

# SERVICE/MAINTENANCE MANUAL

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



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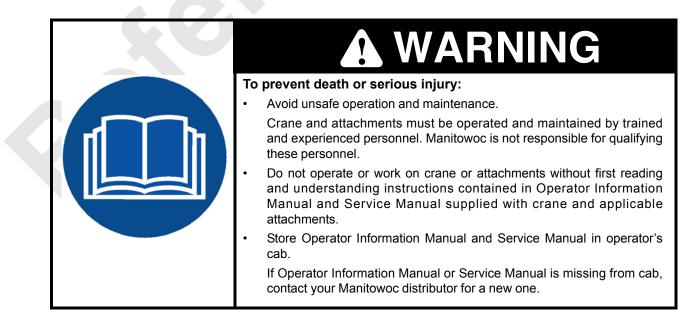
Serial Number This Manual is Divided into the following Sections:

	SAFETY SECTION
SECTION 1	<b>REFERENCE MATERIALS</b>
SECTION 2	TEST PROCEDURES
SECTION 3	GENERAL
SECTION 4	POWER TRAIN
SECTION 5	HYDRAULIC SYSTEM
SECTION 6	HOIST SYSTEM
SECTION 7	BOOM HOIST SYSTEM
SECTION 8	SWING SYSTEM
SECTION 9	TRAVEL SYSTEM
SECTION 10	ELECTRICAL SYSTEM
SECTION 11	AIR CONDITIONER
<b>SECTION 12</b>	TRANSLIFTER SYSTEM
SECTION 13	TROUBLESHOOTING

#### NOTICE

The serial number of the crane is the only method the Manitowoc Crane Care Lattice Team 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 Manitowoc Crane Care Lattice Team.



THE ORIGINAL LANGUAGE OF THIS PUBLICATION IS ENGLISH

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# 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 :



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



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



Indicates a potentially hazardous situation which, if not avoided, may result in a minor or moderate injuries.

It may also be used to alert against possible damage to the machine and its components.



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**

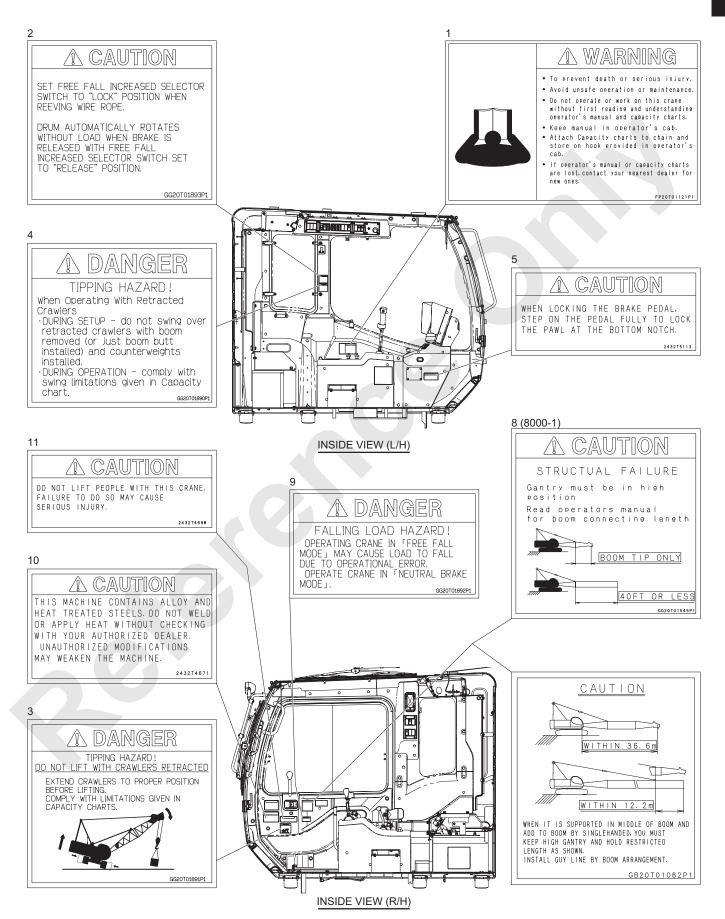
Since the warning labels are installed in the machine and indicated with the three stages in the same way as the warning description, confirm the positions and contents of all warning labels first. Put them to the practical use to secure safety when operating, checking and performing maintenance.

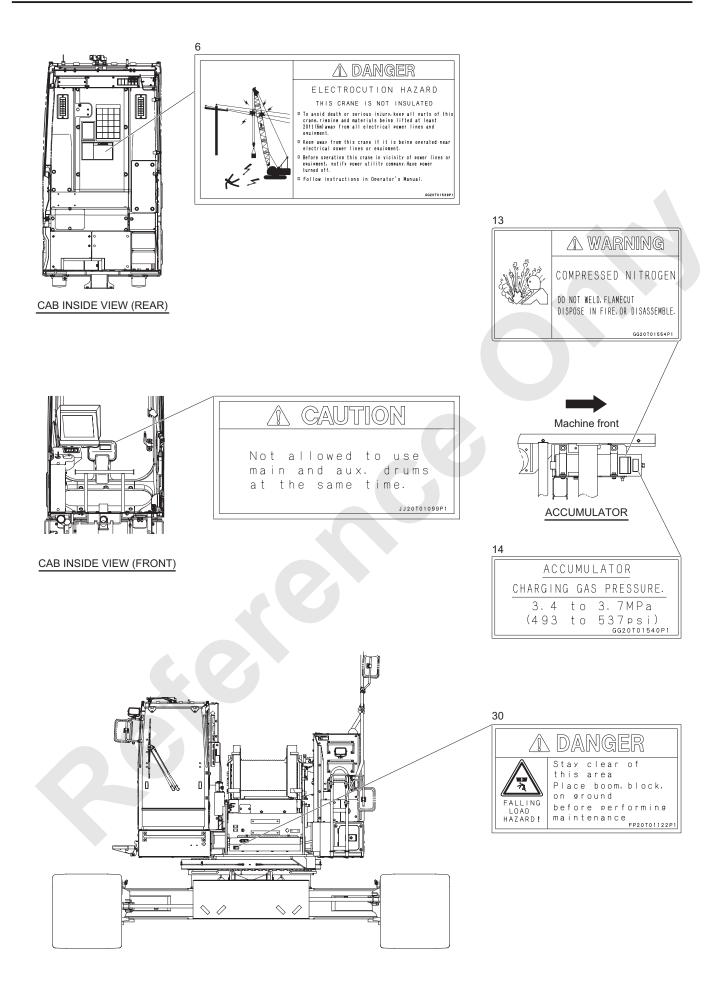
### HANDLING OF WARNING LABELS IN THE MACHINE

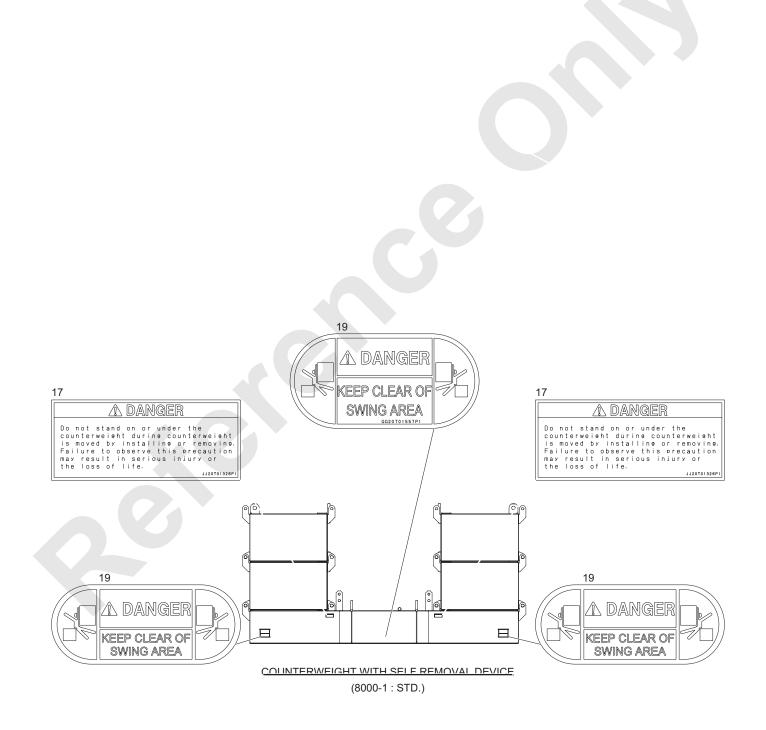
- 1. When the warning label is damaged or stained, order it to the designated service shop.
- 2. Do not remove the warning labels.
- 3. When the surface of the warning label is soiled and difficult to be seen, wipe it cleanly.

### LABEL LAYOUT

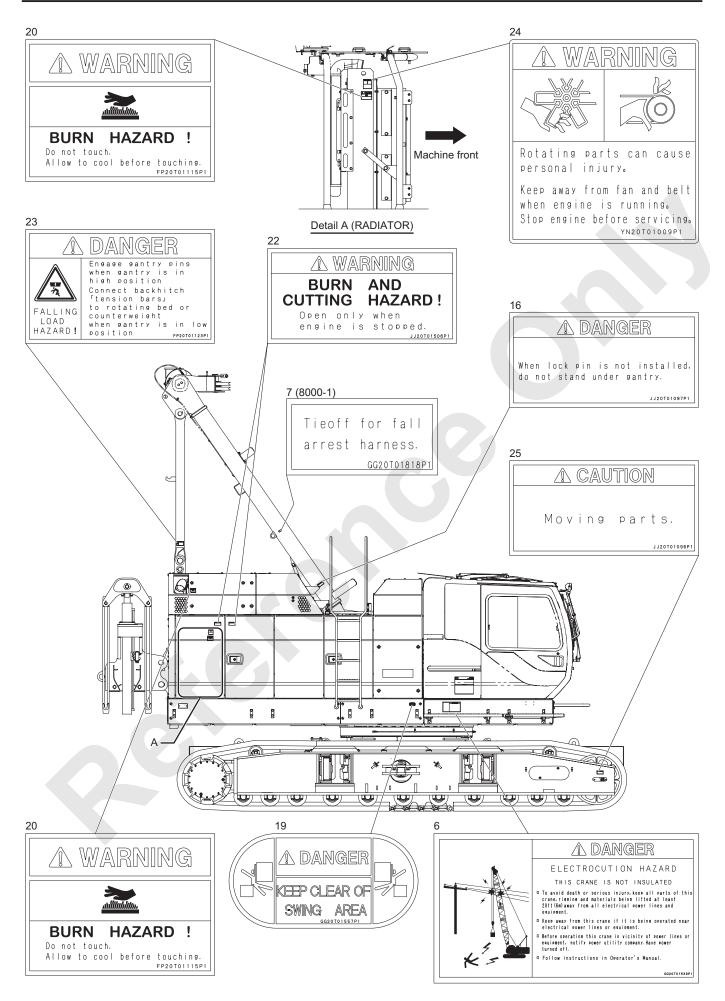
\* Numbers in the drawings correspond with those in the label explanation detail after "P.12"

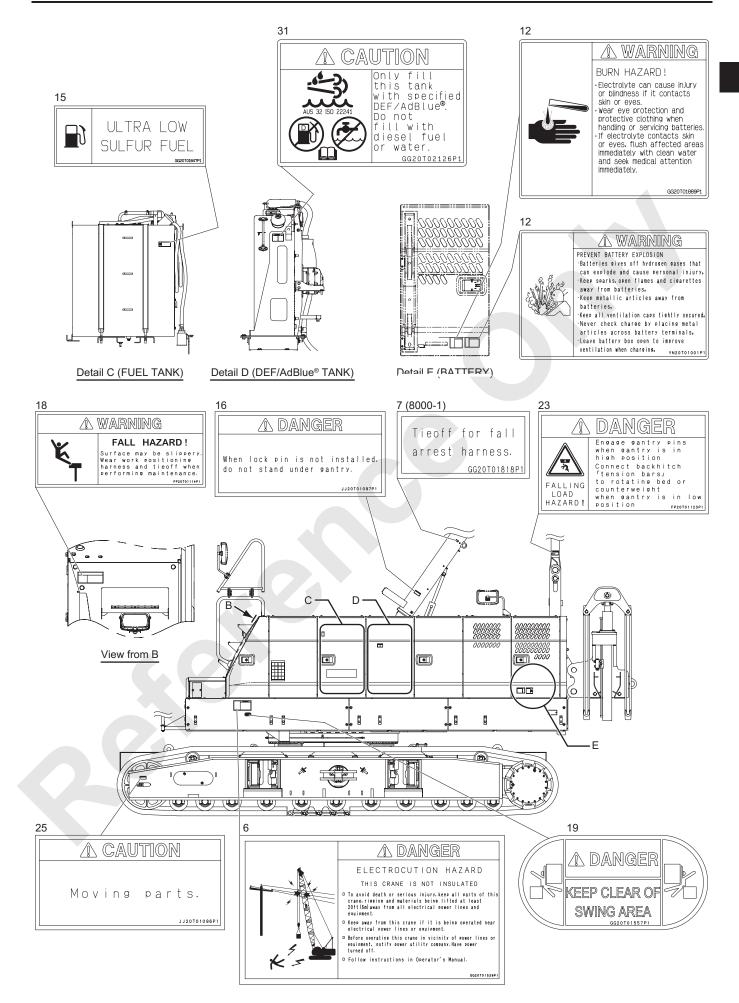




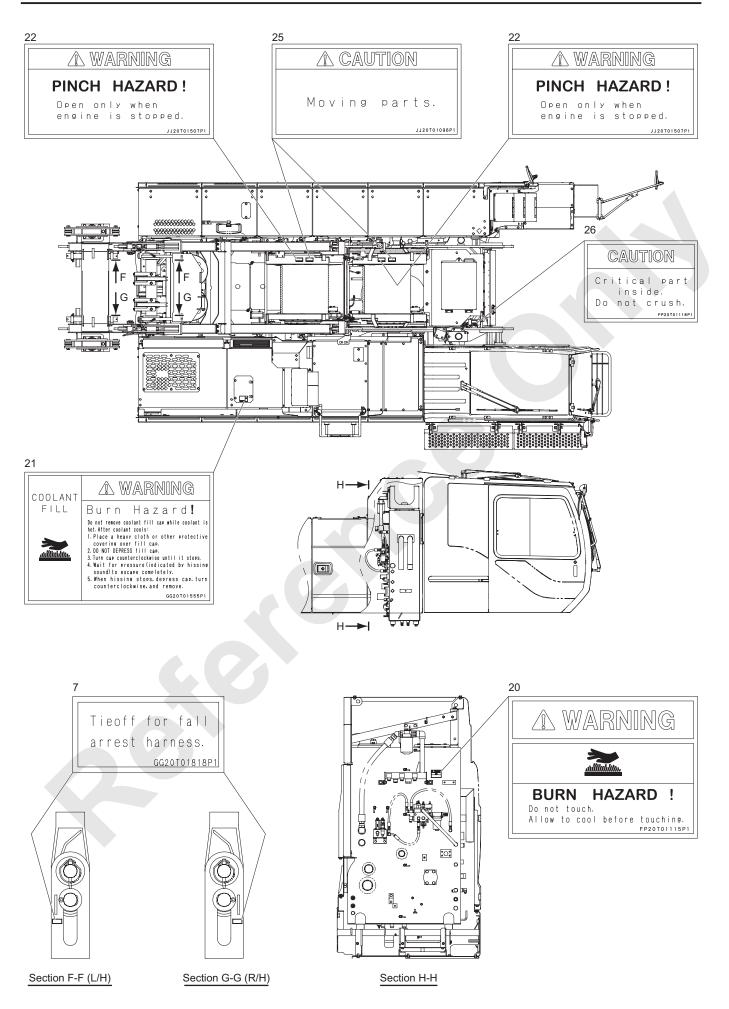


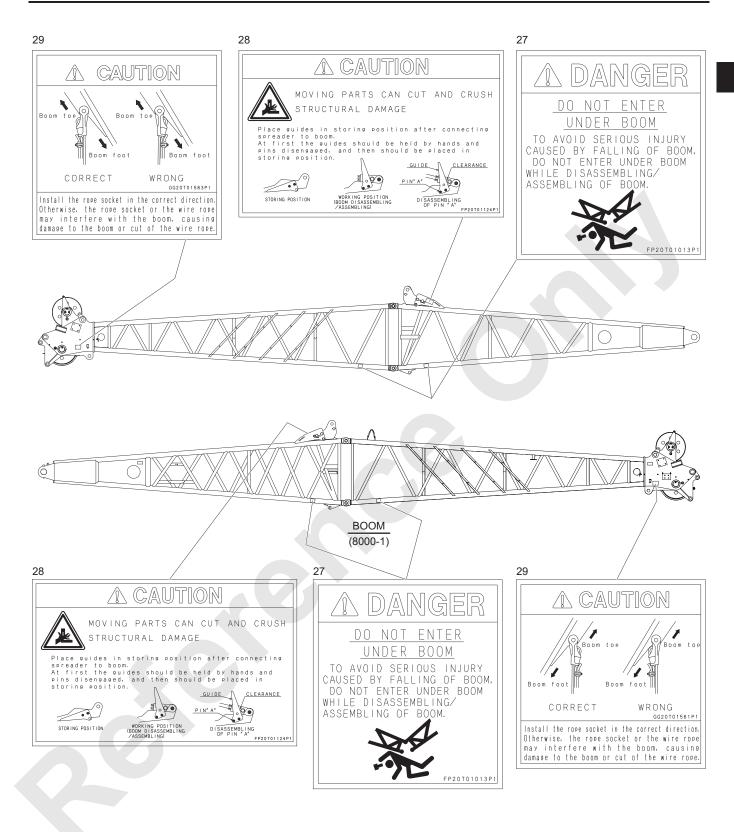
### [SAFETY]

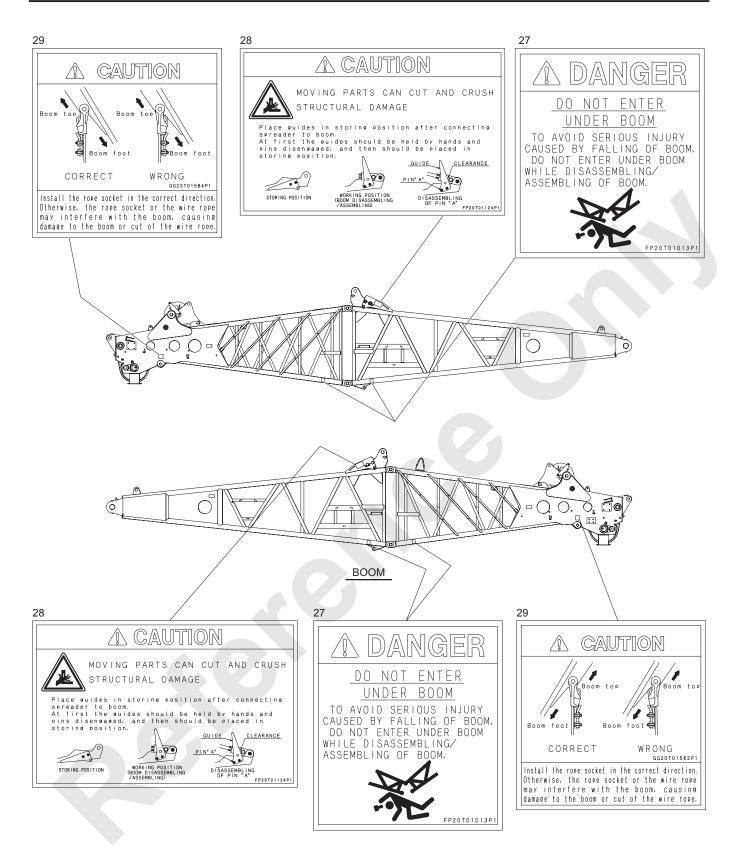


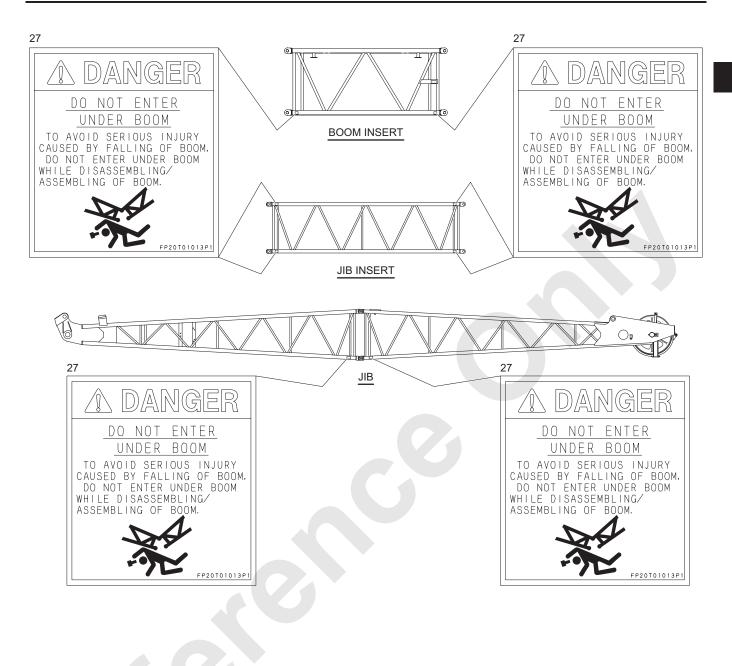


#### [SAFETY]



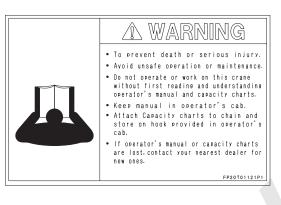






### [SAFETY]

 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 occur.

When paying out the wire rope from the drum, ensure to set the free fall select switch to normal side.

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. SET FREE FALL INCREASED SELECTOR SWITCH TO "LOCK" POSITION WHEN REEVING WIRE ROPE. DRUM AUTOMATICALLY ROTATES WITHOUT LOAD WHEN BRAKE IS RELEASED WITH FREE FALL INCREASED SELECTOR SWITCH SET TO "RELEASE" POSITION.

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4. If machine swings or is assembled / disassembled with crawler retracted, main machinery may turn over to rear side.

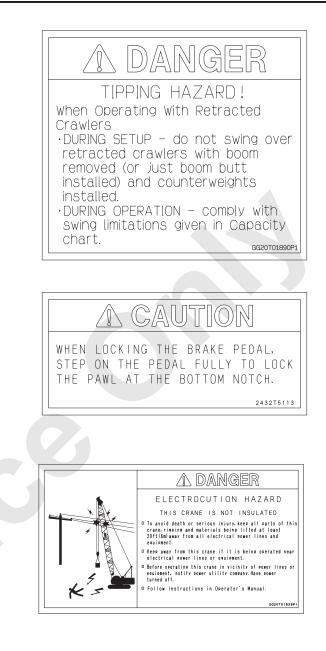
Read the operator's manual carefully and set the crane to the proper configuration.

- 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 to 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.

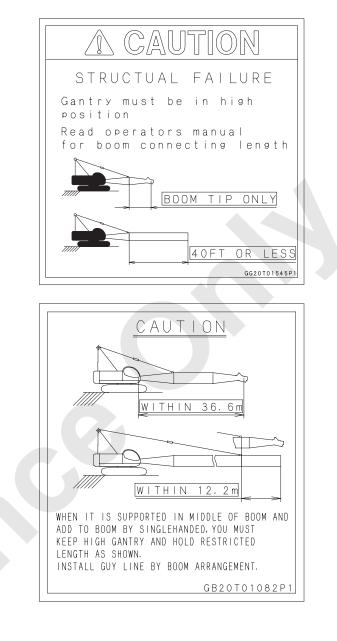
Ensure to engage the safety hook on the specified place.



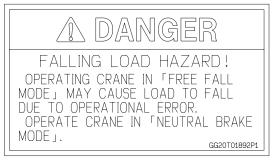


 When the boom is assembled, disassembled, boom self erection / self lowering or crane work with the low gantry, the gantry or boom may be damaged and may fall off.

Raise the gantry to the proper position for work.



 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.

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.



CAUTION

THIS MACHINE CONTAINS ALLOY AND

HEAT TREATED STEELS. DO NOT WELD OR APPLY HEAT WITHOUT CHECKING

WITH YOUR AUTHORIZED DEALER.

UNAUTHORIZED MODIFICATIONS



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.)



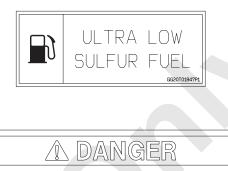
### [ SAFETY ]

- 14. The accumulator is charged with high pressure nitrogen gas.Charge the nitrogen gas within the specified pressure.
- Using the 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. After raising the gantry, ensure to insert the gantry fixing pin.Otherwise the gantry may come off and the boom may drop off.
- Handling the counterweight in wrong way is very dangerous. Never allow any person to enter under the lifting counterweight.
- 18. 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.





When lock pin is not installed, do not stand under gantry.

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<u>A DANGER</u>

Do not stand on or under the counterweight during counterweight is moved by installing or removing. Failure to observe this precaution may result in serious injury or the loss of life.



16

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



20. 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.

21. During engine running or right 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.



Allow to cool before touching.

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 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.

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

24. 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.



25. There are some moving parts nearby.



CAUTION

Critical part inside. Do not crush.

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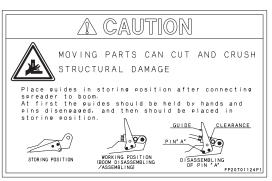
 This is a connector cover of electrical wiring of safety device.
 Do not step on and crush.

27. 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.

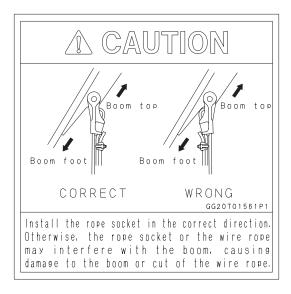
- DO NOT ENTER UNDER BOOM TO AVOID SERIOUS INJURY CAUSED BY FALLING OF BOOM, DO NOT ENTER UNDER BOOM WHILE DISASSEMBLING/ ASSEMBLING OF BOOM.
- 28. Taking wrong method in using the spreader guide installed on the boom base may damage the spreader guide.

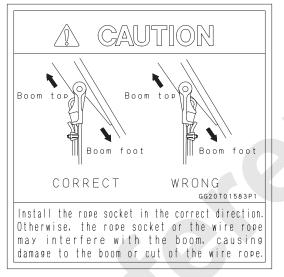
Set the spreader guide to the stowed position except when the upper spreader is connected is connected to the boom base.



29. 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.

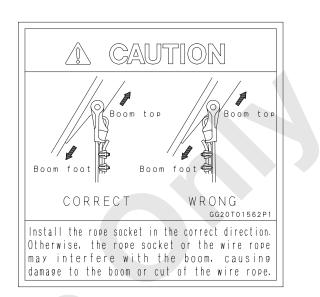
Install the rope socket in the proper direction.

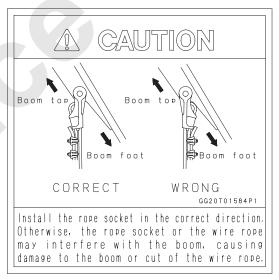




30. Free fall work of load may cause dropping the load by mishandling.

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.)







When fill the water and/or diesel fuel etc. to this tank is danger and may lead to the faults.
 Fill the specified DEF/AdBlue<sup>®</sup> only.

32. One of the drum may stop rotation when the front and rear drums are used at the same time.Do not use the front and the rear drums together at the same time.





#### 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.
- 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 elevated place, always wear a safety harness.
- 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 recommended oils only.
- 14. Always keep the oil containers clean. Protect them against ingress of dust or moisture. Also, fill clean, fresh oils only.
- 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 machine 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.
- 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 (20 kg 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.

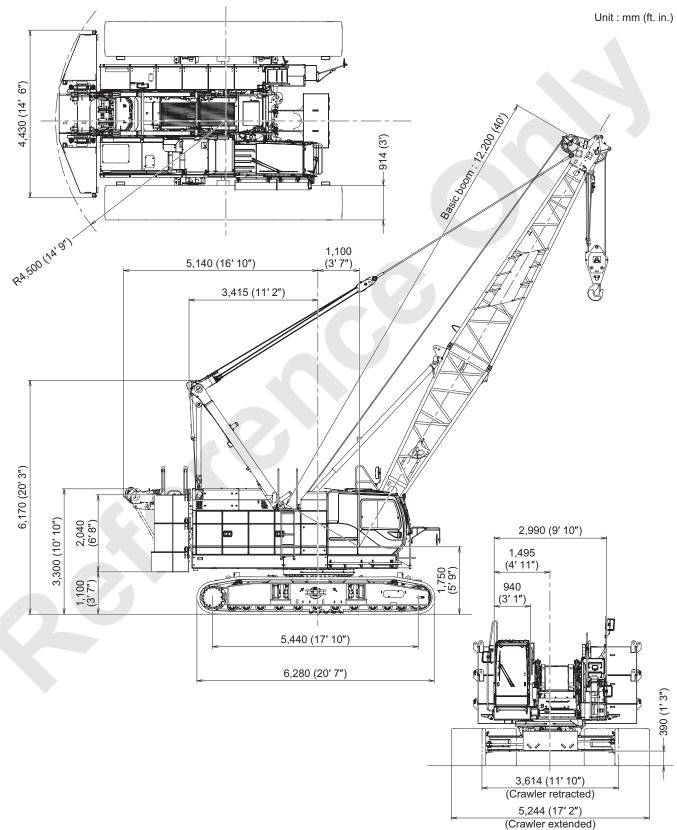
### 1. REFERENCE MATERIALS

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1.1.2	CRANE SPECIFICATION, PERFORMANCE1-2
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1.2.3	ATTACHMENT
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# 1. **REFERENCE MATERIALS**

# 1.1 8000-1 SPECIFICATION

## 1.1.1 CRANE OUTSIDE DIMENSION



#### 1.1.2 **CRANE SPECIFICATION, PERFORMANCE**

### 8000-1

Туре	Full swing, crawler type	Full swing, crawler type			
Max. rated load × work radius 77.1 t × 3.35 m (170,000 lbs × 11')					
Boom length					
Basic boom	12.2 m (40')				
Maximum boom	61.0 m (200')				
• Crane jib	9.1 m (30') to 18.3 m (60')				
Maximum boom and jib	54.9 m (180') Boom + 18.3 m (60') Jib				
Work speed		Wire rope dia.			
Front / Rear hoisting rope speed	120 to 3 m/min (390 to 10 ft/min)	22			
Front / Rear lowering rope speed	120 to 3 m/min (390 to 10 ft/min)	22 mm			
Boom raising rope speed	70 to 2 m/min (230 to 6.6 ft/min)	16 mm			
Boom lowering rope speed	70 to 2 m/min (230 to 6.6 ft/min)	16 mm			
Third hoisting rope speed (option)	120 to 3 m/min (390 to 10 ft/min)	22 mm			
Third lowering rope speed (option)	120 to 3 m/min (390 to 10 ft/min)	22 11111			
Swing speed	4.0 min <sup>-1</sup> (4.0 rpm)				
Travel speed	1.7/1.1 km/h (1.1/0.72 MPH)				
Gradability 40%					
Working weight *1	75.16 t (165,700 lbs)	75.16 t (165,700 lbs)			
Average ground pressure *1	74.2 kPa (10.8 psi)	74.2 kPa (10.8 psi)			
Engine					
Engine name	Hino J08E-VV				
Engine out put	213 kW/2,100 min <sup>-1</sup> (286 HP/2,100 rpn	n)			

Note

The wire rope speeds described above are the value of the drum first layer.

Each wire rope speed varies depend on the load.

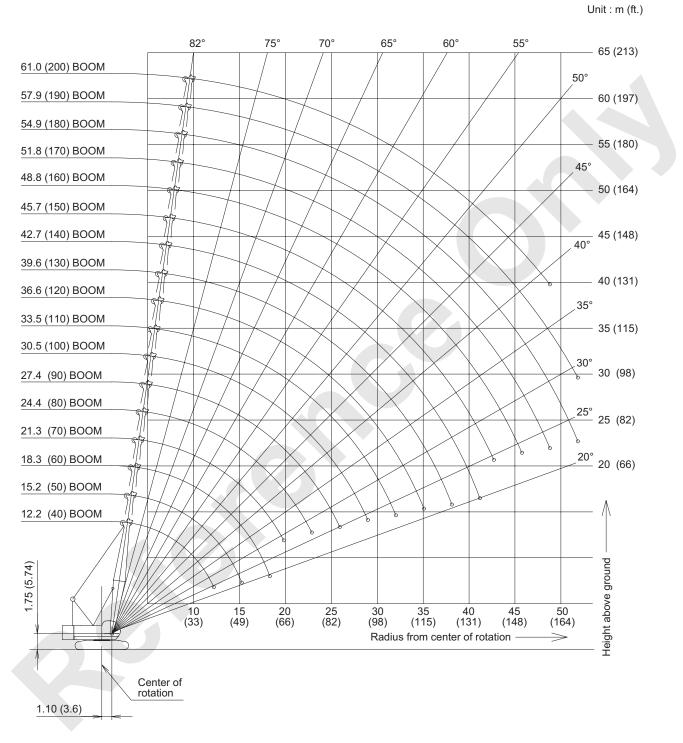
OUTSIDE DIMENSIONS

Unit : mm (ft. in.)

Overall width of cab	2,990 (9' 10")
Radius of rear end (counterweight)	4,500 (14' 9")
Center of rotation to rear end (low gantry position)	5,140 (16′ 10″)
Center of rotation to boom foot pin (from center of rotation)	1,100 (3' 7")
Height from ground to boom foot pin	1,750 (5′ 9″)
Height to top of gantry (working position)	6,170 (20' 3")
Height to top of gantry (low gantry position)	3,300 (10′ 10″)
Counterweight ground clearance	1,100 (3' 7")
Overall length of crawlers	6,280 (20' 7")
Distance between centers of tumblers	5,440 (17' 10")
Overall width of crawlers (extend/retract)	5,244 / 3,614 (17' 2" / 11' 10")
Width of crawler shoe	914 (3')
Ground clearance of carbody	390 (1' 3")

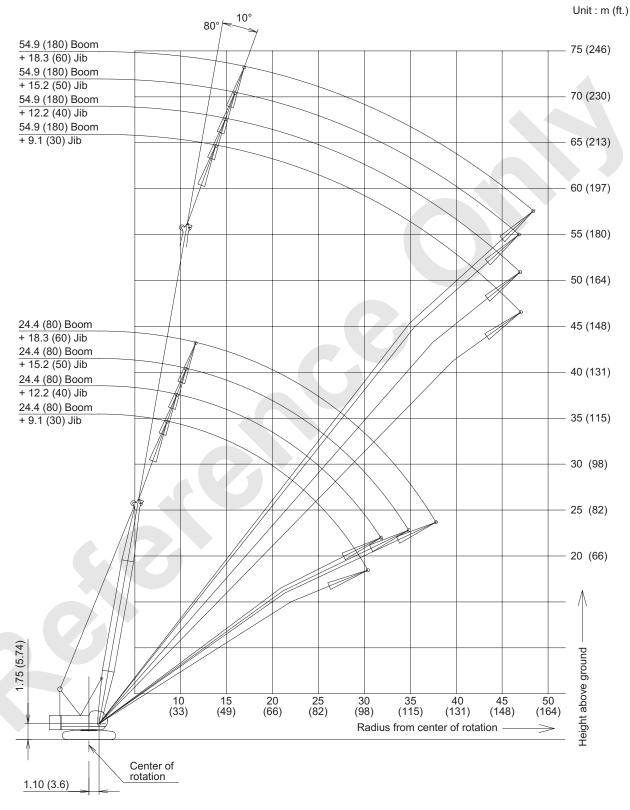
## 1.1.3 CRANE WORKING RANGES

#### 1. Crane working ranges

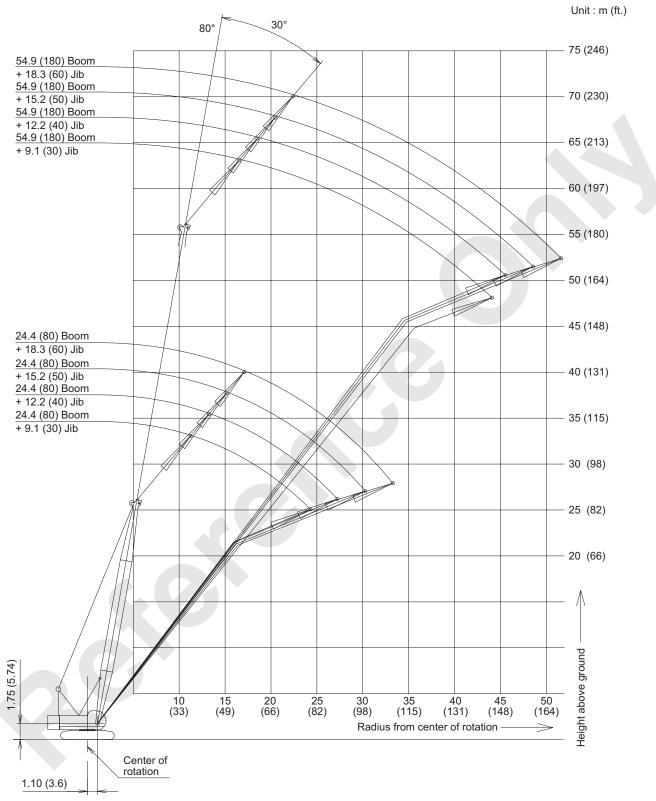


#### 2. Jib working range

#### (1) Offset angle 10 degrees



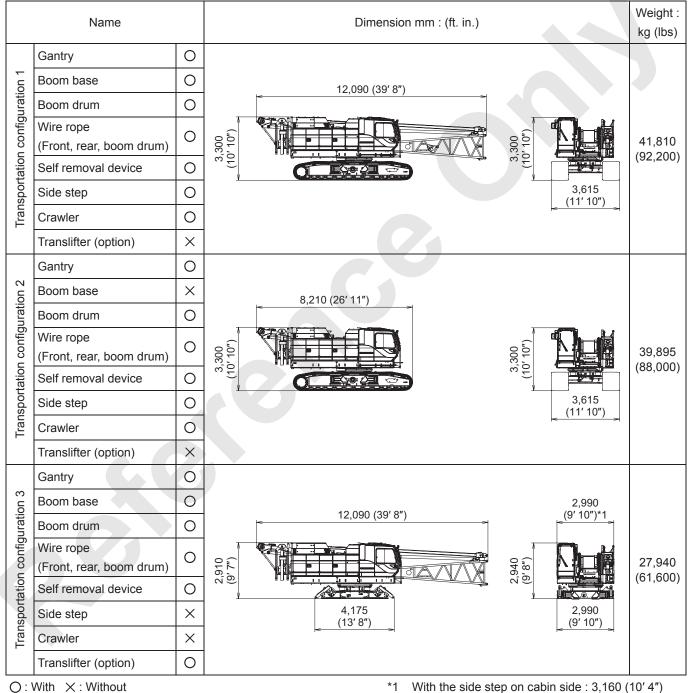
#### (2) Offset angle 30 degrees



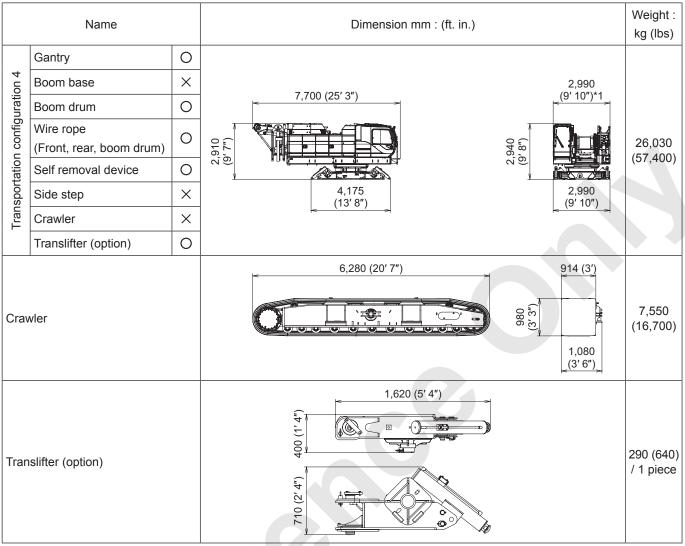
# 1.2 8000-1 DIMENSION, WEIGHT OF EACH COMPONENT

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

## 1.2.1 BASE MACHINE



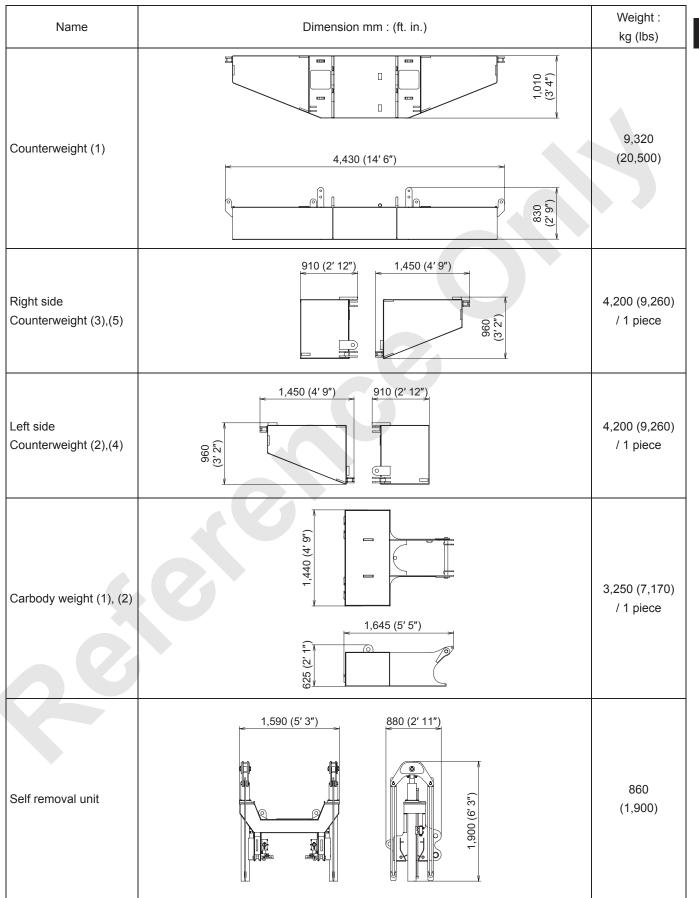
<sup>\*1</sup> With the side step on cabin side : 3,160 (10' 4") With the side steps on the both side : 3,340 (11')



O : With  $\times$  : Without

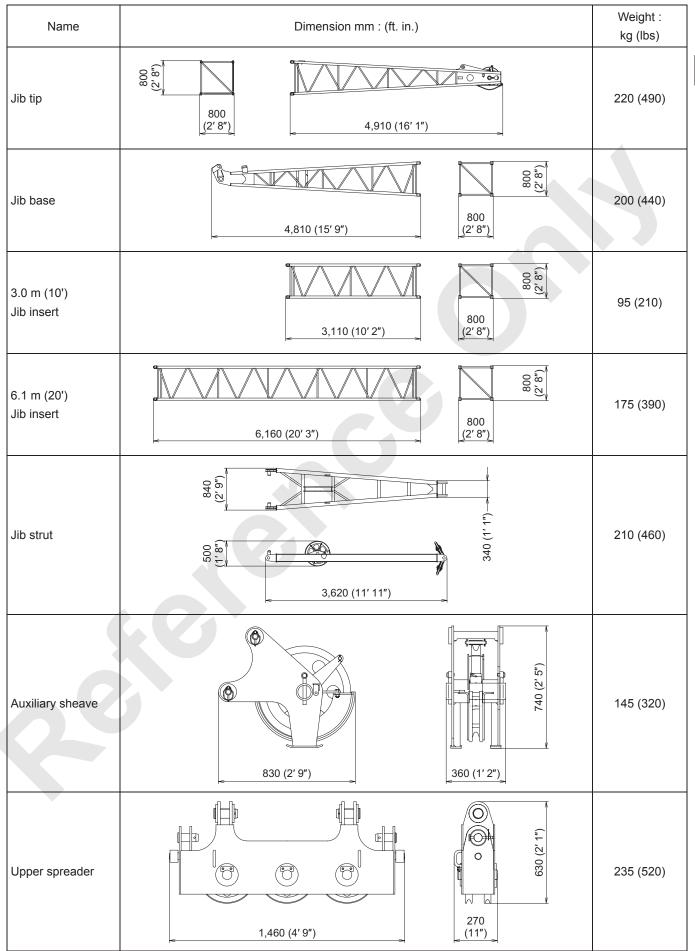
\*1 With the side step on cabin side : 3,160 (10' 4") With the side steps on the both side : 3,340 (11')

## 1.2.2 COUNTERWEIGHT WITH SELF REMOVAL DEVICE



## 1.2.3 ATTACHMENT

Name	Dimension mm : (ft. in.)	Weight : kg (lbs)
Boom tip	S E C 1, 380 (4' 6") (4' 6") (4' 6") (4' 6") (4' 6")	1,025 (2,300)
Boom base	1,510 (4' 11") 1,510 (4' 11") 1,510 (4' 11") 1,360 (4' 6") 1,360 (4' 6")	1,120 (2,500)
3.0 m (10') Boom insert	3,165 (10' 5") 3,165 (10' 5")	275 (610)
6.1 m (20') Boom insert	6,210 (20' 4")	475 (1,100)
12.2 m (40') Boom insert	12,310 (40' 5")	870 (1,900)
12.2 m (40') Boom insert with lug	0 (1, 7, 1) 12,310 (40' 5") 12,310 (40' 5") 12,310 (40' 5")	885 (2,000)
Backstop	5,130 (16' 10")	270 (600)



# 1.3 8000-1 CLAMSHELL RATED LOADS (OPTION)

### CLAMSHELL SPECIFICATION

 Rated loads included in the charts are the maximum allowable freely suspended loads at a given boom length, boom angle and load radius, and have been determined for the machine standing level on firm supporting surface under ideal operating conditions.

The user must limit or de-rate rated loads to allow for adverse conditions (such as soft or uneven ground, out-of-level conditions, wind, side loads, pendulum action, jerking or sudden stopping of loads, inexperience of personnel, multiple machine lifts, and traveling with a load).

- Rated loads do not exceed 66% of minimum tipping loads.
   Rated loads based on factors other than machine stability such as structural competence are shown by asterisk \* in the charts.
- The machine must be reeved and set-up as stated in the operation manual and all the instruction manuals.
   If these manuals are missing, obtain replacements.
- · Boom backstops are required for all boom lengths.
- Gantry must be fully raised position for all operations.
- Crawlers must be fully extended and be locked in position.
- The crane must be leveled to within 1% on a firm supporting surface.
- 39,000 lbs Counterweight and without carbody weight.
- 4. Do not attempt to lift where no radius is shown on the load chart as crane may tip or collapse.
- Attempting to lift more than rated loads may cause machine to tip or collapse.
   Do not tip machine to determine rated loads.
- Weight of bucket, slings and other lifting devices are a part of the total load. Their total weight must be subtracted from the rated load to obtain the weight that can be lifted.

1

- 7. The boom should be erected over the front of the crawlers, not laterally.
- 8. Least stable position is over the side.

#### MAXIMUM LOAD FOR MAIN BOOM

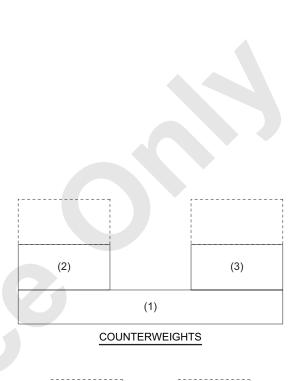
No. of Part of Line	1
Maximum Loads (lbs)	16,000

9. Rated loads listed later is to be applied only to the machine as manufactured and designed by manufacture.

Do not apply any modification to this machine and do not use of this machine other than the specified.

- 10. ASSEMBLING THE COUNTERWEIGHT
- 39,000 lbs Counterweight
- Without carbody counterweight.

Operation of this equipment in excess of rated loads or disregard of instruction voids the warranty.





#### CLAMSHELL CAPACITIES IN POUNDS THREE COUNTERWEIGHTS (39,000 lbs) WITHOUT CARBODY WEIGHTS (0 lbs) CRAWLERS : EXTENDED POSITION

40' Boom							
Load	Boom	360°					
Radius	Angle	Rated Load					
(ft.)	(deg.)	(lbs)					
22.0	63.6	16,000 *					
24.0	60.3	16,000 *					
26.0	56.9	16,000 *					
28.0	53.4	16,000 *					
30.0	49.7	16,000 *					
32.0	45.7	16,000 *					
34.0	41.5	16,000 *					
36.0	36.9	16,000 *					
38.0	31.6	16,000 *					
40.0	25.5	16,000 *					

	50' Boo	om
Load	Boom	360°
Radius	Angle	Rated Load
(ft.)	(deg.)	(lbs)
26.0	64.2	16,000 *
28.0	61.6	16,000 *
30.0	58.9	16,000 *
32.0	56.2	16,000 *
34.0	53.3	16,000 *
36.0	50.4	16,000 *
38.0	47.3	16,000 *
40.0	44.1	16,000 *
42.0	40.6	16,000 *
44.0	36.9	16,000 *
46.0	32.8	16,000 *
48.0	28.2	15,400 *

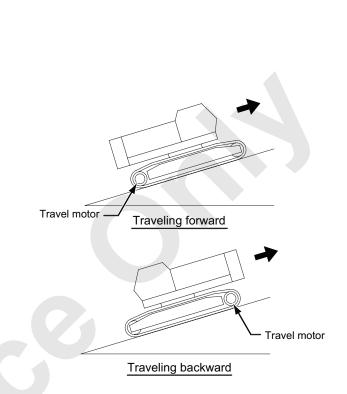
	om	
Load	Boom	360°
Radius	Angle	Rated Load
(ft.)	(deg.)	(lbs)
30.0	64.5	16,000 *
32.0	62.4	16,000 *
34.0	60.2	16,000 *
36.0	58.0	16,000 *
38.0	55.7	16,000 *
40.0	53.3	16,000 *
42.0	50.9	16,000 *
44.0	48.3	16,000 *
46.0	45.7	16,000 *
48.0	42.9	15,200 *
50.0	40.0	14,500 *
52.0	36.9	13,600
54.0	33.5	13,000
56.0	29.8	12,300
58.0	25.6	11,900

70' Boom						
Load	Boom	360°				
Radius	Angle	Rated Load				
(ft.)	(deg.)	(lbs)				
34.0	64.8	16,000 *				
36.0	63.0	16,000 *				
38.0	61.1	16,000 *				
40.0	59.2	16,000 *				
42.0	57.3	16,000 *				
44.0	55.3	15,800 *				
46.0	53.3	15,600 *				
48.0	51.2	15,200 *				
50.0	49.0	14,300 *				
52.0	46.8	13,600 *				
54.0	44.5	13,000 *				
56.0	42.1	12,300 *				
58.0	39.6	11,600 *				
60.0	36.9	11,200 *				
62.0	34.0	10,800 *				
64.0	30.9	10,100 *				
66.0	27.5	9,700 *				

# 1.4 8000-1 SWING AND TRAVEL STABILITY

The stability while swinging and traveling of the machine is to be varied depending on the mass of counterweight, condition of the attachment, extension or retraction of the crawler and traveling on the slope. The operation must be started after confirm the machine stability while swinging and traveling by referring with following table.

- The table above shows the values for operation on firm ground.
   On a weak ground, operate with care after improving the ground.
- 2. Swinging on a trailer is prohibited.
- Maximum slope angle is 21.8 degrees (40%). This may become lower depending on condition (ground, crane configuration).
- Traveling "forward" means that the counterweight is at the lower side of the slope, and "backward" is the counterweight is at the higher side of the slope.



### TABLE FOR STABILITY (WITHOUT CARBODY WEIGHT)

Crawler extendCrawler retractForwardBackwardWithout : 0 tOOONo.1 : 9.32 t (20,550 lbs)OX(Slope 14 degrees or less)ONo.1 : 9.32 t (20,550 lbs)OX(Slope 14 degrees or less)ONo.1 to No.2 : 17.72 t (39,070 lbs)OXXONo.1 to No.3 : 26.12 t (57,590 lbs)XXXXWithout : 0 tOOOOONo.1 to No.2 : 17.72 t (39,070 lbs)OOOONo.1 to No.2 : 17.72 t (39,070 lbs)OX(Slope 5 degrees or less)ONo.1 to No.2 : 17.72 t (39,070 lbs)OX(Slope 5 degrees or less)ONo.1 to No.3 : 26.12 t (57,590 lbs)OOOOWith basic boom (Boom angle : 30 degrees or less)No.1 to No.2 : n.0.1 to No.2 : 21.72 t (39,070 lbs)OOOWith basic boom (Boom angle : 30 degrees or less)No.1 to No.3 : 26.12 t (57,590 lbs)OOONo.1 to No.2 : 17.72 t (39,070 lbs)OOOONo.1 to No.2 : 17.72 t (39,070 lbs)OOOONo.1 to No.3 : 20 degrees or lessNo.1 to No.3 : 26.12 t (57,590 lbs)OX(Slope 11 degrees or less)ONo.1 to No.3 : 26.12 t (57,590 lbs)OXXO	Attachment	Counterweight	All-roun	d swing	Travel o	Travel on slope		
Without attachment (Base machine only)No.1 : 9.32 t (20,550 lbs)OX $\Delta$ (Slope 14 degrees or less)ONo.1 to No.2 : 17.72 t (39,070 lbs)OXXONo.1 to No.3 : 26.12 t (57,590 lbs)XXXXWith boom base (Boom angle : 10 degrees or less)No.1 : 9.32 t (20,550 lbs)OOOONo.1 to No.3 : 26.12 t (57,590 lbs)OOOOONo.1 : 9.32 t (20,550 lbs)OOOONo.1 to No.3 : 26.12 t (57,590 lbs)OX $\Delta$ (No abrupt lever control)OONo.1 to No.3 : 26.12 t (57,590 lbs)OOOONo.1 to No.3 : 26.12 t (57,590 lbs)OOOONo.1 to No.3 : 26.12 t (57,590 lbs)OOOONo.1 to No.2 : 17.72 t (39,070 lbs)OOOONo.1 to No.3 : 26.12 t (57,590 lbs)OOOONo.1 to No.3 : 26.12 t (57,590 lbs)OOOONo.1 to No.2 : 17.72 t (39,070 lbs)OX $\Delta$ (Slope 11 degrees or less)ONo.1 to No.3 : 26.12 t (57,590 lbs)OX $\Delta$ (Slope 11 degrees or less)ONo.1 to No.3 : 26.12 t (57,590 lbs)OX $\Delta$ (Slope 11 degrees or less)O	Allachment	Counterweight	Crawler extend	Crawler retract	Forward	Backward		
Without attachment (Base machine only)No.1. 9.32 t (20,550 lbs)OX(Slope 14 degrees or less)ONo.1 to No.2: 17.72 t (39,070 lbs)OXXONo.1 to No.3: 26.12 t (57,590 lbs)XXXXWithout : 0 to 1OOOONo.1 : 9.32 t (20,550 lbs)OOOONo.1 : 9.32 t (20,550 lbs)OOOONo.1 : 9.32 t (20,550 lbs)OOOONo.1 : 9.32 t (20,550 lbs)OOOONo.1 to No.2: 17.72 t (39,070 lbs)OX $X$ XNo.1 to No.3: 26.12 t (57,590 lbs)OOOONo.1 to No.3: 26.12 t (57,590 lbs)OOOONo.1 to No.3: 26.12 t (57,590 lbs)OOOONo.1 to No.3: 20 degrees or less)No.1 to No.2: 17.72 t (39,070 lbs)OOONo.1 to No.2: 17.72 t (39,070 lbs)OX $X$ $\Delta$ (Slope 11 degrees or less)Without : 0 tOOOONo.1 to No.2: 17.72 t (39,070 lbs)OX $X$ $\Delta$ (Slope 11 degrees or less)No.1 to No.3: 26.12 t (57,590 lbs)OXXO		Without : 0 t	0	Ο	0	0		
No.1 to No.2. 17.72 t (39,070 lbs)OXXONo.1 to No.3: 26.12 t (57,590 lbs)XXXXWith boom base (Boom angle : 10 degrees or less)Without : 0 tOOONo.1 : 9.32 t (20,550 lbs)OOOONo.1 to No.2: 17.72 t (39,070 lbs)OOOONo.1 : 9.32 t (20,550 lbs)OOOONo.1 to No.2: 17.72 t (39,070 lbs)OX $\frac{\Delta}{(Slope 5 degrees or less)}$ ONo.1 to No.3: 26.12 t (57,590 lbs)OXX $\frac{\Delta}{(No abrupt lever control)}$ With basic boom (Boom angle : 30 degrees or less)Without : 0 tOOONo.1 to No.2: 17.72 t (39,070 lbs)OX $\frac{\Delta}{(Slope 5 degrees or less)}$ ONo.1 to No.3: 26.12 t (57,590 lbs)OX $\frac{\Delta}{(Slope 11 degrees or less)}$ ONo.1 to No.3: 26.12 t (57,590 lbs)OXXO	Without attachment		0	×	(Slope 14 degrees	0		
26.12 t (57,590 lbs)XXXXXXWithout : 0 tOOOONo.1 : 9.32 t (20,550 lbs)OOOONo.1 to No.2 : 17.72 t (39,070 lbs)OX $\Delta$ (Slope 5 degrees or less)ONo.1 to No.3 : 26.12 t (57,590 lbs) $\Delta$ (No abrupt lever control)XX $\Delta$ (No abrupt lever control)With basic boom (Boom angle : 30 degrees or less)Without : 0 tOOONo.1 to No.2 : 17.72 t (39,070 lbs)OOOONo.1 to No.3 : 26.12 t (57,590 lbs)OOOONo.1 to No.3 : 20 degrees or less)OOOONo.1 to No.3 : 26.12 t (57,590 lbs)OX $\Delta$ (Slope 11 degrees or less)ONo.1 to No.3 : 26.12 t (57,590 lbs)OXXO	(Base machine only)		0	×	×	0		
With boom base (Boom angle : 10 degrees or less)No.1 : $9.32 t (20,550 lbs)$ OOONo.1 to No.2 : 17.72 t (39,070 lbs)OX $\Delta$ (Slope 5 degrees or less)ONo.1 to No.3 : 26.12 t (57,590 lbs)OXXXWith basic boom (Boom angle : 30 degrees or less)Without : 0 tOOONo.1 to No.2 : 17.72 t (39,070 lbs)OOOONo.1 to No.3 : 26.12 t (57,590 lbs)OOOONo.1 to No.2 : 17.72 t (39,070 lbs)OOOONo.1 to No.2 : 17.72 t (39,070 lbs)OX $\Delta$ (Slope 11 degrees or less)ONo.1 to No.3 : 26.12 t (57,590 lbs)OXX $\Delta$ (Slope 11 degrees or less)			×	×	×	×		
With boom base (Boom angle : 10 degrees or less)9.32 t (20,550 lbs)OOOOONo.1 to No.2 : 17.72 t (39,070 lbs)No.1 to No.3 : 26.12 t (57,590 lbs)OX $\Delta$ (Slope 5 degrees or less)OWith basic boom (Boom angle : 30 degrees or less)Without : 0 tOOOONo.1 to No.2 : 17.72 t (39,070 lbs)OXXX $\Delta$ (No abrupt lever control)With basic boom (Boom angle : 30 degrees or less)No.1 to No.2 : 17.72 t (39,070 lbs)OOOONo.1 to No.2 : 17.72 t (39,070 lbs)OX $\Delta$ (Slope 11 degrees or less)ONo.1 to No.3 : 26.12 t (57,590 lbs)OXX $\Delta$ (Slope 11 degrees or less)No.1 to No.3 : 26.12 t (57,590 lbs)OXXO		Without : 0 t	0	0	0	0		
10 degrees or less)No.1 to No.2 : 17.72 t (39,070 lbs)OX $\Delta$ (Slope 5 degrees or less)ONo.1 to No.3 : 26.12 t (57,590 lbs) $\Delta$ (No abrupt lever control)XX $\Delta$ (No abrupt lever control)Without : 0 tOOOONo.1 : 9.32 t (20,550 lbs)OOOONo.1 to No.2 : 17.72 t (39,070 lbs)OX $\Delta$ (Slope 11 degrees or less)ONo.1 to No.2 : 17.72 t (39,070 lbs)OX $\Delta$ (Slope 11 degrees or less)ONo.1 to No.3 : 26.12 t (57,590 lbs)OXX $\Delta$ (Slope 11 degrees or less)	With boom base		0	0	0	0		
No. 1 to No.3 : 26.12 t (57,590 lbs)(No abrupt lever control)XX(No abrupt lever control)With basic boom (Boom angle : 30 degrees or less)Without : 0 tOOONo.1 : 9.32 t (20,550 lbs)OOOONo.1 to No.2 : 17.72 t (39,070 lbs)OX $\Delta$ (Slope 11 degrees or less)ONo.1 to No.3 : 26.12 t (57,590 lbs)OXXO			0	×	(Slope 5 degrees	0		
With basic boom (Boom angle : 30 degrees or less)         No.1 : 9.32 t (20,550 lbs)         O         O         O         O         O           No.1 to No.2 : 17.72 t (39,070 lbs)         O         X $\Delta$ (Slope 11 degrees or less)         O           No.1 to No.3 : 26.12 t (57,590 lbs)         O         X         X         O			(No abrupt	×	×			
With basic boom (Boom angle : 30 degrees or less)         9.32 t (20,550 lbs)         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O		Without : 0 t	0	0	0	0		
30 degrees or less)         No.1 to No.2 : 17.72 t (39,070 lbs)         O         ×         △ (Slope 11 degrees or less)         O           No.1 to No.3 : 26.12 t (57,590 lbs)         O         ×         ×         O			0	0	0	0		
26.12 t (57,590 lbs) O X X O	30 degrees or less)		0	×	(Slope 11 degrees	0		
			0	×	×	0		
$\bigcirc$ : Allowed $\triangle$ : With restriction $\times$ : Not allowed				() : Allow	ed $\Delta$ : With restriction	on $\times$ : Not allowed		

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#### 8000-1

#### TABLE FOR STABILITY (WITH CARBODY WEIGHT)

Attachment	Counterweight	All-roun	d swing	Travel on slope		
Allachment	Counterweight	Crawler extend	Crawler retract	Forward	Backward	
Without attachment	Without : 0 t	0	0	0	0	
	No.1 : 8.31 t (18,320 lbs)	0	∧ (No abrupt lever control)	0	0	
(Base machine only)	No.1 to No.2 : 19.81 t (43,674 lbs)	0	×	(Slope 4 degrees O or less)		
	No.1 to No.3 : 31.31 t (69,028 lbs)	∧ (No abrupt lever control)	×	×	△ (No abrupt lever control)	
With boom base (Boom angle : 10 degrees or less) With basic boom (Boom angle : 30 degrees or less)	Without : 0 t	0	0	0	0	
	No.1 : 8.31 t (18,320 lbs)	0	0	0	0	
	No.1 to No.2 : 19.81 t (43,674 lbs)	0	×	△ (Slope 11 degrees or less)	0	
	No.1 to No.3 : 31.31 t (69,028 lbs)	0	×	×	0	
	Without : 0 t	0	0	0	0	
	No.1 : 8.31 t (18,320 lbs)	0	0	0	0	
	No.1 to No.2 : 19.81 t (43,674 lbs)	0	∧ (No abrupt lever control)	△ (Slope 16 degrees or less)	0	
	No.1 to No.3 : 31.31 t (69,028 lbs)	0	×	△ (Slope 4 degrees or less)	0	

 $\bigcirc$  : Allowed  $\land$  : With restriction  $\land$  : Not allowed

# 1.5 8000-1 TRAVEL ALLOWABLE SLOPE ANGLE

## 1.5.1 CRANE ATTACHMENT INSTALLED : BOOM INSERT CONFIGURATION

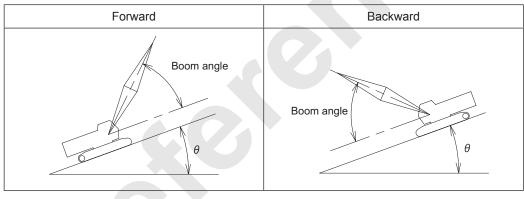
### 

Do not travel with the symbol of "—" in the table. The machine may possible turnover. Failure to observe this precaution may result in a serious accident.

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

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

#### TRAVEL UPWARD DOWNWARD ON SLOPE (θ : ALLOWABLE ANGLE)



1. Crane travel allowable slope angle

### (1) Without Aux. sheave

#### 8000-1

					(Unit :	Degree)
	Forward			Backward		
Boom length m (ft.)	В	Boom ang	le	В	loom ang	le
	35	40	50	40	50	60
12.2 (40)	5	5	4	8	8	8
15.2 (50)	6	6	4	8	8	8
18.3 (60)	8	8	6	8	8	8
21.3 (70)	8	8	6	8	8	8
24.4 (80)	8	8	7	8	8	8
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	8	8	8
45.7 (150)	8	8	8	8	8	8
48.8 (160)	8	8	8	8	8	8
51.8 (170)	8	8	8	8	8	8
54.9 (180)	8	8	8	7	8	8

#### (2) With Aux. sheave

#### 8000-1

					(Unit :	Degree)
	Forward			Backward		
Boom length m (ft.)	E	Boom ang	le	В	loom ang	le
	35	40	50	40	50	60
12.2 (40)	5	5	4	8	8	8
15.2 (50)	6	6	4	8	8	8
18.3 (60)	8	8	6	8	8	8
21.3 (70)	8	8	6	8	8	8
24.4 (80)	8	8	7	8	8	8
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	8	8	8
45.7 (150)	8	8	8	8	8	8
48.8 (160)	8	8	8	8	8	8
51.8 (170)	8	8	8	8	8	8

Published 11-10-17, Control #261-01

#### 2. Fixed jib travel allow slope angle

### 8000-1

					(Unit :	Degree)	
Jib length m (ft.)		9.1 (30)					
Offset angle			1	0			
Configuration		Forward			Backward	ł	
Deem length m (ft)	E	Boom ang	le	В	oom ang	le	
Boom length m (ft.)	35	40	50	40	50	60	
24.4 (80)	8	8	8	8	8	8	
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	8	8	8	
45.7 (150)	8	8	8	8	8	8	
48.8 (160)	8	8	8	8	8	8	
51.8 (170)	8	8	8	7	8	8	
54.9 (180)	8	8	8	4	7	8	

					(0.00	Degree)
Jib length m (ft.)	9.1 (30)					
Offset angle			3	0		
Configuration		Forward			Backward	k
	E	Boom ang	le	В	oom ang	le
Boom length m (ft.)	35	40	50	40	50	60
24.4 (80)	8	8	8	8	8	8
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	8	8	8
45.7 (150)	8	8	8	8	8	8
48.8 (160)	8	8	8	8	8	8
51.8 (170)	8	8	8	7	8	8
54.9 (180)	8	8	8	4	7	8

					(Unit :	Degree)	
Jib length m (ft.)		12.2 (40)					
Offset angle			1	0			
Configuration		Forward			Backward	1	
Deem length m (ft)	E	Boom ang	le	В	loom ang	le	
Boom length m (ft.)	35	40	50	40	50	60	
24.4 (80)	8	8	8	8	8	8	
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	8	8	8	
45.7 (150)	8	8	8	8	8	8	
48.8 (160)	8	8	8	8	8	8	
51.8 (170)	8	8	8	5	8	8	
54.9 (180)	8	8	8	1	5	8	

(Unit : Degree)

Jib length m (ft.)		12.2 (40)					
Offset angle			3	60			
Configuration		Forward			Backward	ł	
	E	Boom ang	le	В	oom ang	le	
Boom length m (ft.)	35	40	50	40	50	60	
24.4 (80)	8	8	8	8	8	8	
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	8	8	8	
45.7 (150)	8	8	8	8	8	8	
48.8 (160)	8	8	8	8	8	8	
51.8 (170)	8	8	8	5	8	8	
54.9 (180)	8	8	8	1	5	8	

					(Unit	Degree)
Jib length m (ft.)			15.2	(50)		
Offset angle			1	0		
Configuration		Forward			Backward	k
	E	Boom ang	le	E	loom ang	le
Boom length m (ft.)	80	40	50	40	50	60
24.4 (80)	4	8	8	8	8	8
27.4 (90)	3	8	8	8	8	8
30.5 (100)	3	8	8	8	8	8
33.5 (110)	2	8	8	8	8	8
36.6 (120)	2	8	8	8	8	8
39.6 (130)	2	8	8	8	8	8
42.7 (140)	2	8	8	8	8	8
45.7 (150)	1	8	8	8	8	8
48.8 (160)	1	8	8	6	8	8
51.8 (170)	1	8	8	2	6	8
54.9 (180)	-	8	8	-	3	8

Jib length m (ft.)		15.2 (50)					
Offset angle			3	0			
Configuration		Forward			Backward	ł	
	E	Boom ang	le	ш	loom ang	le	
Boom length m (ft.)	80	40	50	40	50	60	
24.4 (80)	4	8	8	8	8	8	
27.4 (90)	4	8	8	8	8	8	
30.5 (100)	4	8	8	8	8	8	
33.5 (110)	3	8	8	8	8	8	
36.6 (120)	3	8	8	8	8	8	
39.6 (130)	2	8	8	8	8	8	
42.7 (140)	2	8	8	8	8	8	
45.7 (150)	2	8	8	8	8	8	
48.8 (160)	2	8	8	6	8	8	
51.8 (170)	1	8	8	2	6	8	
54.9 (180)	1	8	8	-	3	8	

					(Unit :	Degree)
Jib length m (ft.)			18.3	(60)		
Offset angle			1	0		
Configuration		Forward			Backward	ł
	Е	Boom ang	le	В	Boom ang	le
Boom length m (ft.)	80	40	50	40	50	60
24.4 (80)	4	8	8	8	8	8
27.4 (90)	3	8	8	8	8	8
30.5 (100)	3	8	8	8	8	8
33.5 (110)	2	8	8	8	8	8
36.6 (120)	2	8	8	8	8	8
39.6 (130)	2	8	8	8	8	8
42.7 (140)	1	8	8	8	8	8
45.7 (150)	1	8	8	8	8	8
48.8 (160)	1	8	8	4	7	8
51.8 (170)	1	8	8	-	4	8
54.9 (180)	-	8	8	-	2	6

Jib length m (ft.)	18.3 (60)					
Offset angle			3	0		
Configuration		Forward			Backward	ł
	E	Boom ang	le	В	loom ang	le
Boom length m (ft.)	80	40	50	40	50	60
24.4 (80)	4	8	8	8	8	8
27.4 (90)	4	8	8	8	8	8
30.5 (100)	4	8	8	8	8	8
33.5 (110)	3	8	8	8	8	8
36.6 (120)	3	8	8	8	8	8
39.6 (130)	3	8	8	8	8	8
42.7 (140)	2	8	8	8	8	8
45.7 (150)	2	8	8	8	8	8
48.8 (160)	2	8	8	4	7	8
51.8 (170)	1	8	8	-	4	8
54.9 (180)	1	8	8	-	1	6

# 1.11 ENGINE MAIN SPECIFICATION

Engine	8000-1: Hino Model J08E-VV diesel engine (complying with the Tier4 & Stage IV Emission Regulations)
Configuration of engine	4 cycle, water cooled, vertical in-line 6, direct injection, turbo-charged, intercooled
Total poston displacement	7.684 L
Rated output	213 kW / 2,100 min <sup>-1</sup>
Max. torque	1,017 N·m / 1,600 min <sup>-1</sup>
Specific fuel consumption	212 g / kWh / 2,100 min <sup>-1</sup>
Dry engine weight	Approx. 719 kg

### FUEL CONSUMPTION (REF)

Hourly fuel consumption at engine rated output and at crane works.

Fuel consumption (L/hr)	At rated output	At crane work *1	At foundation work *2	
8000-1 : J08E-VV	54.1	16.2	22.4	
	54.1	16.2	32.4	

\*1 Is calculated with the assumption that the average load ratio is 30% for crane work and the fuel consumption is proportional to the load.

\*2 Is calculated with the assumption that the average load ratio is 60% for foundation work and the fuel consumption is proportional to the load.

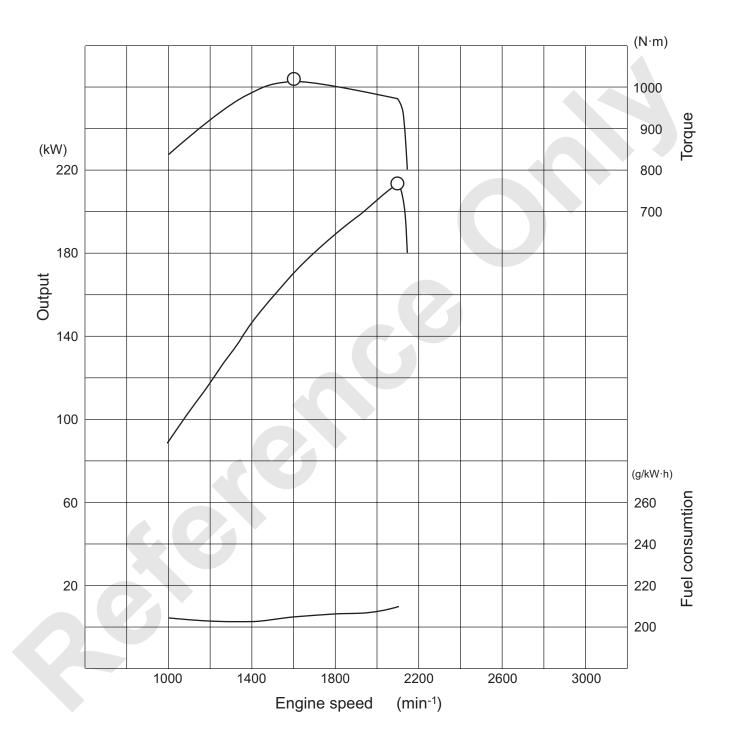
Since the fuel consumption may vary depending on the work content, operators technique and waiting time at actual work, the above figure is for reference only.

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

#### ENGINE PERFORMANCE CURVE

This indicates performance curve of single unit of engine.

This does not considered that the engine performance drops due to crane work.



1

# 2. MAINTENANCE STANDARDS TEST PROCEDURES

2.1	MAINTENANCE STANDARD	 .2-1
2.1.1	PIN, BUSHING, SPRING, LINING AND SHEAVE	 .2-1
2.1.2	TRAVEL DEVICE	 .2-8
2.2	PERFORMANCE STANDARD AND TEST PROCEDURE	 .2-15
2.2.1	OPERATING SPEED	 .2-17
2.2.2	HYDRAULIC PRESSURE	 .2-18
2.2.3	SWING BEARING	. 2-22

#### **MAINTENANCE STANDARDS TEST PROCEDURES** 2.

#### 2.1 **MAINTENANCE STANDARD**

#### PIN, BUSHING, SPRING, LINING AND SHEAVE 2.1.1

1. Pin

Std. dimension



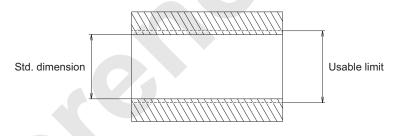
Usable limit

Unit : mm (in.)

2

					, ,
Location	Part number	Std. dimension	Usable limit	Remedy	See figure
(1) Pawl (Front, rear drum)		44.0 (1.732)	43.84 (1.726)	Deplace	P.2-3
(2) Pawl (Boom drum)		45.0 (1.772)	44.82 (1.765)	Replace	P.2-4
(3) Brake pedal		38.1 (1.5)	37.92 (1.493)		
(4) Brake pedal		13.0 (0.512)	12.85 (0.506)	Boplago	P.2-5
(5) Brake pedal		13.0 (0.512)	12.85 (0.506)	Replace	F.2-0
(6) Brake pedal		10.0 (0.394)	9.96 (0.392)		
(7) Boom foot		99.75 (3.927)	99.10 (3.902)	Replace	P.2-6

#### 2. Bushing

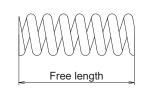


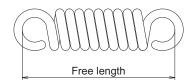
Unit : mm (in.)

			r		. ,
Location	Part number	Std. dimension	Usable limit	Remedy	See figure
(8) Pawl (Front, rear drum)		44.0 (1.732)	44.26 (1.743)	Replace	P.2-3
(9) Pawl (Boom drum)		45.0 (1.772)	45.27 (1.782)	Replace	P.2-4
(10)Boom foot		100.0 (3.937)	100.67 (3.963)	Replace	P.2-6

#### [ 2. MAINTENANCE STANDARDS TEST PROCEDURES ]

3. Spring

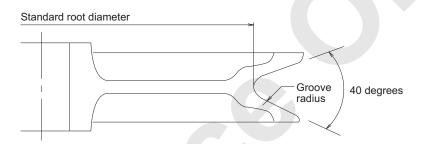




l Init	mm	(in )
Unit	111111	(111.)

				•.	
Location	Part number	Std. free length	Usable limit	Remedy	See figure
(11) Pawl (Front, rear drum)		Compression : 72 (2.835)	68.4 (2.693)	Replace	P.2-3
(12)Pawl (Boom drum)		Compression : 72 (2.835)	68.4 (2.693)	Replace	P.2-4
(13)Brake pedal		Tension : 61.5 (2.421)	63.9 (2.516)	Replace	P.2-5

#### 4. Sheave

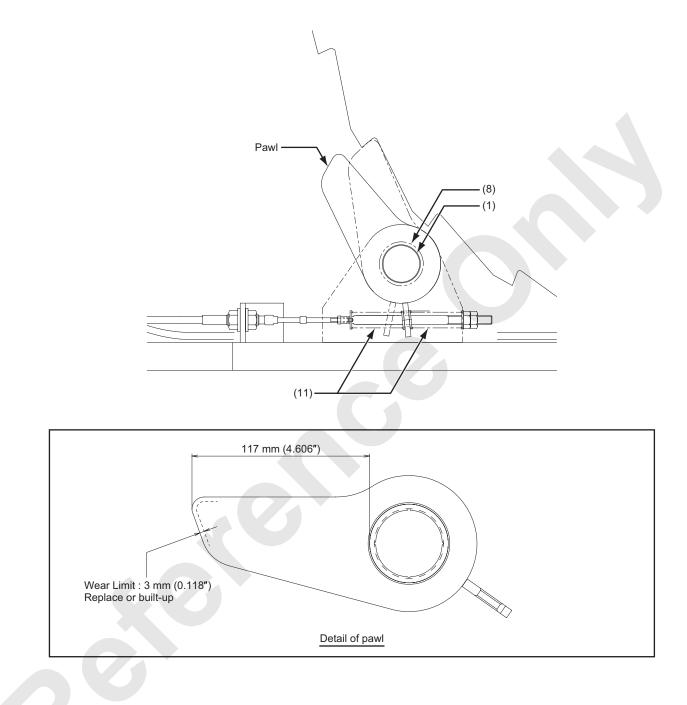


Unit : mm (in.)

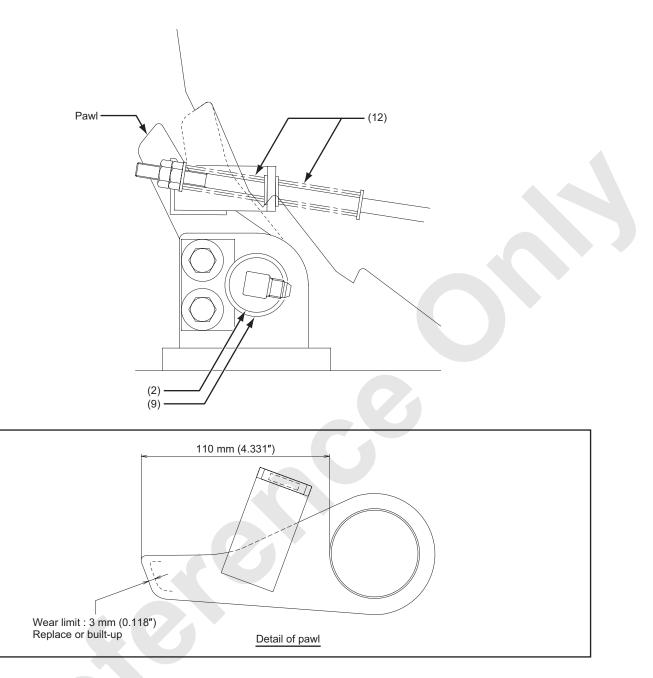
Location	Part number	Std. root dia.	Use limit	Groove radius	Remedy	See figure
(14)Boom point		428 (16.850)	425 (16.732)	12.5 (0.492)		
(15)Idler sheave		428 (16.850)	425 (16.732)	12.5 (0.492)	Replace	P.2-7
(16)Auxiliary sheave		495 (19.488)	492 (19.370)	12.5 (0.492)		
(17)Upper spreader		304 (11.969)	299.2 (11.779)	9.0 (2.743)		P.2-6
(18)Lower spreader		352 (13.858)	347.2 (13.669)	10.0 (0.394)		
(19) Jib point		428 (16.850)	425 (16.732)	12.5 (0.492)	build-up	P.2-7
(20) Jib strut		428 (16.850)	425 (16.732)	12.5 (0.492)	1	
(21)Gantry peak		352 (13.858)	347.2 (13.669)	10.0 (0.394)	1	P.2-6

### SEE FIGURE

• Front / rear drum lock assy

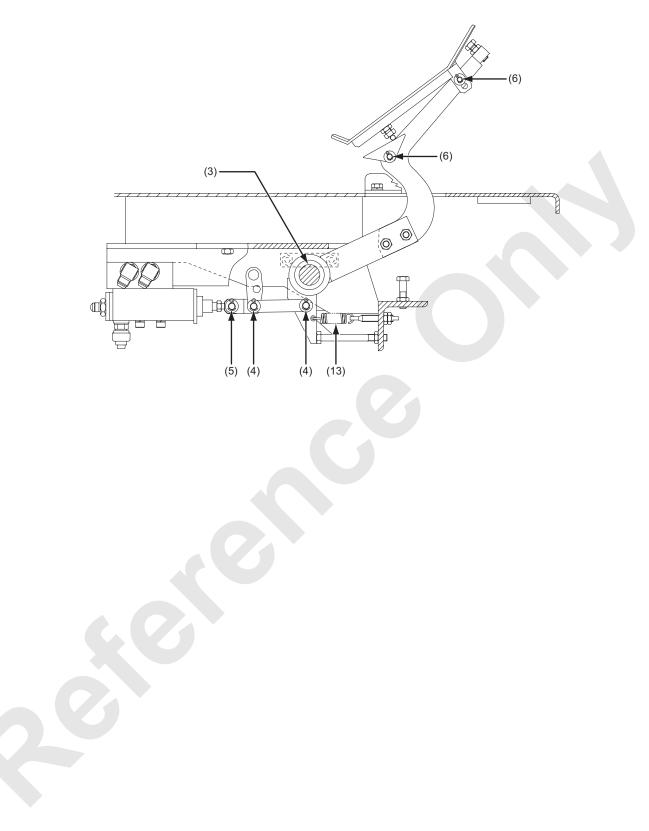


Boom drum lock assy

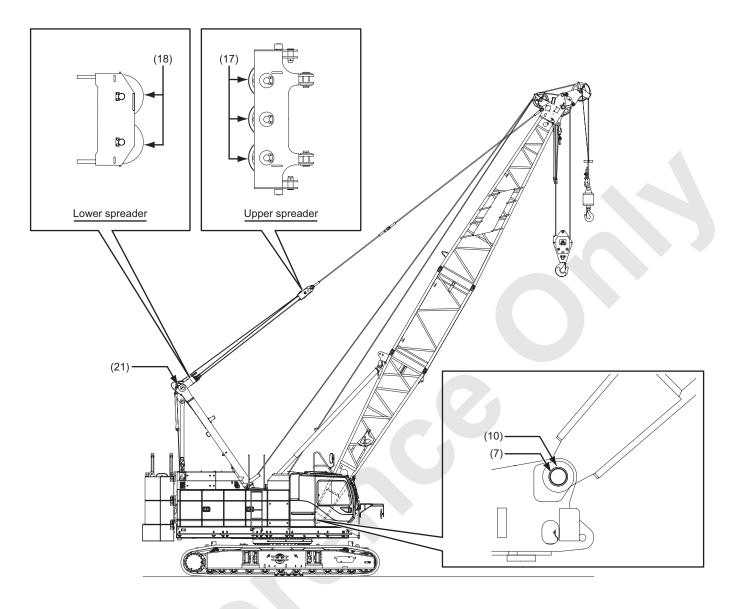


2

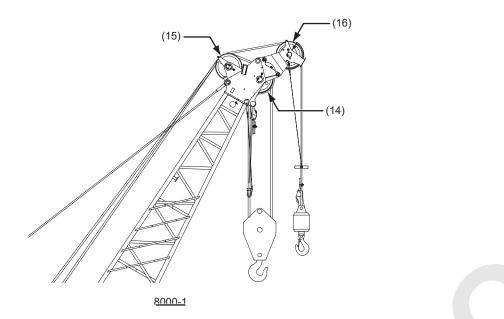
Brake pedal



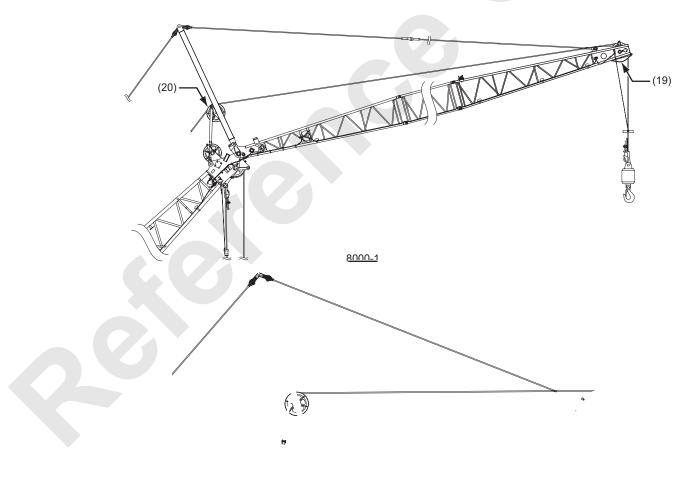
Gantry assy



Crane assy

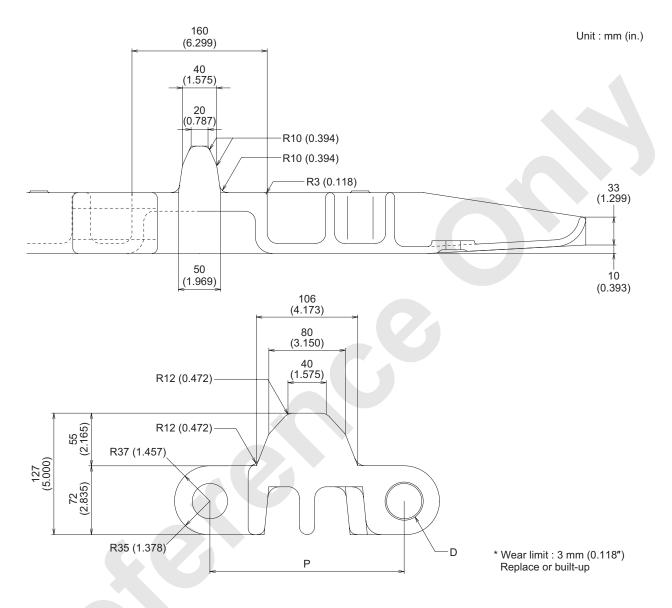


Jib assy



## 2.1.2 TRAVEL DEVICE

- 1. Crawler shoe
- 914 mm

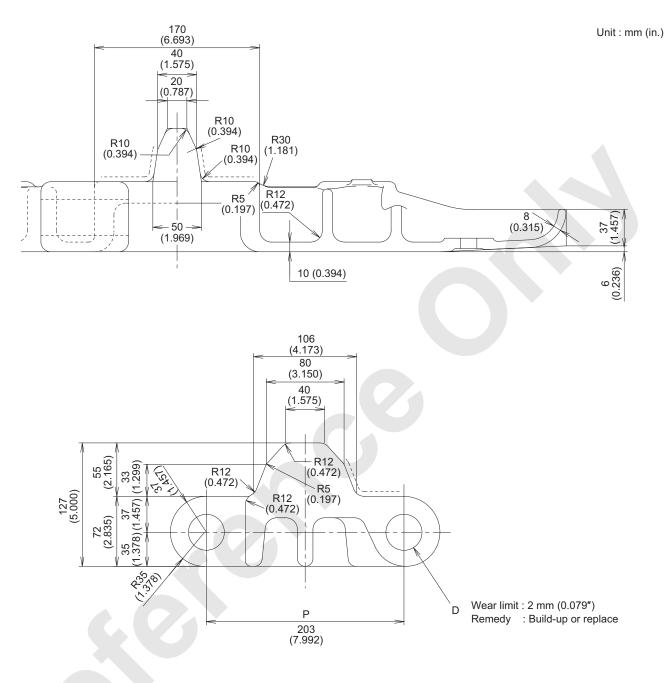


		U	nit : mm (in.)
Location	Std. dimension	Usable limit	Remedy
D : Pin hole	36 to 38 (1.417 to 1.496)	39.0 (1.535)	Replace
Pin	36 <sub>-0.2</sub> (1.417)	34.0 (1.339)	or
P : Pitch	203.2_0 (8.000)	205.0 (8.071)	build-up

Distance between pins when 6 pcs of shoes are connected and tension applied : 1213.2 to 1225.2 mm (47.764 to 48.236 in.)

2

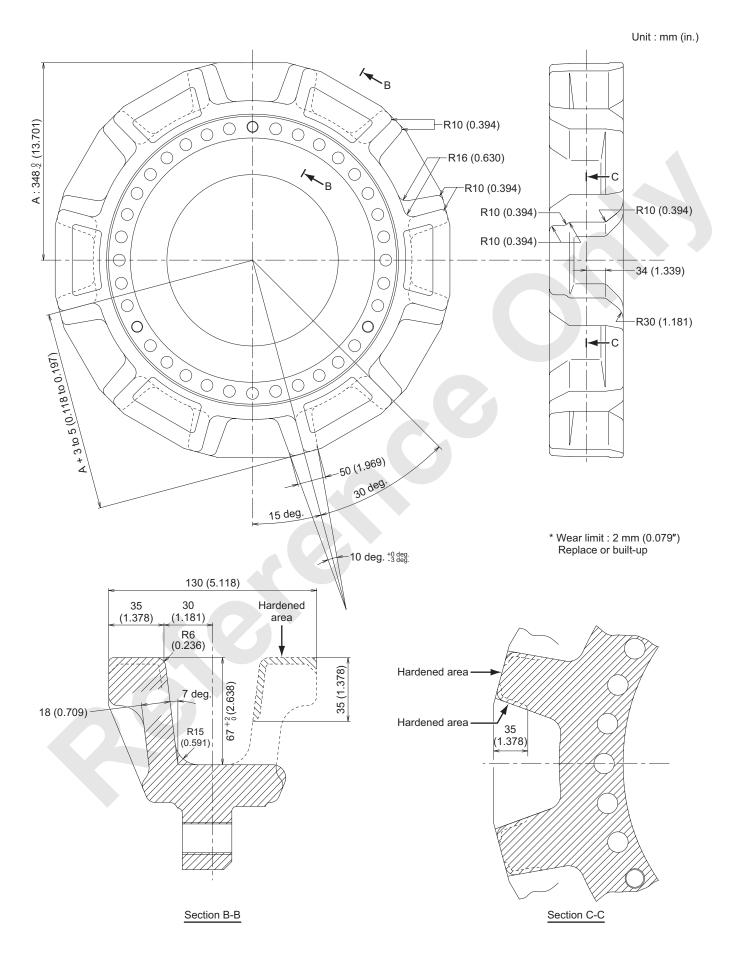
• 800 mm



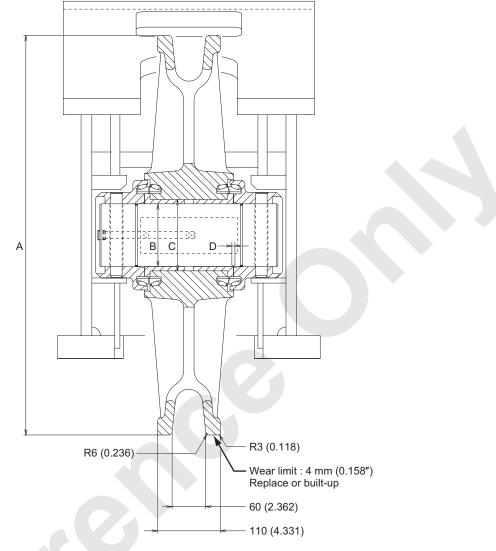
		U	nit : mm (in.)
Location	Std. dimension	Usable limit	Remedy
D : Pin hole	36 to 38 (1.417 to 1.496)	39.0 (1.535)	Build-up
Pin	36 <sub>-0.4</sub> (1.417)	34.0 (1.339)	or
P : Pitch	203.2_2 (8.000)	205.0 (8.071)	replace

Distance between pins when 6 pcs of shoes are connected and tension applied : 1213.2 to 1225.2 mm (47.764 to 48.236 in.)

#### 2. Drive tumbler



3. Idler

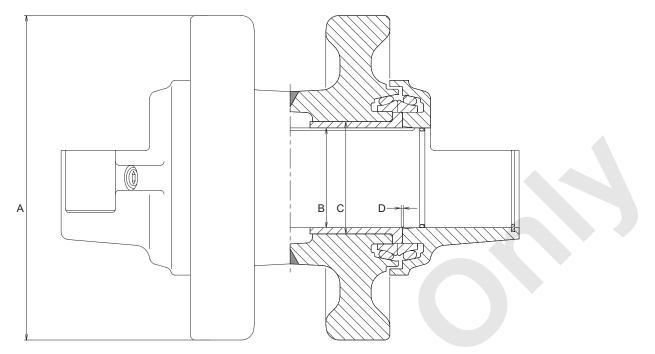


#### Unit : mm (in.)

2

Symbol	Item		Std. dimension			Usable limit	Remedy
A	Outer diameter	5	Φ7(	00 (27.559)		Ф692 (27.244)	Replace or build-up
		Std. dimension	Т	olerance	Standard	Allowable	
В	Gap between shaft and bushing	Ф110 (4.331)	Shaft	-0.036 (-0.001) -0.071 (-0.003)	Gap 0.175 (0.007) to	Gap	
		Ψ110 (4.331)	Bore	+0.161 (+0.006) +0.139 (+0.006)	0.232 (0.009)	0.1 (0.004)	Replacement of bushing
с С	Interference of	ф125 ( <u>4 021</u> )	Shaft	+0.117 (+0.005) +0.092 (+0.004)	Interference 0.052 (0.002) to	Interference	
0	sprocket and $\Phi125$ bushing	Bore	+0.040 (+0.002) +0 (+0)	0.117 (0.005)	0 (0)		
D	Side clearance of idler (One side)		0.02 to 0.7	4 (0.001 to 0.029)		1.2 (0.047)	

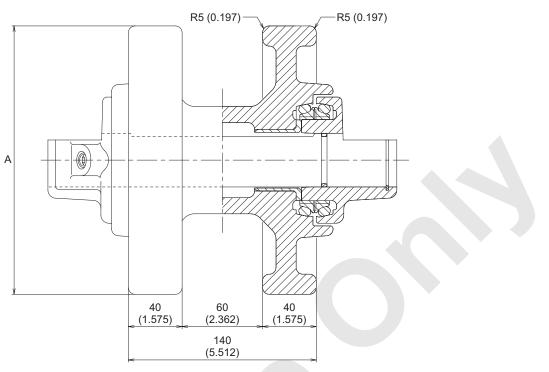
#### 4. Track roller (Lower roller)



Unit : mm (in.)

							0
Symbol	Item		Std. dimension			Usable limit	Remedy
А	Outer diameter		Ф260 (10.236)		Ф252 (9.921)	Replace or build-up	
		Std. dimension	Т	olerance	standard	Allowable	
В	B Gap between shaft and bushing	B   '	Shaft	-0.05 (-0.002) -0.08 (-0.003)	Gap 0.17 (0.007) to	Gap	Replacement of bushing
		Bore	+0.15 (+0.006) +0.12 (+0.005)	0.23 (0.009)	0.8 (0.032)	of buoning	
С	Interference of	<b>(2 542)</b>	Shaft	+0.110 (+0.004) +0.080 (+0.003)	Interference	Interference	
C	roller and bushing	Ф90 (3.543) Воге	+0.035 (+0.001) +0 (+0)	0.045 (0.002) to 0.11 (0.004)	0 (0)	Replace	
D	Side clearance of roller (One side)	0.02 to 0.053 (0.001 to 0.047)			1.2 (0.047)	Replacement of bushing	

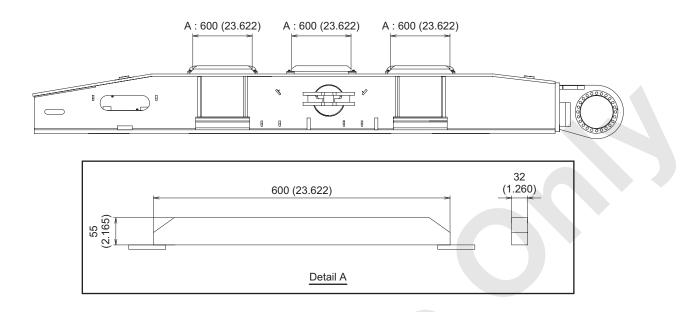
#### 5. Guide roller (Upper roller)



Unit : mm (in.)

Symbol	Item	Std. dimension	Usable limit	Remedy
А	Outer diameter	Ф200 (7.874)	Ф192 (7.559)	Build-up or replace

- 6. Guide bar
- Left side
- Right side



Unit : mm (in.)

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

## 2.2 PERFORMANCE STANDARD AND TEST PROCEDURE

- 1. The meaning of terminologies described in this standard is as follows.
  - STANDARD VALUE Standard values at new machine assembly. However, the value without specified is shown the value for standard specification (the machine equipped with the standard attachment).
- USABLE LIMIT Not to use if exceeding this value.

Repair or replace should be performed for keeping the machine performance and safety.

- TEMPERATURE OF OIL It is an oil temperature when performing the test which taken from the hydraulic oil tank and the oil in the circuit shall be kept the some temperature by circulate always.
- 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.
- 3. The hydraulic hose, O-ring, oil seal and the parts made from rubber would be deteriorated, replace periodically or at the time of overhauling.
- 4. Especially important hoses as safety relative parts are specified as an important security parts, strongly recommended replace it periodically.
- To perform the maintenance works, thoroughly understood the procedure; how to handle the machine, precaution and the lubrication.
   Read thoroughly the shop-manual and understood.

### **WARNING**

Place a signalman to prevent an incident from caught.

Failure to observe this precaution may result in a serious injury or loss of life.

### A WARNING

Operate the control lever slowly.

Abrupt control lever operation is very dangerous, and may create the unexpected loads to the base machinery and the attachment or load swinging.

### 

Off limit signs shall be posted at surrounding area of the machine operating radius.

Failure to observe this precaution may result in a serious injury or loss of life.

### 

When performing the test, all unused functions should be locked.

Failure to observe this precaution may result in a serious injury or loss of life.

### 

Ensure to confirm the functioning of the overload prevention device, as for the details of how to confirm, refer to "3.10.1 CHECK BEFORE ERECT THE BOOM AFTER ASSEMBLY OF THE ATTACHMENT" in OPERATION & MAINTENANCE MANUAL.

## 2.2.1 OPERATING SPEED

Item	Test condition	Test procedure	Standard value
Boom drum hoisting and lowering wire rope speed	Mode : Power mode Engine min <sup>-1</sup> : High idling Temperature of oil : 45 to 55 °C (113 to 131°F) Boom Length : Basic boom Loading : No load	<ul> <li>Measure the time taken to rotate drum 10 times. (Start measuring after rotation becomes stable.)</li> <li>Take average of 3 times measuring.</li> </ul>	8.8 to 10.6 sec
Front and rear drum hoisting wire rope speed	Mode : Power mode Engine min <sup>-1</sup> : High idling Temperature of oil : 45 to 55 °C (113 to 131°F) Loading : No load	<ul> <li>Measure the time taken to rotate drum 10 times. (Start measuring after rotation becomes stable.)</li> <li>Take average of 3 times measuring.</li> </ul>	Low : 11.1 to 13.4 sec (Trimmer low) High : 7.9 to 9.7 sec (Trimmer High)
Swing speed	Mode : Power mode Engine min <sup>-1</sup> : High idling Temperature of oil : 45 to 55 °C (113 to 131 °F) Boom Length : Basic boom Loading : No load Swing mode : Free high	<ul> <li>Measure the time taken to rotate machine one time.</li> <li>Measure the time for 2nd rotation after 1st preliminary rotation.</li> <li>Take average of 3 times measuring.</li> </ul>	14.1 to 16.7 sec
Travel speed	Mode : Power mode Engine min <sup>-1</sup> : High idling Temperature of oil : 45 to 55 °C (113 to 131°F) Boom Length : Basic boom Place : Firm and level ground	<ul> <li>Measure the time taken to Travel machine the distance of 20 m (66 ft).</li> <li>Travel machine first preliminary more than 2 m (6.6 ft) before starting the measuring.</li> <li>Take average of 3 times measuring.</li> </ul>	Low : 60.1 to 69.8 sec High : 40.6 to 47.3 sec
Traveling deflection	Mode : G engine mode Engine min <sup>-1</sup> : High idling Temperature of oil : 45 to 55 °C (113 to 131°F) Boom Length : Basic boom Place : Firm and level ground	<ul> <li>Measure the deflection amount after traveling the distance of 20 m (66 ft).</li> <li>Travel machine first preliminary more than 2 m (6.6 ft) before starting the measuring.</li> <li>Take average of 3 times measuring.</li> </ul>	Within 600mm (23.6 in)

20 m (66') Deflection amount

## 2.2.2 HYDRAULIC 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.

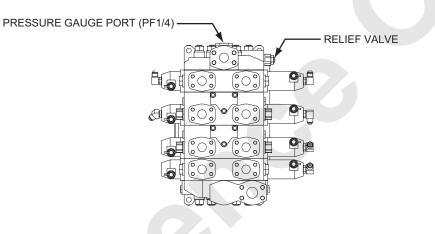
Prior to pressure measurement, clean the port for pressure measurement so as to be free from oil and dust.

Connector and hose for measuring pressure.

Connector	
Hose	

1. Main

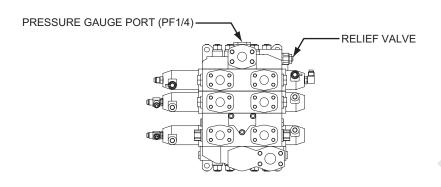
(Travel right, Boom, Rear drum 1st speed, Front drum 2nd speed)



Test condition	Test procedure	Standard value
Mode : Power mode	(1) Lower the boom onto the ground.	
Engine speed : High idling	(2) Lock the boom drum with the drum lock.	31.9 MPa (4,627 psi)
Temperature of oil : 45 to 55 °C	(3) Make the valve relieved by boom drum	31.9 MPa (4,027 psi)
(113 to 131 °F)	winch lowering operation.	

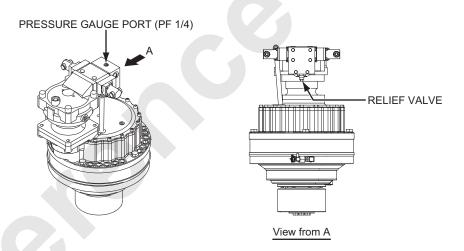
#### 2. Main

(Travel left, Rear drum 2nd speed, Front drum 1st speed)



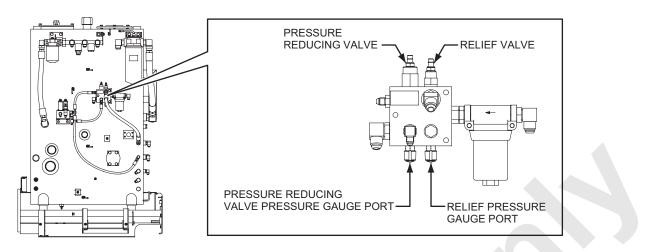
Test condition	Test procedure	Standard value
Mode : Power mode Engine speed : High idling Temperature of oil : 45 to 55 °C (113 to 131 °F)	<ol> <li>Lower the front drum hook onto the ground.</li> <li>Lock the front winch drum with the drum lock.</li> <li>Make the valve relieved by front drum winch lowering operation. (1st speed detent)</li> </ol>	31.9 MPa (4.627 psi)

#### 3. Swing



Test condition	Test procedure	Standard value
Mode : Power mode Engine speed : High idling Temperature of oil : 45 to 55 °C (113 to 131 °F) Swing mode : Free high	<ul><li>(1) Lock the upper with the swing lock pin and parking brake.</li><li>(2) Make the valve relieved by swing operation.</li></ul>	27.5 MPa (3,989 psi)

#### 4. Control circuit (Primary pressure)

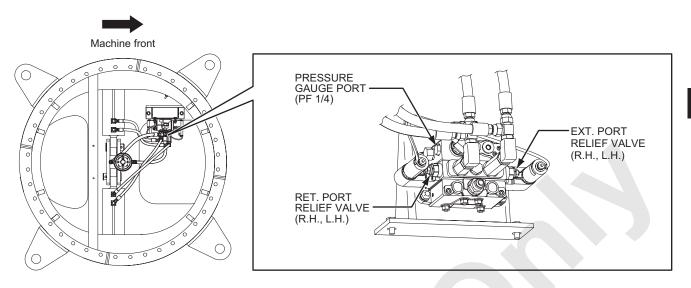


Test condition	Test procedure	Standard value
Engine speed : Low idling Temperature of oil : 45 to 55 °C (113 to 131 °F)	Remove the cap of plug installed in valve block, and instal the pressure gauge.	<ul> <li>Relief valve : 7.0 MPa (1,015 psi)</li> <li>Reduction valve : 5.4 MPa (783 psi)</li> </ul>

#### 5. Control circuit (Secondary pressure)

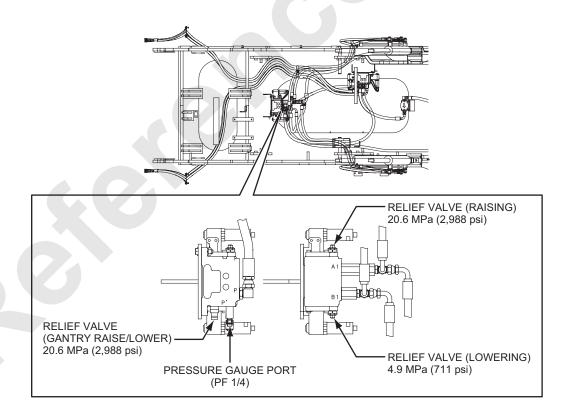
Test condition	Test procedure	Standard value
Engine speed : Low idling Temperature of oil : 45 to 55 °C (113 to 131 °F)	Operate the control lever for the section to be measured. (Operate the speed adjusting knob to the Max. position) Take pressure out from the quick coupler of the control valve spool end.	<ul> <li>Front / rear drum 2.65 to 2.94 MPa (384 to 426 psi)</li> <li>Travel 1.42 to 1.62 MPa (206 to 235 psi)</li> <li>Swing 1.62 to 1.92 MPa (235 to 278 psi)</li> <li>Third 2.65 to 2.94 MPa (384 to 426 psi)</li> <li>Boom 2.50 to 2.79 MPa (363 to 405 psi)</li> </ul>

#### 6. Crawler extening



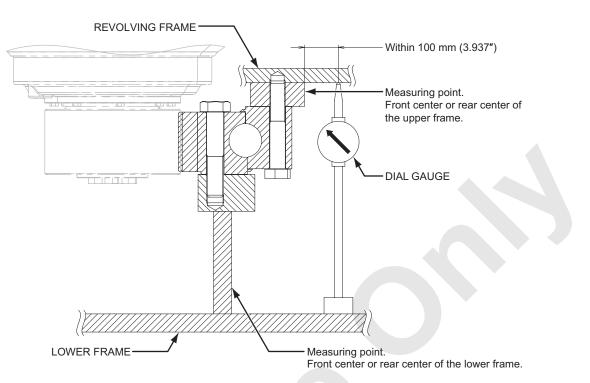
Test condition	Test procedure	Standard value
Engine speed : High idling Temperature of oil : 45 to 55 °C (113 to 131 °F)	<ol> <li>Insert the crawler fixing pins to fix the crawlers.</li> <li>Make the valve relieved by operating crawler retraction or extension.</li> </ol>	<ul> <li>Extension : 17.0 MPa (2.466 psi)</li> </ul>

7. Gantry raising / lowering



Test condition	Test procedure	Standard value
Engine speed : High idling Temperature of oil : 45 to 55 °C (113 to 131 °F)	<ol> <li>Raise the gantry high, and fix it with the gantry fixing pin.</li> <li>Make the valve relieved by raising or lowering the gantry operation.</li> </ol>	<ul> <li>Port relief set</li> <li>Raise : 20.6 MPa (2.988 psi)</li> </ul>

## 2.2.3 SWING BEARING



#### COUNTERWEIGHT : FULL

Condition of measurement	Amount of play
Boom length : 12.2 m (40 ft)	
Radius : 5.5 m (18 ft)	Less than 3 mm (0.118")
Load : 51.4 t (113,318 lbs)	0 mm (0.110 )

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# 3. GENERAL WORK STANDARD

## 3.1 STANDARD TIGHTENING TORQUE

## 3.1.1 TIGHTENING TORQUE OF CAP SCREWS AND NUTS

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

#### 1. METRIC COARSE THREADS (PLATED)

Unit : N·m (ft·lbs)

3

		Class	ification			
Nominal size	4	Г	7	7T		
size –	Dry	Lubricated	Dry	Lubricated		
MO	0.58 to 0.72	0.40 to 0.48	1.26 to 1.54	0.86 to 1.04		
M3	(0.43 to 0.53)	(0.29 to 0.35)	(0.93 to 1.14)	(0.63 to 0.77)		
N44	1.35 to 1.65	0.90 to 1.10	2.90 to 3.50	2.00 to 2.40		
M4	(1.00 to 1.22)	(0.66 to 0.81)	(2.14 to 2.58)	(1.47 to 1.77)		
145	2.60 to 3.20	1.75 to 2.15	5.70 to 6.90	3.80 to 4.60		
M5	(1.92 to 2.36)	(1.29 to 1.59)	(4.20 to 5.09)	(2.80 to 3.39)		
140	4.50 to 5.50	3.10 to 3.70	9.70 to 11.9	6.60 to 8.00		
M6	(3.32 to 4.06)	(2.29 to 2.73)	(7.20 to 8.80)	(4.90 to 5.90)		
140	10.8 to 13.2	7.30 to 8.90	23.4 to 28.6	15.8 to 19.2		
M8	(8.00 to 9.70)	(5.40 to 6.60)	(17.3 to 21.1)	(11.7 to 14.2)		
140	21.6 to 26.4	14.5 to 17.7	46.8 to 57.2	31.5 to 38.5		
M10	(15.9 to 19.5)	(10.7 to 13.1)	(34.5 to 42.2)	(23.2 to 28.4)		
1440	36.9 to 45.1	24.7 to 30.3	80.1 to 97.9	54.0 to 66.0		
M12	(27.2 to 33.3)	(18.2 to 22.3)	(59.1 to 72.2)	(39.8 to 48.7)		
N444	58.5 to 71.5	39.1 to 47.9	128 to 156	85.5 to 104.5		
M14	(43.1 to 52.7)	(28.8 to 35.3)	(94.4 to 115)	(63.1 to 77.1)		
1440	89.1 to 108.9	59.4 to 72.6	194 to 236	129 to 157		
M16	(66.0 to 80.0)	(44.0 to 54.0)	(143 to 174)	(95.0 to 116)		
M40	123 to 151	83.0 to 101	270 to 330	179 to 219		
M18	(91 to 111)	(61.0 to 75.0)	(199 to 243)	(132 to 162)		
M00	173 to 211	115 to 141	378 to 462	252 to 308		
M20	(128 to 156)	(85.0 to 104)	(279 to 341)	(186 to 227)		
M22	234 to 286	154 to 188	504 to 616	338 to 412		
IVIZZ	(173 to 211)	(114 to 139)	(372 to 454)	(249 to 304)		
M24	297 to 363	198 to 242	648 to 792	432 to 528		
10124	(219 to 268)	(146 to 178)	(478 to 584)	(319 to 389)		
M27	441 to 539	293 to 357	954 to 1,166	635 to 775		
	(325 to 397)	(216 to 263)	(704 to 860)	(468 to 572)		
M30	599 to 731	396 to 484	1,296 to 1,584	864 to 1,056		
WISU	(442 to 539)	(292 to 357)	(956 to 1,168)	(637 to 779)		
M33	801 to 979	531 to 649	1,746 to 2,134	1,161 to 1,419		
10100	(591 to 722)	(392 to 479)	(1,288 to 1,574)	(856 to 1,046)		
M36	1,035 to 1,265	689 to 841	2,250 to 2,750	1,494 to 1,826		
10130	(763 to 933)	(508 to 620)	(1,659 to 2,028)	(1,102 to 1,347)		

### 2. METRIC FINE THREADS (PLATED)

Unit : N·m (ft·lbs)

	Classification					
Nominal size	47	Г	7T			
5126	Dry	Lubricated	Dry	Lubricated		
Mo	11.4 to 14.0	7.6 to 9.2	24.8 to 30.2	16.5 to 20.1		
M8	(8.40 to 10.3)	(5.60 to 6.80)	(18.3 to 22.3)	(12.2 to 14.8)		
M40	22.5 to 27.5	15.0 to 18.4	48.6 to 59.4	32.9 to 40.1		
M10	(16.6 to 20.3)	(11.1 to 13.6)	(35.8 to 43.8)	(24.3 to 29.6)		
M10	40.1 to 48.9	26.6 to 32.4	86.4 to 106	57.6 to 70.4		
M12	(29.6 to 36.1)	(19.6 to 23.9)	(63.7 to 77.9)	(42.5 to 51.9)		
1440	94.0 to 114	62.1 to 75.9	203 to 247	135 to 165		
M16	(69.0 to 84.0)	(46.0 to 56.0)	(150 to 182)	(100 to 122)		
1400	189 to 231	123 to 151	410 to 500	270 to 330		
M20	(139 to 170)	(91.0 to 111)	(302 to 369)	(199 to 243)		
MOA	320 to 390	212 to 258	698 to 852	459 to 561		
M24	(236 to 288)	(156 to 190)	(515 to 628)	(338 to 414)		
Mao	648 to 792	423 to 517	1,413 to 1,727	927 to 1,133		
M30	(478 to 584)	(312 to 381)	(1,042 to 1,274)	(684 to 836)		
Mac	1,089 to 1,331	716 to 874	2,367 to 2,893	1,557 to 1,903		
M36	(803 to 982)	(528 to 645)	(1,746 to 2,133)	(1,148 to 1,403)		

#### 3. COARSE THREADS UNC

Unit : N·m (ft·lbs)

3

Nominal	Classification						
size	Gra	de 2	Gra	de 5	Gra	de 8	
	Dry	Lubricated	Dry	Lubricated	Dry	Lubricated	
1/4	7.50 to 9.10	6.40 to 7.80	11.6 to 14.2	9.90 to 12.1	16.4 to 20.0	14.0 to 17.	
1/4	(5.53 to 6.71)	(4.71 to 5.76)	(8.55 to 10.5)	(7.30 to 8.92)	(12.1 to 14.8)	(10.3 to 12.	
5/16	14.9 to 18.1	12.5 to 15.3	23.0 to 28.0	19.3 to 23.7	32.0 to 39.0	27.5 to 33.	
5/10	(11.0 to 13.4)	(9.22 to 11.3)	(17.0 to 20.7)	(14.2 to 17.5)	(23.6 to 28.8)	(20.3 to 24.	
3/8	25.7 to 31.3	21.2 to 25.8	39.6 to 48.4	33.8 to 41.2	55.8 to 68.2	46.8 to 57.	
5/0	(19.0 to 23.1)	(15.6 to 19.0)	(29.2 to 35.7)	(24.9 to 30.4)	(41.2 to 50.3)	(34.5 to 42.	
7/16	39.6 to 48.4	33.8 to 41.2	62.1 to 75.9	52.2 to 63.8	87.3 to 107	72.9 to 89.	
7710	(29.2 to 35.7)	(24.9 to 30.4)	(45.8 to 56.0)	(38.5 to 47.1)	(64.4 to 78.7)	(53.8 to 65.	
1/2	62.1 to 75.9	52.2 to 63.8	95.0 to 117.0	80.1 to 97.9	134 to 164	113 to 139	
172	(45.8 to 56.0)	(38.5 to 47.1)	(70.1 to 86.3)	(59.1 to 72.2)	(98.8 to 121)	(83.3 to 10	
9/16	88.2 to 108	73.8 to 90.2	137 to 167	114 to 140	193 to 237	162 to 198	
9/10	(65.0 to 79.5)	(54.4 to 66.5)	(101 to 123)	(84.1 to 103)	(142 to 175)	(119 to 146	
5/8	123 to 151	104 to 128	193 to 237	160 to 196	275 to 335	230 to 280	
5/0	(90.7 to 111)	(76.7 to 94.4)	(142 to 175)	(118 to 145)	(203 to 247)	(170 to 206	
3/4	221 to 269	184 to 226	338 to 412	284 to 346	477 to 583	396 to 484	
5/4	(163 to 198)	(136 to 167)	(249 to 304)	(209 to 255)	(352 to 430)	(292 to 357	
7/8	212 to 258	176 to 214	540 to 660	450 to 550	756 to 924	634 to 776	
110	(156 to 190)	(130 to 158)	(398 to 487)	(332 to 406)	(558 to 681)	(468 to 572	
1	311 to 379	266 to 324	801 to 979	671 to 819	1,134 to 1,386	954 to 1,16	
I	(229 to 279)	(196 to 239)	(591 to 722)	(495 to 604)	(836 to 1,022)	(704 to 860	
1 1/8	450 to 550	378 to 462	1,008 to 1,232	837 to 1,023	1,620 to 1,980	1,359 to 1,6	
1 1/0	(332 to 406)	(279 to 341)	(743 to 909)	(617 to 754)	(1,195 to 1,460)	(1,002 to 1,2	
1 1/4	625 to 765	522 to 638	1,404 to 1,716	1,170 to 1,430	2,268 to 2,772	1,908 to 2,3	
1 1/4	(461 to 564)	(385 to 471)	(1,035 to 1,265)	(863 to 1,055)	(1,673 to 2,044)	(1,407 to 1,7	
1 3/8	819 to 1,001	689 to 841	1,845 to 2,255	1,548 to 1,892	2,979 to 3,641	2,511 to 3,0	
10/0	(604 to 738)	(508 to 620)	(1,361 to 1,663)	(1,142 to 1,395)	(2,197 to 2,685)	(1,852 to 2,2	
1 1/2	1,098 to 1,342	918 to 1,122	2,448 to 2,992	2,052 to 2,508	3,960 to 4,840	3,321 to 4,0	
	(810 to 990)	(677 to 827)	(1,805 to 2,206)	(1,513 to 1,850)	(2,920 to 3,569)	(2,449 to 2,9	

8000-1

#### 4. FINE THREADS UNF

Unit : N·m (ft·lbs)

	Classification						
Nominal size	Grad	Grade 2		Grade 5		Grade 8	
5120	Dry	Lubricated	Dry	Lubricated	Dry	Lubricated	
1/4	8.40 to 10.2	7.00 to 8.60	13.0 to 15.8	11.0 to 13.4	18.4 to 22.6	15.5 to 18.9	
	(6.19 to 7.52)	(5.16 to 6.34)	(9.59 to 11.7)	(8.11 to 9.88)	(13.6 to 16.7)	(11.4 to 13.9)	
5/16	16.1 to 19.7	13.6 to 16.6	24.8 to 30.2	21.2 to 25.8	35.1 to 42.9	30.2 to 36.8	
	(11.9 to 14.5)	(10.0 to 12.2)	(18.3 to 22.3)	(15.6 to 19.0)	(25.9 to 31.6)	(22.3 to 27.1	
3/8	28.4 to 34.6	23.9 to 29.1	43.2 to 52.8	36.0 to 44.0	62.1 to 75.9	51.3 to 62.7	
	(20.9 to 25.5)	(17.6 to 21.5)	(31.9 to 38.9)	(26.6 to 32.5)	(45.8 to 56.0)	(37.8 to 46.2	
7/16	44.1 to 53.9	36.9 to 45.1	68.4 to 83.6	56.7 to 69.3	95.0 to 117	80.1 to 97.9	
	(32.5 to 39.8)	(27.2 to 33.3)	(50.4 to 61.7)	(41.8 to 51.1)	(70.1 to 86.3)	(59.1 to 72.2	
1/2	68.4 to 83.6	56.7 to 69.3	105 to 129	87.3 to 107	149 to 181	123 to 151	
	(50.4 to 61.7)	(41.8 to 51.1)	(77.4 to 95.1)	(64.4 to 78.7)	(110 to 134)	(90.7 to 111)	
9/16	96.0 to 118	81.0 to 99.0	149 to 183	124 to 152	212 to 258	176 to 214	
	(70.8 to 87.0)	(59.7 to 73.0)	(110 to 135)	(91.4 to 112)	(156 to 190)	(130 to 158)	
5/8	137 to 167	114 to 140	212 to 258	176 to 216	302 to 368	248 to 302	
	(101 to 123)	(84.0 to 103)	(156 to 190)	(130 to 159)	(223 to 271)	(183 to 223)	
3/4	239 to 291	193 to 237	369 to 451	311 to 379	513 to 627	432 to 528	
	(176 to 215)	(142 to 175)	(272 to 333)	(229 to 280)	(378 to 462)	(319 to 389)	
7/8	230 to 280	184 to 226	580 to 710	486 to 594	819 to 1,001	680 to 830	
	(170 to 206)	(136 to 167)	(428 to 524)	(358 to 438)	(604 to 738)	(501 to 612)	
1	338 to 412	275 to 335	864 to 1,056	720 to 880	1,215 to 1,485	1,017 to 1,24	
	(249 to 304)	(203 to 247)	(637 to 779)	(531 to 649)	(896 to 1,095)	(750 to 917)	
1 1/8	495 to 605	405 to 495	1,098 to 1,342	918 to 1,122	1,773 to 2,167	1,485 to 1,81	
	(365 to 446)	(299 to 365)	(810 to 990)	(677 to 827)	(1,308 to 1,598)	(1,095 to 1,33	
1 1/4	680 to 830	567 to 693	1,530 to 1,870	1,260 to 1,540	2,466 to 3,014	2,052 to 2,50	
	(501 to 612)	(418 to 511)	(1,128 to 1,379)	(929 to 1,136)	(1,819 to 2,223)	(1,513 to 1,85	
1 3/8	909 to 1,111	756 to 924	2,043 to 2,497	1,692 to 2,068	3,303 to 4,037	2,745 to 3,35	
	(670 to 819)	(558 to 681)	(1,507 to 1,841)	(1,248 to 1,525)	(2,436 to 2,977)	(2,024 to 2,47	
1 1/2	1,197 to 1,463	999 to 1,221	2,682 to 3,278	2,232 to 2,728	4,347 to 5,313	3,618 to 4,42	
	(883 to 1,079)	(737 to 900)	(1,978 to 2,417)	(1,646 to 2,012)	(3,206 to 3,918)	(2,668 to 3,26	

Use thread lock to prevent bolt and nut from loosening. (LOCTITE #243)

Before using thread lock wash rust, dirt and oil on thread area and dry completely.



#### 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.

#### **BITE TYPE TUBE FITTINGS**

Size : mm (inch) (Outside diameter × thickness)	Tightening torque : N·m (ft·lbs)	Remarks
10 (0.364) × 1.5 (0.059)	49 to 69 (36 to 51)	
15 (0.591) × 2.0 (0.079)	127 to 157 (94 to 116)	SLEEVE
18 (0.709) × 2.5 (0.098)	157 to 167 (116 to 123)	
22 (0.866) × 3.0 (0.118)	196 to 216 (145 to 159)	
28 (1.102) × 4.0 (0.157)	245 to 284 (181 to 210)	tightening 0.2 mm
35 (1.378) × 5.0 (0.197)	324 to 353 (239 to 260)	(0.01")

SPLIT FLANGES

(From SAE Standard) Tightening torque : N·m (ft·lbs) Size Remarks 3,000 psi (210 kg/cm<sup>2</sup>) 6,000 psi (420 kg/cm<sup>2</sup>) 1/2" 20 to 25 (14.5 to 19) 3/4" 34 to 45 (25 to 33) 28 to 39 (21 to 29) SPLIT FLANGE 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)

#### FLARE TYPE TUBE FITTINGS (30 degrees flare, pf threads)

Size	Tightening torque : 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)	

3

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

JUBILEE CLIP (Low pressure and suction)

Trade mark : an adjustable steel band secured with a screw.

## 3.2 STANDARD PARTS

## 3.2.1 BOLT

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

Bolt length (L dimensi	on on right figure : n	nm)
Bolt size (D dimens	ion on right figure : r	nm)
Thread cla	ssification	
Symbol	Classification	
С	Coarse thread	
F	Fine thread	

------ Strength and type of the bolts

Symbol	Classification
11,16	4T
12,27	7T
13,18	10T
23	Hex. socket screw

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



## 3.2.2 O-RING

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

(W dimension on right figure)	
Symbol Used for	]
P moving portion	1
G fixing portion	]

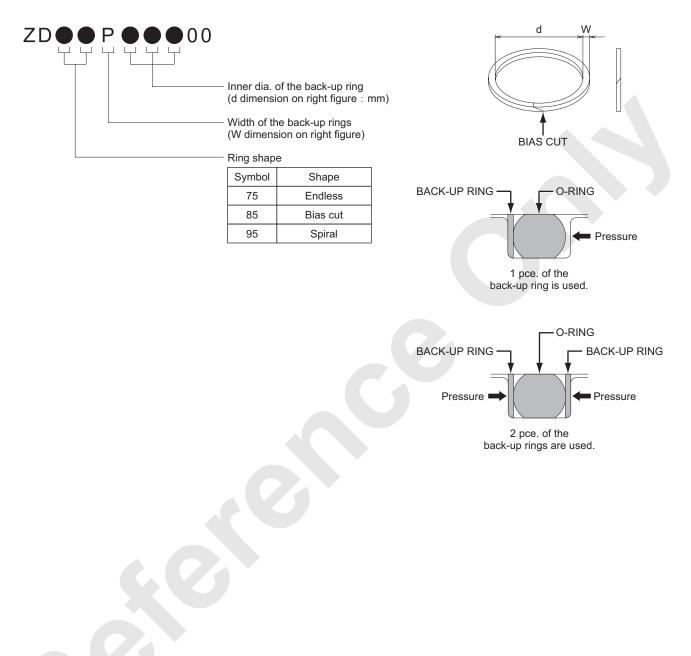
Rubber material classification For practical use, these are identified as color dot on O-ring, blue, red, green, or yellow.

Symbol	ID mark	Rubber material	Hardness	Operating temperature				
11	One blue dot	Nitrile rubber	Hs70	-25 to 120 °C				
12	Two blue dots	Nitrile rubber	Hs90	-25 to 120 °C				
-	One red dot	Nitrile rubber	Hs70	Gasoline resistant type				
-	One yellow dot	Styrol rubber	Hs70	-				
-	One green dot	Fluorine rubber	Hs70	-15 to 200 °C				

3

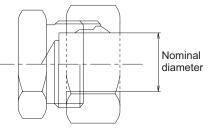
## 3.2.3 BACK-UP RING

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



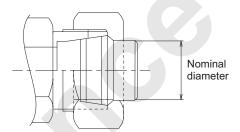
## 3.2.4 BITE TYPE FITTING

#### PLUG FOR TUBE



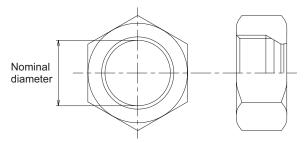
Nominal diameter : mm	Made by IHARA KOHATSU (ZF)	Made by NIHON AMC (ZA)
10		
15		
18		
22		
28		
35		

### PLUG FOR CONNECTOR



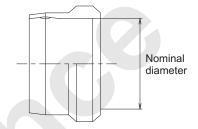
Nominal diameter : mm	Made by IHARA KOHATSU (ZF)	Made by NIHON AMC (ZA)
10		
15		
18		
22		
28		
35		

NUT



Nominal diameter : mm	Made by IHARA KOHATSU (ZF)	Made by NIHON AMC (ZA)
10		
15		
18		
22		
28		
35		

SLEEVE



Nominal diameter : mm	Made by IHARA KOHATSU (ZF)	Made by NIHON AMC (ZA)		
10				
15				
18				
22				
28				
35				

#### Tightening torque ZF Type

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

#### Tightening torque ZA Type

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

3

#### 3.3 **CONVERSION TABLE**

#### 3.3.1 **UNIT CONVERSION**

Figures in ( ) show number of zero down a decimal point.

Ex) 0.(2)1 = 0.001

I ENGTH

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	1000000	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
	1	1		1			L	1
OLUME								

#### VOLUME

Unit	cm <sup>3</sup>	m³	ltr.	kltr.	in³	ft <sup>3</sup>	yd <sup>3</sup>	gal
cm <sup>3</sup>	1	0.(5)1	0.001	0.(5)1	0.06102	0.(4)3531	0.(5)1308	0.(3)2642
m <sup>3</sup>	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 <sup>3</sup>	16.39	0.(4)1639	0.01639	0.(4)1639	1	0.(3)5787	0.(4)2143	0.004329
ft³	28320	0.02832	28.32	0.02832	1728	1	0.03704	7.48055
yd <sup>3</sup>	764500	0.7645	764.5	0.7645	46660	27	1	201.974
gal	3785	0.003785	3.785	0.003785	231	0.1337	0.004951	1

			· · · · ·		·	·
WEIGHT						
Unit	kg	oz	lb	(2000lbs) nt*1	(2240lbs) gt*2	mt*3
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	1.016052
mt	1000	35274	2204.6	1.10231	0.98421	1

\*1 nt : ton (U.S. unit)

\*2 gt : ton (British unit)

\*3 mt : ton (Metric)

### 3.3.2 MILLIMETER : INCH CONVERSION TABLE

 $\text{mm} \rightarrow \text{in}.$ 

	1 mm to 99 mm									
mm	0	1	2	3	4	5	6	7	8	9
					ir	۱.				
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 in.

in.  $\rightarrow$  mm

0	1	2	3	4	5	6	7	8	9
mm									
0.000	25.400	50.800	76.200	101.600	127.000	152.400	177.800	203.200	228.600
0.397	25.797	51.197	76.597	101.997	127.397	152.797	178.197	203.597	228.997
0.794	26.194	51.594	76.994	102.394	127.794	153.194	178.594	203.994	229.394
1.588	26.988	52.388	77.788	103.188	128.588	153.988	179.388	204.788	230.188
2.381	27.781	53.181	78.581	103.981	129.381	154.781	180.181	205.581	230.981
3.175	28.575	53.975	79.375	104.775	130.175	155.575	180.975	206.375	231.775
3.969	29.369	54.769	80.169	105.569	130.969	156.369	181.769	207.169	232.569
4.763	30.163	55.563	80.963	106.363	131.763	157.163	182.563	207.963	233.363
5.556	30.956	56.356	81.756	107.156	132.556	157.956	183.356	208.756	234.156
6.350	31.750	57.150	82.550	107.950	133.350	158.750	184.150	209.550	234.950
7.144	32.544	57.944	83.344	108.744	134.144	159.544	184.944	210.344	235.744
7.938	33.338	58.738	84.138	109.538	134.938	160.338	185.738	211.138	236.538
8.731	34.131	59.531	84.931	110.331	135.731	161.131	186.531	211.931	237.331
9.525	34.925	60.325	85.725	111.125	136.525	161.925	187.325	212.725	238.125
10.319	35.719	61.119	86.519	111.919	137.310	162.719	188.119	213.519	238.919
11.113	36.513	61.913	87.313	112.713	138.113	163.513	188.913	214.313	239.713
11.906	37.306	62.706	88.106	113.506	138.906	164.306	189.706	215.106	240.506
12.700	38.100	63.500	88.900	114.300	139.700	165.100	190.500	215.900	241.300
13.494	38.894	64.294	89.694	115.094	140.494	165.894	191.294	216.694	242.094
14.288	39.688	65.088	90.488	115.888	141.288	166.688	192.088	217.488	242.888
15.081	40.481	65.881	91.281	116.681	142.081	167.481	192.881	218.281	243.681
15.875	41.275	66.675	92.075	117.475	142.875	168.275	193.675	219.075	244.475
16.669	42.069	67.469	92.869	118.269	143.669	169.069	194.469	219.869	245.269
17.463	42.863	68.263	93.663	119.063	144.463	169.863	195.263	220.663	246.063
18.256	43.656	69.056	94.456	119.856	145.256	170.656	196.056	221.456	246.856
19.050	44.450	69.850	95.250	120.650	146.050	171.450	196.850	222.250	247.650
19.844	45.244	70.644	96.044	121.444	146.844	172.244	197.644	223.044	248.444
20.638	46.038	71.438	96.838	122.238	147.638	173.038	198.438	223.838	249.238
21.431	46.831	72.231	97.631	123.031	148.431	173.831	199.231	224.631	250.031
22.225	47.625	73.025	98.425	123.825	149.225	174.625	200.025	225.425	250.825
23.019	48.419	73.819	99.219	124.619	150.019	175.419	200.819	226.219	251.619
23.813	49.213	74.613	100.013	125.413	150.813	176.213	201.613	227.013	252.413
24.606	50.006	75.406	100.806	126.206	151.606	177.006	202.406	227.806	253.206
	0.000           0.397           0.794           1.588           2.381           3.175           3.969           4.763           5.556           6.350           7.144           7.938           8.731           9.525           10.319           11.113           11.906           12.700           13.494           15.875           16.669           17.463           18.256           19.050           19.844           20.638           21.431           22.225           23.019           23.813	0.00025.4000.39725.7970.79426.1941.58826.9882.38127.7813.17528.5753.96929.3694.76330.1635.55630.9566.35031.7507.14432.5447.93833.3388.73134.1319.52534.92510.31935.71911.11336.51311.90637.30612.70038.10013.49438.89414.28839.68815.08140.48115.87541.27516.66942.06917.46342.86318.25643.65619.05044.45019.84445.24420.63846.03821.43146.83122.22547.62523.01948.41923.81349.213	0.00025.40050.8000.39725.79751.1970.79426.19451.5941.58826.98852.3882.38127.78153.1813.17528.57553.9753.96929.36954.7694.76330.16355.5635.55630.95656.3566.35031.75057.1507.14432.54457.9447.93833.33858.7388.73134.13159.5319.52534.92560.32510.31935.71961.11911.11336.51361.91311.90637.30662.70612.70038.10063.50013.49438.89464.29414.28839.68865.08815.08140.48165.88115.08140.48165.88115.08142.06967.46917.46342.86368.26318.25643.65669.05619.05044.45069.85019.84445.24470.64420.63846.03871.43821.43146.83172.23123.01948.41973.81923.81349.21374.613	0.000         25.400         50.800         76.200           0.397         25.797         51.197         76.597           0.794         26.194         51.594         76.994           1.588         26.988         52.388         77.788           2.381         27.781         53.181         78.581           3.175         28.575         53.975         79.375           3.969         29.369         54.769         80.169           4.763         30.163         55.663         80.963           5.556         30.956         56.356         81.756           6.350         31.750         57.150         82.550           7.144         32.544         57.944         83.344           7.938         33.338         58.738         84.138           8.731         34.131         59.531         84.931           9.525         34.925         60.325         85.725           10.319         35.719         61.119         86.519           11.13         36.513         61.913         87.313           11.906         37.306         62.706         88.106           12.700         38.100         63.500         89.694	0.000         25.400         50.800         76.200         101.600           0.397         25.797         51.197         76.597         101.997           0.794         26.194         51.594         76.994         102.394           1.588         26.988         52.388         77.788         103.188           2.381         27.781         53.181         78.581         103.981           3.175         28.575         53.975         79.375         104.775           3.969         29.369         54.769         80.169         105.569           4.763         30.163         55.563         80.963         106.363           5.556         30.956         56.356         81.756         107.156           6.350         31.750         57.150         82.550         107.950           7.144         32.544         57.944         83.344         108.744           7.938         33.338         58.738         84.138         109.538           8.731         34.131         59.531         84.931         110.331           9.525         34.925         60.325         85.725         111.125           10.319         35.719         61.119         86.51	Normal Science         Normal Science           0.000         25.400         50.800         76.200         101.600         127.000           0.397         25.797         51.197         76.597         101.997         127.397           0.794         26.194         51.594         76.994         102.394         127.794           1.588         26.988         52.388         77.788         103.188         128.588           2.361         27.781         53.181         78.581         103.981         129.381           3.175         28.575         53.975         79.375         104.775         130.175           3.969         29.369         54.769         80.169         105.569         130.969           4.763         30.163         55.563         80.963         106.363         131.763           5.556         30.956         56.356         81.756         107.156         132.556           6.350         31.750         57.150         82.500         107.900         133.350           7.144         32.544         57.944         83.344         108.744         134.144           7.938         33.338         58.738         84.138         109.538         134.938	U         U         U           0.000         25.400         50.800         76.200         101.600         127.000         152.400           0.397         25.797         51.197         76.597         101.997         127.397         152.797           0.794         26.194         51.594         76.994         102.394         127.794         153.194           1.588         26.988         52.388         77.788         103.188         128.588         153.986           2.381         27.781         53.181         78.581         103.981         129.381         154.781           3.175         28.575         53.975         79.375         104.775         130.175         156.369           4.763         30.163         55.563         80.963         106.363         131.763         157.163           5.556         30.956         56.356         81.756         107.156         132.556         157.956           6.350         31.750         57.150         82.550         107.950         133.350         158.750           7.144         32.544         57.944         83.344         108.744         134.144         159.541           10.319         35.719         61.119 <td>mm0.00025.40050.80076.200101.600127.000152.400177.8000.39725.79751.19776.597101.997127.397152.797178.1970.79426.19451.59476.994102.394127.794153.194178.5941.58826.98852.38877.788103.88128.588153.988179.3882.31127.78153.18178.581103.981129.381154.781180.1813.17528.57553.97579.375104.775130.175155.575180.9753.96929.36954.76980.169105.569130.969156.369181.7694.76330.16355.56380.963107.156132.556157.956183.3566.35031.75057.15082.550107.950133.350158.750184.1507.14432.54457.94483.344108.744134.144159.544184.9447.93833.33858.73884.138109.538134.938160.338165.7388.73134.13159.53184.931110.331135.731161.131186.51311.13336.51361.91387.313112.713138.113163.513188.91311.90637.30662.70688.106113.506138.906164.306189.70612.70038.10063.50088.900114.300139.700165.100190.50013.4943</td> <td>Image: Normal Science         Image: Normal Science         Image: Normal Science         Image: Normal Science           0.000         25.400         50.800         76.200         101.600         127.000         152.400         177.800         203.200           0.397         25.797         51.197         76.597         101.997         127.397         152.797         178.197         203.597           0.794         26.194         51.594         76.994         102.394         127.791         153.194         178.594         203.994           1.588         26.988         52.388         77.788         103.188         128.588         153.988         179.388         204.788           2.381         27.781         53.181         78.581         103.981         129.381         154.781         180.181         205.581           3.475         28.575         53.975         79.375         104.775         130.495         163.369         181.769         207.169           4.763         30.163         55.563         80.963         106.363         131.763         157.956         183.356         208.505           7.144         32.544         57.150         82.550         107.950         133.50         158.750         184.15</td>	mm0.00025.40050.80076.200101.600127.000152.400177.8000.39725.79751.19776.597101.997127.397152.797178.1970.79426.19451.59476.994102.394127.794153.194178.5941.58826.98852.38877.788103.88128.588153.988179.3882.31127.78153.18178.581103.981129.381154.781180.1813.17528.57553.97579.375104.775130.175155.575180.9753.96929.36954.76980.169105.569130.969156.369181.7694.76330.16355.56380.963107.156132.556157.956183.3566.35031.75057.15082.550107.950133.350158.750184.1507.14432.54457.94483.344108.744134.144159.544184.9447.93833.33858.73884.138109.538134.938160.338165.7388.73134.13159.53184.931110.331135.731161.131186.51311.13336.51361.91387.313112.713138.113163.513188.91311.90637.30662.70688.106113.506138.906164.306189.70612.70038.10063.50088.900114.300139.700165.100190.50013.4943	Image: Normal Science         Image: Normal Science         Image: Normal Science         Image: Normal Science           0.000         25.400         50.800         76.200         101.600         127.000         152.400         177.800         203.200           0.397         25.797         51.197         76.597         101.997         127.397         152.797         178.197         203.597           0.794         26.194         51.594         76.994         102.394         127.791         153.194         178.594         203.994           1.588         26.988         52.388         77.788         103.188         128.588         153.988         179.388         204.788           2.381         27.781         53.181         78.581         103.981         129.381         154.781         180.181         205.581           3.475         28.575         53.975         79.375         104.775         130.495         163.369         181.769         207.169           4.763         30.163         55.563         80.963         106.363         131.763         157.956         183.356         208.505           7.144         32.544         57.150         82.550         107.950         133.50         158.750         184.15

### 3.3.3 METER AND FOOT CONVERSION TABLE

	Mater		Mater		Marta
Foot	Meter	Foot	Meter	Foot	Meter
5	1.52	175	53.34	345	105.12
10	3.05	180	54.86	350	106.68
15	4.57	185	56.39	355	108.20
20	6.10	190	57.91	360	109.73
25	7.62	195	59.44	365	111.25
30	9.14	200	60.96	370	112.78
35	10.67	205	62.48	375	114.30
40	12.19	210	64.01	380	115.82
45	13.72	215	65.53	385	117.35
50	15.24	220	67.06	390	118.87
55	16.76	225	68.58	395	120.40
60	18.29	230	70.10	400	121.92
65	19.81	235	71.63	405	123.44
70	21.34	240	73.15	410	124.97
75	22.86	245	74.68	415	126.49
80	24.38	250	76.20	420	128.02
85	25.91	255	77.72	425	129.54
90	27.43	260	79.25	430	131.06
95	28.96	265	80.77	435	132.59
100	30.48	270	82.30	440	134.11
105	32.00	275	83.82	445	135.64
110	33.53	280	85.34	450	137.16
115	35.05	285	86.87	455	138.68
120	36.58	290	88.39	460	140.21
125	38.10	295	89.92	465	141.73
130	39.62	300	91.44	470	143.26
135	41.15	305	92.96	475	144.78
140	42.67	310	94.49	480	146.30
145	44.20	315	96.01	485	147.83
150	45.72	320	97.54	490	149.35
155	47.24	325	99.06	495	150.88
160	48.77	330	100.58	500	152.40
165	50.29	335	102.11	L	
170	51.82	340	103.63		

1 foot = 0.3048 meter

## 3.3.4 GRADE CONVERSION TABLE

Degrees.	% (tan θ)	Degrees.	% (tan θ)	Degrees.	% (tan θ)
1	1.8	16	28.7	31	60.1
2	3.5	17	30.6	32	62.5
3	5.2	18	32.5	33	64.9
4	7.0	19	34.4	34	67.5
5	8.8	20	36.4	35	70.0
6	10.5	21	38.4	36	72.7
7	12.3	22	40.4	37	75.4
8	14.1	23	42.5	38	78.1
9	15.8	24	44.5	39	81.0
10	17.6	25	46.6	40	83.9
11	19.4	26	48.8	41	86.9
12	21.3	27	51.0	42	90.0
13	23.1	28	53.2	43	93.3
14	24.9	29	55.4	44	96.6
15	26.8	30	57.7	45	100.0

## 3.3.5 UNIT WEIGHT TABLE

Material	Weight per Cub. Meter (t)	Material	Weight per Cub. Meter (t)
Lead	11.4	Sand	1.9
Copper	8.9	Coal cold	0.8
Steel	7.8	Coal powder	1.0
Cast iron	7.2	Coke	0.5
Aluminum	2.7	Oak	0.9
Concrete	2.3	Cedar	0.4
Soil	2.0	Cypress	0.4
Gravel	1.9	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

	nternational System of Uni I : System International Ur	Conversion Formula	
Types	Unit symbols	Meaning	CGS unit system to SI unit system
Mass	kg	Kilogram	Mass (kg) = Weight (kgf)*1
Force (Load)	N kN	Newton Kilonewton	1 (N) = 1 (kg) × 9.80 1 (kN) = 1 (N) × 1000
Moment of force	N∙m	-	1 (N·m) = 1 (N) × 1 (m)
Stress	N/mm <sup>2</sup>	-	1 (N/mm²) =1 (N) ÷ 1 (mm²)
Pressure (hydraulic pressure, pneumatic pressure) ground pressure	Pa kPa MPa	Pascal Kilopascal Megapascal	1 (Pa) = 1 (N/mm²) 1 (kPa) = 1 (Pa) × 1000 1 (MPa) = 1 (kPa) × 1000
Horsepower (Motive power)	kW	Kilowatt	1 (kW) = 1 (PS)*2 ÷ 0.7355
Energy	J	Joule	1 (J) = 1 (N·m)

\*1 f = gravity

\*2 PS = horsepower

ravimetric unit	$\begin{array}{c} - \times \rightarrow \\ \leftarrow \div - \end{array}$	SI unit	Gravimetric unit	$\begin{array}{c} - \times \rightarrow \\ \leftarrow \div - \end{array}$	SI unit
kgf	9.807	Ν	kgf-m/s	0.00981	kW
lbf	4.448	Ν	lbf-ft/s	0.00136	kW
kgf-cm	0.0981	N∙m	PS	0.7355	kW
lbf-ft	1.356	N·m	HP	0.746	kW
lbt-in	0.113	N∙m	kgf-m	9.807	J
kgf/cm <sup>3</sup>	0.0981	MPa	kcal	4186	J
atm	0.1013	MPa	kgf-s/cm <sup>3</sup>	98067	Pa-s
lbf/in <sup>2</sup>	0.0069	MPa	cP	0.001	Pa-s
kgf/cm <sup>3</sup>	98.1	kPa	Р	0.1	Pa-s
atm	101.3	kPa	cSt	1×10 <sup>-6</sup>	m²/s
lbt/in <sup>2</sup>	6.9	kPa	cSt	1	mm²/s
mm Hg	133.3	Pa	St	0.0001	m²/s
in Hg	3386	Pa	atm-cc/s	0.1013	Pa-m <sup>3</sup> /s

# 4. POWER TRAIN

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4.4.2	REPLACEMENT ORDER OF RADIATOR CORE	
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# 4. POWER TRAIN

This crane is a full hydraulic crawler crane.

The engine drives following pumps via the power divider.

#### MAIN PUMP

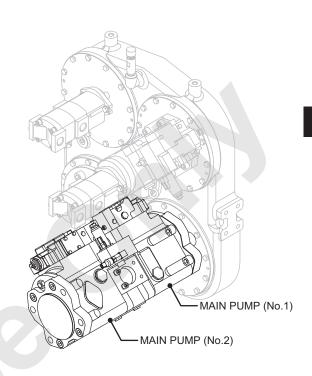
This pump is a tandem type variable displacement pump mounted on the power divider and provides a power to left and right travel motors, boom hoist motor, each of front and rear hoist motor through the two control valves.

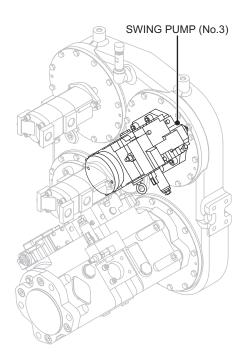
Furthermore, by adding an exclusive control valve it provides power to the third (option) hoist motor.

- Front and rear hoist motors
   Drives drum shafts through respective reduction
   unit and hoisting, lowering or stop the respective
   hoist drums through the drum built in clutch.
- Boom hoist motor Drives drum shafts through reduction unit and hoisting, lowering or stop the boom hoist drum.
- Left and right travel motor Drives drive tumblers through respective reduction units to travel the machine.

#### SWING PUMP

This pump is a plunger pump mounted on the power divider and provides the power to swing motor through the reduction unit to swing the upper machinery.





#### GEAR PUMP

This pump is the tandem type gear pump mounted on the power divider.

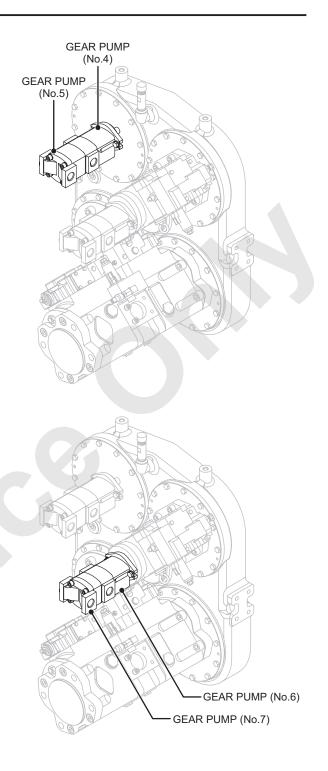
Gear pump sends hydraulic oil to free fall cooling circuit of the front/rear hoist drum.

#### **GEAR PUMP**

This pump is the tandem type gear pump mounted on the swing pump.

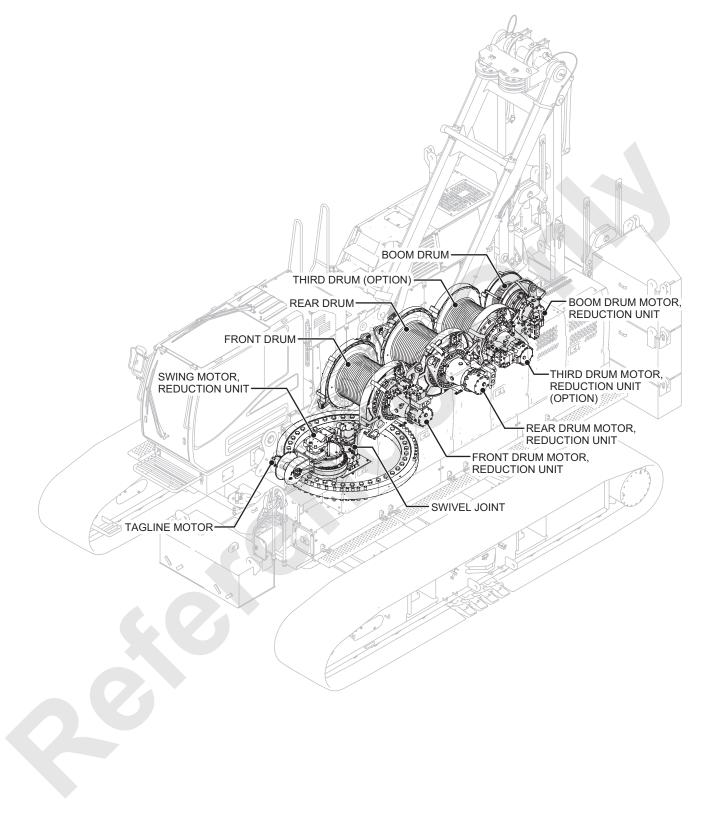
No.6 pump sends hydraulic oil to control circuit.

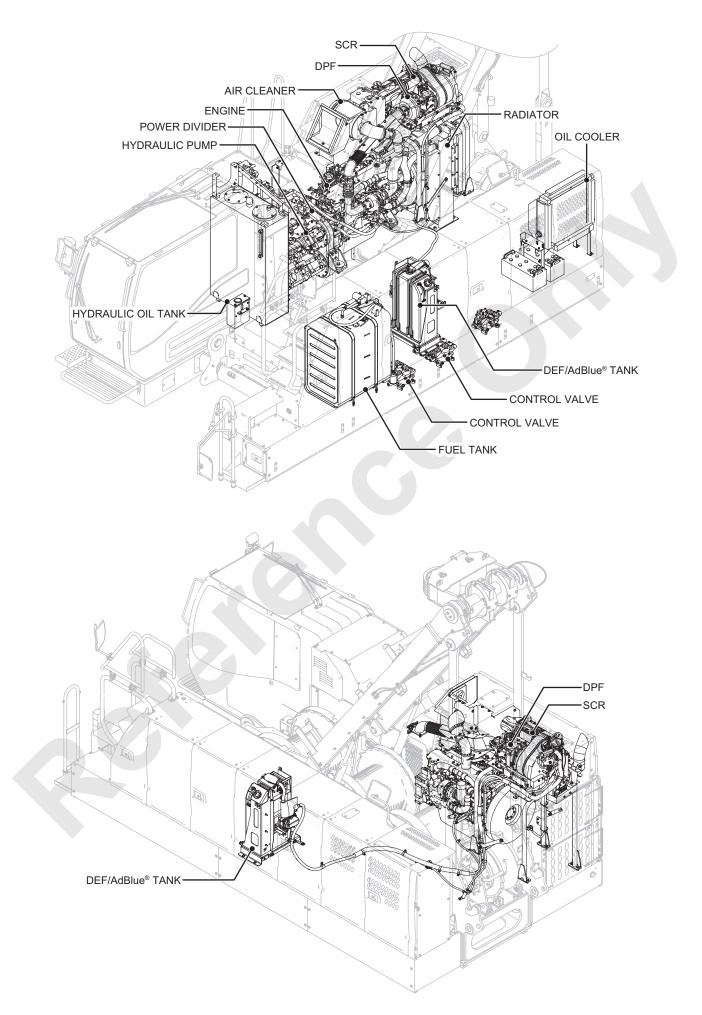
No.7 pump sends hydraulic oil to gantry raising cylinder, crawler extend/retract cylinder and tagline (option) circuit.

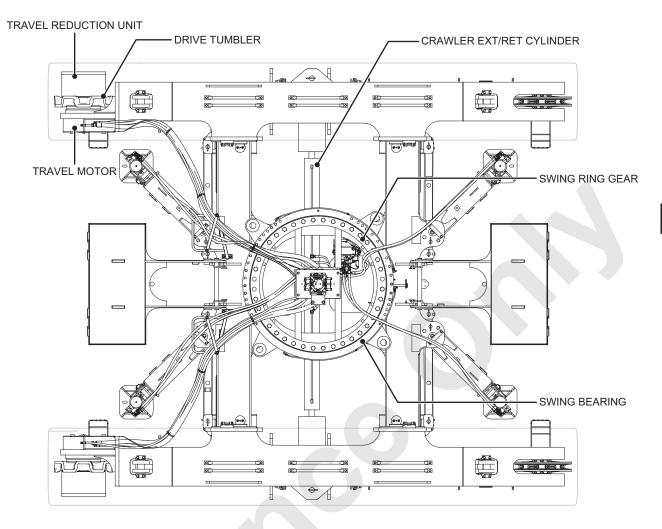


4

# 4.1 APPARATUS AND COMPONENTS LOCATION







# 4.2 ENGINE

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.

# 4.2.1 REMOVAL OF THE ENGINE

Proceed as follows when removing the engine from the machine.

## 

Right after stop the engine, the oils and cooling water of the machine may be extremely hot and may cause scald.

Inspection, replacement, draining and replenishment are to be carry out after cool down.

Failure to observe this precaution may result in a serious injury.

Remove the pump drive assembly together with engine from the base machine.

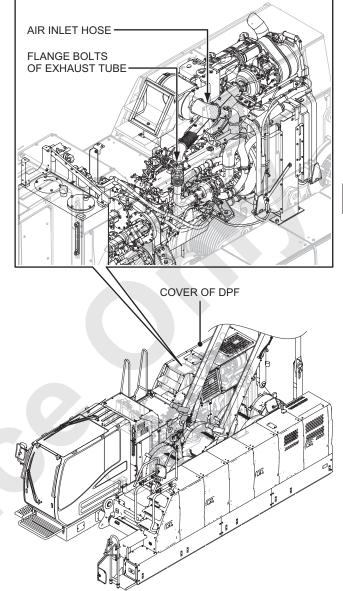
## 

When the oil is cool, warming up the oil to reasonable temperature (approx. 20 to 40  $^{\circ}$ C [68 to 104  $^{\circ}$ F]) and drain the oil.

- 1. Lower the boom on the ground.
- 2. Take out the ground cable first in the battery.
- 3. Drain the hydraulic oil, engine oil and cooling water.
- 4. Remove the cover of the diesel particulate filter and remove the flange bolts (4 pcs.) of the exhaust tube.
- 5. Remove the air cleaner, expansion reservoir and air inlet hoses from the engine.
- The inter-cooler piping is secured on the guard beam. Remove these bolts.
- 7. Remove the electric wiring connectors which are connected to the diesel particulate filter and air cleaner.
- 8. Remove the guard and the engine hood assy. required to remove the engine and pump drive assy.
- 9. Remove the fan shroud from the radiator.
- 10. Remove the hyd. pump piping and label them. Put the cover on all the ports and hoses to prevent from entering of foreign objects.
- 11. Label on the 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 from entering of foreign objects.

- 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.

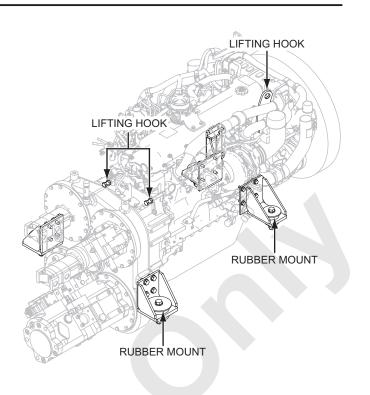


 Lift up the engine and pump drive assy. as one unit slowly and take out from the machine. Weight is approx. 1,250 kg (2,756 lbs).

## 

Take necessary action to prevent overturning of the engine.

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



# 4.2.2 REPAIR AND MAINTENANCE OF THE ENGINE

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

The engine manufacturer	HINO MOT	ORS, LTD.
The engine model	8000-1	J08E-VV
The engine model		JUOE-VV

# 4.2.3 INSTALLATION OF THE ENGINE

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 #263 on the rubber mount holding bolts and tighten to the specified torque.

Front side	360 to 440 N ⋅ m
(Engine cooling fan side)	(266 to 324 ft·lbs)
Rear side	504 to 616 N·m
(Engine flywheel side)	(372 to 454 ft·lbs)

- 5. Install all the hydraulic hoses to the hydraulic pumps.
- Install the fan shroud.
   The clearance between the fan shroud and the fan should be even all around.
- 7. Connect all the electric wirings that were disconnected when the engine was removed.
- 8. Install all the fuel and inter-cooler piping that were removed when the engine was removed.

9. Install the guard, engine hood assembly.

#### 

- The battery generates the flammable hydrogen gas, keep away flammable to prevent an ignition and explosion.
   Failure to observe this precaution may result in serious injuries, property damage or loss of life.
- Do not put the tools or the likes on or near the battery to avoid any sparks.
   Failure to observe this precaution may result in serious injuries, property damage or loss
- of life.If the handling of booster cable is incorrect may cause battery explosion.

Ensure to take correct handling and not to made mistake of ⊕ terminal and ⊝ terminal. Failure to observe this precaution may result in serious injuries, property damage or loss of life.

- Install the air cleaner, expansion reservoir and air inlet hoses that were removed when the engine was removed. Install the exhaust tube and the diesel particulate filter cover.
- 11. Refill the engine with coolant water and engine oil to the required levels.
- 12. Connect the battery cable.

13. Remove the air from the fuel lines.

Loosen the air venting bolt of the fuel filter, move the priming pump forward and back to discharge the air from the fuel system.

## 

The maintenance method differs according to the fuel filter type.

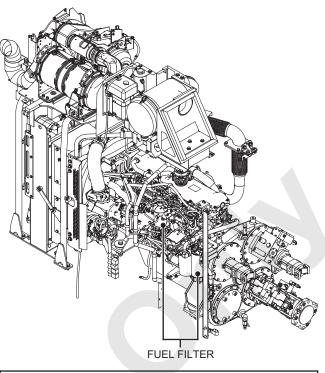
Carefully check the type, then perform the maintenance work.

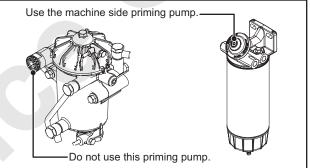
Refer to the article 7 "INSPECTION METHOD OF EACH POINT" of the operator's manual.

#### 

Sound the signal horn to warn the surrounding personnel before starting the engine.

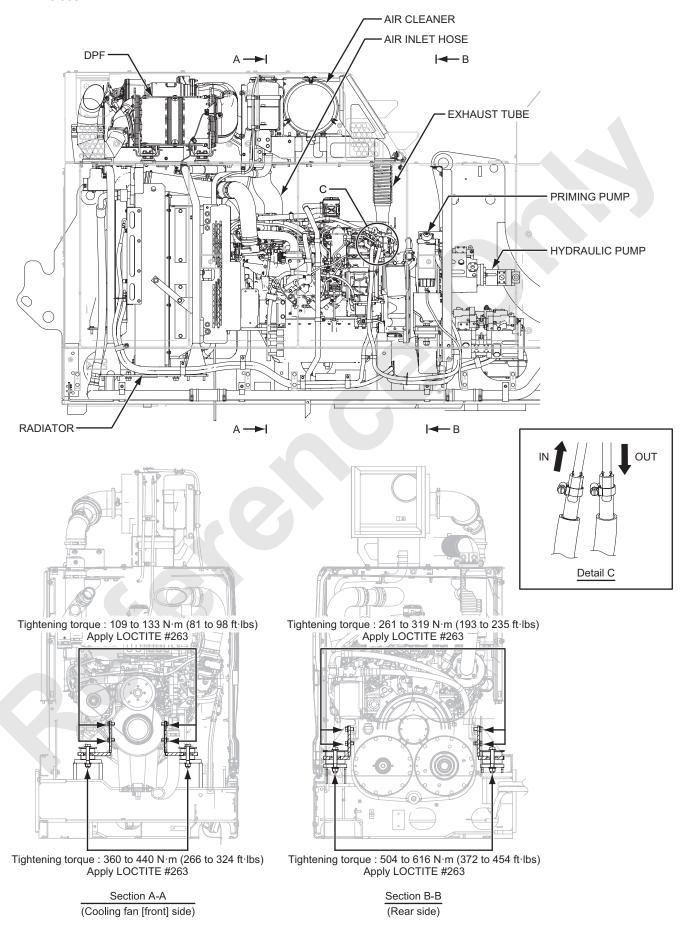
Failure to observe this precaution may result in a serious injury or loss of life.





4

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



# 4.3 **PUMP DRIVE ASSEMBLY**

This chapter explains how to remove, inspect, repair and re-install the pump drive assembly.

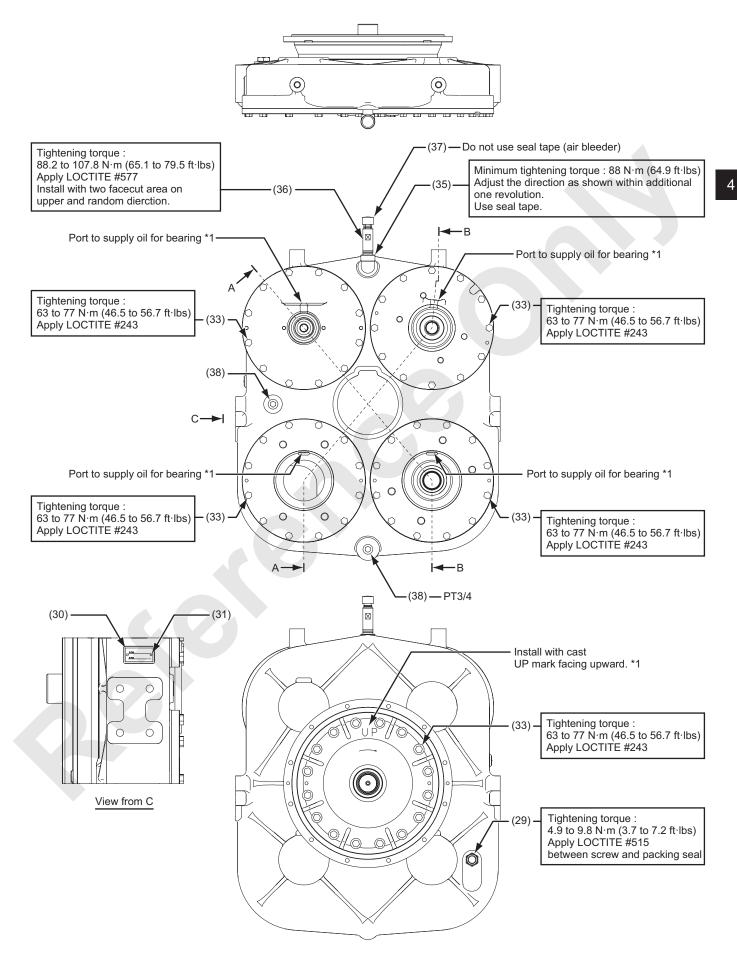
The pump drive assembly is mounted directly onto the rear of the engine.

It consists of a coupling, a power divider, main pumps, and 2 section gear pumps, swing pump and 2 section gear pumps which are connecting to the swing pump. 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 3 sets of helical gears (4 sets when option is selected) to the main pump shaft, swing pump shaft, cooling pump shaft.

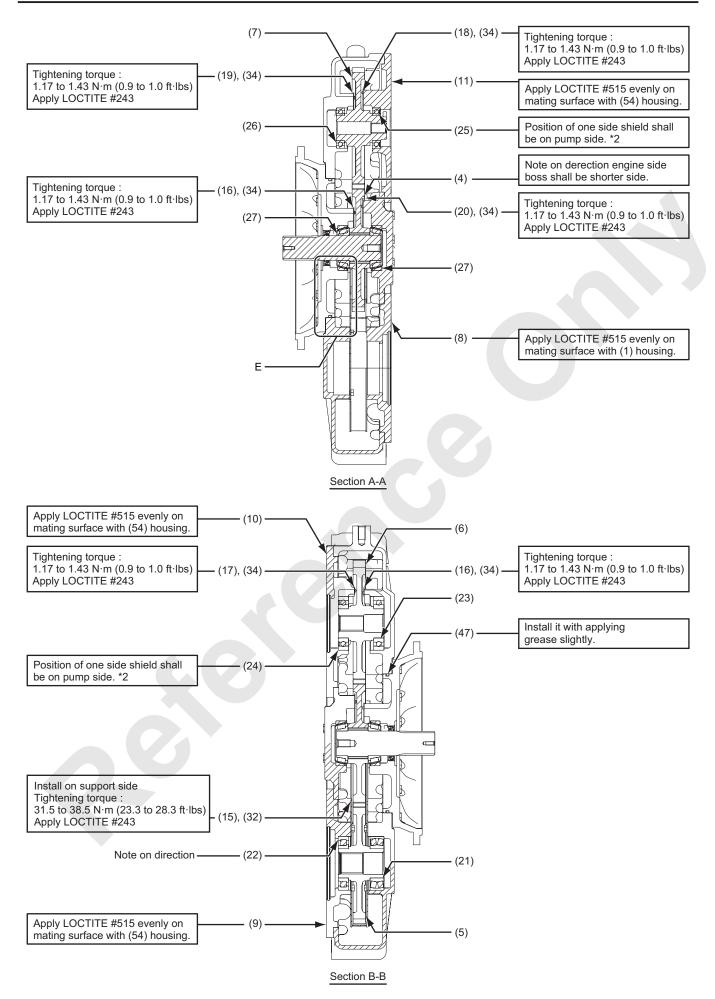
(Closed with the flange when free less is selected.) (Refer to the article "4.3.3 REMOVAL OF EACH PUMP".)

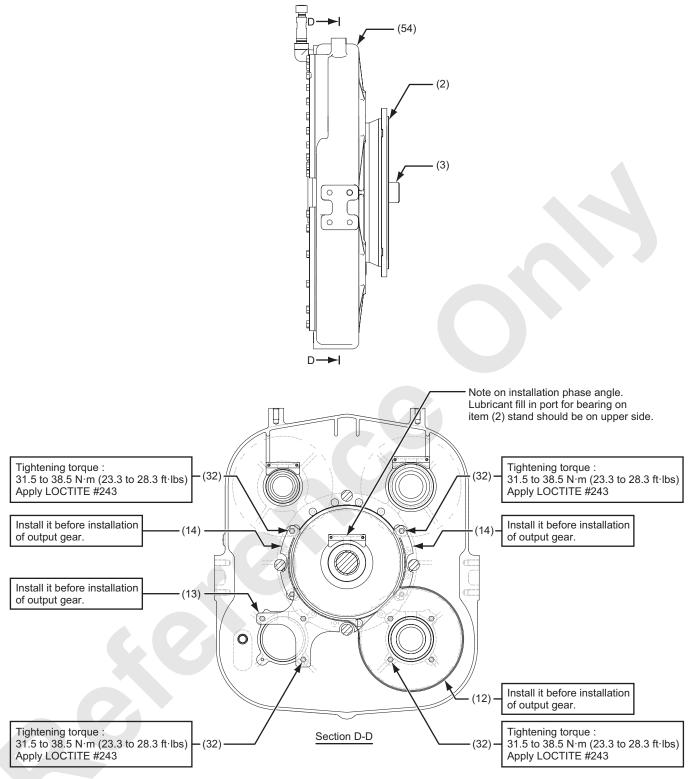
## 4.3.1 CONSTRUCTION OF THE POWER DIVIDER



Published 11-10-17, Control #261-01

#### [4. POWER TRAIN]





#### SHIM (ITEM 39 to 46) ADJUSTING PROCEDURE

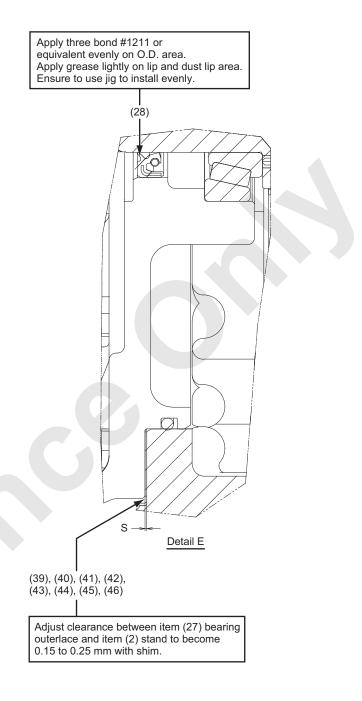
 Assemble (54) housing, (2) stand, (3) shaft and (27) bearing tentatively without inserting the shims.

(47) O-ring and (28) oil seal to be installed to (2) stand after adjustment of shims.

- 2. Place the (54) housing so that (3) shaft is to be faced upward.
- 3. Confirm if the clearance between (54) housing and (2) stand is evenly by checking with thickness gauge and tighten the (33) hex head socket bolt (for mounting the stand) 4 locations at even space.

(Tightening torque 19.4 to 23.6 N·m [14.3 to 17.4 ft·lbs] without LOCTITE)

- 4. Loosen the (33) hex head socket bolt and take them off.
- Rotate the (3) shaft 2 to 3 turns with hand.
   (So that removing the preload from the (27) bearing)
- Measure the clearance between (54) housing and (2) stand with thickness gauge.
- Select the shims (39 to 46) so that the total thickness of shim = Amount of clearance "S" + (0.15 to 0.25) = "X"
- 8. Insert selected shims to the clearance and assemble again tentatively.
- 9. Again rotate the (3) shaft 2 to 3 turns by hand and confirm the (27) bearing has no preload.



#### POWER DIVIDER

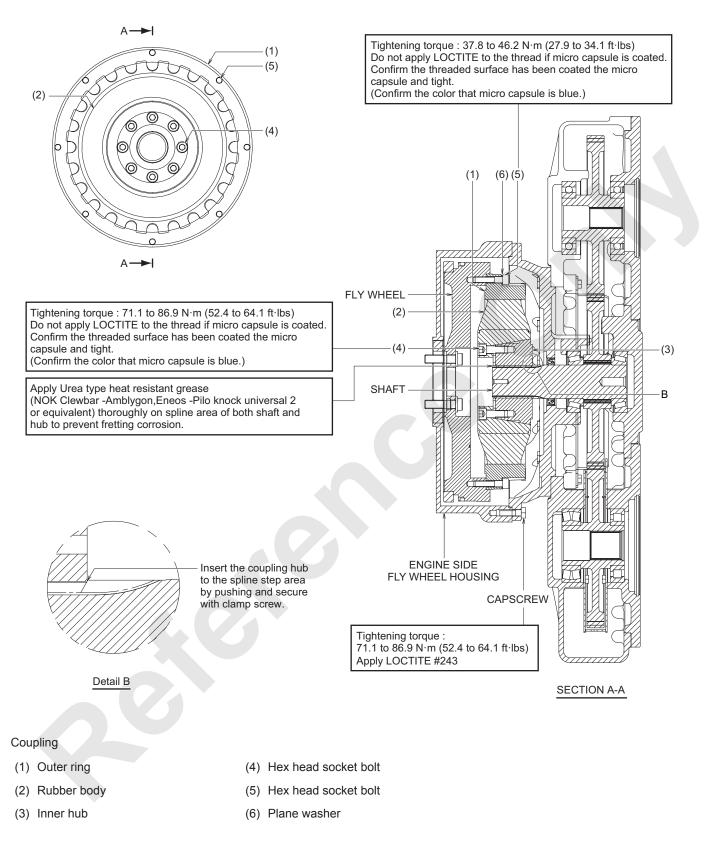
- (2) Stand (3) Shaft (4) Gear (5) Gear (6) Gear (7) Gear (8) Support (9) Support (10)Support (11) Support (12)Plate (13)Plate (14)Plate (15)Plate (16)Plate (17)Plate
- (18)Plate (19)Plate (20)Plate (21) Bearing (22) Roller bearing (23) Ball bearing (24) Ball bearing (25) Ball bearing (26) Ball bearing (27) Roller bearing (28)Oil seal (29) Oil level gauge (30)Plate (31)Rivet (32)Capscrew (33)Capscrew

(34) Machine screw
(35) 90 degrees elbow
(36) Tube
(37) Cap
(38) Plug
(39) Shim
(40) Shim
(40) Shim
(41) Shim
(42) Shim
(43) Shim
(44) Shim
(45) Shim
(46) Shim
(47) O-ring
(54) Housing

\*1 Take note of installation phase angle of pump mounting bolt hole and bearing oil fill port of item (2) stand and item (8), (9), (10), (11) support. (See figure)

\*2 Install item (24), (25) bearing so that position of one side shield becomes on pump mounting side. (See figure)

# 4.3.2 CONSTRUCTION OF THE COUPLING



## 4.3.3 REMOVAL OF EACH PUMP

After the pump drive assembly is removed together with the engine from base machine, remove from the engine as following procedure.

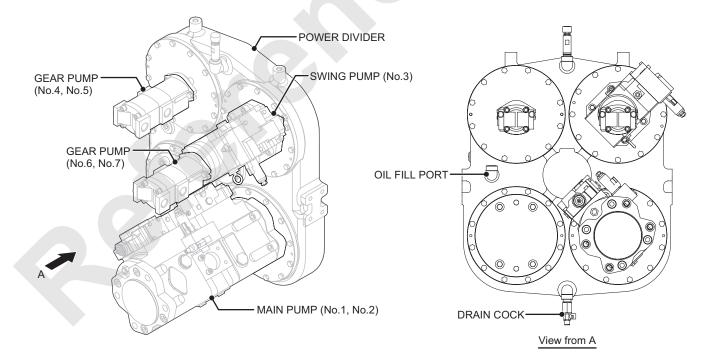
As to removal of the engine is to be referred "4.2.1 REMOVAL OF THE ENGINE"

#### 

Remove the pump drive assembly together with engine from the base machine.

- 1. Drain the oil in the power divider through the port on the lower part of the power divider.
- 2. Remove each pump from the power divider.

Item	No,	Weight
MAIN PUMP	No.1, No.2	143.0 kg (315.0 lbs)
SWING PUMP+GEAR PUMP	No.3+No.6, No.7	57.4 kg (126.5 lbs)
GEAR PUMP (When "with free" is selected)	No.4, No.5	8.4 kg (18.5 lbs)

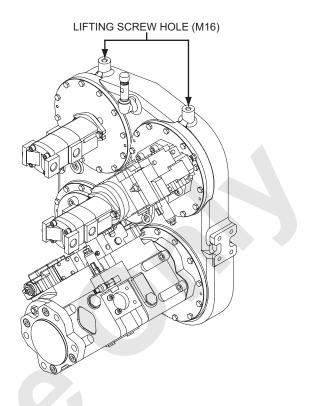


# 4.3.4 REMOVAL OF THE POWER DIVIDER

 Attach the appropriate capacity of appropriate lifting gear to the threaded holes of power divider. (Thread size of hole: M16)

Remove the capscrew which are mounted on the flywheel of the engine and slowly shift the power divider toward to the rear of the engine and remove the power divider after disengage the coupling.

Weight of the power divider (Dry) : Approx. 210 kg (465 lbs)

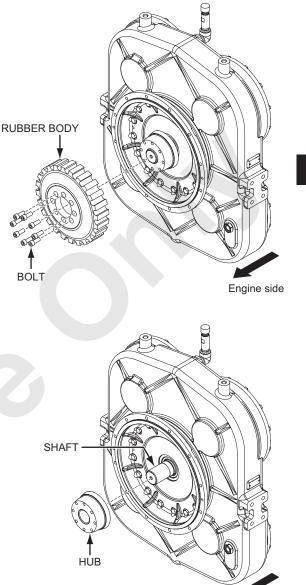


- The main part of this coupling are installed on the center shaft of the power divider and will be removed together with the power divider. Remove the coupling outer ring which is remaining on the flywheel side.
- \* The parts which remain to the flywheel side are outer ring and bolts/washers for mounting.

4

# 4.3.5 REMOVAL OF THE COUPLING

 Loosen the mounting bolts and remove only rubber body of the coupling. The outer ring of the coupling is secured to the engine side.



2. Draw the hub out from the shaft.



# 4.3.6 DISASSEMBLING THE POWER DIVIDER

Proceed as follows when disassembling the power divider.

Refer to "4.3.1 CONSTRUCTION OF THE POWER DIVIDER" or corresponding numbers in the explanation below.

- 1. Place the power divider on the block facing the flywheel side up.
- 2. Remove the (33) capscrews and remove the (2) stand using two pull out screw holes (M10) of the (2) stand.
- Remove the (28) oil seal and the outer race of the (27) taper roller bearing from the (2) stand and then take out the (39) to (46) shims. In this time, keep the (39) to (46) shim as a set. If required, remove the (34) screw and the (16) plates.
- 4. Remove the (3) shaft and drive (4) gear as an assy.If required, pull out the inner race of both side (27) taper roller bearings and then pull out the drive (4) gear.
- Pull out the outer race of the (27) taper roller bearing from the (1) housing.
   If required, remove the (34) screws and the (20) plate.
- 6. Place the power divider on the block facing the pump side up.
- 7. Remove the (33) capscrews and the (8) support using two pull out screw holes (M10) of the (8) support.
- 8. Remove the (32) capscrews and the (13) plate.
- Remove the (33) capscrews and the (9) support using two pull out screw holes (M10) of the (9) support.
   If required, remove the (32) capscrews and the (15) plate.
- 10. Remove the (5) gear and both side (21), (22) bearings if required.

- 11. Remove the (32) cap screw and the (12) plate.
- 12. Remove the (33) capscrews and remove the (10) support using two pull out screw holes (M10) of the (10) support.If required, remove the (34) screws and the (17) plate.
- Remove the (6) gear and both side (23), (24) bearings .
- 14. If required, remove the (34) screws and the (16) plate.
- 15. Remove the (33) capscrews and the (11) support using two pull out screw holes (M10) of the (11) support.If required, remove the (34) screws and the (18) plate.
- 16. Remove the (7) gear and if required, remove both side (25), (26) bearing.
- 17. If required, remove the (34) screws and the (19) plate.
- 18. If required, remove the (32) capscrews and (14) plate.

4

# 4.3.7 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.
- Check bearing balls, rollers, inner and outer races to see that they are free from pitching and scratches. Replace bearing if any defect is observed.
- Bearings with no pitching or scratches should be coat the lubrication oil slightly, but replace any bearings that develop rattles due to excessive clearances toward the axial direction or circumferential direction.
- Check the bearings' outer and inner races. Replace if any indications of slipping and/or rolling.
- 5. Check the teeth of all the gears and replace if any pitching, scratch, signs of friction wear, peeling or cracking.
- Check the shafts and replace any with signs of cracking, deformation, wear at contact surfaces or bearing slippage are observed.
- Check the splines of the shafts and gears. Replace or fix if any cracking, signs of wear or impact damage are observed.
- 8. Check the bearing casings and replace if any slip wear or other deformations.
- 9. Check the gear case and replace or fix if any cracks, deformation or scratches.
- 10. All the O-rings and oil seals should be replaced with new ones.
- 11. Check capscrew and screw hole threadings and replace or repair if any signs burr or permanent strain on the threads.
- 12. Take out the breather cap and clean in the pipe and check the orifice hole for clogging.

## 4.3.8 ASSEMBLING THE POWER DIVIDER

Assembling the power divider is in reverse order of disassembling.

Take extra care on the following points in assembling. Refer to "4.3.1 CONSTRUCTION OF THE POWER DIVIDER" for corresponding numbers in the explanation below.

- Apply clean oil on each part and then assemble. But ensure to remove any oil on the mating face of the (1) housing, the (2) stand and the (8) to (11) support and apply LOCTITE #515 evenly on these face and also apply LOCTITE #243 on the (33) capscrews and tighten them to torque 63 to 77 N·m (46.5 to 56.7 ft·lbs).
- When assembling the (3) shaft, the (4) drive gear, the (27) taper roller bearing and the (2) stand, adjust the clearance shown in "4.3.1 CONSTRUCTION OF THE POWER DIVIDER" to become 0.15 to 0.25 mm with the (39) to (46) shims.
- Install the (2) stand and the (8) to (11) support to the (1) housing to make oil groove comes to the position as shown in "4.3.1 CONSTRUCTION OF THE POWER DIVIDER" (UP cast mark upward)
- 4. After assembly, check that the input shaft turns lightly by hand.

## 4.3.9 INSTALLATION OF THE COUPLING

1. Push the hub in until contact to the step of the shaft (spline).

Note

# Apply Urea type heat resistant grease to the spline of the shaft and hub to prevent the fretting corrosion.

The hub is to be secured its deformation to the shaft, therefore if it is used once may be difficult to reuse.

If the hub originally installed is removed, replace with new one.

2. Install the rubber body of the coupling to the hub and tighten the mounting bolts with specified torque.

(Tightening torque : 71.1 to 86.9 N·m (52.4 to 64.1 ft·lbs)

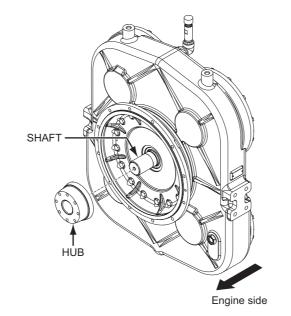
The outer ring of the coupling is secured to the engine side.

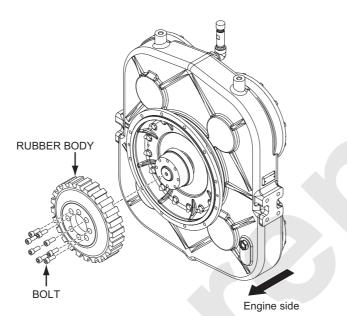


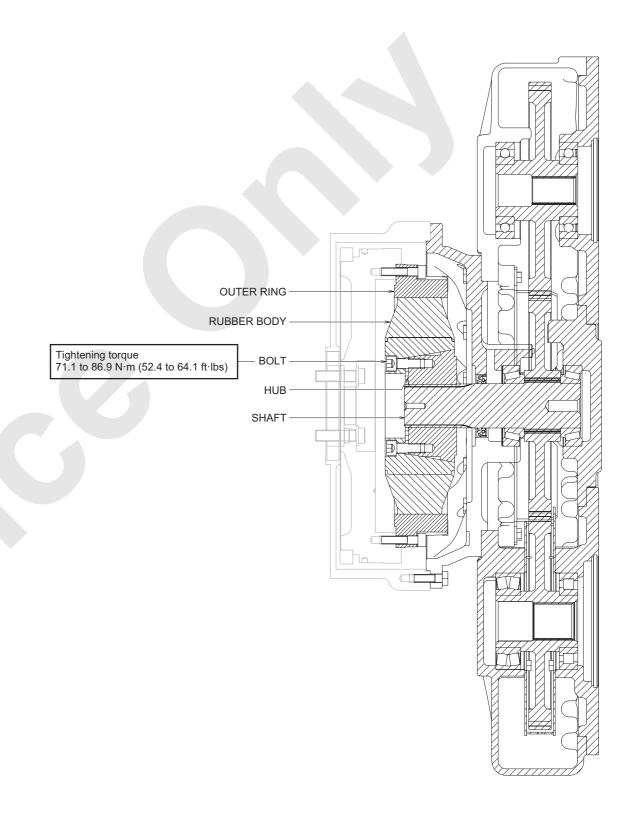
Confirm the threaded surface has been coated the micro capsule and tight.

Do not apply LOCTITE to the thread if micro capsule is coated.

If the bolt is to be reused, apply LOCTITE #243. Wipe off excess LOCTITE thoroughly to avoid adhesive to the rubber body scatters by rotation





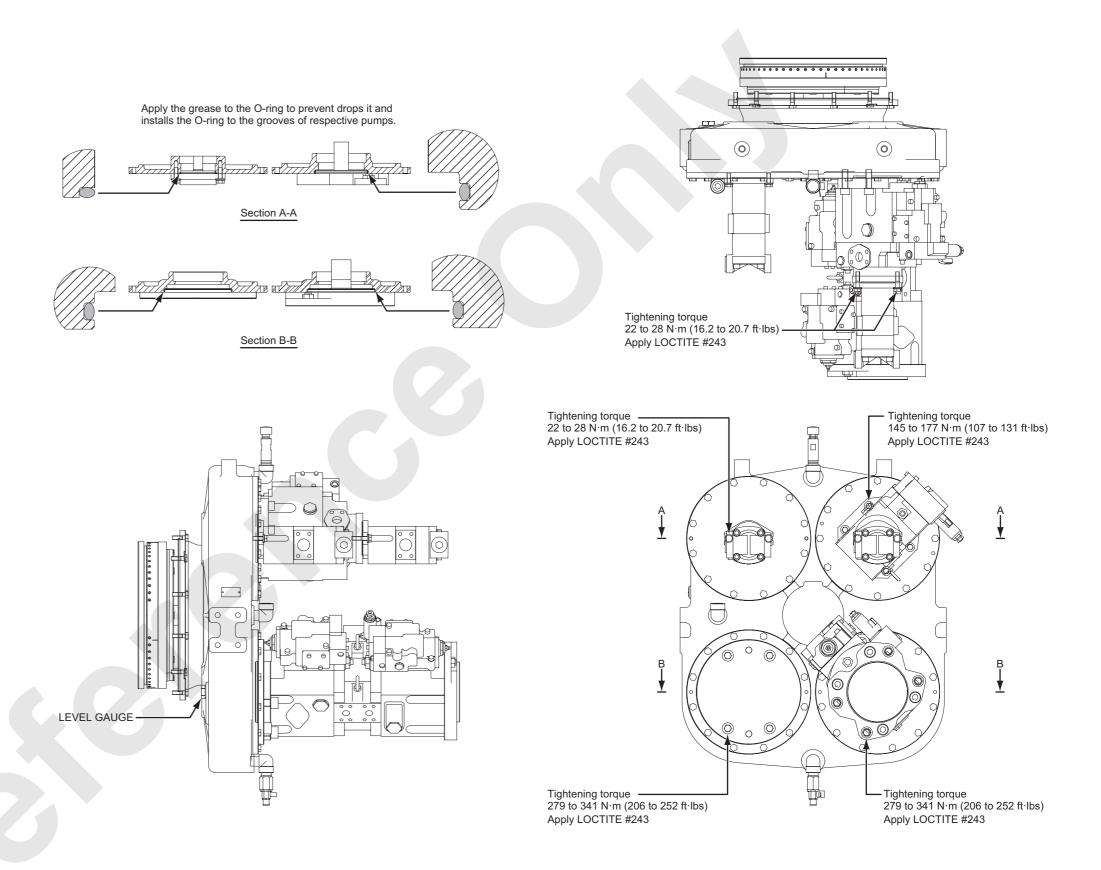


## 4.3.10 INSTALLATION OF EACH PUMP

- 1. Apply the grease to the O-ring to prevent drops it and installs the O-ring to the grooves of respective pumps.
- 2. Refer with the right figures; install each pump with the specified tightening torque.
- Fill the lubricant to the specified level of the power divider and install a plug to the fill port. (More than red rounded mark of the level gauge and within the visible range of the oil level from the level gauge.)

	Oil Level hall be ubove red mark point
	on the level gauge, and be within the
Oil Amount	range where level can be visually
	checked
	(Approx. 10.7 L [2.8 gal])
	Extreme pressure gear oil #90
Specified Oil	Grade GL-3 by API classification

- 4. Refer to the article "4.2.3 INSTALLATION OF THE ENGINE", Install engine and pump drive assembly as one unit to the machine.
- 5. Start the engine with low idling and confirm if any abnormal sounds, oil leakages etc.

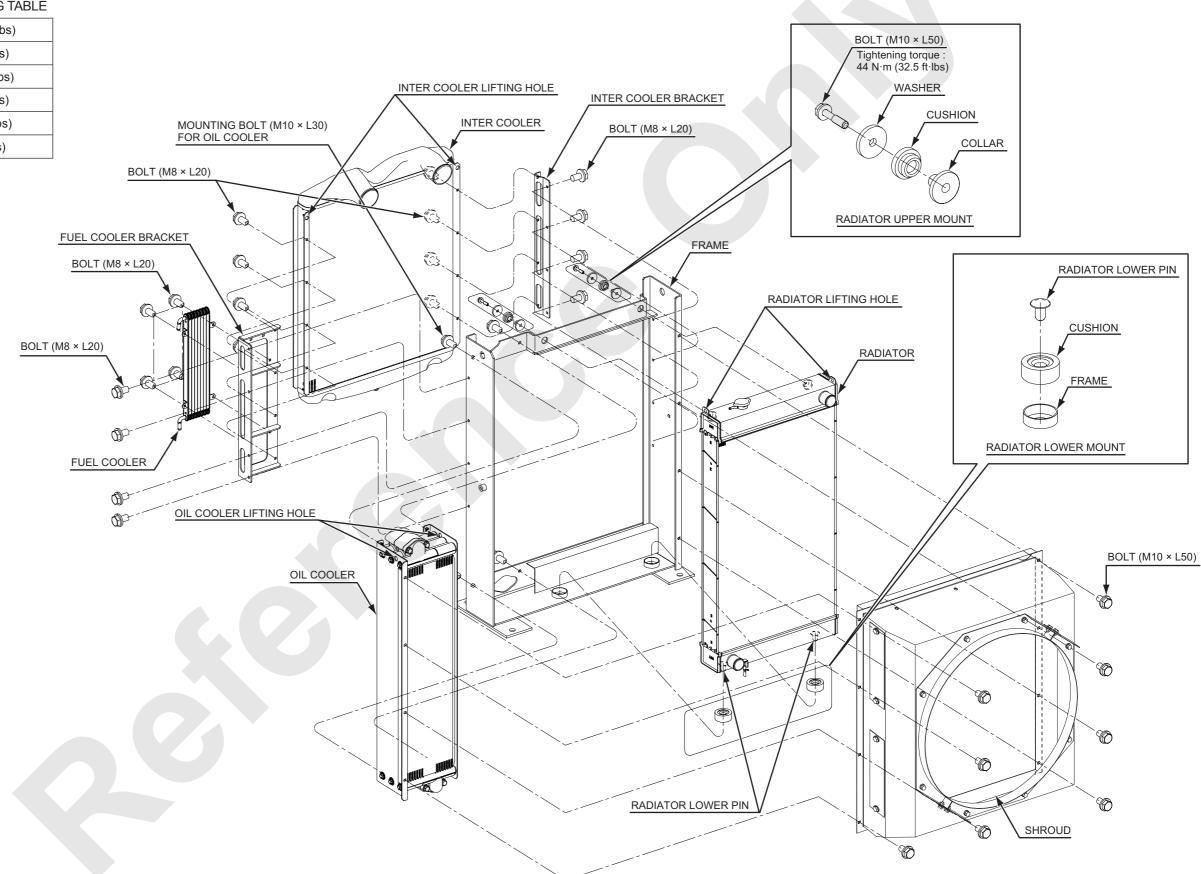


# 4.4 ASSEMBLY AND DISASSEMBLY OF RADIATOR

# 4.4.1 CONSTRUCTION OF THE RADIATOR

#### THE WEIGHT OF EACH PARTS FOLLOWING TABLE

Radiator assy	150 kg (335 lbs)
Radiator	25 kg (55 lbs)
Inter-cooler	24.5 kg (54 lbs)
Oil cooler	30 kg (66 lbs)
Frame	51 kg (112 lbs)
Shroud	8 kg (18 lbs)



# 4.4.2 REPLACEMENT ORDER OF RADIATOR CORE

#### Note

Removal of the oil cooler is not required.

#### 

up.

All the cores are made of aluminum. Ensure not to apply any nicks or gouges.

- Remove the shroud and the inter-cooler. Lift and hold the inter-cooler when removing it's mounting blots.
- 2. Remove the bolts (2 pcs) for radiator mount.
- Hooking to the lifting holes provided at both end of the radiator and lift up the core to right above direction.
   In case of removal of the fuel cooler and oil cooler, remove the bolts (4 pcs) and pull them
- 4. Align the radiator lower pin and the lower cushion and insert the radiator core.
- Fix the radiator upper mount portion as described in the drawings while lifting the radiator core. The female thread for the mounting bolt is helicoid insert, take extreme care of tightening torque when the bolting up. M10 bolt (for helicoid insert) tightening torque : 44 N·m (32.5 ft·lbs)
- 6. Install the shroud and the inter-cooler.
- 7. The tightening torque for each bolts, see following table.

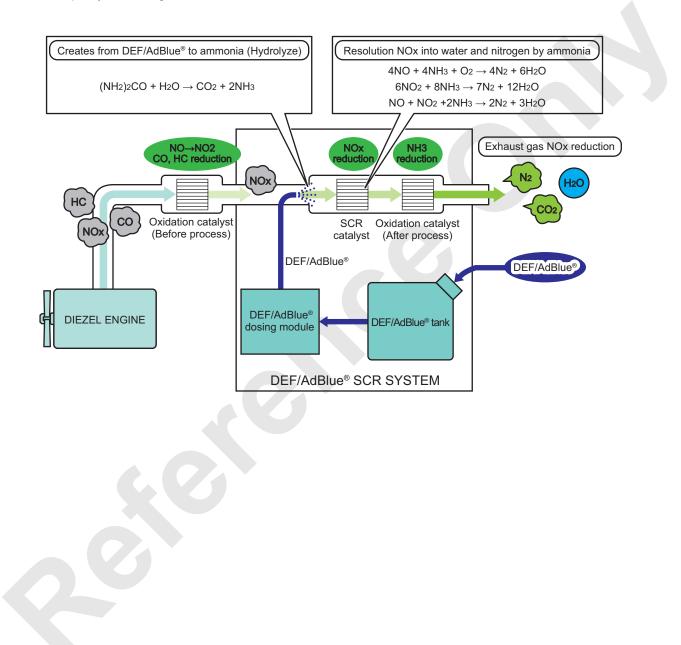
Size	Tightening torque
M8	16 to 34 N·m (11.8 to 25.1 ft·lbs)
M10	34 to 74 N⋅m (25.1 to 54.6 ft lbs)
M12	55 to 123 N⋅m (40.6 to 90.7 ft⋅lbs)

# 4.5 DEF/AdBlue<sup>®</sup> SCR SYSTEM

DEF/AdBlue<sup>®</sup> SCR system is a system for emission control.

The emission from diesel engine creates NOx due to oxidize of nitrogen in the air.

DEF/AdBlue<sup>®</sup> system is to split poisonous NOx into nitrogen and water by injection with DEF/AdBlue<sup>®</sup> in the muffler and purify exhaust gas.



Handling of DEF/AdBlue®

 DEF/AdBlue<sup>®</sup> is the product from the industrial urea solution is dissolved with the pure water of which is colorless and transparent 32.5% urea solution.

Urea solution is colorless and harmless liquid and widely used for cosmetics, pharmaceuticals and fertilizers.

DEF/AdBlue<sup>®</sup> is the safe and harmless product, not require any official qualification to handle it.

 DEF/AdBlue<sup>®</sup> is not specified as dangerous article and/or poison and powerful drugs.
 It is possible to store the goods under the general climate in the world for long period.
 However, should not be exposed to direct sunlight and keep in well ventilated place.

- DEF/AdBlue<sup>®</sup> is frozen at -11°C (12°F) with urea solution temperature.
- The pot life of DEF/AdBlue<sup>®</sup> is differ with stored temperature as shown below.

Stored Temperature °C (°F)	Pot Life
0 (32)	×
10 (50)	75 years
20 (68)	11 years
30 (86)	23 months
40 (104)	4 months
50 (122)	1 month
60 (140)	1 week

#### 

Use the DEF/AdBlue<sup>®</sup> only.

Use other than specified DEF/AdBlue<sup>®</sup> or dilute with water, not only degradation in processing performance but also may resulted in damage the engine internal parts and other components. In case of replenished other than DEF/AdBlue<sup>®</sup> in mistake, contact authorized Manitowoc distributor

immediately.

After run control of DEF/AdBlue®

 When dosing of DEF/AdBlue<sup>®</sup> is stopped due to stop the engine, there is a control system to sucking back the DEF/AdBlue<sup>®</sup> from remaining DEF/AdBlue<sup>®</sup> in the lines.

If the DEF/AdBlue<sup>®</sup> is remains in the lines may be it frozen at cold or crystallized by dryness and may lead to malfunction.

- The pumping sound can be hear after stop the engine but it is not the failure.
- When removing battery lines or disconnect wire harness/connectors at maintenance, wait until after run control is completed.

If disconnect the battery line before completion of the after run, lead to the engine output limitation may be functioned.

As to frozen of DEF/AdBlue®

- DEF/AdBlue<sup>®</sup> is frozen at -11°C (12°F) with urea solution temperature.
- When judged as frozen by the respective temperature sensor, circulate the engine cooling water to the DEF/AdBlue<sup>®</sup> tank, DEF/AdBlue<sup>®</sup> supply module and DEF/AdBlue<sup>®</sup> lines as defreeze function is activate and melting the frozen DEF/AdBlue<sup>®</sup>.
- When frozen DEF/AdBlue<sup>®</sup> is judged as melt, inject DEF/AdBlue<sup>®</sup> when the injection condition is satisfied.
- Even when the DEF/AdBlue<sup>®</sup> is above -11°C (12°F), start the thermal function to the DEF/AdBlue<sup>®</sup> tank and DEF/AdBlue<sup>®</sup> lines if the DEF/AdBlue<sup>®</sup> is cold enough.

When disconnect the DEF/AdBlue® lines

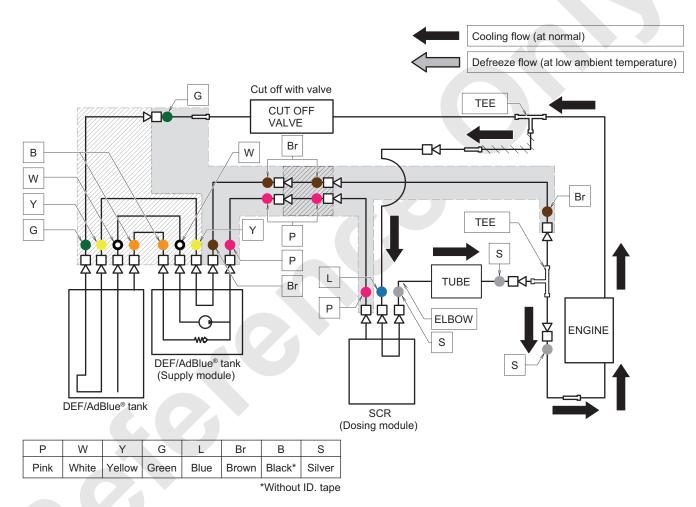
- When remove the heat insulation on the DEF/ AdBlue<sup>®</sup> lines, ensure to furnish in proper position for avoid frozen of DEF/AdBlue<sup>®</sup>.
- When disconnect the DEF/AdBlue<sup>®</sup> lines, install them without breaking, bending and kinking.
- When disconnect the DEF/AdBlue<sup>®</sup> lines, start the engine within 10 seconds after the key on for test run and confirm no engine cooling water leakage.

Due to the length of DEF/AdBlue<sup>®</sup> lines, repeat this task 2 to 3 times.

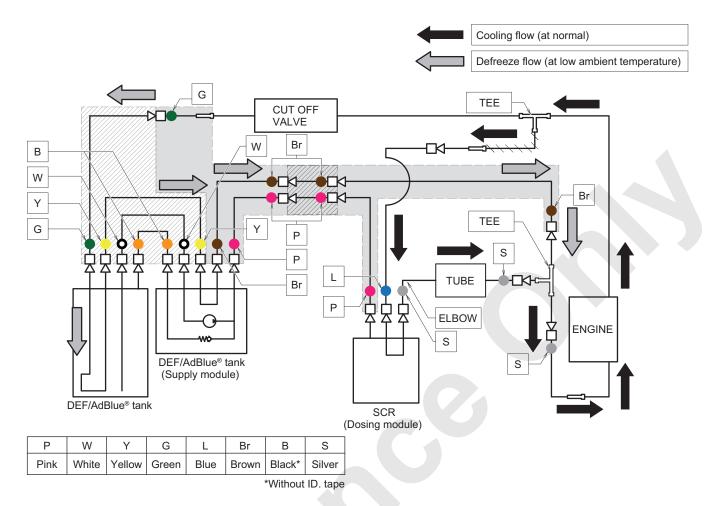
The cooling water shut valve opens 20 seconds after the key on regardless of ambient temperature and the cooling water flows as defreeze. When dismantle the DEF/AdBlue<sup>®</sup> dosing module, DEF/AdBlue<sup>®</sup> supply module and DEF/AdBlue<sup>®</sup> sensor

When dismantle the DEF/AdBlue<sup>®</sup> dosing module, DEF/AdBlue<sup>®</sup> supply module and DEF/ AdBlue<sup>®</sup> sensor, confirm engine cooling water level. If it is diminish in quantity, replenish the engine cooling water to FULL position and start the engine within 10 seconds and repeat 2 to 3 times.

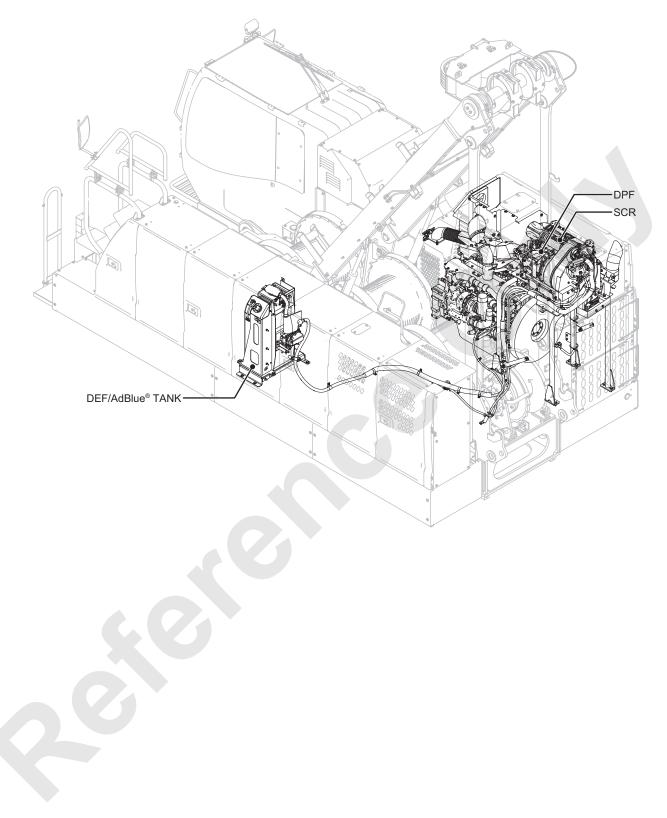
#### FLOW WHEN THE AMBIENT TEMPERATURE IS HIGH



#### FLOW WHEN THE AMBIENT TEMPERATURE IS LOW



## 4.5.1 DEF/AdBlue® TANK



### 1. DEF/AdBlue® tank removal

Discharge contents in the DEF/AdBlue<sup>®</sup> tank and clean inside of DEF/AdBlue<sup>®</sup> tank and DEF/ AdBlue<sup>®</sup> sensor.

To discharge the contents in the DEF/AdBlue<sup>®</sup> tank, suck up contents with a siphon pump which available in the market from the fill port.

Residual quantity of the contents is to be discharge from the drain port by removing the drain plug.

Use 10 mm hexagon head socket wrench for removing the drain plug.

When reinstalling it, attach a O-ring on the plug.

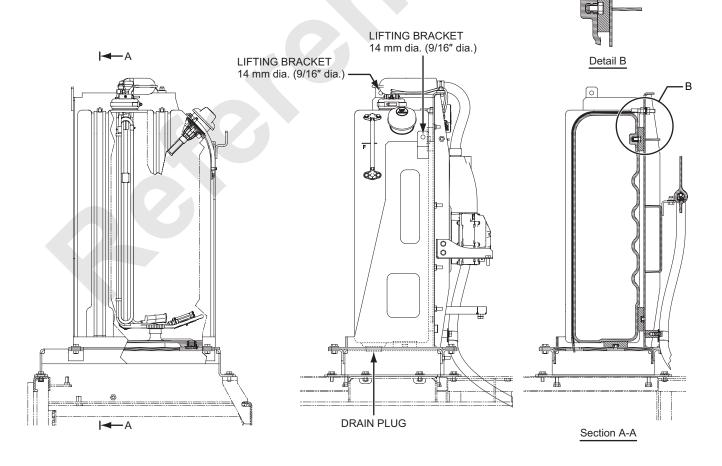
DEF/AdBlue® Tank	Mass	Approx. 72 kg (159 lbs)
	Volume	Approx. 60 L (15.9 gal)

Т

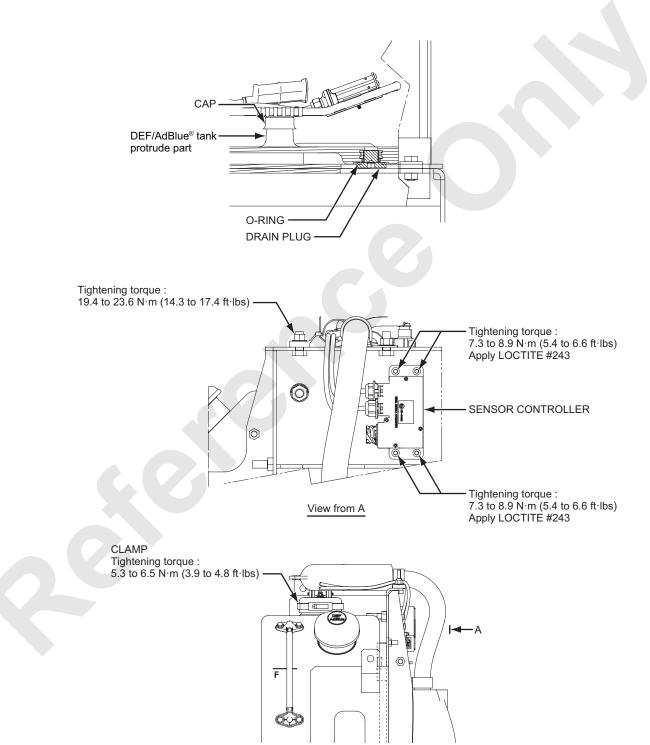
Tightening torque : 5.2 to 6.4 N·m (3.8 to 4.7 ft·lbs)

35.6 to 43.4 N·m (26.3 to 32 ft·lbs)

Tightening torque :



- 2. Sensor installation
- (1) Insert a DEF/AdBlue<sup>®</sup> sensor cap to the protrude part of the tank bottom.
- (2) Apply LOCTITE #243 to the mounting bolts for sensor controller and tighten with 7.3 to 8.9 N⋅m (5.4 to 6.6 ft·lbs).
- (3) Tighten the clamp on the sensor installation part with 5.3 to 6.5 N·m (3.9 to 4.8 ft·lbs).



