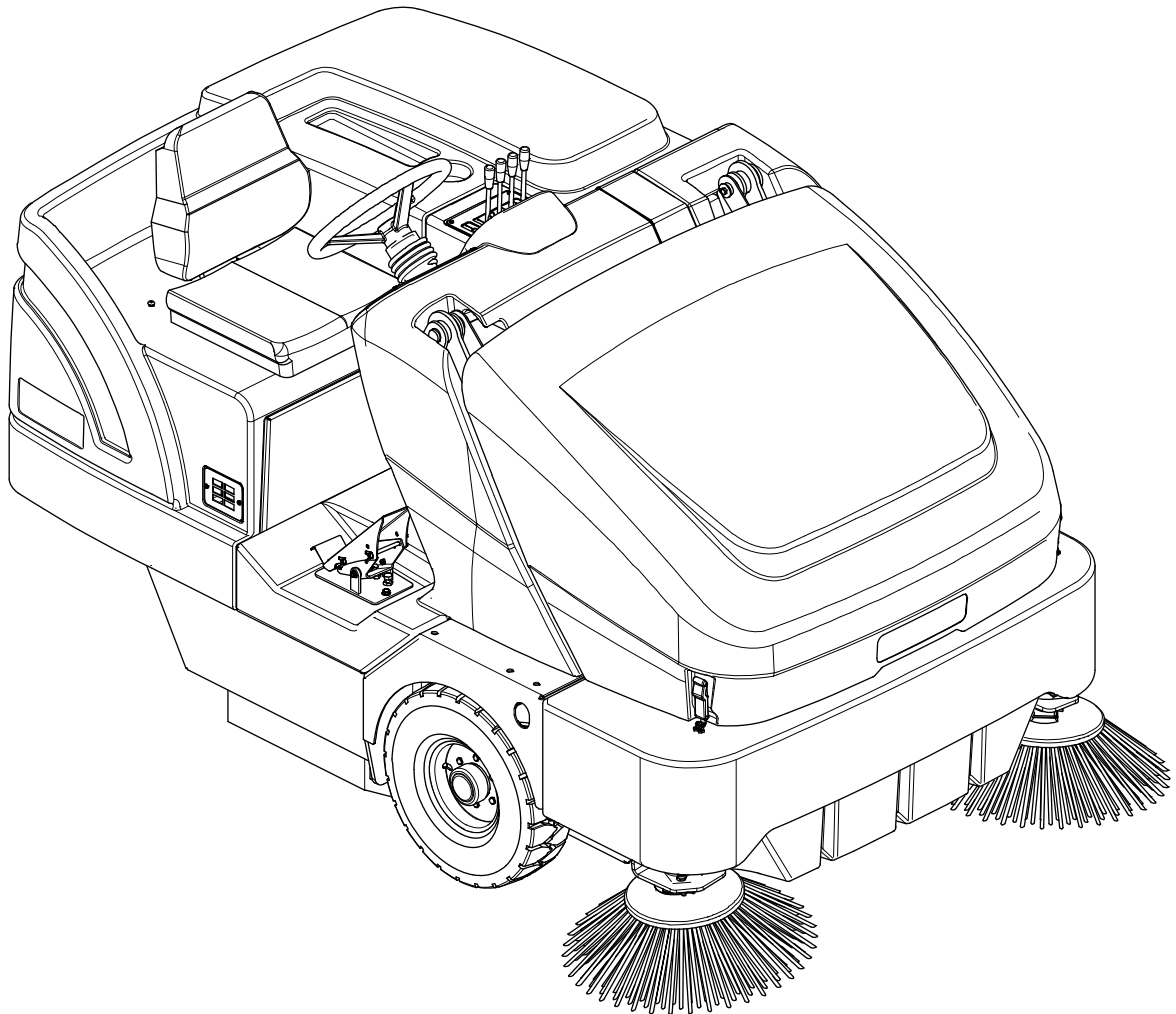


Proterra™



SERVICE MANUAL

Advance models: 13300107 (Battery)
13300106 (3 cyl Diesel)
13300109 (3 cyl LPG)
13300108 (3 cyl Gasoline)

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GENERAL INFORMATION

GENERAL INFORMATION

REFERENCES

Forward, backward, front, rear, left or right are intended with reference to the operator's position when driving.

MACHINE LIFTING



WARNING!

Never work under the lifted machine without supporting it with safety stands.

MACHINE TRANSPORTATION

See the Instructions for use.



WARNING!

Before transporting the machine, ensure that:

- ***All lids and cases are closed.***
- ***All moving parts are locked.***
- ***The ignition key is removed.***
- ***The machine is firmly fastened to the means of transport.***

PUSHING/TOWING THE MACHINE

The machine hydraulic pump (45) is equipped with an unlocking screw. The system prevents damage to the hydraulic system when the machine is being towed/pushed short distances without using the engine.

To access the unlocking screw, open the hood (1) by using the unlocking push-button (25) and locate the hydraulic pump (44) in the front part of the motor (55, Battery - 44, Diesel).

Turn the socket head screw (A) half turn counter-clockwise to disengage the hydrostatic lock between the engine and pump.



CAUTION!

The hydraulic pump can be damaged if the machine is towed when the screw is in the normal working position (locked).



NOTE

If the screw is left in unlocking position, the hydraulic pump cannot drive the machine.

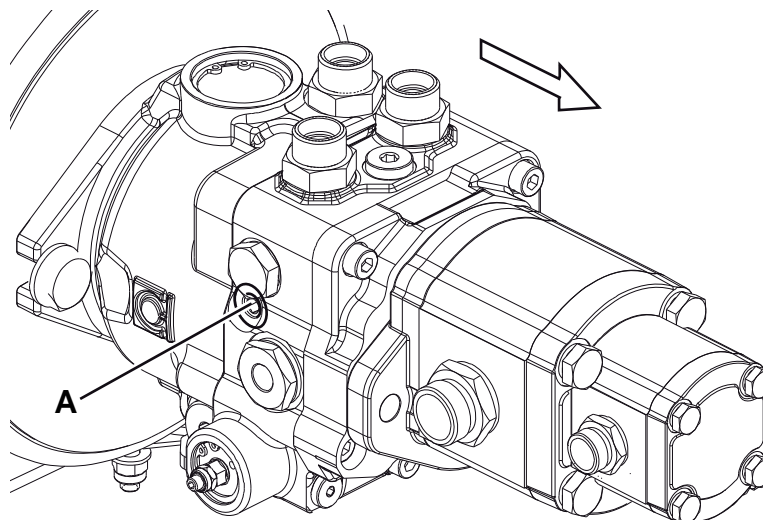


NOTE

Tow or push the machine no faster than a normal walking pace [1.8-2.8 mph (3-4.5 km/hour)] and for short distances only.

If the machine is to be moved long distances the driving wheels need to be raised off the floor and placed on a suitable transport dolly.

After pushing/towing the machine, turn the socket head screw half turn clockwise to reset the hydraulic functions.



P100320

ACCESSORIES/OPTIONS

In addition to the standard components, the machine can be equipped with the following accessories/equipment, according to the machine specific use:

- Lead battery (WET) (for Battery version only)
- Battery charger (for Battery version only)
- Left side broom
- Main and side brooms with harder or softer bristles
- Polyester dust filter
- Polyester closed pocket filter
- Clogged filter sensor
- Dust control system
- Working light
- Flashing light
- Non-marking wheels
- Adjustable steering wheel
- Driver's seat with suspensions
- Driver's seat armrests
- Safety belts
- Side broom guard
- Overhead guard
- Fire extinguisher
- Rearview mirrors
- Rear bumper
- Reverse gear buzzer
- Hopper protection
- Anti-skid mat

OTHER AVAILABLE MANUALS

The following manuals are available at Advance Literature Service Department:

- Proterra™ Diesel / LPG / Gasoline - Instructions for use – Advance Form Number 33019864
- Proterra™ Diesel / LPG / Gasoline - Spare Parts List – Advance Form Number 33019865
- Engine Manual – (supplied with the Instructions for use)
- Proterra™ Battery - Instructions for use – Advance Form Number 33019867
- Proterra™ Battery - Spare Parts List – Advance Form Number 33019868
- 12 V dust control system installation instructions – Advance Form Number 33018767
- 48 V dust control system installation instructions – Advance Form Number 33019375
- Reverse gear buzzer installation instructions – Advance Form Number 33019168
- Left side broom installation instructions – Advance Form Number 33018767
- Rearview mirror installation instructions – Advance Form Number 33018767
- Closed pocket filter installation instructions – Advance Form Number 33018766
- Adjustable steering wheel installation instructions – Advance Form Number 33019157
- Safety belt installation instructions – Advance Form Number 33019209
- Right armrest installation instructions – Advance Form Number 33019211
- Anti-skid surface mirror installation instructions – Advance Form Number 33019195
- Rear protection installation instructions – Advance Form Number 33019205
- 12 V front light system installation instructions – Advance Form Number 33019201
- 48 V front light system installation instructions – Advance Form Number 33019561
- Hopper protection installation instructions – Advance Form Number 33019207

SAFETY

The following symbols indicate potentially dangerous situations. Always read this information carefully and take the necessary precautions to protect people and objects.

SYMBOLS



DANGER!

It indicates a dangerous situation with risk of death for the operator.



WARNING!

It indicates a potential risk of injury for people or damage to objects.



CAUTION!

It indicates a caution related to important or useful functions.

Pay particular attention to the paragraphs marked by this symbol.



NOTE

It indicates a remark related to important or useful functions.



CONSULTATION

It indicates the necessity to refer to the Instructions for use before performing any procedure.

GENERAL INFORMATION

GENERAL INSTRUCTIONS

Specific warnings and cautions to inform about potential damages to people and machine are shown below.



DANGER!

[Battery / Diesel / LPG / Gasoline]

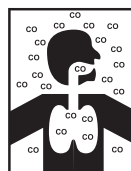
- Before performing any maintenance, repair, cleaning or replacement procedure disconnect the battery connector, remove the ignition key and engage the parking brake.
- This machine must be used by properly trained operators only. Children or disabled people cannot use this machine.
- Sharp turns must be made at slowest possible speed. Avoid: abrupt turns on incline, turns when the hopper is lifted.
- Do not lift the hopper when the machine is on incline. The machine loses stability on incline or when the hopper is full.
- Do not wear jewels when working near electrical components.
- Keep the battery away from sparks, flames and incandescent material. During the normal operation explosive gases are released.
- Do not work under the lifted machine without supporting it with safety stands.
- When working under open hoods, ensure that they cannot close by accident.
- While performing maintenance or checks which require to pass/stop under the hopper, insert the hopper safety support.
- Do not operate the machine near toxic, dangerous, inflammable and/or explosive powders, liquids or vapors. This machine is not suitable for collecting dangerous powders.
- (Equipped on Diesel / LPG / Gasoline, optional on Battery) When lead batteries (WET) are installed on this machine, do not tilt the machine more than 30° from its horizontal position to prevent the highly corrosive acid to leak out of the batteries. When the machine is to be tilted to perform maintenance procedures, remove the batteries.

[Battery]

- If the machine is equipped with lead (WET) batteries, battery charging produces highly explosive hydrogen gas. Keep the hood open when charging the batteries and perform this procedure in well-ventilated areas and away from naked flames.

[Diesel / LPG / Gasoline]

- Regularly check the tire pressure.
- Be careful, fuel is highly flammable.
- Do not smoke or bring naked flames in the area where the machine is refueled or where the fuel is stored.
- Refuel outdoors or in a well-ventilated area, with the engine off.
- Turn off the engine and let it cool down for a few minutes, then remove the fuel tank plug.
- Leave at least a space of 1.6 in (4 cm) in the filler to allow the fuel to expand.
- After refueling, check that the filler cap is tightly closed.
- If any fuel is spilled while refueling, clean the tank area and allow the vapors to evaporate before starting the engine.
- Avoid contact with skin and do not breathe in fuel vapors. Keep out of reach of children.
- Do not tilt the engine too much to avoid fuel spillage.
- When moving the machine, the fuel tank must not be full and the fuel tap must be closed.
- Do not lay any object on the engine.
- Stop the engine before performing any procedure on it. To prevent the engine from starting accidentally, disconnect the battery negative terminal.
- See also the SAFETY RULES in the Engine Manual, which is to be considered an integral part of this Manual.
- Do not use the machine in case of gas leaks. Disconnect the fuel hose and replace the LPG tank. If the gas leak persists, disconnect the fuel hose and contact the Advance Service Center.



DANGER!

Carbon monoxide (CO) can cause brain damage or death.

The internal combustion engine of this machine can emit carbon monoxide.

Do not inhale exhaust gas fumes.

Only use indoors when adequate ventilation is provided, and when an assistant has been instructed to look after you.

**WARNING!****[Battery / Diesel / LPG / Gasoline]**

- *Carefully read all the instructions before performing any maintenance/repair procedure.*
- *When working on the machine always wear protective clothes and safety glasses.*
- *Take all necessary precautions to prevent hair, jewels and loose clothes from being caught by the machine moving parts.*
- *To avoid any unauthorized use of the machine, remove the ignition key.*
- *Do not leave the machine unattended without being sure that it cannot move independently.*
- *Do not use the machine on slopes with a gradient exceeding the specifications.*
- *Use only brooms supplied with the machine and those specified in the Instructions for use. Using other brooms could reduce safety.*
- *Before using the machine, close all doors and/or covers.*
- *Do not use the machine in particularly dusty areas.*
- *Use the machine only where a proper lighting is provided.*
- *If the machine is to be used where there are other people besides the operator, it is necessary to install the pivoting light and the reverse gear buzzer (optional).*
- *Do not wash the machine with direct or pressurised water jets, or with corrosive substances.*
- *Do not use compressed air to clean this type of machine, except for the filters (see the relevant paragraph).*
- *While using this machine, take care not to cause damage to people and children especially.*
- *Do not put any can containing fluids on the machine.*
- *The machine storage temperature must be 32°F to 104°F (0°C to +40°C).*
- *The machine working temperature must be 32°F to 104°F (0°C to +40°C).*
- *Humidity must be between 30% and 95%.*
- *Always protect the machine against the sun, rain and bad weather, both under operation and inactivity condition. Store the machine indoors, in a dry place. This machine must be used in dry conditions, it must not be used or kept outdoors in wet conditions.*
- *Do not use the machine as a means of transport, or for pushing/towing.*
- *Do not allow the brushes to operate while the machine is stationary to avoid damaging the floor.*
- *In case of fire, use a powder fire extinguisher, not a water one.*
- *Do not bump into shelves or scaffoldings, particularly where there is a risk of falling objects.*
- *Adjust the operation speed to suit the floor conditions.*
- *Avoid sudden stops when the machine is going downhill. Avoid sharp turns. Drive at slow speed when going downhill.*
- *This machine cannot be used on roads or public streets.*
- *Do not tamper with the machine safety guards.*
- *Follow the maintenance procedures scrupulously.*
- *Do not remove or modify the plates affixed to the machine.*
- *In case of part replacement, order ORIGINAL spare parts from an authorized dealer or retailer.*
- *The machine must be disposed of properly, because of the presence of toxic-harmful materials (batteries, oil, plastics, etc.), which are subject to standards that require disposal in special centers (see Scrapping chapter).*

[Battery]

- *Do not smoke during battery charging.*

[Diesel / LPG / Gasoline]

- *Pay attention to hot parts when working near the engine, the muffler, the manifold and the cooler.*
- *While the engine is running the silencer heats up. Do not touch the silencer to avoid serious scalding or fire.*
- *Do not run the engine if the oil level is low, to avoid damaging it seriously. Check the oil level with the engine off and the machine on a level surface.*
- *Never run the engine if the air filter is not installed, because the engine could be damaged.*
- *All diesel engine servicing procedures should be performed by an authorised Dealer.*
- *Only use original spare parts or parts of matching quality for the diesel engine. Using spare parts of lower quality can seriously damage the engine.*
- *See also the SAFETY RULES in the Engine Manual, which is to be considered an integral part of this Manual.*

GENERAL INFORMATION

PARKING BRAKE


WARNING!

Before performing any maintenance, repair, cleaning or replacement procedure engage the parking brake. Engage the parking brake when parking the machine on a slope or incline.

- Engage the parking brake by pressing the pedals (35) and (36) simultaneously.
- Disengage the parking brake by pressing and releasing the pedal (35).

TECHNICAL DATA

Dimensions and weights	Battery	Diesel	LPG	Gasoline
Cleaning path with main broom	35.5 in (900 mm)			
Cleaning path with one side broom	49.25 in (1,250 mm)			
Cleaning width with two side brooms	63 in (1,600 mm)			
Machine length	87.5 in (2,220 mm)			
Machine width (broom hubs)	52 in (1,320 mm)			
Maximum machine height	57.5 in (1,460 mm)			
Maximum machine height with overhead guard	79 in (2,000 mm)			
Minimum distance from the floor (skirts not included)	4.25 in (110 mm)			
Maximum hopper lifting height	62.5 in (1,590 mm)			
Maximum height with lifted hopper	108 in (2,745 mm)			
Main broom size (diameter x width)	12.2 x 35.5 in (310 x 900 mm)			
Side broom diameter	21.5 in (550 mm)			
Front wheels	(Diameter x width) 18.5 x 5 in (465 x 120 mm)			
Rear drive and steering wheel	(Diameter x width) 16.5 x 4.5 in (415 x 110 mm)			
Tire pressure	—		87.0 psi (6 Bar)	
Front wheel specific pressure on the floor (*)	159 psi (1.1 N/mm ²)		72.0 psi (0.5 N/mm ²)	
Rear wheel specific pressure on the floor (*)	145 psi (1.0 N/mm ²)		101.0 psi (0.7 N/mm ²)	
Maximum capacity	800 lb (365 kg)			
Front axle kerb weight	1,411 lb (640 kg)		1,180 lb (535 kg)	
Rear axle kerb weight	1,279 lb (580 kg)		905 lb (410 kg)	
Total machine kerb weight (without operator)	2,690 lb (1,220 kg)		2,085 lb (945 kg)	
Maximum weight (GVW)	3,869 lb (1,755 kg)		2,885 lb (1,310 kg)	
Machine weight for shipment	Without batteries: 1,510 lb (685 kg) With batteries: 2,811 lb (1,275 kg)		2,204.6 lb (1,000 kg)	

(*) Machines have been tested under the following conditions:

- With the operator (165 lb (75 kg)) on board
- Battery of maximum size installed
- Oil and fuel tanks filled up
- Optional components installed
- Weight on wheels checked
- Wheel print checked
- The result is expressed as maximum value for front and rear wheels

Electrical data	Battery
Batteries with acid electrolyte (WET) (2 boxes) (optional)	48 V, 375 Ah@5h
Battery charger (optional)	48V, 50A, electronic, high frequency
Battery compartment maximum size (width x length x height)	Right side: 19.3 x 11.2 x 24.8 in (490 x 285 x 630 mm) Left side: 33 x 11.6 x 24.8 in (840 x 295 x 630 mm)
Main motor	Metalrota
Model	191 CA VE
Main motor power	48 V - 7 kW
Rotation speed	1,900 rpm

GENERAL INFORMATION

TECHNICAL DATA (Continues)

Engine (*) and refueling data	Diesel	LPG	Gasoline
Make	Kubota		
Model	D1105	DF972	WG972
Number of cylinders	3		
Displacement	1,123 cc	962 cc	
Regulated power (ISO 1585)	22 hp (16.3 kW) @ 2,750 rpm	25.4 hp (19 kW) @ 2,650 rpm	27 hp (20 kW) @ 2,650 rpm
Working speed	2,750 rpm	2,650 rpm	2,650 rpm
Idle speed	1,800 rpm	1,600 rpm	1,600 rpm
Fuel tank capacity	37 qt (35 liters)	—	37 qt (35 liters)
Engine oil pan capacity (*)	5.4 qt (5.1 liters)	3.59 qt (3.4 liters)	
Engine oil type (**)	SAE 10 W - 30		
Engine coolant quantity (**)	4.2 qt (4 liters)		

(*) For other engine data/values, see the Engine Manual.

