

(Negative brake)

Therefore the boom is held by the counterbalance motor brake.



BOOM HOLDING

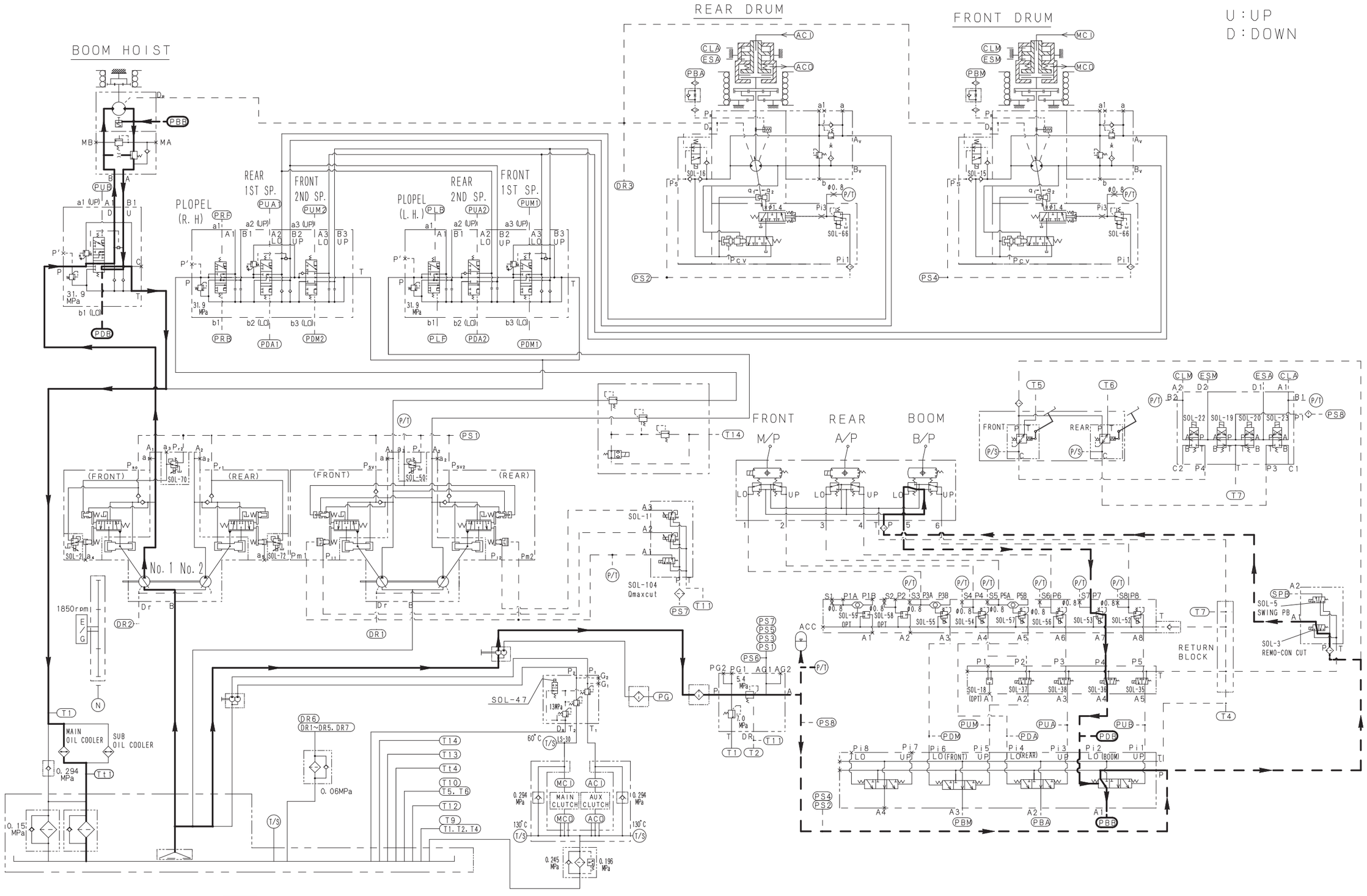
7.5.4 LOWERING BOOM

The pressured oil from the No.1 main pump flows into the 1 section side main control valve. The control pressured oil from the control pump flows into the valve block and remote control valve through the accumulator. (Function lock lever is in WORK POSITION : 2 section valve block SOL-3 is CHANGING POSITION)

At this time, turning the control lever to lowering side make the control pressured oil pass through the remote control valve, 8 section valve, 5 section valve and 1 section valve and enter into the PDB port of the control valve to move the boom section spool.

At the same time, control pressured oil also enters into the built in motor brake in the boom drum motor and the motor brake is released.

Main pressured oil flown into the control valve enters into the lowering side of the boom drum motor by the control valve and open the return counterbalance valve and the boom is lowered.



BOOM LOWERING

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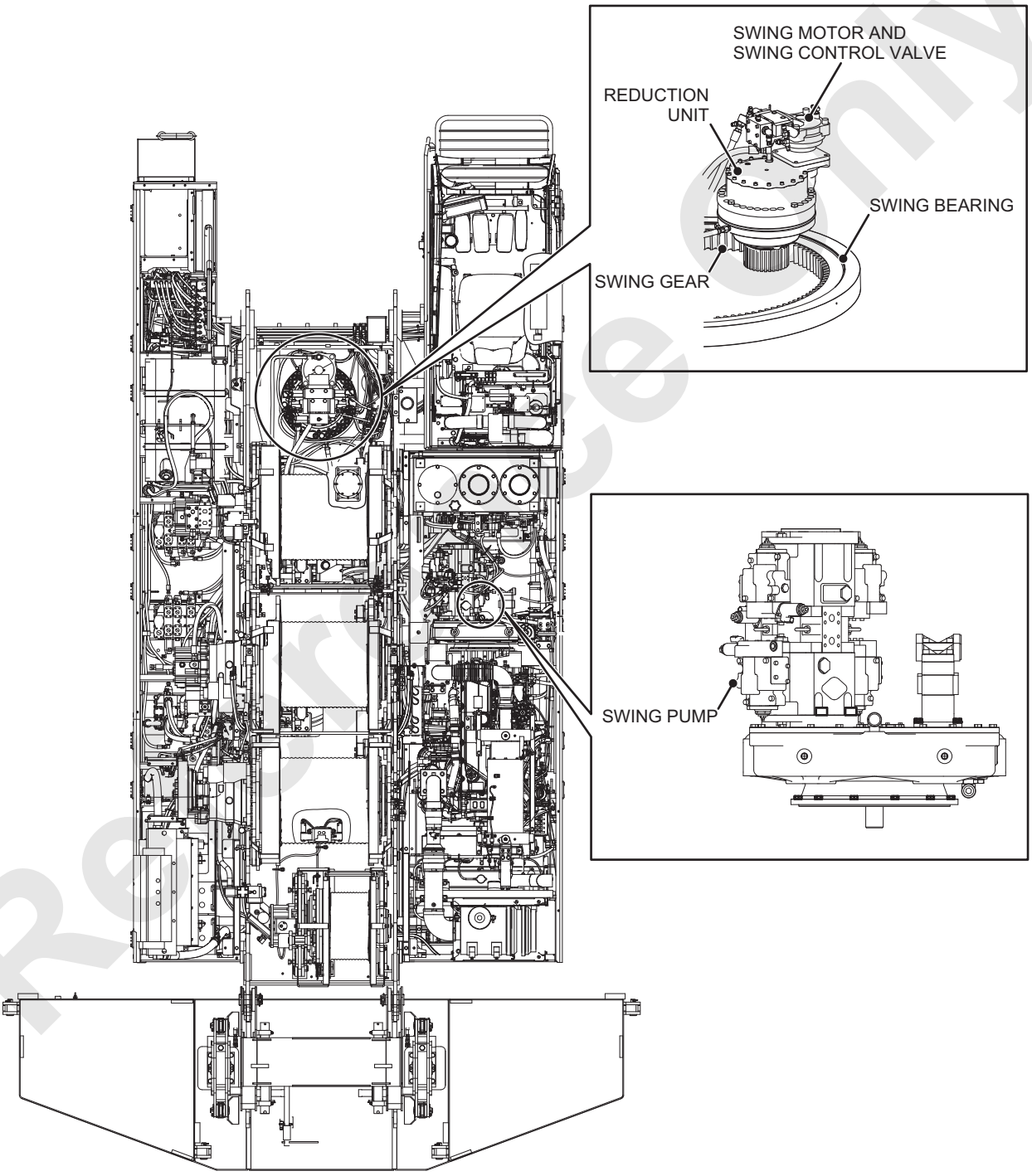
8. SWING SYSTEM

8.1 APPARATUS AND LOCATION OF COMPONENTS

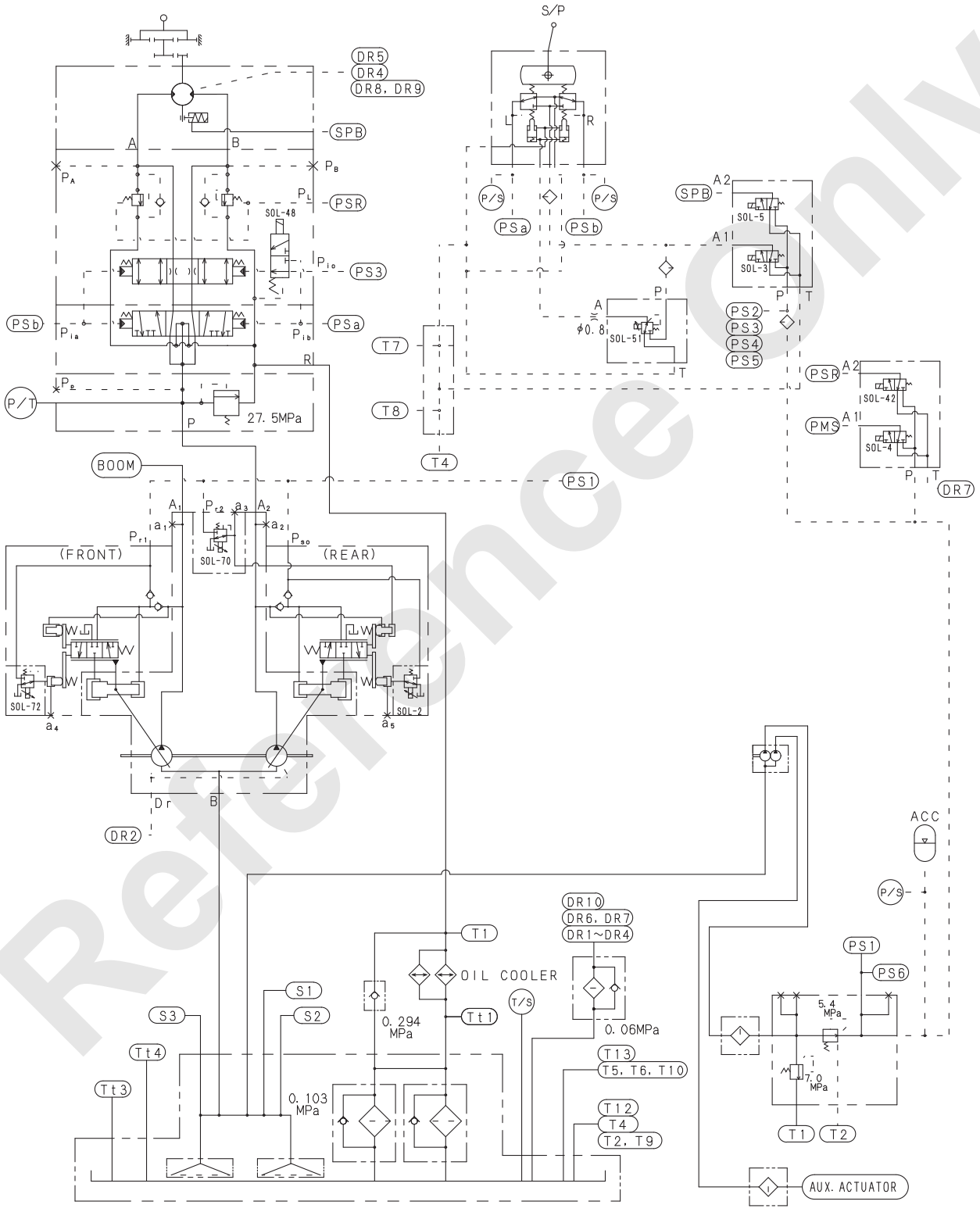
The swing system consists of the swing pump, the swing motor (built in swing brake), the swing control valve, the reduction unit, the swing bearing ring, the swivel joint, the swing gear and the swing lock.
To swing the machine's upper machinery, pressurized oil from the swing pump (No.3) mounted on the power divider is sent to the swing motor by way of the control valve which is directly mounted on the swing motor.



8.2 CONSTRUCTION AND FUNCTION

8.2.1 HYDRAULIC SCHEMATIC

Swing hydraulic schematic



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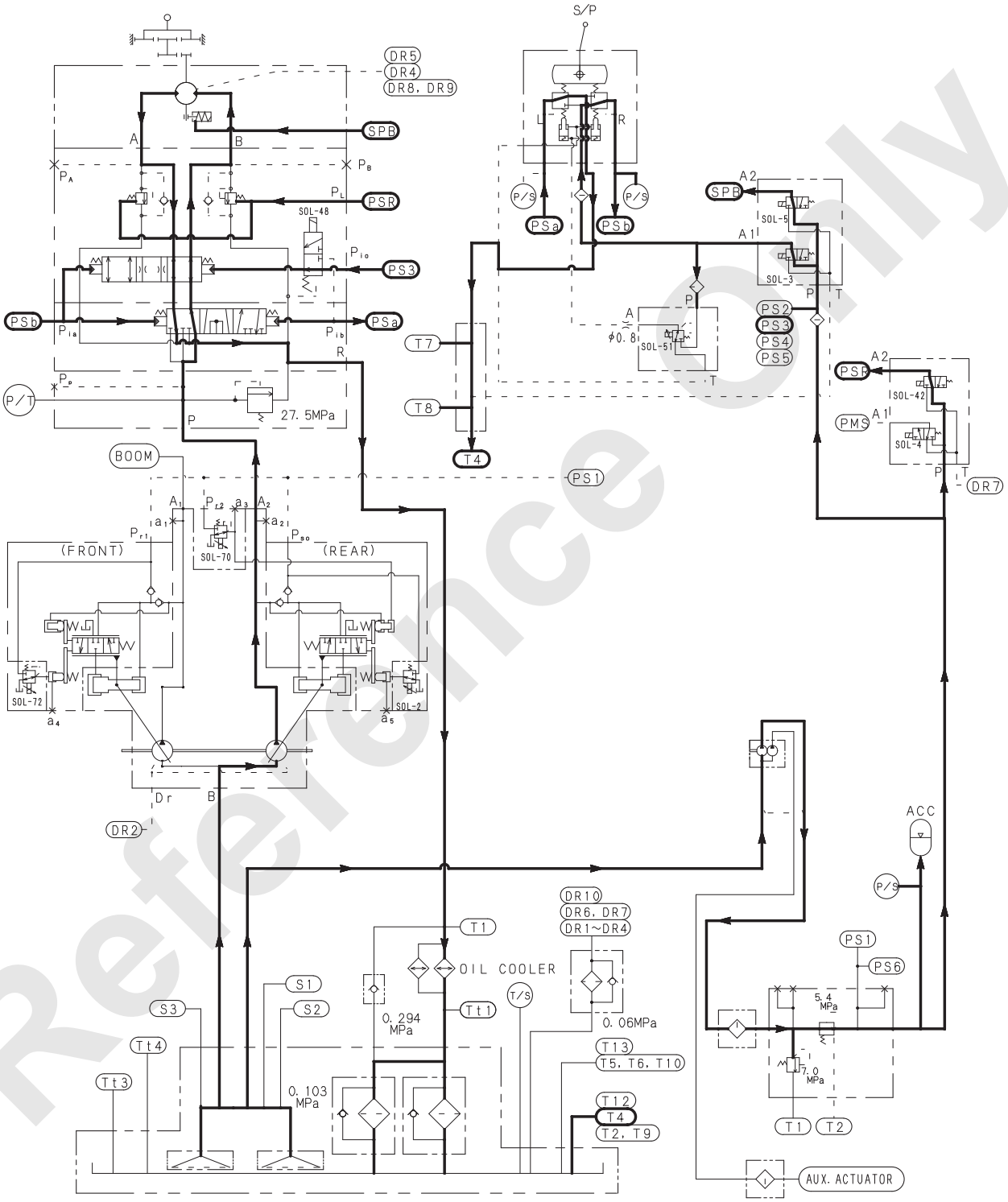
8.2.2 SWING

The working principle of the rightward swing, identical to that of the leftward swing, is shown below. [The swing brake is released ("SPB" SOL-5 is actuated).]
The pressurized oil from the swing pump is led to the swing control valve. On the other hand, the control pressurized oil from the control pump flows into the valve block, swing remote control valve, and brake mode select solenoid valve (SOL-48) built in the swing control valve through the accumulator.
[The function lock lever is at the "Work" position (SOL-3 is actuated).]

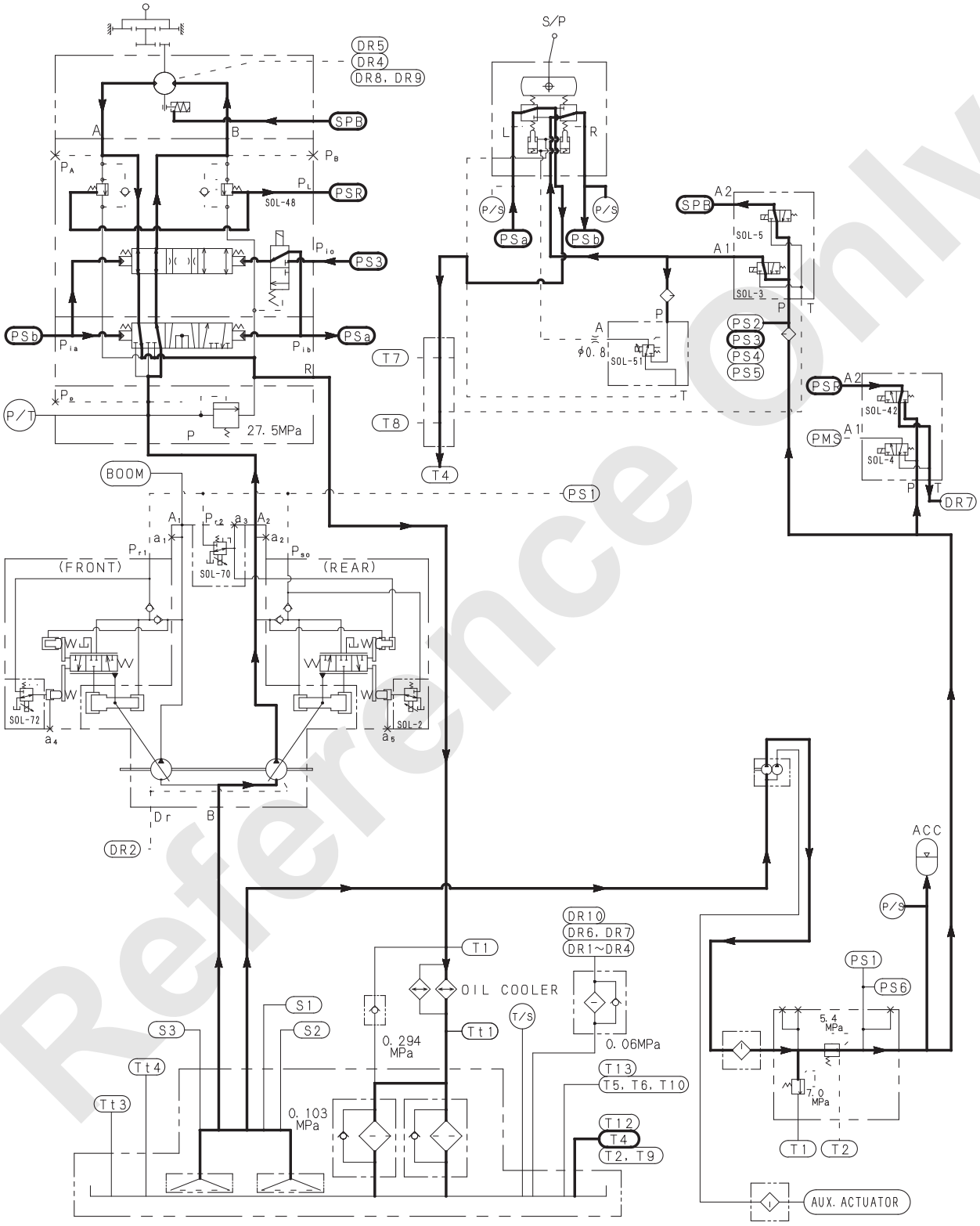
(1) Neutral free mode
When the swing mode selector switch on the side stand panel in the operator's cab is set to the "free" side, the control pressurized oil flows through the solenoid valve (SOL-48) to move the spool (B) of the swing control valve to the full stroke.
In this status, when the swing control lever is swung down to the right swing side (back ward), the control oil flows through the remote control valve, and is led to the (PSb) port of the control valve to move the spool (A).
The main pressurized oil controlled by the control valve is fed to the swing motor to run the motor.

(2) Neutral brake mode
When the swing mode selector switch on the side stand panel in the operator's cab is set to the "brake" side, the solenoid valve (SOL-48) is actuated to connect the both pilot ports, the swing control valve spool (A) and (B).
In this status, when the swing control lever is swung down to the right swing side (back ward), the control oil flows is led to the (PSb) port of the control valve to move the spools (A) and (B) at the same time.
The main pressurized oil controlled by the control valve is fed to the swing motor to run the motor.

SWING (Neutral Free Mode)



SWING (Neutral Brake Mode)



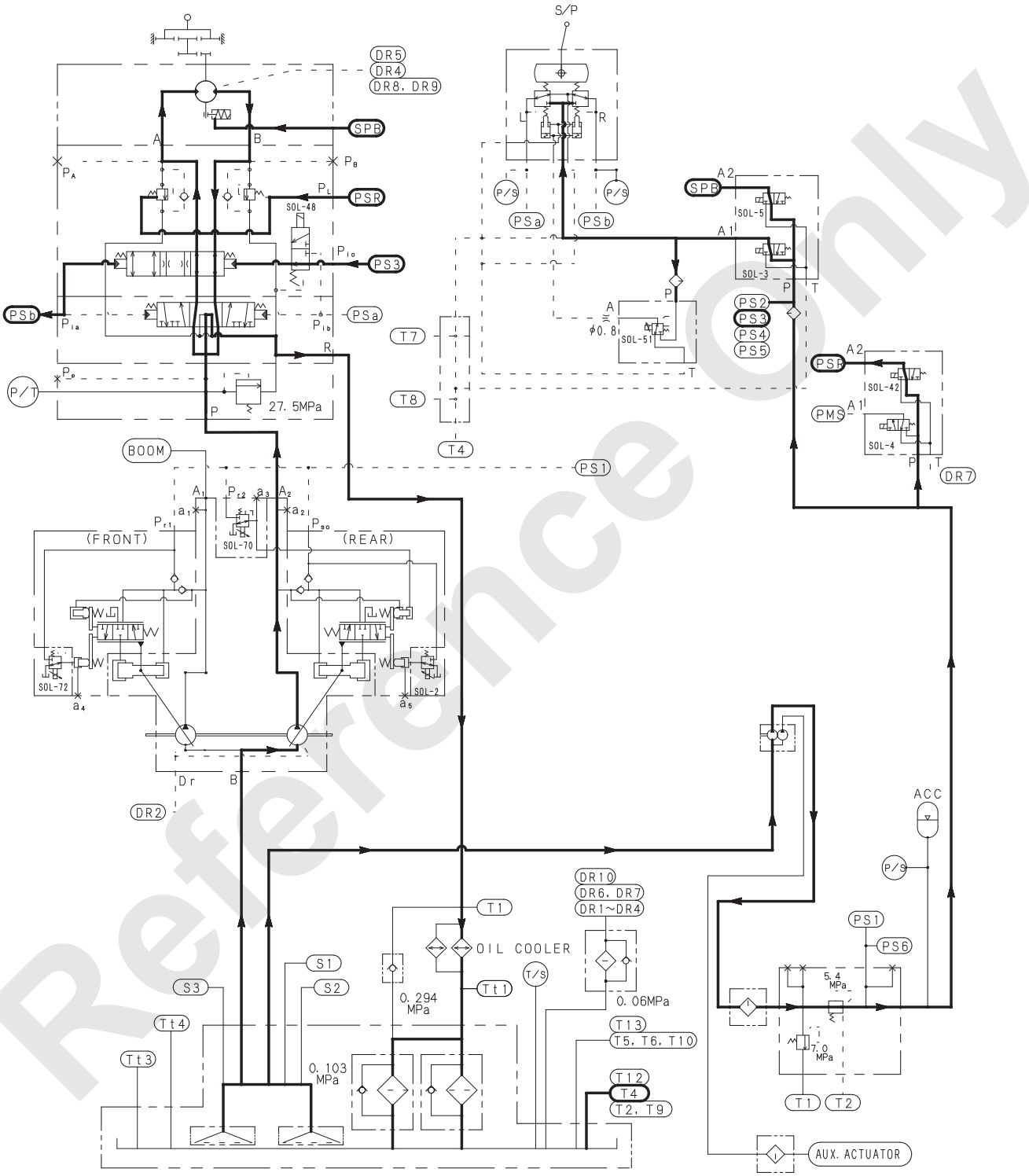
8.2.3 STOPPING

When the swing control lever is returned from the swing mode to the neutral mode, the control pressure from the remote control valve is lost, and the control valve spool (A) returns to neutral. Thus, the main pressurized oil returns to the tank with no load.

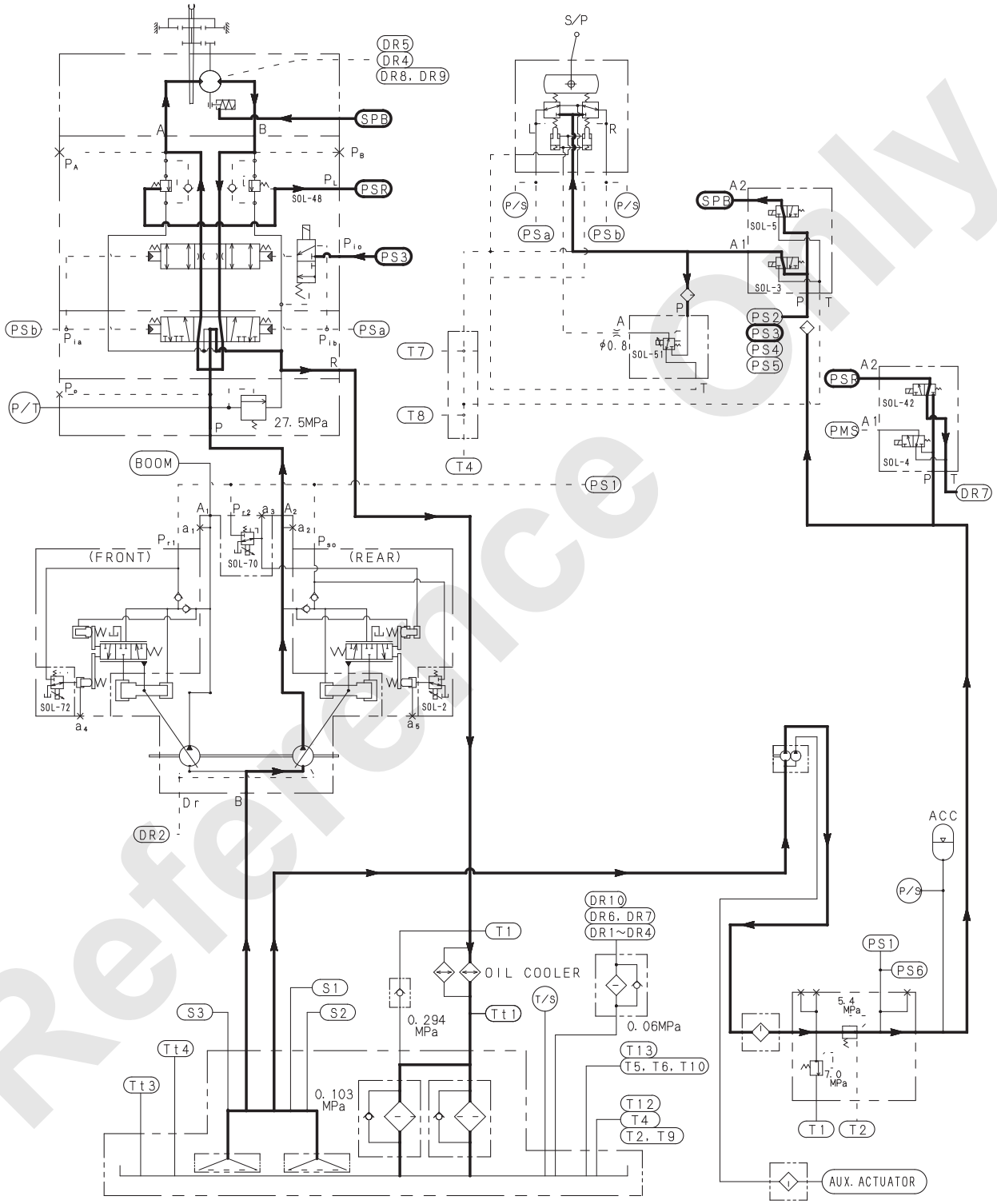
(1) Neutral free mode
Although the pressurized oil flow to the swing motor is shut down, the returned oil circulates in the motor and valves, since the spool (B) has been moved to the full stroke by the pilot pressure. Thus, the motor continues rotating by inertia. (The swing brake is released.) To stop the swing motion, carefully swing down the swing control lever to the opposite side.

(2) Neutral brake mode
The brake mode select solenoid valve (SOL-48) is actuated, and the spool (B) returns to neutral.
The brake pressure is generated at the exit port of the swing motor by the oil returned from the swing motor passing the restrictor section of the control valve spool (B). The swing motor is decelerated by the brake pressure until the motor is stopped smoothly. (The swing brake is released.)
The main pressurized oil returned from the swing motor is interrupted by the orifice of the spool (B), then the swing stops. If an unusually high pressure occurs, the overload valve is actuated to protect the circuit from damage. (At the neutral brake mode, the overload valve relief set is Low side.) However, remember that the motor will not be stopped completely when external forces are always applied, including the operation on a slope or on windy days.

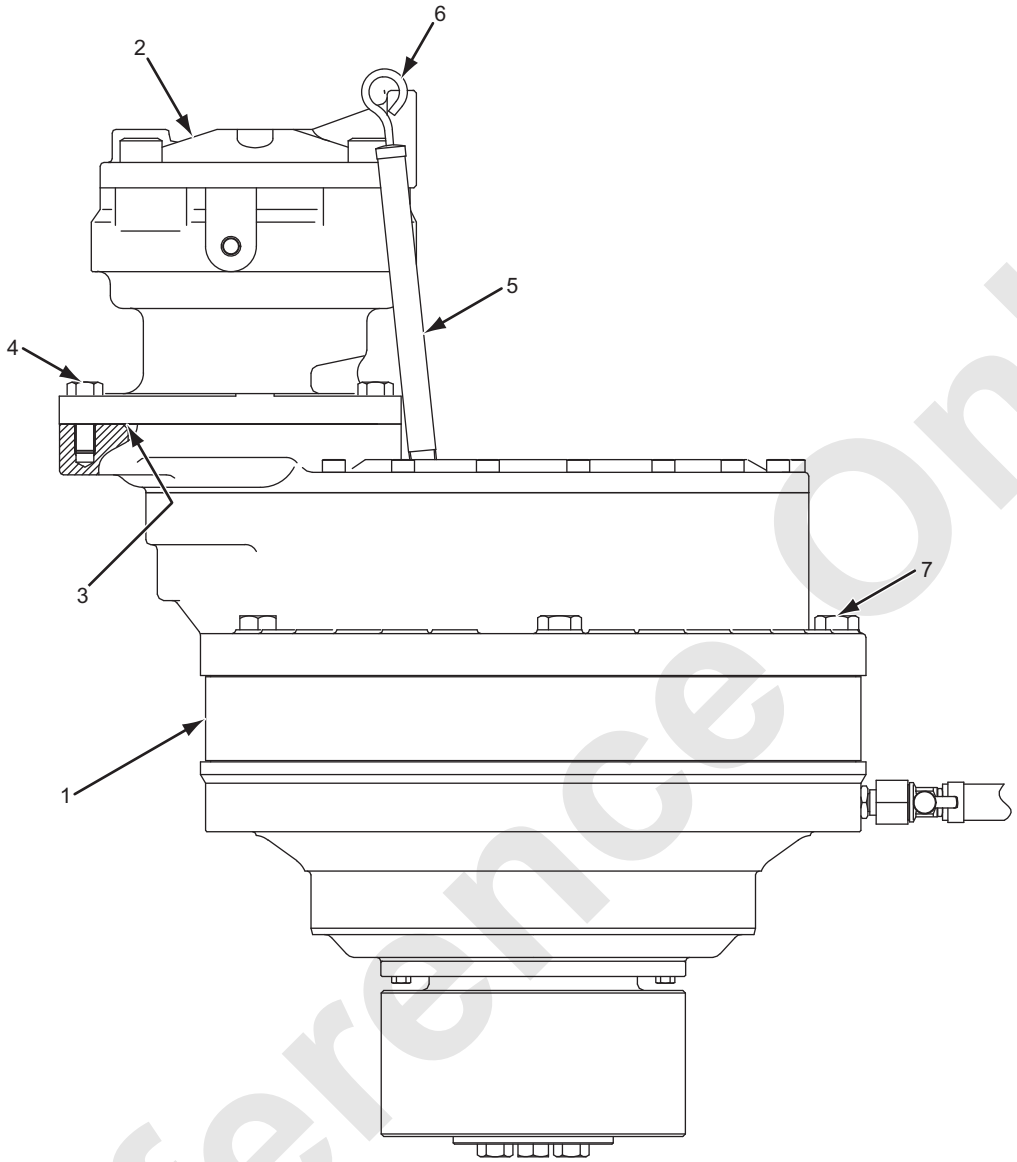
STOP (Neutral Free Mode)



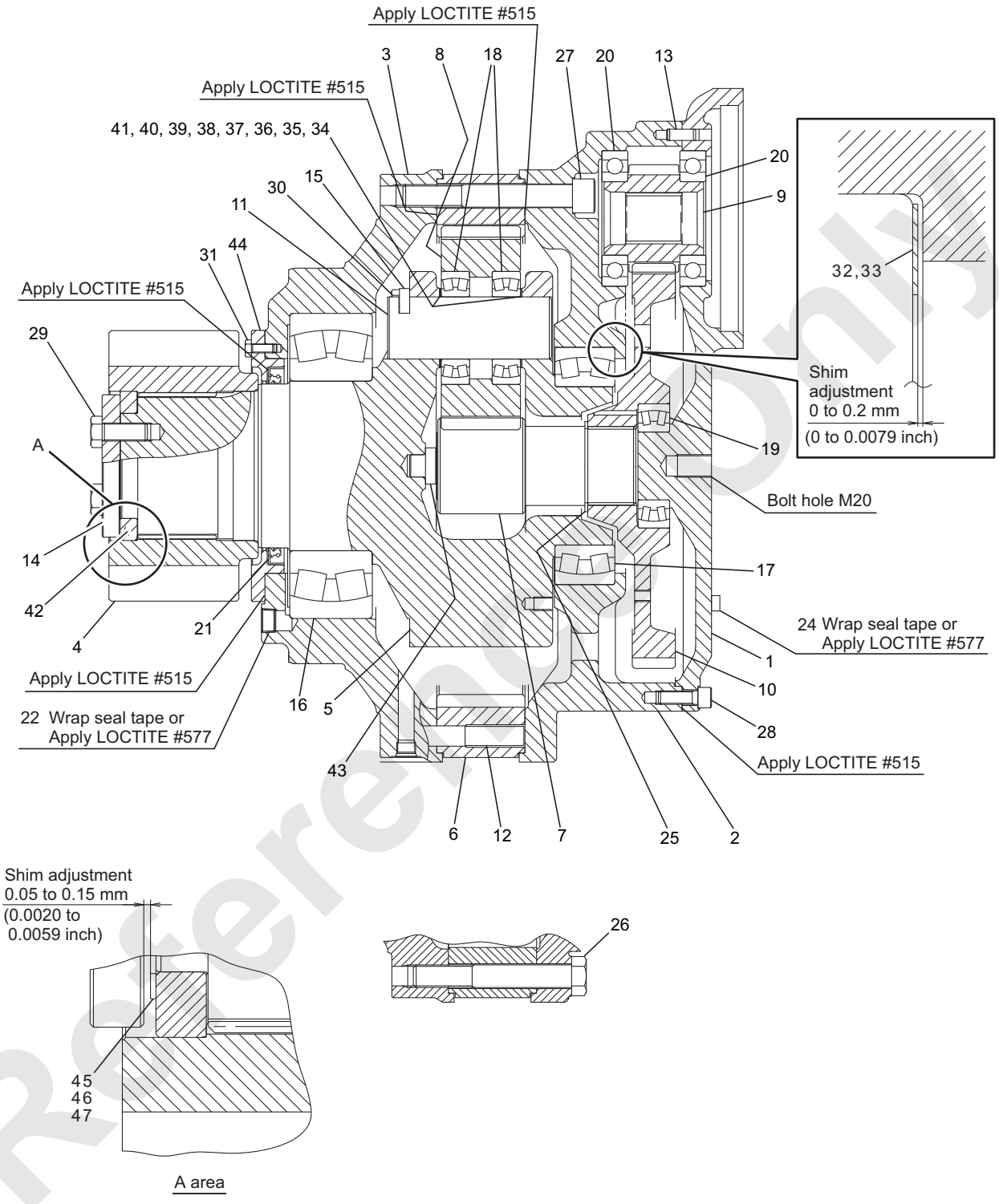
STOP (Neutral Brake Mode)



8.3 SWING REDUCTION UNIT



Item	Name	Tightening Torque	Weight
1	Reduction unit	-	396 kg (873 lbs)
2	Motor	-	64 kg (141 lbs)
3	O-Ring	-	-
4	Bolt	M16 X 45 mm / 145 to 177 N-m (107 to 131 lbs-ft)	-
5	Tube	-	-
6	Level gauge	-	-
7	Bolt	M20 X 140 mm / 504 to 616 N-m (372 to 454 lbs-ft)	-



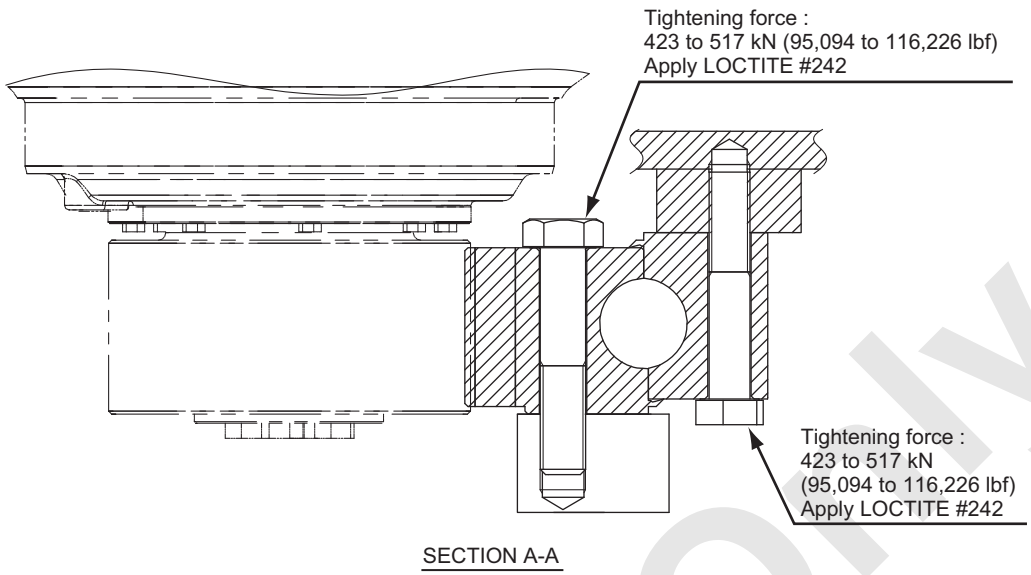
1. Housing
2. Housing
3. Housing
4. Pinion
5. Shaft
6. Ring gear
7. Sun gear
8. Pinion
9. Pinion
10. Gear
11. Pin
12. Pin
13. Pin
14. Plate
15. Keeper plate
16. Bearing
17. Bearing
18. Bearing
19. Bearing
20. Bearing
21. Oil seal
22. Plug
24. Plug
25. Snap ring
26. Capscrew
27. Capscrew
28. Capscrew
29. Capscrew
30. Capscrew
31. Capscrew
32. Shim (t=0.2)
33. Shim (t=0.5)
34. Shim (t=1.1)
35. Shim (t=1.2)
36. Shim (t=1.3)
37. Shim (t=1.4)
38. Shim (t=1.5)
39. Shim (t=1.6)
40. Shim (t=1.7)
41. Shim (t=1.8)
42. Spacer
43. Thrust button
44. Retainer
45. Shim (t=0.1)
46. Shim (t=0.2)
47. Shim (t=0.3)

TIGHTENING TORQUE

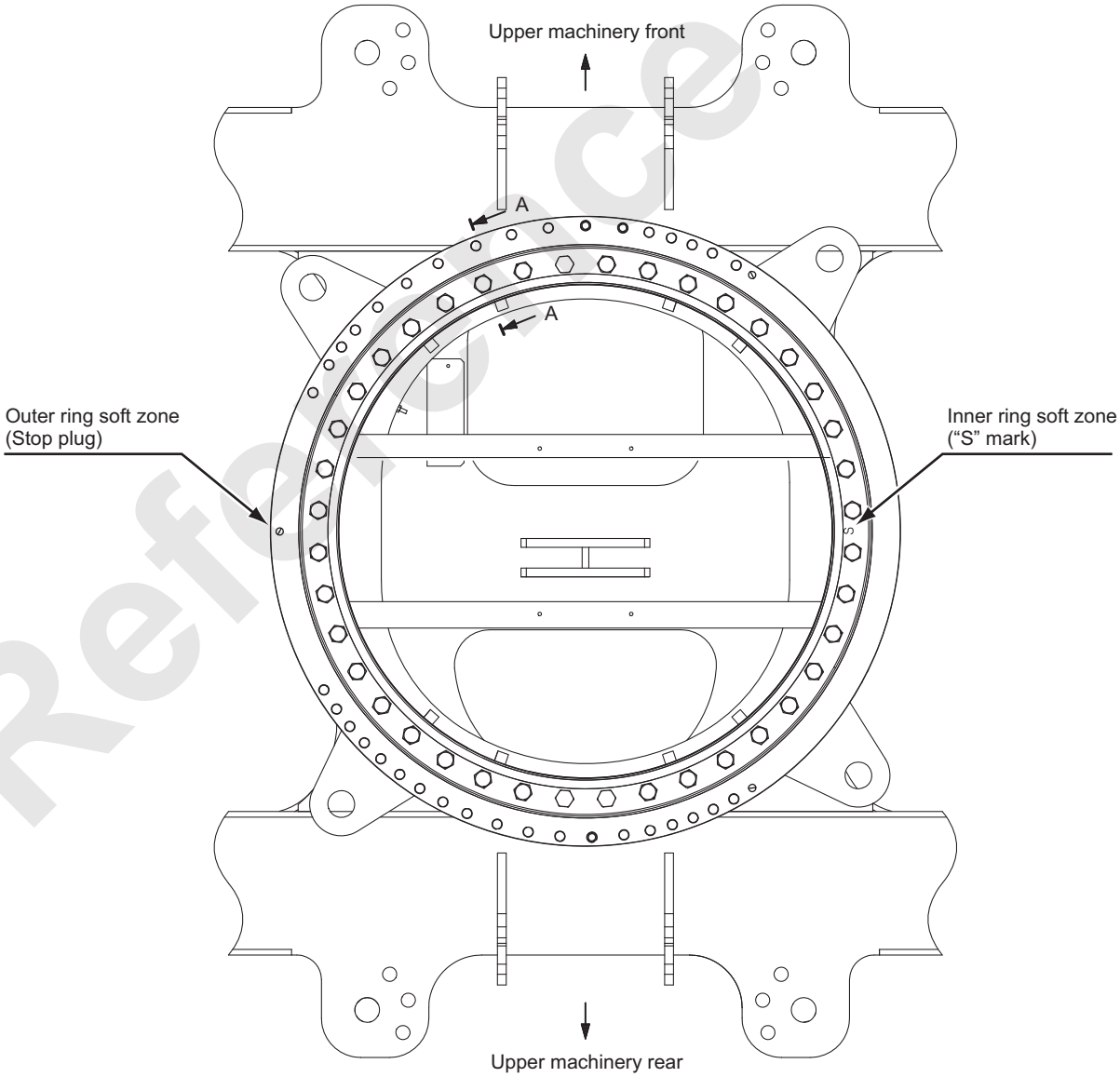
Item	Name	Size	Tightening Torque N-m (lbs-ft)
22	Plug	PT1/2	64.7 to 73.5 (47.7 to 54.2)
24	Plug	PT3/4	98 to 118 (72.3 to 87.0)
26	Capscrew	M20 X 140	504 to 616 (371.7 to 454.3)
27	Capscrew	M20 X 150	504 to 616 (371.7 to 454.3)
28	Capscrew	M12 X 35	109 to 133 (80.4 to 98.1)
29	Capscrew	M16 X 40	261 to 319 (192.5 to 235.3)
30	Capscrew	M10 X 25	63 to 77 (46.5 to 56.8)
31	Capscrew	M8 X 20	31.5 to 38.5 (23.2 to 28.4)

Apply LOCTITE #242 to capscrew.
Assembly total weight : Approx. 396 kg (873 lbs) (Without motor)

8.4 SWING BEARING



SECTION A-A



BOLT TIGHTENING PROCEDURE

Lower frame side

1. Tighten 2 bolts which are positioned 180 degrees apart each other on the lower frame side with 147 N-m (108 lbs-ft) torque.
2. Tighten 2 bolts which are positioned 90 degrees apart from the previously tightened bolts.
3. Tighten diagonally positioned bolts with 147 N-m (108 lbs-ft) torque.
4. Tighten all bolts with 423 to 517 kN (95,094 to 116,226 lbf) tightening force.
   (Tightening torque shall be checked with axial force measurement.)
   Ref : tightening torque 2.5 to 3.06 kN-m
   (1,844 to 2,257 lbs-ft)
5. After tightening to the lower frame, apply enough amount of molybdenum sulfide grease (Shell Alvania EP grease LF) on the gear tooth face.

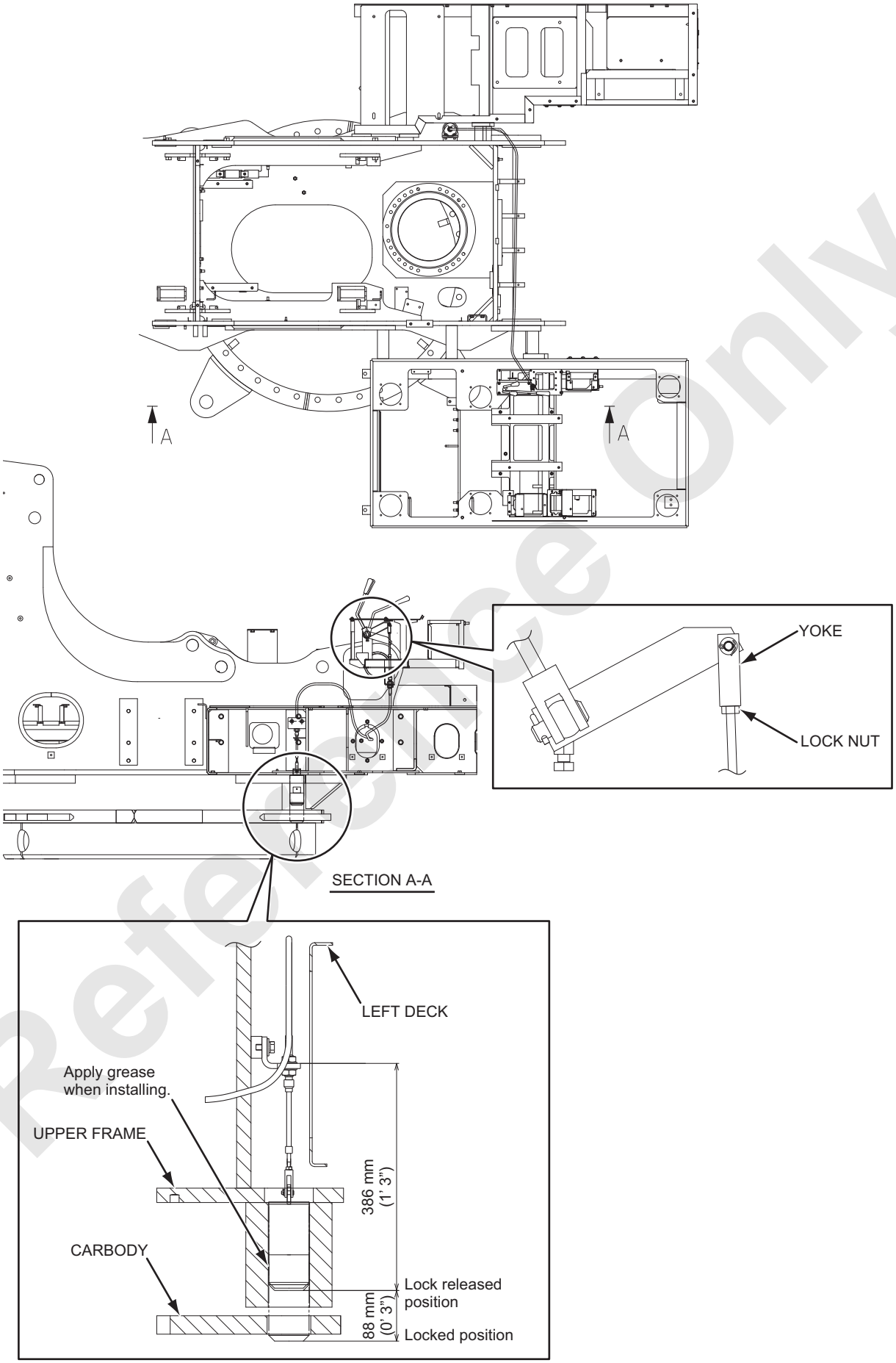
Upper frame side

1. Tighten 4 bolts on both side of front, both side of rear of the upper frame with 147 N-m (108 lbs-ft) torque.
2. Tighten 2 bolts which are positioned 90 degrees apart from the previously tightened bolts.
3. Tighten diagonally positioned bolts with 147 N-m (108 lbs-ft) torque.
4. Tighten all bolts with 423 to 517 kN (95,094 to 116,226 lbf) tightening force.
   (Tightening torque shall be checked with axial force measurement.)
   Ref: tightening torque 2.5 to 3.06 kN-m
   (1,844 to 2,257 lbs-ft)

Bearing inner ring soft zone (S mark position) shall be positioned against the lower machinery as shown.

Assembly total weight : Approx. 1,013 kg (2,233 lbs)

8.5 SWING LOCK

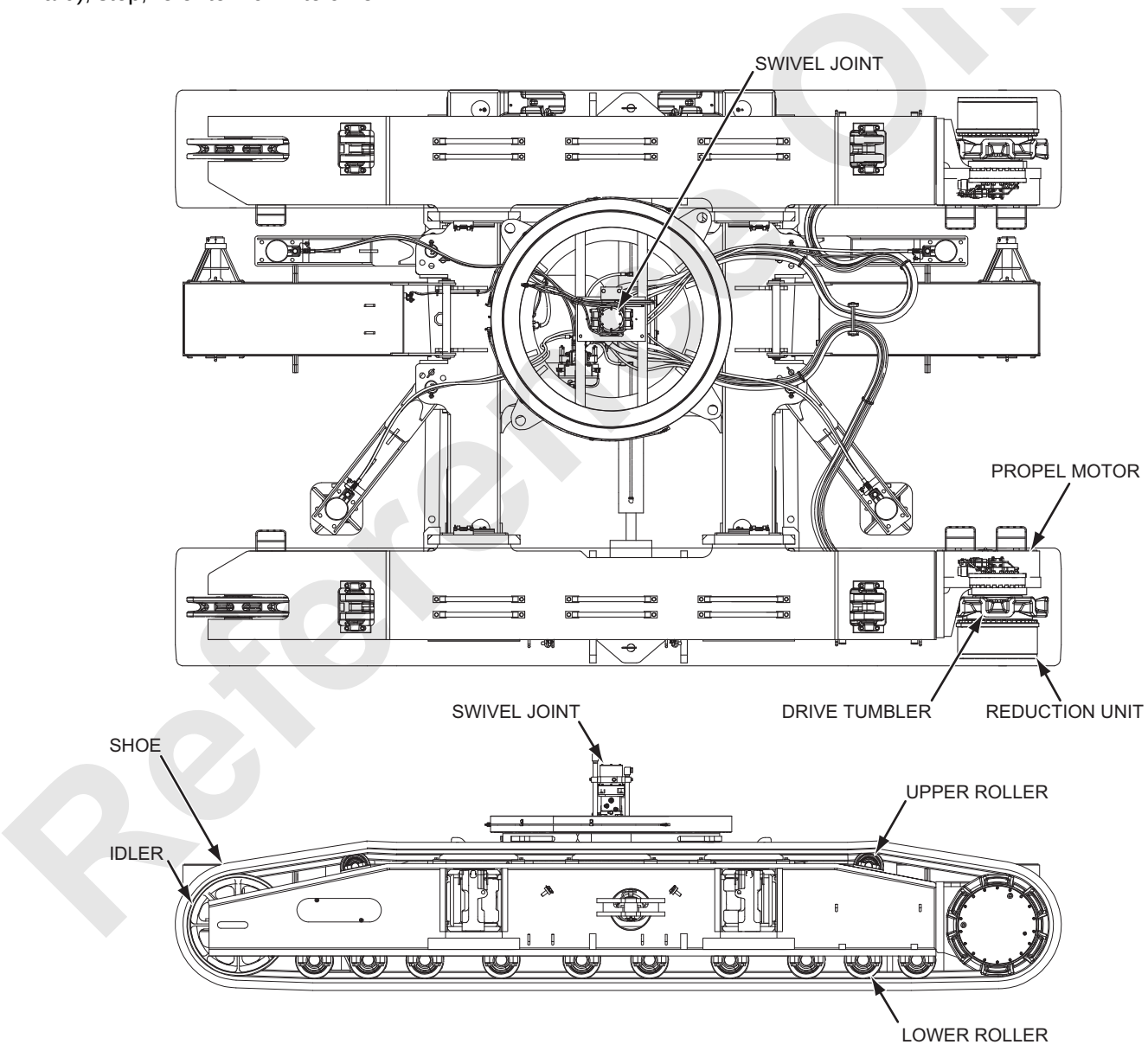


9. PROPEL SYSTEM

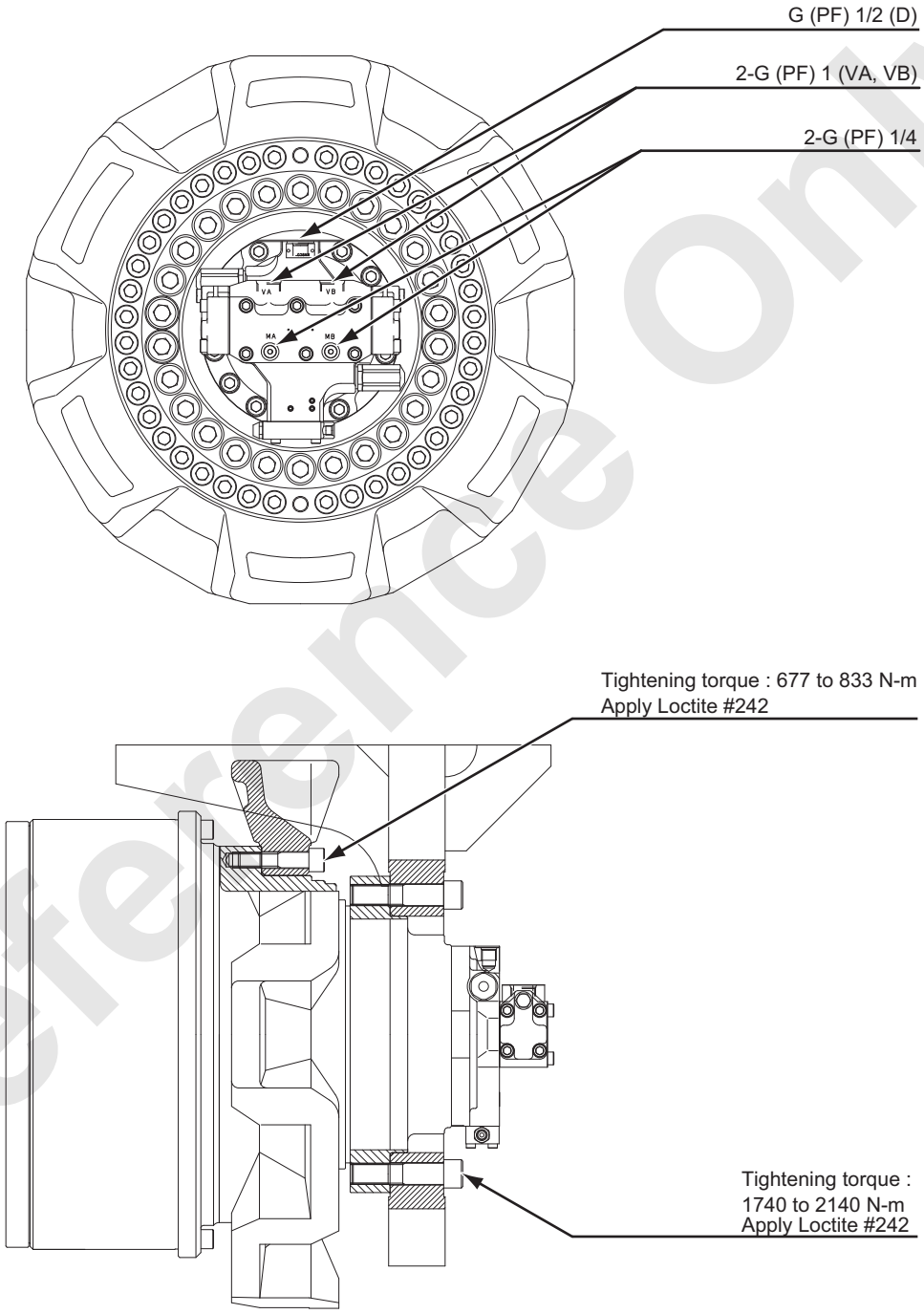
9.1 APPARATUS AND LOCATION OF COMPONENTS

The Propel system consists of the main pump, the main control valves, the propel motors, the propel reduction units, the upper/lower rollers, the drive tumblers, idlers and shoes.
Pressurized oil from the main pumps (No.1 and No.2 pumps installed on the power divider) is controlled through the 2 main control valves. This pressurized oil flows through the swivel joint and then into the left and right propel motors to run their respective motors.
A spring set/hydraulic release disk brake is installed on each of the two propel motors (built-in type).

As for circuit diagram and function of propel (right forward), stop, refer to P.9-11 to 9-15.



9.2 PROPEL REDUCTION UNIT



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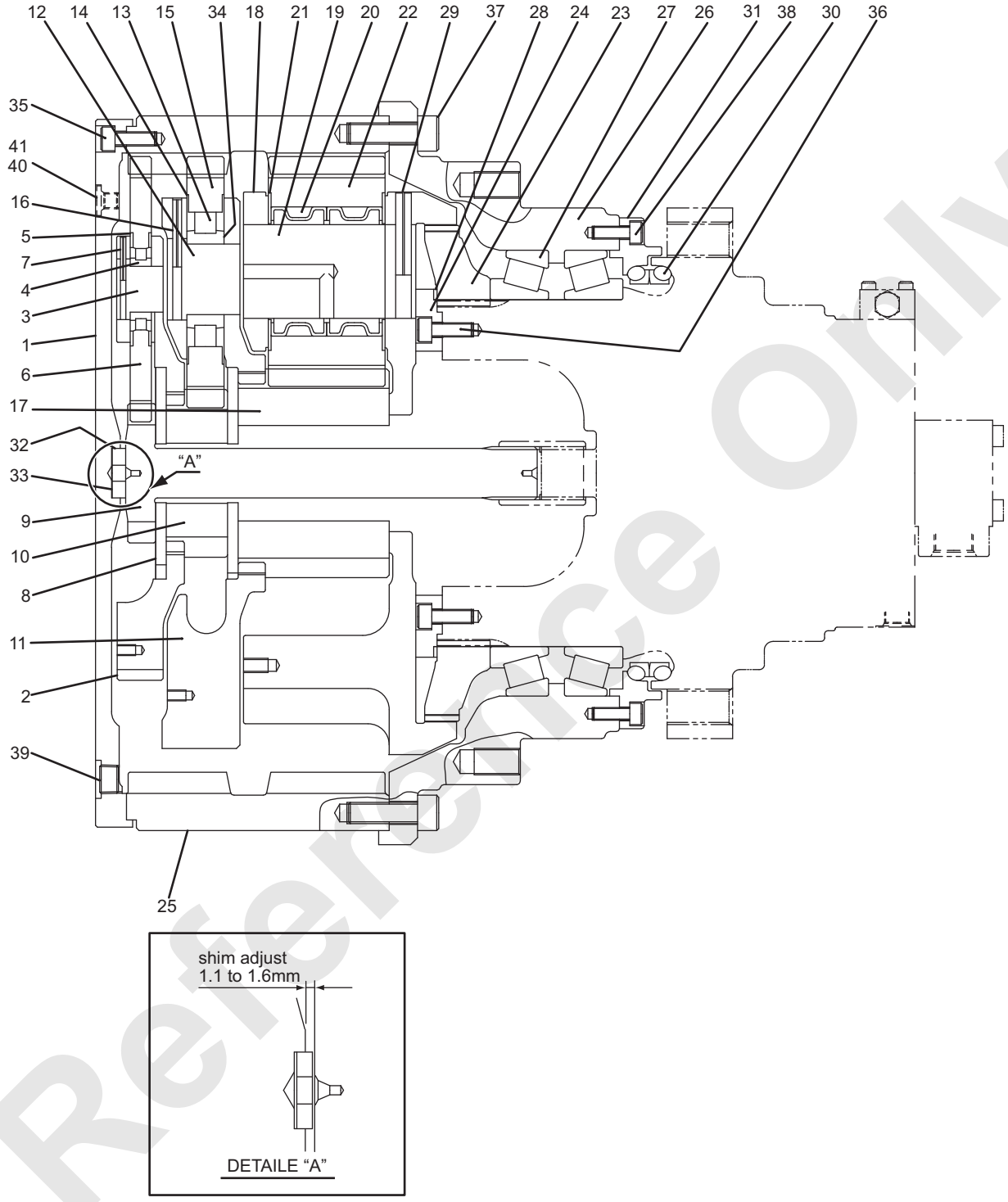
9.2.1 REDUCTION UNIT



1. Cover
2. Spider
3. Pin
4. Bearing
5. Thrust washer
6. Gear
7. Spring pin
8. Spacer
9. Sun gear
10. Sun gear
11. Spider
12. Pin
13. Bearing
14. Thrust washer
15. Gear
16. Spring pin
17. Sun gear
18. Spider
19. Pin
20. Needle bearing
21. Thrust washer
22. Gear
23. Coupling
24. Holder
25. Ring gear
26. Housing
27. Bearing
28. Shim
29. Spring pin
30. Floating seal
31. Cover
32. Ring
33. Shim
34. Spacer
35. Capscrew
36. Capscrew
37. Capscrew
38. Capscrew
39. Plug
40. Plug
41. O-ring

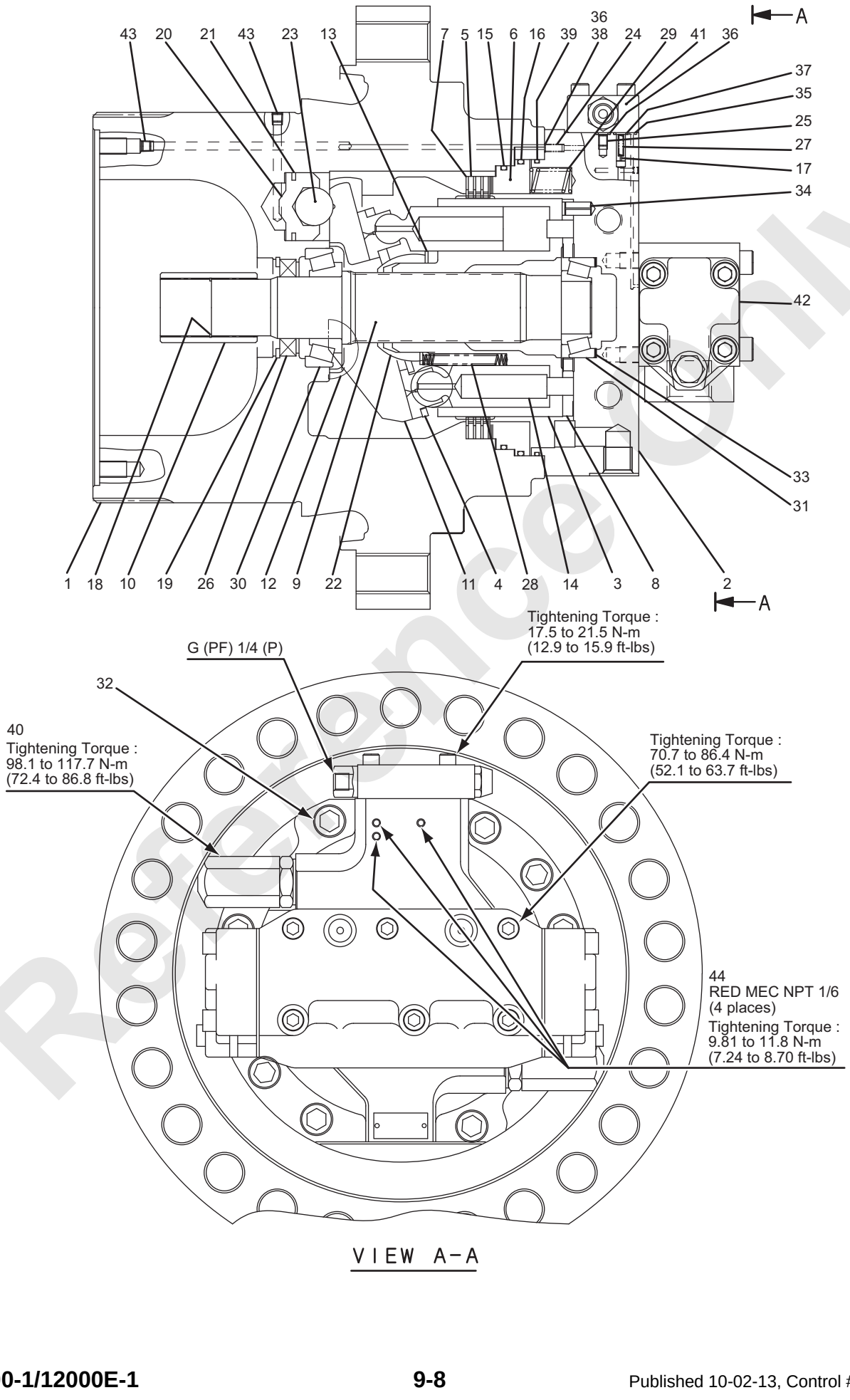
TIGHTENING TORQUE TABLE

Item	Name	Size	Tightening Torque N-m (ft-lbs)
35	Capscrew	M12 X 35	106.2 to 129.8 (78.3 to 95.7)
36	Capscrew	M12 X 30	106.2 to 129.8 (78.3 to 95.7)
37	Capscrew	M18 X 55	362.8 to 441.2 (267.6 to 325.4)
38	Capscrew	M10 X 30	61.7 to 75.4 (45.5 to 55.6)
39	Plug	R (PT) 3/4	88.3 to 107.9 (65.1 to 79.6)
40	Plug	G (PF) 1/4	26.5 to 32.3 (19.5 to 23.8)

Apply loctite #242 on capscrew.

Assembly weight : Approx. 765 kg (1,687lbs)

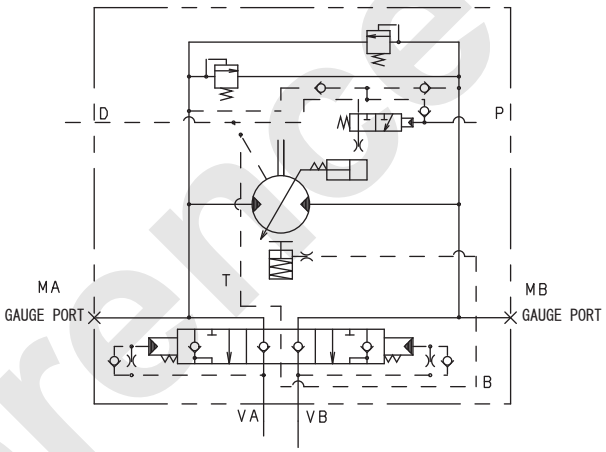
9.2.2 MOTOR



VIEW A-A

1. Case
2. Cover
3. Block
4. Retainer
5. Plate
6. Piston
7. Plate
8. Plate
9. Shaft
10. Coupling
11. Plate
12. Ball
13. Holder
14. Piston assy
15. Seal
16. Seal
17. Check valve
18. Retaining ring
19. Retaining ring
20. Piston
21. Piston seal
22. Ball joint
23. Ball
24. Orifice
25. Orifice
26. Oil seal
27. Spring
28. Spring
29. Spring
30. Bearing
31. Bearing
32. Capscrew
33. Shim
34. Pin
35. O-ring
36. O-ring
37. O-ring
38. O-ring
39. O-ring
40. Overload valve
41. Pilot valve
42. Brake valve
43. Plug
44. Plug

HYDRAULIC CIRCUIT



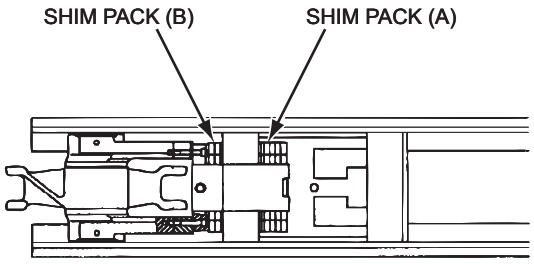
9.3 ADJUSTMENT

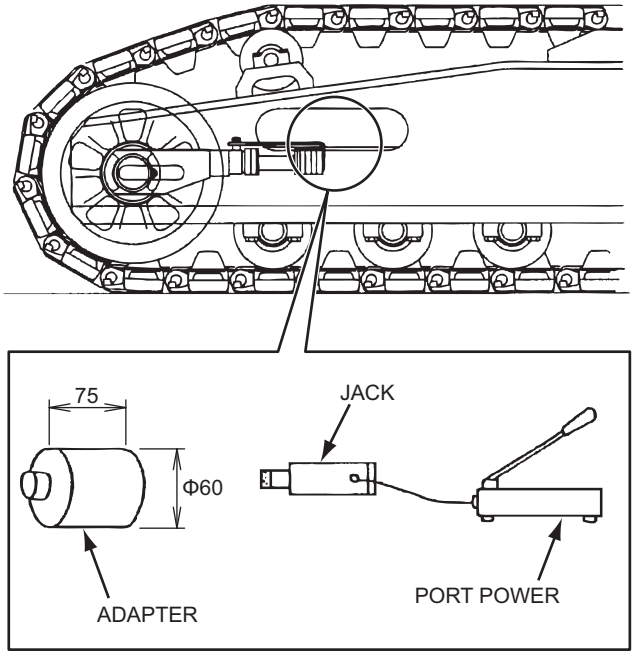
If the crawler shoes are too tight, the shoes wear quickly and a connection between two shoes could break. On the other hand, if the shoes are too loose, the shoes may ride off the drive sprocket and idler wheel during the travel operation.
To prevent these occurrence from happening, it is required to adjust shoe tension.
To adjust shoe tension, proceed as follows :

1. Move the machine forward about the crawler length so that the slackening of the crawler shoes appear on the upper side of the crawler.
2. Remove all the shims from shim pack (A).
3. Set the hydraulic jack in the position between the bracket and block of the side frame.
   Operate the jack to push the idler wheel, and remove the slackening of the shoes.
4. Insert the shims removed from pack (A) in step2. into the vacant room of pack (B).
   Insert the remaining shims into pack (A).
5. Remove the hydraulic jack. Store spare shims in the shim pack (A).

Note

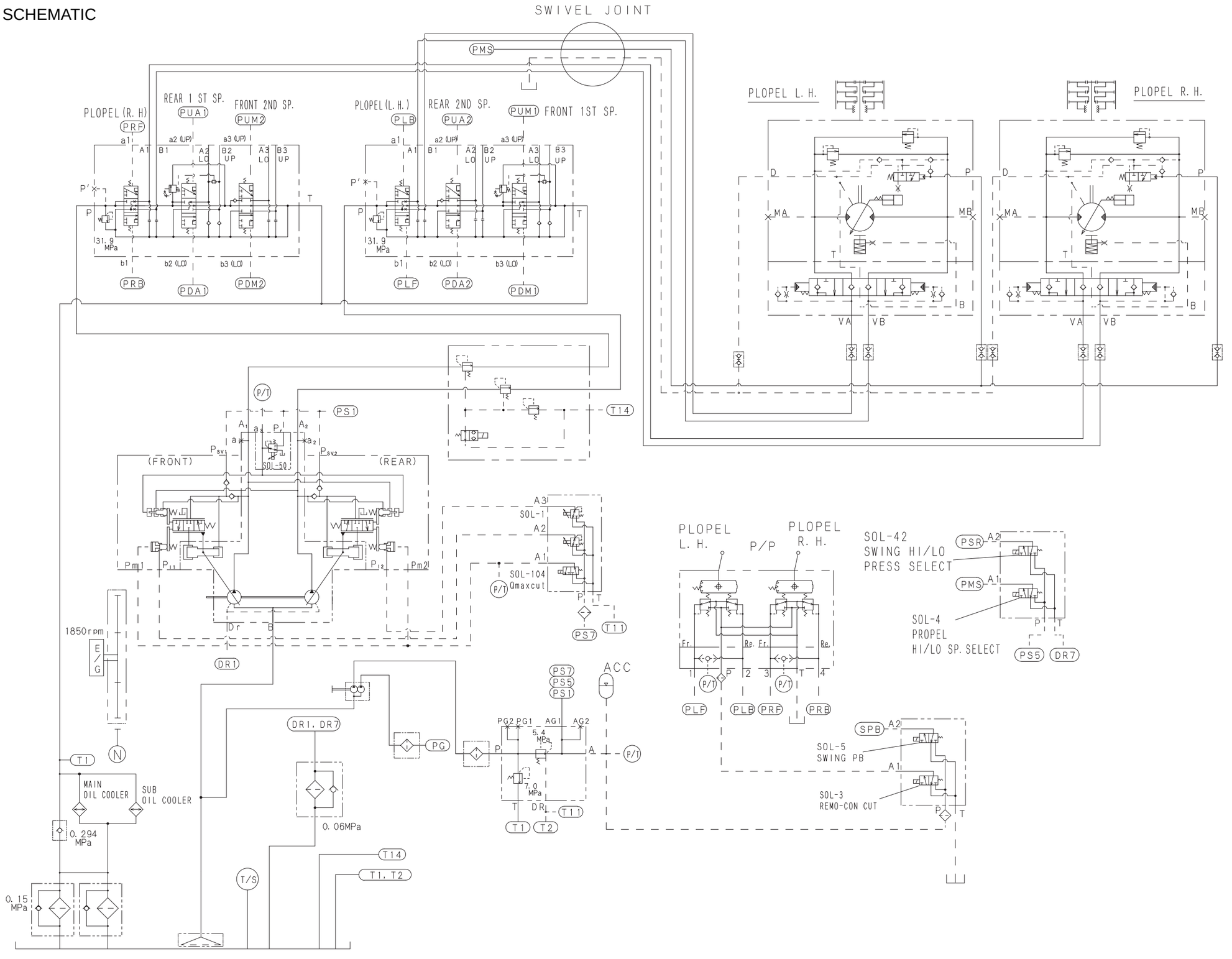
Equalize the tension in right and left crawler tracks.





9.4 CONSTRUCTION AND FUNCTION

9.4.1 HYDRAULIC SCHEMATIC



9.4.2 PROPELLING (RIGHT SIDE FORWARD)

Propelling the right and/or left sides and to the forward and reverse are basically the same operation.

We will use a right side forward operation as the example here.

Pressurised oil from the No.1 pump is directed into the control valve.

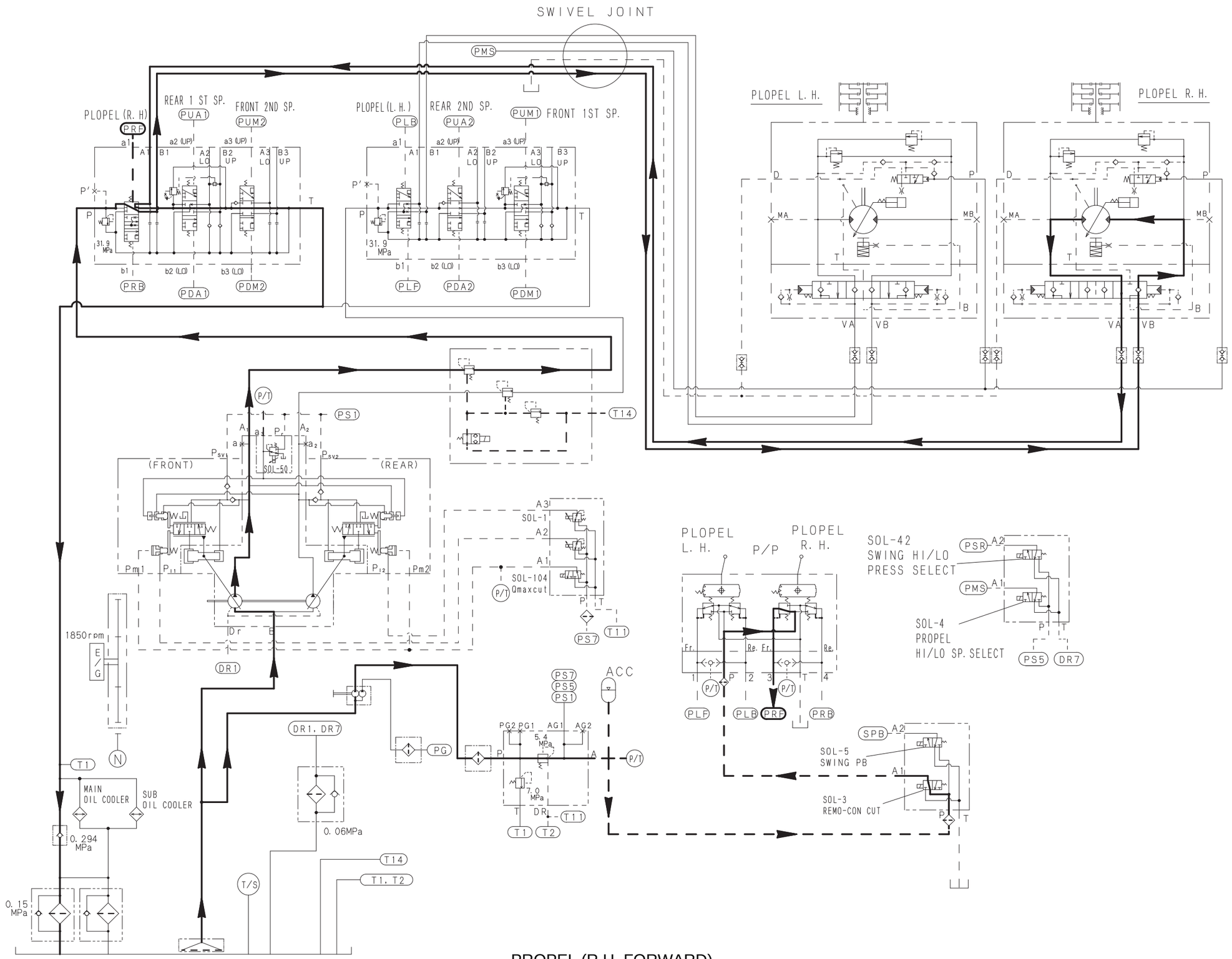
The oil from the control pump, however, goes through the accumulator and into the propel-circuit's remote control valve, (The function lock lever remains in the "Operation" position (SOL-3 : On position).)

When the right propel control lever is shifted to "forward", the control oil runs through the remote control valve to the control valve's [PRF] port to shift the spool of the propel section.

The pressurized oil directed by the control valve then goes through the swivel joint and run into the propel motor. At the same time, this oil runs into the pilot of the brake valve and the brake cylinder.

The oil in this cylinder releases the brake, and the oil in the brake valve pilot moves the spool, so that the pressurized oil releases the mechanical and hydraulic brake.

The pressurized oil that activated in the propel motor is free to return to the reservoir.



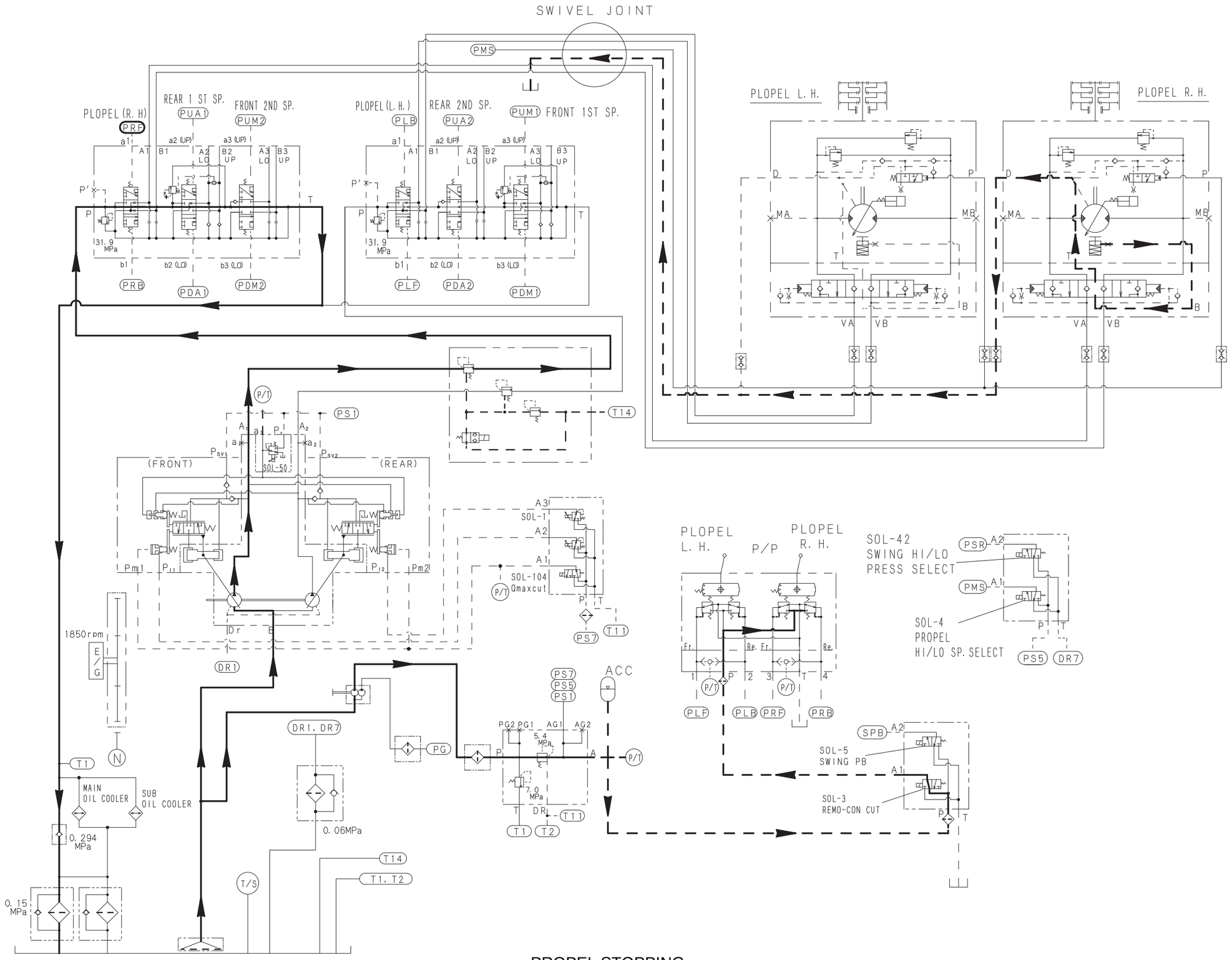
PROPEL (R.H. FORWARD)

9.4.3 STOPPING

When the right propel control lever is shifted back to neutral from propel position, the flow from the remote control valve is cut and the spool of the control valve repositions itself. At the same time, the pilot pressure on the propel brake valve is discontinued, and the spool in the brake valve also repositions itself.

Inertia may continue momentarily to rotate the propel motor. This creates negative pressure on the supply side and high pressure on the return side. Therefore, the supply side is connected to the reservoir in neutral. If extreme pressure develops on the return side, an over load relief valve will open to protect the circuit.

At the same time, the pressurized oil in the brake cylinder is returned to the reservoir, and the parking brake engages slowly.



PROPEL STOPPING

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10. ELECTRIC SYSTEM

CAUTION

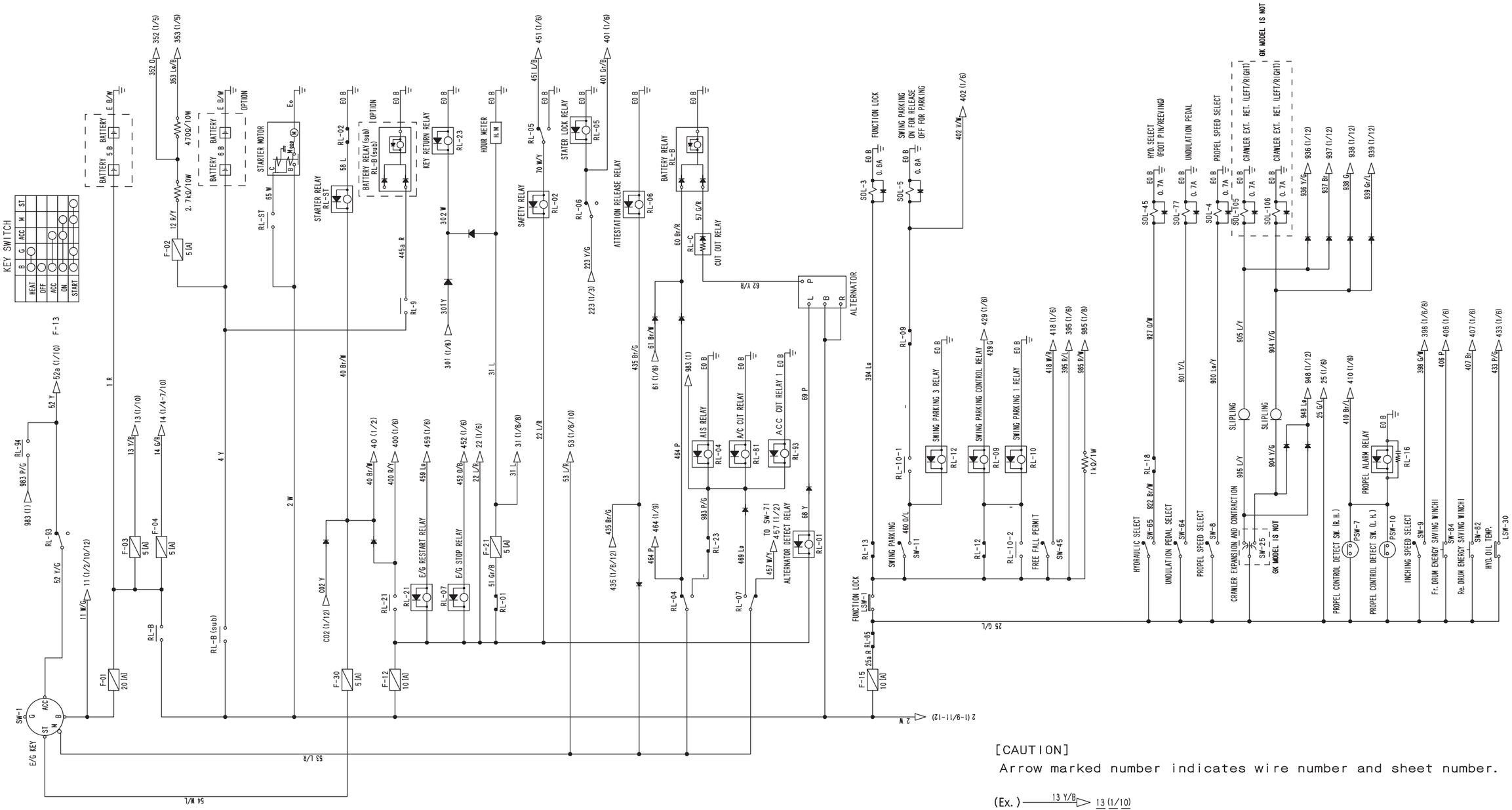
Before unplugging or plugging in the connector, be sure to shut off the power supply (set the starter switch to the OFF position).
When unplugging the connector, hold it with both hands and draw it straight, while pressing down the catch.
DO NOT pull on the cable.
Otherwise, the inner conductors can be damaged.
NEVER twist or pry the connector.
Otherwise, its internal female terminal will be expanded, leading to disconnection.
When plugging in the connector, fully insert it until the catch is engaged (clicks into position).
Otherwise, disconnection can occur later.
When performing a continuity test or voltage measurement on the connector, follow the procedure below.

Square connector
For easy measurement, place the measurement probes of the multitester onto the pins of male side connector.
NEVER insert the probe of the multitester into the socket of the female side connector.
Otherwise, disconnection can occur later.

Round waterproof connector
The male side connector has waterproof construction, and the measurement probe of the multitester cannot touch its pins.
Therefore, place the measurement probes onto the terminals on the female side connector.
NEVER forcibly insert the measurement probe.
Otherwise, disconnection can occur later.
Short-circuiting across terminals inside a connector can damage electronic components.
Be absolutely careful to prevent short-circuit.

10.1 ELECTRICAL

10.1.1 ELECTRICAL WIRING SCHEMATIC

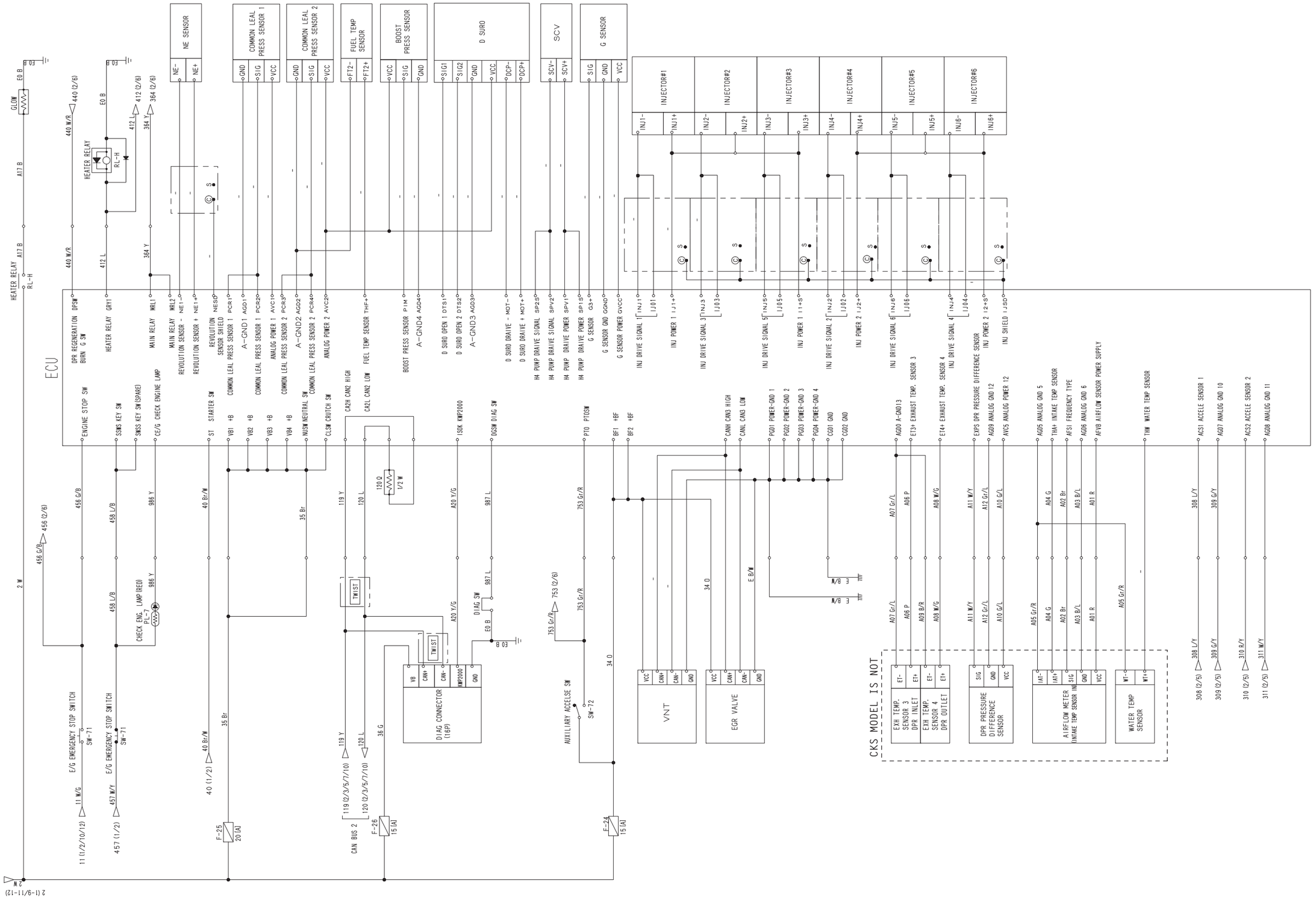


[CAUTION]
Arrow marked number indicates wire number and sheet number.

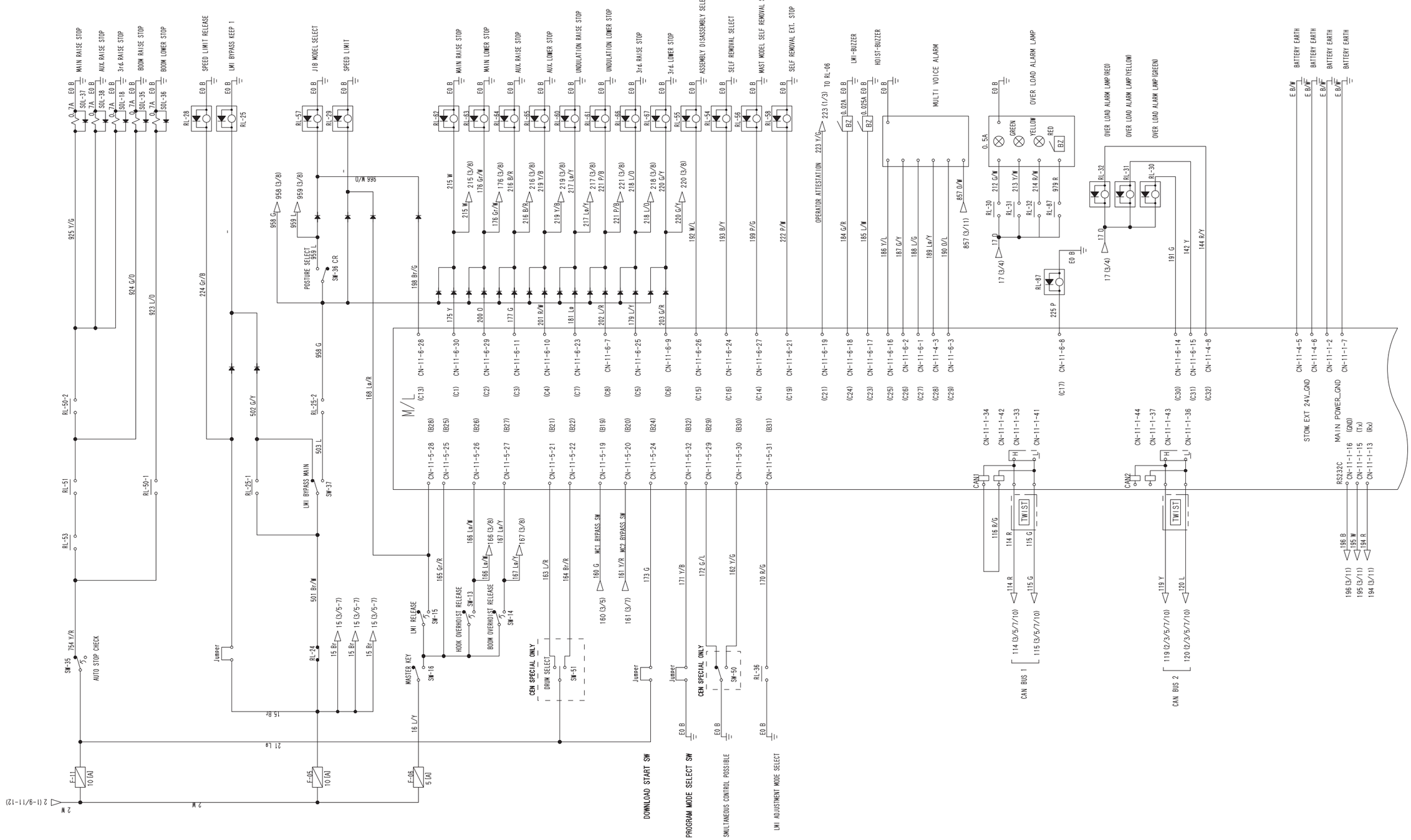
(Ex.) 13 Y/B → 13 (1/10)
- SHEET 10
- SHEET 1
- Wire number 13

(Ex.) 2 W → 2 (1-9/11-12)
- SHEET 11 to 12
- SHEET 1 to 9

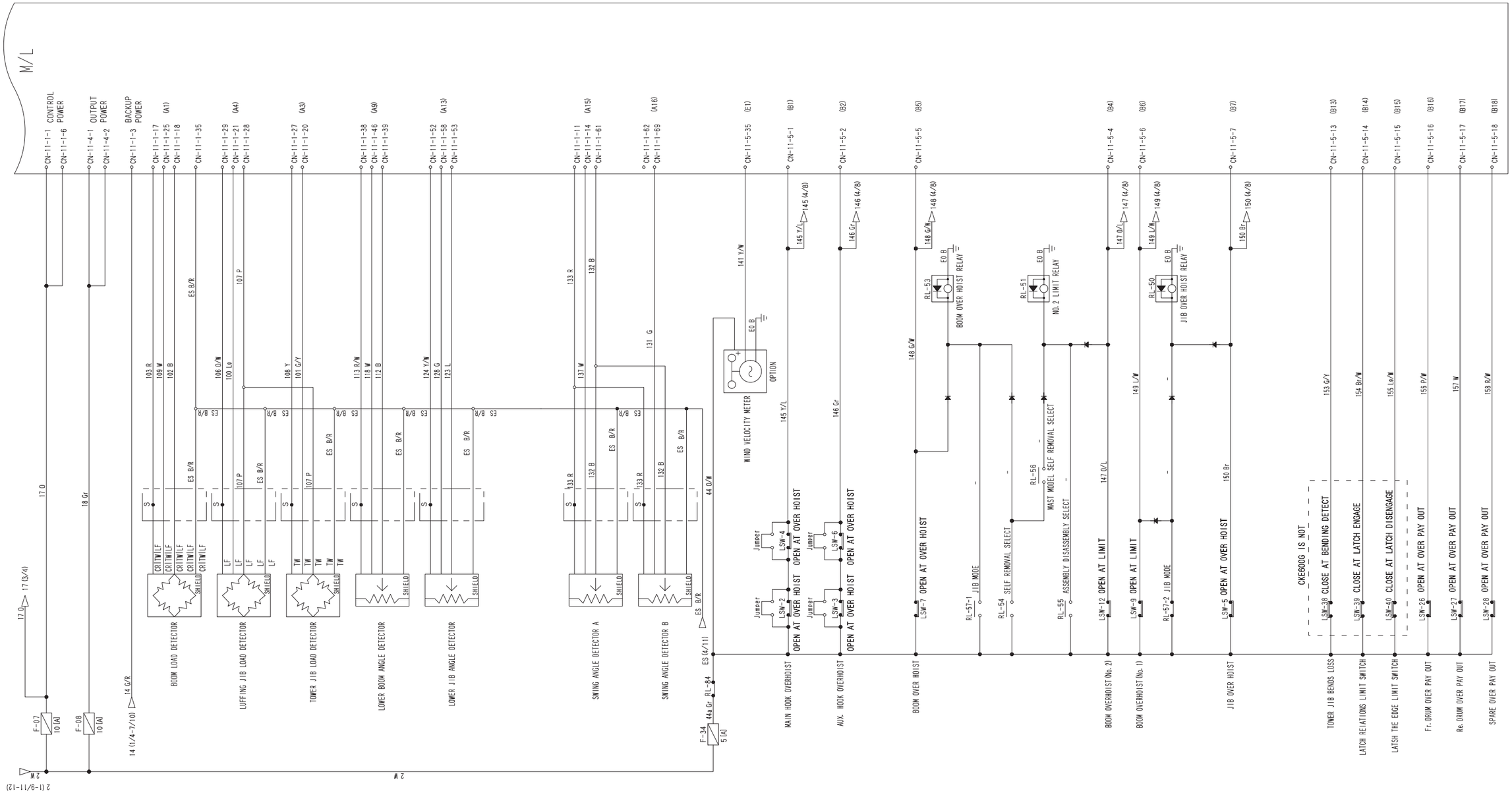
(1/18)


ECU
HEATER RELAY
RL-H
A17 B
GLOW
E0 B
440 W/R
440 (2/6)
HEATER RELAY
412 L
412 (2/6)
364 Y
364 (2/6)
NE SENSOR
COMMON LEAL PRESS SENSOR 1
COMMON LEAL PRESS SENSOR 2
FUEL TEMP SENSOR
BOOST PRESS SENSOR
D SURO
SCV
G SENSOR
INJECTOR#1
INJECTOR#2
INJECTOR#3
INJECTOR#4
INJECTOR#5
INJECTOR#6
DPR REGENERATION DPSW
BURN G SW
HEATER RELAY GRY1
MAIN RELAY MRL1
MAIN RELAY MRL2
REVOLUTION SENSOR - NE1-
REVOLUTION SENSOR + NE1+
REVOLUTION SENSOR SHIELD NESD
A-GND1 AGD1
A-GND2 AGD2
A-GND3 AGD3
A-GND4 AGD4
ANALOG POWER 1 AVC1
ANALOG POWER 2 AVC2
CAN H CAN2 HIGH
CAN L CAN2 LOW
FUEL TEMP SENSOR THF+
BOOST PRESS SENSOR PIM
D SURO OPEN 1 DTS1
D SURO OPEN 2 DTS2
D SURO DRAIVE - MOT-
D SURO DRAIVE + MOT+
H4 PUMP DRAIVE SIGNAL SPV2
H4 PUMP DRAIVE SIGNAL SPV1
H4 PUMP DRAIVE POWER SP1S
G SENSOR G3+
G SENSOR GND GGND
G SENSOR POWER GVCC
INJ DRIVE SIGNAL 1 INJ1
INJ POWER 1 IJ1+
INJ DRIVE SIGNAL 3 INJ3
INJ DRIVE SIGNAL 5 INJ5
INJ POWER 1 I1+S
INJ DRIVE SIGNAL 2 INJ2
INJ POWER 2 IJ2+
INJ DRIVE SIGNAL 6 INJ6
INJ DRIVE SIGNAL 4 INJ4
INJ SHIELD IJSD
CAN H CAN2 HIGH
CAN L CAN2 LOW
PGD1 POWER-GND 1
PGD2 POWER-GND 2
PGD3 POWER-GND 3
PGD4 POWER-GND 4
CGD1 GND
CGD2 GND
AGD0 A-GND13
EI3+ EXHAUST TEMP. SENSOR 3
EI4+ EXHAUST TEMP. SENSOR 4
EXPS DPR PRESSURE DIFFERENCE SENSOR
AGD9 ANALOG GND 12
AVC5 ANALOG POWER 12
AGD5 ANALOG GND 5
THA+ INTAKE TEMP SENSOR
AFS1 FREQUENCY TYPE
AGD6 ANALOG GND 6
AFV0 AIRFLOW SENSOR POWER SUPPLY
THW WATER TEMP SENSOR
ACS1 ACCELE SENSOR 1
AGD7 ANALOG GND 10
ACS2 ACCELE SENSOR 2
AGD8 ANALOG GND 11
ENGINE STOP SW
SMKS KEY SW
SMKS KEY SW (SPARE)
CE/G CHECK ENGINE LAMP
ST STARTER SW
VB1 +B
VB2 +B
VB3 +B
VB4 +B
NUSW NEUTRAL SW
CLSW CRUTCH SW
ISOK KWP2000
IGSW D/AG SW
PTO PTOSW
BF1 +BF
BF2 +BF
456 G/B
456 (2/6)
458 L/B
986 Y
40 Br/W
35 Br
119 Y
120 L
120 Ω 1/2 W
A20 Y/G
987 L
753 Gr/R
753 (2/6)
34 O
E B/W
2 W
11 W/G
457 W/Y
40 (1/2)
119 (2/3/5/7/10)
120 (2/3/5/7/10)
36 G
E/G EMERGENCY STOP SWITCH
SW-71
CHECK ENG. LAMP(RED)
PL-7
D/AG CONNECTOR (16P)
AUXILIARY ACCELSE SW
SW-72
VNT
EGR VALVE
CAN BUS 2
F-25 20 (A)
F-26 15 (A)
F-24 15 (A)
TWIST
CKS MODEL IS NOT
EXH TEMP. SENSOR 3 DPR INLET
EXH TEMP. SENSOR 4 DPR OUTLET
DPR PRESSURE DIFFERENCE SENSOR
AIRFLOW METER W/INTAKE TEMP SENSOR INT
WATER TEMP SENSOR
A07 Gr/L
A06 P
A09 B/R
A08 W/G
A11 W/Y
A12 Gr/L
A10 G/L
A05 Gr/R
A04 G
A02 Br
A03 B/L
A01 R
308 L/Y
309 G/Y
310 B/Y
311 W/Y
308 (2/5)
309 (2/5)
310 (2/5)
311 (2/5)
2 (1-9/11-12)

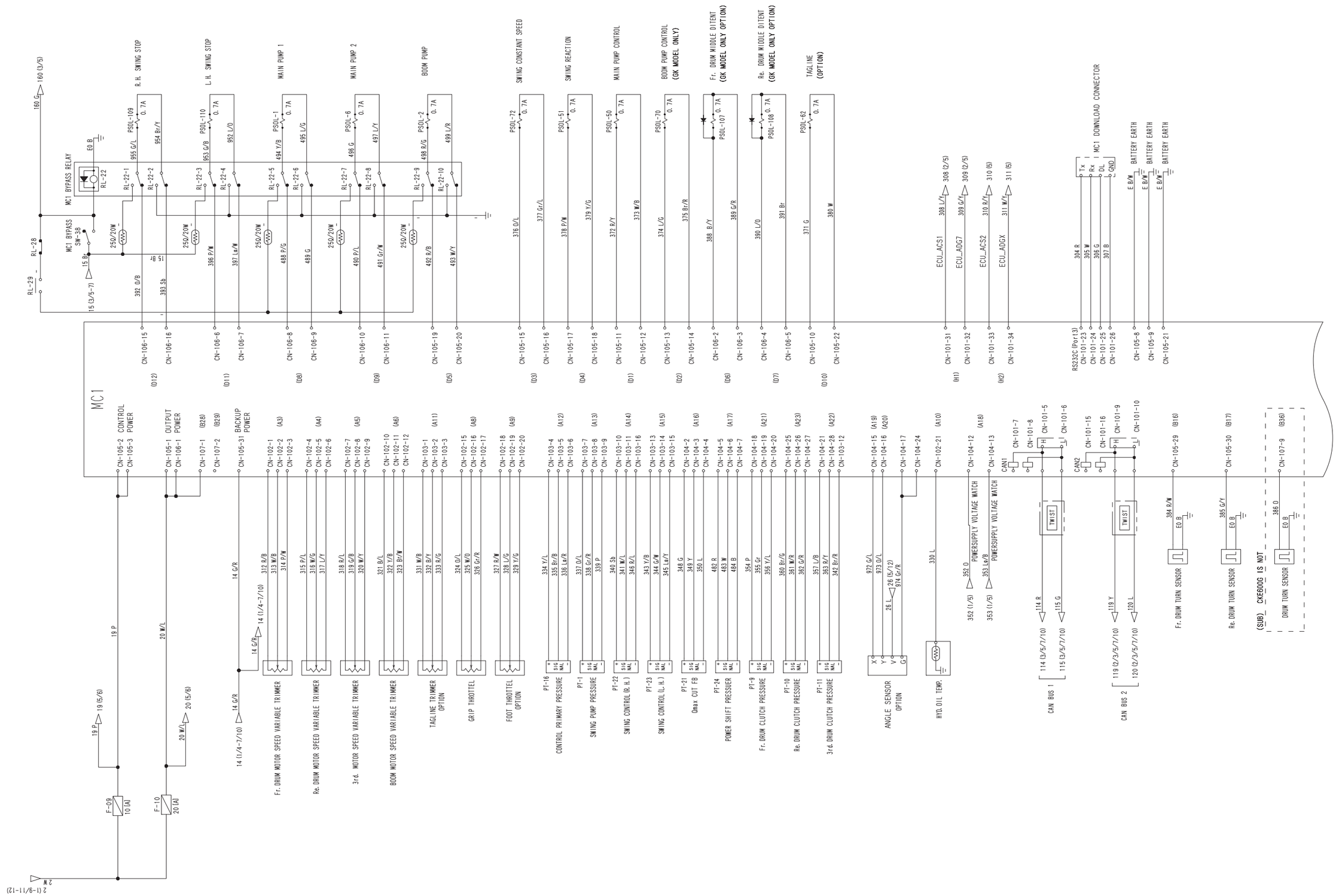
(2/18)


MAIN RAISE STOP
AUX.RAISE STOP
3rd.RAISE STOP
BOOM RAISE STOP
BOOM LOWER STOP
SPEED LIMIT RELEASE
LMI BYPASS KEEP 1
JIB MODEL SELECT
SPEED LIMIT
MAIN RAISE STOP
MAIN LOWER STOP
AUX.RAISE STOP
AUX.LOWER STOP
UNDULATION RAISE STOP
UNDULATION LOWER STOP
3rd.RAISE STOP
3rd.LOWER STOP
ASSEMBLY DISASSEMBLY SELECT
SELF REMOVAL SELECT
MAST MODEL SELF REMOVAL SELECT
SELF REMOVAL EXT. STOP
LMI-BUZZER
HOIST-BUZZER
MULTI VOICE ALARM
OVER LOAD ALARM LAMP
OVER LOAD ALARM LAMP(RED)
OVER LOAD ALARM LAMP(YELLOW)
OVER LOAD ALARM LAMP(GREEN)
BATTERY EARTH
AUTO STOP CHECK
MASTER KEY
LMI RELEASE
HOOK OVERHOIST RELEASE
BOOM OVERHOIST RELEASE
DRUM SELECT
DOWNLOAD START SW
PROGRAM MODE SELECT SW
SIMULTANEOUS CONTROL POSSIBLE
LMI ADJUSTMENT MODE SELECT
CAN BUS 1
CAN BUS 2
STOW EXT 24V_GND
MAIN POWER_GND

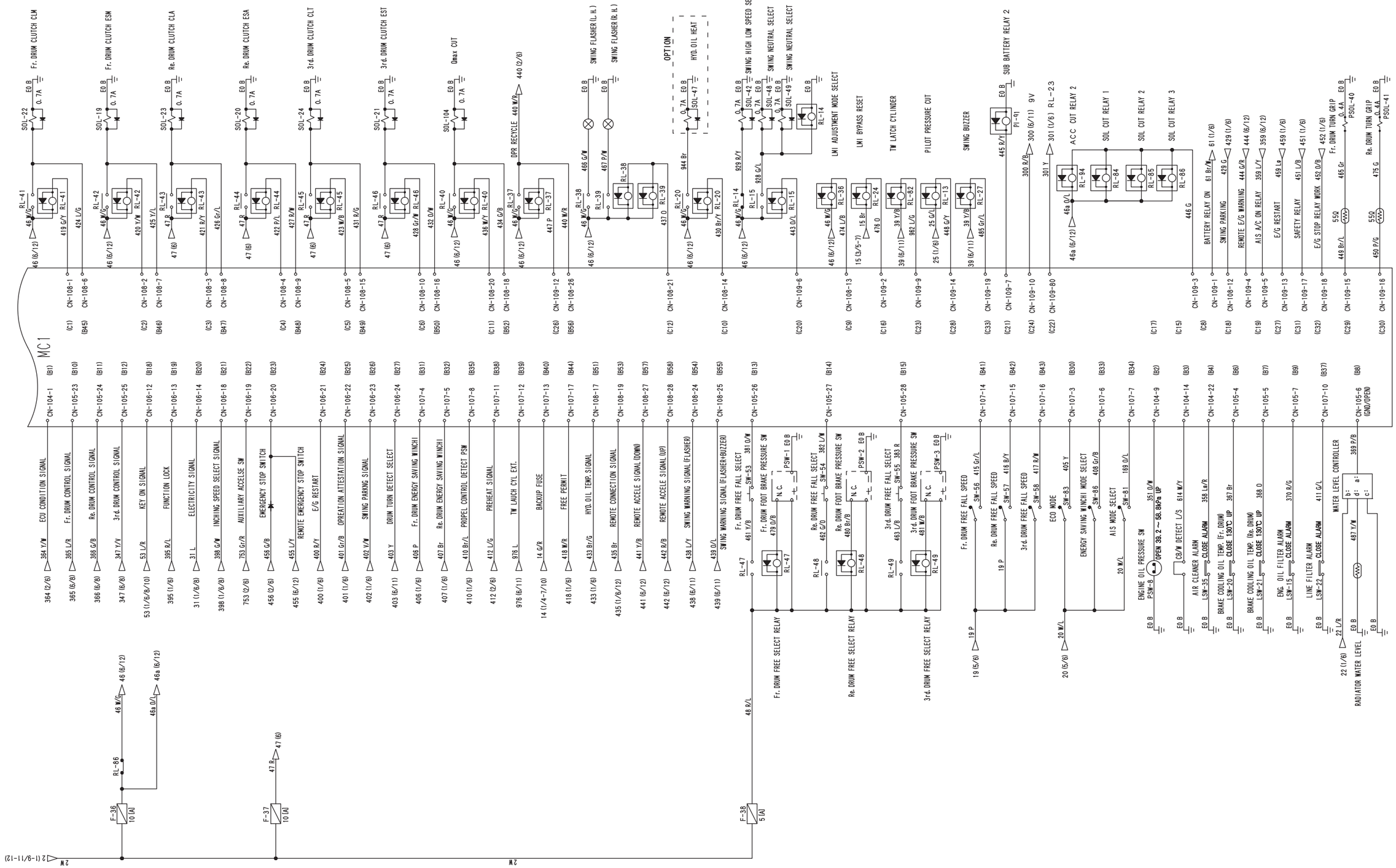
(3/18)


M/L
CONTROL POWER
OUTPUT POWER
BACKUP POWER
BOOM LOAD DETECTOR
LUFFING J1B LOAD DETECTOR
TOWER J1B LOAD DETECTOR
LOWER BOOM ANGLE DETECTOR
LOWER J1B ANGLE DETECTOR
SWING ANGLE DETECTOR A
SWING ANGLE DETECTOR B
WIND VELOCITY METER
OPTION
BOOM OVER RELAY
JIB OVER HOIST RELAY
NO.2 LIMIT RELAY
MAIN HOOK OVERHOIST
AUX. HOOK OVERHOIST
BOOM OVER HOIST
J1B MODE
SELF REMOVAL SELECT
MAST MODEL SELF REMOVAL SELECT
ASSEMBLY DISASSEMBLY SELECT
BOOM OVERHOIST(No. 2)
BOOM OVERHOIST(No. 1)
J1B OVER HOIST
CKE600G IS NOT
TOWER J1B BENDS LOSS
LATCH RELATIONS LIMIT SWITCH
LATSH THE EDGE LIMIT SWITCH
Fr. DRUM OVER PAY OUT
Re. DRUM OVER PAY OUT
SPARE OVER PAY OUT
OPEN AT OVER HOIST
OPEN AT LIMIT
CLOSE AT BENDING DETECT
CLOSE AT LATCH ENGAGE
CLOSE AT LATCH DISENGAGE
OPEN AT OVER PAY OUT
OPEN AT OVER PAY OUT
OPEN AT OVER PAY OUT
F-07 10 (A)
F-08 10 (A)
F-34 5 (A)

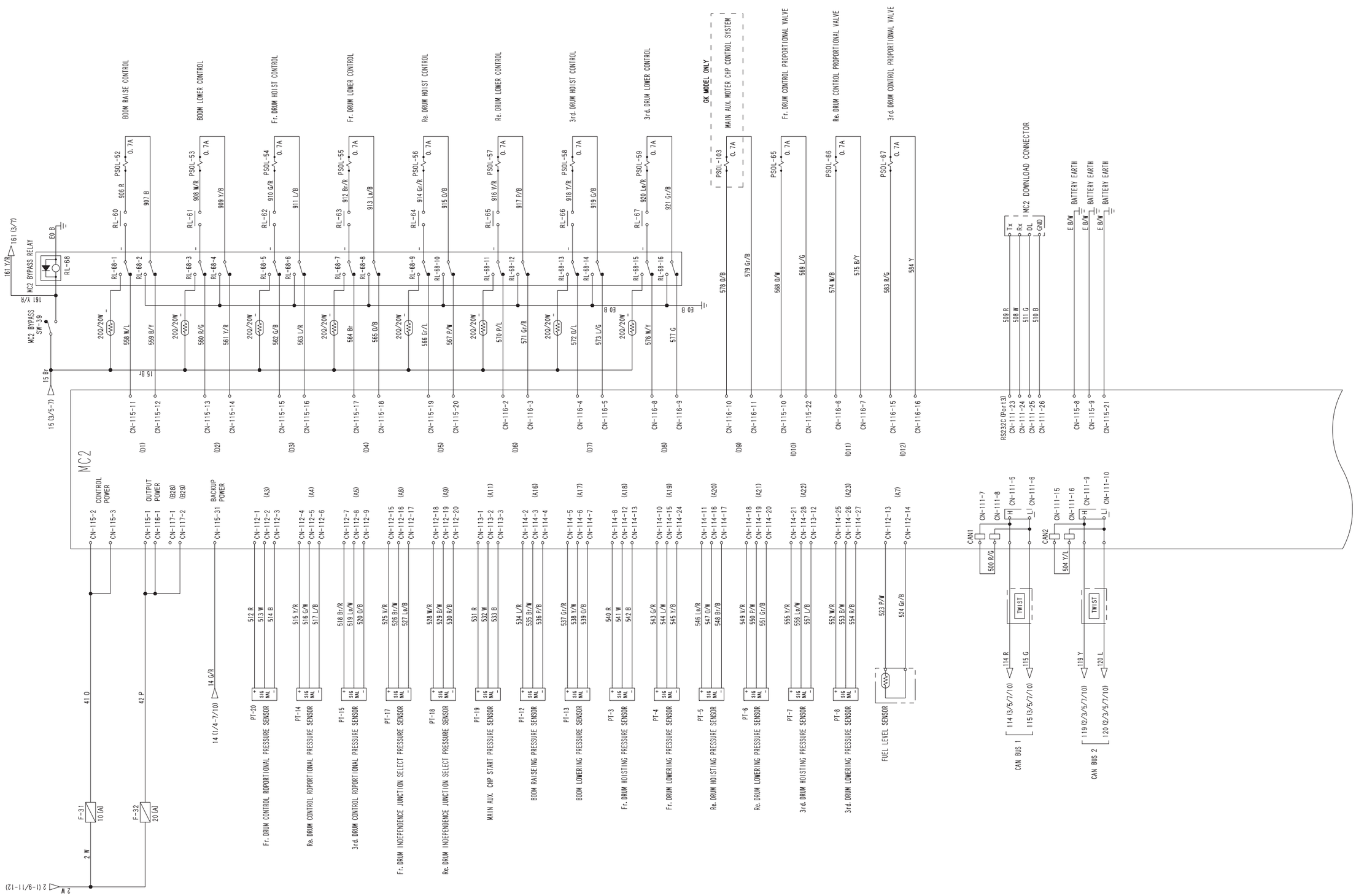
(4/18)


MC1
MC1 BYPASS RELAY
MC1 BYPASS SW-38
RL-22
RL-28
RL-29
160 G
160 (3/5)
15 (3/5-7)
15 Br
E0 B
392 O/B
393 Sb
R.H. SWING STOP
L.H. SWING STOP
MAIN PUMP 1
MAIN PUMP 2
BOOM PUMP
PSOL-109
PSOL-110
PSOL-1
PSOL-6
PSOL-2
0.7A
250/20W
955 G/L
954 Br/Y
953 G/B
952 L/O
494 Y/B
495 L/G
496 G
497 L/Y
498 B/G
499 L/R
398 P/W
397 Lg/W
488 P/G
489 G
490 P/L
491 Gr/W
492 R/B
493 W/Y
SWING CONSTANT SPEED
SWING REACTION
MAIN PUMP CONTROL
BOOM PUMP CONTROL (GK MODEL ONLY)
Fr. DRUM MIDDLE DITENT (GK MODEL ONLY OPTION)
Re. DRUM MIDDLE DITENT (GK MODEL ONLY OPTION)
TAGLINE (OPTION)
PSOL-72
PSOL-51
PSOL-50
PSOL-70
PSOL-107
PSOL-108
PSOL-62
376 O/L
377 Gr/L
378 P/W
379 Y/G
372 B/Y
373 W/B
374 L/G
375 Br/R
388 B/Y
389 G/R
390 L/O
391 Br
371 G
380 W
ECU_ACS1
ECU_ADG7
ECU_ACS2
ECU_AOGX
308 L/Y
309 G/Y
310 B/Y
311 W/Y
308 (2/5)
309 (2/5)
310 (5)
311 (5)
304 R
305 W
306 G
307 B
Tx
Rx
DL
GND
MC1 DOWNLOAD CONNECTOR
E.B/W
BATTERY EARTH
CN-106-15
CN-106-16
CN-106-6
CN-106-7
CN-106-8
CN-106-9
CN-106-10
CN-106-11
CN-105-19
CN-105-20
CN-105-15
CN-105-16
CN-105-17
CN-105-18
CN-105-11
CN-105-12
CN-105-13
CN-105-14
CN-106-2
CN-106-3
CN-106-4
CN-106-5
CN-105-10
CN-105-22
CN-101-31
CN-101-32
CN-101-33
CN-101-34
RS232C (Port13)
CN-101-23
CN-101-24
CN-101-25
CN-101-26
CN-105-8
CN-105-9
CN-105-21
(D12)
(D11)
(D08)
(D09)
(D05)
(D03)
(D04)
(D01)
(D02)
(D06)
(D07)
(D10)
(H1)
(H2)
CONTROL POWER
OUTPUT POWER
BACKUP POWER
CN-105-2
CN-105-3
CN-105-1
CN-106-1
CN-107-1
CN-107-2
CN-105-31
(B28)
(B29)
CN-102-1
CN-102-2
CN-102-3
CN-102-4
CN-102-5
CN-102-6
CN-102-7
CN-102-8
CN-102-9
CN-102-10
CN-102-11
CN-102-12
CN-103-1
CN-103-2
CN-103-3
CN-102-15
CN-102-16
CN-102-17
CN-102-18
CN-102-19
CN-102-20
CN-103-4
CN-103-5
CN-103-6
CN-103-7
CN-103-8
CN-103-9
CN-103-10
CN-103-11
CN-103-16
CN-103-13
CN-103-14
CN-103-15
CN-104-2
CN-104-3
CN-104-4
CN-104-5
CN-104-6
CN-104-7
CN-104-18
CN-104-19
CN-104-20
CN-104-25
CN-104-26
CN-104-27
CN-104-21
CN-104-28
CN-103-12
CN-104-15
CN-104-16
CN-104-17
CN-104-24
CN-102-21
(A3)
(A4)
(A5)
(A6)
(A11)
(A8)
(A9)
(A12)
(A13)
(A14)
(A15)
(A16)
(A17)
(A21)
(A23)
(A22)
(A19)
(A20)
(A10)
CN-104-12
CN-104-13
CAN1
CN-101-7
CN-101-8
CN-101-5
CN-101-6
CAN2
CN-101-15
CN-101-16
CN-101-9
CN-101-10
(A18)
CAN BUS 1
CAN BUS 2
TWIST
114 R
115 G
119 Y
120 L
114 (3/5/7/10)
115 (3/5/7/10)
119 (2/3/5/7/10)
120 (2/3/5/7/10)
CN-105-29
CN-105-30
(B16)
(B17)
384 B/W
385 G/Y
386 O
CN-107-9
(B36)
Fr. DRUM TURN SENSOR
Re. DRUM TURN SENSOR
DRUM TURN SENSOR
(SUB)_CKE600G IS NOT
352 O
353 Lg/B
352 (1/5)
353 (1/5)
POWERSUPPLY VOLTAGE WATCH
330 L
HYD.OIL TEMP.
972 G/L
973 O/L
26 L
26 (5/12)
974 Gr/R
X
Y
V
G
ANGLE SENSOR OPTION
14 G/R
14 (1/4-7/10)
312 B/B
313 W/B
314 P/W
315 P/L
316 W/G
317 L/Y
318 B/L
319 G/B
320 W/Y
321 B/L
322 Y/B
323 Br/W
331 W/B
332 B/Y
333 B/G
324 O/L
325 W/O
326 Gr/R
327 R/W
328 L/G
329 Y/G
Fr. DRUM MOTOR SPEED VARIABLE TRIMMER
Re. DRUM MOTOR SPEED VARIABLE TRIMMER
3rd. MOTOR SPEED VARIABLE TRIMMER
BOOM MOTOR SPEED VARIABLE TRIMMER
TAGLINE TRIMMER OPTION
GRIP THROTTEL
FOOT THROTTEL OPTION
19 P
19 (5/6)
20 W/L
20 (5/6)
F-09
10 (A)
F-10
20 (A)
2 (1-9/11-12)
2 W
334 Y/L
335 Br/B
336 Lg/R
337 O/L
338 Gr/R
339 P
340 Sb
341 W/L
346 B/L
343 Y/B
344 G/W
345 Lg/Y
340 G
349 Y
350 L
482 R
483 W
484 B
354 P
355 Gr
356 Y/L
360 Br/G
361 W/R
362 G/R
357 L/B
363 B/Y
342 Br/R
PT-16
PT-1
PT-22
PT-23
PT-21
PT-24
PT-9
PT-10
PT-11
CONTROL PRIMARY PRESSURE
SWING PUMP PRESSURE
SWING CONTROL(Gr. H.)
SWING CONTROL(L. H.)
Qmax CUT FB
POWER SHIFT PRESSUER
Fr. DRUM CLUTCH PRESSURE
Re. DRUM CLUTCH PRESSURE
3rd. DRUM CLUTCH PRESSURE
SIG
NAL

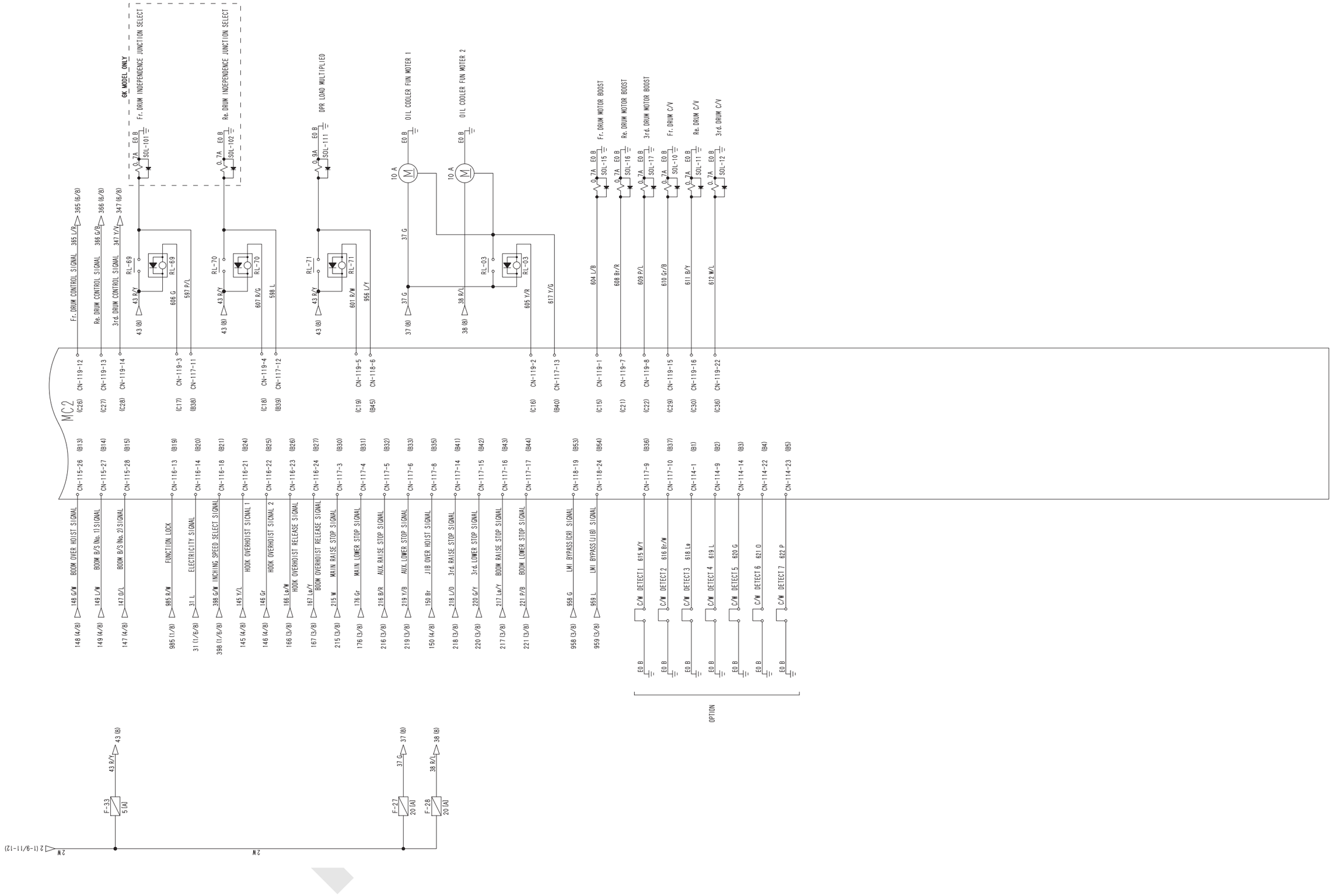
(5/18)


MC1
SOL-22
Fr. DRUM CLUTCH CLM
SOL-19
Fr. DRUM CLUTCH ESM
SOL-23
Re. DRUM CLUTCH CLA
SOL-20
Re. DRUM CLUTCH ESA
SOL-24
3rd. DRUM CLUTCH CLT
SOL-21
3rd. DRUM CLUTCH EST
SOL-104
Qmax CUT
DPR RECYCLE 440 W/O
SWING FLASHER (L. H.)
SWING FLASHER (R. H.)
OPTION
HYD. OIL HEAT
SWING HIGH LOW SPEED SELECT
SWING NEUTRAL SELECT
SWING NEUTRAL SELECT
LM1 ADJUSTMENT MODE SELECT
LM1 BYPASS RESET
TW LATCH CYLINDER
PILOT PRESSURE CUT
SWING BUZZER
SUB BATTERY RELAY 2
ACC CUT RELAY 2
SOL CUT RELAY 1
SOL CUT RELAY 2
SOL CUT RELAY 3
ECU CONDITION SIGNAL
Fr. DRUM CONTROL SIGNAL
Re. DRUM CONTROL SIGNAL
3rd. DRUM CONTROL SIGNAL
KEY ON SIGNAL
FUNCTION LOCK
ELECTRICITY SIGNAL
INCHING SPEED SELECT SIGNAL
AUXILIARY ACCELSE SW
EMERGENCY STOP SWITCH
REMOTE EMERGENCY STOP SWITCH
E/G RESTART
OPREATION ATTESTATION SIGNAL
SWING PARKING SIGNAL
DRUM TURN DETECT SELECT
Fr. DRUM ENERGY SAVING WINCH
Re. DRUM ENERGY SAVING WINCH
PROPEL CONTROL DETECT PSW
PREHEAT SIGNAL
TW LAUCH CYL EXT.
BACKUP FUSE
FREE PERMIT
HYD. OIL TEMP. SIGNAL
REMOTE CONNECTION SIGNAL
REMOTE ACCELE SIGNAL (DOWN)
REMOTE ACCELE SIGNAL (UP)
SWING WARNING SIGNAL (FLASHER)
SWING WARNING SIGNAL (FLASHER+BUZZER)
Fr. DRUM FREE FALL SELECT
Fr. DRUM FOOT BRAKE PRESSURE SW
Re. DRUM FREE FALL SELECT
Re. DRUM FOOT BRAKE PRESSURE SW
3rd. DRUM FREE FALL SELECT
3rd. DRUM FOOT BRAKE PRESSURE SW
Fr. DRUM FREE FALL SELECT RELAY
Re. DRUM FREE SELECT RELAY
3rd. DRUM FREE SELECT RELAY
Fr. DRUM FREE FALL SPEED
Re. DRUM FREE FALL SPEED
3rd. DRUM FREE FALL SPEED
ECO MODE
ENERGY SAVING WINCH MODE SELECT
AIS MODE SELECT
ENGINE OIL PRESSURE SW
OPEN 38.2 ~ 58.8kPa UP
BATTERY RELAY ON
SWING PARKING
REMOTE E/G WARNING
AIS A/C ON RELAY
E/G RESTART
SAFETY RELAY
E/G STOP RELAY WORK
Fr. DRUM TURN GRIP
Re. DRUM TURN GRIP
CB/W DETECT L/S
AIR CLEANER ALARM
BRAKE COOLING OIL TEMP. (Fr. DRUM)
CLOSE 130°C UP
BRAKE COOLING OIL TEMP. (Re. DRUM)
CLOSE 130°C UP
ENG. OIL FILTER ALARM
LINE FILTER ALARM
WATER LEVEL CONTROLLER
RADIATOR WATER LEVEL
CLOSE ALARM
F-36 10 [A]
F-37 10 [A]
F-38 5 [A]
RL-86
2 (1-9/11-12)

(6/18)


MC2
CONTROL POWER
OUTPUT POWER
BACKUP POWER
MC2 BYPASS RELAY
MC2 BYPASS SW-39
BOOM RAISE CONTROL
BOOM LOWER CONTROL
Fr. DRUM HOIST CONTROL
Fr. DRUM LOWER CONTROL
Re. DRUM HOIST CONTROL
Re. DRUM LOWER CONTROL
3rd. DRUM HOIST CONTROL
3rd. DRUM LOWER CONTROL
GK MODEL ONLY
MAIN AUX. MOTER CHP CONTROL SYSTEM
Fr. DRUM CONTROL PROPORTIONAL VALVE
Re. DRUM CONTROL PROPORTIONAL VALVE
3rd. DRUM CONTROL PROPORTIONAL VALVE
MC2 DOWNLOAD CONNECTOR
BATTERY EARTH
F-31 10 [A]
F-32 20 [A]
Fr. DRUM CONTROL ROPORTIONAL PRESSURE SENSOR
Re. DRUM CONTROL ROPORTIONAL PRESSURE SENSOR
3rd. DRUM CONTROL ROPORTIONAL PRESSURE SENSOR
Fr. DRUM INDEPENDENCE JUNCTION SELECT PRESSURE SENSOR
Re. DRUM INDEPENDENCE JUNCTION SELECT PRESSURE SENSOR
MAIN AUX. CHP START PRESSURE SENSOR
BOOM RAISEING PRESSURE SENSOR
BOOM LOWERING PRESSURE SENSOR
Fr. DRUM HOISTING PRESSURE SENSOR
Fr. DRUM LOWERING PRESSURE SENSOR
Re. DRUM HOISTING PRESSURE SENSOR
Re. DRUM LOWERING PRESSURE SENSOR
3rd. DRUM HOISTING PRESSURE SENSOR
3rd. DRUM LOWERING PRESSURE SENSOR
FUEL LEVEL SENSOR
CAN BUS 1
CAN BUS 2
TWIST

(7/18)


MC2
Fr. DRUM CONTROL SIGNAL 365 L/R
Re. DRUM CONTROL SIGNAL 366 G/R
3rd. DRUM CONTROL SIGNAL 347 Y/Y
GK MODEL ONLY
Fr. DRUM INDEPENDENCE JUNCTION SELECT
Re. DRUM INDEPENDENCE JUNCTION SELECT
DPR LOAD MULTIPLIED
OIL COOLER FUN MOTER 1
OIL COOLER FUN MOTER 2
Fr. DRUM MOTOR BOOST
Re. DRUM MOTOR BOOST
3rd. DRUM MOTOR BOOST
Fr. DRUM C/V
Re. DRUM C/V
3rd. DRUM C/V
BOOM OVER HOIST SIGNAL
BOOM B/S No. 1 SIGNAL
BOOM B/S No. 2 SIGNAL
FUNCTION LOCK
ELECTRICITY SIGNAL
INCHING SPEED SELECT SIGNAL
HOOK OVERHOIST SIGNAL 1
HOOK OVERHOIST SIGNAL 2
HOOK OVERHOIST RELEASE SIGNAL
BOOM OVERHOIST RELEASE SIGNAL
MAIN RAISE STOP SIGNAL
MAIN LOWER STOP SIGNAL
AUX RAISE STOP SIGNAL
AUX LOWER STOP SIGNAL
J1B OVER HOIST SIGNAL
3rd. RAISE STOP SIGNAL
3rd. LOWER STOP SIGNAL
BOOM RAISE STOP SIGNAL
BOOM LOWER STOP SIGNAL
LMI BYPASS (CM) SIGNAL
LMI BYPASS (J1B) SIGNAL
OPTION
DETECT 1
DETECT 2
DETECT 3
DETECT 4
DETECT 5
DETECT 6
DETECT 7
F-33 5 (A)
F-27 20 (A)
F-28 20 (A)
2 (1-9/11-12)

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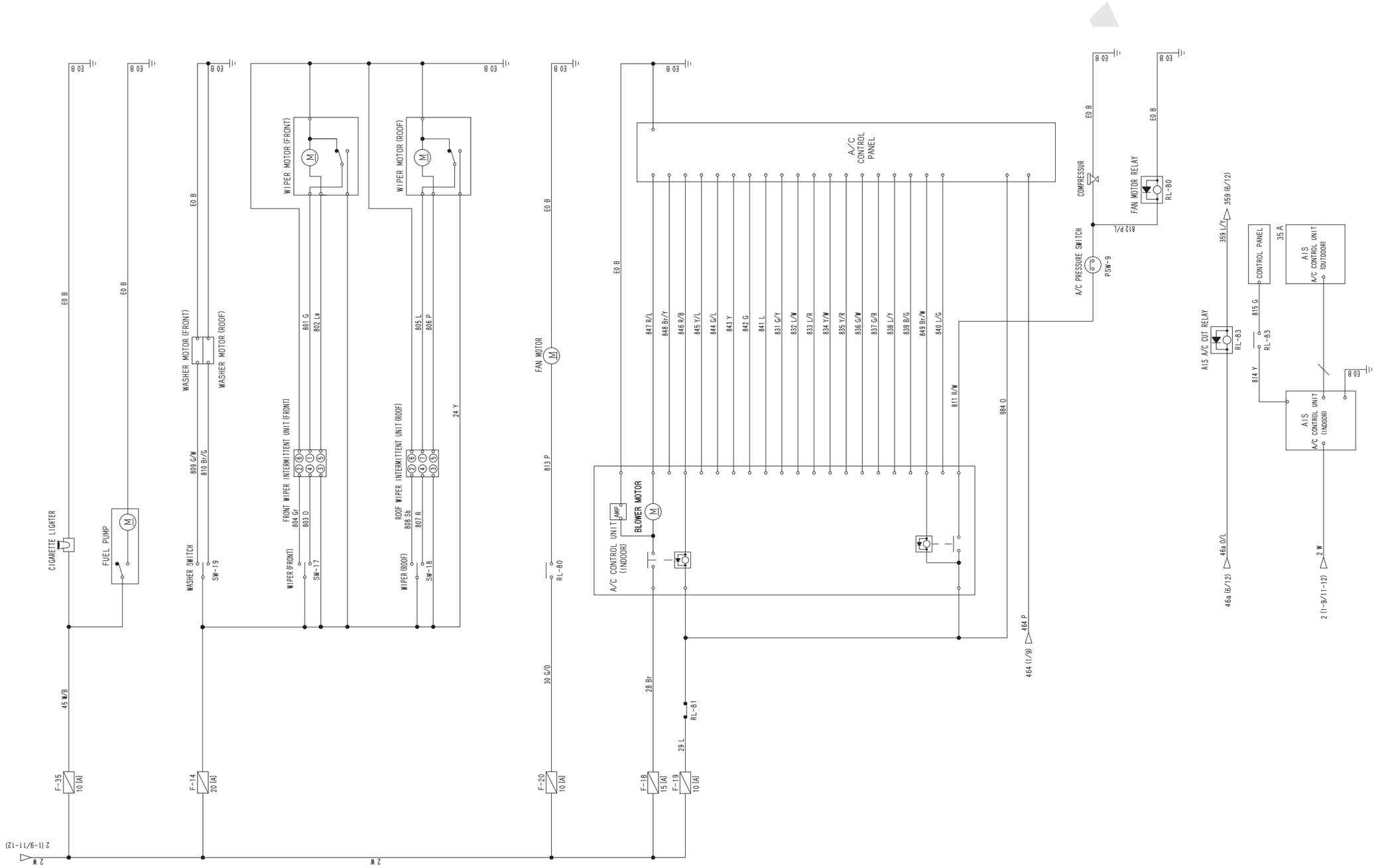
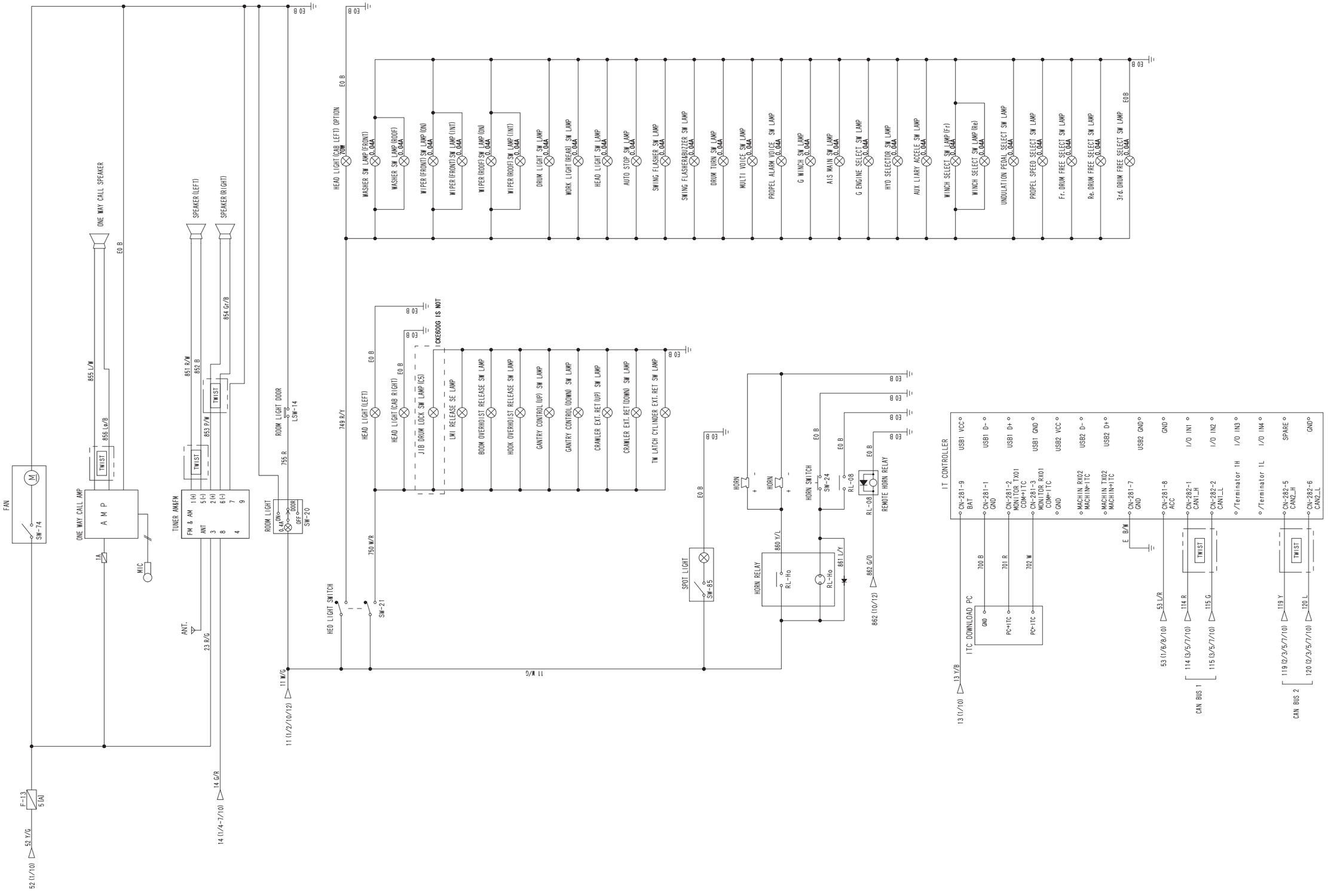
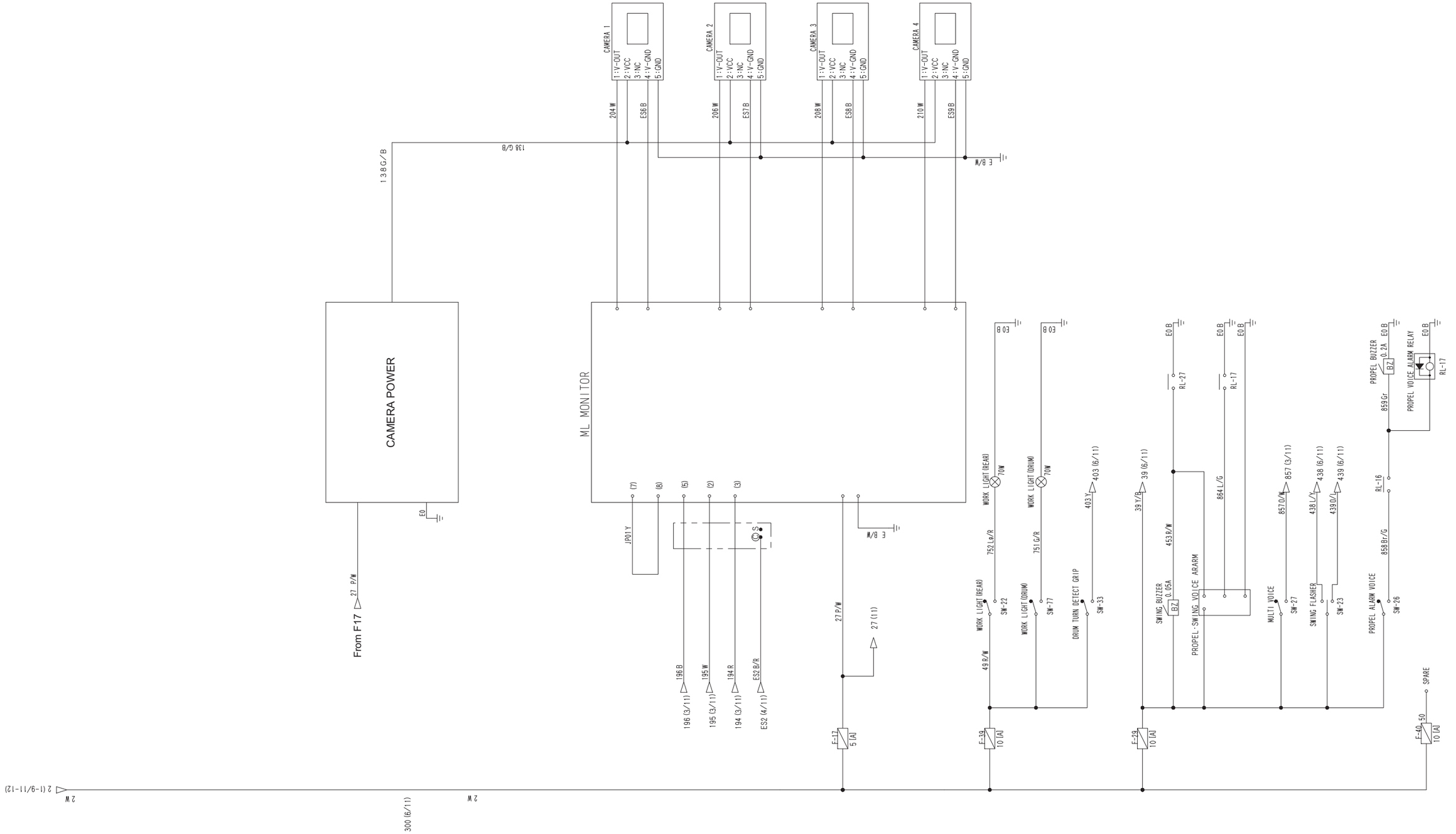

E0 B
CIGARETTE LIGHTER
FUEL PUMP
WASHER MOTOR (FRONT)
WASHER MOTOR (ROOF)
WASHER SWITCH
SW-19
WIPER MOTOR (FRONT)
WIPER MOTOR (ROOF)
FRONT WIPER INTERMITTENT UNIT (FRONT)
ROOF WIPER INTERMITTENT UNIT (ROOF)
WIPER (FRONT)
SW-17
WIPER (ROOF)
SW-18
FAN MOTOR
A/C CONTROL PANEL
COMPRESSOR
A/C PRESSURE SWITCH
PSW-9
FAN MOTOR RELAY
RL-80
RL-81
RL-83
A/C CONTROL UNIT (INDOOR)
BLOWER MOTOR
A/C CONTROL UNIT (OUTDOOR)
A/C CUT RELAY
CONTROL PANEL
F-35 10 (A)
F-14 20 (A)
F-20 10 (A)
F-18 15 (A)
F-19 10 (A)
45 W/B
30 G/O
28 Br
29 L
24 Y
809 G/W
810 Br/G
801 G
802 L
805 L
806 P
804 Gr
803 O
808 Sb
807 R
847 R/L
848 Br/Y
846 R/B
845 Y/L
844 G/L
843 Y
842 G
841 L
832 L/W
833 L/R
834 Y/W
835 Y/R
836 G/W
837 G/R
838 L/Y
839 B/G
849 Br/W
840 L/G
811 R/W
984 O
812 P/L
813 P
814 Y
815 G
359 L/Y
359 (6/12)
35 A
46a O/L
46a (6/12)
2 W
2 (1-9/11-12)
464 P
464 (1/9)

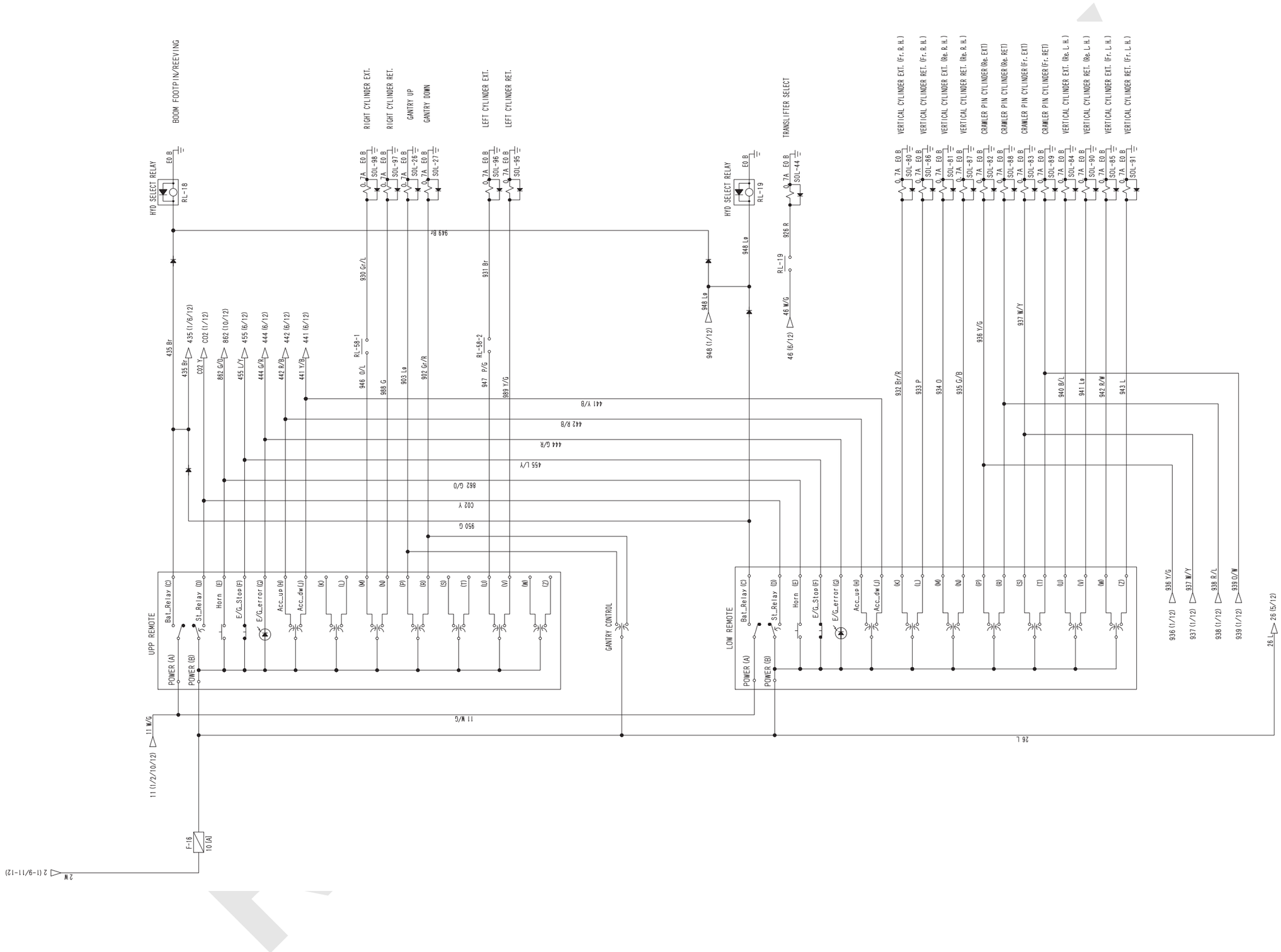
(9/18)


HEAD LIGHT(CAB LEFT) OPTION
70W
WASHER SW LAMP(FRONT)
WASHER SW LAMP(ROOF)
WIPER(FRONT)SW LAMP(ON)
WIPER(FRONT)SW LAMP(INT)
WIPER(ROOF)SW LAMP(ON)
WIPER(ROOF)SW LAMP(INT)
DRUM LIGHT SW LAMP
WORK LIGHT(REAR) SW LAMP
HEAD LIGHT SW LAMP
AUTO STOP SW LAMP
SWING FLASHER SW LAMP
SWING FLASHER&BUZZER SW LAMP
DRUM TURN SW LAMP
MULTI VOICE SW LAMP
PROPEL ALARM VOICE SW LAMP
G WINCH SW LAMP
AIS MAIN SW LAMP
G ENGINE SELECT SW LAMP
HYD SELECTOR SW LAMP
AUX LIARY ACCELE SW LAMP
WINCH SELECT SW LAMP(Gr)
WINCH SELECT SW LAMP(Re)
UNDULATION PEDAL SELECT SW LAMP
PROPEL SPEED SELECT SW LAMP
Fr. DRUM FREE SELECT SW LAMP
Re. DRUM FREE SELECT SW LAMP
3rd. DRUM FREE SELECT SW LAMP
0.04A
E0 B
ONE WAY CALL SPEAKER
SPEAKER(LEFT)
SPEAKER(RIGHT)
855 L/W
856 Lg/B
851 R/W
852 B
853 P/W
854 Gr/B
TWIST
ROOM LIGHT DOOR
SW-14
755 R
FAN
M
SW-74
ONE WAY CALL AMP
A M P
1A
MIC
TUNER AM&FM
FM & AM
ANT
ANT.
23 B/G
14 G/R
14 (1/4-7/10)
F-13
5 (A)
52 Y/G
52 (1/10)
ROOM LIGHT
ON
OFF
DOOR
SW-20
749 R/Y
HEAD LIGHT(LEFT)
HEAD LIGHT(CAB RIGHT)
J1B DRUM LOCK SW LAMP(C5)
CKE6006 IS NOT
LW1 RELEASE SE LAMP
BOOM OVERHOIST RELEASE SW LAMP
HOOK OVERHOIST RELEASE SW LAMP
GANTRY CONTROL(UP) SW LAMP
GANTRY CONTROL(DOWN) SW LAMP
CRAWLER EXT.RET(UP) SW LAMP
CRAWLER EXT.RET(DOWN) SW LAMP
TW LATCH CYLINDER EXT.RET SW LAMP
HED LIGHT SWITCH
750 W/R
SW-21
11 W/G
11 (1/2/10/12)
5/W 11
SPOT LIGHT
SW-65
HORN
HORN RELAY
RL-Ho
860 Y/L
861 L/Y
HORN SWITCH
SW-24
RL-08
REMOTE HORN RELAY
862 G/O
862 (10/12)
IT CONTROLLER
CN-281-9
BAT
13 Y/B
13 (1/10)
CN-281-1
GND
700 B
CN-281-2
MONITOR TXO1
COM+ITC
701 R
CN-281-3
MONITOR RXO1
COM-ITC
702 W
ITC DOWNLOAD PC
GND
PC+ITC
PC-ITC
MACHIN RXO2
MACHIN+ITC
MACHIN TXO2
MACHIN-ITC
CN-281-7
GND
E B/W
CN-281-8
ACC
53 L/R
53 (1/6/8/10)
CN-282-1
CAN1_H
114 R
114 (3/5/7/10)
CN-282-2
CAN1_L
115 G
115 (3/5/7/10)
CAN BUS 1
/Terminator 1H
/Terminator 1L
CN-282-5
CAN2_H
119 Y
119 (2/3/5/7/10)
CN-282-6
CAN2_L
120 L
120 (2/3/5/7/10)
CAN BUS 2
USB1 VCC
USB1 D-
USB1 D+
USB1 GND
USB2 VCC
USB2 D-
USB2 D+
USB2 GND
GND
I/O IN1
I/O IN2
I/O IN3
I/O IN4
SPARE
GND

(10/18)


CAMERA 1
1:V-OUT
2:VCC
3:NC
4:V-GND
5:GND
CAMERA 2
CAMERA 3
CAMERA 4
204 W
ES6 B
206 W
ES7 B
208 W
ES8 B
210 W
ES9 B
138 G/B
F B/W
CAMERA POWER
E0
27 P/W
From F17
ML MONITOR
(7)
(8)
(5)
(2)
(3)
JP01 Y
S
196 B
196 (3/11)
195 W
195 (3/11)
194 R
194 (3/11)
ES2 B/R
ES2 (4/11)
E B/W
27 P/W
27 (11)
F-17
5 [A]
E0 B
WORK LIGHT (REAR)
70W
WORK LIGHT (DRUM)
70W
752 Lg/R
751 G/R
403 Y
403 (6/11)
49 R/W
WORK LIGHT (REAR)
SW-22
WORK LIGHT (DRUM)
SW-77
DRUM TURN DETECT GRIP
SW-33
F-39
10 [A]
39 (6/11)
39 Y/R
453 R/W
SWING BUZZER
0.05A
BZ
PROPEL-SWING VOICE ARARM
RL-27
RL-17
864 L/G
857 (3/11)
857 O/W
MULTI VOICE
SW-27
438 (6/11)
438 L/Y
SWING FLASHER
SW-23
439 (6/11)
439 O/L
PROPEL ALARM VOICE
SW-26
RL-16
858 Br/G
PROPEL BUZZER
0.2A
859 Gr
PROPEL VOICE ALARM RELAY
RL-17
F-29
10 [A]
SPARE
F-40
10 [A]
2 W
2 (1-9/11-12)
300 (6/11)

(11/18)


BOOM FOOTPIN/REEVING
RIGHT CYLINDER EXT.
RIGHT CYLINDER RET.
GANTRY UP
GANTRY DOWN
LEFT CYLINDER EXT.
LEFT CYLINDER RET.
TRANSLIFTER SELECT
VERTICAL CYLINDER EXT. (Fr. R.H.)
VERTICAL CYLINDER RET. (Fr. R.H.)
VERTICAL CYLINDER EXT. (Re. R.H.)
VERTICAL CYLINDER RET. (Re. R.H.)
CRAWLER PIN CYLINDER (Re. EXT)
CRAWLER PIN CYLINDER (Re. RET)
CRAWLER PIN CYLINDER (Fr. EXT)
CRAWLER PIN CYLINDER (Fr. RET)
VERTICAL CYLINDER EXT. (Re. L.H.)
VERTICAL CYLINDER RET. (Re. L.H.)
VERTICAL CYLINDER EXT. (Fr. L.H.)
VERTICAL CYLINDER RET. (Fr. L.H.)
HYD SELECT RELAY
RL-18
RL-19
SOL-98
SOL-97
SOL-26
SOL-27
SOL-96
SOL-95
SOL-44
SOL-80
SOL-86
SOL-81
SOL-87
SOL-82
SOL-88
SOL-83
SOL-89
SOL-84
SOL-90
SOL-85
SOL-91
UPP REMOTE
LOW REMOTE
Bat_Relay (C)
St_Relay (D)
Horn (E)
E/G_Stop(F)
E/G_error (G)
Acc_up (H)
Acc_dw (U)
POWER (A)
POWER (B)
GANTRY CONTROL
F-16
10 (A)
949 Br
948 Lg
926 R
930 Gr/L
931 Br
946 O/L
988 G
903 Lg
902 Gr/R
947 P/G
989 Y/G
441 Y/B
442 R/B
444 G/R
455 L/Y
862 G/O
C02 Y
950 G
11 W/G
26 L
435 Br
435 (1/6/12)
C02 (1/12)
862 (10/12)
455 (6/12)
444 (6/12)
442 (6/12)
441 (6/12)
948 (1/12)
46 (6/12)
46 W/G
11 (1/2/10/12)
2 W
2 (1-9/11-12)
932 Gr/R
933 P
934 O
935 G/B
936 Y/G
937 W/Y
940 B/L
941 Lg
942 R/W
943 L
938 R/L
939 O/W
936 (1/12)
937 (1/12)
938 (1/12)
939 (1/12)
26 (5/12)

(12/18)

RELAY				
RL-NO.	COIL SHEET No.	TERMINAL SHEET No.	TYPE	U S E
RL-B (sub)	1	1	N.O.	BATTERY RELAY (sub)
RL-B	1	1	N.O.	BATTERY RELAY
RL-Ho	10	10	N.O.	HORN RELAY
RL-C	1		N.O.	CUT OUT RELAY
RL-H	2	2	N.O.	HEATER RELAY
RL-ST	1	1	N.O.	STARTER RELAY
RL-01	1	1	N.C.	ALTERNATOR DETECT RELAY
RL-02	1	1	N.C.	SAFETY RELAY
RL-03	8	8	N.O.	OIL COOLER MOTER
RL-04	1	1	N.O. N.C.	AIS RELAY
RL-05	1	1	N.O. N.C.	STATER LOCK RELAY
RL-06	1	1	N.C.	ATTESTATION RELEASE RELAY
RL-07	1	1	N.O. N.C.	E/G STOP RELAY
RL-08	10	10	N.O.	REMOTE HORN RELAY
RL-09	1	1	N.C.	SWING PARKING CONTROL RELAY
RL-10	1			SWING PARKING 1 RELAY
RL-10-1		1	N.O.	SWING PARKING 1
RL-10-2		1	N.O.	SWING PARKING 2
RL-12	1	1	N.C.	SWING PARKING 3 RELAY
RL-13	6	1	N.C.	PILOT PRESSURE CUT

RELAY				
RL-NO.	COIL SHEET No.	TERMINAL SHEET No.	TYPE	U S E
RL-14	6	6	N.C.	SWING HIGH LOW SPEED SELECT
RL-15	6	6	N.O.	SWING NEUTRAL BRAKE SELECT
RL-16	1	11	N.O.	PROPEL ALARM RELAY
RL-17	11	11	N.O.	PROPEL VOICE ALARM RELAY
RL-18	12	1	N.C.	HYD SELECT RELAY
RL-19	12	12	N.O.	HYD SELECT RELAY
RL-20	6	6	N.O.	HYD. OIL HEAT
RL-21	1	1	N.O.	E/G RESTART RELAY
RL-22	5			MC1 BYPASS RELAY
RL-22-1		5	N.O. N.C.	MC1 BYPASS RELAY
RL-22-2		5	N.O. N.C.	MC1 BYPASS RELAY
RL-22-3		5	N.O. N.C.	MC1 BYPASS RELAY
RL-22-4		5	N.O. N.C.	MC1 BYPASS RELAY
RL-22-5		5	N.O. N.C.	MC1 BYPASS RELAY
RL-22-6		5	N.O. N.C.	MC1 BYPASS RELAY
RL-22-7		5	N.O. N.C.	MC1 BYPASS RELAY
RL-22-8		5	N.O. N.C.	MC1 BYPASS RELAY
RL-22-9		5	N.O. N.C.	MC1 BYPASS RELAY
RL-22-10		5	N.O. N.C.	MC1 BYPASS RELAY
RL-23	1	1	N.C.	KEY RETURN RELAY

RELAY				
RL-NO.	COIL SHEET No.	TERMINAL SHEET No.	TYPE	U S E
RL-24	6	3	N.C.	LMI BYPASS RESET
RL-25	3			LMI BYPASS KEEP 1
RL-25-1		3	N.O.	LMI BYPASS KEEP 1
RL-25-2		3	N.O.	LMI BYPASS KEEP 2
RL-27	6	11	N.O.	SWING BUZZER
RL-28	3	5	N.C.	SPEED LIMIT RELEASE
RL-29	3	5	N.O.	SPEED LIMIT
RL-30	3	3	N.O.	OVER LOAD ALARM LAMP (GREEN)
RL-31	3	3	N.O.	OVER LOAD ALARM LAMP (YELLOW)
RL-32	3	3	N.O.	OVER LOAD ALARM LAMP (RED)
RL-36	6	3	N.O.	LMI ADJUSTMENT MODE SELECT
RL-37	6	6	N.O.	DPR RECYCLE RELAY
RL-38	6	6	N.O.	SWING FLASHER (L. H.) RELAY
RL-39	6	6	N.O.	SWING FLASHER (R. H.) RELAY
RL-40	6	6	N.O.	Qmax CUT RELAY
RL-41	6	6	N.O.	CLM RELAY
RL-42	6	6	N.O.	ESM RELAY
RL-43	6	6	N.O.	CLA RELAY
RL-44	6	6	N.O.	ESA RELAY
RL-45	6	6	N.O.	CLT RELAY

RELAY				
RL-NO.	COIL SHEET No.	TERMINAL SHEET No.	TYPE	U S E
RL-46	6	6	N.O.	EST RELAY
RL-47	6	6	N.O.	Fr. DRUM FREE SELECT RELAY
RL-48	6	6	N.O.	Re. DRUM FREE SELECT RELAY
RL-49	6	6	N.O.	3rd. DRUM FREE SELECT RELAY
RL-50	4			JIB OVER HOIST RELAY
RL-50-1		3	N.O.	JIB OVER HOIST RELAY
RL-50-2		3	N.O.	JIB OVER HOIST RELAY
RL-51	4	3	N.O.	NO. 2 LIMIT RELAY
RL-53	4	3	N.O.	BOOM OVER HOIST RELAY
RL-54	3	4	N.O.	SELF REMOVAL SELECT
RL-55	3	4	N.O.	ASSEMBLY DISASSEMBLY SELECT
RL-56	3	4	N.O.	MAST MODEL SELF REMOVAL SELECT
RL-57	3			JIB MODE SELECT
RL-57-1		4	N.O.	JIB MODE
RL-57-2		4	N.C.	JIB MODE
RL-58	3			SELF REMOVAL EXT. STOP
RL-58-1		12	N.O.	SELF REMOVAL EXT. STOP
RL-58-2		12	N.O.	SELF REMOVAL EXT. STOP
RL-60	3	7	N.O.	UNDULATION RAISE STOP
RL-61	3	7	N.O.	UNDULATION LOWER STOP

RELAY				
RL-NO.	COIL SHEET No.	TERMINAL SHEET No.	TYPE	U S E
RL-62	3	7	N.O.	MAIN RAISE STOP
RL-63	3	7	N.O.	MAIN LOWER STOP
RL-64	3	7	N.O.	AUX. RAISE STOP
RL-65	3	7	N.O.	AUX. LOWER STOP
RL-66	3	7	N.O.	3rd. RAISE STOP
RL-67	3	7	N.O.	3rd. LOWER STOP
RL-68	7			MC2 BYPASS RELAY
RL-68-1		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-2		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-3		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-4		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-5		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-6		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-7		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-8		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-9		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-10		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-11		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-12		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-13		7	N.O. N.C.	MC2 BYPASS RELAY

RELAY				
RL-NO.	COIL SHEET No.	TERMINAL SHEET No.	TYPE	U S E
RL-68-14		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-15		7	N.O. N.C.	MC2 BYPASS RELAY
RL-68-16		7	N.O. N.C.	MC2 BYPASS RELAY
RL-69	8	8	N.O.	Fr. DRUM INDEPENDENCE JUNCTION SELECT RELAY
RL-70	8	8	N.O.	Re. DRUM INDEPENDENCE JUNCTION SELECT RELAY
RL-71	8	8	N.O.	DPR LOAD MULTIPLIED RELAY
RL-80	9	9	N.O.	FUN MOTOR RELAY
RL-81	1	9	N.C.	A/C CUT RELAY
RL-82	6	11	N.O.	TW LATCH CYLINDER
RL-83	9	9	N.O.	AIS A/C CUT RELAY
RL-84	6	4	N.C.	SOL CUT RELAY 1
RL-85	6	1	N.C.	SOL CUT RELAY 2
RL-86	6	6	N.C.	SOL CUT RELAY 3
RL-87	3	3	N.O.	OVER LOAD ALARM BUZZER (RED)
RL-91	6	1	N.O.	SUB BATTERY RELAY 2
RL-93	1	1	N.C.	ACC CUT RELAY 1
RL-94	6	1	N.O.	ACC CUT RELAY 2

FUSE			
F-NO.	RATED	U S E	SHEET NO.
F-01	20	ELECTRIC POWER SOURCE	1
F-02	5	POWERSUPPLY-VOLTAGE WATCH RELAY	1
F-03	5	ITC and RADIO POWER SOURCE	1
F-04	5	ML BACK-UP	1
F-05	10	BYPASS SWITCH	3
F-06	5	RELEASE SWITCH	3
F-07	10	LMI CONTROL POWER	4
F-08	10	LMI OUTPUT POWER	4
F-09	10	MC1 CONTROL POWER	5
F-10	20	MC1 OUTPUT POWER	5
F-11	10	AUTO STOP	3
F-12	10	E/G CONDITION	1
F-13	5	ONE WAY/RADIO	10
F-14	20	WIPER	9
F-15	10	FUNCTION LOCK	1
F-16	10	REMOTE	12
F-17	5	MONITOR	11
F-18	15	A/C	9
F-19	10	A/C 2	9
F-20	10	FUN MOTOR	9

FUSE			
F-NO.	RATED	U S E	SHEET NO.
F-21	5	GENERATION OF ELECTRICITY SENSOR	1
F-24	15	ECU (+BF)	2
F-25	20	ECU (+B)	2
F-26	15	ECU	2
F-27	20	OIL COOLER FUN MOTER 1	8
F-28	30	OIL COOLER FUN MOTER 2	8
F-29	10	SWING FLASHER/VOICE ARARM	11
F-30	5	STARTER	1
F-31	10	MC2 CONTROL POWER	7
F-32	20	MC2 OUTPUT POWER	7
F-33	5	MC2 EARTH OUTPUT POWER	8
F-34	5	OVERHOIST L/S	4
F-35	10	FUEL PUMP/CIGARETTE LIGHTER	9
F-36	10	MC1 EARTH OUTPUT POWER 1	6
F-37	10	MC1 EARTH OUTPUT POWER 2	6
F-38	5	NEUTRAL FREE	6
F-39	10	LIGHT	11
F-40	10	SPARE	11

SOLENOID VALVE		
SOL-NO.	U S E	SHEET NO.
SOL-3	FUNCTION LOCK	1
SOL-4	PROPEL SPEED SELECT	1
SOL-5	SWING PARKING ON FOR RELEASE OFF FOR PARKING	1
SOL-10	Fr. DRUM C/V	8
SOL-11	Re. DRUM C/V	8
SOL-12	3rd. DRUM C/V	8
SOL-15	Fr. DRUM MOTOR BOOST	8
SOL-16	Re. DRUM MOTOR BOOST	8
SOL-17	3rd. DRUM MOTOR BOOST	8
SOL-18	3rd. RAISE STOP	3
SOL-19	Fr. DRUM CLUTCH ESM	6
SOL-20	Re. DRUM CLUTCH ESA	6
SOL-21	3rd. DRUM CLUTCH EST	6
SOL-22	Fr. DRUM CLUTCH CLM	6
SOL-23	Re. DRUM CLUTCH CLA	6
SOL-24	3rd. DRUM CLUTCH CLT	6
SOL-26	GANTRY UP	12
SOL-27	GANTRY DOWN	12
SOL-35	BOOM RAISE STOP	3

SOLENOID VALVE		
SOL-NO.	U S E	SHEET NO.
SOL-36	BOOM LOWER STOP	3
SOL-37	MAIN RAISE STOP	3
SOL-38	AUX. RAISE STOP	3
SOL-42	SWING HIGH LOW SPEED SELECT	6
SOL-44	TRANSLIFTER SELECT	12
SOL-45	HYD. SELECT (FOOT PIN/REEVING)	1
SOL-47	HYD. OIL HEAT	6
SOL-48	SWING NEUTRAL SELECT	6
SOL-49	SWING NEUTRAL SELECT	6
SOL-69	JIB UNDULATION DRUM LOCK (ON FOR UNLOCK)	1
SOL-77	UNDULATION PEDAL	1
SOL-80	VERTICAL CYLINDER EXT. (Fr. R. H.)	12
SOL-81	VERTICAL CYLINDER EXT. (Re. R. H.)	12
SOL-82	CRAWLER PIN CYLINDER (Re. EXT)	12
SOL-83	CRAWLER PIN CYLINDER (Fr. EXT)	12
SOL-84	VERTICAL CYLINDER EXT. (Re. L. H.)	12
SOL-85	VERTICAL CYLINDER EXT. (Fr. L. H.)	12
SOL-86	VERTICAL CYLINDER RET. (Fr. R. H.)	12
SOL-87	VERTICAL CYLINDER RET. (Re. R. H.)	12
SOL-88	CRAWLER PIN CYLINDER (Re. RET)	12

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SOLENOID VALVE		
SOL-NO.	U S E	SHEET NO.
SOL-89	CRAWLER PIN CYLINDER (Fr. RET)	12
SOL-90	VERTICAL CYLINDER RET. (Re. L. H.)	12
SOL-91	VERTICAL CYLINDER RET. (Fr. L. H.)	12
SOL-95	LEFT CYLINDER RET.	12
SOL-96	LEFT CYLINDER EXT.	12
SOL-97	RIGHT CYLINDER RET.	12
SOL-98	RIGHT CYLINDER EXT.	12
SOL-101	Fr. DRUM INDEPENDENCE JUNCTION SELECT	8
SOL-102	Re. DRUM INDEPENDENCE JUNCTION SELECT	8
SOL-104	Qmax CUT	6
SOL-105	CRAWLER EXT. RET. (LEFT/RIGHT)	1
SOL-106	CRAWLER EXT. RET. (LEFT/RIGHT)	1
SOL-111	DPR LOAD MULTIPLIED	8

SOLENOID VALVE		
PSOL-NO.	U S E	SHEET NO.
PSOL-1	MAIN PUMP 1	5
PSOL-2	BOOM PUMP	5
PSOL-6	MAIN PUMP 2	5
PSOL-40	Fr. DRUM TURN GRIP	6
PSOL-41	Re. DRUM TURN GRIP	6
PSOL-50	MAIN PUMP CONTROL	5
PSOL-51	SWING REACTION	5
PSOL-52	BOOM RAISE CONTROL	7
PSOL-53	BOOM LOWER CONTROL	7
PSOL-54	Fr. DRUM HOIST CONTROL	7
PSOL-55	Fr. DRUM LOWER CONTROL	7
PSOL-56	Re. DRUM HOIST CONTROL	7
PSOL-57	Re. DRUM LOWER CONTROL	7
PSOL-58	3rd. DRUM HOIST CONTROL	7
PSOL-59	3rd. DRUM LOWER CONTROL	7
PSOL-62	TAGLINE	5
PSOL-65	Fr. DRUM CONTROL PROPORTIONAL VALVE	7
PSOL-66	Re. DRUM CONTROL PROPORTIONAL VALVE	7
PSOL-67	3rd. DRUM CONTROL PROPORTIONAL VALVE	7
PSOL-70	BOOM PUMP CONTROL	5