## 4.5.2 INDUCEMENT CONTROL SYSTEM

An inducement control is to be issued a warning display, alarming and decreasing machine output when the emission control is not functioned properly or possibility of malfunction.

And this control system urges to return to the normal condition.

The engine output decreases depending on the contents of occurrence and become difficult to operate as normal work.

The engine output will be limited by the inducement control when faced following conditions.

- DEF/AdBlue® level becomes lower.
- DEF/AdBlue® quality becomes deteriorated.
- Parts of SCR system failure.

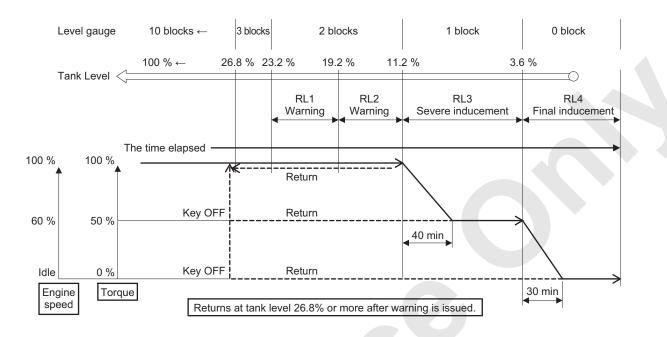
The engine output limitation differs depend on respective conditions.

10	N RI	=
JU	0	

		Conditions		Normal	RL1	RL2	RL3	RL4
	DEF/AdBlue <sup>®</sup> tank	Conditions		_	Warnig	Warning	Severe inducement	Final inducement
1	level warning	Engine speed	At max. torque (rpm)	2,100	2,100	2,100	1,680	800
		Engine loading ratio	Max. load ratio at limitation (%)	100	100	100	50	0
				Normal	RQ1	-	RQ3	RQ4
2	DEF/AdBlue <sup>®</sup> quality	Cor	nditions	_	Warning	-	Severe inducement	Final inducement
2	abnormal warning	Engine speed	At max. torque (rpm)	2,100	2,100		1,680	800
		Engine loading ratio	Max. load ratio at limitation (%)	100	100	_	50	0
	DEF/AdBlue® SCR	DEF/AdBlue <sup>®</sup> SCR Conditions		Normal		TF2	TF3	TF4
2	failure warning			-	_	Warning	Severe inducement	Final inducement
3	SCR system failure Engine     EGR system failure speed	-	At max. torque (rpm)	2,100	_	2,100	1,680	800
	· NOx control abnormal	Engine loading ratio	Max. load ratio at limitation (%)	100	_	75	50	0

1. DEF/AdBlue® tank level lower

The output limitation will be limited step by step as follows. Replenish with specified DEF/AdBlue<sup>®</sup> immediately.



(1) DEF/AdBlue® tank level lower

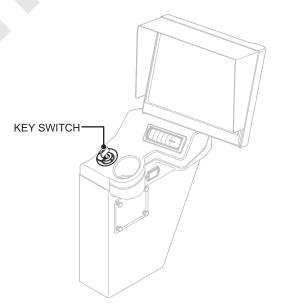
(The method of release when display RL1 or RL2 on the monitor)

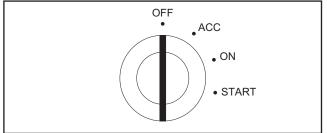
When warning is displayed, follow the instruction below in order.

- (A) Turn a key switch to OFF position.
- (B) Replenish the DEF/AdBlue<sup>®</sup> (20 L [5.3 gal] or more)
- (C) Turn the key to ON position and confirm if the warning has been released.

(After replenish the DEF/AdBlue<sup>®</sup> of which reflects to the monitor may be required few minutes)

If in case the warning is still existed, confirm the residual DEF/AdBlue<sup>®</sup> is more than 3 blocks and repeat the above steps (A) to (C)





 (2) DEF/AdBlue<sup>®</sup> tank level lower (The method of release when display RL3 or RL4 on the monitor)

When warning is displayed, follow the instruction below in order.

- (A) Turn a key switch to OFF position.
- (B) Replenish the DEF/AdBlue<sup>®</sup> (20 L [5.3 gal] or more)
- (C) Turn the key to ON position and confirm if the warning has been released.

(After replenish the DEF/AdBlue<sup>®</sup> of which reflects to the monitor may be required few minutes)

If in case the warning is still existed, confirm the residual DEF/AdBlue<sup>®</sup> is more than 3 blocks and turn the key switch to OFF again.

(D) Confirm the acceleration grip is in low idle and control levers are in neutral position.

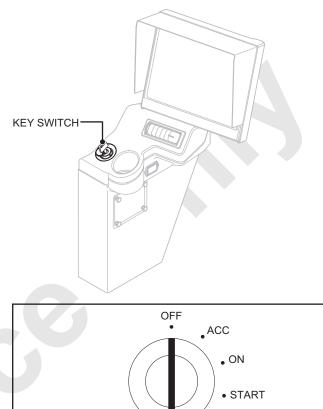
If in case of the G engine mode is selected, change to power mode.

(As for the G engine mode, refer to the article 2 "HOOK HOISTING / LOWERING OPERATION" of the operator's manual.)

- (E) Start the engine and confirm if the engine speed limit has been released.(Turn the acceleration grip and the engine
- speed correspond with the grip.)(F) If no warning is issued and the engine output limitation is released at step (E), normal returned already.

If in case the engine output is not released, turn the key switch to OFF position once, repeat the steps (D) and (E).

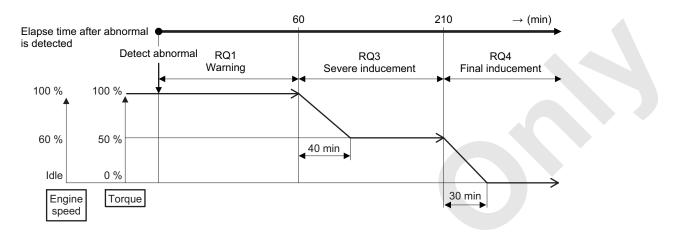
	J08E		
Our difference		Normal	
	Conditions		
Engine speed At max. torque (rpm)		2,100	
Engine loading ratio Max. load ratio at limitation (%)		100	



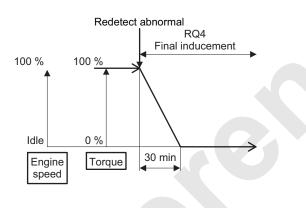
2. Deteriorate the DEF/AdBlue® quality

The output limitation will be limited step by step as follows. Replace with specified DEF/AdBlue<sup>®</sup> immediately.

• First time and at 40 hours elapsed after normal return



• Redetect within 40 hours elapsed after normal return



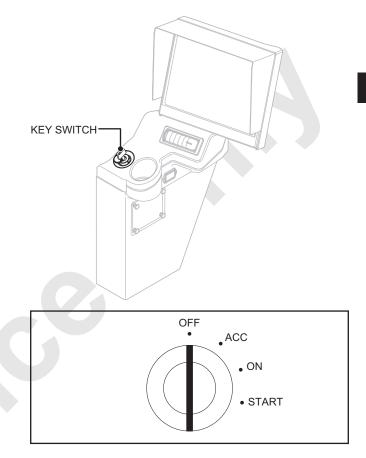
 Deteriorate the DEF/AdBlue<sup>®</sup> quality (The method of release when display RQ1 on the monitor)

When warning is displayed, follow the instruction below in order.

- (A) Turn the key switch to OFF position.
- (B) Drain the DEF/AdBlue<sup>®</sup> from the tank and fill the specified DEF/AdBlue<sup>®</sup> 20 L (5.3 gal) or more.
- (C) Turn the key to ON position and confirm if the warning has been released.

(Require to release the warning approx. 5 to 10 minutes)

If in case the warning is still existed, confirm the residual DEF/AdBlue<sup>®</sup> is more than 3 blocks and repeat the above steps (A) to (C).



 (2) Deteriorate the DEF/AdBlue<sup>®</sup> quality (The method of release when display RQ3 or RQ4 on the monitor)

When warning is displayed, follow the instruction below in order.

- (A) Turn the key switch to OFF position.
- (B) Drain the DEF/AdBlue<sup>®</sup> from the tank and fill the specified DEF/AdBlue<sup>®</sup> 20 L (5.3 gal) or more.
- (C) Turn the key to ON position and confirm if the warning has been released.
  (Require to release the warning approx. 5 to 10 minutes)
  If in case the warning is still existed, confirm the residual DEF/AdBlue<sup>®</sup> is more than 3 blocks and repeat the above steps (A) to (C).
- (D) Turn the key switch to OFF position again.
- (E) Confirm the acceleration grip is in low idle and control levers are in neutral position.If in case of the G engine mode is selected,

If in case of the G engine mode is selected, change to power mode.

(As for the G engine mode, refer to the article 2 "HOOK HOISTING / LOWERING OPERATION" of the operator's manual.)

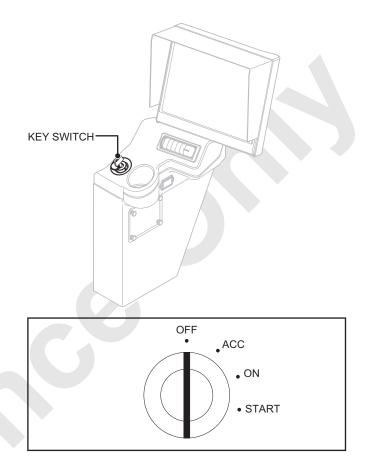
 (F) Start the engine and confirm if the engine speed limit has been released.
 (Turn the appeleration grip and the engine

(Turn the acceleration grip and the engine speed correspond with the grip.)

(G) If no warning is issued and the engine output limitation is released at step (F), normal returned already.

If in case the engine output is not released, turn the key switch to OFF position once, repeat the steps (E) and (F).

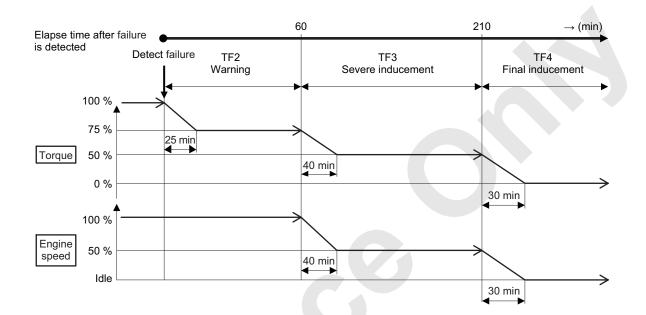
	J08E	
	Normal	
	_	
Engine speed At max. torque (rpm)		2,100
Engine loading ratio Max. load ratio at limitation (%)		100



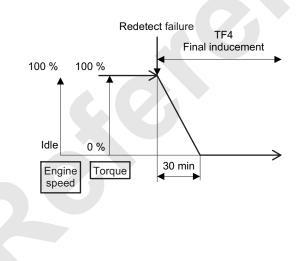
3. SCR system parts failure

The output limitation will be limited step by step as follows. Contact authorized Manitowoc distributor immediately for repair.

• First time and at 40 hours elapsed after normal return



Redetect within 40 hours elapsed after normal return



(1) SCR system parts failure (The method of release when display TF2, TF3 or TF4 on the monitor)

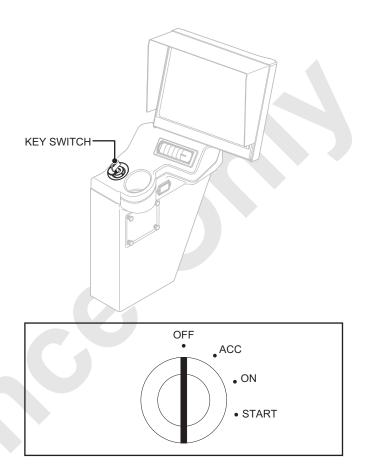
When warning is displayed, follow the instruction below in order.

- (A) Turn the key switch to OFF position.
- (B) Specify the failure location and repair it.
- (C) Turn the key to ON position and confirm if the warning has been released.
- (D) Turn the key switch to OFF position again.
- (E) Confirm the acceleration grip is in low idle and control levers are in neutral position.
  If in case of the G engine mode is selected, change to power mode.
  (As for the G engine mode, refer to the article 2 "HOOK HOISTING / LOWERING OPERATION" of the operator's manual.)
- (F) Start the engine and confirm if the engine speed limit has been released.

(Turn the acceleration grip and the engine speed correspond with the grip.)

(G) If no warning is issued and the engine output limitation is released at step (F), normal returned already.

If in case the engine output is not released, turn the key switch to OFF position once, repeat the steps (E) and (F).



		J08E	
	Normal		
	Conditions		
Engine speed	e speed At max. torque (rpm)		
Engine loading ratio Max. load ratio at limitation (%)		100	

(2) SCR system parts failure (Method of release with DST-i)

> When the following P codes are displayed on the monitor with reaching the TF4 condition, refer to the engine workshop manual.

	SAE code	Function
	P0106	Boost pressure sensor - rationality
	P0401	EGR low flow
P code (ECU side)	P0101	Air flow sensor - rationality
	P204F	Reductant system performance
	P0096	Intake air temperature sensor (intake manifold) - rationality
	P203B	DEF/AdBlue® tank level sensor failure
	P2201	SCR upstream NOx sensor - Performance and Monitoring capability
	P2214	SCR downstream NOx sensor - Performance and Monitoring capability
	P2483	SCR upstream temperature sensor - rationality
	P204B	Abnormal DEF/AdBlue <sup>®</sup> pressure sensor
P code (DCU side)	P0667	Abnormal temperature sensor of the dosing control unit
	P2047	DEF/AdBlue <sup>®</sup> injector failure
	P20F4	DEF/AdBlue <sup>®</sup> consumption failure
	P208B	Abnormal DEF/AdBlue <sup>®</sup> pump motor
	P20E8	Abnormal DEF/AdBlue <sup>®</sup> piping pressure (Low)
	P20E9	Abnormal DEF/AdBlue <sup>®</sup> piping pressure (High)

#### [4. POWER TRAIN]

4. Inducement final limitation recovery mode

Under the final limitation, the crane operation is not possible.

Display following warning and enter to the final limitation and "FINAL LIMIT RECOVERY ICON" is pop up.

When press this icon, the crane can be able to operate temporally for evacuation purpose.



FINAL LIMIT RECOVERY ICON

Residual quantity final limit (RL4)	DEF/AdBlue <sup>®</sup> bar gauge 0 block	
Quality final limit (RQ4)	210 minutes after quality abnormal detect	
SCR system parts final limit (TF4)	210 minutes after SCR parts failure detect	

## 

- The final limit recovery icon use only at the evacuation purpose.
- The crane can be able to operate temporally but the motion is very slow.
- The crane operation may be difficult depending on the work load.
- There is a possibility of stalling the engine at evacuation when perform the combined controls.

### 

- Under the final limitation, the crane operation is not possible.
   Before entering to the final limitation, contact
- authorized Manitowoc distributor.
  There is a possibility of not restating the engine if stop the engine under the final limitation.

### 

- If operated the machine continuously with the warning of inducement control indicated may result in the engine or related component damage.
- Perform the action to normal return as soon as possible after evacuation.

# 5. HYDRAULIC SYSTEM

5.1	LOCATION OF MAIN HYDRAULIC COMPONENTS	5-2
5.1.1	COMPONENTS LOCATION ON THE HYDRAULIC SCHEMATIC	5-2
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# 5. HYDRAULIC SYSTEM

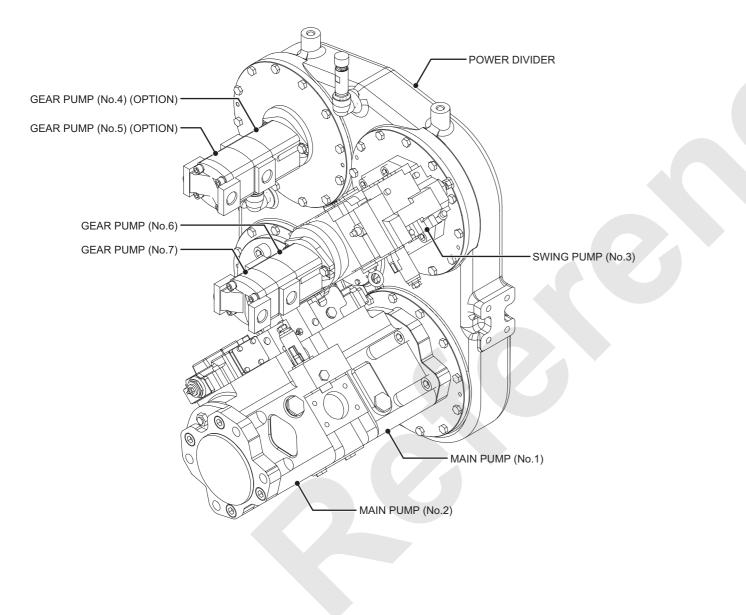
This chapter provides a general outline of the overall hydraulic system.

The pressurized oil in this circuit is supplied by the 3 variable displacement pumps driven with the power divider directly connected to the engine and 2 section gear pumps connected to them.

2 pumps (2 section) out of these 3 variable displacement pumps are for front drum, rear drum, boom drum and travel and one other pump is for swing.

Inner side pump out of 2 section gear pumps directly connected to the swing pump is for control purpose and outer side one is for auxiliary units such as gantry cylinder, crawler extending and other optional circuit. 2 gear pumps directly connected with power divider

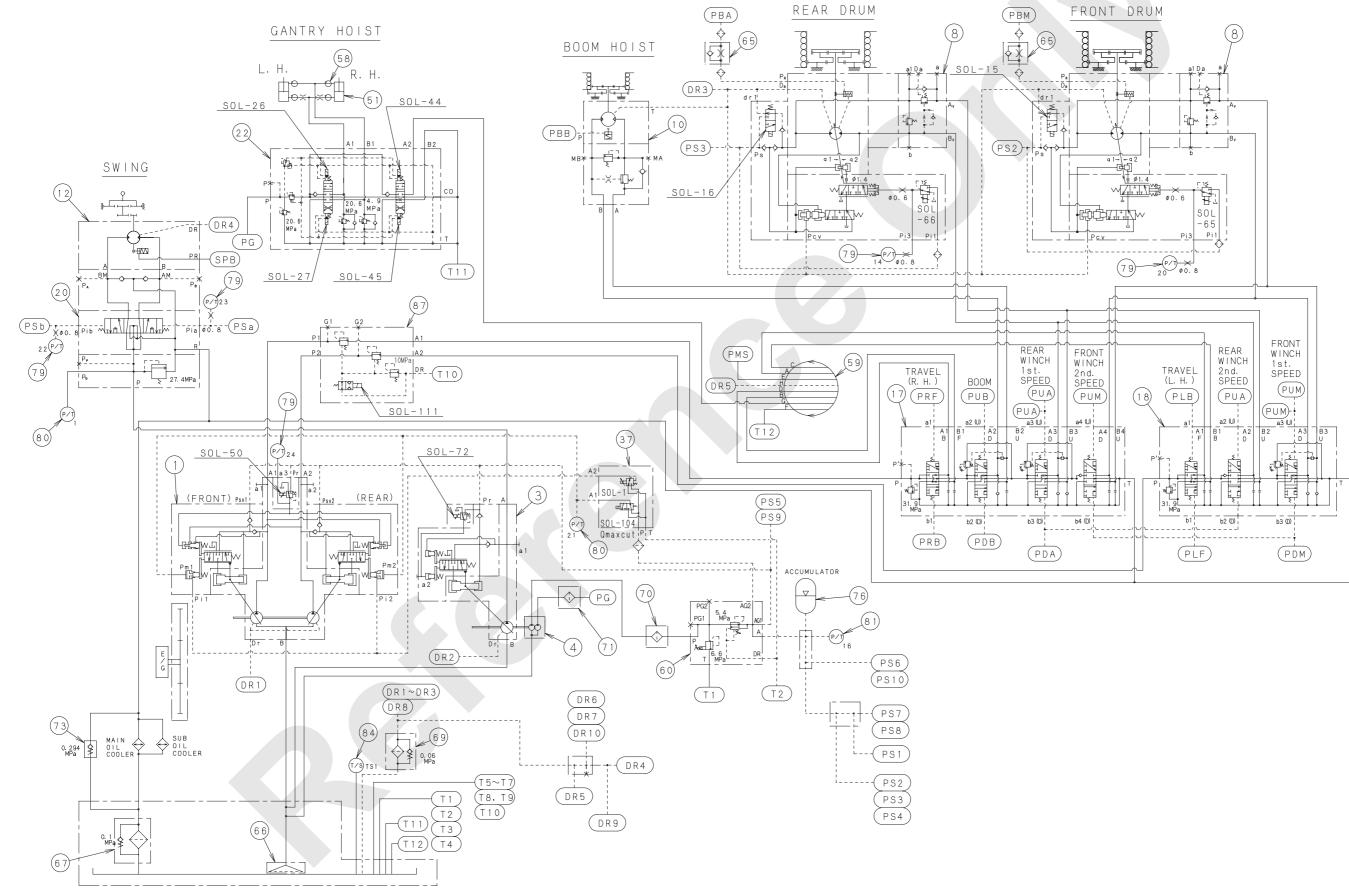
are for front and rear drum brake cooling.

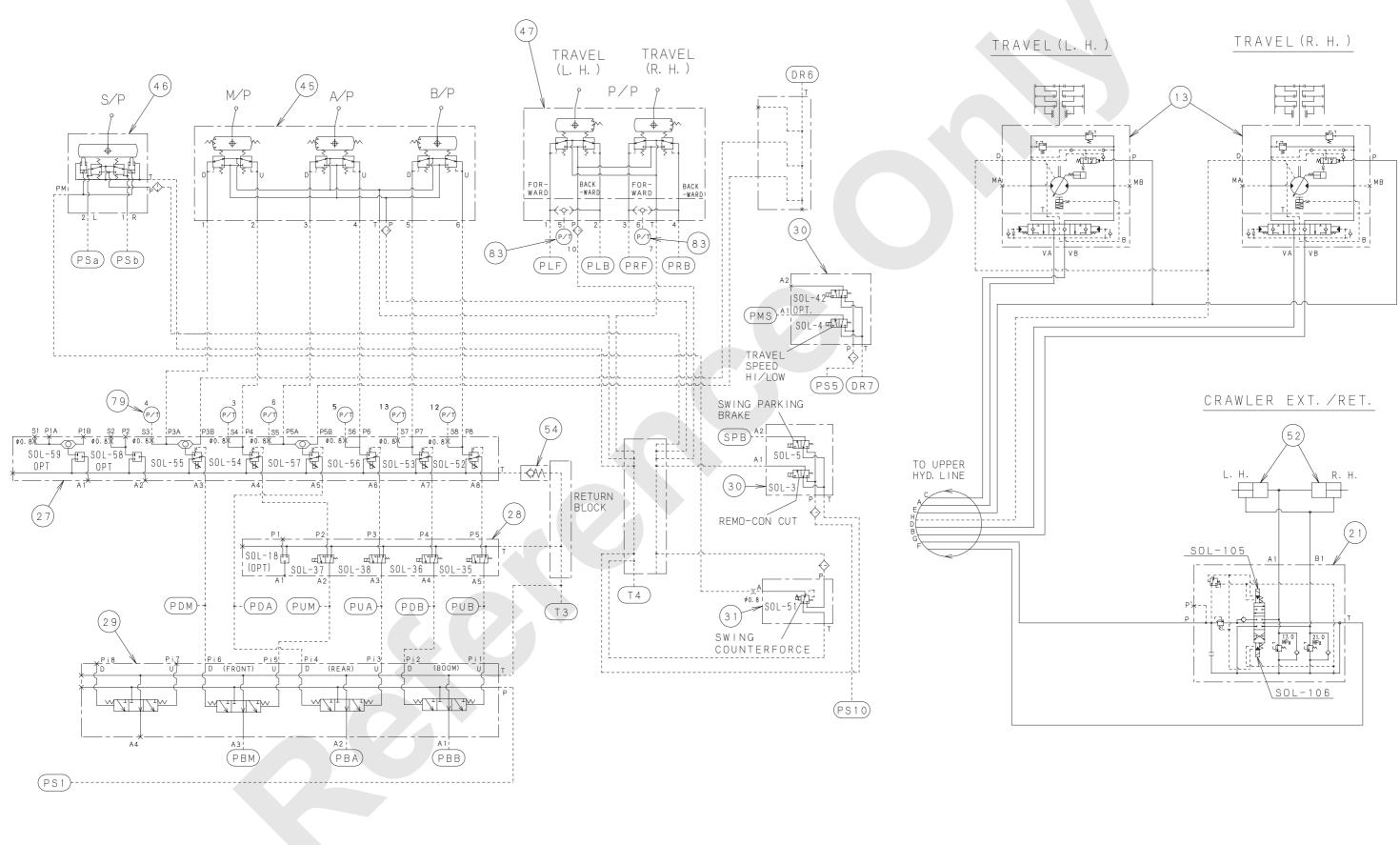


## 5.1 LOCATION OF MAIN HYDRAULIC COMPONENTS

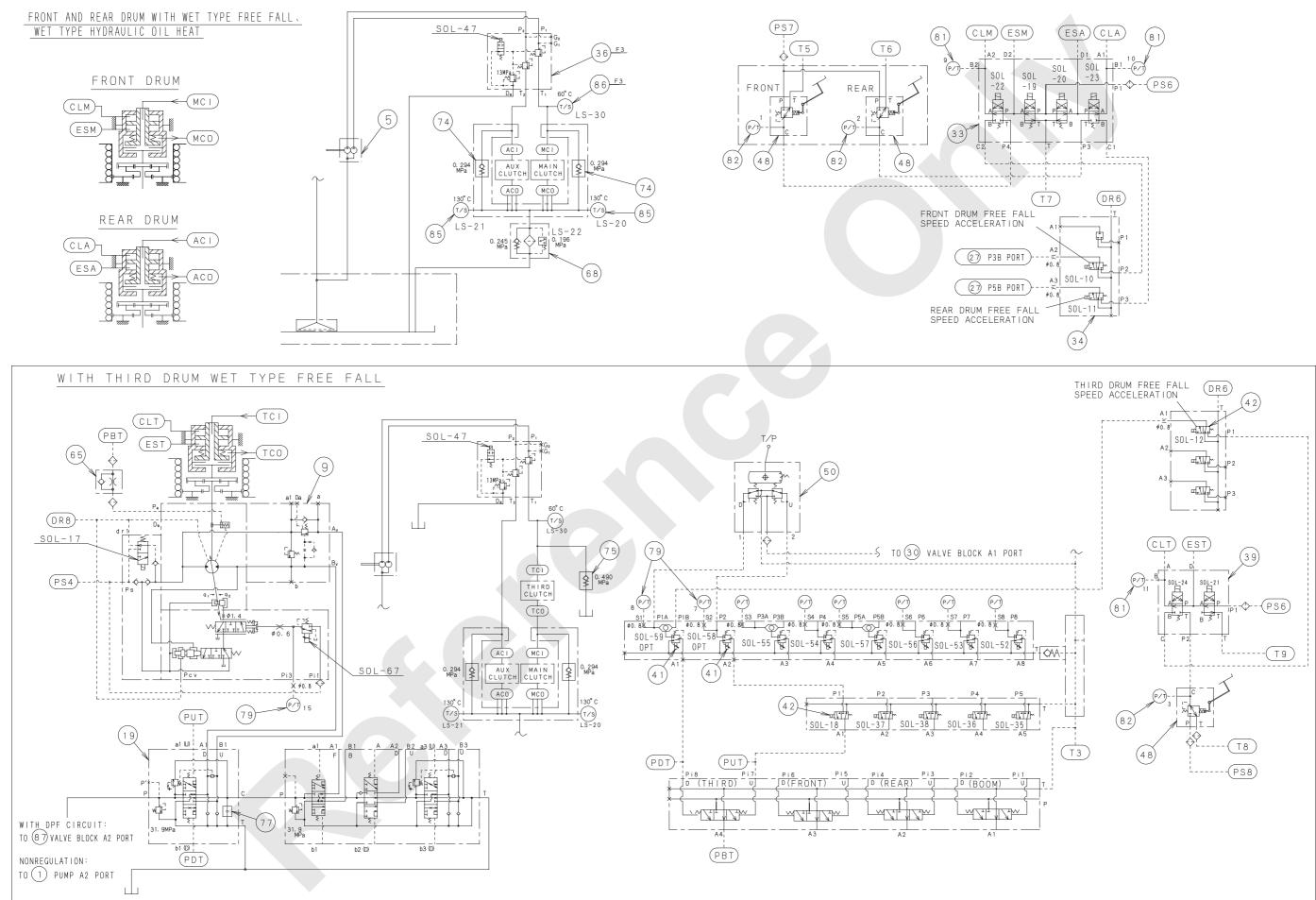
## 5.1.1 COMPONENTS LOCATION ON THE HYDRAULIC SCHEMATIC

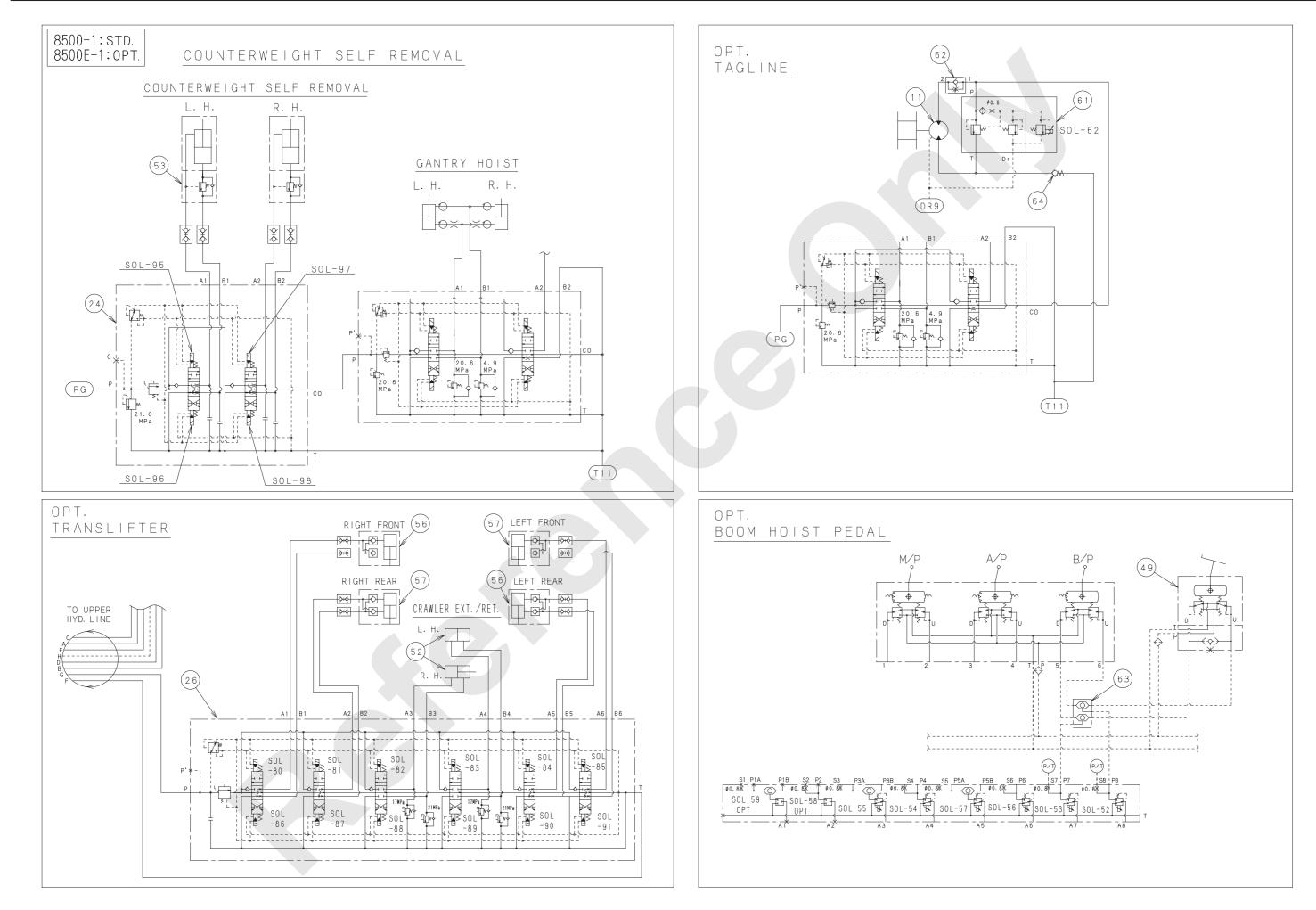
## WITHOUT FREE FALL (STD)

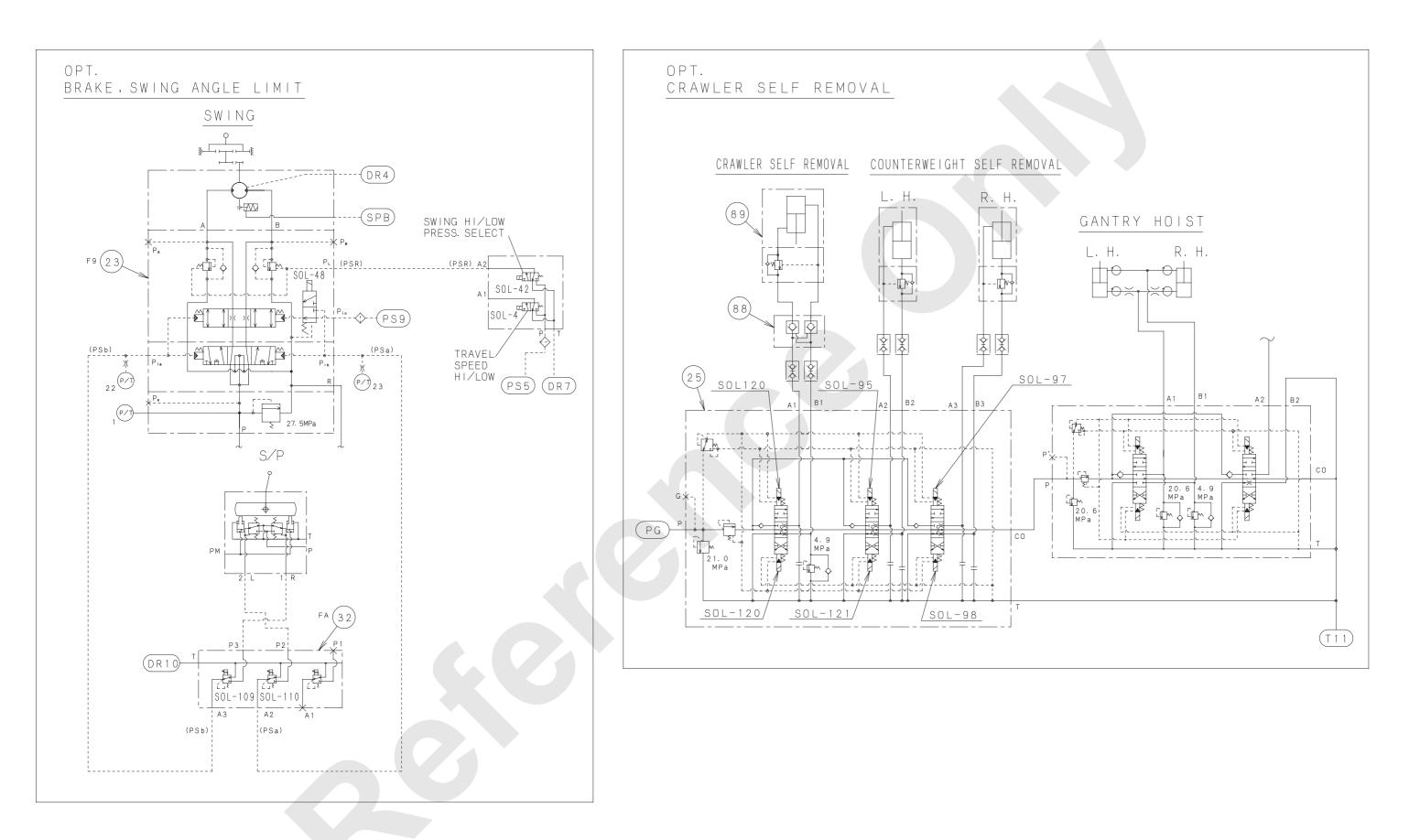




### WITH FREE FALL







# 5.1.2 HYDRAULIC COMPONENTS LIST

Name of component	Use for	Specification
<ol> <li>Main pump (No.1)</li> <li>Main pump (No.2)</li> </ol>	<ul><li>Front, rear drum</li><li>Third drum (option)</li><li>Boom drum</li></ul>	Swash plate type, variable displacement Max. delivery : 255 L/min (67.4 gal/min) Max. working press. : 31.9 MPa (4,627 psi)
3. Swing pump (No.3)	Travel     Swing	Swash plate type, variable displacement Max. delivery : 177 L/min (46.8 gal/min) Max. working press. : 27.5 MPa (3,989 psi)
4. Gear pump (No.6)	Control	Max. delivery : 61 L/min (16.1 gal/min) Max. working press. : 7.0 MPa (1,015 psi)
4. Gear pump (No.7)	<ul><li>Gantry</li><li>Crawler</li><li>Tagline (option)</li></ul>	Max. delivery : 40 L/min (10.6 gal/min) Max. working press. : 20.6 MPa (2,988 psi)
5. Gear pump (No.4) (option)	Front, rear drum brake	Max. delivery : 73 L/min (19.3 gal/min)
5. Gear pump (No.5) (option)	cooling	Max. working press. : 1.0 MPa (145 psi)
8. Motor	Front, rear drum	Swash plate type, variable displacement
9. Motor (option)	Third drum (option)	Max. delivery : 255 L/min (67.4 gal/min) Max. working press. : 31.9 MPa (4,627 psi)
10. Motor	• Boom	Bent axis type, fixed displacement Max. delivery : 255 L/min (67.4 gal/min) Max. working press. : 31.9 MPa (4,627 psi)
11. Motor (option)	Tagline (option)	Max. delivery: 40 L/min (10.6 gal/min)Relief press.: 13.7 Mpa (1,987 psi)
12. Motor	Swing	Swash plate type, variable displacement Max. delivery : 177 L/min (46.8 gal/min) Max. working press. : 27.5 MPa (3,989 psi)
13. Motor	• Travel	Swash plate type, 2 speed motor Max. delivery : 255 L/min (67.4 gal/min) Max. working press. : 31.9 MPa (4,627 psi)
17. Control valve	<ul><li>Travel R.H.</li><li>Boom drum</li><li>Main2, aux.1</li></ul>	Max. delivery : 255 L/min (67.4 gal/min) Max. working press. : 31.9 MPa (4,627 psi)
18. Control valve	<ul><li>Travel L.H.</li><li>Main1, aux.2</li></ul>	Max. delivery: 255 L/min (67.4 gal/min)Max. working press.: 31.9 MPa (4,627 psi)
19. Control valve (option)	Third drum (option)	Max. delivery: 255 L/min (67.4 gal/min)Max. working press.: 31.9 MPa (4,627 psi)
20. Control valve	Swing	Max. working press. : 27.5 MPa (3,989 psi)
21. Control valve	Crawler ext. / ret.	Crawler extendingPress. push: 17.0 MPa (2,466 psi)Press. pull: 21.0 Mpa (4,627 psi)
22. Control valve	Gantry	Set press. : 20.6 MPa / 4.9 Mpa (2,988 psi / 711 psi)
23. Control valve (option)	Swing free / brake	Max. working press. : 27.5 MPa (3,989 psi)
24. Control valve	<ul> <li>Counterweight self removal</li> </ul>	Max. delivery: 40 L/min (10.6 gal/min)Max. working press.: 21.0 MPa (3,046 psi)

### [ 5. HYDRAULIC SYSTEM ]

Name of component	Use for	Specification
25. Control valve (8000-1 : STD. /	<ul><li>Crawler self removal</li><li>Counterweight self removal</li></ul>	Set press. : 21.0 / 4.9 MPa (3,046 / 711 psi)
26. Control valve (option)	<ul><li>Translifter</li><li>Crawler ext. / ret.</li></ul>	Set press. : 17.0 / 21.0 MPa (2,466 / 3,046 psi)
27. Valve block (8-section)	<ul> <li>Automatic stop and speed control</li> </ul>	<ul> <li>Front drum hoist remote control pressure</li> <li>Front drum lowering remote control pressure</li> <li>Rear drum hoist remote control pressure</li> <li>Rear drum lowering remote control pressure</li> <li>Boom raise remote control pressure</li> <li>Boom lowering remote control pressure</li> <li>Third drum hoist remote control pressure (option)</li> <li>Third drum lowering remote control pressure (option)</li> </ul>
28. Valve block (5-section)	Limit stop	<ul> <li>Boom raise stop</li> <li>Boom lower stop</li> <li>Rear drum hoist stop</li> <li>Front drum lower stop</li> <li>Third drum hoist stop (option)</li> </ul>
29. Valve block (4-section)	Motor brake	<ul> <li>Front drum motor parking brake</li> <li>Rear drum motor parking brake</li> <li>Boom drum motor parking brake</li> <li>Third drum motor parking brake (option)</li> </ul>
30. Valve block (2-section)	Remo-con press. source cut etc	<ul> <li>Remo-con cut</li> <li>Swing parking brake</li> <li>Travel speed Hi / Low select</li> <li>Swing Hi / Low pressure select</li> </ul>
31. Valve block (1-section)	Swing counterforce	Swing counterforce
32. Valve block (3-section) (option)	Sol prop valve	Swing angle limit
33. Valve block (4-section)	Wet type free fall	<ul> <li>Rear drum clutch</li> <li>Rear drum emergency clutch</li> <li>Front drum emergency clutch</li> <li>Front drum clutch</li> </ul>
34. Valve block (3-section)	Wet type free fall     speed acceleration	<ul><li>Front drum free fall speed acceleration</li><li>Rear drum free fall speed acceleration</li></ul>
36. Valve block (option)	For hyd. oil heat	Hydraulic oil heat
37. Valve block (2-section)	Feathering, Qmax cut	
39. Valve block (2-section) (option)	Third wet type free fall	<ul><li>Third drum clutch</li><li>Third drum emergency clutch engage</li></ul>
41. Solenoid valve (option)	Third drum (option)	Third drum automatic stop
42. Solenoid valve (option)	Third drum (option)	Third drum limit stop
15 Domoto control volvo	Front, rear drum	Press. : 2.65 to 2.94 Mpa (384 to 426 psi)
45. Remote control valve	Boom drum	Press. : 2.50 to 2.79 Mpa (363 to 405 psi)
46. Remote control valve	Swing	Press. : 1.62 to 1.92 Mpa (235 to 278 psi)

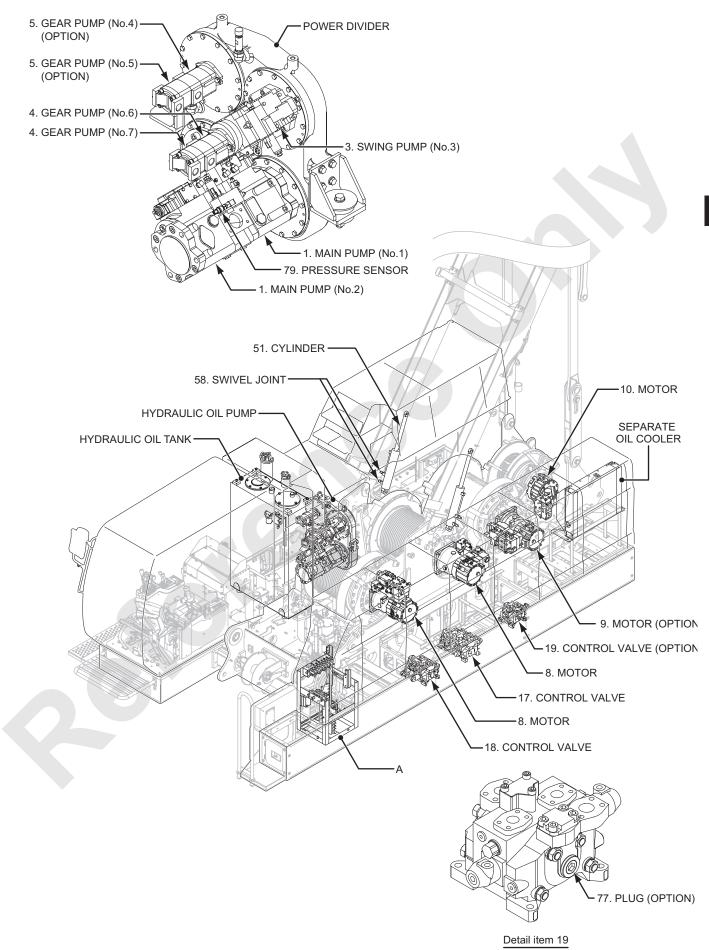
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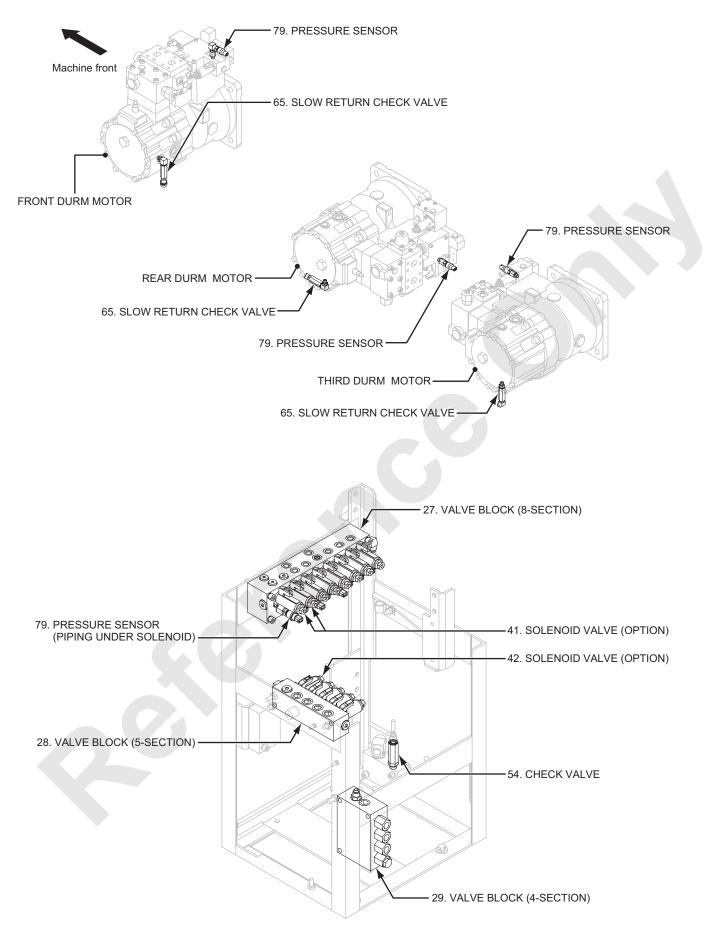
Name of component	Use for	Specification
48. Control valve (option)	Brake	
49. Remote control valve (option)	Boom drum control pedal	
50. Remote control valve (option)	Third drum (option)	Press. : 2.65 to 2.94 Mpa (384 to 426 psi)
51. Cylinder	Gantry hoist	Tube I.D       : 75 mm dia. (2-15/16" dia.)         Rod O.D       : 40 mm dia. (1-9/16" dia.)         Stroke       : 304 mm (11-31/32")         Press. push       : 20.6 MPa (2,988 psi)         Press. pull       : 4.9 Mpa (711 psi)
52. Cylinder	Crawler ext. / ret.	Tube I.D       : 150 mm dia. (5-29/32" dia.)         Rod O.D       : 70 mm dia. (2-3/4" dia.)         Stroke       : 1,111 mm (43-3/4")         Press. push       : 17.0 MPa (2,466 psi)         Press. pull       : 21.0 Mpa (4,627 psi)
53. Cylinder (8000-1 : STD. /	Counterweight self     removal	Tube I.D       : 110 mm dia. (4-11/32" dia.)         Rod O.D       : 85 mm dia. (3-11/32" dia.)         Stroke       : 1,330 mm (52-3/8")
54. Check valve		For valve block
56. Cylinder (option)	Translifter	Tube I.D       : 115 mm dia. (4-17/32" dia.)         Rod O.D       : 80 mm dia. (3-5/32" dia.)         Stroke       : 700 mm (27-9/16")
57. Cylinder (option)		Press. push         : 20.6 MPa (2,988 psi)           Press. pull         : 20.6 Mpa (2,988 psi)
58. Swivel joint		
59. Swivel joint (8 port)		A, B, C, D : Travel E : Travel speed select F : Tank G : Crawler H : Drain
60. Relief valve / reducing valve	Control	Relief press.: 7.0 Mpa (1.015 psi)Reducing sec. press.: 5.4 Mpa (783 psi)
61. Sol. prop relief valve (option)	Tagline (option)	Mechanical relief press. setting : 14.7 Mpa (2,132 psi) Proportional relief press. setting : 13.7 MPa (1,987 psi) (at 0.25 Amp.)
62. Flow control valve (option)	Tagline (option)	
63. Shuttle valve (option)		
64. Slow return check valve (option)	Tagline (option)	
65. Slow return check valve	Motor brake	0.8 mm dia. (0.032″ dia.)
66. Suction strainer		80 Mesh
67. Return filter		β <sub>10</sub> ≥ 8
68. Return filter (option)	Wet type clutch	10 μm
69. Drain filter		10 μm
70. Line filter	Control	100 Mesh (149 μm)
71. Line filter	Aux. actuator	100 Mesh (149 μm)

### [ 5. HYDRAULIC SYSTEM ]

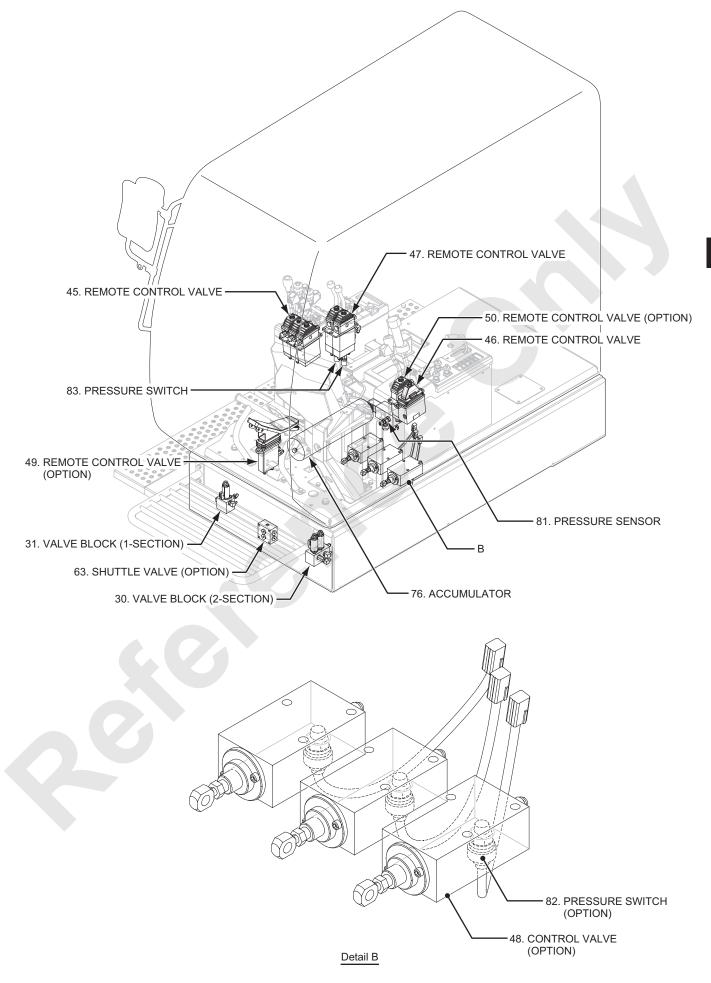
Name of component	Use for	Specification
73. Bypass check valve	Oil cooler	0.294 MPa (43 psi)
74. Bypass check valve (option)	Front, rear drum brake cooling	0.294 MPa (43 psi)
75. Bypass check valve (option)	Third drum (option)	0.490 MPa (71 psi)
76. Accumulator		N <sub>2</sub> Gas 2,900 cm <sup>3</sup>
77. Plug (option)		
79. Pressure sensor	Remo-con press. detect	3.0 MPa (435 psi)
80. Pressure sensor	Swing	50.0 MPa (7,252 psi)
81. Pressure sensor	Clutch	19.6 MPa (2,843 psi)
82. Pressure switch (option)	Control	
83. Pressure switch	Travel remo-con     press. detect	
84. Hyd. oil temperature sensor	Hyd. oil tank	
85. Hyd. oil temperature switch (option)		130 °C (266 °F)
86. Hyd. oil temperature switch (option)		60 °C (140 °F)
87. Valve block		DPF re-generation
88. Double pilot check valve (option)		
89. Cylinder (option)	Crawler self removal	

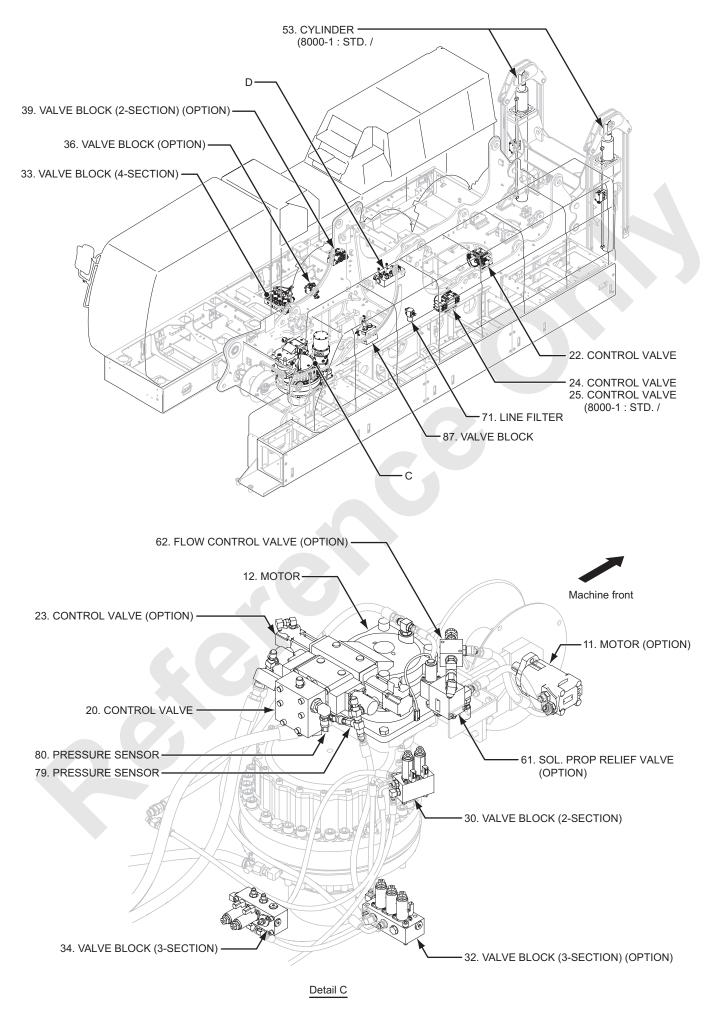
## 5.1.3 LAYOUT OF HYDRAULIC COMPONENTS

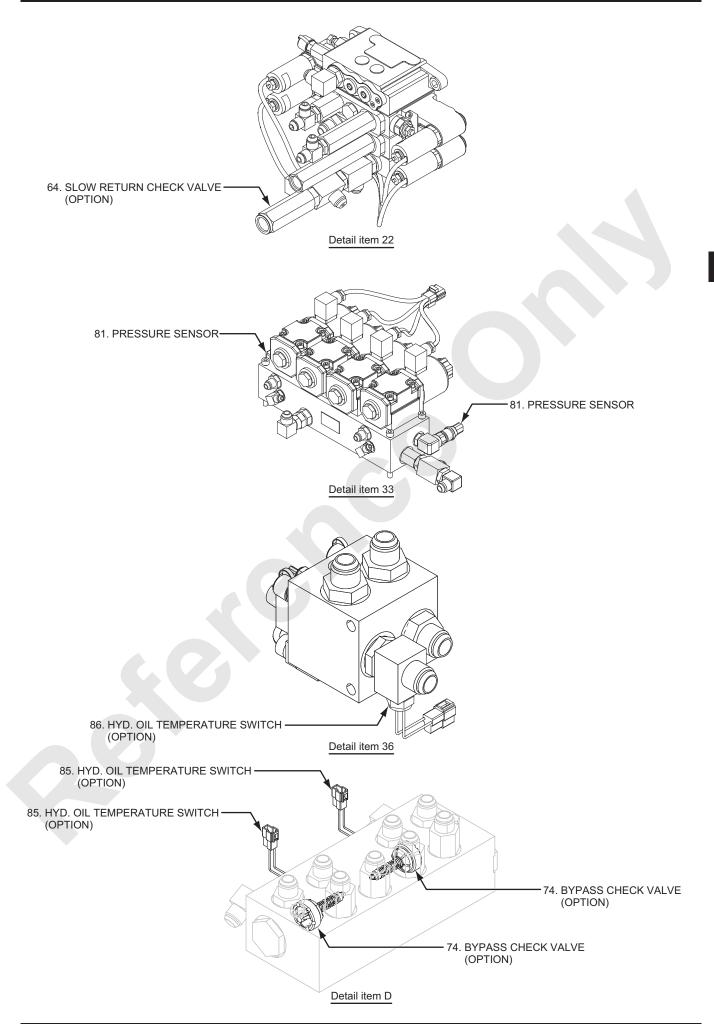


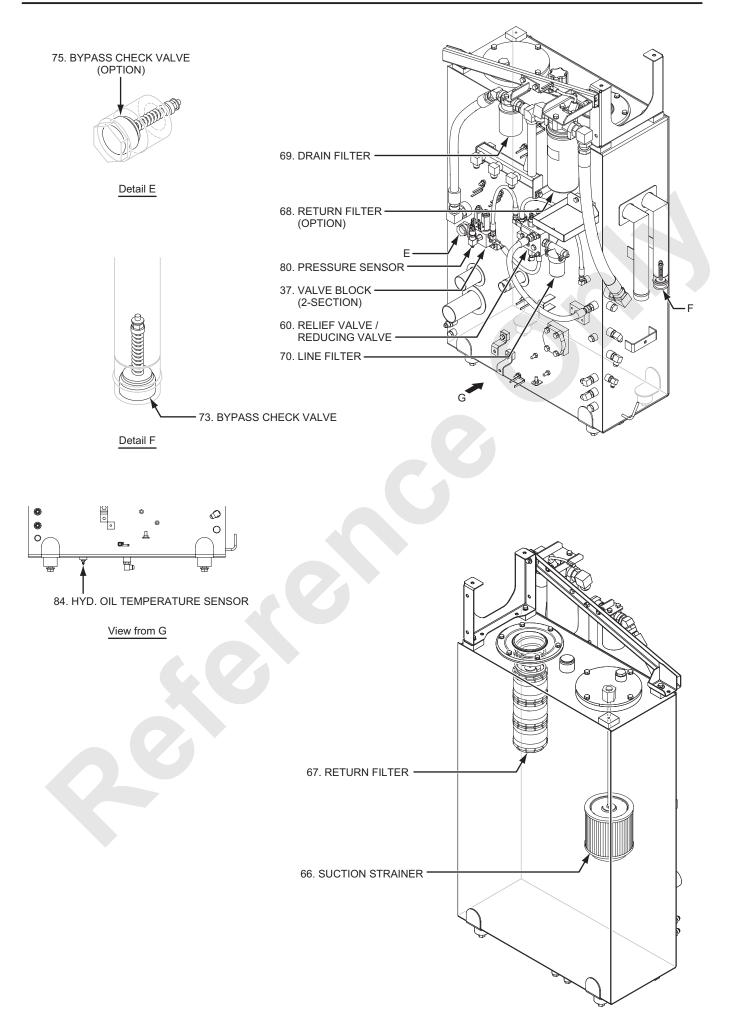


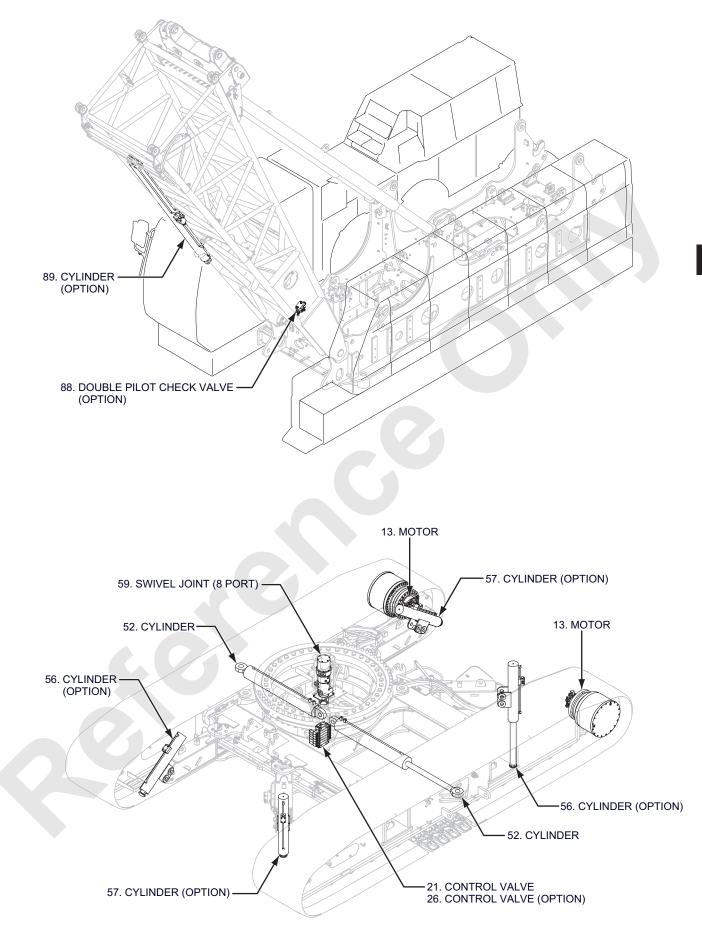
Detail A











# 5.2 CONSTRUCTION AND FUNCTION

## 5.2.1 OIL FLOW FROM No.1 AND No.2 PUMPS

No.1 and No.2 pumps are main pumps and are tandem connected variable displacement double pumps.

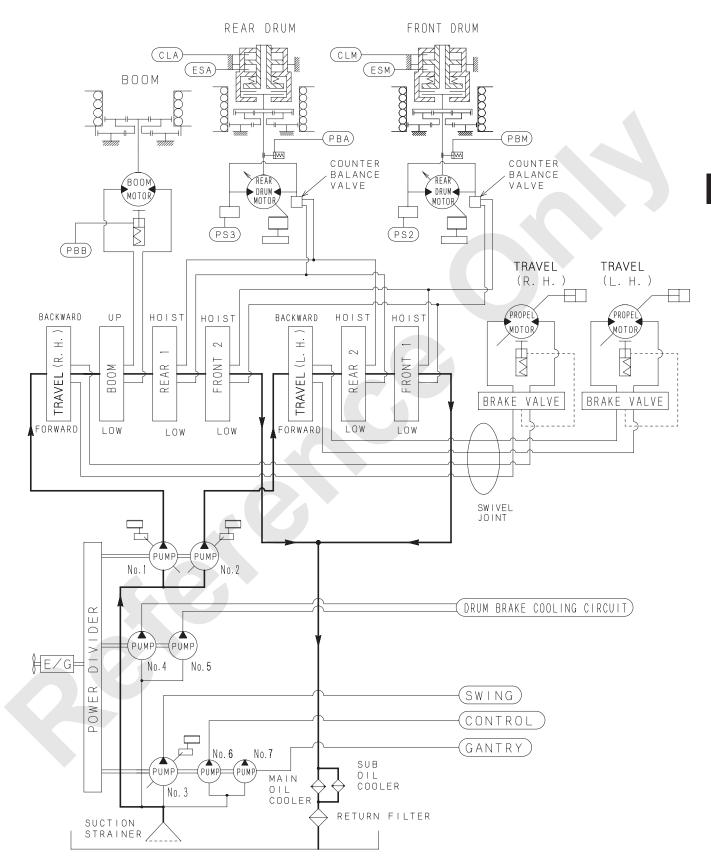
At neutral, pressurized oil from No.1 pump flows into 4 section side control valve circuit (front / rear drum / right travel / boom).

At the same time, pressurized oil from No.2 pump flows into 3 section side control valve circuit (front / rear drum / left travel) 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 valve, 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 AND No.2 PUMPS



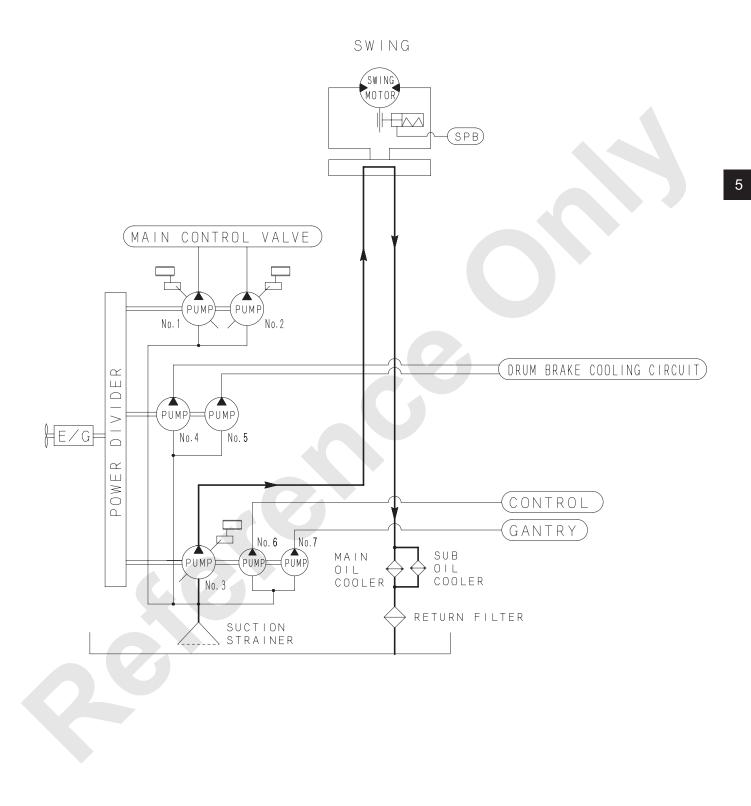
## 5.2.2 OIL FLOW FROM No.3 PUMP

No.3 pump is swing pump and is variable displacement pump.

When the swing remote control valve is in neutral, pressurized oil from No.3 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.

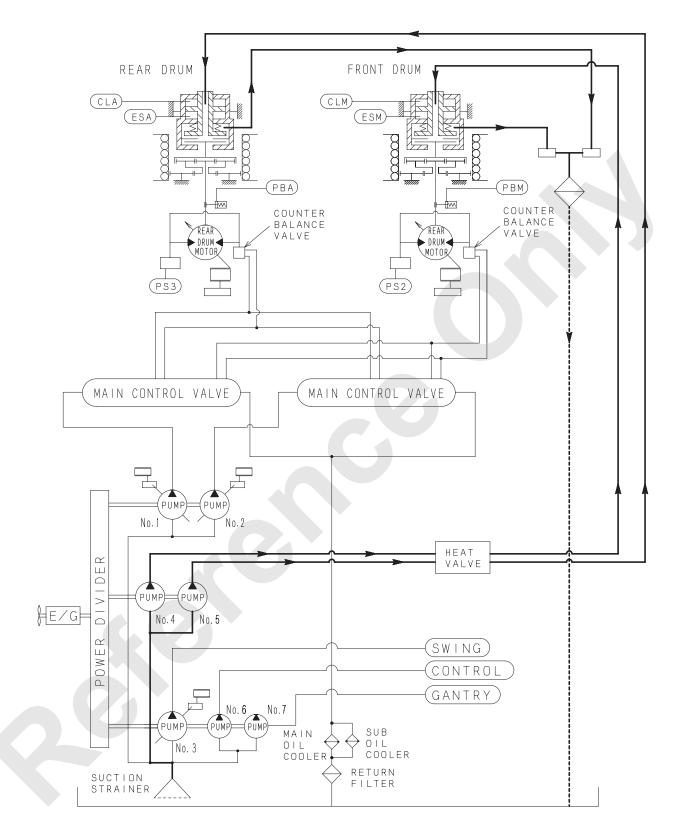
#### **OIL FLOW FROM No.3 PUMP**



## 5.2.3 OIL FLOW FROM No.4 AND No.5 PUMPS (FRONT, REAR DRUM BRAKE COOLING)

No.4 and No.5 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.4 AND No.5 PUMPS (FRONT, REAR DRUM BRAKE COOLING)



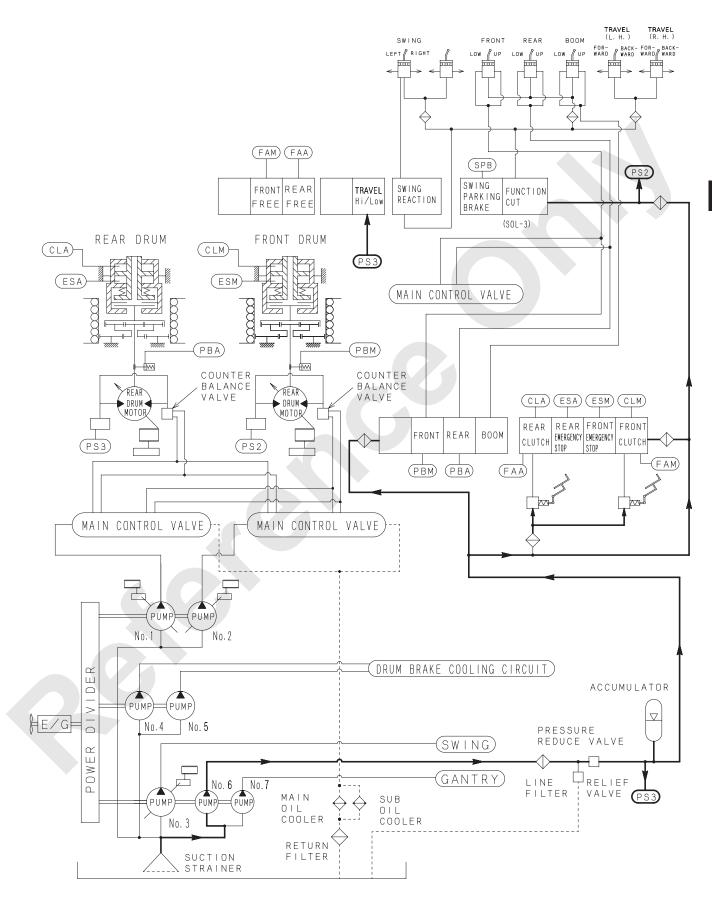
## 5.2.4 OIL FLOW FROM No.6 PUMP

No.6 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 valves and 2 2-section valves 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 which is shut off with the function lock (Remo-con cut) solenoid valve (SOL-3) and is not sent to the remote control valve.

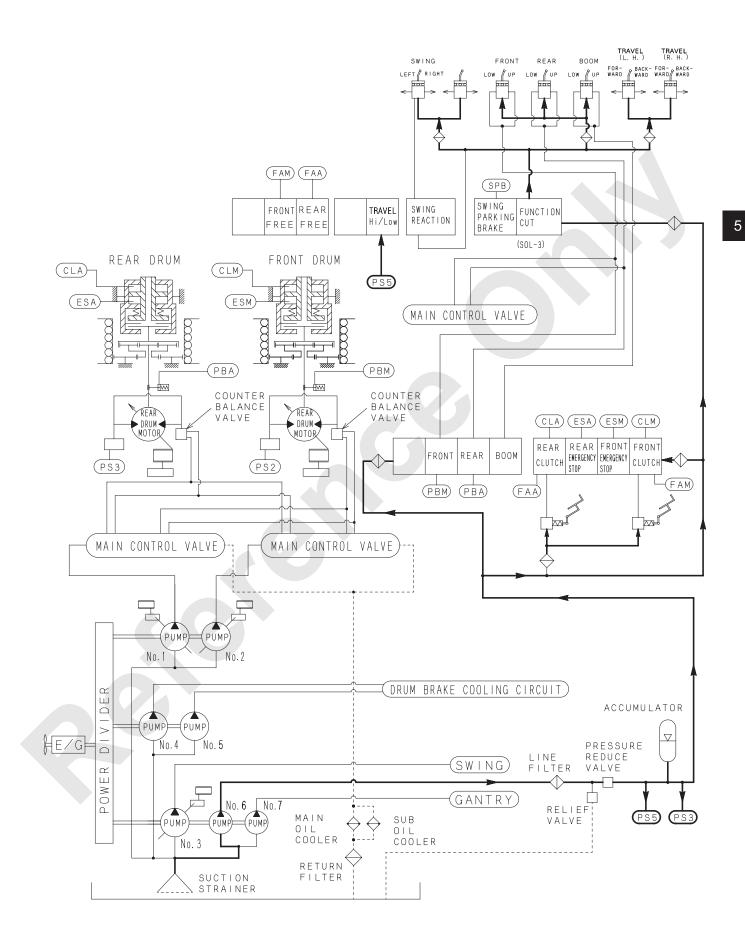
Therefore under this condition, even when the control lever is operated, control pressure will not be generated and the machine will not move. OIL FLOW FROM No.6 PUMP (WHEN FUNCTION LOCK LEVER IS IN "LOCK" POSITION)



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 lever is operated, remote control pressure is sent to the main control valve and make each actuator functioned. OIL FLOW FROM No.6 PUMP (WHEN FUNCTION LOCK LEVER IS IN "WORK" POSITION)



## 5.2.5 OIL FLOW FROM No.7 PUMP

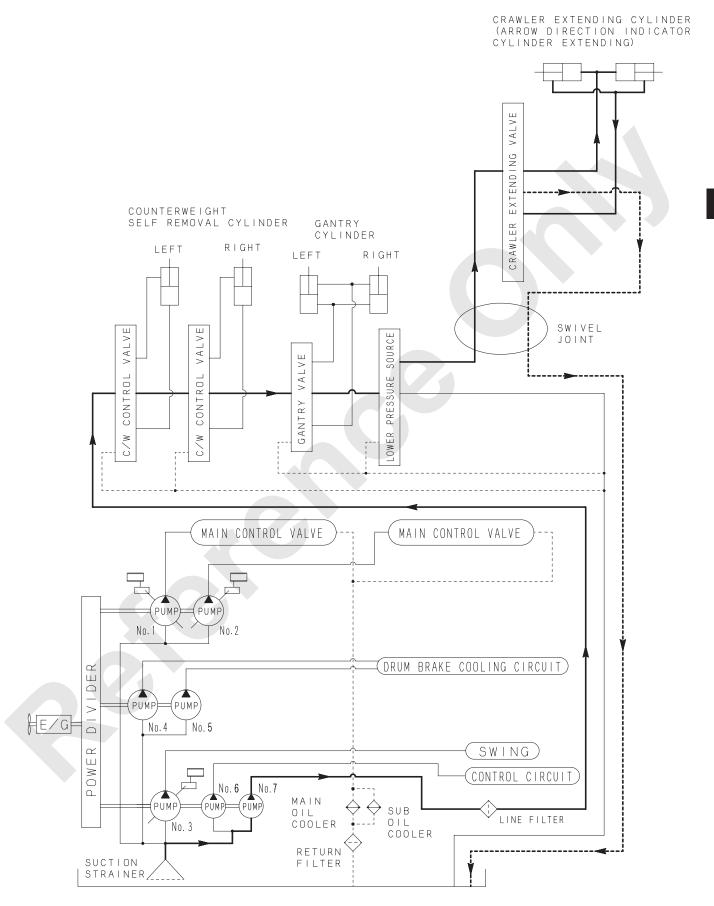
#### 1. Crawler extending cylinder

No.7 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 raise 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.

#### OIL FLOW FROM No.7 PUMP (CRAWLER EXTENDING CYLINDER)



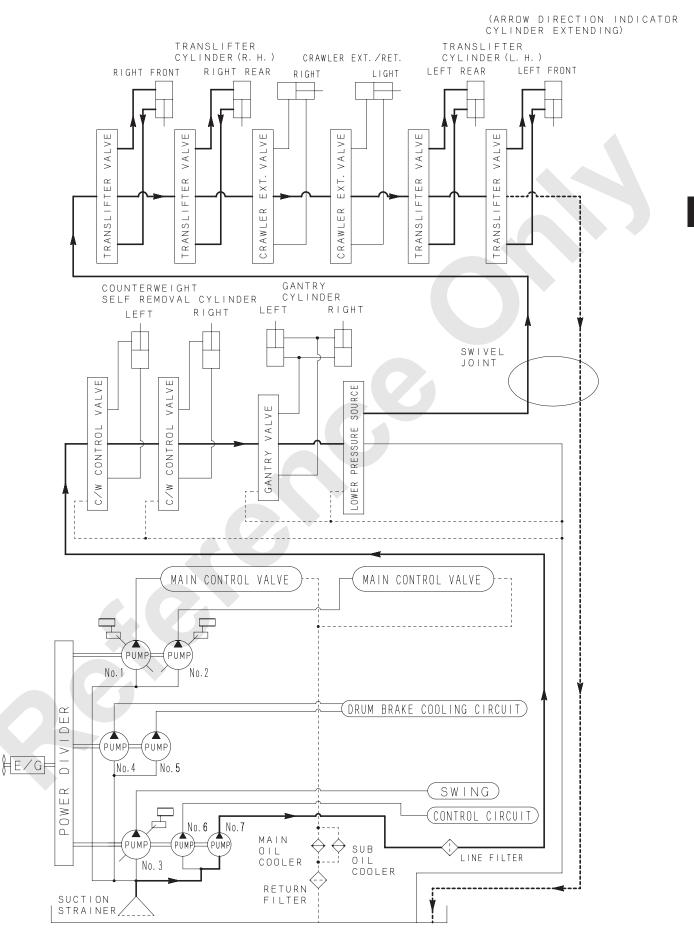
#### 2. Translifter

No.7 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 raise 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.

#### OIL FLOW FROM No.7 PUMP (TRANSLIFTER)



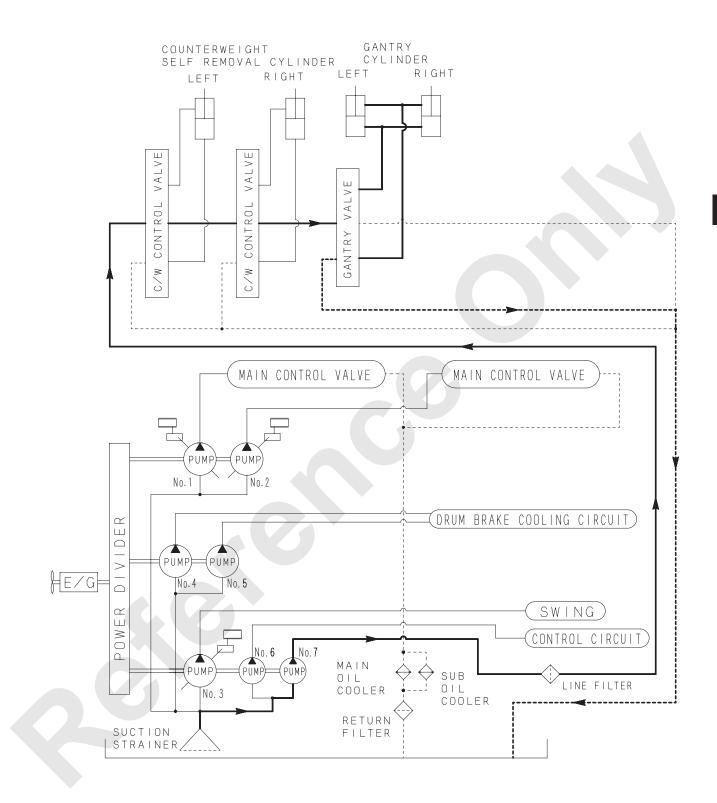
#### 3. Gantry raise cylinder

No.7 pump (Aux. device pump) is fixed displacement gear pump and is used for gantry raise.

The pressurized oil from the pump flows into the gantry raise control valve.

When the gantry raise control valve is in neutral, the pressurized oil passes through the valve and returns to the tank without load.

#### OIL FLOW FROM No.7 PUMP (GANTRY HOIST CYLINDER)



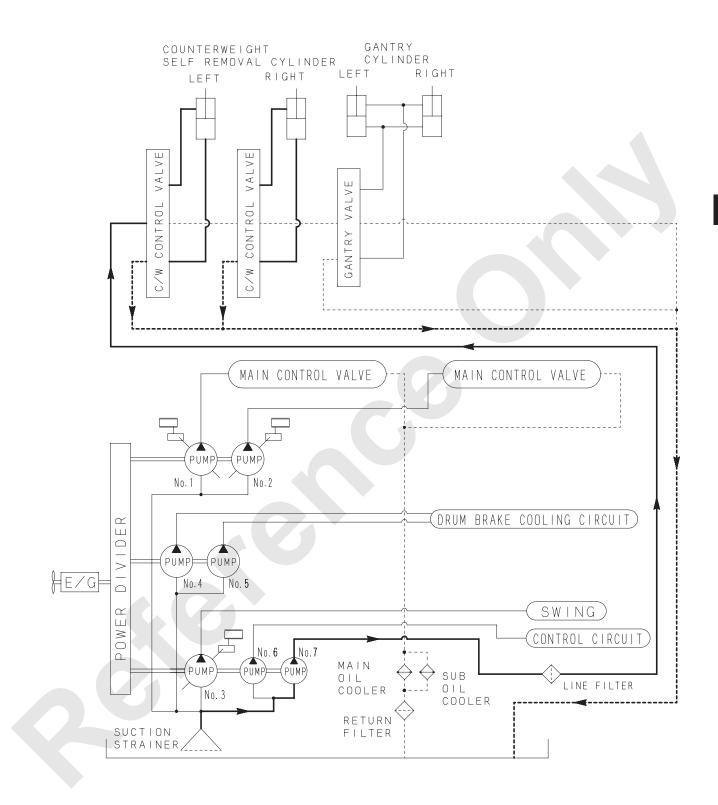
#### 4. Counterweight self removal cylinder

No.7 pump (Aux. device pump) is fixed displacement gear pump and is used for counterweight self removal.

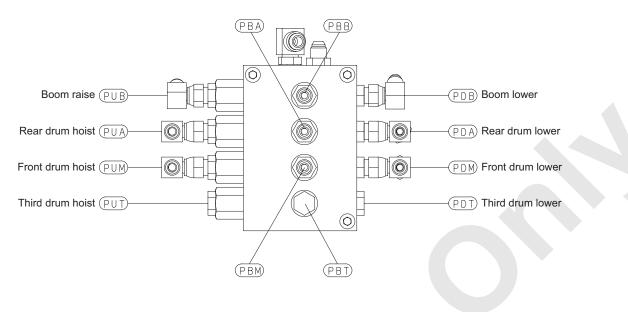
The pressurized oil from the pump flows into the counterweight self removal control valve.

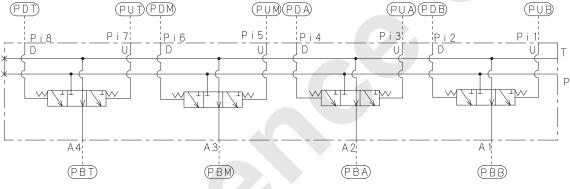
When the counterweight self removal control valve is in neutral, the pressurized oil passes through the valve and returns to the tank without load.

#### OIL FLOW FROM No.7 PUMP (COUNTERWEIGHT SELF REMOVAL CYLINDER)

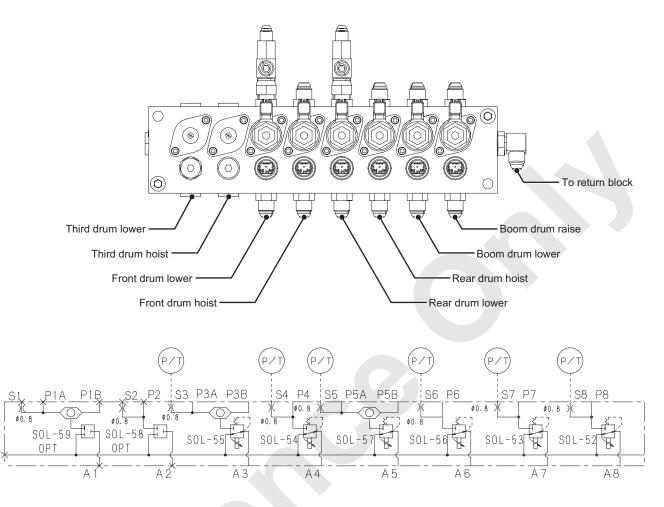


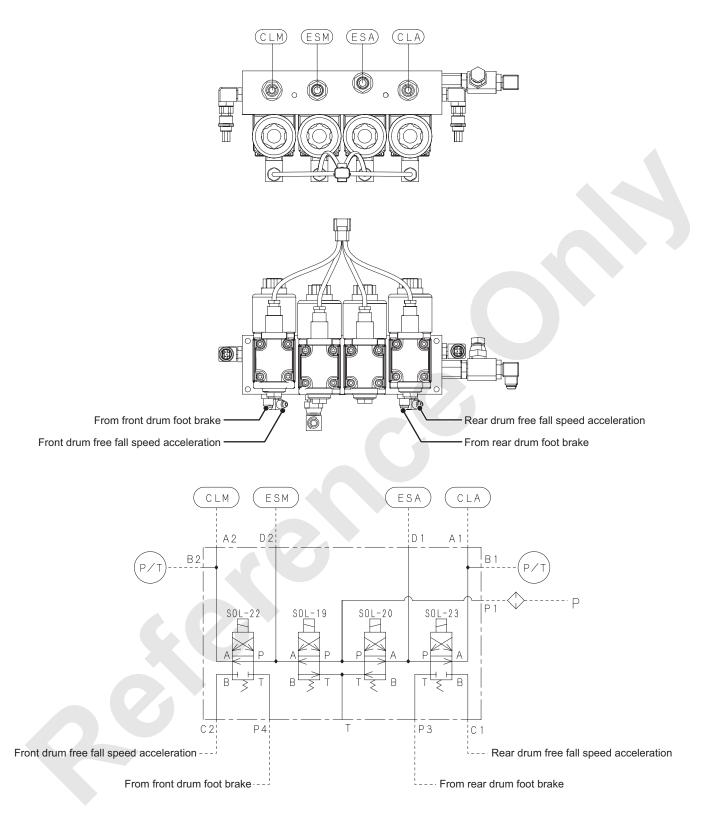
## 5.3 VALVE

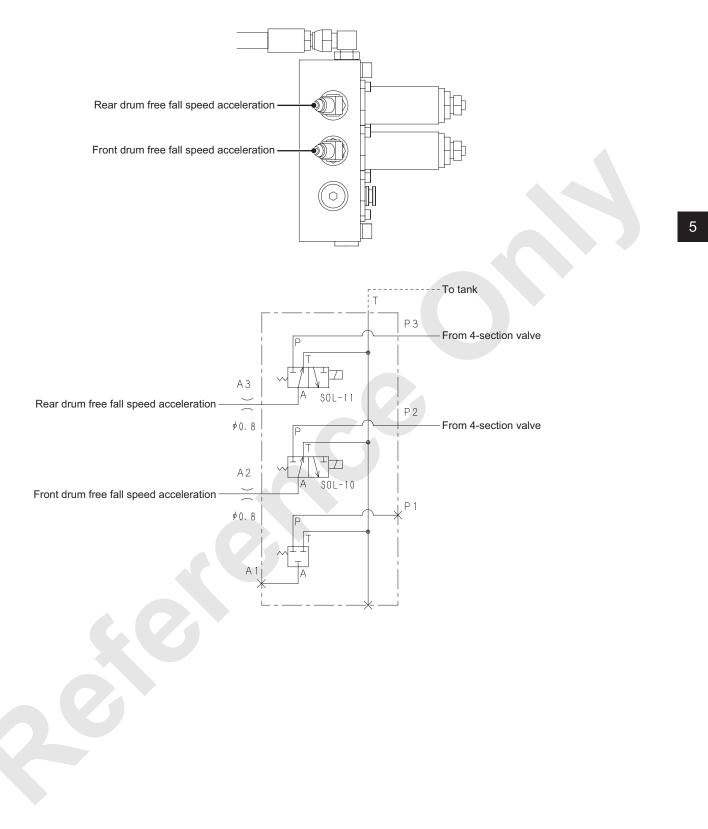


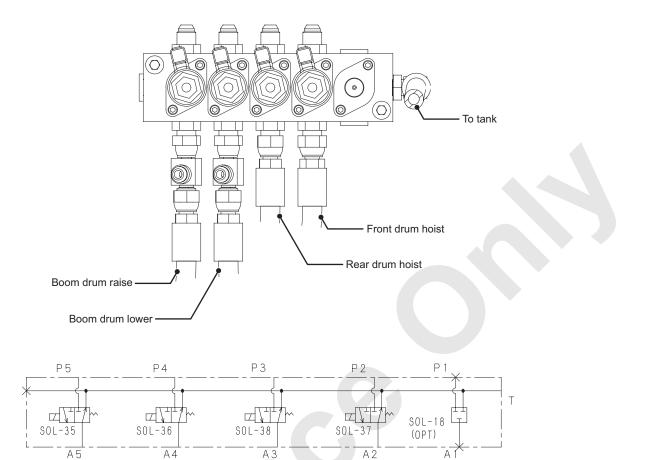


#### 8-SECTION VALVE (WITH SHUTTLE VALVE)

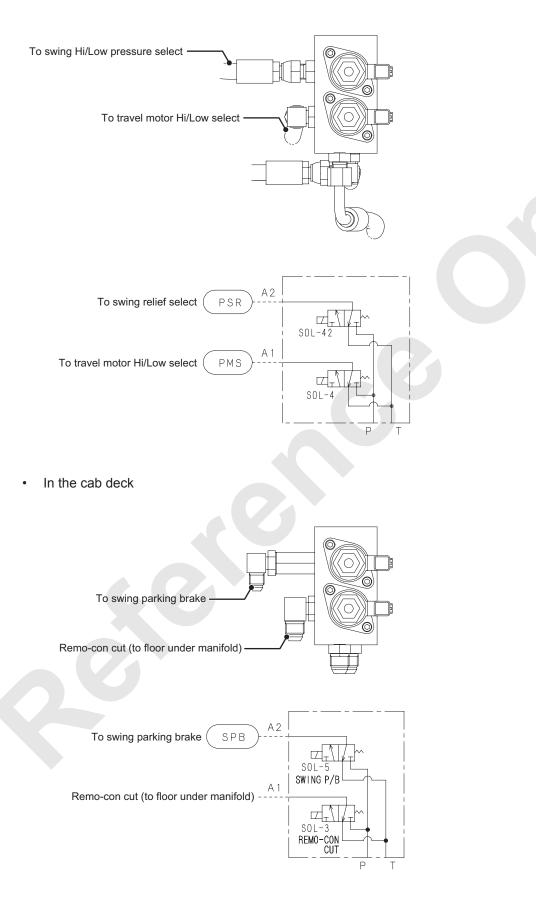


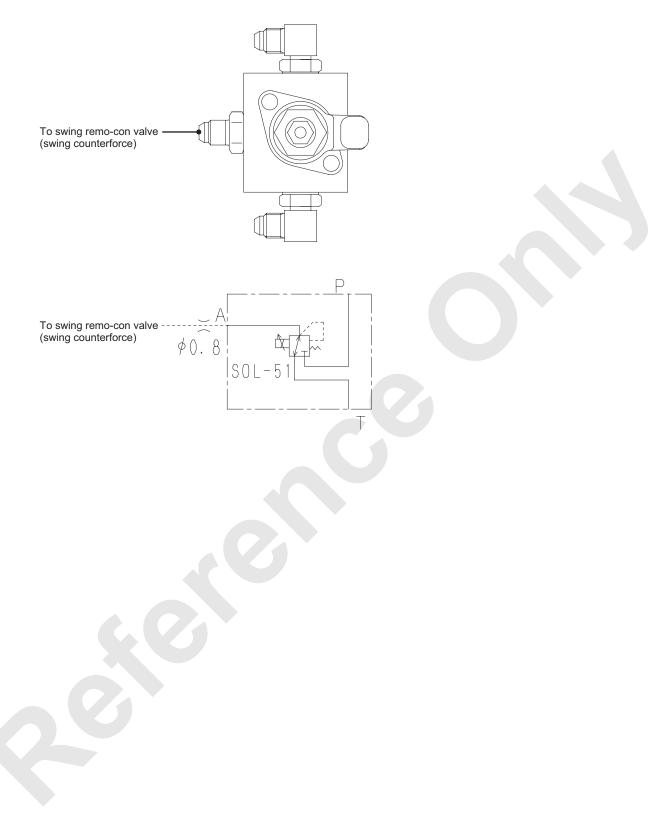




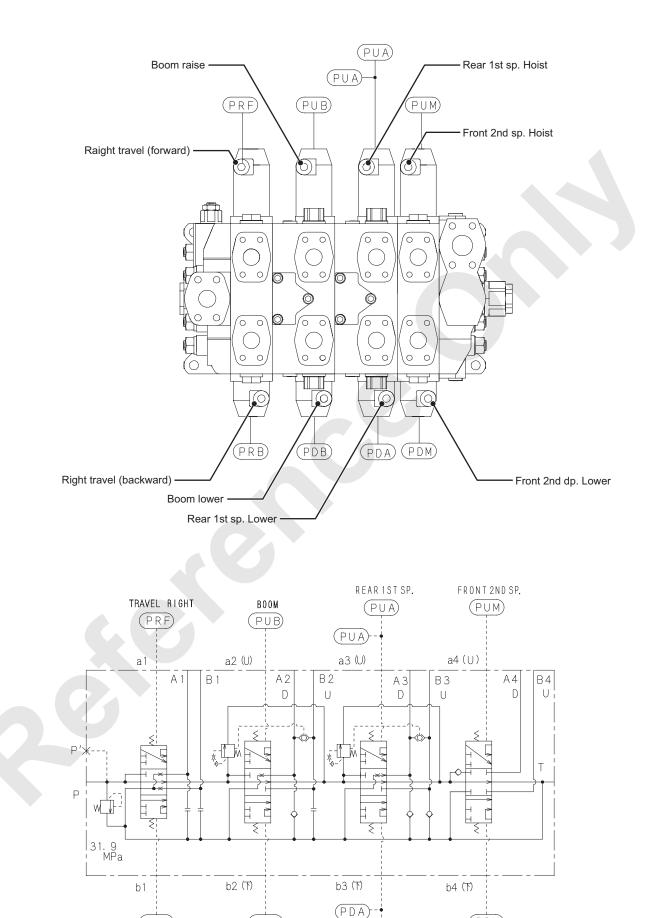


• Beside of swing motor





#### **MAIN CONTROL VALVE (4-SECTION)**



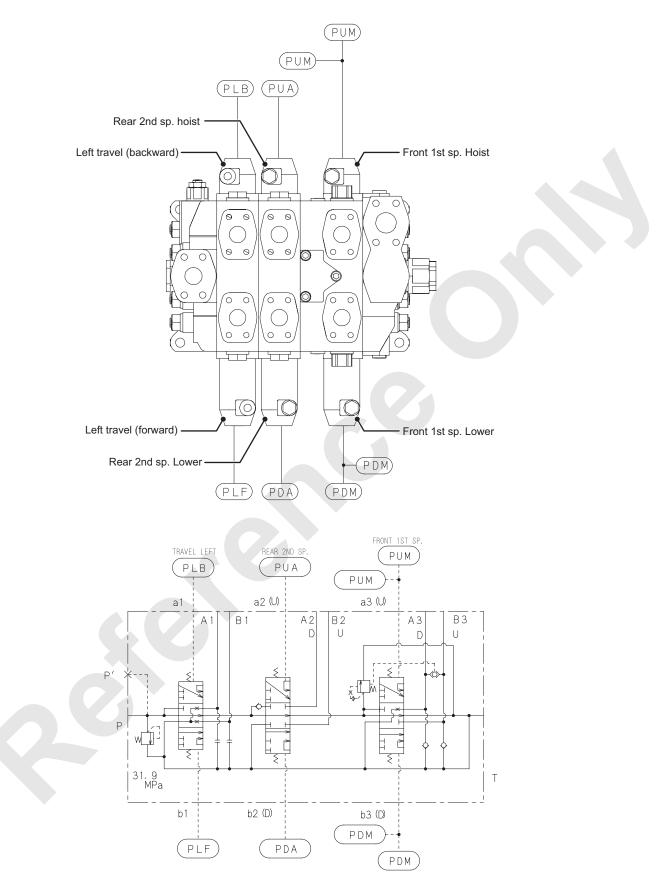
(PRB)

(PDA)

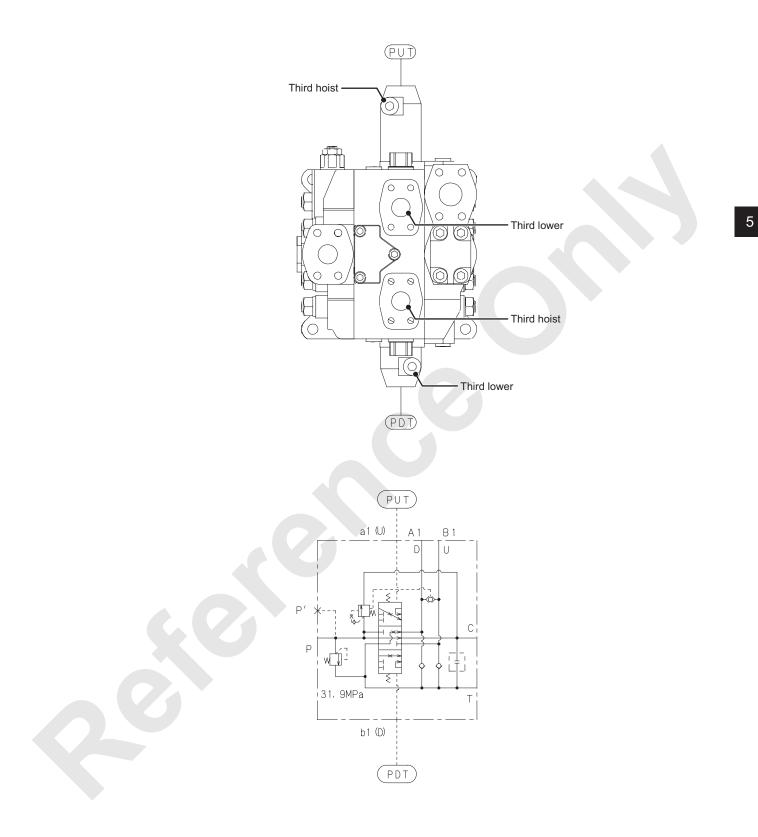
(PDB)

(PDM)

### MAIN CONTROL VALVE (3-SECTION)



MAIN CONTROL VALVE (THIRD 1-SECTION)



# 6. HOIST SYSTEM

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# 6. HOIST SYSTEM

The hoist system consists of the front drum and rear drum assembly.

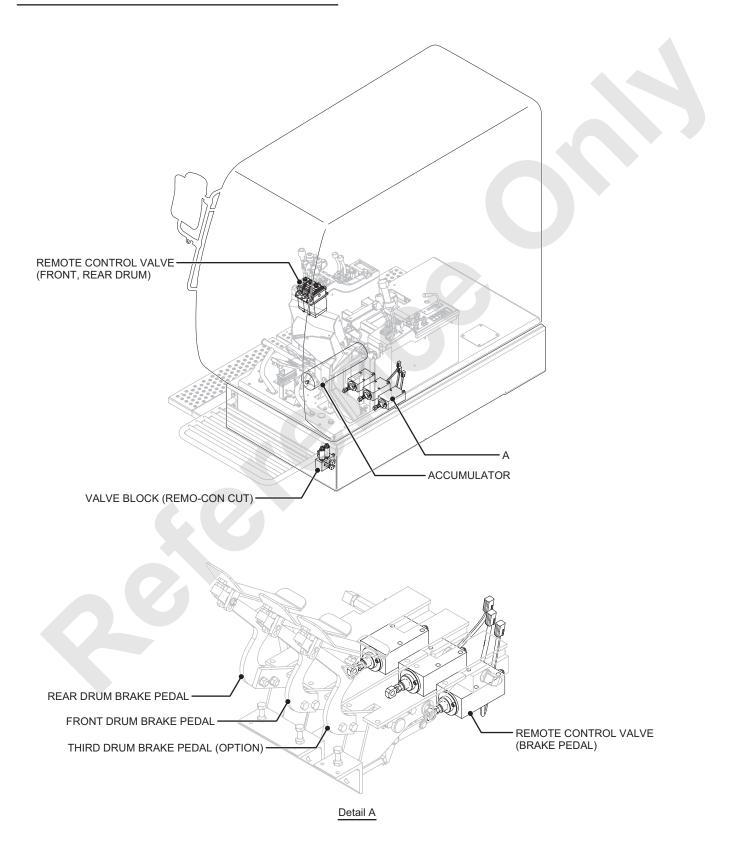
Each drum assy. consists of hoist motor (brake built in), reduction unit, drum clutch (common to free fall brake) and drum lock.

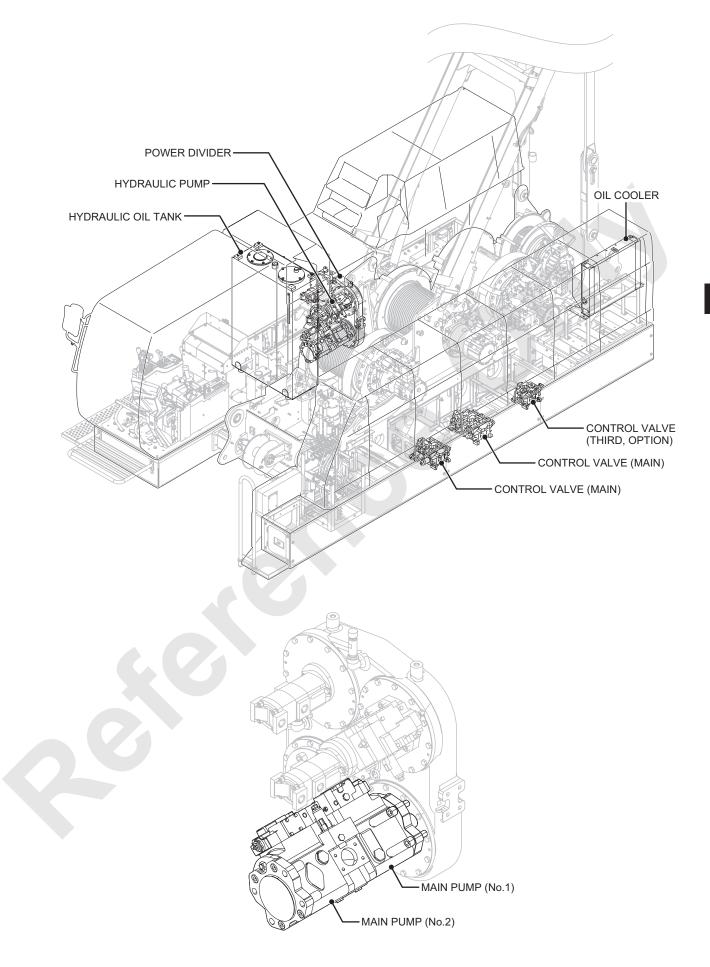
The pressurized oil delivered from 2 main pumps (No.1, No.2) is controlled by the control valve and flows into each motors.

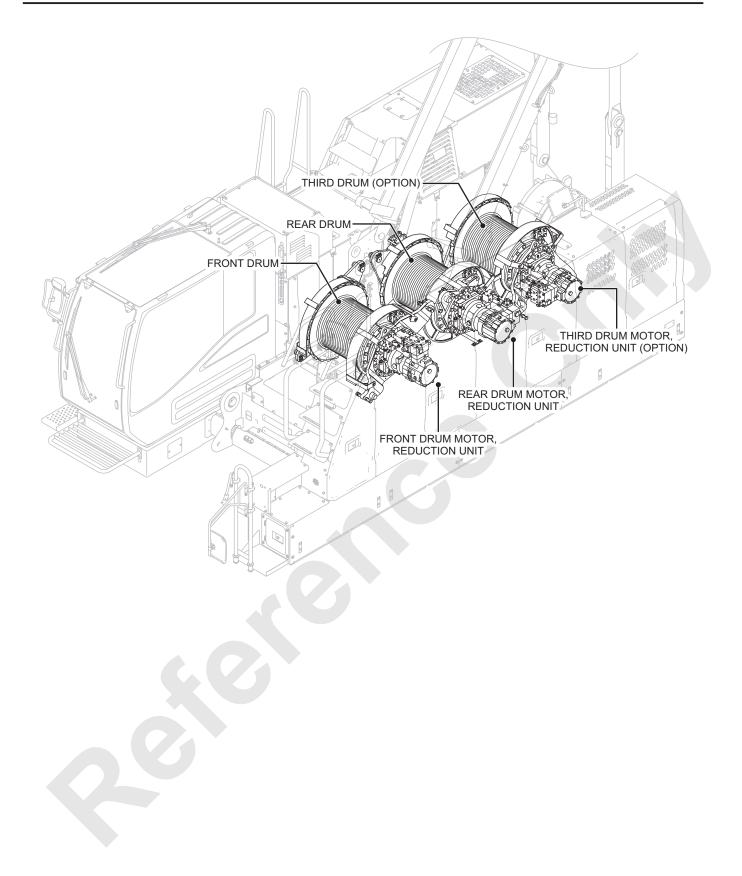
## 6.1 APPARATUS AND LOCATION OF COMPONENTS

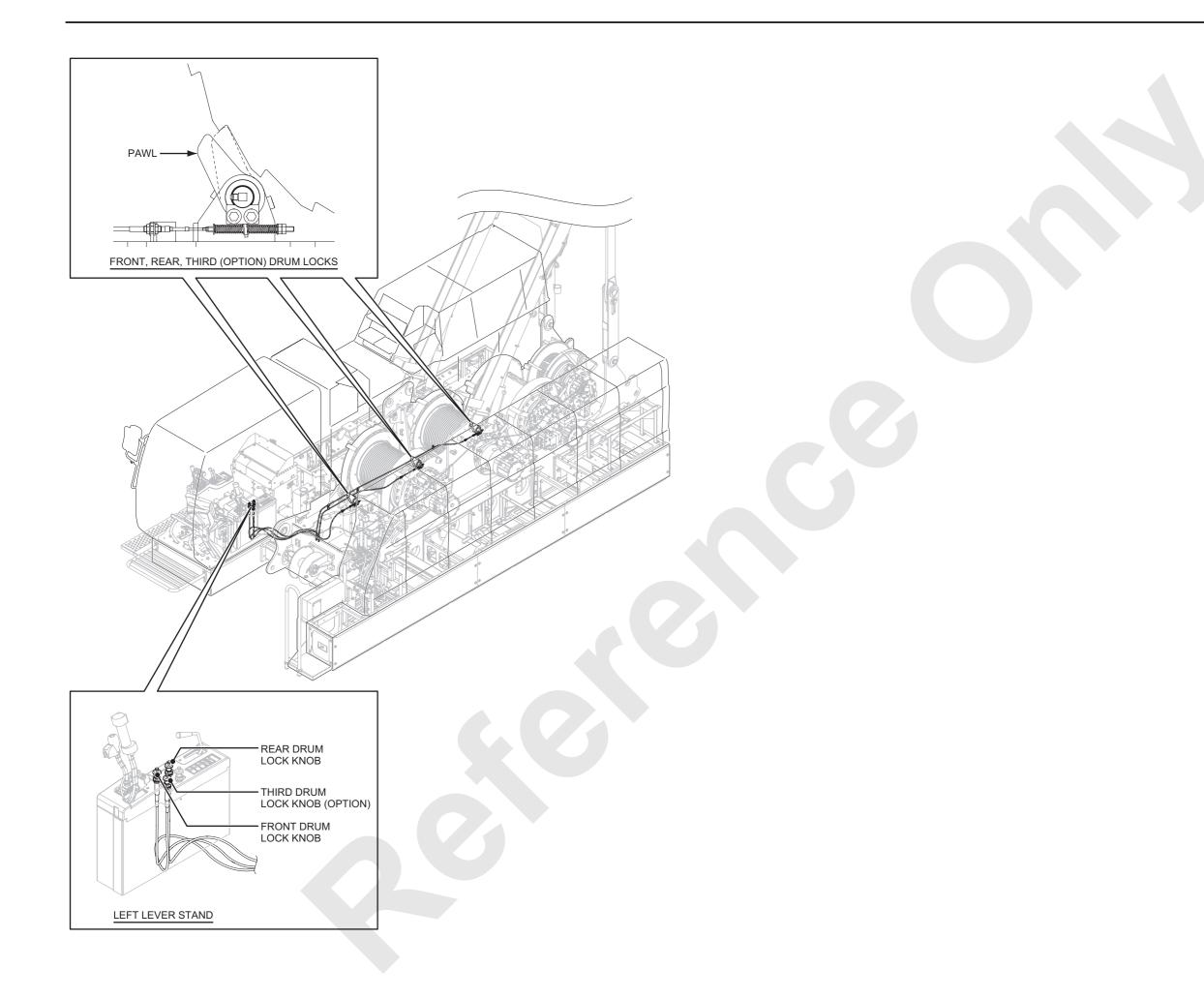


Refer to the article "6.2 CONSTRUCTION AND FUNCTION" for circuit diagram and function.



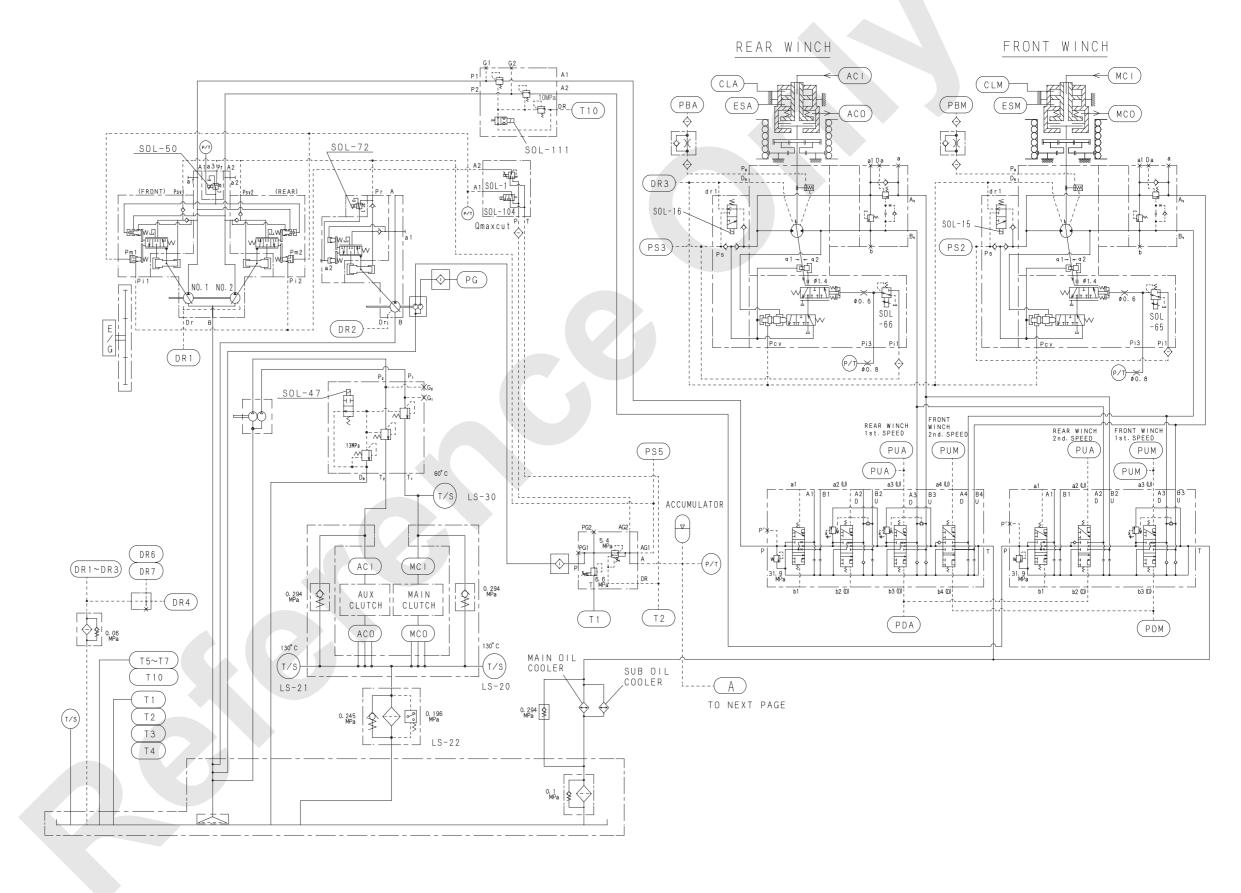


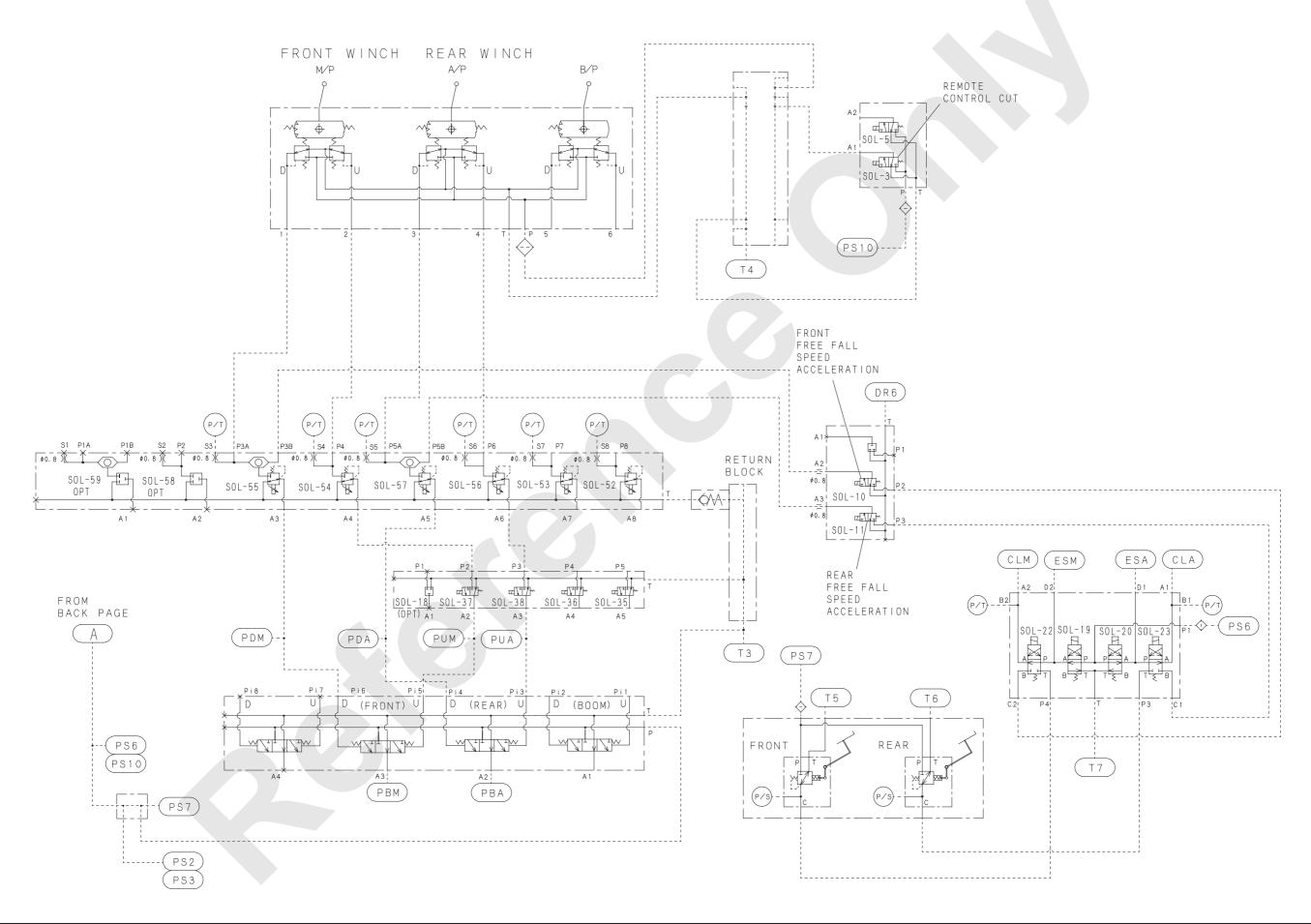




## 6.2 CONSTRUCTION AND FUNCTION

## 6.2.1 HYDRAULIC SCHEMATIC





### 6.2.2 LIFTING A LOAD

Function of the front drum and the rear drum are exactly same.

The front drum is explained here as an example.

Pressurized oil from the main pump (No.1, No.2) flows through the main control valve, and transmitting the power to the hoist system.

While the function lock lever is in the "WORK" position (SOL-3 : "ON" position), oil pressure from the control pump flows to 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.

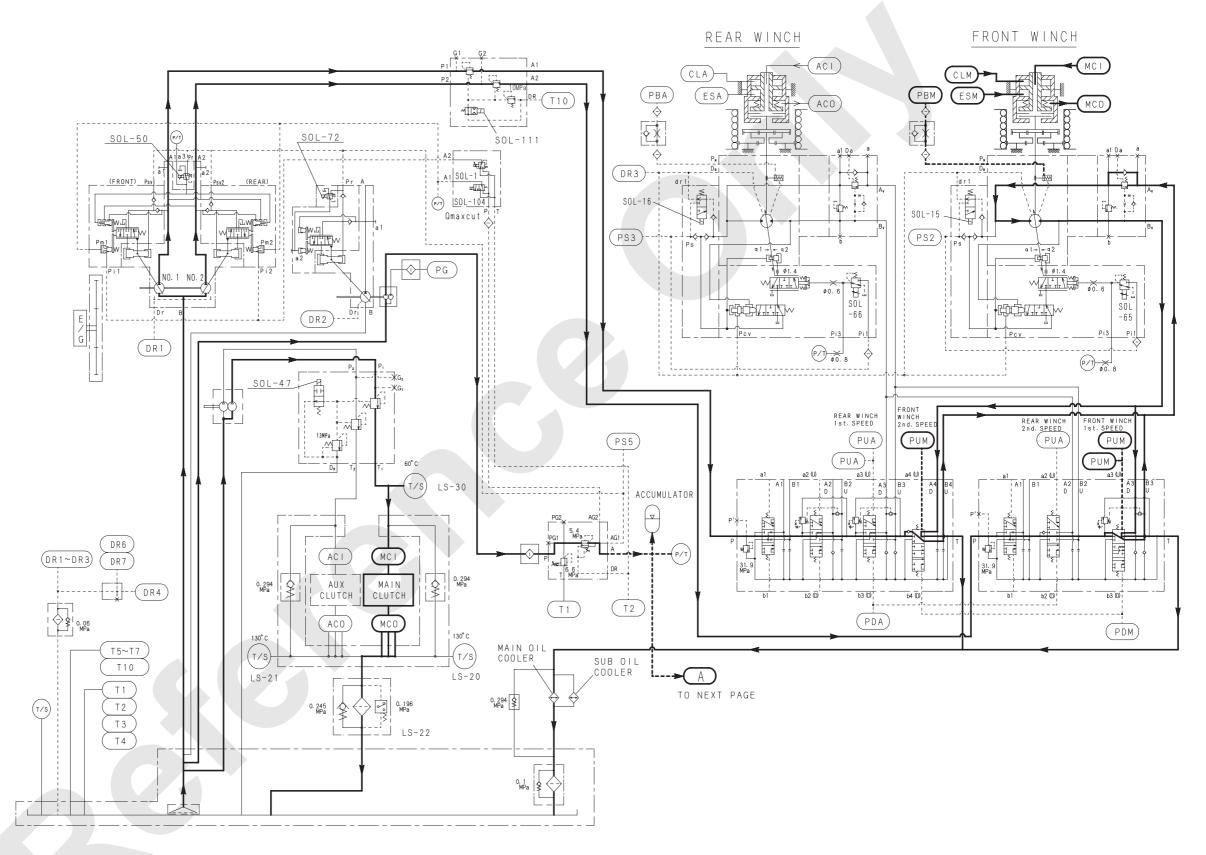
The pressurized oil is also fed to the both sides oil chambers of the front drum clutch cylinder ("CLM", "ESM") via the clutch valve block (4-section solenoid valves).

Since the cylinder thrust force by the pressurized oil is not generated, the clutch is connected with the spring.

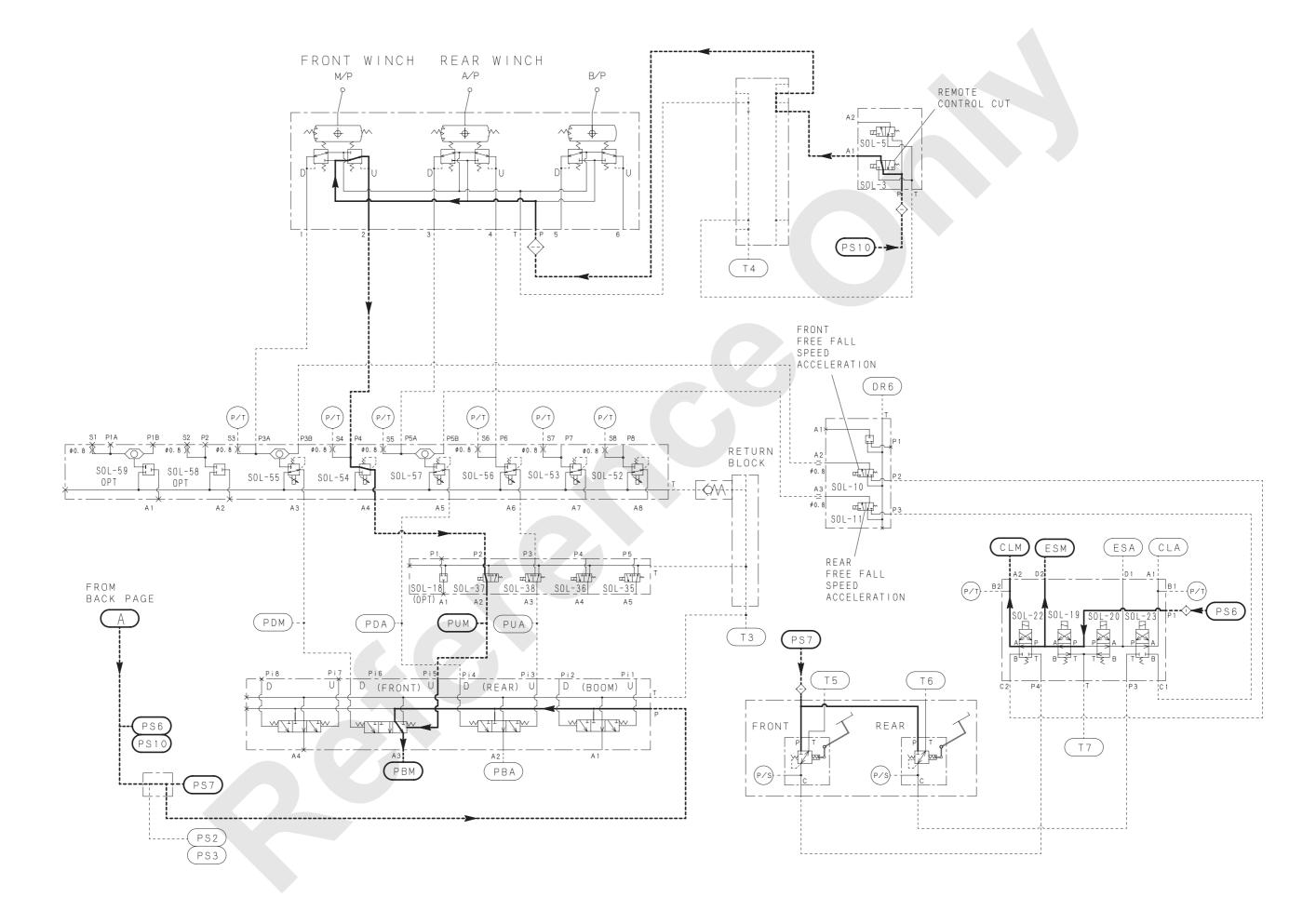
When the front drum control lever is operated in the "hoist load" direction, it directs control pressure oil through the remote control valve and into the "PUM" and "PUM2" ports of the main control valve where it moves the spool.

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 hoist side of the hoist motor to drive the front drum and thereby hoist the load.



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## 6.2.3 HOLDING A HOISTED 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.

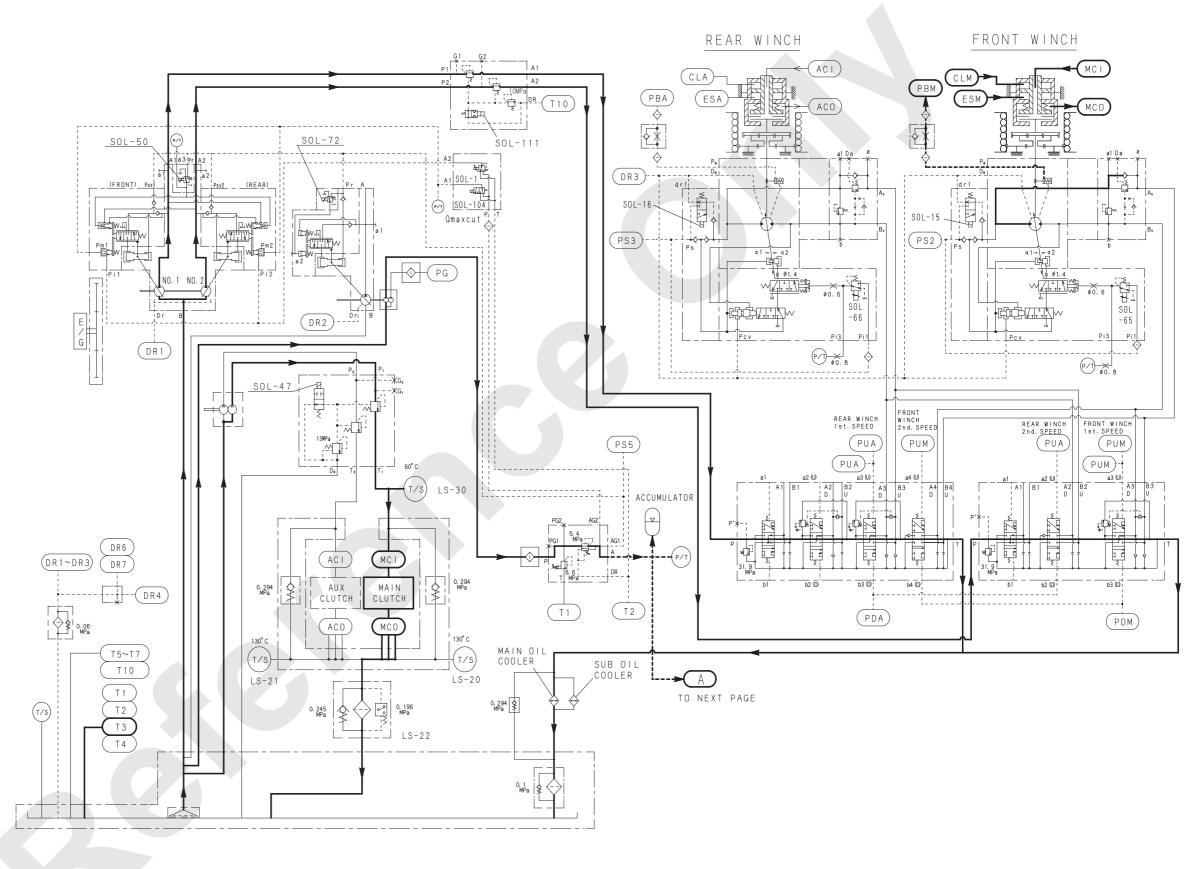
Now, although the weight of the suspended load continues to pull on the drum, further rotation of the drum is prevented by a motor counterbalance valve that blocks the return of oil to the hydraulic tank.

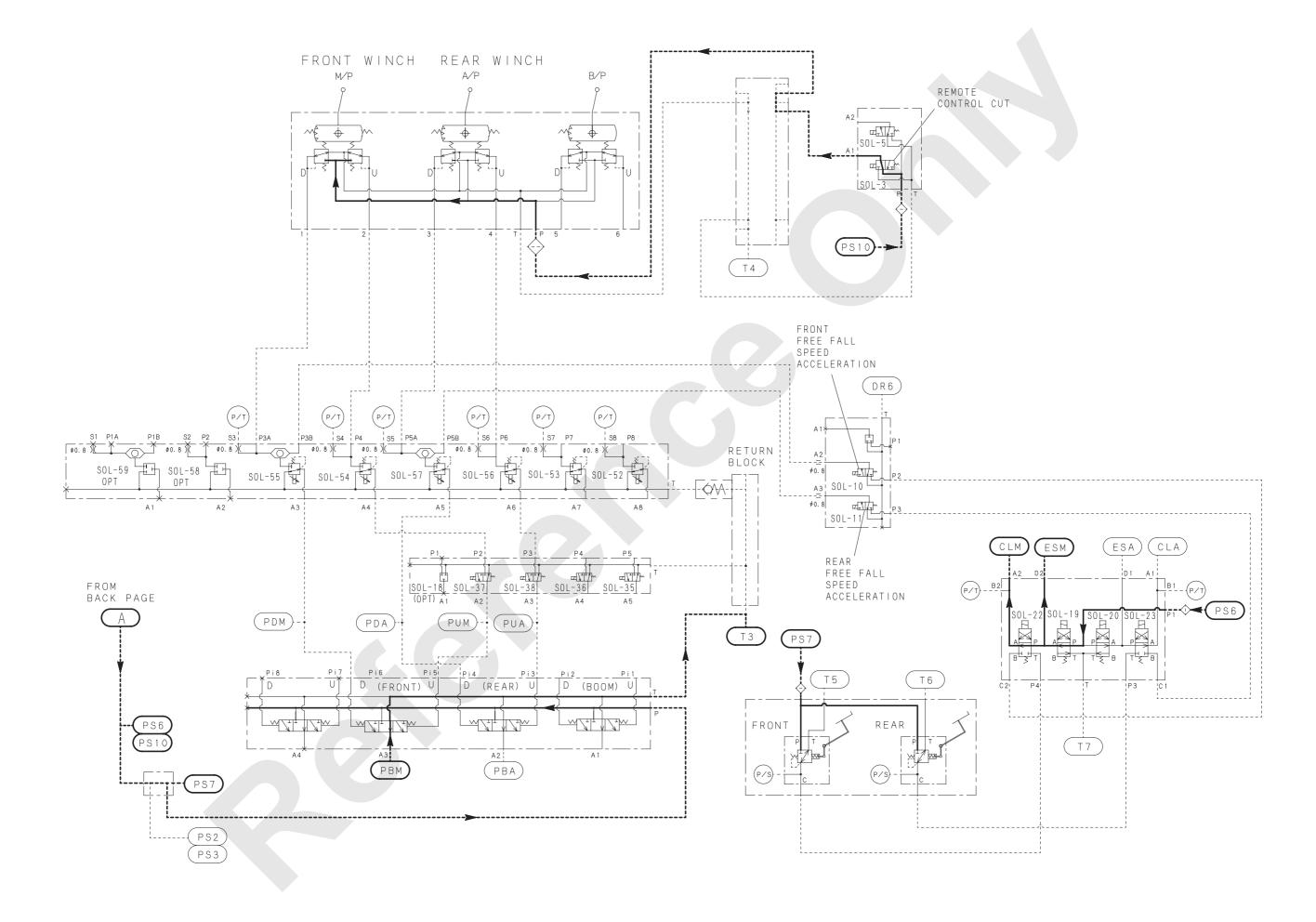
At the same time, the control oil pressure in the motor brake cylinder is directed back to the hydraulic tank and the motor brake (nega-brake) actuates.

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.





## 6.2.4 LOWERING A LOAD (POWER LOWERING)

Pressurized oil from the main pump (No.1, No.2) flows through the main control valve and transmitting the power to the front drum lowering system.

When the function lock lever is in the "WORK" position (SOL-3 : "ON" position), oil pressure from the control pump flows to 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.

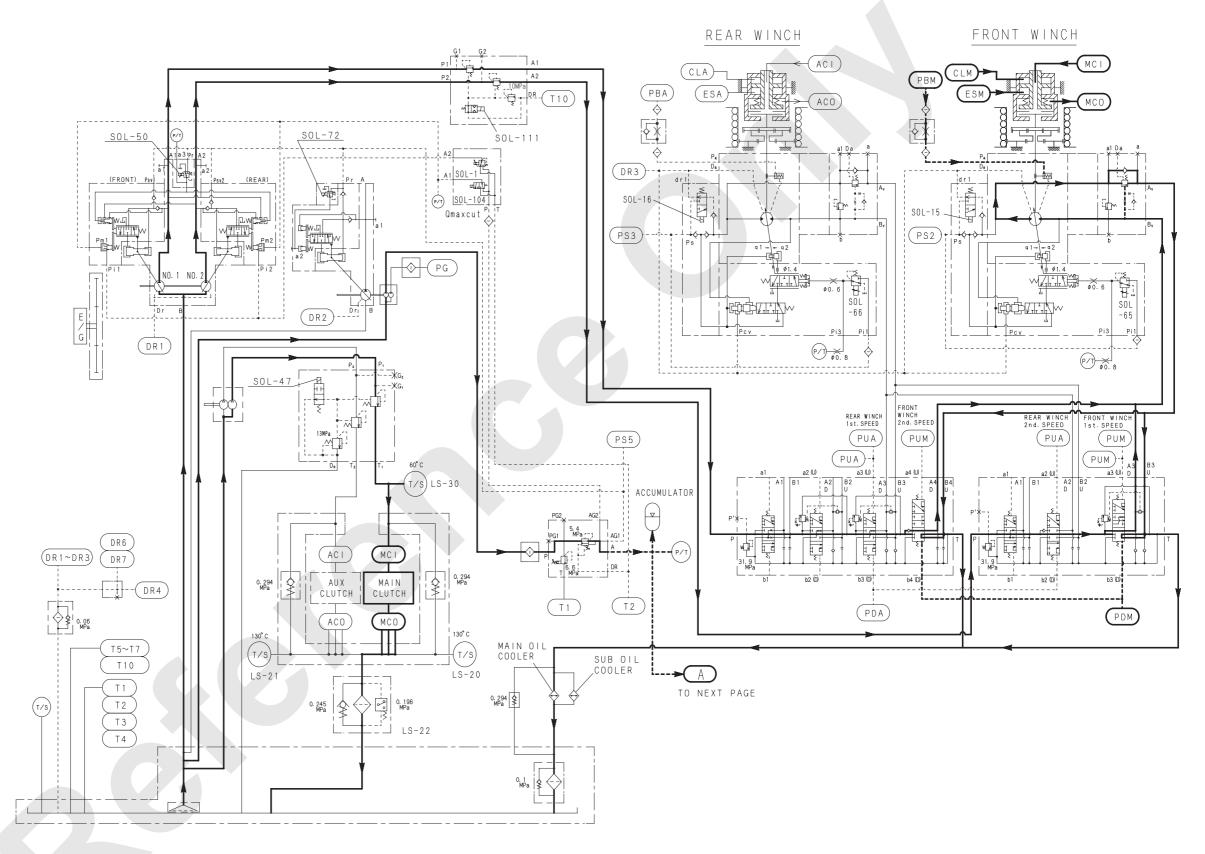
When the main control lever is operated to the "lower load" direction, this control oil pressure is directed by the remote control valve to flow into the port "PDM" of the main control valve and it moves the spool.

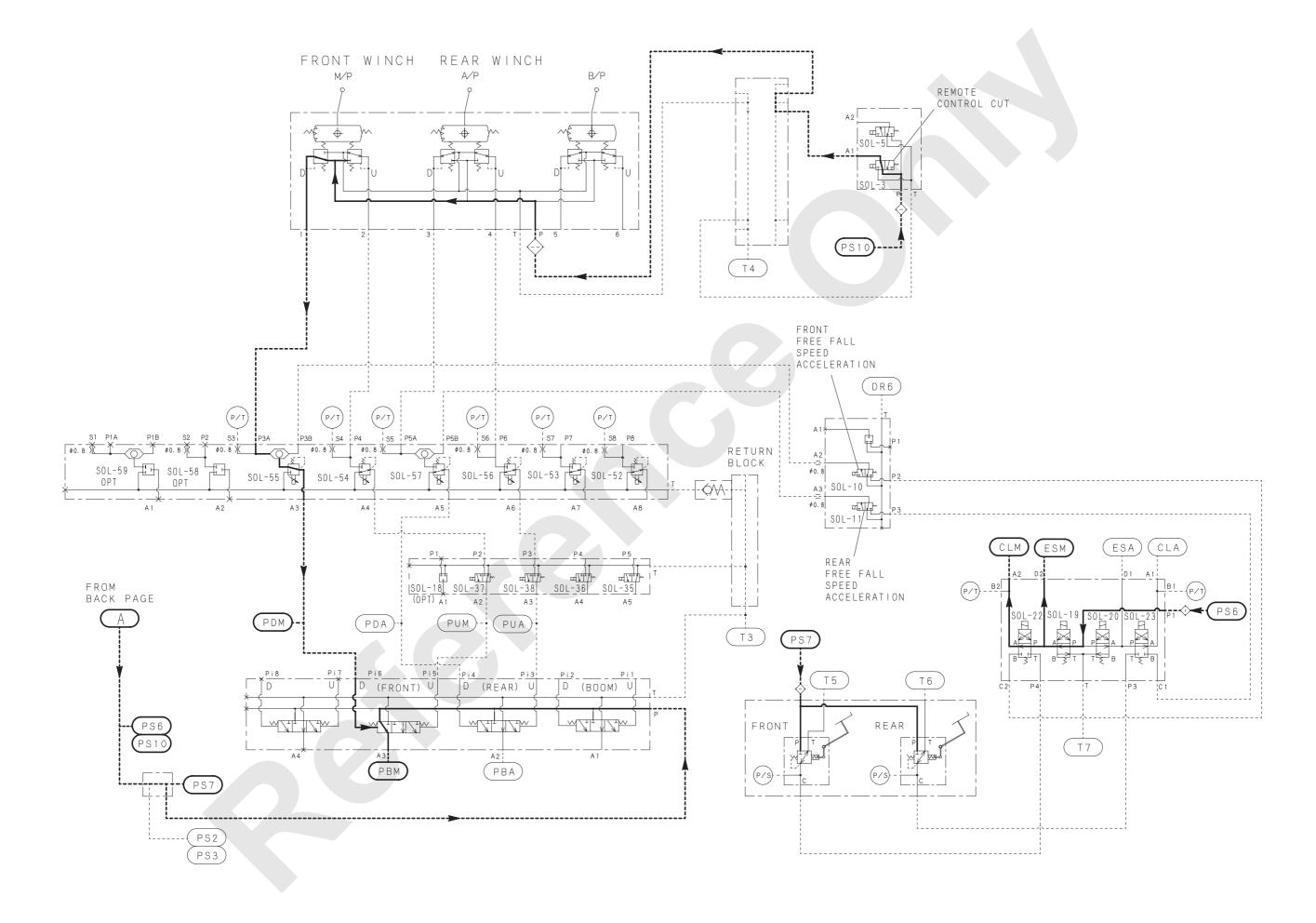
At the same time, control pressure is also directed through the brake valve block (4-section pilot operated valve) to the "PBM" port of the motor brake cylinder.

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.





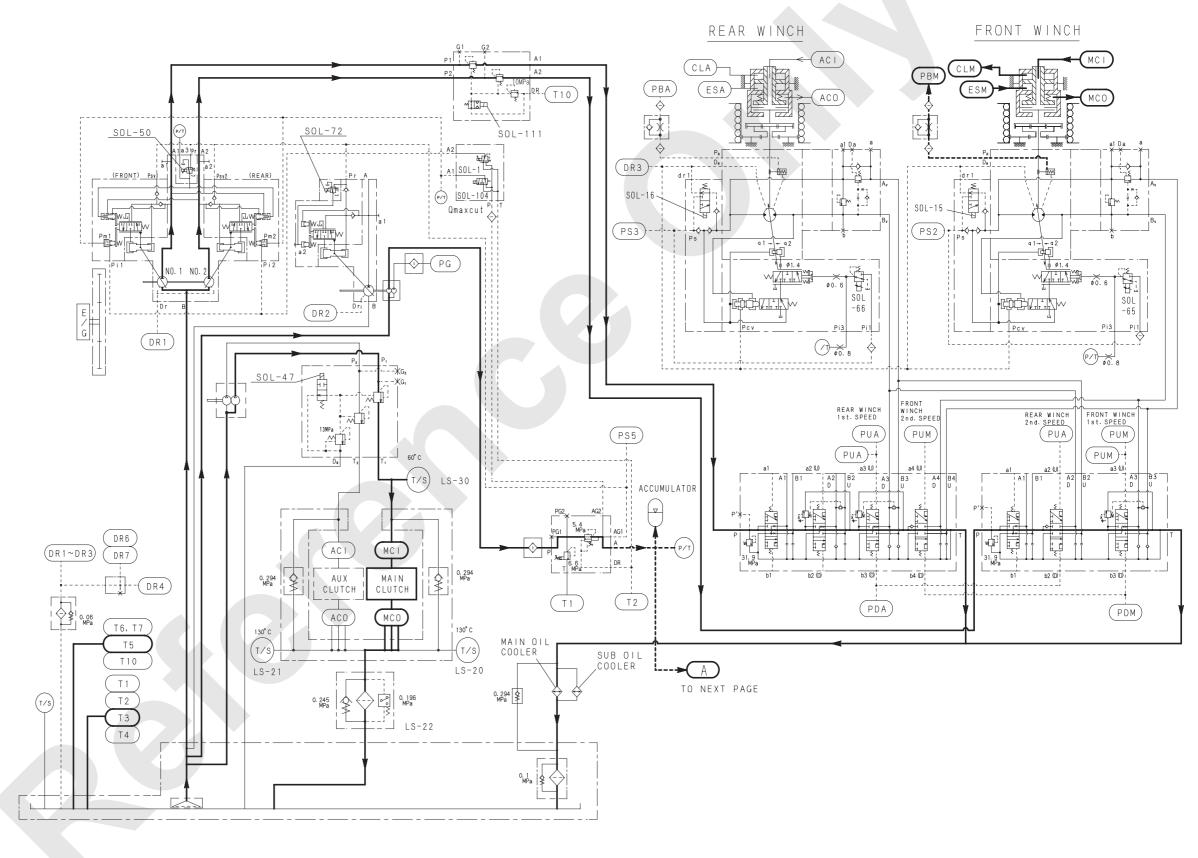
## 6.2.5 FREE FALL OPERATION

#### FREE FALL

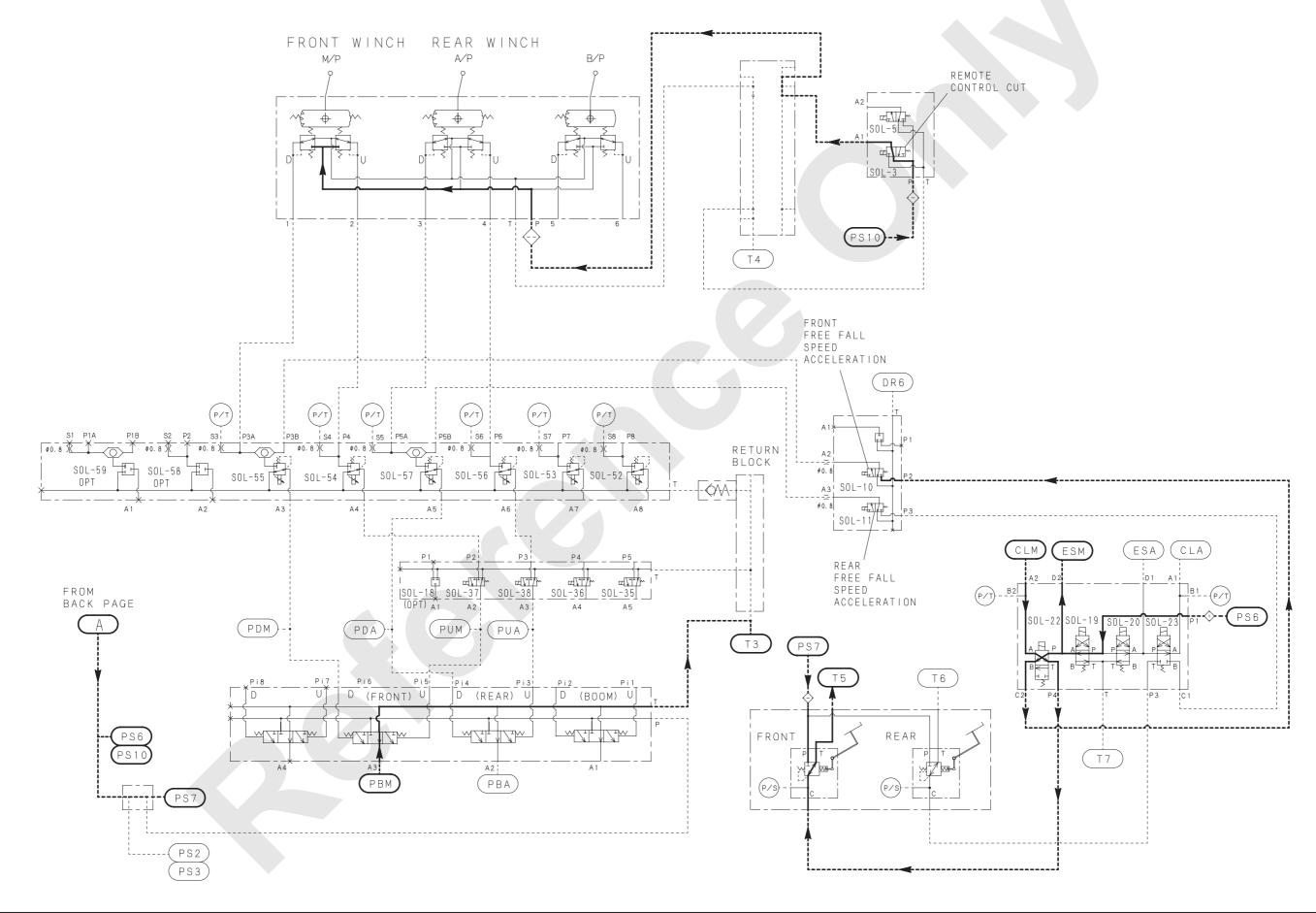
When the brake select switch for front drum is set to the "FREE FALL" side, the solenoid valve (SOL-22) in the clutch valve block (4-section solenoid valves) is switched over.

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.

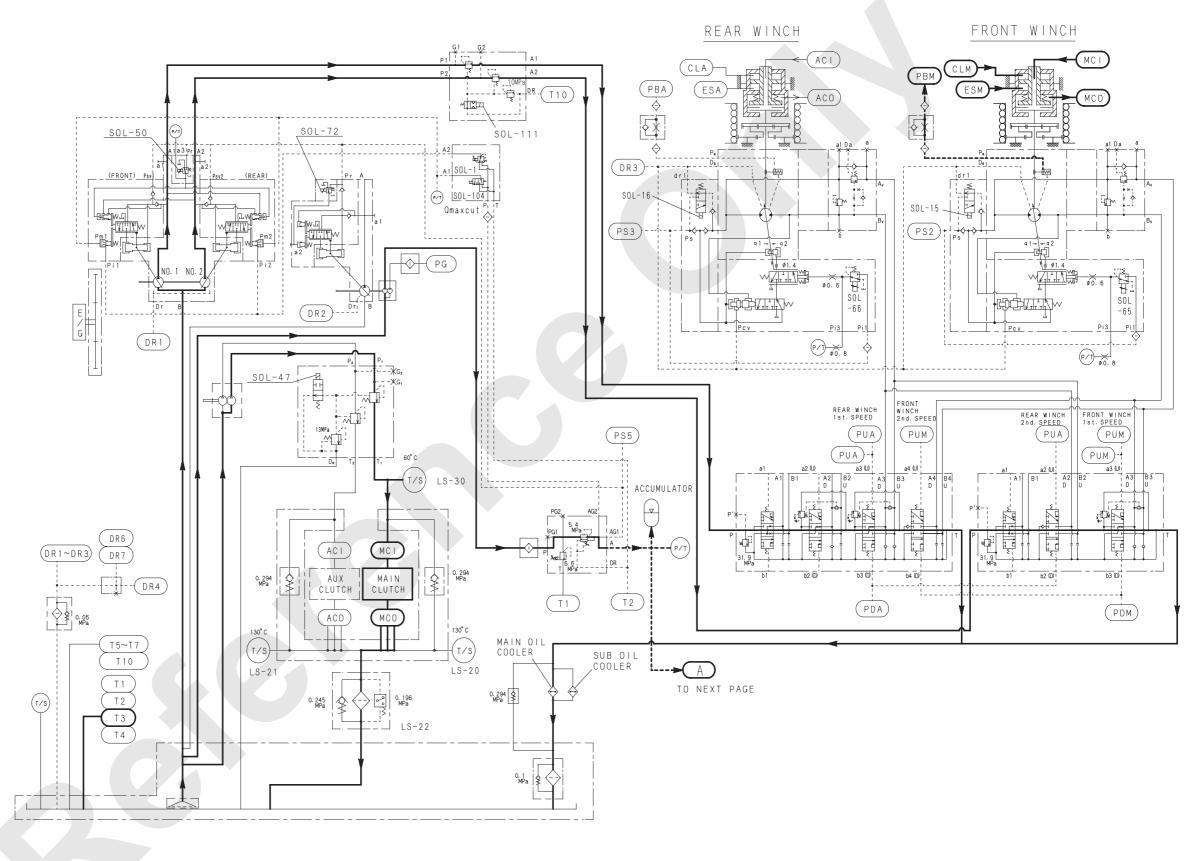


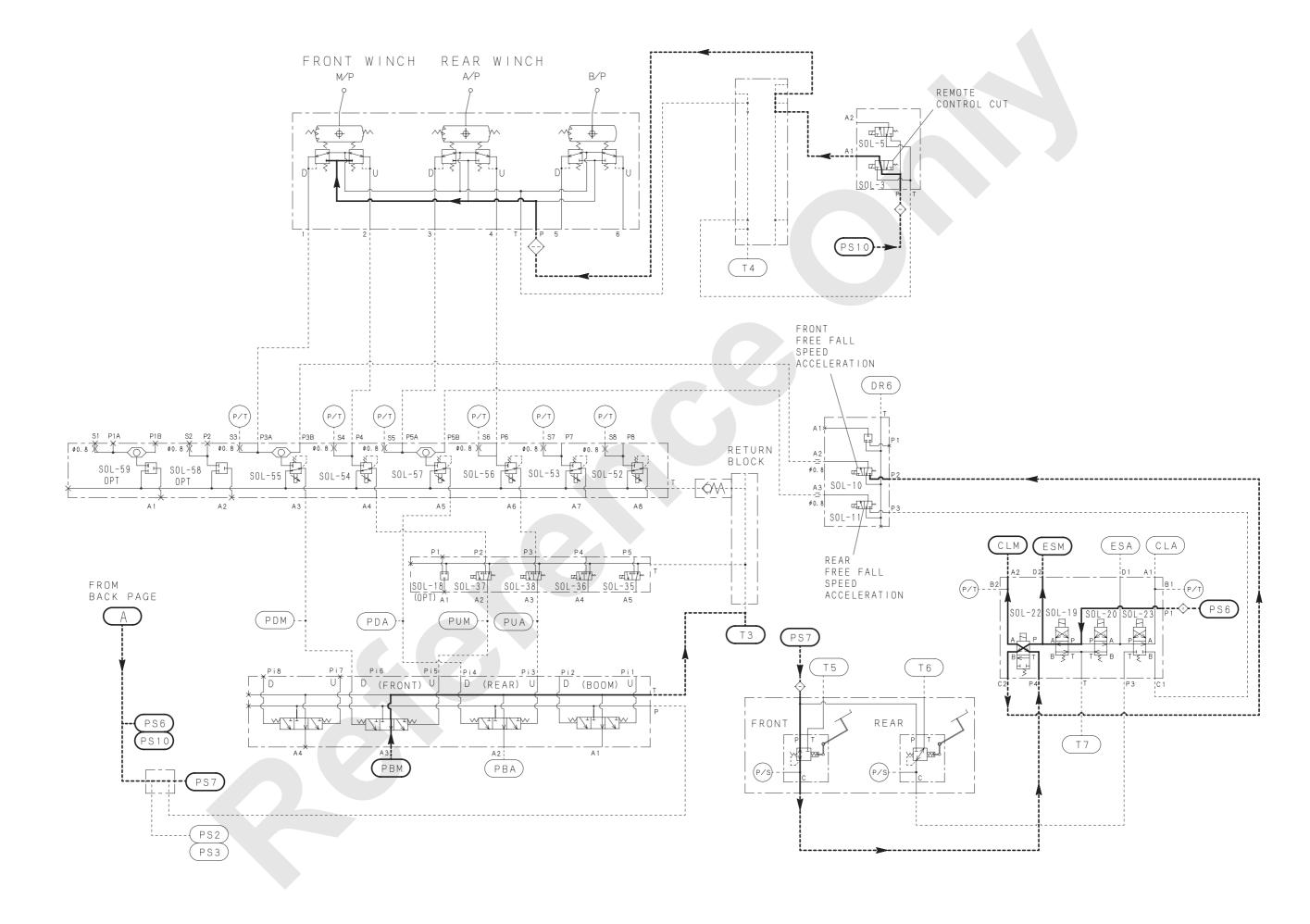
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#### BRAKING

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 increased to actuate the brake (braking with the clutch).





#### FREE FALL ACCELERATION

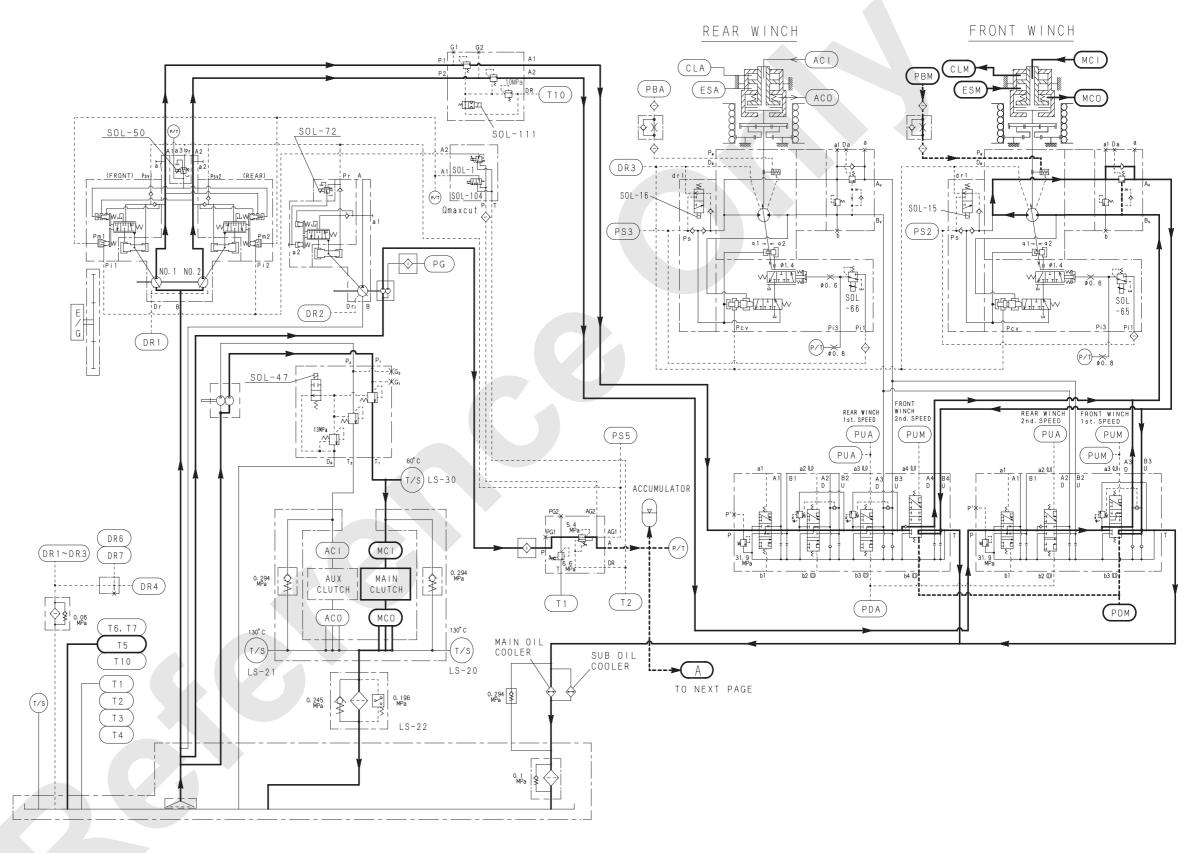
Free fall with the "FREE FALL SPEED SELECT SWITCH" on the left upper switch panel set to the "HIGH" position.

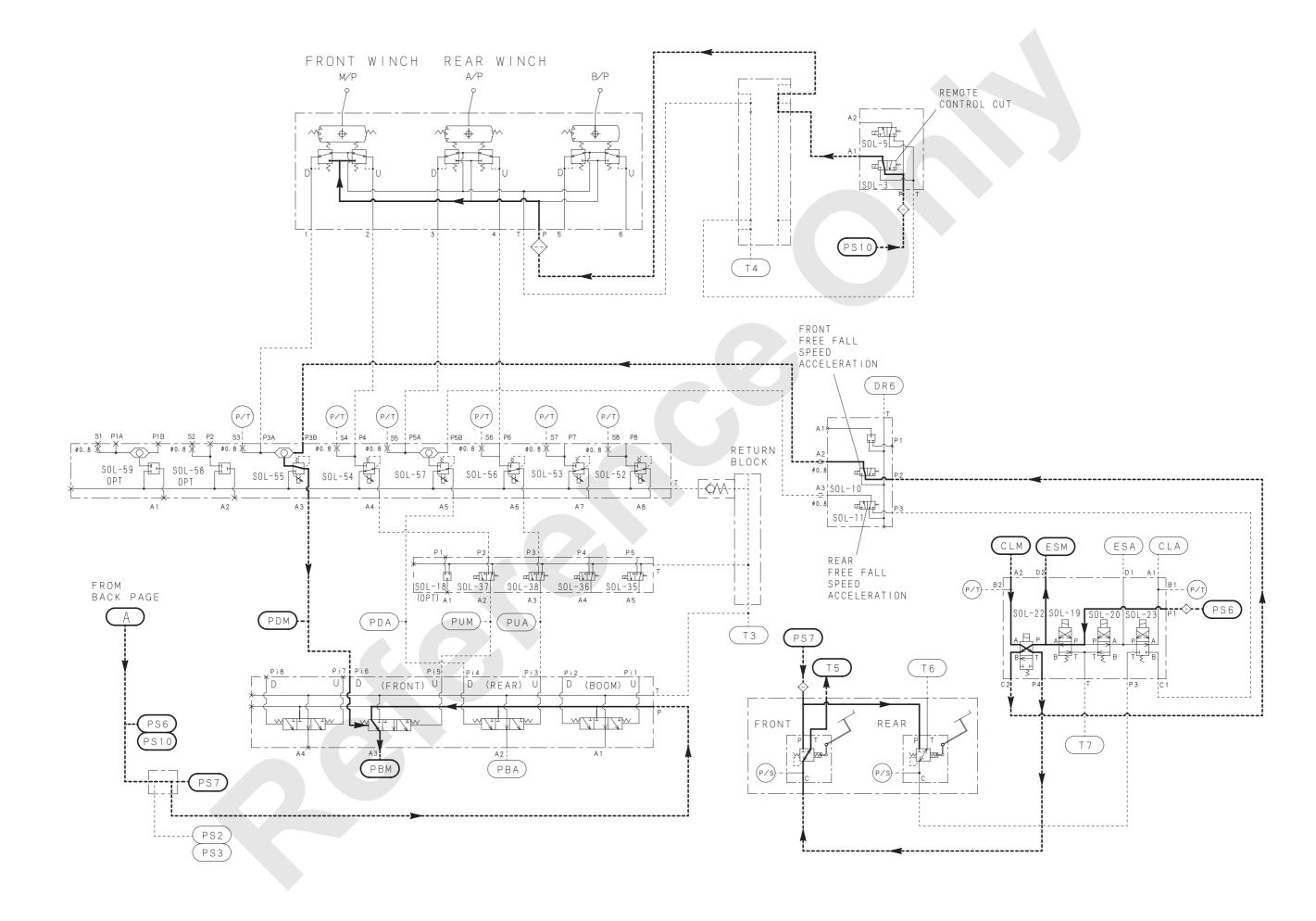
When the free fall speed select switch is turned to HIGH, the solenoid valve (SOL-10) is switched over, and pressurized oil from the clutch valve block (4-section SOL) flows into the "PDM" port of the main control valve through the shuttle valve and solenoid proportional valve (SOL-55) to move the spool.

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.

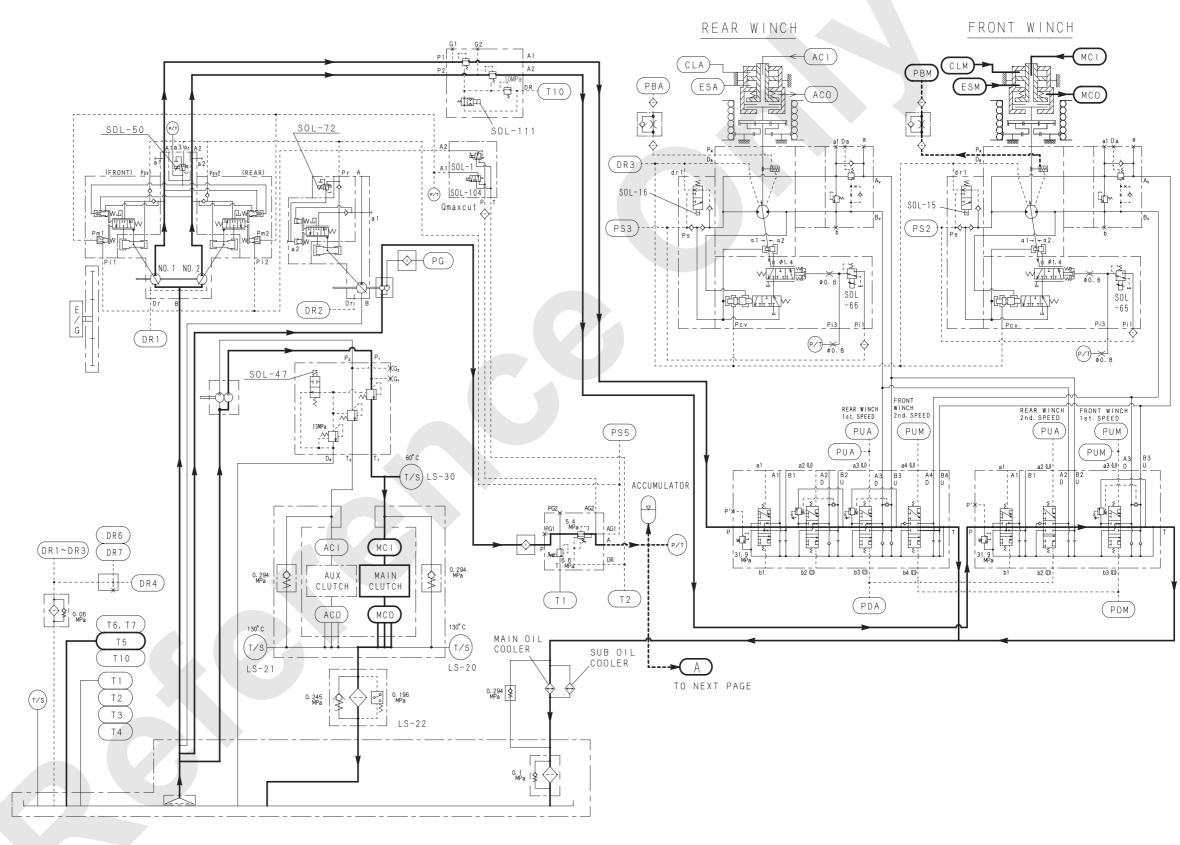


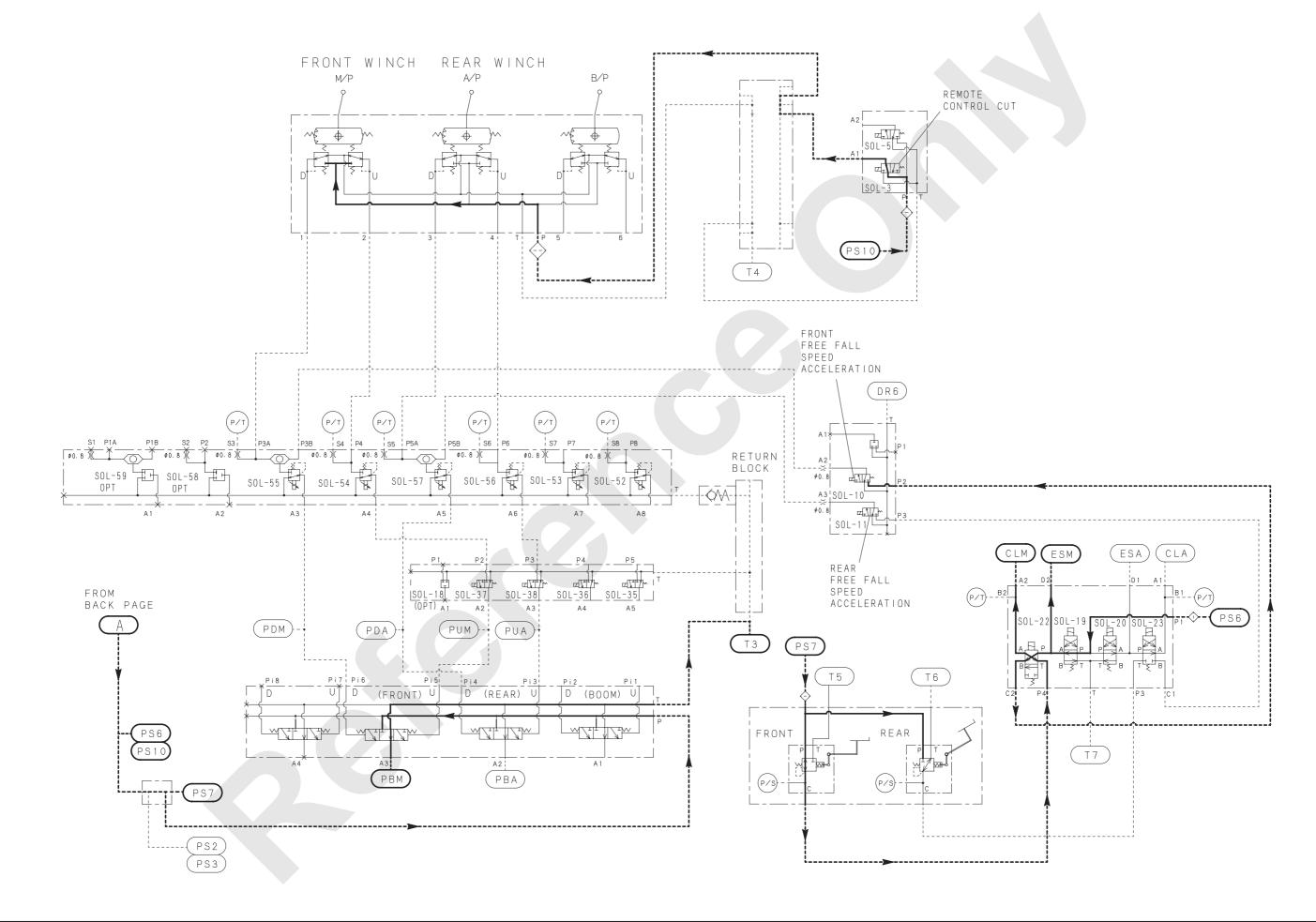


#### BRAKING WHILE FREE FALL ACCELERATION

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.



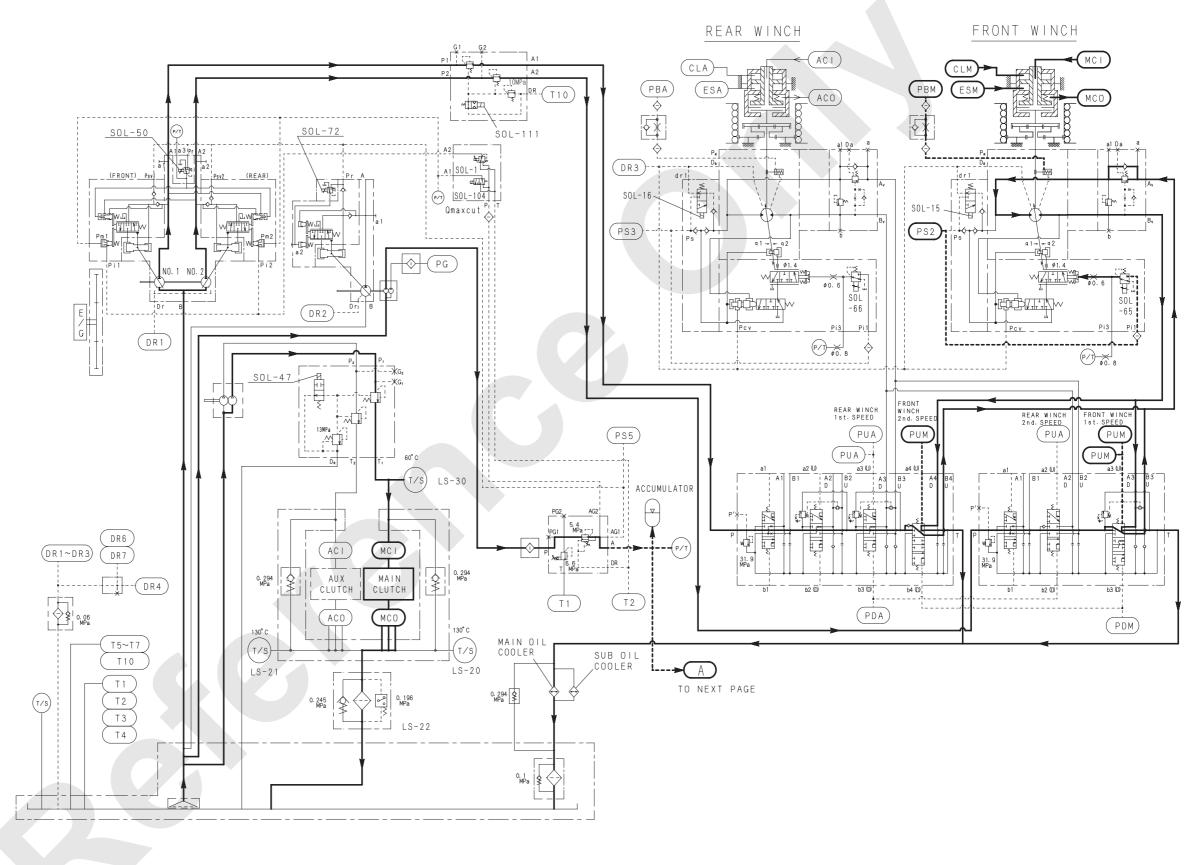


## 6.2.6 G WINCH MODE LIFTING

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.

The function of respective parts for G winch mode is same as "6.2.2 LIFTING A LOAD". In addition to these, the control pressure from a proportional solenoid valve SOL-65 will be output to the motor for minimum capacity (Minimum displacement for G winch) to create the G winch mode.



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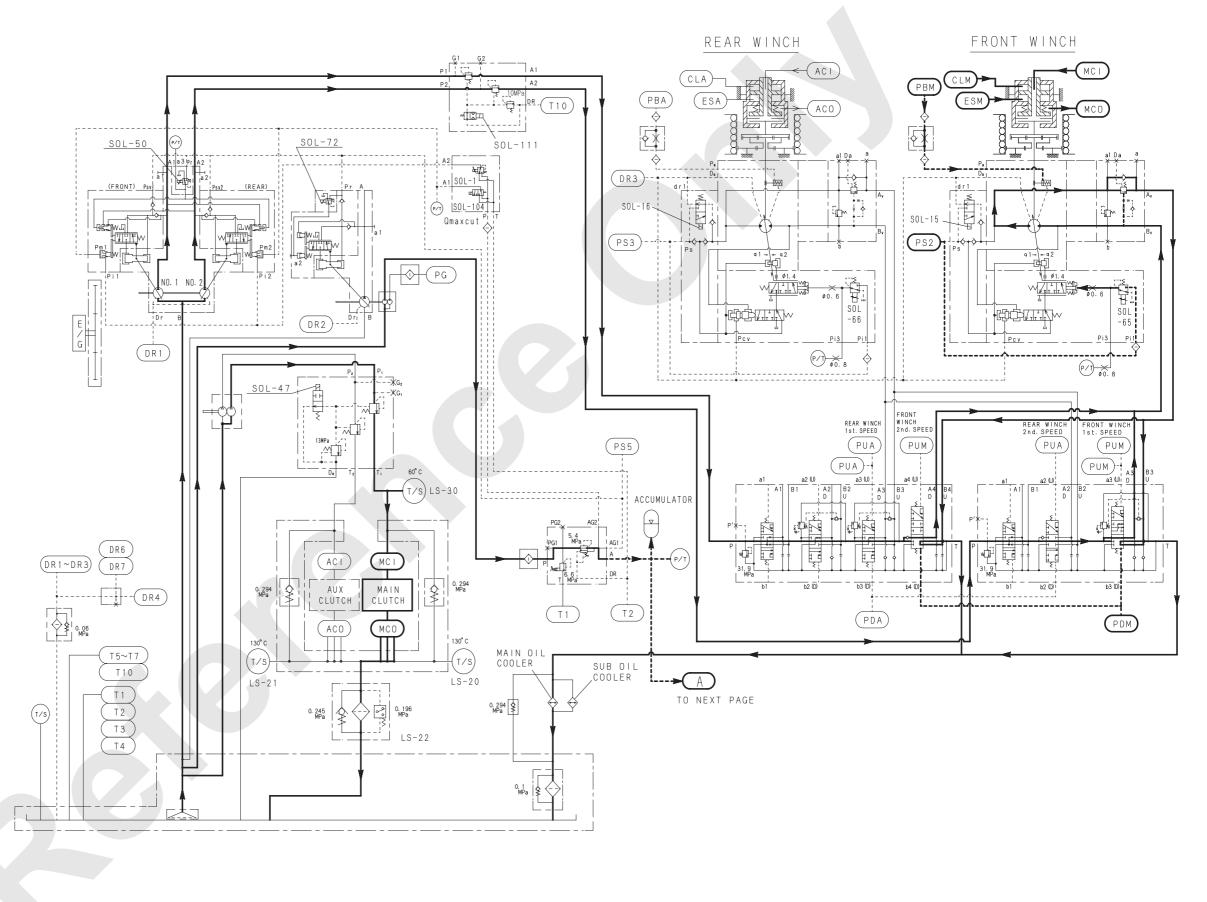
## 6.2.7 G WINCH MODE LOWERING

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 front drum is explained here as an example.

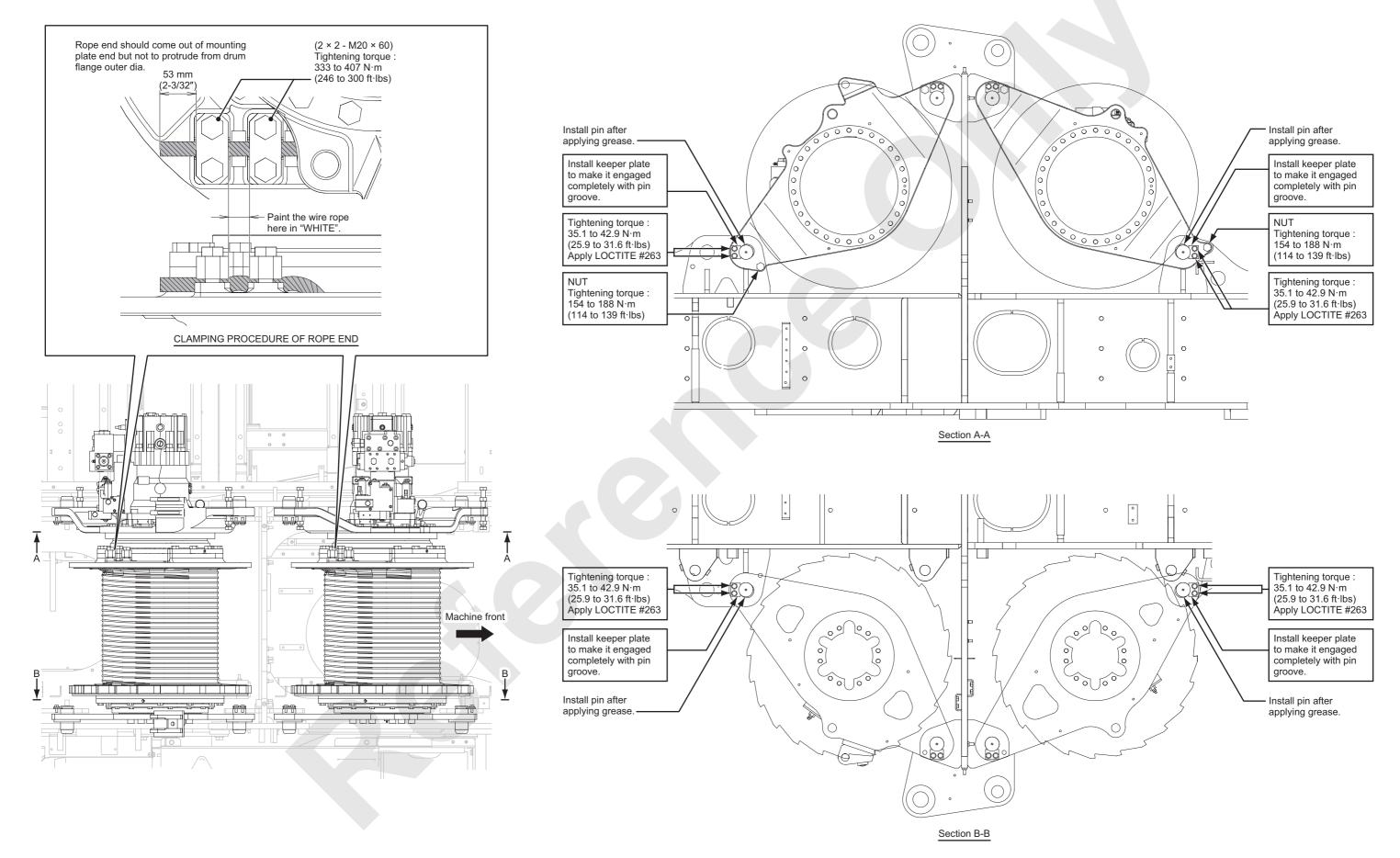
The function of respective parts for G winch mode is same as "6.2.4 LOWERING A LOAD (POWER LOWERING)".

In addition to these, the control pressure from a proportional solenoid valve SOL-65 will be output to the motor for minimum capacity (Minimum displacement for G winch) to create the G winch mode.



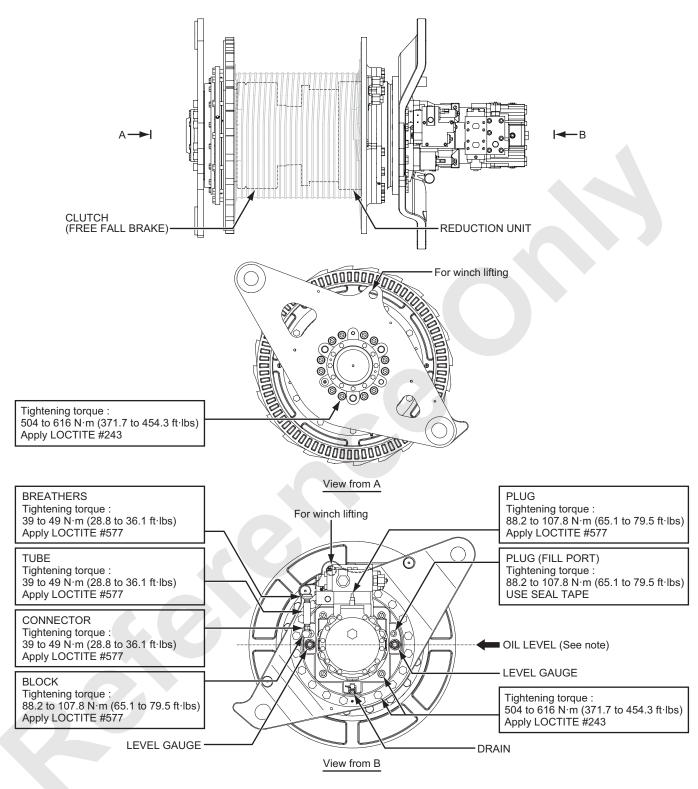
# 6.3 WINCH

#### 6.3.1 WINCH INSTALLATION



6

#### 6.3.2 WINCH ASSEMBLY



Note

After assembly, fill oil to the specified level. (Approx. 15 L [4.0 gal]) Higher than level gauge red point and within the oil. Extreme pressure gear oil SAE #80W-90 (APOLOIL GEAR HE MULTI-SPECIAL).

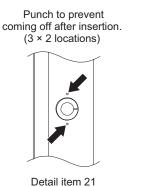
# 6.3.3 REDUCTION UNIT ASSEMBLY

- On mating surface, apply LOCTITE #515 on inner face of sleeve and both of outer periphery surfaces of the press fit in assembling.
- Apply 1 coat painting before winch drum is installed.

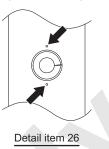
But except machining face.

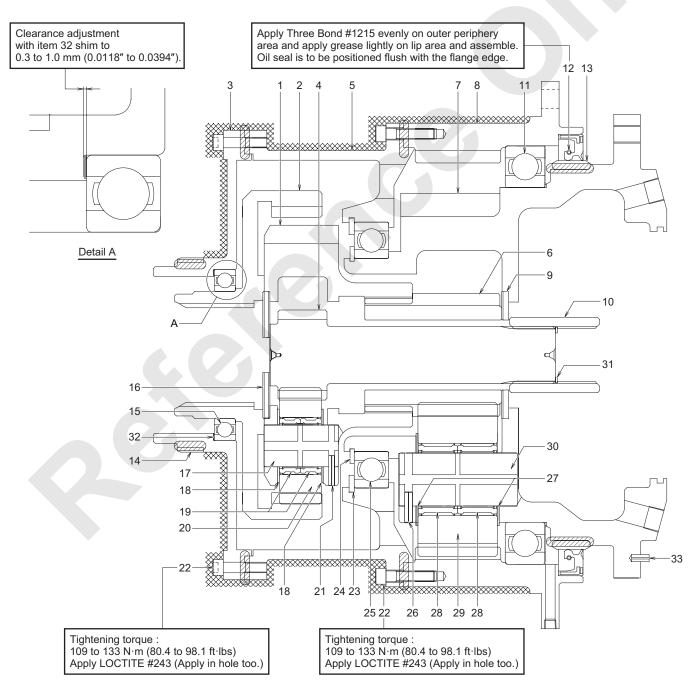
As for paint and film thickness, follow KSC00H50Z003.

After assembling is completed, press the 1st sun gear into the reduction unit by tapping it lightly and confirm that it turns easily.



Punch to prevent coming off after insertion. (3 × 2 locations)





- 1. Spider
- 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

# 6.3.4 ADJUSTMENT OF DRUM LOCK

#### 

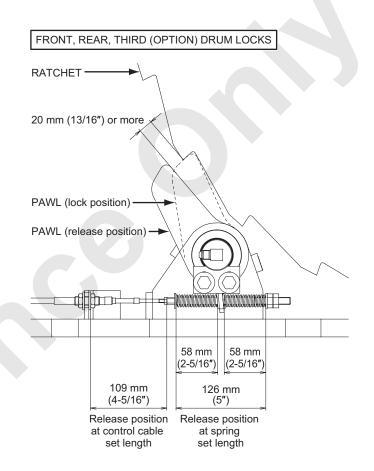
Do not adjust the drum locks until the boom and hook block have been lowered to the ground. Failure to observe this precaution may result in a serious injury or loss of life.

- 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.
- 2. With the release position, adjust the respective dimension as shown in the figure to the right.
- 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 in.).
- 4. Operate the knob to the lock position, and to the release position and confirm that the pawl moves smoothly.

### 

Place a signal person to prevent accident from rotating drum.

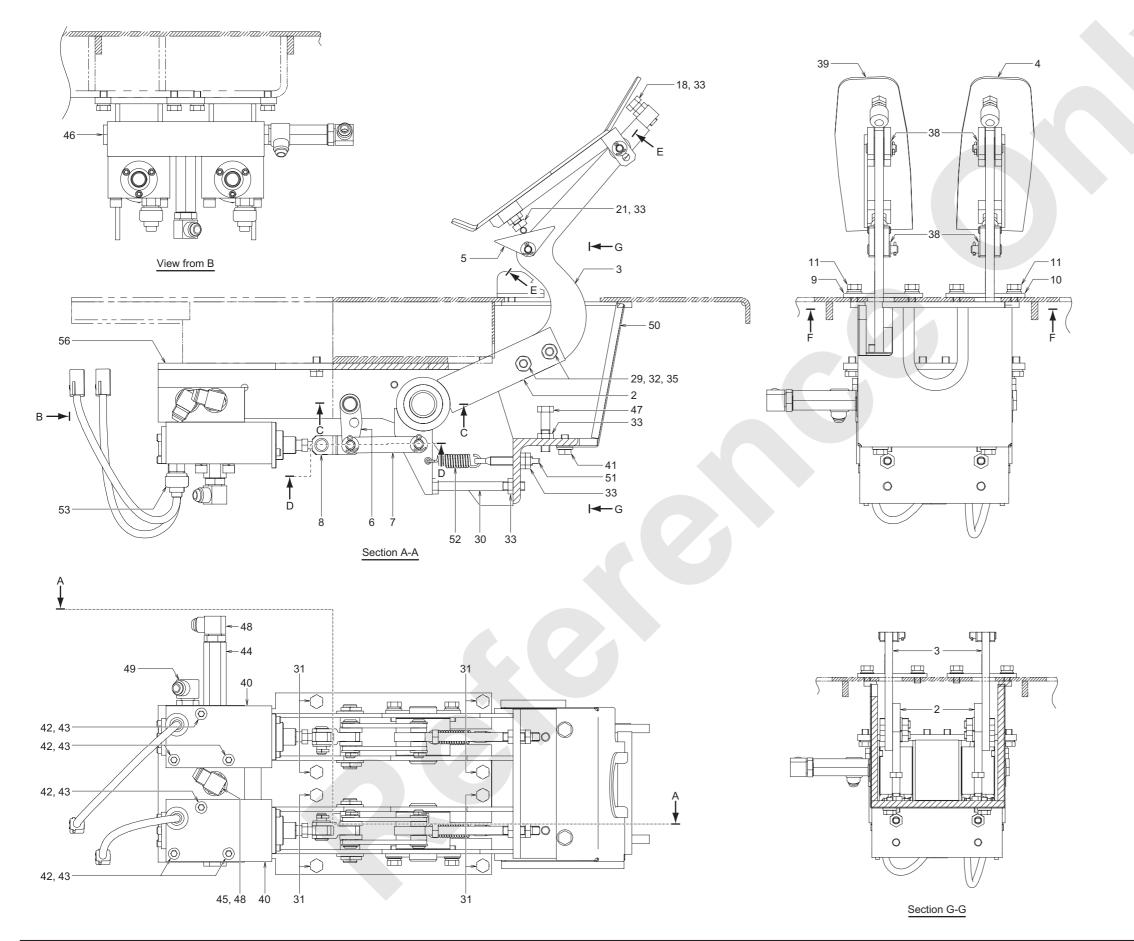
Failure to observe this precaution may result in a serious injury.

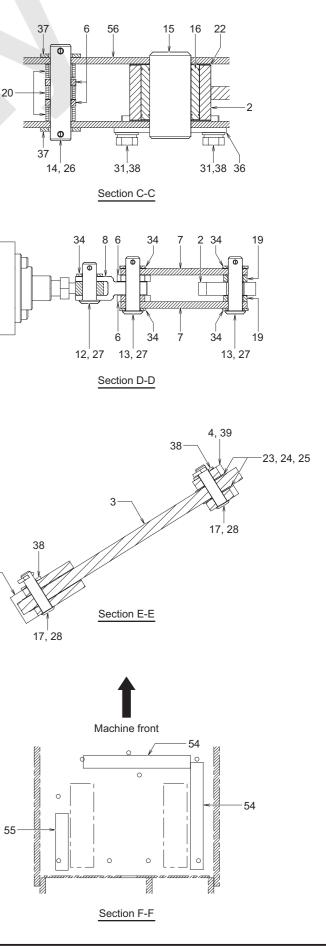


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# 6.4 BRAKE PEDAL

## 6.4.1 ASSEMBLY DRAWING





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

#### TIGHTENING TORQUE TABLE

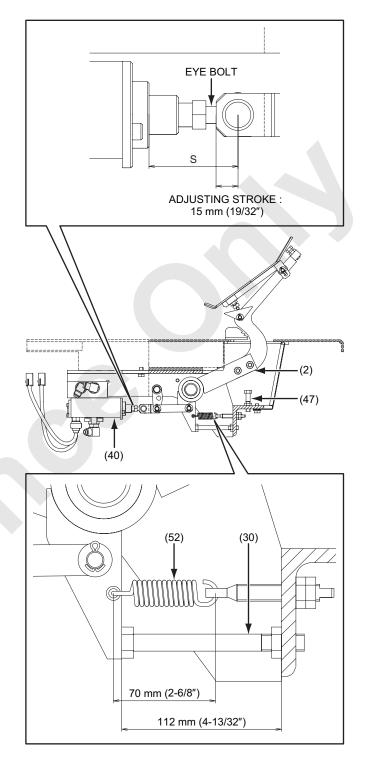
Name	Size	Tightening Torque
29. Bolt	M12 × 40	37.3 to 45.1 N·m (27.5 to 33.2 ft·lbs)
42. Capscrew	M10 × 70	30.4 to 38.2 N·m (22.4 to 28.2 ft·lbs)

- 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

- Adjust the eye bolt until the dimension S is 53 mm (2-3/32 in.).
- Depress the brake pedal until the valve spool reaches the stroke end. (Dimension S = 37.5 mm [1-8/16 in.])
- Bring the (47) capscrew into contact with the (2) lever assembly in the status described in the 2 above, and loosen 3/4 turn (protrude upward) to adjust the dimension S until it is 38 mm (1-8/16 in.) to 38.3 mm (1-8/16 in.). Then, tighten the nut.
- 4. Raise the (2) lever assembly up, and return the valve spool to the neutral position. (Dimension S = 53 mm [2-3/32 in.]) Bring the (30) bolt into contact with the (2) lever assembly, and loosen 3/4 turn (protrude left). Then, tighten the nut. (Dimension S = 52.3 to 52.5 mm [2-3/32 to 2-1/16 in.])
- 5. Adjust the (52) spring until the dimension L is 70 mm (2-6/8 in.) in the status described in the 4 above.
- 6. Ensure that the effective stroke of the (40) valve from the time when the pedal is depressed to the time it is released is 15 mm (19/32 in.).



# 6.4.3 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.

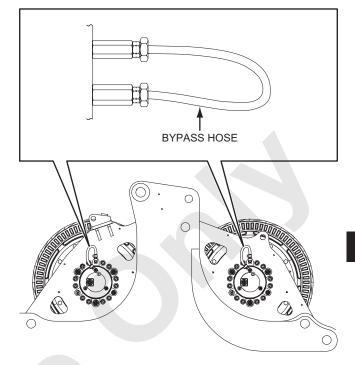
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When bleed the air from the brake circuit, be sure to lower the hook onto the ground, and select the "free fall" mode.

Then, ensure that the drum does not rotate even when you release your foot from the brake pedal. Failure to observe this precaution may result in a serious injury or loss of life.

- 1. Bypass the quick coupler of the winch brake section with a hose, while the engine is stopped.
- 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.
- Release your foot from the brake pedal, and wait for approx. 1 minute. At this time, air bleed.
- 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

pressure is released (approx. 1 minute), and then, remove the bypass hose.



# 7. BOOM HOIST SYSTEM

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# 7. BOOM HOIST SYSTEM

The boom hoist system consists of the main pump (No.1), the main control valve, the boom drum motor, the reduction unit, the boom drum and the drum lock mechanism.

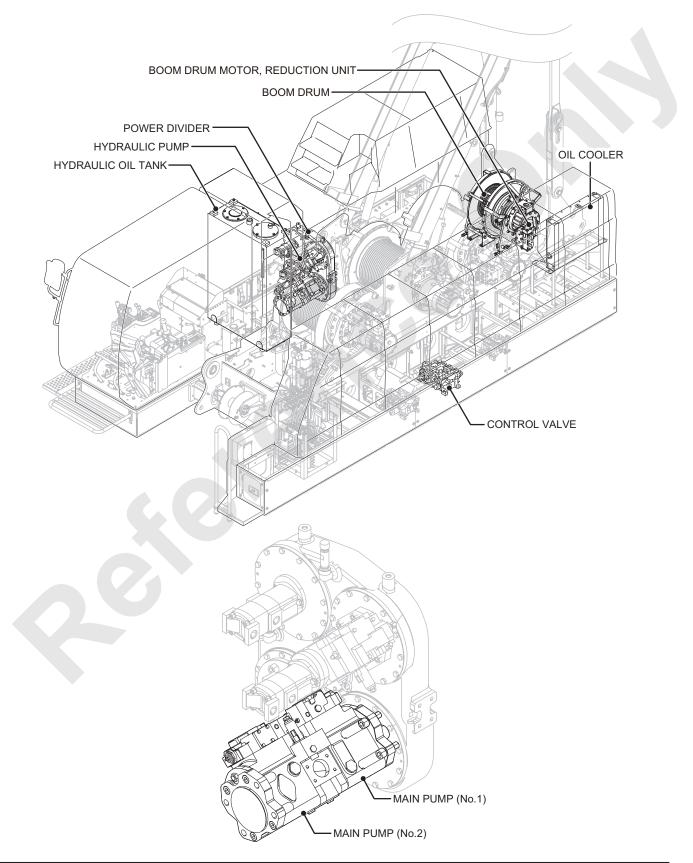
The pressurized oil for the boom hoist system is supplied by the main pump (No.1) installed on the engine's power divider.

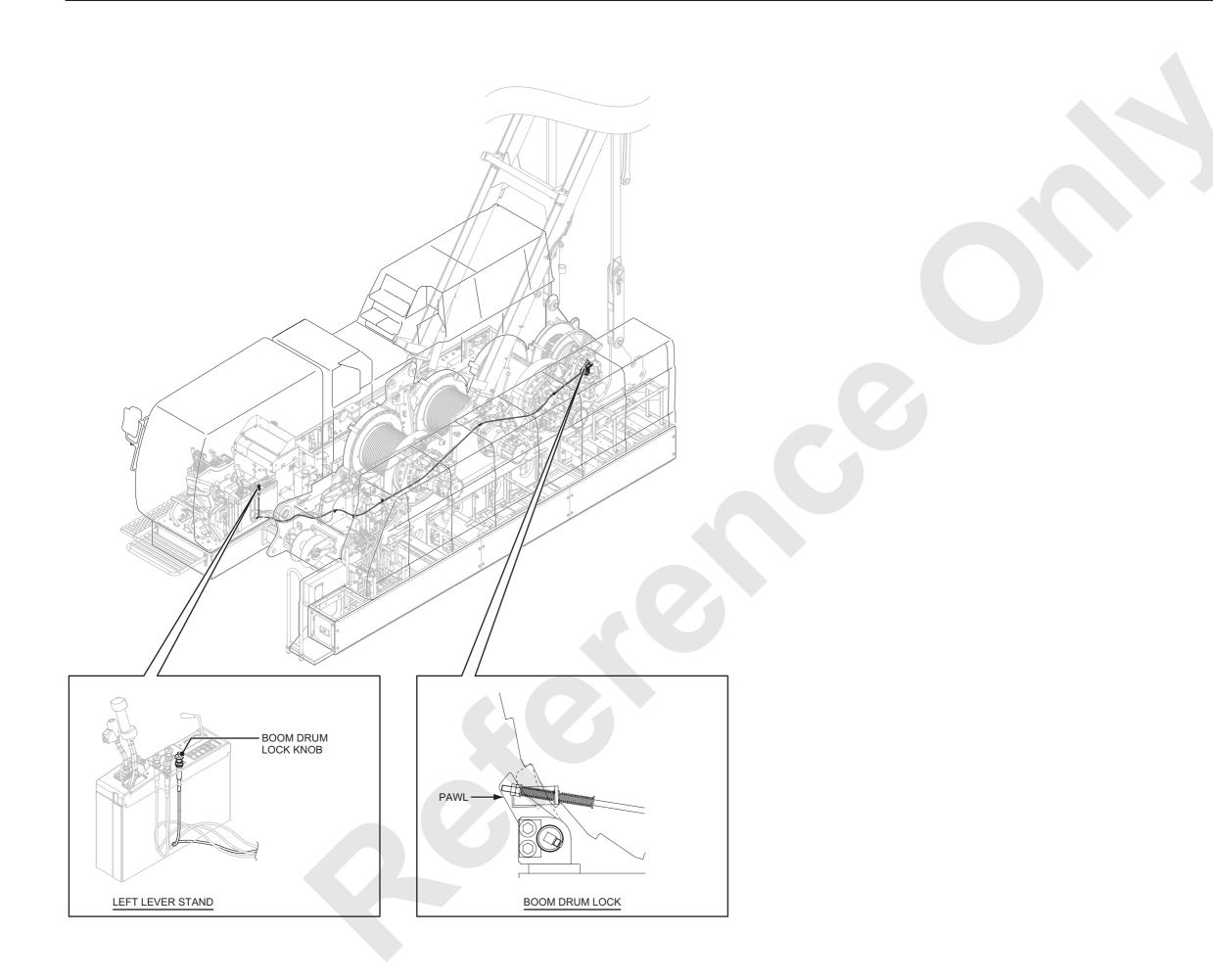
From this pump, the oil flows through the 4 section side control valve to drive the motor of the boom drum.

# 7.1 APPARATUS AND COMPONENTS LOCATION



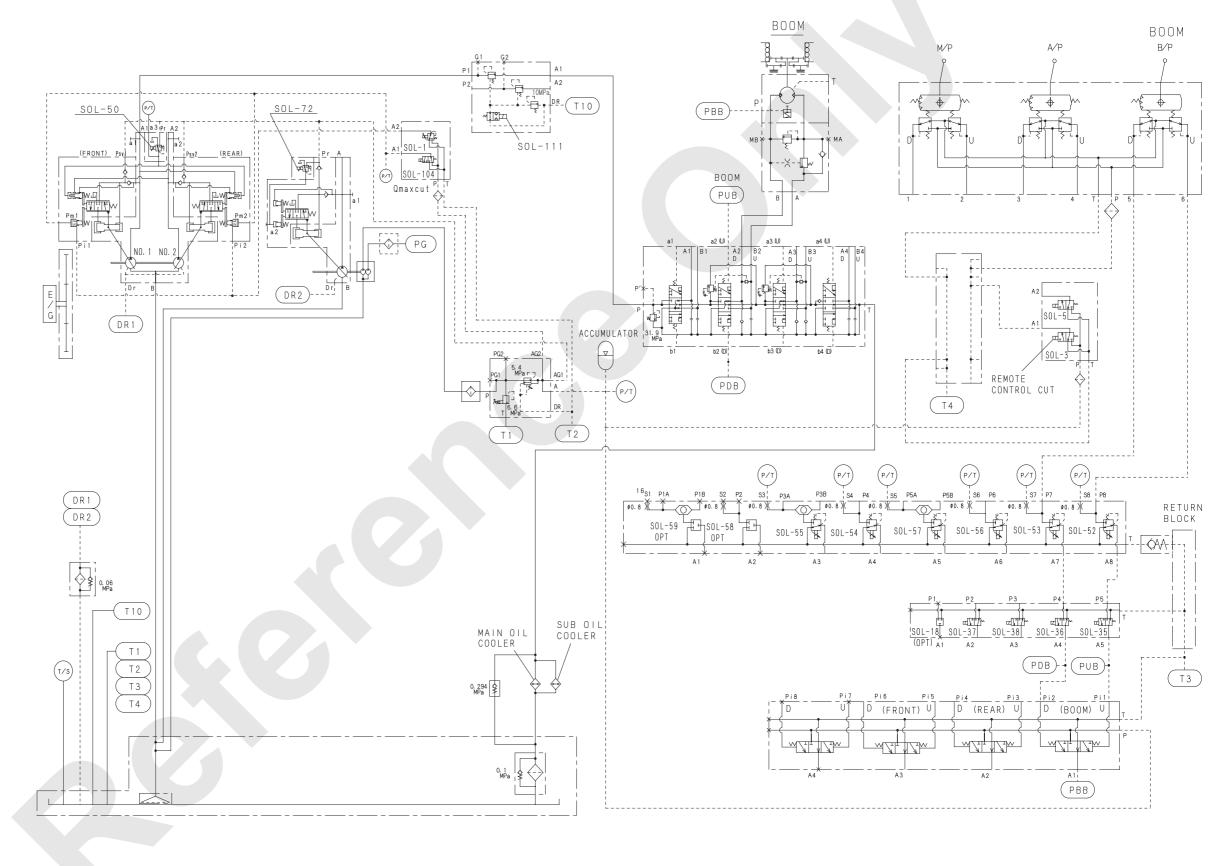
Refer to the article "7.2 CONSTRUCTION AND FUNCTION" for circuit diagram and function.





# 7.2 CONSTRUCTION AND FUNCTION

# 7.2.1 HYDRAULIC SCHEMATIC



## 7.2.2 RAISING BOOM

Pressurized hydraulic oil from the No.1 pump flows into 4 section side of the main control valve.

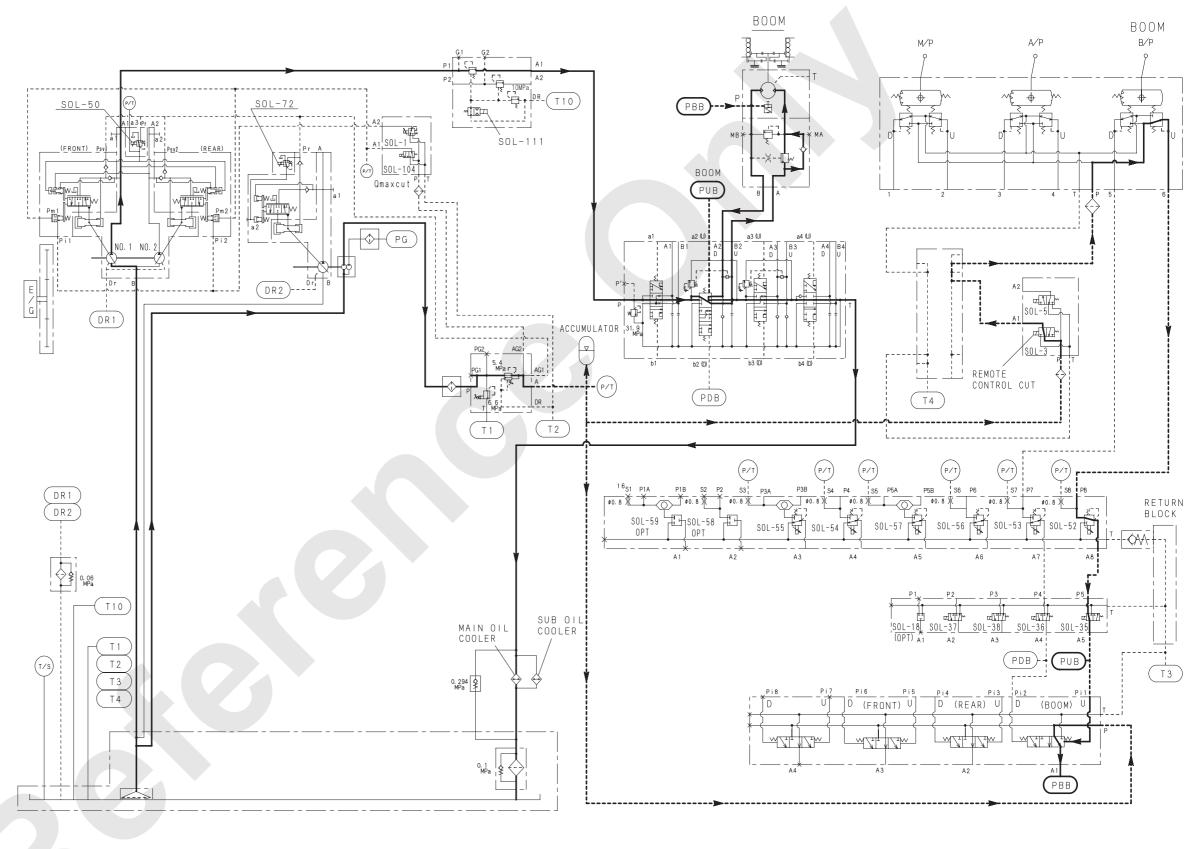
The pressurized oil from the pump for control flows into the valve block and remote control valve through the accumulator.

(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 4 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 flows into the control valve enters into the raising side of the boom drum motor by the boom section spool and the boom is raised.



# 7.2.3 NEUTRAL (HOLDING BOOM)

When the control lever is returned to neutral, control pressure from the remote control valve is shut off and main control valve spool returns to neutral and pressured oil from the No.1 pump passes through the control valve and returns to the tank without load.

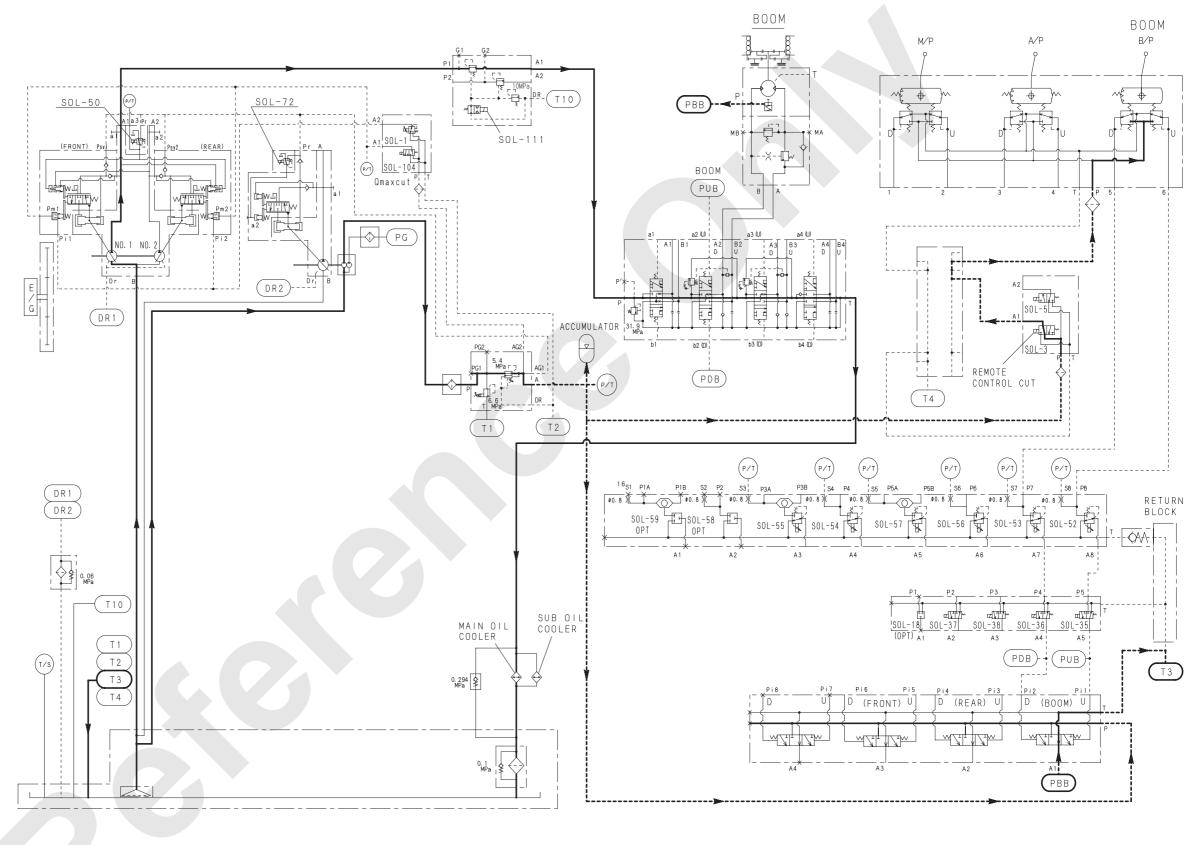
The stopped motor tends to rotate toward lowering side by boom weight.