(**) For engine oil and coolant data, and for technical specifications refer to the Engine Manual.

Performance data	Battery	Diesel	LPG	Gasoline
Maximum forward speed (for transport only)	5 mph (8 km/h)	7.5 mph (12 km/h)		
Maximum gradient when working	8.5° (15 %)	11° (20%)		
Gradeability	11° (20 %)	14° (25%)		
Minimum turning radius	60.2 in (1,530 mm)			
Sound pressure level at workstation (ISO 11201, ISO 4871) (LpA)	69.5 ± 3 dB(A)		69.1 ± 3 dB(A)	
Machine output acoustic power (ISO 3744, ISO 4871) (LwA)	82 dB(A)		83 dB(A)	
Vibration level at the operator's arms (ISO 5349-1) (*)	<98.4 in/s ² (<2.5 m/s ²)			
Vibration level at the operator's body (ISO 2631-1) (*)	17.7 in/s ² (<0.5 m/s ²)			
Hopper capacity	Theoretic: 11.25 cu-ft (315 liters) - Real: 8.00 cu-ft (226 liters)			
Hopper maximum lift capacity	363 kg (800 lb)			
Dust control system tank capacity (optional)	11.9 USgal (45 liters)			
Fuel consumption (transport and work)	—	1.0 USgal/h (3.9 l/h)	—	—
Working autonomy	2.5 hours	10 hours	—	—

(*) Under normal working conditions, on a level asphalt surface.

Dust vacuuming and filtering data	Battery	Diesel	LPG	Gasoline
Panel filter	88 ft ² (8.2 m ²)			
Panel filter rating	0.3 - 1 μ			
Filtering capacity %	>98%			
Main broom compartment vacuum	0.25 in/H ₂ O (6.35 mm/H ₂ O)			

Hydraulic refueling data	Battery	Diesel	LPG	Gasoline
Hydraulic system oil tank capacity	26.5 qt (25 liters)			
Total hydraulic system capacity	30.6 qt (29 liters)			
Hydraulic system oil type (at ambient temperature above 10°C)	46 cSt (*)			

(*) See the hydraulic system oil technical data and reference data tables below.

GENERAL INFORMATION

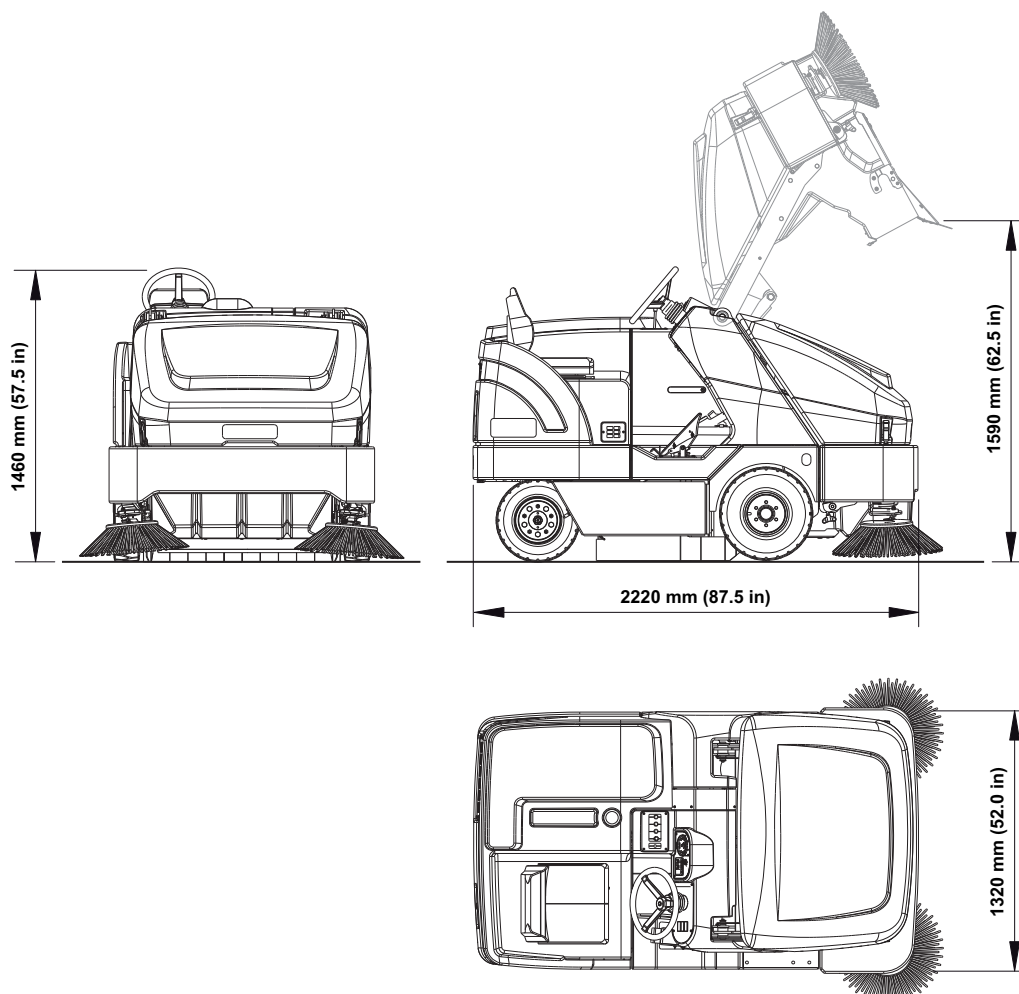
**CAUTION!**

If the machine is to be used at ambient temperatures below 50°F (+10°C), the oil should be changed with equivalent oil having a viscosity of 32 cSt. For temperatures below 32°F (0°C), use an oil with lower viscosity.

FEATURES			
HYDRAULIC OIL cSt		46	32
Viscosity at 104°F (40°C)	in ² /s (mm ² /s)	0.07 (45)	0.05 (32)
Viscosity at 212°F (100°C)	in ² /s (mm ² /s)	0.012 (7.97)	0.009 (6.40)
Viscosity index	/	150	157
Flash point COC	°F (°C)	419 (215)	396 (202)
Pour point	°F (°C)	-32.8 (-36)	-32.8 (-36)
Density at 59° F (15°C)	lb/qt (kg/l)	1.9 (0.87)	1.9 (0.865)

REFERENCE DATA
ISO-L-HV
ISO 11158
AFNOR NF E 48603 HV
AISE 127
ATOS Tab. P 002-0/I
BS 4231 HSE
CETOP RP 91 H HV
COMMERCIAL HYDRAULICS
Danieli Standard 0.000.001 (AGIP ARNICA 22, 46, 68)
EATON VICKERS I-286-S3
EATON VICKERS M-2950
DIN 51524 t.3 HVLP
LAMB LANDIS-CINCINNATI P68, P69, P70
LINDE
PARKER HANNIFIN (DENISON) HF-0
REXROTH RE 90220-1/11.02
SAUER-DANFOSS 520L0463

DIMENSIONS



P100333

GENERAL INFORMATION

MAINTENANCE

The lifespan of the machine and its maximum operating safety are ensured by correct and regular maintenance. The following table provides the scheduled maintenance. The intervals shown may vary according to particular working conditions, which are to be defined by the person in charge of the maintenance.

All scheduled maintenance procedures and repairs must be performed by qualified personnel, or by Advance Service Center. Further instructions about maintenance procedures listed in the following table are shown in the relevant paragraphs.

**CAUTION!**

Scrupulously follow the instructions shown in GENERAL INFORMATION and SAFETY chapters.

SCHEDULED MAINTENANCE TABLE [Battery]

Procedure	Upon delivery	Daily	After the first 50 hours	Every 30 hours	Every 150 hours	Every 300 hours	Every 1,000 hours
Battery fluid level check							
Hydraulic oil level check							
Parking brake check							
Main and side broom cleaning							
Dust control system water filter check and cleaning (optional)							
Hydraulic system oil cooler cleaning							
Broom check and adjustment							
Hopper dust filter check and cleaning ("A" method)				(1)			
Skirt integrity, height and operation check							
Hopper gasket integrity check							
Steering wheel bearing and hydraulic piston lubrication							
Tank hydraulic oil filter replacement							
Pump hydraulic oil filter replacement							
Hopper dust filter check and cleaning ("B" method)							
Hopper dust filter check and cleaning ("C" method)						(1)	
Hydraulic oil "recharge" filter replacement							
Tank hydraulic oil change							(2)

(1) Or more often in dusty areas.

(2) Change the hydraulic oil for the first time after 500 hours, then every year.

GENERAL INFORMATION**SCHEDULED MAINTENANCE TABLE [Diesel / LPG / Gasoline]**

Procedure	Upon delivery	Daily	After the first 50 hours	Every 30 hours	Every 150 hours	Every 300 hours	Every 1,000 hours
Engine coolant check							
Engine oil level check							
Hydraulic system oil level check							
Parking brake check							
Main and side broom cleaning							
Engine oil change							
Oil filter element replacement							
Engine cooling fan belt check							
Engine coolant circuit check							
Battery check							
Dust control system water filter check and cleaning (optional)							
Engine air filter cleaning				(1)			
Engine radiator and hydraulic system oil radiator cleaning							
Broom check and adjustment							
Hopper dust filter check and cleaning ("A" method)				(1)			
Skirt integrity, height and operation check							
Hopper gasket integrity check							
Engine maintenance					(2)		
Steering bearing and hydraulic cylinder joint greasing							
Hydraulic system oil filter replacement (in the tank)							
Drive system pump oil filter replacement							
Hopper dust filter check and cleaning ("B" method)					(1)		
Fuel filter replacement							
Fuel fitting and screw tightening							
Hopper dust filter check and cleaning ("C" method)						(1)	
Hydraulic system oil "recharge" filter replacement							
Tank hydraulic system oil change							(3)

(1) Or more often in dusty areas.

(2) Maintenance procedures to be performed by an authorised KUBOTA dealer.

(3) Change the hydraulic system oil for the first time after 500 hours, then every year.

MACHINE NOMENCLATURE

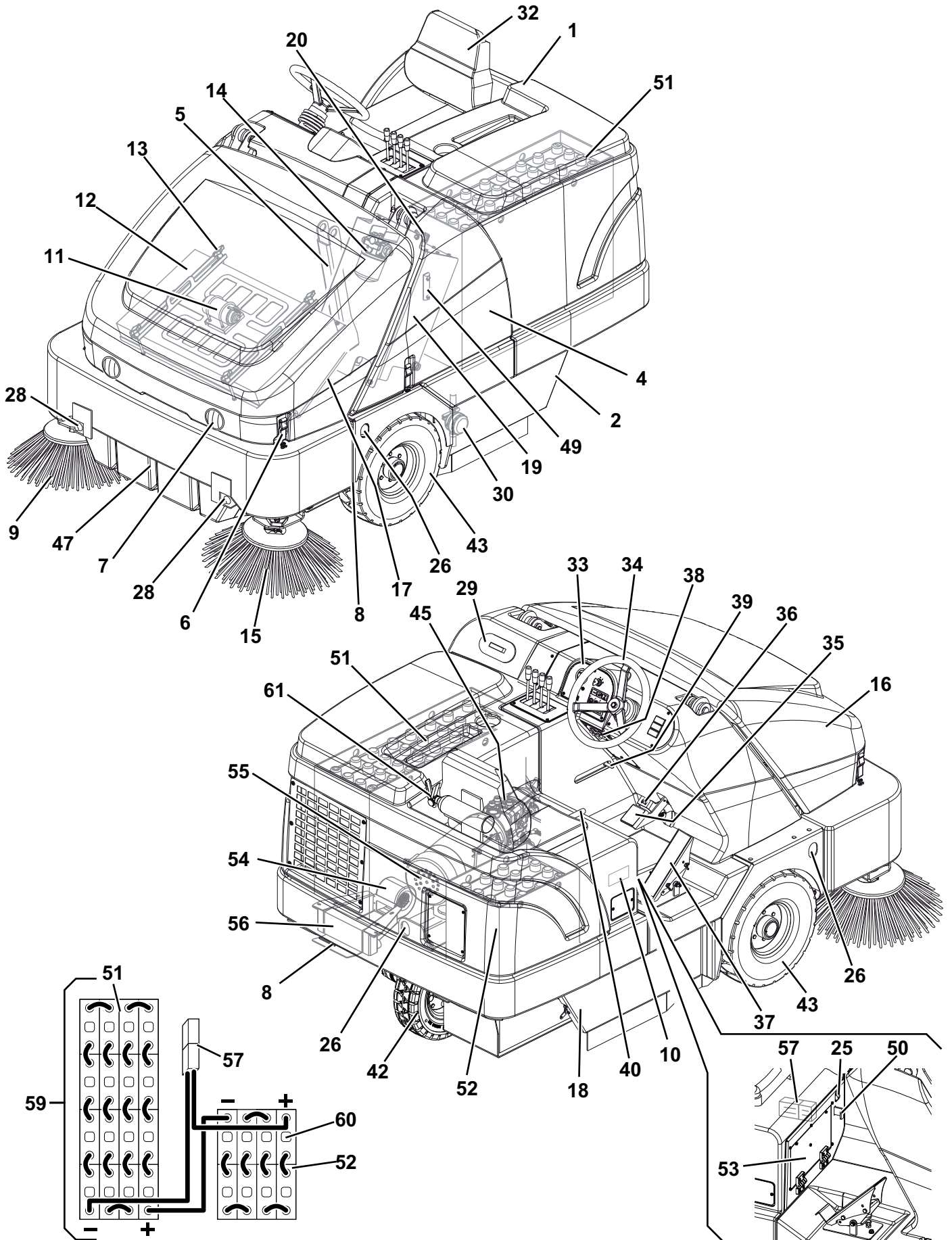
Throughout this Manual you will find numbers in brackets – for example: (2). These numbers refer to the components indicated in these two nomenclature pages. Refer to these pages whenever it is necessary to identify a component mentioned in the text.

MACHINE NOMENCLATURE

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Rear hood 2. Left side main broom access panel 3. [*D-G-P] Battery 4. Left side hood, or dust guard system water tank (optional) 5. Hopper safety support 6. Hopper hood latch 7. Working light (optional) 8. Jacking locations (rear location is under the left battery box or the engine radiator) 9. Right side broom 10. Serial number plate/technical data/conformity certification 11. Dust filter shaker assembly 12. Hopper dust filter
Panel filter (standard)
Closed pocket filter (optional) 13. Filter shaker assembly mounting knobs 14. Drive system pump oil filter 15. Left side broom (optional) 16. Front hood 17. Front hood support rod 18. Right side main broom access panel 19. Hydraulic system oil tank 20. Hydraulic system oil tank plug 21. [*D-P] Fuel tank plug 22. [*D-P] Fuel tank 23. [*D-G-P] Radiator plug 24. [*D-G-P] Engine air filter 25. Rear hood release push-button 26. Tie-down locations (3) 27. [*D-G-P] Air filter service indicator 28. Dust guard system nozzles (optional) 29. Dust guard system water tank plug (optional) 30. Water filter (optional) | <ol style="list-style-type: none"> 31. [*D-G-P] Engine model and serial number plate 32. Driver's seat 33. Control panel (see the following paragraph) 34. Steering wheel 35. Service brake pedal 36. Parking brake pedal
(To engage/disengage the parking brake, use simultaneously with the service brake pedal) 37. Forward/reverse gear pedal 38. Circuit breaker panel 39. Hopper safety support handle <ul style="list-style-type: none"> • Pull backward to lock the support (*) • Push forward to unlock the support (*) 40. Driver's seat adjustment lever 41. [*D-G-P] Engine air grid 42. Rear drive and steering wheel 43. Front wheels 44. [*D-G-P] Engine 45. Hydraulic pump 46. [*D-G-P] Engine coolant/hydraulic oil radiator 47. Hopper 48. [*D-G-P] Fuses 49. Hydraulic system oil level indicator 50. [*B] Battery connector quick release control: This connector also works as EMERGENCY push-button to stop immediately all machine functions 51. [*B] Left side batteries 52. [*B] Right side batteries 53. [*B] Fuse box cover (see the Fuse Check/Replacement/Reset paragraph) 54. [*B] Hydraulic system oil cooler fan 55. [*B] Main hydraulic pump motor 56. [*B] Hydraulic system oil cooler 57. [*B] Battery connector 58. [*B] Driver's seat adjustment lever 59. [*B] Battery connection diagram 60. [*B] Battery caps (for WET batteries only) 61. Fire extinguisher (optional) 62. [*G] LPG cylinder <p style="margin-top: 10px;"> [*B] Equipped on Battery version
 [*D] Equipped on Diesel version
 [*G] Equipped on LPG version
 [*P] Equipped on Gasoline version </p> |
|---|--|

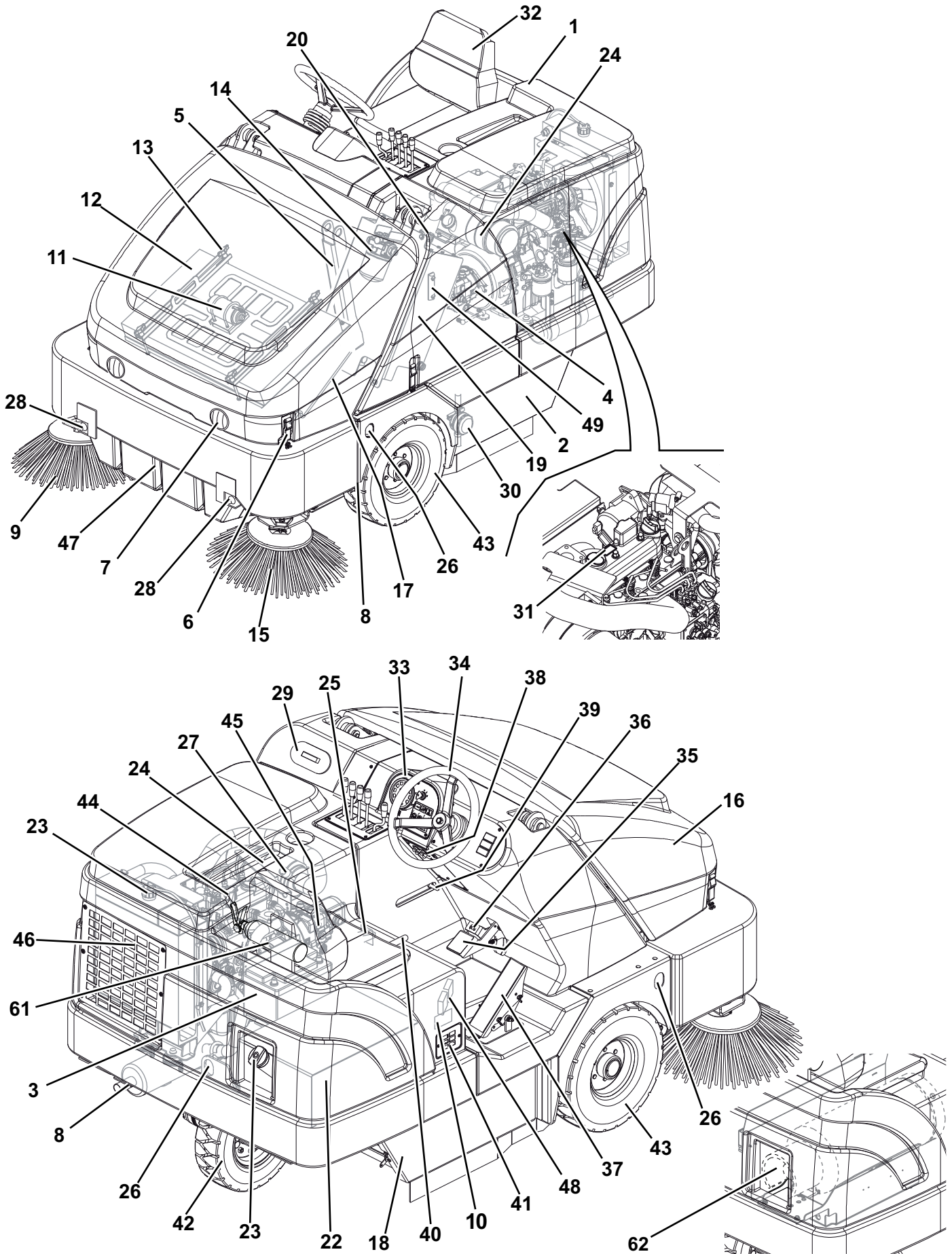
GENERAL INFORMATION

[Battery]