SOLENOID VALVE		
PSOL-NO.	U S E	SHEET NO.
PSOL-72	SWING CONSTANT SPEED	5
PSOL-103	MOTER CHP CONTROL SYSTEM	7
PSOL-107	Fr. DRUM MIDDLE DITENT	5
PSOL-108	Re. DRUM MIDDLE DITENT	5
PSOL-109	R. H. SWING STOP	5
PSOL-110	L. H. SWING STOP	5

SWITCH		
SW-NO.	U S E	SHEET NO.
SW-1	E/G KEY	1
SW-8	PROPEL SPEED SELECT	1
SW-9	INCHING SPEED SELECT	1
SW-11	SWING PARKING	1
SW-12	GANTRY CONTROL	12
SW-13	HOOK OVERHOIST RELEASE	3
SW-14	BOOM OVERHOIST RELEASE	3
SW-15	LMI RELEASE	3
SW-16	MASTER KEY	3
SW-17	WIPER (FRONT)	9
SW-18	WIPER (ROOF)	9
SW-19	WASHER SWITCH	9
SW-20	ROOM LIGHT	10
SW-21	HED LIGHT SWITCH	10
SW-22	WORK LIGHT (REAR)	11
SW-23	SWING FLASHER	11
SW-24	HORN SWITCH	10
SW-25	CRAWLER EXPANSION AND CONTRACTION	1
SW-26	PROPEL ALARM VOICE	11
SW-27	MULTI VOICE	11

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SWITCH		
SW-NO.	U S E	SHEET NO.
SW-33	DRUM TURN DETECT GRIP	11
SW-35	AUTO STOP CHECK	3
SW-36	POSTURE SELECT	3
SW-37	LMI BYPASS MAIN	3
SW-38	MC1 BYPASS	5
SW-39	MC2 BYPASS	7
SW-45	FREE FALL PERMIT	1
SW-50	SMULTANEOUS CONTROL POSSIBLE	3
SW-51	DRUM SELECT	3
SW-53	Fr. DRUM FREE FALL SELECT	6
SW-54	Re. DRUM FREE FALL SELECT	6
SW-55	3rd. DRUM FREE FALL SELECT	6
SW-56	Fr. DRUM FREE FALL SPEED	6
SW-57	Re. DRUM FREE FALL SPEED	6
SW-58	3rd. DRUM FREE FALL SPEED	6
SW-64	UNDULATION PEDAL SELECT	1
SW-65	HYDRAULIC SELECT	1
SW-71	E/G EMERGENCY STOP SWITCH	2
SW-72	AUXILIARY ACCELSE SW	2
SW-74	FAN	10

SWITCH		
SW-NO.	U S E	SHEET NO.
SW-75	LAUCH LOCK OPERATION	11
SW-77	WORK LIGHT (DRUM)	11
SW-79	JIB UNDULATION DRUM LOCK	1
SW-81	AIS MODE SELECT	6
SW-82	Re. DRUM G WINCHI	1
SW-83	G ENGINE	6
SW-84	Fr. DRUM G WINCHI	1
SW-85	SWITCH	10
SW-86	G WINCHI MODE SELECT	6

LIMIT SWITCH		
LSW-NO.	U S E	SHEET NO.
LSW-1	FUNCTION LOCK	1
LSW-2	MAIN HOOK OVERHOIST	4
LSW-3	AUX. HOOK OVERHOIST	4
LSW-4	HOOK OVERHOIST (AUX)	4
LSW-5	JIB OVER HOIST	4
LSW-6	HOOK OVERHOIST (JIB)	4
LSW-7	BOOM OVER HOIST	4
LSW-9	BOOM OVERHOIST (No. 1)	4
LSW-12	BOOM OVERHOIST (No. 2)	4
LSW-14	ROOM LIGHT DOOR	10
LSW-15	ENG. OIL FILTER ALARM	6
LSW-20	BRAKE COOLING OIL TEMP. (Fr. DRUM)	6
LSW-21	BRAKE COOLING OIL TEMP. (Re. DRUM)	6
LSW-22	LINE FILTER ALARM	6
LSW-24	MAST CYLINDER	4
LSW-26	Fr. DRUM OVER PAY OUT	4
LSW-27	Re. DRUM OVER PAY OUT	4
LSW-28	SPARE OVER PAY OUT	4
LSW-30	HYD. OIL TEMP.	1
LSW-35	AIR CLEANER ALARM	6

LIMIT SWITCH		
LSW-NO.	U S E	SHEET NO.
LSW-38	TOWER JIB BENDS LOSS	4
LSW-39	LATCH RELATIONS LIMIT SWITCH	4
LSW-40	LATSH THE EDGE LIMIT SWITCH	4
LSW-41	GANTRY STAND UP DETECT	4

PRESSURE SWITCH			
PSW-NO.	TYPE	U S E	SHEET NO.
PSW-1	N.O.	Fr. DRUM FOOT BRAKE PRESSURE SW	6
PSW-2	N.O.	Re. DRUM FOOT BRAKE PRESSURE SW	6
PSW-3	N.O.	3rd. DRUM FOOT BRAKE PRESSURE SW	6
PSW-7	N.O.	PROPEL CONTROL DETECT SW. (R. H.)	1
PSW-8	N.C.	ENGINE OIL PRESSURE SW	6
PSW-9	N.O.	A/C PRESSURE SWITCH	9
PSW-10	N.O.	PROPEL CONTROL DETECT SW. (L. H.)	1

PRESSURE SENSOR		
PT-NO.	U S E	SHEET NO.
PT-1	SWING PUMP PRESSURE	5
PT-3	Fr. DRUM HOISTING PRESSURE SENSOR	7
PT-4	Fr. DRUM LOWERING PRESSURE SENSOR	7
PT-5	Re. DRUM HOISTING PRESSURE SENSOR	7
PT-6	Re. DRUM LOWERING PRESSURE SENSOR	7
PT-7	3rd. DRUM HOISTING PRESSURE SENSOR	7
PT-8	3rd. DRUM LOWERING PRESSURE SENSOR	7
PT-9	Fr. DRUM CLUTCH PRESSURE	5
PT-10	Re. DRUM CLUTCH PRESSURE	5
PT-11	3rd. DRUM CLUTCH PRESSURE	5
PT-12	BOOM RAISEING PRESSURE SENSOR	7
PT-13	BOOM LOWERING PRESSURE SENSOR	7
PT-14	Re. DRUM CONTROL ROPORTIONAL PRESSURE SENSOR	7
PT-15	3rd. DRUM CONTROL ROPORTIONAL PRESSURE SENSOR	7
PT-16	CONTROL PRIMARY PRESSURE	5
PT-17	Fr. DRUM INDEPENDENCE JUNCTION SELECT PRESSURE SENSOR	7
PT-18	Re. DRUM INDEPENDENCE JUNCTION SELECT PRESSURE SENSOR	7
PT-19	MAIN AUX. CHP START PRESSURE SENSOR	7

PRESSURE SENSOR		
PT-NO.	U S E	SHEET NO.
PT-20	Fr. DRUM CONTROL ROPORTIONAL PRESSURE SENSOR	7
PT-21	Qmax CUT FB	5
PT-22	SWING CONTROL (R. H.)	5
PT-23	SWING CONTROL (L. H.)	5
PT-24	POWER SHIFT PRESSUER	5

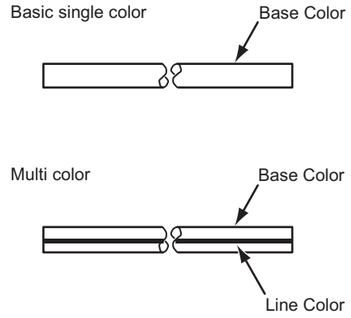
PIROT LAMP		
PL-NO.	U S E	SHEET NO.
PL-7	CHECK ENG. LAMP (RED)	2

10.1.2 CONNECTOR LAYOUT

Wire color list

Basic single color

Color Sign	Color Name
B	Black
W	White
R	Red
G	Green
Y	Yellow
Br	Brown
L	bLue
Lg	Light green
Gr	Gray
O	Orange
Sb	Skyblue
P	Pink
V	Violet
F r e e	Free



Multi color

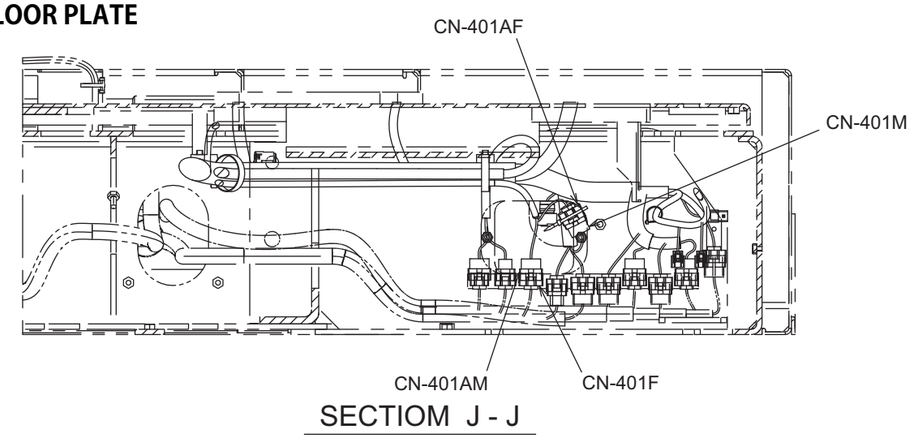
Color Sign	Base Color	Line Color
B W	Black	White
B R	Black	Red
B G	Black	Green
B Y	Black	Yellow
B L	Black	bLue
W B	White	Black
W R	White	Red
W G	White	Green
W Y	White	Yellow
W L	White	bLue
W O	White	Orange
R B	Red	Black
R W	Red	White
R G	Red	Green
R Y	Red	Yellow
R L	Red	bLue
G B	Green	Black
G W	Green	White
G R	Green	Red
G Y	Green	Yellow
G L	Green	bLue
G O	Green	Orange
Y B	Yellow	Black
Y W	Yellow	White
Y R	Yellow	Red
Y G	Yellow	Green
Y L	Yellow	bLue
Y V	Yellow	Violet
BrB	Brown	Black
BrW	Brown	White
BrR	Brown	Red

Color Sign	Base Color	Line Color
BrG	Brown	Green
BrY	Brown	Yellow
BrL	Brown	bLue
L B	bLue	Black
L W	bLue	White
L R	bLue	Red
LG	bLue	Green
L Y	bLue	Yellow
L O	bLue	Orange
L g B	Light green	Black
LgW	Light green	White
L g R	Light green	Red
LgY	Light green	Yellow
L g L	Light green	bLue
GrB	Gray	Black
GrW	Gray	White
G r R	Gray	Red
G r L	Gray	bLue
O B	Orange	Black
O Y	Orange	Yellow
O L	Orange	bLue
O W	Orange	White
S b B	Skyblue	Black
S b R	Skyblue	Red
S b L	Skyblue	bLue
P B	Pink	Black
P W	Pink	White
P R	Pink	Red
P G	Pink	Green
P L	Pink	bLue
V R	Violet	Red

No.	HARNESS NAME
1	FLOOR PLATE
	FLOOR A
	FLOOR B
	OUT INDICATING LIGHT RELAY JUNCTION HARNESS
2	LOWER
	LOWER HARNESS
	TRANS LIFTER REMOTE CONTROLLER CABLE (OPTION)
3	LEFT DECK
	LEFT DECK HARNESS
	RELAY HARNESS
4	RIGHT DECK
	RIGHT DECK HARNESS
	POWER SUPPLY HARNESS
	STARTER (TERMINAL B) TO BATTERY RELAY
	STARTER (TERMINAL C) TO SAFETY RELAY
	GLOW RELAY TO ENGINE SUB HARNESS
5	RIGHT DECK (GUARD)
	GUARD HARNESS A
	GUARD HARNESS B
	GUARD HARNESS C
6	SWING FRAME
	SWING FRAME HARNESS
	ATT. JUNCTION HARNESS
7	CAB
	CAB HARNESS
8	ENGINE
	STARTER MOTOR TO ENGINE GROUND
	STARTER MOTOR TARMINAL B ALTERNATOR B TARMINAL
9	MONITOR
	MONITOR HARNESS
10	COUNTER WEIGHT SELF REMOVAL (OPTION)
	COUNTER WEIGHT SELF REMOVAL
11	OVER LOAD PREVENT (M. MACHINERY)
12	BLANK
13	BLANK

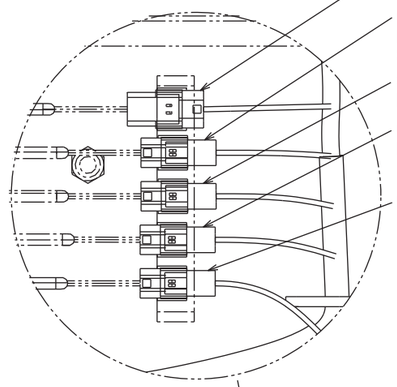
No.	HARNESS NAME
14	HYDRAULIC OIL HEAT
	HYDRAULIC OIL HEAT
15	BOOM BASE (INSERT INCLUDED)
	BOOM BASE (INSERT INCLUDED)
16	BOOM TIP
17	CRAWLER SELF REMOVAL
18	FIXED JIB
	FIXED JIB
19	CAMERA CONTROLLER
	CAMERA CONTROLLER
	CAMERA CONTROLLER
20	IT CONTROLLER INSTALLATION

1.ELECTRICAL PART OF FLOOR PLATE



SECTIOM J - J

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



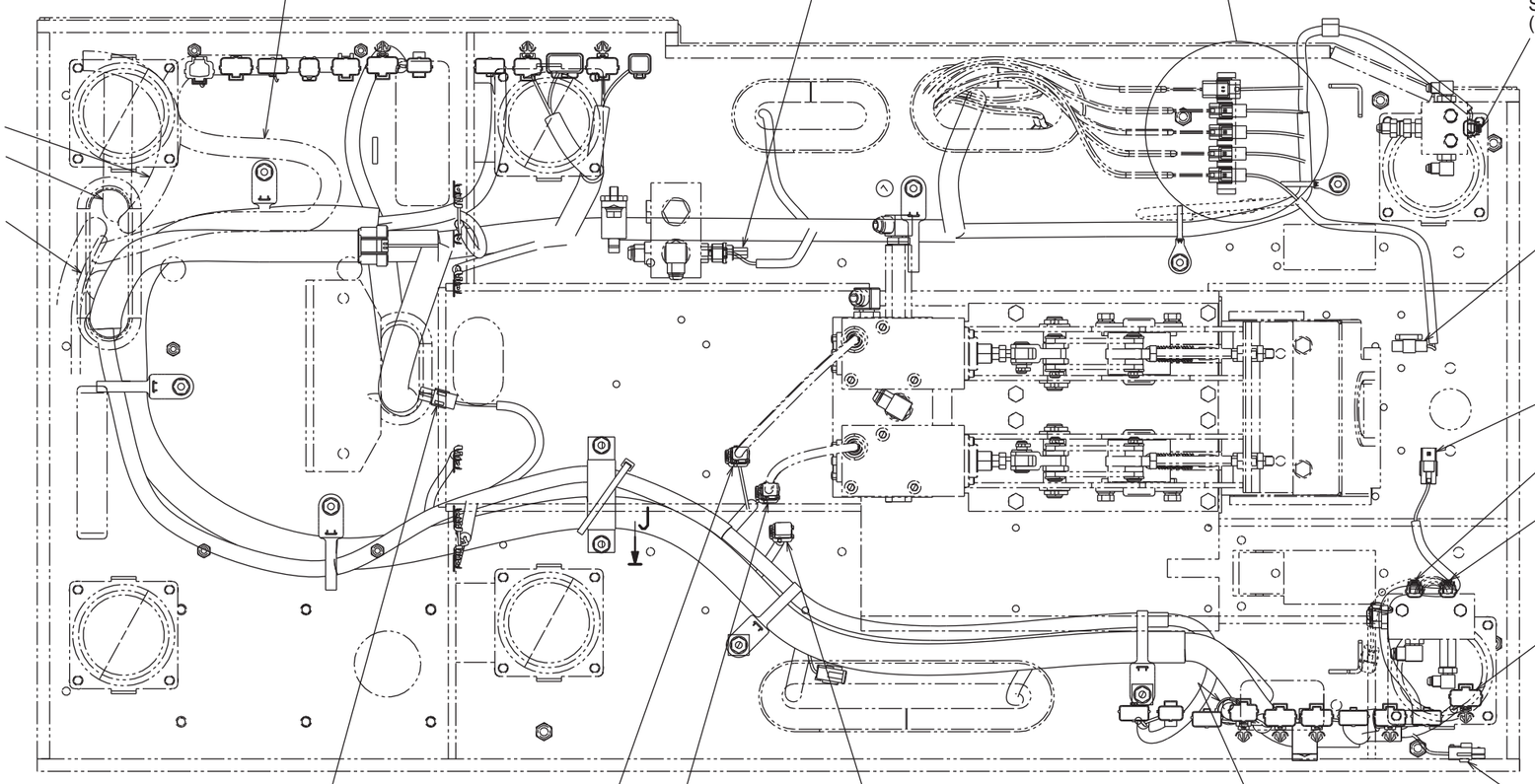
CN-452
INCHING SPEED SELECT SWITCH

CN-453
REAR DRUM G-WINCH SELECT SWITCH

CN-454
FRONT DRUM G-WINCH SELECT SWITCH

CN-455
REAR DRUM FREE-FALL SELECT SWITCH

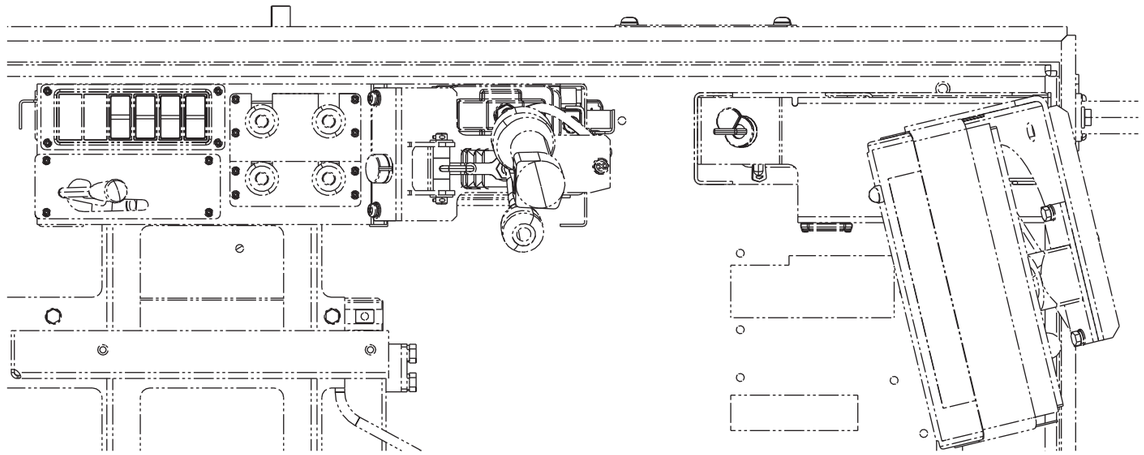
CN-456
FRONT DRUM FREE-FALL SELECT SWITCH

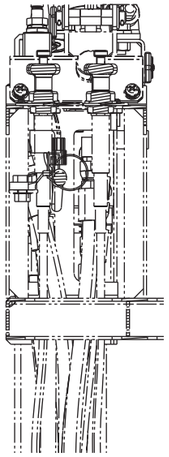


VIEW FROM THE FLOOR PLATE UNDER

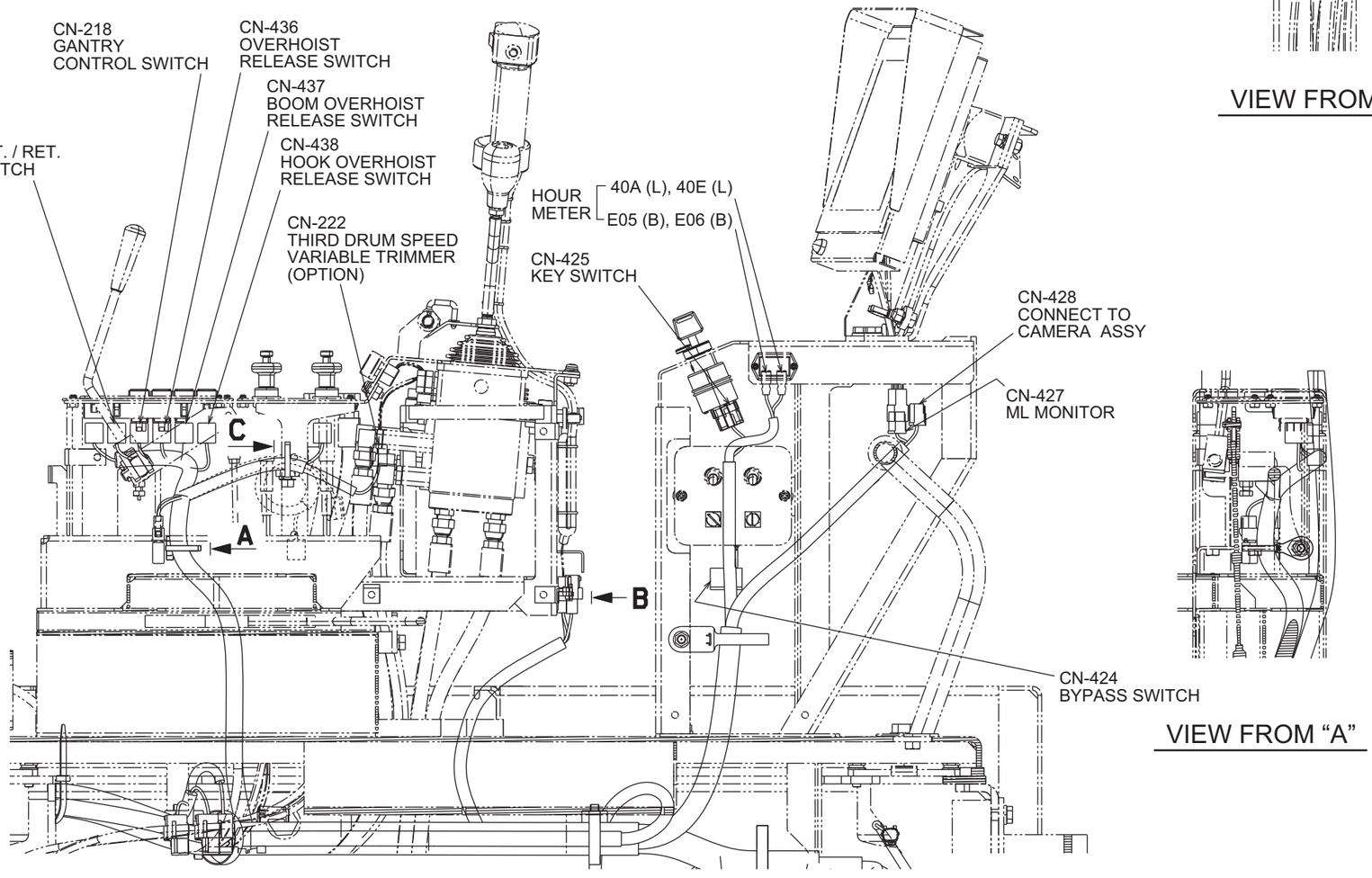
(1/4)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



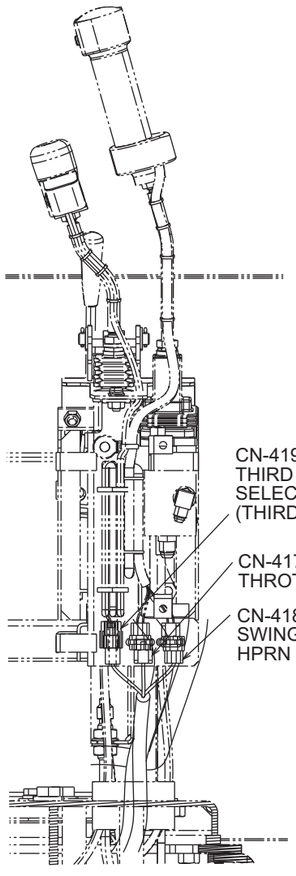


VIEW FROM “C”



DETAIL OF LEFT STAND

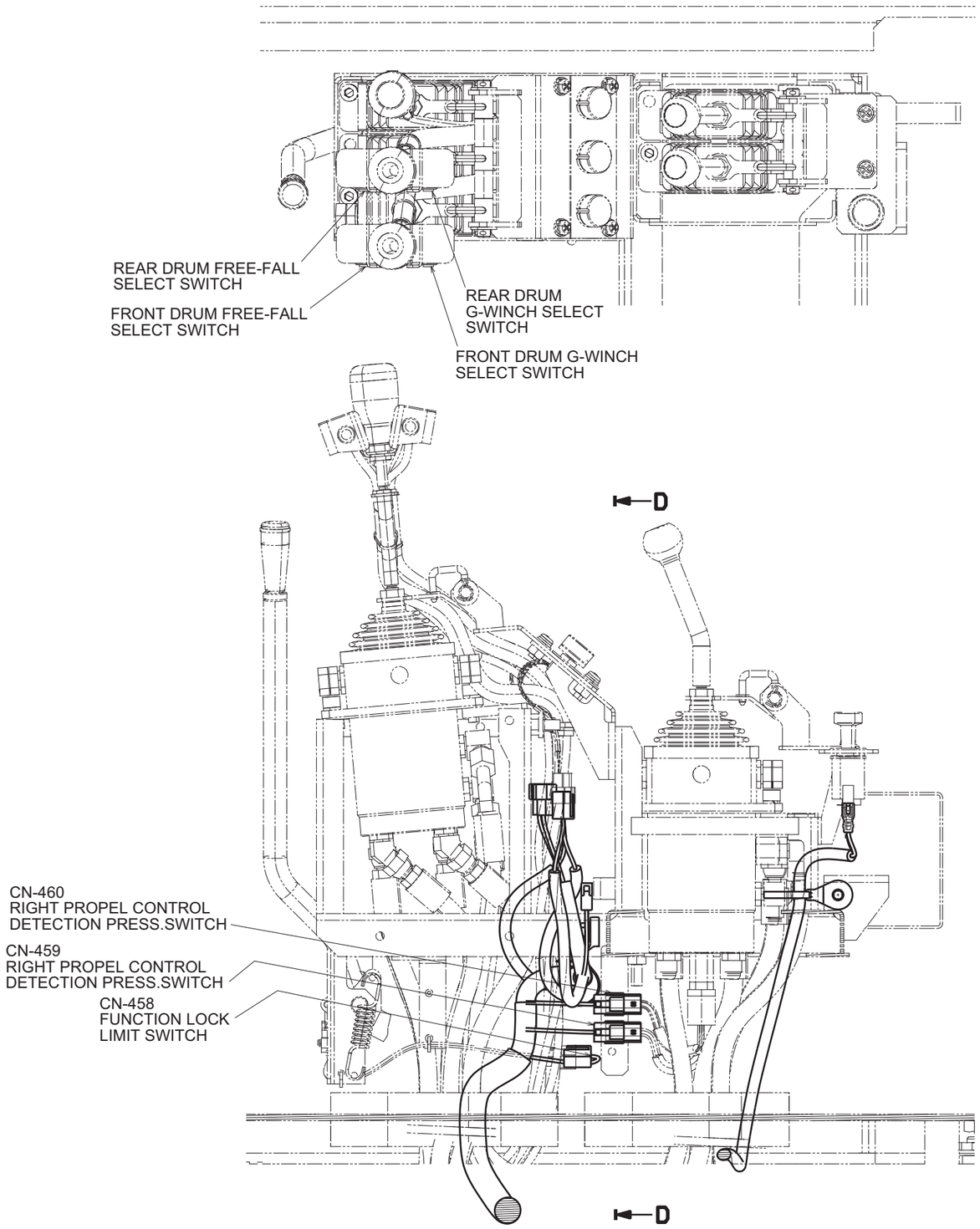
VIEW FROM “A”



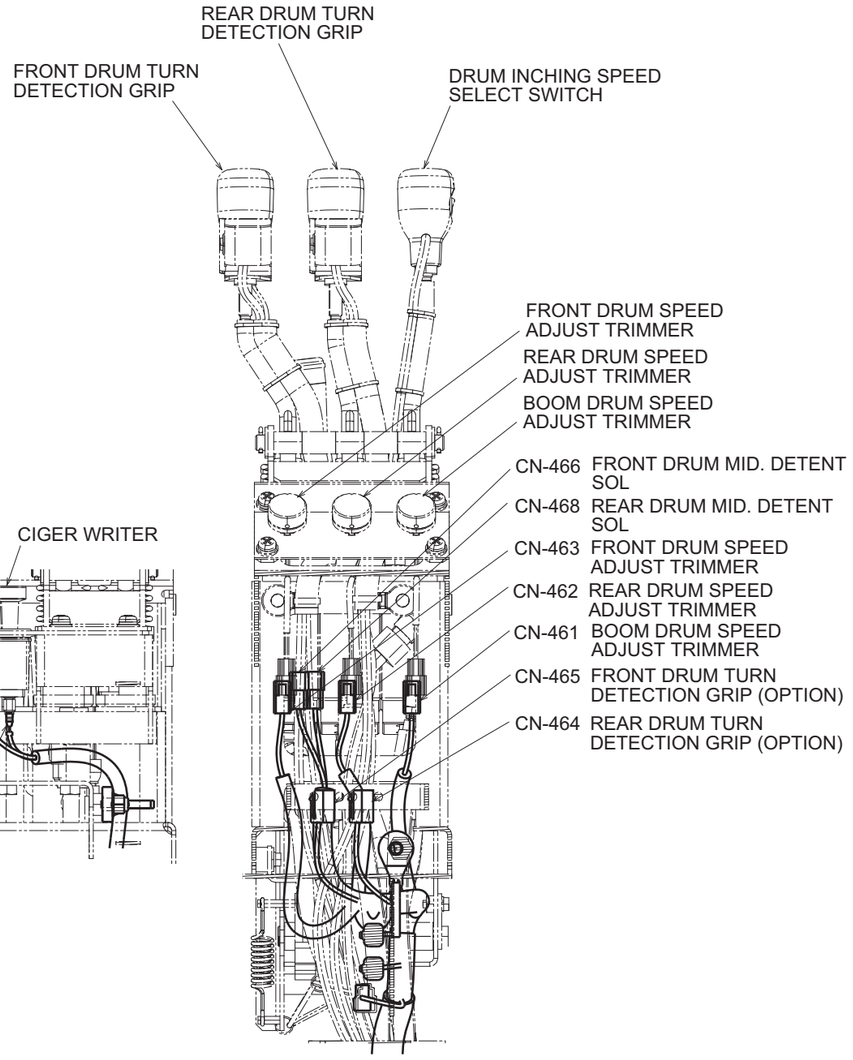
VIEW FROM “B”

(2/**4**)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT

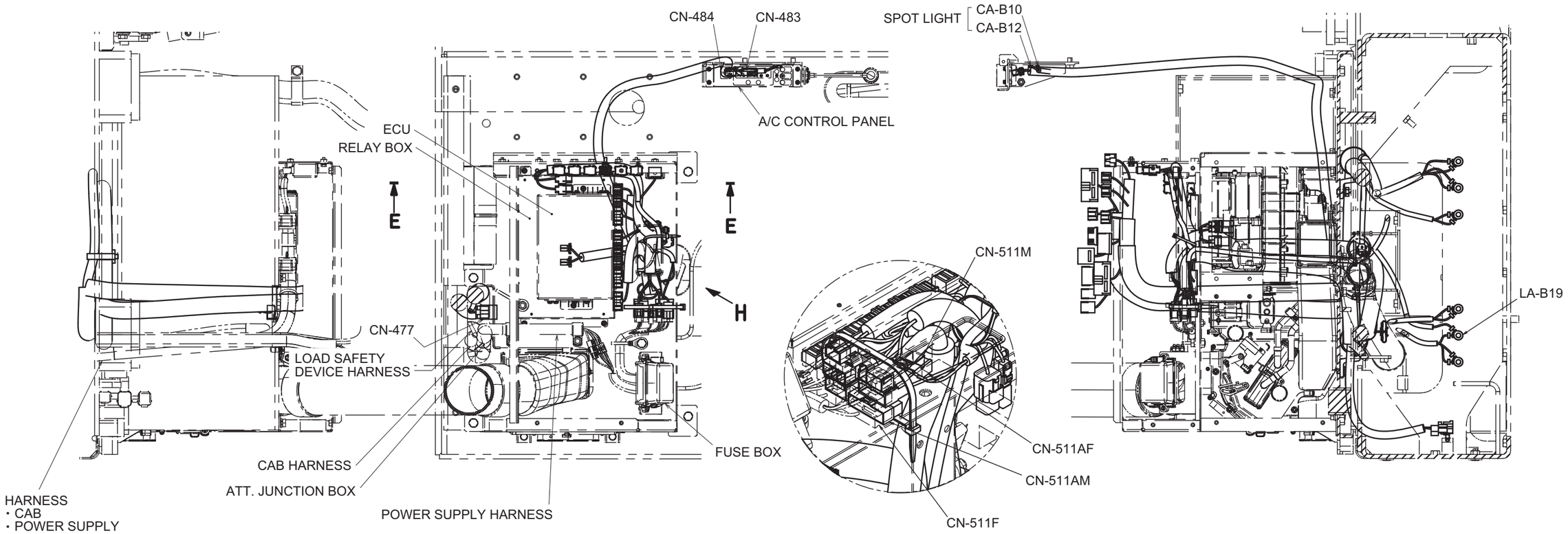


DETAIL OF RIGHT SIDE STAND

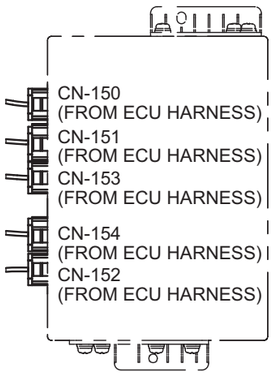


SECTION “D-D”

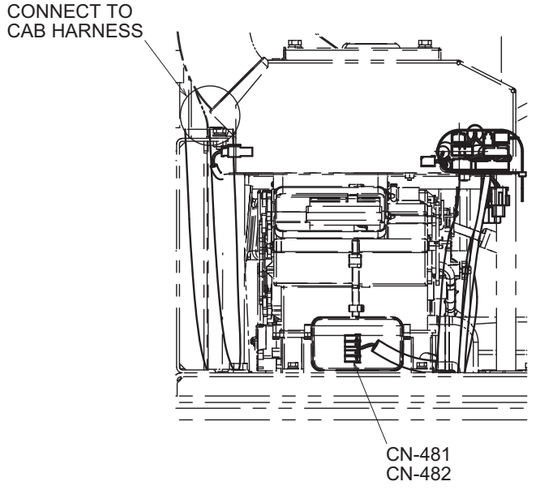
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



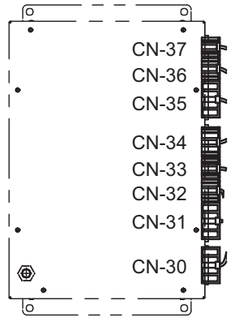
VIEW H



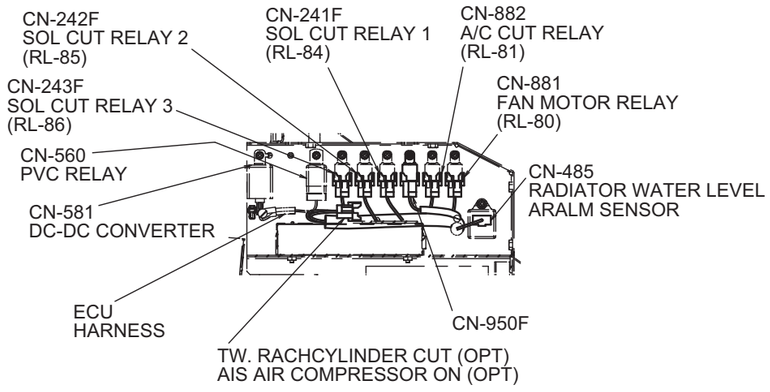
DETAIL OF ECU CONNECTOR



DETAIL OF SWITCH BOARD



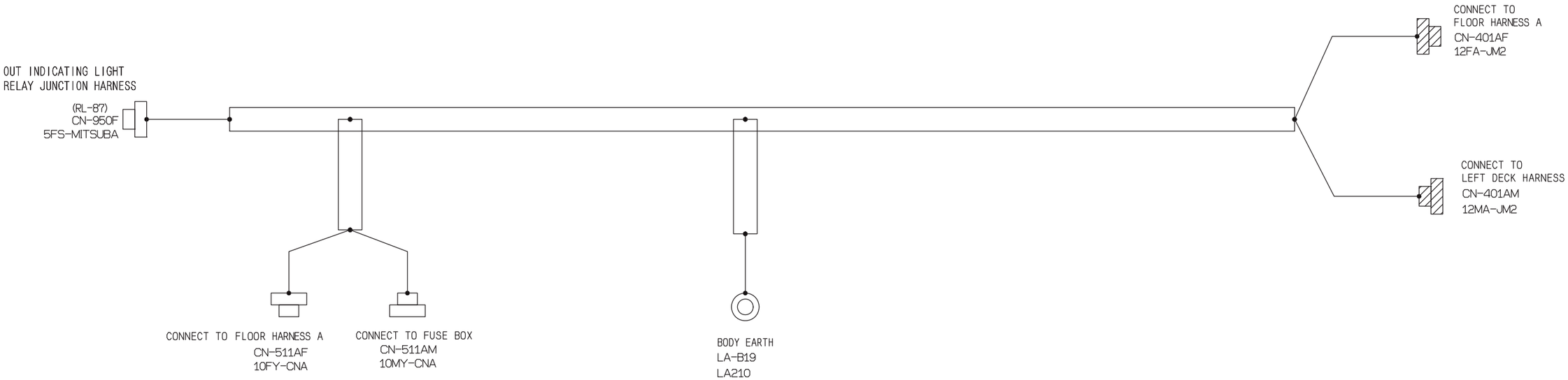
DETAIL OF RELAY BOX CONNECTOR



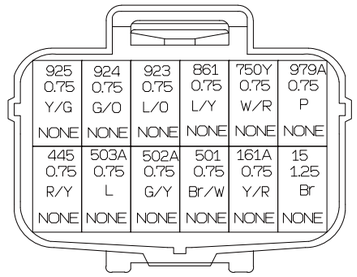
SECTION “E-E”

(4/**4**)

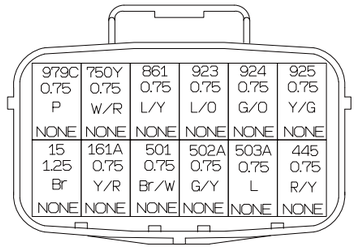
OUT INDICATING LIGHT RELAY JUNCTION HARNESS



(1/2)



CN-401AF
12FA-JM2



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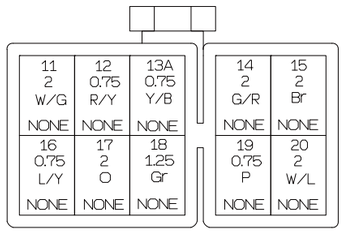

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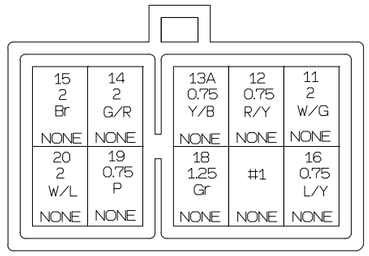
10FY-CNA



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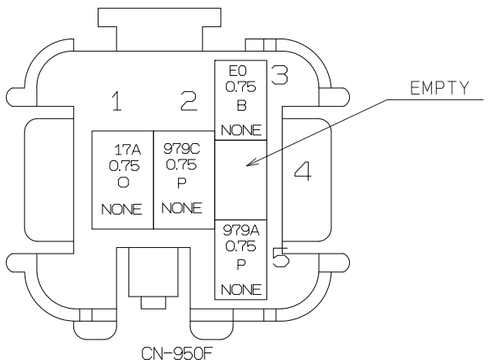
10MY-CNA
#1 17 1.25 O +17A 0.75 O



CN-950F
5FS-MITSUBA

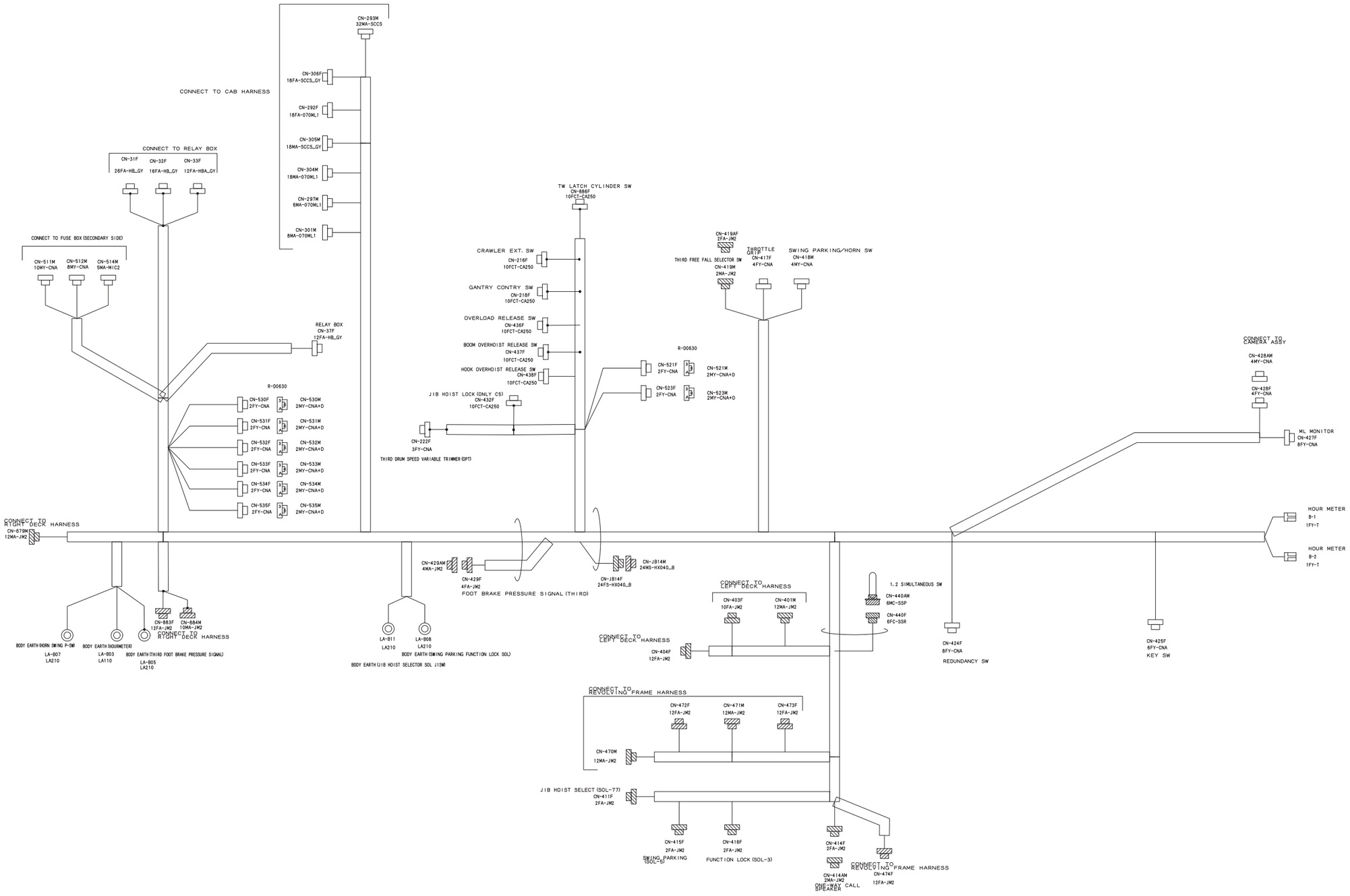
LA-B19
LA210

WIRE No. AND WIRE COLOR LIST

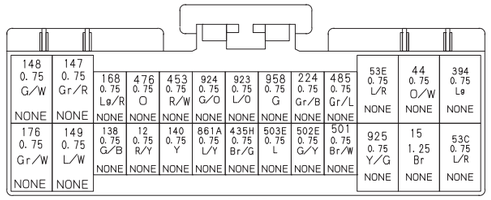
No.	COLOR	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
11	W/G	AVS	2	CN-511AM				CN-511AF
12	R/Y	AVSS	0.75	CN-511AM				CN-511AF
13A	Y/B	AVSS	0.75	CN-511AM				CN-511AF
14	G/R	AVS	2	CN-511AM				CN-511AF
15	Br	AVS	2	CN-511AM				CN-511AF
15	Br	AVSS	1.25	CN-401AF				CN-401AM
16	L/Y	AVSS	0.75	CN-511AM				CN-511AF
17	O	AVS	1.25	CN-511AM				CN-511AF
17A	O	AVSS	0.75	CN-511AM				CN-950F
18	Gr	AVS	1.25	CN-511AM				CN-511AF
19	P	AVSS	0.75	CN-511AM				CN-511AF
20	W/L	AVS	2	CN-511AM				CN-511AF
161A	Y/R	AVSS	0.75	CN-401AM				CN-401AF
445	R/Y	AVSS	0.75	CN-401AM				CN-401AF
501	Br/W	AVSS	0.75	CN-401AM				CN-401AF
502A	G/Y	AVSS	0.75	CN-401AM				CN-401AF
503A	L	AVSS	0.75	CN-401AM				CN-401AF
705Y	W/R	AVSS	0.75	CN-401AM				CN-401AF
861	L/Y	AVSS	0.75	CN-401AM				CN-401AF
923	L/O	AVSS	0.75	CN-401AM				CN-401AF
924	G/O	AVSS	0.75	CN-401AM				CN-401AF
925	Y/G	AVSS	0.75	CN-401AM				CN-401AF
979A	P	AVSS	0.75	CN-401AF				CN-950F
979C	P	AVSS	0.75	CN-401AM				CN-950F
E0	B	AVSS	0.75	CN-950F				LA-B19

(2/2)

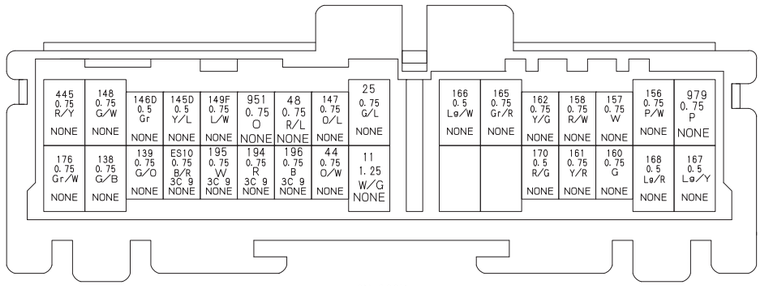
FLOOR HARNESS A



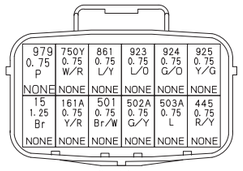
(1/5)



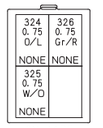
CN-31F
26FA-HB_GY



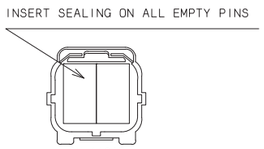
CN-293M
32MA-SCCS



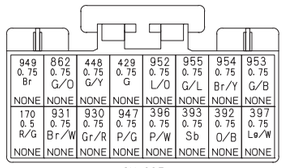
CN-401M
12MA-JM2



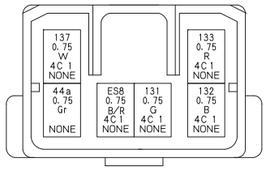
CN-417F
4FY-CNA



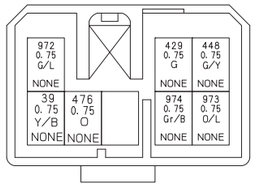
CN-419AF
2FA-JM2



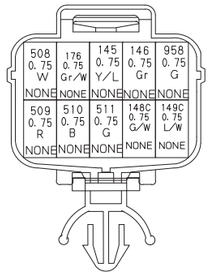
CN-32F
16FA-HB_GY



CN-297M
6MA-070ML1

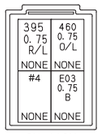


CN-301M
8MA-070ML1

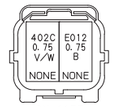


CN-403F
10FA-JM2

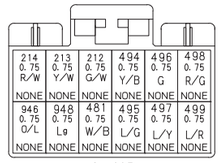
2-WIRE CLAMP



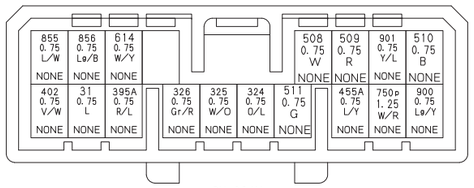
CN-418M
4MY-CNA
#4 861 0.75 L/Y + 861A 0.75 L/Y



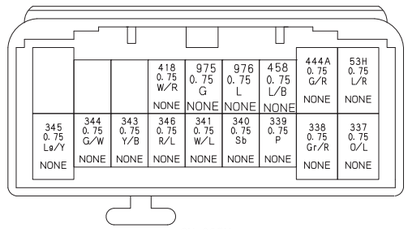
CN-415F
2FA-JM2



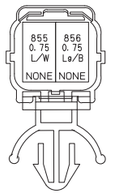
CN-33F
12FA-HBA_GY



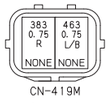
CN-304M
18MA-070ML1



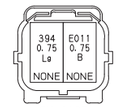
CN-305M
18MA-SCCS_GY



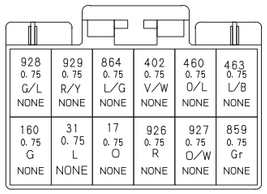
CN-414F
2FA-JM2



CN-419M
2MA-JM2

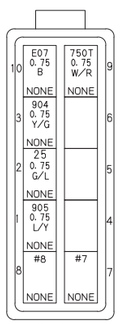


CN-416F
2FA-JM2



CN-37F
12FA-HB_GY

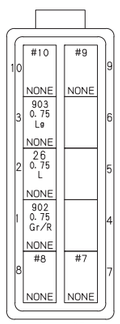
2-WIRE CLAMP



2-WIRE CLAMP

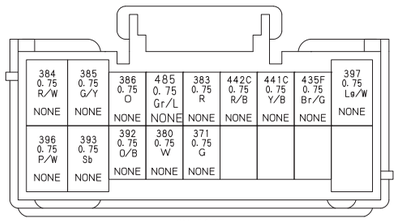
CN-216F
10FCT-CA250

#7 750S 0.75 W/R + 750T 0.75 W/R
#8 E07 0.75 B + E08 0.75 B

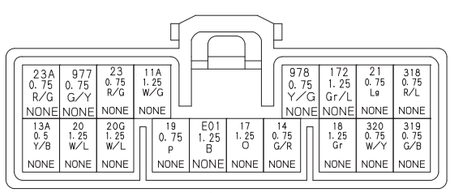


CN-218F
10FCT-CA250

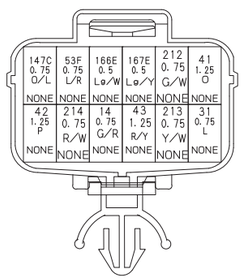
#7 750t 0.75 W/R + 750u 0.75 W/R
#8 E018 0.75 B + E019 0.75 B
#9 750u 0.75 W/R + 750v 0.75 W/R
#10 E018 0.75 B + E07 0.75 B



CN-306F
18FA-SCCS_GY

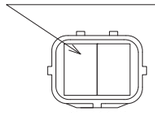


CN-292F
18FA-070ML1

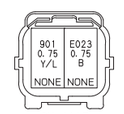


CN-404F
12FA-JM2

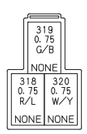
INSERT SEALING ON ALL EMPTY PINS



CN-414AM
2MA-JM2

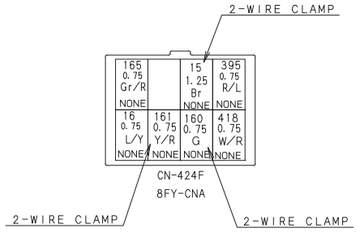


CN-411F
2FA-JM2

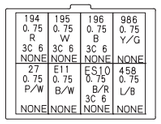


CN-222F
3FY-CNA

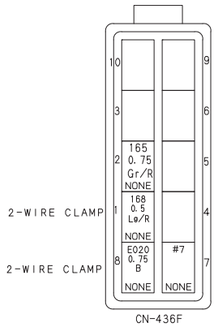
(2/5)



CN-424F
8FY-CNA



CN-427F
8FY-CNA



CN-436F
10FCT-CA250

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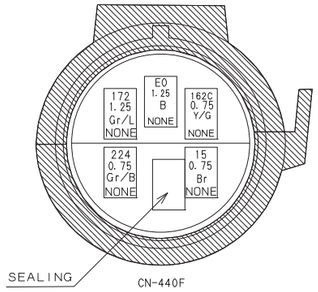
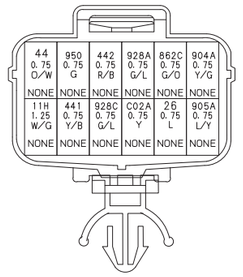
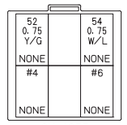


CN-440F
6FC-SSR

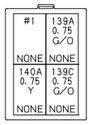


CN-473F
12FA-JM2



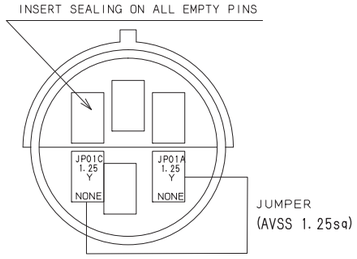
CN-425F
6FY-CNA

#4 53 0.75 L/R + 53A 0.75 L/R
#6 11 1.25 W/G + 11L 1.25 W/G

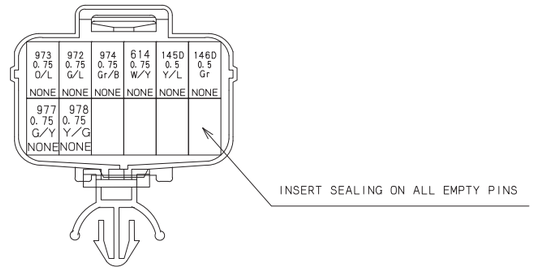


CN-428F
4FY-CNA

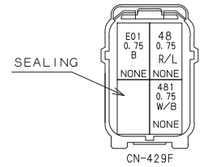
#1 140 0.75 Y + 140A 0.75 Y



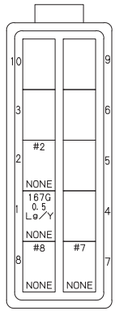
CN-440AM
6MC-SSP



CN-474F
12FA-JM2

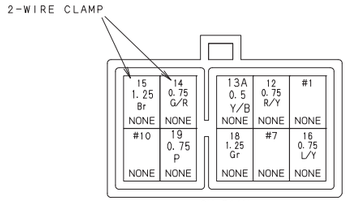


CN-429F
4FA-JM2



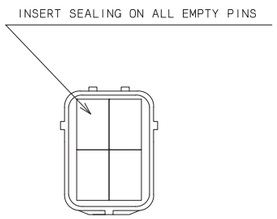
CN-437F
10FCT-CA250

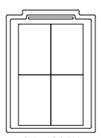
#2 165 0.75 Gr/R + 165 0.75 Gr/R
#7 750r 0.75 W/R + 750s 0.75 W/R
#8 E019 0.75 B + E020 0.75 B



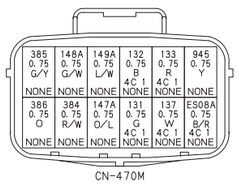
CN-511M
10MY-CNA

#1 11 1.25 W/G + 11A 1.25 W/G
#7 17 1.25 O + 17A 0.75 O
#10 20 1.25 W/L + 20G 1.25 W/L

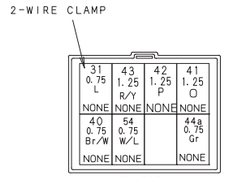




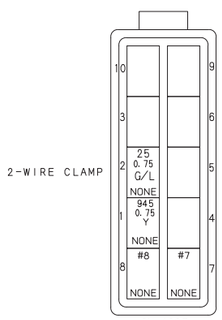
CN-428AM
4MY-CNA



CN-470M
12MA-JM2

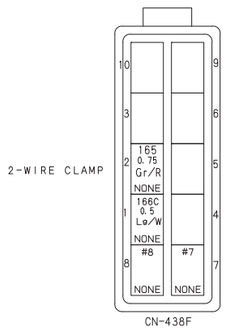


CN-512M
8MY-CNA



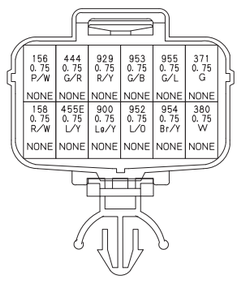
CN-432F
10FCT-CA250

#7 750s 0.75 W/R + 750v 0.75 W/R
#8 E05 0.75 B + E06 0.75 B

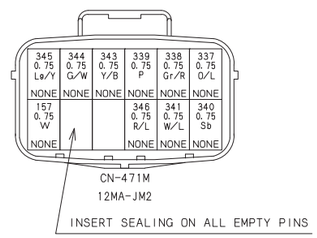


CN-438F
10FCT-CA250

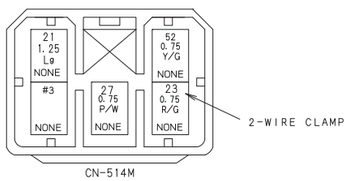
#7 750s 0.75 W/R + 750t 0.75 W/R
#8 E06 0.75 B + E07 0.75 B



CN-472F
12FA-JM2



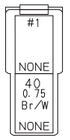
CN-471M
12MA-JM2



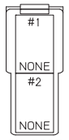
CN-514M
5MA-MIC2

#3 26 0.75 L + 26 0.75 L

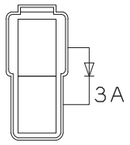
(3/5)



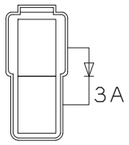
CN-521F
2FY-CNA
#1 C02 0.75 Y + C02A 0.75 Y



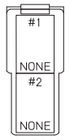
CN-532F
2FY-CNA
#1 950 0.75 G + 950A 0.75 G
#2 435A 0.75 Br/G + 435C 0.75 Br/G



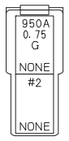
CN-521M
2MY-CNA+D



CN-532M
2MY-CNA+D

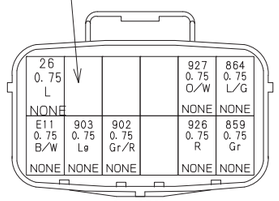


CN-523F
2FY-CNA
#1 435G 0.75 Br/G + 435H 0.75 Br/G
#2 53 0.75 L/R + 53H 0.75 L/R

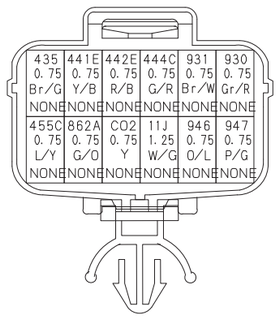


CN-533F
2FY-CNA
#2 948A 0.75 Lg + 948B 0.75 Lg

SEALING

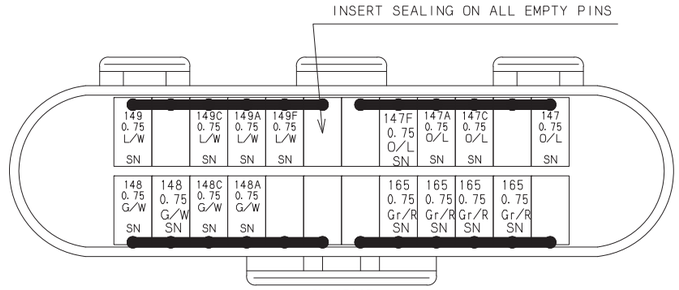


CN-679M
12MA-JM2

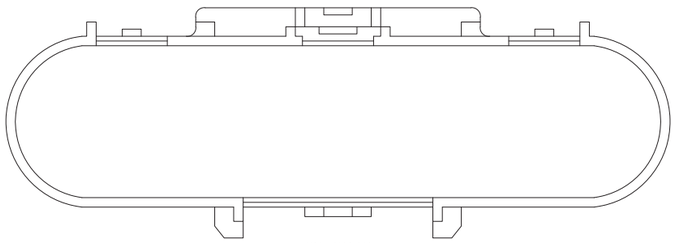


CN-883F
12FA-JM2

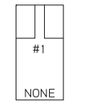
INSERT SEALING ON ALL EMPTY PINS



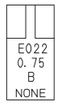
CN-JB14F
24FS-HX040_B



CN-JB14M
24MS-HX040_B



B-1
1FY-T
#1 31 0.75 L + 31 0.75 L



B-2
1FY-T

LA-B03
LA110
#1 E0 1.25 B + E05 0.75 B

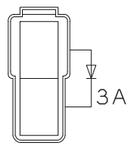
LA-B05
LA210

2-WIRE CLAMP

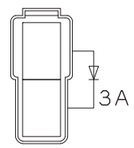
LA-B07
LA210
#1 E03 0.75 B + E04 0.75 B

LA-B08
LA210
#1 E011 0.75 B + E012 0.75 B

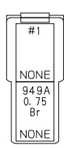
LA-B11
LA210
#1 E022 0.75 B + E023 0.75 B



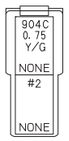
CN-523M
2MY-CNA+D



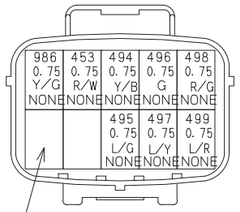
CN-533M
2MY-CNA+D



CN-530F
2FY-CNA
#1 948 0.75 Lg + 948A 0.75 Lg

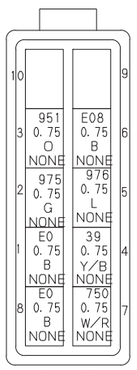


CN-534F
2FY-CNA
#2 948 0.75 Lg + 948C 0.75 Lg

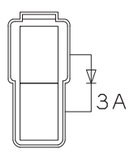


INSERT SEALING ON ALL EMPTY PINS

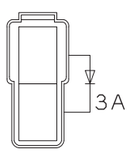
CN-884M
10MA-JM2



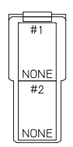
CN-886F
10FCT-CA250



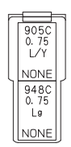
CN-530M
2MY-CNA+D



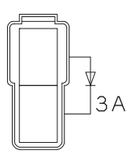
CN-534M
2MY-CNA+D



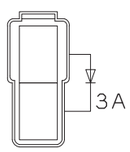
CN-531F
2FY-CNA
#1 435 0.75 Br/G + 435A 0.75 Br/G
#2 949 0.75 Br + 949A 0.75 Br



CN-535F
2FY-CNA



CN-531M
2MY-CNA+D



CN-535M
2MY-CNA+D

WIRE No. AND WIRE COLOR LIST

No.	COLOR	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
11L	W/G	AVS	1.25	CN-473F			DS-B15	CN-425F
11	W/G	AVSS	1.25	CN-511M	DS-B01		DS-B15	CN-425F
11A	W/G	AVSS	1.25	CN-511M	DS-B01			JS-B07
11H	W/G	AVS	1.25	CN-292F				JS-B07
11J	W/G	AVS	1.25	JS-B07				CN-883F
11	W/G	AVSS	1.25	JS-B07				CN-293M
12	R/Y	AVSS	0.75	CN-31F				CN-511M
13A	Y/B	AVSS	0.5	CN-511M				CN-292F
14	G/R	AVSS	0.75	CN-292F			DS-B212	CN-511M
14	G/R	AVSS	0.75	CN-404F			DS-B212	CN-511M
15	Br	AVSS	1.25	CN-424F	DS-B213			CN-401M
15	Br	AVSS	1.25	CN-424F	DS-B213			JS-B122
15	Br	AVSS	0.75	CN-440F				JS-B122
15	Br	AVSS	1.25	CN-511M	DS-B214			JS-B122
15	Br	AVSS	1.25	CN-511M	DS-B214			CN-31F
16	L/Y	AVSS	0.75	CN-511M				CN-424F
17	O	AVSS	1.25	CN-292F			DS-B02	CN-511M
17A	O	AVSS	0.75	CN-37F			DS-B02	CN-511M
18	Gr	AVSS	1.25	CN-292F				CN-511M
19	P	AVSS	0.75	CN-511M				CN-292F
20	W/L	AVSS	1.25	CN-292F			DS-B04	CN-511M
20G	W/L	AVSS	1.25	CN-292F			DS-B04	CN-511M
21	Lg	AVSS	0.75	CN-514M				CN-292F
23	R/G	AVSS	0.75	CN-514M	DS-B215			CN-292F
23A	R/G	AVSS	0.75	CN-514M	DS-B215			CN-292F
25	G/L	AVSS	0.75	CN-293M			DS-B216	CN-432F
25	G/L	AVSS	0.75	CN-216F			DS-B216	CN-432F
26	L	AVSS	0.75	JS-B50				CN-679M
26	L	AVSS	0.75	CN-514M	DS-B06			CN-473F
26	L	AVSS	0.75	CN-514M	DS-B06			JS-B50
26	L	AVSS	0.75	CN-218F				JS-B50
27	P/W	AVSS	0.75	CN-514M				CN-427F
31	L	AVSS	0.75	CN-37F			DS-B07	CN-512M
31	L	AVSS	0.75	JS-B05			DS-B07	CN-512M
31	L	AVSS	0.75	JS-B05			DS-B24	B-1
31	L	AVSS	0.75	CN-404F			DS-B24	B-1
31	L	AVSS	0.75	CN-304M				JS-B05
39	R/W	AVSS	0.75	CN-886F				CN-301M
40	Br/W	AVSS	0.75	CN-521F				CN-512M
41	O	AVSS	1.25	CN-404F				CN-512M
42	P	AVSS	1.25	CN-512M				CN-404F
43	R/Y	AVSS	1.25	CN-512M				CN-404F
44	O/W	AVSS	0.75	JS-B46				CN-31F
44	O/W	AVSS	0.75	JS-B46				CN-293M
44	O/W	AVSS	0.75	JS-B46				CN-473F
44a	Gr	AVSS	0.75	CN-512M				CN-297M
48	R/L	AVSS	0.75	CN-429F				CN-293M
53	L/R	AVSS	0.75	CN-425F	DS-B16			CN-404F
53	L/R	AVSS	0.75	CN-425F	DS-B16		DS-B18	CN-523F
53	L/R	AVSS	0.75	JS-B114			DS-B18	CN-523F
53	L/R	AVSS	0.75	JS-B114				CN-305M
53	L/R	AVSS	0.75	JS-B114				JS-B123
53	L/R	AVSS	0.75	CN-31F				JS-B123
53	L/R	AVSS	0.75	CN-31F				JS-B123
54	W/L	AVSS	0.75	CN-425F				CN-512M
138	G/B	AVSS	0.75	CN-293M				CN-31F
139	G/O	AVSS	0.75	CN-293M				JS-B26
139A	G/O	AVSS	0.75	CN-428F				JS-B26
139C	G/O	AVSS	0.75	CN-428F				JS-B26
140	Y	AVSS	0.75	CN-31F			DS-B218	CN-428F
140A	Y	AVSS	0.75	CN-428F			DS-B218	CN-428F
145	Y/L	AVSS	0.5	CN-293M				JS-B124
145	Y/L	AVSS	0.5	CN-474F				JS-B124
145	Y/L	AVSS	0.75	CN-403F				JS-B124
146	Gr	AVSS	0.5	CN-293M				JS-B125
146	Gr	AVSS	0.5	CN-474F				JS-B125
146	Gr	AVSS	0.75	CN-403F				JS-B125
147	O/L	AVSS	0.75	CN-JB14F				CN-293M
147A	O/L	AVSS	0.75	CN-JB14F				CN-470M
147C	O/L	AVSS	0.75	CN-JB14F				CN-404F
147F	O/L	AVSS	0.75	CN-JB14F				CN-31F
148	G/W	AVSS	0.75	CN-JB14F				CN-31F
148	G/W	AVSS	0.75	CN-JB14F				CN-293M
148A	G/W	AVSS	0.75	CN-JB14F				CN-470M
148C	G/W	AVSS	0.75	CN-JB14F				CN-403F
149	L/W	AVSS	0.75	CN-JB14F				CN-31F
149A	L/W	AVSS	0.75	CN-JB14F				CN-470M
149C	L/W	AVSS	0.75	CN-JB14F				CN-403F
149F	L/W	AVSS	0.75	CN-JB14F				CN-293M
156	P/W	AVSS	0.75	CN-472F				CN-293M
157	W	AVSS	0.75	CN-471M				CN-293M
158	R/W	AVSS	0.75	CN-472F				CN-293M

No.	COLOR	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
160	G	AVSS	0.75	CN-293M			DS-B45	CN-424F
160A	G	AVSS	0.75	CN-37F			DS-B45	CN-424F
161	Y/R	AVSS	0.75	CN-424F	DS-B46			CN-293M
161A	Y/R	AVSS	0.75	CN-424F	DS-B46			CN-401M
162	Y/G	AVSS	0.75	CN-293M				CN-440F
165	Gr/R	AVSS	0.75	CN-293M				CN-JB14F
165C	Gr/R	AVSS	0.75	CN-424F				CN-JB14F
165	Gr/R	AVSS	0.75	CN-438F	DS-B220			CN-JB14F
165	Gr/R	AVSS	0.75	CN-438F	DS-B220		DS-B221	CN-437F
165	Gr/R	AVSS	0.75	CN-436F			DS-B221	CN-437F
166	Lg/W	AVSS	0.5	JS-B115				CN-293M
166C	Lg/W	AVSS	0.5	JS-B115				CN-438F
166E	Lg/W	AVSS	0.5	JS-B115				CN-404F
167	Lg/Y	AVSS	0.5	JS-B116				CN-293M
167E	Lg/Y	AVSS	0.5	JS-B116				CN-404F
167G	Lg/Y	AVSS	0.5	JS-B116				CN-437F
168	Lg/R	AVSS	0.5	CN-293M			DS-B222	CN-436F
168	Lg/R	AVSS	0.75	CN-31F			DS-B222	CN-436F
170	R/G	AVSS	0.5	CN-293M				CN-32F
172	Gr/L	AVSS	1.25	CN-440F				CN-292F
176	Gr/W	AVSS	0.75	CN-293M				JS-B121
176	Gr/W	AVSS	0.75	CN-403F				JS-B121
176	Gr/W	AVSS	0.75	CN-31F				JS-B121
212	G/W	AVSS	0.75	CN-404F				CN-33F
213	Y/W	AVSS	0.75	CN-33F				CN-404F
214	R/W	AVSS	0.75	CN-404F				CN-33F
224	Gr/B	AVSS	0.75	CN-31F				CN-440F
318	R/G	AVSS	0.75	CN-292F				CN-222F
319	G/B	AVSS	0.75	CN-222F				CN-292F
320	W/Y	AVSS	0.75	CN-222F				CN-292F
324	O/L	AVSS	0.75	CN-304M				CN-417F
325	W/O	AVSS	0.75	CN-417F				CN-304M
326	Gr/R	AVSS	0.75	CN-304M				CN-417F
337	O/L	AVSS	0.75	CN-471M				CN-305M
338	Gr/R	AVSS	0.75	CN-471M				CN-305M
339	P	AVSS	0.75	CN-471M				CN-305M
340	Sb	AVSS	0.75	CN-471M				CN-305M
341	W/L	AVSS	0.75	CN-305M				CN-471M
343	Y/B	AVSS	0.75	CN-305M				CN-471M
344	G/W	AVSS	0.75	CN-471M				CN-305M
345	Lg/Y	AVSS	0.75	CN-305M				CN-471M
346	R/L	AVSS	0.75	CN-305M				CN-471M
383	R	AVSS	0.75	CN-306F				CN-419M
384	R/W	AVSS	0.75	CN-306F				CN-470M
385	G/Y	AVSS	0.75	CN-470M				CN-306F
386	O	AVSS	0.75	CN-306F				CN-470M
394	Lg	AVSS	0.75	CN-31F				CN-416F
395	R/L	AVSS	0.75	CN-304M			DS-B230	CN-418M
395	R/L	AVSS	0.75	CN-424F			DS-B230	CN-418M
402	V/W	AVSS	0.75	CN-304M				JS-B21
402A	V/W	AVSS	0.75	CN-37F				JS-B21
402C	V/W	AVSS	0.75	JS-B21				CN-415F
418	W/R	AVSS	0.75	CN-424F				CN-305M
429	G	AVSS	0.75	CN-301M				CN-32F
435	Br/G	AVSS	0.75	CN-531F	DS-B35			CN-31F
435	Br/G	AVSS	0.75	CN-531F	DS-B35		DS-B38	CN-532F
435	Br/G	AVSS	0.75	JS-B126			DS-B38	CN-532F
435	Br/G	AVSS	0.75	JS-B126				CN-306F
435	Br/G	AVSS	0.75	JS-B126				CN-883F
435	Br/G	AVSS	0.75	JS-B126				CN-523F
445	R/Y	AVSS	0.75	CN-293M				CN-401M
476	O	AVSS	0.75	CN-31F				CN-301M
481	W/B	AVSS	0.75	CN-429F				CN-33F
485	Gr/L	AVSS	0.75	CN-31F				CN-306F
501	Br/W	AVSS	0.75	CN-31F				CN-401M
502A	G/Y	AVSS	0.75	CN-401M				CN-31F
503A	L	AVSS	0.75	CN-31F				CN-401M
614	W/Y	AVSS	0.75	CN-474F				CN-304M
750Y	W/R	AVSS	0.75	JS-B120				CN-401M
750p	W/R	AVSS	1.25	JS-B120				CN-304M
750q	W/R	AVSS	0.75	JS-B120			DS-B59	CN-432F
750r	W/R	AVSS	0.75	CN-438F	DS-B61		DS-B59	CN-432F
750s	W/R	AVSS	0.75	CN-438F	DS-B61		DS-B100	CN-437F
750t	W/R	AVSS	0.75	CN-436F	DS-B101		DS-B100	CN-437F
750u	W/R	AVSS	0.75	CN-436F	DS-B101		DS-B102	CN-218F
750v	W/R	AVSS	0.75	CN-218F	DS-B106		DS-B102	CN-218F
750S	W/R	AVSS	0.75	CN-218F	DS-B106		DSA95	CN-216F
750T	W/R	AVSS	0.75	CN-216F	DS-B226		DSA95	CN-216F
750	W/R	AVSS	0.75	CN-216F	DS-B226			CN-886F

No.	COLOR	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
859	Gr	AVSS	0.75	CN-37F				CN-679M
861	L/Y	AVSS	0.75	CN-401M			DS-B41	CN-418M
861A	L/Y	AVSS	0.75	CN-31F			DS-B41	CN-418M
862	G/O	AVSS	0.75	JS-B10				CN-32F
862A	G/O	AVSS	0.75	CN-883F				JS-B10
862C	G/O	AVSS	0.75	CN-473F				JS-B10
864	L/G	AVSS	0.75	CN-37F				CN-679M
900	Lg/Y	AVSS	0.75	CN-472F				CN-304M
901	Y/L	AVSS	0.75	CN-411F				CN-304M
902	Gr/R	AVSS	0.75	CN-218F				CN-679M
903	Lg	AVSS	0.75	CN-679M				CN-218F
904	Y/G	AVSS	0.75	CN-216F				JS-B31
904A	Y/G	AVSS	0.75	CN-473F				JS-B31
904C	Y/G	AVSS	0.75	JS-B31				CN-534F
905	L/Y	AVSS	0.75	JS-B30				CN-216F
905A	L/Y	AVSS	0.75	CN-473F				JS-B30
905C	L/Y	AVSS	0.75	JS-B30				CN-535F
923	L/O	AVSS	0.75	CN-31F				CN-401M
924	G/O	AVSS	0.75	CN-31F				CN-401M
925	Y/G	AVSS	0.75	CN-31F				CN-401M
926	R	AVSS	0.75	CN-37F				CN-679M
927	O/W	AVSS	0.75	CN-37F				CN-679M
928	G/L	AVSS	0.75	CN-37F				JS-B48
928A	G/L	AVSS	0.75	CN-473F				JS-B48
928C	G/L	AVSS	0.75	CN-473F				JS-B48
929	R/Y	AVSS	0.75	CN-37F				CN-472F
930	Gr/R	AVSS	0.75	CN-32F				CN-883F
931	Br/W	AVSS	0.75	CN-32F				CN-883F
945	Y	AVSS	0.75	CN-432F				CN-470M
946	O/L	AVSS	0.75	CN-33F				CN-883F
947	P/G	AVSS	0.75	CN-32F				CN-883F
948C	Lg	AVSS	0.75	CN-535F			DS-B227	CN-534F
948	Lg	AVSS	0.75	CN-530F	DS-B34		DS-B227	CN-534F
948A	Lg	AVSS	0.75	CN-530F	DS-B34		DS-B39	CN-533F
948B	Lg	AVSS	0.75	CN-33F			DS-B39	CN-533F
949	Br	AVSS	0.75	CN-531F	DS-B36			CN-32F
949A	Br	AVSS	0.75	CN-531F	DS-B36			CN-530F
950	G	AVSS	0.75	CN-473F			DS-B37	CN-532F
950A	G	AVSS	0.75	CN-533F			DS-B37	CN-532F
951	O	AVSS	0.75	CN-886F				CN-293M
958	G	AVSS	0.75	CN-31F				CN-403F
972	G/L	AVSS	0.75	CN-474F				CN-301M
973	O/L	AVSS	0.75	CN-301M				CN-474F
974	Gr/B	AVSS	0.75	CN-474F				CN-301M
975	G	AVSS	0.75	CN-305M				CN-886F
976	L	AVSS	0.75	CN-305M				CN-886F
977	G/Y	AVSS	0.75	CN-292F				CN-474F
978	Y/G	AVSS	0.75	CN-292F				CN-474F

No.	COLOR	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
979	P	AVSS	0.75	CN-293M				CN-401M
986	Y/G	AVSS	0.75	CN-427F				CN-884M
C02	Y	AVSS	0.75	CN-521F	DS-B21			CN-883F
C02A	Y	AVSS	0.75	CN-521F	DS-B21			CN-473F
JP01A	Y	AVSS	1.25	CN-440AM				(CN-440AM)
								CN-440AM
392	O/B	AVSS	0.75	CN-306F				CN-32F
393	Sb	AVSS	0.75	CN-306F				CN-32F
371	G	AVSS	0.75	CN-472F				CN-306F
380	W	AVSS	0.75	CN-306F				CN-472F
396	P/W	AVSS	0.75	CN-306F				CN-32F
397	Lg/W	AVSS	0.75	CN-306F				CN-32F
494	Y/B	AVSS	0.75	CN-884M				CN-33F
495	L/G	AVSS	0.75	CN-884M				CN-33F
496	G	AVSS	0.75	CN-884M				CN-33F
497	L/Y	AVSS	0.75	CN-884M				CN-33F
498	R/G	AVSS	0.75	CN-884M				CN-33F
499	L/R	AVSS	0.75	CN-884M				CN-33F
855	L/W	AVSS	0.75	CN-414F				CN-304M
856	Lg/B	AVSS	0.75	CN-414F				CN-304M
952	L/O	AVSS	0.75	CN-472F				CN-32F
953	G/B	AVSS	0.75	CN-32F				CN-472F
954	Br/Y	AVSS	0.75	CN-32F				CN-472F
955	G/L	AVSS	0.75	CN-32F				CN-472F
131	G	MVVS	0.75	CN-470M				CN-297M
132	B	MVVS	0.75	CN-470M				CN-297M
133	R	MVVS	0.75	CN-470M				CN-297M
137	W	MVVS	0.75	CN-470M				CN-297M
ES8	B/R	AVSS	0.75	(CN-470F)				CN-297M
ES08A	B/R	AVSS	0.75	CN-470M				(CN-297M)
194	R	MVVS	0.75	CN-427F				CN-293M
195	W	MVVS	0.75	CN-427F				CN-293M
196	B	MVVS	0.75	CN-427F				CN-293M
ES10	B/R	MVVS	0.75	CN-427F				CN-293M
508	W	MVVS	0.75	CN-304M				CN-403F
509	R	MVVS	0.75	CN-304M				CN-403F
510	B	MVVS	0.75	CN-304M				CN-403F
511	G	MVVS	0.75	CN-304M				CN-403F
E01	B	AVSS	1.25	CN-292F			DS-B228	LA-B05
E01	B	AVSS	0.75	CN-429F			DS-B228	LA-B05
E023	B	AVSS	0.75	LA-B11	DS-B43			CN-411F
E022	B	AVSS	0.75	LA-B11	DS-B43			B-2
E0	B	AVSS	1.25	LA-B03	DS-B25			CN-440F
E05	B	AVSS	0.75	LA-B03	DS-B25		DS-B105	CN-432F
E06	B	AVSS	0.75	CN-438F	DS-B64		DS-B105	CN-432F
E07	B	AVSS	0.75	CN-438F	DS-B64		DS-B63	CN-437F
E020	B	AVSS	0.75	CN-436F	DS-B229		DS-B63	CN-437F
E019	B	AVSS	0.75	CN-436F	DS-B229		DS-B104	CN-218F
E018	B	AVSS	0.75	CN-218F	DS-B103		DS-B104	CN-218F
E07	B	AVSS	0.75	CN-218F	DS-B103		DS-B237	CN-216F
E08	B	AVSS	0.75	CN-216F	DS-B238		DS-B237	CN-216F
E0	B	AVSS	0.75	CN-216F	DS-B238		DS-B234	CN-886F
E0	B	AVSS	0.75	CN-886F	DS-B235		DS-B234	CN-886F
E0	B	AVSS	0.75	CN-886F	DS-B235		DS-B239	CN-886F
E0	B	AVSS	0.75	LA-B07	DS-B75		DS-B239	CN-886F
E03	B	AVSS	0.75	LA-B07	DS-B75			CN-418M
E011	B	AVSS	0.75	LA-B08	DS-B67			CN-416F
E012	B	AVSS	0.75	LA-B08	DS-B67			CN-415F
E11	B/W	AVSS	0.75	CN-427F				CN-679M

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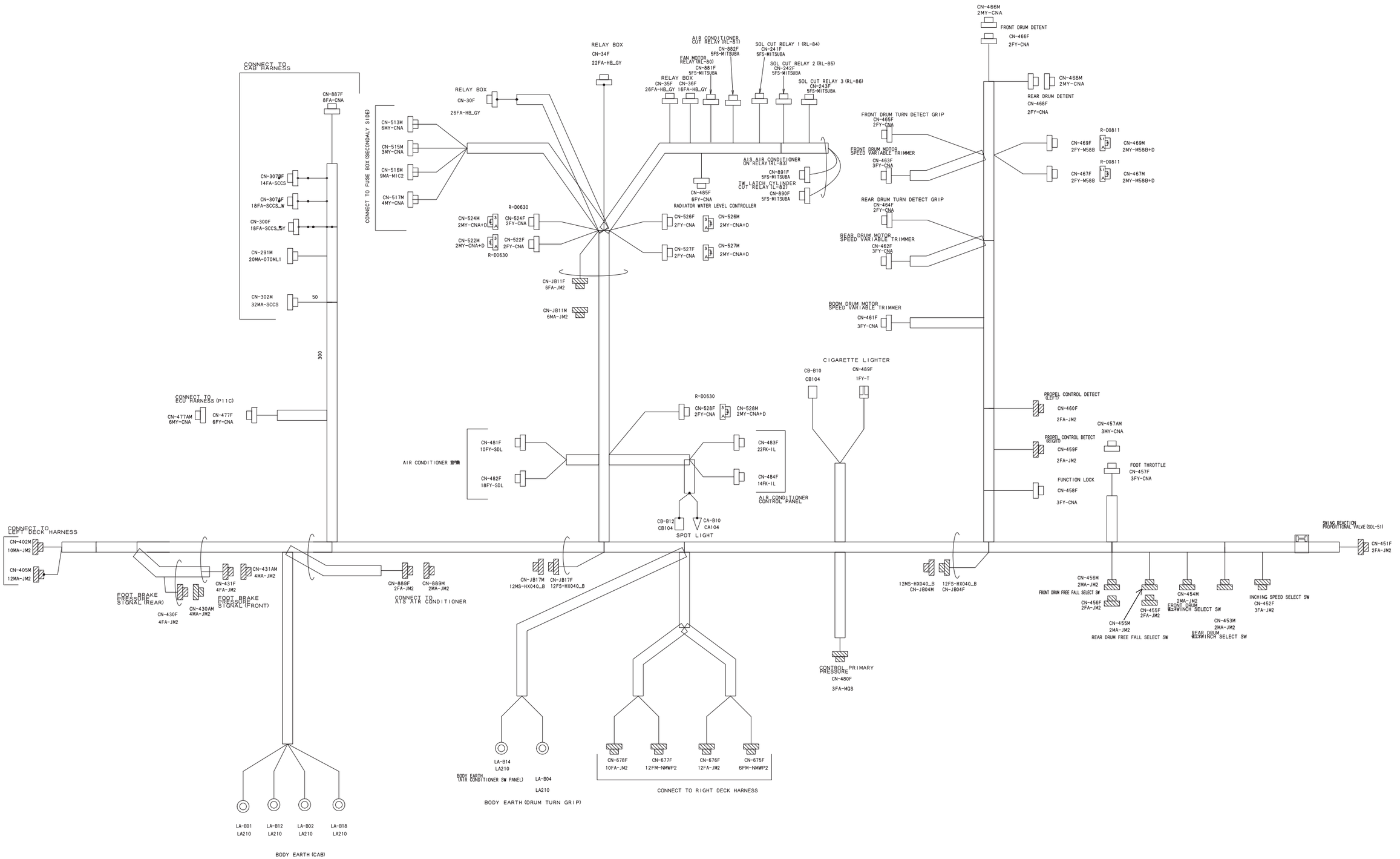
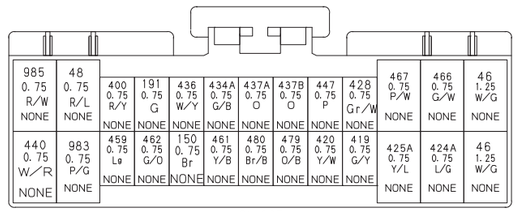
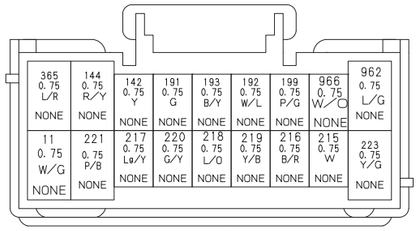
FLOOR HARNESS B



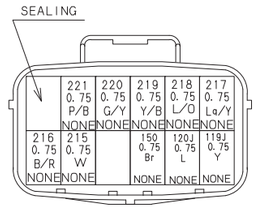
(1/5)



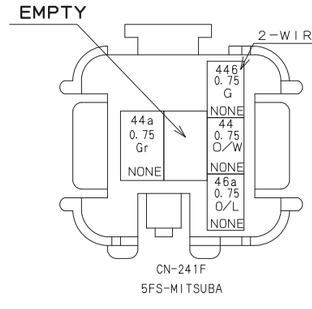
CN-30F
26FA-HB_GY



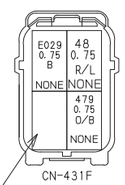
CN-300F
18FA-SCCS_GY



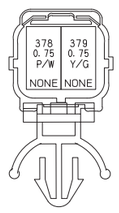
CN-405M
12MA-JM2



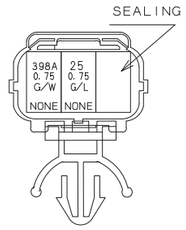
CN-241F
5FS-MITSUBA



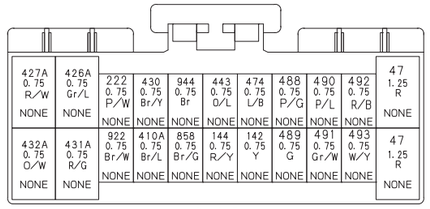
CN-431F
4FA-JM2



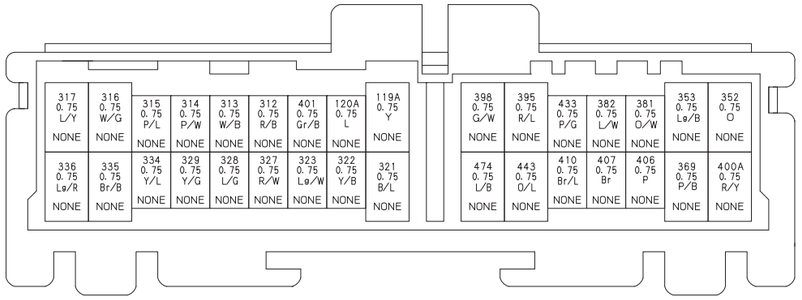
CN-451F
2FA-JM2



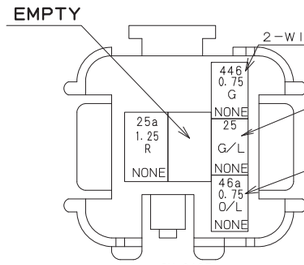
CN-452F
3FA-JM2



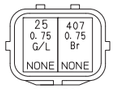
CN-34F
22FA-HB_GY



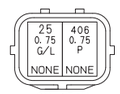
CN-302M
32MA-SCCS



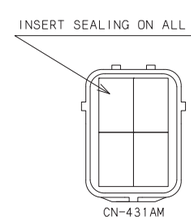
CN-242F
5FS-MITSUBA



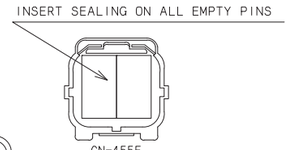
CN-453M
2MA-JM2



CN-454M
2MA-JM2

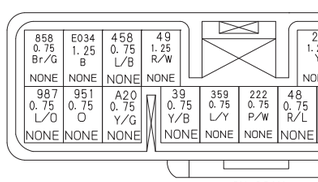


CN-431AM
4MA-JM2

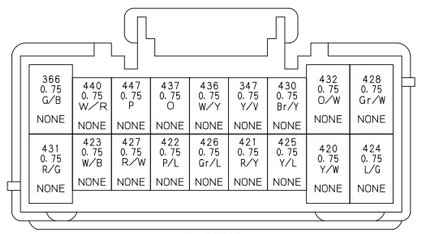


CN-455F
2FA-JM2

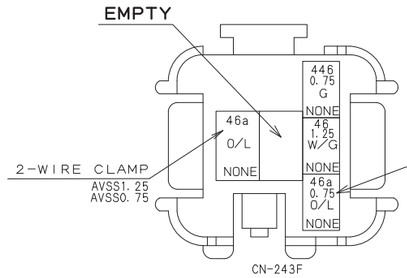
CN-455M
2MA-JM2



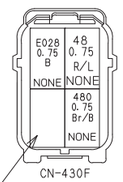
CN-35F
26FA-HB_GY



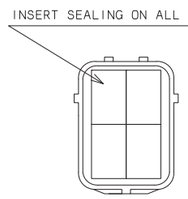
CN-307AF
18FA-SCCS_W



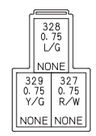
CN-243F
5FS-MITSUBA



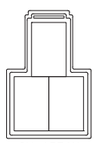
CN-430F
4FA-JM2



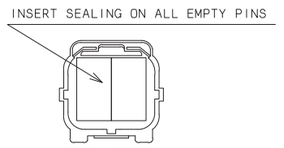
CN-430AM
4MA-JM2



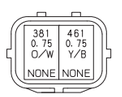
CN-457F
3FY-CNA



CN-457AM
3MY-CNA

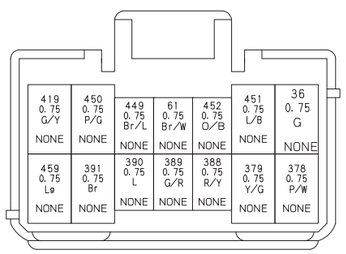


CN-456F
2FA-JM2

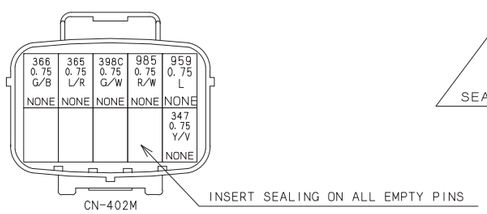


CN-456M
2MA-JM2

CN-291M
20MA-070ML1

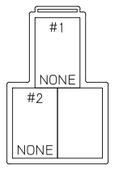


CN-307BF
14FA-SCCS

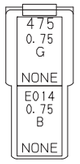


CN-402M
10MA-JM2

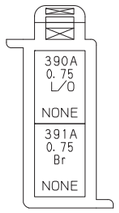
(2/5)



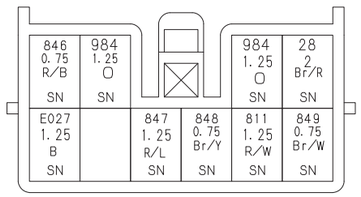
CN-458F
3FY-CNA
#1 25 1.25 G/L + 25 1.25 G/L
#2 395 0.75 R/L + 395F 0.75 R/L



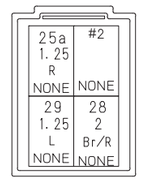
CN-464F
2FY-CNA



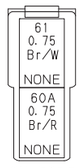
CN-469F
2FY-M58B



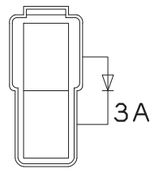
CN-481F
10FY-SDL



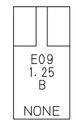
CN-517M
4MY-CNA
#2 22 0.75 L/R + 22 0.75 L/R



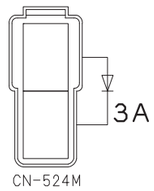
CN-527F
2FY-CNA



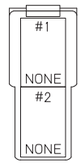
CN-522M
2MY-CNA+D



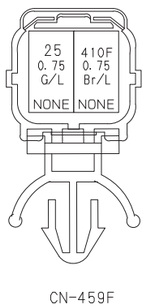
CN-489F
1FY-T



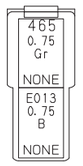
CN-524M
2MY-CNA+D



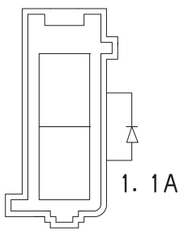
CN-526F
2FY-CNA
#1 464 0.75 P + 464A 0.75 P
#2 60 0.75 Br/R + 60A 0.75 Br/R



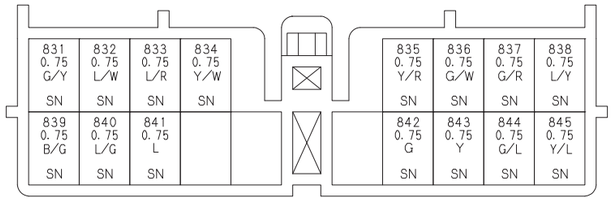
CN-459F
2FA-JM2



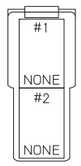
CN-465F
2FY-CNA



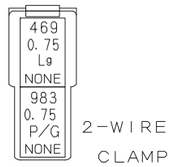
CN-469M
2MY-M58B+D



CN-482F
18FY-SDL

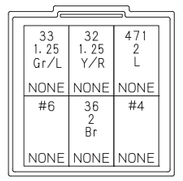


CN-522F
2FY-CNA
#1 400 0.75 R/Y + 400A 0.75 R/Y
#2 40 0.75 Br/W + 40 0.75 Br/W

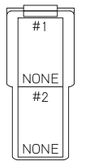


CN-524F
2FY-CNA

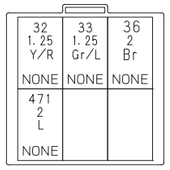
2-WIRE CLAMP



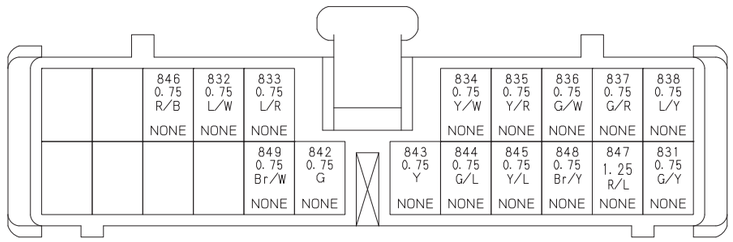
CN-513M
6MY-CNA
#4 34 0.75 O + 34A 2 O
#6 36 2 G + 36B 0.75 G



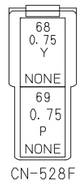
CN-466F
2FY-CNA
#1 389 0.75 G/R + 389A 0.75 G/R
#2 388 0.75 Lg/Y + 388A 0.75 Lg/Y



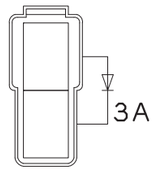
CN-477F
6FY-CNA



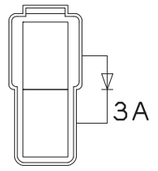
CN-483F
22FK-IL



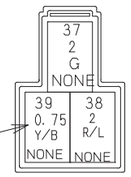
CN-528F
2FY-CNA



CN-527M
2MY-CNA+D

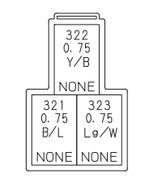


CN-526M
2MY-CNA+D

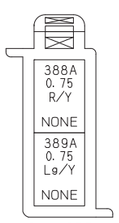


2-WIRE CLAMP

CN-515M
3MY-CNA

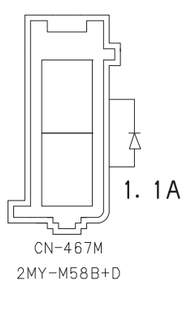


CN-461F
3FY-CNA

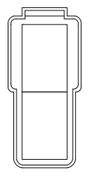


CN-462F
3FY-CNA

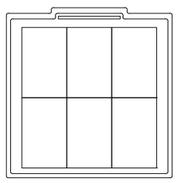
CN-467F
2FY-M58B



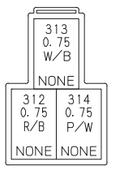
CN-467M
2MY-M58B+D



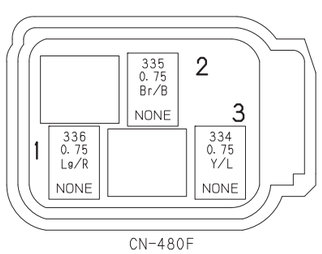
CN-466M
2MY-CNA



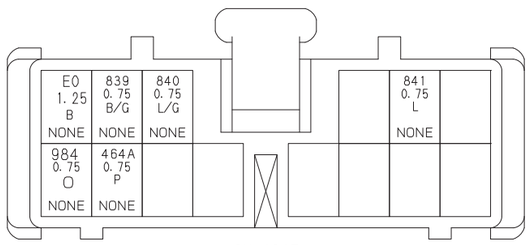
CN-477AM
6MY-CNA



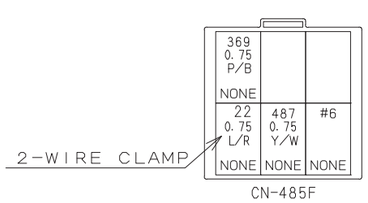
CN-463F
3FY-CNA



CN-480F
3FA-MQS

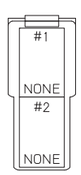


CN-484F
14FK-IL

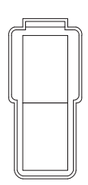


2-WIRE CLAMP

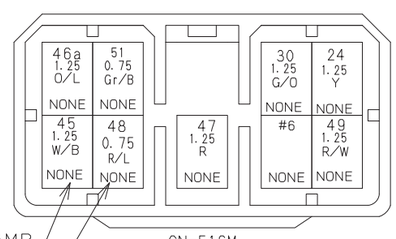
CN-485F
6FY-CNA
#6 E07 0.75 B + E08 0.75 B



CN-468F
2FY-CNA
#1 391 0.75 Br + 391A 0.75 Br
#2 390 0.75 L/O + 390A 0.75 L/O



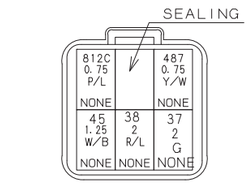
CN-468M
2MY-CNA



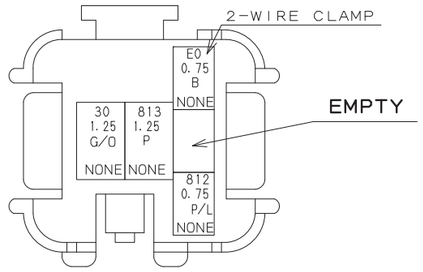
2-WIRE CLAMP
2-WIRE CLAMP

CN-516M
9MA-MIC2
#6 40 0.75 Br/W + 40 0.75 Br/W

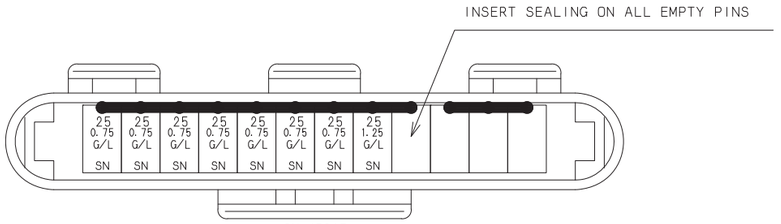
(3/5)



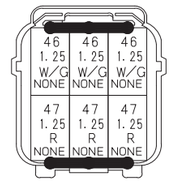
CN-675F
6FM-NMWP2



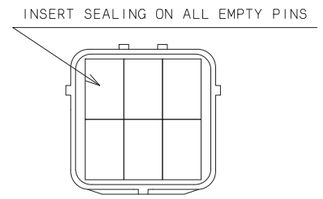
CN-881F
5FS-MITSUBA



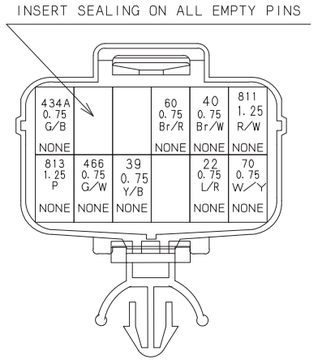
CN-JB04F
12FS-HX040_B



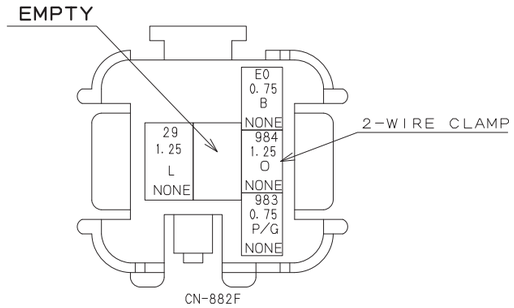
CN-JB11F
6FA-JM2



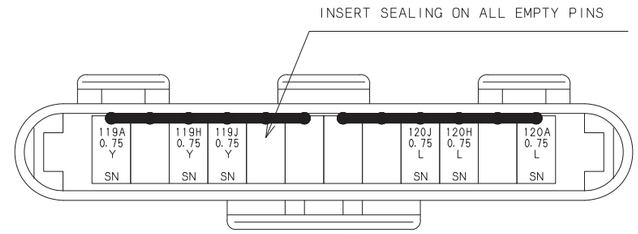
CN-JB11M
6MA-JM2



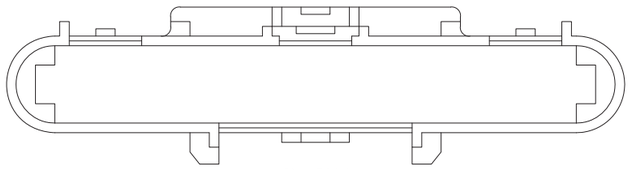
CN-676F
12FA-JM2



CN-882F
5FS-MITSUBA



CN-JB17F
12FS-HX040_B

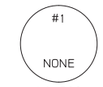


LA-B01
LA210
#1 E028 0.75 B + E029 0.75 B

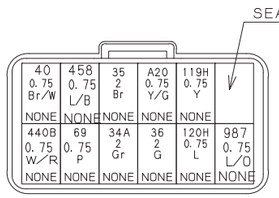
LA-B14
LA210
#1 E0 1.25 B + E027 1.25 B

CA-B10
CA104

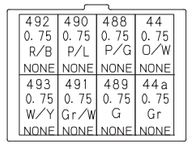
2-WIRE CLAMP



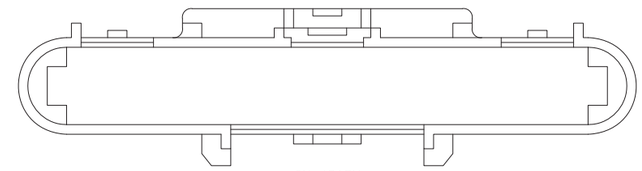
LA-B02
LA210
#1 E08 0.75 B + E09 1.25 B

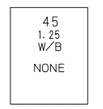


CN-677F
12FM-NMWP2



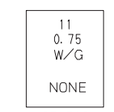
CN-887F
8FY-CNA



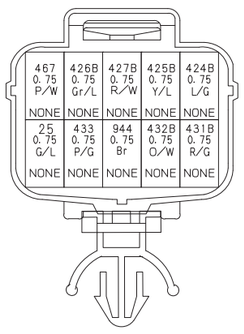


CB-B10
CB104

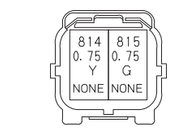
LA-B04
LA210
#1 E013 0.75 B + E014 0.75 B



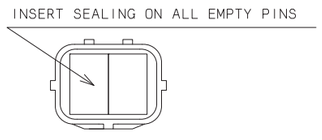
CB-B12
CB104



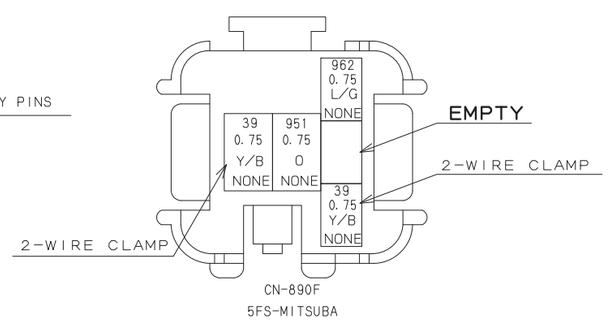
CN-678F
10FA-JM2



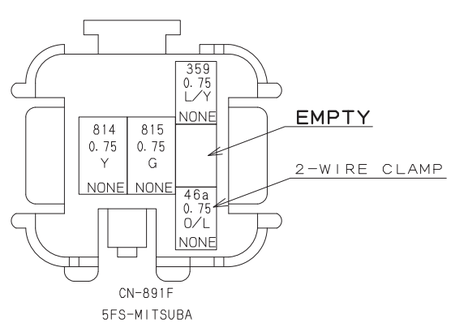
CN-889F
2FA-JM2



CN-889M
2MA-JM2



CN-890F
5FS-MITSUBA



CN-891F
5FS-MITSUBA

LA-B12
LA210
#1 E025 0.75 B + E041 0.75 B

LA-B18
LA210
#1 E034 1.25 B + E038 1.25 B

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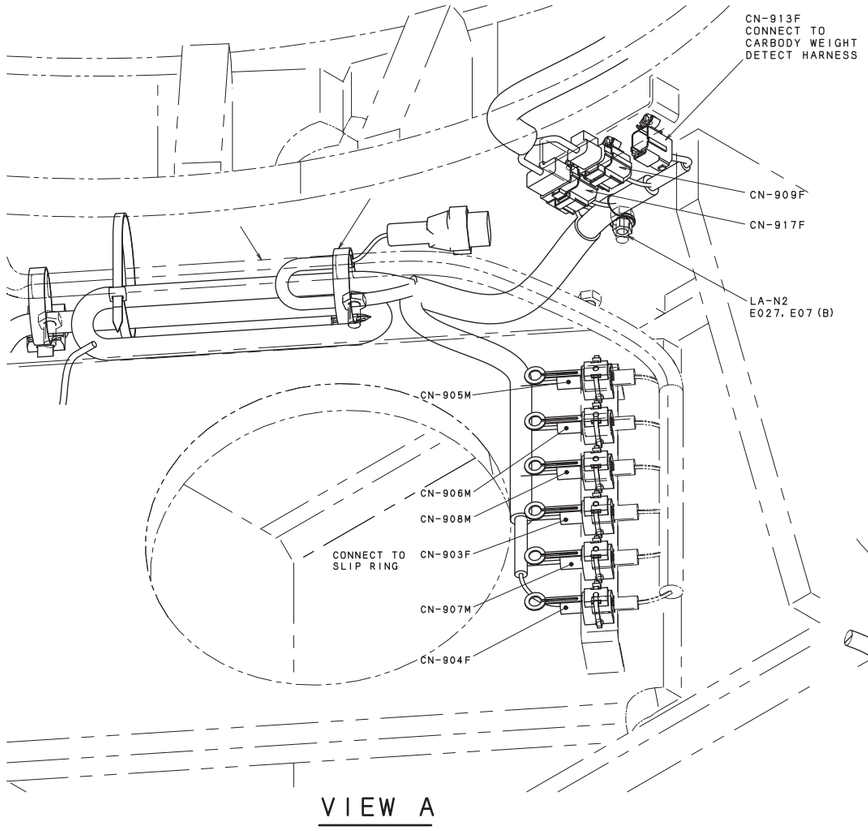
WIRE No. AND WIRE COLOR LIST

No.	COLOR	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
11	W/G	AVSS	0.75	CB-B12				CN-300F
22	L/R	AVSS	0.75	CN-35F				JS-B12
22	L/R	AVSS	0.75	CN-36F				JS-B12
22	L/R	AVSS	0.75	CN-485F	DS-B200			JS-B12
22	L/R	AVSS	0.75	CN-485F	DS-B200		DS-B08	CN-517M
22	L/R	AVSS	0.75	CN-676F			DS-B08	CN-517M
24	Y	AVSS	1.25	CN-291M				CN-516M
25	G/L	AVSS	0.75	CN-242F	DS-B05			CN-291M
25	G/L	AVSS	1.25	CN-242F	DS-B05		DS-B40	CN-458F
25	G/L	AVSS	1.25	CN-JB04F			DS-B40	CN-458F
25	G/L	AVSS	0.75	CN-JB04F				CN-454M
25	G/L	AVSS	0.75	CN-JB04F				CN-453M
25	G/L	AVSS	0.75	CN-JB04F				CN-35F
25	G/L	AVSS	0.75	CN-JB04F				CN-452F
25	G/L	AVSS	0.75	CN-JB04F				CN-459F
25	G/L	AVSS	0.75	CN-JB04F				CN-460F
25	G/L	AVSS	0.75	CN-JB04F				CN-678F
25a	R	AVSS	1.25	CN-517M				CN-242F
28	Br/R	AVS	2	CN-517M				CN-481F
29	L	AVSS	1.25	CN-517M				CN-882F
30	G/O	AVSS	1.25	CN-881F				CN-516M
32	Y/R	AVSS	1.25	CN-513M				CN-477F
33	Gr/L	AVS	1.25	CN-477F				CN-513M
34	Gr	AVSS	0.75	CN-513M	DS-B09			CN-291M
34A	Gr	AVS	2	CN-513M	DS-B09			CN-677F
35	Br	AVS	2	CN-513M				JS-B113
35	Br	AVS	2	CN-477F				JS-B113
35	Br	AVS	2	CN-677F				JS-B113
36	G	AVS	2	CN-677F			DS-B10	CN-513M
36	G	AVSS	0.75	CN-307BF			DS-B10	CN-513M
37	G	AVS	2	CN-515M				CN-675F
38	R/L	AVS	2	CN-515M				CN-675F
39	Y/B	AVSS	0.75	CN-291M			DS-B201	CN-515M
39	Y/B	AVSS	0.75	CN-890F	DS-B231		DS-B201	CN-515M
39	Y/B	AVSS	0.75	CN-890F	DS-B231		DS-B232	CN-890F
39	Y/B	AVSS	0.75	JS-B104			DS-B232	CN-890F
39	Y/B	AVSS	0.75	JS-B104				CN-36F
39	Y/B	AVSS	0.75	JS-B104				CN-676F
40	Br/W	AVSS	0.75	CN-676F			DS-B12	CN-516M
40	Br/W	AVSS	0.75	CN-522F	DS-B22		DS-B12	CN-516M
40	Br/W	AVSS	0.75	CN-522F	DS-B22			CN-677F
44	O/W	AVSS	0.75	CN-887F				CN-241F
44a	Gr	AVSS	0.75	CN-887F				CN-241F
45	W/B	AVSS	1.25	CN-516M	DS-B202			CN-675F
45	W/B	AVSS	1.25	CN-516M	DS-B202			CB-B10
46	W/G	AVSS	1.25	CN-JB11F				CN-243F
46	W/G	AVSS	1.25	CN-JB11F				CN-30F
46	W/G	AVSS	1.25	CN-JB11F				CN-30F
46a	O/L	AVSS	1.25	CN-516M			DS-B50	CN-243F
46a	O/L	AVSS	0.75	CN-891F	DS-B51		DS-B50	CN-243F
46a	O/L	AVSS	0.75	CN-891F	DS-B51		DS-B52	CN-243F
46a	O/L	AVSS	0.75	CN-242F	DS-B53		DS-B52	CN-243F
46a	O/L	AVSS	0.75	CN-242F	DS-B53			CN-241F
47	R	AVSS	1.25	CN-JB11F				CN-516M
47	R	AVSS	1.25	CN-JB11F				CN-34F
47	R	AVSS	1.25	CN-JB11F				CN-34F
48	R/L	AVSS	0.75	CN-516M	DS-B204			CN-30F
48	R/L	AVSS	0.75	CN-516M	DS-B204			JS-B114
48	R/L	AVSS	0.75	CN-291M				JS-B114
48	R/L	AVSS	0.75	CN-430F				JS-B114
48	R/L	AVSS	0.75	CN-431F				JS-B114
49	R/W	AVSS	1.25	CN-291M				CN-516M
51	Gr/B	AVSS	0.75	CN-516M				CN-35F
60	Br/R	AVSS	0.75	CN-676F			DS-B33	CN-526F
60A	Br/R	AVSS	0.75	CN-527F			DS-B33	CN-526F
61	Br/W	AVSS	0.75	CN-527F				CN-307BF
68	Y	AVSS	0.75	CN-36F				CN-528F
69	P	AVSS	0.75	CN-528F				CN-677F
70	W/Y	AVSS	0.75	CN-676F				CN-35F
142	Y	AVSS	0.75	CN-300F				CN-34F
144	R/Y	AVSS	0.75	CN-300F				CN-34F
150	Br	AVSS	0.75	CN-30F				JS-B100
150	Br	AVSS	0.75	CN-291M				JS-B100
150	Br	AVSS	0.75	CN-405M				JS-B100
191	G	AVSS	0.75	CN-300F				CN-30F
192	W/L	AVSS	0.75	CN-300F				CN-35F
193	B/Y	AVSS	0.75	CN-300F				CN-35F
199	P/G	AVSS	0.75	CN-300F				CN-35F
215	W	AVSS	0.75	CN-300F				JS-B106
215	W	AVSS	0.75	CN-405M				JS-B106
215	W	AVSS	0.75	CN-35F				JS-B106
216	B/R	AVSS	0.75	CN-300F				JS-B107
216	B/R	AVSS	0.75	CN-405M				JS-B107
216	B/R	AVSS	0.75	CN-35F				JS-B107
217	Lg/Y	AVSS	0.75	CN-300F				JS-B108
217	Lg/Y	AVSS	0.75	CN-405M				JS-B108
217	Lg/Y	AVSS	0.75	CN-35F				JS-B108
218	L/Y	AVSS	0.75	CN-300F				JS-B109
218	L/Y	AVSS	0.75	CN-405M				JS-B109
218	L/Y	AVSS	0.75	CN-35F				JS-B109
219	Y/B	AVSS	0.75	CN-300F				JS-B110
219	Y/B	AVSS	0.75	CN-405M				JS-B110
219	Y/B	AVSS	0.75	CN-35F				JS-B110
220	G/Y	AVSS	0.75	CN-300F				JS-B111
220	G/Y	AVSS	0.75	CN-405M				JS-B111
220	G/Y	AVSS	0.75	CN-35F				JS-B111
221	P/B	AVSS	0.75	CN-300F				JS-B112
221	P/B	AVSS	0.75	CN-405M				JS-B112
221	P/B	AVSS	0.75	CN-35F				JS-B112
222	P/W	AVSS	0.75	CN-291M				CN-34F
223	Y/G	AVSS	0.75	CN-35F				CN-300F
312	R/B	AVSS	0.75	CN-463F				CN-302M
313	W/B	AVSS	0.75	CN-463F				CN-302M
314	P/W	AVSS	0.75	CN-463F				CN-302M
315	P/L	AVSS	0.75	CN-302M				CN-462F
316	W/G	AVSS	0.75	CN-462F				CN-302M
317	L/Y	AVSS	0.75	CN-302M				CN-462F
321	B/L	AVSS	0.75	CN-461F				CN-302M
322	Y/B	AVSS	0.75	CN-302M				CN-461F
323	Lg/W	AVSS	0.75	CN-302M				CN-461F
327	R/W	AVSS	0.75	CN-457F				CN-302M
328	L/G	AVSS	0.75	CN-302M				CN-457F
329	Y/G	AVSS	0.75	CN-302M				CN-457F
334	Y/L	AVSS	0.75	CN-302M				CN-480F
335	Br/B	AVSS	0.75	CN-302M				CN-480F
336	Lg/R	AVSS	0.75	CN-302M				CN-480F
347	Y/L	AVSS	0.75	CN-307AF				CN-402M
352	O	AVSS	0.75	CN-302M				CN-35F
353	Lg/B	AVSS	0.75	CN-302M				CN-35F
359	L/Y	AVSS	0.75	CN-291M				CN-891F
365	L/R	AVSS	0.75	CN-300F				CN-402M
366	G/B	AVSS	0.75	CN-402M				CN-307AF
369	P/B	AVSS	0.75	CN-302M				CN-485F
381	O/W	AVSS	0.75	CN-302M				CN-456M
382	L/W	AVSS	0.75	CN-455M				CN-302M
395	R/L	AVSS	0.75	CN-302M			DS-B41	CN-458F
395F	R/L	AVSS	0.75	CN-35F			DS-B41	CN-458F
398	G/W	AVSS	0.75	JS-B101				CN-302M
398A	G/W	AVSS	0.75	JS-B101				CN-452F
398C	G/W	AVSS	0.75	JS-B101				CN-402M
400	R/Y	AVSS	0.75	CN-30F			DS-B23	CN-522F
400A	R/Y	AVSS	0.75	CN-302M			DS-B23	CN-522F
401	Gr/B	AVSS	0.75	CN-302M				CN-36F
406	P	AVSS	0.75	CN-454M				CN-302M
407	Br	AVSS	0.75	CN-453M				CN-302M
410F	Br/L	AVSS	0.75	JS-B105				CN-459F
410E	Br/L	AVSS	0.75	JS-B105				CN-460F
410C	Br/L	AVSS	0.75	JS-B105				CN-302M
410	Br/L	AVSS	0.75	JS-B105				CN-34F
419	G/Y	AVSS	0.75	CN-30F				CN-307BF
420	Y/W	AVSS	0.75	CN-307AF				CN-30F
421	R/Y	AVSS	0.75	CN-307AF				CN-35F
422	P/L	AVSS	0.75	CN-307AF				CN-35F
423	W/B	AVSS	0.75	CN-307AF				CN-36F
424	L/G	AVSS	0.75	CN-307AF				JS-B37
424A	L/G	AVSS	0.75	JS-B37				CN-30F
424B	L/G	AVSS	0.75	CN-678F				JS-B37
425	Y/L	AVSS	0.75	CN-307AF				JS-B38
425A	Y/L	AVSS	0.75	JS-B38				CN-30F
425B	Y/L	AVSS	0.75	CN-678F				JS-B38
426	Gr/L	AVSS	0.75	CN-307AF				JS-B39
426A	Gr/L	AVSS	0.75	JS-B39				CN-34F
426B	Gr/L	AVSS	0.75	JS-B39				CN-678F
427	R/W	AVSS	0.75	CN-307AF				JS-B40
427A	R/W	AVSS	0.75	JS-B40				CN-34F
427B	R/W	AVSS	0.75	CN-678F				JS-B40
428	Gr/W	AVSS	0.75	CN-307AF				CN-30F
430	Br/Y	AVSS	0.75	CN-34F				CN-307AF
431	R/G	AVSS	0.75	JS-B41				CN-307AF
431A	R/G	AVSS	0.75	JS-B41				CN-34F
431B	R/G	AVSS	0.75	CN-678F				JS-B41
432	O/W	AVSS	0.75	JS-B42				CN-307AF
432A	O/W	AVSS	0.75	JS-B42				CN-34F
432B	O/W	AVSS	0.75	JS-B42				CN-678F
433	P/G	AVSS	0.75	CN-302M				CN-678F
434A	G/B	AVSS	0.75	CN-30F				CN-676F
436	W/Y	AVSS	0.75	CN-30F				CN-307AF
437	O	AVSS	0.75	JS-B35				CN-307AF
437A	O	AVSS	0.75	CN-30F				JS-B35
437B	O	AVSS	0.75	CN-30F				JS-B35
440	W/R	AVSS	0.75	CN-307AF				JS-B34
440A	W/R	AVSS	0.75	JS-B34				CN-30F
440B	W/R	AVSS	0.75	JS-B34				CN-677F
443	O/L	AVSS	0.75	CN-34F				CN-302M
446	G	AVSS	0.75	CN-291M			DS-B60	CN-241F
446	G	AVSS	0.75	CN-242F	DS-B61		DS-B60	CN-241F
446	G	AVSS	0.75	CN-242F	DS-B61			CN-243F
447	P	AVSS	0.75	CN-307AF				CN-30F
449	Br/L	AVSS	0.75	CN-36F				CN-307BF
450	P/G	AVSS	0.75	CN-307BF				CN-36F
451	L/B	AVSS	0.75	CN-307BF				CN-35F
452	O/B	AVSS	0.75	CN-307BF				CN-36F
457	W/Y	AVSS	0.75	CN-36F				CN-291M
458	L/B	AVSS	0.75	CN-677F				CN-291M
459	Lg	AVSS	0.75	CN-30F				CN-307BF
461	Y/B	AVSS	0.75	CN-30F				CN-456M
462	G/O	AVSS	0.75	CN-455M				CN-30F
464	P	AVSS	0.75	CN-526F	DS-B32			CN-35F
464A	P	AVSS	0.75	CN-526F	DS-B32			CN-484F
465	Gr	AVSS	0.75	CN-36F				CN-465F
466	G/W	AVSS	0.75	CN-30F				CN-676F
467	P/W	AVSS	0.75	CN-30F				CN-678F
469	Lg	AVSS	0.75	CN-35F				CN-524F
471	L	AVS	2	CN-513M				CN-477F
474	L/B	AVSS	0.75	CN-34F				CN-302M
475	G	AVSS	0.75	CN-36F				CN-464F
479	O/B	AVSS	0.75	CN-431F				CN-30F
480	Br/B	AVSS	0.75	CN-430F				CN-30F
487	Y/W	AVSS	0.75	CN-675F				CN-485F
754	Y/R	AVSS	0.75	CN-35F				CN-291M
811	R/W	AVS	1.25	CN-676F				CN-481F
812C	P/L	AVSS	0.75	CN-675F				CN-881F
813	P	AVS	1.25	CN-881F				CN-676F
814	Y	AVSS	0.75	CN-889F				CN-891F
815	G	AVSS	0.75	CN-889F				CN-891F
831	G/Y	AVSS	0.75	CN-482F				CN-483F
832	L/W	AVSS	0.75	CN-482F				CN-483F
833	L/R	AVSS	0.75	CN-482F				CN-483F
834	Y/W	AVSS	0.75	CN-482F				CN-483F
835	Y/R	AVSS	0.75	CN-482F				CN-483F
836	G/W	AVSS	0.75	CN-482F				CN-483F
837	G/R	AVSS	0.75	CN-482F				CN-483F
838	L/Y	AVSS	0.75	CN-482F				CN-483F
839	B/G	AVSS	0.75	CN-482F				CN-484F
840	L/G	AVSS	0.75	CN-482F				CN-484F
841	L	AVSS	0.75	CN-484F				CN-482F
842	G	AVSS	0.75	CN-483F				CN-482F
843	Y	AVSS	0.75	CN-483F				CN-482F
844	G/L	AVSS	0.75	CN-483F				CN-482F
845	Y/L	AVSS	0.75	CN-483F				CN-482F
846	R/B	AVSS	0.75	CN-483F				CN-481F
847	R/L	AVS	1.25	CN-483F				CN-481F
848	Br/Y	AVSS	0.75	CN-483F				CN-481F
849	Br/W	AVSS	0.75	CN-481F				CN-483F
858	Br/G	AVSS	0.75	CN-291M				CN-34F
922	Br/W	AVSS	0.75	CN-34F				CN-291M
944	Br	AVSS	0.75	CN-34F				CN-678F
951	O	AVSS	0.75	CN-890F				CN-291M
962	L/G	AVSS	0.75	CN-890F				CN-300F
966	W/O	AVSS	0.75	CN-36F				CN-300F
959	L	AVSS	0.75	CN-36F				CN-402M
983	P/G	AVSS	0.75	CN-30F			DS-B205	CN-524F
983	P/G	AVSS	0.75	CN-882F			DS-B205	CN-524F
984	O	AVSS	0.75	CN-882F	DS-B206			CN-484F
984	O	AVS	1.25	CN-882F	DS-B206			JS-B102
984	O	AVS	1.25	CN-481F				JS-B102
984	O	AVS	1.25	CN-481F				JS-B102
985	R/W	AVSS	0.75	CN-30F				CN-402M
987	L/O	AVSS	0.75	CN-677F				CN-291M
A20	Y/G	AVSS	0.75	CN-677F				CN-291M
119A	Y	AVSS	0.75	CN-JB17F				CN-302M
120A	L	AVSS	0.75	CN-JB17F				CN-302M
119H	Y	AVSS	0.75	CN-JB17F				CN-677F
120H	L	AVSS	0.75	CN-JB17F				CN-677F
119J	Y	AVSS	0.75	CN-JB17F				CN-405M
120J	L	AVSS	0.75	CN-JB17F				CN-405M
378	P/L	AVSS	0.75	CN-307BF				CN-451F
379	Y/G	AVSS	0.75	CN-307BF				CN-451F
388A	Lg/Y	AVSS	0.75	CN-467F			DS-B30	CN-466F
388	Lg/Y	AVSS	0.75	CN-307BF			DS-B30	CN-466F
389	G/R	AVSS	0.75	CN-307BF			DS-B31	CN-466F
389A	G/R	AVSS	0.75	CN-467F			DS-B31	CN-466F
390A	L/O	AVSS	0.75	CN-469F			DS-B28	CN-468F
390	L/O	AVSS	0.75	CN-307BF			DS-B28	CN-468F
391	Br	AVSS	0.75	CN-307BF			DS-B29	CN-468F
391A	Br	AVSS	0.75	CN-469F			DS-B29	CN-468F
488	P/G	AVSS	0.75	CN-34F				CN-887F
489	G	AVSS	0.75	CN-34F				CN-887F
490	P/L	AVSS	0.75	CN-34F				CN-887F
491	Gr/W	AVSS	0.75	CN-34F				CN-887F
492	R/B	AVSS	0.75	CN-34F				CN-887F
493	W/Y	AVSS	0.75	CN-34F				CN-887F
E0	B	AVSS	0.75	CN-881F	DS-B208		DS-B209	CN-882F
E07	B	AVSS	0.75	CN-881F	DS-B208		DS-B210	CN-485F
E08	B	AVSS	0.75	LA-B02	DS-B78		DS-B210	CN-485F
E09	B	AVSS	1.25	LA-B02	DS-B78			CN-489F
E013	B	AVSS	0.75	CN-465F			DS-B26	LA-B04
E014	B	AVSS	0.75	CN-464F			DS-B26	LA-B04
E025	B	AVSS	1.25	LA-B12	DS-B65			CN-35F
E041	B	AVSS	1.25	LA-B12	DS-B65			CN-35F
E0	B	AVSS	1.25	CA-B10	DS-B211			CN-484F
E0	B	AVSS	1.25	CA-B10	DS-B211		DS-B66	LA-B14
E027	B	AVSS	1.25	CN-481F			DS-B66	LA-B14
E028	B	AVSS	0.75	LA-B01	DS-B19			CN-430F
E029	B	AVSS	0.75	LA-B01	DS-B19			CN-431F
E034	B	AVSS	1.25	CN-291M			DS-B68	LA-B18
E038	B	AVSS	1.25	CN-291M			DS-B68	LA-B18

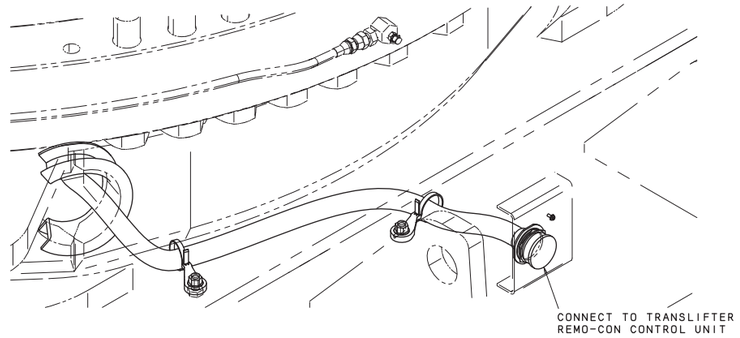
(5/5)

2.ELECTRICAL PART OF LOWER

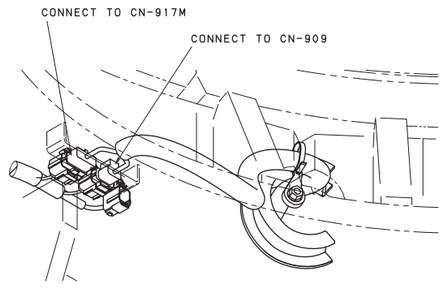
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



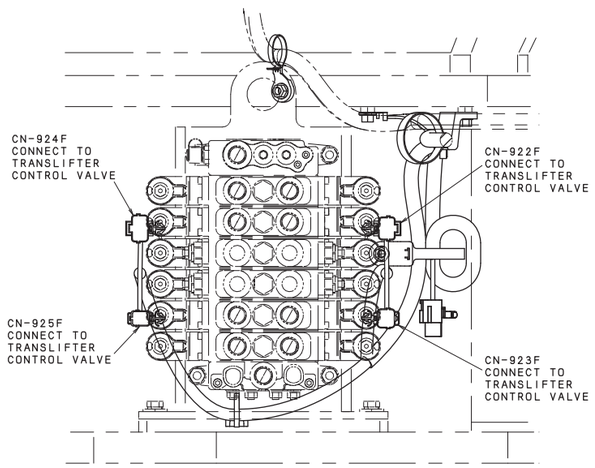
VIEW A



VIEW E



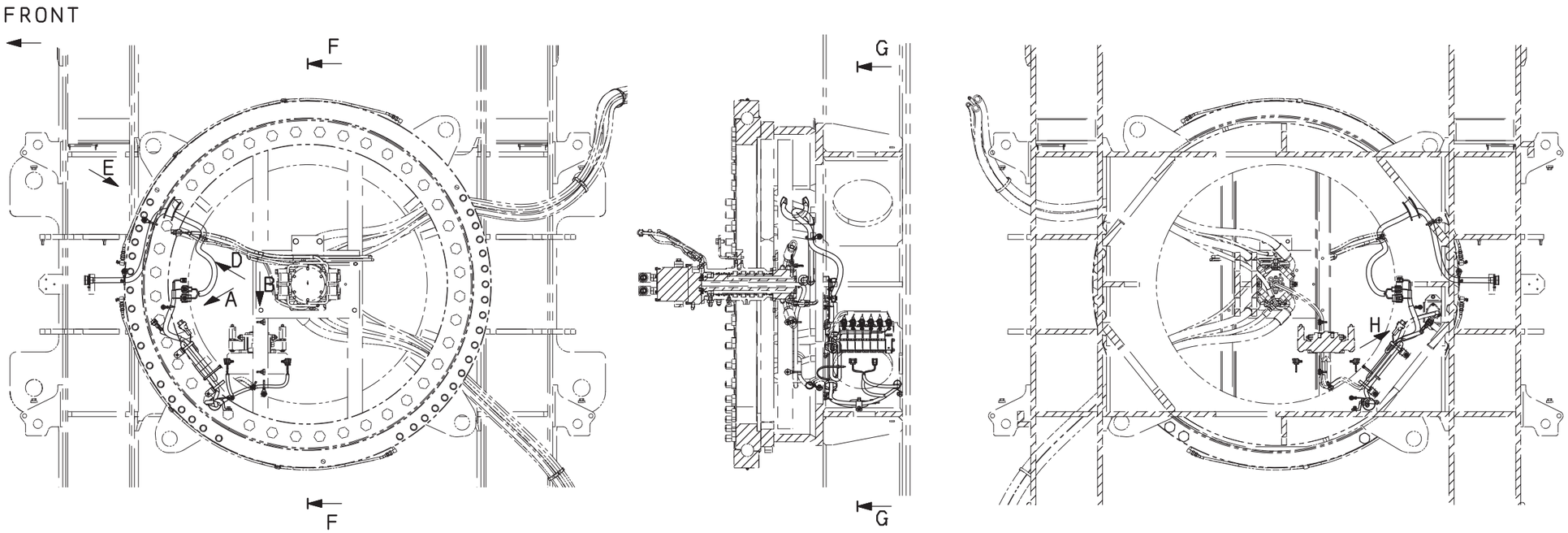
VIEW D



VIEW B

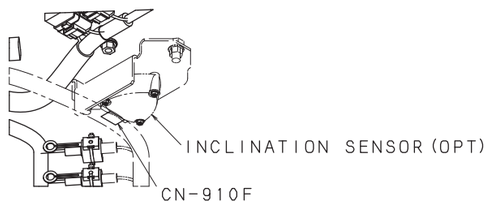
(1/2)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



SECTION F-F

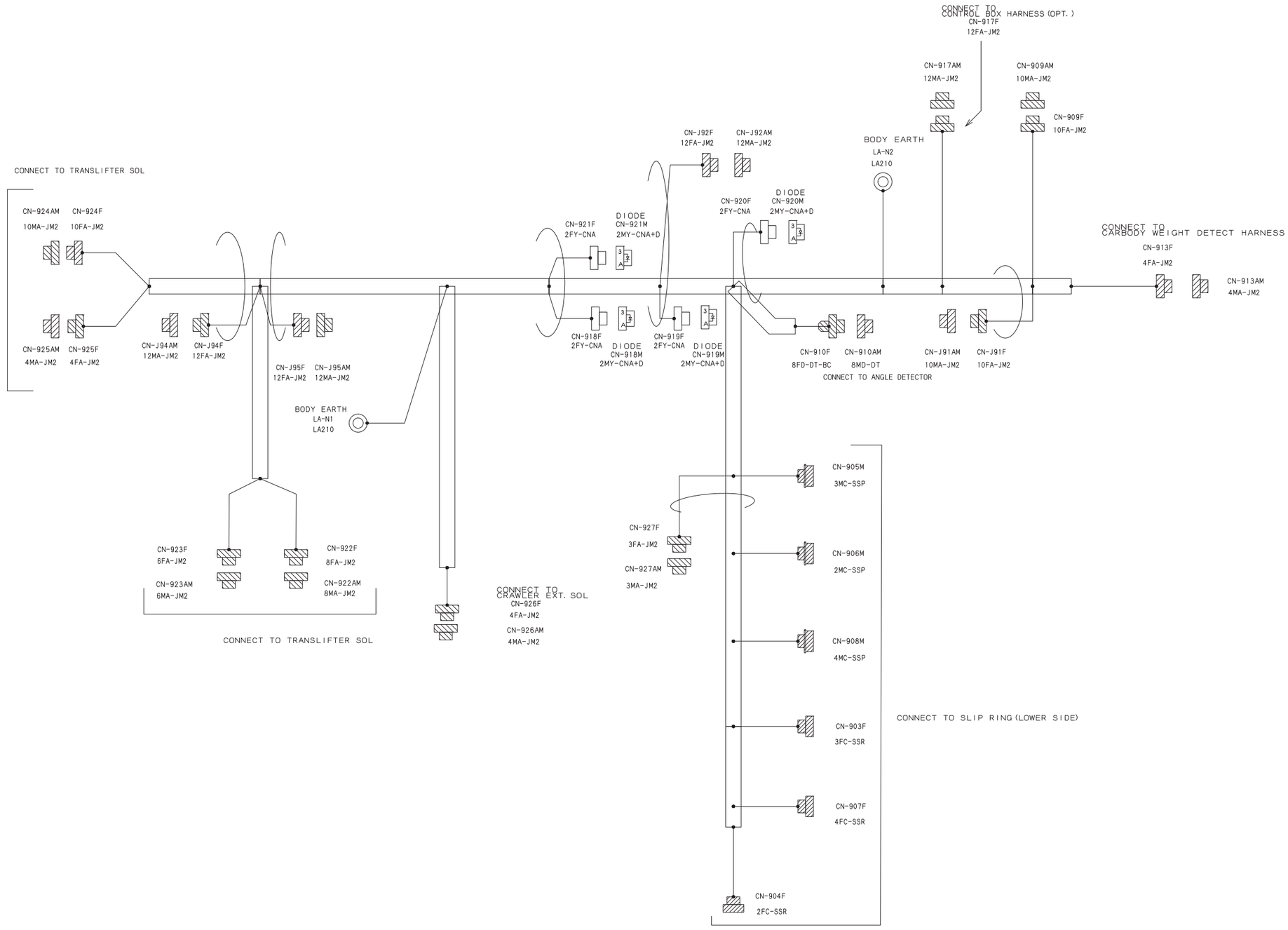
SECTION G-G



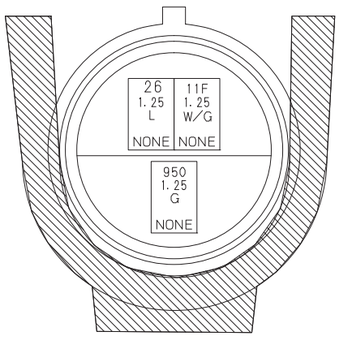
VIEW H

(2/2)

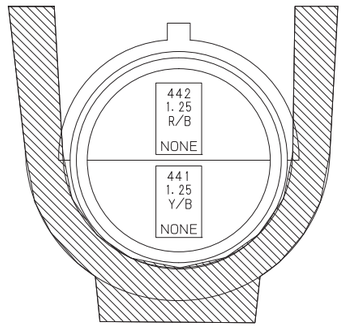
LOWER HARNESS



(1/4)

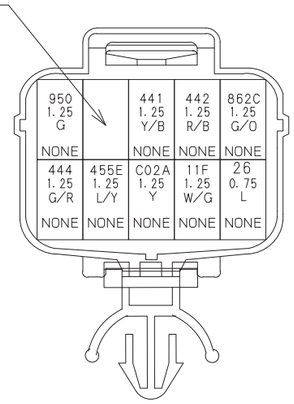


CN-903F
3FC-SSR



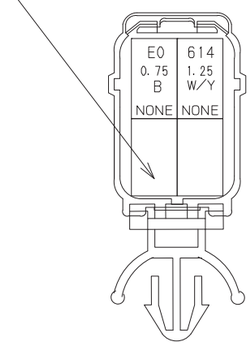
CN-906M
2MC-SSP

SEALING



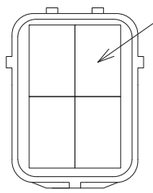
CN-909F
10FA-JM2

INSERT SEALING ON ALL EMPTY PINS

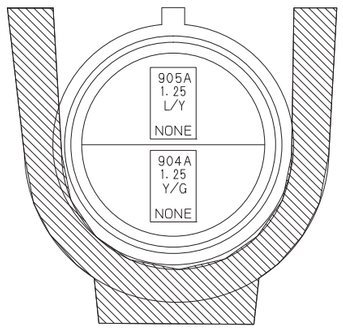


CN-913F
4FA-JM2

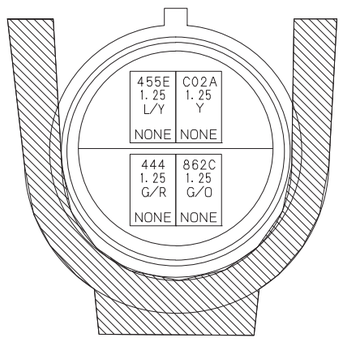
INSERT SEALING ON ALL EMPTY PINS



CN-913AM
4MA-JM2

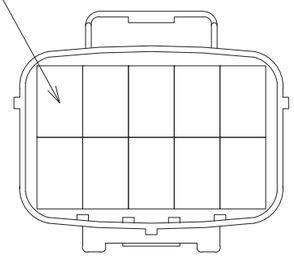


CN-904F
2FC-SSR

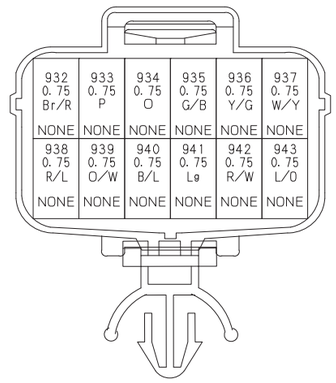


CN-907F
4FC-SSR

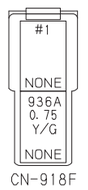
INSERT SEALING ON ALL EMPTY PINS



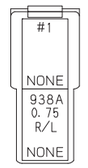
CN-909AM
10MA-JM2



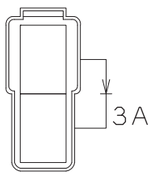
CN-917F
12FA-JM2



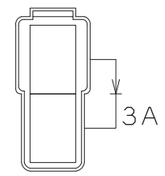
CN-918F
2FY-CNA
#1 905A 1.25 L/Y + 905C 0.75 L/Y



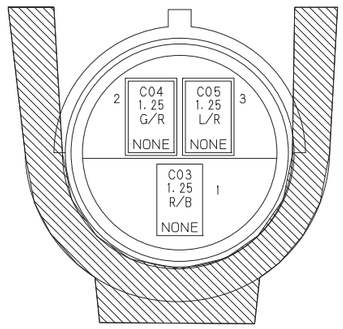
CN-920F
2FY-CNA
#1 904A 1.25 Y/G + 904C 0.75 Y/G



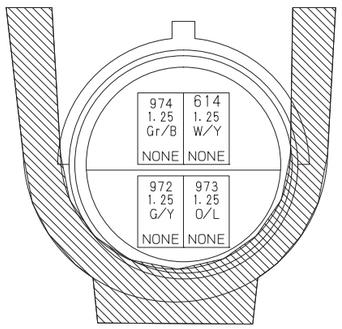
CN-918M
2MY-CNA+D



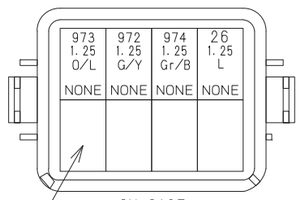
CN-920M
2MY-CNA+D



CN-905M
3MC-SSP

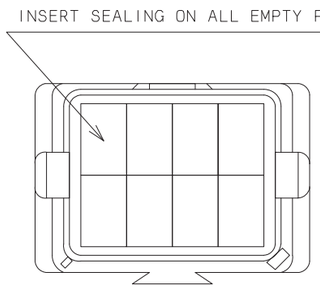


CN-908M
4MC-SSP



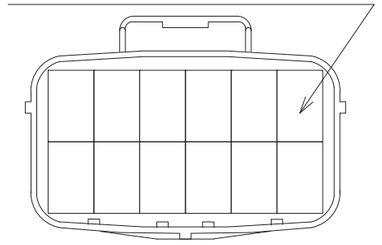
CN-910F
8FD-DT-BC

INSERT SEALING ON ALL EMPTY PINS

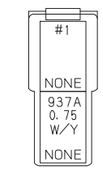


CN-910AM
8MD-DT

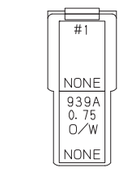
INSERT SEALING ON ALL EMPTY PINS



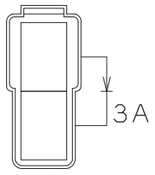
CN-917AM
12MA-JM2



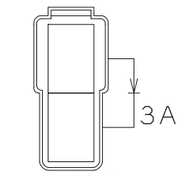
CN-919F
2FY-CNA
#1 905C 0.75 L/Y + 905E 0.75 L/Y



CN-921F
2FY-CNA
#1 904C 0.75 Y/G + 904E 0.75 Y/G

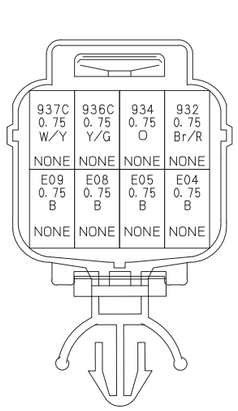


CN-919M
2MY-CNA+D

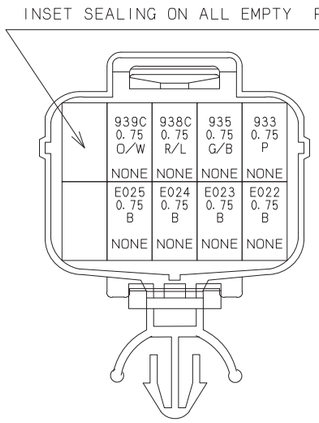


CN-921M
2MY-CNA+D

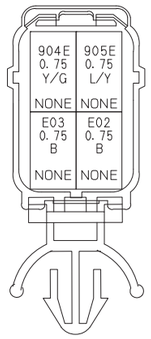
(2/4)



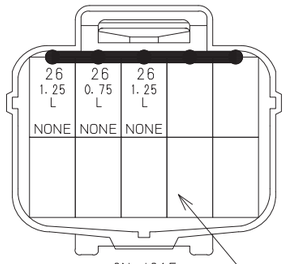
CN-922F
8FA-JM2



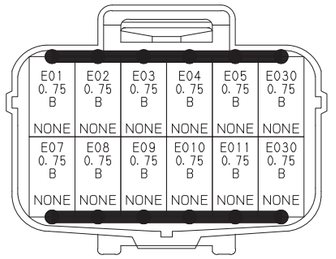
CN-924F
10FA-JM2



CN-926F
4FA-JM2



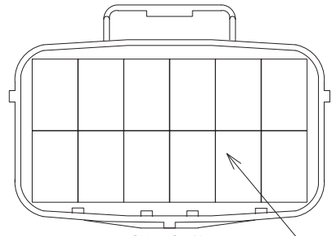
CN-J91F
10FA-JM2



JUMPER
(AVSS0.75sq)

CN-J94F
12FA-JM2

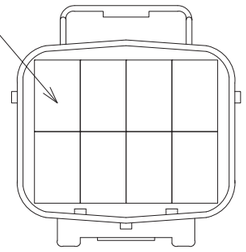
INSERT SEALING ON ALL EMPTY PINS



CN-J94AM
12MA-JM2

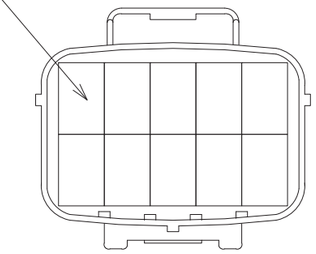
INSERT SEALING
ON ALL EMPTY PINS

INSERT SEALING ON ALL EMPTY PINS



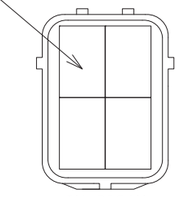
CN-922AM
8MA-JM2

INSERT SEALING ON ALL EMPTY PINS

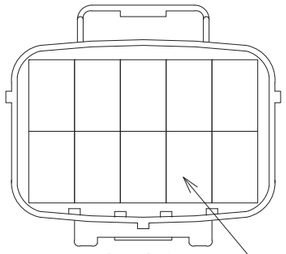


CN-924AM
10MA-JM2

INSERT SEALING ON ALL EMPTY PINS



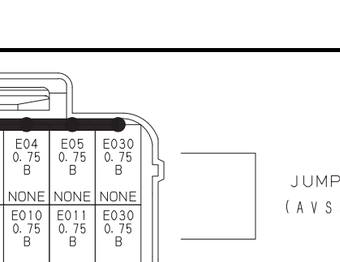
CN-926AM
4MA-JM2



CN-J91AM
10MA-JM2

INSERT SEALING ON ALL EMPTY PINS

CN-J92F
12FA-JM2

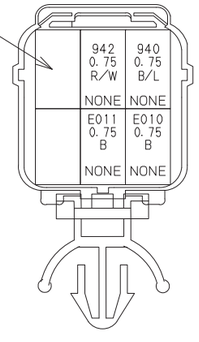


JUMPER
(AVSS0.75sq)

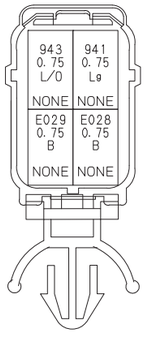
CN-J95F
12FA-JM2

SEALING

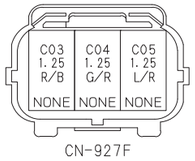
INSET SEALING ON ALL EMPTY PINS.



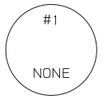
CN-923F
6FA-JM2



CN-925F
4FA-JM2

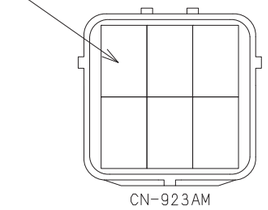


CN-927F
3FA-JM2



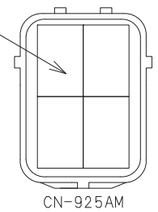
LA-N1
LA210
#1 E01 0.75 B + E021 0.75 B

INSERT SEALING ON ALL EMPTY PINS



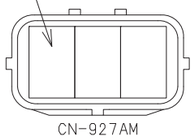
CN-923AM
6MA-JM2

INSERT SEALING ON ALL EMPTY PINS

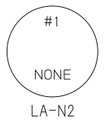


CN-925AM
4MA-JM2

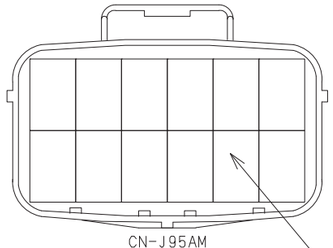
INSERT SEALING ON ALL EMPTY PINS



CN-927AM
3MA-JM2

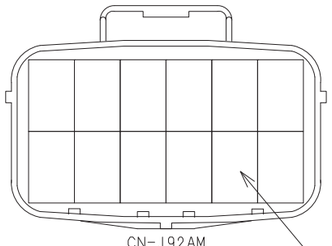


LA-N2
LA210
#1 E027 0.75 B + E07 0.75 B



CN-J95AM
12MA-JM2

INSERT SEALING ON ALL EMPTY PINS



CN-J92AM
12MA-JM2

INSERT SEALING
ON ALL EMPTY PINS

(3/4)

WIRE No. AND WIRE COLOR LIST

No.	COLOR	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
11F	W/G	AVSS	1.25	CN-909F				CN-903F
26A	L	AVSS	1.25	CN-J91F				CN-903F
26C	L	AVSS	1.25	CN-J91F				CN-910F
26G	L	AVSS	0.75	CN-J91F				CN-909F
441	Y/B	AVSS	1.25	CN-906M				CN-909F
442	R/B	AVSS	1.25	CN-906M				CN-909F
444	G/R	AVSS	1.25	CN-907F				CN-909F
455E	L/Y	AVSS	1.25	CN-907F				CN-909F
614	W/Y	AVSS	1.25	CN-913F				CN-908M
862C	G/O	AVSS	1.25	CN-907F				CN-909F
904A	Y/G	AVSS	1.25	CN-904F			DS3	CN-920F
904C	Y/G	AVSS	0.75	CN-921F	DS4		DS3	CN-920F
904E	Y/G	AVSS	0.75	CN-921F	DS4			CN-926F
905A	L/Y	AVSS	1.25	CN-904F			DS1	CN-918F
905C	L/Y	AVSS	0.75	CN-919F	DS2		DS1	CN-918F
905E	L/Y	AVSS	0.75	CN-919F	DS2			CN-926F
932	Br/R	AVSS	0.75	CN-917F				CN-922F
933	P	AVSS	0.75	CN-917F				CN-924F
934	O	AVSS	0.75	CN-917F				CN-922F
935	G/B	AVSS	0.75	CN-917F				CN-924F
936	Y/G	AVSS	0.75	CN-J92F				CN-917F
936A	Y/G	AVSS	0.75	CN-J92F				CN-918F
936C	Y/G	AVSS	0.75	CN-J92F				CN-922F
937	W/Y	AVSS	0.75	CN-J92F				CN-917F
937A	W/Y	AVSS	0.75	CN-J92F				CN-919F
937C	W/Y	AVSS	0.75	CN-J92F				CN-922F
938	R/L	AVSS	0.75	CN-J92F				CN-917F
938A	R/L	AVSS	0.75	CN-J92F				CN-920F
938C	R/L	AVSS	0.75	CN-J92F				CN-924F
939	O/W	AVSS	0.75	CN-J92F				CN-917F
939A	O/W	AVSS	0.75	CN-J92F				CN-921F
939C	O/W	AVSS	0.75	CN-J92F				CN-924F
940	B/L	AVSS	0.75	CN-917F				CN-923F
941	Lg	AVSS	0.75	CN-917F				CN-925F
942	R/W	AVSS	0.75	CN-917F				CN-923F
943	L/O	AVSS	0.75	CN-917F				CN-925F
950	G	AVSS	1.25	CN-909F				CN-903F
972	G/Y	AVSS	1.25	CN-910F				CN-908M
973	O/L	AVSS	1.25	CN-910F				CN-908M
974	Gr/B	AVSS	1.25	CN-910F				CN-908M
C02A	Y	AVSS	1.25	CN-907F				CN-909F
C03	R/B	AVSS	1.25	CN-905M				CN-927F
C04	G/R	AVSS	1.25	CN-905M				CN-927F
C05	L/R	AVSS	1.25	CN-905M				CN-927F
E01	B	AVSS	0.75	CN-J94F			DS5	LA-N1
E02	B	AVSS	0.75	CN-J94F				CN-926F
E03	B	AVSS	0.75	CN-J94F				CN-926F
E04	B	AVSS	0.75	CN-J94F				CN-922F
E05	B	AVSS	0.75	CN-J94F				CN-922F
E030	B	AVSS	0.75	CN-J94F				CN-J94F
E07	B	AVSS	0.75	LA-N2	DS6			CN-J94F
E08	B	AVSS	0.75	CN-922F				CN-J94F
E09	B	AVSS	0.75	CN-922F				CN-J94F
E010	B	AVSS	0.75	CN-923F				CN-J94F
E011	B	AVSS	0.75	CN-923F				CN-J94F
E021	B	AVSS	0.75	CN-J95F			DS5	LA-N1
E022	B	AVSS	0.75	CN-J95F				CN-924F
E023	B	AVSS	0.75	CN-J95F				CN-924F
E024	B	AVSS	0.75	CN-J95F				CN-924F
E025	B	AVSS	0.75	CN-J95F				CN-924F
E031	B	AVSS	0.75	CN-J95F				CN-J95F
E027	B	AVSS	0.75	LA-N2	DS6			CN-J95F
E028	B	AVSS	0.75	CN-925F				CN-J95F
E029	B	AVSS	0.75	CN-925F				CN-J95F
E0	B	AVSS	0.75	CN-913F				CN-J95F

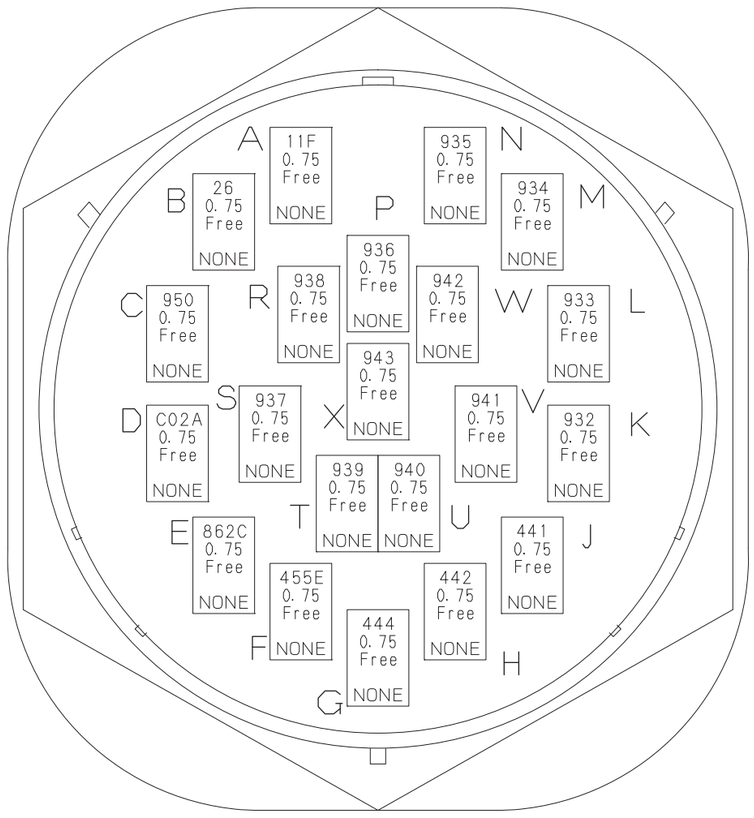
(4/4)

TRANS LIFTER REMOTE CONTROLLER CABLE HARNESS (OPTION)

(1/3)

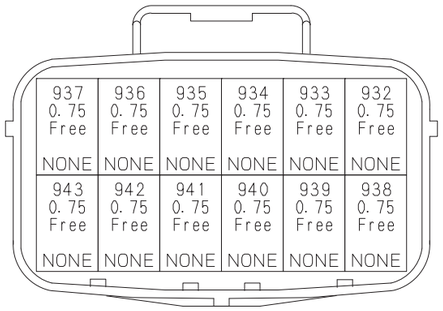
CN-909M

10MA-JM2



CN-916F

21FAE-774R16+C+CL24



CN-917M

12MA-JM2

(2/3)

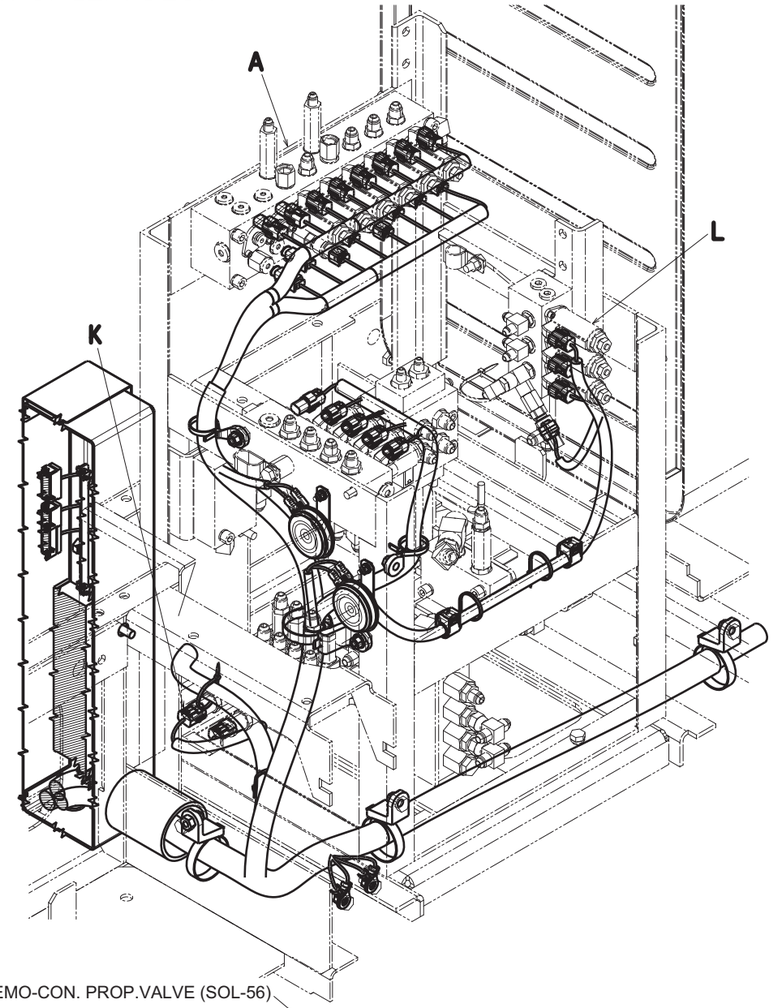
WIRE No. AND WIRE COLOR LIST

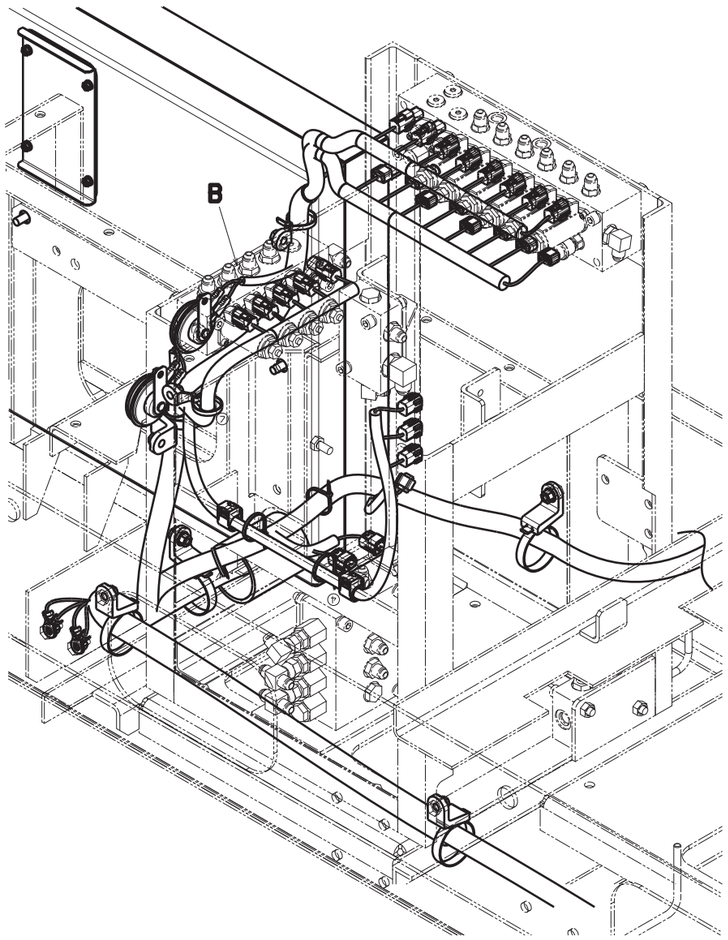
No.	COLOR	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
11F	Free	2PNCT-SR	0.75	CN-909M		———		CN-916F
26	Free	2PNCT-SR	0.75	CN-909M		———		CN-916F
441	Free	2PNCT-SR	0.75	CN-909M		———		CN-916F
442	Free	2PNCT-SR	0.75	CN-909M		———		CN-916F
444	Free	2PNCT-SR	0.75	CN-909M		———		CN-916F
455E	Free	2PNCT-SR	0.75	CN-909M		———		CN-916F
862C	Free	2PNCT-SR	0.75	CN-909M		———		CN-916F
932	Free	2PNCT-SR	0.75	CN-917M		———		CN-916F
933	Free	2PNCT-SR	0.75	CN-917M		———		CN-916F
934	Free	2PNCT-SR	0.75	CN-917M		———		CN-916F
935	Free	2PNCT-SR	0.75	CN-917M		———		CN-916F
936	Free	2PNCT-SR	0.75	CN-917M		———		CN-916F
937	Free	2PNCT-SR	0.75	CN-917M		———		CN-916F
938	Free	2PNCT-SR	0.75	CN-917M		———		CN-916F
939	Free	2PNCT-SR	0.75	CN-917M		———		CN-916F
940	Free	2PNCT-SR	0.75	CN-917M		———		CN-916F
941	Free	2PNCT-SR	0.75	CN-917M		———		CN-916F
942	Free	2PNCT-SR	0.75	CN-917M		———		CN-916F
943	Free	2PNCT-SR	0.75	CN-917M		———		CN-916F
950	Free	2PNCT-SR	0.75	CN-909M		———		CN-916F
C02A	Free	2PNCT-SR	0.75	CN-909M		———		CN-916F

(3/3)

3. ELECTRICAL PART OF LEFT DECK

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT

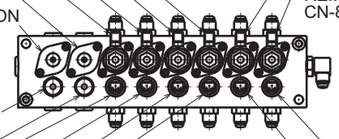




FRONT DRUM INDEPENDENT. CONFLUENCE SELECT (SOL-101) CN-836F
REAR DRUM INDEPENDENT. CONFLUENCE SELECT (SOL-102) CN-837F
MOTOR CHP CONTROL PROP.VALVE (SOL-103) CN-832F
FRONT/REAR CHP PRESS. SENSOR (PT-19) CN-807F

DETAIL OF “L”
FOR 12000-1/12000E-1

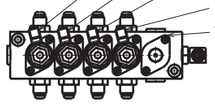
REAR DRUM RAISE REMO-CON. PROP.VALVE (SOL-56) CN-828F
REAR DRUM LOWER REMO-CON. PROP.VALVE (SOL-57) CN-829F
FRONT DRUM RAISE REMO-CON. PROP.VALVE (SOL-54) CN-826F
FRONT DRUM LOWER REMO-CON. PROP.VALVE (SOL-55) CN-827F
THIRD DRUM RAISE REMO-CON. PROP VALVE (SOL-58) OPTION CN-830F
THIRD DRUM LOWER REMO-CON. PROP VALVE (SOL-59) OPTION CN-831F
BOOM LOWERING REMO-CON. PROP. VALVE (SOL-53) CN-825F
BOOM RAISE REMO-CON. PROP. VALVE (SOL-52) CN-824F



THIRD DRUM LOWER PRESS. SENSOR (PT-8) OPTION CN-815F
THIRD DRUM RAISE PRESS. SENSOR (PT-7) OPTION CN-814F
FRONT DRUM LOWER PRESS. SENSOR (PT-4) CN-811F
FRONT DRUM RAISE PRESS. SENSOR (PT-3) CN-810F
REAR DRUM LOWER PRESS. SENSOR (PT-6) CN-813F
REAR DRUM RAISE PRESS. SENSOR (PT-5) CN-812F
BOOM RAISE PRESS. SENSOR (PT-12) CN-808F
BOOM LOWER PRESS. SENSOR (PT-13) CN-809F

DETAIL OF “A”

BOOM RAISE STOP (SOL-35) CN-822F
BOOM LOWERING STOP (SOL-36) CN-823F
REAR DRUM RAISE STOP (SOL-38) CN-821F
FRONT DRUM RAISE STOP (SOL-37) CN-820F
THIRD RAISE STOP (SOL-18) OPTION CN-819F



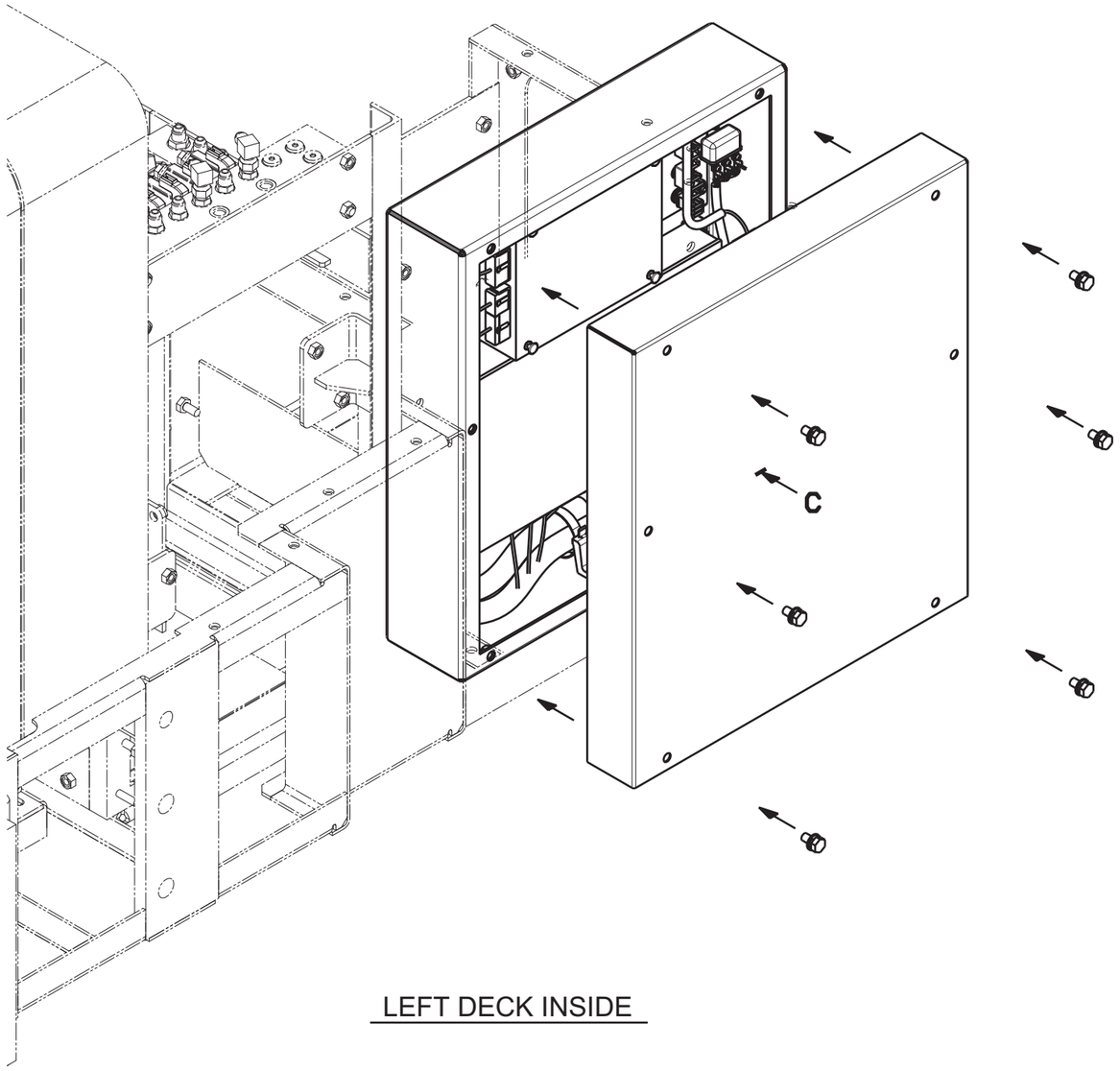
DETAIL OF “B”

FRONT DRUM INDEPENDENT. CONFLUENCE SELECT PRESS. SENSOR (PT-17) CN-805F
REAR DRUM INDEPENDENT. CONFLUENCE SELECT PRESS. SENSOR (PT-18) CN-806F

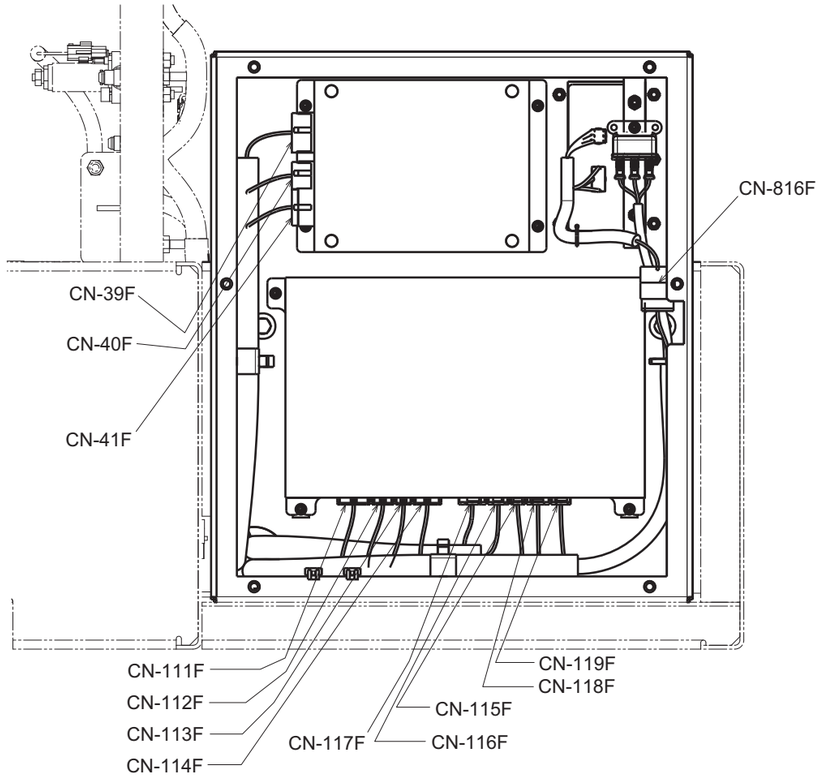
DETAIL OF “K”
FOR 12000-1/12000E-1

(1/6)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



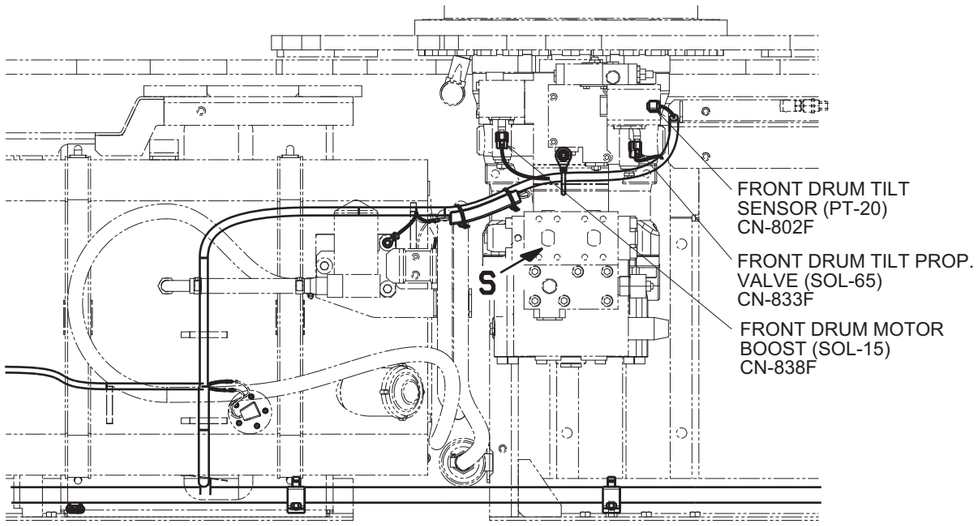
LEFT DECK INSIDE

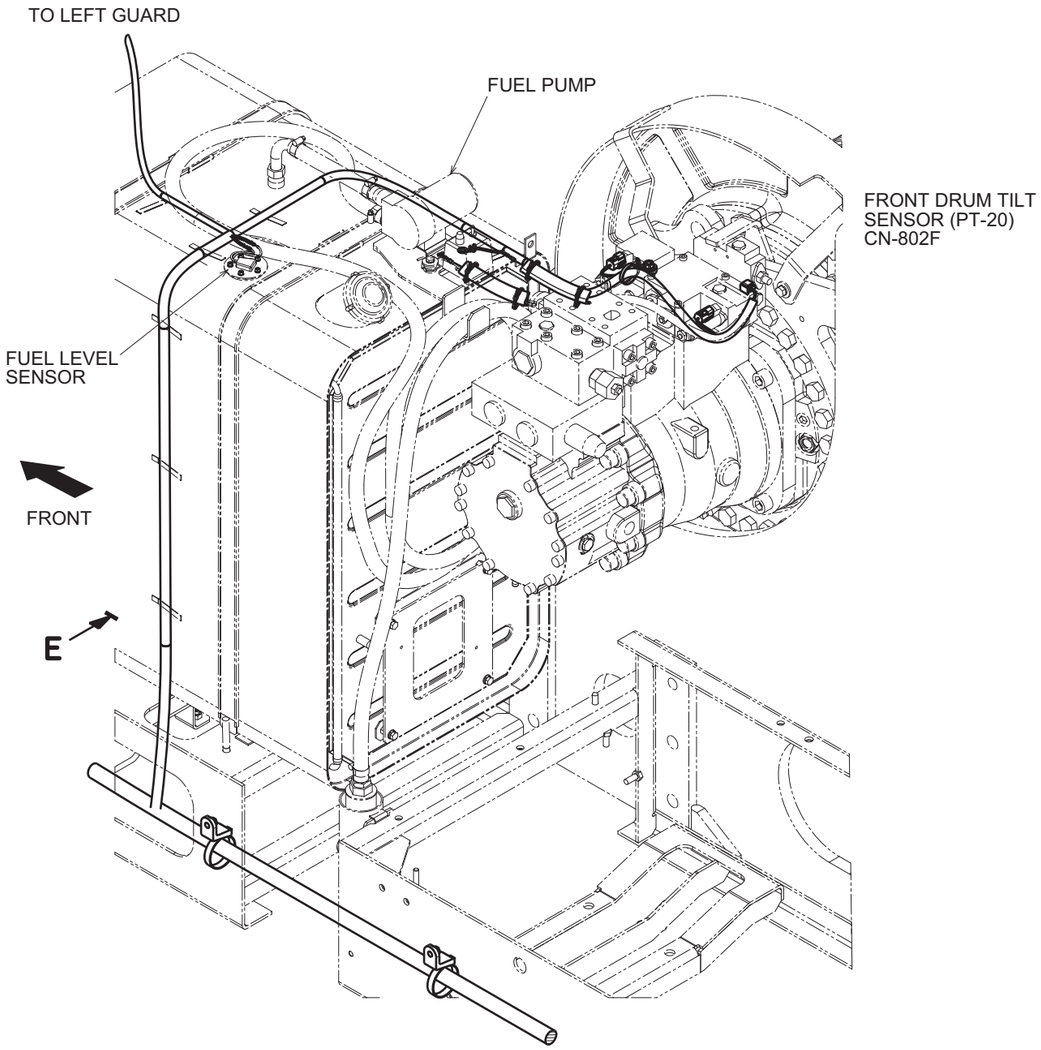


VIEW FROM “C”

(2/6)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT

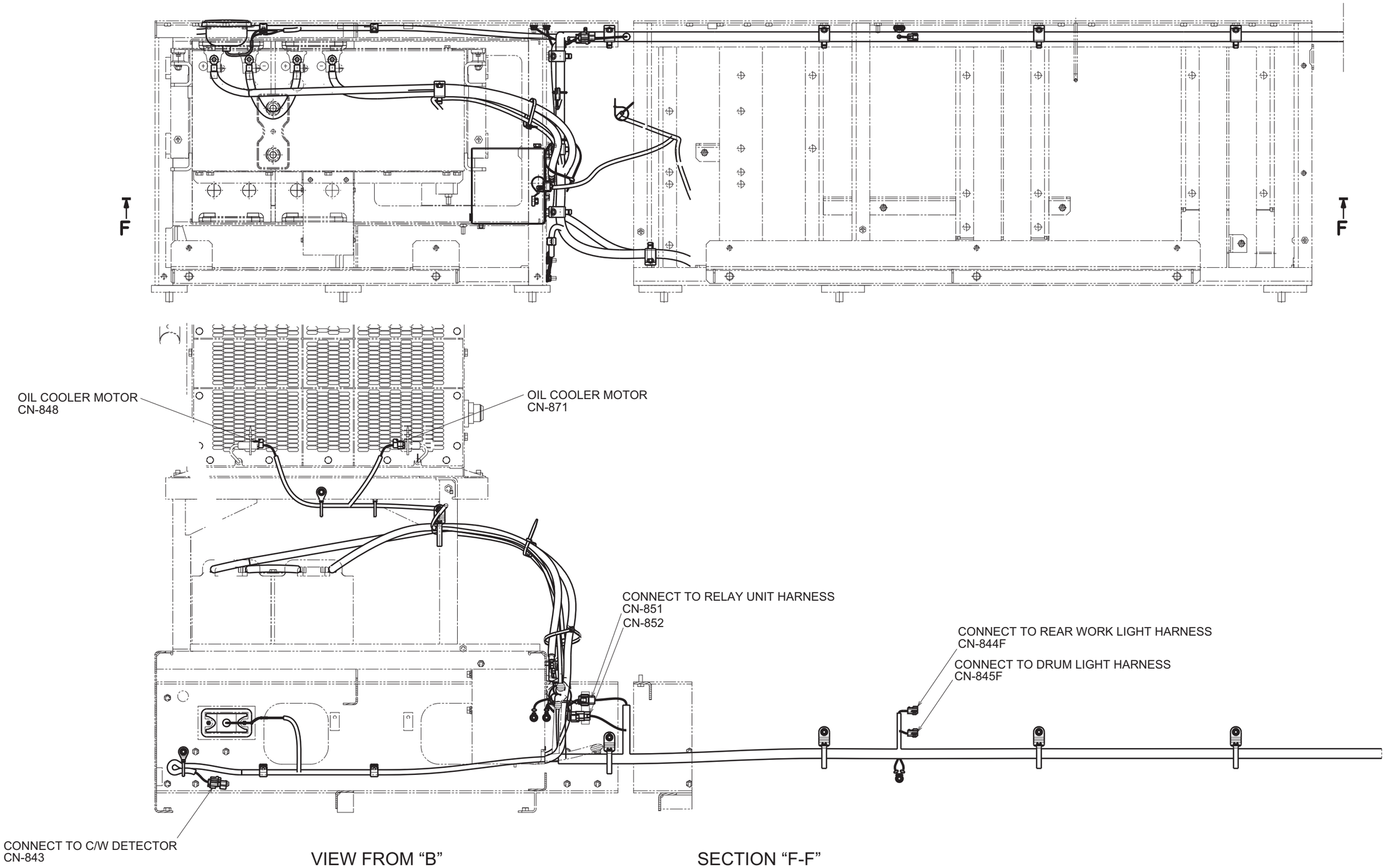




LEFT REAR VIEW OF LEFT DECK CENTER
FUEL TANK AND FRONT DRUM MOTOR AREA

(3/6)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT

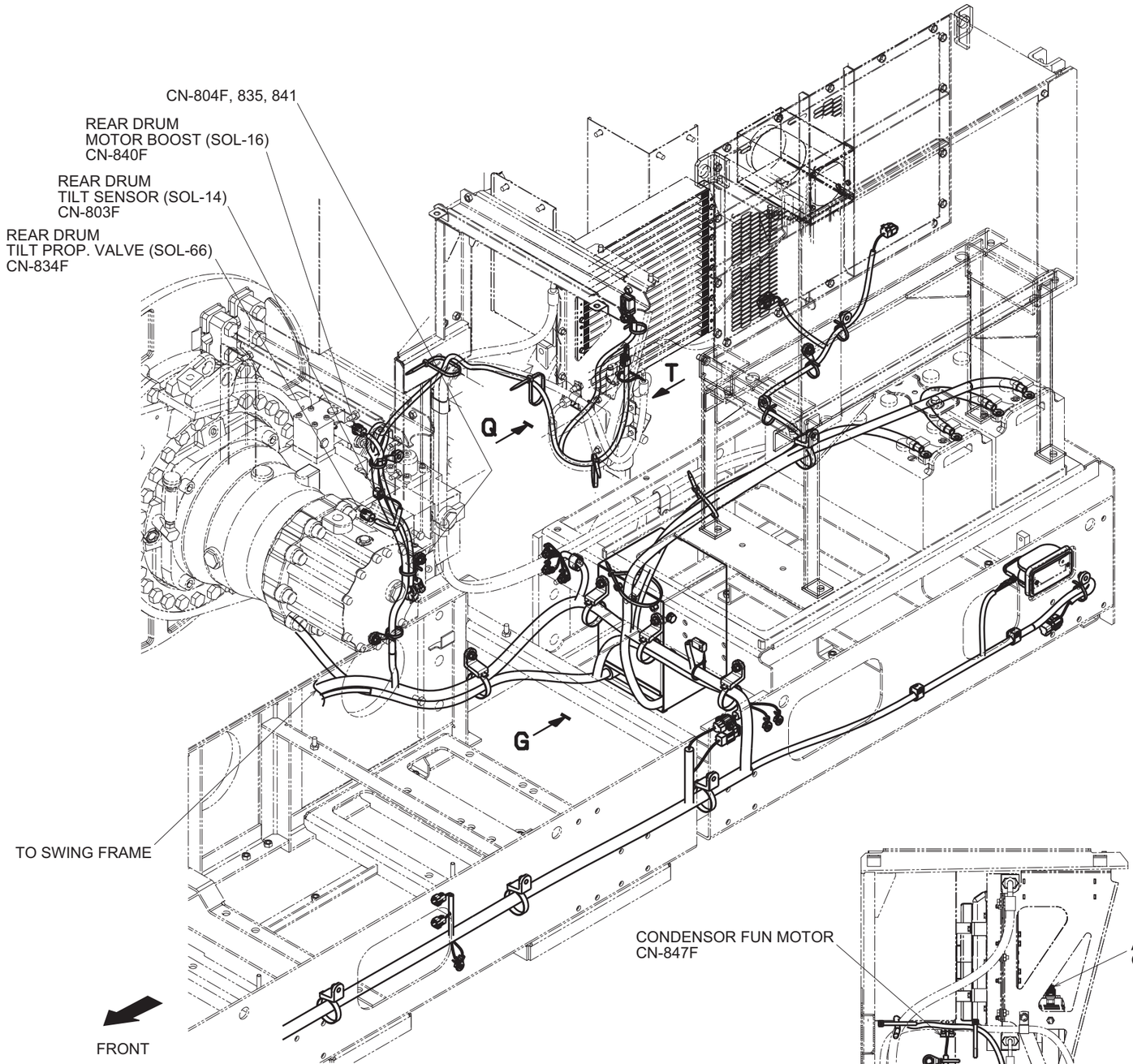


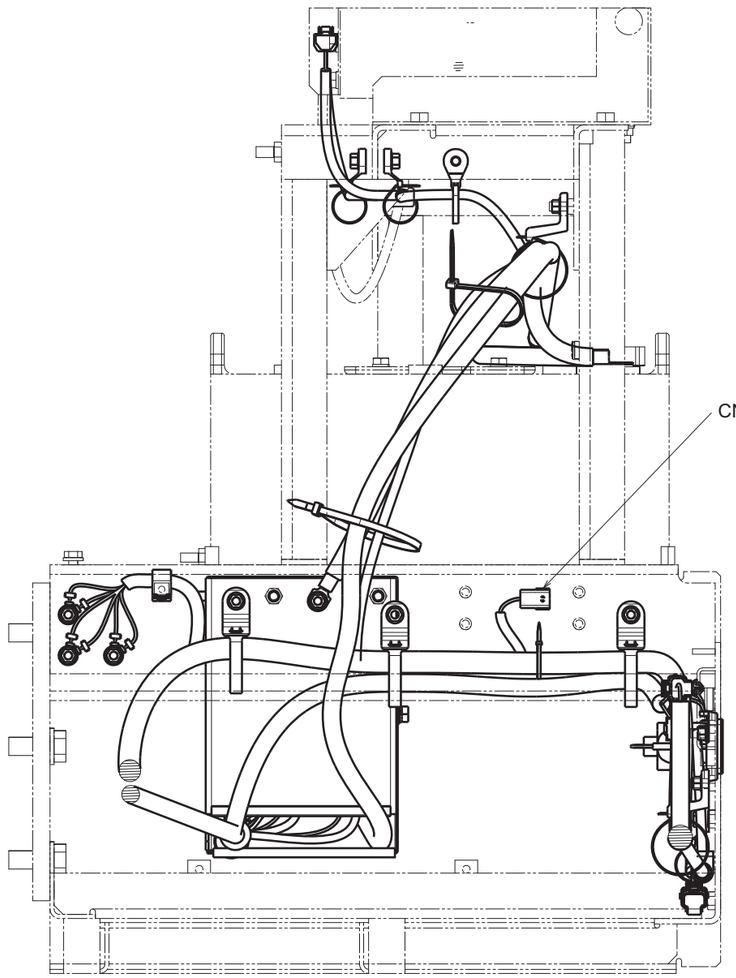
VIEW FROM “B”

SECTION “F-F”

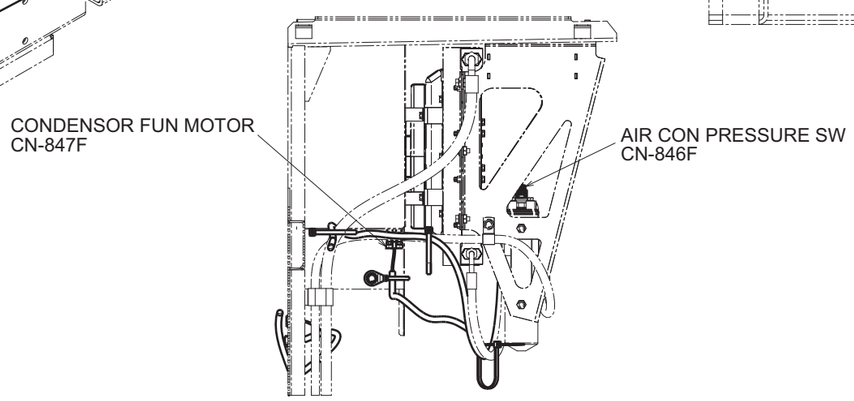
(4/6)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT





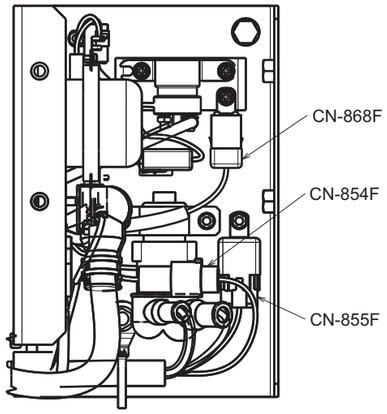
VIEW FROM “G”

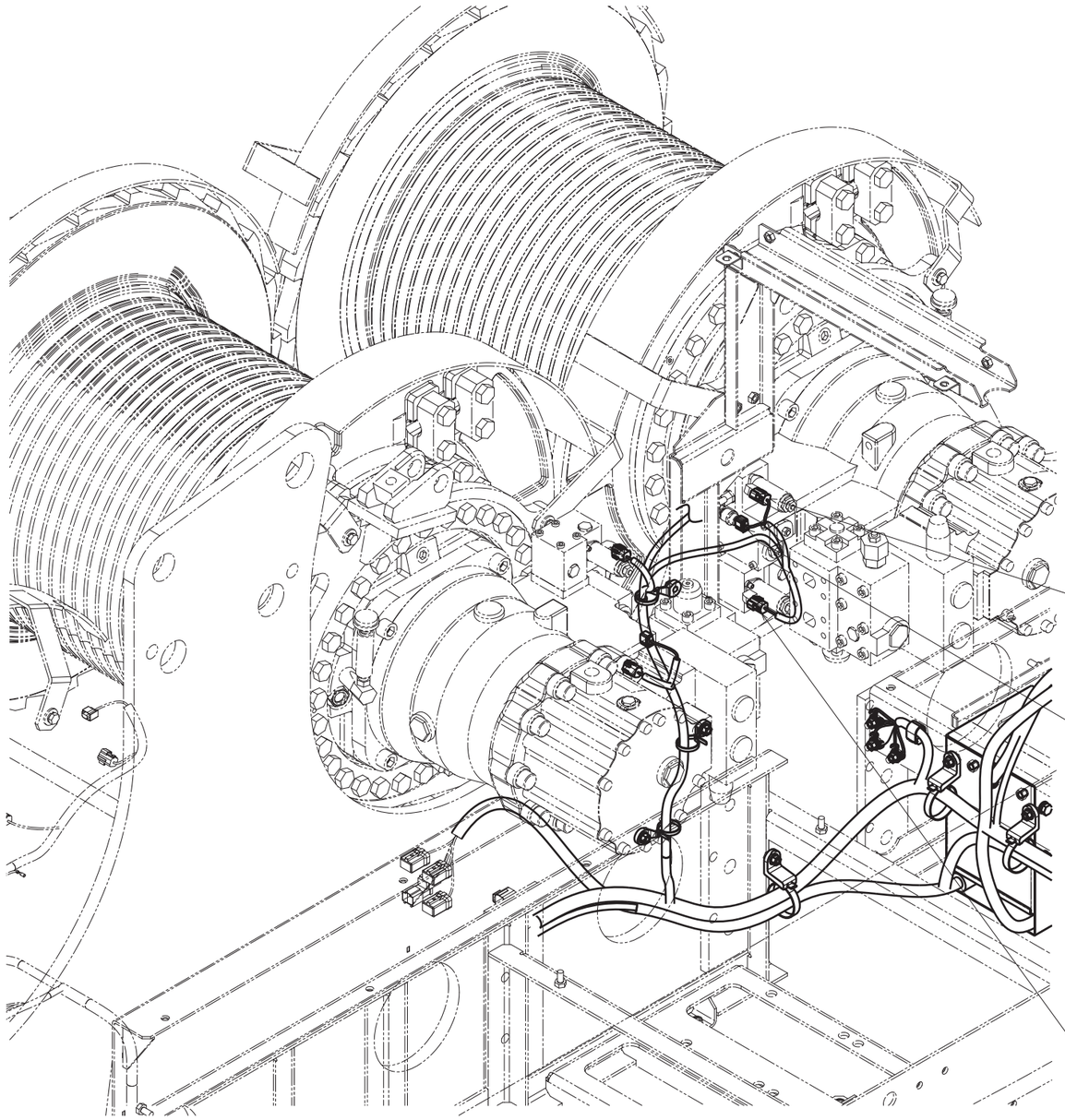


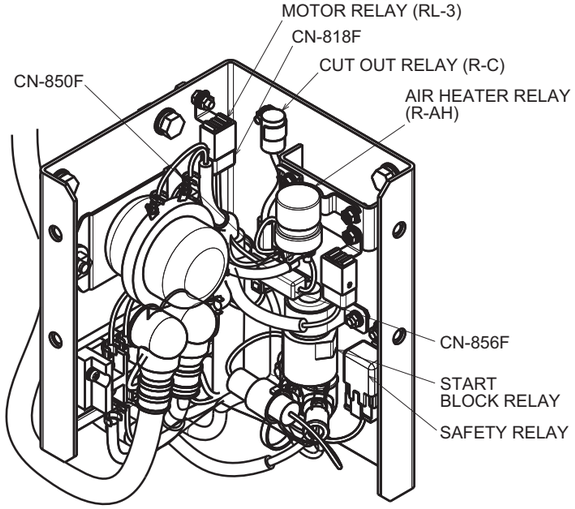
VIEW FROM “Q”

(5/6)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



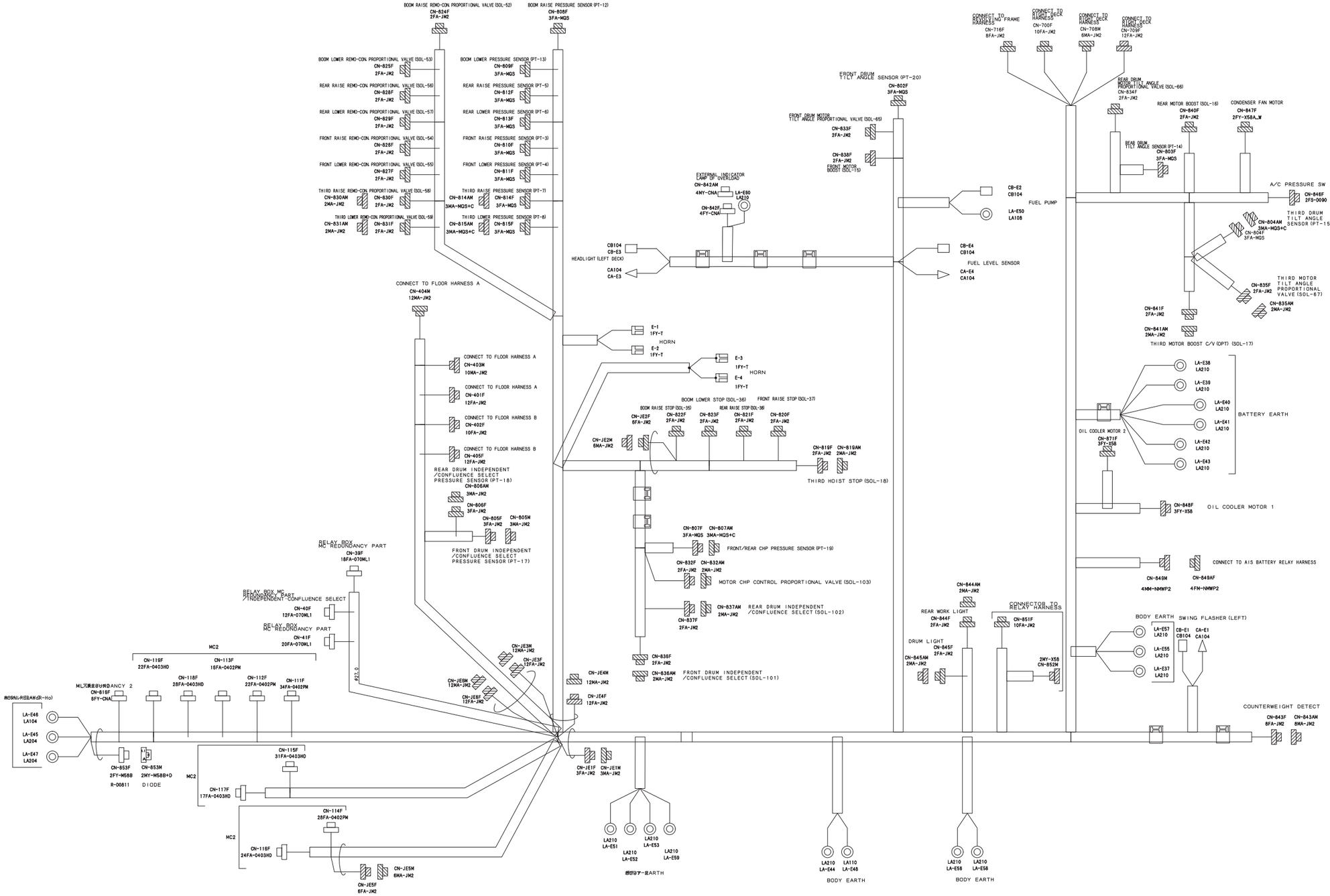




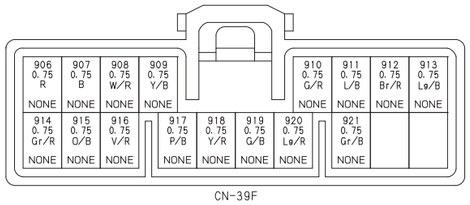
WHEN THIRD WINCH (OPTION) IS INSTALLED.