But the return oil flow is shut off by the counterbalance valve and motor does not rotate.

At the same time, pressured oil flows 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 valve and motor brake.



## 7.2.4 LOWERING BOOM

The pressured oil from the No.1 pump flows into the 4 section side main control valve.

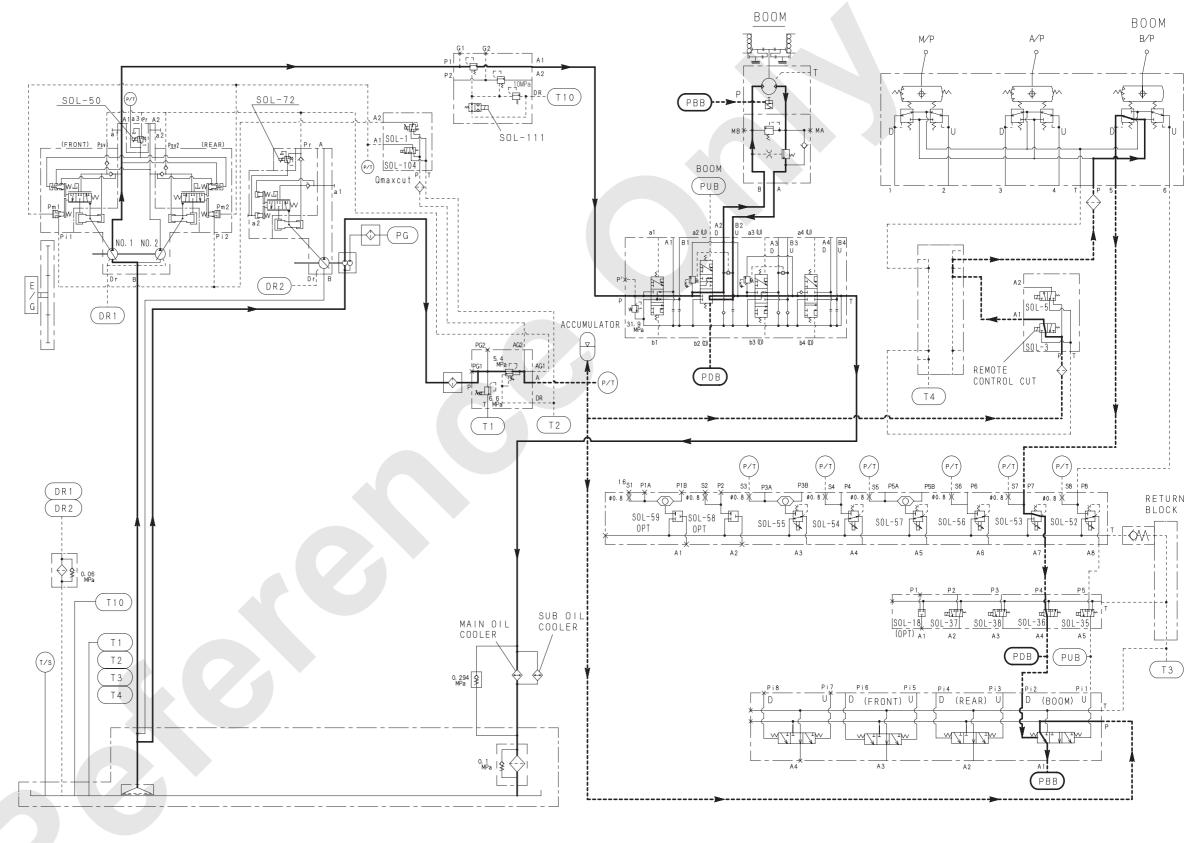
The pressurized oil from the pump for control flows into the valve block and remote control valve through the accumulator.

(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, to make the pressurized oil for control pass through the remote control valve, 8 section valve, 5 section valve and 4 section valve and enter into the [PDB] port of the control valve to move the boom section spool.

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

Main pressured oil flows 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.

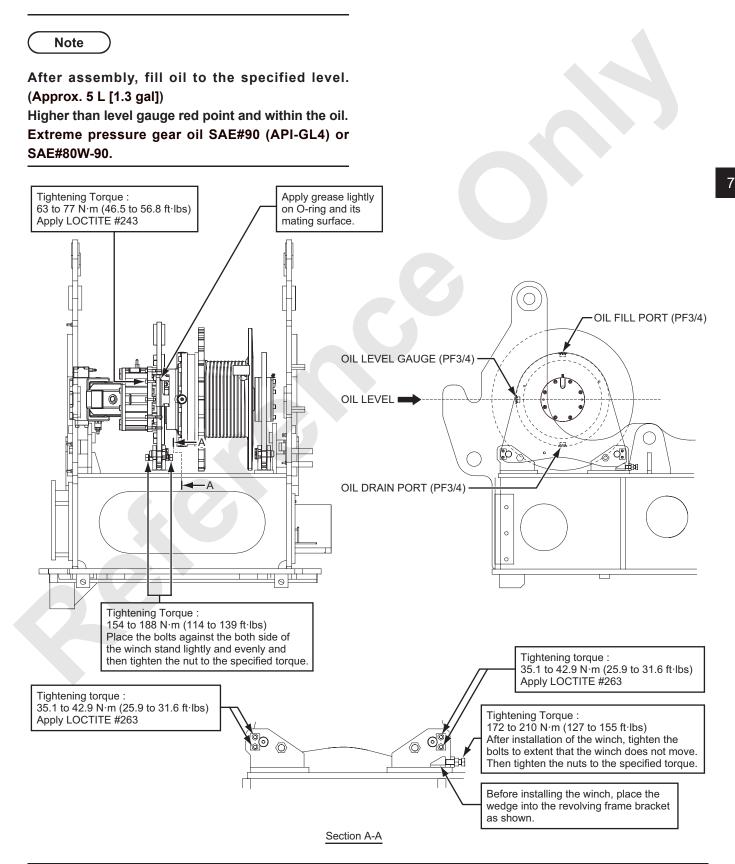


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# 7.3 BOOM HOIST WINCH

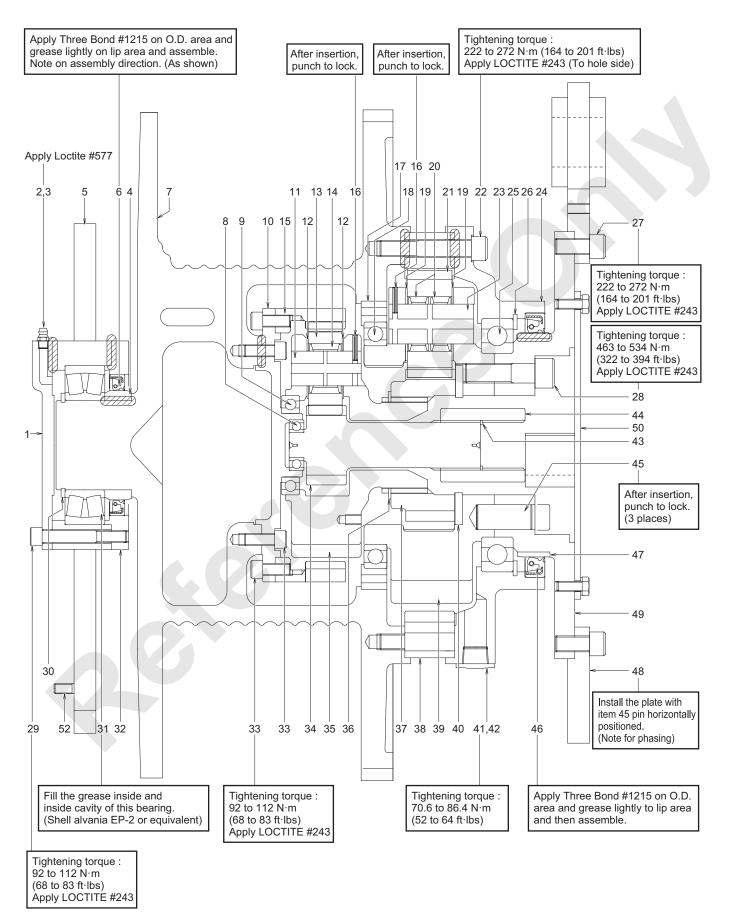
### 7.3.1 BOOM HOIST WINCH INSTALLATION

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



## 7.3.2 REDUCTION UNIT ASSEMBLY

\* Apply LOCTITE #515 on the mating surface as shown



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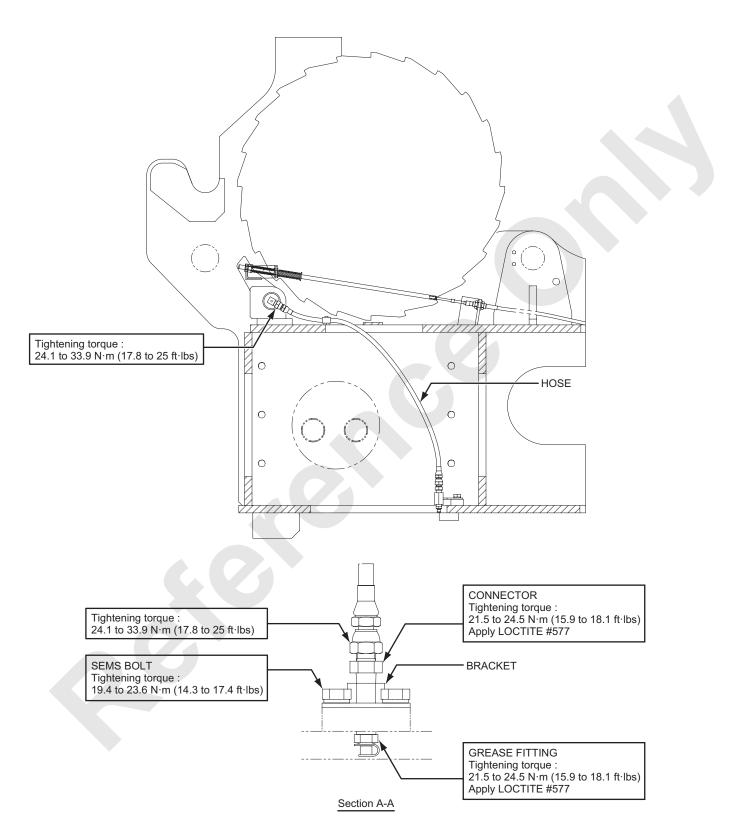
1.	Cover	19.	Thrust washer	37.	Sun gear
2.	Grease fitting	20.	Needle bearing	38.	Ring gear
3.	Сар	21.	Pinion	39.	Carrier
4.	Sleeve	22.	Hex. set screw	40.	Spacer
5.	Plate	23.	Pin	41.	Plug
6.	Oil seal	24.	Sleeve bearing	42.	O-ring
7.	Drum	25.	Bearing	43.	Snap ring
8.	Bearing	26.	Snap ring	44.	Collar
9.	Bearing	27.	Hex. set screw	45.	Pin
10.	Cover	28.	Hex. set screw	46.	Oil seal
11.	Pin	29.	Hex. set screw	47.	Sleeve
12.	Thrust washer	30.	Snap ring	48.	Plate
13.	Pinion	31.	Bearing	49.	Retainer
14.	Needle bearing	32.	Plate	50.	Plate
15.	Ring gear	33.	Hex. set screw	51.	Plate
16.	Spring pin	34.	Sun gear	52.	Stud bolt
17.	Spacer	35.	Carrier		
18.	Bearing	36.	Snap ring		

#### TIGHTENING TORQUE TABLE

Name	Size	Tightening Torque : N·m (ft·lbs)
22. Hex. set screw	M16 × 90	222 to 272 (164 to 201)
27. Hex. set screw	M16 × 35	222 to 272 (164 to 201)
28. Hex. set screw	M20 × 70	436 to 534 (322 to 394)
29. Hex. set screw	M12 × 85	92 to 112 (68 to 83)
33. Hex. set screw	M12 × 25	92 to 112 (68 to 83)
41. Plug		70.6 to 86.4 (52 to 64)

## 7.3.3 BOOM DRUM LOCK ASSEMBLY

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



### 7.3.4 ADJUSTMENT OF BOOM DRUM LOCK

#### 

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

 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.

2. With the release position of drum lock, adjust the respective dimension as shown in the figure to the below.

BOOM DRUM LOCK		
RATCHET	Release position at spring set length 126 mm (5")	
26 mm (1") or more	58 mm 58 mm (2-5/16") (2-5/16")	
PAWL (lock position) ——		Release position at
PAWL (release position) —		Control cable set length

- 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 26 mm (1 in.).
- 4. Operate the knob to the lock position, and to the release position and confirm that the pawl moves smoothly.

#### 

Place a signal person to prevent accident from rotating drum.

Failure to observe this precaution may result in a serious injury.

8000-1

# 8. SWING SYSTEM

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8.3	CONSTRUCTION OF THE SWING SYSTEM	
8.3.1	SWING REDUCTION UNIT	
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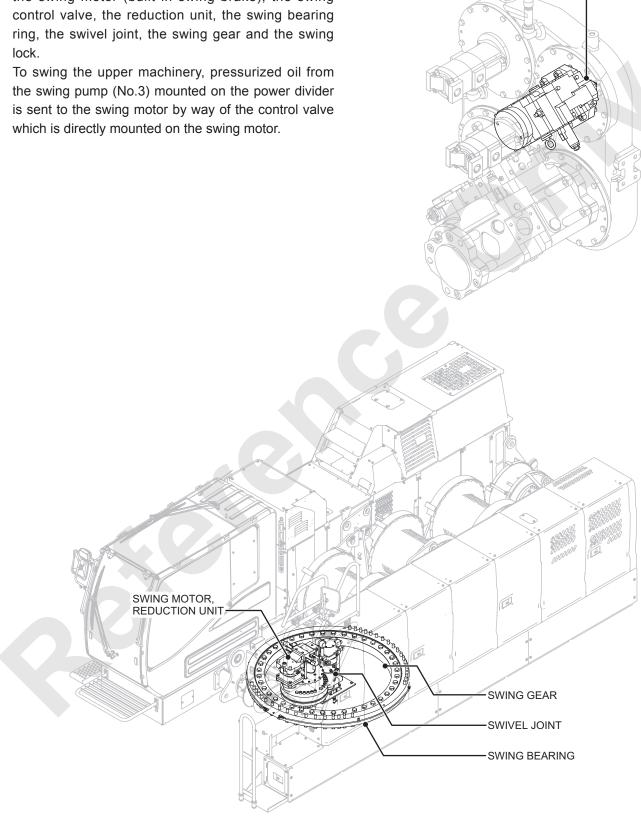
8

SWING PUMP (No.3)

#### **SWING SYSTEM** 8.

#### 8.1 **APPARATUS AND COMPONENTS LOCATION**

The swing system consists of the swing pump (No.3), the swing motor (built in swing brake), the swing

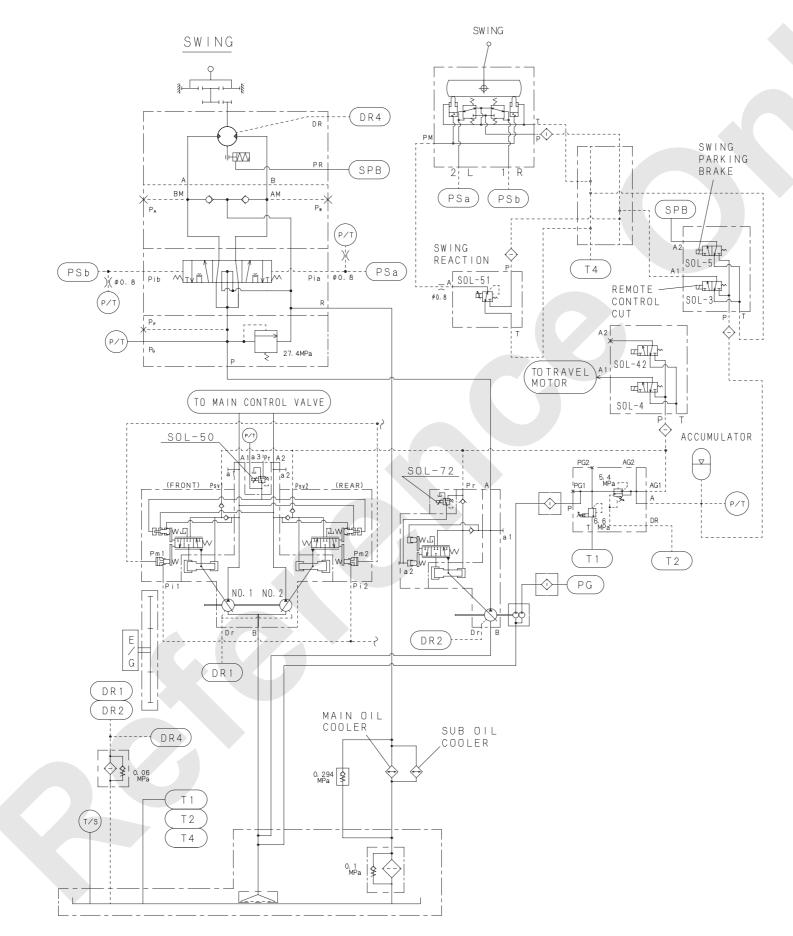


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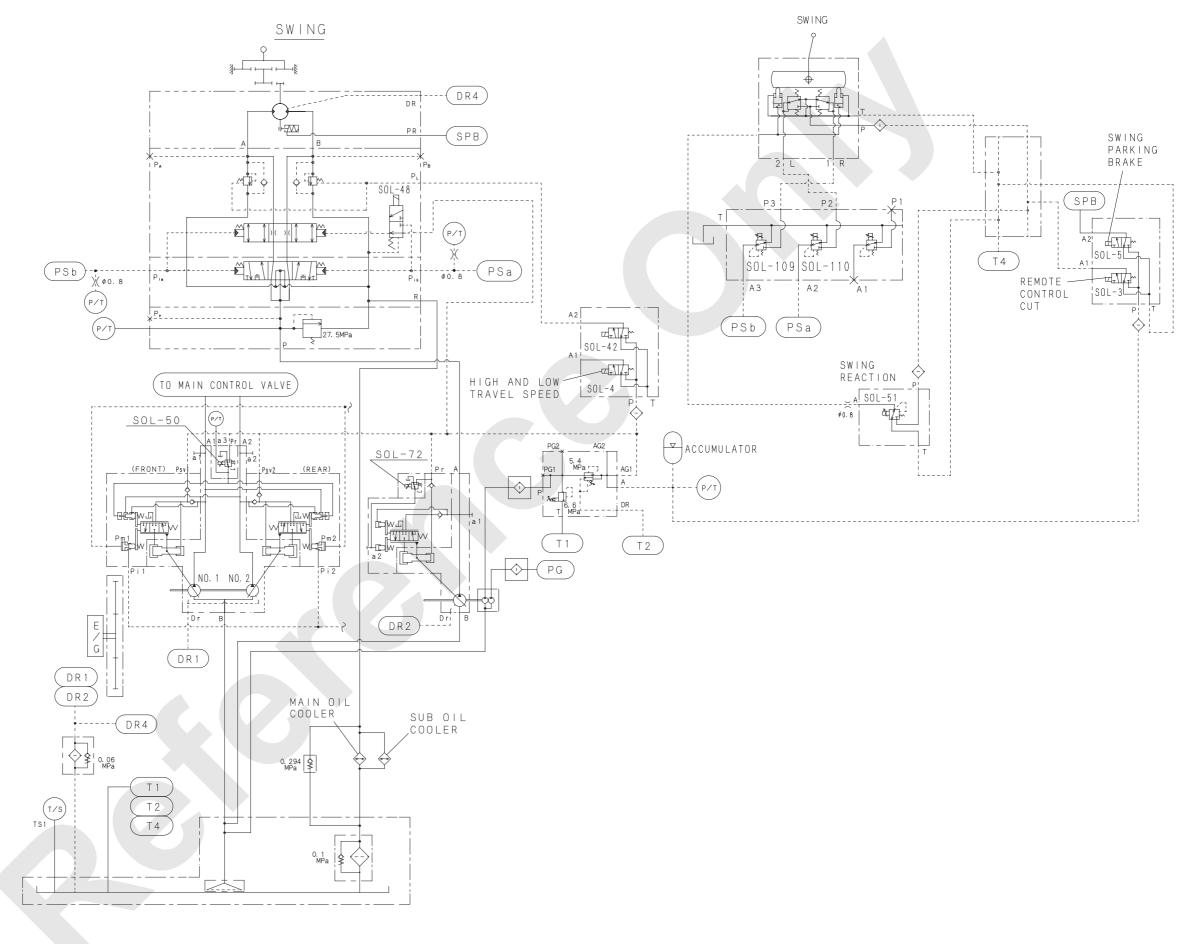
# 8.2 CONSTRUCTION AND FUNCTION

### 8.2.1 HYDRAULIC SCHEMATIC

1. Swing neutral free circuit



2. Swing neutral free/brake, swing angle limit (Option)



### 8.2.2 SWING (NEUTRAL FREE)

The working principle of right swing, and left swing are identical. The right swing is explained here.

[The swing brake is released ("SPB" SOL-5 is actuated).]

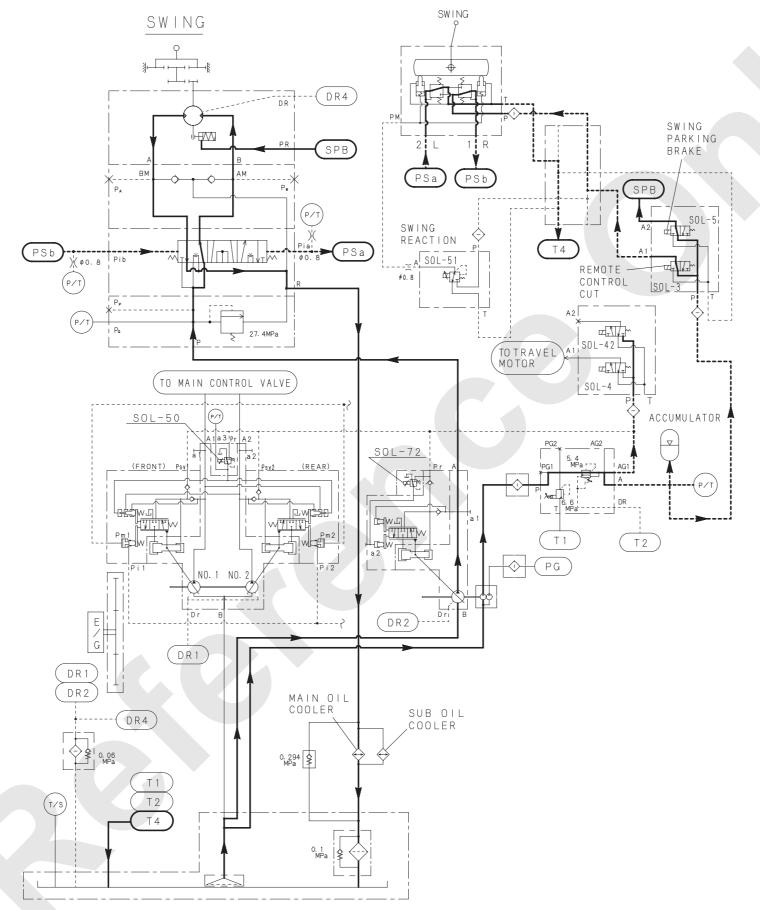
The pressurized oil from the swing pump (No.3) is led to the swing control valve.

On the other hand, the control pressurized oil from the control pump flows through the accumulator, and into the valve block, swing remote control valve.

[The function lock lever is in the "WORK" position (SOL-3 is actuated).]

When the swing control lever is turned to right swing (toward to the operator), control oil pass through the remote control valve and flows into the (PSb) port of the control valve and move the spool (A).

The main pressurized oil control by the control valve is fed the swing motor to run the swing motor.



## 8.2.3 STOPPING (NEUTRAL FREE)

When the swing control lever is returned from the swing position to the neutral position, the control pressure from the remote control valve is shut off, and the control valve spool (A) returns to neutral.

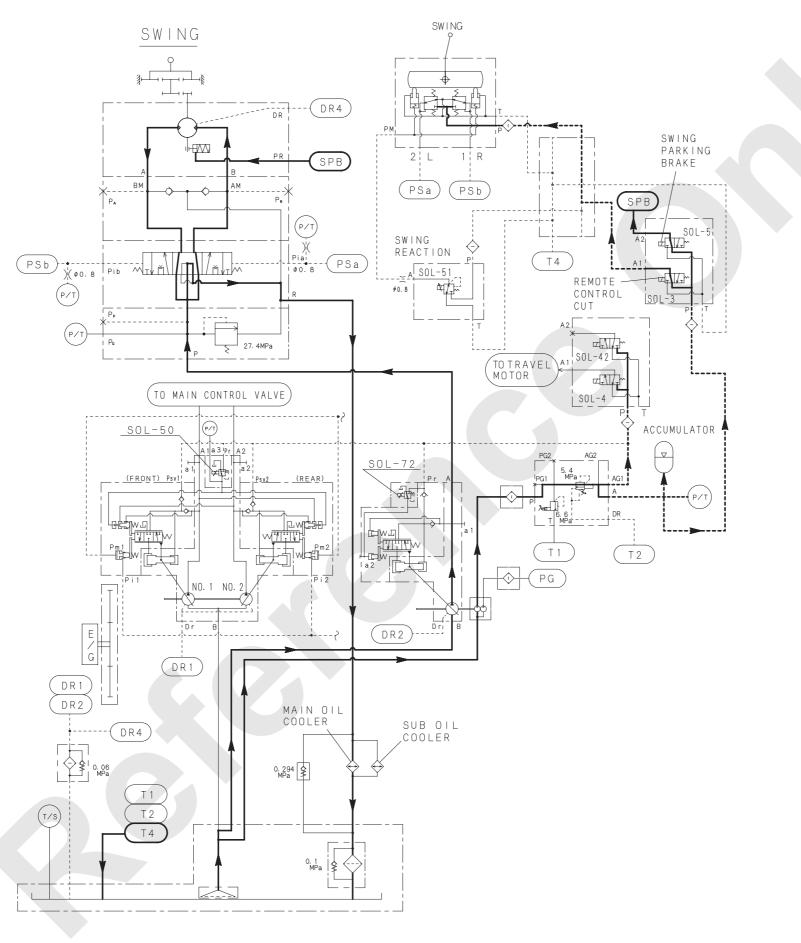
As a result, the main pressurized oil from the swing pump (No.3) returns to the tank with no load.

Although oil supply to the swing motor is cut off, but the return oil circulates within the motor and valve.

Therefore motor continues to rotate with its inertia.

(When the swing brake released position selected.)

To stop the swing motion, turn the swing control lever gently to the opposite direction to generate the brake pressure at the swing motor outlet port by the pump pressure.





### 8.2.4 SWING (NEUTRAL FREE/BRAKE MODE SELECT)

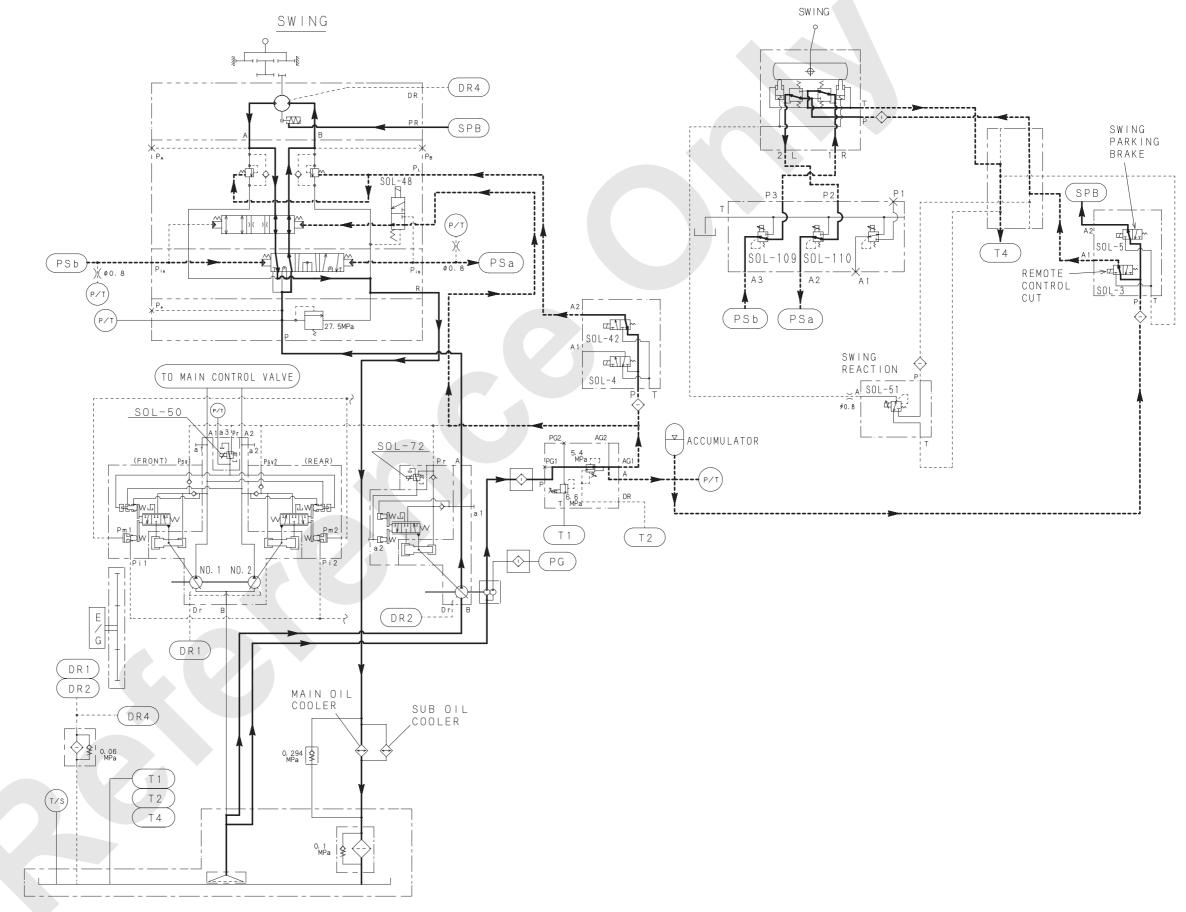
The working principle of the rightward swing, identical to that of the leftward swing, is shown below.[The swing brake is released ("SPB" SOL-5 is actuated).]The pressurized oil from the swing pump is led to the swing control valve. On the other hand, the control pressurized oil from the control pump 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 monitor 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.



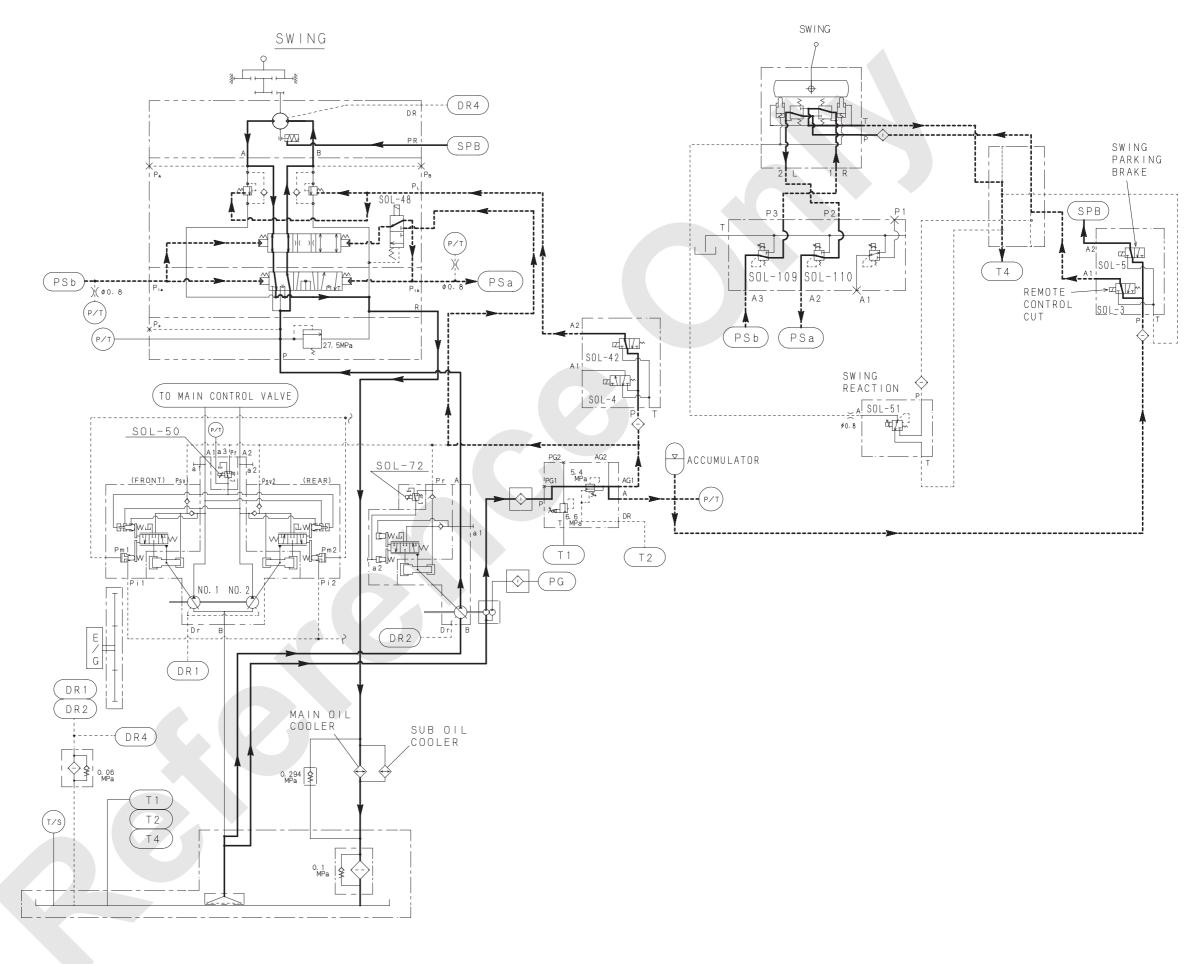
#### [8. SWING SYSTEM]

#### 2. Neutral brake mode

When the swing mode selector switch on the monitor 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.



### 8.2.5 STOPPING (NEUTRAL FREE/BRAKE MODE SELECT)

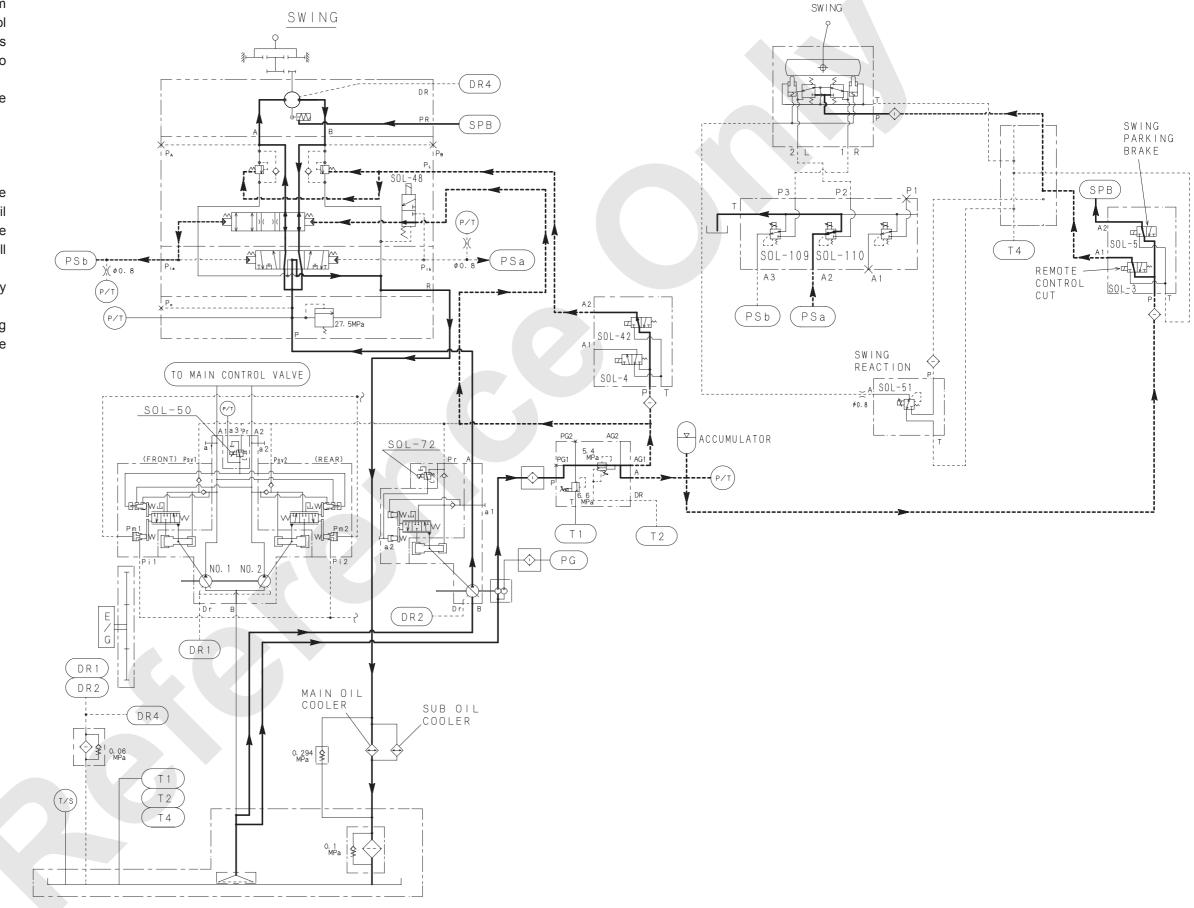
When the swing control lever is returned from the swing mode to the neutral mode, the control pressure from the remote control valve is lost, and the control valve spool (A) returns to neutral.

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 restrict or section of the control valve spool (B).

The swing motor is decelerated by the brake pressure until the motor is stopped smoothly.

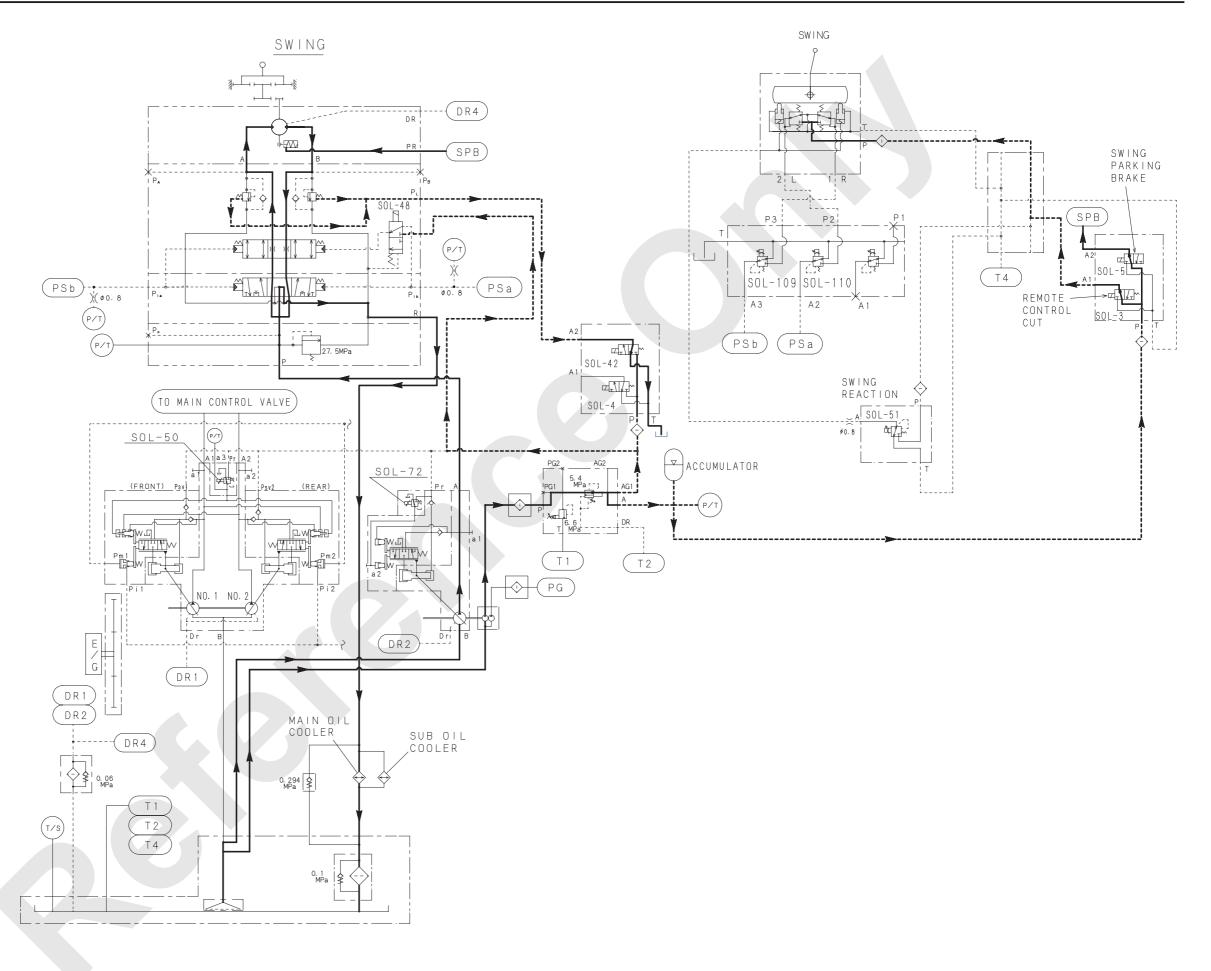
(The swing brake is released.)

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.

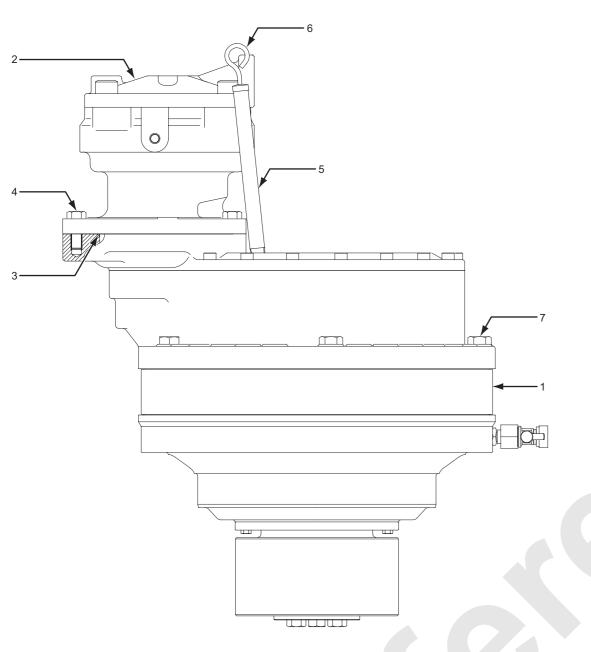
(At the neutral brake mode, the overload valve relief set is Low side.)

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.



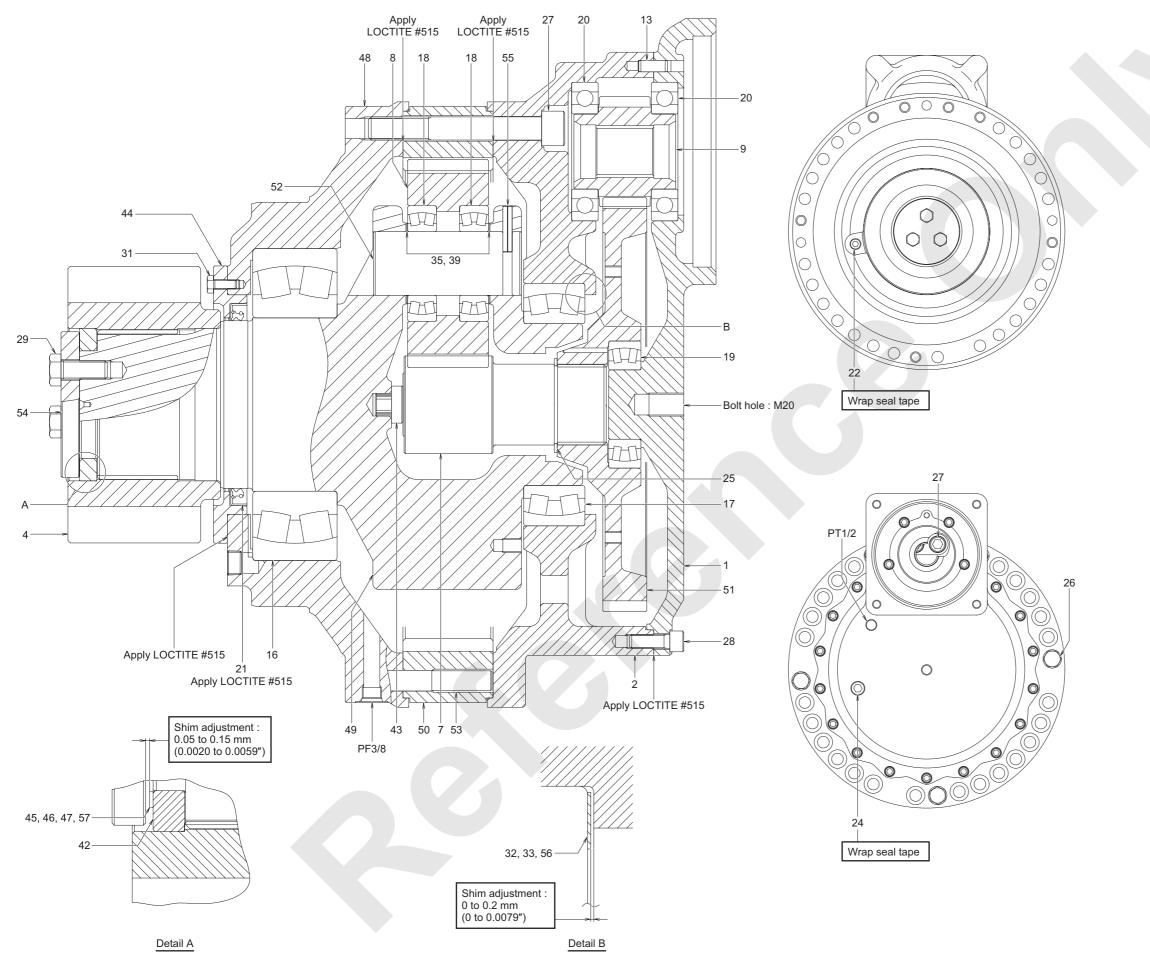
# 8.3 CONSTRUCTION OF THE SWING SYSTEM

# 8.3.1 SWING REDUCTION UNIT



Name	Tightening Torque	Weight
1. Reduction unit	-	395 kg (875 lbs)
2. Motor	-	64 kg (141 lbs)
3. O-Ring		_
4. Bolt	M16×45 mm / 145 to 177 N·m (107 to 131 ft·lbs)	_
5. Tube	-	_
6. Level gauge	-	_
7. Bolt	M20×140 mm / 500 to 618 N·m (369 to 456 ft·lbs)	_

### 8.3.2 REDUCTION UNIT ASSEMBLY



1.	Housing	32.	Shim (t=0.2)
2.	Housing	33.	Shim (t=0.5)
4.	Pinion	35.	Shim (t=1.2)
7.	Sun gear	39.	Shim (t=1.6)
8.	Pinion	42.	Spacer
9.	Pinion	43.	Thrust button
13.	Pin	44.	Retainer
16.	Bearing	45.	Shim (t=0.1)
17.	Bearing	46.	Shim (t=0.2)
18.	Bearing	47.	Shim (t=0.3)
19.	Bearing	48.	Housing
20.	Bearing	49.	Shaft
21.	Oil seal	50.	Ring gear
22.	Plug	51.	Gear
24.	Plug	52.	Pin
25.	Retaining ring	53.	Pin
26.	Capscrew	54.	Plate
27.	Capscrew	55.	Spring pin
28.	Capscrew	56.	Shim (t=1.0)
29.	Capscrew	57.	Shim (t=0.4)
31.	Capscrew		

#### TIGHTENING TORQUE

Name	Size	Tightening torque : N⋅m (ft·lbs)
22. Plug	PT 1/2	57.9 to 71.6 (42.7 to 52.8)
24. Plug	PT 3/4	88.3 to 108 (65.1 to 79.6)
26. Capscrew*	M20×140	500 to 618 (369 to 456)
27. Capscrew*	M20×150	500 to 618 (369 to 456)
28. Capscrew*	M12×35	109 to 132 (80.4 to 97.4)
29. Capscrew*	M16×40	255 to 314 (188 to 232)
31. Capscrew*	M8×20	31.4 to 39.2 (23.2 to 28.9)

\* Apply LOCTITE #243 to capscrew.

Assembly total weight	Approx. 394 kg (870 lbs)	
Assembly total weight	(Without motor)	

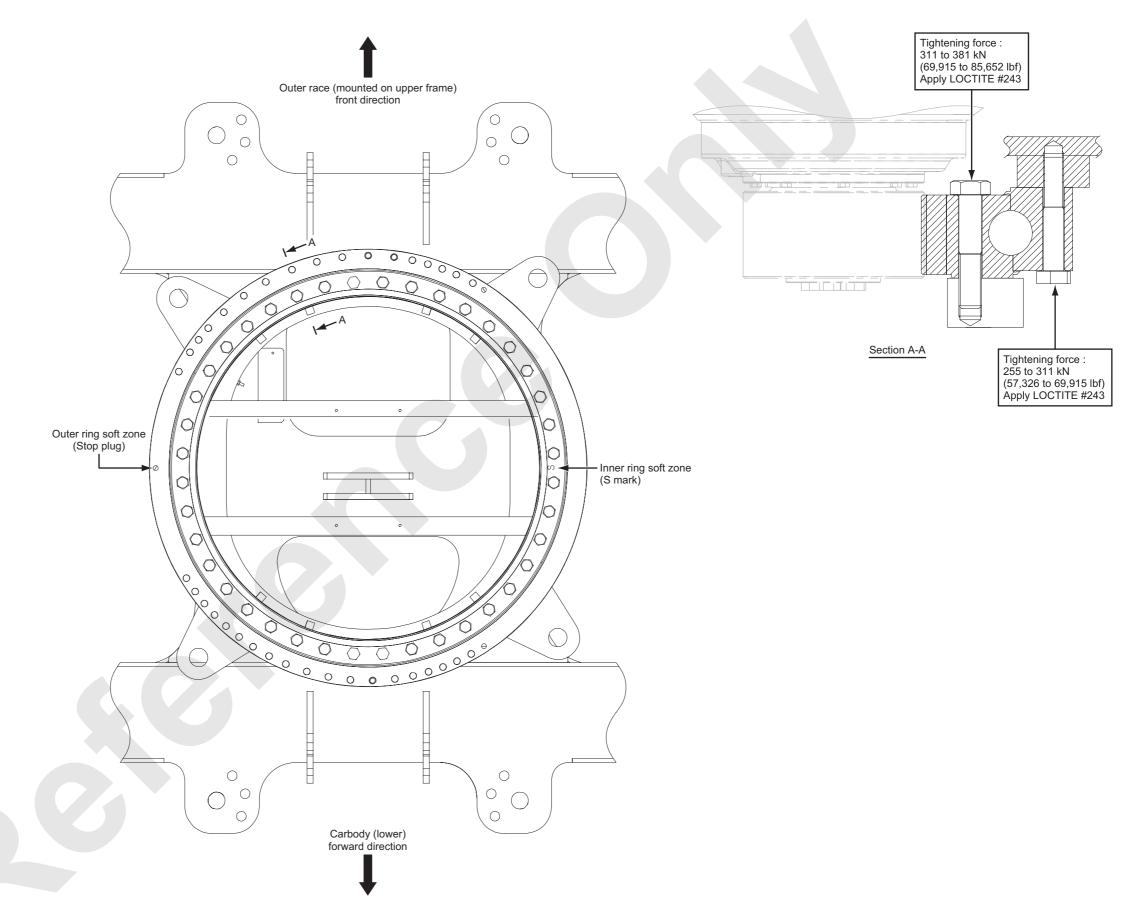
#### 8.3.3 SWING BEARING

#### **BOLT TIGHTENING PROCEDURE**

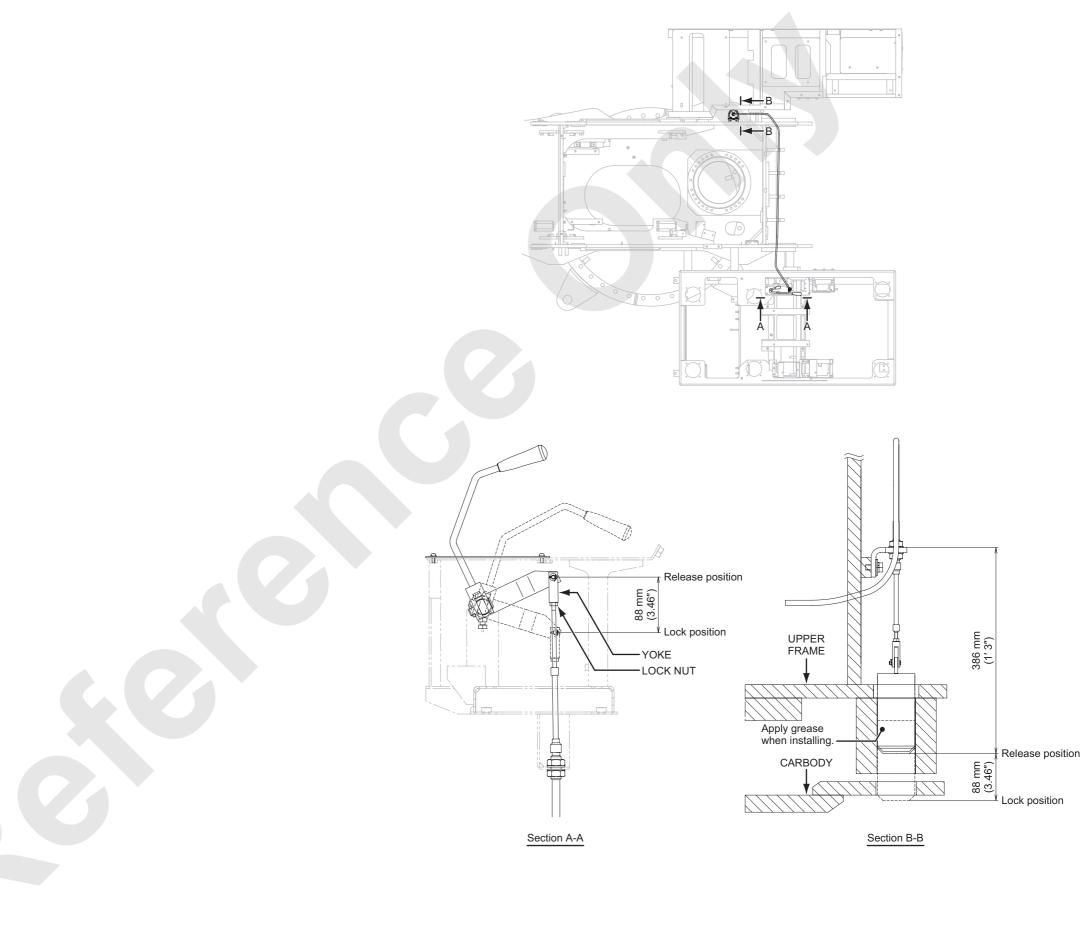
- 1. Lower frame side
- Tighten 2 bolts which are positioned 180 degrees apart each other on the lower frame side with 147 N·m (108 ft·lbs) torque.
- (2) Tighten 2 bolts which are positioned 90 degrees apart from the previously tightened bolts with 147 N·m (108 ft·lbs) torque.
- (3) Tighten diagonally positioned bolts with 147 N·m (108 ft·lbs) torque.
- (4) Tighten all bolts with 311 to 381 kN (69,915 to 85,652 lbf) tightening force.(Tightening torque shall be checked with axial force measurement.)
- \* Ref : tightening torque 1.75 to 2.13 kN·m (1,290 to 1,571 ft·lbs)
- (5) After tightening to the lower frame, apply enough amount of molybdenum sulfide grease (Shell Alvania EP grease LF) on the gear tooth face.
- 2. Upper frame side
- Tighten 4 bolts on both side of front, both side of rear of the upper frame with 147 N·m (108 ft·lbs) torque.
- (2) Tighten diagonally positioned bolts with 147 N·m (108 ft·lbs) torque in order.
- (3) Tighten all bolts with 255 to 311 kN (57,326 to 69,915 lbf) tightening force.(Tightening torque shall be checked with axial force measurement.)
- \* Ref : tightening torque 1.28 to 1.56 kN⋅m (944 to 1,150 ft·lbs)

The figure shows the outer race is rotated 180 degrees.

Assembly total weight Approx. 769 kg (1,695 lbs)



8.3.4 SWING LOCK



# 9. TRAVEL SYSTEM

9.1	APPARATUS AND COMPONENTS LOCATION	9-1
9.2	CONSTRUCTION AND FUNCTION	9-2
9.2.1	HYDRAULIC SCHEMATIC	9-2
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# 9. TRAVEL SYSTEM

# 9.1 APPARATUS AND COMPONENTS LOCATION

The travel system consists of the No.1 pump, the main control valves, the travel motors, the travel reduction units, the upper/lower rollers, the drive tumblers, idlers and shoes.

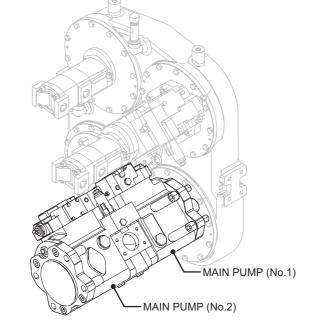
Pressurized oil from the No.1 pump is controlled by the 2 main control valves.

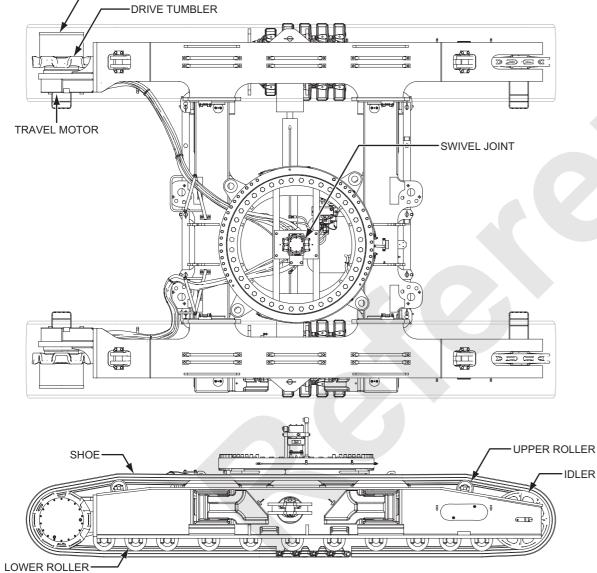
This pressurized oil flows through the swivel joint and then into the left and right travel motors to run their respective motors.

A spring set/hydraulic release disk brake is installed on each of the two travel motors (built-in type).

As for circuit diagram and function of travel (right forward and stopping), refer to the article "9.2 CONSTRUCTION AND FUNCTION".

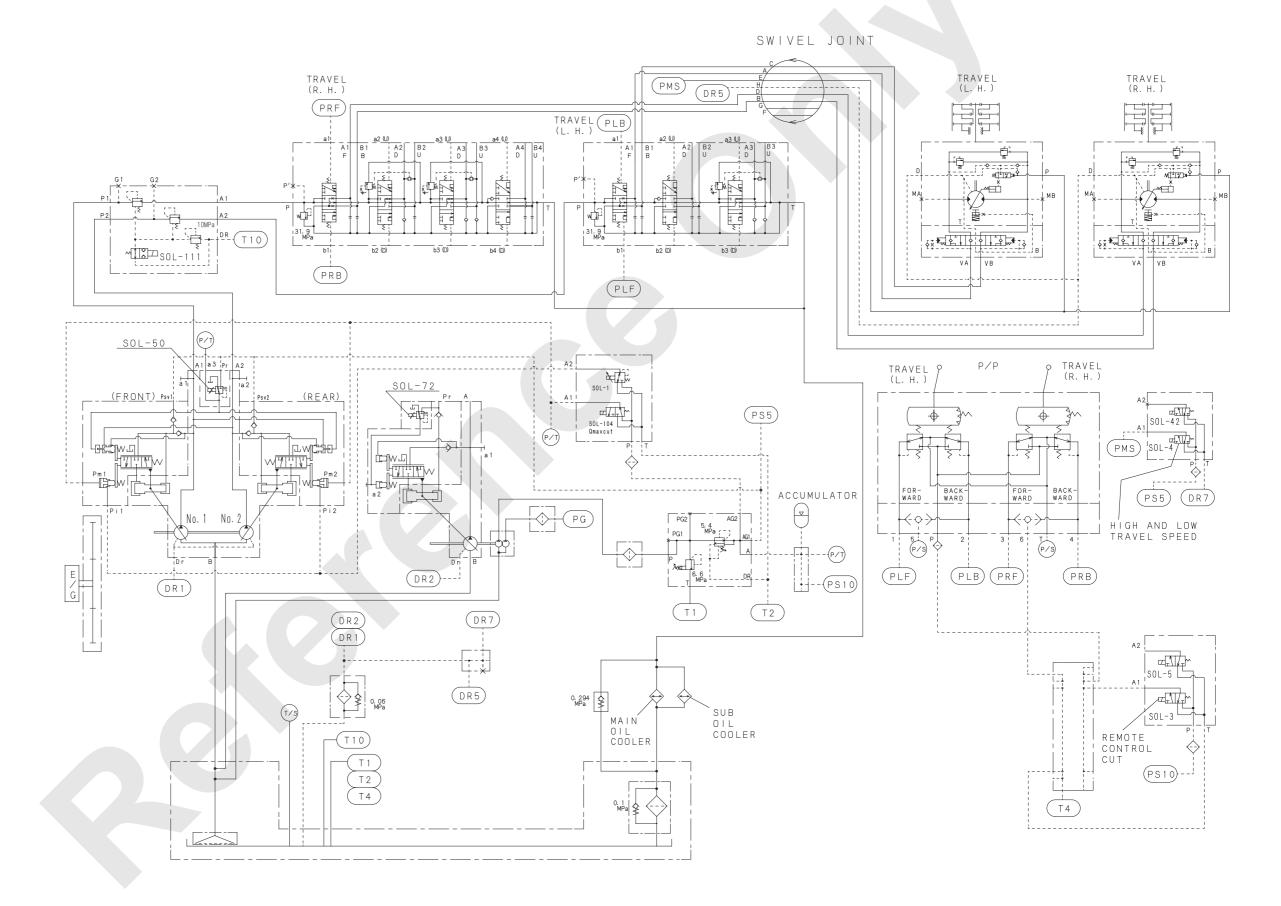
-REDUCTION UNIT





## 9.2 CONSTRUCTION AND FUNCTION

### 9.2.1 HYDRAULIC SCHEMATIC



### 9.2.2 TRAVELING (RIGHT SIDE FORWARD)

Traveling the right and left sides, to the forward and reverse are basically the same operation. We will use a right side forward operation as the example here.

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

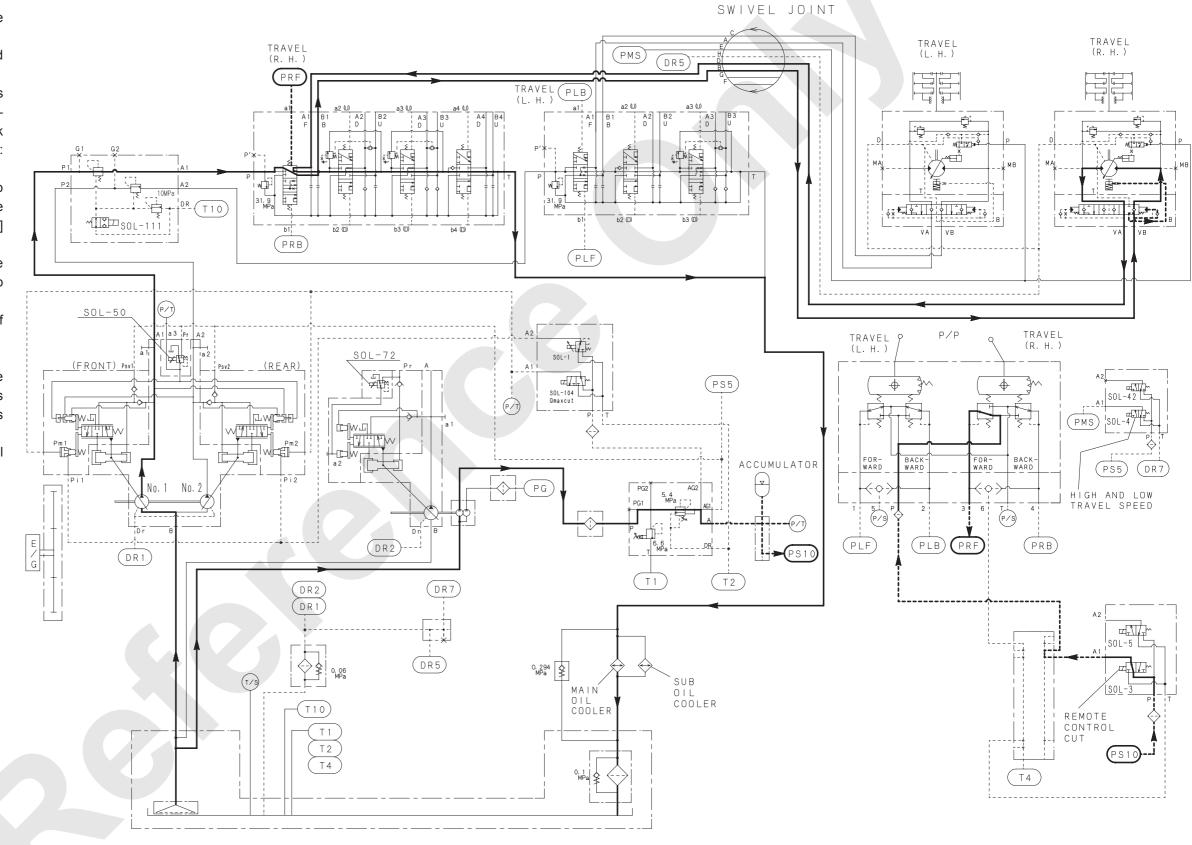
The oil from the No.3-1 pump, however, goes through the accumulator and into the travelcircuit's remote control valve, (The function lock lever remains in the "WORK" position [SOL-3 : ON position].)

When the right travel 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 travel section.

The pressurized oil directed by the control valve then goes through the swivel joint and run into the travel 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 negative 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 travel motor is free to return to the reservoir.



### 9.2.3 STOPPING

When the right travel control lever is shifted back to neutral from travel position, the flow from the remote control valve is cut and the spool of the control valve moves to neutral position.

At the same time, the pilot pressure on the travel brake valve is discontinued, and the spool in the brake valve also moves to neutral position.

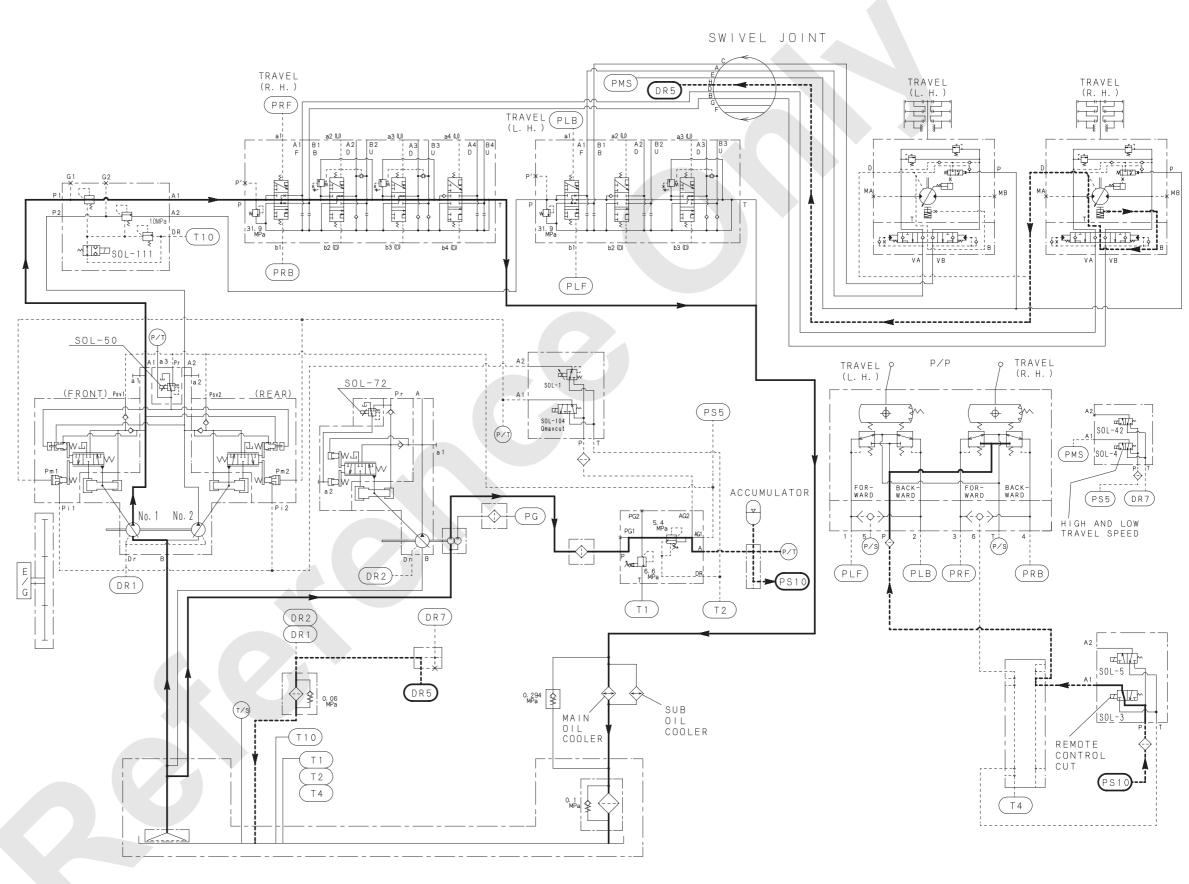
At this time inertia may continue momentarily to rotate the travel motor.

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.

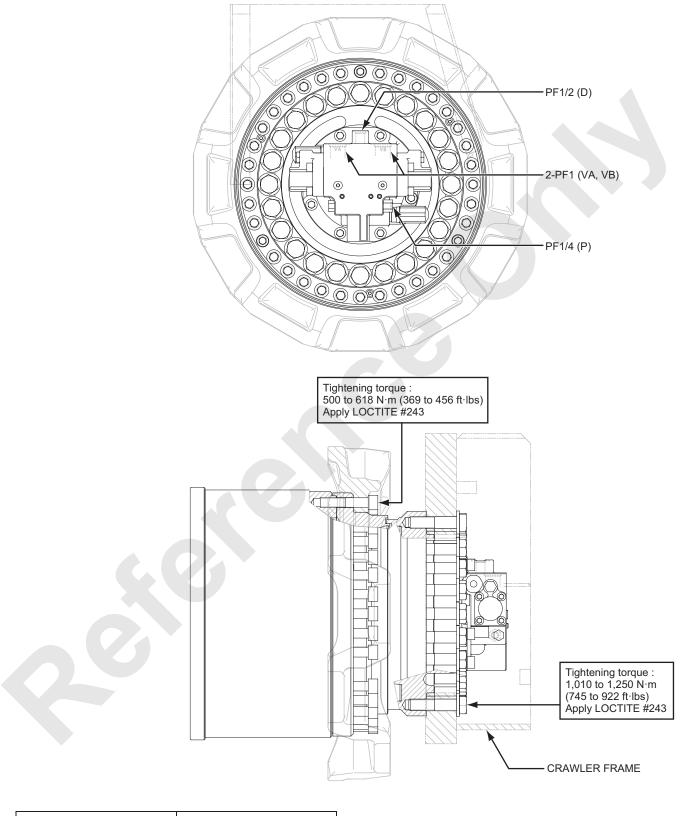


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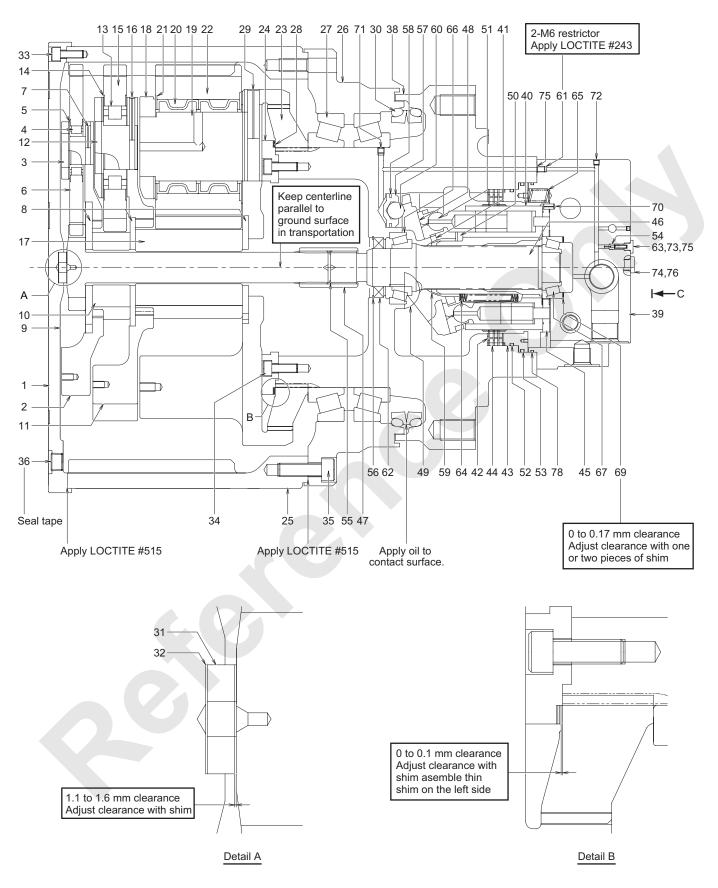
## 9.3 CRAWLER

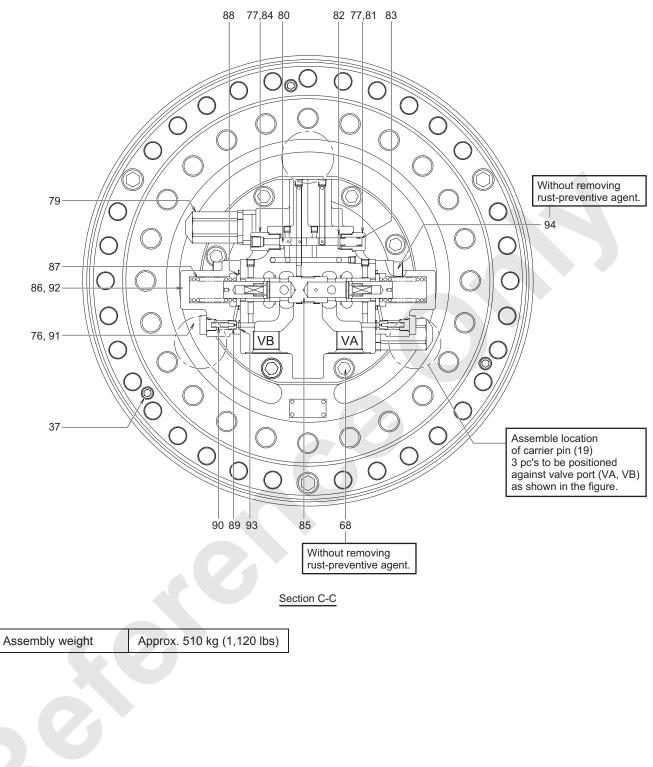
### 9.3.1 DRIVE ASSEMBLY



Assembly weight Approx. 510 kg (1,120 lbs)

### 9.3.2 MOTOR AND REDUCTION UNIT





#### [9. TRAVEL SYSTEM]

1. Cover	25. Ring gear	49. Pivot	73. Plug
2. Carrier	26. Housing	50. Spring holder	74. Plug
3. Carrier pin	27. Taped roller bearing	51. Piston assy	75. O-ring
4. Bearing	28. Shim	52. D-ring	76. O-ring
5. Thrust washer	29. Spring pin	53. D-ring	77. O-ring
6. Planetary gear	30. Floating seal	54. Check valve	78. O-ring
7. Spring pin	31. Thrust ring	55. Retaining ring of C type	79. Overload relief assy
8. Spacer	32. Shim	56. Retaining ring	80. Spool
9. Sun gear	33. Capscrew	57. Shifter piston	81. Plug
10. Sun gear	34. Capscrew	58. Piston seal	82. Spring holder
11. Carrier	35. Capscrew	59. Ball joint	83. Spring
12. Carrier pin	36. Capscrew	60. Ball	84. Connector
13. Bearing	37. Capscrew	61. M6 restrictor	85. Spool assy
14. Thrust washer	38. Casing	62. Oil seal	86. Cover
15. Planetary gear	39. Rear cover	63. Spring of check valve	87. Spring
16. Spring pin	40. Cylinder block	64. Spring of cylinder	88. Spring holder
17. Sun gear	41. Shoe retainer	65. Spring of brake	89. Restrictor
18. Carrier	42. Friction plate	66. Bearing	90. Spring
19. Carrier pin	43. Brake piston	67. Bearing	91. Plug
20. Niddle bearing	44. Separated plate	68. Hex. socket head bolt	92. O-rings
21. Thrust washer	45. Valve plate	69. Shim	93. O-ring
22. Planetary gear	46. Shaft	70. Parallel pin	94. Socket head cap screw
23. Coupling	47. Coupling	71. Plug	
24. Holder	48. Swash plate	72. Plug	
TIGHTENING TORQUE TAE	BLE		
Num			

#### TIGHTENING TORQUE TABLE

		<b>—</b>	
Name	Size	Tightening torque : N·m (ft·lbs)	Remarks
33. Capscrew	M10 × 30	61.74 to 75.46 (45.5 to 55.7)	Apply LOCTITE #243
34. Capscrew	M12 × 30	106.2 to 129.8 (78.3 to 95.7)	Apply LOCTITE #243
35. Capscrew	M16 × 45	264.6 to 323.4 (195 to 239)	Apply LOCTITE #243
36. Capscrew	R (PT) 3/4	88.29 to 107.91 (65.1 to 79.6)	
37. Capscrew	M8 × 35	30.38 to 38.22 (22.4 to 28.2)	Apply LOCTITE #243
68. Hex. socket head bolt	M16 × 45	206.5 to 254.5 (152 to 187)	
71. Plug	NPT 1/16	11.74 to 15.66 (8.7 to 11.6)	Apply LOCTITE #243
72. Plug	NPT 1/16	9.81 to 11.8 (7.2 to 8.7)	
73. Plug	G (PF) 1/8	12.74 to 16.66 (9.4 to 13.3)	
74. Plug	G (PF) 1/4	26.46 to 32.34 (19.5 to 23.9)	
79. Overload relief assy		98.1 to 118 (72.4 to 87)	
81. Plug	G3/8	49 to 58.8 (36.1 to 43.4)	
84. Connector		49 to 58.8 (36.1 to 43.4)	
91. Plug		24.5 to 29.4 (18.1 to 21.7)	
94. Socket head cap screw	M12 × 35	88.29 to 107.91 (65.1 to 79.6)	

## 9.3.3 ADJUSTMENT OF SHOE

If the crawler tension is high, the shoes wear quickly and connection between two shoes could break.

On the other hand, if the tension too loose, the shoes may run off the drive tumbler or idler wheel during traveling.

To prevent these, it is necessary to adjust shoe tension.

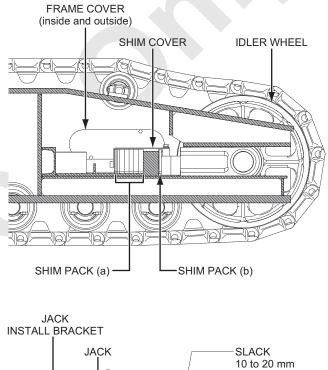
Travel forward about 7 m (23 ft.) with the drive tumbler at rear and then adjust the shim to make upper shoe slackening to be 10 to 20 mm (3/8 to 7/8 in.).

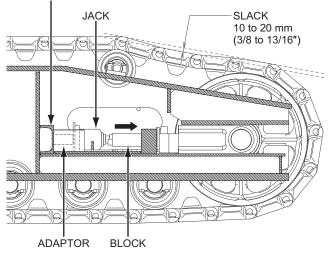
To adjust shoe tension, proceed as follows :

- 1. Travel the machine forward about one crawler length so that the slack in the crawler shoes appear on the top of the crawler.
- 2. Remove all the shims from shim pack (a).
- Position the hydraulic jack between the bracket and block of the side frame.
   Operate the jack to push the idler wheel and remove the slack in the shoes.
- 4. Insert the shims removed from pack (a) in step (2) into the vacant room of pack (b).Insert the remaining shims into pack (a).
- After the shims are installed, install the mud cover (c) on the shim installation area (a). Install the cover (d) to the elongated hole area of both crawler frames.

### 

Equalize the tension in right and left crawler tracks.





9

# 10. ELECTRIC SYSTEM

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# 10. ELECTRIC SYSTEM

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Ensure to turn the key switch OFF to avoid any adverse effect to the electric devices when the connectors are in the process of connecting or disconnecting.

Failure to observe this precaution may lead to damage parts.

### 

When disconnect the connector, hold it with both hands and draw it straight, while pressing down the catch.

DO NOT pull on the cable.

Otherwise, lead to the breaking of a wire.

NEVER twist or pry the connector.

Otherwise, its internal female terminal will be expanded, lead to faulty connection.

### 

When connection in the connector, fully insert it until the catch is engaged (clicks into position).

10

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Otherwise, faulty connection 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 multi tester onto the pins of male side connector from the electric wire inlet side. NEVER insert the probe of the multi tester into the socket of the female side connector. Otherwise, faulty connection can occur later.

Round waterproof connector

The male side connector has waterproof construction, and the measurement probe of the multi tester cannot touch its pins from the electric wire inlet side.

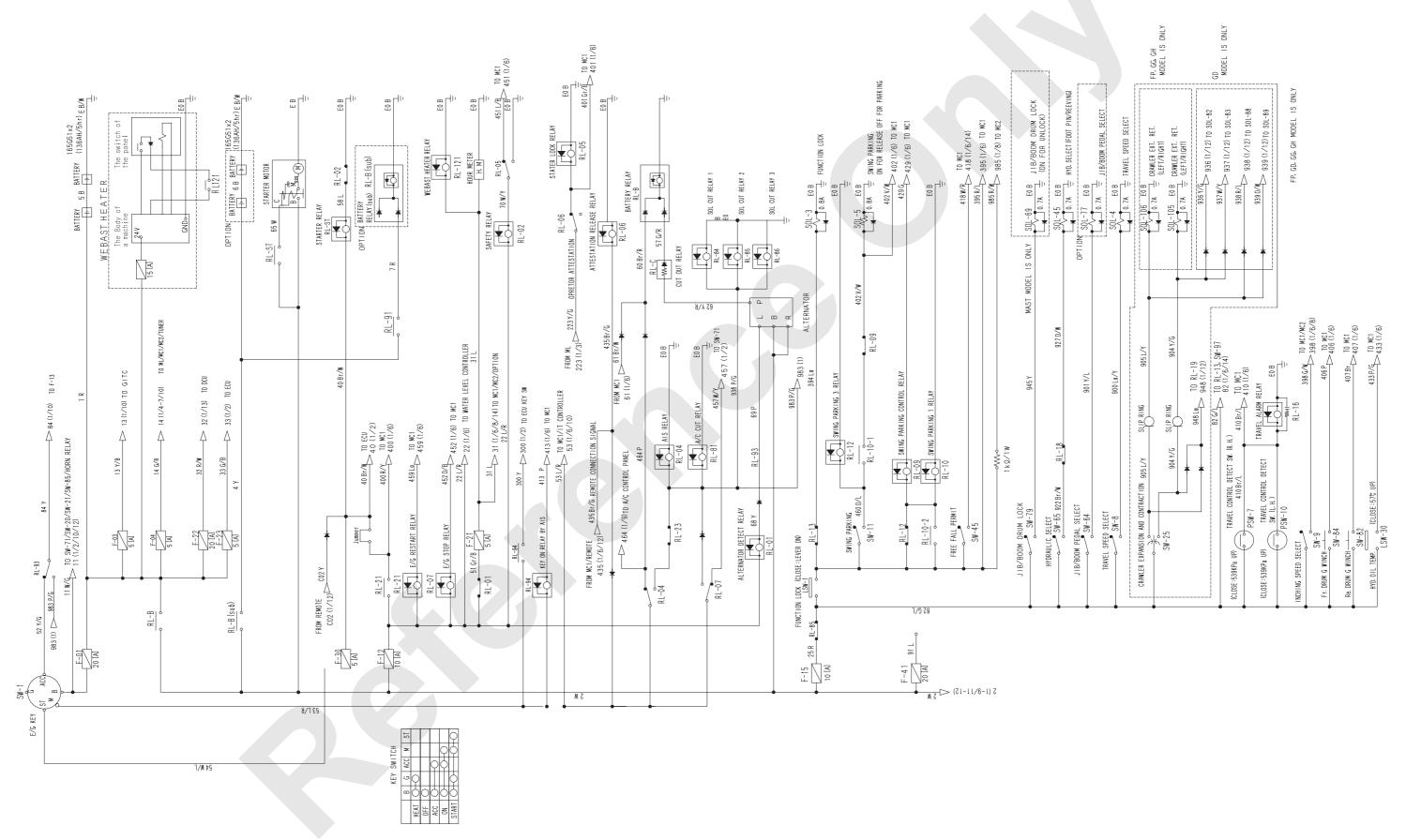
Therefore, place the measurement probes onto the terminals side connector.

NEVER forcibly insert the measurement probe.

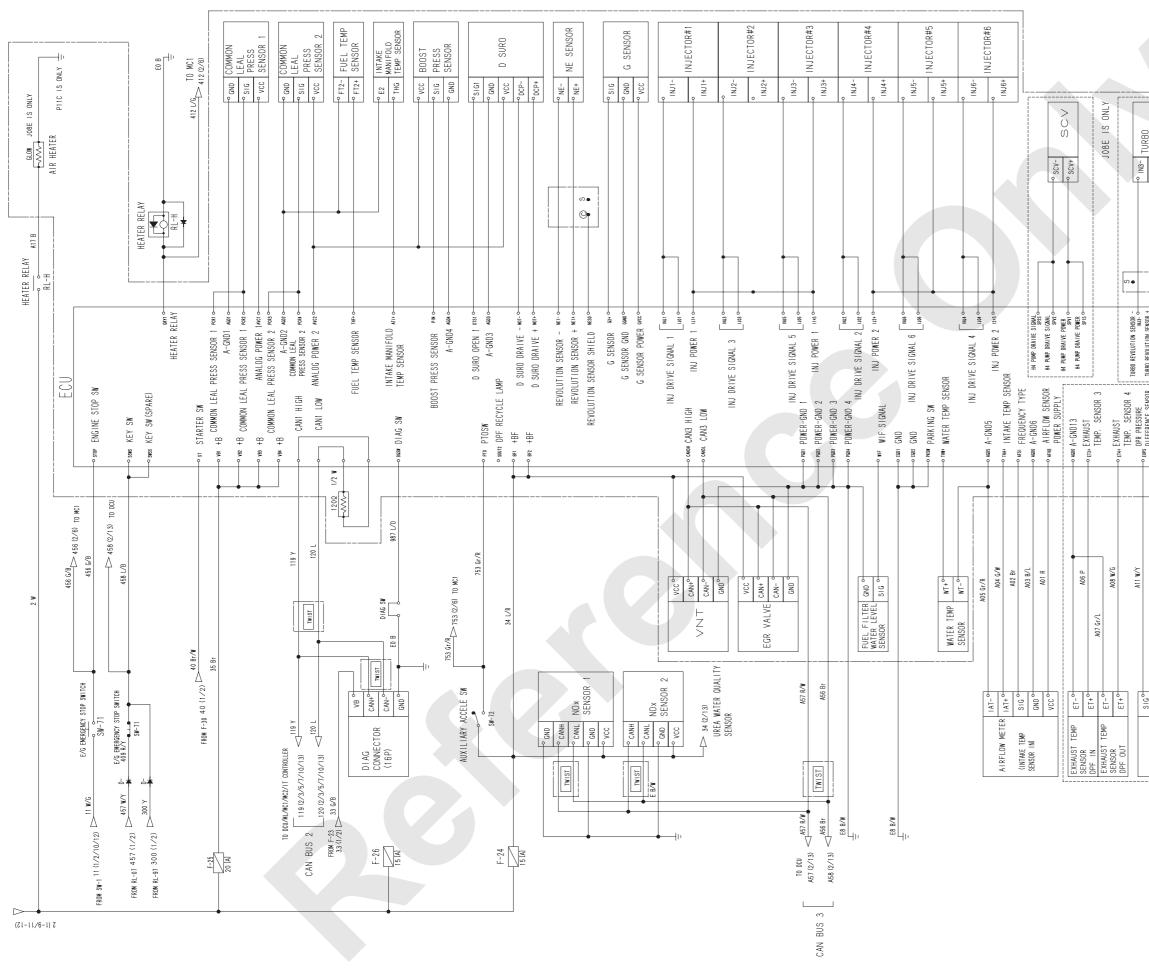
Otherwise, faulty connection can occur later. Short-circuiting across terminals inside a connector can damage electronic components. Be absolutely careful to prevent short-circuit.

# 10.1 ELECTRICAL

## 10.1.1 ELECTRICAL WIRING SCHEMATIC



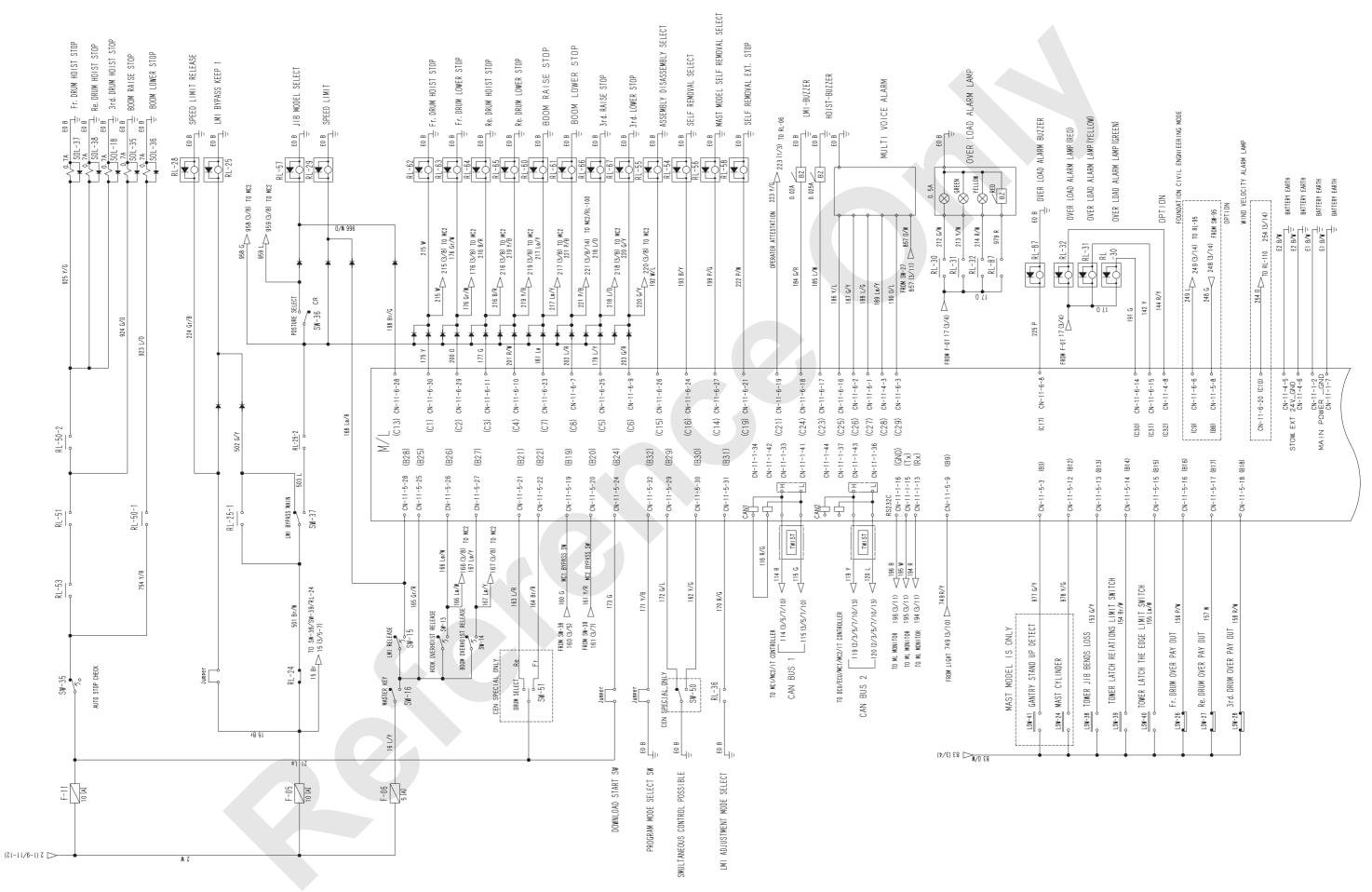
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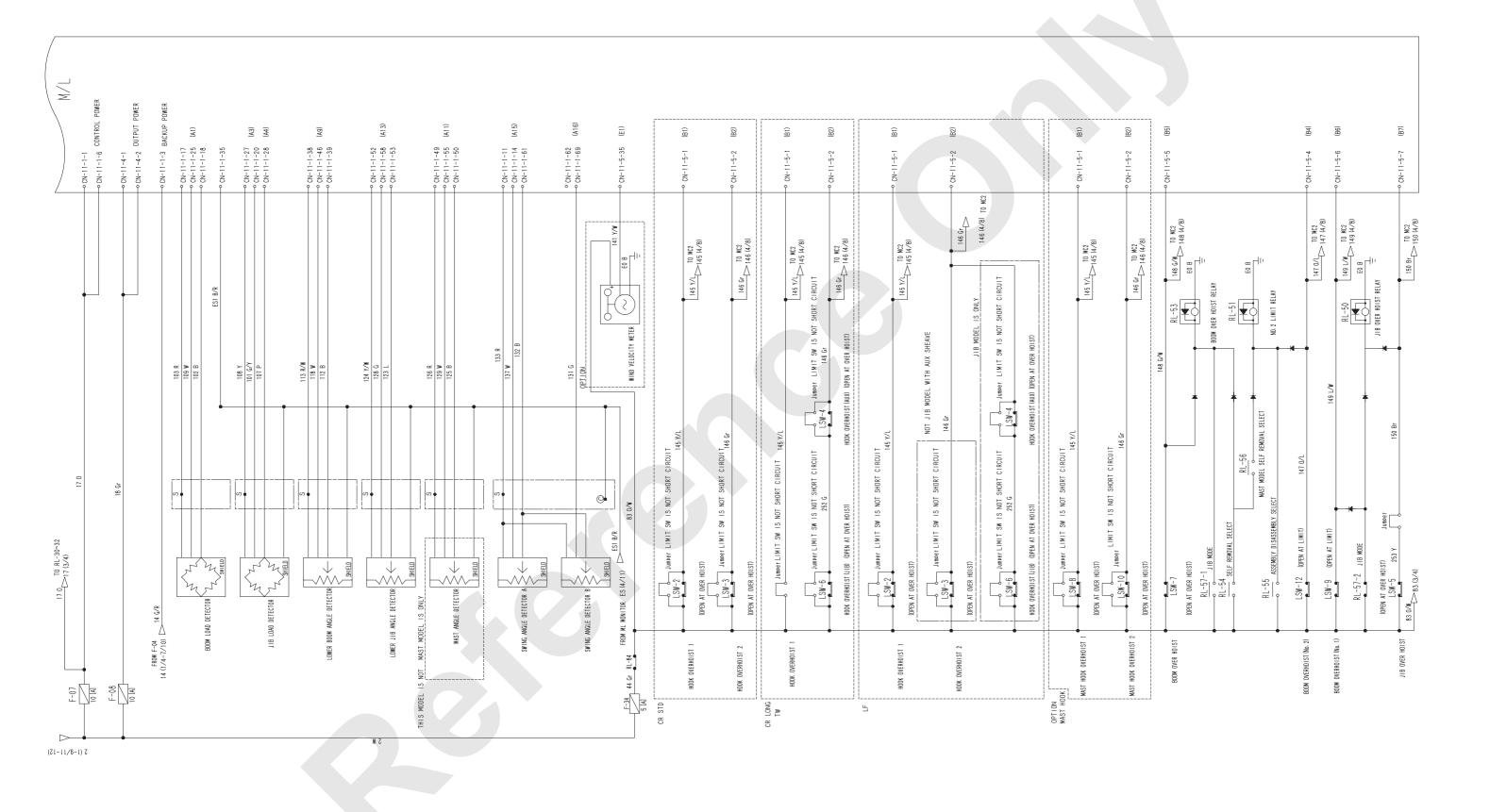
### [ 10. ELECTRIC SYSTEM ]

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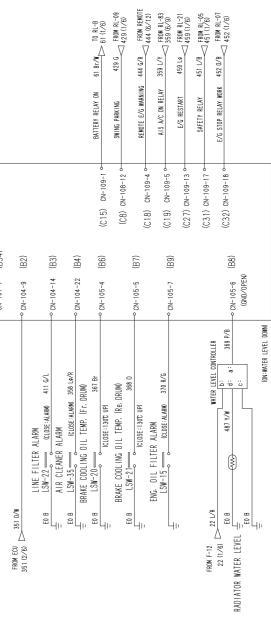
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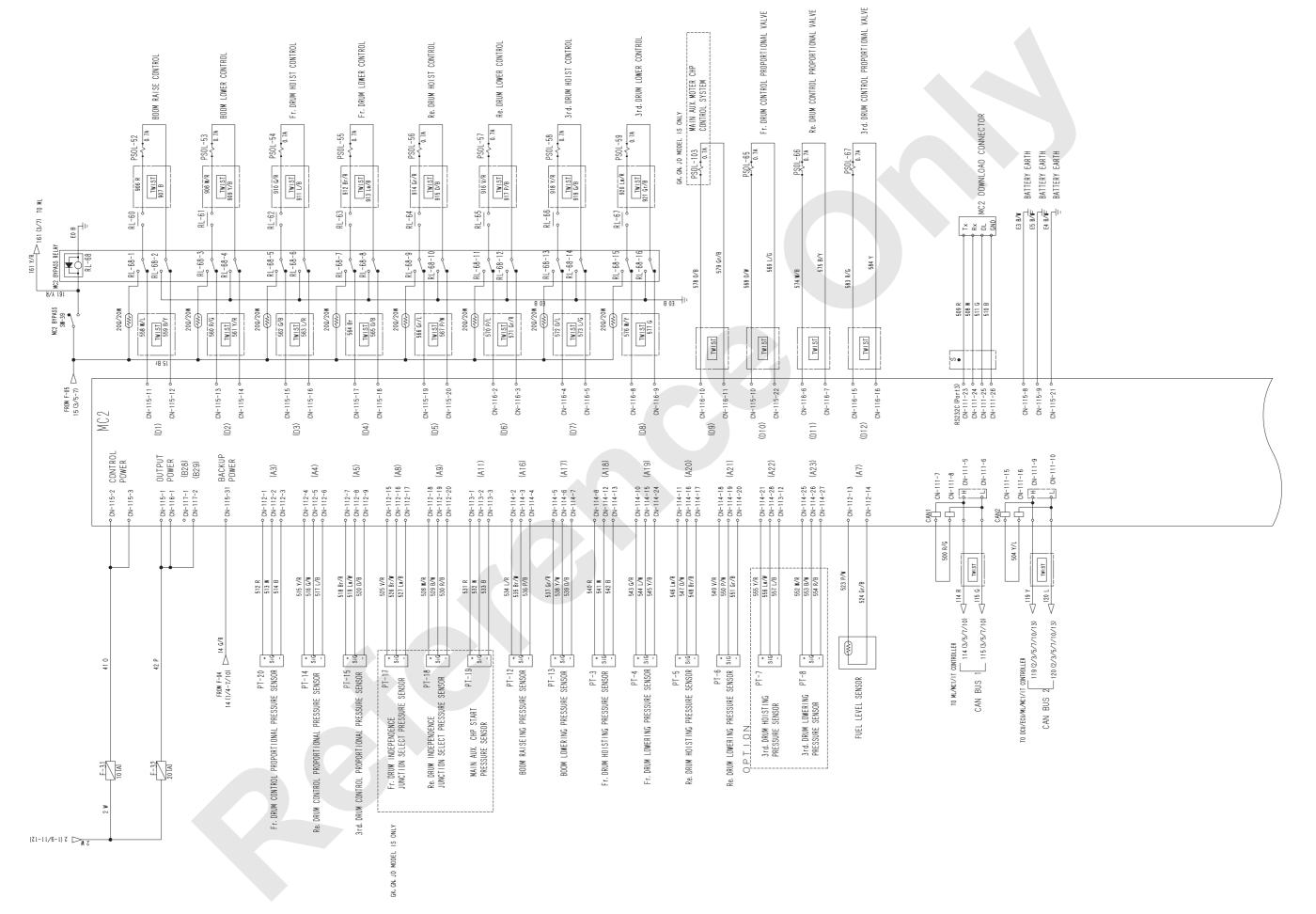
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 TAGLINE ŝ PS0L-109 PS0L-110 PSOL-1 GK. GD. HF. G PSOL-6 0.7A ÷ Re. PS0L-72 PS0L-51 PS0L-0.2 PS0L-70 PS0L-107 PSOL-50 PSOL-108 TWIST 952 L/0 494 Y/B TWIST 495 L/G 496.G TWIST 497 L/Y 955 G/L TWIST 954 Br 953 G/B 308 LY 309 GY 309 GY 500 (2/5) TO ECU E0 B MC1 BYPASS RELAY 310 R/Y 310 (5) RL-22-2 RL-22-7 RL-22-9 RL-22-10 RL-22-4 RL-22-3 RL-22-5 311 (5) RL-22-1 RL-22 311 W/Y 377 Gr/L 375 Br/R 389 G/R 379 Y/G 373 W/B 391 Br 80 W 378 P/W E0 B 372 R/Y 374 L/G MC1 BYPASS SW-38 E0 B 376 0/L 371 G 388 B/Y 390 L/0 250/20W 252/20W 252/20W 252/20W 252/201 RL-28 ECU\_ACS2 ECU\_ACS1 ECU\_ADGX 397 Lø/W ECU\_ADG7 396 P/W 491 Gr/W 393 Sb 488 P/G 492 R/B 392 0/B 493 W/Y 490 P/L 489 G TWIST 18 BI RL-29 FROM F-05 TWIST 5 (3/5-7) S CN-106-3 -CN-106-4 -CN-106-5 -(H1) CN-101-31 C CN-101-32 C CN-101-33 <sup>C</sup> CN-101-34 <sup>C</sup> CN-106-15 CN-105-17 CN-105-18 CN-105-12 CN-106-16 CN-106-8 CN-106-10 CN-105-19 CN-105-20 105-15 CN-105-16 CN-105-13 CN-105-14 CN-106-2 CN-105-10 CN-105-22 CN-106-11 CN-105-11 106-CN-106-106-S ş CN-(D11) (D12) (D8) (6Q) (D5) (D3) (D4) (D1) (D2) (90) (LU) (D10) (H2) MC CONTROL POWER OUTPUT POWER (828) (828) (828) (828) (828) (828) (A11) (A13) (A14) (A15) (A16) (A17) (A18) (A21) (A23) (A10) (A12) (A19) (A20) (A1) (A3) (A4) (45) (9P) (A9) (A8) (A22) CN-101-7 CN-101-7 CN-101-8 CN-101-8 CN-104-18
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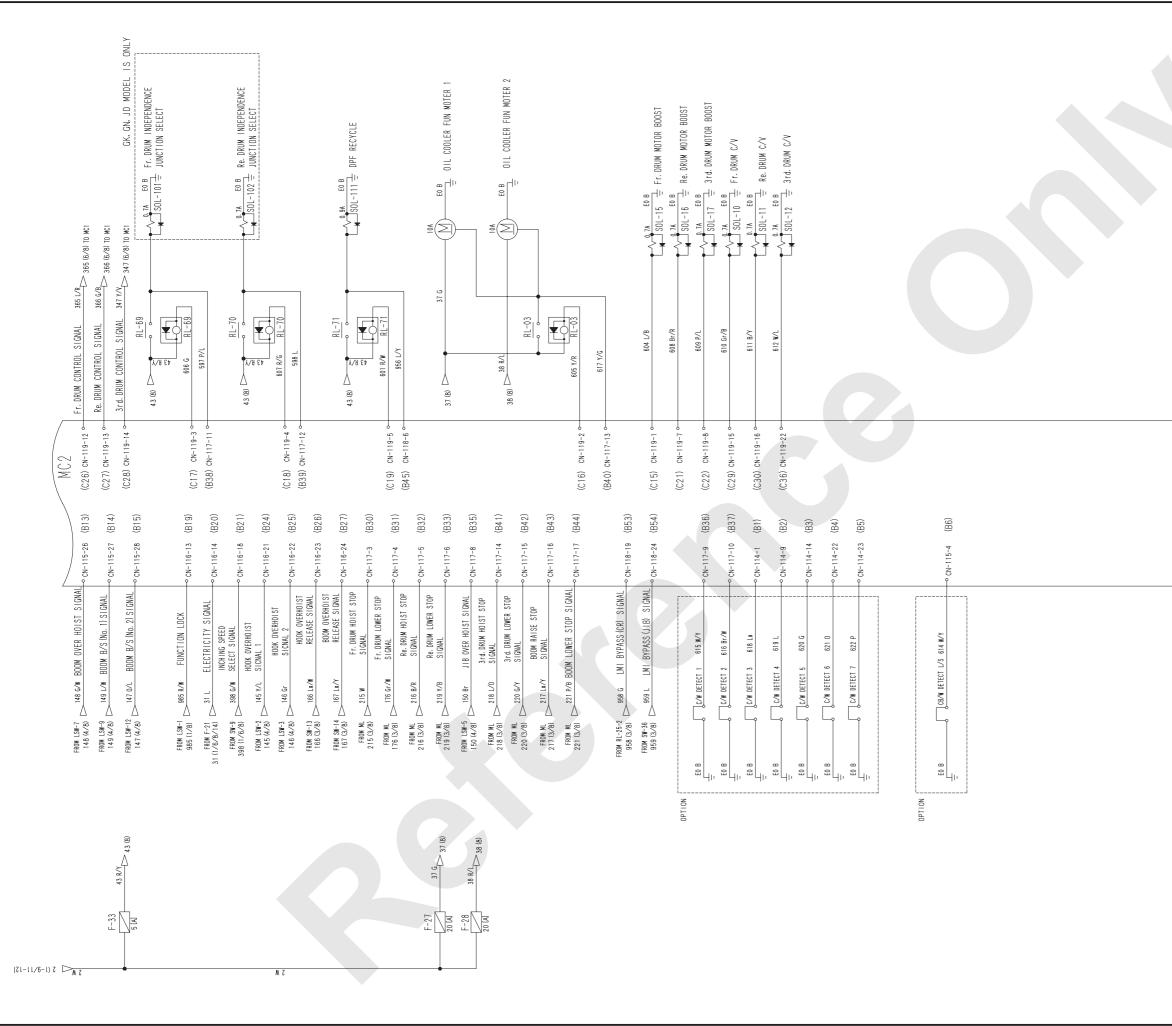
×L	MC1 DOWNLOAD CONNECTOR		E B/W = BATTERY EARTH	E B/W 🗕 BATTERY EARTH	– – Battery Earth	r. DRUM TURN GRIP		Re. DRUM TURN GRIP 475 G _ 0.4A E0 B	لمحافظ المحافظ	COLON THOM AND A		BOOM DRUM TURN GRIP 478 6/Y4AE0 B 7901-46	NO.140
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FROM RL-86 81 (6/12) □ CN-108-6 0 CN-108-6 0 R1 (6/12) □ CN-108-2 0 CN-108-2 0 CN-108-3 0 CN-108-3 0 CN-108-3 0 CN-108-4 0 CN-108-6 0 CN-108-6 0 CN-108-7 0 CN-108-8 0 CN-108-7 0 CN-108-8 0 CN-108-8 0 CN-108-7 0 CN-108-8 0 CN-	CN-108-9 CN-108-5 CN-108-5 CN-108-15 CN-108-15 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-108-10 CN-	(C26) CN-109-12 81 (6/12) 81 WG FL-37 FR0M RL-86 FR0M RL-86 81 (6/12) 91 WG FR0M RL-86 81 (6/12) 91 WG FL-36 81 (6/12) 91 WG FL-36 91 (6/12	CN-109-14 C CN-109-14 C CN-109-14 CN-20 CN-109-14 CN-20 CN-109-15 CN-20 CN-109-15 CN-20 CN	$(228) \text{ CV} - 109 - 14 \xrightarrow{\text{CV}} \frac{17 \text{ CV} - 143}{446 \text{ GV}} \xrightarrow{\text{CV}} \frac{1}{\text{R} - 1-3} \xrightarrow{\text{CV}} \xrightarrow{\text{CV}} \frac{1}{\text{R} - 1-3} \xrightarrow{\text{CV}} \frac{1}{\text{R} - 1-3} \xrightarrow{\text{CV}} $
Fight       End       End <th< td=""><td>SUPF SMICH         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -</td><td><math display="block"> \begin{array}{c} FEQN SH-65 418 (1/6/14) \\ FEQN SH-63 418 (1/6/14) \\ FEQN SH-63 418 (1/6/14) \\ FEQN SH-90 433 (1/6) \\ FEQN REWITE 435 (1/6/12) \\ FEQN REWITE 435 (1/6/12) \\ FEQN REWITE 435 (1/6/12) \\ FEQN REWITE 423 (1/6/12) \\ FEQN REWITE 423 (1/6/12) \\ FEQN REWOTE 442 (6/12) \\ FEQN REWOTE 600 FCCELE S1GNAL (1001N)  CN-108-23 (1557) \\ FEQN REWOTE 442 (6/12) \\ FEQN REWOTE 600 FCCELE S1GNAL (1001N)  CN-108-23 (1557) \\ FEQN REWOTE 442 (6/12) \\ FEQN REWOTE 600 FCCELE S1GNAL (1001N)  CN-108-24 (1557) \\ FEQN SH-23 439 (6/11) \\ FEN SH-23 439 (6/11) \\ FL ORIN FREE FALL SELECT  REW SH-23 439 (6/11) \\ FL ORIN FREE FALL SELECT  FT ORIN FREE FALL SELECT  FL ORIN FREE FALL SELECT  F</math></td><td>Fr. DRUM FREE SELECT RELAY Fr. DRUM FREE SELECT RELAY R. DRUM FREE SELEC</td><td>(B41) (B42) (B43) (B33) (B33)</td></th<>	SUPF SMICH         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -	$ \begin{array}{c} FEQN SH-65 418 (1/6/14) \\ FEQN SH-63 418 (1/6/14) \\ FEQN SH-63 418 (1/6/14) \\ FEQN SH-90 433 (1/6) \\ FEQN REWITE 435 (1/6/12) \\ FEQN REWITE 435 (1/6/12) \\ FEQN REWITE 435 (1/6/12) \\ FEQN REWITE 423 (1/6/12) \\ FEQN REWITE 423 (1/6/12) \\ FEQN REWOTE 442 (6/12) \\ FEQN REWOTE 600 FCCELE S1GNAL (1001N)  CN-108-23 (1557) \\ FEQN REWOTE 442 (6/12) \\ FEQN REWOTE 600 FCCELE S1GNAL (1001N)  CN-108-23 (1557) \\ FEQN REWOTE 442 (6/12) \\ FEQN REWOTE 600 FCCELE S1GNAL (1001N)  CN-108-24 (1557) \\ FEQN SH-23 439 (6/11) \\ FEN SH-23 439 (6/11) \\ FL ORIN FREE FALL SELECT  REW SH-23 439 (6/11) \\ FL ORIN FREE FALL SELECT  FT ORIN FREE FALL SELECT  FL ORIN FREE FALL SELECT  F$	Fr. DRUM FREE SELECT RELAY Fr. DRUM FREE SELECT RELAY R. DRUM FREE SELEC	(B41) (B42) (B43) (B33) (B33)

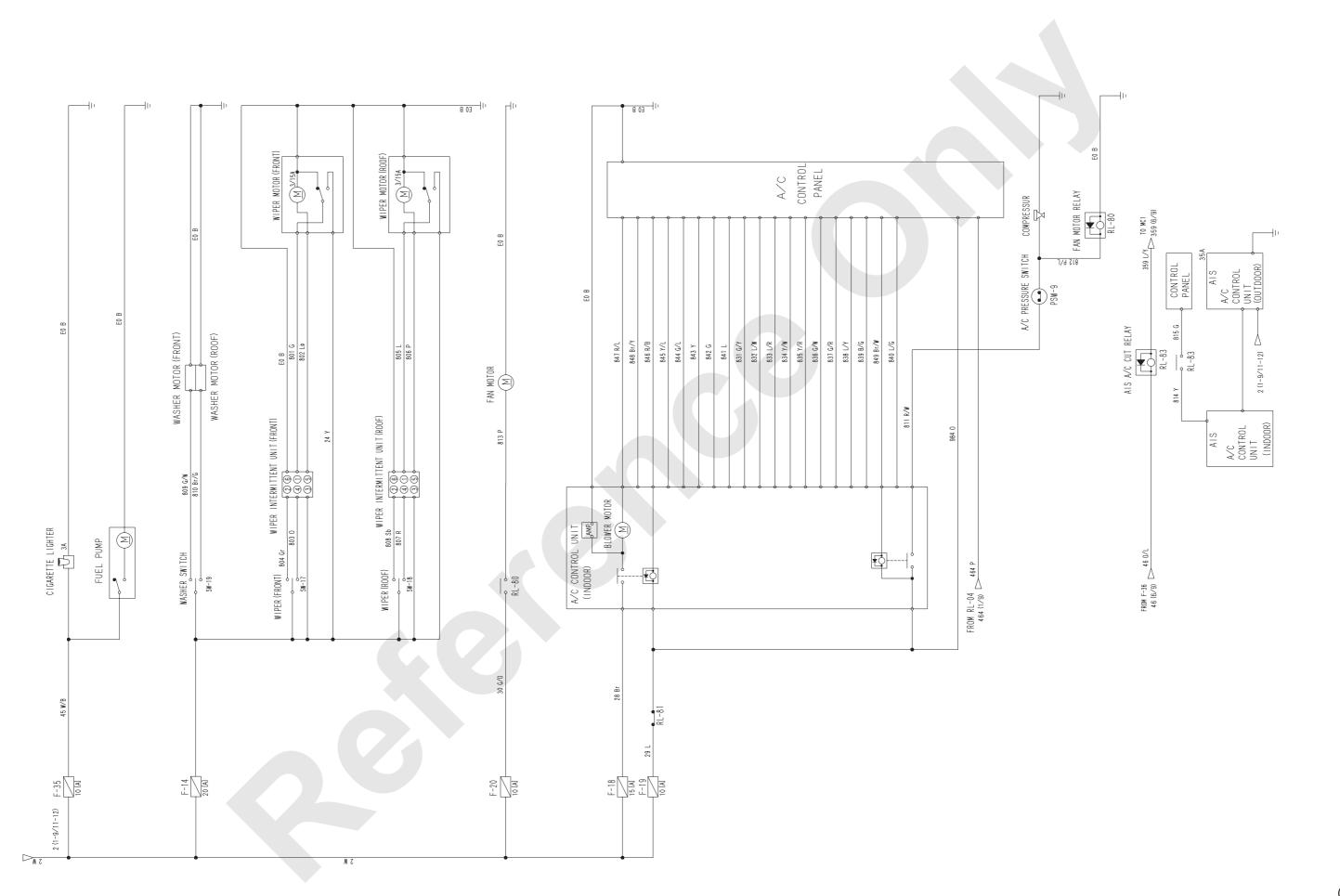


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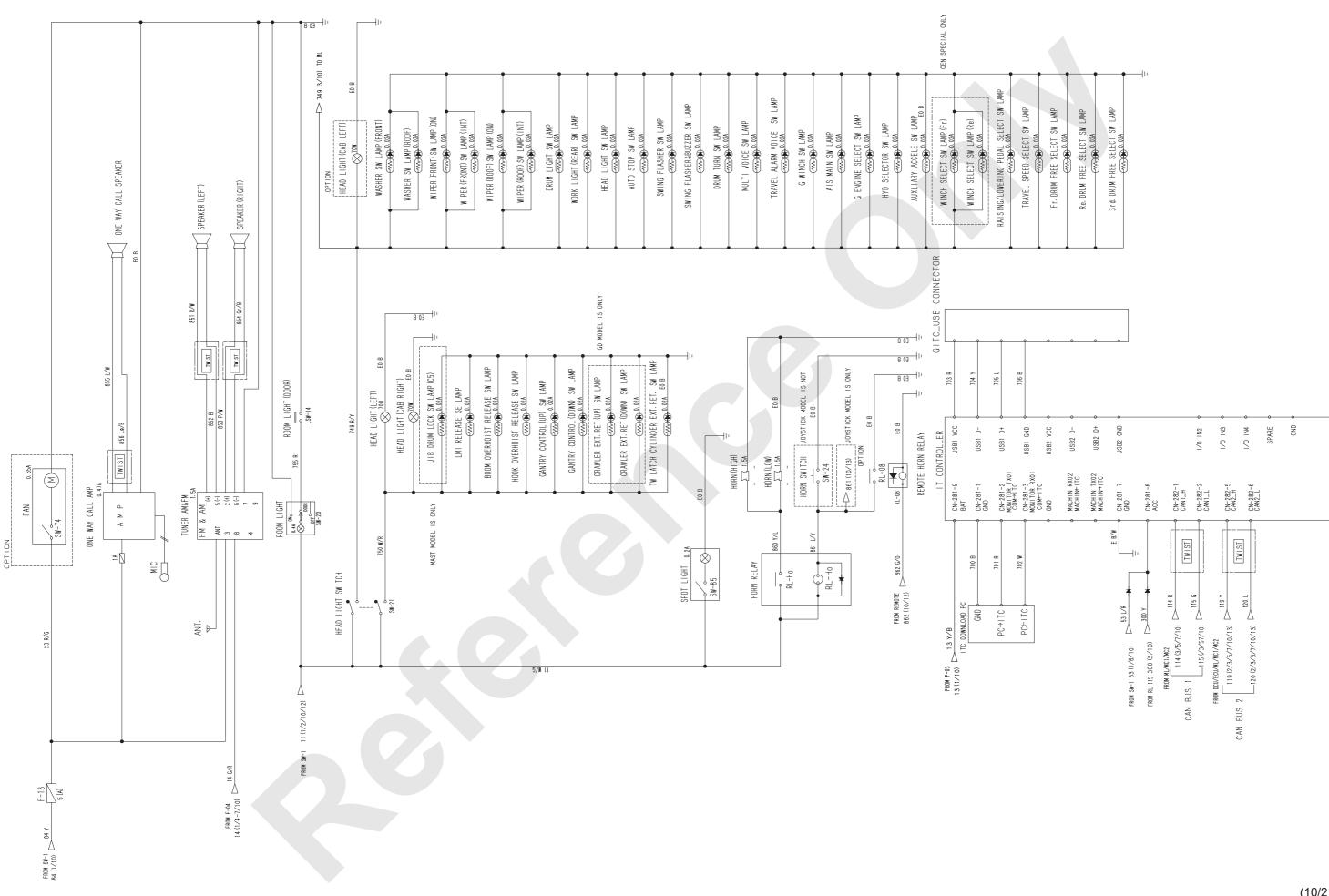


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#### Published 11-10-17, Control #261-01

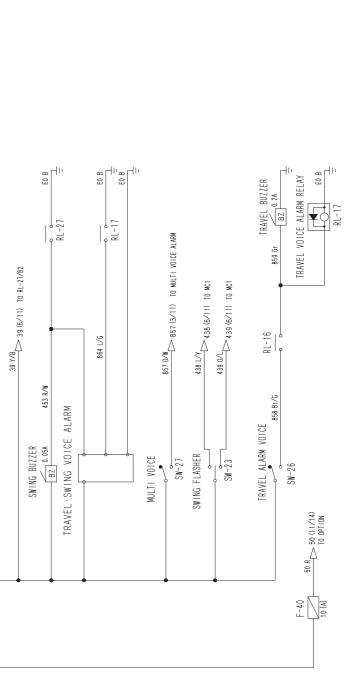
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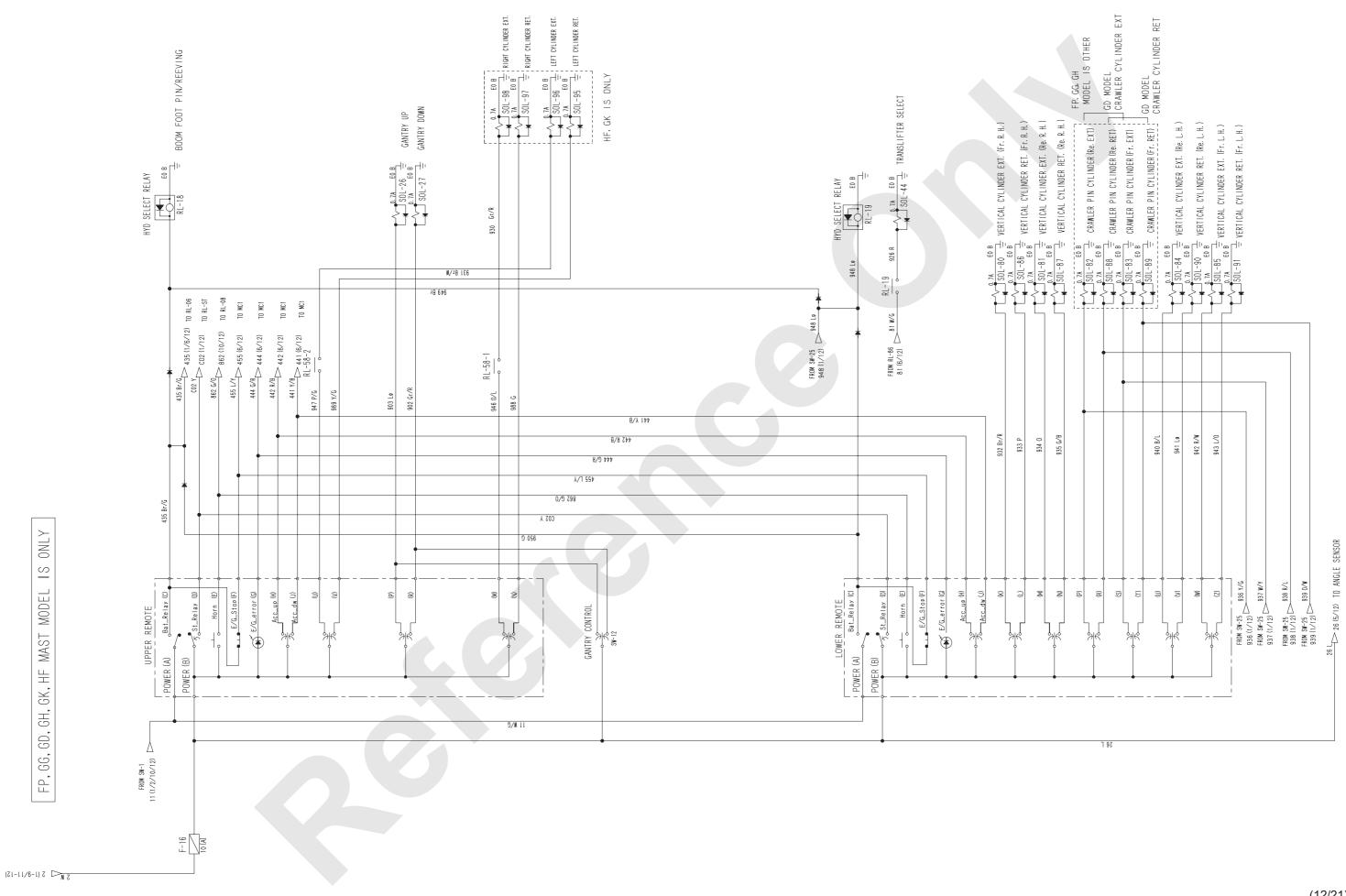


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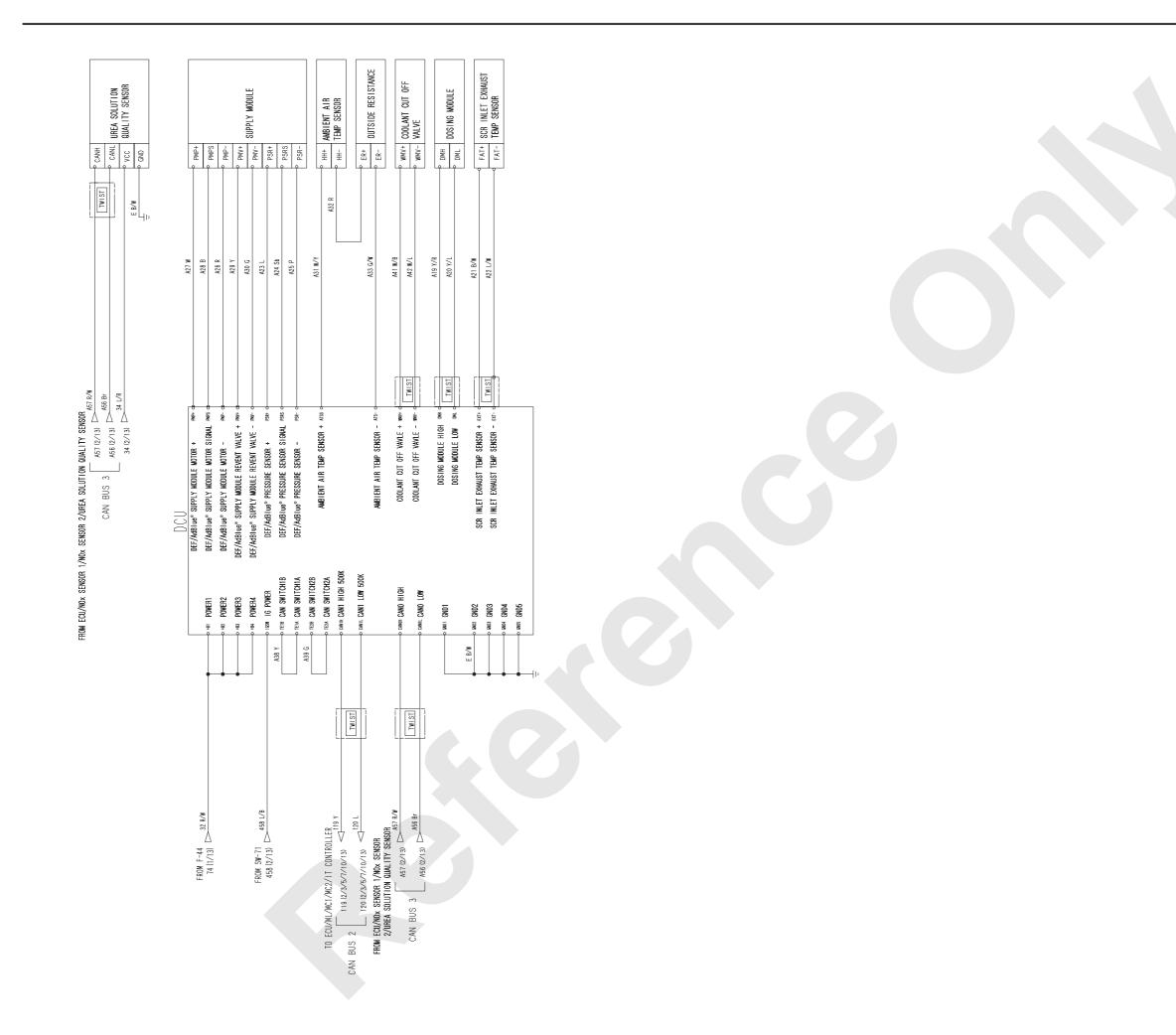
Fr&Re DRUM CAMERA 1:V-OUT 2:VCC -5:GND REAR WORK CAMERA 2:VCC 3:VC 4:V-CND 4:V-CND 5:CND BDOM DRUM CAMERA 1:V-OUT 2:VCC 3:NC 4:V-GND 5:GND SPARE CAMERA 138 C\B ES6 B E11 B/W 204 W 206 W ES8 B 210 W ES7 B 208 W ES9 B JAPANESE MODEL IS ONL 7000 SERIES IS ONLY 1 M N/8 113 139 R o• က 🔸 ဖ တ • E0 B CYL EXT. ML MONITOR CAMERA POWER 975 G WORK LIGHT (REAR) WORK LIGHT (DRUM) STOW 403 Y TO MC1 403 (6/11) 976 L 10 MC1 976 L (2) 6 (8) (2) (3) OPTION F ₩/8 II3 -||· ς) **Θ** 752 Lø/R 751 G/R P01 Y LATCH LOCK OPERATION E0 B SW-75 DRUM TURN DETECT GRIP 951 0 E0 B SW-22 WORK LIGHT (DRUM) 27 P/W TO CAMERA POWER WORK LIGHT (REAR) 27 P/W SW-77 SW-33 E0 B NO I T d O RL-82 L\_I. L FROM ML 194 (3/11) FROM ML ES2 (4/11) CS1 B/R FROM ML 196 (3/11) FROM ML 195 (3/11) 49 R/W FROM F-17 27 P/W F-39 5 M - 1 F-29 5 (1-9/11-12)



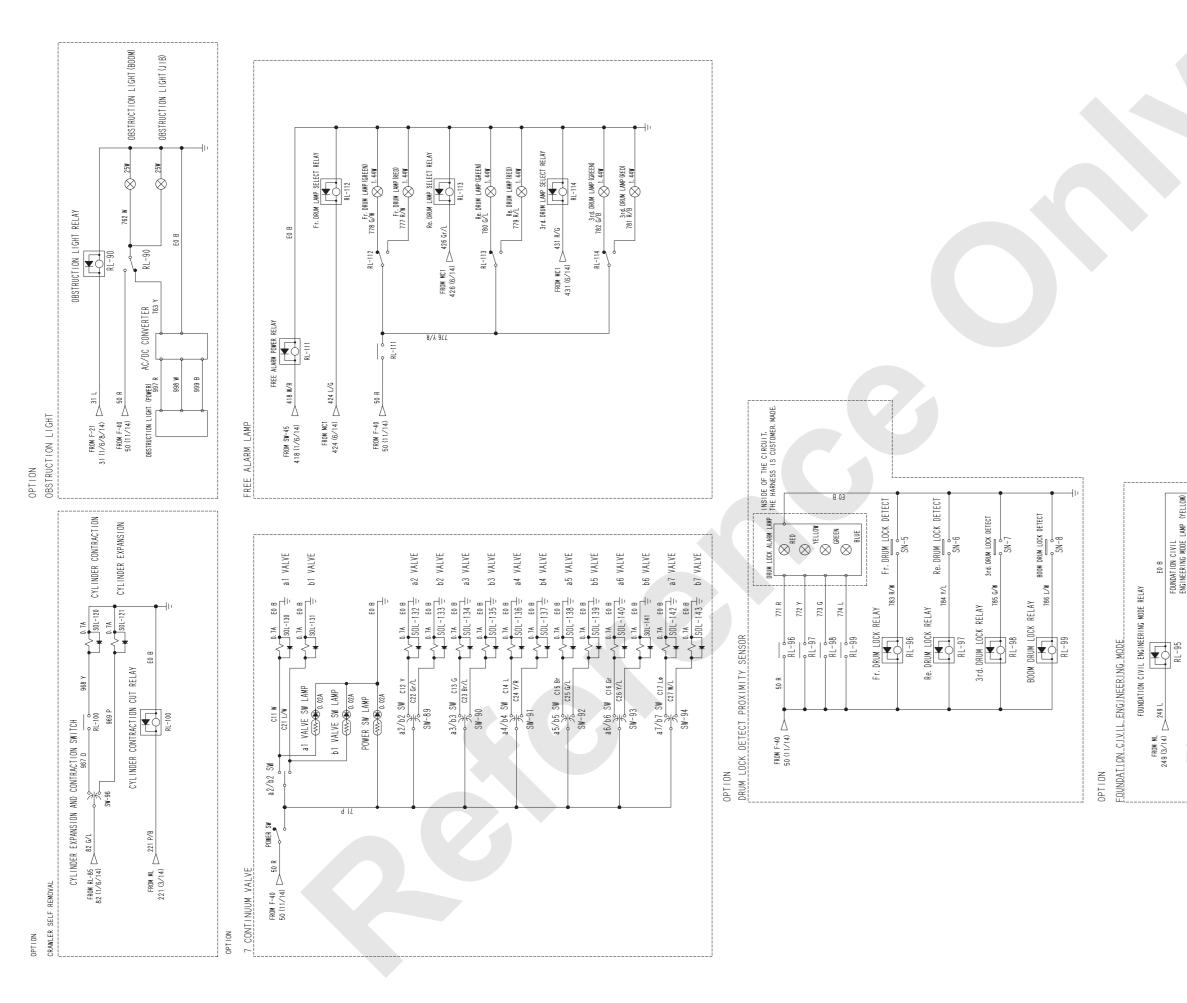


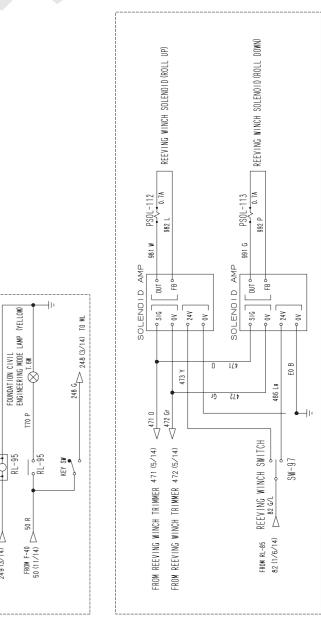


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(14/21)

		1		RELAY						RELAY			
RL-NO.		TERMINAL SHEET No.		USE	<b>Manitowoc</b> PART NO.	RL-NO.		TERMINAL SHEET No		USE	Manitowoc PART NO.	RL-NO.	COIL SHEET No.
RL-B(sub)	1	1	N. O.	BATTERY RELAY (sub)		RL-14	6	6	N. C.	SWING HIGH LOW SPEED SELECT		RL-24	6
RL-B	1	1	N. O.	BATTERY RELAY		RL-15	6	6	N. O.	SWING NEUTRAL BRAKE SELECT		RL-25	3
RL-Ho	10	10	N. O.	HORN RELAY		RL-16	1	11	N. O.	TRAVEL ALARM RELAY		RL-25-1	
RL-C	1		N. O.	CUT OUT RELAY		RL-17	11	11	N. O.	TRAVEL VOICE ALARM RELAY		RL-25-2	
RL-H	2	2	N. O.	HEATER RELAY		RL-18	12	1	N. C.	HYD SELECT RELAY		RL-27	6
RL-ST	1	1	N. O.	STARTER RELAY		RL-19	12	12	N. O.	HYD SELECT RELAY		RL-28	3
RL-01	1	1	N. C.	ALTERNATOR DETECT RELAY		RL-20	6	6	N. O.	HYD. OIL HEAT		RL-29	3
RL-02	1	1	N. C.	SAFETY RELAY		RL-21	1	1	N. O.	E/G RESTART RELAY		RL-30	3
RL-03	8	8	N. O.	OIL COOLER MOTOR		RL-22	5			MC1 BYPASS RELAY		RL-31	3
RL-04	1	1	N. C.	AIS RELAY		RL-22-1		5	N. O. N. C.	MC1 BYPASS RELAY		RL-32	3
RL-05	1	1	N. C.	STATER LOCK RELAY		RL-22-2		5	N. O. N. C.	MC1 BYPASS RELAY		RL-36	6
RL-06	1	1	N. C.	ATTESTATION RELEASE RELAY		RL-22-3		5	N. O. N. C.	MC1 BYPASS RELAY		RL-37	6
RL-07	1	1	N. O. N. C.	E/G STOP RELAY		RL-22-4		5	N. O. N. C.	MC1 BYPASS RELAY		RL-38	6
RL-08	10	10	N. O.	REMOTE HORN RELAY		RL-22-5		5	N. O. N. C.	MC1 BYPASS RELAY		RL-39	6
RL-09	1	1	N. C.	SWING PARKING CONTROL RELAY		RL-22-6		5	N. O. N. C.	MC1 BYPASS RELAY		RL-40	6
RL-10	1			SWING PARKING 1 RELAY		RL-22-7		5	N. O. N. C.	MC1 BYPASS RELAY		RL-41	6
RL-10-1		1	N. O.	SWING PARKING 1		RL-22-8		5	N. O. N. C.	MC1 BYPASS RELAY		RL-42	6
RL-10-2		1	N. O.	SWING PARKING 2		RL-22-9		5	N. O. N. C.	MC1 BYPASS RELAY		RL-43	6
RL-12	1	1	N. C.	SWING PARKING 3 RELAY		RL-22-10		5	N. O. N. C.	MC1 BYPASS RELAY		RL-44	6
RL-13	6	1	N. C.	PILOT PRESSURE CUT		RL-23	1	1	N. C.	KEY RETURN RELAY		RL-45	6

		RELAY	
TERMINAL SHEET No.	TYPE	USE	<b>Manitowoc</b> PART NO.
3	N. C.	LMI BYPASS RESET	
		LMI BYPASS KEEP 1	
3	N. O.	LMI BYPASS KEEP 1	
3	N. O.	LMI BYPASS KEEP 2	
11	N. O.	SWING BUZZER	
5	N. C.	SPEED LIMIT RELEASE	
5	N. O.	SPEED LIMIT	
3	N. O.	OVERLOAD ALARM LAMP (GREEN)	
3	N. O.	OVERLOAD ALARM LAMP (YELLOW)	
3	N. O.	OVERLOAD ALARM LAMP (RED)	
3	N. O.	LMI ADJUSTMENT MODE SELECT	
6	N. O.	DPF RECYCLE RELAY	
6	N. O.	SWING FLASHER (L. H. ) RELAY	
6	N. O.	SWING FLASHER (R. H. ) RELAY	
6	N. O.	Qmax CUT RELAY	
6	N. O.	CLM RELAY	
6	N. O.	ESM RELAY	
6	N. O.	CLA RELAY	
6	N. O.	ESA RELAY	
6	N. O.	CLT RELAY	

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RELAY					RELAY						RELAY				
	TERMINAL TYP	COIL TER SHEET No.SHE	RL-NO.	<b>Manitowoc</b> PART NO.	USE	TYPE	TERMINAL SHEET No.	COIL SHEET No	RL-NO.	<b>Manitowoc</b> PART NO.	U S E	TYPE	TERMINAL SHEET No.	COIL SHEET No	RL-NO.
7 N.O. N.C. MC2 BYPASS RELAY	7 N. O.		RL-68-14		Fr. DRUM HOIST STOP	N. O.	7	3	RL-62		EST RELAY	N. O.	6	6	RL-46
7 N.O. N.C. MC2 BYPASS RELAY		15	RL-68-15		Fr. DRUM LOWER STOP	N. O.	7	3	RL-63		Fr. DRUM FREE SELECT RELAY	N. O.	6	6	RL-47
7 N.O. N.C. MC2 BYPASS RELAY		16	RL-68-16		Re. DRUM HOIST STOP	N. O.	7	3	RL-64		Re. DRUM FREE SELECT RELAY	N. O.	6	6	RL-48
8 Fr. DRUM INDEPENDENCE JUNCTION		9 8	RL-69		Re. DRUM LOWER STOP	N. O.	7	3	RL-65		3rd. DRUM FREE SELECT RELAY	N. O.	6	6	RL-49
N.O. DE DRIM INDEDENDENCE UNICTION	N. O.				3rd. DRUM HOIST STOP	N. O.	7	3	RL-66		JIB OVER HOIST RELAY			4	RL-50
8 Re. DRUM INDEPENDENCE JUNCTION SELECT RELAY	8	8	RL-70		3rd. DRUM LOWER STOP	N. O.	7	3	RL-67		JIB OVER HOIST RELAY	N. O.	3		L-50-1
8 N.O. DPR LOAD MULTIPLIED RELAY	8 <sup>N. O.</sup>	1 8	RL-71		MC2 BYPASS RELAY			7	RL-68		JIB OVER HOIST RELAY	N. O.	3		L-50-2
1 N.O. INJECTOR COOLING FAN MOTOR RELAY	1 N. O.	9 1	RL-79		MC2 BYPASS RELAY	N. O. N. C.	7		RL-68-1		NO. 2 LIMIT RELAY	N. O.	3	4	RL-51
9 N.O. FAN MOTOR RELAY	9 N. O.	9	RL-80		MC2 BYPASS RELAY	N. O. N. C.	7		RL-68-2		BOOM OVER HOIST RELAY	N. O.	3	4	RL-53
9 N.C. A/C CUT RELAY	9 N. C.	1 1	RL-81		MC2 BYPASS RELAY	N. O. N. C.	7		RL-68-3		SELF REMOVAL SELECT	N. O.	4	3	RL-54
11 N.O. TW LATCH CYLINDER	1 1 N. O.	2 6	RL-82		MC2 BYPASS RELAY	N. O. N. C.	7		RL-68-4		ASSEMBLY DISASSEMBLY SELECT	N. O.	4	3	RL-55
g N.O. AIS A/C CUT RELAY	9 N. O.	3 9	RL-83		MC2 BYPASS RELAY	N. O. N. C.	7		RL-68-5		MAST MODEL SELF REMOVAL SELECT	N. O.	4	3	RL-56
4 N.C. SOL CUT RELAY 1	4 N. C.	4 6	RL-84		MC2 BYPASS RELAY	N. O. N. C.	7		RL-68-6		JIB MODEL SELECT			3	RL-57
1 N.C. SOL CUT RELAY 2	1 N. C.	5 6	RL-85		MC2 BYPASS RELAY	N. O. N. C.	7		RL-68-7		JIB MODE	N. O.	4		L-57-1
6 N.C. SOL CUT RELAY 3	6 N. C.	6 6	RL-86		MC2 BYPASS RELAY	N. O. N. C.	7		RL-68-8		JIB MODE	N. C.	4		L-57-2
3 N.O. OVER LOAD ALARM BUZZER	3 N. O.	7 3	RL-87		MC2 BYPASS RELAY	N. O. N. C.	7		RL-68-9		SELF REMOVAL EXT. STOP			3	RL-58
14 N.C. OBSTRUCTION LIGHT RELAY	1.4 N.C.	0 14	RL-90		MC2 BYPASS RELAY	N. O. N. C.	7		RL-68-10		SELF REMOVAL EXT. STOP	N. O.	12		L-58-1
1 N.O. SUB BATTERY RELAY 2	1 N. O.	1 6	RL-91		MC2 BYPASS RELAY	N. O.	7		RL-68-11		SELF REMOVAL EXT. STOP	N. O.	12		L-58-2
1 N.C. ACC CUT RELAY 1	1 N. C.	3 1	RL-93		MC2 BYPASS RELAY	N. O.	7		RL-68-12		RAISING/LOWERING RAISE STOP	N. O.	7	3	RL-60
1 N.O. ACC CUT RELAY 2	1 N. O.	4 6	RL-94		MC2 BYPASS RELAY	N. O.	7	j	RL-68-13		RAISING/LOWERING LOWER STOP	N. O.	7	3	RL-61
1     N.C.       1     N.C.       ACC CUT RELAY 1	1 N. C. 1 N. C.	3 1	RL-93		MC2 BYPASS RELAY	N. C. N. O. N. C.	7	2	RL-68-12		RAISING/LOWERING RAISE STOP	N. O.	7		RL-60

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				RELAY	
RL-NO.	COIL SHEET No.	TERMINAL SHEET No.	TYPE	USE	Manitowoc PART NO.
RL-95	14	14	N. O.	FOUNDATION CIVIL ENGINEERING MODE RELAY	
RL-96	14	14	N. O.	Fr.DRUM LOCK RELAY	
RL-97	14	14	N. O.	Re.DRUM LOCK RELAY	
RL-98	14	14	N. O.	3rd.DRUM LOCK RELAY	
RL-99	14	14	N. O.	BOOM DRUM LOCK RELAY	
RL-100	14	14	N. O.	CYLINDER CONTRACTION CUT RELAY	
RL-106	12	12	N. C.	LEFT CYLINDER RET. CUT RELAY	
RL-107	12	12	N. C.	RIGHT CYLINDER EXT. CUT RELAY	
RL-108	12	12	N. C.	LEFT CYLINDER EXT. CUT RELAY	
RL-109	12	12	N. C.	RIGHT CYLINDER RET. CUT RELAY	
RL-110	14	14	N. O.	WIND VELOCITY ALARM LAMP RELAY	
RL-111	13	14	N. O.	FREE ALARM POWER RELAY	
RL-112	14	14	N. C.	Fr.DRUM LAMP SELECT RELAY	
RL-113	14	14	N. C.	Re. DRUM LAMP SELECT RELAY	
RL-114	14	14	N. C.	3rd.DRUM LAMP SELECT RELAY	
RL-115	6	2	N. O.	ENGINE RELAY	
RL-116	6	2	N. O.	OPERATION RECOVERY RELAY	
RL-120	6	1	N. C.	GITC RETURN RELAY	
RL-121	1	1	N. O.	WEBASTO HEATER RELAY	

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		FUSE		
F-N0.	RATED [A]	USE	SHEET NO.	Manitowoc PART NO.
F-01	20	ELECTRIC POWER SOURCE	1	
F-02	5	POWER SUPPLY-VOLTAGE WATCH	1	
F-03	5	ITC POWER SOURCE	1	
F-04	5	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	ENGINE CONDITION	1	
F-13	5	ONE WAY/RADIO	10	
F-14	20	WIPER	9	
F-15	10	FUNCTION LOCK	1	
F-16	10	REMOTE CONTROL	12	
F-17	5	MONITOR	11	
F-18	15	A/C	9	
F-19	10	A/C 2	9	
F-20	10	FAN MOTOR	9	

		FUSE		
F-N0.	RATED [A]	USE	SHEET NO.	Manitowoc PART NO.
F-21	5	GENERATION OF ELECTRICITY SENSOR	1	
F-22	20	DCU POWER SOURCE	2	
F-23	5	ECU POWER SOURCE	1	
F-24	15	ECU (+BF)	2	
F-25	20	ECU (+B)	2	
F-26	15	ECU	2	
F-27	20	OIL COOLER FAN MOTOR 1	8	
F-28	20	OIL COOLER FAN MOTOR 2	8	
F-29	10	SWING FLASHER/VOICE ALARM	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	

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		FUSE		
F-N0.	RATED [A]	U S E	SHEET NO.	<b>Manitowoc</b> PART NO.
F-41	20	USER	1	
F-42	1	CAMERA PAWER	11	
F-43	3	WIND VELOCITY ALARM LAMP	14	

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		SOLENOID VAL	VE	
<b>Manitowoc</b> PART NO.	SOL-NO.	U S E	SHEET NO.	<b>Manitowoc</b> PART NO.
	SOL-3	FUNCTION LOCK	1	
	SOL-4	TRAVEL 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	
	C			

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	SOLENOID VALV	E			
SOL-NO.	USE	SHEET NO.	<b>Manitowoc</b> PART NO.		SOL-N
SOL-36	BOOM LOWER STOP	3			SOL-
SOL-37	Fr. DRUM HOIST STOP	3			SOL-
SOL-38	Re. DRUM HOIST STOP	3			SOL-
SOL-42	SWING HIGH LOW SPEED SELECT	6	·		SOL-
SOL-44	TRANSLIFTER SELECT	12			SOL-
SOL-45	HYD. SELECT (FOOT PIN/REEVING)	1			SOL-
SOL-47	HYD. OIL HEAT	6			SOL-
SOL-48	SWING NEUTRAL SELECT	6			SOL-1
SOL-49	SWING NEUTRAL SELECT	6			SOL-1
SOL-69	JIB RAISING/LOWERING DRUM LOCK (ON FOR UNLOCK)	1			SOL-1
SOL-77	RAISING/LOWERING PEDAL	1			SOL-1
SOL-80	VERTICAL CYLINDER EXT. (Fr. R. H. )	12			SOL-1
SOL-81	VERTICAL CYLINDER EXT. (Re. R. H. )	12			SOL-1
SOL-82	CRAWLER PIN CYLINDER (Re. EXT)	12			SOL-1
SOL-83	CRAWLER PIN CYLINDER (Fr. EXT)	12			SOL-1
SOL-84	VERTICAL CYLINDER EXT. (Re. L. H.	12			SOL-1
SOL-85	VERTICAL CYLINDER EXT. (Fr. L. H. )	12			SOL-1
SOL-86	VERTICAL CYLINDER RET. (Fr. R. H. )	12			SOL-1
SOL-87	VERTICAL CYLINDER RET. (Re. R. H.)	12			SOL-1
SOL-88	CRAWLER PIN CYLINDER(Re. RET)	12			SOL-1

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	SOLENOID VALVE					
	SOL-NO.	USE	SHEET NO.	<b>Manitowoc</b> PART 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	DPF RECYCLE	8			
	SOL-120	CYLINDER CONTRACTION	14			
	SOL-121	CYLINDER EXPANSION	14			
	SOL-130	a1 VALVE	14			
	SOL-131	b1 VALVE	14			
	SOL-132	a2 VALVE	14			
	SOL-133	b2 VALVE	14			
	SOL-134	a3 VALVE	14			

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	SOLENOID VALVE		
SOL-NO.	U S E	SHEET NO.	<b>Manitowoc</b> PART NO.
SOL-135	b3 VALVE	14	
SOL-136	a4 VALVE	14	
SOL-137	b4 VALVE	14	
SOL-138	a5 VALVE	14	
SOL-139	b5 VALVE	14	
SOL-140	a6 VALVE	14	
SOL-141	b6 VALVE	14	
SOL-142	a7 VALVE	14	
SOL-143	b7 VALVE	14	

SOLENOID VALVE					
PSOL-NO.	U S E	SHEET NO.	<b>Manitowoc</b> PART 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-43	3rd.DRUM TURN GRIP	6			
PSOL-46	BOOM DRUM TURN GRIP	6			
PSOL-50	MAIN PUMP POWER REDUCTION	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			

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	SOLENOID VALV	E ,	
PSOL-NO.	U S E	SHEET NO.	<b>Manitowoc</b> PART NO.
PSOL-67	3rd. DRUM CONTROL PROPORTIONAL VALVE	7	
PSOL-70	BOOM PUMP POWER REDUCTION	5	
PSOL-72	SWING CONSTANT SPEED	5	
PSOL-103	Fr. Re. MOTOR 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	
PSOL-112	(ROLL UP)	14	
PSOL-113	REEVING WINCH SOLENOID (ROLL DOWN)	14	

	SWITCH		
SW-NO.	USE	SHEET NO.	<b>Manitowoc</b> PART NO.
SW-1	E∕G KEY	1	
SW-8	TRAVEL 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	HEAD 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	TRAVEL ALARM VOICE	11	
SW-27	MULTI VOICE	11	
	MULTI VUIGL		

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SWITCH						
SW-NO.	USE	SHEET NO.	<b>Manitowoc</b> PART 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	RAISING/LOWERING PEDAL SELECT	1				
SW-65	HYDRAULIC SELECT	1				
SW-71	E/G EMERGENCY STOP SWITCH	2				
SW-72	AUXILIARY ACCELE SW	2				
SW-74	FAN	10				

SWITCH						
SW-NO.	U S E	SHEET NO.	<b>Manitowoc</b> PART NO.			
SW-75	LATCH LOCK OPERATION	11				
SW-77	WORK LIGHT (DRUM)	11				
SW-79	JIB RAISING/LOWERING DRUM LOCK	1				
SW-81	AIS MODE SELECT	6				
SW-82	Re. DRUM G WINCH	1				
SW-83	G ENGINE	6				
SW-84	Fr. DRUM G WINCH	1				
SW-85	SPOT LIGHT	10				
SW-86	G WINCH MODE SELECT	6				
SW-87	POWER SW	14				
SW-88	a2∕b2 SW	14				
SW-89	a2∕b2 SW	14				
SW-90	a3∕b3 SW	14				
SW-91	a4/b4 SW	14				
SW-92	a5/b5 SW	14				
SW-93	a6∕b6 SW	14				
SW-94	a7/b7 SW	14				
SW-95	KEY SW	14				
SW-96	CYLINDER EXPANSION AND CONTRACTION SWITCH	14				
SW-97	REEVING WINCH SWITCH	14				

	LIMIT SWITCH				
LSW-NO.	USE	SHEET NO.	<b>Manitowoc</b> PART NO.		
LSW-1	FUNCTION LOCK	1			
LSW-2	HOOK OVERHOIST 1	4			
LSW-3	HOOK OVERHOIST 2	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-8	MAST HOOK OVERHOIST 1	4			
LSW-9	BOOM OVERHOIST (No. 1)	4			
LSW-10	MAST HOOK OVERHOIST 2	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	3Th. DRUM OVER PAY OUT	4			

LSW-NO. LSW-30 LSW-35 LSW-38 LSW-39

LSW-40

LSW-41

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LIMIT SWITCH							
).	USE	SHEET NO.	<b>Manitowoc</b> PART NO.				
)	HYD. OIL TEMP.	1					
5	AIR CLEANER ALARM	6					
3	TOWER JIB BENDS LOSS	4					
9	TOWER LATCH REIATIONS LIMIT SWITCH	4					
)	TOWER LATCH THE EDGE LIMIT SWITCH	4					
1	GANTRY STAND UP DETECT	4					

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

PRESSURE SENSOR					
PT-NO.	PT-NO. USE		<b>Manitowoc</b> PART 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 PROPORTIONAL PRESSURE SENSOR	7			
PT-15	3rd.DRUM CONTROL PROPORTIONAL 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.	USE	SHEET NO.	<b>Manitowoc</b> PART NO.	
PT-20	Fr.DRUM CONTROL PROPORTIONAL 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		
PT-25	BOOM DRUM POWER SHIFT PRESSURE SENSOR	5		

	PILOT LAMP		
PL-NO.	U S E	SHEET NO.	<b>Manitowoc</b> PART NO.
PL-7	CHECK ENG. LAMP (RED)	2	

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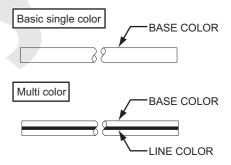
# 10.1.2 CONNECTOR LAYOUT

### Wire color list

<ul> <li>Basic sing</li> </ul>	gle color		
Color sign	Color name	Color sign	Color name
В	Black	Lg	Light green
W	White	Gr	Gray
R	Red	0	Orange
G	Green	Sb	Skyblue
Y	Yellow	Р	Pink
Br	Brown	V	Violet
L	bLue	Free	Free

Multi color

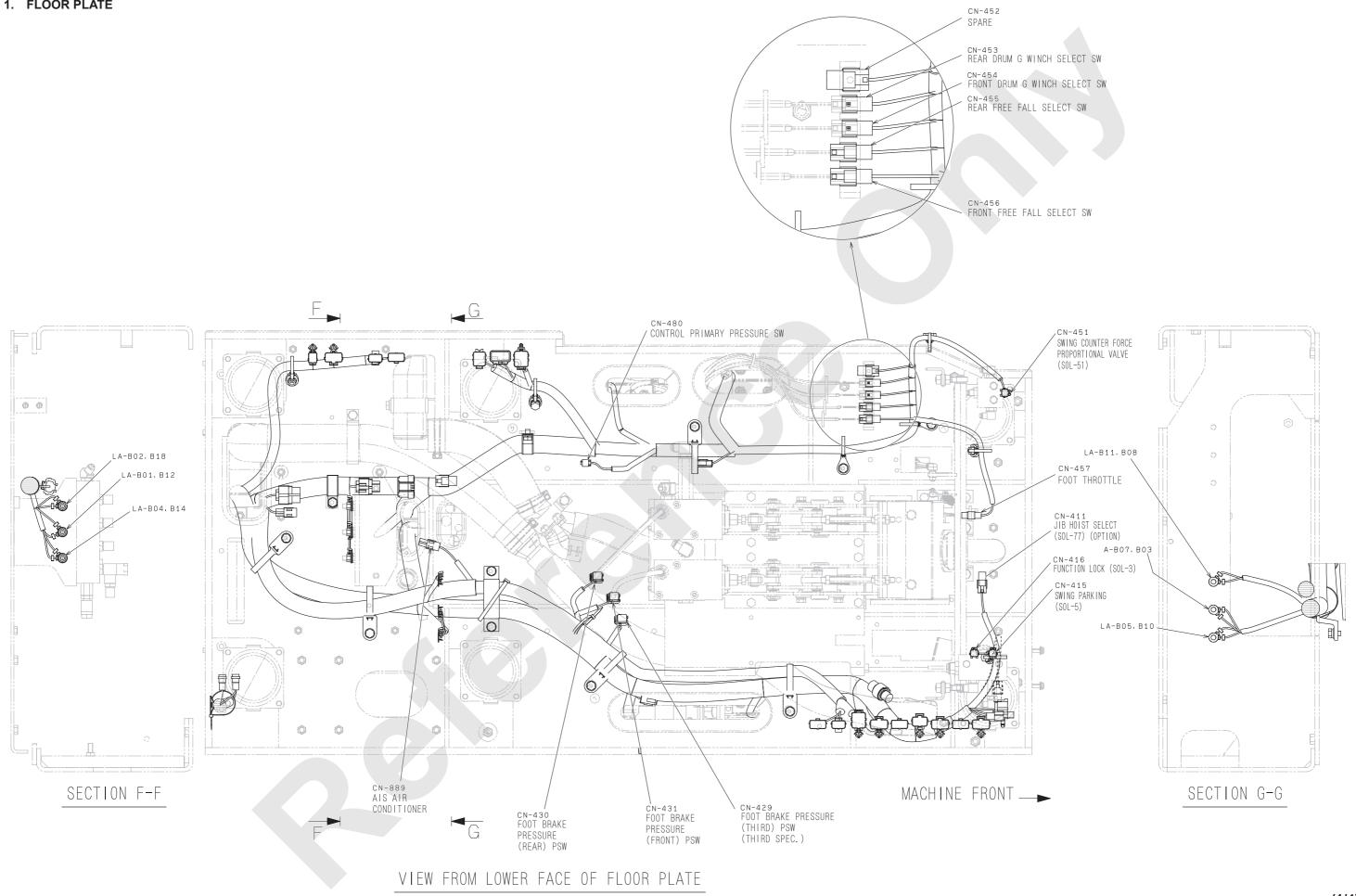
• Wulli	0001							
Color sign	Color name	Line color	Color sign	Color name	Line color	Color sign	Color name	Line color
B/W	Black	White	G/O	Green	Orange	Lg/R	Light green	Red
B/R	Black	Red	Y/B	Yellow	Black	Lg/Y	Light green	Yellow
B/G	Black	Green	Y/W	Yellow	White	Lg/L	Light green	bLue
B/Y	Black	Yellow	Y/R	Yellow	Red	Gr/B	Gray	Black
B/L	Black	bLue	Y/G	Yellow	Green	Gr/W	Gray	White
W/B	White	Black	Y/L	Yellow	bLue	Gr/R	Gray	Red
W/R	White	Red	Y/V	Yellow	Violet	Gr/L	Gray	bLue
W/G	White	Green	Br/B	Brown	Black	O/B	Orange	Black
W/Y	White	Yellow	Br/W	Brown	White	O/Y	Orange	Yellow
W/L	White	bLue	Br/R	Brown	Red	O/L	Orange	bLue
W/O	White	Orange	Br/G	Brown	Green	O/W	Orange	White
R/B	Red	Black	Br/Y	Brown	Yellow	Sb/B	Skyblue	Black
R/W	Red	White	Br/L	Brown	bLue	Sb/R	Skyblue	Red
R/G	Red	Green	L/B	bLue	Black	Sb/L	Skyblue	bLue
R/Y	Red	Yellow	L/W	bLue	White	P/B	Pink	Black
R/L	Red	bLue	L/R	bLue	Red	P/W	Pink	White
G/B	Green	Black	L/G	bLue	Green	P/R	Pink	Red
G/W	Green	White	L/Y	bLue	Yellow	P/G	Pink	Green
G/R	Green	Red	L/O	bLue	Orange	P/L	Pink	bLue
G/Y	Green	Yellow	Lg/B	Light green	Black	V/R	Violet	Red
G/L	Green	bLue	Lg/W	Light green	White			



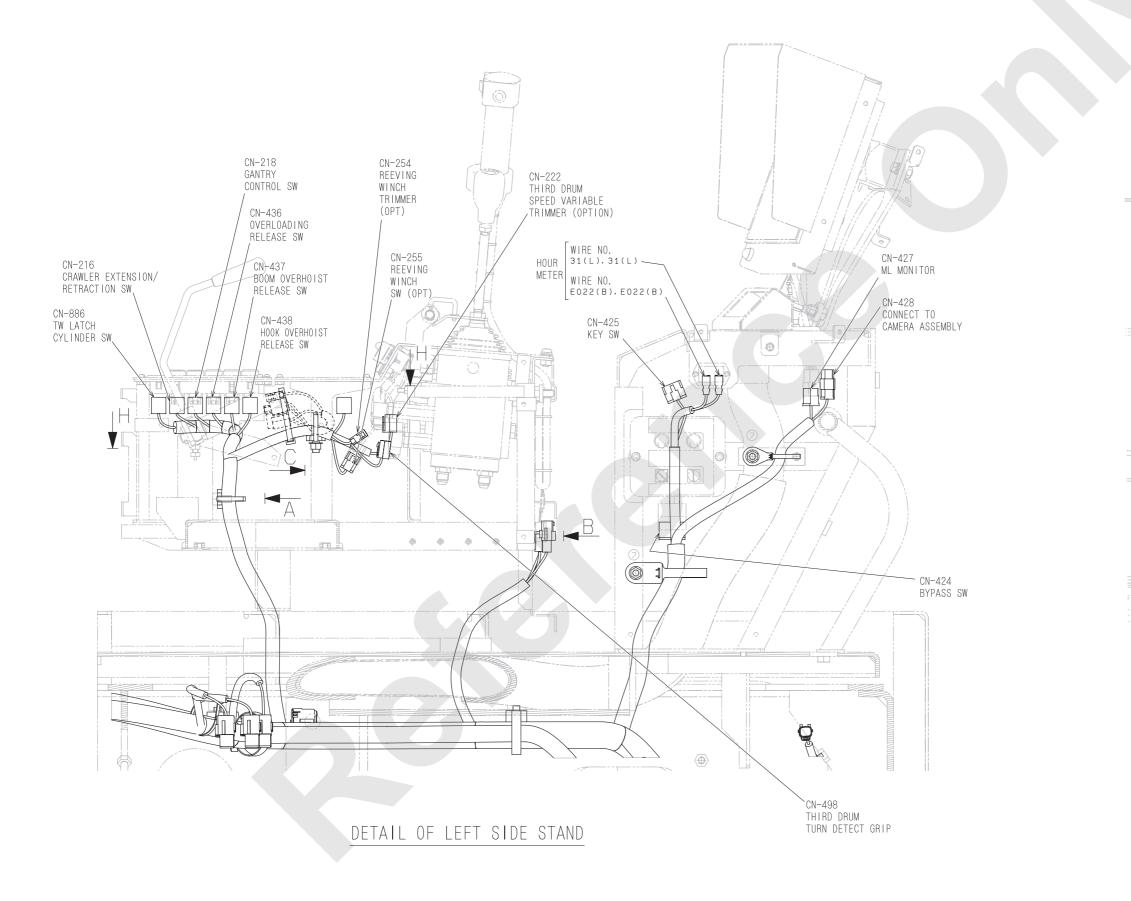
	Parts No.	Page	
1. FLOOR PLATE		P.10-26	
FLOOR PLATE HARNESS (a)		P.10-30	
FLOOR PLATE HARNESS (b)		P.10-35	
2. LOWER		P.10-41	
LOWER HARNESS		P.10-43	
3. UPPER		P.10-47	-
UPPER HARNESS		P.10-48	
4. LEFT DECK		P.10-49	
MAIN HARNESS		P.10-56	-
RELAY HARNESS		P.10-61	
5. RIGHT DECK		P.10-64	
RIGHT DECK HARNESS (a)		P.10-68	
RIGHT DECK HARNESS (b)		P.10-73	
POWER SUPPLY HARNESS		P.10-74	
STARTER (TERMINAL B) TO BATTERY RELAY		P.10-76	
STARTER (TERMINAL C) TO SAFETY RELAY		P.10-76	
6. RIGHT DECK (GUARD)		P.10-77	
GUARD HARNESS (a)		P.10-80	
GUARD HARNESS (b)		P.10-81	-
GUARD HARNESS (c)		P.10-83	
NOX SENSOR HARNESS		P.10-84	
7. CAB		P.10-85	
CAB MAIN HARNESS		P.10-88	
8. SWING FRAME	GG GH	P.10-93	
SWING FRAME HARNESS		P.10-99	-
JUNCTION BOX		P.10-104	-
ATT. JUNCTION HARNESS		P.10-105	-
9. ENGINE		P.10-107	-
STARTER MOTOR TO ENGINE GROUND		P.10-108	-
STARTER MOTOR TERMINAL B ALTERNATOR B TERMINAL		P.10-108	-
10. MONITOR		P.10-109	-
MONITOR HARNESS		P.10-110	-
11. COUNTERWEIGHT SELF REMOVAL		P.10-111	-
		P.10-113	-

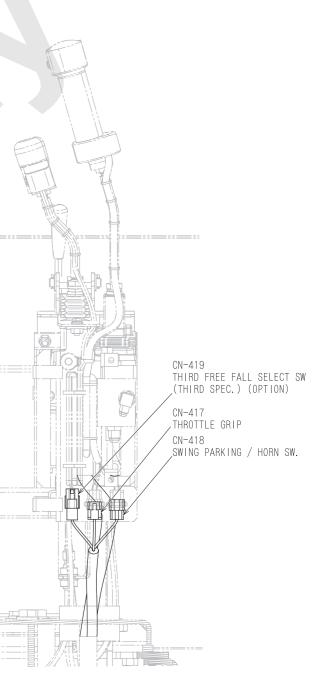
Harness name	Parts No.	Page
12. COUNTERWEIGHT DETECTOR / 3-C/W / OPT.		P.10-114
COUNTERWEIGHT DETECTOR HARNESS (a)		P.10-116
COUNTERWEIGHT DETECTOR HARNESS (b)		P.10-117
COUNTERWEIGHT DETECTOR HARNESS (c)		P.10-118
13. COUNTERWEIGHT DETECTOR / 4-C/W / OPT.		P.10-119
COUNTERWEIGHT DETECTOR HARNESS (a)		P.10-120
COUNTERWEIGHT DETECTOR HARNESS (b)		P.10-121
COUNTERWEIGHT DETECTOR HARNESS (c)		P.10-123
COUNTERWEIGHT DETECTOR HARNESS (d)		P.10-125
14. CARBODY WEIGHT DETECTOR / OPT.		P.10-127
CARBODY WEIGHT DETECTOR HARNESS (a)		P.10-128
CARBODY WEIGHT DETECTOR HARNESS (b)		P.10-129
CARBODY WEIGHT DETECTOR HARNESS (c)		P.10-130
15. BOOM OVER HOIST PREVENTING		P.10-131
BOOM OVER HOIST PREVENTING HARNESS (a)		P.10-135
BOOM OVER HOIST PREVENTING HARNESS (b)		P.10-136
BOOM OVER HOIST PREVENTING HARNESS (c)		P.10-137
BOOM OVER HOIST PREVENTING HARNESS (d)		P.10-139
16. JIB OVER HOIST PREVENTING		P.10-140
JIB OVER HOIST PREVENTING HARNESS (a)		P.10-141
JIB OVER HOIST PREVENTING HARNESS (b)		P.10-142
17. TRANSLIFTER		P.10-143
TRANSLIFTER HARNESS		P.10-144
18. HOIST DRUM TURN SENSOR		P.10-145
HOIST DRUM TURN SENSOR HARNESS		P.10-147
19. THIRD DRUM TURN SENSOR		P.10-148
THIRD DRUM TURN SENSOR HARNESS		P.10-149
20. DEF/AdBlue® TANK		P.10-150
DEF/AdBlue® TANK		P.10-151
21. CAMERA CONTROLLER		P.10-152
CAMERA CONTROLLER HARNESS (a)		P.10-154
CAMERA CONTROLLER HARNESS (b)		P.10-156
22. DRUM LIGHT INSTAL		P.10-157
DRUM LIGHT INSTAL HARNESS		P.10-158
23. BACK LIGHT INSTAL		P.10-159
BACK LIGHT INSTAL HARNESS		P.10-159
24. IT CONTROLLER INSTALLATION		P.10-160

1. FLOOR PLATE



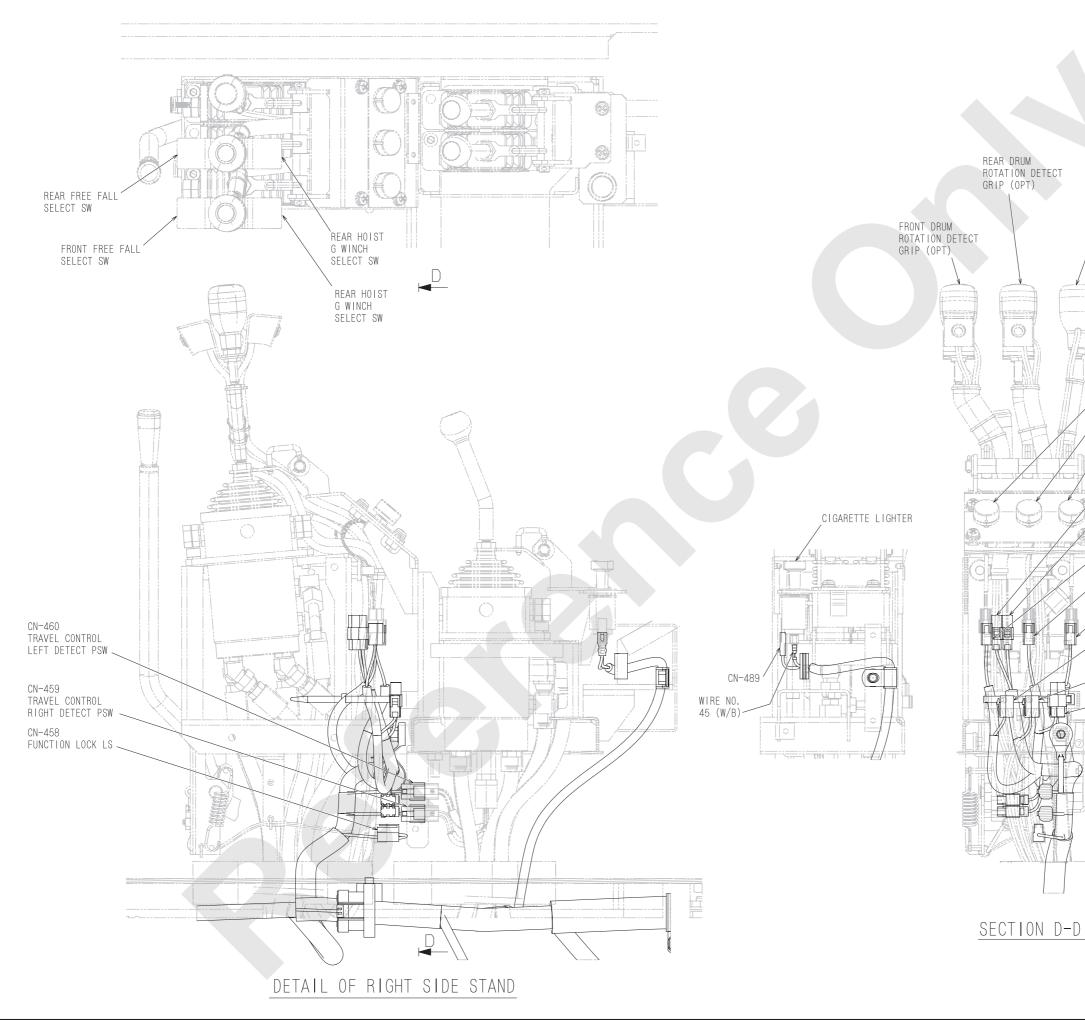
(1/4)





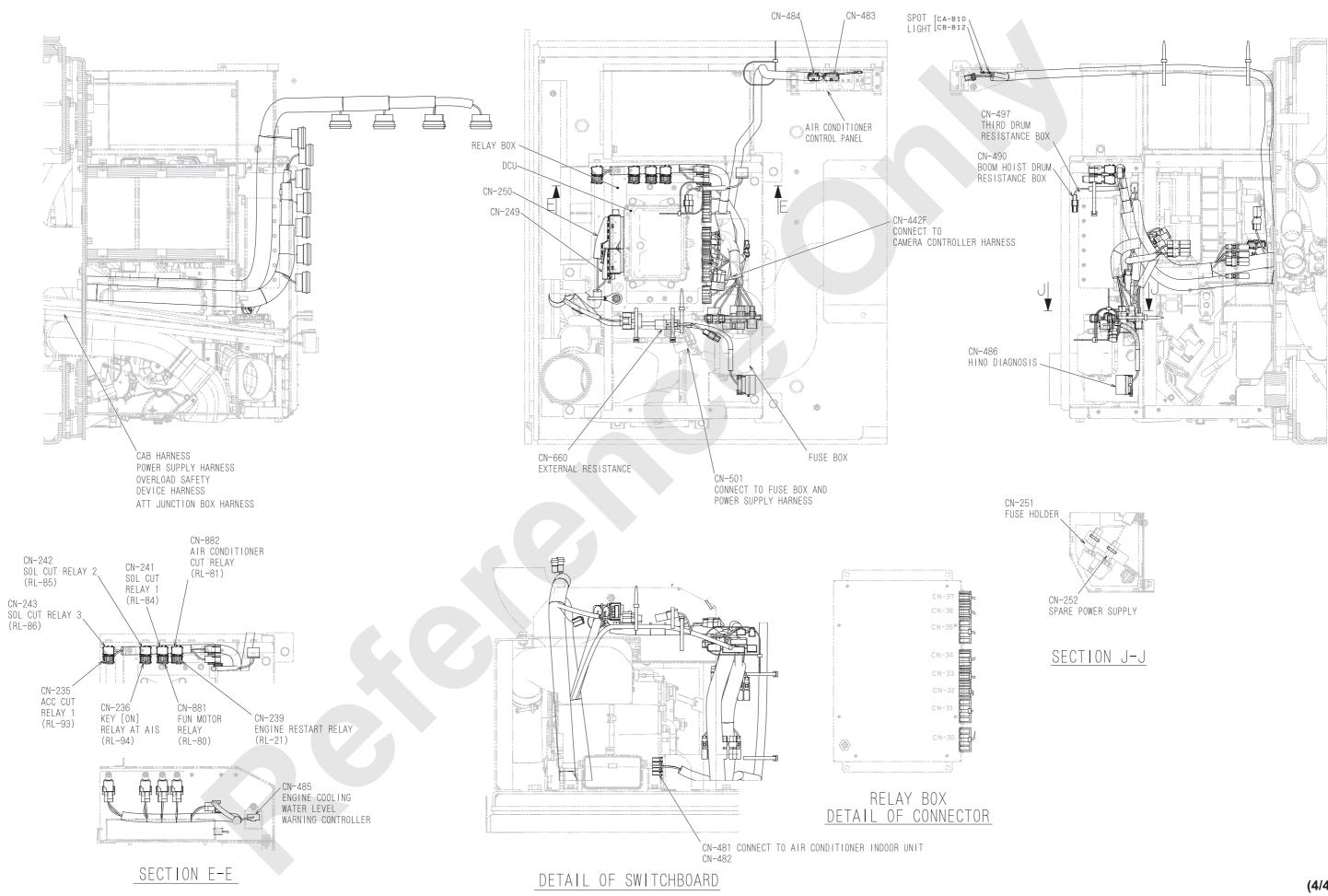
VIEW FROM B

(2/4)



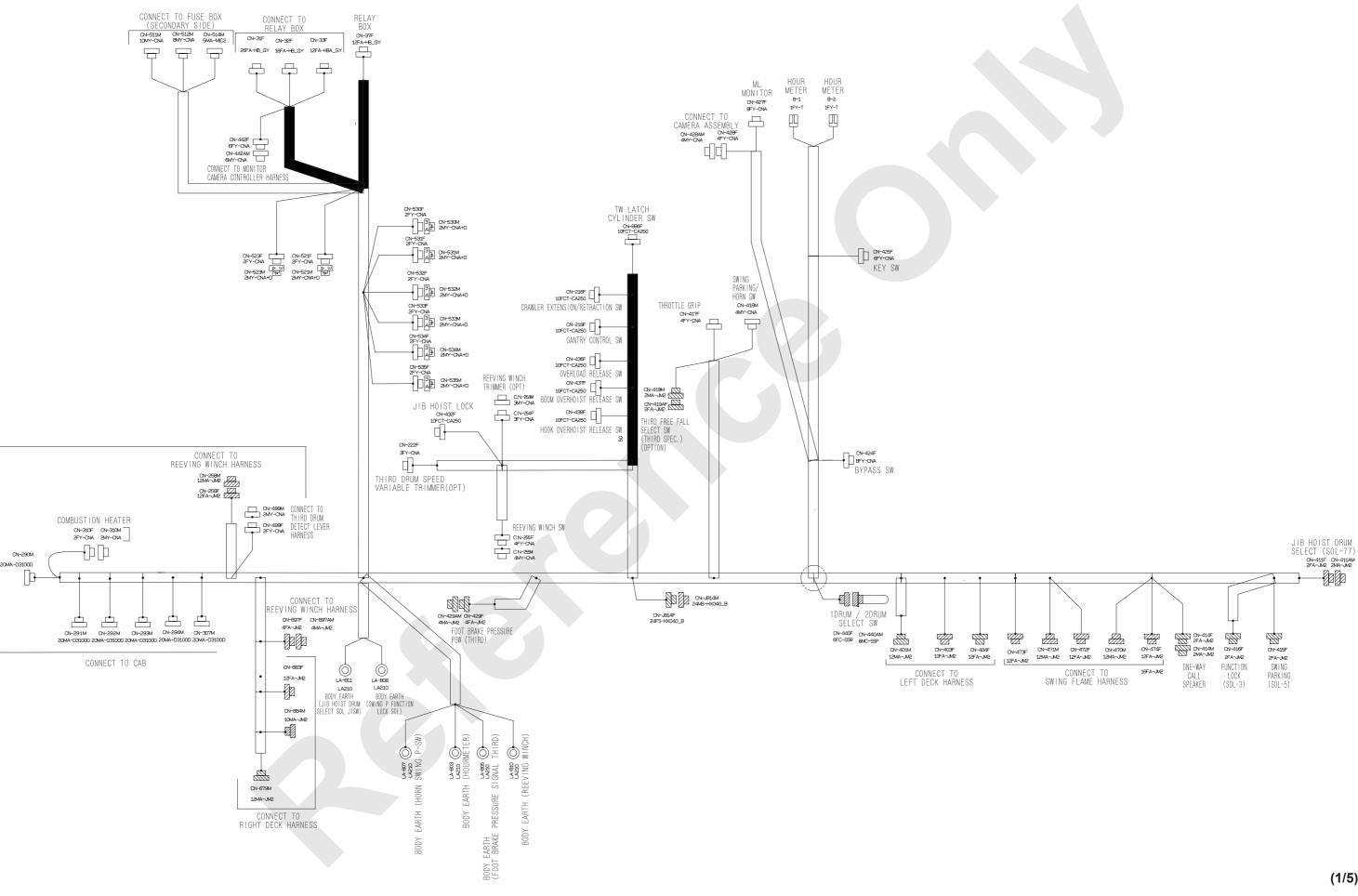
BOOM HOIST DRUM ROTATION DETECT GRIP (OPT) FRONT DRUM MOTOR SPEED VARIABLE TRIMMER BOOM DRUM MOTOR /SPEED VARIABLE TRIMMER CN-466 FRONT HOIST INTERMEDIATE DETENT SOL ′CN-468 REAR HOIST ∕INTERMEDIATE DETENT SOL CN-463 FRONT DRUM MOTOR SPEED VARIABLE TRIMMER CN-462 REAR DRUM MOTOR SPEED VARIABLE TRIMMER CN-461 > BOOM DRUM MOTOR SPEED VARIABLE TRIMMER CN-465 FRONT DRUM ROTATION DETECT GRIP (OPTION) CN-464 REAR DRUM ROTATION DETECT GRIP (OPTION) - CN-476 BOOM DRUM ROTATION DETECT GRIP (OPTION)

### (3/4)

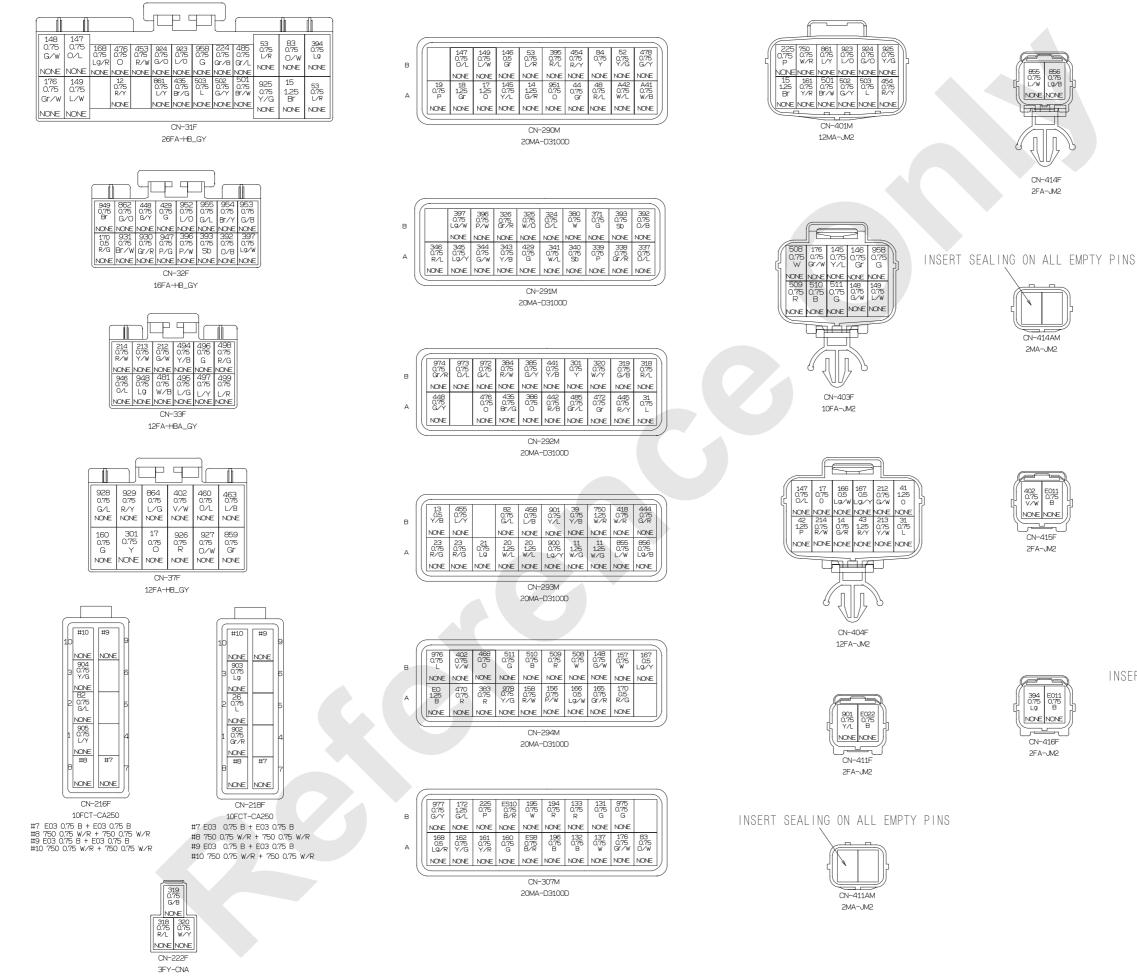


(4/4)

#### FLOOR PLATE HARNESS (a)



### (1/5)



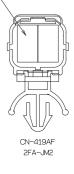


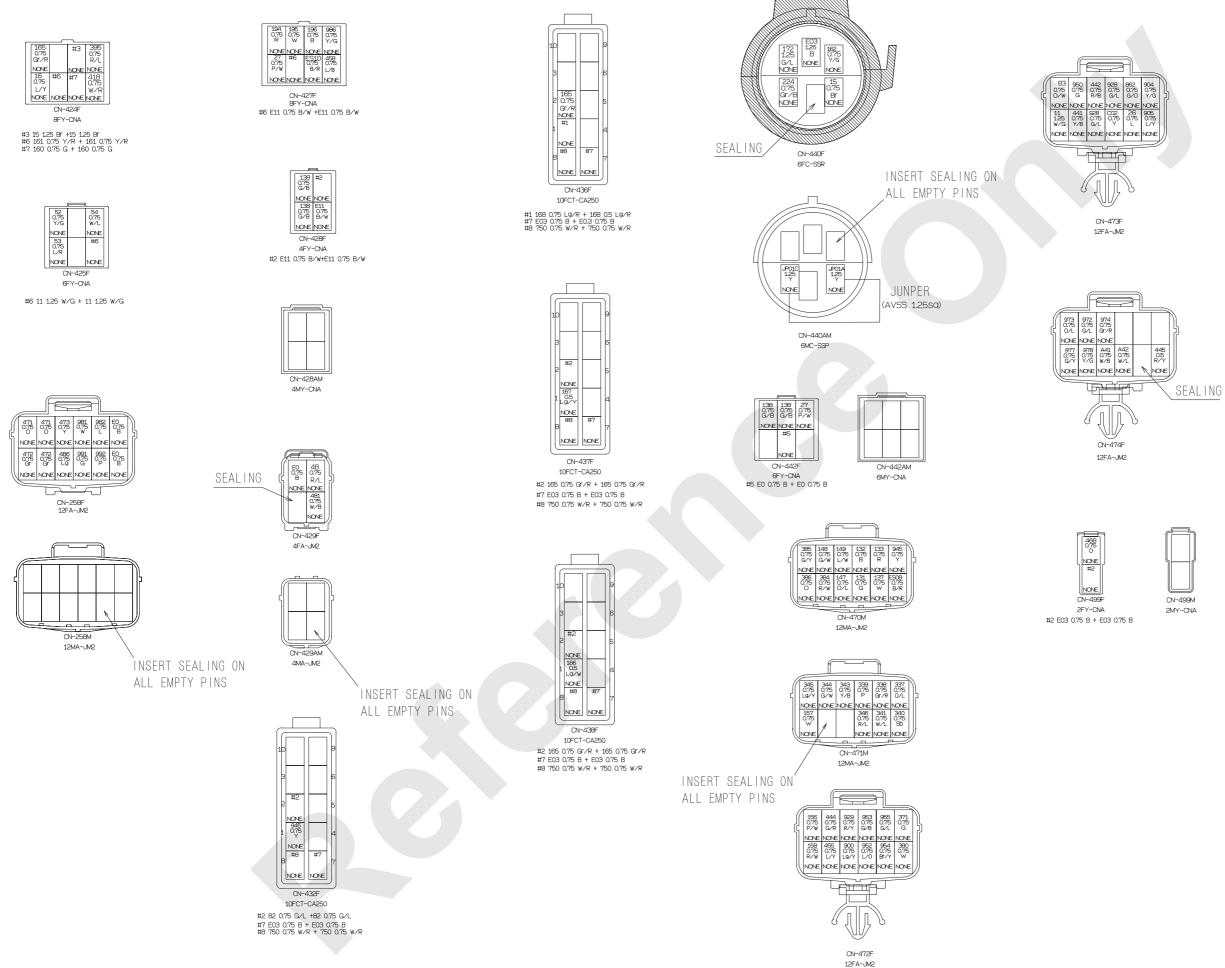


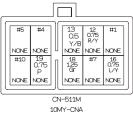
#1 395 0.75 R/L + 395 0.75 R/L #4 861 0.75 L/Y + 861 0.75 L/Y



INSERT SEALING ON ALL EMPTY PINS



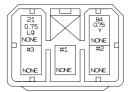




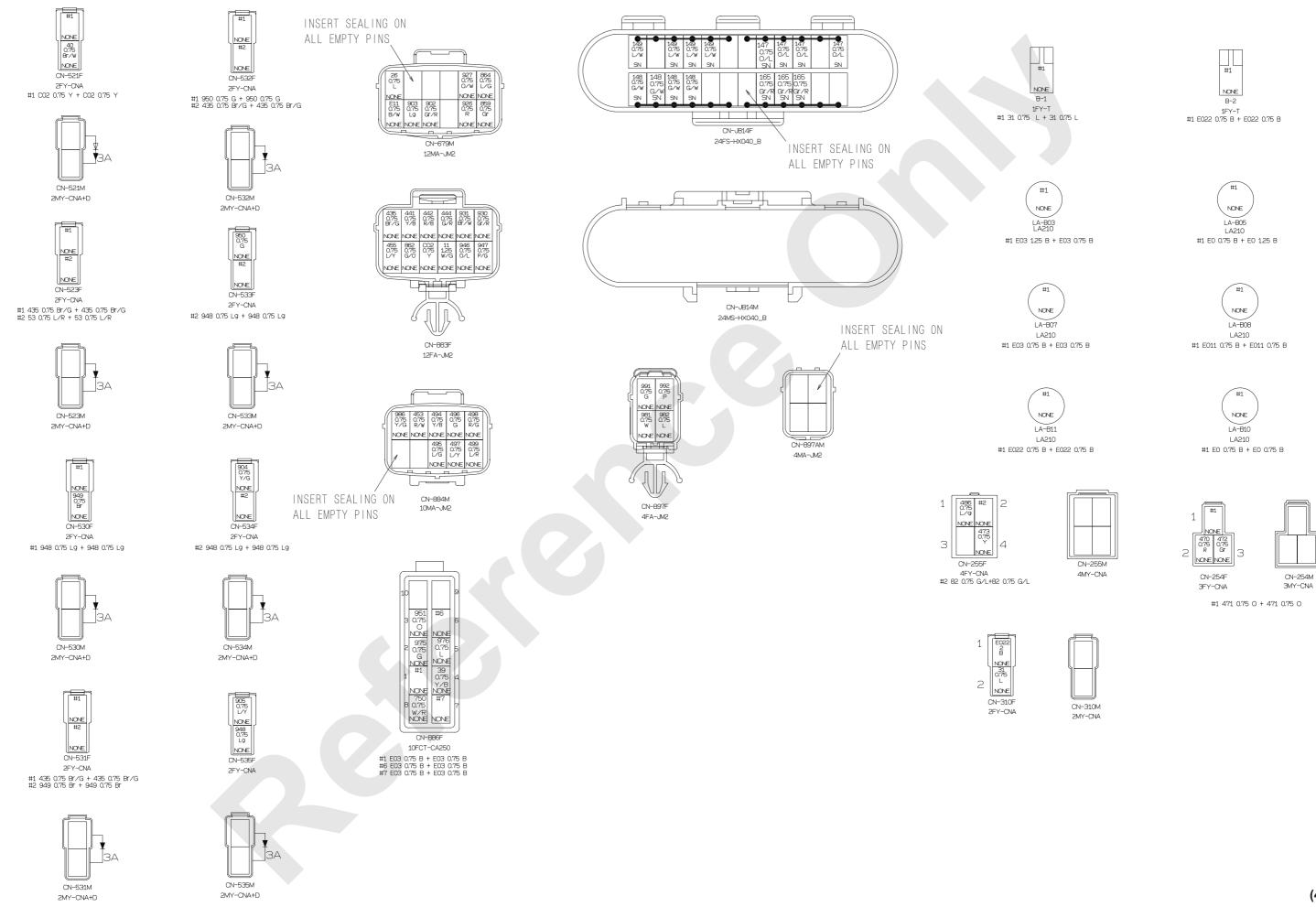
#1 11 125 W/G + 11 125 W/G #4 14 0.75 G/R + 14 125 G/R #5 15 125 Br +15 125 Br #7 17 125 0 + 17 0.75 0 #10 20 125 W/L + 20 125 W/L



CN-512M 8MY-CNA #1 31 0.75 L + 31 0.75 L



CN-514M 5MA-MIC2 #1 27 0.75 P/W + 27 0.75 P/W #2 23 0.75 R/G + 23 0.75 R/G #3 26 0.75 L + 26 0.75 L



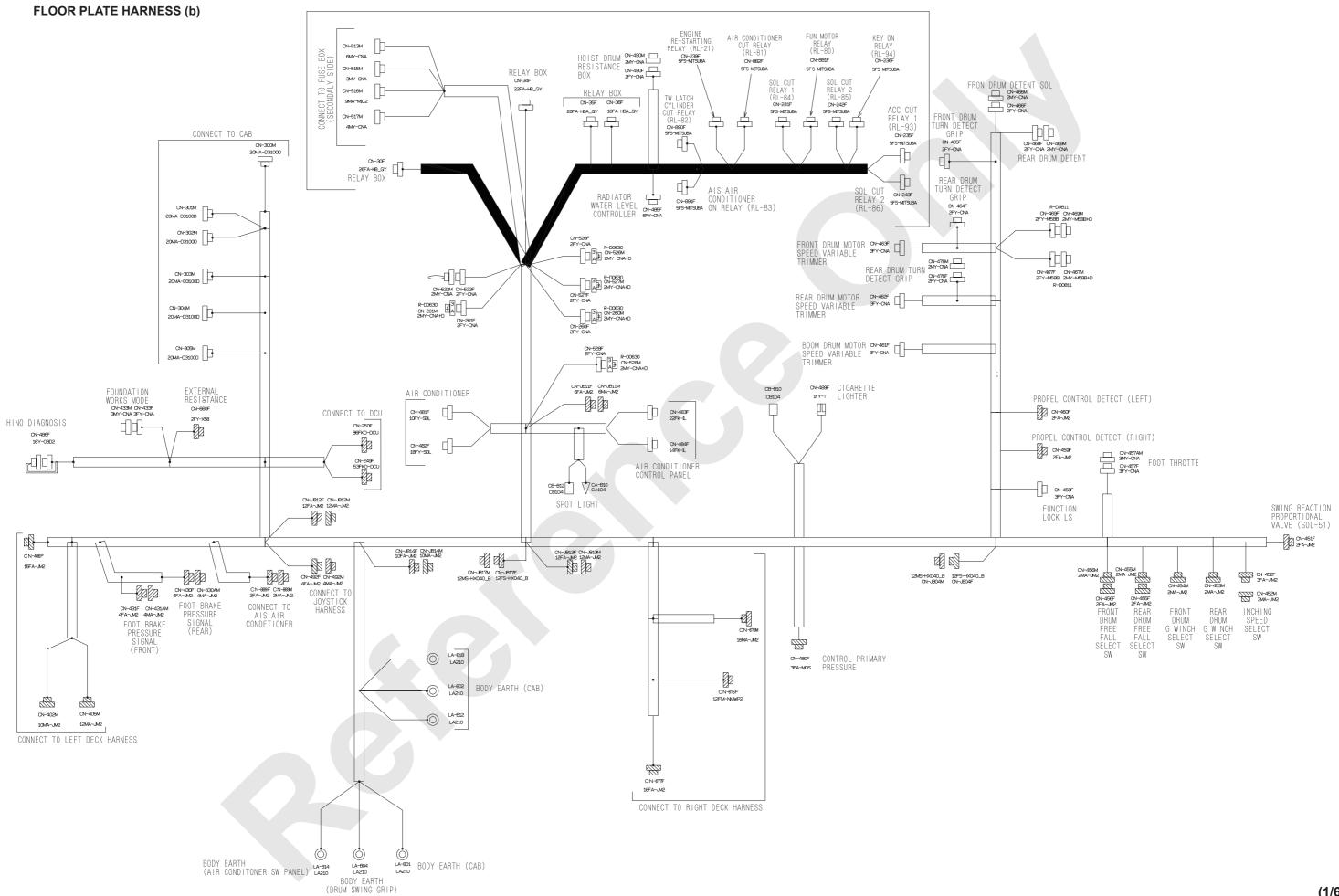
#### [ 10. ELECTRIC SYSTEM ]

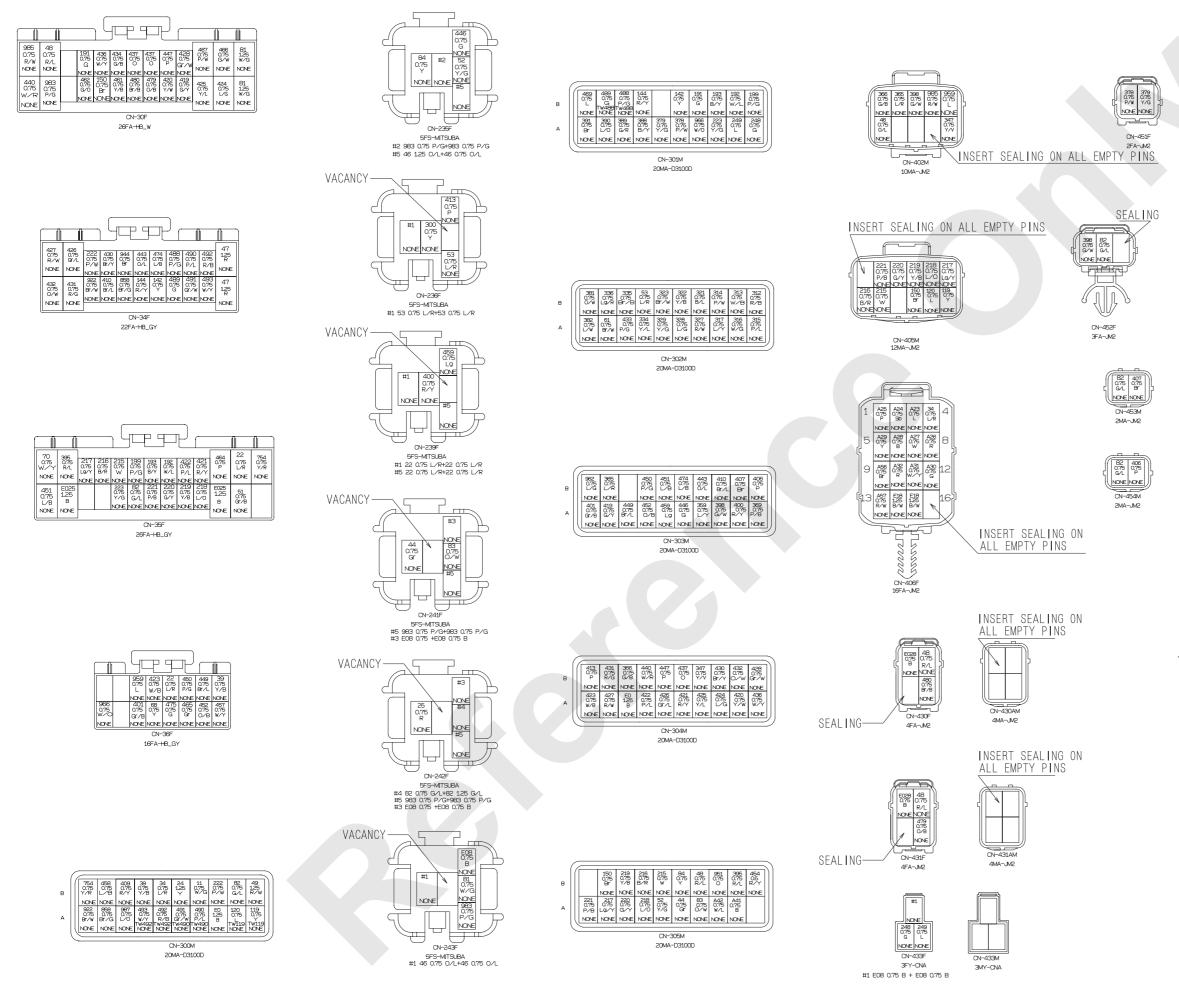
(4/5)