P100340

[Diesel / LPG / Gasoline]



P100341

GENERAL INFORMATION

OPERATING CONTROLS

71. [*D] Engine speed lever (minimum/maximum)
 - (Forward) working speed
 - (Backward) idle speed
72. Side broom lever
 - (Forward) side broom lowered
 - (Backward) side broom lifted
73. Main broom lever
 - (Forward) main broom lowered
 - (Backward) main broom lifted
74. Hopper lever
 - (Forward) hopper lowered
 - (Backward) hopper lifted
75. Hopper dumping door lever
 - (Forward) dumping door opened
 - (Backward) dumping door closed
76. Hour counter
77. [*B] Charged battery warning light.
 - When all yellow LEDs are on, the batteries are charged. Residual autonomy depends on battery capacity and working conditions.
 - When the red LED is on, batteries are discharged. The autonomy is over, the batteries must be recharged (see the procedure in the relevant paragraph).
78. [*D-P] Fuel level indicator
79. Hopper overtemperature warning light
80. Clogged hopper filter warning light
81. [*D-G-P] Charged battery indicator light
82. [*D-G-P] Engine coolant overtemperature warning light
83. [*D-G-P] Parking brake warning light
84. [*D] Glow plug pre-heating warning light
85. [*B] Ignition key:
 - When turned to “O”, it turns the electrical system off and disables all machine functions.
 - When turned to “I” it enables the machines functions.
 - When turned to “II” it starts the main motor.
As soon as the main motor starts, release the key, which returns to “I”.
86. [*D-G-P] Ignition key:
 - When turned to “0” it stops the engine and disables all machine functions.
 - When turned to “I” it enables the machines functions.
 - When turned to “II” it starts the engine.
When the engine starts, release the ignition key immediately; it will go back to “I”.
87. Horn switch
88. Switch
 - (Lower position) filter shaker activation
 - (Upper position) vacuum fan and dust guard system activation
89. Dust guard system switch (optional)
90. [*G-P] Choke lever
91. Working light switch (optional)
92. [*D-G-P] Hazard warning light switch (optional)
93. [*D-G-P] Turn signal switch (optional)
94. Steering wheel adjustment lever (optional)

[*B] Equipped on Battery version

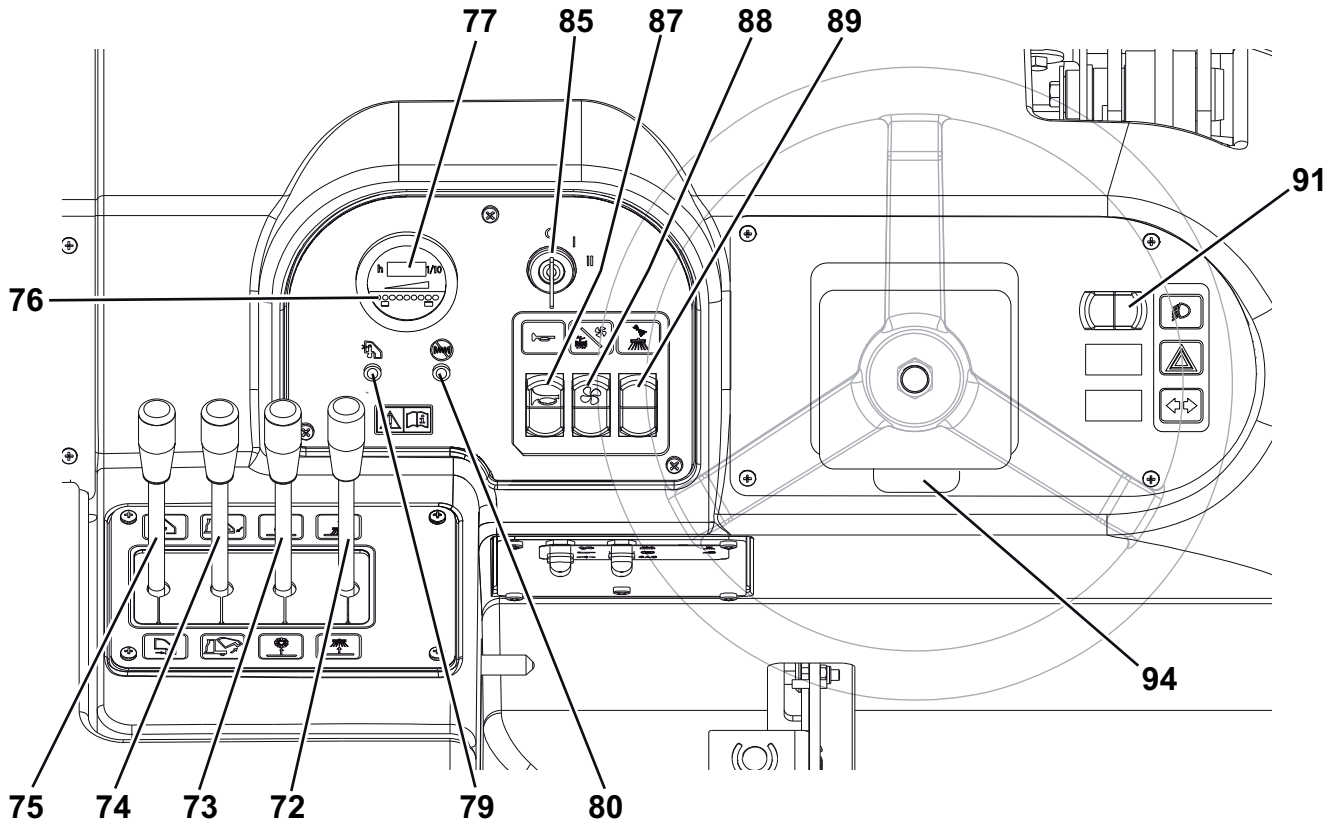
[*D] Equipped on Diesel version

[*G] Equipped on LPG version

[*P] Equipped on Gasoline version

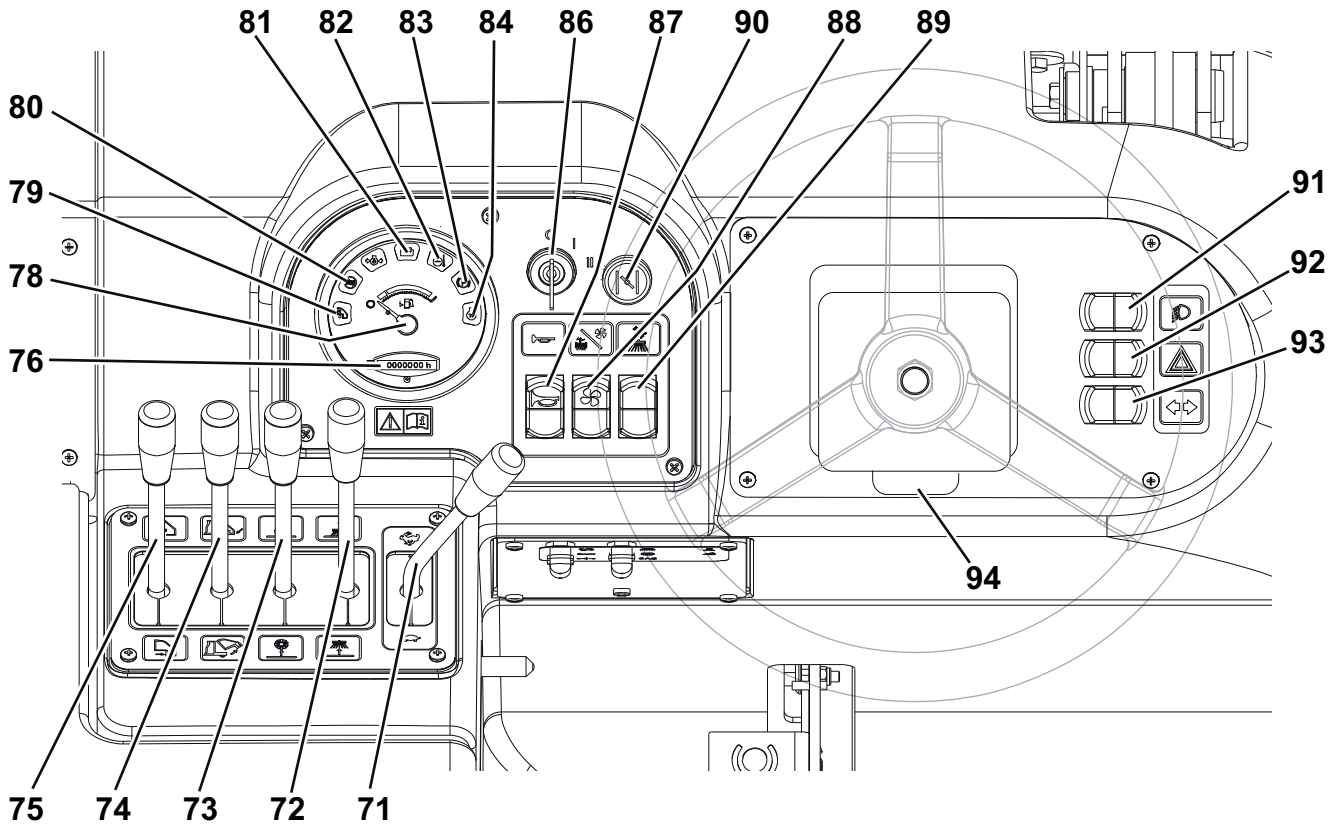
GENERAL INFORMATION

[Battery]



P100336

[Diesel / LPG / Gasoline]



S301782

SWEEPING SYSTEM

SWEEPING SYSTEM

TROUBLESHOOTING [All versions]

Poor operation or excessive wear of the side and main brooms

Possible cause:

1. The broom height is not properly adjusted (adjust).

The side or main broom lowers even when the relevant control is not activated

Possible causes

1. The check valve is faulty (replace).

The side or main broom does not turn

Possible cause:

1. Debris wrapped around the broom drive (clean the broom).
2. The hopper is not fully lowered (lower the hopper).
3. There are oil leaks from hoses (replace gaskets/hoses).
4. The distributor is faulty (repair or replace).
5. The broom motor is faulty (repair or replace).
6. The accessory pump does not pressurize the oil in the circuit (check the hydraulic system oil pressure).

The brooms do not lift/lower

Possible cause:

1. There are oil leaks from hoses (replace gaskets/hoses).
2. The distributor is faulty (repair or replace).
3. The lifting/lowering hydraulic cylinder gaskets are worn (check the cylinder).
4. The accessory pump does not pressurize the oil in the circuit (check the hydraulic system oil pressure).

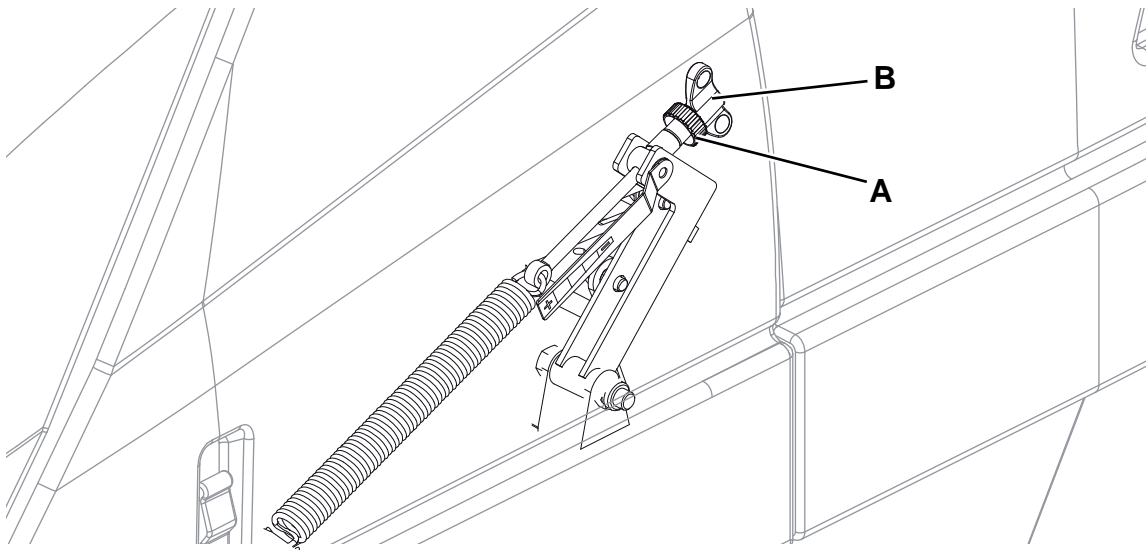
MAIN BROOM HEIGHT CHECK AND ADJUSTMENT [All versions]**NOTE**

*Brooms of various hardness are available.
This procedure is applicable to all types of brooms.*

1. Drive the machine on a level floor.
2. Engage the parking brake.
3. Start the machine with the ignition key (85, Battery - 86, Engine).
4. Lower the main broom with the lever (73) and let it run for 1 minute.
5. This allows the broom to polish a "strip" on the floor. After 1 minute, lift the main broom, release the parking brake and move the machine so that the polished strip is visible.
6. Inspect the polished strip on the floor. If the strip is less than 2 in (50 mm) or more than 3 in (75 mm) wide, the main broom must be adjusted.
7. To perform the adjustment, open the engine compartment hood (1) by using the release push-button (25). Loosen the knob (A) and operate on the main broom adjuster (B) by considering the following:
 - When turning clockwise, the main broom pressure and pattern is decreased.
 - When turning counter-clockwise, the side broom pressure and pattern is increased.After adjusting, lock the adjuster with the knob (A).
8. Repeat steps 2 to 7 until the polished strip is 2-3 in (50-75 mm) wide.

**NOTE**

If the print cannot be properly adjusted, because the broom pressure differs from one end to another, see the following procedure.



S301783

SWEEPING SYSTEM

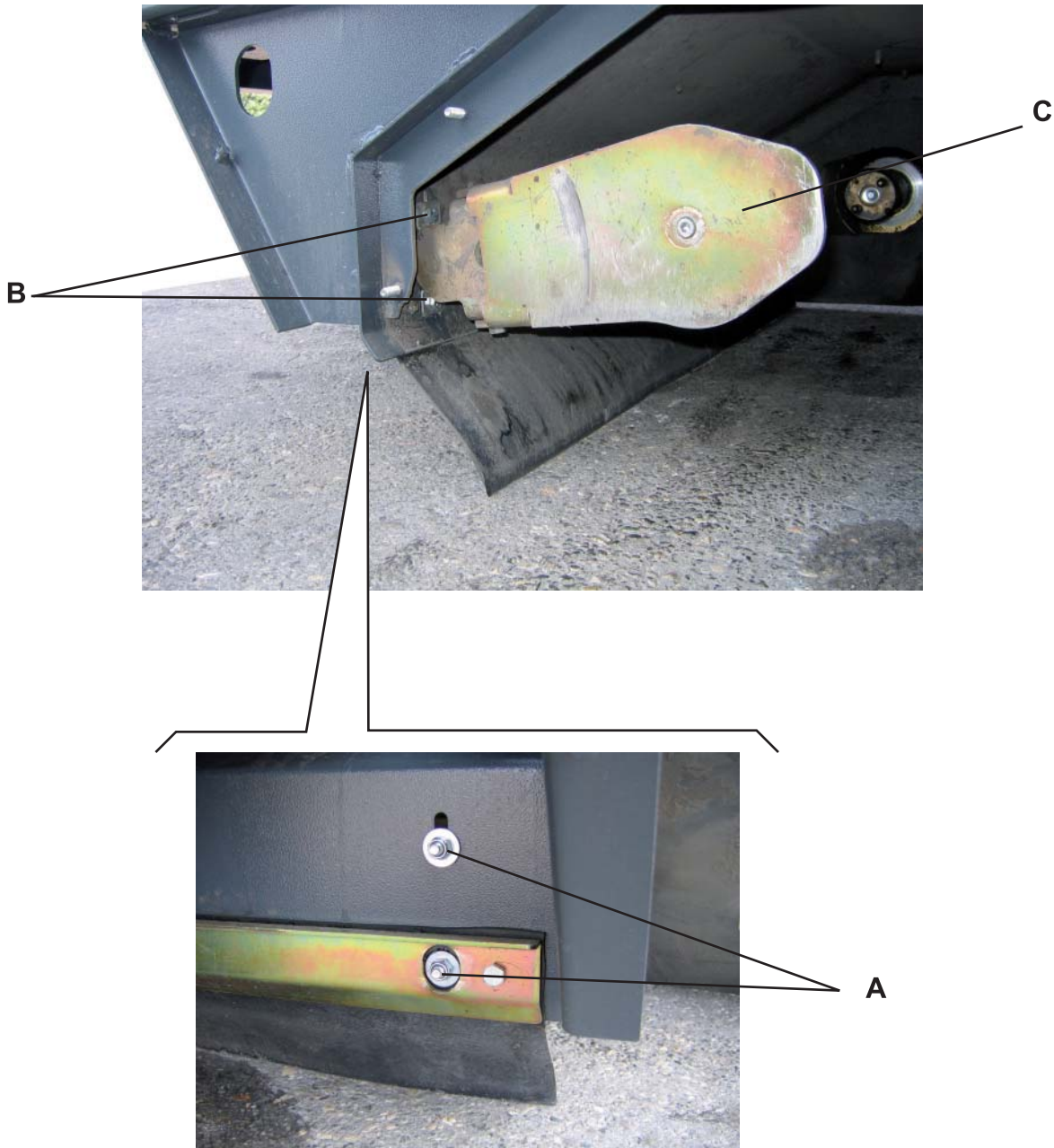
MAIN BROOM LONGITUDINAL PRESSURE ADJUSTMENT [All versions]

**NOTE**

*Brooms of various hardness are available.
This procedure is applicable to all types of brooms.*

After adjusting the main broom height, the broom print on the floor may not be even. If necessary the print evenness can be restored according to the following procedure.

1. Drive the machine on a level floor.
2. Remove the main broom (see the procedure in the relevant paragraph).
3. Loosen the nuts (A) with the screws (B), then lift or lower the main broom right holder (C) as necessary to properly adjust the broom.
Move the holder gradually (C).
After adjusting, tighten the nuts (A).
4. Install the main broom (see the procedure in the relevant paragraph).
5. Check the main broom height (see the procedure in the relevant paragraph).



S301784

SIDE BROOM HEIGHT CHECK AND ADJUSTMENT [All versions]



NOTE

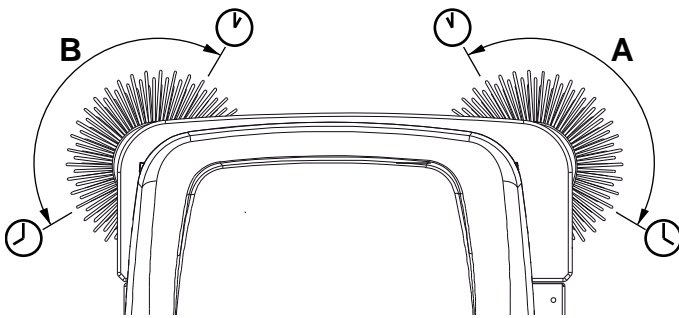
Brooms of various hardness are available.
This procedure is applicable to all types of brooms.