(6/6)

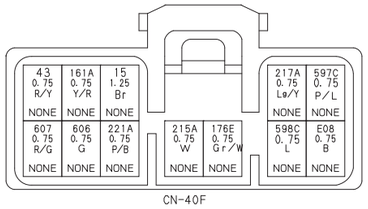
LEFT DECK HARNESS



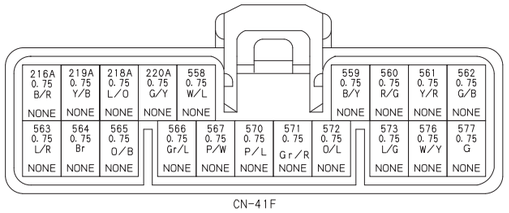
(1/5)



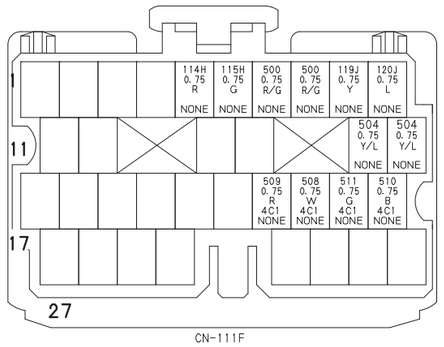
CN-39F
18FA-070ML1



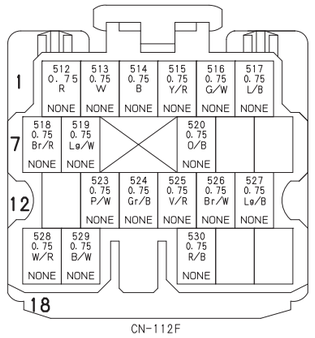
CN-40F
12FA-070ML1



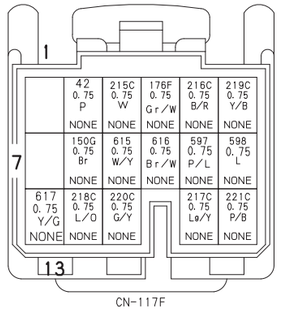
CN-41F
20FA-070ML1



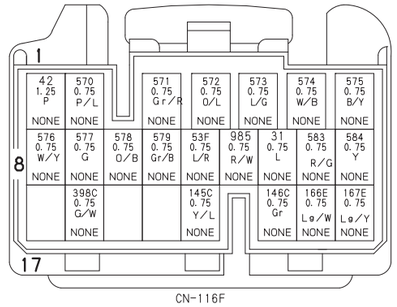
CN-111F
34FA-0402PM



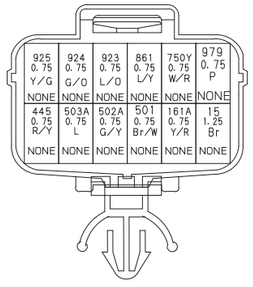
CN-112F
22FA-0402PM



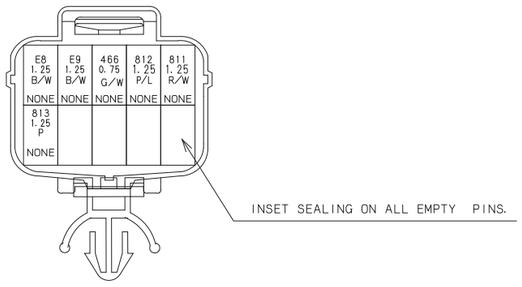
CN-117F
17FA-0403HD



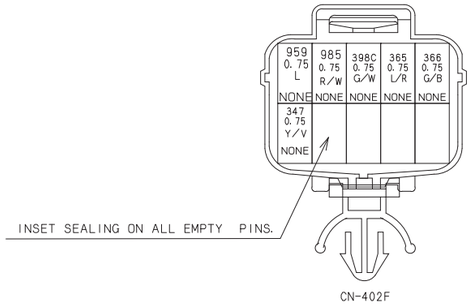
CN-116F
24FA-0403HD



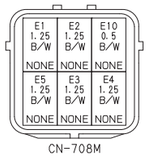
CN-401F
12FA-JM2



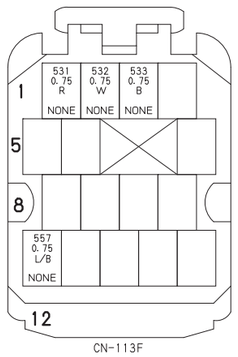
CN-700F
10FA-JM2



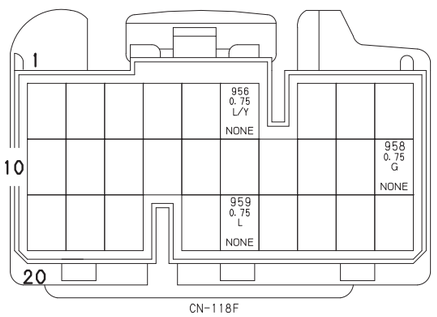
CN-402F
10FA-JM2



CN-708M
6MA-JM2

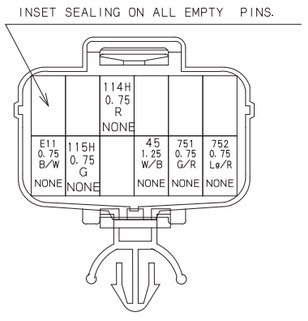


CN-113F
16FA-0402PM



CN-118F
28FA-0403HD

CN-403M
10MA-JM2



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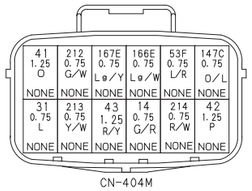
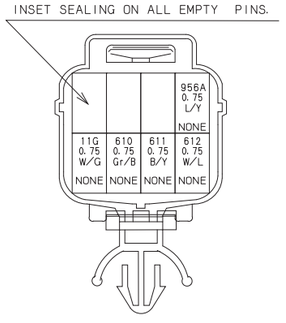
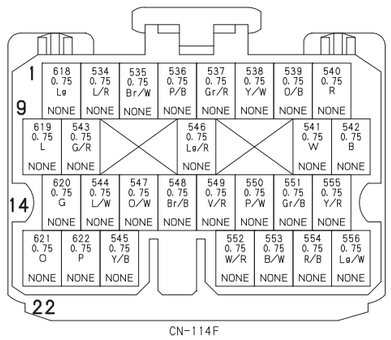
12FA-JM2



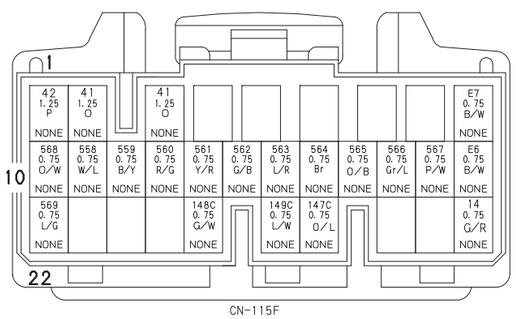
CN-404M
12MA-JM2



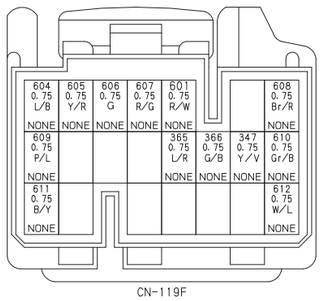
CN-716F
8FA-JM2



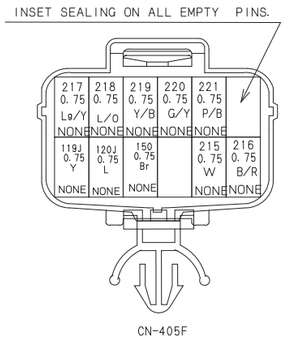
CN-114F
28FA-0402PM



CN-115F
31FA-0403HD

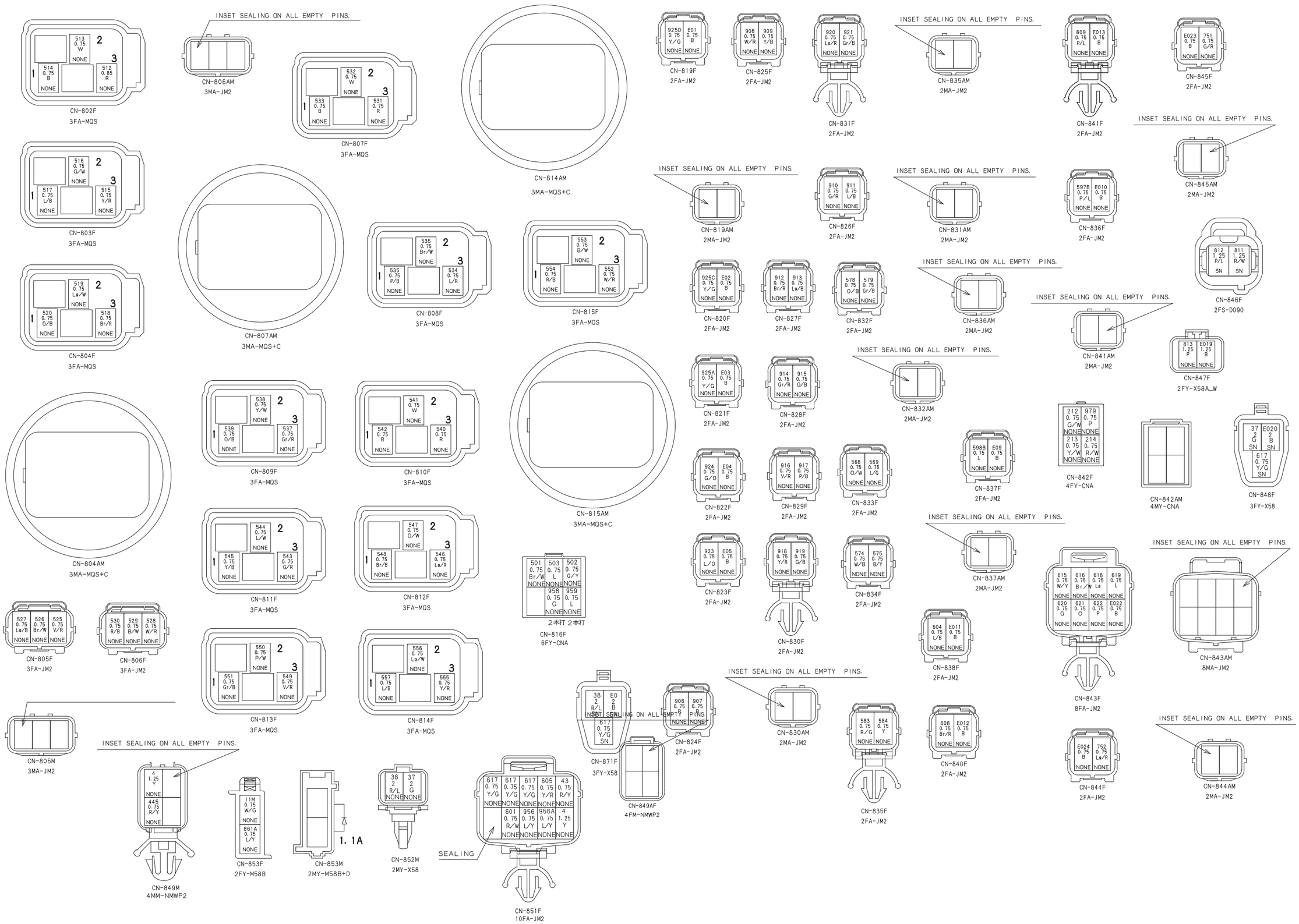


CN-119F
22FA-0403HD



CN-405F
12FA-JM2

(2/5)


CN-802F
3FA-MQS
CN-803F
3FA-MQS
CN-804F
3FA-MQS
CN-804AM
3MA-MQS+C
INSET SEALING ON ALL EMPTY PINS.
CN-806AM
3MA-JM2
CN-807F
3FA-MQS
CN-807AM
3MA-MQS+C
CN-808F
3FA-MQS
CN-814AM
3MA-MQS+C
CN-815F
3FA-MQS
CN-815AM
3MA-MQS+C
CN-809F
3FA-MQS
CN-810F
3FA-MQS
CN-811F
3FA-MQS
CN-812F
3FA-MQS
CN-813F
3FA-MQS
CN-814F
3FA-MQS
CN-816F
6FY-CNA
2本打 2本打
CN-805F
3FA-JM2
CN-806F
3FA-JM2
CN-805M
3MA-JM2
CN-849M
4MM-NMWP2
CN-853F
2FY-M58B
CN-853M
2MY-M58B+D
CN-852M
2MY-X58
CN-851F
10FA-JM2
SEALING
CN-871F
3FY-X58
CN-849AF
4FM-NMWP2
CN-824F
2FA-JM2
CN-819F
2FA-JM2
CN-825F
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CN-831F
2FA-JM2
CN-835AM
2MA-JM2
CN-841F
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CN-845F
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CN-831AM
2MA-JM2
CN-836F
2FA-JM2
CN-846F
2FS-D090
CN-820F
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CN-827F
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CN-832F
2FA-JM2
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CN-841AM
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CN-847F
2FY-X58A_W
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CN-828F
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CN-822F
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CN-842F
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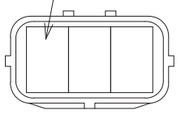
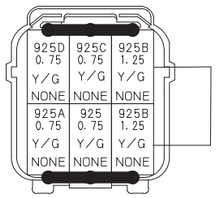
4MY-CNA
CN-848F
3FY-X58
CN-823F
2FA-JM2
CN-830F
2FA-JM2
CN-834F
2FA-JM2
CN-837AM
2MA-JM2
CN-838F
2FA-JM2
CN-843F
8FA-JM2
CN-843AM
8MA-JM2
CN-830AM
2MA-JM2
CN-835F
2FA-JM2
CN-840F
2FA-JM2
CN-844F
2FA-JM2
CN-844AM
2MA-JM2

(3/5)

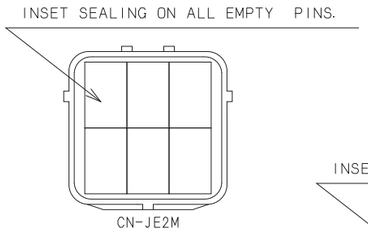
CN-JE1F
3FA-JM2



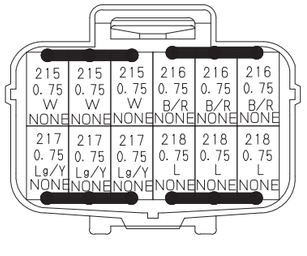
CN-JE1M
3MA-JM2



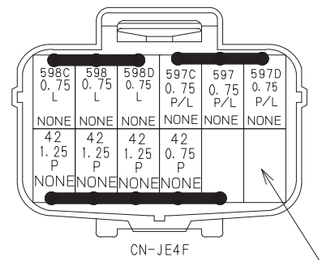
CN-JE2F
6FA-JM2



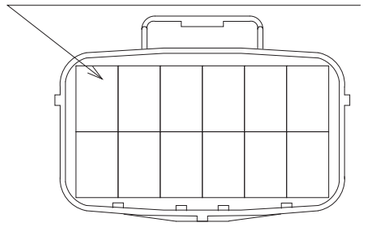
CN-JE2M
6MA-JM2



CN-JE3F
12FA-JM2

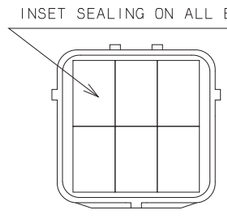


CN-JE4F
12FA-JM2

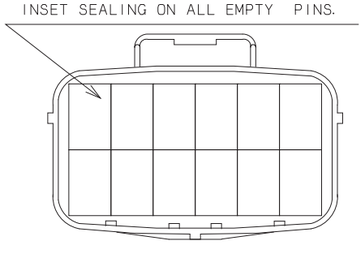


CN-JE4M
12MA-JM2

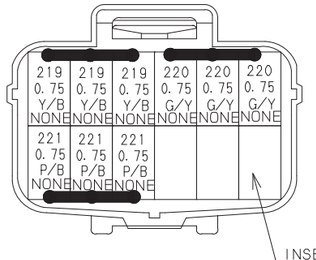
CN-JE5F
6FA-JM2



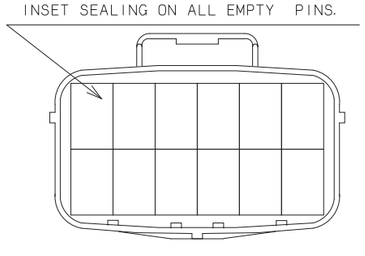
CN-JE5M
6MA-JM2



CN-JE6M
12MA-JM2

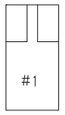


CN-JE6F
12FA-JM2



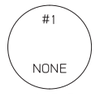
CN-JE3M
12MA-JM2

CA-E1
CA104



E-3
1FY-T
#1 860 0.75 Y/L+860 0.75 Y/L

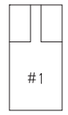
LA-E37
LA210
#1 E021 0.75 B + E022 0.75 B



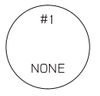
LA-E45
LA204
#1 11G 0.75 W/G + 11M 0.75 W/G

LA-E53
LA210
#1 E04 0.75 B + E05 0.75 B

CA-E3
CA104

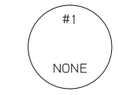


E-4
1FY-T
#1 E06 0.75 B+E032 0.75 B



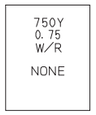
LA-E38
LA210
#1 E10 0.5 B/W + E11 0.75 B/W

LA-E46
LA104



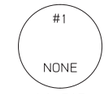
LA-E55
LA210
#1 E019 1.25 B + E020 2 B

CA-E4
CA104

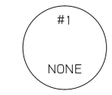


CB-E3
CB104

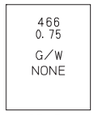
LA-E39
LA210
#1 E1 1.25 B/W + E2 1.25 B/W



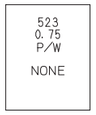
LA-E47
LA204
#1 861 0.75 L/Y + 861A 0.75 L/Y



LA-E56
LA210
#1 E023 0.75 B + E024 0.75 B



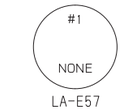
CB-E1
CB104



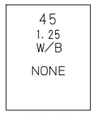
CB-E4
CB104

LA-E40
LA210
#1 E3 1.25 B/W + E4 1.25 B/W

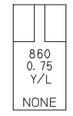
LA-E48
LA110



LA-E57
LA210
#1 E012 0.75 B + E013 0.75 B



CB-E2
CB104

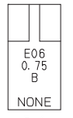


E-1
1FY-T

LA-E41
LA210
#1 E6 0.75 B/W + E7 0.75 B/W

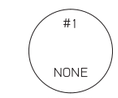
LA-E50
LA108

LA-E58
LA210
#1 E011 0.75 B + E0 2 B



E-2
1FY-T

LA-E42
LA210
#1 E8 1.25 B/W + E9 1.25 B/W



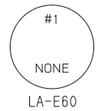
LA-E51
LA210
#1 E01 0.75 B + E08 0.75 B

LA-E59
LA210
#1 E010 0.75 B + E09 0.75 B

LA-E44
LA210
#1 E025 0.75 B + E07 0.75 B

LA-E43
LA210

LA-E52
LA210
#1 E02 0.75 B + E03 0.75 B



LA-E60
LA210
#1 E025 0.75 B + E026 0.75 B

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WIRE No. AND WIRE COLER LIST

WIRE NO	COLER	TYPE	SIZE	F R O M	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	T O
4	Y	AVSS	1.25	CN-849M				CN-851F
11G	W/G	AVSS	0.75	LA-E45	DS-E21			CN-716F
11M	W/G	AVSS	0.75	LA-E45	DS-E21			CN-853F
14	G/R	AVSS	0.75	CN-115F				CN-404M
15	Br	AVSS	1.25	CN-40F				CN-401F
31	L	AVSS	0.75	CN-116F				CN-404M
37	G	AVS	2	CN-848F				CN-852M
38	R/L	AVS	2	CN-871F				CN-852M
41	O	AVSS	1.25	CN-JE5F				CN-404M
41	O	AVSS	1.25	CN-JE5F				CN-115F
41	O	AVSS	1.25	CN-JE5F				CN-115F
42	P	AVSS	1.25	CN-JE4F				CN-404M
42	P	AVSS	0.75	CN-JE4F				CN-117F
42	P	AVSS	1.25	CN-JE4F				CN-116F
42	P	AVSS	0.75	CN-JE4F				CN-115F
43	R/Y	AVSS	1.25	CN-JE5F				CN-404M
43	R/Y	AVSS	0.75	CN-JE5F				CN-40F
43	R/Y	AVSS	0.75	CN-JE5F				CN-851F
45	W/B	AVSS	1.25	CN-709F				CB-E2
53F	L/R	AVSS	0.75	CN-116F				CN-404M
145C	Y/L	AVSS	0.75	CN-116F				CN-403M
146C	Gr	AVSS	0.75	CN-116F				CN-403M
147	O/L	AVSS	0.75	CN-115F				CN-404M
148	G/W	AVSS	0.75	CN-115F				CN-403M
149	L/W	AVSS	0.75	CN-115F				CN-403M
150	Br	AVSS	0.75	CN-117F				CN-405F
161A	Y/R	AVSS	0.75	CN-401F				CN-40F
166E	Lg/W	AVSS	0.75	CN-404M				CN-116F
167E	Lg/Y	AVSS	0.75	CN-404M				CN-116F
176	Gr/W	AVSS	0.75	CN-JE1F				CN-403M
176E	Gr/W	AVSS	0.75	CN-JE1F				CN-40F
176F	Gr/W	AVSS	0.75	CN-JE1F				CN-117F
212	G/W	AVSS	0.75	CN-842F				CN-404M
213	Y/W	AVSS	0.75	CN-842F				CN-404M
214	R/W	AVSS	0.75	CN-842F				CN-404M
215	W	AVSS	0.75	CN-405F				CN-JE3F
215	W	AVSS	0.75	CN-40F				CN-JE3F
215	W	AVSS	0.75	CN-117F				CN-JE3F
216	B/R	AVSS	0.75	CN-405F				CN-JE3F
216	B/R	AVSS	0.75	CN-41F				CN-JE3F
216	B/R	AVSS	0.75	CN-117F				CN-JE3F
217	Lg/Y	AVSS	0.75	CN-405F				CN-JE3F
217	Lg/Y	AVSS	0.75	CN-40F				CN-JE3F
217	Lg/Y	AVSS	0.75	CN-117F				CN-JE3F
218	L/O	AVSS	0.75	CN-405F				CN-JE3F
218	L/O	AVSS	0.75	CN-41F				CN-JE3F
218	L/O	AVSS	0.75	CN-117F				CN-JE3F
219	Y/B	AVSS	0.75	CN-405F				CN-JE6F
219	Y/B	AVSS	0.75	CN-41F				CN-JE6F
219	Y/B	AVSS	0.75	CN-117F				CN-JE6F
220	G/Y	AVSS	0.75	CN-405F				CN-JE6F
220	G/Y	AVSS	0.75	CN-41F				CN-JE6F
220	G/Y	AVSS	0.75	CN-117F				CN-JE6F
221	P/B	AVSS	0.75	CN-405F				CN-JE6F
221	P/B	AVSS	0.75	CN-40F				CN-JE6F
221	P/B	AVSS	0.75	CN-117F				CN-JE6F
347	Y/V	AVSS	0.75	CN-119F				CN-402F
365	L/R	AVSS	0.75	CN-119F				CN-402F
366	G/B	AVSS	0.75	CN-119F				CN-402F
398C	G/W	AVSS	0.75	CN-402F				CN-116F
445	R/Y	AVSS	0.75	CN-401F				CN-849M
466	G/W	AVSS	0.75	CB-E1				CN-700F
500	R/G	AVSS	0.75	CN-111F				CN-111F
501	Br/W	AVSS	0.75	CN-816F				CN-401F
502	G/Y	AVSS	0.75	CN-401F				CN-816F
503	L	AVSS	0.75	CN-816F				CN-401F
504	Y/L	AVSS	0.75	CN-111F				CN-111F
512	R	AVSS	0.75	CN-112F				CN-802F
513	W	AVSS	0.75	CN-112F				CN-802F
514	B	AVSS	0.75	CN-112F				CN-802F
515	Y/R	AVSS	0.75	CN-112F				CN-803F
516	G/W	AVSS	0.75	CN-112F				CN-803F
517	L/B	AVSS	0.75	CN-112F				CN-803F
518	Br/R	AVSS	0.75	CN-112F				CN-804F
519	Lg/W	AVSS	0.75	CN-112F				CN-804F
520	O/B	AVSS	0.75	CN-112F				CN-804F
523	P/W	AVSS	0.75	CB-E4				CN-112F
524	Gr/B	AVSS	0.75	CA-E4				CN-112F
525	V/R	AVSS	0.75	CN-112F				CN-805F
526	Br/W	AVSS	0.75	CN-112F				CN-805F
527	Lg/B	AVSS	0.75	CN-112F				CN-805F
528	W/R	AVSS	0.75	CN-112F				CN-806F
529	B/W	AVSS	0.75	CN-112F				CN-806F
530	R/B	AVSS	0.75	CN-112F				CN-806F
531	R	AVSS	0.75	CN-113F				CN-807F
532	W	AVSS	0.75	CN-113F				CN-807F
533	B	AVSS	0.75	CN-113F				CN-807F
534	L/R	AVSS	0.75	CN-114F				CN-808F
535	Br/W	AVSS	0.75	CN-114F				CN-808F
536	P/B	AVSS	0.75	CN-114F				CN-808F
537	Gr/R	AVSS	0.75	CN-114F				CN-809F
538	Y/W	AVSS	0.75	CN-114F				CN-809F
539	O/B	AVSS	0.75	CN-114F				CN-809F
540	R	AVSS	0.75	CN-114F				CN-810F
541	W	AVSS	0.75	CN-114F				CN-810F
542	B	AVSS	0.75	CN-114F				CN-810F
543	G/R	AVSS	0.75	CN-114F				CN-811F
544	L/W	AVSS	0.75	CN-114F				CN-811F
545	Y/B	AVSS	0.75	CN-114F				CN-811F
546	Lg/R	AVSS	0.75	CN-114F				CN-812F
547	O/W	AVSS	0.75	CN-114F				CN-812F
548	Br/B	AVSS	0.75	CN-114F				CN-812F
549	V/R	AVSS	0.75	CN-114F				CN-813F
550	P/W	AVSS	0.75	CN-114F				CN-813F
551	Gr/B	AVSS	0.75	CN-114F				CN-813F
552	W/R	AVSS	0.75	CN-114F				CN-815F
553	B/W	AVSS	0.75	CN-114F				CN-815F
554	R/B	AVSS	0.75	CN-114F				CN-815F
555	Y/R	AVSS	0.75	CN-114F				CN-814F
556	Lg/W	AVSS	0.75	CN-114F				CN-814F
557	L/B	AVSS	0.75	CN-113F				CN-814F
597	P/L	AVSS	0.75	CN-JE4F				CN-117F
597D	P/L	AVSS	0.75	CN-JE4F				CN-836F
597C	P/L	AVSS	0.75	CN-JE4F				CN-40F
598	L	AVSS	0.75	CN-JE4F				CN-117F
598D	L	AVSS	0.75	CN-JE4F				CN-837F
598C	L	AVSS	0.75	CN-JE4F				CN-40F
601	R/W	AVSS	0.75	CN-851F				CN-119F
604	L/B	AVSS	0.75	CN-119F				CN-838F
605	Y/R	AVSS	0.75	CN-119F				CN-851F
606	G	AVSS	0.75	CN-119F				CN-40F
607	R/G	AVSS	0.75	CN-119F				CN-40F
608	Br/R	AVSS	0.75	CN-119F				CN-840F
609	P/L	AVSS	0.75	CN-119F				CN-841F
610	Gr/B	AVSS	0.75	CN-716F				CN-119F
611	B/Y	AVSS	0.75	CN-716F				CN-119F
612	W/L	AVSS	0.75	CN-716F				CN-119F
615	W/Y	AVSS	0.75	CN-843F				CN-117F
616	Br/W	AVSS	0.75	CN-843F				CN-117F
617	Y/G	AVSS	0.75	CN-851F				CN-848F
617	Y/G	AVSS	0.75	CN-851F				CN-871F
617	Y/G	AVSS	0.75	CN-851F				CN-117F
618	Lg	AVSS	0.75	CN-843F				CN-114F
619	L	AVSS	0.75	CN-843F				CN-114F
620	G	AVSS	0.75	CN-843F				CN-114F
621	O	AVSS	0.75	CN-114F				CN-843F
622	P	AVSS	0.75	CN-114F				CN-843F
750Y	W/R	AVSS	0.75	CN-401F				CB-E3
751	G/R	AVSS	0.75	CN-845F				CN-709F
752	Lg/R	AVSS	0.75	CN-844F				CN-709F
811	R/W	AVSS	1.25	CN-846F				CN-700F
812	P/L	AVSS	1.25	CN-846F				CN-700F
813	P	AVS	1.25	CN-700F				CN-847F
860	Y/L	AVSS	0.75	LA-E46			DS-E29	E-3
860	Y/L	AVSS	0.75	E-1			DS-E29	E-3
861	L/Y	AVSS	0.75	LA-E47	DS-E22			CN-401F
861A	L/Y	AVSS	0.75	LA-E47	DS-E22			CN-853F
923	L/O	AVSS	0.75	CN-823F				CN-401F
924	G/O	AVSS	0.75	CN-822F				CN-401F
925D	Y/G	AVSS	0.75	CN-JE2F				CN-819F
925C	Y/G	AVSS	0.75	CN-JE2F				CN-820F
925B	Y/G	AVSS	1.25	CN-JE2F				CN-JE2F
925A	Y/G	AVSS	0.75	CN-821F				CN-JE2F
925	Y/G	AVSS	0.75	CN-401F				CN-JE2F
956	L/Y	AVSS	0.75	CN-118F				CN-851F
956A	L/Y	AVSS	0.75	CN-716F				CN-851F
958	G	AVSS	0.75	CN-118F			DS-E23	CN-816F
958	G	AVSS	0.75	CN-403M			DS-E23	CN-816F
959	L	AVSS	0.75	CN-118F			DS-E24	CN-816F
959	L	AVSS	0.75	CN-402F			DS-E24	CN-816F
979	P	AVSS	0.75	CN-401F				CN-842F
985	R/W	AVSS	0.75	CN-402F				CN-116F
114H	R	AVSS	0.75	CN-709F				CN-111F
115H	G	AVSS	0.75	CN-709F				CN-111F
119J	Y	AVSS	0.75	CN-111F				CN-405F
120J	L	AVSS	0.75	CN-111F				CN-405F
558	W/L	AVSS	0.75	CN-115F				CN-41F
559	B/Y	AVSS	0.75	CN-115F				CN-41F
560	R/G	AVSS	0.75	CN-115F				CN-41F
561	Y/R	AVSS	0.75	CN-115F				CN-41F
562	G/B	AVSS	0.75	CN-115F				CN-41F
563	L/R	AVSS	0.75	CN-115F				CN-41F
564	Br	AVSS	0.75	CN-115F				CN-41F
565	O/B	AVSS	0.75	CN-115F				CN-41F
566	Gr/L	AVSS	0.75	CN-115F				CN-41F
567	P/W	AVSS	0.75	CN-115F				CN-41F
568	O/W	AVSS	0.75	CN-115F				CN-833F
569	L/G	AVSS	0.75	CN-115F				CN-833F
570	P/L	AVSS	0.75	CN-116F				CN-41F
571	Gr/R	AVSS	0.75	CN-116F				CN-41F
572	O/L	AVSS	0.75	CN-116F				CN-41F
573	L/G	AVSS	0.75	CN-116F				CN-41F
574	W/B	AVSS	0.75	CN-116F				CN-834F
575	B/Y	AVSS	0.75	CN-116F				CN-834F
576	W/Y	AVSS	0.75	CN-116F				CN-41F
577	G	AVSS	0.75	CN-116F				CN-41F
578	O/B	AVSS	0.75	CN-116F				CN-832F
579	Gr/B	AVSS	0.75	CN-116F				CN-832F
583	R/G	AVSS	0.75	CN-116F				CN-835F
584	Y	AVSS	0.75	CN-116F				CN-835F
906	R	AVSS	0.75	CN-39F				CN-824F
907	B	AVSS	0.75	CN-39F				CN-824F
908	W/R	AVSS	0.75	CN-39F				CN-825F
909	Y/B	AVSS	0.75	CN-39F				CN-825F
910	G/R	AVSS	0.75	CN-39F				CN-826F
911	L/B	AVSS	0.75	CN-39F				CN-826F
912	Br/R	AVSS	0.75	CN-39F				CN-827F
913	Lg/B	AVSS	0.75	CN-39F				CN-827F
914	Gr/R	AVSS	0.75	CN-39F				CN-828F
915	O/B	AVSS	0.75	CN-39F				CN-828F
916	V/R	AVSS	0.75	CN-39F				CN-829F
917	P/B	AVSS	0.75	CN-39F				CN-829F
918	Y/R	AVSS	0.75	CN-39F				CN-830F
919	G/B	AVSS	0.75	CN-39F				CN-830F
920	Lg/R	AVSS	0.75	CN-39F				CN-831F
921	Gr/B	AVSS	0.75	CN-39F				CN-831F
508	W	MVVS	0.75	CN-403M				CN-111F
509	R	MVVS	0.75	CN-403M				CN-111F
510	B	MVVS	0.75	CN-403M				CN-111F
511	G	MVVS	0.75	CN-403M				CN-111F
E01	B	AVSS	0.75	LA-E51	DS-E14			CN-819F
E08	B	AVSS	0.75	LA-E51	DS-E14			CN-40F
E02	B	AVSS	0.75	CN-820F			DS-E1	LA-E52
E03	B	AVSS	0.75	CN-821F			DS-E1	LA-E52
E04	B	AVSS	0.75	LA-E53	DS-E2			CN-822F
E05	B	AVSS	0.75	LA-E53	DS-E2			CN-823F
E06	B	AVSS	0.75	E-2			DS-E30	E-4
E032	B	AVSS	0.75	LA-E48			DS-E30	E-4
E07	B	AVSS	0.75	LA-E50			DS-E13	LA-E44
E025	B	AVSS	0.75	LA-E60	DS-E24		DS-E13	LA-E44
E026	B	AVSS	0.75	LA-E60	DS-E24			CA-E3
E09	B	AVSS	0.75	CN-837F			DS-E4	LA-E59
E010	B	AVSS	0.75	CN-836F			DS-E4	LA-E59
E0	B	AVS	2	CN-871F			DS-E25	LA-E58
E011	B	AVSS	0.75	CN-838F			DS-E25	LA-E58
E012	B	AVSS	0.75	LA-E57	DS-E23			CN-840F
E013	B	AVSS	0.75	LA-E57	DS-E23			CN-841F
E019	B	AVS	1.25	CN-847F			DS-E8	LA-E55
E020	B	AVS	2	CN-848F			DS-E8	LA-E55
E021	B	AVSS	0.75	LA-E37	DS-E6			CA-E1
E022	B	AVSS	0.75	LA-E37	DS-E6			CN-843F
E023	B	AVSS	0.75	CN-845F			DS-E7	LA-E56
E024	B	AVSS	0.75	CN-844F			DS-E7	LA-E56
E1	B/W	AVSS	1.25	LA-E39	DS-E10			CN-708M
E2	B/W	AVSS	1.25	LA-E39	DS-E10			CN-708M
E3	B/W	AVSS	1.25	CN-708M			DS-E11	LA-E40
E4	B/W	AVSS	1.25	CN-708M			DS-E11	LA-E40
E5	B/W	AVSS	1.25	CN-708M				LA-E43
E6	B/W	AVSS	0.75	LA-E41	DS-E3			CN-115F
E7	B/W	AVSS	0.75	LA-E41	DS-E3			CN-115F
E8	B/W	AVSS	1.25	CN-700F			DS-E12	LA-E42
E9	B/W	AVSS	1.25	CN-700F			DS-E12	LA-E42
E10	B/W	AVSS	0.5	LA-E38	DS-E9			CN-708M
E11	B/W	AVSS	0.75	LA-E38	DS-E9			CN-709F

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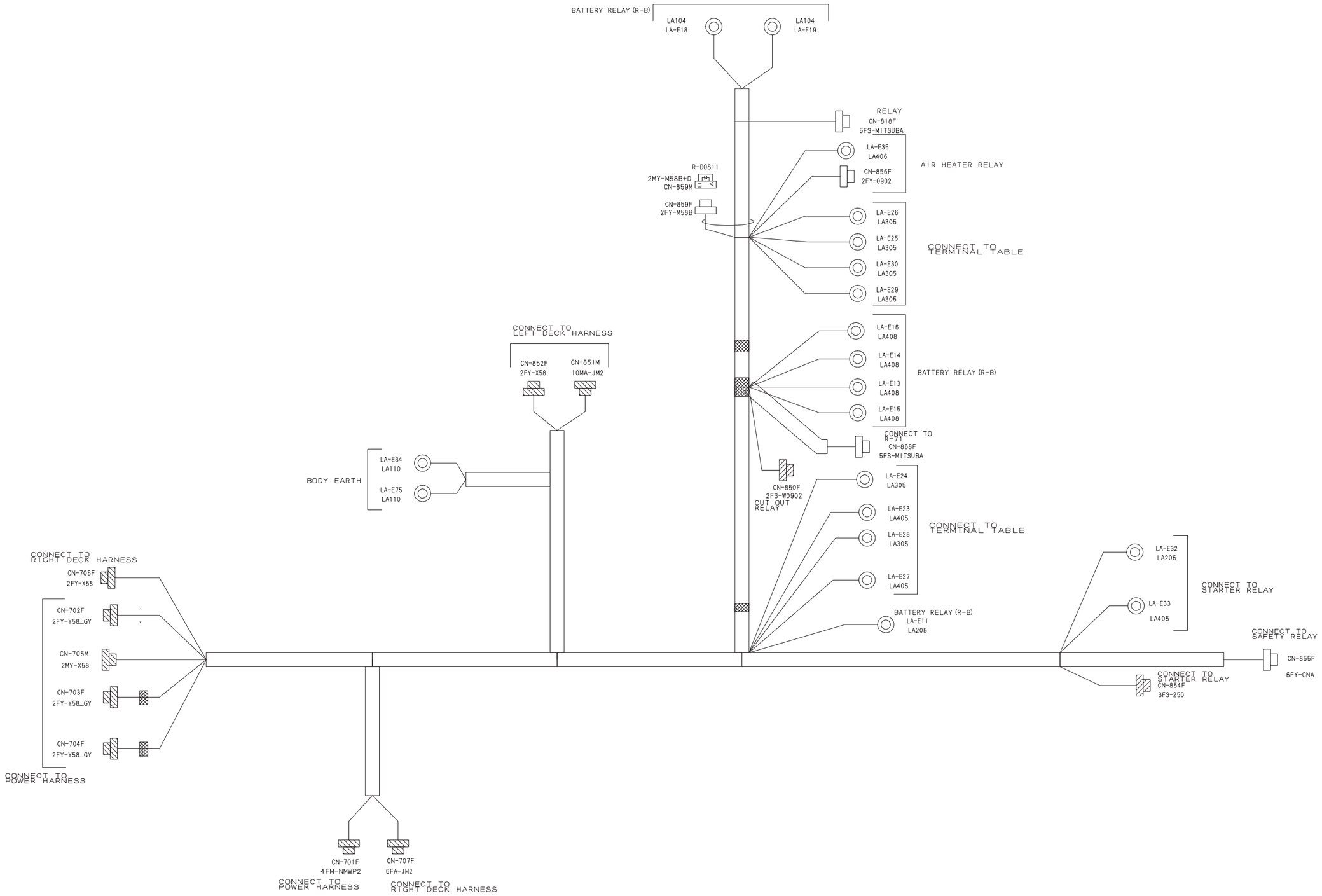
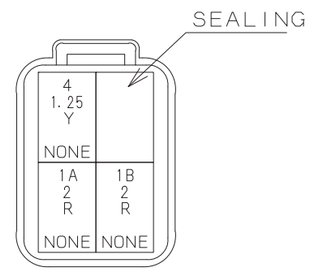
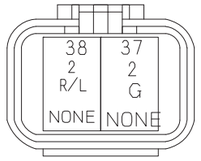
RELAY HARNESS



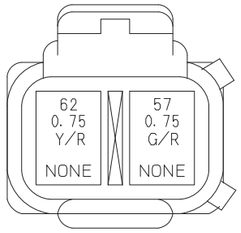
(1/3)



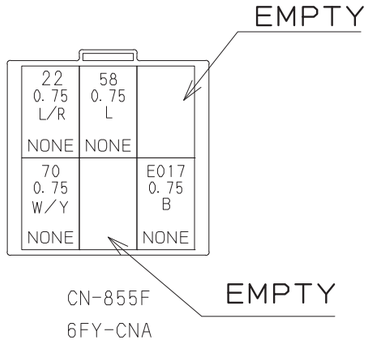
CN-701F
4FM-NMWP2



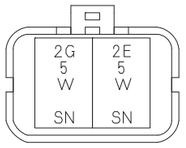
CN-706F
2FY-X58



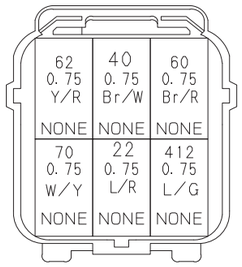
CN-850F
2FS-W0902



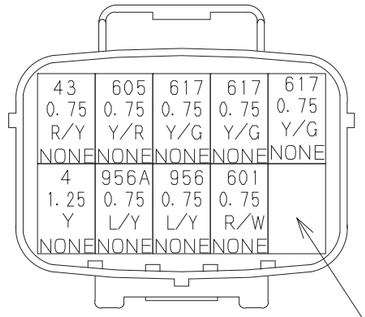
CN-855F
6FY-CNA



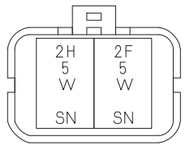
CN-702F
2FY-Y58_GY



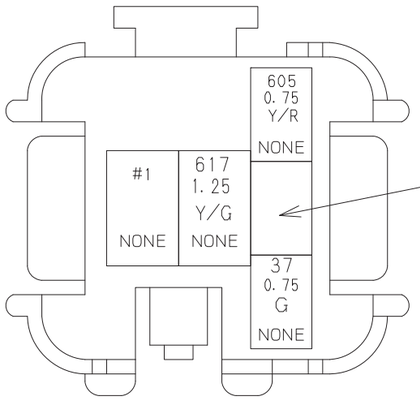
CN-707F
6FA-JM2



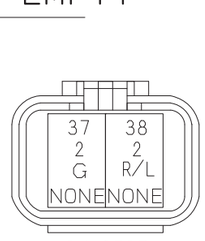
CN-851M
10MA-JM2



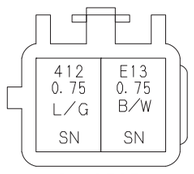
CN-703F
2FY-Y58_GY



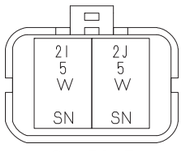
CN-818F
5FS-MITSUBA
#1 37 0.75 G + 37 0.75 G



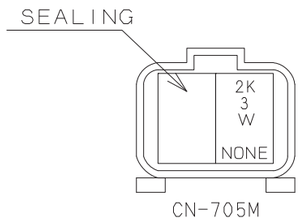
CN-852F
2FY-X58



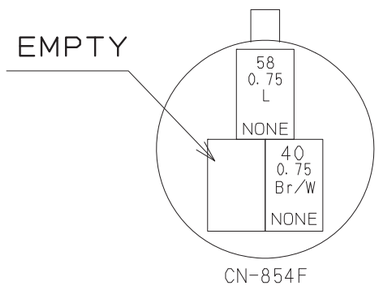
CN-856F
2FY-0902



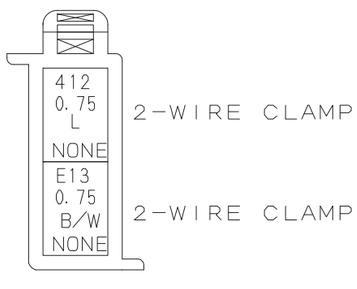
CN-704F
2FY-Y58_GY



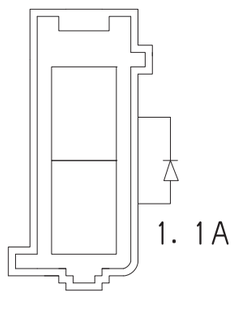
CN-705M
2MY-X58



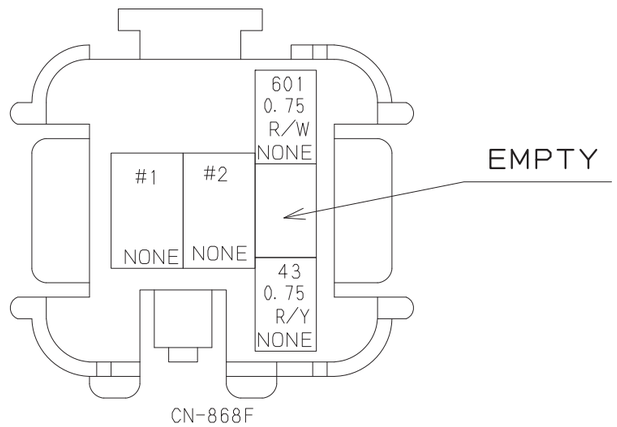
CN-854F
3FS-250



CN-859F
2FY-M58B



CN-859M
2MY-M58B+D



CN-868F
5FS-MITSUBA
#1 43 0.75 R/Y + 43 0.75 R/Y
#2 956 0.75 L/Y + 956A 0.75 L/Y

LA-E11
LA208
#1 1A 2 R + 1B 2 R

LA-E18
LA104

LA-E26
LA305

LA-E32
LA206

LA-E13
LA408

LA-E19
LA104

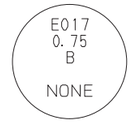
LA-E27
LA405

LA-E33
LA405

LA-E14
LA408

LA-E23
LA405

LA-E28
LA305

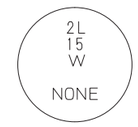


LA-E34
LA110

LA-E15
LA408

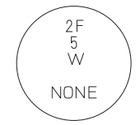
LA-E24
LA305

LA-E29
LA305



LA-E35
LA406

LA-E16
LA408



LA-E25
LA305

LA-E30
LA305

LA-E75
LA110

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WIRE No. AND WIRE COLOR LIST

No.	COLOR	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
1A	R	AVS	2	LA-E11	DS-E16			CN-701F
1B	R	AVS	2	LA-E11	DS-E16			CN-701F
2A	W	AV	15	LA-E23				LA-E13
2B	W	AV	15	LA-E14				LA-E27
2C	W	AV	15	LA-E33				LA-E15
2E	W	AVS	5	CN-702F				LA-E24
2F	W	AVS	5	CN-703F				LA-E25
2G	W	AVS	5	CN-702F				LA-E26
2H	W	AVS	5	CN-703F				LA-E28
2I	W	AVS	5	CN-704F				LA-E29
2J	W	AVS	5	CN-704F				LA-E30
2K	W	AVS	3	LA-E32				CN-705M
2L	W	AV	15	LA-E35				LA-E16
4	Y	AVSS	1.25	CN-701F				CN-851M
22	L/R	AVSS	0.75	CN-707F				CN-855F
37	G	AVS	2	CN-706F				JS-B01
37A	G	AVS	2	JS-B01				CN-852F
37C	G	AVSS	0.75	JS-B01			DS-E1	CN-818F
37E	G	AVSS	0.75	CN-818F			DS-E1	CN-818F
38	R/L	AVS	2	CN-706F				CN-852F
40	Br/W	AVSS	0.75	CN-707F				CN-854F
43C	R/Y	AVSS	0.75	CN-851M			DS-E2	CN-868F
43E	R/Y	AVSS	0.75	CN-868F			DS-E2	CN-868F
57	G/R	AVSS	0.75	CN-850F				LA-E19
58	L	AVSS	0.75	CN-854F				CN-855F
60	Br/R	AVSS	0.75	CN-707F				LA-E18
62	Y/R	AVSS	0.75	CN-707F				CN-850F
70	W/Y	AVSS	0.75	CN-707F				CN-855F
412	L/G	AVSS	0.75	CN-707F			DS-E4	CN-859F
412	L/G	AVSS	0.75	CN-856F			DS-E4	CN-859F
601	R/W	AVSS	0.75	CN-851M				CN-868F
605	Y/R	AVSS	0.75	CN-851M				CN-818F
617	Y/G	AVSS	1.25	CN-818F				JS-B02
617	Y/G	AVSS	0.75	CN-851M				JS-B02
617	Y/G	AVSS	0.75	JS-B03				JS-B02
617	Y/G	AVSS	0.75	JS-B03				CN-851M
617	Y/G	AVSS	0.75	JS-B03				CN-851M
956	L/Y	AVSS	0.75	CN-851M			DS-E3	CN-868F
956A	L/Y	AVSS	0.75	CN-851M			DS-E3	CN-868F
E017	B	AVSS	0.75	CN-855F				LA-E34
E13	B/W	AVSS	0.75	LA-E75			DS-E5	CN-859F
E13	B/W	AVSS	0.75	CN-856F			DS-E5	CN-859F

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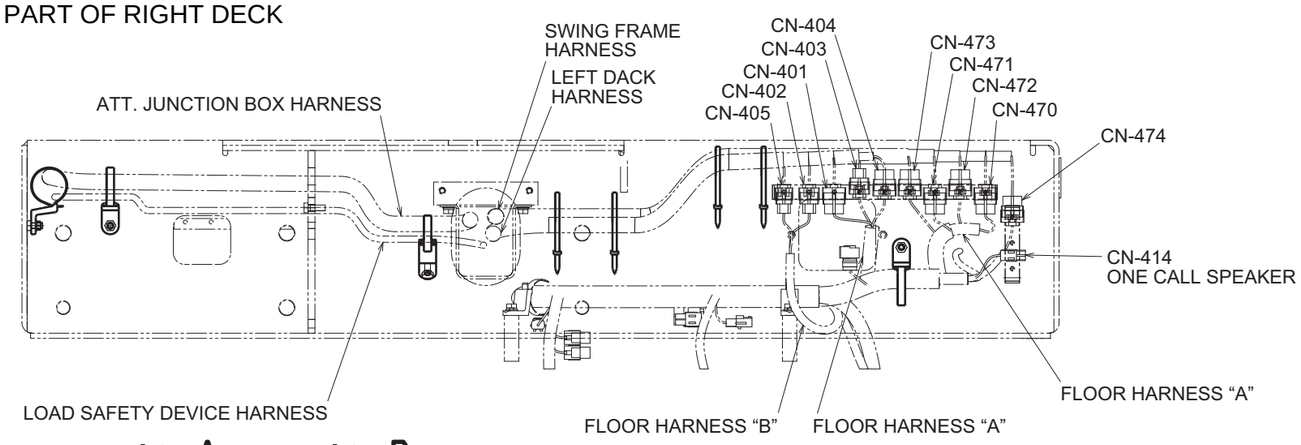
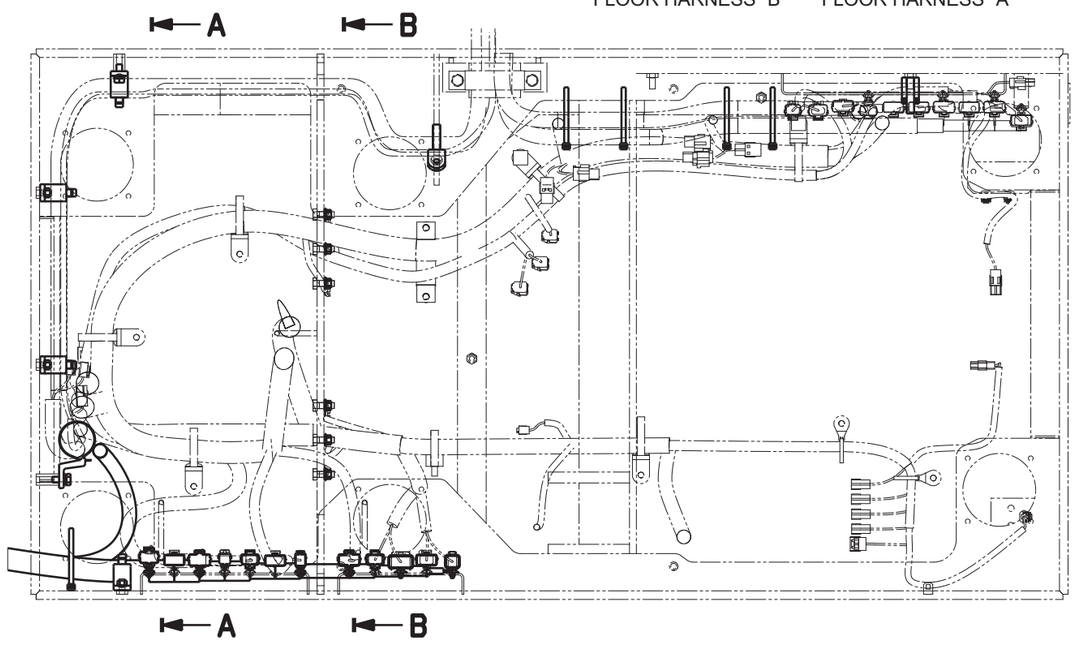
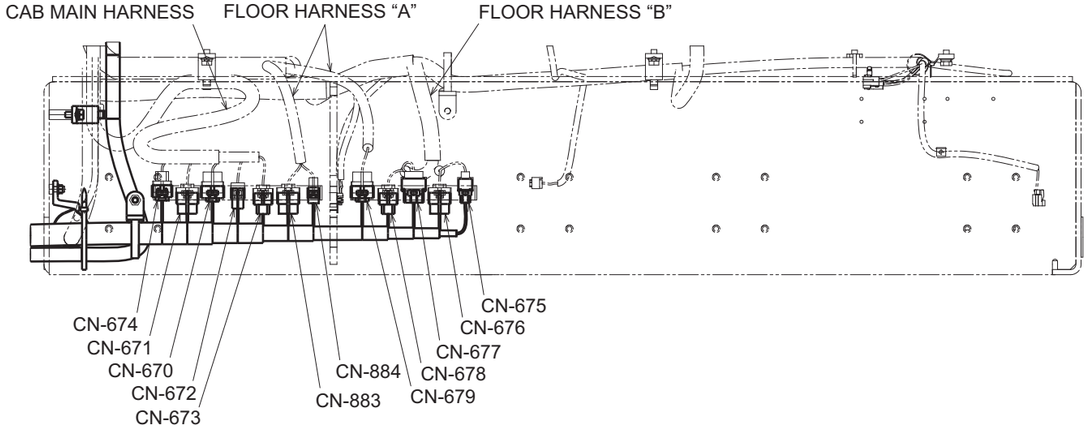
4. ELECTRICAL PART OF RIGHT DECK

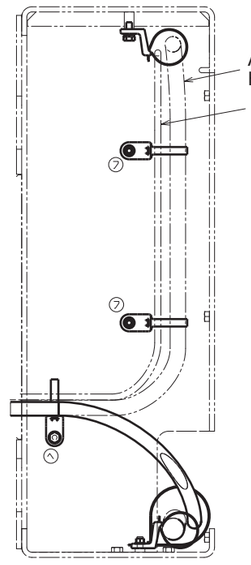
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



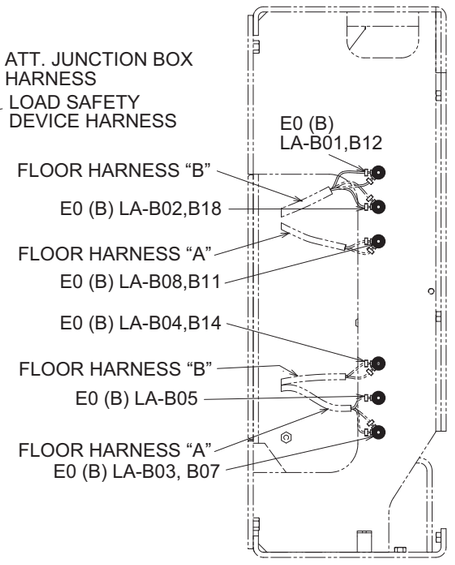


DETAIL OF CAB LOWER DECK





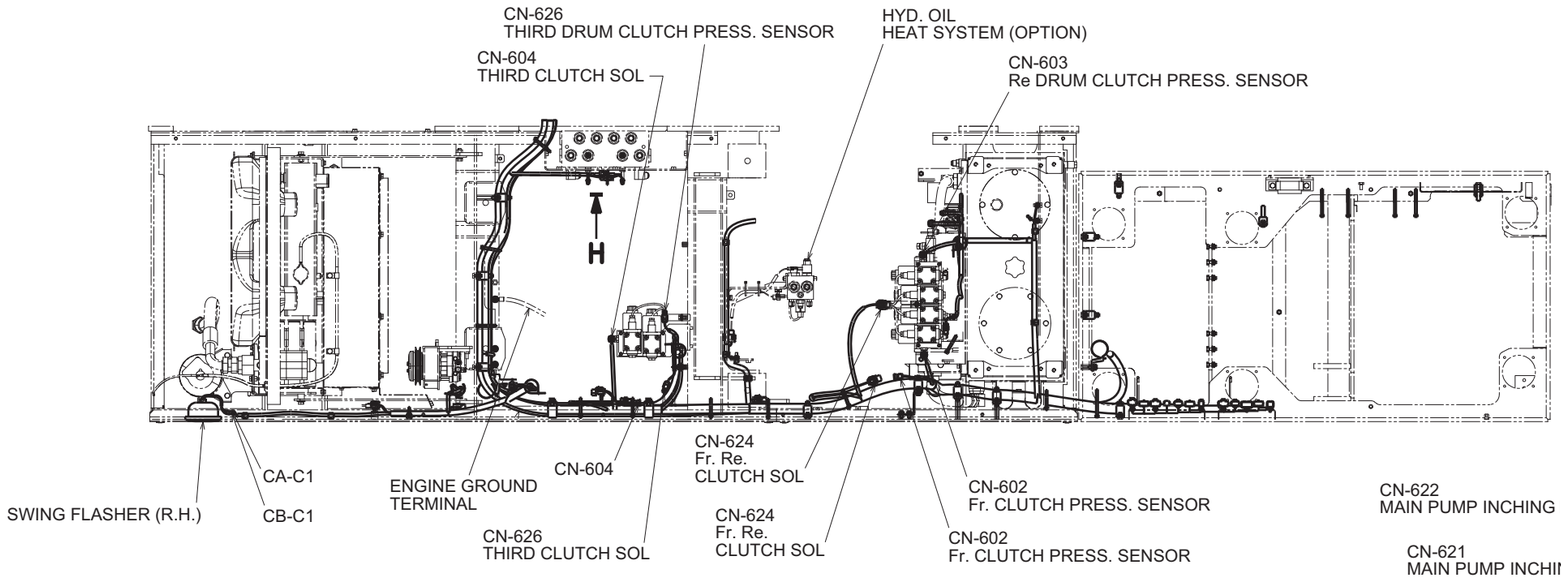
SECTION "A-A"

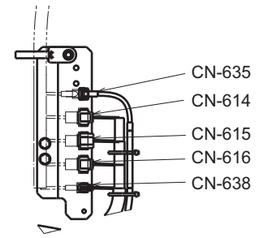


SECTION "B-B"

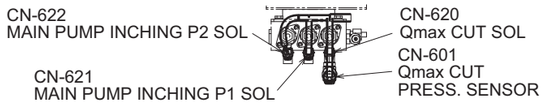
(1/4)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT

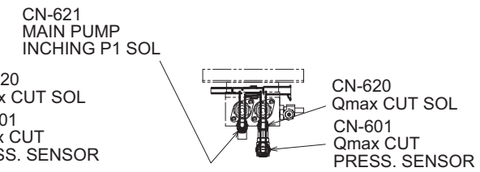




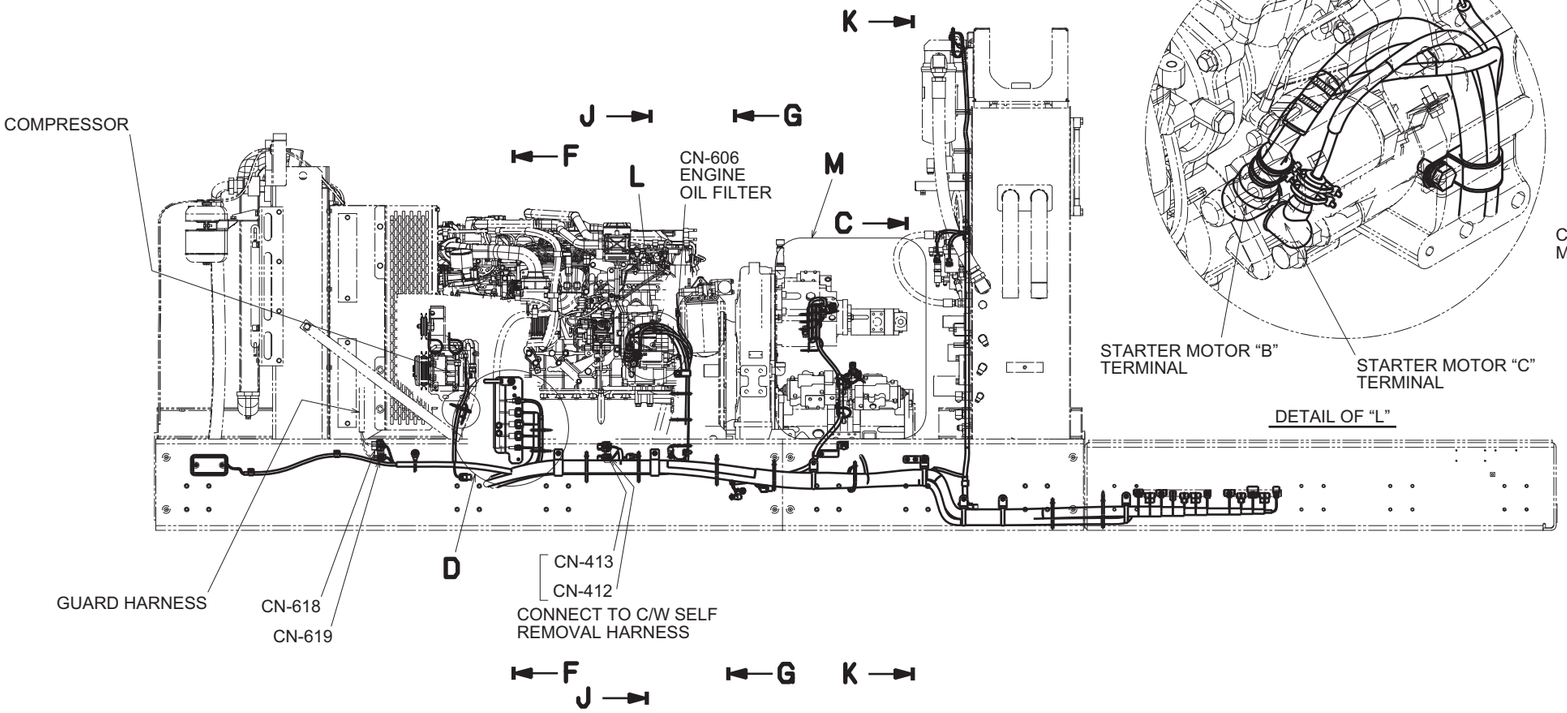
DETAIL OF “C”

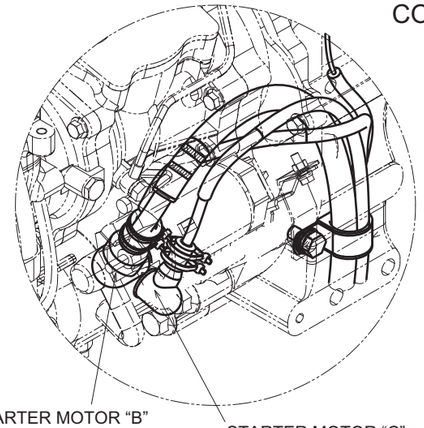


VIEW FROM “E”
(AT INDEPENDENT, CONFLUENCE SELECTED)

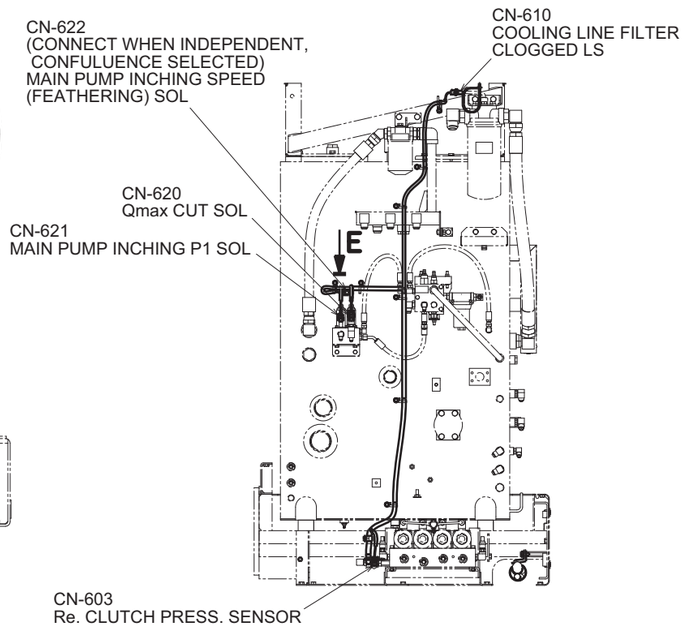


VIEW FROM “E”
(AT CONFLUENCE)





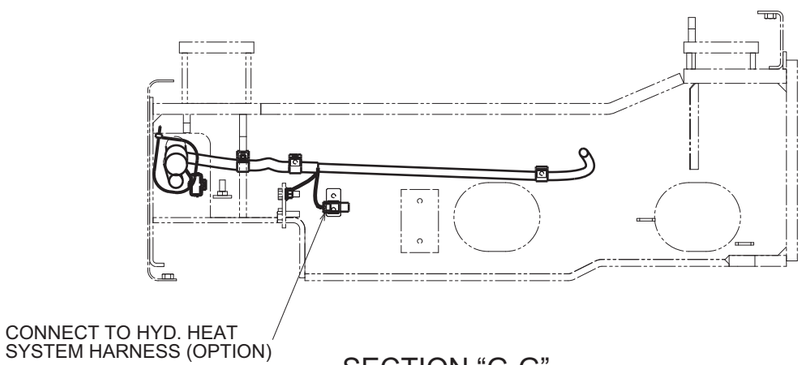
DETAIL OF “L”



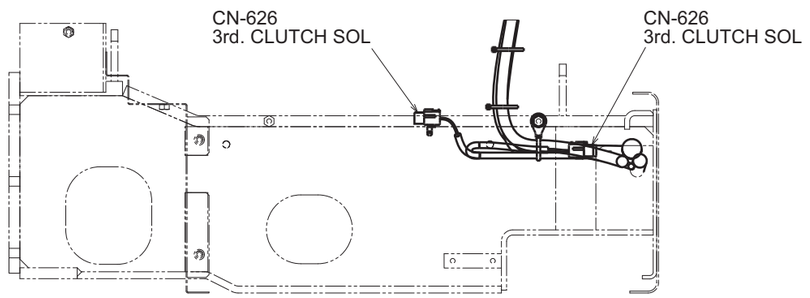
VIEW FROM “C”

(2/4)

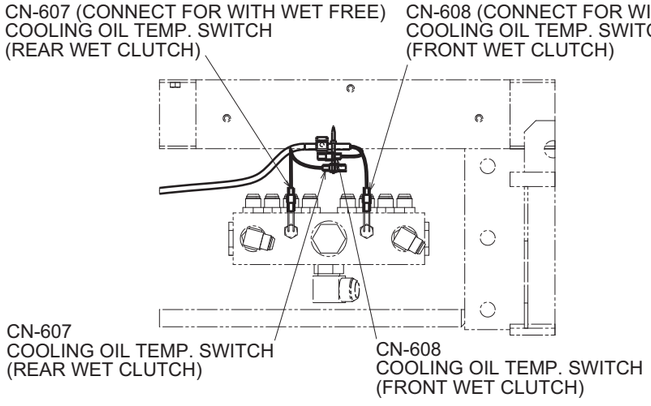
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



SECTION “G-G”



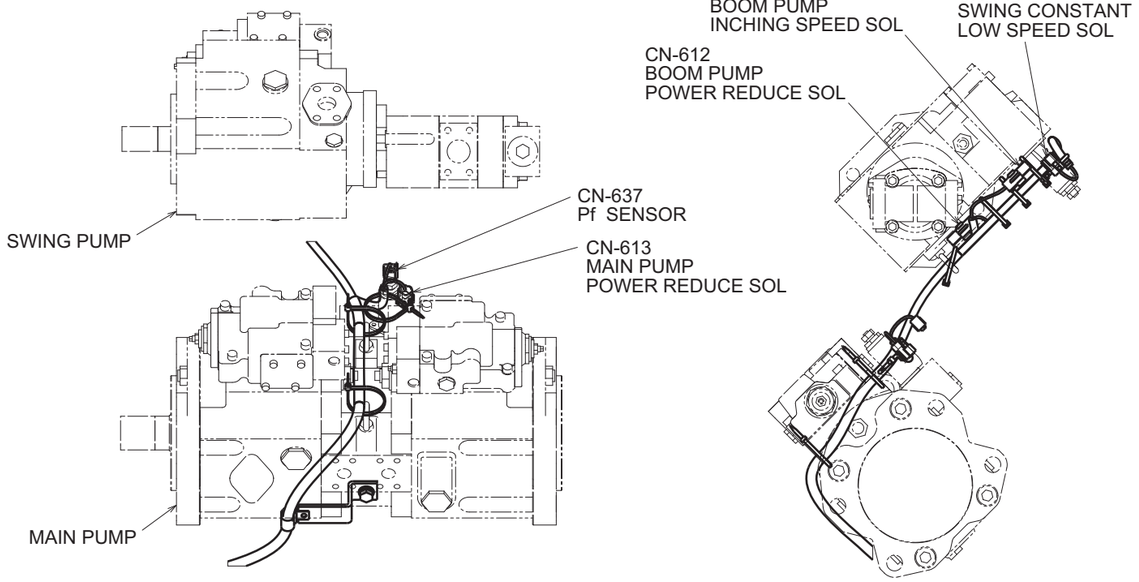
SECTION “J-J”



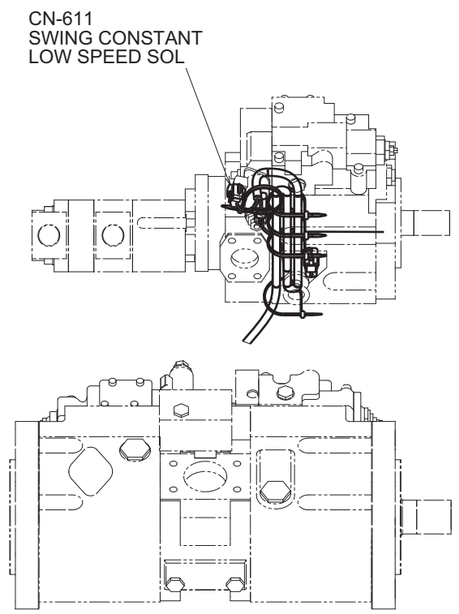
VIEW FROM “H”

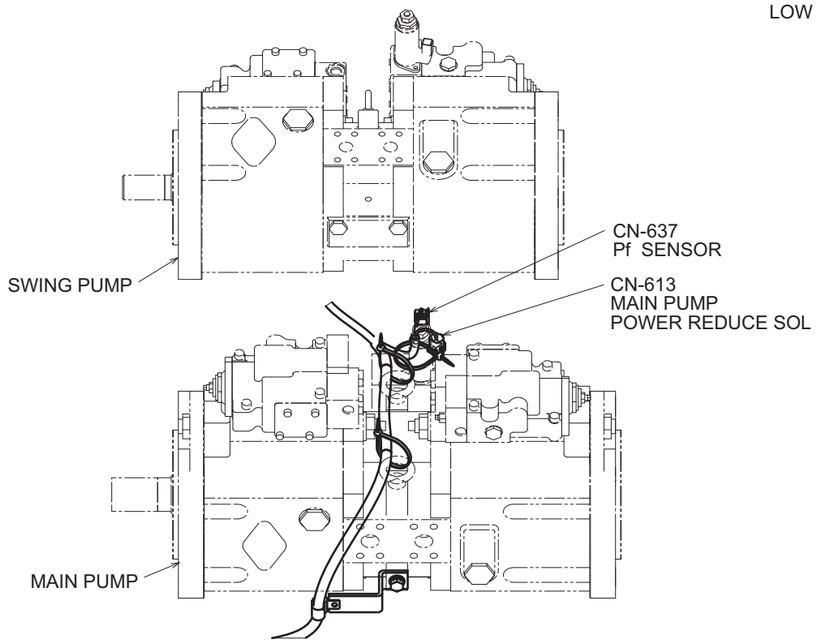
(3/4)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT

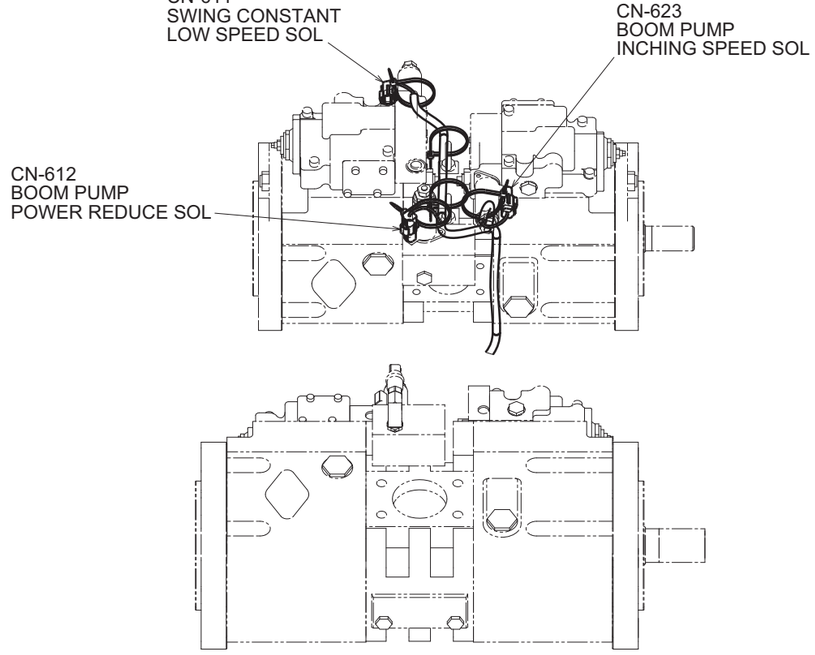


DETAIL OF “M”
(AT CONFLUENCE)



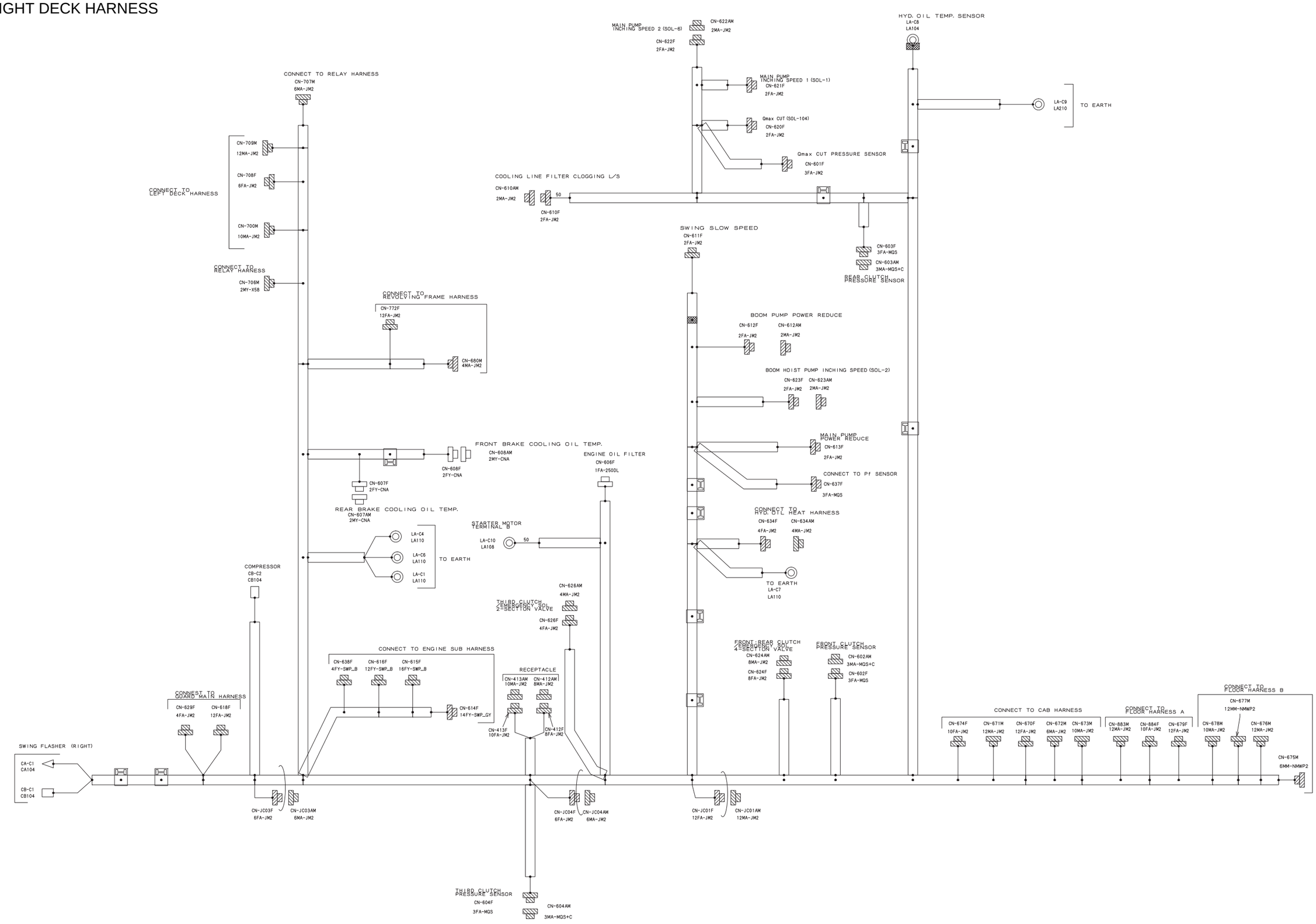


DETAIL OF “M”
(AT INDEPENDENT,
CONFLUENCE SELECTED)

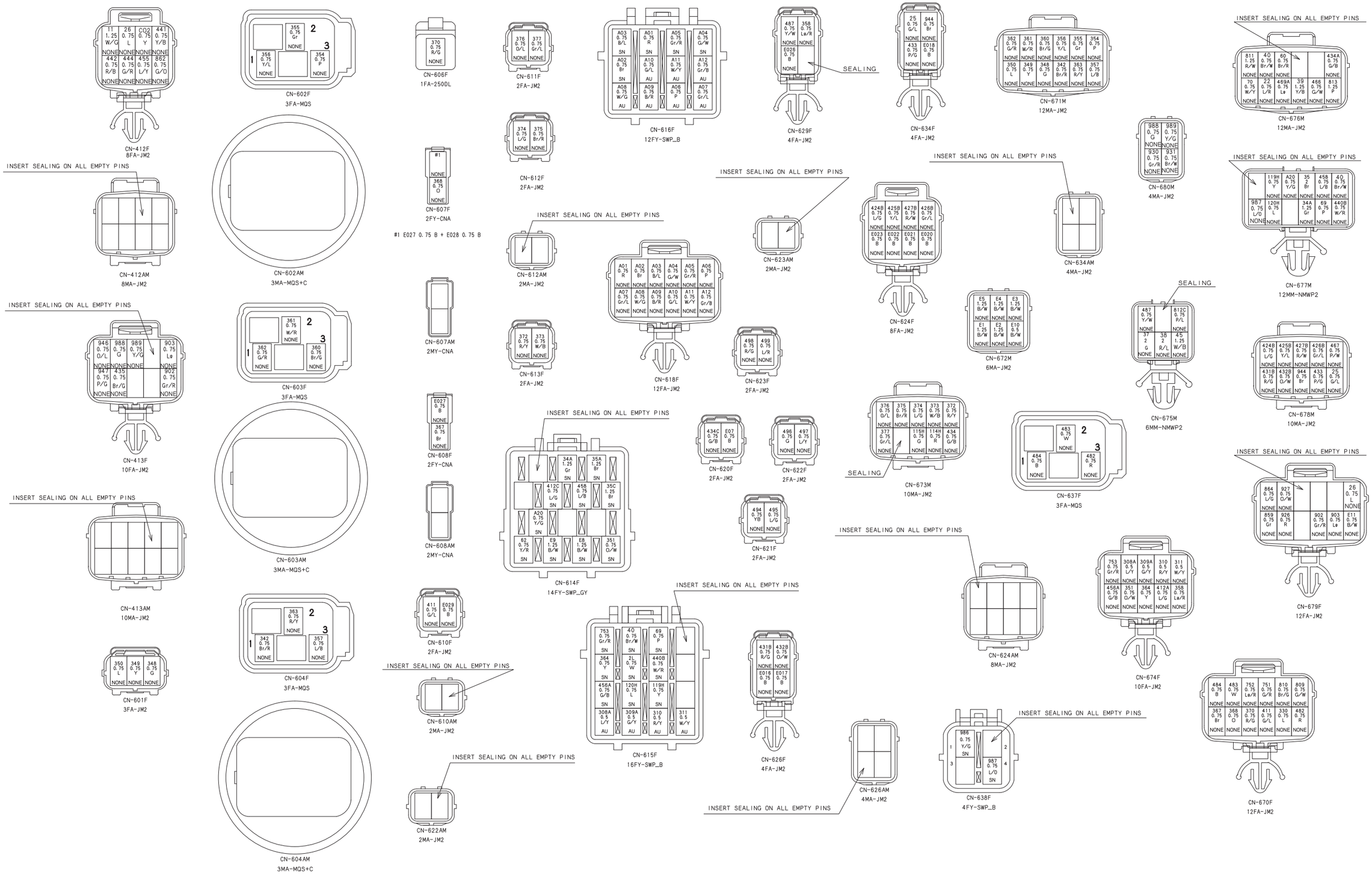


(4/4)

RIGHT DECK HARNESS



(1/4)


CN-412F
8FA-JM2
CN-602F
3FA-MQS
CN-606F
1FA-250DL
CN-611F
2FA-JM2
CN-616F
12FY-SWP_B
CN-629F
4FA-JM2
SEALING
CN-634F
4FA-JM2
CN-671M
12MA-JM2
INSERT SEALING ON ALL EMPTY PINS
CN-676M
12MA-JM2
INSERT SEALING ON ALL EMPTY PINS
CN-412AM
8MA-JM2
CN-602AM
3MA-MQS+C
CN-612F
2FA-JM2
CN-607F
2FY-CNA
#1 E027 0.75 B + E028 0.75 B
INSERT SEALING ON ALL EMPTY PINS
CN-623AM
2MA-JM2
INSERT SEALING ON ALL EMPTY PINS
CN-634AM
4MA-JM2
CN-680M
4MA-JM2
INSERT SEALING ON ALL EMPTY PINS
CN-677M
12MM-NMWP2
INSERT SEALING ON ALL EMPTY PINS
CN-612AM
2MA-JM2
CN-624F
8FA-JM2
CN-607AM
2MY-CNA
CN-618F
12FA-JM2
CN-623F
2FA-JM2
CN-672M
6MA-JM2
SEALING
CN-675M
6MM-NMWP2
INSERT SEALING ON ALL EMPTY PINS
CN-678M
10MA-JM2
CN-613F
2FA-JM2
INSERT SEALING ON ALL EMPTY PINS
CN-413F
10FA-JM2
CN-603F
3FA-MQS
CN-608F
2FY-CNA
CN-620F
2FA-JM2
CN-622F
2FA-JM2
CN-673M
10MA-JM2
SEALING
CN-637F
3FA-MQS
INSERT SEALING ON ALL EMPTY PINS
CN-608AM
2MY-CNA
CN-614F
14FY-SWP_GY
CN-621F
2FA-JM2
INSERT SEALING ON ALL EMPTY PINS
CN-679F
12FA-JM2
INSERT SEALING ON ALL EMPTY PINS
CN-413AM
10MA-JM2
CN-603AM
3MA-MQS+C
CN-610F
2FA-JM2
CN-624AM
8MA-JM2
CN-674F
10FA-JM2
INSERT SEALING ON ALL EMPTY PINS
CN-601F
3FA-JM2
CN-604F
3FA-MQS
INSERT SEALING ON ALL EMPTY PINS
CN-610AM
2MA-JM2
CN-615F
16FY-SWP_B
CN-626F
4FA-JM2
INSERT SEALING ON ALL EMPTY PINS
CN-638F
4FY-SWP_B
CN-670F
12FA-JM2
INSERT SEALING ON ALL EMPTY PINS
CN-622AM
2MA-JM2
CN-626AM
4MA-JM2
CN-604AM
3MA-MQS+C

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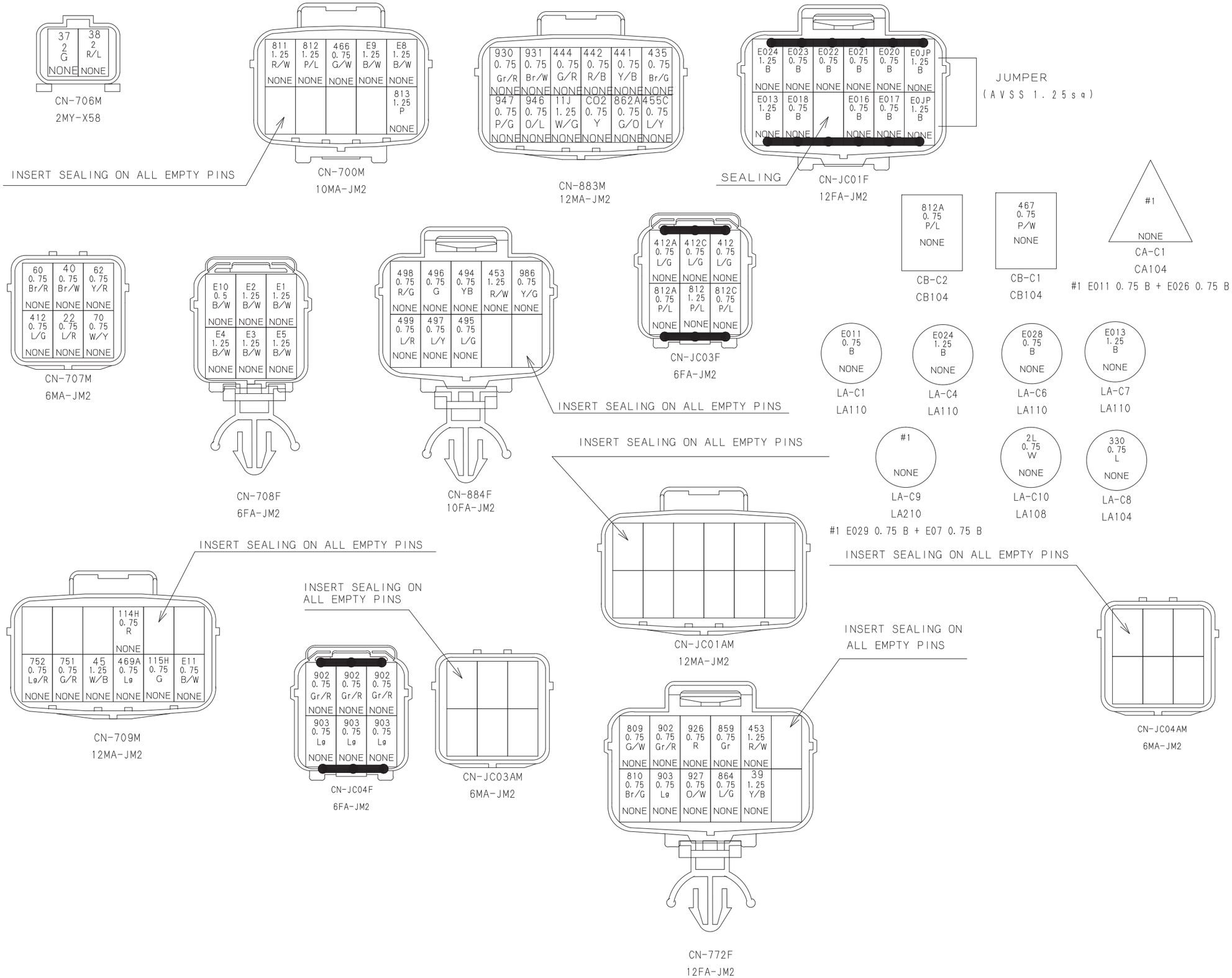
37 2 G NONE
38 2 R/L NONE
CN-706M
2MY-X58
811 1.25 R/W NONE
812 1.25 P/L NONE
466 0.75 G/W NONE
E9 1.25 B/W NONE
E8 1.25 B/W NONE
813 1.25 P NONE
INSERT SEALING ON ALL EMPTY PINS
CN-700M
10MA-JM2
930 0.75 Gr/R NONE
931 0.75 Br/W NONE
444 0.75 G/R NONE
442 0.75 R/B NONE
441 0.75 Y/B NONE
435 0.75 Br/G NONE
947 0.75 P/G NONE
946 0.75 O/L NONE
11J 1.25 W/G NONE
CO2 0.75 Y NONE
862A 0.75 G/O NONE
455C 0.75 L/Y NONE
CN-883M
12MA-JM2
E024 1.25 B NONE
E023 0.75 B NONE
E022 0.75 B NONE
E021 0.75 B NONE
E020 0.75 B NONE
E0JP 1.25 B NONE
E013 1.25 B NONE
E018 0.75 B NONE
E016 0.75 B NONE
E017 0.75 B NONE
E0JP 1.25 B NONE
JUMPER
(AVSS 1.25sq)
SEALING
CN-JC01F
12FA-JM2
812A 0.75 P/L NONE
CB-C2
CB104
467 0.75 P/W NONE
CB-C1
CB104
#1 NONE
CA-C1
CA104
#1 E011 0.75 B + E026 0.75 B
60 0.75 Br/R NONE
40 0.75 Br/W NONE
62 0.75 Y/R NONE
412 0.75 L/G NONE
22 0.75 L/R NONE
70 0.75 W/Y NONE
CN-707M
6MA-JM2
E10 0.5 B/W NONE
E2 1.25 B/W NONE
E1 1.25 B/W NONE
E4 1.25 B/W NONE
E3 1.25 B/W NONE
E5 1.25 B/W NONE
CN-708F
6FA-JM2
498 0.75 R/G NONE
496 0.75 G NONE
494 0.75 YB NONE
453 1.25 R/W NONE
986 0.75 Y/G NONE
499 0.75 L/R NONE
497 0.75 L/Y NONE
495 0.75 L/G NONE
CN-884F
10FA-JM2
412A 0.75 L/G NONE
412C 0.75 L/G NONE
412 0.75 L/G NONE
812A 0.75 P/L NONE
812 1.25 P/L NONE
812C 0.75 P/L NONE
CN-JC03F
6FA-JM2
INSERT SEALING ON ALL EMPTY PINS
E011 0.75 B NONE
LA-C1
LA110
E024 1.25 B NONE
LA-C4
LA110
E028 0.75 B NONE
LA-C6
LA110
E013 1.25 B NONE
LA-C7
LA110
#1 NONE
LA-C9
LA210
#1 E029 0.75 B + E07 0.75 B
2L 0.75 W NONE
LA-C10
LA108
330 0.75 L NONE
LA-C8
LA104
INSERT SEALING ON ALL EMPTY PINS
114H 0.75 R NONE
752 0.75 Lg/R NONE
751 0.75 G/R NONE
45 1.25 W/B NONE
469A 0.75 Lg NONE
115H 0.75 G NONE
E11 0.75 B/W NONE
CN-709M
12MA-JM2
INSERT SEALING ON ALL EMPTY PINS
902 0.75 Gr/R NONE
902 0.75 Gr/R NONE
902 0.75 Gr/R NONE
903 0.75 Lg NONE
903 0.75 Lg NONE
903 0.75 Lg NONE
CN-JC04F
6FA-JM2
CN-JC03AM
6MA-JM2
INSERT SEALING ON ALL EMPTY PINS
CN-JC01AM
12MA-JM2
INSERT SEALING ON ALL EMPTY PINS
809 0.75 G/W NONE
902 0.75 Gr/R NONE
926 0.75 R NONE
859 0.75 Gr NONE
453 1.25 R/W NONE
810 0.75 Br/G NONE
903 0.75 Lg NONE
927 0.75 O/W NONE
864 0.75 L/G NONE
39 1.25 Y/B NONE
CN-772F
12FA-JM2
INSERT SEALING ON ALL EMPTY PINS
CN-JC04AM
6MA-JM2

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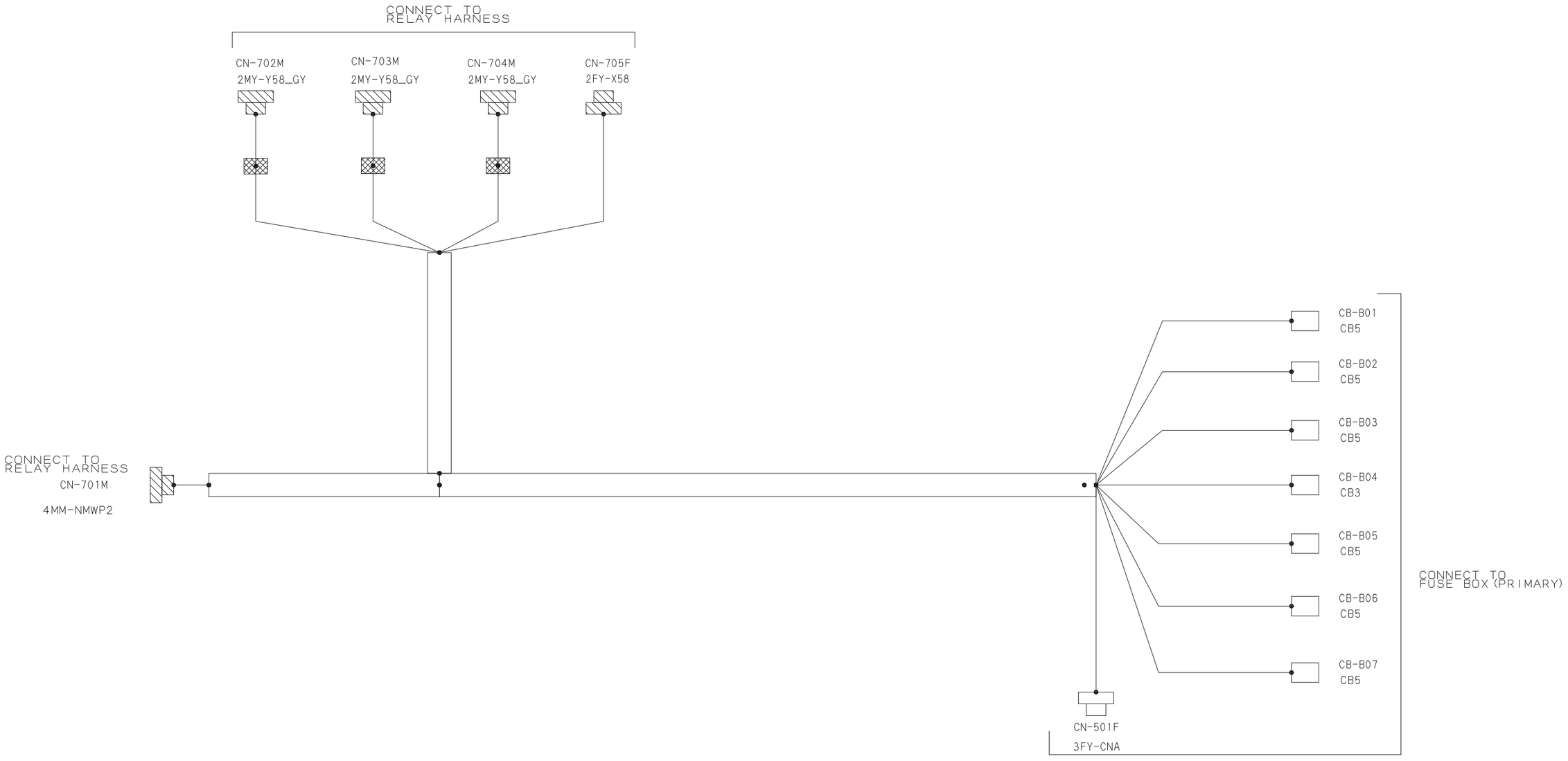
WIRE No. AND WIRE COLOR LIST

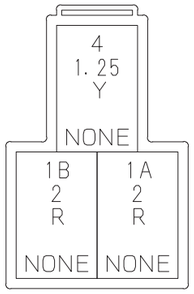
No.	COLOR	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
2L	W	AVSS	0.75	LA-C10				CN-615F
11	W/G	AVSS	1.25	CN-412F				CN-883M
22	L/R	AVSS	0.75	CN-676M				CN-707M
25	G/L	AVSS	0.75	CN-634F				CN-678M
26	L	AVSS	0.75	CN-412F				CN-679F
34A	Gr	AVSS	1.25	CN-677M				CN-614F
35	Br	AVS	2	CN-677M				JSC3
35A	Br	AVSS	1.25	CN-614F				JSC3
35C	Br	AVSS	1.25	CN-614F				JSC3
37	G	AVS	2	CN-675M				CN-706M
38	R/L	AVS	2	CN-675M				CN-706M
39	Y/B	AVSS	1.25	CN-772F				CN-676M
40	Br/W	AVSS	0.75	CN-707M				CN-676M
40	Br/W	AVSS	0.75	CN-677M				CN-615F
45	W/B	AVSS	1.25	CN-709M				CN-675M
60	Br/R	AVSS	0.75	CN-676M				CN-707M
62	Y/R	AVSS	0.75	CN-707M				CN-614F
69	P	AVSS	0.75	CN-677M				CN-615F
70	W/Y	AVSS	0.75	CN-707M				CN-676M
308A	L/Y	AVSS	0.5	CN-674F				CN-615F
309	GY	AVSS	0.5	CN-674F				CN-615F
310	RY	AVSS	0.5	CN-674F				CN-615F
311	W/Y	AVSS	0.5	CN-674F				CN-615F
330	L	AVSS	0.75	LA-C8				CN-670F
342	Br/R	AVSS	0.75	CN-671M				CN-604F
348	G	AVSS	0.75	CN-671M				CN-601F
349	Y	AVSS	0.75	CN-671M				CN-601F
350	L	AVSS	0.75	CN-671M				CN-601F
351	O/W	AVSS	0.75	CN-614F				CN-674F
354	P	AVSS	0.75	CN-671M				CN-602F
355	Gr	AVSS	0.75	CN-671M				CN-602F
356	Y/L	AVSS	0.75	CN-671M				CN-602F
357	L/B	AVSS	0.75	CN-671M				CN-604F
358	Lg/R	AVSS	0.75	CN-674F				CN-629F
360	Br/G	AVSS	0.75	CN-671M				CN-603F
361	W/R	AVSS	0.75	CN-671M				CN-603F
362	G/R	AVSS	0.75	CN-671M				CN-603F
363	R/Y	AVSS	0.75	CN-671M				CN-604F
364	Y	AVSS	0.75	CN-674F				CN-615F
367	Br	AVSS	0.75	CN-670F				CN-608F
368	O	AVSS	0.75	CN-670F				CN-607F
370	R/G	AVSS	0.75	CN-670F				CN-606F
411	G/L	AVSS	0.75	CN-670F				CN-610F
412	L/G	AVSS	0.75	CN-JC03F				CN-707M
412A	L/G	AVSS	0.75	CN-JC03F				CN-674F
412C	L/G	AVSS	0.75	CN-JC03F				CN-614F
424B	L/G	AVSS	0.75	CN-624F				CN-678M
425B	Y/L	AVSS	0.75	CN-624F				CN-678M
426B	Gr/L	AVSS	0.75	CN-624F				CN-678M
427B	R/W	AVSS	0.75	CN-624F				CN-678M
431B	R/G	AVSS	0.75	CN-626F				CN-678M
432B	O/W	AVSS	0.75	CN-626F				CN-678M
433	P/G	AVSS	0.75	CN-634F				CN-678M
434	G/B	AVSS	0.75	CN-673M				JS01
434A	G/B	AVSS	0.75	CN-676M				JS01
434C	G/B	AVSS	0.75	CN-620F				JS01
435	Br/G	AVSS	0.75	CN-413F				CN-883M
440B	W/R	AVSS	0.75	CN-677M				CN-615F
441	Y/B	AVSS	0.75	CN-412F				CN-883M
442	R/B	AVSS	0.75	CN-412F				CN-883M
444	G/R	AVSS	0.75	CN-412F				CN-883M
453	R/W	AVSS	1.25	CN-884F				CN-772F
455	L/Y	AVSS	0.75	CN-412F				CN-883M
456A	G/B	AVSS	0.75	CN-615F				CN-674F
458	L/B	AVSS	0.75	CN-614F				CN-677M
466	G/W	AVSS	0.75	CN-676M				CN-700M
467	P/W	AVSS	0.75	CB-C1				CN-678M
469A	Lg	AVSS	0.75	CN-676M				CN-709M
482	R	AVSS	0.75	CN-670F				CN-637F
483	W	AVSS	0.75	CN-670F				CN-637F
484	B	AVSS	0.75	CN-670F				CN-637F
487	Y/W	AVSS	0.75	CN-675M				CN-629F
751	G/R	AVSS	0.75	CN-709M				CN-670F
752	Lg/R	AVSS	0.75	CN-709M				CN-670F
753	Gr/R	AVSS	0.75	CN-674F				CN-615F
809	G/W	AVSS	0.75	CN-772F				CN-670F
810	Br/G	AVSS	0.75	CN-772F				CN-670F
811	R/W	AVSS	1.25	CN-676M				CN-700M
812	P/L	AVSS	1.25	CN-JC03F				CN-700M
812A	P/L	AVSS	0.75	CN-JC03F				CB-C2
812C	P/L	AVSS	0.75	CN-JC03F				CN-675M
813	P	AVS	1.25	CN-676M				CN-700M
859	Gr	AVSS	0.75	CN-772F				CN-679F
862	G/O	AVSS	0.75	CN-412F				CN-883M
864	L/G	AVSS	0.75	CN-772F				CN-679F
902	Gr/R	AVSS	0.75	CN-679F				CN-JC04F
902	Gr/R	AVSS	0.75	CN-413F				CN-JC04F
902	Gr/R	AVSS	0.75	CN-772F				CN-JC04F
903	Lg	AVSS	0.75	CN-679F				CN-JC04F
903	Lg	AVSS	0.75	CN-413F				CN-JC04F
903	Lg	AVSS	0.75	CN-772F				CN-JC04F
926	R	AVSS	0.75	CN-772F				CN-679F
927	O/W	AVSS	0.75	CN-772F				CN-679F
930	Gr/R	AVSS	0.75	CN-680M				CN-883M
931	Br/W	AVSS	0.75	CN-680M				CN-883M
944	Br	AVSS	0.75	CN-634F				CN-678M
946	O/L	AVSS	0.75	CN-413F				CN-883M
947	P/G	AVSS	0.75	CN-413F				CN-883M
986	Y/G	AVSS	0.75	CN-638F				CN-884F
987	L/O	AVSS	0.75	CN-638F				CN-677M
988	G	AVSS	0.75	CN-413F				CN-680M
989	Y/G	AVSS	0.75	CN-413F				CN-680M
A01	R	AVSS	0.75	CN-616F				CN-618F
A02	Br	AVSS	0.75	CN-616F				CN-618F
A03	B/L	AVSS	0.75	CN-616F				CN-618F
A04	G/W	AVSS	0.75	CN-616F				CN-618F
A05	Gr/R	AVSS	0.75	CN-616F				CN-618F
A06	P	AVSS	0.75	CN-616F				CN-618F
A07	Gr/L	AVSS	0.75	CN-616F				CN-618F
A08	W/G	AVSS	0.75	CN-616F				CN-618F
A09	B/R	AVSS	0.75	CN-616F				CN-618F
A10	G/L	AVSS	0.75	CN-616F				CN-618F
A11	W/Y	AVSS	0.75	CN-616F				CN-618F
A12	Gr/B	AVSS	0.75	CN-616F				CN-618F
A20	Y/G	AVSS	0.75	CN-677M				CN-614F
CO2	Y	AVSS	0.75	CN-412F				CN-883M
114H	R	AVSS	0.75	CN-673M				CN-709M
115H	G	AVSS	0.75	CN-673M				CN-709M
119H	Y	AVSS	0.75	CN-615F				CN-677M
120H	L	AVSS	0.75	CN-615F				CN-677M
372	R/Y	AVSS	0.75	CN-673M				CN-613F
373	W/B	AVSS	0.75	CN-673M				CN-613F
374	L/G	AVSS	0.75	CN-673M				CN-612F
375	Br/R	AVSS	0.75	CN-673M				CN-612F
376	O/L	AVSS	0.75	CN-611F				CN-673M
377	Gr/L	AVSS	0.75	CN-611F				CN-673M
494	YB	AVSS	0.75	CN-621F				CN-884F
495	L/G	AVSS	0.75	CN-621F				CN-884F
496	G	AVSS	0.75	CN-622F				CN-884F
497	L/Y	AVSS	0.75	CN-622F				CN-884F
498	R/G	AVSS	0.75	CN-623F				CN-884F
499	L/R	AVSS	0.75	CN-623F				CN-884F
E07	B	AVSS	0.75	LA-C9	DSC3			CN-620F
E029	B	AVSS	0.75	LA-C9	DSC3			CN-610F
E011	B	AVSS	0.75	CA-C1	DSC1			LA-C1
E026	B	AVSS	0.75	CA-C1	DSC1			CN-629F
E013	B	AVSS	1.25	CN-JC01F				LA-C7
E016	B	AVSS	0.75	CN-JC01F				CN-626F
E017	B	AVSS	0.75	CN-JC01F				CN-626F
E018	B	AVSS	0.75	CN-JC01F				CN-634F
E0JP	B	AVSS	1.25	CN-JC01F				CN-JC01F
E020	B	AVSS	0.75	CN-624F				CN-JC01F
E021	B	AVSS	0.75	CN-624F				CN-JC01F
E022	B	AVSS	0.75	CN-624F				CN-JC01F
E023	B	AVSS	0.75	CN-624F				CN-JC01F
E024	B	AVSS	1.25	LA-C4				CN-JC01F
E027	B	AVSS	0.75	CN-608F			DSC6	CN-607F
E028	B	AVSS	0.75	LA-C6			DSC6	CN-607F
E1	B/W	AVSS	1.25	CN-708F				CN-672M
E2	B/W	AVSS	1.25	CN-708F				CN-672M
E3	B/W	AVSS	1.25	CN-708F				CN-672M
E4	B/W	AVSS	1.25	CN-708F				CN-672M
E5	B/W	AVSS	1.25	CN-708F				CN-672M
E8	B/W	AVSS	1.25	CN-700M				CN-614F
E9	B/W	AVSS	1.25	CN-700M				CN-614F
E10	B/W	AVSS	0.5	CN-672M				CN-708F
E11	B/W	AVSS	0.75	CN-709M				CN-679F

(4/4)

POWER SUPPLY HARNESS

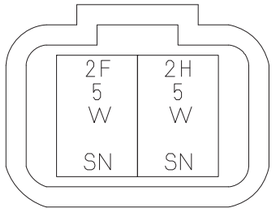


(1/3)



CN-501F

3FY-CNA



CN-703M

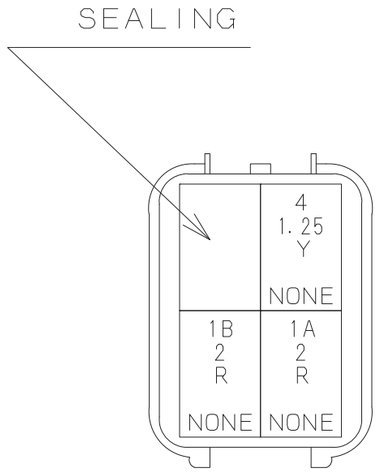
2MY-Y58_GY

CB-B01

CB5

CB-B05

CB5



CN-701M

4MM-NMWP2

CN-704M

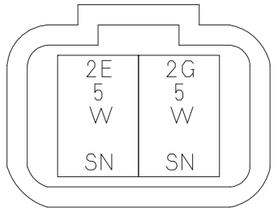
2MY-Y58_GY

CB-B02

CB5

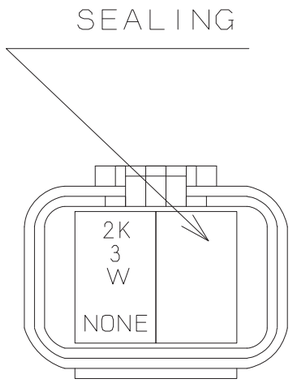
CB-B06

CB5



CN-702M

2MY-Y58_GY



CN-705F

2FY-X58

CB-B03

CB5

CB-B07

CB5

CB-B04

CB3

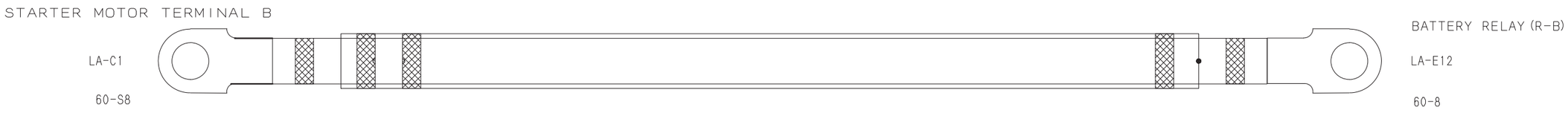
(2/3)

WIRE No. AND WIRE COLOR LIST

No.	COLOR	TYPE	SIZE	FROM	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	TO
1A	R	AVS	2	CN-501F			————			CN-701M
1B	R	AVS	2	CN-501F			————			CN-701M
2E	W	AVS	5	CB-B07			————			CN-702M
2F	W	AVS	5	CB-B05			————			CN-703M
2G	W	AVS	5	CB-B06			————			CN-702M
2H	W	AVS	5	CB-B03			————			CN-703M
2I	W	AVS	5	CB-B01			————			CN-704M
2J	W	AVS	5	CB-B02			————			CN-704M
2K	W	AVS	3	CB-B04			————			CN-705F
4	Y	AVSS	1.25	CN-501F			————			CN-701M

(3/3)

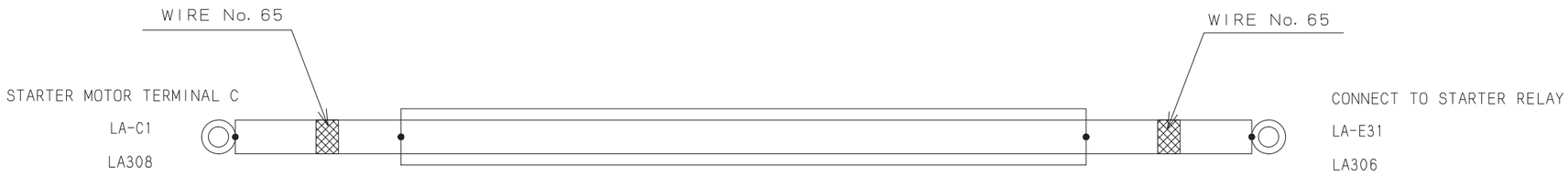
STARTER HARNESS (TERMINAL B) TO BATTERY RELAY HARNESS



WIRE No. AND WIRE COLOR LIST

No.	COLOR	TYPE	SIZE	FROM	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	TO
2	B	AV	60	LA-E12			————			LA-C1

STARTER HARNESS (TERMINAL C) TO SAFETY RELAY HARNESS



WIRE No. AND WIRE COLOR LIST

No.	COLOR	TYPE	SIZE	FROM	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	TO
65	W	AV	8	LA-C1			————			LA-E31

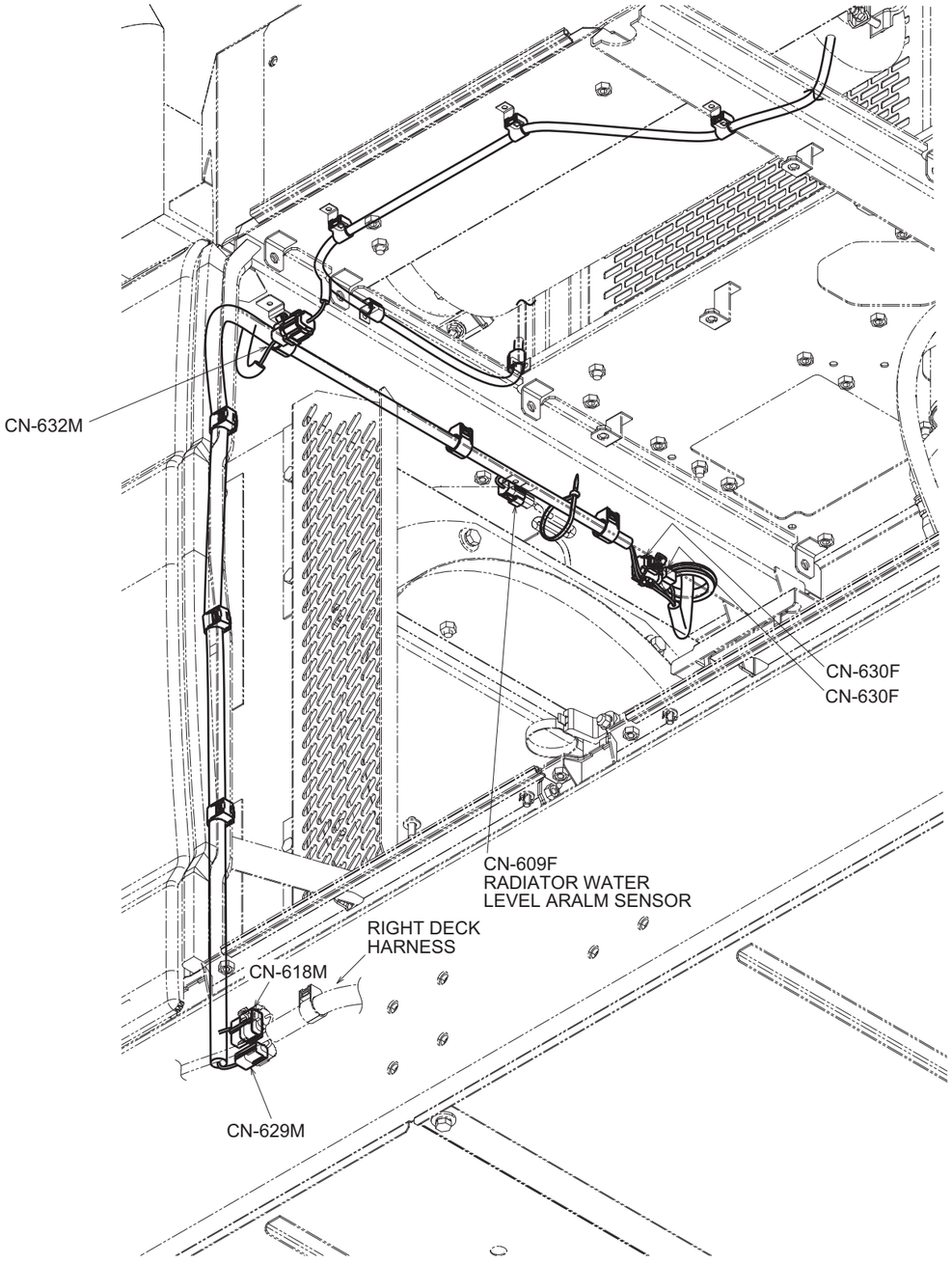
GLOW RELAY HARNESS TO ENGINE SUB HARNESS

WIRE No. AND WIRE COLOR LIST

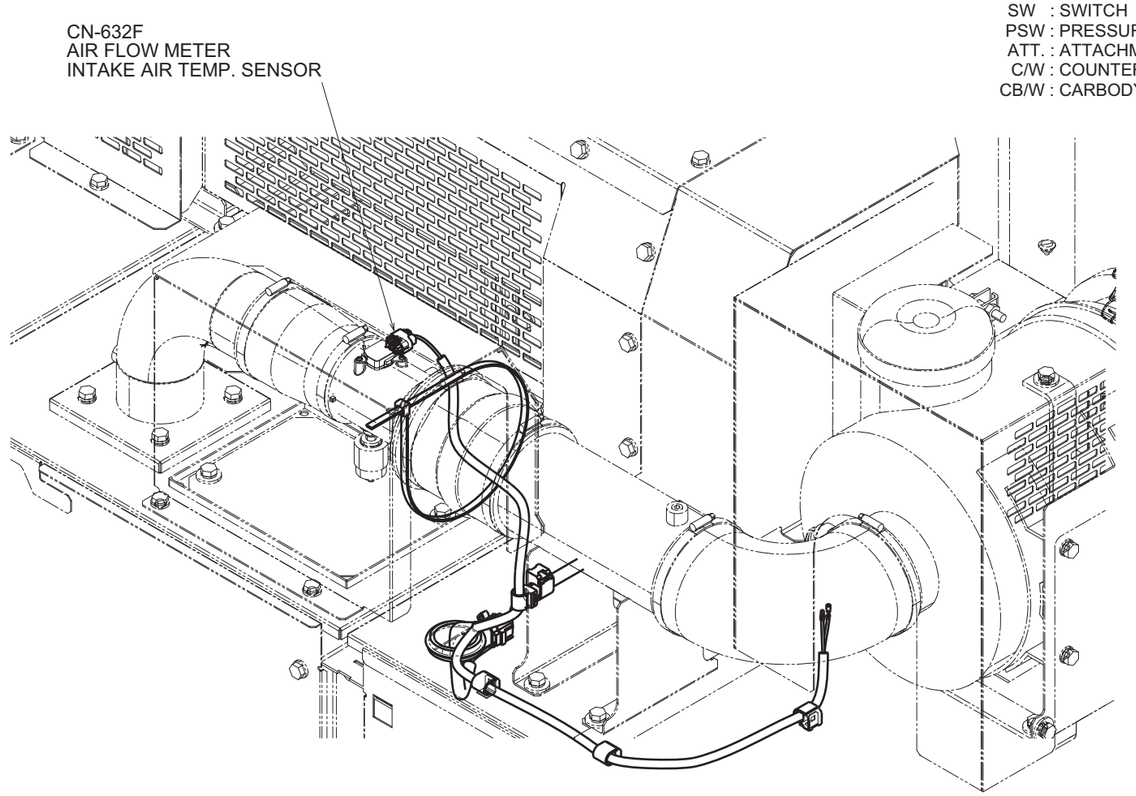
No.	COLOR	TYPE	SIZE	FROM	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	TO
A17	W	AV	8	LA-E36B			————			CN-635F

5. ELECTRICAL PART OF RIGHT DECK (GUARD)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



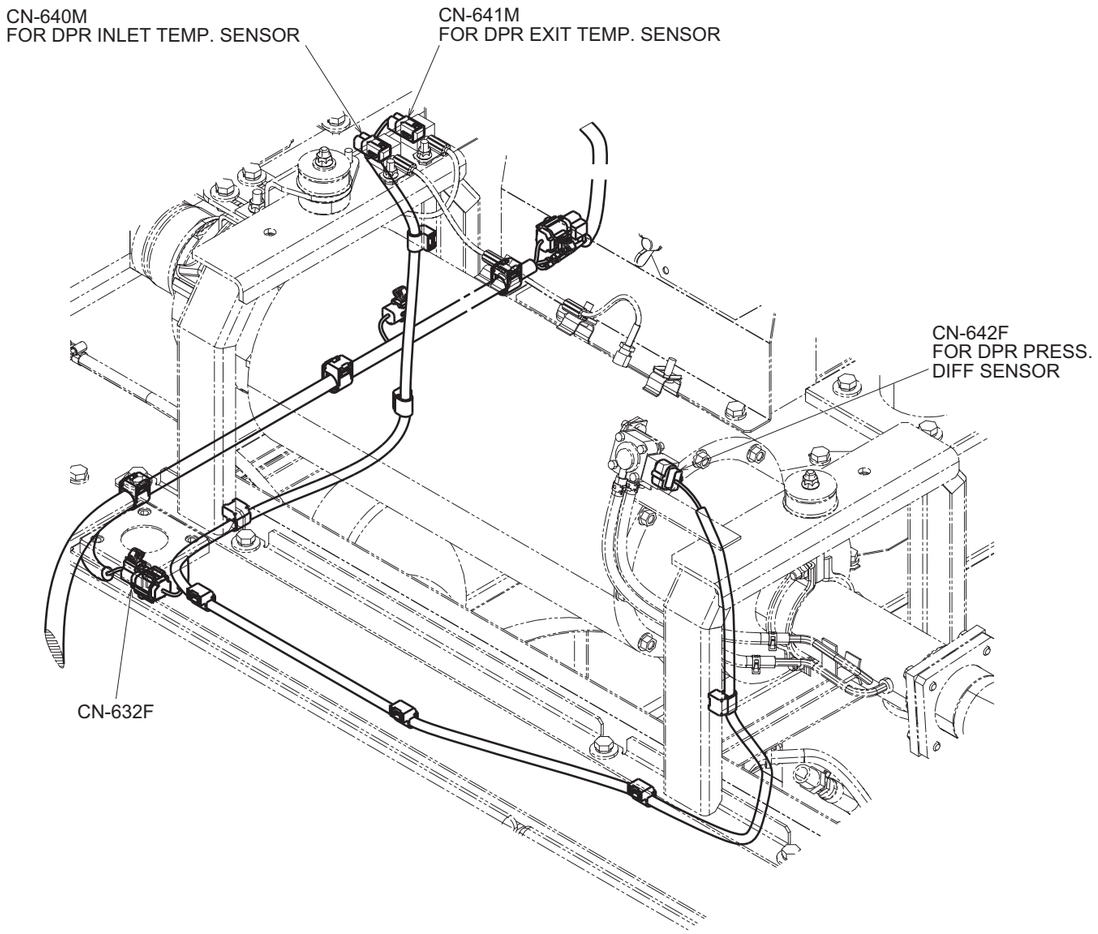
VIEW FROM “A”

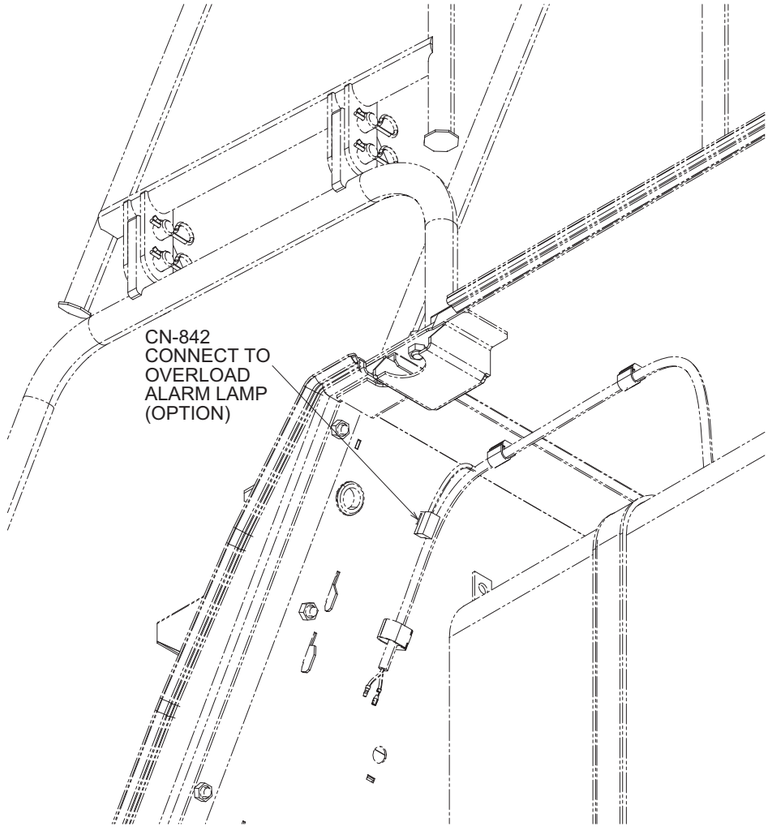


VIEW FROM “B”

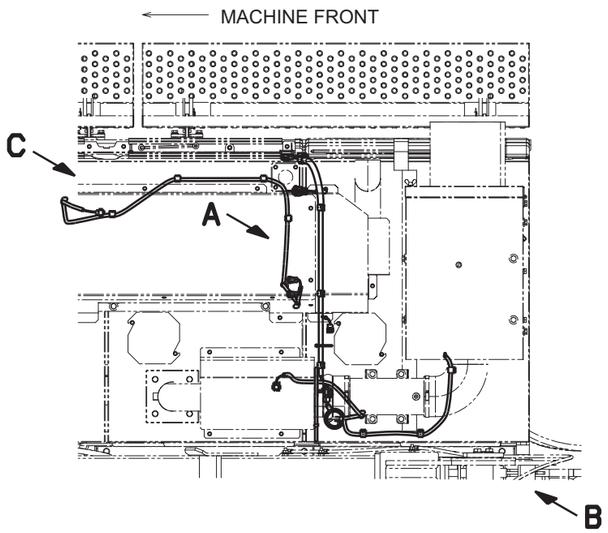
(1/2)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT

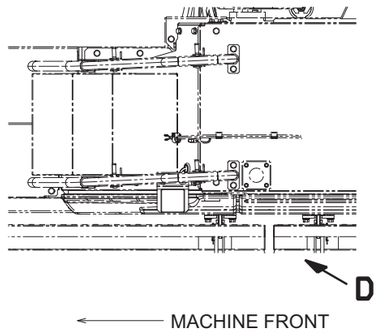




VIEW FROM “C”

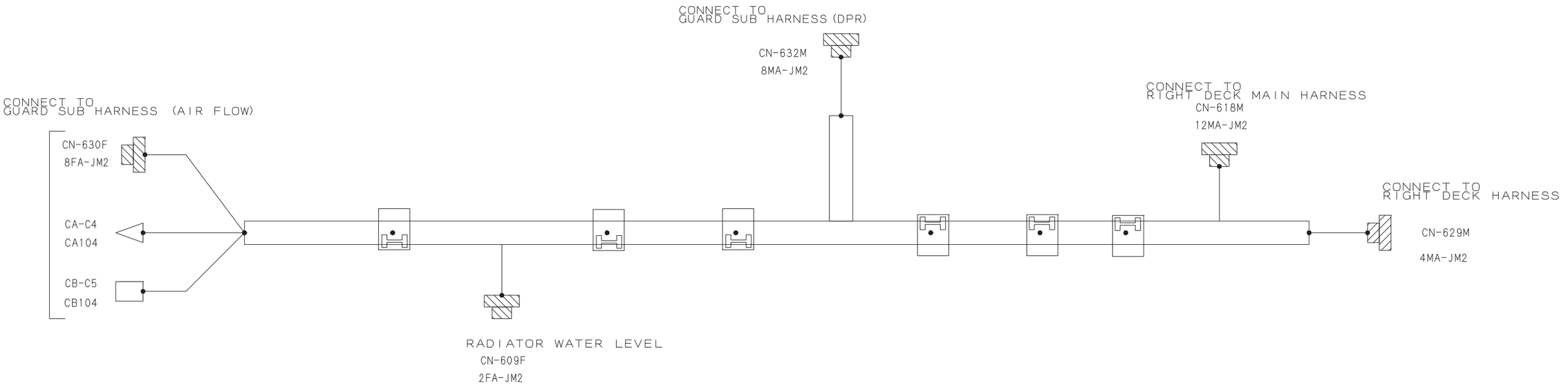


VIEW FROM “D”

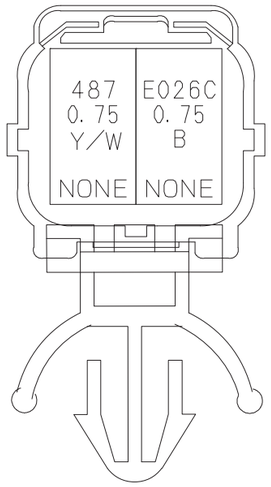


(2/2)

GUARD HARNESS A



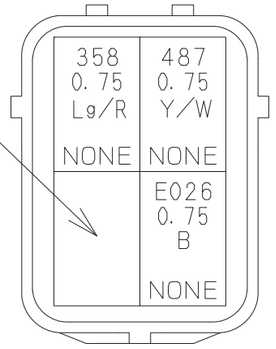
(1/3)



CN-609F

2FA-JM2

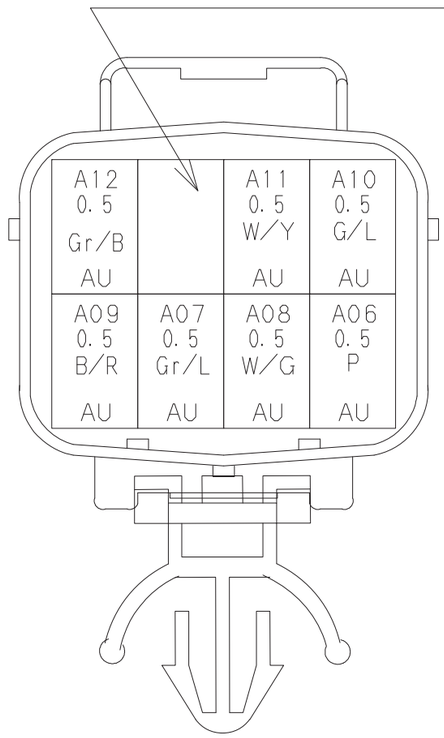
INSERT SEALING ON ALL EMPTY PINS



CN-629M

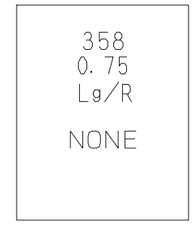
4MA-JM2

INSERT SEALING ON ALL EMPTY PINS



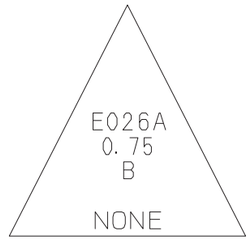
CN-632M

8MA-JM2



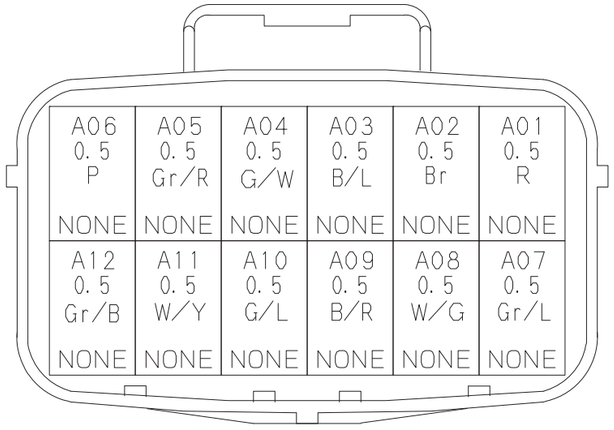
CB-C5

CB104



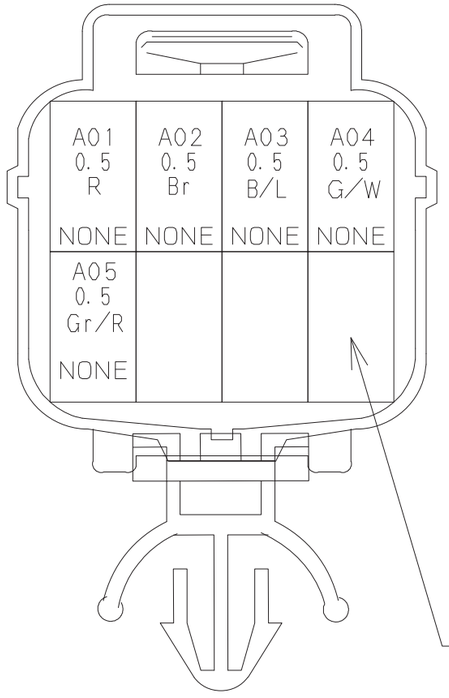
CA-C4

CA104



CN-618M

12MA-JM2



CN-630F

8FA-JM2

INSERT SEALING ON ALL EMPTY PINS

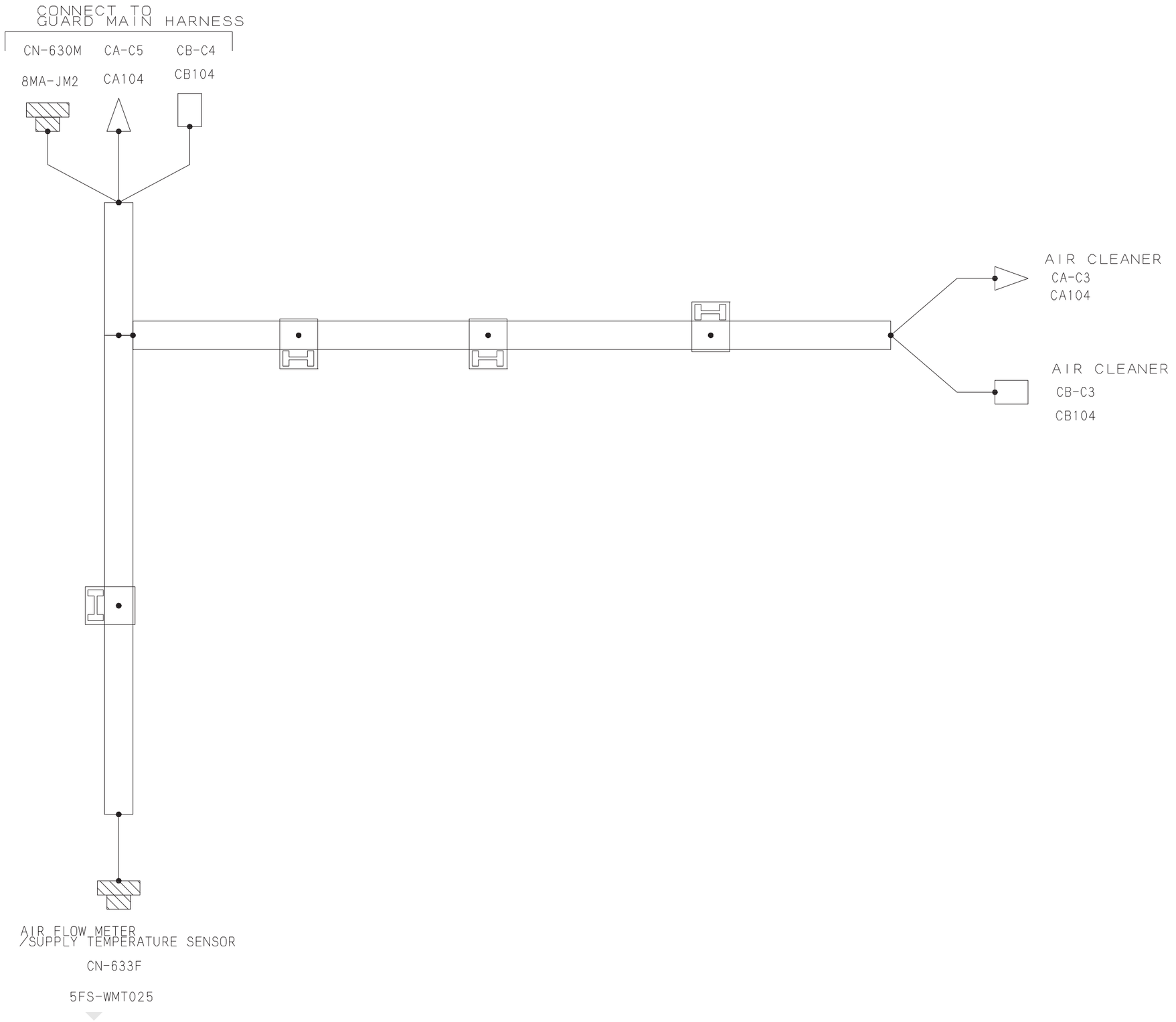
(2/3)

WIRE No. AND WIRE COLOR LIST

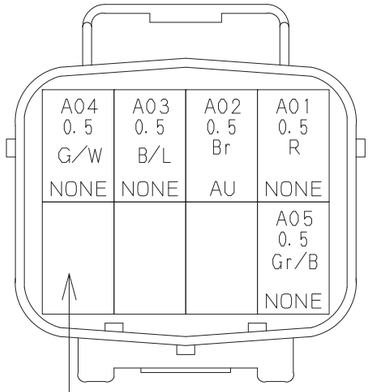
No.	COLOR	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	T O
358	Lg/R	AVSS	0.75	CN-629M		———————		CB-C5
487	Y/W	AVSS	0.75	CN-609F		———————		CN-629M
A01	R	AVSS	0.5	CN-618M		———————		CN-630F
A02	Br	AVSS	0.5	CN-618M		———————		CN-630F
A03	B/L	AVSS	0.5	CN-618M		———————		CN-630F
A04	G/W	AVSS	0.5	CN-618M		———————		CN-630F
A05	Gr/R	AVSS	0.5	CN-618M		———————		CN-630F
A06	P	AVSS	0.5	CN-618M		———————		CN-632M
A07	Gr/L	AVSS	0.5	CN-618M		———————		CN-632M
A08	W/G	AVSS	0.5	CN-618M		———————		CN-632M
A09	B/R	AVSS	0.5	CN-618M		———————		CN-632M
A10	G/L	AVSS	0.5	CN-618M		———————		CN-632M
A11	W/Y	AVSS	0.5	CN-618M		———————		CN-632M
A12	Gr/B	AVSS	0.5	CN-618M		———————		CN-632M
E026	B	AVSS	0.75	CN-629M		———————		JSC4
E026A	B	AVSS	0.75	CA-C4		———————		JSC4
E026C	B	AVSS	0.75	CN-609F		———————		JSC4

(3/3)

GUARD HARNESS B



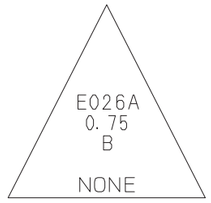
(1/3)



CN-630M

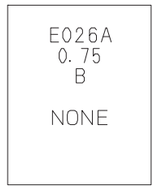
8MA-JM2

INSERT SEALING ON ALL EMPTY PINS



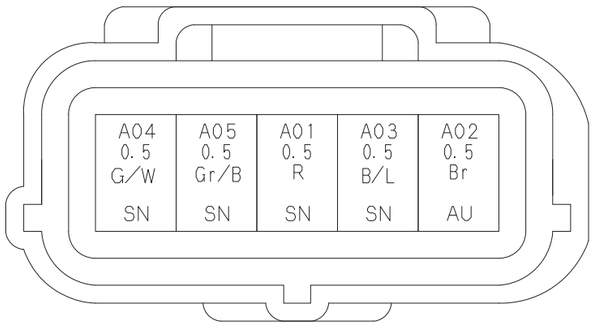
CA-C3

CA104



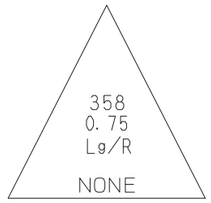
CB-C4

CB104



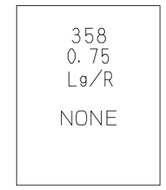
CN-633F

5FS-WMT025



CA-C5

CA104



CB-C3

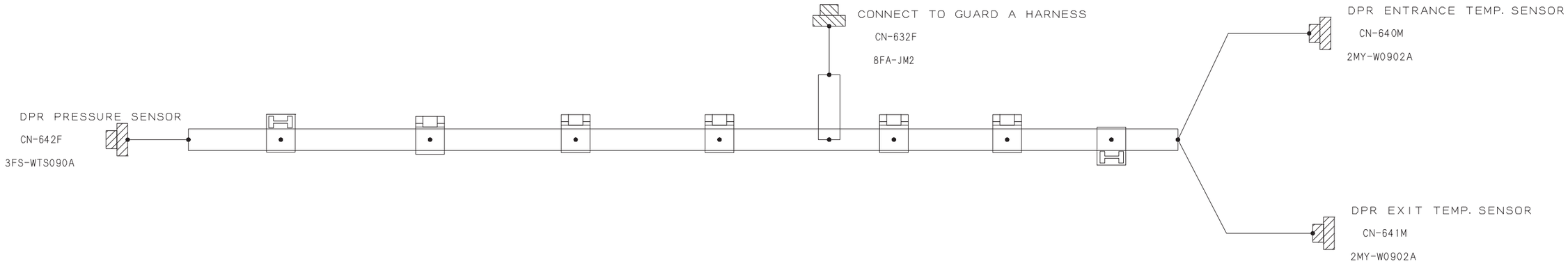
CB104

(2/3)

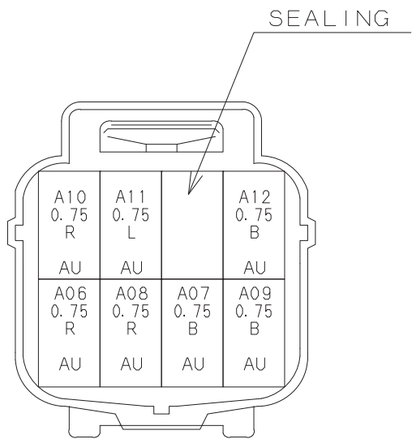
WIRE No. AND WIRE COLOR LIST

No.	COLOR	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
358	Lg/R	AVSS	0.75	CA-C5		———————		CB-C3
A01	R	AVSS	0.5	CN-630M		———————		CN-633F
A02	Br	AVSS	0.5	CN-630M		———————		CN-633F
A03	B/L	AVSS	0.5	CN-630M		———————		CN-633F
A04	G/W	AVSS	0.5	CN-630M		———————		CN-633F
A05	Gr/B	AVSS	0.5	CN-630M		———————		CN-633F
E026A	B	AVSS	0.75	CA-C3		———————		CB-C4

GUARD HARNESS C

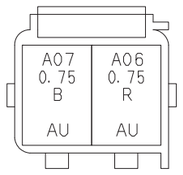


(1/2)



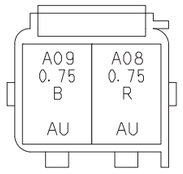
CN-632F

8FA-JM2



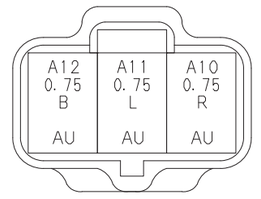
CN-640M

2MY-W0902A



CN-641M

2MY-W0902A



CN-642F

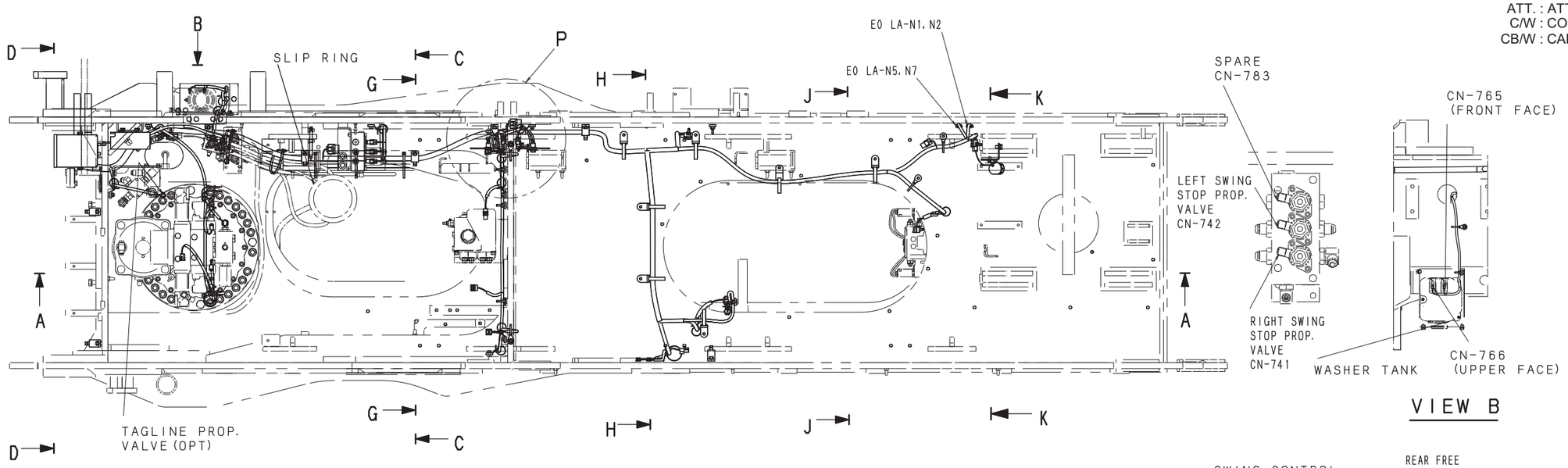
3FS-WTS090A

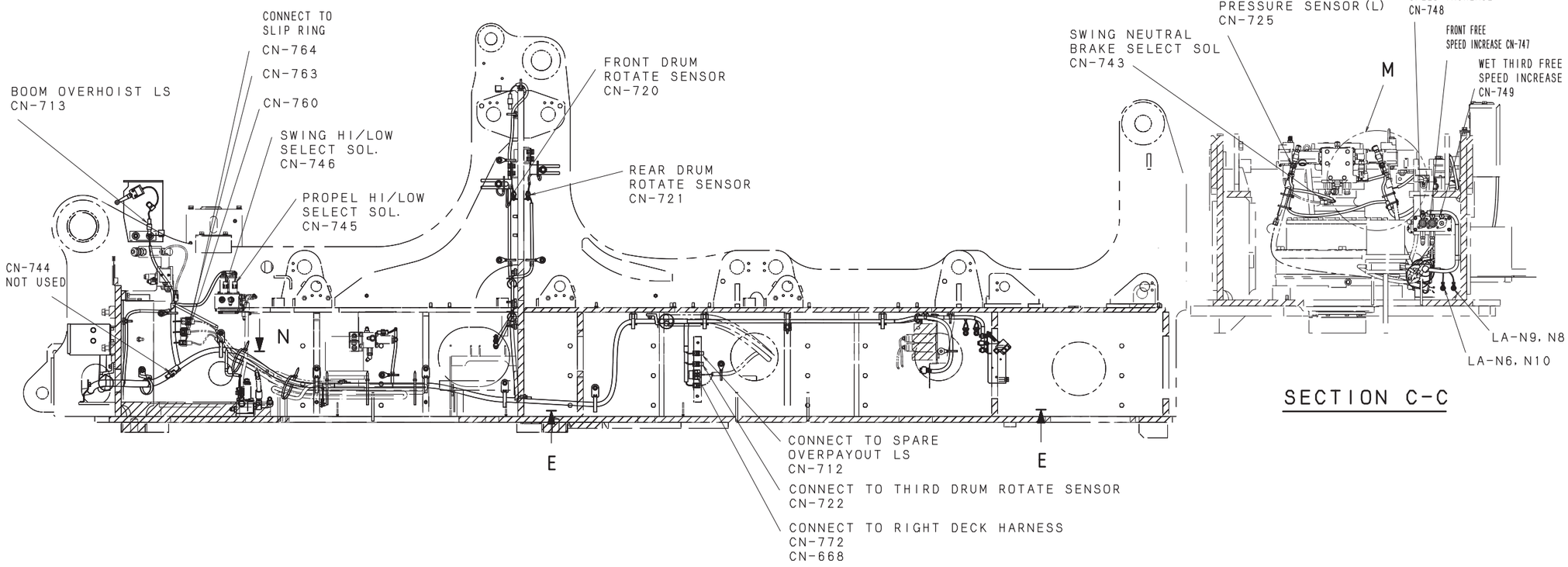
WIRE No. AND WIRE COLOR LIST

No.	COLOR	TYPE	SIZE	FROM	PIN No.	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	PIN No.	TO
A06	R	AESSX	0.75	CN-632F	5			———			1	CN-640M
A07	B	AESSX	0.75	CN-632F	7			———			2	CN-640M
A08	R	AESSX	0.75	CN-632F	6			———			1	CN-641M
A09	B	AESSX	0.75	CN-632F	8			———			2	CN-641M
A10	R	AESSX	0.75	CN-632F	1			———			3	CN-642F
A11	L	AESSX	0.75	CN-632F	2			———			2	CN-642F
A12	B	AESSX	0.75	CN-632F	4			———			1	CN-642F

6. ELECTRICAL PART OF SWING FRAME

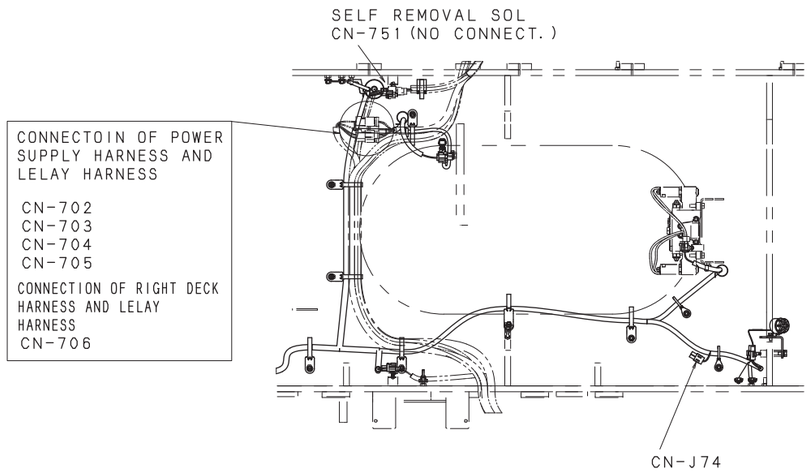
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



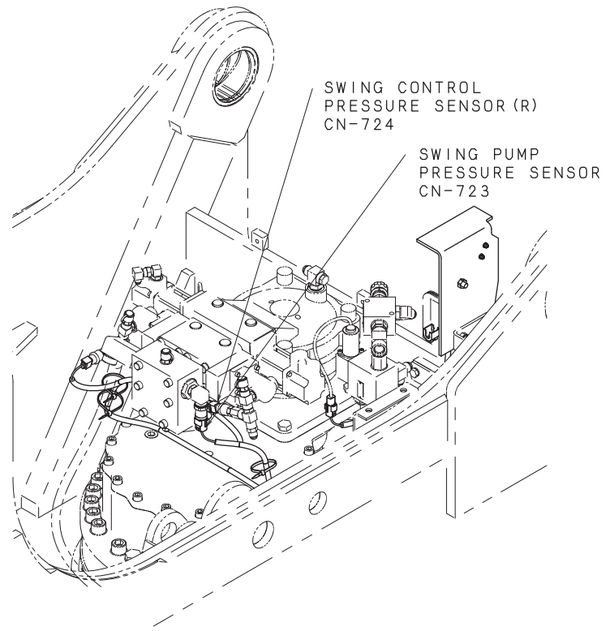


(1/3)

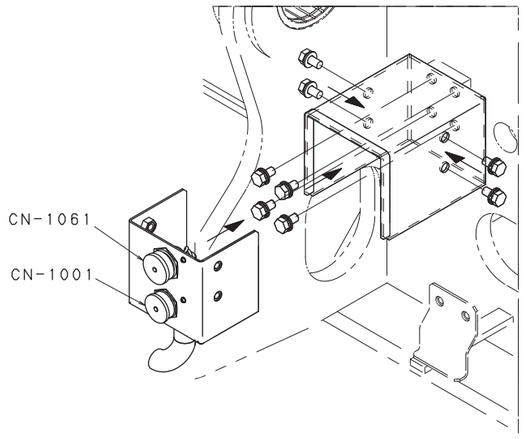
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



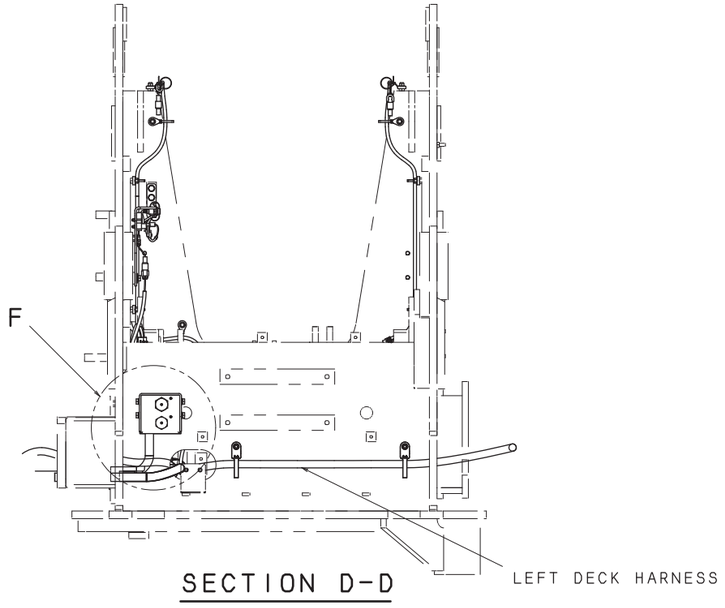
VIEW E-E



DETAIL M



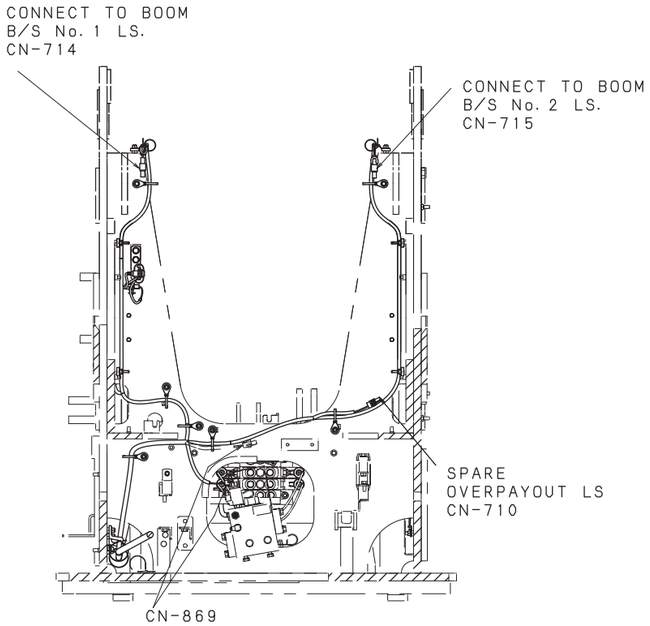
DETAIL A



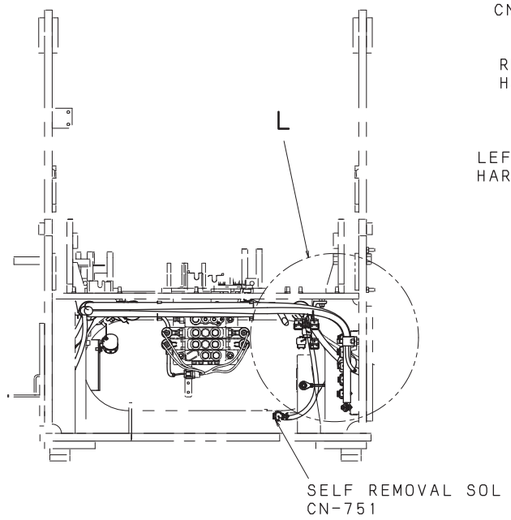
SECTION D-D

(2/3)

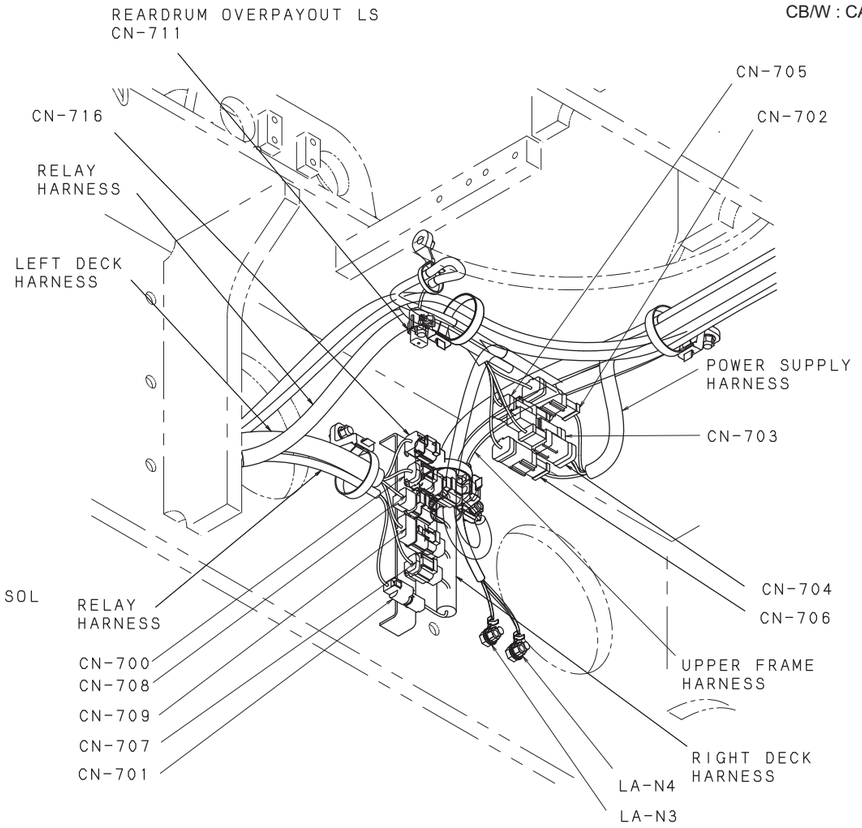
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



