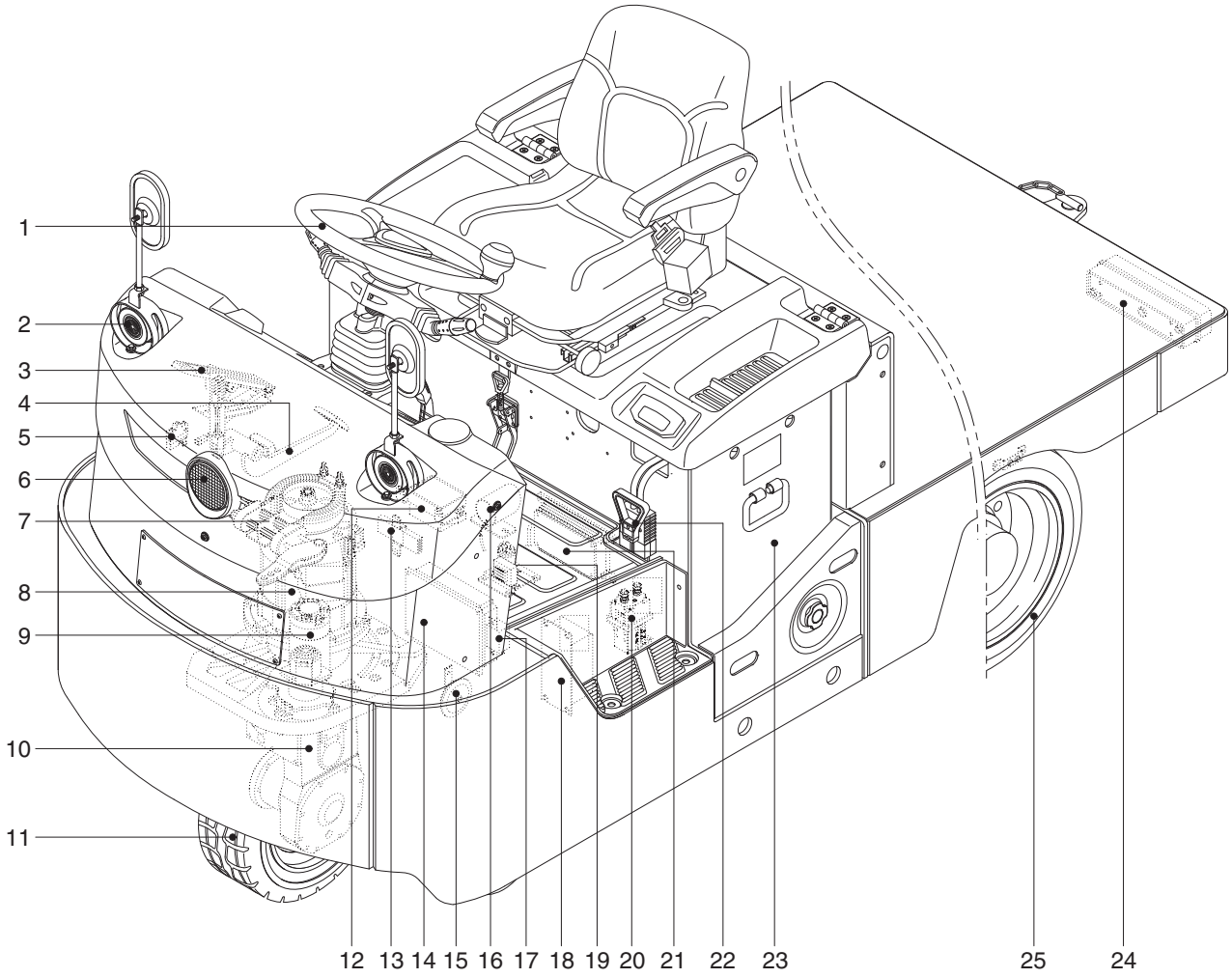
6. MAINTENANCE AND INSPECTION

1. MAJOR COMPONENT LOCATIONS

Use the illustration below to locate components included in the PM procedures.