1. Drive the machine on a level floor.
2. Engage the parking brake.
3. Start the machine with the ignition key (85, Battery - 86, Engine).
4. Lower the side broom with the lever (72) and let it run for 1 minute.
5. When lowered, the side brooms (9) and (15) (optional) must touch the floor in the areas (A) and (B).
6. To adjust, loosen the knob (C) and operate on the side broom adjuster (D) by considering the following:
 - When turning clockwise, the main broom pressure and pattern is decreased.
 - When turning counter-clockwise, the side broom pressure and pattern is increased.
 After adjusting, lock the adjuster with the knob (C).
7. Repeat steps 1 to 5 to check the proper adjustment of the side broom height.
8. When the broom is too worn to be adjusted, replace it as shown in the relevant paragraph.

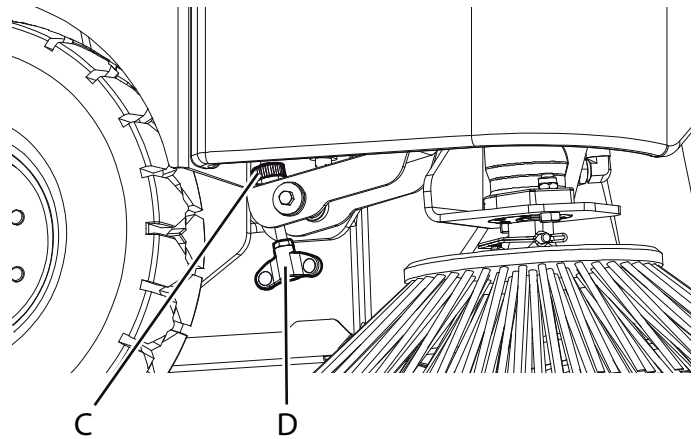


NOTE

The side brooms (9) and (15) (optional) should be replaced for optimal performance when the bristles are worn to a length of 3 in (75 mm). When replacing the side brooms, adjust the height.



S301785



S301786

SWEEPING SYSTEM

MAIN BROOM DISASSEMBLY/ASSEMBLY [All versions]


NOTE

Brooms of various hardness are available.
This procedure is applicable to all types of brooms.


CAUTION!

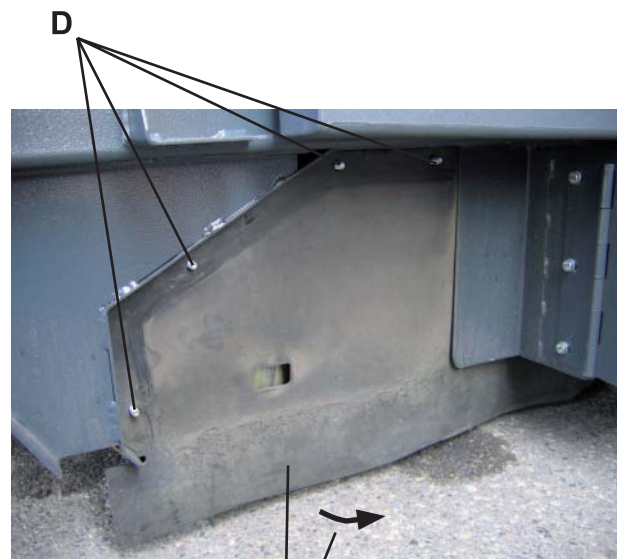
It is advisable to wear protective gloves when replacing the main broom because there can be sharp debris between the bristles.

Disassembly

1. Drive the machine on a level ground.
2. Lower the main broom with the lever (73).
3. Engage the parking brake.
4. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
5. Lift the release lever (A) and open the right panel (B) of the main broom compartment.
6. Move the right skirt (C) by releasing the pins (D).
7. Fasten the right skirt (C) to the pin (E).
8. Turn the right bracket (F) outwards, thus disengaging it from the main broom.
9. Remove the main broom (G).

Assembly

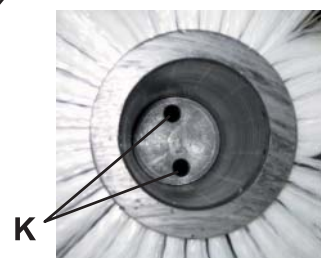
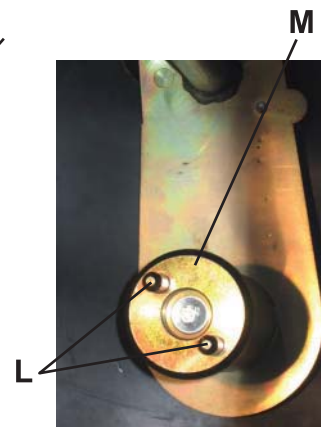
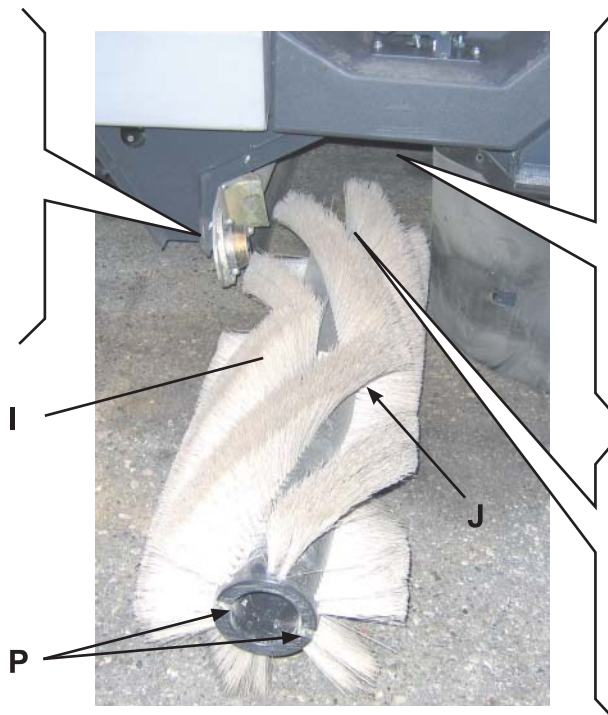
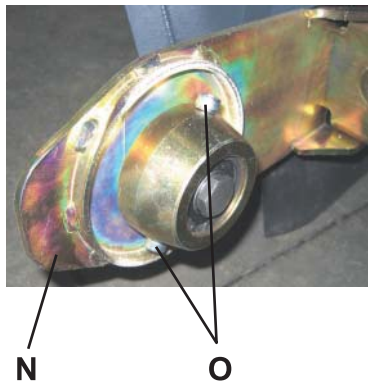
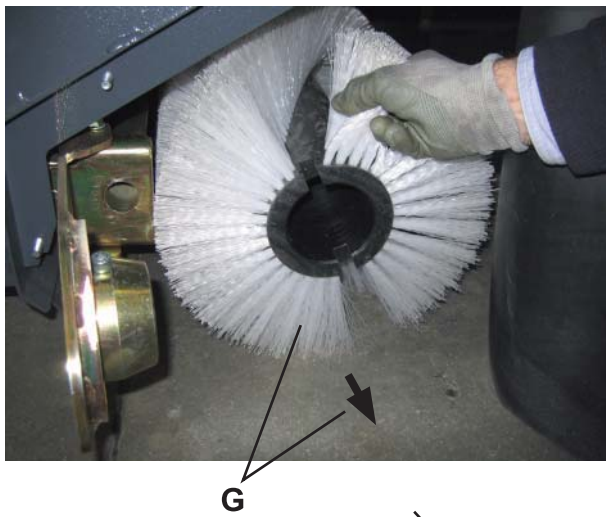
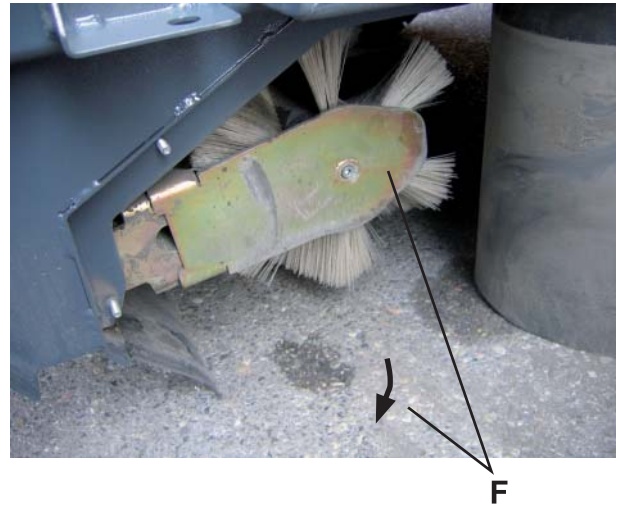
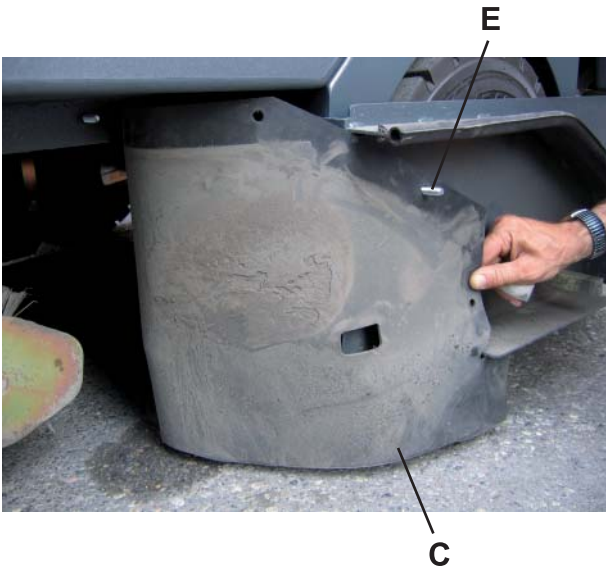
1. Remove foreign material (ropes, rags, dirt, etc.) from the broom hub (M).
2. Install the main broom (I) with the bristles (J) bent as shown in the figure. Also ensure that the broom holes (K) engage the pins (L) of the hub (M).
3. Turn the bracket (N) on the main broom (I) and insert the tabs (O) in the broom slots (P).
4. Perform steps 5 to 8 in the reverse order.
5. If a new main broom has been installed, adjust its height (see the procedure in the relevant paragraph).


A
B

C
D

S301788

SWEEPING SYSTEM

MAIN BROOM DISASSEMBLY/ASSEMBLY [All versions] (Continues)



S301789

SWEEPING SYSTEM

SIDE BROOM DISASSEMBLY/ASSEMBLY [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

1. (*) Empty the hopper; if it contains a small quantity of material, it is not necessary to empty it.
2. (*) Drive the machine on a solid and level ground, then engage the parking brake.
3. (*) Lift the hopper as necessary to remove the side broom.



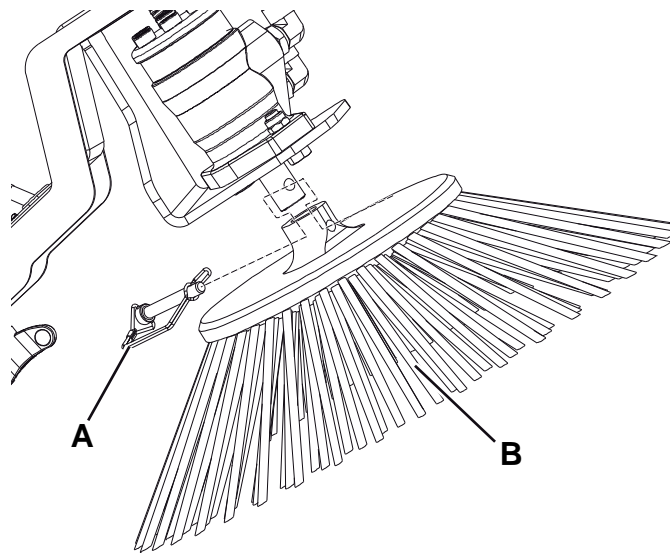
WARNING!

No people must pass under the lifted hopper (47), even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

4. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
5. Release the spring to remove the pin (A), then remove the side broom (B) from the motor shaft.

Assembly

1. Assemble the components in the reverse order of disassembly.



S301790

SIDE AND MAIN BROOM CHECK VALVE DISASSEMBLY/ASSEMBLY [All versions]

**CAUTION!**

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.

**CAUTION!**

If necessary, remove "Bonded" washers and replace them.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. Remove the dust control system water tank (see the procedure in the relevant paragraph).
2. On the left side of the machine, disconnect all the hoses (A) from the main broom check valve (B), or disconnect all the hoses (C) from the side broom check valve (D).
3. Remove the screw with the nut (E).

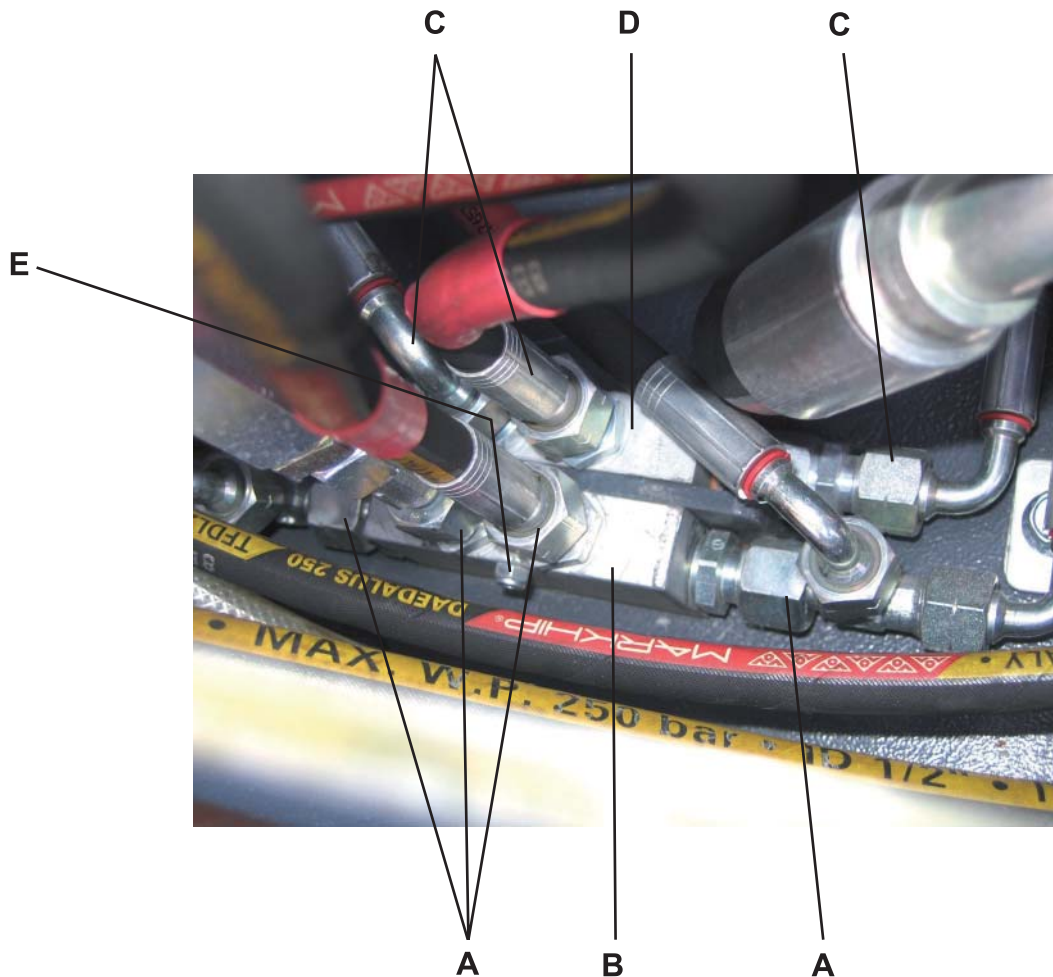
**WARNING!**

Hydraulic system oil is highly corrosive, wear rubber gloves.

4. Recover the check valve (B) or (D).
5. If necessary, remove the check valve fittings at the workbench.

Assembly

1. Assemble the components in the reverse order of disassembly.
2. (*) Start the machine and check the brooms for proper operation; then stop the machine, check the hydraulic system oil level (see the procedure in the relevant paragraph) and, if necessary, top up.



S301791

SWEEPING SYSTEM

MAIN BROOM MOTOR DISASSEMBLY/ASSEMBLY [All versions]


CAUTION!

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. (*) Empty the hopper; if it contains a small quantity of material, it is not necessary to empty it.
2. (*) Drive the machine on a solid and level ground, then engage the parking brake.
3. (*) Fully lift the hopper.
4. To avoid that the hopper lowers by accident, install the safety support as shown below.
 - Pull the handle (A) fully backwards and, by keeping it in this position, lower the hopper by pushing the lever (B) forward until the hopper stops on the safety support.
 - Release the lever (B) and the handle (A).


WARNING!

It is essential to insert the safety support under the lifted hopper, even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

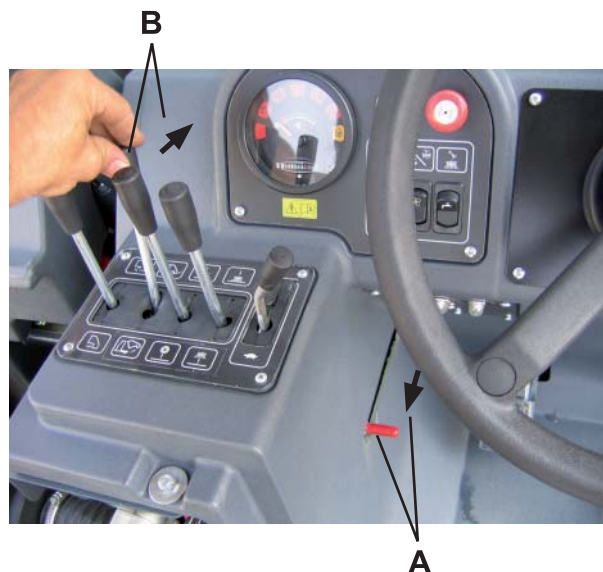
5. Remove the main broom (see the procedure in the relevant paragraph).
6. Check that the side broom is lowered (so that the motor is accessible).
7. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
8. Remove the mounting screw (C) on the left panel (D) of the main broom compartment.
9. Remove the left panel (D) by disengaging the fasteners (E).
10. Remove the mounting nuts (F) of the left skirt (G).
11. Remove the mounting screw (H) of the main broom tie rod (I). Recover the bushing (J) and the washer (K).
12. Move the left side skirt (L).
13. Remove the screw (M) and the flange (N) from the main broom motor.
14. Remove the screws (O).
15. Mark the position of the main broom motor hoses (P) and (Q) (for proper assembly).
16. Remove the main broom motor (R), then disconnect the hoses (P) and (Q) from the motor.


WARNING!

Hydraulic system oil is highly corrosive, wear rubber gloves.