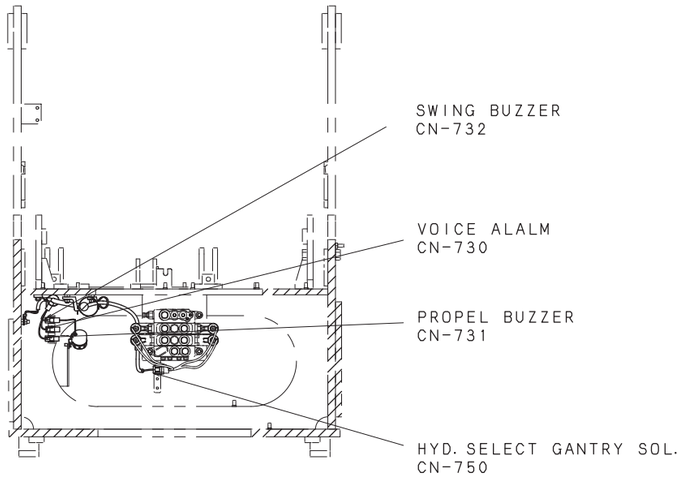
SECTION G-G



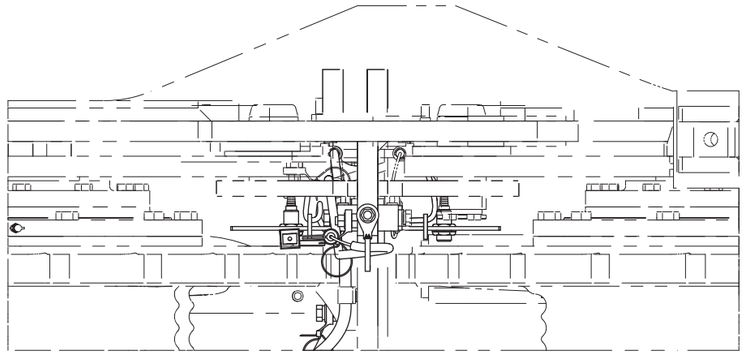
SECTION H-H

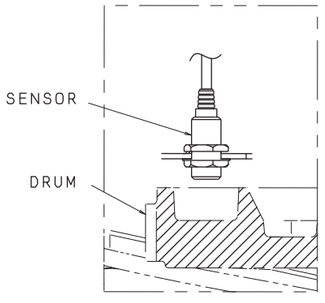


DETAIL L



SECTION J-J

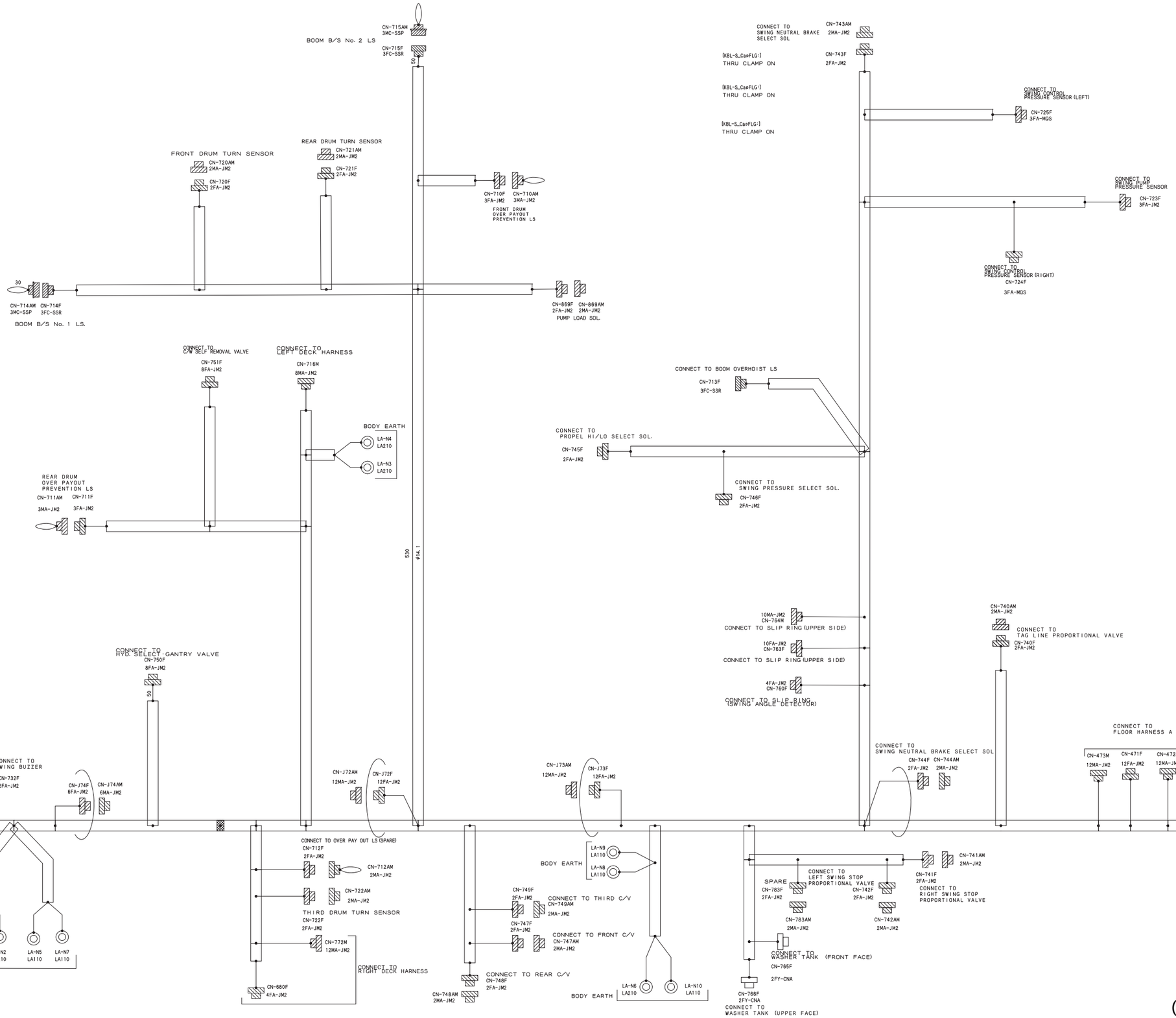




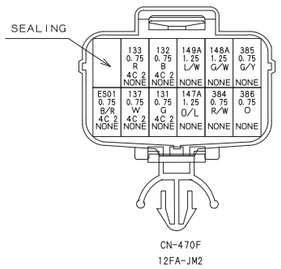
DETAIL P

(3/3)

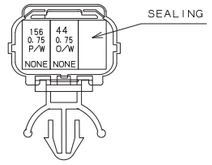
SWING FRAME HARNESS



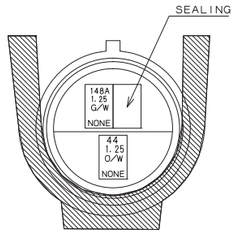
(1/4)



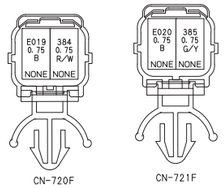
CN-470F
12FA-JM2



CN-710F
3FA-JM2

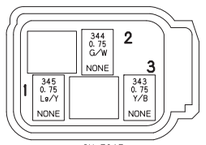


CN-713F
3FC-SSR



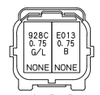
CN-720F
2FA-JM2

CN-721F
2FA-JM2



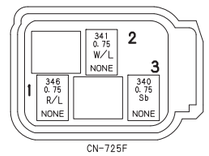
CN-724F
3FA-MQS

CN-740F
2FA-JM2

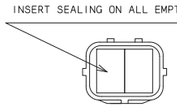


CN-744F
2FA-JM2

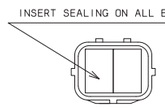
CN-749F
2FA-JM2



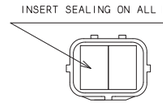
CN-725F
3FA-MQS



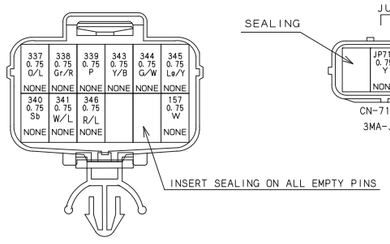
CN-740AM
2MA-JM2



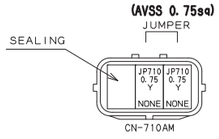
CN-744AM
2MA-JM2



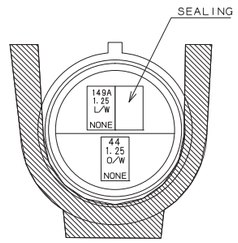
CN-749AM
2MA-JM2



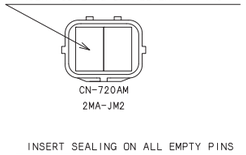
CN-471F
12FA-JM2



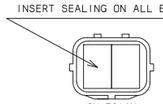
CN-710AM
3MA-JM2



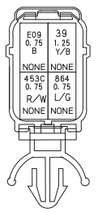
CN-714F
3FC-SSR



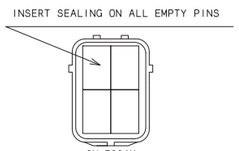
CN-720AM
2MA-JM2



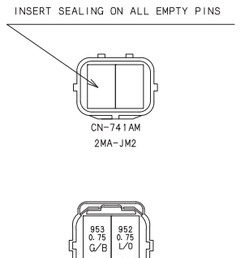
CN-721AM
2MA-JM2



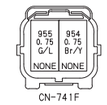
CN-730F
4FA-JM2



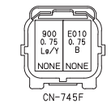
CN-730AM
4MA-JM2



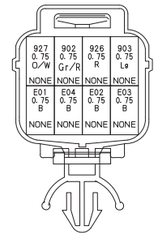
CN-741AM
2MA-JM2



CN-741F
2FA-JM2

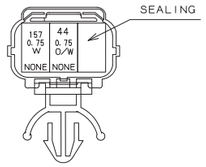


CN-745F
2FA-JM2

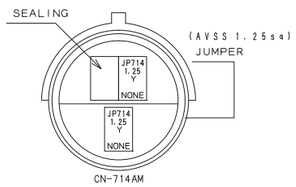


CN-750F
8FA-JM2

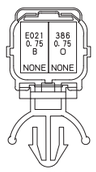
CN-472M
12MA-JM2



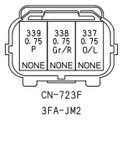
CN-711F
3FA-JM2



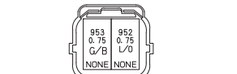
CN-714AM
3MC-SSP



CN-722F
2FA-JM2

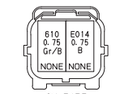


CN-723F
3FA-JM2

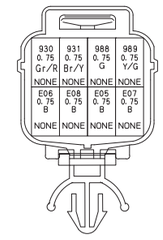


CN-747AM
2MA-JM2

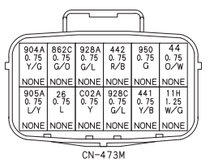
CN-742F
2FA-JM2



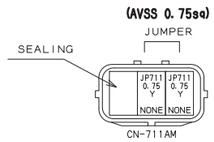
CN-747F
2FA-JM2



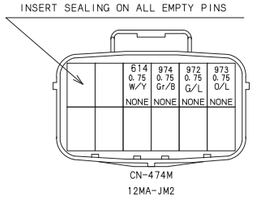
CN-751F
8FA-JM2



CN-473M
12MA-JM2



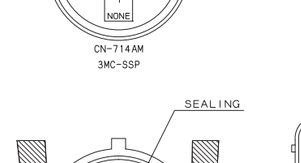
CN-711AM
3MA-JM2



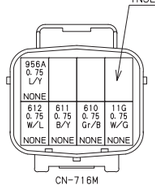
CN-474M
12MA-JM2

CN-712F
2FA-JM2

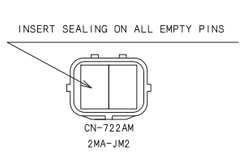
CN-712AM
2MA-JM2



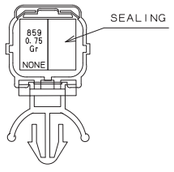
CN-715F
3FC-SSR



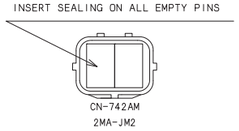
CN-716M
8MA-JM2



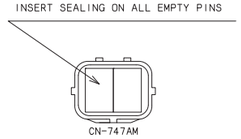
CN-722AM
2MA-JM2



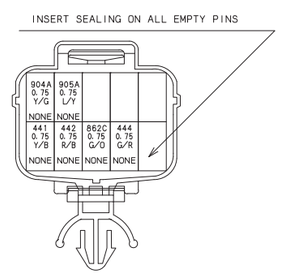
CN-731F
2FA-JM2



CN-742AM
2MA-JM2

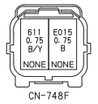


CN-747AM
2MA-JM2

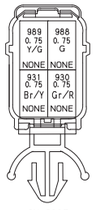


CN-763F
10FA-JM2

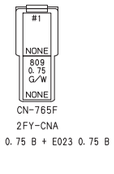
CN-743F
2FA-JM2



CN-748F
2FA-JM2

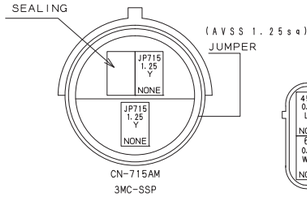


CN-680F
4FA-JM2

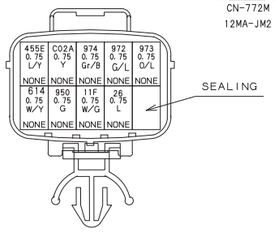


CN-765F
2FY-CNA
#1 E022 0.75 B + E023 0.75 B

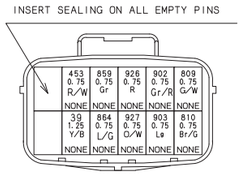
CN-766F
2FY-CNA



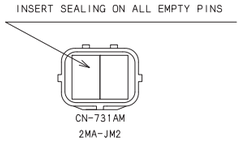
CN-715AM
3MC-SSP



CN-764M
10MA-JM2

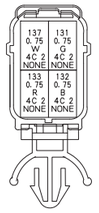


CN-772M
12MA-JM2

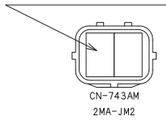


CN-731AM
2MA-JM2

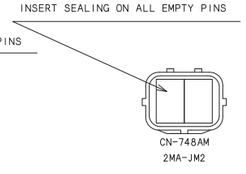
CN-732F
2FA-JM2



CN-760F
4FA-JM2



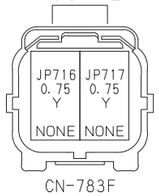
CN-743AM
2MA-JM2



CN-748AM
2MA-JM2

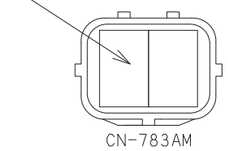
(AVSS 0.75sq)

JUMPER

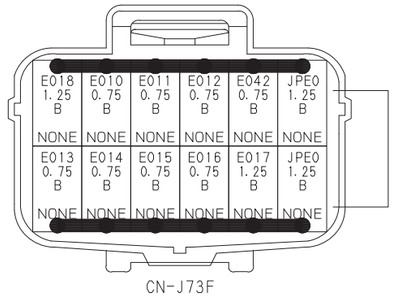


CN-783F
2FA-JM2

INSERT SEALING ON ALL EMPTY PINS

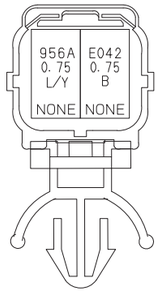


CN-783AM
2MA-JM2



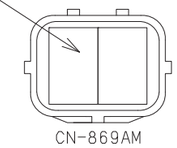
JUMPER
(AVSS 1.25sq)

CN-J73F
12FA-JM2



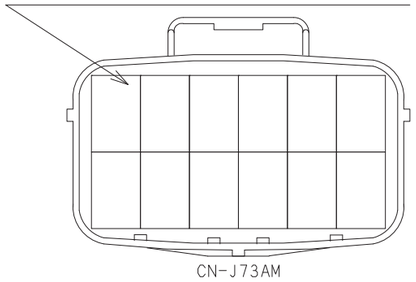
CN-869F
2FA-JM2

INSERT SEALING ON ALL EMPTY PINS



CN-869AM
2MA-JM2

INSERT SEALING ON ALL EMPTY PINS

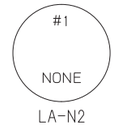


CN-J73AM
12MA-JM2

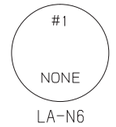
LA-N1
LA210
#1 E01 0.75 B + E02 0.75 B

LA-N5
LA110

LA-N9
LA110

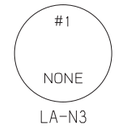


LA-N2
LA210
#1 E03 0.75 B + E04 0.75 B



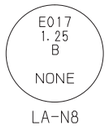
LA-N6
LA210
#1 E019 0.75 B + E020 0.75 B

LA-N10
LA110



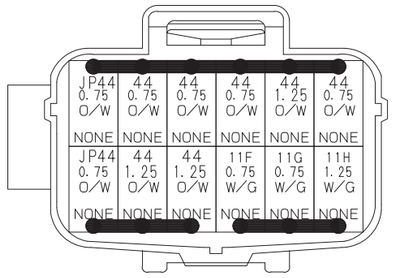
LA-N3
LA210
#1 E05 0.75 B + E06 0.75 B

LA-N7
LA110

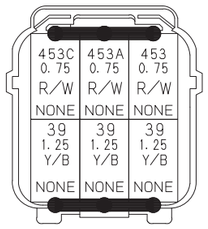


LA-N8
LA110

JUMPER
(AVSS 0.75sq)

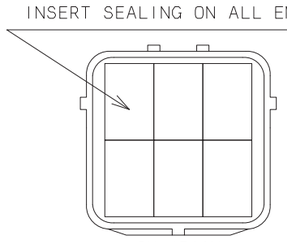


CN-J72F
12FA-JM2



CN-J74F
6FA-JM2

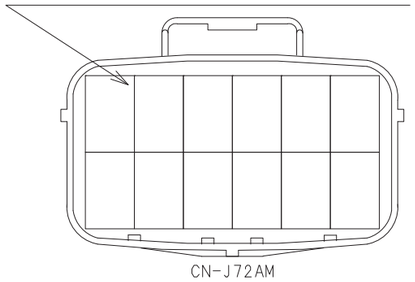
INSERT SEALING ON ALL EMPTY PINS



CN-J74AM
6MA-JM2

LA-N4
LA210
#1 E07 0.75 B + E08 0.75 B

INSERT SEALING ON ALL EMPTY PINS



CN-J72AM
12MA-JM2

(3/4)

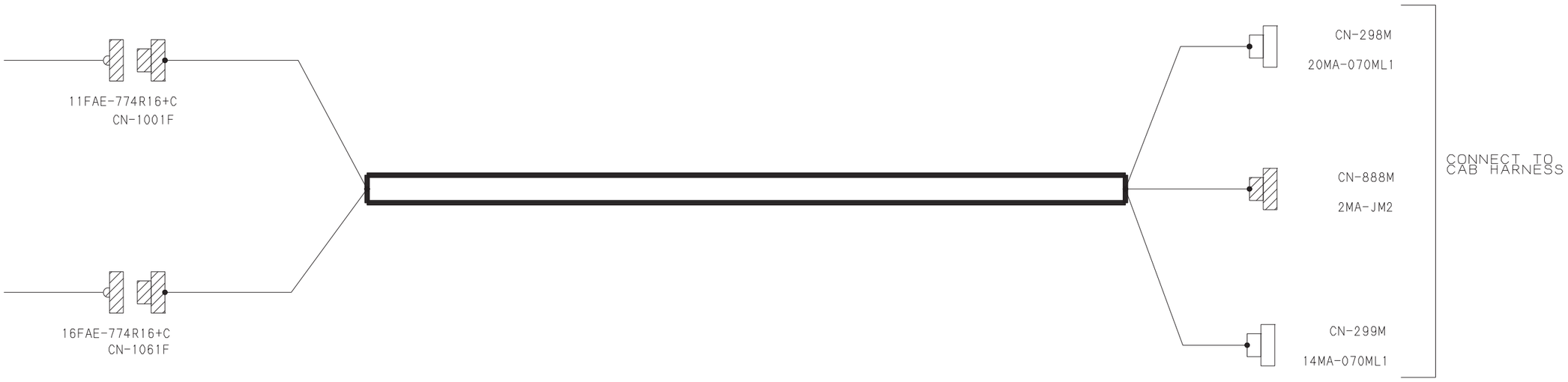
WIRE No. AND WIRE COLOR LIST

No.	COLOR	TYPE	SIZE	F R O M	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
11F	W/G	AVSS	0.75	CN-J72F				CN-764M
11G	W/G	AVSS	0.75	CN-J72F				CN-716M
11H	W/G	AVSS	1.25	CN-J72F				CN-473M
26	L	AVSS	0.75	CN-473M				CN-764M
39	Y/B	AVSS	1.25	CN-J74F				CN-772M
39	Y/B	AVSS	1.25	CN-J74F				CN-730F
39	Y/B	AVSS	1.25	CN-J74F				CN-732F
44	O/W	AVSS	0.75	CN-J72F				CN-473M
44	O/W	AVSS	0.75	CN-J72F				CN-710F
44	O/W	AVSS	0.75	CN-J72F				CN-711F
44	O/W	AVSS	0.75	CN-J72F				CN-712F
44	O/W	AVSS	1.25	CN-J72F				CN-714F
JP44	O/W	AVSS	0.75	CN-J72F				CN-J72F
44	O/W	AVSS	1.25	CN-715F				CN-J72F
44	O/W	AVSS	1.25	CN-713F				CN-J72F
147A	O/L	AVSS	1.25	CN-715F				CN-470F
148A	G/W	AVSS	1.25	CN-713F				CN-470F
149A	L/W	AVSS	1.25	CN-470F				CN-714F
156	P/W	AVSS	0.75	CN-472M				CN-710F
157	W	AVSS	0.75	CN-471F				CN-711F
158	RW	AVSS	0.75	CN-472M				CN-712F
337	O/L	AVSS	0.75	CN-723F				CN-471F
338	Gr/R	AVSS	0.75	CN-723F				CN-471F
339	P	AVSS	0.75	CN-723F				CN-471F
340	Sb	AVSS	0.75	CN-725F				CN-471F
341	W/L	AVSS	0.75	CN-725F				CN-471F
343	Y/B	AVSS	0.75	CN-724F				CN-471F
344	G/W	AVSS	0.75	CN-724F				CN-471F
345	Lg/Y	AVSS	0.75	CN-724F				CN-471F
346	R/L	AVSS	0.75	CN-725F				CN-471F
384	R/W	AVSS	0.75	CN-720F				CN-470F
385	G/Y	AVSS	0.75	CN-721F				CN-470F
386	O	AVSS	0.75	CN-470F				CN-722F
441	Y/B	AVSS	0.75	CN-473M				CN-763F
442	R/B	AVSS	0.75	CN-763F				CN-473M
444	G/R	AVSS	0.75	CN-472M				CN-763F
453	R/W	AVSS	0.75	CN-J74F				CN-772M
453A	R/W	AVSS	0.75	CN-J74F				CN-732F
453C	R/W	AVSS	0.75	CN-J74F				CN-730F
455E	L/Y	AVSS	0.75	CN-764M				CN-472M
610	Gr/B	AVSS	0.75	CN-747F				CN-716M
611	B/Y	AVSS	0.75	CN-748F				CN-716M
612	W/L	AVSS	0.75	CN-749F				CN-716M
614	W/Y	AVSS	0.75	CN-764M				CN-474M
809	G/W	AVSS	0.75	CN-772M				CN-765F
810	Br/G	AVSS	0.75	CN-766F				CN-772M
859	Gr	AVSS	0.75	CN-772M				CN-731F
862C	G/O	AVSS	0.75	CN-763F				CN-473M
864	L/G	AVSS	0.75	CN-730F				CN-772M
900	Lg/Y	AVSS	0.75	CN-745F				CN-472M
902	Gr/R	AVSS	0.75	CN-750F				CN-772M
903	Lg	AVSS	0.75	CN-750F				CN-772M
904A	Y/G	AVSS	0.75	CN-763F				CN-473M
905A	L/Y	AVSS	0.75	CN-473M				CN-763F
926	R	AVSS	0.75	CN-772M				CN-750F
927	O/W	AVSS	0.75	CN-772M				CN-750F
928A	G/L	AVSS	0.75	CN-473M				CN-743F
928C	G/L	AVSS	0.75	CN-473M				CN-744F
929	R/Y	AVSS	0.75	CN-472M				CN-746F
930	Gr/R	AVSS	0.75	CN-680F				CN-751F
931	Br/Y	AVSS	0.75	CN-680F				CN-751F
950	G	AVSS	0.75	CN-764M				CN-473M
956A	L/Y	AVSS	0.75	CN-869F				CN-716M
972	G/L	AVSS	0.75	CN-474M				CN-764M
973	O/L	AVSS	0.75	CN-474M				CN-764M
974	Gr/B	AVSS	0.75	CN-474M				CN-764M
988	G	AVSS	0.75	CN-751F				CN-680F
989	Y/G	AVSS	0.75	CN-751F				CN-680F
C02A	Y	AVSS	0.75	CN-473M				CN-764M
JP710	Y	AVSS	0.75	CN-710AM				CN-710AM
JP711	Y	AVSS	0.75	CN-711AM				CN-711AM
JP712	Y	AVSS	0.75	CN-712AM				CN-712AM
JP714	Y	AVSS	1.25	CN-714AM				CN-714AM
JP715	Y	AVSS	1.25	CN-715AM				CN-715AM
JP716	Y	AVSS	0.75	CN-783F				
JP717	Y	AVSS	0.75					CN-783F
371	G	AVSS	0.75	CN-472M				CN-740F
380	W	AVSS	0.75	CN-472M				CN-740F
952	L/O	AVSS	0.75	CN-472M				CN-742F
953	G/B	AVSS	0.75	CN-472M				CN-742F
954	Br/Y	AVSS	0.75	CN-472M				CN-741F
955	G/L	AVSS	0.75	CN-472M				CN-741F

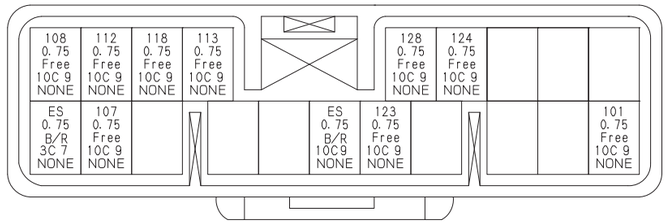
No.	COLOR	TYPE	SIZE	F R O M	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
131	G	MVVS	0.75	CN-470F				CN-760F
132	B	MVVS	0.75	CN-470F				CN-760F
133	R	MVVS	0.75	CN-470F				CN-760F
137	W	MVVS	0.75	CN-470F				CN-760F
ES1	B/R	AVSS	0.75	CN-470F				(CN-760F)
E01	B	AVSS	0.75	CN-750F			DS01	LA-N1
E02	B	AVSS	0.75	CN-750F			DS01	LA-N1
E03	B	AVSS	0.75	LA-N2	DS02			CN-750F
E04	B	AVSS	0.75	LA-N2	DS02			CN-750F
E05	B	AVSS	0.75	CN-751F			DS03	LA-N3
E06	B	AVSS	0.75	CN-751F			DS03	LA-N3
E07	B	AVSS	0.75	LA-N4	DS04			CN-751F
E08	B	AVSS	0.75	LA-N4	DS04			CN-751F
E09	B	AVSS	0.75	CN-730F				LA-N5
E018	B	AVSS	1.25	CN-J73F				LA-N9
E010	B	AVSS	0.75	CN-J73F				CN-745F
E011	B	AVSS	0.75	CN-J73F				CN-746F
E012	B	AVSS	0.75	CN-J73F				CN-743F
E042	B	AVSS	0.75	CN-J73F				CN-869F
JPE0	B	AVSS	1.25	CN-J73F				CN-J73F
E013	B	AVSS	0.75	CN-744F				CN-J73F
E014	B	AVSS	0.75	CN-747F				CN-J73F
E015	B	AVSS	0.75	CN-748F				CN-J73F
E016	B	AVSS	0.75	CN-749F				CN-J73F
E017	B	AVSS	1.25	LA-N8				CN-J73F
E019	B	AVSS	0.75	CN-720F			DS06	LA-N6
E020	B	AVSS	0.75	CN-721F			DS06	LA-N6
E021	B	AVSS	0.75	LA-N7				CN-722F
E022	B	AVSS	0.75	CN-765F	DS07			LA-N10
E023	B	AVSS	0.75	CN-765F	DS07			CN-766F

(4/4)

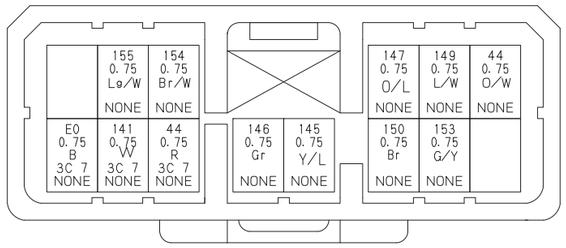
ATT. JUNCTION HARNESS



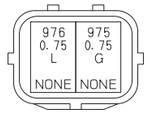
(1/3)



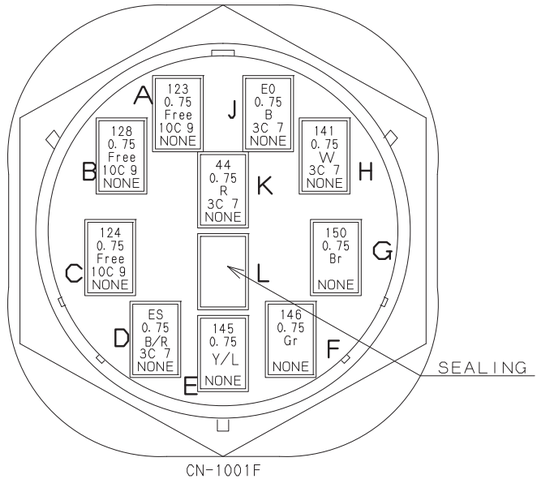
CN-298M
20MA-070ML1



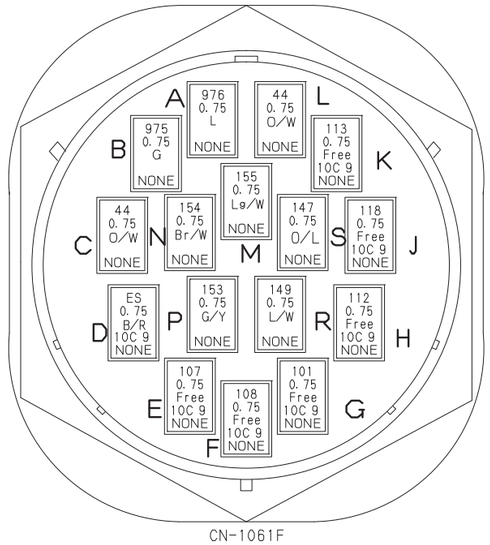
CN-299M
14MA-070ML1



CN-888M
2MA-JM2



CN-1001F
11FAE-774R16+C



CN-1061F
16FAE-774R16+C

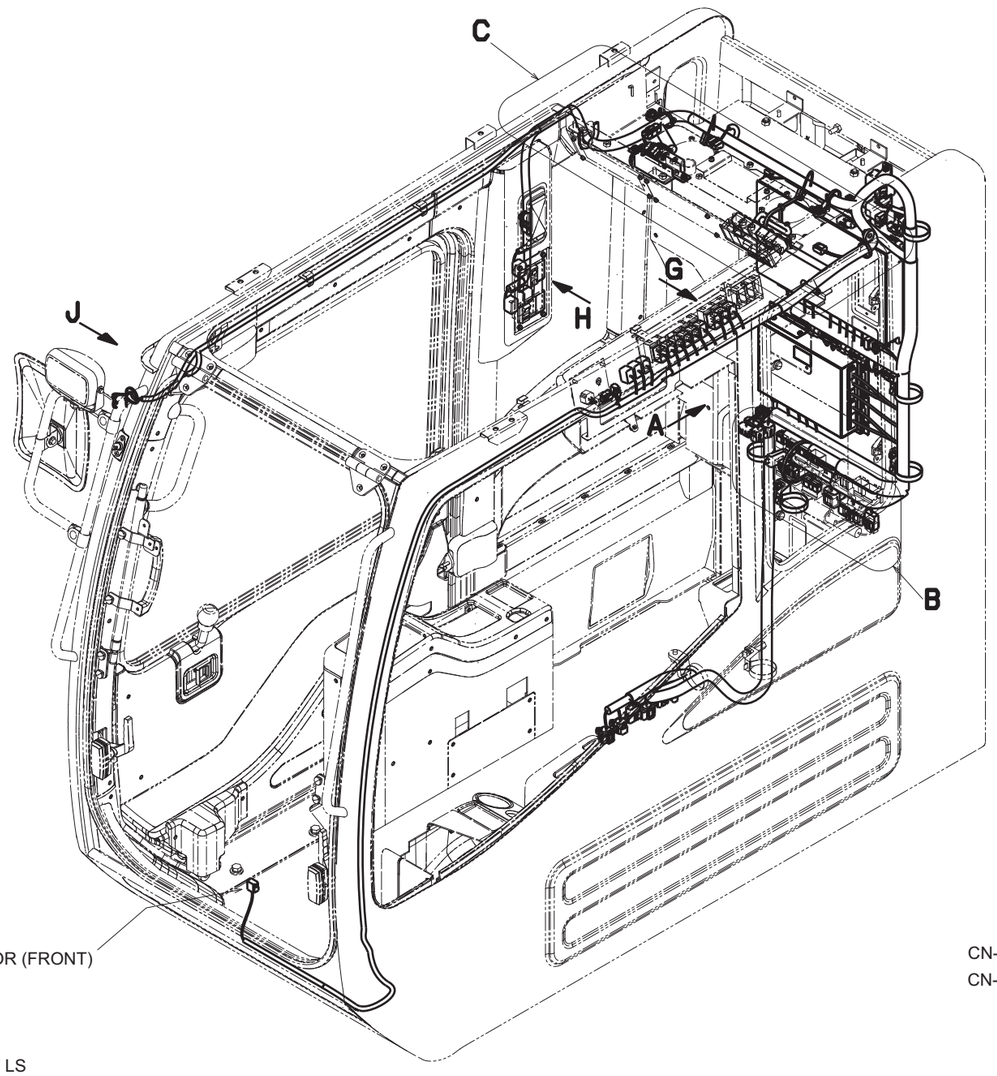
(2/3)

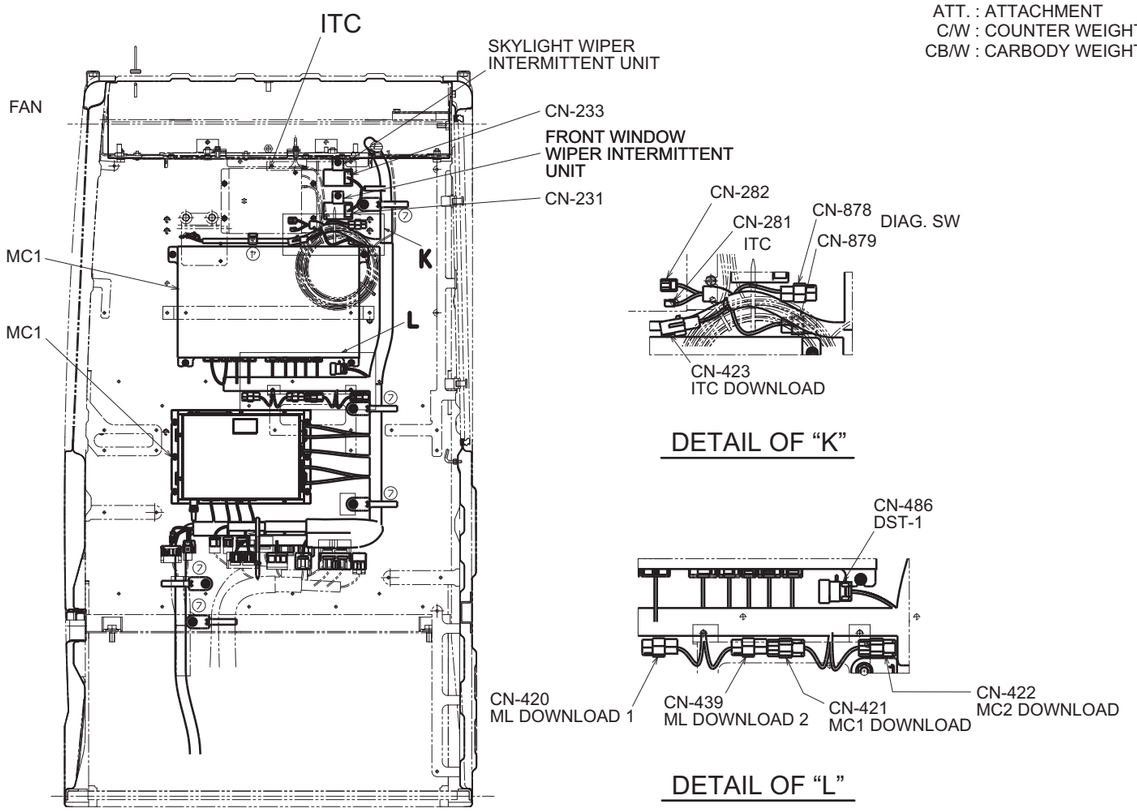
WIRE No. AND WIRE COLOR LIST

No.	COLOR	TYPE	SIZE	FROM	PIN No.	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	PIN No.	TO
44	O/W	AVSS	0.75	CN-299M	1							JS
44	O/W	AVSS	0.75	CN-1061F	11							JS
44	O/W	AVSS	0.75	CN-1061F	3							JS
145	Y/L	AVSS	0.75	CN-1001F	5						10	CN-299M
146	Gr	AVSS	0.75	CN-1001F	6						11	CN-299M
147	O/L	AVSS	0.75	CN-1061F	16						3	CN-299M
149	L/W	AVSS	0.75	CN-1061F	15						2	CN-299M
150	Br	AVSS	0.75	CN-1001F	7						9	CN-299M
153	G/Y	AVSS	0.75	CN-1061F	14						8	CN-299M
154	Br/W	AVSS	0.75	CN-1061F	13						4	CN-299M
155	Lg/W	AVSS	0.75	CN-1061F	12						5	CN-299M
975	G	AVSS	0.75	CN-1061F	2						1	CN-888M
976	L	AVSS	0.75	CN-1061F	1						2	CN-888M
44	R	MVVS	0.75	CN-1001F	10	3C7				3C7	12	CN-299M
141	W	MVVS	0.75	CN-1001F	8	3C7				3C7	13	CN-299M
E0	B	MVVS	0.75	CN-1001F	9	3C7				3C7	14	CN-299M
ES	B/R	AVSS	0.75	(CN-1001F)		3C7				3C7	20	CN-298M
ES	B/R	AVSS	0.75	CN-1001F	4	3C7				3C7		(CN-299M)
101	Free	MVVS	0.75	CN-1061F	7	10C9				10C9	10	CN-298M
107	Free	MVVS	0.75	CN-1061F	5	10C9				10C9	19	CN-298M
108	Free	MVVS	0.75	CN-1061F	6	10C9				10C9	9	CN-298M
112	Free	MVVS	0.75	CN-1061F	8	10C9				10C9	8	CN-298M
113	Free	MVVS	0.75	CN-1061F	10	10C9				10C9	6	CN-298M
118	Free	MVVS	0.75	CN-1061F	9	10C9				10C9	7	CN-298M
123	Free	MVVS	0.75	CN-1001F	1	10C9				10C9	14	CN-298M
124	Free	MVVS	0.75	CN-1001F	3	10C9				10C9	4	CN-298M
128	Free	MVVS	0.75	CN-1001F	2	10C9				10C9	5	CN-298M
ES	B/R	AVSS	0.75	(CN-1061F)		10C9				10C9	15	CN-298M
ES	B/R	AVSS	0.75	CN-1061F	4	10C9				10C9		(CN-298M)

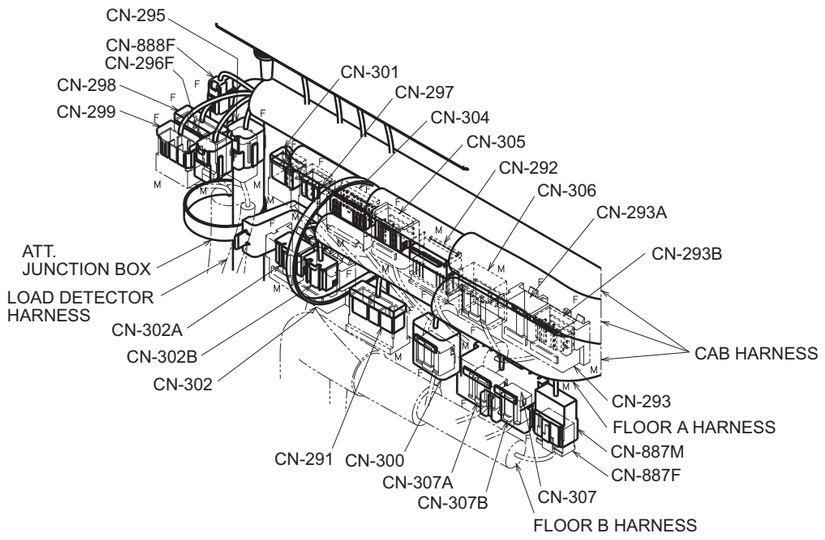
7. ELECTRICAL PART OF CAB

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT

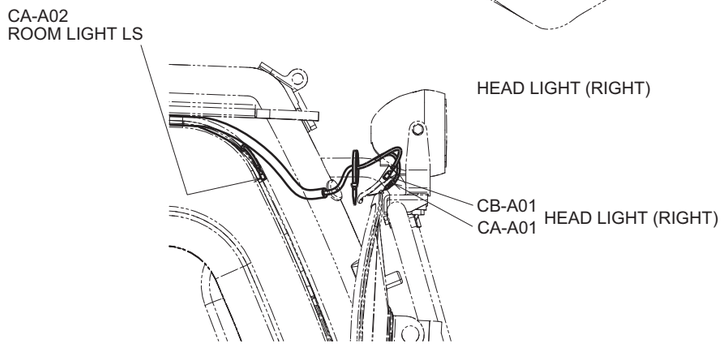




VIEW FROM “A”



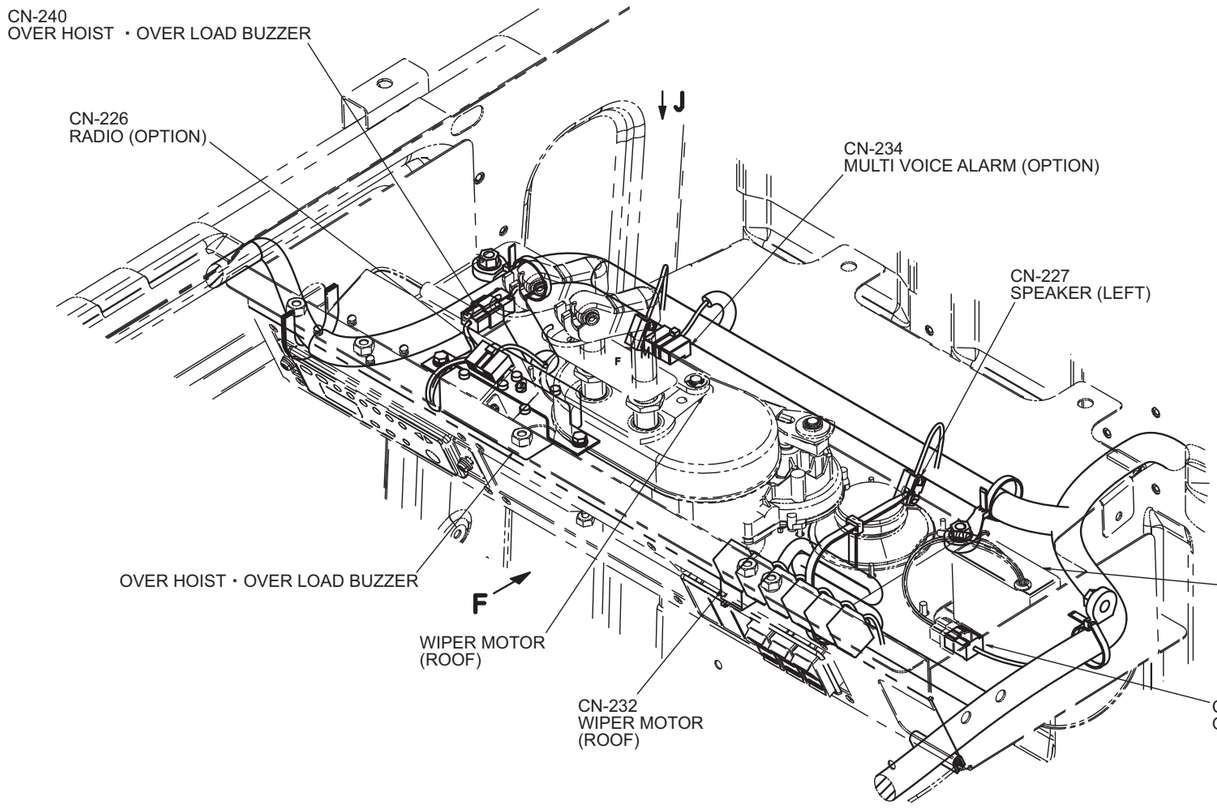
DETAIL OF “B”



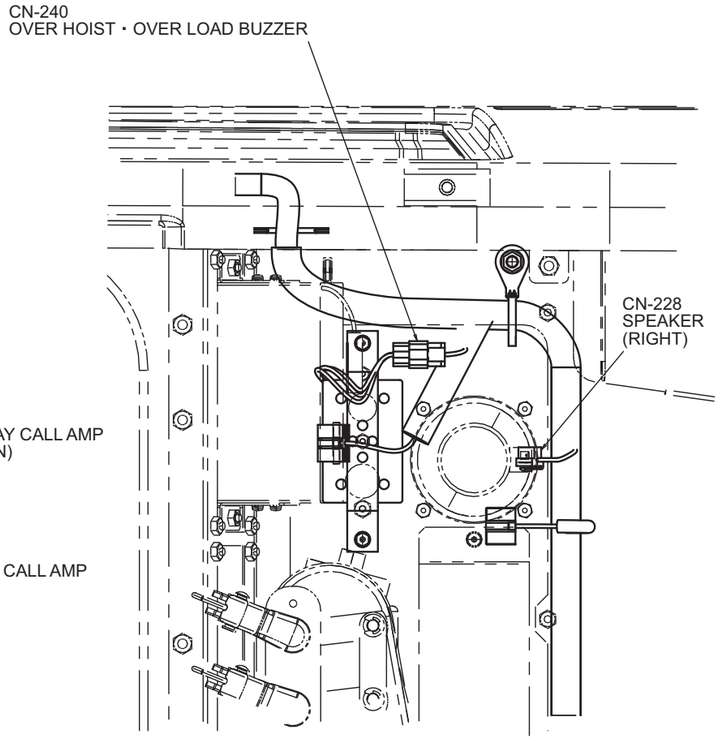
VIEW FROM “J-J”

(1/3)

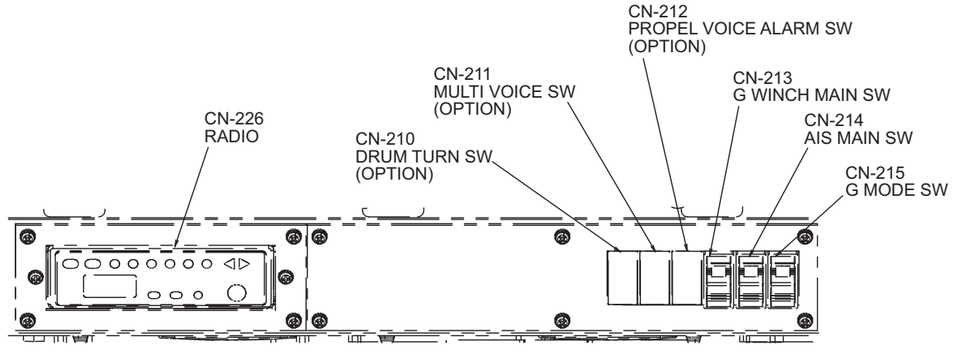
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



DETAIL OF “C”



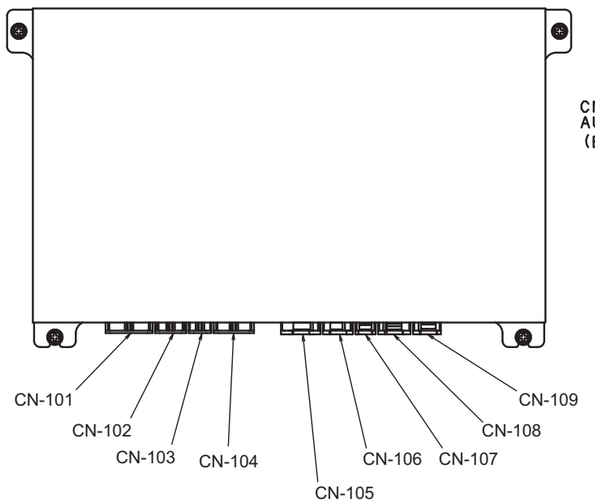
VIEW FROM “J”



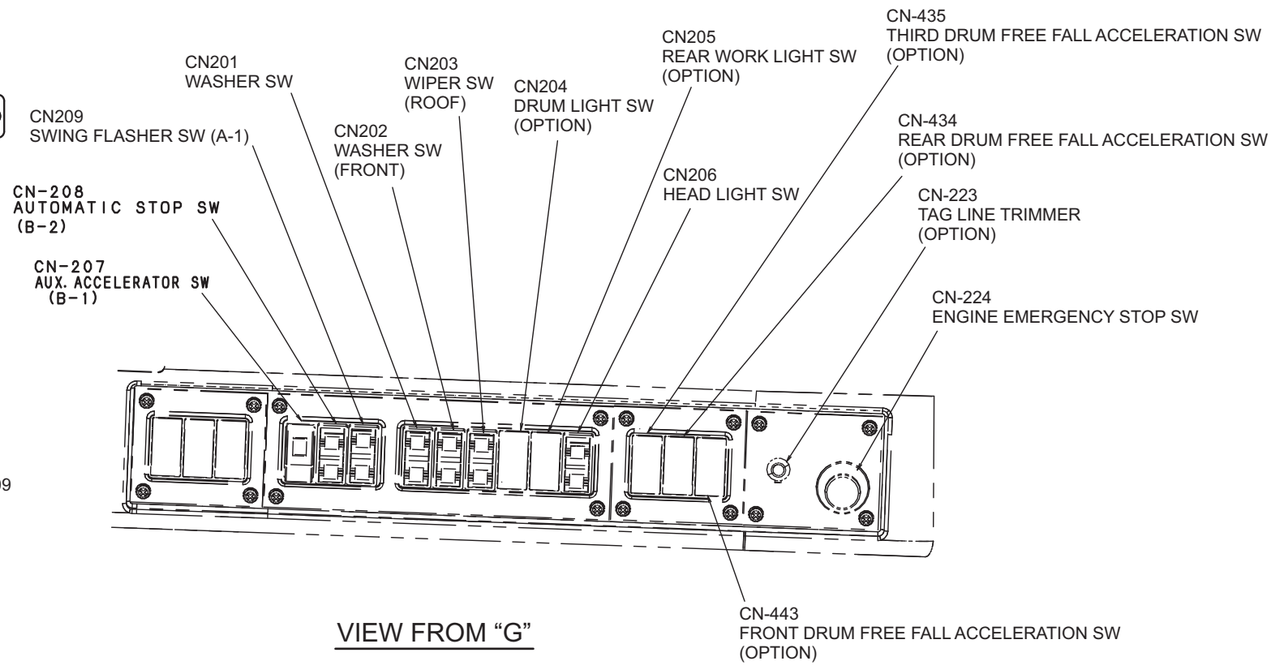
VIEW FROM “F”

(2/3)

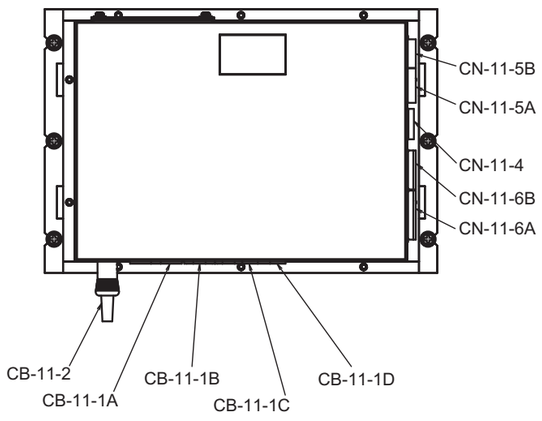
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



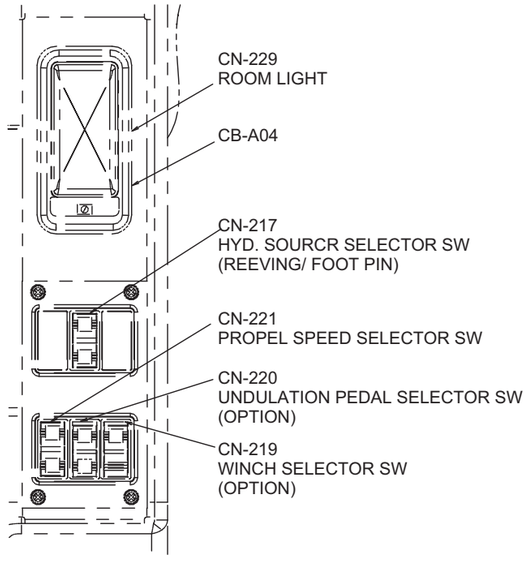
MC1 CONNECTOR



VIEW FROM “G”



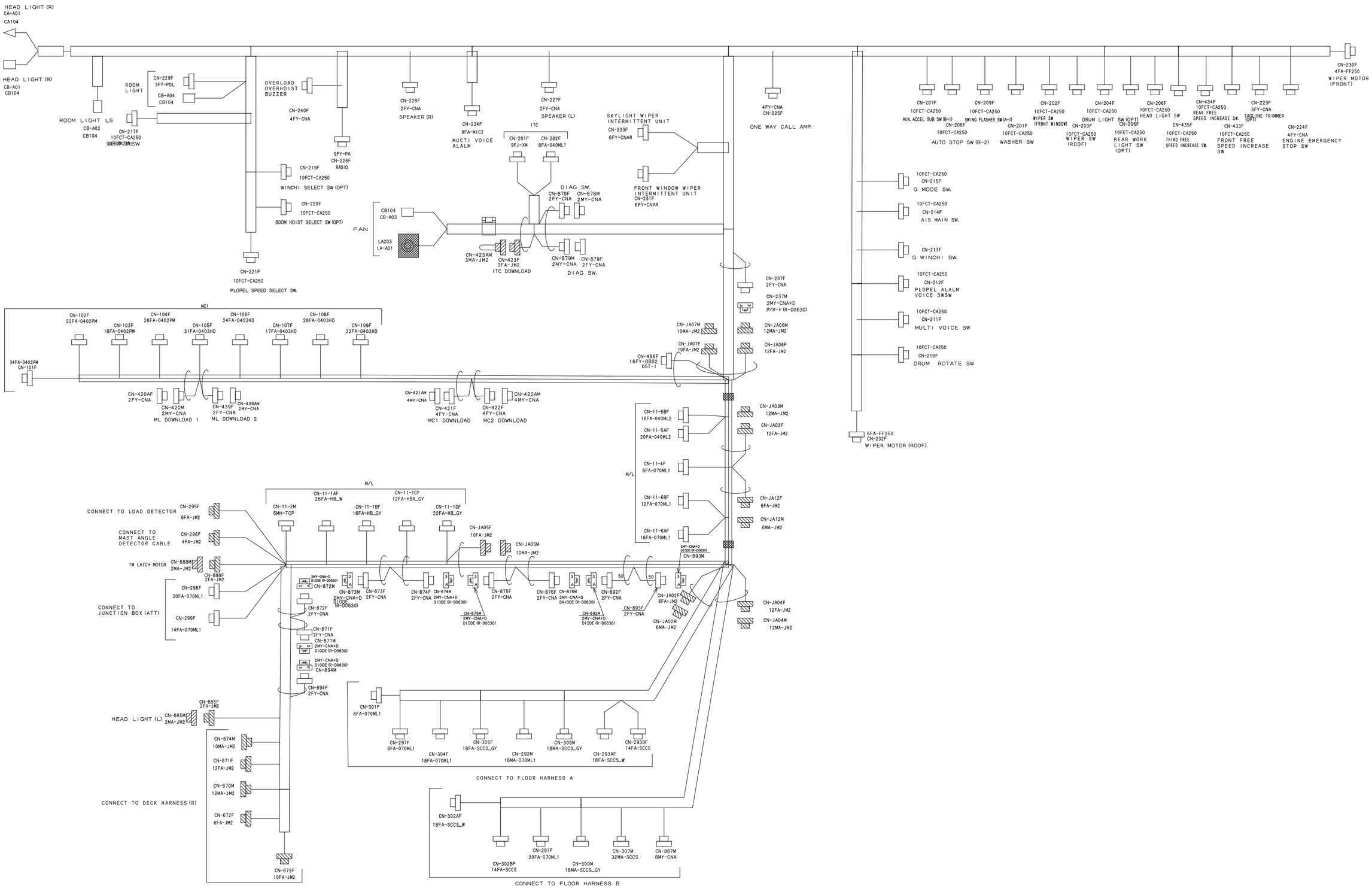
M/L CONNECTOR



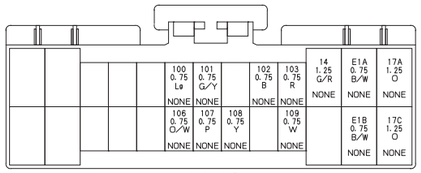
VIEW FROM “H”

(3/3)

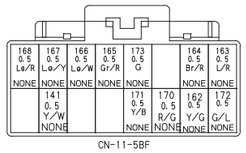
CAB HARNESS



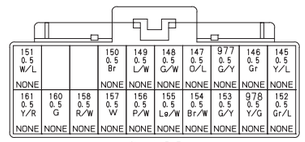
(1/6)



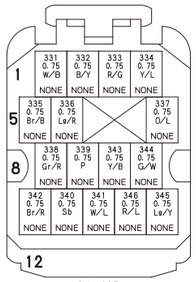
CN-11-1AF
26FA-HB_W



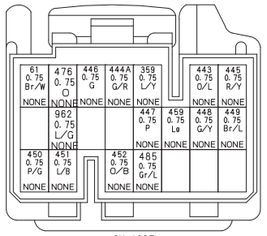
CN-11-5BF
16FA-040ML2



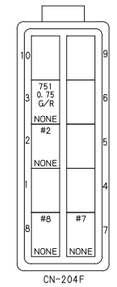
CN-11-5AF
20FA-040ML2



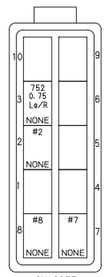
CN-103F
16FA-0402PM



CN-109F
22FA-0403HD

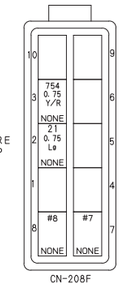


CN-204F
10FCT-CA250
#2 49 1.25 R/W+49 0.75 R/W
#7 749 0.75 R/Y+749 0.75 R/Y
#8 E025 0.75 B+E026 0.75 B

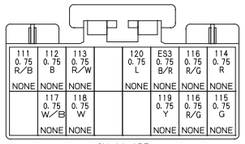


CN-205F
10FCT-CA250
#2 49 0.75 R/W+49 0.75 R/W
#7 749 0.75 R/Y+749 0.75 R/Y
#8 E024 0.75 B+E025 0.75 B

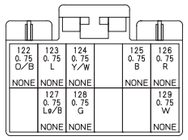
2-WIRE CLAMP



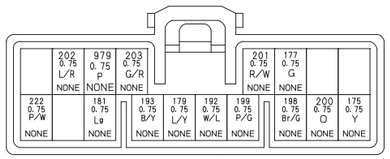
CN-208F
10FCT-CA250
#7 749 0.75 R/Y+749 0.75 R/Y
#8 E021 0.75 B+E022 0.75 B



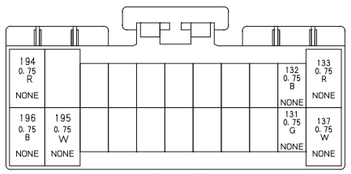
CN-11-1BF
16FA-HB_GY



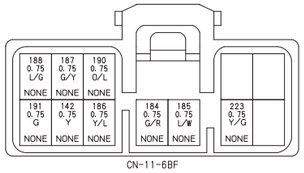
CN-11-1CF
12FA-HBA_GY



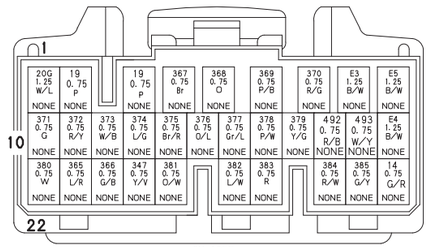
CN-11-6AF
18FA-070ML1



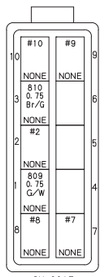
CN-11-1DF
22FA-HB_GY



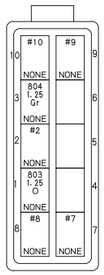
CN-11-6BF
12FA-070ML1



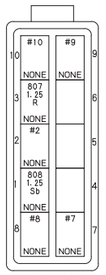
CN-105F
31FA-0403HD



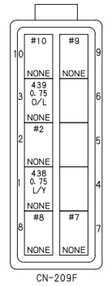
CN-201F
10FCT-CA250
#2 24 1.25 Y+24 1.25 Y
#7 749 0.75 R/Y+749 0.75 R/Y
#8 E032 0.75 B+E033 0.75 B
#9 749 0.75 R/Y+749 0.75 R/Y
#10 E031 0.75 B+E032 0.75 B



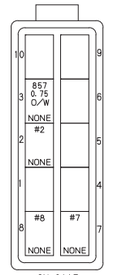
CN-202F
10FCT-CA250
#2 24 1.25 Y+24 1.25 Y
#7 749 0.75 R/Y+749 0.75 R/Y
#8 E030 0.75 B+E031 0.75 B
#9 749 0.75 R/Y+749 0.75 R/Y
#10 E029 0.75 B+E030 0.75 B



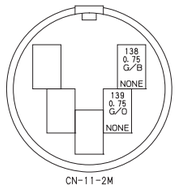
CN-203F
10FCT-CA250
#2 24 1.25 Y+24 1.25 Y
#7 749 0.75 R/Y+749 0.75 R/Y
#8 E028 0.75 B+E029 0.75 B
#9 749 0.75 R/Y+749 0.75 R/Y
#10 E027 0.75 B+E028 0.75 B



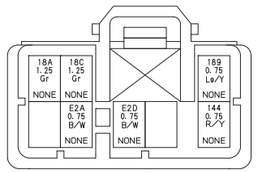
CN-209F
10FCT-CA250
#2 39 0.75 Y/B+39 0.75 Y/B
#7 749 0.75 R/Y+749 0.75 R/Y
#8 E019 0.75 B+E020 0.75 B
#9 749 0.75 R/Y+749 0.75 R/Y
#10 E020 0.75 B+E021 0.75 B



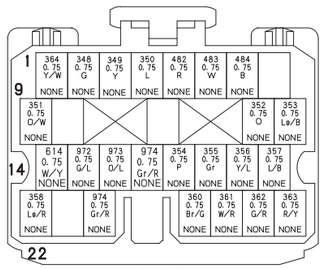
CN-211F
10FCT-CA250
#2 39 0.75 Y/B+39 0.75 Y/B
#7 749 0.75 R/Y+749 0.75 R/Y
#8 E013 0.75 B+E014 0.75 B



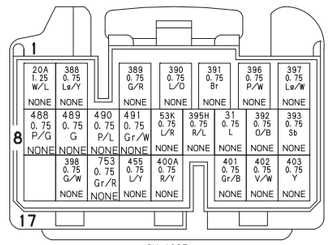
CN-11-2M
5MH-TCP



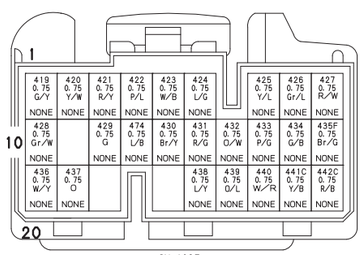
CN-11-4F
8FA-070ML1



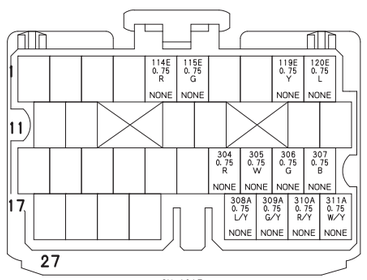
CN-104F
28FA-0402PM



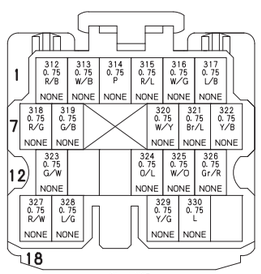
CN-106F
24FA-0403HD



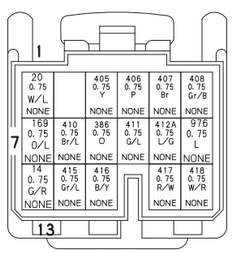
CN-108F
28FA-0403HD



CN-101F
34FA-0402PM

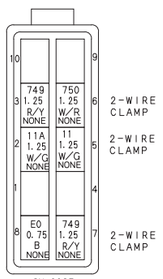


CN-102F
22FA-0402PM



CN-107F
17FA-0403HD

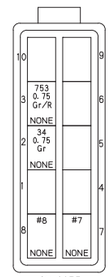
2-WIRE CLAMP



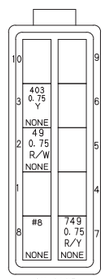
2-WIRE CLAMP
2-WIRE CLAMP
2-WIRE CLAMP
2-WIRE CLAMP

CN-206F
10FCT-CA250

2-WIRE CLAMP

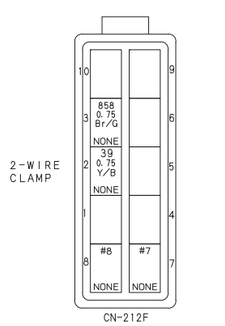


CN-207F
10FCT-CA250
#7 749 0.75 R/Y+749 0.75 R/Y
#8 E022 0.75 B+E023H 0.75 B

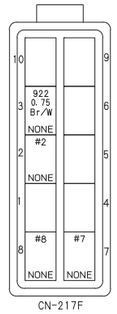


CN-210F
10FCT-CA250
#8 E012 0.75 B+E013 0.75 B

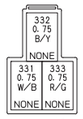
(2/6)



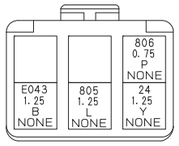
CN-212F
10FCT-CA250
#7 749 0.75 R/Y + 749 0.75 R/Y
#8 E014 0.75 B + E015 0.75 B



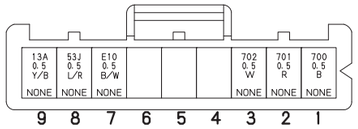
CN-217F
10FCT-CA250
#2 25 0.75 G/L+25 0.75 G/L
#7 749 0.75 R/Y + 749 0.75 R/Y
#8 E05 0.75 B+E08 0.75 B



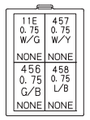
CN-223F
3FY-CNA



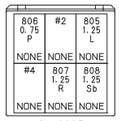
CN-232F
6FA-FF250



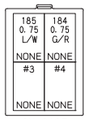
CN-281F
9FJ-XM



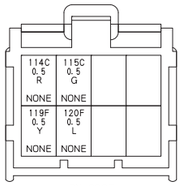
CN-224F
4FY-CNA



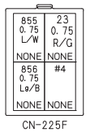
CN-233F
6FY-CNAR
#2 24 1.25 Y+24 1.25 Y
#4 E035 1.25 B+E037 1.25 B



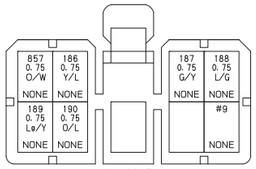
CN-240F
4FY-CNA
#3 E011 0.75 B + E012 0.75 B
#4 E010 0.75 B + E011 0.75 B



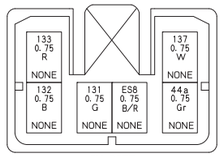
CN-282F
8FA-040ML1



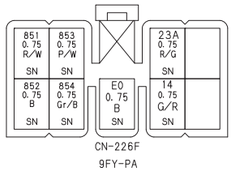
CN-225F
4FY-CNA
#4 E018 0.75 B+E019 0.75 B



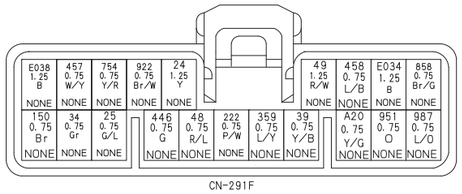
CN-234F
9FA-MIC2
#9 E010 0.75 B + E09 0.75 B



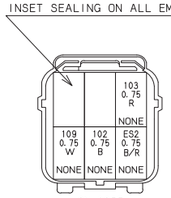
CN-297F
6FA-070ML1



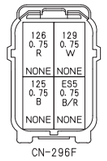
CN-226F
9FY-PA



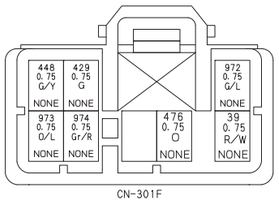
CN-291F
20FA-070ML1



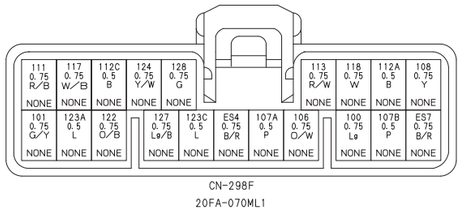
CN-295F
6FA-JM2



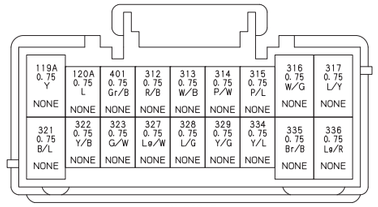
CN-296F
4FA-JM2



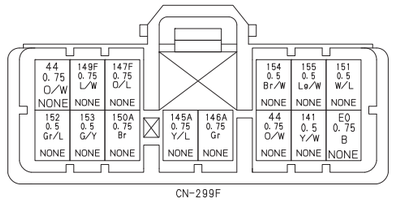
CN-301F
8FA-070ML1



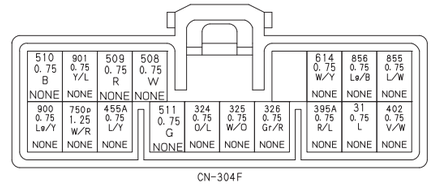
CN-298F
20FA-070ML1



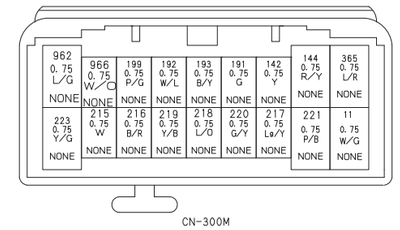
CN-302AF
18FA-SCCS_W



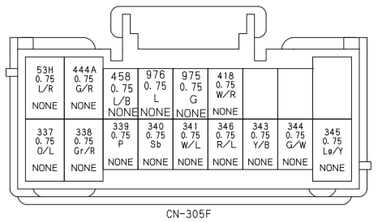
CN-299F
14FA-070ML1



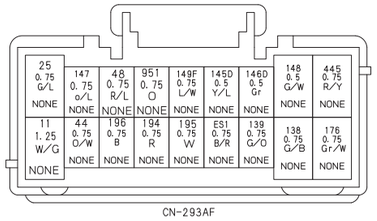
CN-304F
18FA-070ML1



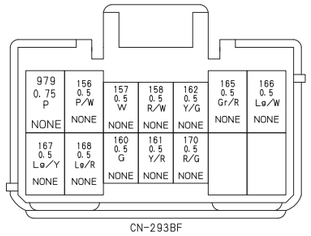
CN-300M
18MA-SCCS_GY



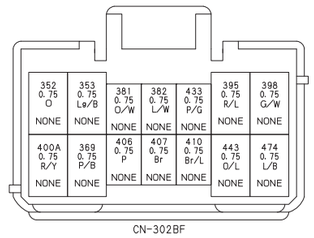
CN-305F
18FA-SCCS_GY



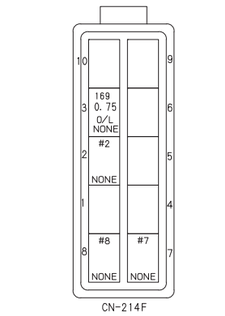
CN-293AF
18FA-SCCS_W



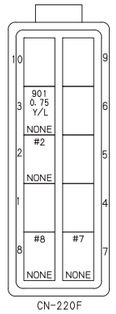
CN-293BF
14FA-SCCS



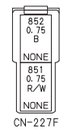
CN-302BF
14FA-SCCS



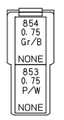
CN-214F
10FCT-CA250
#2 20 0.75 W/L+20 0.75 W/L
#7 749 0.75 R/Y + 749 0.75 R/Y
#8 E017 0.75 B+E016 0.75 B



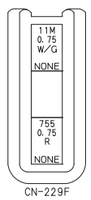
CN-220F
10FCT-CA250
#2 25 0.75 G/L+25 0.75 G/L
#7 749 0.75 R/Y + 749 0.75 R/Y
#8 E02 0.75 B+E03 0.75 B



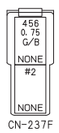
CN-227F
2FY-CNA



CN-228F
2FY-CNA

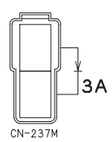


CN-229F
3FY-POL

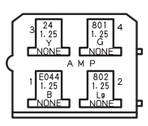


CN-237F
2FY-CNA
#2 455 0.75 L/Y + 455A 0.75 L/Y

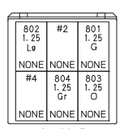
2-WIRE CLAMP



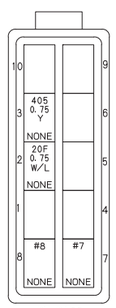
CN-237M
2MY-CNA+D



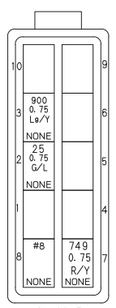
CN-230F
4FA-FF250



CN-231F
6FY-CNAR
#2 24 1.25 Y+24 1.25 Y
#4 E037 1.25 B+E038 1.25 B



CN-215F
10FCT-CA250
#7 749 0.75 R/Y + 749 0.75 R/Y
#8 E017 0.75 B+E018 0.75 B



CN-221F
10FCT-CA250
#8 E017 0.75 B+E018 0.75 B

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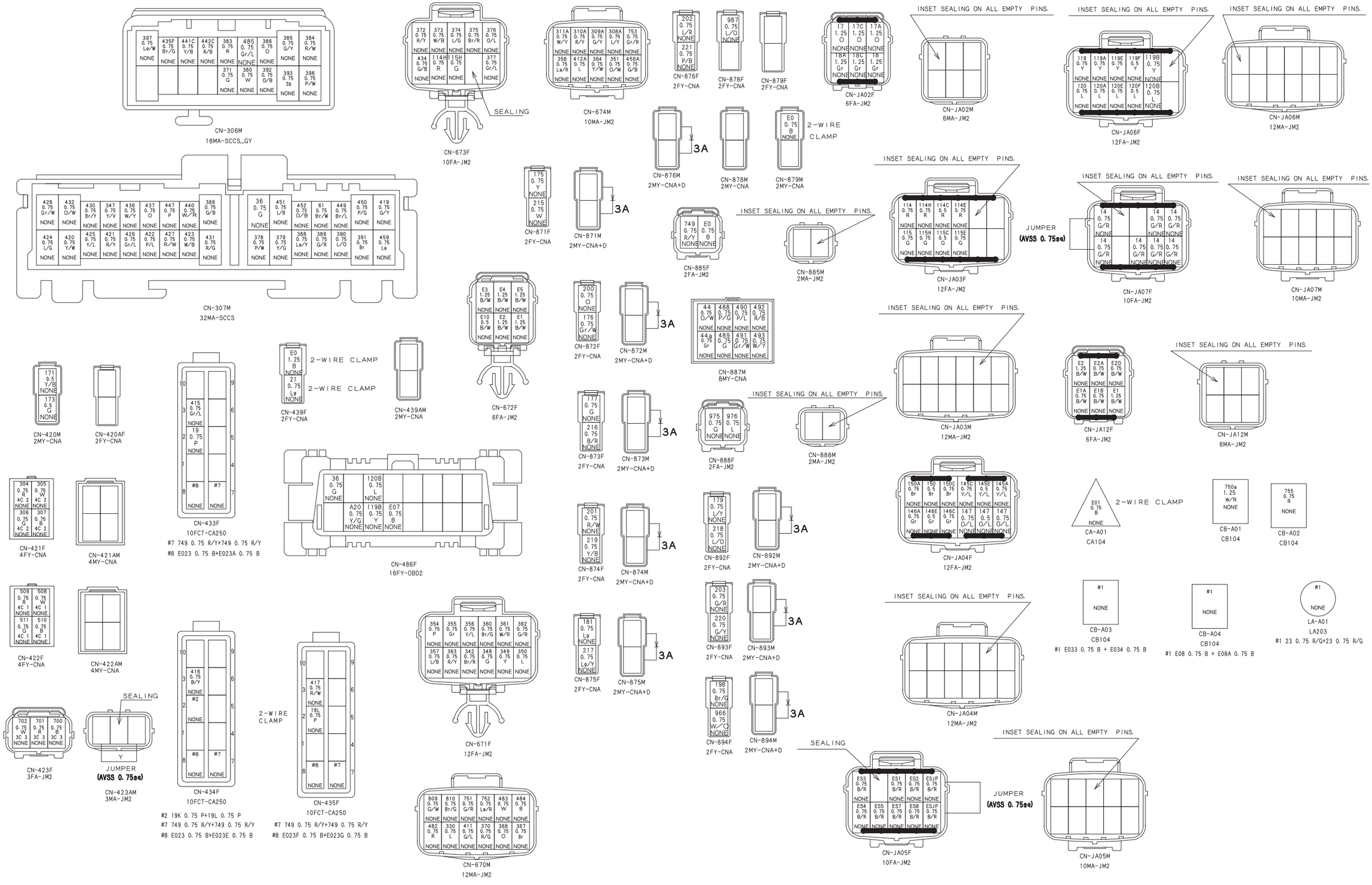
CN-306M
18MA-SCCS_GY
CN-673F
10FA-JM2
SEALING
CN-674M
10MA-JM2
CN-876F
2FY-CNA
CN-878F
2FY-CNA
CN-879F
2FY-CNA
CN-JA02F
6FA-JM2
INSET SEALING ON ALL EMPTY PINS.
CN-JA02M
6MA-JM2
CN-JA06F
12FA-JM2
CN-JA06M
12MA-JM2
CN-307M
32MA-SCCS
CN-876M
2MY-CNA+D
CN-878M
2MY-CNA
CN-879M
2MY-CNA
2-WIRE CLAMP
3A
CN-871F
2FY-CNA
CN-871M
2MY-CNA+D
CN-885F
2FA-JM2
CN-885M
2MA-JM2
CN-JA03F
12FA-JM2
JUMPER
(AVSS 0.75sq)
CN-JA07F
10FA-JM2
CN-JA07M
10MA-JM2
CN-672F
6FA-JM2
CN-872F
2FY-CNA
CN-872M
2MY-CNA+D
CN-887M
8MY-CNA
CN-439F
2FY-CNA
CN-439AM
2MY-CNA
CN-420M
2MY-CNA
CN-420AF
2FY-CNA
CN-433F
10FCT-CA250
#7 749 0.75 R/Y+749 0.75 R/Y
#8 E023 0.75 B+E023A 0.75 B
CN-873F
2FY-CNA
CN-873M
2MY-CNA+D
CN-888F
2FA-JM2
CN-888M
2MA-JM2
CN-JA03M
12MA-JM2
CN-JA12F
6FA-JM2
CN-JA12M
6MA-JM2
CN-421F
4FY-CNA
CN-421AM
4MY-CNA
CN-874F
2FY-CNA
CN-874M
2MY-CNA+D
CN-892F
2FY-CNA
CN-892M
2MY-CNA+D
CN-JA04F
12FA-JM2
CA-A01
CA104
CB-A01
CB104
CB-A02
CB104
CN-422F
4FY-CNA
CN-422AM
4MY-CNA
CN-875F
2FY-CNA
CN-875M
2MY-CNA+D
CN-893F
2FY-CNA
CN-893M
2MY-CNA+D
CN-JA04M
12MA-JM2
CB-A03
CB104
#1 E033 0.75 B + E034 0.75 B
CB-A04
CB104
#1 E08 0.75 B + E08A 0.75 B
LA-A01
LA203
#1 23 0.75 R/G+23 0.75 R/G
CN-423F
3FA-JM2
CN-423AM
3MA-JM2
CN-434F
10FCT-CA250
#2 19K 0.75 P+19L 0.75 P
#7 749 0.75 R/Y+749 0.75 R/Y
#8 E023 0.75 B+E023E 0.75 B
CN-435F
10FCT-CA250
#7 749 0.75 R/Y+749 0.75 R/Y
#8 E023F 0.75 B+E023G 0.75 B
CN-486F
16FY-OBD2
CN-671F
12FA-JM2
CN-670M
12MA-JM2
CN-894F
2FY-CNA
CN-894M
2MY-CNA+D
CN-JA05F
10FA-JM2
CN-JA05M
10MA-JM2

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WIRE No. AND WIRE COLER LIST

WIRE NO.	COLER	TYPE	SIZE	F R O M	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
11A	W/G	AVSS	1.25	CN-292M				CN-206F
11	W/G	AVSS	1.25	CN-293AF			DSA35	CN-206F
11	W/G	AVSS	0.75	JS-A1			DSA35	CN-206F
11E	W/G	AVSS	0.75	JS-A1				CN-224F
11M	W/G	AVSS	0.75	JS-A1				CN-229F
11	W/G	AVSS	0.75	JS-A1				CN-300M
13A	Y/B	AVSS	0.5	CN-292M				CN-281F
14	G/R	AVSS	0.75	CN-226F				CN-JA07F
14	G/R	AVSS	1.25	CN-11-1AF				CN-JA07F
14	G/R	AVSS	0.75	CN-JA07F				CN-JA07F
14	G/R	AVSS	0.75	CN-JA07F				CN-292M
14	G/R	AVSS	0.75	CN-JA07F				CN-105F
14	G/R	AVSS	0.75	CN-JA07F				CN-107F
17	O	AVSS	1.25	CN-JA02F				CN-292M
17A	O	AVSS	1.25	CN-JA02F				CN-11-1AF
17C	O	AVSS	1.25	CN-JA02F				CN-11-1AF
18	Gr	AVSS	1.25	CN-JA02F				CN-292M
18A	Gr	AVSS	1.25	CN-JA02F				CN-11-4F
18C	Gr	AVSS	1.25	CN-JA02F				CN-11-4F
19	P	AVSS	0.75	CN-292M				JS-A11
19	P	AVSS	0.75	CN-105F				JS-A11
19	P	AVSS	0.75	JS-A12				JS-A11
19	P	AVSS	0.75	JS-A12				CN-105F
19	P	AVSS	0.75	JS-A12			DSA120	CN-435F
19	P	AVSS	0.75	CN-434F	DSA121		DSA120	CN-435F
19	P	AVSS	0.75	CN-434F	DSA121			CN-433F
20	W/L	AVSS	1.25	CN-292M				JS-A13
20	W/L	AVSS	1.25	CN-105F				JS-A13
20	W/L	AVSS	0.75	CN-107F				JS-A13
20	W/L	AVSS	1.25	CN-292M				JS-A14
20	W/L	AVSS	1.25	CN-106F				JS-A14
20	W/L	AVSS	0.75	CN-215F	DSA49			JS-A14
20	W/L	AVSS	0.75	CN-215F	DSA49		DSA207	CN-214F
20	W/L	AVSS	0.75	CN-213F			DSA207	CN-214F
21	Lg	AVSS	0.75	CN-292M			DSA209	CN-439F
21	Lg	AVSS	0.75	CN-208F	DSA200		DSA209	CN-439F
21	Lg	AVSS	0.75	CN-208F	DSA200			CN-219F
23	R/G	AVSS	0.75	LA-A01	DSA13			CN-292M
23	R/G	AVSS	0.75	LA-A01	DSA13			CN-225F
23A	R/G	AVSS	0.75	CN-226F				CN-292M
24	Y	AVSS	1.25	CN-231F	DSA1			CN-291F
24	Y	AVSS	1.25	CN-231F	DSA1		DSA5	CN-233F
24	Y	AVSS	1.25	JS-A7			DSA5	CN-233F
24	Y	AVSS	1.25	JS-A7				CN-232F
24	Y	AVSS	1.25	JS-A7			DSA206	CN-201F
24	Y	AVSS	1.25	CN-202F	DSA22		DSA206	CN-201F
24	Y	AVSS	1.25	CN-202F	DSA22		DSA17	CN-203F
24	Y	AVSS	1.25	CN-230F			DSA17	CN-203F
25	G/L	AVSS	0.75	JS-A4				CN-291F
25	G/L	AVSS	0.75	CN-217F	DSA59			JS-A4
25	G/L	AVSS	0.75	CN-217F	DSA59		DSA68	CN-220F
25	G/L	AVSS	0.75	CN-221F			DSA68	CN-220F
25	G/L	AVSS	0.75	CN-293AF				JS-A4
31	L	AVSS	0.75	CN-304F				CN-106F
34	Gr	AVSS	0.75	CN-207F				CN-291F
36	G	AVSS	0.75	CN-486F				CN-307M
39	Y/B	AVSS	0.75	CN-209F	DSA201			CN-291F
39	Y/B	AVSS	0.75	CN-209F	DSA201		DSA203	CN-211F
39	Y/B	AVSS	0.75	CN-212F	DSA202		DSA203	CN-211F
39	Y/B	AVSS	0.75	CN-212F	DSA202			CN-301F
44	O/W	AVSS	0.75	JS-A2				CN-887M
44	O/W	AVSS	0.75	JS-A2				CN-299F
44	O/W	AVSS	0.75	JS-A2				CN-299F
44	O/W	AVSS	0.75	JS-A2				CN-291F
44a	Gr	AVSS	0.75	CN-297F				CN-887M
48	R/L	AVSS	0.75	CN-291F				CN-293AF
49	R/W	AVSS	1.25	CN-204F	DSA31			CN-291F
49	R/W	AVSS	0.75	CN-204F	DSA31		DSA33	CN-205F
49	R/W	AVSS	0.75	CN-210F			DSA33	CN-205F
53H	L/R	AVSS	0.75	JS-A17				CN-305F
53J	L/R	AVSS	0.5	JS-A17				CN-281F
53K	L/R	AVSS	0.75	JS-A17				CN-106F
61	Br/W	AVSS	0.75	CN-109F				CN-307M
100	Lg	AVSS	0.75	CN-11-1AF				CN-298F
101	G/Y	AVSS	0.75	CN-11-1AF				CN-298F
102	B	AVSS	0.75	CN-11-1AF				CN-295F
103	R	AVSS	0.75	CN-11-1AF				CN-295F
106	O/W	AVSS	0.75	CN-11-1AF				CN-298F
107	P	AVSS	0.75	JS-A18				CN-11-1AF
107A	P	AVSS	0.5	JS-A18				CN-298F
107B	P	AVSS	0.5	JS-A18				CN-298F
108	Y	AVSS	0.75	CN-11-1AF				CN-298F
109	W	AVSS	0.75	CN-11-1AF				CN-295F
111	R/B	AVSS	0.75	CN-11-1BF				CN-298F
112	B	AVSS	0.75	JS-A19				CN-11-1BF
112A	B	AVSS	0.5	JS-A19				CN-298F
112C	B	AVSS	0.5	JS-A19				CN-298F
113	R/W	AVSS	0.75	CN-298F				CN-11-1BF
116	R/G	AVSS	0.75	CN-11-1BF				CN-11-1BF
117	W/B	AVSS	0.75	CN-11-1BF				CN-298F
118	W	AVSS	0.75	CN-11-1BF				CN-298F
122	O/B	AVSS	0.75	CN-11-1CF				CN-298F
123	L	AVSS	0.75	JS-A20				CN-11-1CF
123A	L	AVSS	0.5	JS-A20				CN-298F
123C	L	AVSS	0.5	JS-A20				CN-298F
124	Y/W	AVSS	0.75	CN-11-1CF				CN-298F
125	B	AVSS	0.75	CN-11-1CF				CN-296F
126	R	AVSS	0.75	CN-11-1CF				CN-296F
127	Lg/B	AVSS	0.75	CN-11-1CF				CN-298F
128	G	AVSS	0.75	CN-11-1CF				CN-298F
129	W	AVSS	0.75	CN-11-1CF				CN-296F
131	G	AVSS	0.75	CN-11-1DF				CN-297F
132	B	AVSS	0.75	CN-11-1DF				CN-297F
133	R	AVSS	0.75	CN-11-1DF				CN-297F
137	W	AVSS	0.75	CN-11-1DF				CN-297F
138	G/B	AVSS	0.75	CN-11-2M				CN-293AF
139	G/O	AVSS	0.75	CN-11-2M				CN-293AF
141	Y/W	AVSS	0.5	CN-299F				CN-11-5BF
142	Y	AVSS	0.75	CN-300M				CN-11-6BF
144	R/Y	AVSS	0.75	CN-11-4F				CN-300M
145	Y/L	AVSS	0.5	CN-11-5AF				CN-JA04F
145	Y/L	AVSS	0.75	CN-299F				CN-JA04F
145	Y/L	AVSS	0.5	CN-293AF				CN-JA04F
146	Gr	AVSS	0.5	CN-11-5AF				CN-JA04F
146	Gr	AVSS	0.75	CN-299F				CN-JA04F
146	Gr	AVSS	0.5	CN-293AF				CN-JA04F
147	O/L	AVSS	0.5	CN-11-5AF				CN-JA04F
147	O/L	AVSS	0.75	CN-293AF				CN-JA04F
147	O/L	AVSS	0.75	CN-299F				CN-JA04F
148	G/W	AVSS	0.5	CN-293AF				CN-11-5AF
149	L/W	AVSS	0.5	JS-A15				CN-11-5AF
149	L/W	AVSS	0.75	JS-A15				CN-293AF
149	L/W	AVSS	0.75	JS-A15				CN-299F
150	Br	AVSS	0.5	CN-JA04F				CN-11-5AF
150A	Br	AVSS	0.75	CN-JA04F				CN-299F
150C	Br	AVSS	0.75	CN-JA04F				CN-291F
151	W/L	AVSS	0.5	CN-11-5AF				CN-299F
152	Gr/L	AVSS	0.5	CN-11-5AF				CN-299F
153	G/Y	AVSS	0.5	CN-11-5AF				CN-299F
154	Br/W	AVSS	0.5	CN-11-5AF				CN-299F
155	Lg/W	AVSS	0.5	CN-299F				CN-11-5AF
156	P/W	AVSS	0.5	CN-11-5AF				CN-293BF
157	W	AVSS	0.5	CN-293BF				CN-11-5AF
158	R/W	AVSS	0.5	CN-11-5AF				CN-293BF
160	G	AVSS	0.5	CN-11-5AF				CN-293BF
161	Y/R	AVSS	0.5	CN-293BF				CN-11-5AF
162	Y/G	AVSS	0.5	CN-293BF				CN-11-5BF
163	L/R	AVSS	0.5	CN-11-5BF				CN-219F
164	Br/R	AVSS	0.5	CN-219F				CN-11-5BF
165	Gr/R	AVSS	0.5	CN-293BF				CN-11-5BF
166	Lg/W	AVSS	0.5	CN-293BF				CN-11-5BF
167	Lg/Y	AVSS	0.5	CN-293BF				CN-11-5BF
168	Lg/R	AVSS	0.5	CN-293BF				CN-11-5BF
169	O/L	AVSS	0.75	CN-214F				CN-107F
170	R/G	AVSS	0.5	CN-11-5BF				CN-293BF
171	Y/B	AVSS	0.5	CN-420M				CN-11-5BF
172	G/L	AVSS	0.5	CN-11-5BF				CN-292M
173	G	AVSS	0.5	CN-420M				CN-11-5BF
175	Y	AVSS	0.75	CN-871F				CN-11-6AF
176	Gr/W	AVSS	0.75	CN-872F				CN-293AF
177	G	AVSS	0.75	CN-873F				CN-11-6AF
179	L/Y	AVSS	0.75	CN-892F				CN-11-6AF
181	Lg	AVSS	0.75	CN-875F				CN-11-6AF
184	G/R	AVSS	0.75	CN-240F				CN-11-6BF
185	L/W	AVSS	0.75	CN-240F				CN-11-6BF
186	Y/L	AVSS	0.75	CN-234F				CN-11-6BF
187	G/Y	AVSS	0.75	CN-11-6BF				CN-234F
188	L/G	AVSS	0.75	CN-11-6BF				CN-234F
189	Lg/Y	AVSS	0.75	CN-11-4F				CN-234F
190	O/L	AVSS	0.75	CN-11-6BF				CN-234F
191	G	AVSS	0.75	CN-11-6BF				CN-300M
192	W/L	AVSS	0.75	CN-300M				CN-11-6AF
193	B/Y	AVSS	0.75	CN-11-6AF				CN-300M
194	R	AVSS	0.75	CN-11-1DF				CN-293AF
195	W	AVSS	0.75	CN-11-1DF				CN-293AF
196	B	AVSS	0.75	CN-11-1DF				CN-293AF
198	Br/G	AVSS	0.75	CN-894F				CN-11-6AF
199	P/G	AVSS	0.75	CN-300M				CN-11-6AF
200	O	AVSS	0.75	CN-11-6AF				CN-872F
201	R/W	AVSS	0.75	CN-11-6AF				CN-874F
202	L/R	AVSS	0.75	CN-11-6AF				CN-876F
203	G/R	AVSS	0.75	CN-11-6AF				CN-893F
215	W	AVSS	0.75	CN-300M				CN-871F
216	B/R	AVSS	0.75	CN-300M				CN-873F
217	Lg/Y	AVSS	0.75	CN-300M				CN-875F
218	L/O	AVSS	0.75	CN-300M				CN-892F
219	Y/B	AVSS	0.75	CN-300M				CN-874F
220	G/Y	AVSS	0.75	CN-300M				CN-893F
221	P/B	AVSS	0.75	CN-300M				CN-876F
222	P/W	AVSS	0.75	CN-11-6AF				CN-291F
223	Y/G	AVSS	0.75	CN-11-6BF				CN-300M
308A	L/Y	AVSS	0.75	CN-101F				CN-674M
309A	G/Y	AVSS	0.75	CN-674M				CN-101F
310A	R/Y	AVSS	0.75	CN-674M				CN-101F
311A	W/Y	AVSS	0.75	CN-101F				CN-674M
312	R/B	AVSS	0.75	CN-302AF				CN-102F
313	W/B	AVSS	0.75	CN-302AF				CN-102F
314	P	AVSS	0.75	CN-302AF				CN-102F
315	R/L	AVSS	0.75	CN-302AF				CN-102F
316	W/G	AVSS	0.75	CN-302AF				CN-102F
317	L/B	AVSS	0.75	CN-302AF				CN-102F
318	R/G	AVSS	0.75	CN-102F				CN-292M
319	G/B	AVSS	0.75	CN-102F				CN-292M
320	W/Y	AVSS	0.75	CN-102F				CN-292M
321	Br/L	AVSS	0.75	CN-302AF				CN-102F
322	Y/B	AVSS	0.75	CN-302AF				CN-102F
323	G/W	AVSS	0.75	CN-302AF				CN-102F
324	O/L	AVSS	0.75	CN-304F				CN-102F
325	W/O	AVSS	0.75	CN-304F				CN-102F
326	Gr/R	AVSS	0.75	CN-304F				CN-102F
327	R/W	AVSS	0.75	CN-302AF				CN-102F
328	L/G	AVSS	0.75	CN-302AF				CN-102F
329	Y/G	AVSS	0.75	CN-302AF				CN-102F
330	L	AVSS	0.75	CN-102F				CN-670M
331	W/B	AVSS	0.75	CN-223F				CN-103F
332	B/Y	AVSS	0.75	CN-223F				CN-103F
333	R/G	AVSS	0.75	CN-223F				CN-103F
334	Y/L	AVSS	0.75	CN-302AF				CN-103F
335	Br/B	AVSS	0.75	CN-302AF				CN-103F
336	Lg/R	AVSS	0.75	CN-302AF				CN-103F
337	O/L	AVSS	0.75	CN-305F				CN-103F
338	Gr/R	AVSS	0.75	CN-305F				CN-103F
339	P	AVSS	0.75	CN-305F				CN-103F
340	Sb	AVSS	0.75	CN-305F				CN-103F
341	W/L	AVSS	0.75	CN-305F				CN-103F
342	Br/R	AVSS	0.75	CN-103F				CN-671F
343	Y/B	AVSS	0.75	CN-305F				CN-103F
344	G/W	AVSS	0.75	CN-305F				CN-103F
345	Lg/Y	AVSS	0.75	CN-305F				CN-103F
346	R/L	AVSS	0.75	CN-305F				CN-103F
347	Y/L	AVSS	0.75	CN-307M				CN-105F
348	G	AVSS	0.75	CN-104F				CN-671F
349	Y	AVSS	0.75	CN-104F				CN-671F
350	L	AVSS	0.75	CN-104F				CN-671F
351	O/W	AVSS	0.75	CN-104F				CN-674M
352	O	AVSS	0.75	CN-104F				CN-302BF
353	Lg/B	AVSS	0.75	CN-104F				CN-302BF
354	P	AVSS	0.75	CN-104F				CN-671F
355	Gr	AVSS	0.75	CN-104F				CN-671F
356	Y/L	AVSS	0.75	CN-104F				CN-671F
357	L/B	AVSS	0.75	CN-104F				CN-671F
358	Lg/R	AVSS	0.75	CN-104F				CN-674M
359	L/Y	AVSS	0.75	CN-109F				CN-291F
360	Br/G	AVSS	0.75	CN-104F				CN-671F
361	W/R	AVSS	0.75	CN-104F				CN-671F
362	G/R	AVSS	0.75	CN-104F				CN-671F
363	R/Y	AVSS	0.75	CN-104F				CN-671F
364	Y/W	AVSS	0.75	CN-674M				CN-104F
365	L/R	AVSS	0.75	CN-105F				CN-300M
366	G/B	AVSS	0.75	CN-105F				CN-307M
367	Br	AVSS	0.75	CN-105F				CN-670M
368	O	AVSS	0.75	CN-670M				CN-105F
369	P/B	AVSS	0.75	CN-105F				CN-302BF
370	R/G	AVSS	0.75	CN-670M				CN-105F
381	O/W	AVSS	0.75	CN-302BF				CN-105F
382	L/W	AVSS	0.75	CN-302BF				CN-105F
383	R	AVSS	0.75	CN-105F				CN-306M
384	R/W	AVSS	0.75	CN-306M				CN-105F
385	G/Y	AVSS	0.75	CN-306M				CN-105F
386	O	AVSS	0.75	CN-107F				CN-306M
395	R/L	AVSS	0.75	CN-302BF				JS-A3
395A	R/L	AVSS	0.75	JS-A3				CN-304F
395H	R/L	AVSS	0.75	JS-A3				CN-106F
398	G/W	AVSS	0.75	CN-302BF				CN-106F
400A	R/Y	AVSS	0.75	CN-302BF				CN-106F
401	Gr/B	AVSS	0.75	CN-302AF				CN-106F
402	V/W	AVSS	0.75	CN-304F				CN-106F
403	Y	AVSS	0.75	CN-106F				CN-210F
405	Y	AVSS	0.75	CN-107F				CN-215F
406	P	AVSS	0.75	CN-107F				CN-302BF
407	Br	AVSS	0.75	CN-107F				CN-302BF
408	Gr/B	AVSS	0.75	CN-213F				CN-107F
410	Br/L	AVSS	0.75	CN-302BF				CN-107F
411	G/L	AVSS	0.75	CN-670M				CN-107F
412A	L/G	AVSS	0.75	CN-674M				CN-107F
415	Gr/L	AVSS	0.75	CN-107F				CN-433F
416	B/Y	AVSS	0.75	CN-107F				CN-434F
417	R/W	AVSS	0.75	CN-107F				CN-435F
418	W/R	AVSS	0.75	CN-305F				CN-107F
419	G/Y	AVSS	0.75	CN-108F				CN-307M
420	Y/W	AVSS	0.75	CN-108F				CN-307M
421	R/Y	AVSS	0.75	CN-108F				CN-307M
422	P/L	AVSS	0.75	CN-108F				CN-307M
423	W/B	AVSS	0.75	CN-108F				CN-307M
424	L/G	AVSS	0.75	CN-108F				CN-307M
425	Y/L	AVSS	0.75	CN-108F				CN-307M
426	Gr/L	AVSS	0.75	CN-108F				CN-307M
427	R/W	AVSS	0.75	CN-108F				CN-307M
428	Gr/W	AVSS	0.75	CN-108F				CN-307M
429	G	AVSS	0.75	CN-108F				CN-301F
430	Br/Y	AVSS	0.75	CN-108F				CN-307M
431	R/G	AVSS	0.75	CN-108F				CN-307M
432	O/W	AVSS	0.75	CN-108F				CN-307M
433	P/G	AVSS	0.75	CN-108F				CN-302BF
434	G/B	AVSS	0.75	CN-108F				CN-673F
435F	Br/G	AVSS	0.75	CN-108F				CN-306M
436	W/Y	AVSS	0.75	CN-108F				CN-307M
437	O	AVSS	0.75	CN-108F				CN-307M
438	L/Y	AVSS	0.75	CN-209F				CN-108F
439	O/L	AVSS	0.75	CN-209F				CN-108F
440	W/R	AVSS	0.75	CN-108F				CN-307M
441C	Y/B	AVSS	0.75	CN-108F				CN-306M
442C	R/B	AVSS	0.75	CN-108F				CN-306M
443	O/L	AVSS	0.75	CN-109F				CN-302BF
444A	G/R	AVSS	0.75	CN-109F				CN-305F
445	R/Y	AVSS	0.75	CN-109F				CN-293AF
446	G	AVSS	0.75	CN-109F				CN-291F
447	P	AVSS	0.75	CN-109F				CN-307M
448	G/Y	AVSS	0.75	CN-109F				CN-301F
449	Br/L	AVSS	0.75	CN-109F				CN-307M
450	P/G	AVSS	0.75	CN-109F				CN-307M
451	L/B	AVSS	0.75	CN-109F				CN-307M
452	O/B	AVSS	0.75	CN-109F				CN-307M
455	L/Y	AVSS	0.75	CN-106F			DSA73	CN-237F
455A	L/Y	AVSS	0.75	CN-304F			DSA73	CN-237F
456	G/B	AVSS	0.75	CN-237F	DSA15			CN-224F
456A	G/B	AVSS	0.75	CN-237F	DSA15			CN-674M
457	W/Y	AVSS	0.75	CN-224F				CN-291F
458	L/B	AVSS	0.75	CN-224F	DSA210			CN-305F
458	L/B	AVSS	0.75	CN-224F	DSA210			CN-291F
459	Lg	AVSS	0.75	CN-109F				CN-307M
474	L/B	AVSS	0.75	CN-108F				CN-302BF
476	O	AVSS	0.75	CN-109F				CN-301F
482	R	AVSS	0.75	CN-104F				CN-670M

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WIRE NO. AND WIRE COLER LIST

WIRE NO.	COLER	TYPE	SIZE	F R O M	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
483	W	AVSS	0.75	CN-104F				CN-670M
484	B	AVSS	0.75	CN-670M				CN-104F
485	Gr/L	AVSS	0.75	CN-109F				CN-306M
614	W/Y	AVSS	0.75	CN-304F				CN-104F
700	B	AVSS	0.5	CN-281F				CN-423F
701	R	AVSS	0.5	CN-281F				CN-423F
702	W	AVSS	0.5	CN-281F				CN-423F
749	R/Y	AVSS	0.75	CN-220F	DSA94			CN-221F
749	R/Y	AVSS	0.75	CN-220F	DSA94		DSA97	CN-219F
749	R/Y	AVSS	0.75	CN-219F	DSA98		DSA97	CN-219F
749	R/Y	AVSS	0.75	CN-219F	DSA98		DSA99	CN-217F
749	R/Y	AVSS	0.75	JS-A16			DSA99	CN-217F
749	R/Y	AVSS	0.75	JS-A16				CN-885F
749	R/Y	AVSS	0.75	JS-A16			DSA110	CN-206F
749	R/Y	AVSS	1.25	CN-206F	DSA100		DSA110	CN-206F
749	R/Y	AVSS	1.25	CN-206F	DSA100		DSA94	CN-433F
749	R/Y	AVSS	0.75	CN-434F	DSA93		DSA94	CN-433F
749	R/Y	AVSS	0.75	CN-434F	DSA93		DSA92	CN-435F
749	R/Y	AVSS	0.75	CN-205F	DSA91		DSA92	CN-435F
749	R/Y	AVSS	0.75	CN-205F	DSA91		DSA90	CN-204F
749	R/Y	AVSS	0.75	CN-203F	DSA89		DSA90	CN-204F
749	R/Y	AVSS	0.75	CN-203F	DSA89		DSA88	CN-203F
749	R/Y	AVSS	0.75	CN-202F	DSA87		DSA88	CN-203F
749	R/Y	AVSS	0.75	CN-202F	DSA87		DSA86	CN-202F
749	R/Y	AVSS	0.75	CN-201F	DSA85		DSA86	CN-202F
749	R/Y	AVSS	0.75	CN-201F	DSA85		DSA84	CN-201F
749	R/Y	AVSS	0.75	CN-209F	DSA83		DSA84	CN-201F
749	R/Y	AVSS	0.75	CN-209F	DSA83		DSA82	CN-209F
749	R/Y	AVSS	0.75	CN-208F	DSA81		DSA82	CN-209F
749	R/Y	AVSS	0.75	CN-208F	DSA81		DSA80	CN-207F
749	R/Y	AVSS	0.75	CN-215F	DSA102		DSA80	CN-207F
749	R/Y	AVSS	0.75	CN-215F	DSA102		DSA103	CN-214F
749	R/Y	AVSS	0.75	CN-213F	DSA105		DSA103	CN-214F
749	R/Y	AVSS	0.75	CN-213F	DSA105		DSA107	CN-212F
749	R/Y	AVSS	0.75	CN-211F	DSA109		DSA107	CN-212F
749	R/Y	AVSS	0.75	CN-211F	DSA109			CN-210F
750	W/R	AVSS	1.25	CN-206F	DSA101			CB-A01
750	W/R	AVSS	1.25	CN-206F	DSA101			CN-304F
751	G/R	AVSS	0.75	CN-204F				CN-670M
752	Lg/R	AVSS	0.75	CN-670M				CN-205F
753	Gr/R	AVSS	0.75	CN-674M			DSA208	CN-207F
753	Gr/R	AVSS	0.75	CN-106F			DSA208	CN-207F
754	Y/R	AVSS	0.75	CN-208F				CN-291F
755	R	AVSS	0.75	CN-229F				CB-A02
801	G	AVSS	1.25	CN-230F				CN-231F
802	Lg	AVSS	1.25	CN-230F				CN-231F
803	O	AVSS	1.25	CN-202F				CN-231F
804	Gr	AVSS	1.25	CN-231F				CN-202F
805	L	AVSS	1.25	CN-233F				CN-232F
806	P	AVSS	0.75	CN-233F				CN-232F
807	R	AVSS	1.25	CN-233F				CN-203F
808	Sb	AVSS	1.25	CN-203F				CN-233F
809	G/W	AVSS	0.75	CN-201F				CN-670M
810	Br/G	AVSS	0.75	CN-201F				CN-670M
857	O/W	AVSS	0.75	CN-211F				CN-234F
858	Br/G	AVSS	0.75	CN-291F				CN-212F
900	Lg/Y	AVSS	0.75	CN-304F				CN-221F
901	Y/L	AVSS	0.75	CN-220F				CN-304F
922	Br/W	AVSS	0.75	CN-291F				CN-217F
951	O	AVSS	0.75	CN-291F				CN-293AF
962	L/G	AVSS	0.75	CN-300M				CN-109F
966	W/O	AVSS	0.75	CN-300M				CN-894F
972	G/L	AVSS	0.75	CN-301F				CN-104F
973	O/L	AVSS	0.75	CN-301F				CN-104F
974	Gr/R	AVSS	0.75	CN-104F				JS-A21
974	Gr/R	AVSS	0.75	CN-104F				JS-A21
974	Gr/R	AVSS	0.75	CN-301F				JS-A21
975	G	AVSS	0.75	CN-888F				CN-305F
976	L	AVSS	0.75	CN-888F				JS-A22
976	L	AVSS	0.75	CN-305F				JS-A22
976	L	AVSS	0.75	CN-107F				JS-A22
977	G/Y	AVSS	0.5	CN-11-5AF				CN-292M
978	Y/G	AVSS	0.5	CN-11-5AF				CN-292M
979	P	AVSS	0.75	CN-11-6AF				CN-293BF
987	L/O	AVSS	0.75	CN-291F				CN-878F
A20	Y/G	AVSS	0.75	CN-486F				CN-291F
ES3	B/R	AVSS	0.75	CN-JA05F				CN-11-1BF
ES1	B/R	AVSS	0.75	CN-JA05F				CN-293AF
ES2	B/R	AVSS	0.75	CN-JA05F				CN-295F
ESJP	B/R	AVSS	0.75	CN-JA05F				CN-JA05F
ES4	B/R	AVSS	0.75	CN-298F				CN-JA05F
ES5	B/R	AVSS	0.75	CN-296F				CN-JA05F
ES7	B/R	AVSS	0.75	CN-298F				CN-JA05F
ES8	B/R	AVSS	0.75	CN-297F				CN-JA05F

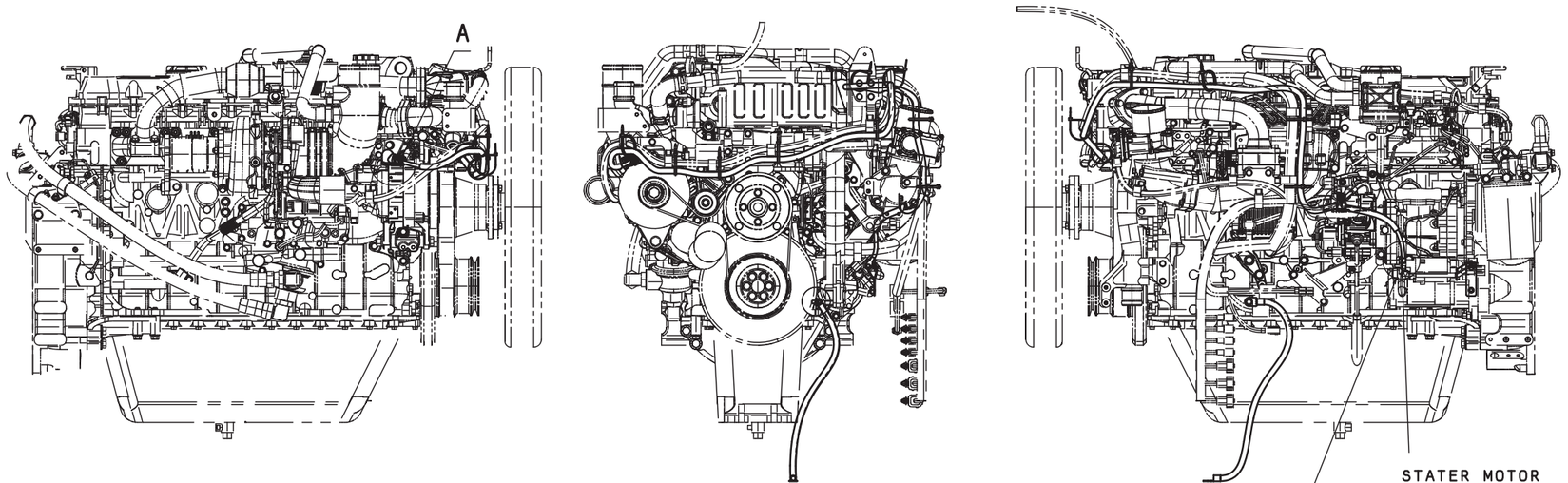
WIRE NO.	COLER	TYPE	SIZE	F R O M	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
114	R	AVSS	0.75	CN-JA03F				CN-11-1BF
115	G	AVSS	0.75	CN-JA03F				CN-11-1BF
114C	R	AVSS	0.5	CN-JA03F				CN-282F
115C	G	AVSS	0.5	CN-JA03F				CN-282F
114E	R	AVSS	0.75	CN-JA03F				CN-101F
115E	G	AVSS	0.75	CN-JA03F				CN-101F
114H	R	AVSS	0.75	CN-JA03F				CN-673F
115H	G	AVSS	0.75	CN-JA03F				CN-673F
119	Y	AVSS	0.75	CN-JA06F				CN-11-1BF
120	L	AVSS	0.75	CN-JA06F				CN-11-1BF
119A	Y	AVSS	0.75	CN-JA06F				CN-302AF
120A	L	AVSS	0.75	CN-JA06F				CN-302AF
119B	Y	AVSS	0.75	CN-JA06F				CN-486F
120B	L	AVSS	0.75	CN-JA06F				CN-486F
119E	Y	AVSS	0.75	CN-JA06F				CN-101F
120E	L	AVSS	0.75	CN-JA06F				CN-101F
119F	Y	AVSS	0.5	CN-JA06F				CN-282F
120F	L	AVSS	0.5	CN-JA06F				CN-282F
371	G	AVSS	0.75	CN-105F				CN-306M
380	W	AVSS	0.75	CN-105F				CN-306M
372	R/Y	AVSS	0.75	CN-105F				CN-673F
373	W/B	AVSS	0.75	CN-105F				CN-673F
374	L/G	AVSS	0.75	CN-105F				CN-673F
375	Br/R	AVSS	0.75	CN-105F				CN-673F
376	O/L	AVSS	0.75	CN-105F				CN-673F
377	Gr/L	AVSS	0.75	CN-105F				CN-673F
378	P/W	AVSS	0.75	CN-105F				CN-307M
379	Y/G	AVSS	0.75	CN-105F				CN-307M
388	Lg/Y	AVSS	0.75	CN-106F				CN-307M
389	G/R	AVSS	0.75	CN-106F				CN-307M
390	L/O	AVSS	0.75	CN-106F				CN-307M
391	Br	AVSS	0.75	CN-106F				CN-307M
392	O/B	AVSS	0.75	CN-106F				CN-306M
393	Sb	AVSS	0.75	CN-106F				CN-306M
396	P/W	AVSS	0.75	CN-106F				CN-306M
397	Lg/W	AVSS	0.75	CN-106F				CN-306M
488	P/G	AVSS	0.75	CN-887M				CN-106F
489	G	AVSS	0.75	CN-887M				CN-106F
490	P/L	AVSS	0.75	CN-887M				CN-106F
491	Gr/W	AVSS	0.75	CN-887M				CN-106F
492	R/B	AVSS	0.75	CN-887M				CN-105F
493	W/Y	AVSS	0.75	CN-887M				CN-105F

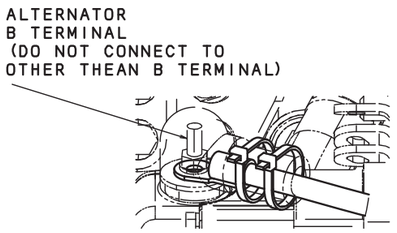
WIRE NO.	COLER	TYPE	SIZE	F R O M	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
851	R/W	AVSS	0.75	CN-226F				CN-227F
852	B	AVSS	0.75	CN-226F				CN-227F
853	P/W	AVSS	0.75	CN-226F				CN-228F
854	Gr/B	AVSS	0.75	CN-226F				CN-228F
855	L/W	AVSS	0.75	CN-304F				CN-225F
856	Lg/B	AVSS	0.75	CN-225F				CN-304F
304	R	MVVS	0.75	CN-101F				CN-421F
305	W	MVVS	0.75	CN-101F				CN-421F
306	G	MVVS	0.75	CN-101F				CN-421F
307	B	MVVS	0.75	CN-101F				CN-421F
508	W	MVVS	0.75	CN-304F				CN-422F
509	R	MVVS	0.75	CN-304F				CN-422F
510	B	MVVS	0.75	CN-304F				CN-422F
511	G	MVVS	0.75	CN-304F				CN-422F
E0	B	AVSS	1.25	CN-291F				JS-A8
E0	B	AVSS	0.75	CN-226F				JS-A8
E0	B	AVSS	1.25	CN-439F	DSA130			JS-A8
E0	B	AVSS	1.25	CN-439F	DSA130			JS-A300
E0	B	AVSS	0.75	CN-486F				JS-A300
E0	B	AVSS	0.75	CN-879M	DSA131			JS-A300
E0	B	AVSS	0.75	CN-879M	DSA131		DSA132	CB-A03
E0	B	AVSS	0.75	CN-231F	DSA133		DSA132	CB-A03
E0	B	AVSS	0.75	CN-231F	DSA133		DSA134	CN-233F
E0	B	AVSS	0.75	CN-234F	DSA172		DSA134	CN-233F
E0	B	AVSS	0.75	CN-234F	DSA172		DSA138	CN-240F
E0	B	AVSS	0.75	CN-240F	DSA139		DSA138	CN-240F
E0	B	AVSS	0.75	CN-240F	DSA139		DSA140	CN-221F
E0	B	AVSS	0.75	CN-220F	DSA141		DSA140	CN-221F
E0	B	AVSS	0.75	CN-220F	DSA141		DSA142	CN-219F
E0	B	AVSS	0.75	CN-219F	DSA143		DSA142	CN-219F
E0	B	AVSS	0.75	CN-219F	DSA143		DSA144	CN-217F
E0	B	AVSS	0.75	CB-A04	DSA168		DSA144	CN-217F
E0	B	AVSS	0.75	CB-A04	DSA168		DSA52	CA-A01
E0	B	AVSS	0.75	CN-433F	DSA145		DSA52	CA-A01
E0	B	AVSS	0.75	CN-433F	DSA145		DSA146	CN-434F
E0	B	AVSS	0.75	CN-435F	DSA147		DSA146	CN-434F
E0	B	AVSS	0.75	CN-435F	DSA147		DSA167	CN-206F
E0	B	AVSS	0.75	CN-205F	DSA148		DSA167	CN-206F
E0	B	AVSS	0.75	CN-205F	DSA148		DSA149	CN-204F
E0	B	AVSS	0.75	CN-203F	DSA154		DSA149	CN-204F
E0	B	AVSS	0.75	CN-203F	DSA154		DSA152	CN-203F
E0	B	AVSS	0.75	CN-202F	DSA150		DSA152	CN-203F
E0	B	AVSS	0.75	CN-202F	DSA150		DSA156	CN-202F
E0	B	AVSS	0.75	CN-201F	DSA157		DSA156	CN-202F
E0	B	AVSS	0.75	CN-201F	DSA157		DSA158	CN-201F
E0	B	AVSS	0.75	CN-209F	DSA159		DSA158	CN-201F
E0	B	AVSS	0.75	CN-209F	DSA159		DSA160	CN-209F
E0	B	AVSS	0.75	CN-208F	DSA161		DSA160	CN-209F
E0	B	AVSS	0.75	CN-208F	DSA161		DSA162	CN-207F
E0	B	AVSS	0.75	CN-210F	DSA163		DSA162	CN-207F
E0	B	AVSS	0.75	CN-210F	DSA163		DSA164	CN-211F
E0	B	AVSS	0.75	CN-212F	DSA165		DSA164	CN-211F
E0	B	AVSS	0.75	CN-212F	DSA165		DSA171	CN-213F
E0	B	AVSS	0.75	CN-214F	DSA170		DSA171	CN-213F
E0	B	AVSS	0.75	CN-214F	DSA170		DSA205	CN-215F
E0	B	AVSS	0.75	CN-225F	DSA300		DSA205	CN-215F
E0	B	AVSS	0.75	CN-225F	DSA300			JS-A301
E0	B	AVSS	0.75	CN-299F				JS-A301
E0	B	AVSS	1.25	CN-292M				JS-A301
E0	B	AVSS	1.25	CN-291F				JS-A302
E0	B	AVSS	0.75	CN-885F				JS-A302
E0	B	AVSS	1.25	CN-232F	DSA301			JS-A302
E0	B	AVSS	1.25	CN-232F	DSA301			CN-230F
E1	B/W	AVSS	1.25	CN-JA12F				CN-672F
E1A	B/W	AVSS	0.75	CN-JA12F				CN-11-1AF
E1B	B/W	AVSS	0.75	CN-JA12F				CN-11-1AF
E2	B/W	AVSS	1.25	CN-JA12F				CN-672F
E2A	B/W	AVSS	0.75	CN-JA12F				CN-11-4F
E2D	B/W	AVSS	0.75	CN-JA12F				CN-11-4F
E3	B/W	AVSS	1.25	CN-105F				CN-672F
E4	B/W	AVSS	1.25	CN-105F				CN-672F
E5	B/W	AVSS	1.25	CN-672F				CN-105F
E10	B/W	AVSS	0.5	CN-281F				CN-672F

(6/6)

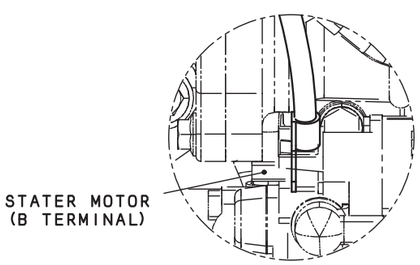
8. ELECTRICAL PART OF ENGINE

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



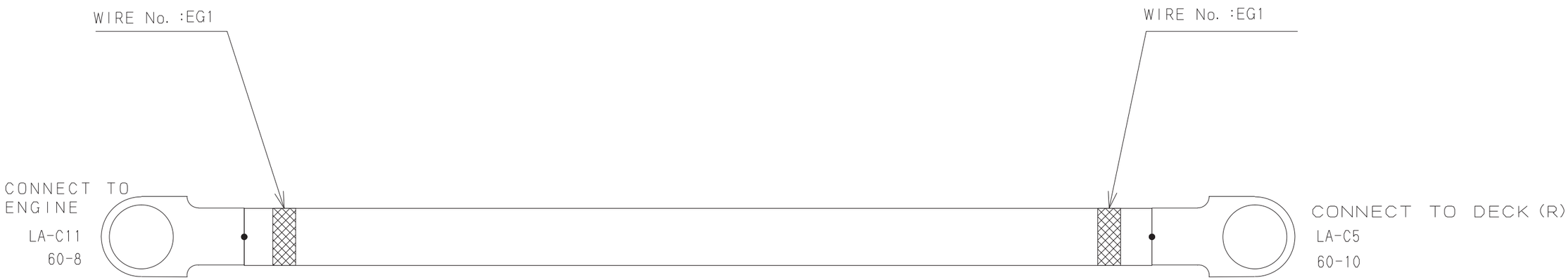


DETAIL A



DETAIL C

STARTER MOTOR HARNESS TO ENGINE GROUND HARNESS



WIRE No. AND WIRE COLER LIST

WIRE No.	COLER	TYPE	SIZE	F R O M	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	TO
EG1	B	AV	60	LA-C11			————			LA-C5

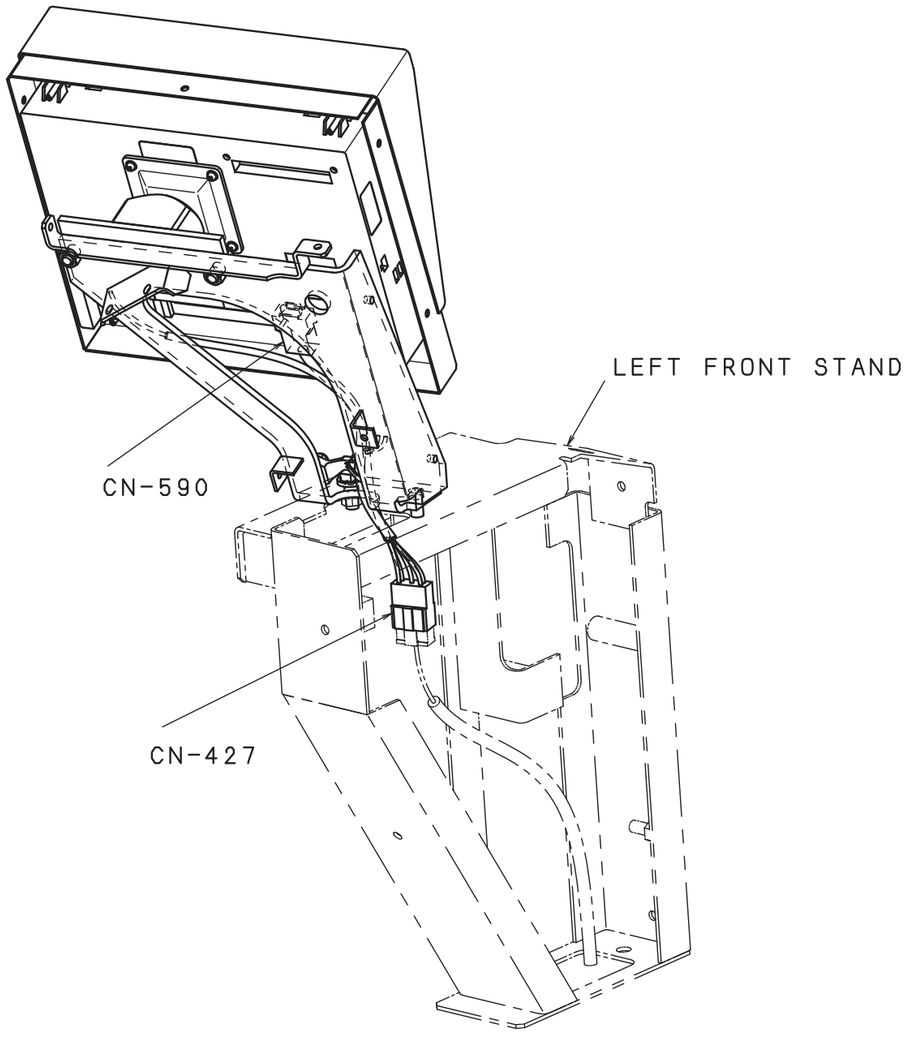
STARTER MOTOR HARNESS TARMINAL B ALTERNATOR HARNESS TARMINAL B

WIRE No. AND WIRE COLER LIST

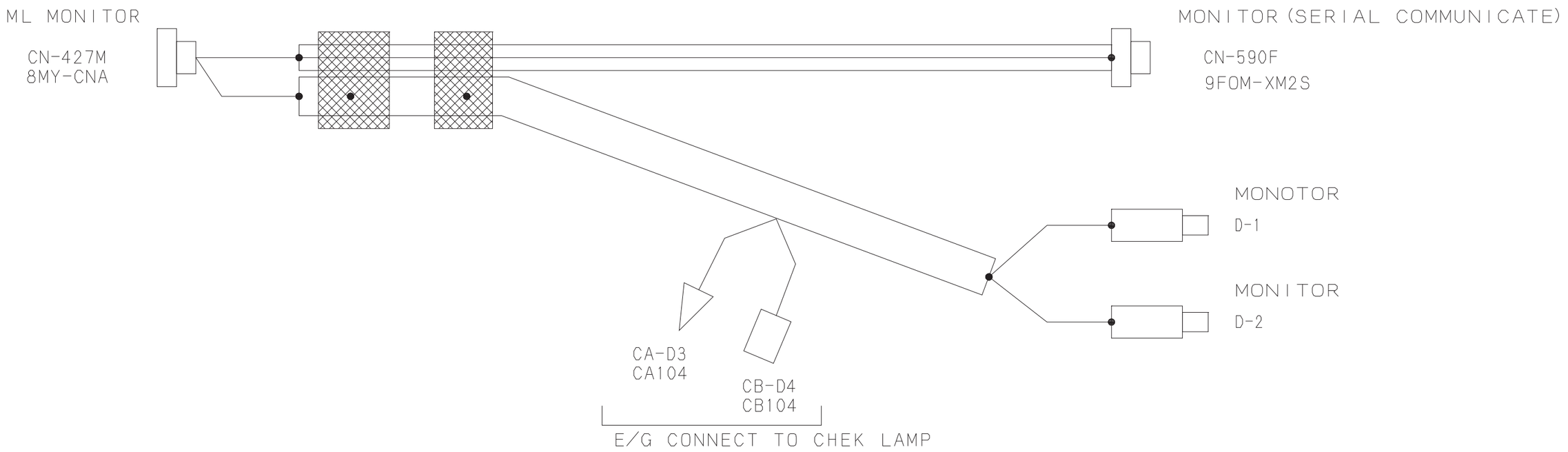
WIRE No.	COLER	TYPE	SIZE	F R O M	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	TO
2M	W	AV	20	LA-C3			————			LA-C10

9. ELECTRICAL PART OF MONITOR

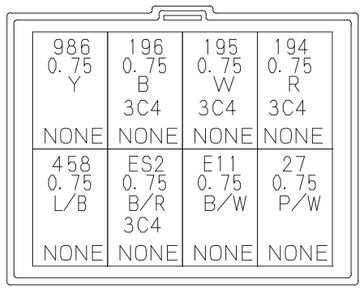
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



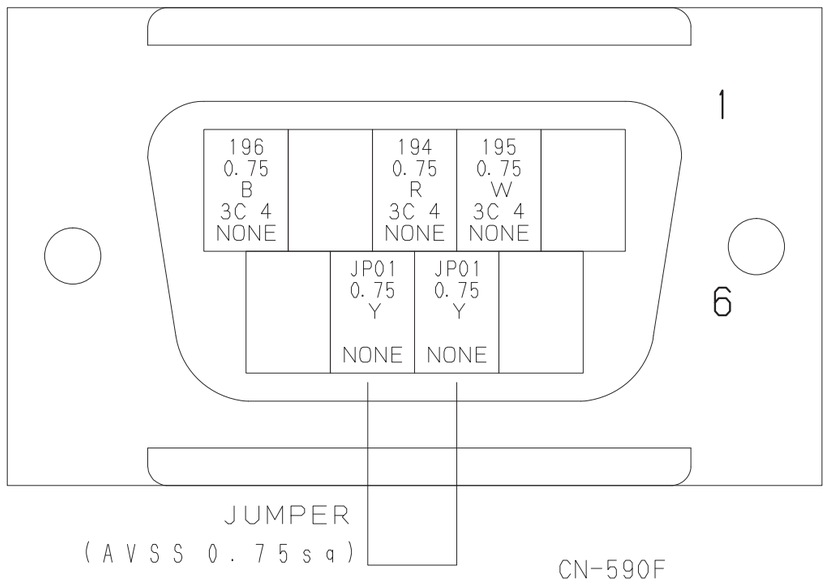
MONITOR HARNESS



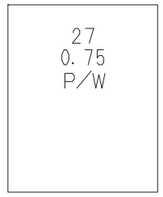
(1/2)



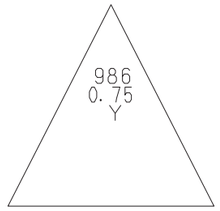
CN-427M
8MY-CNA



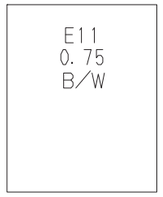
CN-590F
9FOM-XM2S



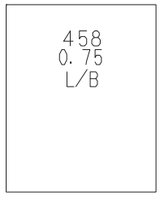
D-1



CA-D3
CA104



D-2



CB-D4
CB104

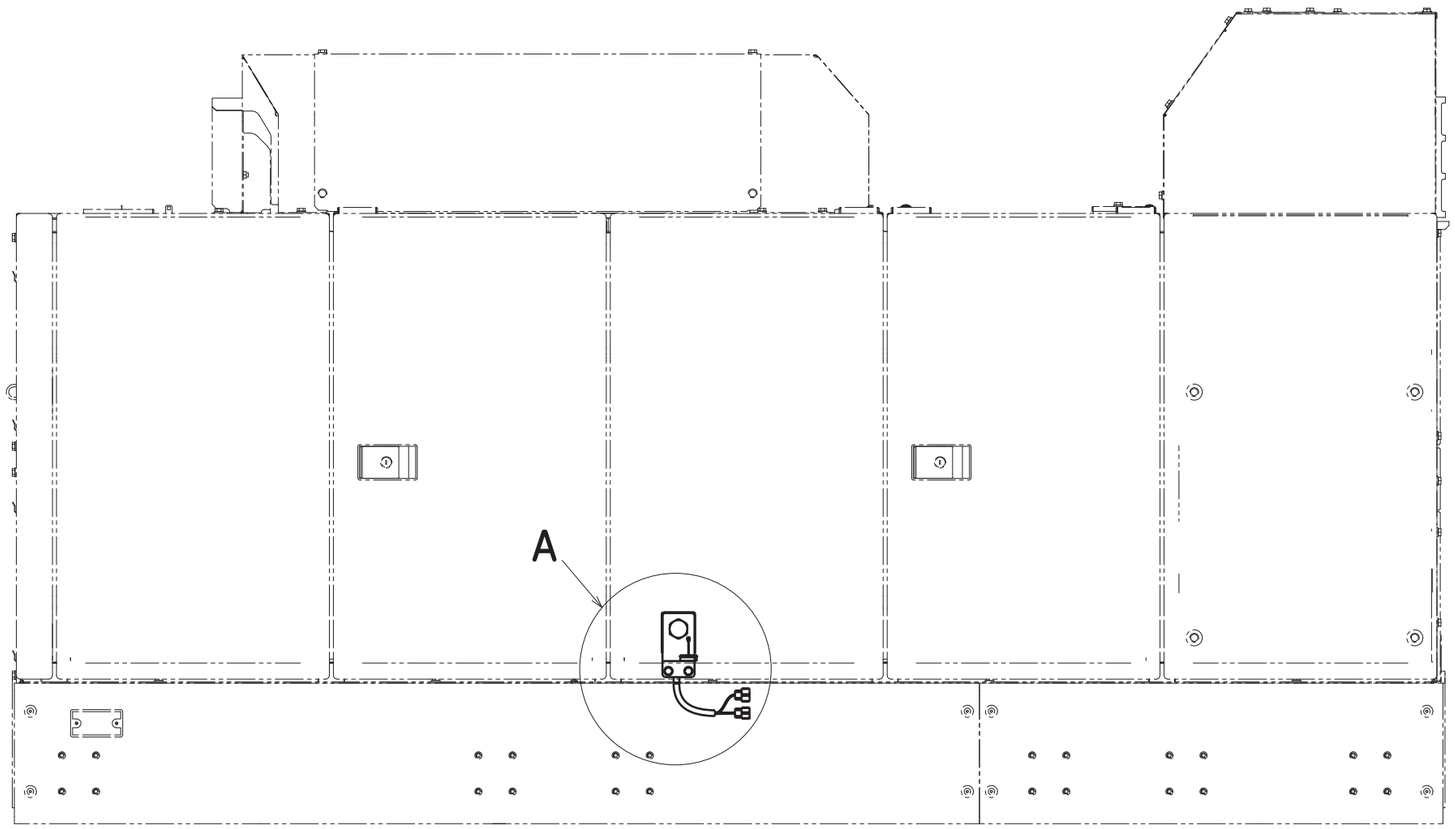
WIRE No. AND WIRE COLER LIST

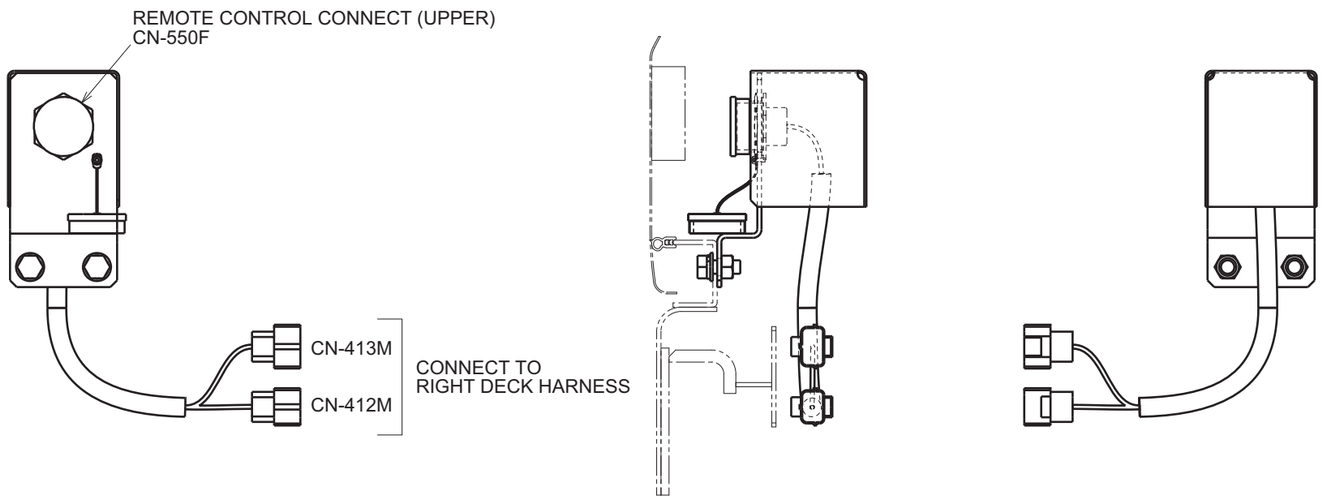
WIRE No.	COLER	TYPE	SIZE	FROM	PIN No.	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	PIN No.	TO
27	P/W	AVSS	0.75	CN-427M	5						1	D-1
JP01	Y	AVSS	0.75	CN-590F	7						8	CN-590F
194	R	MVVS	0.75	CN-427M	1	3C4				3C4	3	CN-590F
195	W	MVVS	0.75	CN-427M	2	3C4				3C4	2	CN-590F
196	B	MVVS	0.75	CN-427M	3	3C4				3C4	5	CN-590F
ES2	B/R	AVSS	0.75	CN-427M	7	3C4				3C4		(CN-590F)
E11	B/W	AVSS	0.75	CN-427M	6						1	D-2
458	L/B	AVSS	0.75	CN-427M	8							CB-D4
986	Y/G	AVSS	0.75	CN-427M	4							CA-D3

(2/2)

10. ELECTRICAL PART OF COUNTER WEIGHT SELF REMOVAL (OPTION)

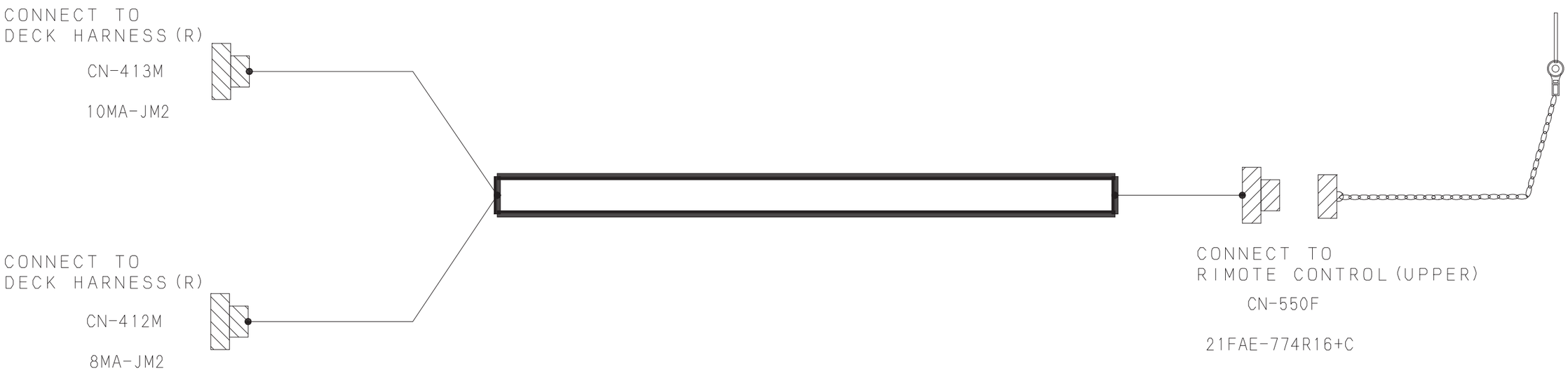
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



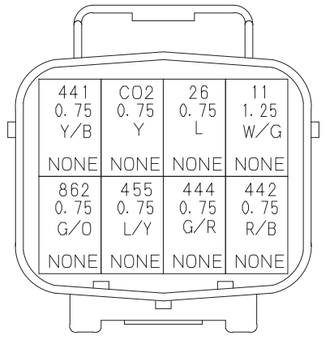


DETAIL OF “A”

COUNTER WEIGHT SELF REMOVAL HARNESS

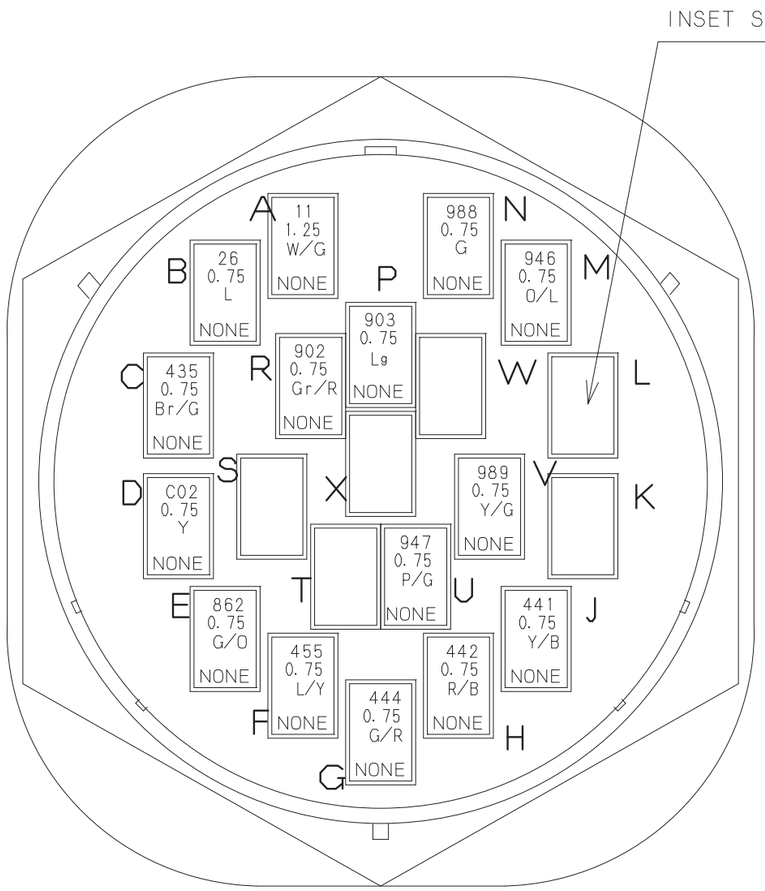


(1/3)



CN-412M

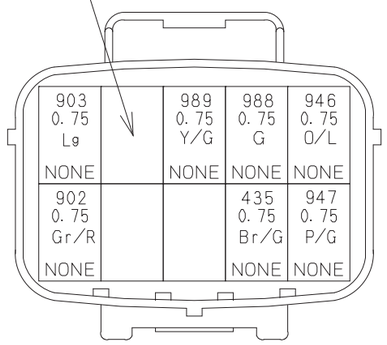
8MA-JM2



CN-550F

21FAE-774R16+C

INSET SEALING ON ALL EMPTY PINS.



CN-413M

10MA-JM2

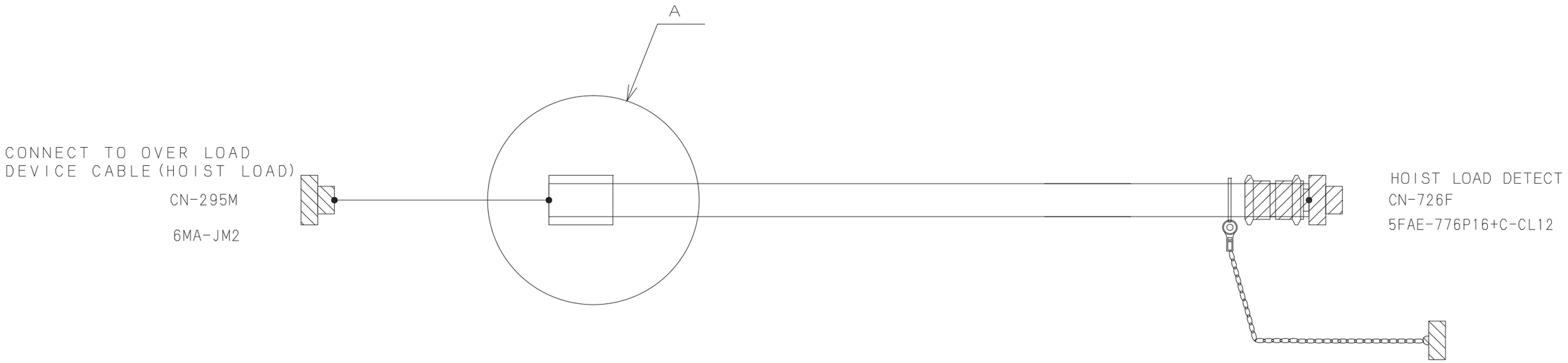
(2/3)

WIRE No. AND WIRE COLER LIST

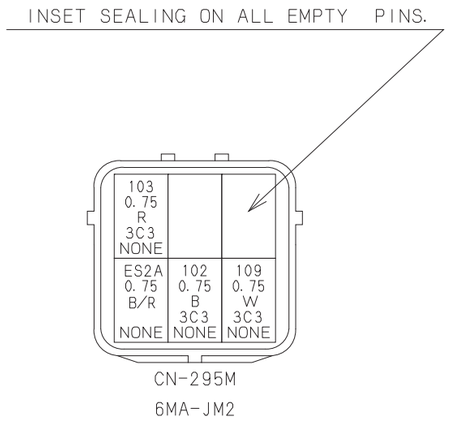
WIRE No.	COLER	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
11	W/G	AVSS	1.25	CN-412M		———		CN-550F
26	L	AVSS	0.75	CN-412M		———		CN-550F
435	Br/G	AVSS	0.75	CN-413M		———		CN-550F
441	Y/B	AVSS	0.75	CN-412M		———		CN-550F
442	R/B	AVSS	0.75	CN-412M		———		CN-550F
444	G/R	AVSS	0.75	CN-412M		———		CN-550F
455	L/Y	AVSS	0.75	CN-412M		———		CN-550F
862	G/O	AVSS	0.75	CN-412M		———		CN-550F
902	Gr/R	AVSS	0.75	CN-413M		———		CN-550F
903	Lg	AVSS	0.75	CN-413M		———		CN-550F
946	O/L	AVSS	0.75	CN-413M		———		CN-550F
947	P/G	AVSS	0.75	CN-413M		———		CN-550F
988	G	AVSS	0.75	CN-413M		———		CN-550F
989	Y/G	AVSS	0.75	CN-413M		———		CN-550F
CO2	Y	AVSS	0.75	CN-412M		———		CN-550F

(3/3)

11. OVER LOAD PREVENT (M. MACHINERY)

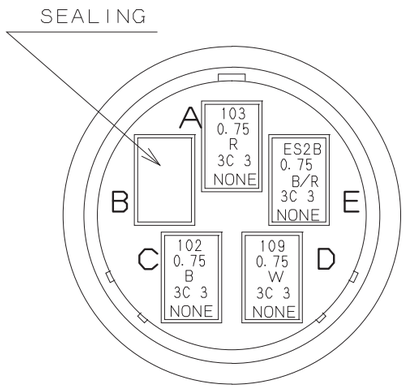


(1/2)



CN-295M

6MA-JM2



CN-726F

5FAE-776P16+C-CL12

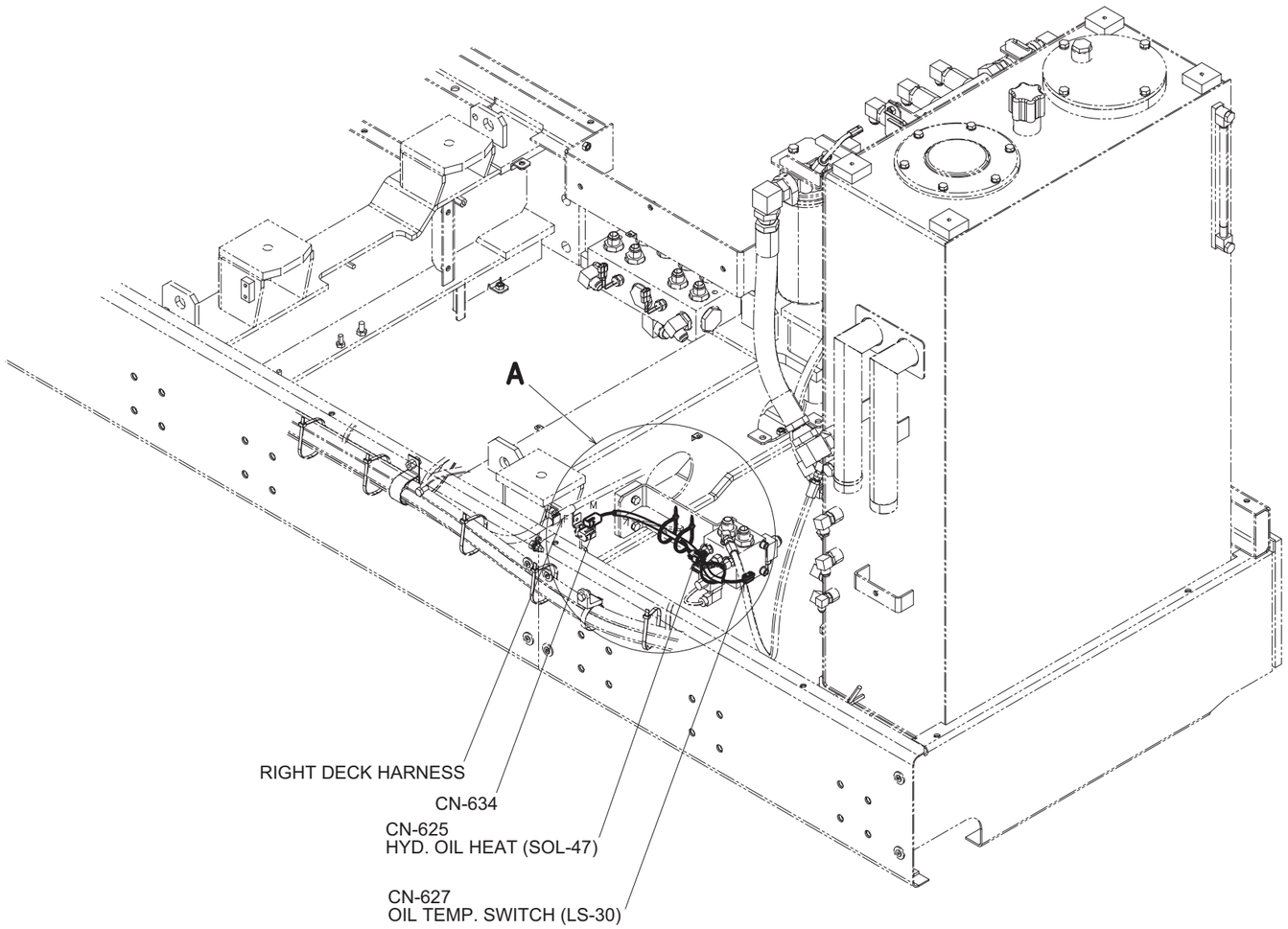
WIRE No. AND WIRE COLER LIST

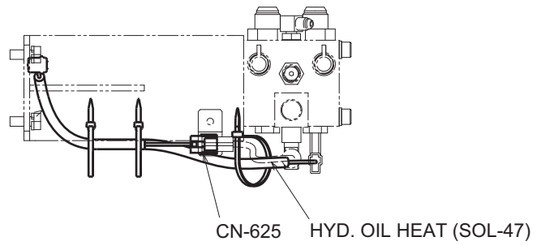
WIRE No.	COLER	TYPE	SIZE	F R O M	PIN No.	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	PIN No.	TO
102	B	2PNCT-SB	0.75	CN-295M	5	3C3				3C3	3	CN-726F
103	R	2PNCT-SB	0.75	CN-295M	3	3C3				3C3	1	CN-726F
109	W	2PNCT-SB	0.75	CN-295M	4	3C3				3C3	4	CN-726F
ES2A	B/R	AVSS	0.75	CN-295M	6	3C3				3C3		(CN-726F)
ES2B	B/R	AVSS	0.75	(CN-295M)		3C3				3C3	5	CN-726F

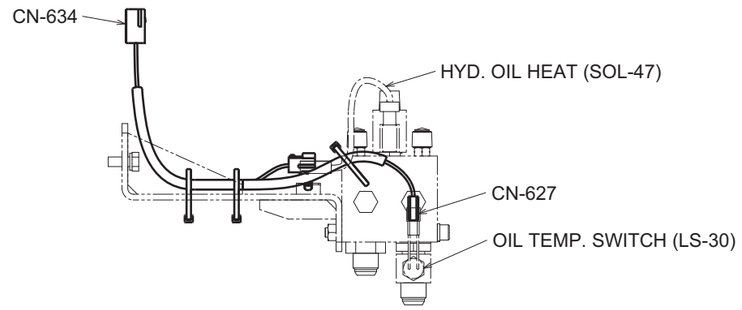
(2/2)

14. ELECTRICAL PART OF HYDRAULIC OIL HEAT

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT

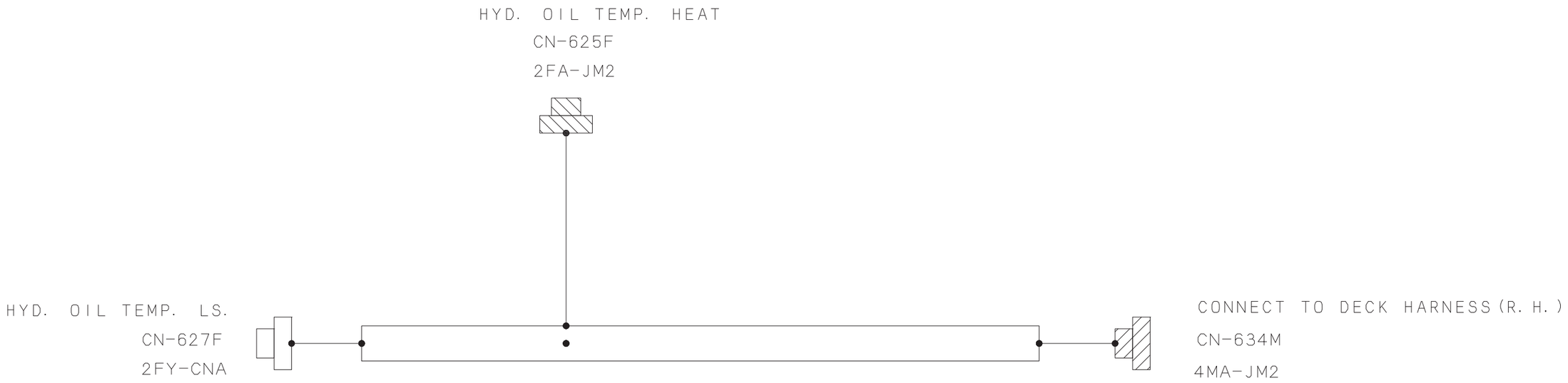




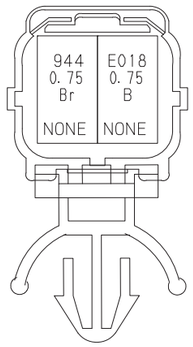


DETAIL OF “A”

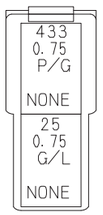
HYDRAULIC OIL HEAT HARNESS



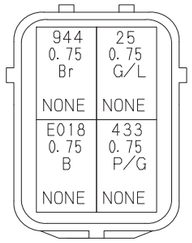
(1/2)



CN-625F
2FA-JM2



CN-627F
2FY-CNA



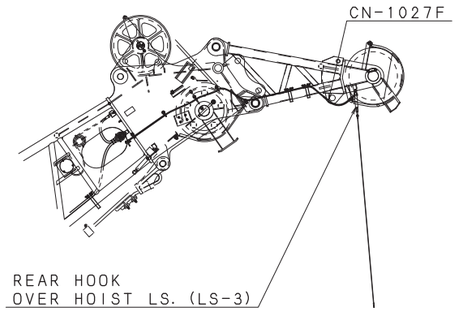
CN-634M
4MA-JM2

WIRE No. AND WIRE COLER LIST

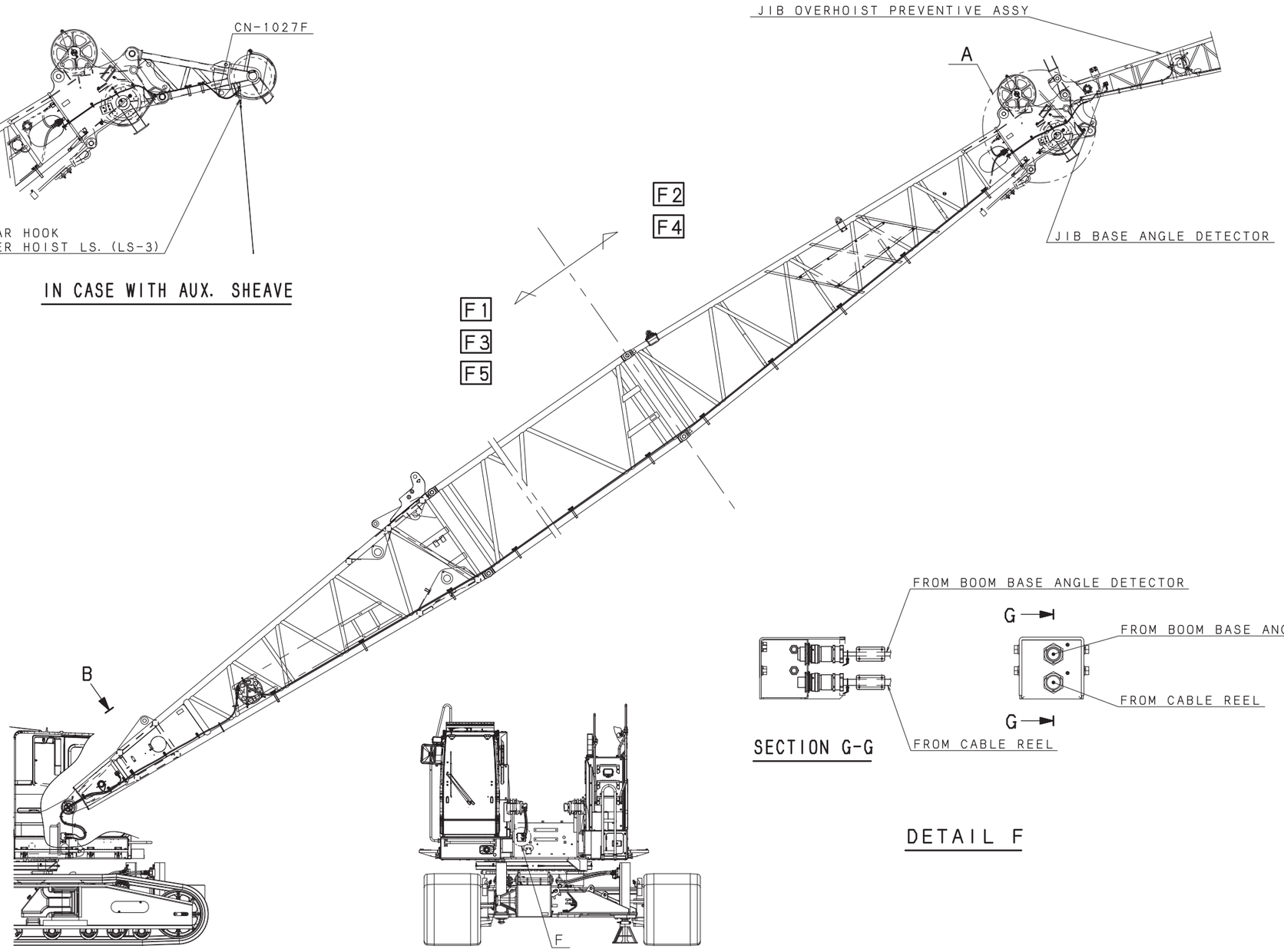
WIRE No.	COLER	TYPE	SIZE	FROM	PIN No.	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	PIN No.	TO	LENGTH (mm)
25	G/L	AVSS	0.75	CN-627F	1						1	CN-634M	440
433	P/G	AVSS	0.75	CN-627F	2						3	CN-634M	440
944	Br	AVSS	0.75	CN-625F	1						2	CN-634M	350
E018	B	AVSS	0.75	CN-634M	4						2	CN-625F	350

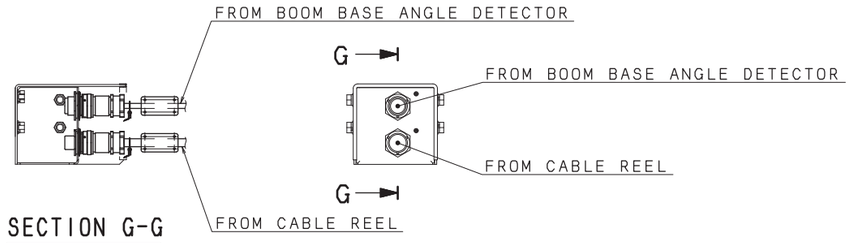
15. ELECTRICAL PART OF BOOM BASE (INSERT INCLUDED)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



IN CASE WITH AUX. SHEAVE



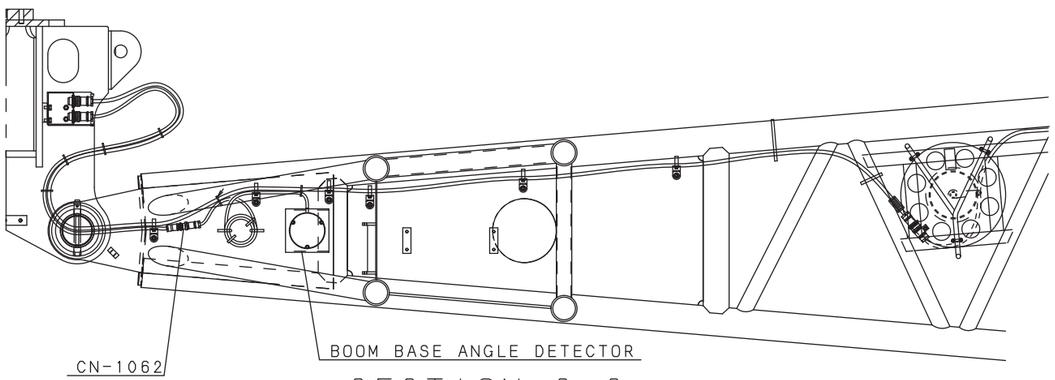


SECTION G-G

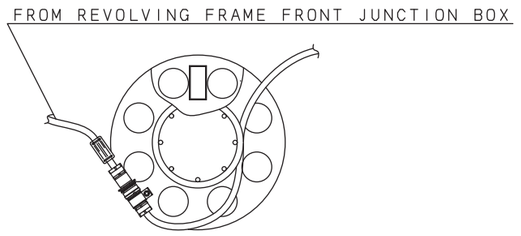
DETAIL F

(1/3)

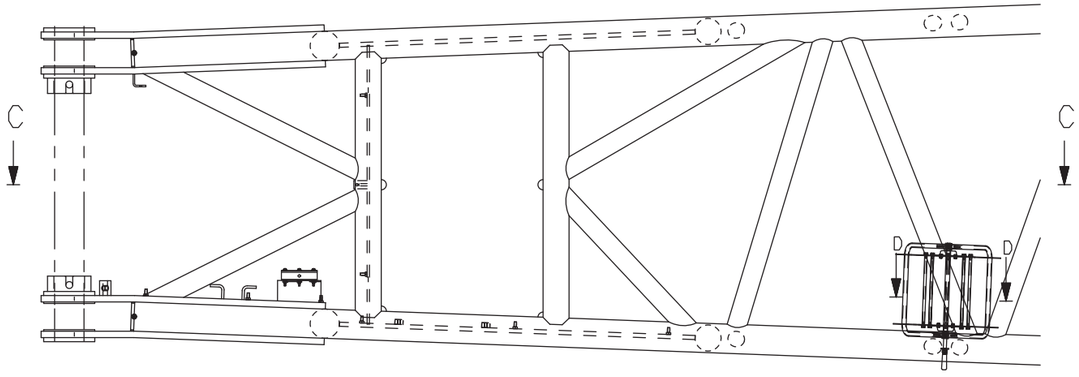
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



SECTION C-C



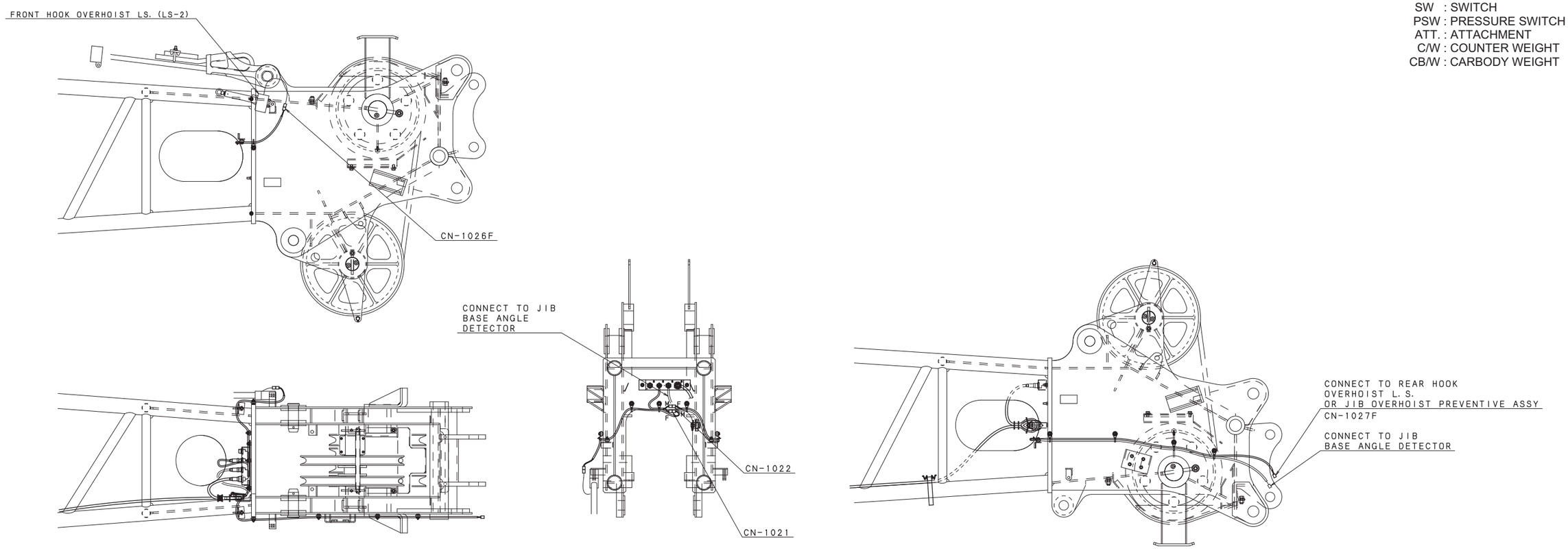
SECTION D-D



VIEW B

(2/3)

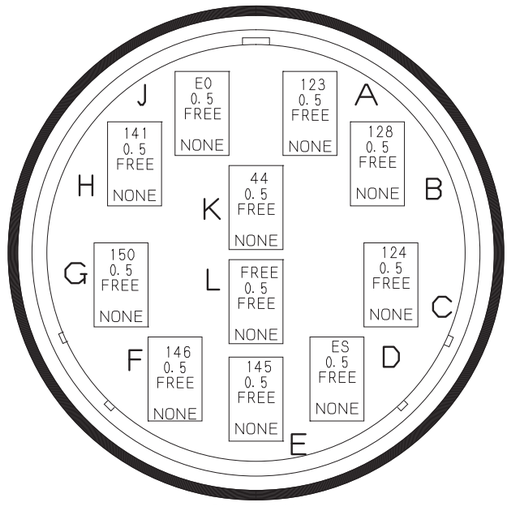
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



(3/3)

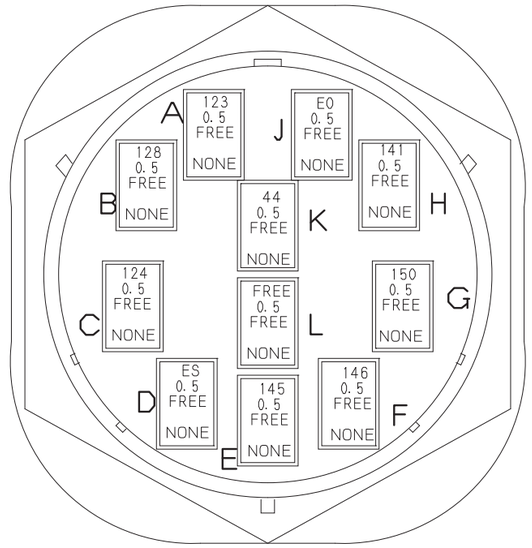
BOOM BASE HARNESS (INSERT INCLUDED)

(1/2)



CN-1001M

11MAE-776P16+C-CL16



CN-1005F

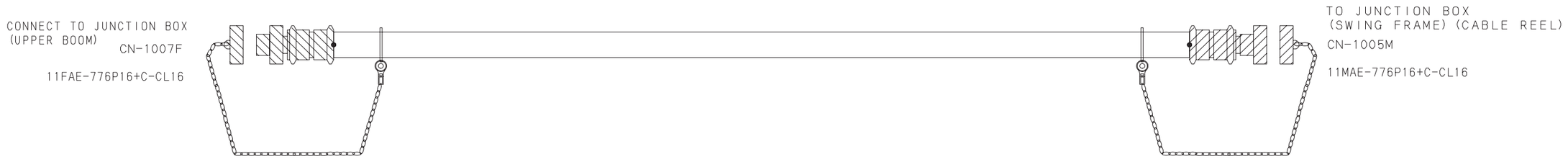
11FAE-774R16+C-CL16

WIRE No. AND WIRE COLER LIST

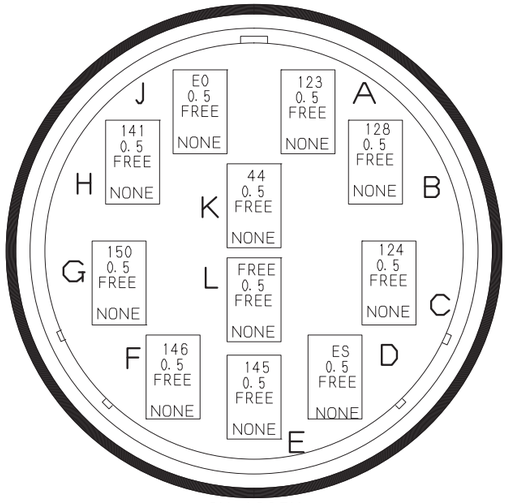
WIRE No.	COLER	TYPE	SIZE	F R O M	PIN No.	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	PIN No.	TO
44	Free	2PNCT-SB	0.5	CN-1005F	10				10	CN-1001M
123	Free	2PNCT-SB	0.5	CN-1005F	1				1	CN-1001M
124	Free	2PNCT-SB	0.5	CN-1005F	3				3	CN-1001M
128	Free	2PNCT-SB	0.5	CN-1005F	2				2	CN-1001M
141	Free	2PNCT-SB	0.5	CN-1005F	8				8	CN-1001M
145	Free	2PNCT-SB	0.5	CN-1005F	5				5	CN-1001M
146	Free	2PNCT-SB	0.5	CN-1005F	6				6	CN-1001M
150	Free	2PNCT-SB	0.5	CN-1005F	7				7	CN-1001M
E0	Free	2PNCT-SB	0.5	CN-1005F	9				9	CN-1001M
FREE	Free	2PNCT-SB	0.5	CN-1005F	11				11	CN-1001M
ES	Free	SHIELD		CN-1005F	4					(CN-1001M)
ES	Free	SHIELD		(CN-1005F)					4	CN-1001M

(2/2)

CABLE

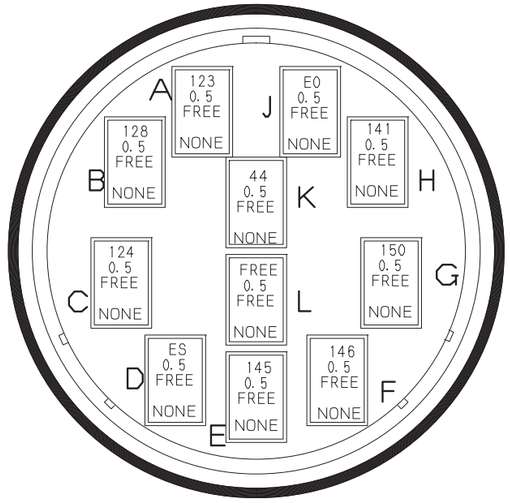

CONNECT TO JUNCTION BOX
(UPPER BOOM)
CN-1007F
11FAE-776P16+C-CL16
TO JUNCTION BOX
(SWING FRAME) (CABLE REEL)
CN-1005M
11MAE-776P16+C-CL16

(1/2)



CN-1005M

11MAE-776P16+C-CL16



CN-1007F

11FAE-776P16+C-CL16

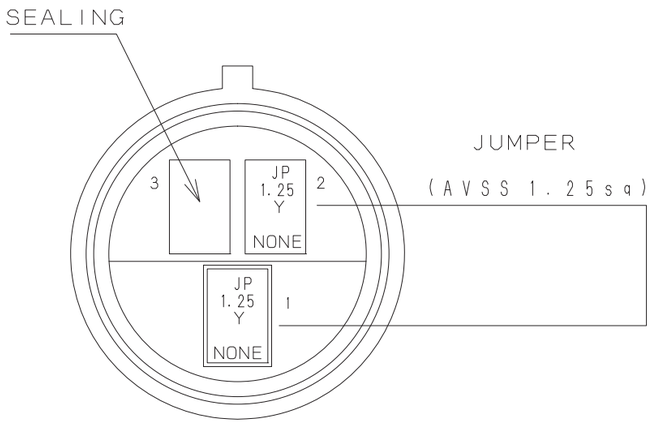
WIRE No. AND WIRE COLER LIST

WIRE No.	COLER	TYPE	SIZE	F R O M	PIN No.	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	PIN No.	TO
44	Free	2PNCT-SB	0.5	CN-1007F	10				10	CN-1005M
123	Free	2PNCT-SB	0.5	CN-1007F	1				1	CN-1005M
124	Free	2PNCT-SB	0.5	CN-1007F	3				3	CN-1005M
128	Free	2PNCT-SB	0.5	CN-1007F	2				2	CN-1005M
141	Free	2PNCT-SB	0.5	CN-1007F	8				8	CN-1005M
145	Free	2PNCT-SB	0.5	CN-1007F	5				5	CN-1005M
146	Free	2PNCT-SB	0.5	CN-1007F	6				6	CN-1005M
150	Free	2PNCT-SB	0.5	CN-1007F	7				7	CN-1005M
E0	Free	2PNCT-SB	0.5	CN-1007F	9				9	CN-1005M
FREE	Free	2PNCT-SB	0.5	CN-1007F	11				11	CN-1005M
ES	Free	SHIELD		CN-1007F	4					(CN-1005M)
ES	Free	SHIELD		(CN-1007F)					4	CN-1005M

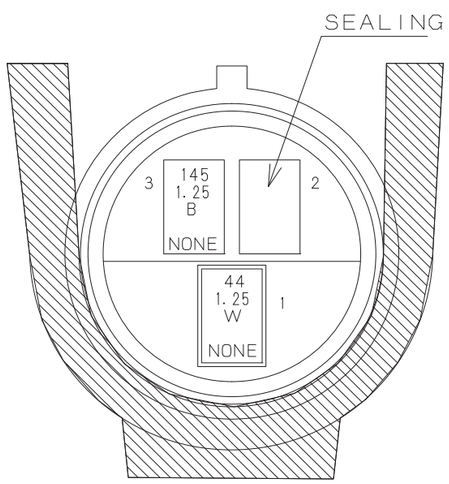
(2/2)

16. BOOM TIP HARNESS

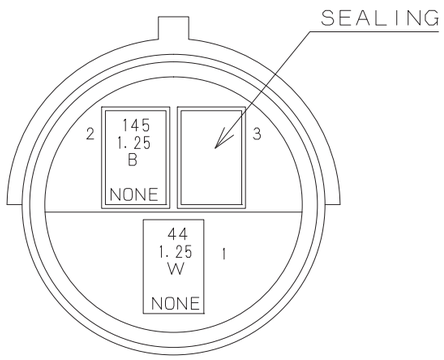
(1/2)