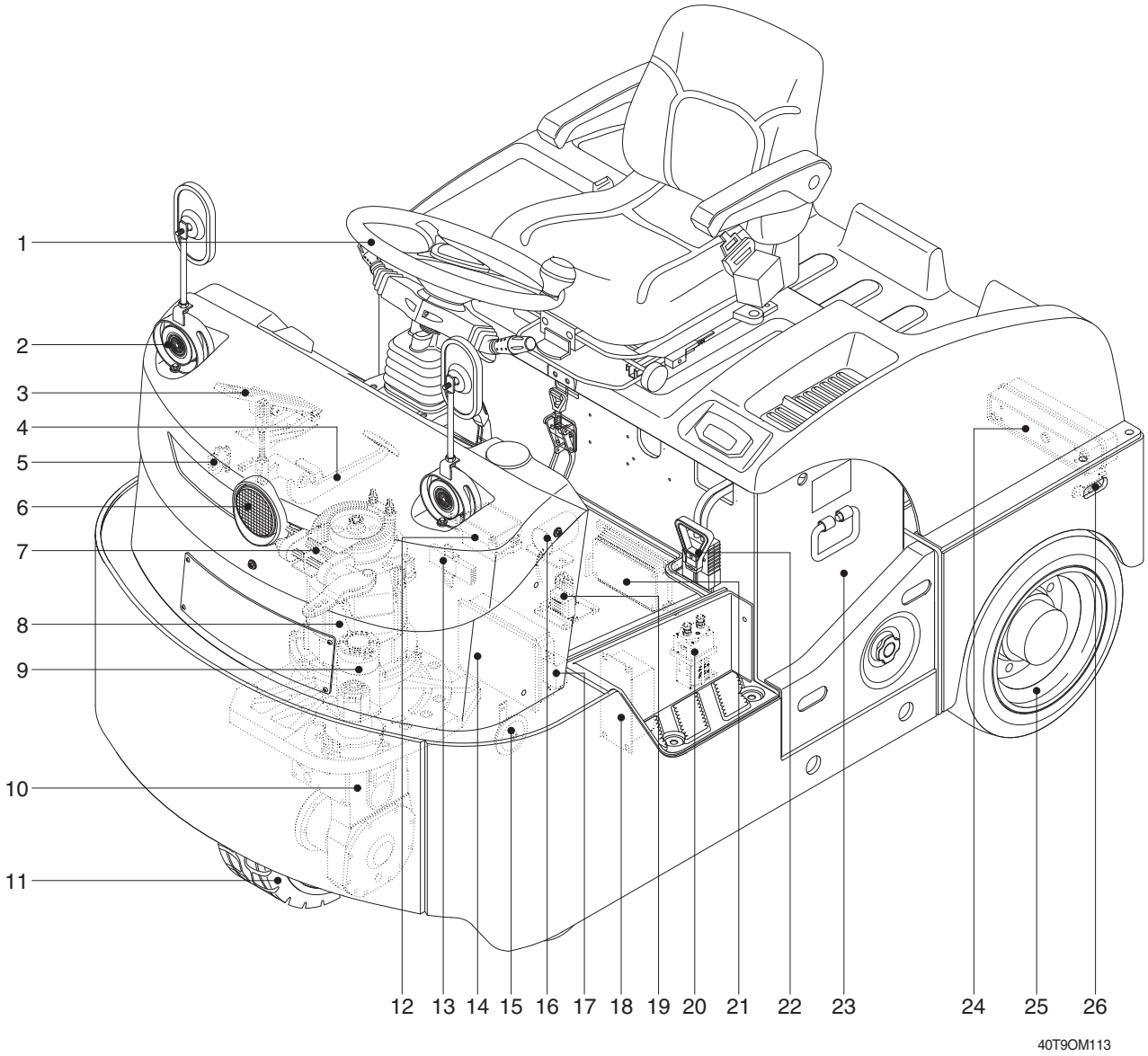
1) 15P-9



15P9OM113

1	Steering wheel	10	Drive unit	18	DC-DC converter
2	Flasher position lamp	11	Front wheel	19	EPS filter
3	Accelerator	12	Fuse box	20	Contactor
4	Brake pedal	13	Can tiller card	21	EPS controller
6	Head lamp	14	Inverter	22	Battery connector
7	Brake system	15	Horn	23	Battery
8	Drive motor	16	Back buzzer	24	Combination lamp
9	EPS actuator	17	Flasher unit	25	Rear wheel

2) 40T-9



1	Steering wheel	10	Drive unit	19	EPS filter
2	Flasher position lamp	11	Front wheel	20	Contactor
3	Accelerator	12	Fuse box	21	EPS controller
4	Brake pedal	13	Can tiller card	22	Battery connector
5	Foot switch	14	Inverter	23	Battery
6	Head lamp	15	Horn	24	Combination lamp
7	Brake system	16	Back buzzer	25	Rear wheel
8	Drive motor	17	Flasher unit	26	Inching switch
9	EPS actuator	18	DC-DC converter		

2. PERIODIC REPLACEMENT

For operation safety, never fail to perform periodic maintenance or make periodic replacement of the consumable parts listed in the following.