Assembly

1. Assemble the components in the reverse order of disassembly.



S301792

SWEEPING SYSTEM

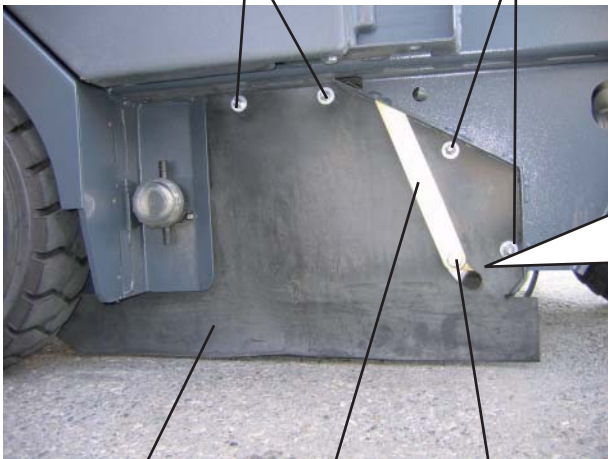
MAIN BROOM MOTOR DISASSEMBLY/ASSEMBLY [All versions] (Continues)



D

D

C



G

I

H

H

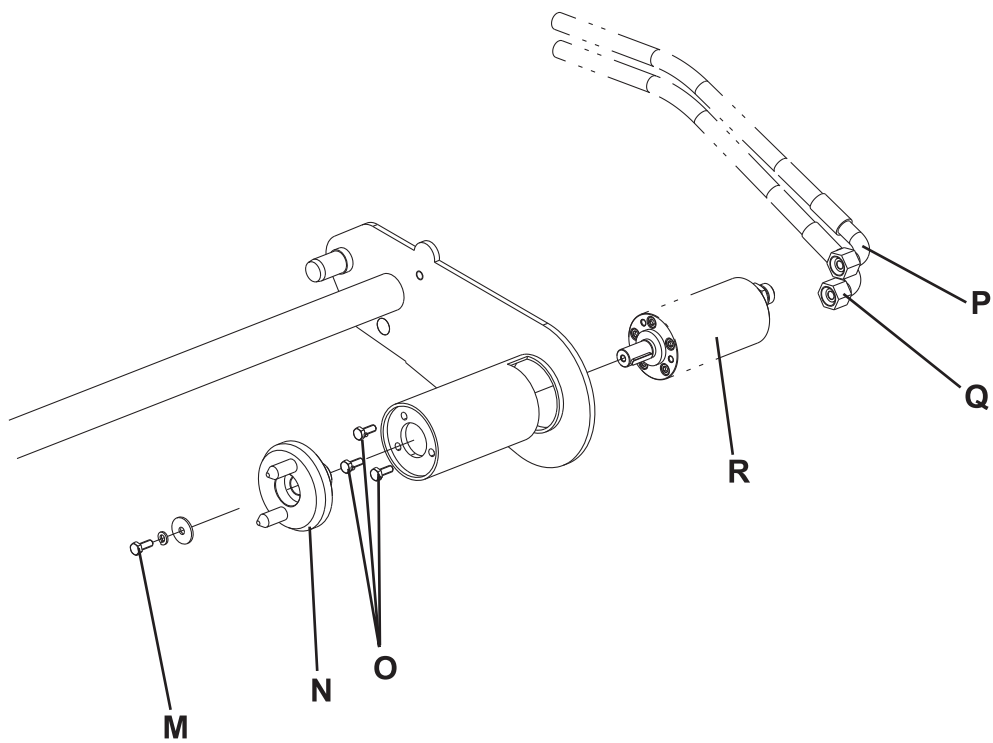
K

J

S301793

SWEEPING SYSTEM

MAIN BROOM MOTOR DISASSEMBLY/ASSEMBLY [All versions] (Continues)



S301794

SIDE BROOM MOTOR DISASSEMBLY/ASSEMBLY [All versions]**CAUTION!**

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. (*) Empty the hopper; if it contains a small quantity of material, it is not necessary to empty it.
2. (*) Lower the side brooms (to access the relevant motors).
3. Remove the side broom of the motor to be removed (see the procedure in the relevant paragraph).

**WARNING!**

No people must pass under the lifted hopper (47), even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

4. Mark the position of the hoses (A) and (B) connected to the side broom motor (C) (for proper assembly).
5. Disconnect the hoses (A) and (B) from the side broom motor.

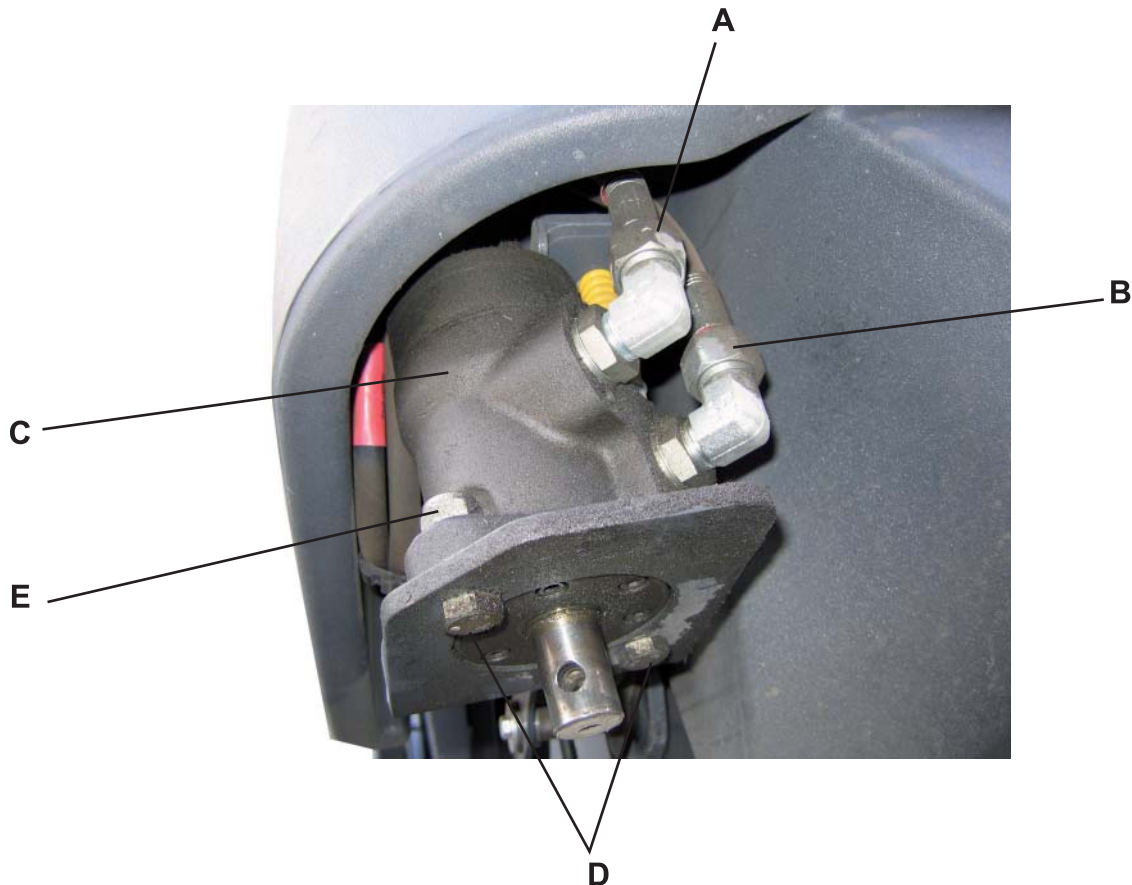
**WARNING!**

Hydraulic system oil is highly corrosive, wear rubber gloves.

6. Remove the screws (D) with the nuts (E).
7. Remove the motor (C).

Assembly

1. Assemble the components in the reverse order of disassembly.



S301795

SWEEPING SYSTEM

SIDE BROOM HYDRAULIC LIFTING CYLINDER DISASSEMBLY/ASSEMBLY [All versions]

**CAUTION!**

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.

**CAUTION!**

If necessary, remove "Bonded" washers and replace them.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. (*) Empty the hopper; if it contains a small quantity of material, it is not necessary to empty it.
2. (*) Drive the machine on a solid and level ground, then engage the parking brake.
3. (*) Fully lift the hopper.
4. To avoid that the hopper lowers by accident, install the safety support as shown below.
 - Pull the handle (A) fully backwards and, by keeping it in this position, lower the hopper by pushing the lever (B) forward until the hopper stops on the safety support.
 - Release the lever (B) and the handle (A).

**WARNING!**

It is essential to insert the safety support under the lifted hopper, even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

5. Lower the side brooms.
6. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
7. Remove the side broom of the hydraulic cylinder to be removed (see the procedure in the relevant paragraph).
8. Unscrew the nut (C) of the side broom hydraulic lifting cylinder (D) by holding the rod (E) at the position (F).
If the hydraulic cylinder (D) is locked and the rod (E) cannot be extracted to reach the position (F), remove the hoses before unscrewing the nut (C), as shown in steps 9 and 10.
9. Remove the screw (G) and disconnect the hoses (H) from the hydraulic cylinder (D).

**WARNING!**

Hydraulic system oil is highly corrosive, wear rubber gloves.

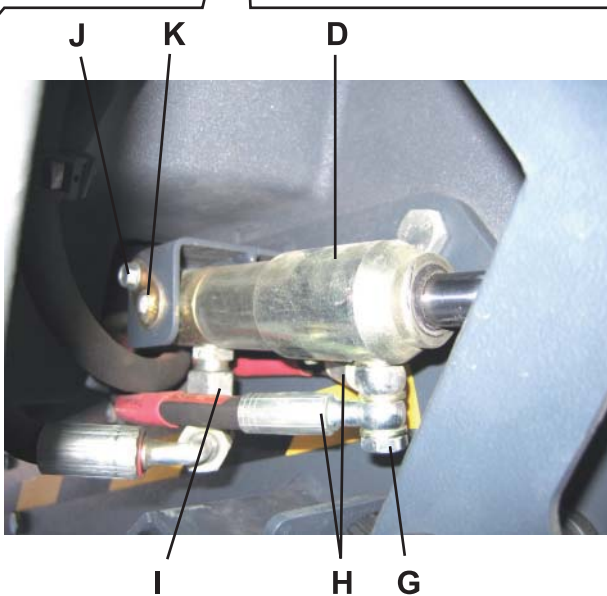
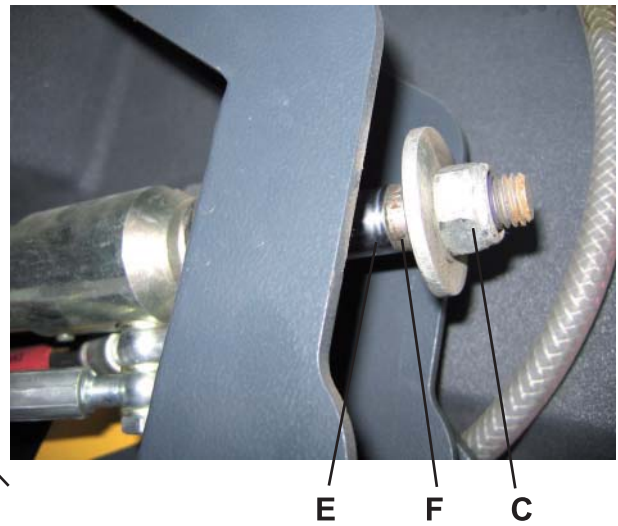
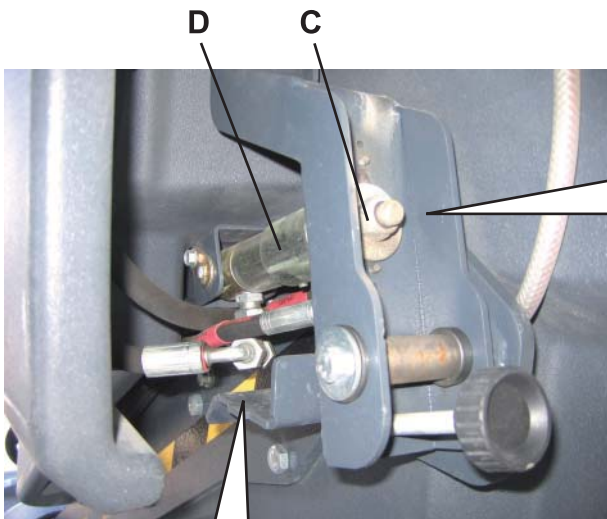
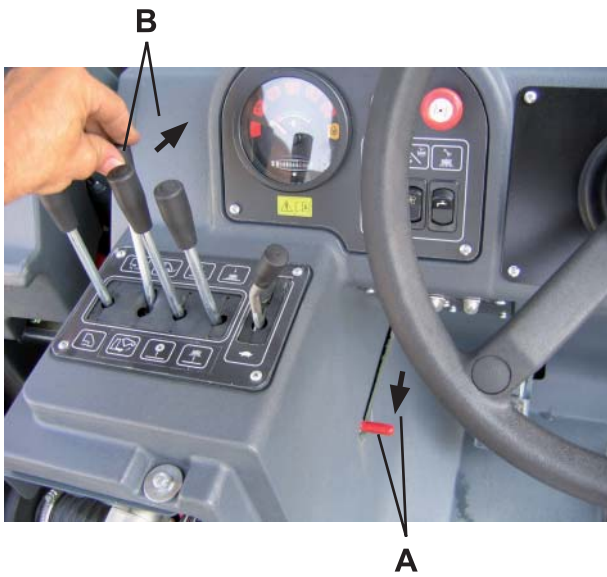
10. Unscrew the hose fitting (I) from the hydraulic cylinder (D).
11. Remove the screw (J) and the flange with the pin (K).
12. Remove the side broom hydraulic lifting cylinder (D).

Assembly

1. Assemble the components in the reverse order of disassembly.
2. (*) Start the machine and check the side brooms for proper lifting/lowering operation; then stop the machine, check the hydraulic system oil level (see the procedure in the relevant paragraph) and, if necessary, top up.

SWEEPING SYSTEM

SIDE BROOM HYDRAULIC LIFTING CYLINDER DISASSEMBLY/ASSEMBLY [All versions]
(Continues)



S301796

SWEEPING SYSTEM

MAIN BROOM HYDRAULIC LIFTING CYLINDER DISASSEMBLY/ASSEMBLY [All versions]


CAUTION!

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.


CAUTION!

If necessary, remove "Bonded" washers and replace them.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. Remove the dust control system water tank (see the procedure in the relevant paragraph).
2. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
3. On the left side of the machine, disconnect all the hoses (A) from the main broom hydraulic lifting cylinder (B).

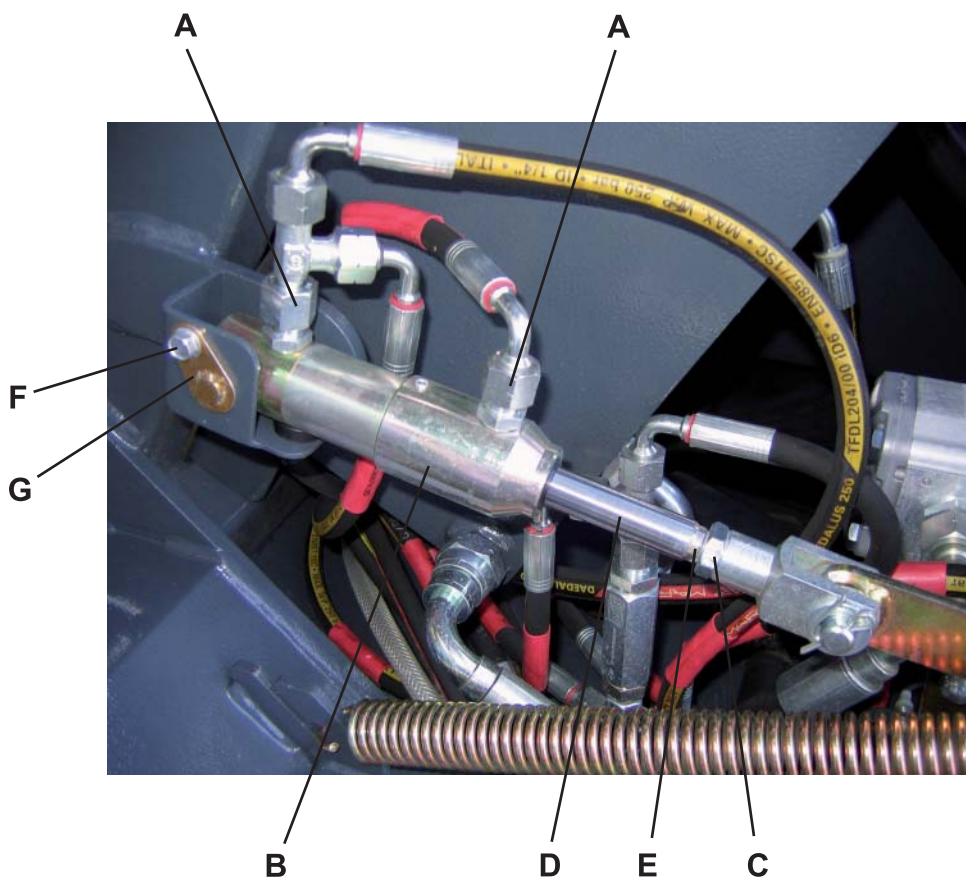

WARNING!

Hydraulic system oil is highly corrosive, wear rubber gloves.

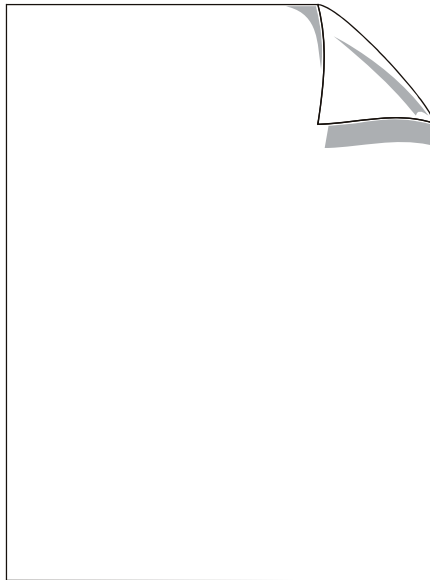
4. Remove the nut (C), by holding the rod (D) at the position (E).
5. Remove the screw (F) and the flange with the pin (G).
6. Remove the main broom hydraulic lifting cylinder (B).

Assembly

1. Assemble the components in the reverse order of disassembly, and note the following:
 - Fully tighten the nut (C).
2. (*) Start the machine and check the main broom for proper lifting/lowering operation; then stop the machine, check the hydraulic system oil level (see the procedure in the relevant paragraph) and, if necessary, top up.



S301797



SKIRT

SKIRT

SKIRT HEIGHT AND OPERATION CHECK [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

Preliminary operations

1. (*) Empty the hopper.
2. (*) Drive the machine on a level ground and engage the parking brake.
3. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.

Side skirts

1. Check the side skirts (A) and (B) for integrity. Replace the side skirts when cut or torn/broken (see the procedure in the relevant paragraph), otherwise the machine vacuum capabilities can be affected.
2. Check that the side skirts (A) and (B) are flush with the floor, or that the distance from the floor is not higher than 0.25 in (6 mm), otherwise replace them (see the procedure in the relevant paragraph).

Rear skirt

1. Check the rear skirt (C) for integrity. Replace the rear skirt when cut or torn/broken (see the procedure in the relevant paragraph), otherwise the machine vacuum capabilities can be affected.
Check that the rear skirt (C) is flush with the floor, or that the distance from the floor is not higher than 0.25 in (6 mm), otherwise adjust it as shown below:
 - Loosen the mounting screws (E) of the rear skirt.
 - By using the slots of the mounting holes, adjust the rear skirt (C) so that the distance from the floor is not higher than 0.2 in (6 mm), then tighten the screws (E).If the rear skirt cannot be adjusted, replace it (see the procedure in the relevant paragraph).