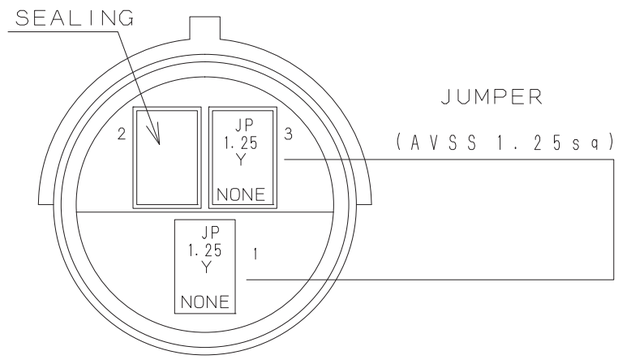
CN-1021AF
3FC-SSR



CN-1026F
3FC-SSR



CN-1021M
3MC-SSP



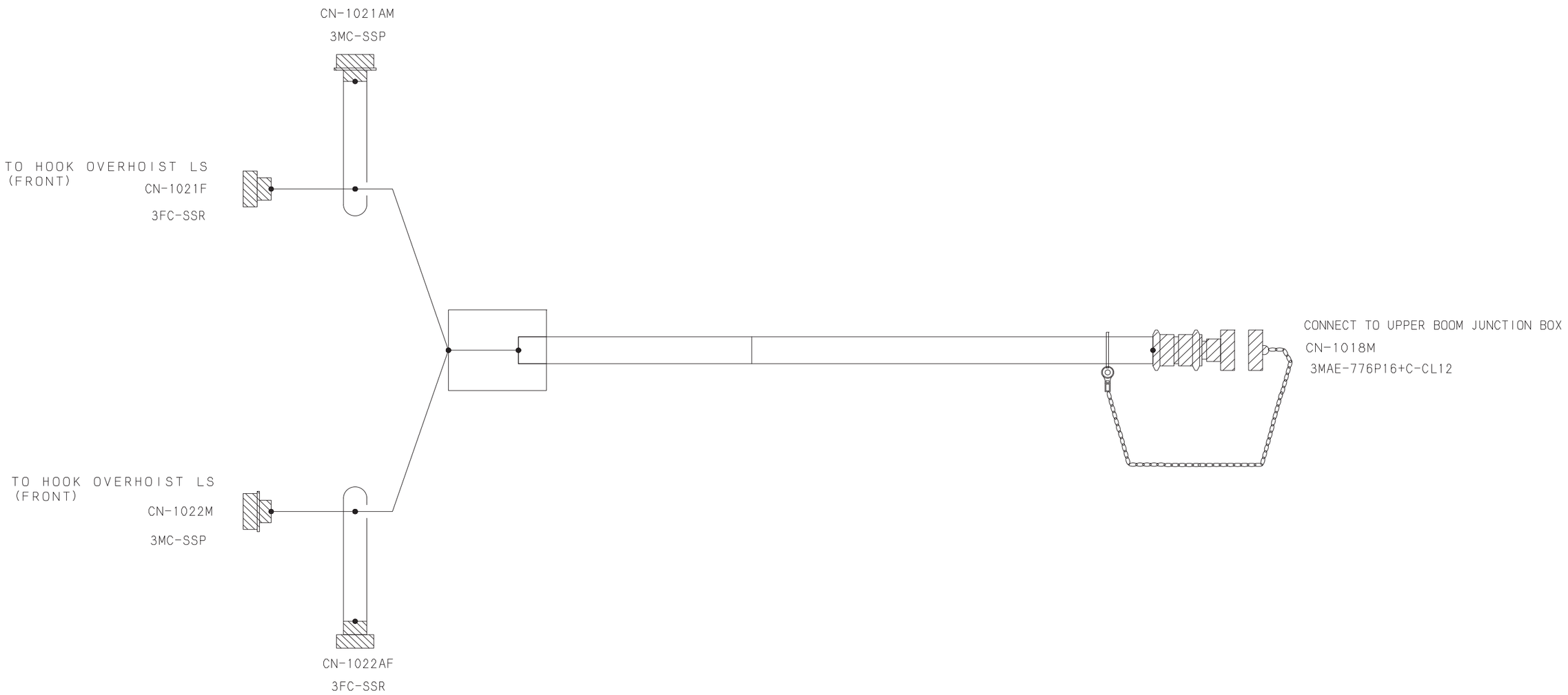
CN-1026AM
3MC-SSP

WIRE No. AND WIRE COLOR LIST

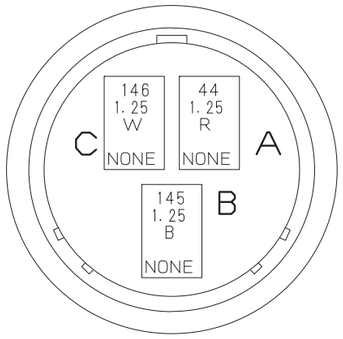
No.	COLER	TYPE	SIZE	FROM	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	TO
44	W	VCTF	1.25	CN-1021M						CN-1026F
145	B	VCTF	1.25	CN-1021M						CN-1026F
JP	Y	AVSS	1.25	CN-1021AF						
JP	Y	AVSS	1.25							CN-1021AF
JP	Y	AVSS	1.25	CN-1026AM						
JP	Y	AVSS	1.25							CN-1026AM

(2/2)

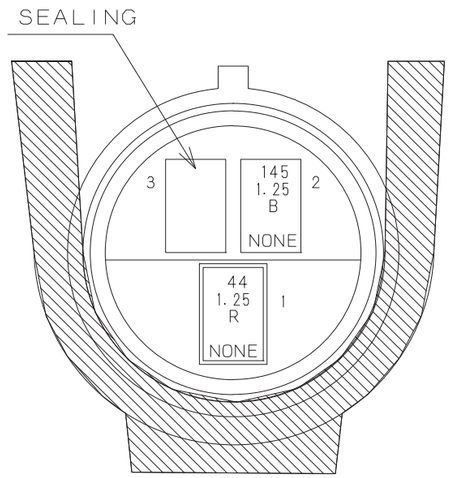
CABLE


CN-1021AM
3MC-SSP
TO HOOK OVERHOIST LS
(FRONT)
CN-1021F
3FC-SSR
CONNECT TO UPPER BOOM JUNCTION BOX
CN-1018M
3MAE-776P16+C-CL12
TO HOOK OVERHOIST LS
(FRONT)
CN-1022M
3MC-SSP
CN-1022AF
3FC-SSR

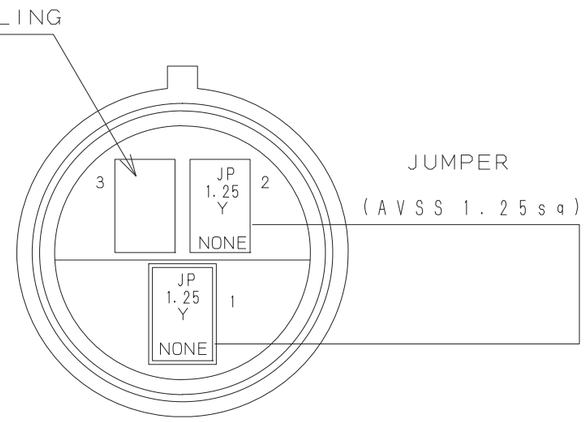
(1/2)



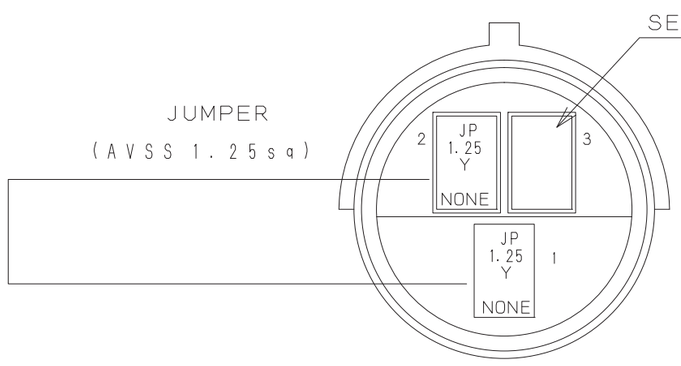
CN-1018M
3MAE-776P16+C-CL12



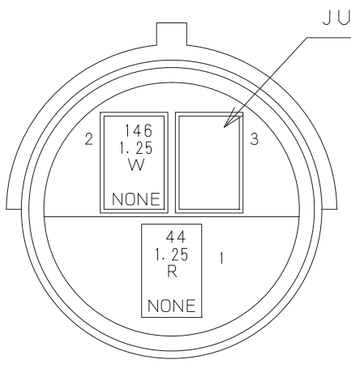
CN-1021F
3FC-SSR



CN-1022AF
3FC-SSR



CN-1021AM
3MC-SSP



CN-1022M
3MC-SSP

WIRE No. AND WIRE COLER LIST

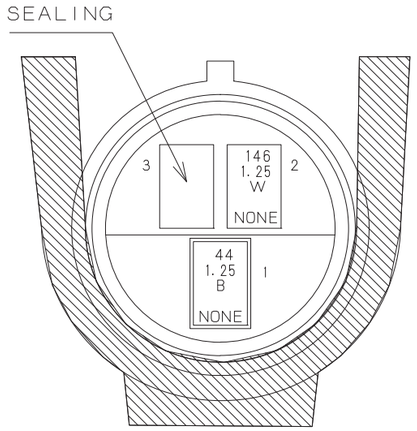
No.	COLER	TYPE	SIZE	FROM	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	TO
44	R	AVSS	1.25	CN-1021F			———			JS
44	R	AVSS	1.25	CN-1022M			———			JS
44	R	2PNCT-SR	1.25	CN-1018M			———			JS
145	B	2PNCT-SR	1.25	CN-1021F			———			CN-1018M
146	W	2PNCT-SR	1.25	CN-1022M			———			CN-1018M
JP	Y	AVSS	1.25	CN-1021AM			———			CN-1021AM
JP	Y	AVSS	1.25	CN-1022AF			———			CN-1022AF

(2/2)

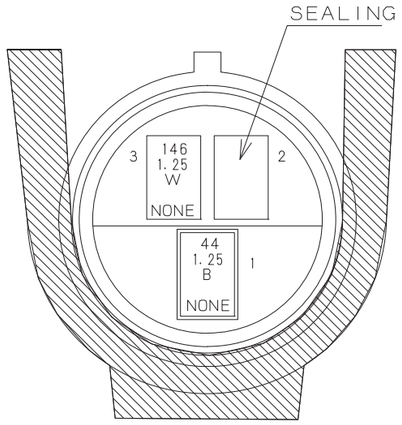
CABLE


CONNECT TO AUX. HOOK OVERHOIST LS
CN-1027F
3FC-SSR
TO UPPER BOOM JUNCTION BOX
CN-1022F
3FC-SSR
CN-1027AM
3MC-SSP
CN-1022AM
3MC-SSP

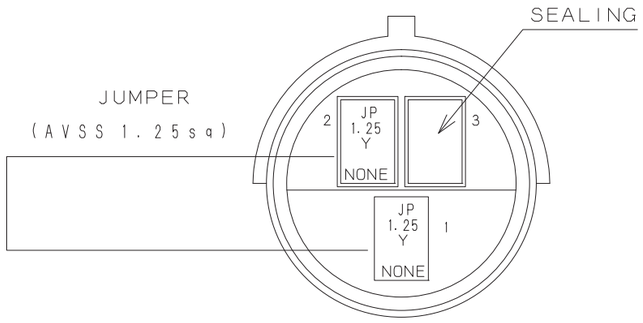
(1/2)



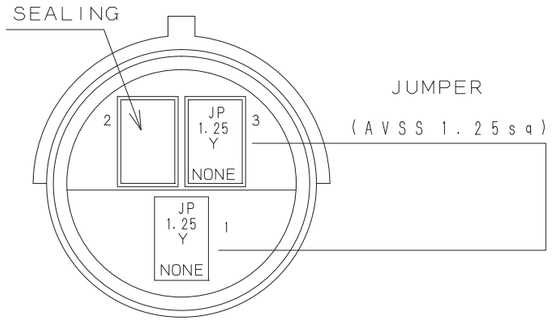
CN-1022F
3FC-SSR



CN-1027F
3FC-SSR



CN-1022AM
3MC-SSP



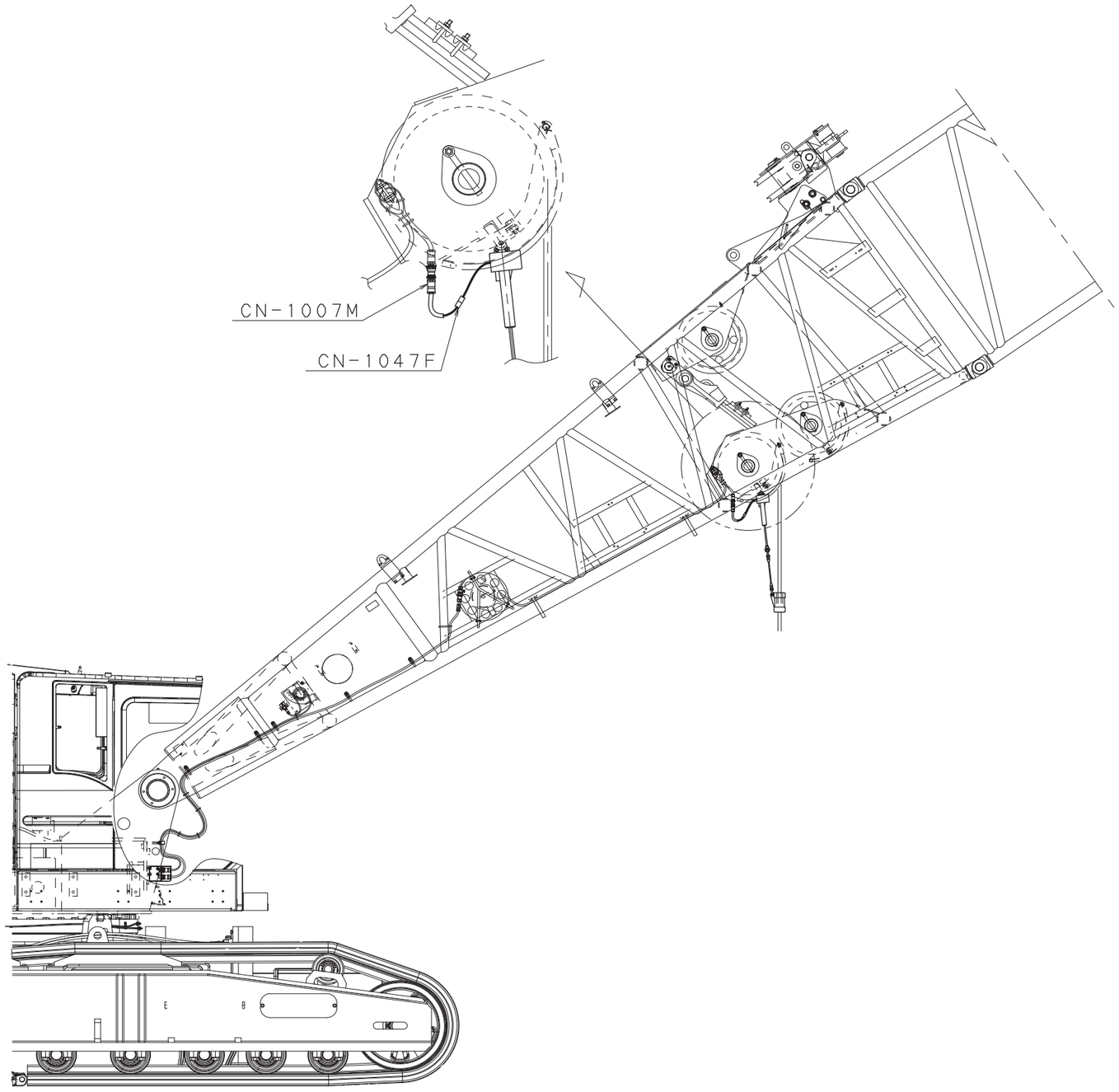
CN-1027AM
3MC-SSP

WIRE No. AND WIRE COLER LIST

No.	COLER	TYPE	SIZE	FROM	DISTING SYMBOL	2-WIRE CLAMP No.	CONNECTON	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	TO
44	B	VCTF	1.25	CN-1022F						CN-1027F
146	W	VCTF	1.25	CN-1022F						CN-1027F
JP	Y	AVSS	1.25	CN-1022AM						
JP	Y	AVSS	1.25							CN-1022AM
JP	Y	AVSS	1.25	CN-1027AM						
JP	Y	AVSS	1.25							CN-1027AM

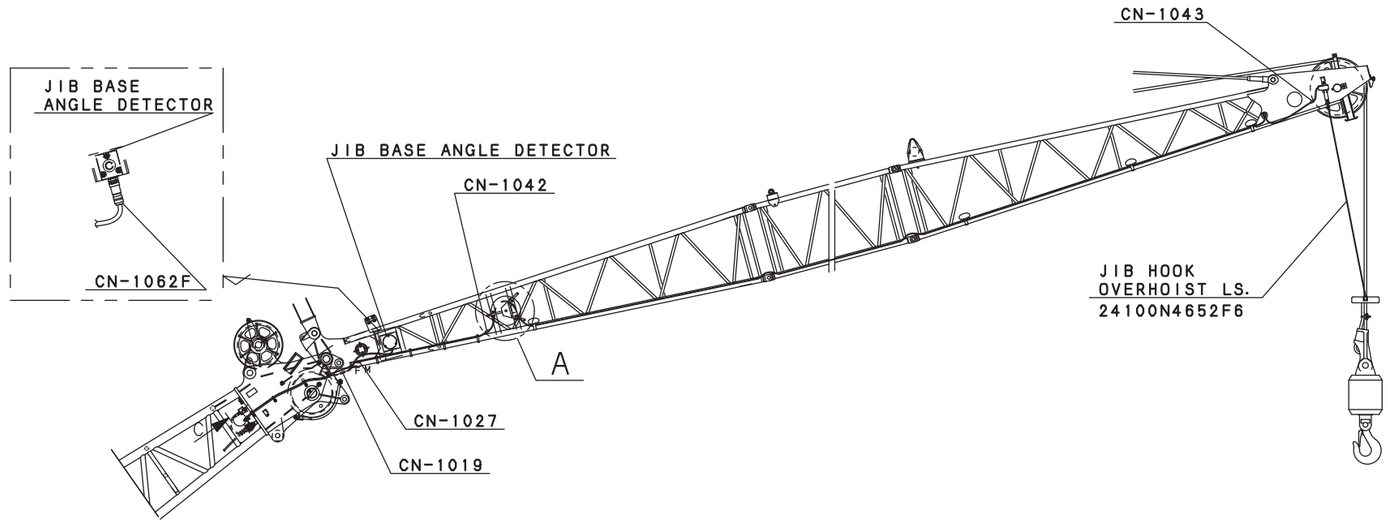
(2/2)

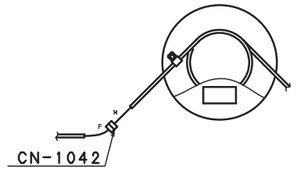
17. ELECTRICAL PART OF CRAWLER SELF REMOVAL



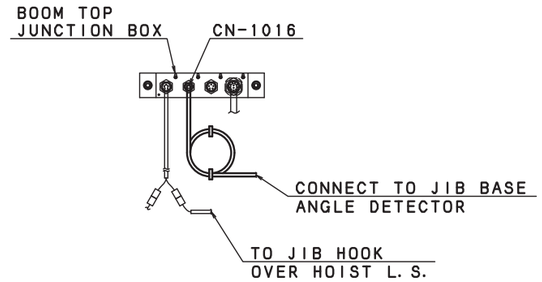
18. ELECTRICAL PART OF FIXED JIB

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT

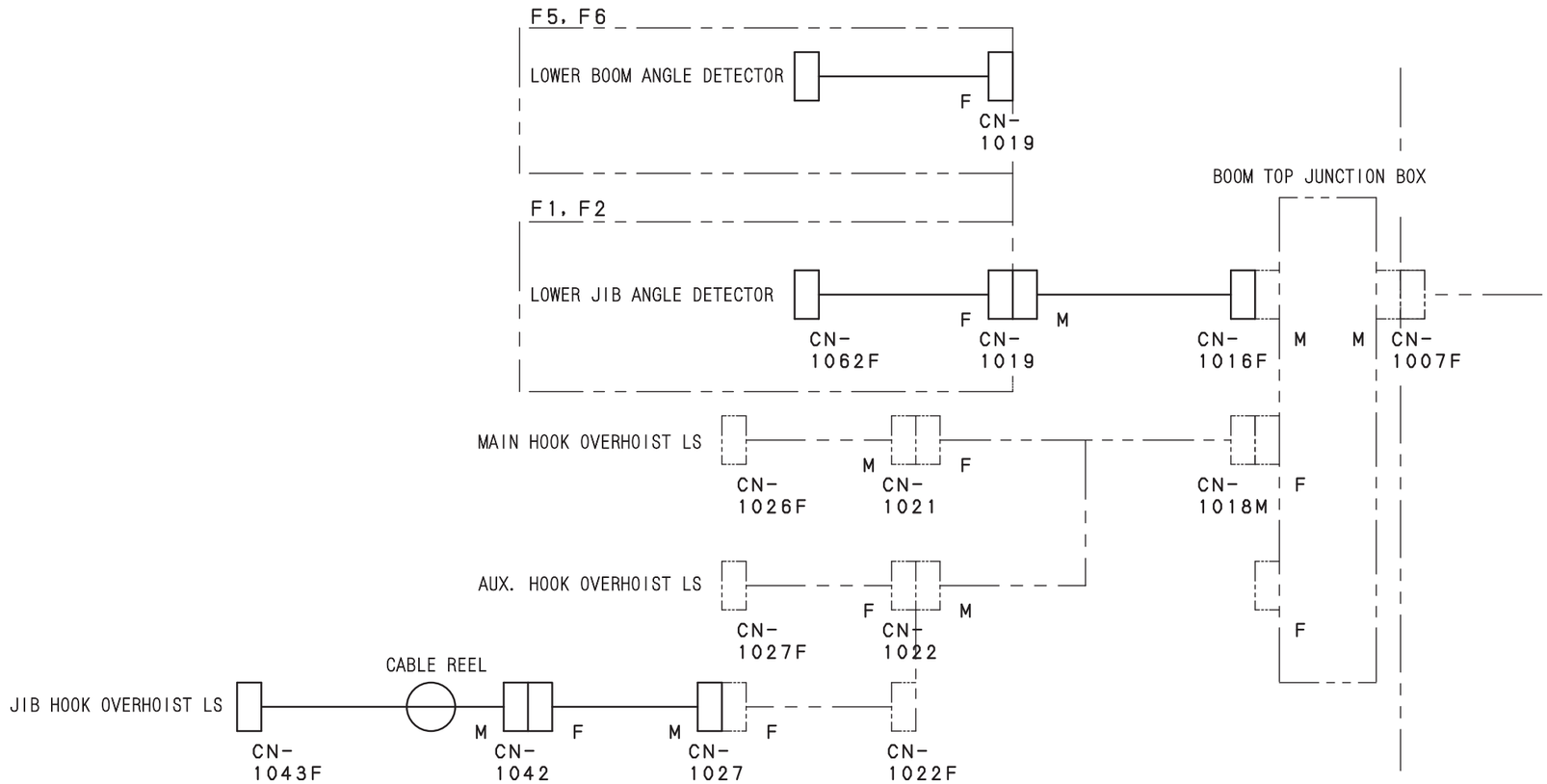




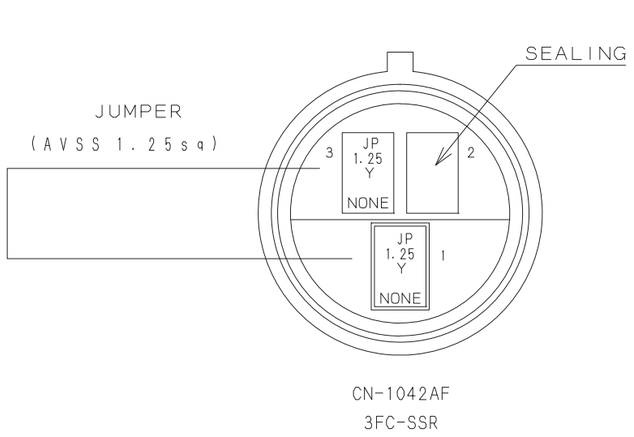
DETAIL A



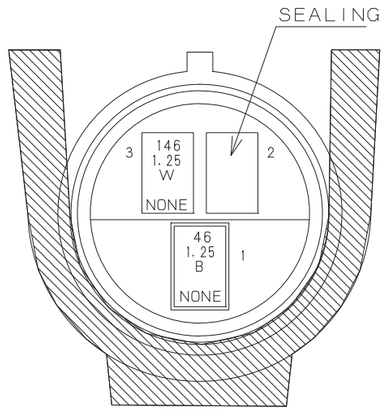
VIEW C



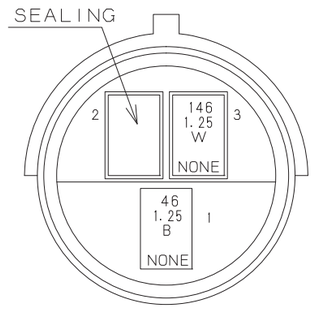
FIXED JIB HARNESS



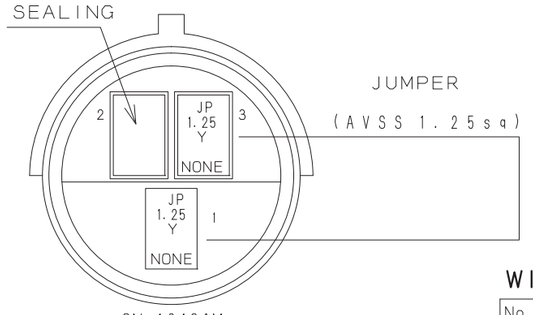
CN-1042AF
3FC-SSR



CN-1043F
3FC-SSR



CN-1042M
3MC-SSP



CN-1043AM
3MC-SSP

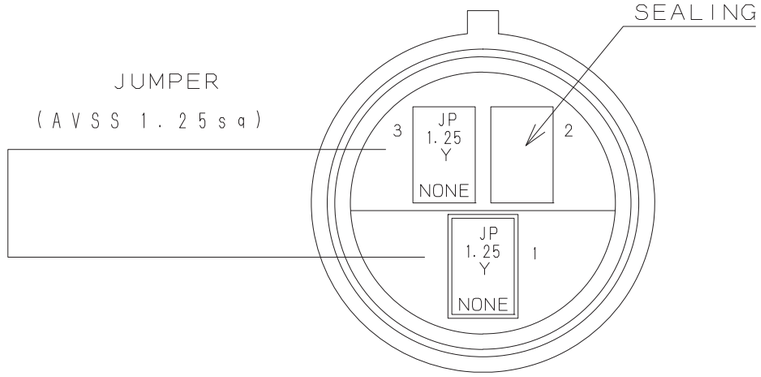
WIRE No. AND WIRE COLER LIST

No.	COLER	TYPE	SIZE	FROM	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	TO
46	B	VCTF	1.25	CN-1043F						CN-1042M
146	W	VCTF	1.25	CN-1043F						CN-1042M
JP	Y	AVSS	1.25	CN-1042AF						
JP	Y	AVSS	1.25							CN-1042AF
JP	Y	AVSS	1.25	CN-1043AM						
JP	Y	AVSS	1.25							CN-1043AM

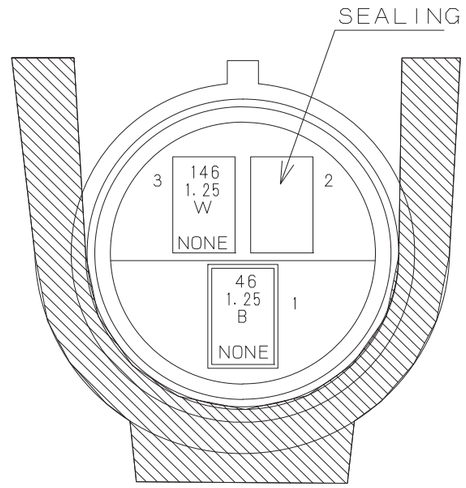
CABLE


CONNECT TO JUNCTION BOX
(AUX. HOOK OVER HOIST LS)
CN-1042F
3FC-SSR
CN-1042AM
3MC-SSP
TO JUNCTION BOX
(UPPER BOOM)
CN-1027M
3MC-SSP
CN-1027AF
3FC-SSR

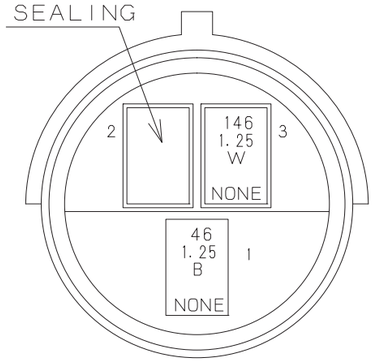
(1/2)



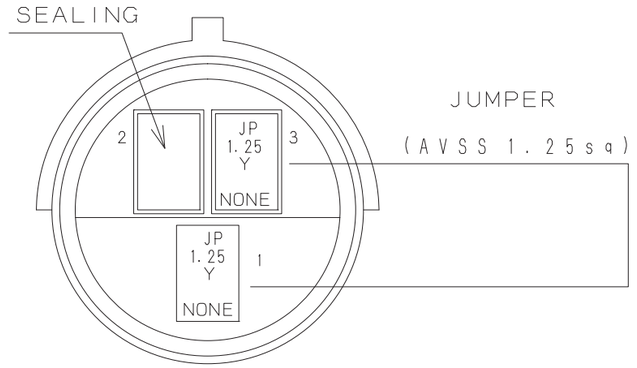
CN-1027AF
3FC-SSR



CN-1042F
3FC-SSR



CN-1027M
3MC-SSP



CN-1042AM
3MC-SSP

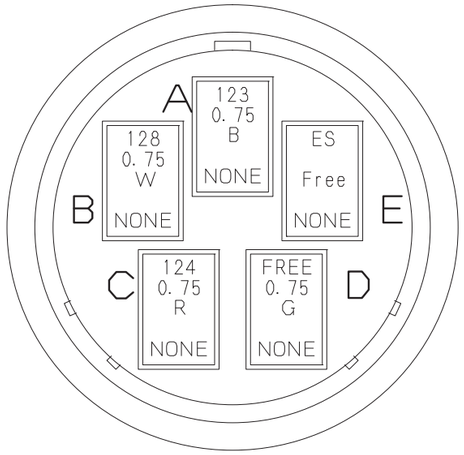
WIRE No. AND WIRE COLER LIST

No.	COLER	TYPE	SIZE	FROM	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	TO
46	B	VCTF	1.25	CN-1042F						CN-1027M
146	W	VCTF	1.25	CN-1042F						CN-1027M
JP	Y	AVSS	1.25	CN-1027AF						
JP	Y	AVSS	1.25							CN-1027AF
JP	Y	AVSS	1.25	CN-1042AM						
JP	Y	AVSS	1.25							CN-1042AM

CABLE

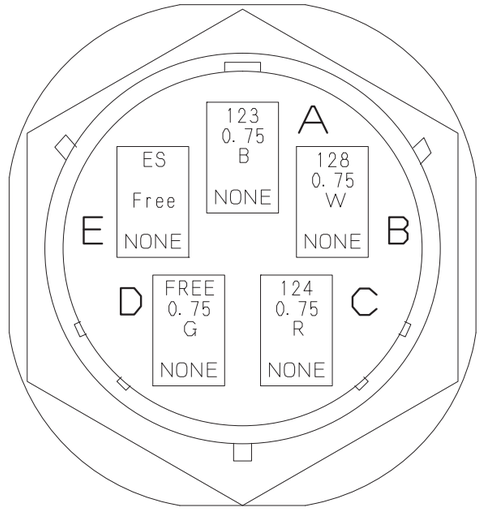

CONNECT TO ANGLE DETACTOR
(FIX JIB)
CN-1019M
5MAE-774R16+C-CL12
CONNECT TO JUNCTION BOX
(UPPER BOOM)
CN-1016F
5FAE-776P16+C-CL12

(1/2)



CN-1016F

5FAE-776P16+C-CL12



CN-1019M

5MAE-774R16+C-CL12

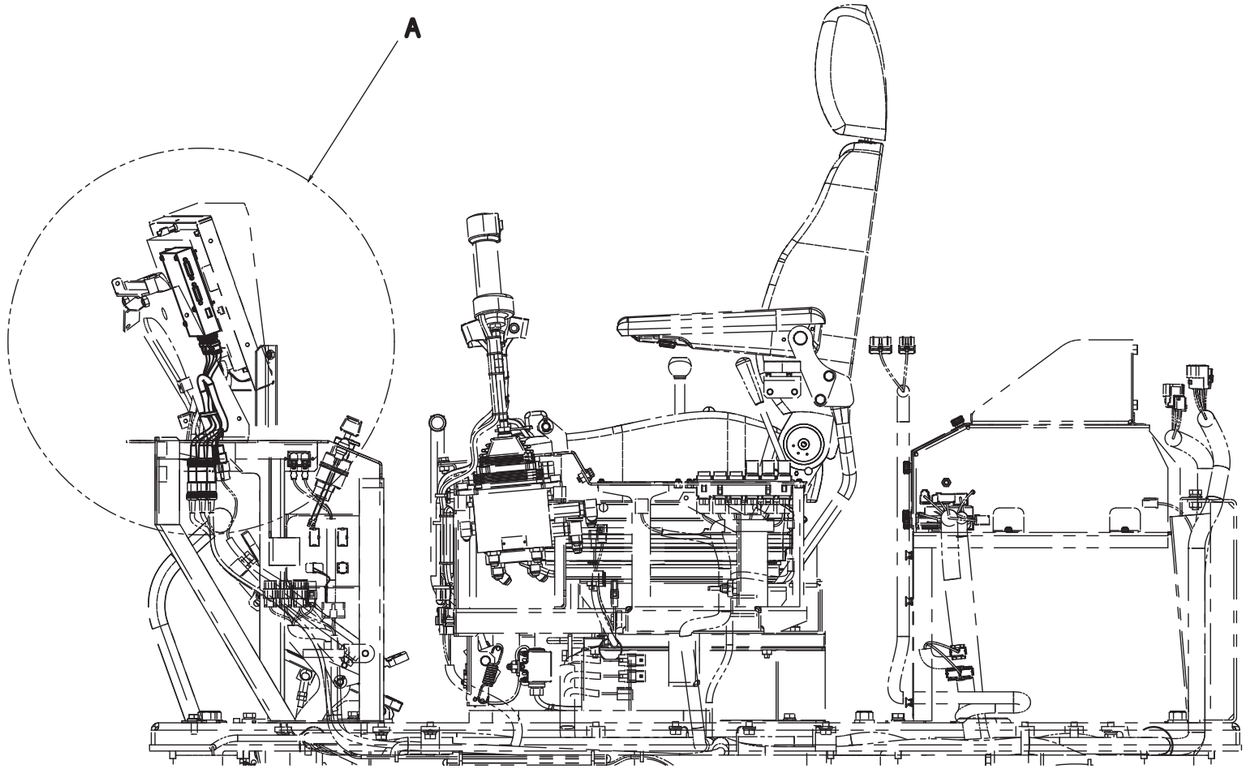
WIRE No. AND WIRE COLER LIST

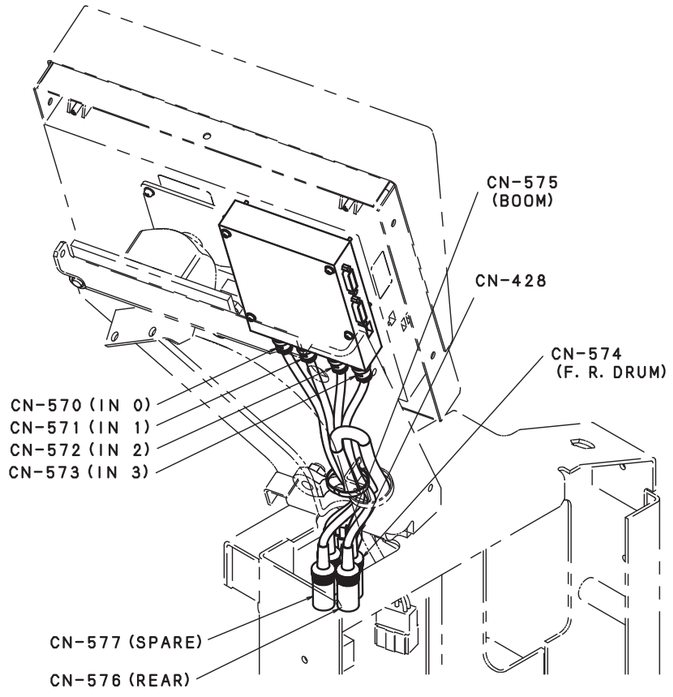
WIRE No.	COLER	TYPE	SIZE	FROM	PIN No.	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	PIN No.	TO
123	B	2PNCT-SB	0.75	CN-1016F	1				1	CN-1019M
124	R	2PNCT-SB	0.75	CN-1016F	3				3	CN-1019M
128	W	2PNCT-SB	0.75	CN-1016F	2				2	CN-1019M
FREE	G	2PNCT-SB	0.75	CN-1016F	4				4	CN-1019M
ES	Free	SHIELD		CN-1016F	5					(CN-1019M)
ES	Free	SHIELD		(CN-1016F)					5	CN-1019M

(2/2)

19. ELECTRICAL PART OF CAMERA CONTROLLER

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT

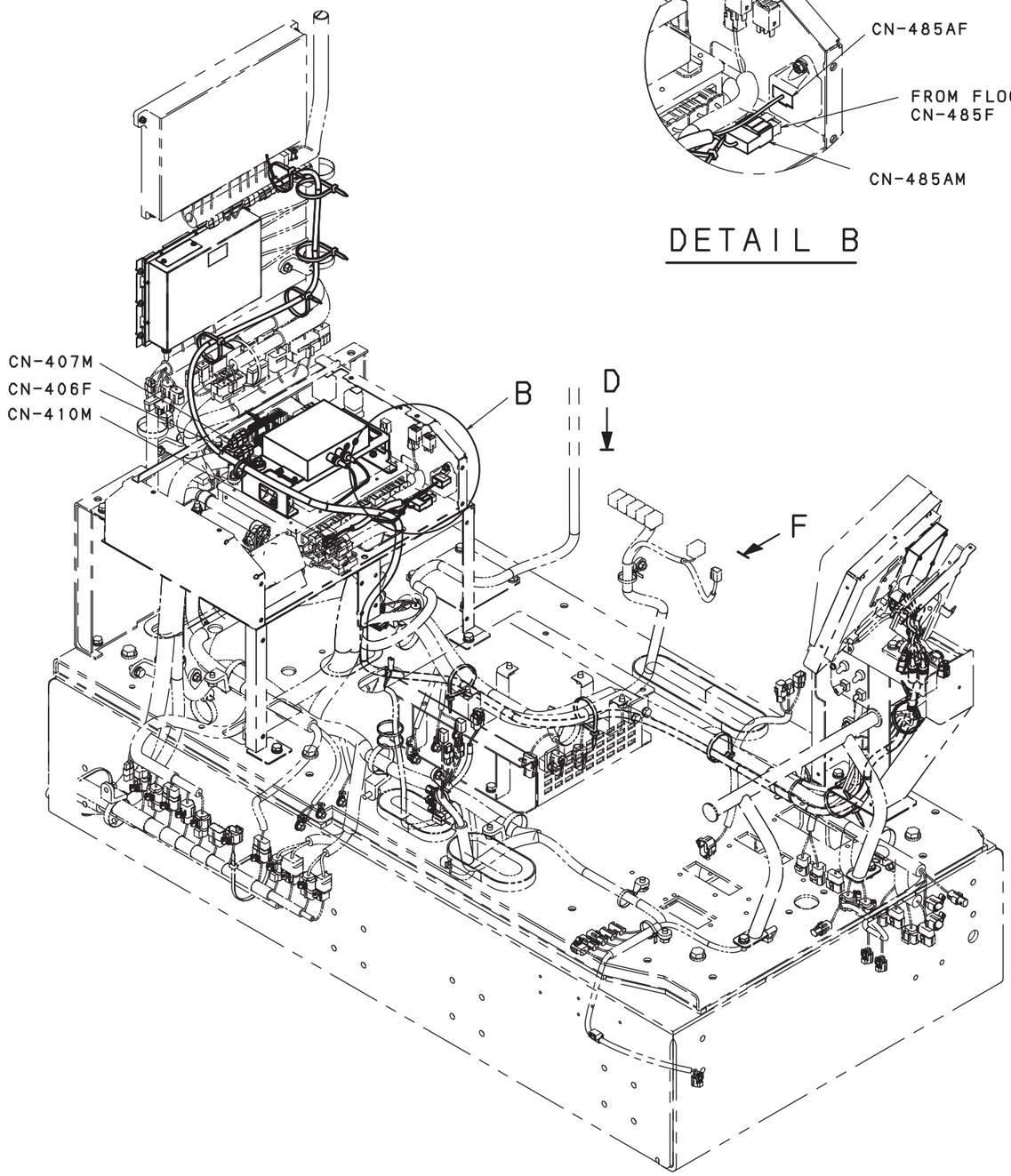


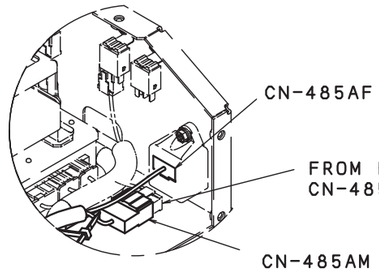


DETAIL A

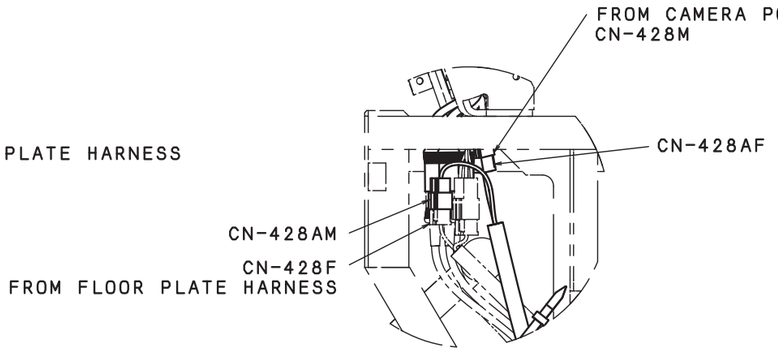
(1/3)

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT

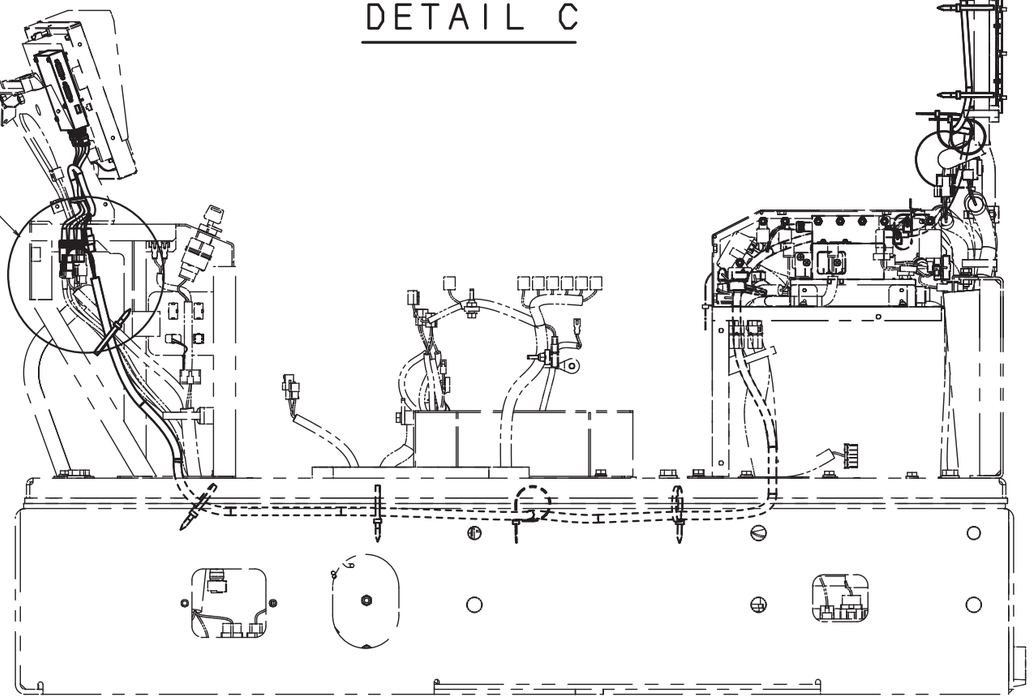




DETAIL B



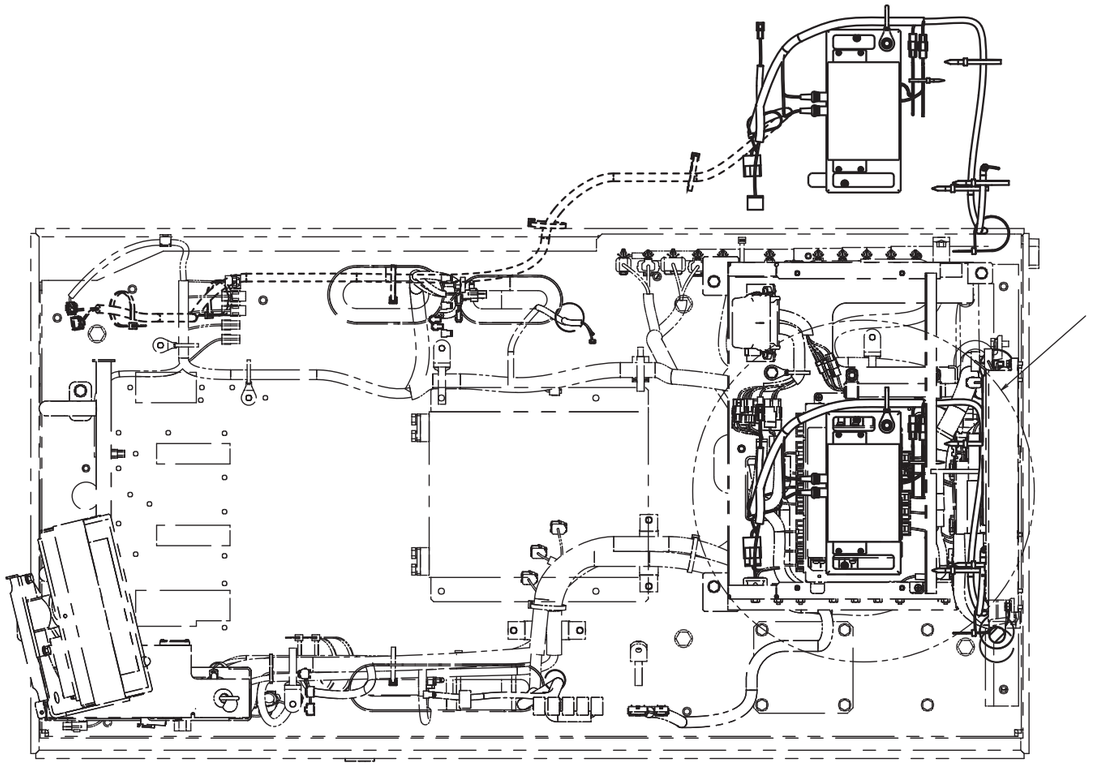
DETAIL C



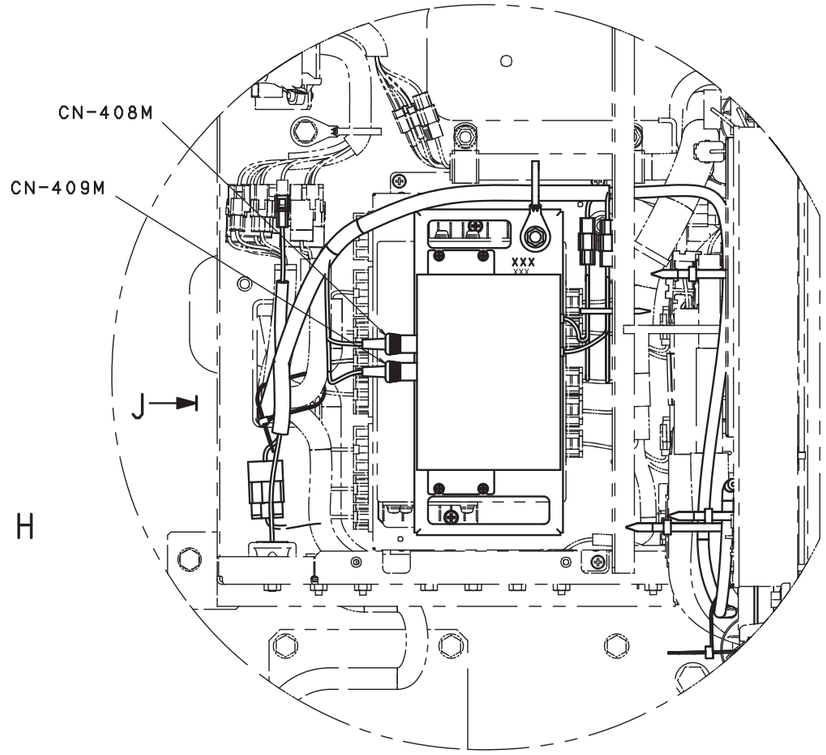
VIEW F

(2/3)

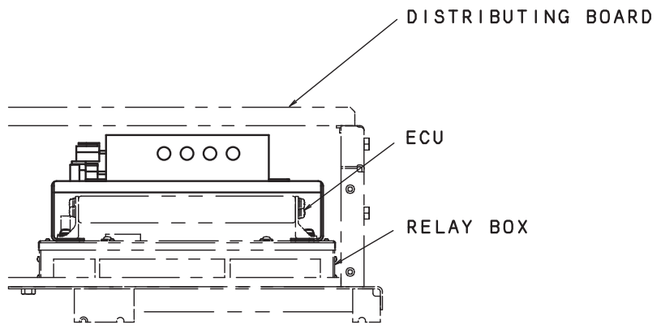
SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT



VIEW D



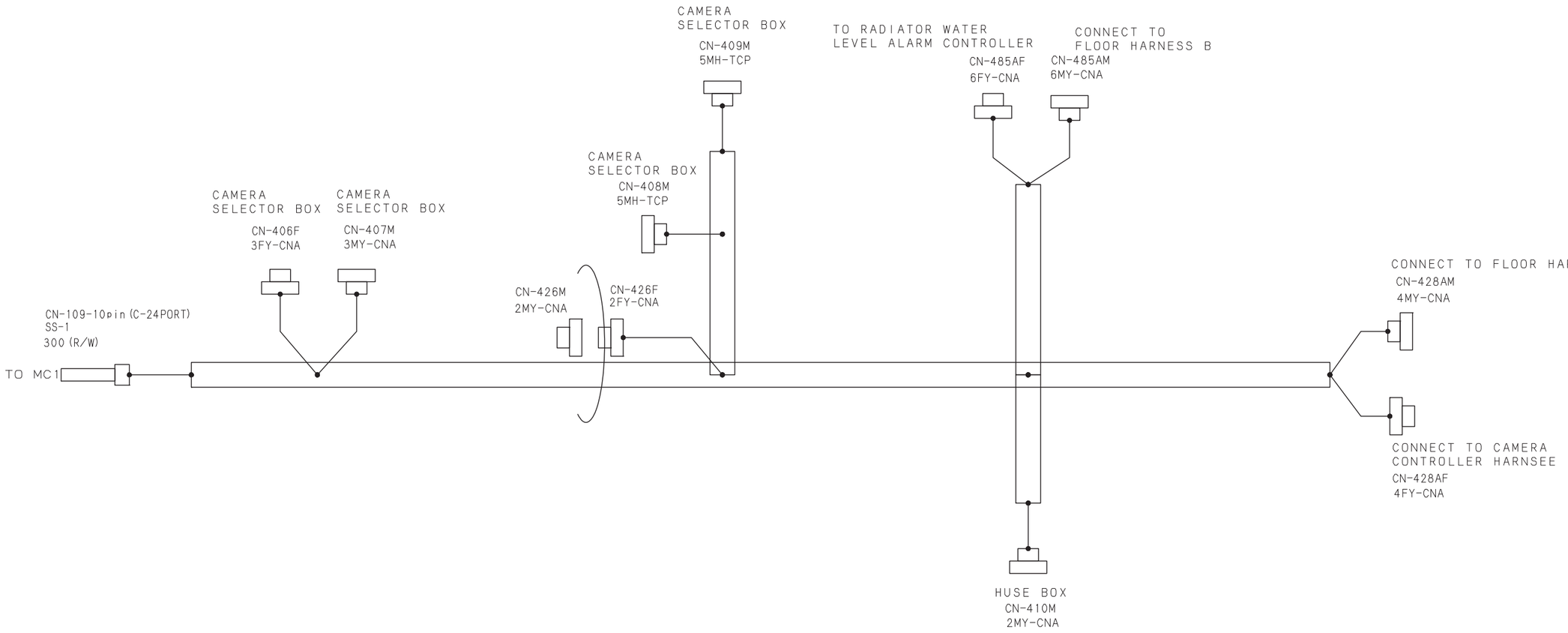
DETAIL H



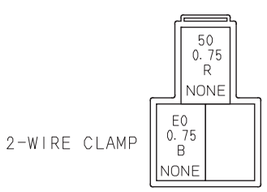
VIEW J

(3/3)

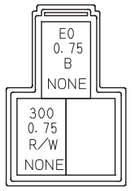
CAMERA CONTROLLER HARNESS



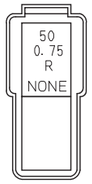
(1/2)



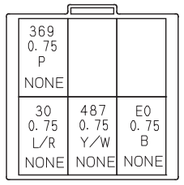
CN-406F
3FY-CNA



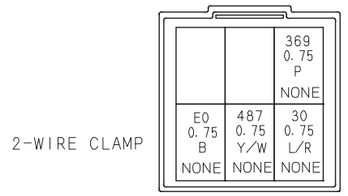
CN-407M
3MY-CNA



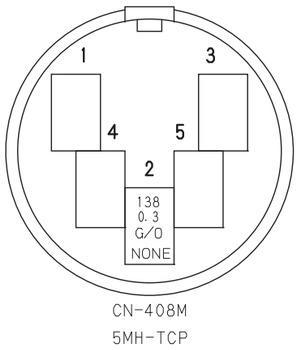
CN-410M
2MY-CNA



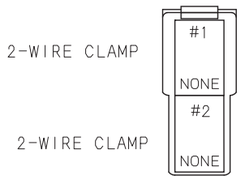
CN-485AF
6FY-CNA



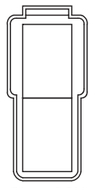
CN-485AM
6MY-CNA



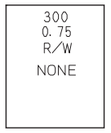
CN-408M
5MH-TCP



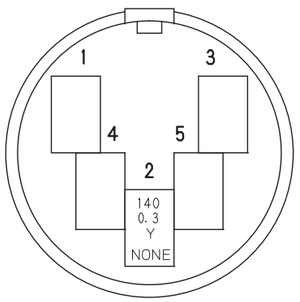
CN-426F
2FY-CNA
#1 138 0.3 G/O +138 0.75 G/O
#2 140 0.3 Y +140 0.75 Y



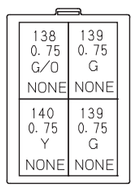
CN-426M
2MY-CNA



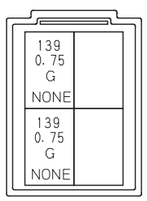
SS-1
FA-0403HD



CN-409M
5MH-TCP



CN-428AF
4FY-CNA



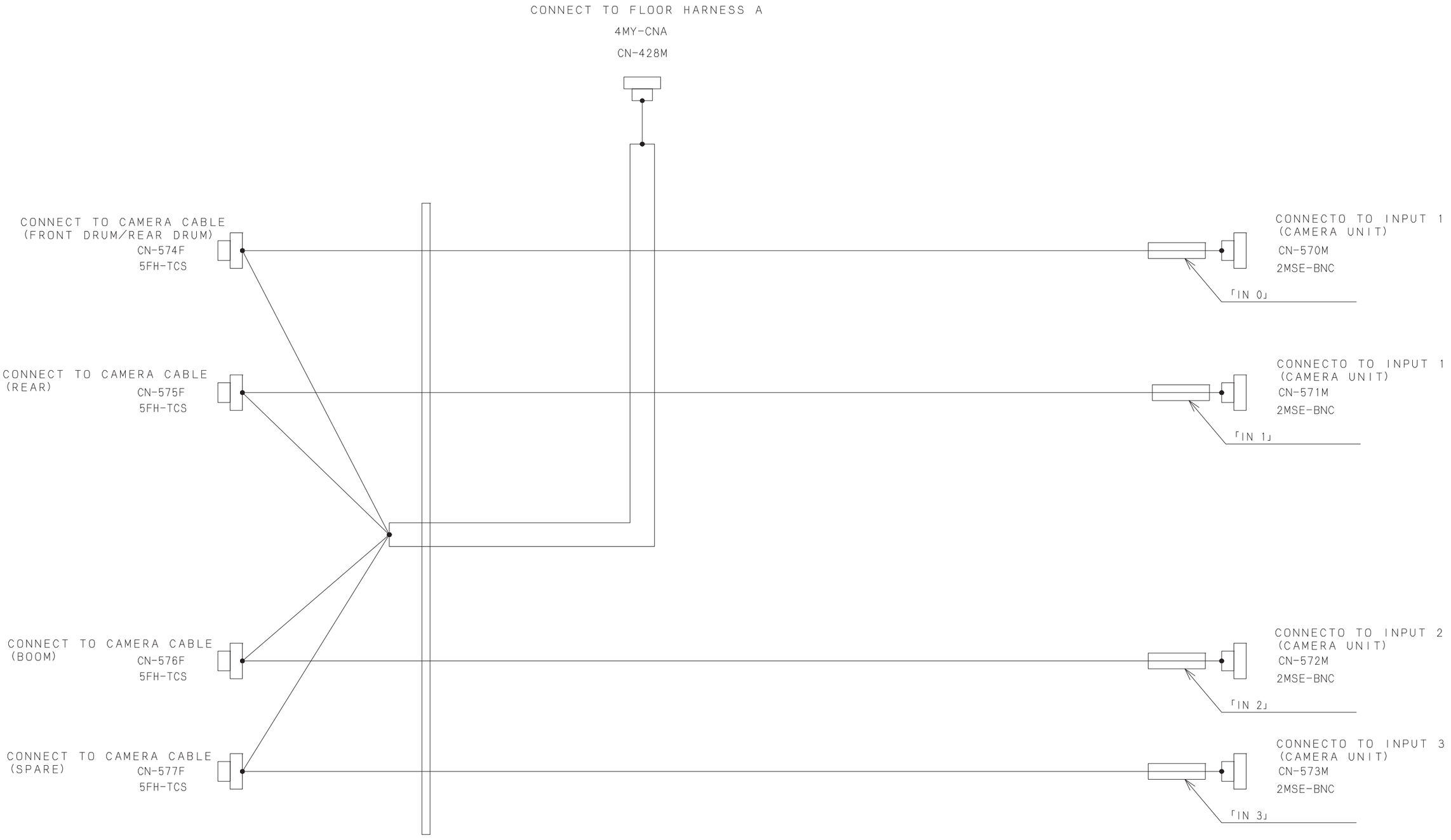
CN-428AM
4MY-CNA

WIRE No. AND WIRE COLOR LIST

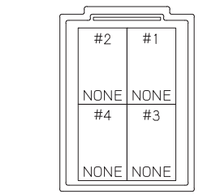
WIRE No.	COLOR	TYPE	SIZE	FROM	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	TO
30	L/R	AVSS	0.75	CN-485AF				CN-485AM
50	R	AVSS	0.75	CN-406F				CN-410M
138	G/O	AVSS	0.3	CN-408M				CN-426F
138	G/O	AVSS	0.75	CN-428AF				CN-426F
139	G	AVSS	0.75	CN-428AF				CN-428AM
139	G	AVSS	0.75	CN-428AF				CN-428AM
140	Y	AVSS	0.3	CN-409M				CN-426F
140	Y	AVSS	0.75	CN-428AF				CN-426F
300	R/W	AVSS	0.75	SS-1				CN-407M
369	P	AVSS	0.75	CN-485AF				CN-485AM
487	Y/W	AVSS	0.75	CN-485AF				CN-485AM
E0	B	AVSS	0.75	CN-485AF				CN-485AM
E0	B	AVSS	0.75	CN-406F				CN-485AM
E0	B	AVSS	0.75	CN-406F				CN-407M

(2/2)

CAMERA CONTROLLER HARNESS



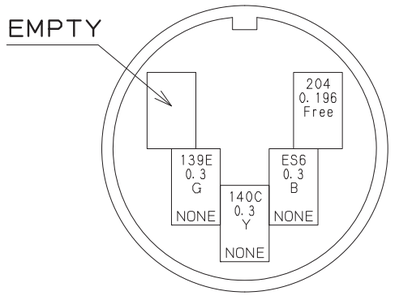
(1/2)



CN-428M

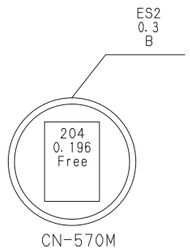
4MY-CNA

#1 140C 0.3 Y + 140E 0.3 Y
#2 139E 0.3 G + 139F 0.3 G
#3 140F 0.3 Y + 140G 0.3 Y
#4 139G 0.3 G + 139H 0.3 G



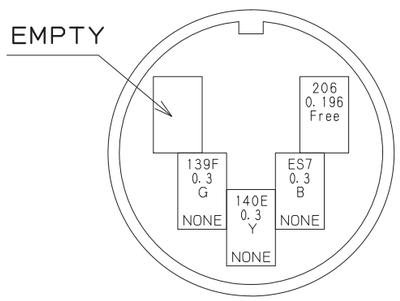
CN-574F

5FH-TCS



CN-570M

2MSE-BNC

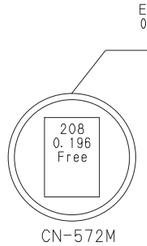


CN-575F

5FH-TCS

CN-571M

2MSE-BNC

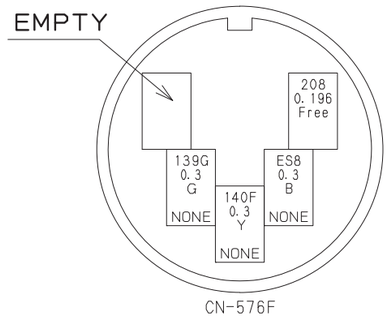


CN-572M

2MSE-BNC

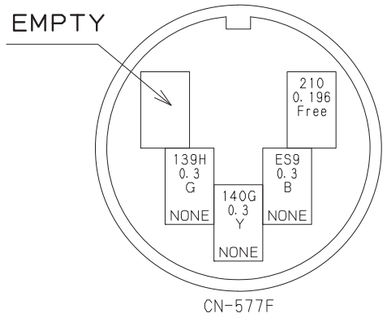
CN-573M

2MSE-BNC



CN-576F

5FH-TCS



CN-577F

5FH-TCS

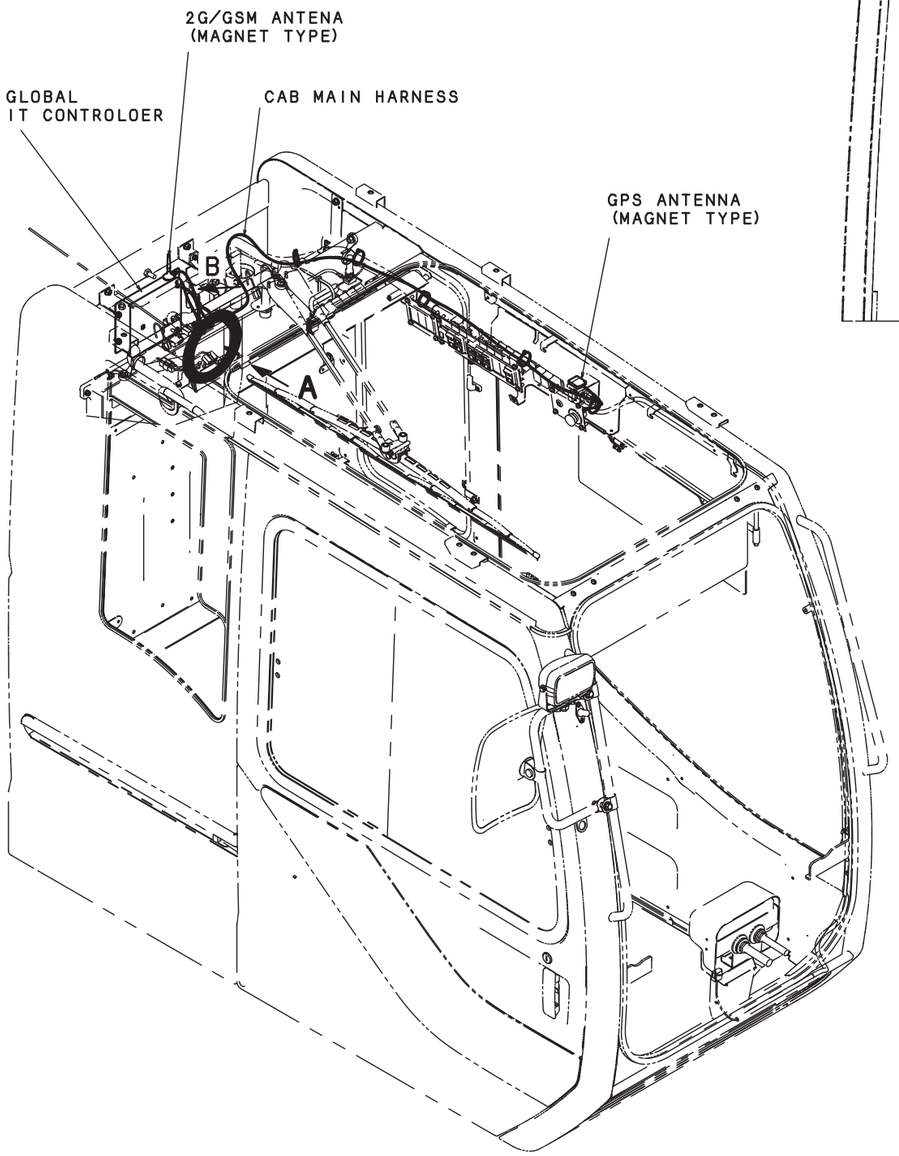
WIRE No. AND WIRE COLER LIST

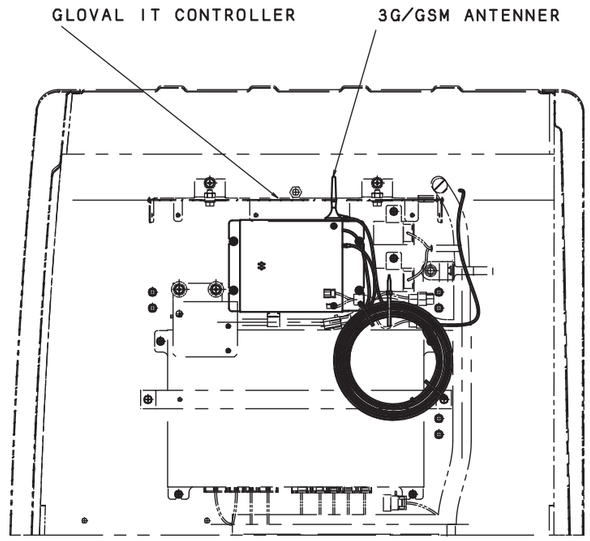
WIRE No.	COLER	TYPE	SIZE	FROM	PIN No.	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	PIN No.	TO	LENGTH (mm)
139E	G	AVSS	0.3	CN-428M	2		DS-B92				5	CN-574F	300
139F	G	AVSS	0.3	CN-428M	2		DS-B92				5	CN-575F	300
139G	G	AVSS	0.3	CN-428M	4		DS-B94				5	CN-576F	300
139H	G	AVSS	0.3	CN-428M	4		DS-B94				5	CN-577F	300
140C	Y	AVSS	0.3	CN-428M	1		DS-B90				2	CN-574F	300
140E	Y	AVSS	0.3	CN-428M	1		DS-B90				2	CN-575F	300
140F	Y	AVSS	0.3	CN-428M	3		DS-B93				2	CN-576F	300
140G	Y	AVSS	0.3	CN-428M	3		DS-B93				2	CN-577F	300
204	Free	3C-2W	0.196	CN-574F	1						1	CN-570M	200
ES2	B	AVSS	0.3	(CN-574F)							2	CN-570M	100
ES6	B	AVSS	0.3	CN-574F	4							(CN-570M)	100
206	Free	3C-2W	0.196	CN-575F	1						1	CN-571M	200
ES3	B	AVSS	0.3	(CN-575F)							2	CN-571M	100
ES7	B	AVSS	0.3	CN-575F	4							(CN-571M)	100
208	Free	3C-2W	0.196	CN-576F	1						1	CN-572M	200
ES4	B	AVSS	0.3	(CN-576F)							2	CN-572M	100
ES8	B	AVSS	0.3	CN-576F	4							(CN-572M)	100
210	Free	3C-2W	0.196	CN-577F	1						1	CN-573M	200
ES5	B	AVSS	0.3	(CN-577F)							2	CN-573M	100
ES9	B	AVSS	0.3	CN-577F	4							(CN-573M)	100

(2/2)

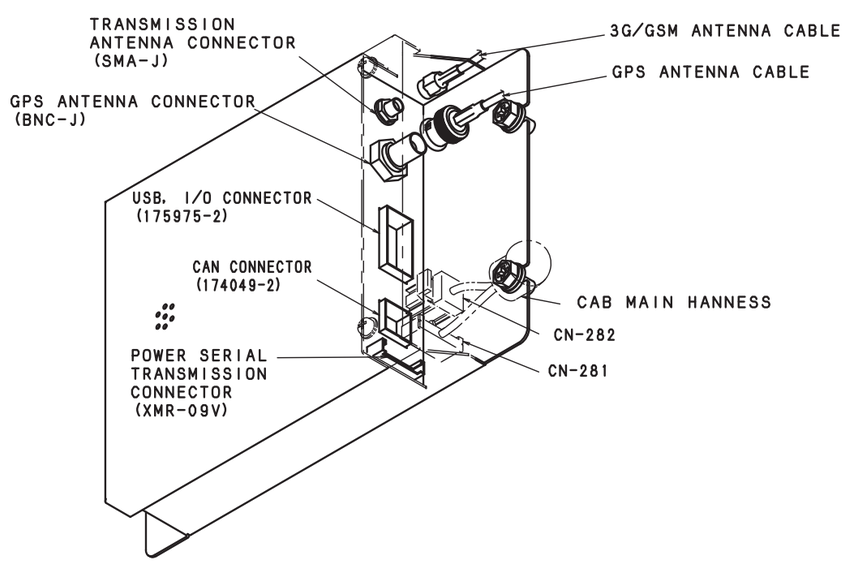
20. ELECTRICAL PART OF IT CONTROLLER INSTALLATION

SOL : SOLENOID VALVE
SW : SWITCH
PSW : PRESSURE SWITCH
ATT. : ATTACHMENT
C/W : COUNTER WEIGHT
CB/W : CARBODY WEIGHT





VIEW A



DETAIL B

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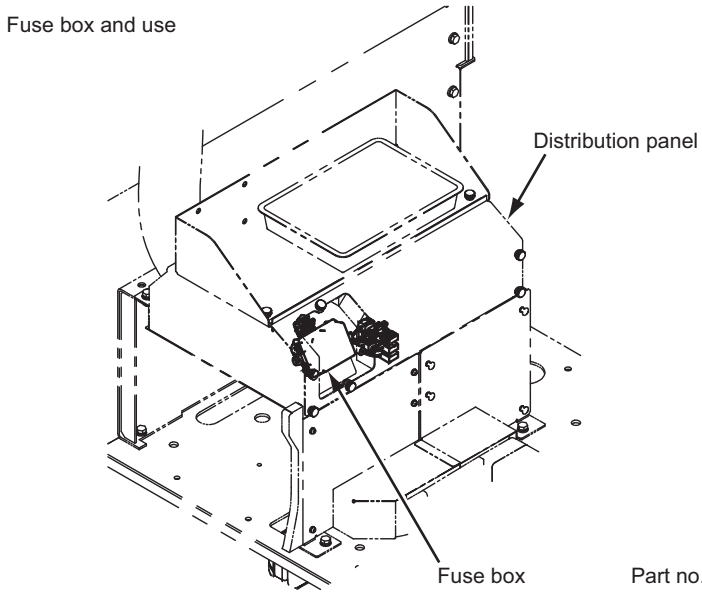
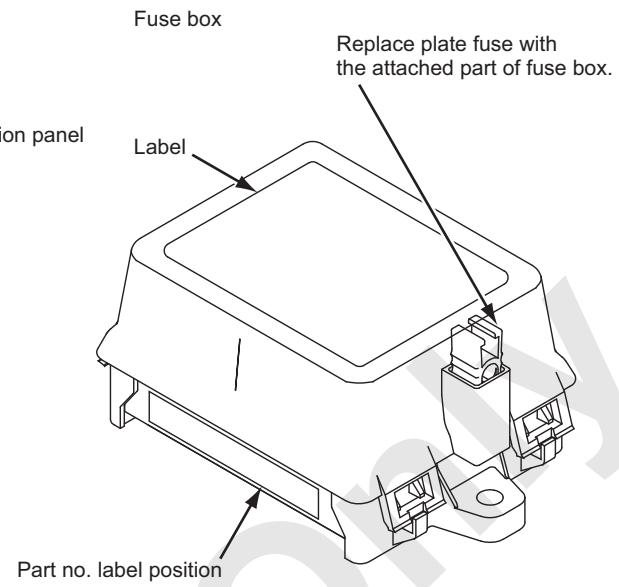
10.1.3 LOCATION AND USE OF FUSE



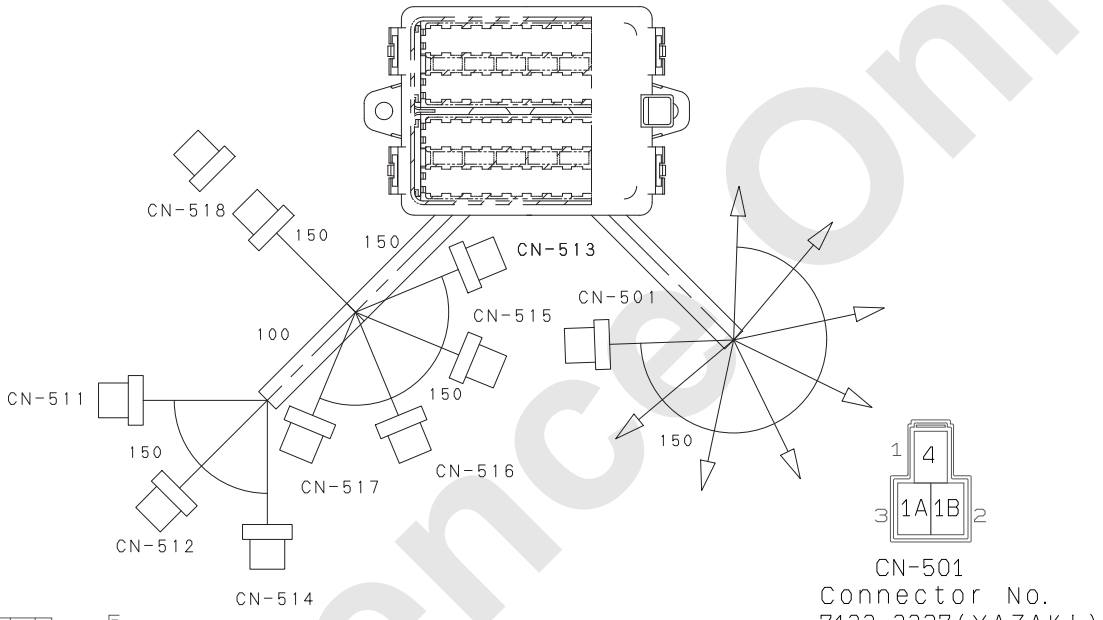


Classification of Fuse Use					
Fuse No.	Capacity	Type	Line No.	Use	Location
F1	20A	Automotive Blade	1A – 11	Main power	Fuse box
F2	5A		4 – 12	AIS air-con battery voltage	
F3	5A		1B – 13	ITC	
F4	5A		1B – 14	ML, MC1.MC2 radio backup	
F5	10A		2F – 15	Bypass switch	
F6	5A		2F – 16	Release switch	
F7	10A		2F – 17	For ML control	
F8	10A		2F – 18	For ML output	
F9	10A		2F – 19	For MC1 control	
F10	20A		2F – 20	For MC1 output	
F11	10A		2F – 21	Auto stop	
F12	10A		2F – 22	Engine condition	
F13	5A		52 – 23	One way radio	
F14	20A		2G – 24	Wiper	
F15	10A		2G – 25	Function lock	
F16	10A		2G – 26	Remote control	
F17	5A		2G – 27	Monitor	
F18	15A		2E – 28	Air-con	
F19	10A		2E – 29	Air-con 2	
F20	10A		2E – 30	Fan motor	

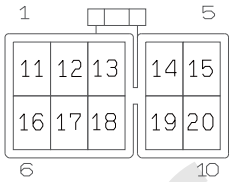
Classification of Fuse Use					
Fuse No.	Capacity	Type	Line No.	Use	Location
F21	5A	Automotive Blade	51 – 31	Generating detect	Fuse box
F22	10A		471 – 32	PCV1	
F23	10A		471 – 33	PCV2	
F24	15A		2J – 34	ECU (+BF)	
F25	20A		2J – 35	ECU (J08E : + B)	
F26	15A		2J – 36	ECU (P11C : + B)	
F27	20A		2I – 37	Dc motor for oil cooler ①	
F28	20A		2I – 38	Dc motor for oil cooler ②	
F29	10A		2I – 39	Swing flasher / Voice alarm	
F30	5A		54 – 40	Starter	
F31	10A		2H – 41	For MC control	
F32	20A		2H – 42	For MC2 output	
F33	5A		2H – 43	For MC2 ground output	
F34	5A		2H – 44	Over hoist LS	
F35	10A		2H – 45	Fuel pump / lighter	
F36	10A		2K – 46	For MC1 ground output 1	
F37	10A		2K – 47	For MC1 ground output 2	
F38	5A		2K – 48	Neutral free	
F39	10A		2K – 49	Light	
F40	10A		2K – 50	Spare	

DANGER

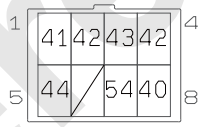
Ensure to turn starter switch OFF when replacing fuse.
Replace the fuse with the same capacity.
If fuse blows off right after replaced, there is some abnormality in the electric circuit.
Find out a cause and take necessary action.



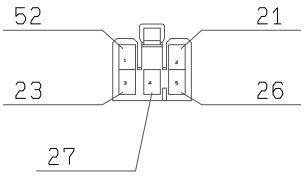
CN-501
Connector No.
7122-2237(YAZAKI)



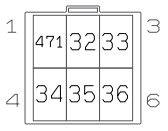
CN-511
Connector No.
7123-2800(YAZAKI)



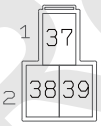
CN-512
Connector No.
7123-2186(YAZAKI)



CN-514
Connector No.
172494-1(AMP)



CN-513
Connector No.
7123-2262(YAZAKI)



CN-515
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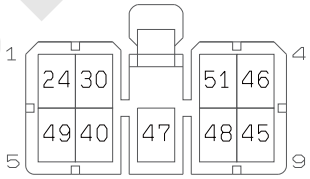
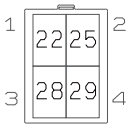
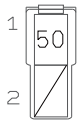


CN-516
Connector No.
172496-1(AMP)

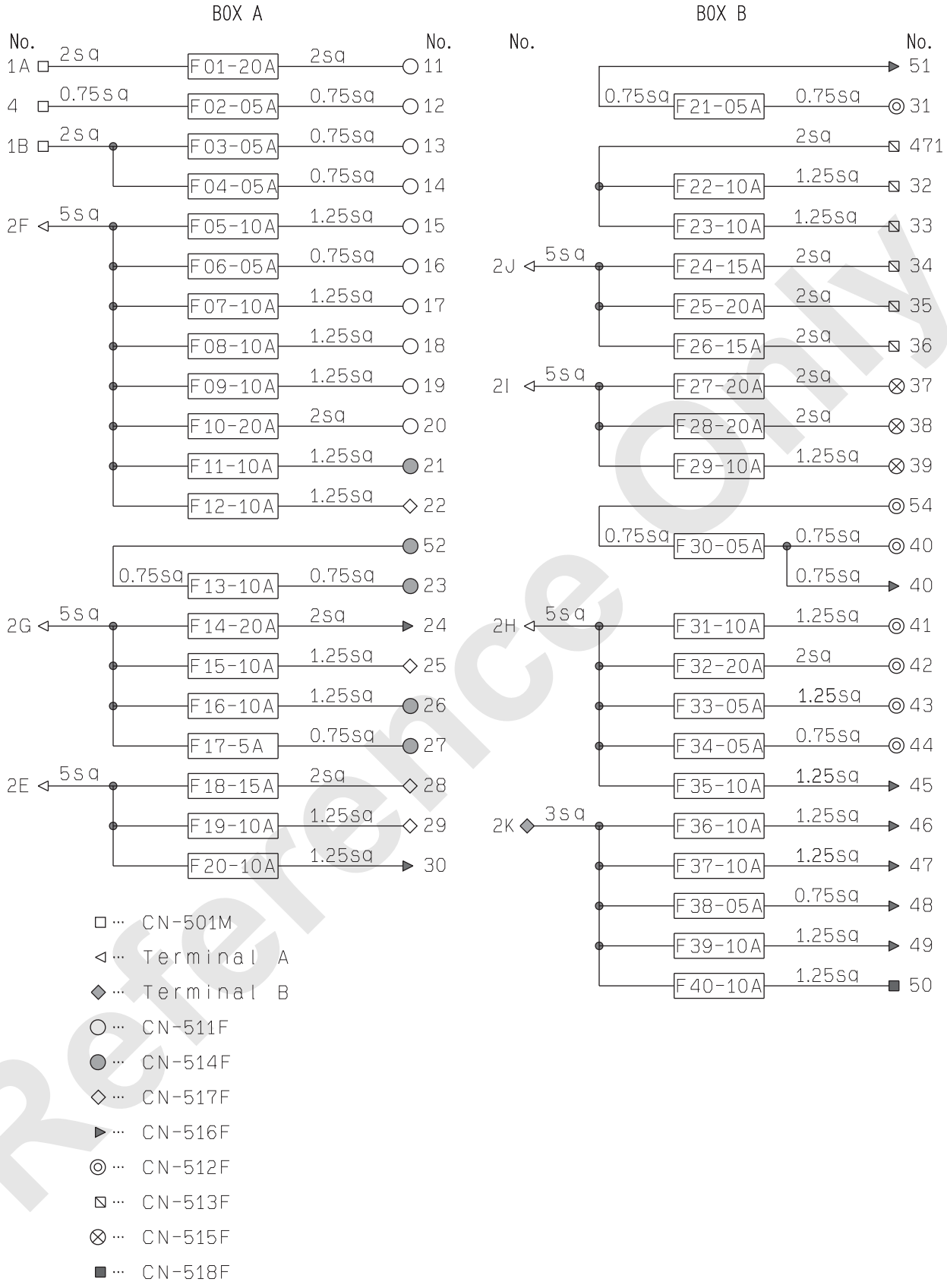


CN-517
Connector No.
7123-2446(YAZAKI)



CN-518
Connector No.
7123-2228(YAZAKI)

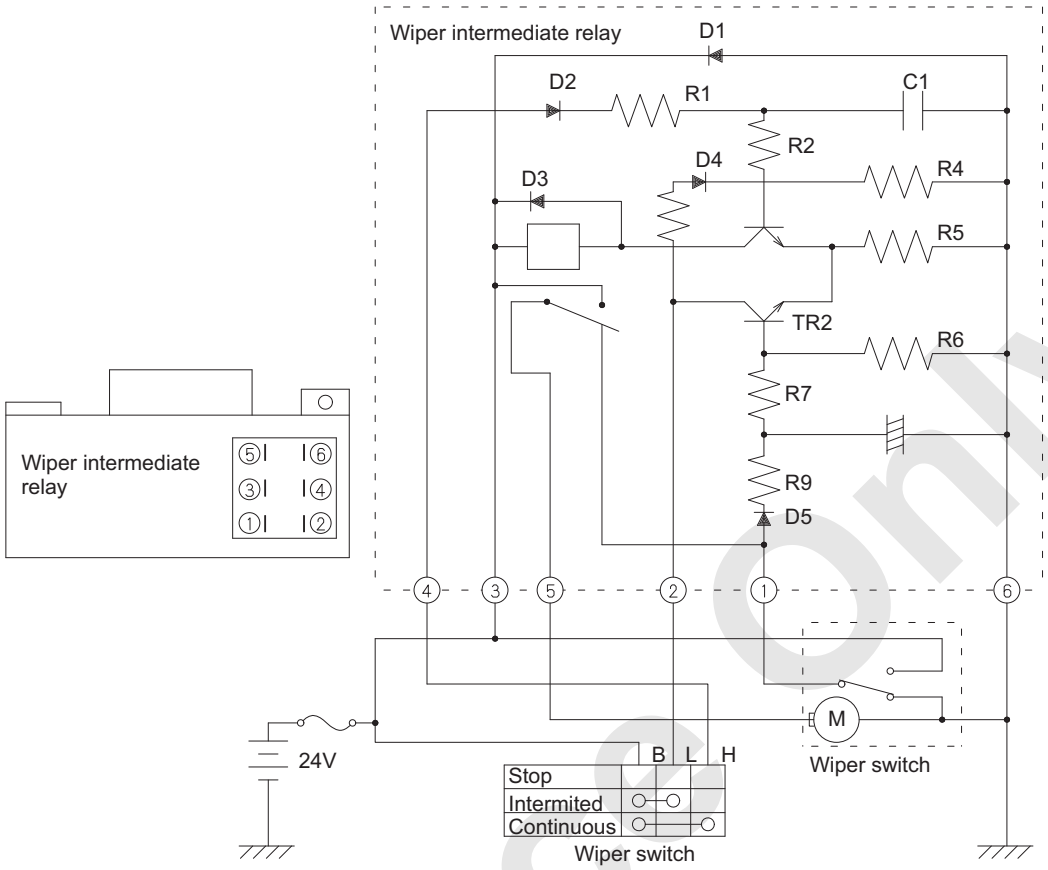
Fuse Connection Schematic



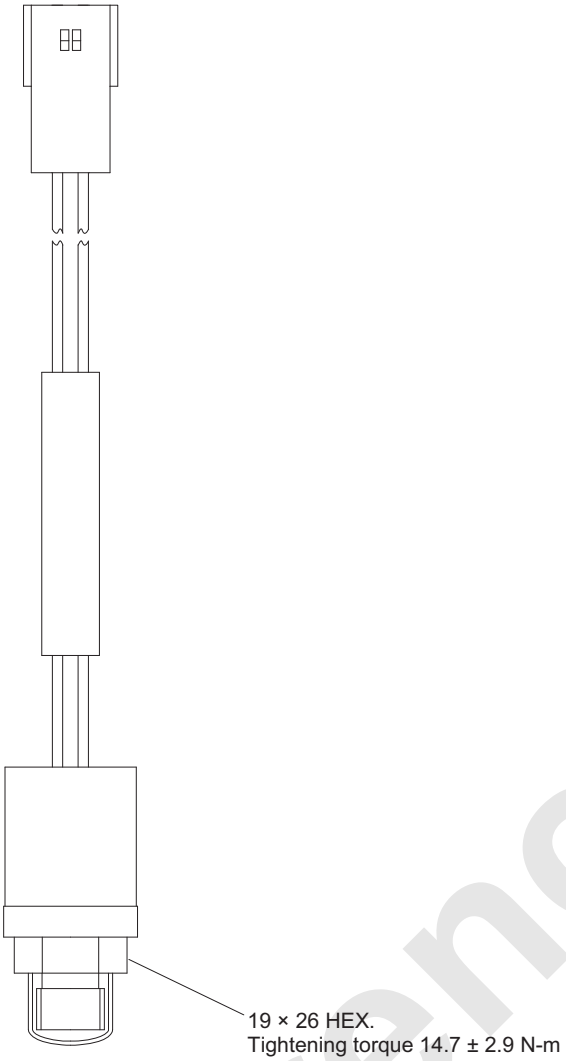
Label

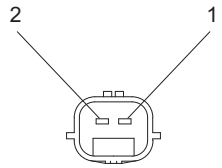
F	A		F	A	F	A		F	A
1	20	20A X 2	11	10	21	5	10A X 5	31	10
2	5		12	10	22	10		32	20
3	5		13	5	23	10		33	5
4	5		14	20	24	15		34	5
5	10		15	10	25	20		35	10
6	5	15A X 2 (Spare)	16	10	26	15	5A X 4 (Spare)	36	10
7	10		17	5	27	20		37	10
8	10		18	15	28	20		38	5
9	10		19	10	29	10		39	10
10	20		20	10	30	5		40	10

10.1.4 WIPER CONTROL RELAY

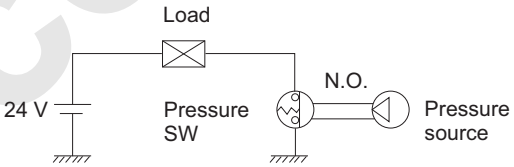


10.1.5 PRESSURE SWITCH (FOR PROPEL MOTION DETECT)





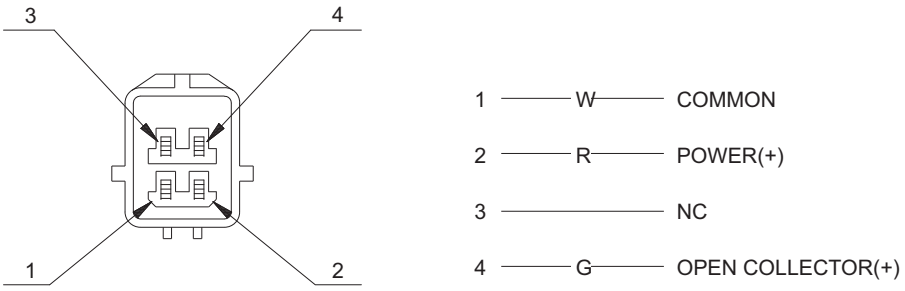
1 : POWER (+)
2 : EARTH (-)

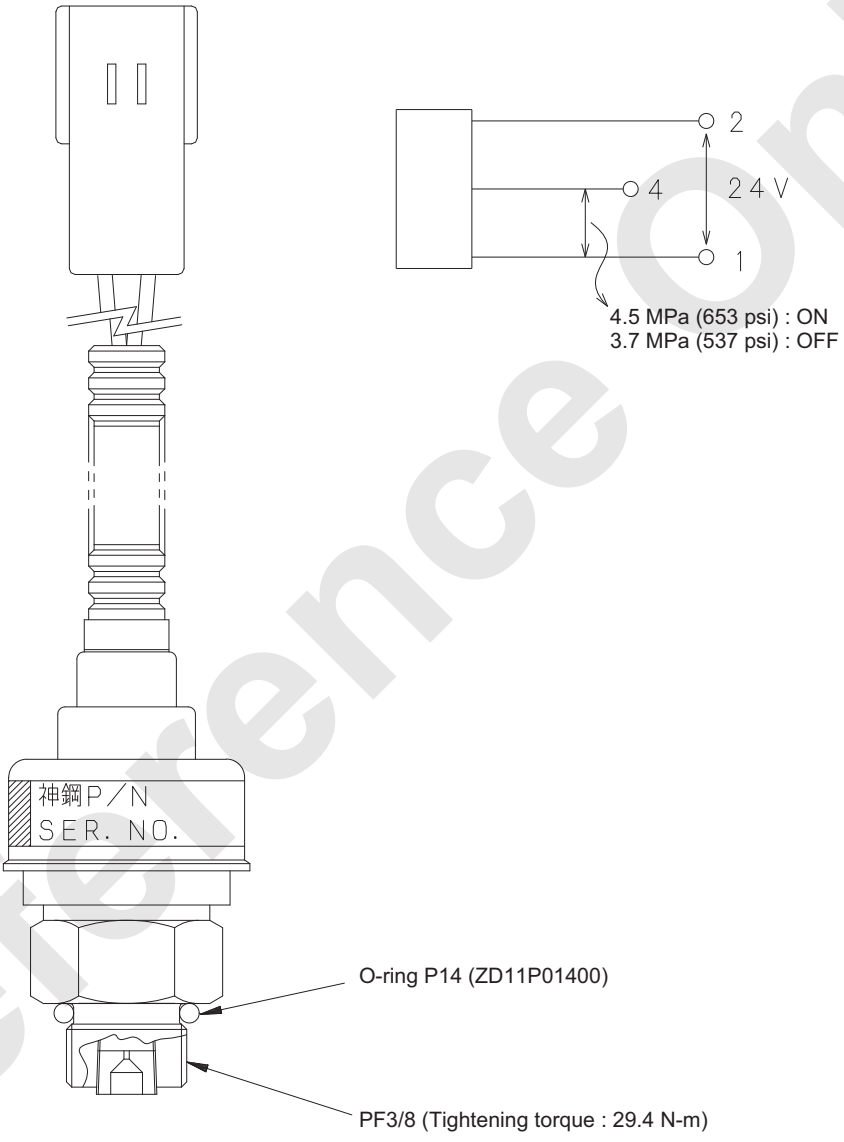


539 ± 49 KPa : ON
343 ± 49 KPa : OFF

Use	[ON] Pressure (KPa)	[OFF] Pressure (KPa)
Propel motion detect pressure	539 ± 49	343 ± 49

10.1.6 PRESSURE SWITCH (FOOT BRAKE)

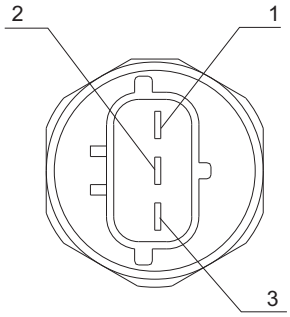




Use	[ON] Pressure (MPa)	[OFF] Pressure (MPa)
Propel motion detect pressure	4.5	3.7

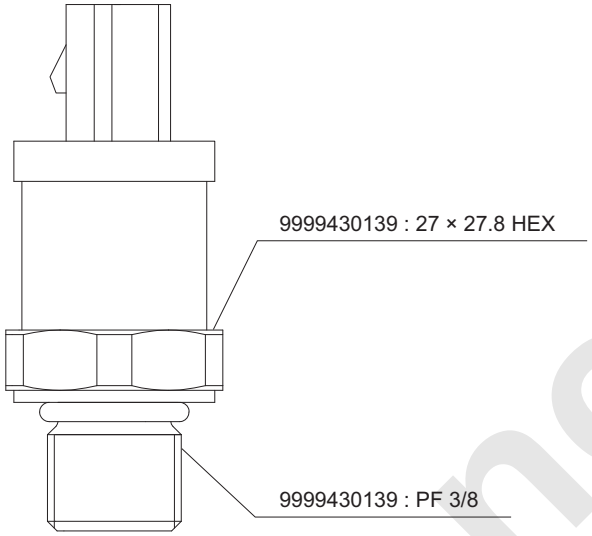
10.1.7 PRESSURE SENSOR

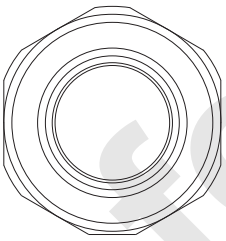
(9999430139 • 9999430134)

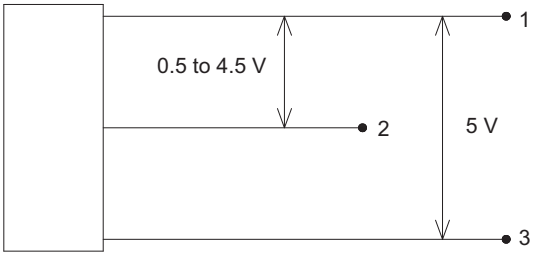


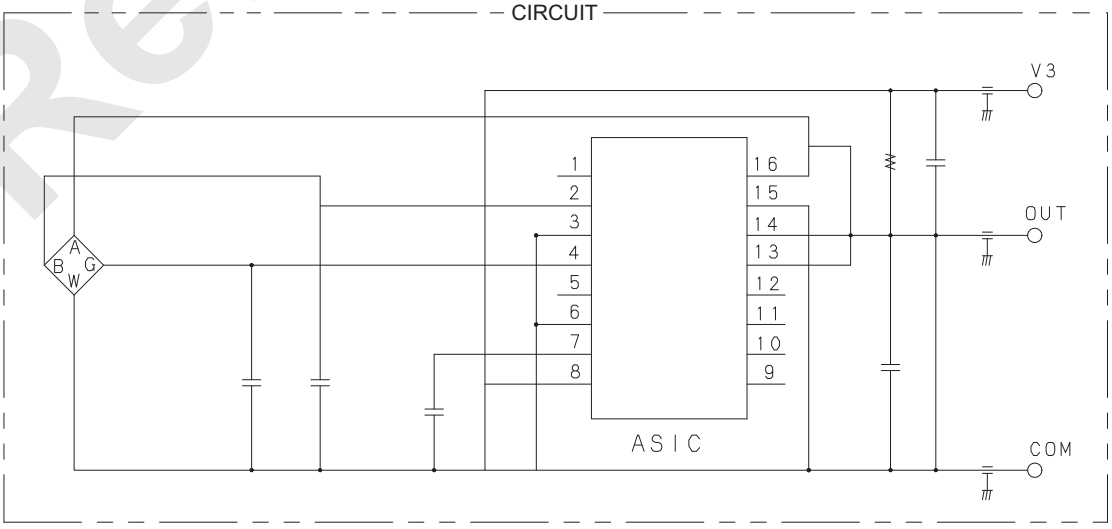
Location of connector terminal No.

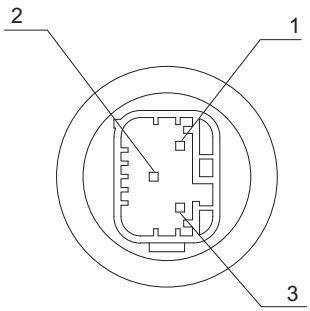
1. COMMON
2. OUT - PUT (+)
3. POWER (+)





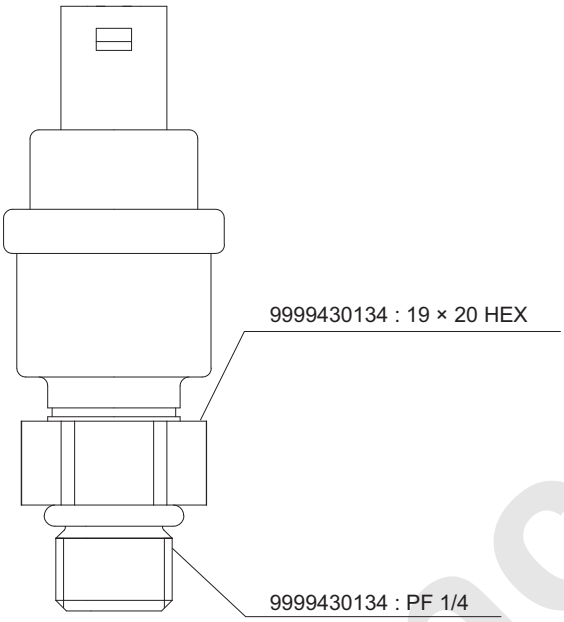


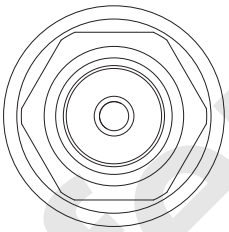


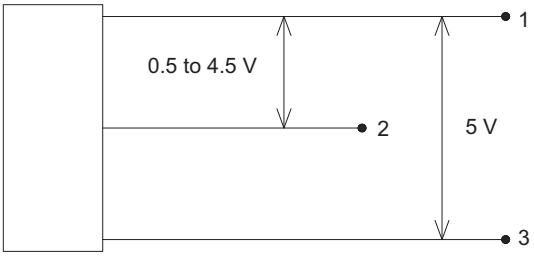


Location of connector terminal No.

1. COMMON
2. OUT - PUT (+)
3. POWER (+)





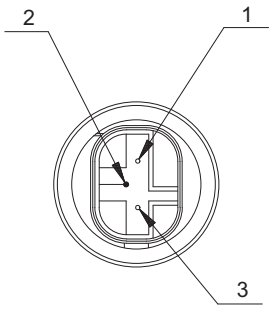


Use	Part number	Pressure raqnge MPa (Psi)	Power (V)	Out-put (V)
Main pump power control shift control pressure Swing motion detect pressure (R · L) CHP start pressure Remote control pressure (Front · Rear · 3rd · Swing · Boom) Motor control pressure (Front · Rear · 3rd)	9999430134	0 to 3 (0 to 435)	5	0.5 to 4.5
Swing pump pressure Independence conflurnce select Q max cut pressure	9999430139	0 to 50 (0 to 7252)	5	0.5 to 4.5

NOTE

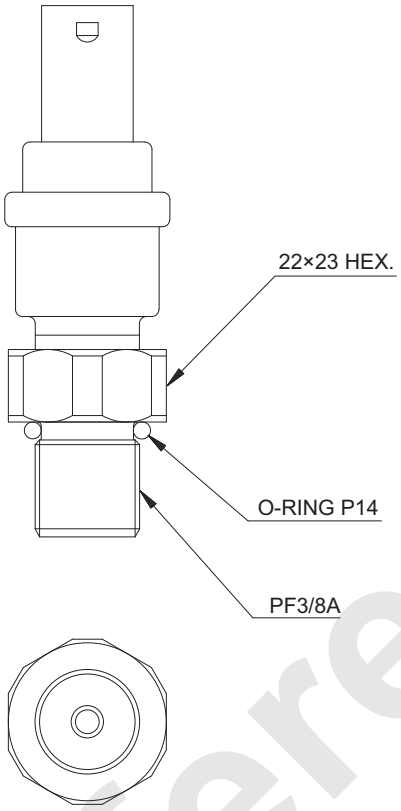
9999430134	9999430139
Pressure range : 0 to 3.0 MPa	Pressure range : 0 to 50 MPa
Voltage Vcc : 5.0 ± 0.5 VDC	Voltage Vcc : 5.0 ± 0.5 VDC
Out-put : 1/10 Vcc =0.5 V to 4.5 V	Out-put : 1/10 Vcc =0.5 V to 4.5 V
Tightning torque : 32 N-m max (26.7 ft-lbs)	Tightning torque : 73.5 N-m max (54.2 ft-lbs)

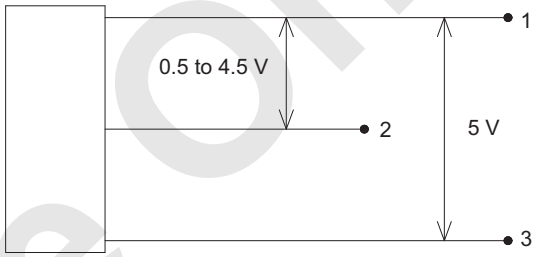
9999426022

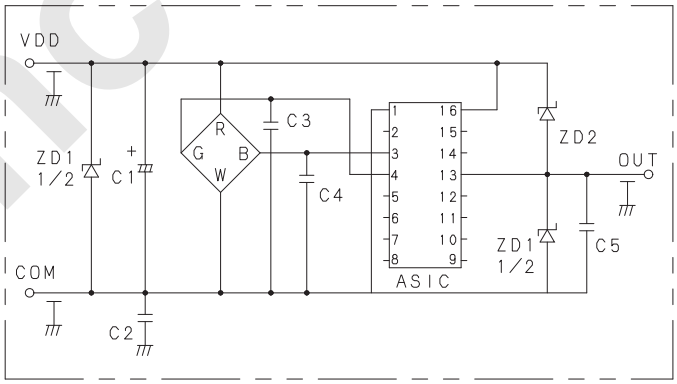


Location of connector terminal No.

1. COMMON
2. OUT - PUT (+)
3. POWER (+)



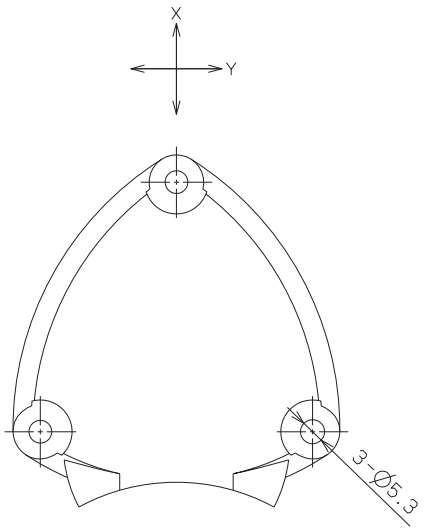


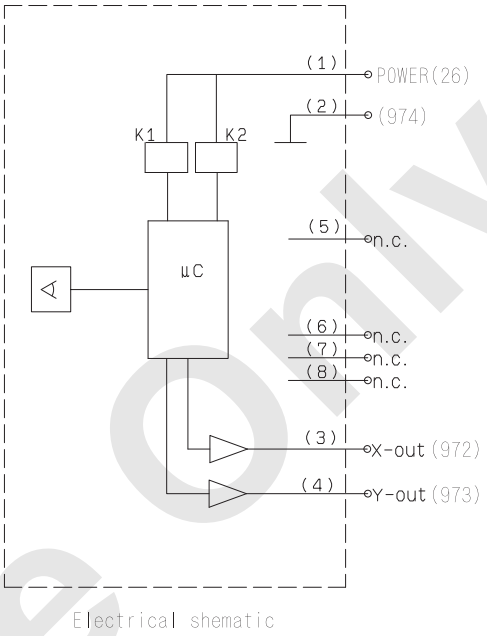


Use	Part number	Pressure range MPa (psi)	Power (V)	Out-put (V)
Clutch pressure (Front • Rear • 3rd)	9999426022	0 to 19.6 (0 to 2842)	5	0.5 to 4.5
Control pressure (Primary side)				

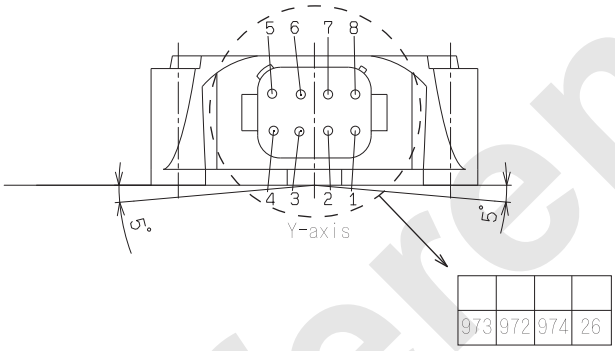
NOTE
9999426022
Tightening torque : 73.5 N-m

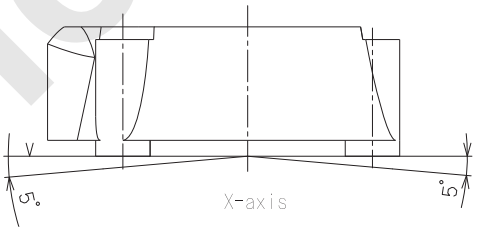
10.1.8 INCLINATION SENSOR





Electrical shematic

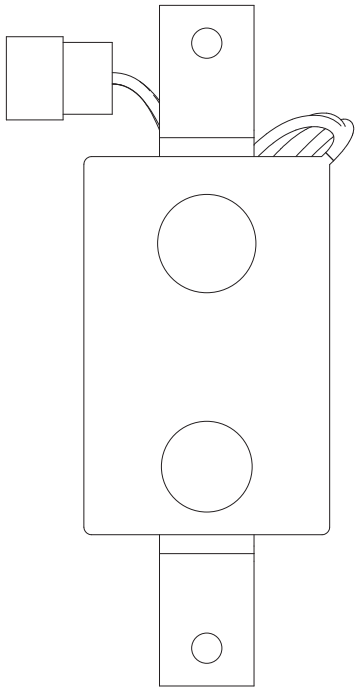


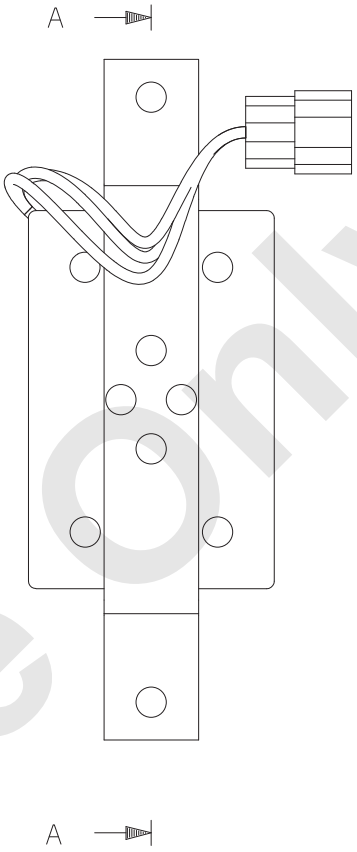


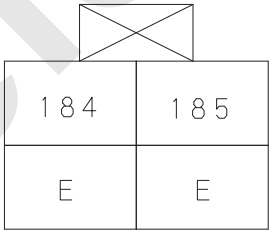
973	972	974	26		

Type	:	N4AA20010	Resolution	:	0.04°
Specification			Linear error	:	1%typ. of angle range
Angle range	:	±5°	Recurrence accuracy	:	±0.2°typ.
Power source	:	10 to 30VDC	Temperature drift	:	1.3% typ.
Power consumption	:	typ.22mA	Protection class	:	IP 67
Output	:	X-axis 0.5 to 4.5V	Temperature range	:	-40 to 70℃
	:	Y-axis 0.5 to 4.5V	Vibration resistance	:	Endurance 10 to 500HZ Amplitude 3 mm width X.Y.Z, direction 96h (about 20G)
Load resistance	:	min 10kΩ	Impact resistance	:	Endurance 500/s^2 (about 50G) width X.Y.Z, direction about 10th
Zero adjustment	:	±5°			

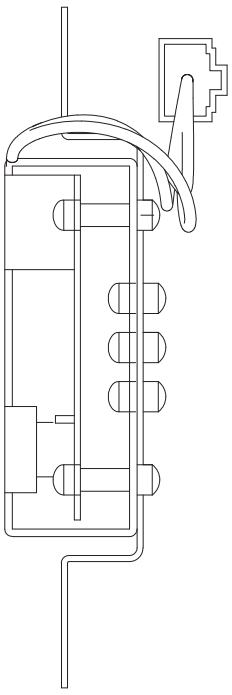
10.1.9 BUZZER UNIT







CN-240



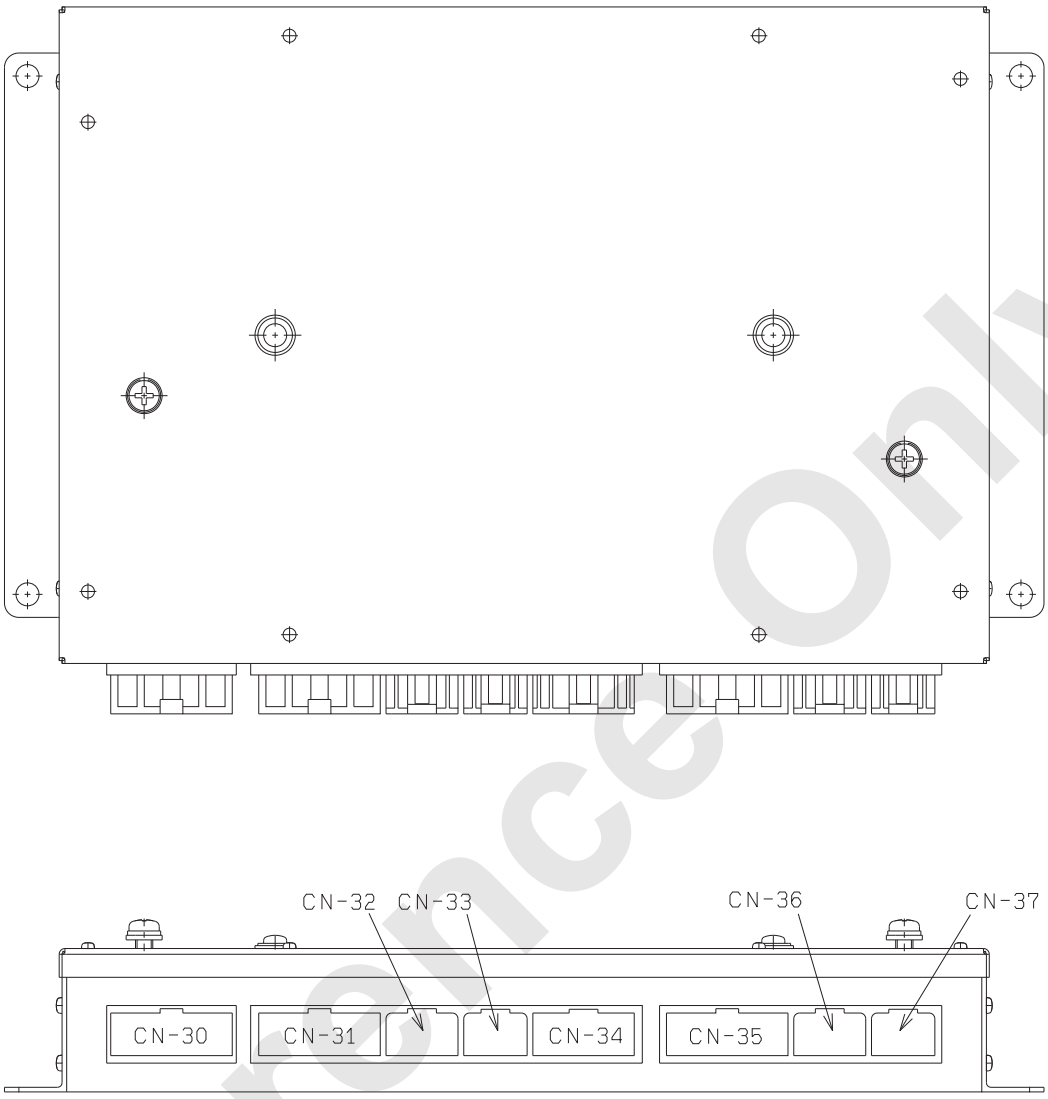
SECTION A-A

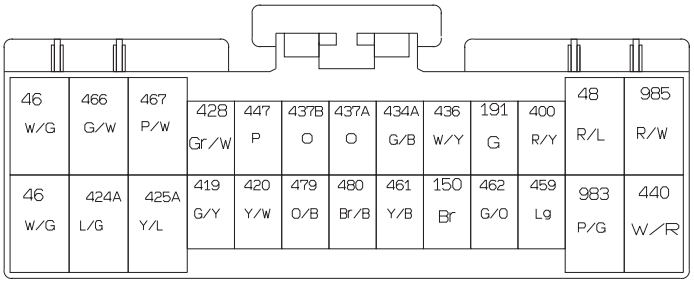
Buzzer to be used	High-pitched tone	FDK corp.	EB2210A-38C-12V
	Low-pitched tone	Bass Star precession corp.	TMX-12F

Rated Volt	24V
Work range (Volt)	19 to 32V
Working temperature range	-10 to 60℃
Storage temperature range	-20 to 70℃
Humidity	0 to 90%
Sound volume	75db/30cm MIN
Consumption elec. current	Max 50 mA

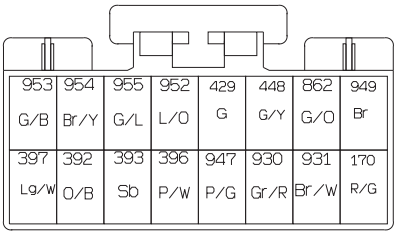
10.1.10 RELAY BOX

1. ARRANGEMENT OF CONNECTOR

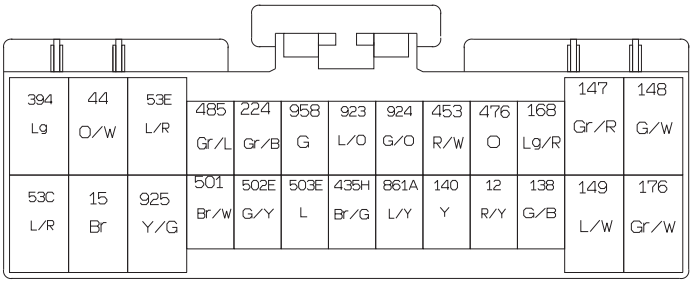




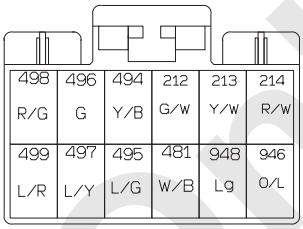
CN-30M
26MA-HB_GY



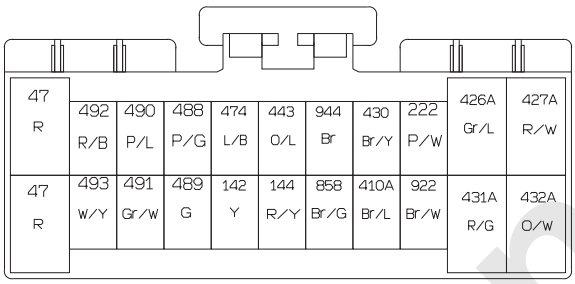
CN-32M
16MA-HB_GY



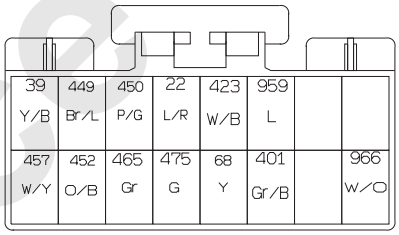
CN-31M
26MA-HB_GY



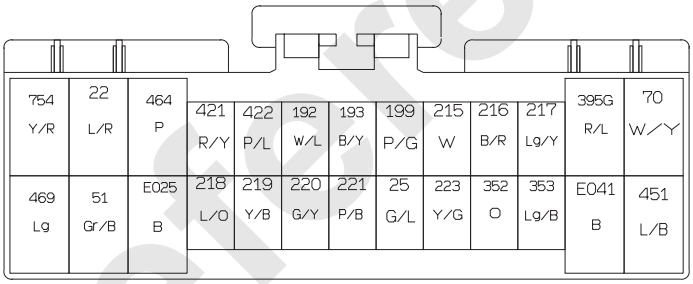
CN-33M
12MA-HBA_GY



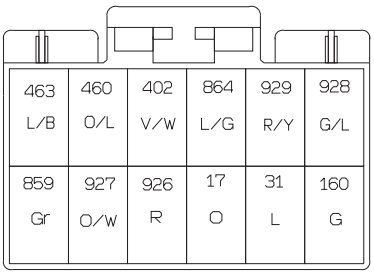
CN-34M
22MA-HB_GY



CN-36M
16MA-HB_GY



CN-35M
26MA-HB_GY

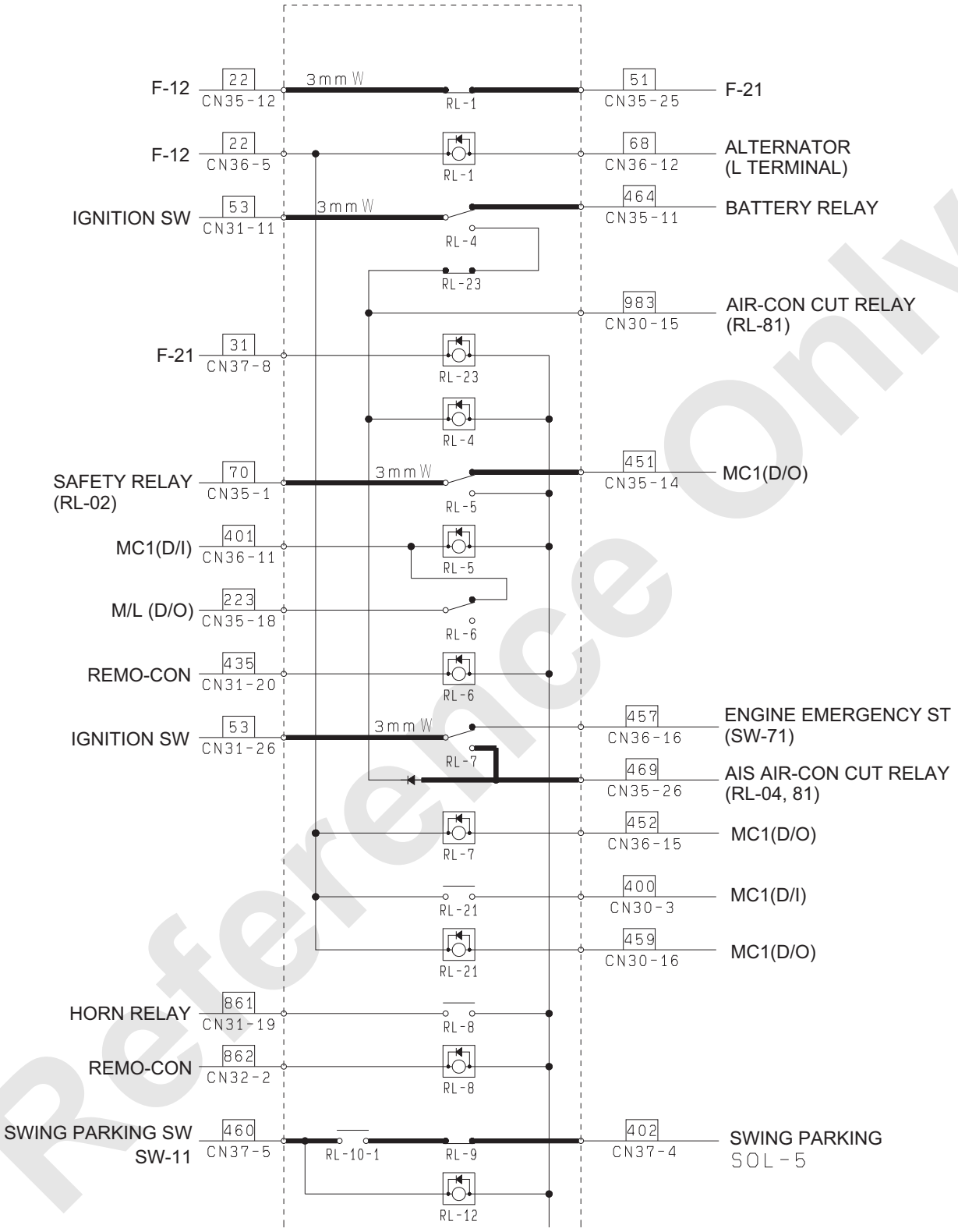


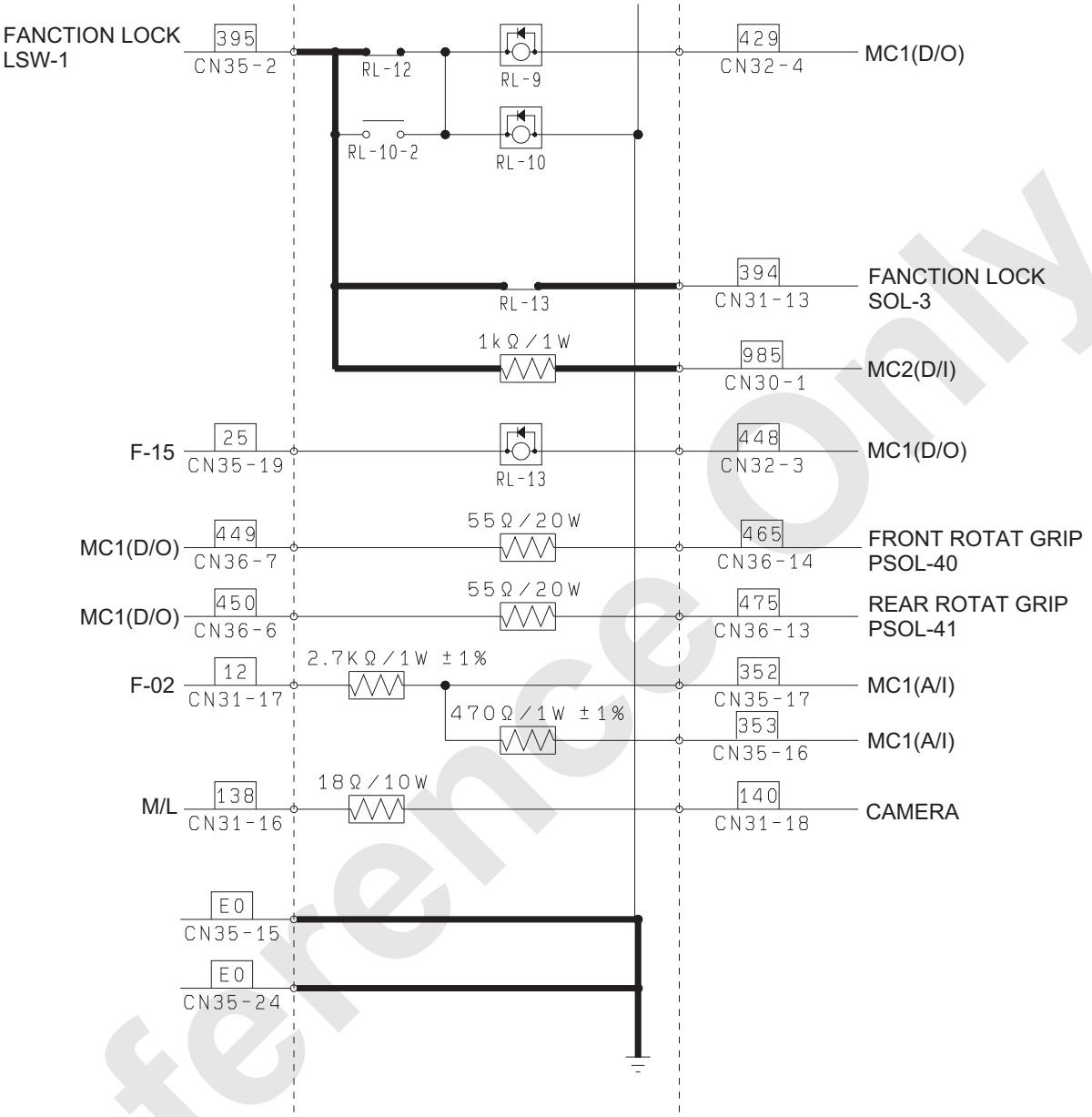
CN-37M
12MA-HB_GY

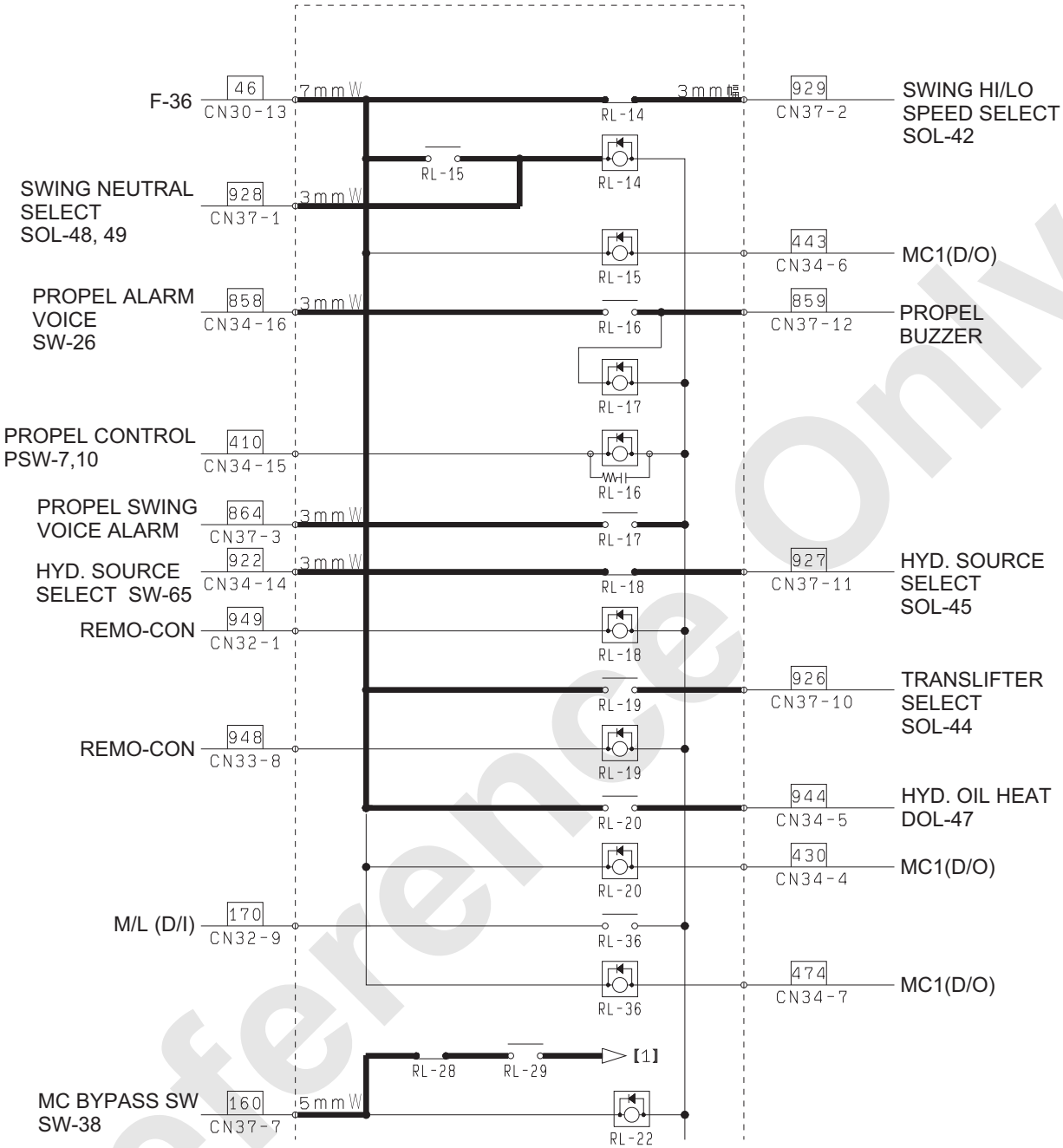
No.	Name
RL-1	Generation detect
RL-2	Safety
RL-3	Separate oil cooler motor
RL-4	AIS
RL-5	Starter lock
RL-6	Certify release
RL-7	Engine stop
RL-8	Remocon horn
RL-9	Swing parking control
RL-10-1	Swing parking 1
RL-10-2	Swing parking 2
RL-12	Swing parking 3
RL-13	Pilot pressure cut
RL-14	Swing hi/lo pressure select
RL-15	Swing neutral brake select
RL-16	Propel alarm
RL-17	Voice alarm
RL-18	Hyd. pressure select (SOL45)
RL-19	Hyd. pressure select (SOL44)
RL-20	Hyd. oil heat
RL-21	Engine restart
RL-22-1	MC1 bypass (left swing stop +)
RL-22-2	MC1 bypass (left swing stop -)
RL-22-3	MC1 bypass (right swing stop +)
RL-22-4	MC1 bypass (right swing stop -)
RL-22-5	MC1 bypass (main pump 1 +)
RL-22-6	MC1 bypass (main pump 1 -)
RL-22-7	MC1 bypass (main pump 2 +)
RL-22-8	MC1 bypass (main pump 2 -)
RL-22-9	MC1 bypass (boom pump +)
RL-22-10	MC1 bypass (boom pump -)
RL-23	Key resume
RL-24	ML bypass reset
RL-25-1	ML bypass hold 1
RL-25-2	ML bypass hold 2
RL-27	Swing buzzer
RL-28	Speed limit release
RL-29	Speed limit
RL-30	Outside indication lamp (green)
RL-31	Outside indication lamp (yellow)
RL-32	Outside indication lamp (red)
RL-36	ML adjust mode select

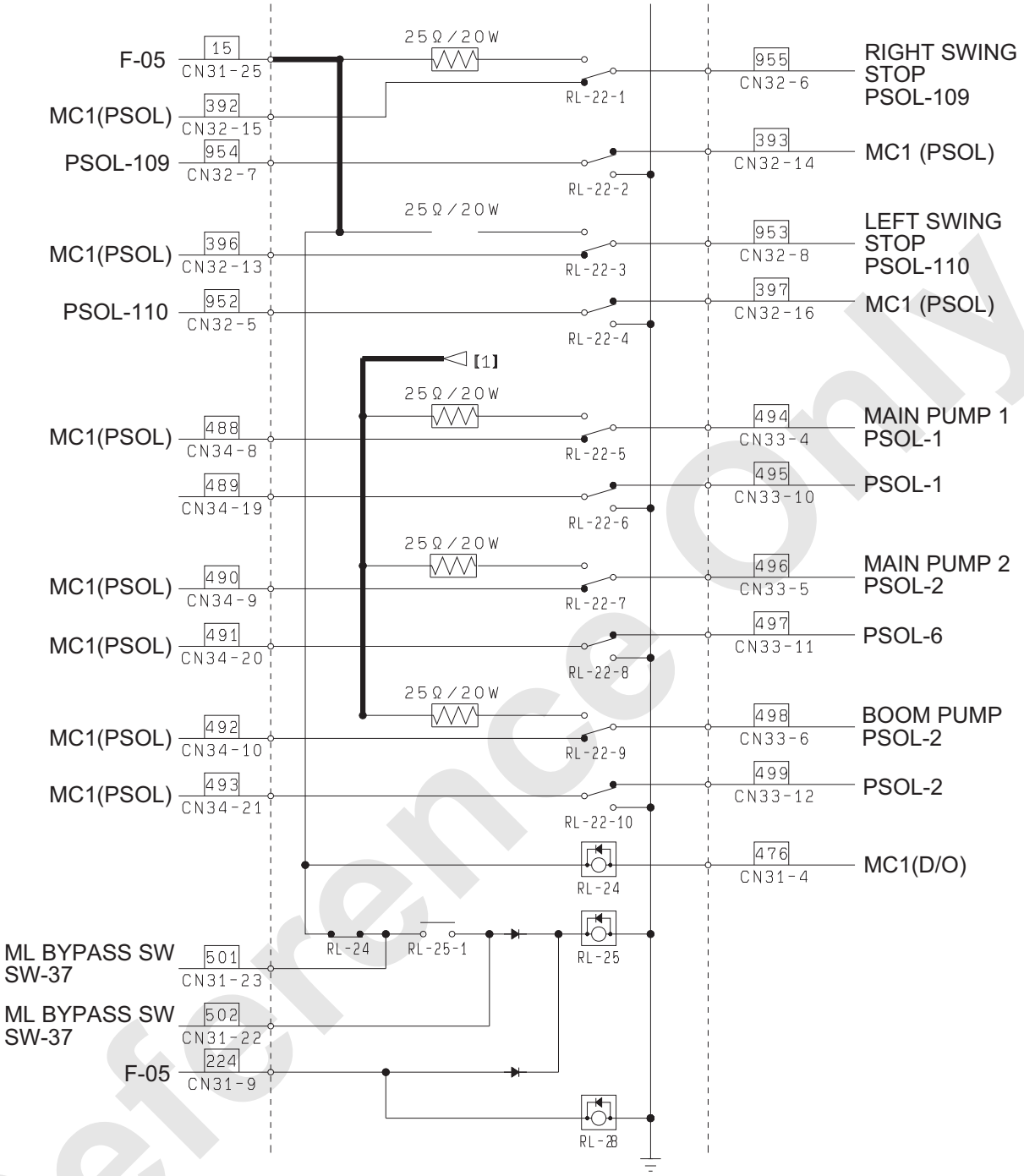
No.	Name
RL-37	DPR Regeneration
RL-38	Swing flasher (L)
RL-39	Swing flasher (R)
RL-40	Pump Qmax cut
RL-41	CLM
RL-42	ESM
RL-43	CLA
RL-44	ESA
RL-45	CLT
RL-46	EST
RL-47	Front free select
RL-48	Rear free select
RL-49	Third free select
RL-50-1	Jib over hoist 1
RL-50-2	Jib over hoist 2
RL-51	No. 2 limit
RL-53	Boom over hoist
RL-54	Self removal select
RL-55	Assy / disassy select
RL-56	Mast model self removal select
RL-57-1	Jib mode select 1
RL-57-2	Jib mode select 2
RL-58-1	Bend- prevent relay (R. upper)
RL-58-2	Bend- prevent relay (L. upper)

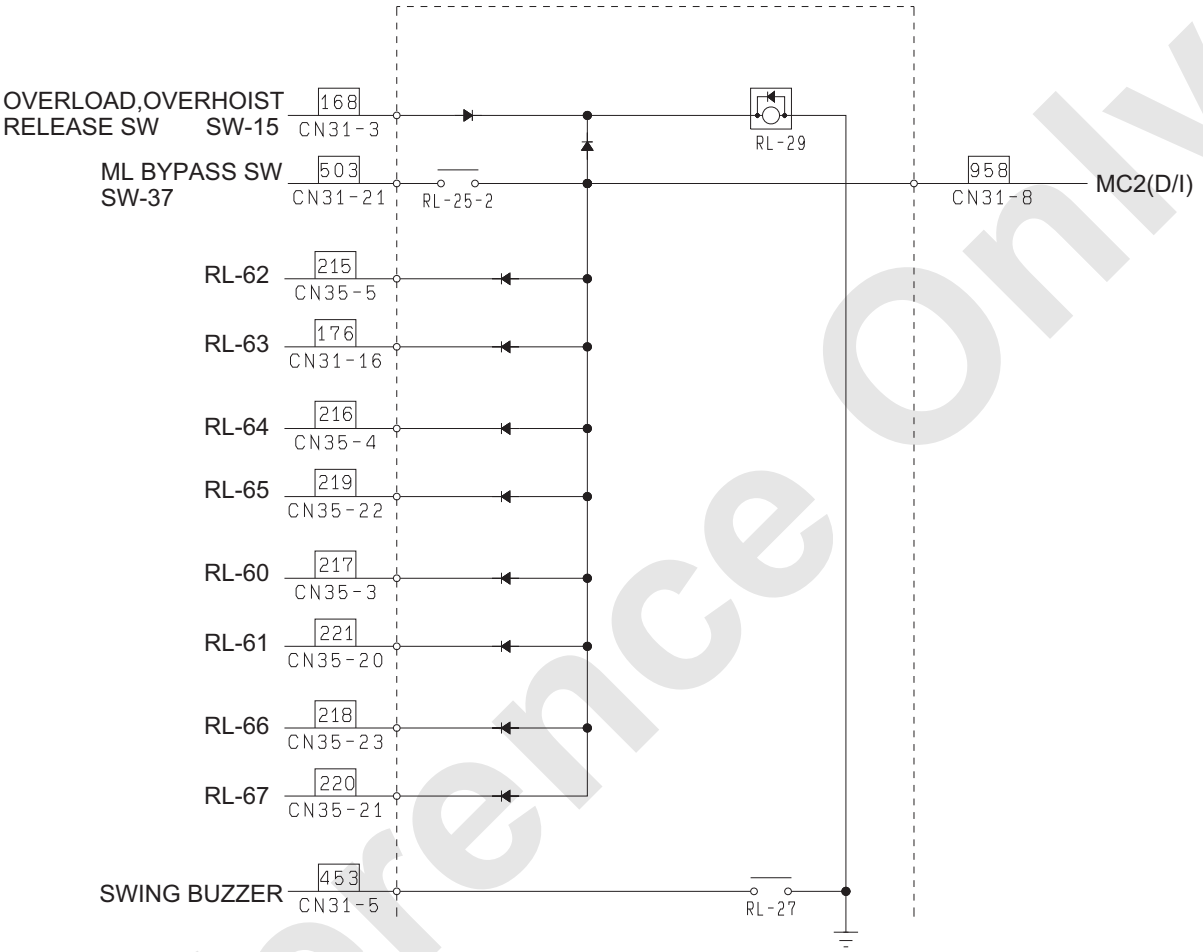
2. RELAY BOX SCHEMATIC

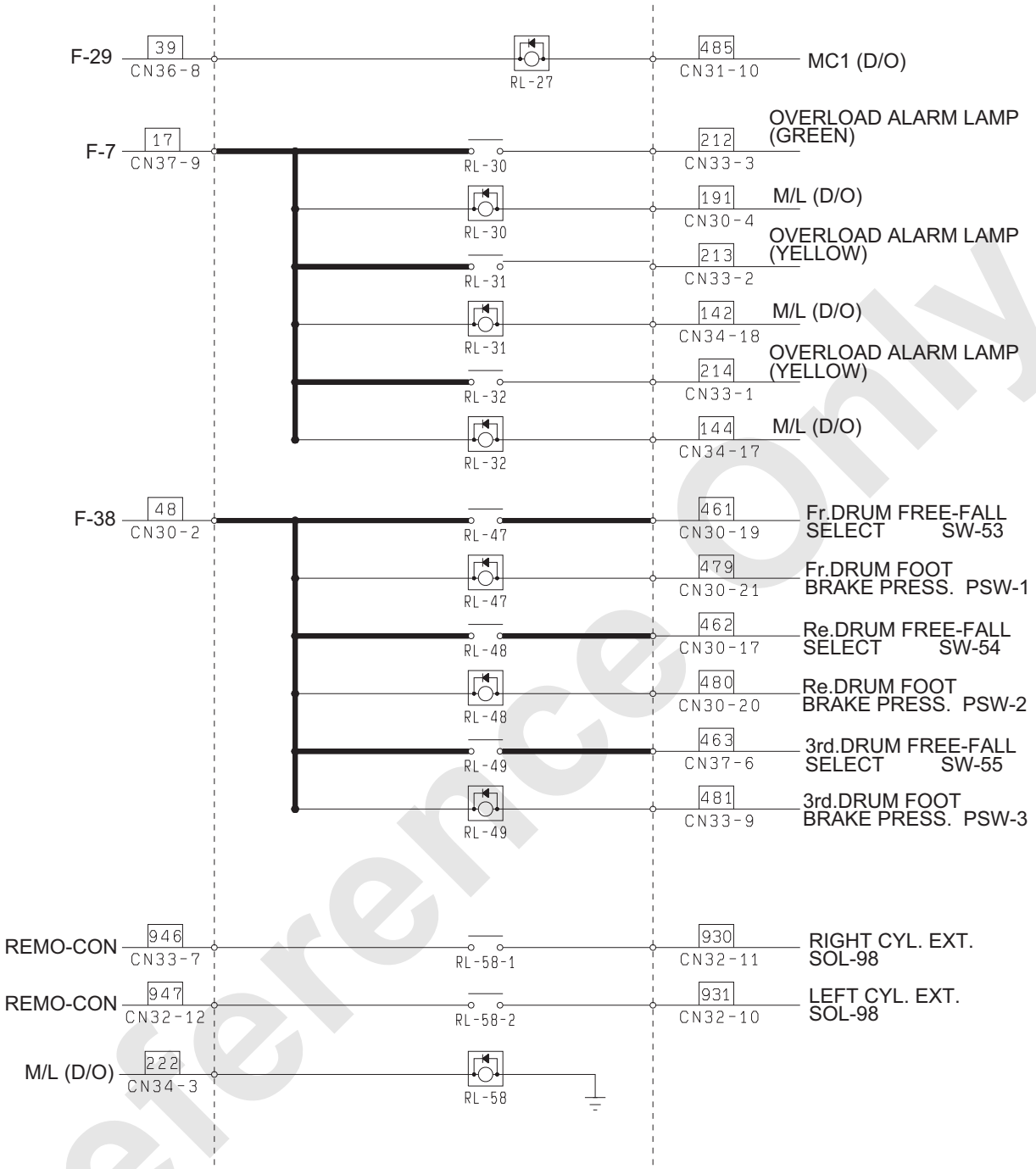


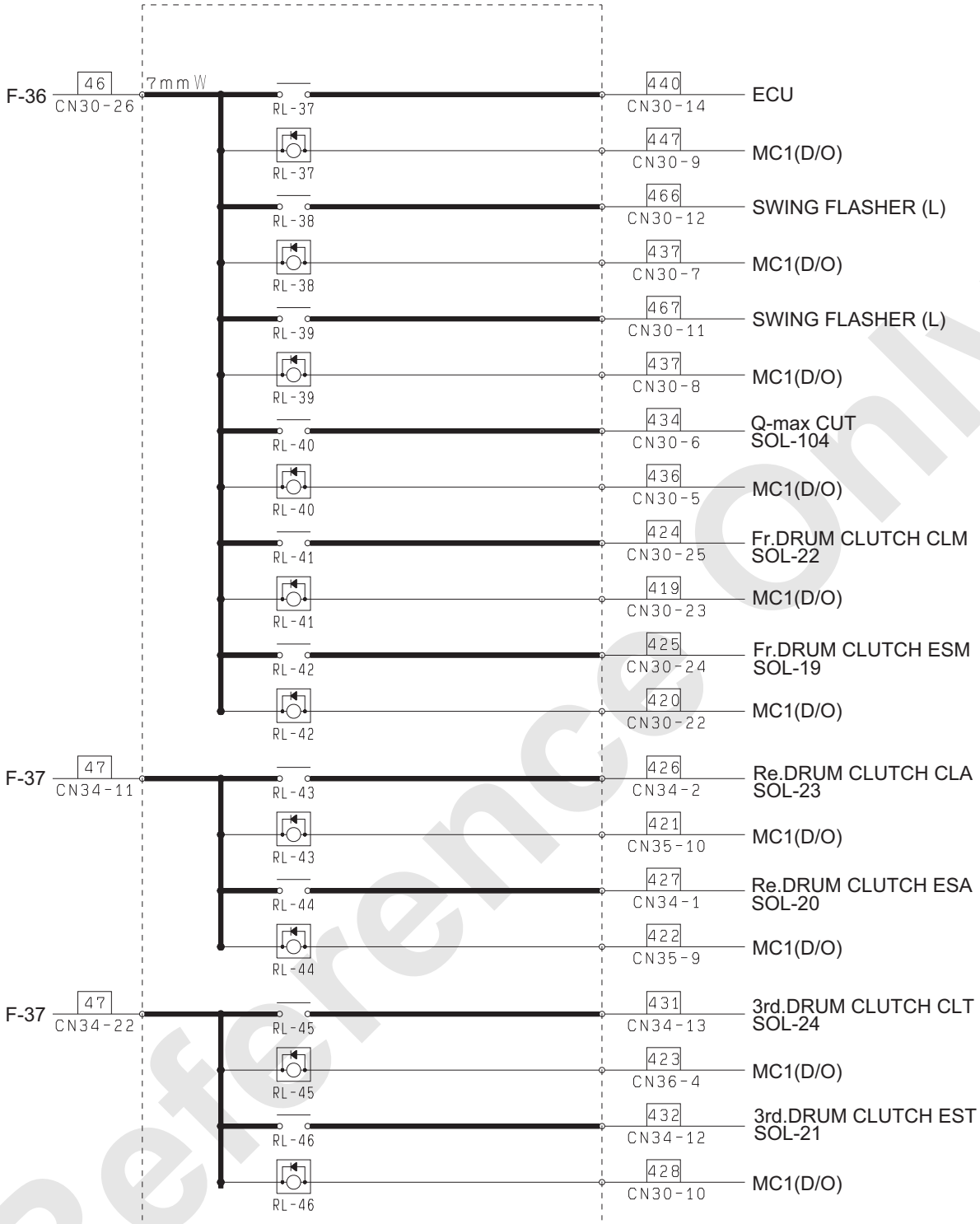


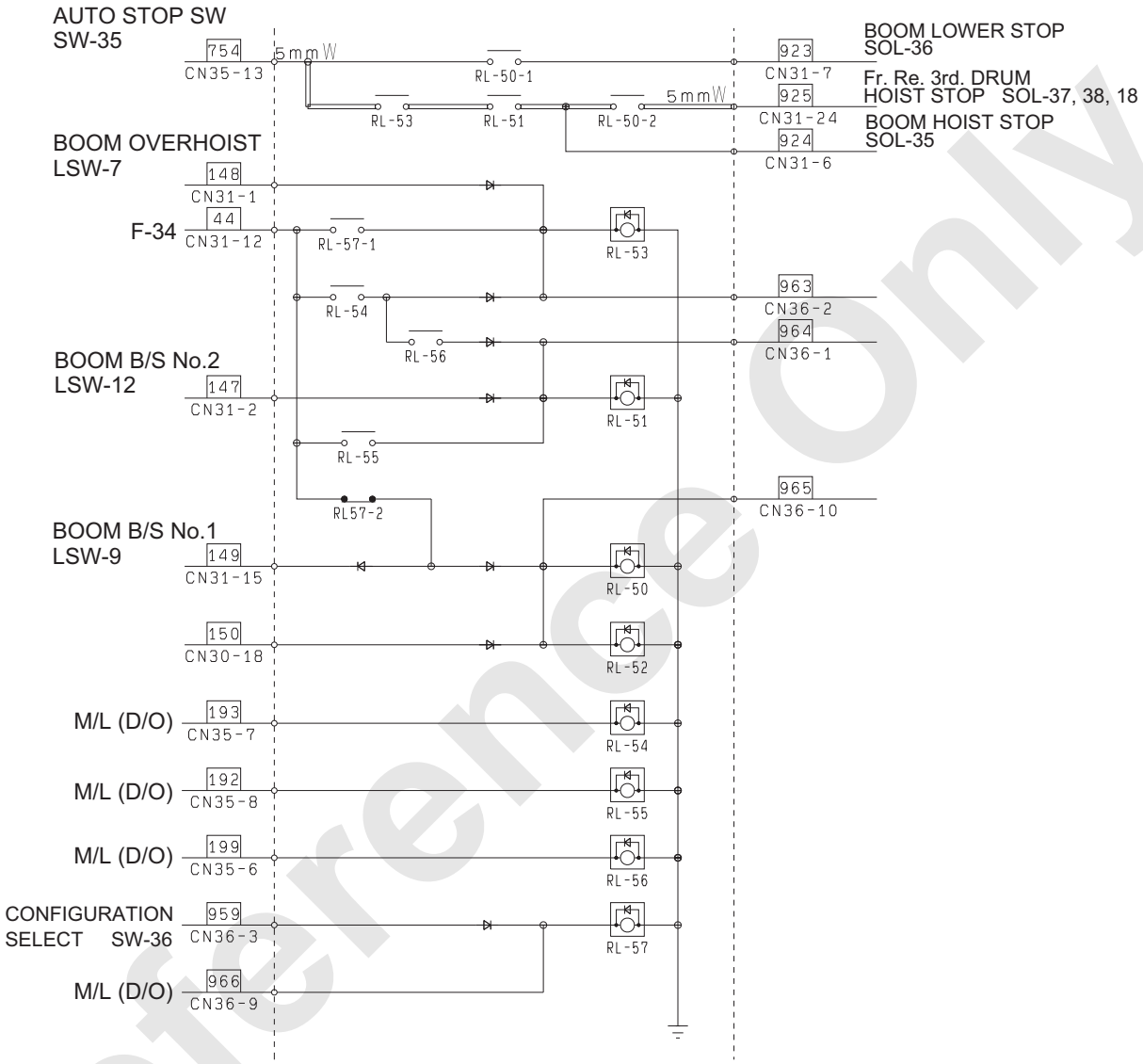




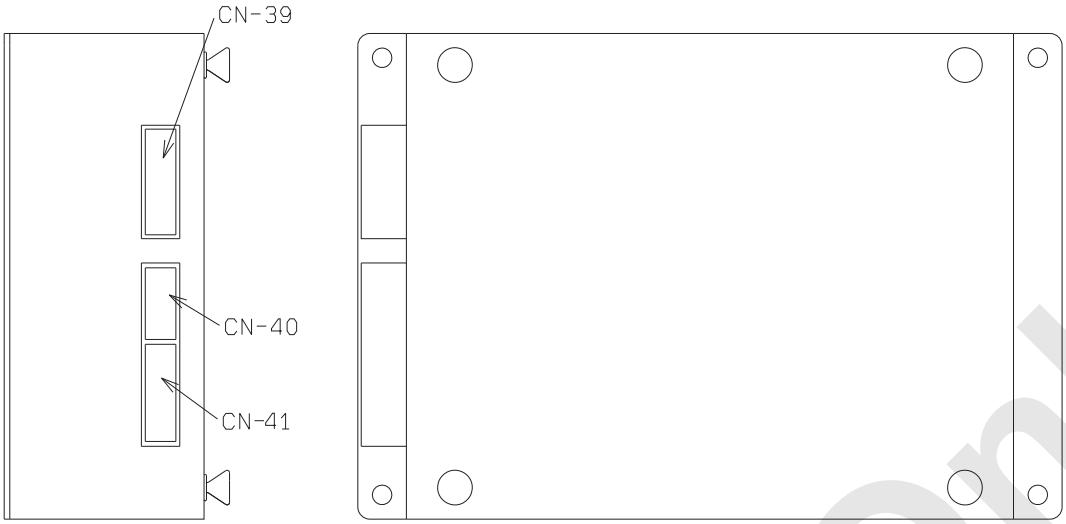


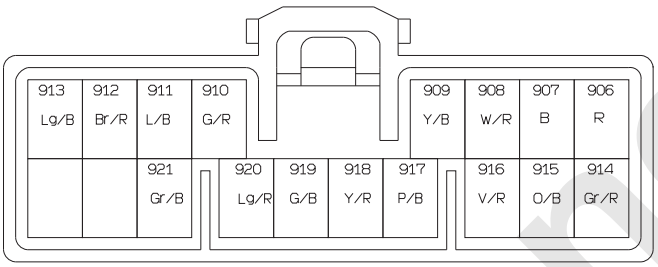




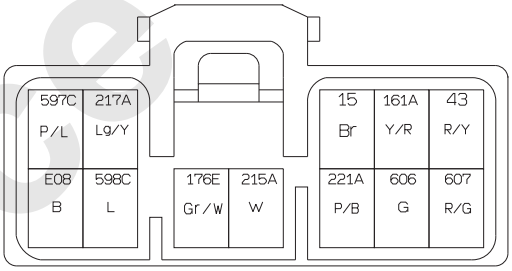


10.1.11 RELAY BOX

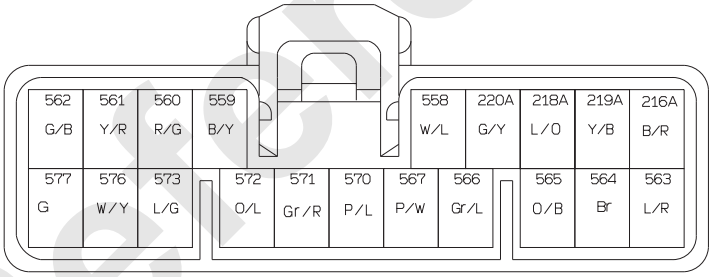




CN-39M
18MA-070ML1

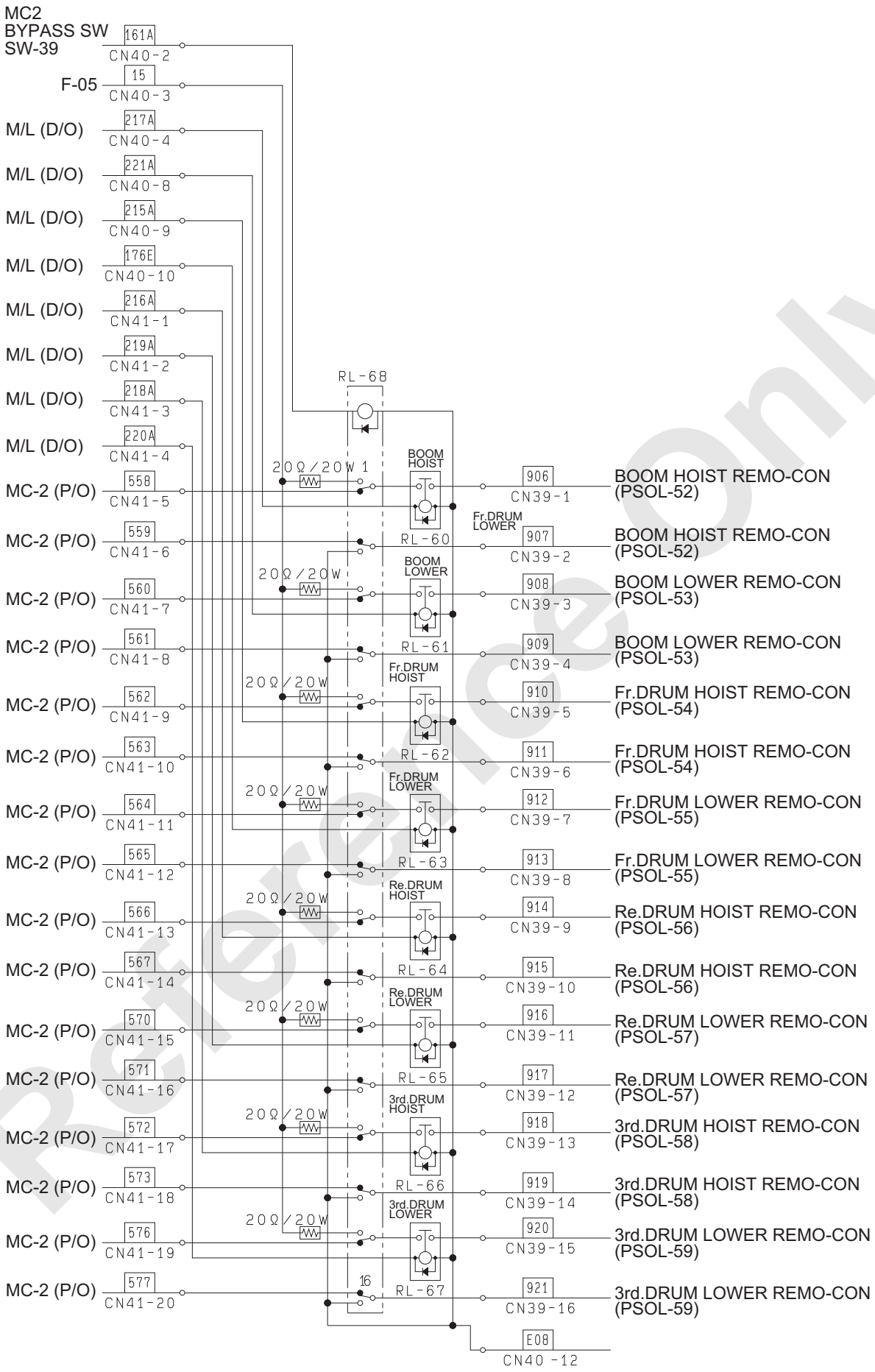


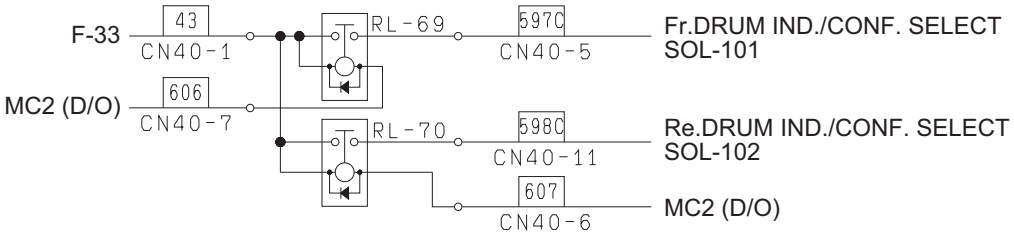
CN-40M
12MA-070ML1



CN-41M
20MA-070ML1

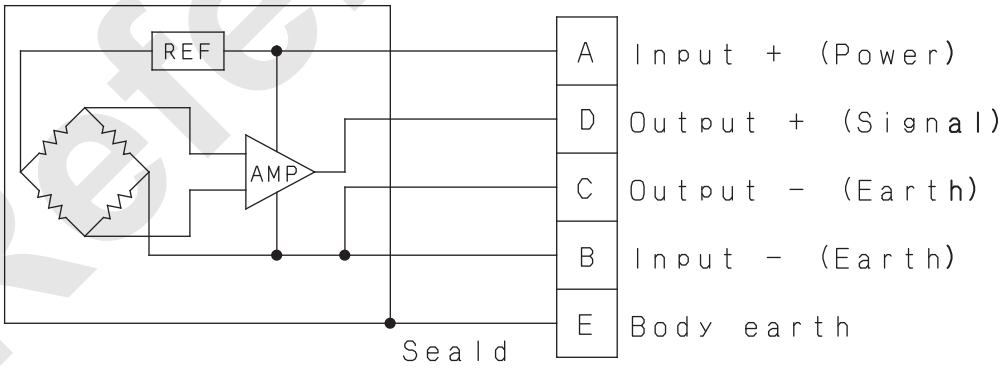
No.	Name
RL-60	Boom hoist raise stop relay
RL-61	Boom hoist lower stop relay
RL-62	Front raise stop relay
RL-63	Front lower stop relay
RL-64	Rear raise stop relay
RL-65	Rear lower stop relay
RL-66	Third raise stop relay
RL-67	Third lower stop relay
RL-68	MC bypass relay 1
RL-69	Independence, confluence select (F)
RL-70	Independence, confluence select (R)





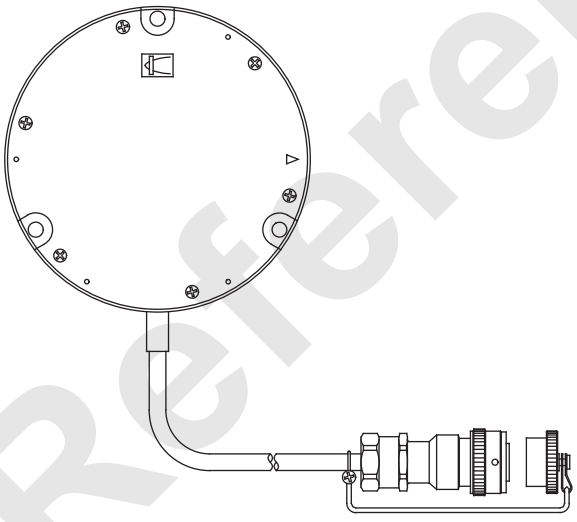
10.1.12 LOAD CELL (CRANE)

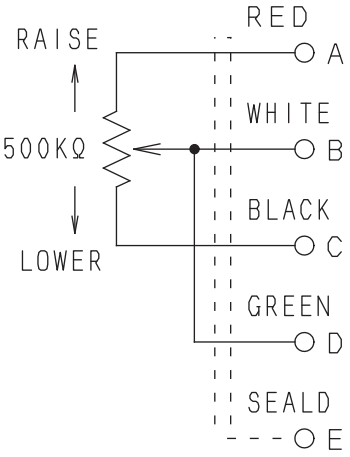
Model name :	LTP-S-100-KNSA7
Detective capacity:	Guy-cable support power
Rated capacity :	10 ton (98.07KN)
Load capacity :	150%
Output voltage :	with no load 1V ± 0.01V (at shipping) with rated load 5V ± 0.040V
Power source :	DC9V ± 15V (under 30 mA)
Output resistance :	Appr. under 100 Ω
Insulated resistance :	500MΩ / above 25VDC
Non Linearity :	± 1% RO
Hysteresis :	± 1% RO
Temperature compensation range :	-30° C + 65° C
Temperature capacity :	-35° C to + 75° C
Temperature effect at zero point :	± 0.1% RO/° C
Temperature effect at output :	± 0.1% RO/° C
Output cable :	None apex classification 5P water proof plug AE770L14-05P
Vibration proof :	69.6 m/s 33Hz up/down for 4 hours and left/right, front/back for 2 hours.
Shock proof :	245 m/s, 15mS X,Y, Z (3 times each)
Water proof :	Conforms to IP67 or equivalent (JIS C0920 non-seeping type)
Durability :	5×10^5 times
Noise proof :	DC700V 100ns
Total integrity :	2.9% RO
Weight :	About 6 kg



10.1.13 ANGLE SENSOR

Model name :	MLA-901A-**C
Detection capacity :	Boom angle against ground
Valid operating range :	0 to ± 90 degree
Operation range :	360° endless
Rated output sensitivity :	0.255V/V±0.5%
Input voltage :	10V
Input resistance :	50kΩ ± 5%
Output resistance :	(25000 + 141.6 X θ) Ω ± 5%
Detecting accuracy :	±1°
Initial imbalance :	Set within ±5°
Insulate resistance :	100MΩ / 50VDC
Output cable :	Cab tire crolobren cable 0.5mm^2 X 4
Cable analysis :	Bending radius : R100, Tensile strength : 8kg
Cable apex :	5P water proof plug AE776L14-05S+MT12-14+MS3180-14CAL
Control method :	Oil damper
Monitor :	With outside weight 0° , 30° , 60° , 90° Monitorable
Case material :	Plastic (Toshiba premix AP-902S)
Surface treatment :	Non, stripe (Black)
Temperature range :	-20 to 70° C
Store temp. :	-40 to 80° C
Weight :	appr. 1.2kg (main body), appr. 65g/m (cable)





A-C Resistance : 50KΩ

A-B Resistance (R) : 25000+141.6Xθ°

10.1.14 TROUBLESHOOTING OF EXHAUST GAS THIRD REGULATION ENGINE

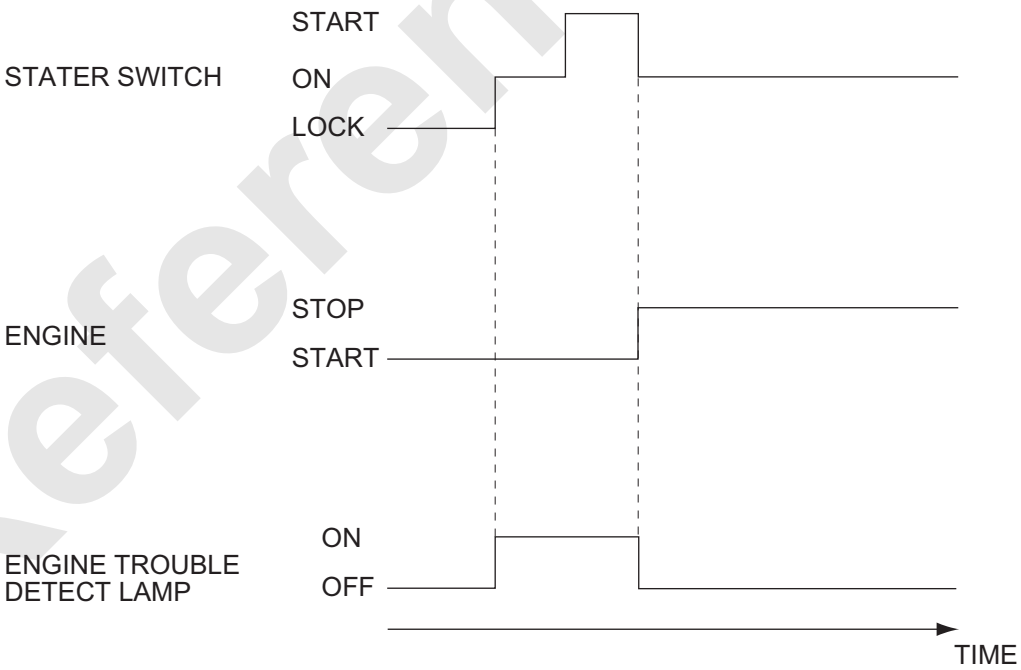
1. FAILURE DIAGNOSIS FUNCTION

ECU always diagnoses whether or not the sensors malfunction while the key switch (M) is turned ON, and it lights on the diagnosis lamp when the sensor is judged as being malfunctioned and restores the place of failure at the same time to inform the operator of abnormality and ECU restricts the injection amount of fuel depending on the failure content.

It is possible to check the place of failure by using the diagnosis lamp or the diagnosis tool (HINO DX) via the DST-1 connector.

- Diagnosis lamp status while the key is turned ON
  The lamp lights on when the key is ON (M) and engine is stopped as shown in the following chart. When the lamp does not go off even if the engine has been started, promptly stop the engine after avoiding danger because the system may have abnormality.

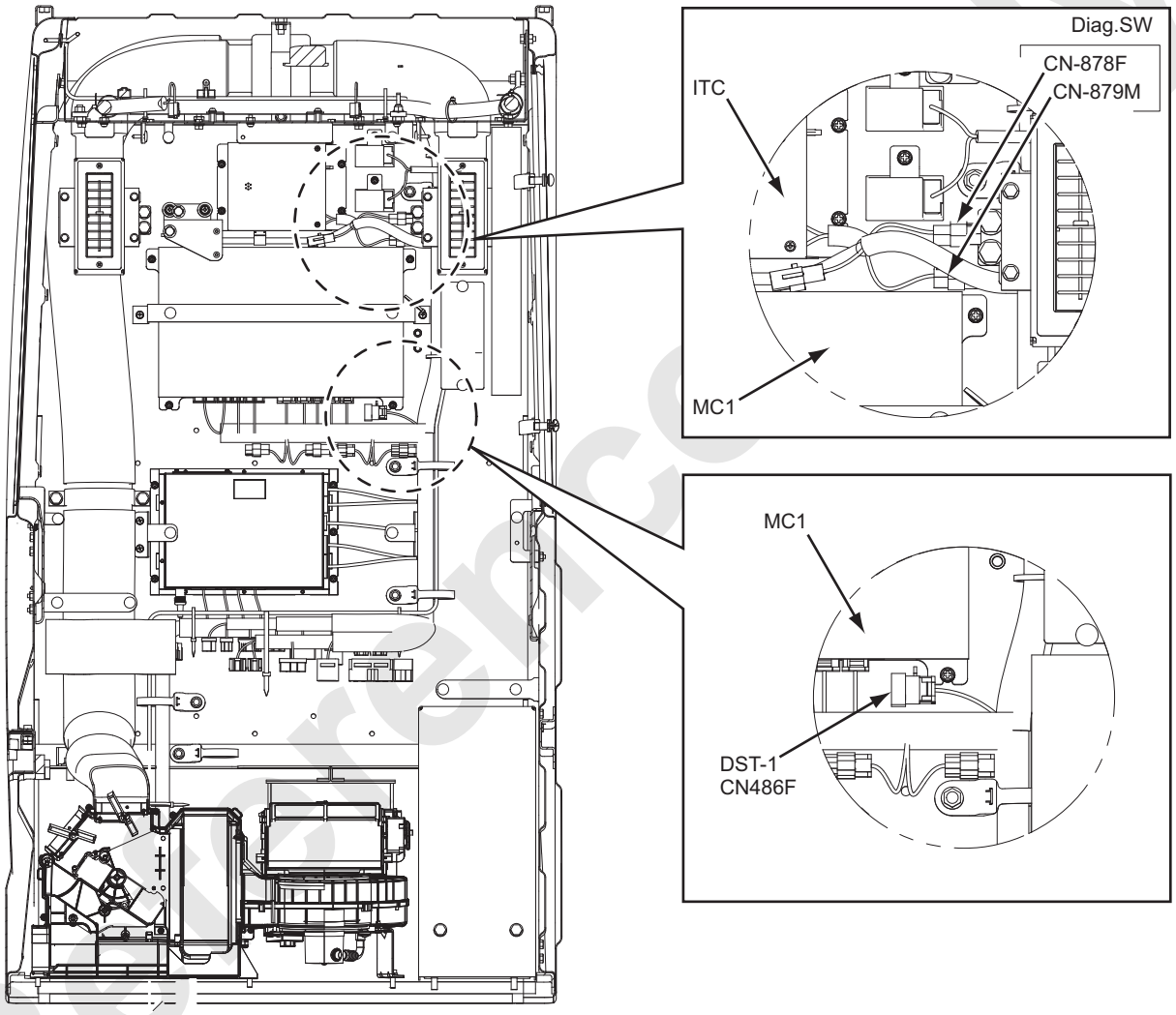
How to turn off the engine trouble detect lamp

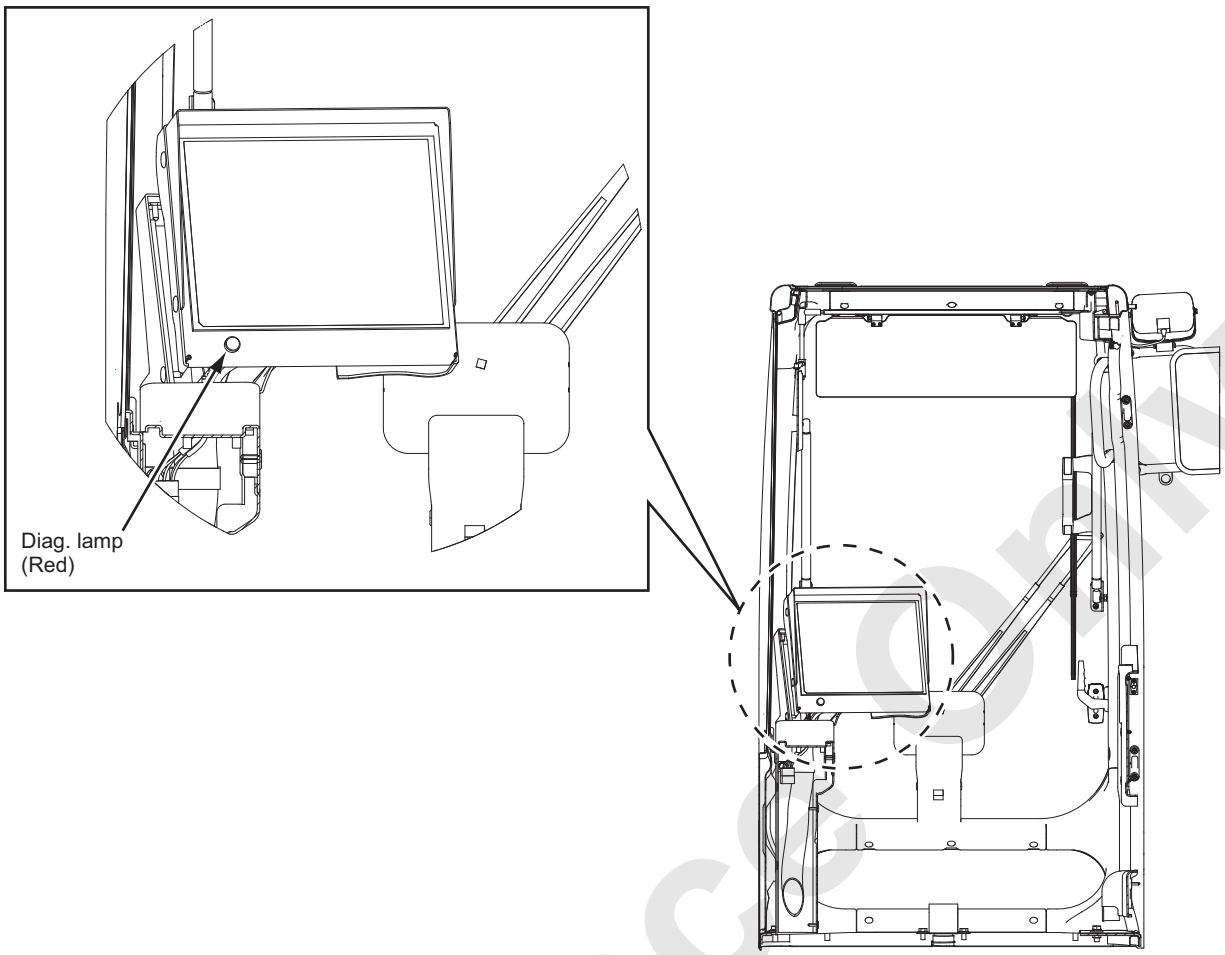


10.1.15 HOW TO CHECK THE FAILURE CONTENTS

1. Failure diagnosis code table (J08E Engine)
   When the failure is detected by diagnosis lamp, diag. code can be checked by connecting diag. connector CN-878F, CN-879M
   Component location related to diagnosis.