These parts may deteriorate in time and are susceptible to wear. It is difficult to estimate the degree of wear at time of periodic maintenance; therefore, even if no apparent wear is found, always replace with new parts within the prescribed period of replacement (Or earlier if trouble is found).
Note that periodic replacement has nothing to do with guarantee service.

※ **Replacement of consumable service parts is not covered under warranty.**

No.	Description	Period of replacement
1	Brake fluid	Every 1 year
2	Drive unit gear oil (15P/40T-9)	Every 1 year
3	EPS motor gear oil	Every 1 year
4	Wheel bearing grease	Every 1 year

3. DAILY MAINTENANCE CHECKS

The PM intervals depend on hour meter records of operation.

PM interval
A : 8 hours or daily
B : 50 hours or every week (Typical PM interval)
C : 250 hours or every 1 months
D : 1000 hours or every 6 months
E : 2000 hours or every year

Daily maintenance checks	A	B	C	D	E
Check tractor for obvious damages and leaks.	○				
Check capacity, warning plates and decals.	○				
Check condition of tires and wheels.	○				
Check for missing or loose wheel nuts.	○				
Check for steering wheel.	○				
Check gauges, instruments and switches.	○				
Check warning lights.	○				
Check directional and speed controls operation.	○				
Check for accelerator operation.	○				
Check optional safety equipment. (Alarms, Lights etc.)	○				
Check for head lamp and flasher operation.	○				
Check for flasher unit operation.	○				
Check battery connector's cleanliness.	○				
Check battery electrolyte level.	○				
Check for service brake drum, lining and cam.	○				
Check for harness, cables.	○				
Check for contactors. (Replace contactor tips if roughness is remarkable)	○				
Check for EPS filter.	○				
Check for controllers.	○				
Check for brake pedal condition and wear.	○				
Check for brake fluid (80T-9 only)	○				

○ : Check

4. PERIODIC MAINTENANCE CHECKS

The PM intervals depend on hour meter records of operation.