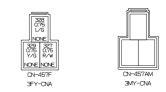
		WIRE TYP	E SIZE	FROM 2WIRE CONNECT NO.							FROM 2WIRE CONNECT NO. C	CONNECTION			WIRE NO. WIRE COLOR WIRE T			NO. CONNECTION		0			R WIRE TYPE
	w∕G W∕G	AVS AVSS		CN-473F CN-511M DS-B01		DS-815 DS-815	CN-425F CN-425F	301 Y 318 R/			CN-292M -			CN-37F CN-222F	900 Lg/Y AVSS 901 Y/L AVSS	0.75 CN-				-293M -293M	392 ( 393 s	)/B	AVSS AVSS
	W/G	AVSS		CN-511M DS-B01	<u> </u>	03-015	JS-B07	319 G/			CN-222F -			CN-292M	902 Gr/R AVSS	0.75 CN-				-679M	371 0		AVSS
	W/G	AVS		CN-293M			JS-807	320 W,			CN-222F -			CN-292M	903 Lg AVSS 904 Y/G AVSS	0.75 CN-				-218F	380		AVSS
	W/G W/G	AVS AVS	1.25				JS-808 CN-883F	324 O/ 325 W/			CN-291M -			CN-417F CN-291M	904 Y/G AVSS 904 Y/G AVSS	0.75 CN-				-B31 -B31	396 F 397 L	9/W g/W	AVSS AVSS
11	W/G	AVSS	1.25	JS-808			CN-293M	326 Gr	/R AVSS	0.75	CN-291M -			CN-417F	904 Y/G AVSS	0.75 JS-I	131		CN	-534F	494	′/B	AVSS
.2 .3	R/Y Y/B	AVSS AVSS	0.75	CN-31F CN-511M			CN-511M CN-293M	337 O, 338 Gr			CN-471M -			CN-291M CN-291M	905 L/Y AVSS 905 L/Y AVSS	0.75 JSH 0.75 CN-				-216F -B30	495 L 496 C		AVSS AVSS
	G/R	AVSS		CN-290M		DS-8212	CN-511M	339 P	AV55 AV55		CN-471M -			CN-291M	905 L/Y AVSS	0.15 UN				1-535F	490 L		AVSS
	G/R	AVSS	0.75 (	CN-404F		DS-8212	CN-511M	340 St	AVSS	0.75	CN-471M -			CN-291M	923 L/O AVSS	0.75 CN-	31F		CN	-401M	498 F	?/G	AVSS
	Br	AVSS AVSS		CN-424F DS-B213 CN-424F DS-B213	•		CN-401M	341 W.			CN-291M -			CN-471M	924 G/O AVSS 925 Y/G AVSS	0.75 CN- 0.75 CN-				-401M		/R	AVSS AVSS
	Br Br	AVSS		CN-424F DS-8213 CN-440F			JS-B122 JS-B122	343 Y, 344 G,			CN-291M -			CN-471M CN-291M	925 Y/G AVSS 926 R AVSS	0.75 CN-				-401M -679F		/W 9/B	AVSS
	Br	AVSS	1.25 (	CN-511M DS-B214	•		JS-8122	345 Lg	/Y AVSS	0.75	CN-291M —			CN-471M	927 O/W AVSS	0.75 CN-	37F		CN	-679F	952 L	/0	AVSS
	Br	AVSS AVSS		CN-511M DS-8214 CN-511M			CN-31F CN-424F	346 R/			CN-291M			CN-471M	928 G/L AVSS 928 G/L AVSS	0.75 CN-				-848 -848	953 ( 954 E		AVSS
	L/Y 0	AVSS		CN-511M DS-B240			JS-B129	383 R 384 R			CN-294M -			CN-419M CN-470M	928 G/L AVSS 928 G/L AVSS	0.75 CN-				-848		1/Y 3/L	AVSS AVSS
	0	AVSS	0.75 (	CN-511M DS-B240			CN-404F	385 G/	Y AVSS	0.75	CN-470M -			CN-292M	929 R/Y AVSS	0.75 CN-	37F		CN	-472F	A41 N		AVSS
	0	AVSS AVSS		CN-290M CN-37F			JS-B129 JS-B129	386 O 394 Lg		0.75 0	CN-292M -			CN-470M CN-416F	930 Gr/R AVSS 931 Br/W AVSS	0.75 CN- 0.75 CN-				-883F -883F	A42 \	1/L	AVSS
	Gr	AVSS		CN-290M			CN-511M	394 LQ 395 R/			CN-290M -	(		CN-418M	945 Y AVSS	0.75 CN-				-470M	131 0	3	MVVS
1	P	AVSS		CN-511M			CN-290M	395 R/	1 AVSS	0.75 (	CN-424F -	[	DS-8230	CN-418M	946 0/L AVSS	0.75 CN-				-883F	132 E		MVVS
	W/L	AVSS AVSS		CN-293M CN-293M		DS-804 DS-804	CN-511M CN-511M	402 V/ 402 V/		0.75 0	CN-294M -			JS-821 JS-821	947 P/G AVSS 948 Lg AVSS	0.75 CN- 0.75 CN-				-883F -534F	133 F	-	MVVS
	W/L Lg	AVSS		CN-514M		03-804	CN-293M	402 V/ 402 V/		0.75				05-621 CN-415F	948 Lg AVSS 948 Lg AVSS	0.75 CN-				-534F	137 V ES8 E		MVVS AVSS
	R/G	AVSS		CN-514M DS-8215	<u>د                                    </u>		CN-293M	411 W	Y AVSS	0.75	CN-290M -		1	CN-474F	948 Lg AVSS	0.75 CN-				-533F	ESOB E		AVSS
	R/G	AVSS AVSS		CN-514M DS-8215 CN-514M	<u> </u>		CN-293M CN-473F	418 W,			CN-424F -			CN-293M	948 Lg AVSS 949 Br AVSS	0.75 CN-				-533F -32F	104	, ,	NA AVC
	L	AVSS		CN-514M			JS-850-	429 G 435 Br			CN-291M -			CN-32F JS-B126	949 Br AVSS 949 Br AVSS	0.75 CN-				-530F	194 F 195 \	v	MVVS MVVS
	L	AVSS	0.75 (	CN-679M			JS-850	435 Br	/G AVSS	0.75 0	CN-883F -			JS-B126	950 G AVSS	0.75 CN-	473F		DS-B37 CN-	-532F	196 E	3	MVVS
	L	AVSS		CN-218F			JS-850	435 Br 435 Br			CN-532F			JS-B126 CN-531F	950 G AVSS 951 O AVSS	0.75 CN- 0.75 CN-				-532F -290M	ES10 E	I/R	MVVS
	P/W P/W	AVSS AVSS		CN-514M DS-B241 CN-514M DS-B241	<u> </u>		CN-427F CN-442F	435 Br			CN-523F			CN-531F CN-531F	958 G AVSS	0.75 CN-				-403F	508	v	MVVS
	L	AVSS	0.75 (	CN-310F			CN-512M	435 Br	/G AVSS	0.75	CN-523F	<u> </u>	1	CN-31F	972 G/L AVSS	0.75 CN-	474F		CN	-292M	509 F		MVVS
	L	AVSS AVSS	0.75			DS-824	CN-512M B-1	441 Y/			CN-292M -			JS-8131 JS-8131	973 0/L AVSS 974 Gr/R AVSS	0.75 CN- 0.75 CN-		-		-474F -292M	510 E 511 0	3	MVVS MVVS
	L	AVS5 AVS5		CN-404F		DS-824 DS-824	B-1 B-1	441 Y. 441 Y.			CN-883F -			JS-8131 JS-8131	975 G AVSS	0.75 CN-		1		-886F			1111 V3
	L	AVSS	0.75 (	CN-292M			JS-B05	442 R	/B AVSS	0.75	CN-292M -			JS-B132	976 L AVSS	0.75 CN-	294M		CN	-886F	EO E	3	AVSS
	Y/B Br/W	AVSS AVSS		CN-886F CN-521F			CN-293M CN-512M	442 R			CN-473F -			JS-8132 JS-8132	977 G/Y AVSS 978 Y/G AVSS	0.75 CN- 0.75 CN-				-474F -474F	EO E	5	AVSS AVSS
	B1/W O	AVSS		CN-521F CN-404F			CN-512M	444 G.	R AVSS		CN-293M -			JS-B132 JS-B133	981 W AVSS	0.75 CN-	397F1		CN	-258F	EO E	3	AVSS
	P	AVSS		CN-512M			CN-404F	444 G.			CN-472F -			JS-8133	982 L AVSS	0.75 CN-				-258F	EO E		AVSS
	R/Y Gr	AVSS AVSS		CN-512M CN-512M			CN-404F CN-290M	444 G. 445 R.			CN-883F -			JS-B133 CN-474F	986 Y/G AVSS 991 G AVSS	0.75 CN- 0.75 CN-				-884M -258F	E03 E	3	AVSS AVSS
	R/L	AVSS		CN-429F			CN-290M	443 G			CN-32F -			CN-292M	992 P AVS5	0.75 CN-				-258F	E03 E	3	AVSS
	Y/G	AVSS	0.75 (	CN-425F			CN-290M	453 R/	W AVSS	0.75 (	CN-31F -		(	CN-884M	CO2 Y AVSS	0.75 CN-		•		-883F	E03 E	3	AVSS
	L/R L/R	AVSS AVSS		CN-425F JS-B114		DS-818 DS-818	CN-523F CN-523F	454 R/ 455 L/			DN-290M -			CN-401M JS-B134	CO2 Y AVSS JP01A Y AVSS	0.75 CN- 1.25 CN-				-473F √-440AM)	E03 E	3	AVSS AVSS
	L/R	AVSS		JS-B114		00 010	CN-290M	455 L/			CN-472F			JS-B134	JP01C Y AVSS	1.25 (CN-				-440AM	E03 E	3	AVSS
	L/R	AVSS		JS-B114			JS-B123	455 L/			CN-883F -			JS-B134							E03 E	3	AVSS
	L/R L/R	AVSS AVSS	0.75 0	CN-31F			JS-B123 JS-B123	458 L/ 460 D/			DN-293M -			CN-427F CN-37F							E03 E	3	AVSS AVSS
	W/L	AVSS		CN-425F			CN-512M	463 L/			CN-419M -			CN-37F							E03 E	3	AVSS
	G/L	AVSS		CN-293M			CN-255F	468 0			CN-294M -			CN-499F							E03 E	3	AVSS AVSS
	G/L G/L	AVSS AVSS		CN-432F CN-432F	<b>€</b>		CN-255F CN-216F	470 R 471 0	AVSS AVSS		CN-254F -			CN-294M CN-258F							E03 E	, }	AVSS AVSS
	0/W	AVSS		JS-B46			CN-31F	471 0			CN-254F			CN-258F							E03 E	3	AVSS
	0/W	AVSS	0.75				CN-307M	472 Gr		0.75				CN-292M							E011 E	3	AVSS AVSS
	0/W	AVSS AVSS	0.75	JS-846 CN-514M			CN-473F CN-290M	472 Gr 472 Gr		0.75				CN-254F JS-02							E011 E	3	AVSS
	Ġ∕B	AVSS	0.75 (	CN-442F			CN-428F	472 Gr			CN-258F -			JS-02							E022 E	3	AVSS
	G/B	AVSS		CN-442F			CN-428F	472 Gr			CN-258F -			JS-02							E022 E	·	AVSS AVSS
	Y/L Gr	AVSS AVSS		CN-290M CN-290M			CN-403F CN-403F	473 Y 476 O		0.75 0	CN-255F			CN-258F CN-292M							E11 E	3/W	AVSS
	0/L	AVSS	0.75 (	CN-JB14F	•		CN-290M														E11 E	3/W	AVSS
	0/L 0/L	AVSS AVSS		CN-JB14F CN-JB14F	+		CN-470M CN-404F	481 W,			DN-429F			CN-33F CN-292M									
	0/L 0/L	AVSS			+	+	CN-404F CN-31F	485 Gr 486 Lg			CN-31F -			CN-292M CN-258F									
	G/W	AVSS	0.75 (	CN-JB14F	•		CN-31F	501 Br	/w AVSS	0.75 (	CN-31F —	_		CN-401M									
	G/W	AVSS AVSS			+		CN-294M CN-470M	502 G. 503 L			CN-401M			CN-31F									
	G/W G/W	AVSS AVSS			-	-	CN-403F	503 L 750 W,	AVSS /R AVSS		JS-B120 -			CN-401M CN-401M									
	L/W	AVSS	0.75 (	CN-JB14F	+		CN-31F	750 W.	/R AVSS	1.25	JS-B120 -			CN-293M									
	L/W L/W	AVSS AVSS		CN-JB14F CN-JB14F	+	+	CN-470M CN-403F	750 W. 750 W.			US-B120 - CN-438F DS-B61 •			CN-432F CN-432F									
_	L/W L/W	AVSS	0.75 (	CN-JB14F	- <b>-</b>		CN-290M	750 W.	/R AVSS	0.75 (	CN-438F DS-861			CN-437F									
_	P/W	AVSS	0.75 (	CN-472F			CN-294M	750 W.	/R AVSS		CN-436F DS-B101		DS-B100	CN-437F									
	W	AVSS		CN-471M CN-472F		+	CN-294M CN-294M	750 W, 750 W,			CN-436F DS-8101 CN-218F DS-8106			CN-218F CN-218F									
		AVSS	10.10			DS-845	CN-424F	750 W.	/R AVSS		CN-218F DS-B106			CN-216F									
	R∕W G	AVSS AVSS	0.75 (				CN-424F	750 W.	/R AVSS	0.75	CN-216F DS-B226 🗨		DSA95	CN-216F									
	R∕W G G	AVSS AVSS	0.75 (	CN-37F	/	DS-845																	
	R/W G G Y/R	AVSS AVSS AVSS	0.75 (	CN-37F CN-424F DS-B46	•	05-845	CN-307M	750 W,	R AVSS	0.75	CN-216F DS-B226			CN-886F									
	R∕W G G	AVSS AVSS	0.75 (	CN-37F		05-845	CN-307M CN-401M CN-440F	750 W, 859 Gr	AVSS	0.75	CN-37F -		1	CN-679M									
	R/W G G Y/R Y/R Y/G Gr/R	AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0	CN-37F CN-424F DS-B46 CN-424F DS-B46 CN-307M CN-294M		05-845	CN-307M CN-401M CN-440F CN-JB14F	750 W, 859 Gr 861 L/	AVSS Y AVSS	0.75 (	CN-37F -		DS-B41	CN-679M CN-418M									
	R/W G G Y/R Y/R Y/G Gr/R Gr/R	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F CN-424F DS-B46 CN-424F DS-B46 CN-307M CN-294M CN-294M CN-424F	+	US-B45	CN-307M CN-401M CN-440F CN-JB14F CN-JB14F	750 W, 859 Gr 861 L/ 861 L/	Y AVSS Y AVSS Y AVSS	0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M									
	R/W G G Y/R Y/R Y/G Gr/R	AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0 0.75 0 0.75 0 0.75 0 0.75 0 0.75 0 0.75 0	CN-37F CN-424F DS-B46 CN-424F DS-B46 CN-307M CN-294M	•	DS-B221	CN-307M CN-401M CN-440F CN-JB14F CN-JB14F CN-JB14F	750 W, 859 Gr 861 L/	- AVSS Y AVSS Y AVSS Y AVSS /0 AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F -		DS-841 DS-841	CN-679M CN-418M									
	R/W G G Y/R Y/R Y/G Gr/R Gr/R Gr/R Gr/R Gr/R	AVSS	0.75 ( 0.75 (	CN-37F CN-424F DS-B46 CN-424F DS-B46 CN-307M CN-294M CN-294M CN-424F CN-438F DS-B220 CN-438F DS-B220 CN-438F	•	DS-B221	CN-307M CN-401M CN-440F CN-JB14F CN-JB14F CN-JB14F CN-JB14F CN-437F CN-437F	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10 JS-B10 JS-B10									
	R/W G G Y/R Y/R Y/G Gr/R Gr/R Gr/R Gr/R Lg/W	AVSS	0.75 ( 0.75 ( 0.	CN-37F CN-424F CN-424F CN-424F CN-424F CN-424F CN-424F CN-424F CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-825 DS-825 DS-825 DS-825 DS-825 DS-825 DS-825 DS-825 DS-825 DS-825 DS-825 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-85 DS-8	•	DS-B221	CN-307M CN-401M CN-440F CN-JB14F CN-JB14F CN-JB14F CN-JB14F CN-437F CN-437F CN-294M	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10									
	R/W G G Y/R Y/R Y/G Gr/R Gr/R Gr/R Gr/R Gr/R	AVSS	0.75 ( 0.75 ( 0.	CN-37F CN-424F DS-B46 CN-424F DS-B46 CN-307M CN-294M CN-294M CN-424F CN-438F DS-B220 CN-438F DS-B220 CN-438F	•	DS-B221	CN-307M CN-401M CN-440F CN-JB14F CN-JB14F CN-JB14F CN-JB14F CN-437F CN-437F	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10 JS-B10 JS-B10									
	R/W G G Y/R Y/R G/R G/R G/R G/R G/R G/R L J/W L J/W L J/W L J/W L J/W	AVSS	0.75 ( 0.75 ( 0.	CN-37F CN-37F CN-424F DS-846 CN-327M CN-327M CN-327M CN-424F CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F JS-8115 JS-8115 JS-8115 JS-8115 JS-8115 JS-8116 JS-8116	•	DS-B221	CN-307M CN-401M CN-440F CN-JB14F CN-JB14F CN-JB14F CN-437F CN-437F CN-437F CN-438F CN-438F CN-404F CN-294M	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10 JS-B10 JS-B10									
	R/W G G Y/R Y/R G/R G/R G/R G/R G/R G/R Lg/W Lg/W Lg/W Lg/W Lg/W Lg/Y Lg/Y	AVSS	0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0	CN-37F CN-37F CN-424F DS-846 CN-307M CN-424F CN-424F CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8215 JS-8115 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-8116 JS-816	•	DS-B221	CN-307M CN-401M CN-440F CN-9814F CN-9814F CN-9814F CN-437F CN-437F CN-294M CN-439F CN-404F CN-404F CN-404F	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10 JS-B10 JS-B10									
	R/W G G Y/R Y/R G/R G/R G/R G/R G/R G/R L J/W L J/W L J/W L J/W L J/W	AVSS	0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0	CN-37F CN-37F CN-424F DS-846 CN-327M CN-327M CN-327M CN-424F CN-438F DS-8220 CN-438F DS-8220 CN-438F DS-8220 CN-438F JS-8115 JS-8115 JS-8115 JS-8115 JS-8115 JS-8116 JS-8116		DS-B221	CN-307M CN-401M CN-401F CN-J814F CN-J814F CN-J814F CN-437F CN-437F CN-433F CN-438F CN-404F CN-404F CN-404F CN-404F CN-437F	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10 JS-B10 JS-B10									
	R/W G G Y/R Y/R Y/R G/R G/R G/R G/R G/R G/R U y/W Lg/W Lg/W Lg/W Lg/Y Lg/Y Lg/Y Lg/Y Lg/R Lg/R	AVSS	0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.75         0	CN-37F CN-324F DS-B46 CN-324F DS-B46 CN-327M CN-328F DS-B20 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B20 CN-438F DS-B115 US-B115 US-B115 US-B115 US-B116 US-B116 US-B116 CN-337M CN-33F CN-33F		DS-B221 DS-B221	CN-307M CN-401M CN-401F CN-JB14F CN-JB14F CN-314F CN-437F CN-437F CN-438F CN-438F CN-438F CN-438F CN-438F CN-438F CN-438F CN-438F	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10 JS-B10 JS-B10									
	P/W G G Y/R Y/R Y/R G/R G/R G/R G/R G/R Lg/W Lg/W Lg/W Lg/W Lg/Y Lg/Y Lg/Y Lg/Y Lg/Y Lg/R Lg/R Lg/R R/G	AVSS	0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.75         0           0.75         0           0.75         0           0.75         0           0.5         0	CN-37F CN-37F CN-424F DS-B46 CN-307M CN-424F CN-424F CN-439F DS-B220 CN-439F DS-B220 CN-439F DS-B220 CN-439F DS-B220 CN-439F DS-B220 CN-439F DS-B215 JS-B115 JS-B115 JS-B116 JS-B116 CN-307M CN-307M CN-294M		DS-8221 DS-8221	CN-307M           CN-401M           CN-440F           CN-3814F           CN-3814F           CN-3814F           CN-3814F           CN-3837F           CN-294M           CN-438F           CN-32F	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10 JS-B10 JS-B10									
	R/W G G Y/R Y/R Y/R G/R G/R G/R G/R G/R Lg/W Lg/W Lg/W Lg/Y Lg/Y Lg/Y Lg/Y Lg/Y R R/G G/L	AVSS	0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0      0.5	CN-37F CN-37F CN-424F DS-B46 CN-327M CN-424F CN-424F CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B15 JS-B115 JS-B115 JS-B115 JS-B115 JS-B116 CN-307M CN-307M CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN-30F CN		DS-8221 DS-8221	CN-307M CN-401M CN-401F CN-914F CN-914F CN-914F CN-937F CN-437F CN-437F CN-437F CN-437F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-32F CN-32F CN-32F	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10 JS-B10 JS-B10									
	R/W           G           G           Y/R           Y/R           Y/R           G/R           G/R           G/R           G/R           Lg/W           Lg/W           Lg/W           Lg/Y           Lg/Y           Lg/Y           Lg/Y           Lg/R           R/G           G/L           G/Y	AVSS	0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.75         0           0.75         0           0.75         0	CN-37F CN-37F CN-434F DS-B46 CN-307M CN-424F CN-439F CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B20 DS-B115 JS-B115 JS-B115 JS-B116 CN-307M CN-307M CN-440F CN-400F CN-400F CN-400F		DS-8221 DS-8221	CN-307M           CN-401M           CN-440F           CN-941F           CN-9814F           CN-9814F           CN-377F           CN-294M           CN-436F           CN-436F           CN-436F           CN-436F           CN-436F           CN-436F           CN-436F           CN-436F           CN-436F           CN-32F	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10 JS-B10 JS-B10									
	R/W G G Y/R Y/R Y/R G/R G/R G/R G/R Lg/W Lg/W Lg/W Lg/W Lg/Y Lg/Y Lg/Y Lg/Y C G/R R/G G/L G/W Gr/W Gr/W	AVSS	0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.75         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.5         0           0.75         0           0.75         0           0.75         0           0.75         0	CN-37F CN-37F CN-424F DS-B46 CN-327M CN-424F DS-B46 CN-337M CN-424F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-31F CN-2440F CN-403F CN-403F CN-403F CN-403F CN-403F CN-403F CN-31F		DS-8221 DS-8221	CN-307M CN-401M CN-401F CN-9814F CN-9814F CN-9814F CN-437F CN-437F CN-437F CN-437F CN-436F CN-436F CN-404F CN-404F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-32F CN-35F CN-35F CN-35F CN-35F CN-35F CN-35F	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10 JS-B10 JS-B10									
	R/W           G           G           Y/R           Y/R           Y/R           G/R           G/R           G/R           G/R           G/R           Lg/W           Lg/W           Lg/W           Lg/Y           Lg/Y           Lg/Y           Lg/Y           G/R           G/Y           G/Y  <	AVSS	0.75         0.75           0.75         0.75           0.75         0.75           0.75         0.75           0.75         0.75           0.75         0.75           0.75         0.75           0.75         0.75           0.75         0.75           0.75         0.75           0.5         0.5           0.5         0.5           0.5         0.5           0.5         0.5           0.5         0.5           0.5         0.5           0.75         0.75           0.75         0.75           0.75         0.75           0.75         0.75           0.75         0.75           0.75         0.75           0.75         0.75           0.75         0.75           0.75         0.75	CN-37F CN-37F CN-434F DS-B46 CN-307M CN-424F CN-439F CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B20 CN-438F CN-284M CN-31F CN-294M CN-33F CN-294M CN-403F CN-403F CN-403F CN-404F CN-404F		DS-8221 DS-8221	CN-307M CN-401M CN-401F CN-JB14F CN-JB14F CN-JB14F CN-437F CN-437F CN-437F CN-438F CN-438F CN-404F CN-404F CN-404F CN-404F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-437F CN-437F CN-437F CN-437F CN-437F CN-437F CN-437F CN-437F CN-437F CN-437F CN-437F CN-437F CN-437F CN-437F CN-436F CN-437F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-336F CN-336F CN-336F CN-336F CN-336F CN-336F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F CN-337F	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10 JS-B10 JS-B10									
	R/W G G Y/R Y/R Y/R G/R G/R G/R G/R Lg/W Lg/W Lg/W Lg/W Lg/W Lg/Y Lg/Y Lg/Y C G/R R/G G/L G/W G/W G/W G/W C G/W C G/W C G/W C C M C C C C C C C C C C C C C C C C	AVSS	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CH-37F CN-37F CN-424F DS-B46 CN-307M CN-424F CN-424F CN-424F CN-438F DS-B210 CN-438F DS-B210 CN-438F DS-B215 JS-B115 JS-B115 JS-B115 JS-B116 CN-307M CN-31F CN-307M CN-33F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F CN-404F		DS-8221 DS-8221	CN-307M CN-401M CN-401F CN-9814F CN-9814F CN-9814F CN-437F CN-437F CN-437F CN-437F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-436F CN-33F CN-33F CN-404F CN-33F	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10 JS-B10 JS-B10									
	R/W           G           G           Y/R           Y/R           Y/R           G/R           Gr/R           Gr/R           Gr/R           Gr/R           Gr/R           Lg/W           Lg/W           Lg/W           Lg/Y           Lg/Y           Lg/Y           Gr/R           Gr/R           Gr/W           Gr/W      <	AVSS           AVSS	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-37F CN-37F CN-434F DS-B46 CN-307M CN-424F CN-434F CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B220 CN-438F DS-B20 DS-B115 JS-B115 JS-B115 JS-B116 CN-33F CN-340F CN-403F CN-403F CN-403F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F CN-34F		DS-8221 DS-8221	CN-307M           CN-401M           CN-440F           CN-440F           CN-3814F           CN-3814F           CN-3814F           CN-377F           CN-294M           CN-438F           CN-32F           CN-33F           CN-33F           CN-33F           CN-33F           CN-33F	750 W. 859 Gr 861 L/ 861 L/ 862 G. 862 G.	AVSS           Y         AVSS           Y         AVSS           Y         AVSS           70         AVSS	0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 ( 0.75 (	CN-37F		DS-B41 DS-B41	CN-679M CN-418M CN-418M JS-B10 JS-B10 JS-B10 JS-B10									

TYPE						
	SIZE	FROM	2WIRE CONNECT NO	. CONNECTION	2WIRE CONNECT N	
	0.75	CN-291M				CN-32F
	0.75	CN-291M				CN-32F
	0.75	CN-291M		<u>¬</u>		CN-472F
	0.75	CN-291M		+_XXXX		CN-472F
	0.75	CN-291M				CN-32F
	0.75	CN-291M				CN-32F
_	0.75	CN-884M -				CN-33F
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	0.75	CN-884M				CN-33F
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	0.75	CN-884M		5000		CN-33F
_	0.75	CN-884M -				CN-33F
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	0.75	CN-414F				CN-293M
	0.75	CN-414F				CN-293M
	0.75	CN-472F				CN-32F
	0.75	CN-32F				CN-472F
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	0.75	CN-32F		+_ <del>/////</del>		CN-472F
	0.75	CN-290M			+	CN-474F
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	0.75	CN-290M				CN-474F
	0.75	CN-470M				CN-307M
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	0.75	CN-470M			+	CN-307M
	0.75	CN-470M			1	CN-307M
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	0.75	CN-470M				(CN-307M)
	0.75	CN-427F				CN-307M
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	0.75	CN-294M		1-1-1-		CN-403F
	0.75	CN-294M				CN-403F
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	0.75	CN-294M				CN-403F
	1.25	CN-294M			DS-8228	LA-805
	0.75	CN-429F			DS-B228	LA-805
	0.75	CN-258F		-	DO DEED	LA-B10
	0.75	CN-442F		< <u> </u>		LA-B10
	0.75	CN-442F	1		1	CN-258F
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		CN-440F		>	DS-B25	LA-803
	0.75	CN-440F CN-499F	DS-8106			
			DS-8106 DS-8106		DS-B25 DS-B25 DS-B105	LA-803
	0.75 0.75	CN-499F CN-499F	DS-8106		DS-B25 DS-B105	LA-803 LA-803 CN-432F
	0.75 0.75 0.75	CN-499F CN-499F CN-438F	DS-8106 DS-864		DS-B25 DS-B105 DS-B105	LA-B03 LA-B03 CN-432F CN-432F
	0.75 0.75 0.75 0.75	CN-499F CN-499F CN-438F CN-438F	DS-8106 DS-864 DS-864		DS-825 DS-8105 DS-8105 DS-863	LA-803 LA-803 CN-432F CN-432F CN-437F
	0.75 0.75 0.75 0.75 0.75	CN-499F CN-499F CN-438F CN-438F CN-436F	DS-B106 DS-B64 DS-B64 DS-B229		DS-B25 DS-B105 DS-B105 DS-B63 DS-B63	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-437F
	0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-499F CN-438F CN-438F CN-436F CN-436F	DS-B106 DS-B64 DS-B64 DS-B229 DS-B229		DS-B25 DS-B105 DS-B105 DS-B63 DS-B63 DS-B104	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-437F CN-437F CN-218F
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-499F CN-438F CN-438F CN-438F CN-436F CN-436F CN-218F	DS-B106 DS-B64 DS-B64 DS-B229 DS-B229 DS-B229 DS-B103		DS-B25 DS-B105 DS-B105 DS-B63 DS-B63 DS-B63 DS-B104 DS-B104	LA-803 LA-803 CN-432F CN-432F CN-437F CN-437F CN-437F CN-218F CN-218F
	0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-499F CN-438F CN-438F CN-436F CN-436F	DS-B106 DS-B64 DS-B64 DS-B229 DS-B229		DS-B25 DS-B105 DS-B105 DS-B63 DS-B63 DS-B104	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-437F CN-437F CN-218F
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-499F CN-438F CN-438F CN-438F CN-436F CN-436F CN-218F	DS-B106 DS-B64 DS-B64 DS-B229 DS-B229 DS-B229 DS-B103		DS-B25 DS-B105 DS-B105 DS-B63 DS-B63 DS-B63 DS-B104 DS-B104	LA-803 LA-803 CN-432F CN-432F CN-437F CN-437F CN-437F CN-218F CN-218F
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-438F CN-438F CN-436F CN-436F CN-436F CN-218F CN-218F CN-216F	DS-B106 DS-B64 DS-B64 DS-B229 DS-B229 DS-B103 DS-B103 DS-B103 DS-B238		DS-B25 DS-B105 DS-B105 DS-B63 DS-B63 DS-B104 DS-B104 DS-B237 DS-B237	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-437F CN-218F CN-218F CN-216F CN-216F
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-438F CN-438F CN-436F CN-436F CN-218F CN-218F CN-216F CN-216F	DS-B106 DS-B64 DS-B64 DS-B229 DS-B229 DS-B103 DS-B103 DS-B103 DS-B238 DS-B238		DS-825 DS-8105 DS-8105 DS-863 DS-863 DS-863 DS-8104 DS-8104 DS-8237 DS-8237 DS-8234	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-437F CN-218F CN-218F CN-218F CN-216F CN-216F CN-216F
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-438F CN-438F CN-436F CN-436F CN-218F CN-218F CN-216F CN-216F CN-216F CN-216F	DS-B106 DS-B64 DS-B64 DS-B229 DS-B229 DS-B103 DS-B103 DS-B103 DS-B238 DS-B238 DS-B235		DS-B25           DS-B105           DS-B105           DS-B105           DS-B63           DS-B63           DS-B104           DS-B104           DS-B104           DS-B237           DS-B234	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-218F CN-218F CN-218F CN-216F CN-216F CN-216F CN-26F CN-886F
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-438F CN-438F CN-436F CN-436F CN-218F CN-218F CN-216F CN-216F CN-886F CN-886F	DS-B106 DS-B64 DS-B64 DS-B229 DS-B229 DS-B229 DS-B103 DS-B103 DS-B103 DS-B238 DS-B238 DS-B235		DS-B25           DS-B105           DS-B105           DS-B63           DS-B63           DS-B104           DS-B104           DS-B104           DS-B237           DS-B234           DS-B234           DS-B239	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-218F CN-218F CN-218F CN-216F CN-216F CN-216F CN-886F CN-886F
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-438F CN-438F CN-436F CN-218F CN-218F CN-218F CN-216F CN-216F CN-886F CN-886F CN-886F LA-B07	DS-B106 DS-B64 DS-B64 DS-B229 DS-B229 DS-B103 DS-B103 DS-B238 DS-B238 DS-B238 DS-B235 DS-B235 DS-B235		DS-B25           DS-B105           DS-B105           DS-B105           DS-B63           DS-B63           DS-B104           DS-B104           DS-B104           DS-B237           DS-B234	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-218F CN-218F CN-218F CN-216F CN-288F CN-888F CN-888F CN-888F
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-438F CN-438F CN-438F CN-218F CN-218F CN-218F CN-216F CN-216F CN-886F CN-886F LA-B07 LA-B07	DS-B106 DS-B64 DS-B64 DS-B229 DS-B103 DS-B103 DS-B103 DS-B238 DS-B238 DS-B235 DS-B235 DS-B75		DS-B25           DS-B105           DS-B105           DS-B63           DS-B63           DS-B104           DS-B104           DS-B104           DS-B237           DS-B234           DS-B234           DS-B239	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-218F CN-218F CN-218F CN-218F CN-218F CN-886F CN-886F CN-886F CN-886F CN-4886F CN-418M
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-438F CN-438F CN-436F CN-218F CN-218F CN-218F CN-216F CN-216F CN-886F CN-886F CN-886F LA-B07	DS-B106 DS-B64 DS-B64 DS-B229 DS-B229 DS-B103 DS-B103 DS-B238 DS-B238 DS-B238 DS-B235 DS-B235 DS-B235		DS-B25           DS-B105           DS-B105           DS-B63           DS-B63           DS-B104           DS-B104           DS-B104           DS-B237           DS-B234           DS-B234           DS-B239	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-218F CN-218F CN-218F CN-216F CN-288F CN-888F CN-888F CN-888F
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-438F CN-438F CN-438F CN-218F CN-218F CN-218F CN-216F CN-216F CN-886F CN-886F LA-B07 LA-B07	DS-B106 DS-B64 DS-B64 DS-B229 DS-B103 DS-B103 DS-B103 DS-B238 DS-B238 DS-B235 DS-B235 DS-B75		DS-B25           DS-B105           DS-B105           DS-B63           DS-B63           DS-B104           DS-B104           DS-B104           DS-B237           DS-B234           DS-B234           DS-B239	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-218F CN-218F CN-218F CN-218F CN-218F CN-886F CN-886F CN-886F CN-886F CN-4886F CN-418M
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-438F CN-438F CN-436F CN-218F CN-218F CN-216F CN-216F CN-216F CN-886F CN-886F CN-886F CN-886F LA-807 LA-807 LA-808	DS-B106 DS-B64 DS-B64 DS-B229 DS-B103 DS-B103 DS-B103 DS-B238 DS-B238 DS-B235 DS-B235 DS-B235 DS-B75 DS-B75 DS-B775		DS-B25           DS-B105           DS-B105           DS-B63           DS-B63           DS-B104           DS-B104           DS-B104           DS-B237           DS-B234           DS-B234           DS-B239	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-218F CN-218F CN-218F CN-218F CN-218F CN-218F CN-886F CN-886F CN-886F CN-886F CN-886F CN-4886F CN-418M CN-418F
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-438F CN-438F CN-438F CN-438F CN-218F CN-218F CN-218F CN-218F CN-218F CN-888F CN-888F CN-888F CN-888F CN-888F CN-888F CN-888F CN-888F CN-888F CN-888F CN-888F CN-888F CN-888F CN-888F LA-B07 LA-B08 LA-B11	DS-B106 DS-B64 DS-B64 DS-B229 DS-B129 DS-B103 DS-B103 DS-B238 DS-B238 DS-B238 DS-B235 DS-B75 DS-B75 DS-B77 DS-B67 DS-B67 DS-B43		DS-825 DS-8105 DS-8105 DS-863 DS-863 DS-8104 DS-8104 DS-8237 DS-8234 DS-8234 DS-8234 DS-8234 DS-8234 DS-8234 DS-8239 DS-8239	LA-B03 LA-B03 CN-432F CN-432F CN-432F CN-437F CN-218F CN-218F CN-218F CN-218F CN-218F CN-886F CN-886F CN-886F CN-886F CN-4886F CN-418F CN-415F CN-415F CN-310F
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-438F CN-438F CN-438F CN-438F CN-218F CN-218F CN-218F CN-218F CN-218F CN-218F CN-288F LA-807 LA-807 LA-808 LA-807 LA-808 LA-808 LA-808 LA-811	DS-B106 DS-B64 DS-B64 DS-B229 DS-B103 DS-B103 DS-B103 DS-B238 DS-B238 DS-B235 DS-B235 DS-B75 DS-B75 DS-B75 DS-B67		DS-825 DS-8105 DS-8105 DS-8063 DS-863 DS-863 DS-8104 DS-8124 DS-8237 DS-8237 DS-8237 DS-8234 DS-8239 DS-8239 DS-8239 DS-8242	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-218F CN-218F CN-218F CN-218F CN-216F CN-216F CN-888F CN-888F CN-888F CN-888F CN-888F CN-416F CN-415F CN-415F CN-310F B-2
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-439F CN-438F CN-438F CN-438F CN-218F CN-218F CN-218F CN-216F CN-216F CN-268F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-885F CN-885F CN-885F CN-885F CN-885F CN-885F CN-885F CN-	DS-B106 DS-B64 DS-B64 DS-B229 DS-B229 DS-B103 DS-B238 DS-B238 DS-B238 DS-B238 DS-B235 DS-B75 DS-B75 DS-B67 DS-B67 DS-B67 DS-B43 DS-B43 DS-B43		DS-825 DS-8105 DS-8105 DS-863 DS-863 DS-8104 DS-8104 DS-8237 DS-8234 DS-8234 DS-8234 DS-8234 DS-8234 DS-8234 DS-8239 DS-8239	LA-B03 LA-B03 ON-432F ON-432F ON-437F ON-437F ON-218F ON-218F ON-218F ON-216F ON-216F ON-268F ON-888F ON-888F ON-888F ON-418M ON-4116F ON-4116F ON-4116F ON-412F ON-412F B-22 B-2
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-439F CN-438F CN-438F CN-438F CN-438F CN-218F CN-218F CN-216F CN-216F CN-216F CN-886F CN-886F CN-886F LA-B07 LA-B08 LA-B11 CN-411F CN-427F	DS-B106 DS-B64 DS-B64 DS-B229 DS-B229 DS-B103 DS-B103 DS-B238 DS-B238 DS-B238 DS-B235 DS-B75 DS-B75 DS-B75 DS-B75 DS-B75 DS-B43 DS-B43 DS-B43 DS-B43		DS-B25 DS-B105 DS-B105 DS-B63 DS-B63 DS-B63 DS-B104 DS-B124 DS-B237 DS-B234 DS-B234 DS-B234 DS-B239 DS-B239 DS-B239 DS-B242 DS-B242 DS-B242	LA-B03 LA-B03 CN-432F CN-432F CN-437F CN-437F CN-218F CN-218F CN-218F CN-218F CN-218F CN-218F CN-218F CN-288F CN-888F CN-888F CN-888F CN-888F CN-888F CN-888F CN-888F CN-888F CN-888F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F CN-418F
	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-499F CN-439F CN-439F CN-438F CN-438F CN-438F CN-218F CN-218F CN-218F CN-216F CN-216F CN-268F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-886F CN-885F CN-885F CN-885F CN-885F CN-885F CN-885F CN-885F CN-	DS-B106 DS-B64 DS-B64 DS-B229 DS-B229 DS-B103 DS-B238 DS-B238 DS-B238 DS-B238 DS-B235 DS-B75 DS-B75 DS-B67 DS-B67 DS-B67 DS-B43 DS-B43 DS-B43		DS-825 DS-8105 DS-8105 DS-8063 DS-863 DS-863 DS-8104 DS-8124 DS-8237 DS-8237 DS-8237 DS-8234 DS-8239 DS-8239 DS-8239 DS-8242	LA-B03 LA-B03 ON-432F ON-432F ON-437F ON-437F ON-218F ON-218F ON-218F ON-216F ON-216F ON-268F ON-888F ON-888F ON-888F ON-418M ON-4116F ON-4116F ON-4116F ON-412F ON-412F B-22 B-2

### (5/5)

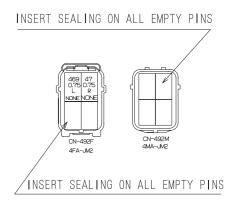




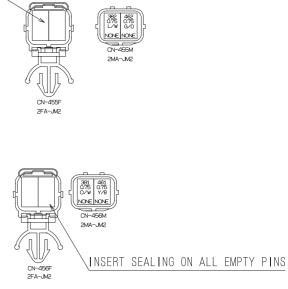


# INSERT SEALING ON ALL EMPTY PINS

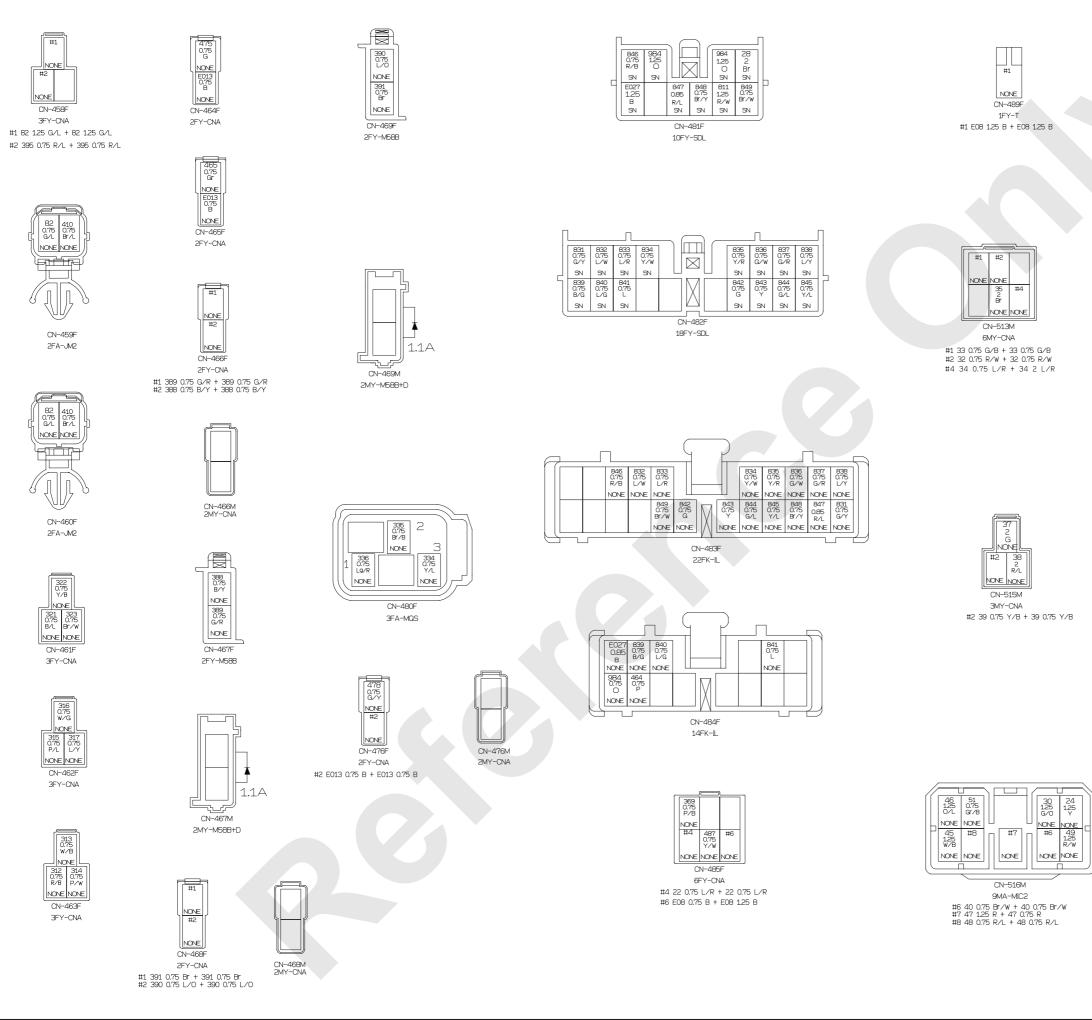
CN-452M 3MA-JM2



INSERT SEALING ON ALL EMPTY PINS



(2/6)



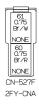


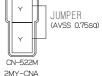
#1 22 0.75 L/R + 22 0.75 L/R

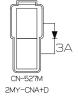


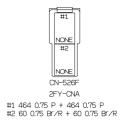
#1 400 0.75 R/Y + 400 0.75 R/Y

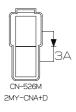
#2 40 0.75 Br/w + 40 0.75 Br/w



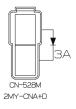




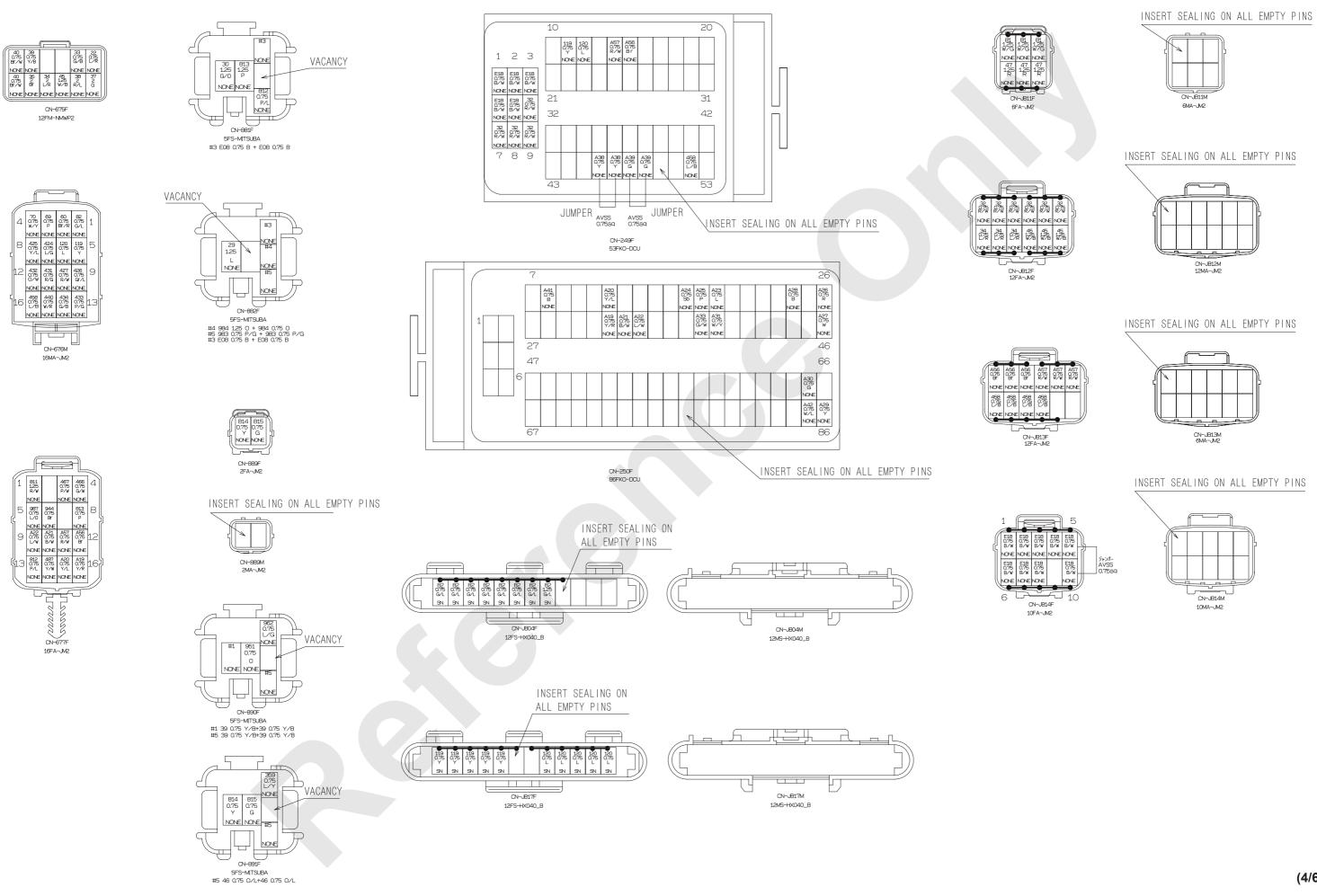




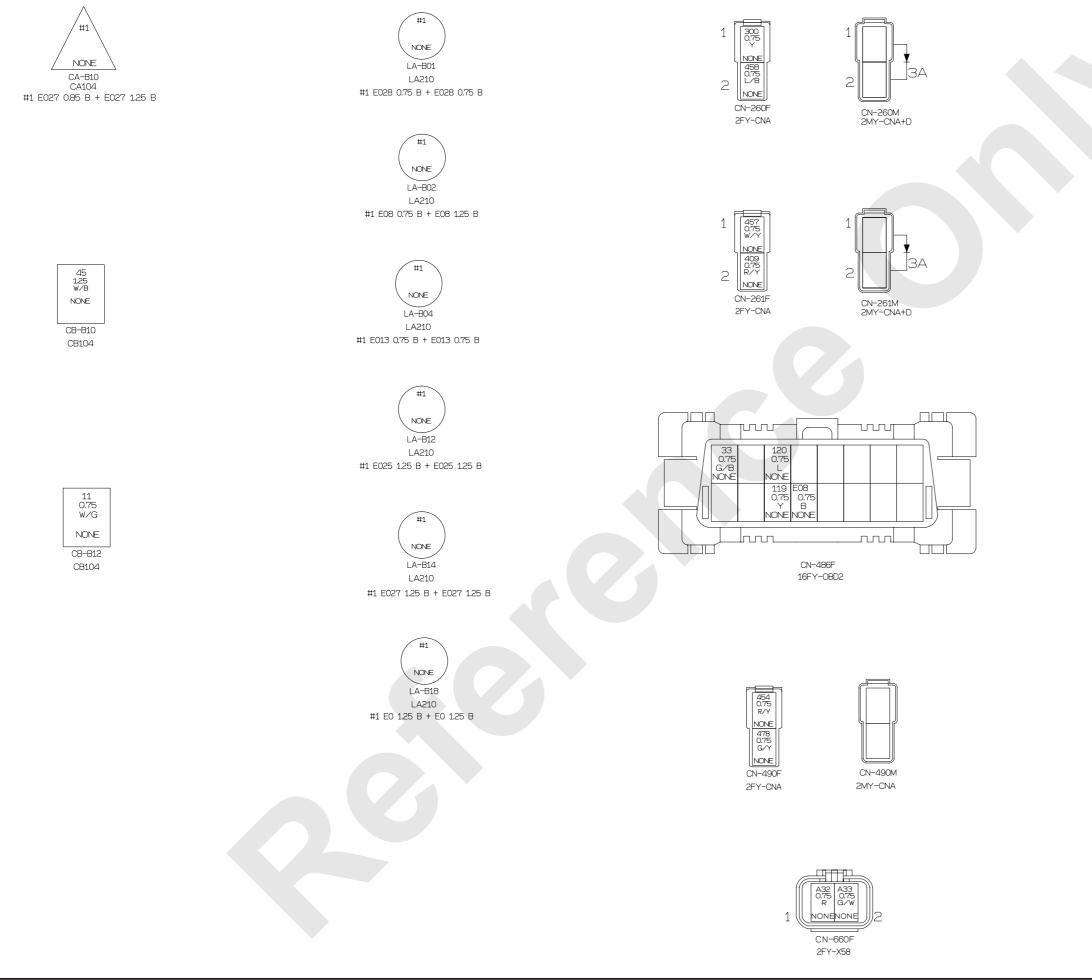




(3/6)



### (4/6)



(5/6)

#### THE WIRE NO. /COLOR LIST

	_	R WIRE TYPE		FROM	2WIRE CONNECT NO.	CONNECTION	2WIRE CONNECT NO.	1 0
11	W/G	AVSS	0.75	CB-B12				CN-300M
			-					
22	L/R	AVSS	0.75	CN-517M				CN-675F
22	L/R	AVSS	0.75	CN-517M				CN-239F
22	L/R	AVSS	0.75	CN-239F	DS-B200	•		CN-239F
22	L/R	AVSS	0.75	CN-239F	DS-B200		DS-B08	CN-485F
22	L/R	AVSS	0.75	JS-B12			DS-B08	CN-485F
22	L/R	AVSS	0.75	JS-B12		·		CN-35F
22	L/R	AVSS	0.75	JS-B12				CN-36F
24	Y	AVSS	1.25	CN-300M				CN-516M
25	R	AVSS	0.75	CN-517M				CN-242F
	-							
28	Br	AVSS	2	CN-517M				CN-481F
29	L	AVSS	1.25	CN-517M				CN-882F
30	G/0	AVSS	1.25	CN-881F				CN-516M
32	R/W	AVSS	0.75	CN-513M	DS-812	• •		CN-JB12F
32	R/W	AVSS	0.75	CN-513M	DS-812	<b>`</b> ∳		CN-JB12F
32	R/W	AVSS	0.75	CN-249F		<b> </b>		CN-JB12F
32	R/W	AVSS	0.75	CN-249F				CN-JB12F
32	R/W	AVSS	0.75	CN-249F				CN-JB12F
32	R/W	AVSS	0.75	CN-249F				CN-JB12F
33	G/B	AVSS	0.75	CN-513M		•		CN-486F
	-	_				•		
33	G/B	AVSS	0.75	CN-513M	00.000			CN-675F
34	L/R	AVS	2	CN-513M	DS-809	•		CN-675F
34	L/R	AVSS	0.75	CN-513M	DS-809	<b>└──●</b>	L	CN-JB12F
34	L/R	AVSS	0.75	CN-300M		<b>└───</b> ♦─		CN-JB12F
34	L/R	AVSS	0.75	CN-406F		• • •		CN-JB12F
35	Br	AVS	2	CN-513M				CN-675F
	1	1						
37	G	AVS	2	CN-515M	1			CN-675F
38	R/L	AVS	2	CN-515M	1		-	CN-675F
	-		-		1		DC_0004	
39	Y/B	AVSS	0.75	CN-300M	00.000	<b></b>	DS-B201	CN-515M
39	Y/B	AVSS	0.75	CN-890F	DS-8231	•	DS-8201	CN-515M
39	Y/B	AVSS	0.75	CN-890F	DS-8231		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-675F
40	Br/W	AVSS	0.75	CN-675F			DS-B12	CN-516M
40	Br/W	AVSS	0.75	CN-522F	DS-B22		DS-B12	CN-516M
40		AVSS	0.75	CN-522F	DS-B22	<u> </u>	00 012	CN-675F
	Br/W	-			03-622			
44	Gr	AVSS	0.75	CN-305M				CN-241F
45	W∕B	AVSS	1.25	CN-516M		•		CN-JB12F
45	W/B	AVSS	1.25	CN-675F		∳		CN-JB12F
45	W/B	AVSS	1.25	CB-B10		·		CN-JB12F
46	0/L	AVSS	1.25	CN-516M			DS-B12	CN-235F
46		AVSS	0.75	CN-243F	DS-B22		DS-B12	CN-235F
	0/L	-				<u> </u>	03 012	
46	0/L	AVSS	0.75	CN-243F	DS-B22			CN-891F
46	0/L	AVSS	0.75	CN-402M				CN-891F
47	R	AVSS	0.75	CN-492F		•	DS-47	CN-516M
47	R	AVSS	1.25	CN-JB11F		• • · · · ·	DS-47	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-8204			JS-B114
48	R/L	AVSS	0.75	CN-305M	00 020 .			JS-B114
48		AVSS	0.75	CN-430F				JS-B114
	R/L					<u> </u>		JS-B114 JS-B114
48	R/L	AVSS	0.75	CN-431F				
49	R/W	AVSS	1.25	CN-300M	-		L	CN-516M
51	Gr/B	AVSS	0.75	CN-516M				CN-35F
52	Y/G	AVSS	0.75	CN-305M				CN-235F
53	L/R	AVSS	0.75	CN-302M		•		CN-236F
53	L/R	AVSS	0.75	CN-236F				CN-236F
60	Br/R	AVSS	0.75	CN-676M	1		DS-B33	CN-526F
50 50	Br/R	AVSS	0.75	CN-527F	1		DS-B33	CN-526F
50 51	Br/W	AVSS	0.75	CN-527F	1	´		CN-302M
51	Br/W Y	AVSS		CN-36F	1		-	CN-528F
			0.75					
69 70	P	AVSS	0.75	CN-528F				CN-676M
70	W/Y	AVSS	0.75	CN-676M	l			CN-35F
81	W/G	AVSS	1.25	CN-JB11F				CN-243F
B1	W/G	AVSS	1.25	CN-JB11F		- <b>•</b>		CN-30F
81	W/G	AVSS	1.25	CN-JB11F		<b></b>		CN-30F
32	G/L	AVSS	0.75	CN-242F	DS-B05	•		CN-300M
32	G/L	AVSS	1.25	CN-242F	DS-805	r <u> </u>	DS-B40	CN-458F
32		AVSS	1.25	CN-JB04F	1		DS-B40	CN-458F
	G/L		-			- <b>T</b>	00 040	
32	G/L	AVSS	0.75	CN-JB04F		<b>-P</b>		CN-454M
32	G/L	AVSS	0.75	CN-JB04F	1	<b>↓</b> • • • • • • • • • • • • • • • • • • •	L	CN-453M
32	G/L	AVSS	0.75	CN-JB04F		· •		CN-35F
32	G/L	AVSS	0.75	CN-JB04F		_ <b>_</b>		CN-452F
32	G/L	AVSS	0.75	CN-JB04F		-		CN-459F
32	G/L	AVSS	0.75	CN-JB04F	1			CN-460F
						I I		
32	G/L	AVSS	0.75	CN-JB04F				CN-676M
33	0/W	AVSS	0.75	CN-305M				CN-241F
34	Y	AVSS	0.75	CN-305M				CN-235F
142	Y	AVSS	0.75	CN-301M				CN-34F
144	R/Y	AVSS	0.75	CN-301M				CN-34F
150	Br	AVSS	0.75	CN-30F	1			JS-B100
150	Br	AVSS	0.75	CN-305M	1			JS-B100
	_		-	CN-405M				
150	Br	AVSS	0.75					JS-B100

WIRE NO. 191	WIRE COLOR G	WIRE TYPE	SIZE 0.75	FROM CN-301M	2WIRE CONNECT NO.	CONNECTION	2WIRE CONNECT NO.	T CN-30F
192	W/L	AVSS	0.75	CN-301M				CN-35F
193		AVSS	0.75	CN-301M				CN-35F
	B/Y							
199	P/G	AVSS	0.75	CN-301M				CN-35F
215	W	AVSS	0.75	CN-305M				JS-B106
215	W	AVSS	0.75	CN-405M				JS-B106
215	W	AVSS	0.75	CN-35F				JS-B106
			<u> </u>					
216	B/R	AVSS	0.75	CN-305M				JS-B10'
216	B/R	AVSS	0.75	CN-405M				JS-B10'
216	B/R	AVSS	0.75	CN-35F				JS-B10'
217	Lg/Y	AVSS	0.75	CN-305M				JS-B10
217	Lg/Y	AVSS	0.75	CN-405M				JS-B10
217	Lg/Y	AVSS	0.75	CN-35F				JS-B10
218	L/0	AVSS	0.75	CN-305M				JS-B10
218	L/0	AVSS	0.75	CN-405M				JS-B10
218	L/0	AVSS	0.75	CN-35F				JS-B10
219	Y/B	AVSS	0.75	CN-305M				JS-B11
219	Y/B	AVSS	0.75	CN-405M				JS-B11
219	Y/B	AVSS	0.75	CN-35F				JS-B11
220	G/Y	AVSS	0.75	CN-305M				JS-B11
220	G/Y	AVSS	0.75	CN-405M				JS-B11
220	G/Y	AVSS	0.75	CN-35F				JS-B11
221	P/B	AVSS	0.75	CN-305M				JS-B11
221	P/B	AVSS	0.75	CN-405M				JS-B11
221	P/B	AVSS	0.75	CN-35F				JS-B11
222	P/W	AVSS	0.75	CN-300M		<u> </u>		CN-34F
223	Y/G	AVSS	0.75	CN-35F				CN-301
248	G	AVSS	0.75	CN-433F				CN-301
249	-	AVSS		CN-433F				
	L		0.75					CN-301
300	Y	AVSS	0.75	CN-236F				CN-260
312	R/B	AVSS	0.75	CN-463F				CN-302
313	W/B	AVSS	0.75	CN-463F				CN-302
313 314	P/W	AVSS	0.75	CN-463F				CN-302
315	P/L	AVSS	0.75	CN-302M				CN-462
316	W/G	AVSS	0.75	CN-302M				CN-462
317	L/Y	AVSS	0.75	CN-302M				CN-462
321	B/L	AVSS	0.75	CN-461F				CN-302
322	Y/B	AVSS	0.75	CN-302M				CN-461
323	Br/W	AVSS	0.75	CN-302M				CN-461
327	R/W	AVSS	0.75	CN-457F				CN-302
328	L/G	AVSS	0.75	CN-302M				CN-457
329	Y/G	AVSS	0.75	CN-302M				CN-457
334	Y/L	AVSS	0.75	CN-302M				CN-480
335	Br/B	AVSS	0.75	CN-302M				CN-480
336		AVSS	0.75	CN-302M				CN-480
	Lg/R							
347	Y/V	AVSS	0.75	CN-304M				CN-402
359	L/Y	AVSS	0.75	CN-303M				CN-891
365	L/R	AVSS	0.75	CN-303M				CN-402
								_
366	G/B	AVSS	0.75	CN-402M				CN-304
369	P/B	AVSS	0.75	CN-303M				CN-485
381	0/W	AVSS	0.75	CN-302M				CN-456
382	L/W	AVSS	0.75	CN-455M				CN-302
							DC D44	
395	R/L	AVSS	0.75	CN-305M			DS-841	CN-458
395	R/L	AVSS	0.75	CN-35F			DS-B41	CN-458
398	G/W	AVSS	0.75	JS-B101				CN-303
398		AVSS		JS-B101		_		CN-452
	G/W							
398	G/W	AVSS		JS-B101				CN-402
400	R/Y	AVSS	0.75	CN-239F			DS-B23	CN-522
400	R/Y	AVSS	0.75	CN-303M			DS-B23	CN-522
401	Gr/B	AVSS		CN-303M				CN-36F
.01			5.10					5
1000		11/000	0.75	01 45 41				01:00-
406	P	AVSS	0.75	CN-454M		_		CN-303
407	Br	AVSS	0.75	CN-453M				CN-303
409	R/Y	AVSS	0.75	CN-300M				CN-261
		-						
410	Br /I	AVSS	0.75	JS-8105				CN-459
	Br/L	_	_					
410	Br/L	AVSS	0.75	JS-B105				CN-460
410	Br/L	AVSS	0.75	JS-B105				CN-303
410	Br/L	AVSS	0.75	JS-B105				CN-34F
	P							
413		AVSS	0.75	CN-304M				CN-236
			0.00					
419	G/Y	AVSS	0.75	CN-30F				CN-303
420	Y/W	AVSS	0.75	CN-304M				CN-30F
421	R/Y	AVSS	0.75	CN-304M				CN-35F
422	P/L	AVSS	0.75	CN-304M				CN-35F
423	W/B	AVSS	0.75	CN-304M				CN-36F
424	L/G	AVSS	0.75	CN-304M				JS-B37
424		AVSS	0.75	JS-B37				CN-30F
	L/G							
424	L/G	AVSS	0.75	CN-676M				JS-B37
425	Y/L	AVSS	0.75	CN-304M				JS-B38
425	Y/L	AVSS	0.75	JS-B38	l			CN-30F
			· · · · · ·					
425	Y/L	AVSS	0.75	CN-676M				JS-B38
426	Gr/L	AVSS	0.75	CN-304M				JS-B39
426	Gr/L	AVSS	0.75	JS-B39				CN-34F
		AVSS	0.75	JS-B39				CN-676
126	Gr/L							
	R/W	AVSS	0.75	CN-304M				JS-B40
427		141/000	0.75	JS-840				CN-34F
426 427 427	R/W	AVSS	0.15					
427 427								
427 427 427	R/W	AVSS	0.75	CN-676M				JS-B40
427								JS-B40 CN-30F CN-304

431	WIRE COLOR	WIRE TYPE	SIZE	FROM	2WIRE CONNECT NO.	CONNECTION	2WIRE CONNECT NO.	
431	R/G	AVSS	0.75	JS-B41				CN-304M
431	R/G	AVSS	0.75	JS-B41				CN-34F
431	R/G	AVSS	0.75	CN-676M	-			JS-B41
432		AVSS	0.75	JS-B42	-			CN-304M
432	0/ W	AVSS	0.75	JS-B42	-			CN-34F
432	0/W	AVSS	0.75	JS-B42				CN-676M
					-			
433	P/G	AVSS	0.75	CN-302M				CN-676M
434	G/B	AVSS	0.75	CN-30F				CN-676M
436	W/Y	AVSS	0.75	CN-30F				CN-304M
437	0	AVSS	0.75	JS-B35				CN-304M
437	0	AVSS	0.75	CN-30F				JS-B35
437	0	AVSS	0.75	CN-30F				JS-B35
440	W/R	AVSS	0.75	CN-304M				JS-B34
440	W/R	AVSS	0.75	JS-B34				CN-30F
440	W/R	AVSS	0.75	JS-B34	-			CN-676M
443	0/L	AVSS	0.75	CN-34F	-			CN-303M
445	G	AVSS	0.75	CN-303M	-			CN-235F
	P				-			
447		AVSS	0.75	CN-304M				CN-30F
449	Br/L	AVSS	0.75	CN-36F				CN-303M
450	P/G	AVSS	0.75	CN-303M				CN-36F
451	L/B	AVSS	0.75	CN-303M				CN-35F
452	0/B	AVSS	0.75	CN-303M				CN-36F
454	R/Y	AVSS	0.75	CN-305M				CN-490F
457	W/Y	AVSS	0.75	CN-36F				CN-261F
458	L/B	AVSS	0.75	CN-676M				CN-JB13F
458	L/B	AVSS	0.75	CN-300M				CN-JB13F
458	L/B	AVSS	0.75	CN-249F		T		CN-JB13
458	L/B	AVSS	0.75	CN-260F		T		
						•		CN-JB13F
459	Lg	AVSS	0.75	CN-239F				CN-303M
461	Y/B	AVSS	0.75	CN-30F	-			CN-456M
462	G/0	AVSS	0.75	CN-455M				CN-30F
464	P	AVSS	0.75	CN-526F	DS-B32	•		CN-35F
464	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-677F
467	P/W	AVSS	0.75	CN-30F				CN-677F
469	1	AVSS	0.75	CN-301M				CN-492F
474		AVSS	0.75	CN-34F				CN-303M
	L/B		-					
475	G	AVSS	0.75	CN-36F				CN-464F
478	G/Y	AVSS	0.75	CN-490F				CN-476F
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-677F				CN-485F
754	Y/R	AVSS	0.75	CN-35F				CN-300M
811	R/W	AVS	1.25	CN-677F				CN-481F
812	P/L	AVSS	0.75	CN-677F				CN-881F
813	P	AVS	1.25	CN-881F				CN-677F
814	Y	AVSS	0.75	CN-889F	-			CN-891F
	G	AVSS	0.75	CN-889F	-			CN-891F
			0.15	UN-009F	-			CI1-091L
815	La la	AV35						
815	ŭ	AV35						
815	G	AV35						
815	d	AV33						
815	0							
815	0							
815								
815								
			0.75	CN-482F				CN-483F
831	G/Y	AVSS	0.75	CN-482F				
831 832	G/Y L/W	AVSS	0.75	CN-482F				CN-483F
831 832 833	G/Y L/W L/R	AVSS AVSS AVSS	0.75 0.75	CN-482F CN-482F				CN-483F CN-483F
831 832 833 834	G/Y L/W L/R Y/W	AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75	CN-482F CN-482F CN-482F				CN-483F CN-483F CN-483F
831 832 833 834 835	G/Y L/W L/R Y/W Y/R	AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F				CN-483F CN-483F CN-483F CN-483F
831 832 833 834 835 836	G/Y L/W L/R Y/W	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F				CN-483F CN-483F CN-483F CN-483F CN-483F
831 832 833 834 835 836	G/Y L/W L/R Y/W Y/R	AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F				CN-483F CN-483F CN-483F CN-483F
831 832 833 834 835 836 836 837	G/Y L/W L/R Y/W Y/R G/W	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F				CN-483F CN-483F CN-483F CN-483F CN-483F
831 832 833 834 835 836 836 837 838	G/Y L/W L/R Y/W Y/R G/W G/R	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F
831 832 833 834 835 836 836 837 838 837 838 839	G/Y L/W L/R Y/W Y/R G/W G/R L/Y	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F
831 832 833 834 835 836 837 838 837 838 839 839 840	G/Y L/W L/R Y/W Y/R G/W G/R L/Y B/G	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F
831 832 833 834 835 836 837 838 838 839 840 841	G/Y L/W L/R Y/W Y/R G/W G/R L/Y B/G L/Y	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-484F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F CN-484F CN-484F CN-482F
831 832 833 834 835 836 837 838 839 840 841 841 842	G/Y L/W L/R G/W G/R L/Y B/G L/Y G L/G L G	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-484F CN-483F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F CN-484F CN-484F CN-482F CN-482F
831 832 833 834 835 836 837 838 839 838 839 840 841 841 842 843	G/Y L/W L/R Y/W Y/R G/W G/R L/Y B/G L/G L G Y	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-484F CN-483F CN-483F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F CN-484F CN-484F CN-482F CN-482F CN-482F
831 332 333 334 335 335 336 337 338 339 340 341 341 342 343 344	G/Y L/W L/R Y/W Y/R G/W G/R L/Y L/G L/G L/G G Y G/L	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-483F CN-483F CN-483F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F CN-484F CN-484F CN-482F CN-482F CN-482F CN-482F
831 832 833 834 835 836 836 837 838 838 838 838 838 839 840 841 842 843 843	G/Y L/W L/R Y/W Y/R G/W G/R L/G L G G Y G/L Y/L	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-484F CN-483F CN-483F CN-483F CN-483F CN-483F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F CN-484F CN-484F CN-482F CN-482F CN-482F CN-482F
831 832 833 834 836 837 838 839 836 839 840 841 842 843 844 845 845 846	G/Y L/W L/R Y/W Y/R G/W G/R L/Y L/G L/G L/G G Y G/L	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-484F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F CN-484F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-481F
831 832 833 834 836 837 838 839 836 839 840 841 842 843 844 845 845 846	G/Y L/W L/R Y/W Y/R G/W G/R L/G L G G Y G/L Y/L	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-484F CN-483F CN-483F CN-483F CN-483F CN-483F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F CN-484F CN-484F CN-482F CN-482F CN-482F CN-482F
B31 332 333 334 335 336 337 338 339 338 339 340 341 342 344 344 344 344 5 344 5 344 344	G/Y L/W L/R Y/W Y/R G/R L/Y B/G L/G L/G L/G G/L Y K/B	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-484F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F CN-484F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-481F
331 332 333 334 335 336 337 338 336 337 338 337 338 339 340 341 342 343 344 343 344 344 345 344 344 345 344 347 348	G/Y L/W L/R G/W G/R L/Y B/G L/Y G/L Y Y/R G/L Y K/B R/L	AVSS AVSS AVSS AVSS AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-484F CN-484F CN-483F CN-483F CN-483F CN-483F CN-483F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F CN-484F CN-484F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-484F CN-481F
331 332 333 334 335 336 336 337 338 339 340 341 342 344 344 344 344 344 344 344 344 344	G/Y L/W L/R Y/W Y/R G/W G/R L/G L/G L/G L/G L/G L/G K/L R/L Br/Y Br/W	AVSS	6750 6750 6750 6750 6750 6750 6750 6750	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F CN-484F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-481F CN-481F CN-483F
331 332 333 334 335 336 337 338 339 340 341 342 243 344 344 344 344 344 344 344 344	G/Y L/W L/R Y/W G/R L/Y B/G L G G/R L/Y G/L G G/L G Y C G/L R/B R/L Br/Y Br/Y Br/G	AVSS	6750 6750 6750 6750 6750 6750 6750 6750	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-484F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-482F CN-482F CN-482F CN-482F CN-482F CN-481F CN-481F CN-481F CN-481F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-
331 332 333 334 335 336 337 338 339 340 341 343 344 343 344 3445 3445 3445 3445	G/Y L/W L/R Y/W G/W G/R L/Y G/W G/R L/Y G/W G/R L/Y G/L Y/L B/G L/G L/G L/G L/G B/G L/G B/G B/C B/C B/C B/C B/C B/C B/C B/C B/C B/C	AVSS		CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F CN-482F CN-482F CN-482F CN-482F CN-482F CN-481F CN-481F CN-481F CN-483F CN-340F CN-300M
331 332 333 334 335 336 337 338 336 337 338 339 340 341 342 344 345 344 343 344 344 345 344 344 345 344 344	G/Y L/W L/R Y/W Y/R G/W G/R L/G L/G L/G L/G L/G L/G L/G L/G L/G B// Y/L R/B R/L Br/Y Br/W Br/W Br/W Br/B Br/W	AVSS	370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F CN-484F CN-484F CN-482F CN-482F CN-482F CN-482F CN-481F CN-481F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-
331 332 333 334 335 336 336 337 338 339 340 341 342 344 344 344 344 344 344 344 344 344	G/Y L/W L/R Y/W Y/R G/R L/G L/G L/G L/G L/G E Y/L R/L Br/Y Br/W Br/G Br/W Br/G D	AVSS	370         370           370         370         370           370         370         370         370           370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-481F CN-481F CN-481F CN-483F CN-483F CN-483F CN-300M CN-307M
831 832 833 834 835 836 837 838 839 840 841 842 843 844 844 844 844 844 844 844 844 844	G/Y L/W L/R Y/W Y/R G/W G/R L/G L/G L/G L/G L/G L/G L/G L/G L/G B// Y/L R/B R/L Br/Y Br/W Br/W Br/W Br/B Br/W	AVSS	370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370           370         370         370	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-481F CN-481F CN-481F CN-483F CN-483F CN-483F CN-300M CN-307M
331 332 333 334 335 336 337 338 339 341 342 343 344 344 344 344 344 344 344 344	G/Y L/W L/R Y/W Y/R G/R L/G L/G L/G L/G L/G E Y/L R/L Br/Y Br/W Br/G Br/W Br/G D	AVSS	370         370           370         370         370           370         370         370         370           370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370         370	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-485F CN-				CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-481F CN-481F CN-481F CN-483F CN-483F CN-483F CN-300M CN-307M
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831 832 833 834 835 836 837 838 839 840 841 841 842	G/Y L/W L/R Y/W G/W G/R L/G L/G L/G G/W G/R L/G L/G B/G B/G B/G B/G B/G B/G L/G B/G B/G C C C C C C C C C C C C C C C C C C C	AVSS           AVS     <	0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         6           0.7         7           0.7         7           0.7         7           0.7         7           0.7         7           0.7         7           0.7         7           0.7         7           0.7         7           0.7         7           0.7         7           0.7         7           0.7         7           0.7         7           0.7	CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-482F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-34F CN-34F CN-36F CN-90F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-96F CN-	-			CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-483F CN-484F CN-484F CN-482F CN-482F CN-482F CN-482F CN-482F CN-481F CN-481F CN-481F CN-481F CN-483F CN-305M CN-305M CN-305M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-303M CN-

A24 50 A25 P A26 R A27 W A28 B A29 Y A30 G A31 W/Y A32 R A33 G/W A38 Y A39 G A 119 120 120 L 119 Y 120 L 119 Y 120 L 119 120 L 119 Y 120 L A 
 378
 P/w
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 379
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 388
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 388
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 Av

 389
 G/R
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 389
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 390
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 390
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 391
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 391
 Br
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 488
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 490
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 Av

 491
 Gr/W
 Av

 492
 R/B
 Av

 419
 Y/L
 Av

 A20
 Y/L
 Av

 A21
 B/W
 Av

 A21
 B
 Av

 A41
 B
 A<sup>1</sup>

 A42
 W/L
 A<sup>1</sup>

 A56
 Br
 A<sup>1</sup>

 A57
 R∕W
 A<sup>1</sup>

 A56
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 A<sup>1</sup>
 A57 R/W A A56 Br A A57 R/W A F08 E08 B E08 B E08 E08 B E08 B E08 B E08 B AV AV AV EOB B AV E013 B A۱ A۱ 
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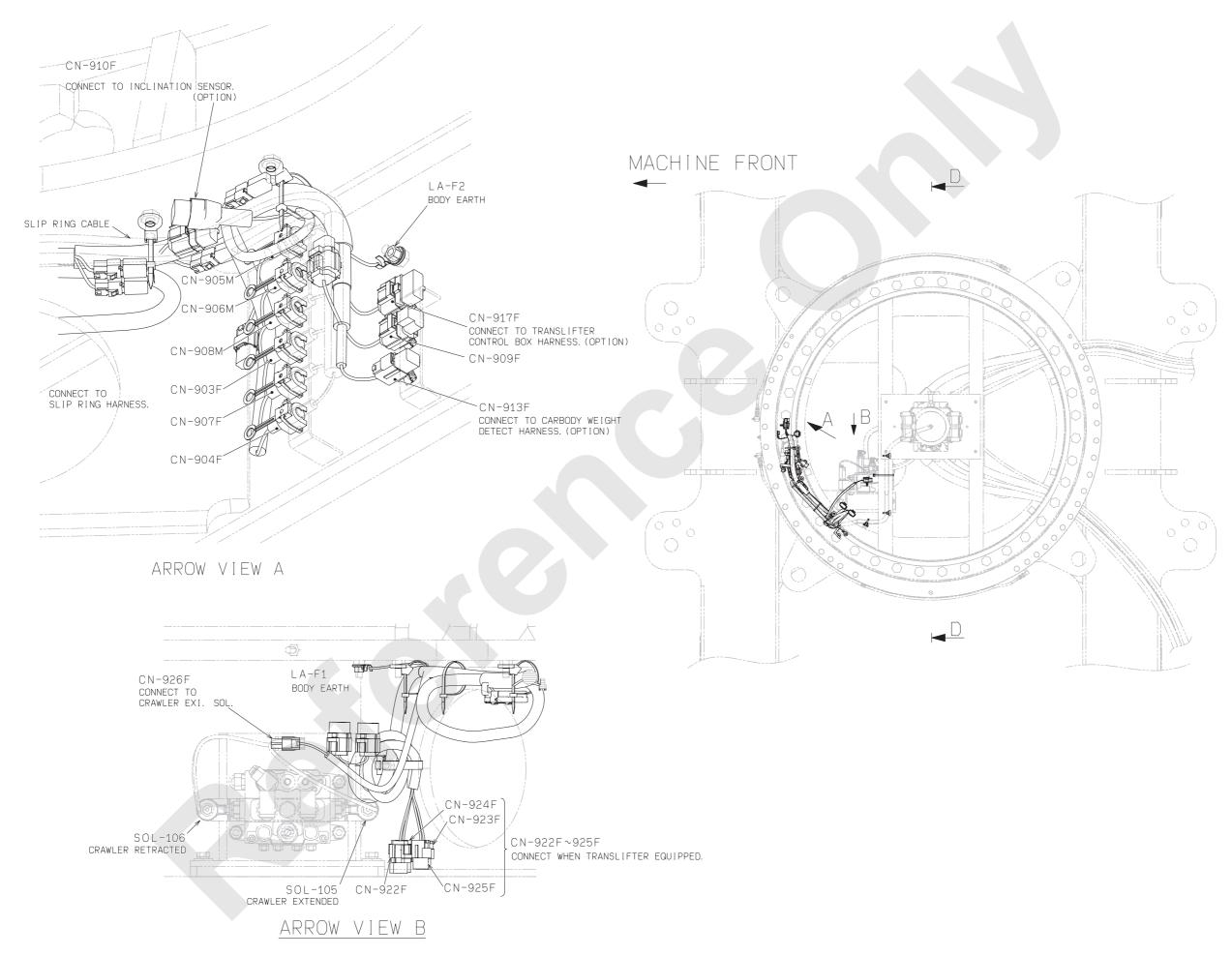
 E025
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 E027 B E027 B A١ A١ E027 B E028 B A) A) A) E028 B \_\_\_\_\_ 
 E18
 B/W
 Av

 E18
 B/W
 AV

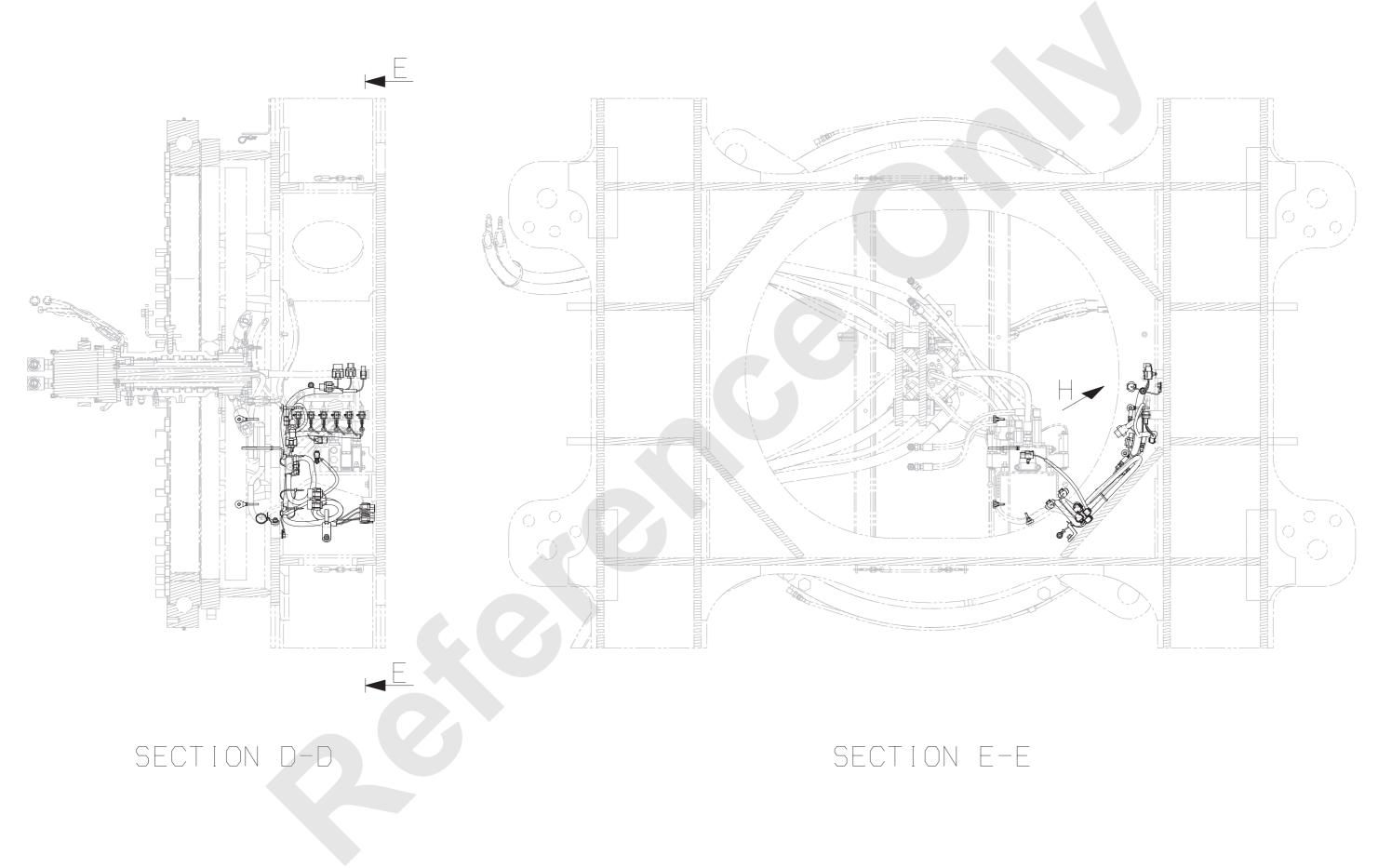
WIRE NO	. WIRE COLOR	WIRE TYPE	SIZE	FROM	2WIRE CONNECT NO.	CONNECTION	2WIRE CONNECT NO	Ļ Ţ
983	P/G	AVSS	0.75	CN-30F	1	· · · · · ·		CN-235F
983	P/G	AVSS	0.75	CN-882F	1	- /	1	CN-235F
	_					•		
983	P/G	AVSS	0.75	CN-882F		· · · · · · · · ·	DS-01	CN-241F
983	P/G	AVSS	0.75	CN-242F	DS-02	•	DS-01	CN-241F
983	P/G	AVSS	0.75	CN-242F	DS-02			CN-243F
		_	_		00 02			
423	-	AVSS	0.75	CN-406F	1			CN-250F
424	Sb	AVSS	0.75	CN-406F				CN-250F
125	Þ	AVSS	0.75	CN-406F				CN-250F
_								
126	R	AVSS	0.75	CN-406F				CN-250F
127	W	AVSS	0.75	CN-406F				CN-250F
128	В	AVSS	0.75	CN-406F				CN-250F
		-						-
129	Y	AVSS	0.75	CN-406F				CN-250F
130	G	AVSS	0.75	CN-406F				CN-250F
431	W/Y	AVSS	0.75	CN-406F				CN-250F
								-
132	R	AVSS	0.75	CN-406F				CN-660F
733	G/W	AVSS	0.75	CN-660F				CN-250F
438	Y	AVSS	0.75	CN-249F				CN-249
439	G	AVSS	0.75	CN-249F				CN-249
119	Y	AVSS	0.75	CN-JB17F				CN-300
120	L	AVSS	0.75	CN-JB17F	1			CN-300
	-					• · · · · <u>·</u>		
119	Y	AVSS	0.75	CN-JB17F				CN-676
120	L	AVSS	0.75	CN-JB17F				CN-676M
19	Y	AVSS	0.75	CN-JB17F	1	11		CN-405
120	L	AVSS	0.75	CN-JB17F				CN-405
19	Y	AVSS	0.75	CN-JB17F				CN-486F
120		-			1			CN-486
	L	AVSS	0.75	CN-JB17F	-	PT ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~		
19	Y	AVSS	0.75	CN-JB17F				CN-249
120	L	AVSS	0.75	CN-JB17F				CN-249
		-			1	<b>-</b> · · · · <u>·</u>		
378	P/W	AVSS	0.75	CN-301M	-		-	CN-451F
379	Y/G	AVSS	0.75	CN-301M	1	_^		CN-451F
388	B/Y	AVSS	0.75	CN-467F			DS-B30	CN-466F
					1	<u> </u>		
388	B/Y	AVSS	0.75	CN-301M	-		DS-B30	CN-466F
389	G/R	AVSS	0.75	CN-301M	I		DS-B31	CN-466F
389	G/R	AVSS	0.75	CN-467F		/	DS-831	CN-466F
390	L/0				-			
	_	AVSS	0.75	CN-469F			DS-B28	CN-468
390	L/0	AVSS	0.75	CN-301M			DS-B28	CN-468
391	Br	AVSS	0.75	CN-301M			DS-B29	CN-468
	-	-			-			-
391	Br	AVSS	0.75	CN-469F			DS-B29	CN-468
188	P/G	AVSS	0.75	CN-34F				CN-301M
189	G	AVSS	0.75	CN-34F				CN-301N
	-	-						
190	P/L	AVSS	0.75	CN-34F				CN-300
491	Gr/W	AVSS	0.75	CN-34F				CN-300
192	R/B	AVSS	0.75	CN-34F				CN-300
					-			
193	W/Y	AVSS	0.75	CN-34F				CN-300
419	Y/R	AVSS	0.75	CN-677F				CN-250F
420	Y/L	AVSS	0.75	CN-677F				CN-250F
		+				2		
421	B/W	AVSS	0.75	CN-677F				CN-250F
A22	L/W	AVSS	0.75	CN-677F				CN-250F
441	В	AVSS	0.75	CN-305M				CN-250F
442	-	AVSS	0.75	CN-305M				CN-250F
	W/L							
456	Br	AVSS	0.75	CN-406F				CN-JB13
457	R/W	AVSS	0.75	CN-406F				CN-JB13
A56	-	AVSS	0.75	CN-249F		- I		CN-JB13
	Br							
457	R/W	AVSS	0.75	CN-249F				CN-JB13
A56	Br	AVSS	0.75	CN-677F				CN-JB13
						୲᠆ᡔᡣᠬᢦᢪᡰ		
457	R/W	AVSS	0.75	CN-677F			·	CN-JB13
0	в	AVSS	1.25	CN-300M			DS-B68	LA-B18
	-							
0	В	AVSS	1.25	CN-304M		/	DS-B68	LA-B18
808	в	AVSS	0.75	CN-243F	1	·•		CN-242F
08	в	AVSS	0.75	CN-241F		•		CN-242F
		AVSS			1	-		
08	В		0.75	CN-241F	-	·>	-	CN-882F
808	в	AVSS	0.75	CN-881F				CN-882F
08	в	AVSS	0.75	CN-881F		· •		CN-485f
					+			
808	В	AVSS	1.25	CN-489F		<b>↓</b>		CN-485F
803	в	AVSS	1.25	CN-489F		• • • •		LB-B02
08	в	AVSS	0.75	CN-433F				LB-B02
	-					<u>-</u> −		-
08	В	AVSS	0.75	CN-433F	-			CN-486
013	в	AVSS	0.75	CN-464F				CN-476
E013					1			
	B	AVSS	0.75	LA-B04		<b>▼</b>		CN-476
013	В	AVSS	0.75	LA-B04				CN-465
025	В	AVSS	1.25	LA-B12	DS-B65	•		CN-35F
025	В	AVSS	1.25	LA-B12	DS-B65	-		CN-35F
					00 000	<u> </u>		-
027	В	AVS	0.85	CA-B10		•		CN-484
027	в	AVSS	1.25	CA-B10				LA-B14
					1	F 7		
	B	AVSS	1.25	CN-481F		· //		LA-B14
027	В	AVSS	0.75	LA-B01	DS-B19	•		CN-430F
027	в	AVSS	0.75	LA-B01	DS-B19			CN-431F
027 028								0.1 701
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027 028 028	B∕W	AVSS	1.25	CN-JB14F				
E027 E028 E028 E028		AVSS AVSS	1.25 0.75	CN-JB14F CN-JB14F		•		
E027 E028 E028 E18 E18	B∕W	AVSS	0.75	CN-JB14F		+		CN-249
027 028 028 18 18 18	B/W B/W B/W	AVSS AVSS	0.75 0.75	CN-JB14F CN-JB14F				CN-249 CN-249
E027 E028 E028 E18 E18 E18 E18 E18 E18	B/W B/W B/W B/W	AVSS AVSS AVSS	0.75 0.75 0.75	CN-JB14F CN-JB14F CN-JB14F		• • •		CN-249 CN-249 CN-249
E027 E028 E028 E18 E18 E18 E18 E18 E18 E18	B/W B/W B/W	AVSS AVSS	0.75 0.75 0.75 0.75	CN-JB14F CN-JB14F				CN-249 CN-249 CN-249
E027 E028 E028 E18 E18 E18 E18 E18 E18 E18 E18	B/W B/W B/W B/W	AVSS AVSS AVSS AVSS	0.75 0.75 0.75 0.75	CN-JB14F CN-JB14F CN-JB14F CN-JB14F				CN-249 CN-249 CN-249 CN-249
E027 E028 E028 E18 E18 E18 E18 E18 E18 E18 E18 E18 E1	B/W B/W B/W B/W B/W	AVSS AVSS AVSS	0.75 0.75 0.75	CN-JB14F CN-JB14F CN-JB14F				CN-249F CN-249F CN-249F CN-JB14 CN-JB14 CN-JB14

## (6/6)

#### 2. LOWER

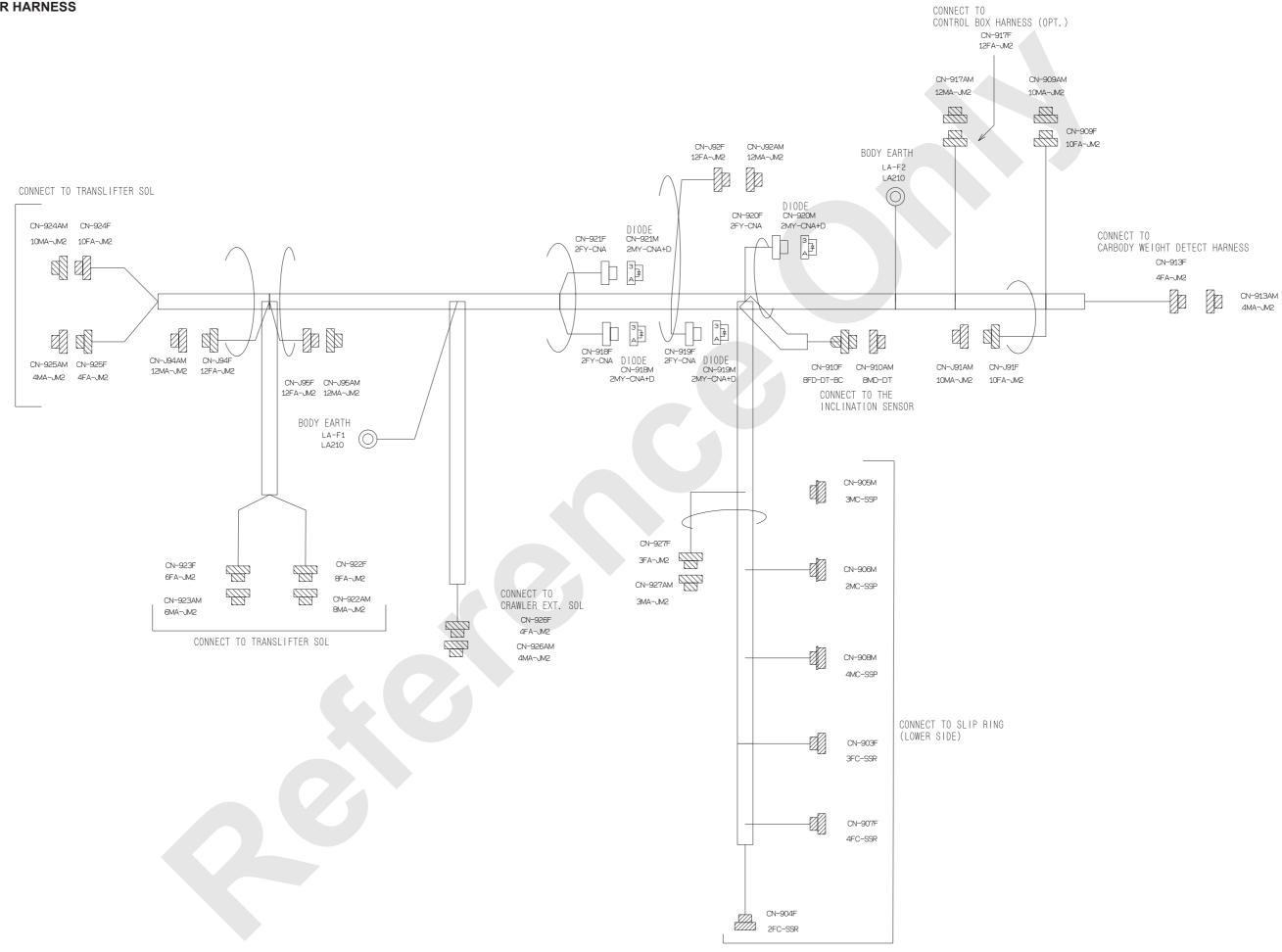


(1/2)

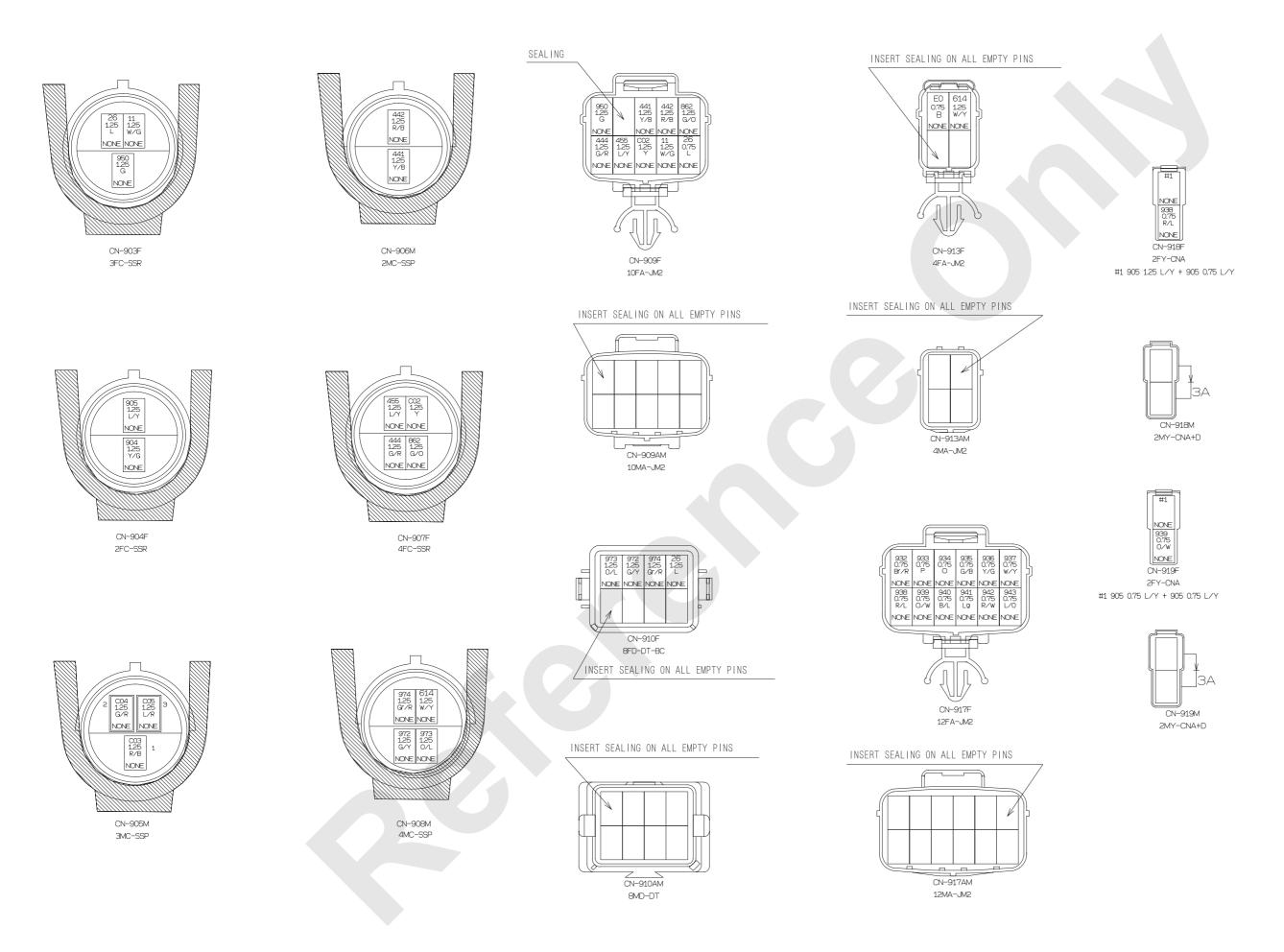


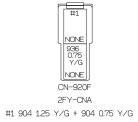
(2/2)





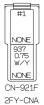
(1/4)



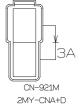




CN-920M 2MY-CNA+D

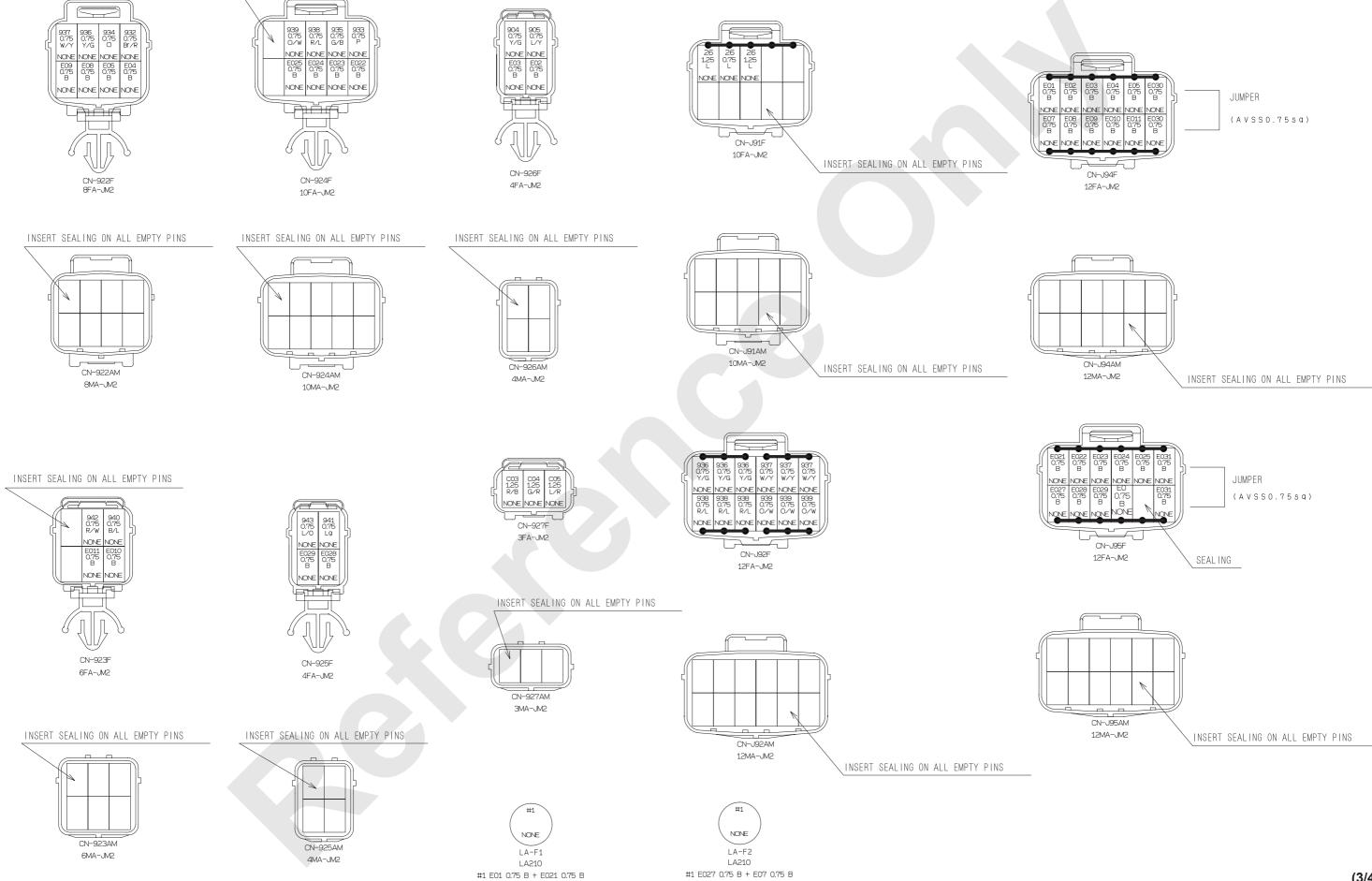


#1 904 0.75 Y/G + 904 0.75 Y/G



#### (2/4)

INSERT SEALING ON ALL EMPTY PINS



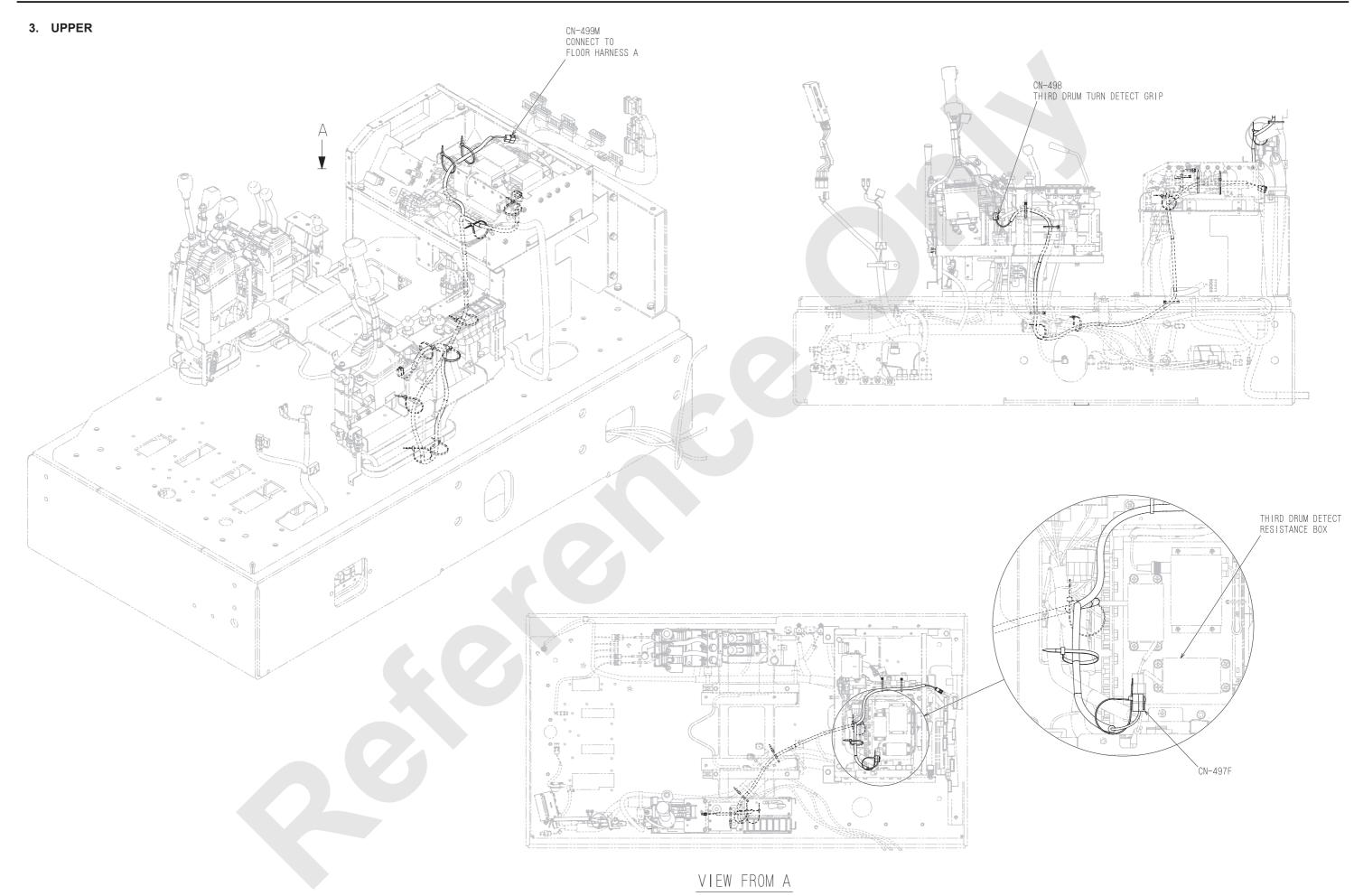
(3/4)

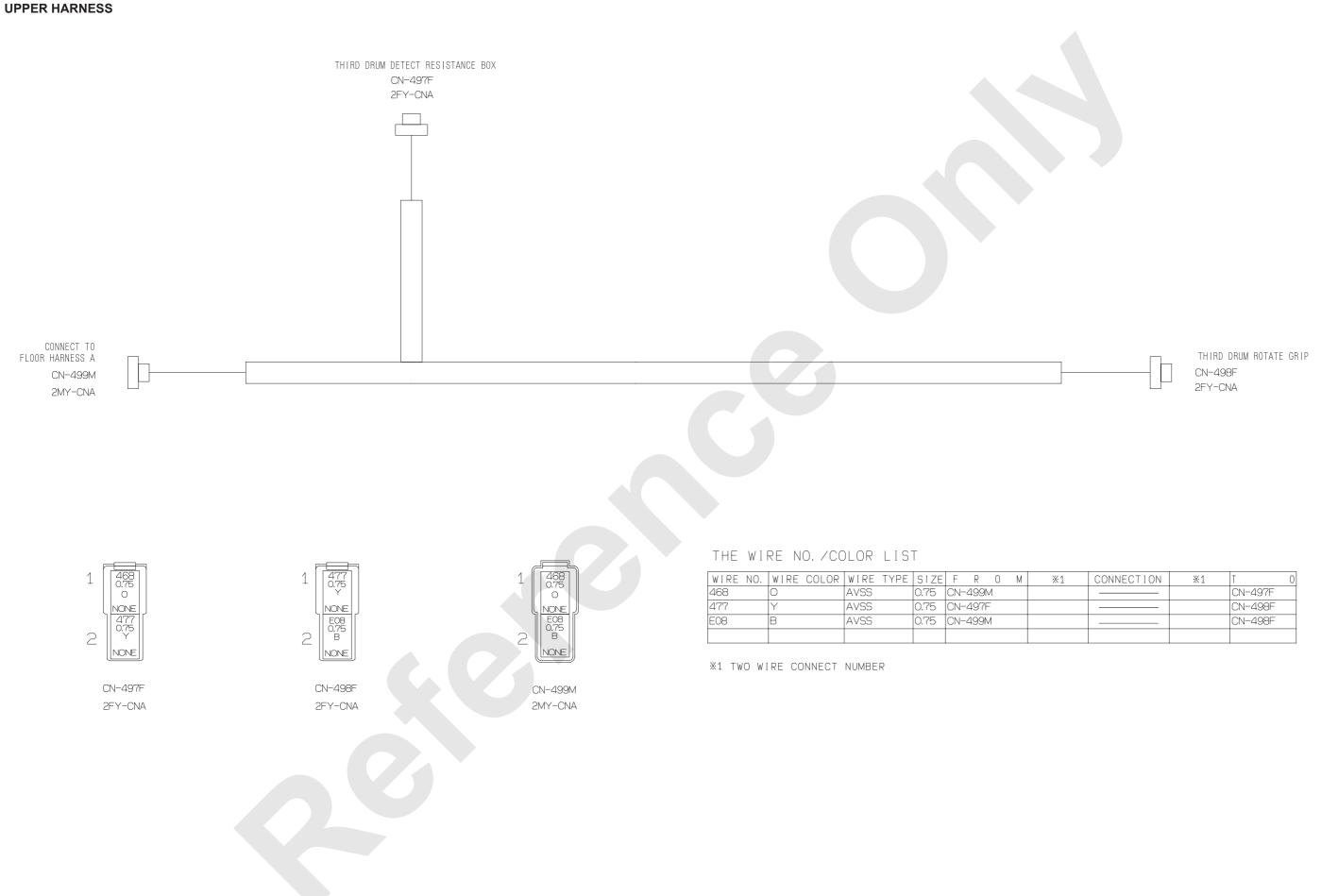
# THE WIRE NO. /COLOR LIST

WIRE NO.	WIRE COLOR	WIRE TYPE	SIZE	FROM	×1	CONNECTION	*1	
11	W/G	AVSS	1.25	CN-909F				CN-903F
26		AVSS	1.25	CN-J91F				CN-903F
26		AVSS	1.25	CN-J91F		+ I		CN-910F
26		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
455	L/Y	AVSS	1.25	CN-907F				CN-909F
614	W/Y	AVSS	1.25	CN-913F				CN-908M
862	G/0	AVSS	1.25	CN-907F				CN-909F
904	Y/G	AVSS	1.25	CN-904F		·•	DS3	CN-920F
904	Y/G	AVSS	0.75	CN-921F	DS4	•	DS3	CN-920F
904	Y/G	AVSS	0.75	CN-921F	DS4			CN-926F
905		AVSS	1.25	CN-904F			DS1	CN-918F
	L/Y				DC2		-	
905	L/Y	AVSS	0.75	CN-919F	DS2	<b>€</b>	DS1	CN-918F
905	L/Y	AVSS	0.75	CN-919F	DS2			CN-926F
932	Br/R	AVSS	0.75	CN-917F				CN-922F
933	Р	AVSS	0.75	CN-917F				CN-924F
934	0	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
936	Y/G	AVSS	0.75	CN-J92F	1			CN-920F
	-	AVSS				+ I		
936	Y/G		0.75	CN-J92F			-	CN-922F
937	W/Y	AVSS	0.75	CN-J92F		<b>↓↑</b>		CN-917F
937	W/Y	AVSS	0.75	CN-J92F		-		CN-921F
937	W/Y	AVSS	0.75	CN-J92F		- <b>é</b>		CN-922F
938	R/L	AVSS	0.75	CN-J92F		- <b>e</b>		CN-917F
938	R/L	AVSS	0.75	CN-J92F		-		CN-918F
938	R/L	AVSS	0.75	CN-J92F		<b></b>		CN-924F
939	0/W	AVSS	0.75	CN-J92F		-		CN-917F
939	0/W	AVSS	0.75	CN-J92F		I		CN-919F
939		AVSS	0.75	CN-J92F		T		CN-924F
	0/W							
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/0	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	0/L	AVSS	1.25	CN-910F				CN-908M
974	Gr/R	AVSS	1.25	CN-910F				CN-908M
C02		AVSS	1.25	CN-907F				CN-909F
	1							
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	В	AVSS	0.75	CN-J94F		• •	DS5	LA-F1
E02	В	AVSS	0.75	CN-J94F		┿─────────		CN-926F
E03	В	AVSS	0.75	CN-J94F		<b>↓</b>		CN-926F
E04	B	AVSS	0.75	CN-J94F				CN-922F
E05	B	AVSS	0.75	CN-J94F	-			CN-922F
	B	AVSS						
E030			0.75	CN-J94F				CN-J94F
E07	В	AVSS	0.75	LA-F2	DS6			CN-J94F
E08	В	AVSS	0.75	CN-922F				CN-J94F
E09	В	AVSS	0.75	CN-922F		<b>│ │ │ ♦</b>		CN-J94F
E010	В	AVSS	0.75	CN-923F				CN-J94F
E011	В	AVSS	0.75	CN-923F				CN-J94F
E021	В	AVSS	0.75	CN-J95F		•	DS5	LA-F1
E022	B	AVSS	0.75	CN-J95F		-		CN-924F
E023	B	AVSS	0.75	CN-J95F				CN-924F
						I		-
E024	B	AVSS	0.75	CN-J95F		I		CN-924F
E025	B	AVSS	0.75	CN-J95F				CN-924F
E031	В	AVSS	0.75	CN-J95F		• •		CN-J95F
E027	В	AVSS	0.75	LA-F2	DS6	► <b>•</b>		CN-J95F
	В	AVSS	0.75	CN-925F		+		CN-J95F
E028	D	1, 1, 00						
E028 E029	B	AVSS	0.75	CN-925F				CN-J95F

%1 TWO WIRE CONNECT NUMBER

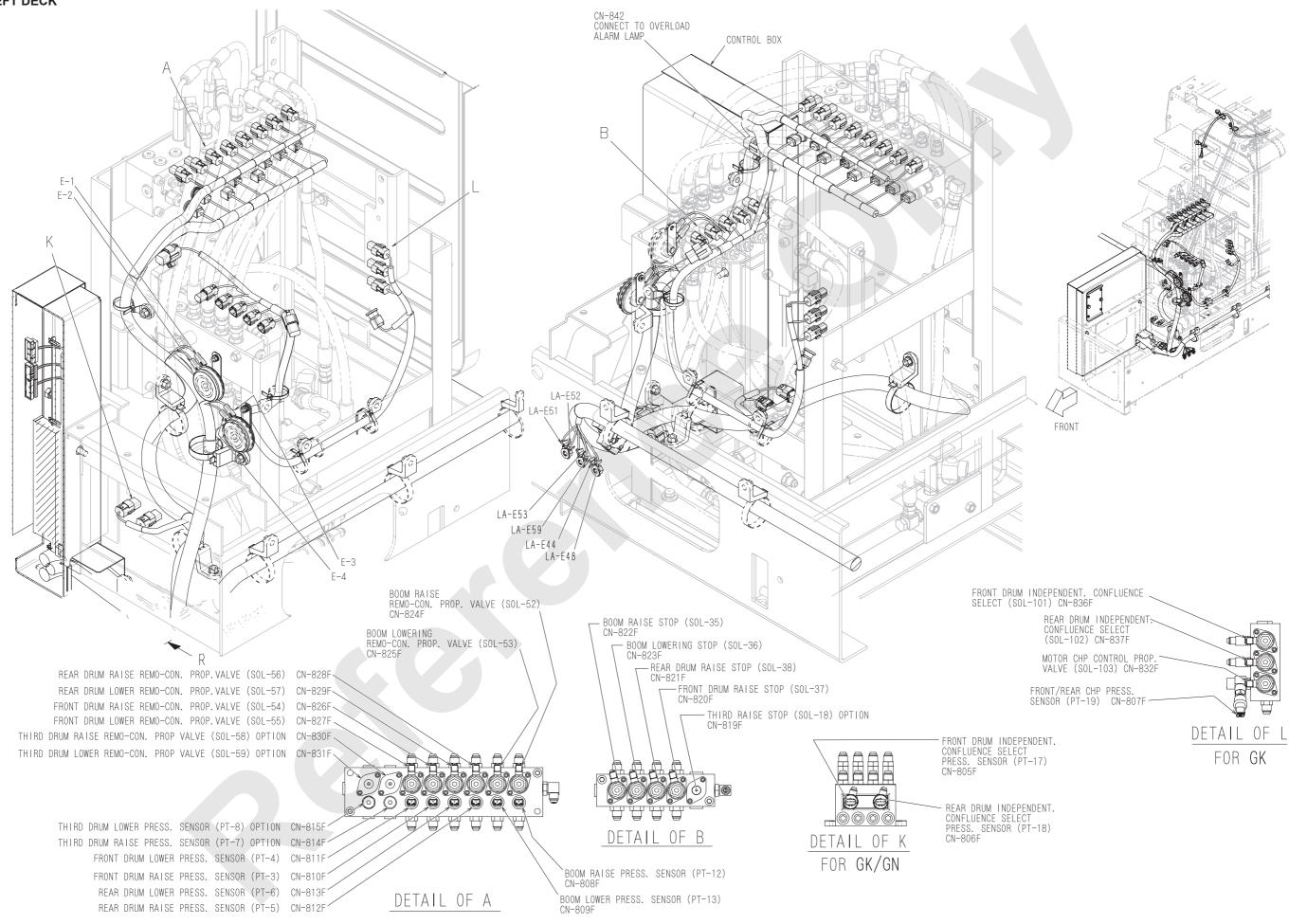
(4/4)

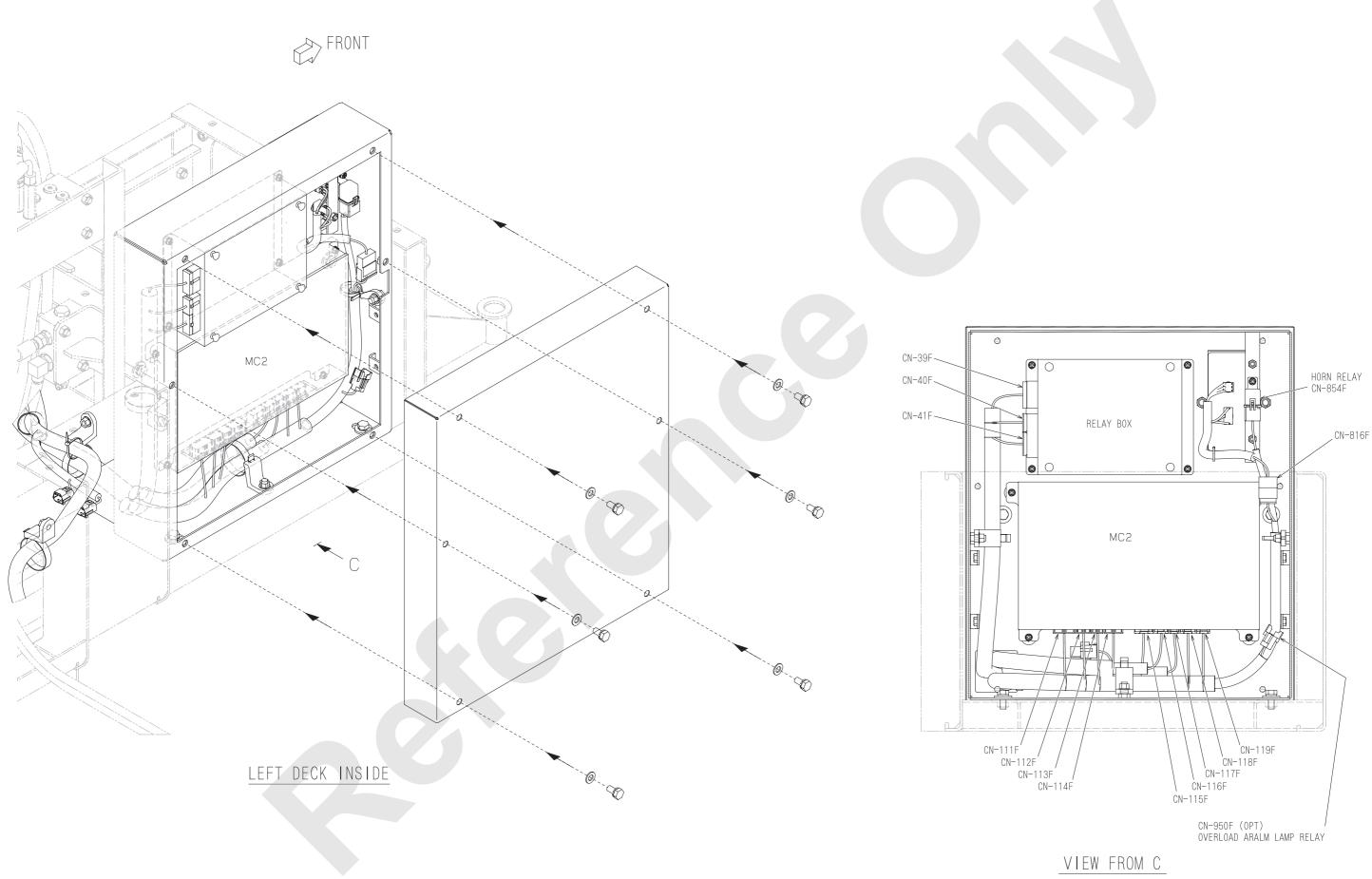




CONNECTION	*1	Т	0
		CN-497F	
		CN-498F	
		CN-498F	



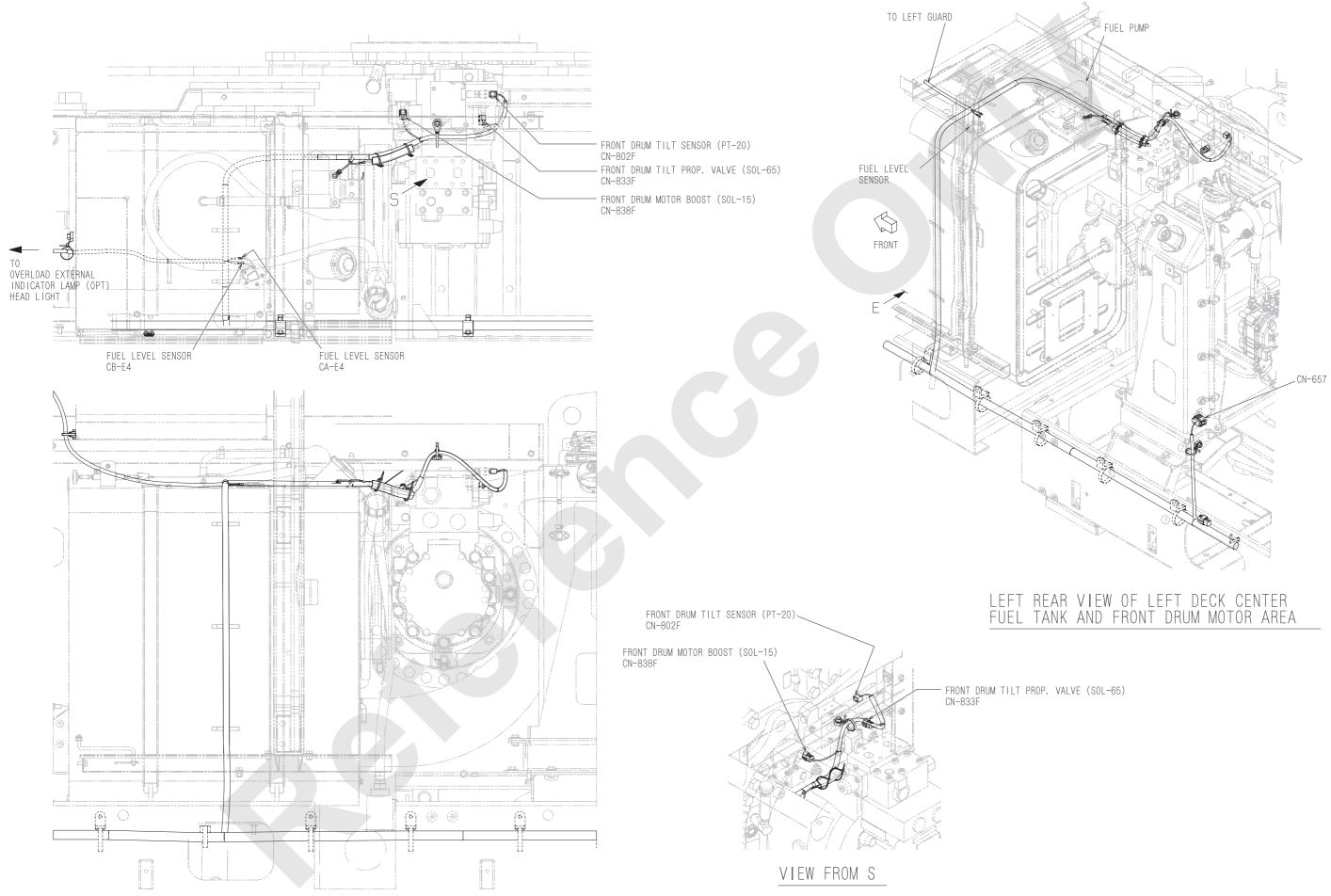




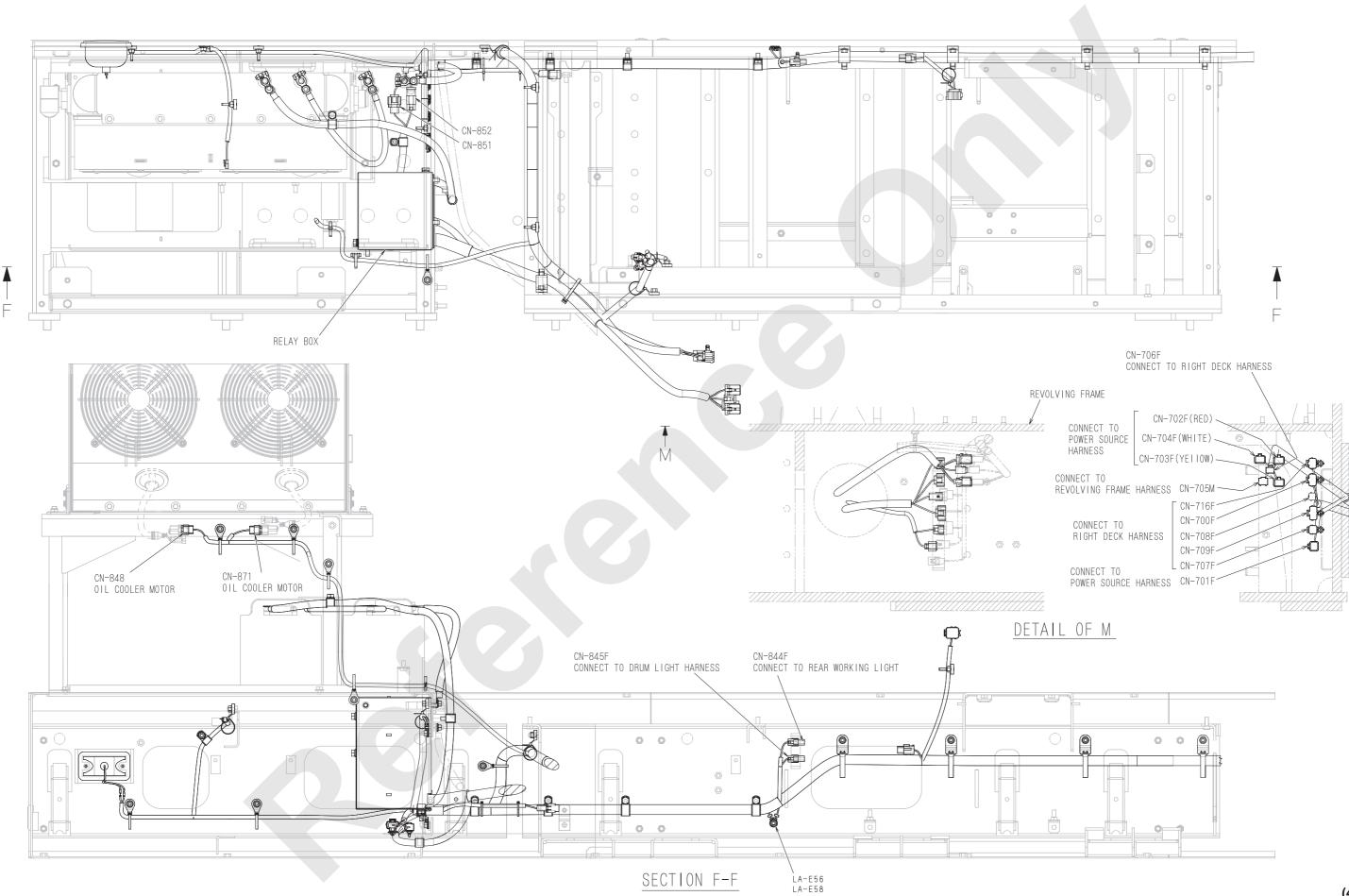
8000-1



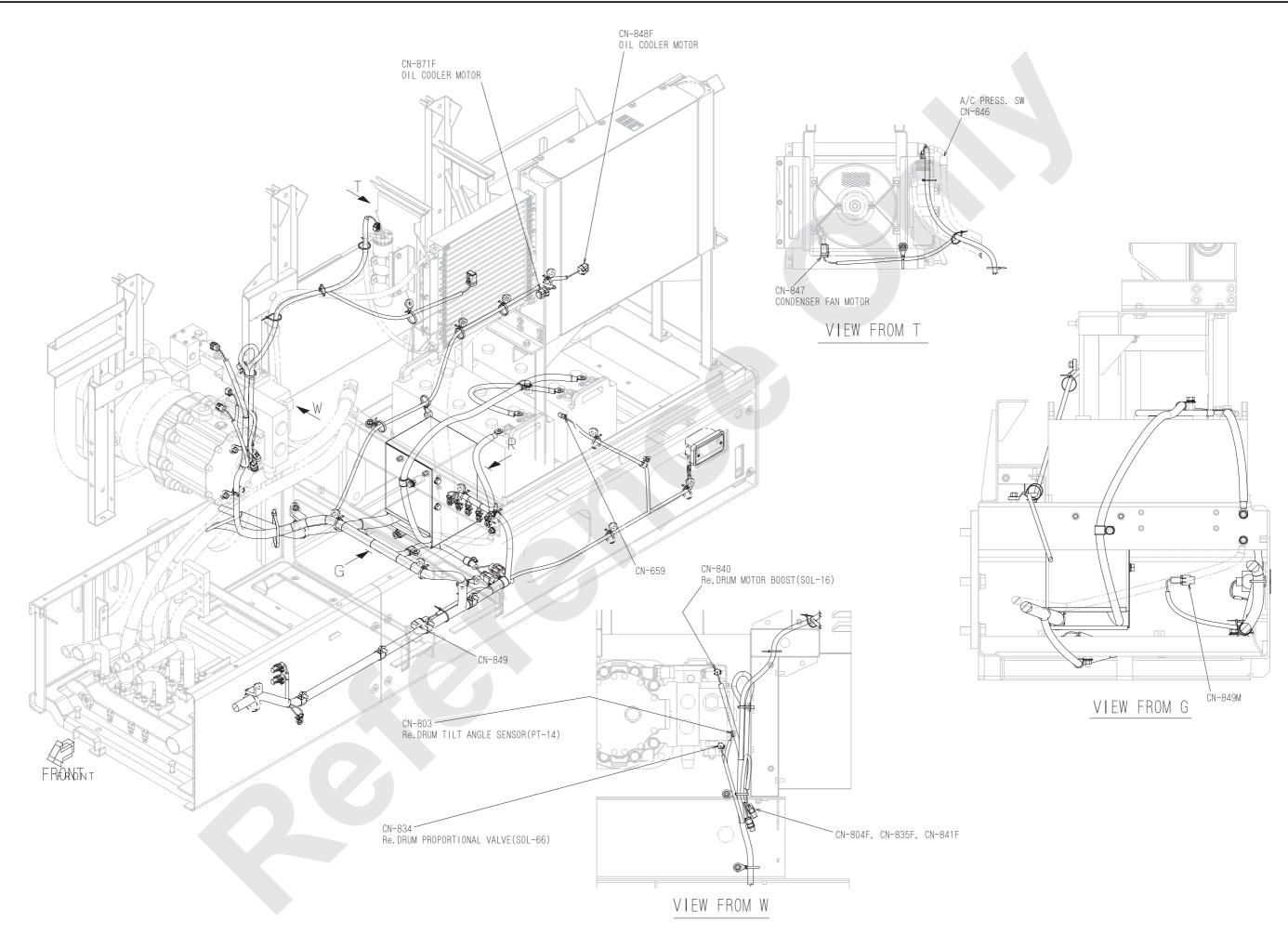
(2/7)

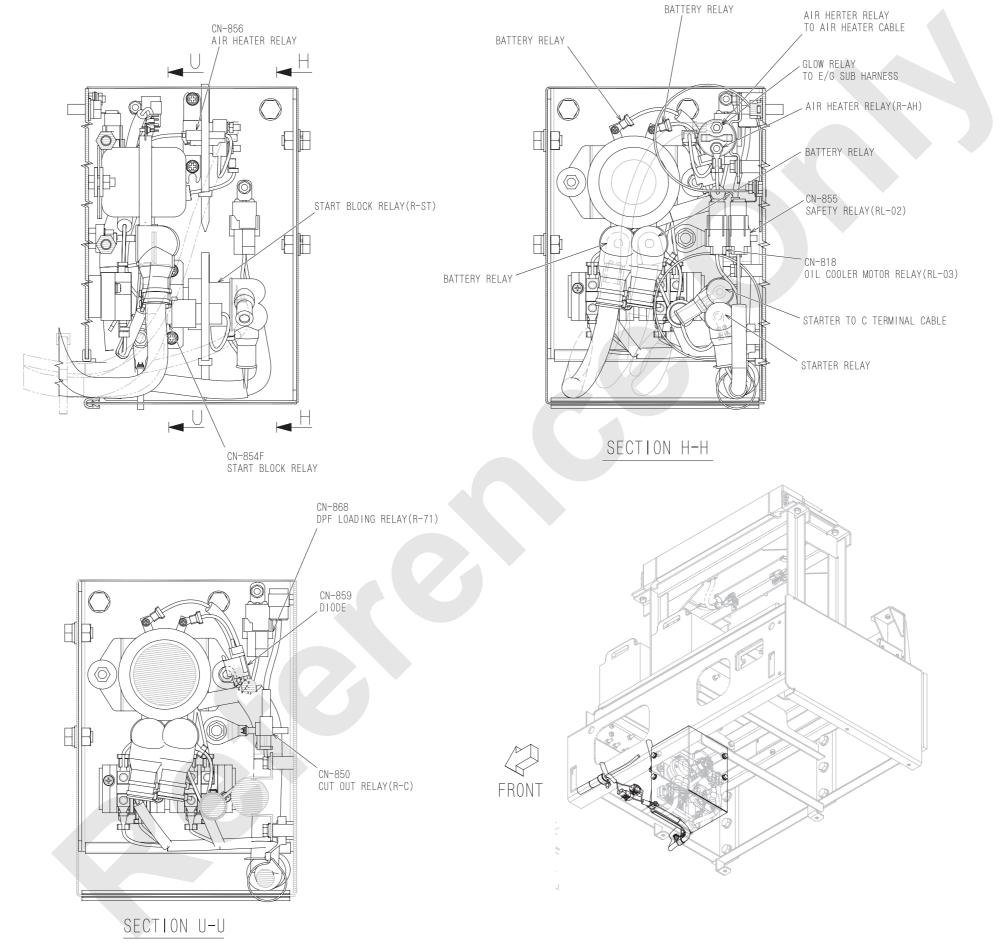


(3/7)

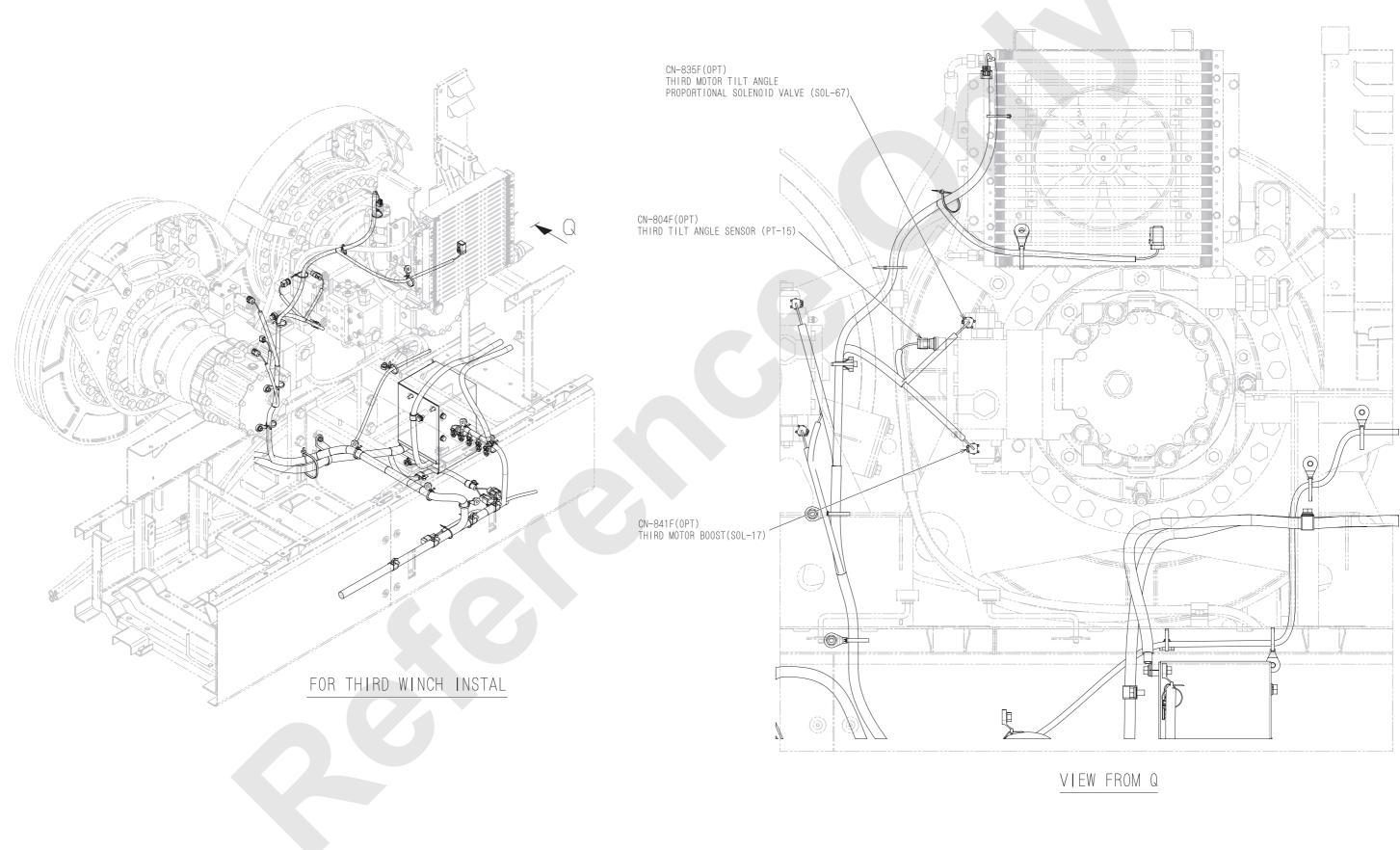


(4/7)

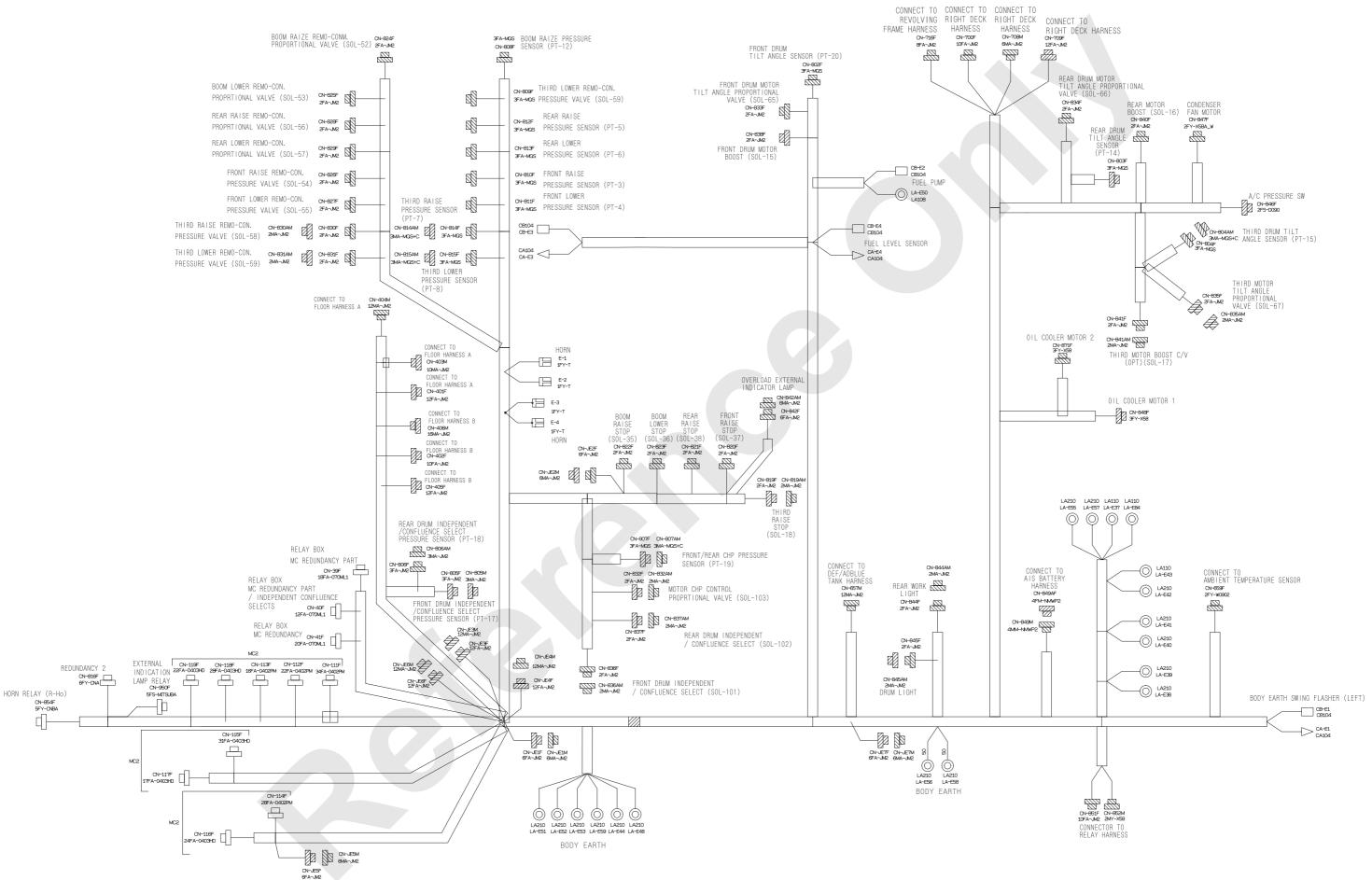




(6/7)

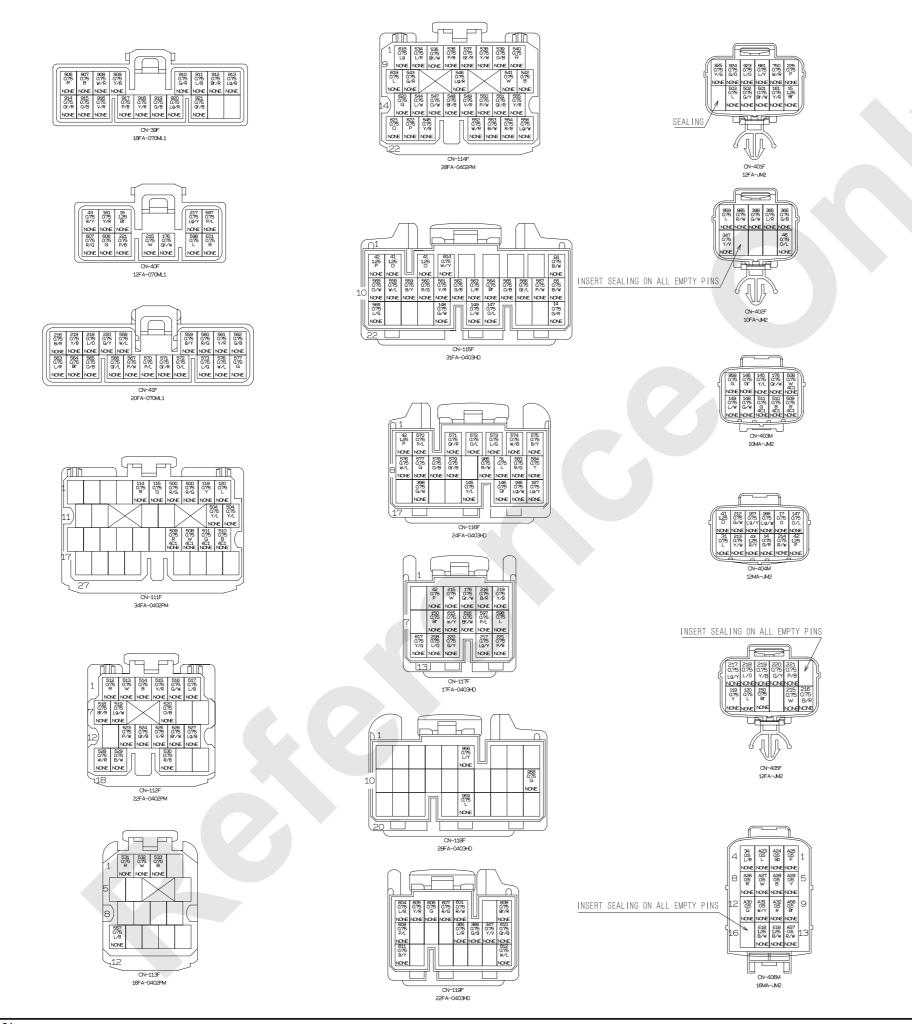


#### MAIN HARNESS



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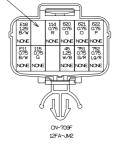
#### (1/5)

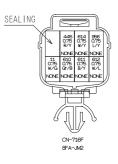


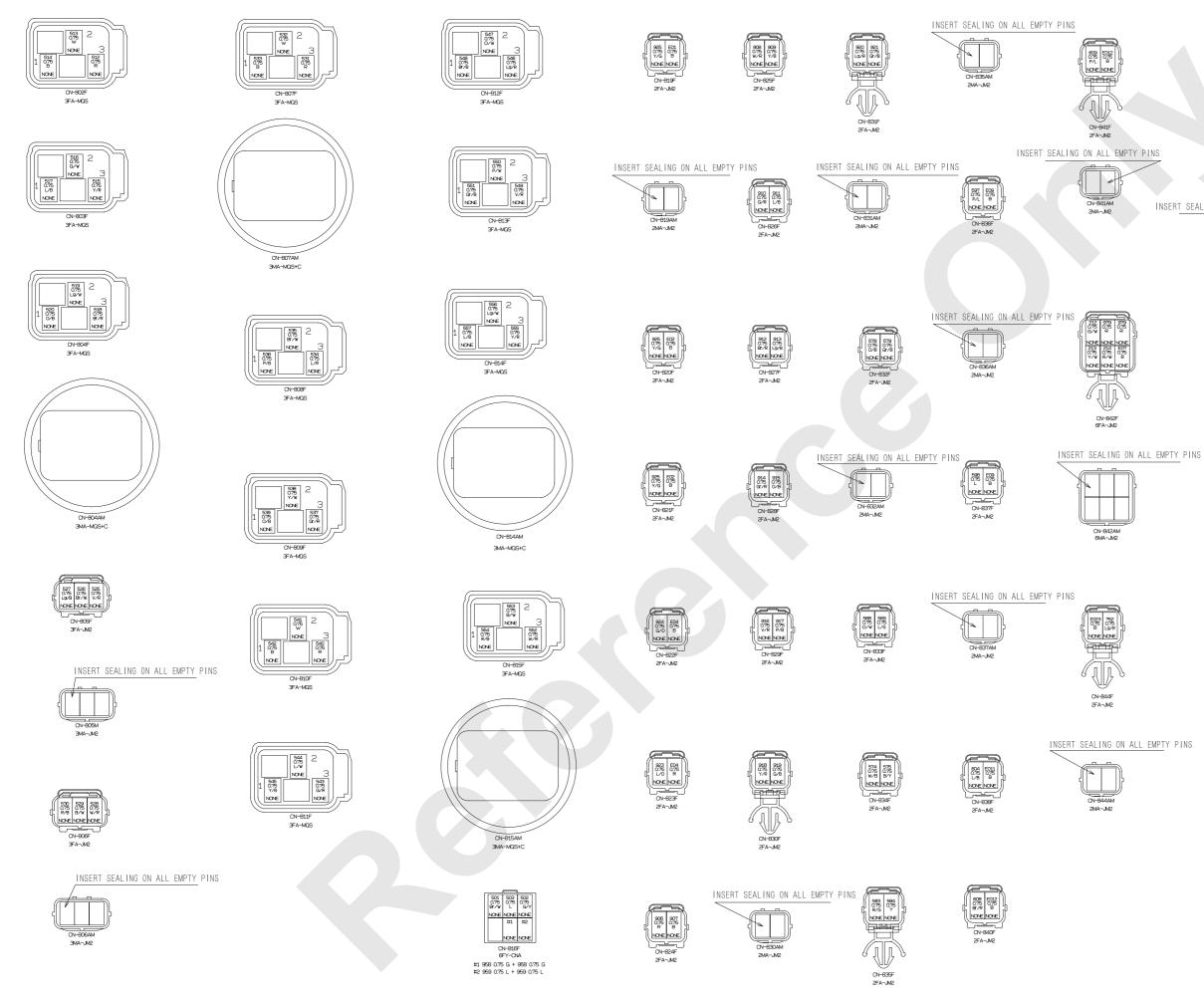
Published 11-10-17, Control #261-01



INSERT SEALING ON ALL EMPTY PINS









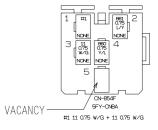
INSERT SEALING ON ALL EMPTY PINS



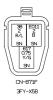












CN-852M 2MY-X58

INSERT SEALING ON ALL EMPTY PINS

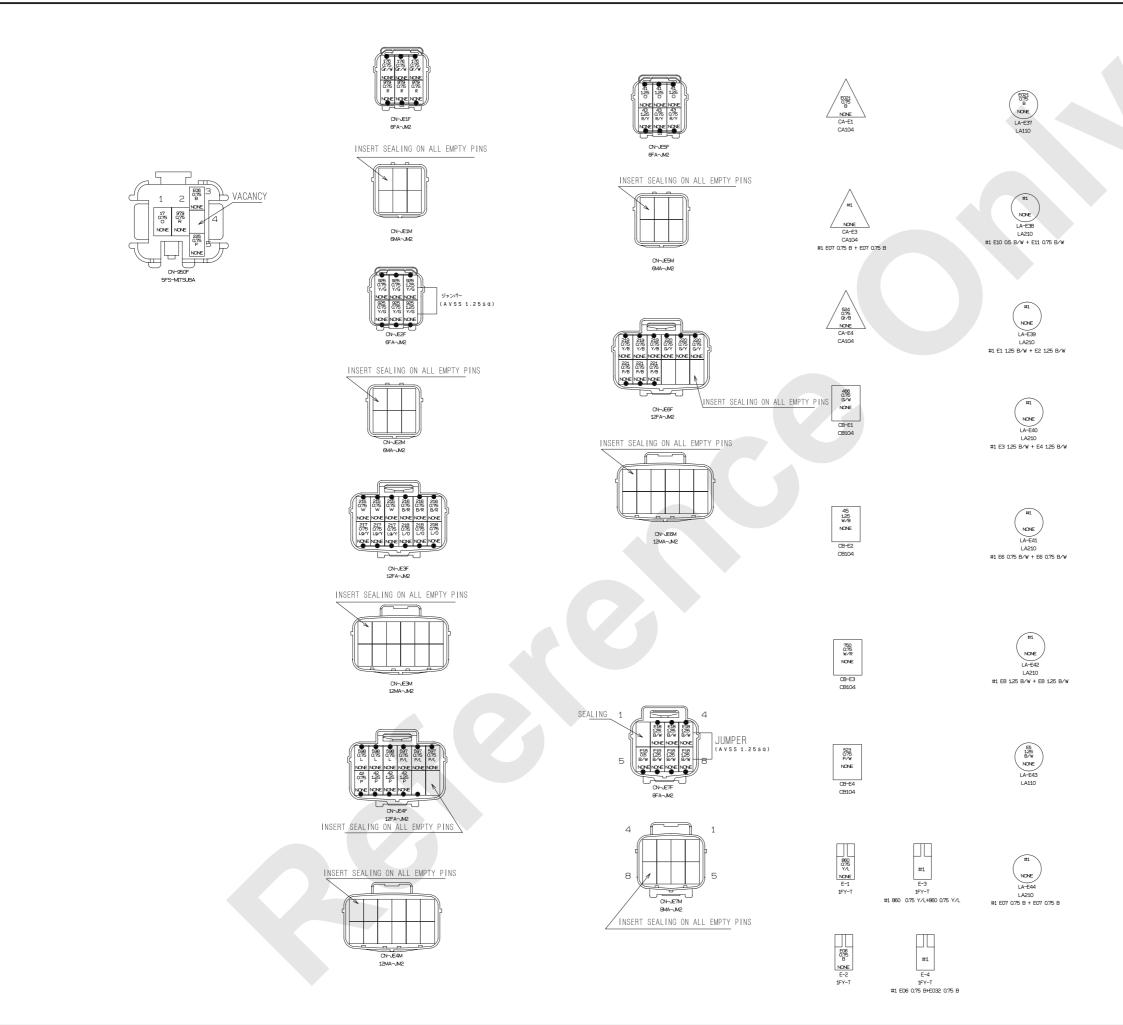
4FM-NMWP2

PULLA

CN-851F 10FA-JM2

SEALING/

(3/5)







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

LA-E57

LA210 #1 E012 0.75 B + E012 0.75 B











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

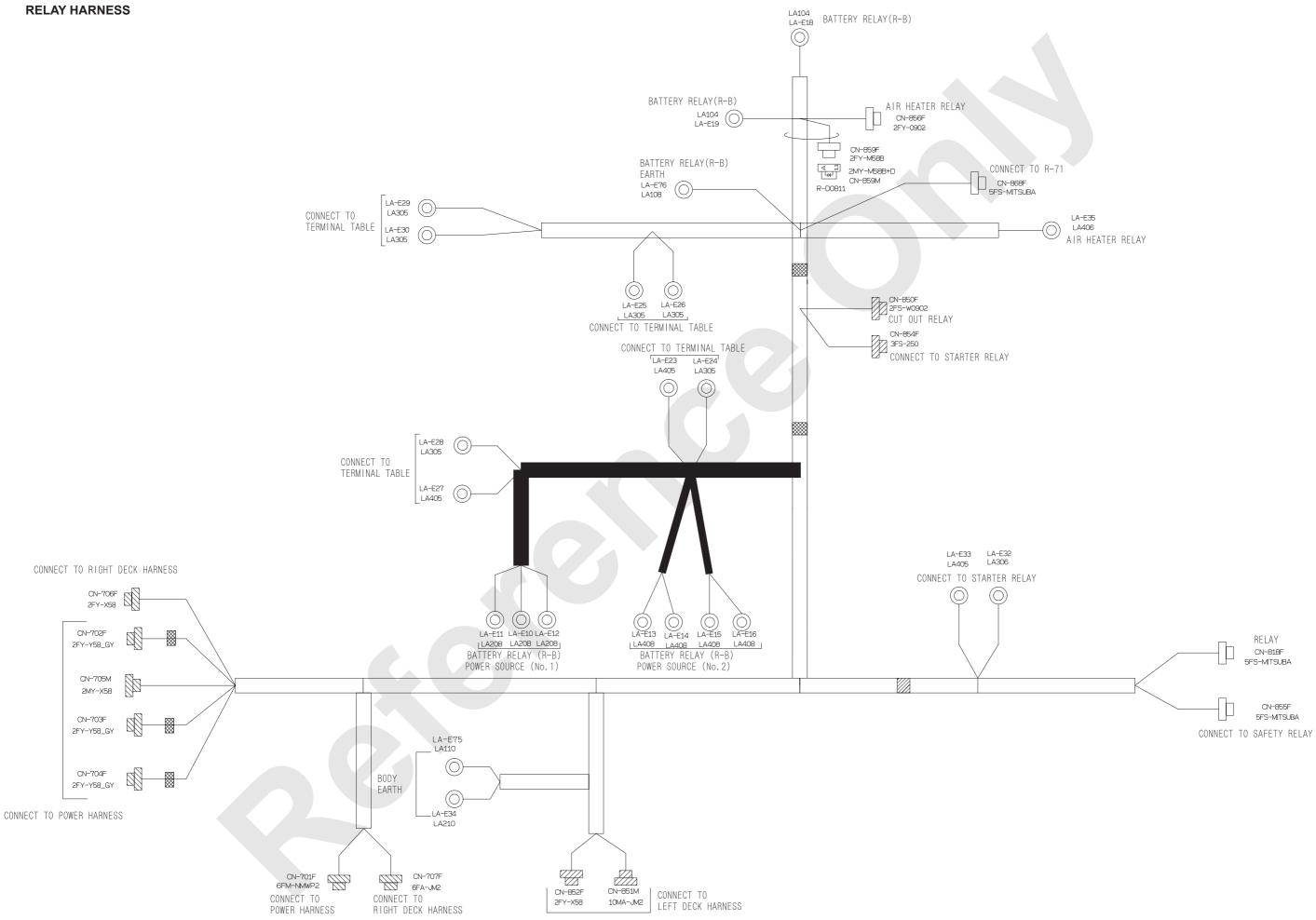


THE WIRE NO./COLOR LIST

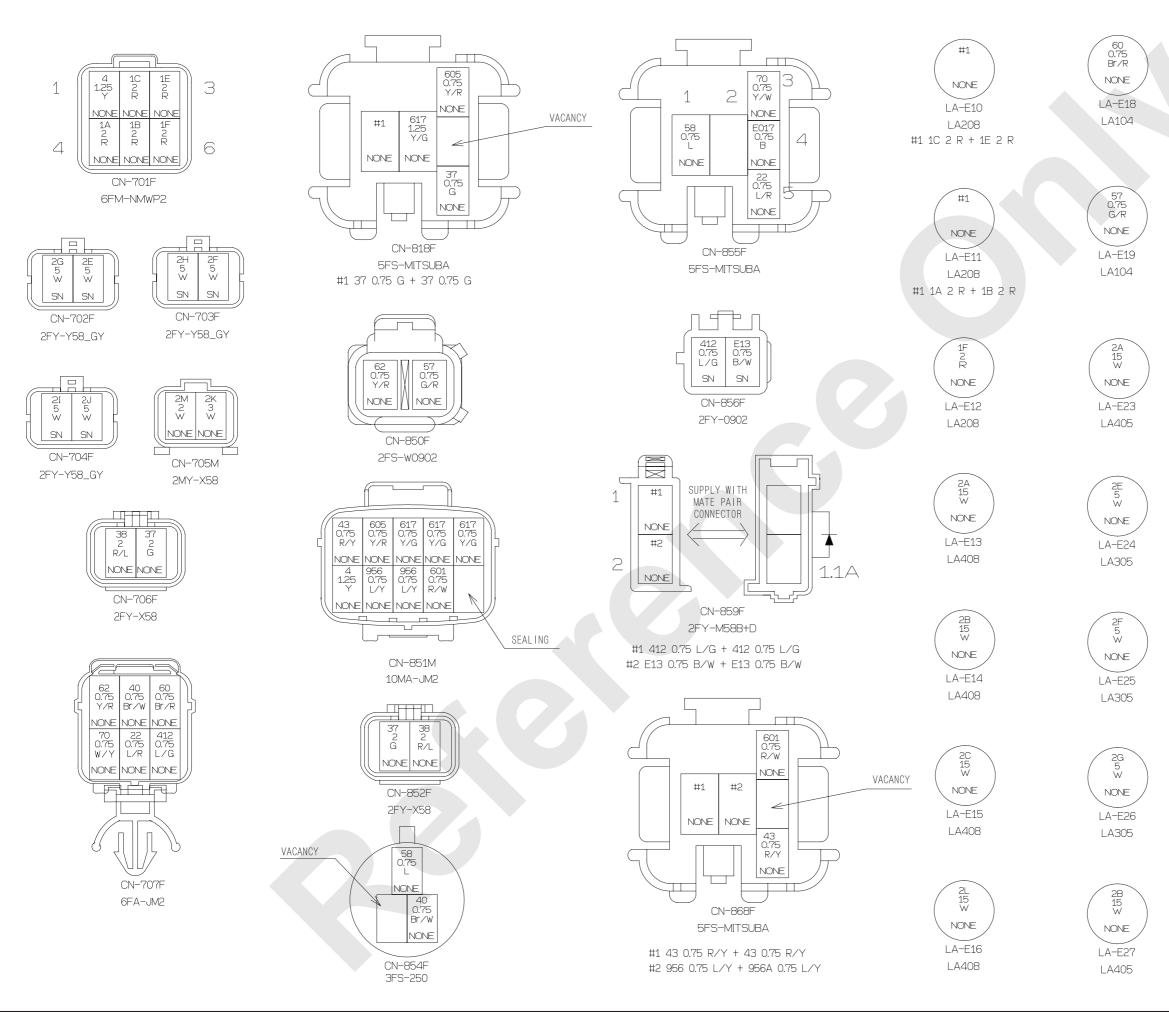
THE WIRE NO./COLOR LIST															
WIRE NO. WIRE COLOR WIRE TYPE SIZE FROM I	. SYMBOL 2WIRE CONNECT NO. CONNECTION 2WIRE CONNECT	TNO. ID. SYMBOL T O		WIRE COLOR	WIRE TYPE SIZE FR	OM ID. SYMBOL	201RE CONNECTION 20	IRE CONNECT NO. I.D. SYM	30L T 0	WIRE	NO. WIRE COLOR	R WIRE TYPE SI	I ZE FROM	ID. SYMBOL	2WIRE CONNEC
4 Y AVSS 1.25 CN-849M		CN-851F			AVSS 0.75 CN-1				CN-813F	908		AVSS 0.7		TWST0.75TW:	
11 W/G AVSS 0.75 CN-854F	DS-E21	CN-716F			AVSS 0.75 CN-1				CN-813F	909	Y/B		75 CN-39F	TWST0.75TW:	
11 W/G AVSS 0.75 CN-854F	DS-E21	CN-854F			AVSS 0.75 CN-1				CN-813F	910	G/R	AVSS 0.7		TWST0.75TW1	
14 G/R AVSS 0.75 CN-115F		CN-404M			AVSS 0.75 CN-1				CN-815F	911	L/B	AVSS 0.7		TWST0.75TW1	
15 Br AVSS 1.25 CN-40F		CN-401F			AVSS 0.75 CN-1				CN-815F	912		AVSS 0.7		TWST0.75TW1 TWST0.75TW1	
17 O AVSS 0.75 CN-404M		CN-950F			AVSS 0.75 CN-1				CN-815F	913	Lg/B	AVSS 0.7			
31 L AVSS 0.75 CN-116F 34 L/R AVSS 0.5 CN-406M		CN-404M CN-657M			AVSS 0.75 CN-1 AVSS 0.75 CN-1				CN-814F CN-814F	914 915		AVSS 0.1 AVSS 0.1	75 CN-39F	TWST0.75TW1 TWST0.75TW1	
37 G AVS 2 CN-848F		CN-852M			AVSS 0.75 CN-1 AVSS 0.75 CN-1				CN-814F	915		AVSS 0.1		TWST0.75TW1	
38 R/L AVS 2 CN-871F		CN-852M			AVSS 0.75 CN-JE				CN-117F	910	P/B		75 CN-39F	TWST0.75TW1	
41 O AVSS 1.25 CN-JE5F		CN-404M			AVSS 0.75 CN-JE				CN-836F	918	Y/R		75 CN-39F	Twsto.75Tw1	
41 O AVSS 1.25 CN-JE5F		CN-115F			AVSS 0.75 CN-JE				CN-40F	919	G/B	AVSS 0.7		TWST0.75TW1	
41 O AVSS 1.25 CN-JE5F		CN-115F	598		AVSS 0.75 CN-JE				CN-40 CN-117F	920		AVSS 0.1		TWST0.75TW1	
42 P AVSS 1.25 CN-JE4F		CN-404M	598		AVSS 0.75 CN-JE				CN-837F	921	Gr/B	AVSS 0.7		TWST0.75TW1	
42 P AVSS 0.75 CN-JE4F		CN-117F	598		AVSS 0.75 CN-JE				CN-40F	A56	Br		5 CN-406M		
42 P AVSS 1.25 CN-JE4F		CN-116F			AVSS 0.75 CN-8		• •		CN-119F	A57	R/W		5 CN-406M		
42 P AVSS 1.25 CN-JE4F		CN-115F			AVSS 0.75 CN-1				CN-838F		10 11				-
43 R/Y AVSS 1.25 CN-JE5F		CN-404M			AVSS 0.75 CN-1				CN-851F	508	W	MVVS Of	75 CN-403M	MVVS4C1	-
43 R/Y AVSS 0.75 CN-JE5F		CN-40F			AVSS 0.75 CN-1				CN-40F	509	R		75 CN-403M		+
43 R/Y AVSS 0.75 CN-JE5F		CN-851F			AVSS 0.75 CN-1				CN-40F	510	B		75 CN-403M		+
45 W/B AVSS 1.25 CN-709F		CB-E2			AVSS 0.75 CN-1				CN-840F	511			75 CN-403M		+
46 0/L AVSS 0.75 CN-849M		CN-402F			AVSS 0.75 CN-1				CN-841F		_				+
145 Y/L AVSS 0.75 CN-116F		CN-403M	610	Gr/B	AVSS 0.75 CN-7	16F			CN-119F						-
146 Gr AVSS 0.75 CN-116F		CN-403M			AVSS 0.75 CN-7	16F			CN-119F	E01	В	AVSS 0.7	75 LA-E51		DS-E14
147 0/L AVSS 0.75 CN-115F		CN-404M	612	W/L	AVSS 0.75 CN-7	16F			CN-119F	E01	В	AVSS 0.7	75 LA-E51		DS-E14
148 G/W AVSS 0.75 CN-115F		CN-403M	614	W/Y	AVSS 0.75 CN-1:	15F			CN-716F	E02	В	AVSS 0.7	75 CN-820F		
149 L/W AVSS 0.75 CN-115F		CN-403M	615	w/Y	AVSS 0.75 CN-7	DOF			CN-117F	E02	В	AVSS 0.7	75 CN-821F		
150 Br AVSS 0.75 CN-117F		CN-405F	616	Br∕W	AVSS 0.75 CN-7	DOF			CN-117F	E04	В		75 LA-E53		DS-E2
161 Y/R AVSS 0.75 CN-401F		CN-40F	617		AVSS 0.75 CN-8				CN-848F	E04			75 LA-E53		DS-E2
166 Lg/W AVSS 0.75 CN-404M		CN-116F			AVSS 0.75 CN-8				CN-871F	E06	В	AVSS 0.7			
167 Lg/Y AVSS 0.75 CN-404M		CN-116F			AVSS 0.75 CN-8				CN-117F	E06			75 LA-E48		DS-E31
176 Gr/w AVSS 0.75 CN-JE1F		CN-403M			AVSS 0.75 CN-7				CN-114F	E06			75 LA-E48		DS-E31
176 Gr/W AVSS 0.75 CN-JE1F	<b>†</b>	CN-40F	619		AVSS 0.75 CN-7				CN-114F	E07			75 LA-E50		
176 Gr/W AVSS 0.75 CN-JE1F		CN-117F			AVSS 0.75 CN-7				CN-114F	E07	_		75 CA-E3		DS-E24
212 G/W AVSS 0.75 CN-842F		CN-404M			AVSS 0.75 CN-1				CN-709F	E07	B	AVSS 0.7		_	DS-E24
213 Y/W AVSS 0.75 CN-842F		CN-404M	UCC		AVSS 0.75 CN-1				CN-709F	E09			75 CN-837F	_	
214 R/W AVSS 0.75 CN-842F		CN-404M			AVSS 0.75 CN-4				CB-E3	E09			75 CN-836F	_	-
215 W AVSS 0.75 CN-405F 215 W AVSS 0.75 CN-40F	<b>T</b>	CN-JE3F			AVSS 0.75 CN-8				CN-709F	E011 E011			CN-871F 75 CN-838F		
		CN-JE3F			AVSS 0.75 CN-8				CN-709F	E011 E012			75 LA-E57		DC_E22
215 W AVSS 0.75 CN-117F		CN-JE3F CN-JE3F			AVSS 1.25 CN-8				CN-700F	E012			75 LA-E57		DS-E23 DS-E23
216 B/R AVSS 0.75 CN-405F 216 B/R AVSS 0.75 CN-41F			812		AVSS 1.25 CN-8 AVS 1.25 CN-7				CN-847F	E012			25 CN-847F		03-623
216 B/R AVSS 0.75 CN-117F		CN-JE3F CN-JE3F			AVS 0.75 CN-8			S-E29	E-3	E019		AVS 2			
217 Lg/Y AVSS 0.75 CN-405F		ON-JE3F			AVSS 0.75 E-1	э <del>ч</del> г		S-E29	E-3	E021			75 LA-E37		
217 Lg/Y AVSS 0.75 CN-40F		ON-JE3F			AVSS 0.75 CN-8	5/IF		5 125	CN-401F	E023			75 CN-845F		+
217 Lg/Y AVSS 0.75 CN-117F		CN-JE3F			AVSS 0.75 CN-8				CN-401F	E023			75 CN-844F		-
218 L/O AVSS 0.75 CN-405F		CN-JE3F			AVSS 0.75 CN-8				CN-401F	E1	B/W		25 LA-E39		DS-E10
218 L/O AVSS 0.75 CN-41F		CN-JE3F			AVSS 0.75 CN-J				CN-819F	E2	B/W		25 LA-E39		DS-E10
218 L/O AVSS 0.75 CN-117F		CN-JE3F			AVSS 0.75 CN-J				CN-820F	E3	B/W		25 CN-708M	1	
219 Y/B AVSS 0.75 CN-405F		CN-JE6F			AVSS 1.25 CN-J		1		CN-JE2F	E4	B/W		25 CN-708M		+
219 Y/B AVSS 0.75 CN-41F	↓↓	CN-JE6F			AVSS 0.75 CN-8				CN-JE2F	E5	B/W		25 CN-708M		+
219 Y/B AVSS 0.75 CN-117F	<b>_</b>	CN-JE6F			AVSS 0.75 CN-4				CN-JE2F	E6	B/W	AVSS 0.7			DS-E3
220 G/Y AVSS 0.75 CN-405F		CN-JE6F	956	L/Y	AVSS 0.75 CN-1	18F			CN-851F	E6	B∕W	AVSS 0.7	75 LA-E41		DS-E3
220 G/Y AVSS 0.75 CN-41F	<b>↓</b>	CN-JE6F	956	L/Y	AVSS 0.75 CN-7	16F			CN-851F	E8	B∕W	AVSS 12	25 CN-700F		-
220 G/Y AVSS 0.75 CN-117F		CN-JE6F	958	G	AVSS 0.75 CN-1	18F	D	S-E23	CN-816F	E8	B∕W	AVSS 12	25 CN-700F		
221 P/B AVSS 0.75 CN-405F	<b>♦</b>	CN-JE6F	958	G	AVSS 0.75 CN-4	03F		S-E23	CN-816F	E10	B∕W		5 LA-E38		DS-E9
221 P/B AVSS 0.75 CN-40F	<b>♦</b>	CN-JE6F	959	L	AVSS 0.75 CN-1	18F		S-E24	CN-816F	E11	B∕W	AVSS 0.7	75 LA-E38		DS-E9
221 P/B AVSS 0.75 CN-117F	<b>♦</b>	CN-JE6F	959	L	AVSS 0.75 CN-4	02F		S-E24	CN-816F	E18	B∕W	AVSS 12	25 CN-406M		
225 P AVSS 0.75 CN-401F		CN-950F	979	R	AVSS 0.75 CN-9	50F	<b>──</b>		CN-JE1F	E18	B∕W		25 CN-406M		
347 Y/V AVSS 0.75 CN-119F		CN-402F	0.0		AVSS 0.75 CN-8		· · · · • ·		CN-JE1F	E18	B∕W		25 CN-JE7F		_
365 L/R AVSS 0.75 CN-119F		CN-402F	010		AVSS 0.75 CN-8		•		CN-JE1F	E18	B∕W		5 CN-JE7F		_
366 G/B AVSS 0.75 CN-119F		CN-402F			AVSS 0.75 CN-4				CN-116F	E18			25 CN-JE7F		
398 G/W AVSS 0.75 CN-402F		CN-116F	A23		AVSS 0.5 CN-4				CN-657M	E18	B/W	AV55 12	25 CN-JE7F		
445 R/Y AVSS 0.75 CN-716F 466 G/W AVSS 0.75 CB-E1		CN-849M CN-700F	A24 A25		AVSS 0.5 CN-4 AVSS 0.5 CN-4				CN-657M						
466 G/W AVSS 0.75 CB-E1 500 R/G AVSS 0.75 CN-111F		CN-111F			AVSS 0.5 CN-4				CN-657M CN-657M						
501 Br/w AVSS 0.75 CN-816F		CN-401F			AVSS 0.5 CN-4				CN-657M						
502 G/Y AVSS 0.75 CN-401F		CN-816F			AVSS 0.5 CN-4				CN-657M						
503 L AVSS 0.75 CN-816F		CN-401F	A29		AVSS 0.5 CN-4				CN-657M						
504 Y/L AVSS 0.75 CN-111F		CN-111F			AVSS 0.5 CN-4				CN-657M	1					
512 R AVSS 0.75 CN-112F		CN-802F			AVSS 0.5 CN-4				CN-659F	1					
513 W AVSS 0.75 CN-112F		CN-802F	A32		AVSS 0.5 CN-4				CN-659F	1					
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			AVSS 0.75 CN-7				5TW2 CN-111F						
518 Br/R AVSS 0.75 CN-112F		CN-804F			AVSS 0.75 CN-7				5TW2 CN-111F						
519 Lg/w AVSS 0.75 CN-112F		CN-804F			AVSS 0.75 CN-1				TW3 CN-405F						
520 0/B AVSS 0.75 CN-112F		CN-804F	120		AVSS 0.75 CN-1				TW3 CN-405F						
523 P/W AVSS 0.75 CB-E4		CN-112F			AVSS 0.75 CN-1				TW1 CN-41F						
524 Gr/B AVSS 0.75 CA-E4 525 V/R AVSS 0.75 CN-112F		CN-112F CN-805F			AVSS 0.75 CN-1				TW1 CN-41F						
525 V/R AVSS 0.75 CN-112F 526 Br/w AVSS 0.75 CN-112F		CN-805F			AVSS 0.75 CN-1				TW4 CN-41F						
527 Lg/B AVSS 0.75 CN-112F		CN-805F			AVSS 0.75 CN-1 AVSS 0.75 CN-1				TW3 CN-41F						
528 W/R AVSS 0.75 CN-112F		CN-806F			AVSS 0.75 CN-1 AVSS 0.75 CN-1				TW5 CN-41F						
529 B/W AVSS 0.75 CN-112F		CN-806F			AVSS 0.75 CN-1				TW6 CN-41F	1					
		CN-806F			AVSS 0.75 CN-1				TW6 CN-41F	1					
530 R/B AVSS 0.75 CN-112F		CN-807F			AVSS 0.75 CN-1				TW7 CN-41F	1					
530 R/B AVSS 0.75 CN-112F 531 R AVSS 0.75 CN-113F		CN-807F			AVSS 0.75 CN-1				TW7 CN-41F	1					
		CN-807F			AVSS 0.75 CN-1				Tw20 CN-833F						
531 R AVSS 0.75 CN-113F			569		AVSS 0.75 CN-1				Tw20 CN-833F						
531 R AVSS 0.75 CN-113F 532 W AVSS 0.75 CN-113F		CN-808F													
531         R         AVSS         0.75         CN-113F           532         W         AVSS         0.75         CN-113F           533         B         AVSS         0.75         CN-113F           534         L/R         AVSS         0.75         CN-114F           535         Br/W         AVSS         0.75         CN-114F				P/L	AVSS 0.75 CN-1			1₩310.1.	TW8 CN-41F						
531         R         AVSS         0.75         0.N-113F           532         W         AVSS         0.75         0.N-113F           533         B         AVSS         0.75         0.N-113F           534         L/R         AVSS         0.75         0.N-114F           535         Br/W         AVSS         0.75         0.N-114F           536         Pr/W         AVSS         0.75         0.N-114F		CN-808F CN-808F CN-808F	570		AVSS 0.75 CN-1	16F TWST0.75TW8	XXXC		TW8 CN-41F						
531         R         AVSS         0.75         CN-113F           532         W         AVSS         0.75         CN-113F           533         B         AVSS         0.75         CN-113F           534         L/R         AVSS         0.75         CN-114F           535         Br/W         AVSS         0.75         CN-114F           536         Br/W         AVSS         0.75         CN-114F           536         P/B         AVSS         0.75         CN-114F           537         Gr/R         AVSS         0.75         CN-114F		CN-808F CN-808F CN-808F CN-808F CN-809F	570 571	Gr/R		16F TWST0.75TW8 16F TWST0.75TW9		TWST0.7 TWST0.7	TW8 CN-41F						
531         R         AVSS         0.75         CN-113F           532         W         AVSS         0.75         CN-113F           533         B         AVSS         0.75         CN-113F           534         L/R         AVSS         0.75         CN-113F           535         Br/W         AVSS         0.75         CN-114F           536         P/B         AVSS         0.75         CN-114F           536         P/B         AVSS         0.75         CN-114F           537         Gr./R         AVSS         0.75         CN-114F           537         Gr./R         AVSS         0.75         CN-114F           538         Y/W         AVSS         0.75         CN-114F		CN-808F CN-808F CN-808F CN-809F CN-809F CN-809F	570 571 572	Gr/R 0/L L/G	AVSS 0.75 CN-1 AVSS 0.75 CN-1 AVSS 0.75 CN-1	16F         TwST0.75Tw8           16F         TwST0.75Tw9           16F         TwST0.75Tw9		TWST0.75 TWST0.75 TWST0.75	5TW8 CN-41F 5TW9 CN-41F 5TW9 CN-41F						
531         R         AVSS         0.75         0.N-113F           532         W         AVSS         0.75         0.N-113F           533         B         AVSS         0.75         0.N-113F           534         L/R         AVSS         0.75         0.N-113F           535         Br/W         AVSS         0.75         0.N-114F           536         Pr/W         AVSS         0.75         0.N-114F           537         Gr/R         AVSS         0.75         0.N-114F           538         P/W         AVSS         0.75         0.N-114F           539         O/R         AVSS         0.75         0.N-114F           539         O/R         AVSS         0.75         0.N-114F		CN-808F CN-808F CN-808F CN-809F CN-809F CN-809F	570 571 572 573 574	Gr/R O/L L/G W/B	AVSS         0.75         CN-1	16F         TwST0.75Tw8           16F         TwST0.75Tw9           16F         TwST0.75Tw9           16F         TwST0.75Tw9           16F         TwST0.75Tw9		TwST0.75 TWST0.75 TwST0.75 TwST0.75	5TW8 CN-41F 5TW9 CN-41F 5TW9 CN-41F 5TW21 CN-834F						
531         R         AVSS         0.75         CN-113F           532         W         AVSS         0.75         CN-113F           533         B         AVSS         0.75         CN-113F           534         L/R         AVSS         0.75         CN-114F           535         Br/W         AVSS         0.75         CN-114F           536         P/B         AVSS         0.75         CN-114F           537         Gr/R         AVSS         0.75         CN-114F           538         Y/W         AVSS         0.75         CN-114F           539         O/B         AVSS         0.75         CN-114F		0x-808F 0x-808F 0x-809F 0x-809F 0x-809F 0x-809F 0x-809F 0x-810F	570 571 572 573 574	Gr/R 0/L L/G W/B B/Y	AVSS         0.75         CN-1	16F         TWST0.75TW8           16F         TWST0.75TW9           16F         TWST0.75TW9           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW21		TWST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73	TW8         CN-41F           TW9         CN-41F           TW9         CN-41F           TW9         CN-834F           TW21         CN-834F						
531         R         AVSS         0.75         CN-113F           532         W         AVSS         0.75         CN-113F           533         B         AVSS         0.75         CN-113F           534         L/R         AVSS         0.75         CN-113F           535         Br/W         AVSS         0.75         CN-114F           536         P/B         AVSS         0.75         CN-114F           537         GY/R         AVSS         0.75         CN-114F           538         Y/W         AVSS         0.75         CN-114F           538         Y/W         AVSS         0.75         CN-114F           539         O/B         AVSS         0.75         CN-114F           539         O/B         AVSS         0.75         CN-114F           540         R         AVSS         0.75         CN-114F           540         R         AVSS         0.75         CN-114F		0N-808F 0N-808F 0N-808F 0N-809F 0N-809F 0N-809F 0N-809F 0N-810F	570 571 572 573 574 575 576	Gr/R 0/L L/G W/B B/Y W/L	AVSS         0.75         CN-1	16F         TWST0.75TW8           16F         TWST0.75TW9           16F         TWST0.75TW9           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW21		TWST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73	TW8         CN-41F           STW9         CN-41F           STW9         CN-41F           STW21         CN-834F           STW21         CN-834F           STW21         CN-834F           STW10         CN-41F						
531         R         AVSS         0.75         0N-113F           532         W         AVSS         0.75         0N-113F           533         B         AVSS         0.75         0N-113F           534         L/R         AVSS         0.75         0N-113F           534         L/R         AVSS         0.75         0N-113F           534         L/R         AVSS         0.75         0N-114F           536         Br/W         AVSS         0.75         0N-114F           537         Gr/R         AVSS         0.75         0N-114F           538         Y/W         AVSS         0.75         0N-114F           539         O/B         AVSS         0.75         0N-114F           539         O/B         AVSS         0.75         0N-114F           540         R         AVSS         0.75         0N-114F           540         R         AVSS         0.75         0N-114F           541         W         AVSS         0.75         0N-114F           542         B         AVSS         0.75         0N-114F		01-806 01-806 01-806 01-806 01-809 01-809 01-809 01-809 01-810 01-810 01-810F	570 571 572 573 574 575 576 577	Gr/R 0/L L/G W/B B/Y W/L G	AVSS         0.75         CN-1	16F         TWST0.75TW8           16F         TWST0.75TW9           16F         TWST0.75TW9           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW10	>>>>> >>>>>> >>>>>>>>>>>>>>>>>>>>>>>>>	TwST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73	TW8         CN-41F           TW9         CN-41F           TW9         CN-41F           TW21         CN-834F           TW21         CN-834F           TW10         CN-41F           TW10         CN-41F           TW10         CN-41F						
531         R         AVSS         0.75         CN-113F           532         W         AVSS         0.75         CN-113F           533         B         AVSS         0.75         CN-113F           534         L/R         AVSS         0.75         CN-114F           535         Br/W         AVSS         0.75         CN-114F           536         Pr/W         AVSS         0.75         CN-114F           537         Gr/R         AVSS         0.75         CN-114F           538         P/W         AVSS         0.75         CN-114F           539         O/B         AVSS         0.75         CN-114F           539         O/B         AVSS         0.75         CN-114F           540         R         AVSS         0.75         CN-114F           540         R         AVSS         0.75         CN-114F           541         W         AVSS         0.75         CN-114F           542         B         AVSS         0.75         CN-114F           543         G/R         AVSS         0.75         CN-114F		QN-808F           QN-808F           QN-809F           QN-809F           QN-809F           QN-809F           QN-810F           QN-810F           QN-810F           QN-810F           QN-810F           QN-810F           QN-810F	570 571 572 573 574 575 576 577 578	Gr/R 0/L L/G W/B B/Y W/L G 0/B	AVSS         0.75         CN-1           AVSS         0.76         CN-1           AVSS         0.75         CN-1	16F         TWST0.75TW8           16F         TWST0.75TW9           16F         TWST0.75TW9           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW10           16F         TWST0.75TW10           16F         TWST0.75TW10           16F         TWST0.75TW10           16F         TWST0.75TW10		TWST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73 TWST0.73	TW8         CN-41F           TW9         CN-41F           TW9         CN-41F           TW21         CN-834F           TW21         CN-834F           TW10         CN-41F           TW10         CN-41F           TW10         CN-41F           TW10         CN-41F           TW10         CN-41F           TW10         CN-832F						
531         R         AVSS         0.75         CN-113F           532         W         AVSS         0.75         CN-113F           533         B         AVSS         0.75         CN-113F           534         L/R         AVSS         0.75         CN-113F           535         Br/W         AVSS         0.75         CN-114F           536         Br/W         AVSS         0.75         CN-114F           536         P/B         AVSS         0.75         CN-114F           537         Gr/R         AVSS         0.75         CN-114F           538         Y/W         AVSS         0.75         CN-114F           539         O/B         AVSS         0.75         CN-114F           539         O/B         AVSS         0.75         CN-114F           540         R         AVSS         0.75         CN-114F           541         W         AVSS         0.75         CN-114F           542         B         AVSS         0.75         CN-114F           543         G/R         AVSS         0.75         CN-114F		ON-808F           ON-808F           ON-808F           ON-809F           ON-809F           ON-809F           ON-809F           ON-810F           ON-810F           ON-810F           ON-810F           ON-810F           ON-811F	570 571 572 573 574 575 576 576 577 578 578	Gr/R 0/L L/G W/B B/Y W/L G 0/B Gr/B	AVSS         0.75         CN-1	16F         TWST0.75TW8           16F         TWST0.75TW9           16F         TWST0.75TW9           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW10           16F         TWST0.75TW10           16F         TWST0.75TW10           16F         TWST0.75TW10           16F         TWST0.75TW19           16F         TWST0.75TW19		TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7	TWB         CN-41F           TW9         CN-41F           TW9         CN-41F           TW21         CN-834F           TW21         CN-41F           TW10         CN-41F           TW10         CN-41F           TW10         CN-832F           TW19         CN-832F						
531         R         AVSS         0.75         0N-113F           532         W         AVSS         0.75         0N-113F           533         B         AVSS         0.75         0N-113F           534         L/R         AVSS         0.75         0N-113F           534         L/R         AVSS         0.75         0N-113F           534         L/R         AVSS         0.75         0N-114F           536         Br/W         AVSS         0.75         0N-114F           537         Gr/R         AVSS         0.75         0N-114F           538         Y/W         AVSS         0.75         0N-114F           539         O/B         AVSS         0.75         0N-114F           539         O/B         AVSS         0.75         0N-114F           540         R         AVSS         0.75         0N-114F           540         R         AVSS         0.75         0N-114F           542         B         AVSS         0.75         0N-114F           542         B         AVSS         0.75         0N-114F           543         G/R         AVSS         0.75 <td< td=""><td></td><td>0N-808F           0N-808F           0N-808F           0N-809F           0N-809F           0N-809F           0N-809F           0N-809F           0N-810F           0N-810F           0N-810F           0N-810F           0N-811F           0N-811F</td><td>570 571 572 573 574 575 576 577 578 577 578 579 583</td><td>Gr/R 0/L L/G W/B B/Y W/L G 0/B Gr/B R/L</td><td>AVSS         0.75         CN-1           AVSS         0.75         CN-1</td><td>18F         TwST0.75Tw8           16F         TwST0.75Tw9           18F         TwST0.75Tw9           18F         TwST0.75Tw21           18F         TwST0.75Tw21           18F         TwST0.75Tw21           18F         TwST0.75Tw21           18F         TwST0.75Tw21           18F         TwST0.75Tw10           18F         TwST0.75Tw19           18F         TwST0.75Tw19           18F         TwST0.75Tw19           18F         TwST0.75Tw19           18F         TwST0.75Tw19           18F         TwST0.75Tw19</td><td></td><td>TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7</td><td>TW8         CN-41F           TW9         CN-41F           STW1C         CN-834F           TW21         CN-834F           STW10         CN-41F           STW10         CN-41F           STW10         CN-41F           STW10         CN-41F           STW10         CN-83F           STW10         CN-83F           STW19         CN-83F           STW22         CN-83F</td><td></td><td></td><td></td><td></td><td></td><td></td></td<>		0N-808F           0N-808F           0N-808F           0N-809F           0N-809F           0N-809F           0N-809F           0N-809F           0N-810F           0N-810F           0N-810F           0N-810F           0N-811F           0N-811F	570 571 572 573 574 575 576 577 578 577 578 579 583	Gr/R 0/L L/G W/B B/Y W/L G 0/B Gr/B R/L	AVSS         0.75         CN-1	18F         TwST0.75Tw8           16F         TwST0.75Tw9           18F         TwST0.75Tw9           18F         TwST0.75Tw21           18F         TwST0.75Tw21           18F         TwST0.75Tw21           18F         TwST0.75Tw21           18F         TwST0.75Tw21           18F         TwST0.75Tw10           18F         TwST0.75Tw19           18F         TwST0.75Tw19           18F         TwST0.75Tw19           18F         TwST0.75Tw19           18F         TwST0.75Tw19           18F         TwST0.75Tw19		TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7 TwST0.7	TW8         CN-41F           TW9         CN-41F           STW1C         CN-834F           TW21         CN-834F           STW10         CN-41F           STW10         CN-41F           STW10         CN-41F           STW10         CN-41F           STW10         CN-83F           STW10         CN-83F           STW19         CN-83F           STW22         CN-83F						
531         R         AVSS         0.75         0N-113F           532         W         AVSS         0.75         ON-113F           533         B         AVSS         0.75         ON-113F           534         L/R         AVSS         0.75         ON-113F           534         L/R         AVSS         0.75         ON-114F           535         Br/W         AVSS         0.75         ON-114F           536         P/A         AVSS         0.75         ON-114F           537         Gr/R         AVSS         0.75         ON-114F           538         Y/W         AVSS         0.75         ON-114F           539         O/B         AVSS         0.75         ON-114F           540         R         AVSS         0.75         ON-114F           540         R         AVSS         0.75         ON-114F           542         B         AVSS         0.75         ON-114F           543         G/R         AVSS         0.75         ON-114F           544         L/W         AVSS         0.75         ON-114F           544         L/W         AVSS         0.75         <		QN-808F           QN-808F           QN-809F           QN-809F           QN-809F           QN-809F           QN-810F           QN-810F           QN-810F           QN-810F           QN-810F           QN-810F           QN-811F           QN-811F           QN-811F           QN-811F           QN-811F           QN-811F	570 571 572 573 574 575 576 577 578 578 579 583 584	Gr/R 0/L L/G W/B B/Y G G/B Gr/B R/L Y	AVSS         0.75         CN-1           AVSS         0.76         CN-1           AVSS         0.76         CN-1           AVSS         0.75         CN-1           AVSS         0.76         CN-1           AVSS         0.76         CN-1           AVSS         0.76         CN-1	16F         TWST0.75TW8           16F         TWST0.75TW9           16F         TWST0.75TW9           16F         TWST0.75TW21           16F         TWST0.75TW21           16F         TWST0.75TW10           16F         TWST0.75TW10           16F         TWST0.75TW19           16F         TWST0.75TW22           16F         TWST0.75TW22		TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7 TWST0.7	TW8         CN-41F           TW9         CN-41F           TW9         CN-41F           TW21         CN-834F           TW10         CN-41F           TW10         CN-41F           TW10         CN-41F           TW10         CN-41F           TW10         CN-43F           TW10         CN-43F           TW10         CN-832F           TW19         CN-832F           TW22         CN-835F						
531         R         AVSS         0.75         CN-113F           532         W         AVSS         0.75         CN-113F           533         B         AVSS         0.75         CN-113F           534         L/R         AVSS         0.75         CN-113F           535         Br/W         AVSS         0.75         CN-114F           536         Br/W         AVSS         0.75         CN-114F           537         Gr/R         AVSS         0.75         CN-114F           537         Gr/R         AVSS         0.75         CN-114F           538         Y/W         AVSS         0.75         CN-114F           539         O/B         AVSS         0.75         CN-114F           539         O/B         AVSS         0.75         CN-114F           540         R         AVSS         0.75         CN-114F           540         R         AVSS         0.75         CN-114F           543         G/R         AVSS         0.75         CN-114F           544         L/W         AVSS         0.75         CN-114F           545         Y/B         AVSS         0.75		0N-808F           0N-808F           0N-808F           0N-809F           0N-809F           0N-809F           0N-809F           0N-810F           0N-810F           0N-810F           0N-810F           0N-811F           0N-811F           0N-812F           0N-812F           0N-812F	570 571 572 573 575 576 576 577 578 579 583 584 906	Gr/R 0/L L/G W/B B/Y W/L G 0/B Gr/B R/L Y R	AVSS         0.75         0.14           AVSS         0.75         0.14	L6F         TWST0/75TW8           L6F         TWST0/75TW9           L6F         TWST0/75TW9           L6F         TWST0/75TW21           L6F         TWST0/75TW21           L6F         TWST0/75TW21           L6F         TWST0/75TW10           L6F         TWST0/75TW10           L6F         TWST0/75TW10           L6F         TWST0/75TW10           L6F         TWST0/75TW12           L6F         TWST0/75TW22           L6F         TWST0/75TW22		TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7	TW8         CN-41F           TW9         CN-41F           TW9         CN-41F           TW21         CN-834F           TW21         CN-834F           TW10         CN-41F           TW10         CN-41F           TW10         CN-83F           TW10         CN-83F           TW10         CN-83F           TW10         CN-83F           TW12         CN-83F           TW22         CN-83F           TW22         CN-83F           TW22         CN-83F           TW10         CN-83F						
531         R         AVSS         0.75         0N-113F           532         W         AVSS         0.75         ON-113F           533         B         AVSS         0.75         ON-113F           534         L/R         AVSS         0.75         ON-113F           534         L/R         AVSS         0.75         ON-114F           535         Br/W         AVSS         0.75         ON-114F           536         P/A         AVSS         0.75         ON-114F           537         Gr/R         AVSS         0.75         ON-114F           538         Y/W         AVSS         0.75         ON-114F           539         O/B         AVSS         0.75         ON-114F           540         R         AVSS         0.75         ON-114F           540         R         AVSS         0.75         ON-114F           542         B         AVSS         0.75         ON-114F           543         G/R         AVSS         0.75         ON-114F           544         L/W         AVSS         0.75         ON-114F           544         L/W         AVSS         0.75         <		QN-808F           QN-808F           QN-809F           QN-809F           QN-809F           QN-809F           QN-810F           QN-810F           QN-810F           QN-810F           QN-810F           QN-810F           QN-811F           QN-811F           QN-811F           QN-811F           QN-811F           QN-811F	570 571 572 573 575 576 576 577 578 579 583 584 906	Gr/R 0/L L/G W/B B/Y W/L G 0/B Gr/B R/L Y R	AVSS         0.75         CN-1           AVSS         0.76         CN-1           AVSS         0.76         CN-1           AVSS         0.75         CN-1           AVSS         0.76         CN-1           AVSS         0.76         CN-1           AVSS         0.76         CN-1	L6F         TWST0/75TW8           L6F         TWST0/75TW9           L6F         TWST0/75TW9           L6F         TWST0/75TW21           L6F         TWST0/75TW21           L6F         TWST0/75TW21           L6F         TWST0/75TW10           L6F         TWST0/75TW10           L6F         TWST0/75TW10           L6F         TWST0/75TW10           L6F         TWST0/75TW12           L6F         TWST0/75TW22           L6F         TWST0/75TW22		TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7 TWS10.7	TW8         CN-41F           TW9         CN-41F           TW9         CN-41F           TW21         CN-834F           TW10         CN-41F           TW10         CN-41F           TW10         CN-41F           TW10         CN-41F           TW10         CN-43F           TW10         CN-43F           TW10         CN-832F           TW19         CN-832F           TW22         CN-835F						

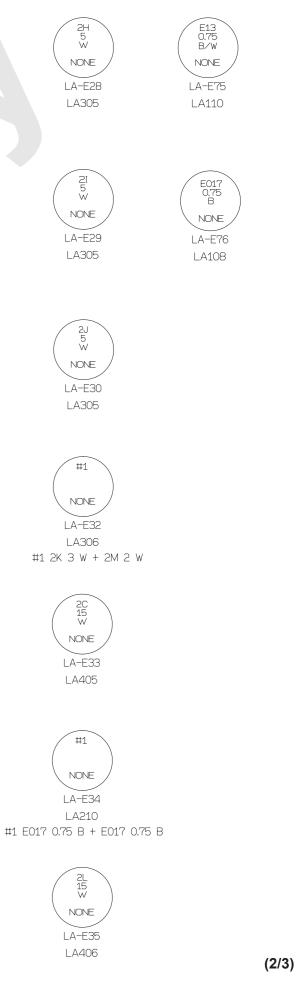
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_	2WIRE CONNECT NO.	CONNECTION	2WIRE CONNECT NO.	ID. SYMBOL	T O
1				TWST0.75TW11	
1				TWST0.75TW11	
2				TWST0.75TW12	CN-826F
2				TWST0.75TW12	CN-826F
3				TWST0.75TW13	CN-827F
3				TWST0.75TW13	
4	_			TWST0.75TW14	
4		20000		TWST0.75TW14	
5				TWST0.75TW15	
5				TWST0.75TW15	CN-829F
6				TWST0.75TW16	CN-830F
6		_XXXX_		TWST0.75TW16	CN-830F
7		3		TWST0.75TW17	CN-831F
7				TWST0.75TW17	
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1		-1-1-		MVVS4C1	CN-111F
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1		++		MVVS4C1	CN-111F
+				MVVS4C1	CN-111F
+		<u> </u>		TOHOT	CUN 111L
-					
4					011 0165
	DS-E14	<u>•</u>			CN-819F
	DS-E14	<u> </u>			CN-40F
٦			DS-E1		LA-E52
1			DS-E1		LA-E52
t	DS-E2	•			CN-822F
	DS-E2	~			CN-823F
+	00 LE		DS-E30		E-4
4					
	DS-E31	<u> </u>	DS-E30		E-4
	DS-E31	<u> </u>			CN-950F
1			DS-E13		LA-E44
1	DS-E24	•	DS-E13		LA-E44
+	DS-E24	<u> </u>			CA-842F
+		-	DS-E4		LA-E59
+			DS-E4		LA-E59
		/			
			DS-E25		LA-E58
			DS-E25		LA-E58
	DS-E23	•			CN-840F
1	DS-E23	<u> </u>			CN-841F
1			DS-E8		LA-E55
+			DS-E8		LA-E55
+					CA-E1
4			00.55		
			DS-E7		LA-E56
			DS-E7		LA-E56
	DS-E10	•			CN-708M
	DS-E10				CN-708M
1			DS-E11		LA-E40
+			DS-E11		LA-E40
+					LA-E43
-	DC F2				CN 4455
	DS-E3	•			CN-115F
	DS-E3	<u> </u>			CN-115F
J			DS-E12		LA-E42
1			DS-E12		LA-E42
t	DS-E9	•			CN-708M
	DS-E9	<u> </u>			CN-709F
+	00-E9				
		•			CN-JE7F
		•			CN-JE7F
1		++			CN-JE7F
1		+			CN-657M
					LA-E84
_		1			CN-709F

## (5/5)



(1/3)





THE WIRE NO. /COLOR LIST

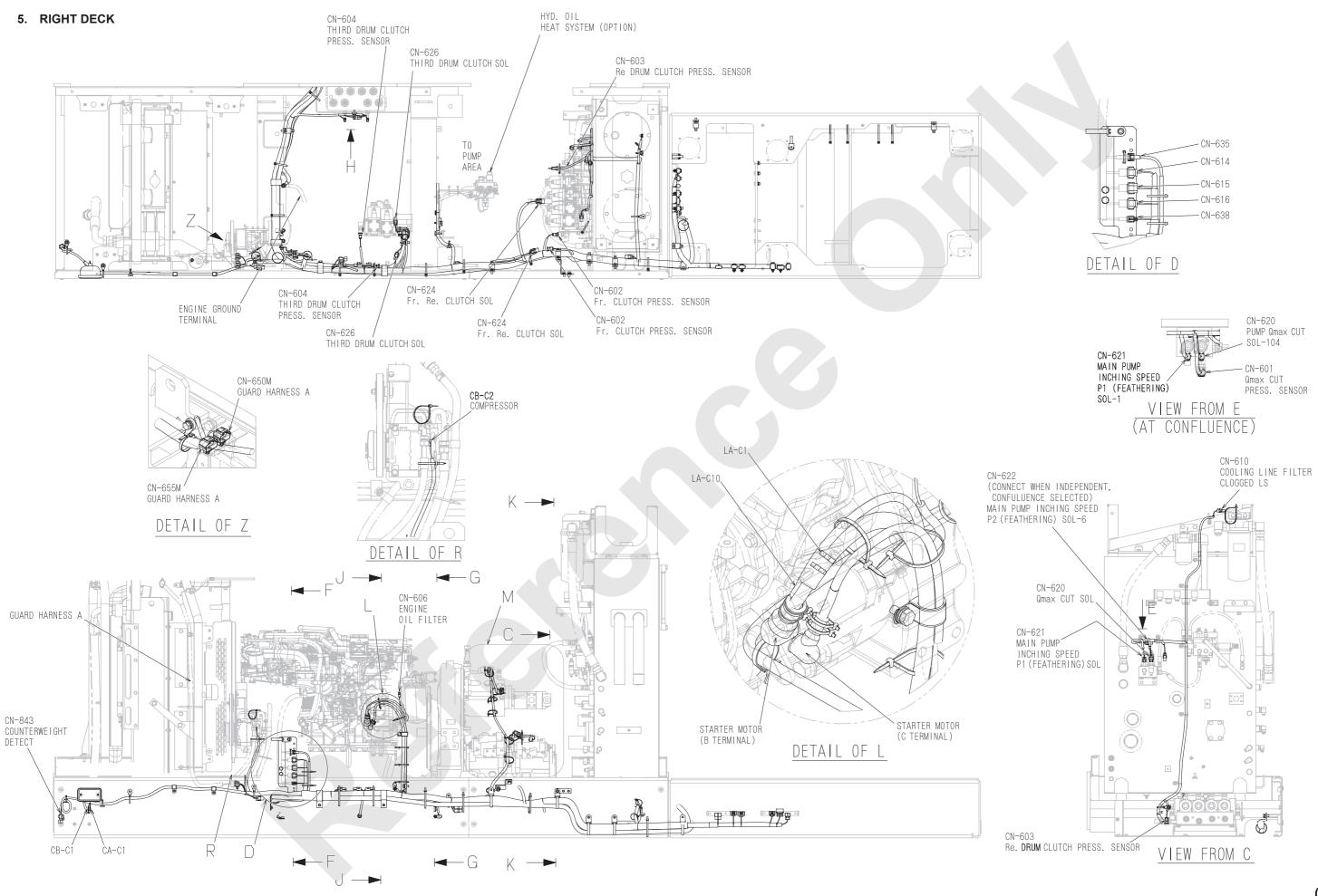
# X1 IDENTIFICATION SYMBOL

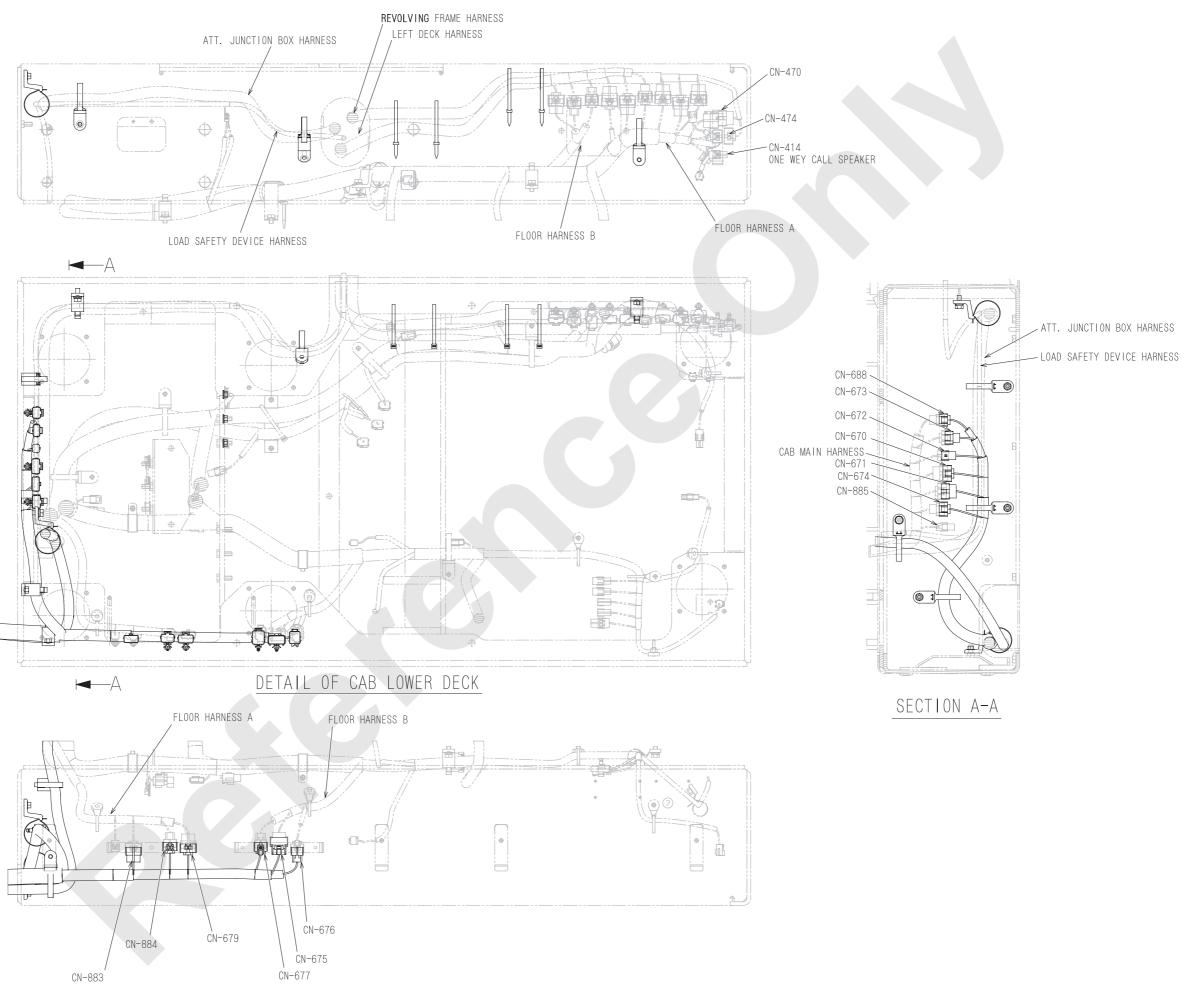
%2 TWO WIRE CONNECT NUMBER

WIRE NO.	WIRE COLOR	WIRE TYPE	SIZE	FROM	*1	*2	CONNECTION	*2	*1	T C
1A	R	AVS	2	LA-E11		DS-E16	•			CN-701F
1B	R	AVS	2	LA-E11		DS-E16				CN-701F
1C	R	AVS	2	LA-E10		DS-E6	•			CN-701F
1E	R	AVS	2	LA-E10		DS-E6				CN-701F
1F	R	AVS	2	LA-E12						CN-701F
2A	W	AV	15	LA-E23						LA-E13
2B	W	AV	15	LA-E14						LA-E27
20	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
2Н	W	AVS	5	CN-703F						LA-E28
21	W	AVS	5	CN-704F						LA-E29
2J	W	AVS	5	CN-704F						LA-E30
2K	W	AVS	3	LA-E32		DS-E7	•			CN-705M
2М	W	AVS	2	LA-E32		DS-E7				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
37	G	AVS	2	JS-B01						CN-852F
37	G	AVSS	0.75	JS-B01			•	DS-E1		CN-818F
37	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
43	R/Y	AVSS	0.75	CN-851M			•	DS-E2		CN-868F
43	R/Y	AVSS	0.75	CN-868F				DS-E2		CN-868F
57	G/R	AVSS	0.75	CN-850F						LA-E19
58	L/R	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
956	L/Y	AVSS	0.75	CN-851M			/	DS-E3		CN-868F
E017	В	AVSS	0.75	CN-855F			<b>,</b>			LA-E34
E017	В	AVSS	0.75	LA-E76			/			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

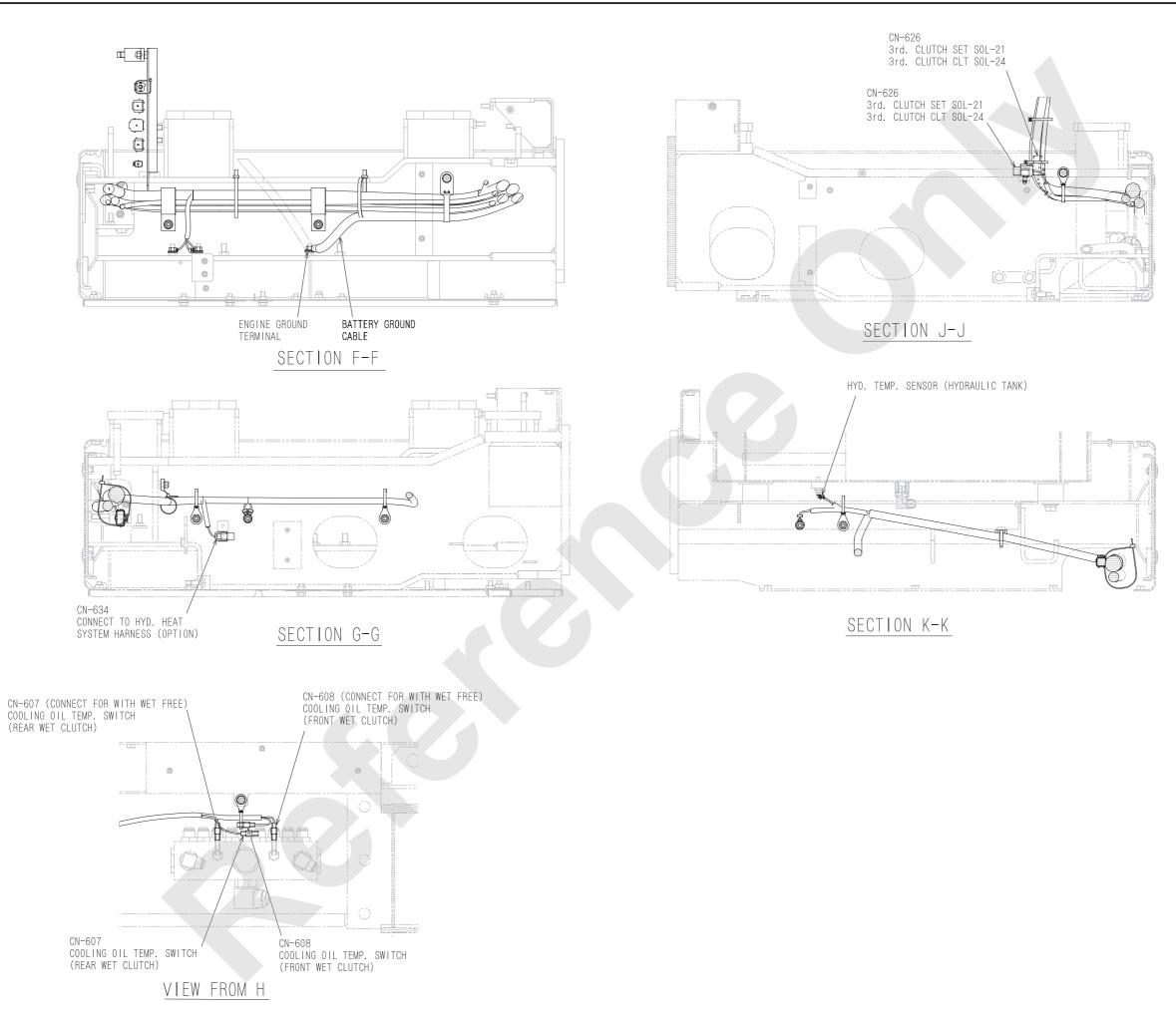
(3/3)