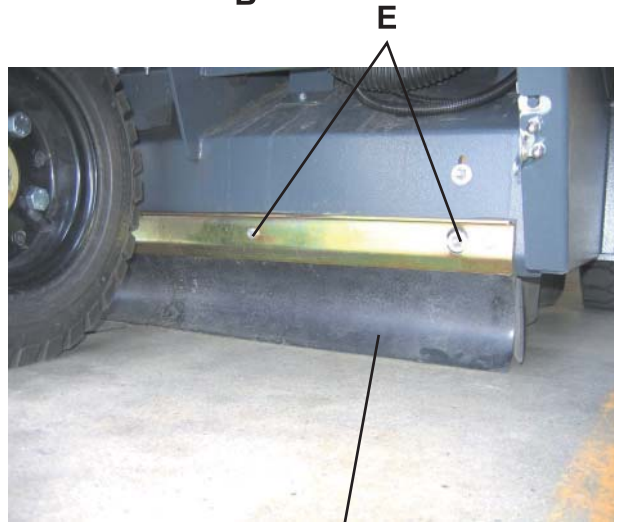
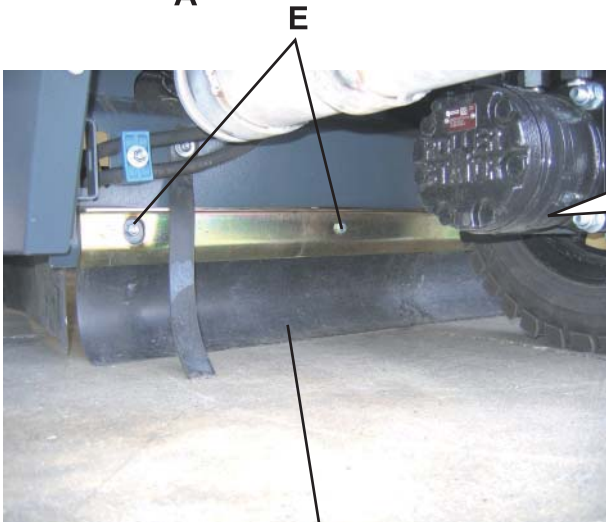
Front skirt

1. Remove the main broom (see the procedure in the relevant paragraph).
2. (*) Check that the hopper is fully lowered.
3. (*) Fully open the hopper dumping door.
4. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
5. Check the front skirt (F) for integrity by looking through the main broom compartment. Replace the front skirt when cut or torn/broken (see the procedure in the relevant paragraph), otherwise the machine vacuum capabilities can be affected.
Check that the front skirt (F) leans on the floor as shown in the figure; if it is detached from the floor proceed as follows:
 - If the front skirt (F) is not worn, adjust its height (see the procedure in Hopper Closure Check and Adjustment paragraph).
 - If the front skirt (F) is too worn, replace it (see the procedure in the relevant paragraph).

Reset

1. Assemble the components in the reverse order of disassembly.

SKIRT HEIGHT AND OPERATION CHECK [All versions] (Continues)



S301798

SKIRT

SIDE SKIRT DISASSEMBLY/ASSEMBLY [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

Preliminary operations

1. (*) Empty the hopper; if it contains a small quantity of material, it is not necessary to empty it.
2. (*) Drive the machine on a solid and level ground, then engage the parking brake.
3. (*) Fully lift the hopper.
4. To avoid that the hopper lowers by accident, install the safety support as shown below.
 - Pull the handle (A) fully backwards and, by keeping it in this position, lower the hopper by pushing the lever (B) forward until the hopper stops on the safety support.
 - Release the lever (B) and the handle (A).



WARNING!

It is essential to insert the safety support under the lifted hopper, even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

5. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
6. Remove the main broom (see the procedure in the relevant paragraph).

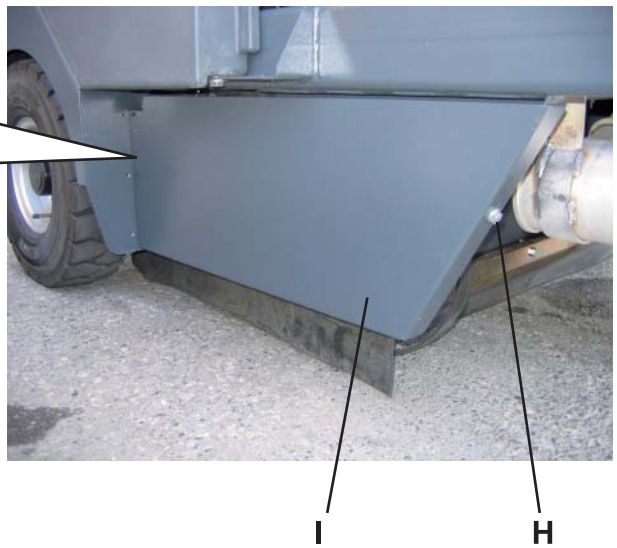
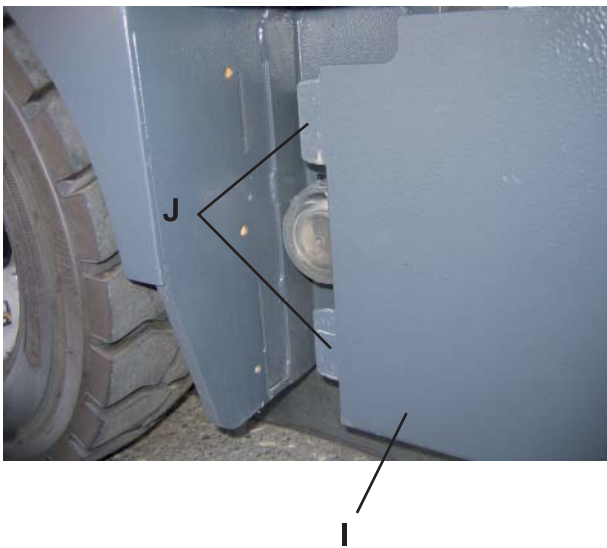
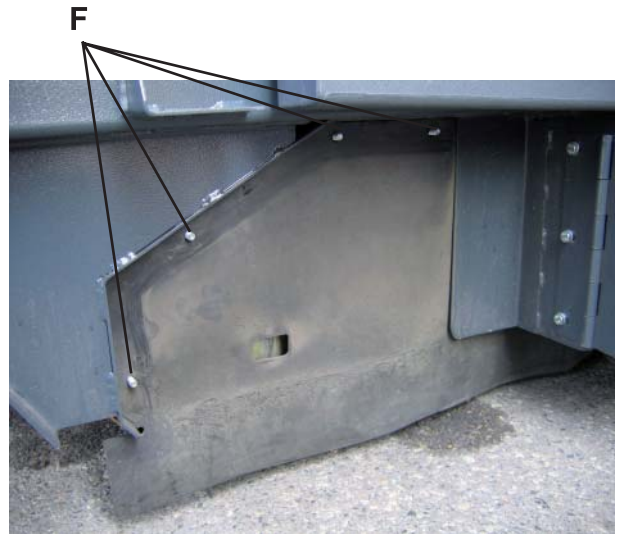
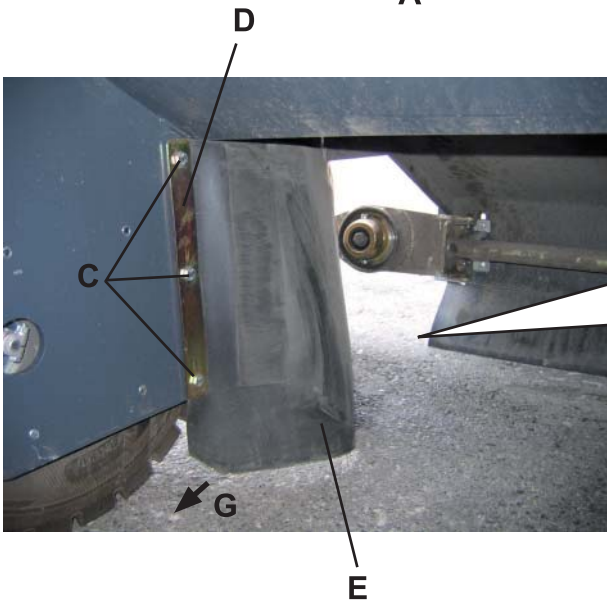
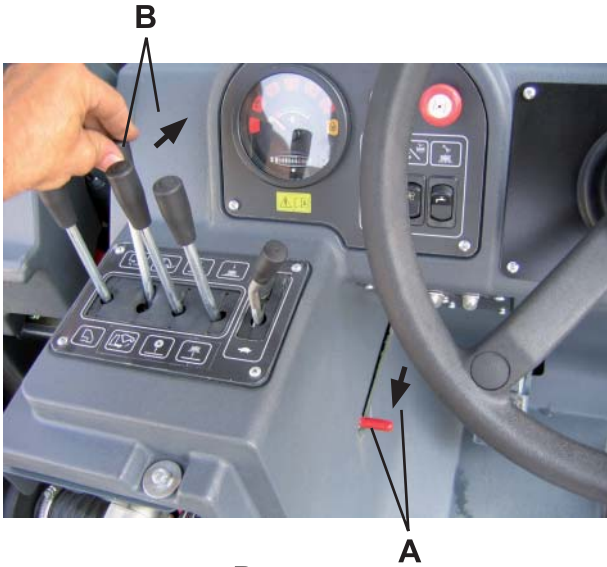
Right side skirt disassembly/assembly

1. Remove the skirt front mounting screw (C) inside the right front wheel.
2. Remove the rod (D).
3. Remove the right side skirt (E).
4. Assemble the right side skirt in the reverse order of disassembly, and note the following:
 - Place the right side skirt on the pins (F) and tighten the screws (C) while slightly pulling the skirt front end (E) in the direction shown by the arrow (G).
5. Check the right side skirt height as shown in the relevant paragraph.

Left side skirt disassembly/assembly

1. Lower the main broom with the lever (73).
2. Remove the mounting screw (H) on the left panel (I) of the main broom compartment.
3. Remove the left panel (I) by disengaging the fasteners (J).
4. Remove the mounting nuts (K) of the left skirt (L).
5. Remove the mounting screw (M) of the main broom tie rod (N). Recover the bushing (O) and the washer (P).
6. Remove the skirt front mounting screw (Q) inside the left front wheel.
7. Remove the rod (R).
8. Remove the left skirt (S).
9. Assemble the components in the reverse order of disassembly, and note the following:
 - Place the right side skirt on the threaded pins of the nuts (F) and tighten the screws (Q) while slightly pulling the skirt front end (S) in the direction shown by the arrow (T).
10. Check the left side skirt height as shown in the relevant paragraph.

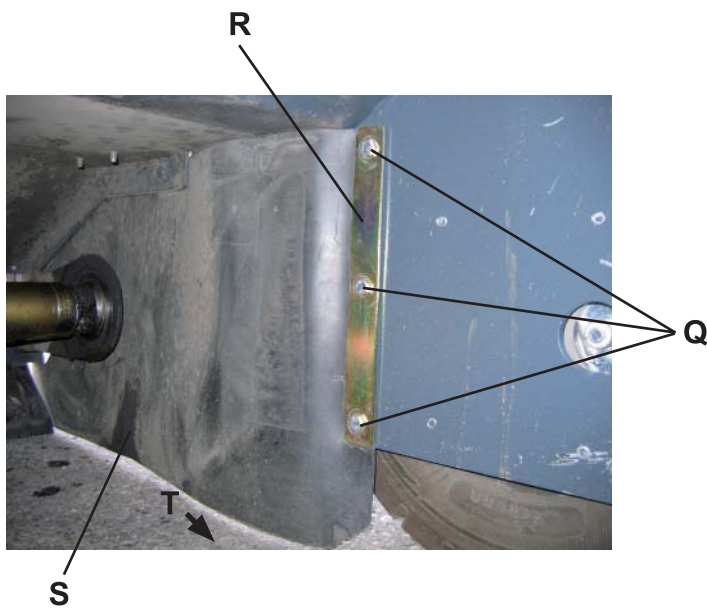
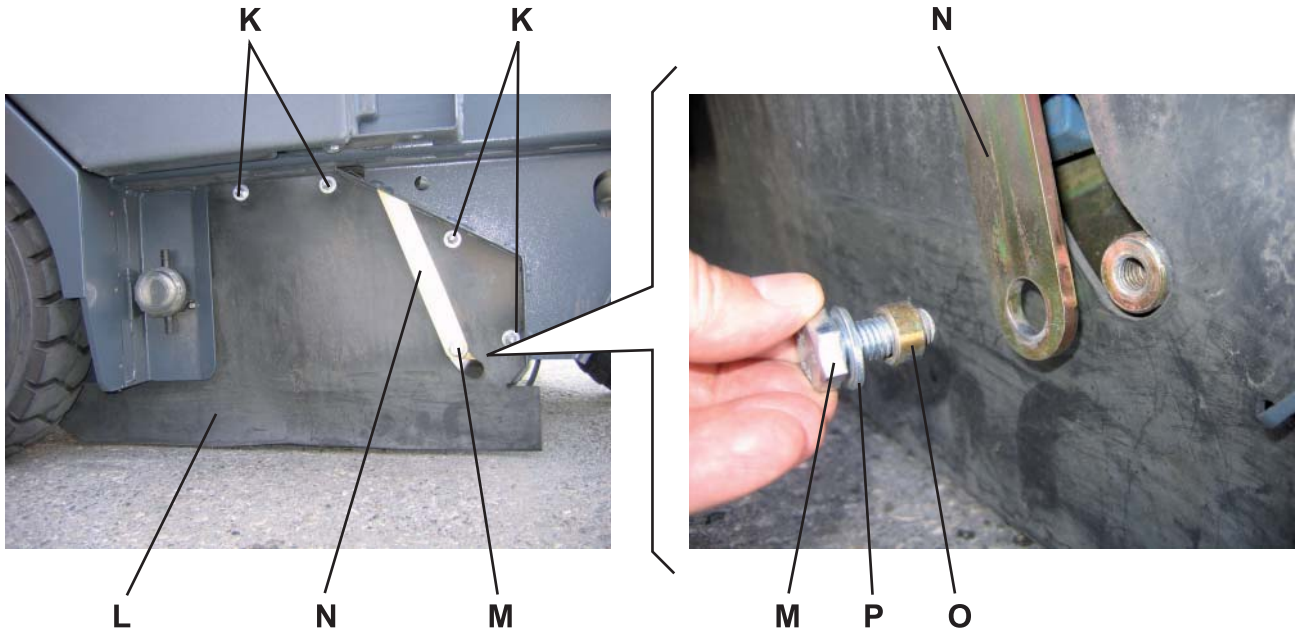
SIDE SKIRT DISASSEMBLY/ASSEMBLY [All versions] (Continues)



S301799

SKIRT

SIDE SKIRT DISASSEMBLY/ASSEMBLY [All versions] (Continues)



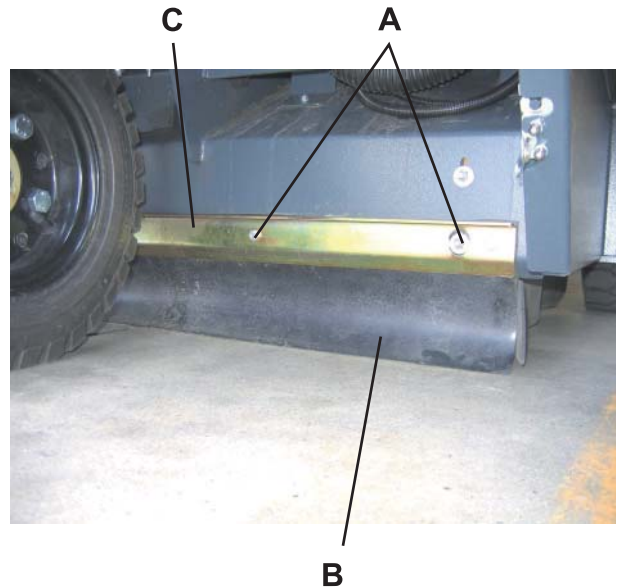
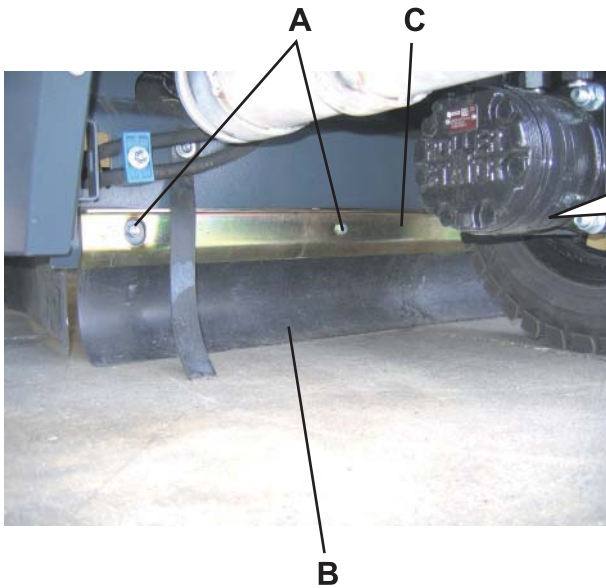
S301800

REAR SKIRT DISASSEMBLY/ASSEMBLY [All versions]**Disassembly**

1. Drive the machine on a level floor that is suitable for checking the skirt height.
2. Engage the parking brake.
3. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
4. Remove the mounting screws (A) of the rear skirt (B).
5. Remove the rod (C).
6. Remove the rear skirt (B).

Assembly

1. Assemble the components in the reverse order of disassembly, and note the following:
 - By using the slots of the mounting holes, adjust the rear skirt so that the distance from the floor is not higher than 0.2 in (6 mm), then tighten the screws (A).



S301801

SKIRT

FRONT SKIRT AND SIDE GASKET DISASSEMBLY/ASSEMBLY [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

Preliminary operations

1. (*) Empty the hopper; if it contains a small quantity of material, it is not necessary to empty it.
2. (*) Drive the machine on a solid and level ground, then engage the parking brake.
3. (*) Fully lift the hopper.
4. To avoid that the hopper lowers by accident, install the safety support as shown below.
 - Pull the handle (A) fully backwards and, by keeping it in this position, lower the hopper by pushing the lever (B) forward until the hopper stops on the safety support.
 - Release the lever (B) and the handle (A).



WARNING!

It is essential to insert the safety support under the lifted hopper, even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

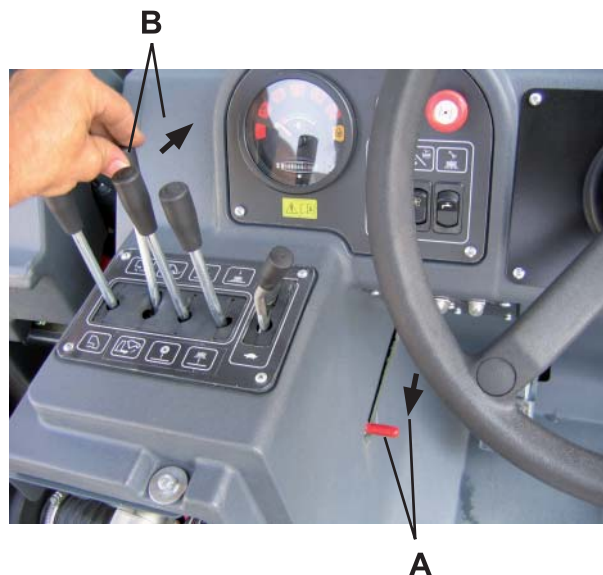
5. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.

Front skirt disassembly/assembly

1. Loosen the nuts (C) on the outer side of the hopper.
2. Remove the rod with the stud bolt (D) on the inner side.
3. Remove the front skirt (E).
4. Assemble the front skirt (E) in the reverse order of disassembly, and note the following:
 - Place the front skirt (F) on the side gaskets (G) then tighten the screws (C).
5. Check the front skirt height as shown in Hopper Closure Check and Adjustment paragraph.