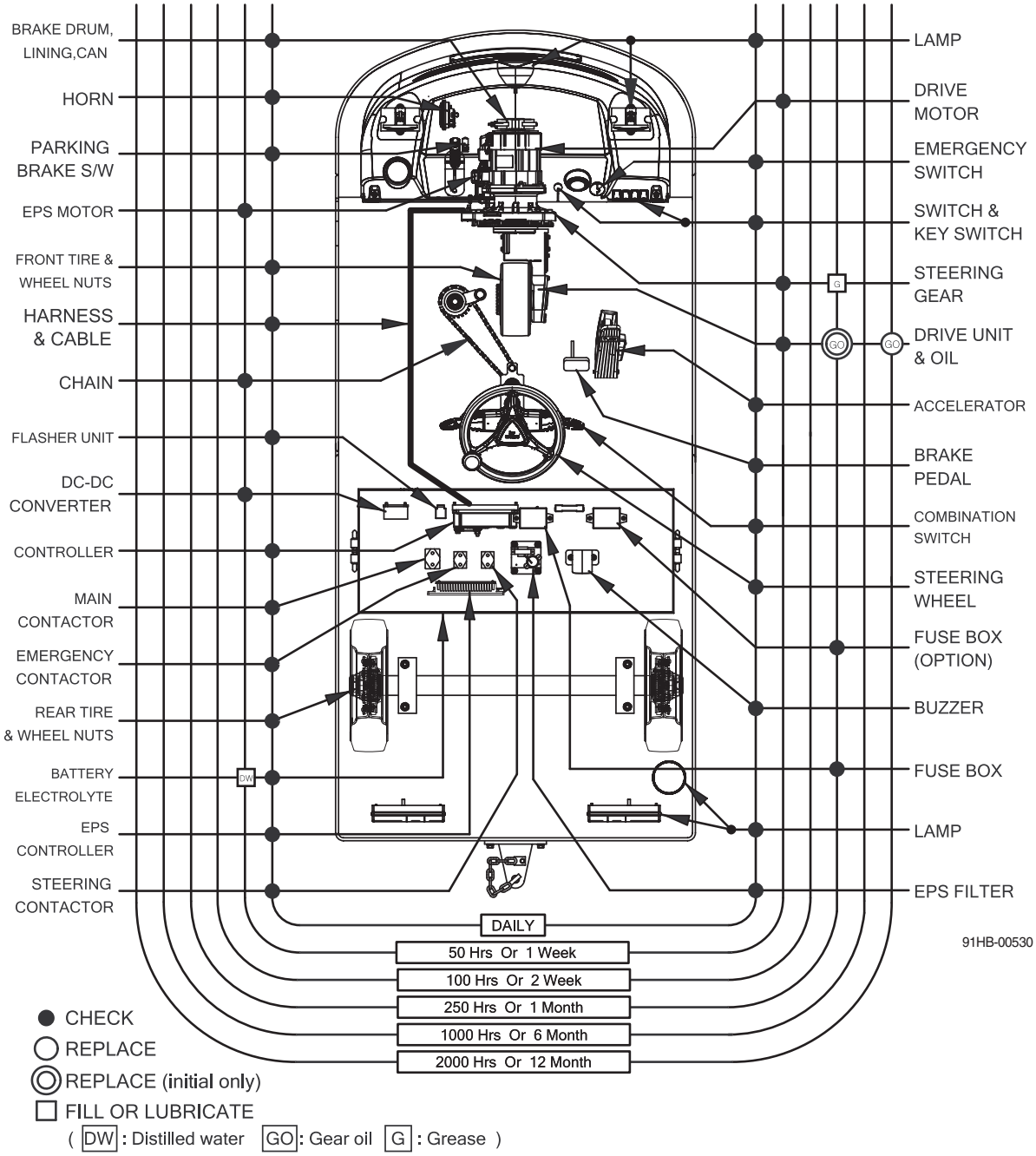
PM interval
A : 8 hours or daily
B : 50 hours or every week(Typical PM interval)
C : 250 hours or every 1 months
D : 1000 hours or every 6 months
E : 2000 hours or every year

Periodic checks and planned maintenance (PM)	A	B	C	D	E
Check tractor visually and inspect components.		○			
Test drive truck/check functional performance.		○			
Check torque on critical fasteners.		○			
Check/Clean battery terminals.		○			
Refill battery electrolyte.		■			
Check battery cables/truck receptacle		○			
Perform battery load test.		○			
Check drive motor.		○			
Check drive unit fluid level.		○	▲		●
Check chain condition and deflection		○			
Check battery connector.		○			
Check DC-DC converter.		○			
Lubricate steering gear and steering bearing of drive unit.		■			
Lubricate drive motor		○			
Check/lubricate steering column and wheel bearing.		○			
Check EPS motor and gear oil		○			●
Check EPS motor brushes			○		
Check for steering chain condition		○			
Check for fuse box		○			

* : Replace as required
○ : Check ● : Replace ■ : Refill or lubrication ▲ : Replace (Only for the first time)

5. MAINTENANCE CHART

1) 15P/40T-9



※ Service intervals are based on the hourmeter reading.

※ Turn the start switch to OFF position when servicing.

※ Always keep the surface of control & instrument panels clean in case of damage or malfunction detected in panel, replace it with a new one.

※ For other details, refer to the service manual.

6. SAFE MAINTENANCE PRACTICES

The following instructions have been prepared from current industry and government safety standards applicable to industrial tractor operation and maintenance. These recommended procedures specify conditions, methods, and accepted practices that aid in the safe maintenance of industrial tractor. They are listed here for the reference and safety of all workers during maintenance operations. Carefully read and understand these instructions and the specific maintenance procedures before attempting to do any repair work. When in doubt of any maintenance procedure, please contact your local HYUNDAI dealer.

1) Powered industrial tractor can become hazardous if maintenance is neglected. Therefore, suitable maintenance facilities, trained personnel and procedures shall be provided.

2) Maintenance and inspection of all powered industrial tractor shall be performed in conformance with the manufacturer's recommendations.