#### [ 10. ELECTRIC SYSTEM ]

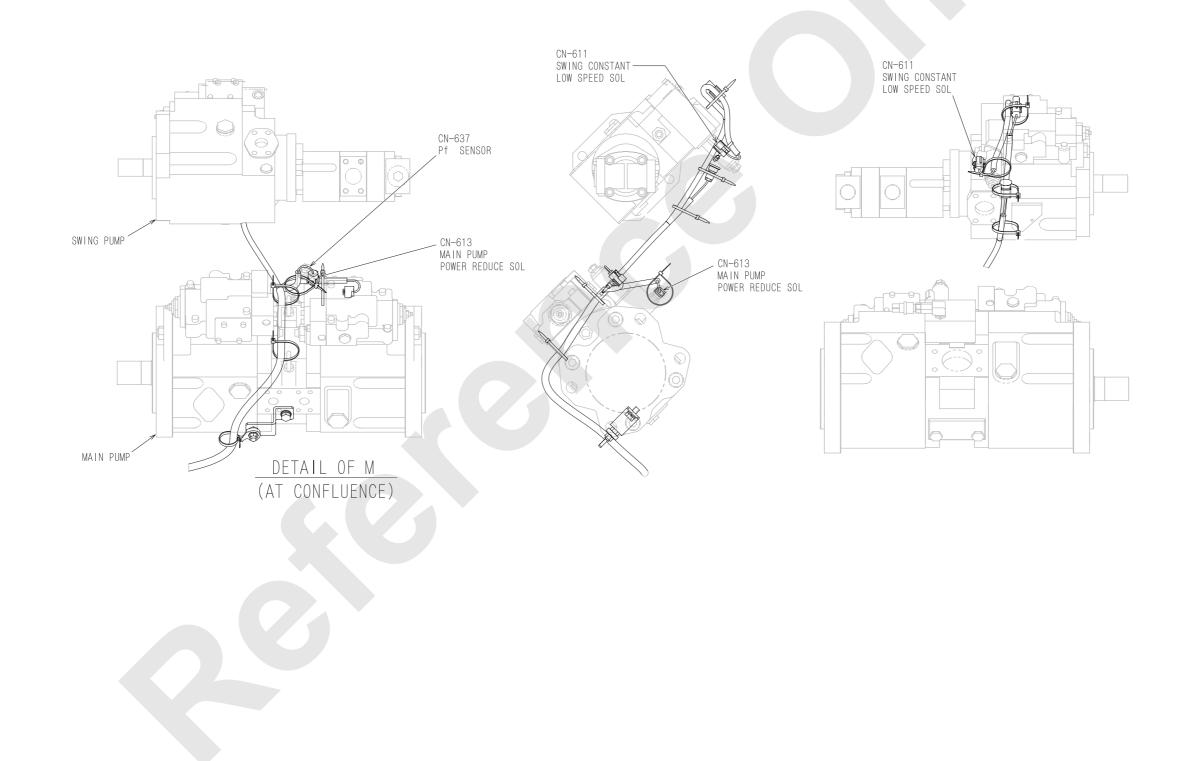




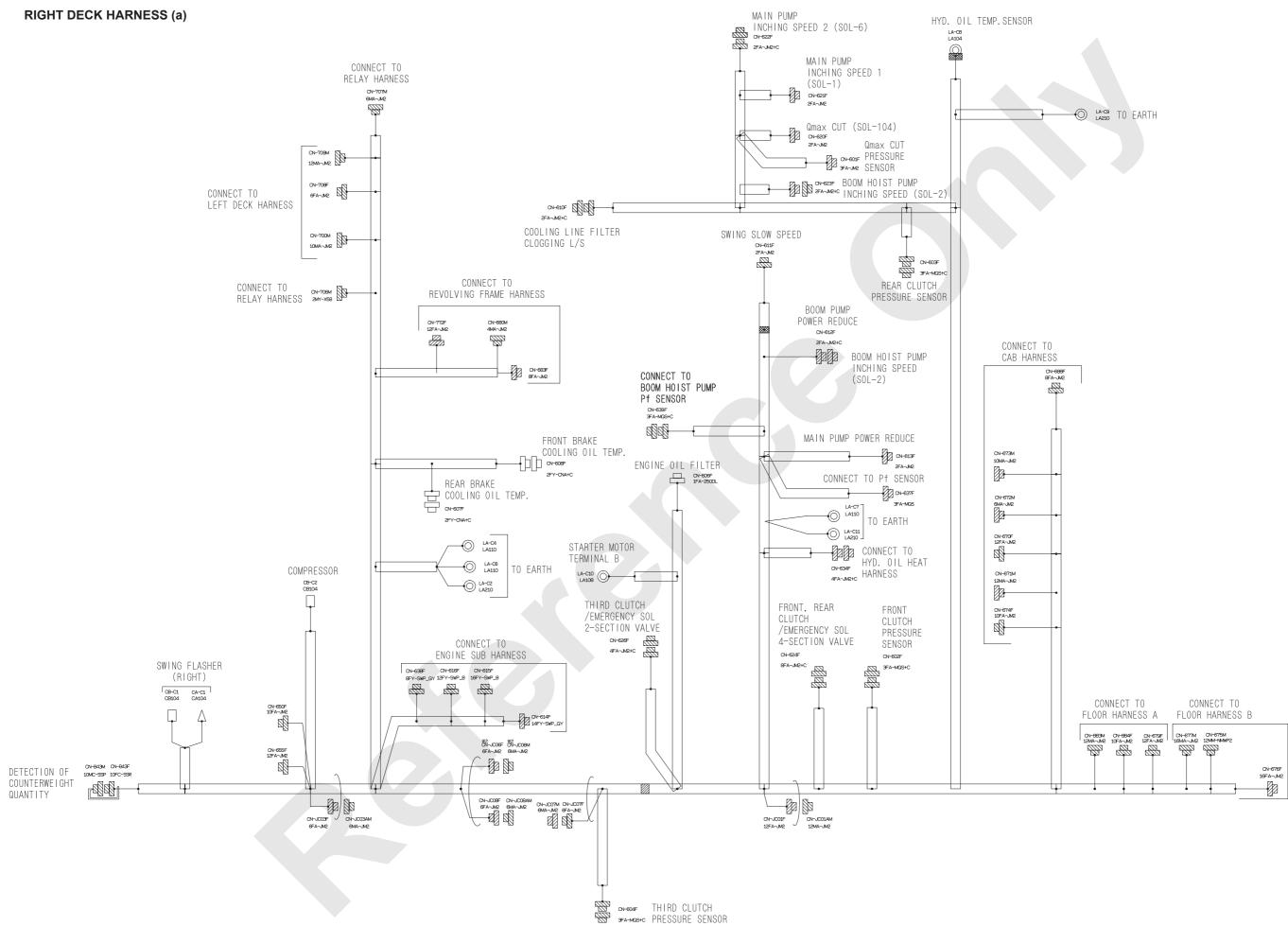
(2/4)



## (3/4)

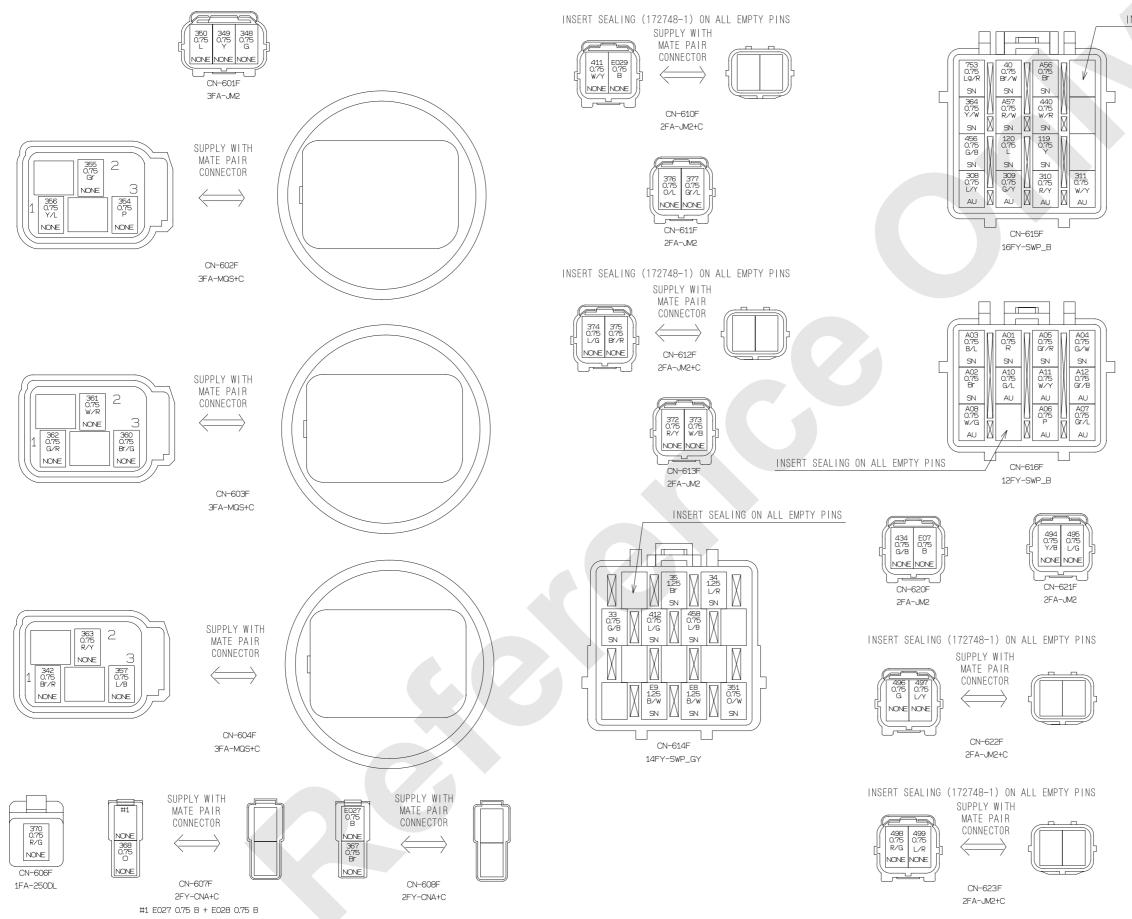


(4/4)



(1/5)

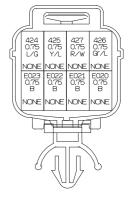
Published 11-10-17, Control #261-01



INSERT SEALING ON ALL EMPTY PINS



INSERT SEALING (172748-1) ON ALL EMPTY PINS



SUPPLY WITH MATE PAIR CONNECTOR



CN-624F 8FA-JM2+C

INSERT SEALING (172748-1) ON ALL EMPTY PINS

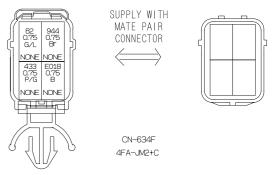


SUPPLY WITH MATE PAIR CONNECTOR

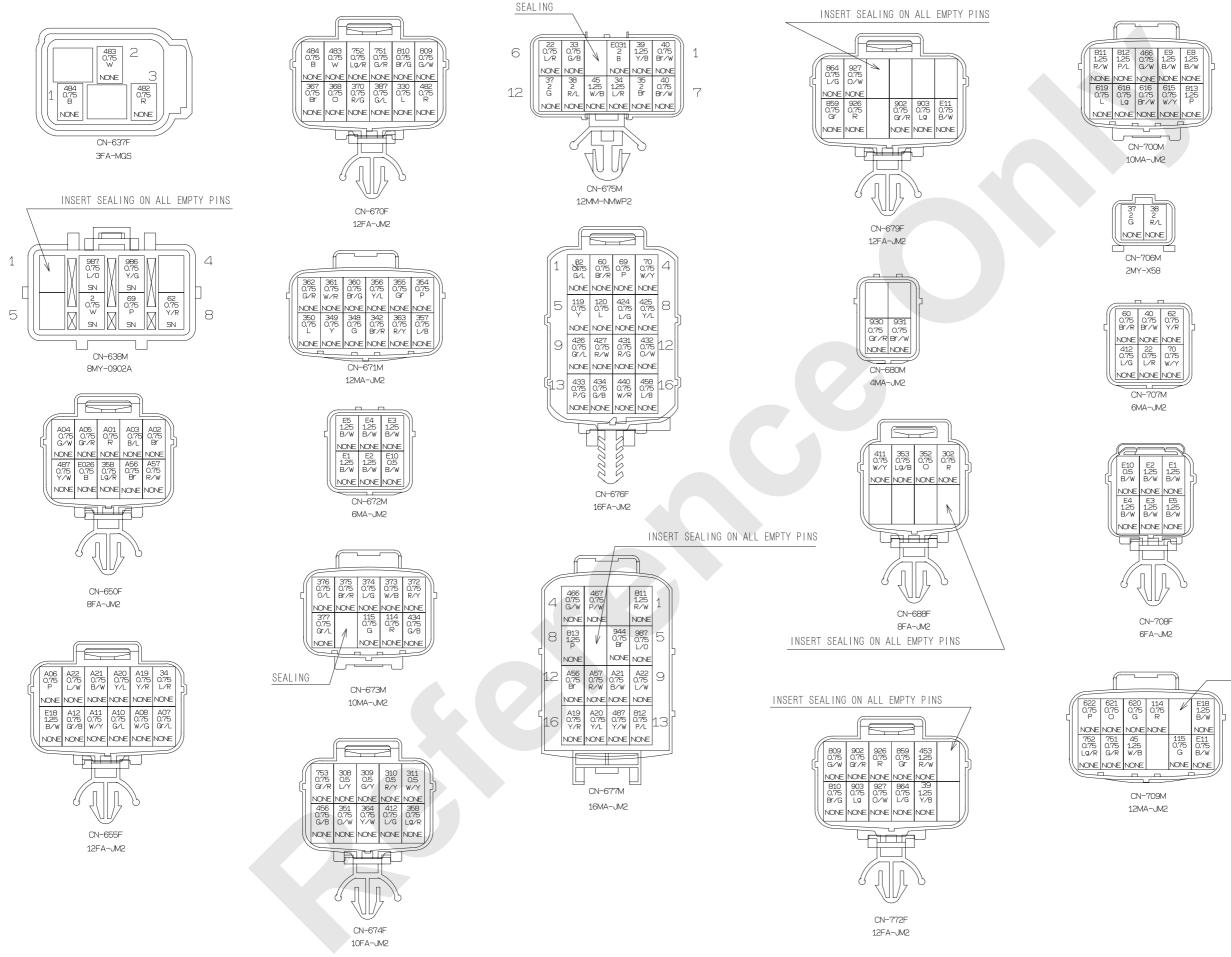


CN-626F 4FA-JM2+C

INSERT SEALING (172748-1) ON ALL EMPTY PINS

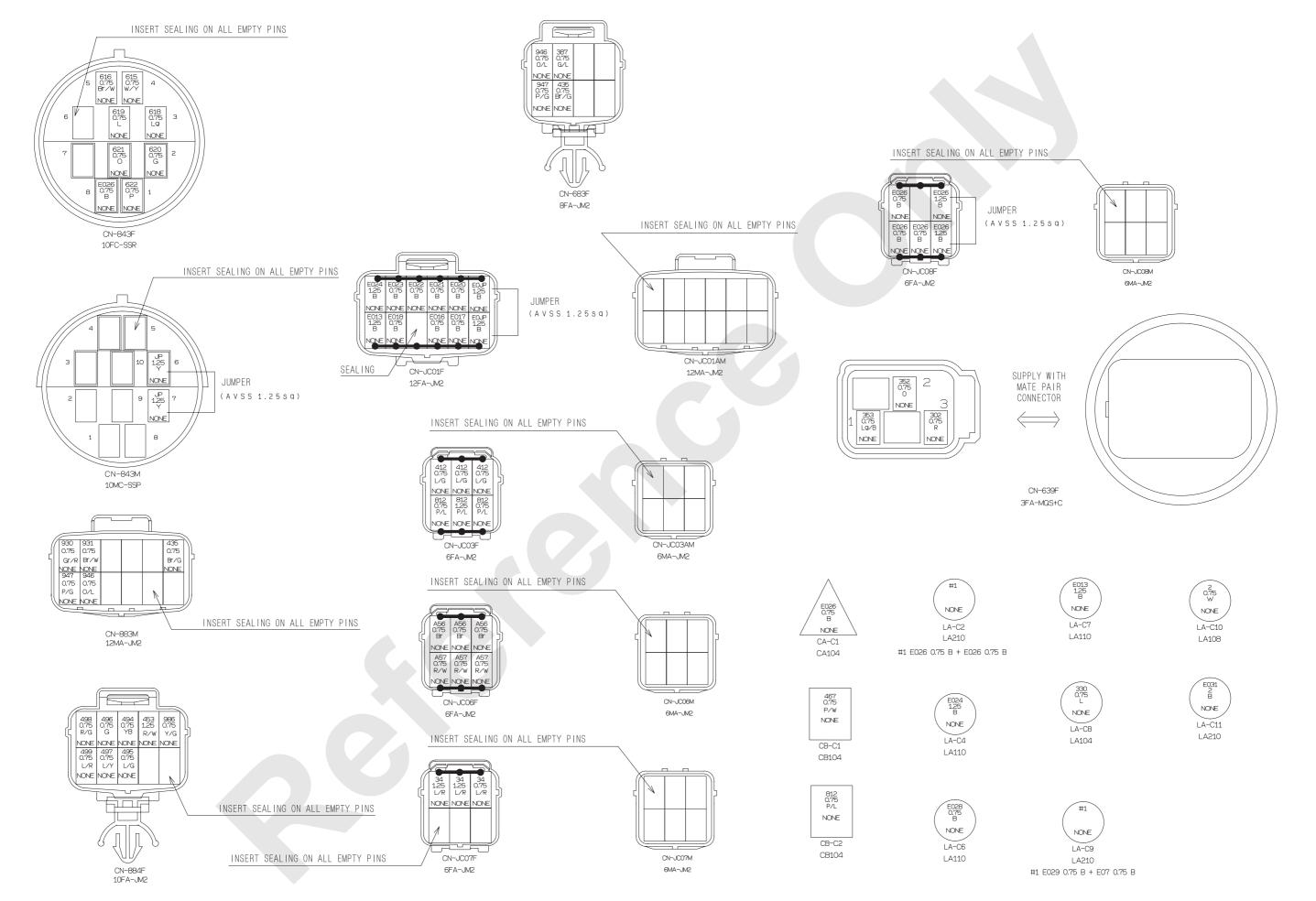


(2/5)



(3/5)

INSERT SEALING ON ALL EMPTY PINS



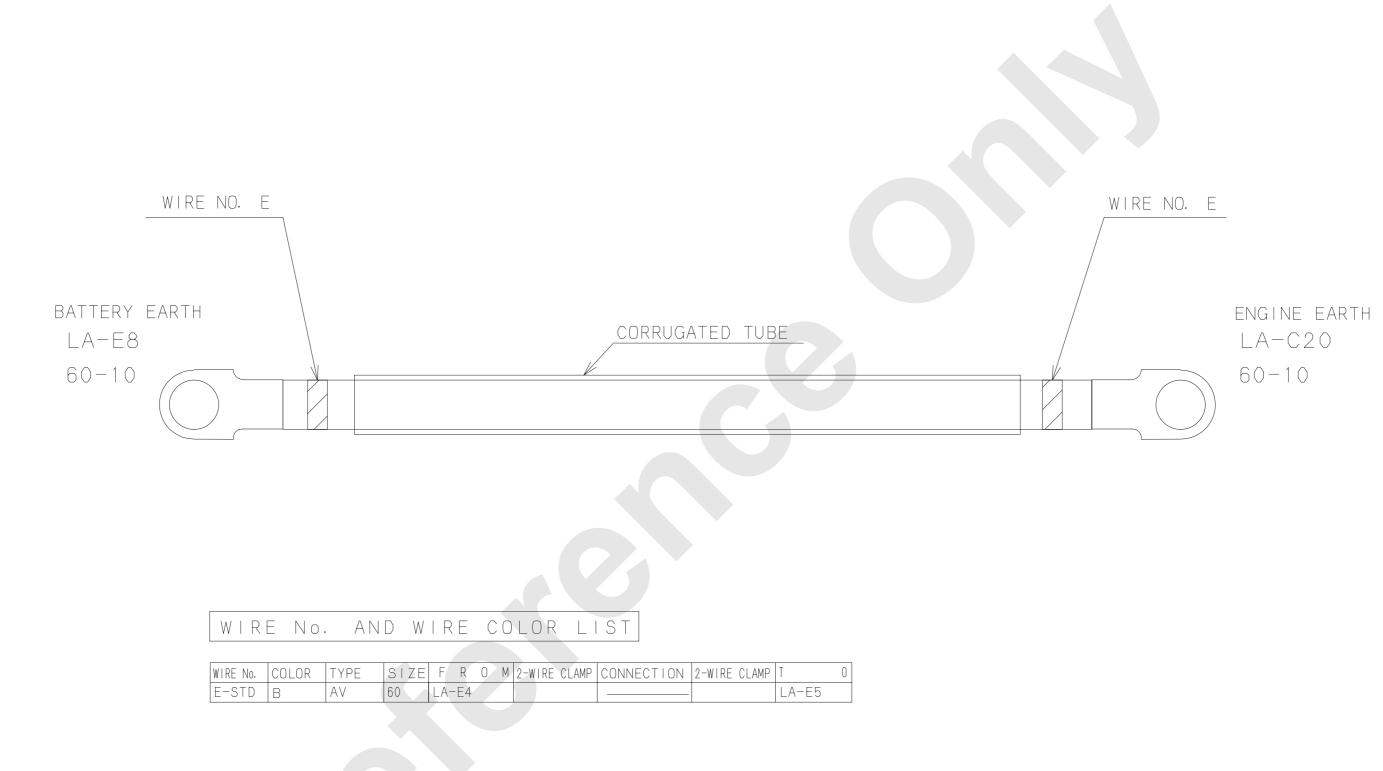
WIRE NO.	WIRE COLOR		S I ZE 0.75	FROM LA-C10	×1	¥2	CONNECTION	¥2	*1	T 0 CN-638M	
22	W L/R	AVSS AVSS	0.75	CN-675M						CN-707M	
	G/B	AVSS	0.75	CN-614F						CN-675M	
34	L/R	AVSS	1.25	CN-675M			+			CN-JC07F	
34	L/R	AVSS	1.25	CN-614F						CN-JC07F	
34	L/R	AVSS	0.75	CN-655F						CN-JC07F	
	Br	AVSS	1.25	CN-614F						CN-675M	
	G	AVS	2	CN-675M						CN-706M	
	R/L	AVS	2	CN-675M						CN-706M	
39	Y/B	AVSS	1.25	CN-772F						CN-675M	
	Br/W Br/W	AVSS	0.75 0.75	CN-707M CN-675M						CN-675M CN-615F	
	W/B	AVSS AVSS	1.25	CN-709M						CN-675M	
	Br/R	AVSS	0.75	CN-676M						CN-707M	
52	Y/R	AVSS	0.75	CN-707M						CN-638M	
59	Р	AVSS	0.75	CN-676F						CN-638M	
	W/Y	AVSS	0.75	CN-707M						CN-676F	
	G/L	AVSS	0.75	CN-634F						CN-676F	
	R	AVSS	0.75	CN-688F						CN-639F	
308	L/Y	AVSS	0.5	CN-674F						CN-615F	
	G/Y	AVSS	0.5 0.5	CN-674F						CN-615F CN-615F	
310	R/Y W/Y	AVSS	0.5	CN-674F						CN-615F	
330	w∕⊺ L	AVSS AVSS	0.5	CN-674F LA-C8						CN-670F	
	Br/R	AVSS	0.75	CN-671M						CN-604F	
348	G	AVSS	0.75	CN-671M						CN-601F	1
349	Y	AVSS	0.75	CN-671M						CN-601F	
350	L	AVSS	0.75	CN-671M						CN-601F	
	0/W	AVSS	0.75	CN-614F						CN-674F	
352	0	AVSS	0.75	CN-688F						CN-639F	
353	Lg/B	AVSS	0.75	CN-688F						CN-639F	
354 355	P Gr	AVSS	0.75	CN-671M CN-671M						CN-602F CN-602F	
	Gr Y/L	AVSS AVSS	0.75	CN-671M CN-671M						CN-602F	
357	L/B	AVSS	0.75	CN-671M						CN-604F	
358	Lg/R	AVSS	0.75	CN-674F						CN-650F	
	Br/G	AVSS	0.75	CN-671M						CN-603F	
	W/R	AVSS	0.75	CN-671M						CN-603F	
	G/R	AVSS	0.75	CN-671M						CN-603F	
	R/Y	AVSS	0.75	CN-671M						CN-604F	
364	Y/W	AVSS	0.75	CN-674F						CN-615F	
	Br O	AVSS	0.75	CN-670F						CN-608F	
	R/G	AVSS	0.75 0.75	CN-670F CN-670F						CN-607F CN-606F	
	G/L	AVSS AVSS	0.75	CN-670F						CN-683F	
	W/Y	AVSS	0.75	CN-688F						CN-610F	
412	L/G	AVSS	0.75	CN-JC03F			•			CN-707M	
412	L/G	AVSS	0.75	CN-JC03F			<b>.</b>			CN-674F	
412	L/G	AVSS	0.75	CN-JC03F			<b>.</b>			CN-614F	
424	L/G	AVSS	0.75	CN-624F						CN-676F	
425	Y/L	AVSS	0.75	CN-624F						CN-676F	
426	Gr/L	AVSS	0.75	CN-624F						CN-676F	
101	R/W	AVSS	0.75	CN-624F CN-626F						CN-676F	
	R/G O/W	AVSS	0.75	CN-626F						CN-676F	
	P/G	AVSS	0.75	CN-634F						CN-676F	
	G/B	AVSS AVSS	0.75	CN-673M						JS01	
	G/B	AVSS	0.75	CN-676F						JS01	
434	G/B	AVSS	0.75	CN-620F						J501	
	Br/G	AVSS	0.75	CN-883M						CN-683F	
	W/R	AVSS	0.75	CN-676F						CN-615F	
	R/W	AVSS	1.25	CN-884F						CN-772F	
	G/B	AVSS	0.75	CN-615F			/			CN-674F	6
458 466	L/B G/W	AVSS AVSS	0.75 0.75	CN-614F CN-677M						CN-676F CN-700M	
	G/W P/W	AVSS	0.75	CB-C1						CN-677M	ľ
	R	AVSS	0.75	CN-670F						CN-637F	1
483	W	AVSS	0.75	CN-670F						CN-637F	1
	В	AVSS	0.75	CN-670F						CN-637F	1
487	Y/W	AVSS	0.75	CN-677M						CN-650F	
	W/Y	AVSS	0.75	CN-843F						CN-700M	
	Br∕W	AVSS	0.75	CN-843F						CN-700M	
518	Lg	AVSS	0.75	CN-843F						CN-700M	
319 320	L G	AVSS	0.75 0.75	CN-843F CN-843F						CN-700M CN-709M	1
	0	AVSS AVSS	0.75	CN-843F						CN-709M	1
22	P	AVSS	0.75	CN-843F						CN-709M	1
	F G/R	AVSS	0.75	CN-709M						CN-670F	1
52	Lg/R	AVSS	0.75	CN-709M						CN-670F	1
	Gr/R	AVSS	0.75	CN-674F						CN-615F	
	G/W	AVSS	0.75	CN-772F						CN-670F	1
²53	Q2 11			-							
753 309 310	Br/G	AVSS	0.75	CN-772F						CN-670F	
753 809 810 811	Br∕G R∕W	AVSS AVSS	1.25	CN-677M						CN-700M	
753 809 310 311 312	Br/G R/W P/L	AVSS AVSS	1.25 1.25	CN-677M CN-JC03F						CN-700M CN-700M	
753 309 310 311 312 312	Br∕G R∕W	AVSS	1.25	CN-677M						CN-700M	

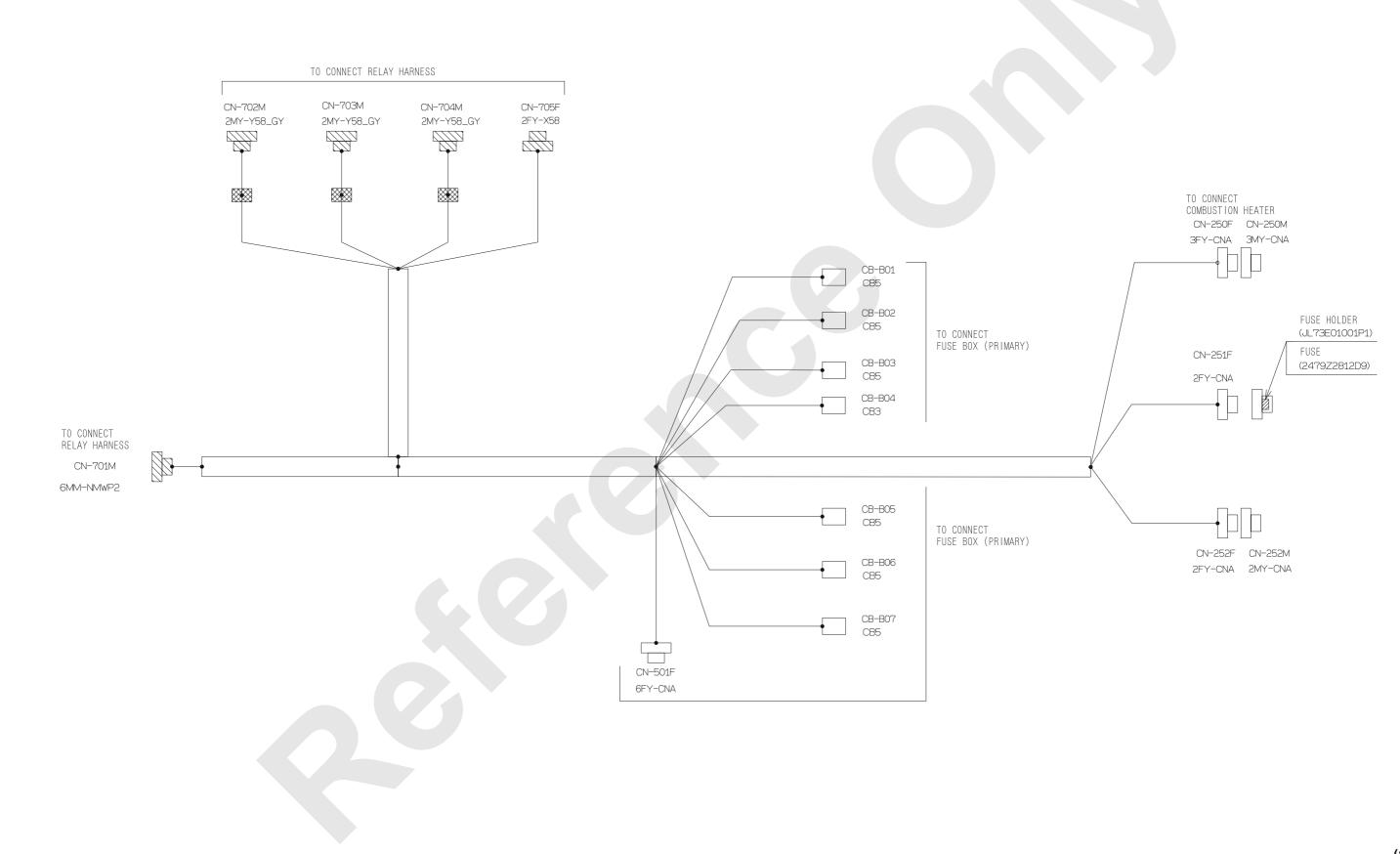
WIRE NO.	WIRE COLOR	WIKE IYPE	SIZE	FROM	×1	¥2	CONNECTION	*2	×1	1 CN-67
359	Gr	AVSS	0.75	CN-772F						CN-67
364	L/G	AVSS	0.75	CN-772F						CN-67
902	Gr/R	AVSS	0.75	CN-679F						CN-77
903	Lg	AVSS	0.75	CN-679F						CN-77
926	R	AVSS	0.75	CN-772F						CN-67
927	0/W	AVSS	0.75	CN-772F						CN-67
930	Gr/R	AVSS	0.75	CN-680M						CN-88
931	Br/W	AVSS	0.75	CN-680M						CN-88
944	Br	AVSS	0.75	CN-634F					17	CN-67
946	0/L	AVSS		CN-883M						CN-68
	P/G	AVSS		CN-883M						CN-68
986	Y/G	AVSS	0.75	CN-638M						CN-88
987	L/0	AVSS		CN-638M						CN-67
A01	R	AVSS	0.75	CN-616F						CN-65
A02	Br			CN-616F						CN-65
		AVSS								
	B/L	AVSS		CN-616F						CN-65
404	G/W	AVSS		CN-616F						CN-65
A05	Gr/R			CN-616F						CN-65
A06	P	AVSS		CN-616F						CN-65
	Gr/L	AVSS		CN-616F						CN-65
A08	W/G	AVSS	0.75	CN-616F						CN-65
A10	G/L	AVSS	0.75	CN-616F						CN-65
A11	W/Y	AVSS	0.75	CN-616F						CN-65
A12	Gr/B	AVSS	0.75	CN-616F						CN-65
114	R	AVSS		CN-673M	TWST0.75TW1				TWST0.75TW1	CN-70
115	G	AVSS	0.75	CN-673M	TWST0.75TW1		+_XXXX		TWST0.75TW1	CN-70
119	Y	AVSS		CN-615F	TWST0.75TW2				TWST0.75TW2	CN-67
120		AVSS		CN-615F	TWST0.75TW2				TWST0.75TW2	CN-67
372		AVSS	0.75	CN-673M	TWST0.75TW3				TWST0.75TW3	CN-61
373	W/B	AVSS .		CN-673M	TWST0.75TW3			-	TWST0.75TW3	CN-61
374			0.75	CN-673M	TWST0.75TW4		1		TWST0.75TW4	CN-61
375	L/G	AVSS		CN-673M	TWST0.75TW4				TWST0.75TW4	CN-61
	Br/R	AVSS								
376		AVSS		CN-611F	TWST0.75TW5				TWST0.75TW5	CN-67
377	Gr/L	AVSS	0.75	CN-611F	TWST0.75TW5				TWST0.75TW5	CN-67
494	Y/B	AVSS		CN-621F	TWST0.75TW6				TWST0.75TW6	CN-88
495	L/G	AVSS	0.75	CN-621F	TWST0.75TW6				TWST0.75TW6	CN-88
496	G	AVSS	0.75	CN-622F	TWST0.75TW7				TWST0.75TW7	CN-88
497	L/Y	AVSS	0.75	CN-622F	TWST0.75TW7		_XXXX		TWST0.75TW7	CN-88
498	R/G	AVSS	0.75	CN-884F	TWST0.75TW8				TWST0.75TW8	CN-62
499	L/R	AVSS	0.75	CN-884F	TWST0.75TW8		_XXXX		TWST0.75TW8	CN-62
A19	Y/R	AVSS	0.75	CN-655F	TWST0.75TW9				TWST0.75TW9	CN-67
A20	Y/L	AVSS	0.75	CN-655F	TWST0.75TW9		<u> _XXXX_</u>		TWST0.75TW9	CN-67
A21	B/W	AVSS	0.75	CN-655F	TWST0.75TW10				TWST0.75TW10	CN-67
A22	L/W	AVSS		CN-655F	TWST0.75TW10		<u> _XXXX_</u>		TWST0.75TW10	CN-67
A56	Br	AVSS	0.75	CN-615F	TWST0.75TW11				TWST0.75TW11	
A57	R/W	AVSS		CN-615F	TWST0.75TW11				TWST0.75TW11	
456	Br	AVSS		CN-650F	TWST0.75TW12				TWST0.75TW12	
457	R/W		0.75	CN-650F	TWST0.75TW12				TWST0.75TW12	
A56	Br	AVSS		CN-677M	TWST0.75TW13				TWST0.75TW12	
		AVSS			TWST0.75TW13					
457	R∕W	AVSS	0.75	CN-677M	18510.751813		•		TWST0.75TW13	UN-JL
	В	AVSS		LA-C9		DSC3	•			CN-62
E029	В	AVSS		LA-C9		DSC3				CN-61
	В	AVSS		CN-JC01F						LA-C7
E016	В	AVSS	0.75	CN-JC01F			<b>+</b>			CN-62
017	В	AVSS	0.75	CN-JC01F						CN-62
018	В	AVSS	0.75	CN-JC01F			<del>                                    </del>			CN-63
EOJP		AVSS	1.25	CN-JC01F						CN-JC
	В	AVSS		CN-624F			<b>-</b>			CN-JC
	B	AVSS		CN-624F						CN-JC
	B	AVSS		CN-624F					1	CN-JC
E023	B	AVSS	0.75	CN-624F			<u> </u>			CN-JC
	B	AVSS		LA-C4			<u> </u>	-	1	CN-JC
	B			CN-650F					1	CN-JC
	-	AVSS							+	
	B	AVSS		CN-JC08F			++			CN-JC
		AVSS		CN-JC08F			<b>†</b>	0001		CA-C1
2026	-	AVSS		CN-JC08F				DSC1		LA-C2
	В	AVSS		CN-843F				DSC1		LA-C2
		AVSS	0.75	CN-608F			· · · · ·	DSC6		CN-60
028	В	AVSS	0.75	LA-C6				DSC6		CN-60
2031	В	AVS	2	LA-C11						CN-67
1	B∕W	AVSS	1.25	CN-708F						CN-67
2		AVSS		CN-708F						CN-61
 E3	B/W	AVSS		CN-708F						CN-6
	B/W	AVSS		CN-708F						CN-61
_4 E5	B/W			CN-708F			1			CN-61
 E8		AVSS								
		AVSS		CN-700M						CN-61
9		AVSS		CN-700M						CN-61
E10	B∕W	AVSS	0.5	CN-672M						CN-70
	B/W	AVSS	0.75	CN-709M				1	1	CN-67
-11 -18	B/W	AVSS		CN-655F						CN-70

THE WIRE NO. /COLOR LIST

%1IDENTIFICATION SYMBOL %2TWO WIRE CONNECT NUMBER

(5/5)

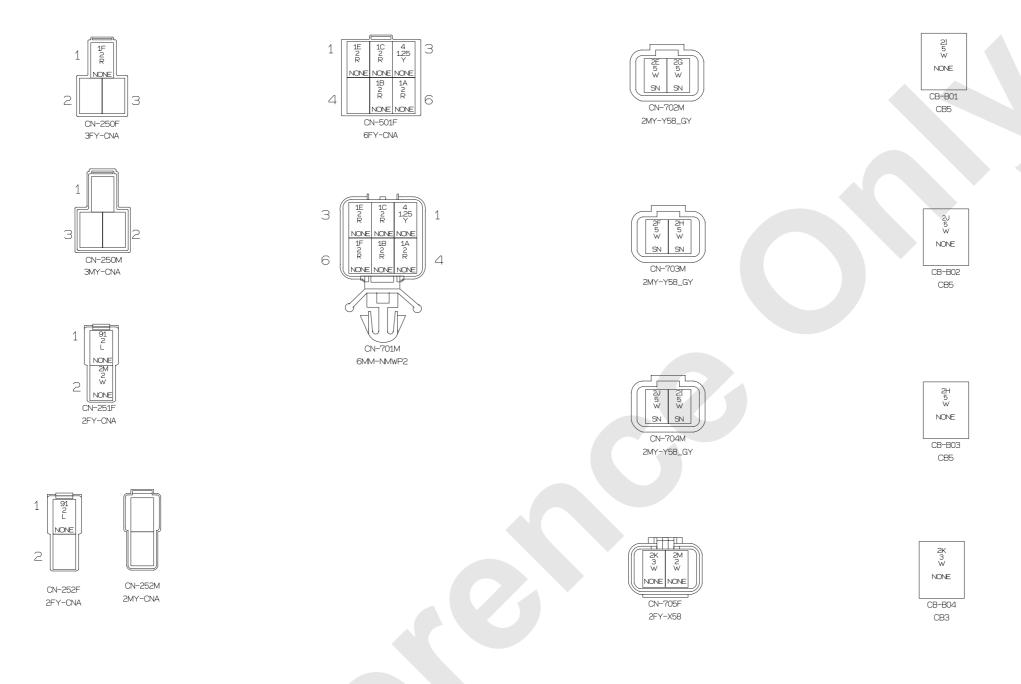




### POWER SUPPLY HARNESS

8000-1

# (1/2)



WIREN	IO. WIRE COLO	R WIRE TYPE	SIZE	FROM	×1	¥2	CONNECTION	¥2	×1	T
1A	R	AVS	2	CN-501F						CN-7
1B	R	AVS	2	CN-501F						CN-7
1C	R	AVS	2	CN-501F						CN-7
1E	R	AVS	2	CN-501F						CN-7
1F	R	AVS	2	CN-250F						CN-1
2E	W	AVS	5	CB-B07						CN-7
2G	W	AVS	5	CB-B06						CN-7
2H	W	AVS	5	CB-B03						CN-7
21	W	AVS	5	CB-B01						CN-7
2J	W	AVS	5	CB-B02						CN-7
2K	W	AVS	3	CB-B04						CN-7
2L	W	AVS	2	CN-705F						CN-2
4	Y	AVSS	1.25	CN-501F						CN-7
91	L	AVS	2	CN-252F						CN-2

# ABOL IMBER

Published 11-10-17, Control #261-01

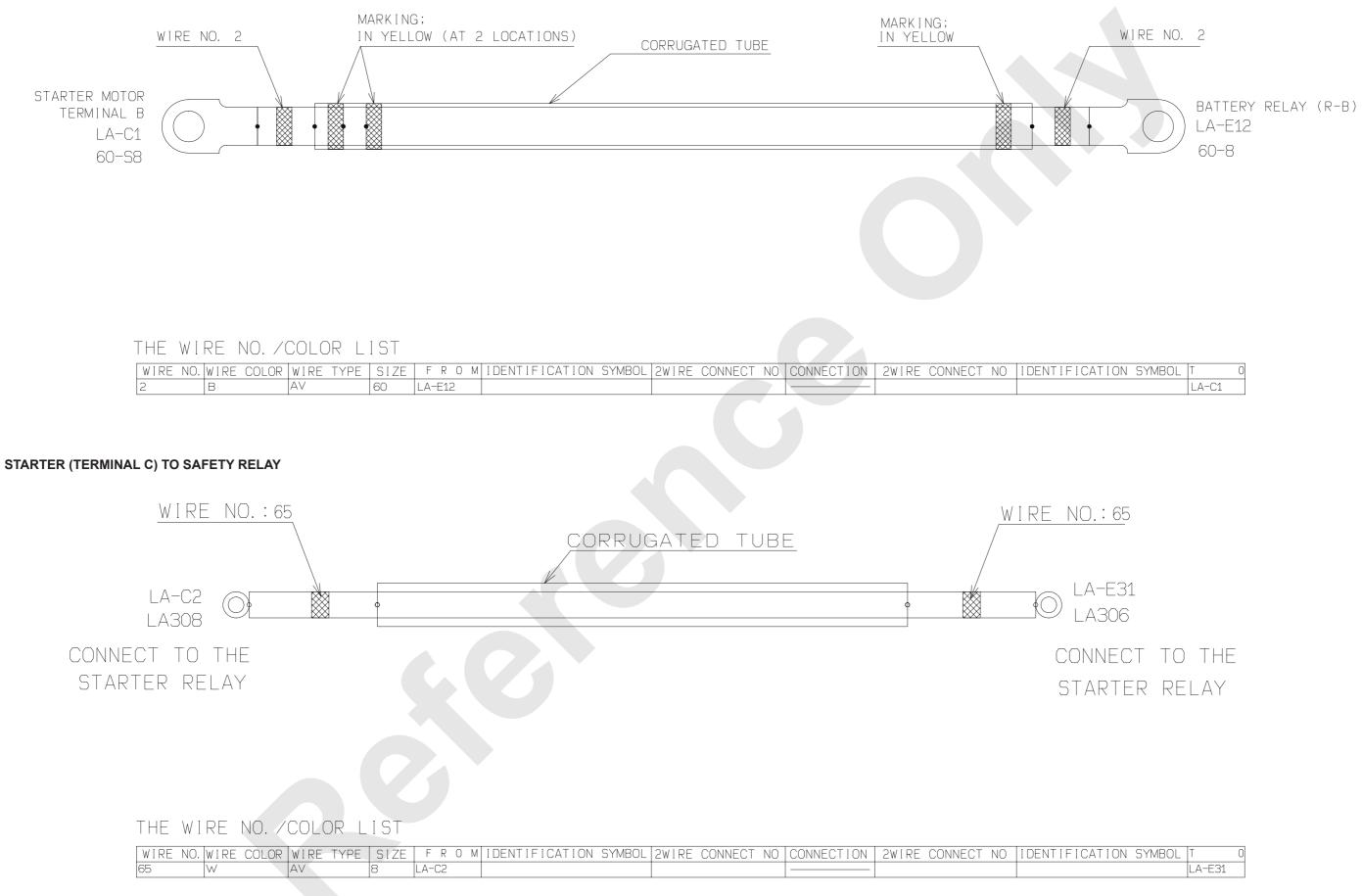






(2/2)

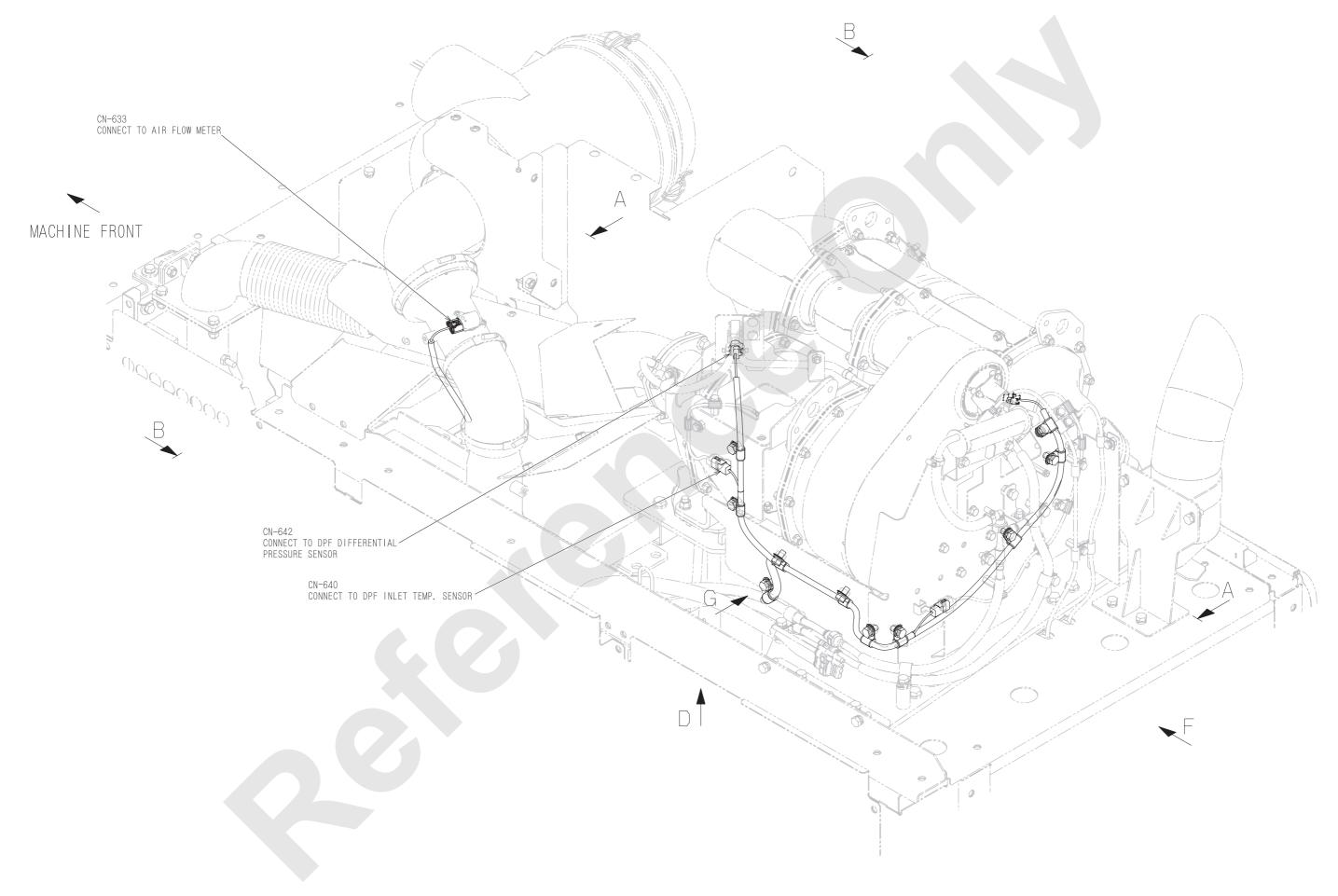
### STARTER (TERMINAL B) TO BATTERY RELAY



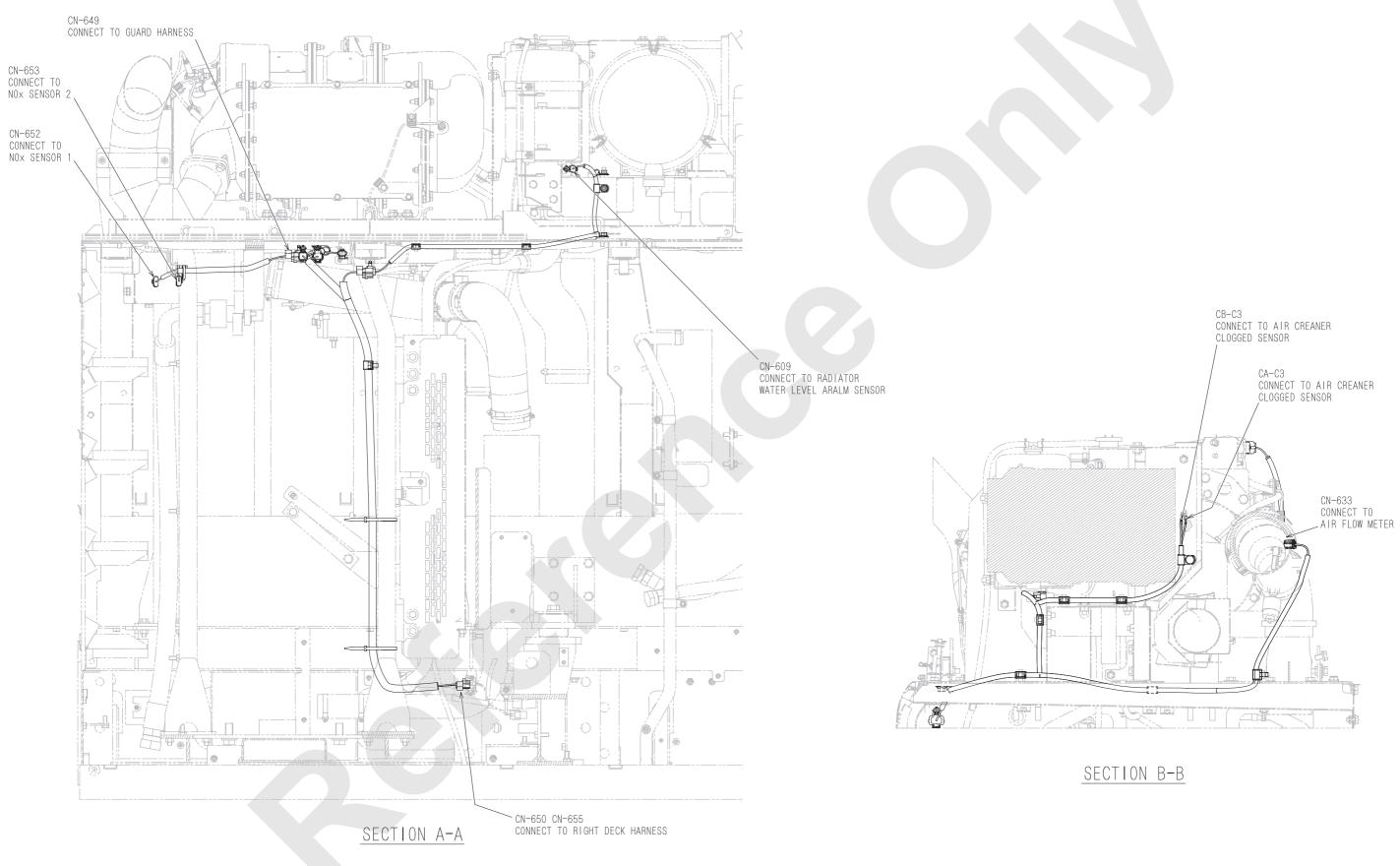
ION	SYMBOL	Т	0
		LA-C1	

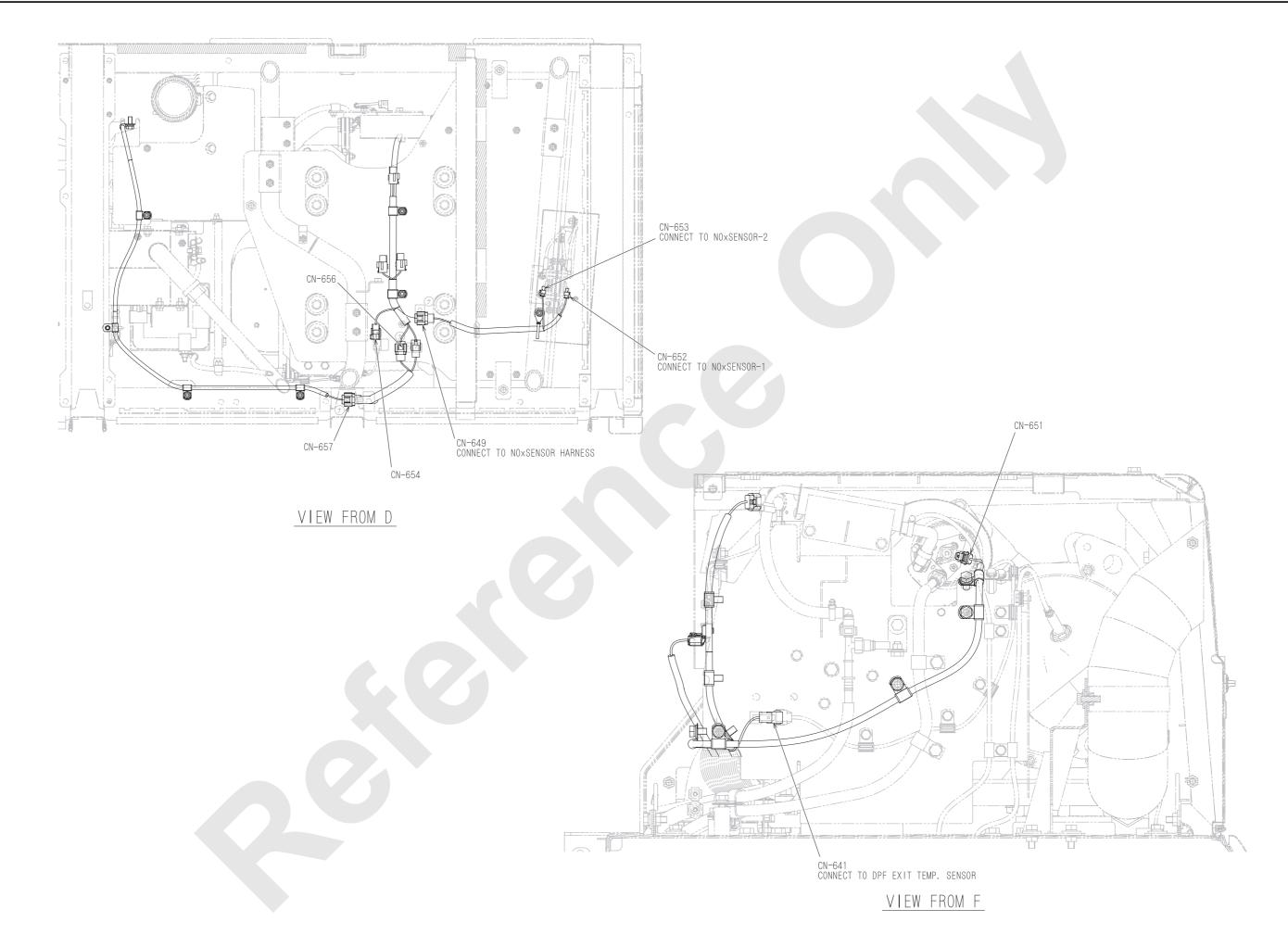
ION	SYMBOL	Т	0
		LA-E31	

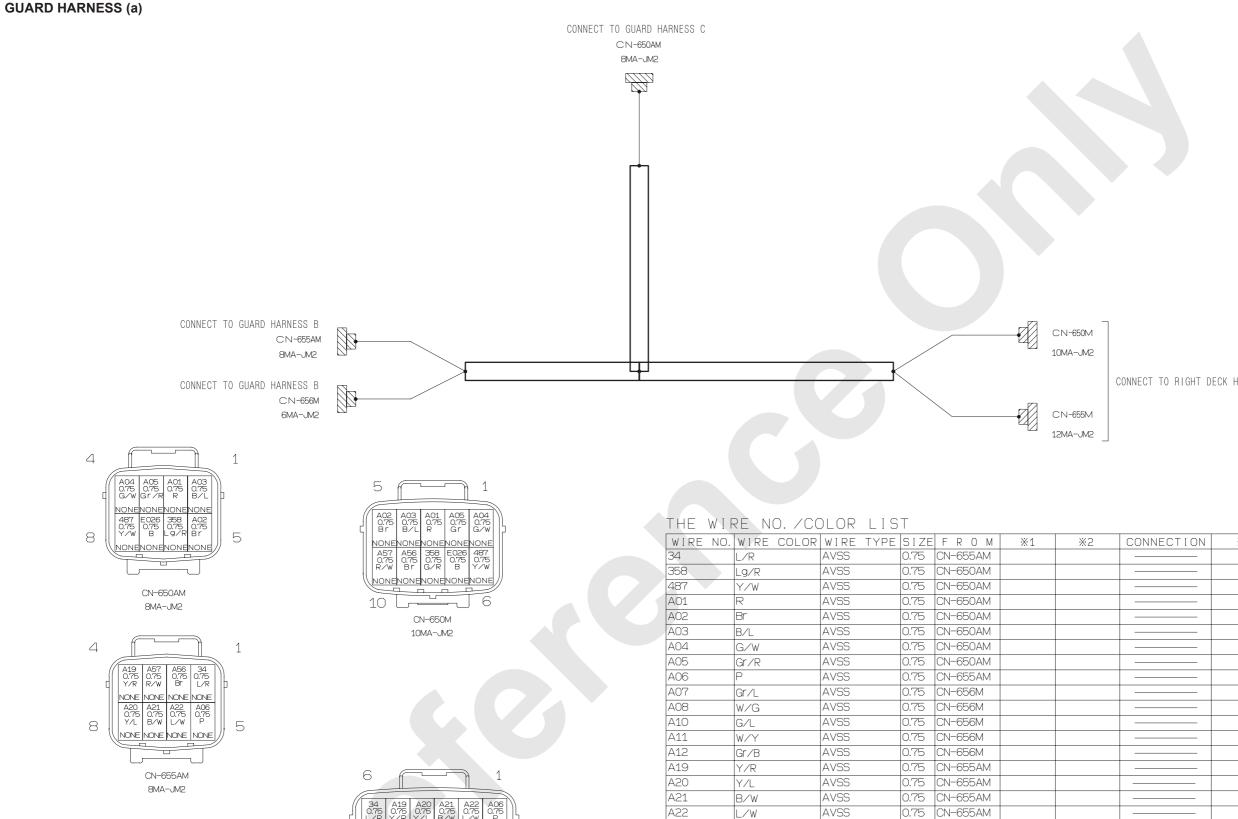
# 6. RIGHT DECK (GUARD)



(1/3)







L/W

R/W

B/W

%1 PIN NUMBER %2 TWO WIRE CONNECT NUMBER

Br

B

A56

A57

E026

E18

AVSS

AVSS

AVSS

AVSS

AVSS



6MA-JM2

34 0.75

12

A08

A11 0.75

7

NONENONENONENONE

CN-655M 12MA-JM2 CONNECT TO RIGHT DECK HARNESS

CONNECTION	<b></b> 2	×1	T O
			CN-655M
			CN-650M
			CN-655M
			CN-650M
			CN-655M

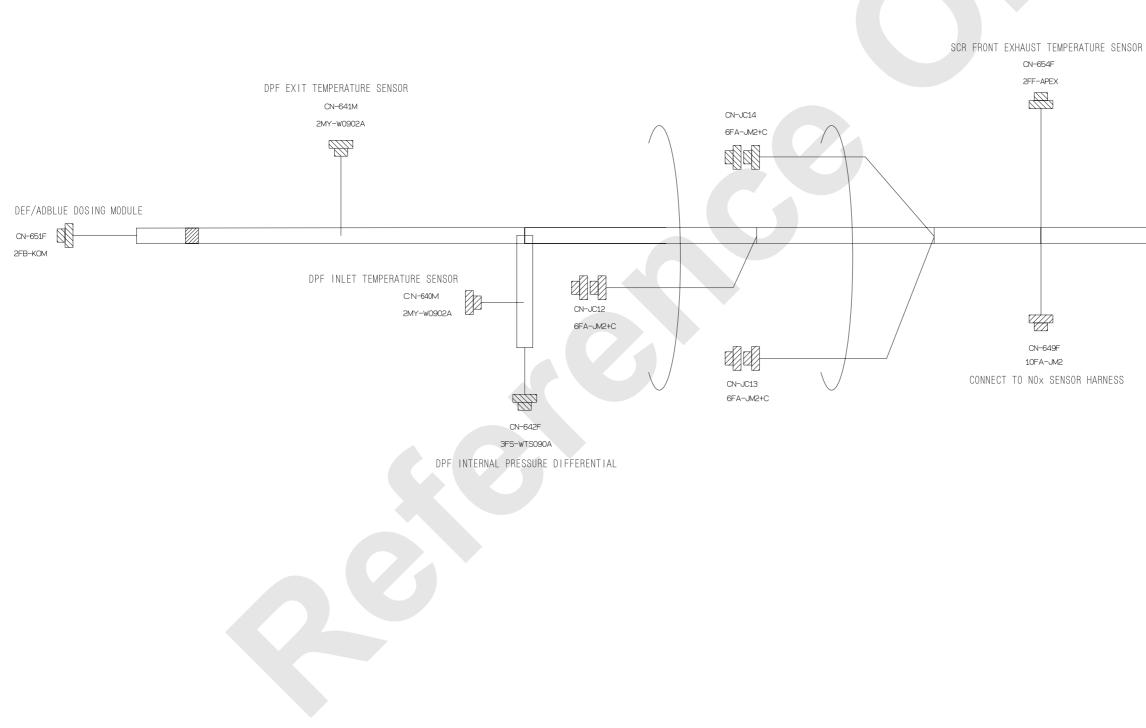
0.75 CN-655AM

0.75 CN-655AM

0.75 CN-655AM

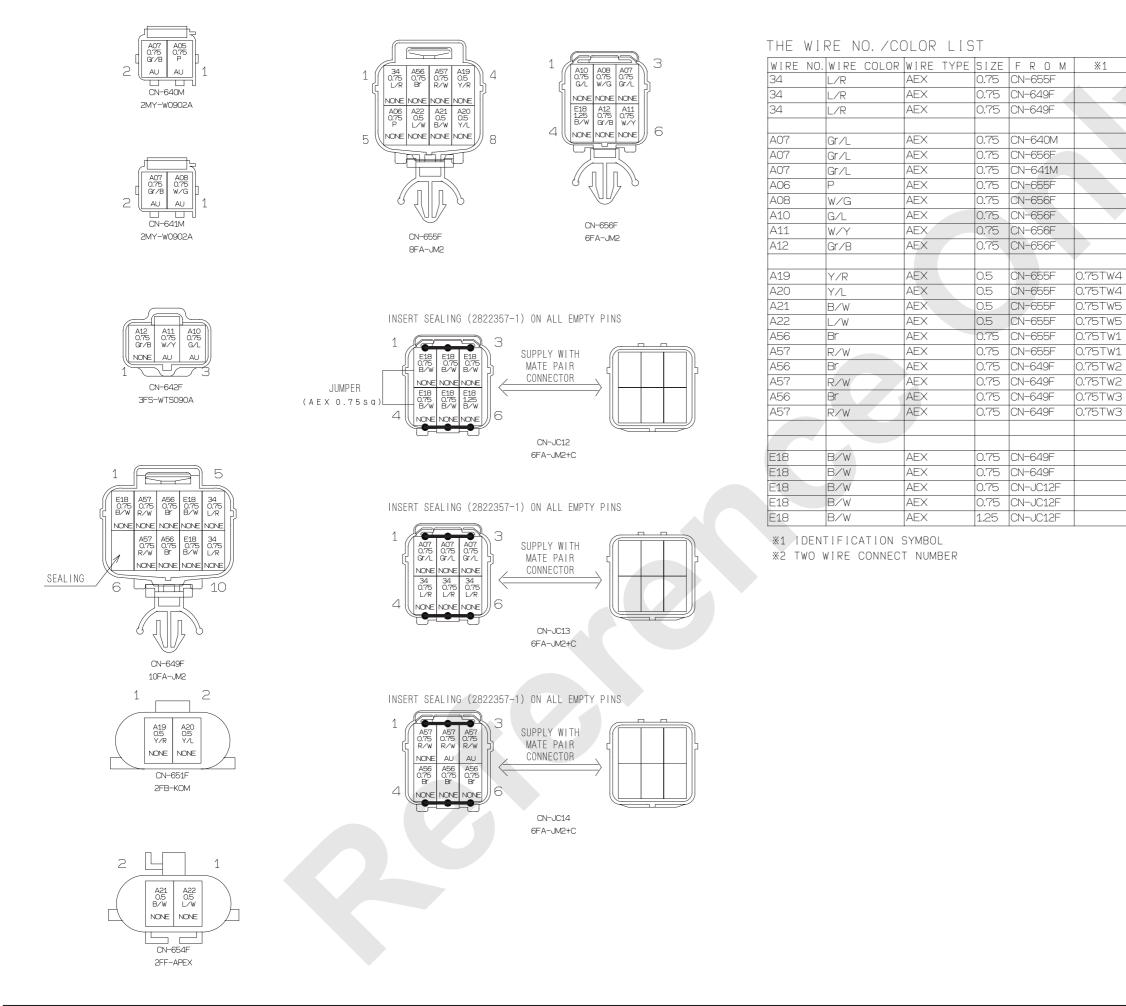
0.75 CN-650AM

1.25 CN-656M



CONNECT TO GUARD HARNESS A CN-655F 8FA-JM2 CONNECT TO GUARD HARNESS A

# (1/2)

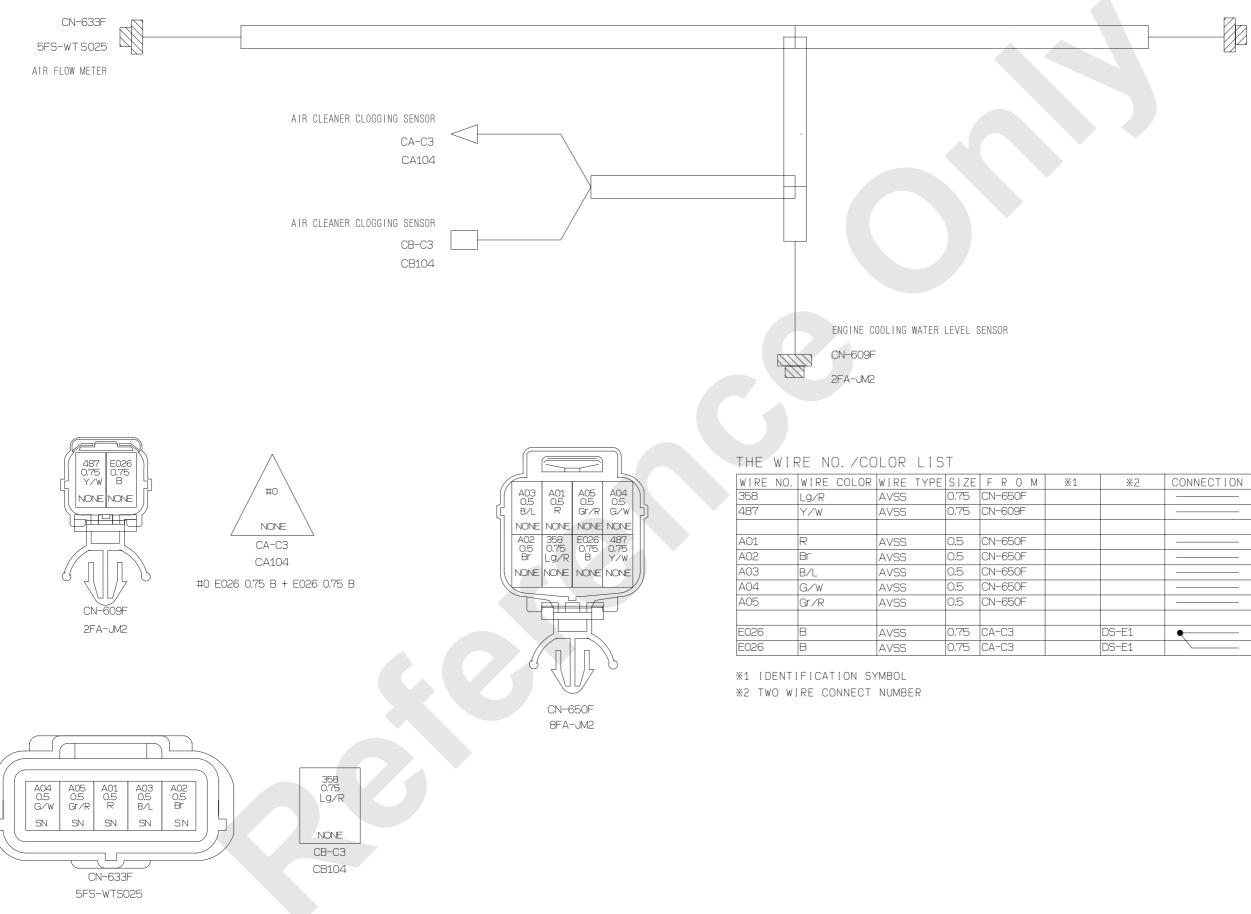


2	CONNECTION	<b></b> 2	*1	T 0
				CN-JC13F
	I ↓			CN-JC13F
	<b>I</b> − − <b>↓</b>			CN-JC13F
_				
	• • ·			CN-JC13F
	1			CN-JC13F
				CN-JC13F
				CN-640M
				CN-641M
				CN-642F
				CN-642F
				CN-642F
			0.75TW4	CN-651F
			0.75TW4	CN-651F
			0.75TW5	CN-654F
			0.75TW5	CN-654F
			0.75TW1	CN-JC14F
			0.75TW1	CN-JC14F
			0.75TW2	CN-JC14F
			0.75TW2	CN-JC14F
			0.75TW3	CN-JC14F
			0.75TW3	CN-JC14F
				CN-JC12F
	<u> </u>			CN-JC12F
	<b>│ -                                   </b>			CN-JC12F
	<b>↓ ↓ ↓</b>			CN-649F
	<b>→</b>			CN-656F

×

(2/2)

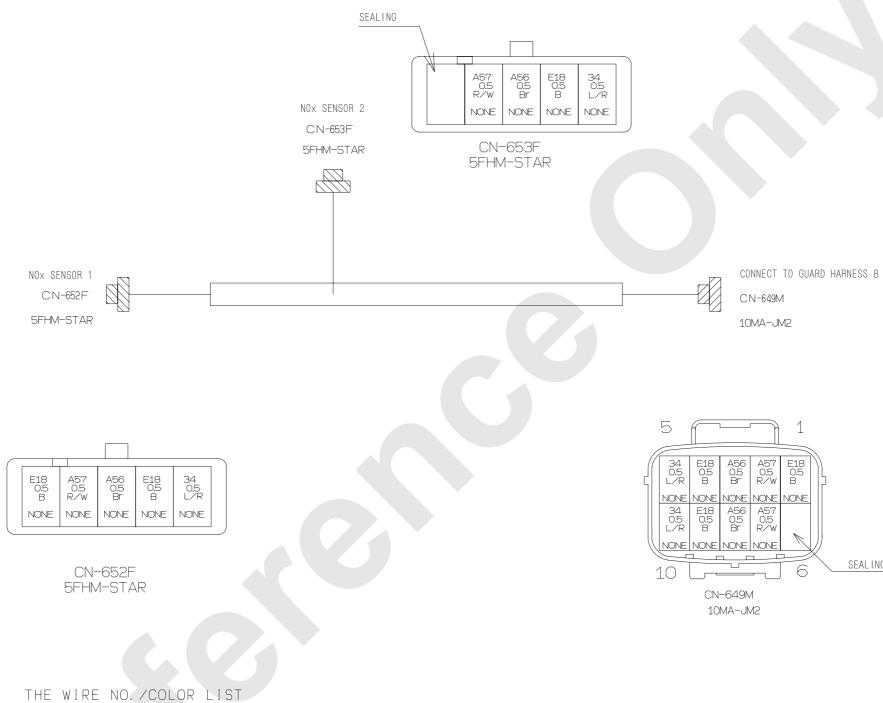
### GUARD HARNESS (c)



CN-650F 8FA-JM2 CONNECT TO GUARD HARNESS A

*2	CONNECTION	*2	*1	T O
				CB-C3
				CN-650F
				CN-633F
DS-E1	•			CN-650F
DS-E1				CN-609F

### NOx SENSOR HARNESS



WIRE	NO.	WIRE	COLOR	WIRE	TYPE	SIZE	F	R	0	М	PIN	NUMBER	81
34		L/R		AEX		0.5	CN	-65	52F				
34		L/R		AEX		0.5	CN	-65	53F				

34	L/R	AEX	0.5	CN-652F			CN-649M
34	L/R	AEX	0.5	CN-653F			CN-649M
	Br	AEX	0.5	CN-652F			CN-649M
A56	Br	AEX	0.5	CN-653F			CN-649M
A57	R/W	AEX	0.5	CN-652F			CN-649M
A57	R/W	AEX	0.5	CN-653F			CN-649M
E18	В	AEX	0.5	CN-652F			CN-649M
E18	В	AEX	0.5	CN-652F			CN-649M
E18	В	AEX	0.5	CN-653F			CN-649M

CONNECTION

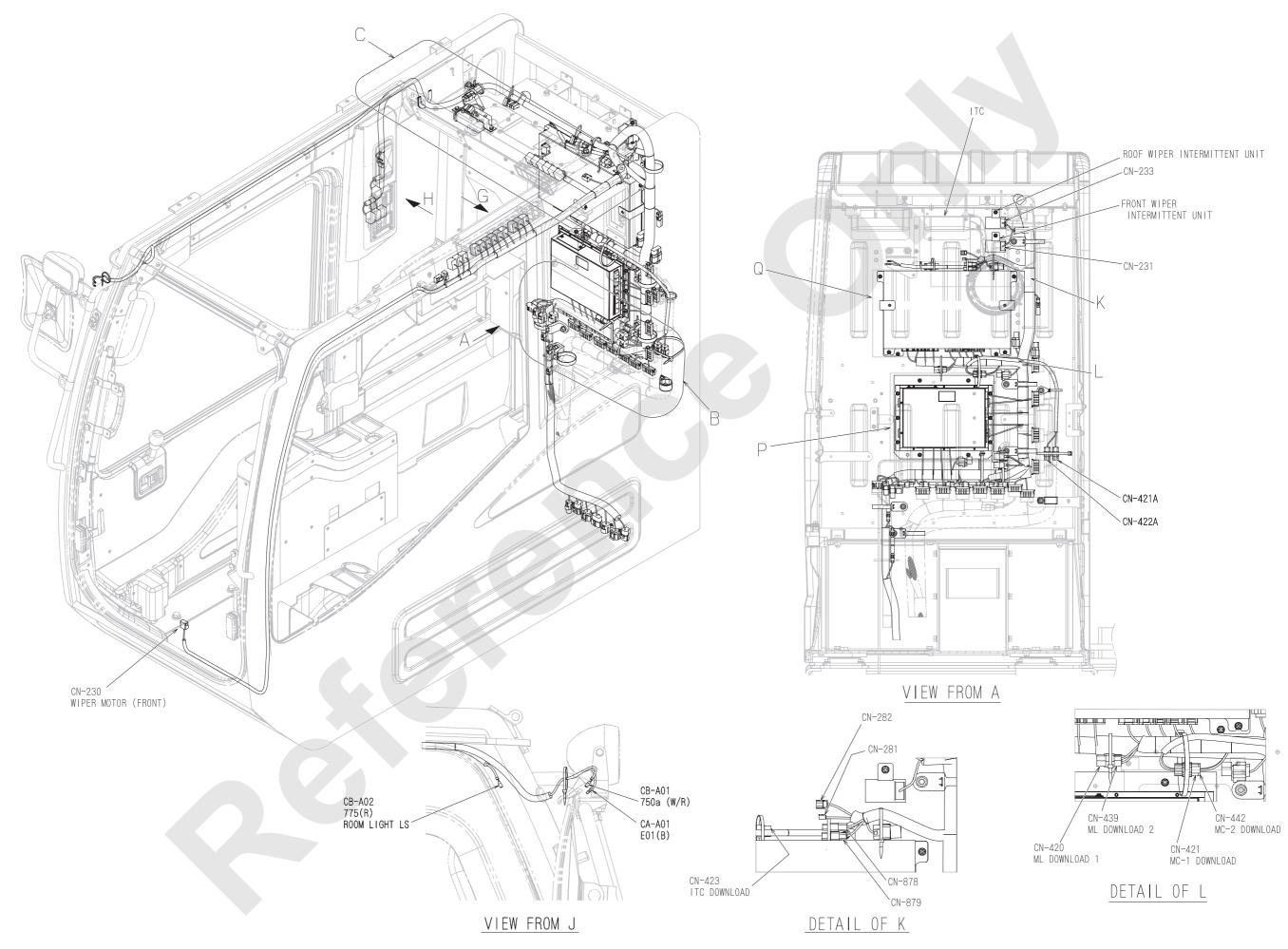
₩1

PIN NUMBER

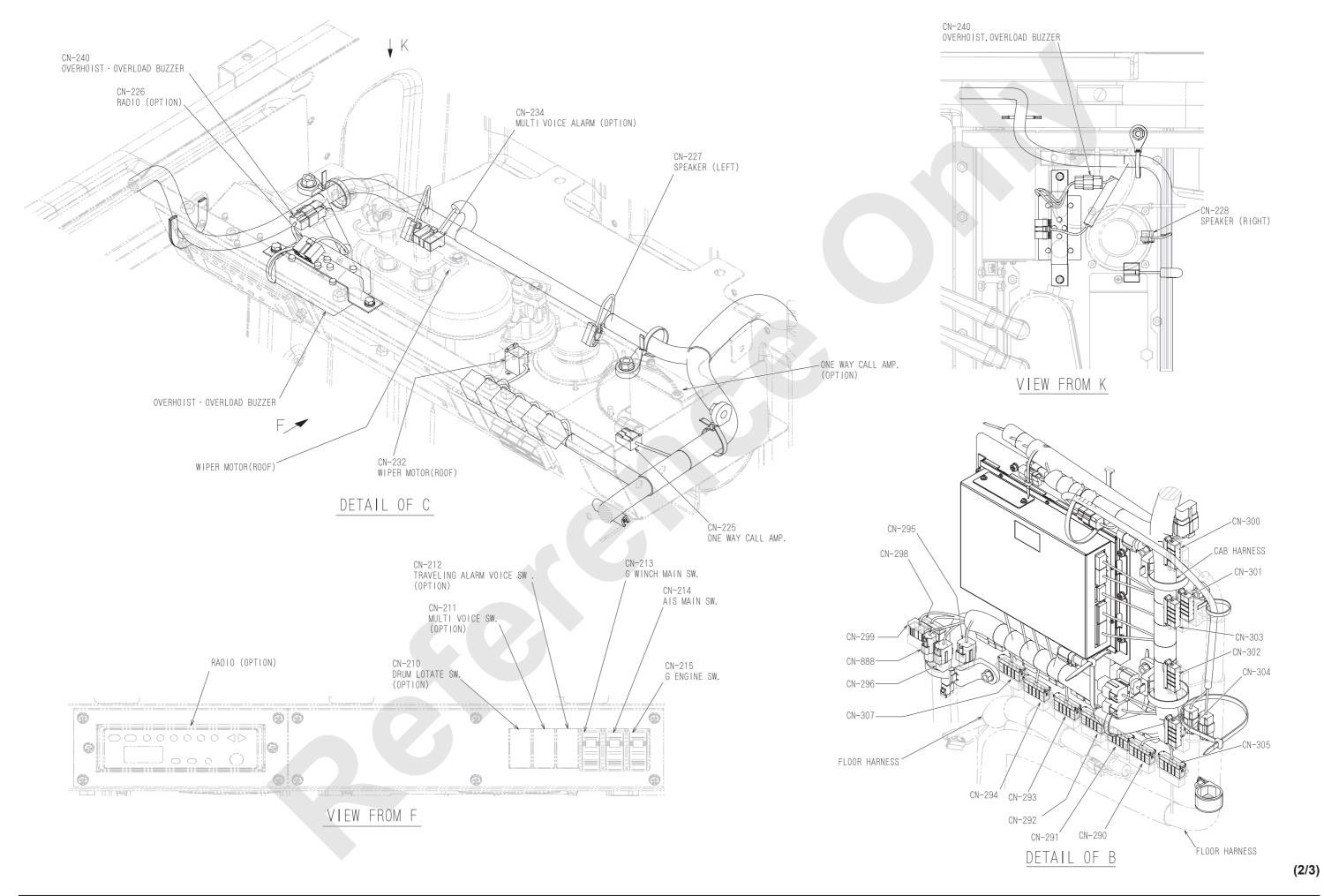
0

SEALING

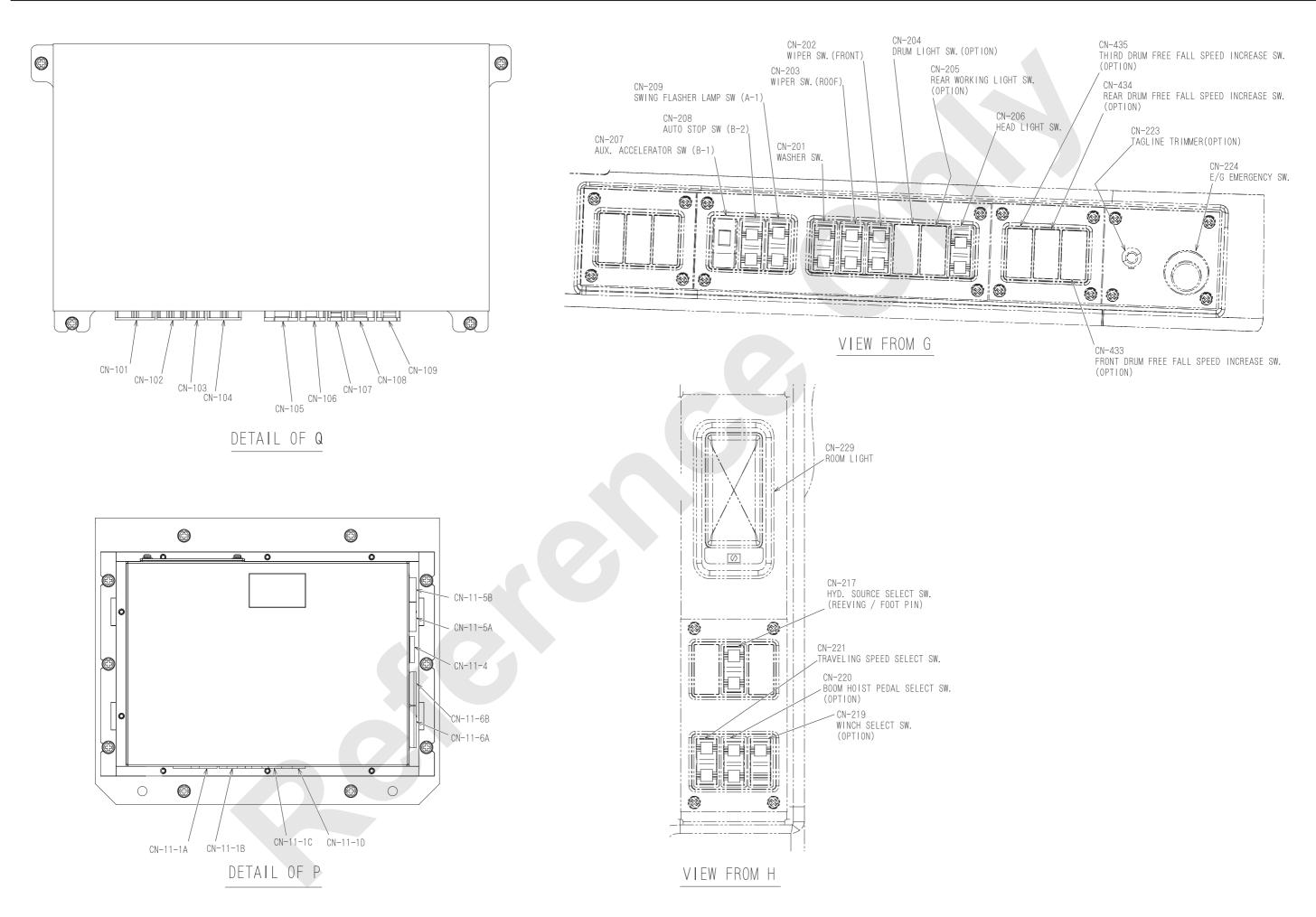
\*1 IDENTIFICATION SYMBOL



(1/3)

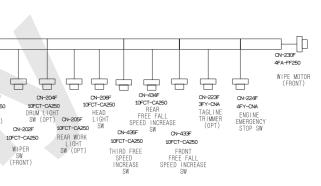


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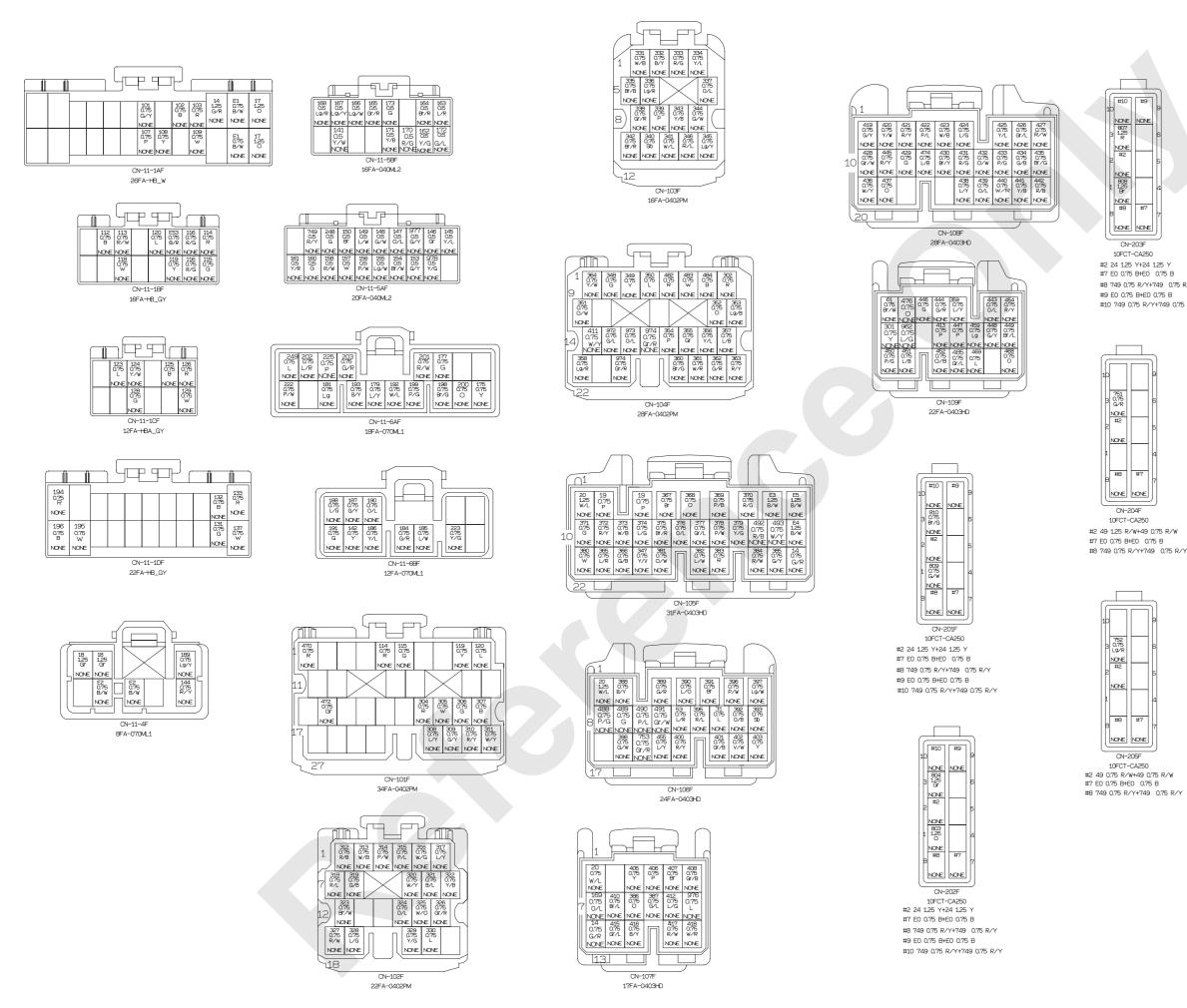


(3/3)

### **CAB MAIN HARNESS** HEADLIGHT(CAB RIGHT) CB-A01 TOP WIPER CN-233F HEADLIGHT(CAB RIGHT) ROOM LIGHT CB-404 CB104 CN-227F CN-240F CN-228F 2FY-CNA SPEAKER (RIGHT) CN-209F ÷ ÷ Ē $\Box$ OVERHOIST/ OVERLOAD BUZZER 6FY-CNAR CN-207F CN-203F CN-234F 9FA-MIC2 MULTI VOICE ALARM 4FY-CNA CN-225F 10FCT-CA250 FRONT WIPER ROOM LIGHT LS CB-A02 CB104 ONE WAY CALL AMP CN-201F 10FCT-CA250 WASHER SW 10FCT-CA250 CN-282F 8FA-040ML1 CN-217F 10FCT-CA250 AUTMATIC STOP ÷ HYD. SOURCE SELECTOR SW CN-219F 10FCT-CA250 WINCH SELECTOR SW (OPT) CN-281F 9FJ-XM 9FY-PA CN-226F CN-215F G ENGINE 10FCT-CA250 MAIN SW RADIO CN-220F 10FCT-CA250 HOIST PEDAL SELECTOR SW (OPT) CAN DIAG SW CN-CANAM CN-CANAF CN-878M CN-878F 2MY-CNA 2FY-CNA 2MY-CNA 2FY-CNA ON-214F AIS MAIN SW CB-A03 CB104 00-FAN PROPEL SPEED CN-221F SELECTOR SW 10FCT-CA250 CN-213F G WINCH 10FCT-CA250 MAIN SW 늡 CA-A03 CA104 CH-CANER CH-CANER CH-B73F CH-B73M 2MY-CNA 2FY-CNA 2HY-CNA 2MY-CNA CN-423F CN-423AM 3FA-JM2 3MA-JM2 ON-212F PROPEL ALARM DIAG SW ITC DOWNLOAD CN-237F 2FY-CNA CN-104F 28FA-0402PM CN-102F 22FA-0402PM CN-103F 16FA-0402PM CN-237M 2MY-CNA+D D | 0 D E (R-D0630) CN-211F 10FCT-CA250 MULTI VOICE SW 34FA-0402PM CN-101F CN-JAO3M 10MA-JM2 CN-JA06M 10MA-JM2 10FCT-CA250 CN-210F DRUM ROTATE SW CN-JA07F CN-JA03F MC1 CN-JA06F 10FA-JM2 CN-108F CN-107F ON-108F CN-109F 24FA-0403H0 17FA-0403H0 28FA-0403H0 22FA-0403H0 CN-105F 31FA-0403HD CN-JAO7M BMA-JM2 ML DOWNLOAD 1 D CN-420AF CN-420M 2FY-CNA 2MY-CNA CN-300F 20FA-D3100D ML DOWNLOAD 2 MC1 DOWNLOAD 0N-232F 6FA-FF250 WIPER MOTOR (TOP) CN-421F 4FY-CNA ÷ MC2 DOWNLOAD CN-11-58F 16FA-040ML2 CN-301F 20FA-D3100 CN-422F 4FY-CNA CN-11-5AF 20FA-040ML2 0N-11-4F 8FA-070ML1 M/L CN-11-68F 12FA-070ML1 CONNECT TO FLOOR HARNESS B 0N-11-6AF 18FA-070ML1 0N-302F 20FA-D3100 CN-11-1AF CN-11-10F 26FA+HB\_W CN-11-1DF 12FA+HBA\_GY CN-11-1DF 16FA+HB\_GY 22FA+HB\_GY CONNECT TO CN-295F LOAD DECODER HARNESS 6FA-JM2 무 무 무 무 CN-JA12F 6FA-JM2 CN-JAOGF CN-JAOGM 10FA-JM2 10MA-JM2 GFA-JM2 MA-JM2 MA-JM2 CONNECT TO CN-296F MAST ANGLE DELECTOR CABLE 4FA-JM2 2MY-CNAHD DIODE (P-00830) CN-304F 20FA-D3100D TW LATCH MOTOR 201-000 CN-B74F 2FY-CNA CN-B74M 2MY-CNA+D D | ODE (R-D0630) CH-JACON CH-JACON CH-JACON CH-JACON CN-888 Þ ₹<sup>3</sup> CN-298F -12 -11 CN-892M2FY-CNA 2MY-CNA+D DIODE (R-00630) CN-875F 2FY-CN4 CN-676F 20FA-070ML1 CONNECT TO ATT JUNCTION BOX ⊕ CN-875M CN-299F 14FA-070ML1 ON-JADAF 12FA-JAP ON-JADAM 12MA-JAP CN-307F 20FA-D3100D CONNECT TO FLOOR HARNESS A CN-293F 20FA-D3100D CONNECT TO FLOOR HARNESS A ÷ ▶ a) 2MY-CNA+D ↓ D IODE (R-00530) ↓ AMY-CNA+D D ↓ D IODE (R-00530) □ CN-B94M CN-B94F □ CN-B94F 2FY-CNA CN-294F 20FA-031000 CONNECT TO FLOOR HARNESS ÷ ÷ CN-290F CN-305F 20FA-D3100D 20FA-D3100D CN-885F 2FA-JM2 CONNECT TO FLOOR HARNESS A FLOOR HARNESS B ON-292F 20FA-D3100D HEADLIGHT CAB LEFT CN-674M CONNECT TO FLOOR HARNESS A CN-671F 12FA-JM2 CN-670M Ð CONNECT TO RIGHT DECK HARNESS CN-291F 20FA-D3100D CONNECT TO FLOOR HARNESS A CN-672F CN-673F 10FA-JM2 CN-688M 8MA-JM2



## (1/5)



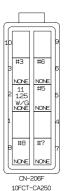


#2 24 1.25 Y+24 1.25 Y #7 E0 0.75 B+E0 0.75 B #8 749 0.75 R/Y+749 0.75 R/Y #9 E0 0.75 B+E0 0.75 B #10 749 0.75 R/Y+749 0.75 R/Y

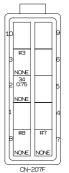




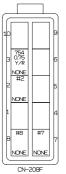




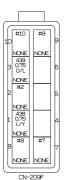
#3 749 125 R/Y+749 125 R/Y #5 11 1.25 W/G+11 1.25 W/G #6 750 1.25 W/R+750 1.25 W/R #7 E0 0.75 B+E0 0.75 B #8 749 1.25 R/Y+749 1.25 R/Y



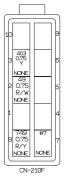
10FCT-CA250 #3 753 0.75 Gr/R+753 0.75 Gr/R #7 E0 0.75 B+E0 0.75 B #8 749 0.75 R/Y+749 0.75 R/Y



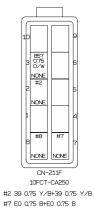
10FCT-CA250 #2 21 0.75 Lg+21 0.75 Lg #7 E0 0.75 B+E0 0.75 B #8 749 0.75 R/Y+749 0.75 R/Y



10FCT-CA250 #2 39 0.75 Y/B+39 0.75 Y/B #7 E0 0.75 B+E0 0.75 B #8 749 0.75 R/Y+749 0.75 R/Y #9 E0 0.75 B+E0 0.75 B #10 749 0.75 R/Y+749 0.75 R/Y

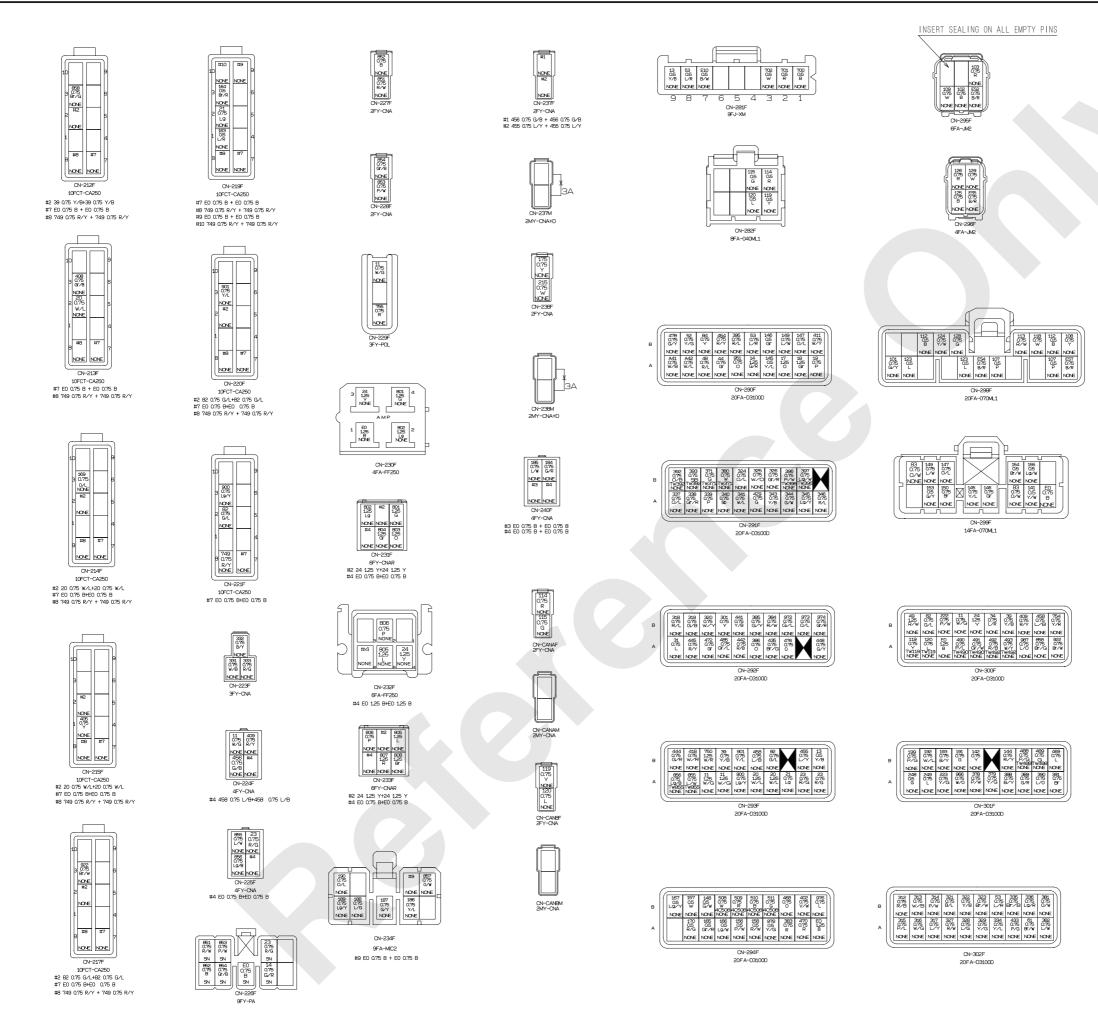


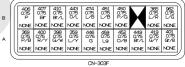
10FCT-CA250 #7 E0 0.75 B+E0 0.75 B



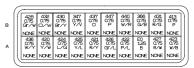
#7 E0 0.75 B+E0 0.75 B #8 749 0.75 R/Y+749 0.75 R/Y

(2/5)

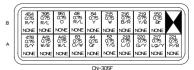








CN-304F 20FA-D3100D

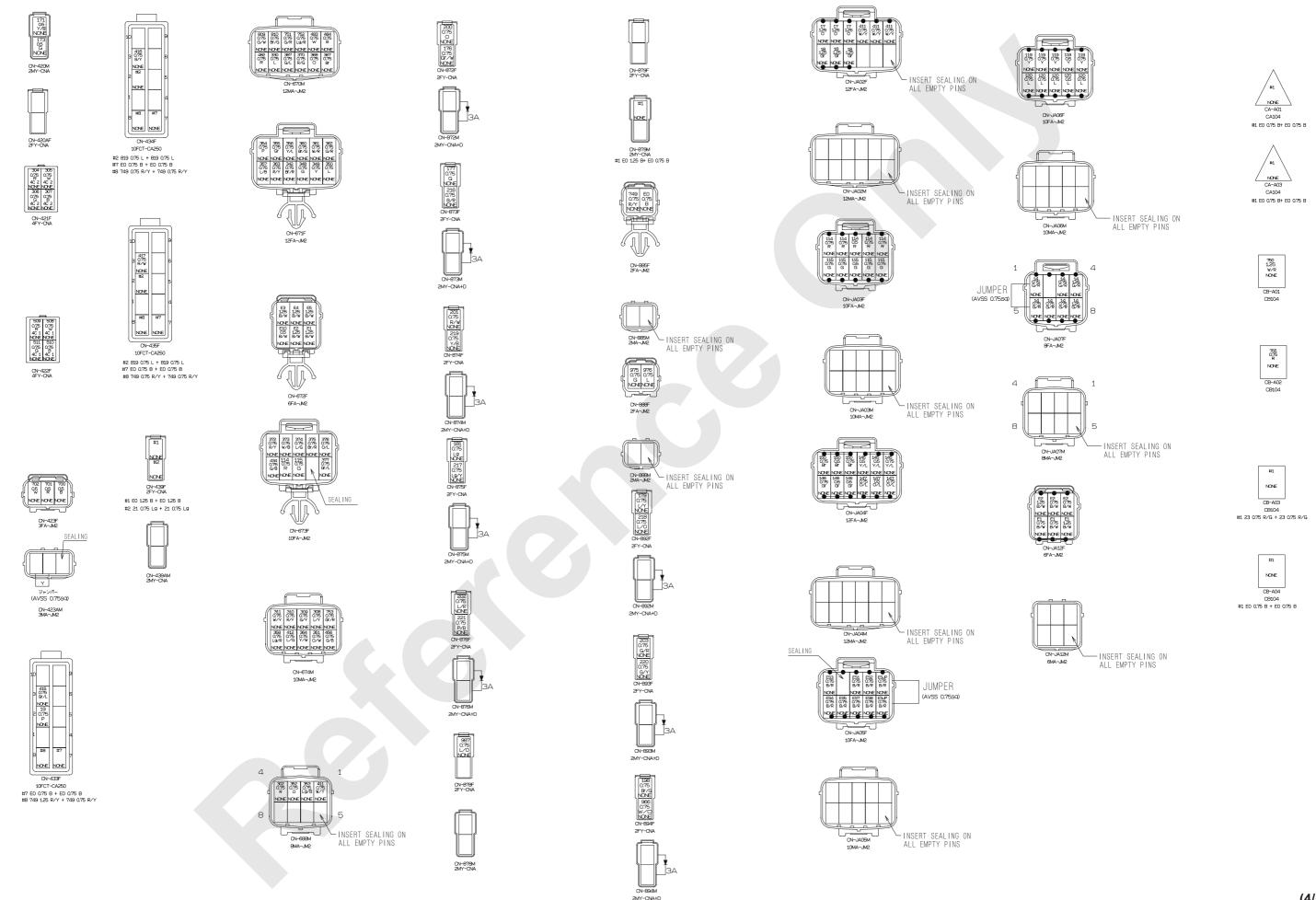


20FA-D3100D

(	2	~										2
в	Í		908 33	131 0 0 0 0	133 0.75 R	194 0,70 R	195 0.75 W	EST DR	225 0.75 P	1255 1855	977 05 G/Y	)
			NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	
A		Saa	10.0 0.0 0	137 0.75 ₩	132/0 0.76 B	196 0,75 B	800 Rog€	160 0.5 G	161 05 Y/R	568	168 05 Lg/R	
	U	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	IJ
	2				·							2
							2075					-

CN-301F
20FA-D3100D

(3/5)

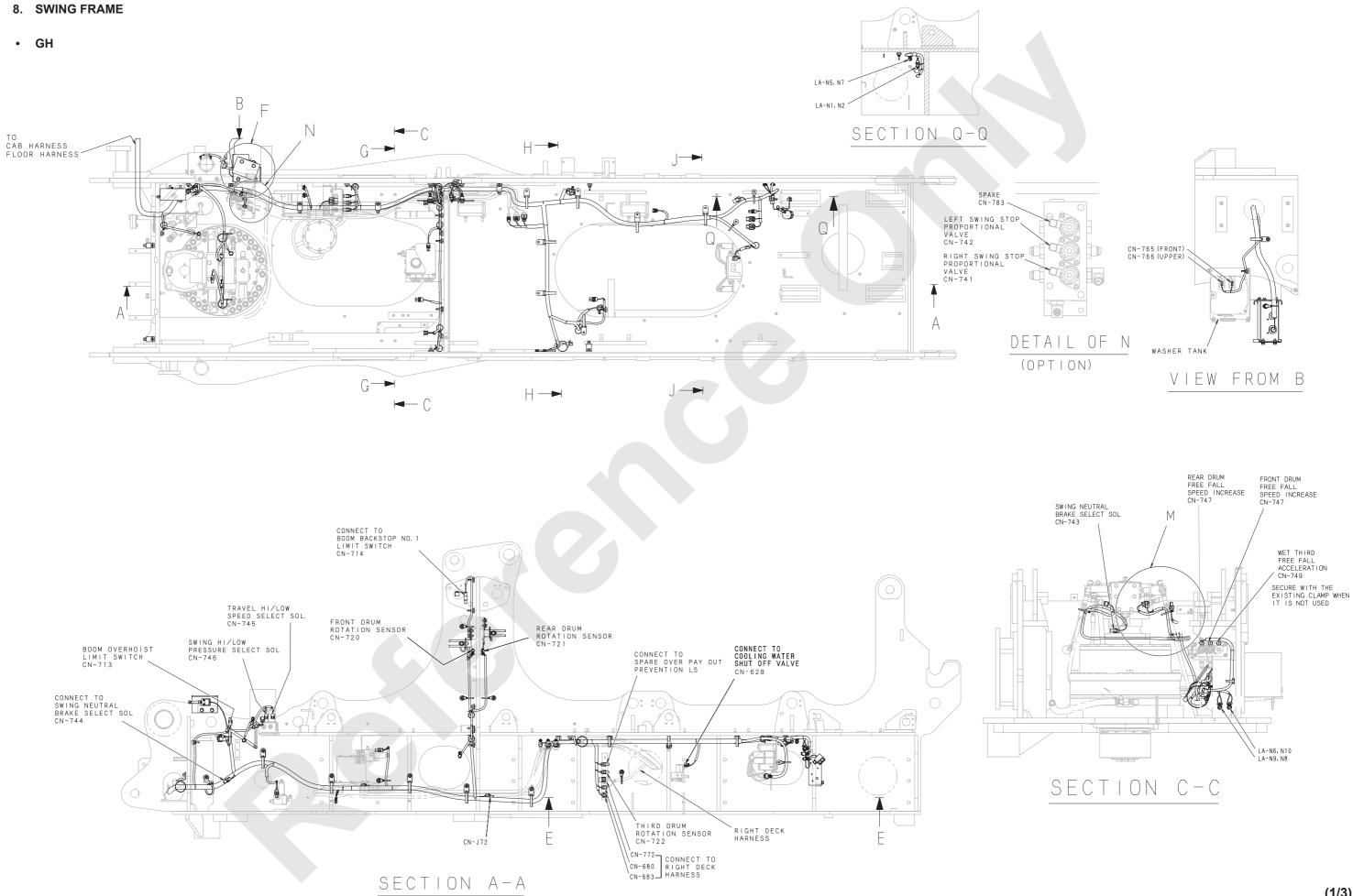


(4/5)

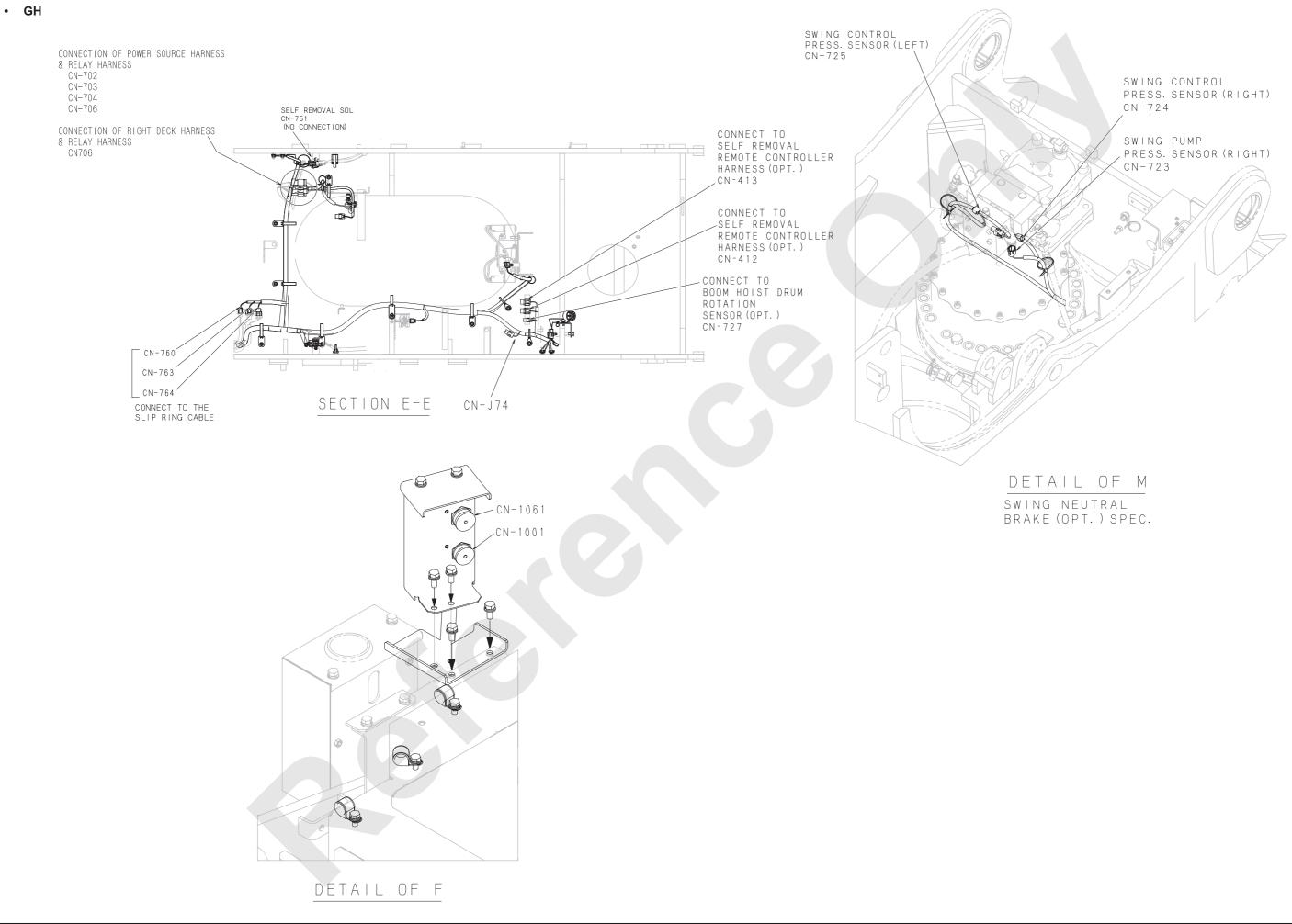
WIRE NO. WIRE COURT WIRE TYPE SIZE FROM 2WIRE CONNECTION CONNECTION CONNECTION TO WIRE TWO TO THE NO. WIRE COLUR WIRE TYPE SIZE FROM 2WIRE CONNECTION	SIZE FROM 2WIRE CONNECT NO. CONNECTION 2WIRE CONNECT NO. T	0 WIRE NO. WIRE COLOR WIRE TYPE SIZE FROM 2017E CONNECTION 2017E CONNECTION 2017E CONNECTION TO 0	WIRE NO. WIRE COUCH WIRE TYPE SIZE FROM 2WIRE CONNECTION 2WIRE	
11 W/G AVSS 1.25 DN-293F ON-206F 145 Y/L AVSS 0.5 ON-11-5AF ON-JA04F 340 SD AVSS		468 0 AVSS 0.75 ON-109F ON-294F	700 B AVSS 0.5 CN-281F	CN-423F 371 G AVSS 0.75 CN-105F CN-291F
11 w/G AVSS 1.25 CN-293F DSA35 CN-206F 145 Y/L AVSS 0.75 CN-299F ON-JA04F 341 w/L AVSS		469 L AVSS 0.75 CN-109F CN-301F	701 R AVSS 0.5 CN-281F	ON-423F         311         G         AV35         O.15         OV-100F         OV-201F           ON-423F         380         W         AV5S         0.75         ON-105F         DXXX         ON-291F
11 W/G AVSS 125 JS-A1DSA36 DK-206F 145 Y/L AVSS 0.5 DK-290F DK-3404F 342 BY/R AVSS		470 R AVSS 0.75 CN-101F CN-294F	702 W AVSS 0.5 CN-281F	0N-423F 372 R/Y AVSS 0.75 0N-105F ON-673F
11 w/G AVSS 0.75 JS-A1 0X-224F 146 Gr AVSS 0.5 0X-11-5AF 0X-JA04F 343 Y/B AVSS	0.75 CN-291F CN-103		749 R/Y AVSS 0.75 CN-220F DSA94	
11 W/G AVSS 0.75 US-A1 DX-223F 146 Gr AVSS 0.75 DX-239F DX-M04F 344 G/W AVSS	0.75 CN-291F CN-103		749 R/Y AVSS 0.75 CN-220F DSA94	
11 W/G AVSS 0.75 (K-A1	0.75 CN-291F CN-103 0.75 CN-291F CN-103	410 0 8133 0.13 01 103	749 R/Y AVSS 0.75 CN-219F DSA98	
		478 G/Y AVSS 0.75 CN-290F ON-305F 482 R AVSS 0.75 CN-104F ON-670M	749 R/Y AVSS 0.75 CN-219F DSA98 DSA9	
	0.75 CN-104F CN-671		749 R/Y AVSS 0.75 JS-A16 DSAS 749 R/Y AVSS 0.75 JS-A16	
			749 R/Y AVSS 0.5 JS-A10	01-11-5AF 379 Y/G AVSS 0.75 0N-105F 0N-301F
	0.75 CN-104F CN-671		749 R/Y AVSS 125 JS-A17	01 0055 299 D.07 AV65 0.75 CN-4065 CN-2016
14 G/R AVSS 0.75 0/5-10/76 - 0/-10/7F 149 L/W AVSS 0.75 J/5-A15 - 0/-200F 351 0//W AVSS				LO ON-206F 389 G/R AVSS 0.75 ON-106F ON-301F
		A42 W/L AVSS 0.75 DN-290F DN-305F	749 R/Y AVSS 125 CN-206F DSA100 C DSA1	
17 O AVSS 1.25 CN-JA02F - CN-290F 150 Br AVSS 0.5 CN-JA04F - CN-11-5AF 353 Lg/B AVSS	0.75 CN-104F CN-688		749 R/Y AVSS 125 CN-206F DSA100 DSAS	
17 O AVSS 1.25 (CN-JA02F CN-JA02F CN-J1-1AF) 150 Br AVSS 0.75 (CN-JA04F CN-299F 354 P AVSS	0.75 ICN-104F   ICN-671		749 R/Y AVSS 0.75 CN-434F DSA93 C DSA9	4 CN-433F 392 0/8 AVSS 0.75 CN-106F CN-291F 393 Sb AVSS 0.75 CN-106F CN-291F
17 O AVSS 1.25 ON-JA02F ON-JA02F ON-JA02F ON-JA04F ON-JA04F SC AVSS 0.75 ON-JA04F SC AVS	0.75 CN-104F CN-671		749 R/Y AVSS 0.75 CN-434F DSA93 DSA9	
16         GY         AVSS         125         ON-002F         ●         ON-20F         153         G/Y         AVSS         05         ON-11-5AF         ●         ON-209F         356         Y/L         AVSS           18         GY         AVSS         125         ON-004F         ●         ON-209F         153         G/Y         AVSS         0.5         ON-11-5AF         ●         00-209F         356         Y/L         AVSS           18         GY         AVSS         125         ON-0402F         ●         ON-11-4F         154         BY/W         AVSS         0.5         ON-11-5AF         ●         00-209F         367         1/B         AVSS	0.75 CN-104F CN-671 0.75 CN-104F CN-671	_	749 R/Y AVSS 0.75 CN-205F DSA91 DSA9 749 R/Y AVSS 0.75 CN-205F DSA91 DSA9	2 CN-435F 396 P/W AVSS 0.75 CN-106F CN-291F 397 1.0/W AVSS 0.75 CN-106F CN-291F CN-291F
18         Gr         AVSS         125         CN-402F         Image: CN-11-4F         154         Br/w         AVSS         0.5         CN-11-5AF         CM-299F         367         1/8         AVSS           18         Gr         AVSS         125         CN-402F         Image: CN-11-4F         155         Lg/w         AVSS         0.5         CN-11-5AF         CM-11-5AF         CM-11-5AF         CM-299F         CM-11-5AF         CM-201F         358         Lg/R         AVSS	0.75 DN-104F DN-674	_	749 R/Y AVSS 0.75 CN-203F DSA91 DSA5 749 R/Y AVSS 0.75 CN-203F DSA89 DSA5	01-2045 400 D/C AVEC 075 01-2015
18         Or         AVSS         125         ON-JAQ2F         Image: Constraint of the state of the stat			749 R/Y AVSS 0.75 CN-203F DSA89	3 ON-203F 489 G AVSS 0.75 ON-301F ON-106F
19 P AVSS 0.75 0X-106F US-A11 157 W AVSS 0.5 0X-1294F OX-1157 B00 B7.6 AVSS			749 P/V AVSS 0.75 ON-202E DSAR7	3 ON-203E 490 R4 AVSS 075 ON-300E
19 P AVSS 0.75 US-A12 US-A11 158 R/W AVSS 0.5 (N-11-5AF CN-294F 361 W/R AVSS		-	749 R/Y AVSS 0.75 CN-202F DSA87 DSA8	5 CN-202F 490 P/L AVSS 0.75 CN-300F CN-100F
19 P AVSS 0.75 JS-A12 (N-105F 160 G AVSS 0.5 (N-11-5AF (N-307F 362 G/R AVSS			749 R/Y AVSS 0.75 CN-201F DSA85 CM-201F	5 CN-202F 492 R/B AVSS 0.75 CN-300F ON-105F
19 P AVSS 0.75 US-A12 DSA120 CN-435F 161 Y/R AVSS 0.5 CN-307F ON-11-5AF 363 R/Y AVSS	0.75 CN-104F CN-671		749         R/Y         AVSS         0.75         CH-201F         DSA87         DSA87           749         R/Y         AVSS         0.75         CH-201F         DSA85         DSA85           749         R/Y         AVSS         0.75         CH-201F         DSA85         DSA55           749         R/Y         AVSS         0.75         CH-201F         DSA85         DSA55	5 CN-202F 492 R/B AVSS 0.75 CN-300F CN-105F AVSS 0.75 CN-300F CN-105F CN-105F
19 P AVSS 0.75 0N-434F DSA121 C DGA120 0N-436F 162 Y/G AVSS 0.5 0N-307F ON-11-58F 364 Y/W AVSS				4 ON-201F 851 R/W AVSS 0.75 ON-226F ON-227F
19 P AVSS 0.75 0N-434F DSA121 ON-433F 163 U.R AVSS 0.5 0N-11-56F ON-219F 366 U.R AVSS	0.75 CN-105F CN-303		749 R/Y AVSS 0.75 CN-209F DSA83 DSA8	2 ON-209F 852 B AVSS 0.75 ON-226F ON-227F
20 W/L AVSS 125 DV-293F	0.75 CN-106F CN-304		749         R/Y         AVSS         0.75         ON-208F         DSA81         DSA8           749         R/Y         AVSS         0.75         ON-208F         DSA81         DSA8	2 ON-209F 853 P/W AVSS 0.75 ON-226F ON-228F
20 W/L AVSS 125 ON-106F			749         R/Y         AVSS         0.75         ON-208F         DSA81          DSA81           749         R/Y         AVSS         0.75         ON-215F         DSA102          DSA8	
			749 R/Y AVSS 0.75 CN-215F DSA102 DSA2 749 R/Y AVSS 0.75 CN-215F DSA102 DSA2	) UN=2U/I+ 1605 L/W AVSS U.Y5 UN=293F UN=220F UN=220F UN=220F UN=220F UN=225F
20         w/L         AVSS         125         CN-293F			749 R/Y AVSS 0.75 CN-213F DSA105	
20 W/L AVSS 0.75 CN-215F DSA49 . JS-A14 169 0/L AVSS 0.75 CN-214F	0.75 CN-302F CN-105	-	749 R/Y AVSS 0.75 CN-213F DSA105	07 CN-212F 304 R MVVS 0.75 CN-101F
20 W/ AVSS 0.75 (N-215F DSA49 - DSA207 (N-214F 170 R/G AVSS 0.5 (N-11-58F	0.75 CN-302F CN-105		749 R/Y AVSS 0.75 CN-211F DSA109 CONSAL	07 CN-212F 305 W MVVS 0.75 CN-101F CN-421F
20 W/ AVSS 075 (N=217E DSA207 (N=214E 171 V/R AVSS 0.5 (N=420M DSA207 R AVSS	0.75 ON-105F ON-294		749 R/Y AVSS 0.75 CN-211F DSA109	0N-210E 306 G MV/S 0.75 (N-101E
21 I.g AVSS 0.75 CN-293F DSA209 CN-439F 172 G/ AVSS 0.5 CN-11-58F CN-307F 384 R/W AVSS	0.75 ON-292F ON-105			307 B MVVS 0.75 CN-101F CN-421F
21 Lig LAVSS 1075 10N-209E IDSA200 L	0.75 CN-292F CN-105		750 W/R AVSS 125 CN-206F DSA101	
21 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.75 ON-107F ON-292		750 W/R AVSS 125 CN-206F DSA101	0N-299F 508 W MVVS 0.75 0N-294F
	0.75 CN-107F CN-670 0.75 CN-306F JS-A3	-	751 G/R AVSS 0.75 ON-204F	CN-670M         509         R         MVVS         0.75         CN-294F         ON-422F           CN-205F         510         B         MVVS         0.75         CN-294F         ON-422F
23         R/G         AVSS         0.75         08+803         DSA13	U/6 DN=306F U5=A3 0.75 JS=A3 DN=290	-	753 Gr/R AVSS 0.75 0N-672F	0N-228F 510 B MVVS 0.75 0N-294F 0N-422F 0N-422F 0N-422F
24 Y AVSS 1/25 OX-23/F DSA1 - OX-30/F 1/8 Lg AVSS 1/75 OX-87/F - OX-11-6A 3/5 P/L AVSS				28 CN-207F
24 Y AVSS 125 [01-23] 5 [054] 5 [054] 5 [054] 5 [054] 5 [07-237] 184 [G/R AVSS [075 [01-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-2407] 5 [07-24			754 Y/R AVSS 0.75 DN-208F	CN-300F E0 B AVSS 1.25 CN-439F CM-300F
24 Y AVSS 125 JS-A7 DSA5 DN-233E 185 J.W AVSS 0.75 DN-240E DN-11-69E 400 P.Y AVSS			755 R AVSS 0.75 DN-229F	08-A02 E0 B AVSS 1.25 CN-439F ON-879M
24 Y AVSS 125 US-47 0N-11-69E 401 02/8 AVSS 075 0N-234E 0N-11-69E 401 02/8 AVSS	0.75 (N=309F (N=106	-	801 G AVSS 1.25 CN-230F	CN-231F EO B AVSS 0.75 CA-A03 CN-879M
24 Y AVSS 1.25 JS-A7 DSA206 CN-201F 187 G/Y AVSS 0.75 CN-11-68F ON-234F 402 V/W AVSS	0.75 CN-294F CN-106		802 Lg AVSS 1.25 CN-230F	CN-231F E0 B AVSS 0.75 CA-A03 JS-A8
24 IY IAVSS 125 ION-202E IDSA22 I INTER I DSA206 ION-201E   188 IL/G IAVSS IO.75 ION-11-68E   INTER I ION-234E   1403 IY IAVSS	0.75 CN-106F CN-210		803 O AVSS 1.25 CN-202F	CN-231F E0 B AVSS 0.75 JS-A08 CN-226F
24         V         AVSS         125         65-A7         DSA206         OH-201F         197         0./V         AVSS         0.57         OH-11-68F         OH-234F         402         V.W         AVSS           24         Y         AVSS         125         OH-202F         DSA22         DSA206         OH-201F         197         0./V         AVSS         0.75         OH-11-68F         OH-234F         402         V.W         AVSS           24         Y         AVSS         1.25         OH-202F         DSA20         OH-201F         189         0./V         AVSS         0.75         OH-11-68F         OH-234F         402         V         AVSS           24         Y         AVSS         1.25         OH-202F         DSA20E         OH-201F         189         0./V         AVSS         0.75         OH-11-68F         OH-234F         402         V         AVSS           24         Y         AVSS         1.25         OH-230F         OH         OH-234F         406         Y         AVSS         1.64         OH-234F         406         P         AVSS         1.45         OH-234F         406         P         AVSS         1.45         OH-234F         405	0.75 CN-107F CN-215		804 Gr AVSS 1.25 CN-231F	CN-202F EO B AVSS 0.75 JS-A08 CN-231F
24 Y AVSS 125 CH-230F DSA17 CH-203F 190 C/L AVSS 0.75 CH-11-68F CH-234F 406 P AVSS 31 L AVSS 0.75 CH-11-68F CH-234F 407 Br AVSS	0.75 CN-107F CN-303 0.75 CN-107F CN-303		805 L AVSS 1.25 ON-233F 806 P AVSS 0.75 ON-233F	0N-232F E0 B AVSS 0.75 0N-233F 0N-233F 0N-231F
31         L         AVSS         0.75         ON-100F			800 P AV55 U.75 U.7237 807 R AV55 125 DN=233F	CN-232F         E0         B         AVSS         0.75         CN-233F         DSA133         DSA134         CN-234F           CN-203F         E0         B         AVSS         0.75         CN-240F         DSA172         DSA134         CN-234F
39 Y/78 AVS5 0.75 0X-29F D5A201 C 0X-300F 139 B/Y AVS5 0.15 0X-16-6A OX-10 0X 100F 409 B/Y AVS5 0X-10-6A			808 Br AVSS 125 CN-203F	01-233F E0 B AVSS 0.75 0N-240F DSA172 DSA134 0N-240F
39 1/26 AVS5 0.75 04-209F DSA201 DSA203 04-211F 194 R AVS5 0.75 04-11-10F 410 BA7L AVS5			809 G/W AVSS 0.75 CN-201F	01-670M E0 B AVSS 075 01-221E DSA139 DSA138 01-240E
39 Y/B AVSS 0.75 CN-212F DSA202 CN-212F DSA203 CN-211F 195 W AVSS 0.75 CN-11-1DF CN-307F 411 W/Y AVSS	0.75 CN-104F CN-JA0		810 Br/G AVSS 0.75 CN-201F	CN-670M E0 B AVSS 0.75 CN-221F DSA139 DSA140 CN-220F
39 Y/B AVSS 0.75 CN-212F DSA202 CN-233F 196 B AVSS 0.75 CN-11-1DF CN-307F 411 W/Y AVSS	0.75 CN-688M CN-JAO		857 0/W AVSS 0.75 CN-211F	CN-234F E0 B AVSS 0.75 CN-219F DSA141 Q DSA140 CN-220F
44 0r AVSS 0.75 0H-230F 0H-305F 198 0r/G AVSS 0.75 0H-894F 0H-94F 411 W/Y AVSS			858 Br/G AVSS 0.75 CN-300F	CN-212F E0 B AVSS 0.75 CN-219F DSA141 DSA142 CN-219F
48         R/L         AVSS         0.75         CN-306F	0.75 CN-674M CN-107		900 Lg/Y AVSS 0.75 CN-293F	ON-221FE0B AVSS 0.75 CN-217F DSA143 DSA142 CN-219F
			901 Y/L AVSS 0.75 CN-220F	CN-293F E0 B AVSS 0.75 CN-217F DSA143 DSA144 C8-A04 CN-217F E0 B AVSS 0.75 CA-A01 DSA168 DSA144 C8-A04
49 R/W AVSS 0.75 CN-204F DSA31DCSA33 CN-206F 201 R/W AVSS 0.75 CN-11-6AF CN+674F 415 Gr/L AVSS 449 R/W AVSS 0.75 CN-210F CN+674F 415 Gr/L AVSS 0.75 CN-11-6AF CN+674F 416 B/Y AVSS 0.75 CN-210F 416 B/Y AVSS 0.			922 Br/w AVSS 0.75 CN-300F 951 O AVSS 0.75 CN-290F	ON-217F         E0         B         AVSS         0.75         CA-A01         DSA168         DSA144         CB-A04           ON-306F         E0         B         AVSS         0.75         CA-A01         DSA168         DSA124         CB-A04
			962 L/G AVSS 0.75 CN-303F	01-109F E0 B AVSS 0.75 CN-434F DSA145 C DSA52 CN-433F
52         Y/G         AVSS         0.75         ON-306F         ON-230F         203         G/R         AVSS         0.75         ON-11-6AF         ON-6997         417         R/w         AVSS           53         I/R         AVSS         0.75         ON-106F         ON-230F         215         w         AVSS         0.75         ON-306F         ON-236F         418         w//r         AVSS	0.75 CN-293F ON-107		966 W/O AVSS 0.75 CN-301F	ON-894F EO B AVSS 0.75 CN-434F DSA145 DSA146 CN-435F
53 L/R AVSS 0.5 CN-281F JS-A17 216 B/R AVSS 0.75 CN-305F CN-873F 419 G/Y AVSS			972 G/L AVSS 0.75 CN-292F	CN-104F E0 B AVSS 0.75 CN-206F DSA147 CDSA146 CN-435F
53 L/R AVSS 0.75 JS-A18 JS-A17 217 LQ/Y AVSS 0.75 JON-305F ON-875F 420 Y/W AVSS	0.75 CN-108F CN-304		973 0/L AVSS 0.75 CN-292F	CN-104F E0 B AVSS 0.75 CN-206F DSA147 DSA167 CN-205F
53 L/R AVSS 0.75 US-A18 CN-290F 218 L/O AVSS 0.75 CN-305F CN-692F 421 R/Y AVSS			974 Gr/R AVSS 0.75 CN-104F	JS-A21 E0 B AVSS 0.75 CN-204F DSA148 C DSA167 CN-206F
5.3         I_/R         AVSS         0.75         IS-A18         ON-302F         219         Y/B         AVSS         0.75         ON-302F         ON-302F         422         P/L         AVSS           61         Br/w         AVSS         0.75         ON-302F         220         G/Y         AVSS         0.75         ON-302F         QH-932F         423         W/B         AVSS			974 Gr/R AVSS 0.75 CN-104F	JS-A21 E0 B AVSS 0.75 CN-204F DSA148 DSA149 CN-203F
61 Br/W AVS5 075 (0×109F			974 Gr/R AVSS 0.75 CN-292F	J5-A21 E0 B AVSS 0.75 0N-203F DSA154 DSA149 0N-203F CN-307F E0 B AVSS 0.75 0N-203F DSA154 DSA152 0N-203F
B2         G/L         AVSS         0.75         0.74         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.75         0.	0.75 DN=108F DN=304		975 G AVSS 0.75 CN-888F	
82 G/L AVSS 0.75 (0X-217F DSA59 DSA68 (0X-220F 223 Y/G AVSS 0.75 (0X-11-68F (0X-301F 426 G/L AVSS 0.75 (0X-11-68F (0X-11	0.75 CN-108F CN-304			
82 G/L AVSS 0.75 (XH-221F DSA68 (XH-220F 225 P AVSS 0.75 (XH-11-6AF CXH-307F 427 R/W AVSS	0.75 CN-108F CN-304		976 L AVSS 0.75 CN-888F	J5-A22         EO         B         AVSS         0.75         DN-202F         DSA150         DSA152         CN-202F           J5-A22         EO         B         AVSS         0.75         DN-202F         DSA150         ●         DSA152         CN-202F           J5-A22         EO         B         AVSS         0.75         DN-202F         DSA150         ●         DSA156         CN-202F
			976 L AVSS 0.75 CN-294F	JS-A22         EO         B         AVSS         0.75         ON-202F         DSA150         DSA152         DN-202F           JS-A22         EO         B         AVSS         0.75         ON-202F         DSA150         DSA156         ON-202F           JS-A22         EO         B         AVSS         0.75         ON-202F         DSA150         DSA156         ON-202F           JS-A22         EO         B         AVSS         0.75         ON-202F         DSA150         DSA156         ON-202F
82 G/L AVSS 0.75 0X+293F			976 L AVSS 0.75 0N-294F 976 L AVSS 0.75 0N-107F 977 G/Y AVSS 0.5 0N-11-5AF	JS-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA152         OH-202F           JS-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         OH-202F           JS-A22         E0         B         AVSS         0.75         OH-202F         DSA156         OH-201F           JS-A22         E0         B         AVSS         0.75         OH-201F         DSA157         DSA156         OH-201F           JS-A307F         E0         B         AVSS         0.75         OH-201F         DSA157         DSA158         OH-201F
	0.75 CN-108F ON-291		976 L AVSS 0.75 0x-294F 976 L AVSS 0.75 0x-107F 977 G/Y AVSS 0.5 0x-11-5AF 978 Y/G AVSS 0.5 0x-11-5AF	US-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA152         OH-202F           US-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         DSA156         DSA156         DSA156         DSA156         DSA156         DH-201F         DSA157         DSA158         DH-201F         DSA157         DSA158         DH-201F         DSA156         DH-201F         DSA157         DSA158         DH-201F         DSA157         DSA158         DH-201F         DSA157         DSA158         DH-201F
83 0/w AVSS 0.75 US-A2	0.75 CN-108F CN-291 0.75 CN-108F CN-304 CN-304		976         L         AVSS         0.75         0+2.94F	JS-A22         E0         B         AVSS         0.75         OH-202F         CSA150         DSA152         OH-202F           JS-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         OH-201F           JS-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         OH-201F           JS-A22         E0         B         AVSS         0.75         OH-201F         DSA156         OH-201F           OH-307F         E0         B         AVSS         0.75         OH-201F         DSA158         OH-200F           OH-307F         E0         B         AVSS         0.75         OH-200F         DSA158         OH-200F           OH-976F         E0         B         AVSS         0.75         OH-200F         DSA158         OH-200F           OH-976F         E0         B         AVSS         0.75         OH-200F         DSA158         OH-200F           OH-976F         E0         B         AVSS         0.75         OH-200F         DSA158         OH-200F
B3         O/W         AVSS         D/T5         GF-A2         OH-305F         249         L         AVSS         D/T5         DH-301F         429         G         AVSS           B3         O/W         AVSS         D/T5         US-A2         OH-305F         249         L         AVSS         D/T5         US-301F         429         L         AVSS         AVSS         D/T5         US-301F         420         L         AVSS         AVSS         D/T5         US-301F         D/L-302F         430         B/T/Y         AVSS         AVSS         D/T5         US-420F         D/L-302F         302         R         AVSS         D/T5         US-420F         D/L-302F         430         B/T/Y         AVSS         AVSS         D/T5         US-420F         D/L-302F         302         R         AVSS         D/T5         US-420F         D/L-302F         AVSS         AVSS </td <td>0.75 CN-108F ON-291 0.75 CN-108F ON-304 0.75 CN-108F ON-304</td> <td></td> <td>976 L AVSS 0.75 0+294F 976 L AVSS 0.75 0+107F 977 6-7 AVSS 0.5 0+115AF 978 7/0 AVSS 0.5 0+115AF 987 L/0 AVSS 0.75 0+300F 987 L/0 AVSS 0.75 0+300F</td> <td>US-A22         E0         B         AVSS         0.75         OH-202F         DSA152         OH-202F           S-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         DSA156         D-202F           JS-A22         E0         B         AVSS         0.75         OH-202F         DSA156         D-202F           OH-307F         E0         B         AVSS         0.75         OH-202F         DSA158         OH-203F           OH-234F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-234F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-676F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-676F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-11-19F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-11-19F         E0         B         AVSS         0.75         OH-203F         DSA160         OH-203F</td>	0.75 CN-108F ON-291 0.75 CN-108F ON-304 0.75 CN-108F ON-304		976 L AVSS 0.75 0+294F 976 L AVSS 0.75 0+107F 977 6-7 AVSS 0.5 0+115AF 978 7/0 AVSS 0.5 0+115AF 987 L/0 AVSS 0.75 0+300F 987 L/0 AVSS 0.75 0+300F	US-A22         E0         B         AVSS         0.75         OH-202F         DSA152         OH-202F           S-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         DSA156         D-202F           JS-A22         E0         B         AVSS         0.75         OH-202F         DSA156         D-202F           OH-307F         E0         B         AVSS         0.75         OH-202F         DSA158         OH-203F           OH-234F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-234F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-676F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-676F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-11-19F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-11-19F         E0         B         AVSS         0.75         OH-203F         DSA160         OH-203F
63         0.7w         AVSS         0.75         US-A2         OH-305F         249         L         AVSS         0.75         DH-11-6AF         OH-301F         429         G         AVSS           83         0.7w         AVSS         0.75         US-A2         OH-302F         310         Y         AVSS         0.75         DH-104F         OH-302F         430         87 //         AVSS           83         0.7w         AVSS         0.75         US-104F         OH-302F         430         87 //         AVSS           83         0.7w         AVSS         0.75         US-104F         OH-4304F         OH-4304F         431         87 //         AVSS           83         0.7w         AVSS         0.75         US-104F         OH-4304F         OH-4304F         431         87 //         AVSS           83         0.7w         AVSS         0.75         US-104F         OH-4304F         OH-4304F         0H-4304F         432         0/w         AVSS           83         0.7w         AVSS         0.75         US-104F         OH-4304F         0H-4304F         0H-4304F         0H-4304F         432         0/w         AVSS           843         0.7w	0.75 0N-108F 0N-291 0.75 0N-108F 0N-304 0.75 0N-108F 0N-304 0.75 0N-108F 0N-304		976         L         AVSS         0.75         OH-209#	JS-A22         E0         B         AVSS         0.75         OH-202F         DSA152         OH-202F           JS-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         OH-201F           JS-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         OH-201F           OH-307F         E0         B         AVSS         0.75         OH-201F         DSA158         OH-201F           OH-307F         E0         B         AVSS         0.75         OH-201F         DSA158         OH-201F           OH-307F         E0         B         AVSS         0.75         OH-201F         DSA158         OH-201F           OH-978F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-978F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-978F         E0         B         AVSS         0.75         OH-203F         DSA160         OH-203F           OH-977F         E0         B         AVSS         0.75         OH-2077F         DSA1610         OH-203F
83         0/w         AVSS         0.75         0.8-30f         249         L         AVSS         0.75         0.8-30f         429         G         AVSS           83         0/w         AVSS         0.75         0.8-42          0.1-305         0.75         0.8-16-64F          0.1-292F         430         8/7         0.8-301F         430         8/7         AVSS         0.75         0.8-42F          0.1-292F         302         R         AVSS         0.75         0.8-42F          0.1-292F         302         R         AVSS         0.75         0.8-42F          0.1-292F         302         R         AVSS         0.75         0.1-104F          0.1-292F         302         R         AVSS         0.75         0.1-104F	0.75         OH-100F         OH-291           0.75         OH-100F         OH-304           0.75         OH-100F         OH-304           0.75         OH-100F         OH-303           0.75         OH-100F         OH-304           0.75         OH-100F         OH-303           0.75         OH-100F         OH-303           0.75         OH-100F         OH-304           0.75         OH-100F         OH-303		976 L AVSS 0.75 0+294F 976 L AVSS 0.75 0+107F 977 6-7 AVSS 0.5 0+115AF 978 7/0 AVSS 0.5 0+115AF 987 L/0 AVSS 0.75 0+300F 987 L/0 AVSS 0.75 0+300F	JS-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA152         OH-202F           JS-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         DSA156         DH-201F           JS-A22         E0         B         AVSS         0.75         OH-201F         DSA157         DSA156         OH-201F           OH-307F         E0         B         AVSS         0.75         OH-201F         DSA158         OH-201F           OH-307F         E0         B         AVSS         0.75         OH-201F         DSA158         OH-200F           OH-970F         E0         B         AVSS         0.75         OH-202F         DSA158         OH-200F           OH-970F         E0         B         AVSS         0.75         OH-202F         DSA158         OH-203F           OH-970F         E0         B         AVSS         0.75         OH-203F         DSA160         OH-203F           OH-11-15F         E0         B         AVSS         0.75         OH-203F         DSA160         OH-203F           OH-307F         E0         B         AVSS         0.75         OH-203F
83         0./w         AVSS         0.75         6F-A2          0H-305F         249         L         AVSS         0.75         0H-14-64F          DH-302F         429         G         AVSS           83         0./w         AVSS         0.75         0H-326F         429         G         AVSS         0.75         DH-14-64F          DH-329F         429         G         AVSS         0.76         DH-329F         300         D//         AVSS         0.75         DH-10F          DH-329F         403         D/         AVSS         0.75         DH-329F         302         R         AVSS         0.75         DH-307F         302         R         AVSS         0.75         DH-307F         302         L         AVSS         0.75         DH-307F         302         L//         AVSS         0.75         DH-307H	07:5         0+108F         0+291           07:5         0+108F         0+293           07:5         0+108F         0+304           07:5         0+108F         0+673           07:5         0+108F         0+673		976         L         AVSS         0.75         0+2.94F           977         G./Y         AVSS         0.75         0+1.077           978         L         AVSS         0.75         0+1.077           978         L         AVSS         0.75         0+1.078           978         L         AVSS         0.75         0+1.078           978         L/O         AVSS         0.5         0+1.154F           978         L/O         AVSS         0.75         0+300F           ES3         B/R         AVSS         0.75         0+300F           ES1         B/R         AVSS         0.75         0+300F           ES4         B/R         AVSS         0.75         0+300F           ES4         B/R         AVSS         0.75         0+300F	JS-A22         E0         B         AVSS         0.75         OH-202F         DSA152         OH-202F           JS-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         OH-201F           JS-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         OH-201F           OH-307F         E0         B         AVSS         0.75         OH-201F         DSA158         OH-201F           OH-307F         E0         B         AVSS         0.75         OH-201F         DSA158         OH-201F           OH-307F         E0         B         AVSS         0.75         OH-202F         DSA158         OH-203F           OH-6716F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-6716F         E0         B         AVSS         0.75         OH-203F         DSA1610         OH-203F           OH-6717F         E0         B         AVSS         0.75         OH-203F         DSA161         DSA162         OH-203F           OH-3027F         E0         B         AVSS         0.75         OH-203F         DSA164<
83         0./w         AVSS         0.75         bit-11-64F          Di-201F         429         G         AVSS           83         0./w         AVSS         0.75         bit-11-64F          Di-202F         429         G         AVSS           83         0./w         AVSS         0.75         bit-11-64F          Di-202F         429         G         AVSS           83         0./w         AVSS         0.75         bit-10F          Di+229F         302         R         AVSS         0.75         Di+104F          Di+239F           83         0./w         AVSS         0.75         bit-10F          Di+239F         302         R         AVSS         0.75         Di+104F          Di+244         <	0.75         0×108F         0×239           0.75         0×108F         0×304           0.75         0×108F         0×632		976         L         AVSS         0.75         OH-294F           976         L         AVSS         0.75         OH-107F           977         G/Y         AVSS         0.5         OH-107F           978         L/Y         AVSS         0.5         OH-11-5AF           978         L/Y         AVSS         0.5         OH-11-5AF           977         L/Y         AVSS         0.75         OH-300F           987         L/O         AVSS         0.75         OH-300F           982         B/R         AVSS         0.75         OH-300F           982         B/R         AVSS         0.75         OH-300F           982         B/R         AVSS         0.75         OH-300F           983         B/R         AVSS         0.75         OH-300F           984         AVSS         0.75         OH-300F <td>US-A22         E0         B         AVSS         0.75         OH-202F         DSA152         OH-202F           US-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         DSA156         DH-202F           US-A22         E0         B         AVSS         0.75         DH-202F         DSA150         DSA156         DH-202F           DH-307F         E0         B         AVSS         0.75         DH-202F         DSA158         DH-202F           DH-307F         E0         B         AVSS         0.75         DH-202F         DSA158         DH-202F           DH-307F         E0         B         AVSS         0.75         DH-202F         DSA158         DH-202F           DH-107F         E0         B         AVSS         0.75         DH-202F         DSA158         DH-202F           DH-107F         E0         B         AVSS         0.75         DH-202F         DSA1610         DH-202F           DH-202F         E0         B         AVSS         0.75         DH-202F         DSA162         DH-202F           DH-202F         E0         B         AVSS         0.75         DH-202F         DSA162</td>	US-A22         E0         B         AVSS         0.75         OH-202F         DSA152         OH-202F           US-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         DSA156         DH-202F           US-A22         E0         B         AVSS         0.75         DH-202F         DSA150         DSA156         DH-202F           DH-307F         E0         B         AVSS         0.75         DH-202F         DSA158         DH-202F           DH-307F         E0         B         AVSS         0.75         DH-202F         DSA158         DH-202F           DH-307F         E0         B         AVSS         0.75         DH-202F         DSA158         DH-202F           DH-107F         E0         B         AVSS         0.75         DH-202F         DSA158         DH-202F           DH-107F         E0         B         AVSS         0.75         DH-202F         DSA1610         DH-202F           DH-202F         E0         B         AVSS         0.75         DH-202F         DSA162         DH-202F           DH-202F         E0         B         AVSS         0.75         DH-202F         DSA162
83     0/w     AVSS     0.75     b/+30F     249     0     AVSS     0.75     b/+11-64F      D/+20F     249     0     AVSS       83     0/w     AVSS     0.75     b/+10F      D/+22F     200     b/-40F      D/+22F       83     0/w     AVSS     0.75     b/+10F      D/+22F     200     b/-40F      D/+22F       83     0/w     AVSS     0.75     b/+10F      D/+22F     200     b/-40F      D/+22F       83     0/w     AVSS     0.75     b/-10F      D/+22F     308     b/-7     AVSS     0.75     D/+10F       84     Y     AVSS     0.75     D/+11-4AF      D/+22F     308     b/-7     AVSS     0.75     D/+10F       101     G/Y     AVSS     0.75     D/+11-4AF	075         0×108F         0×239           075         0×108F         0×230           075         0×108F         0×304           075         0×108F         0×304           075         0×108F         0×304           075         0×108F         0×304           075         0×108F         0×303		976         L         AVSS         0.75         0+2.94F           976         L         AVSS         0.75         0+1077           977         G.Y         AVSS         0.5         0+11-5AF           978         L         AVSS         0.5         0+11-5AF           978         L         AVSS         0.5         0+11-5AF           978         L/O         AVSS         0.5         0+11-5AF           978         L/O         AVSS         0.5         0+14-04F           53         B.R         AVSS         0.75         0+300F           53         B.R         AVSS         0.75         0+300F           52         B.R         AVSS         0.75         0+200F           52         B.R         AVSS         0.75         0+200F           53         B.R         AVSS         0.75         0+200F	US-A22         E0         B         AVSS         0.75         OH-202F         DSA152         OH-202F           US-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         DSA156         DH-202F           US-A22         E0         B         AVSS         0.75         DH-202F         DSA150         DSA156         DH-202F           DH-307F         E0         B         AVSS         0.75         DH-202F         DSA158         DH-202F           DH-307F         E0         B         AVSS         0.75         DH-202F         DSA158         DH-202F           DH-307F         E0         B         AVSS         0.75         DH-202F         DSA158         DH-202F           DH-107F         E0         B         AVSS         0.75         DH-202F         DSA158         DH-202F           DH-107F         E0         B         AVSS         0.75         DH-202F         DSA1610         DH-202F           DH-202F         E0         B         AVSS         0.75         DH-202F         DSA162         DH-202F           DH-202F         E0         B         AVSS         0.75         DH-202F         DSA162
68       0/w       AVSS       0.75       0.8-30.75       0.8-16.4F	0.75         0×108F         0×239           0.75         0×108F         0×304           0.75         0×108F         0×303           0.75         0×108F         0×1037           0.75         0×108F         0×1037           0.75         0×108F         0×1037           0.75         0×108F         0×1030           0.75         0×108F         0×303           0.75         0×108F         0×303           0.75         0×108F         0×303		976         L         AVSS         0.75         OH-294F           976         L         AVSS         0.75         OH-107F           977         G/Y         AVSS         0.5         OH-107F           978         L/Y         AVSS         0.5         OH-11-5AF           978         L/Y         AVSS         0.5         OH-11-5AF           977         L/Y         AVSS         0.75         OH-300F           987         L/O         AVSS         0.75         OH-300F           982         B/R         AVSS         0.75         OH-300F           982         B/R         AVSS         0.75         OH-300F           982         B/R         AVSS         0.75         OH-300F           983         B/R         AVSS         0.75         OH-300F           984         AVSS         0.75         OH-300F <td>US-A22         E0         B         AVSS         0.75         OH-202F         DSA152         OH-202F           US-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         DSA156         D-202F           US-A22         E0         B         AVSS         0.75         OH-202F         DSA156         DSA156         D-202F           OH-307F         E0         B         AVSS         0.75         DH-202F         DSA158         OH-203F           OH-307F         E0         B         AVSS         0.75         DH-203F         DSA158         OH-203F           OH-4767         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-114F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-114F         E0         B         AVSS         0.75         OH-203F         DSA168         OH-203F           OH-114F         E0         B         AVSS         0.75         OH-203F         DSA168         OH-203F           OH-307F         E0         B         AVSS         0.75         OH-213F         DSA168</td>	US-A22         E0         B         AVSS         0.75         OH-202F         DSA152         OH-202F           US-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         DSA156         D-202F           US-A22         E0         B         AVSS         0.75         OH-202F         DSA156         DSA156         D-202F           OH-307F         E0         B         AVSS         0.75         DH-202F         DSA158         OH-203F           OH-307F         E0         B         AVSS         0.75         DH-203F         DSA158         OH-203F           OH-4767         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-114F         E0         B         AVSS         0.75         OH-203F         DSA158         OH-203F           OH-114F         E0         B         AVSS         0.75         OH-203F         DSA168         OH-203F           OH-114F         E0         B         AVSS         0.75         OH-203F         DSA168         OH-203F           OH-307F         E0         B         AVSS         0.75         OH-213F         DSA168
68         0/w         AVSS         0.75         0.8-30.75         0.8-16.4F          Dr-201F         429         G         AVSS           83         0/w         AVSS         0.75         0.8-10.6F          Dr-202F         429         G         AVSS           83         0/w         AVSS         0.75         0.8-10.6F          Dr-202F         430         pr/v         AVSS           83         0/w         AVSS         0.75         0.8-10.6F          Dr-202F         430         pr/v         AVSS           83         0/w         AVSS         0.75         0.8-10.6F          Dr-202F         430         pr/v         AVSS           83         0/w         AVSS         0.75         0.8-10.6F          Dr-202F         430         pr/v         AVSS           84         Y         AVSS         0.75         0.8-10.7F	0.75         0×108F         0×239           0.75         0×108F         0×304           0.75         0×108F         0×303           0.75         0×108F         0×1037           0.75         0×108F         0×1037           0.75         0×108F         0×1037           0.75         0×108F         0×1030           0.75         0×108F         0×303           0.75         0×108F         0×303           0.75         0×108F         0×303		976         L         AVSS         0.75         OH-294F           976         L         AVSS         0.75         OH-107F           977         G./Y         AVSS         0.5         OH-1154F           978         L/X         AVSS         0.5         OH-1054F           978         L/X         AVSS         0.75         OH-3005F           ES3         B/R         AVSS         0.75         OH-3005F           ES4         B/R         AVSS         0.75         OH-3005F           ES4         B/R         AVSS         0.75         OH-3005F           ES4         B/R         AVSS         0.75         OH-2005F           ES4         B/R         AVSS         0.75         OH-2005F           ES4         B/R         AVSS         0.75         OH-2005F           ES5         B/R         AVSS         0.75         OH-2005F           ES6         B/R         AVSS         0.7	US-A22         E0         B         AVSS         QT5         OH-202F         DSA152         OH-202F           US-A22         E0         B         AVSS         QT5         OH-202F         DSA150         DSA156         OH-202F           US-A22         E0         B         AVSS         QT5         OH-202F         DSA150         DSA156         OH-202F           US-307F         E0         B         AVSS         QT5         OH-202F         DSA158         OH-202F           UH-307F         E0         B         AVSS         QT5         OH-202F         DSA158         OH-202F           UH-307F         E0         B         AVSS         QT5         OH-202F         DSA158         OH-202F           UH-104F         E0         B         AVSS         QT5         OH-202F         DSA158         OH-202F           UH-104F         E0         B         AVSS         QT5         OH-202F         DSA168         OH-202F           UH-104F         E0         B         AVSS         QT5         OH-202F         DSA1610         OH-202F           UH-202F         E0         B         AVSS         QT5         OH-212F         DSA162         OH-212F
83       0./w       AVSS       0.75       b;-3.02	075         0+108F         0+291           075         0+108F         0+291           075         0+108F         0+304           075         0+108F         0+304           075         0+108F         0+304           075         0+108F         0+304           075         0+108F         0+532           075         0+108F         0+532           075         0+108F         0+304           075         0+208F         0+108           075         0+208F         0+108           075         0+208F         0+108           075         0+208F         0+108		976         L         AVSS         0.75         0+294F           976         L         AVSS         0.75         0+107F           977         G.Y         AVSS         0.5         0+1175AF           978         L         AVSS         0.5         0+1175AF           978         L         AVSS         0.5         0+1175AF           978         L/V.G         AVSS         0.5         0+300F           978         L/V.G         AVSS         0.75         0H-300F           978         L/V.G         AVSS         0.75         0H-300F           978         L/V.G         AVSS         0.75         0H-300F           978         L/V.G         0.75         0H-300F	US-A22         E0         B         AVSS         0.75         OH-202F         DSA152         OH-202F           US-A22         E0         B         AVSS         0.75         OH-202F         DSA150         DSA156         DSA166         DSA209F         DSA166         DSA209F         DSA167         DSA166         DSA209F         DSA167         DSA156         DSA156         DSA166         DSA209F         DSA167         DSA167         DSA167         DSA168         DSA168         DSA209F         DSA167         DSA164         DSA2167         DSA164         DSA2167         DSA164         DSA2
83       0./w       AVSS       0.75       b.9.42	075         0+108F         0+291           075         0+108F         0+304           075         0+108F         0+673           075         0+108F         0+673           075         0+108F         0+530           075         0+108F         0+530           075         0+108F         0+304           075         0+208F         0+304           075         0+208F         0+108           075         0+208F         0+108           075         0+208F         0+108           075         0+108F         0+304           075         0+108F         0+108           075         0+108F         0+304           075         0+108F         0+304           075         0+108F         0+304           075         0+108F         0+304		976         L         AVSS         0.75         0+294F           976         L         AVSS         0.75         0+107F           977         G_Y         AVSS         0.5         0+115AF           978         L         AVSS         0.5         0+115AF           978         L         AVSS         0.5         0+115AF           978         L/V.0         AVSS         0.5         0+300F           978         L/V.0         AVSS         0.5         0+300F           978         L/V.0         AVSS         0.75         0+300F           987         L/O.0         AVSS         0.75         0+300F           923         B/R         AVSS         0.75         0+300F           925         B/R         AVSS         0.75         0+300F           925         B/R         AVSS         0.75         0+209F           925         B/R         AVSS         0.75         0+209F           925         B/R         AVSS         0.75         0+209F           925         B/R         AVSS         0.75         0+300F           928         B/R         AVSS         0.75         0+3	US-A22         E0         B         AVSS         QT5         OH-202F         DSA152         OH-202F           US-A22         E0         B         AVSS         QT5         OH-202F         DSA150         DSA156         D+202F           US-A22         E0         B         AVSS         QT5         DH-201F         DSA150         DSA156         DH-201F           DH-307F         E0         B         AVSS         QT5         DH-201F         DSA157         DSA156         DH-201F           DH-307F         E0         B         AVSS         QT5         DH-201F         DSA158         DH-201F           DH-307F         E0         B         AVSS         QT5         DH-201F         DSA158         DH-201F           DH-307F         E0         B         AVSS         QT5         DH-201F         DSA168         DH-209F           DH-419F         E0         B         AVSS         QT5         DSA161         DSA160         DH-209F           DH-419F         E0         B         AVSS         QT5         DH-211F         DSA162         DH-210F           DH-204F         E0         B         AVSS         QT5         DH-211F         DSA163
83 $O/W$ AVSS $O75$ $b7.42$ $OP-30F$ $249$ $C_{75}$ $bP+11-64F$ $OP-30F$ $429$ $G$ AVSS         83 $O/W$ AVSS $0.75$ $bF+12-64F$ $OP+32F$ $430$ $g'/W$ AVSS $0.75$ $bF+105F$ $OP+32F$ $430$ $g'/W$ AVSS $0.75$ $bF+102F$ $OP+32F$ $430$ $g'/W$ AVSS $0.75$ $bF+10F$ $OP+32F$ $430$ $g'/W$ $AVSS$ $0.75$ $OP+10F$ $OP+32F$ $430$ $g'/W$ $AVSS$ $0.75$ $OP+10F$ $OP+32F$ $430$ $g'/W$ $AVSS$ $0.75$ $OP+10F$ $432$ $O'W$ $AVSS$ $0.75$ $OP+10F$ $430$ $O_VW$ $AVSS$ $0.75$ $OP+10F$ $430$ $O_W$	0.75         0+108F         0+291           0.75         0+108F         0+304           0.75         0+108F         0+673           0.75         0+108F         0+673           0.75         0+108F         0+304           0.75         0+108F         0+304           0.75         0+108F         0+304           0.75         0+108F         0+304           0.75         0+208F         0+108           0.75         0+208F         0+304           0.75         0+208F         0+304           0.75         0+108F         0+302           0.75         0+108F         0+302           0.75         0+108F         0+302 <td< td=""><td></td><td>976         L         AVSS         0.75         0+204F           976         L         AVSS         0.75         0+107F           977         L         AVSS         0.5         0+107F           977         L         AVSS         0.5         0+117-54F           978         L         AVSS         0.5         0+11-54F           977         L         AVSS         0.5         0+10-54F           978         L         AVSS         0.75         0+300F           E33         Br.R         AVSS         0.75         0+300F           E52         Br.R         AVSS         0.75         0+300F           E52         Br.R         AVSS         0.75         0+300F           E54         Br.R         AVSS         0.75         0+300F           E54         Br.R         AVSS         0.75         0+239F           E57         Br.R         AVSS         0.75         0+239F           E58         Br.R         AVSS         0.75         0+239F           E59         Br.R         AVSS         0.75         0+300F           114         R         AVSS         0.75         0+300F</td><td>US-A22         E0         B         AVSS         QT5         Diversify         <thd< td=""></thd<></td></td<>		976         L         AVSS         0.75         0+204F           976         L         AVSS         0.75         0+107F           977         L         AVSS         0.5         0+107F           977         L         AVSS         0.5         0+117-54F           978         L         AVSS         0.5         0+11-54F           977         L         AVSS         0.5         0+10-54F           978         L         AVSS         0.75         0+300F           E33         Br.R         AVSS         0.75         0+300F           E52         Br.R         AVSS         0.75         0+300F           E52         Br.R         AVSS         0.75         0+300F           E54         Br.R         AVSS         0.75         0+300F           E54         Br.R         AVSS         0.75         0+239F           E57         Br.R         AVSS         0.75         0+239F           E58         Br.R         AVSS         0.75         0+239F           E59         Br.R         AVSS         0.75         0+300F           114         R         AVSS         0.75         0+300F	US-A22         E0         B         AVSS         QT5         Diversify         Diversify <thd< td=""></thd<>
83       0./w       AVSS       0.75       b:A2        0.H-30F       49       L       AVSS       0.75       b:H-164F        D:H-32F       49       G       AVSS         83       0./w       AVSS       0.75       b:H-164F        D:H-32F       49       G       AVSS         83       0./w       AVSS       0.75       b:H-164F        D:H-32F       40       B'/       AVSS         83       0./w       AVSS       0.75       b:H-42        D:H-29F       302       R       AVSS       0.75       D:H-32F        D:H-32F         83       0./w       AVSS       0.75       b:H-32F        D:H-30F        D:H-32F         84       Y       AVSS       0.75       b:H-30F        D:H-30F        D:H-30F       423       P./G       AVSS         101       G./Y       AVSS       0.75       D:H-114F	07:5         0+108F         0+293           07:5         0+108F         0+233           07:5         0+108F         0+304           07:5         0+208F         0+108           07:5         0+208F         0+108           07:5         0+108F         0+304           07:5         0+108F         0+304           07:5         0+108F         0+304           07:5         0+108F         0+303		976         L         AVSS         0.75         0+294F           976         L         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           978         L         AVSS         0.75         0+1078           977         G.Y         AVSS         0.75         0+1078           978         L         AVSS         0.5         0+11-54F           978         L         AVSS         0.75         0+300F           ES3         BrR         AVSS         0.75         0+300F           ES4         BrR         AVSS         0.75         0+300F           ES2         BrR         AVSS         0.75         0+300F           ES4         BrR         AVSS         0.75         0+300F           ES5         BrR         AVSS         0.75         0+209F	
83 $O/W$ AVSS $O75$ $b7.42$ $OP-30F$ $429$ $C$ $AVSS$ $075$ $b7-30F$ $429$ $C$ $AVSS$ $075$ $b7-16AF$ $OP-30F$ $429$ $C$ $AVSS$ $075$ $b7-16F$ $OP-30F$ $429$ $C$ $AVSS$ $075$ $b7-10F$ $OP-30F$ $431$ $R/G$ $AVSS$ $431$ $R/G$ $AVSS$ $431$ $R/G$ $AVSS$ $075$ $b7-30F$ $OP-30F$ $431$ $R/G$ $AVSS$ $431$ $R/G$ $AVSS$ $075$ $OP-30F$ $OP-30F$ $OP-30F$ $OP-30F$ $OP-30F$ $OP-40F$ $AVSS$ $075$ $OP-30F$ $OP-40F$ $AVSS$ $OTS$ $OP-40F$ $AVSS$ <td>075         0+106F         0+291           075         0+106F         0+293           075         0+106F         0+304           075         0+106F         0+673           075         0+106F         0+304           075         0+106F         0+302           075         0+106F         0+303           075         0+106F         0+303           075         0+106F         0+303           075         0+106F         0+303           075         0</td> <td></td> <td>976         L         AVSS         0.75         0+207F           976         L         AVSS         0.75         0+107F           977         L         AVSS         0.5         0+107F           977         L         AVSS         0.5         0+117-54F           978         L         AVSS         0.5         0+117-54F           977         L/O         AVSS         0.5         0+307F           ES3         ByR         AVSS         0.75         0+300F           ES3         ByR         AVSS         0.75         0+300F           ES2         ByR         AVSS         0.75         0+300F           ES4         ByR         AVSS         0.75         0+300F           ES4         ByR         AVSS         0.75         0+300F           ES4         ByR         AVSS         0.75         0+209F           ES5         ByR         AVSS         0.75         0+209F           ES6         ByR         AVSS         0.75         0+209F           ES6         ByR         AVSS         0.75         0+209F           E36         ByR         AVSS         0.75         0+300F<td></td></td>	075         0+106F         0+291           075         0+106F         0+293           075         0+106F         0+304           075         0+106F         0+673           075         0+106F         0+304           075         0+106F         0+302           075         0+106F         0+303           075         0+106F         0+303           075         0+106F         0+303           075         0+106F         0+303           075         0		976         L         AVSS         0.75         0+207F           976         L         AVSS         0.75         0+107F           977         L         AVSS         0.5         0+107F           977         L         AVSS         0.5         0+117-54F           978         L         AVSS         0.5         0+117-54F           977         L/O         AVSS         0.5         0+307F           ES3         ByR         AVSS         0.75         0+300F           ES3         ByR         AVSS         0.75         0+300F           ES2         ByR         AVSS         0.75         0+300F           ES4         ByR         AVSS         0.75         0+300F           ES4         ByR         AVSS         0.75         0+300F           ES4         ByR         AVSS         0.75         0+209F           ES5         ByR         AVSS         0.75         0+209F           ES6         ByR         AVSS         0.75         0+209F           ES6         ByR         AVSS         0.75         0+209F           E36         ByR         AVSS         0.75         0+300F <td></td>	
83       0/w       AVSS       0.75       6x-A2	075         0+106F         0+291           075         0+106F         0+293           075         0+106F         0+304           075         0+106F         0+673           075         0+106F         0+304           075         0+106F         0+302           075         0+106F         0+303           075         0+106F         0+303           075         0+106F         0+303           075         0+106F         0+303           075         0		976         L         AVSS         0.75         OH-204F           977         L         AVSS         0.75         OH-107F           977         L         AVSS         0.55         OH-117-54F           977         L         AVSS         0.55         OH-11-54F           978         L         AVSS         0.55         OH-11-54F           978         L         AVSS         0.55         OH-104F           578         L         AVSS         0.75         OH-300F           528         BrR         AVSS         0.75         OH-300F           528         BrR         AVSS         0.75 <oh-300f< td="">         OH-300F           528         BrR         AVSS         0.75<oh-300f< td="">         OH-300F           529         BrR         AVSS         0.75<oh-300f< td="">         OH-300F           528         BrR         AVSS         0.75<oh-300f< td="">         OH-300F           528         BrR         AVSS         0.75<oh-300f< td="">         OH-300F           528         BrR         AVSS         0.75<oh-300f< td="">         OH-300F           124         R         AVSS         0.75<oh-300f< td="">         OH-300F           125         BrR&lt;</oh-300f<></oh-300f<></oh-300f<></oh-300f<></oh-300f<></oh-300f<></oh-300f<>	JS-A22         E0         B         AVSS         QT5         Dr402F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr402F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr402F         DSA150         DSA156         Dr202F           Dr-203F         E0         B         AVSS         QT5         Dr402F         DSA156         Dr203F           Dr40767         E0         B         AVSS         QT5         Dr203F         DSA157         DSA158         Dr203F           Dr40767         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr41149         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr41149         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr41149         E0         B         AVSS         QT5         Dr213F         DSA161         DSA161         Dr212F           Dr4030F         E0         B         AVSS         QT5         Dr213F
83       0./w       AVSS       0.75       65-A2	075         0+108F         0+291           075         0+108F         0+293           075         0+108F         0+304           075         0+108F         0+303           075         0		976         L         AVSS         0.75         0+207F           976         L         AVSS         0.75         0+107F           977         L         AVSS         0.5         0+107F           977         L         AVSS         0.5         0+117-54F           978         L         AVSS         0.5         0+117-54F           978         L         AVSS         0.5         0+111-54F           978         L         AVSS         0.75         0+300F           ES3         BJR         AVSS         0.75         0+300F           ES4         BJR         AVSS         0.75         0+300F           ES2         BJR         AVSS         0.75         0+300F           ES4         BJR         AVSS         0.75         0+300F           ES4         BJR         AVSS         0.75         0+209F           ES5         BJR         AVSS         0.75         0+209F           ES6         BJR         AVSS         0.75         0+209F           ES6         BJR         AVSS         0.75         0+300F           E36         BJR         AVSS         0.75         0+300F <td>JS-A22         E0         B         AVSS         QT5         Dr402F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr402F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr402F         DSA150         DSA156         Dr202F           Dr-203F         E0         B         AVSS         QT5         Dr402F         DSA156         Dr203F           Dr40767         E0         B         AVSS         QT5         Dr203F         DSA157         DSA158         Dr203F           Dr40767         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr41149         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr41149         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr41149         E0         B         AVSS         QT5         Dr213F         DSA161         DSA161         Dr212F           Dr4030F         E0         B         AVSS         QT5         Dr213F</td>	JS-A22         E0         B         AVSS         QT5         Dr402F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr402F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr402F         DSA150         DSA156         Dr202F           Dr-203F         E0         B         AVSS         QT5         Dr402F         DSA156         Dr203F           Dr40767         E0         B         AVSS         QT5         Dr203F         DSA157         DSA158         Dr203F           Dr40767         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr41149         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr41149         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr41149         E0         B         AVSS         QT5         Dr213F         DSA161         DSA161         Dr212F           Dr4030F         E0         B         AVSS         QT5         Dr213F
83       0./w       AVSS       0.75       65-A2	0715         0×108F         0×239           0715         0×108F         0×230           0715         0×108F         0×304           0715         0×108F         0×304           0715         0×108F         0×304           0715         0×108F         0×304           0715         0×108F         0×303           0715         0×108F         0×1036           0715         0×108F         0×1030           0715         0×108F         0×303           0715         0×108F         0×303           0715         0×108F         0×303		976         L         AVSS         0.75         OH-204F           977         L         AVSS         0.75         OH-107F           977         G.Y         AVSS         0.5         OH-11-54F           977         G.Y         AVSS         0.5         OH-11-54F           978         L         AVSS         0.5         OH-11-54F           978         L         AVSS         0.5         OH-10-54F           978         L         AVSS         0.75         OH-300F           ES3         BrR         AVSS         0.75         OH-300F           ES2         BrR         AVSS         0.75         OH-300F           ES2         BrR         AVSS         0.75         OH-300F           ES4         BrR         AVSS         0.75         OH-300F           ES5         BrR         AVSS         0.75         OH-300F           ES6         BrR         AVSS         0.75         OH-300F           114         R         AVSS         0.75         OH-300F           115         G         AVSS         0.75         OH-300F           116         G         AVSS         0.75 <t< td=""><td>JS-A22         E0         B         AVSS         QT5         Diversify         Diversify</td></t<>	JS-A22         E0         B         AVSS         QT5         Diversify
83       0./w       AVSS       0.75       65-A2	07:5         0+108F         0+291           07:5         0+108F         0+293           07:5         0+108F         0+304           07:5         0+108F         0+673           07:5         0+108F         0+304           07:5         0+108F         0+304           07:5         0+108F         0+304           07:5         0+108F         0+304           07:5         0+108F         0+303           07:5         0+108F         0+303 <td< td=""><td></td><td>976         L         AVSS         0.75         OH-204F           976         L         AVSS         0.75         OH-107F           977         G.Y         AVSS         0.55         OH-11-54F           978         L         AVSS         0.55         OH-11-54F           978         L         AVSS         0.55         OH-11-54F           978         L         AVSS         0.55         OH-104F           578         L         AVSS         0.75         OH-300F           523         BrR         AVSS         0.75         OH-300F           524         BrR         AVSS         0.75         OH-300F           524         BrR         AVSS         0.75         OH-300F           525         BrR         AVSS         0.75         OH-300F           526         BrR         AVSS         0.75         OH-300F           527         BrR         AVSS         0.75         OH-300F           528         BrR         AVSS         0.75         OH-300F           528         BrR         AVSS         0.75         OH-300F           528         BrR         AVSS         0.75</td><td>JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         DSA156         Dr202F           Dr-234F         E0         B         AVSS         QT5         Dr202F         DSA156         Dr202F           Dr-234F         E0         B         AVSS         QT5         Dr202F         DSA158         Dr203F           Dr437F         E0         B         AVSS         QT5         Dr203F         DSA158         Dr203F           Dr437F         E0         B         AVSS         QT5         Dr203F         DSA158         Dr203F           Dr411F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr437F         E0         B         AVSS         QT5         Dr213F         DSA161         DSA162         Dr213F           Dr438F         E0         B         AVSS         QT5         Dr213F         DSA165         DSA164         &lt;</td></td<>		976         L         AVSS         0.75         OH-204F           976         L         AVSS         0.75         OH-107F           977         G.Y         AVSS         0.55         OH-11-54F           978         L         AVSS         0.55         OH-11-54F           978         L         AVSS         0.55         OH-11-54F           978         L         AVSS         0.55         OH-104F           578         L         AVSS         0.75         OH-300F           523         BrR         AVSS         0.75         OH-300F           524         BrR         AVSS         0.75         OH-300F           524         BrR         AVSS         0.75         OH-300F           525         BrR         AVSS         0.75         OH-300F           526         BrR         AVSS         0.75         OH-300F           527         BrR         AVSS         0.75         OH-300F           528         BrR         AVSS         0.75         OH-300F           528         BrR         AVSS         0.75         OH-300F           528         BrR         AVSS         0.75	JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         DSA156         Dr202F           Dr-234F         E0         B         AVSS         QT5         Dr202F         DSA156         Dr202F           Dr-234F         E0         B         AVSS         QT5         Dr202F         DSA158         Dr203F           Dr437F         E0         B         AVSS         QT5         Dr203F         DSA158         Dr203F           Dr437F         E0         B         AVSS         QT5         Dr203F         DSA158         Dr203F           Dr411F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr437F         E0         B         AVSS         QT5         Dr213F         DSA161         DSA162         Dr213F           Dr438F         E0         B         AVSS         QT5         Dr213F         DSA165         DSA164         <
B3 $O/W$ AVSS $O.75$ $B-30F$ $B-30F$ $B-30F$ $D-20F$	0765         0×108F         0×239           0765         0×108F         0×230           0755         0×108F         0×230           0755         0×108F         0×230           0755         0×108F         0×230           0755         0×108F         0×332           0755         0×108F         0×138           0755         0×108F         0×333           0755         0×108F         0×333 <td< td=""><td></td><td>976         L         AVSS         0.75         OH-204F           977         L         AVSS         0.75         OH-107F           977         G.Y         AVSS         0.5         OH-11-54F           977         G.Y         AVSS         0.5         OH-11-54F           978         L         AVSS         0.5         OH-11-54F           978         L         AVSS         0.5         OH-10-54F           978         L         AVSS         0.75         OH-300F           ES3         BrR         AVSS         0.75         OH-300F           ES2         BrR         AVSS         0.75         OH-300F           ES2         BrR         AVSS         0.75         OH-300F           ES4         BrR         AVSS         0.75         OH-300F           ES5         BrR         AVSS         0.75         OH-300F           ES6         BrR         AVSS         0.75         OH-300F           114         R         AVSS         0.75         OH-300F           115         G         AVSS         0.75         OH-300F           116         G         AVSS         0.75         <t< td=""><td>JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA152         Or-Q2F           JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA150         DSA156         Dr-202F           JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA150         DSA156         Dr-202F           Dr-307F         E0         B         AVSS         QT5         Dr-Q2F         DSA158         Or-201F           Dr-307F         E0         B         AVSS         QT5         Dr-202F         DSA158         Or-203F           Dr-307F         E0         B         AVSS         QT5         Dr-203F         DSA158         Or-203F           Dr-4797F         E0         B         AVSS         QT5         Dr-203F         DSA160         Or-203F           Dr-417F         E0         B         AVSS         QT5         Dr-214F         DSA160         Or-203F           Dr-207F         E0         B         AVSS         QT5         Dr-214F         DSA162         Dr-212F           Dr-208F         E0         B         AVSS         QT5         Dr-213F         DSA164         Dr-212F</td></t<></td></td<>		976         L         AVSS         0.75         OH-204F           977         L         AVSS         0.75         OH-107F           977         G.Y         AVSS         0.5         OH-11-54F           977         G.Y         AVSS         0.5         OH-11-54F           978         L         AVSS         0.5         OH-11-54F           978         L         AVSS         0.5         OH-10-54F           978         L         AVSS         0.75         OH-300F           ES3         BrR         AVSS         0.75         OH-300F           ES2         BrR         AVSS         0.75         OH-300F           ES2         BrR         AVSS         0.75         OH-300F           ES4         BrR         AVSS         0.75         OH-300F           ES5         BrR         AVSS         0.75         OH-300F           ES6         BrR         AVSS         0.75         OH-300F           114         R         AVSS         0.75         OH-300F           115         G         AVSS         0.75         OH-300F           116         G         AVSS         0.75 <t< td=""><td>JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA152         Or-Q2F           JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA150         DSA156         Dr-202F           JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA150         DSA156         Dr-202F           Dr-307F         E0         B         AVSS         QT5         Dr-Q2F         DSA158         Or-201F           Dr-307F         E0         B         AVSS         QT5         Dr-202F         DSA158         Or-203F           Dr-307F         E0         B         AVSS         QT5         Dr-203F         DSA158         Or-203F           Dr-4797F         E0         B         AVSS         QT5         Dr-203F         DSA160         Or-203F           Dr-417F         E0         B         AVSS         QT5         Dr-214F         DSA160         Or-203F           Dr-207F         E0         B         AVSS         QT5         Dr-214F         DSA162         Dr-212F           Dr-208F         E0         B         AVSS         QT5         Dr-213F         DSA164         Dr-212F</td></t<>	JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA152         Or-Q2F           JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA150         DSA156         Dr-202F           JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA150         DSA156         Dr-202F           Dr-307F         E0         B         AVSS         QT5         Dr-Q2F         DSA158         Or-201F           Dr-307F         E0         B         AVSS         QT5         Dr-202F         DSA158         Or-203F           Dr-307F         E0         B         AVSS         QT5         Dr-203F         DSA158         Or-203F           Dr-4797F         E0         B         AVSS         QT5         Dr-203F         DSA160         Or-203F           Dr-417F         E0         B         AVSS         QT5         Dr-214F         DSA160         Or-203F           Dr-207F         E0         B         AVSS         QT5         Dr-214F         DSA162         Dr-212F           Dr-208F         E0         B         AVSS         QT5         Dr-213F         DSA164         Dr-212F
83       0./w       AVSS       0.75       68-9.42	07:5         0+108F         0+293           07:5         0+108F         0+293           07:5         0+108F         0+304           07:5         0+108F         0+303           07:5         0+108F         0+303 <td< td=""><td></td><td>976         L         AVSS         0.75         OH-204F           977         L         AVSS         0.75         OH-107F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-117-54F           978         L         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-107-54F           978         L/O         AVSS         0.75         OH-300F           ES3         BrR         AVSS         0.75         OH-300F           ES4         BrR         AVSS         0.75         OH-300F           ES5         BrR         AVSS         0.75         OH-300F           114         R         AVSS         0.75         OH-300F           115         G         AVSS         0.75</td><td>JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA152         Dr2202F           JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA150         DSA156         D&gt;201F           JS-A22         E0         B         AVSS         QT5         Dr4201F         DSA150         DSA156         D&gt;201F           OH-204F         E0         B         AVSS         QT5         Dr4201F         DSA159         DSA158         DV-203F           DH-234F         E0         B         AVSS         QT5         Dr4204F         DSA158         DV-203F           DH-11FF         E0         B         AVSS         QT5         Dr4204F         DSA160         Dr4204F           DH-11FF         E0         B         AVSS         QT5         Dr4204F         DSA160         Dr4204F           DH-11FF         E0         B         AVSS         QT5         DSA161         DSA162         Dr4210F           DH-307F         E0         B         AVSS         QT5         DSA163         DSA164         Dr4212F           DH-307F         E0         B         AVSS         QT5         DF4164         Dr4212F</td></td<>		976         L         AVSS         0.75         OH-204F           977         L         AVSS         0.75         OH-107F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-117-54F           978         L         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-107-54F           978         L/O         AVSS         0.75         OH-300F           ES3         BrR         AVSS         0.75         OH-300F           ES4         BrR         AVSS         0.75         OH-300F           ES5         BrR         AVSS         0.75         OH-300F           114         R         AVSS         0.75         OH-300F           115         G         AVSS         0.75	JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA152         Dr2202F           JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA150         DSA156         D>201F           JS-A22         E0         B         AVSS         QT5         Dr4201F         DSA150         DSA156         D>201F           OH-204F         E0         B         AVSS         QT5         Dr4201F         DSA159         DSA158         DV-203F           DH-234F         E0         B         AVSS         QT5         Dr4204F         DSA158         DV-203F           DH-11FF         E0         B         AVSS         QT5         Dr4204F         DSA160         Dr4204F           DH-11FF         E0         B         AVSS         QT5         Dr4204F         DSA160         Dr4204F           DH-11FF         E0         B         AVSS         QT5         DSA161         DSA162         Dr4210F           DH-307F         E0         B         AVSS         QT5         DSA163         DSA164         Dr4212F           DH-307F         E0         B         AVSS         QT5         DF4164         Dr4212F
83       0./w       AVSS       0.75       6F-A2	075         0+108F         0+291           075         0+108F         0+293           075         0+108F         0+304           075         0+108F         0+303           075         0		976         L         AVSS         0.75         0+204F           976         L         AVSS         0.75         0+1077           977         G./Y         AVSS         0.75         0+1077           978         L         AVSS         0.75         0+1077           977         G./Y         AVSS         0.75         0+1078           978         L         AVSS         0.5         0+11-54F           978         L         AVSS         0.75         0+300F           E33         BrR         AVSS         0.75         0+300F           E34         BrR         AVSS         0.75         0+300F           E52         BrR         AVSS         0.75         0+300F           E52         BrR         AVSS         0.75         0+300F           E53         BrR         AVSS         0.75         0+300F           E54         BrR         AVSS         0.75         0+300F           E58         BrR         AVSS         0.75         0+300F           E58         BrR         AVSS         0.75         0+300F           E58         BrR         AVSS         0.75         0+300F </td <td>JS-A22         E0         B         AVSS         QT5         Dr402er         DSA152         Or-202F           JS-A22         E0         B         AVSS         QT5         Or-202F         DSA150         DSA156         D&gt;201F           JS-A22         E0         B         AVSS         QT5         Dr-202F         DSA150         DSA156         D&gt;201F           Or-203F         E0         B         AVSS         QT5         Dr-203F         DSA158         DSA158         DSA158         Dr-203F           Dr-234F         E0         B         AVSS         QT5         Dr-203F         DSA158         DSA158         Dr-203F           Dr-111-19F         E0         B         AVSS         QT5         Dr-203F         DSA161         DSA160         Dr-203F           Dr-111-19F         E0         B         AVSS         QT5         Dr-203F         DSA161         DSA160         Dr-203F           Dr-111-19F         E0         B         AVSS         QT5         Dr-203F         DSA164         Dr-212F           Dr-203F         E0         B         AVSS         QT5         Dr-213F         DSA164         Dr-212F           Dr-203F         E0         B</td>	JS-A22         E0         B         AVSS         QT5         Dr402er         DSA152         Or-202F           JS-A22         E0         B         AVSS         QT5         Or-202F         DSA150         DSA156         D>201F           JS-A22         E0         B         AVSS         QT5         Dr-202F         DSA150         DSA156         D>201F           Or-203F         E0         B         AVSS         QT5         Dr-203F         DSA158         DSA158         DSA158         Dr-203F           Dr-234F         E0         B         AVSS         QT5         Dr-203F         DSA158         DSA158         Dr-203F           Dr-111-19F         E0         B         AVSS         QT5         Dr-203F         DSA161         DSA160         Dr-203F           Dr-111-19F         E0         B         AVSS         QT5         Dr-203F         DSA161         DSA160         Dr-203F           Dr-111-19F         E0         B         AVSS         QT5         Dr-203F         DSA164         Dr-212F           Dr-203F         E0         B         AVSS         QT5         Dr-213F         DSA164         Dr-212F           Dr-203F         E0         B
83       0./w       AVSS       0.75       6F-A2	0715         0×108F         0×239           0715         0×108F         0×230           0715         0×108F         0×304           0715         0×108F         0×303           0715         0×108F         0×1304           0715         0×108F         0×1303		976         L         AVSS         0.75         0×294F           976         L         AVSS         0.75         0×107F           977         L         AVSS         0.5         0×107F           977         L         AVSS         0.5         0×117-5AF           978         L         AVSS         0.5         0×111-5AF           977         L/O         AVSS         0.75         0×300F           E33         Br.R         AVSS         0.75         0×300F           E32         Br.R         AVSS         0.75         0×300F           E32         Br.R         AVSS         0.75         0×300F           E32         Br.R         AVSS         0.75         0×300F           E34         Br.R         AVSS         0.75         0×300F           E35         Br.R         AVSS         0.75         0×300F           E36         Br.R         AVSS         0.75         0×300F           E37         Br.R         AVSS         0.75         0×300F           E38         Br.R         AVSS         0.75         0×300F           E37         Br.R         AVSS         0.75 <t< td=""><td>JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA152         Or-Q2F           JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA150         DSA156         Dr-202F           JS-A22         E0         B         AVSS         QT5         Dr-202F         DSA156         Dr-202F           Dr-234F         E0         B         AVSS         QT5         Dr-202F         DSA156         Dr-202F           Dr-234F         E0         B         AVSS         QT5         Dr-202F         DSA158         Dr-203F           Dr-234F         E0         B         AVSS         QT5         Dr-203F         DSA158         Dr-203F           Dr-234F         E0         B         AVSS         QT5         Dr-204F         DSA160         Dr-204F           Dr-234F         E0         B         AVSS         QT5         Dr-214F         DSA160         Dr-204F           Dr-417F         E0         B         AVSS         QT5         DSA161         DSA164         Dr-212F           Dr-405F         E0         B         AVSS         QT5         Dr-214F         DSA164         Dr-212F           Dr-404</td></t<>	JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA152         Or-Q2F           JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA150         DSA156         Dr-202F           JS-A22         E0         B         AVSS         QT5         Dr-202F         DSA156         Dr-202F           Dr-234F         E0         B         AVSS         QT5         Dr-202F         DSA156         Dr-202F           Dr-234F         E0         B         AVSS         QT5         Dr-202F         DSA158         Dr-203F           Dr-234F         E0         B         AVSS         QT5         Dr-203F         DSA158         Dr-203F           Dr-234F         E0         B         AVSS         QT5         Dr-204F         DSA160         Dr-204F           Dr-234F         E0         B         AVSS         QT5         Dr-214F         DSA160         Dr-204F           Dr-417F         E0         B         AVSS         QT5         DSA161         DSA164         Dr-212F           Dr-405F         E0         B         AVSS         QT5         Dr-214F         DSA164         Dr-212F           Dr-404
B3 $O.V_{m}$ AVSS $O.75$ $B-30$ $O.V$ AVSS $O.75$ $B-14.84F$ $O-202F$ $429$ $G$ $AVSS$ B3 $O.V_{m}$ AVSS $O.75$ $B-742$ $OP-209F$ $302$ $R$ $AVSS$ $O.75$ $D-104F$ $OP-209F$ $302$ $R$ $AVSS$ $O.75$ $D-101F$ $434$ $R$ $AVSS$ <	0715         0×108F         0×293           0715         0×108F         0×393           0715         0×108F         0×193           0715         0×108F         0×193 <td< td=""><td></td><td>976         L         AVSS         0.75         OH-204F           977         L         AVSS         0.75         OH-107F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-115-54F           977         J.Y.G         AVSS         0.75         OH-300F           E33         B.R         AVSS         0.75         OH-300F           E32         B.R         AVSS         0.75         OH-300F           E52         B.R         AVSS         0.75         OH-300F           E54         B.R         AVSS         0.75         OH-300F           E55         B.R         AVSS         0.75&lt;</td><td>JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA152         Dr-Q2F           JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA150         DSA156         DSA156         Dr-202F           JS-A22         E0         B         AVSS         QT5         Dr-202F         DSA156         DSA156         Dr-202F           Dr-234F         E0         B         AVSS         QT5         Dr-203F         DSA158         DSA158         Dr-203F           Dr-234F         E0         B         AVSS         QT5         Dr-203F         DSA158         Dr-203F           Dr-407F         E0         B         AVSS         QT5         Dr-203F         DSA161         DSA160         Dr-203F           Dr-11F         E0         B         AVSS         QT5         Dr-203F         DSA161         DSA160         Dr-203F           Dr-4030F         E0         B         AVSS         QT5         Dr-203F         DSA164         Dr-212F           Dr-4030F         E0         B         AVSS         QT5         Dr-213F         DSA164         Dr-212F           Dr-4030F         E0         B         AVSS         &lt;</td></td<>		976         L         AVSS         0.75         OH-204F           977         L         AVSS         0.75         OH-107F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-115-54F           977         J.Y.G         AVSS         0.75         OH-300F           E33         B.R         AVSS         0.75         OH-300F           E32         B.R         AVSS         0.75         OH-300F           E52         B.R         AVSS         0.75         OH-300F           E54         B.R         AVSS         0.75         OH-300F           E55         B.R         AVSS         0.75<	JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA152         Dr-Q2F           JS-A22         E0         B         AVSS         QT5         Dr-Q2F         DSA150         DSA156         DSA156         Dr-202F           JS-A22         E0         B         AVSS         QT5         Dr-202F         DSA156         DSA156         Dr-202F           Dr-234F         E0         B         AVSS         QT5         Dr-203F         DSA158         DSA158         Dr-203F           Dr-234F         E0         B         AVSS         QT5         Dr-203F         DSA158         Dr-203F           Dr-407F         E0         B         AVSS         QT5         Dr-203F         DSA161         DSA160         Dr-203F           Dr-11F         E0         B         AVSS         QT5         Dr-203F         DSA161         DSA160         Dr-203F           Dr-4030F         E0         B         AVSS         QT5         Dr-203F         DSA164         Dr-212F           Dr-4030F         E0         B         AVSS         QT5         Dr-213F         DSA164         Dr-212F           Dr-4030F         E0         B         AVSS         <
B3 $O.V_{m}$ AVSS $O.75$ $B-30$ $O.V$ AVSS $O.75$ $B-14.84F$ $O-202F$ $429$ $G$ $AVSS$ B3 $O.V_{m}$ AVSS $O.75$ $B-742$ $OP-209F$ $302$ $R$ $AVSS$ $O.75$ $D-104F$ $OP-209F$ $302$ $R$ $AVSS$ $O.75$ $D-101F$ $434$ $R$ $AVSS$ <	07:5         0+108F		976         L         AVSS         0.75         0×294F           976         L         AVSS         0.75         0×107F           977         L         AVSS         0.55         0×107F           977         L         AVSS         0.55         0×117-5AF           978         L         AVSS         0.55         0×111-5AF           977         L/O         AVSS         0.75         0×300F           E33         Br.R         AVSS         0.75         0×300F           E32         Br.R         AVSS         0.75         0×300F           E52         Br.R         AVSS         0.75         0×300F           E54         Br.R         AVSS         0.75         0×300F           E54         Br.R         AVSS         0.75         0×300F           E54         Br.R         AVSS         0.75         0×300F           E57         Br.R         AVSS         0.75         0×300F           E58         Br.R         AVSS         0.75         0×300F           E14         R         AVSS         0.75         0×300F           E14         R         AVSS         0.75         0	JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         Dr202F           Dr-234F         E0         B         AVSS         QT5         Dr202F         DSA158         DSA158         Dr203F           Dr-234F         E0         B         AVSS         QT5         Dr203F         DSA158         Dr203F           Dr471F         E0         B         AVSS         QT5         Dr203F         DSA158         DSA160         Dr203F           Dr411F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr415F         E0         B         AVSS         QT5         Dr214F         DSA160         Dr203F           Dr436F         E0         B         AVSS         QT5         DSA161         DSA164         Dr212F           Dr436F         E0         B         AVSS         QT5         Dr213F         DSA170         <
B3 $O.V_{m}$ AVSS $O.75$ $B-30$ $O.V$ AVSS $O.75$ $B-14.84F$ $O-202F$ $429$ $G$ $AVSS$ B3 $O.V_{m}$ AVSS $O.75$ $B-742$ $OP-209F$ $302$ $R$ $AVSS$ $O.75$ $D-104F$ $OP-209F$ $302$ $R$ $AVSS$ $O.75$ $D-101F$ $434$ $R$ $AVSS$ <	0765         0×108F         0×293           0765         0×108F         0×393           0775         0×208F         0×108           0775         0×208F         0×108           0775         0×208F         0×108           0775         0×108F         0×293           0775         0×108F         0×393           0775         0×108F         0×393           0775         0×108F         0×393 <t< td=""><td></td><td>976         L         AVSS         0.75         OH-204F           977         L         AVSS         0.75         OH-107F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-117-54F           977         J.Y.G         AVSS         0.75         OH-300F           ES3         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES2         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES5         B.R         AVSS         0.75         OH-300F           ES6         B.R         AVSS         0.75         OH-300F           114         R         AVSS         0.75         OH-300F           115         G         AVSS         0.75</td><td>JS-A22         E0         B         AVSS         QT5         Dr402F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         DSA156         Dr202F           Dr-239F         E0         B         AVSS         QT5         Dr203F         DSA158         Dr203F           Dr4767F         E0         B         AVSS         QT5         Dr203F         DSA159         DSA168         Dr203F           Dr4119F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr4119F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr4119F         E0         B         AVSS         QT5         Dr204F         DSA161         DSA164         Dr212F           Dr4030F         E0         B         AVSS         QT5         Dr213F         DSA164         Dr212F           Dr4030F         E0         B         AVSS         QT5         DSA170</td></t<>		976         L         AVSS         0.75         OH-204F           977         L         AVSS         0.75         OH-107F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-117-54F           977         J.Y.G         AVSS         0.75         OH-300F           ES3         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES2         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES5         B.R         AVSS         0.75         OH-300F           ES6         B.R         AVSS         0.75         OH-300F           114         R         AVSS         0.75         OH-300F           115         G         AVSS         0.75	JS-A22         E0         B         AVSS         QT5         Dr402F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         DSA156         Dr202F           Dr-239F         E0         B         AVSS         QT5         Dr203F         DSA158         Dr203F           Dr4767F         E0         B         AVSS         QT5         Dr203F         DSA159         DSA168         Dr203F           Dr4119F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr4119F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr4119F         E0         B         AVSS         QT5         Dr204F         DSA161         DSA164         Dr212F           Dr4030F         E0         B         AVSS         QT5         Dr213F         DSA164         Dr212F           Dr4030F         E0         B         AVSS         QT5         DSA170
88       0./w       AVSS       0.75       bit-104F	07:5         0+106F         0+293           07:5         0+108F         0+293           07:5         0+108F         0+304           07:5         0+108F         0+303           07:5         0+108F         0+303 <td< td=""><td></td><td>976         L         AVSS         0.75         0+294F           976         L         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           978         L         AVSS         0.75         0+1074           978         L         AVSS         0.75         0+300F           E33         BrR         AVSS         0.75         0+300F           E32         BrR         AVSS         0.75         0+300F           E34         BrR         AVSS         0.75         0+209F           E35         BrR         AVSS         0.75         0+209F           E58         BrR         AVSS         0.75         0+209F           E59         BrR         AVSS         0.75         0+209F           E14         R         AVSS         0.75         0+300F</td><td>JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         DSA156         Dr202F           Dr-234F         E0         B         AVSS         QT5         Dr202F         DSA159         DSA158         Dr203F           Dr-234F         E0         B         AVSS         QT5         Dr203F         DSA159         DSA158         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr214F         DSA161         DSA164         Dr212F           Dr403F         E0         B         AVSS         QT5         Dr214F         DSA170         DSA171         Dr214F           Dr403F         E0         B         AVSS</td></td<>		976         L         AVSS         0.75         0+294F           976         L         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           978         L         AVSS         0.75         0+1074           978         L         AVSS         0.75         0+300F           E33         BrR         AVSS         0.75         0+300F           E32         BrR         AVSS         0.75         0+300F           E34         BrR         AVSS         0.75         0+209F           E35         BrR         AVSS         0.75         0+209F           E58         BrR         AVSS         0.75         0+209F           E59         BrR         AVSS         0.75         0+209F           E14         R         AVSS         0.75         0+300F	JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         DSA156         Dr202F           Dr-234F         E0         B         AVSS         QT5         Dr202F         DSA159         DSA158         Dr203F           Dr-234F         E0         B         AVSS         QT5         Dr203F         DSA159         DSA158         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr214F         DSA161         DSA164         Dr212F           Dr403F         E0         B         AVSS         QT5         Dr214F         DSA170         DSA171         Dr214F           Dr403F         E0         B         AVSS
88       0./w       AVSS       0.75       6-A.2	0715         0×108F         0×238           0715         0×108F         0×230           0715         0×108F         0×230           0715         0×108F         0×230           0715         0×108F         0×230           0715         0×108F         0×232           0715         0×108F         0×232           0715         0×108F         0×322           0715         0×108F         0×322           0715         0×108F         0×323           0715         0×108F         0×323           0715         0×108F         0×330           0715         0×108F         0×133           0715         0×108F         0×132           0715         0×108F         0×132 <t< td=""><td></td><td>976         L         AVSS         0.75         OH-204F           977         L         AVSS         0.75         OH-107F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-117-54F           977         J.Y.G         AVSS         0.75         OH-300F           ES3         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES2         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES5         B.R         AVSS         0.75         OH-300F           ES6         B.R         AVSS         0.75         OH-300F           114         R         AVSS         0.75         OH-300F           115         G         AVSS         0.75</td><td>JS-A22         E0         B         AVSS         QT5         Dr402F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         DSA156         Dr202F           Dr-239F         E0         B         AVSS         QT5         Dr203F         DSA158         Dr203F           Dr4767F         E0         B         AVSS         QT5         Dr203F         DSA159         DSA168         Dr203F           Dr4119F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr4119F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr4119F         E0         B         AVSS         QT5         Dr204F         DSA161         DSA164         Dr212F           Dr4030F         E0         B         AVSS         QT5         Dr213F         DSA164         Dr212F           Dr4030F         E0         B         AVSS         QT5         DSA170</td></t<>		976         L         AVSS         0.75         OH-204F           977         L         AVSS         0.75         OH-107F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-117-54F           977         G.Y         AVSS         0.5         OH-117-54F           977         J.Y.G         AVSS         0.75         OH-300F           ES3         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES2         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES4         B.R         AVSS         0.75         OH-300F           ES5         B.R         AVSS         0.75         OH-300F           ES6         B.R         AVSS         0.75         OH-300F           114         R         AVSS         0.75         OH-300F           115         G         AVSS         0.75	JS-A22         E0         B         AVSS         QT5         Dr402F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         DSA156         Dr202F           Dr-239F         E0         B         AVSS         QT5         Dr203F         DSA158         Dr203F           Dr4767F         E0         B         AVSS         QT5         Dr203F         DSA159         DSA168         Dr203F           Dr4119F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr4119F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr4119F         E0         B         AVSS         QT5         Dr204F         DSA161         DSA164         Dr212F           Dr4030F         E0         B         AVSS         QT5         Dr213F         DSA164         Dr212F           Dr4030F         E0         B         AVSS         QT5         DSA170
88       0./w       AVSS       0.75       6-A2	075         0×108F         0×293           075         0×108F         0×293           075         0×108F         0×393           075         0×108F         0×1393           075		976         L         AVSS         0.75         0+294F           976         L         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           978         L         AVSS         0.75         0+1074           978         L         AVSS         0.75         0H-1074F           978         L         AVSS         0.75         0H-300F           E33         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E34         BrR         AVSS         0.75         0H-300F           E35         BrR         AVSS         0.75         0H-300F           E36         BrR         AVSS         0.75         0H-300F           E37         BrR         AVSS         0.75         0H-300F           E38         BrR         AVSS         0.75	JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         DSA156         Dr202F           Dr-234F         E0         B         AVSS         QT5         Dr202F         DSA159         DSA158         Dr203F           Dr-234F         E0         B         AVSS         QT5         Dr203F         DSA159         DSA158         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr214F         DSA161         DSA164         Dr212F           Dr403F         E0         B         AVSS         QT5         Dr214F         DSA170         DSA171         Dr214F           Dr403F         E0         B         AVSS
B3       O/W       AVSS       O/TS       B-A2       Image: Model of the matrix	0765         0×108F         0×238           0765         0×108F         0×230           0765         0×108F         0×230           0765         0×108F         0×230           0765         0×108F         0×230           0765         0×108F         0×232           0765         0×108F         0×232           0765         0×108F         0×323           0765         0×108F         0×323           0765         0×108F         0×332           0775         0×208F         0×333           0775         0×208F         0×108           0775         0×208F         0×108           0775         0×108F         0×232           0775         0×108F         0×333           0775         0×108F         0×333           0775         0×108F         0×333 <t< td=""><td></td><td>976         L         AVSS         0.75         0+294F           976         L         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           978         L         AVSS         0.75         0+1074           978         L         AVSS         0.75         0H-1074F           978         L         AVSS         0.75         0H-300F           E33         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E34         BrR         AVSS         0.75         0H-300F           E35         BrR         AVSS         0.75         0H-300F           E36         BrR         AVSS         0.75         0H-300F           E37         BrR         AVSS         0.75         0H-300F           E38         BrR         AVSS         0.75</td><td>JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         DSA156         Dr202F           Dr-234F         E0         B         AVSS         QT5         Dr202F         DSA159         DSA158         Dr203F           Dr-234F         E0         B         AVSS         QT5         Dr203F         DSA159         DSA158         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr214F         DSA161         DSA164         Dr212F           Dr403F         E0         B         AVSS         QT5         Dr214F         DSA170         DSA171         Dr214F           Dr403F         E0         B         AVSS</td></t<>		976         L         AVSS         0.75         0+294F           976         L         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           978         L         AVSS         0.75         0+1074           978         L         AVSS         0.75         0H-1074F           978         L         AVSS         0.75         0H-300F           E33         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E34         BrR         AVSS         0.75         0H-300F           E35         BrR         AVSS         0.75         0H-300F           E36         BrR         AVSS         0.75         0H-300F           E37         BrR         AVSS         0.75         0H-300F           E38         BrR         AVSS         0.75	JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         DSA156         Dr202F           Dr-234F         E0         B         AVSS         QT5         Dr202F         DSA159         DSA158         Dr203F           Dr-234F         E0         B         AVSS         QT5         Dr203F         DSA159         DSA158         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr214F         DSA161         DSA164         Dr212F           Dr403F         E0         B         AVSS         QT5         Dr214F         DSA170         DSA171         Dr214F           Dr403F         E0         B         AVSS
83       0/w       AVSS       0/5       0-4/2       0/-302F       649       L       AVSS       0/7       D+-302F       629       0       AVSS       0/7       0/-302F       629       0       AVSS       0/7       0/-209F	0765         0×108F         0×238           0765         0×108F         0×230           0765         0×108F         0×230           0765         0×108F         0×230           0765         0×108F         0×230           0765         0×108F         0×232           0765         0×108F         0×232           0765         0×108F         0×323           0765         0×108F         0×323           0765         0×108F         0×332           0775         0×208F         0×333           0775         0×208F         0×108           0775         0×208F         0×108           0775         0×108F         0×232           0775         0×108F         0×333           0775         0×108F         0×333           0775         0×108F         0×333 <t< td=""><td></td><td>976         L         AVSS         0.75         0+294F           976         L         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           978         L         AVSS         0.75         0+1074           978         L         AVSS         0.75         0H-1074F           978         L         AVSS         0.75         0H-300F           E33         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E34         BrR         AVSS         0.75         0H-300F           E35         BrR         AVSS         0.75         0H-300F           E36         BrR         AVSS         0.75         0H-300F           E37         BrR         AVSS         0.75         0H-300F           E38         BrR         AVSS         0.75</td><td>JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         DSA156         Dr202F           Dr-234F         E0         B         AVSS         QT5         Dr202F         DSA159         DSA158         Dr203F           Dr-234F         E0         B         AVSS         QT5         Dr203F         DSA159         DSA158         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr214F         DSA161         DSA164         Dr212F           Dr403F         E0         B         AVSS         QT5         Dr214F         DSA170         DSA171         Dr214F           Dr403F         E0         B         AVSS</td></t<>		976         L         AVSS         0.75         0+294F           976         L         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           977         G.Y         AVSS         0.75         0+1077           978         L         AVSS         0.75         0+1074           978         L         AVSS         0.75         0H-1074F           978         L         AVSS         0.75         0H-300F           E33         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E32         BrR         AVSS         0.75         0H-300F           E34         BrR         AVSS         0.75         0H-300F           E35         BrR         AVSS         0.75         0H-300F           E36         BrR         AVSS         0.75         0H-300F           E37         BrR         AVSS         0.75         0H-300F           E38         BrR         AVSS         0.75	JS-A22         E0         B         AVSS         QT5         Dr4202F         DSA152         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA150         DSA156         DSA156         Dr202F           JS-A22         E0         B         AVSS         QT5         Dr202F         DSA156         DSA156         Dr202F           Dr-234F         E0         B         AVSS         QT5         Dr202F         DSA159         DSA158         Dr203F           Dr-234F         E0         B         AVSS         QT5         Dr203F         DSA159         DSA158         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr203F         DSA160         Dr203F           Dr417F         E0         B         AVSS         QT5         Dr214F         DSA161         DSA164         Dr212F           Dr403F         E0         B         AVSS         QT5         Dr214F         DSA170         DSA171         Dr214F           Dr403F         E0         B         AVSS

THE WIRE NO. /COLOR LIST

(5/5)

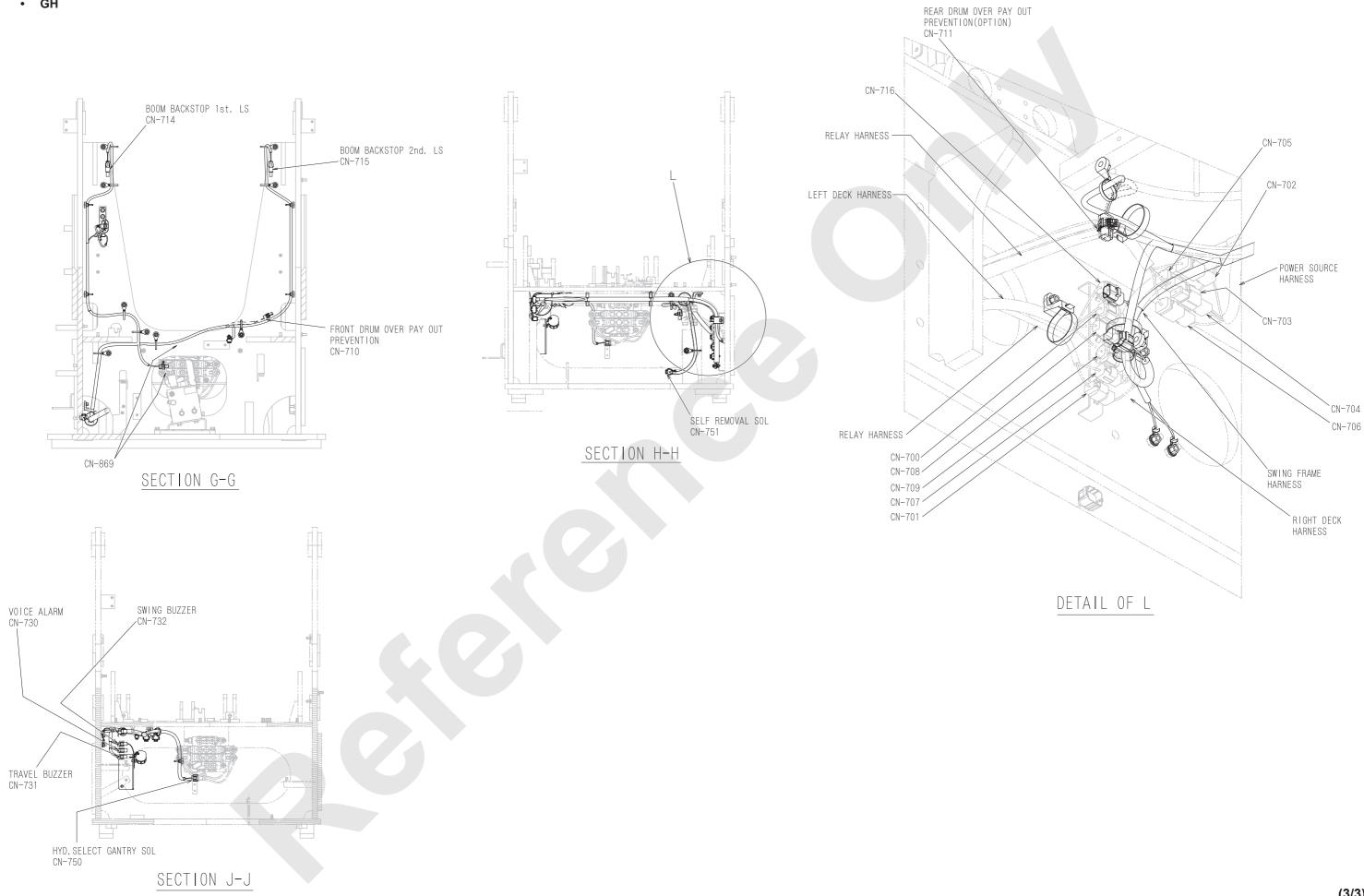






(2/3)