- Diag. lamp location
- Diag. connector CN-878F,CN-879M location
- DST-1 diag. connector location





SAE code	System	TCCS digit code	Function	Check Lamp ON	Failure Level	Resume Timing	Injection volume limit	Engine Stop action	D P R Regeneration control	Failure judging condition	EGR Motion	Cause of failure	Remark
P0217	Each sensor system & related dialog	6	Over heat	—	2	Instant resume	Limited to 75%	No stop	—	Waater temp 115℃	Stop	Over heat	
P2228	Each sensor system & related dialog	15	Air pressure sensor failure （Lo）	O	2	Instant resume	Limited to 75%	No stop	—	＜1.90V	Stop	Sensor failure or unexpected high recognition	
P2229			Air pressure sensor failure （Hi）	O	2	Instant resume	Limited to 75%	No stop	—	＞4.20V	Stop		
P119F	Each sensor system & related dialog	74	Commonrail press. sensor charact.abnormal	O	1	Instant resume	No limit	No stop	—		—		
P0192			Commonrail press. Sensor failure（Lo）	O	2	After IG-OFF	No limit	No stop	No Regeneration	＜0.64V	Stop	Sensore failure or harness wire breaking, short	
P0193			Commonrail press. Sensor failure （Hi）	O	2	After IG-OFF	No limit	No stop	No Regeneration	＞4.78V	Stop		
P1197		74	Commonrail sub press. Sensor failure（Lo）	—	1	Instant resume	No limit	No stop	—	＜0.89V	—	Sensore failure or harness wire breaking, short	Due to main priority, no output limit since limited at B/U main failure.
P1198			Commonrail sub press. Sensor failure （Hi）	—	1	Instant resume	No limit	No stop	—	＞4.82V	—		
P0237	Each sensor system & related dialog	25	Intake air press. (boost P.) sensor failure(Lo)	O	2	After IG-OFF	Limited to 75%	No stop	—	＜0.19V	—	Sensore failure or harness wire breaking, short	Injection volume is surpressed and futher output down
P0108			Intake air press. (boost P.) sensor failure(Hi)	O	2	After IG-OFF	Limited to 75%	No stop	—	＞4.11	—		
P0117	Each sensor system & related dialog	11	Water temp sensor failure (Lo)	O	2	Instant resume	Limited to 75%	No stop	—	＜0.10V	Stop	Sensore failure or harness wire breaking, short	
P0118			Water temp sensor failure (Hi)	O	2	Instant resume	Limited to 75%	No stop	—	＞4.77V	Stop		
P0182	Each sensor system & related dialog	14	Combution temp. sensor failure (Lo)	O	1	Instant resume	No limit	No stop	—	＜0.10V	—	Sensore failure or harness wire breaking, short	
P0183			Combution temp. sensor failure (Hi)	O	1	Instant resume	No limit	No stop	—	＞4.85V	—		
P2120	Accel sensor system	22	Both accel sensor failure	O	1	After IG-OFF	No limit	No stop	—	1・2 sensor failed	—	Sensore failure or harness wire breaking, short	
P2121			Accel sensor 1 voltage abnormal	—	1	After IG-OFF	No limit	No stop	—		—		
P2122			Accel sensor 1 failure (Lo)	—	1	After IG-OFF	No limit	No stop	—	＜0. 30V	—		※C A N is main control
P2123			Accel sensor 1 failure (Hi)	—	1	After IG-OFF	No limit	No stop	—	＞4. 85V	—		※C A N is main control
P2126			Accel sensor 2 voltage abnormal	—	1	After IG-OFF	No limit	No stop	—		—		
P2127			Accel sensor 2 failure (Lo)	—	1	After IG-OFF	No limit	No stop	—	＜0. 30V	—		
P2128			Accel sensor 2 failure (Hi)	—	1	After IG-OFF	No limit	No stop	—	＞4. 85V	—		
P1133		23	Work accel sensor （Hi）	—	1	After IG-OFF	No limit	No stop	—	＞4. 85V	—		
P0335	Rotating sensore system	13	Main rotate sensor failure, Both rotate sensor failure	O	2	Instant resume	Limited to 75%	No stop	—		Stop	When front rotate sensor failure. harness abnormal, both sensors failed starter ON at certain level.	Intake air volume is required in calculation. At fault Eng. Is closed.
P0336			Main rotate sensor pulse abnormal	O	2	Instant resume	Limited to 75%	No stop	—		Stop	otate sensor abnormal, pulse area abnormal etc.	
P0016			Main sub,sensor phase shift failure	O	1	Instant resume	No limit	No stop	—		—		
P0340		12	Sub rotate sensor failure	O	1	Instant resume	No limit	No stop	—		—	ub rotate sensor failure, harness abnorm	Starting characteristics becomes slightly worse.
P0341			Sub rotate sensor pulse abnormal	O	1	Instant resume	No limit	No stop	—		—	tate sensor abnormal, pulse area abnorn	
P0088	Supply pump system	69	Commonrail abnormal hi pressure (1st step)	O	1	After IG-OFF	No limit	No stop	—		—		
P0088		69	Commonrail abnormal hi pressure (2nd step)	O	1	After IG-OFF	No limit	No stop	—		—		
P0088		76	Commonrail pressure hi pressure abnormal	O	1	After IG-OFF	No limit	No stop	—		—		
P0087		76	Commonrail pressure under abnormal	O	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop		
P0629		75	Supply pump sol v. 1failure (no press.feed)	O	3	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop	S C V short (＋B)	Half of cylinders do not inject and output is decreased accordingly.
P0628		73	Supply pump sol v. 1failure (All delivery)	O	2	After IG-OFF	Limited to 75%	No stop	—			S C V drive system abnormal	
P2635		76	Supply pump replace	—	1	After IG-OFF	No limit	No stop	—				
P1211	Injector system	68	Injector common 1 failure (GND short)	O	3	After IG-OFF	No limit	No stop	No Regeneration		Stop	Injector×3 failed. Or injector power harness abnormal	No output limit. Inject inself is decreased into half, reduced cylinder running and speed variation becomes large.
P1214			Injector common 2 failure (GND short)	O	3	After IG-OFF	No limit	No stop	No Regeneration		Stop		
P1212			Injector common 1 failure (VB short, open)	O	3	After IG-OFF	No limit	No stop	No Regeneration		Stop		
P1215			Injector common 2 failure (VB short, open)	O	3	After IG-OFF	No limit	No stop	No Regeneration		Stop		
P0201	Injector system	61	Injector 1 wire breaking	O	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop	injector failed or injector harness abnormal (intake side)	No output limit. Failed cylinder does not inject and output is decreased accordingly.
P0202		62	Injector 2 wire breaking	O	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop		
P0203		63	Injector 3 wire breaking	O	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop		
P0204		64	Injector 4 wire breaking	O	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop		
P0205		65	Injector 5 wire breaking	O	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop		
P0206		66	Injector 6 wire breaking	O	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop		

SAE code	System	TCCS digit code	Function	Check Lamp ON	Failure Level	Resume Timing	Injection volume limit	Engine Stop action	DPR Regeneration control	Failure judging condition	EGR Motion	Cause of failure	Remark
P0263	Injector system	61	Inter-cylinderc Caribration errer# 1	–	1	After IG-OFF	No limit	No stop	–		–	Intercylinder carbration abnormal or flow dumper actuation	
P0266		62	Inter-cylinderc Caribration errer#2	–	1	After IG-OFF	No limit	No stop	–		–		
P0269		63	Inter-cylinderc Caribration errer#3	–	1	After IG-OFF	No limit	No stop	–		–		
P0272		64	Inter-cylinderc Caribration errer# 4	–	1	After IG-OFF	No limit	No stop	–		–		
P0275		65	Inter-cylinderc Caribration errer# 5	–	1	After IG-OFF	No limit	No stop	–		–		
P0278		66	Inter-cylinderc Caribration errer# 6	–	1	After IG-OFF	No limit	No stop	–		–		
P0234	Turbo	34	Turbo over boost	O	3	Instant resume	Limited to 50%	No stop	–		–	Over boost ? Turbo failure	
P0045	V N T System	35	VNT actuator failure 1 (major failure)	O	3	After IG-OFF	20%＋rotate contrc	No stop	–	Failure info. Received from VNT controller	–	Major failure may highly cause VNT drive area sticking. Or failure of stuck.	
			VNT actuator failure 2 (minor failure)	O	2	After IG-OFF	Limited to 75%	No stop	–		–		
P00AF			VNT CONTROLLER FAILURE 1 (MAJOR FAILURE)	O	3	After IG-OFF	20%＋rotate contrc	No stop	–		–		
			VNT CONTROLLER FAILURE 2 (MAJOR FAILURE)	O	2	After IG-OFF	Limited to 75%	No stop	–		–		
P0611	E C U Main body system	71	ECU CHARGE CIRCUIT FAILURE (Lo)	O	3	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop	ECU failure ? Affecting engine control	
P0200			ECU CHARGE CIRCUIT FAILURE (Hi)	O	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop		
P0605		3	Flash ROM abnormal	O	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		–		
P0606			CPU failure (Hard detect)	O	3	Instant resume	Forcible stop	Stop	–		–		
P0607			CPU monitor IC abnormal	O	3	Instant resume	Limited to 75%	No stop	No Regeneration		Stop		
P1601		2	QR code failure	O	1	Instant resume	No limit	No stop	–		–		
P2100	Intake air orfice valve	31	DC motor wrte breakage drive duty wire breaka	O	1	After IG-OFF	No limit	No stop	–		–	ecting to temp. rise at manual regenerat	Intale throttle full open
P2103			DC motor, GND short	O	3	After IG-OFF	Limited to 50%	No stop	–		Stop		
P2101			Intake air orifice sensor sticking	O	3	After IG-OFF	Limited to 50%	No stop	–		Stop		
P0122		32	Intake air orifice opening sensor failure (Lo)	O	3	After IG-OFF	Limited to 50%	No stop	–	＜0.20V	–		
P0123			Intake air orifice opening sensor failure (Hi)	○	3	After IG-OFF	Limited to 50%	No stop	–	＞4.80V	–		
P1458	E G R related	81	EGR system failure 1 (major failure)	O	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop	EGR close order, but may be stuck	
P1459			EGR system failure 2 (major failure)	○	2	After IG-OFF	Limited to 75%	No stop	–		Stop	EGR close order but close valve stuck	
P06D3	Air flow sensor	5	Air flow sensor power (+B)	–	1	Instant resume	No limit	No stop	–		–		
P06D4			Air flow sensor power (GND)	–	1	Instant resume	No limit	No stop	–		–		
P0104		17	Air flow sensor abnormal 1 (High frequend)	O	2	After IG-OFF	Limited to 75%	No stop	–	＜0.85kHz	Stop		
P0104			Air flow sensor abnormal 2 (Low frequend)	O	2	After IG-OFF	Limited to 75%	No stop	–	＞9.80kHz	Stop		
P0112	Intake air sensor	17	Intake air temp. sensor abnormal (Low)	O	1	Instant resume	No limit	No stop	–	＜0.06V			
P0113			Intake air temp. sensor abnormal (High)	O	1	Instant resume	No limit	No stop	–	＞4.55V			
P200C	DRP related	91	D P F meltdown failure 1	O	1	DPR-reset	No limit	No stop	–		–		Failure resume need reset of DPR internal info with special tool. Use of tool requiews sparate leveling
P244A			D P F meltdown failure 2	O	3	DPR-reset	Limited to 50%	No stop	–		–		
P2463		92	D P F abnormal clog 1	O	3	DPR-reset	Limited to 50%	No stop	–		–		
P244B			D P F abnormal clog 2	O	3	DPR-reset	Limited to 50%	No stop	–		–		
P2458		93	DRP catalyst detedeterioration 1	O	3	DPR-reset	Limited to 50%	No stop	No Regeneration		–		
P24A2			DRP catalyst detedeterioration 2	O	3	DPR-reset	Limited to 50%	No stop	No Regeneration		–		
P1427	Pressure difference sensor system	28	Pressure difference sensor abnormal (Lo)	○	3	After IG-OFF	Limited to 50%	No stop	–	＜0.50V	–		
P1428			Pressure difference sensor abnormal (Hi)	○	3	After IG-OFF	Limited to 50%	No stop	–	＞4.46V	–		
P0545	Exhaust air temp. system	27	Exhaust air temp. sensor1 abnormal (Lo)	O	1	Instant resume	No limit	No stop	No Regeneration	＜0.06V	–		
P0546			Exhaust air temp. sensor1 abnormal 1 (Hi)	O	1	Instant resume	No limit	No stop	No Regeneration	＞4.96V	–		
P2032			Exhaust air temp. sensor1 abnormal 2 (Lo)	O	1	Instant resume	No limit	No stop	–	＜0.06V	–		
P2033			Exhaust air temp. sensor1 abnormal 2 (Hi)	O	1	Instant resume	No limit	No stop	–	＞4.96V	–		
P0642	Sensor voltage system	5	Sensor power 1 abnormal (Lo)	–	1	Instant resume	No limit	No stop	–		–		This occurs at same time with other failure. Power system check as major cause may help
P0643			Sensor power 1 abnormal (Hi)	–	1	Instant resume	No limit	No stop	–		–		
P0652			Sensor power 2 abnormal (Lo)	–	1	Instant resume	No limit	No stop	–		–		
P0653			Sensor power 2 abnormal (Hi)	–	1	Instant resume	No limit	No stop	–		–		

SAE code	System	TCCS digit code	Function	Check Lamp ON	Failure Level	Resume Timing	Injection volume limit	Engine Stop action	D P R Regeneration control	Failure judging condition	EGR Motion	Cause of failure	Remark
P0540	Vehicle system	53	Pre-heating device failure	O	1	Instant resume	No limit	No stop	–		–	Pre-heating device (Shoprt +B, GND)	
P0686	Vehicle system	51	Main relay failure	O	1	Instant resume	No limit	No stop	–		–	Power system failure	
P0219	Vehicle system	7	Engine over run	O	1	Instant resume	No limit	No stop	–		–	Over run	Intake throttle full close
P0617	Vehicle system	45	Starter switch failure	–	1	Instant resume	No limit	No stop	–		–	Switch failure (Shorted continuously)	Low temp strting worsen
U1001	Transmission related	9	CAN1 failure	O	1	After IG-OFF	No limit	No stop	–		–		
U110A			Transmission lost_TSC1 (Isolation command)	O	1	After IG-OFF	No limit	No stop	–		–		
U0073		8	CAN2 failure	O	3	After IG-OFF	Limited to 50%	No stop	No Regeneration		Stop		
U1122			Transmission lost_E G R	O	2	After IG-OFF	Limited to 75%	No stop	–		Stop		
U1123			Transmission lost_V N T	O	3	After IG-OFF	Limited to 50%	No stop	No Regeneration		–		

*How to output diag. code

1. SAE code : This is output when failure is confirmed with failure diagnosis. Failure code is indicated on present and past.
Past failure can be erased only with failure diagnosis tool.

2. 2 digit code : Check for blinking number of engine check clamp.
Present error only is indicated. (Past failure can not be seen)

Note) Regarding light ON of engine check lamp
Diag. Sw OFF (user mode) : Check lamp turns ON when failure occurs.
Diag. Sw ON : 2 digit code is indicated by blinking of check lamp. (“No error” is indicated by continuous blinking as normal)

3. Indication of failure code : Failure code is indicated in sequence from smaller number of failure codes repeatedly.
The below shows example of diag. code indication.
(Upper … Code 32 and code 21 are indicated. Lower … normal case.)

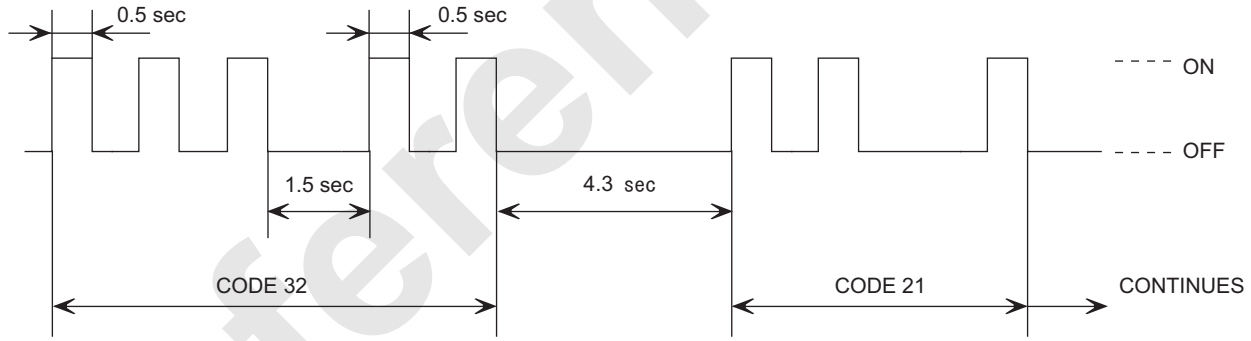
3. Indication of diagnosis codes

(1) For example, the following chart shows the case when the diagnosis codes 32 and 21 are displayed. The display method is based on the blinking intervals of the lamp. First, the first code makes the lamp light on the figure "3" at the 10's place for 0.5 seconds 3 times and lights on 2 times after 1.5 seconds. Next code display makes the lamp light on 2 + 1 times having 4.3 seconds intervals in the same way as the first code, and afterward this sequence will be repeated.Next code display makes the lamp light on 2 + 1 times having 4.3 seconds intervals in the same way as the first code, and afterward this sequence will be repeated.

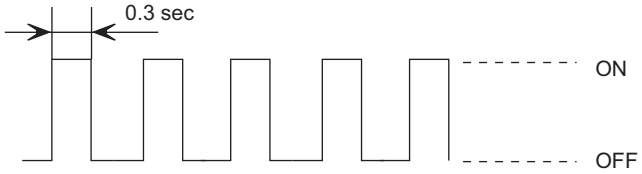
(2) Usually, the lamp does not light on or blink when the system has no abnormality.
At this time, if the diagnosis indication connector is connected, the lamp repeats blinking with 0.3 seconds of light-on duration.

[Example] Display of diagnosis codes

example 1) When codes 32 and 21 are displayed



example 2) Normality displayed



10.1.16 CHECKING OF DIAGNOSIS LAMP FUNCTION

The diagnosis lamp function is normal when the lamp is lit up with the following conditions.

[Requirements for checking lit-up diagnosis lamps]

- No any fault to be lit up the diagnosis lamp
- Diagnosis indication connector (CN-446) : Open
- Engine Key switch : ON position
- No Engine RPM signal : 0 mim^{-1}

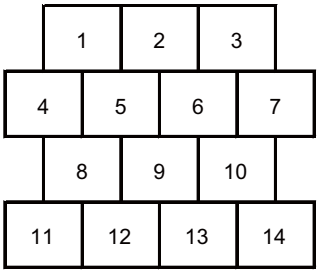
Note

If the diagnosis lamp will not be lit up with the above conditions, inspect and repair the lamp or other relating parts.

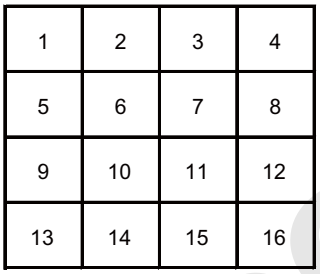
10.1.17 ENGINE ECU

ECU TERMINAL NUMBER

Engine sub harness connector no.
Connector A : Respond connector : CN-614

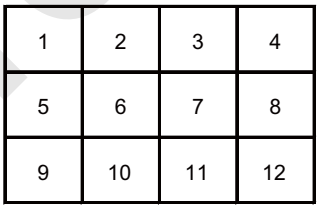


Connector B: Respond connector :CN-615

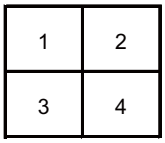


Connector C: Respond connector :CN-635

Connector D: Respond connector :CN-616

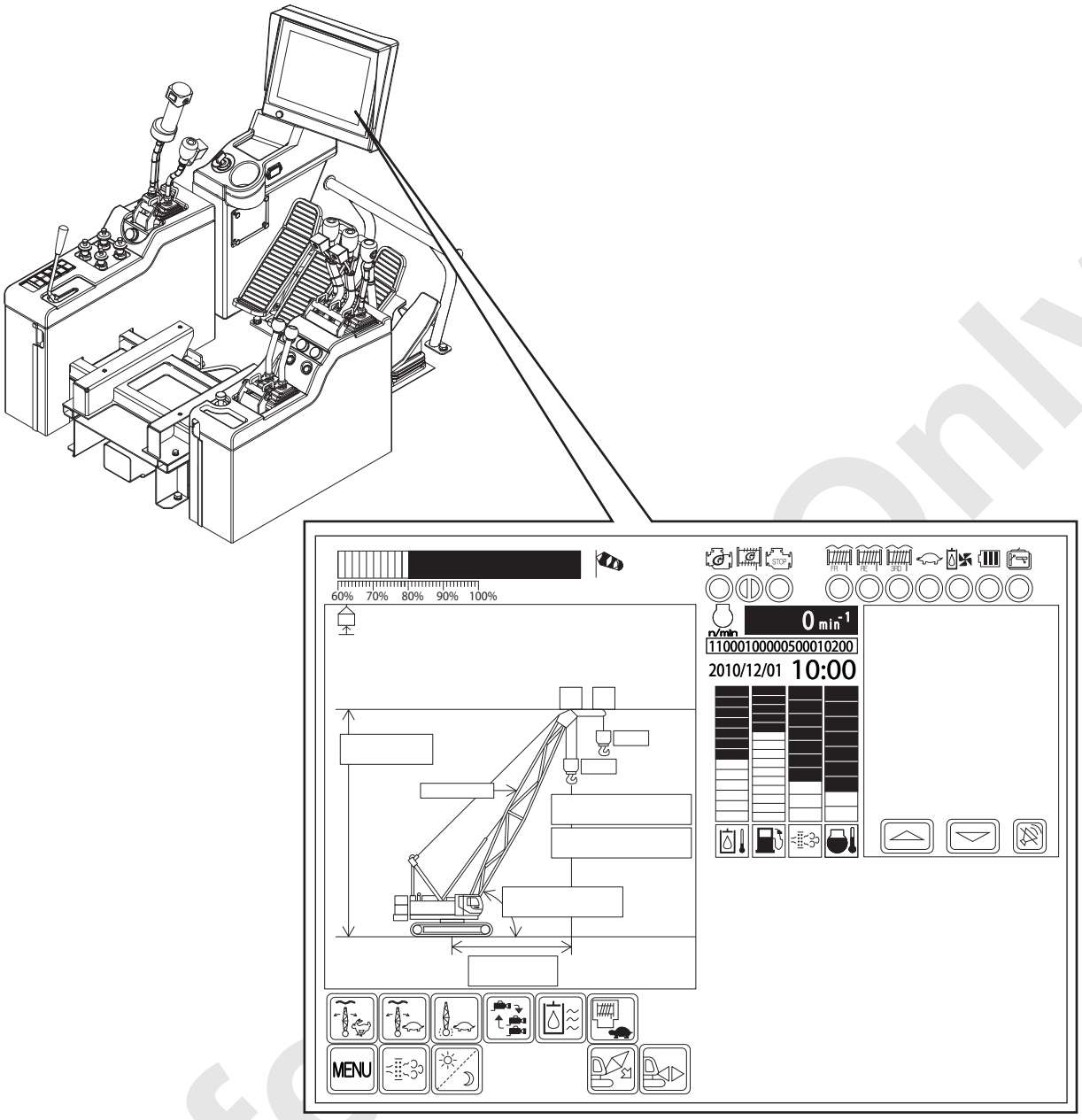


Connector E: Respond connector :CN-638



Connector A			Connector B			Connector C			Connector D			Connector E		
Terminal NO	Ter. symbol	Content	Terminal NO	Ter. symbol	Content	Terminal NO	Ter. symbol	Content	Terminal NO	Ter. symbol	Content	Terminal NO	Ter. symbol	Content
1	VNTV EGRV +BF1 +BF2	VNT･EGR Power	1	-	-	1	-	Grow plug	1	THA+	AFM･intake air temp sensor signal	1	GRL	Grow lamp
2	VB1～4	ECU main power	2		ALT･L	2	-	-	2	AGD5	AFM･intake air temp sensor GND	2	-	-
3	ADG7	Work accel sensor GND	3	ST	Starter SW	3	-	-	3	AFVB	AFM power	3	-	-
4	NUSW CLSW	Neutral SW Clutch SW	4	PTO	Work accel sensor SW	4	-	-	4	AGD6	AFMGND	4	-	-
5	SSWS SWSS	Key SW Key SW-Spare	5	DPF	DPR LT	5	-	-	5	ADG9	Press. Diffrence GND	5	-	-
6	GRY1	Heater relay	6	DPSW	DPR SW	6	-	-	6	EXPS	Pressure difference signal	6	-	-
7	BATT	Battery	7		ALT･R	7	-	-	7	AVC5	Pressure difference sensro power	7	-	-
8	ASCS	Work accel sensor signal	8	MRL1 MRL2	ECU Main relay	8	-	-	8	AFSI	AFM Signal	8	-	-
9	-	-	9		-	9	-	-	9	ADG0	Exhaust air temp sensor 1 GND	9	-	-
10	IS0K	Daig connector signal	10	CANIH	CAN HIGH	10	-	-	10	ET3+	Exhaust air temp sensor 1 signal	10	-	-
11	OIL+	Hyd press. SW	11	CAN1L	CAN LOW	11	-	-	11	ADG0	Exhaust air temp sensor 2 GND	11	-	-
12	VNTG EGRV CGD1 CGD2	VNT･EGR GND	12	STOP	Engine stop ｀SW	12	-	-	12	ET4+	Exhaust air temp sensor 2 signal	12	-	-
13	PGD1 to 4	Power GND	13	ADG8	Accel sensor2GND	13	-	-	13	-	-	13	-	-
14	-	ALT･P	14	ACS2	Accel sensor2signal	14	-	-	14	-	-	14	-	-
15	-	-	15	ADG7	Accel sensor1GND	15	-	-	15	-	-	15	-	-
16	-	-	16	ACS1	Accel sensor1signal	16	-	-	16	-	-	16	-	-

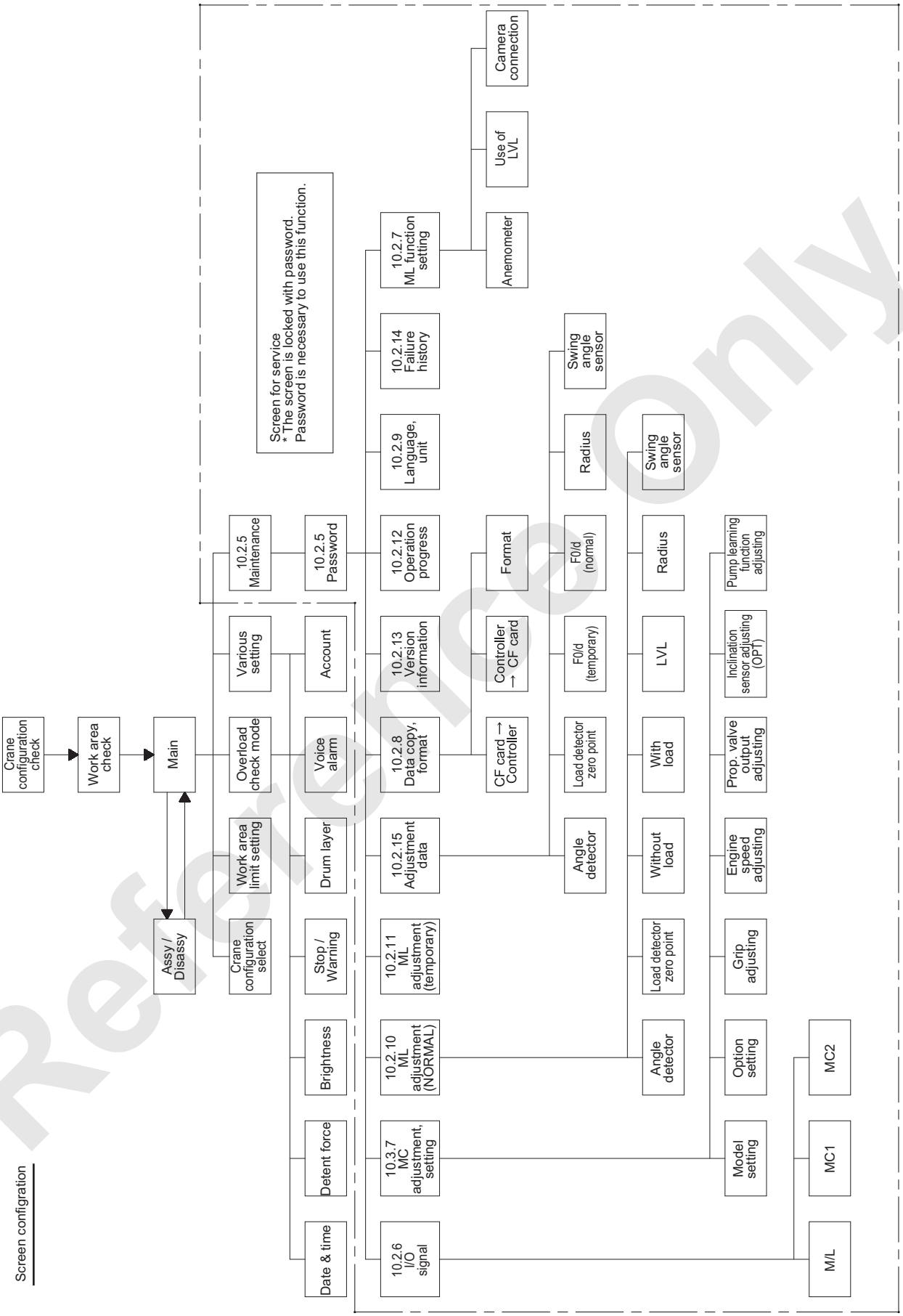
10.2 LOAD SAFETY DEVICE



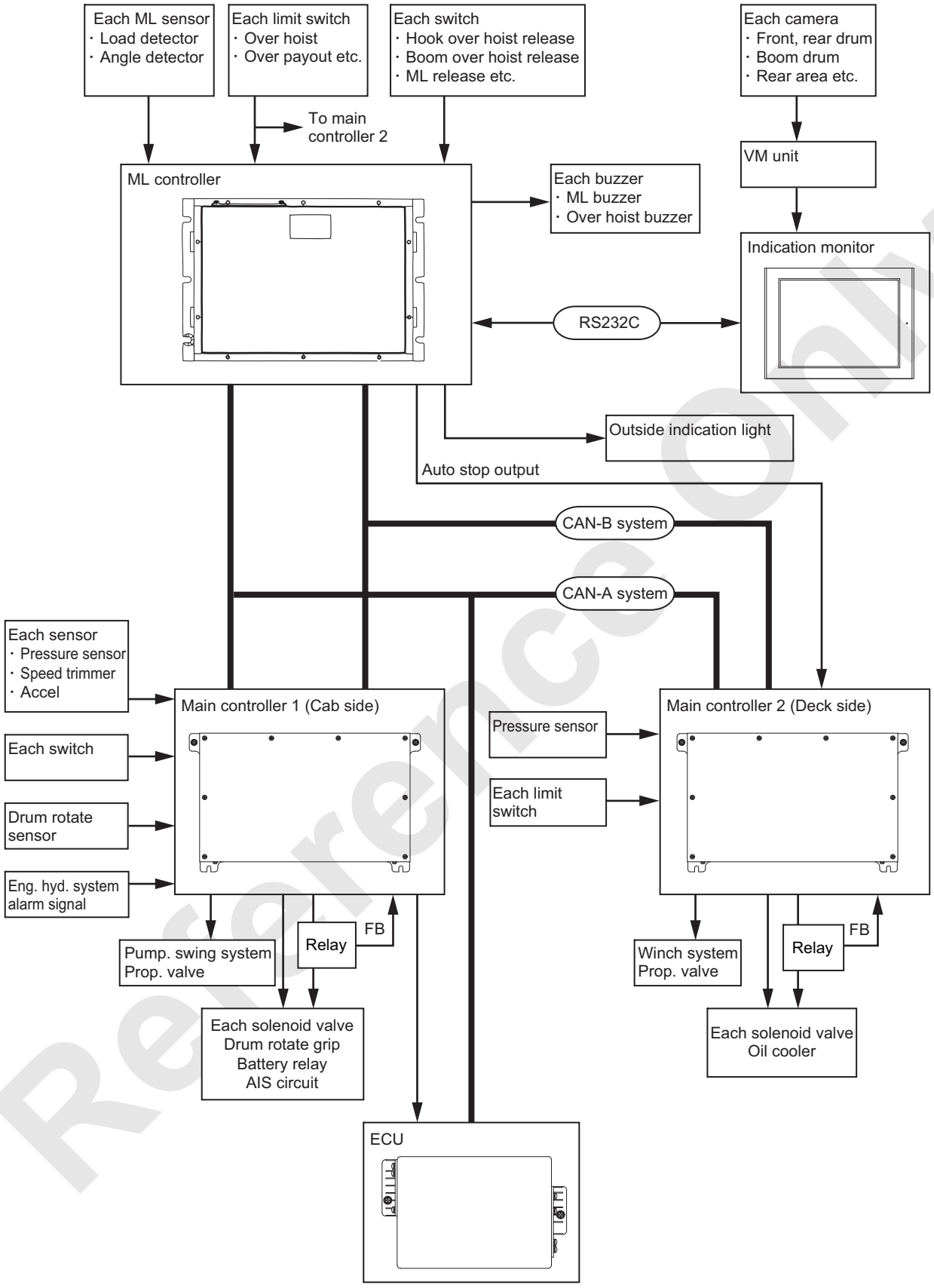
CAUTION

All values in the figure are for reference only.

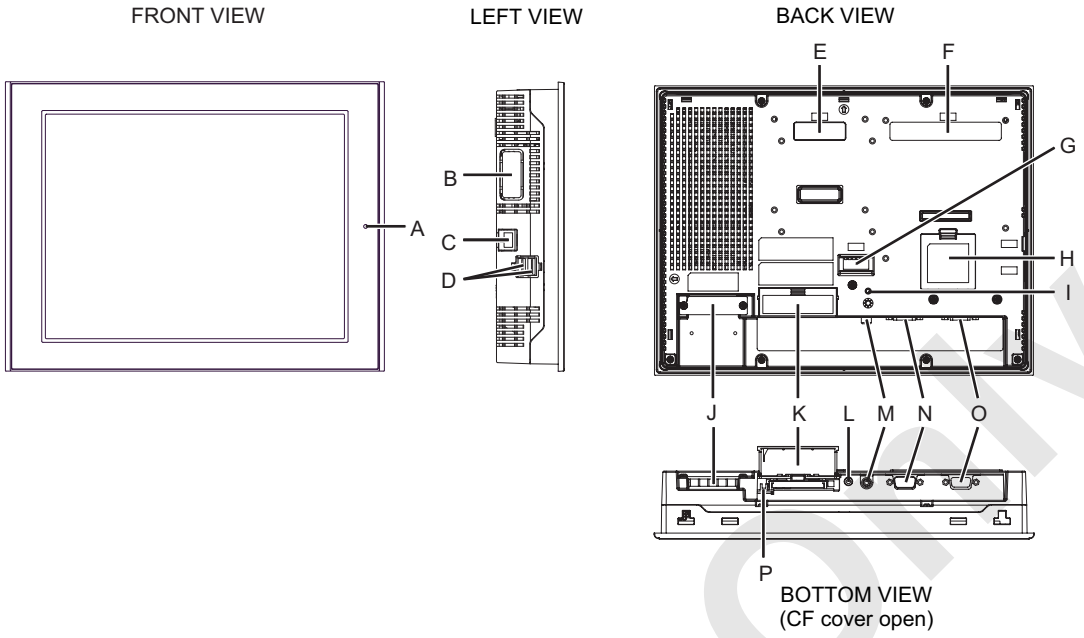
10.2.1 CONFIGURATION OF SCREENS



10.2.2 SYSTEM DAIGRAM



10.2.3 MONITOR INDICATION



	Name	Explanation
A	STATUS LED	<table><tr><th>Color</th><th>Indication</th><th>Operation mode (pictorial)</th><th>Logic motion mode (when logic is effective)</th></tr><tr><td rowspan="3">Green</td><td rowspan="2">ON</td><td>Off line</td><td>-</td></tr><tr><td>Running</td><td>RUN</td></tr><tr><td>Flashing</td><td>Running</td><td>STOP</td></tr><tr><td rowspan="2">Red</td><td>ON</td><td colspan="2">At power ON</td></tr><tr><td>Flashing</td><td>Runnning</td><td>Major abnormal</td></tr><tr><td rowspan="2">Orange</td><td>ON</td><td colspan="2">Backlight bulb is blown or main machinery failure *1</td></tr><tr><td>Flashing</td><td colspan="2">Software is being started.</td></tr></table> * 1. Backlight replacement needs returning to manufacturer.
B	Extended unit interface (EXT)	For installation of extended unit (Transmission function) * not used
C	Ethernet interface (LAN)	10BASE-T / 100BASE-TX RJ-45 type modular jack connector (8 pole) * not used
D	USB Host interface (USB)	2 port. USB 1.1 correspond Type A Voltage DC5V ± 5%, Output current : 500mA (Max) Max transmission distance 5m * not used
E	Extended unit interface 1 *1	For installation of extended unit (Transmission function) * not used
F	VM unit interface 1 *1	This is to connect VM unit when camera is to be connected.

	Name	Explanation
G	Aux. input/output / Voice output interface (AUX)	Outside reset, alarm output, buzzer output, sound output. * not used
H	Extended memory interface	* not used
I	CF card access	Green light is ON when CF card is inserted and cover is closed or CF card is being accessed. <M EM O> · Do not insert or take out CF card when LED lamp is ON Otherwise data in the CF card may be destroyed.
J	Power supply connector	DC model : Connector (socket) type
K	CF card cover	-
L	Audio input interface (L-IN / MIC)	This is to connect microphone. Minijack connector (φ 3.5 mm) * not used
M	Video input interface (V-IN)	NTSC (59.9Hz) / PAL (50Hz) type correspnd RCA connector (75Ω) * not used
N	Serial interface (COM1)	D-SUB9 pin plug type,RS232C. This is used for transmission to ML
O	Serial interface (COM2)	D-SUB9 pin socket type. Corespond to RS422 / RS485. * not used
P	Dip Swtich	In the CF card cover. * not used

GENERAL SPECIFICATION

- ELECTRICAL SPECIFICATION

		DC model
Power supply	Rated voltage	DC24V
	Voltage range	DC19.2 to 28.8V
	Allowable instant power outage time	10ms or less
	Power consumption	DC24V 2.08A or less (TYP 1.30A)
	Inrush current	30A or less
Dielectric stregth		AC1000V 20mA 1 minute (between charging terminal and FG terminal)
Insulating resistance		DC500V, more than 10MΩ (between charging terminal and FG terminal)

- Environmental specification

Physical environment	Atmospheric temp for use	0 to 50℃ (32 to 122°F) *1
	Atmospheric temp for storing	-20 to +60℃ (-4 to 140°F)
	Atmospheric humidity for use	10 to 90%RH (No condensation. Wet bulb temp 39℃ (102°F) or lower.
	Atmospheric humidity for storing	10 to 90%RH (No condensation. Wet bulb temp 39℃ (102°F) or lower.
	Dust	0.1mg/m^3 or less (No conductive dust)
	Contamination	Contamination degree 2

*1 As for STN color LCD equipped model, long time use under ambient tenperature higher than 40 degrees C may cause indication quality lowering such as contrast.

- Installation specification

Condition	Ground	Functional grounding : D type ground (for both SG-FG)
	Construction *1	Protection : IP65f equivalent NEMA #250 TYPE 4X/13 (Front surface at panel built in.) Shape : Built in type Installation method : Panel built in.
	Cooling type	Natural cooling

*1 Protective construction of the front area when this unit is installed in the panel. Adaptability has been checked under these conditions but it does not necessary gurantee use under all environmental conditions. Even the oil specified in the test may cause oil ingress due to sheet peeling off of the front area if this unit is exposed in such oil in sprayed condition for long time or exposed in extreamly low viscosity machine oil. In such case, some other countermeasure may become necessary. Use of non specified oil may cause same oil ingress or plastic deterioration. Check environmental condition in adavance before use. Drip proof packing used for long time or resued drip proof packing once installed on the panel has dirt or flaw and may not be good for protection. Periodical replacement of drip proof packing is recommended.

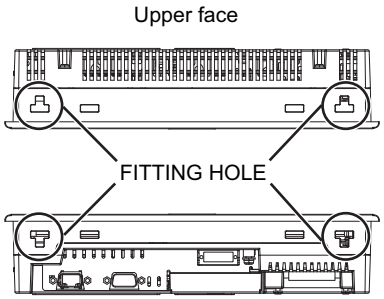
OUTER INTERFACE

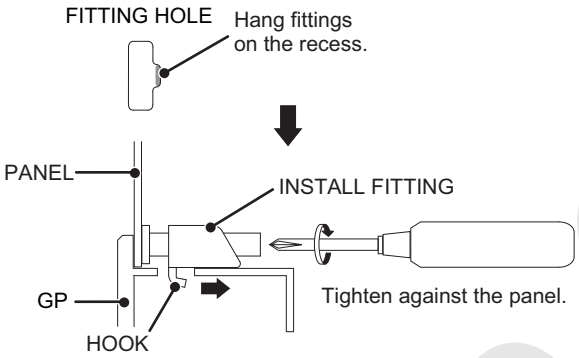
- COM1 (Used for transmission to ML)

Recommended connector in cable side	XM2D-0901 Omron
Recommended jack screw	XM2Z-0073 Omron
Recommended cover	XM2S-0913 Omron
Caulking fix fitting	#4-40 (UNC)

Pin No.	RS232C	
	Signal	Content
1	CD	Carrier detect
2	RD (RXD)	Received data
3	SD (TXD)	Transmitted data
4	ER (DSR)	Data terminal ready
5	SG	Signal ground
6	DR (DSR)	Data set ready
7	RS (RTS)	Transmission request
8	CS (CTS)	Transmission permit
9	CI (RI) / (VCC)	Indication +5V ± 5% output 0.25A *1

- INSTALLATION PROCEDURE





CAUTION

Overtightening the screws may damage the GP.
Proper tightening torque for drip proof effect is 0.5 N-m.

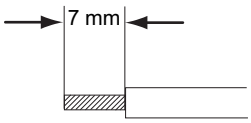
POWER SUPPLY WIRING

WARNING

Electric shock may be caused. Ensure to connect under power supply is disconnected.
Do not supply other than specified voltage. Otherwise main body may be damaged.
Ensure to connect FG terminal to earth. Otherwise electric shock may be caused in case of failure.
Failure to observe these precautions may result in serious injuries or loss of life.

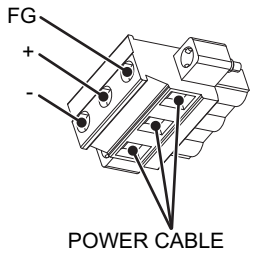
- Power cable specification

Use copper core wire.

Size of power cable	0.75 to 2.5mm^2 (18 - 12 AWG)
Core wire	Solid or strand wire *1
Core wire length	

*1 If strand wire is used, ensure that the core wire is properly stranded.
Otherwise shortening may occur by strand touching the adjacent terminal.

- Power supply connector (plug) specification



+	24V
-	0V
FG	Ground terminal connected to GP body.
	* Not used

Note

Power supply connector is DIGITAL CA5-DCCNL-01 or PHOENIX-CONTACT GMVSTBW2, 5/3-STF-7, 62.

Use wiring material as shown below.
These are all product of PHOENIX- CONTACT.

Recommended screw driver	SZF 1-0.6 X 3.5 (1204517)
Recommended terminal	AI 0.75-8GY (3200519)
	AI 1-8RD (3200030)
	AI 1.5-8BK (3200043)
	AI 2.5-8BU (3200522)
Recommended crimping tool for terminal	CRIMPFOX ZA 3 (1201882)

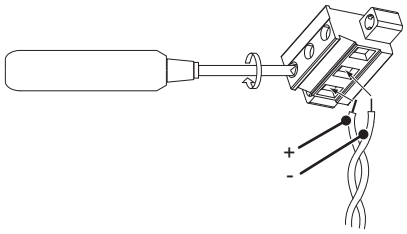
- Procedure of power cable connection

1. Ensure that the power is disconnected.
2. Take out the power supply connector (plug) from the main body.
3. Loosen the 3 screws in the center of power supply connector.
4. Peel off the sheath of the power supply cable and twist the strand wire and insert into rod terminal and crimp.
   Install it to the connecting points.
5. Secure them with screws.

CAUTION

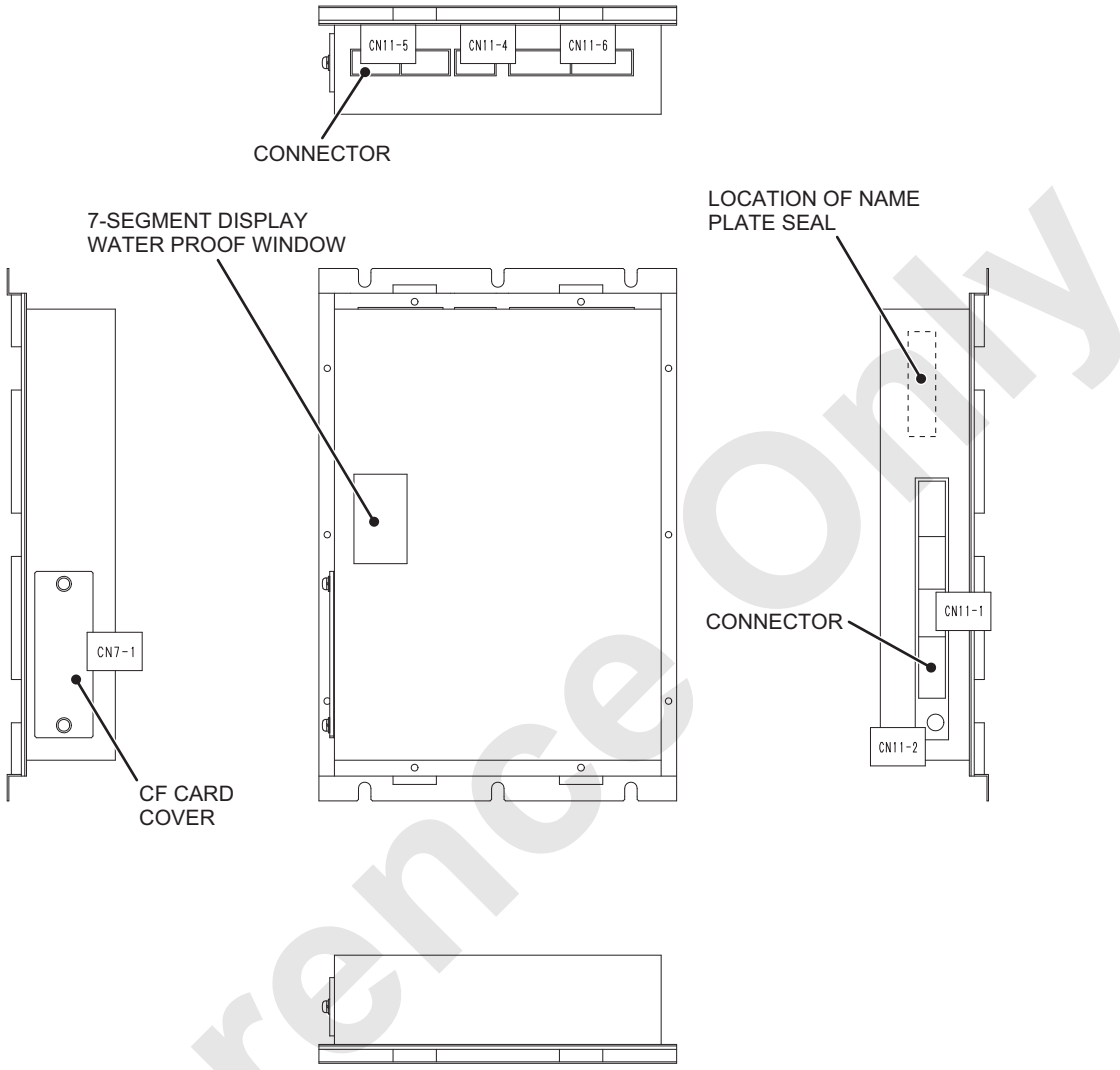
When tightening the terminal screw, use flat head screw driver (Size 0.6 X 3.5).
Tightening torque is 0.5 to 0.6 N-m.
Do not solder on cable connection point.
Otherwise extreme heat may cause failure of fire.

6. Install the power supply cable to GP and secure it to GP body with left and right power supply connector securing screws.



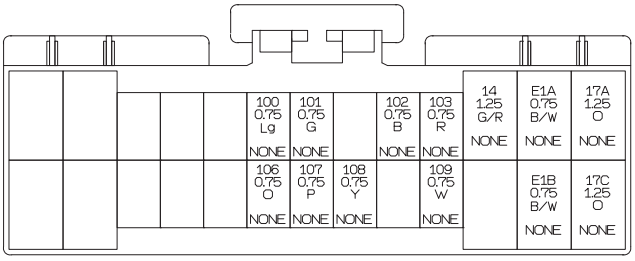
10.2.4 DETAIL OF MOMENT LIMITER CONNECTOR

1. Outside view and connector layout

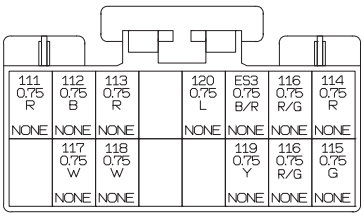


- CF card contains the adjusted data as backup. When replacing the ML controller, ensure to re-insert the original CF card and copy the backup data to the controller.

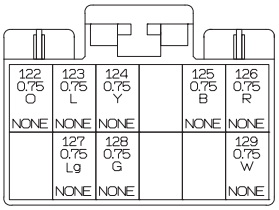
2. ML controller connector pin layout
   (View from main machinery harness)



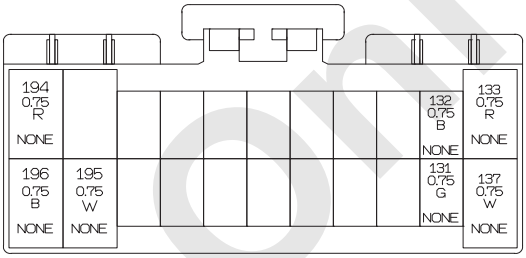
CN-11-1AF



CN-11-1BF



CN-11-1CF

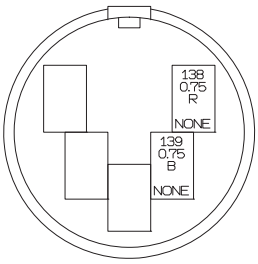


CN-11-1DF

Connector No.	Pin No.	Name	Wire No.	Wire color	Specification
CN-11-1A	1	Control power (+)	17A	O	Main power (IG power +)
	6	Control power (+)	17C	O	Main power (IG power +)
	2	Control power (-)	E1A	B/W	Main power (IG power GND)
	7	Control power (-)	E1B	B/W	Main power (IG power GND)
	3	Backup power (+)	14	G/R	Sub power (+B power +)
	8	Backup power (GND)	E	BW	Sub power (+B power GND)
	17	Load detector (for crane) power (+)	103	R	12V load detecting power -1 (+)
	25	Load detector (for crane) signal	109	W	12V load detecting signal -1 (0 to 6.2V)
	18	Load detector (for crane) power (-)	102	B	12V load detector power (GND)
	26				12V load detector signal -2 (0 to 6.2V)
	19				12V load detector power -2 (+)
	27	Load detector (for jib) power (+) (Not used)	108	Y	12V load detector power -3 (+)
	20	Load detector (for jib) signal (Not used)	101	G	12V load detecting signal -3 (0 to 6.2V)
	28	Load detector (for jib) power (-) (Not used)	107	P	12V load detector power (GND)
	21				12V load detecting signal -4 (0 to 6.2V)
	29				12V load detector power -4 (+)
	22				12V load detector power -5 (+)
	30				12V load detecting signal -5 (0 to 6.2V)
	23				12V load detector power (GND)
	31				12V load detecting signal -6 (0 to 6.2V)
	24				12V load detector power -6 (+)
	32				12V load detector power -7 (+)
	4				12V load detecting signal -7 (0 to 6.2V)
	9				12V load detector power (GND)
	5				12V load detecting signal -7 (0 to 6.2V)
	10				12V load detector power -8 (+)

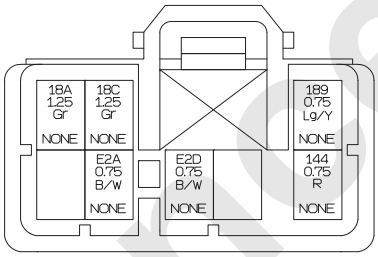
Connector No.	Pin No.	Name	Wire No.	Wire color	Specification
CN-11-1B	33	Inter main controller transmission 1 (H)	114	R	CAN0 H
	41	Inter main controller transmission 1 (L)	115	G	CAN0 L
	34	Inter main controller transmission 1 (H end)	116	R/G	CAN0 H end
	42	Inter main controller transmission 1 (L end)	116	R/G	CAN0 L end
	35	Shield earth	ES3	B/R	Shield earth signal ground
	43	Inter main controller transmission 2 (H)	119	Y	CAN1 H
	36	Inter main controller transmission 2 (L)	120	L	CAN1 L
	44				CAN1 H end
	37				CAN1 L end
	45				Shield earth signal ground
	38	Boom angle detector power (+)	113	R	12V ML system sensor power 1-1 (+)
	46	Boom angle detector signal	118	W	12V ML system sensor signal 1-1 (0 to 12V)
	39	Boom angle detector power (GND)	112	B	12V ML system sensor power 1 (GND)
	47				12V ML system sensor signal 1-2 (0 to 12V)
	40				12V ML system sensor power 1-2 (+)
	48	vacant			vacant
CN-11-1C	49	Crane mast angle detector power (+) (Not used)	126	R	12V ML system sensor power 1-3 (+)
	55	Crane mast angle detector signal (Not used)	129	W	12V ML system sensor power 1-3 (0 to 12V)
	50	Crane mast angle detector power (GND) (Not used)	125	B	12V ML system sensor power 1 (GND)
	56				12V ML system sensor signal 1-4 (0 to 12V)
	51				12V ML system sensor signal 1-4 (+)
	57	vacant			vacant
	52	Jib angle detector power (+)	124	Y	12V ML system sensor power 2-1 (+)
	58	Jib angle detector signal (OPT)	128	G	12V ML system sensor signal 2-1 (0 to 12V)
	53	Jib angle detector power (GND)	123	L	12V ML system sensor power 2 (GND)
	59				12V ML system sensor signal 2-2 (0 to 12V)
	54				12V ML system sensor power 2-2 (+)
	60	vacant			vacant

Connector No.	Pin No.	Name	Wire No.	Wire color	Specification
CN-11-1D	11	Swing angle detector power (+)	133	R	12V ML system sensor power 2-3 (+)
	14	Swing angle detector (A) signal	137	W	12V ML system sensor signal 2-3 (0 to 12V)
	61	Swing angle detector power (-)	132	B	12V ML system sensor power 2 (GND)
	69	Swing angle detector (B) signal	131	G	12V ML system sensor signal 2-4 (0 to 12V)
	62				12V ML system sensor power 2-4 (+)
	70				24V load detector power 2-4 (+)
	63				24V load detector signal -1 (0 to 12.5V)
	71				24V load detector power (GND)
	64				24V load detector signal -2 (0 to 12.5V)
	72				24V load detector power -2 (+)
	65				24V load detector power -3 (+)
	73				24V load detector signal -3 (0 to 12.5V)
	66				24V load detector power (GND)
	74				24V load detector signal -4 (0 to 12.5V)
	67				24V load detector signal -4 (0 to 12.5V)
	75	vacant			vacant
	68	vacant			vacant
	76	vacant			vacant
	12				RS232C (+)
	15	Inter monitor transmission (TXD)	195	W	RS232C (TXD)
	13	Inter monitor transmission (RXD)	194	R	RS232C (RXD)
	16	Inter monitor transmission (GND)	196	B	RS232C (GND)



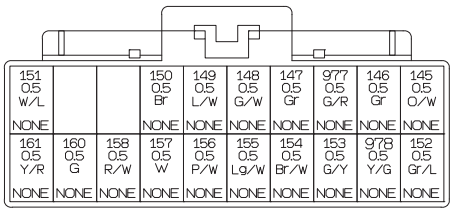
CN-11-2M

Connector No.	Pin No.	Name	Wire No.	Wire color	Specification
CN-11-2	1				Composite signal (+)
	2	vacant			vacant
	3	Camera power (+)	138	R	12V LCD monitor power (+)
	4				Composite signal (GND)
	5	Camera power (GND)	139	B	12V LCD monitor power (+GND)

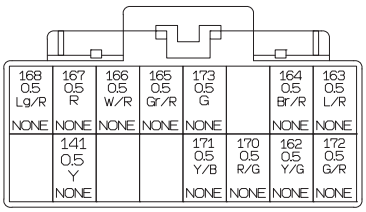


CN-11-4F

Connector No.	Pin No.	Name	Wire No.	Wire color	Specification
CN-11-4	1	Output power (+)	18A	Gr	Extended 24V power (+)
	4				Extended 25V power (+)
	2	Output power (+)	18A	Gr	Extended 26V power (+)
	5	Output power (-)	E2A	B/W	Extended 24V power (GND)
	6	Output power (-)	E2D	B/W	Extended 25V power (GND)
	7				Extended 26V power (GND)
	3	Voice alarm output 4	189	Lg/Y	Ground output (0.1A)
	8	Outside indication light (Red)	144	R	Ground output (0.2A)



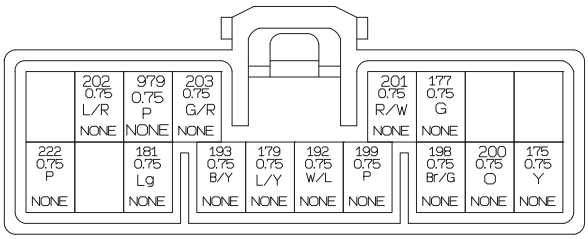
CN-11-5AF



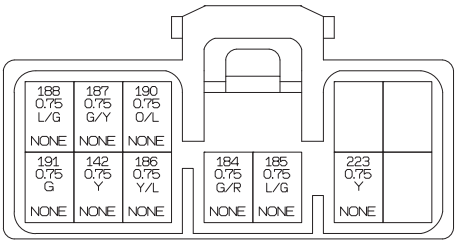
CN-11-5BF

Connector No.	Pin No.	Name	Wire No.	Wire color	Specification
CN-11-5A	1	Hook over hoist LS1	145	O/W	24V input
	2	Hook over hoist LS2	146	Gr	24V input
	3	Gantry hoist detect LS (Not used)	977	G/R	24V input
	4	Boom backstop no.2 LS	147	Gr	24V input
	5	Crane boom over hoist LS	148	G/W	24V input
	6	Boom backstop no.1 LS	149	L/W	24V input
	7	Jib over hoist LS	150	Br	24V input
	8	Crane mast over lower LS (Not used)			24V input
	9	HL mast over hoist LS (Not used)			24V input
	10	Strut over hoist LS (Not used)	151	W/L	24V input
	11	Strut over lower LS (Not used)	152	Gr/L	24V input
	12	Mast cylinder position detect LS (Not used)	978	Y/G	24V input
	13	TW jib bending prevent LS (Not used)	153	G/Y	24V input
	14	Latch (engage) LS (Not used)	154	Br/W	24V input
	15	Latch (disengage) LS (Not used)	155	Lg/W	24V input
	16	Over payout prevent LS (front)	156	P/W	24V input
	17	Over payout prevent LS (rear)	157	W	24V input
	18	Over payout prevent LS (third)	158	R/W	24V input
	19	Main controller 1 bypass SW	160	G	24V input
	20	Main controller 2 bypass SW	161	Y/R	24V input

Connector No.	Pin No.	Name	Wire No.	Wire color	Specification
CN-11-5B	21	Drum select SW (rear)	163	L/R	24V input
	22	Drum select SW (front)	164	Br/R	24V input
	23				24V input
	24	Download start signal	173	G	24V input
	25	Master key SW	165	Gr/R	24V input
	26	Hook over hoist release SW	166	W/R	24V input
	27	Boom/Jib over hoist release SW	167	R	24V input
	28	Moment limiter release SW	168	Lg/R	24V input
	29	CEN spec. distinct signal	172	G/R	Ground input (330Ω)
	30	Simultaneous control permit signal	162	Y/G	Ground input (330Ω)
	31	Adjustment permit signal	170	R/G	Ground input (4.7kΩ)
	32	Program rewrite permit signal	171	Y/B	Ground input (4.7kΩ)
	33	vacant			vacant
	34	vacant			vacant
	35	Wind speed sensor	141	Y	Pulse input (+)
	36				Pulse input (-)



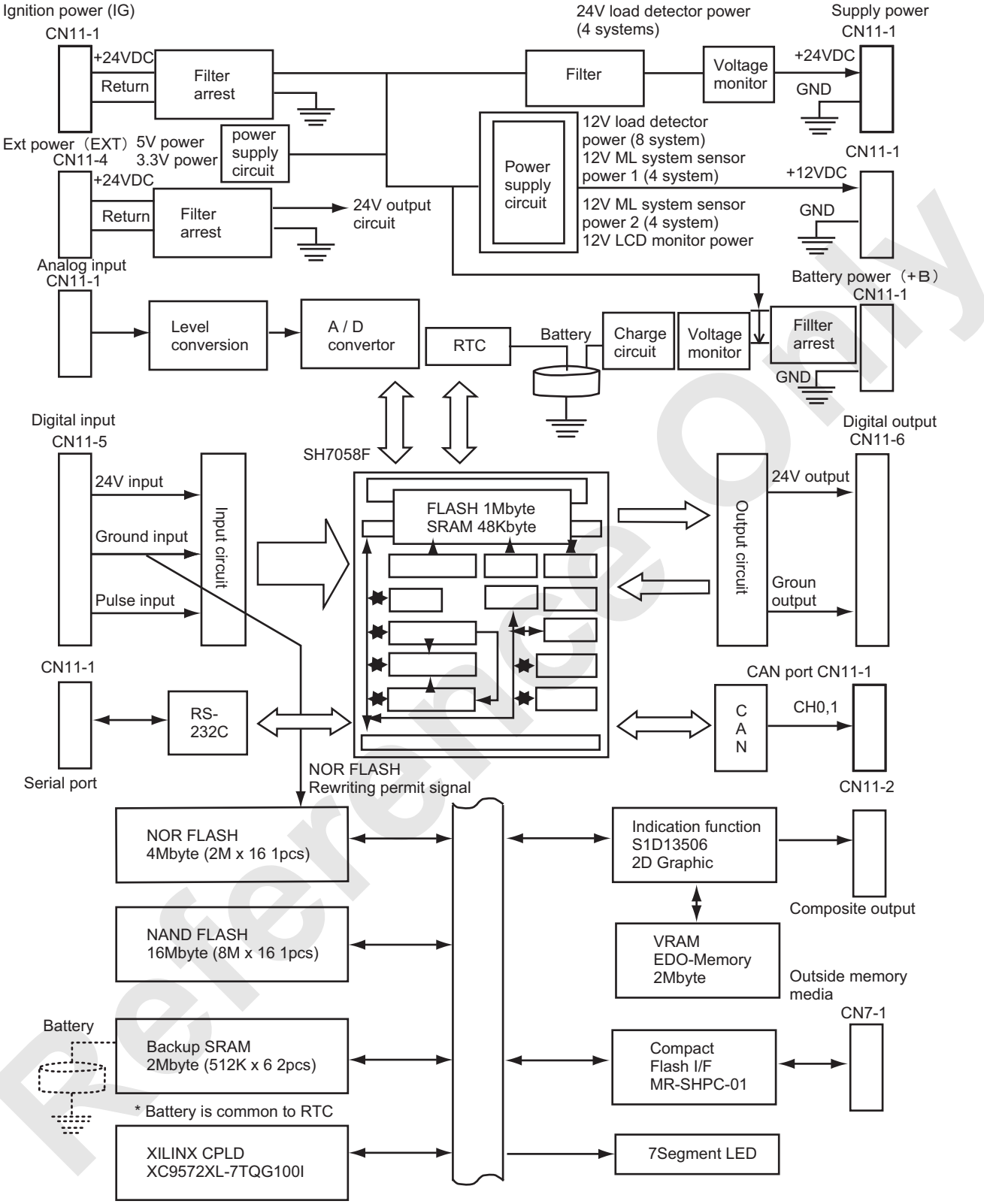
CN-11-6AF



CN-11-6BF

Connector No.	Pin No.	Name	Wire No.	Wire color	Specification
CN-11-6A	13				24V Output
	30	Front drum raise stop	175	Y	24V Output
	12				24V Output
	29	Front drum lower stop	200	O	24V Output
	11	Rear drum raise stop	177	G	24V Output
	28	Mode select (luffing jib)	198	Br/G	24V Output
	10	Rear drum lower stop	201	R/W	24V Output
	27	Mode select (mast)	199	P	24V Output
	26	Mode select (assy/disassy)	192	W/L	24V Output
	25	Third drum raise stop	179	L/Y	24V Output
	24	Mode select (self removal)	193	B/Y	24V Output
	9	Third drum lower stop	203	G/R	24V Output
	8	Outside indication light (buzzer)	979	P	24V Output
	23	Boom drum raise stop	181	Lg	24V Output
	7	Boom drum lower stop	202	L/R	24V Output
	22				24V Output
	6				24V Output
	21	Mast bending prevent signal	222	P	24V Output
CN-11-6B	5				24V Output
	20				24V Output
	4				24V Output
	19	Operator authenticate signal	223	Y	24V Output
	18	Overload buzzer	185	L/G	24V Output
	17	Over hoist buzzer	184	G/R	24V Output
	3	Voice alarm output 5	190	O/L	Ground output (0.1A)
	16	Voice alarm output 1	186	Y/L	Ground output (0.1A)
	2	Voice alarm output 2	187	G/Y	Ground output (0.1A)
	15	Outside indication light (yellow)	142	Y	Ground output (0.1A)
	1	Voice alarm output 3	188	L/G	Ground output (0.1A)
	14	Outside indication light (green)	191	G	Ground output (0.1A)

3. System block diagram



4. ML INPUT/OUTPUT

(1) ANALOGUE INPUT [A]

No.	Name	Variation	Input Voltage	Remarks
1	Crane boom load detector	0t to rated t	1 to 5V	CN11-1-25
2	Spare	↑	↑	CN11-1-26
3	Jib load detector	↑	↑	CN11-1-20
4	Spare	↑	↑	CN11-1-21
5	Spare	↑	↑	CN11-1-30
6	Spare	↑	↑	CN11-1-31
7	Spare	↑	↑	CN11-1-4
8	Spare	↑	↑	CN11-1-5
9	Boom base angle detector	-150 to +150°	0.4 to 11.6V	CN11-1-46
10	Spare	↑	↑	CN11-1-47
11	Crane mast angle detector	↑	↑	CN11-1-55
12	Spare	↑	↑	CN11-1-56
13	Jib base angle detector	↑	↑	CN11-1-58
14	Spare	↑	↑	CN11-1-59
15	Swing angle detector A	0° to 180°	0 to 12V	CN11-1-14
16	Swing angle detector B	↑	0 to 12V	CN11-1-69
17	Spare		0 to 12.5V	CN11-63
18	Spare		0 to 12.5V	CN11-64
19	Spare		0 to 12.5V	CN11-73
20	Spare		0 to 12.5V	CN11-74
21				
22				
23				

(2) PULSE INPUT (BREAK IN) [E]

No.	Name	Condition	Signal level	Remarks
1	Anemometer		GND/OPEN	CN11-5-35

(3) DIGITAL INTPUT [B]

No.	Name	Condition	Signal level	Remarks
1	Hook over hoist LS1	Normal / Over	+24V/OPEN	CN11-5-1
2	Hook over hoist LS2	Normal / Over	+24V/OPEN	CN11-5-2
3	Gantry raise detect LS	Not detect / Detect	+24V/OPEN	CN11-5-3
4	Boom B/S No.2 LS	Normal / Over	+24V/OPEN	CN11-5-4
5	Crane boom over hoist LS	Normal / Over	+24V/OPEN	CN11-5-5
6	Boom B/S No.1 LS	Normal / Over	+24V/OPEN	CN11-5-6
7	Jib over hoist LS	Normal / Over	+24V/OPEN	CN11-5-7
8	Crane mast over lower LS	Normal / Over	+24V/OPEN	CN11-5-8
9	Spare		+24V/OPEN	CN11-5-9
10	Spare		+24V/OPEN	CN11-5-10
11	Spare		+24V/OPEN	CN11-5-11
12	Mast cylinder LS	Not detect / Detect	+24V/OPEN	CN11-5-12
13	TW jib bending prevent LS	Ground / Normal	+24V/OPEN	CN11-5-13
14	Latch (engage) LS	Engage / Normal	+24V/OPEN	CN11-5-14
15	Latch (disengage) LS	Disengage / Normal	+24V/OPEN	CN11-5-15
16	Over payout prevent (Raise No.1)	Normal / Over	+24V/OPEN	CN11-5-16
17	Over payout prevent (Raise No.2)	Normal / Over	+24V/OPEN	CN11-5-17
18	Over payout prevent (Raise No.3)	Normal / Over	+24V/OPEN	CN11-5-18
19	MC1 bypass SW	Bypass / Normal	+24V/OPEN	CN11-5-19
20	MC2 bypass SW	Bypass / Normal	+24V/OPEN	CN11-5-20
21	Drum select (raise 2) CEN	Select / Not select	+24V/OPEN	CN11-5-21
22	Drum select (raise 1) CEN	Select / Not select	+24V/OPEN	CN11-5-22
23			+24V/OPEN	CN11-5-23
24	DL start SW	Start / Normal	+24V/OPEN	CN11-5-24
25	Master key	Release / Normal	+24V/OPEN	CN11-5-25
26	Hook over hoist release	Release / Normal	+24V/OPEN	CN11-5-26
27	Boom over hoist release	Release / Normal	+24V/OPEN	CN11-5-27
28	ML release	Release / Normal	+24V/OPEN	CN11-5-28
29	CEN spec. recognize signal	CEN / Normal	GND/OPEN	CN11-5-29
30	Simultaneous operate permit	Permit & CEN / Normal	GND/OPEN	CN11-5-30
31	For adjusting	Adjusting / Normal	GND/OPEN	CN11-5-31
32	For program rewriting	Rewrinting / Normal	GND/OPEN	CN11-5-32

(4) ANALOGUE OUTPUT [H]

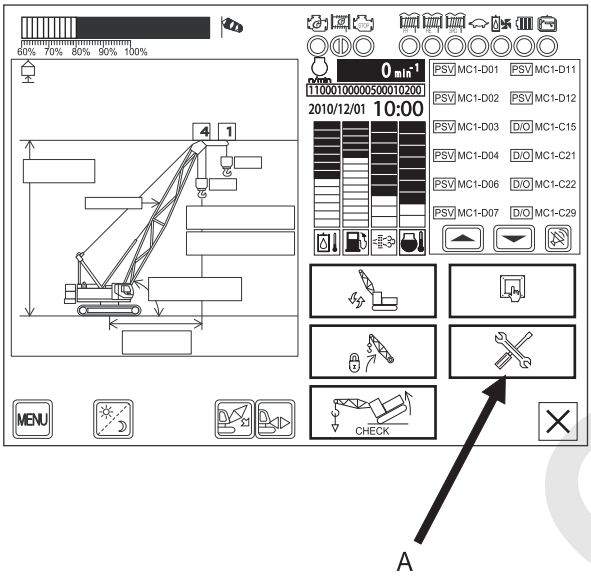
No.	Name	Condition	Signal level	Remarks
1				
2				

(5) DIGITAL OUTPUT [C]

No.	Name	Condition	Signal level	Remarks
1	Front drum raise stop	Actuate / Normal	+24V/OPEN	CN11-6-30
2	Front drum lower stop	Actuate / Normal	+24V/OPEN	CN11-6-29
3	Rear drum raise stop	Actuate / Normal	+24V/OPEN	CN11-6-11
4	Rear drum lower stop	Actuate / Normal	+24V/OPEN	CN11-6-10
5	Third (jib) drum raise stop	Actuate / Normal	+24V/OPEN	CN11-6-25
6	Third (jib) drum lower stop	Actuate / Normal	+24V/OPEN	CN11-6-9
7	Boom drum raise stop	Actuate / Normal	+24V/OPEN	CN11-6-23
8	Boom drum lower stop	Actuate / Normal	+24V/OPEN	CN11-6-7
9	Spare	Actuate / Normal	+24V/OPEN	CN11-6-6
10	Spare	Actuate / Normal	+24V/OPEN	CN11-6-20
11	Spare	Actuate / Normal	+24V/OPEN	CN11-6-13
12	Spare	Actuate / Normal	+24V/OPEN	CN11-6-12
13	Mode select (jib model)	Jib model / Except jib model	+24V/OPEN	CN11-6-28
14	Mode select (mast model)	Mast mode / Except mast model	+24V/OPEN	CN11-6-27
15	Mode select (assy,disassy)	Assy disassy / Except assy,disassy	+24V/OPEN	CN11-6-26
16	Mode select (self removal)	Self removal / Except self removal	+24V/OPEN	CN11-6-24
17	Outer indication light buzzer (red)	Actuate / Normal	+24V/OPEN	CN11-6-8
18			+24V/OPEN	CN11-6-22
19	Mast bending prevent	Actuate / Normal	+24V/OPEN	CN11-6-21
20			+24V/OPEN	CN11-6-5
21	Operator recognize signal	Actuate / Normal	+24V/OPEN	CN11-6-19
22			+24V/OPEN	CN11-6-4
23	Over hoist buzzer	Actuate / Normal	+24V/OPEN	CN11-6-17
24	Over load buzzer	Actuate / Normal	+24V/OPEN	CN11-6-18
25	Voice alarm 1	Actuate / Normal	GND/OPEN	CN11-6-16
26	Voice alarm 2	Actuate / Normal	GND/OPEN	CN11-6-2
27	Voice alarm 3	Actuate / Normal	GND/OPEN	CN11-6-1
28	Voice alarm 4	Actuate / Normal	GND/OPEN	CN11-4-3
29	Voice alarm 5	Actuate / Normal	GND/OPEN	CN11-6-3
30	Outer indication light (green)	On / Off	GND/OPEN	CN11-6-14
31	Outer indication light (yellow)	On / Off	GND/OPEN	CN11-6-15
32	Outer indication light (red)	On / Off	GND/OPEN	CN11-4-8

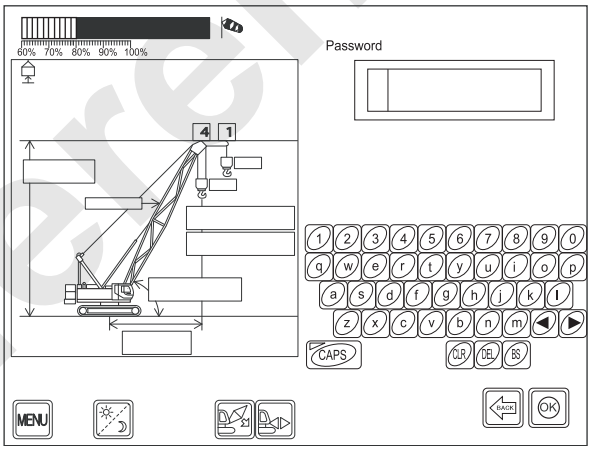
10.2.5 SHIFTING TO MAINTENANCE SCREEN

1. Push the [MENU] icon in the main screen.
2. Push [A] switch.

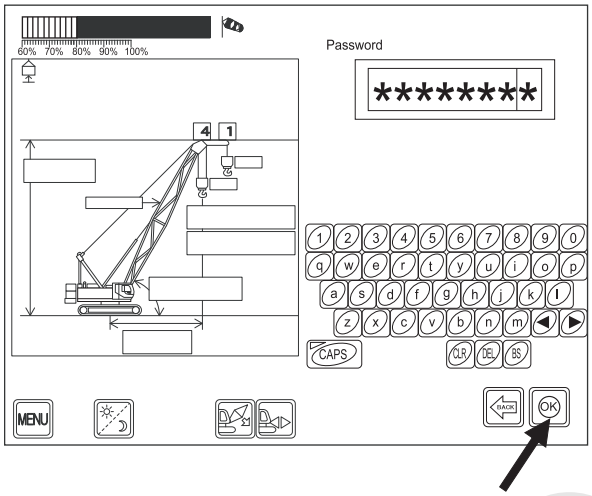


3. Input the password (8 digits) with the keyboard.
   * In case of using capital letter, push CAPS switch.

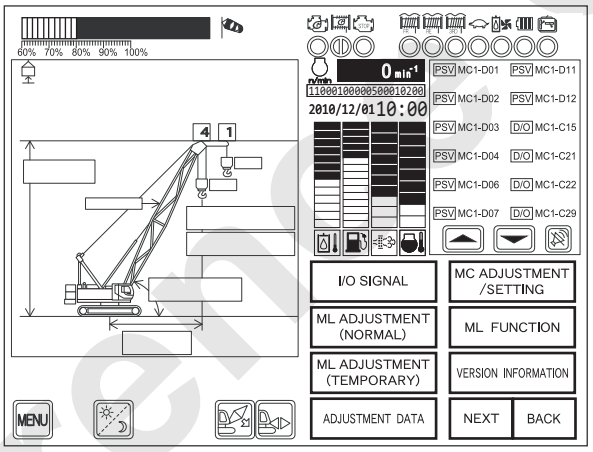
   CLR : All clear
   DEL : One letter clear
   BS : One letter clear and back

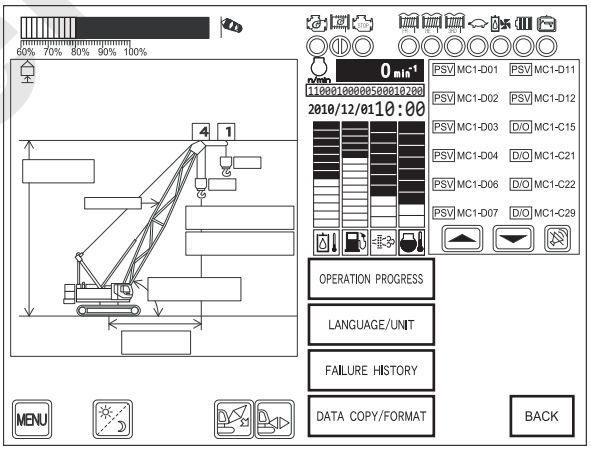


4. Push [OK] switch.



5. If password is correct, the maintenance menu becomes indicated.



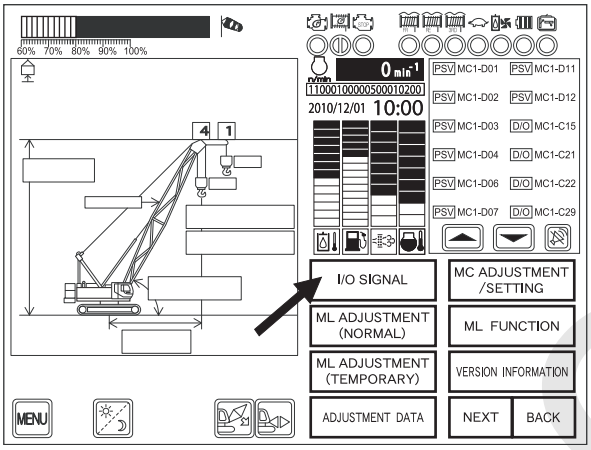


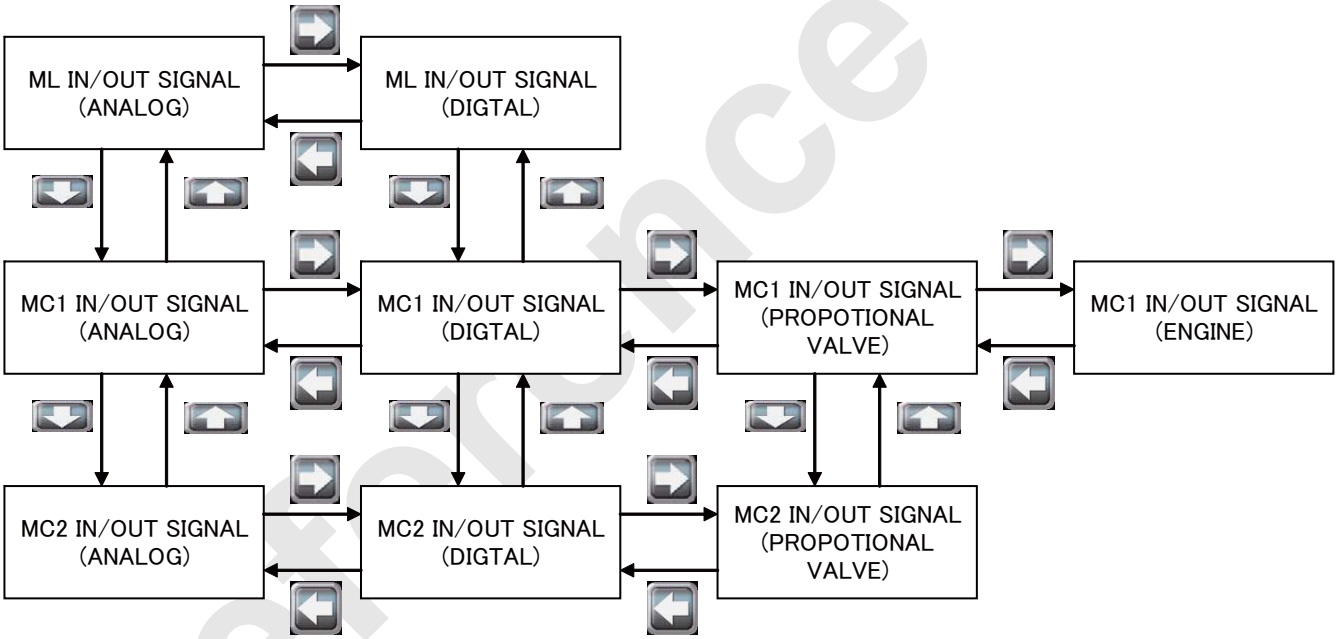
6. If password is not correct, password area blinks three times and then screen returns to 3. screen. Check the password and input again.

10.2.6 INPUT, OUTPUT SIGNAL

This screen can check input signal condition of various sensors or switches or output signal condition of solenoid valves, relays and proportional valves.

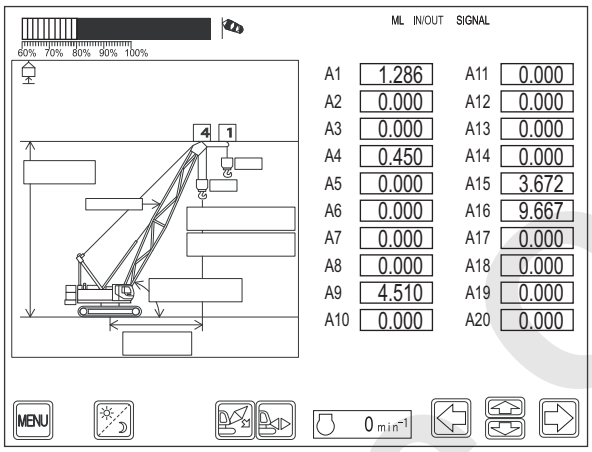
1. Push [I/O SIGNAL] in the maintenance menu.



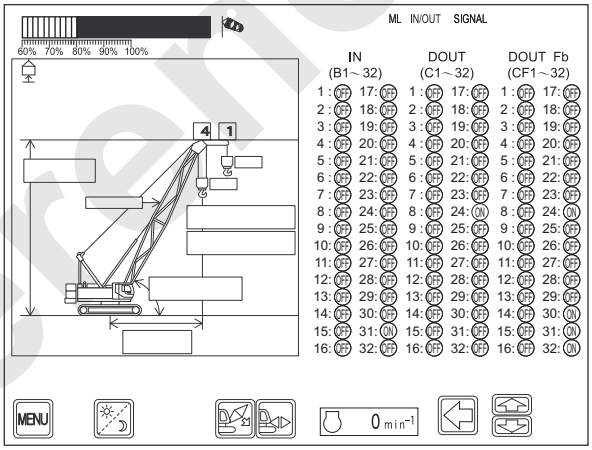


(1) INPUT, OUTPUT CHECK OF ML
(MOMENT LIMITER)

(A) Select [ML SCREEN] in the menu.
The first screen indicates condition of analog signal of the load detector, angle detector.
Unit of indicating figure is V (volt).
Refer to P.10-211 for connection and signal level.
0 V is indicated on non connected point.



(B) By pushing [NEXT], digital input and digital output become indicated.



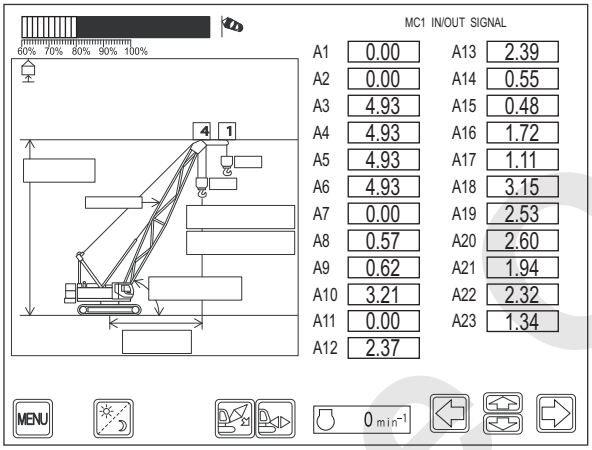
1) DIGITAL INPUT
This is indicated by "IN".
Digital input consists of 24 V input and ground (GND) input.
In 24 V input, ON is indicated at 24 V and OFF at open (0 V).
In ground input, ON is indicated at ground (GND) and OFF at open.
As for signal name and specification, refer to P.10-212.

2) DIGITAL OUTPUT
This is indicated by "DOUT".
Digital output consists of 24 V output and ground input.
In 24 V output, ON is indicated at 24 V and OFF at open (0 V).
In ground output, ON is indicated at ground (GND) and OFF at open.
As for signal name and specification, refer to P.10-213.

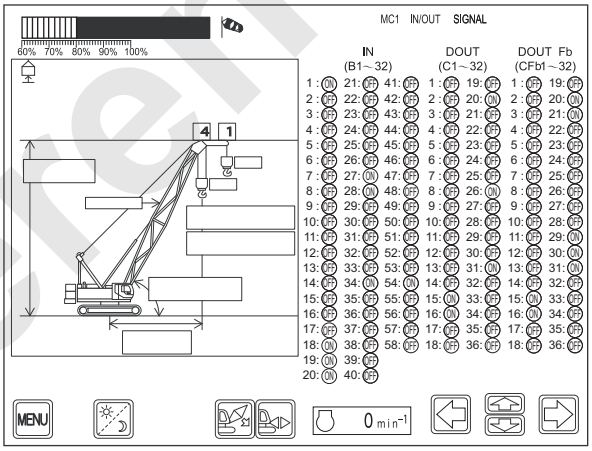
3) DIGITAL OUTPUT (FEEDBACK SIGNAL)
This is indicated by "DOUT Fb".
This is feedback signal of digital signal (DOUT) and corresponds to digital output condition.
If it does not correspond to digital signal condition, wire breakage or ground fault is presumed.

(2) INPUT, OUTPUT CHECK OF MC1 (MAIN CONTROLLER 1)

(A) Select "MC1" screen in the menu.
The first screen indicates conditions of analog signal of pressure sensors, potentiometers etc.
Unit of indicating figure is V (volt).
As for signal name and specification, refer to P.10-333.
0 V is indicated on non connected point.



(B) By pushing [NEXT], digital input and digital output are indicated.

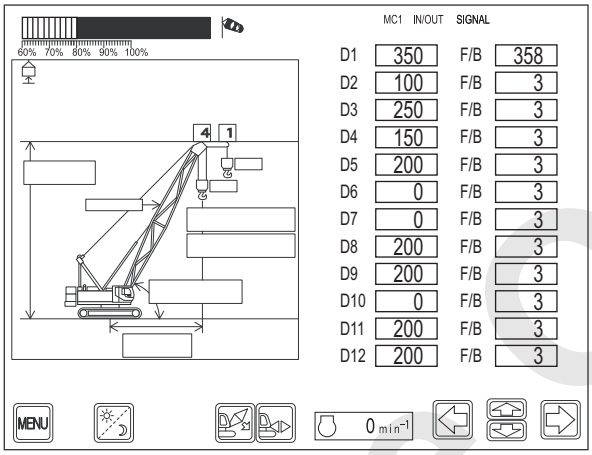


1) DIGITAL INPUT
This is indicated by "IN".
Digital input consists of 24 V input and ground (GND) input.
In 24 V input, ON is indicated at 24 V and OFF at open (0 V).
In ground input, ON is indicated at ground (GND) and OFF at open.
As for signal name and specification, refer to P.10-334, 10-335.

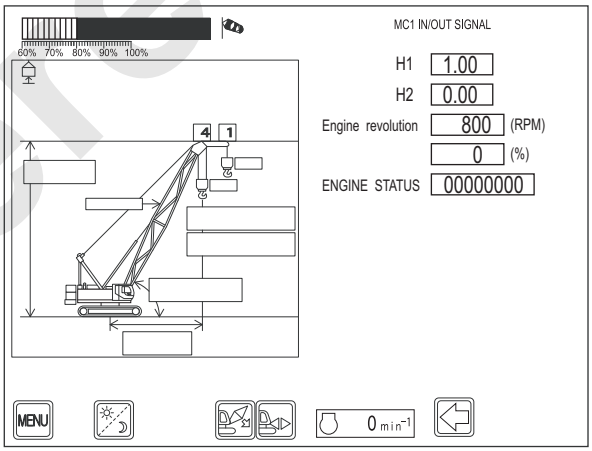
2) DIGITAL OUTPUT
This is indicated by "DOUT".
Digital output consists of 24 V output and ground input.
In 24 V output, ON is indicated at 24 V and OFF at open (0 V).
In ground output, ON is indicated at ground (GND) and OFF at open.
As for signal name and specification, refer to P.10-336.

3) DIGITAL OUTPUT (FEEDBACK SIGNAL)
This is indicated by "DOUT Fb".
This is feedback signal of digital signal (DOUT) and corresponds to digital output condition.
If it does not correspond to digital signal condition, wire breakage or ground fault is presumed.

(C) By pushing [NEXT], output of proportional valve becomes indicated.
Instruct value is indicated on left hand and feedback value on right hand.
Unit of indicating figure is mA (mille ampere).
If instruct value is more than 100 mA and feedback value is about 0 mA, wire breakage is presumed.
As for signal name and specification, refer to P.10-335.

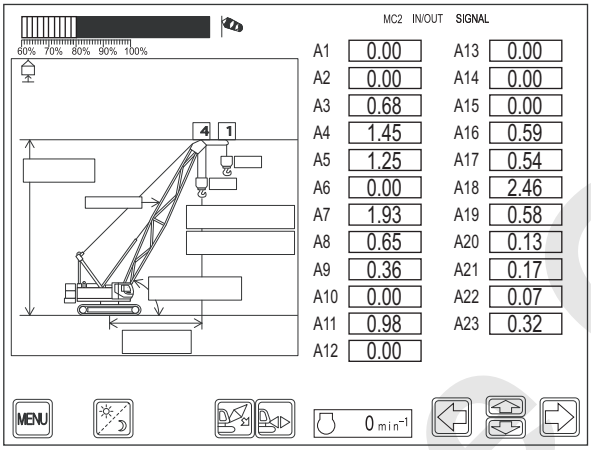


(D) By pushing [NEXT], analog output and engine status becomes indicated.
Unit of indicating figure is V (volt).
This is used as accelerator signal to ECU.
However this becomes effective only when G-28 accelerator control (MC option set) is "O".

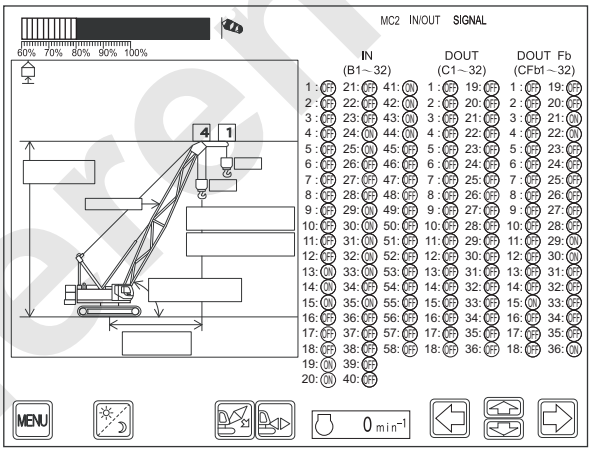


(3) INPUT, OUTPUT SIGNAL CHECK OF MC2
(MAIN CONTROLLER 2)

(A) Select "MC2" screen in the menu.
The first screen indicates conditions of analog signal of pressure sensors, potentiometers etc.
Unit of indicating figure is V (volt).
As for signal name and specification, refer to P.10-337.
0 V is indicated on non connected point.



(B) By pushing [NEXT], digital input and digital output are indicated.



1) DIGITAL INPUT

This is indicated by "IN".
Digital input consists of 24 V input and ground (GND) input.
In 24 V input, ON is indicated at 24 V and OFF at open (0 V).
In ground input, ON is indicated at ground (GND) and OFF at open.
As for signal name and specification, refer to P.10-338, 10-339.

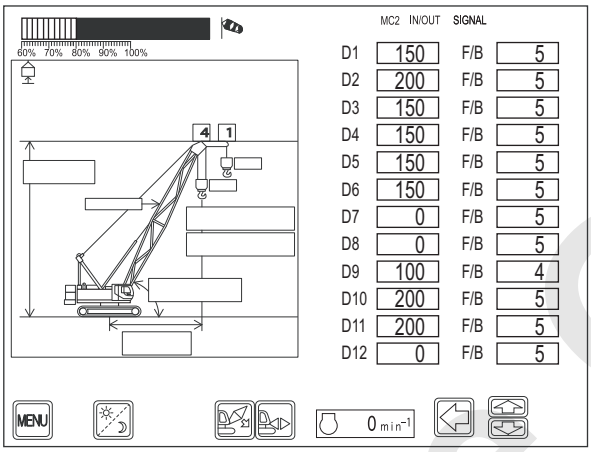
2) DIGITAL OUTPUT

This is indicated by "DOUT".
Digital output consists of 24 V output and ground input.
In 24 V output, ON is indicated at 24 V and OFF at open (0 V).
In ground output, ON is indicated at ground (GND) and OFF at open.
As for signal name and specification, refer to P.10-340.

3) DIGITAL OUTPUT (FEEDBACK SIGNAL)

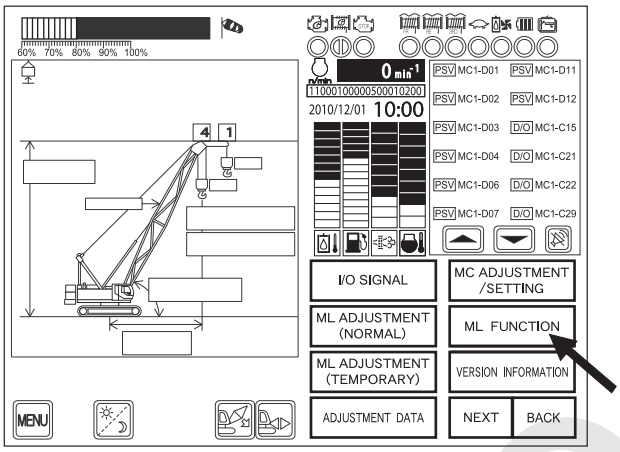
This is indicated by "DOUT Fb".
This is feedback signal of digital signal (DOUT) and corresponds to digital output condition.
If it does not correspond to digital signal condition, wire breakage or ground fault is presumed.

(C) By pushing [NEXT], output of proportional valve becomes indicated.
Instruct value is indicated on left hand and feedback value on right hand.
Unit of indicating figure is mA (mille ampere).
If instruct value is more than 100 mA and feedback value is about 0 mA, wire breakage is presumed.
As for signal name and specification, refer to P.10-339.

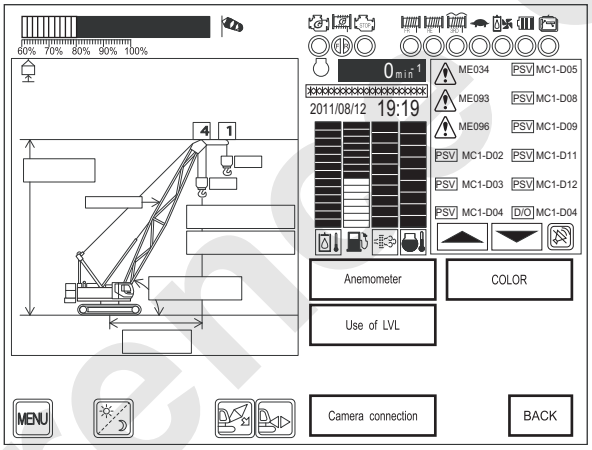


10.2.7 ML FUNCTION SETTING

1. Push [ML FUNCTION SETTING] in the maintenance menu.



2. Setting item becomes indicated.



(1) OPTION SETTING OF ANEMOMETER
This is to set with or without wind speed meter.

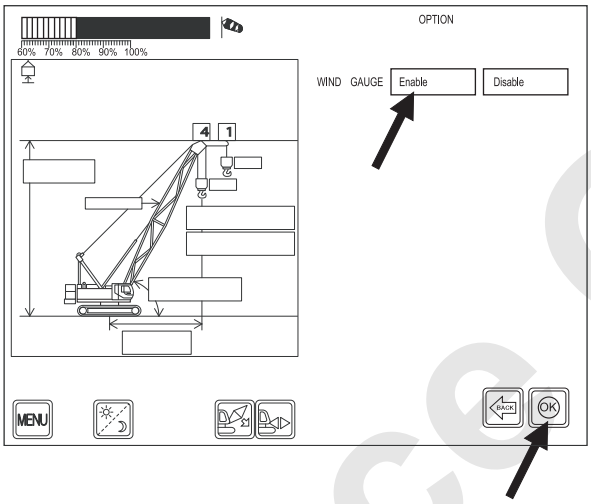
(EX) In case of anemometer installed.

(A) Push [ANEMOMETER] in the menu.

(B) Option setting screen of anemometer becomes indicated.

(C) Push [Enable].
* The selected side turns to blue indication.

(D) Push [OK].



(2) MAKING LVL FUNCTION EFFECTIVE

This is to set LVL (auto stop load ratio) effective or not effective.

Refer to P.10-254 to P.10-256.

LVL setting for setting procedure of LVL value.

(EX) In case of making LVL function effective.

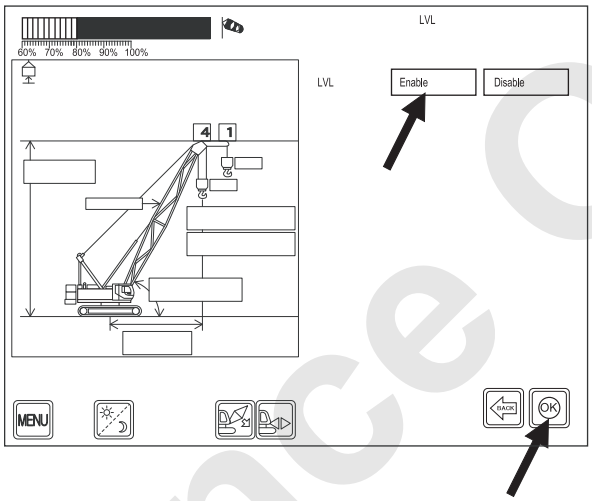
(A) Push [USE OF LVL] in the menu.

(B) LVL function screen becomes indicated.

(C) Push [Enable].

* The selected side turns to blue indication.

(D) Push [OK].



(3) SETTING OF CAMERA CONNECTION
This is to set with or without camera.

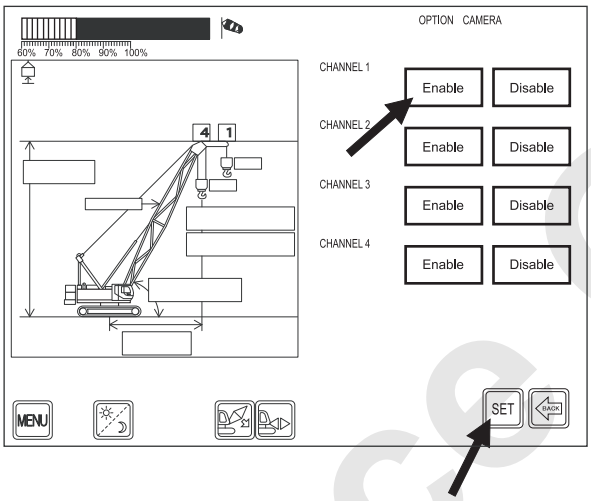
(EX) In case camera is added to channel 1.

(A) Push [CAMERA CONNECTION] in the menu.

(B) Camera connection setting screen becomes indicated.

(C) Push [Enable] of channel 1.
* The selected side turns to blue indication.

(D) Push [SET].



(4) SETTING OF CRANE BODY COLOR
This is to set crane body color.

(EX) In case body color is selected to yellow.

(A) Push [Color] in the menu.

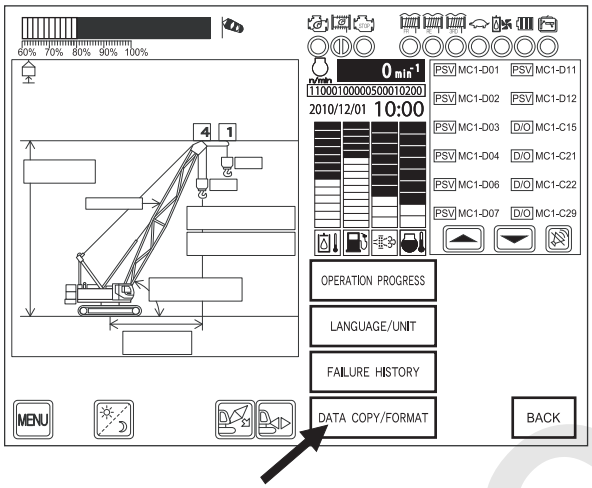
(B) Push [Enable] .

(C) Push [Yellow] area.

(D) Push [OK].

10.2.8 DATA COPY, FORMAT

1. Push [DATA COPY, FORMAT] in the maintenance menu.



2. Items become indicated.

(1) ADJUSTMENT DATA READING OUT

This reads out backup data in the data card into memory in the controller.

Memorized data in the controller are overwritten and is erased.

Actual data to be used for calculation is those in the controller.

Special caution is required for this handling.

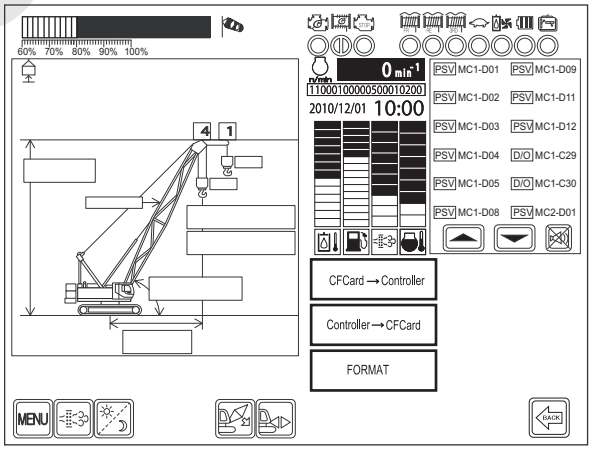
(2) ADJUSTMENT DATA WRITING IN

This is to copy the memorized data in the controller to the data card. (adjustment data back up)

(3) ADJUSTMENT DATA FORMATTING

This is to format the adjustment data memorized in the controller.

The backup data in the data card is not formatted.



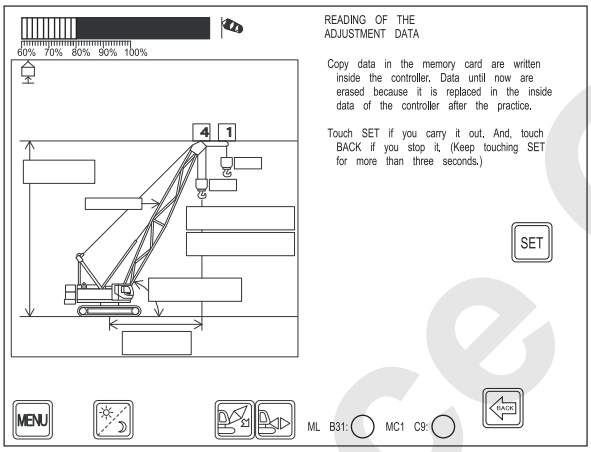
(A) ADJUSTMENT DATA READING OUT

This is to read out the adjusted value (backup data) in the data card to the memory in the controller.

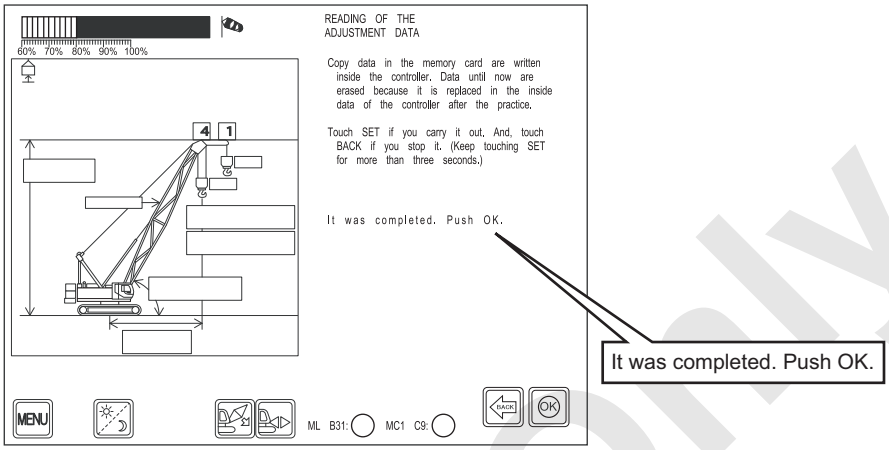
Note

When using this function, the data in the controller being used for calculation is overwritten. Be careful not to use in error.

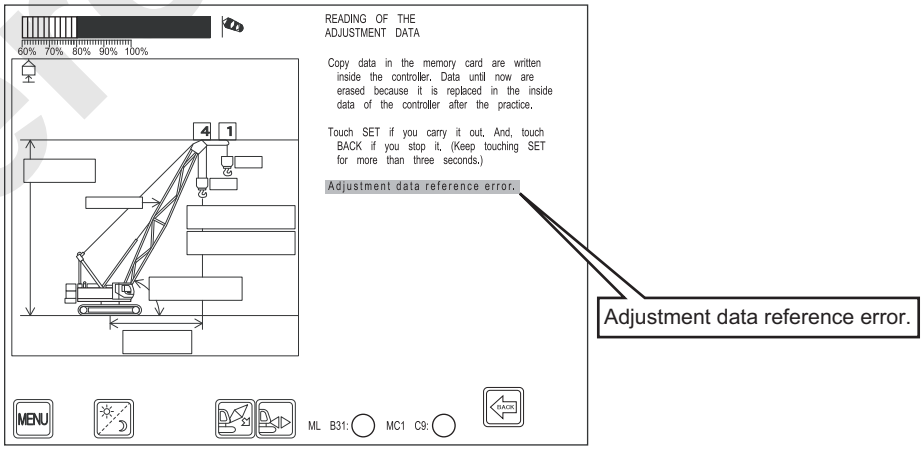
Select [CF Card → Controller] in the menu.
The screen shown right becomes indicated.
Push [SET] for 3 seconds to execute.



When completed properly, the screen shown below is indicated.
By pushing [OK], the screen returns to the previous one.



After execution, if error message as shown below is indicated, data card failure (including not enough insertion) is presumed. Re-insert the card and try again.
By pushing "BACK", screen returns to the previous one.
Unless both of ML B31 and MC1 C9 lamps indicated on lower part of the screen light up, the card can not be accessed and reading out would not be completed properly.
In this case, check the function of ML adjusting mode select relay (R-36).

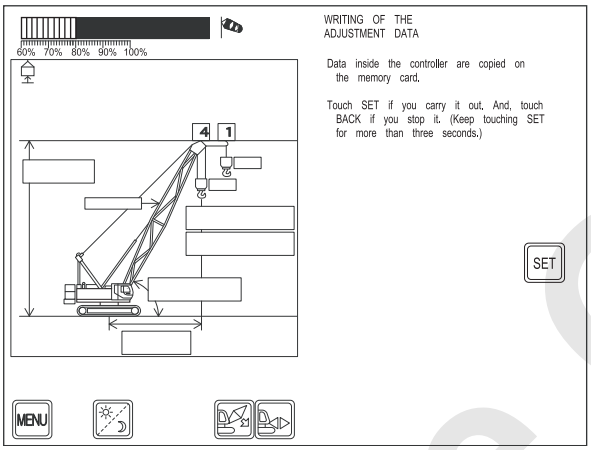


(B) ADJUSTMENT DATA WRITING IN

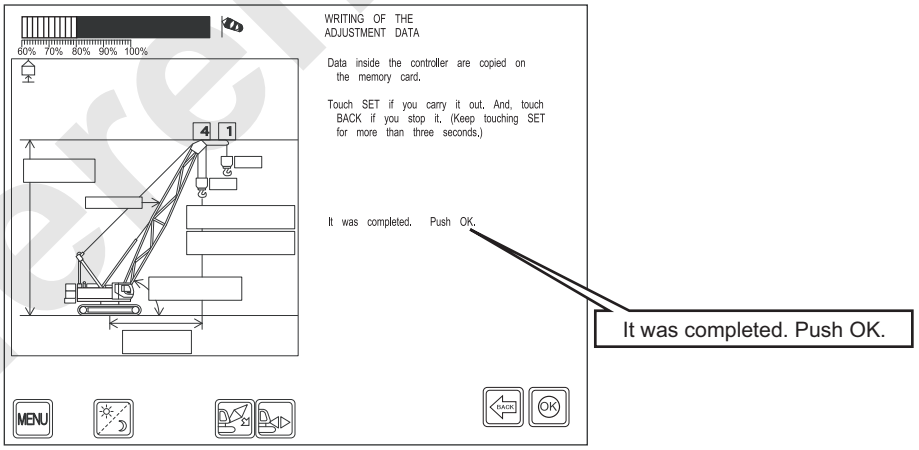
This is to copy the adjustment data in the memory of the controller to the data card.

* Normally whenever adjustment is done, data is copied to the card, but this is used to copy forcibly.

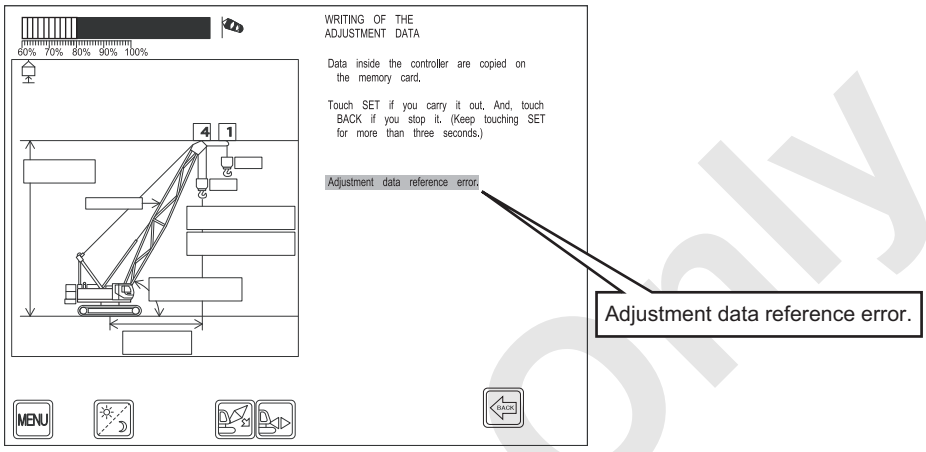
Select [Controller → CF Card] in the menu.
The screen shown right becomes indicated.
Push [SET] for 3 seconds to execute.



When completed properly, the screen shown right becomes indicated.
By pushing [OK], the screen returns to the previous one.



After execution, if error message as shown right is indicated, data card failure (including not enough insertion) is presumed. Re-insert the card and try again.
By pushing [BACK], screen returns to the previous one.



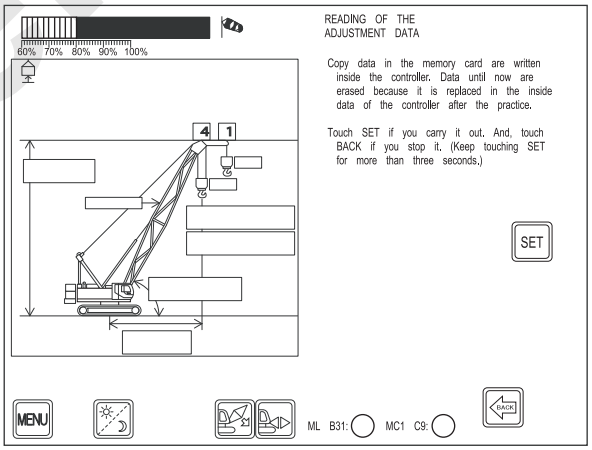
(C) ADJUSTMENT DATA FORMATTING

This is to format the adjustment data in the memory in the controller.

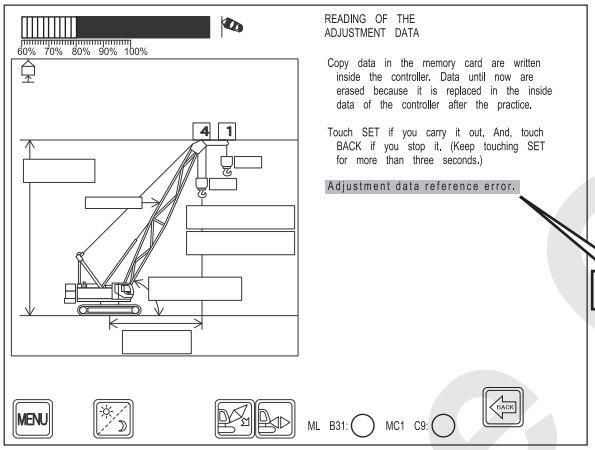
Note

When using this function, the data in the controller being used for calculation is overwritten. Be careful not to use in error.

Select [FORMAT] in the menu.
The screen shown below is indicated. Push [SET] for 3 seconds to execute.

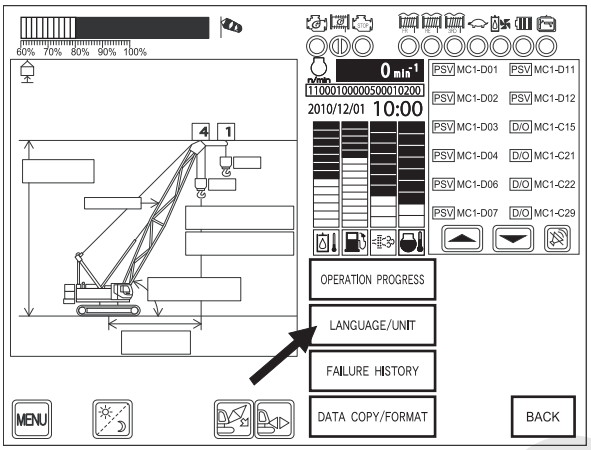


When completed properly, the screen shown below is indicated.
By pushing [OK] the screen returns to the previous one.
Unless both of ML B31 and MC1 C9 lamps indicated on lower part of the screen light up, the card can not be accessed and reading out would not be completed properly.
In this case, check the function of ML adjusting mode select relay (R-36).



10.2.9 LANGUAGE, UNIT SETTING

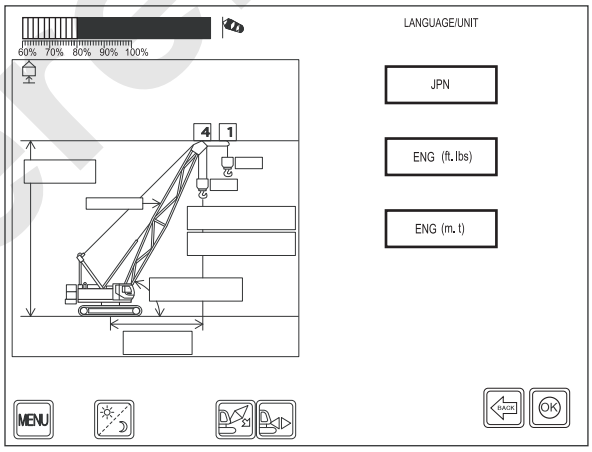
1. Push [LANGUAGE/UNIT] in the maintenance menu.



2. Item becomes indicated. Select the required language, unit.

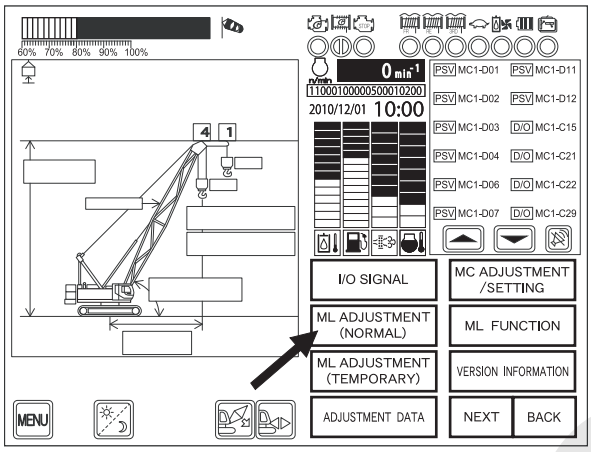
	Indicated language	Indicated unit
JPN	Japanese	m, t
ENG (ft • lbs)	English	feet, lbs
ENG (m • t)	English	m, t

Selected item becomes indicated in blue letter.
After select, push [OK].

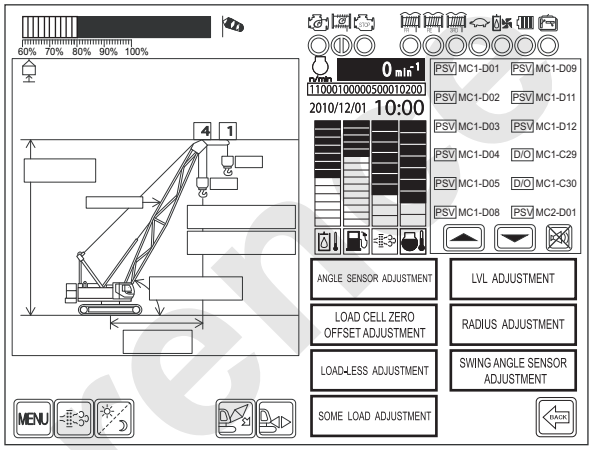


10.2.10 ML ADJUSTMENT (NORMAL)

1. Push [ML ADJUSTMENT (NORMAL)] in the maintenance menu.



2. Adjustment menu becomes indicated.



Angle sensor adjustment	This is used when error between indication of boom angle, jib angle mast angle become larger and their actual angle become larger or whenever the angle detector is replaced.
Loads cell zero offset adjustment	This is used when output voltage is shifted from 1.000 V when load is not applied to load cell. This becomes necessary whenever load detector or cable is replaced.
Load-less adjustment	This is used when the hook weight is not properly indicated.
Some load adjustment	This is used when error becomes large on actual load indication after without load adjustment is completed.
LVL adjustment	This is to change auto stop point (warning point).
Work radius adjustment	This is used when error of work radius indication and actual work radius becomes larger.
Swing sensor adjustment	This is used when screen indication of swing direction and actual swing direction varies. This is also used whenever swing angle sensor (slip ring built-in) is replaced.

(1) ANGLE DETECTOR ADJUSTMENT

Select [ANGLE DETECTOR ADJUSTMENT] in the adjustment menu.

Angle detector connected to presently set attachment becomes indicated.

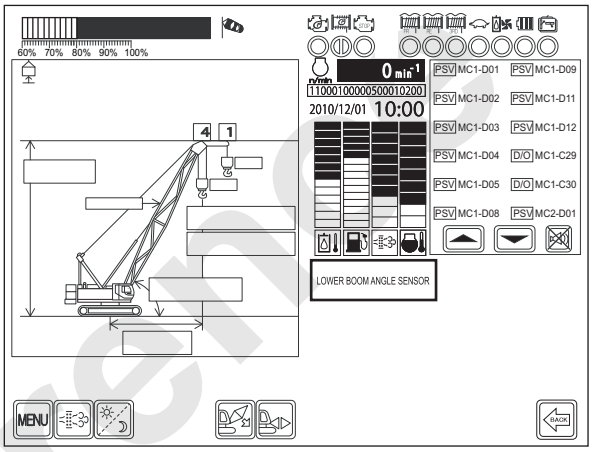
(Figure below shows example of crane with aux. sheave.)

In case with jib, jib angle detector becomes indicated and in case with mast, mast angle detector becomes indicated.

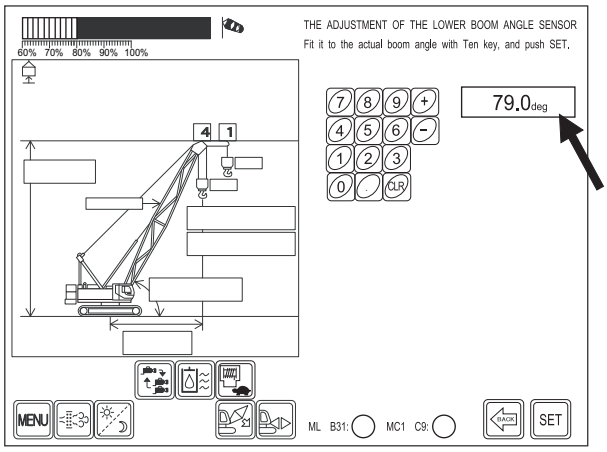
Select the adjustment required angle detector.

This procedure explains boom angle detector as an example. Jib angle detector and mast angle detector are adjusted in the same procedure.

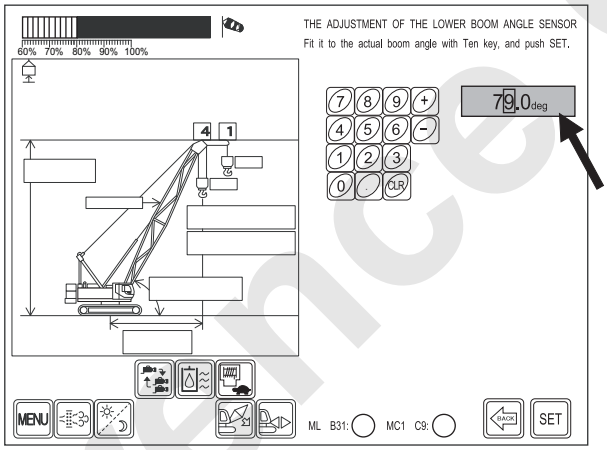
After boom is raised to near upper limit angle lower the boom slightly and push [LOWER BOOM ANGLE SENSOR].



Touch angle indicating area.

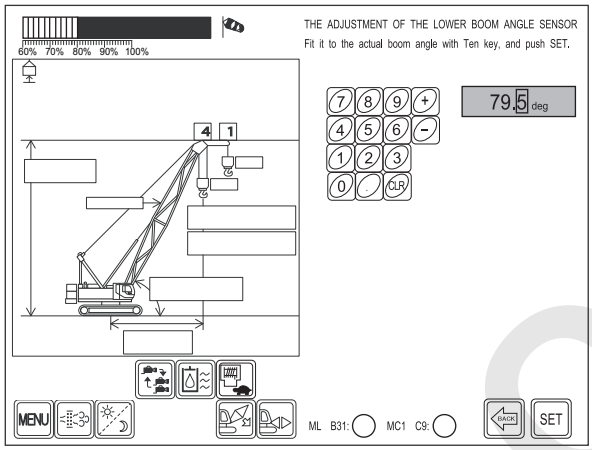


Angle indicating area becomes indicated in reverse and digit input becomes possible.



Measure the actual boom angle with the level gauge and angle meter and input digit with numeric key.
(EX) In case of input [79.5], input [7], [9], [.] [5].

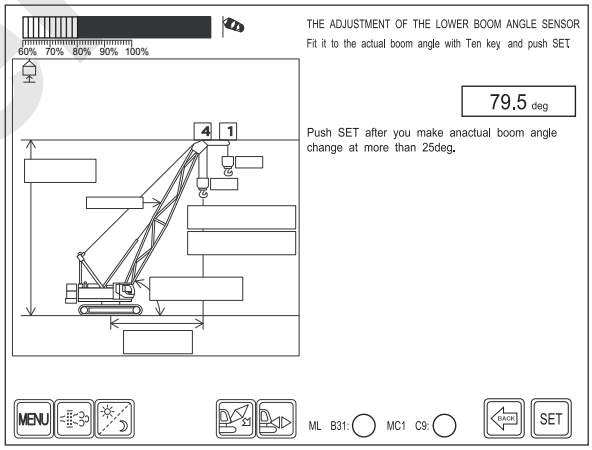
After input, push [SET].



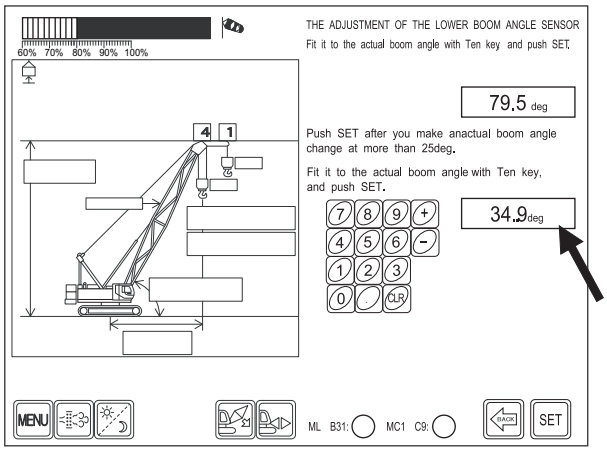
Lower the boom for more than 25 degrees and stop. Then push [SET].

CAUTION

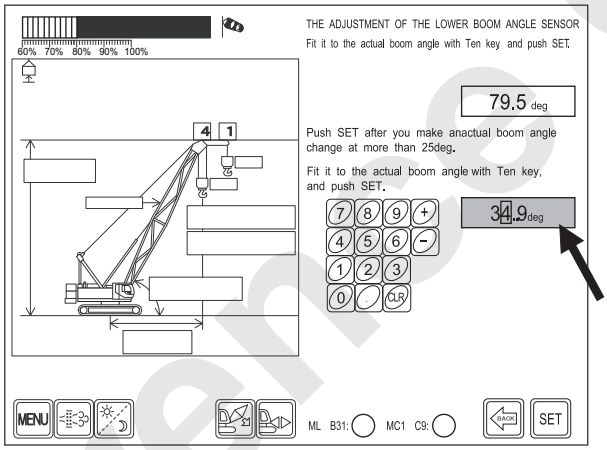
Angle of 25 degrees is just a guideline for lowering the boom, and this guideline should not be necessarily observed. However, remember that the adjustment is effective if the boom is lowered with an angle as large as possible.



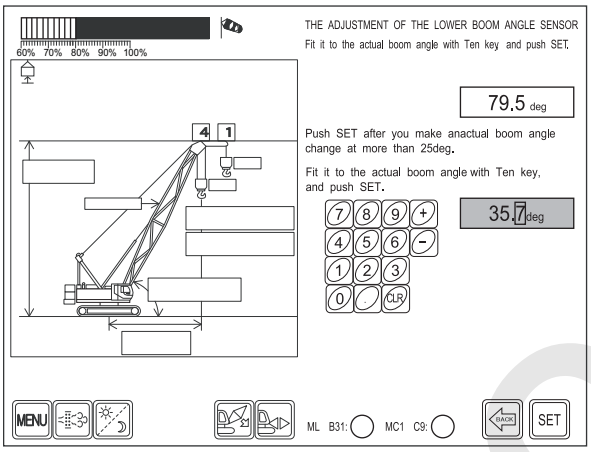
Touch the second angle indicating area.



Angel indicating area becomes indicated in reverse and digit input becomes possible.



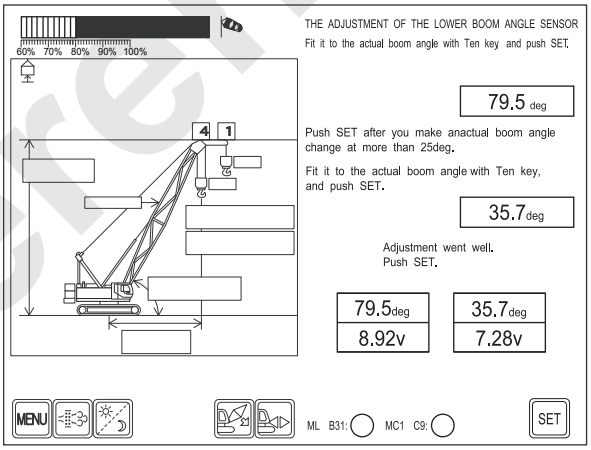
Measure the actual boom angle with the level gauge and angle meter and input digit with numeric key.
(EX) In case of input [35.7], input [3], [5], [.] [7]. After input, push [SET].



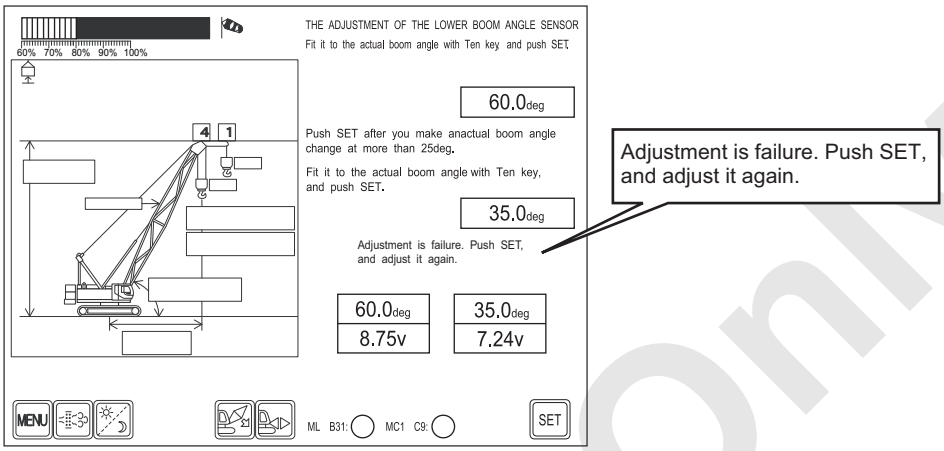
When the adjustment is properly completed, the message shown below is indicated.

"Adjustment is properly completed. Push [SET]"

By pushing [SET], the screen returns to the previous one.

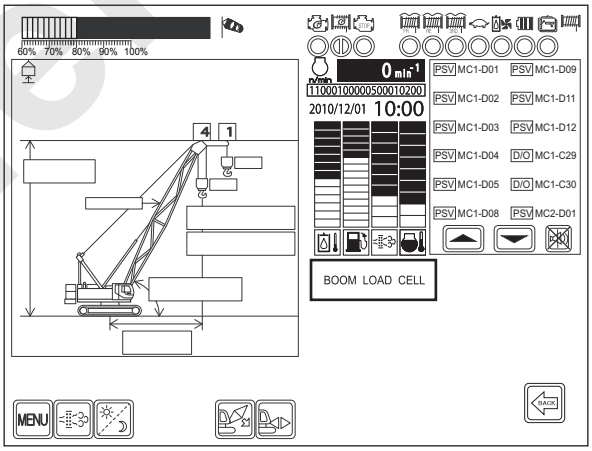


If the adjustment is not properly completed, the message shown below is indicated.
By pushing [SET], screen returns to the one during adjusting. Re-check the procedure and start adjustment again.

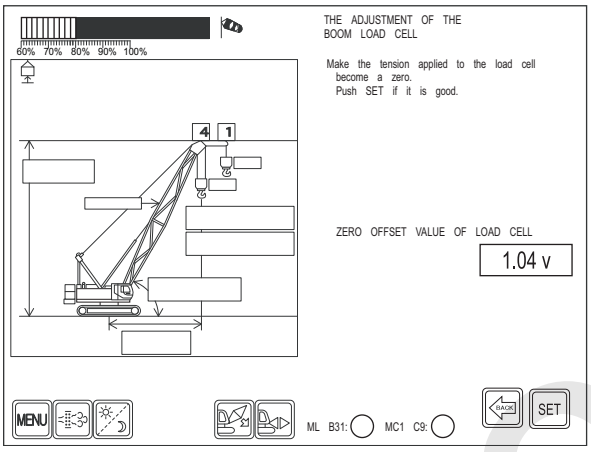


(2) LOAD DETECTOR ZERO ADJUSTMENT

Select [LOAD CELL ZERO OFFSET ADJUSTMENT] in the adjustment menu.
The load detectors used in the presently set attachment become indicated. Select the required load detector to be adjusted.
* Right screen shows inclined crane as an example.
In case of adjusting jib load detector, luffing configuration must be selected. If multi number of load detectors are used, multi number of load detectors become indicated. Select the required load detector to be adjusted.



Release the tension on the boom hoist rope to "zero" by releasing the boom hoist rope as much as possible or by removing the load detector.
Push [SET] when prepared.



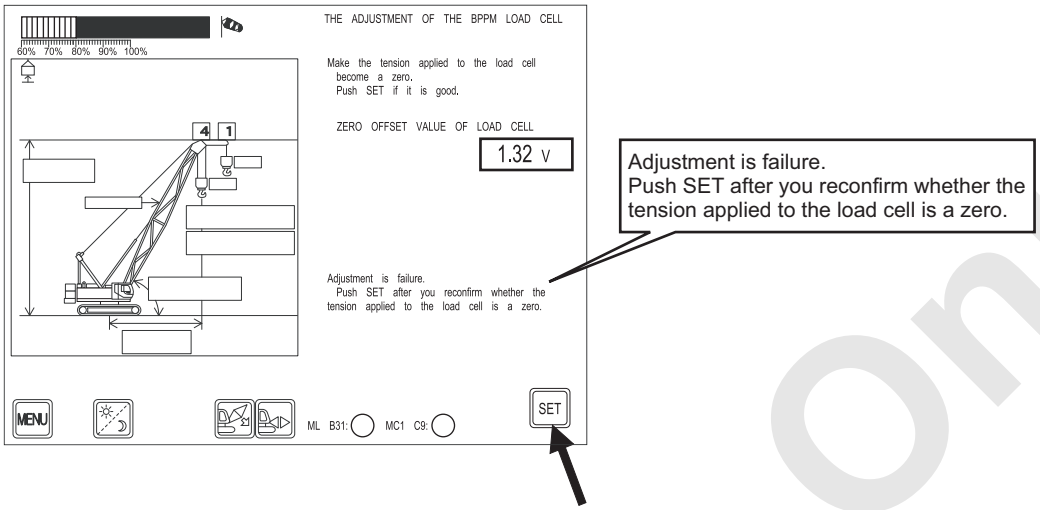
CAUTION

When the displayed load cell voltage is not in the rage from 0.8 to 1.2 V, the load cell is judged to be faulty and the adjustment is rejected. In such a case, replace the load cell.

The message shown below becomes indicated when the adjustment is properly completed.

By pushing [SET], screen returns to the previous one.

If the adjustment is not properly completed, the message shown below is indicated.
By pushing [SET], screen returns to the one during adjusting. Re-check the procedure and start adjustment again.



(3) LOAD LESS ADJUSTMENT

Set the load to only the hook installed.

Adjust each hook position based on the table below.

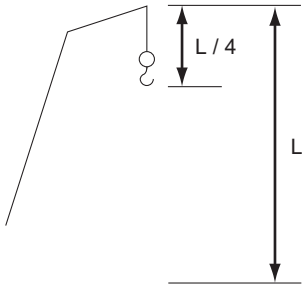
(CKE Series)

Type of attachments	Mode	Weight of hook block to be entered during adjustment	Weight of hook block when load is adjusted	
			Hook of mode selected	Other hooks
Crane	Main lifting	Main hook	Boom foot	—
Crane with auxiliary sheave	Main lifting	Main hook	Boom foot	*1
	Auxiliary sheave lifting	Auxiliary sheave hook	Boom foot	*1
Crane with jib	Main lifting	Main hook	Boom foot	*1
	Jib lifting	Jib hook	Boom foot	*1
Tower crane	—	Main hook	Boom foot	*1
Luffing crane (with main hook)	Main lifting	Main hook	Boom foot	*1
	Jib lifting	Jib hook	Boom foot	*1
Luffing crane (with aux. sheave hook)	Jib lifting	Jib hook	Boom foot	*1
	Auxiliary sheave lifting	Auxiliary sheave hook	Boom foot	*1
Luffing crane (jib hook only)	Jib lifting	Jib hook	Boom foot	*1

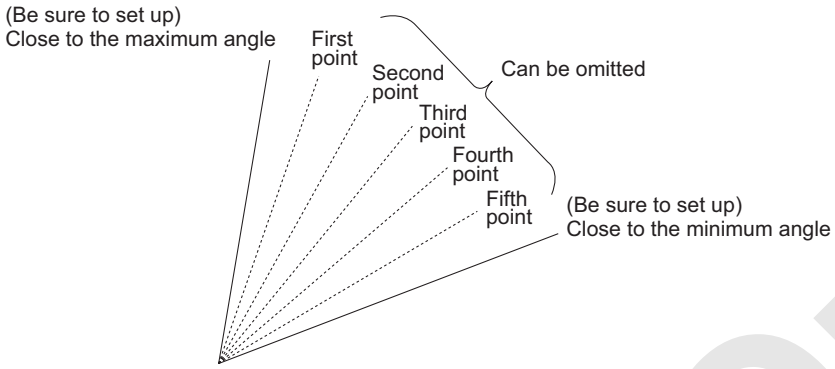
(CK Series)

Type of attachments	Mode	Weight of hook block to be entered during adjustment	Weight of hook block when load is adjusted	
			Hook of mode selected	Other hooks
Crane	Main lifting	Main hook	Boom foot	—
Crane with auxiliary sheave	Main lifting	Main hook + Aux. sheave hook	Boom foot	*1
	Auxiliary sheave lifting	Main hook + Aux. sheave hook	Boom foot	*1
Crane with jib	Main lifting	Main hook + Jib hook	Boom foot	*1
	Jib lifting	Main hook + Jib hook	Boom foot	*1
Luffing crane (with main hook)	Main lifting	Main hook + Jib hook	Boom foot	*1
	Jib lifting	Jib hook	Boom foot	*1
Luffing crane (with aux. sheave hook)	Jib lifting	Jib hook + Aux. sheave hook	Boom foot	*1
	Auxiliary sheave lifting	Jib hook + Aux. sheave hook	Boom foot	*1
Luffing crane (jib hook only)	Jib lifting	Jib hook + Aux. sheave hook	Boom foot	*1

*1 = 1/4 of distances from boom point sheave to ground.



Perform this adjustment by boom lowering motion control.
Adjusting points shall be max. boom (jib) angle point and min. boom (jib) angle point and random selected 5 points between them.

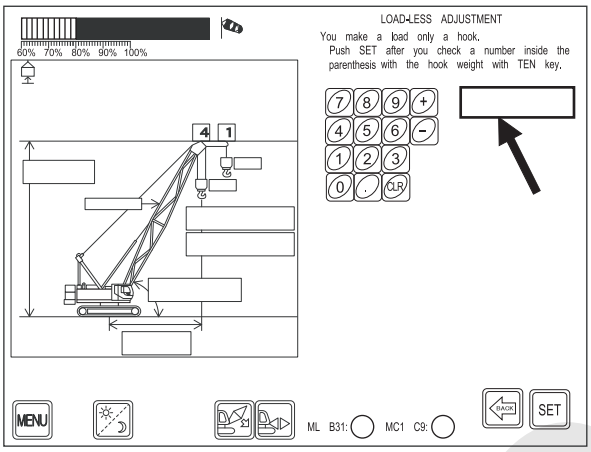


Max. boom (jib) angle and min. boom (jib) angle points are essentially required but points between them can be neglected.
There is no rule on number of points and their interval.

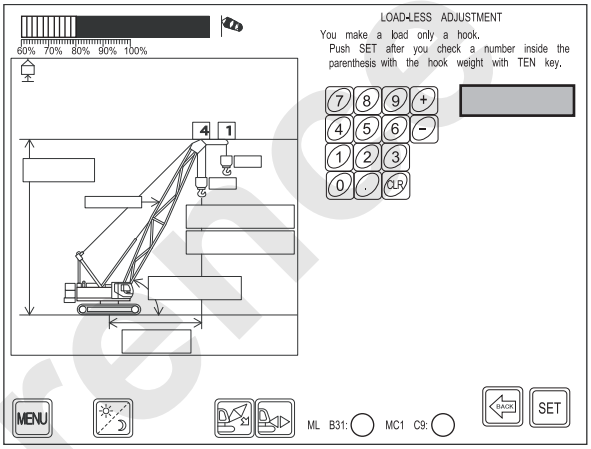
However more precise adjustment becomes possible with more points on wider angle range.

Adjustment would become easier if the adjustment points (angle) are set in advance in the range between the upper limit angle and lower limit angle divided into 6 in the adjustment required configuration.

Select [LOAD-LESS ADJUSTMENT] in the adjustment menu.
Touch load indicating area.

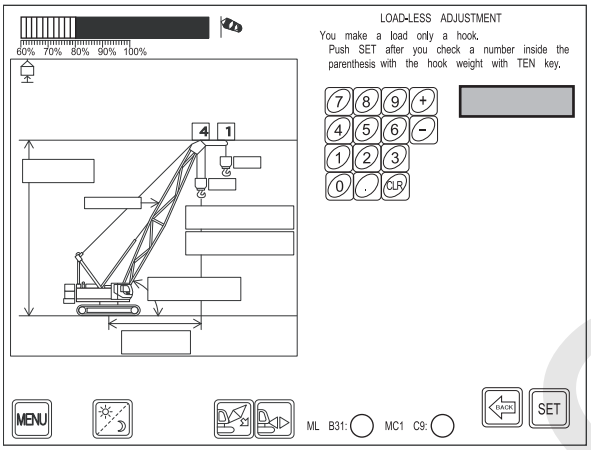


Load indicating area turns in reverse indication and digit input becomes possible.



Input hook weight with digit key.
Refer to the table in the previous page for hook weight to be input.
(EX) In case of input [2.0], input [2], [.], [0].

After input, push [SET].

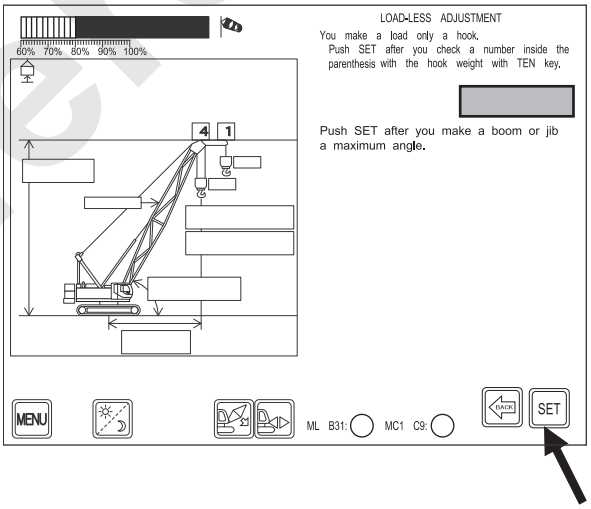


After raising the boom to almost the upper limit angle and then lower by about 1 degree and then stop.

CAUTION

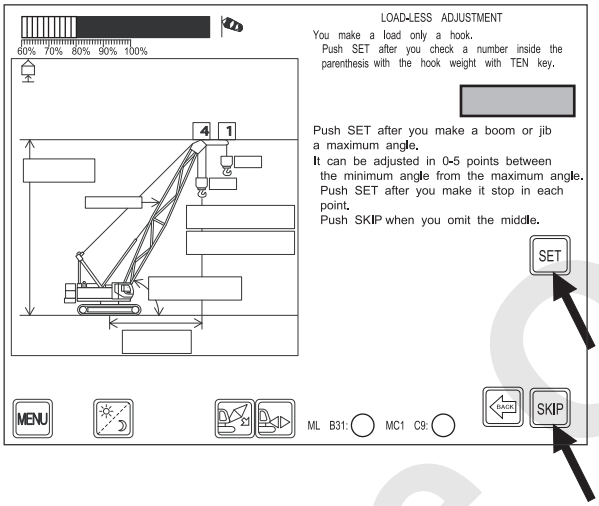
There are some error in boom raising and boom lowering. So ensure to stop in boom lowering.

Push [SET].



Lower the boom and stop. Then push [SET].
During boom lowering motion, control the hook raising motion to keep the hook in the same height.

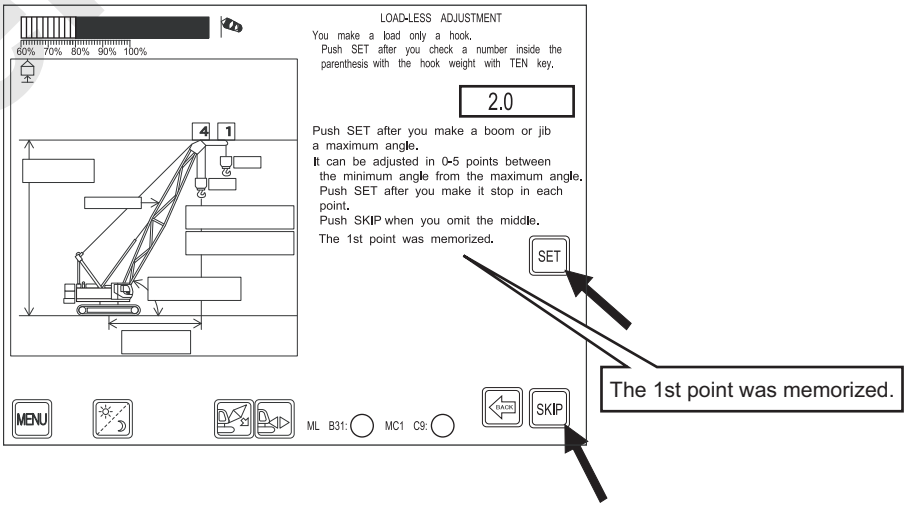
If the points in between are to be skipped, push [SKIP].
They are skipped to the minimum angle.



By pushing [SET], message memorizing the fist point is indicated.

After lowering the boom, push [SET].

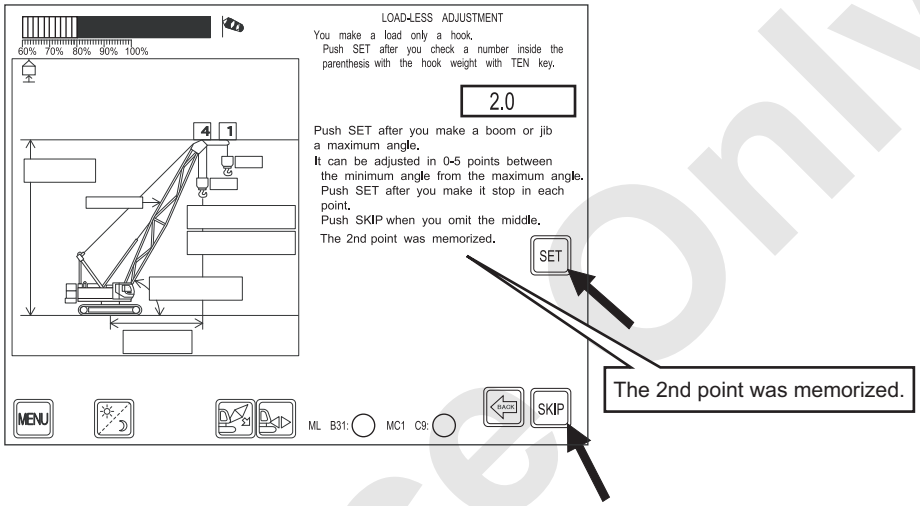
If the points in between are to be skipped, push [SKIP].
They are skipped to the minimum angle.



By pushing [SET], message memorizing the second point is indicated.

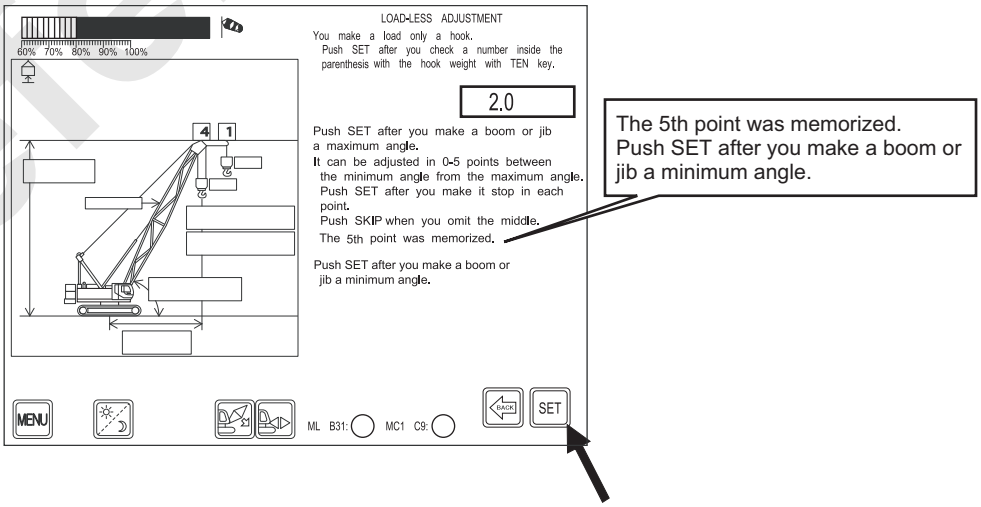
Second point is memorized. After lowering the boom further, push [SET].

If the points in between are to be skipped, push [SKIP].
They are skipped to the minimum angle.



Repeat the adjustment in the same way in sequence. When 5th point is memorized, message requesting to set the angle to minimum and push [SET] is indicated.

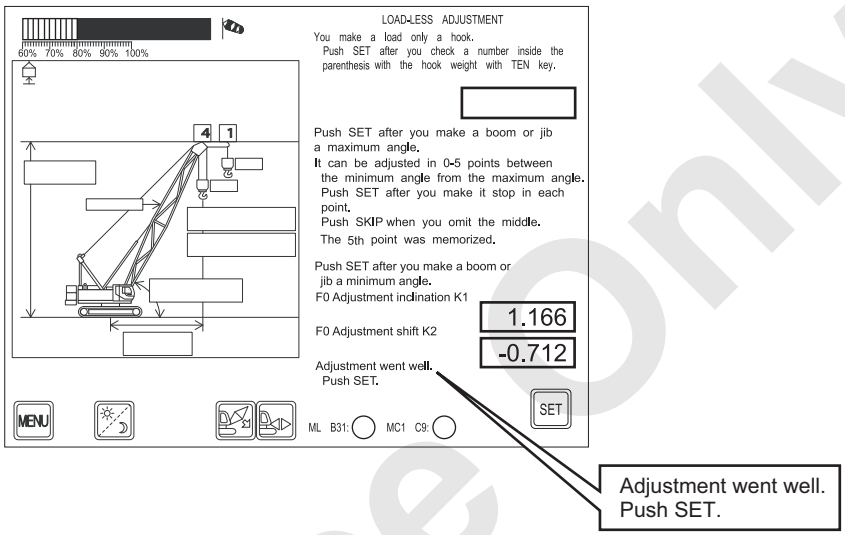
Lower the boom to almost minimum angle and push [SET].



If the adjustment is properly completed, the message shown below is indicated.

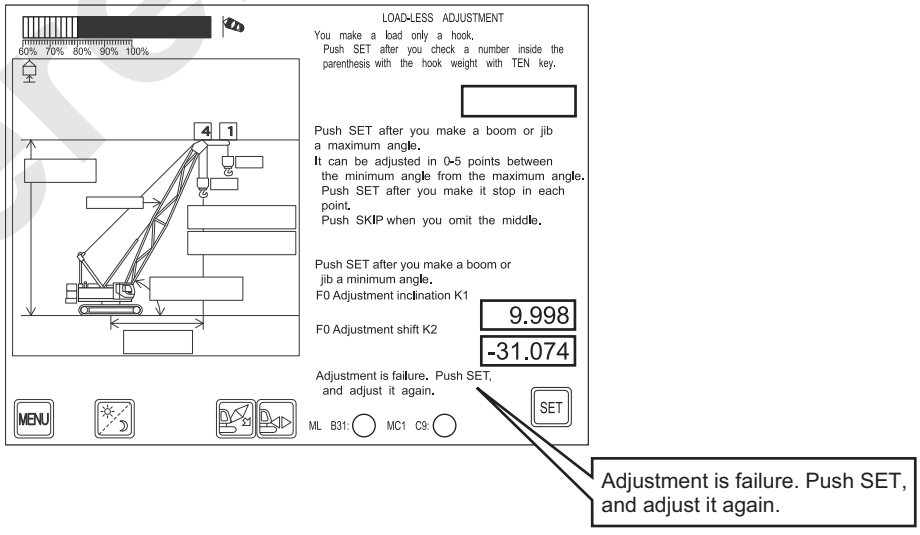
At the same time K1, K2 values are indicated as adjustment result.

By pushing [SET], screen returns to the previous one.



If the adjustment is not properly completed, the message shown below is indicated.

After pushing [SET], start adjustment again.



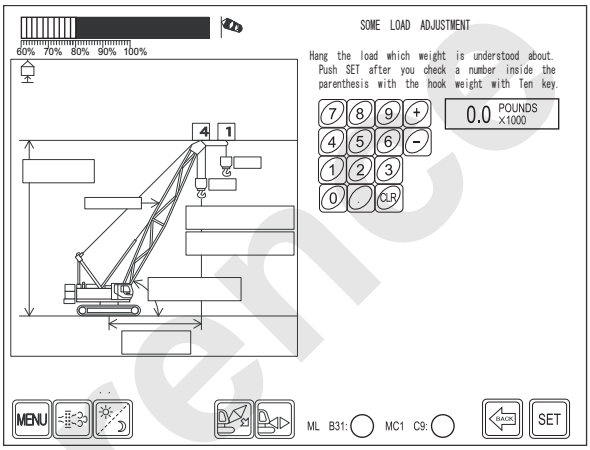
In without load adjustment, if adjustment on more than two boom (jib) length is done, on boom (jib) length which is not adjusted yet, calibration by interpolation by two closest length adjustment values is applied.

(4) SOME LOAD ADJUSTMENT

Only the different point to without load adjustment is the load value input first.
The rest are same.
Different point to without load adjustment ONLY is explained here.

Firstly lift the weight known load.
Select [SOME LOAD ADJUSTMENT] in the adjustment menu.
By touching load indicating area, indication turns into reverse and digit input becomes possible. Input load weight actually being lifted with digit key and push [SET].
* This includes weight of hook and lifting sling.

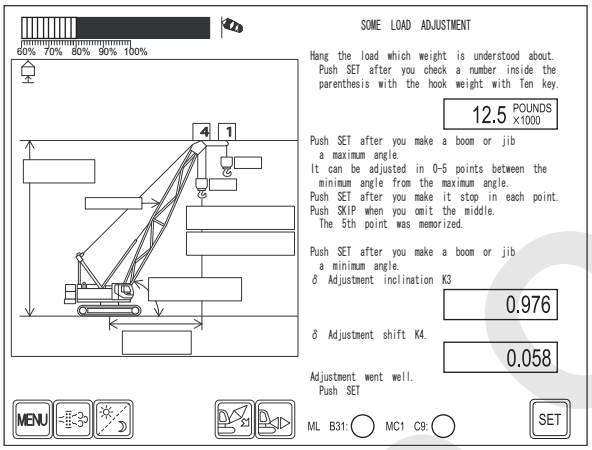
The procedure afterward is as same as without load.
Proceed as without load adjustment.



If the adjustment is properly completed, the message shown below is indicated.

At the same time K3, K4 values are indicated as adjustment result.

By pushing [SET], screen returns to the previous one.



If the adjustment is not properly completed, the message shown below is indicated.

After pushing [SET], start adjustment again.

CAUTION

With load adjustment is likely to be affected with lifting load swinging.
Therefore when the actual load indication moves significantly, wait until the lifting load swinging stops and push [SET].

(5) LVL ADJUSTMENT

LVL means the load ratio to stop automatically. Normally auto stop load ratio is 105% but with this function this load ratio can be changed to 90 to 110%.

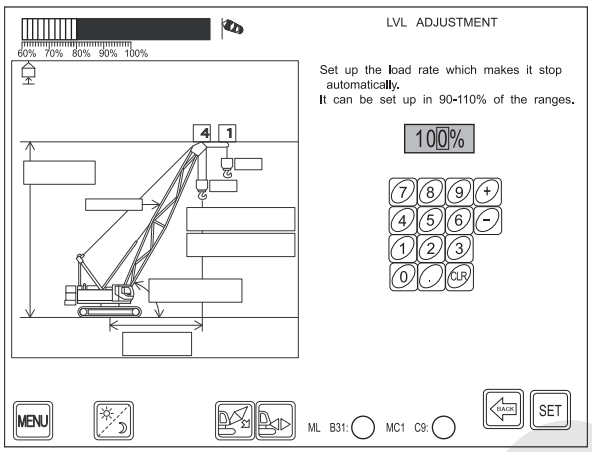
CAUTION

LVL function is only effective when "EFFECTIVE" is set in "LVL SETTING" in the "SETTING". If "NOT EFFECTIVE" is selected, normal 105% is applied even value is changed in this function.

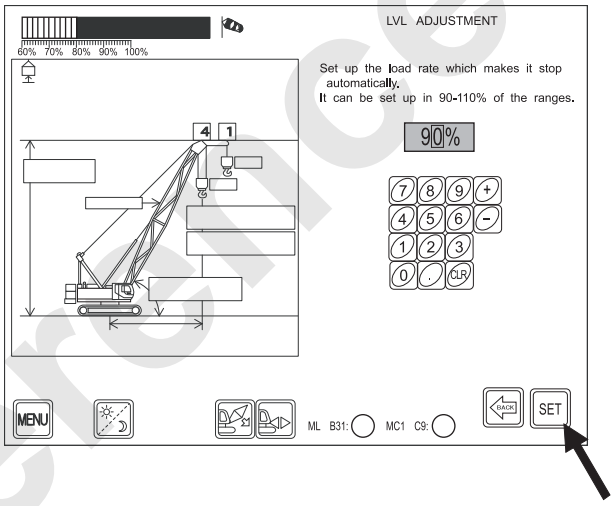
Select [LVL ADJUSTMENT] in the adjustment menu.

Touch the load ratio indicating area.

The indicating area becomes reverse indication. Input value with digit key.



After value input is completed, push [SET].
Setting is completed and screen returns to previous one.



LVL Function

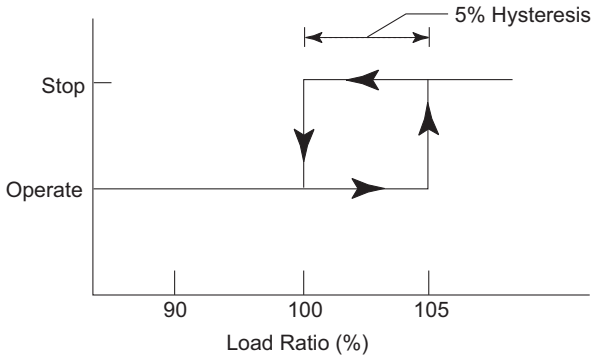
The following drawings are some examples of LVL function.

(A) When the LVL function is OFF.

If the loading ratio is 105% or more while the LVL function is not actuated, operation toward the hazardous side is automatically stopped. Note that hysteresis of 5% must be considered for restoration from the automatic stop status.

When the loading ratio is returned to 100%, the automatic stop status is cancelled. When the loading ratio is 90% or more, intermittent alarm sounds are emitted.

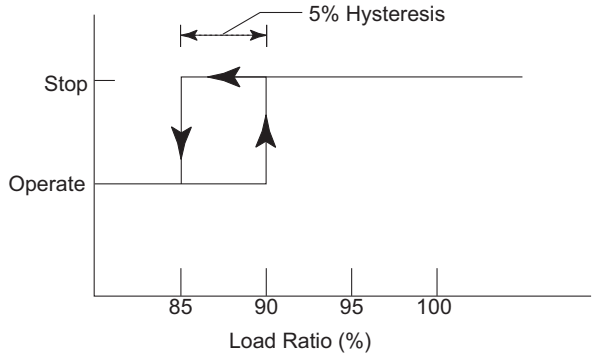
Continuous alarm sounds are emitted when the loading ratio is 100% or more.



(B) When the LVL function is ON and set to 90%.

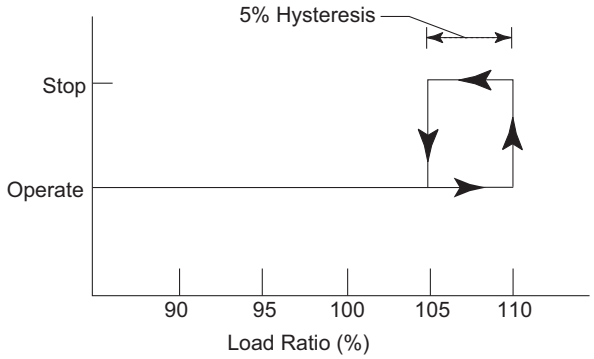
If the loading ratio is 90% or more, operation toward the hazardous side is automatically stopped. The machine is restored from the automatic stop status when the loading ratio is less than 85%.

When the loading ratio is 90%, continuous alarm sounds are emitted. No forecasting sound (intermittent sound) will be emitted.



(C) When the LVL function is ON and set to 110%.

When LVL is set at 110%, the figure above applies. Please note the following points.



- LVL is also affected by the work area limit parameters. It operates by referencing the smaller value set by the Load Setting switch in "Setting the Work Area Limit Values".
- The LVL operational lag (hysterics) is -5%.
- The load ratio is not affected by LVL function.
- When the loading ratio is 90%, forecasting sounds (intermittent sounds) are emitted.
  Alarm sounds (continuous sounds) are emitted when the loading ratio is 100% (not affected by the LVL function).

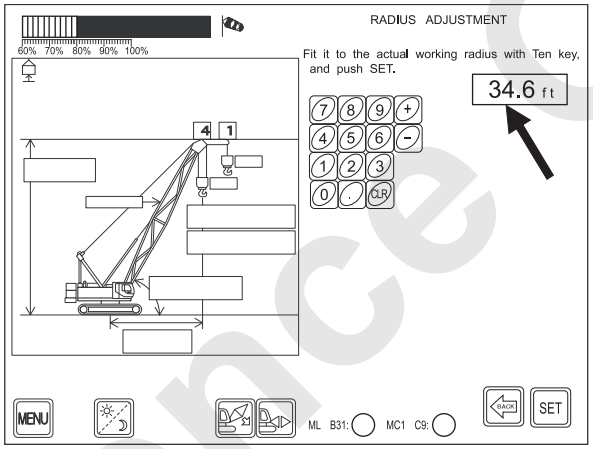
(6) WORK RADIUS ADJUSTMENT

This is used when difference between the indicated work radius and the actual work radius is large due to the boom deflection etc.

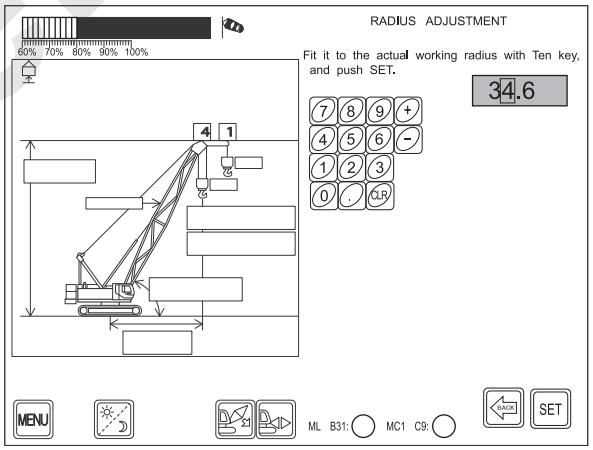
CAUTION

Ensure to check if there is any error in angle indication. If error is larger than 0.3 degrees carry out angle adjustment first.

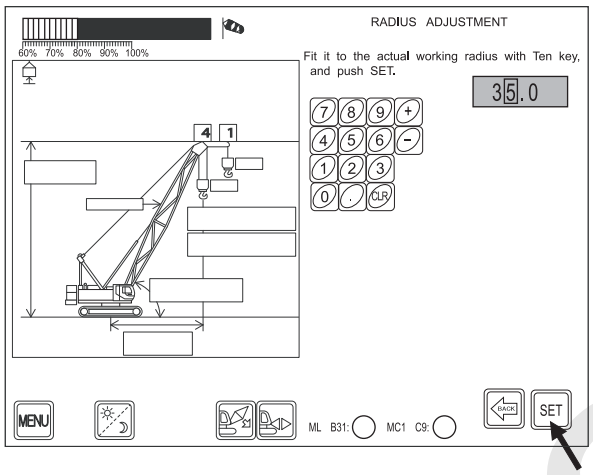
Raise the boom (jib) to almost upper limit angle and then lower by about 1 degree and then stop.
Select [RADIUS ADJUSTMENT] in the adjustment menu.
Touch the radius indication area.



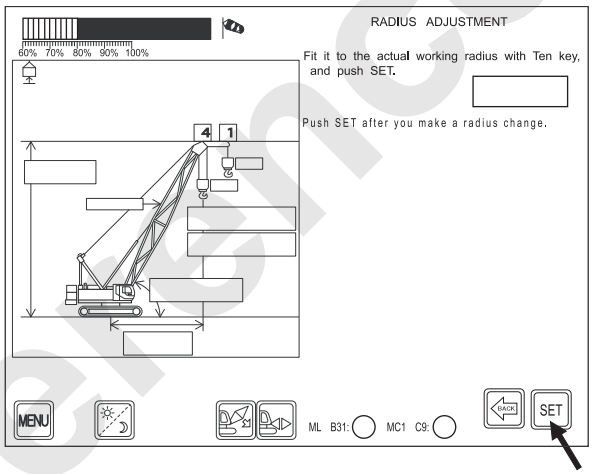
Radius indication area becomes reverse indication and digit input becomes possible.



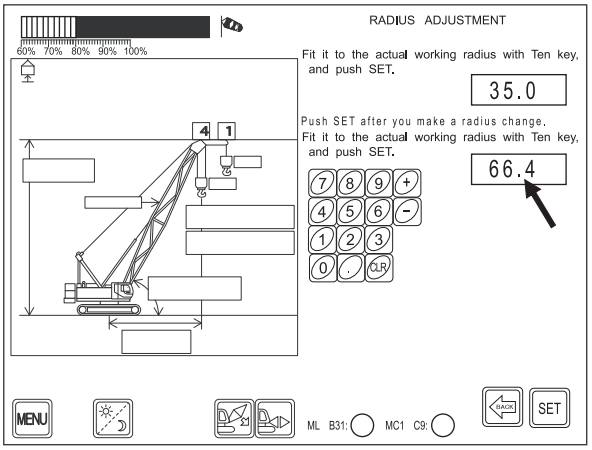
Input actually measured work radius with digit key.
(EX) In case of input [35.0], input [3], [5], [.] [0].
After input, push [SET].



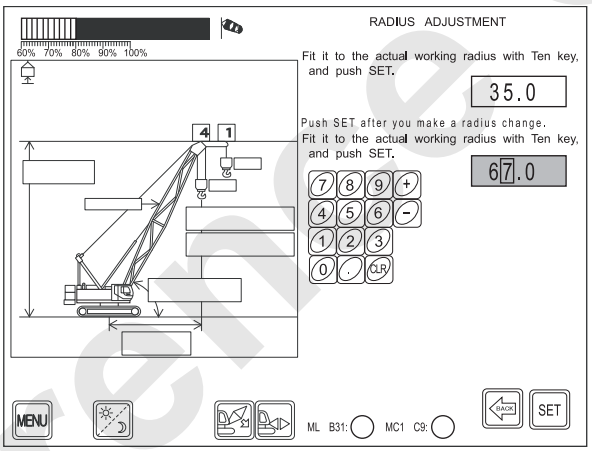
Lower the boom (jib) to almost min. angle and stop.
Then push [SET].



Touch the radius indication area.

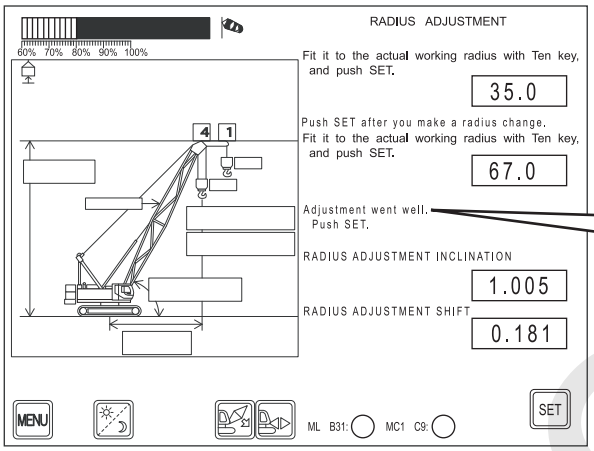


Input actually measured work radius with digit key.
(EX) In case of input [67.0], input [6], [7], [.] [0].
After input, push [SET].

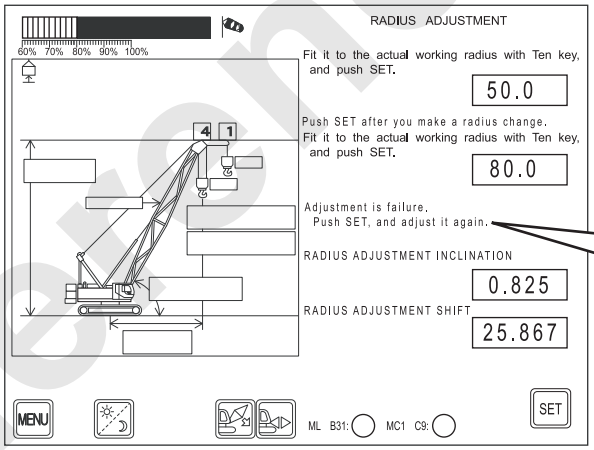


If the adjustment is properly completed, the message shown below is indicated.

By pushing [SET], screen returns to the previous one.



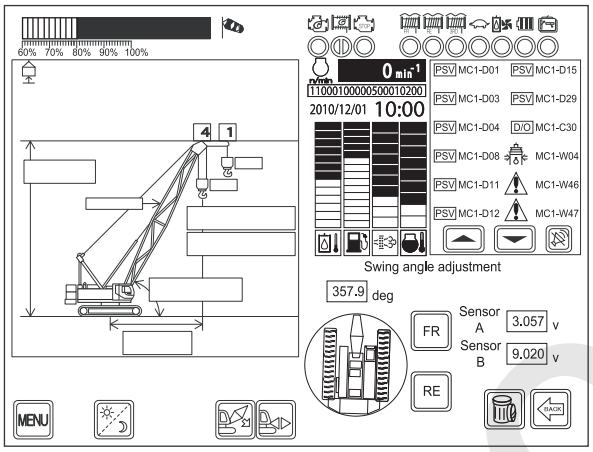
If the adjustment is not properly completed, the message shown below is indicated.
By pushing [SET], screen returns to the one during adjusting. Re-check the procedure and start adjustment again.



(7) SWING ANGLE ADJUSTMENT

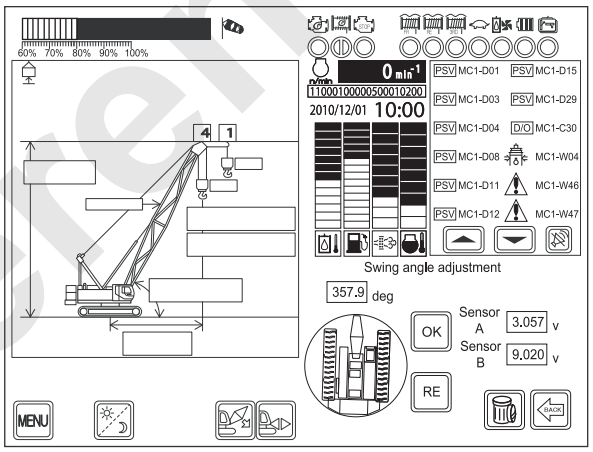
Select [SWING ANGLE ADJUSTMENT] in the adjustment menu.

Face the crane toward front (idler side of crawler) and fix with the swing lock pin. Push [FR].

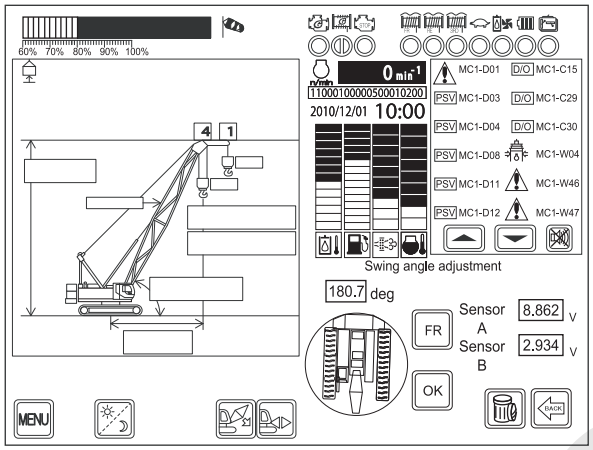


If the indication changes from [FR] to [OK], front side adjustment is properly completed.

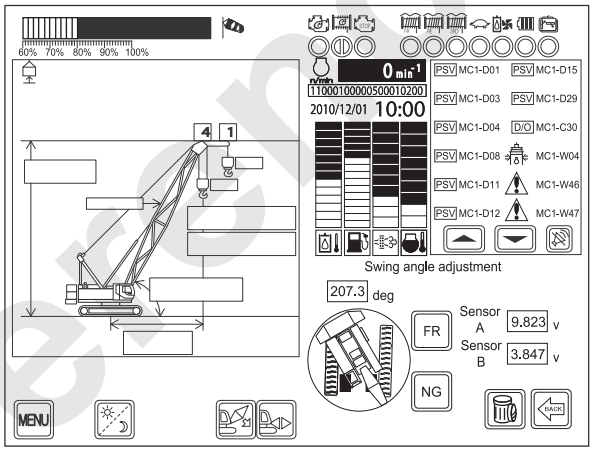
Swing the crane by 180 degrees and face it toward rear (propel motor side) and fix with the swing lock pin.



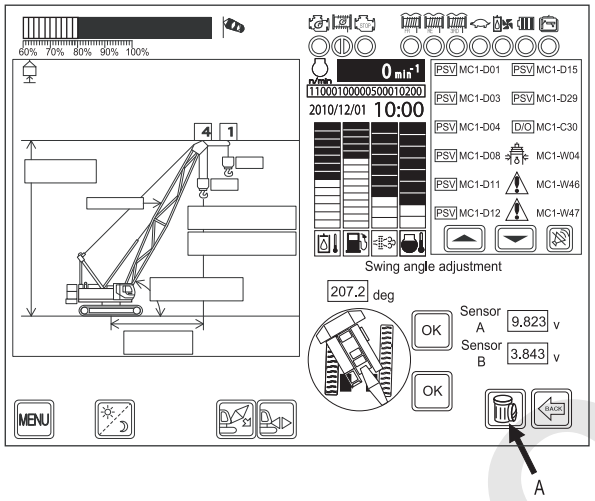
Push [RE].
If indication changes from [RE] to [OK], rear side adjustment is properly completed.



When either [FR] or [RE] is pushed and "NG" is indicated, adjustment is in error.
Check if the crane direction or sensor voltage is correct and start adjustment again.
Below screen indicates NG in rear adjustment as an example.



To rest adjusted value, push [A].
"OK" is indicated on both [FR] and [RE] and the value is reset.



10.2.11 ML ADJUSTMENT (TEMPORARY)

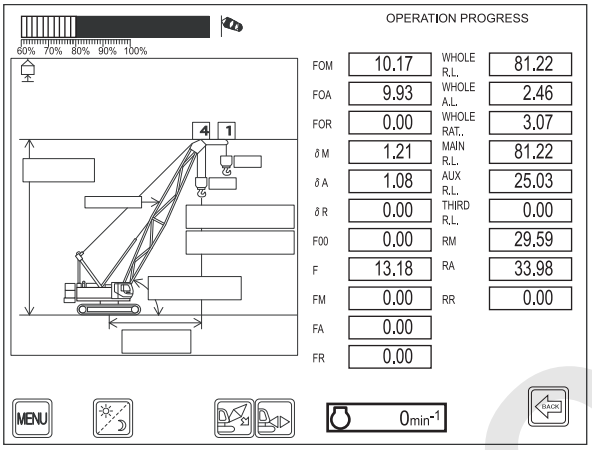
This adjustment is used to match with the load temporary when error exists in load indication due to load detector abnormality etc.
There is no limit in adjustment value and adjustment would become possible even when error occurs in without load / with load adjustment in "10.2.10 ML ADJUSTMENT (NORMAL)".
However if the crane configuration setting (setting of attachment) is changed, adjusted value would be deleted.
Use this adjustment ONLY for emergency case.

1. Push [ML ADJUSTMENT (TEMPORARY)] in the maintenance menu.
   Adjustment possible load detectors become indicated. Select the required one.

Adjustment items become indicated. Select the required one.
The procedure of "WITHOUT LOAD ADJUSTMENT", "WITH LOAD ADJUSTMENT" are same as "WITHOUT LOAD ADJUSTMENT", "WITH LOAD ADJUSTMENT" of "10.2.10 ML ADJUSTMENT (NORMAL)".
(Adjust in the same procedure as P.10-245 to 10-253.)

10.2.12 OPERATION PROGRESS

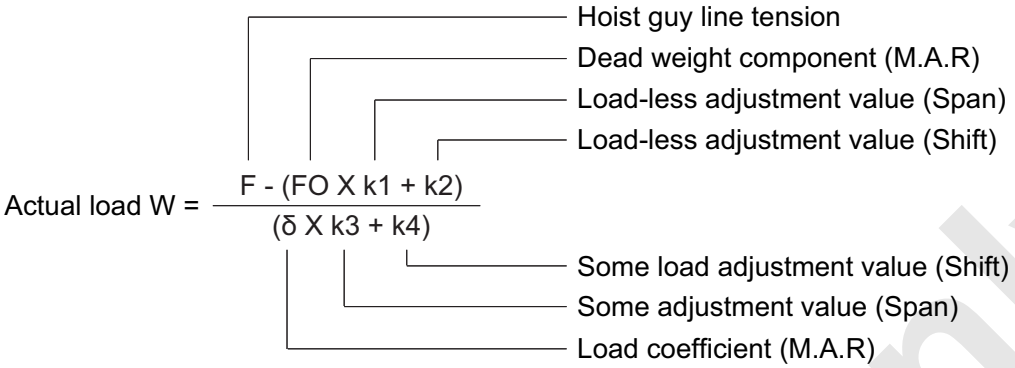
1. Push [OPERATION PROGRESS] in the maintenance menu.
   Information of internal operation indicated.



Symbols	Details
FOM	Tare weight component during main winch lifting with current radius
FOA	Tare weight component during aux. winch lifting with current radius
FOR	Tare weight component during third winch lifting with current radius
δM	Load coefficient during main winch lifting with current radius
δA	Load coefficient during aux. winch lifting with current radius
δR	Load coefficient during third winch lifting with current radius
F00	Tare weight component other than weight of hook block with current radius (during simultaneous lifting only) (Not used)
F	Raising guy line tension
FM	Main winch wire rope tension (w/ main winch load cell) (Not used)
FA	Aux. winch wire rope tension (w/ aux. winch load cell) (Not used)
FR	Third winch wire rope tension (w/ third winch load cell) (Not used)
WHOLE R.L.	Whole rated load (rated load during selected mode other than simultaneous lifting mode)
WHOLE A.L.	Whole actual load (actual load during selected mode other than simultaneous lifting mode)
WHOLE RAT.	Whole moment ratio (value indicated in bar graph)
MAIN R.L.	Main winch rated load with current radius on the basis of data
AUX. R.L.	Aux. winch rated load with current radius on the basis of data
THIRD R.L.	Third winch rated load with current radius on the basis of data
RM	Calculated main winch operating radius before correction by radius adjustment
RA	Calculated aux. winch operating radius before correction by radius adjustment
RR	Calculated third winch operating radius before correction by radius adjustment

EXAMPLE OF USING OPERATION SCREEN

The actual load W can be indicated by the formula shown below.

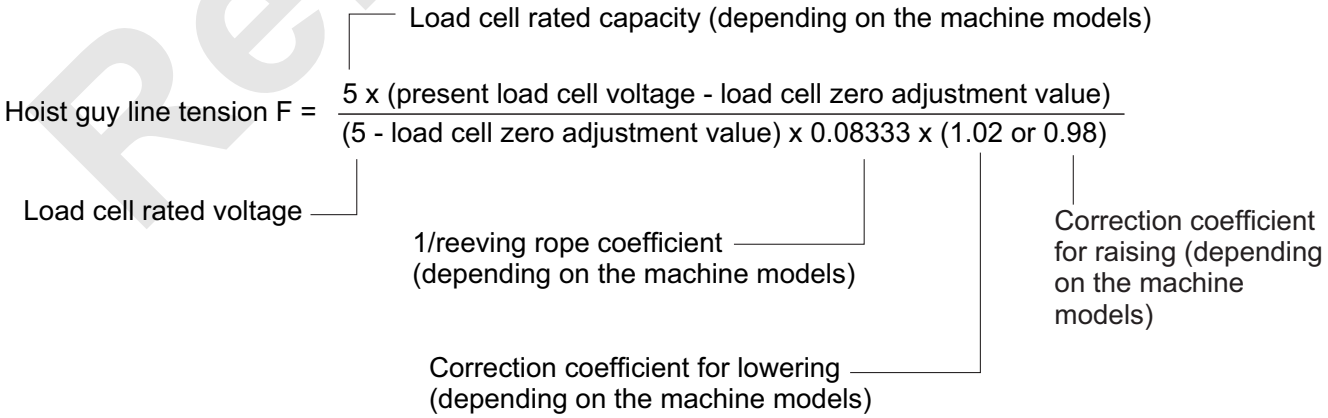


Suppose the values above are indicated shown below and the indicated actual load is 2 t, when a load weighing 5 t is lifted with the main winch.