3) Follow a scheduled planned maintenance, lubrication and inspection system.

4) Only trained and authorized personnel are permitted to maintain, repair, adjust and inspect industrial tractor and must do so in accordance with the manufacturer's specifications.

5) Always wear safety glasses. Wear a safety(hard) hat in industrial plants and in special work areas where protection is necessary and required.

6) Properly ventilate work area and keep shop clean and floors dry.

7) Avoid fire hazards and have fire protection equipment present in the work area. Do not use an open flame to check for fluid or electrolyte levels.

8) Before starting work on tractor:

(1) Raise drive wheels free of floor and use oak blocks or other positive truck positioning devices.

(2) Remove all jewelry (watches, rings, bracelets, etc.).

(3) Put blocks under the load-engaging means, chassis before working on them.

(4) Disconnect the battery connector before working on the electrical system.

※ **Refer to the page 4-4 for proper procedures.**

9) Operation of the tractor to check performance must be conducted in an authorized, safe, clear area.

10) Before starting to operate the tractor:

(1) Put the directional control in NEUTRAL.

(2) Turn the start switch to the ON position.

(3) Check functioning of, direction and speed controls, steering, brakes and warning devices.

11) Before leaving the tractor:

(1) Stop the tractor.
(2) Put the directional control lever in NEUTRAL.
(3) Turn the start switch to the OFF position.
(4) Put blocks at the wheels if the tractor must be left on an incline.

12) Brakes, steering mechanisms, control mechanisms, warning devices, lights, articulating axle stops and frame members must be carefully and regularly inspected and maintained in a safe operating condition.

13) Special devices designed and approved for hazardous area operation must receive special attention to insure that maintenance preserves the original approved safe operating features.

14) The tractor manufacturer's capacity, operation, and maintenance instruction plates, tags, or decals must be maintained in legible condition.

15) Batteries, limit switches, protective devices, electrical conductors and connections must be maintained in conformance with good practice. Special attention must be paid to the condition of electrical insulation.

16) To avoid injury to personnel or damage to the equipment, consult the manufacturer's procedures in replacing contacts on any battery connection.

17) Industrial tractor must be kept in a clean condition to minimize fire hazards and help in detection of loose or defective parts.

18) Modifications and additions that affect capacity and safe tractor operation must not be done without the manufacturer's prior written approval. Capacity, operation and maintenance instruction plates, tags or decals must be changed accordingly.

19) Care must be taken to assure that all replacement parts, including tires, are interchangeable with the original parts and of a quality at least equal to that provided in the original equipment. Parts, including tires are to be installed per the manufacturer's procedures. Always use genuine HYUNDAI or HYUNDAI-approved parts.

20) Use special care when removing heavy components. Be sure that lifting and handling equipment is of the correct capacity and in good condition.

7. MAINTENANCE GUIDE

1) DRIVE WHEELS

(1) Pay constant caution to see that the set bolts of the power axle are not loosened.
(2) Make sure that the wheel tightening nuts are not loosened.
When tightening the nuts, be sure to tighten the nuts located at diagonal position sequentially so that they should not be tightened in deviant way.
(3) Make sure that there is no oil leakage from the drive gear case.
Also, check that the tightening bolts are not loosened.

2) REAR WHEELS

(1) Be sure to pay caution constantly so that the wheel tightening bolts are not loosened as in the case with the drive wheels.
(2) When reassembling the idle wheels after disassembling them for alignment, be sure to reassemble them just in the reverse of disassembling.

3) STEERING SYSTEM

(1) Since the steering system is particularly an essential part, be sure to check each part of the system for alignment, damage, deformation, etc., so that it can be always kept under the optimum condition.
(2) Check the deflection of the chain with a finger press at a point midway.
・Chain deflection : 10 mm (under load of 5 kg)

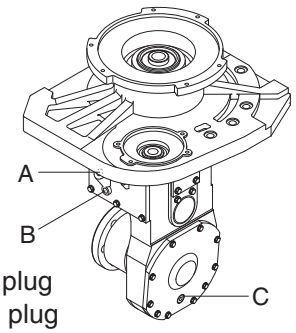
4) BRAKE

(1) Check the brake pedal for "play" and pedaling allowance when it is stepped on, and looseness of each part, etc.
(2) If the tractor slides laterally when the brake is applied suddenly, the brake is applied unevenly.
In this case, adjust the brake so that it can be applied evenly.
(3) Check and adjust the gap between the parking brake lining and the drum, and the braking efficiency.
(4) Parking brake
Adjust the parking brake to such an extent that there still remains some pulling allowance when the brake lever is fully pulled. Make sure that the brake is held in a condition not to be applied at all when the lever is returned.