(3/3)

• GG

## LEFT SWING STOP PROPORTIONAL VALVE, CN-742 RIGHT SWING STOP PROPORTIONAL VALVE CN-741 Η-G-Ν \_\_► DETAIL OF N 0 00 (OPTION) А 0 ,¶⊂¶8 -MII I G-M . | --> || --▶| - () REAR DRUM FREE FALL SPEED INCREASE SELECT SWITCH CN-748 CN-714. SWING NEUTRAL BRAKE SELECT SOL CN-743 TRAVEL SPEED HI/LOW SELECT SOL REAR DRUM ROTATION SENSOR CN-720 CN-745 SWING PRESS. HI/LOW SELECT SOL REAR DRUM ROTATION SENSOR CN-746 CN-721 BOOM OVERHOIST LS CN-713 CN-628 CN-744

RIGHT DECK HARNESS

CN-680 CONNNECT TO RIGHT DECK HARNESS

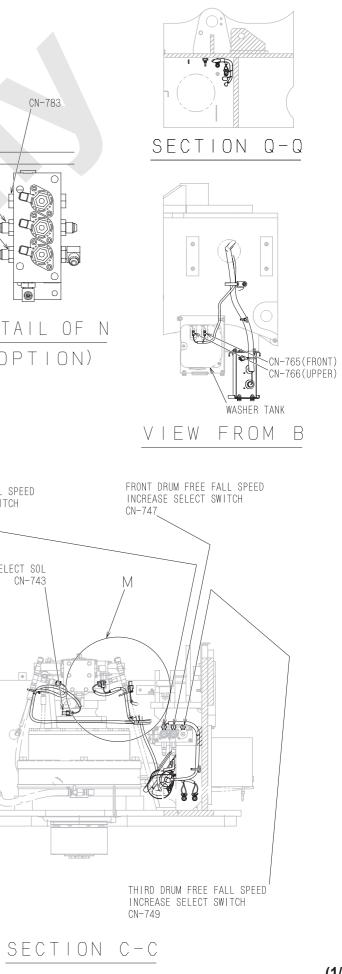
CN-712

CN-683

3rd.DRUM ROTATION SENSOR CN-722 CN-772

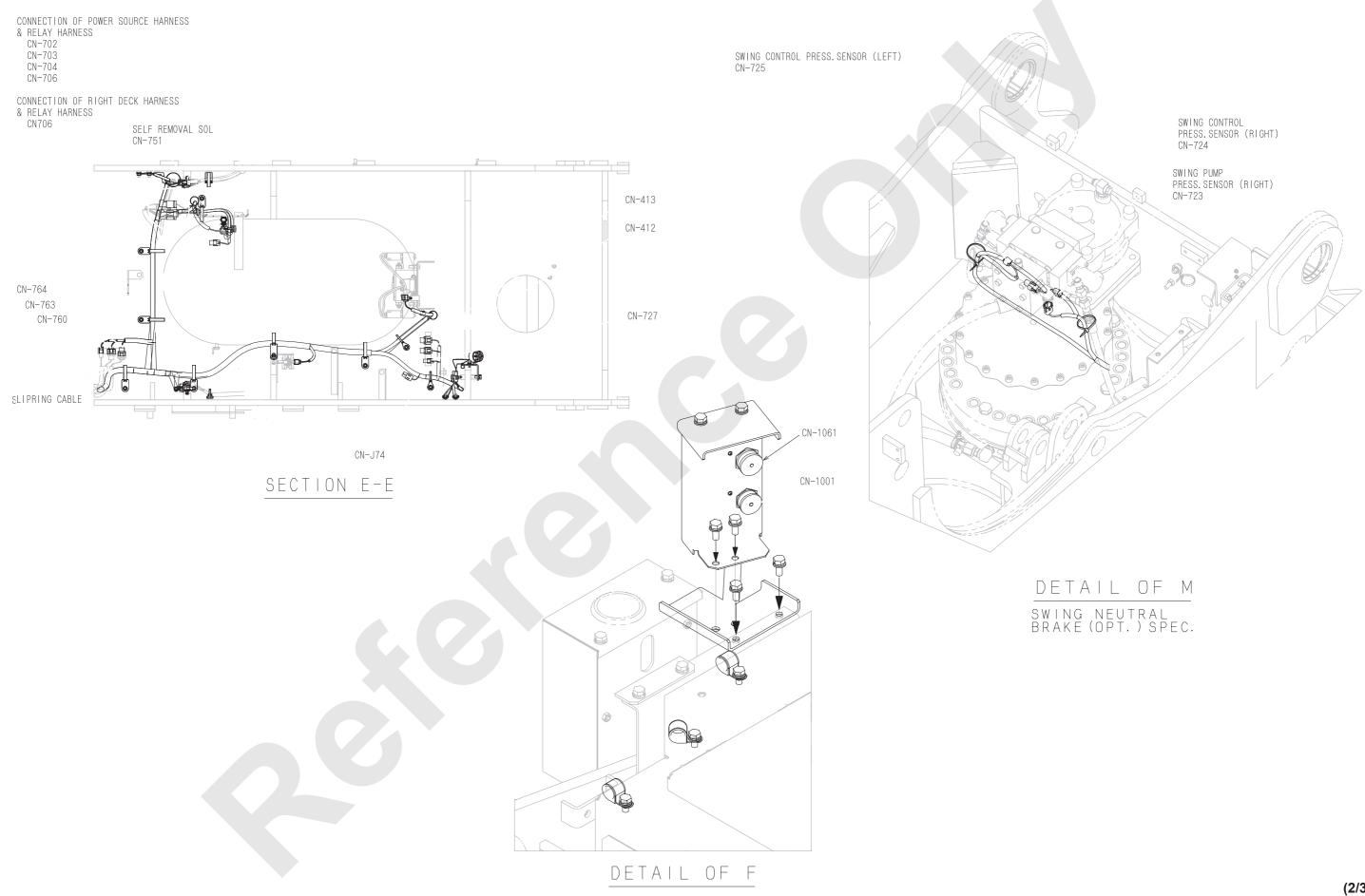
CN-J72

SECTION A-A

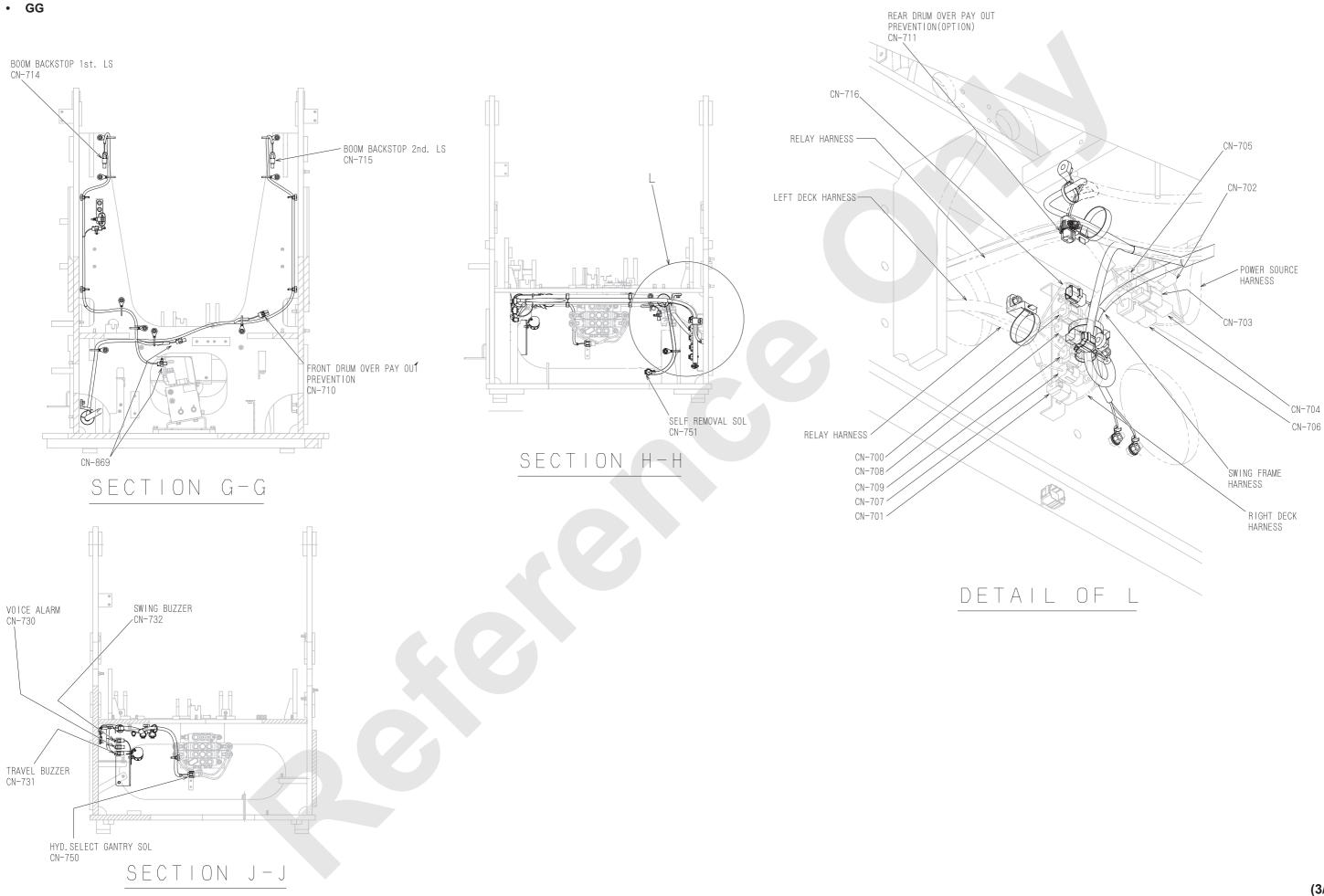


(1/3)

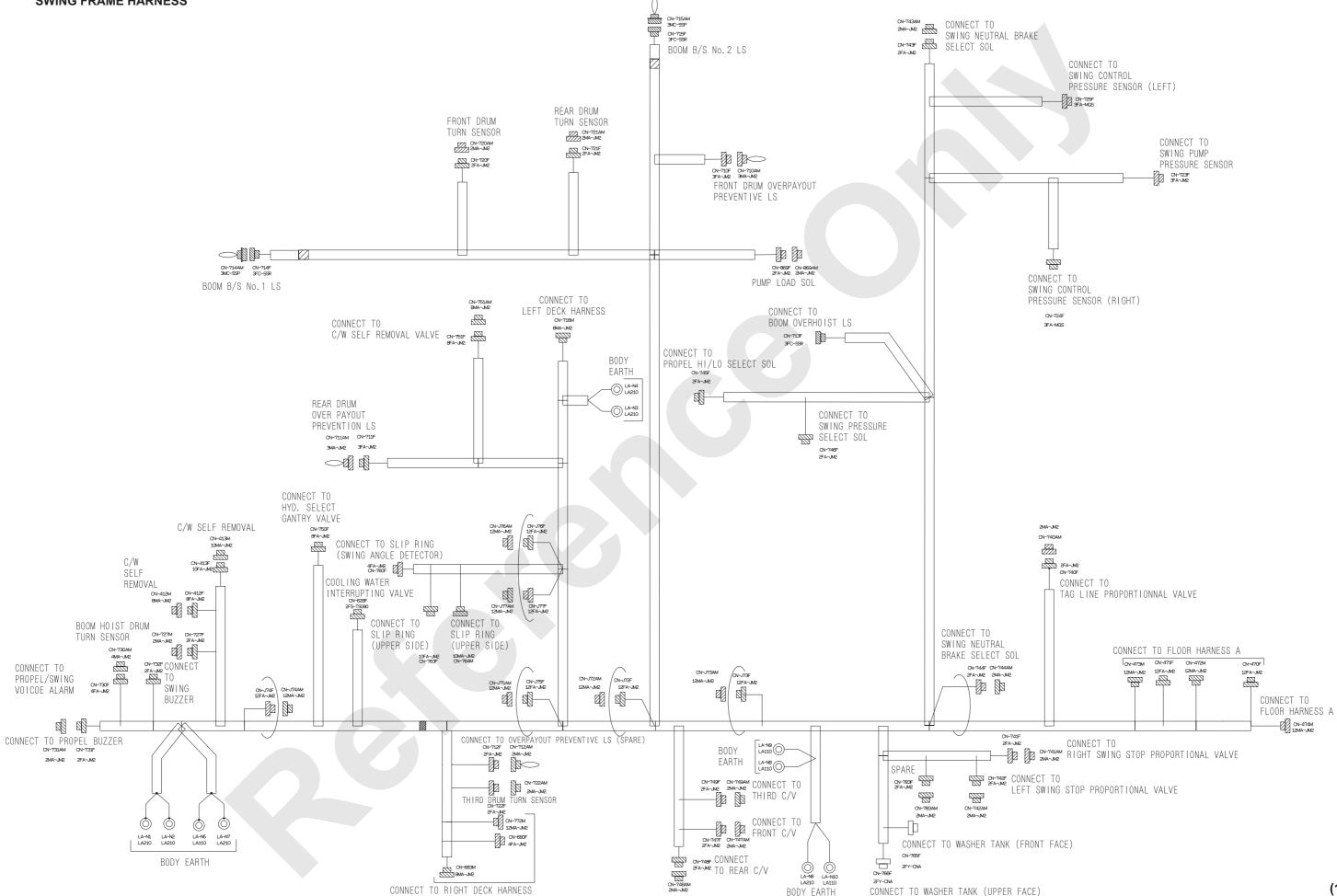
• GG



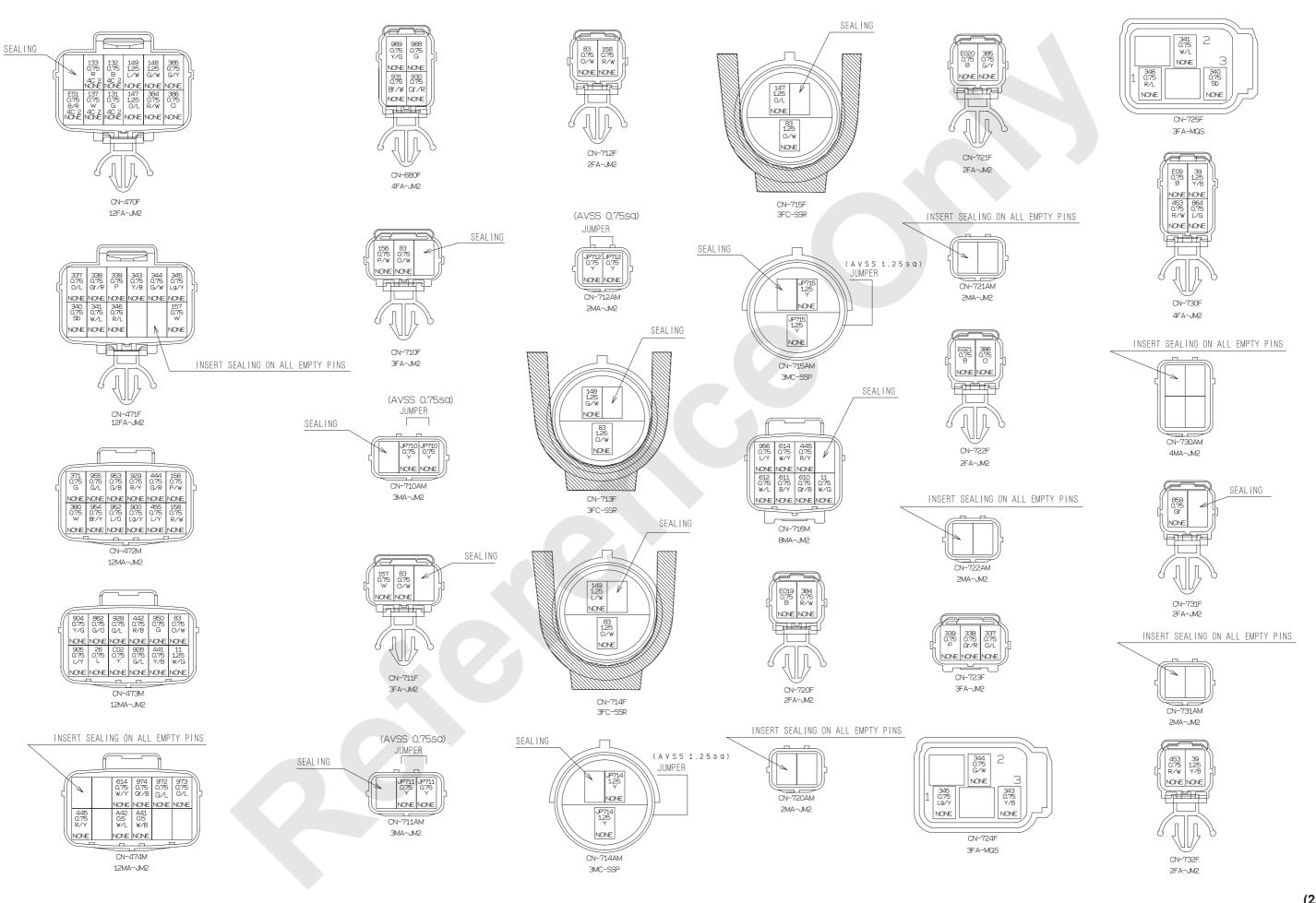
(2/3)



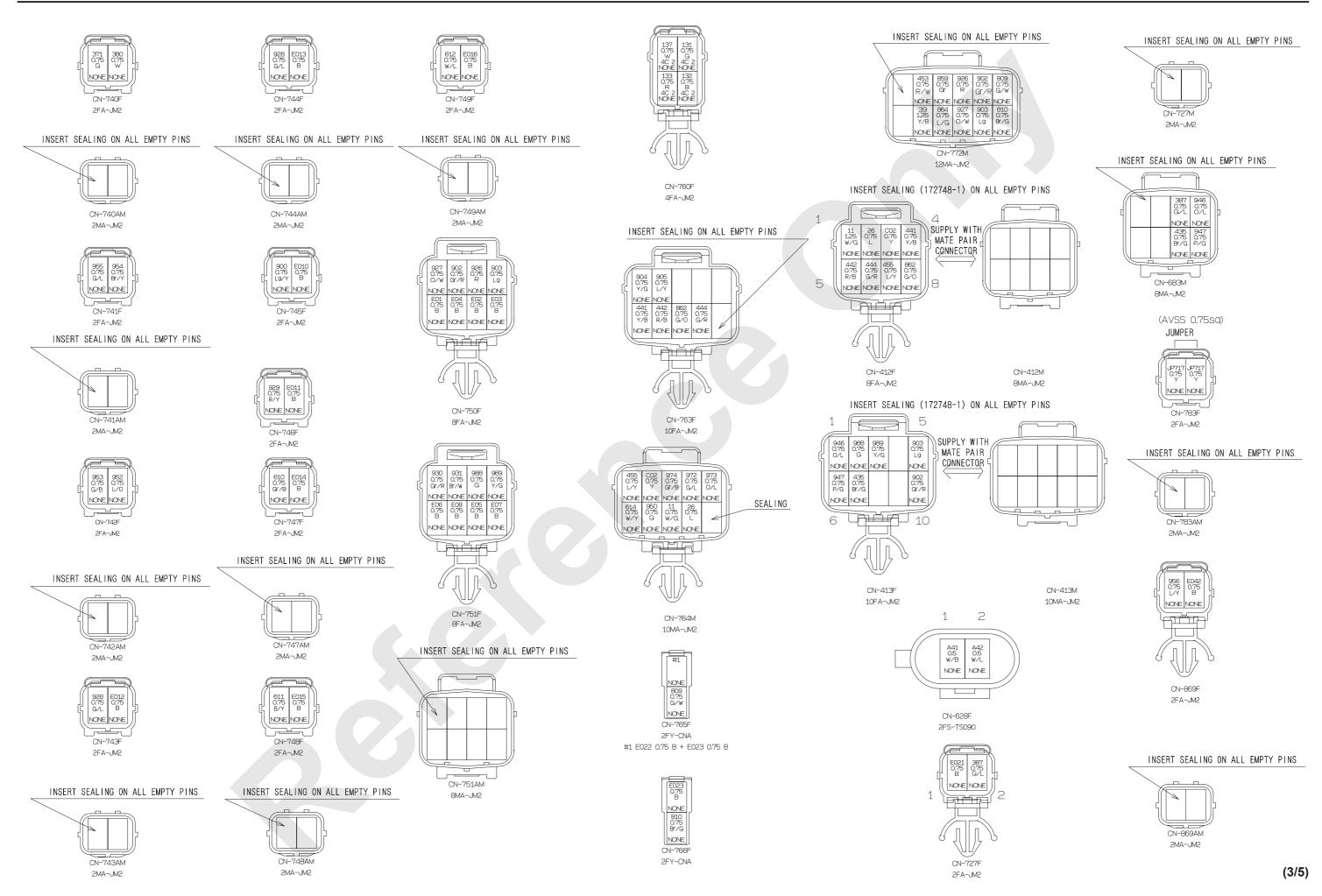
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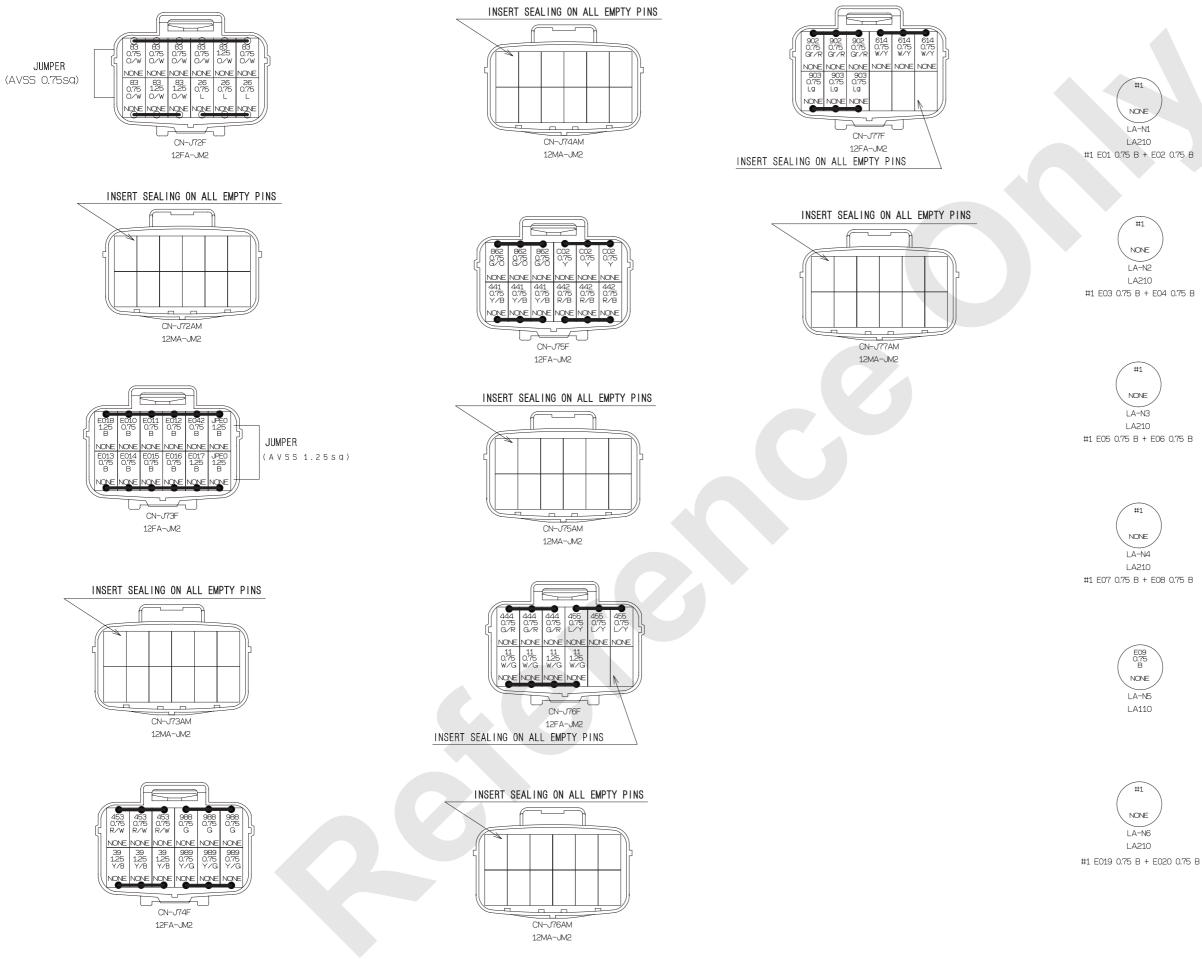
BODY EARTH



(2/5)



Published 11-10-17, Control #261-01





E017 1.25 B

NONE

LA-N8

LA110





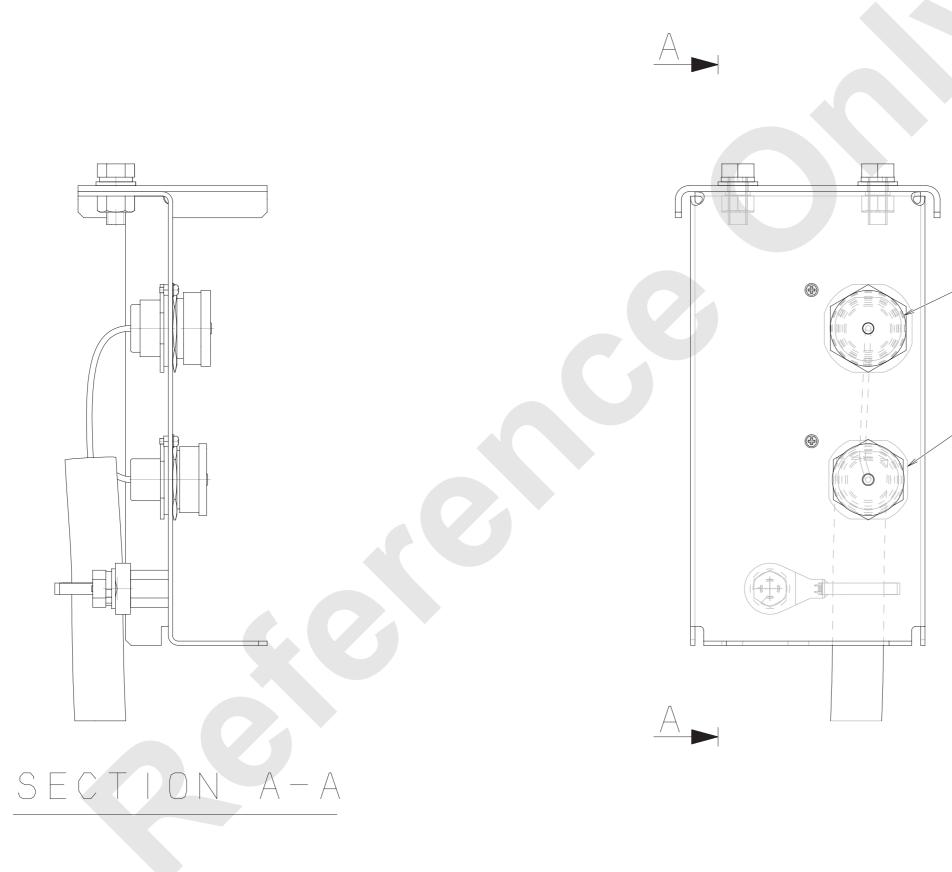
(4/5)

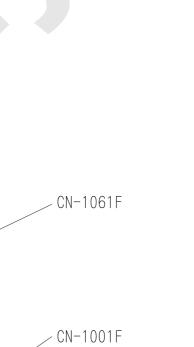
WIRE NO.	WIRE COLOR	WIRE TYPE	SIZE	FROM	<b>%</b> 1	×2	CONNECTION	¥2	*1	T
11	W/G	AVSS	0.75	CN-J76F			-	ML.		CN-764
11	W/G	AVSS	0.75	CN-J76F			<b>↓</b>			CN-716
11	W/G	AVSS	1.25	CN-J76F			• · · · · ·			CN-47
11	W/G	AVSS	1.25	CN-J76F						CN-412
26	L	AVSS	0.75	CN-J72F			•			CN-412
26	L	AVSS	0.75	CN-J72F			•			CN-47
26	L	AVSS	0.75	CN-J72F			- <b>b</b>			CN-764
39	Y/B	AVSS	1.25	CN-J74F			•			CN-772
39	Y/B	AVSS	1.25	CN-J74F			<b>↓↓↓</b>			CN-730
39	Y/B	AVSS	1.25	CN-J74F			• <u> </u>			CN-732
83	0/W	AVSS	0.75	CN-J72F			•			CN-47
83	0/W	AVSS	0.75	CN-J72F			•			CN-710
83	0/W	AVSS	0.75	CN-J72F			•			CN-71
83	0/W	AVSS	0.75	CN-J72F						CN-712
83	0/W	AVSS	1.25	CN-J72F						CN-714
83	0/W	AVSS AVSS	0.75 1.25	CN-J72F						CN-J72
83 83	0/W	AVSS AVSS	1.25	CN-715F CN-713F			<b>F</b>			CN-J72 CN-J72
83 147	0/W	AVSS	1.25	CN-713F CN-715F						CN-470
147 148	0/L G/W	AVSS AVSS	1.25	CN-713F			+			CN-470
148	G/W L/W	AVSS	1.25	CN-470F			+			CN-714
149 156	L/W P/W	AVSS	0.75	CN-472M			++			CN-71
150	W	AVSS	0.75	CN-471F			<u> </u>			CN-71
158	R/W	AVSS	0.75	CN-472M			<u>                                     </u>			CN-712
337	0/L	AVSS	0.75	CN-723F			<u> </u>			CN-47
338	Gr/R	AVSS	0.75	CN-723F			1 1			CN-47
339	P	AVSS	0.75	CN-723F						CN-47
340	Sb	AVSS	0.75	CN-725F						CN-47
341	W/L	AVSS	0.75	CN-725F						CN-47
343	Y/B	AVSS	0.75	CN-724F						CN-47
344	G/W	AVSS	0.75	CN-724F						CN-47
345	Lg/Y	AVSS	0.75	CN-724F						CN-47
346	R/L	AVSS	0.75	CN-725F						CN-47
384	R/W	AVSS	0.75	CN-720F						CN-470
385	G/Y	AVSS	0.75	CN-721F						CN-470
386	0	AVSS	0.75	CN-470F						CN-722
387	G/L	AVSS	0.75	CN-683M						CN-72
435	Br/G	AVSS	0.75	CN-683M						CN-413
441	Y/B	AVSS	0.75	CN-J75F			-			CN-41
441 441	Y/B	AVSS AVSS	0.75 0.75	CN-J75F			- <b>-</b>			CN-47
441 442	Y/B	AVSS	0.75	CN-J75F CN-J75F			- <b>-</b>			CN-76 CN-41
442	R/B R/B	AVSS	0.75	CN-J75F						CN-41
442	R/B	AVSS	0.75	CN-J75F						CN-76
444	G/R	AVSS	0.75	CN-J76F						CN-412
444	G/R	AVSS	0.75	CN-J76F						CN-47
444	G/R	AVSS	0.75	CN-J76F						CN-76
445	R/Y	AVSS	0.75	CN-474M						CN-716
453	R/W	AVSS	0.75	CN-J74F						CN-77
453	R/W	AVSS	0.75	CN-J74F						CN-73
453	R/W	AVSS	0.75	CN-J74F						CN-730
455	L/Y	AVSS	0.75	CN-J76F			- <b>-</b>			CN-412
455	L/Y	AVSS	0.75	CN-J76F			<b>↓</b>			CN-47
455	L/Y	AVSS	0.75	CN-J76F						CN-764
610	Gr/B	AVSS	0.75	CN-747F						CN-718
611	B/Y	AVSS	0.75	CN-748F						CN-716
612	W/L	AVSS	0.75	CN-749F						CN-71
614	W/Y	AVSS	0.75	CN-764M						CN-J7
614	W/Y	AVSS	0.75	CN-716M			+			CN-J7
614	W/Y	AVSS	0.75	CN-474M						CN-J7
809	G/W	AVSS	0.75	CN-772M						CN-76
810	Br/G	AVSS	0.75	CN-766F						CN-77
859	Gr	AVSS	0.75	CN-772M						CN-73
862	G/0	AVSS	0.75	CN-J75F			1			CN-412
862	G/0	AVSS	0.75	CN-J75F				_		CN-47
862 864	G/O	AVSS AVSS	0.75 0.75	CN-J75F CN-730F						CN-76.
864 900	L/G	AVSS	0.75	CN-745F						CN-47
900	Lg/Y Gr/R	AVSS	0.75	CN-J77F						CN-75
902	Gr/R	AVSS	0.75	CN-J77F			I			CN-413
902	Gr/R	AVSS	0.75	CN-J77F			I			CN-77
903	Lg	AVSS	0.75	CN-J77F						CN-75
903	Lg	AVSS	0.75	CN-J77F		· · · · · ·				CN-413
903	Lg	AVSS	0.75	CN-J77F						CN-772
904	Y/G	AVSS	0.75	CN-763F						CN-47
905		AVSS	0.75	CN-473M						CN-76
926	R	AVSS	0.75	CN-772M			<u> </u>			CN-750
927	o/w	AVSS	0.75	CN-772M			† †			CN-750
928	G/L	AVSS	0.75	CN-473M			† †			CN-74
928	G/L	AVSS	0.75	CN-473M			† †			CN-74
929	R/Y	AVSS	0.75	CN-472M		-				CN-74
930	Gr/R	AVSS	0.75	CN-680F			+ +			CN-75

WIRE NO.	WIRE COLOR	WIRE TYPE	SIZE	FROM	*1	¥ 2	CONNECTION	<u></u> % 2	*1	T O
946	0/L	AVSS	0.75	CN-413F						CN-683M
947	P/G	AVSS	0.75	CN-413F						CN-683M
950	G	AVSS	0.75	CN-764M						CN-473M
956	L/Y	AVSS	0.75	CN-869F						CN-716M
972	G/L	AVSS	0.75	CN-474M						CN-764M
973	0/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-J74F
988	G	AVSS	0.75	CN-413F						CN-J74F
988	G	AVSS	0.75	CN-680F						CN-J74F
989	Y/G	AVSS	0.75	CN-751F						CN-J74F
989	Y/G	AVSS	0.75	CN-413F						CN-J74F
989	Y/G	AVSS	0.75	CN-680F						CN-J74F
C02	Y	AVSS	0.75	CN-J75F			- <b>-</b>			CN-412F
C02	Y	AVSS	0.75	CN-J75F			•			CN-473M
C02	Y	AVSS	0.75	CN-J75F			•			CN-764M
JP717	Y	AVSS	0.75	CN-783F						CN-783F
371	G	AVSS	0.75	CN-472M	0.75TW1				0.75TW1	CN-740F
380	W	AVSS	0.75	CN-472M	0.75TW1				0.75TW1	CN-740F
952	L/0	AVSS	0.75	CN-472M	0.75TW2				0.75TW2	CN-742F
953	G/B	AVSS	0.75	CN-472M	0.75TW2				0.75TW2	CN-742F
954	Br/Y	AVSS	0.75	CN-472M	0.75TW3				0.75TW3	CN-741F
955	G/L	AVSS	0.75	CN-472M	0.75TW3				0.75TW3	CN-741F
A41	W/B	AVSS	0.5	CN-474M	0.5TW1				0.5TW1	CN-628F
A42	W/L	AVSS	0.5	CN-474M	0.5TW1				0.5TW1	CN-628F
131	G	MVVS	0.75	CN-470F	4C2				4C2	CN-760F
132	В	MVVS	0.75	CN-470F	4C2				4C2	CN-760F
133	R	MVVS	0.75	CN-470F	4C2				4C2	CN-760F
137	W	MVVS	0.75	CN-470F	4C2				4C2	CN-760F
ES1	B/R	AVSS	0.75	CN-470F	4C2				4C2	(CN-760F)

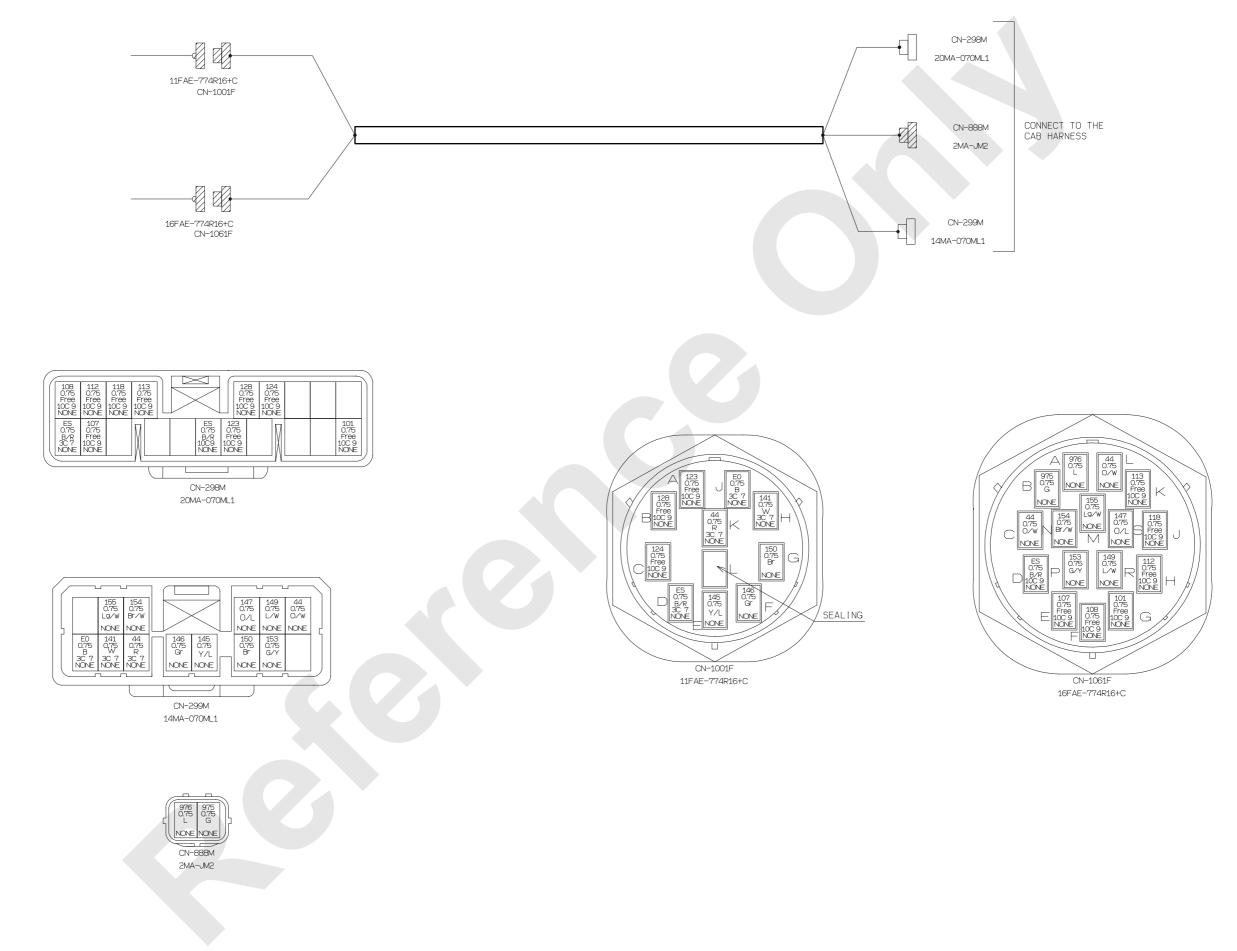
(5/5)

JUNCTION BOX





### **ATT. JUNCTION HARNESS**



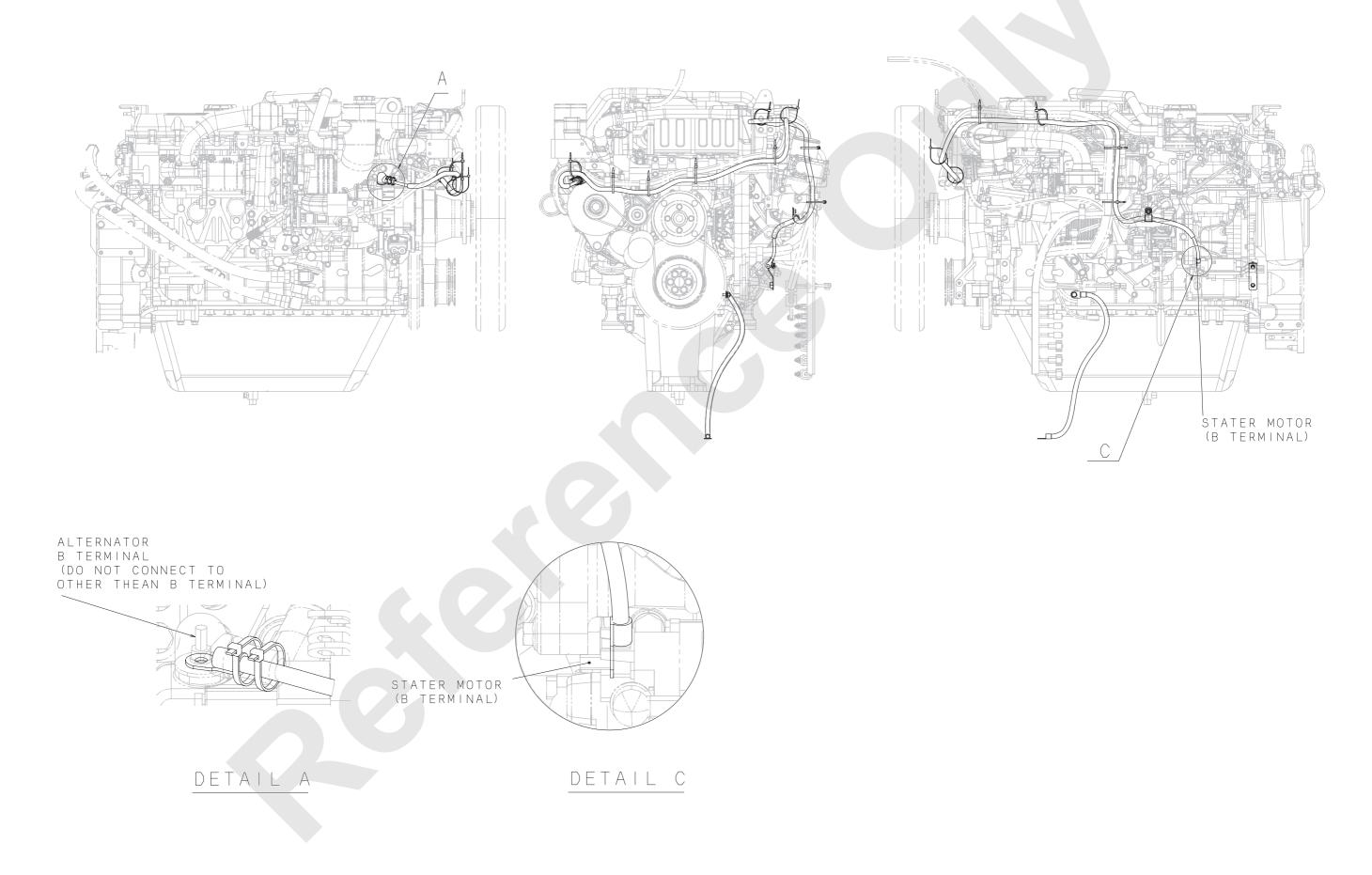
(1/2)

THE WIRE NO. /COLOR LIST

%1 WIRE NO. %2 WIRE COLOR		TWO WIRE CONNECT CONNECTION	NUMBER
%3 WIRE TYPE %4 SIZE			
%5 PIN NUMBER %6 identificat	I ON	SYMBOL	

*1	×2	жЗ	*4	FROM	*5	*6	*7		<u>%</u> 8	<b>%</b> 7	×6	*5	T	0
44	0/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-299	M
146	Gr	AVSS	0.75	CN-1001F	6							11	CN-299	M
147	0/L	AVSS	0.75	CN-1061F	16							3	CN-2991	М
149	L/W	AVSS	0.75	CN-1061F	15							2	CN-299	Μ
150	Br	AVSS	0.75	CN-1001F	7							9	CN-299	M
153	G/Y	AVSS	0.75	CN-1061F	14							8	CN-2991	Μ
154	Br∕W	AVSS	0.75	CN-1061F	13							4	CN-2991	М
155	Lg/W	AVSS	0.75	CN-1061F	12							5	CN-299	М
975	G	AVSS	0.75	CN-1061F	2							1	CN-888	M
976	L	AVSS	0.75	CN-1061F	1			-				2	CN-888	M
44	R	MVVS	0.75	CN-1001F	10	3C7					3C7	12	CN-299	м
141	W	MVVS	0.75	CN-1001F	8	3C7		$  \rightarrow$			3C7	13	CN-299	M
EO	В	MVVS	0.75	CN-1001F	9	3C7					3C7	14	CN-299	М
ES	B/R	AVSS	0.75	(CN-1001F)		3C7					3C7	20	CN-298	M
ES	B/R	AVSS	0.75	CN-1001F	4	3C7					3C7		(CN-299	(ME
101	Free	MVVS	0.75	CN-1061F	7	10C9		$ -\gamma $	<u> </u>		10C9	10	CN-298	M
107	Free	MVVS	0.75	CN-1061F	5	10C9		-			10C9	19	CN-298	М
108	Free	MVVS	0.75	CN-1061F	6	10C9					10C9	9	CN-298	M
112	Free	MVVS	0.75	CN-1061F	8	10C9					10C9	8	CN-298	Μ
113	Free	MVVS	0.75	CN-1061F	10	10C9					10C9	6	CN-298	M
118	Free	MVVS	0.75	CN-1061F	9	10C9					10C9	7	CN-298	M
123	Free	MVVS	0.75	CN-1001F	1	10C9					10C9	14	CN-298	M
124	Free	MVVS	0.75	CN-1001F	3	10C9					10C9	4	CN-298	M
128	Free	MVVS	0.75	CN-1001F	2	10C9					10C9	5	CN-298	M
ES	B/R	AVSS	0.75	(CN-1061F)		10C9					10C9	15	CN-298	M
ES	B/R	AVSS	0.75	CN-1061F	4	10C9					10C9		(CN-298	3M)

(2/2)



# STARTER MOTOR TO ENGINE GROUND



# WIRE No. AND WIRE COLER LIST

WIRE No.	COLER	TYPE	SIZE	F	R	0 1	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CO	NNECTI	ON	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	ТО
EG1	В	AV	60	LA-	C11				_		-			LA-C5

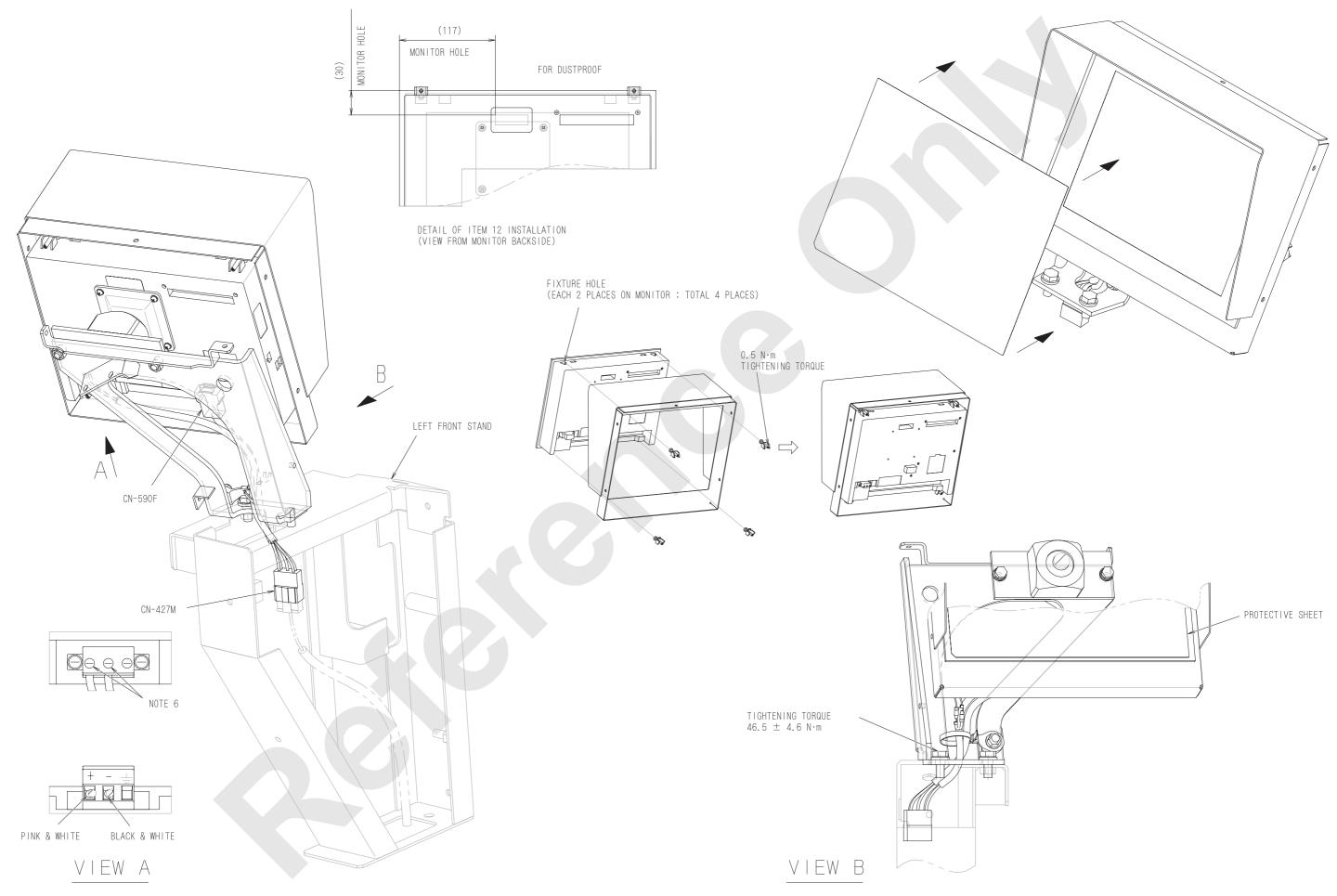
### STARTER MOTOR TERMINAL B ALTERNATOR B TERMINAL



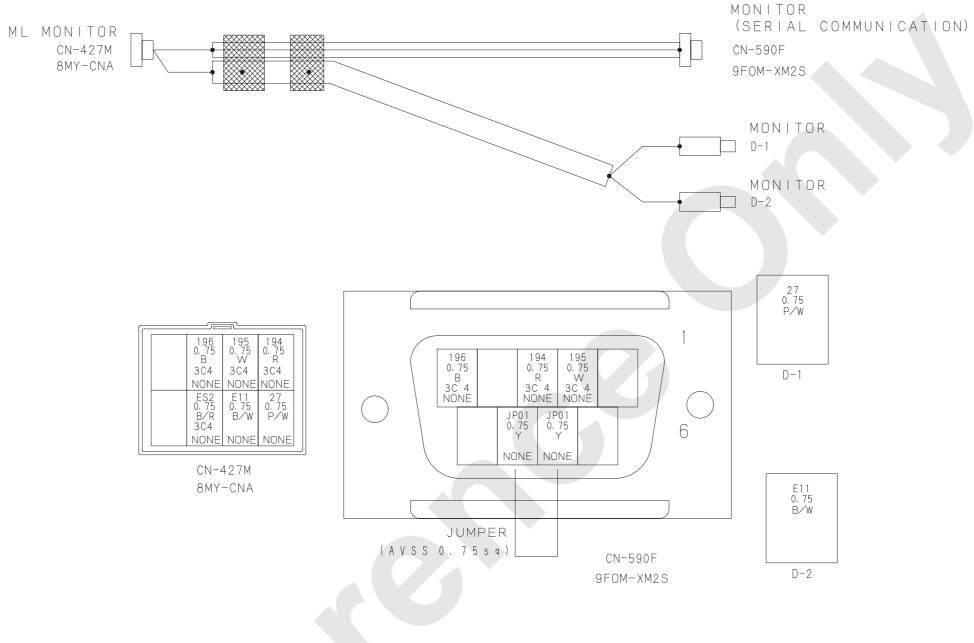
WIRE No.	COLER	TYPE	SIZE	FR	0 М	DISTINGUISH SYMBOL	2-WIRE CLAMP No.	CONNECTION	2-WIRE CLAMP No.	DISTINGUISH SYMBOL	ТО
2M	W	AV	20	LA-C3							LA-C10



### 10. MONITOR

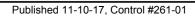


### **MONITOR HARNESS**

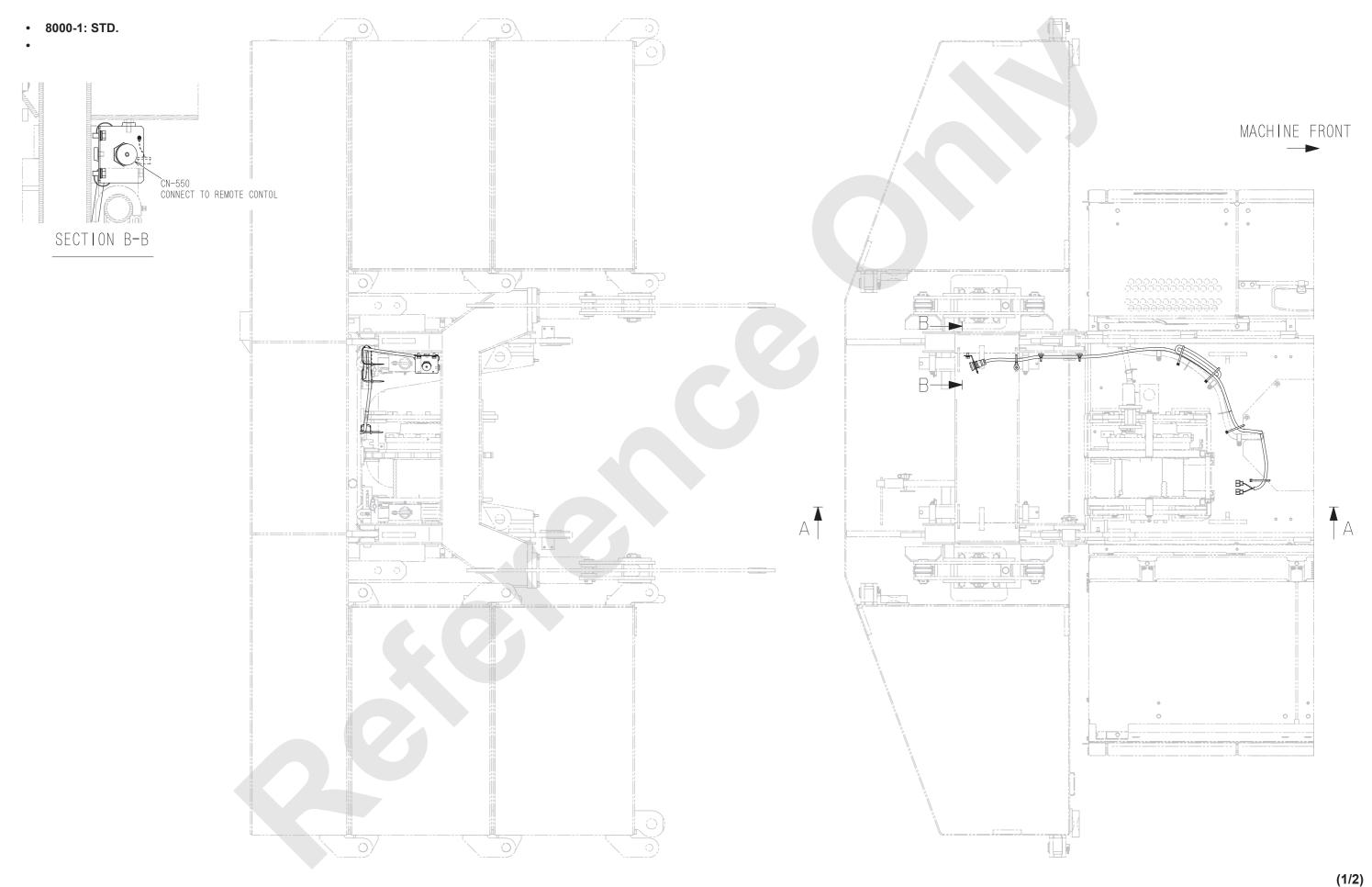


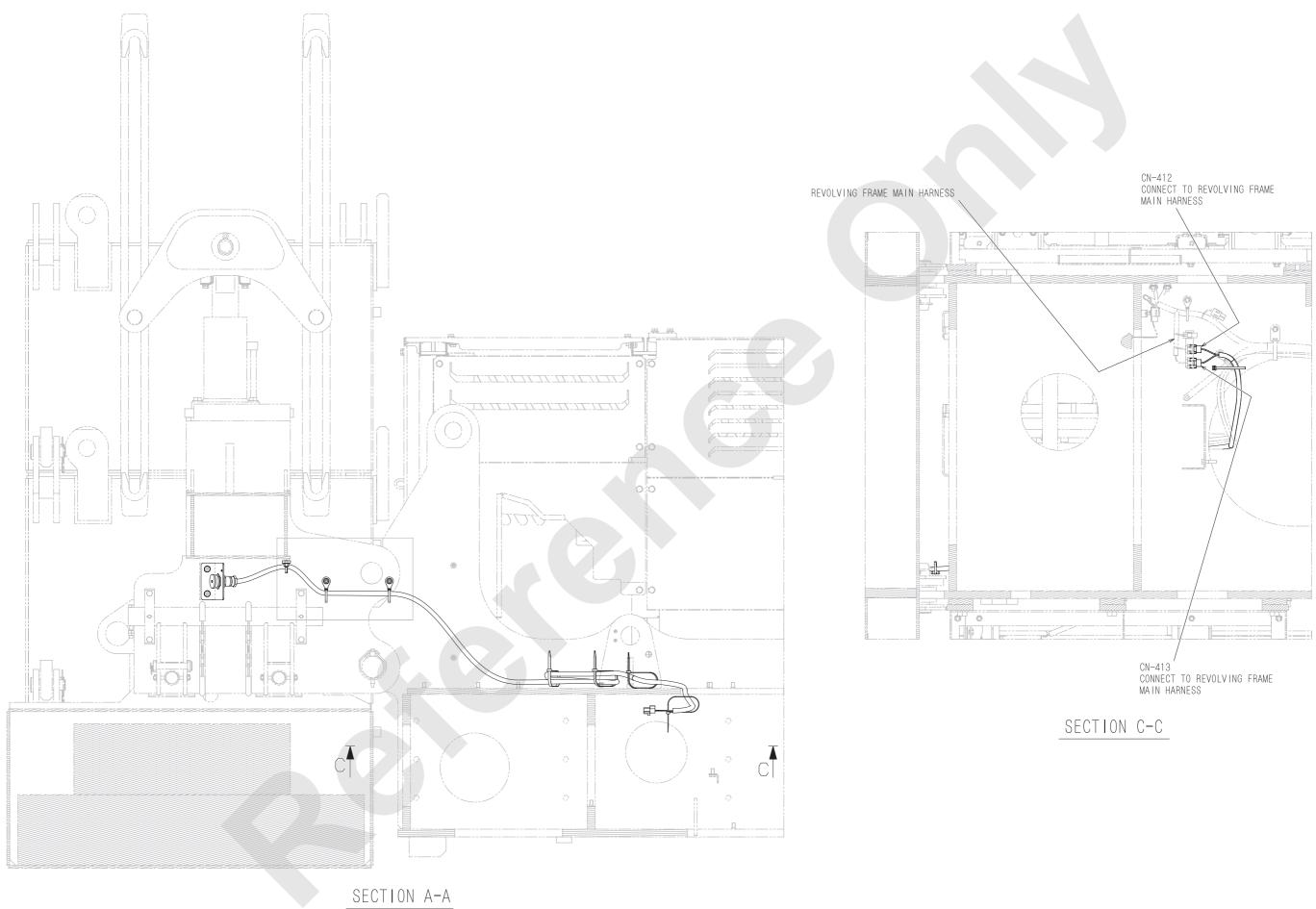
# WIRE No. AND WIRE COLOR LIST

									,		,	
WIRE No.	COLOR	TYPE	SIZE	FROM	PIN No	. DISTINGUISH SYMBOL	2-WIRE CLAMP	CONNECTION	2-WIRE CLAMP	DISTINGUISH SYMBOL	PIN No.	ТО
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	В	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



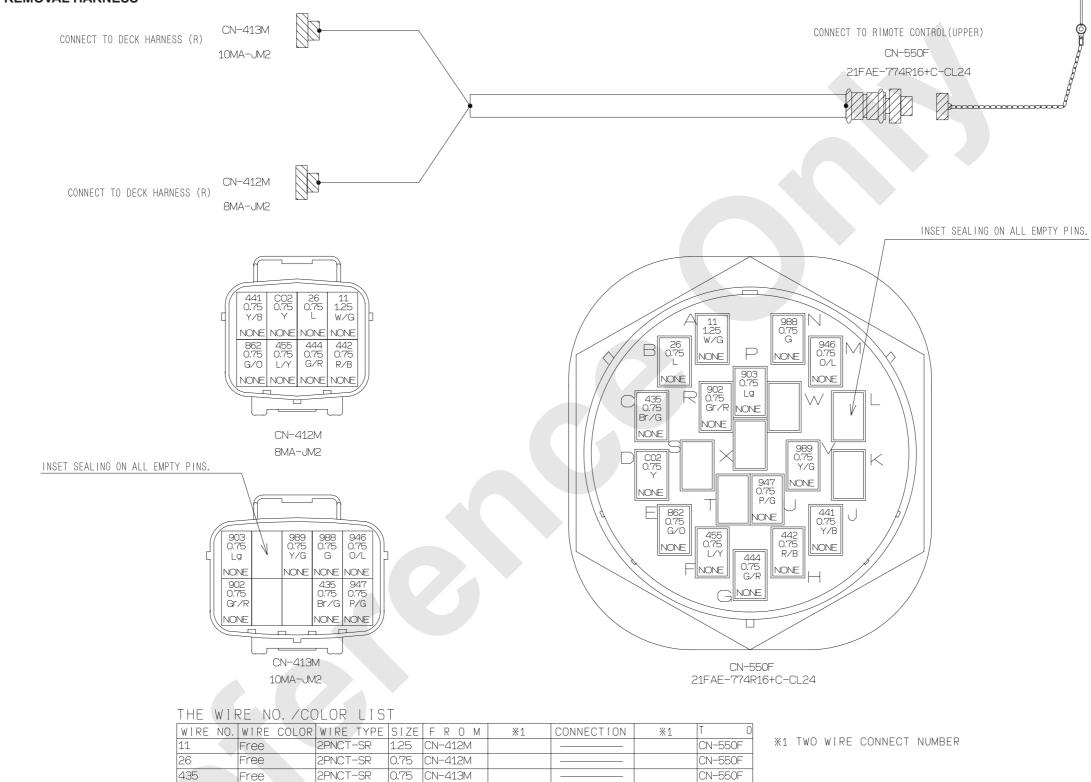
### 11. COUNTERWEIGHT SELF REMOVAL





(2/2)

### COUNTERWEIGHT SELF REMOVAL HARNESS



Published 11-10-17, Control #261-01

441

442

444

455

862

902

903

946

947

988

989

CO2

Free

TFree

Free

2PNCT-SR

0.75 CN-412M

0.75 CN-412M

0.75 CN-412M

0.75 CN-412M

0.75 CN-412M

0.75 CN-413M

0.75 CN-413M

0.75 CN-413M

0.75 CN-413M

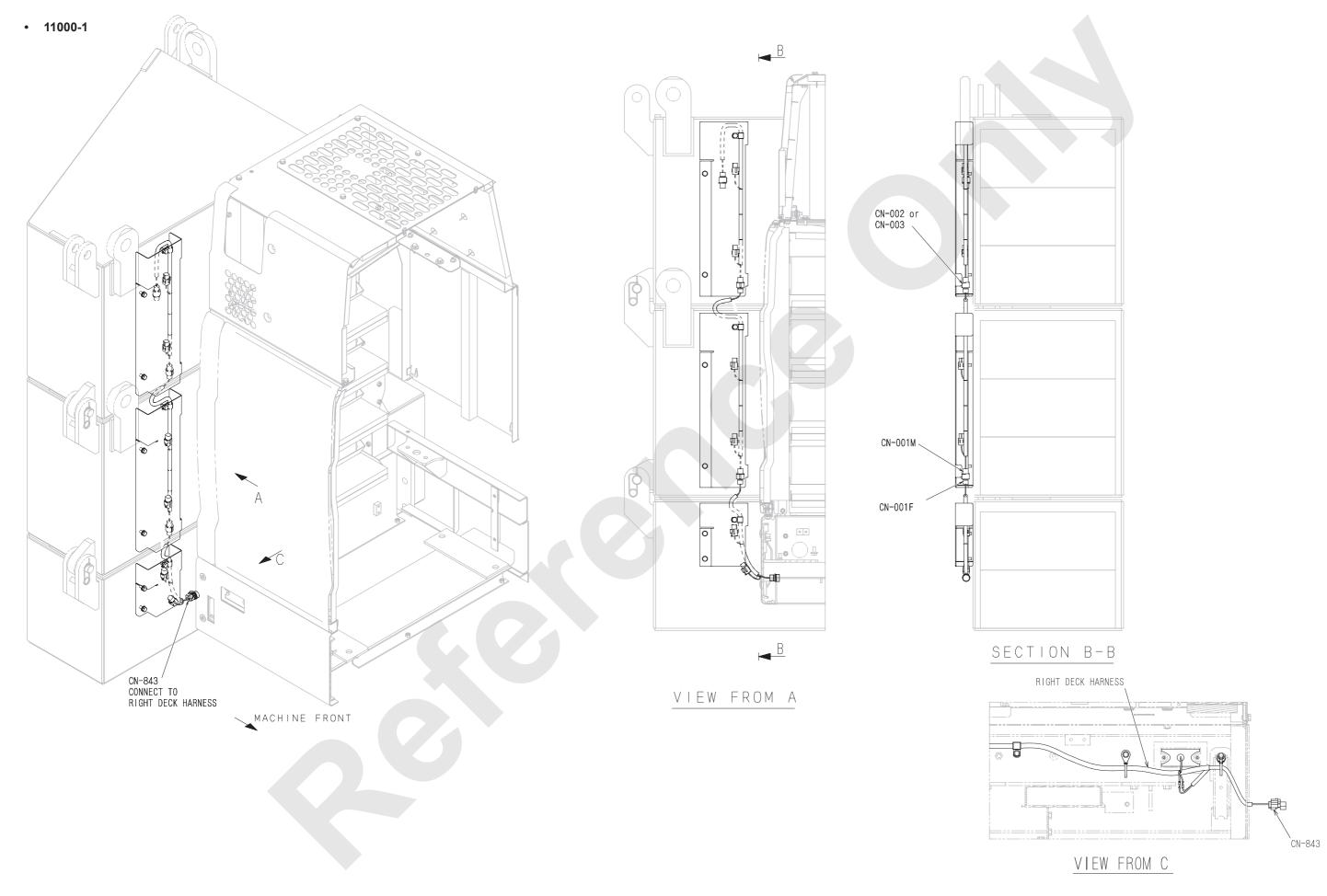
0.75 CN-413M

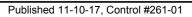
0.75 CN-413M

0.75 CN-412M

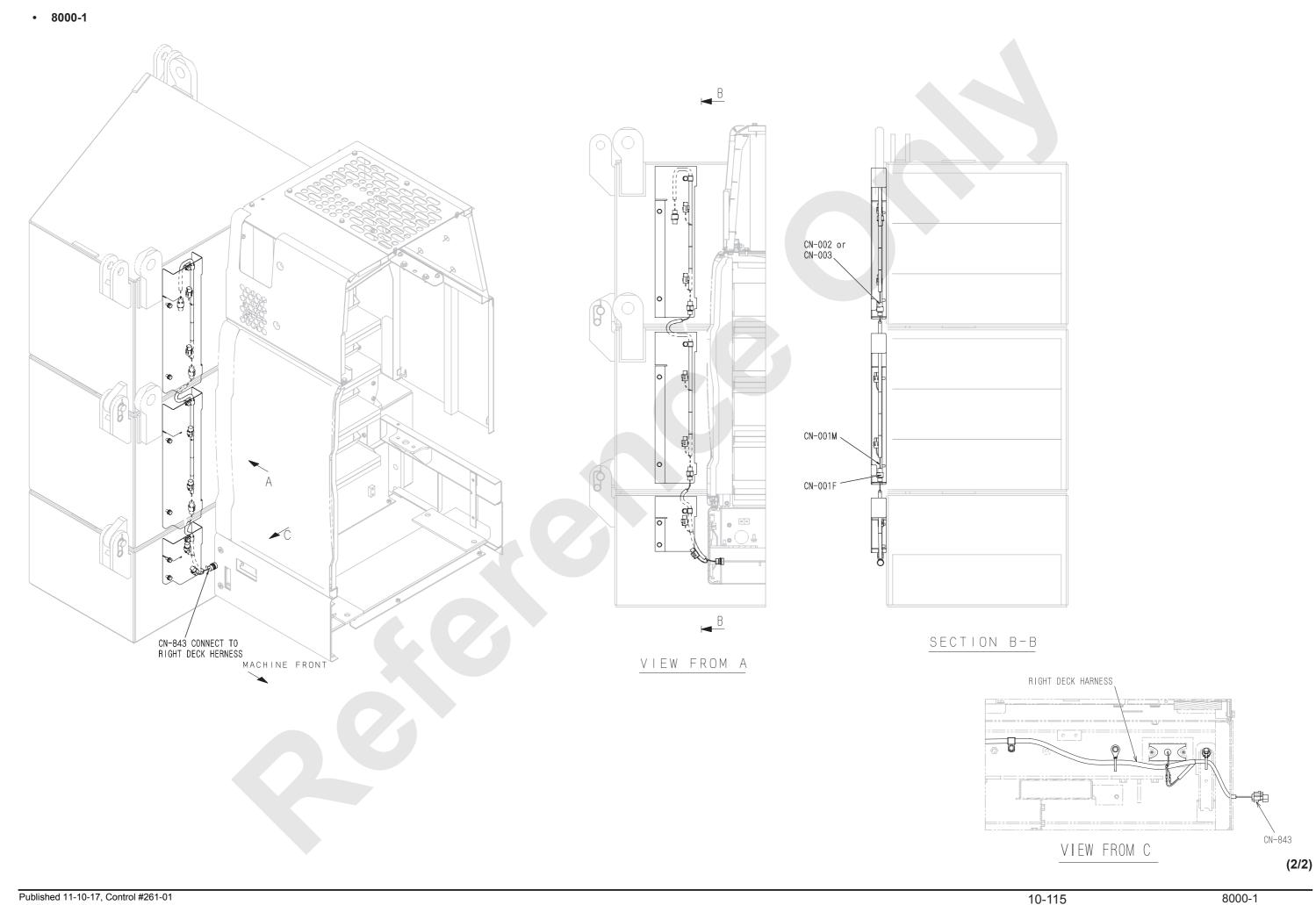
CN-550F

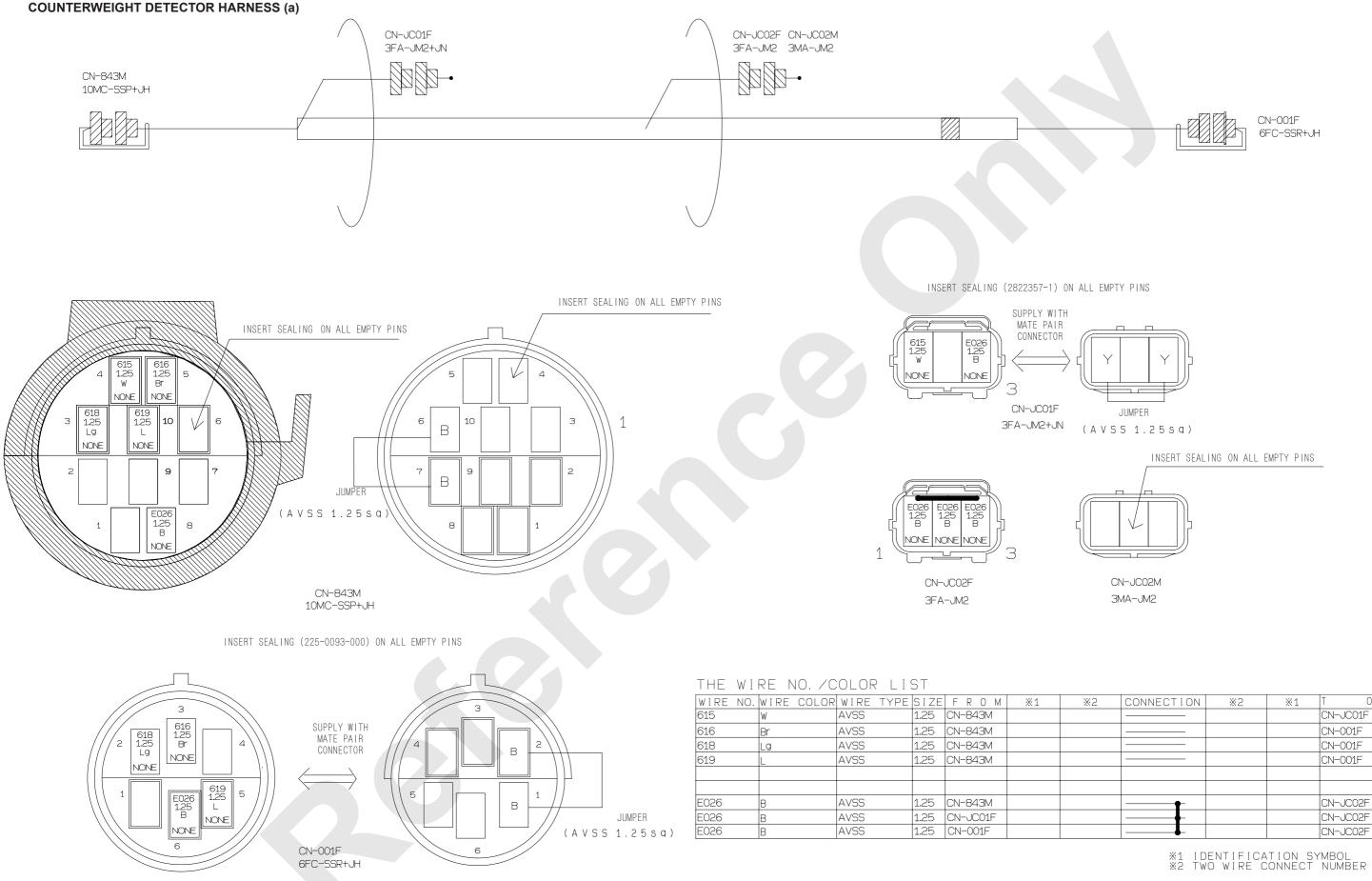
12. COUNTERWEIGHT DETECTOR / 3-C/W / OPT.



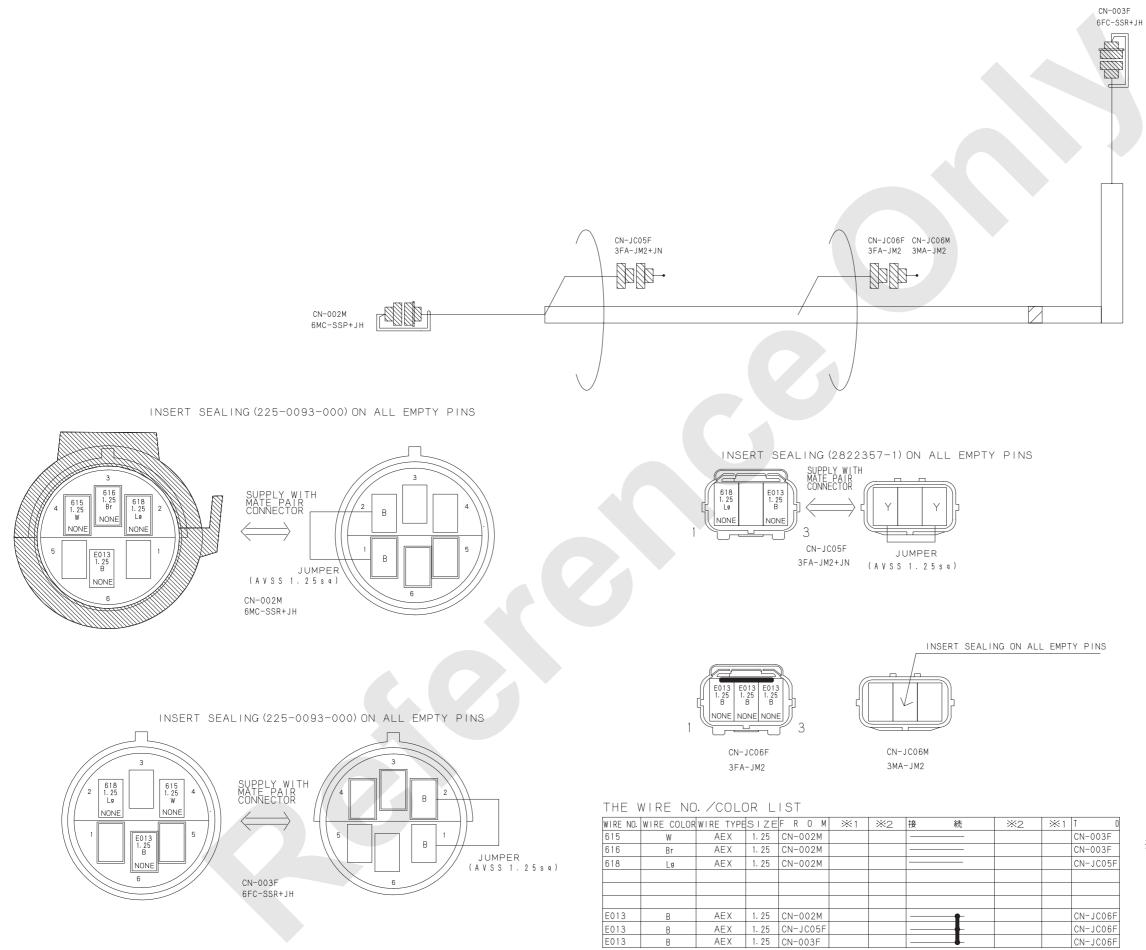


(1/2)





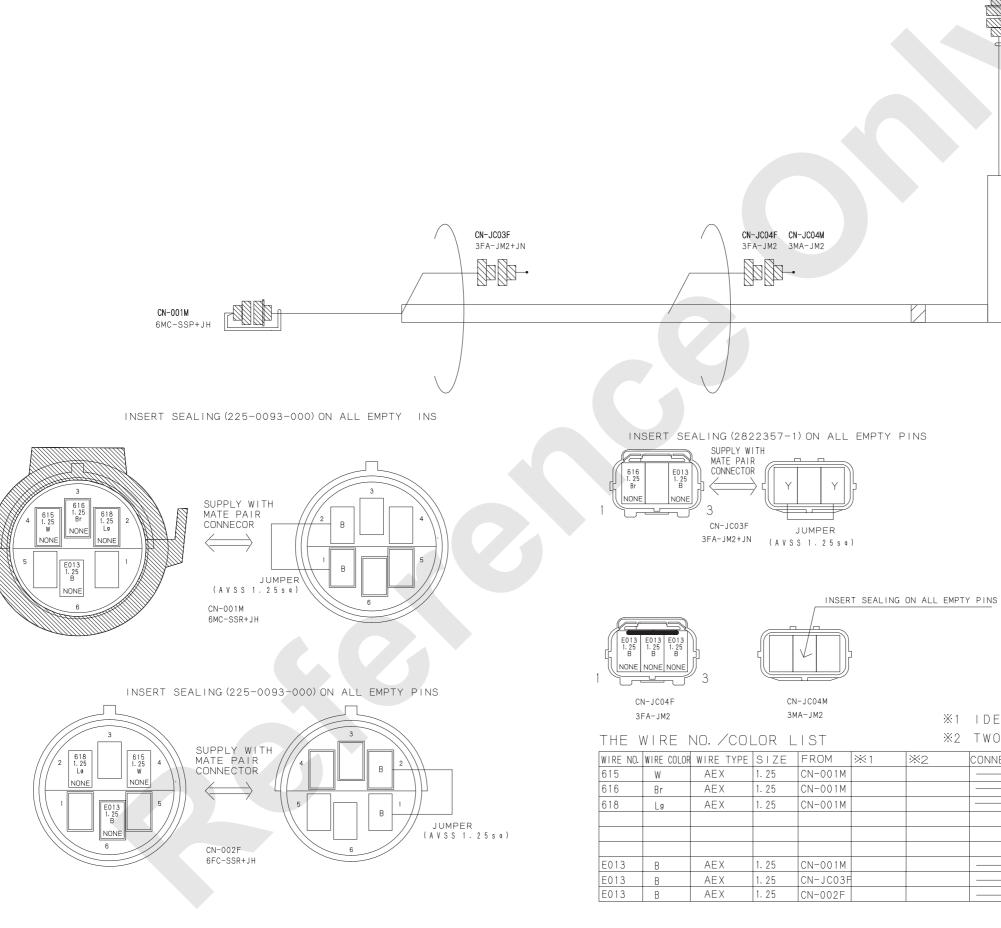
### COUNTERWEIGHT DETECTOR HARNESS (b)

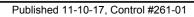


0
1-003F
1-003F
V-JC05F
V-JC06F
V-JC06F
V-JC06F

₩1	IDEN	VTIFI(	CATION	S`	YMBOL
₩2	ΤWΟ	WIRE	CONNEC	T	NUMBER

### COUNTERWEIGHT DETECTOR HARNESS (c)

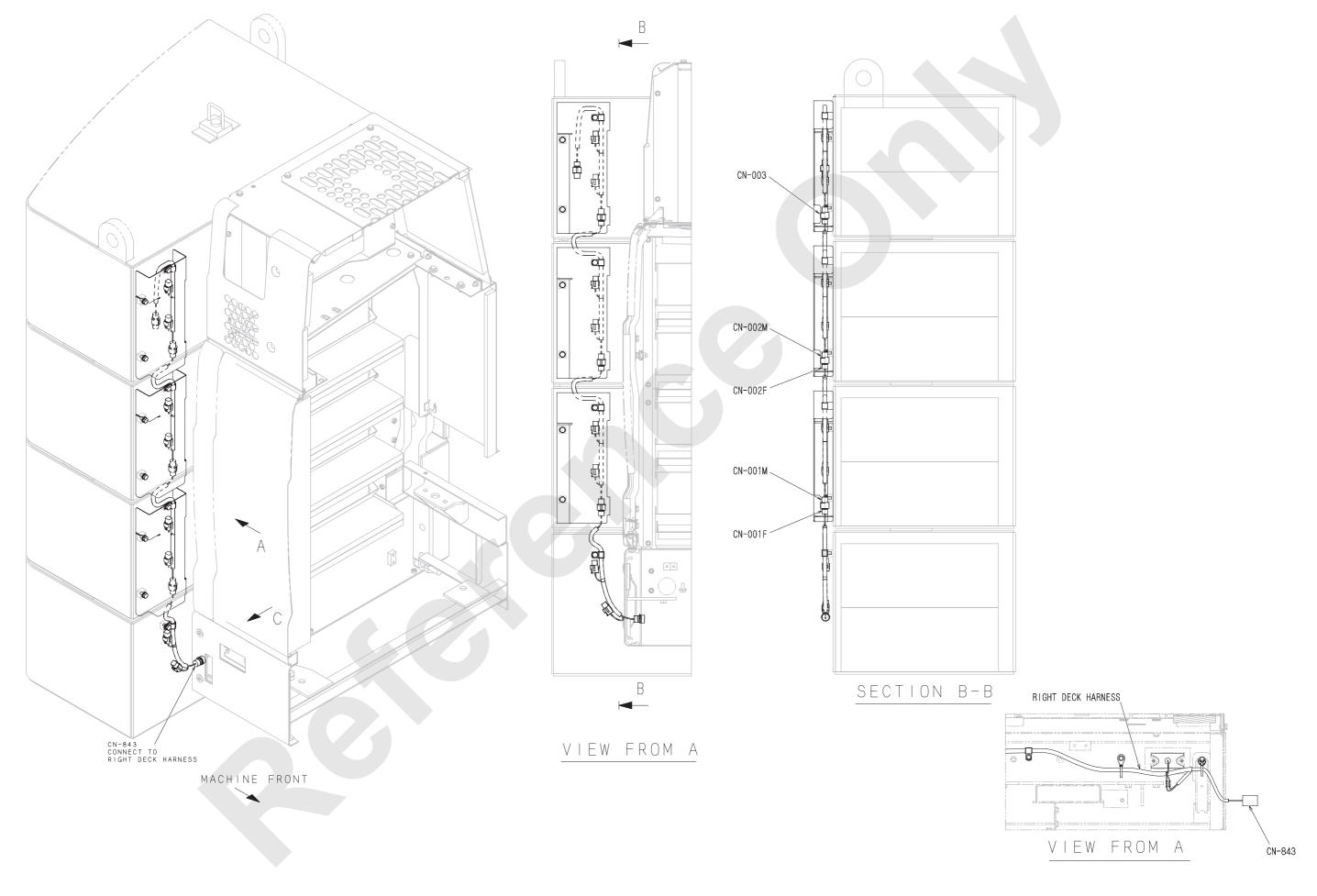




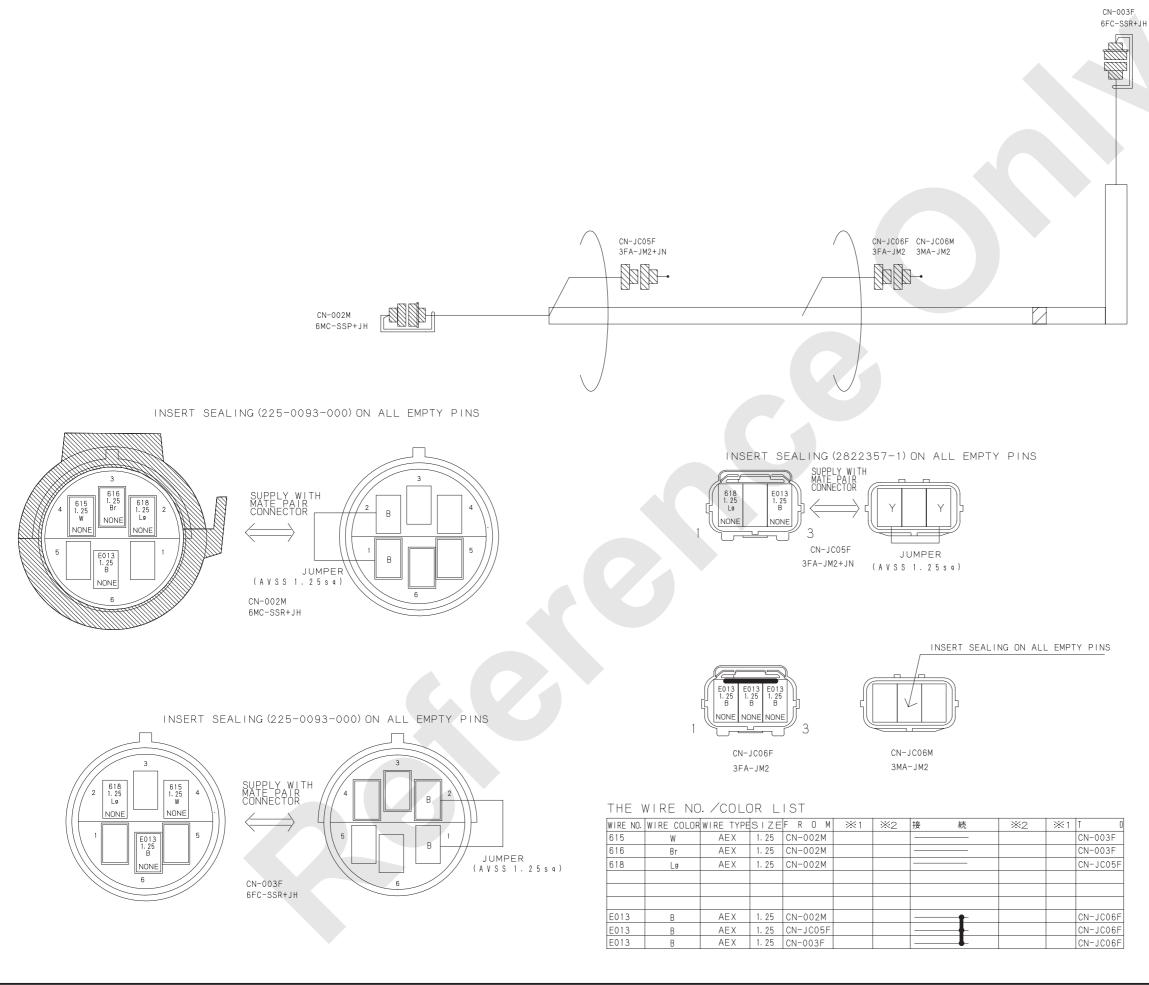
NECTION	₩2	₩1	TO
			CN-002F
			CN-JC03F
			CN-002F
			CN-JC04F
			CN-JC04F
			CN-JC04F

### X1 IDENTIFICATION SYMBOL \*2 TWO WIRE CONNECT NUMBER

### 13. COUNTERWEIGHT DETECTOR / 4-C/W / OPT.

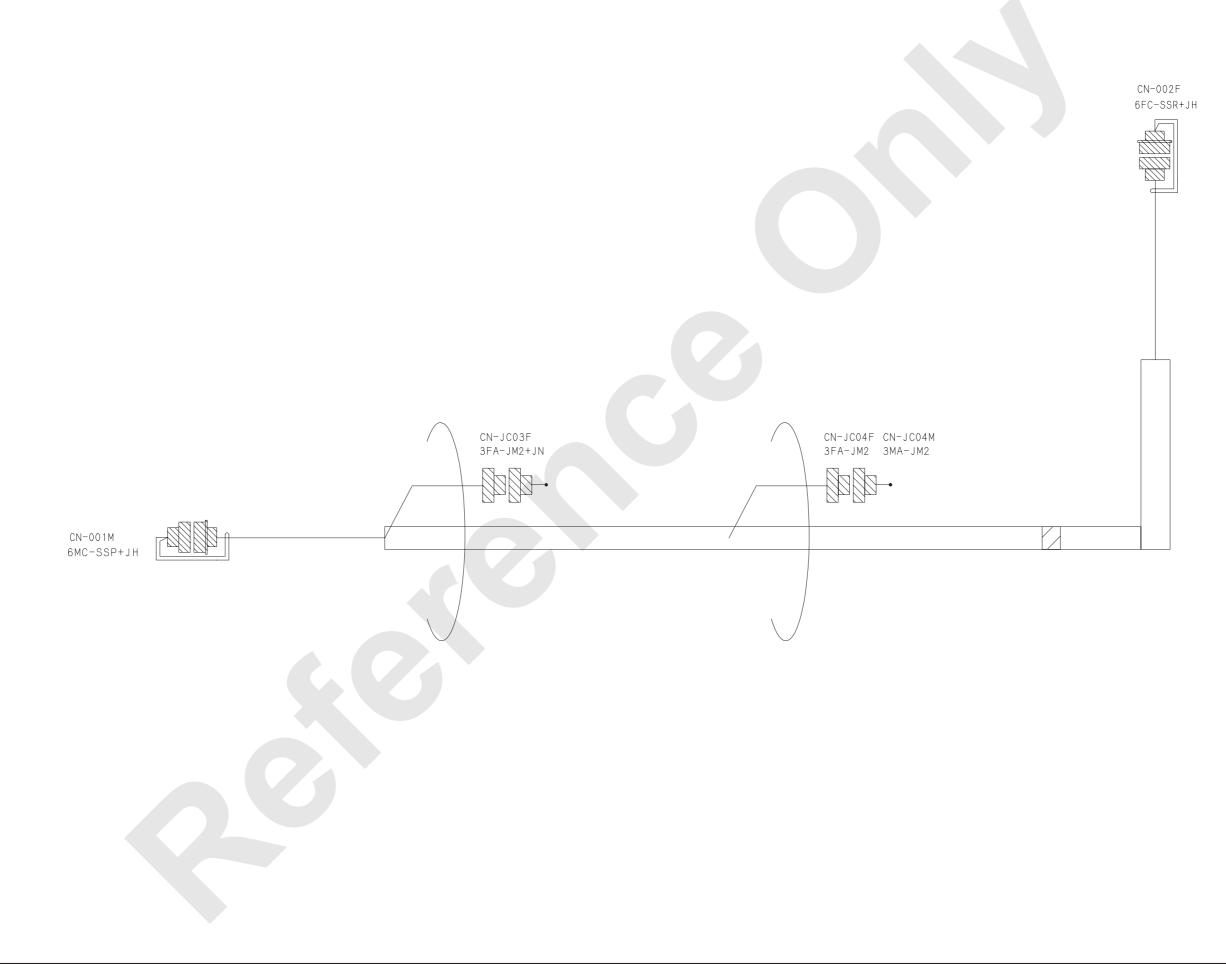


### **COUNTERWEIGHT DETECTOR HARNESS (a)**

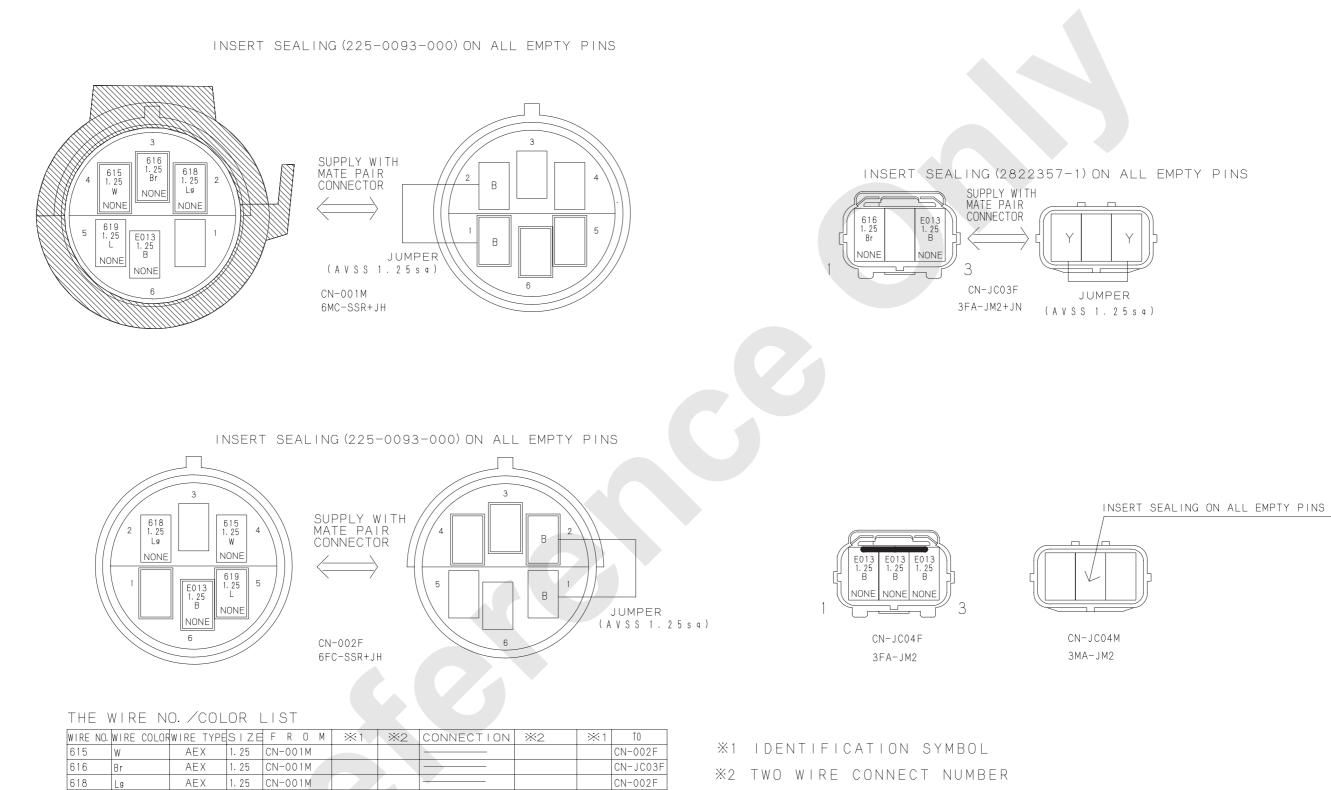




%1 IDENTIFICATION SYMBOL X2 TWO WIRE CONNECT NUMBER



(1/2)



CN-002F

CN-JC04F CN-JC04F

CN-JC04F

AEX

AEX

AEX

AEX

1.25 CN-001M

1.25 CN-001M

1.25 CN-JC03F

1.25 CN-002F

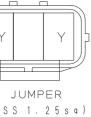
619

E013

E013 E013

B

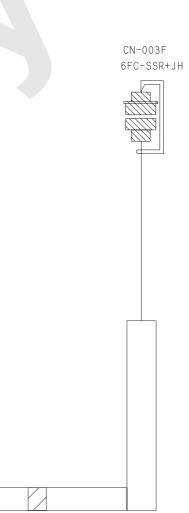


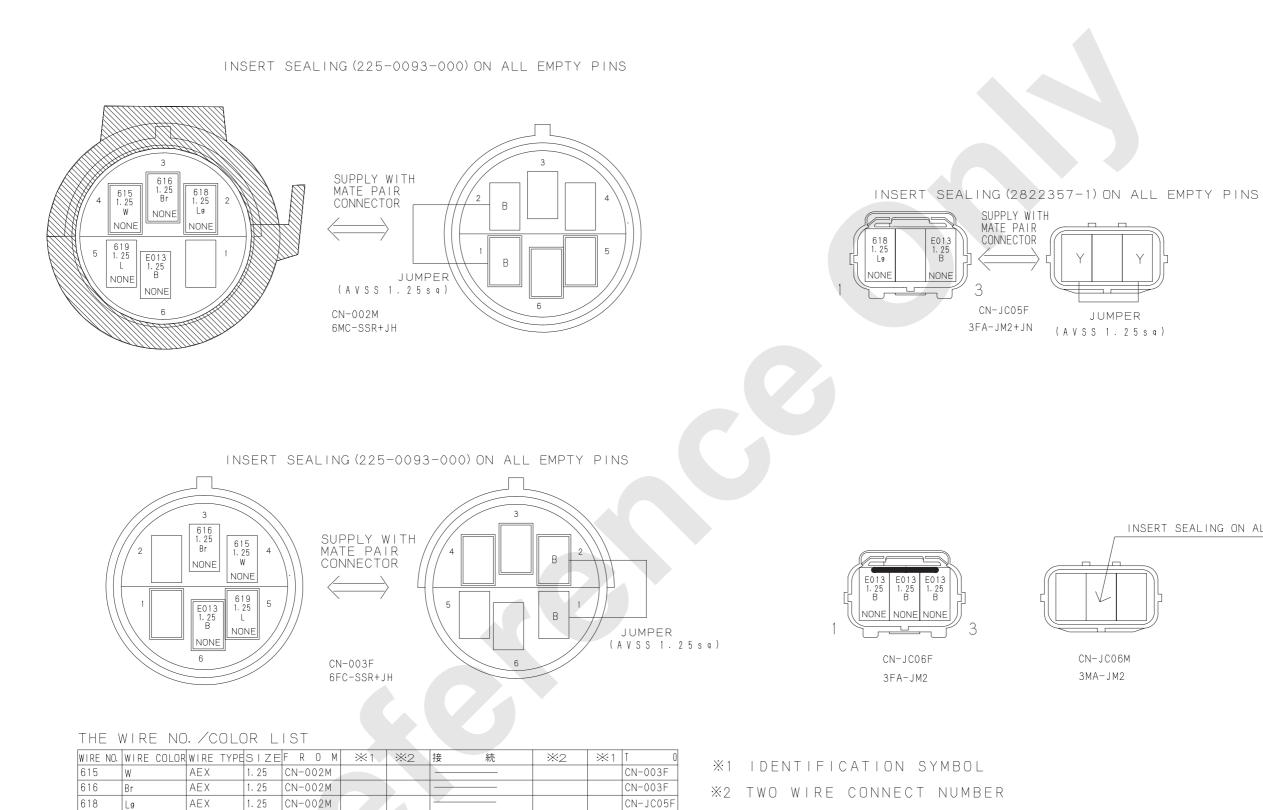


### (2/2)

42124	CN-JC05F 3FA-JM2+JN	CN-JCO6F CN-JCO6M 3FA-JM2 3MA-JM2
CN-002M 6MC-SSP+JH		

COUNTERWEIGHT DETECTOR HARNESS (c)





CN-003F

CN-JC06F

CN-JC06F

CN-JC06F

AEX

AEX

AEX

AEX

619

E013

E013

E013 B

1.25 CN-002M

1.25 CN-002M

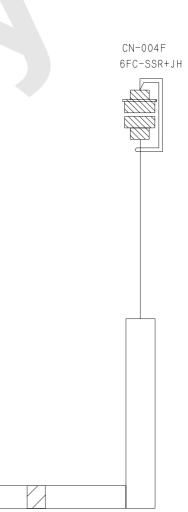
1.25 CN-JC05F

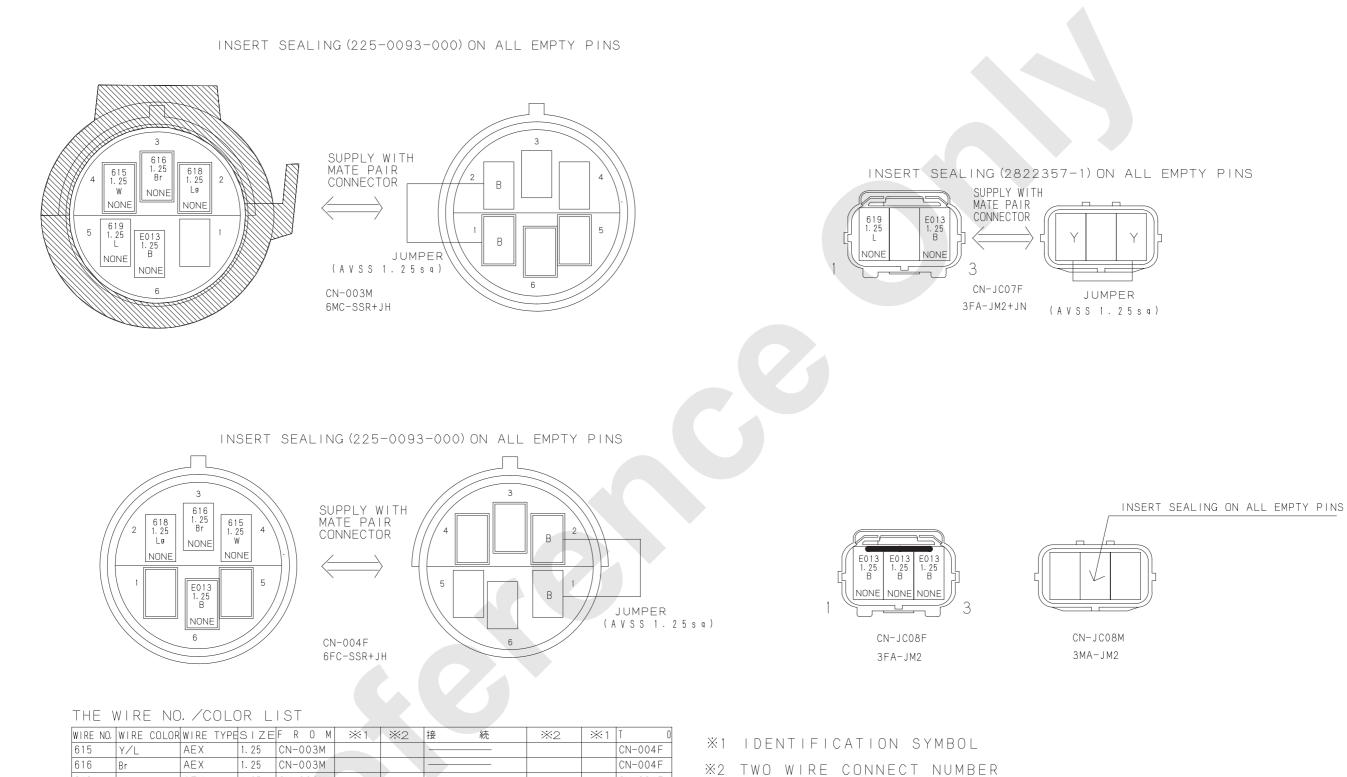
1.25 CN-003F

INSERT SEALING ON ALL EMPTY PINS

(2/2)

_	CN-JC07F 3FA-JM2+JN	CN-JC08F CN-JC08M 3FA-JM2 3MA-JM2
CN-003M 6MC-SSP+JH		





CN-004F

CN-JC07F

CN-JC08F

CN-JC08F

CN-JC08F

8000-1

618

619

E013

E013

E013

Lg

B

AEX

AEX

AEX

AEX

AEX

1.25 CN-003M

1.25 CN-003M

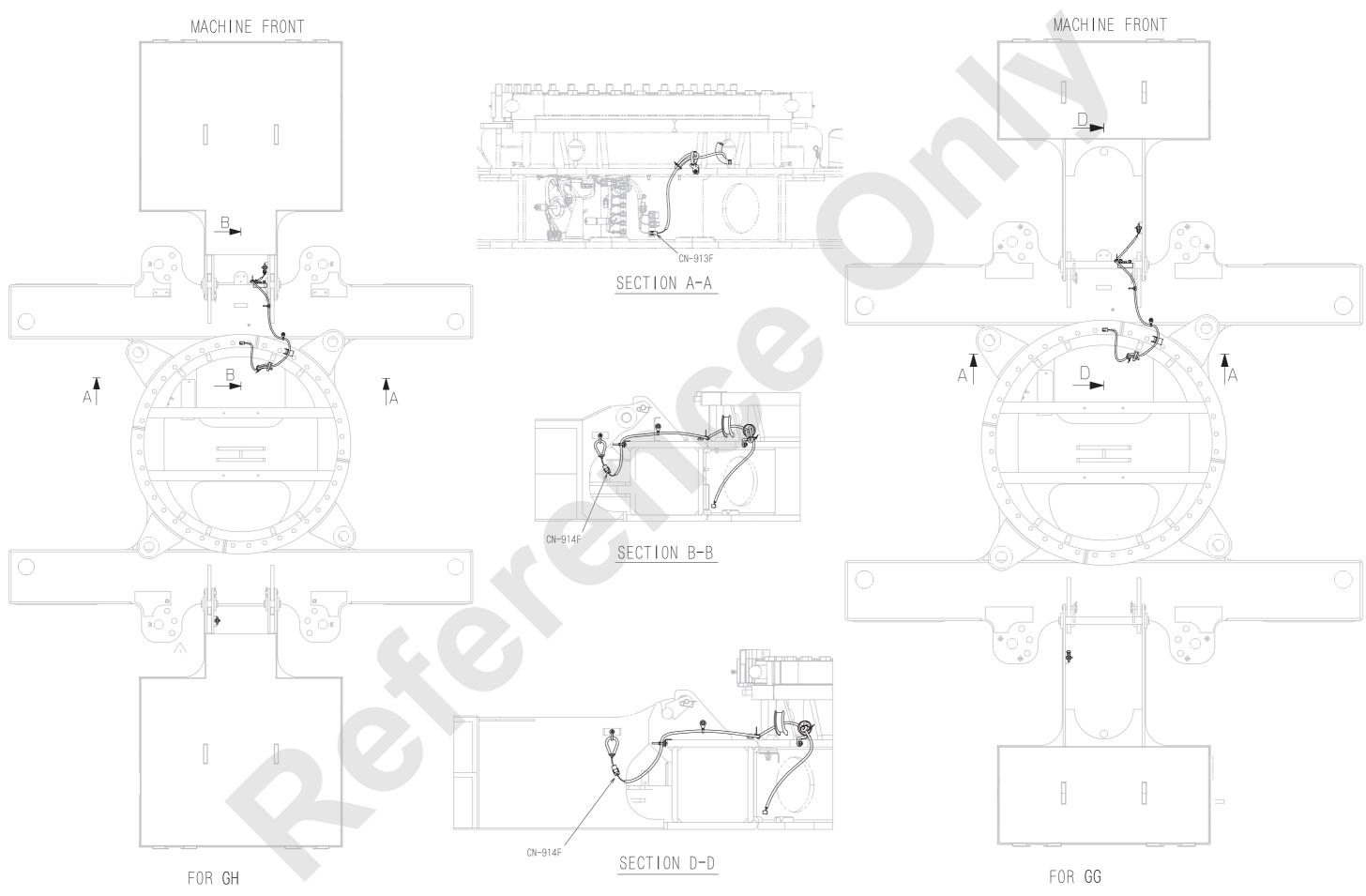
1.25 CN-003M

1.25 CN-JC07F

1.25 CN-004F

(2/2)

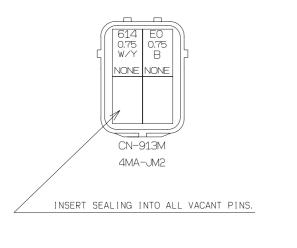
### 14. CARBODY WEIGHT DETECTOR / OPT.

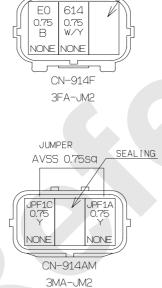


### CARBODY WEIGHT DETECTOR HARNESS (a)

CONNECT TO THE CAR BODY WEIGHT DETECTION 1 CN-913M 4MA-JM2 CN-914F 3FA-JM2 CN-914AM 3MA-JM2 THE WIRE NO /COLOR LIST

WIRE NO. 614	WIRE COLOR	-		г к 0 м CN-914F	*1	CONNECTION	CN-913M
EO	B			CN-914F			 CN-913M
JPF1A	Y	AVSS	0.75	CN-914AM			
JPF1C	Y	AVSS	0.75				CN-914AM

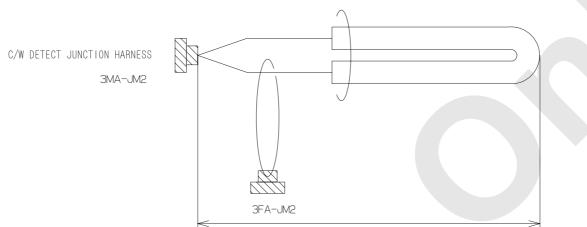




CONNECT TO LOWER MAIN HARNESS.



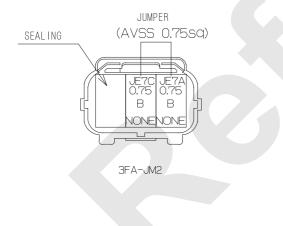
\*1 TWO WIRE CONNECT NUMBER





JUMPER (AVSS 0.75sq) SEALING JE6C JE6A 0.75 0.75 B B NONE NONE

3MA-JM2



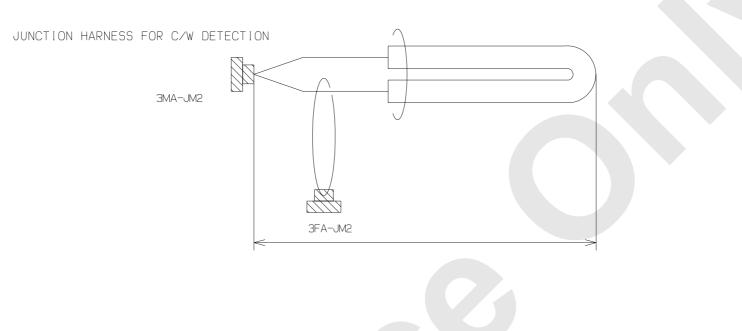
## THE WIRE NO. /COLOR LIST

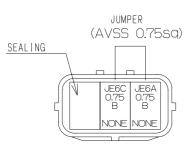
WIRE NO.	WIRE COLOR	WIRE TYPE	SIZE	F	R	0	М	<b>※</b> 1	CONNECTION	*1	T
JE6A	В	AVSS	0.75								
JE6C	В	AVSS	0.75								
JE7A	В	AVSS	0.75								
JE7C	В	AVSS	0.75								



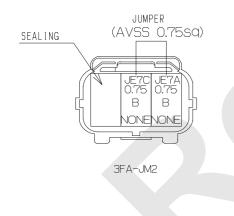
\*1 TWO WIRE CONNECT NUMBER

### CARBODY WEIGHT DETECTOR HARNESS (c)





3MA-JM2



THE WIRE NO. /COLOR LIST

WIRE NO.	WIRE COLOR	WIRE TYPE	SIZE	F	R	0	М	<b>%</b> 1	CONNECTION	×1	Т	0
JE6A	В	AVSS	0.75									
JE6C	В	AVSS	0.75									
JE7A	B	AVSS	0.75									
JE7C	В	AVSS	0.75									

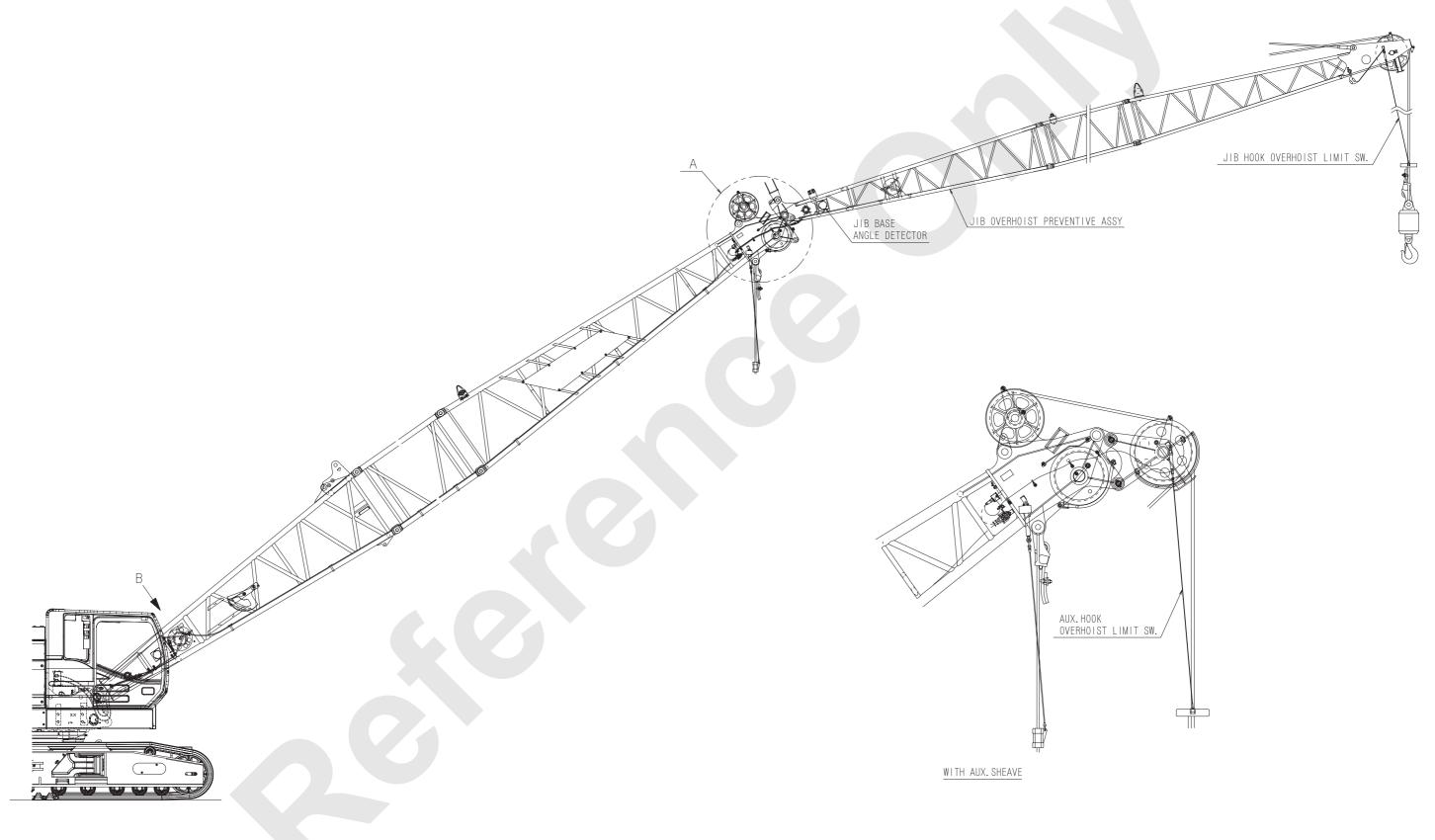


%1 TWO WIRE CONNECT NUMBER

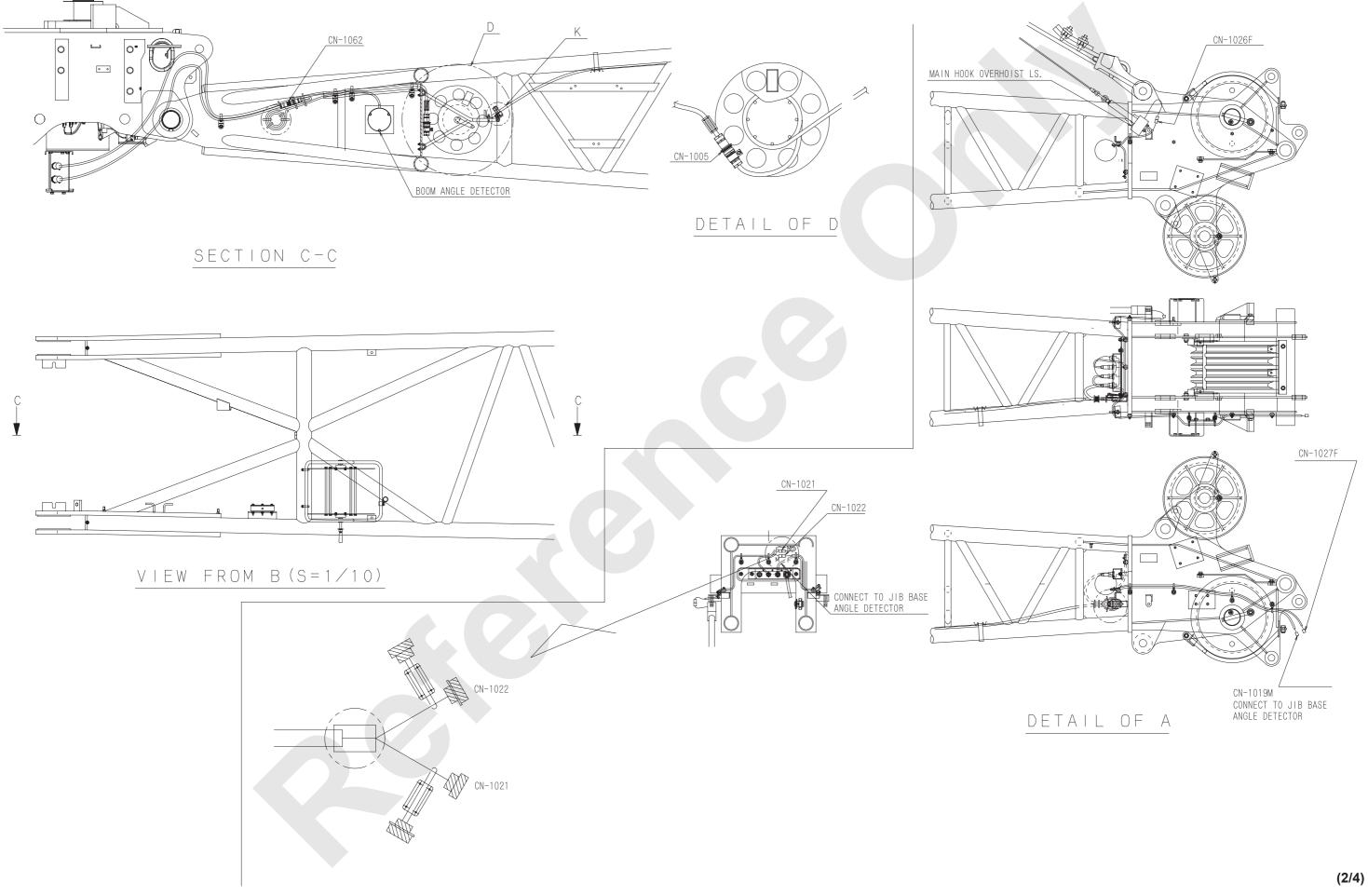
### 15. BOOM OVER HOIST PREVENTING

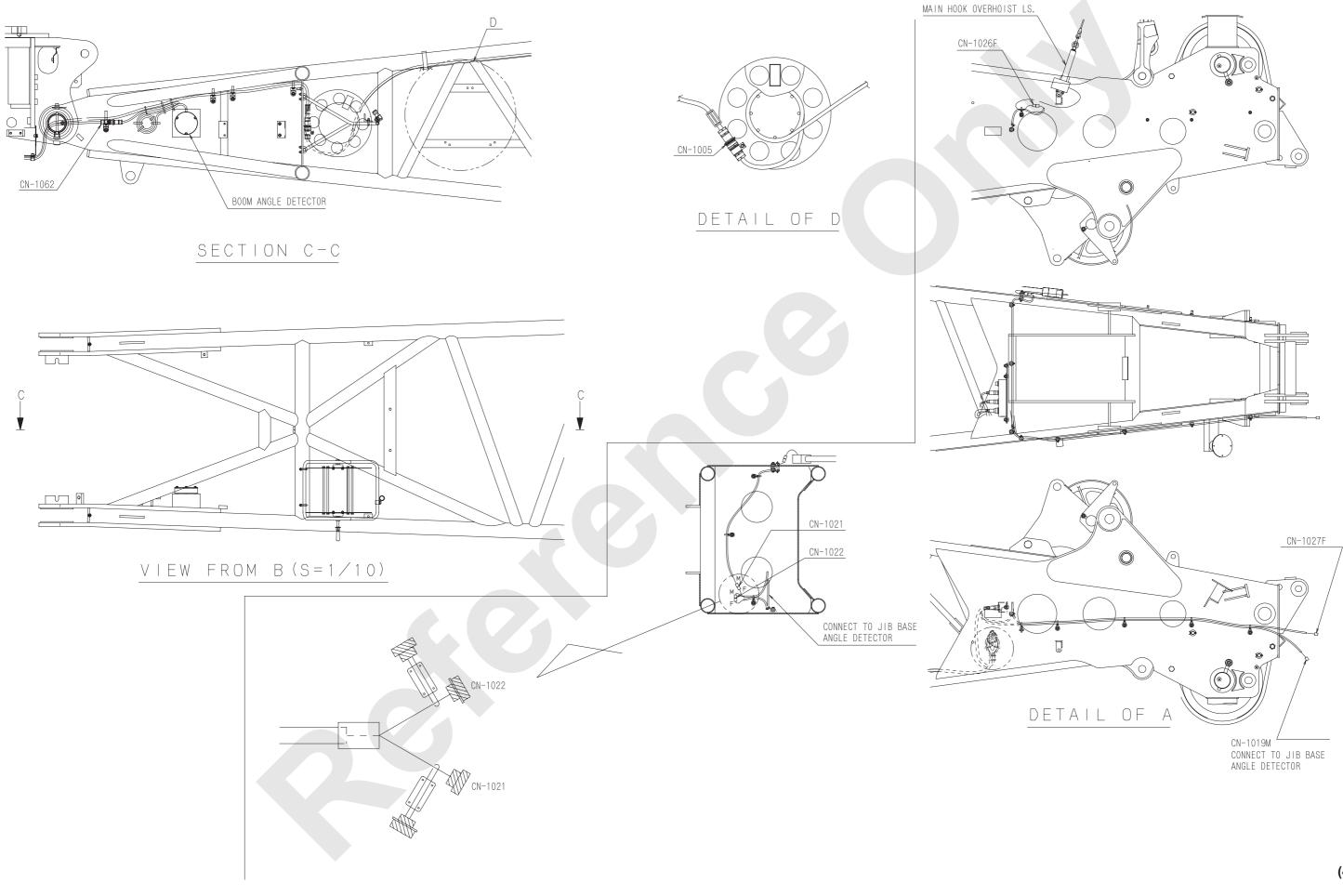
• 8000-1

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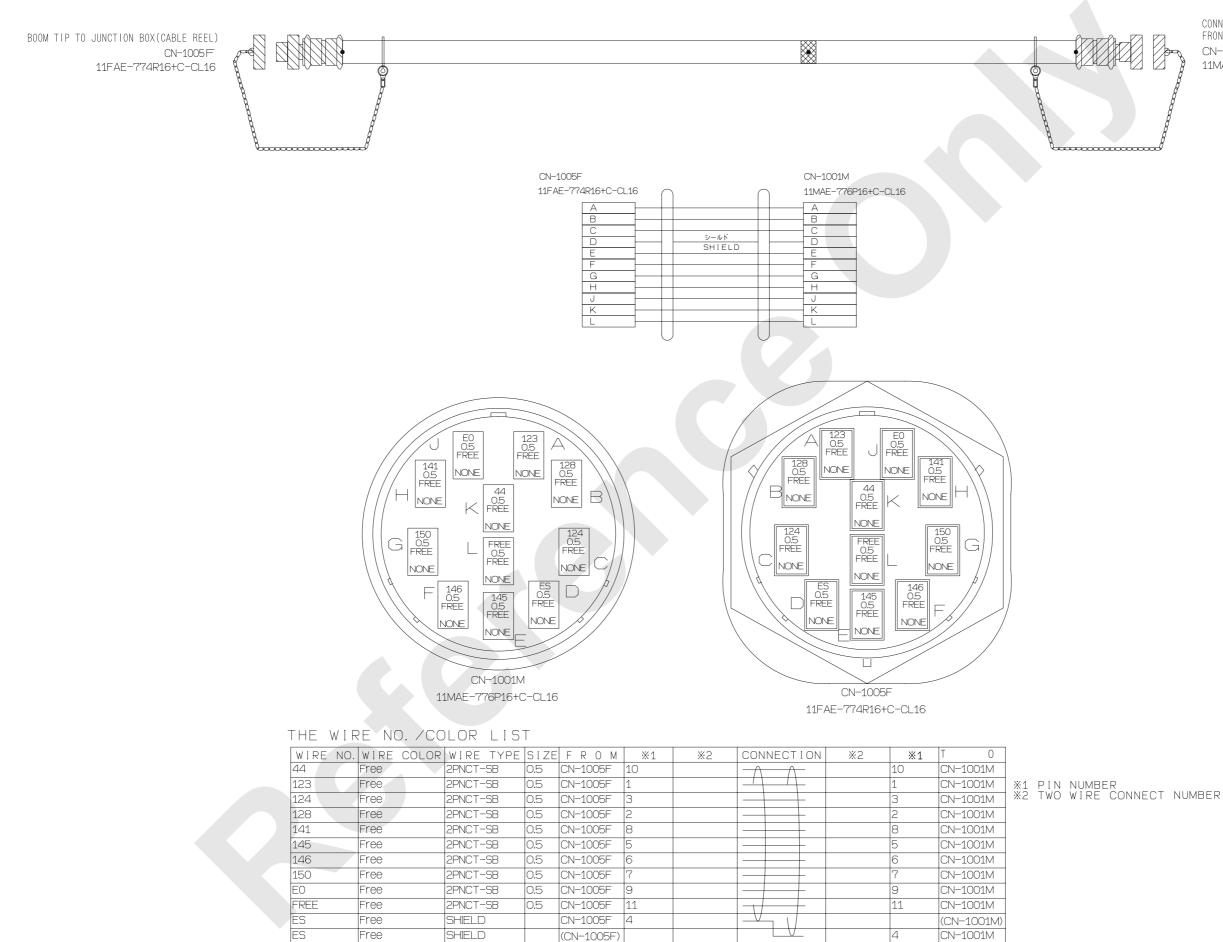
(1/4)





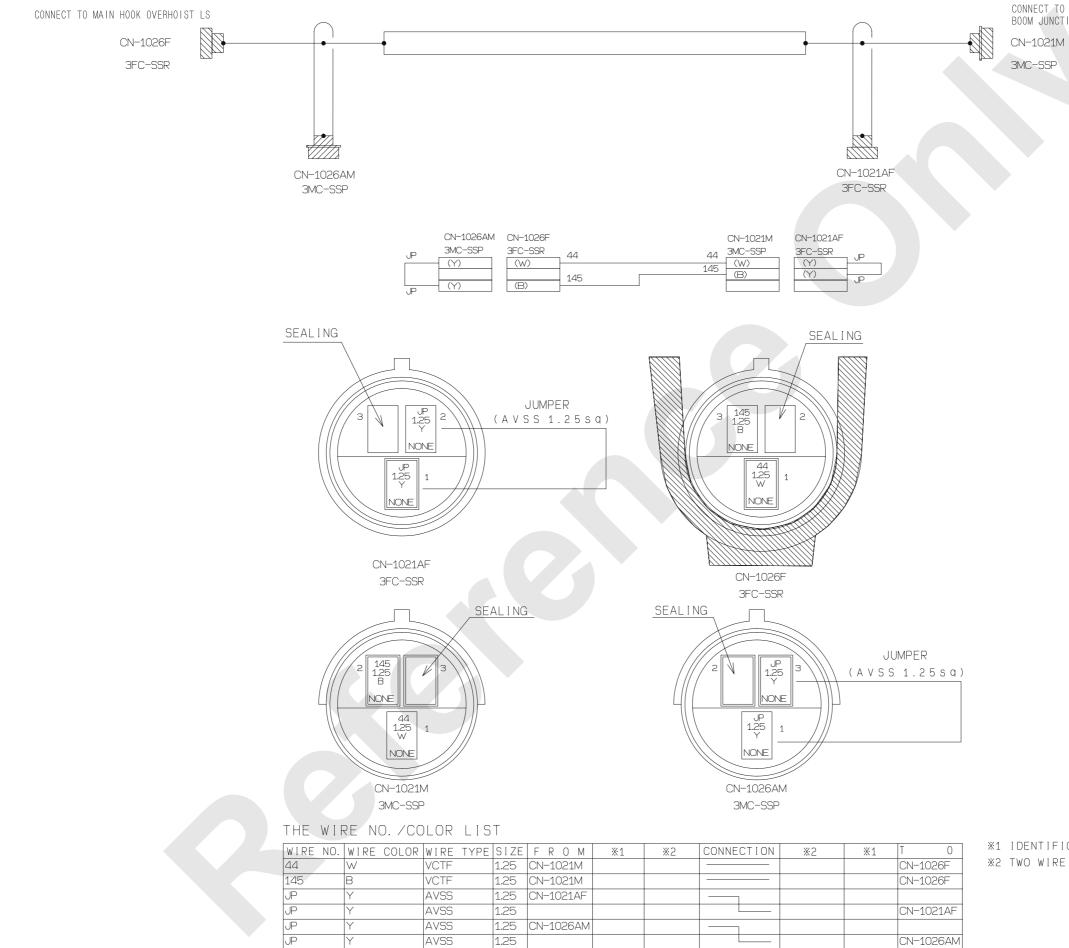
10-134

### **BOOM OVER HOIST PREVENTING HARNESS (a)**



CONNECT TO THE SWING FRAME FRONT JUNCTION BOX CN-1001M 11MAE-776P16+C-CL16

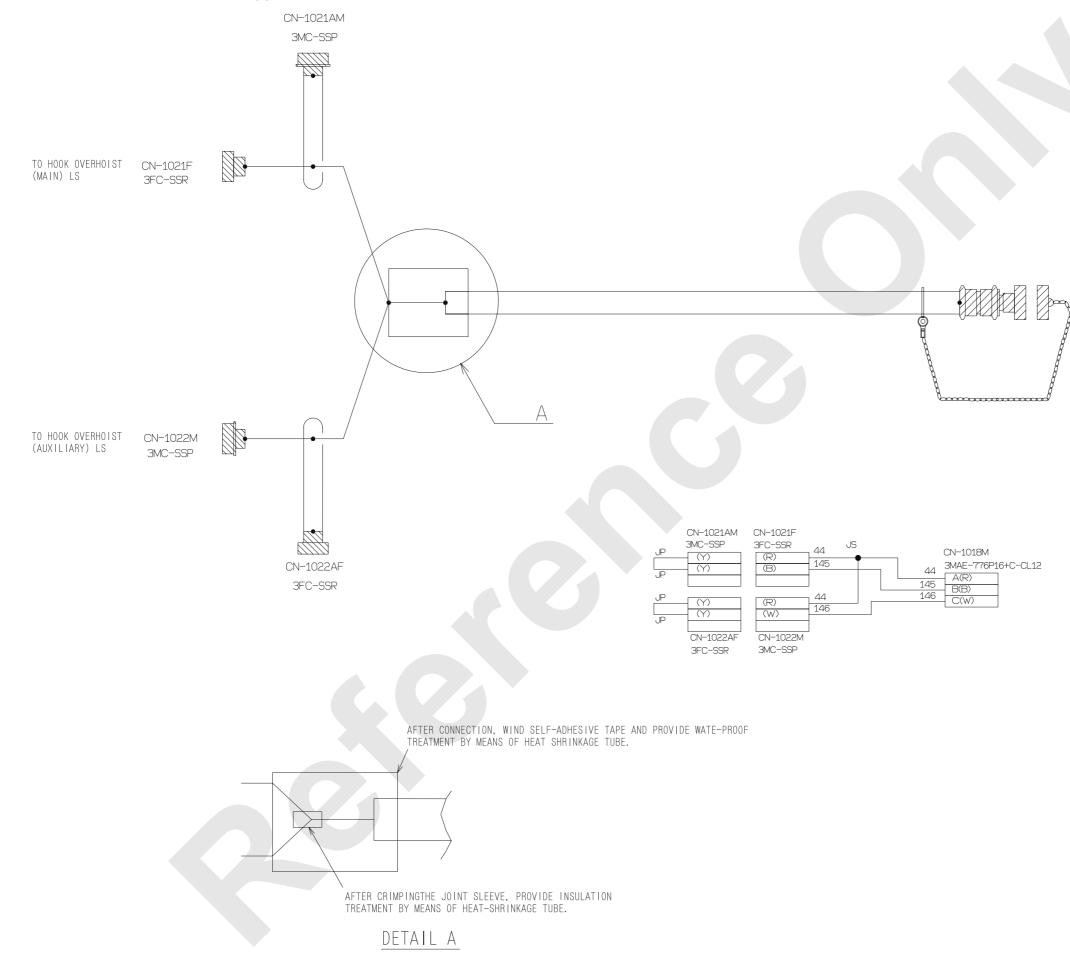
### BOOM OVER HOIST PREVENTING HARNESS (b)



\*1 IDENTIFICATION SYMBOL %2 TWO WIRE CONNECT NUMBER

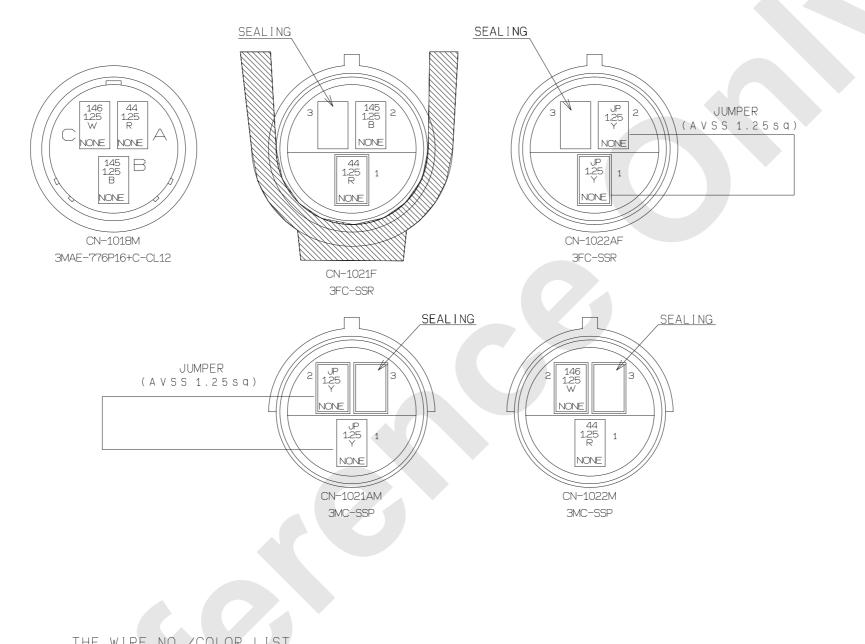
CONNECT TO THE UPPER BOOM JUNCTION BOX

### BOOM OVER HOIST PREVENTING HARNESS (c)



CN-1018M 3MAE-776P16+C-CL12 CONNECT TO THE UPPER BOOM JUNCTION BOX

(1/2)

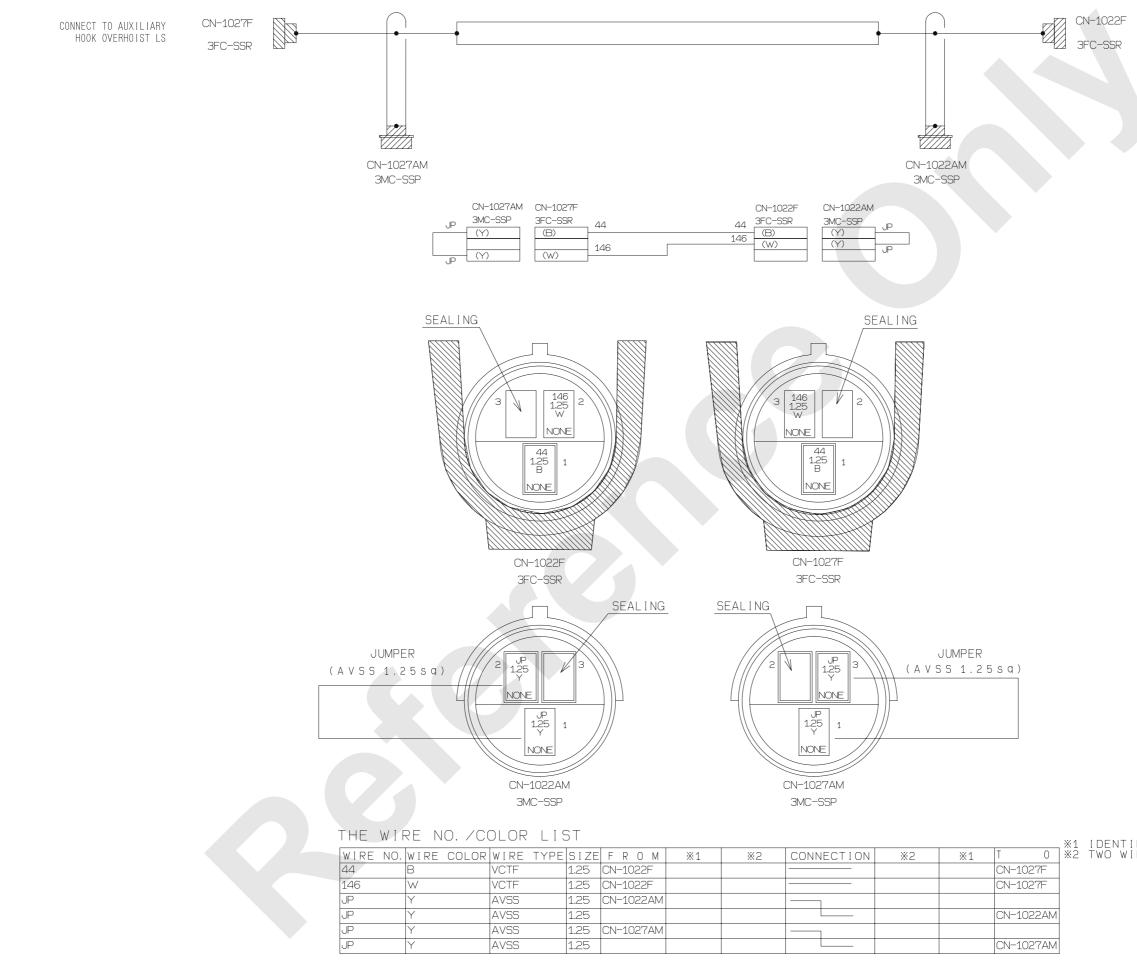


THE	WIRE	NO.	/COLOR	LI	ST

WIRE	NO.	WIRE	COLOR	WIRE TYPE	SIZE	FROM	×1	×2	CONNECTION	¥2	*1	T O
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		В		ŽPNCT-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

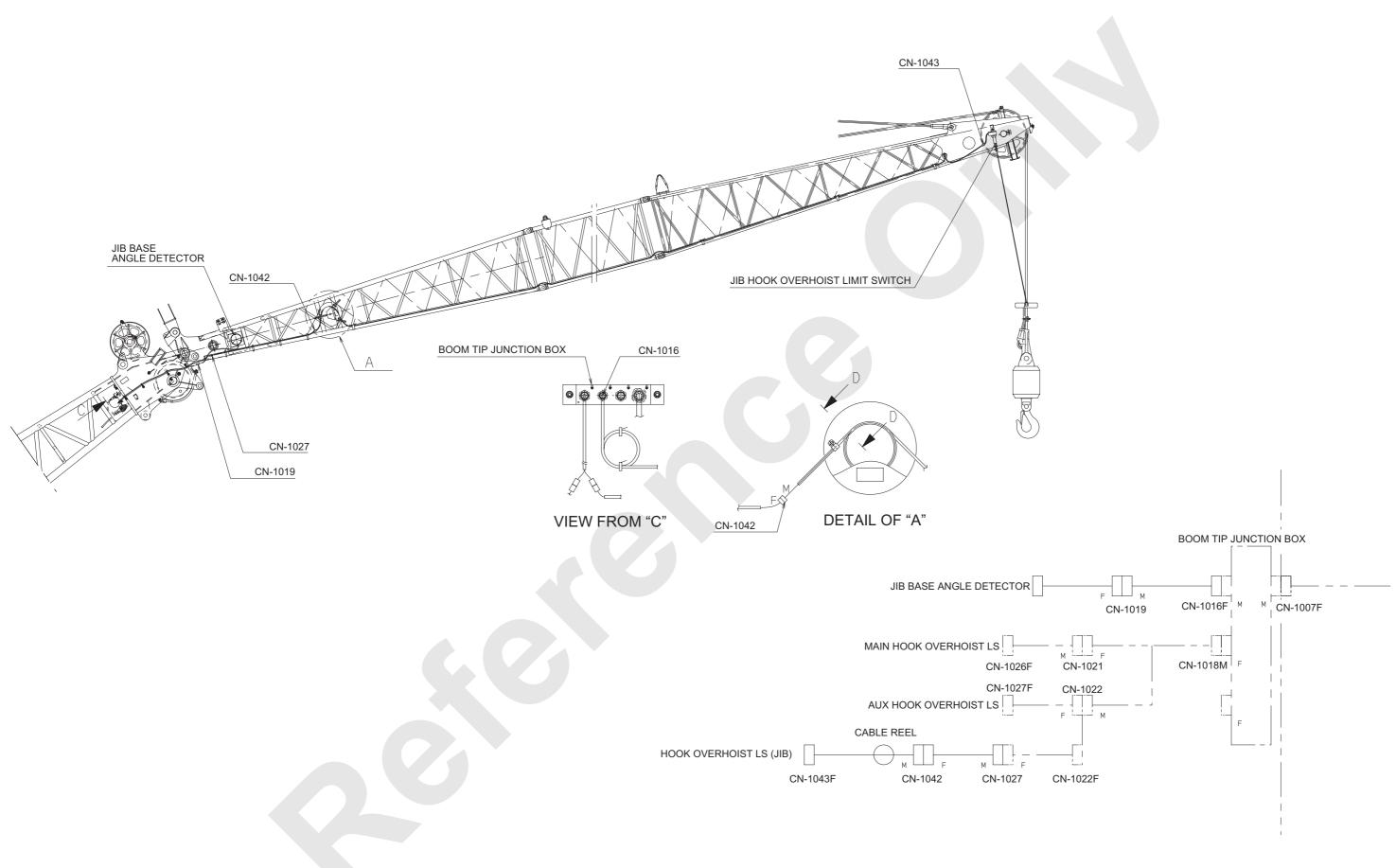
%1 IDENTIFICATION SYMBOL %2 TWO WIRE CONNECT NUMBER

### BOOM OVER HOIST PREVENTING HARNESS (d)

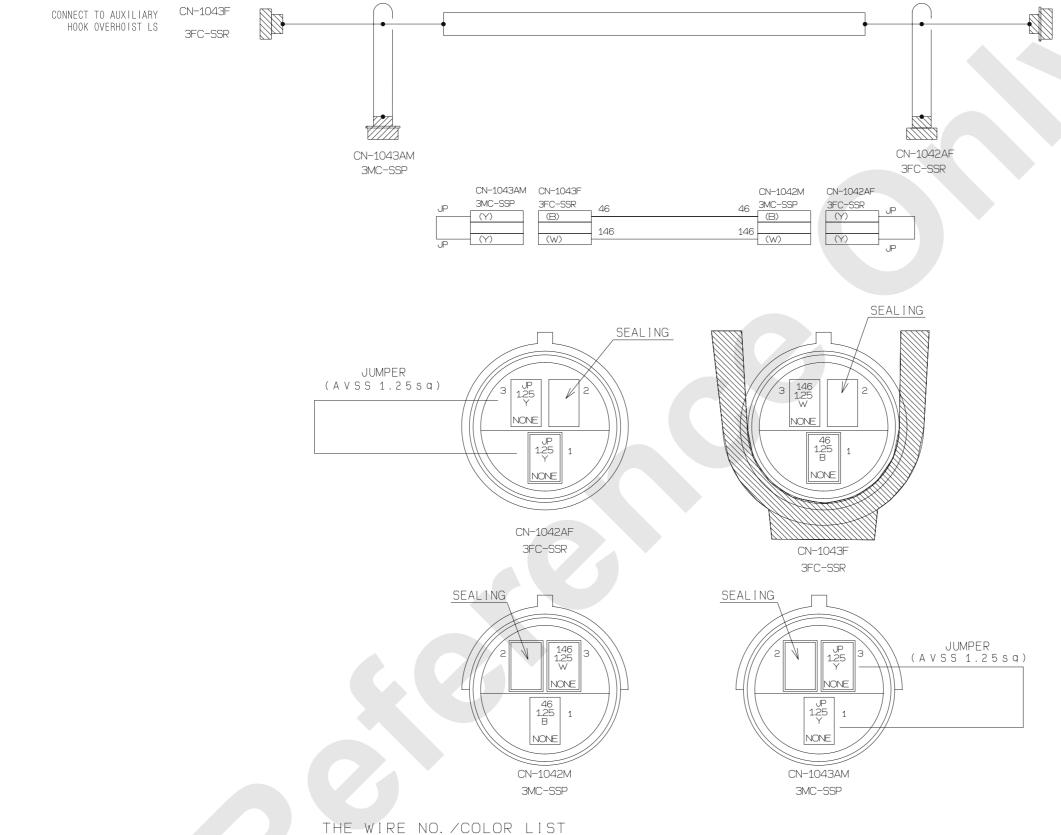


TO THE UPPER BOOM JUNCTION BOX

\*1 IDENTIFICATION SYMBOL 0 \*2 TWO WIRE CONNECT NUMBER 16. JIB OVER HOIST PREVENTING



### JIB OVER HOIST PREVENTING HARNESS (a)

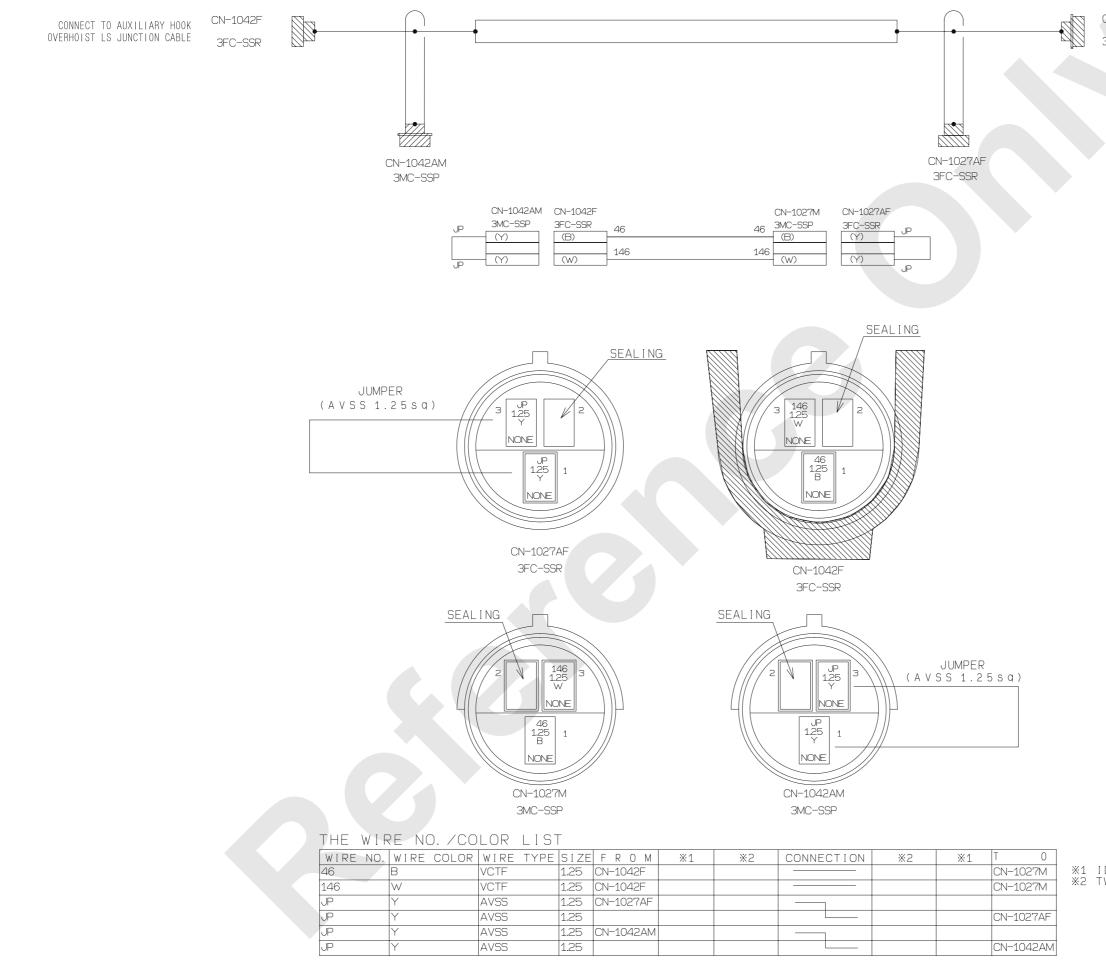


WIRE NO.	WIRE COLOR	WIRE TYPE	SIZE	FROM	<b>※</b> 1	<b>%</b> 2	CONNECTION	<b>%</b> 2	×1	T O
46	В	VCTF	1.25	CN-1043F						CN-1042M
146	W	VCTF	1.25	CN-1043F						CN-1042M
JP	Y	AVSS	1.25	CN-1042AF						
JP	Y	AVSS	1.25							CN-1042AF
JP	Y	AVSS	1.25	CN-1043AM						
JP	Y	AVSS	1.25							CN-1043AM

CN-1042M CONNECT TO AUXILIARY HOOK OVERHOIST LS JUNCTION CABLE 3MC-SSP

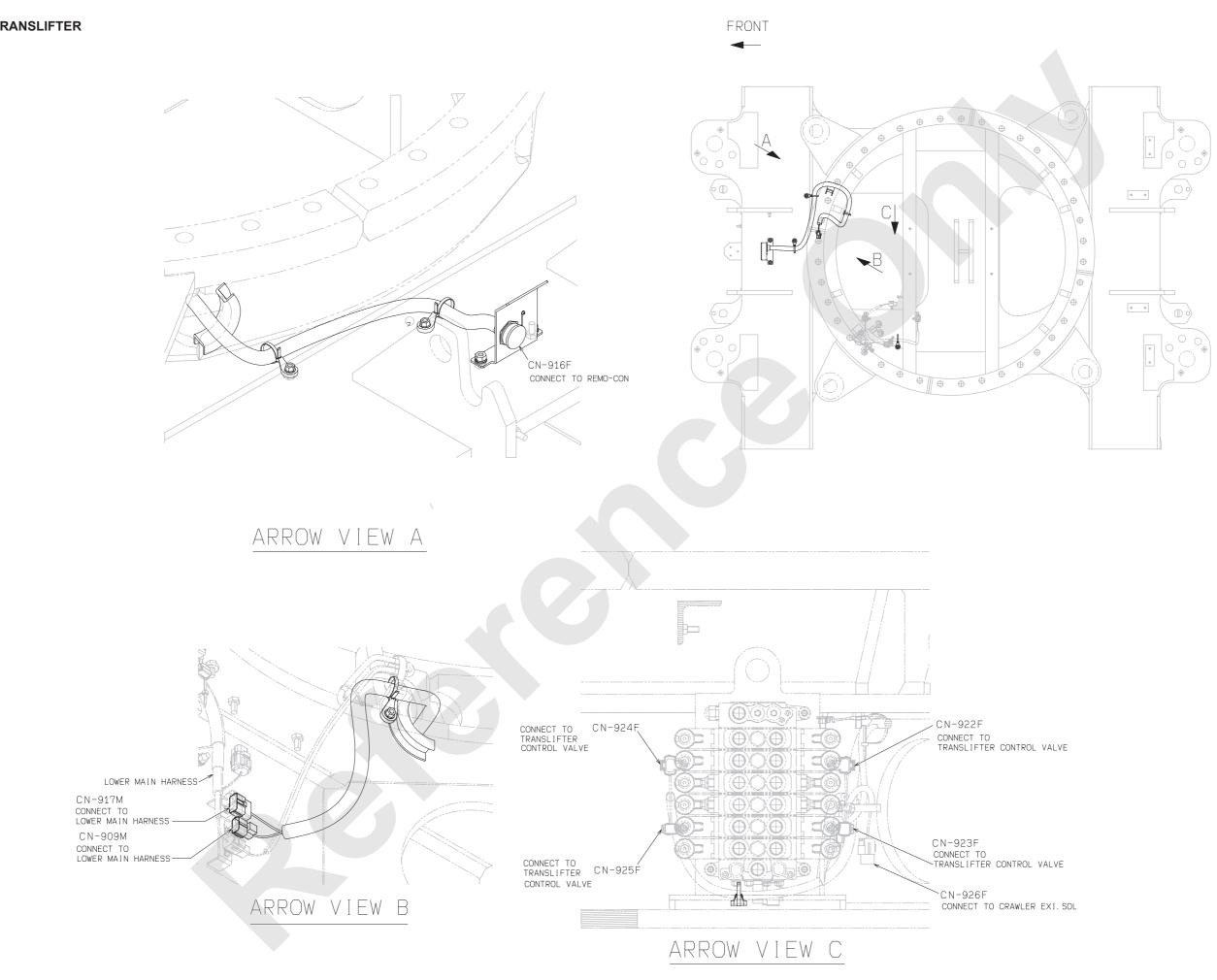
%1 IDENTIFICATION SYMBOL %2 TWO WIRE CONNECT NUMBER

### JIB OVER HOIST PREVENTING HARNESS (b)



CN-1027M 3MC-SSP

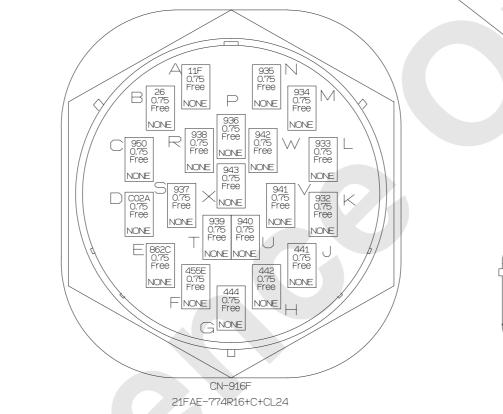
%1 IDENTIFICATION SYMBOL %2 TWO WIRE CONNECT NUMBER

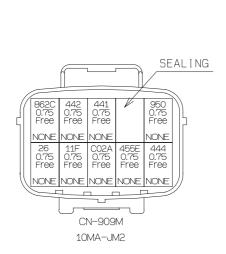


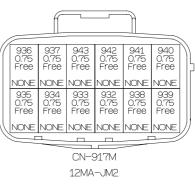
Ø

### **TRANSLIFTER HARNESS**

REMOTE CONTROLLER CONNECTION (LOWER PART) 21FAE-774R16+C-CL24 CN-916F







THE WIRE NO. /COLOR LIST

INL WIRL	NO. / COLOR L	.1.31						
WIRE NO	.WIRE COLOR	WIRE TYPE	SIZE	FROM	*1	CONNECTION	×1	T 0
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
CO2A	Free	2PNCT-SR	0.75	CN-909M				CN-916F

CN-909M 10MA-JM2 CONNECT TO LOWER MAIN HARNESS

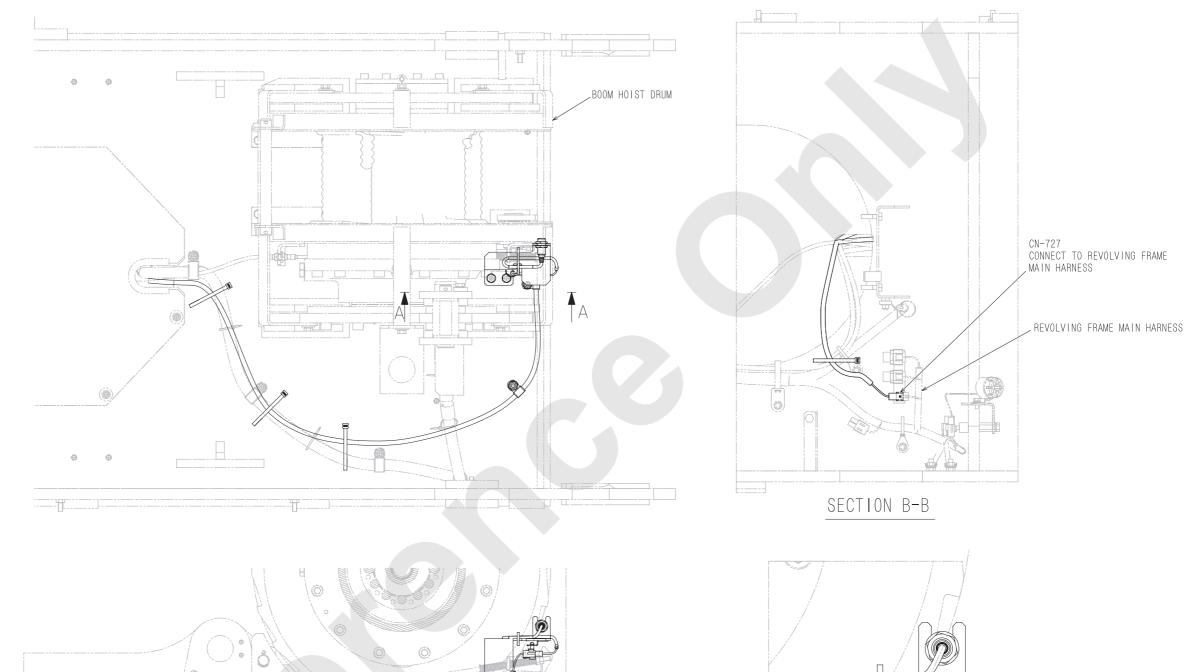


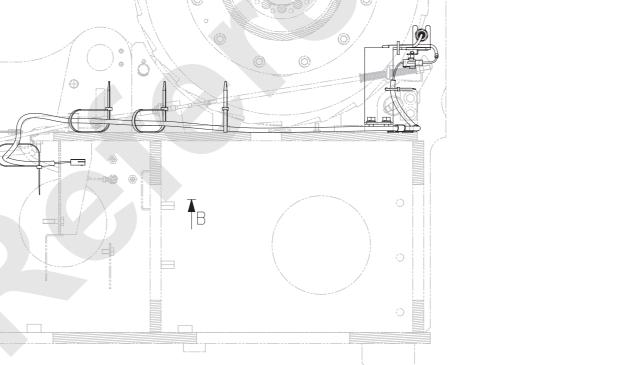
CN-917M 12MA-JM2 CONNECT TO LOWER MAIN HARNESS

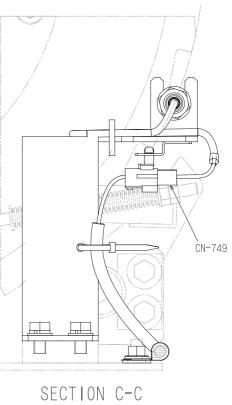
### 18. HOIST DRUM TURN SENSOR

B

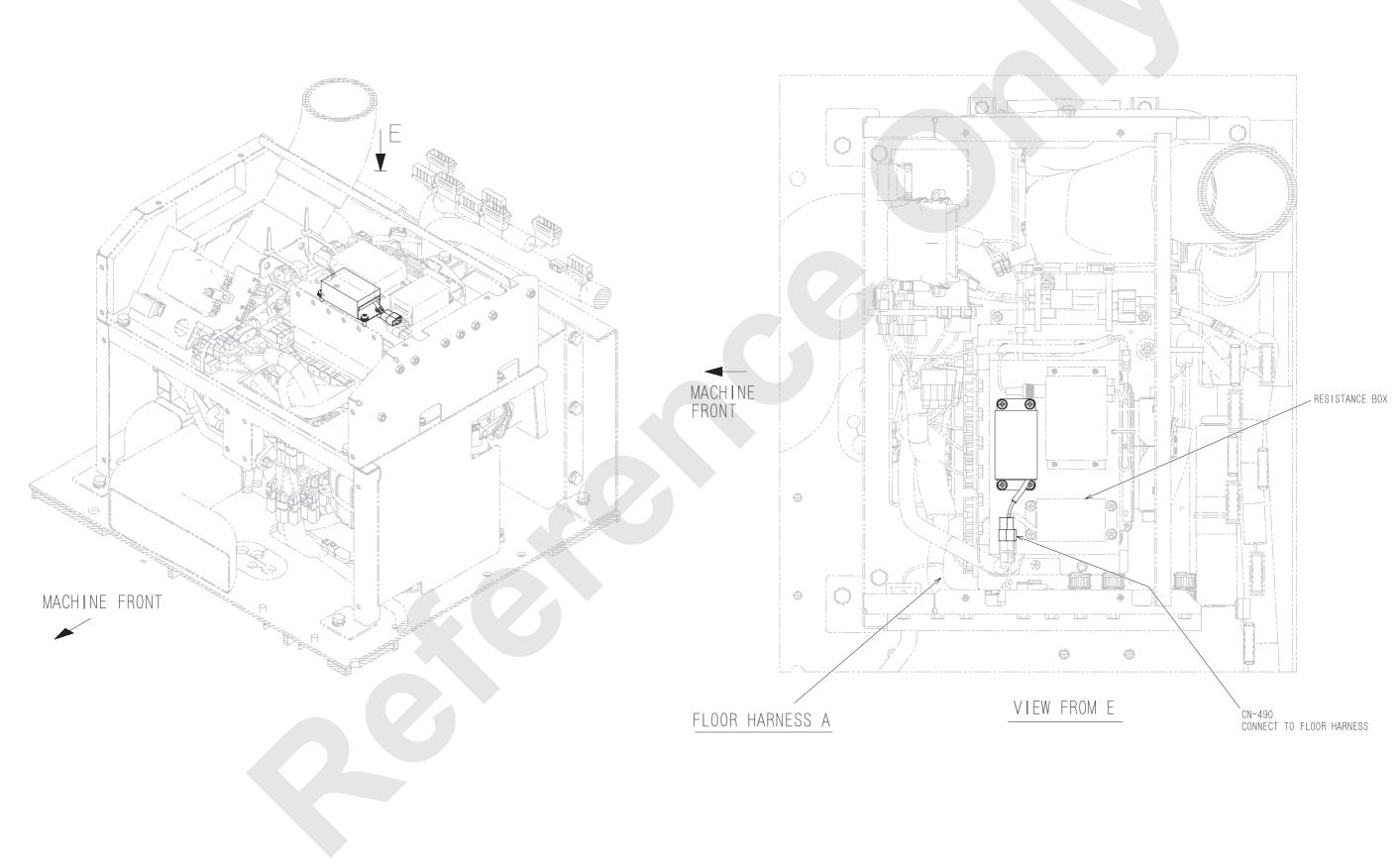
TH -



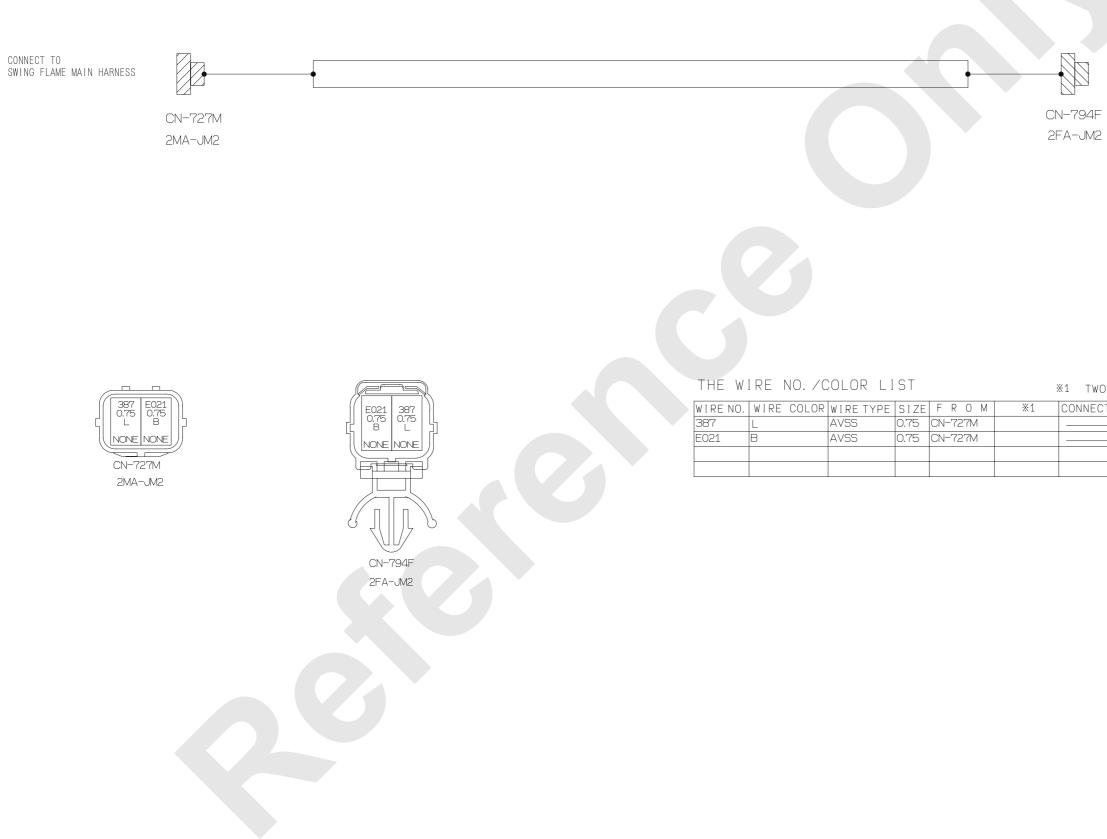




(1/2)



### HOIST DRUM TURN SENSOR HARNESS

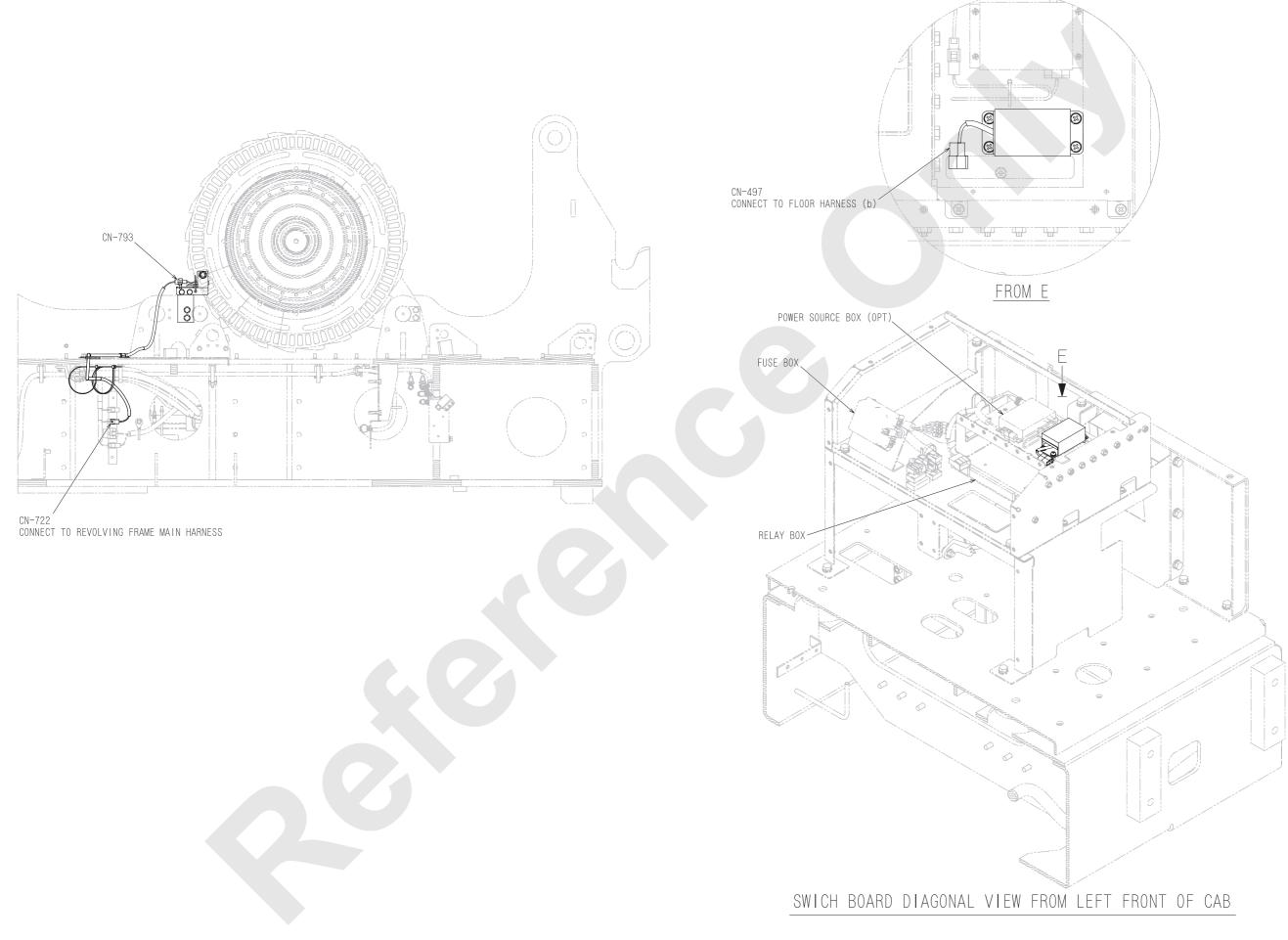


CONNECT TO BOOM HOIST DRUM TURN SENSOR

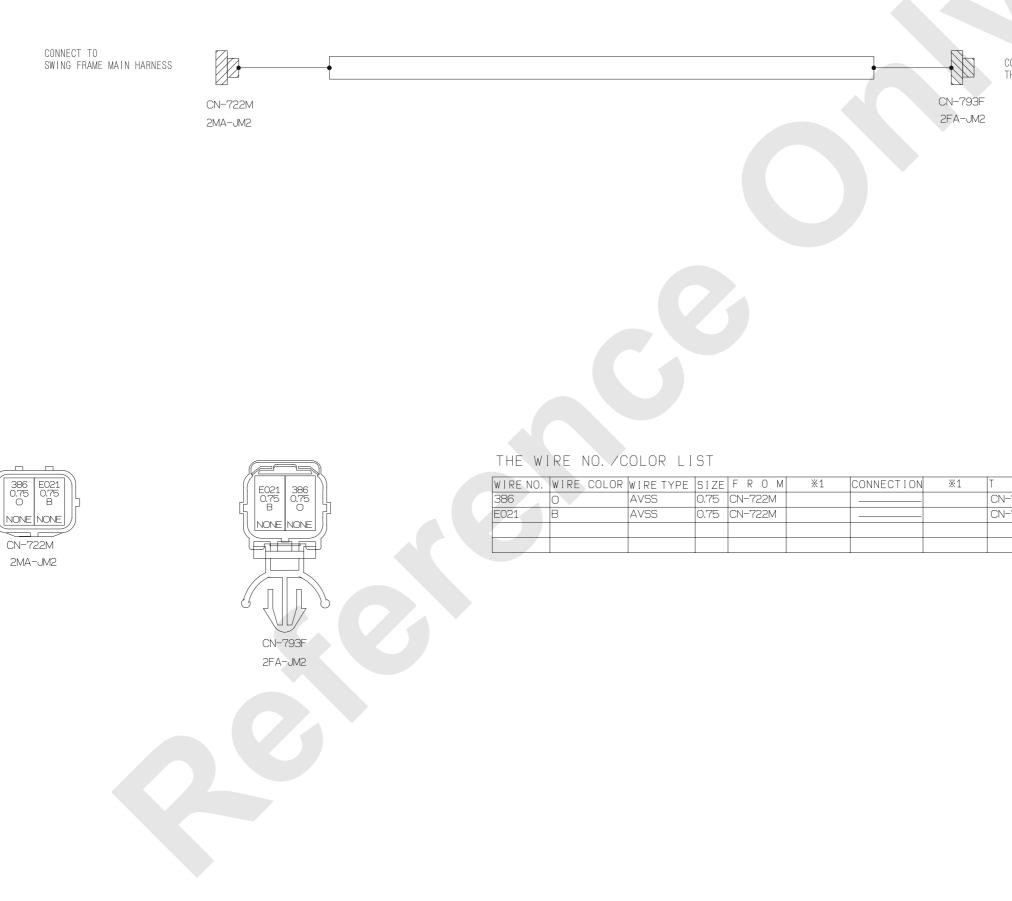
### %1 TWO WIRE CONNECT NUMBER

CONNECTION	<b>%</b> 1	Т О
		CN-794F
		CN-794F

# 19. THIRD DRUM TURN SENSOR



### THIRD DRUM TURN SENSOR HARNESS

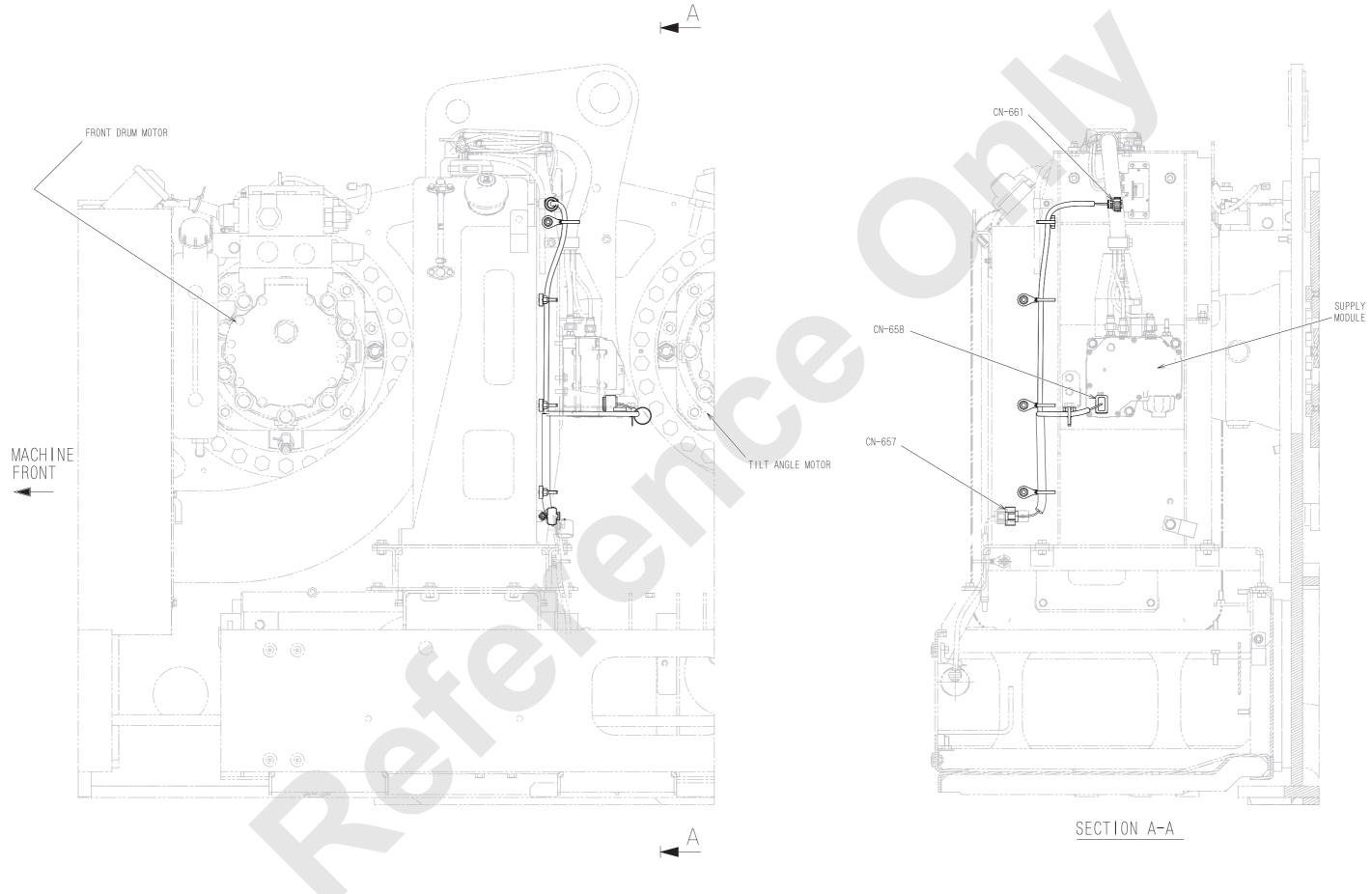


CONNECT TO THIRD DRUM ROTATION DETECT SENSOR

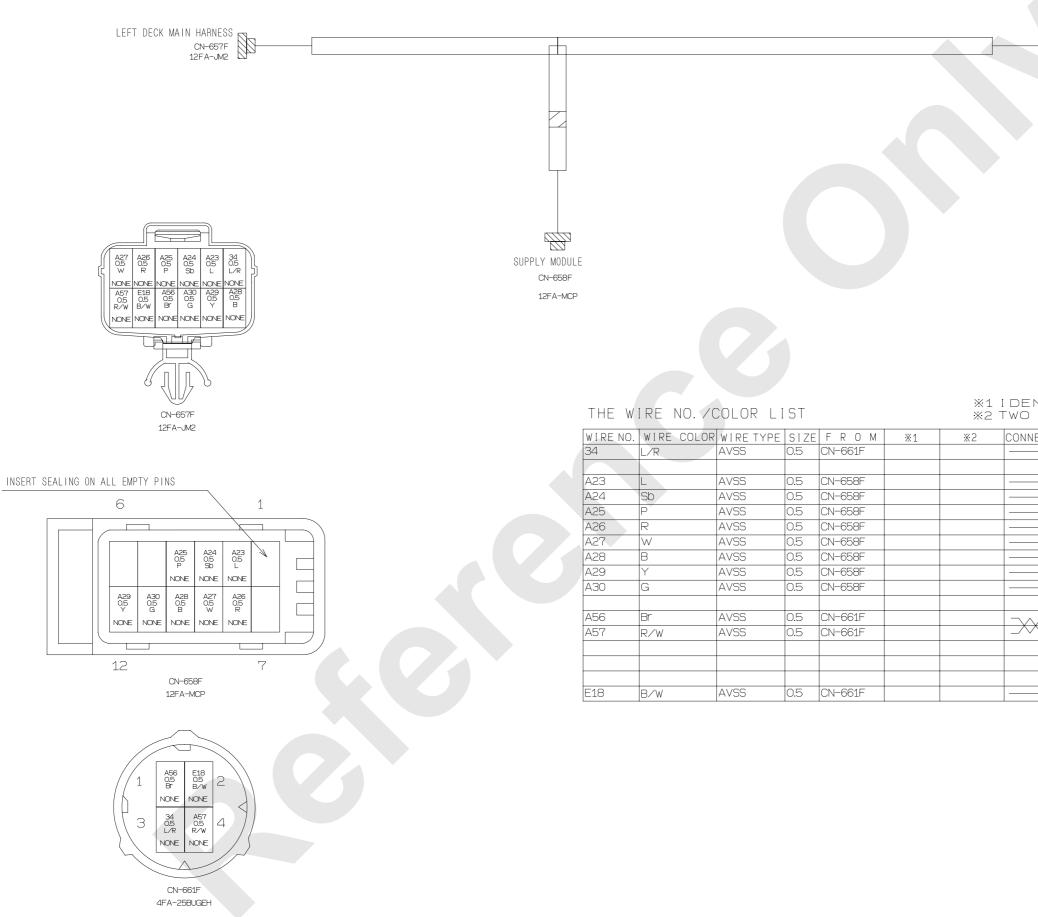
T 0 CN-793F CN-793F

\*1 TWO WIRE CONNECT NUMBER

# 20. DEF/AdBlue® TANK



### DEF/AdBlue® TANK HARNESS

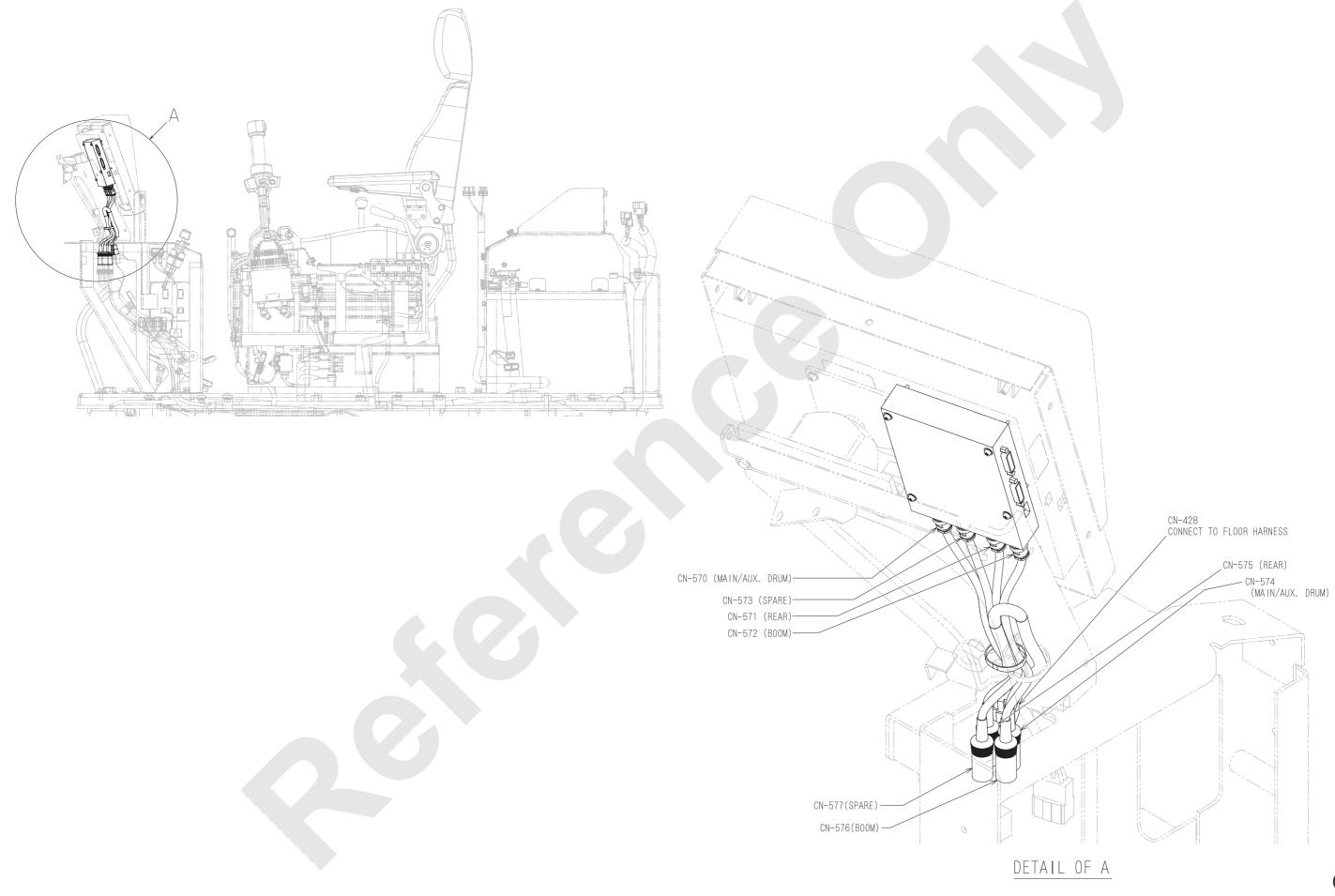


DEF/ADBLUE DETERIORATION SENSOR CN-661F 4FA-25BUGEH

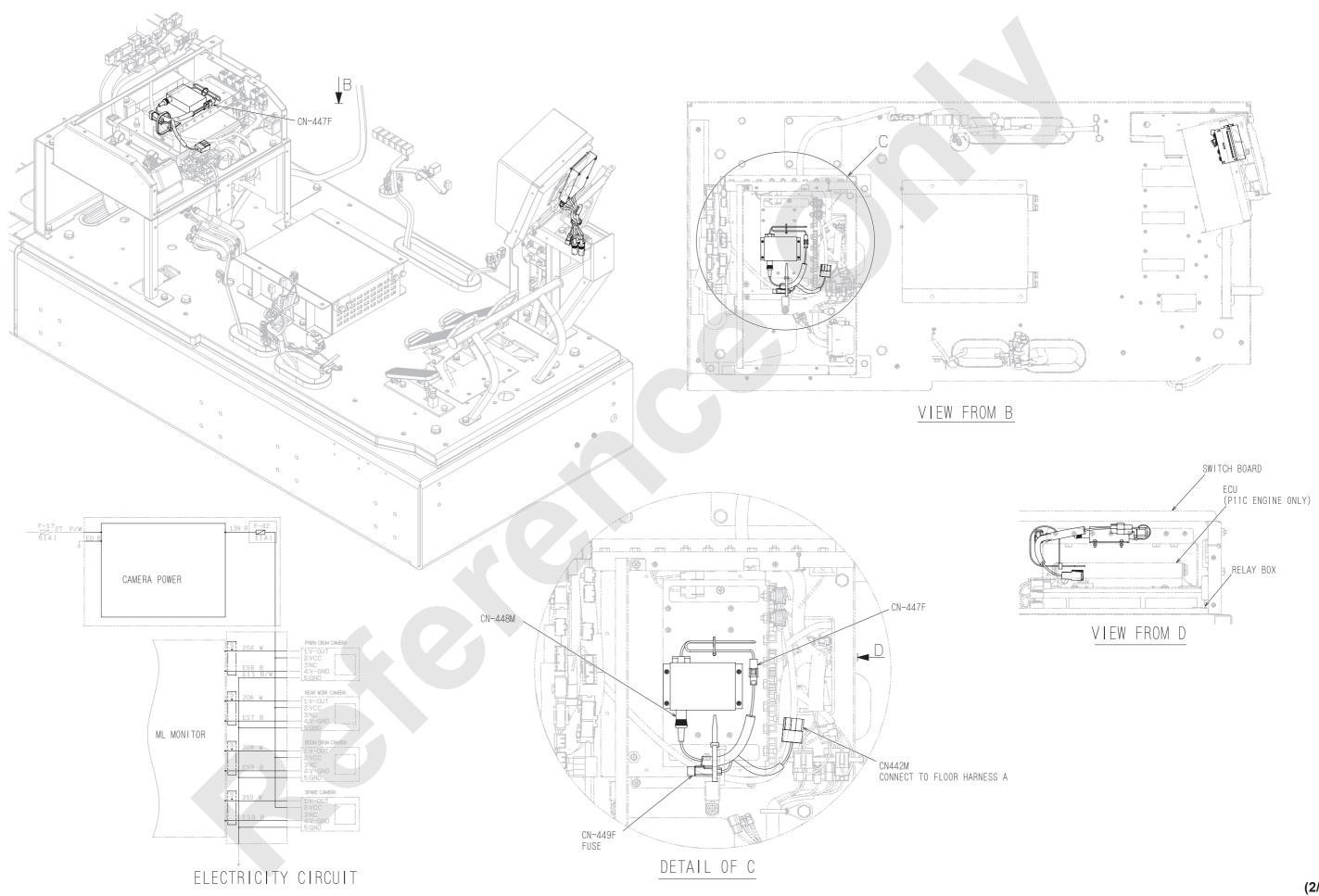
ECTION	<b>%</b> 2	×1	T (
			CN-657F
			CN-657F
			CN-657F
			CN-657F
			CN-657F

### %1 I DENTIFICATION SYMBOL %2 TWO WIRE CONNECT NUMBER

# 21. CAMERA CONTROLLER

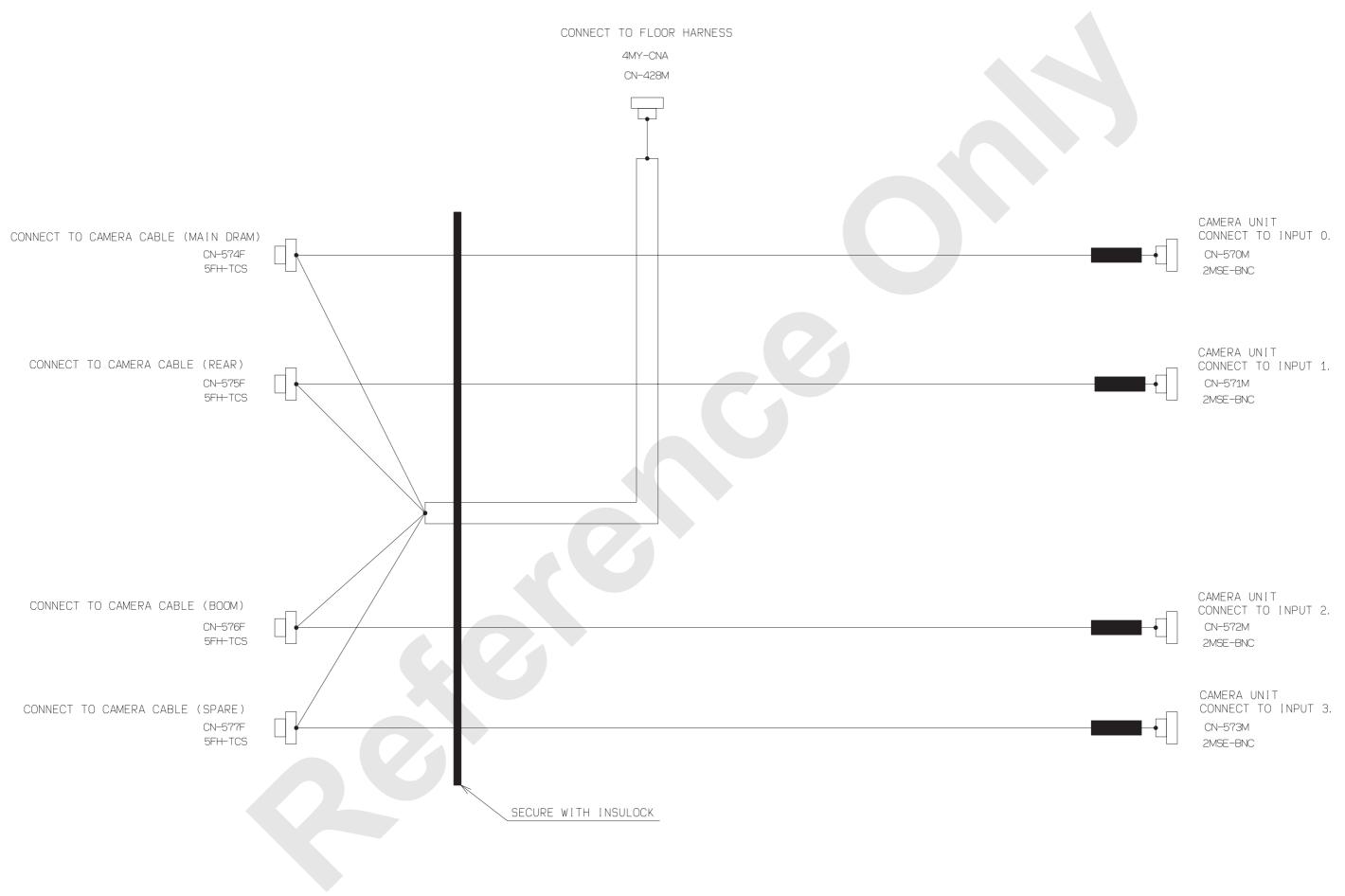


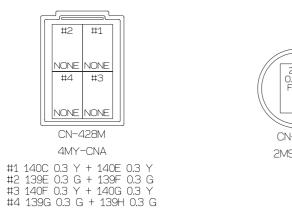
(1/2)

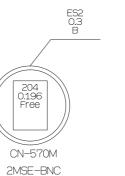


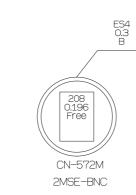
(2/2)

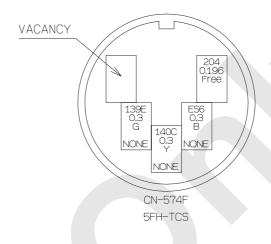
## CAMERA CONTROLLER HARNESS (a)





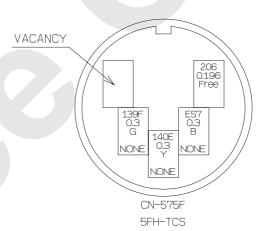






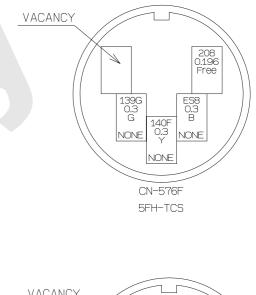


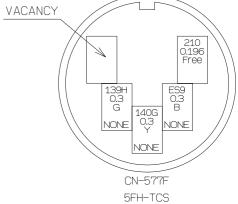




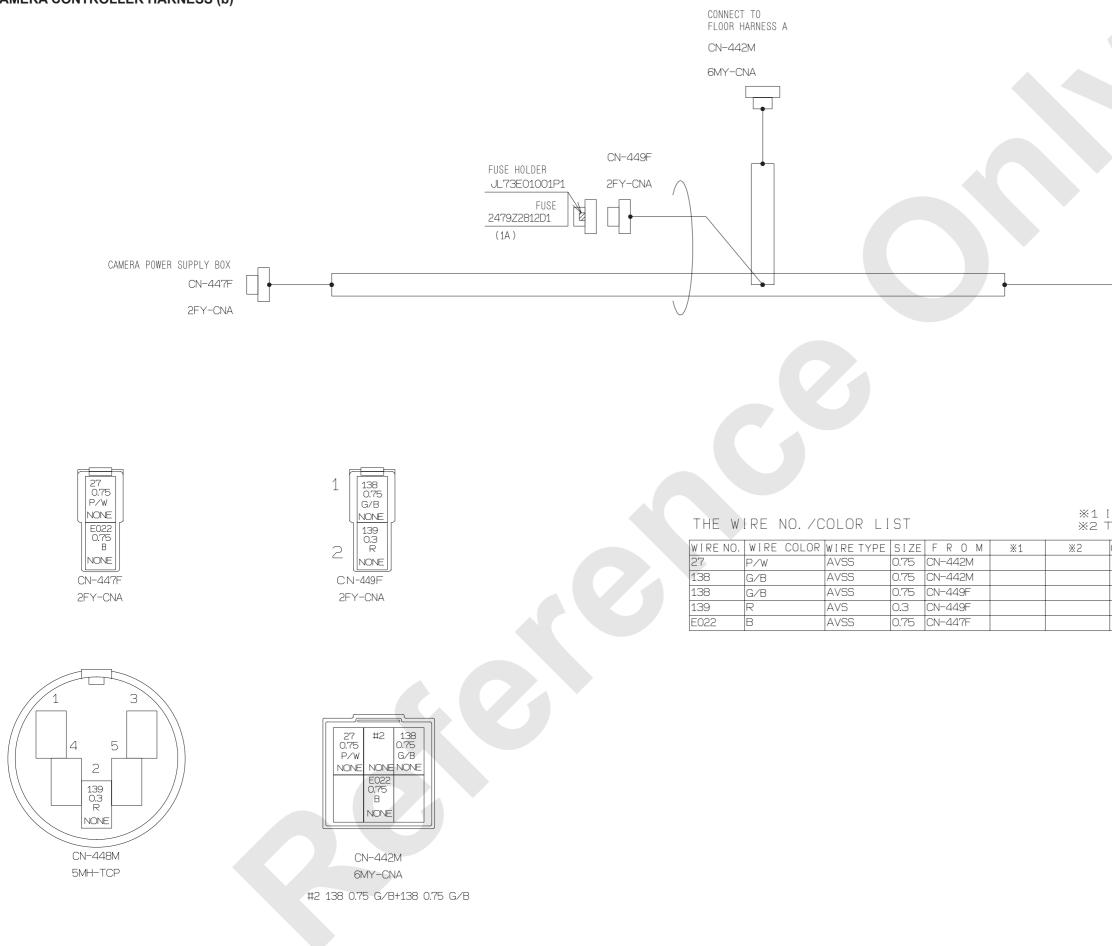
THE WIRE NO. /COLOR LIST

×1	*2	*3	×4	FROM	/ *5	<b>※</b> 6	*7	×8		<b>※</b> 6	×5	T	0	X1 WIRE NO.
139E	G	AVSS	0.3	CN-428M	2		DS-B92	Q			5	CN-574F	300	- X2 WIRE COLOR
139F	G	AVSS	0.3	CN-428M	2		DS-B92				5	CN-575F	300	- X3 WIRE TYPE
139G	G	AVSS	0.3	CN-428M	4		DS-B94	Q	•		5	CN-576F	300	- X4 SIZE - X5 PIN NUMBER
139H	G	AVSS	0.3	CN-428M	4		DS-B94				5	CN-577F	300	- XS FIN NOMBER X6 IDENTIFICATION SYMB
140C	Y	AVSS	0.3	CN-428M	1		DS-B90	Q	•		2	CN-574F	300	X7 TWO WIRE CONNECT NO
140E	Y	AVSS	0.3	CN-428M	1		DS-B90				2	CN-575F	300	3 X8 CONNECTION
140F	Y	AVSS	0.3	CN-428M	3		DS-B93	Q			2	CN-576F	300	%9 LENGTH(DESIGN VALUE
140G	Y	AVSS	0.3	CN-428M	3		DS-893				2	CN-577F	300	
204	Free	3C-2W	0.196	CN-574F	1			- <b>Q</b> - <b>Q</b> -			1	CN-570M	200	
ES2	В	AVSS	0.3	(CN-574F)							2	CN-570M	100	
ES6	В	AVSS	0.3	CN-574F	4							(CN-570M)	100	
206	Free	3C-2W	0.196	CN-575F	1			- <del>Q</del> -Q-			1	CN-571M	200	
ES3	В	AVSS	0.3	(CN-575F)							2	CN-571M	100	
ES7	В	AVSS	0.3	CN-575F	4							(CN-571M)	100	
208	Free	3C-2W	0.196	CN-576F	1			- <b>QQ</b> -			1	CN-572M	200	
ES4	В	AVSS	0.3	(CN-576F)							2	CN-572M	100	
ES8	В	AVSS	0.3	CN-576F	4							(CN-572M)	100	
210	Free	3C-2W	0.196	CN-577F	1			- <del>Q</del> -Q-			1	CN-573M	200	
ES5	В	AVSS	0.3	(CN-577F)		-					2	CN-573M	100	
ES9	В	AVSS	0.3	CN-577F	4							(CN-573M)	100	





### CAMERA CONTROLLER HARNESS (b)



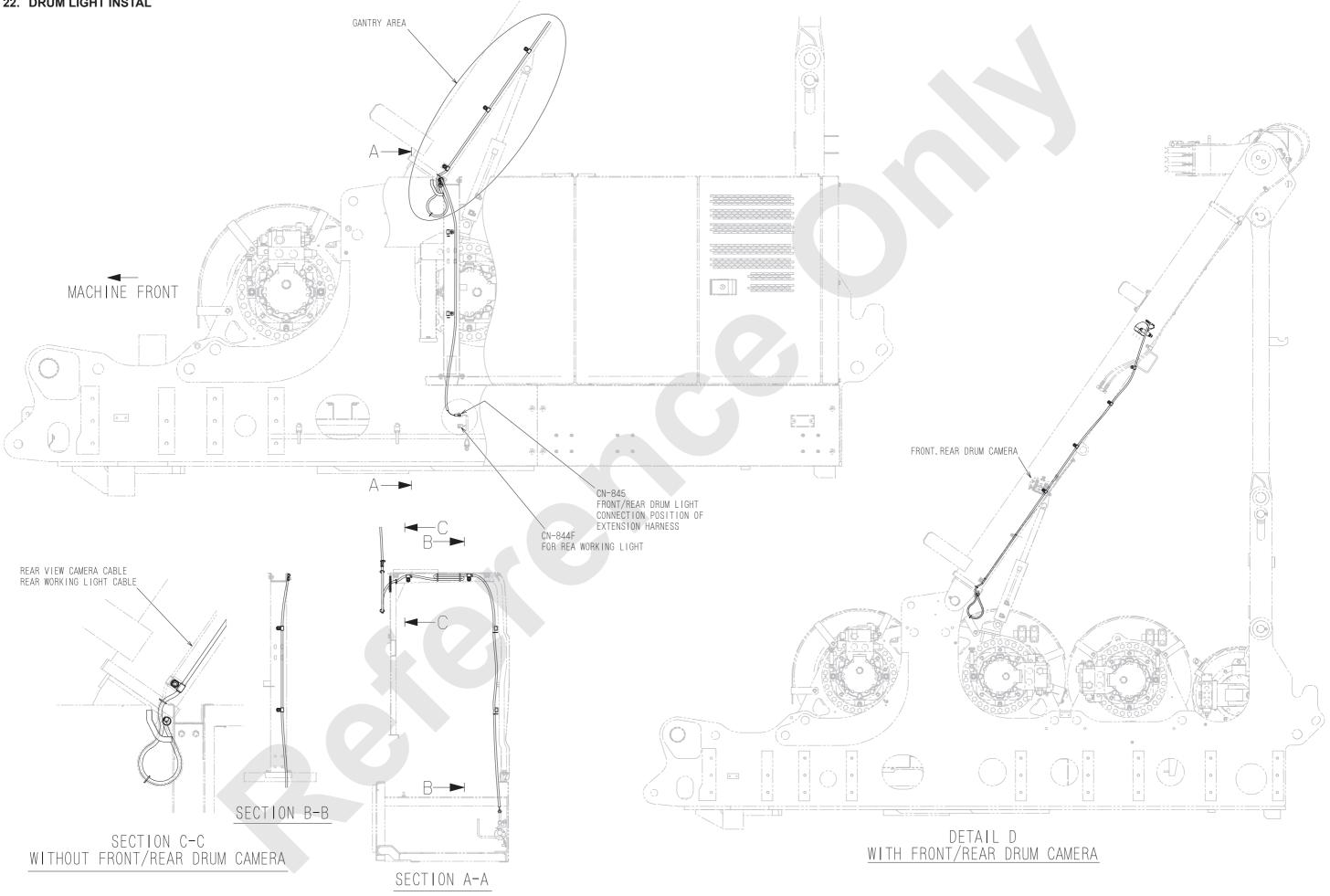


CAMERA POWER SUPPLY BOX CN-448M 5MH-TCP

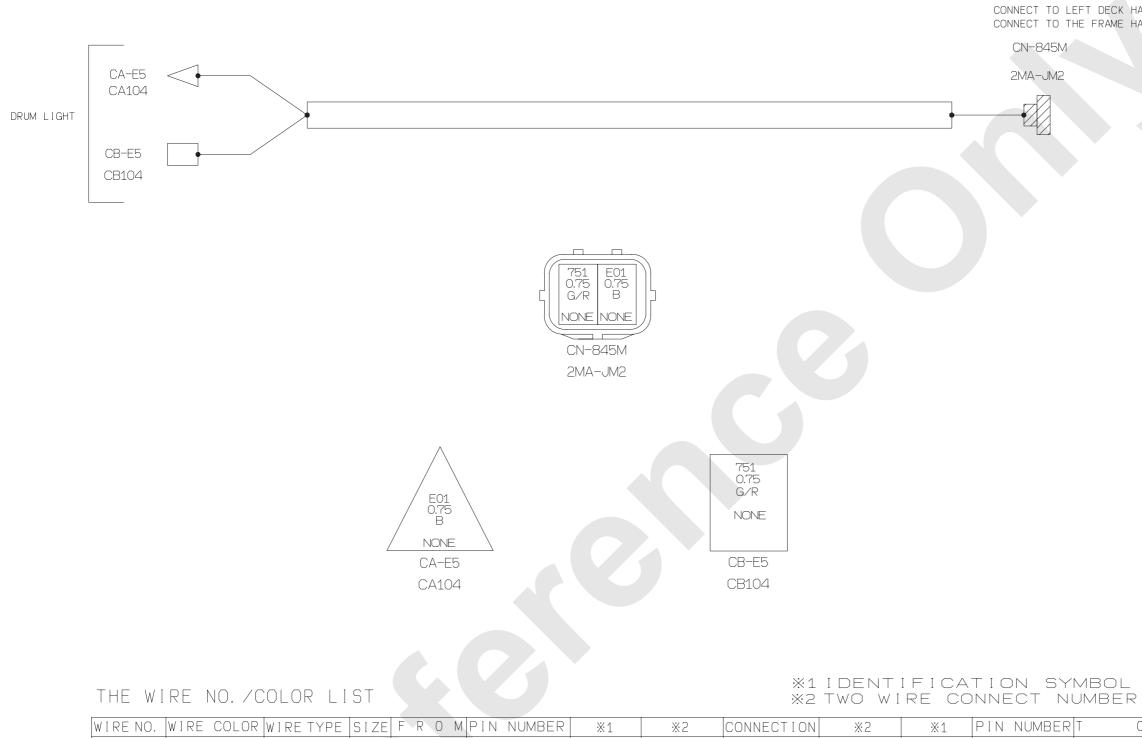
### %1 I DENTIFICATION SYMBOL %2 TWO WIRE CONNECT NUMBER

CONNECTION	<b>%</b> 2	<b>※</b> 1	T O
			CN-447F
			CN-442M
/			CN-442M
			CN-448M
			CN-442M

## 22. DRUM LIGHT INSTAL



## DRUM LIGHT INSTAL HARNESS



WIRE NO.	WIRE COLOR	WIRE TYPE	SIZE	FRON	PIN NUMBER	×1	×2	CONNECTION	ж2	×1	PIN NUMBER	T
751	G/R	AVSS	0.75	CB-E5	2						2	CN-84
E01	В	AVSS	0.75	CN-845M	1						1	CA-E5

CONNECT TO LEFT DECK HARNESS (FP, GG, GD, GH, GK, HF, GN) CONNECT TO THE FRAME HARNESS (JD)



### 23. BACK LIGHT INSTAL

# BACK LIGHT INSTAL HARNESS CA-E6 $< \bullet$ CA104 REAR WORK LIGHT CB-E6 CB104 THE WIRE NO. /COLOR LIST WIRE NO. WIRE COLOR WIRE TYPE SIZE F R O M PIN NUMBER Ж1 ж2 CONNE 752A 0.75 E02 0.75 752A AVSS 0.75 CB-E6 Lg/R \_\_\_\_\_ Lg/R E E02 AVSS 0.75 CA-E6 B NONE NONE CN-844M 2MA-JM2 752A 0.75 Lg/R E02 0.75 B NONE NONE CA-E6 CB-E6 CB104 CA104

CONNECT TO LEFT DECK HARNESS

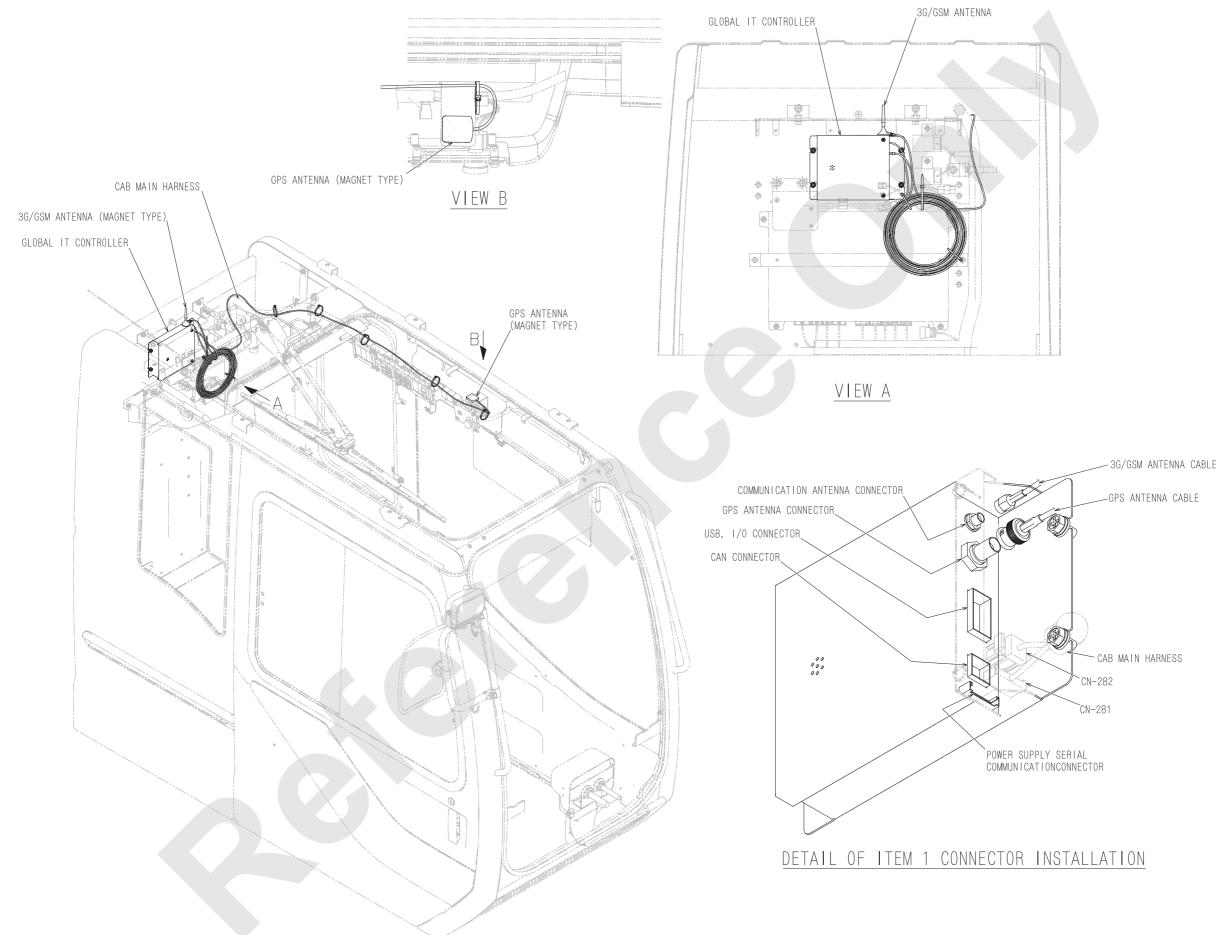
CN-844M



### %1 I DENTIFICATION SYMBOL %2 TWO WIRE CONNECT NUMBER

ECTION	<b>%</b> 2	<b>%</b> 1	PIN	NUMBER	т О
			2		CN-844M
			1		CN-844M

## 24. IT CONTROLLER INSTALLATION

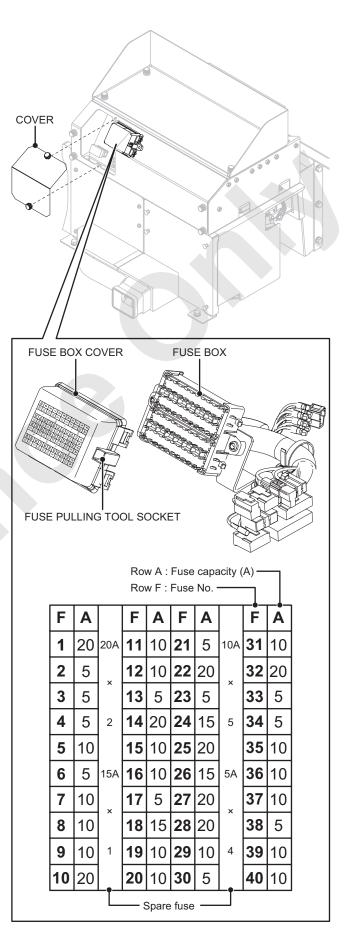


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# 10.1.3 LOCATION AND USE OF FUSE

While lifting two locks on the side face of the fuse box, open the cover.