F = 4.97
FOM = 2.28
δ = 1.33

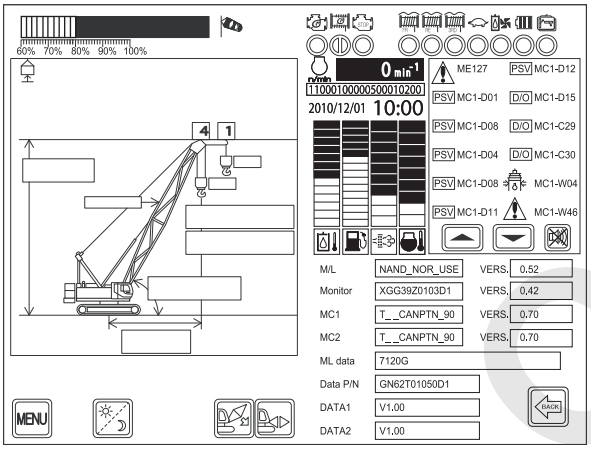
If neither load-less adjustment nor some load adjustment is carried out, and factors from k1 to k4 are ignored, the theoretical F required for the actual load of 5 t can be found by the using the formula above, as shown below.

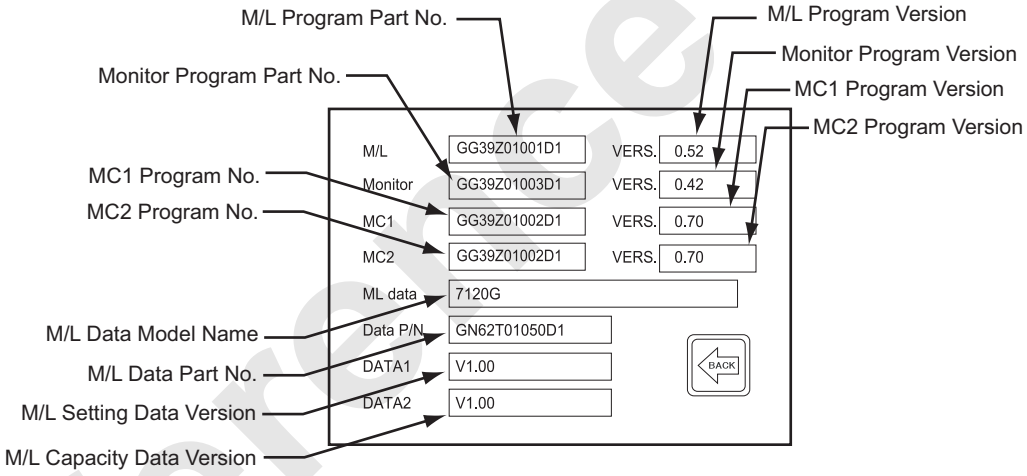
F = 5 X 1.33 + 2.28 = 8.93
Where, the actual F is obviously smaller than the theoretical F.
Next, the F can be found by the formula shown below.



10.2.13 VERSION INFORMATION

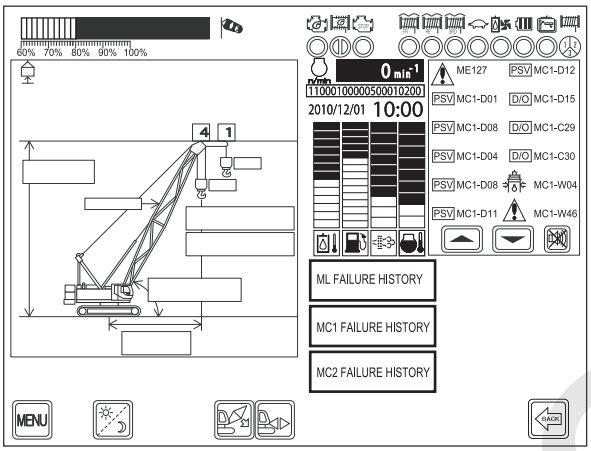
1. Push [VERSION INFORMATION] in the maintenance menu.
   Each part number and version of ML program, monitor, MC1 program, MC2 program, ML data are indicated.





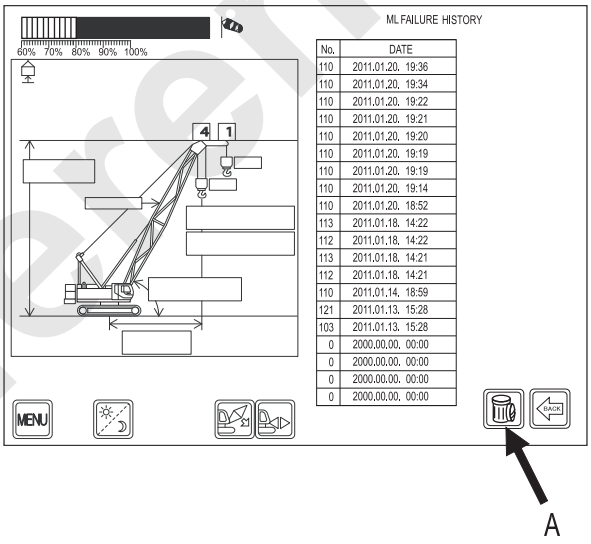
10.2.14 FAILURE HISTORY

1. Push [FAILURE HISTORY] in the maintenance menu.
2. Items are indicated.



(1) ML FAILURE HISTORY

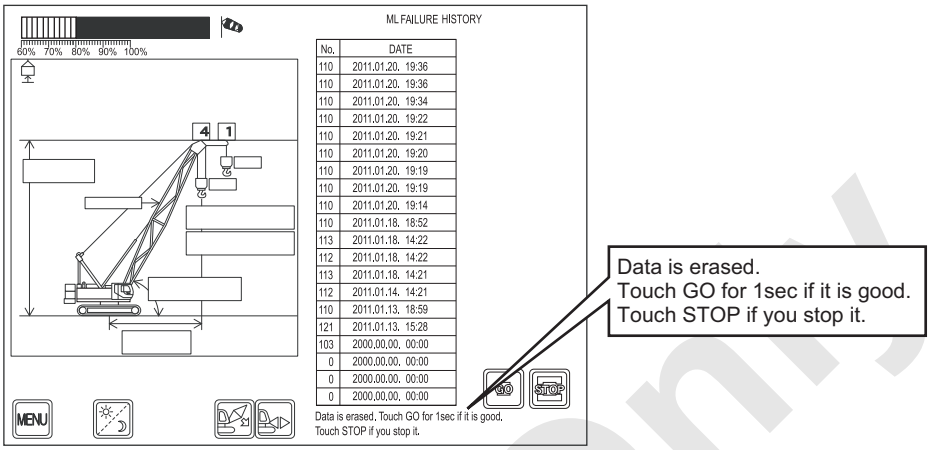
Push [ML FAILURE HISTORY] in the menu.
Past failures become indicated from latest one in order to max. 20 items.
Failure content is indicated by code.
Check the contents by the table in operator's manual "3.13 MESSAGE TABLE".



DELETING FAILURE HISTORY

When the failure record is to be deleted, push [A].

The message below becomes indicated.

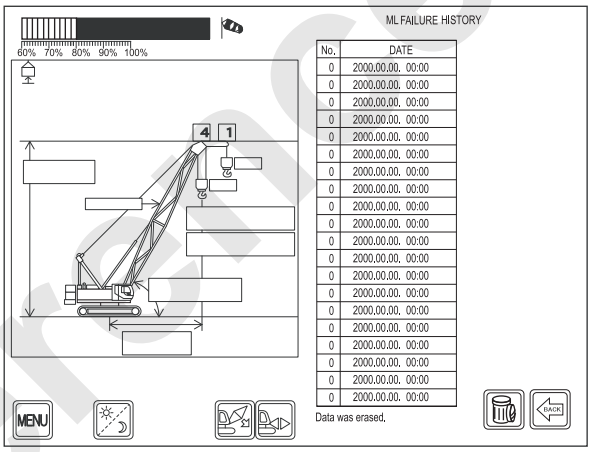


In case of deletion, push [GO].

In case of stop, push [STOP].

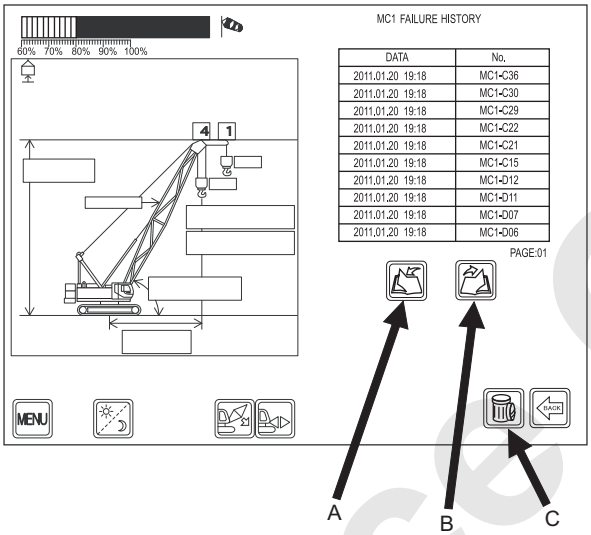
Push [GO] for more than 1 second.

By pushing [GO], data is deleted.



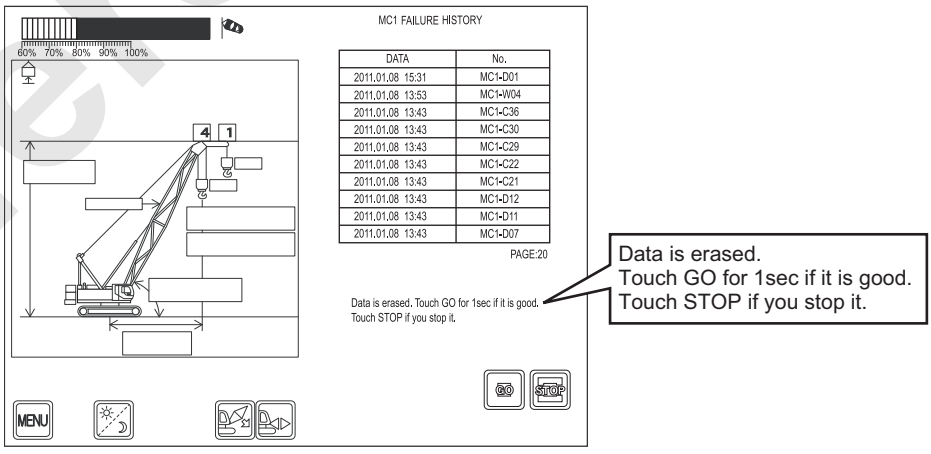
(2) MC1 FAILURE HISTORY

Push [MC1 FAILURE HISTORY] in the menu.
Past failures become indicated from the latest one in order to max. 200 items (10 item X 20 page).
By [A] page can be scrolled up and by [B] page can be scrolled down.
Failure content is indicated by code.
Check the contents by the table in operator's manual "3.13 MESSAGE TABLE".



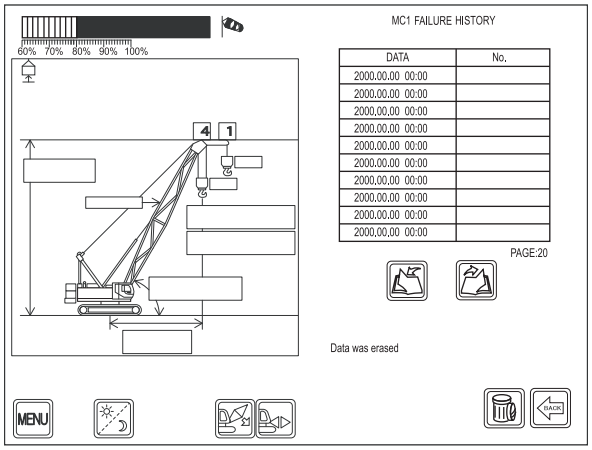
DELETING FAILURE HISTORY
To delete failure history, push [C].
Message below becomes indicated.

By pushing [GO], data is deleted.



In case of deletion, push [GO]. In case of stop, push [STOP].
If deleted, all pages are deleted at once. Push [GO] for more than 1 second.

By pushing [GO], data is deleted.



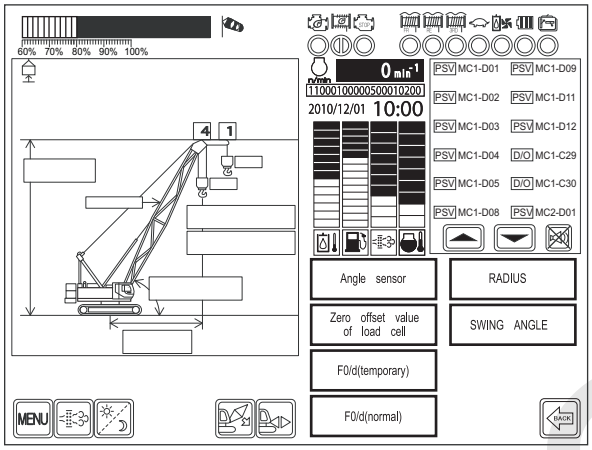
(3) DELETING MC2 FAILURE HISTORY

Push [DELETING MC2 FAILURE HISTORY] in the menu.

Indication content and handling procedure are same as MC1.

10.2.15 ADJUSTMENT DATA

1. Push [ADJUSTMENT DATA] in the maintenance menu.
   Adjustment data menu becomes indicated.



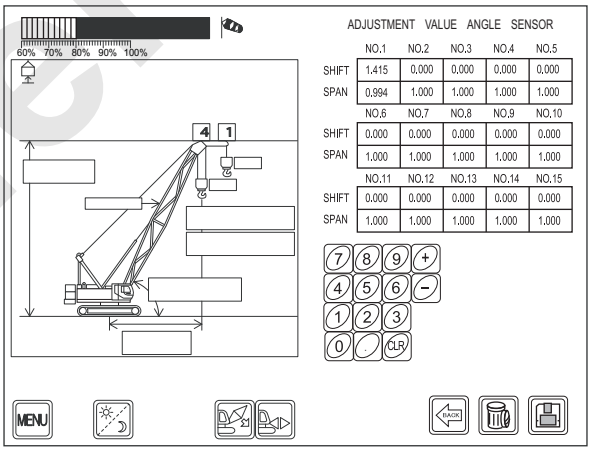
(1) ANGLE SENSOR

(A) ADJUSTMENT DATA INDICATION

Push [ANGLE SENSOR] in the menu.
Table of adjustment data of angle detector is indicated.

On this machine, No.1 is used for boom angle detector, No.2 is for tower jib angle detector and No.3 is for tower jib angle detector.

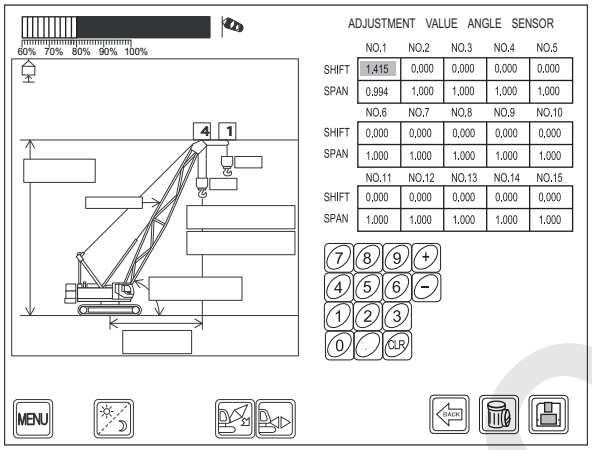
If adjustment is not done yet, shift = 0.000, span = 1.000 is indicated.



(B) ADJUSTMENT DATA CHANGE

In case of changing adjustment data, touch the digit area to be changed.

Touched area becomes reverse indication and digit input becomes possible.

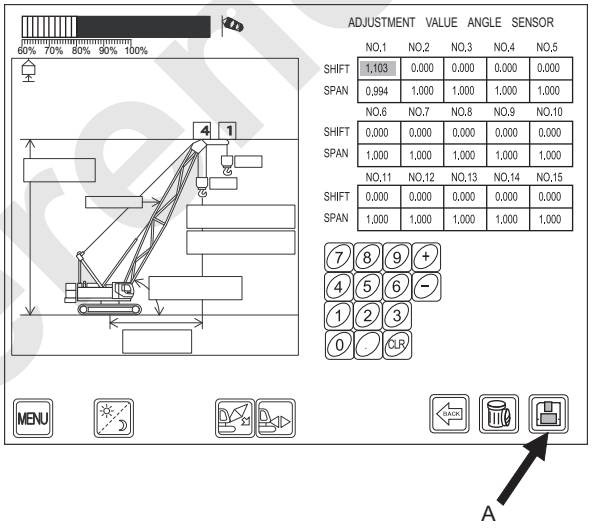


Input digit with digit key.

In case of input [1.103], input [1], [.], [1], [0], [3].

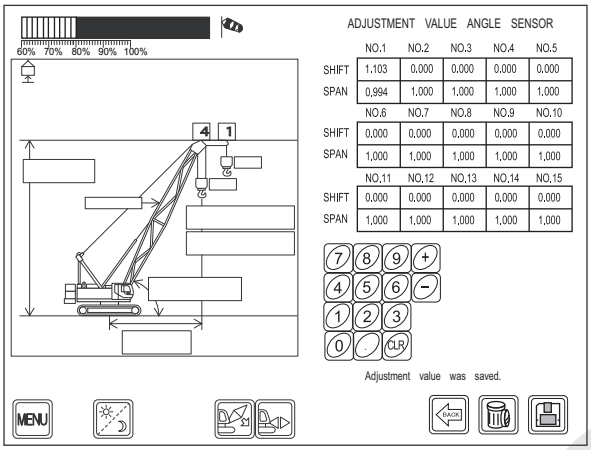
If there is other changing area, change the digit in the same way.

After all input is completed, push [A].



The message below becomes indicated.

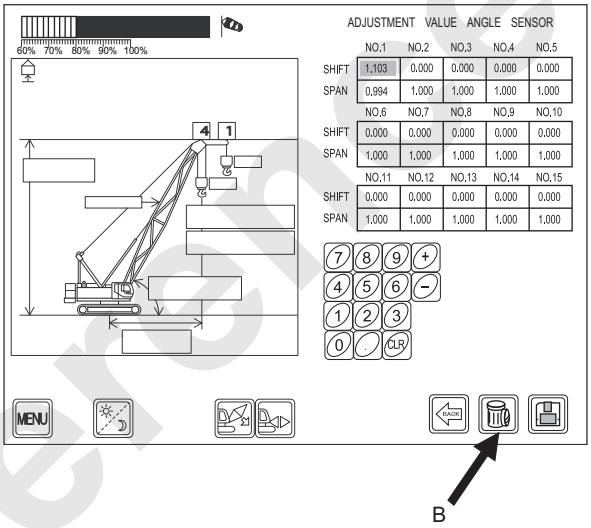
Push [OK].



(C) DELETING ADJUSTMENT DATA

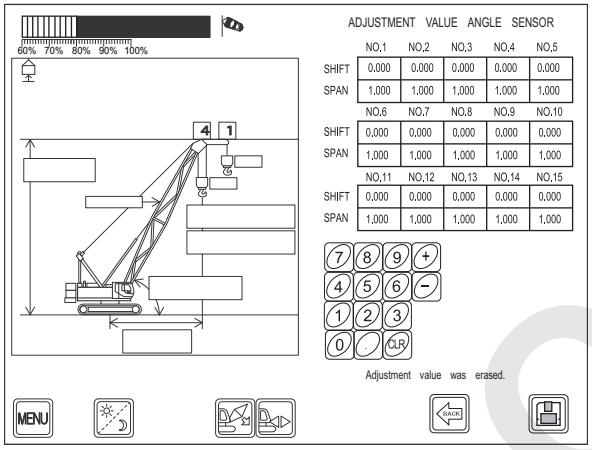
All of adjustment data are returned to initial values.

Push [B] for 3 seconds to execute.



All adjustment data returns to the initial value.
Initial value :
Shift = 0.000, Span = 1.000

This is to complete deletion.
Push [OK].



(2) LOAD DETECTOR ZERO ADJUSTMENT

(A) ADJUSTMENT DATA INDICATION

Push [Zero offset value of load cell] in the menu.

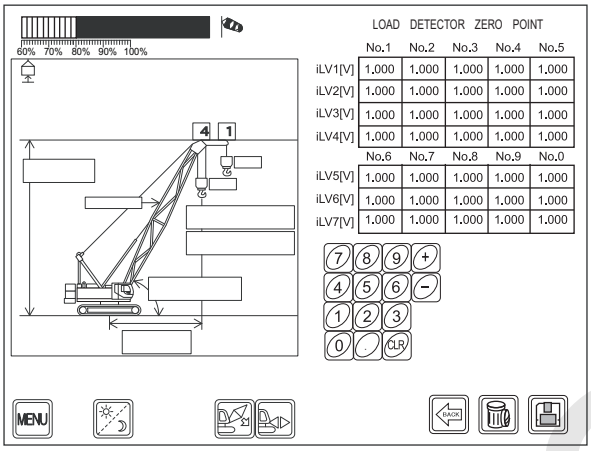


Table of zero point adjustment data of load detector is indicated.
They are indicated by load cell voltage value at time of zero adjustment.

On this machine, No.1 of iL1 is used for boom hoist load detector, No.1 of iL3 is for jib hoist load detector.
If adjustment is not done yet, 1.000 is indicated.
Push [BACK] to return to the previous screen.

(B) CHANGING OF ADJUSTMENT DATA

(C) DELETION OF ADJUSTMENT DATA

Adjustment data can be changed or deleted with the same way as that of adjustment data of angle detectors.

(3) WITHOUT LOAD / WITH LOAD
(TEMPORARY)

(A) ADJUSTMENT DATA INDICATION
Push [F0/d (temporary)] in the menu.

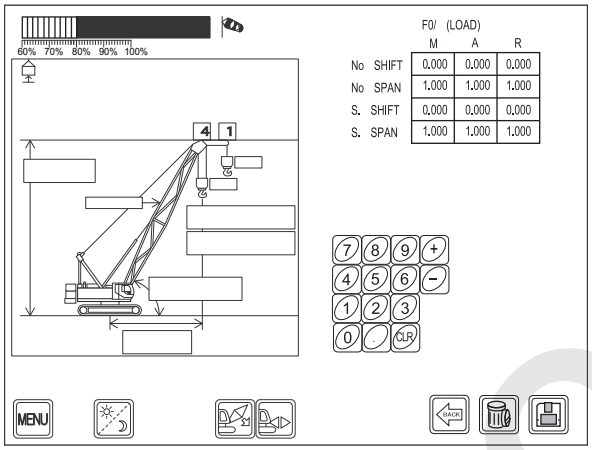


Table of adjustment data becomes indicated.
M : Front lifting mode adjustment data
A : Rear lifting mode adjustment data
R : Third lifting mode adjustment data
No. : Without load adjustment
S. : With load adjustment
If adjustment is not done yet, shift = 0.000, span = 1.000 becomes indicated.
To return to previous screen, push [BACK].

(B) CHANGING OF ADJUSTMENT DATA

(C) DELETION OF ADJUSTMENT DATA

Adjustment data can be changed or deleted with the same way as that of adjustment data of angle detectors.

(4) WITHOUT LOAD / WITH LOAD (NORMAL)

(A) ADJUSTMENT DATA INDICATION

Push [F0/d (normal)] in the menu.

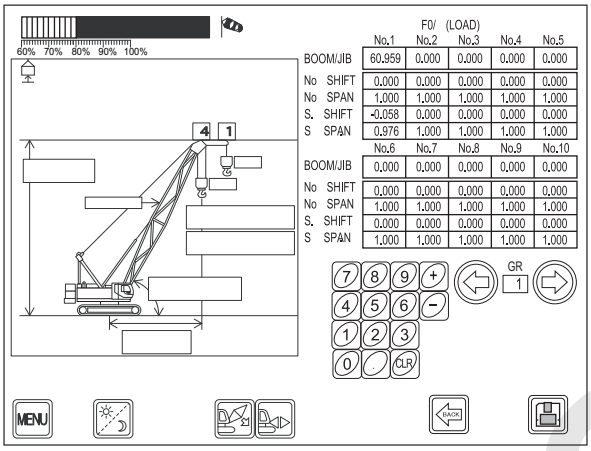


Table of adjustment data becomes indicated.
On this adjustment, 10 type of boom length adjustment are possible on each group of 1 to 30.
At first, group 1 becomes indicated.
On every pushing of [→], group changes like 2, 3, 4.....30.
On every pushing of [←], group changes like 30, 29, 28.....2.
No.1 to No.10, adjusted boom length (jib length in case of luffing), shift and span of without load adjusting become indicated.
If adjustment is not done yet, shift = 0.000, span = 1.000 becomes indicated. When more than two boom (jib) length are adjusted and non adjusted boom (jib) length is used, calibration between closest two length is applied.

(B) CHANGING OF ADJUSTMENT DATA

(C) DELETION OF ADJUSTMENT DATA

Adjustment data can be changed or deleted with the same way as that of adjustment data of angle detectors.
* In case of deletion, indicated group data ONLY are deleted.

(5) SWING RADIUS

(A) ADJUSTMENT DATA INDICATION

Push [RADIUS] in the menu.

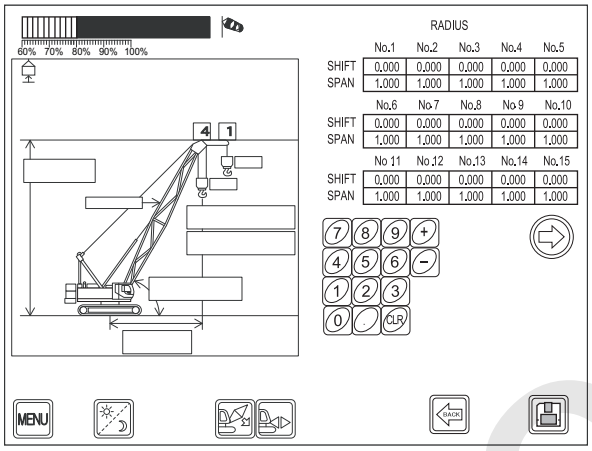


Table of adjustment data becomes indicated.
This adjustment also consists of group 1 to 30 and the first screen indicates group 16 to 30.
By pushing [→] group 16 to 30 becomes indicated.
Contents of each group is as same as that of "WITHOUT LOAD / WITH LOAD (NORMAL)".
If adjustment is not done yet, shift = 0.000, span = 1.000 becomes indicated.

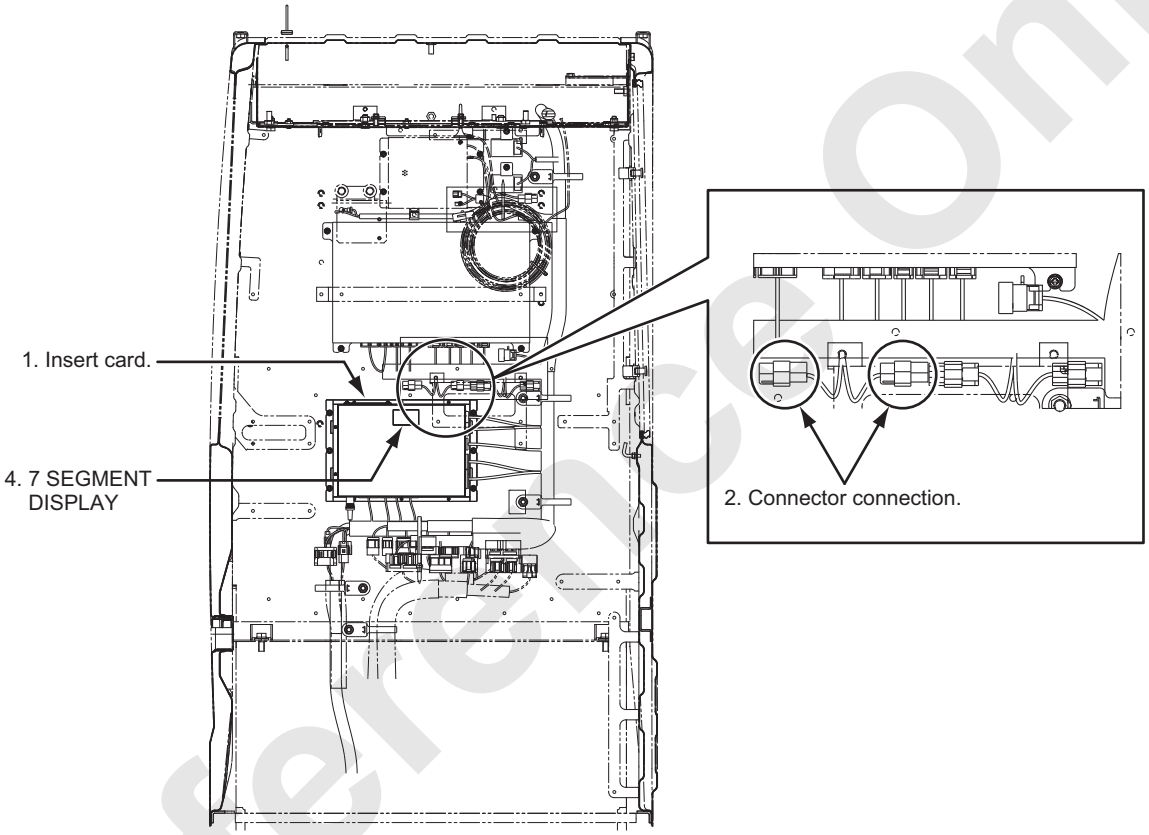
(B) CHANGING OF ADJUSTMENT DATA

(C) DELETION OF ADJUSTMENT DATA

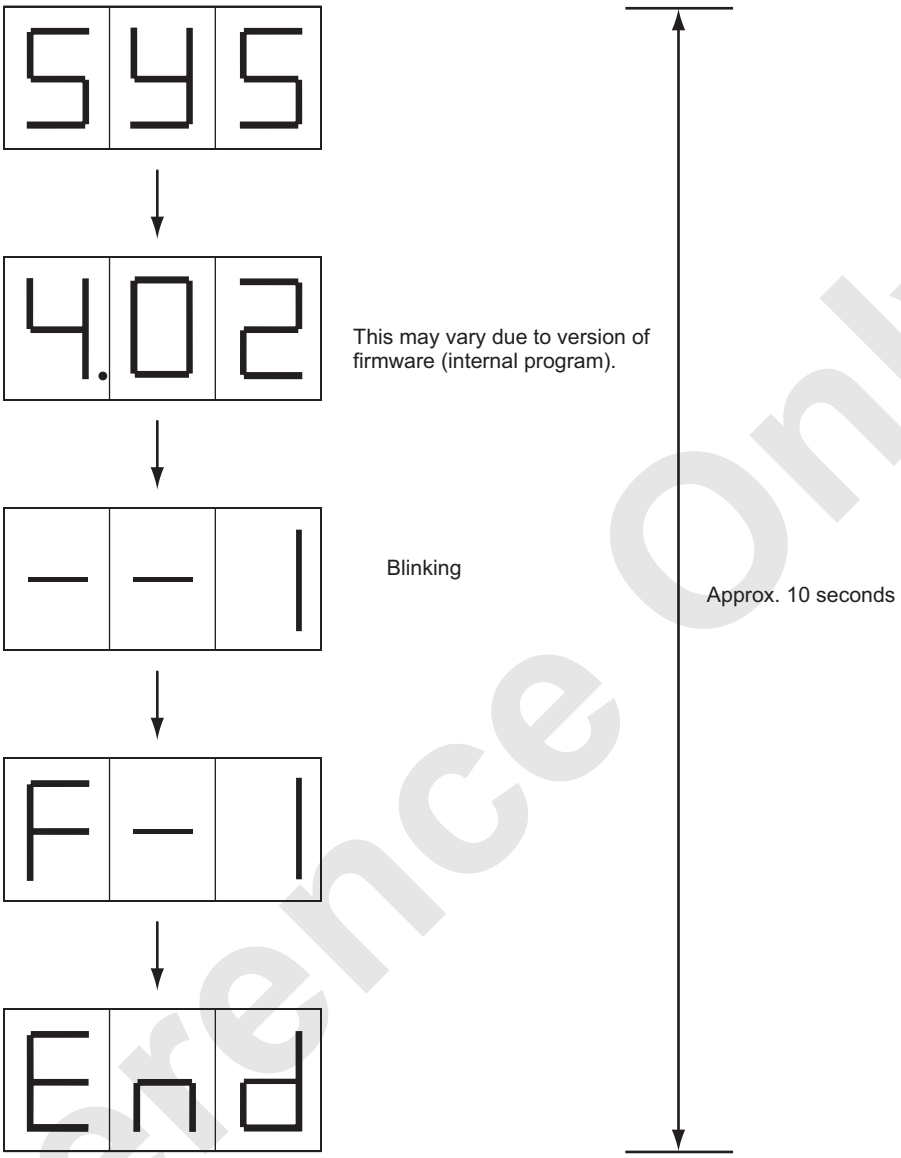
Adjustment data can be changed or deleted with the same way as that of adjustment data of angle detectors.

10.2.16 DOWNLOAD ML PROGRAM

1. Take out data CF card from ML controller and insert CF card with new program filed in.
   * It is possible to write in by filing the program to data CF card.
   E Model will be need turn on to "H3" position of drum select switch.
2. Connect write in permit connector CN- 420M on the right upper of the controller and CN-439F.
3. Turn on the key switch.
4. Download is started.



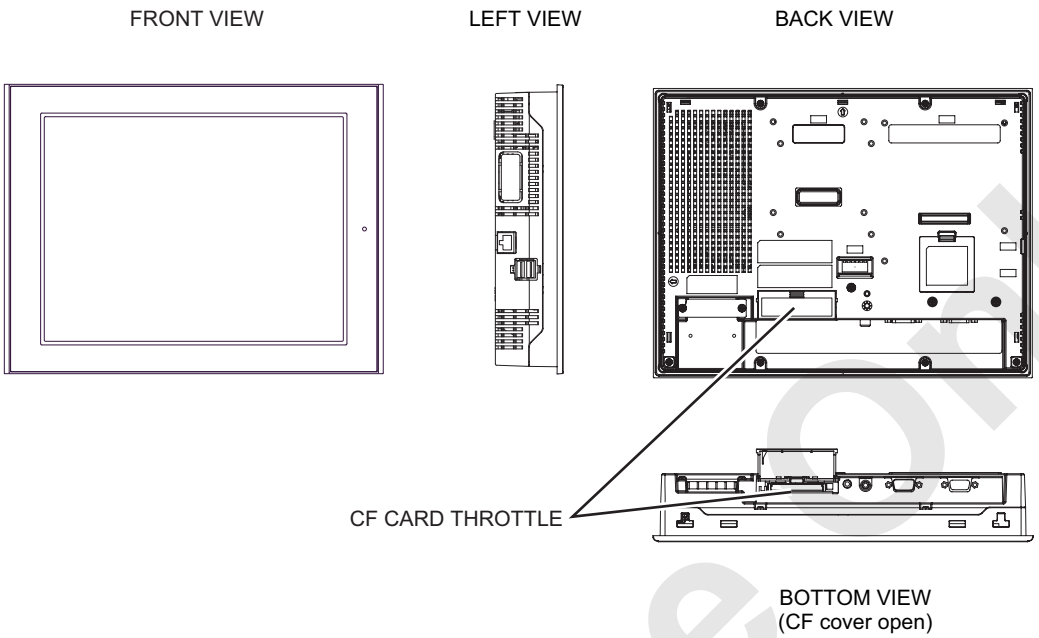
During download, 7 segment display of the controller changes as shown below.



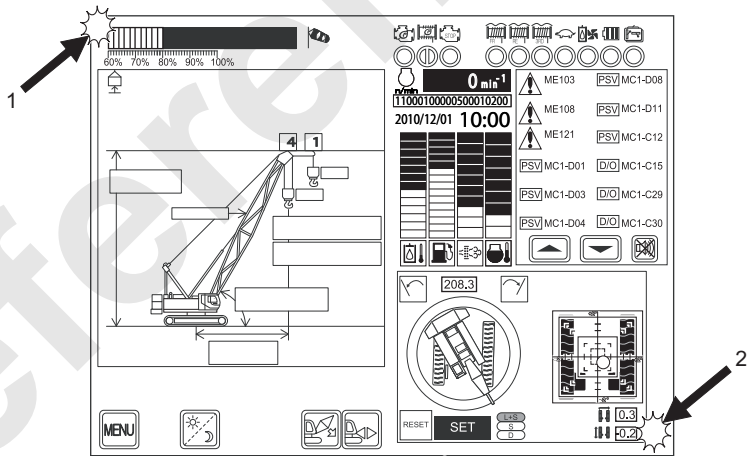
5. When End is indicated, re-writing is completed.
6. Turn OFF the key switch.
7. Pull out write in permit connector.
8. Return the CF card back to the original position.

10.2.17 DOWNLOAD OF MONITOR PROGRAM

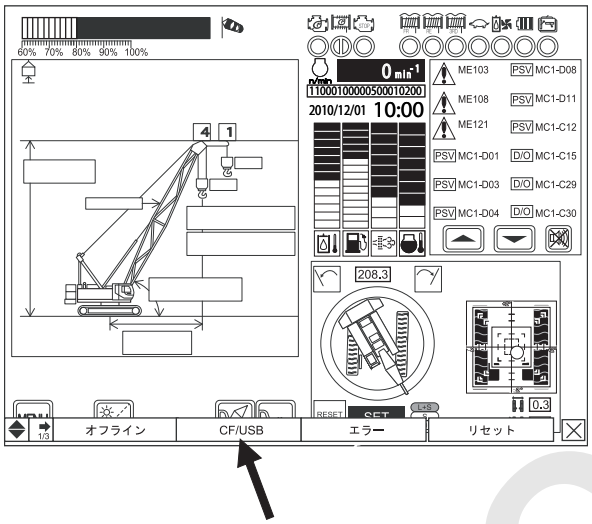
1. Insert the CF card with new program filed in to the CF card throttle on the back face of the monitor.
   * Ensure to close the cover.



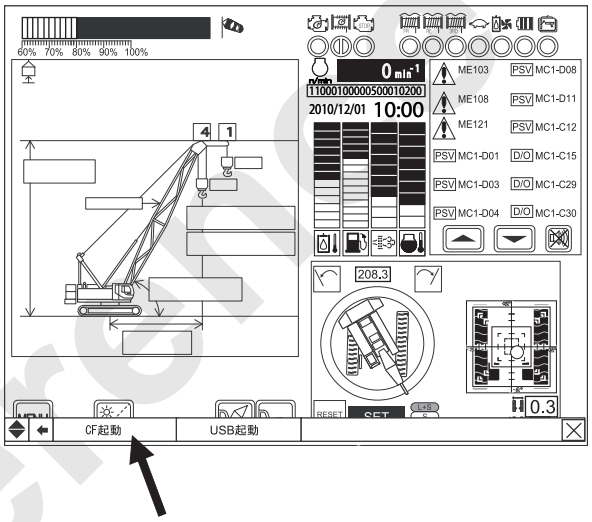
2. Turn the key switch ON and wait for screen to start.
3. When the screen is started, tap on screen corners diagonally in succession.



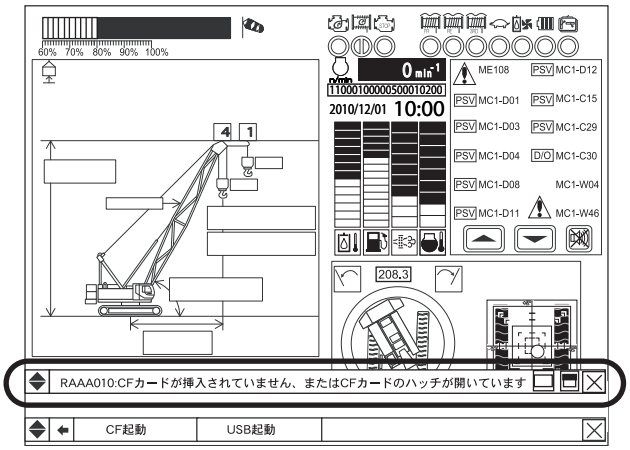
4. Menu becomes indicated on the lower part of the screen. Select [CF/USB].



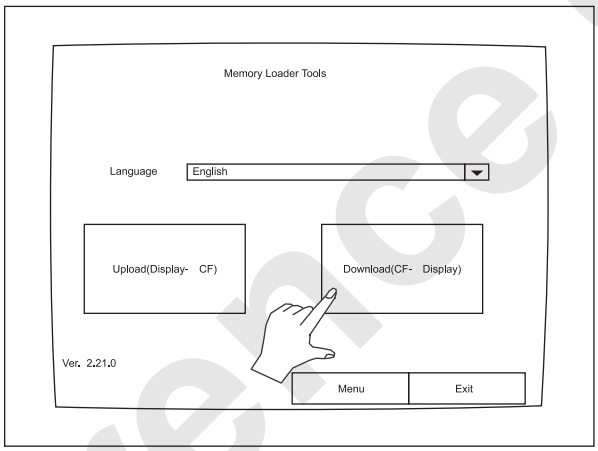
5. Select [CF START].



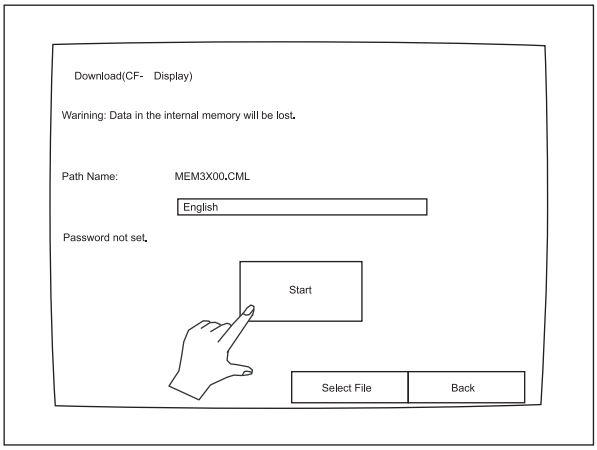
6. If the error as shown below is indicated, check for inserted condition of CF card or cover to be closed.



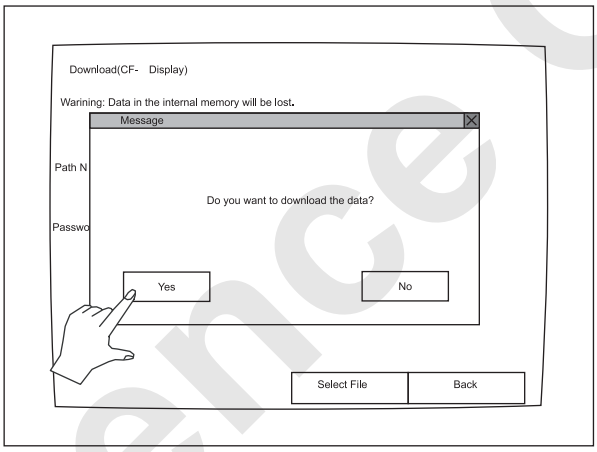
7. Select [DOWNLOAD (CF → Display)]



8. Select [START].

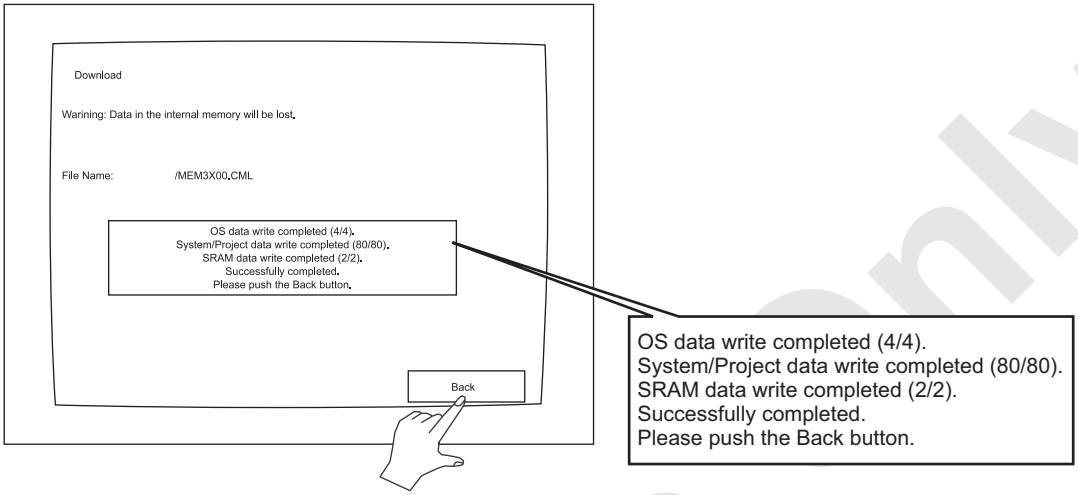


9. Select [YES].

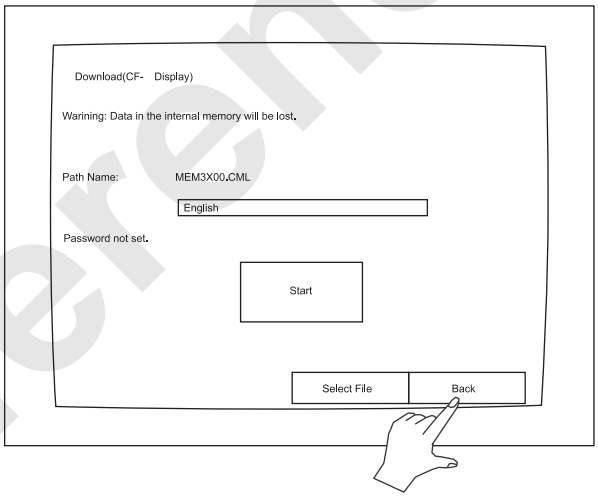


10. Download starts.
    Write in [OS data], [System / Project data] in its order. If properly completed, message as shown bellow becomes indicated.

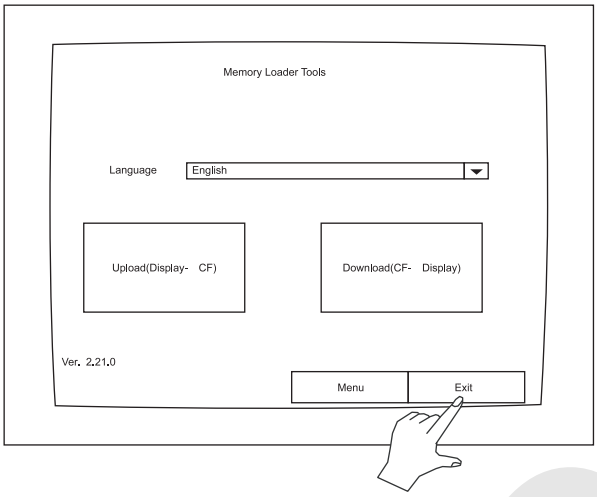
    Push [Back].



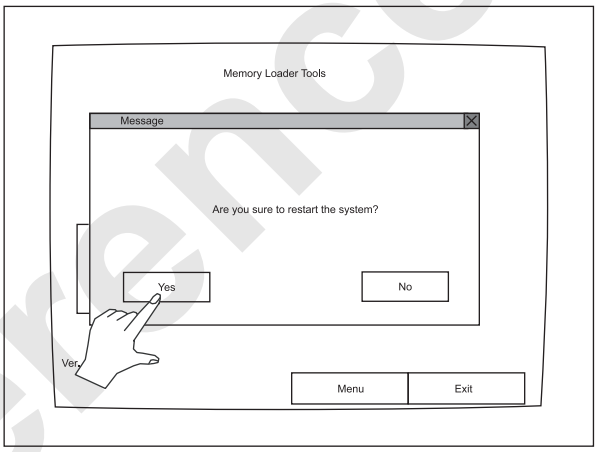
11. Push [Back] to return to the screen before writing in starts.



12. Push [Exit] to return to the screen 1 step before.



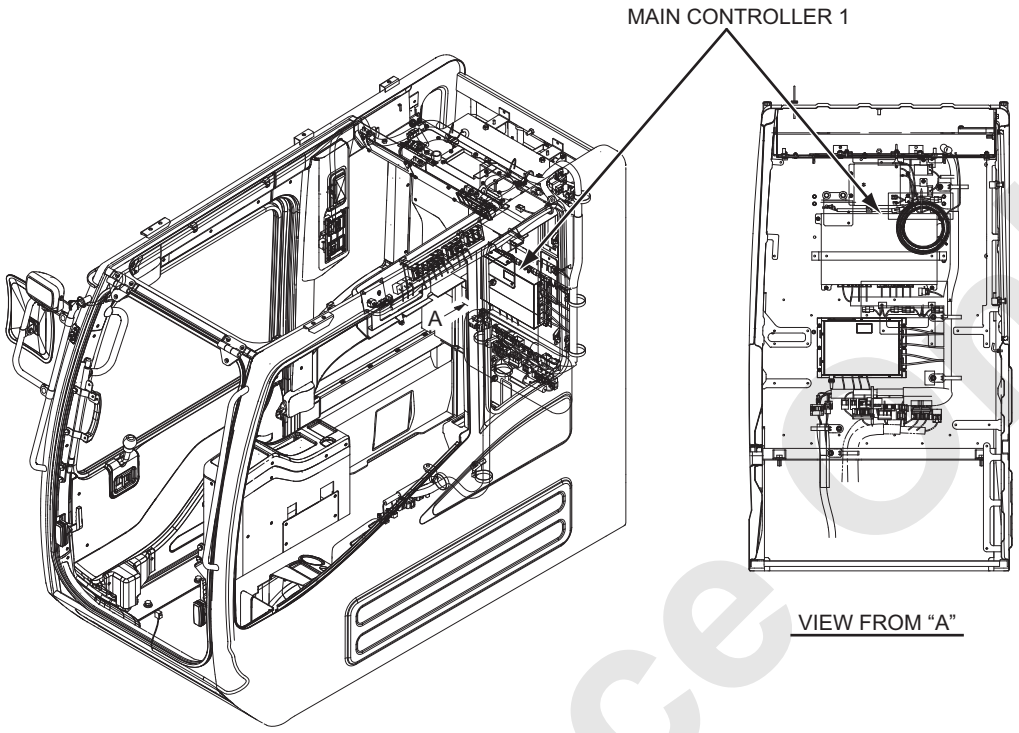
13. Push [Yes].
    Monitor re-starts.
    This is to complete re-writing of program.
    Turn the key switch OFF and take out the CF card.



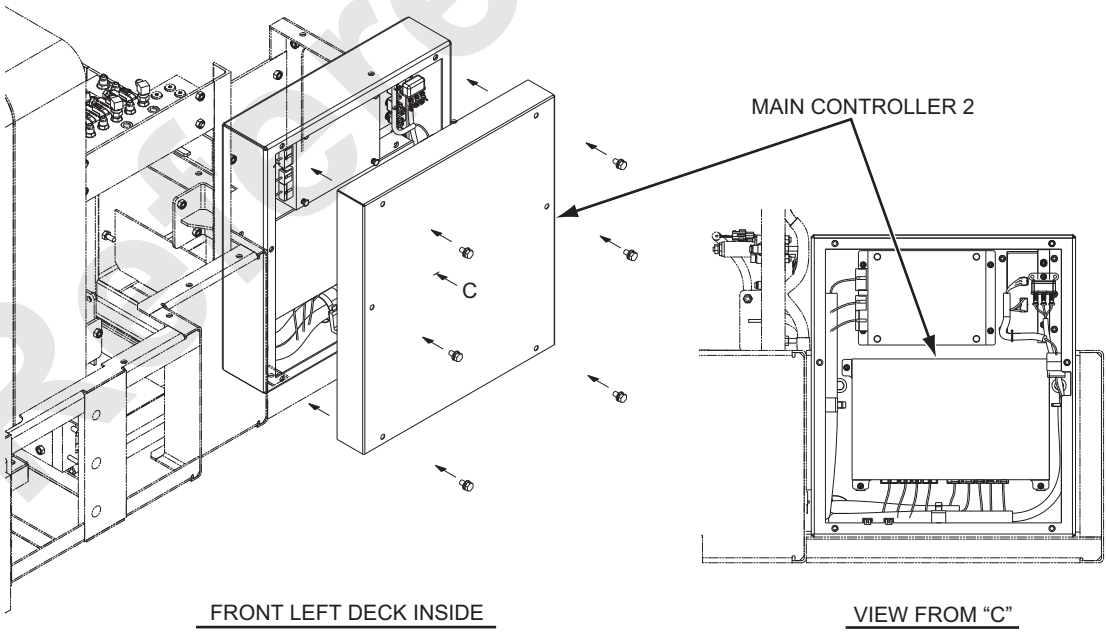
10.3 MAIN CONTROLLER

10.3.1 ARRANGEMENT OF MAIN CONTROLLER

1. INSTALLATION POSITION (CAB) OF MAIN CONTROLLER 1

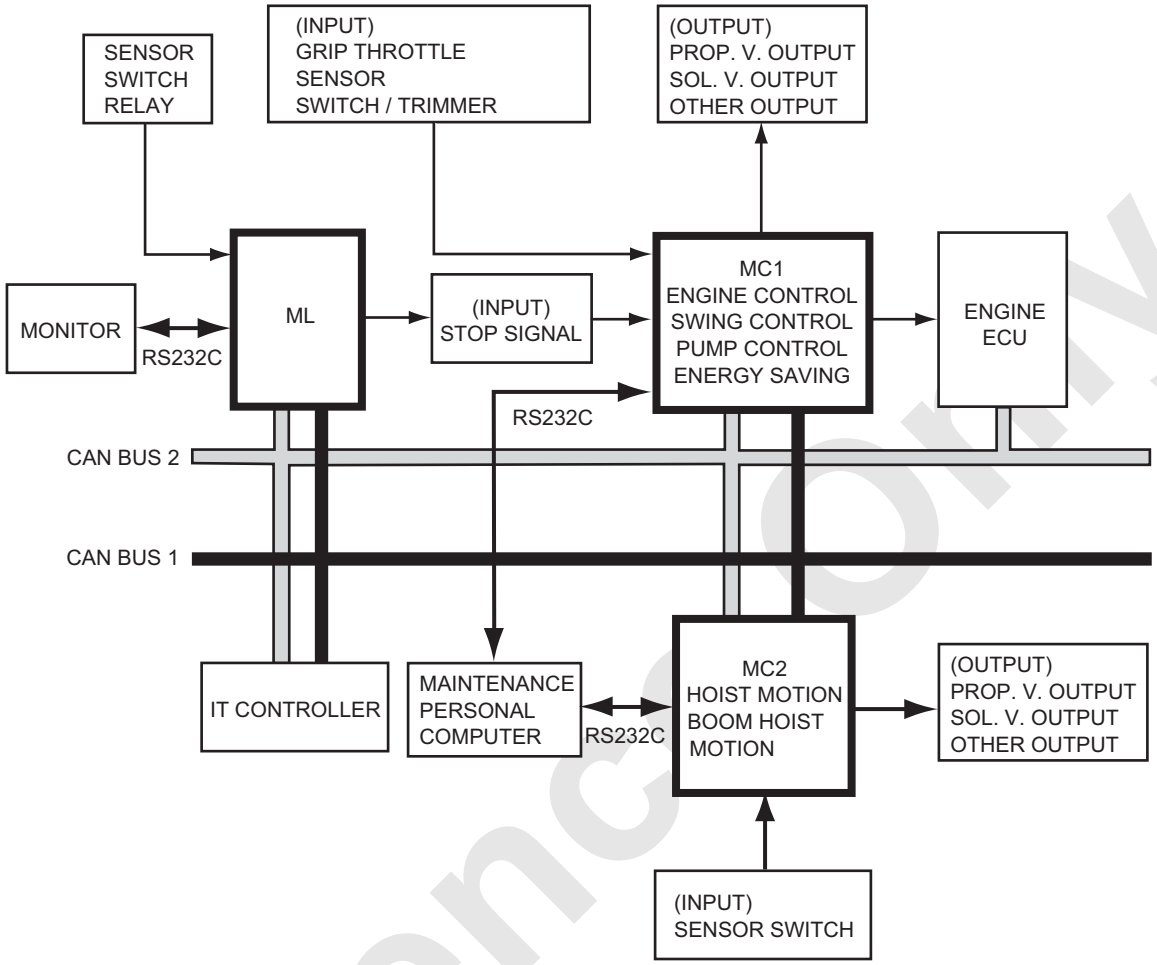


2. INSTALLATION POSITION (LEFT CAB) OF MAIN CONTROLLER 2



10.3.2 COMPOSITION OF SYSTEM

1. SYSTEM COMPOSITION CHART



- Output relation to controller

Items	Input/Output	Signal types	Outline
M/L (LMI)	Input/Output	Serial communication	The changes in lifting height during boom and jib hoisting, faults signals, and number of part lines are transmitted from the M/L. The operating direction of the winch operation lever is transmitted to the M/L. The signals referring to automatic stop are input from the M/L in digital form.
Maintenance personal computer	Input/Output	Serial communication	This PC is used for down-loading of programs.
Grip throttle	Input	Analogue 0 to 5 V	The grip signals from the engine throttle are input.
Sensor	Input		The values from the pressure sensor, engine turn sensor, wind speed sensor, etc. are input.
Cab inside switch/ trimmer	Input		The values from the switches and trimmers in the cab are input.
Proportional valve	Output	24 V 100 to 700 mA	PWM output Constant current circuit (Max 1 A) Disconnection detection W/short-circuit protection
Solenoid valve	Output	24 V 1 A	Disconnection detection W/short-circuit protection

10.3.3 FUNCTION OF MAIN CONTROLLER

No.	FUNCTION	CONTROL	
		MC1	MC2
1	ACCELERATOR CONTROL	O	
2	HORSE POWER CONTROL	O	
3	WINCH MOTOR SPEED CONTROL	O	O
4	-		
5	SWING COUNTERFORCE	O	
6	SWING SPEED CONTROL	O	
7	SWING AUTO STOP	O	
8	WINCH CONTROL	O	O
9	BOOST CONTROL		O
10	BOOM STOP CONTROL		O
11	-		
12	-		
13	FRONT/REAR HOIST STOP		O
14	MOTOR TILT ANGLE CONTROL		O
15	HOOK OVER HOIST CONTROL	O	O
16	DRUM ROTATION DETECT GRIP CONTROL	O	
17	FRONT/BOOM PUMP CONTROL	O	
18	HEIGHT METER	O	
19	LEVER INTERLOCK CONTROL	O	O
20	DPF REGENERATION CONTROL	O	O
21	INDEPENDENT/CONFLUENCE SELECT CONTROL	O	O
22	G WINCH CONTROL		O
23	G ENGINE CONTROL	O	
24	AIS CONTROL	O	
25	HYD. OIL HEAT	O	O

MC1 : MAIN CONTROLLER 1
MC2 : MAIN CONTROLLER 2

- Adjustment function

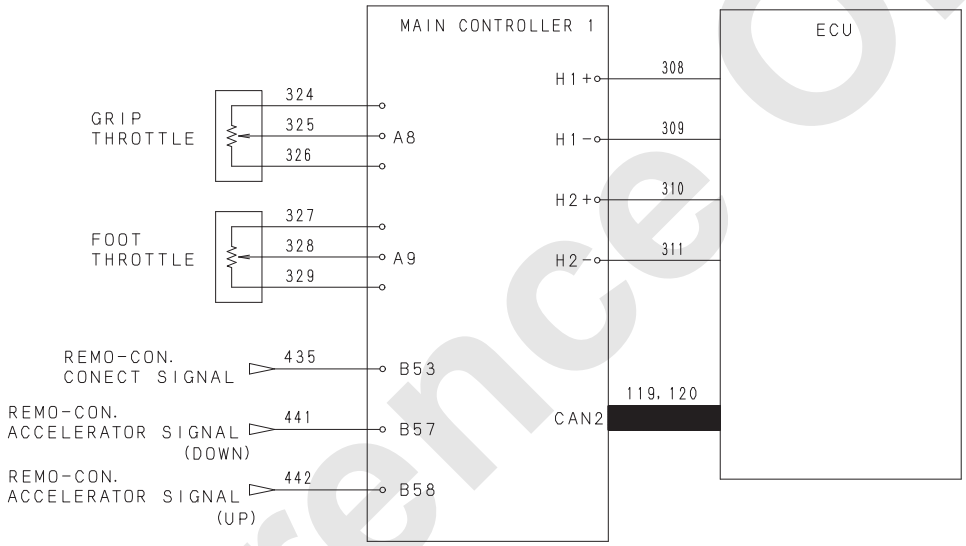
No.	Function items
1	Adjustment 1 Model number setting
2	Adjustment 2 Option setting
3	Adjustment 3 Adjustment of grip throttle and foot throttle
4	Adjustment 4 Engine speed adjustment
5	Adjustment 5 Adjusting of inclination meter
6	Adjustment 6 Supply pump adjustment

1. ACCELERATOR CONTROL

(1) Accelerator control

This provides command to ECU (engine control) based on input of grip throttle or foot throttle.
In case of both throttles are equipped, throttle having larger amount of command has priority.

To make foot throttle effective, option setting and adjustment is required.
In case of receiving command from remote control too, accelerator control by command to ECU shall be done.
In case the remote control is connected, input to remote control has the first priority to control.



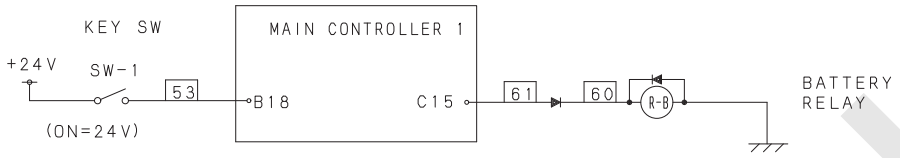
If the wire of accelerator control or foot control is broken, output voltage to ECU becomes 0 V.)
In this case, by turning the aux. accelerator switch to ON, low speed and middle speed becomes operational.
(High speed is not possible)

(2) Power control

Battery is energized 1.5 seconds after the key switch is turned ON.

Battery is de-energized 4 seconds *after the key switch is turned OFF.

However in case of emergency solenoid being actuated, 90 seconds after.



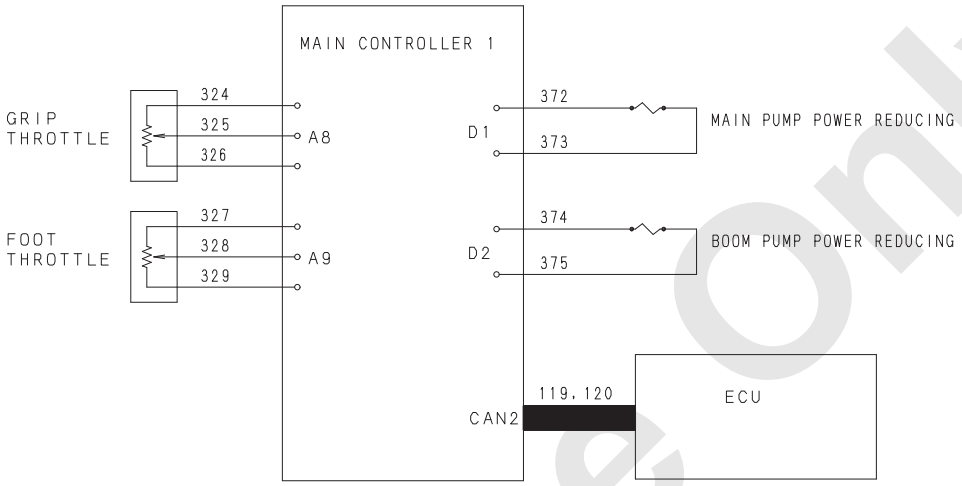
2. HORSE POWER CONTROL

This is to control pump by calculating target speed from grip throttle and by matching with engine actual speed.

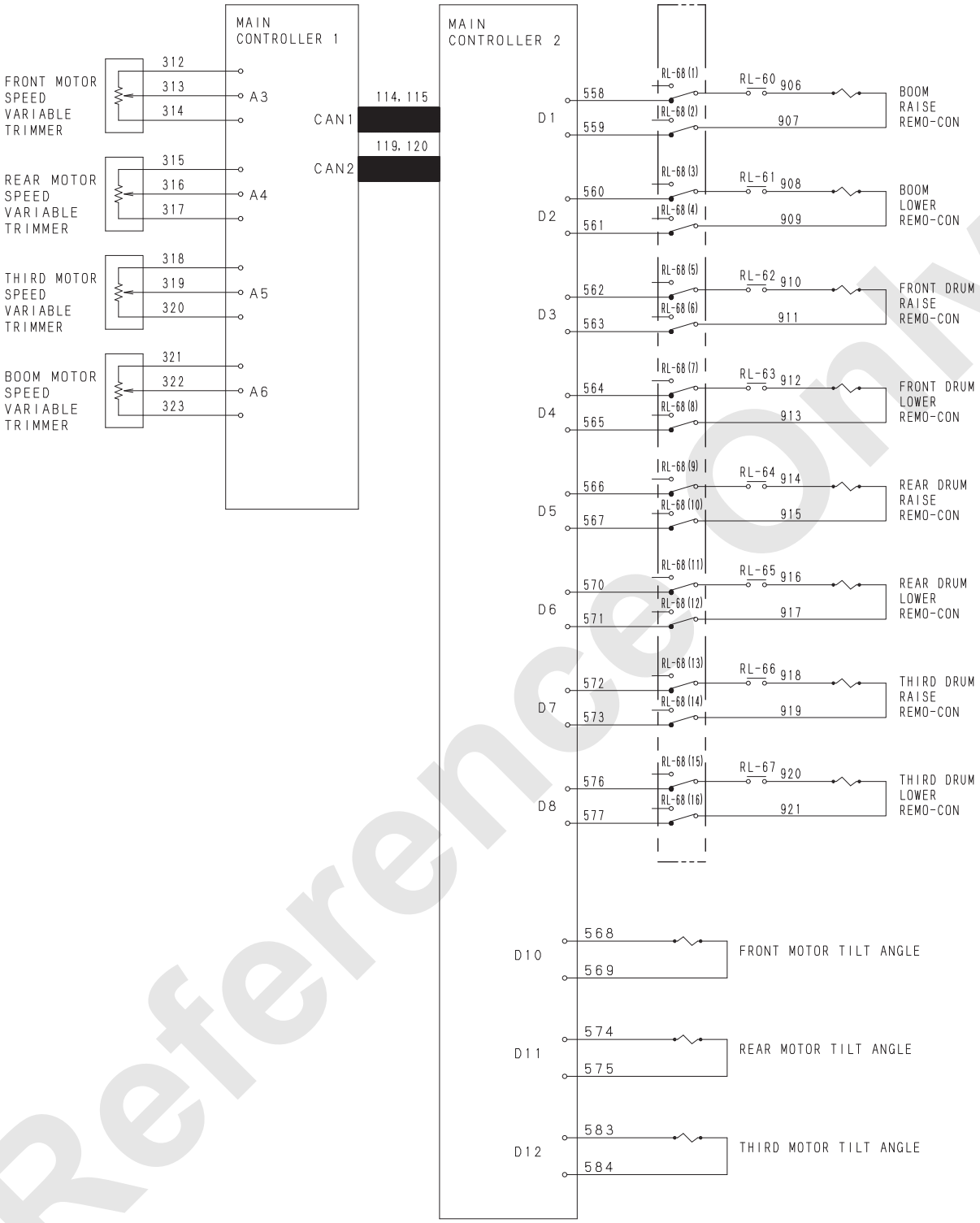
Lower the actual speed is against target speed, larger the output current is.

However in case of low idling, even the difference is small, output current is large.

(to prevent engine stall)



3. WINCH MOTOR SPEED CONTROL



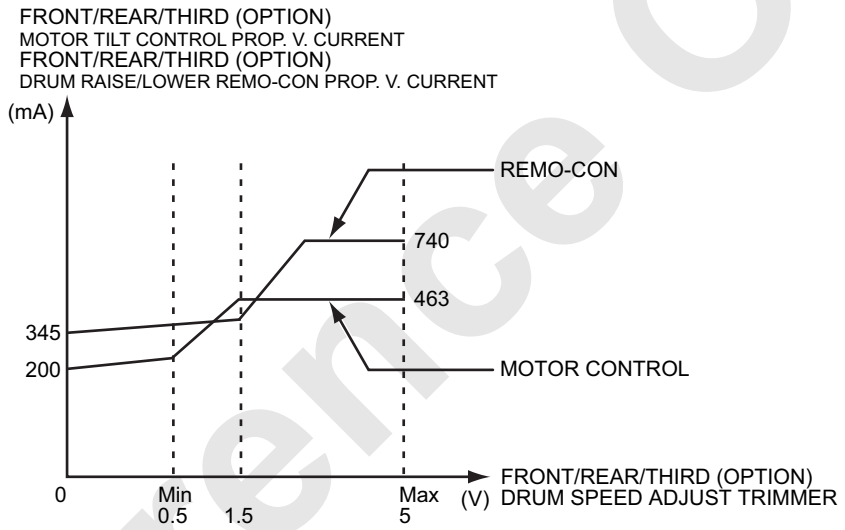
(1) Front/Rear/Third (option) drum speed variable

Max. current of remo-con prop. valve and motor control prop. valve is controlled as shown above.

Priority order is as follows.

Remo-con prop. valve
Front, rear, third (option) stop, Lever interlock > Front, rear speed reducing > Free fall > Trimmer control

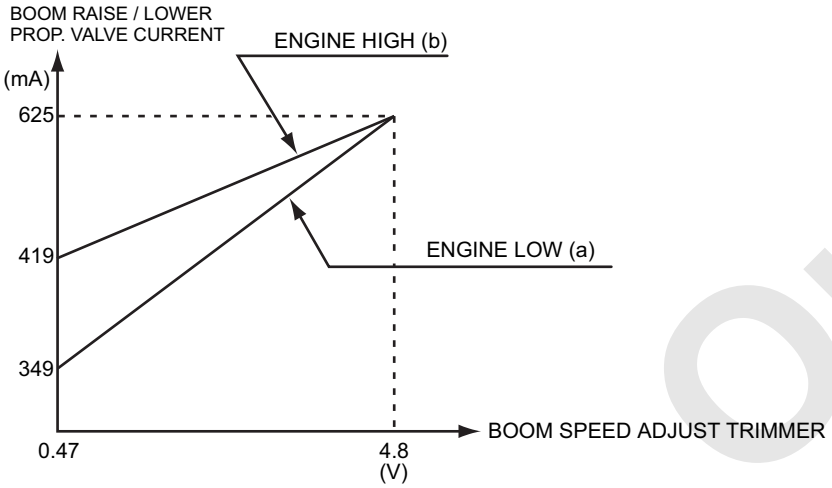
Motor control prop. valve
(Refer to "14. MOTOR TILT ANGLE CONTROL" for detail)
Auto-stop > Free fall speed increase > Main pump inching speed > Trimmer control (during power lowering)



(2) Boom drum speed control

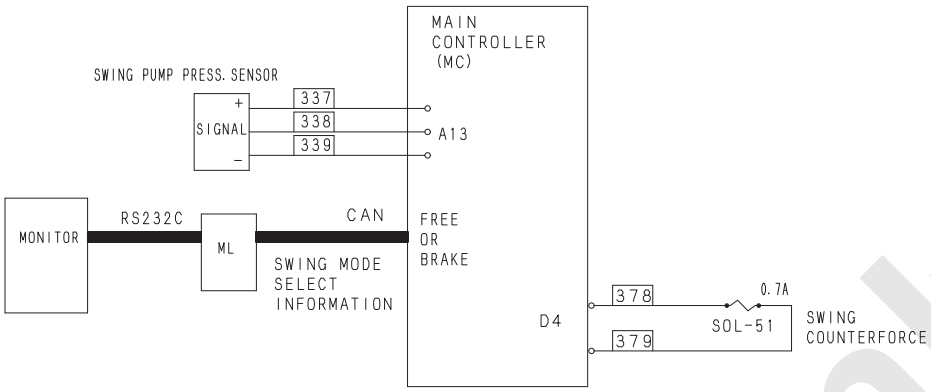
In case of low engine speed, when engine speed is intended to raise by characteristic (a), it becomes closer to characteristic (b).

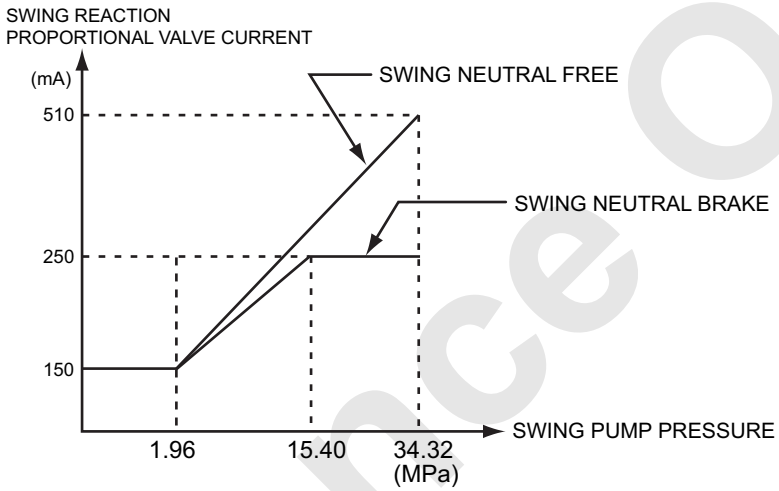
If the trimmer is set to maximum value, the prop. valve becomes full open and the main valve opening becomes maximum.



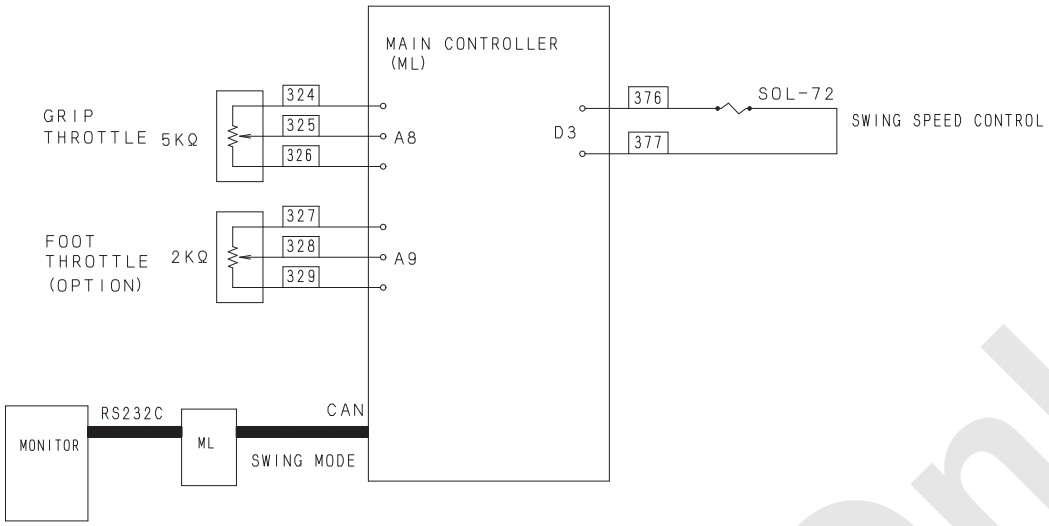
5. SWING COUNTERFORCE

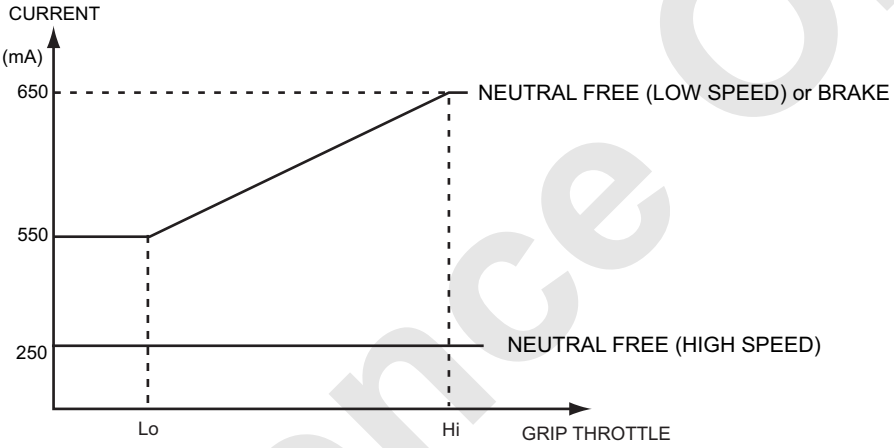
A reaction is applied to the lever depending on swing loads.





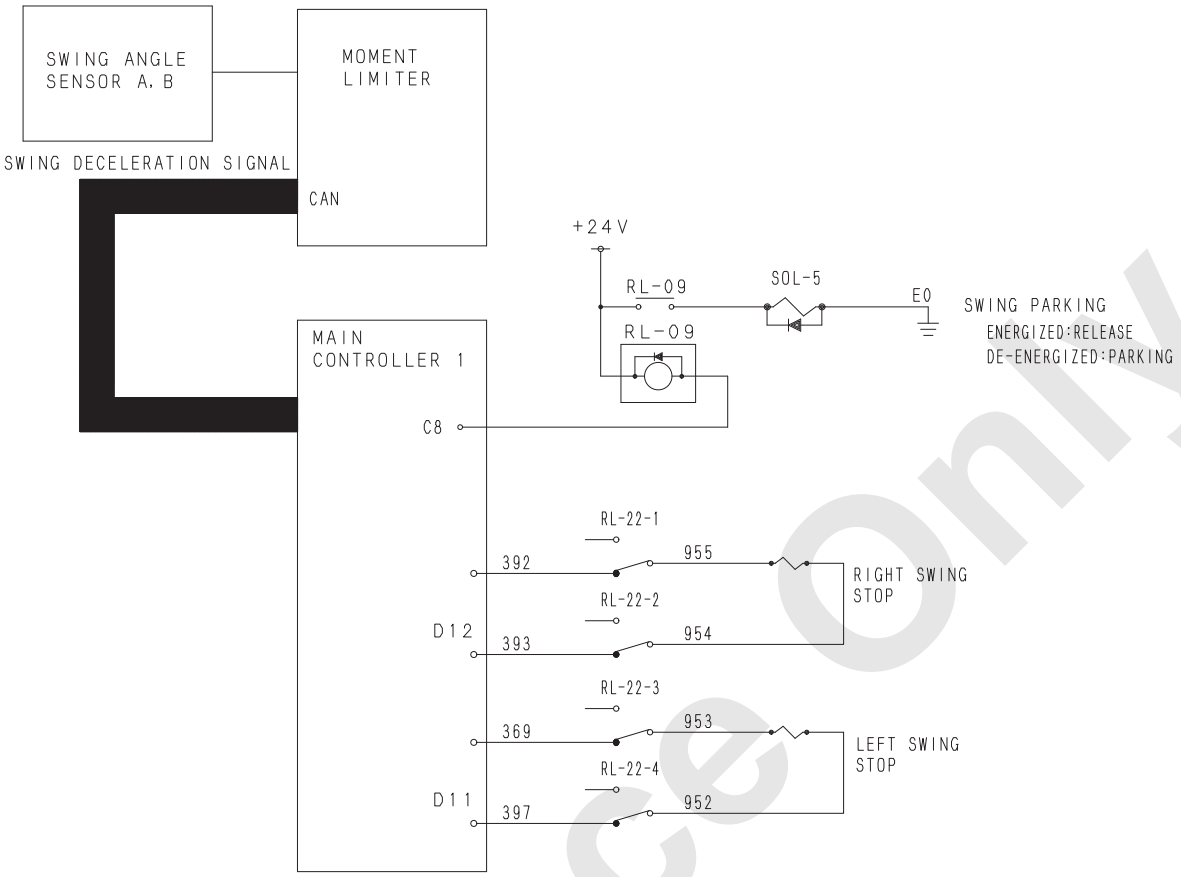
6. SWING SPEED CONTROL





- When the swing control signal is OFF for 10 seconds, or swing limit function is selected, the current becomes maximum value. (700 mA)

7. SWING LIMIT CONTROL



(1) Swing deceleration

Based on swing deceleration signal (R and L) input value (31 → 0), right swing / left swing stop prop. valve output current is controlled.

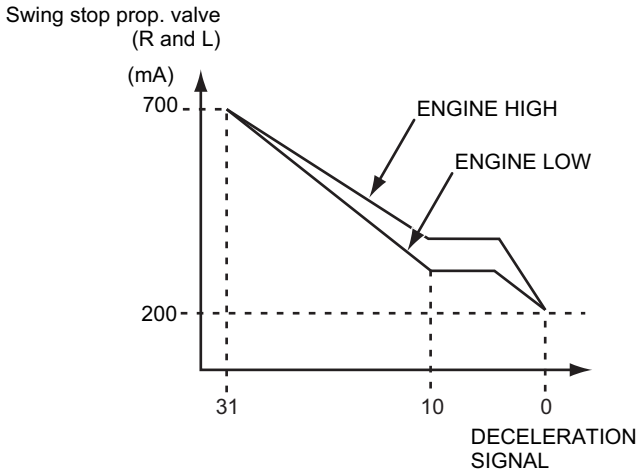
(2) Swing stop

5 seconds after the deceleration signal becomes "0", swing parking output is issued.

Parking action is released when left control pressure is detected when stopped with right deceleration.

Parking action is released when right control pressure is detected when stopped with left deceleration.

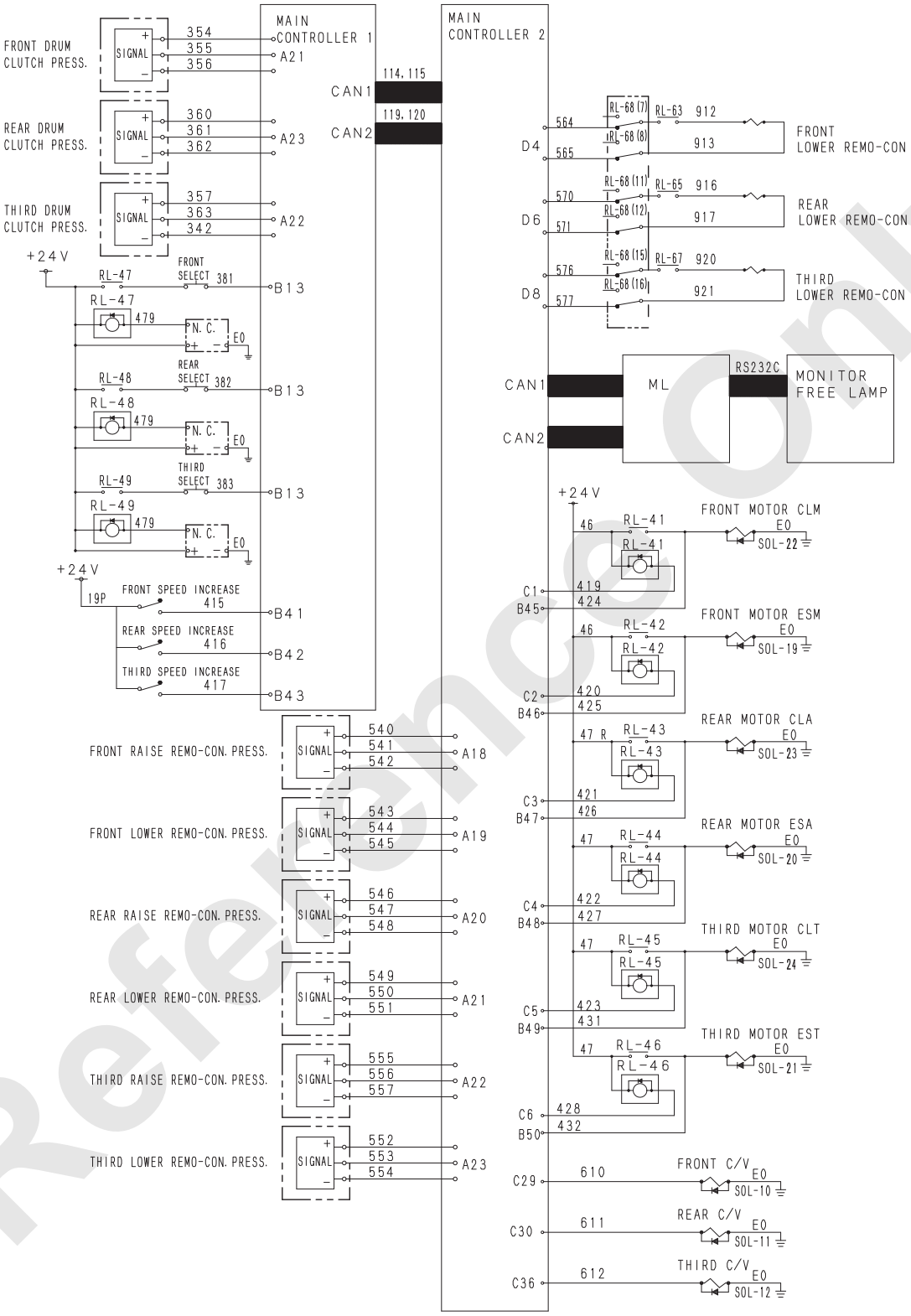
Judging point of control pressure is more than 0.539 MPa.



8. WINCH CONTROL

(1) Control lever neutral mode selection

(2) Winch operation solenoid valve control



(A) When power is supplied
The machine always starts running in the neutral brake mode.

(B) Switching from the brake mode to the free fall mode.

Condition		Output
A. The free fall lock switch is set released. And function lock lever is neutral position.	→ Free release "ON"	• Select the free mode. • Light up the free fall indicator lamp. (Monitor indication) • Release the main
B. The foot brake is depressed (the pressure switch is set to the "ON" position). C. The free selector switch is set to the "ON" position.	→ Each drum free fall signal "ON"	

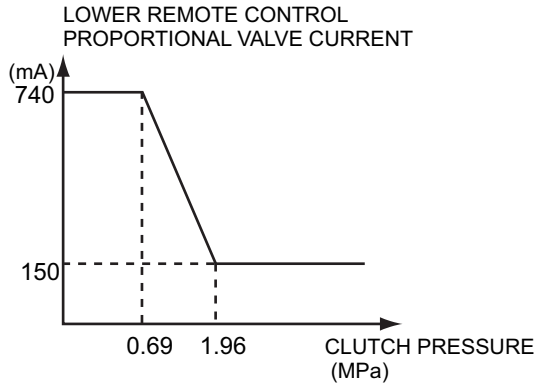
(C) Change from free fall mode to brake mode Depress the foot brake again, and set the free fall mode selector switch to the ON position.
Or, when the free fall permission signal is in the "OFF" status.

(D) Control of solenoid valve in free fall/brake mode
The front drum CLM (SOL-22) is controlled as shown in the table below.

	Mode	
Lever control	Neutral free	Neutral brake
Hoisting	X	X
Lowering	X	X
Neutral	O	X

O : Energized X : De-energized

- The ON/OFF status of the lever operation is judged by the value from the pressure sensor.
(Lever operation is judged to be ON if the pressure is 0.343 MPa or more.
It is judged to be OFF if the pressure is not more than 0.196 MPa or less.)
The rear drum CLA (SOL-23) and the third drum CLT (SOL-24) are controlled in a similar manner.
When the lever is at the neutral position while the free fall mode is selected, output from the front drum (rear drum and third drum) down remote control proportional valve should depend on the clutch pressure.



(E) Emergency solenoid valve control

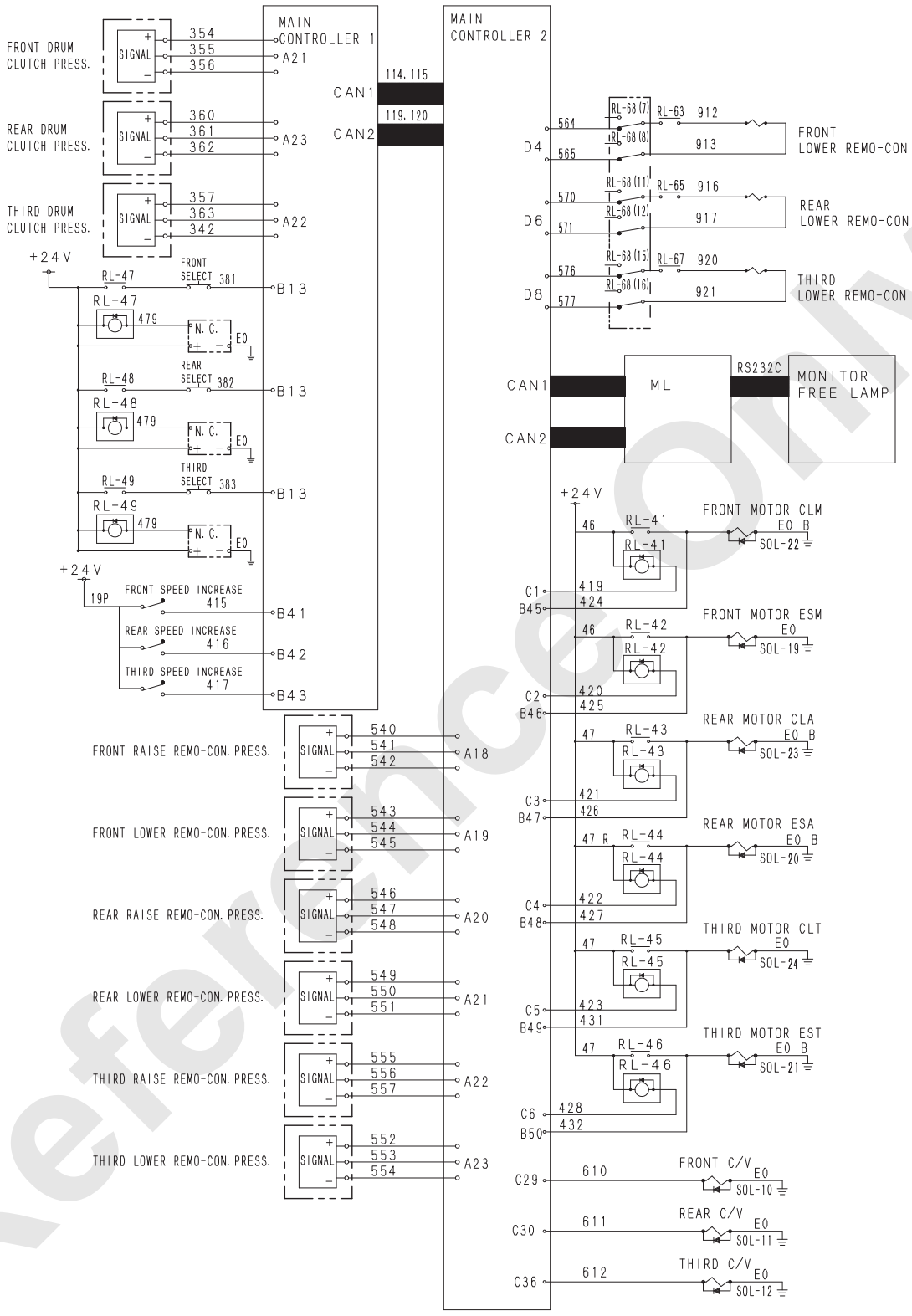
For the front drum, when either of the conditions below is satisfied, ESM (SOL-19) is energized to prevent a drop of a lifted load.

1) The clutch pressure is reduced although the brake mode is selected.
2) The clutch pressure is reduced although the lever is operated during the free fall mode.
   For the rear drum and the third drum, the ESA (SOL-20) and EST (SOL-21) are controlled, respectively.

Note

Once the emergency solenoid valve is actuated, the current operation mode cannot be altered to the free fall mode unless power to the controller is shut down. Even after the main power supply is shut down while the emergency solenoid valve is being actuated, power supply to the controller remains alive for ninety seconds after the engine is stopped. In this period, the residual clutch pressure is removed.

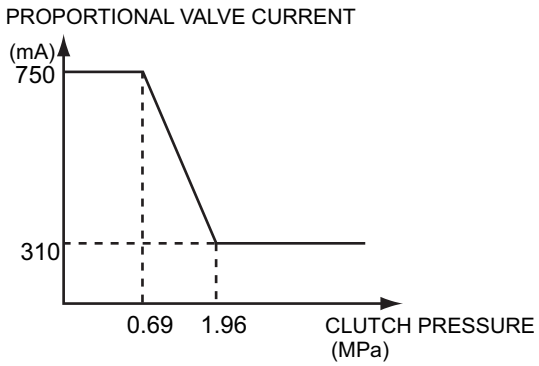
(3) Free fall acceleration



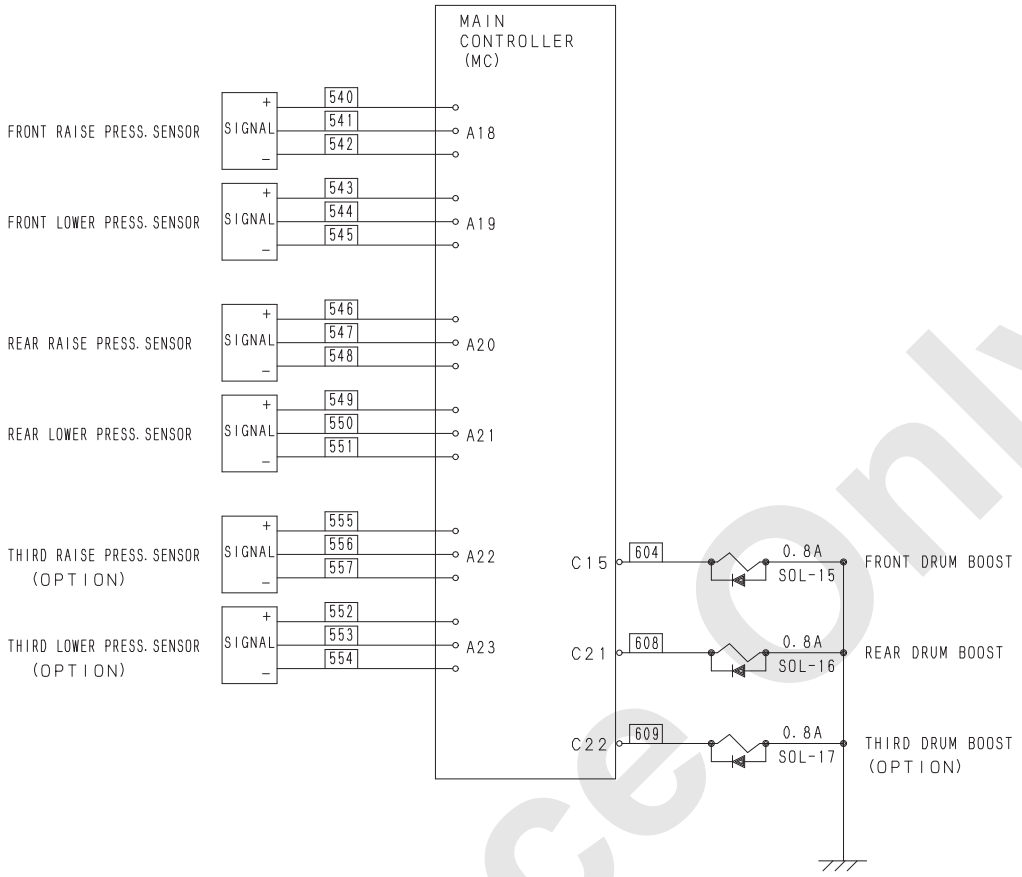
The falling speed can be increased by idling the motor during the free fall.
The speed is controlled as shown in the table below.

Conditions	Procedures
1. Free fall mode is selected. 2. The control lever is at the neutral position. 3. The “FREE FALL SPEED INCREASE SWITCH” on the left upper of operation seat is ON. 4. The foot brake is not depressed. (Clutch pressure ≦ 1.96 MPa., when free fall mode)	• C/V solenoid is energized. • Current at the drum control proportional valve is maintained at 463 mA. (The motor keeps running at a high speed.)
Any of conditions shown above is not satisfied.	• L/V Solenoid is de-energized. • Other conditions are restored to those of the normal control.

The monitor control proportional valve is controlled according to the depression of the foot pedal (clutch pressure).



9. BOOST CONTROL



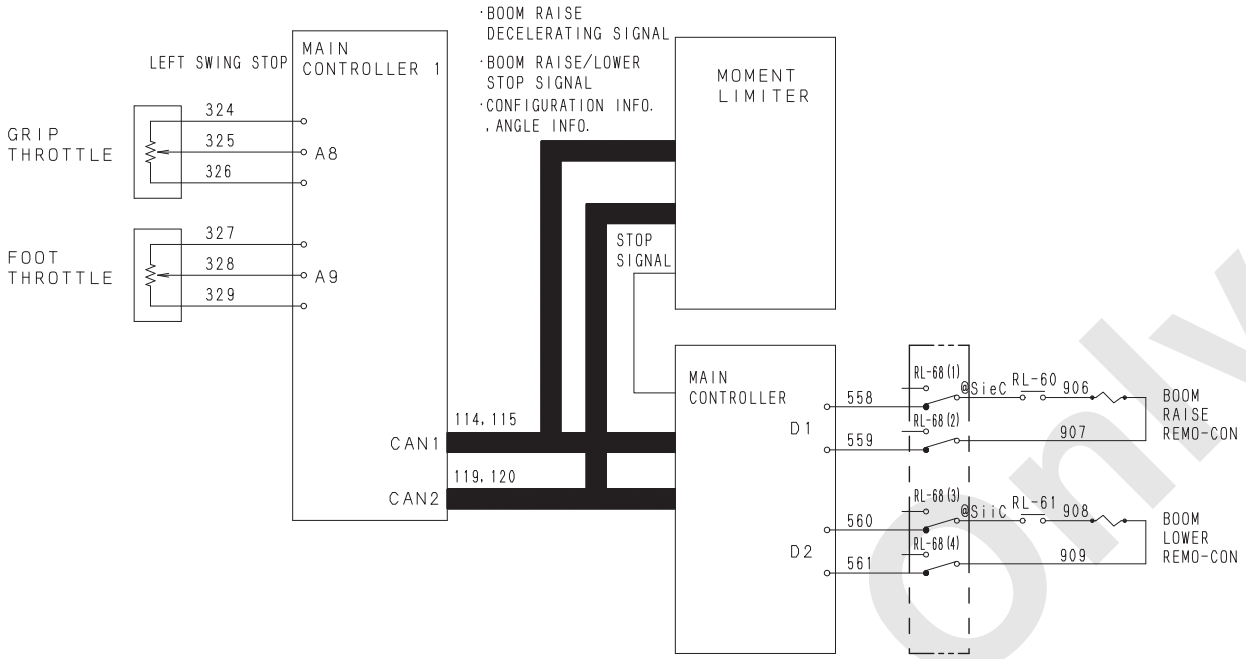
To prevent a momentary drop of a lifted load, apply a constant boost to the motor while the lever is in the neutral position.
The boost solenoid valve is controlled as shown in the table below.

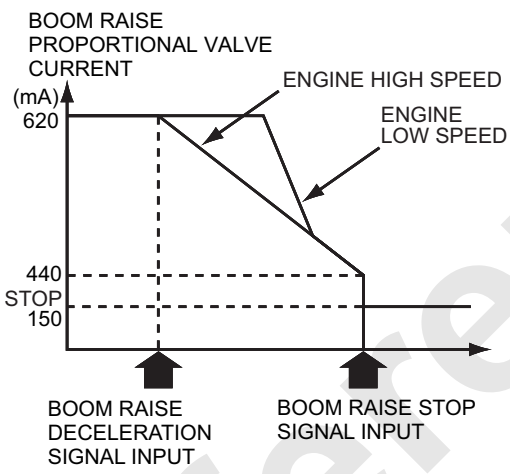
Lever	Boost solenoid valve
Neutral	Energized.
Neutral → raise, lower	Immediately de-energized.
Raise, lower → Neutral	Energized a second after the lever is returned to the neutral position. Remained de-energized if the lever is operated within a second after the lever is returned to the neutral position.

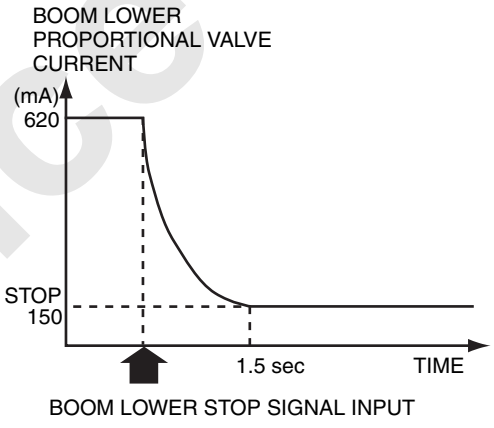
When the front drum or rear drum is stopped, the boost solenoid valve is controlled as shown in the table below.

Stop signal	Boost solenoid valve
Front drum raise stop	Front drum boost solenoid is immediately de-energized.
Rear drum raise stop	Rear drum boost solenoid is immediately de-energized.
Third drum raise stop	Third drum boost solenoid is immediately de-energized.

10. BOOM STOP CONTROL



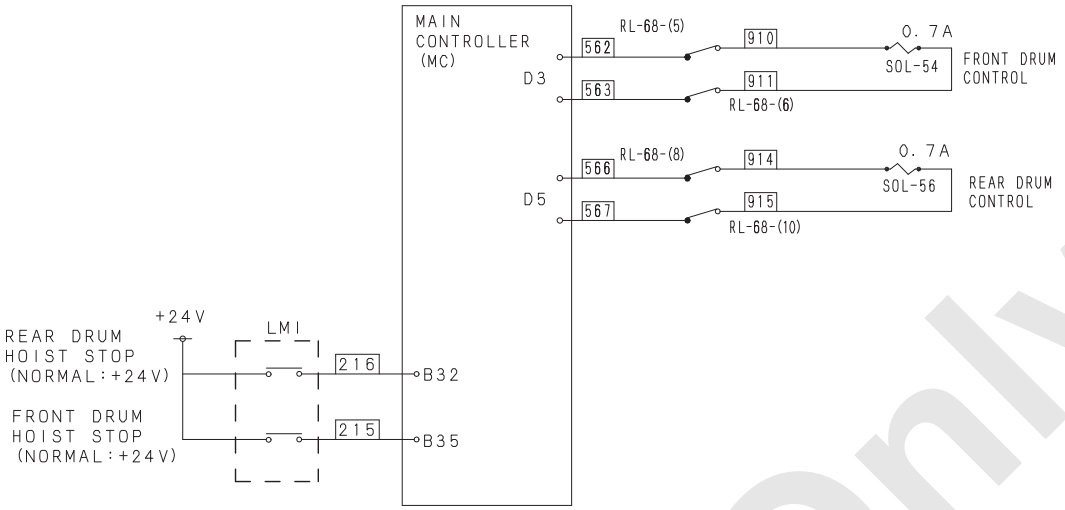


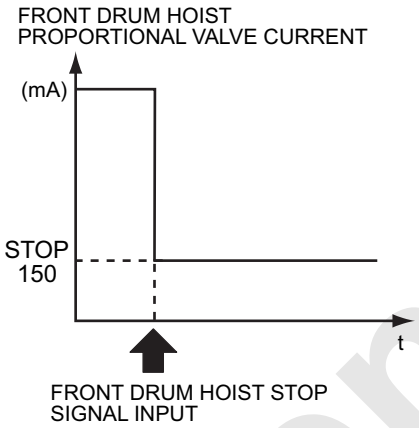


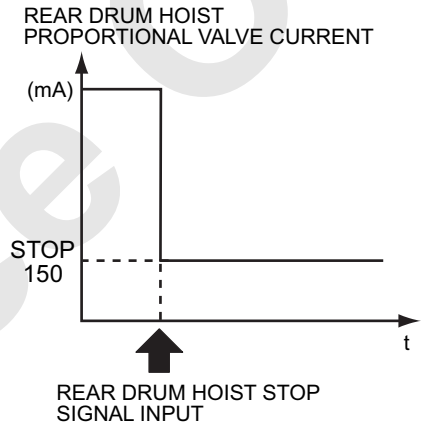
When boom raise deceleration signals are input (input when the boom reaches the angle smaller than the boom upper limit angle by 10 degrees), the boom raise remote control proportional valve is controlled and the boom raising speed is decelerated according to the boom angle.

When the boom lower stop signals are input, the current value at the boom lower proportional valve is minimized within 1.5 seconds, and the boom is slowly stopped.

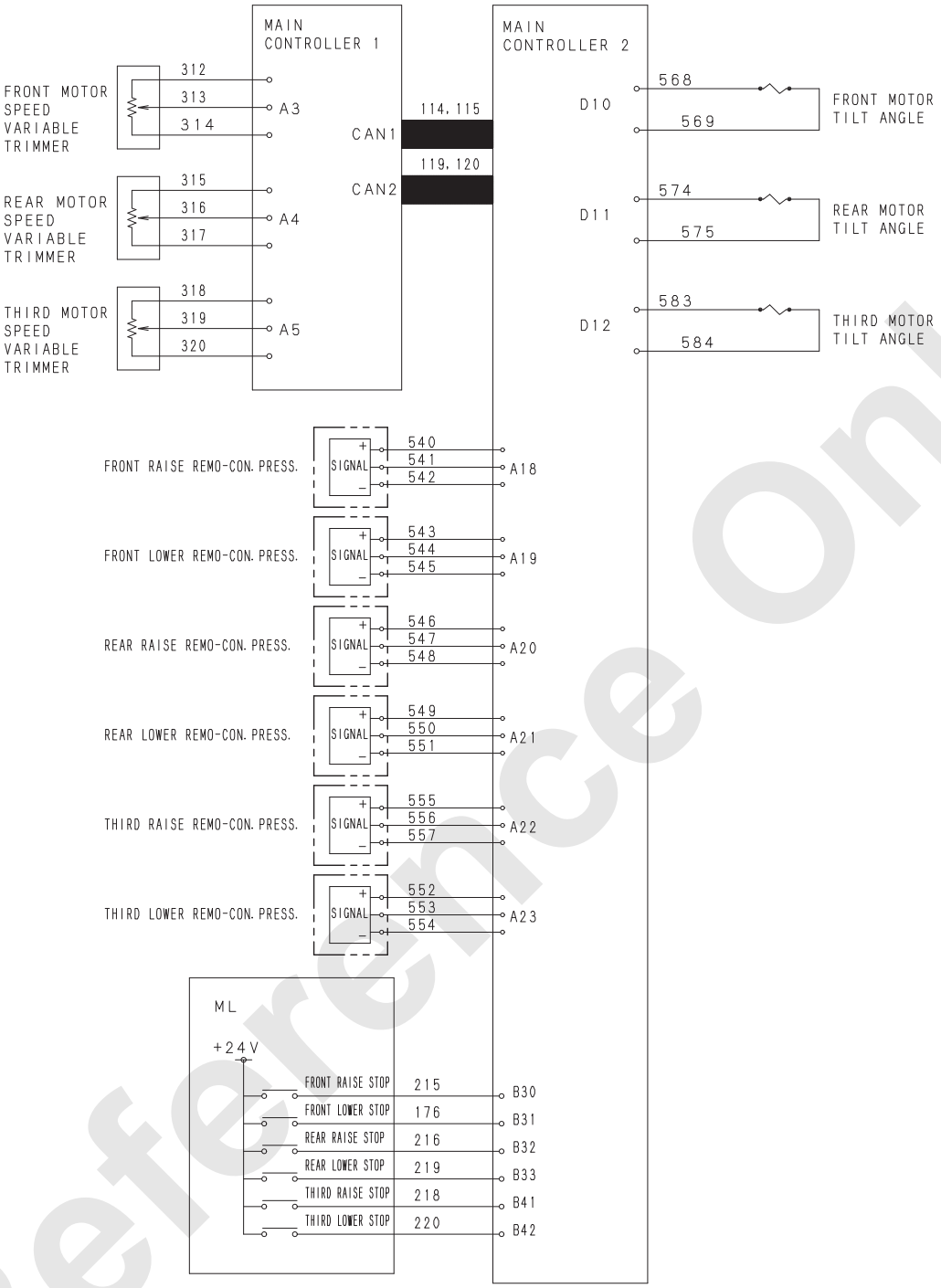
13. FRONT DRUM HOISTING STOP / REAR DRUM HOISTING STOP







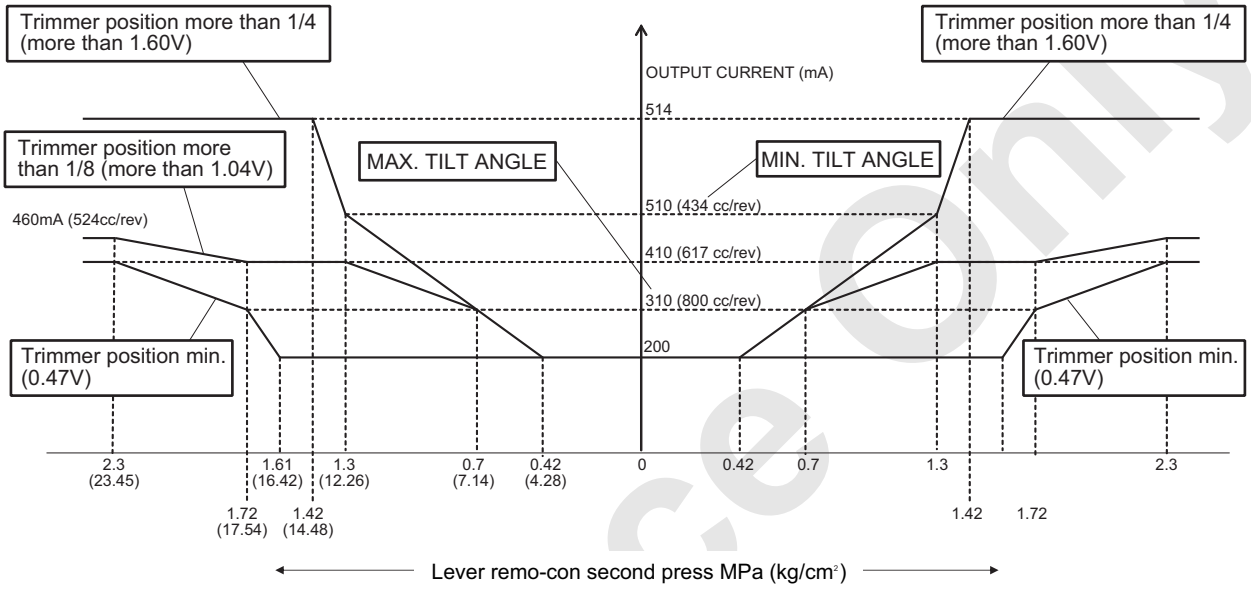
14. MOTOR TILT ANGLE CONTROL



(1) During raising or lowering at brake mode or free mode, current of each motor tilt angle prop. valve is controlled as follows.
(Trimmer control)

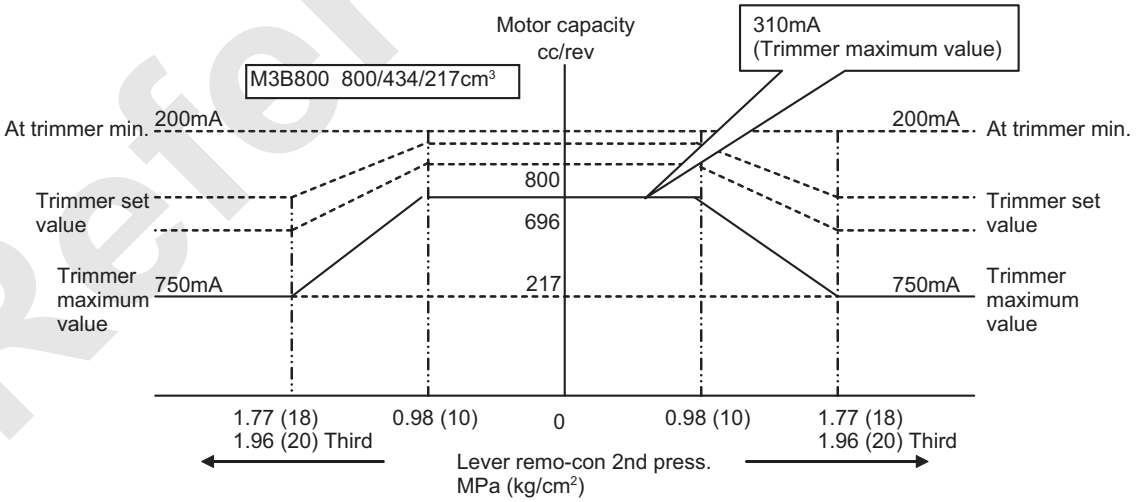
(A) Current of motor tilt angle prop. valve varies based on lever motion and speed variable trimmer position.

1) Front drum and rear drum



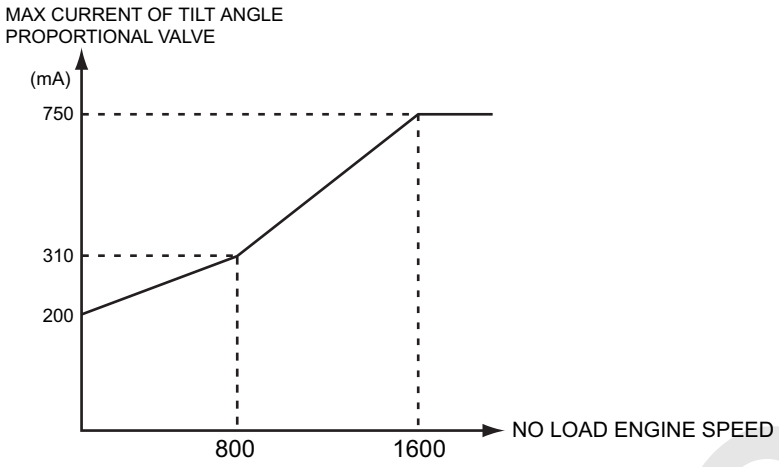
At confluence circuit, front, rear tilt angle prop. valve control

2) Third drum



Third tilt angle prop. valve control

(B) Maximum current of motor tilt angle prop. valve is controlled by no load engine speed (Command volume by grip).



(2) When auto-stopped

In case of drum auto-stop, output is to be 200 mA. But if operated toward safe side (not auto-stop side), it shall return to the value by other control.

(3) Luffing mode speed control

In case luffing mode is selected by ML (by ML transmission) third motor high speed is cut off by output control of rear motor tilt angle prop. valve. Prop valve current is cut off to make rear tilt angle pressure lower than 2.11 MPa (3.37 V)

(4) Clamshell mode

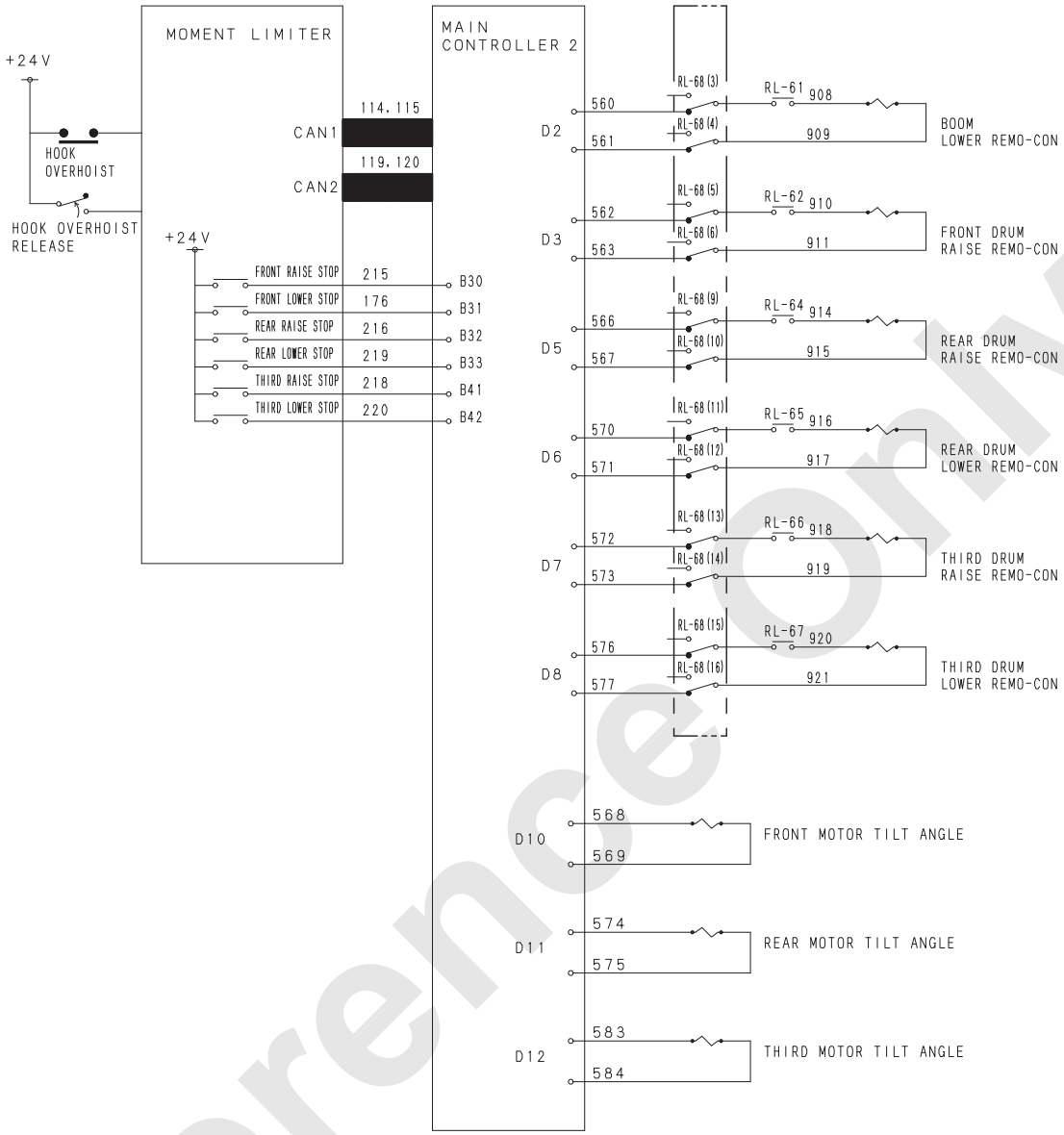
In case work mode select is ON (= low speed is selected (Heavy load clam), front motor tilt angle and rear motor tilt angle are fixed to low. (prop valve current is fixed to 200 mA)
(In case of tower specification, this is not done.)

(5) Priority order is as follows.

Auto stop (this section) > free speed increase > main pump inching speed > clamshell mode (this section) > trimmer control (this section) > tower mode speed control (this section)

Between trimmer lever control value or engine speed control value, smaller value is selected as maximum value.

15. HOOK OVER HOIST CONTROL



(1) Action at hook over hoist

Output of corresponding remo-con. valves shall be 150 mA when hook over hoist notice is received with CAN transmission from ML.

At the same time, stop signal from ML is input and stop action is done.

[Stop corresponding re-con. prop. valve]

Front raise remo-con prop. valve

Rear raise remo-con prop valve → But in case of tower configuration, stop action is not executed.

Rear lower remo-con prop. valve → But in case of tower configuration only, stop action is executed.

Boom hoist lower remo-con prop. valve

Third raise remo-con prop. valve → But in case of luffing configuration.

Third lower remo-con. prop. valve → But in case of luffing configuration only, stop action is executed.

(2) Action at hook over hoist

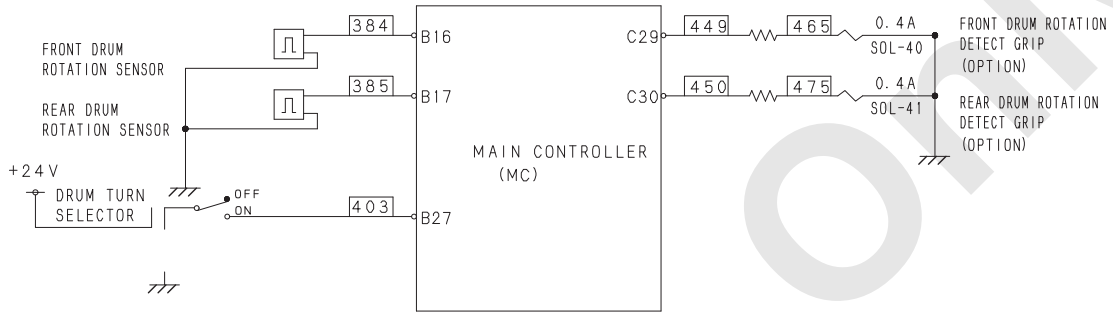
When hook over hoist is released at hook over hoist occurs, the following action is done.

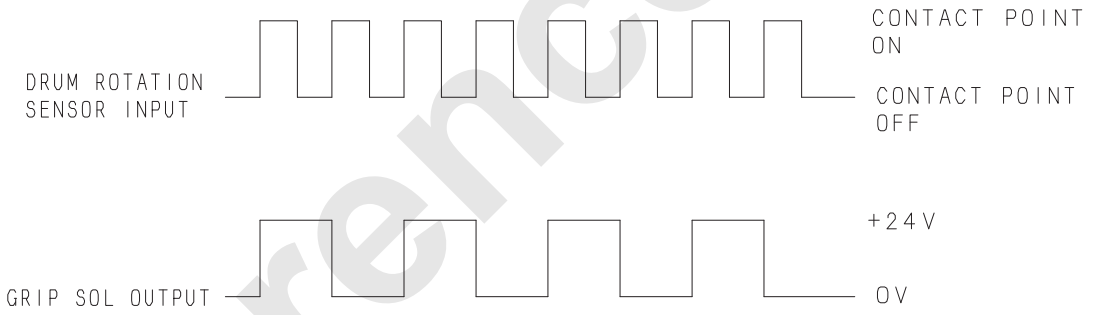
Front, rear and third (jib) raise remo-con. prop. valve command current are set to inching speed level. (375 mA)
If each lever is in operation, each tilt angle prop. valve output is fixed to Low. (310 mA)

16. DRUM ROTATION DETECT GRIP CONTROL (OPTION)

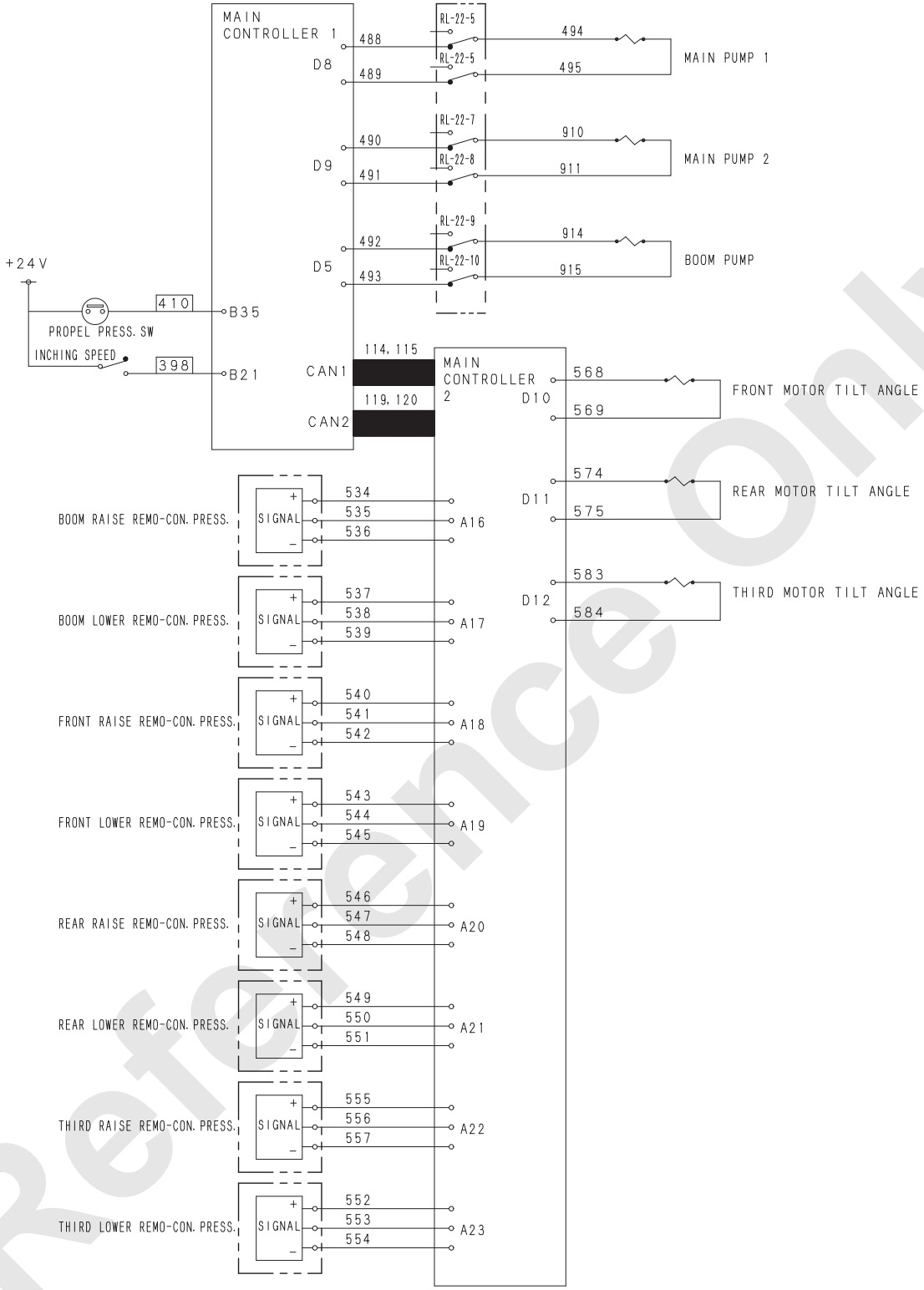
This can control the grip solenoid based on drum rotation sensor input.

Grip solenoid output becomes OFF when the drum speed exceeds the specified level.
Specified speed. = drum speed :
about 61.5 min^{-1} = more than 4 pulse at 50 m sec.
Therefore there is no output from the total controller.





17. FRONT/BOOM PUMP CONTROL



(1) Feathering control :
This is to control the tilt angle proportional (prop.) valve of each pump based on lever motion.

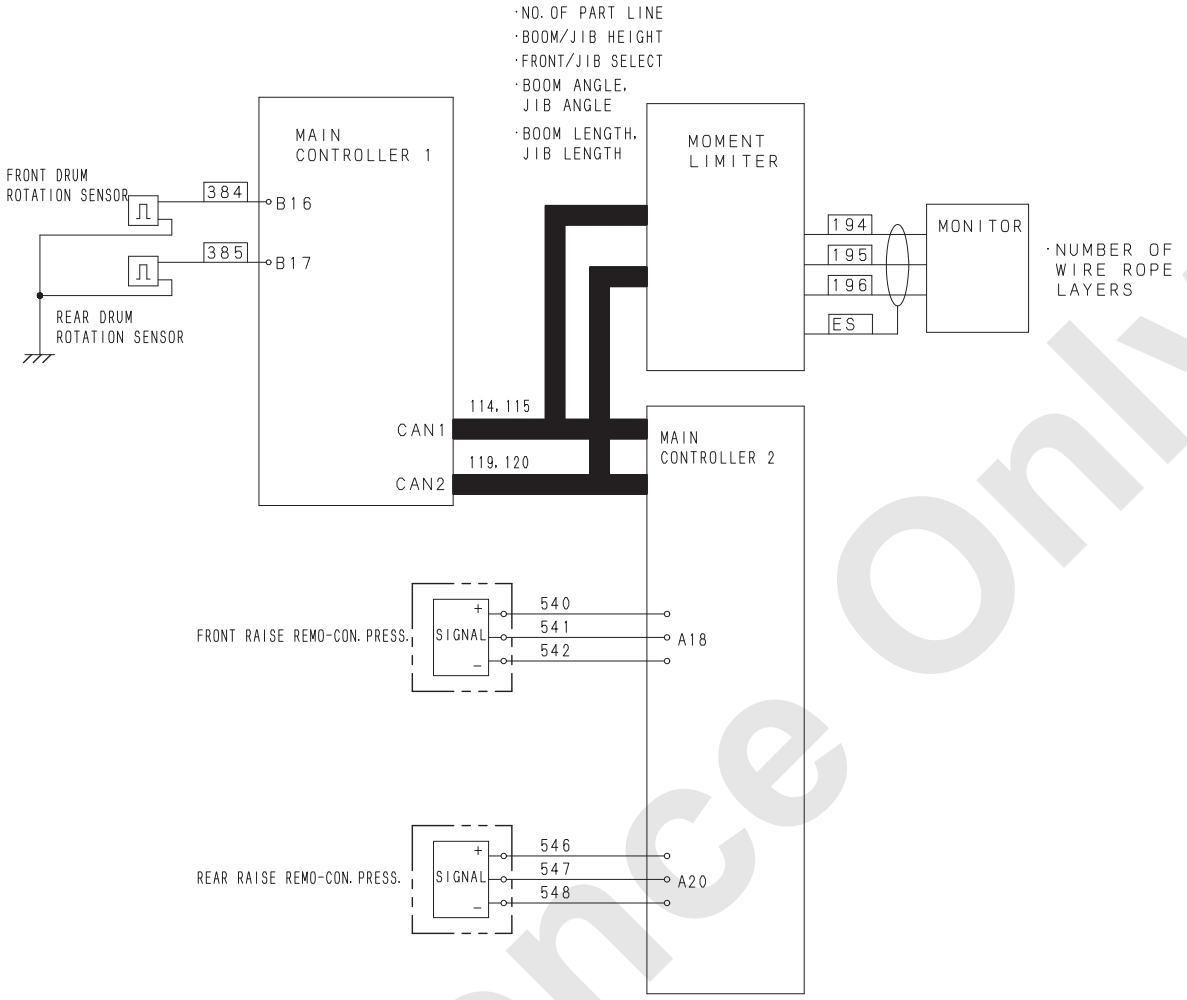
Pump	Prop. valve	Lever motion				
		Front	Rear	Boom	Propel L	Propel R
Main F Main R	Main pump tilt angle 1	Release	Release	Release	Release	Release

- The corresponding prop. valve is released based on lever motion as shown above.
  Release : 150 mA
  Lever in neutral : 700 mA
- For model with main pump 1, 2, prop valve 1 and 2 are released based on front and rear control motion only at independence mode.
  At confluence mode, they are released at the same time.
- Prop. valve released at third drum is lever controlled.
  Main pump tilt angle prop. valve is released.

(2) Control at inching switch is IN.
When the inching switch is ON, output becomes 700 mA regardless of lever control.
At this time, motor tilt angle prop. valve is fixed to low. (310 mA)

(3) CKE (CEN conforming) control
(Not required for North American much.)
When ML bypass is effective and switch input is ON, same control as inching switch IN control (2) above is applied.
When ML is released and switch input is ON, same control as inching switch IN control (2) above is applied.

18. HEIGHT METER



(1) Drum rotation amount is detected by pulse counting with drum rotation sensor.

(2) When raise pressure sensor input exists, variation is counted on raising side, and on the other case, variation is counted as + or - on lowering side.

(3) Layer no. adjusted a s the reference point in the main monitor, no. of layer is calculated during rotation.

(4) From the factor of each layer and pulse number, rope payout amount is calculated.

(5) Winch height is calculated by dividing with no. of part line.

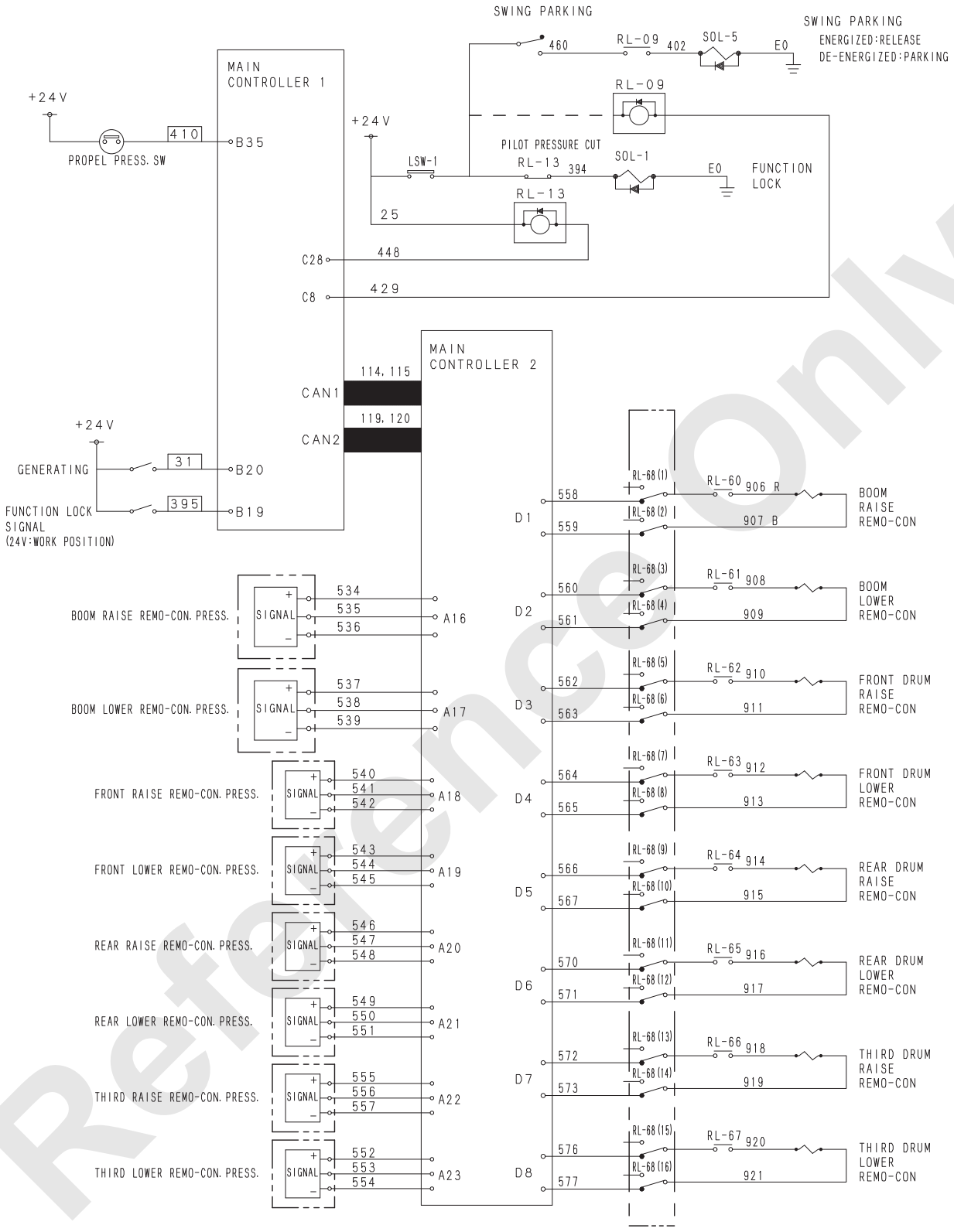
(6) With moment limiter, boom point height data is received (jib point height in case of tower). Difference between height of zero reset time and the present height is calculated and the boom or jib height is calculated.

(7) Distance variation of hook and boom point (jib point) is calculated by angle variation of boom (jib).

(8) Actual height variation is calculated by adding (5) to (7) and is indicated on main monitor.

- To make this control effective, option setting is required.

19. LEVER INTERLOCK CONTROL



This is to prevent drum unexpected rotation with engine start when the lever is in operating position and the function lock lever is in work position.

(1) Before engine start
Each prop. valve current is minimum. (150 mA)
Pilot cut relay RL-13 is to be output. (pilot cut condition)
Swing parking relay RL-09 is to be output. (Swing parking condition)

(2) After engine started
After generation signal is input, the following actions tale place.

(A) In case the function lock lever signal is OFF

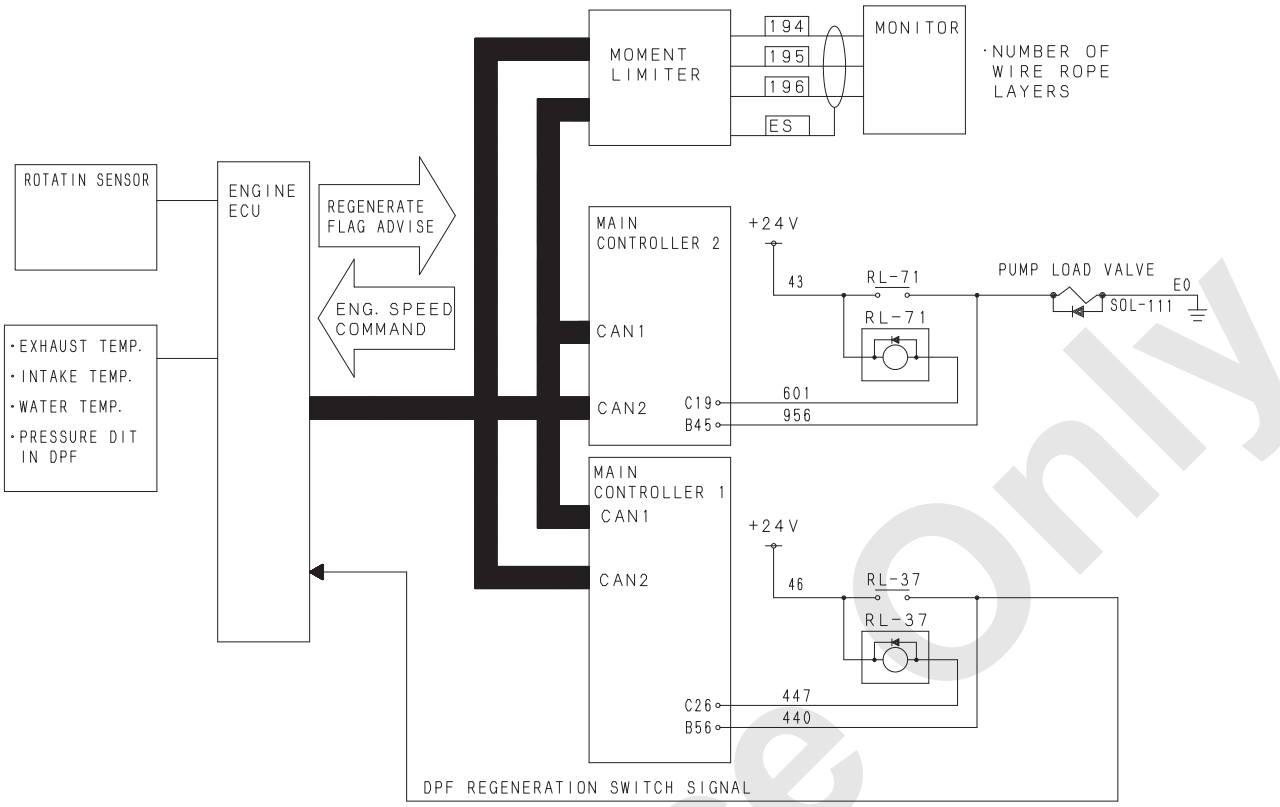
1) When propel interlock option is equipped :
Pilot cut relay output becomes ON.
When propel interlock option is not equipped :
Pilot cut relay output is not issued.
2) Swing parking relay output becomes ON.
3) Output of each proportional valve is minimum.

(B) In case the function lock lever signal is work position (+24 V)

1) Output of pilot cut relay becomes OFF. →
If propel control is detected 1 second after pilot cut relay OFF, pilot cut relay becomes ON again. (only when propel interlock option is equipped.)
2) Swing parking relay output becomes OFF.
3) If 3 seconds is elapsed after pilot cut relay OFF, each remo-com prop. valve judges pressure.
If all raise and lower motion levers are in neutral, raise and lower in other control become minimum output. →
Either one of control is detected as MOTION, all prop. valve output stay minimum as is.

Control stop condition by lever interlock function is advised to the monitor.

20. DPF REGENERATION CONTROL



Regeneration starts when more than certain amount of soot is accumulated in DPF (Diesel Particulate Filter).
Counting of soot accumulated volume and regeneration start timing etc are all done by engine ECU.
However load valve control and engine speed control to raise exhaust temperature in order to prevent regeneration starting during crane control are done by crane side controller.

(1) Auto regeneration

Between 0 and 4 soot gauge bar, the following requests are issued from engine ECU.

Long time idling :
If low idling, low load work is continued, request is issued from ECU.
Idling speed is raised (1,000 min^{-1}) and load valve becomes ON.

Load valve request :
To raise exhaust temperature, idling speed is raised (900 min^{-1}) and load valve becomes ON.

During auto regeneration :
This is the condition that exhaust temperature is reached to regeneration possible level and engine ECU started regeneration.
The load valve remains ON but idling speed returns back.

Long time idling can not be canceled.
Others can cancel by only 1.

(2) Manual regeneration

Between 5 and 9 soot gauge bar, the following requests are issued from engine ECU.

Manual regeneration request :
After engine ECU request, regeneration switch and cancel switch become indicated on the main monitor.

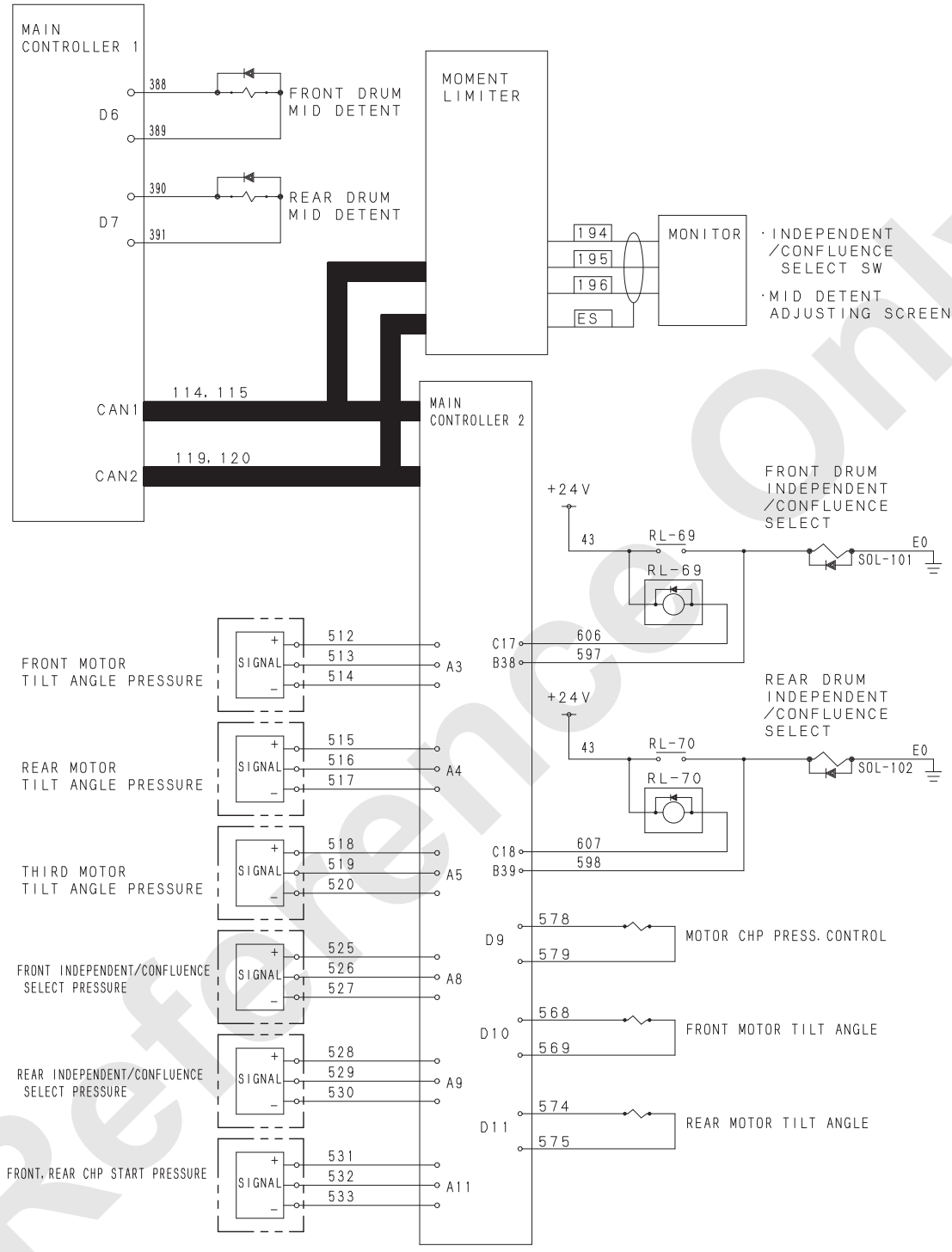
Manual regeneration preparation :
When regeneration switch is pushed, regeneration start signal from the main controller 1 to ECU is issued.
At this time, crane control becomes impossible and engine speed is raised to 1,000 min^{-1}.
Engine ECU issues preparation flag output after regeneration start signal is input.

During Manual regeneration :
This is the condition that exhaust temperature is reached to regeneration possible level and engine ECU started regeneration.
Crane condition is as same as "Manual regeneration preparation".

Manual regeneration is possible at soot gauge up to 7 bar.
When soot gauge becomes 9 bar, forcible regeneration starts by detecting no control condition.
The content of action is as same as manual regeneration and action starts without requesting permit to crane operator.
The above request flag content of ECU can be checked in the main controller 1 output, input condition of service diagnosis screen.

Soot bar indication	ECU advice content	MC condition	
10	Regeneration impossible error code output	Error indication	DPF replacement beccomes necessary.
9	Manual regeneration request Manual regeneration preparation During Manual regeneration	Load valve forcibly ON, speed fixed to 1,000 min^{-1}	Forcible regeneration occurs to perevent DPF replacement.
8		Regeneration switch indication Load valve ON Speed 1,000 min^{-1} Control impossible	Regeneration is done with operators permit. → Crane operation is not possible.
7			
6			
5			
4	Long time idling Load valve request During auto regeneration	Load valve ON Speed 800 to 1,000 min^{-1} Control possible	Auto regeneration is done. → Crane operation is possible.
3			
2			
1			
0			

21. INDEPENDENT/CONFLUENCE SELECT CONTROL (IND./CONF. SELECT FUNCTION EQUIPPED MODEL ONLY GK, HF, GN, JD)



This is to make selection of independence and confluence circuit of front and rear possible by select switch.

(1) Front, rear mid detent

When selecting confluence circuit, mid detent function of front and rear drum to ON condition.
The detent is of electro-magnetic type and detent force changing becomes possible by adjusting in the main monitor.

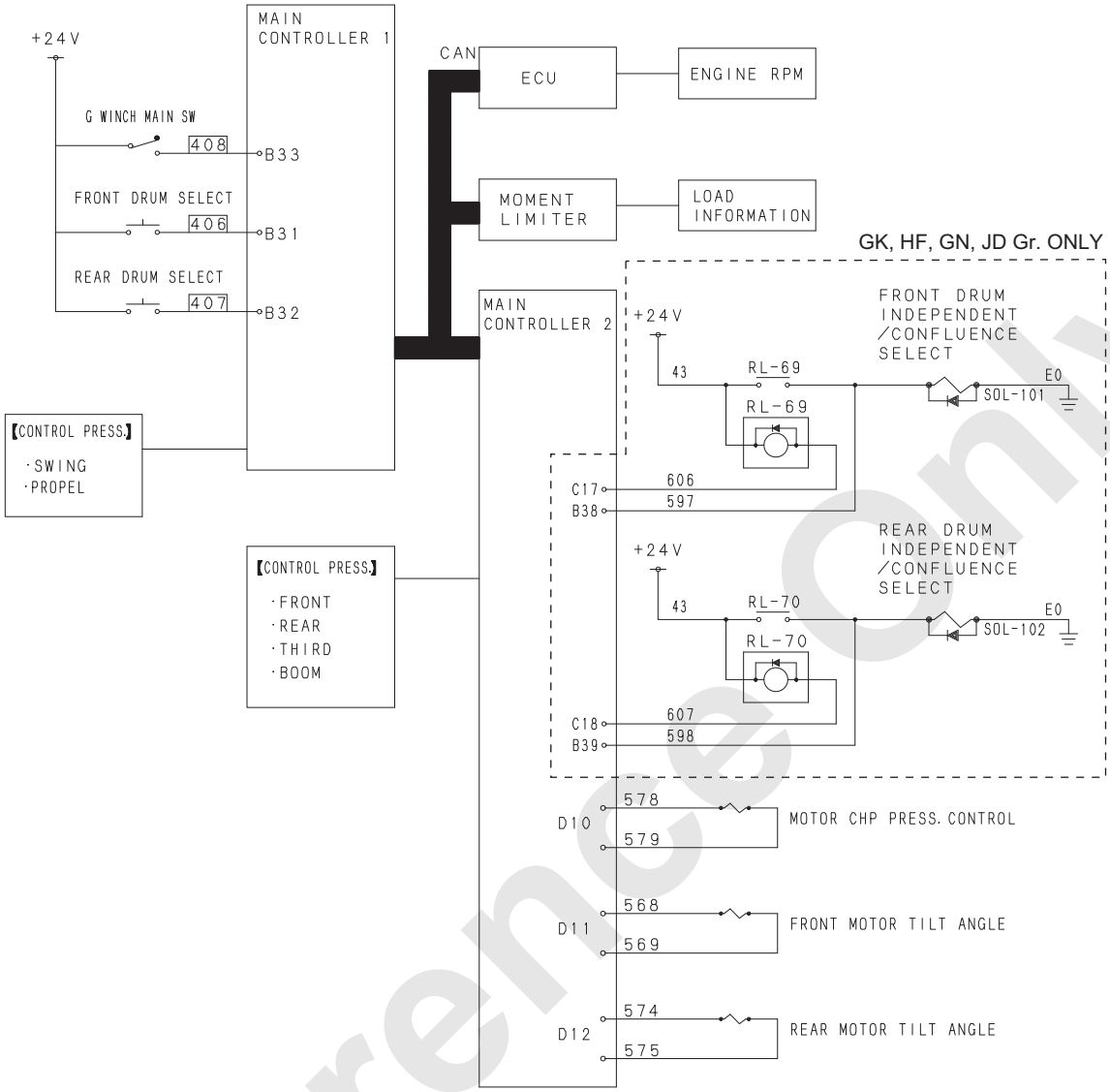
At tower configuration, both of front and rear become independence mode.
As for E model, even confluence circuit is selected, mid detent stay OFF.

(2) Independence/confluence selecting

When selecting ind./conf. circuit, the following action shown in the table shall be done.
After selected, motor tilt angle control become changed.
Refer to [motor tilt angle control] for detail.

	Input			Output				
	Select single	Control lever condition	Configuration info.	Motor CHP press. control prop.V.	Conf./Ind. (Fr) SOL	Conf./Ind. (Re) SOL	Front motor tilt angle prop. V. control range	Rear motor tilt angle prop. V. control range
Independence	OFF	Neutral	CR/LF TW	150 mA	OFF	OFF	Table for independence	Table for independence
Confluence	ON	Neutral	CR/LF	GK, HF : 720 mA GN, JD : 590 mA	ON	ON	Table for confluence	Table for confluence
			TW	150 mA	OFF	OFF	Table for independence	Table for independence

22. G WINCH CONTROL



(1) G winch mode selecting

This is to make individual select switch, which is set individually for front/rear based on input of G winch select switch effective.

When individual switch is input, G winch condition is selected based on the conditions shown in the table.

Mode	Input condition				
	G winch			Lever condition	Engine speed
	Main	(Fr)	(Re)		
Normal mode	OFF	-	-	Neutral	-
G winch main mode	ON	-	-	Neutral	Idle -5% to +5%
G winch (Fr) (Re) mode	ON	ON	ON	Neutral	1,000 min^{-1} or lower
		(Ind.)	(Ind.)		

Engine speed upper limit value is a value with G engine function OFF.
At G engine function ON, upper limit 900 min^{-1}.

(2) G winch individual mode

When individual mode is selected either front or rear drum, the following action occur.

(A) Hydraulic circuit is changed internally to confluence mode. →
In case of independence mode is selected, monitor indication only becomes independence condition.
Mid detent is also ineffective.

(B) Engine speed is raised to upper limit value.
If G engine OFF, it becomes 1,000 min^{-1}.
At G engine, it becomes upper limit 900 min^{-1}.

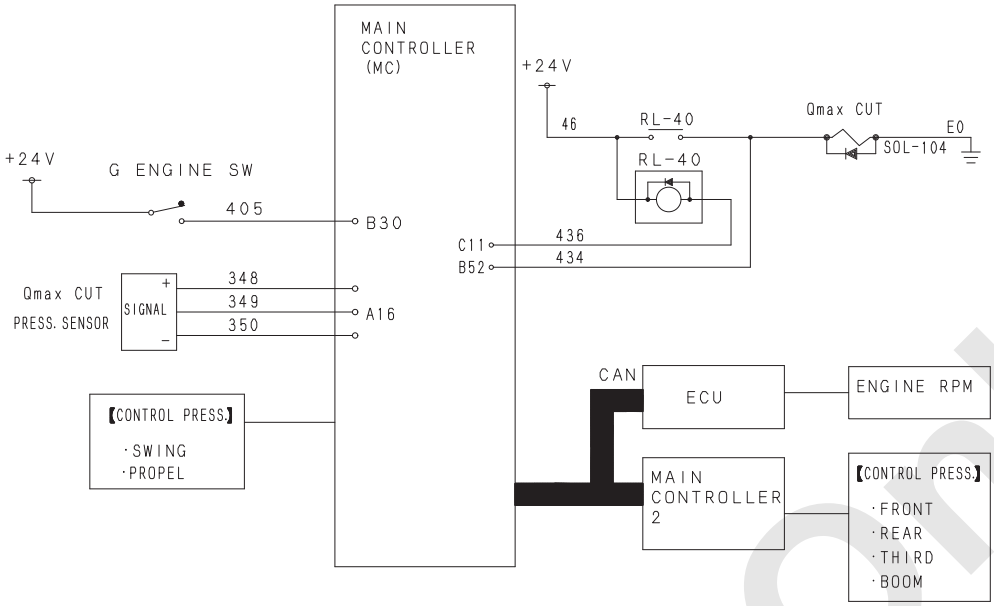
(C) Motor tilt angle control is changed to that of individual mode.

(D) Motor chp prop. valve is changed to the one same as individual mode.

At tower configuration, rear individual mode becomes ineffective.

After either front or rear becomes independence, G winch shall be released by one lever control (neutral → operation → neutral)
In case G winch function is required again, the individual switch is input.
After switched to individual mode and individual switch is pushed again, function is cancelled.

23. G ENGINE CONTROL



(1) G engine function select switch

After inputting into select switch, check is made on each lever control.

If neutral Q max cut solenoid is energized.

	Input		Output	
	G engine function select	Lever condition	Q max cut SOL	Engine speed control
At G engine	ON	At Neutral	ON	1,725 min^{-1}
At Normal	OFF	At Neutral	OFF	2,100 min^{-1}

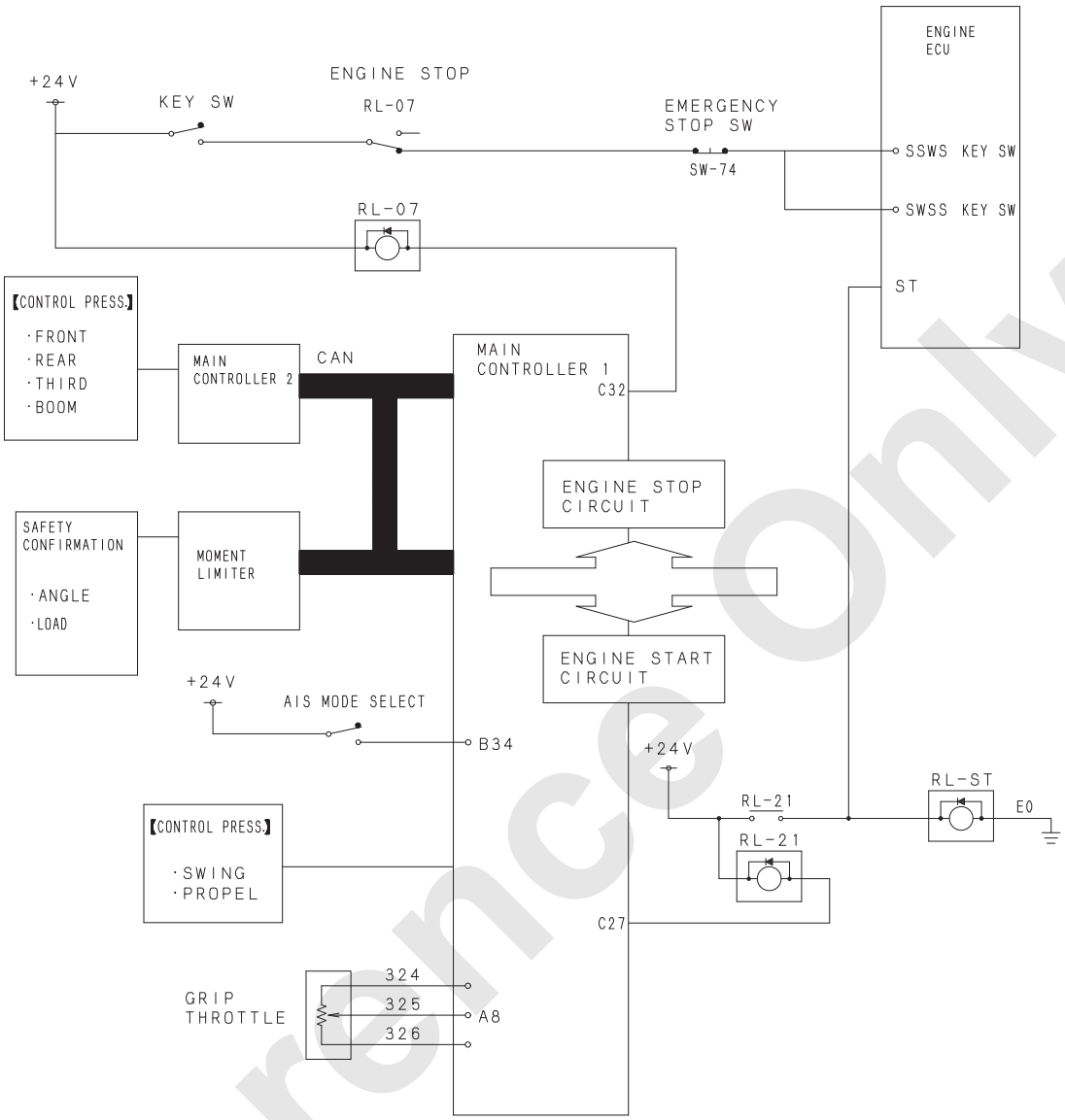
* At G engine mode, engine speed upper limit is changed as shown in the table.
* Q max cut solenoid becomes de-energized and Q max cut condition is created. (When energized, pump flow max. value is raised.)

(2) Fail safe

To prevent pump failure, engine speed and Q max cut pressure are always monitored and the following actions are taken at abnormal.

	Abnormal judged value			Action at abnormal	
	Q max cut pressure	Q max cut SOL FB value	Engine speed control	Q max cut SOL	Engine speed control
At G engine	3 MPa or more	OFF	1,800 min^{-1} or more	OFF output * at speed abnormal	1,725 min^{-1}
At Normal	Less than 3 MPa	ON	No judgement		

24. AIS CONTROL



The above circuit diagram is extract from the main diagram for only related portion of this control.
(engine stop/re-start)
When the condition bellows are met, engine stops automatically.

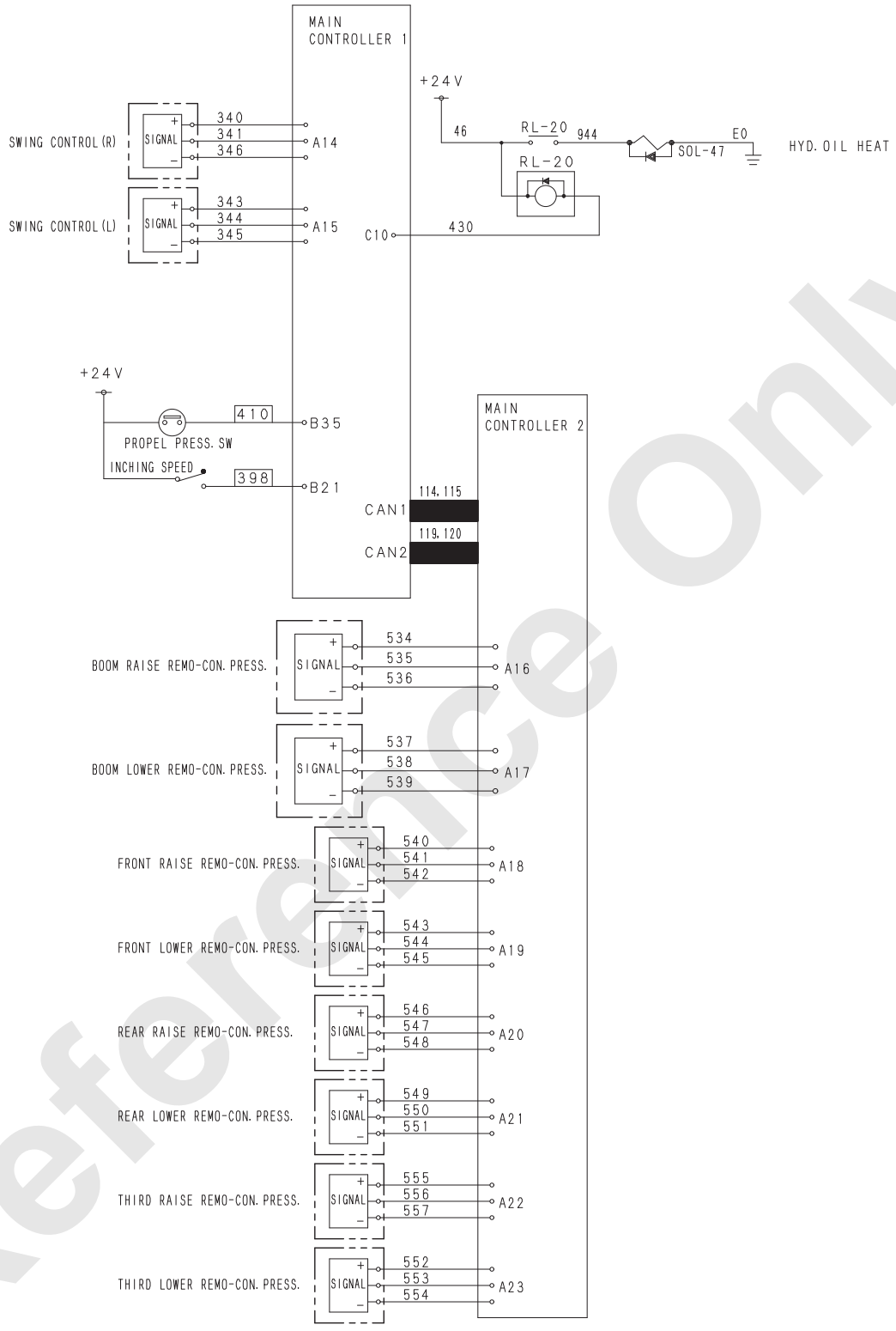
Engine stop condition	Meeting condition	ML permit condition
ML permit	ML permit condition	Configuration condition : Other than assembly/ disassembly, stowing mode Moment limiter released condition : Release key off
No load engine speed	Low idling -5% to +5%	
Free fall	Neutral brake mode	
Parking switch	Parking condition	
Control lever neutral	All neutral incl. swing	
Water temp. condition	40 to 80 °C (104 to 176 °F)	
Oil temp condition	Lower than 60 °C (140 °F)	

(1) Engine stop action
If the conditions are met and operator's cancel does not exist, main controller 1 energize engine stop relay. (RL-07) →
Key switch signal to engine ECU becomes OPEN condition and engine ECU activate as Key OFF condition.

(2) Engine restart
At AIS condition, control id only applied at engine stop condition. Grip accelerator voltage is monitored and when higher than 20% voltage is detected, engine restart relay (RL-21) becomes energized.
However if engine does not start within 3 seconds, engine restart relay becomes de-energized regardless of grip voltage.

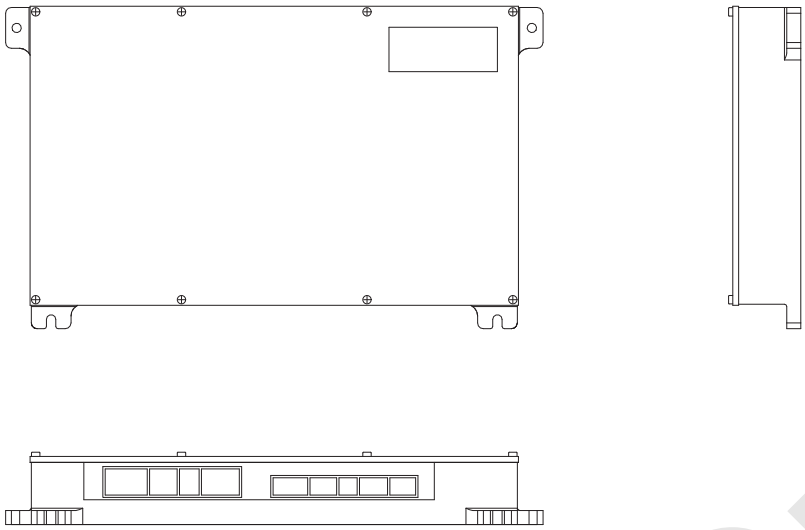
(3) Key cut off fail preventing function AIS condition may be left for long time.
If AIS condition is continued for longer than certain time, battery is turned OFF automatically.