5) CHECK FOR THE OIL LEVEL OF THE DRIVING GEAR CASE

Check for the oil level by taking out the oil level plug provided front side of the gear case.

15P/40T-9



A : Oil filler plug
B : Oil level plug
C : Oil drain plug

15P9OM119B

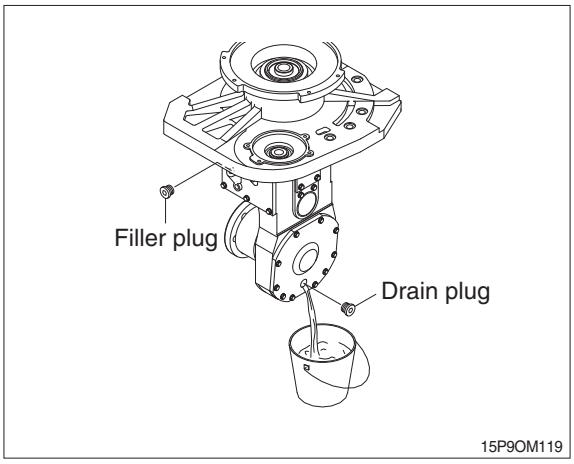
6) OIL CHANGE & FILL OF DRIVE UNIT

(1) Oil change

⚠ Do not drain drive unit oil into the soil or the sewerage system.
Pay attention to the type and quantity of debris.

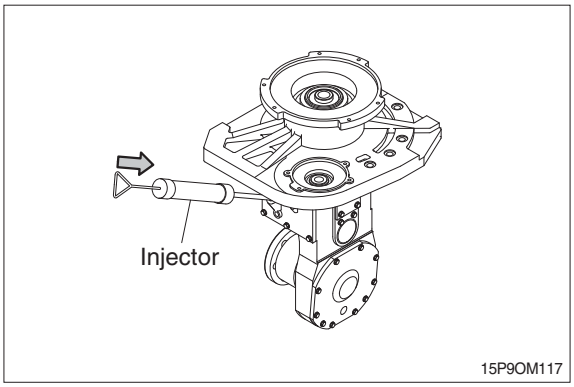
⚠ High oil temperatures are to be expected after continuous operation of the drive unit.
Wear temperature-resistant gloves!

- Position the vehicle on even ground and lock the wheels for safety purposes.
- Carefully clean the area around the oil filler and oil drain plug.
- Place a suitable big oil collecting vessel under the oil drain plug.
- Loosen the oil filler plug with a allen wrench. Remove the oil filler plug.
- Loosen the oil drain plug with a allen wrench. Remove the oil drain plug.
- Have the oil drained into the vessel completely.



(2) Fill in the drive unit oil

- Clean magnet on the oil drain plug.
- Fill in the drive unit oil. (Refer to page 6-18)
- For filling use a suction and pressure injector. This allows an easy and rapid filling of the drive unit with oil.
- The correct oil level and the correct oil quantity is achieved when the oil level is at the lower edge of the oil level plug, at least when oil penetrates at the level plug.
- Attach the oil filler plug.

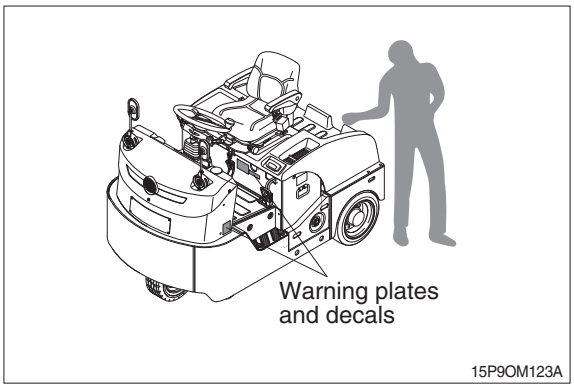


7) EXTERNAL APPEARANCE CHECK OF THE VEHICLE

Check for the external appearance of vehicles. If any defect is found immediately contact the service station.