Cover will not open unless the locks are completely unlocked.

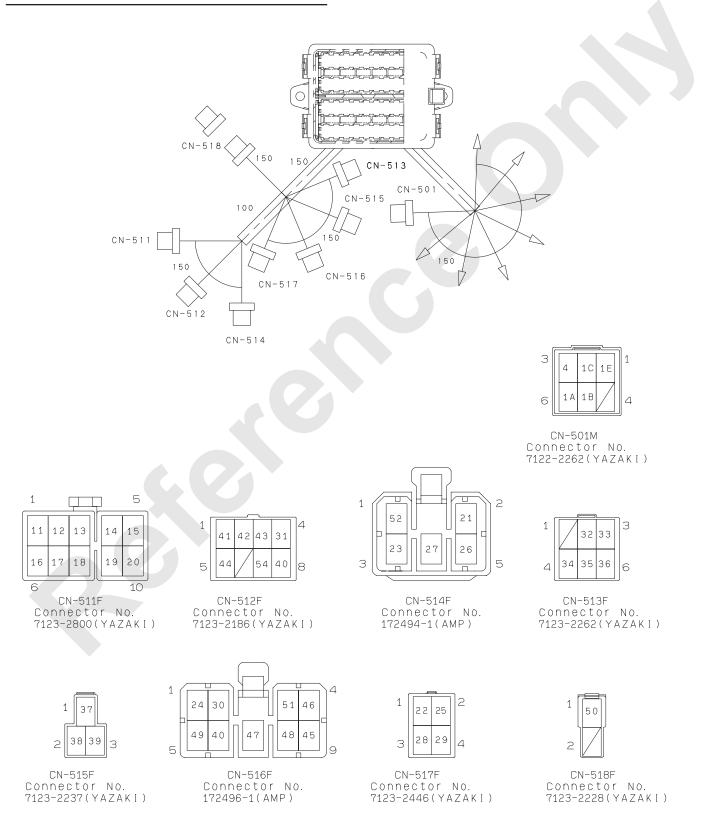


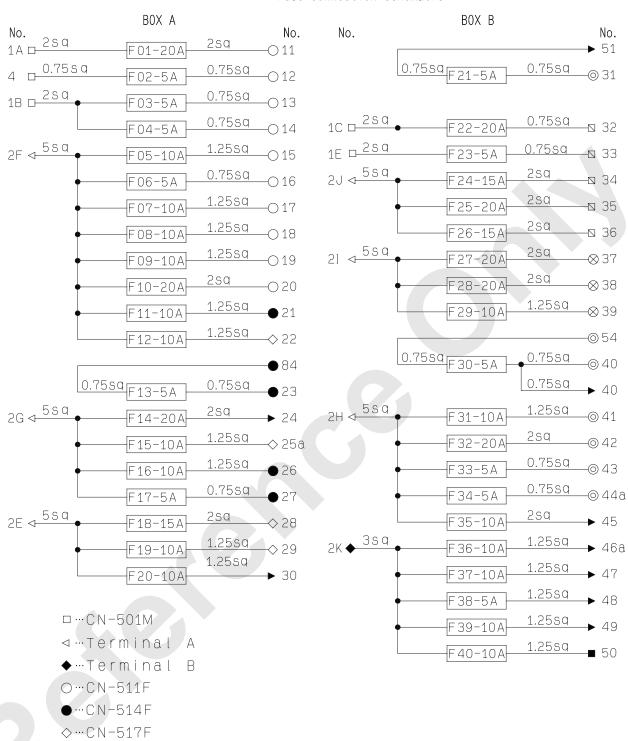
## CLASSIFICATION OF FUSE USE

Fuse No.	Capacity	Line No.	Use
F1	20A	1A - 11	Main power supply, Work light
F2	5A	4-12	Sub battery voltage monitor
F3	5A	1B - 13	IT controller
F4	5A	1B - 14	Back-up (M/L, MC1, MC2, Radio)
F5	10A	2F - 15	Bypass circuit
F6	5A	2F - 16	Release circuit
F7	10A	2F - 17	Control power (M/L)
F8	10A	2F - 18	Output power (M/L)
F9	10A	2F - 19	Control power (MC1)
F10	20A	2F - 20	Output power (MC1)
F11	10A	2F - 21	Auto-stop
F12	10A	2F - 22	Engine condition
F13	5A	84 - 23	Radio, One-way call
F14	20A	2G - 24	Wiper
F15	10A	2G - 25	Function lock
F16	10A	2G - 26	Remo-con
F17	5A	2G - 27	Monitor
F18	15A	2E - 28	Air conditioner
F19	10A	2E - 29	Air conditioner 2
F20	10A	2E - 30	Fun motor
F21	5A	51 - 31	Generation detect
F22	20A	IC - 32	DCU
F23	5A	IE - 33	ECU (BATT)
F24	15A	2J - 34	ECU (+BF)
F25	20A	2J - 35	ECU (+B)
F26	15A	2J - 36	Spare
F27	20A	21 - 37	DC motor 1 for oil cooler
F28	20A	21 - 38	DC motor 2 for oil cooler
F29	10A	21 - 39	Swing flasher, Voice alarm
F30	5A	54 - 40	Starter
F31	10A	2H - 41	Control power (MC2)
F32	20A	2H - 42	Output power (MC2)
F33	5A	2H - 43	Solenoid valve (Confluence/independent)
F34	5A	2H - 44	Overhoist limit switch
F35	10A	2H - 45	Fuel pump, Cigarette lighter
F36	10A	2K - 46	Relay
F37	10A	2K - 47	Relay
F38	5A	2K - 48	Free fall
F39	10A	2K - 49	Light
F40	10A	2K -	Spare

# 

- Ensure to turn key 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.





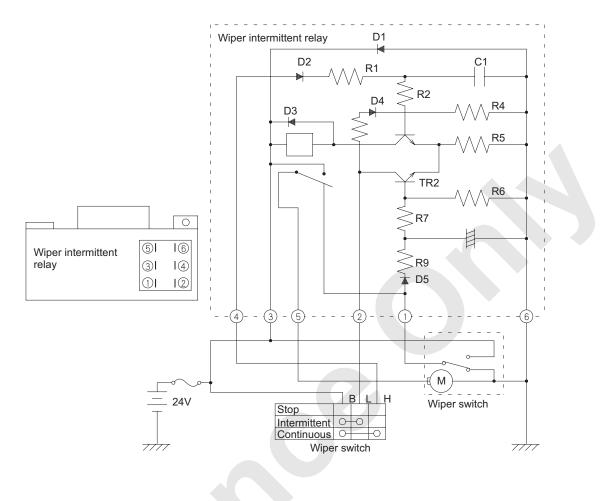
Fuse Connection Schematic

▶ … C N - 516F
 ◎ … C N - 512F
 ◎ … C N - 513F
 ⊗ … C N - 515F
 ■ … C N - 518F

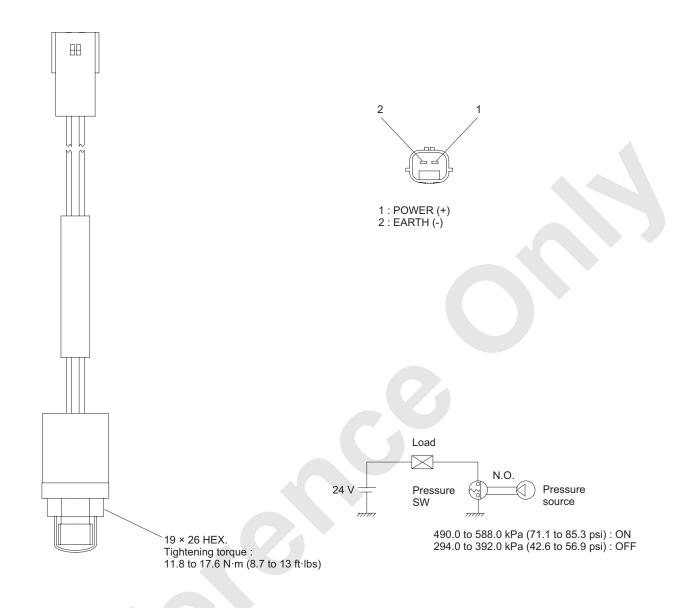
F	А		F	А	L	А		Γ	А
1	20	20A	11	10	21	5	10A	31	10
2	5	X	12	10	22	20		32	20
3	5		13	5	23	5	X	33	5
4	5	2	14	20	24	15	5	34	5
5	10		15	10	25	20		35	10
6	5	15 A	16	10	26	15	5A	36	10
7	10	X	17	5	27	20	X	37	10
8	10	1	18	15	28	20	4	38	5
9	10	re)	19	10	29	10	Le)	39	10
10	20	(Spare)	20	10	30	5	(Spare)	40	10

Label

# 10.1.4 WIPER CONTROL RELAY

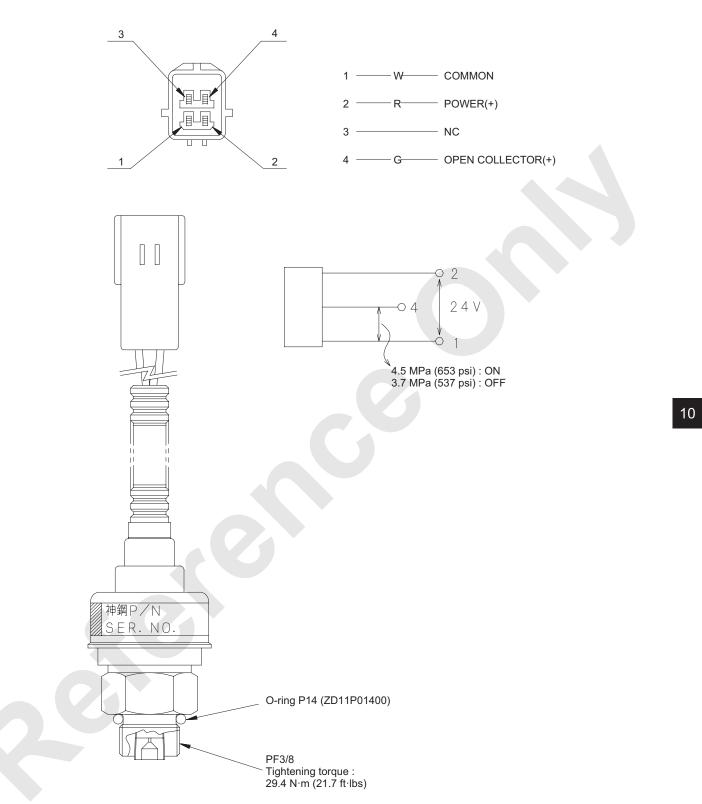


# 10.1.5 PRESSURE SWITCH (FOR TRAVEL MOTION DETECT)



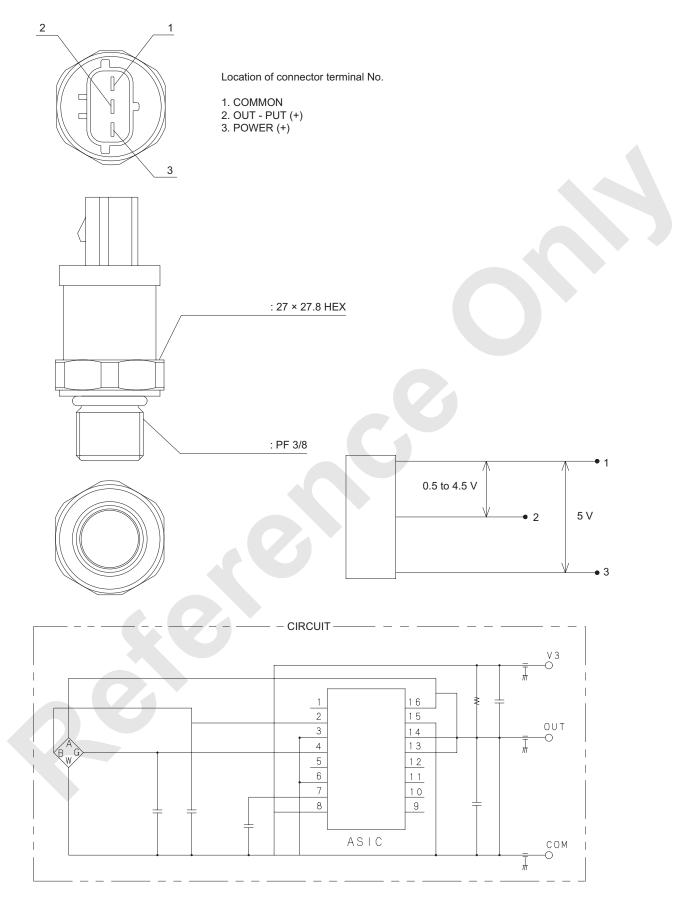
Use	Part number	[ON] Pressure	[OFF] Pressure
Travel motion detect pressure		490.0 to 588.0 kPa	294.0 to 392.0 kPa
have motion detect pressure		(71.1 to 85.3 psi)	(42.6 to 56.9 psi)

# 10.1.6 PRESSURE SWITCH (FOOT BRAKE)

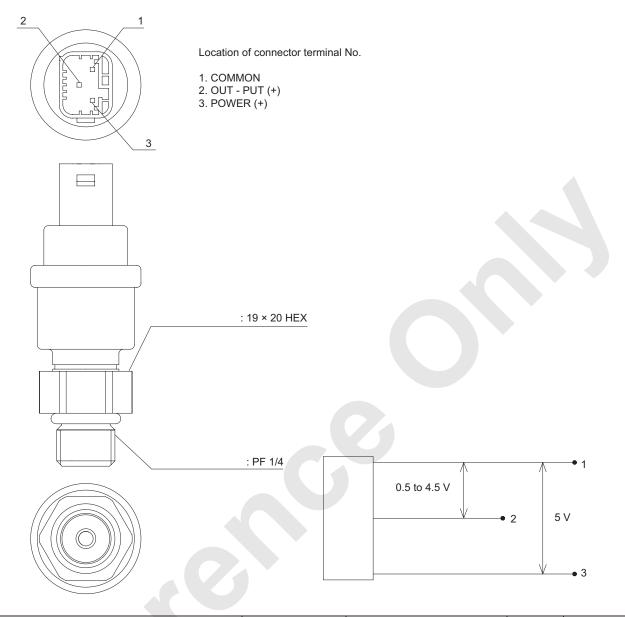


Use	Part number	[ON] Pressure	[OFF] Pressure
Foot brake pressure		4.5 MPa (653 psi)	3.7 MPa (537 psi)

# 10.1.7 PRESSURE SENSOR



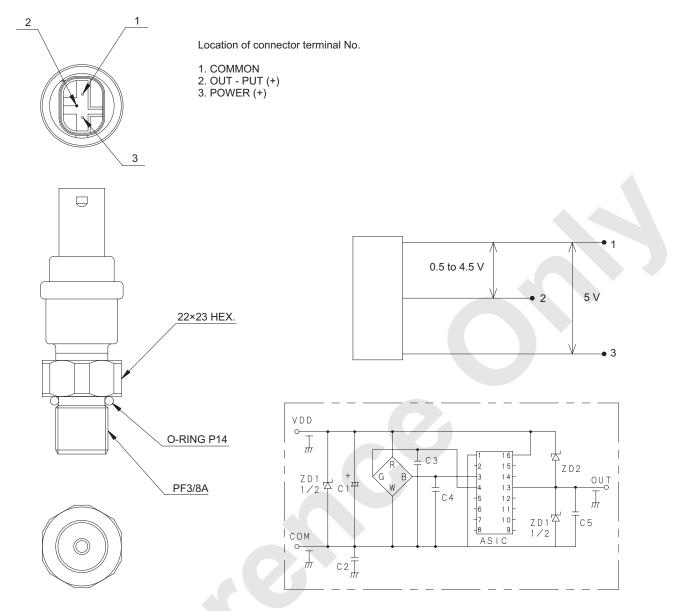
10



Use	Part number	Pressure raqnge	Power	Out-put
<ul> <li>Main pump power shift control pressure</li> <li>Swing motion detect pressure (R/L)</li> <li>CHP cracking pressure</li> <li>Remote control pressure (Front, Rear, 3rd, Swing, Boom)</li> <li>Motor control pressure (Front, Rear, 3rd)</li> </ul>		0 to 3 MPa (0 to 435 psi)	5 V	0.5 to 4.5 V
<ul><li>Swing pump pressure</li><li>Independence confluence select</li><li>Q max cut pressure</li></ul>		0 to 50 MPa (0 to 7,252 psi)	5 V	0.5 to 4.5 V

## NOTE

Pressure range	0 to 3 MPa (0 to 435 psi)	Pressure range	0 to 50 MPa (0 to 7,252 psi)
Voltage Vcc	4.5 to 5.5 VDC	Voltage Vcc	4.5 to 5.5 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 (26.7 ft⋅lbs) max	Tightning torque	73.5 N·m (54.2 ft·lbs) max

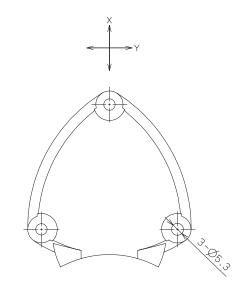


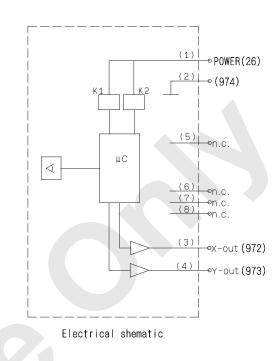
Use	Part number	Pressure raqnge	Power	Out-put
<ul><li>Clutch pressure (Front, Rear, 3rd)</li><li>Control pressure (Primary side)</li></ul>		0 to 19.6 MPa (0 to 2,842 psi)	5 V	0.5 to 4.5 V

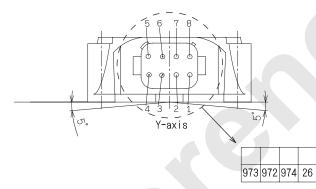
## NOTE

Tightening torque	73.5 N·m (54.2 ft·lbs)

# 10.1.8 INCLINATION SENSOR





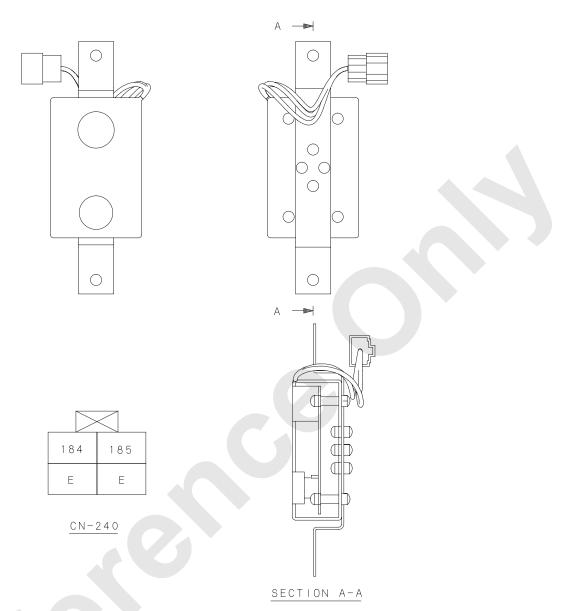


บา <u>ง</u> X-	axis

Туре	N4AA20010			
Angle range	±5 degrees			
Power source	10 to 30 VDC			
Power consumption	typ. 22 mA			
Output	X-axis 0.5 to 4.5 V Y-axis 0.5 to 4.5 V			
Load resistance	min.10 kΩ			
Zero adjustment	±5 degrees			
Resolution	0.04 degrees			
Linearity error	1% typ. of angle range			

Repetition accuracy	±0.2 degrees typ.
Temperature drift	1.3% typ.
Protection class	IP 67
Temperature range	-40 to 70°C
Vibration resistance	Endurance 10 to 500 Hz Amplitude width 3 mm X, Y, Z direction 96h (about 20G)
Impact resistance	Endurance 500 m/s² (about 50G) X, Y, Z direction about 10th

# 10.1.9 BUZZER UNIT

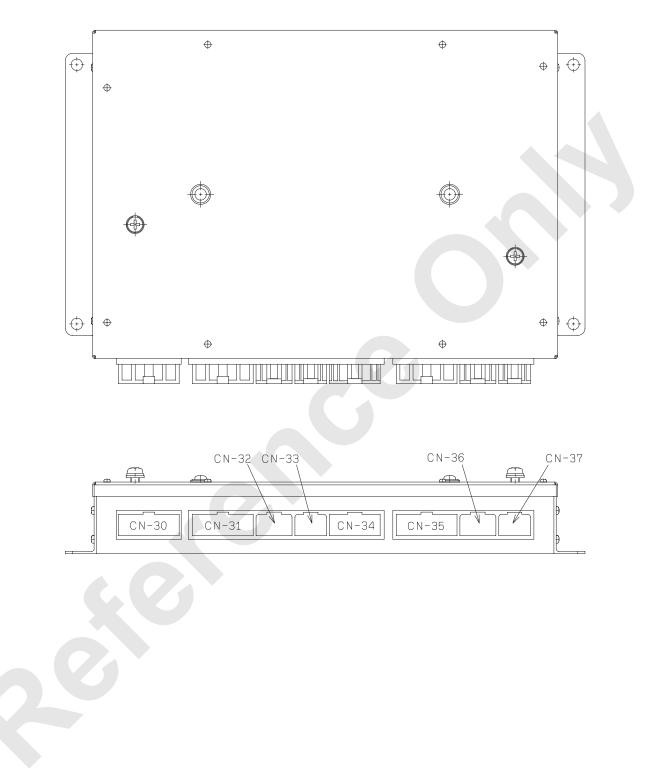


Buzzer to be used	High-pitched tone	FDK corp.	EB2210A-38C-12V
Buzzer to be used	Low-pitched tone	Bass Star precession corp.	TMX-12F

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

# 10.1.10 RELAY BOX

1. Arrangement of connector



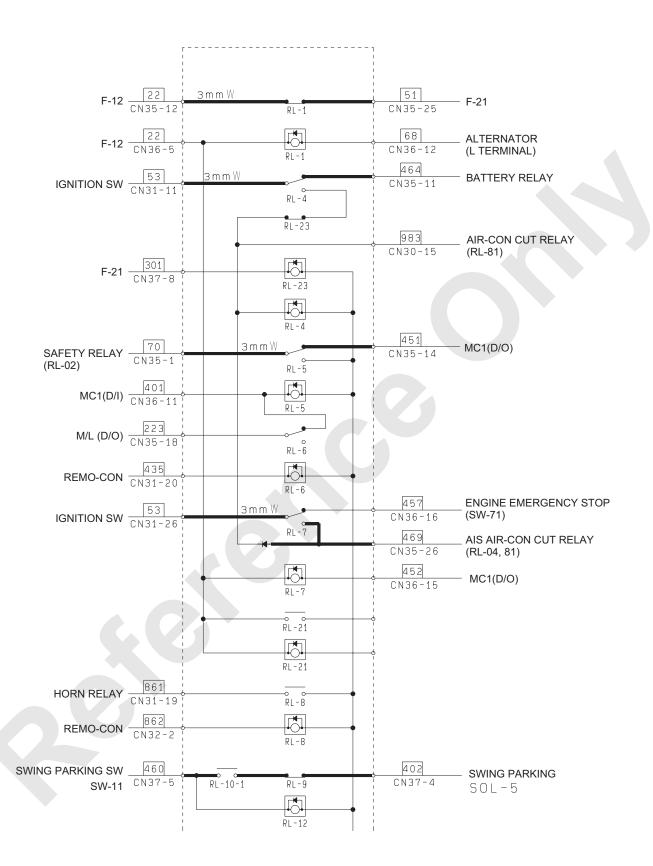
		C															
						(											
81 4	466 467	428 447		407	424 42	3 191		48	985		953 954	4 955	 5  952			52 949	
W∕G (	G/W P/W	420 447 Gr/W P	437 O		434 43 G/B W/			R/L	R∕W		G/B Br/					52 949 ⁄0 Br	
81 4	424 425	419 420	479	480	461 150	) 462		983	440		397 392	2 393	3 396	947 9	930 93	31 170	-
		G/Y Y/W	O∕B	Br/B	Y/B Br	G/0		P/G	W/R		L9/W 0/E	3 Sb	P∕W	P/G (	ar⁄R Br.	/W R/G	
			 	I-ЗОМ	•						· · · · ·		CN-3				
				-HB_G`	Y							-	l6MA-H	B_GY			
		ſ										_					
			jŒ		끈			Û		]		٦þ		Πſ			
394	83 53E	485 224	4 958	923	924 45	3 476	168	147	148			496 4					
Lg (	O/W L/R	Gr/L Gr/	′вG	L/0	G/0 R/	w o	Lg/R	0/L	G⁄W		R/G 493		/ 0	81 948			
53C	15 925	501 502 Br/W G/1			861 L/Y	12 R/Y		149	176		W/Y C			/B Lg			
L/R	Br Y/G							L/W	Gr⁄W				CN-33	M		IJ	
ر		1		V-31M						)		121	1A-HBA	_GY			
			26 MA	∖-HB_G	ŝΥ												
					)												
					,	<u>[]</u>			ſ	dh	- G	P	9		dh		
47 R	492 490 4	188 474	443 9	44 43	30 222	426 Gr/L	427			39	449 450	22	423	959			
	R/B P/L F	₽∕G L⁄B	O/L E	Br Br.	/Y P/W	GI/L	R/W			Y/B E	Br/L P/G	L/R	W∕B	L			
41		195 142 ./G Y		158 41 -⁄G Br.	10 922 /L Br/W	431	432				452 465 D/B Gr	475 G		401	960 W/1		
R						R/G	0/W							Gr⁄B			
			v−34M								1	CN-3 6MA-H					
		22 MA	∖-HB_GY	•					*								
		ſ										_			7		
			jĘ	F	PL			0					$\mathbb{P}$				]
154	22 464	421 422	2 192	193	199 21	5 216	217	395	70		463	460	402	864	929	928	
Y/R	L/R P	R/Y P/L	W/L	В/Ү	P/G W	B/R	Lg/Y	R/L	W/Y		L/B	0/L	V/W	L/G	R/Y	G/L	
	51 E0 Gr/B B	218 219 L/O Y/E			82 22 G/L Y/			E0 B	451 L/B		859 Gr	927 0/W	926 R	17 0	301 Y	160 G	

CN-35M 26 MA-HB\_GY

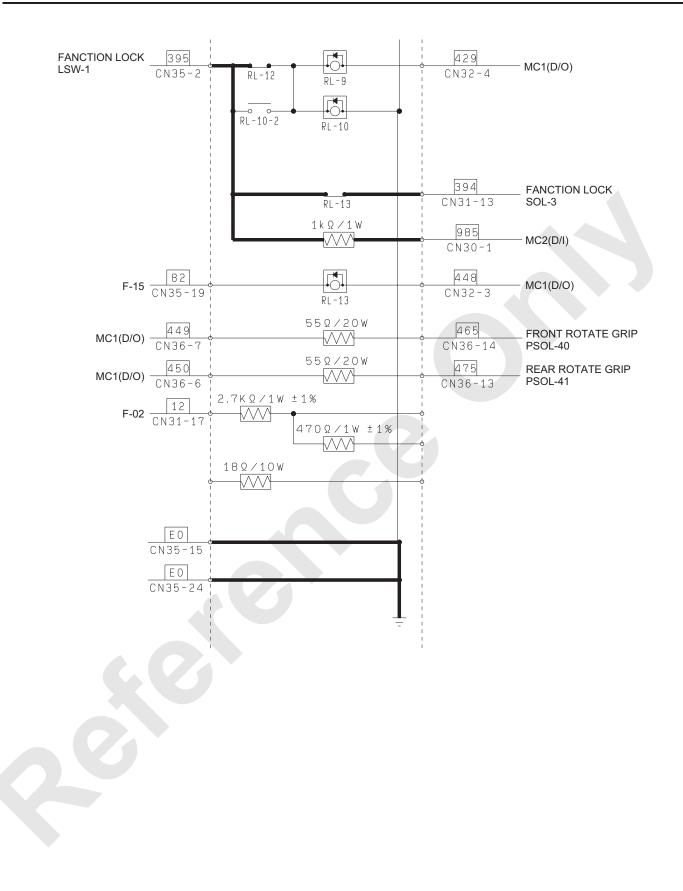
CN-37M 12MA-HB\_GY

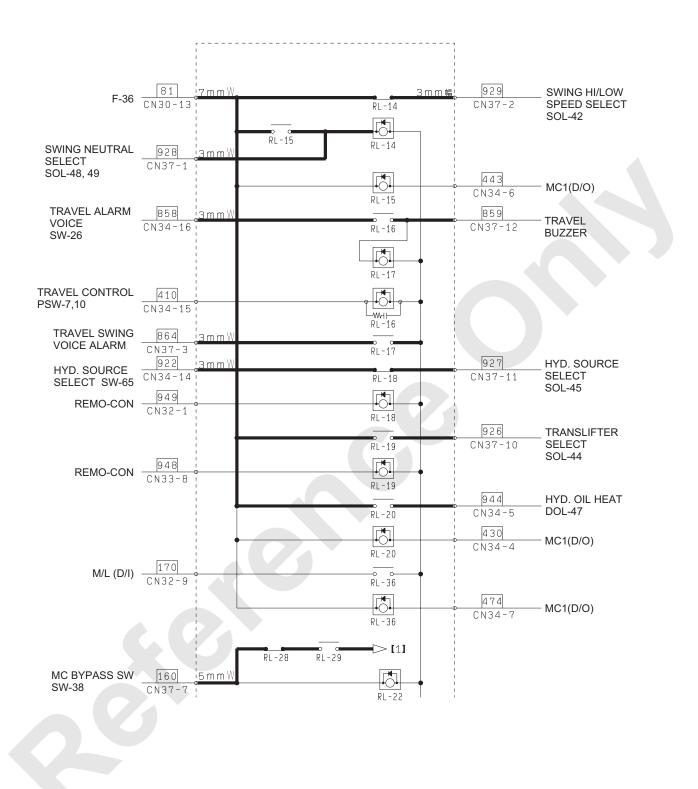
No.	Name	No.	Name
RL-1	Generation detect	RL-25-1	ML bypass hold 1
RL-2	Safety	RL-25-2	ML bypass hold 2
RL-3	Separate oil cooler motor	RL-27	Swing buzzer
RL-4	AIS	RL-28	Speed limit release
RL-5	Starter lock	RL-29	Speed limit
RL-6	Certify release	RL-30	Outside indication lamp (green)
RL-7	Engine stop	RL-31	Outside indication lamp (yellow)
RL-8	Remote control horn	RL-32	Outside indication lamp (red)
RL-9	Swing parking control	RL-36	ML adjust mode select
RL-10-1	Swing parking 1	RL-37	DPF Regeneration
RL-10-2	Swing parking 2	RL-38	Swing flasher (L)
RL-12	Swing parking 3	RL-39	Swing flasher (R)
RL-13	Pilot pressure cut	RL-40	Pump Qmax cut
RL-14	Swing Hi/Low pressure select	RL-41	CLM
RL-15	Swing neutral brake select	RL-42	ESM
RL-16	Travel alarm	RL-43	CLA
RL-17	Voice alarm	RL-44	ESA
RL-18	Hyd. pressure select (SOL45)	RL-45	CLT
RL-19	Hyd. pressure select (SOL44)	RL-46	EST
RL-20	Hyd. oil heat	RL-47	Front free select
RL-21	Engine restart	RL-48	Rear free select
RL-22-1	MC1 bypass (left swing stop +)	RL-49	Third free select
RL-22-2	MC1 bypass (left swing stop -)	RL-50-1	Jib over hoist 1
RL-22-3	MC1 bypass (right swing stop +)	RL-50-2	Jib over hoist 2
RL-22-4	MC1 bypass (right swing stop -)	RL-51	No. 2 limit
RL-22-5	MC1 bypass (main pump 1 +)	RL-53	Boom over hoist
RL-22-6	MC1 bypass (main pump 1 -)	RL-54	Self removal select
RL-22-7	MC1 bypass (main pump 2 +)	RL-55	Assy / disassy select
RL-22-8	MC1 bypass (main pump 2 -)	RL-56	Mast model self removal select
RL-22-9	MC1 bypass (boom pump +)	RL-57-1	Jib mode select 1
RL-22-10	MC1 bypass (boom pump -)	RL-57-2	Jib mode select 2
RL-23	Key resumption	RL-58-1	Bend - prevent relay (R. upper)
RL-24	ML bypass reset	RL-58-2	Bend - prevent relay (L. upper)

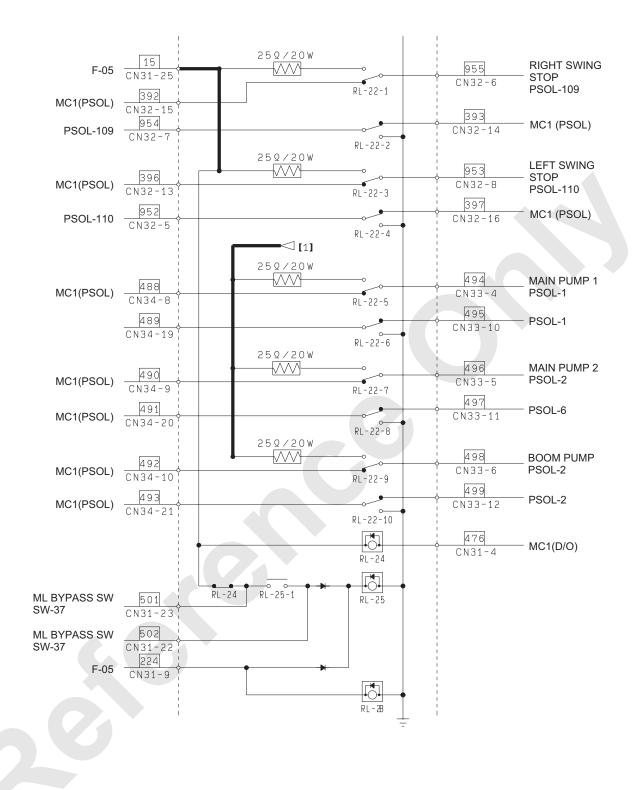
## 2. Relay box schematic

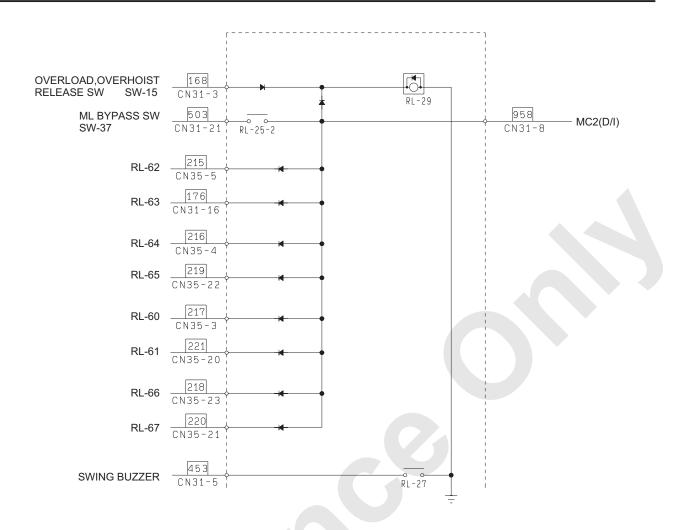


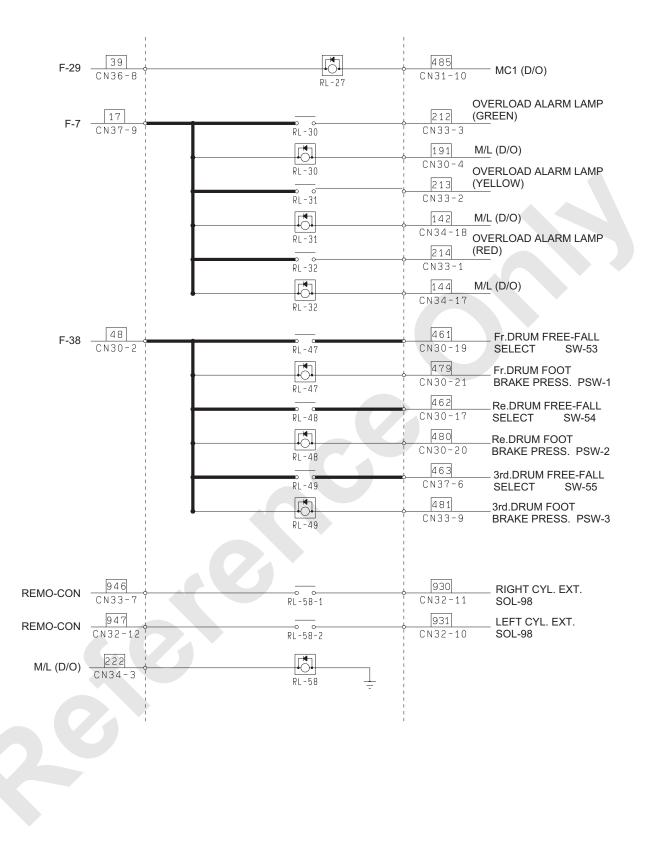
## [ 10. ELECTRIC SYSTEM ]



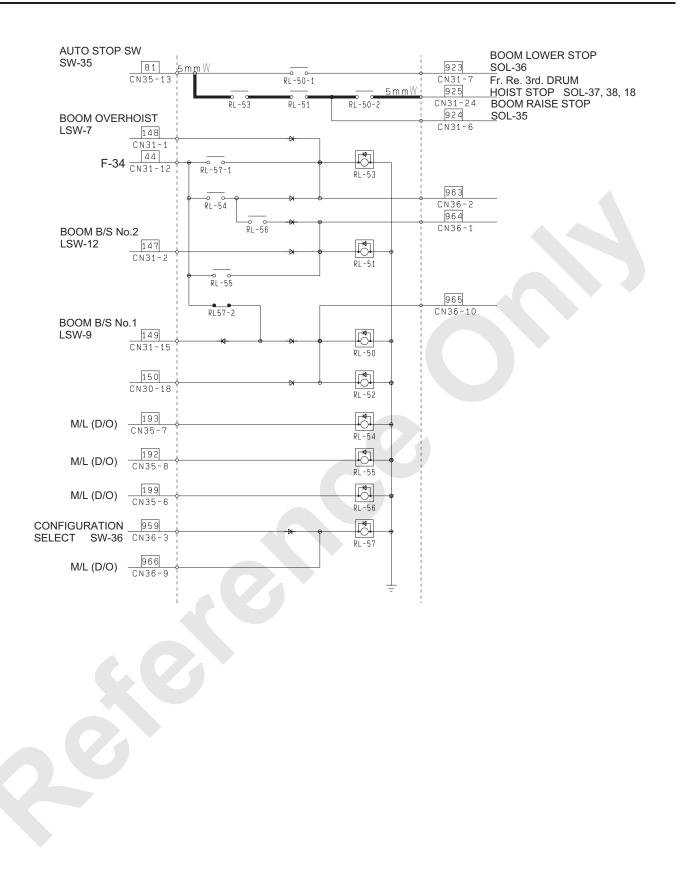




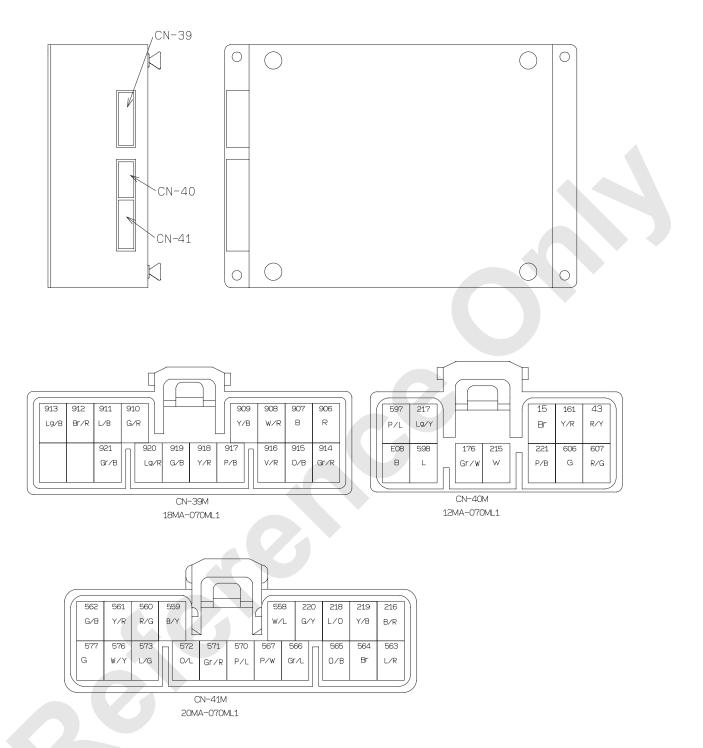




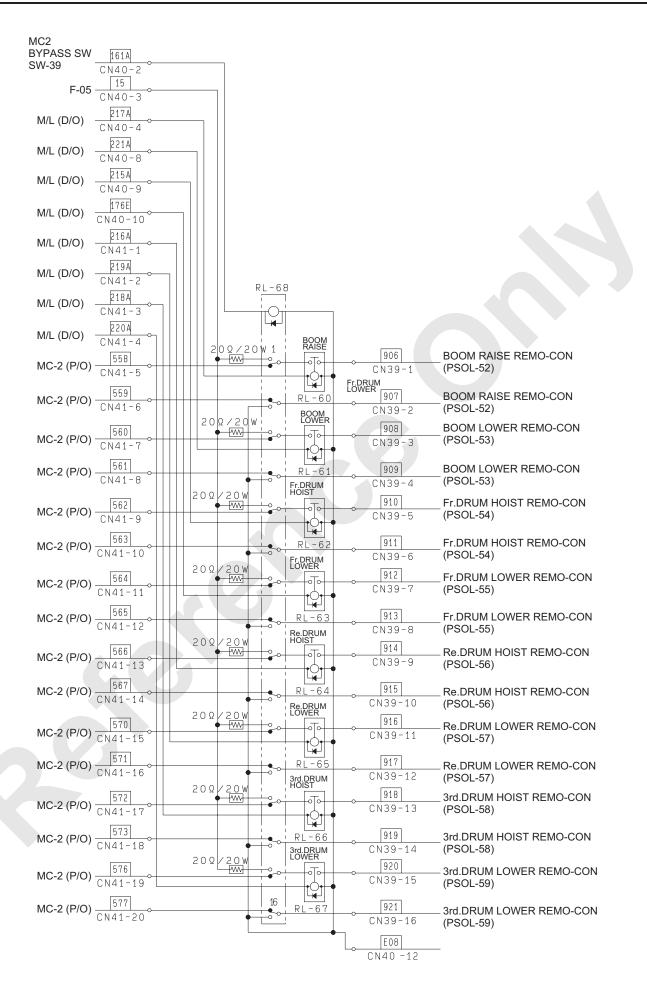
·			
F-36 81 7mmW -		440 CN30-14	- ECU
	37	447 CN30-9	- MC1(D/O)
		466 CN30-12	- SWING FLASHER (L)
	-38	437 CN30-7	- MC1(D/O)
		467 CN30-11	- SWING FLASHER (R)
	- 39	437 CN30-8	- MC1(D/O)
RI	- 40	434 CN30-6	_ Q-max CUT SOL-104
	-40	436 CN30-5	- MC1(D/O)
	- 41	424 CN30-25	Fr.DRUM CLUTCH CLM SOL-22
	-41	419 CN30-23	- MC1(D/O)
	- 42	425 CN30-24	Fr.DRUM CLUTCH ESM SOL-19
	-42	420 CN30-22	- MC1(D/O)
F-37 47	-43	426 CN34-2	Re.DRUM CLUTCH CLA SOL-23
	-43	421 CN35-10	- MC1(D/O)
	- 44	427 CN34-1	Re.DRUM CLUTCH ESA SOL-20
	-44	422 CN35-9	- MC1(D/O)
	- 45	431 CN34-13	_ 3rd.DRUM CLUTCH CLT SOL-24
	*¢¢	423 CN36-4	- MC1(D/O)
	- 46	432 CN34-12	_ 3rd.DRUM CLUTCH EST SOL-21
	- 46	428 CN30-10	- MC1(D/O)

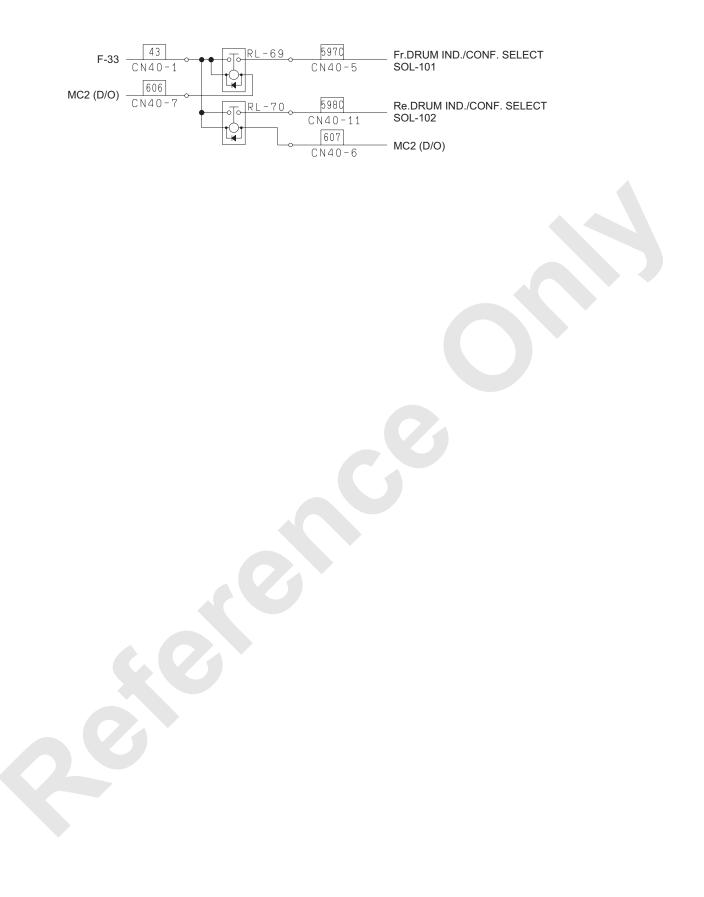


# 10.1.11 RELAY BOX



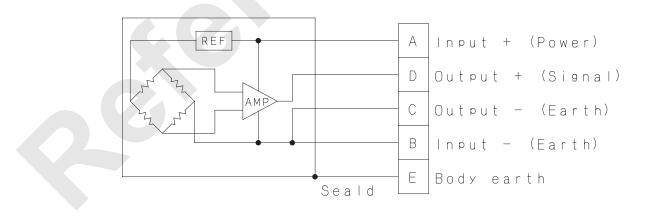
No.	Name	No.	Name
RL-60	Boom hoist raise stop relay	RL-66	Third hoist stop relay
RL-61	Boom hoist lower stop relay	RL-67	Third lower stop relay
RL-62	Front hoist stop relay	RL-68	MC bypass relay 1
RL-63	Front lower stop relay	RL-69	Independence, confluence select (F)
RL-64	Rear hoist stop relay	RL-70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





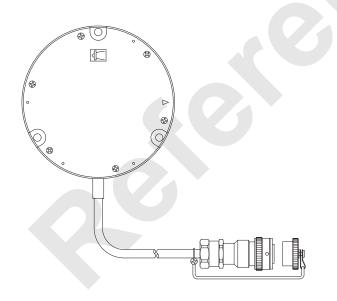
# 10.1.12 LOAD DETECTOR (CRANE)

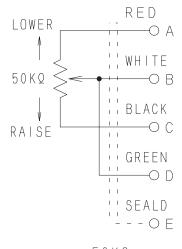
Model name	LTP-S-50-KNSA10							
Detective capacity	Guy-cable support power							
Rated capacity	5 ton (49.03 KN)							
Load capacity	150%							
	with no load 1 V $\pm$ 0.01 V (at shipping)							
Output voltage	with rated load 5 V ± 0.040 V							
Power source	DC9V ± 15 V (under 30 mA)							
Output resistance	Appr. under 100 Ω							
Insulated resistance	500M Ω / above 25 VDC							
Non Lineality	± 0.01% RO/°C							
Hysteresis	± 0.03% RO/°C							
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 33 Hz up/down for 4 hours and left/right, front/back for 2 hours.							
Shock proof	245 m/s, 15 mS X,Y, Z (3 times each)							
Water proof	Conforms to IP67 or equivalent (JIS C0920 non-seaping type)							
Durability	5 × 10 <sup>5</sup> times							
Noise proof	DC700 V 100 ns							
Total integrity	2.9% RO							
Weight	About 3 kg							



# 10.1.13 ANGLE SENSOR

Model name :	MLA-901A-**C
Object to detect :	Boom angle against ground
Valid operating range :	0 to ± 90 degree
Operation range :	360° endless
Rated output sensitivity :	0.255 V/V ± 0.5%
Input voltage :	10V
Input resistance :	50 kΩ ± 5%
Output resistance :	$(25000 + 141.6 \times \theta) \Omega \pm 5\%$
Detecting accuracy :	± 1°
Initial imbalance :	Set within ±5°
Insulate resistance :	100M Ω/ 50VDC
Output cable :	Cabtire crolobren cable 0.5 mm <sup>2</sup> × 4
Cable analysis :	Bending radius : R100, Tensile strength : 8 kg
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. 1.2 kg (main body), appr. 65 g/m (cable)





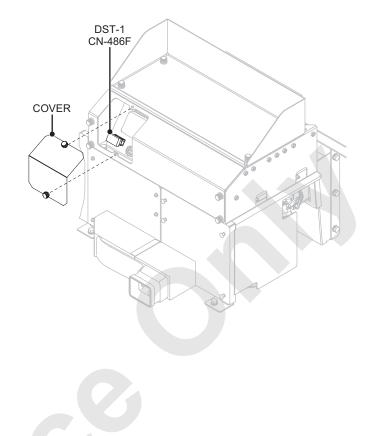
A-C	Resistance	:50ΚΩ	
A – B	Resistance (R)	:25000+141.6X	θ°

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# 10.1.14 HOW TO CHECK THE FAILURE CONTENTS

### DST-1 diag. connector location

CN-486F is located beside of fuse box at behind operator's seat.



### 1. Table of Diagnosis codes (J08E-TI)

SAE code	System	TCCS digit	Function	Check Lamp ON	Failure Level	Resume Timing	Injection volume limit	Engine Stop action	D P F Regeneration control	Failure judging condition	EGR Motion	Cause of failure
P0217	Each sensor system & related dialog	code 6	Over heat	-	2	Instant resume	Limited to 75%	No stop	-	Waater temp 115°0	Stop	Over heat
P2228	Each sensor system & related	45	Air pressure sensor failure (Lo)	0	2	Instant resume	Limited to 75%	No stop	-	<1.90V	Stop	Ourses failure an unsume stud bigh
P2229	dialog	15	Air pressure sensor failure (Hi)	0	2	Instant resume	Limited to 75%	No stop	-	>4.20V	Stop	Sensor failure or unexpected high recognition
P119F			Commonrail press. sensor charact.abnormal	0	1	Instant resume	No limit	No stop	-		_	
P0192	Each sensor system & related	74	Commonrail press. Sensor failure (Lo)	0	2	After IG-OFF	No limit	No stop	No Regeneration	<0.64V	Stop	Sensore failure or harness wire
P0193 P1197	dialog		Commonrail press. Sensor failure (Hi) Commonrail sub press. Sensor failure (Lo)	0	2	After IG-OFF Instant resume	No limit No limit	No stop No stop	No Regeneration –	>4.78V <0.89V	Stop	breaking, short
P1198		74	Commonrail sub press. Sensor failure (Hi)	-	1	Instant resume	No limit	No stop	-	>4.82V	-	Sensore failure or harness wire breaking, short
P0237	Each sensor system & related	25	Intake air press. (boost P.) sensor failure(Lo)	0	2	After IG-OFF	Limited to 75%	No stop	-	<0.19V	_	Sensore failure or harness wire
P0108	dialog	20	Intake air press. (boost P.) sensor failure(Hi)	0	2	After IG-OFF	Limited to 75%	No stop	-	>4.11	_	breaking, short
P0117	Each sensor system & related	11	Water temp sensor failure (Lo)	0	2	Instant resume	Limited to 75%	No stop	-	<0.10V	Stop	Sensore failure or harness wire
P0118	dialog	11	Water temp sensor failure (Hi)	0	2	Instant resume	Limited to 75%	No stop	-	>4.77V	Stop	breaking, short
P0182	Each sensor system & related	14	Combution temp. sensor failure (Lo)	0	1	Instant resume	No limit	No stop	-	<0.10V	-	Sensore failure or harness wire
P0183	dialog	14	Combution temp. sensor failure (Hi)	0	1	Instant resume	No limit	No stop	-	>4.85V	-	breaking, short
P2120			Both accel sensor failure	0	1	After IG-OFF	No limit	No stop	-	1 · 2 sensor failed	_	
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	-	
P2123 P2126	Accel sensor system	22	Accel sensor 1 failure (Hi) Accel sensor 2 voltage abnormal	-	1	After IG-OFF After IG-OFF	No limit No limit	No stop No stop	-	>4. 85V		Sensore failure or harness wire
P2120 P2127			Accel sensor 2 failure (Lo)		1	After IG-OFF	No limit	No stop	_	<0. 30V		breaking, short
P2127			Accel sensor 2 failure (Hi)		1	After IG-OFF	No limit	No stop	_	<0. 30V		
P1133		23	Work accel sensor (Hi)		1	After IG-OFF	No limit	No stop	_	>4. 85V	_	
P0335		20	Main rotate sensor failure, Both rotate sensor failure	0	2	Instant resume	Limited to 75%	No stop	_	74.007	Stop	When front rotate sensor failure. harness abnormal, both sensors failed starter ON at certain level.
P0336		13	Main rotate sensor pulse abnormal	0	2	Instant resume	Limited to 75%	No stop	_		Stop	ptate sensor abnormal, pulse area abnorr
P0016	Rotating sensore system		Main sub,sensor phase shift failure	0	1	Instant resume	No limit	No stop	_		_	
P0340		40	Sub rotate sensor failure	0	1	Instant resume	No limit	No stop	-		-	ub rotate sensor failure, harness abnorma
P0341		12	Sub rotate sensor pulse abnormal	0	1	Instant resume	No limit	No stop	-		_	tate sensor abnormal, pulse area abnorm
P0088		69	Commonrail abnormal hi pressure (1st step )	0	1	After IG-OFF	No limit	No stop	-		-	
P0088		69	Commonrail abnormal hi pressure (2nd step )	0	1	After IG-OFF	No limit	No stop	-		-	
P0088		76	Commonrail pressure hi pressure abnormal	0	1	After IG-OFF	No limit	No stop	-		_	
P0087	Supply pump system	76	Commonrail pressure under abnormal	0	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop	
P0629		75	Supply pump sol v. 1failure (no press.feed)	0	3	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop	SCV short (+B)
P0628		73	Supply pump sol v. 1failure (All delivery)	0	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 common 1 failure (GND short )	0	3	After IG-OFF	No limit	No stop	No Regeneration		Stop	
P1214	Injector system	68	Injector common 2 failure (GND short )	0	3	After IG-OFF	No limit	No stop	No Regeneration		Stop	Injector×3 failed. Or injector power harness abnormal
P1212	injector system	00	Injector common 1 failure (VB short, open )	0	3	After IG-OFF	No limit	No stop	No Regeneration		Stop	
P1215			Injector common 2 failure (VB short, open )	0	3	After IG-OFF	No limit	No stop	No Regeneration		Stop	
P0201		61	Injector 1 wire breaking	0	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop	
P0202		62	Injector 2 wire breaking	0	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop	
P0203	Injector system	63	Injector 3 wire breaking	0	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop	injector failed or injector harness abnormal
P0204	injector system	64	Injector 4 wire breaking	0	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop	(intake side)
P0205		65	Injector 5 wire breaking	0	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop	
P0206		66	Injector 6 wire breaking	0	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop	

1	Remark
	Due to main priority, no output limit since limited at B/U main failure.
	Injection volume is surpressed and futher output down
	XCAN is main control
	X C A N is main control
	Intake air volume is required in calculation. At fault Eng. Is closed.
rn	nal etc.
na	Starting characteristics becomes slightly worse.
n	ongnity worse.
-	
	Half of cylinders do not inject and output
	is decreased accordingly.
	No output limit. Inject inself is decreased into half, reduced cylinder running and speed variation becomes large.
	Ť
	No output limit. Failed cylinder does not inject and output is decreased accordingly.

		TOOR											
SAE code	System	digit code	Function	Check Lamp ON	Failure Level	Resume Timing	Injection volume limit	Engine Stop action	D P F Regeneration control	Failure judging condition	EGR Motion	Cause of failure	Remark
P0263		61	Inter-cylinder Caribration errer # 1	-	1	After IG-OFF	No limit	No stop	_		_		
P0266		62	Inter-cylinder Caribration errer #2	-	1	After IG-OFF	No limit	No stop	-		_		
P0269		63	Inter-cylinder Caribration errer #3	-	1	After IG-OFF	No limit	No stop	-		_	Intercylinder carbration abnormal or	
P0272	Injector system	64	Inter-cylinder Caribration errer # 4	-	1	After IG-OFF	No limit	No stop	-		-	flow dumper actuation	
P0275		65	Inter-cylinder Caribration errer #5	-	1	After IG-OFF	No limit	No stop	-		-		
P0278		66	Inter-cylinder Caribration errer #6	-	1	After IG-OFF	No limit	No stop	-		_		
P0234	Turbo	34	Turbo over boost	0	3	Instant resume	Limited to 50%	No stop	-		-	Over boost Turbo failure	
P0045			VNT actuator failure 1 (major failure)	0	3	After IG-OFF	20%+rotate contro	No stop	-		-		
F 0043	V N T System	35	VNT actuator failure 2 (minor failure)	0	2	After IG-OFF	Limited to 75%	No stop	-	Failure info. Received from	-	Major failure may highly cause VNT drive area sticking.	
P00AF	V IV I Oystoni	00	VNT CONTROLLER FAILURE 1 (MAJOR FAILURE)	0	3	After IG-OFF	20%+rotate contro	No stop	-	VNT controller	-	Or failure of stuck.	
1 00/ 1			VNT CONTROLLER FAILURE 2 (MAJOR FAILURE)	0	2	After IG-OFF	Limited to 75%	No stop	-		-		
P0611		71	ECU CHARGE CIRCUIT FAILURE (Lo)	0	3	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop		
P0200			ECU CHARGE CIRCUIT FAILURE (Hi)	0	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		Stop		
P0605	E C U Main body system		Flash ROM abnormal	0	2	After IG-OFF	Limited to 75%	No stop	No Regeneration		-	ECU failure Affecting engine control	
P0606		3	CPU failure (Hard detect)	0	3	Instant resume	Forcible stop	Stop	-		_		
P0607			CPU monitor IC abnormal	0	3	Instant resume	Limited to 75%	No stop	No Regeneration		Stop		
P1601		2	QR code failure	0	1	Instant resume	No limit	No stop	-		-		
P2100			DC motor wrte breakage drive duty wire breaka	0	1	After IG-OFF	No limit	No stop	-		-		
P2103		31	DC motor, GND short	0	3	After IG-OFF	Limited to 50%	No stop	-		Stop		
P2101	Intake air orfice valve		Intake air orifice sensor sticking	0	3	After IG-OFF	Limited to 50%	No stop	-		Stop	ecting to temp. rise at manual regenerat	t Intale throttle full open
P0122		32	Intake air orifice opening sensor failure (Lo)	0	3	After IG-OFF	Limited to 50%	No stop	-	<0.20V	_		
P0123			Intake air orifice opening sensor failure (Hi)	0	3	After IG-OFF	Limited to 50%	No stop	-	>4.80V	-		
P1458	E G R related	81	EGR system failure 1 (major failure)	0	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)	0	2	After IG-OFF	Limited to 75%	No stop	-		Stop	EGR close order but close valve stuck	
P06D3		5	Air flow sensor power (+B)	-	1	Instant resume	No limit	No stop	-		-		
P06D4	Air flow sensor		Air flow sensor power (GND)	-	1	Instant resume	No limit	No stop	-		_		
P0104		17	Air flow sensor abnormal 1 (High frequend)	0	2	After IG-OFF	Limited to 75%	No stop	-	<0.85kHz	Stop		
P0104			Air flow sensor abnormal 2 (Low frequend)	0	2	After IG-OFF	Limited to 75%	No stop	-	>9.80kHz	Stop		
P0112	Intake air sensor	17	Intake air temp. sensor abnormal (Low)	0	1	Instant resume	No limit	No stop	-	<0.06V			
P0113			Intake air temp. sensor abnormal (High)	0	1	Instant resume	No limit	No stop	-	>4.55V			
P200C		91	D P F meltdown failure 1	0	1	DPF-reset	No limit	No stop	-		_		
P244A			D P F meltdown failure 2	0	3	DPF-reset	Limited to 50%	No stop	-		-		
P2463	DPF related	92	D P F abnormal clog 1	0	3	DPF-reset	Limited to 50%	No stop	-		_		Failure resume need reset of DPF internal info with special tool.
P244B			D P F abnormal clog 2	0	3	DPF-reset	Limited to 50%	No stop	-		_		Use of tool requiews sparate leveling
P2458		93	DPF catalyst detedeterioration 1	0	3	DPF-reset	Limited to 50%	No stop	No Regeneration		_		
P24A2			DPF catalyst detedeterioration 2	0	3	DPF-reset	Limited to 50%	No stop	No Regeneration		_		
P1427	Pressure difference sensor system	28	Pressure difference sensor abnormal (Lo)	0	3	After IG-OFF	Limited to 50%	No stop	-	<0.50V	_		
P1428			Pressure difference sensor abnormal (Hi)	0	3	After IG-OFF	Limited to 50%	No stop	-	>4.46V	_		
P0545	Exhaust air temp. system 27		Exhaust air temp. sensor1 abnormal (Lo)	0	1	Instant resume	No limit	No stop	No Regeneration	<0.06V	_		
P0546		27	Exhaust air temp. sensor1 abnormal 1 (Hi)	0	1	Instant resume	No limit	No stop	No Regeneration	>4.96V	_		
P2032			Exhaust air temp. sensor1 abnormal 2 (Lo)	0	1	Instant resume	No limit	No stop	-	<0.06V	_		
P2033			Exhaust air temp. sensor1 abnormal 2 (Hi)	0	1	Instant resume	No limit	No stop	-	>4.96V	_		
P0642			Sensor power 1 abnormal (Lo)	_	1	Instant resume	No limit	No stop	-		_		This occurs at same time with other
P0643	Sensor voltage system	5	Sensor power 1 abnormal (Hi)	_	1	Instant resume	No limit	No stop	-		_		failure. Power system check as major cause
P0652			Sensor power 2 abnormal (Lo)	-	1	Instant resume	No limit	No stop	-		_		may help
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 F Regeneration control	Failure judging condition	EGR Motion	Cause of failure	Remark
P0540	Vehicle system		Pre-heating device failure	0	1	Instant resume	No limit	No stop	_		-	Pre-heating device (Shoprt +B, GND)	
P0686	Vehicle system	51	Main relay failure	0	1	Instant resume	No limit	No stop	_		-	Power system failure	
P0219	Vehicle system	7	Engine over run	0	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		٩	CAN1 failure	0	1	After IG-OFF	No limit	No stop	-		-		
U110A		9	Transmission lost_TSC1 (Isolation command)	0	1	After IG-OFF	No limit	No stop	-		-		
U0073	Transmission related		CAN2 failure	0	3	After IG-OFF	Limited to 50%	No stop	No Regeneration		Stop		
U1122		8	Transmission lost_E G R	0	2	After IG-OFF	Limited to 75%	No stop	-		Stop		
U1123			Transmission lost_V N T	0	3	After IG-OFF	Limited to 50%	No stop	No Regeneration		1		

\*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)

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.)

## 10.1.15 WARNING DISPLAY CONDITION

Code	Message	Condition, Action	Warning display condition
MC1-W01	ENGINE PREHEAT	The message is displayed when the engine cooling water temperature is 0 degrees or less with the key switch turned ON.	(MC1-B20) is in OFF condition with the
MC1-W02	PREHEAT COMPLETED	The message is displayed for 5 seconds after the operation is complete.	Indicate 5 seconds when the charging (MC1-B20) becomes ON (Approx. 24V after indicate "W01".
MC1-W03	CHARGING PROBLEM	<ul> <li>The charging circuit is malfunctioned.</li> <li>Consult with your nearest Manitowoc authorize distributor.</li> <li>* That it is not fault even this item is momentarily displayed immediately after the engine is started.</li> </ul>	Indicate either the conditions of th engine oil pressure (MC1-B02) is OFF the engine revolution is more than 10 min <sup>-1</sup> with the charging (MC1-B20) is OF or the engine oil pressure (MC1-B02 is ON (=GND), the actual engin revolution is less than 100 min <sup>-1</sup> with th charging (MC1-B20) is ON (Approx. 24V condition.
MC1-W04	PILOT RESSURE (PRIMARY) ABNORMAL	The control primary pressure is abnormal. Stop the operation at once, and consult with your nearest Manitowoc authorize distributor. * That it is not fault even this item is momentarily displayed immediately after the engine is started.	Indicate either the conditions of th engine oil pressure (MC1-B02) is OFI the charging (MC1-B20) is ON (Approx 24V) with the control primary pressur (MC1-A12) is less than 4.4 MPa or th engine oil pressure (MC1-B02) is O (=GND), the charging (MC1-B20) is OFF with the control primary pressur (MC1-A12) is exceeding 4.4 MPa.
MC1-W05	ENGINE OIL PRESSURE	The engine oil pressure is abnormal. Stop the engine at once, and consult with your nearest Manitowoc authorize distributor.	Indicate either the conditions of the charging (MC1-B20) is ON (Appro- 24V), the actual engine revolution more than 100 min <sup>-1</sup> with the engine of pressure (MC1-B02) is ON (=GND) or the charging (MC1-B20) is OFF, the actu- engine revolution is less than 100 min with the engine oil pressure (MC1-B02) is in OFF condition.
MC1-W06	ENGINE WATER LEVEL	The cooling water level in the radiator is insufficient. Refill the radiator with cooling water.	Indicate when the cooling water leve (MC1-B08) is in ON (=GND) condition with the engine is stopping.
MC1-W08	ENGINE COOLANT TEMPERATURE	The cooling water temperature is excessively high. Idle the engine to lower temperature, and consult with your nearest Manitowoc authorize distributor.	Indicate when the cooling wate temperature is exceeding 105°C (221°F
MC1-W09	ENGINE OIL FILTER	The engine oil filter is clogged. Replace the filter.	Indicate when the engine oil filter cloggin (MC1-B09) is ON (=GND) condition.

Code	Message	Condition, Action	Warning display condition
MC1-W10	ENGINE AIR FILTER	The engine air cleaner is clogged. Clean or replace the element.	Indicate when the air cleaner filter clogging (MC1-B04) is ON (=GND) condition.
MC2-W11	EMPTY FUEL	The fuel level is insufficient. Refuel.	Indicate when the fuel level is less than 5% of the tank capacity condition.
MC1-W12	HYDRAULIC OIL TEMPERATURE		Indicate when the hydraulic oil temperature (MC1-A10) is exceeding 90°C (194°F) condition and release becomes less than 80°C (176°F).
MC1-W13	FRONT WINCH COOLING CIRCUIT OIL TEMPERATURE		Indicate when the main winch brake cooling oil temperature (MC1-B06) is ON condition.
MC1-W14	REAR WINCH COOLING CIRCUIT OIL TEMPERATURE	The temperature of clutch cooling oil of the front drum is excessively high. Idle the engine at a high speed to lower the oil temperature. If this item frequently appears during normal operations, consult with your nearest Manitowoc authorize distributor. At the same time, inform the Manitowoc service of the details of the operation (lifting load, free fall distance, speed, and duration).	Indicate when the auxiliary winch brake cooling oil temperature (MC1-B07) is ON condition.
MC1-W15	WINCH FILTER CLOGGED		Indicate when the cooling line filter (MC1-B37) is ON (=GND) condition with the condition of either the engine oil pressure (MC1-B02) is OFF or charging (MC1-B20) is ON (Approx. 24V).

Code	Message	Condition, Action	Warning display condition
MC1-W16	FRONT SAFETY ESM SOLENOID VALVE IS ENERGIZED	The front drum clutch emergency system is actuated. The free fall of the front drum cannot be normally performed. Place a load and the hook onto the ground, and turn the key switch to the OFF position. Then, consult your nearest Manitowoc authorize distributor. DO NOT operate the key switch with a load or the hook hung in the air, since it may cause drop of the load or the hook.	<ul> <li>Indicate when the ESM-SOL is operating.</li> <li>The conditions of operating the ESM (operate either 1 or 2 below is realized).</li> <li>1. The main winch clutch pressure (MC1-A21) is less than 3.73 MPa (Approx. 1.26V) with the condition of the engine oil pressure (MC1-B02) is OFF at the brake mode is selected.</li> <li>2. The main winch clutch pressure is less than 3.73 MPa (Approx. 1.26V) while the lever is manipulating with the free mode is selected.</li> </ul>
MC1-W17	REAR SAFETY ESA SOLENOID VALVE IS ENERGIZED	The front drum clutch emergency system is actuated. The free fall of the front drum cannot be normally performed. Place a load and the hook onto the ground, and turn the key switch to the OFF position. Then, consult your nearest Manitowoc authorize distributor. DO NOT operate the key switch with a load or the hook hung in the air, since it may cause drop of the load or the hook.	<ul> <li>Indicate when the ESA-SOL is operating.</li> <li>The conditions of operating the ESA (operate either 1 or 2 below is realized).</li> <li>1. The auxiliary winch clutch pressure (MC1-A22) is less than 3.73 MPa (Approx. 1.26V) with the condition of the engine oil pressure (MC1-B02) is OFF at the brake mode is selected.</li> <li>2. The auxiliary winch clutch pressure is less than 3.73 MPa (Approx. 1.26V) while the lever is manipulating with the free mode is selected.</li> </ul>
MC1-W18	3RD SAFETY EST SOLENOID VALVE IS ENERGIZED	The front drum clutch emergency system is actuated. The free fall of the front drum cannot be normally performed. Place a load and the hook onto the ground, and turn the key switch to the OFF position. Then, consult your nearest Manitowoc authorize distributor. DO NOT operate the key switch with a load or the hook hung in the air, since it may cause drop of the load or the hook.	<ul> <li>Indicate when the EST-SOL is operating.</li> <li>The conditions of operating the EST (operate either 1 or 2 below is realized).</li> <li>1. The third winch clutch pressure (MC1-A22) is less than 3.73 MPa (Approx. 1.26V) with the condition of the engine oil pressure (MC1-B02) is OFF at the brake mode is selected.</li> <li>2. The auxiliary winch clutch pressure is less than 3.73 MPa (Approx. 1.26V) while the lever is manipulating with the free mode is selected.</li> </ul>
MC1-W19	HOOK OVER HOIST RELEASE SWITCH IS OPERATING	The hook overhoist automatic stop release switch is actuated.	When hook over hoist limit is released.
MC1-W20	BOOM OVER HOIST RELEASE SWITCH IS OPERATING	The boom overhoist automatic stop release switch is actuated.	When boom over hoist limit is released.

Code	Message	Condition, Action	Warning display condition
MC2-W21	ML BYPASS SWITCH IS OPERATING		Indicate when the ML becomes bypass (MC2-B53, B54) is ON (Approx. 24V) condition.
MC1-W22	DPF OPTION SETTING ABNORMAL	Option setting dose not match with engine spec. Contact Manitowoc service shop.	<ul> <li>Indicate when either 1 or 2 below is realized.</li> <li>1. When the signal of "none DPF equipped" is receiving (CAN) from the ECU with the area (Regulated area) where the DPF is optional (option setting : O).</li> <li>2. When the signal of "none DPF equipped" is not receiving while the DPF option setting is "X".</li> </ul>
MC1-W23	FRONT DRUM ROTATION SENSOR ADJUSTMENT	Front drum rotation sensor is not functioning properly. Adjust sensor position. If not corrected even after adjustment, contact Manitowoc service shop.	Indicate when more than continuous 5 times failure of the detection is occurred of the interruption by the main winch rotation sensor during the main winch operating lever back to neutral position after more than 3 seconds manipulated the lever. Release when detect the interruption by the main winch rotation sensor while the main winch lever is manipulating.
MC1-W24	REAR DRUM ROTATION SENSOR ADJUSTMENT	Rear drum rotation sensor is not functioning properly. Adjust sensor position. If not corrected even after adjustment, contact Manitowoc service shop.	Indicate when more than continuous 5 times failure of the detection is occurred of the interruption by the auxiliary winch rotation sensor during the auxiliary winch operating lever back to neutral position after more than 3 seconds manipulated the lever. Release when detect the interruption by the auxiliary winch rotation sensor while the auxiliary winch lever is manipulating.
MC2-W31	FRONT DRUM NEGA BRAKE ABNORMAL	Front drum nega brake function may be abnormal. Contact Manitowoc service shop.	<ul> <li>Indicate when detect the drum rotation after following conditions are realized.</li> <li>The main winch lever is more than 1 second in neutral position.</li> <li>The mode selection is in main neutral brake made.</li> <li>No occurrence of the main rotation sensor adjustment (W23).</li> </ul>

Code	Message	Condition, Action	Warning display condition
MC2-W32	REAR DRUM NEGA BRAKE ABNORMAL	Rear drum nega brake function may be abnormal. Contact Manitowoc service shop.	<ul> <li>Indicate when detect the drum rotation after following conditions are realized.</li> <li>The auxiliary winch lever is more than 1 second in neutral position.</li> <li>The mode selection is in auxiliary neutral brake made.</li> <li>No occurrence of the auxiliary rotation sensor adjustment (W24).</li> </ul>
MC2-W33	3RD. DRUM NEGA BRAKE ABNORMAL	3rd. drum nega brake function may be abnormal. Contact Manitowoc service shop.	<ul> <li>Indicate when detect the drum rotation after following conditions are realized.</li> <li>The third winch lever is more than 1 second in neutral position.</li> <li>The mode selection is in third neutral brake made.</li> <li>No occurrence of the third rotation sensor adjustment (W25).</li> </ul>
MC1-W35	BATTERY RELAY ABNORMAL	Battery relay contact may be adhered. Inspect battery relay. Replace if the deposited at the contact point of the relay.	Indicate when the controller power dose not trip after the battery relay (MC1-C15) is OFF condition with the main key is ON at AIS (Auto Idle Stop) situation.
MC1-W36	PROPEL LEVER INTERLOCKED	Propel (travel) lever is kept ON. Pilot pressure is cut. Return propel (travel)lever back to neutral.	Indicate when the propel (travel) lever is kept manipulating (MC1-B36) position with the function lever (MC1-B19) is ON (Approx. 24V) while this option is effective.
MC2-W37	FRONT DRUM LEVER INTERLOCKED	Front drum is stopped since front drum lever is kept ON. Return front drum lever back to neutral.	Indicate when the main winch lever is in manipulating position at the function lever (MC1-B19) becomes ON (Approx. 24V).
MC2-W38	REAR DRUM LEVER INTERLOCKED	Rear drum is stopped since rear drum lever is kept ON. Return rear drum lever back to neutral.	Indicate when the auxiliary winch lever is in manipulating position at the function lever (MC1-B19) becomes ON (Approx. 24 V).
MC2-W39	3RD. DRUM LEVER INTERLOCKED	3rd. drum is stopped since 3rd. drum lever is kept ON. Return 3rd. drum lever back to neutral.	Indicate when the third winch lever is in manipulating position at the function lever (MC1-B19) becomes ON (Approx. 24V).
MC2-W40	BOOM DRUM LEVER INTERLOCKED	Boom drum is stopped since boom drum lever is kept ON. Return boom drum lever back to neutral.	Indicate when the boom winch lever is in manipulating position at the function lever (MC1-B19) becomes ON (Approx. 24V).
MC1-W41	REMOTE CONTROLLER CONNECTED	Remote control is connected. Disconnect remote control for crane work.	Indicate when the remote-control is connected (MC1-B53 is ON : more than 24V) and the engine emergency stop (MC1-B23) is ON (Approx. 24V) $\rightarrow$ Monitor lamp is also lit.

Code	Message	Condition, Action	Warning display condition
MC1-W42 MC2-W42	MC1, 2 CHARGE SIGNAL ABNORMAL	Charge signal differs on each MC. Contact Manitowoc service shop.	Indicate when the charging conditions of MC1 and MC2 (MC1-B20, MC2-B20) are not identical.
MC1-W44 MC2-W44	MC1, 2 FUNCTION LOCK SIGNAL ABNORMAL	Function lock signal differs on each MC. Contact Manitowoc service shop.	Indicate when the function lever conditions of MC1 and MC2 (MC1-B19, MC2-B19) are not identical.
MC1-W45 MC2-W45	MC1, 2 INCHING SPEED SELECT SIGNAL ABNORMAL	Inching speed select signal differs on each MC. Contact Manitowoc service shop.	Indicate when the inching switch conditions of MC1 and MC2 (MC1-B21, MC2-B21) are not identical.
MC1-W46	Qmax CUT SOL OUTPUT OFF ABNORMAL	Qmax cut solenoid relay contact is adhered at energize side. The engine revolution will be restricted not to raising the maximum revolution. Contact Manitowoc service shop.	<ul> <li>Indicate when either following condition is realized.</li> <li>MC1-B52 signal is ON (Approx. 24V) at the Qmax Cut (MC1-C11) is OFF.</li> <li>Qmax Cut pressure (MC1-A16) is less than 3 MPa (Approx. 0.74V).</li> </ul>
MC1-W47	Qmax CUT SOL OUTPUT ON ABNORMAL	Qmax cut solenoid relay is not functioned. The engine revolution will be restricted not to raising the maximum revolution. Contact Manitowoc service shop.	<ul> <li>Indicate when either following condition is realized.</li> <li>MC1-B52 signal is OFF at the Qmax Cut (MC1-C11) is ON.</li> <li>Qmax Cut pressure (MC1-A16) is more than 3 MPa (Approx. 0.74V).</li> <li>Exceeding the engine revolution upper limit. (J08E : more than 1,800 min<sup>-1</sup>, P11C : more than 1,600 min<sup>-1</sup>)</li> </ul>
MC1-W48	ACTUAL ROTATION IS HIGHER THAN NO LOAD ROTATION	Either front or rear winch motor is running over speed or engine speed is over. Contact Manitowoc service shop.	<ul> <li>Indicate when either following condition is realized.</li> <li>Exceeding the engine revolution upper limit with the G engine mode is selected. (J08E : more than 1,800 min<sup>-1</sup>, P11C : more than 1,600 min<sup>-1</sup>)</li> <li>Detect the main or auxiliary drum over speed rotation when the neutral brake is selected. (More than 115% of specified rotation speed.)</li> </ul>
MC1-W49	HIGH LOAD TORQUE	operation is taken. Avoid abrupt lever operation and work with the care.	Indicate the present output torque is reached to 90% or more against the engine owning maximum torque as called 100%. Instruct the operator not to taking abrupt operation to avoid sudden loading.

### [ 10. ELECTRIC SYSTEM ]

Code	Message	Condition, Action	Warning display condition
MC1-W50	JOY STICK ABNORMAL	Joy stick accel switch exceeds neutral range. Return it to neutral position. If error continues even at neutral position, contact Manitowoc service shop.	Indicate when following condition is realized. When the acceleration voltage (MC1-A09) is out of neutral position (without adjustment value : 2.4V to 2.6V) at the engine started.
MC1-W51	BACK UP FUSE BLOWN OUT	Back up fuse (F-4) of each controller is blown off. Replace with new one.	Indicate the backup fuse (MC1-B40) becomes OFF.
MC2-W52	HOOK OVERHOIST LS	MC2 detects hook overhoist. Check ML or hook overhoist signal and then contact Manitowoc service shop.	Indicate when detecting the hook overhoist (MC2-B24, B25) is OFF on MC2 while ML is not detecting (not to light up the warning lamp on ML).
MC2-W53	BOOM OVERHOIST LS	MC2 detects boom overhoist. Check ML or boom overhoist signal and then contact Manitowoc service shop.	Indicate when detecting the boom overhoist (MC2-B13) is OFF on MC2 while ML is not detecting (not to light up the warning lamp on ML).
MC2-W54	JIB OVERHOIST LS	MC2 detects jib overhoist. Check ML or jib overhoist signal and then contact Manitowoc service shop.	Indicate when detecting the jib over hoist (MC2-B35) is OFF on MC2 while ML is not detecting (not to light up the warning lamp on ML).
MC2-W55	BOOM BACKSTOP No.1 LS	MC2 detects boom backstop No.1 overhoist. Check ML or boom backstop No.1 overhoist signal and then contact Manitowoc service shop.	Indicate when detecting the boom backstop No.1 (MC2-B14) is OFF on MC2 while ML is not detecting (not to light up the warning lamp on ML).
MC2-W56	BOOM BACKSTOP No.2 LS	MC2 detects boom backstop No.2 overhoist. Check ML or boom backstop No.2 overhoist signal and then contact Manitowoc service shop.	Indicate when detecting the boom backstop No.2 (utmost limit) (MC2-B15) is OFF on MC2 while ML is not detecting (not to light up the warning lamp on ML).

Code	Mossago	Warning display condition
	Message	
ME001	Out of working angle.	When press boom/jib lowering icon.
ME002	Hook over hoist release switch is operating.	When hook over hoist limit is released.
ME003	Boom/Jib over hoist release switch is operating.	When boom over hoist limit is released.
ME004	Overload release switch is operating.	When overload release switch is released.
ME005	Over load condition.	When load ratio becomes more than 100%.
ME006	Head wind is strong.	When boom/jib suspending tension drops while the boom/jib is raising.
ME007	Boom is lowered too much.	When boom reaches lowest angle limit.
ME008	Boom is raised too much.	When boom reaches high angle limit or boom over hoist limits are functioning.
ME011	Boom is lowered too much.	When boom reaches low angle limit.
ME012	Boom is raised too much.	When boom reaches high angle limit.
ME013	Jib is lowered too much.	When jib reaches low angle limit.
ME014	Jib is raised too much.	When jib reaches high angle limit.
ME015	Mast is raised too much.	When mast reaches high angle limit while lifting by mast.
ME016	Mast is lowered too much.	When mast reaches low angle limit while lifting by mast.
ME017	Hook over hoist.	When detect hook over hoist limit switch (ML-A01, A02) function.
ME018	Hook over hoist.	When detect hook over hoist limit switch (ML-A01, A02) function.
ME019	Mast cylinder limit switch has not been turned on.	When not detect mast cylinder limit switch (ML-B12) signal.
ME020	Detecting limit switch for high gantry position has not been turned on.	When not detect high gantry limit switch (ML-B12) signal.
ME021	Boom over hoist.	When boom reaches high angle limit.
ME022	Jib over hoist.	When jib reaches high angle limit.
ME024	Overload precautions.	When reaches overload precaution area. (Load ratio get into more than 90 to less than 100%).
ME025	Reached the load limitation value of WORKING AREA LIMIT function.	When reaches to lifting load set value for work area limit.
ME026	Reached 90% of the load limitation value of WORKING AREA LIMIT function.	When reaches to 90% of lifting load set value for work area limit.
ME027	Boom angle reached upper limitation value of WORKING AREA LIMIT function.	When boom reaches high set angle limit for work area limit.
ME028	Boom angle reached lower limitation value of WORKING AREA LIMIT function.	When boom reaches low set angle limit for work are limit.
ME029	Jib angle reached upper limitation value of WORKING AREA LIMIT function.	When jib reaches high set angle limit for work area limit.
ME030	Jib angle reached lower limitation value of WORKING AREA LIMIT function.	When jib reaches low set angle limit for work area limit.
ME031	Working radius reached limitation value of WORKING AREA LIMIT function.	When reaches working radios set value for work area limit.

Code	Message	Warning display condition	
ME032	Boom point elevation reached limitation value of WORKING AREA LIMIT function.	When reaches boom point height set value for wor area limit.	
ME033	Jib point elevation reached limitation value of WORKING AREA LIMIT function.	When reaches jib point height set value for work a limit.	
ME034	Crane configuration setting is wrong.	When read internal memory abnormally.	
ME035	A moment real load exceeds minimum value.	When detect indefinite load while boom/jib lowerin icon is actuated.	
ME036	The malfunction of the load cell for the boom (1).	When occurs port error (ML-A1).	
ME037	The malfunction of the load cell for the boom (2).	When occurs port error (ML-A2).	
ME038	The malfunction of the load cell for the jib (1).	When occurs port error (ML-A3).	
ME039	The malfunction of the load cell for the jib (2).	When occurs port error (ML-A4).	
ME040	The malfunction of the load cell for the main hook.	When occurs port error (ML-A5).	
ME041	The malfunction of the load cell for the aux. hook.	When occurs port error (ML-A6).	
ME042	The malfunction of the load cell for the 3rd hook.	When occurs port error (ML-A7).	
ME044	The malfunction of the boom base angle sensor.	When occurs port error (ML-A9).	
ME045	The malfunction of the boom tip angle sensor.	When occurs port error (ML-A10).	
ME046	The malfunction of the mast angle sensor.	When occurs port error (ML-A11 or ML-A12).	
ME047	The trouble of the lower jib angle sensor.	When occurs port error (ML-A13)	
ME048	The malfunction of the jib tip angle sensor.	When occurs port error (ML-A14).	
ME049	CEN Option setting error	When mismatch between CEN option setting and CE specification recognition (ML-B29).	
ME050	Test Mode	When converting test mode for EN13000.	
ME051	Options unmatch of civil engineering mode.	When setting of civil engineering works option mode wrong.	
ME052	Data unmatch of civil engineering mode.	When mismatch between selected posture an condition of mode select switch.	
ME056	Inspection mode for overload condition.	When actuate overload testing icon. (on the monitor display)	
ME058	Set the swing brake mode.	When setting of swing limit with swing free mode. Apply swing parking brake and shift to swing brak mode.	
ME060	Boom over hoist.	When boom reaches high angle limit.	
ME061	Jib winch wire rope is tightened a little more than normal.	When detect suspending tension between 5 to 8 tor at tower configuration with boom/jib lowering icon actuated.	
ME062	Jib winch wire rope is abnormally tightened.	When detect suspending tension more than 8 tor at tower configuration with boom/jib lowering icon actuated.	
ME063	ML crane configuration does not correspond to the counter weight detecting signal.	When mismatch between detected value and selected posture of counter-weight.	
ME066	Danger!! The jib tip touches at the ground.	When detect tower jib prevention limit switch fro bending.	
ME067	Boom winch wire rope is abnormally tightened.	When detect tension to mast more than 5 tons.	

Code	Message	Warning display condition	
ME068	Writing error of operator identification ID and/or password.	When write account information fail.	
ME069	Writing error of WORKING AREA LIMIT values.	When write setting information of work area limit fail.	
ME081	Front winch over pay out	When detect over pay-out No. 1 limit switch signal.	
ME082	Rear winch over pay out	When detect over pay-out No. 2 limit switch signal.	
ME083	Third winch over pay out	When detect over pay-out No. 3 limit switch signal.	
ME084	Lateral inclination is out of range.	When detect inclination exceed more than ±0.2 degrees.	
ME085	Longitudinal inclination is out of range.	When detect inclination exceed more than ±0.2 degrees.	
ME086	MC1 redundancy switch is operating.	When input MC1 bypass switch (ML-B19).	
ME087	MC2 redundancy switch is operating.	When input MC2 bypass switch (ML-B20).	
ME088	Connect the weight	When reduced weight specification, detect abnormal of weight.	
ME089	Time out error of synchronizing check during the MC1 start-up process.	When not synchronized with MC1 at boot-up. MC1 fault or CAN communication failure.	
ME090	Time out error of synchronizing check during the MC2 start-up process.	When not synchronized with MC2 at boot-up. MC2 fault or CAN communication failure.	
ME092	Error No.1 of ML internal setting values abnormality. (Optional item setting)	When read option information fail. *1	
ME093	Error No.2 of ML internal setting values abnormality. (Crane data)	When read crane date fail. *1	
ME094	Error No.3 of ML internal setting values abnormality. (Manufacturer adjustment data)	When read manufacture adjustment data fail. *1	
ME095	Error No.4 of ML internal setting values abnormality. (Temporary adjustment data)	When read user adjustment data fail. *1	
ME096	Error No.5 of ML internal setting values abnormality. (Crane operation data)	When read operation data fail. *1	
ME097	Error No.6 of ML internal setting values abnormality. (Data for each case)	When read option information fail. *1	
ME099	Error No.8 of ML internal setting values abnormality. (Failure history data)	When read load/fault history data fail. *1	
ME100	Writing error of optional item setting.	When write option information fail.	
ME101	Writing error of crane data.	When write crane date fail.	
ME102	Writing error of manufacturer adjustment data.	When write manufacture adjustment data fail.	
ME103	Writing error of temporary adjustment data.	When write user adjustment data fail.	
ME104	Writing error of crane operation data.	When write operation data fail.	
ME105	Writing error of the data of each case.	When write occasion demand data fail.	
ME108	Error of the MC crane model number unmatched.	When mismatch machine model information between controllers. Resetting machine model require.	
ME109	Error of the MC optional item setting unmatched.	When mismatch option information. Resetting option information require. *1	

### [ 10. ELECTRIC SYSTEM ]

Code	Message	Warning display condition	
ME110	Communication error between touch panel monitor.	When communication abnormal between ML mon and ML.	
ME111	Time out error of MC1 & MC2 adjustment response.	When time-out communication while MC adjustment. Readjustment require. *1	
ME112	CAN communication error with MC1.	When CAN communication error between MC1 - ML.	
ME113	CAN communication error with MC2.	When CAN communication error between MC2 - ML.	
ME114	CAN communication sending error with MC1 & MC2.	When communication error with not accept adjustment. Faulty or check communication line.	
ME115	Error No.9 of ML internal setting values abnormality. (Failure history data of MC1)	When read MC1 fault history data fail. *1	
ME116	Error No.10 of ML internal setting values abnormality. (Failure history data of MC2)	When read MC2 fault history data fail. *1	
ME117	Writing error of failure history data for MC1.	When write MC1 fault history data fail.	
ME118	Writing error of failure history data for MC2.	When write MC2 fault history data fail.	
ME119	Error No.11 of ML internal setting values abnormality. (Operator identification ID and/or password)	When read account information fail. *1	
ME120	Error No.12 of ML internal setting values abnormality. (WORKING AREA LIMIT values)	When read work area limit set information fail.	
ME121	Access error to NOR flash memory in ML. Setting values can not be written.	When NOR flash memory access faulty. *1	
ME122	MC1 & MC2 reset is detected.	When reboot MC1 or MC2.	
ME123	Writing error of system information for MC1 or MC2.	When read/write error MC system information. *1	
ME124	Writing error of optional item setting for MC1 or MC2.	When write MC option information error.	
ME125	Writing error of adjustment data for MC1 or MC2.	When read/write error MC adjustment information. *1	
ME126	Writing error of crane operation data for MC1 or MC2.	When read/write error MC adjustment information. *1	
ME127	Writing error of No.2. manufacturer adjustment data.	When write manufacture adjustment data 2 fail.	
ME128	Error No.13 of ML internal setting values abnormality. (No.2 manufacturer adjustment data)	When read manufacture adjustment data 2 fail. *1	

\*1 Carry out machine model set, MC adjustment (option set etc.). Possibly controller failure if error can't be disappear.

# 10.1.16 ENGINE ECU

#### 1. ECU terminal number

	1	2	2	3	3	
4	Ļ	5	6	6	-	7
 8	3	Ċ,	9	1	0	
1	1	2	1	3	1	4

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

Connector B: Respond connector :CN-615

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

Connector C: Respond connector :CN-635



Connector D: Respond connector :CN-616

1	2	3	4
5	6	7	8
9	10	11	12

Connector E: Respond connector :CN-638

1	2	3	4
5	6	7	8

#### 2. Input / output table

#### CONNECTOR A

Terminal No.	Ter. symbol	Content
	VNTV	
4	EGRV	VNT-EGR Power
1	+BF1	VINT-EGR POwer
	+BF2	
2	VB1 to 4	ECU main power
3	ADG7	Work accel sensor GND
4	NUSW	Neutral SW
4	CLSW	Clutch SW
5	SSWS	Key SW
5	SWSS	Key SW-Spare
6	GRY1	Heatre relay
7	BATT	Battery
8	ASCS	Work accel sensor signal
9	AVC5	Work accel sensor power
10	PTOSW2	Recovery SW
11	OIL+	Hyd press. SW
	VNTG	
12	EGRV	VNT-EGR GND
12	CGD1	
	CGD2	
13	PGD1 to 4	Power GND
14	REV	Reverse SW 1st
15	_	-
16	_	- 0

Terminal No.	Ter. symbol	Content	
1	_	Accel sensor 1 power	
2	_	ALT-L	
3	ST	Stater SW	
4	РТО	Work accel sensor SW	
5	DPF	DPR LT	
6	DPSW	DPR SW	
7	-	ALT-R	
8	MRL1 MRL2	ECU Main relay	
9		Engine check	
10	CANIH	CAN HIGH	
11	CAN1L	CAN LOW	
12	STOP	Engine stop SW	
13	ADG8	Accel sensor 2 GND	
14	ACS2	Accel sensor 2 signal	
15	ADG7	Accel sensor 1 GND	
16	ACS1	Accel sensor 1 signal	

#### CONNECTOR C

CONTECTO		
Terminal No.	Ter. symbol	Content
1		Grow plug
2	-	
3	_	-
4	-	-
5	/	-
6	-	_
7	-	_
8	-	_
9		_
10	_	_
11	—	_
12	—	_
13	_	_
14	_	_
15	_	_
16	_	_

### CONNECTOR B

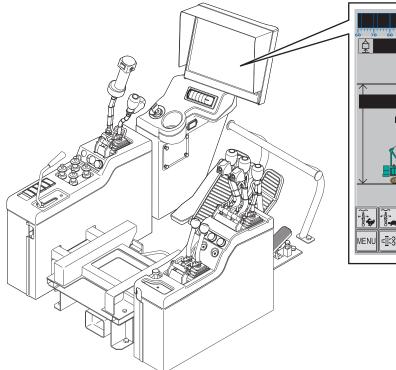
#### CONNECTOR D

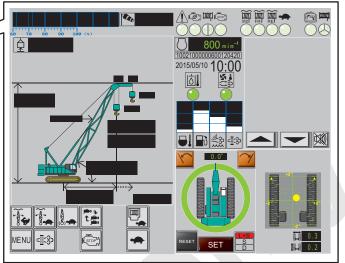
Terminal No.	Ter. symbol	Content
1	THA+	AFM intake air temp sensor
	יאווו	signal
2	AGD5	AFM intake air temp sensor
۷	AGD3	GND
3	AFVB	AFM power
4	AGD6	AFM GND
5	ADG9	Press. Difference GND
6	EXPS	Press. Difference signal
7	1) (05	Press. Difference sensor
/	AVC5	power
8	AFSI	AFM Signal
9	ADG0	Exhaust air temp sensor 1
9	ADGU	GND
10	ET3+	Exhaust air temp sensor 1
10	L13+	signal
11	ADG0	Exhaust air temp sensor 2
	ADGU	GND
12	ET4+	Exhaust air temp sensor 2
12		signal
13	_	_
14	_	_
15	_	-
16	_	-

#### CONNECTOR E

Terminal No. Ter. symbol		Content
1	GRL	Grow lamp
2	CE/G	Engine check lamp
3	DGSW	Daig SW
4	THW+	Water themometer
5	—	ALT-P
6	_	ALT-L
7	-	ALT-R
8	-	-
9	-	-
10	-	-
11		_
12	-	-
13	_	_
14	-	_
15	_	_
16	_	_

# 10.2 LOAD SAFETY DEVICE

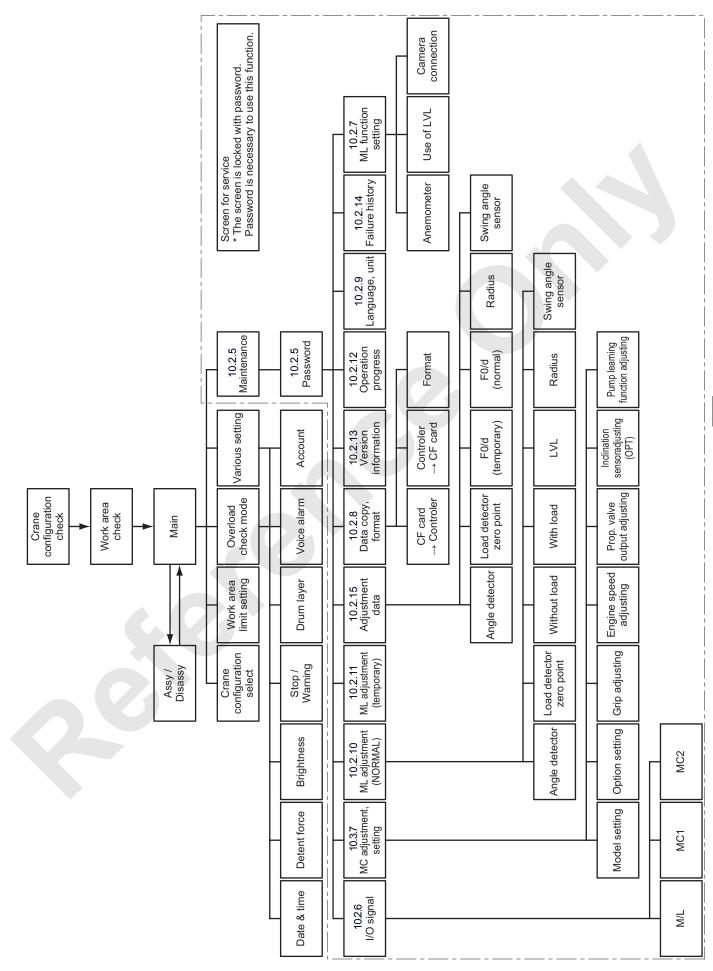




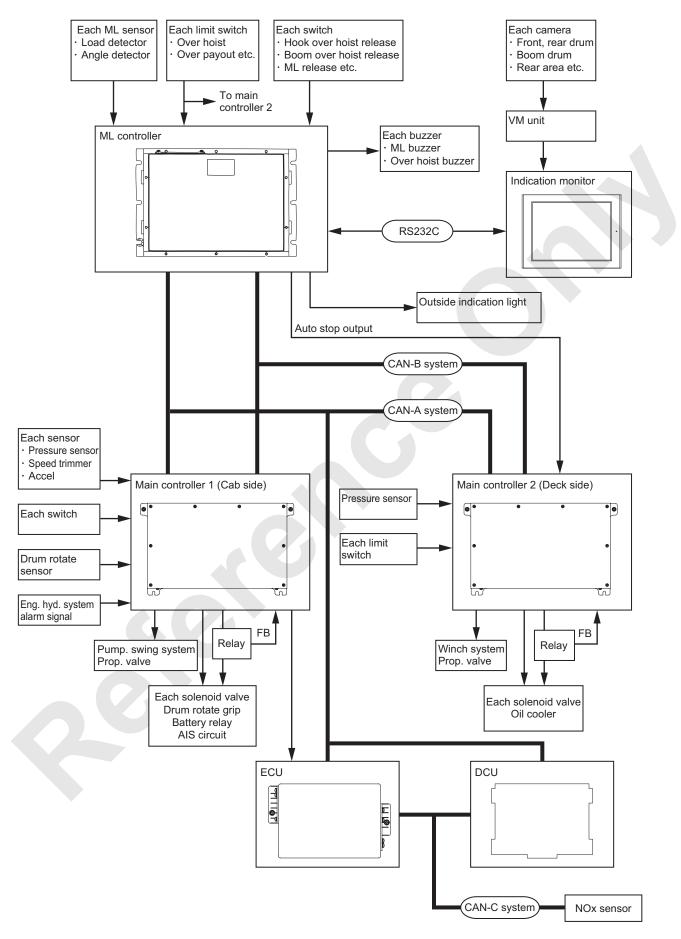
Note

All values in the monitor displays are for reference only.

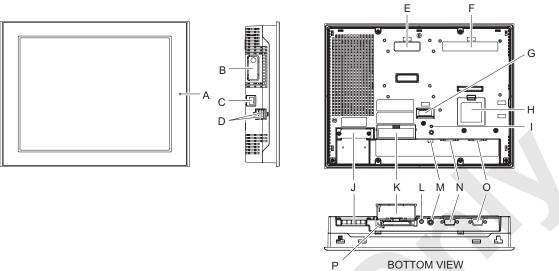




# 10.2.2 SYSTEM DAIGRAM



#### 10.2.3 **MONITOR DISPLAY**



BOTTOM VIEW (CF cover opened)

	Nama	1		Evaluation	
⊢	Name			Explanation	
		Color	Indication	Operation mode (pictorial)	Logic motion mode (when logic is effective)
		Green	ON Flashing	Off line Running Running	- RUN STOP
			ON	At powe	
Γ	STATUS LED	Red	Flashing	Runnning	Major abnormal
			ON	Backlight bulb is blown or r	main machinery failure *1
		Orange	Flashing	Software is be	ng started.
		* 1. Backlight replacement needs returning to manufacturer.			
В	Extended unit interface (EXT)	For installa	ation of exte	nded unit (Transmission func	tion) * not used
С	Ethernet interface (LAN)		/ 100BASE e modular ja	-TX ck connector (8 pole) * not u	sed
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			
Е	Extended unit interface 1	For installation of extended unit (Transmission function) * not used			
F	VM unit interface 1	This is to connect VM unit when camera is to be connected.			
G	Aux. input/output / Voice output interface (AUX)	Outside reset, alarm output, buzzer output, sound output. * not used			
н	Extended memory interface	* not used			
		Green light is ON when CF card is inserted and cover is closed or CF card is being accessed.		er is closed or CF card is	
1	CF card access	<note></note>			
K		<ul> <li>Do not insert or take out CF card when LED lamp is ON Otherwise data in the CF card may be destroyed.</li> </ul>			
J	Power supply connector	DC model : Connector (socket) type			
к	CF card cover	-			
L	Audio input interface (L-IN / MIC)	This is to connect microphone. Minijack connector ( $\phi$ 3.5 mm) * not used		p 3.5 mm) * not used	
М	Video input interface (V-IN)	NTSC (59.9Hz) / PAL (50Hz) type correspnd RCA connector (75 $\Omega$ ) * not used			nnector(75Ω)
Ν	Serial interface ( COM1 )	D-SUB9 pin plug type,RS232C. This is used for transmission to ML			nsmission to ML
0	Serial interface ( COM2 )	D-SUB9 pin socket type. Corespond to RS422 / RS485. * not used			485. * not used
Р	Dip Swtich	In the CF card cover. * not used			

#### 1. GENERAL SPECIFICATION

#### (1) Electrical specification

		DC model
	Rated voltage	DC24V
	Voltage range	DC19.2 to 28.8V
Power supply	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 $10M\Omega$ (between charging terminal and FG terminal)

#### (2) Environmental specification

	Atmospheric temp for use	0 to 50°C (32 to 122°F) *1
	Atmospheric temp for storing	-20 to +60°C (-4 to 140°F)
Physical anvironment	Atmospheric humidity for use	10 to 90%RH (No condensation. Wet bulb temp 39°C (102°F) or lower.
Physical environment	Atmospheric humidity for storing	10 to 90%RH (No condensation. Wet bulb temp $39^{\circ}$ C (102°F) or lower.
	Dust	0.1mg/m <sup>3</sup> 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.

#### (3) Installation specification

	Ground	Functional grounding : D type ground (for both SG-FG)
		Protection : IP65f equivalent
		NEMA #250 TYPE 4X/13
Condition	Construction *1	(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.

### 2. OUTER INTERFACE

#### (1) COM1 (USED FOR TRANSMISSION TO ML)

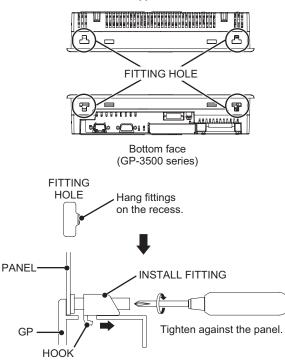
Recommended connector in cable side	XM2D-0901 Omron
Recommended jack screw	XM2Z-0073 Omron
Recommended cover	XM2S-0913 Omron
Caulking fix fitting	#4-40 (UNC)

Pin No.	RS232C		
PIII NO.	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 + 5 V ± 5% output 0.25 A	

(2) Installation procedure

### 

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



Upper face

#### 3. POWER SUPPLY WIRING

### 

- Electric shock may be caused. Ensure to connect under the power supply is disconnected.
   Failure to observe these precautions may result in serious injuries or loss of life.
- Do not supply other than specified voltage. Otherwise the power source line or base machine may be damaged.

Failure to observe these precautions may result in parts damage.

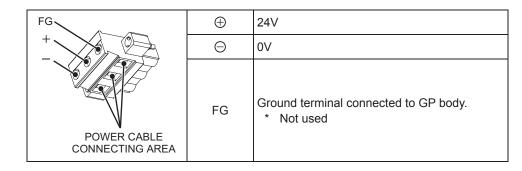
• Ensure to connect FG terminal to earth. Otherwise electric shock may be caused in case of failure.

Failure to observe these precautions may result in serious injuries or loss of life.

(1) Power cable specification Use copper core wire.

Size of power cable	0.75 to 2.5 mm <sup>2</sup> (18 - 12 AWG)
Core wire	Solid or strand wire *1
Core wire length	7 mm -

\*1 If strand wire is used, ensure that the core wire is properly stranded. Otherwise shortening may occur by strand touching the adjacent terminal. (2) Power supply connector (plug) specification



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 × 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)

- (3) Procedure of power cable connection
- (A) Ensure that the power is disconnected.
- (B) Take out the power supply connector (plug) from the main body.
- (C) Loosen the 3 screws in the center of power supply connector.
- (D) 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.
- (E) Secure them with screws.

## 

- When tightening the terminal screw, use flat head screw driver (Size 0.6 × 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 or fire.
- (F) Install the power supply cable to GP and secure it to GP body with left and right power supply connector securing screws.

10

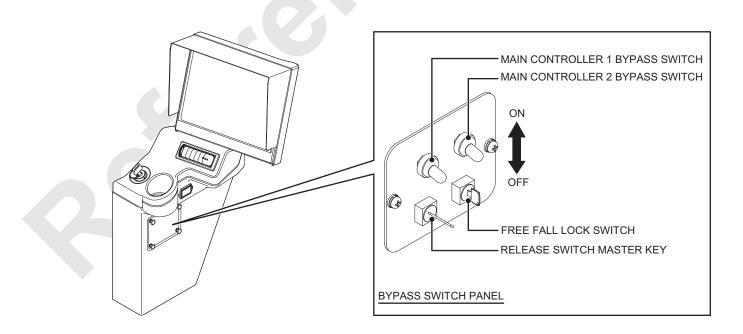
(4) Handling of the bypass switch when touch panel of the monitor dose not functioning

In case of abnormal phenomenon occurs on the monitor as no functioning of touch panel at the boot up, the crane operation becomes possible by the following bypass processing.

- (A) Remove a fuse F17 (5A) for not applying the power to the monitor.
- (B) Start the engine.
- (C) The main controller 2 bypass switch is to be turned ON once and immediately after turned OFF.
- (D) Confirm each levers are ready for operation after the function lock lever is shifted to work side.
- (E) If not obtain the crane operation after the step4. above has been carried out, repeat step3. again and reconfirm of the readiness for operation.

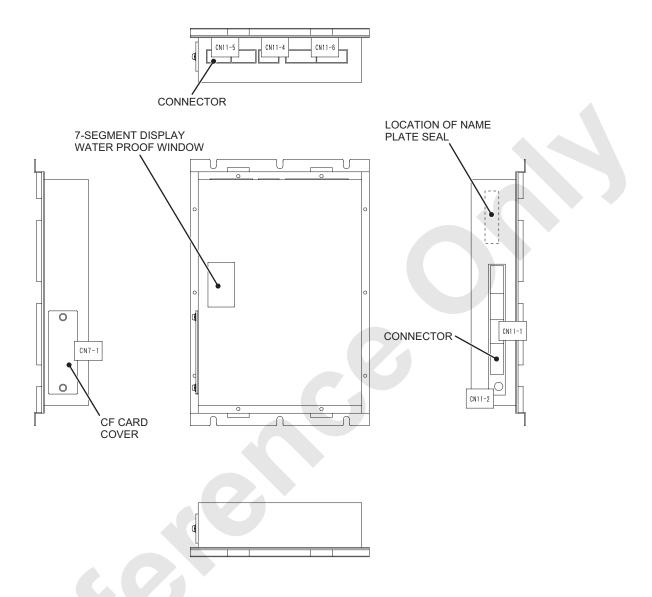
# 

This process is to be made only at emergency case. No any indication on the display panel. Evacuate from the situation carefully.

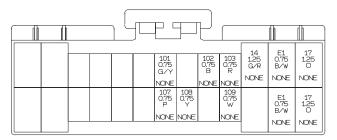


# 10.2.4 DETAIL OF ML CONTROLLER

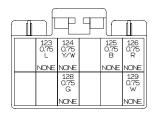
1. Outside view and connector layout



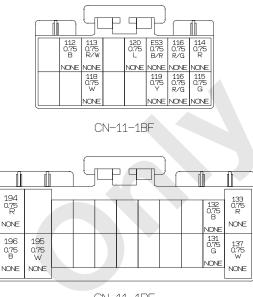
• CF card contains the adjusted data as backup. When replacing the ML controller, ensure to reinsert the original CF card and copy the backup data to the controller. 2. ML controller connector pin layout (View from main machinery harness)



CN-11-1AF



CN-11-1CF



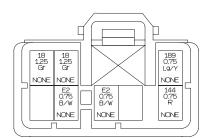
CN-11-1DF

10

Connector No.	Pin No.	Name	Wire No.	Wire color	Specification
	1	Control power (+)	17	0	Main power (IG power +)
	6	Control power (+)	17	0	Main power (IG power +)
	2	Control power (-)	E1	B/W	Main power (IG power GND)
	7	Control power (-)	E1	B/W	Main power (IG power GND)
	3	Backuppower(+)	14	G/R	Subpower(+Bpower+)
	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	В	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 (+)
CN-11-1A	20	Load detector (for jib) signal (Not used)	101	G/Y	12Vloaddetectingsignal-3(0to6.2V)
	28	Load detector (for jib) power (-) (Not used)	107	Р	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 (+)

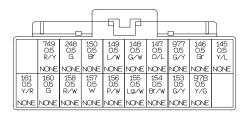
Connector No.	Pin No.	Name	Wire No.	Wire color	Specification
	33	Inter main controller transmission 1 (H)	114	R	CAN0 H
	41	Inter main controller transmission 1 (L)	115	G	CAN0 L
	34	Inter main controller transmission 1 (H end)	116	R/G	CAN0 H end
	42	Inter main controller transmission 1 (L end)	116	R/G	CAN0 L end
	35	Shield earth	ES3	B/R	Shield earth signal ground
	43	Inter main controller transmission 2 (H)	119	Y	CAN1 H
CN-11-1B	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/W	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	В	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
	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	В	12V ML system sensor power 1 (GND)
	56				12V ML system sensor signal 1-4 (0 to 12V)
CN-11-1C	51				12V ML system sensor signal 1-4 (+)
	57	vacant			vacant
	52	Jib angle detector power (+)	124	Y/W	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

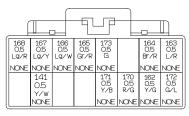
11         14         61         69         62         70         63         71         64         72         65         73	Swing angle detector power (+) Swing angle detector (A) signal Swing angle detector power (-) Swing angle detector (B) signal	133 137 132 131	R W B G	<ul> <li>12V ML system sensor power 2-3 (+)</li> <li>12V ML system sensor signal 2-3 (0 to 12V)</li> <li>12V ML system sensor power 2 (GND)</li> <li>12V ML system sensor signal 2-4 (0 to 12V)</li> <li>12V ML system sensor power 2-4 (+)</li> <li>24V load detector power 2-4 (+)</li> <li>24V load detector signal -1 (0 to 12.5V)</li> <li>24V load detector signal -2 (0 to 12.5V)</li> <li>24V load detector signal -2 (0 to 12.5V)</li> </ul>
61 69 62 70 63 71 64 72 65 73	Swing angle detector power (-)	132	В	<ul> <li>12V)</li> <li>12V ML system sensor power 2 (GND)</li> <li>12V ML system sensor signal 2-4 (0 to 12V)</li> <li>12V ML system sensor power 2-4 (+)</li> <li>24V load detector power 2-4 (+)</li> <li>24V load detector signal -1 (0 to 12.5V)</li> <li>24V load detector signal -2 (0 to 12.5V)</li> </ul>
<ul> <li>69</li> <li>62</li> <li>70</li> <li>63</li> <li>71</li> <li>64</li> <li>72</li> <li>65</li> <li>73</li> </ul>				<ul> <li>12V ML system sensor signal 2-4 (0 to 12V)</li> <li>12V ML system sensor power 2-4 (+)</li> <li>24V load detector power 2-4 (+)</li> <li>24V load detector signal -1 (0 to 12.5V)</li> <li>24V load detector power (GND)</li> <li>24V load detector signal -2 (0 to 12.5V)</li> </ul>
62 70 63 71 64 72 65 73	Swing angle detector (B) signal	131	G	12V) 12V ML system sensor power 2-4 (+) 24V load detector power 2-4 (+) 24V load detector signal -1 (0 to 12.5V) 24V load detector power (GND) 24V load detector signal -2 (0 to 12.5V)
70 63 71 64 72 65 73				24V load detector power 2-4 (+) 24V load detector signal -1 (0 to 12.5V) 24V load detector power (GND) 24V load detector signal -2 (0 to 12.5V)
63 71 64 72 65 73				24V load detector signal -1 (0 to 12.5V) 24V load detector power (GND) 24V load detector signal -2 (0 to 12.5V)
71 64 72 65 73				24V load detector power (GND) 24V load detector signal -2 (0 to 12.5V)
64 72 65 73				24V load detector signal -2 (0 to 12.5V)
72 65 73				
65 73				24V load detector power -2 (+)
73				,
				24V load detector power -3 (+)
00				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	В	RS232C (GND)
	67 75 68 76 12 15 13	6775vacant68vacant76vacant12	676775vacant68vacant76vacant1215Inter monitor transmission (TXD)19513Inter monitor transmission (RXD)194	676775vacant68vacant76vacant121000000000000000000000000000000000000



CN-11-4F

Connector No.	Pin No.	Name	Wire No.	Wire color	Specification
	1	Output power (+)	18	Gr	Extended 24V power (+)
	4				Extended 25V power (+)
	2	Output power (+)	18	Gr	Extended 26V power (+)
CN-11-4	5	Output power (-)	E2	B/W	Extended 24V power (GND)
011-11-4	6	Output power (-)	E2	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)



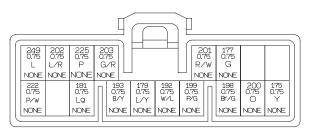


CN-11-5AF

CN-11-5BF

Connector No.	Pin No.	Name	Wire No.	Wire color	Specification
	1	Hook over hoist LS1	145	Y/L	24V input
	2	Hook over hoist LS2	146	Gr	24V input
	3	Gantry hoist detect LS (Not used)	977	G/Y	24V input
	4	Boom backstop no.2 LS	147	O/L	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	Civil engineering mode SW	248	G	24V input
	9	Work light SW	749	R/Y	24V input
	10				24V input
	11				24V input
CN-11-5A	12	12 Mast cylinder position detect LS 978 (Not used)	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		
NO.	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	Lg/W	24V input		
	27	Boom/Jib over hoist release SW	167	Lg/Y	24V input		
CN-11-5B	28	Moment limiter release SW	168	Lg/R	24V input		
CIN-TI-JD	29	CEN spec. distinct signal	172	G/L	Ground input (330Ω)		
	30	Simultaneous control permit signal	162	Y/G	Ground input (330Ω)		
	31	Adjustment permit signal	170	R/G	Ground input (4.7k $\Omega$ )		
	32	Program rewrite permit signal	171	Y/B	Ground input $(4.7k\Omega)$		
	33	vacant			vacant		
	34	vacant			vacant		
	35	Wind speed sensor	141	Y/W	Pulse input (+)		
	36				Pulse input (-)		



 138
 197
 190

 0.75
 0.75
 0.75

 UG
 6.77
 0.75

 NONE
 NONE
 NONE

 191
 142
 186

 0.75
 0.75
 0.75

 0.75
 0.75
 0.75

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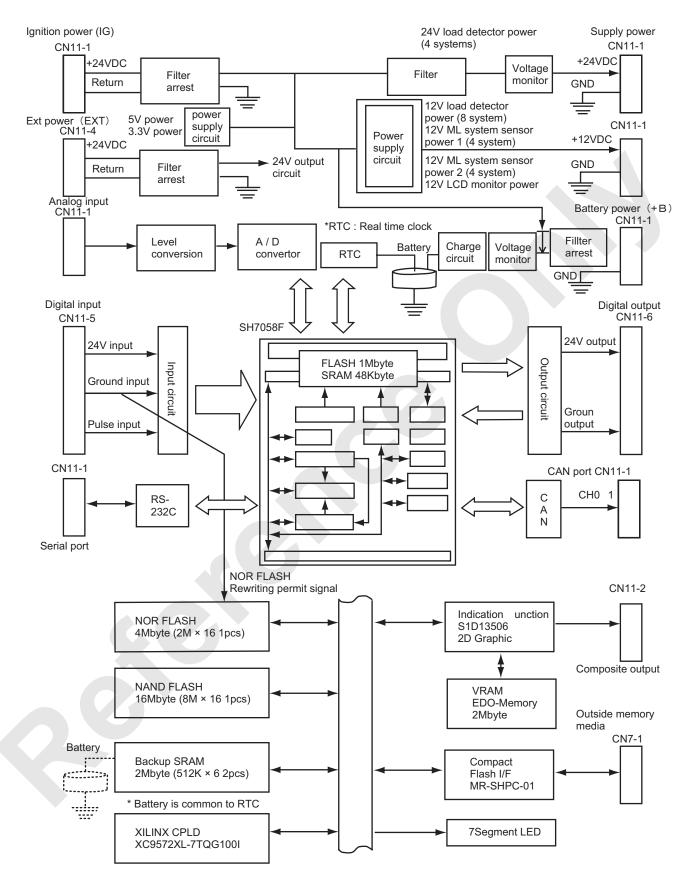
 0.75
 0.75
 0.75

CN-11-6AF

CN-11-6BF

Connector No.	Pin No.	Name	Wire No.	Wire color	Specification
	13				24V Output
	30	Front drum hoist stop	175	Y	24V Output
	12				24V Output
	29	Front drum lower stop	200	0	24V Output
	11	Rear drum hoist 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/G	24V Output
CN 44 CA	26	Mode select (assy/disassy)	192	W/L	24V Output
CN-11-6A	25	Third drum hoist 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	Over load alarm buzzer	225	P 24V Output	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	Civil engieering mode lamp	249	L	24V Output
	21	Mast bending prevent signal	222	P/W	24V Output
	5				24V Output
	20				24V Output
	4				24V Output
	19	Operator authenticate signal	223	Y/G	24V Output
	18	Overload buzzer	185	L/W	24V Output
011 44 05	17	Over hoist buzzer	184	G/R	24V Output
CN-11-6B	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

Note

The table of code shown all of code numbers and some of codes would not be indicated depending on the model.

#### (1) Analogue input [A]

No.	Name	Variation	Input Voltage	Remarks	Judgement
ML-A01	Crane boom load detector	0 t to rated t	1 to 5V	CN11-1-25	
ML-A02	Spare	↑	↑ (	CN11-1-26	
ML-A03	Jib load detector	↑	↑	CN11-1-20	Judge detect either
ML-A04	Spare	Î	↑ (	CN11-1-21	following.
ML-A05	Spare	↑	↑ (	CN11-1-30	Input voltage < 0.29V.
ML-A06	Spare	↑	1	CN11-1-31	<ul> <li>Input voltage &gt; 6.19V.</li> </ul>
ML-A07	Spare	↑	1	CN11-1-4	
ML-A08	Spare	↑	1	CN11-1-5	
ML-A09	Boom base angle detector	-150 to 150 degrees	0.4 to 11.6V	CN11-1-46	
ML-A10	Spare	1	1 1	CN11-1-47	Judge detect either
ML-A11	Crane mast angle detector	î	1	CN11-1-55	following.
ML-A12	Spare	1	↑	CN11-1-56	Input voltage < 0.30V.
ML-A13	Jib base angle detector	î	↑	CN11-1-58	<ul> <li>Input voltage &gt; 12V.</li> </ul>
ML-A14	Spare	Î	↑ (	CN11-1-59	
ML-A15	Swing angle detector A	0 to 180 degrees	0 to 12V	CN11-1-14	Judge when the voltage differential other than 5.0V
ML-A16	Swing angle detector B	î	0 to 12V	CN11-1-69	to 7.0V between the angle detector A and B.
ML-A17	Spare		0 to 12.5V	CN11-63	
ML-A18	Spare		0 to 12.5V	CN11-64	
ML-A19	Spare		0 to 12.5V	CN11-73	
ML-A20	Spare		0 to 12.5V	CN11-74	

## (2) Pulse input (break in) [E]

No.	Name	Condition	Signal level	Remarks	Judgement
ML-E01	Anemometer		GND/OPEN	CN11-5-35	Judge when read the pulse fail.

(3) Digital intput [B]

No.	Name	Condition	Signal level	Remarks	Judgement
ML-B01	Hook over hoist LS1	Normal / Over	+24V/OPEN	CN11-5-1	
ML-B02	Hook over hoist LS2	Normal / Over	+24V/OPEN	CN11-5-2	
ML-B03	Gantry raise detect LS	Not detect / Detect	+24V/OPEN	CN11-5-3	No failure judgement take place.
ML-B04	Boom B/S No.2 LS	Normal / Over	+24V/OPEN	CN11-5-4	place.
ML-B05	Crane boom over hoist LS	Normal / Over	+24V/OPEN	CN11-5-5	
ML-B06	Boom B/S No.1 LS	Normal / Over	+24V/OPEN	CN11-5-6	
ML-B07	Jib over hoist LS	Normal / Over	+24V/OPEN	CN11-5-7	
ML-B08		Civil engineering mode / Normal	+24V/OPEN	CN11-5-8	
ML-B09	Work light SW	ON / OFF	+24V/OPEN	CN11-5-9	
ML-B10	Spare		+24V/OPEN	CN11-5-10	
ML-B11	Spare		+24V/OPEN	CN11-5-11	
ML-B12	Mast cylinder LS	Not detect / Detect	+24V/OPEN	CN11-5-12	
ML-B13	TW jib bending prevent LS	Ground / Normal	+24V/OPEN	CN11-5-13	
ML-B14	Latch (engage) LS	Engage / Normal	+24V/OPEN	CN11-5-14	
ML-B15	Latch (disengage) LS	Disengage / Normal	+24V/OPEN	CN11-5-15	
ML-B16	Over payout prevent (Front drum)	Normal / Over	+24V/OPEN	CN11-5-16	
ML-B17	Over payout prevent (Rear drum)	Normal / Over	+24V/OPEN	CN11-5-17	
ML-B18	Over payout prevent (3rd drum)	Normal / Over	+24V/OPEN	CN11-5-18	No failure judgement take place.
ML-B19	MC1 bypass SW	Bypass / Normal	+24V/OPEN	CN11-5-19	
ML-B20	MC2 bypass SW	Bypass / Normal	+24V/OPEN	CN11-5-20	
ML-B21	Drum select (Rear hoist) CEN	Select / Not select	+24V/OPEN	CN11-5-21	
ML-B22	Drum select (Front hoist) CEN	Select / Not select	+24V/OPEN	CN11-5-22	
ML-B23	Spare		+24V/OPEN	CN11-5-23	
ML-B24	DL start SW	Start / Normal	+24V/OPEN	CN11-5-24	
ML-B25	Master key	Release / Normal	+24V/OPEN	CN11-5-25	
ML-B26	Hook over hoist release	Release / Normal	+24V/OPEN	CN11-5-26	
ML-B27	Boom over hoist release	Release / Normal	+24V/OPEN	CN11-5-27	
ML-B28	ML release	Release / Normal	+24V/OPEN	CN11-5-28	
ML-B29	CEN spec. recognize signal	CEN / Normal	GND/OPEN	CN11-5-29	
ML-B30	Simultaneous operate permit	Permit & CEN / Normal	GND/OPEN	CN11-5-30	
ML-B31	For adjusting	Adjusting / Normal	GND/OPEN	CN11-5-31	
ML-B32	For program rewriting	Rewrinting / Normal	GND/OPEN	CN11-5-32	

# (4) Analogue output [H]

No.	Name	Condition	Signal level	Remarks	Judgement
ML-H01	Spare				
ML-H02	Spare				

# (5) Digital output [C]

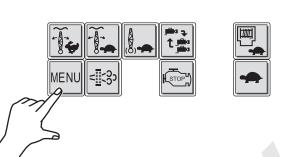
No.	Name	Condition	Signal level	Remarks	Judgement
ML-C01	Front drum hoist stop	Actuate / Normal	+24V/OPEN	CN11-6-30	
ML-C02	Front drum lower stop	Actuate / Normal	+24V/OPEN	CN11-6-29	-
ML-C03	Rear drum hoist stop	Actuate / Normal	+24V/OPEN	CN11-6-11	-
ML-C04	Rear drum lower stop	Actuate / Normal	+24V/OPEN	CN11-6-10	
ML-C05	Third (jib) drum hoist stop	Actuate / Normal	+24V/OPEN	CN11-6-25	
ML-C06	Third (jib) drum lower stop	Actuate / Normal	+24V/OPEN	CN11-6-9	
ML-C07	Boom drum raise stop	Actuate / Normal	+24V/OPEN	CN11-6-23	
ML-C08	Boom drum lower stop	Actuate / Normal	+24V/OPEN	CN11-6-7	
ML-C09	Civil engineering mode	ON / OFF	+24V/OPEN	CN11-6-6	
ML-C10	Wind velocity warning lamp	Warning / Normal	+24V/OPEN	CN11-6-20	
ML-C11	Spare	Actuate / Normal	+24V/OPEN	CN11-6-13	
ML-C12	Spare	Actuate / Normal	+24V/OPEN	CN11-6-12	
ML-C13	Mode select (jib model)	Jib model / Except jib model	+24V/OPEN	CN11-6-28	
ML-C14	Mode select (mast model)	Mast mode / Except mast model	+24V/OPEN	CN11-6-27	
ML-C15	Mode select (assy/disassy)	Assy disassy / Except assy disassy	+24V/OPEN	CN11-6-26	Judge when mismatch feedback value against output demand.
ML-C16	Mode select (self removal)	Self removal / Except self removal	+24V/OPEN	CN11-6-24	
ML-C17	Outer indication light buzzer (red)	Actuate / Normal	+24V/OPEN	CN11-6-8	
ML-C18	Spare		+24V/OPEN	CN11-6-22	
ML-C19	Mast bending prevent	Actuate / Normal	+24V/OPEN	CN11-6-21	
ML-C20	Spare		+24V/OPEN	CN11-6-5	
ML-C21	Operator authenticate signal	Actuate / Normal	+24V/OPEN	CN11-6-19	
ML-C22	Spare		+24V/OPEN	CN11-6-4	
ML-C23	Over hoist buzzer	Actuate / Normal	+24V/OPEN	CN11-6-17	
ML-C24	Over load buzzer	Actuate / Normal	+24V/OPEN	CN11-6-18	
ML-C25	Voice alarm 1	Actuate / Normal	GND/OPEN	CN11-6-16	
ML-C26	Voice alarm 2	Actuate / Normal	GND/OPEN	CN11-6-2	
ML-C27	Voice alarm 3	Actuate / Normal	GND/OPEN	CN11-6-1	
ML-C28	Voice alarm 4	Actuate / Normal	GND/OPEN	CN11-4-3	]
ML-C29	Voice alarm 5	Actuate / Normal	GND/OPEN	CN11-6-3	
ML-C30	Outer indication light (green)	ON / OFF	GND/OPEN	CN11-6-14	Judge when mismatch
ML-C31	Outer indication light (yellow)	ON / OFF	GND/OPEN	CN11-6-15	feedback value against
ML-C32	Outer indication light (red)	ON / OFF	GND/OPEN	CN11-4-8	output demand.

10

# 10.2.5 SHIFTING TO MAINTENANCE SCREEN

1. Press the  $\mathbb{R}$  icon in the main screen.

2. Press 🔭 switch.





- 3. Input the password (8 digits) with the keyboard.
- \* In case of using capital letter, press witch.

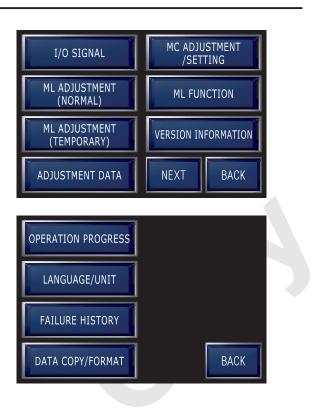
CLR	All clear
DEL	One letter clear
BS	One letter clear and back





4. Press 🛞 switch.

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



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

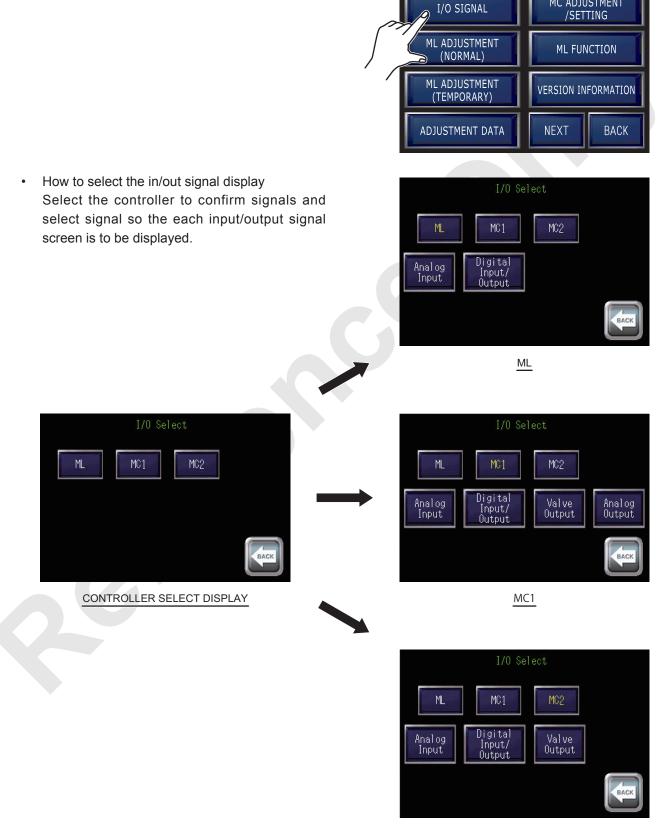
Check the password and input again.

MC ADJUSTMENT

#### 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.

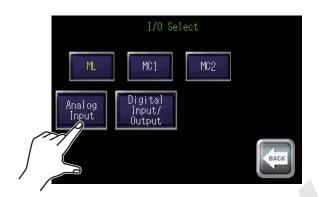
1. Press [I/O SIGNAL] in the maintenance menu.



MC2

## [ 10. ELECTRIC SYSTEM ]

- 2. Input / output check of ML (MOMENT LIMITER)
- Select analog input from ML menu. Display state of analog signals of load detector and angle detector etc.



 Unit of indicating figure is V (volt).
 Refer to the article "10.2.4 DETAIL OF ML CONTROLLER" for connection and signal level.
 0V is displayed on non connected point.

		ML IN/O	UT SIGNAL	
		[MPa]		[MPa]
A.1	1.6		A11 0.0	
A2	0.0		A12 0.0	
AЗ	1.3		A13 7.4	
A4	0.0		A14 0.0	
A5	0.0		A15 4.5	
A6	0.0		A1610.6	
A7	0.0	101010	A17 0.0	
A8	0.0		A18 0.0	
Α9	6.4		A19 0.0	
A10	0.4		A20 0.0	
$\bigcirc$	810 m	in <sup>-1</sup>		ήÐ
т.			ما مد ما ا	

To controler serect display

(3) To display of the respective sensors, press area of input value, the name of sensor will be displayed.

By push 📾 icon, previous display indicated.

	Boom load detector1	1.646
	Not use	0.000
	Jib load detector	1.346
	Not use	0.000
	Not use	0.000
A6	Not use	0.000
87	Not use	0.000
A8	Not use	0.000
	Lower boom angle detector -	6.471
	Not use -	0.427

- (4) By pressing , digital input and digital output become displayed.
- Digital input

This is displayed by "IN".

Digital input consists of 24 V input and ground (GND) input.

In 24 V input, ON is displayed at 24 V and OFF at open (0 V).

In ground input, ON is displayed at ground (GND) and OFF at open.

As for signal name and specification, refer to the article "10.2.4 DETAIL OF ML CONTROLLER".

Digital output

This is displayed by "DOUT".

Digital output consists of 24 V output and ground input.

In 24 V output, ON is displayed at 24 V and OFF at open (0 V).

In ground output, ON is displayed at ground (GND) and OFF at open.

As for signal name and specification, refer to the article "10.2.4 DETAIL OF ML CONTROLLER".

 Digital output (feedback signal) This is displayed by "DOUT Fb". This is feedback signal of digital signal (DOUT) which is corresponds to digital output when normal condition.

If it does not correspond to digital signal condition, wire breakage or ground fault is presumed.

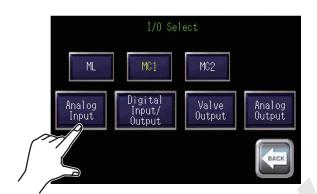
 To display each value of the I/O, press area of I/ O, the name of I/O will be displayed .
 By push , previous display indicated.





## [ 10. ELECTRIC SYSTEM ]

- Input, output signal check of MC1 (main controller 1)
- Select analog input from MC1 menu. Display state of analog signals of pressure sensors, potentiometers etc.



Pressure value

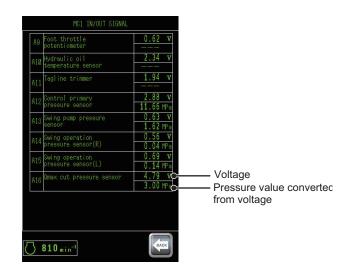
(2) The first screen indicates conditions of analog signal of pressure sensors, potentiometers etc. Unit of indicating figure is V (volt).
As for signal name and specification, refer to the article "10.3.5 SPECIFICATIONS OF MAIN CONTROLLER INPUT/OUTPUT".
OV is displayed on non connected point.

converted from volta	iae
Volta	-
MC1 IN/	OUT SIGNAL
[V] [MPa]	[V] [MPa]
A1 1.2	A13 0.6 1.62
A2 0.0	A14 0.5 0.04
A3 4.9	A15 0.6 0.14
A4 4.9	A16 4.7 3.00
A5 4.9	A17 0.6 0.09
A6 1.3	A18 2.7 1.65
A7 0.0	A19 2.6
A8 1.0	A20 2.5
A9 0.6	A21 2.6 0.00
A10 2.3	A22 2.2 8.33
A11 1.9	A23 2.4 0.00
A12 2.8 11.66	
<b>810</b> min <sup>-1</sup>	

(3) To display of the respective sensors, press area of input value, the name of sensor will be displayed.

By push 📾 icon, previous display indicated.

A1         Not use         1.28           A2         Not use         0.00           A2         Not use            A3         Fr. drum motor speed         4.93           adjusting trimmer            A4         Re, drum motor speed         4.93           A4         Abjusting trimmer            A5         Jib (third) motor speed         4.93           adjusting trimmer          A6           A6         Boom motor speed         1.34	V V
n2        A3     adjusting trimmer       A4     Re, drum motor speed       A5     bij (third) motor speed       A6     guisting trimmer           A5     bij (third) motor speed       A6     1.34	V
no adjusting trimmer        A4 Re, drum motor speed     4.93       A4 Justing trimmer        A5 Jib (third) motor speed     4.93       adjusting trimmer        as Boom motor speed     1.34	
A4     Re, drum motor speed     4.93       Adjusting trimmer        A5     bdjusting trimmer       ac_o Boom motor speed     1.34	V
A5 Jib (third) motor speed 4.93 adjusting trimmer	V
ne Boom motor speed 1.34	V
<sup>n0</sup> adjusting trimmer	V
A7 Not use 0.00	V
A8 Hand throttle 1.01	V



- (4) By pressing , digital input and digital output become displayed.
- Digital input

This is displayed by "IN".

Digital input consists of 24 V input and ground (GND) input.

In 24 V input, ON is displayed at 24 V and OFF at open (0 V).

In ground input, ON is displayed at ground (GND) and OFF at open.

As for signal name and specification, refer to the article "10.3.5 SPECIFICATIONS OF MAIN CONTROLLER INPUT/OUTPUT".

Digital output

This is displayed by "DOUT".

Digital output consists of 24 V output and ground input.

In 24 V output, ON is displayed at 24 V and OFF at open (0 V).

In ground output, ON is displayed at ground (GND) and OFF at open.

As for signal name and specification, refer to the article "10.3.5 SPECIFICATIONS OF MAIN CONTROLLER INPUT/OUTPUT".

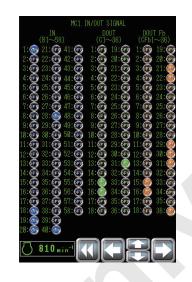
 Digital output (feedback signal) This is displayed by "DOUT Fb". This is feedback signal of digital signal (DOUT)

which is corresponds to digital output when normal condition.

If it does not correspond to digital signal condition, wire breakage or ground fault is presumed.

 To display each value of the I/O, press area of I/ O, the name of I/O will be displayed .
 By push , previous display indicated.





- (5) By pressing  $\square$ , output of proportional valve becomes displayed.
- Indicated value is displayed on left hand and ٠ feedback value on right hand. Unit of indicating figure is mA (milliampere). If indicated 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 the article "10.3.5 SPECIFICATIONS OF MAIN CONTROLLER INPUT/OUTPUT".

To display of the respective proportional ٠ solenoid valves, press the area of I/O value, the name of proportional solenoid valve will be displayed.

By push 🔄 , previous display indicated.

MC1 IN/O	
D1 350	F/B 359
D2 ()	F/B 8
D3 700	F/B <u>701</u>
D4 150	F/B 8
D5 🚺	F/B7
D6 🛛 🗘	F/B 6
D7 🚺	F/B 7
D8 200	F/B 7
D9 0	F/B 7
D10 100	F/B 8
D11 200	F/B 8
D12 200	F/B 8
<mark>│ 810 min<sup>-1</sup></mark>	

		MC1 IN/OUT SIGNAL	
6	)1	Main pump power control proportional valve	350 mA F/B 346 mA
0	)2	Boom pump power control proportional valve	0 mA F/B 9 mA
0	)3	Swing speed control	700 mA <sup>F/B</sup> 709 mA
C	)4	Swing reaction proportional valve	150 mA F/B 8 mA
6	)5	Boom pump control proportional valve	0 mA F7B 8 mA
8	)6	Fr. electromagnetic detent	0 mA F/B 7 mA
0	810 min <sup>-1</sup>		

By pressing 📾, analog output and engine	_
status becomes displayed.	
Unit of indicating figure is V (volt).	
This is used as accelerator signal to ECU.	
However this becomes effective only when G-28	Engi
accelerator control (MC option set) is "ENABLE".	ENGI

		Н 1	1.33
		H2	1.33
			988 (RPM)
			(%)
			0000000
		6	
(	3 81	0 min <sup>-1</sup>	

•

## [ 10. ELECTRIC SYSTEM ]

- 4. Input, output signal check of MC2 (main controller 2)
- Select analog input from MC2 menu. Display state of analog signals of pressure sensors, potentiometers etc.
- (2) 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 the article "10.3.5 SPECIFICATIONS OF MAIN CONTROLLER INPUT/OUTPUT".
  OV is displayed on non connected point.

	I/O Se	lect	
ML	MC1	MC2	
Analog Input	Digital Input/ Output	Valve Output	Analog Output
			BACK

Pressure value converted from voltage				
Volta	ge			
	OUT SIGNAL			
[V] [MPa]				
A1 0.0	A13 0.0			
A2 0.0	A14 0.0			
A3 0.9 0.33	A15 0.0			
A4 0.3 0.00	A16 0.4 0.00			
A5 1.4 0.69	A17 0.3 0.00			
A6 0.0	A18 0.5 0.02			
A7 1.2	A19 0.1 0.00			
A8 0.2 0.00	A20 0.4 0.00			
A9 0.6 0.07	A21 0.0 0.00			
A10 0.0	A22 0.0 0.00			
A11 1.1 0.48	A23 0.0 0.00			
A12 0.0				
<b>810</b> min <sup>-1</sup>				

(3) To display of the respective sensors, press area of input value, the name of sensor will be displayed.

By push 📾 icon, previous display indicated.

A1	Not use	0.00 V	
A2	Not use	0.00 V	
A3	Fr. motor pressure sensor	0.94 V 0.33 MPa	
A4	Re, motor pressure sensor	0.36 V 0.00 MPa	
A5	3rd, motor pressure sensor	1.42 v 0.69 MPa	
A6	Not use	0.00 v	
Α7	Fuel level sensor.	1.20 v	
A8	Fr. independence/ confluence pressure sensor	0.29 V 0.00 MP c	— Voltage Pressure value converted
			from voltage
5	810 min <sup>-1</sup>	BACK	

- Digital input

This is displayed by "IN".

Digital input consists of 24 V input and ground (GND) input.

In 24 V input, ON is displayed at 24 V and OFF at open (0 V).

In ground input, ON is displayed at ground (GND) and OFF at open.

As for signal name and specification, refer to the article "10.3.5 SPECIFICATIONS OF MAIN CONTROLLER INPUT/OUTPUT".

Digital output

This is displayed by "DOUT".

Digital output consists of 24 V output and ground input.

In 24 V output, ON is displayed at 24 V and OFF at open (0 V).

In ground output, ON is displayed at ground (GND) and OFF at open.

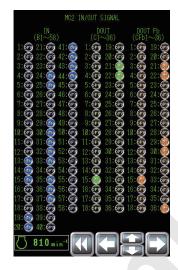
As for signal name and specification, refer to the article "10.3.5 SPECIFICATIONS OF MAIN CONTROLLER INPUT/OUTPUT".

 Digital output (feedback signal) This is displayed by "DOUT Fb".

This is feedback signal of digital signal (DOUT) which is corresponds to digital output when normal condition.

If it does not correspond to digital signal condition, wire breakage or ground fault is presumed.

 To display each value of the I/O, press area of I/ O, the name of I/O will be displayed .
 By push @ , previous display indicated.



		MC2 IN/OUT SIGNAL
	B1	C/W detection3
	B2	C/W detection4
	B3	C/W detection5 (GN,JD)
	B4	C/W detection6 (JD)
	B2	C/W detection7 (JD)
	B6	Carbody wights detection 📀
	B7	Not use 🔘
	B8	Not use 🔘
	B9	Not use 🔘
	B10	Not use 🔘
	B11	Not use 🔘
	B12	Not use 🔘
	B13	Crane boom over hoist. 💿
	B14	Luffing boom over hoist1 📀
	B15	Luffing boom over hoist2 📀
	B16	Not use 🔘
3	3 1	B10 min <sup>-1</sup>

- (5) By pressing ☐, output of proportional valve becomes displayed.
- Indicated value is displayed on left hand and feedback value on right hand.
   Unit of indicating figure is mA (milliampere).
   If indicated 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 the article "10.3.5 SPECIFICATIONS OF MAIN CONTROLLER INPUT/OUTPUT".

 To display of the respective proportional solenoid valves, press the area of I/O value, the name of proportional solenoid valve will be displayed.

By push 🐼 , previous display indicated.

D 1	150	F/B	3	
D 2	150	F/B	3	
D 3	150	F/B	3	
D4	150	F/B	3	
D 5	740	F/B	741	
D 6	150	F/B	3	
D7	150	F/B	3	
D 8	150	F/B	3	
D 9	0	F/B	3	
D 10	200	F/B	223	
D 1 1	200	F/B	218	
D 12	200	F/B	4	
	_			
810,	nin <sup>-1</sup> (			

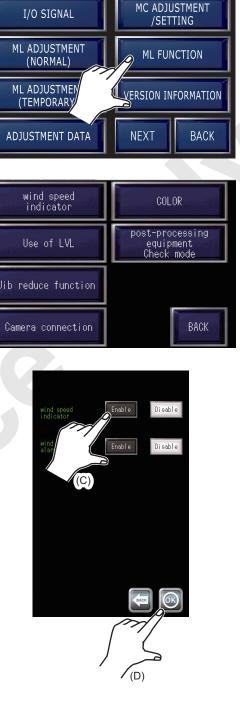
		MC2 IN/OUT SIGNAL	
	D1	Boom raising speed control	<mark>150 <sub>mA</sub> <sup>F/B</sup> 4 mA</mark>
	D2	Boom lowering speed control	150 mA F7B 3 mA
	D3	Fr. drum hoisting speed control	150 mA F7B 3 mA
	D4	Fr. drum lowering speed control	F7B 3 mA
	D5	Re. drum hoisting speed control	740 mA F7B 724 mA
	D6	Re. drum lowering speed control	F7B 150 mA
ζ	3	810 min <sup>-1</sup>	BACK

# 10.2.7 ML FUNCTION SETTING

1. Press "ML FUNCTION" in the maintenance menu.

2. Setting item becomes displayed.

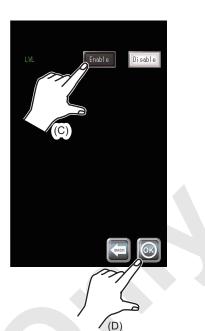
- Option setting of anemometer This is to set with or without wind speed meter.
- Ex) In case of anemometer installed.
- (A) Press "ANEMOMETER" in the menu.
- (B) Option setting screen of anemometer becomes displayed.
- (C) Press "Enable".
- \* The selected side turns to blue display.
- (D) Press 🛞 icon.

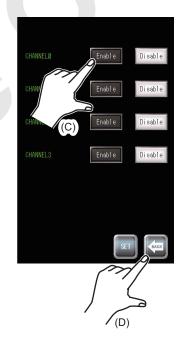


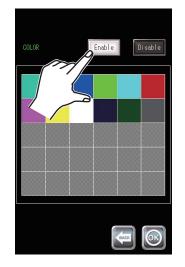
- Setting of LVL function effective This is to set LVL (auto stop load ratio) effective or not effective.
   Refer to the article "10.2.10 ML ADJUSTMENT (NORMAL)".
   LVL setting for setting procedure of LVL value.
- Ex) In case of making LVL function effective.
- (A) Press "USE OF LVL" in the menu.
- (B) LVL function screen becomes displayed.
- (C) Press "Enable".
- \* The selected side turns to blue display.
- (D) Press 🛞 icon.
- (3) Setting of camera connection This is to set with or without camera.
- Ex) In case camera is added to channel 0.
- (A) Press "CAMERA CONNECTION" in the menu.
- (B) Camera connection setting screen becomes displayed.
- (C) Press "Enable" of channel 0.
- \* The selected side turns to blue display.
- (D) Press SET icon.



- (A) Press "COLOR" in the menu.
- (B) Color adjusting screen is displayed.
- (C) Press "Yes".
- (D) Select color.
- (E) Press 🛞 icon.



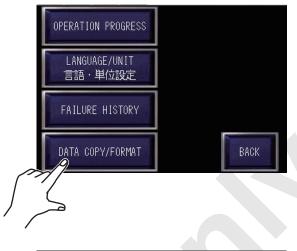




10

# 10.2.8 DATA COPY, FORMAT

1. Press "DATA COPY, FORMAT" in the maintenance menu.



- 2. Items become displayed.
- (1) Adjustment data reading out

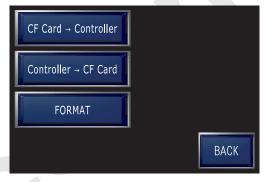
This reads out backup data in the data card into memory in the controller.

Memorized data in the controller are overwritten and are 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.

## [ 10. ELECTRIC SYSTEM ]

(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 this function in error.

> Select "CF Card  $\rightarrow$  Controller" in the menu. The screen shown right becomes displayed. Press SET for 3 seconds to execute.

When completed properly, the screen shown right is displayed.

By pressing (19), the screen returns to the previous one.



READING OF T ADJUSTMENT D

AUJUSIMENI UAIA AKE COPIEU FROM THE CF-CARD TO THE ML FLASH-MEMORY, ADJUSTMENT DATA ARE OVER URITIENT TO THE ML FLASH-MEMORY, THEREFORE PRESENT ADJUSTMENT DATA WILL BE LOST. (Keep pushing SET icon for more than three seconds.)

ADJUSTMENT DATA COPY HAS BEEN COMPLETED. PUSH OK ICON.



After execution, if error message as shown right is displayed, data card failure (including not enough insertion) is presumed.

Re-insert the card and try again.

By pressing , screen returns to the previous one.

Unless both of ML B31 and MC1 C9 lamps displayed on lower part of the screen light up, can not be accessed to the card 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  $\rightarrow$  CF Card" in the menu. The screen shown right becomes displayed. Press SET for 3 seconds to execute.

When completed properly, the screen shown right is displayed.

By pressing B, the screen returns to the previous one.



After execution, if error message as shown right is displayed, data card failure (including not enough insertion) is presumed. Re-insert the card and try again. By pressing , screen returns to the previous

#### RITING OF THE DJUSTMENT DATA

ADJUSTMENT DATA ARE COPIED ROM THE ML FLASH-HENDRY TO THE CF-CARD. Yush SET icon for execution of copying (Keep pushing SET icon for more than three seconds.). Push BAGK icon for cancellation.



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 this function in error.

> Select "FORMAT" in the menu. The screen shown right is displayed. Press ET for 3 seconds to execute.

#### ADJUSTMENT DATA INITIALIZATION

All adjustment data inside the controller are initialized. All the adjustment data until now are erased after the practice. Touch SET if you carry it out, And, touch Back if you stop it. (Keep touching SET for more than three seconds.) AUUSTRENT DATA in the ML flash memory are initialized. Present ADUSTRENT DATA WILL BE LOST. Yueh SET icon for secution of initializing (Keep pushing SET icon for more than three seconds.).



10

When completed properly, the screen shown right is displayed.

By pressing B the screen returns to the previous one.

Unless both of ML B31 and MC1 C9 lamps displayed on lower part of the screen light up, can not be accessed to the card and reading out would not be completed properly.

In this case, check the function of ML adjusting mode select relay (R-36).

### ADJUSTMENT DATA

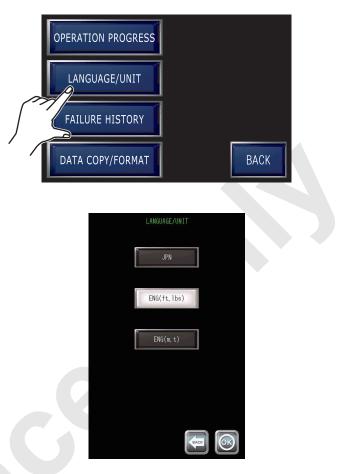
All adjustment data inside the controller are initialized, All the adjustment data until now are erased after the practice. Touch SET if you carry it out, And, touch Back if you stop it. (Keep touching SET for more than three seconds.) AUJUSTNENT CHIA in the HL tlash memory are initialized. Present AUJUSTNENT DATA WILL BE LOST. Push SET icon for execution of initializing (Keep pushing SET icon for more than three seconds.). Push BACK icon for cancellation.

ADJUSTMENT DATA COPY HAS BEEN COMPLETED,



# 10.2.9 LANGUAGE, UNIT SETTING

1. Press "LANGUAGE/UNIT" in the maintenance menu.



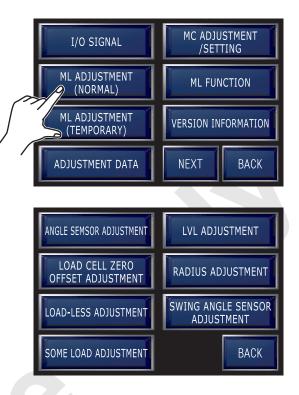
Item becomes displayed.
 Select the required language, unit.

	Displayed language	Displayed unit
JPN	Japanese	m, t
ENG (ft·lbs)	English	feet, klbs
ENG (m·t)	English	m, t

Selected item becomes displayed in blue letter. After select, press  $\fbox$ 

# 10.2.10 ML ADJUSTMENT (NORMAL)

1. Press "ML ADJUSTMENT (NORMAL)" in the maintenance menu.



2. Adjustment menu becomes displayed.

Angle sensor adjustment	This is used when error between display 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 deviate 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 displayed.
Some load adjustment	This is used when error becomes large on actual load display after load-less 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 display and actual work radius becomes larger.
Swing sensor adjustment	This is used when screen display of swing direction differ from the actual direction. This is also used whenever swing angle sensor (slip ring built-in) is replaced.

- 3. Angle detector adjustment
- (1) Select "ANGLE DETECTOR ADJUSTMENT" in the adjustment menu.

Angle detector connected to presently set attachment becomes displayed.

(Figure right shows example of crane with aux. sheave.)

In case with jib, jib angle detector becomes displayed and in case with mast, mast angle detector becomes displayed.

Select the adjustment required angle detector.

This procedure explains boom angle detector as an example.

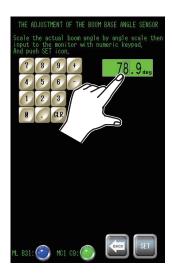
Jib angle detector and mast angle detector are adjusted in the same procedure.

After boom is raised close to the upper limit and lower the boom slightly and press "LOWER BOOM ANGLE SENSOR".

(2) Touch angle indicating area.

ANGLE SEMSOR ADJUSTMENT	LVL ADJUSTMENT
LOAD CELL ZERO OFFSET ADJUSTMENT	RADIUS ADJUSTMENT
LOAD-LESS ADJUSTMENT	SWING ANGLE SENSOR ADJUSTMENT
SOME LOAD ADJUSTMENT	ВАСК
LOWER BOOM SENSOR	
	ВАСК





(3) Angle indicating area becomes highlighted and the numeral input becomes possible.

- (4) Measure the actual boom angle with the level gauge and angle meter and input the number with numeric keypad.
- Ex) In case of input "79.5", input (7), (9), (.), (5).

After input, press SET.

(5) Lower the boom for more than 25 degrees and stop. Then press SET.

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 more effective if the boom is lowered with an angle as large as possible.

(6) Touch the second angle indicating area.





THE ADJUSTMENT OF THE BOOM BASE ANGLE SENSOR
Scale the actual boom angle by angle scale then input to the monitor with numeric keypad. And push SET icon,
79.5 <sub>deg</sub>
Lower the boom more than 25degrees then push SET icon.
Scale the actual boom angle by angle scale then input to the monitor with numeric keypad, And push SET icon,
7 8 9 + 43,6 <sub>deg</sub>
4 5 6
1 2 3
8
ML B31: 📀 MC1 C9: 📀 🚾 🖭

(7) Angel indicating area becomes highlighted and the numeral input becomes possible.

- (8) Measure the actual boom angle with the level gauge and angle meter and input the number with numeric keypad.
- Ex) In case of input "43.2", input (4), (3), (.) (2). After input, press SET.

(9) When the adjustment is properly completed, the message shown right is displayed.

By pressing SET, the screen returns to the previous one.

THE ADJUSTMENT OF THE BOOM BASE ANGLE SENSOR Scale the actual boom angle by angle scale then input to the monitor with numeric keypad, And push SET icon.
79.5 <sub>dog</sub>
Lower the boom more than 25degrees then push SET icon. Scale the estuel beam angle by angle scale than
Scale the actual boom angle by angle scale then input to the monitor with numeric keypad, And push SET icon,
7 8 9 + 43.6 <sub>deg</sub>
4 5 6
8 . a
ML B31: 🕘 MC1 C9: 🙆 🕼 💷
THE ADJUSTMENT OF THE BOOM BASE ANGLE SENSOR
Scale the actual boom angle by angle scale then input to the monitor with numeric keypad. And push SET icon,
<b>79.5</b> dog
Lower the boom more than 25degrees then push SET icon. Scale the actual boom angle by angle scale then
Scale the actual boom angle by angle scale then input to the monitor with numeric keypad, And push SET icon,
7 8 9 + 43.2 <sub>deg</sub>
4 5 6 -
1 2 3
8 - CLR
ML B31: 🕘 MC1 C9: 🙆 💵 💵
THE ADJUSTMENT OF THE BOOM BASE ANGLE SENSOR
Scale the actual boom angle by angle scale then input to the monitor with numeric keypad. And push SET icon,
$79.5_{deg}$
Lower the boom more than 25degrees then push SET icon. Scale the actual boom angle by angle scale then
Scale the actual boom angle by angle scale then input to the monitor with numeric keypad, And push SET icon,
43.2 <sub>deg</sub>
Adjustment has been completed successfully. Push SET icon,
Push SET i con.
79.5 <sub>deg</sub> 43.2 <sub>deg</sub>
7.30  V $6.10  V$
ML 831: 📀 MC1 C9: 📀 🛛 🛄

(10) If the adjustment is not properly completed, the message shown right is displayed.
 By pressing for account returns to the one during

By pressing  $\ensuremath{\text{set}}$  , screen returns to the one during adjusting.

Re-check the procedure and start adjustment again.



- 4. Load detector zero adjustment
- (1) Select "LOAD CELL ZERO OFFSET ADJUSTMENT" in the adjustment menu. The load detectors used in the presently set attachment become displayed. Select the required load detector to be adjusted.
- Right screen shows normal crane as an example.

In case of adjusting jib load detector, luffing configuration must be selected.

If plural load detectors are used, plural load detectors become displayed.

Select the required load detector to be adjusted.

(2) 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.

Press SET when prepared.

## 

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.

ANGLE SEMSOR ADJUSTMENT	LVL ADJUSTMENT
LOAD CELL ZERO OFFSET ADJUSTMENT	RADIUS ADJUSTMENT
OAD-LESS ADJUSTMENT	SWING ANGLE SENSOR ADJUSTMENT
SOME LOAD ADJUSTMENT	ВАСК
BOOM LOAD CELL	
	ВАСК
THE ADJUSTMEN BOOM LOAD CEL	IT OF THE
Apply the ZERO tension t Confirm whether the appl Then push SET icon.	o the load cell. ied tension is ZERO.
ZERO OFFSET VALUE OF L	000 001
ZERO OFFSET VALUE UF L	1.05 v



(3) The message shown right becomes indicated when the adjustment is properly completed.
 By pressing SET, screen returns to the previous one.

The adjustment is properly completed, press SET, the screen returns to the previous one. If the adjustment is fail, resetting again from the previous screen.

(4) If the adjustment is not properly completed, the message shown right is displayed.
By pressing SET, screen returns to the one during adjusting.
Re-check the procedure and start adjustment

again.



THE ADJUSTMENT OF THE BOOM LOAD CELL
Apply the ZERO tension to the load cell. Confirm whether the applied tension is ZERO. Then push SET icon.
ZERO OFFSET VALUE OF LOAD CELL
0.45 v
Adjustment has been failed. Reconfirm whether the applied tension to the load cell is ZERO, Then push SET icon and perform adjustment again.
ML 831: 🕝 MC1 09: 🕑 🔗

#### 5. Load less adjustment

Set the load to only the hook installed. Adjust each hook position based on the table below.

#### 8000-1

8000-1				
		Weight of hook block	Position of hook block	when load is adjusted
Type of attachments	Mode	to be entered during adjustment	Hook of mode selected	Other hooks
Crane	Main lifting	Main hook	Boom foot	_
Crane with auxiliary	Main lifting	Main hook + Aux. sheave hook	Boom foot	
sheave	Auxiliary sheave lifting	Main hook + Aux. sheave hook	Boom foot	
	Main lifting	Main hook + Jib hook	Boom foot	
Crane with jib	Jib lifting	Main hook + Jib hook	Boom foot	
Luffing crane	Main lifting	Main hook + Jib hook	Boom foot	1/4 of distances from boom point sheave to
(with main hook)	Jib lifting	Jib hook	Boom foot	ground.
Luffing crane	Jib lifting	Jib hook + Aux. sheave hook	Boom foot	
(with aux. sheave hook)	Auxiliary sheave lifting	Jib hook + Aux. sheave hook	Boom foot	
Luffing crane (jib hook only)	Jib lifting	Jib hook + Aux. sheave hook	Boom foot	

L/4

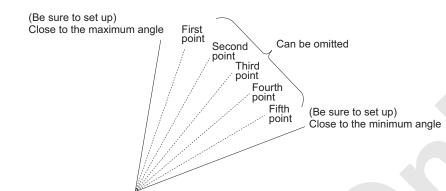
L

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8000-1Published 11-10-17, Control #261-01

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.



(2) Load indicating area turns highlighting and numeral input becomes possible.

Input hook weight with the numeric keypad. Refer to the table in the previous page for hook weight to be input.

Ex) In case of input "2.0", input (2), (.), (0).

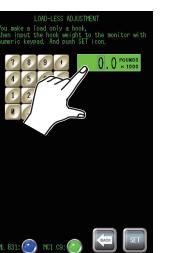
After input, press SET.

After raising the boom to almost the upper limit angle and then lower by about 1 degree and then stop.

## 

There is a some error stopped in boom raising and boom lowering motion.

So ensure to stop in boom lowering.



to the monitor with

(3) Press SET.

(4) Lower the boom and stop. -

Then press 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, press  $\ensuremath{\mbox{\tiny SKIP}}$ 

If "sup" is selected, all the adjustment points in between are skipped.

(5) By pressing EI, message memorizing the first point is displayed.

After lowering the boom, press  $\ensuremath{\texttt{SET}}$  .

If the points in between are to be skipped, press skip.

If "sup" is selected, all the adjustment points in between are skipped.



(6) By pressing SET, message memorizing the second point is displayed.

Second point is memorized. After lowering the boom further, press SET.

If the points in between are to be skipped, press  $\ensuremath{\mbox{\tiny SKIP}}$ 

If " $\ensuremath{\texttt{SKP}}\xspace"$  is selected, all the adjustment points in between are skipped.

(7) Repeat the adjustment in the same way in sequence.

When 5th point is memorized, message requesting to set the angle to minimum and press SET is displayed.

Lower the boom to almost minimum angle and press  $\operatorname{\operatorname{set}}$ 

LOAD-LESS ADJUSTMENT
You make a load only a hook, then input the hook weight to the monitor with numeric keypad, And push SET icon,
0,0 POUNDS × 1000
Raise a boom or a jib to the approximate maximum working angle. Then push SET icon.
You can input maximum 5 middle points between the maximum angle and minimum angle. Push SET icon after you made a boom/jib stop at each middle point. When you stop a boom, jib and hooks at each point, always return the each lever from lowering-side to neutral in order to perform accurately the adjustment. If you want to skip the inputting of middle points, push SKIP icon.
The 2nd point has been memoriz
LOAD-LESS ADJUSTMENT You make a load only a hook, then input the hook weight to the monitor with numeric keypad. And push SET icon.
0,0 POUNDS
Raise a boom or a jib to the approximate maximum working angle. Then push SFT ion
You can input maximum 5 middle points between the maximum angle and minimum angle. Push SEI icon after you made a boom/jib stop at each middle point. When you stop a boom, jib and hooks at each point, always return the each lever from lowering-side to neutral in order to perform accurately the adjustment. If you want to skip the inputting of middle points, push SKIP icon.
The 5th point has been memoriz
Lower a boom or a jib to the approximate minimum working angle, Then push SET icon.
ML 831: (2) MOI 09: (2)
1

(8) If the adjustment is properly completed, the message shown right is displayed.

At the same time K1, K2 values are displayed as adjustment result.

By pressing  $\ensuremath{\text{sell}}$  , screen returns to the previous one.

If the adjustment is not properly completed, the message shown right is displayed.

After pressing SET, start adjustment again.

LOAD-LESS ADJUSTMENT	
You make a load only a hook, then input the hook weight to the monitor with numeric keypad. And push SET icon.	
0,0 POUNDS × 1900	
Raise a boom or a jib to the approximate maximum working angle. Then push SET icon.	
You can input maximum 5 middle Points Metwert from an input and signal for a boom 3 b https://www.second.com/second https://www.second.com/second lowering-side to input an input and so lowering-side to input and input and so lowering-side to	
Lower a boom or a jib to the approximate minimum working angle. Then push SET icon.	
FØ Adjustment inclination K1 0.000	
FØ Adjustment shift K2 -0.181	
Adjustment has been failed. Push SET icon, and perform adjustment again.	
ML 831: 🕑 MC1 C9: 🕜	
LOAD-LESS ADJUSTMENT You make a load only a hook, then input the hook weight to the monitor with numeric keypad. And push SET icon.	
You make a load only a hook, then input the hook weight to the monitor with numeric keypad. And push SET icon. <b>2.0</b> Poumps Raise a boom or a jib to the approximate maximum working angle. Then push SET icon.	
You make a load only a hook, then input the hook weight to the monitor with numeric keypad. And push SET icon. <b>2.0</b> Poumps Raise a boom or a jib to the approximate maximum working angle. Then push SET icon.	
You make a load only a hook, then input the hook weight to the monitor with numeric keypad. And push SET icon.	
You make a load only a hook, then input the hook weight to the monitor with numeric keypad. And push SET icon. Reise a boom or a jib to the approximate maximum working angle. Then push SET icon. Yest seen these sections and the second state and we have set in the second state and the second state second state and the second state and we have set in the second state and the second state second state and the second state and we have set in the second state and the second state second state and the second state and we have second state and the second state and we have set in the second state and the second state second state and the second state and we have set in the second state and the second state second state and the second state and we have second state and the second state and we have second state and the second state and the second state second state and the approximate minimum working angle. The second second state second state and second second state second state and second second second state and the second second state second state and second second second state second state and second second second state and second second second state and second second second second state and second second second second state and second sec	
You make a load only a hook, then input the hook weight to the monitor with numeric keypad. And push SET icon. Raise a boom or a jib to the approximate maximum working angle. Then push SET icon. You can push SET icon. You can push SET icon. Setting a setting and a setting a setting and a setting a setting a setting a setting a setting and a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a set a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a set a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a setting a settin	
You make a load only a hook, then input the hook weight to the monitor with numeric keypad. And push SET icon. Raise a boom or a jib to the approximate maximum working angle. Then push SET icon. You can push SET icon. You can push SET icon. The set of the set of	
You make a load only a hook, then input the hook weight to the monitor with numeric keypad. And push SET ioon. 2.0 × 1000 Raise a boom or a jib to the approximate maximum morking angle. Then push SET ioon. You can push SET ioon. The set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of th	
You make a load only a hook, then input the hook weight to the monitor with numeric keypad. And push SET ion.	

In the load-less 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. 10

6. Some load adjustment

Only the different point to load-less adjustment is the first load value input.

The rest are same.

Different point to load-less adjustment ONLY is explained here.

Firstly lift the weight known load.

Select "SOME LOAD ADJUSTMENT" in the adjustment menu.

By touching load indicating area, display turns highlighting and numeral input becomes possible.

Input load weight actually being lifted with the numeric keypad and press **SET**.

This includes weight of hook and lifting sling.

The procedure afterward is as same as load-less adjustment.

Proceed as same as load-less adjustment.

If adjustment is completed, the screen is displayed as shown right.

At the same time, K3, K4 values are displayed as the adjustment result.

By pressing  $\fbox,$  screen returns to the previous one.

If adjustment is not completed, following is displayed.

"Adjustment is in error". Press SET and readjust.

After pressing SET, start readjustment.

## 

The some load adjustment is likely to receive wind effect.

Therefore if the actual load display changes significantly, wait until the lifting load stops swinging and then press **E** icon.



7. LVL adjustment

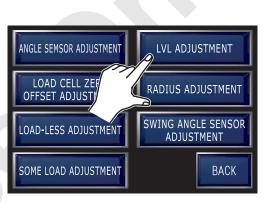
LVL means the load ratio to stop automatically. Normally auto stop load ratio is set at 105% but with this function this load ratio can be changed to 90 to 110%.

# 

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.

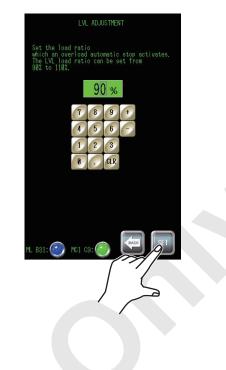
(2) The indicating area becomes highlighted. Input value with the numeric keypad.





10

(3) After value input is completed, press 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 become 105% while the LVL function is not effective, 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 warning alarm sounds are emitted. Continuous alarm sounds are emitted when the loading ratio is 100% or more.

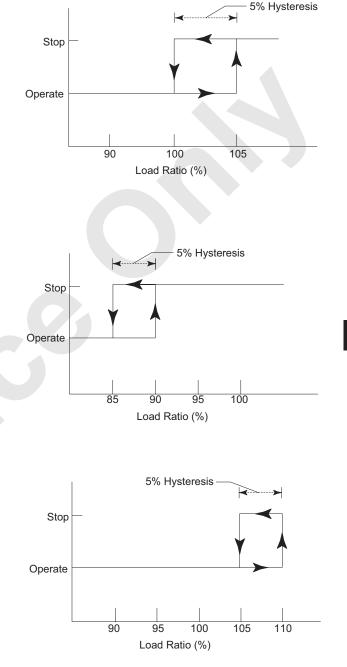
(B) When the LVL function is ON and set to 90%. If the loading ratio become 90%, operation toward the hazardous side is automatically stopped.

The machine is restored from the automatic stop status when the loading ratio is less than 85%.

When the loading ratio becomes 90% with the continuous alarm sounds are emitted.

No forecasting sound (intermittent sound) will be emitted.

(C) When the LVL function is ON and set at 110%.When LVL is set at 110%, the function will be taken as shown in the figure.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).

8. Work radius adjustment

This is used when difference between the displayed work radius and the actual work radius is large due to the boom deflection etc.

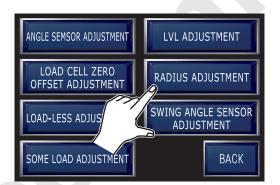
## 

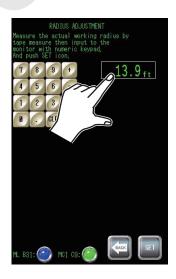
Ensure to check if there is any error in angle display. If error is larger than 0.3 degrees carry out angle adjustment first.

 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 display area.





(2) Radius display area becomes highlighted and the numeral input becomes possible.

- (3) Input actually measured work radius with the numeric keypad.
- Ex) In case of input "13.9", input (1), (3), (.) (9).

After input, press SET.



. B31: 🕥 MC1 C9: 🉆

CADIUS ADJUSTMENT actual working radius by then input to the numeric keypad, icon

13.9<sub>ft</sub>

(4) Lower the boom (jib) to almost min. angle and stop.Then press SET.

RADIUS ADJUSTMENT
Measure the actual working radius by tape measure then input to the monitor with numeric keypad. And push SET icon.
13.9 <sub>ft</sub>
Lower a boom or a jib to the approximate minimum working angle. Then push SET icon.
ML 831: 🕐 MC1 C9: 🌔 📴

(5) Touch the radius display area.

- (6) Input actually measured work radius with the numeric keypad.
- Ex) In case of input "16.9", input (1), (6), (.) (9).

After input, press SET.

(7) If the adjustment is properly completed, the message shown right is displayed.

By pressing ET, screen returns to the previous one.

RADIUS ADJUSTMENT
essure the actual working radius by ape measure then input to the onitor with numeric keypad. nd push SET icon.
13.9 <sub>ft</sub>
ower a boom or a jib to the pproximate minimum working angle, hen push SET icon,
leasure the actual working radius by ape measure then input to the nonitor with numeric keypad. nd push SET icon.
7 8 9 + <u>13.9<sub>ft</sub></u>
1 2 3
8.0
L 831: 🙆 MCI 69: 🏉 💷
RADIUS ADJUSTMENT
essure the actual working radius by ape measure then input to the whitor with numeric keypad, nd push SEI icon,
13.9 <sub>ft</sub>
ower a boom or a jib to the pproximate minimum working angle, hen push SET icon,
leasure the actual working radius by ape measure then input to the onitor with numeric keypad. nd push SET icon.
7 8 9 + 16.9 <sub>ft</sub>
4 5 6 - 1 2 3
8 . CLR
L 831: 🚱 MCI 69: 🍘 💷
RADIUS ADJUSTMENT essure the actual working radius by and the state of the onloor, with numeric keyPad.
13.9 <sub>ft</sub>
ower a boom or a jib to the pproximate minimum working angle. hen push SET icon.
leasure the actual working radius by ape measure then input to the onitor with numeric keypad, nd push SET icon,
16.9 <sub>ft</sub>
djustment has been completed successfully.

Lower a boom or a jib to the approximate minimum working angle. Then push SET icon.
Measure the actual working radius by tape measure then input to the monitor with numeric keypad, And push SET icon,
16.9 <sub>ft</sub>
Adjustment has been completed successfully. Push SET icon.
RADIUS ADJUSTMENT INCLINATION
0.967
RADIUS ADJUSTMENT SHIFT
0.447
ML 831: 💽 NC1 C9: 📀 🛛 📧

(8) If the adjustment is not properly completed, the message shown right is displayed.

By pressing SET, screen returns to the one during adjusting.

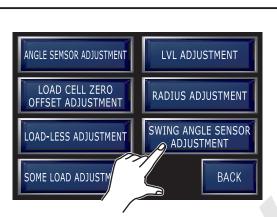
Re-check the procedure and start adjustment again.

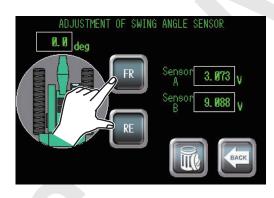
RADIUS ADJUSTMENT	
leasure the actual working radius by aPe measure then inPut to the monitor with numeric keyPad. nd Push SET icon.	
13.9 <sub>ft</sub>	
ower a boom or a jib to the pproximate minimum working angle. hen push SET icon.	
leasure the actual working radius by ape measure then input to the wonitor with numeric keypad, ind push SET icon,	
21.0 <sub>ft</sub>	
djustment has been failed. ush SET icon, and perform adjustment again,	
ADIUS ADJUSTMENT INCLINATION	
2.289	
ADIUS ADJUSTMENT SHIFT	
-17.934	
L B31: 🔄 MC1 C9: 🕑 💽	

- 9. Swing angle adjustment
- (1) Select "SWING ANGLE ADJUSTMENT" in the adjustment menu.

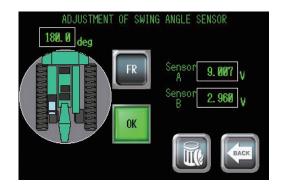
Face the crane toward front (idler side of crawler) and fix with the swing lock pin.

Press FR.





ADJUSTMENT OF SWING ANGLE SENSOR 181.6 deg OK Sensor 9.011 v Sensor 2.963 v RE



(2) If the display changes from FR to (), front side adjustment is properly completed.

Swing the crane by 180 degrees and face it toward rear (travel motor side) and fix with the swing lock pin.

Press RE.

(3) If display changes from RE to (18), rear side adjustment is properly completed.

(4) When either FR or RE is pressed and "NG" is displayed, adjustment is in error.

Check if the crane direction or sensor voltage is correct and start adjustment again.

Right screen indicates "NG" in rear adjustment as an example.

(5) To reset adjusted value, press .
"OK" is displayed on both FR, RE and the values are reset.

	G ANGLE SENSOR
180.0 deg	
R	Sensor 9.007 v A Sensor 2.960 v B
	Back
ADJUSTMENT OF SWIN	G ANGLE SENSOR
181. 7 deg	a ANALE SENSUR
	Sensor 9.017 v
	Sensor 2.967 v
ОК	B 2.301 ¥
ОК	

# 10.2.11 ML ADJUSTMENT (TEMPORARY)

This adjustment is used to match with the load temporary when error exists in load display due to load detector abnormality etc.

There is no limit in adjustment value and adjustment would become possible even when error occurs in load-less/some 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.

 Press "ML ADJUSTMENT (TEMPORARY)" in the maintenance menu. Adjustment possible load detectors become displayed. Select the required one.

Adjustment items become indicated.

Select the required one.

The procedure of "LOAD-LESS ADJUSTMENT", "SOME LOAD ADJUSTMENT" are same as "LOAD-LESS ADJUSTMENT", "SOME LOAD ADJUSTMENT" of "10.2.10 ML ADJUSTMENT (NORMAL)".

# **10.2.12 OPERATION PROGRESS**

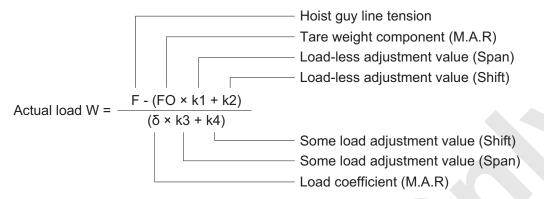
 Press "OPERATION PROGRESS" in the maintenance menu. Information of internal operation will be displayed.



Details
Tare weight component during front winch lifting with current radius
Tare weight component during rear winch lifting with current radius
Tare weight component during third winch lifting with current radius
Load coefficient during front winch lifting with current radius
Load coefficient during rear winch lifting with current radius
Load coefficient during third winch lifting with current radius
Tare weight component other than weight of hook block with current radius (during simultaneous lifting only) (Not used)
Raising guy line tension
Front winch wire rope tension (w/ front winch load cell) (Not used)
Rear winch wire rope tension (w/ Rear winch load cell) (Not used)
Third winch wire rope tension (w/ third winch load cell) (Not used)
Whole rated load (rated load during selected mode )
Whole actual load (actual load during selected mode )
Whole moment ratio (value indicated in bar gauge)
Front winch rated load with current radius on the basis of data
Rear winch rated load with current radius on the basis of data
Third winch rated load with current radius on the basis of data
Calculated front winch operating radius before correction by radius adjustment
Calculated Rear winch operating radius before correction by radius adjustment
Calculated third winch operating radius before correction by radius adjustment

# EXAMPLE OF USING OPERATION PROGRESS 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 front 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 value F required for the actual load of 5 t can be found by the using the formula above, as shown below.

 $F = 5 \times 1.33 + 2.28 = 8.93$ 

Where, the actual value F is obviously smaller than the theoretical F.

Next, the F can be found by the formula shown below.

Hoist guy line tension 
$$F = \begin{bmatrix} -5 \times (\text{present load cell voltage - load cell zero adjustment value}) \\ 5 \times (\text{present load cell voltage - load cell zero adjustment value}) \\ (5 - load cell zero adjustment value) \times 0.08333 \times (1.02 \text{ or } 0.98) \\ \hline \\ 1/\text{reeving rope coefficient } \\ (\text{depending on the machine models}) \\ \hline \\ Correction coefficient for lowering \\ (\text{depending on the machine models}) \\ \hline \\ \end{array}$$

If the load cell zero point adjustment has not been carried out, adjustment value is 1, and the coefficient is 1.02 if the boom lowering stopped.

In such a status, if the load cell voltage is calculated with using the formula above and the value when the F is 4.97, the present load cell voltage is 1.34 V.

In a similar manner, the load cell voltage is 1.61 V, when the theoretical tension F is 8.93.

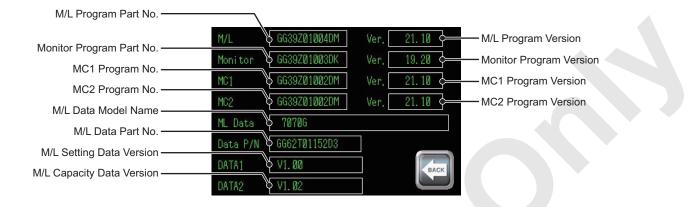
Then check the load cell voltage on the I/O signal check screen.

If it is close to 1.34 V as stated above, the detected load cell voltage is smaller than the theoretical value. In this case, the load cell may be faulty.

# **10.2.13 VERSION INFORMATION**

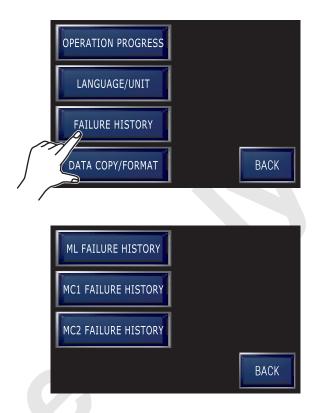
 Press "VERSION INFORMATION" in the maintenance menu.
 Each part number and version of ML program,

monitor, MC1 program, MC2 program, ML data are displayed.



# 10.2.14 FAILURE HISTORY

- 1. Press "FAILURE HISTORY" in the maintenance menu.
- 2. Items are displayed.



3. ML failure history

Press "ML FAILURE HISTORY" in the menu. Past failures become displayed from latest one in order to max. 20 items. Failure content is displayed by code. Check the contents by the table in operator's manual refer to the article 3 "MESSAGE TABLE".

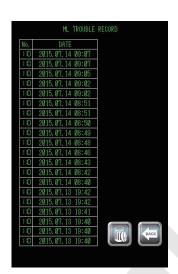
DELETING FAILURE HISTORY

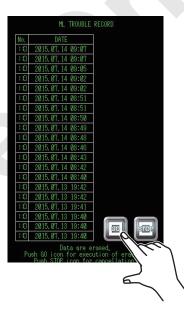
.

When the failure record is to be deleted, press  $\fbox$ .

The message right becomes displayed.

In case of deletion, press I. In case of not deletion, press I. Press I. for more than 1 second. By pressing I. data is deleted.





No.	DATE	]
0	2000.00.00.00:00	ł
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	j -
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	
0	2000.00.00 00:00	BACK
0	2000.00.00 00:00	

4. MC1 failure history

Press "MC1 FAILURE HISTORY" in the menu. Past failures become displayed from the latest one in order to max. 200 items (10 item × 20 page).

By 🖾 page can be scrolled up and by 🖄 page can be scrolled down.

Failure content is displayed by code.

Check the contents by the table in operator's manual refer to the article 3 "MESSAGE TABLE".

DELETING FAILURE HISTORY

When the failure record is to be deleted, press B.

The message right becomes displayed.

In case of deletion, press . In case of not deletion, press . Press . for more than 1 second. By pressing . data is deleted.

MC1 TROUBL	E RECORD
DATE	No.
2015.07.14 09:09	MC1-H12
2015.07.14 09:09	MC1-W46
2015.07.14 09:09	MC1-W17
2015.07.14 09:09	MC1-W16
2015.07.14 09:09	MC1-W14
2015.07.14 09:09	MC1-W13
2015.07.14 09:09	MC1-C03
2015.07.14 09:09	MC1-C02
2015.07.14 09:09	MC1-C01
2015.07.14 09:09	MC1-D08
MO1 TROUDL	E DECODD

No.		DATE
MC1-H12	09:09	2015.07.14
MC1-W46	09:09	2015.07.14
MC1-W17	09:09	2015.07.14
MC1-W16	09:09	2015.07.14
MC1-W14	09:09	2015.07.14
MC1-W13	09:09	2015.07.14
MC1-CØ3	09:09	2015.07.14
MC1-C02	09:09	2015.07.14
MC1-CØ1	09:09	2015.07.14
MC1-D08	09:09	2015.07.14

Data is erased. Touch SET if it is good . Touch STOP if you stop it.

GO	STOP



5. MC2 failure history

Press "MC2 FAILURE HISTORY" in the menu. Display content and handling procedure are same as MC1. 10

# 10.2.15 ADJUSTMENT DATA

Press "ADJUSTMENT DATA" in the maintenance menu.

Adjustment data menu becomes displayed.

- 1. Angle sensor
- (1) Adjustment data displayPress "ANGLE SENSOR" in the menu.

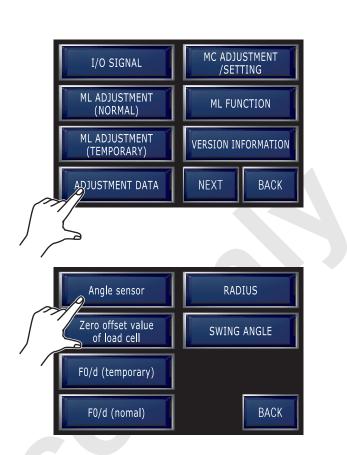
(2) Table of adjustment data of angle detector is displayed.

On this machine, No.1 is used for boom angle detector, No.2 is for crane jib angle detector and No.3 is for tower jib angle detector.

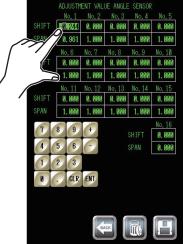
If adjustment is not done yet, shift=0.000, span=1.000 is displayed.

(3) Adjustment data change

 In case of changing adjustment data, touch the numeral area to be changed.
 Touched area becomes highlighting and the numeral input becomes possible.







- (4) Input the value with numeric keypad.
- Ex) In case of input "1.103", input (1), (.), (1), (0), (3).

If there is other changing area, change the value in the same way. After all input is completed, press 🗐.

(5) The message right becomes displayed.

Press 🐼.

 (6) Deleting adjustment data Touch the area where to be deleted, be turns highlighting.
 Press 
 for 3 seconds to execute.



		ENT VAL			
OUTET	No. 1	No. 2	No. 3	No. 4	No. 5
SHIFT	1, 103	0.000	0.000	0.000	0.000
SPAN	0, 961	1.000	1.000	1.000	1.000
	No. 6	No. 7	No. 8	No. 9	No. 10
SHIFT	0.000	0.000	0.000	0.000	0.000
	1.000	1.000	1.000	1.000	1.000
	No. 11	No. 12	No. 13	No. 14	No. 15
	0.000	0.000	0.000	0.000	0.000
SPAN	1.000	1.000	1.000	1.000	1.000
					No. 16
7	8 9	+		SHIFT	0.000
4	5 6	-		SPAN	0.000
	0 0				01000
	2 3				
0	. CLR	ENT			
	Adjust	ment va	lue was		
		_	_		
		B	CK		
	_	D			
	~~	//=			
		/			
	(				
/					
	/				
		ENT VAL			
<b>CHIET</b>	No. 1	No. 2	No. 3	No. 4	No. 5
SHIFT	No. 1 0. 244	No. 2 0. 000	No, 3 <b>0. 000</b>	No. 4 0. 000	No. 5 0. 000
SHIFT SPAN	No. 1 0.244 0.961	No. 2 0. 000 1. 000	No. 3 0. 000 1. 000	No. 4 0. 000 1. 000	No. 5 0. 000 1. 000
	No. 1 0. 244 0. 961 No. 6	No. 2 0. 000 1. 000 No. 7	No. 3 0. 000 1. 000 No. 8	No. 4 0. 000 1. 000 No. 9	No. 5 <b>0. 000</b> <b>1. 000</b> No. 10
	No. 1 <b>9.244</b> <b>0.961</b> No. 6 <b>0.000</b>	No. 2 0. 000 1. 000 No. 7 0. 000	No. 3 0. 000 1. 000 No. 8 0. 000	No. 4 0. 000 1. 000 No. 9 0. 000	No, 5 0. 000 1. 000 No, 10 0. 000
	No. 1 0. 244 0. 961 No. 6	No. 2 0. 000 1. 000 No. 7	No. 3 0. 000 1. 000 No. 8	No. 4 0. 000 1. 000 No. 9	No. 5 <b>0. 000</b> <b>1. 000</b> No. 10
	No. 1 <b>9.244</b> <b>0.961</b> No. 6 <b>0.000</b> <b>1.000</b> No. 11	No. 2 0. 000 1. 000 No. 7 0. 000	No. 3 0. 000 1. 000 No. 8 0. 000	No. 4 0. 000 1. 000 No. 9 0. 000	No, 5 0. 000 1. 000 No, 10 0. 000
	No. 1 <b>0. 961</b> No. 6 <b>0. 000</b> <b>1. 000</b>	No. 2 0. 000 1. 000 No. 7 0. 000 1. 000	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000	No. 4 0. 000 1. 000 No. 9 0. 000 1. 000	No. 5 <b>9. 000</b> <b>1. 000</b> No. 10 <b>0. 000</b> <b>1. 000</b>
	No. 1 <b>9.244</b> <b>0.961</b> No. 6 <b>0.000</b> <b>1.000</b> No. 11	No. 2 0. 000 1. 000 No. 7 0. 000 1. 000 No. 12	No. 3 <b>0.000</b> <b>1.000</b> No. 8 <b>0.000</b> <b>1.000</b> No. 13	No. 4 9. 909 1. 909 No. 9 9. 909 1. 909 No. 14	No. 5 <b>9. 000</b> <b>1. 000</b> No. 10 <b>9. 000</b> <b>1. 000</b> No. 15
SPAN SHIFT SPAN SHIFT SPAN	No. 1 <b>9. 244</b> <b>9. 961</b> No. 6 <b>9. 999</b> <b>1. 999</b> No. 11 <b>9. 999</b> <b>1. 999</b>	No. 2 0. 000 1. 000 No. 7 0. 000 1. 000 No. 12 0. 000 1. 000	No. 3           0.000           1.000           No. 8           0.000           1.000           No. 13           0.000	No. 4 <b>9. 000</b> <b>1. 000</b> No. 9 <b>9. 000</b> <b>1. 000</b> No. 14 <b>9. 000</b>	No. 5 <b>0. 000</b> <b>1. 000</b> No. 10 <b>0. 000</b> No. 15 <b>0. 000</b>
SPAN SHIFT SPAN SHIFT	No. 1 0. 961 No. 6 0. 000 1. 000 No. 11 0. 000	No. 2 <b>0. 000</b> <b>1. 000</b> No. 7 <b>0. 000</b> <b>1. 000</b> No. 12 <b>0. 000</b>	No, 3 0, 900 1, 900 No, 8 0, 900 1, 900 No, 13 0, 900 1, 900	No. 4 <b>9. 000</b> <b>1. 000</b> No. 9 <b>9. 000</b> <b>1. 000</b> No. 14 <b>9. 000</b>	No. 5 <b>9. 000</b> <b>1. 000</b> No. 10 <b>9. 000</b> <b>1. 000</b> No. 15 <b>9. 000</b> <b>1. 000</b>
SPAN SHIFT SPAN SHIFT SPAN	No. 1 <b>9. 244</b> <b>9. 961</b> No. 6 <b>9. 999</b> <b>1. 999</b> No. 11 <b>9. 999</b> <b>1. 999</b>	No. 2 0. 000 1. 000 No. 7 0. 000 1. 000 No. 12 0. 000 1. 000	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 000 1. 000 No. 9 0. 000 1. 000 No. 14 0. 000 1. 000	No. 5 <b>0. 600</b> <b>1. 000</b> <b>No.</b> 10 <b>0. 000</b> <b>1. 000</b> <b>No.</b> 15 <b>0. 000</b> <b>1. 000</b> <b>No.</b> 16
SPAN SHIFT SPAN SHIFT SPAN	No. 1 <b>9. 244</b> <b>0. 961</b> No. 6 <b>0. 000</b> <b>1. 000</b> <b>1. 000</b> <b>1. 000</b> <b>3. 9</b> <b>5. 6</b>	No. 2 0. 000 1. 000 No. 7 0. 000 1. 000 No. 12 0. 000 1. 000	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 000 1. 000 No. 9 8. 000 1. 000 No. 14 8. 000 1. 000 SHIFT	No. 5           0.600           1.000           No. 10           0.000           1.000           No. 15           0.600           1.000           No. 15           0.000           1.000           No. 16           0.000
SPAN SHIFT SPAN SHIFT SPAN	No. 1 9. 961 No. 6 9. 009 1. 009 No. 11 9. 009 1. 000 8. 9	No. 2 0. 000 1. 000 No. 7 0. 000 1. 000 No. 12 0. 000 1. 000	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 000 1. 000 No. 9 8. 000 1. 000 No. 14 8. 000 1. 000 SHIFT	No. 5           0.600           1.000           No. 10           0.000           1.000           No. 15           0.600           1.000           No. 15           0.000           1.000           No. 16           0.000
SPAN SHIFT SPAN SHIFT SPAN	No. 1 <b>9. 244</b> <b>9. 961</b> No. 6 <b>9. 000</b> <b>1. 000</b> <b>1. 000</b> <b>1. 000</b> <b>3. 9</b> <b>5. 6</b>	No. 2 0. 000 1. 000 No. 7 0. 000 1. 000 No. 12 0. 000 1. 000	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 000 1. 000 No. 9 8. 000 1. 000 No. 14 8. 000 1. 000 SHIFT	No. 5           0.600           1.000           No. 10           0.000           1.000           No. 15           0.600           1.000           No. 15           0.000           1.000           No. 16           0.000
SPAN SHIFT SPAN SHIFT SPAN 7 4 1	No, 1 <b>9. 244</b> <b>0. 961</b> No, 6 <b>9. 000</b> <b>1. 000</b> <b>No, 11</b> <b>9. 000</b> <b>1. 000</b> <b>8. 9</b> <b>5. 6</b> <b>2. 3</b>	No, 2 0, 009 1, 000 No, 7 0, 009 1, 009 No, 12 0, 009 1, 009 1, 009 1, 009	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 000 1. 000 No. 9 8. 000 1. 000 No. 14 8. 000 1. 000 SHIFT	No. 5           0.600           1.000           No. 10           0.000           1.000           No. 15           0.600           1.000           No. 15           0.000           1.000           No. 16           0.000
SPAN SHIFT SPAN SHIFT SPAN 7 4 1	No, 1 <b>9. 244</b> <b>0. 961</b> No, 6 <b>9. 000</b> <b>1. 000</b> <b>No, 11</b> <b>9. 000</b> <b>1. 000</b> <b>8. 9</b> <b>5. 6</b> <b>2. 3</b>	No, 2 0, 009 1, 000 No, 7 0, 009 1, 009 No, 12 0, 009 1, 009 1, 009 1, 009	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 000 1. 000 No. 9 8. 000 1. 000 No. 14 8. 000 1. 000 SHIFT	No. 5           0.600           1.000           No. 10           0.000           1.000           No. 15           0.600           1.000           No. 15           0.000           1.000           No. 16           0.000
SPAN SHIFT SPAN SHIFT SPAN 7 4 1	No, 1 <b>9. 244</b> <b>0. 961</b> No, 6 <b>9. 000</b> <b>1. 000</b> <b>No, 11</b> <b>9. 000</b> <b>1. 000</b> <b>8. 9</b> <b>5. 6</b> <b>2. 3</b>	No, 2 0, 009 1, 000 No, 7 0, 009 1, 009 No, 12 0, 009 1, 009 1, 009 1, 009	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 999 1. 069 No. 9 9. 069 1. 069 1. 069 1. 069 SHIFT SPAN	No. 5 8. 000 1. 000 No. 10 0. 000 1. 000 1. 000 No. 15 8. 000 1. 000 No. 16 9. 000
SPAN SHIFT SPAN SHIFT SPAN 7 4 1	No, 1 <b>9. 244</b> <b>0. 961</b> No, 6 <b>9. 000</b> <b>1. 000</b> <b>No, 11</b> <b>9. 000</b> <b>1. 000</b> <b>8. 9</b> <b>5. 6</b> <b>2. 3</b>	No, 2 0, 009 1, 000 No, 7 0, 009 1, 009 No, 12 0, 009 1, 009 1, 009 1, 009	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 999 1. 069 No. 9 9. 069 1. 069 1. 069 1. 069 SHIFT SPAN	No. 5 8. 000 1. 000 No. 10 0. 000 1. 000 1. 000 No. 15 8. 000 1. 000 No. 16 9. 000
SPAN SHIFT SPAN SHIFT SPAN 7 4 1	No, 1 <b>9. 244</b> <b>0. 961</b> No, 6 <b>9. 000</b> <b>1. 000</b> <b>No, 11</b> <b>9. 000</b> <b>1. 000</b> <b>8. 9</b> <b>5. 6</b> <b>2. 3</b>	No, 2 0, 009 1, 000 No, 7 0, 009 1, 009 No, 12 0, 009 1, 009 1, 009 1, 009	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 000 1. 000 No. 9 8. 000 1. 000 No. 14 8. 000 1. 000 SHIFT	No. 5 8. 000 1. 000 No. 10 0. 000 1. 000 No. 15 8. 000 1. 000 No. 16 9. 000
SPAN SHIFT SPAN SHIFT SPAN 7 4 1	No, 1 <b>9. 244</b> <b>0. 961</b> No, 6 <b>9. 000</b> <b>1. 000</b> <b>No, 11</b> <b>9. 000</b> <b>1. 000</b> <b>8. 9</b> <b>5. 6</b> <b>2. 3</b>	No, 2 0, 009 1, 000 No, 7 0, 009 1, 009 No, 12 0, 009 1, 009 1, 009 1, 009	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 999 1. 069 No. 9 9. 069 1. 069 1. 069 1. 069 SHIFT SPAN	No. 5 8. 000 1. 000 No. 10 0. 000 1. 000 No. 15 8. 000 1. 000 No. 16 9. 000
SPAN SHIFT SPAN SHIFT SPAN 7 4 1	No, 1 <b>9. 244</b> <b>0. 961</b> No, 6 <b>9. 000</b> <b>1. 000</b> <b>No, 11</b> <b>9. 000</b> <b>1. 000</b> <b>8. 9</b> <b>5. 6</b> <b>2. 3</b>	No, 2 0, 009 1, 000 No, 7 0, 009 1, 009 No, 12 0, 009 1, 009 1, 009 1, 009	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 999 1. 069 No. 9 9. 069 1. 069 1. 069 1. 069 SHIFT SPAN	No. 5 8. 000 1. 000 No. 10 0. 000 1. 000 No. 15 8. 000 1. 000 No. 16 9. 000
SPAN SHIFT SPAN SHIFT SPAN 7 4 1	No, 1 <b>9. 244</b> <b>0. 961</b> No, 6 <b>9. 000</b> <b>1. 000</b> <b>No, 11</b> <b>9. 000</b> <b>1. 000</b> <b>8. 9</b> <b>5. 6</b> <b>2. 3</b>	No, 2 0, 009 1, 000 No, 7 0, 009 1, 009 No, 12 0, 009 1, 009 1, 009 1, 009	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 999 1. 069 No. 9 9. 069 1. 069 1. 069 1. 069 SHIFT SPAN	No. 5 8. 000 1. 000 No. 10 0. 000 1. 000 No. 15 8. 000 1. 000 No. 16 9. 000
SPAN SHIFT SPAN SHIFT SPAN	No, 1 <b>9. 244</b> <b>0. 961</b> No, 6 <b>9. 000</b> <b>1. 000</b> <b>No, 11</b> <b>9. 000</b> <b>1. 000</b> <b>8. 9</b> <b>5. 6</b> <b>2. 3</b>	No, 2 0, 009 1, 000 No, 7 0, 009 1, 009 No, 12 0, 009 1, 009 1, 009 1, 009	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 999 1. 069 No. 9 9. 069 1. 069 1. 069 1. 069 SHIFT SPAN	No. 5 8. 000 1. 000 No. 10 0. 000 1. 000 No. 15 8. 000 1. 000 No. 16 9. 000
SPAN SHIFT SPAN SHIFT SPAN 7 4 1	No, 1 <b>9. 244</b> <b>0. 961</b> No, 6 <b>9. 000</b> <b>1. 000</b> <b>No, 11</b> <b>9. 000</b> <b>1. 000</b> <b>8. 9</b> <b>5. 6</b> <b>2. 3</b>	No, 2 0, 009 1, 000 No, 7 0, 009 1, 009 No, 12 0, 009 1, 009 1, 009 1, 009	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 999 1. 069 No. 9 9. 069 1. 069 1. 069 1. 069 SHIFT SPAN	No. 5 8. 000 1. 000 No. 10 0. 000 1. 000 No. 15 8. 000 1. 000 No. 16 9. 000
SPAN SHIFT SPAN SHIFT SPAN 7 4 1	No, 1 <b>9. 244</b> <b>0. 961</b> No, 6 <b>9. 000</b> <b>1. 000</b> <b>No, 11</b> <b>9. 000</b> <b>1. 000</b> <b>8. 9</b> <b>5. 6</b> <b>2. 3</b>	No, 2 0, 009 1, 000 No, 7 0, 009 1, 009 No, 12 0, 009 1, 009 1, 009 1, 009	No. 3 0. 000 1. 000 No. 8 0. 000 1. 000 1. 000 1. 000	No. 4 8. 999 1. 069 No. 9 9. 069 1. 069 1. 069 1. 069 SHIFT SPAN	No. 5 8. 000 1. 000 No. 10 0. 000 1. 000 No. 15 8. 000 1. 000 No. 16 9. 000

(7) All adjustment data returns to the initial value. Initial value : Shift = 0.000, Span = 1.000

If either shift or span is deleted, the other one also is deleted.

The message right becomes displayed. This is to complete deletion. Press .

- 2. Load detector zero adjustment
- Adjustment data display Press "Zero offset value of load cell" in the menu.

Table of zero point adjustment data of load detector is displayed.

They are displayed by load cell voltage value at time of zero adjustment.

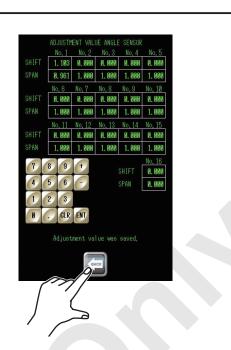
On this machine, No.1 of iL1 is used for boom hoist load detector, No.1 of iL3 is for jib hoist load detector.

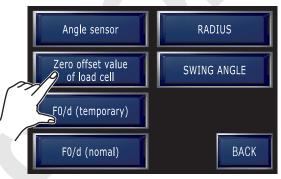
If adjustment is not done yet, 1.000 is displayed.

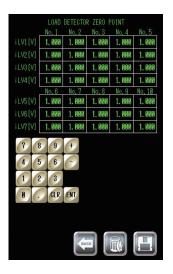
Press 🐼 to return to the previous screen.

- (2) Changing of adjustment data
- (3) Deletion of adjustment data

Adjustment data can be changed or deleted with the same way as that of adjustment data of angle detectors.







- 3. Load-less / some load (temporary)
- Adjustment data display
   Press "F0/d (temporary)" in the menu.
   Table of adjustment datas becomes displayed.

М	Front lifting mode adjustment data
А	Rear lifting mode adjustment data
R	Third lifting mode adjustment data
No	Load-less load adjustment
S.	Some load adjustment

If adjustment is not done yet, shift=0.000, span=1.000 is displayed.

Press  $\textcircled{\mbox{\footnotesize \mbox{\tiny EP}}}$  to return to the previous screen.

- (2) Changing of adjustment data
- (3) Deletion of adjustment data

Adjustment data can be changed or deleted with the same way as that of adjustment data of angle detectors.