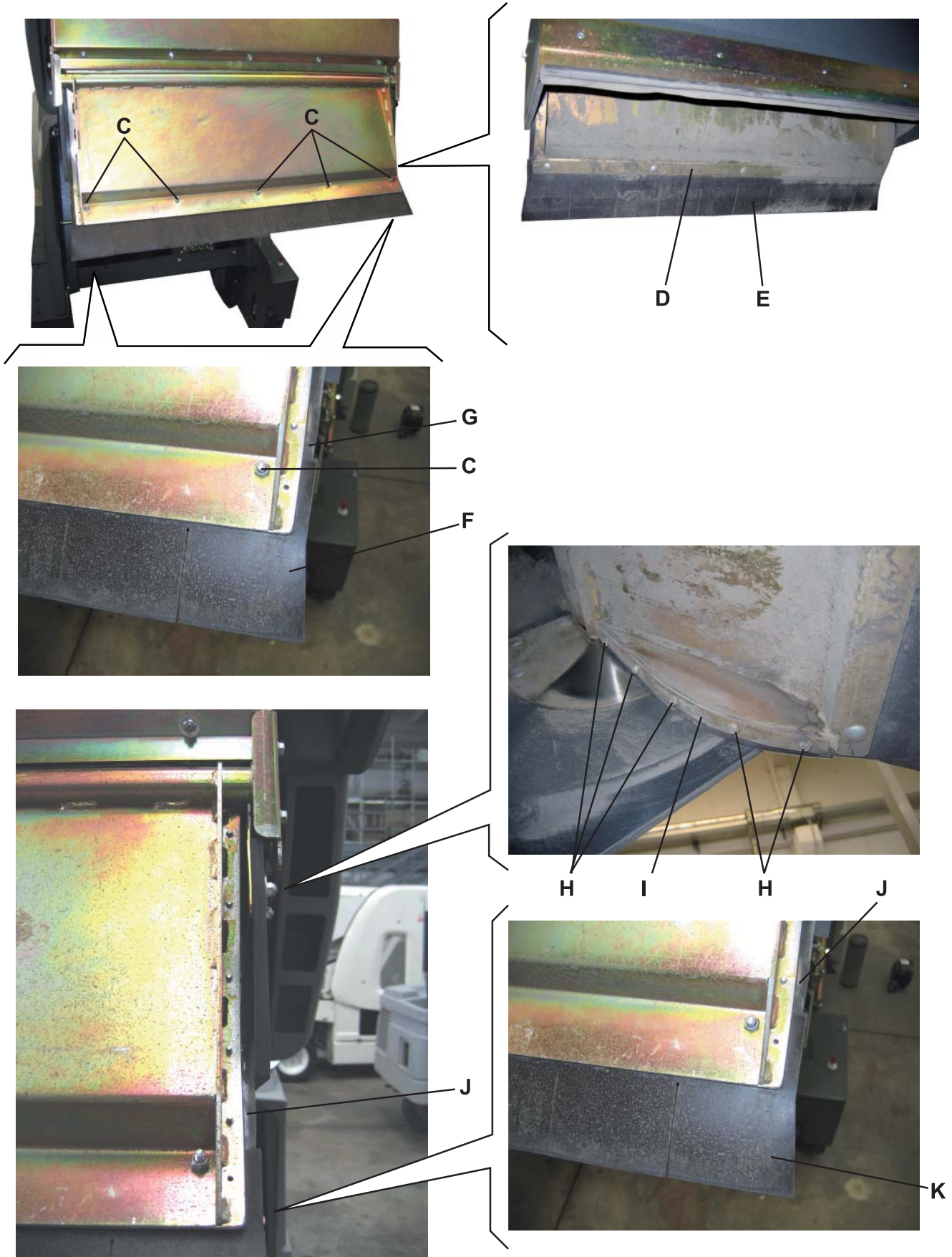
Side gasket disassembly/assembly

1. Remove the screws (H) of the side gasket to be removed, on the right or left inner side of the hopper.
2. Remove the rod (I).
3. Remove the side gasket (J).
4. Assemble the side gasket in the reverse order of disassembly, and note the following:
 - Place the side gasket (J) on the hopper and on the front skirt (K), then tighten the screws (H).



S301792

FRONT SKIRT AND SIDE GASKET DISASSEMBLY/ASSEMBLY [All versions] (Continues)



S301802

DUST AND DEBRIS COLLECTION SYSTEM

DUST AND DEBRIS COLLECTION SYSTEM

TROUBLESHOOTING [All versions]

The machine collects little dust

Possible causes

1. The vacuum system is turned off (turn on).
2. The hopper is full (empty it).
3. The skirts are not integral or not properly adjusted (replace/adjust).
4. The main broom height is not correct (adjust).
5. The dust filter is clogged (clean).
6. The filter shaker is faulty (replace the filter shaker motor).
7. The vacuum fan fins are broken/worn (replace the vacuum fan assembly).
8. The vacuum fan motor is faulty (check the motor/replace the vacuum fan assembly).
9. The thermal fuse is deactivated (reset the fuse).

The filter shaker motor does not work

Possible causes

1. The filter shaker motor connector is not properly connected (connect).
2. The motor is faulty (repair or replace).
3. The filter shaker push-button is broken (replace).
4. The wiring harness is damaged (repair).
5. The thermal fuse is deactivated (reset the fuse).

The hopper door does not close properly

Possible causes

1. The door is stuck by debris (clean).
2. The door is not properly adjusted (adjust).
3. The hydraulic cylinder is faulty (repair or replace).

DUST AND DEBRIS COLLECTION SYSTEM

FILTER SHAKER OPERATION CHECK [All versions]

1. Drive the machine and start sweeping as shown in the Instructions for use. Then empty the hopper. When the hopper has been dumped, turn on the filter shaker and check that more dust comes out by effect of the filter shaker activation. Check for filter shaker operation noise.

PANEL FILTER DISASSEMBLY/ASSEMBLY AND CLEANING [All versions]

The hopper panel filter must be cleaned regularly to maintain the efficiency of the vacuum system. Follow the recommended filter service intervals for the longest filter life.



WARNING!

- **Wear safety glasses when cleaning the filter.**
- **Do not puncture the filter.**
- **Clean the filter in a well-ventilated area.**
- **Wear appropriate dust mask to avoid breathing in dust.**

1. Drive the machine on a level floor, engage the parking brake and turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
2. Open the latches (A) and lift the front hood (B) then hold it with the support rod (C).
3. Check the dust filter upper part (D) for damage. A large amount of dust on top of the filter is usually caused by a hole in the filter or a damaged filter gasket.
4. Unscrew the filter shaker assembly mounting knobs (E). Lift the filter shaker assembly (F) to access the filter (D).
5. Lift the filter (D) and remove it from the machine.
6. Clean the filter (D) by using one of the following methods:

Method "A"

Vacuum loose dust from the filter. Then gently tap the filter against a flat surface (with the dirty side down) to remove loose dust and dirt.



NOTE

Take care not to damage the metal lip which extends past the gasket.

Method "B"

Vacuum loose dust from the filter. Then blow compressed air (maximum pressure 87.0 psi (6 Bar)) into the clean side of the filter (in the opposite direction of the airflow).

Method "C"

Vacuum loose dust from the filter. Then soak the filter in warm water for 15 minutes, then rinse it under a gentle stream of water (maximum pressure 36.0 psi (2.5 Bar)). Let the filter dry completely before installing it back into the machine.



NOTE

For proper drying, lay the filter horizontally on two spacers to allow the air to flow under the filter.



NOTE

For a better cleaning, it is allowed to wash the filter with water and non-lathering detergents. This provides better quality cleaning but reduces the life of the filter, which will have to be replaced more frequently. Using inadequate detergents can damage the filter.

7. Assemble the filter in the reverse order of disassembly, and note the following:
 - Install the filter with the wire gauze up.
 - If the filter gasket is damaged or missing, it must be replaced.

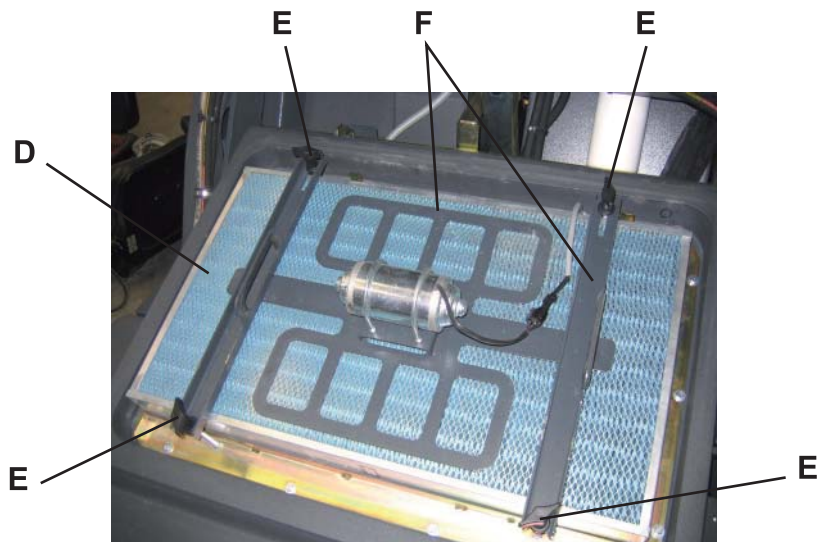
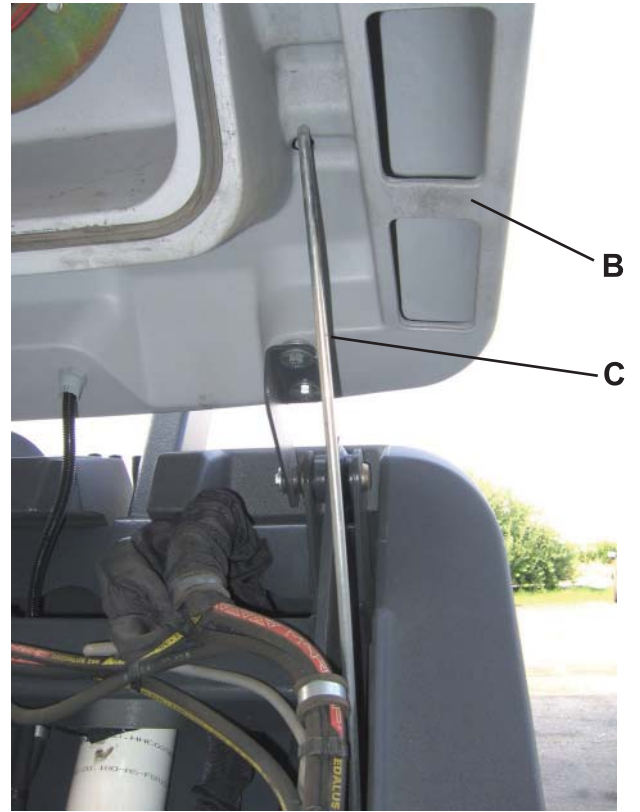
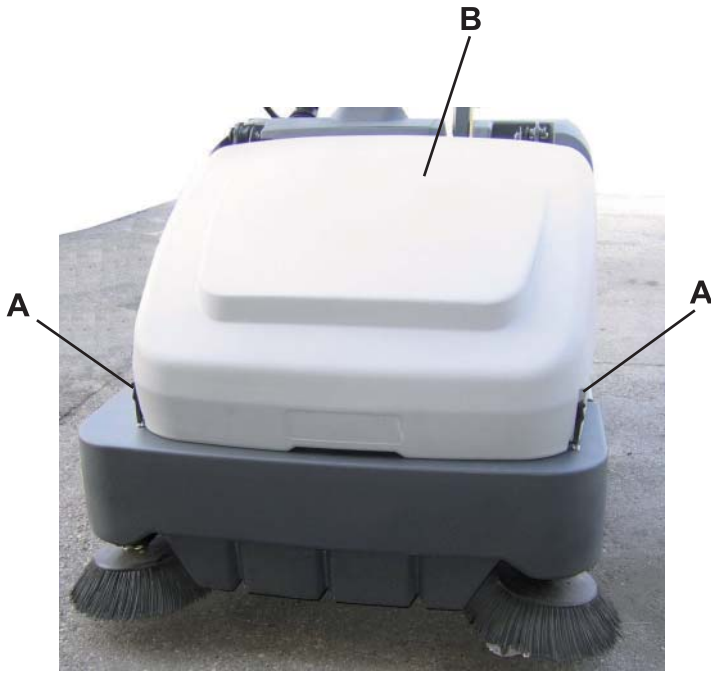


NOTE

Before installing the filter, clear debris from dust plate located under filter. Check that the debris skirt at the rear of the dust plate swings freely.

DUST AND DEBRIS COLLECTION SYSTEM

PANEL FILTER DISASSEMBLY/ASSEMBLY AND CLEANING [All versions] (Continues)



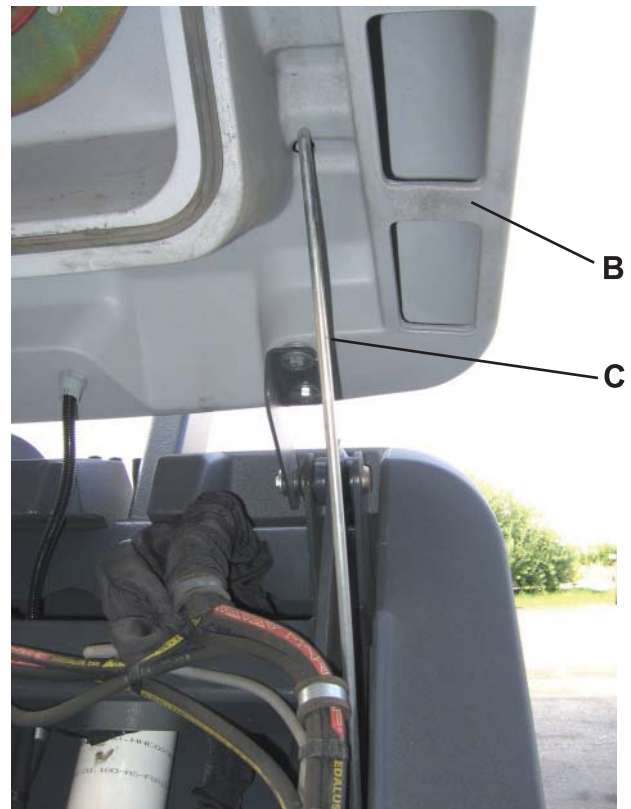
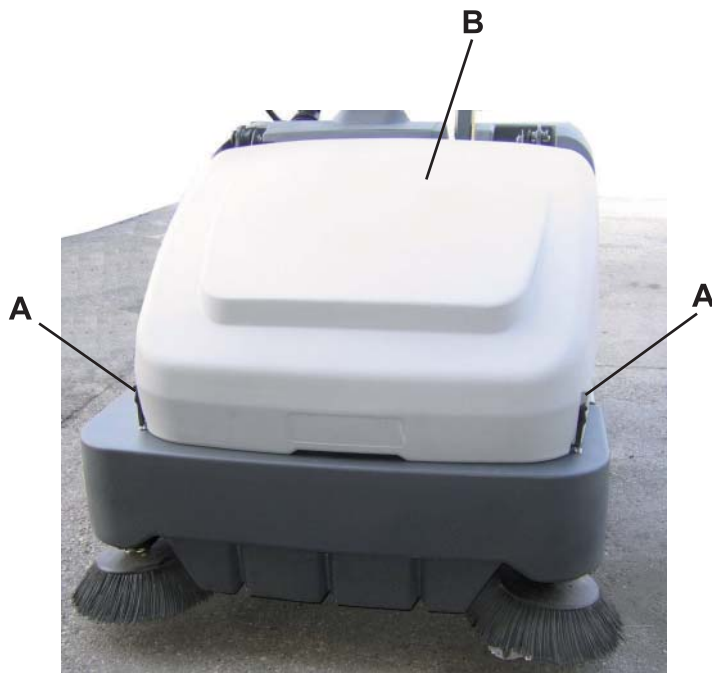
S301803

DUST AND DEBRIS COLLECTION SYSTEM

CLOSED POCKET FILTER CLEANING (WITHOUT REMOVING IT FORM THE MACHINE) [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

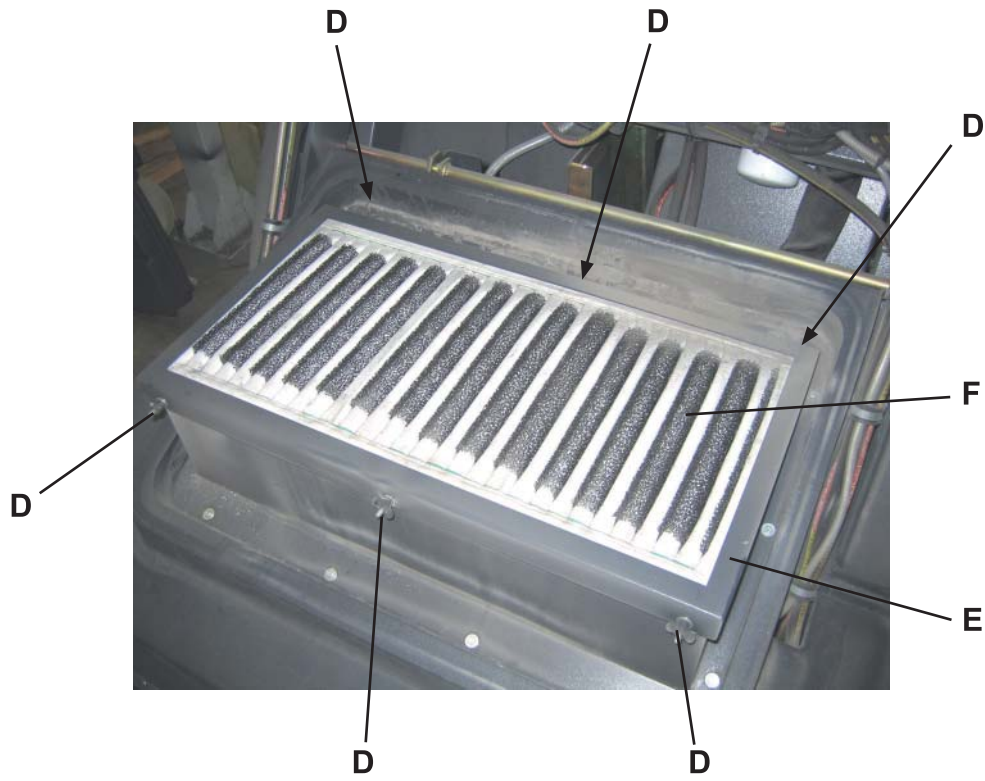
1. (*) Drive the machine to an appropriate area where the closed pocket filter can be cleaned with compressed air.
2. (*) Turn on the filter shaker to remove dust from the closed pocket filter as much as possible.
3. Engage the parking brake.
4. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
5. Open the latches (A) of the front hood (B).
6. Open the front hood (B) and hold it with the support rod (C).
7. Loosen the knobs (D) and remove the mounting frame (E) of the closed pocket filter (F).
8. Lift one side of the closed pocket filter (G) then, with a proper tool, vacuum the inner and outer surfaces of the filter pockets. Lower the filter side and perform the procedure on the other side of the filter.
With a compressed air gun (maximum pressure 87.0 psi (6 Bar)), remove dust deposits from the inner and outer surfaces of the filter pockets.
Lower the closed pocket filter.
9. Assemble the components in the reverse order of disassembly.



S301803

DUST AND DEBRIS COLLECTION SYSTEM

CLOSED POCKET FILTER CLEANING (WITHOUT REMOVING IT FORM THE MACHINE) [All versions] (Continua)



S301811

DUST AND DEBRIS COLLECTION SYSTEM

CLOSED POCKET FILTER DISASSEMBLY/ASSEMBLY AND CLEANING [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

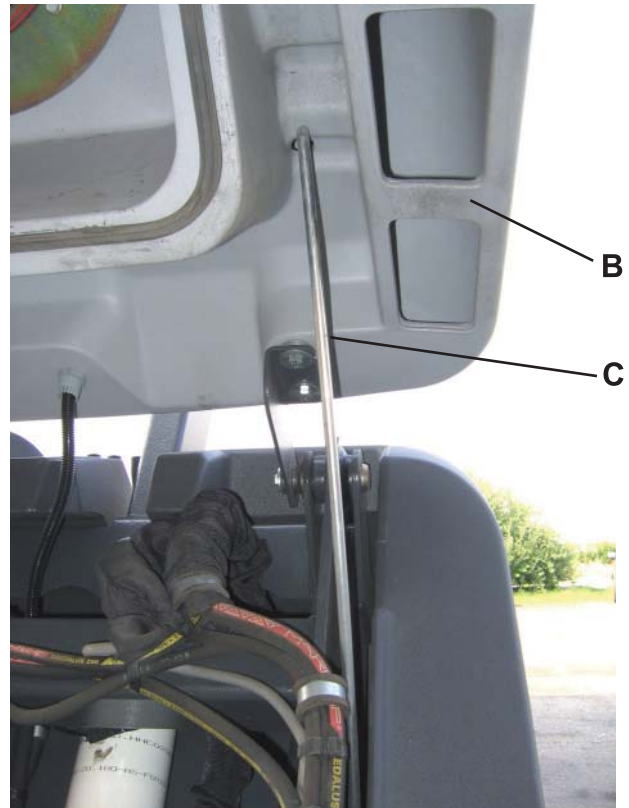
1. (*) Drive the machine to an appropriate area where the closed pocket filter can be cleaned with compressed air.
2. (*) Turn on the filter shaker to remove dust from the closed pocket filter as much as possible.
3. Engage the parking brake.
4. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
5. Release the rear hood (1) with the lever (25), then fully lift it.
6. Disconnect the battery negative pole (3).
7. Open the latches (A) of the front hood (B).
8. Open the front hood (B) and hold it with the support rod (C).
9. Loosen the knobs (D) and remove the mounting frame (E) of the closed pocket filter.
10. Loosen the nuts (F).
11. With the help of two operators, lift the closed pocket filter with the frame (G) and disconnect the filter shaker motor electrical connection; then lay the closed pocket filter assembly on the floor.
12. Remove the screws (H) and the guard (I).
13. Remove the screws with the nuts (J) and remove the cross member assembly with the filter shaker motor (K).
14. If necessary, unscrew the nuts (L) and remove the brackets (M) then recover the filter shaker motor (N) by disengaging the dowel (O) from its housing (P).
15. Remove the screws (Q) and the profiles (R).
16. Remove the comb (S) and the frame (T).
17. Recover the closed pocket filter (U).