8. VISUAL INSPECTION

First, perform a visual inspection of the tractor and its components.

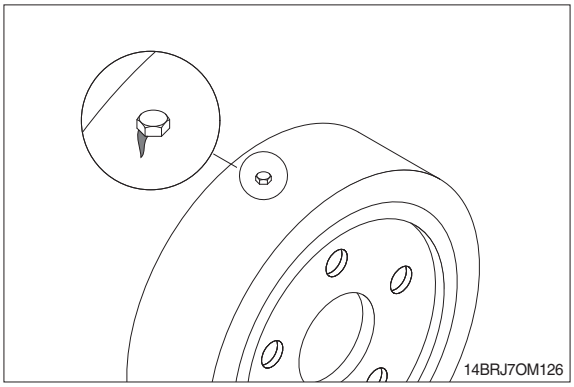


1. Walk around the tractor and take note of any obvious damage and maintenance problems. Check for loose fasteners and fittings.
2. Check to be sure all capacity, safety, and warning plates or decals are attached and legible.

※ **NAMEPLATES AND DECALS: Do not operate a tractor with damaged or lost decals and nameplates. Replace them immediately. They contain important information.**

3. Inspect the tractor for any sign of external leakage: drive axle fluid etc.
4. Be sure that the driver's overhead guard, and safety devices are in place, undamaged and attached securely.

5. WHEELS AND TIRES



1) Check the condition of the drive and steering wheels and tires. Remove objects that are embedded in the tread. Inspect the tires for excessive wear and breaks or chunking out.
   Check all wheel nuts or bolts to be sure none of them is loose or missing. Replace missing bolts or nuts. Torque loose or replaced items to specifications.

※ **Refer to the page 7-3.**

9. AIR CLEANING THE TRACTOR

Always maintain a tractor in a clean condition. Do not allow dirt, dust, lint or other contaminants to accumulate on the tractor. Keep the tractor free from leaking oil and grease. Wipe up all oil spills. Keep the controls and floorboards clean, dry and safe. A clean tractor makes it easier to see leakage and loose, missing or damaged parts. A clean condition helps prevent fires and helps the tractor run cooler.

Tractor should be air cleaned at every PM interval and more often if needed.

Use an air hose with special adapter or extension having a control valve and a nozzle to direct the air properly. Use clean, dry, low pressure, compressed air. Restrict air pressure to 30 psi (207 kPa), maximum. (OSHA requirement.)

⚠ Wear suitable eye protection and protective clothing.

Air clean : drive unit; battery; cables; switches and wiring harness; drive motors; and suspension, linkage.

10. ELECTRICAL SYSTEM

1) TRACTION CONTROLLER

(1) Periodically cleaning the controller exterior will help protect it against corrosion and possible electrical control problems created by dirt, grime, and chemicals that are part of the operating environment and that normally exist in battery powered systems.

(2) When working around any battery powered system, proper safety precautions should be taken. These include, but are not limited to : proper training, wearing eye protection, and avoiding loose clothing and jewelry.

(3) Use the following cleaning procedure for routine maintenance. Never use a high pressure washer to clean the controller.

① Remove power by disconnecting the battery.

② Discharge the capacitors in the controller by connecting a load (such as a contactor coil) across the controller's B^+ and B terminals.

③ Remove any dirt or corrosion from the power and signal connector areas. The controller should be wiped clean with a moist rag. Dry it before reconnecting the battery.

④ Make sure the connections are tight.

2) BATTERY

(1) The maintenance of the battery is very important to obtain efficient truck operation and maximum battery life.

(2) Leakage voltage from battery terminals to battery case can cause misleading trouble symptoms with the truck electrical system.

(3) Because components of the truck electrical system are insulated from truck frame, leakage voltage will not normally affect truck operation unless a short circuit or breakdown of circuit wire.

(4) A voltage check from battery connector terminal to battery case should be indicated near zero voltage. Typically, however, the sum of the voltages at both terminals will equal the battery volts.

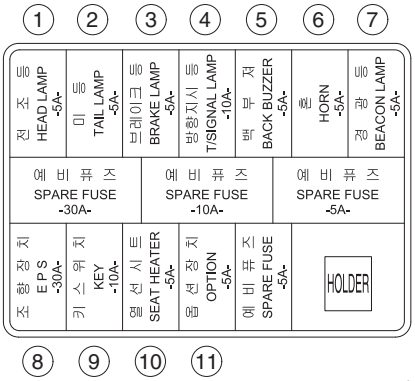
(5) This leakage voltage will discharge the battery. As battery cleanliness deteriorates, the usable charge of the battery decreases due to this self discharge.