Angle sensor	RADIUS
Zero offset value of load cell	SWING ANGLE
F0/d (temporary)	
F0/d (nomal)	ВАСК
F8/8 (LL No SHIFT No SPAN S. SHIFT S. SPAN S. SFAN 1 0000 7 8 9 1 4 5 6 1 2 3 8 0 CLR ENT	A R 8.000 B.000 1.000 1.000 8.000 B.000 1.000 1.000

- 4. Load-less / some load (normal)
- Adjustment data display
   Press "F0/d (normal)" in the menu.
   Table of adjustment datas becomes displayed.

On this adjustment, 10 type of boom length adjustment are possible on each group of 1 to 30.

At first, group 1 becomes displayed. On every pressing of , group changes like 2, 3, 4...30. On every pressing 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 load-less adjusting become displayed.

If adjustment is not done yet, shift=0.000, span=1.000 is displayed.

When more than two boom (jib) length are adjusted and non adjusted boom (jib) length is used, calibration between closest two length is applied.

- (2) Changing of adjustment data
- (3) 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, displayed group data ONLY is deleted.

Angle sensor	RADIUS
Zero offset value of load cell	SWING ANGLE
F0/d (temporary)	
F0/d (nomal)	ВАСК
No.1         No.1 <th< td=""><td>808         1.808         1.009         1.009           7         No.3         No.3         No.13           1.808         8.009         8.009         8.009           608         8.009         8.009         8.009           608         8.009         8.009         8.009           608         1.009         1.009         1.009           608         1.009         1.009         1.009           608         1.009         1.009         1.009           609         1.009         1.009         1.009           609         1.009         1.009         1.009</td></th<>	808         1.808         1.009         1.009           7         No.3         No.3         No.13           1.808         8.009         8.009         8.009           608         8.009         8.009         8.009           608         8.009         8.009         8.009           608         1.009         1.009         1.009           608         1.009         1.009         1.009           608         1.009         1.009         1.009           609         1.009         1.009         1.009           609         1.009         1.009         1.009

- 5. Working radius
- (1) Adjustment data displayPress "RADIUS" in the menu.Table of adjustment datas becomes displayed.

This adjustment also consists of group 1 to 30 and the first screen indicates group 1 to 15. By pressing ⊕ group 16 to 30 becomes displayed.

Contents of each group is as same as that of "LOAD-LEE/SOME LOAD(NORMAL)".

If adjustment is not done yet, shift=0.000, span=1.000 is displayed.

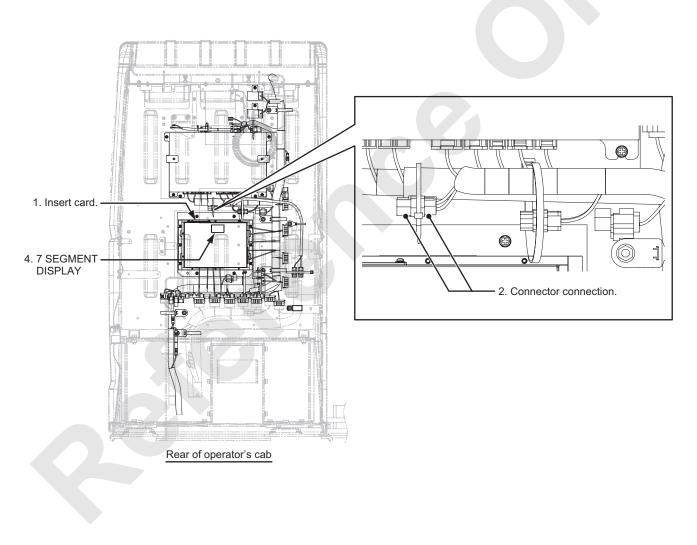
- (2) Changing of adjustment data
- (3) Deletion of adjustment data

Adjustment data can be changed or deleted with the same way as that of adjustment data of angle detectors.

Ang	gle sen	sor		9	F	RADIU	S	
	offset load c			5	SWI	NG AN	IGLE	
F0/d	(tempc	orary)	1			_		
F0/	ˈd (nom	nal)					BACK	
	SHIFT SPAN SHIFT SPAN SHIFT SPAN	No. 1 9. 009 1. 009 No. 6 9. 009 1. 009 No. 11 9. 009 1. 009 8. 9	RAD I' No. 2 0. 900 1. 900 No. 7 0. 900 1. 900 No. 12 0. 900 1. 900	US No. 3 <b>1. 000</b> No. 8 <b>0. 000</b> <b>1. 000</b> No. 13 <b>0. 000</b> <b>1. 000</b>	No. 4 <b>9. 899</b> <b>1. 899</b> No. 9 <b>9. 899</b> <b>1. 899</b> No. 14 <b>9. 899</b>	No. 5 <b>0.000</b> <b>1.000</b> <b>0.000</b> <b>1.000</b> <b>1.000</b> <b>1.000</b> <b>1.000</b> <b>1.000</b>		
		5 6 2 3 CLR		CK				

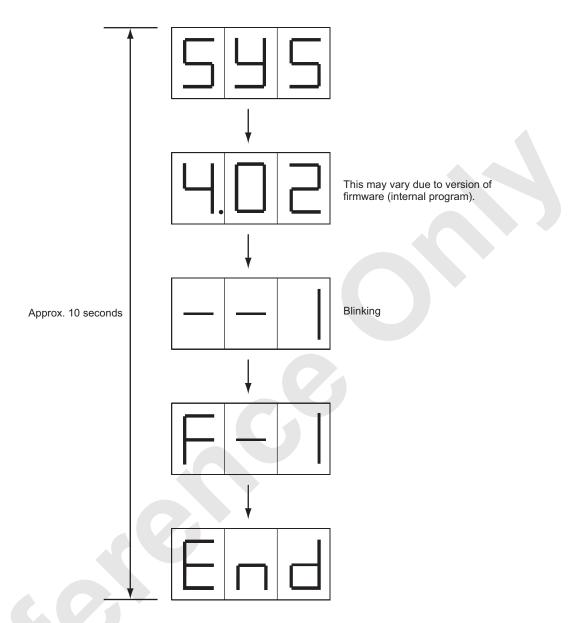
# 10.2.16 DOWNLOAD ML PROGRAM

- 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.
- 2. Connect write in permit connector CN- 420M and CN-439F on the right upper of the controller.
- 3. Turn on the key switch.
- 4. Download is started.



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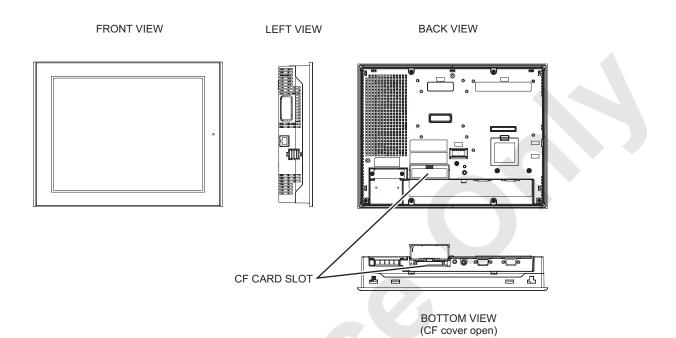
During download, 7 segment display of the controller changes as shown below.



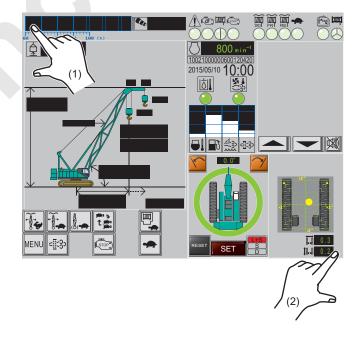
- 5. When End is indicated, re-writing is completed.
- 6. Turn OFF the key switch.
- 7. Pull out write in permit connector.
- 8. Return the original CF card back to the ML controller.

## 10.2.17 DOWNLOAD OF MONITOR PROGRAM

- 1. Insert the CF card with new program filed in to the CF card slot on the back face of the monitor.
- \* Ensure to close the cover.



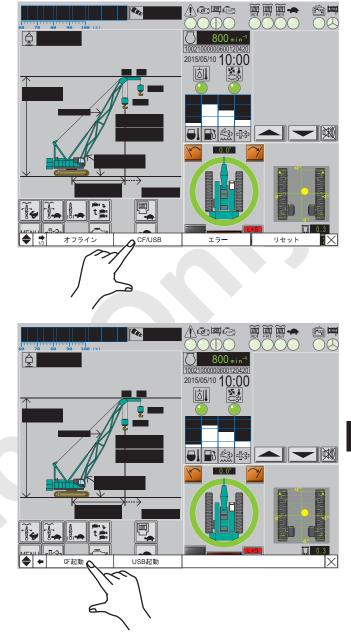
- 2. Turn the key switch ON and wait for screen to start.
- 3. When the screen is started, tap on screen corners diagonally in succession.



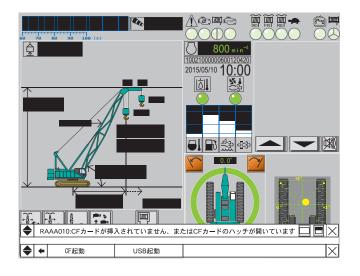
## [ 10. ELECTRIC SYSTEM ]

 Menu becomes indicated on the lower part of the screen. Select "CF/USB".

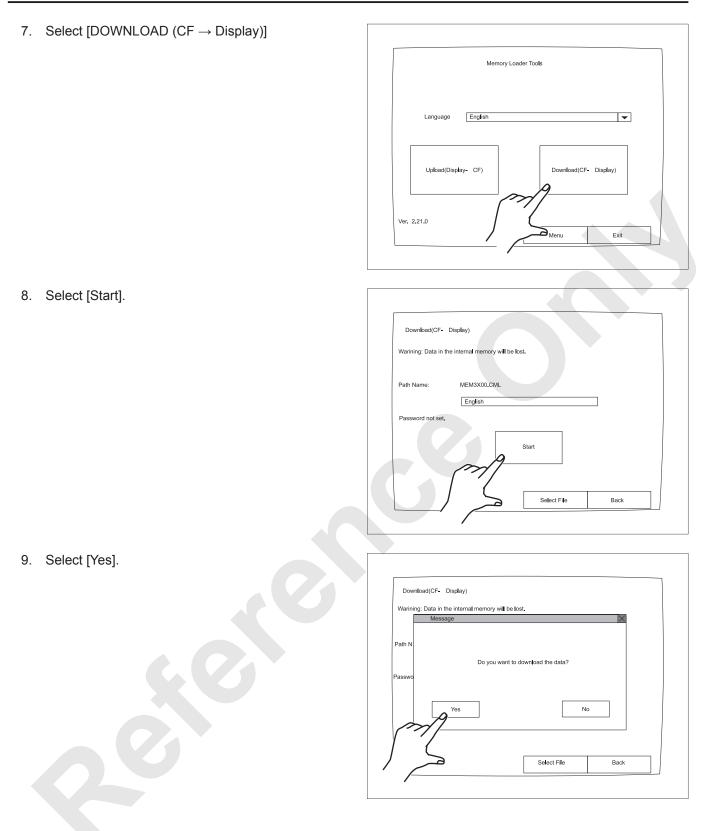
5. Select "CF START".



6. If the error as shown right is displayed, check for inserted condition of CF card or cover to be closed.



## [ 10. ELECTRIC SYSTEM ]



10

 Download starts.
 Write in [OS data], [System / Project data] in its order. If properly completed, message as shown right becomes displayed.

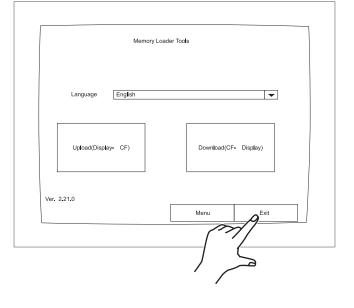
Press [Back].

OS data write completed (4/4). System/Project data write completed (80/80). SRAM data write completed (2/2). Successfully completed. Please press the Back button.
Download
Warining: Data in the internal memory will be lost.
File Name: //MEM3X00.CML
OS data write com/leted (4/4). System/Project data write completed (80/80). SRAM data write completed (22), Successfully completed. Please push the Back button.
Back

11. Press [Back] to return to the screen before writing in starts.

Download(CF-	
Warining: Data in th	e internal memory will be lost.
Path Name:	MEM3X00.CML
	English
Password not set.	
	Start
	Select File
	$\sim$

12. Press [Exit] to return to the screen 1 step before.



- 13. Press [Yes].
  - Monitor re-starts.

This is to complete re-writing of program.

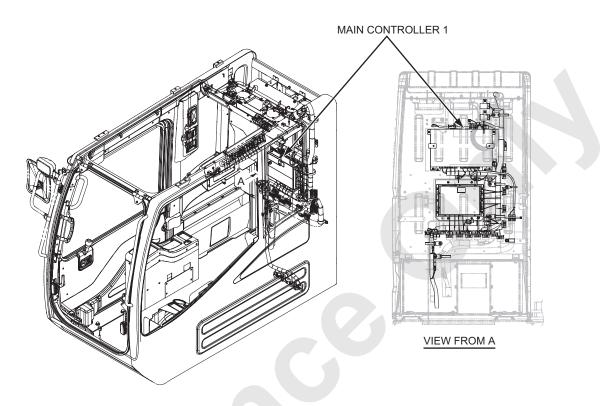
Turn the key switch OFF and take out the CF card.

Memory Loader Tools	
Message X	
Are you sure to restart the system?	
Menu Exit	

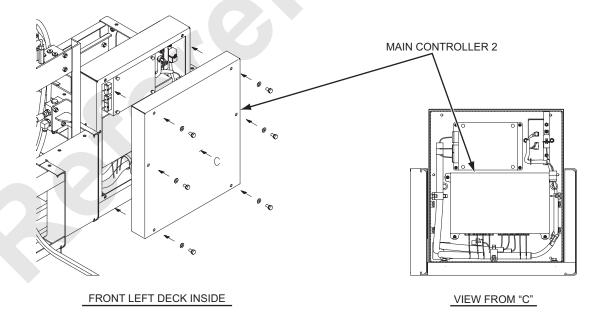
# 10.3 MAIN CONTROLLER

## 10.3.1 ARRANGEMENT OF MAIN CONTROLLER

1. Installation position (cab) of main controller 1



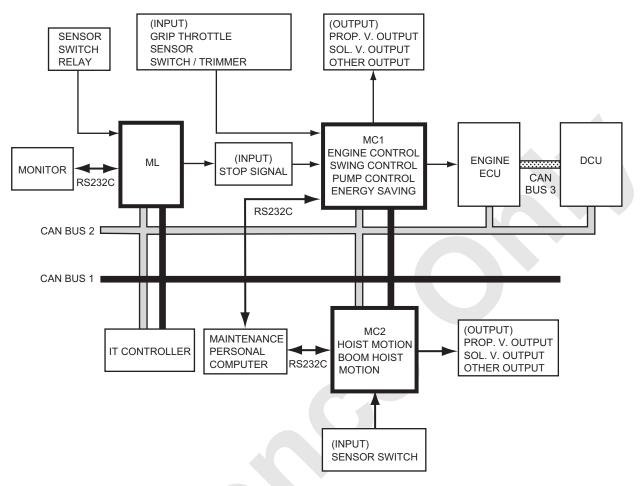
2. Installation position (left deck) of main controller 2



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# 10.3.2 COMPOSITION OF SYSTEM

1. System composition chart



2. 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, 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

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## **10.3.3 FUNCTION OF MAIN CONTROLLER**

FUNCTION	CONTROL	
FUNCTION	MC1	MC2
1. Accelerator control	0	
2. Horse power control	0	
3. Winch motor speed control	0	0
4. Swing counterforce	0	
5. Swing speed control	0	
6. Swing limit control	0	
7. Winch control	0	0
8. Boost control		0
9. Boom stop control		0
10. Front, rear drum hoisting stop		0
11. Motor tilt angle control		0
12. Hook over hoist control		0
13. Drum rotation detect grip control (option)	0	
14. Front, boom pump control	0	
15. Height meter	0	
16. Lever interlock control	0	0
17. DPF regeneration control	0	0
18. G winch control	0	0
19. G engine control	0	
20. AIS control	0	
21. HYD. oil heat (option)	0	0

MC1 : MAIN CONTROLLER 1 MC2 : MAIN CONTROLLER 2

Adjustment function

(1)	Model number setting
(2)	Option setting
(3)	Adjustment of grip throttle and foot throttle
(4)	Engine speed adjustment
(5)	Adjustment 5 Proportional solenoid valve output adjustment
(6)	Adjusting of inclination meter
(7)	Supply pump adjustment

### 1. Accelerator control

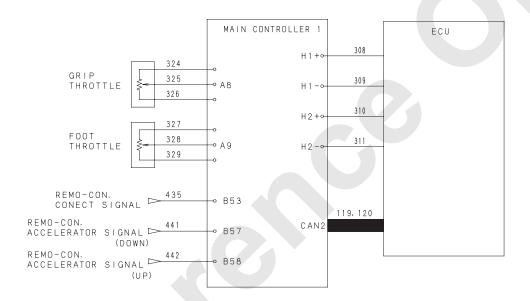
#### (1) Accelerator control

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 a 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.

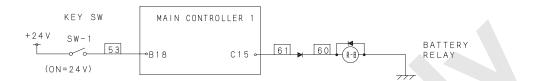
(High speed is not possible)

## (2) Power control

Battery relay is energized 1.5 seconds after the key switch is turned ON.

Battery relay 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

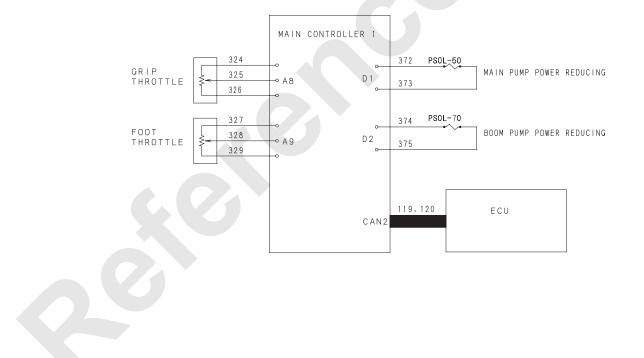
This is to control pump by calculating target speed from grip throttle to meet with engine actual speed.

The actual speed of pump is lower against target speed, the output current is larger.

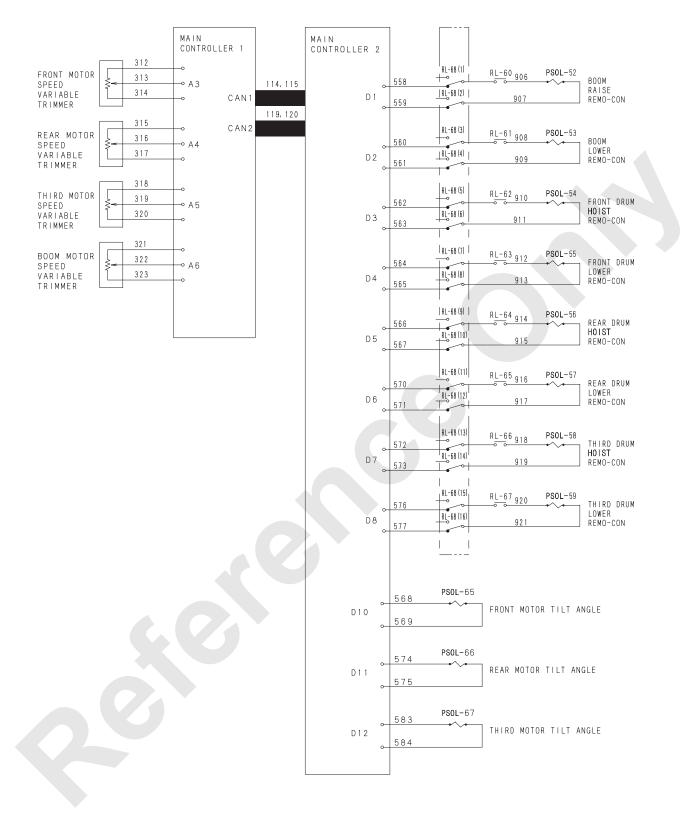
However in case of low idling, even the difference

is small, output current is large.

(to prevent engine stall)



## 3. Winch motor speed control



 Front, Rear, Third (option) drum speed variable Max. current of remo-con prop. valve and motor control prop. valve is controlled as shown above.

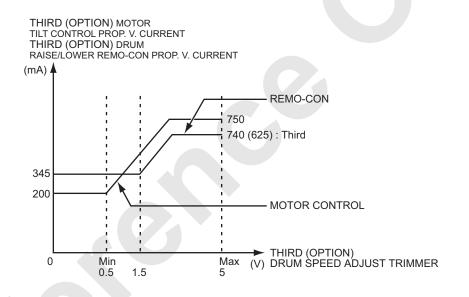
Priority order is as follows.

Remo-con prop. valve :

Front, rear, third (option) stop, Lever interlock > Front, rear speed reducing > Free fall > Trimmer control

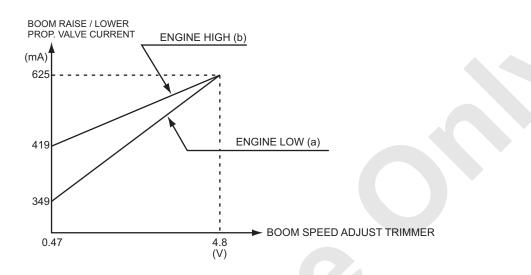
Motor control prop. valve :

(Refer to "11. Motor tilt angle control" for detail) Auto-stop > Free fall speed increase > Main pump inching speed > Trimmer control (during power lowering)



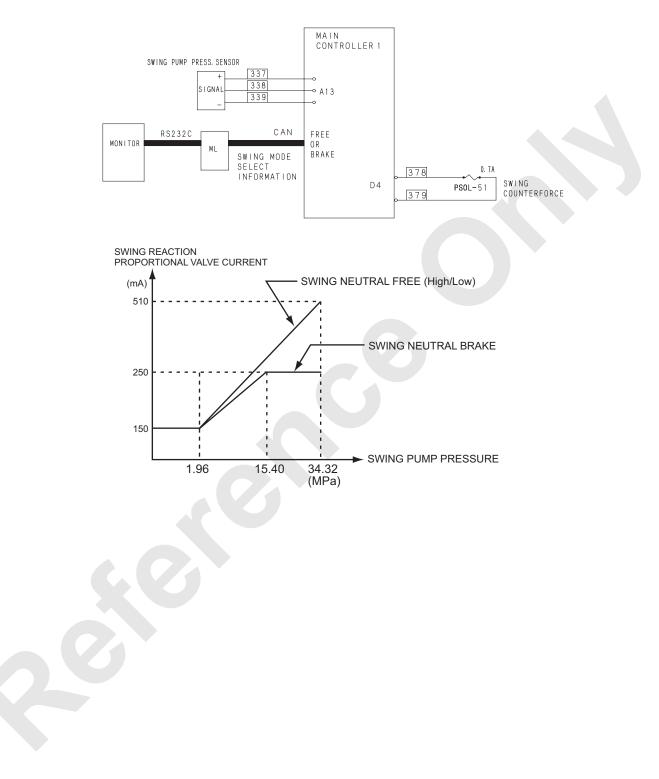
(2) Boom drum speed control

In case of low engine speed, when engine speed is intended to increase by characteristic (a) 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.



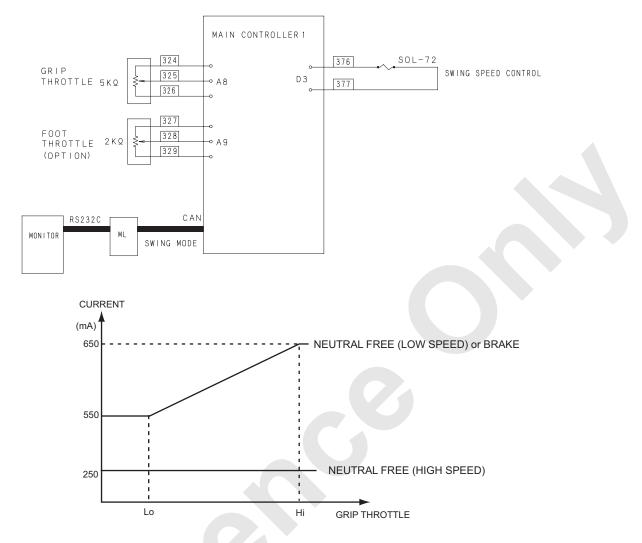
#### 4. Swing counterforce

A reaction is applied to the lever depending on swing loads.



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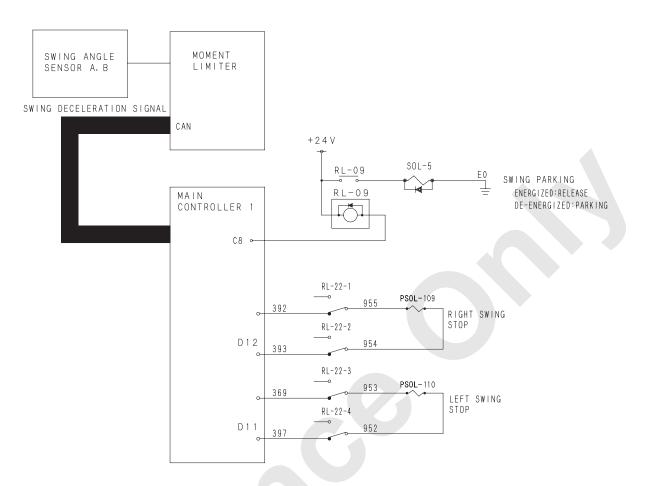
## 5. Swing speed control



• When the swing control signal is OFF for 10 seconds, or swing limit function is selected, the current becomes maximum value. (700 mA)

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### 6. Swing limit control



(1) Swing deceleration

Based on swing deceleration signal (R and L) input value (31  $\rightarrow$  0), right swing / left swing stop prop. valve output current is controlled.

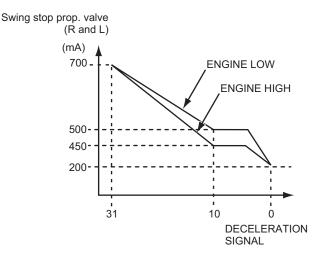
(2) Swing stop

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.

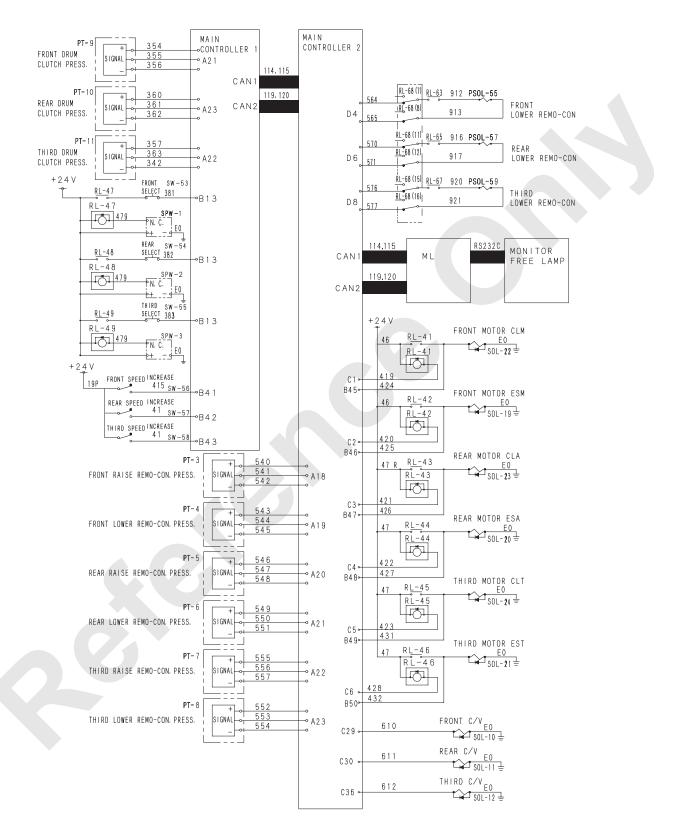
Parking action is released when right control pressure is detected when stopped with left deceleration.

Judging point of control pressure is more than 0.539 MPa.



## 7. 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
• The free fall lock switch is set released and function lock lever is in work position.	Free release "ON"	Select the free mode.
<ul> <li>The foot brake is depressed (the pressure switch is set to the "ON" position).</li> <li>The free selector switch is set to the "ON" position.</li> </ul>	Each drum free fall signal "ON"	<ul> <li>Light up the free fall indicator lamp. (Monitor indication)</li> <li>Release the main pump control.</li> </ul>

- (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		
Neutral free	Neutral brake	
×	×	
×	×	
0	X	
	Neutral free	

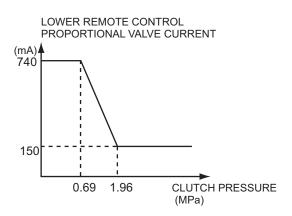
 $\bigcirc$  : Energized  $\times$  : De-energized

 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 control 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) lower remote control proportional valve to be met according to the respective clutch pressure outputs.



- (E) Emergency solenoid valve control For the front drum, when either of the conditions below is realized, ESM (SOL-19) is energized to prevent a drop of a lifted load.
- The clutch pressure is reduced (under 3.73 Mpa) although the brake mode is selected.
- The clutch pressure is reduced (under 3.73 Mpa) although the lever is operated during the free fall mode.

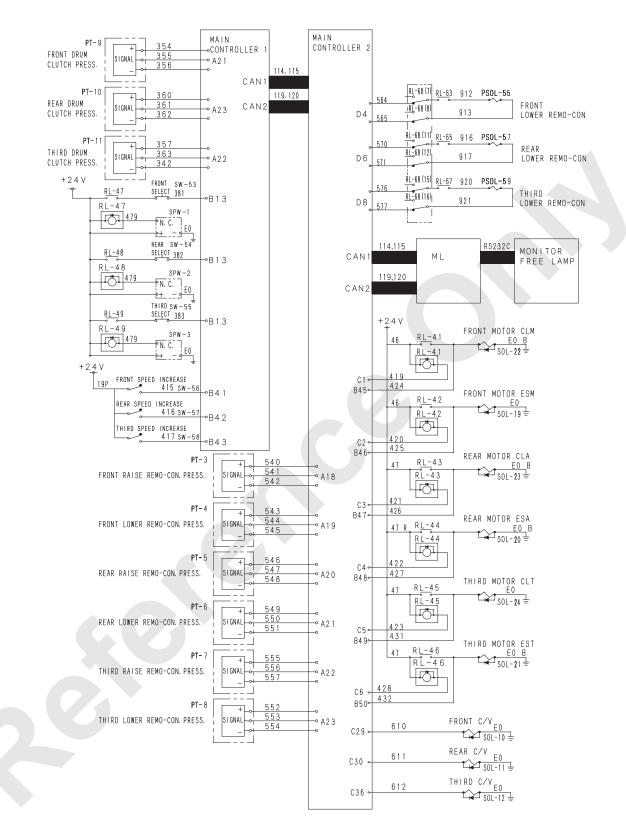
For the rear drum and the third drum, the ESA (SOL-20) and EST (SOL-21) are controlled respectively as same as front drum.

#### 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 90 seconds and after the engine is stopped, in this period, the residual clutch pressure is removed.

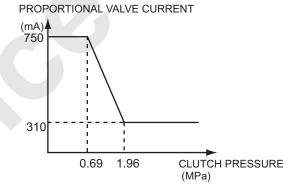
#### (3) Free fall acceleration



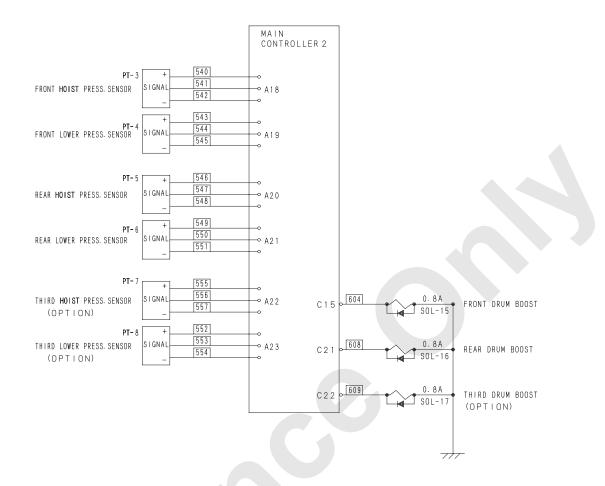
The falling speed can be increased by idling the motor during the free fall. The speed is controlled as shown in the table below.

Conditions	Procedures
	C/V free fall acceleration solenoid is energized.
	Current of motor tilt angle proportional solenoid
Free fall mode is selected.	Model Gr. : Current (Front/Rear Confluence/Independent)
<ul> <li>The control lever is at the neutral position.</li> <li>The "FREE FALL SPEED INCREASE SWITCH" on the</li> </ul>	FP, GG : 450 mA / 750 mA
<ul><li>The FREE FALL SPEED INCREASE SWITCH OF the left upper of operation seat is ON.</li><li>The foot brake is not depressed.</li></ul>	GD, GH, GK :510 mA / 750 mA
	GN, JD : 535 mA / 750 mA
(Clutch $\leq$ pressure 1.96 MPa, when free fall mode)	HF : 527 mA / 750 mA
	Current (Third)
	All Models : 750
One of the above conditions is not realized.	C/V free fall acceleration solenoid is de-energized.
	Other conditions are restored to those of the normal control.

The motor control proportional valve is controlled according to the depression of the foot pedal (clutch pressure).



#### 8. 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.

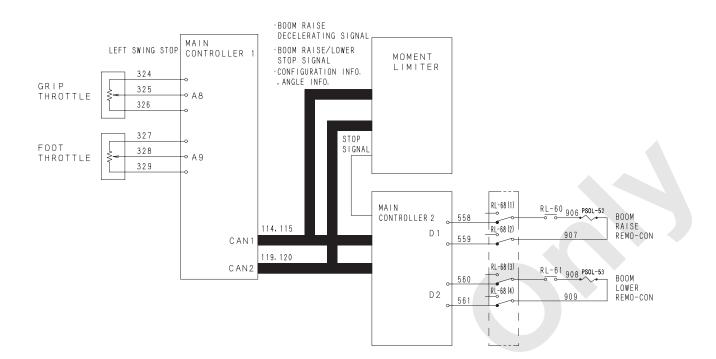
The boost solenoid valves are controlled as shown in the table below.

Lever	Boost solenoid valve	
Neutral	Energized.	
Neutral $\rightarrow$ hoist, lower	Immediately de-energized.	
Raise, lower $\rightarrow$ 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.

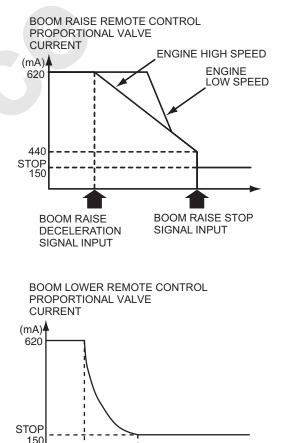
Stop signal	Boost solenoid valve
Front drum hoist stop	Front drum boost solenoid is immediately de-energized.
Rear drum hoist stop	Rear drum boost solenoid is immediately de-energized.
Third drum hoist stop	Third drum boost solenoid is immediately de-energized.

## 9. Boom stop control



When boom raise deceleration signals are input (input when the boom reaches 10 degrees before the boom upper limit), the boom raise remote control proportional valve is controlled and the boom raising speed is decelerated according to the boom angle.

When the boom lowering stop signals are input, the current value at the boom lower proportional valve is minimized within 1.5 seconds, and the boom lowering stops gradually.



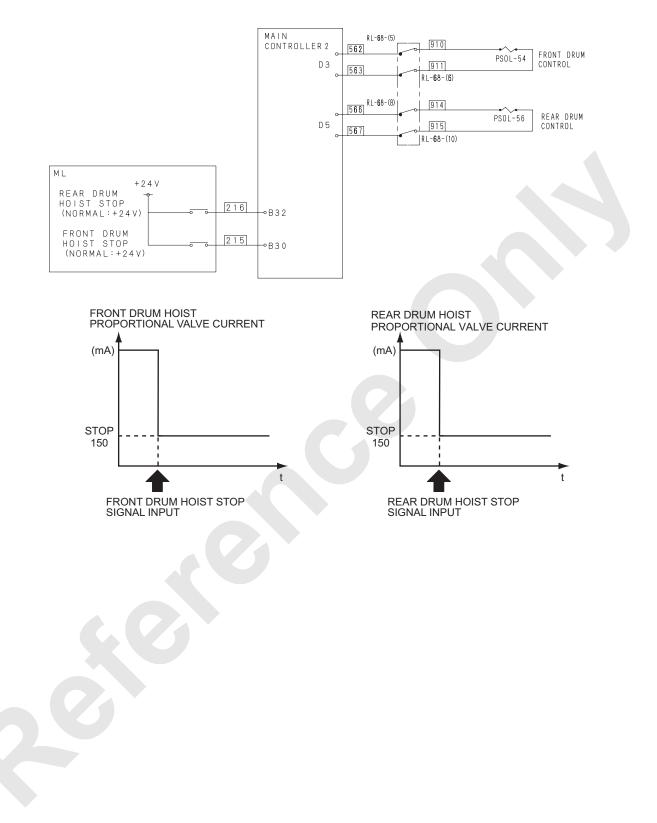


1.5 sec

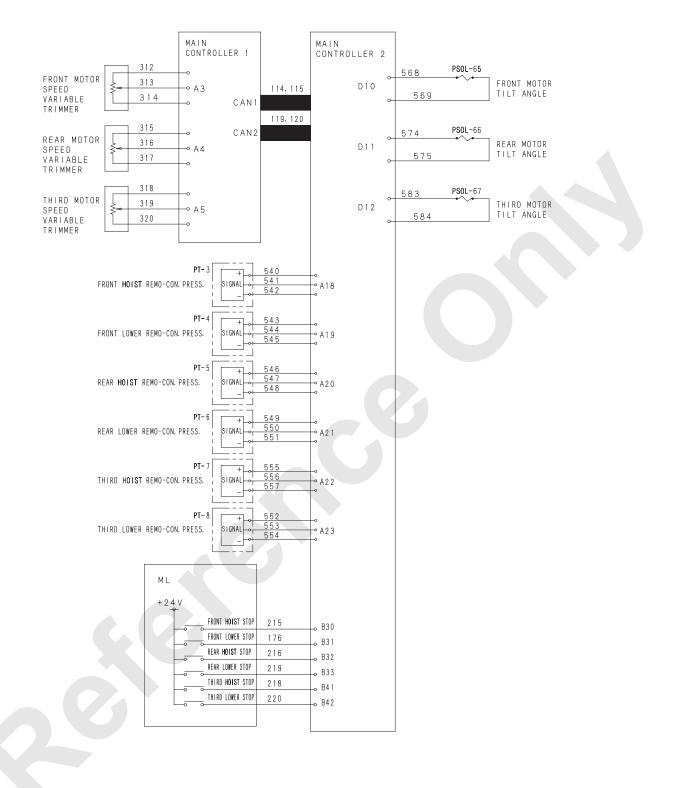
TIME

10

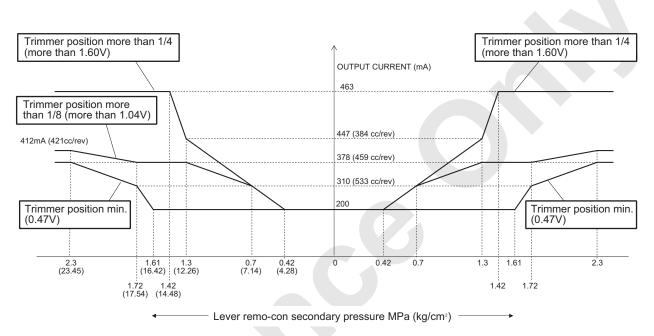
#### 10. Front, rear drum hoisting stop



## 11. Motor tilt angle control

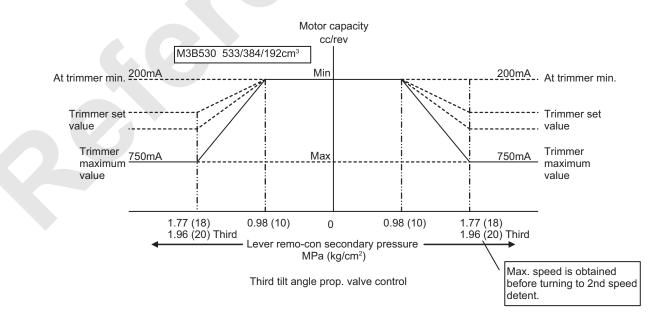


- During hoisting or lowering at brake mode or free mode, current of each motor tilt angle prop. valve is controlled as follows. (Trimmer control)
- (A) Current of motor tilt angle prop. valve varies based on lever motion and speed variable trimmer position.
- 1) Front drum and rear drum (At confluence)

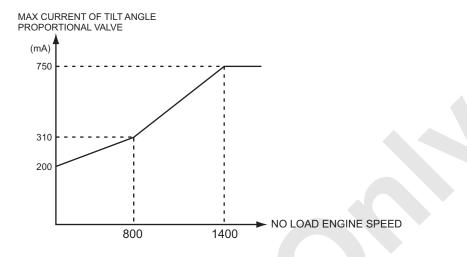


At confluence circuit, front, rear tilt angle prop. valve control

2) Front, rear and third drum (At independence)



(B) Maximum current of motor tilt angle prop. valve is controlled by no load engine speed (Command quantity by grip).



(2) When auto-stopped

In case of drum is in auto-stop condition, output current is to be fixed to 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 third motor tilt angle prop. valve. Prop valve current is cut off to make third 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)

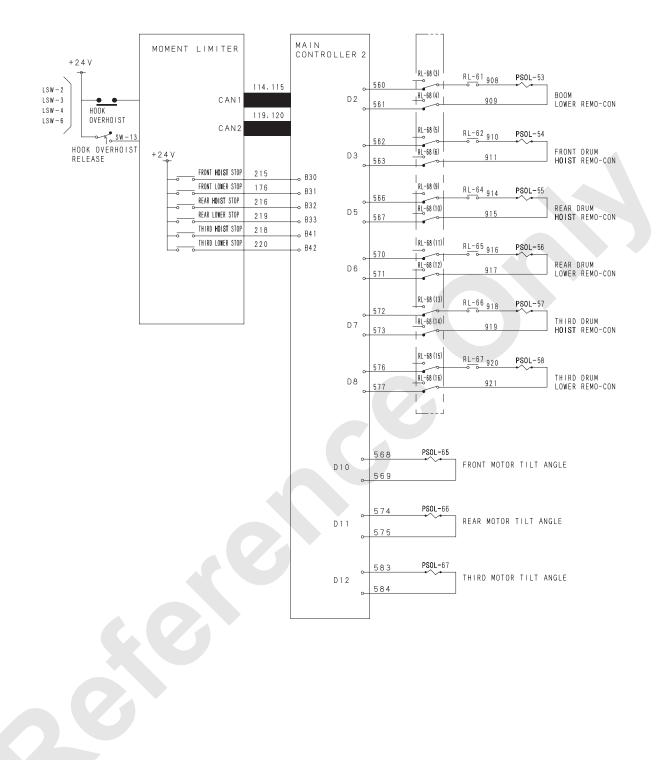
(In case of luffing specification, this is not done.)

(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) > luffing mode speed control (this section)

Between trimmer lever control value or engine speed control value, smaller value is selected as maximum value.

#### 12. 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 REMO-CON. PROP. VALVE

Front hoist remo-con. prop. valve	
Rear hoist 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 raise lower remo-con. prop. valve	
Third hoist remo-con. prop. valve	
*But in case of luffing configuration, stop action is not executed.	
Third lower remo-con. prop. valve	
*But in case of luffing configuration only, stop action is executed.	

(2) Action at hook over hoist released When hook over hoist is released at hook over hoist occurs, the following action is made.

Front, rear and third (jib) hoist 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)

## 13. Drum rotation detect grip control (option)

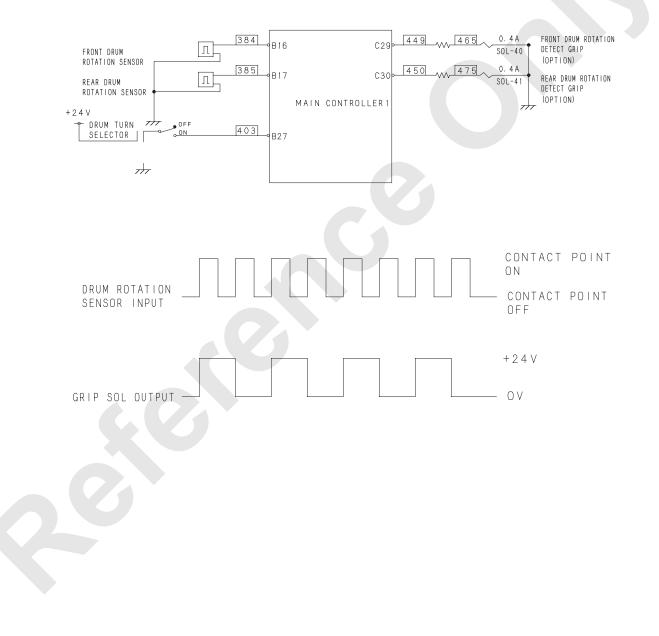
Control the grip solenoid based on drum rotation sensor input.

Grip solenoid output becomes OFF when the drum speed exceeds the specified level.

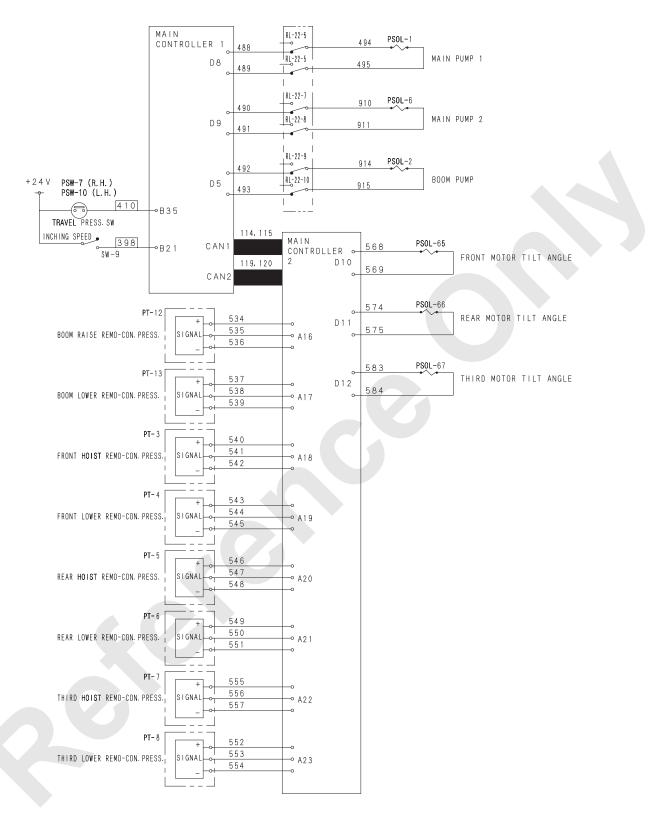
Specified speed. = drum speed :

about 61.5 min<sup>-1</sup> = more than 4 pulses at 50 msec.

Therefore there is no output from the total controller.



#### 14. Front, boom pump control



### (1) Inching control

This is to control the tilt angle proportional (prop.) valve of each pump according to lever motion.

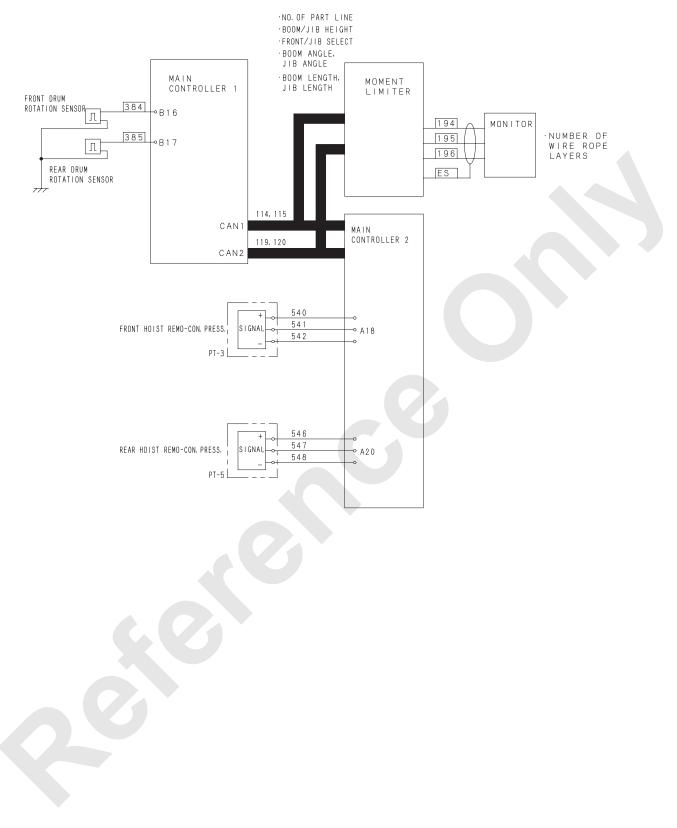
Pump	Prop. valve	Lever motion				
		Front	Rear	Boom	Travel L	Travel R
Main front	Main pump tilt angle 1	Release	Release	Release	Release	Release
Main rear						

- 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.

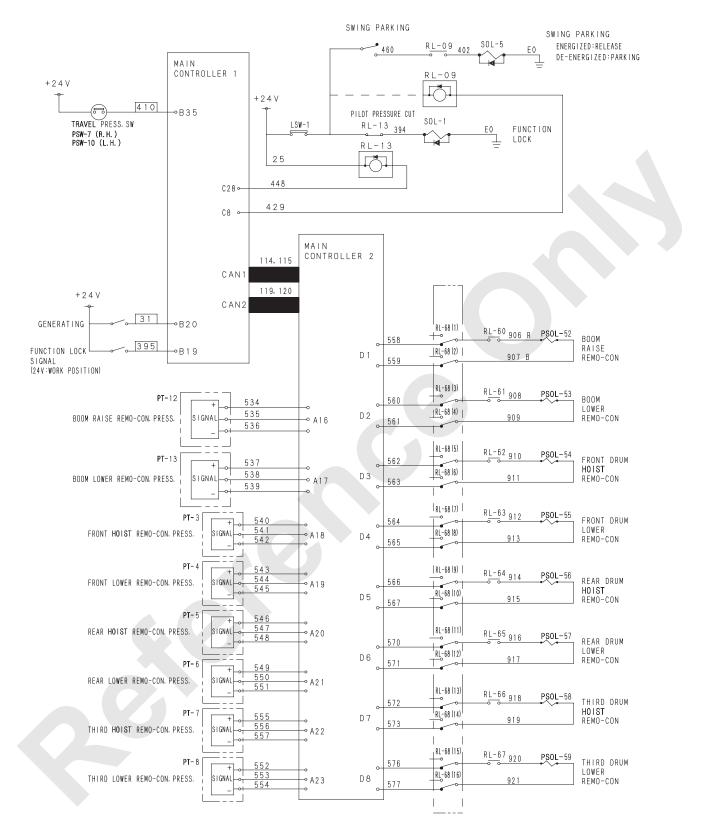
(2) Control at inching switch is ON.When the inching switch is ON, output becomes 700 mA regardless of lever control.At this time, motor tilt angle prop. valve is fixed to low. (310 mA)

#### 15. Height meter



- (1) Drum rotation amount is detected by pulse counting with drum rotation sensor.
- (2) When hoist pressure sensor input exists, variation is counted on hoisting side, and on the other case, variation is counted as ⊕ or ⊖ on lowering side.
- (3) The number of wire rope layer adjusted in the main monitor is as a standard layer, calculate the layer during rotation.
- (4) From the factor of each layer and pulse number, rope payout amount is calculated.
- (5) The height is calculated by winding length divided by number 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.

## 16. Lever interlock control



This is to prevent drum unexpected rotation at engine start when the lever is in operating position and the function lock lever is in work position.

(1) Before engine start

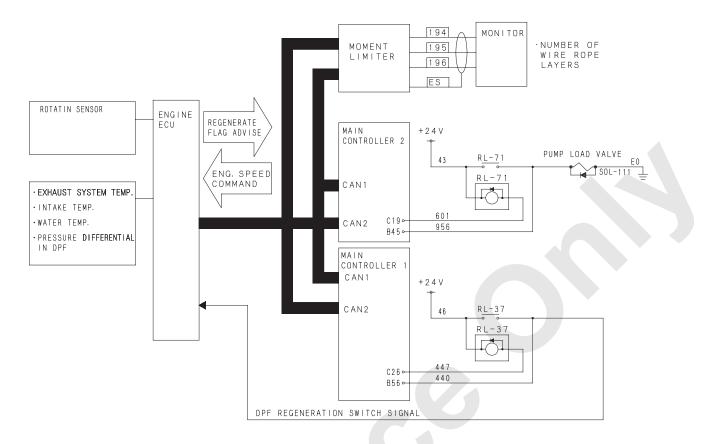
Each prop. valve current is minimum. (150 mA) Pilot cut relay RL-13 is to be output. (pilot cut condition) Swing parking relay RL-09 is to be output. (Swing parking condition)

- (2) After engine started After generation signal is input, the following actions take place.
- (A) In case the function lock lever signal is OFF
- When travel interlock option is equipped : Pilot cut relay output becomes ON.
   When travel interlock option is not equipped : Pilot cut relay output is not issued.
- 2) Swing parking relay output becomes ON.
- 3) Output to each proportional valves are minimum.
- (B) In case the function lock lever signal is work position (+24 V)
- Output of pilot cut relay becomes OFF. If travel control is detected 1 second after pilot cut relay OFF, pilot cut relay becomes ON again. (only when travel interlock option is equipped.)
- 2) Swing parking relay output becomes OFF.
- 3) If 3 seconds is elapsed after pilot cut relay OFF, judge if the pressure is existing on each remocon prop. valve and all hoist and lower motion levers are in neutral, both hoist and lower output becomes minimum value of which used in other control.

Either one of operating motion is detected, all prop. valves output stay minimum as is.

Control stop condition by lever interlock function is to be transmitted to the monitor.

### 17. DPF regeneration control

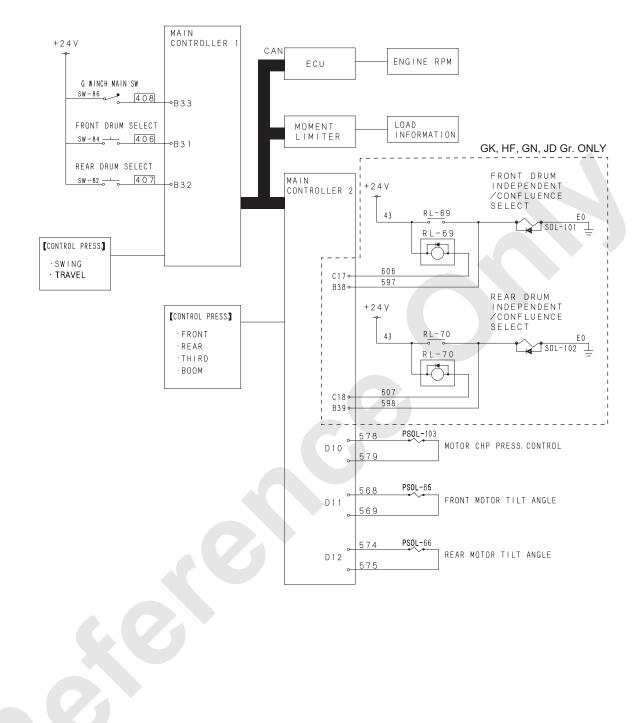


Regeneration starts when more than certain amount of soot is accumulated in DPF (Diesel Particulate Filter).

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 system temperature in order to prevent regeneration starting during crane operation are done by crane side controller.

### 18. 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.

	Input condition					
Mode	G winch		Lover condition	<b>F</b>		
	Main	(Fr)	(Re)	Lever condition	Engine speed	
Normal mode	OFF	-	-	Neutral	-	
G winch main mode	ON	-	_	Neutral	Idle ±5 %	
G winch (Fr) (Re) mode	ON	ON (Ind.)	ON (Ind.)	Neutral	1,000 min <sup>-1</sup> or lower	

\* Engine speed upper limit value is a value with G engine function OFF. At G engine function is ON, upper limit 900 min<sup>-1</sup>.

(2) G winch individual modeWhen 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<sup>-1</sup>.
   At G engine, it becomes upper limit 900 min<sup>-1</sup>.
- (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 luffing configuration, rear individual mode becomes ineffective.

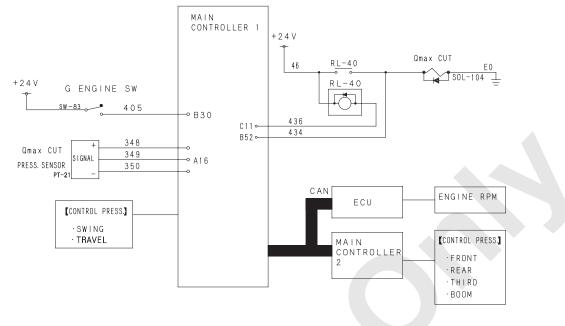
After either front or rear becomes independence, G winch shall be released by one lever control (neutral  $\rightarrow$  operation  $\rightarrow$  neutral)

In case G winch function is required again, the individual switch is input.

After switched to individual mode and individual switch is pressed again, function is cancelled.

The load limit is to be determined with the displayed load in the monitor, selecting the G winch mode after the selection of the hook which is to be used.

### 19. G engine control



 G engine function select switch After inputting into select switch, check the each levers location and if they are all in neutral, Q max cut solenoid is energized.

Mode	Inp	but	Output		
Mode	G engine function select	Lever condition	Q max cut SOL	Engine speed control	
G engine	ON	Neutral	ON	1,725 min <sup>-1</sup>	
Normal	OFF	Neutral	OFF	2,100 min <sup>-1</sup>	

\* At G engine mode, engine speed upper limit is changed as shown in the table.

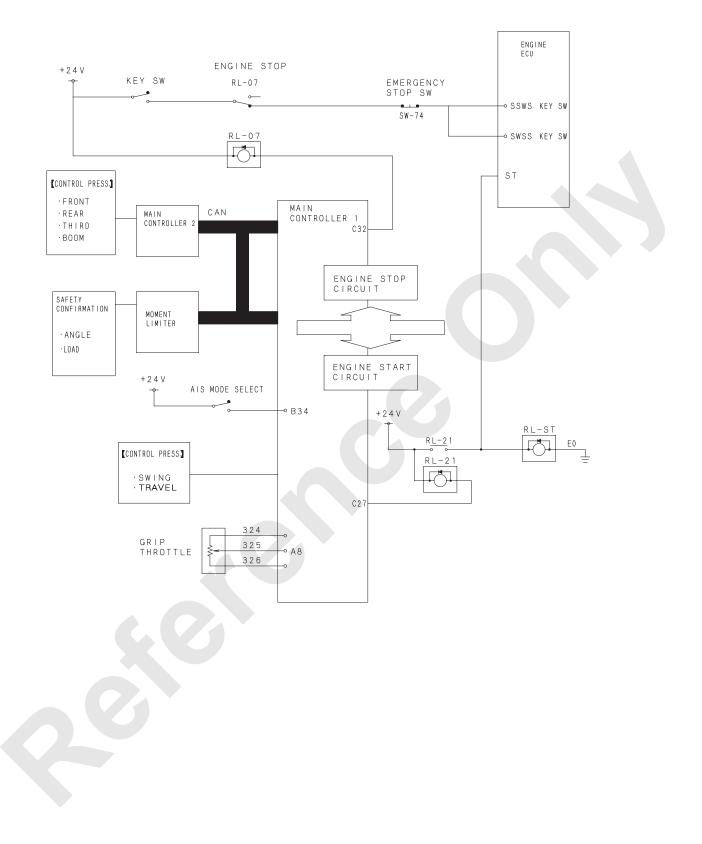
\* Q max cut solenoid becomes de-energized and then Q max cut condition is created. (When energized, pump flow max. value is raised.)

(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
Mode	Q max cut pressure	Q max cut SOL FB value	Engine speed control	Q max cut SOL	Engine speed control
G engine	e 3 MPa or more	OFF	1,800 min <sup>-1</sup> or more	OFF output	1 705 min-1
Normal	Less than 3 MPa	ON	No judgement	* at speed abnormal	1,725 min <sup>-1</sup>

#### 20. 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 conditions below are met, engine stops automatically.

Engine stop condition	Effective condition	ML permit condition
ML permit	ML permit condition	
No load engine speed	Low idling ±5 %	
Free fall	Neutral brake mode	
Parking switch	Parking condition	Configuration condition : Other than assembly/ disassembly, stowing mode
Control lever neutral	All neutral incl. swing	ether than assembly, alloaceening, stewing mode
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 cancellation does not made, 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.

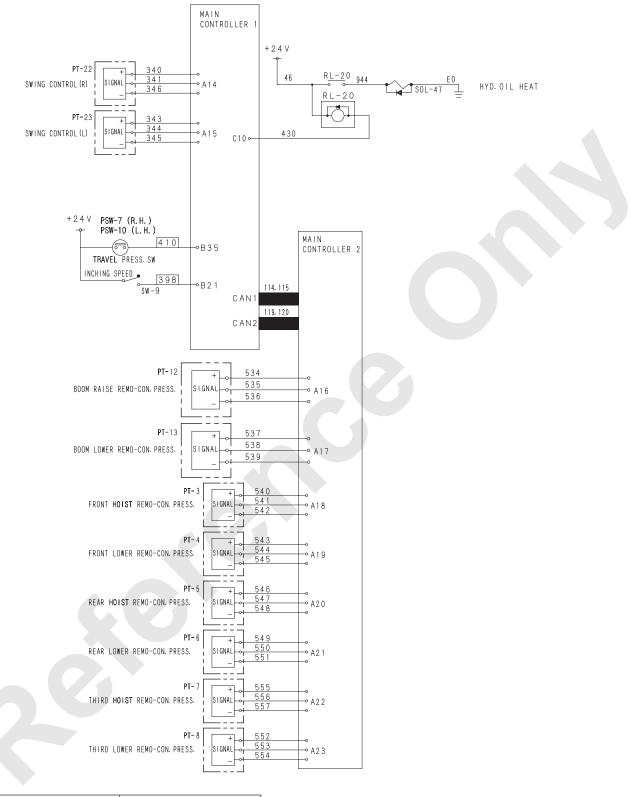
(2) Engine restart

At AIS condition, control is only applied at engine stop condition.

Grip accellerator 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-

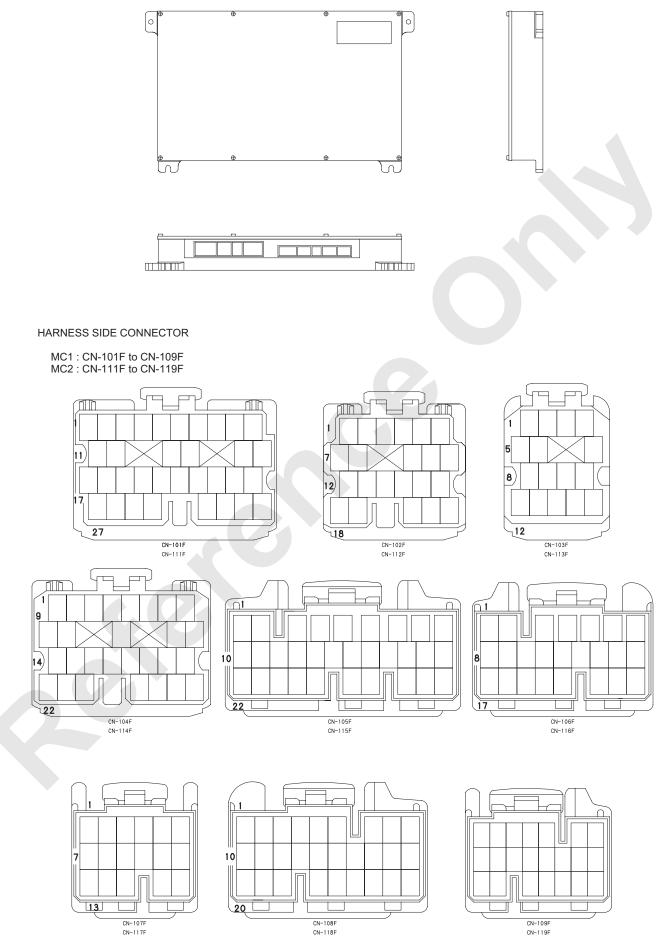
energized regardless of grip voltage.
(3) Key cut off fail preventing function. If AIS condition is continued for longer than certain time, battery relay is turned OFF automatically.

### 21. HYD. oil heat (option)



Control	Relay
When all lever is in neutral	Energized
When any lever is in operation	De-energized

# 10.3.4 MAIN CONTROLLER 1, 2 (HARDWARE)



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## 10.3.5 SPECIFICATIONS OF MAIN CONTROLLER INPUT/OUTPUT

1. Specifications of main controller 1 input/output

### ANALOGUE INPUT [A]

No.	Name	Range	Input voltage	Judgement
MC1-A01	Reeving winch trimmer			
MC1-A02	A/D Spare			
MC1-A03	Fr. drum motor speed adjusting trimmer	0 to FULL	0.43 to 5V	
MC1-A04	Re. drum motor speed adjusting trimmer	0 to FULL	0.43 to 5V	Input voltage InV ≤ 0.2V.
MC1-A05	Third drum motor speed adjusting trimmer	0 to FULL	0.43 to 5V	- input voitage inv ≤ 0.2 v.
MC1-A06	Boom drum motor speed adjusting trimmer	0 to FULL	0.43 to 5V	
MC1-A07	A/D Spare			
MC1-A08	Grip throttle	LOW to HIGH	0.7 to 5V	
MC1-A09	Foot throttle (option)	LOW to HIGH	1.0 to 4.4V	
MC1-A10	Hyd. oil temperature sensor	50 to 130 °C	117.9 Ω to 9.6 Ω	- Input voltage InV ≤ 0.2V. -
MC1-A11	Tagline trimmer (option)	0 to FULL	0.43 to 5V	
MC1-A12	Control primary pressure	0 to 19.61 MPa	0.5 to 4.5V	
MC1-A13	Swing pump pressure sensor	0 to 49.03 MPa	0.5 to 4.5V	Judge detect among one of
MC1-A14	Swing operation (right) pressures sensor	0 to 2.94 MPa	0.5 to 4.5V	following condition. 1. Input voltage InV ≤ 0.1V.
MC1-A15	Swing operation (left) pressures sensor	0 to 2.94 MPa	0.5 to 4.5V	2.Input voltage InV $\leq$ 4.9V.3.Input voltage InV $\leq$ 3.0V with
MC1-A16	Qmax cut solenoid detection pressure	0 to 49.03 MPa	0.5 to 4.5V	engine oil pressure = ON and changing = OFF.
MC1-A17	Power shift pressures sensor	0 to 2.94 MPa	0.5 to 4.5V	
MC1-A18	Supply voltage monitor	19V to 32V	0.5V to 4.8V	Input voltage InV ≤ 2V.
MC1-A19	Inclination detector X	-5 to 5 degrees	0.5 to 4.5V	$ n_{n_{1}}  =  n_{1}  =  n_{1}  =  n_{1} $
MC1-A20	Inclination detector Y	-5 to 5 degrees	0.5 to 4.5V	Input voltage InV ≤ 0.2V.
MC1-A21	Fr. drum clutch pressure sensor	0 to 19.61 MPa	0.5 to 4.5V	<ul> <li>Judge detect among one of following condition.</li> <li>1. Input voltage InV ≤ 0.1V.</li> <li>2. Input voltage InV ≤ 4.9V.</li> <li>3. Input voltage InV ≤ 3.0V with engine oil pressure = ON and changing = OFF.</li> </ul>
MC1-A22	Third drum clutch pressure sensor (option)	0 to 19.61 MPa	0.5 to 4.5V	
MC1-A23	Re. drum clutch pressure sensor	0 to 19.61 MPa	0.5 to 4.5V	

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#### DIGITAL INPUT [B]

No.	Name	Status	Signal level	Judgement
MC1-B01	ECU status signal	Power ON/OFF	Ground (15 kΩ) / OPEN	
MC1-B02	Engine hyd. pressure PSW	Engine Stop /Work	Ground (15 kΩ) / OPEN	
MC1-B03	Cooling line filter	Clogging / Normal	Ground (3.3 kΩ) / OPEN	
MC1-B04	Clogging of engine air cleaner	Clogging / Normal	Ground (15 kΩ) / OPEN	
MC1-B05	Vacancy		Ground (3.3 kΩ) / OPEN	
MC1-B06	Fr. drum brake cooling oil temperature	Higher temperature / Normal	Ground (3.3 kΩ) / OPEN	
MC1-B07	Re. drum brake cooling oil temperature	Higher temperature / Normal	Ground (3.3 kΩ) / OPEN	
MC1-B08	Radiator water level	Low level / Normal	Ground (3.3 kΩ) / OPEN	
MC1-B09	Engine oil filer	Clogging / Normal	Ground (3.3 kΩ) / OPEN	
MC1-B10	Fr. drum control signal	ON / OFF	Ground (3.3 kΩ) / OPEN	
MC1-B11	Re. drum control signal	ON / OFF	Ground (3.3 kΩ) / OPEN	
MC1-B12	Third drum control signal	ON / OFF	Ground (3.3 kΩ) / OPEN	
MC1-B13	Fr. drum free fall select. signal	Free / Brake	+24V / OPEN	
MC1-B14	Re. drum free fall select. signal	Free / Brake	+24V / OPEN	
MC1-B15	Third drum free fall select. signal	Free / Brake	+24V / OPEN	
MC1-B16	Fr. drum rotation sensor	0 to 500 min <sup>-1</sup>	Ground (3.3 kΩ) / OPEN	
MC1-B17	Re. drum rotation sensor	0 to 500 min <sup>-1</sup>	Ground (3.3 kΩ) / OPEN	
MC1-B18	Key switch ON signal	ON / OFF	+24V / OPEN	
MC1-B19	Function lock	Work / Lock	+24V / OPEN	
MC1-B20	Charge signal	Engine Stop /Work	+24V / OPEN	
MC1-B21	Inching select switch	Inching / Normal	+24V / OPEN	
MC1-B22	Aux. accel. signal	ON / OFF	+24V / OPEN	
MC1-B23	Engine emg. stop signal	Stop / Normal	+24V / OPEN	
MC1-B24	Engine restart	Work / Normal	+24V / OPEN	
MC1-B25	Operator certify wait signal	Uncertify / Certify	+24V / OPEN	
MC1-B26	Swing parking switch	Release / Parking	+24V / OPEN	
MC1-B27	Drum rotation detect grip selection	Select / Non-select	+24V / OPEN	

### DIGITAL INPUT [B]

	· ~ · [-]			
No.	Name	Status	Signal level	Judgement
MC1-B28	Controller ID 1	B28=ON, B29=OFF $\rightarrow$ MC1	+24V / OPEN	
MC1-B29	Controller ID 2	B28=OFF, B29=ON $\rightarrow$ MC2	+24V / OPEN	
MC1-B30	G mode / Normal selection	G mode / Normal	+24V / OPEN	
MC1-B31	G winch (Fr.)	High speed / Normal	+24V / OPEN	
MC1-B32	G winch (Re.)	High speed / Normal	+24V / OPEN	
MC1-B33	Energy saving winch (main)	ON / OFF	+24V / OPEN	
MC1-B34	AIS function ON / OFF switch	ON / OFF	+24V / OPEN	
MC1-B35	Traveling operating pressure switch	Control / Neutral	+24V / OPEN	
MC1-B36	Third drum rotation sensor	0 to 500 min <sup>-1</sup>	Ground (3.3 kΩ) / OPEN	
MC1-B37	Boom drum rotation sensor	0 to 500 min <sup>-1</sup>	Ground (3.3 kΩ) / OPEN	
MC1-B38	Engine preheat	Preheat / Normal	+24V / OPEN	
MC1-B39	TW latch cylinder (Ex.) signal	Extension / Normal	+24V / OPEN	
MC1-B40	Backup fuse	Normal / Fusion	+24V / OPEN	
MC1-B41	Fr. drum free fall speed increase switch	High / Normal	+24V / OPEN	
MC1-B42	Re. drum free fall speed increase switch	High / Normal	+24V / OPEN	
MC1-B43	Third drum free fall speed increase switch (option)	High / Normal	+24V / OPEN	
MC1-B44	Free fall permit signal	Permit / Lock	+24V / OPEN	
MC1-B45	Fr. drum motor CLM-SOL (FB)	Energized / De-energized	+24V / OPEN	
MC1-B46	Fr. drum motor ESM-SOL (FB)	Energized / De-energized	+24V / OPEN	
MC1-B47	Re. drum motor CLA-SOL (FB)	Energized / De-energized	+24V / OPEN	
MC1-B48	Re. drum motor ESA-SOL (FB)	Energized / De-energized	+24V / OPEN	
MC1-B49	Third drum motor CLT-SOL (FB)	Energized / De-energized	+24V / OPEN	
MC1-B50	Third drum motor EST-SOL (FB)	Energized / De-energized	+24V / OPEN	
MC1-B51	Hyd. oil heat LS (OPT)	Energized / De-energized	+24V / OPEN	
MC1-B52	Pump Qmax cut solenoid (FB)	Energized / De-energized	+24V / OPEN	

#### DIGITAL INPUT [B]

No.	Name	Status	Signal level	Judgement
MC1-B53	Remote control connection signal	Connected / Unconnected	+24V / OPEN	
MC1-B54	Swing warning (flasher)	Flasher ON/OFF	+24V / OPEN	
MC1-B55	Swing warning (buzzer and flasher)	Buzzer and flasher ON/OFF	+24V / OPEN	
MC1-B56	DPF regeneration (FB)	Energized / De-energized	+24V / OPEN	
MC1-B57	Accel. signal (DOWN)	Rotate down / Holding	+24V / OPEN	
MC1-B58	Accel. signal (UP)	Rotate up / Holding	+24V / OPEN	
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#### ANALOGUE OUTPUT [H]

No.	Name	Status	Signal level	Judgement
MC1-H01	Accel opening signal 1	800 min <sup>-1</sup> to 2,100 min <sup>-1</sup>	1 to 4V	
MC1-H02	Accel opening signal 2	800 min <sup>-1</sup> to 2,100 min <sup>-1</sup>	1 to 4V	
PROPORTI	ONAL VALVE OUTPUT [D]		0	

### PROPORTIONAL VALVE OUTPUT [D]

No.	Name	Output current	Dither	Judgement
INU.			Dittiel	Judgement
MC1-D01	Main pump power reduction prop. valve	100 mA to 700 mA	200 mAp-p 100 Hz	
MC1-D02	Boom pump power reduction prop. valve	100 mA to 700 mA	200 mAp-p 100 Hz	
MC1-D03	Swing low speed prop. valve	100 mA to 700 mA	200 mAp-p 100 Hz	
MC1-D04	Swing counterforce prop. valve	150 mA to 510 mA	200 mAp-p 160 Hz	
MC1-D05	Boom pump tilt angle control prop. valve	150 mA to 700 mA	200 mAp-p 100 Hz	When output command value is ≥ 100 mA and feedback current is ≤ 50 mA.
MC1-D06	Fr. drum middle detent	60 mA to 110 mA	None	
MC1-D07	Re. drum middle detent	60 mA to 110 mA	None	
MC1-D08	Main pump tilt a. control prop. valve 1	150 mA to 700 mA	200 mAp-p 100 Hz	
MC1-D09	Main pump tilt a. control prop. valve 2	150 mA to 700 mA	200 mAp-p 100 Hz	
MC1-D10	Tagline prop. valve	100 mA to 700 mA	200 mAp-p 63 Hz	
MC1-D11	Left swing stop prop. valve	100 mA to 700 mA	200 mAp-p 100 Hz	
MC1-D12	Right swing stop prop. valve	100 mA to 700 mA	200 mAp-p 100 Hz	<b>^</b>

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No.	Name	Status	Signal level	Judgement
MC1-C01	Fr. drum motor CLM-SOL	Energized / De-energized	GND / OPEN	<ul> <li>Judge detect either following condition.</li> <li>1. Mismatch between output command and actual port condition.</li> <li>2. Mismatch between output command and MC1-B45 condition.</li> </ul>
MC1-C02	Fr. drum motor ESM-SOL	Energized / De-energized	GND / OPEN	<ul> <li>Judge detect either following condition.</li> <li>1. Mismatch between output command and actual port condition.</li> <li>2. Mismatch between output command and MC1-B46 condition.</li> </ul>
MC1-C03	Re. drum motor CLA-SOL	Energized / De-energized	GND / OPEN	<ul> <li>Judge detect either following condition.</li> <li>1. Mismatch between output command and actual port condition.</li> <li>2. Mismatch between output command and MC1-B47 condition.</li> </ul>
MC1-C04	Re. drum motor ESA-SOL	Energized / De-energized	GND / OPEN	<ul> <li>Judge detect either following condition.</li> <li>1. Mismatch between output command and actual port condition.</li> <li>2. Mismatch between output command and MC1-B48 condition.</li> </ul>
MC1-C05	Third drum motor CLT-SOL	Energized / De-energized	GND / OPEN	<ul> <li>Judge detect either following condition.</li> <li>1. Mismatch between output command and actual port condition.</li> <li>2. Mismatch between output command and MC1-B49 condition.</li> </ul>
MC1-C06	Third drum motor EST-SOL	Energized / De-energized	GND / OPEN	<ul> <li>Judge detect either following condition.</li> <li>1. Mismatch between output command and actual port condition.</li> <li>2. Mismatch between output command and MC1-B50 condition.</li> </ul>

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No.	Name	Status	Signal level	Judgement
MC1-C07	Sub battery relay energizing	Energized / De-energized	+24V / OPEN	Mismatch between output command and actual port condition. But judged only at output command is ON.
MC1-C08	Swing parking control	Parking / Release	GND / OPEN (300 mA)	<ul> <li>Judge detect all of followings realized.</li> <li>Swing limit device option setting " () ".</li> <li>Function lock (MC1-B19) is ON condition.</li> <li>Engine running.</li> <li>Swing parking input (MC1-B26) has been made even once.</li> </ul>
MC1-C09	ML adjust. mode selection	Adjust. Mode / Normal	GND / OPEN (300 mA)	
MC1-C10	Hyd. oil heat SOL	Heat / Normal	GND / OPEN	Mismatch between output command
MC1-C11	Pump Qmax cut solenoid	Energized / De-energized	GND / OPEN	and actual port condition.
MC1-C12	Swing flasher	Lit up / Unlit	GND / OPEN	
MC1-C13	Vacancy	C	GND / OPEN (PWM)	
MC1-C14	Vacancy		GND / OPEN (PWM)	
MC1-C15	Battery relay energizing	Energized / De-energized	+24V / OPEN	Mismatch between output command and actual port condition. But judged only at output command is ON.
MC1-C16	ML bypass reset	Reset / Bypass possible	GND / OPEN	
MC1-C17	Solenoid cut relay energizing	Solenoid cut / Normal	GND / OPEN	
MC1-C18	Engine warning output	Engine abnormal / Normal	GND / OPEN	Mismatch between output command and actual port condition.
MC1-C19	AIS air con. ON relay energizing	Power ON enabled / Disabled	GND / OPEN	
MC1-C20	Swing neutral brake selection	Neutral brake / Free	GND / OPEN	
MC1-C21	Boom drum rotate detect grip (option)	Energized / De-energized	+24V / OPEN	
MC1-C22	Key return	Resume / Normal	+24V / OPEN	Miamatah hatwaan autout aammand
MC1-C23	TW latch cylinder (retract) output	Retract / Normal	GND / OPEN	Mismatch between output command and actual port condition.
MC1-C24	Camera power		GND / OPEN	
MC1-C25	Key switch ON signal by AIS	ON / OFF	GND / OPEN (PWM)	

No.	Name	Status	Signal level	Judgement
MC1-C26	DPF regeneration start	Manual regene. start / Normal	GND / OPEN	<ul> <li>Judge detect either following condition.</li> <li>1. Mismatch between output command and actual port condition.</li> <li>2. Mismatch between output command and MC1-B56 condition.</li> </ul>
MC1-C27	Engine restart	Start / Normal	GND / OPEN	<ul> <li>Judge detect either following condition.</li> <li>1. Mismatch between output command and actual port condition.</li> <li>2. Mismatch between output command and MC1-B24 condition.</li> </ul>
MC1-C28	Pilot pressure cut relay	Energized / De-energized	GND / OPEN	
MC1-C29	Fr. drum rotate detect grip (option)	Bumps / dips	+24V / OPEN	
MC1-C30	Re. drum rotate detect grip (option)	Bumps / dips	+24V / OPEN	 
MC1-C31	Safety relay operation	Operation / Normal	GND / OPEN	Mismatch between output command and actual port condition.
MC1-C32	Engine stop relay operation	Energized / De-energized	GND / OPEN	
MC1-C33	Swing voice alarm	ON / OFF	GND / OPEN	
MC1-C34	Re. / 3rd. drum change		GND / OPEN	
MC1-C35	Vacancy	O	GND / OPEN (CPU error)	
MC1-C36	3rd. drum turn detection grip		+24V / OPEN	Mismatch between output command and actual port condition.

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2. Specifications of main controller 2 input/output

### ANALOGUE INPUT [A]

No.	Name	Range	Input voltage	Judgement
MC2-A01	A/D Spare			
MC2-A02	A/D Spare			
MC2-A03	Fr. drum motor tilt control press. sensor	0 to 2.94 MPa (30 kg/cm²)	0.5 to 4.5V	<ul> <li>Judge detect among one of following condition.</li> <li>1. Input voltage InV ≤ 0.1V.</li> <li>2. Input voltage InV ≤ 4.9V.</li> <li>3. Input voltage InV ≤ 3.0V with engine oil pressure = ON and changing = OFF.</li> <li>4. Main hoist lever in neutral with the main hoist neutral brake mode. Main hoist motor swash angle pressure ≥ 2.0 MPa.</li> </ul>
MC2-A04	Re. drum motor tilt control press. sensor	0 to 2.94 MPa (30 kg/cm²)	0.5 to 4.5V	<ul> <li>Judge detect among one of following condition.</li> <li>1. Input voltage InV ≤ 0.1V.</li> <li>2. Input voltage InV ≤ 4.9V.</li> <li>3. Input voltage InV ≤ 3.0V with engine oil pressure = ON and changing = OFF.</li> <li>4. Aux. hoist lever in neutral with the main hoist neutral brake mode. Aux. hoist motor swash angle pressure ≥ 2.0 MPa.</li> </ul>
MC2-A05	Third drum motor tilt control press. sensor	0 to 2.94 MPa (30 kg/cm²)	0.5 to 4.5V	<ul> <li>Judge detect among one of following condition.</li> <li>1. Input voltage InV ≤ 0.1V.</li> <li>2. Input voltage InV ≤ 4.9V.</li> <li>3. Input voltage InV ≤ 3.0V with engine oil pressure = ON and changing = OFF.</li> </ul>
MC2-A06	A/D Spare			
MC2-A07	Fuel level	F to 1/2 to E $\rightarrow$ 10 to 32 to 83 $\Omega$	Grounded input (56 Ω)	Input voltage InV ≤ 0.2V.
MC2-A08	Confluence / Independence select pressure (Fr.)	0 to 49.03 MPa (500 kg/cm²)	0.5 to 4.5V	<ul> <li>Judge detect among one of following condition.</li> <li>1. Input voltage InV ≤ 0.2V.</li> <li>2. At single oil flow : Input pressure ≥ 3.0 Mpa.</li> <li>3. At confluence flow : Input pressure &lt; 3.0 Mpa.</li> </ul>

### ANALOGUE INPUT [A]

No.	Name	Range	Input voltage	Judgement
MC2-A09	Confluence / Independence select pressure (Re.)	0 to 49.03 MPa (500 kg/cm²)	0.5 to 4.5V	<ul> <li>Judge detect among one of following condition.</li> <li>1. Input voltage InV ≤ 0.2V.</li> <li>2. At single oil flow : Input pressure ≥ 3.0 Mpa.</li> <li>3. At confluence flow : Input pressure &lt; 3.0 Mpa.</li> </ul>
MC2-A10	A/D Spare		Grounded input (56 Ω)	
MC2-A11	Fr., Re. drum CHP start pressure sensor	0 to 2.94 MPa (30 kg/cm²)	0.5 to 4.5V	<ul> <li>Judge detect among one of following condition.</li> <li>1. Input voltage InV ≤ 0.1V.</li> <li>2. Input voltage InV ≤ 4.9V.</li> <li>3. Input voltage InV ≤ 3.0V with engine oil pressure = ON and changing = OFF.</li> <li>At single oil flow : Input pressure ≥ 2.7 Mpa.</li> <li>At confluence flow : Input pressure &lt; 2.7 Mpa.</li> </ul>
MC2-A12	A/D Spare			
MC2-A13	A/D Spare			
MC2-A14	A/D Spare			
MC2-A15	A/D Spare			
MC2-A16	Boom drum raise pressure sensor	0 to 2.94 MPa (30 kg/cm <sup>2</sup> )	0.5 to 4.5V	
MC2-A17	Boom drum lower pressure sensor	0 to 2.94 MPa (30 kg/cm <sup>2</sup> )	0.5 to 4.5V	
MC2-A18	Fr. drum hoist pressure sensor	0 to 2.94 MPa (30 kg/cm²)	0.5 to 4.5V	Judge detect among one of following condition.
MC2-A19	Fr. drum lower pressure sensor	0 to 2.94 MPa (30 kg/cm²)	0.5 to 4.5V	1.Input voltage InV $\leq$ 0.1V.2.Input voltage InV $\geq$ 4.9V.
MC2-A20	Re. drum hoist pressure sensor	0 to 2.94 MPa (30 kg/cm <sup>2</sup> )	0.5 to 4.5V	3. Input voltage InV ≥ 3.0V with engine oil pressure = ON,
MC2-A21	Re. drum lower pressure sensor	0 to 2.94 MPa (30 kg/cm²)	0.5 to 4.5V	charging = OFF, function lock = OFF.
MC2-A22	Third drum hoist pressure sensor	0 to 2.94 MPa (30 kg/cm <sup>2</sup> )	0.5 to 4.5V	
MC2-A23	Third drum lower pressure sensor	0 to 2.94 MPa (30 kg/cm <sup>2</sup> )	0.5 to 4.5V	

DIGITAL INPUT [B]

No.	Name	Range	Input voltage	Judgement
MC2-B01	C/W detect 3		GND (15 kΩ) /	
MOL DOI			OPEN	
MC2-B02	C/W detect 4		GND (15 kΩ) /	
			OPEN	
MC2-B03	C/W detect 5 (C4, C5)		GND (15 kΩ) /	
			OPEN	
MC2-B04	C/W detect 6 (C5)		GND (15 kΩ) /	
			OPEN	
MC2-B05	C/W detect 7 (C5)		GND (15 kΩ) /	
		Defection /	OPEN	
MC2-B06	CB/W detect	Detection / Non-detection	Ground (15 kΩ) / OPEN	
		Non-detection	GND (15 kΩ) /	
MC2-B07			OPEN	
			GND (15 kΩ) /	
MC2-B08			OPEN	
			GND (15 kΩ) /	
MC2-B09			OPEN	
			GND (15 kΩ) /	
MC2-B10			OPEN	
MC2-B11			GND (15 kΩ) /	
NICZ-DII			OPEN	
MC2-B12			GND (15 kΩ) /	
			OPEN	
MC2-B13	Crane boom overhoist signal	Normal / Overhoist	+24V / OPEN	
MC2-B14	Boom B/S No. 1 signal	Normal / Overhoist	+24V / OPEN	
MC2-B15	Boom B/S No. 2 signal	Normal / Overhoist	+24V / OPEN	
MC2-B16			GND (3.3 kΩ) /	
			OPEN	
MC2-B17			GND (3.3 kΩ) /	
			OPEN	
MC2-B18			+24V / OPEN	
MC2-B19	Function lock	Work / stop	+24V / OPEN	
		With power		
MC2-B20	Charge signal (alternator power	generation /	+24V / OPEN	
	generation signal)	Without power generation		
MC2-B21	Inching selection switch	Inching / Normal	+24V / OPEN	
MC2-B21			+24V / OPEN +24V / OPEN	
MC2-B23			+24V / OPEN	
MC2-B24	Crane hook overhoist signal	Normal / Overhoist	+24V / OPEN	
MC2-B25	Jib hook overhoist signal	Normal / Overhoist	+24V / OPEN	
MC2-B26	Hook overhoist release signal	Release / Normal	+24V / OPEN	

DIGITAL INPUT [B]

No.	Name	Range	Input voltage	Judgement
MC2-B27	Boom hoisting release signal	Release / Normal	+24V / OPEN	
MC2-B28	Controller ID 1		+24V / OPEN	
MC2-B29	Controller ID 2		+24V / OPEN	
MC2-B30	Fr. drum hoist stop	Normal / Stop	+24V / OPEN	
MC2-B31	Fr. drum lower stop (CEN)	Normal / Stop	+24V / OPEN	
MC2-B32	Re. drum (tower jib) hoist stop	Normal / Stop	+24V / OPEN	
MC2-B33	Re. drum (tower jib) lower stop	Normal / Stop	+24V / OPEN	
MC2-B34			+24V / OPEN	
MC2-B35	Jib overhoist signal	Normal / Overhoist	+24V / OPEN	
MC2-B36	C/W detect 1		GND (3.3 kΩ) / OPEN	
MC2-B37	C/W detect 2		GND (3.3 kΩ) / OPEN	
MC2-B38	Confluence / independence selection SOL (Fr. drum)		+24V / OPEN	
MC2-B39	Confluence / independence selection SOL (Re. drum)		+24V / OPEN	
MC2-B40	Oil cooler motor relay	ON / OFF	+24V / OPEN	
MC2-B41	Third drum hoist stop	Normal / Stop	+24V / OPEN	
MC2-B42	Third drum lower stop	Normal / Stop	+24V / OPEN	
MC2-B43	Boom drum raise stop	Normal / Stop	+24V / OPEN	
MC2-B44	Boom drum lower stop	Normal / Stop	+24V / OPEN	
MC2-B45	DPF load SOL	Load ON / OFF	+24V / OPEN	
MC2-B46			+24V / OPEN	
MC2-B47			+24V / OPEN	
MC2-B48			+24V / OPEN	
MC2-B49			+24V / OPEN	
MC2-B50			+24V / OPEN	
MC2-B51			+24V / OPEN	
MC2-B52			+24V / OPEN	
MC2-B53	ML bypass (CR)	ON / OFF	+24V / OPEN	
MC2-B54	ML bypass (JIB)	ON / OFF	+24V / OPEN	
MC2-B55			+24V / OPEN	
MC2-B56			+24V / OPEN	
MC2-B57			+24V / OPEN	
MC2-B58			+24V / OPEN	

#### ANALOGUE OUTPUT [H]

No.	Name	Status	Signal level	Judgement
MC2-H01				
MC2-H02				

#### PROPORTIONAL VALVE OUTPUT [D]

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No.	Name	Output current	Dither	Judgement
MC2-D01	Boom drum raise prop. valve	200 to 625 mA	200 mAp-p 100 Hz	
MC2-D02	Boom drum lower prop. valve	200 to 625 mA	200 mAp-p 100 Hz	
MC2-D03	Fr. drum hoist prop. valve	150 to 620 mA	200 mAp-p 100 Hz	
MC2-D04	Fr. drum lower prop. valve	150 to 620 mA	200 mAp-p 100 Hz	
MC2-D05	Re. drum hoist prop. valve	150 to 620 mA	200 mAp-p 100 Hz	
MC2-D06	Re. drum lower prop. valve	150 to 620 mA	200 mAp-p 100 Hz	
MC2-D07	Third drum hoist prop. valve (option)	150 to 620 mA	200 mAp-p 100 Hz	When output command value is ≥
MC2-D08	Third drum lower prop. valve (option)	150 to 620 mA	200 mAp-p 100 Hz	
MC2-D09	Motor CHP pressure control prop. valve	100 to 400 mA	200 mAp-p 100 Hz	50 mA.
MC2-D10	Fr. drum motor tilt control prop. valve	200 to 750 mA	200 mAp-p 100 Hz	
MC2-D11	Re. drum motor tilt control prop. valve	200 to 750 mA	200 mAp-p 100 Hz	
MC2-D12	Third drum motor tilt control prop. valve (option)	200 to 750 mA	200 mAp-p 100 Hz	

No.	Name	Output current	Dither	Judgement
MC2-C01			GND / OPEN	
MC2-C02			GND / OPEN	
MC2-C03			GND / OPEN	
MC2-C04			GND / OPEN	
MC2-C05			GND / OPEN	
MC2-C06			GND / OPEN	
MC2-C07			GND /	
102-007			OPEN (300 mA)	
MC2-C08			GND / OPEN (300 mA)	
MC2-C09			GND / OPEN (300 mA)	
MC2-C10			GND / OPEN	
MC2-C11			GND / OPEN	
MC2-C12			GND / OPEN	
MC2-C13			GND / OPEN	
102-013			(PWM)	
MC2-C14			GND /	
			OPEN (PWM)	
MC2-C15	Fr. drum motor boost SOL	Boost / Normal	+24V / OPEN	Mismatch between output command and actual port condition.
MC2-C16	Oil cooler electric motor	ON / OFF	GND / OPEN	<ul> <li>Judge detect either following condition.</li> <li>1. Mismatch between output command and actual port condition.</li> <li>2. Mismatch between output command and MC2-B40 condition.</li> </ul>
MC2-C17	Confluence / independence select SOL (Fr. drum)	Confluence / independence	GND / OPEN	<ul> <li>Judge detect either following condition.</li> <li>1. Mismatch between output command and actual port condition.</li> <li>2. Mismatch between output command and MC2-B38 condition.</li> </ul>
MC2-C18	Confluence/independence select SOL (Re. drum)	Confluence / independence	GND / OPEN	<ul> <li>Judge detect either following condition.</li> <li>1. Mismatch between output command and actual port condition.</li> <li>2. Mismatch between output command and MC2-B39 condition.</li> </ul>

No.	Name	Output current	Dither	Judgement
MC2-C19	DPF load SOL	Load ON / OFF	GND / OPEN	<ul> <li>Judge detect either following condition.</li> <li>1. Mismatch between output command and actual port condition.</li> <li>2. Mismatch between output command and MC2-B45 condition.</li> </ul>
MC2-C20			GND / OPEN	
MC2-C21	Re. drum motor boost SOL	Boost / Normal	+24V / OPEN	Mismatch between output command and actual port condition.
MC2-C22	Third drum motor boost SOL (option)	Boost / Normal	+24V / OPEN	Mismatch between output command and actual port condition.
MC2-C23			GND / OPEN	
MC2-C24			GND / OPEN	
MC2-C25			GND / OPEN (PWM)	
MC2-C26	Fr. drum control signal		GND / OPEN	Mismatch between output command and actual port condition.
MC2-C27	Re. drum control signal		GND / OPEN	Mismatch between output command and actual port condition.
MC2-C28	Third control signal		GND / OPEN	Mismatch between output command and actual port condition.
MC2-C29	Fr. drum C/V-SOL	Energized / De-energized	+24V / OPEN	Mismatch between output command and actual port condition.
MC2-C30	Re. drum C/V-SOL	Energized / De-energized	+24V / OPEN	Mismatch between output command and actual port condition.
MC2-C31			GND / OPEN	
MC2-C32			GND / OPEN	
MC2-C33			GND / OPEN	
MC2-C34			GND / OPEN	
MC2-C35	6		GND / OPEN (CPU error)	
MC2-C36	Third C / V-SOL (option)	Energized / De-energized	+24V / OPEN	Mismatch between output command and actual port condition.

## 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			
	24	RXD3		Program DL serial	
	25	DL		Program DE senai	
	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		
	2	A3		Fr. drum motor speed adjusting trimmer	l
	3	GA	A3		l
	4	+5VA	A4		
	5	A4		Re. drum motor speed adjusting trimmer	l
	6	GA	A4		l
	7	+5VA	A5		4
	8	A5		Third drum motor speed adjusting trimmer	
	9	GA	A5		
	10	+5VA	A6		
	11	A6		Boom drum motor speed adjusting trimmer	
	12	GA	A6		
	13	A7	Resistance input	Spare	
	14	GA	A7	Spare	l
	15	+5VA	A8		
	16	A8		Grip throttle	l
	17	GA	A8		L
	18	+5VA	A9		
	19	A9		Foot throttle (option)	l
-	20	GA	A9		l
	21	A10	Resistance input	Hydraulic oil temperature sensor	
	22	GA	A10	riyuraulic oli temperature sensor	1

Connector No.	Pin No.	Port name	Function	Specifications	Remarks
CN103	1	+5A	A11		
	2	A11		Tagline trimmer (option)	
	3	GA	A11		
	4	+5A	A12		
	5	A12		Control primary pressure	
	6	GA	A12		
	7	+5A	A13		
	8	A13		Swing pump pressure sensor	
	9	GA	A13		
	10	+5A	A14	Swing control (right) pressure sensor	
	11	A14		Swing control (right) pressure sensor	
	12	GA	A22	GND for third clutch pressure sensor (option)	
	13	+5A	A15		
	14	A15		Swing control (left) pressure sensor	
	15	GA	A15		
	16	GA	A14	GND for swing control (right) pressure sensor	

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	Pin No.	Port name	Function	Specifications	Remarks
CN104	1	B1	Grounded input (15 K $\Omega$ )	ECU signal	
	2	+5A	A16		
	3	A16		Qmax cut solenoid detection pressure	
	4	GA	A16		
	5	+5A	A17		
	6	A17		Power shift pressure sensor	
	7	GA	A17		
	8	+5A	A18	+5V for supply voltage monitoring	
	9	B2	Grounded input (15 K $\Omega$ )	Engine oil. pressure PSW	
	10	+5A	A19	+5V for Inclination sensor X	
	11	+5A	A20	+5 V for Inclination sensor Y	
	12	A18			
-	13	GA	A18	Supply voltage monitoring	
	14	B3	Grounded input (15 KΩ)	CB/W detect	
	15	A19		Inclination sensor X	
	16	A20			
	17	GA	A20	Inclination sensor Y	
	18	'+5A	A21		
	19	A21		Fr. drum clutch pressure sensor	
	20	GA	A21		
	21	'+5A	A22	+5V for third drum clutch pressure sensor (option)	
	22	B4	Grounded input (15 K $\Omega$ )	Clogging of air cleaner	
	23	B5	Grounded input (3.3 KΩ)	Spare	
	24	GA	A19	GND for Inclination sensor X	
	25	'+5A	A23		
	26	A23		Re. drum clutch pressure sensor	
			100	1	
	27	GA	A23		

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	
	12	D1-		prop. valve	
	13	D2+		Boom pump horse power control	
•	14	D2-		prop. valve	
	15	D3+			
	16	D3-		Swing low speed prop. valve	
	17	D4+			
	18	D4-		Swing counterforce prop. valve	
	19	D5+			
	20	D5-		Boom pump tilt control prop. valve	
	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)	Fr. drum rotate sensor	
			(and pulse input)		
	30	B17	Grounded input (3.3 KΩ) (and pulse input)	Re. drum rotate sensor	
	31	+24 V	For backup power supply RTC		

Pin No.	Port name	Function	Specifications	Remarks
1	+24 V 1	Battery (+)		
2	D6+		Er, drum middle detent	
3	D6-		Fr. drum middle detent	
4	D7+		Po, drum middlo dotont	
5	D7-			
6	D11+		Left owing otop properticed value	
7	D11-		Left swing stop proportional valve	
8	D8+		Main numn tilt control prop. volvo 1	
9	D8-		Main pump un control prop. valve i	
10	D9+		Main numn tilt control prop. volvo 2	
11	D9-		Main pump un control prop. valve 2	
12	B18	+24 V input	Key SW ON signal	
13	B19	+24 V input	Function lock	
14	B20	+24 V input	Charge signal	1
15	D12+		Pight swing stop proportional valvo	
16	D12-		Right swing stop proportional valve	
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	
	3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23	3         D6-           4         D7+           5         D7-           6         D11+           7         D11-           8         D8+           9         D8-           10         D9+           11         D9-           12         B18           13         B19           14         B20           15         D12+           16         D12-           17         GND           18         B21           19         B22           20         B23           21         B24           22         B25           23         B26	3       D6-         4       D7+         5       D7-         6       D11+         7       D11-         8       D8+         9       D8-         10       D9+         11       D9-         12       B18         13       B19         14       B20         15       D12+         16       D12-         17       GND         B21       +24 V input         19       B22       +24 V input         19       B22       +24 V input         20       B23       +24 V input         21       B24       +24 V input         22       B25       +24 V input         23       B26       +24 V input	Fr. drum middle detent3D6-Fr. drum middle detent4D7+Re. drum middle detent5D7-Re. drum middle detent6D11+Left swing stop proportional valve7D11-Left swing stop proportional valve8D8+Main pump tilt control prop. valve 19D8-Main pump tilt control prop. valve 110D9+Main pump tilt control prop. valve 211D9-Main pump tilt control prop. valve 212B18 $+24$ V inputKey SW ON signal13B19 $+24$ V inputCharge signal15D12+Right swing stop proportional valve16D12-Spare18B21 $+24$ V inputInching selection19B22 $+24$ V inputEngine emg. stop signal20B23 $+24$ V inputEngine restart22B25 $+24$ V inputSwing parking switch



CN1071B28D/O FBController ID 12B29D/O FBController ID 23B30 $\pm 24$ V inputG mode/Normal selection4B31 $\pm 24$ V inputG winch (Fr.)5B32 $\pm 24$ V inputG winch (Re.)6B33 $\pm 24$ V inputG winch (main)7B34D/O FBAIS function ON/OFF SW8B35 $\pm 24$ V inputTravel control pressure switch9B36Grounded input (3.3 KΩ) (and pulse input)Spare10B37Grounded input (3.3 KΩ) (and pulse input)Cooling line filter11B38 $\pm 24$ V inputEngine preheat12B39 $\pm 24$ V inputSpare13B40D/O FBBackup fuse14B41 $\pm 24$ V inputFr. drum free fall speed increase SW	
3B30 $+24 \vee input$ G mode/Normal selection4B31 $+24 \vee input$ G winch (Fr.)5B32 $+24 \vee input$ G winch (Re.)6B33 $+24 \vee input$ G winch (main)7B34D/O FBAIS function ON/OFF SW8B35 $+24 \vee input$ Travel control pressure switch9B36Grounded input (3.3 KΩ) (and pulse input)Spare10B37Grounded input (3.3 KΩ) (and pulse input)Cooling line filter11B38 $+24 \vee input$ Engine preheat12B39 $+24 \vee input$ Spare13B40D/O FBBackup fuse14B41 $+24 \vee input$ Fr. drum free fall	
4B31 $+24 \vee input$ G winch (Fr.)5B32 $+24 \vee input$ G winch (Re.)6B33 $+24 \vee input$ G winch (main)7B34D/O FBAIS function ON/OFF SW8B35 $+24 \vee input$ Travel control pressure switch9B36Grounded input (3.3 KΩ) (and pulse input)Spare10B37Grounded input (3.3 KΩ) (and pulse input)Cooling line filter11B38 $+24 \vee input$ Engine preheat12B39 $+24 \vee input$ Spare13B40D/O FBBackup fuse14B41 $+24 \vee input$ Fr. drum free fall	
5B32 $+24$ V inputG winch (Re.)6B33 $+24$ V inputG winch (main)7B34D/O FBAIS function ON/OFF SW8B35 $+24$ V inputTravel control pressure switch9B36Grounded input (3.3 K $\Omega$ ) (and pulse input)Spare10B37Grounded input (3.3 K $\Omega$ ) (and pulse input)Cooling line filter11B38 $+24$ V inputEngine preheat12B39 $+24$ V inputSpare13B40D/O FBBackup fuse14B41 $+24$ V inputFr. drum free fall	
6B33 $+24 \vee input$ G winch (main)7B34D/O FBAIS function ON/OFF SW8B35 $+24 \vee input$ Travel control pressure switch9B36Grounded input (3.3 KΩ) (and pulse input)Spare10B37Grounded input (3.3 KΩ) (and pulse input)Cooling line filter11B38 $+24 \vee input$ Engine preheat12B39 $+24 \vee input$ Spare13B40D/O FBBackup fuse14B41 $+24 \vee input$ Fr. drum free fall	
7B34D/O FBAIS function ON/OFF SW8B35+24 V inputTravel control pressure switch9B36Grounded input (3.3 KΩ) (and pulse input)Spare10B37Grounded input (3.3 KΩ) (and pulse input)Cooling line filter11B38+24 V inputEngine preheat12B39+24 V inputSpare13B40D/O FBBackup fuse14B41+24 V inputFr. drum free fall	
8B35+24 V inputTravel control pressure switch9B36Grounded input (3.3 KΩ) (and pulse input)Spare10B37Grounded input (3.3 KΩ) (and pulse input)Cooling line filter11B38+24 V inputEngine preheat12B39+24 V inputSpare13B40D/O FBBackup fuse14B41+24 V inputFr. drum free fall	
9B36Grounded input (3.3 KΩ) (and pulse input)Spare10B37Grounded input (3.3 KΩ) (and pulse input)Cooling line filter11B38+24 V inputEngine preheat12B39+24 V inputSpare13B40D/O FBBackup fuse14B41+24 V inputFr. drum free fall	(
9B36 (and pulse input)Spare10B37Grounded input (3.3 KΩ) (and pulse input)Cooling line filter11B38+24 V inputEngine preheat12B39+24 V inputSpare13B40D/O FBBackup fuse14B41+24 V inputFr. drum free fall	
10B37Grounded input (3.3 KΩ) (and pulse input)Cooling line filter11B38+24 V inputEngine preheat12B39+24 V inputSpare13B40D/O FBBackup fuse14B41+24 V inputFr. drum free fall	
10B37 (and pulse input)Cooling line filter11B38+24 V inputEngine preheat12B39+24 V inputSpare13B40D/O FBBackup fuse14B41+24 V inputFr. drum free fall	
Image: mark text     (and pulse input)       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	
12     B39     +24 V input     Spare       13     B40     D/O FB     Backup fuse       14     B41     +24 V input     Fr. drum free fall	
13   B40   D/O FB   Backup fuse     14   B41   +24 V input   Fr. drum free fall	
14 B41 +24 V input Fr. drum free fall	
$1/1$ B/1 $\pm 2/1$ V input	
speed increase SW	
15 B42 +24 V input Re. drum free fall speed increase SW	
16 R43 +24 V input Third drum free fall	
10     124 V input     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)	

Pin No.	Port name	Function	Specifications	Remarks
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	
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	1         C15           2         C16           3         C17           4         C18           5         C19           6         C20           7         C21           8         C22           9         C23           10         C24           11         C25           12         C26           13         C27           14         C28           15         C29           16         C30           17         C31           18         C32           19         C33           20         C34           21         C35	1C15+24 V output2C16Grounded output3C17Grounded output4C18Grounded output5C19Grounded output6C20Grounded output7C21+24 V output8C22+24 V output9C23Grounded output10C24Grounded output11C25PWM output12C26Grounded output13C27Grounded output14C28Grounded output15C29+24 V output16C30+24 V output17C31Grounded output19C33Grounded output20C34Grounded output21C35Grounded output	1C15+24 V outputBattery relay energizing2C16Grounded outputML bypass reset3C17Grounded outputSolenoid cut relay energizing4C18Grounded outputEngine warning output5C19Grounded outputAIS air con. ON relay energizing6C20Grounded outputSwing neutral brake selection7C21+24 V outputSub battery relay energizing8C22+24 V outputSub battery relay energizing9C23Grounded outputSpare10C24Grounded outputSpare11C25PWM outputSpare12C26Grounded outputDPF regeneration start13C27Grounded outputFr. drum rotate detection grip (option)16C30+24 V outputRe. drum rotate detection grip (option)17C31Grounded outputSafety relay operation18C32Grounded outputSyare20C34Grounded outputSyare21C35Grounded outputSyare

### 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			
	24	RXD3		Dragram DL aarial	
	25	DL		Program DL serial	
	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	

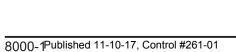
	Specifications	Function	Port name	Pin No.	Connector No.
		A3	+5VA	1	CN112
	Fr. drum motor tilt control pressure sensor		A3	2	
		A3	GA	3	
		A4	+5VA	4	
	Re. drum motor tilt control pressure sensor		A4	5	6
	1	A4	GA	6	
		A5	+5VA	7	
	Third drum motor tilt control pressure sensor		A5	8	
		A5	GA	9	
		A6	+5VA	10	
	A/D spare		A6	11	
		A6	GA	12	
P	Fuel level	Resistance input	A7	13	
	ruei levei	A7	GA	14	
		A8	+5VA	15	
	Confluence/Independence selection pressure (Fr. drum)		A8	16	
		A8	GA	17	
		A9	+5VA	18	
	Confluence/Independence selection pressure (Re. drum)		A9	19	
		A9	GA	20	
	A/D spare	Resistance input	A10	21	
	ArD spare	A10	GA	22	

Connector No.	Pin No.	Port name	Function	Specifications
CN113	1	+5A	A11	
	2	A11		Fr./Re. drum CHP start pressure sensor
	3	GA	A11	
	4	+5A	A12	
	5	A12		A/D spare
	6	GA	A12	
	7	+5A	A13	
	8	A13		A/D spare
	9	GA	A13	
	10	+5A	A14	A/D spare
	11	A14		
	12	GA	A22	Third drum raise pressure sensor
	13	+5A	A15	
	14	A15		A/D spare
	15	GA	A15	
	16	GA	A14	A/D spare

Connector No.	Pin No.	Port name	Function	Specifications
CN114	1	B1	Grounded input (15 K $\Omega$ )	C/W detect 3
	2	+5A	A16	
	3	A16		Boom drum raise pressure sensor
	4	GA	A16	
	5	+5A	A17	
	6	A17		Boom drum lower pressure sensor
	7	GA	A17	
	8 9 10 11	+5A	A18	Fr. drum hoist pressure sensor
		B2	Grounded input (15 K $\Omega$ )	C/W detect 4
		+5A	A19	Fr. drum lower pressure sensor
		+5A	A20	Re. drum hoist pressure sensor
	12	A18		Fr. drum hoist pressure sensor
	13	GA	A18	FI. drum holst pressure sensor
	14	B3	Grounded input (15 K $\Omega$ )	C/W detect 5 (C4, C5)
	15	A19		Fr. drum lower pressure sensor
	16	A20		Re. drum hoist pressure sensor
	17	GA	A20	Re. druht holst pressure sensor
	18	'+5A	A21	
	19	A21		Re. drum lower pressure sensor
	20	GA	A21	
	21	'+5A	A22	Third drum hoist pressure sensor
	22	B4	Grounded input (15 K $\Omega$ )	C/W detect 6 (C5)
	23	B5	Grounded input (3.3 K $\Omega$ )	C/W detect 7 (C5)
	24	GA	A19	Fr. drum lower pressure sensor
	25	'+5A	A23	
	26	A23		Third drum lower pressure sensor
	27	GA	A23	
	28	A22		Third drum hoist 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 K $\Omega$ )	Fr. drum brake cooling oil temperature	
	5	B7	Grounded input (3.3 K $\Omega$ )	Re. drum brake cooling oil temperature	
	6	B8	Grounded input (3.3 KΩ)	Radiator water level	
	7	B9	Grounded input (3.3 K $\Omega$ )	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 hoist proportional valve	
	16	D3-			
	17	D4+		Fr. drum lower proportional valve	
	18	D4-			
	19	D5+		Re. drum hoist proportional valve	
	20	D5-		rte. drum noist proportional valve	
	21	GND	Battery (-)	GND	
	22	D10-		Fr. drum motor tilt control prop. valve -	
	23	B10	Grounded input (3.3 K $\Omega$ )	Spare	
	24	B11	Grounded input (3.3 K $\Omega$ )	Spare	
	25	B12	Grounded input (3.3 K $\Omega$ )	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	

CN116	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 hoist 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	Spare	
	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 hoist stop	
	4	B31	+24 V input	Fr. drum lower stop	
	5	B32	+24 V input	Re. drum (tower jib) hoist 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 K $\Omega$ )	C/W detect 1	
			(and pulse input)		
	10	B37	Grounded input (3.3 KΩ)	C/W detect 2	
			(and pulse input)		
	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 hoist 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		Spare	
	5	C5	Grounded output	Spare	
	6	B45	D/O FB	DPF load solenoid	
	7	B46	D/O FB	Spare	
CN118	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	

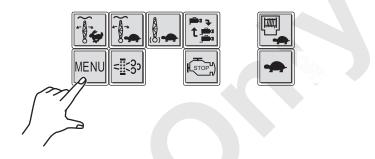
Connector No.	Pin No.	Port name	Function	Specifications	Remarks
CN119	1	C15	+24 V output	Fr. drum motor boost SOL	
	2	C16	Grounded output		
	3	C17	C15+24 V outputFr. drum motor boost SOLC16Grounded outputOil cooler electric motorC17Grounded outputConfluence/Independence selection solenoid (Fr. drum)C18Grounded outputConfluence/Independence selection solenoid (Re. drum)C19Grounded outputDPF load solenoidC20Grounded outputSpareC21+24 V outputRe. drum motor boost SOLC22+24 V outputThird motor boost SOL (option)C23Grounded outputSpareC24Grounded outputSpareC25PWM outputSpareC26Grounded outputRe. drum control signalC27Grounded outputRe. drum control signalC28Grounded outputThird drum control signalC29+24 V outputThird drum control signalC29+24 V outputRe. drum C/V-SOLC30+24 V outputRe. drum C/V-SOLC31Grounded outputSpareC32Grounded outputSpareC33Grounded outputSpareC34Grounded outputSpareC35Grounded outputSpare	solenoid (Fr. drum)	
	4	C18			
	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)	
			0		

# 10.3.7 ADJUSTMENT OF MAIN CONTROLLER

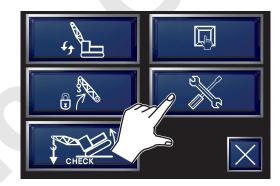
1. Model number setting

Perform this setting only when controller is replaced. If model setting is not properly done, machine does not work properly. Take extra care.

2. Press the icon in the main screen.

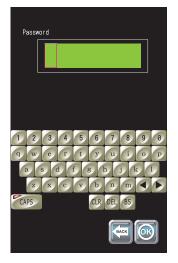


3. Press 🚿 switch.



- 4. Input the password (8 digits) with the keyboard.
- \* In case of using capital letter, press witch.

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

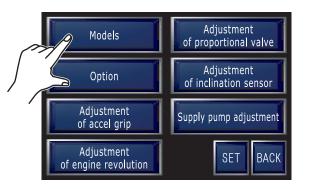


5. Press 🛞 switch.



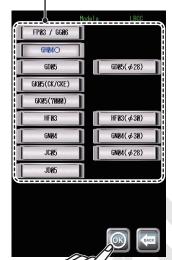
- 6. Press "ML ADJUSTMENT (TEMPORARY)"
- I/O SIGNALMC ADJUSTMENT<br/>/SETTINGML ADJUSTMENT<br/>(NORMAL)ML FUNCTIONML ADJUSTMENT<br/>(TEMPORARY)VERSION INFORMATIONADJUSTMENT DATANEXTBACK

7. Press "ML ADJUSTMENT (TEMPORARY)"



- (1) Select the displayed model group.
- (2) Press 🛞 after model group is selected.
- \* Unless 🛞 is pressed, selection becomes ineffective.

Select model group



- 8. Option setting
- (1) Turn the engine key "ON".
- (2) Select the screen as follows.
   Main screen : ₩→ 𝔅 → "Password input"
   → "MC adjustment" → "Option setting"
- (3) Select "O (YES)" or "X (NO)" on each function setting.
  - Use  $\textcircled{\bullet}$  icon for page change.
- (4) After setting is completed, press 🛞 and after page is changed, press 🖭 to record.
- \* Unless SET is pressed, selection becomes ineffective.

OPTION	م الم
G-09 FRONT FREE FALL WINCH	0
G-10 REAR FREE FALL WINCH	0
G-11 3RD FREE FALL WINCH	×
G-12 3RD WINCH	×
G-13 TAG-LINE WINCH	×
G-14 WINCH ROTATION SENSITIVE	×
G-15 ACCELERATOR PEDAL	×
G-16 HOOK HEIGHT GAUGE	×
G-17 INCLINATION SENSOR	×
G-18 JIB WINCH	×
G-19 OPERATOR AUTHENTICATION	×
û-20 EUROPE SPECIFICATION û-20 (COMPLY WITH CEN)	×
G-21 INTERLOCK FOR PROPEL LEVERS	×
G-22 SWING MODE SELECTION	×
G-23 SWING RESTRICTION	×
G-24AIS AIR CONDITIONER	×

Select

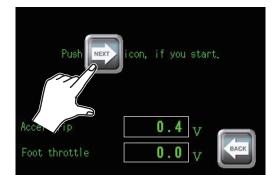
## [ 10. ELECTRIC SYSTEM ]

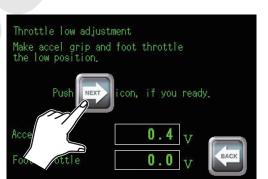
- 9. Adjustment of grip throttle and foot throttle.
- (1) Turn the engine key "ON".
- (2) Select the screen as follows.
   Main screen : ₩→ 𝔅 → "Password input"
   → "MC adjustment" → "Grip adjustment"
- (3) The screen changes to adjustment screen. Press adjustment start button .
- (4) Throttle low adjustment. Set the grip throttle and foot throttle to low idle position and in case of the joy-stick to the neutral position.
- (5) If OK, press button  $\textcircled{\basis}$ .
- (6) Throttle high adjustment. Set the grip throttle and foot throttle to high idle position and in case of the joy-stick to the idleup position.
- (7) If OK, press button .
- (8) If adjustment completion becomes displayed, press (3) and press (3ET) after screen has been changed to record.
- \* Unless **SET** is pressed, selection becomes ineffective.
- 10. Engine speed adjustment

Warm up the engine sufficiently before adjustment.

- (1) Turn the engine key "ON".
- (2) Select the screen as follows.
   Main screen : M→ → → Password input" →
   "MC adjustment" → "Engine speed adjustment"
- (3) The screen changes to adjustment screen. Press adjustment start button .
- (4) Engine speed is raised to high idle once and then gradually lowered to low idle.
- (5) If adjustment completion becomes displayed, press is and press is after screen has been changed to record.
- \* Unless ET is pressed, selection becomes ineffective.
- If adjustment becomes NG, NG 1 : Engine speed is abnormal. Check if engine error is output. NG 2 : Transmission is error.

Check if warning of CAN transmission abnormal is output.





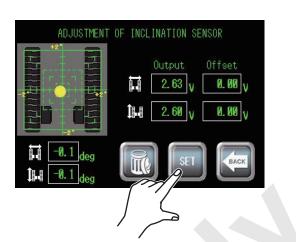
11. Adjusting of inclination meter

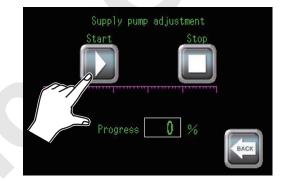
Place the main machinery on the horizontal ground before adjustment using the level gauge etc.

- (1) Turn the engine key "ON".
- (2) Select the screen as follows.
   Main screen : → → → Password input"
   → "MC adjustment" → "Inclination meter adjustment"
- (3) The screen changes to adjustment screen. Press adjustment start button **ET** if OK.
- (4) If adjustment completion becomes displayed, press (3) and press (3ET) after screen has been changed to record.
- \* Unless SET is pressed, selection becomes ineffective.
- 12. 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.

- After replacement of supply pump, start the engine and select the screen as follows.
   Main screen : I → → → Password input"
   → "MC adjustment" → "Pump learning function"
- (2) Engine speed stays in low idle. Press .
- (3) Progress becomes displayed.100% is reached after 5 minutes.





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## **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.

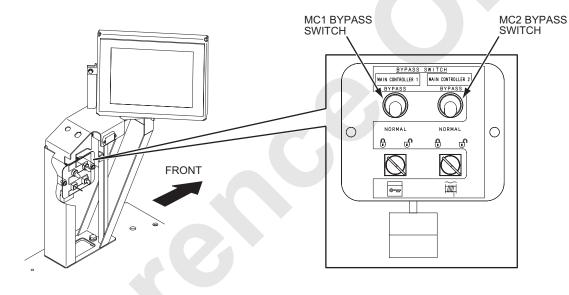
The crane operation becomes possible.

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 monitor display.

(excluding the case when H-1 is displayed)



# 11. AIR CONDITIONER

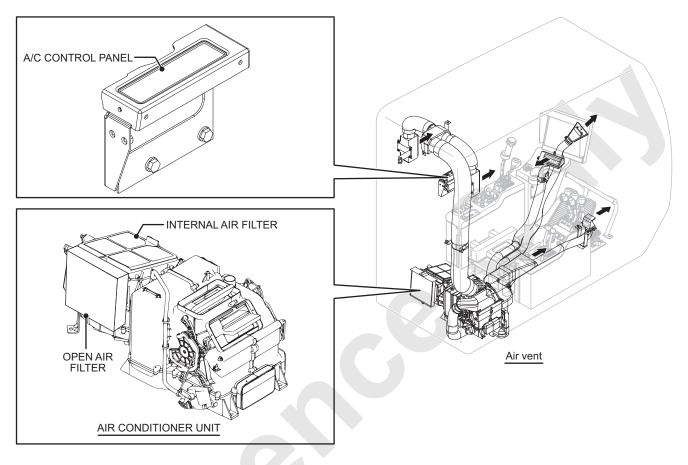
11.1	NAME OF THE AIR CONDITIONER PARTS	11-1
11.2	ELECTRIC WIRING DIAGRAM	11-7
11.3	PARTS ILLUSTRATION	11-8
11.4	DISASSEMBLY AND ASSEMBLY OF THE UNIT	11-10
11.4.1	REMOVAL OF THE BLOWER UNIT	11-10
11.4.2	REPLACING THE BLOWER MOTOR	11-11
11.4.3	REPLACING THE BLOWER CONTROLLER	11-11
11.4.4	REMOVAL OF THE HEATER CORE	11-11
11.4.5	REMOVAL OF THE AIR CON. UNIT CASE-FRONT, REAR AND LOWER	11-12
11.4.6	REPLACING THE EVAPORATOR AND EXPANSION VALVE	11-13
11.4.7	INSTALLATION OF EVAPORATOR SENSOR	11-13
11.4.8	REPLACING THE MOTOR ACTUATOR	11-14
11.5	FAULT DETECTION FROM THE CONTROL PANEL INDICATION	11-15
11.5.1	GENERAL	11-15
11.5.2	FAULT IN THE INPUT AND OUTPUT CIRCUIT OF THE MOTOR	
	ACTUATOR	11-15
11.5.3	FAULT IN THE THERMISTOR SENSOR CIRCUIT	11-16
11.6	BASIC SYSTEM OF HVAC	11-17
11.7	RECHARGING OF THE COOLANT	11-23
11.7.1	CAUTION AT WORK	11-23
11.7.2	WORK PROCEDURE	11-25
11.7.3	RECHARGING PROCEDURE	11-27
11.8	TROUBLESHOOTING	11-32

11

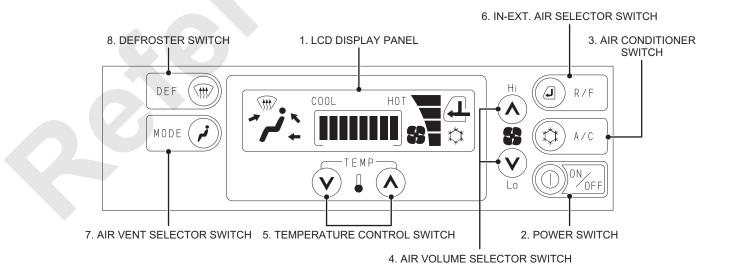
# 11. AIR CONDITIONER

# 11.1 NAME OF THE AIR CONDITIONER PARTS

## NAME OF THE AIR CONDITIONER PARTS



## NAME OF THE CONTROL PANEL



## FUNCTION OF EACH CONTROL

#### 1. LCD DISPLAY PANEL

Air volume setting etc. are displayed.

#### 2. POWER SWITCH (ON/OFF SWITCH)

It turns ON or OFF the air conditioner. When this switch is pushed at the first time, the air conditioner starts on factory set mode. When this switch is pushed, air conditioner starts with previous set mode.

### 3. AIR CONDITIONER SWITCH (A/C SWITCH)

Every time when this switch is pushed, the air compressor alternates ON/OFF. When the air conditioner is ON, I lights up on the LCD display (a).

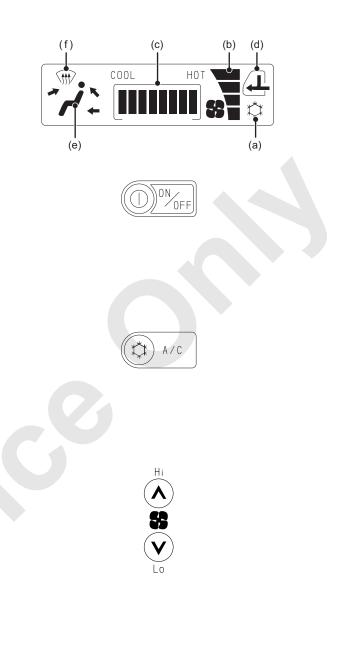
### 4. AIR VOLUME SELECTOR SWITCH (FAN SWITCH)

Air volume can be changed by pushing this switch when air conditioner is running.

	Increase air volume.
$\odot$	Decrease air volume.

Set air volume is displayed on the LCD display (b).

LCD display				
Air volume	Low	Medium	High	Max. high



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#### 5. TEMPERATURE CONTROL SWITCH (AIR CONDITIONER TEMP. SET)

Pushing this switch changes temperature setting when the air conditioner is running.

	Rises temperature (blowing air temp.)
$\odot$	Lowers temperature (blowing air temp.)

Set temperature mm is displayed on LCD display (c).

### 6. IN-EXT. AIR SELECTOR SWITCH (R/F SWITCH)

Every time when this switch is pushed, internal air / external air alternate.

L	Internal air circulation
L)	External air take in

Setting is displayed on LCD display (d).

### 7. AIR VENT SELECTOR SWITCH (MODE SWITCH)

Every time when this switch is pushed, blow out opening changes on in sequence.

LCD display	فهر م	۲ تمرم	نی <i>شر</i> م	+ نسم
Blow out opening	Face	Vent	Bi level	Foot
Blow out direction	Front	Front/Upper rear	Front/Upper rear and foot	Foot*

Setting is displayed on LCD display (e).

### 8. DEFROSTER SWITCH (DEF SWITCH)

Every time when this switch is pushed, blow out opening changes to defroster.

Blow out opening	Defroster
Blow out direction	Front windscreen*

\* Air blows from foot too.

 $\forall ff \rangle$  is displayed on LCD display (f).







\* Air blows from defroster also.

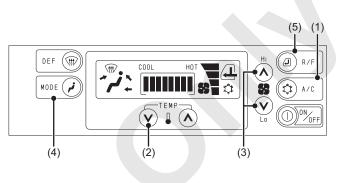
## AIR CONDITIONER CONTROL

1. To start or stop air conditioner

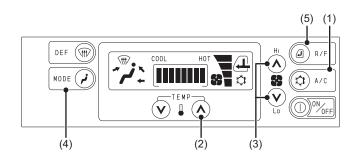
Push ONF (Power switch).

DEF ()) MODE () MODE (

- 2. To cool
- (1) Push ( (Air conditioner switch).
- (2) Push ⊙<sup>™™</sup>∂ (Temperature control switch) to indicate <sup>™</sup> temperature display.
- (3) Push the air volume selector switch for required air volume setting.
- (4) Push week (Air vent selector switch) for \*/\*
  (Vent) position.
  (The above is recommended position and can be chosen as desired.)
- (5) By pushing (a) R/F (In-ext. air selector switch), set the selector to (a) (Internal air circulation). (The above is recommended position and can be chosen as desired.)
  If the A/C cools down too low, adjust the temp. or air volume by (2), (3).
- (air conditioner switch) is not pushed, the A/C does not cool but only air flows.
- While defrosting the windows, do not set the temperature too low.
- Cold air may make windows foggy from outside

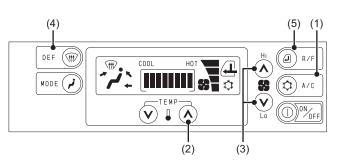


- 3. To warm
- (1) Push ( (Air conditioner switch).
- (2) Push S<sup>™</sup> (Temperature control switch) to indicate minimative temperature display.
- (3) Push the air volume selector switch for required air volume setting.
- (4) Push weee (Air vent selector switch) for ↓ (Foot position.
  (The above is recommended position and can be chosen as desired.)
- (5) By pushing (In-ext. air selector switch), set the selector to (Internal air circulation).
  (The above is recommended position and can be chosen as desired.)
  If the A/C warms up too high, adjust the temp. or air volume by (2), (3).
- If <a>A/C</a> (Air conditioner switch) is pushed, the A/ C operates on dry air warming.
- If blow out opening is set to "Foot", small amount for air bows from defroster also.



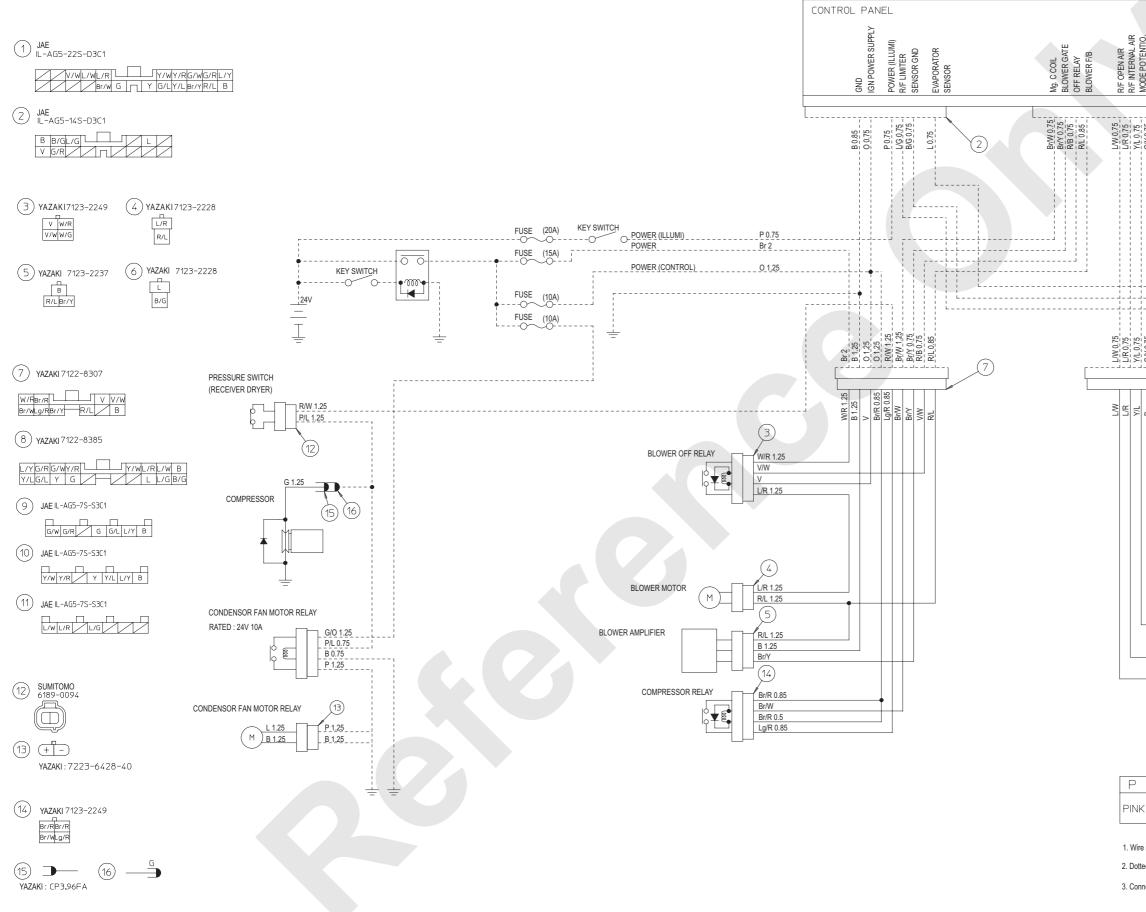
## [ 11. AIR CONDITIONER ]

- 4. To defrost on the windows
- (1) Push ( (Air conditioner switch).
- (2) Push ⊙<sup>™™</sup> (Temperature control switch) to indicate <sup>™™™</sup> temperature display.
- (3) Push the air volume selector switch for "Max, high" air volume.
- (4) Push □EF (Defroster switch) to change the blow out opening to ( (Defroster) position.
- (5) By pushing (In-ext. air selector switch), set the selector to (Internal air circulation).
- By pushing week (Air vent selector switch) blow out opening return to previous one before (Defree) (Defroster switch) is pushed.
- When blow out opening is set to "Defroster", small amount of air comes out from foot also.
- 5. To defog on the windows
- (1) Push ( (Air conditioner switch).
- (2) Push the air volume selector switch for required air volume setting.
- (3) Push □EF (Defroster switch) to change the blow out opening to ( the formation of the formation of
- (4) By pushing @ R/F (In-ext. air selector switch), set the selector to ⓓ (External air take in).
- If quick defogging is required, set the air volume to "Max, high" by (2).
- By pushing week (Air vent selector switch) blow out opening return to previous one before (Defrom (Defroster switch) is pushed.
- When blow out opening is set to "Defroster", small amount of air comes out from foot also.



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# 11.2 ELECTRIC WIRING DIAGRAM



MODE POTENTIO.	MODE OUTPUT 2			AM OUTPUT 2	AM LIMITTER															
90,072-1	<u>YM.0.75</u>	GL 0.75				G/R 0.75			\ 	~	1									
P/L 2012L	$\begin{array}{c c} & \gamma W \\ \gamma & \gamma & \gamma \\ \gamma & \gamma & \gamma \\ \gamma & \gamma & \gamma \\ \gamma & \gamma &$			G/W 0.75			G/R G/R 0.75	B/G <u>B/G</u> <u>B/G</u> <u>0.75</u>			L B/G	6	8	)		EV	/AP	ORATOR	SENSOF	ł
•			•						)) ))		G/R G G/W L/Y G/L B Y/R Y/W L/Y Y/L B						(A 2	otor a( IR MIX) Otor ac IODE)		
											L/R L/G L/W							OTOR AC N/OUT AIF		

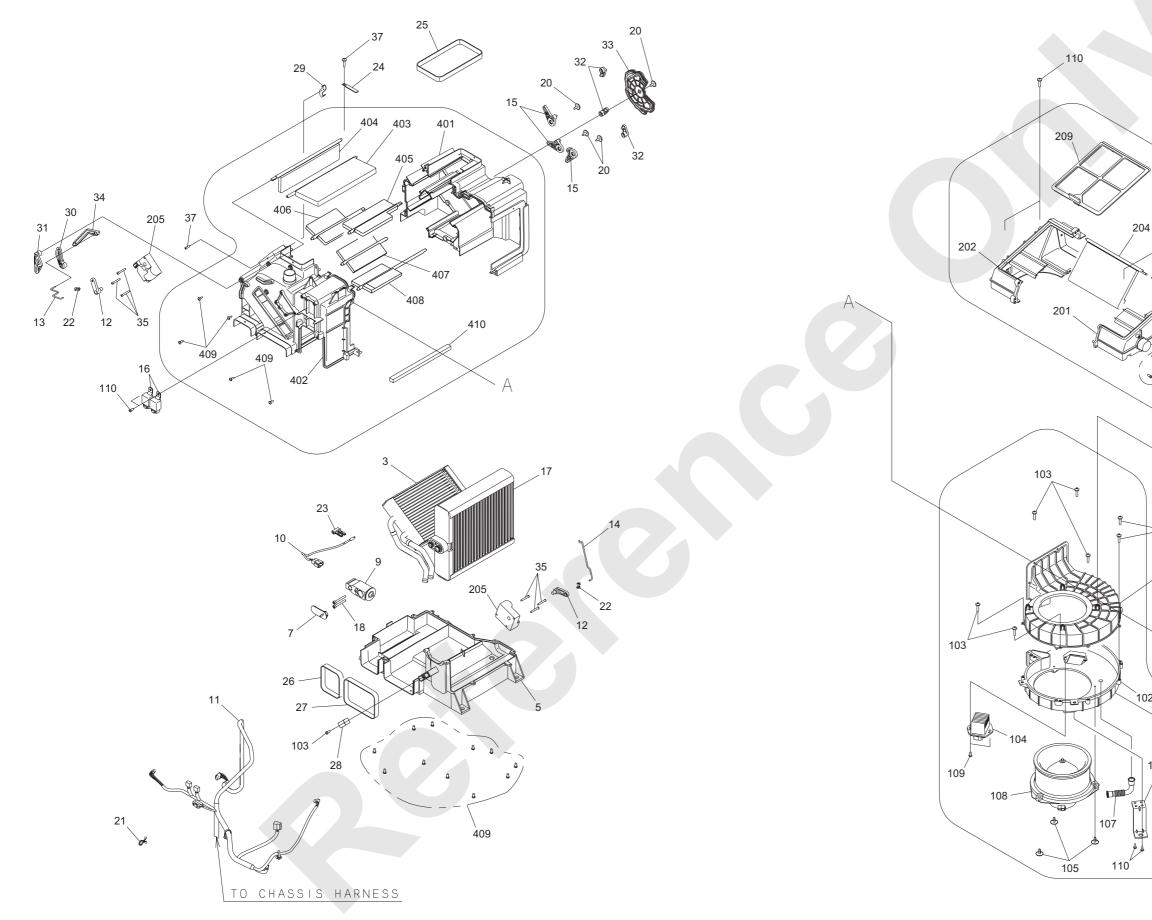
C	W	В	R	Y	G	L	Br	Lg	0	V
NK	WHITE	BLACK	RED	YELLOW	GREEN	BLUE	BROWN	LIGHT GREEN	ORANGE	VIOLET

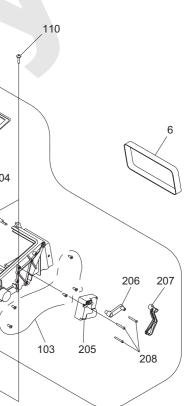
1. Wire meter is 0.5 mm unless otherwise spicified.

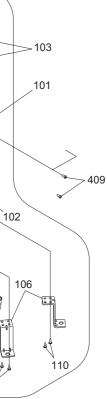
2. Dotted line ( ) is vehicle's body wiring.

3. Connector pin layout color is a view on the mating face.

# 11.3 PARTS ILLUSTRATION







- 3. Heater core assy
- 5. Lower unit case
- 6. Out air intake packing
- 7. Expansion cover
- 9. Expansion valve
- 10. Thermistor
- 11. Unit harness assy
- 12. Lever (MAL1)
- 13. AM rod
- 14. Mode rod
- 15. Lever (MO2)
- 16. Relay
- 17. Evaporator
- 18. Hex. Socket head screw
- 20. Tapping screw
- 21. Cord clamp C
- 22. Rod holder
- 23. Sensor holder
- 24. Cord clamp A
- 25. Duct VE packing

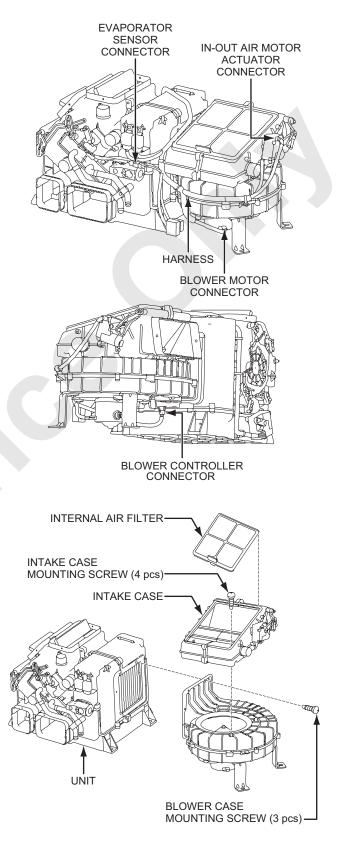
- 26. Duct DE packing 27. Duct FO packing 28. Pipe clamp 29. Plate 30. Lever (AM) 31. Lever (CM) 32. Lever (MO1) 33. Mode cam 34. Rod AC 35. Tapping screw 37. Screw 101. Upper blower case 102. Lower blower case 103. Tapping screw 104. Fan driver 105. Tapping screw
- 106. Unit bracket
- 107. Unit cooling hose
- 108. Blower motor (24V)
- 109. Tapping screw

- 110. Tapping screw 201. Intake case (right) 202. Intake case (left) 204. Damper (IN) assy 205. Actuator 206. Lever (MAL2) 207. Lever (IN) 208. Tapping screw 209. Internal air filter 401. Rear unit case 402. Front unit case 403. Damper AM assy 404. Damper CM assy 405. Damper VE assy 406. Damper FA assy 407. Damper DE assy 408. Damper FO assy 409. Tapping screw 410. Evaporator F packing
- 11

# 11.4 DISASSEMBLY AND ASSEMBLY OF THE UNIT

# 11.4.1 REMOVAL OF THE BLOWER UNIT

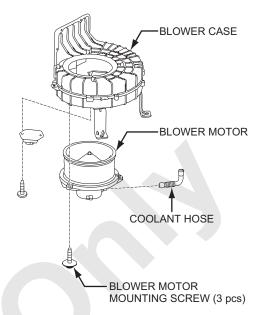
 Remove the various connectors attached to the in-out air motor actuator, blower motor, blower controller, evaporator sensor and harnesses attached to the blower case.



- Pull out the in air filter from the intake case. Remove four of the cross head screw (Phillips) T4 × 14 (T1) from the intake case and remove the intake duct.
- Remove four of the cross head screw (Phillips) T5 × 14 (T1) and the remove intake case.
- Remove three of the cross head screw (Phillips) T5 × 14 (T1) and separate the blower case and the air con. unit.

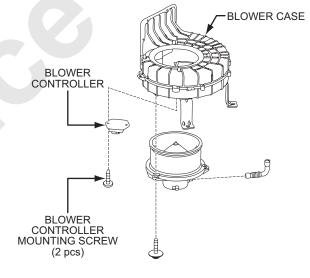
# 11.4.2 REPLACING THE BLOWER MOTOR

- 1. Remove the coolant hose coolant between the blower motor and the blower case.
- Remove three of the cross head screw (Phillips) N5 × 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.



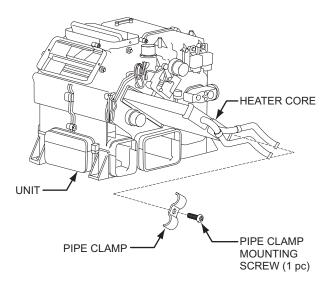
# 11.4.3 REPLACING THE BLOWER CONTROLLER

- Remove two of the cross head screw (Phillips) T4 × 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.



# 11.4.4 REMOVAL OF THE HEATER CORE

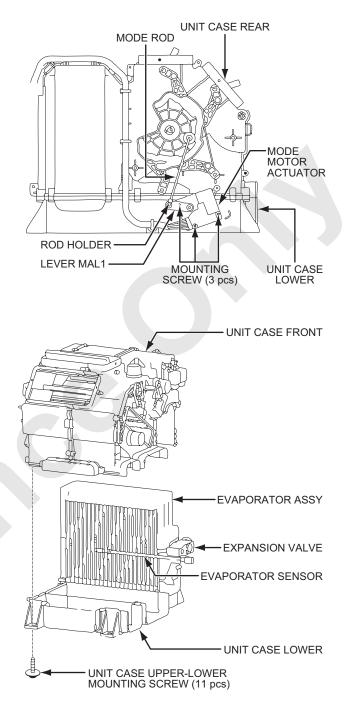
- 1. Drain out the cooling water.
- Remove one of the cross head screw (Phillips) N5 × 16 (T2) and pipe clamp which secure the heater core to the unit. Then pull out the heater core from the unit.
- 3. Installation is reverse way of the foregoing procedure.



## 11.4.5 REMOVAL OF THE AIR CON. UNIT CASE-FRONT, REAR AND LOWER

- 1. Remove the connectors for mode motor actuator and the evaporator sensor.
- 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 × 30 (T1) and remove the mode motor actuator installed on the unit case- lower and the unit case-rear.

- Remove eleven of the cross head screw (Phillips) N5 × 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.



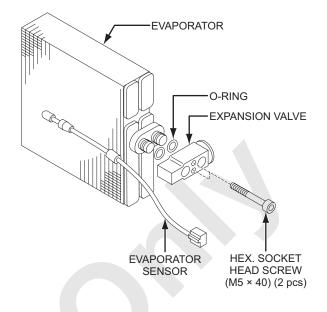
## 11.4.6 REPLACING THE EVAPORATOR AND EXPANSION VALVE

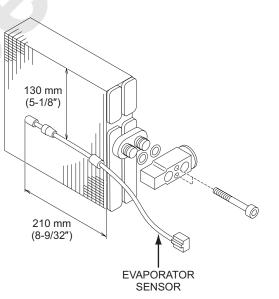
- 1. Pull out the evaporator assy from the caselower with the case insulation material and the expansion valve attached.
- 2. After the evaporator assy is removed, then pull out the evaporator sensor and sensor holder as one piece.
- Remove the HEX. socket head screw M5 × 40 (two) and remove the expansion valve from the evaporator with the hex. wrench (4 mm [0.16 in.]).
- Install the O-ring (NFO ring 5/8 and 1/2, one each) to the new evaporator. (Tightening torque 6.9 N⋅m [5.09 ft·lbs])
- \* Be careful not to make the O-ring jammed during the expansion valve installation.

# 11.4.7 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.





## 11.4.8 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)  $N4 \times 30$  (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 mix motor actuator

Remove the connector connected to the motor actuator.

Remove the AM rod which connect the motor actuator and the lever AM1 from the rod holder. Remove the three of the cross head screw (Phillips) N4  $\times$  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

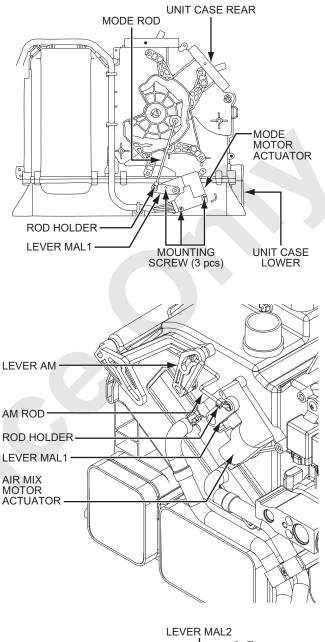
Remove the connector connected to the motor actuator.

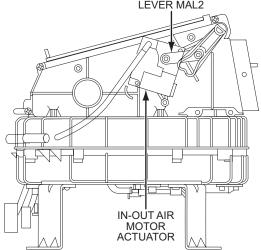
Remove three of the cross head screw (Phillips)  $N4 \times 28$  (T1) holding the motor actuator.

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.





# 11.5 FAULT DETECTION FROM THE CONTROL PANEL INDICATION

## 11.5.1 GENERAL

When there is any fault in each sensor input circuit of the controller or the motor actuator drive line, fault detection is indicated.

## 

Once the fault is detected, fault indication is not reset even the fault is recovers to normal condition. In case the fault recovers to normal, the fault indication can be reset by power off the base machine with engine key.

## 11.5.2 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 rotating angle does not reach the target, considered as LOCKED 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	

# 11.5.3 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	A/C mark blinking		

# 11.6 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.

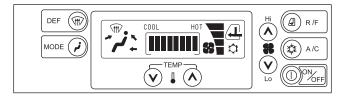
2. Control panel and control unit

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)



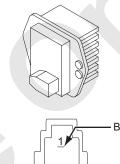
3. Fan driver (blower amplifier)

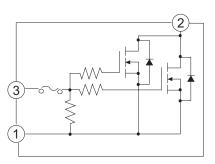
The fan driver receives the control signal from the control unit and control the fan motor speed.

#### Normal condition

		Terminal no.		Continuity	
	1	2	3	Continuity	
	$\oplus$		Θ	Yes (4.7 k Ω ± 5 %)	
Tester	Θ	$\oplus$		No	
	$\oplus$	Θ		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.

(1) 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.

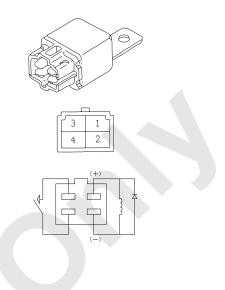
(2) Compressor relay

This relay turns ON-OFF by the compressor control of the control amplifier.

Inspection points of the relay

Identification	Check Method		
Relay			
Coil resistance	320 Ω		
Voltage <sup>*1</sup>	DC20 V to 30 V		
	between the terminal 3		
Inspection	to 4 under the following		
	condition.*2		

- \*1 Note : This relay coil has a polarity.
- \*2 Inspection : Check the continuity.
   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



#### 5. 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.)

#### 6. In-out air actuator

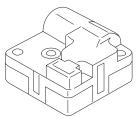
In-out air actuator is installed in the blower intake unit and opens or closes the in-out air damper through the linkage.

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.)



8000-1Published 11-10-17, Control #261-01

7. 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.)

8. Evaporator sensor

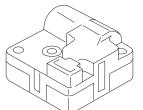
This sensor controls ON-OFF of the compressor by detecting the temperature of the bow out air of the evaporator to prevent it from freezing.

 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 multi-tester.

Resistance value between terminal to the sensor

When the sensor detect temp. is 0°C	7.2k Ω
When the sensor detect temp. is 25°C	2.2k Ω



9. 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.

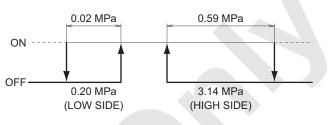
Cover the front face of the condenser with some board or such during this work.

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

# 11.7 RECHARGING OF THE COOLANT

# 11.7.1 CAUTION AT WORK

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.

## 

 Make sure to wear the safety goggles when charging.
 (If the refrigerent gets into our may source)

(If the refrigerant gets into eye may cause the loss of eyesight.)

- Extreme care to handle the liquid refrigerant due to it is extreme low temperature (-26 C°). (If they touch the skin, it may cause the frostbite.)
- 1. Storage and transport
- 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.

- (C) Do not store the bottle within the reach of the children.
- 2. 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.
- 3. Others
- Reuse of the recharge bottle is prohibited by law. NEVER reuse.
- (2) Do not put any foreign material into the air conditioner piping.
- (3) 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.

## 

Pay attention not to overcharge. Tighten all the pipe fittings with the specified torque.

11

# 11.7.2 WORK PROCEDURE

- Recharging work of the coolant into the air conditioner is divided into "Vacuuming work" and "Gas recharging work".
- (1) "Vacuuming work" is to remove 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 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.

VACUUMING WORK COOLANT RECHARGING WORK CHARGING CHECK CHECK COOLANT CHECK START STOP 30 minutes Leaving for 5 minutes or more LEAK VACUUM VACUUM TIGHT COOLANT -750 mmHg or less GAS I AIR -Gauge ind. abnormal CONNECTOR CHECK COOLANT GAS RECHARGING TO & REPAIR GAUGE PRESSURE 0.098 MPa (1 kg/cm<sup>2</sup>)

### 2. Work chart

#### 3. Tool

Name	Shape	Quantity	Use
Gauge manifold		1	
Charging hose		3	Red : High pressure side Blue : Low pressure side Yellow : Vacuum pump side
Quick joint	27.5 mm dia.	1	
Quick joint	23.5 mm (30/32")	1	Low pressure side
T-Joint	ODDD	1	Service bottle valve
Service bottle valve		2	For service bottle
Vacuum pump adapter	DD DD DD	1	For vacuum pump

### 11.7.3 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)

### 

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.

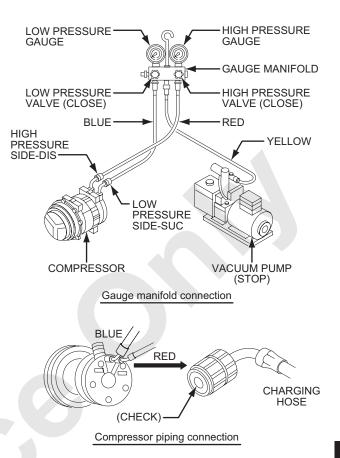
The "L" shaped end has a check valve.

If connected in reverse way, check valve of the compressor will not open.

(3) Connect the center valve of the gauge manifold and the vacuum pump with the charging hose.

#### Note

Some type of the gauge manifold does not have the open/close valve in their center.

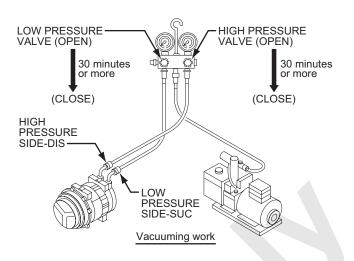


- 2. Vacuuming
- (1) Open the high pressure valve (HI) and low pressure valve (LO) of the gauge manifold.
- (2) Turn ON the switch of the vacuum pump and continue vacuuming work for more that 30 minutes.
- (3) When the vacuuming for the specified time is completed (Target figure of vacuum : -750 mgHg or lower), close the high pressure valve and the lower pressure valve.
- (4) Then turn off the switch of the vacuum pump.
- 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.

### 

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.)

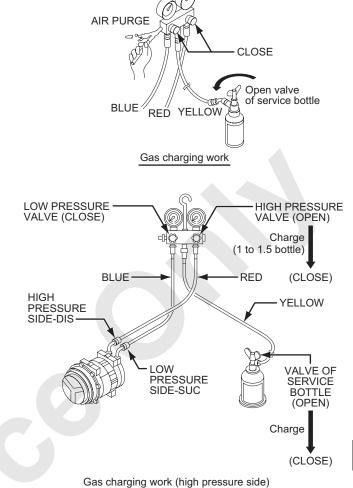
Then push the check valve in the service port of the lower pressure side on the gauge manifold with a screw driver or such to purge the air in the charging hose by the coolant pressure.

(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/

(Charge the coolant gas to 0.098 MPa [1 kgt/ cm<sup>2</sup>] in gauge reading.)

After charging close the high pressure valve in the gauge manifold and the service bottle valve.



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.

### 

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<sup>2</sup>] during charging.
- (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 sight glass disappear.

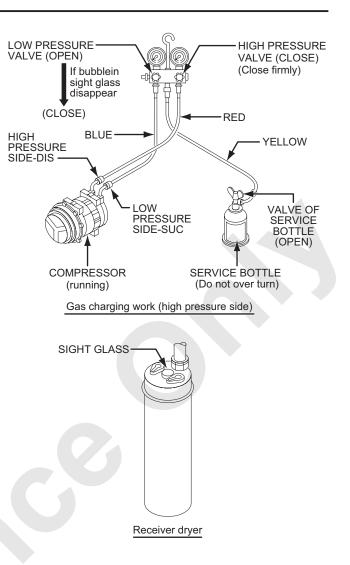
Full goo oborging amount	850 to 950 g
Full gas charging amount	(1.87 to 2.09 lbs)

(6) When the coolant charging is completed, close the low pressure valve of the manifold and the service bottle valve and stop the engine.

### 

- 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.)



#### 4. Guidepost of recharging coolant amount

Judge result	Coolant condition	Coolant change
In case of travel charge	After A/C turned on, bubbles appear a little, hereafter it becomes transparent, and shows milk-white.	$\begin{pmatrix} c_0 \\ c_$
In case of overcharge	After A/C turned on, no bubble appears.	$\bigcirc \rightarrow \bigcirc \rightarrow \bigcirc$
In case of insufficient charge	After A/C turned on, bubbles can be seen continuously.	$\left(\begin{smallmatrix} 0&0\\ 0&0\\ 0&0\\ 0&0\\ 0&0\\ 0&0\\ 0&0\\ 0&0$

Judgement from sight glass view of the receiver dryer

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.

### 

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.

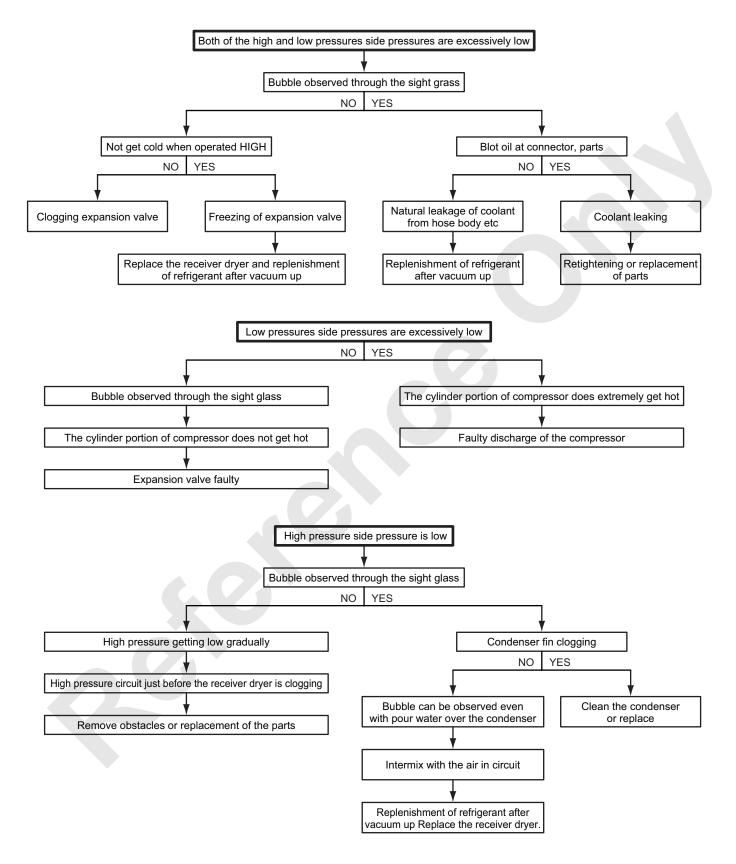
 Push the L shaped fitting of the lower pressure side charging hose (blue) to the service valve of the compressor to prevent coolant leaking and loosen the nut.

When the nut is removed, quickly remove the charging hose from the service valve.

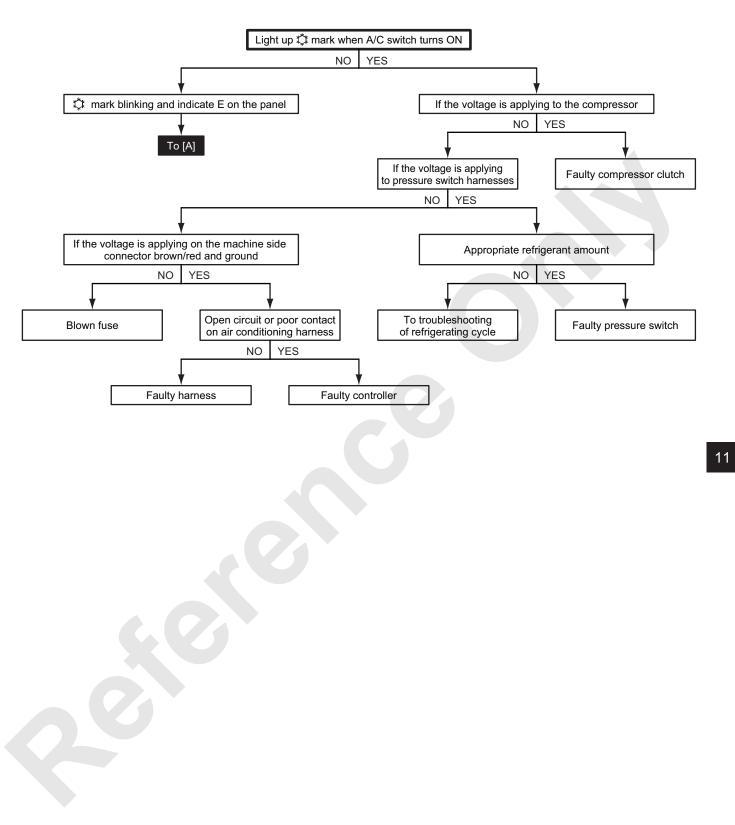
- (2) Keep the high pressure side until the high pressure gauge reading becomes lower than 0.98 MPa (10 kg/cm<sup>2</sup>).
- (3) Remove the high pressure side charging hose (red) in the same procedure as the low pressure side.

# 11.8 TROUBLESHOOTING

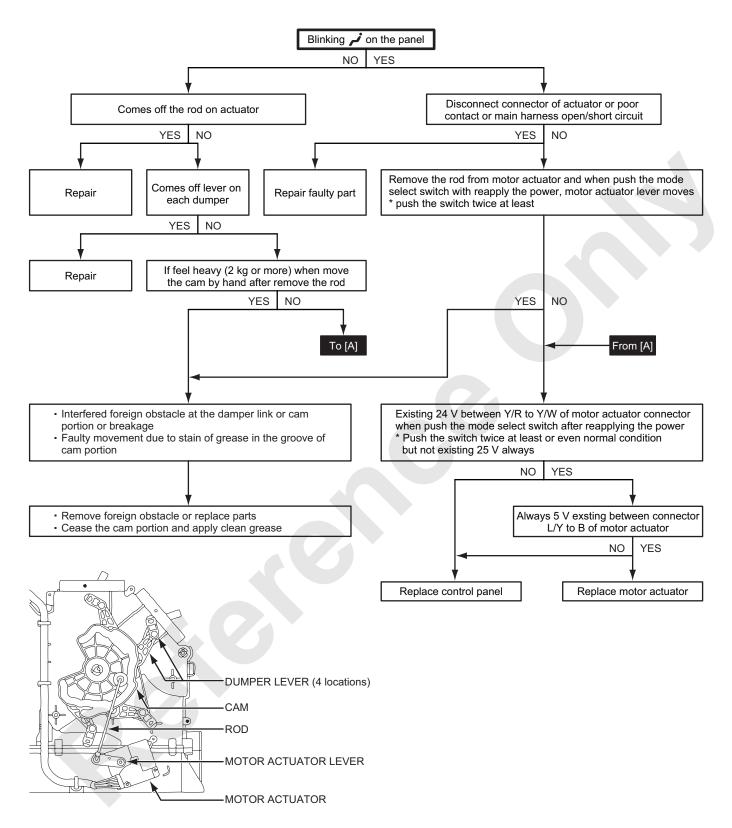
1. Trouble in cooling circuit



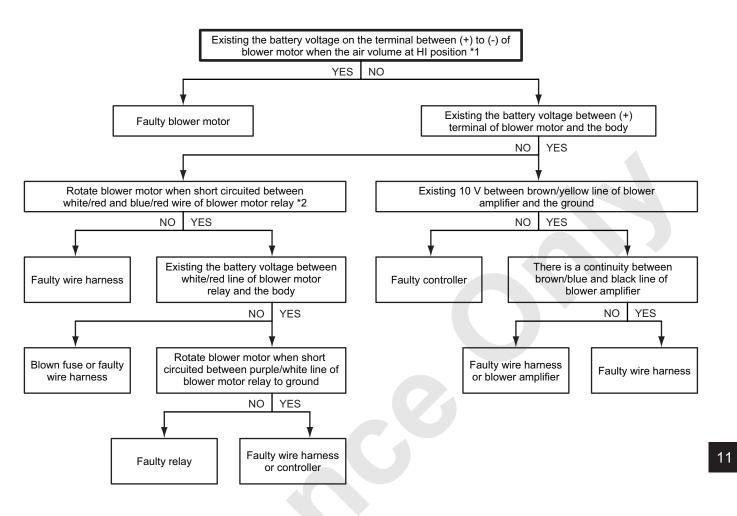
2. Magnet clutch does not rotated



#### 3. Mode does not change



4. Blower motor does not rotated



- \*1 Measure when the connectors are connected.
- \*2 When short circuit test is performed, the air conditioner, base machine key and lighting switches should be turned OFF for safety.

# 12. TRANSLIFTER SYSTEM

2.1 APPARATUS AND COMPONENTS LOCATION	NENTS LOCATION	
2.2 CONSTRUCTION AND FUNCTION	NCTION	
12.2.1 HYDRAULIC SCHEMATIC12-	C	
12.2.2 RAISING THE TRANSLIFTER	FTER	
12.2.3 LOWERING THE TRANSLIFTER	SLIFTER	
REMOTE CONTROL SWITCH BOX	СН ВОХ	

12

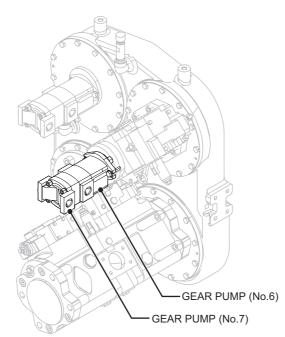
#### 12. **TRANSLIFTER SYSTEM**

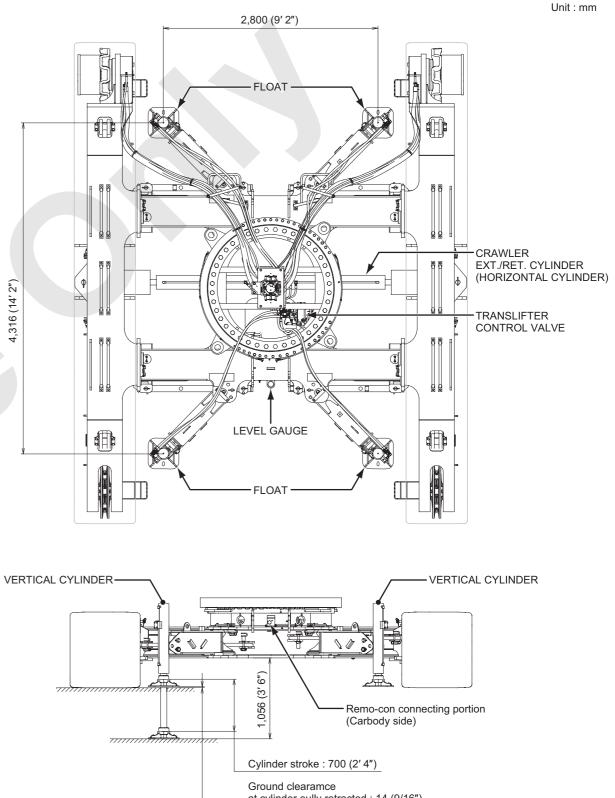
#### 12.1 **APPARATUS AND COMPONENTS LOCATION**

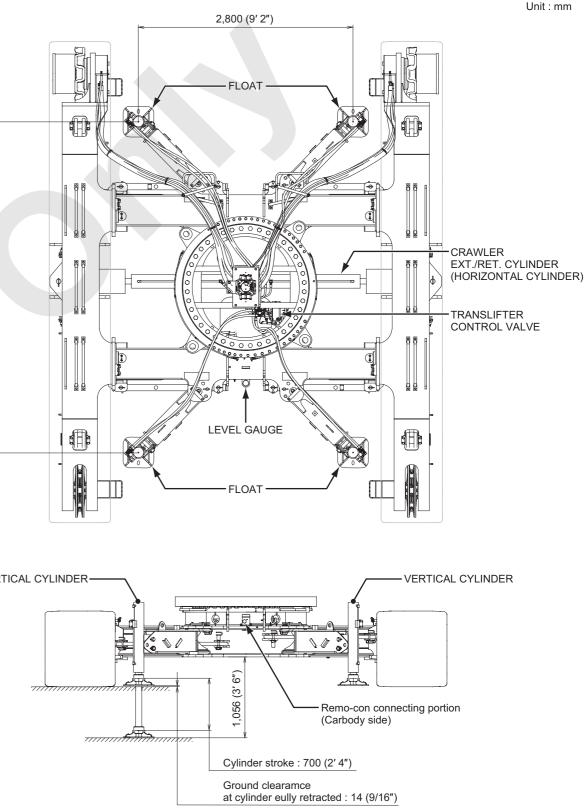
The translifter system consists of the vertical cylinder, crawler EXT./RET. cylinder (horizontal cylinder), control valve, remote control switch box.

The pressurized oil discharged from the No.7 pump which is mounted on 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.







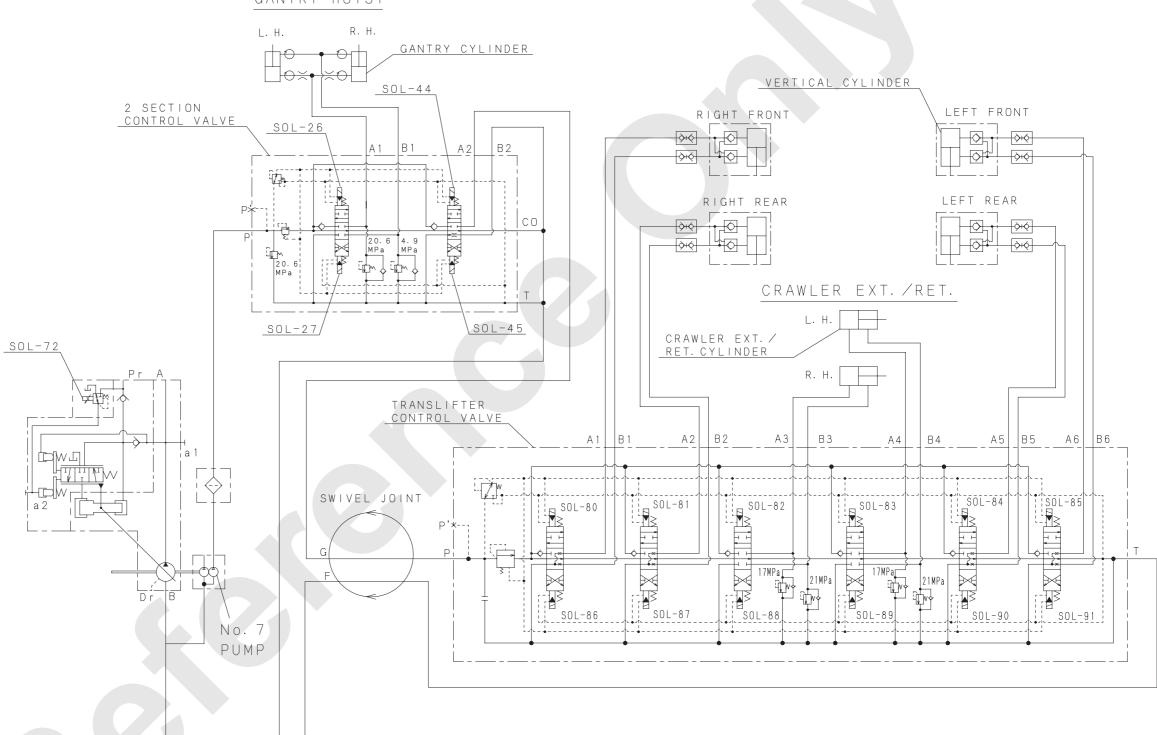
## 12.2 CONSTRUCTION AND FUNCTION

## 12.2.1 HYDRAULIC SCHEMATIC

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.



GANTRY HOIST

### 12.2.2 RAISING THE TRANSLIFTER

The pressurized oil discharged from the auxiliary unit No.7 pump is led into the hydraulic circuit select section through the gantry section of 2 section control valve.

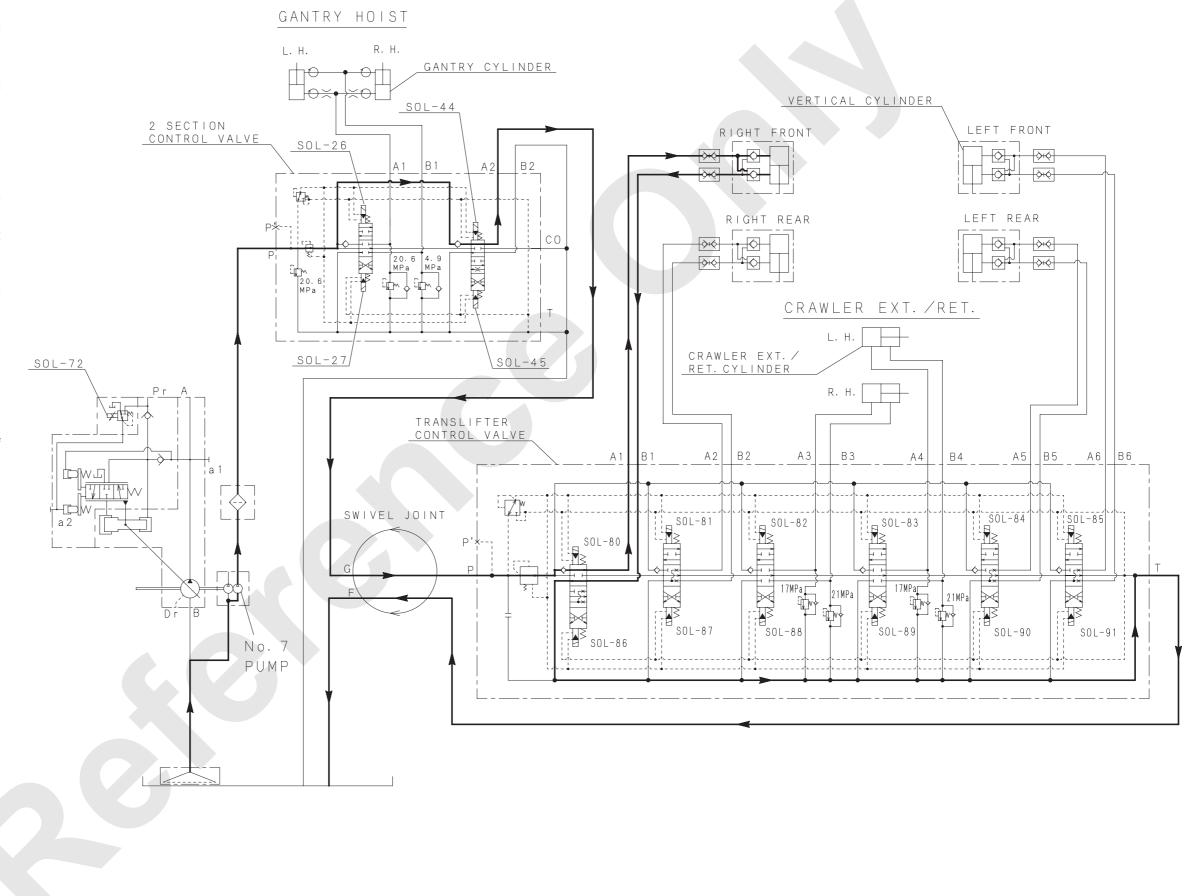
At this time, if the hydraulic circuit select switch is in "NEUTRAL (GANTRY)" position, the pressurized oil flows through the 2 section control valve, and returns to the tank without any load.

When the remote control switch is connected to the machine, 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.



### 12.2.3 LOWERING THE TRANSLIFTER

The pressurized oil discharged from the auxiliary unit No.7 pump is led into the gantry and hydraulic selector valve through the gantry section of the 2 section control valve.

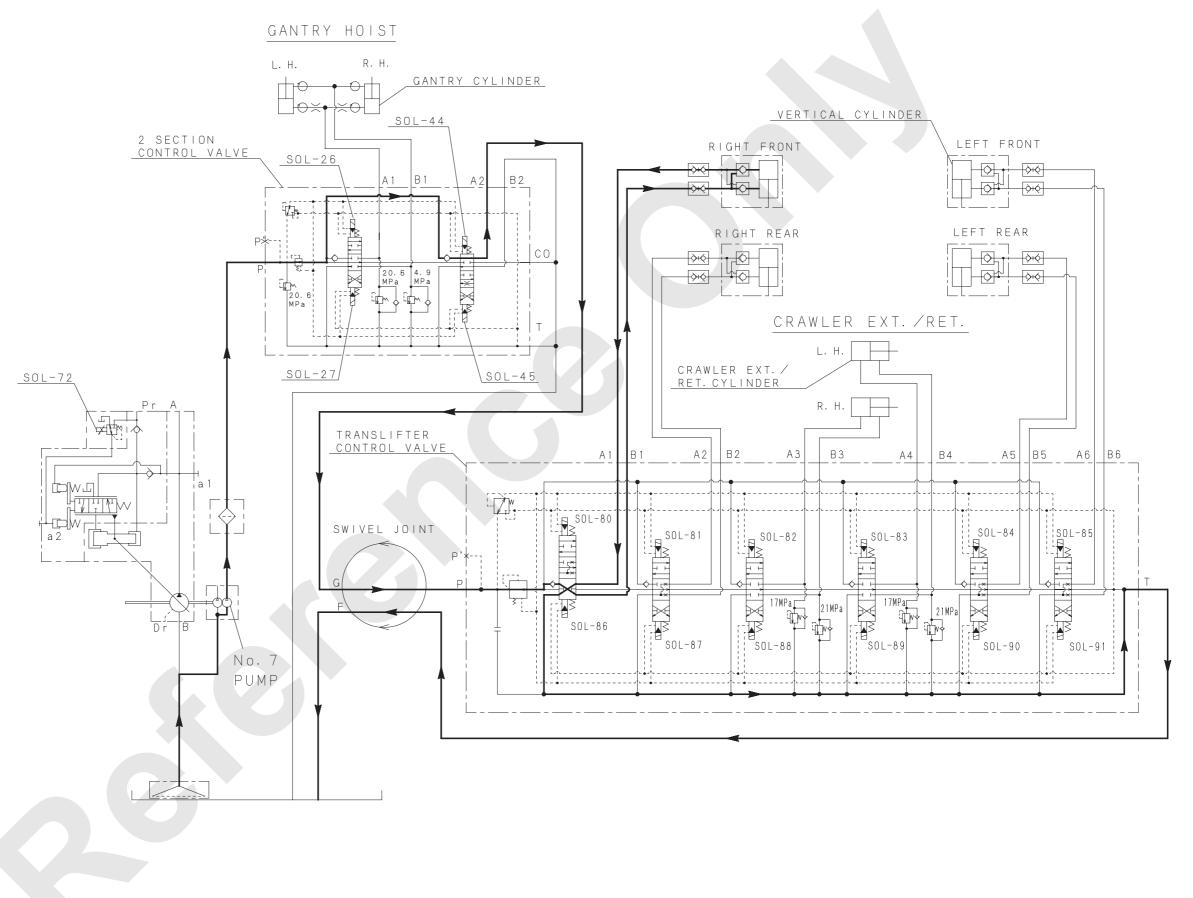
At this time, if the hydraulic circuit select switch is in "NEUTRAL (GANTRY)" position, the pressurized oil flows through the 2 section control valve, and returns to the tank without any load.

When the hydraulic circuit select switch is selected to "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.



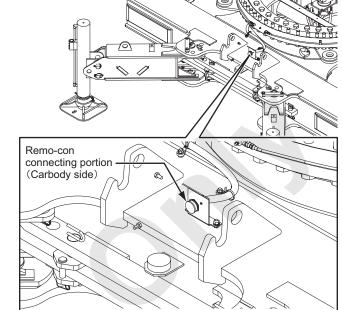
## 12.3 REMOTE CONTROL SWITCH BOX

This machine provides the remote control switch box (here after called "remo-con") for operate the machine from outside at the assembling/disassembling.

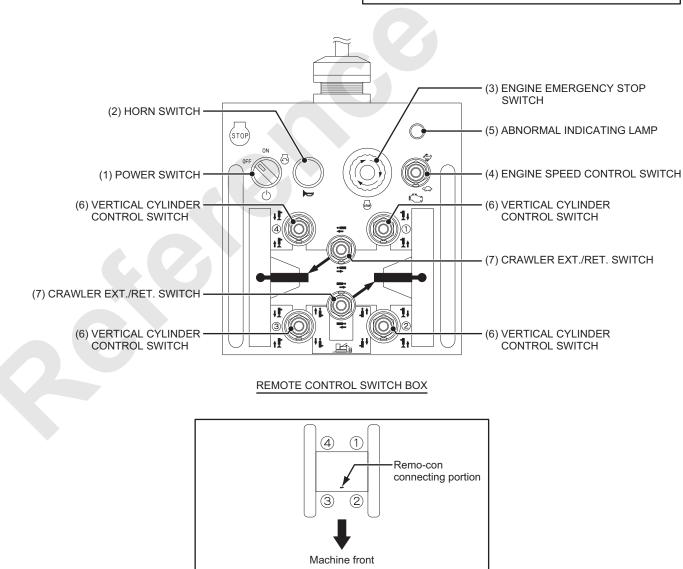
### Note

When a power switch of remote control switch box is ON position, the engine can't be started with the engine key in the operator's cab.

When starting the engine from key switch in the operator's cab, ensure to turn the power switch of remote control box OFF position.



1. Connection with the carbody side



#### (1) POWER SWITCH

	Power off. / Engine stop.
OFF	Turning to this position stops the engine.
ON Power is supplied to crane portion.	
	Engine starts.
	When released, the switch automatically
	return to ON position.

#### Note

The engine can't start from the operator's cab if in case this power switch is on position.

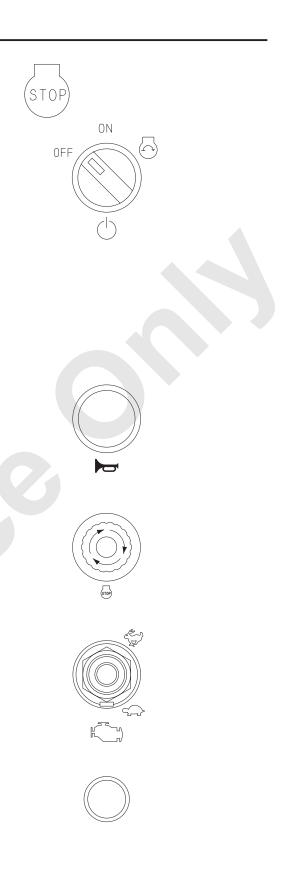
- (2) HORN SWITCH Press this switch to sound the horn.
- (3) ENGINE EMERGENCY STOP SWITCH
   Press this switch to stop the engine in emergency.
   The switch stays at depressed position.
   To reset, turn the switch to right or pull.
- \* Use only to stop the engine at emergency case.
- (4) ENGINE SPEED CONTROL SWITCH

Increase the engine speed.
Decrease the engine speed.

(5) ABNORMAL INDICATING LAMP

This lamp turns ON when the engine abnormality occurs.

When this lamp is ON, check the detail of abnormality by the cab monitor and take appropriate action.



(6) VERTICAL CYLINDER CONTROL SWITCH This switch is used to control the translifter.

Vertical cylinder extends.	
tt.1t	Vertical cylinder retracts.

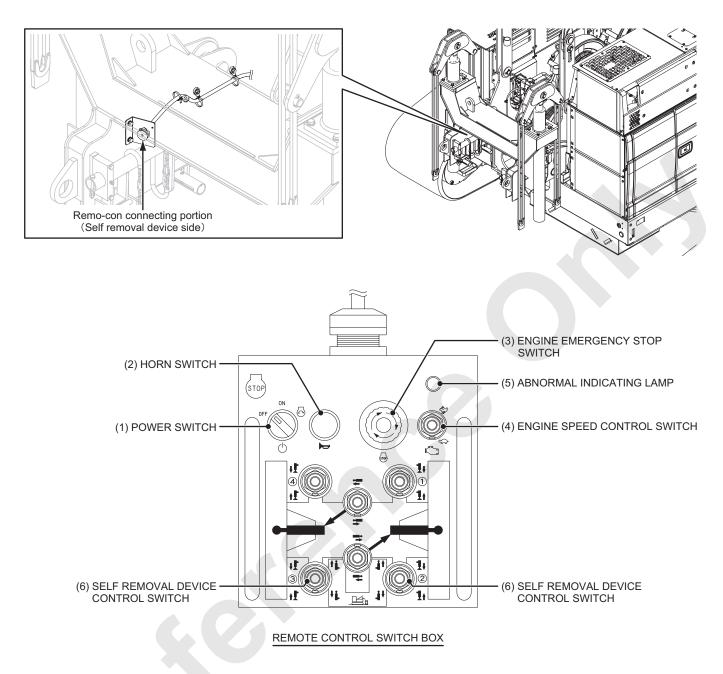
(7) CRAWLER EXTEND/RETRACT SWITCH This switch is used to control the crawler extend/retract cylinder.

<b>;</b> , <b>;</b> , <b>;</b>	Crawler extend/retract cylinder extends.
•	Crawler extend/retract cylinder retracts.





2. Connection with the self removal device side



Switches (1) to (5) are same functions when connect the switch box with carbody.

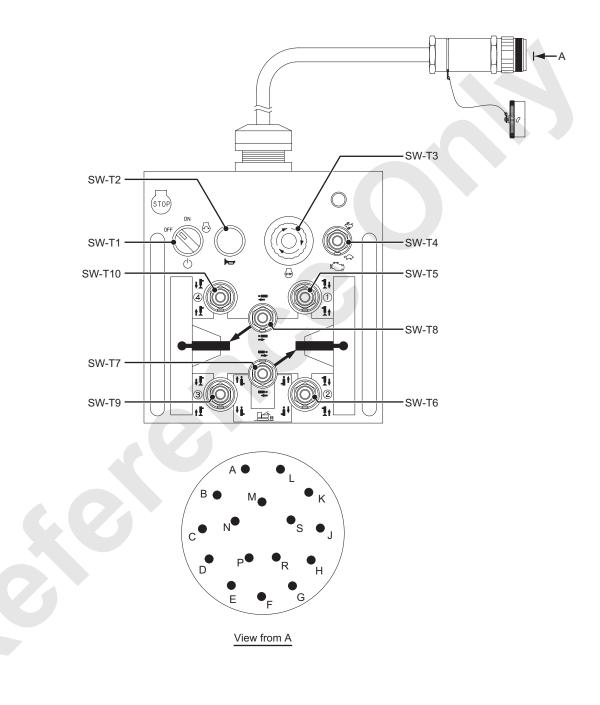
(6) SELF REMOVAL DEVICE CONTROL SWITCH This switch is used to control self-removal cylinders.

	Self-removal cylinder extends.
tt.1t	Self-removal cylinder retracts.



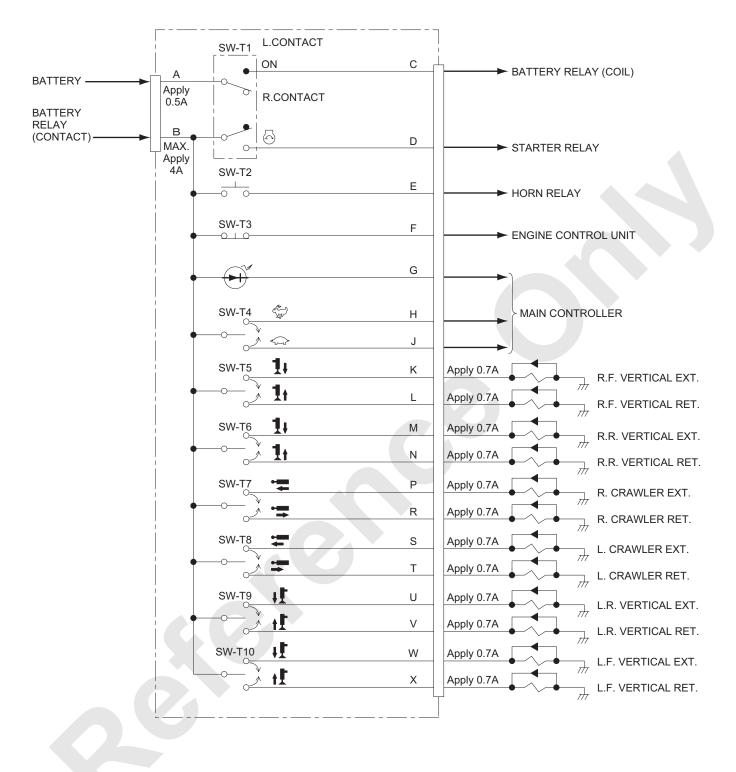
#### 3. Construction

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.



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4. Schematic



# 13. TROUBLESHOOTING

13.1	ENGINE	13-1
	WINCH SYSTEM	
13.3	SWING SYSTEM	
13.4	TRAVELING SYSTEM	

# 13. TROUBLESHOOTING

Grasp the appropriate trouble contents and make the most useful action from this troubleshooting table.

## 13.1 ENGINE

#### TROUBLESHOOTING OF ENGINE

Symptom	Possible cause	Check points	Remedy
	Battery is dead.	Check the battery electrolyte for level and specific gravity.	Charge or replace the battery.
		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.
	Starter is not rotating.	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).
Engine does not	Fuel is not supplied.	Check presence of fuel and flow of fuel in	Supply fuel or replenish fuel in the priming pump.
start.		piping.	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	Check contents of the error.	Take action after locating the cause in accordance with the Engine Maintenance Manual.
	(P code) is output.		Contact Manitowoc authorized distributor 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.	The aux. accelerator switch toward "ON" side.

#### TROUBLESHOOTING OF ENGINE

Symptom	Possible cause	Check points	Remedy
	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 speed does not increase.	Insufficient of DEF/AdBlue®	Check residual amount of DEF/AdBlue <sup>®</sup> .	Replenishment of DEF/AdBlue <sup>®</sup> .
not increase.	Engine error signal	Check contents of the error.	Take action after locating the cause in accordance with the Engine Maintenance Manual.
	(P code) is output.		Contact Manitowoc authorized distributor as needed.
		Check presence of fuel and flow of fuel in	Supply fuel or replenish fuel in the priming pump.
	Fuel is not supplied.	piping.	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)
Engine revolutions	Air intake is not performed.	Check that air cleaner element is not clogged.	Clean or replace the air cleaner element.
Engine revolutions are uneven.		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.
			Contact Manitowoc authorized distributor as needed.
	Cooling water is not enough.	Check the cooling water level.	Replenish cooling water.
	Cooling water is not	Check that the thermostat is not stuck.	Replace the thermostat.
	supplied.	Check water piping for clogging.	Eliminate the clogging.
		Check that the fan is not slipping.	Adjust the V belt tension.
Overheating	Cooling air volume is not enough.	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	Check contents of the error.	Take action after locating the cause in accordance with the Engine Maintenance Manual.
	(P code) is output.		Contact Manitowoc authorized distributor as needed.

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## 13.2 WINCH SYSTEM

TROUBLESHOOTING OF W	INCH SYSTEM
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Symptom	Possible cause	Check points	Remedy
	Hydraulic oil is not	Check the hydraulic oil tank oil level.	Replenish hydraulic oil.
	enough.	Check the suction strainer for clogging.	Wash or replace the strainer.
	Clutch is slipping.	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 is normal.	Replace the remote control valve.
		Check the primary pressure.	Adjust the primary pressure or replace the valve.
	Malfunctioning of remote control circuit relief valve	Check the function lock limit switch for operation.	Adjust operation of the limit switch or replace the limit switch.
		Check the function lock solenoid valve for operation.	Replace the solenoid valve.
	Malfunctioning of main pump	Check whether traveling system is functioning.	Replace the main pump.
	Malfunctioning of	Check the main valve relief pressure.	Adjust the relief valve pressure or replace the relief valve.
	main valve	Check the pilot pressure on the main valve.	Check and replace the remote contro valve.
h M h u A ir e		Check the counter balance valve spool movement.	Replace the valve.
		Check the counter balance valve poppet for deposition of contaminant and flaw on seat surface.	
	Malfunctioning of hoisting motor	<ol> <li>Check the motor drain oil amount.</li> <li>Conditions for motor drain measurement</li> <li>Engine rpm : High idle</li> <li>Hyd. oil temp. : 50°C (VG46)</li> <li>Trimmer position: Max. High (For motor swash angle to be minimum)</li> <li>Lifting load: Empty hook only</li> <li>Operate either front or rear drum lever with full stroke.</li> <li>Drain amount : 10 L/min or less.</li> </ol>	Replace the motor.
	Malfunctioning of hoisting reduction unit.	Check for unusual noise, temperature and vibration.	Replace the reduction gears/unit.
	Automatic stop, interlock, stop electrically and others.	Check the contents of the stopping condition.	Release the functions (elimination of cause of auto stop and release o interlock)

Symptom	Possible cause	Check points	Remedy
	Hydraulic oil is not	Check the hydraulic oil tank oil level.	Replenish hydraulic oil.
	enough.	Check the suction strainer for clogging.	Wash or replace the strainer.
	Clutch is slipping.	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 is normal.	Replace the remote control valve.
Intended hoisting and lowering speeds unable to obtain.	Malfunctioning of remote control circuit relief valve	Check the primary pressure.	Adjust the primary pressure or replace the valve.
	Malfunctioning of main pump	Check whether traveling system is functioning.	Replace the main pump.
	Malfunctioning of	Check the main valve relief pressure.	Adjust the relief valve pressure or replace the relief valve.
	main valve	Check the pilot pressure on the main valve.	Check and replace the remote controvalve.
		Check the counter balance valve spool movement.	Replace the valve.
	Malfunctioning of hoisting motor	Check the counter balance valve poppet for deposition of contaminant and flaw on seat surface.	
		Check the motor drain oil amount.	Replace the motor.
		Check motor tilt control proportional solenoid valve.	Replace proportional solenoid valve.
	Malfunctioning of hoisting reduction unit.	Check for unusual noise, temperature and vibration.	Replace the reduction gears/unit.
		Check the voltage of the engine rotation grip or rotating speed sensor.	Adjust the rotation grip L/H level o replace the rotation grip.
	Malfunctioning of engine sensing	Check the voltage of the main pump proportional solenoid valve for pressure reducing.	Adjust or replace the proportiona solenoid pressure reducing valve.
	Speed trimmer position is minimized.	Check the speed trimmer position.	Maximize the speed trimmer.

#### TROUBLESHOOTING OF WINCH SYSTEM

#### TROUBLESHOOTING OF WINCH SYSTEM

Symptom	Possible cause	Check points	Remedy
	Clutch is slipping.	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 is normal.	Replace the remote control valve.
	Malfunctioning of remote control circuit relief valve	Check whether the primary pressure generation is normal.	Adjust the primary pressure or replace the valve.
Hoisting and	Malfunctioning of main pump	Check whether traveling system is functioning.	Replace the main pump.
lowering speeds unable to control.	ering speeds	Check the main valve relief pressure.	Adjust the relief valve pressure or replace the relief valve.
		Check the pilot pressure on the main valve.	Check and replace the remote control valve.
		Check the counter balance valve spool movement.	Replace the valve.
		Check the motor drain oil amount.	Replace the motor.
Malfunctioning of hoisting reduction unit.	hoisting reduction	Check for unusual noise, temperature and vibration.	Replace the reduction gears/unit.
	Clutch is slipping.	Check the positive and negative pressures.	Replace the positive and negative pressure selector valve.
Inching operation	Malfunctioning of remote control valve	Check whether the secondary pressure generation is normal.	Replace the remote control valve.
unable to do.	Malfunctioning of remote control circuit relief valve	Check whether the primary pressure generation is normal.	Adjust the primary pressure or replace the valve.
	Slow reaction of negative brake valve	Check the negative brake release pressure.	Check the negative brake release valve and the slow return valve.
	K	Check the counter balance valve spool movement.	Replace the valve.
Suspended load unable to hold.	Malfunctioning of hoisting motor	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 amount.	Replace the motor.

#### Symptom Possible cause Check points Remedy [Operations on negative brake side] Check the positive and negative Replace the positive and negative Clutch is slipping. pressures. pressure selector valve. Negative brake is Check the negative brake release Check the negative brake release valve released. pressure. and the slow return valve. Suspended load Malfunctioning of Check the secondary pressure. Replace the remote control valve. unable to hold. remote control valve [Operations on positive brake side] Check the brake pedal linkage for Adjust or repair the linkage. loosening and interference. Clutch is slipping. Check the positive and negative Replace the positive and negative pressure selector valve. pressures. Check the positive and negative Replace the positive and negative pressures. pressure selector valve. Check the brake pedal linkage for Adjust or repair the linkage. loosening and interference. Clutch cannot be released. Replace the negative and positive brake Check the specified brake force is output. units. Check the positive brake control valve Replace the valve. spool movement. Check whether the primary pressure Adjust the primary pressure or replace generation is normal. the valve. Malfunctioning Check the function lock limit switch Adjust the movement of the limit switch of remote control works. or replace the limit switch. circuit relief valve Free fall function is Check the function lock solenoid valve Replace the solenoid valve. unable to do. function. Check the shaft, gear and bearing for Malfunctioning of unusual noise and seizure. Check for unusual noise, temperature hoisting reduction and vibration. Repair the shaft and bearing or replace unit. parts. Check the fuse (F-38) for blowing as well Replace the fuse (F-38) or repair the as wiring. wiring. Check the free fall selector switch Replace the switch or repair the wiring. function. Defective electrical system Check the relay for switching and the Replace the relay or repair the wiring. contact for burn mark. Check the free fall selector solenoid Replace the solenoid valve or repair the valve for function. wiring.

#### TROUBLESHOOTING OF WINCH SYSTEM

#### TROUBLESHOOTING OF WINCH SYSTEM

Symptom	Possible cause	Check points	Remedy
	Hydraulic oil is not	Check the hydraulic oil tank oil level.	Replenish hydraulic oil.
	enough.	Check the suction strainer for clogging.	Wash or replace the strainer.
		Check the counter balance valve spool movement.	Replace the valve.
	Malfunctioning of hoisting motor	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 amount.	Replace the motor.
	Malfunctioning of remote control valve	Check whether the secondary pressure generation is normal.	Replace the spool or adjust the valve.
		Check the primary pressure.	Adjust the primary pressure or replace the valve.
	Malfunctioning of remote control circuit relief valve	Check the function lock limit switch works.	Adjust movement of the limit switch or replace the limit switch.
		Check the function lock solenoid valve function.	Replace the solenoid valve.
Hunting	Malfunctioning of	Check the main valve relief pressure.	Adjust the relief valve pressure or replace the relief valve.
Tioning	main valve	Check the pilot pressure on the main valve.	Check the remote control valve.
		Check the counter balance valve spool movement.	Replace the valve.
	Malfunctioning of hoisting motor	Check the counter balance valve poppet for deposition of contaminant and flaw on seat surface.	
			Check the piston movement and replace the part.
		Check the motor drain oil amount.	Replace the motor.
	Malfunctioning of hoisting reduction unit.	Check for unusual noise, temperature and vibration.	Replace the reduction gears/unit.
	Malfunctioning of	Check the voltage of the engine rotation grip or rotating speed sensor	Adjust the rotation grip L/H level or replace the rotation grip.
	Malfunctioning of engine sensing	Check the voltage of the main pump proportional solenoid pressure reducing valve.	Adjust or replace the proportional solenoid pressure reducing valve.

## 13.3 SWING SYSTEM

TROUBLESHOOTING OF SWING SYSTEM

Symptom	Possible cause	Check points	Remedy
	Hydraulic oil is not	Check the hydraulic oil tank oil level.	Replenish hydraulic oil.
	enough.	Check the suction strainer for clogging.	Wash or replace the strainer.
		Check whether the swing brake release pressure is normal or not.	Repair the swing brake valve or replace the valve.
	Defective swing brake	Check whether the pressure switch function 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 disk or replace the disk.
	Malfunctioning of remote control valve	Check whether the secondary pressure generation is normal.	Replace the spool or replace the valve.
	Malfunctioning of remote control circuit relief valve	Check the primary pressure.	Adjust the primary pressure or replace the valve.
		Check the function lock limit switch works.	Adjust movement of the limit switch or replace the limit switch.
Swing is unable to		Check the function lock solenoid valve function.	Replace the solenoid valve.
do.	Defective swing	Check the main valve relief pressure.	Adjust the relief valve pressure or replace the relief valve.
Specified swing speed unable to	control valve	Check the valve spool movement.	Lap or replace the spool.
obtain.	Malfunctioning of	Check the piston for sticking or get out of place.	Check the piston movement and replace the part.
Lack of swing force.	swing motor	Check the motor drain oil amount.	Replace the motor.
		Check for unusual noise, temperature	Check the shaft and bearing for unusual noise and seizure.
	Malfunctioning of swing reduction	Ifunctioning of and vibration.	Repair the shaft, gear and bearing or replace parts.
	unit.	Check the gear oil level in the reduction gears.	Replenish gear oil or replace parts.
	Malfunctioning of swing bearing	Check for unusual noise, temperature and vibration.	Check the bolt for loosening, the bearing for flaking, wearing and seizure.
swing bearing			Retighten the bolt, replace the ball and replace the bearing.
	Defective electrical system	Check the parking brake and the swing mode selector switch function.	Replace the switch or repair the wiring.
		Check the relay for switching and the point for burning mark.	Replace the relay or repair the wiring.
		Check the swing mode selector solenoid valve works.	Replace the solenoid valve or repair the wiring.

#### TROUBLESHOOTING OF SWING SYSTEM

Symptom	Possible cause	Check points	Remedy
	Malfunctioning of swing bearing	Check for unusual noise, temperature	Check the bolt for loosening, the ball for problem and bearing for seizure.
		and vibration.	Retighten the bolt, check the bearing for flaking, wearing and if damaged replace the bearing.
		Check the swing pinion for unusual noise and vibration.	Check the pinion for tooth contac condition, seizure and chipping.
			Apply lubrication, replace the pinion.
	Check whether the swing brake release pressure is normal or not.	Repair the swing brake valve or replace the valve.	
	Defective swing brake	Check whether the pressure switch function is normal or not.	Repair the pressure switch wiring o replace the switch.
		Check the brake disk for unusual noise and high temperature.	Check the brake disk or replace the disk
Shock is observed at stating/stopping of swing motion.		Check the primary pressure.	Adjust the primary pressure or replac the valve.
	Malfunctioning of remote control circuit relief valve	Check the function lock limit switch works.	Adjust movement of the limit switch or replace the limit switch.
		Check the function lock solenoid valve function.	Replace the solenoid valve.
Swing motion is not smooth.	Defective swing control valve	Check the main valve relief pressure.	Adjust the relief valve pressure or replac the relief valve.
	control valve	Check the valve spool movement.	Lapping or replace the spool.
	Malfunctioning of	Check the piston for sticking or get out of place.	Check the piston movement and replac the part.
	swing motor	Check the motor drain oil amount.	Replace the motor.
		Check for unusual noise, temperature	Check the shaft, gear and bearing for unusual noise and seizure.
	Malfunctioning of swing reduction	and vibration.	Repair the shaft and bearing or replac parts.
	unit.	Check the gear oil level in the reduction unit.	Replenish gear oil or replace parts.
		Check the parking brake and the swing mode selector switch for functioning.	Replace the switch or repair the wiring.
	Defective electrical system	Check the relay for switching and the contact points for burning mark.	Replace the relay or repair the wiring.
		Check the swing mode selector solenoid valve function.	Replace the solenoid valve or repair th wiring.
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Symptom	Possible cause	Check points	Remedy
		Check whether the swing brake release pressure is normal or not.	Repair the swing brake valve or replace the valve.
	Defective swing brake	Check whether the pressure switch works normal or not.	Repair the pressure switch wiring or replace the switch.
Swing brake		Check the brake disk for unusual noise and high temperature.	Check the brake disk or replace the disk.
ineffective.		Check the parking brake and the swing mode selector switch function.	Replace the switch or repair the wiring.
Defective electrical system	Check the relay for switching and the contact points for burning mark.	Replace the relay or repair the wiring.	
		Check the swing mode selector solenoid valve function.	Replace the solenoid valve or repair the wiring.

#### TROUBLESHOOTING OF SWING SYSTEM

## 13.4 TRAVELING SYSTEM

Check the hydraulic oil tank oil level. Check the suction strainer for clogging. Check whether the secondary pressure generation is normal. Adjust the secondary pressure detection switch. Check the primary pressure. Check the function lock limit switch works. Check the function lock solenoid valve function.	Replenish hydraulic oil.         Wash or replace the strainer.         Replace the valve.         Replace the pressure switch.         Adjust the primary pressure or replace the valve.         Adjust movement of the limit switch or replace the limit switch.
Check whether the secondary pressure generation is normal. e Adjust the secondary pressure detection switch. Check the primary pressure. Check the function lock limit switch works. Check the function lock solenoid valve	Replace the valve. Replace the pressure switch. Adjust the primary pressure or replace the valve. Adjust movement of the limit switch o
generation is normal.         e         Adjust the secondary pressure detection switch.         Check the primary pressure.         Check the function lock limit switch works.         Check the function lock solenoid value	Replace the pressure switch. Adjust the primary pressure or replace the valve. Adjust movement of the limit switch o
Switch.         Check the primary pressure.         Check the function lock limit switch works.         Check the function lock solenoid value	Adjust the primary pressure or replace the valve. Adjust movement of the limit switch o
Check the function lock limit switch works. Check the function lock solenoid valve	the valve. Adjust movement of the limit switch o
works. Check the function lock solenoid valve	-
Turicuon.	Replace the solenoid valve.
Check the main valve relief pressure.	Adjust the relief valve pressure or replace the relief
Check the piston for sticking or get out of place.	Check the piston movement and replace the part.
Check the motor drain oil amount.	Replace the motor.
Check for unusual noise, temperature and vibration.	Check the shaft, gear and bearing for unusual noise and seizure.
	Repair the shaft and bearing or replace parts.
Check the gear oil level in the reduction unit.	Replenish gear oil or replace parts.
1	Check the piston for sticking or get out of place. Check the motor drain oil amount. Check for unusual noise, temperature and vibration. Nit Check the gear oil level in the reduction

Symptom	Possible cause	Check points	Remedy
	Poor engagement of shoe with tumbler	Check engagement of the shoe with the tumbler and shoe overriding the tumbler.	Adjust tension of the shoe, repair the shoe or replace parts.
	Defective travel	Check whether the travel brake release pressure is normal or not.	Repair the travel brake valve or replace the valve.
		Check whether the pressure switch function is normal or not.	Repair the pressure switch wiring or replace the switch.
	brake	Check the brake disk for unusual noise and high temperature.	Check the brake disk or replace the disk.
		Check the brake valve.	Replace the brake valve.
Malfunctioning of remote control circuit relief valve		Check the primary pressure.	Adjust the primary pressure or replace the valve.
	Check the function lock limit switch works.	Adjust movement of the limit switch or replace the limit switch.	
		Check the function lock solenoid valve function.	Replace the solenoid valve.
Shock is observed at starting/stopping	Defective travel	Check the main valve relief pressure.	Adjust the relief valve pressure or replace the relief valve.
of traveling motion.	control valve	Check the valve spool movement.	Lapping or replace the spool.
Traveling motion is not smooth.	Malfunctioning of	Check the piston for sticking or get out of place.	Check the piston movement and replace the part.
	travel motor	Check the motor drain oil amount.	Replace the motor.
		Check for unusual noise, temperature	Check the shaft, gear and bearing for unusual noise and seizure.
	Malfunctioning of travel reduction unit	and vibration.	Repair the shaft and bearing or replace parts.
Defective		Check the gear oil level in the reduction unit.	Replenish gear oil or replace parts.
	6.0	Check the fuse (F-15) for blowing as well as wiring.	Replace the fuse (F-15) or repair the wiring.
	Defective electrical	Check the travel brake and low and high speed selector switch function.	Replace the switch or repair the wiring.
	system	Check the relay for switching and the contact points for burning mark.	Replace the relay or repair the wiring.
	Check the travel brake and low and high speed selector solenoid valve function.	Replace the solenoid valve or repair the wiring.	

#### TROUBLESHOOTING OF TRAVELING SYSTEM

Symptom	Possible cause	Check points	Remedy
Defective travel		Check whether the travel brake release pressure is normal or not.	Repair the travel brake valve or replace the valve.
	Defective travel	Check whether the pressure switch operation is normal or not.	Repair the pressure switch wiring or replace the switch.
	DIAKE	Check the brake disk for unusual noise and high temperature.	Check the brake disk or replace the disk.
Travel brake ineffective.		Check the brake valve.	Replace the brake valve.
		Check the travel brake and low and high speed selector switch works.	Replace the switch or repair the wiring.
	Defective electrical system	Check the relay for switching and the contact points for burning mark.	Replace the relay or repair the wiring.
		Check the travel brake and low and high speed selector solenoid valve function.	Replace the solenoid valve or repair the wiring.

#### TROUBLESHOOTING OF TRAVELING SYSTEM

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