25. HYD. OIL HEAT (OPTION)



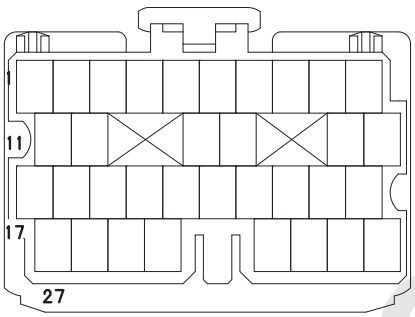
Control	Relay
When all lever is in neutral	Energized
Either on lever is in operation	De-energized

10.3.4 MAIN CONTROLLER 1, 2 (HARDWARE)

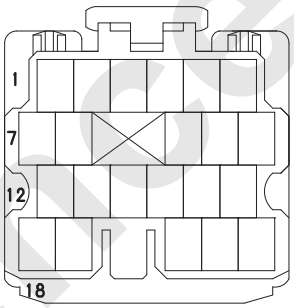


HARNESS SIDE CONNECTOR

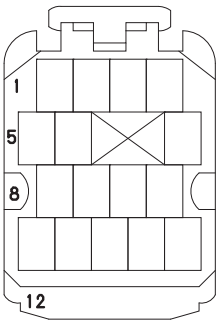
MC1 : CN-101F to CN-109F
MC2 : CN-111F to CN-119F



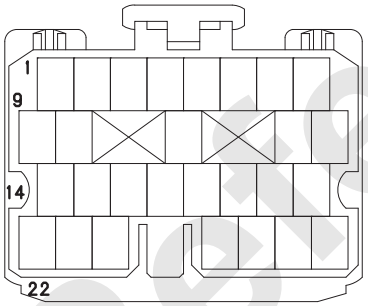
CN-101F
CN-111F



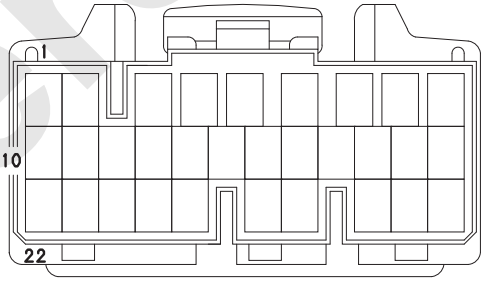
CN-102F
CN-112F



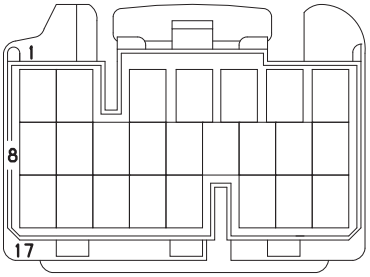
CN-103F
CN-113F



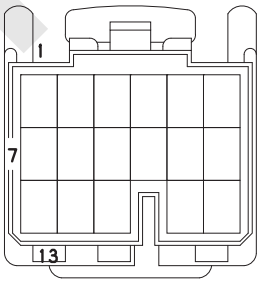
CN-104F
CN-114F



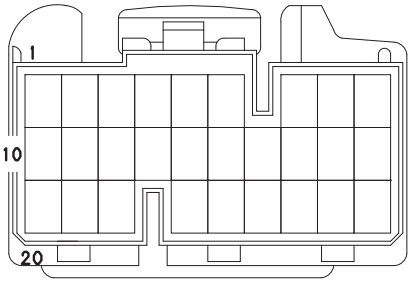
CN-105F
CN-115F



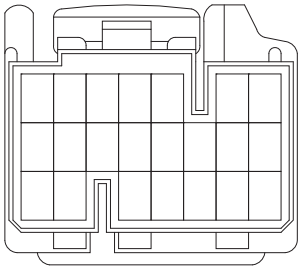
CN-106F
CN-116F



CN-107F
CN-117F



CN-108F
CN-118F


CN-109F
CN-119F

10.3.5 SPECIFICATIONS OF MAIN CONTROLLER OUTPUT

1. SPECIFICATIONS OF MAIN CONTROLLER 1
   INPUT/OUTPUT

(1) ANALOGUE INPUT [A]

No.	Name	Range	Input voltage
1	A/D Spare		
2	A/D Spare		
3	Fr. drum motor speed adjusting trimmer	0 to FULL	0.43 to 5 V
4	Re. drum motor speed adjusting trimmer	0 to FULL	0.43 to 5 V
5	Third drum motor speed adjusting trimmer	0 to FULL	0.43 to 5 V
6	Boom drum motor speed adjusting trimmer	0 to FULL	0.43 to 5 V
7	Spare A/D	0 to FULL	0.43 to 5 V
8	Grip throttle	LOW to HIGH	0.7 to 5 V
9	Foot throttle (option)	LOW to HIGH	1.0 to 4.4 V
10	Hyd. oil temperature sensor	50 to 130°C (122 to 266°F)	117.9 Ω to 9.6 Ω
11	Tagline trimmer (option)	0 to FULL	0.43 to 5 V
12	Control primary pressure	0 to 19.61 MPa	0.5 to 4.5 V
13	Swing pump pressure sensor	0 to 49.03 MPa	0.5 to 4.5 V
14	Swing operation (right) pressures sensor	0 to 2.94 MPa	0.5 to 4.5 V
15	Swing operation (left) pressures sensor	0 to 2.94 MPa	0.5 to 4.5 V
16	Qmax cut solenoid detection pressure	0 to 49.03 MPa	0.5 to 4.5 V
17	Power shift pressures sensor	0 to 2.94 MPa	0.5 to 4.5 V
18	Supply voltage monitor	19 V to 32 V	0.5 V to 4.8 V
19	Inclination detector X	-5 to +5 deg.	0.5 to 4.5 V
20	Inclination detector Y	-5 to +5 deg.	0.5 to 4.5 V
21	Fr. drum clutch pressure sensor	0 to 19.61 MPa	0.5 to 4.5 V
22	Third drum clutch pressure sensor (option)	0 to 19.61 MPa	0.5 to 4.5 V
23	Re. drum clutch pressure sensor	0 to 19.61 MPa	0.5 to 4.5 V

(2) DIGITAL INPUT [B]

No.	Name	Status	Signal level
1	ECU status signal	Power ON/OFF	Ground (15 kΩ)/OPEN
2	Engine hyd. pressure PSW	Engine Stop/Work	Ground (15 kΩ)/OPEN
3	CB/W detect	Detection/Non-detection	Ground (15 kΩ)/OPEN
4	Clogging of Engine air cleaner	Clogging/Normal	Ground (15 kΩ)/OPEN
5	Vacancy		Ground (3.3 kΩ)/OPEN
6	Fr. drum brake cooling oil temperature	Higher temperature/Normal	Ground (3.3 kΩ)/OPEN
7	Re. drum brake cooling oil temperature	Higher temperature/Normal	Ground (3.3 kΩ)/OPEN
8	Radiator water level	Low level/Normal	Ground (3.3 kΩ)/OPEN
9	Engine oil filer	Clogging/Normal	Ground (3.3 kΩ)/OPEN
10	Fr. drum control signal	ON/OFF	Ground (3.3 kΩ)/OPEN
11	Re. drum control signal	ON/OFF	Ground (3.3 kΩ)/OPEN
12	Third drum control signal	ON/OFF	Ground (3.3 kΩ)/OPEN
13	Fr. drum free fall select. signal	Free/Brake	+24 V/OPEN
14	Re. drum free fall select. signal	Free/Brake	+24 V/OPEN
15	Third drum free fall select. signal	Free/Brake	+24 V/OPEN
16	Fr. drum rotation sensor	0 to 500 min^{-1}	Ground (3.3 kΩ)/OPEN
17	Re. drum rotation sensor	0 to 500 min^{-1}	Ground (3.3 kΩ)/OPEN
18	Key switch ON signal	ON/OFF	+24 V/OPEN
19	Function lock	Work/Function	+24 V/OPEN
20	Charge signal	E/G work/Stop	+24 V/OPEN
21	Inching select switch	Inching/Normal	+24 V/OPEN
22	Aux. accel. signal	ON/OFF	+24 V/OPEN
23	Engine emg. stop signal	Stop/Normal	+24 V/OPEN
24	Engine restart	Work/Normal	+24 V/OPEN
25	Operator certify wait signal	Uncertify/Certify	+24 V/OPEN
26	Swing parking switch	Release/Parking	+24 V/OPEN
27	Drum rotation detect grip selection	Select/Non-select	+24 V/OPEN
28	Controller ID 1	B28=ON, B29=OFF ⇒ MC1	+24 V/OPEN
29	Controller ID 2	B28=OFF, B29=ON ⇒ MC2	+24 V/OPEN
30	G mode/Normal selection	G mode/Normal	+24 V/OPEN
31	G winch (Fr.)	High speed/Normal	+24 V/OPEN
32	G winch (Re.)	High speed/Normal	+24 V/OPEN
33	Energy saving winch (main)	ON/OFF	+24 V/OPEN
34	AIS function ON/OFF switch	ON/OFF	+24 V/OPEN
35	Propelling operating pressure switch	Control/Neutral	+24 V/OPEN
36	Vacancy	0 to 500 min^{-1}	Ground (3.3 kΩ)/OPEN
37	Cooling line filter	Clogging/Normal	Ground (3.3 kΩ)/OPEN
38	Engine preheat	Preheat/Normal	+24 V/OPEN
39	Vacancy		+24 V/OPEN
40	Backup fuse	Normal/Fusion	+24 V/OPEN
41	Fr. drum free fall speed increase switch	High/Normal	+24 V/OPEN
42	Re. drum free fall speed increase switch	High/Normal	+24 V/OPEN
43	Third drum free fall speed increase switch (option)	High/Normal	+24 V/OPEN
44	Free fall permit signal	Permit/Lock	+24 V/OPEN
45	Fr. drum motor CLM-SOL (FB)	Energized/De-energized	+24 V/OPEN
46	Fr. drum motor ESM-SOL (FB)	Energized/De-energized	+24 V/OPEN
47	Re. drum motor CLA-SOL (FB)	Energized/De-energized	+24 V/OPEN
48	Re. drum motor ESA-SOL (FB)	Energized/De-energized	+24 V/OPEN
49	Third drum motor CLT-SOL (FB)	Energized/De-energized	+24 V/OPEN
50	Third drum motor EST-SOL (FB)	Energized/De-energized	+24 V/OPEN

No.	Name	Status	Signal level
51	Hyd. oil heat LS (OPT)	Energized/De-energized	+24 V/OPEN
52	Pump Qmax cut solenoid (FB)	Energized/De-energized	+24 V/OPEN
53	Remote control connection signal	Connected/Unconnected	+24 V/OPEN
54	Swing warning (flasher)	Flasher ON/OFF	+24 V/OPEN
55	Swing warning (buzzer and flasher)	Buzzer and flasher ON/OFF	+24 V/OPEN
56	DPF regeneration (FB)	Energized/De-energized	+24 V/OPEN
57	Accel. signal (DOWN)	Rotate down/Holding	+24 V/OPEN
58	Accel. signal (UP)	Rotate up/Holding	+24 V/OPEN

(3) ANALOGUE OUTPUT [H]

No.	Name	Status	Signal level
1	Accel opening signal 1	800 min^{-1} to 2,100 min^{-1}	1 to 4 V
2	Accel opening signal 2	800 min^{-1} to 2,100 min^{-1}	1 to 4 V

(4) PROPORTIONAL VALVE OUTPUT [D]

No.	Name	Output current	Dither
1	Main pump power reduction prop. valve	100 to 700 mA	200 mAp-p 100 Hz
2	Boom pump power reduction prop. valve	100 to 700 mA	200 mAp-p 100 Hz
3	Swing low speed prop. valve	100 to 700 mA	200 mAp-p 100 Hz
4	Swing counterforce prop. valve	150 to 510 mA	200 mAp-p 160 Hz
5	Boom pump tilt angle control prop. valve	150 mA to 700 mA	200 mAp-p 100 Hz
6	Fr. drum middle detent	60 mA to 110 mA	None
7	Re. drum middle detent	60 mA to 110 mA	None
8	Main pump tilt a. control prop. valve 1	150 mA to 700 mA	200 mAp-p 100 Hz
9	Main pump tilt a. control prop. valve 2	150 mA to 700 mA	200 mAp-p 100 Hz
10	Tagline prop. valve	100 to 700 mA	200 mAp-p 63 Hz
11	Left swing stop prop. valve	100 to 700 mA	200 mAp-p 100 Hz
12	Right swing stop prop. valve	100 to 700 mA	200 mAp-p 100 Hz

(5) DIGITAL OUTPUT [C]

No.	Name	Status	Signal level
1	Fr. drum motor CLM-SOL	Energized/De-energized	GND/OPEN
2	Fr. drum motor ESM-SOL	Energized/De-energized	GND/OPEN
3	Re. drum motor CLA-SOL	Energized/De-energized	GND/OPEN
4	Re. drum motor ESA-SOL	Energized/De-energized	GND/OPEN
5	Third drum motor CLT-SOL	Energized/De-energized	GND/OPEN
6	Third drum motor EST-SOL	Energized/De-energized	GND/OPEN
7	Vacancy		GND/OPEN (300 mA)
8	Swing parking control	Parking/Release	GND/OPEN (300 mA)
9	ML adjust. mode selection	Adjust. Mode/Normal	GND/OPEN (300 mA)
10	Hyd. oil heat SOL	Heat/Normal	GND/OPEN
11	Pump Qmax cut solenoid	Energized/De-energized	GND/OPEN
12	Swing flasher	Lit up/Unlit	GND/OPEN
13	Vacancy		GND/OPEN (PWM)
14	Vacancy		GND/OPEN (PWM)
15	Battery relay energizing	Energized/De-energized	+24 V/OPEN
16	ML bypass reset	Reset/Redundancy possible	GND/OPEN
17	Solenoid cut relay energizing	Solenoid cut/Normal	GND/OPEN
18	Engine warning output	Engine abnormal/Normal	GND/OPEN
19	AIS air con. ON relay energizing	Power ON enabled/Disabled	GND/OPEN
20	Swing neutral brake selection	Neutral brake/Free	GND/OPEN
21	Sub battery relay energizing	Energized/De-energized	+24 V/OPEN
22	Vacancy		+24 V/OPEN
23	Vacancy		GND/OPEN
24	Vacancy		GND/OPEN
25	Vacancy		GND/OPEN (PWM)
26	DPR regeneration start	Manual regene. start/Normal	GND/OPEN
27	Engine restart	Start/Normal	GND/OPEN
28	Pilot pressure cut relay	Energized/De-energized	GND/OPEN
29	Fr. drum rotate detect grip (option)	凸/凹	+24 V/OPEN
30	Re. drum rotate detect grip (option)	凸/凹	+24 V/OPEN
31	Safety relay operation	Operation/Normal	GND/OPEN
32	Engine stop relay operation	Energized/De-energized	GND/OPEN
33	Swing voice alarm	ON/OFF	GND/OPEN
34	Vacancy		GND/OPEN
35	Vacancy		GND/OPEN (CPU error)
36	Vacancy		+24 V/OPEN

2. SPECIFICATIONS OF MAIN CONTROLLER 2
INPUT/OUTPUT

(1) ANALOGUE INPUT [A]

No.	Name	Range	Input voltage
1	Spare A/D		
2	Spare A/D		
3	Fr. drum motor tilt control press. sensor	0 to 2.94 MPa (30 kg/cm^2)	0.5 to 4.5 V
4	Re. drum motor tilt control press. sensor	0 to 2.94 MPa (30 kg/cm^2)	0.5 to 4.5 V
5	Third drum motor tilt control press. sensor	0 to 2.94 MPa (30 kg/cm^2)	0.5 to 4.5 V
6			
7	Fuel level	F to 1/2 to E⇒10 to 32 to 83 Ω	Grounded input (56 Ω)
8	Confluence/Independence select pressure (Fr.)	0 to 49.03 MPa (500 kg/cm^2)	0.5 to 4.5 V
9	Confluence/Independence select pressure (Re.)	0 to 49.03 MPa (500 kg/cm^2)	0.5 to 4.5 V
10			Grounded input (56 Ω)
11	Fr. • Re. drum CHP start pressure sensor	0 to 2.94 MPa (30 kg/cm^2)	0.5 to 4.5 V
12			
13			
14			
15			
16	Boom drum raise pressure sensor	0 to 2.94 MPa (30 kg/cm^2)	0.5 to 4.5 V
17	Boom drum lower pressure sensor	0 to 2.94 MPa (30 kg/cm^2)	0.5 to 4.5 V
18	Fr. drum raise pressure sensor	0 to 2.94 MPa (30 kg/cm^2)	0.5 to 4.5 V
19	Fr. drum lower pressure sensor	0 to 2.94 MPa (30 kg/cm^2)	0.5 to 4.5 V
20	Re. drum raise pressure sensor	0 to 2.94 MPa (30 kg/cm^2)	0.5 to 4.5 V
21	Re. drum lower pressure sensor	0 to 2.94 MPa (30 kg/cm^2)	0.5 to 4.5 V
22	Third drum raise pressure sensor	0 to 2.94 MPa (30 kg/cm^2)	0.5 to 4.5 V
23	Third drum lower pressure sensor	0 to 2.94 MPa (30 kg/cm^2)	0.5 to 4.5 V

(2) DIGITAL INPUT [B]

No.	Name	Status	Signal level
1	C/W detect 3		GND (15 kΩ)/OPEN
2	C/W detect 4		GND (15 kΩ)/OPEN
3	C/W detect 5 (C4, C5)		GND (15 kΩ)/OPEN
4	C/W detect 6 (C5)		GND (15 kΩ)/OPEN
5	C/W detect 7 (C5)		GND (3.3 kΩ)/OPEN
6			GND (3.3 kΩ)/OPEN
7			GND (3.3 kΩ)/OPEN
8			GND (3.3 kΩ)/OPEN
9			GND (3.3 kΩ)/OPEN
10			GND (3.3 kΩ)/OPEN
11			GND (3.3 kΩ)/OPEN
12			GND (3.3 kΩ)/OPEN
13	Crane boom overhoist signal	Normal/Overhoist	+24 V/OPEN
14	Boom B/S No. 1 signal	Normal/Overhoist	+24 V/OPEN
15	Boom B/S No. 2 signal	Normal/Overhoist	+24 V/OPEN
16			GND (3.3 kΩ)/OPEN
17			GND (3.3 kΩ)/OPEN
18	Key switch ON signal (+24 V at key ON)	ON/OFF	+24 V/OPEN
19	Function lock	Work/stop	+24 V/OPEN
20	Charge signal (alternator power generation signal)	With power generation/Without power generation	+24 V/OPEN
21	Inching selection switch	Inching/Normal	+24 V/OPEN
22			+24 V/OPEN
23			+24 V/OPEN
24	Crane hook overhoist signal	Normal/Overhoist	+24 V/OPEN
25	Jib hook overhoist signal	Normal/Overhoist	+24 V/OPEN
26	Hook overhoist release signal	Release/Normal	+24 V/OPEN
27	Boom hoisting release signal	Release/Normal	+24 V/OPEN
28	Controller ID 1		+24 V/OPEN
29	Controller ID 2		+24 V/OPEN
30	Fr. drum raise stop	Normal/Stop	+24 V/OPEN
31	Fr. drum lower stop (CEN)	Normal/Stop	+24 V/OPEN
32	Re. drum (tower jib) raise stop	Normal/Stop	+24 V/OPEN
33	Re. drum (tower jib) lower stop	Normal/Stop	+24 V/OPEN
34			+24 V/OPEN
35	Jib overhoist signal	Normal/Overhoist	+24 V/OPEN
36	C/W detect 1		GND (3.3 kΩ)/OPEN
37	C/W detect 2		GND (3.3 kΩ)/OPEN
38	Confluence/independence selection SOL (Fr. drum)		+24 V/OPEN
39	Confluence/independence selection SOL (Re. drum)		+24 V/OPEN
40	Oil cooler motor relay	ON/OFF	+24 V/OPEN
41	Third drum raise stop	Normal/Stop	+24 V/OPEN
42	Third drum lower stop	Normal/Stop	+24 V/OPEN
43	Boom drum raise stop	Normal/Stop	+24 V/OPEN
44	Boom drum lower stop	Normal/Stop	+24 V/OPEN
45	DPF load SOL	Load ON/OFF	+24 V/OPEN
46			+24 V/OPEN
47			+24 V/OPEN
48			+24 V/OPEN
49			+24 V/OPEN
50			+24 V/OPEN

No.	Name	Status	Signal level
51			+24 V/OPEN
52			+24 V/OPEN
53	ML bypass (CR)	ON/OFF	+24 V/OPEN
54	ML bypass (JIB)	ON/OFF	+24 V/OPEN
55			+24 V/OPEN
56			+24 V/OPEN
57			+24 V/OPEN
58			+24 V/OPEN

(3) ANALOGUE OUTPUT [H]

No.	Name	Status	Signal level
1			
2			

(4) PROPORTIONAL VALVE OUTPUT [D]

No.	Name	Output current	Dither
1	Boom drum raise prop. valve	200 to 625 mA	200 mAp-p 100 Hz
2	Boom drum lower prop. valve	200 to 625 mA	200 mAp-p 100 Hz
3	Fr. drum raise prop. valve	150 to 620 mA	200 mAp-p 100 Hz
4	Fr. drum lower prop. valve	150 to 620 mA	200 mAp-p 100 Hz
5	Re. drum raise prop. valve	150 to 620 mA	200 mAp-p 100 Hz
6	Re. drum lower prop. valve	150 to 620 mA	200 mAp-p 100 Hz
7	Third drum raise prop. valve (option)	150 to 620 mA	200 mAp-p 100 Hz
8	Third drum lower prop. valve (option)	150 to 620 mA	200 mAp-p 100 Hz
9	Motor CHP pressure control prop. valve	100 to 400 mA	200 mAp-p 100 Hz
10	Fr. drum motor tilt control prop. Valve	200 to 750 mA	200 mAp-p 100 Hz
11	Re. drum motor tilt control prop. valve	200 to 750 mA	200 mAp-p 100 Hz
12	Third drum motor tilt control prop. valve (option)	200 to 750 mA	200 mAp-p 100 Hz

(5) DIGITAL OUTPUT [C]

No.	Name	Output current	Dither
1			GND/OPEN
2			GND/OPEN
3			GND/OPEN
4			GND/OPEN
5			GND/OPEN
6			GND/OPEN
7			GND/OPEN (300 mA)
8			GND/OPEN (300 mA)
9			GND/OPEN (300 mA)
10			GND/OPEN
11			GND/OPEN
12			GND/OPEN
13			GND/OPEN (PWM)
14			GND/OPEN (PWM)
15	Fr. drum motor boost SOL	Boost/Normal	+24 V/OPEN
16	Oil cooler electric motor	ON/OFF	GND/OPEN
17	Confluence/independence select SOL (Fr. drum)	Confluence/independence	GND/OPEN
18	Confluence/independence select SOL (Re. drum)	Confluence/independence	GND/OPEN
19	DPF load SOL	Load ON/OFF	GND/OPEN
20			GND/OPEN
21	Re. drum motor boost SOL	Boost/Normal	+24 V/OPEN
22	Third drum motor boost SOL (option)	Boost/Normal	+24 V/OPEN
23			GND/OPEN
24			GND/OPEN
25			GND/OPEN (PWM)
26	Fr. drum control signal		GND/OPEN
27	Re. drum control signal		GND/OPEN
28	Third control signal		GND/OPEN
29	Fr. drum C/V-SOL	Energized/De-energized	+24 V/OPEN
30	Re. drum C/V-SOL	Energized/De-energized	+24 V/OPEN
31			GND/OPEN
32			GND/OPEN
33			GND/OPEN
34			GND/OPEN
35			GND/OPEN (CPU error)
36	Third C/V-SOL (option)	Energized/De-energized	+24 V/OPEN

10.3.6 ARRANGEMENT OF MAIN CONTROLLER CONNECTOR PIN

1. ARRANGEMENT OF MC1 CONNECTOR PIN

Connector No.	Pin No.	Port name	Function	Specifications	Ref.
CN101	1	+5VA	A1	Spare	
	2	GD2		Spare	
	3	TXD2		Spare	
	4	RXD2		Spare	
	5	CANH1		CAN1_H	
	6	CANL1		CAN1_L	
	7	CAN1 termination		Spare	
	8	CAN1 termination		Spare	
	9	CANH2		CAN2_H	
	10	CANL2		CAN2_L	
	11	A1		Spare	
	12	RTS		Spare	
	13	CTS		Spare	
	14	SHG2		Spare	
	15	CAN2 termination		Spare	
	16	CAN2 termination		Spare	
	17	A2	Resistance input	Spare	
	18	GA	A1	Spare	
	19	TXD1		Spare	
	20	RXD1		Spare	
	21	GD1		Spare	
	22	SHG1		Spare	
	23	TXD3		Program DL serial	
	24	RXD3			
	25	DL			
	26	GD3			
	27	GA	A2	Spare	
	28	E1+	Engine turn sensor	Spare	
	29	E1-		Spare	
	30	SHG3		Spare	
	31	H1+		Accel. indicator voltage 1＋	
	32	H1-		Accel. indicator voltage 1－	
	33	H2+		Accel. indicator voltage 2＋	
	34	H2-		Accel. indicator voltage 2－	

Connector No.	Pin No.	Port name	Function	Specifications	Ref.
CN102	1	+5VA	A3	Fr. drum motor speed adjusting trimmer	
	2	A3			
	3	GA	A3		
	4	+5VA	A4	Re. drum motor speed adjusting trimmer	
	5	A4			
	6	GA	A4		
	7	+5VA	A5	Third drum motor speed adjusting trimmer	
	8	A5			
	9	GA	A5		
	10	+5VA	A6	Boom drum motor speed adjusting trimmer	
	11	A6			
	12	GA	A6		
	13	A7	Resistance input	Spare	
	14	GA	A7		
	15	+5VA	A8	Grip throttle	
	16	A8			
	17	GA	A8		
	18	+5VA	A9	Foot throttle (option)	
	19	A9			
	20	GA	A9		
	21	A10	Resistance input	Hydraulic oil temperature sensor	
	22	GA	A10		

Connector No.	Pin No.	Port name	Function	Specifications	Remarks
CN103	1	+5A	A11	Tagline trimmer (option)	
	2	A11			
	3	GA	A11		
	4	+5A	A12	Control primary pressure	
	5	A12			
	6	GA	A12		
	7	+5A	A13	Swing pump pressure sensor	
	8	A13			
	9	GA	A13		
	10	+5A	A14	Swing control (right) pressure sensor	
	11	A14			
	12	GA	A22	GND for third clutch pressure sensor (option)	
	13	+5A	A15	Swing control (left) pressure sensor	
	14	A15			
	15	GA	A15		
	16	GA	A14	GND for swing control (right) pressure sensor	

Connector No.	Pin No.	Port name	Function	Specifications	Remarks
CN104	1	B1	Grounded input (15 KΩ)	ECU signal	
	2	+5A	A16	Qmax cut solenoid detection pressure	
	3	A16			
	4	GA	A16		
	5	+5A	A17	Power shift pressure sensor	
	6	A17			
	7	GA	A17		
	8	+5A	A18	+5V for supply voltage monitoring	
	9	B2	Grounded input (15 KΩ)	Engine hyd. pressure PSW	
	10	+5A	A19	+5V for Inclination sensor X	
	11	+5A	A20	+5 V for Inclination sensor Y	
	12	A18		Supply voltage monitoring	
	13	GA	A18		
	14	B3	Grounded input (15 KΩ)	CB/W detect	
	15	A19		Inclination sensor X	
	16	A20		Inclination sensor Y	
	17	GA	A20		
	18	'+5A	A21	Fr. drum clutch pressure sensor	
	19	A21			
	20	GA	A21		
	21	'+5A	A22	+5V for third drum clutch pressure sensor (option)	
	22	B4	Grounded input (15 KΩ)	Clogging of air cleaner	
	23	B5	Grounded input (3.3 KΩ)	Spare	
	24	GA	A19	GND for Inclination sensor X	
	25	'+5A	A23	Re. drum clutch pressure sensor	
	26	A23			
	27	GA	A23		
	28	A22		Third drum clutch pressure sensor (option)	

Connector No.	Pin No.	Port name	Function	Specifications	Remarks
CN105	1	+24 V 1	Battery (+)	Power supply	
	2	+24 V		Power supply	
	3	+24 V		Power supply	
	4	B6	Grounded input (3.3 KΩ)	Fr. drum brake cooling oil temperature	
	5	B7	Grounded input (3.3 KΩ)	Re. drum brake cooling oil temperature	
	6	B8	Grounded input (3.3 KΩ)	Radiator water level	
	7	B9	Grounded input (3.3 KΩ)	Engine oil filter	
	8	GND	Battery (-)	GND	
	9	GND		GND	
	10	D10+		Tagline tension prop. valve +	
	11	D1+		Main pump horse power control prop. valve	
	12	D1-			
	13	D2+		Boom pump horse power control prop. valve	
	14	D2-			
	15	D3+		Swing low speed prop. valve	
	16	D3-			
	17	D4+		Swing counterforce prop. valve	
	18	D4-			
	19	D5+		Boom pump tilt control prop. valve	
	20	D5-			
	21	GND	Battery (-)	GND	
	22	D10-		Tagline tension prop. valve -	
	23	B10	Grounded input (3.3 KΩ)	Fr. drum control signal	
	24	B11	Grounded input (3.3 KΩ)	Re. drum control signal	
	25	B12	Grounded input (3.3 KΩ)	Third drum control signal	
	26	B13	+24 V input	Fr. drum free fall select. signal	
	27	B14	+24 V input	Re. drum free fall select. signal	
	28	B15	+24 V input	Third drum free fall select. signal	
	29	B16	Grounded input (3.3 KΩ) (and pulse input)	Fr. drum rotate sensor	
	30	B17	Grounded input (3.3 KΩ) (and pulse input)	Re. drum rotate sensor	
	31	+24 V	For backup power supply RTC		

Connector No.	Pin No.	Port name	Function	Specifications	Remarks
CN106	1	+24 V 1	Battery (+)		
	2	D6+		Fr. drum middle detent	
	3	D6-			
	4	D7+		Re. drum middle detent	
	5	D7-			
	6	D11+		Left swing stop proportional valve	
	7	D11-			
	8	D8+		Main pump tilt control prop. valve 1	
	9	D8-			
	10	D9+		Main pump tilt control prop. valve 2	
	11	D9-			
	12	B18	+24 V input	Key SW ON signal	
	13	B19	+24 V input	Function lock	
	14	B20	+24 V input	Charge signal	
	15	D12+		Right swing stop proportional valve	
	16	D12-			
	17	GND	Battery (-)	Spare	
	18	B21	+24 V input	Inching selection	
	19	B22	+24 V input	Aux. accel. signal	
	20	B23	+24 V input	Engine emg. stop signal	
	21	B24	+24 V input	Engine restart	
	22	B25	+24 V input	Operator certificate wait signal	
	23	B26	+24 V input	Swing parking switch	
	24	B27	+24 V input	Drum rotate detecting grip selection	

Connector No.	Pin No.	Port name	Function	Specifications	Remarks
CN107	1	B28	D/O FB	Controller ID 1	
	2	B29	D/O FB	Controller ID 2	
	3	B30	+24 V input	G mode/Normal selection	
	4	B31	+24 V input	G winch (Fr.)	
	5	B32	+24 V input	G winch (Re.)	
	6	B33	+24 V input	G winch (main)	
	7	B34	D/O FB	AIS function ON/OFF SW	
	8	B35	+24 V input	Propel control pressure switch	
	9	B36	Grounded input (3.3 KΩ) (and pulse input)	Spare	
	10	B37	Grounded input (3.3 KΩ) (and pulse input)	Cooling line filter	
	11	B38	+24 V input	Engine preheat	
	12	B39	+24 V input	Spare	
	13	B40	D/O FB	Backup fuse	
	14	B41	+24 V input	Fr. drum free fall speed increase SW	
	15	B42	+24 V input	Re. drum free fall speed increase SW	
	16	B43	+24 V input	Third drum free fall speed increase SW (option)	
	17	B44	+24 V input	Free fall permit signal	

Connector No.	Pin No.	Port name	Function	Specifications	Remarks
CN108	1	C1	Grounded output	Fr. drum motor CLM-SOL	
	2	C2	Grounded output	Fr. drum motor ESM-SOL	
	3	C3	Grounded output	Re. drum motor CLA-SOL	
	4	C4	Grounded output	Re. drum motor ESA-SOL	
	5	C5	Grounded output	Third drum motor CLT-SOL	
	6	B45	D/O FB	Fr. drum motor CLM-SOL (FB)	
	7	B46	D/O FB	Fr. drum motor ESM-SOL (FB)	
	8	B47	D/O FB	Re. drum motor CLA-SOL (FB)	
	9	B48	D/O FB	Re. drum motor ESA-SOL (FB)	
	10	C6	Grounded output	Third drum motor EST-SOL	
	11	C7	Grounded output	Spare	
	12	C8	Grounded output	Swing parking control	
	13	C9	Grounded output	ML adjust. mode selection	
	14	C10	Grounded output	Hyd. oil heat SOL	
	15	B49	D/O FB	Third motor CLT-SOL (FB)	
	16	B50	D/O FB	Third motor EST-SOL (FB)	
	17	B51	D/O FB	Hyd. oil heat LS(option)	
	18	B52	D/O FB	Pump Qmax cut solenoid (FB)	
	19	B53	D/O FB	Remote control connection signal	
	20	C11	Grounded output	Pump Qmax cut solenoid	
	21	C12	Grounded output	Swing flasher	
	22	C13	PWM output	Spare	
	23	C14	PWM output	Spare	
	24	B54	D/O FB	Swing warning (flasher)	
	25	B55	D/O FB	Swing warning (Buzzer and flasher)	
	26	B56	D/O FB	DPF regeneration FB）	
	27	B57	D/O FB	Accel. signal (DOWN)	
	28	B58	D/O FB	Accel. signal (UP)	

Connector No.	Pin No.	Port name	Function	Specifications	Remarks
CN109	1	C15	+24 V output	Battery relay energizing	
	2	C16	Grounded output	ML bypass reset	
	3	C17	Grounded output	Solenoid cut relay energizing	
	4	C18	Grounded output	Engine warning output	
	5	C19	Grounded output	AIS air con. ON relay energizing	
	6	C20	Grounded output	Swing neutral brake selection	
	7	C21	+24 V output	Sub battery relay energizing	
	8	C22	+24 V output	Spare	
	9	C23	Grounded output	Spare	
	10	C24	Grounded output	Spare	
	11	C25	PWM output	Spare	
	12	C26	Grounded output	DPF regeneration start	
	13	C27	Grounded output	Engine restart	
	14	C28	Grounded output	Pilot pressure cut relay	
	15	C29	+24 V output	Fr. drum rotate detection grip (option)	
	16	C30	+24 V output	Re. drum rotate detection grip (option)	
	17	C31	Grounded output	Safety relay operation	
	18	C32	Grounded output	Engine stop relay operation	
	19	C33	Grounded output	Swing voice alarm	
	20	C34	Grounded output	Spare	
	21	C35	Grounded output	Spare	
	22	C36	+24 V output	Spare	

2. ARRANGEMENT OF MC2 CONNECTOR PIN

Connector No.	Pin No.	Port name	Function	Specifications	Ref.
CN111	1	+5VA	A1	Vacancy	
	2	GD2		Vacancy	
	3	TXD2		Vacancy	
	4	RXD2		Vacancy	
	5	CANH1		CAN1_H	
	6	CANL1		CAN1_L	
	7	CAN1 termination		Vacancy	
	8	CAN1 termination		Vacancy	
	9	CANH2		CAN2_H	
	10	CANL2		CAN2_L	
	11	A1		Vacancy	
	12	RTS		Vacancy	
	13	CTS		Vacancy	
	14	SHG2		Vacancy	
	15	CAN2 termination		Vacancy	
	16	CAN2 termination		Vacancy	
	17	A2	Resistance input	Vacancy	
	18	GA	A1	Vacancy	
	19	TXD1		Vacancy	
	20	RXD1		Vacancy	
	21	GD1		Vacancy	
	22	SHG1		Vacancy	
	23	TXD3		Program DL serial	
	24	RXD3			
	25	DL			
	26	GD3			
	27	GA	A2	Vacancy	
	28	E1+	Engine rotate sensor	Vacancy	
	29	E1-		Vacancy	
	30	SHG3		Vacancy	
	31	H1+		Vacancy	
	32	H1-		Vacancy	
	33	H2+		Vacancy	
	34	H2-		Vacancy	

Connector No.	Pin No.	Port name	Function	Specifications	
CN112	1	+5VA	A3	Fr. drum motor tilt control pressure sensor	
	2	A3			
	3	GA	A3		
	4	+5VA	A4	Re. drum motor tilt control pressure sensor	
	5	A4			
	6	GA	A4		
	7	+5VA	A5	Third drum motor tilt control pressure sensor	
	8	A5			
	9	GA	A5		
	10	+5VA	A6	A/D spare	
	11	A6			
	12	GA	A6		
	13	A7	Resistance input	Fuel level	
	14	GA	A7		
	15	+5VA	A8	Confluence/Independence selection pressure (Fr. drum)	
	16	A8			
	17	GA	A8		
	18	+5VA	A9	Confluence/Independence selection pressure (Re. drum)	
	19	A9			
	20	GA	A9		
	21	A10	Resistance input	A/D spare	
	22	GA	A10		

Connector No.	Pin No.	Port name	Function	Specifications	
CN113	1	+5A	A11	Fr./Re. drum CHP start pressure sensor	
	2	A11			
	3	GA	A11		
	4	+5A	A12	A/D spare	
	5	A12			
	6	GA	A12		
	7	+5A	A13	A/D spare	
	8	A13			
	9	GA	A13		
	10	+5A	A14	A/D spare	
	11	A14			
	12	GA	A22	Third drum raise pressure sensor	
	13	+5A	A15	A/D spare	
	14	A15			
	15	GA	A15		
	16	GA	A14	A/D spare	

Connector No.	Pin No.	Port name	Function	Specifications	
CN114	1	B1	Grounded input (15 KΩ)	C/W detect 3	
	2	+5A	A16	Boom drum raise pressure sensor	
	3	A16			
	4	GA	A16		
	5	+5A	A17	Boom drum lower pressure sensor	
	6	A17			
	7	GA	A17		
	8	+5A	A18	Fr. drum raise pressure sensor	
	9	B2	Grounded input (15 KΩ)	C/W detect 4	
	10	+5A	A19	Fr. drum lower pressure sensor	
	11	+5A	A20	Re. drum raise pressure sensor	
	12	A18		Fr. drum raise pressure sensor	
	13	GA	A18		
	14	B3	Grounded input (15 KΩ)	C/W detect 5 (C4, C5)	
	15	A19		Fr. drum lower pressure sensor	
	16	A20		Re. drum raise pressure sensor	
	17	GA	A20		
	18	'+5A	A21	Re. drum lower pressure sensor	
	19	A21			
	20	GA	A21		
	21	'+5A	A22	Third drum raise pressure sensor	
	22	B4	Grounded input (15 KΩ)	C/W detect 6 (C5)	
	23	B5	Grounded input (3.3 KΩ)	C/W detect 7 (C5)	
	24	GA	A19	Fr. drum lower pressure sensor	
	25	'+5A	A23	Third drum lower pressure sensor	
	26	A23			
	27	GA	A23		
	28	A22		Third drum raise pressure sensor	

Connector No.	Pin No.	Port name	Function	Specifications	
CN115	1	+24 V 1	Battery (+)	Power supply	
	2	+24 V		Power supply	
	3	+24 V		Power supply	
	4	B6	Grounded input (3.3 KΩ)	Fr. drum brake cooling oil temperature	
	5	B7	Grounded input (3.3 KΩ)	Re. drum brake cooling oil temperature	
	6	B8	Grounded input (3.3 KΩ)	Radiator water level	
	7	B9	Grounded input (3.3 KΩ)	Engine oil filter	
	8	GND	Battery (-)	GND	
	9	GND		GND	
	10	D10+		Fr. drum motor tilt control prop. valve +	
	11	D1+		Boom drum raise proportional valve	
	12	D1-			
	13	D2+		Boom drum lower proportional valve	
	14	D2-			
	15	D3+		Fr. drum raise proportional valve	
	16	D3-			
	17	D4+		Fr. drum lower proportional valve	
	18	D4-			
	19	D5+		Re. drum raise proportional valve	
	20	D5-			
	21	GND	Battery (-)	GND	
	22	D10-		Fr. drum motor tilt control prop. valve -	
	23	B10	Grounded input (3.3 KΩ)	Spare	
	24	B11	Grounded input (3.3 KΩ)	Spare	
	25	B12	Grounded input (3.3 KΩ)	Spare	
	26	B13	+24 V input	Crane boom overhoist signal	
	27	B14	+24 V input	Boom B/S No.1 signal	
	28	B15	+24 V input	Boom B/S No.2 signal	
	29	B16	Grounded input (3.3 KΩ) (and pulse input)	Spare	
	30	B17	Grounded input (3.3 KΩ) (and pulse input)	Spare	
	31	+24 V	For backup power supply RTC	Power supply	

Connector No.	Pin No.	Port name	Function	Specifications	Remarks
CN116	1	+24 V 1	Battery (+)	Power supply	
	2	D6+		Re. drum lower proportional valve	
	3	D6-			
	4	D7+		Third drum raise proportional valve (option)	
	5	D7-			
	6	D11+		Re. drum motor tilt control prop. valve	
	7	D11-			
	8	D8+		Third drum lower prop. valve (option)	
	9	D8-			
	10	D9+		Motor CHP pressure control prop. valve	
	11	D9-			
	12	B18	+24 V input	Key SW ON signal	
	13	B19	+24 V input	Function lock	
	14	B20	+24 V input	Charge signal	
	15	D12+		Third drum motor tilt control prop. valve (option)	
	16	D12-			
	17	GND	Battery (-)	Spare	
	18	B21	+24 V input	Inching selection	
	19	B22	+24 V input	Spare	
	20	B23	+24 V input	Spare	
	21	B24	+24 V input	Crane hook overhoist signal	
	22	B25	+24 V input	Jib hook overhoist signal	
	23	B26	+24 V input	Hook overhoist release signal	
	24	B27	+24 V input	Boom overhoist release signal	

Connector No.	Pin No.	Port name	Function	Specifications	Remarks
CN117	1	B28	D/O FB	Controller ID 1	
	2	B29	D/O FB	Controller ID 2	
	3	B30	+24 V input	Fr. drum raise stop	
	4	B31	+24 V input	Fr. drum lower stop	
	5	B32	+24 V input	Re. drum (tower jib) raise stop	
	6	B33	+24 V input	Re. drum (tower jib) lower stop	
	7	B34	D/O FB	Spare	
	8	B35	+24 V input	Jib overhoist signal	
	9	B36	Grounded input (3.3 KΩ) (and pulse input)	C/W detect 1	
	10	B37	Grounded input (3.3 KΩ) (and pulse input)	C/W detect 2	
	11	B38	+24 V input	Confluence/Independence selection solenoid (Fr.)	
	12	B39	+24 V input	Confluence/Independence selection solenoid (Re.)	
	13	B40	D/O FB	Oil cooler motor relay	
	14	B41	+24 V input	Third drum raise stop	
	15	B42	+24 V input	Third drum lower stop	
	16	B43	+24 V input	Boom drum raise stop	
	17	B44	+24 V input	Boom drum lower stop	

Connector No.	Pin No.	Port name	Function	Specifications	Remarks
CN118	1	C1	Grounded output	Spare	
	2	C2	Grounded output	Spare	
	3	C3	Grounded output	Spare	
	4	C4	Grounded output	Spare	
	5	C5	Grounded output	Spare	
	6	B45	D/O FB	DPF load solenoid	
	7	B46	D/O FB	Spare	
	8	B47	D/O FB	Spare	
	9	B48	D/O FB	Spare	
	10	C6	Grounded output	Spare	
	11	C7	Grounded output	Spare	
	12	C8	Grounded output	Spare	
	13	C9	Grounded output	Spare	
	14	C10	Grounded output	Spare	
	15	B49	D/O FB	Spare	
	16	B50	D/O FB	Spare	
	17	B51	D/O FB	Spare	
	18	B52	D/O FB	Spare	
	19	B53	D/O FB	ML bypass (CR)	
	20	C11	Grounded output	Spare	
	21	C12	Grounded output	Spare	
	22	C13	PWM output	Spare	
	23	C14	PWM output	Spare	
	24	B54	D/O FB	ML bypass (JIB)	
	25	B55	D/O FB	Spare	
	26	B56	D/O FB	Spare	
	27	B57	D/O FB	Spare	
	28	B58	D/O FB	Spare	

Connector No.	Pin No.	Port name	Function	Specifications	Remarks
CN119	1	C15	+24 V output	Fr. drum motor boost SOL	
	2	C16	Grounded output	Oil cooler electric motor	
	3	C17	Grounded output	Confluence/Independence selection solenoid (Fr. drum)	
	4	C18	Grounded output	Confluence/Independence selection solenoid (Re. drum)	
	5	C19	Grounded output	DPF load solenoid	
	6	C20	Grounded output	Spare	
	7	C21	+24 V output	Re. drum motor boost SOL	
	8	C22	+24 V output	Third motor boost SOL (option)	
	9	C23	Grounded output	Spare	
	10	C24	Grounded output	Spare	
	11	C25	PWM output	Spare	
	12	C26	Grounded output	Fr. drum control signal	
	13	C27	Grounded output	Re. drum control signal	
	14	C28	Grounded output	Third drum control signal	
	15	C29	+24 V output	Fr. drum C/V-SOL	
	16	C30	+24 V output	Re. drum C/V-SOL	
	17	C31	Grounded output	Spare	
	18	C32	Grounded output	Spare	
	19	C33	Grounded output	Spare	
	20	C34	Grounded output	Spare	
	21	C35	Grounded output	Spare	
	22	C36	+24 V output	Third C/V-SOL (option)	

10.3.7 ADJUSTMENT OF MAIN CONTROLLER

1. Model number setting

   Perform this setting only when controller is replaced.

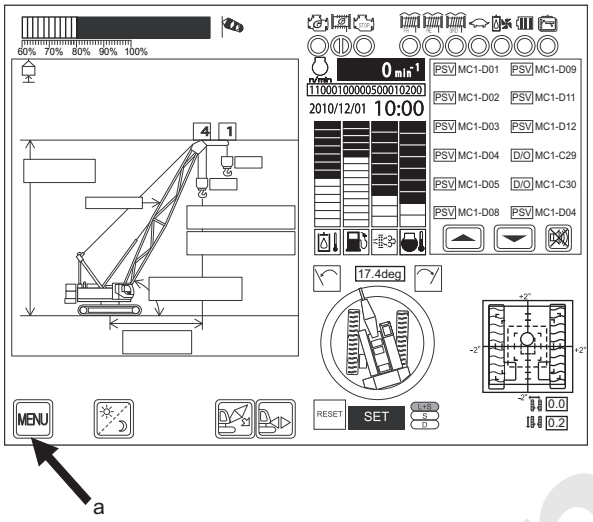
   If model setting is not properly done, machine does not work properly.

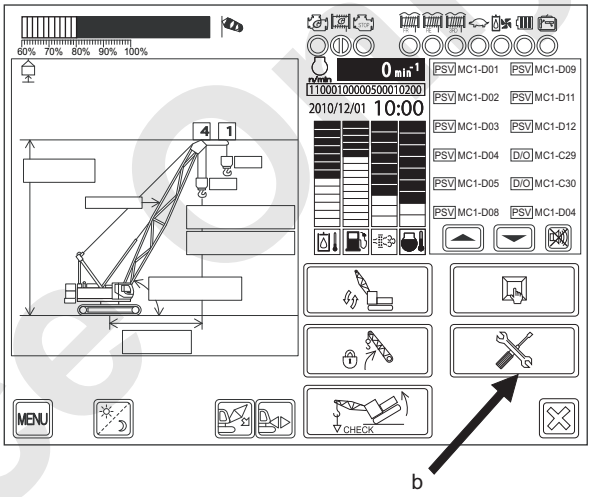
   Take extra care.

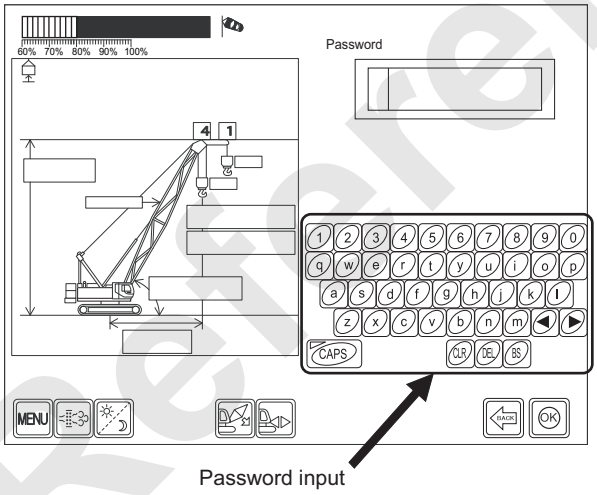
(1) Turn the engine key ON.

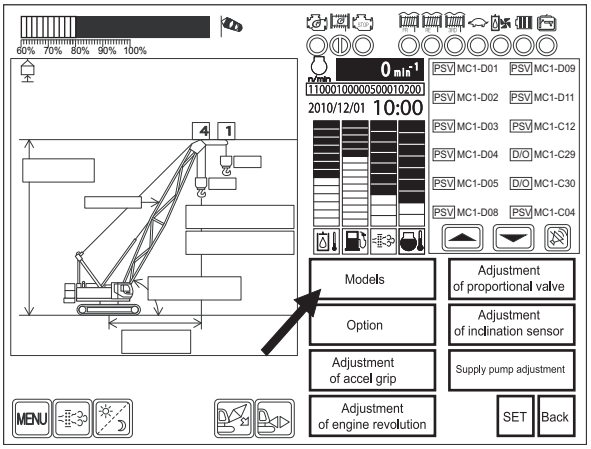
(2) Select the screen as follows.

   Main screen (a) → (b) → Password input → MC adjustment → Model number setting



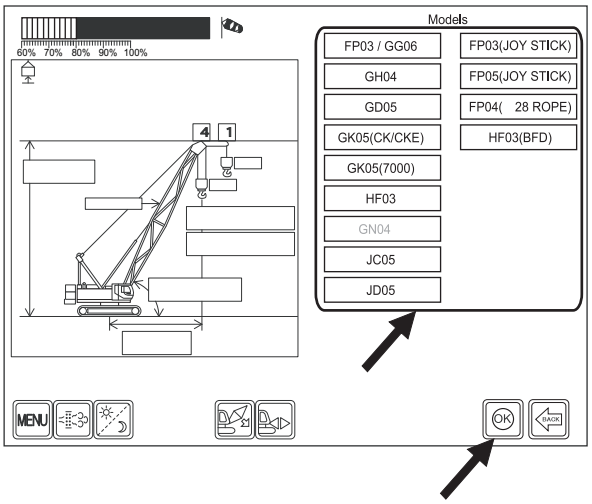






(3) Select the indicated model group.

(4) Push "OK" after model group is selected.
Unless "OK" is pushed, selection becomes ineffective.



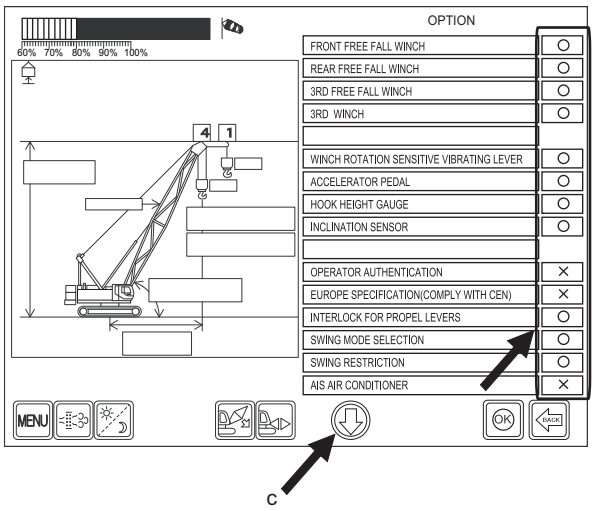
2. Option setting

(1) Turn the engine key "ON".

(2) Select the screen as follows.
Main screen (a) → (b) → Password input
→ MC adjustment → Option setting

(3) Select "O" (yes) or "X" (no) on each function setting.
Use (c) icon for page change.

(4) After setting is completed, push "OK" and after page is changed, push "SET" to record.
Unless "SET" is pushed, selection becomes ineffective.



3. Adjustment of grip throttle and foot throttle.

(1) Turn the engine key "ON".

(2) Select the screen as follows.
Main screen (a) → (b) → Password input
→ MC adjustment → Grip adjustment

(3) The screen changes to adjustment screen.
Push adjustment start button (d).

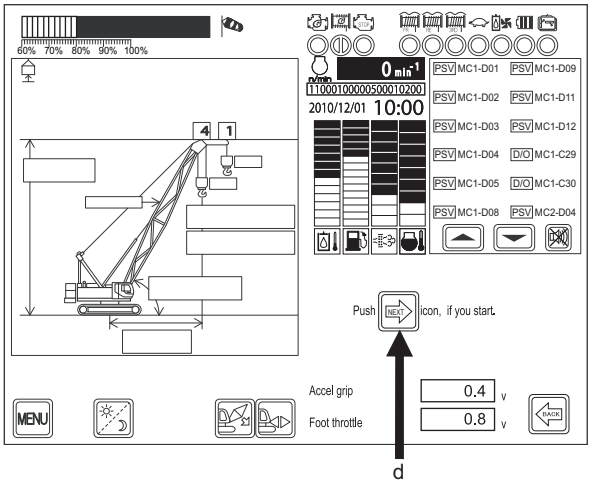
(4) Throttle low adjustment.
Set the grip throttle and foot throttle to low idle position.

(5) If OK, push button (d).

(6) Throttle high adjustment.
Set the grip throttle and foot throttle to high idle position.

(7) If OK, push button (d).

(8) If adjustment completion becomes indicated, push "OK" and push "SET" after screen has been changed to record.
Unless "SET" is pushed, selection becomes ineffective.



4. Engine speed adjustment
Warm up the engine sufficiently before adjustment.

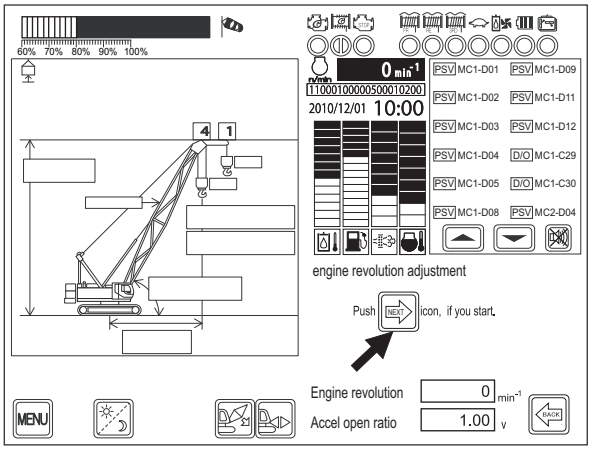
(1) Start the engine and select the screen as follows.
Main screen (a) → (b) → Password input
→ MC adjustment → Engine speed adjustment

(2) The screen changes to adjustment screen.
Push adjustment start button if OK.

(3) Engine speed is raised to high idle once and then gradually lowered to low idle.

(4) If adjustment completion becomes indicated, push "OK" and push "SET" after screen has been changed to record.
Unless "SET" is pushed, selection becomes ineffective.

If adjustment becomes NG,
NG 1 :
Engine speed is abnormal.
Check if engine error is output.
NG 2 :
Transmission is error.



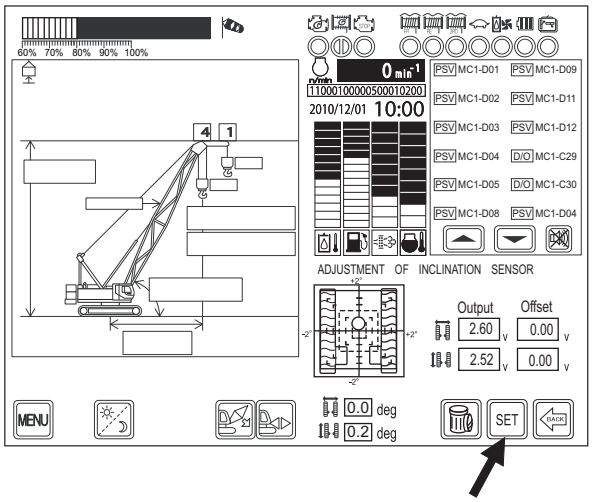
5. Adjusting of inclination meter
   Place the main machinery on the horizontal ground before adjustment using the level gauge etc.

(1) Turn the engine key ON.

(2) Select the screen as follows.
   Main screen (a) → (b) → Password input
   → MC adjustment → Inclination meter adjustment

(3) The screen changes to adjustment screen.
   Push adjustment start button "SET" if OK.

(4) If adjustment completion becomes indicated, push "OK" and push "SET" after screen has been changed to record.
   Unless "SET" is pushed, selection becomes ineffective.

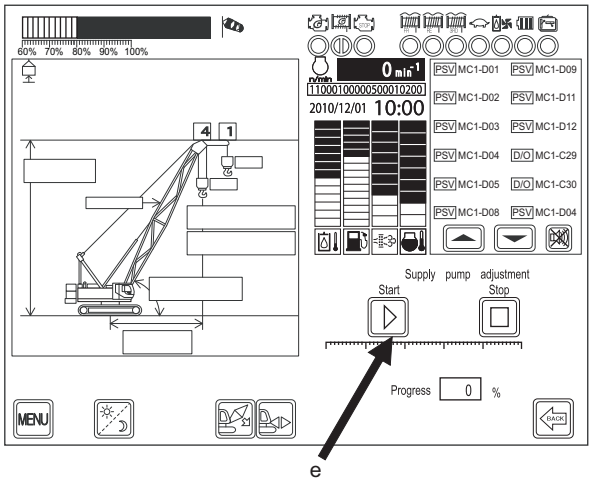


6. Supply pump adjustment
   This adjustment is not normally used.
   Perform this adjustment only when engine supply pump is replaced.
   If this is used other than supply pump replacement, it would affect the engine performance.
   Take extra care.

(1) After replacement of supply pump, start the engine and select the screen as follows.
   Main screen (a) → (b) → Password input
   → MC adjustment → Pump learning function

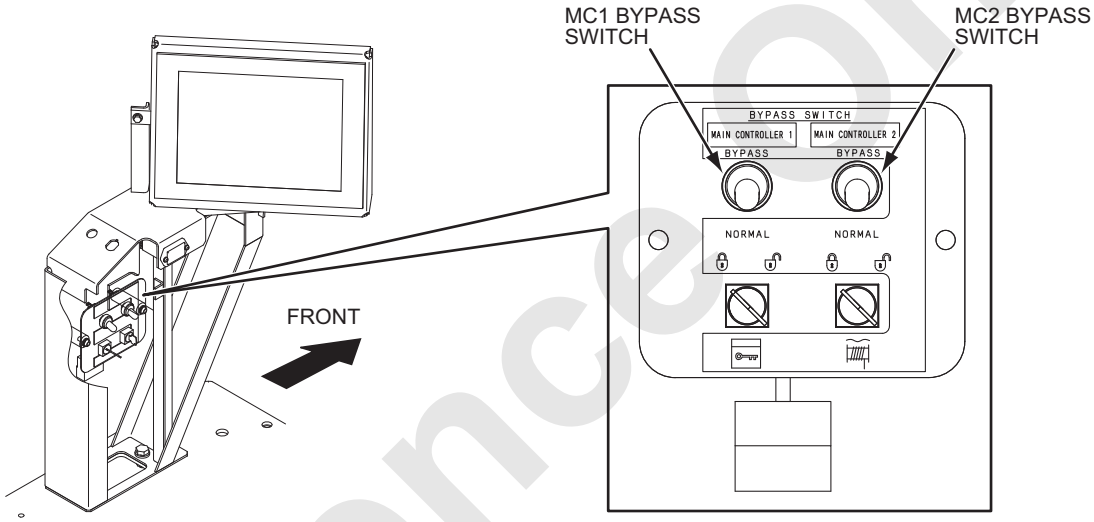
(2) Engine speed stays in low idle. Push (e).

(3) Progress becomes indicated.
   100% is reached after 5 minutes.



10.3.8 CONTROLLER MALFUNCTION EMERGENCY MEASURES

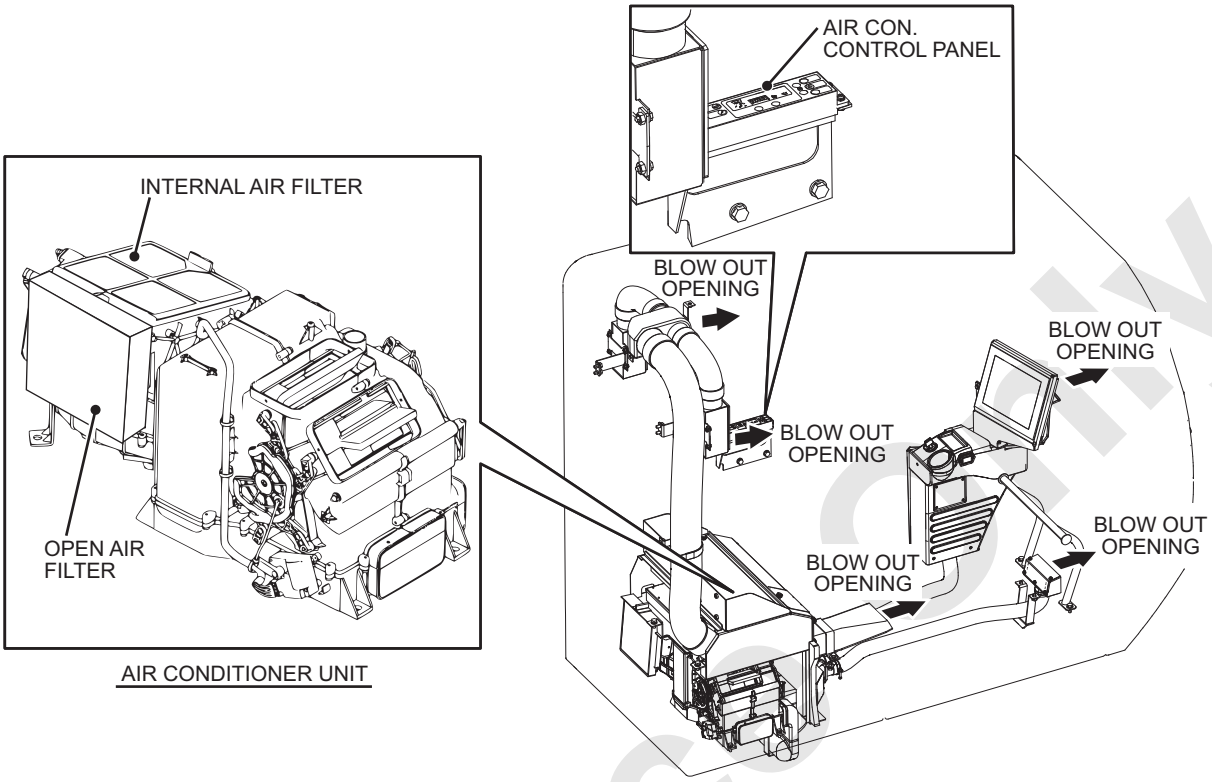
When the controller is malfunctioned, as an emergency measure, set the BYPASS switch for the main controller in the left side stand to the "bypass" position.
The crane operation becomes possible.
Automatic stop is actuated by the load safety device even when the BYPASS switch is actuated.
The variable speed function with the drum speed control knob is unavailable during the crane operation using the BYPASS switch.
Malfunction of the proportional valves (D5, D8, D9, D11, D12 in MC1 and D1 to D8 in MC2) will be displayed in the cluster gauge.
(excluding the case when H-1 is displayed)



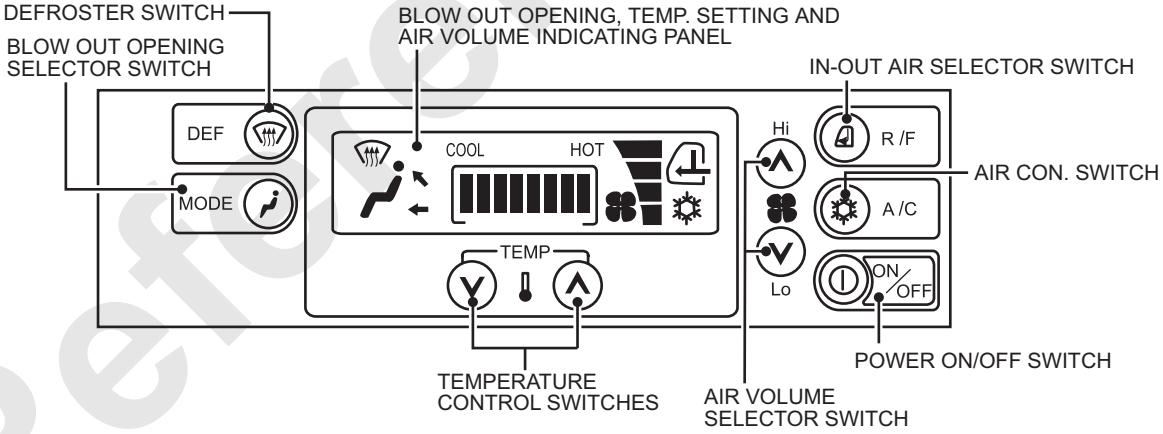
11. AIR CONDITIONER

11.1 AIR CONDITIONER

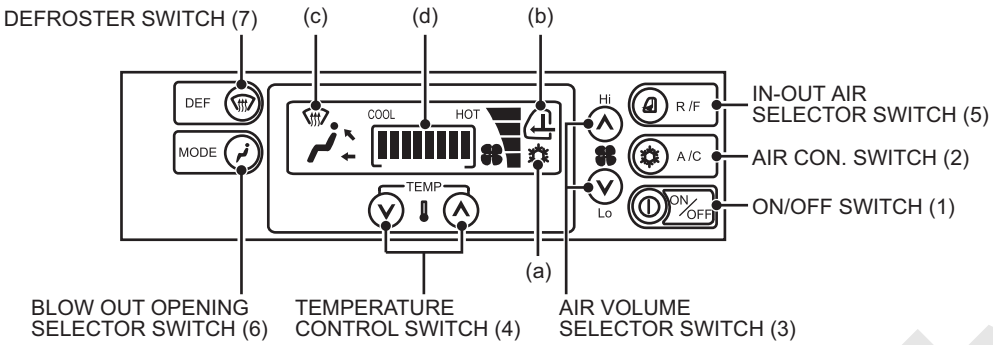
1. NAME OF THE AIR CONDITIONER PARTS



2. NAME OF THE CONTROL PANEL



3. FUNCTION OF EACH CONTROL



(1) ON/OFF SWITCH
(POWER SWITCH)

It turns ON or OFF the air conditioner. When this switch is pushed, air conditioner starts with previous set mode.

When this switch is pushed at the first time, the air conditioner starts on factory set mode.

(2) AIR CON. SWITCH
(AIR CONDITIONER SWITCH)

Every time when this switch is pushed, the air compressor alternates ON/OFF.

When the air conditioner is ON, lights up on the LCD display (a).

(a) SWITCH "ON" INDICATION

(3) AIR VOLUME SELECTOR SWITCH
(FAN SWITCH)

Air volume can be changed by pushing this switch and is indicated on the LCD display when air conditioner is running.

Pushing ⓐ increase air volume.

Pushing ⓥ decrease air volume.

LCD DISPLAY				
AIR VOLUME	LOW	MEDIUM LOW	MEDIUM HIGH	HIGH

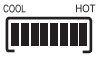
(4) TEMPERATURE CONTROL SWITCH
(AIR CONDITIONER TEMP. SET)

Pushing this switch changes temperature setting when the air conditioner is running.

Set temperature (d) is indicated on LCD display.

Pushing ⓐ rises temperature (blowing air temp.)

Pushing ⓥ lowers temperature (blowing air temp.)



(d) INDICATION CONTENT

(5) IN-OUT AIR SELECTOR SWITCH
(R/F SWITCH)

Every time when this switch is pushed, internal air / open air alternate and it is indicated (b) on LCD display.

internal air circulation

out air take in

(b) INDICATION CONTENT

(6) BLOW OUT OPENING SELECTOR SWITCH
(MODE SWITCH)

Every time when this switch is pushed, blow out opening changes on the following sequence.
Vent → Bi-level → Foot → Vent
They are indicated as shown below.

LCD display			
Blow out opening	Vent	Bi level	Foot
Blow out direction	Upper rear	Upper rear and foot	Foot / *windscreen

* Air blows from DEF too.
Blow volume is Foot > DEF.

(7) DEFROSTER SWITCH
(DEF SWITCH)

Every time when this switch is pushed, blow out opening changes to DEF and is indicated (c) on the LCD display.
This is to defog on the inner side of the front glass or to defrost on the outer side of the front glass.

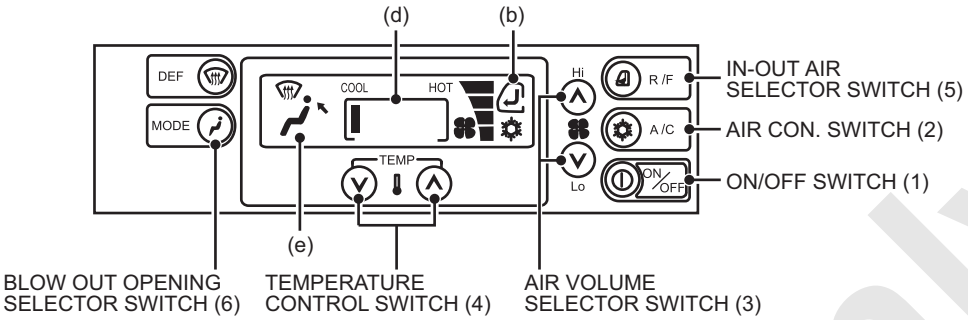
(c) LCD display	
Blow out opening	DEF
Blow out direction	windscreen and *foot

* Air also blows from DEF.
Blow volume is Foot < DEF.

4. AIR CONDITIONER CONTROL

(1) To stop or to start air conditioner :

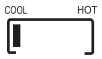
Push ON/OFF SWITCH (1).



(2) To cool :

(A) Push AIR CON. SWITCH (2).

(B) Push the TEMPERATURE CONTROL SWITCH (4) to indicate on the LCD display.



(d) TEMPERATURE CONTROL INDICATION

(C) Push the AIR VOLUME SELECTOR SWITCH (3) for required air volume setting position.

(D) Push BLOW OUT OPENING SELECTOR SWITCH (6) for VENT position (e).
(Vent position is recommended in this case.)

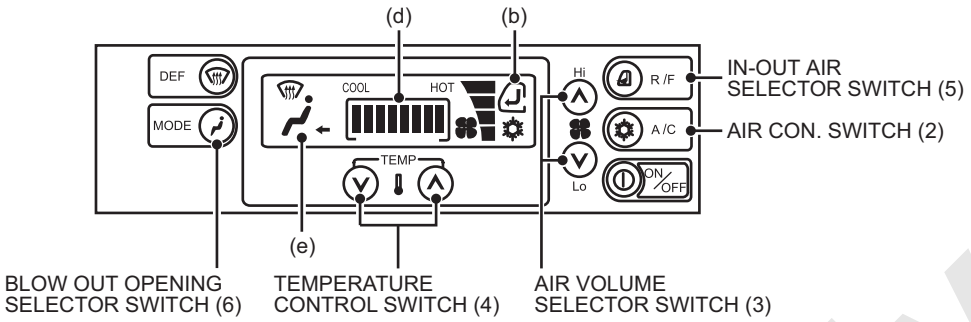
(e) VENT

(E) By pushing IN-OUT AIR SELECTOR SWITCH (5), set the selector to internal air circulation (b) (recommended position in this case)
If air con. cools down too low, adjust the temp. by TEMPERATURE CONTROL SWITCH (4) or adjust the air volume by AIR VOLUME SELECTOR SWITCH (3) or both.

(b) INTERNAL AIR CIRCULATION

- If AIR CON. SWITCH (2) is not pushed, air con. does not cool but only air flows.
- While defrosting the windscreen do not set the temperature to max. cooling.
- Cold air may make windscreen foggy from outside and it may disturb the operator's vision.

(3) To warm :



(A) Push the TEMPERATURE CONTROL SWITCH (4) to indicate on the LCD display.

(d) TEMPERATURE CONTROL INDICATION

(B) Push the AIR VOLUME SELECTOR SWITCH (3) for required air volume.

(C) Push BLOW OUT OPENING SELECTOR SWITCH (6) for FOOT position (e).
(Foot position is recommended in this case.)

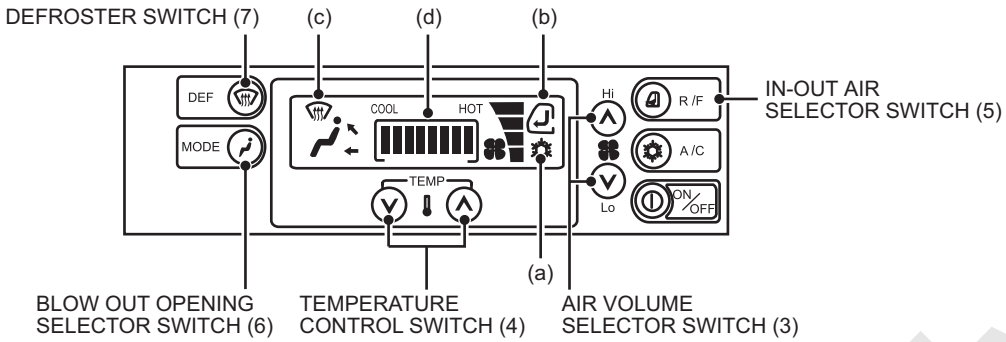
(e) FOOT

(D) By pushing IN-OUT AIR SELECTOR SWITCH (5), set the selector to internal air circulation (b).
(Recommended position in this case.)
If air con. warms up too high, adjust the temp. by TEMPERATURE CONTROL SWITCH (4) or adjust the air volume by AIR VOLUME SELECTOR SWITCH (3) or both.

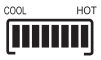
(b) INTERNAL AIR CIRCULATION

- If AIR CON. SWITCH (2) is pushed, air con. operates on dry air warming
- If blow out selector switch is on Foot position, air blow out from defroster too.

(4) To defrost on the windscreen :



(A) Push the TEMPERATURE CONTROL SWITCH (4) to indicate (d) on the LCD display.



(d) TEMPERATURE CONTROL INDICATION

(B) Push the AIR VOLUME SELECTOR SWITCH (3) for HIGH air volume.

(C) Push DEFROSTER SWITCH (7) to change the blow out opening to DEF position (c).

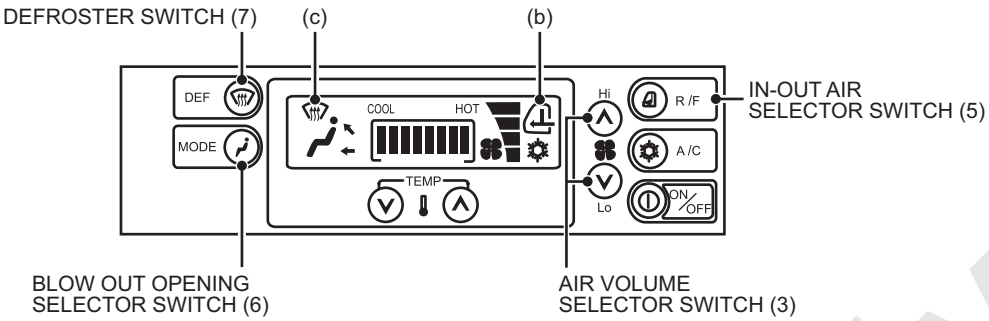
(c) DEF

(D) By pushing IN-OUT AIR SELECTOR SWITCH (5), set the selector to internal air circulation (b).

(b) INTERNAL AIR CIRCULATION

- By pushing BLOW OUT OPENING SELECTOR SWITCH (6), blow out opening returns to the set opening before DEFROSTER SWITCH (7) is pushed.
- If blow out opening is set to DEF, air bows to foot too.

(5) To defog on the windscreen :



(A) Push the AIR VOLUME SELECTOR SWITCH (3) for required air volume.

(B) Push the DEFROSTER SWITCH (7) to change the blow out opening to DEF position (c).

(c) DEF

(C) By pushing IN-OUT AIR SELECTOR SWITCH (5), set the selector to out air take in.

(b) OUT AIR TAKE IN

- If quick defogging is required, set the air volume to HIGH by AIR VOLUME SELECTOR SWITCH (3).
- By pushing BLOW OUT OPENING SELECTOR SWITCH (6), blow out opening returns to the set opening before DEFROSTER SWITCH (7) is pushed.

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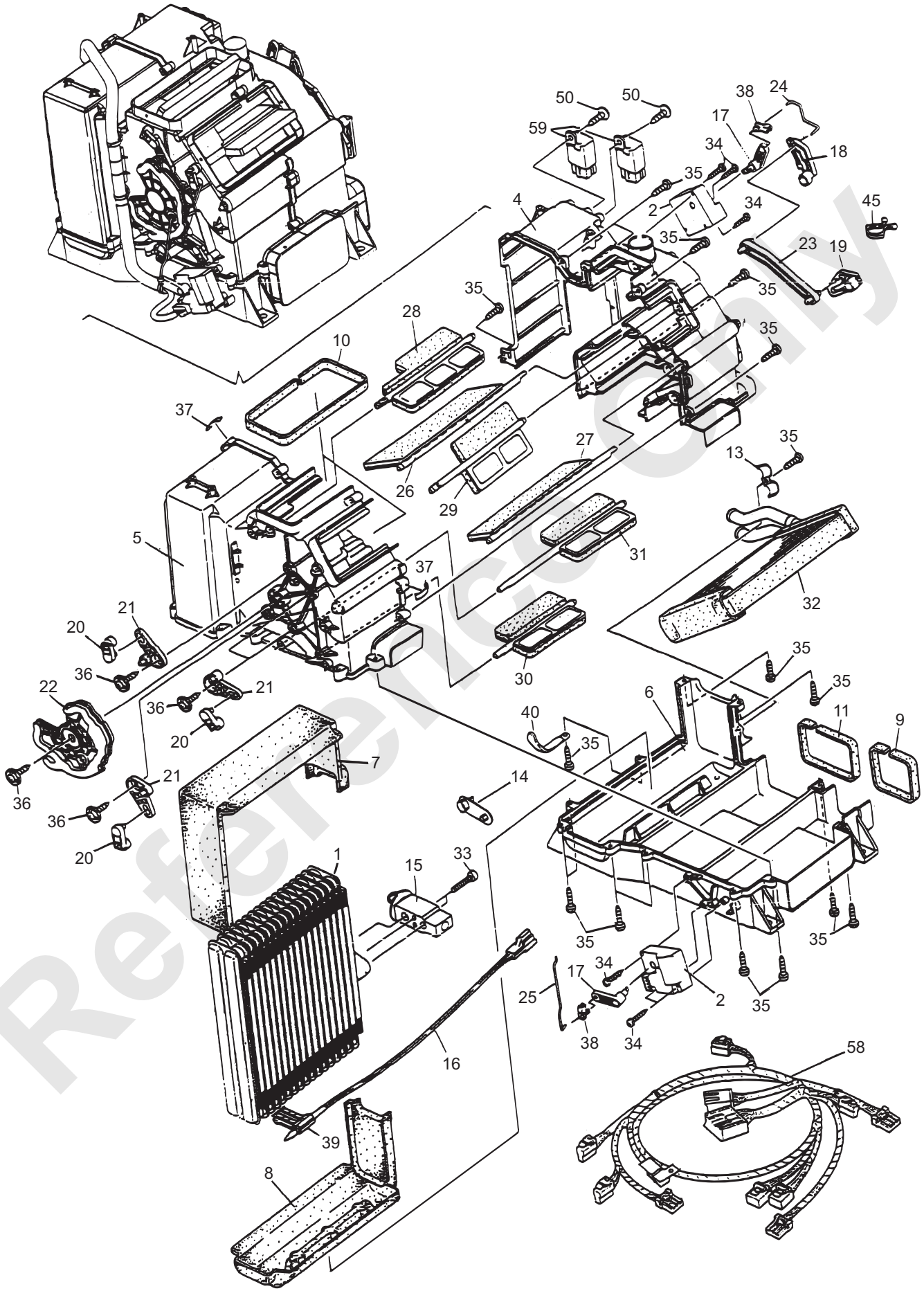
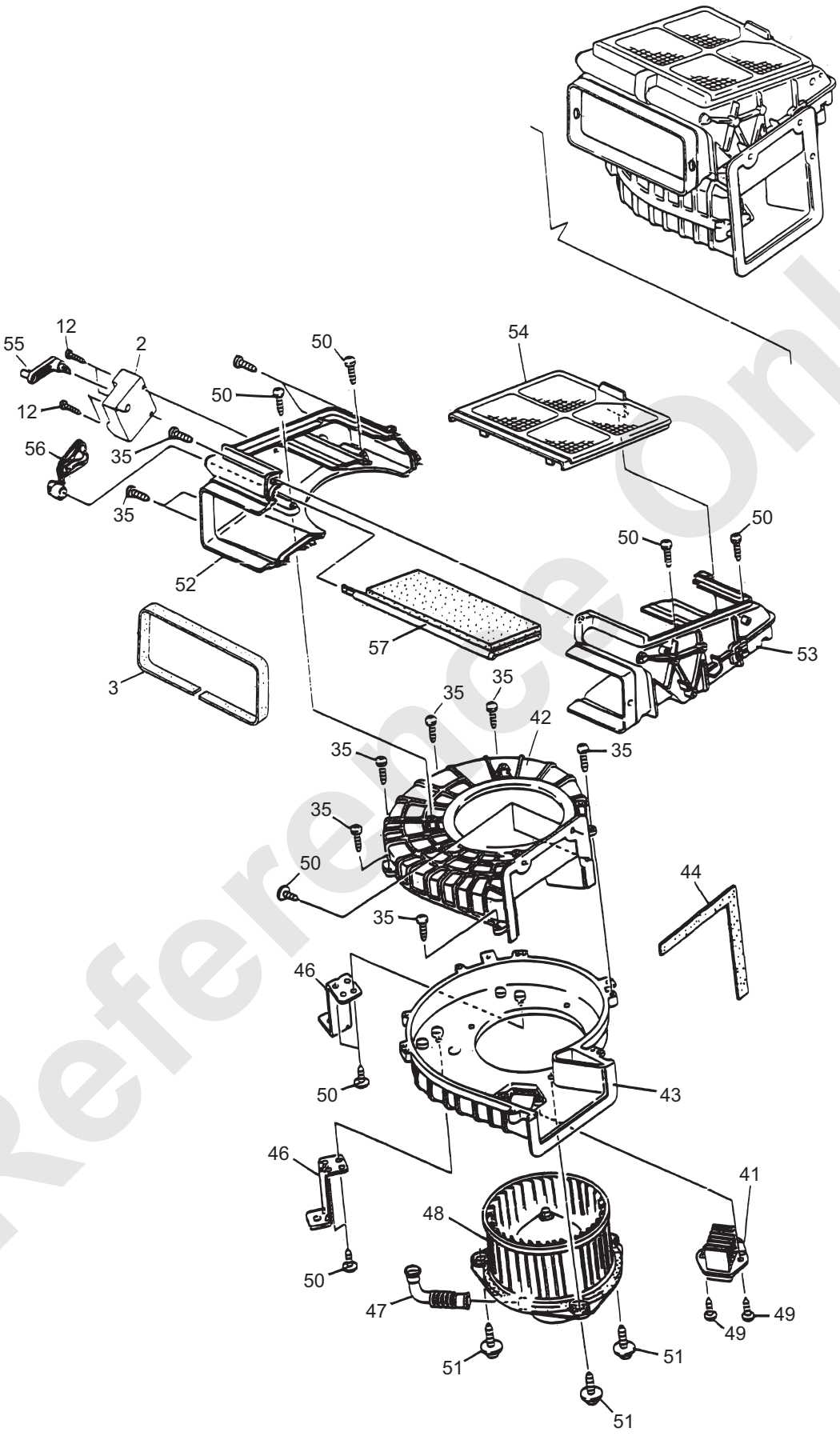
11.2 PARTS ILLUSTRATION



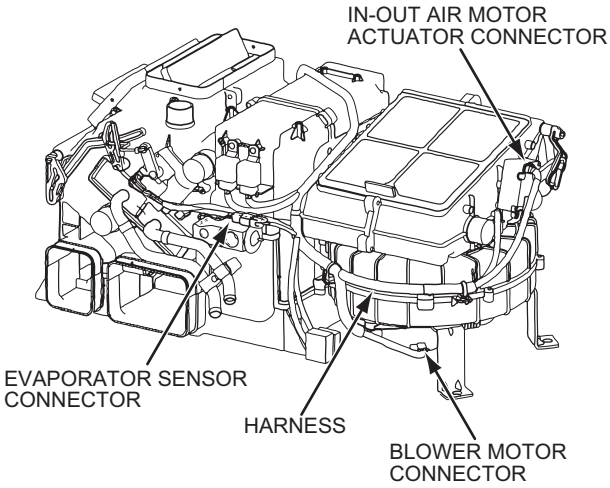


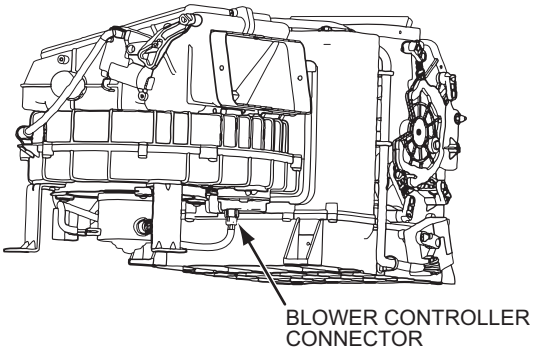
1. EVAPORATOR
2. ACTUATOR
3. OUT AIR INTAKE PACKING
4. FRONT UNIT CASE
5. REAR UNIT CASE
6. LOWER UNIT CASE
7. CASE INSULATION (UPPER)
8. CASE INSULATION (LOWER)
9. DUCT PACKING
10. DUCT PACKING
11. DUCT PACKING
12. TAPPING SCREW
13. PIPE CLAMP
14. EXPANSION VALVE
16. THERMISTOR
17. LEVER (MAL1)
18. LEVER (AM)
19. LEVER (CM)
20. LEVER (MO1)
21. LEVER (MO2)
22. MODE CAM
23. ROD AC
24. AM ROD
25. MODE ROD
26. DAMPER AM ASSY
27. DAMPER CM ASSY
28. DAMPER VE ASSY
29. DAMPER FA ASSY
30. DAMPER DE ASSY
31. DAMPER FO ASSY
32. HEATER CORE ASSY
33. HEX. SOCKET HEAD SCREW
34. TAPPING SCREW
35. TAPPING SCREW
36. TAPPING SCREW
37. CLAMP
38. ROD HOLDER
39. SENSOR HOLDER
40. CORD CLAMP A
41. FAN DRIVER
42. UPPER BLOWER CASE
43. LOWER BLOWER CASE
44. BLOWER PACKING
45. CORD CLAMP
46. UNIT BRACKET
47. UNIT COOLING HOSE
48. BLOWER MOTOR (29V)
49. TAPPING SCREW
50. TAPPING SCREW
51. TAPPING SCREW
52. INTAKE CASE (R)
53. INTAKE CASE (L)
54. INTERNAL AIR FILTER
55. LEVER (MAL2)
56. LEVER (IN)
57. DAMPER (IN) ASSY
58. UNIT HARNESS ASSY
59. RELAY

11.3 DISASSEMBLY AND ASSEMBLY OF THE UNIT

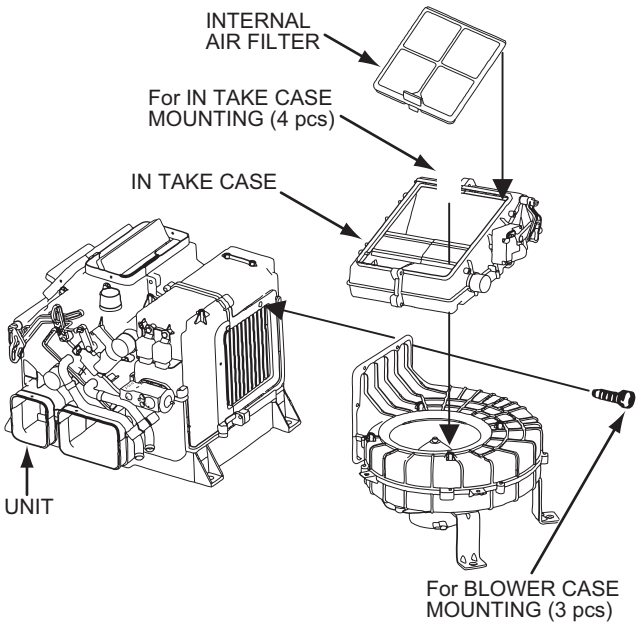
11.3.1 REMOVAL OF THE BLOWER UNIT

1. Remove the various connectors attached to the in-out air motor actuator, blower motor and blower controller and harnesses attached to the blower case.





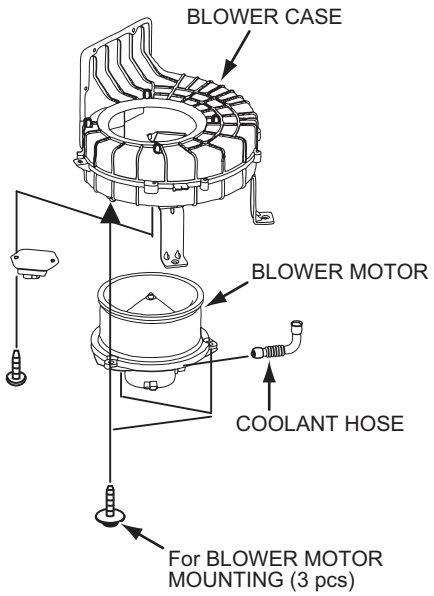
2. Pull out the in air filter from the intake case.
3. Remove four of the cross head screw (Phillips) T5 X 14 (T1) from the intake case.
4. Remove three of the cross head screw (Phillips) T5 X 14 (T1) and separate the blower case and the air-con. unit.



11.3.2 REPLACING THE BLOWER MOTOR

1. Remove the coolant hose coolant between the blower motor and the blower case.
2. Remove three of the cross head screw (Phillips) N5 X 16 (W) which are tightened from under the blower unit case and pull the blower unit out.
3. Take the reverse way in the foregoing procedure for installation.

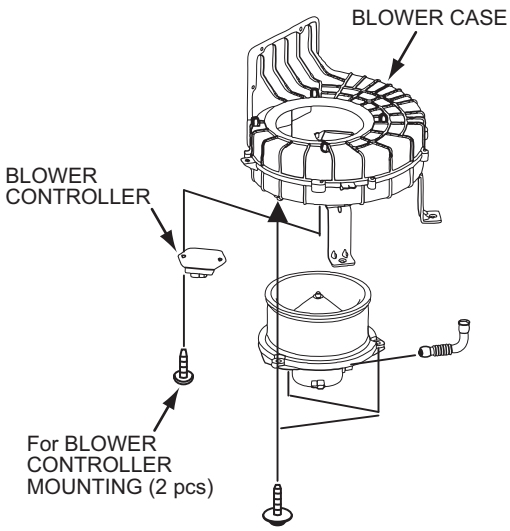
Do not remove the fan from the blower motor.



11.3.3 REPLACING THE BLOWER CONTROLLER

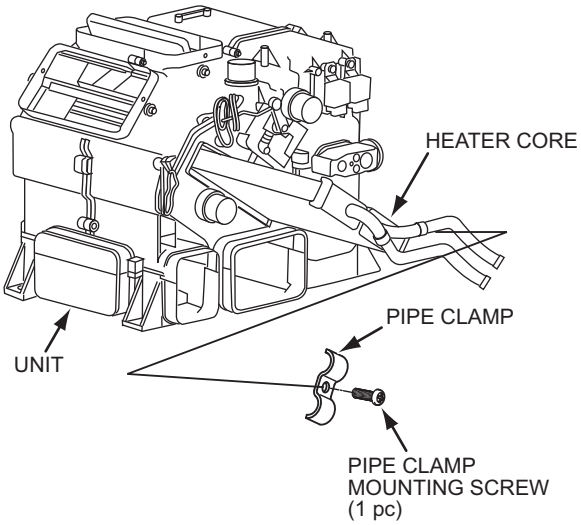
1. Remove two of the cross head screw (Phillips) T4 X 14 (T1) which are tightened from under the blower case and pull the blower controller out.
2. Installation of the new blower controller is in the reverse way of the foregoing procedure.

NEVER disassemble the blower controller.



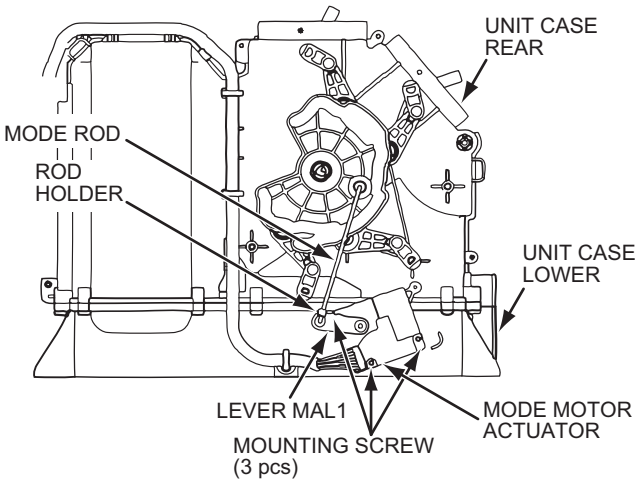
11.3.4 REMOVAL OF THE HEATER CORE

1. Drain out the cooling water.
2. Remove one of the cross head screw (Phillips) N5 X 16 (T2) and pipe clamp which secure the heater core to the unit.
   Then pull out the heater core from the unit.
3. Installation is reverse way of the foregoing procedure.



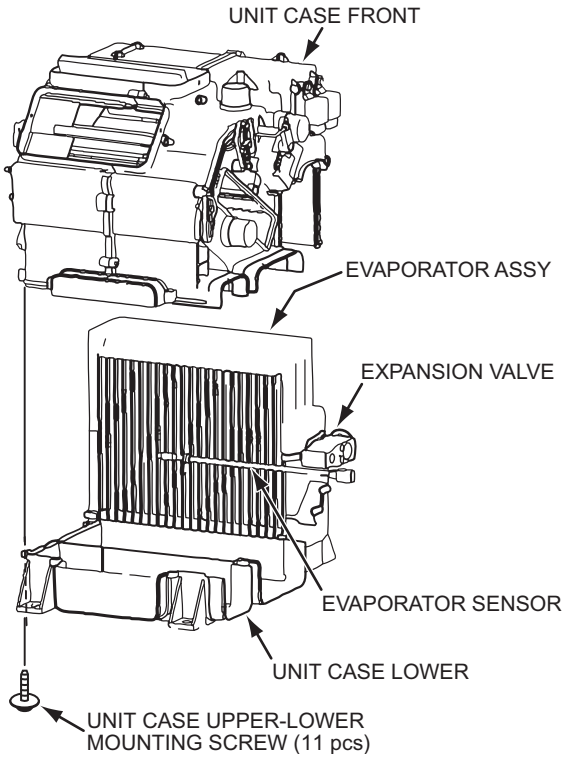
11.3.5 REMOVAL OF THE AIR-CON UNIT CASE-FRONT AND- REAR

1. Remove the mode motor actuator and the evaporator sensor connector.
2. Remove the mode rod from the rod holder which is installed on the lever MAL1 of the mode motor actuator.
3. Remove three screws N4 X 30 (T1) and remove the mode motor actuator installed on the unit case- lower and the unit case-rear.



4. Remove eleven of the cross head screw (Phillips) N5 X 16 (T2) and remove the unit case-lower and the unit case-front. Pull the unit case upward taking care of evaporator sensor cord not to catch the case.

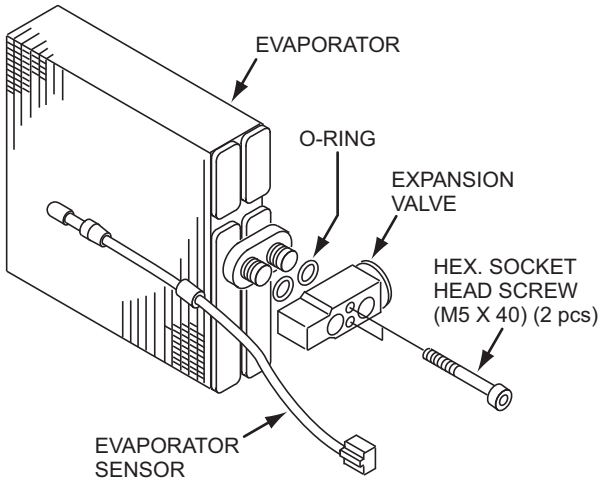
   In this case make sure that the heater core is removed from the unit case.



11.3.6 REPLACING THE EVAPORATOR AND EXPANSION VALVE

1. Pull out the evaporator assy from the case-lower with the case insulation material and the expansion valve attached.
2. After the evaporator assy is removed, then pull out the evaporator sensor and sensor holder as one piece.
3. Remove the HEX. socket head screw M5 X 40 (two) and remove the expansion valve from the evaporator with the hex. wrench (4 mm).
4. Install the O-ring (NFO ring 5/8 and 1/2, one each) to the new evaporator.
   (Tightening torque 6.9 N-m)

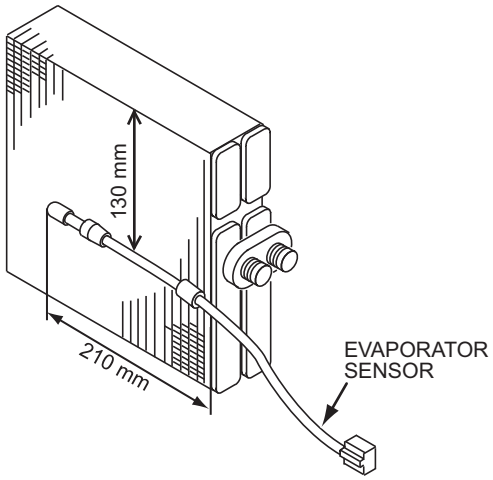
   Be careful not to make the O-ring jammed during the expansion valve installation.



11.3.7 INSTALLATION OF EVAPORATOR SENSOR

Install the evaporator sensor precisely to the original place of the evaporator as shown.

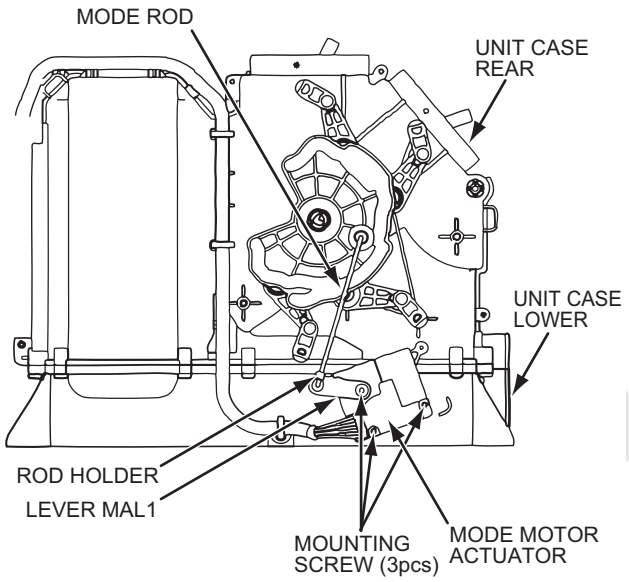
During the installation work, take care not to make the sensor cord jammed with the case.



11.3.8 REPLACING THE MOTOR ACTUATOR

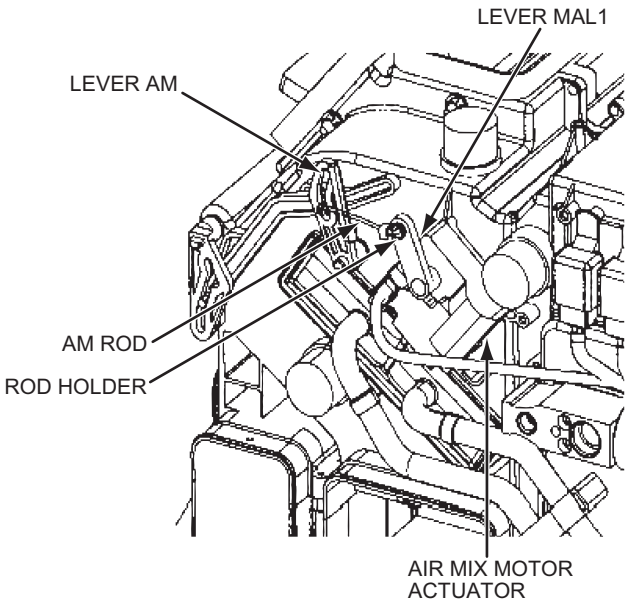
1. REPLACING THE MODE MOTOR ACTUATOR

Remove the connector of the motor actuator. Remove the mode rod which connects the motor actuator and the mode cam from the rod holder.
Remove three of the cross head screw (Phillips) N4 X 30 (T1) which hold the motor actuator and remove the motor actuator from the unit while the rod holder and lever MAL1 are attached to the motor actuator.
Remove the rod holder and the lever MAL1 from the motor actuator and install the new actuator in the reverse way of this procedure.



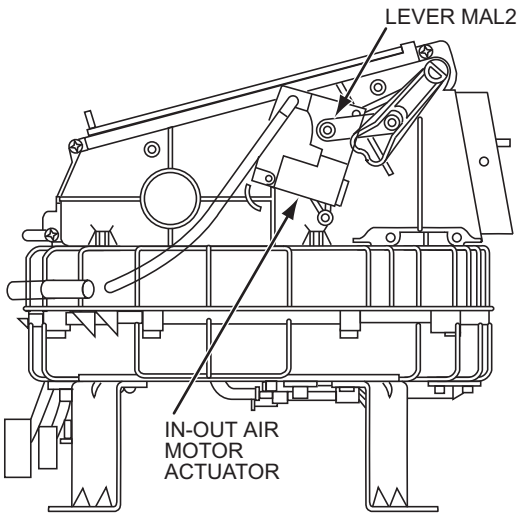
2. REPLACING THE AIR MOTOR ACTUATOR

Remove the connector connected to the motor actuator.
Remove the AM rod which connect the motor actuator and the lever MAL1 from the rod holder.
Remove the three of the cross head screw (Phillips) N4 X 30 (T1) holding the motor actuator.
Remove the motor actuator from the unit while the rod holder and lever MAL1 are attached. Remove the rod holder and lever MAL1 from the motor actuator.
Install the new motor actuator to the unit in the reverse way of the foregoing procedure.



3. REPLACING THE IN-OUT AIR MOTOR ACTUATOR

Remove the connector connected to the motor actuator.
Remove three of the cross head screw (Phillips) N4 X 28 (T1) holding the motor actuator.
Remove the motor actuator from the unit while the lever MAL2 is attached. Remove the lever MAL2 from the motor actuator.
Install the new motor actuator in the reverse way of the foregoing procedure.



11.4 FAULT DETECTION FROM THE CONTROL PANEL INDICATION

11.4.1 GENERAL

When there is any fault in the input circuit of the controller of the motor actuator drive line or each sensor, fault detection is indicated.

⚠CAUTION

Once the fault is detected, fault detection is not reset even the fault returns to normal.
Turning the vehicle's main key switch is turned to OFF, then the fault is reset.

11.4.2 FAULT IN THE INPUT AND OUTPUT CIRCUIT OF THE MOTOR ACTUATOR

1. OPEN CIRCUIT DETECTION
   If there is an open circuit or short circuit in the motor actuator line, open circuit detection is indicated.

OPEN CIRCUIT DETECT INDICATION

FAULT LOCATION	FAULT INDICATION
AIR MIX (TEMPERATURE CONTROL)	HOT MARK BLINKING

2. MOTOR LOCK DETECTION
   If the motor speed does not reach the target, LOCK is detected and motor output is ceased and motor lock detection is indicated.

MOTOR LOCK DETECT INDICATION

FAULT LOCATION	FAULT INDICATION
AIR MIX (TEMPERATURE CONTROL)	HOT MARK BLINKING
IN-OUT AIR MOTOR ACTUATOR	IN-OUT AIR MARK BLINKING

11.4.3 FAULT IN THE THERMISTOR SENSOR CIRCUIT

1. OPEN OR SHORT CIRCUIT
   Open circuit detect is indicated when there is an open or short circuit in the sensor line.

OPEN CIRCUIT DETECT INDICATION

FAULT LOCATION	FAULT INDICATION
EVAPORATOR SENSOR	AIR CON. MARK BLINKING

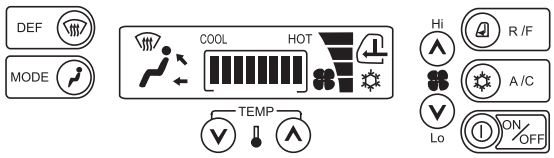
11.5 BASIC SYSTEM OF HVAC

This is the built in type air con. unit with evaporator, heater core and blower as one package and generate cool and warm air.

1. AIR CYCLE

- HEATER
  The unit takes internal air of the cab or open air from the intake port and have them passed through the air filter and send them to the heater core of the air conditioner unit to exchange heat and send the warm air through the duct and blow out from the grill.
- COOLER
  The unit takes internal air of the cab or open air from the intake port and have it passed through the air filter and send them to the evaporator to exchange the heat (dehumidifying cool) and send the cooled air to the duct and blow out the air from the grill.
- HEATER SYSTEM
  The heater unit circulates the engine cooling water. The warm water from the engine is sent to the heater core to exchange heat.
  Air sucked in is warmed up and is blown out from the grill inside of the cab.
  Temperature of the blow air can be adjusted by temperature adjusting switch.
  This air movement is controlled by the air mix damper of the air conditioner unit.

2. CONTROL PANEL AND CONTROL UNIT
   The control panel and the control unit is one package.
   Micro computer inside of the unit handles the arithmetic processing of input signal from each sensor with the input signal of each switch in the control panel and totally controls the fan motor and compressor and each actuator in the output side of the actuator (in-out blow port selector, air mix).
   The unit also has self diagnose function and can perform self diagnose easily.
   (For detail refer to the control specification)



3. FAN DRIVER

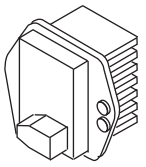
The fan driver receives the control signal from the control unit and control the fan motor speed.

NORMAL CONDITION

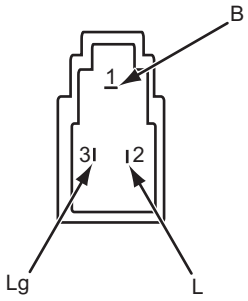
	TERMINAL NO.			CONTINUITY
	1	2	3	
TESTER	+		–	YES (4.7 kΩ ± 5%)
	–	+		NO
	+	–		YES (DIODE PARALLEL FORWARD DIRECTION)

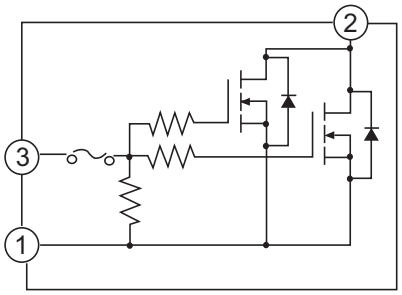
(1) Remove the connector of the blower amplifier.

(2) Check the continuity between each terminal of the blower amplifier.



• The amplifier is located in the left hand of the air conditioner unit.





4. RELAY

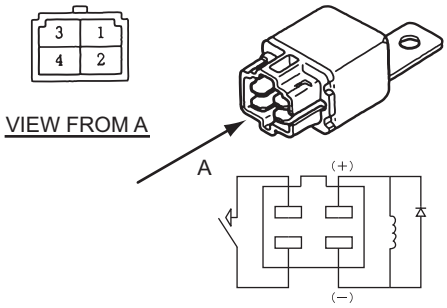
The blower OFF relay and the compressor relay are four pole relay.

5. BLOWER OFF RELAY

The blower OFF relay turns ON when the signal from the control amplifier is received.
When the blower OFF relay turns ON, power is supplied to the blower motor and the blower motor starts.

6. COMPRESSOR RELAY

This relay turns ON-OFF by the compressor control of the control amplifier.



7. INSPECTION POINTS OF THE RELAY

(1) RELAY

(2) COIL RESISTANCE : 320Ω

(3) VOLTAGE : DC20 V to 30 V

(4) Note : This relay has coil polarity.

(5) Inspection : Check the continuity between the terminal 3 to 4 under the following condition.

Apply 20 to 30 V between the terminal 1 and 2 : Continuity should be YES
Apply no voltage between the terminal 1 and 2 : Continuity should be NO

8. AIR MIX ACTUATOR

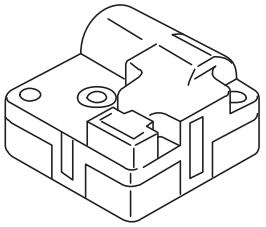
The air mix actuator is installed in the center of the air conditioner unit and controls OPEN/CLOSE of the air mix damper.

The air mix actuator has the potentiometer in its inside to be controller by the actuator shaft movement.

When the target position of the air mix door is decided by the temperature control switch, the control system reads the potentiometer indication of the actuator and decides the direction of motor rotation.

The contact moves together with the motor and comes to separate its contact point or reaches to the target position of the potentiometer indication to make output signal OFF from the control unit. Then the motor stops.

(Refer to the inspection of the air mix motor actuator.)



9. IN-OUT AIR ACTUATOR

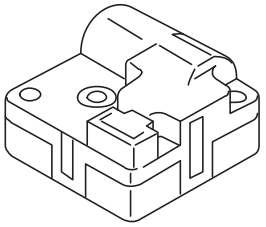
In-out air actuator is installed in the blower intake unit and opens or closes the in-out air damper through the linkage.

In-out air actuator has the position detect switch in its inside which is controlled by the shaft movement of the actuator.

When the target location of the in-out air damper is decided by the in-out air selector switch of the control unit, the control system reads the potentiometer indication of the actuator and decides the direction of motor rotation.

The contact moves together with motor and stops the motor by reaching to the target position.

(Refer to inspection of the In-out motor actuator.)



10. BLOW OUT MODE ACTUATOR

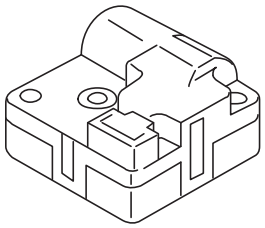
The blow out mode actuator is installed in the back side of the air conditioner unit and opens or closes the blow out damper through the linkage.

The bow out mode actuator has the potentiometer in its inside which is controlled by the shaft movement of the actuator.

When the target position of the blow out mode is decided by the temperature control switch, the control system reads the potentiometer indication of the actuator and decides the direction of motor rotation.

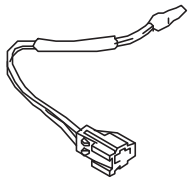
The contact moves together with the motor and comes to separate its contact point or reaches to the target position of the potentiometer indication to make output signal OFF from the control unit. Then the motor stops.

(Refer to the inspection of the motor actuator.)



11. EVAPORATOR SENSOR

This sensor controls ON-OFF of the compressor by detecting the temperature of the bow out air of the evaporator to prevent it from freezing.



- INSPECTION OF THE EVAPORATOR

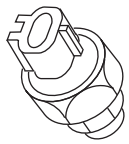
(Specification data)

Remove the evaporator sensor connector from the main harness and measure the resistance value between the terminals to the sensor with the multitester.

Resistance value between terminal to the sensor	**When the sensor detect temp. is 0° C : 7.2 kΩ**
	When the sensor detect temp. is 25° C : 2.2 kΩ

12. DUAL PRESSURE SWITCH

The dual pressure switch is installed in the receiver dryer and protect the cooling cycle by opening its contact and cutting the power supply to the compressor when the high pressure side of cooling becomes malfunction (high pressure faulty, low pressure faulty).

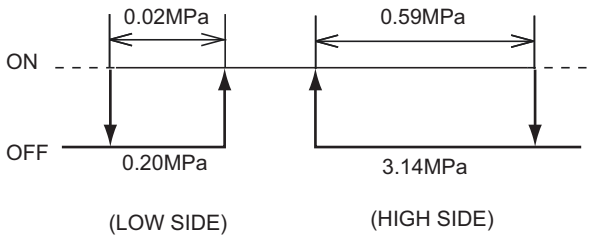


- SIMPLE INSPECTION OF DUAL PRESSURE SWITCH

(1) Disconnect the connector from the switch when the cooling cycle is stopped and check the continuity between the terminal to the switch and to the connector with the multi-tester.
If the continuity is YES, then it is normal.
(When the ambient temperature is above 0° C)

(2) Connect the high pressure side hose of the gauge manifold to the high pressure side charge port and raise the high side pressure when the cooling cycle is operating. Cover the front face of the condenser with some board or such during this work.
If the compressor stops at 3.14 MPa or around then the system if normal.

(3) Check the continuity between the terminal to the switch and to the connector when the coolant is removed.
If continuity is NO, the system is normal.



SPEC. OF DUAL PRESSURE SWITCH

11.6 RECHARGING OF THE COOLANT

11.6.1 CAUTION AT WORK

1. Make sure that the work is done by the specialist.
   Recharging work consist of high pressure gas handling. Make sure that the work is done with the specialist who is familiar with the work.

⚠CAUTION

- Make sure to wear a SAFETY GLASS.
  (If the coolant material gets into eye, it may cause the loss of eyesight.)
- The coolant in its liquid form is EXTREMELY LOW temperature (approx. 26° C below zero).
  Handle it with extra care.
  (If they touch the skin, it may cause the frostbite.)

2. STORAGE AND TRANSPORT

(1) Store the service bottle (Hereafter called bottle) in the temperature below 40° C.
   High pressure gas "R134a" is contained inside the bottle in the saturated liquid form. Rapid rise of the temperature may cause burst of the bottle and is very dangerous.
   Therefore it is NECESSARY to store the bottle in the cold place under minus 40° C temperature.

(2) Prevent direct sunlight to the bottle and store them in the cool and dark place.

(3) If the bottle is placed close to the fire, it may raise the temperature due to the heat radiation and may cause to raise the inside pressure and virtually may cause burst of the bottle. Never place the bottle close to the fire.

(4) Temperature on the closed operator's room will be risen quickly to the dangerous range even at the winter time when the radiant heat from the sun strikes it.
   Do not take the bottle into the closed operator's room even at the winder time.
   Temperature in the storage box also rises to dangerous range at summer time. Be careful on this point.

(5) Flaw, indent mark or deformation may decrease the strength of the bottle. Be careful on this point.

(A) Do not drop or hit the bottle.

(B) Take care in loading, transporting and unloading the bottles or packing case containing the bottles. Handle with care and do not drop or throw them.

(6) Do not store the bottle within the reach of the children.

3. AT THE RECHARGING TIME

(1) When the bottle is to be warmed up for recharging, make sure to open the bottle valve , the low pressure side gauge manifold and then warm up the bottle with warm water of about 40° C temperature (Below hand hot temperature!).
Do not put the bottle into the hot water or heat up with direct fire.
Otherwise the pressure may go up quickly and may burst the bottle.

(2) When the engine is started to recharge the bottle with the coolant, NEVER open the high pressure valve (HI) of the gauge manifold.
Opening the high pressure valve may cause the high pressure gas to backflow and may cause to burst the bottle or the charging hose and is very dangerous.

4. OTHERS

Reuse of the recharge bottle is prohibited by law.
NEVER reuse.
Do not put any foreign material into the air conditioner piping.
Cooling cycle hates air, water and dust.
Assembling work of the air conditioner must be done quickly and take extra care to prevent water, dust entering into the system.

⚠CAUTION

Pay attention not to overcharge.

Tighten all the pipe fittings with the specified torque.

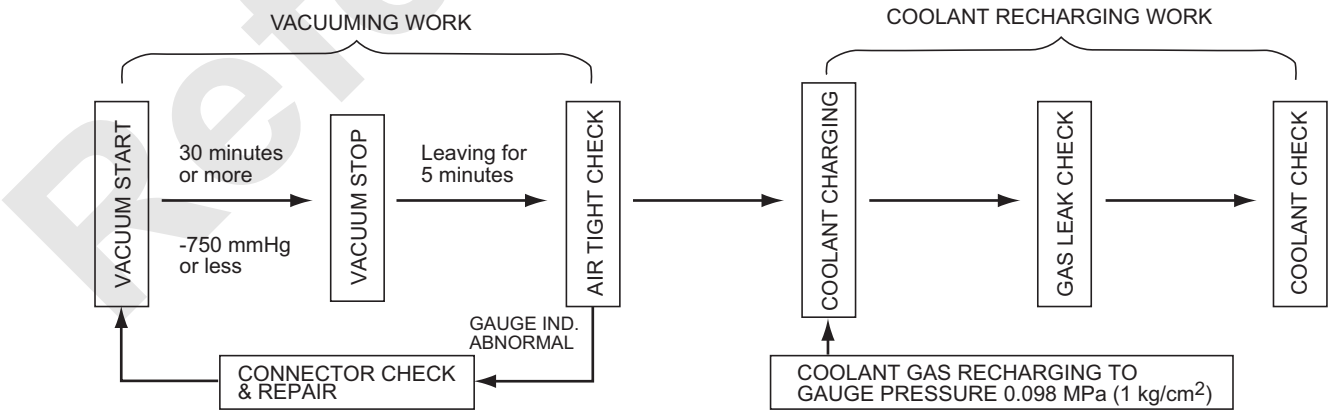
11.6.2 WORK PROCEDURE

1. Recharging work of the coolant into the air conditioner is divided into "Vacuuming work" and "Gas recharging work".

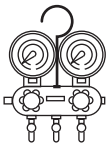
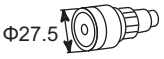
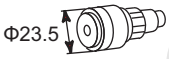
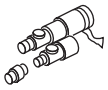
(1) "Vacuuming work" is to delete the water in the air conditioner piping completely.
Even a slight amount of water is left in the piping, it will be frozen in the small holes in the expansion valve during the operation and may cause piping clogged or rust inside the piping or other trouble.
In order to avoid these troubles the vacuuming work must be done to boil off the water in the piping prior to recharge the coolant into the piping.

(2) "Gas recharging work" is to recharge the system with the coolant after the vacuuming work is completed.
Gas recharging work is the main work and affects not only the cooling performance of the air conditioner but also to the life of the circuit.
Extreme over charging may cause abnormal high pressure in the system and may lower the cooling performance.
On the other hand, extreme low amount of the coolant may cause poor circulation of the lubricant to the air compressor and may virtually cause seizure on the sliding area.
Gas recharging work also handle the high pressure gas and wrong handling is very dangerous.
Carry out the coolant recharging by exactly following the procedure mentioned in this manual.

2. WORK CHART



3. TOOL

No.	NAME	QUANTITY	SHAPE	USE
1	GAUGE MANIFOLD	1		
2	CHARGING HOSE	3		RED : HIGH PRESSURE SIDE BLUE : LOW PRESSURE SIDE YELLOW : VACUUM PUMP SIDE
3	QUICK JOINT	1		
4	QUICK JOINT	1		LOW PRESSURE SIDE
5	T-JOINT	1		SERVICE BOTTLE VALVE
6	SERVICE BOTTLE VALVE	2		FOR SERVICE BOTTLE
7	VACUUM PUMP ADAPTER	1		FOR VACUUM PUMP

11.6.3 RECHARGING PROCEDURE

VACUUMING WORK

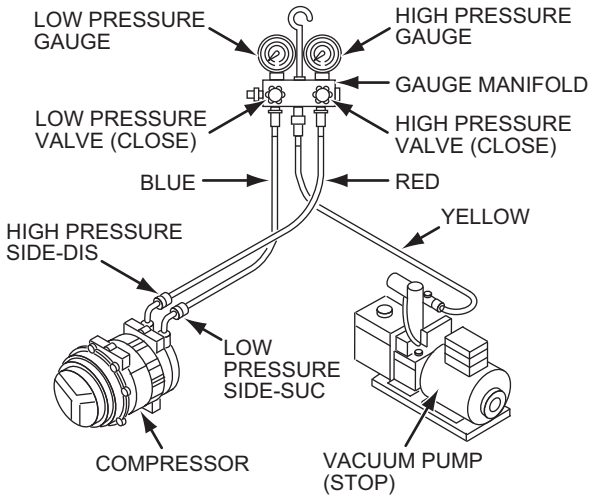
1. CONNECTION OF GAUGE MANIFOLD

(1) Close the high pressure valve (HI) and low pressure valve (LO) of the gauge manifold.

(2) Connect the charging hose (Red and Blue) to the service valve of the compressor.

Red hose :
High pressure side of the gauge manifold → (HI)
High pressure side of the compressor (DIS)

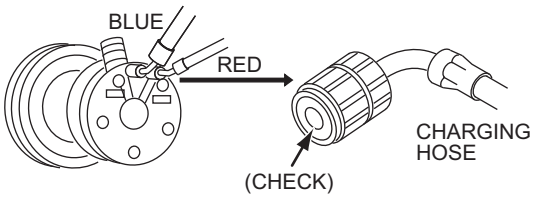
Blue hose :
Low pressure side of gauge manifold (LO) →
Low pressure side of the compressor (SUC)



GAUGE MANIFOLD CONNECTION

⚠CAUTION

- Do not mix the high pressure side and low pressure side connection.
  Push the hose firmly until "the click" sounds.
- Connect the charging hose with "L" shaped end to the service valve of the compressor.
  The "L" shaped end has a check valve. If connected in reverse way, check valve of the compressor will not open.



COMPRESSOR PIPING CONNECTION

(3) Connect the center valve of the gauge manifold and the vacuum pump with the charging hose.

⚠CAUTION

Some type of the gauge manifold does not have the open/close valve in their center.

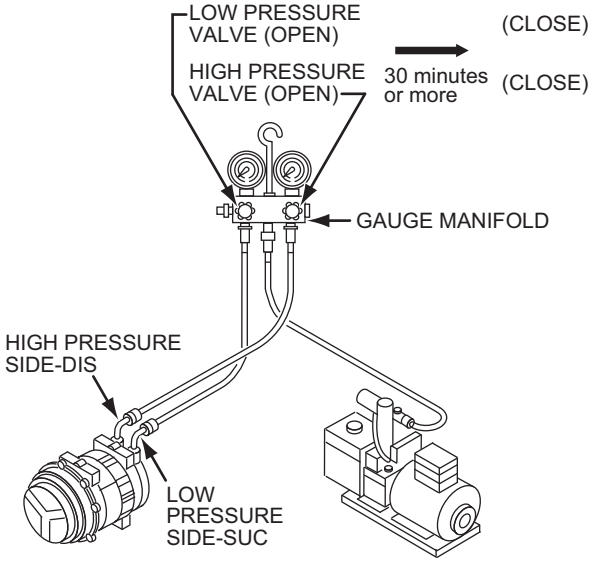
2. VACUUMING

(1) Open the high pressure valve (HI) and low pressure valve (LO) of the gauge manifold.

(2) Turn ON the switch of the vacuum pump and continue vacuuming work for more that 30 minutes.

(3) When the vacuuming for the specified time is completed (Target figure of vacuum : -750 mgHg or lower), close the high pressure valve and the lower pressure valve.

(4) Then turn off the switch of the vacuum pump.



VACUUMING WORK

3. AIRTIGHT CHECK

Watch the gauge for more than five minutes while the high pressure valve and the lower pressure valve are closed and confirm that the gauge needle does not move back toward zero direction.

CAUTION

If the gauge moves back toward zero direction, there must be leaking point somewhere. Retighten all of pipe fittings and again repeat the vacuuming work and check for leak again.

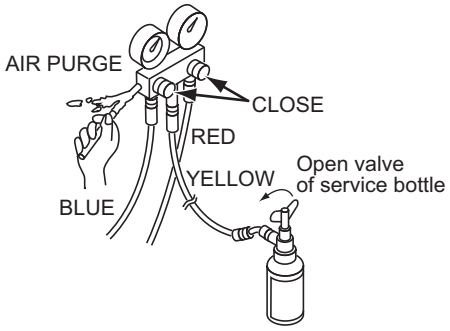
GAS RECHARGING WORK

1. RECHARGE FROM THE HIGH PRESSURE SIDE

(1) Disconnect the charging hose (yellow) of the gauge manifold from the vacuum pump and reconnect it to the service bottle after the vacuum pump is completed.

(2) AIR PURGE
Open the service bottle valve. (High pressure side and low pressure side valves must be closed.)
Then push the check valve in the service port of the lower pressure side on the gauge manifold with a screw driver or such to purge the air in the charging hose by the coolant pressure.
(If the air sound "shoo!" comes out, it is completed.)

(3) Open the high pressure valve of the gauge manifold and charge the coolant.
(Charge the coolant gas to 0.098 MPa {1 kgf/cm^2} in gauge reading.)
After charging close the high pressure valve in the gauge manifold and the service bottle valve.

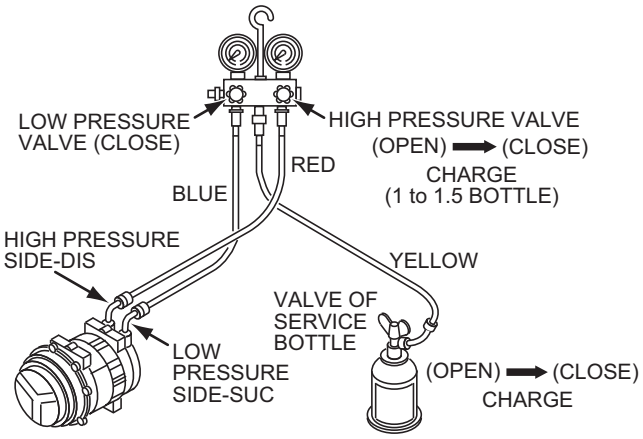


GAS CHARGING WORK

CAUTION

Never run the compressor.
(The coolant will flow back and the service bottle or the hose may burst and is very dangerous.)

2. GAS LEAKING CHECK
Check gas leak in the cooling cycle with the gas leak tester (electric type).
If there is any leaking point, re-tighten.



GAS CHARGING WORK (HIGH PRESSURE SIDE)

CAUTION

Make sure that the tester is for R134a coolant.
(Tester for flon coolant is not usable due to low sensibility)

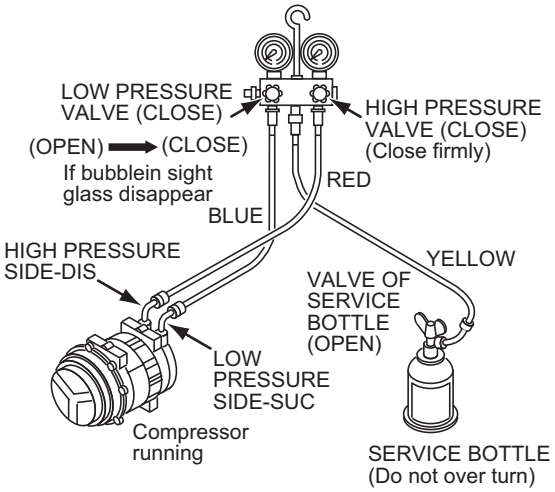
3. CHARGING FROM THE LOW PRESSURE SIDE

(1) Make sure that the valves for high pressure side, low pressure side and service bottle are all closed.

(2) Start the engine and set the speed to 1400 to 1600 rpm and open the cab door completely.

(3) Turn ON the air con. switch and set the fan switch to max. and temperature adjusting switch to max. cooling.

(4) Set the delivery pressure of the compressor to 1.37 to 1.57 MPa {14 to 16 kg/cm^2} during charging.



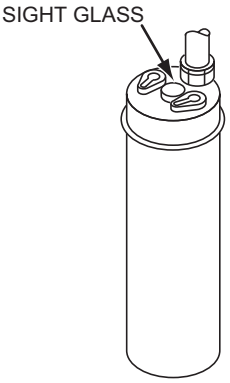
GAS CHARGING WORK (LOW PRESSURE SIDE)

(5) Open the low pressure valve of the gauge manifold and the service bottle valve and charge the coolant until the bubble in the receiver side glass disappear. (Full gas charging amount : 850 to 950 g)

(6) When the coolant charging is completed, close the low pressure valve of the manifold and the service bottle valve and stop the engine.

CAUTION

- NEVER open the high pressure side valve of the gauge manifold.
- NEVER place the service bottle upside down. (Liquid form of coolant may be injected into the cooling cycle and may damage the compressor valve.)



RECEIVER DRYER

4. GUIDEPOST OF RECHARGING COOLANT AMOUNT

- JUDGEMENT FROM SIGHT GLASS VIEW OF THE RECEIVER DRYER

JUDGEMENT FROM SIGHT GLASS VIEW OF THE RECEIVER DRYER

IN CASE OF PROPER CHARGE	After A/C turned on, bubbles appear a little, hereafter it becomes transparent, and shows milk-white.	
IN CASE OF OVERCHARGE	After A/C turned on, no bubble appears.	
IN CASE OF INSUFFICIENT CHARGE	After A/C turned on, bubbles can be seen continuously.	

(Explanation for illustration of refrigerant flowing condition)

 Bubbles exist : Vapor and liquid of refrigerant are mixed.

 No bubbles : All refrigerant becomes liquid and is transparent.

 Impurity : Oil and refrigerant are separated, and show milk-white.

⚠CAUTION

- The air conditioner is operated when the coolant (R134a) is very low, it may badly affect the compressor.
- If the coolant is overcharged, it will rather reduce the cooling performance and the cooling cycle becomes extreme high pressure and is dangerous. Keep the correct amount of coolant.

5. REMOVAL OF THE GAUGE MANIFOLD

When the inspection of coolant recharging is completed, remove the charging hose from the compressor under the following procedure.

(1) Push the L shaped fitting of the lower pressure side charging hose (blue) to the service valve of the compressor to prevent coolant leaking and loosen the nut.
When the nut is removed, quickly remove the charging hose from the service valve.

(2) Keep the high pressure side until the high pressure gauge reading becomes lower than 0.98 MPa {10 kg/cm^2}.

(3) Remove the high pressure side charging hose (red) in the same procedure as the low pressure side.

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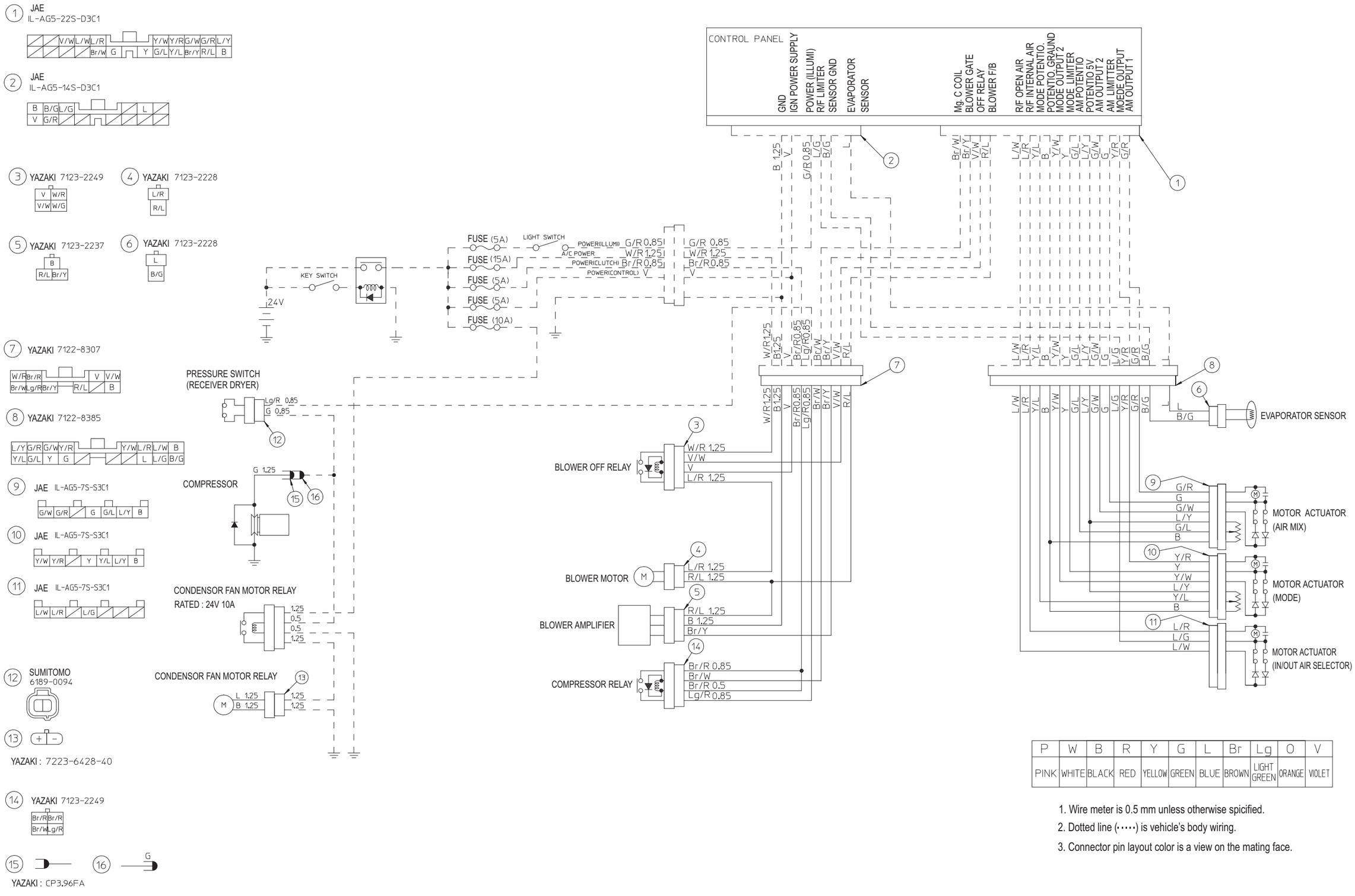
11.7 ELECTRIC WIRING DIAGRAM



P	W	B	R	Y	G	L	Br	Lg	O	V
PINK	WHITE	BLACK	RED	YELLOW	GREEN	BLUE	BROWN	LIGHT GREEN	ORANGE	VIOLET

1. Wire meter is 0.5 mm unless otherwise spicified.
2. Dotted line (·····) is vehicle's body wiring.
3. Connector pin layout color is a view on the mating face.

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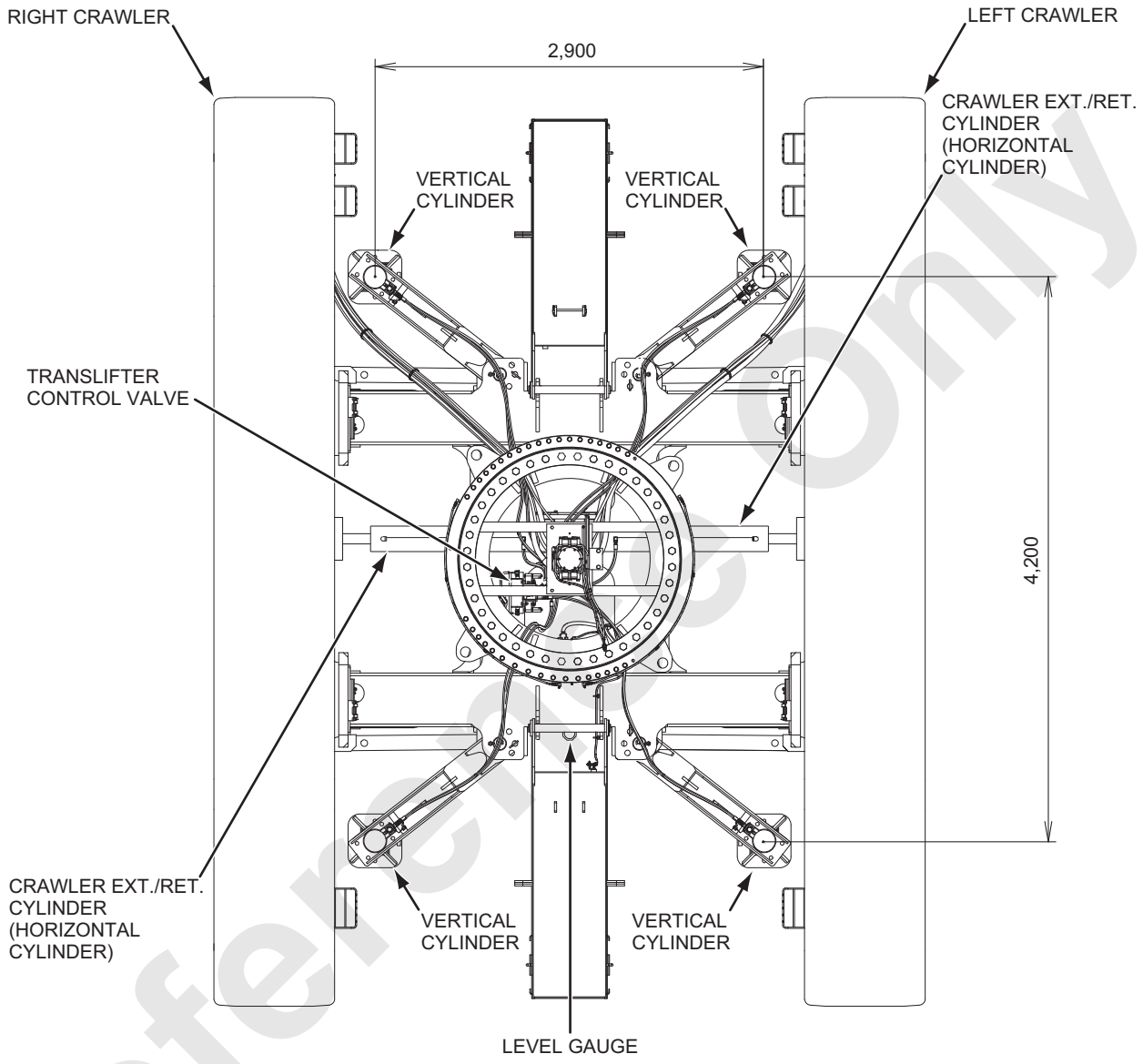
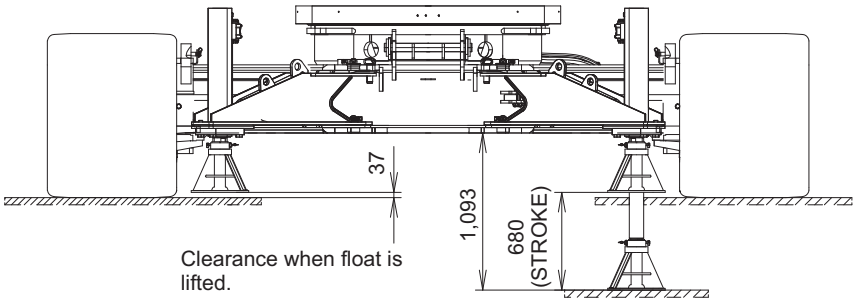
12. TRANSLIFTER SYSTEM

12.1 APPARATUS AND LOCATION OF COMPONENTS

The translifter system consists of the vertical cylinder, crawler EXT./RET. cylinder (horizontal cylinder), control valve, remote controller and junction box.

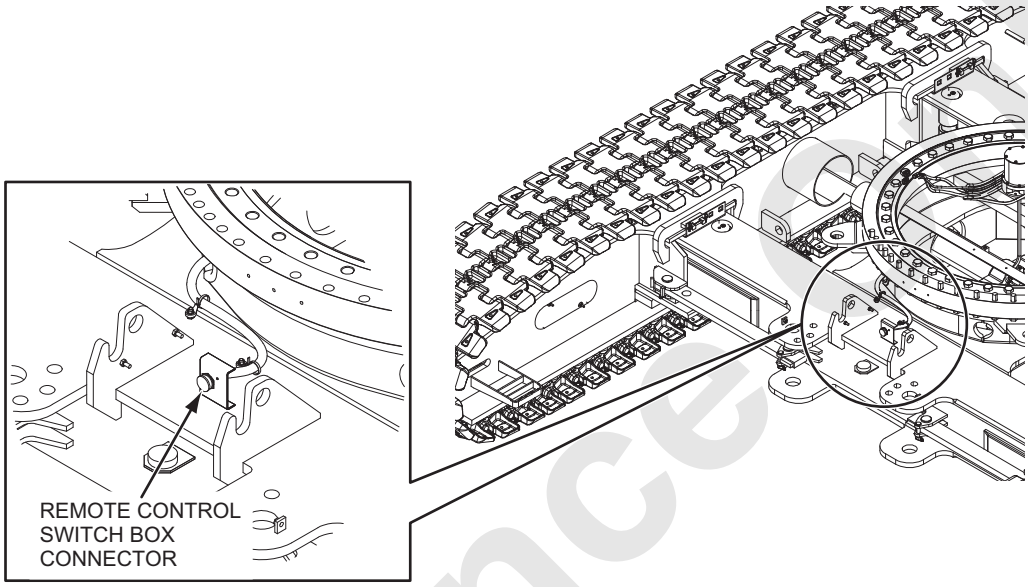




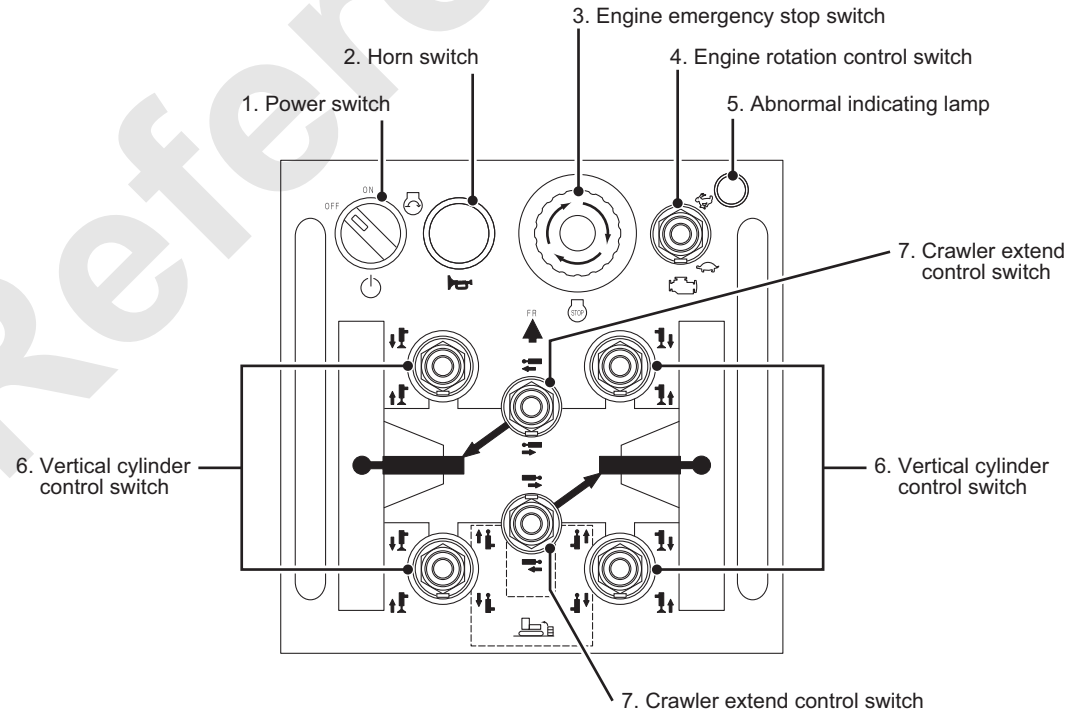
HANDLING OF REMOTE CONTROL SWITCH BOX

⚠ DANGER

Remove all counterweights and carbody-weight when the translifter is handled to prevent overturning.
Failure to observe this precaution may result in serious accident.



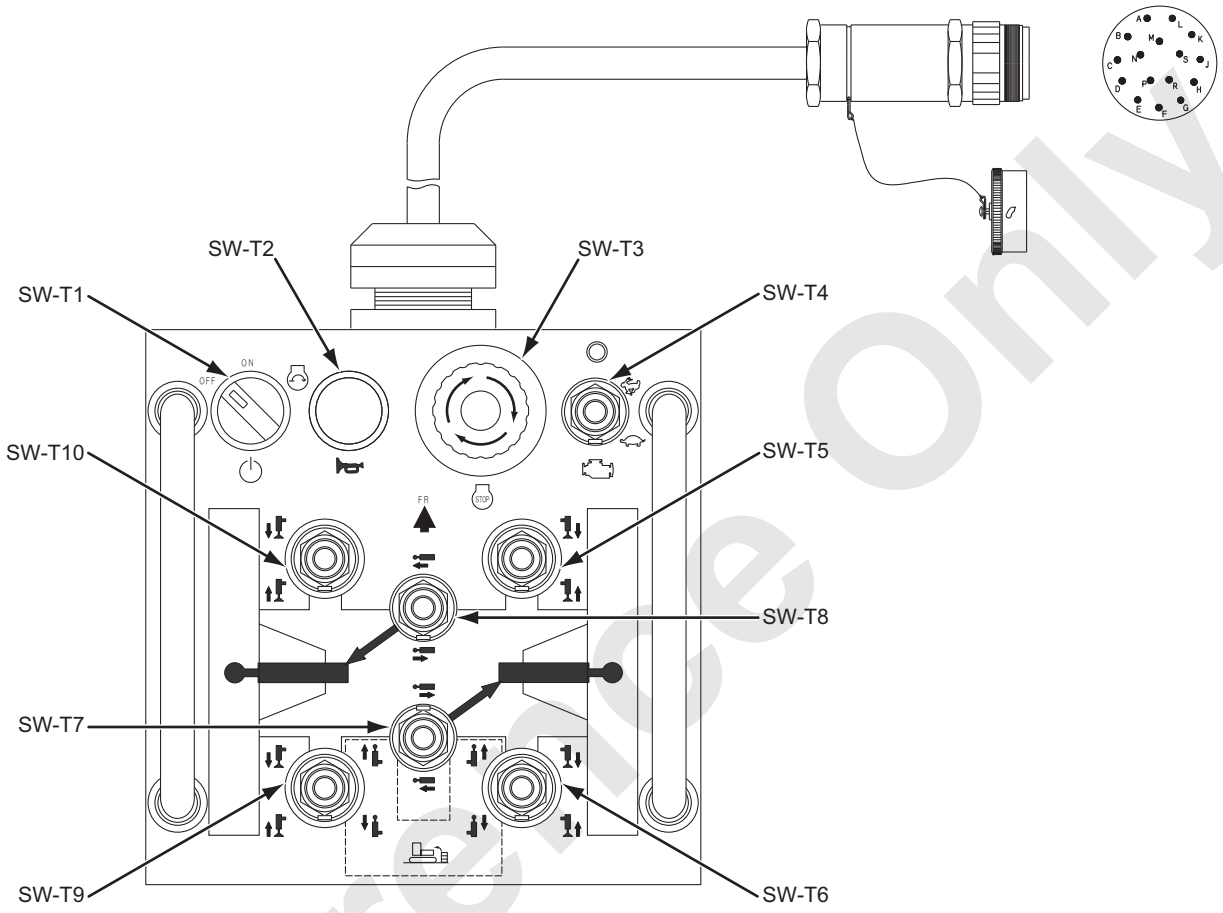
• REMOTE CONTROL SWITCH BOX



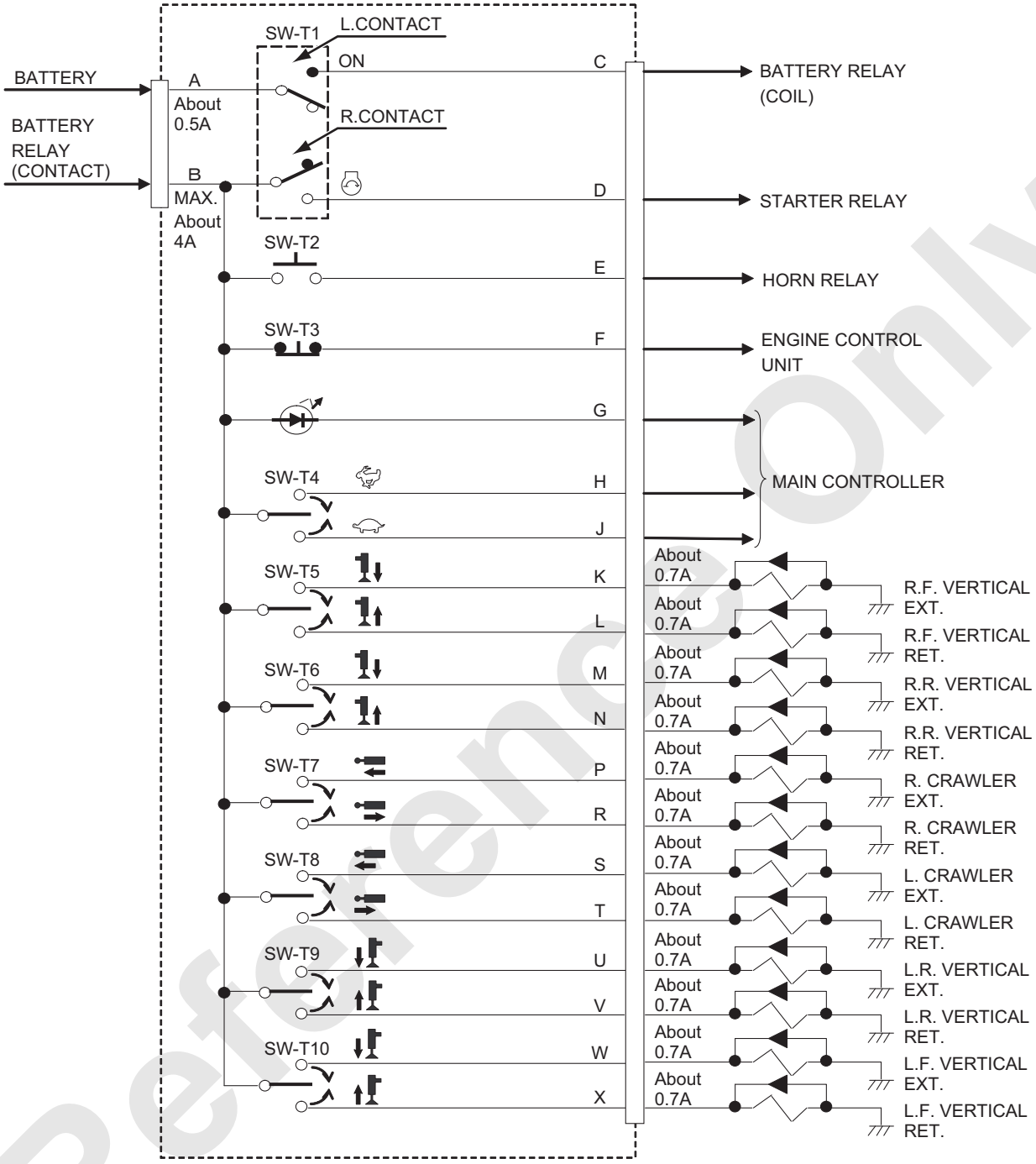
REMOTE CONTROL SWITCH BOX

12.2 REMOTE CONTROL

When the controller is failed or the cable breakage occurs but the machine still need to be operated, repair upon reviewing the controller circuit or apply voltage directly on the solenoid valve.



CIRCUIT DIAGRAM



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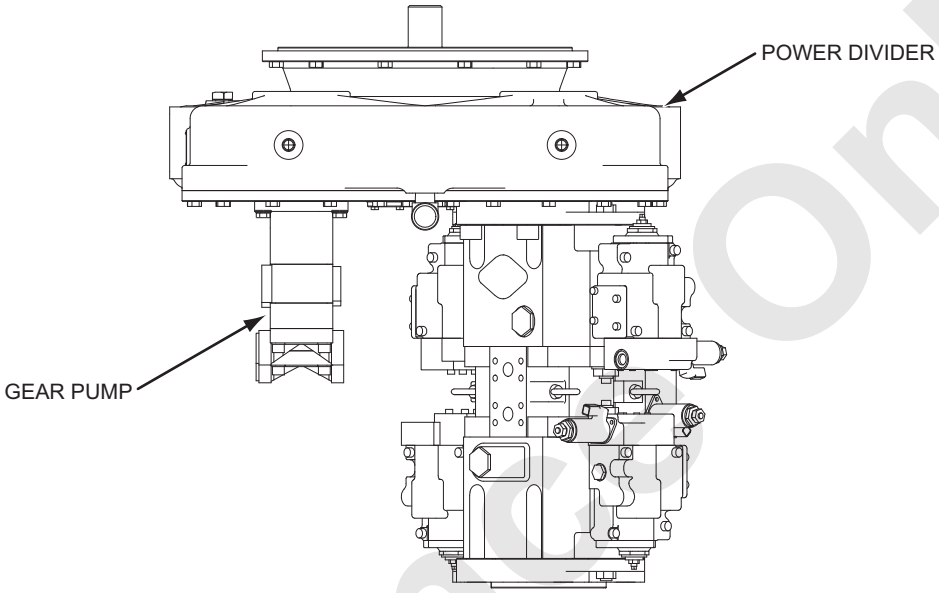
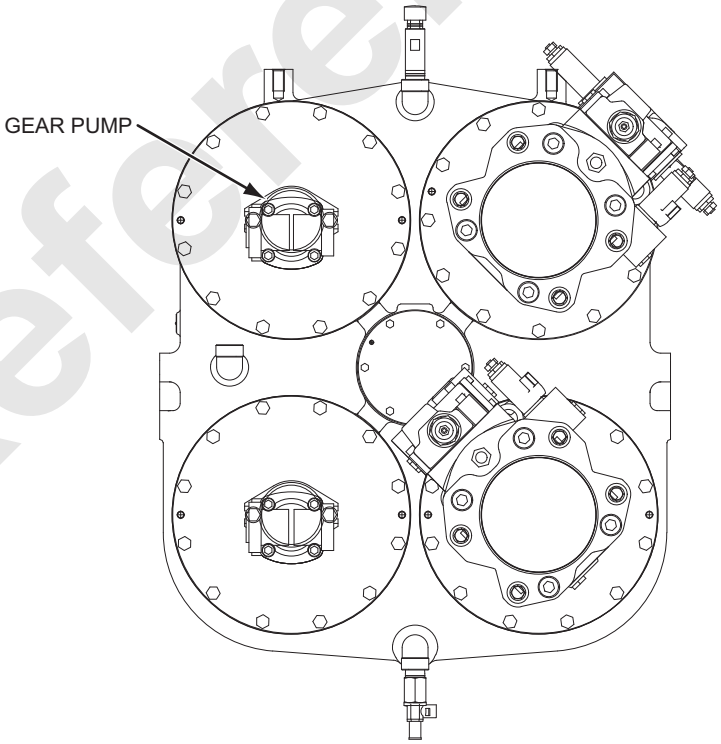
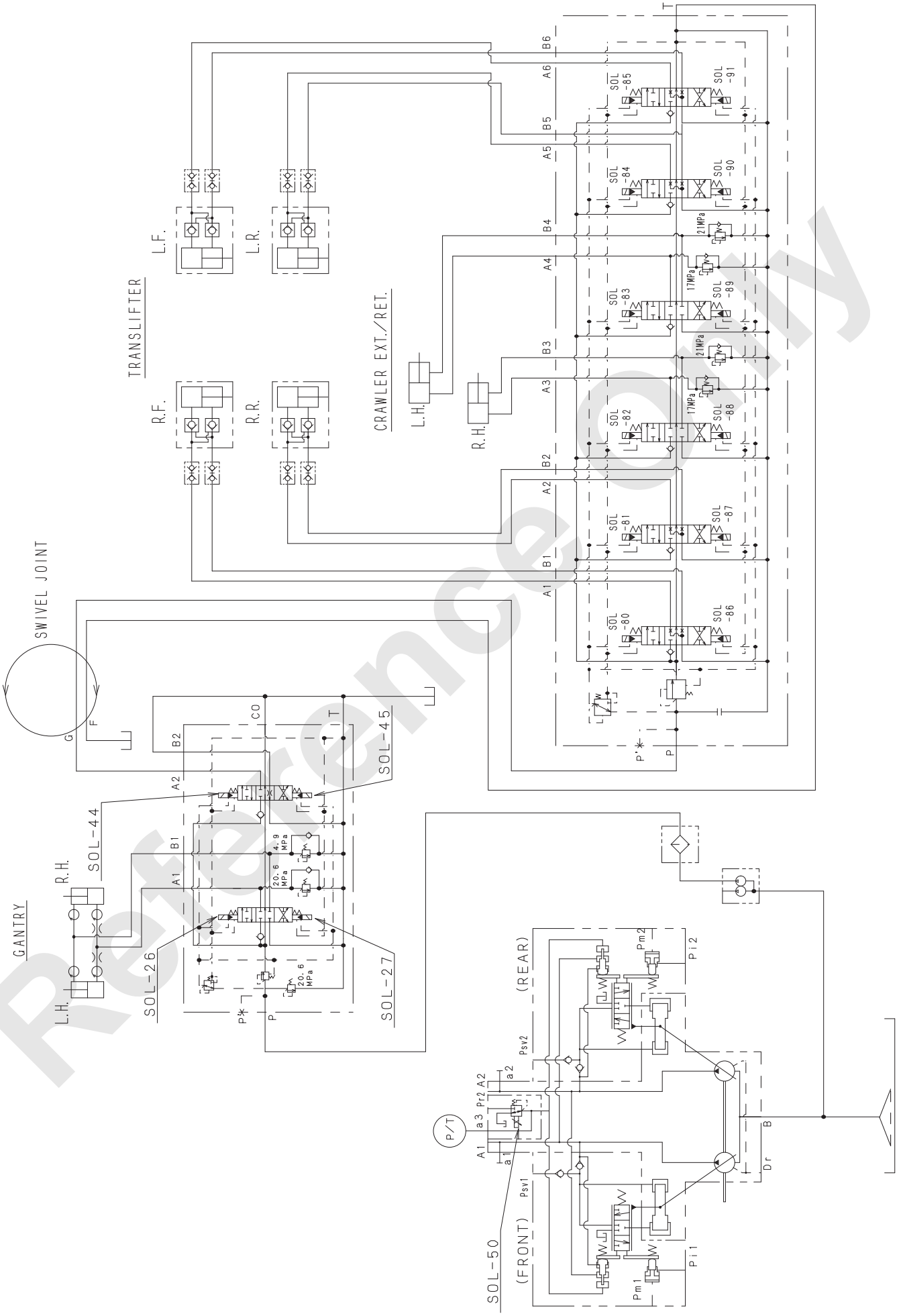
12.3 CONSTRUCTION AND FUNCTION

12.3.1 OUTLINE

The pressurized oil discharged from the gear pump (the outside one of the two) directly connected to the main pump is controlled by the hydraulic selector section of the 2-section control valve (gantry control valve), and is led to the translifter control valve through the swivel joint. The pressurized oil controlled by the remote controller is sent to the respective cylinders.







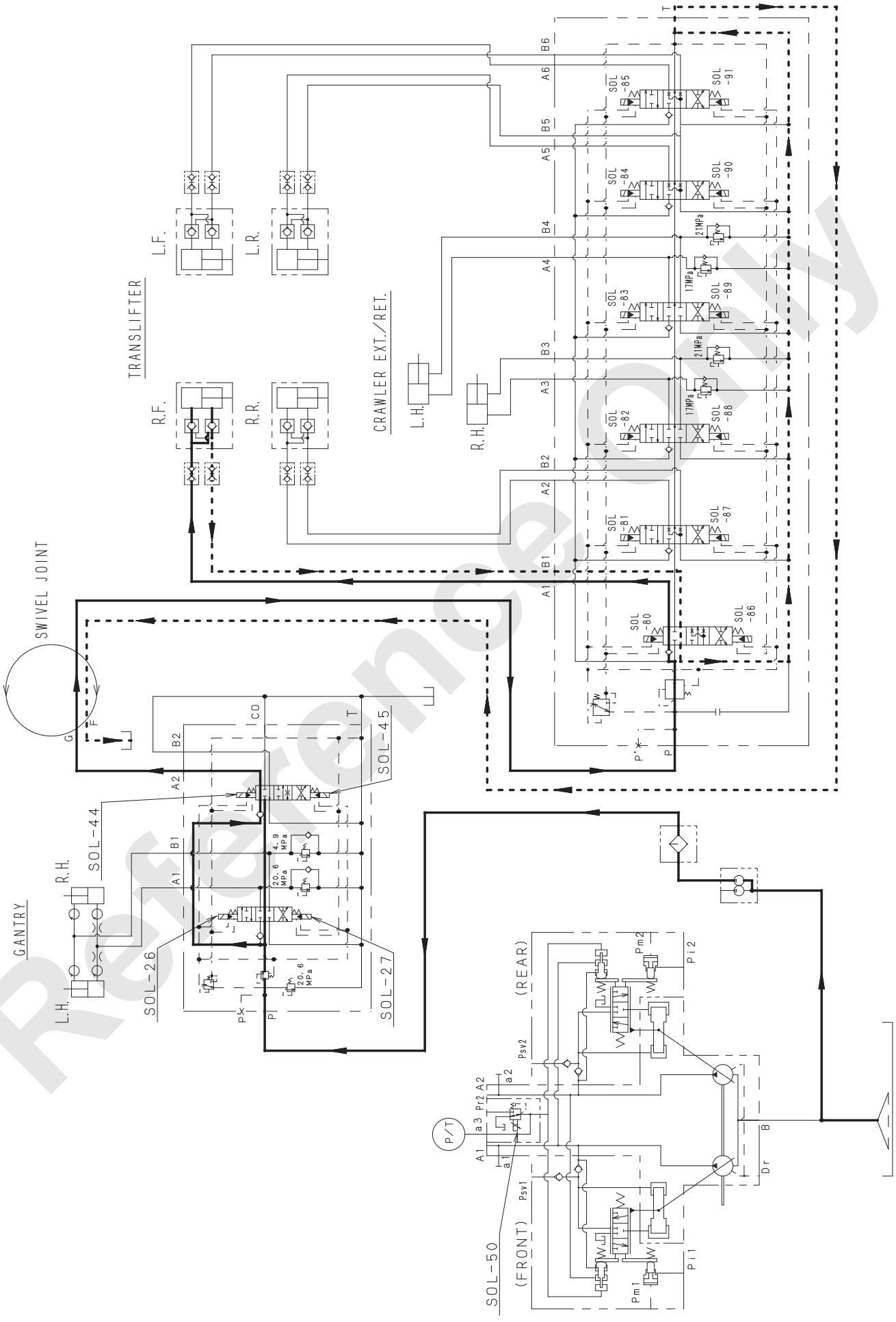
12.4 FUNCTION

The function is common to the four translifter vertical cylinders. The function of the crawler EXT./ RET. cylinders is almost identical to that of the vertical cylinders except double pilot check valve.
The function of the translifter cylinders is described below taking the front right vertical cylinder as an example.

12.4.1 RAISING THE TRANSLIFTER

The pressurized oil discharged from the auxiliary actuator pump is led into the hydraulic circuit select section through the gantry section of 2-section control valve. If the hydraulic selector switch in the operator's cab is in the "NEUTRAL (GANTRY)" position, the pressurized oil flows through the 2-section control valve, and returns to the tank without any load.
When the hydraulic selector switch is set to the "TRANSLIFTER" position, the SOL-44 actuates, causing the pressurized oil to flow through the swivel joint and into the translifter control solenoid valve.
If the translifter control solenoid valve remains unactuated, the pressurized oil flows through the valve, and returns to the tank without any load.
When the "right front" vertical cylinder switch is set to the "EXTEND" side, the solenoid valve (SOL-80) actuates, causing the pressurized oil not only to flow into the head side of the vertical cylinder but also to open the rod side check of the double pilot operated check valve. As a result, the oil in the rod side returns to the tank, and the right front vertical cylinder is extended.

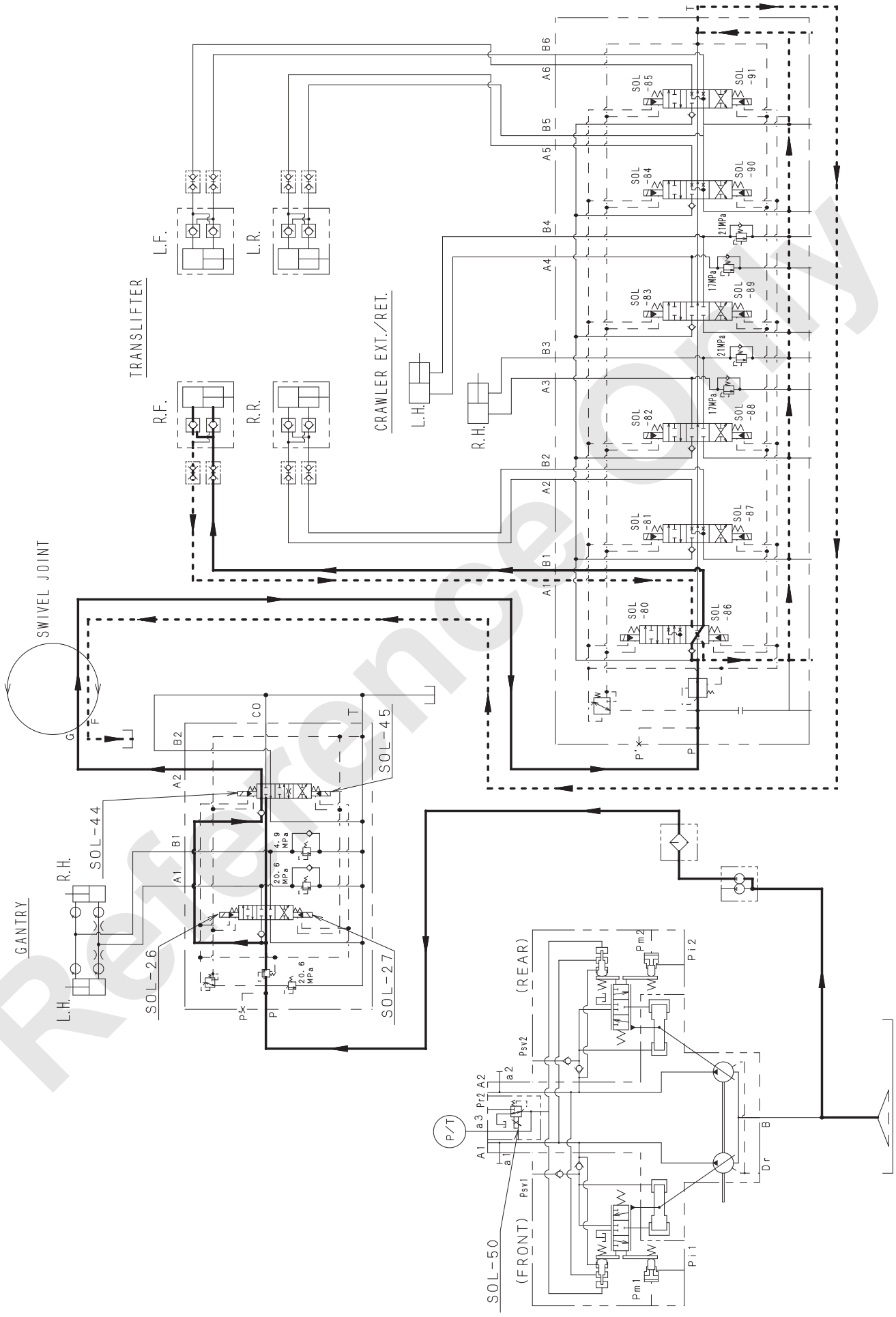
RAISING THE TRANSLIFTER



12.4.2 LOWERING THE TRANSLIFTER

The pressurized oil discharged from the auxiliary actuator gear pump is led into the gantry and hydraulic selector valve through the gantry section of the 2-section control valve. If the hydraulic selector switch in the operator's cab is in the "NEUTRAL (GANTRY)" position, the pressurized oil flows through the 2-section control valve, and returns to the tank without any load.
When the hydraulic selector switch is set to the "TRANSLIFTER" position, the SOL-44 actuates, causing the pressurized oil to flow through the swivel joint and into the translifter control solenoid valve.
If the translifter control solenoid valve remains unactuated, the pressurized oil flows through the valve, and returns to the tank without any load.
When the "right front" vertical cylinder switch is set to the "RETRACT" side, the SOL-86 actuates, causing the pressurized oil not only to flow into the rod side of the vertical cylinder but also to open the head side check of the double pilot operated check valve.
As a result, the oil in the head side returns to the tank, and the right front vertical cylinder is retracted.

LOWERING THE TRANSLIFTER



13. TROUBLESHOOTING

13.1 TROUBLESHOOTING

What actions should be taken upon occurrence of these problems ?

Portion in question	Symptom	Possible cause	Check points	Remedy
Engine	Engine does not start.	Battery is dead.	Check the battery electrolyte for level and specific gravity.	Charge or replace the battery.
		Starter is not rotating.	Check the starter relay for operation.	Replace the starter relay.
			Check contents of the error warning displayed on the main monitor.	Reset the error warning.
			Check that the Engine Emergency Stop switch is not pushed.	Release the Engine Emergency Stop switch (inside cabin or via remote controller).
			Check the safety relay for operation.	Replace the safety relay.
			The operator is not authenticated.	Conduct operator authentication work.
			Check whether the fuse (F30) is blown or not.	Replace the fuse (F30).
		Fuel is not supplied.	Check presence of fuel and flow of fuel in piping.	Supply fuel or replenish fuel in the priming pump.
				Conduct air bleeding.
			Check elements of the fuel filters (main and pre filters) for clogging.	Replace elements of the fuel filters (main and pre filters)
			Check that fuel open/close valve is not closed.	Open the open/close valve.
		Air intake is not performed.	Check that air cleaner element is not clogged.	Clean or replace the air cleaner element.
			Check the air intake piping (from air cleaner, turbo intercooler to engine) for clogging.	Eliminate the clogging.
		Engine error signal (P code) is output.	Check contents of the error.	Take action after locating the cause in accordance with the Engine Maintenance Manual.
				Inform Hino Motors, Ltd. as needed.
	Engine does not stop.	Defective electrical system	Key switch in trouble	Replace the key switch.
	Engine speed does not increase.	Accelerator grip is in trouble.	Check whether grip trouble error signal is output or not.	Flip the aux. accelerator switch toward “ON” side.

Portion in question	Symptom	Possible cause	Check points	Remedy
Engine	Engine speed does not increase.	Malfunctioning of ECU	Check the P code.	Check the Engine Manual.
		Defective electrical system	Defective controller	Replace the controller. (Conduct the work with aux. accelerator.)
		Engine error signal (P code) is output.	Check contents of the error.	Take action after locating the cause in accordance with the Engine Maintenance Manual.
				Inform Hino Motors, Ltd. as needed.
	Engine revolutions are uneven.	Fuel is not supplied.	Check presence of fuel and flow of fuel in piping.	Supply fuel or replenish fuel in the priming pump.
				Conduct air bleeding.
			Check elements of the fuel filters (main and pre filters) for clogging.	Replace elements of the fuel filters (main and pre filters)
		Air intake is not performed.	Check that air cleaner element is not clogged.	Clean or replace the air cleaner element.
			Check the air intake piping (from air cleaner, turbo intercooler to engine) for clogging.	Eliminate the clogging.
		Engine error signal (P code) is output.	Check contents of the error.	Take action after locating the cause in accordance with the Engine Maintenance Manual.
				Inform Hino Motors, Ltd. as needed.
Engine	Overheating	Cooling water is short.	Check the cooling water level.	Replenish cooling water.
		Cooling water is not supplied.	Check that the thermostat is not stuck.	Replace the thermostat.
			Check water piping for clogging.	Eliminate the clogging.
		Cold wind is not flowing.	Check that the fan is not slipping.	Adjust the V belt tension.
			Check that the radiator front face is not blocked with dust and others.	Blow air to clean the radiator.
			Check that there are no obstacles in openings on the air supply and exhaust sides of the guard.	Remove the obstacles.
		Engine error signal (P code) is output.	Check contents of the error.	Take action after locating the cause in accordance with the Engine Maintenance Manual.
				Inform Hino Motors, Ltd. as needed.

Portion in question	Symptom	Possible cause	Check points	Remedy
Winch system	Hoisting and lowering impracticable	Hydraulic oil is short.	Check the hydraulic oil tank oil level.	Replenish hydraulic oil.
			Check the suction strainer for clogging.	Wash or replace the strainer.
		Clutch operation is slippery.	Check the positive and negative pressures.	Replace the positive and negative pressure selector valve.
		Malfunctioning of remote control valve	Check whether the secondary pressure generation condition is normal.	Replace the remote control valve.
		Malfunctioning of remote control circuit relief valve	Check the primary pressure.	Regulate the primary pressure or replace the valve.
			Check the function lock limit switch for operation.	Regulate operation of the limit switch or replace the limit switch.
			Check the function lock solenoid valve for operation.	Regulate operation of the solenoid valve or replace the solenoid valve.
		Malfunctioning of main pump	Check whether propelling of the system is possible.	Replace the main pump.
		Malfunctioning of main valve	Check the main valve relief pressure.	Regulate the relief valve pressure or replace the relief valve.
			Check the pilot pressure on the main valve.	Look into and replace the remote control valve.
		Malfunctioning of hoisting motor	Check the counter balance valve spool for operation.	Replace the spool or replace the valve.
			Check the counter balance valve poppet for deposition of contaminant and flaw on seat surface.	Wash or replace the poppet.
			Check the motor drain oil level.	Replace the motor.
		Malfunctioning of hoisting reduction gears	Check the system for unusual noise, abnormally high temperature and vibrations.	Replace the reduction gears.
		Automatic stop and electrical stop of interlock and others	Check the contents of the functional operations.	Release the functions (elimination of cause of auto stop and release of interlock)

Portion in question	Symptom	Possible cause	Check points	Remedy
Winch system	Intended hoisting and lowering speeds cannot be attained.	Hydraulic oil is short.	Check the hydraulic oil tank oil level.	Replenish hydraulic oil.
			Check the suction strainer for clogging.	Wash or replace the strainer.
		Clutch operation is slippery.	Check the positive and negative pressures.	Replace the positive and negative pressure selector valve.
		Malfunctioning of remote control valve	Check whether the secondary pressure generation condition is normal.	Replace the remote control valve.
		Malfunctioning of remote control circuit relief valve	Check the primary pressure.	Regulate the primary pressure or replace the valve.
		Malfunctioning of main pump	Check whether propelling of the system is possible.	Replace the main pump.
		Malfunctioning of main valve	Check the main valve relief pressure.	Regulate the relief valve pressure or replace the relief valve.
			Check the pilot pressure on the main valve.	Look into and replace the remote control valve.
		Malfunctioning of hoisting motor	Check the counter balance valve spool for operation.	Replace the spool or replace the valve.
			Check the counter balance valve poppet for deposition of contaminant and flaw on seat surface.	Wash or replace the poppet.
			Check the motor drain oil level.	Replace the motor.
			Look into motor tilted rotation control solenoid proportional valve.	Replace the solenoid proportional pressure reducing valve.
		Malfunctioning of hoisting reduction gears	Check the system for unusual noise, abnormally high temperature and vibrations.	Replace the reduction gears.
		Malfunctioning of engine sensing	Check the voltage of the engine rotation grip or rotating speed sensor.	Adjust the rotation grip L/H level or replace the rotation grip.
			Check the voltage of the main pump solenoid proportional pressure reducing valve.	Adjust or replace the solenoid proportional pressure reducing valve.
		Speed trimmer is minimized.	Check the speed trimmer level.	Maximize the speed trimmer.

Portion in question	Symptom	Possible cause	Check points	Remedy
Winch system	Hoisting and lowering speeds cannot be controlled.	Clutch operation is slippery.	Check the positive and negative pressures.	Replace the positive and negative pressure selector valve.
		Malfunctioning of remote control valve	Check whether the secondary pressure generation condition is normal.	Replace the remote control valve.
		Malfunctioning of remote control circuit relief valve	Check whether the primary pressure generation condition is normal.	Regulate the primary pressure or replace the valve.
		Malfunctioning of main pump	Check whether propelling of the system is possible.	Replace the main pump.
		Malfunctioning of main valve	Check the main valve relief pressure.	Regulate the relief valve pressure or replace the relief valve.
			Check the pilot pressure on the main valve.	Look into and replace the remote control valve.
		Malfunctioning of hoisting motor	Check the counter balance valve spool for operation.	Replace the spool or replace the valve.
			Check the motor drain oil level.	Replace the motor.
		Malfunctioning of hoisting reduction gears	Check the system for unusual noise, abnormally high temperature and vibrations.	Replace the reduction gears.
	Inching is unavailable.	Clutch operation is slippery.	Check the positive and negative pressures.	Replace the positive and negative pressure selector valve.
		Malfunctioning of remote control valve	Check whether the secondary pressure generation condition is normal.	Replace the remote control valve.
		Malfunctioning of remote control circuit relief valve	Check whether the primary pressure generation condition is normal.	Regulate the primary pressure or replace the valve.
		Slow working of negative brake valve	Look into the negative brake release pressure.	Look into the negative brake release valve and the slow return valve.
	Load picked and carried cannot be held.	Malfunctioning of hoisting motor	Check the counter balance valve spool for operation.	Replace the spool or replace the valve.
			Check the counter balance valve poppet for deposition of contaminant and flaw on seat surface.	Wash or replace the poppet.
			Check the motor drain oil level.	Replace the motor.

Portion in question	Symptom	Possible cause	Check points	Remedy
Winch system	Load picked and carried cannot be held.	[Operations on negative brake side]		
		Clutch operation is slippery.	Check the positive and negative pressures.	Replace the positive and negative pressure selector valve.
		Negative brake is released.	Look into the negative brake release pressure.	Look into the negative brake release valve and the slow return valve.
		Malfunctioning of remote control valve	Look into the secondary pressure.	Replace the remote control valve.
		[Operations on positive brake side]		
		Clutch operation is slippery.	Check the brake pedal linkage for loosening and interference.	Adjust or repair the linkage.
			Check the positive and negative pressures.	Replace the positive and negative pressure selector valve.
	Free fall is unavailable.	Clutch cannot be released.	Check the positive and negative pressures.	Replace the positive and negative pressure selector valve.
			Check the brake pedal linkage for loosening and interference.	Adjust or repair the linkage.
			Check that specified brake force is output.	Replace the negative and positive brake units.
			Check the positive brake control valve spool for operation.	Replace the spool or replace the valve.
		Malfunctioning of remote control circuit relief valve	Check whether the primary pressure generation condition is normal.	Regulate the primary pressure or replace the valve.
			Check the function lock limit switch for operation.	Regulate operation of the limit switch or replace the limit switch.
			Check the function lock solenoid valve for operation.	Regulate operation of the solenoid valve or replace the solenoid valve.
		Malfunctioning of hoisting reduction gears	Check the system for unusual noise, abnormally high temperature and vibrations.	Check the shaft and bearing for unusual noise and seizure.
				Repair the shaft and bearing or replace parts.
		Defective electrical system	Check the fuse (F-38) for blowing as well as wiring.	Replace the fuse (F-38) or repair the wiring.
			Check the free fall selector switch for operation.	Replace the switch or repair the wiring.
			Check the relay for switching and the contact for burn mark.	Replace the relay or repair the wiring.
			Check the free fall selector solenoid valve for operation.	Replace the solenoid valve or repair the wiring.

Portion in question	Symptom	Possible cause	Check points	Remedy
Winch system	Hunting	Hydraulic oil is short.	Check the hydraulic oil tank oil level.	Replenish hydraulic oil.
			Check the suction strainer for clogging.	Wash or replace the strainer.
		Malfunctioning of hoisting motor	Check the counter balance valve spool for operation.	Replace the spool or replace the valve.
			Check the counter balance valve poppet for deposition of contaminant and flaw on seat surface.	Wash or replace the poppet.
			Check the motor drain oil level.	Replace the motor.
		Malfunctioning of remote control valve	Check whether the secondary pressure generation condition is normal.	Replace the spool or replace the valve.
		Malfunctioning of remote control circuit relief valve	Check the primary pressure.	Regulate the primary pressure or replace the valve.
			Check the function lock limit switch for operation.	Regulate operation of the limit switch or replace the limit switch.
			Check the function lock solenoid valve for operation.	Regulate operation of the solenoid valve or replace the solenoid valve.
		Malfunctioning of main valve	Check the main valve relief pressure.	Regulate the relief valve pressure or replace the relief valve.
			Check the pilot pressure on the main valve.	Look into the remote control valve.
		Malfunctioning of hoisting motor	Check the counter balance valve spool for operation.	Replace the spool or replace the valve.
			Check the counter balance valve poppet for deposition of contaminant and flaw on seat surface.	Wash or replace the poppet.
			Check the piston for sticking or omission.	Check the piston for operation and replace the part.
			Check the motor drain oil level.	Replace the motor.
		Malfunctioning of hoisting reduction gears	Check the system for unusual noise, abnormally high temperature and vibrations.	Replace the reduction gears.
		Malfunctioning of engine sensing	Check the voltage of the engine rotation grip or rotating speed sensor.	Adjust the rotation grip L/H level or replace the rotation grip.
			Check the voltage of the main pump solenoid proportional pressure reducing valve.	Adjust or replace the solenoid proportional pressure reducing valve.

Portion in question	Symptom	Possible cause	Check points	Remedy
Swing system	Swing is unavailable. Specified swing speed cannot be reached. There is no swing force.	Hydraulic oil is short.	Check the hydraulic oil tank oil level.	Replenish hydraulic oil.
			Check the suction strainer for clogging.	Wash or replace the strainer.
		Defective swing brake	Check whether the swing brake release pressure is normal or not.	Repair the swing brake valve or replace the valve.
			Check whether the pressure switch operation is normal or not.	Repair the pressure switch wiring or replace the switch.
			Check the brake disc for unusual noise and high temperature.	Check the brake disc or replace the disc.
		Malfunctioning of remote control valve	Check whether the secondary pressure generation condition is normal.	Replace the spool or replace the valve.
		Malfunctioning of remote control circuit relief valve	Check the primary pressure.	Regulate the primary pressure or replace the valve.
			Check the function lock limit switch for operation.	Regulate operation of the limit switch or replace the limit switch.
			Check the function lock solenoid valve for operation.	Regulate operation of the solenoid valve or replace the solenoid valve.
		Defective swing control valve	Check the main valve relief pressure.	Regulate the relief valve pressure or replace the relief valve.
			Check the valve spool for operation.	Lap or replace the spool.
		Malfunctioning of swing motor	Check the piston for sticking or omission.	Check the piston for operation and replace the part.
			Check the motor drain oil level.	Replace the motor.
		Malfunctioning of swing reduction gears	Check the system for unusual noise, abnormally high temperature and vibrations.	Check the shaft and bearing for unusual noise and seizure.
				Repair the shaft and bearing or replace parts.
			Check the gear oil level in the reduction gears.	Replenish gear oil or replace parts.
		Malfunctioning of swing bearing	Check the system for unusual noise, abnormally high temperature and vibrations.	Check the bolt for loosening, the ball for problem and bearing for seizure.
				Retighten the bolt, replace the ball and replace the bearing.

Portion in question	Symptom	Possible cause	Check points	Remedy
Swing system	Swing is unavailable. Specified swing speed cannot be reached. There is no swing force.	Defective electrical system	Check the parking brake and the swing mode selector switch for operation.	Replace the switch or repair the wiring.
			Check the relay for switching and the contact for burn mark.	Replace the relay or repair the wiring.
			Check the swing mode selector solenoid valve for operation.	Replace the solenoid valve or repair the wiring.
	Shock action is seen at the occasions of start and stop of swing motion. Swing motion is not smooth.	Malfunctioning of swing bearing	Check the system for unusual noise, abnormally high temperature and vibrations.	Check the bolt for loosening, the ball for problem and bearing for seizure.
				Retighten the bolt, replace the ball and replace the bearing.
			Check the swing pinion for unusual noise and vibration.	Check the pinion for tooth contact condition, seizure and missing.
				Conduct lubrication, adjust the tooth contact or replace the pinion.
		Defective swing brake	Check whether the swing brake release pressure is normal or not.	Repair the swing brake valve or replace the valve.
			Check whether the pressure switch operation is normal or not.	Repair the pressure switch wiring or replace the switch.
			Check the brake disc for unusual noise and high temperature.	Check the brake disc or replace the disc.
		Malfunctioning of remote control circuit relief valve	Check the primary pressure.	Regulate the primary pressure or replace the valve.
			Check the function lock limit switch for operation.	Regulate operation of the limit switch or replace the limit switch.
			Check the function lock solenoid valve for operation.	Regulate operation of the solenoid valve or replace the solenoid valve.
		Defective swing control valve	Check the main valve relief pressure.	Regulate the relief valve pressure or replace the relief valve.
			Check the valve spool for operation.	Lap or replace the spool.
		Malfunctioning of swing motor	Check the piston for sticking or omission.	Check the piston for operation and replace the part.
			Check the motor drain oil level.	Replace the motor.

Portion in question	Symptom	Possible cause	Check points	Remedy
Swing system	Shock action is seen at the occasions of start and stop of swing motion. Swing motion is not smooth.	Malfunctioning of swing reduction gears	Check the system for unusual noise, abnormally high temperature and vibrations.	Check the shaft and bearing for unusual noise and seizure. Repair the shaft and bearing or replace parts.
			Check the gear oil level in the reduction gears.	Replenish gear oil or replace parts.
		Defective electrical system	Check the parking brake and the swing mode selector switch for operation.	Replace the switch or repair the wiring.
			Check the relay for switching and the contact for burn mark.	Replace the relay or repair the wiring.
			Check the swing mode selector solenoid valve for operation.	Replace the solenoid valve or repair the wiring.
	Swing brake went out.	Defective swing brake	Check whether the swing brake release pressure is normal or not.	Repair the swing brake valve or replace the valve.
			Check whether the pressure switch operation is normal or not.	Repair the pressure switch wiring or replace the switch.
			Check the brake disc for unusual noise and high temperature.	Check the brake disc or replace the disc.
		Defective electrical system	Check the parking brake and the swing mode selector switch for operation.	Replace the switch or repair the wiring.
			Check the relay for switching and the contact for burn mark.	Replace the relay or repair the wiring.
			Check the swing mode selector solenoid valve for operation.	Replace the solenoid valve or repair the wiring.
Propelling system	Propelling is unavailable. Specified propelling speed cannot be reached.	Hydraulic oil is short.	Check the hydraulic oil tank oil level.	Replenish hydraulic oil.
			Check the suction strainer for clogging.	Wash or replace the strainer.
	There is no propelling force.	Malfunctioning of remote control valve	Check whether the secondary pressure generation condition is normal.	Replace the spool or replace the valve.
			Adjust the secondary pressure detection switch.	Replace the pressure switch.
		Malfunctioning of remote control circuit relief valve	Check the primary pressure.	Regulate the primary pressure or replace the valve.
			Check the function lock limit switch for operation.	Regulate operation of the limit switch or replace the limit switch.
			Check the function lock solenoid valve for operation.	Regulate operation of the solenoid valve or replace the solenoid valve.
		Defective propelling control valve	Check the main valve relief pressure.	Regulate the relief valve pressure or replace the relief valve.

Portion in question	Symptom	Possible cause	Check points	Remedy
Propelling system	Propelling is unavailable. Specified propelling speed cannot be reached. There is no propelling force.	Malfunctioning of propel motor	Check the piston for sticking or omission.	Check the piston for operation and replace the part.
			Check the motor drain oil level.	Replace the motor.
		Malfunctioning of propel reduction gears	Check the system for unusual noise, abnormally high temperature and vibrations.	Check the shaft and bearing for unusual noise and seizure.
				Repair the shaft and bearing or replace parts.
			Check the gear oil level in the reduction gears.	Replenish gear oil or replace parts.
	Shock action is seen at the occasions of start and stop of propelling motion. Propelling motion is not smooth.	Poor engagement of shoe with tumbler	Check engagement of the shoe with the tumbler as well as running on.	Adjust tension of the shoe, repair the shoe or replace parts.
		Defective propelling brake	Check whether the propelling brake release pressure is normal or not.	Repair the propelling brake valve or replace the valve.
			Check whether the pressure switch operation is normal or not.	Repair the pressure switch wiring or replace the switch.
			Check the brake disc for unusual noise and high temperature.	Check the brake disc or replace the disc.
			Look into the brake valve.	Replace the brake valve.
		Malfunctioning of remote control circuit relief valve	Check the primary pressure.	Regulate the primary pressure or replace the valve.
			Check the function lock limit switch for operation.	Regulate operation of the limit switch or replace the limit switch.
			Check the function lock solenoid valve for operation.	Regulate operation of the solenoid valve or replace the solenoid valve.
		Defective propelling control valve	Check the main valve relief pressure.	Regulate the relief valve pressure or replace the relief valve.
			Check the valve spool for operation.	Lap or replace the spool.
		Malfunctioning of propel motor	Check the piston for sticking or omission.	Check the piston for operation and replace the part.
			Check the motor drain oil level.	Replace the motor.

Portion in question	Symptom	Possible cause	Check points	Remedy
Propelling system	Shock action is seen at the occasions of start and stop of propelling motion. Propelling motion is not smooth.	Malfunctioning of propel reduction gears	Check the system for unusual noise, abnormally high temperature and vibrations.	Check the shaft and bearing for unusual noise and seizure.
				Repair the shaft and bearing or replace parts.
			Check the gear oil level in the reduction gears.	Replenish gear oil or replace parts.
		Defective electrical system	Check the fuse (F-15) for blowing as well as wiring.	Replace the fuse (F-15) or repair the wiring.
			Check the propelling brake and low and high speed selector switch for operation.	Replace the switch or repair the wiring.
			Check the relay for switching and the contact for burn mark.	Replace the relay or repair the wiring.
			Check the propelling brake and low and high speed selector solenoid valve for operation.	Replace the solenoid valve or repair the wiring.
	Propelling brake went out.	Defective propelling brake	Check whether the propelling brake release pressure is normal or not.	Repair the propelling brake valve or replace the valve.
			Check whether the pressure switch operation is normal or not.	Repair the pressure switch wiring or replace the switch.
			Check the brake disc for unusual noise and high temperature.	Check the brake disc or replace the disc.
			Look into the brake valve.	Replace the brake valve.
		Defective electrical system	Check the propelling brake and low and high speed selector switch for operation.	Replace the switch or repair the wiring.
			Check the relay for switching and the contact for burn mark.	Replace the relay or repair the wiring.
			Check the propelling brake and low and high speed selector solenoid valve for operation.	Replace the solenoid valve or repair the wiring.