(6) Although a leakage voltage reading of zero volts may not be possible, a cleaner battery will have more usable charge for truck operation and not affect operation of electric devices on the unit.

3) FUSE BOX

(1) Fuse box assy 1

No.	Capacity	Related electrical component
①	5A	Head lamp
②	5A	Tail lamp
③	5A	Brake lamp
④	10A	Turn signal lamp
⑤	5A	Back buzzer
⑥	5A	Horn
⑦	5A	Beacon lamp
⑧	30A	EPS
⑨	10A	Start switch
⑩	5A	Seat heat
⑪	5A	Option

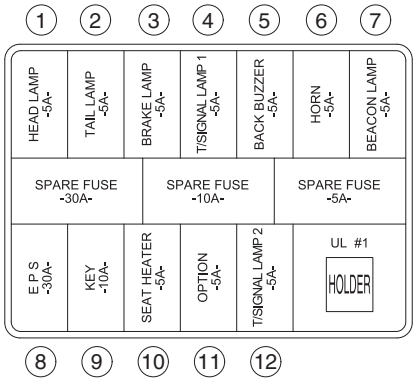


15P9OM121

(2) Fuse box assy 2 (UL)

①UL #1

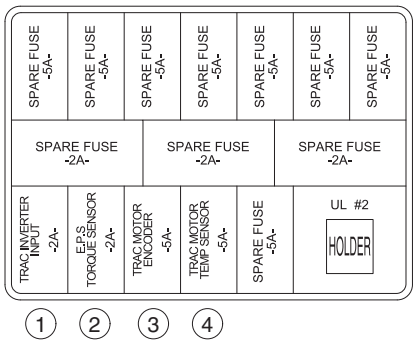
No.	Capacity	Related electrical component
①	5A	Head lamp
②	5A	Tail lamp
③	5A	Brake lamp
④	10A	Turn signal lamp 1
⑤	5A	Back buzzer
⑥	5A	Horn
⑦	5A	Beacon lamp
⑧	30A	EPS
⑨	10A	Start switch
⑩	5A	Seat heat
⑪	5A	Option
⑫	5A	Turn signal lamp 2



15P9OM122

②UL #2

No.	Capacity	Related electrical component
①	5A	Traction inverter input
②	5A	EPS torque sensor
③	5A	Traction motor encoder
④	10A	Traction motor temp sensor



15P9OM123

① Turn the starting switch OFF.

② Open the cover of the fuse box, and replace fuses inside (To open the cover of the fuse box, push the side of the cover lightly with a finger, and pull the cover forward to remove it.)

⚠ **When replacing the fuse, check the relationship between the fuse and the electrical components it protects. Always replace fuses with a fuse of the same capacity. Always turn the starting switch OFF before replacing any fuse.**

11. LUBRICATION

Since the life of vehicle is dependent upon the quality of lubrication, be sure to perform the lubrication with utmost care so that the tractor will not fall in trouble due to insufficient or improper lubrication oil.

(1) In supplying the oil, be sure to clean the lubrication port so that the oil should not be contaminated.

(2) Sine the oil viscosity will be decreased under high temperature, resulting in decreased lubrication efficiency, be sure to use the oil of high viscosity in summer (for normal temperature of over 32˚C) and that of low viscosity in winter (for normal temperature of under 0˚C).

12. NEW TRACTOR OILS

New machine uses following lubricants and oils.

Description	Specification
Gear oil (GO)	SAE 80W-90/API GL-5

· API : American Petroleum Institute

· SAE : Society of Automotive Engineers

13. RECOMMENDED LUBRICANTS

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	-20 (-4)	-10 (14)	0 (32)	10 (50)	20 (68)	30 (86)	40 (104)
		15P-9 40T-9							
Drive unit	Gear oil	1.6 (0.42)	SAE 80W-90/API GL-5						
	Brake fluid	-	Azolla ZS 32/ SAE 10W						
EPS Actuator	Gear oil	0.175 (0.05)	SAE 80W-90/API GL-5						