Cleaning

1. With a proper tool vacuum the inner and outer surfaces of the filter pockets (U).
With a compressed air gun (maximum pressure 87.0 psi (6 Bar)), remove dust deposits from the inner and outer surfaces of the filter pockets (U).

Assembly

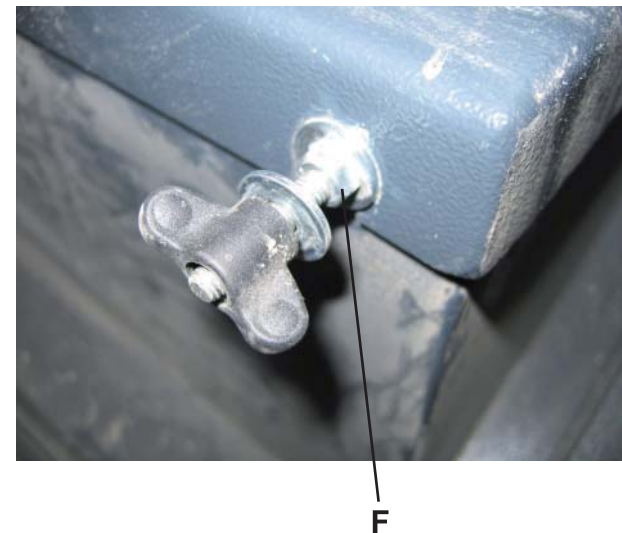
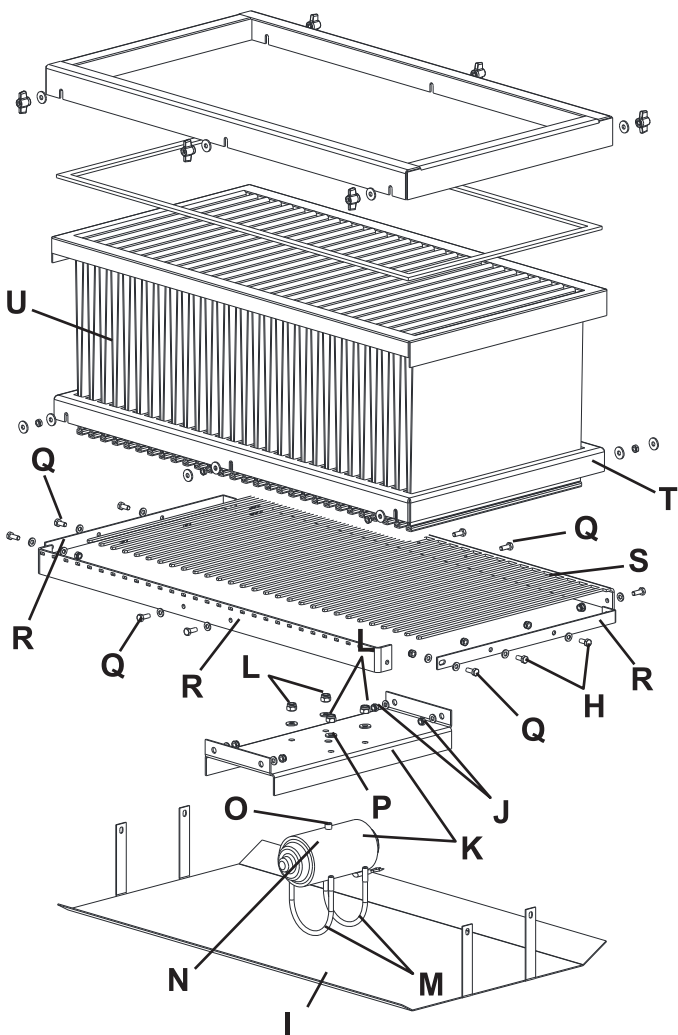
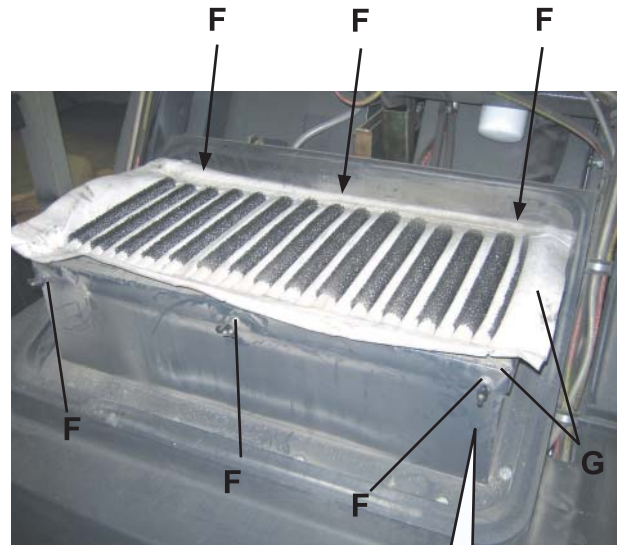
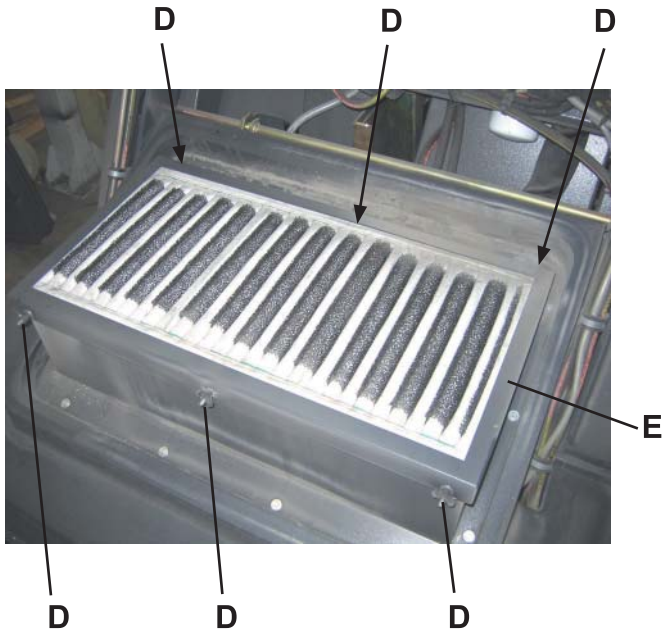
1. Assemble the components in the reverse order of disassembly.



S301803

DUST AND DEBRIS COLLECTION SYSTEM

CLOSED POCKET FILTER DISASSEMBLY/ASSEMBLY AND CLEANING [All versions] (Continues)



S301866

DUST AND DEBRIS COLLECTION SYSTEM

HOPPER CLOSURE CHECK AND ADJUSTMENT [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

1. (*) Fully empty the hopper.
2. (*) Drive the machine on a solid and level ground, then engage the parking brake.
3. Remove the main broom (see the procedure in the relevant paragraph).
4. Fully lower the hopper and fully open the hopper dumping door.
5. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
6. By looking through the main broom compartment, check that the hopper dumping door front skirt (A) lays on the ground as shown in the figure; otherwise adjust it as shown below.
7. (*) Fully lift the hopper.
8. To avoid that the hopper lowers by accident, install the safety support as shown below.
 - Pull the handle (B) fully backwards and, by keeping it in this position, lower the hopper by pushing the lever (C) forward until the hopper stops on the safety support.
 - Release the lever (C) and the handle (B).

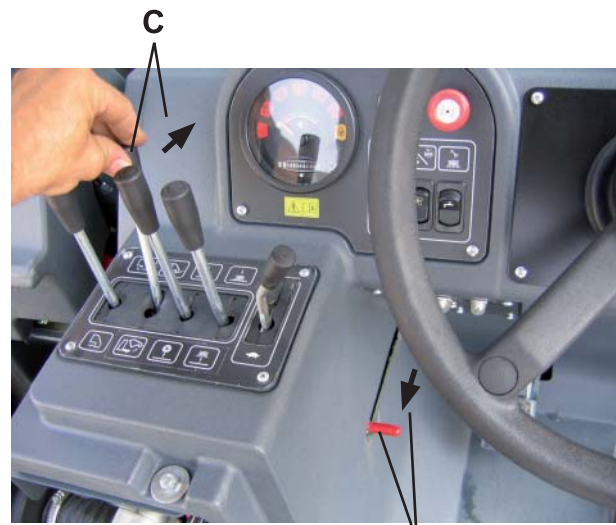
**WARNING!**

It is essential to insert the safety support under the lifted hopper, even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

9. (*) Close the hopper door (D).
10. Check that the front skirt (E) touches the profile (F), all along its length.
11. If necessary, restore the conditions indicated in steps 6 and 10 according to the following procedure:
 - (*) Partially open the hopper door (D).
 - Loosen the locknut (G).
 - Operate in the position (H) to adjust the door hydraulic cylinder rod (I) until the required conditions are satisfied.
 - Tighten the locknut (G).
 - Perform steps 9 and 10 again.
 - Remove the hopper safety support in the reverse order, then perform steps 4 to 6 again.
12. Install the main broom (see the procedure in the relevant paragraph).
13. (*) Turn off the machine.



A

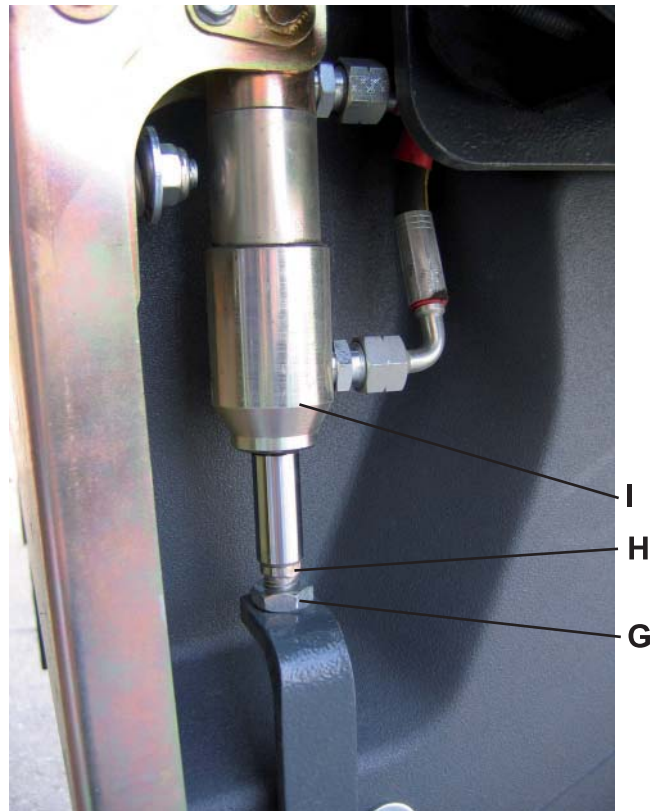
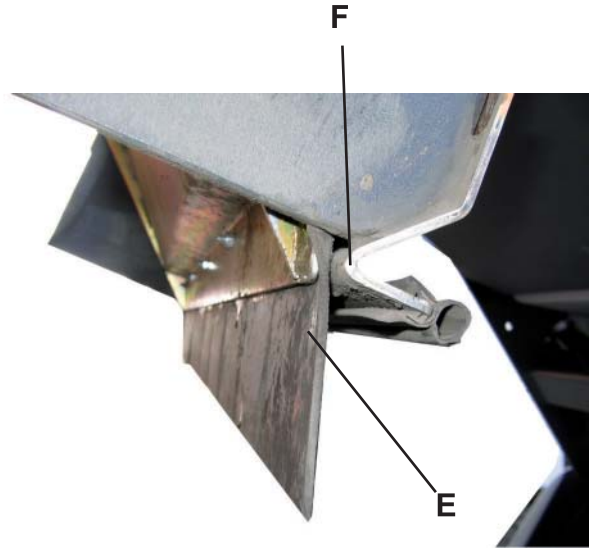
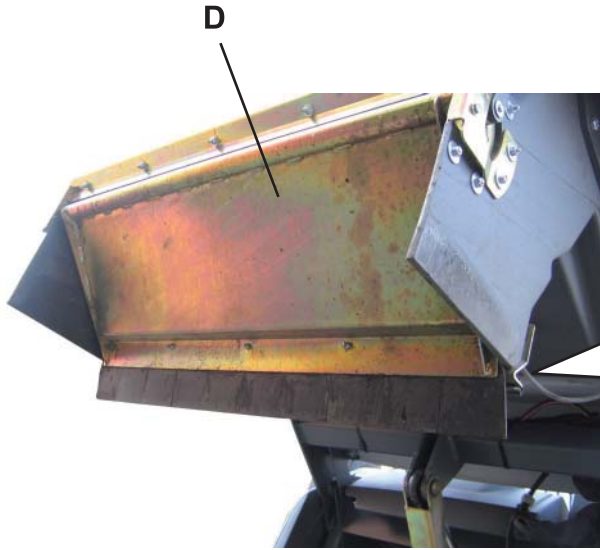


B

S301804

DUST AND DEBRIS COLLECTION SYSTEM

HOPPER CLOSURE CHECK AND ADJUSTMENT [All versions] (Continues)



S301805

DUST AND DEBRIS COLLECTION SYSTEM

VACUUM FAN MOTOR ELECTRICAL INPUT CHECK [All versions]

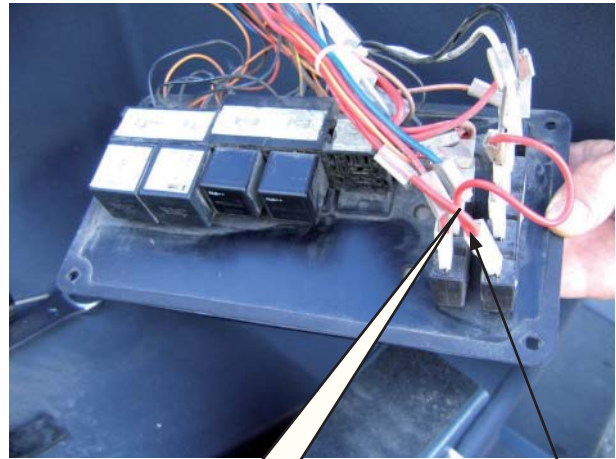
**WARNING!**

This procedure must be performed by qualified personnel only.

1. Remove the fuse and relay panel (A) under the steering wheel.
2. Set an ammeter (B) on the dust control system F1 fuse cable (C).
3. Turn on the vacuum system and check that the motor electrical input is:
 - 5 A a 48 V for battery version
 - 14 A a 12 V for engine versions
4. Turn off the vacuum system, then remove the ammeter (B).
5. If the electrical input is higher, make sure that the vacuum fan can turn freely and check it for dirt and foreign material. If the above-mentioned procedures do not lead to a proper electrical input, the motor must be replaced (see the procedure in the relevant paragraph).
6. Install the panel (A).



A



C



B

S301806

DUST AND DEBRIS COLLECTION SYSTEM

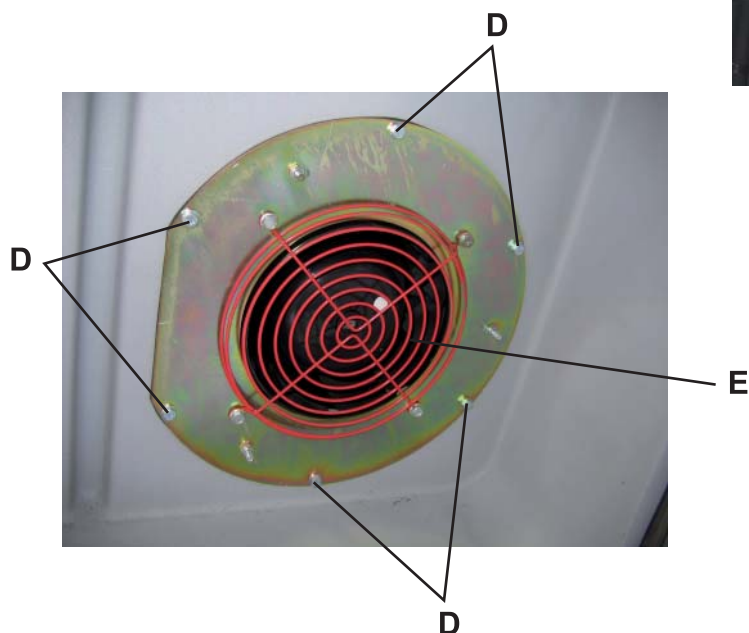
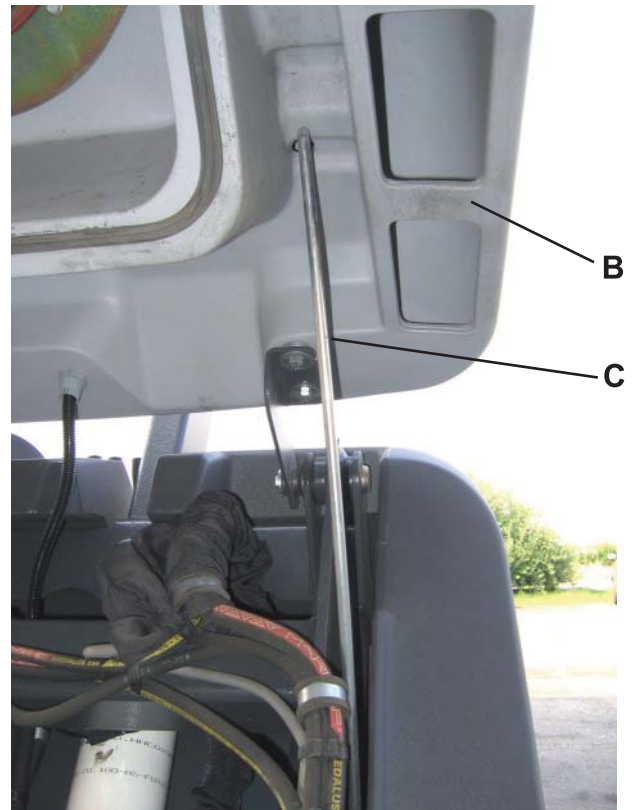
VACUUM FAN DISASSEMBLY/ASSEMBLY [All versions]

Disassembly

1. Engage the parking brake.
2. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
3. Release the rear hood (1) with the lever (25), then fully lift it.
4. Disconnect the battery negative pole (3).
5. Open the latches (A) of the front hood (B).
6. Open the front hood (B) and hold it with the support rod (C).
7. Remove the screw (D) on the front hood.
8. Remove the vacuum fan unit (E).
9. Disconnect the electrical connection (F).
10. Remove the vacuum fan unit (G).
11. At the workbench, remove the screws (I) and the support (J).
12. Remove the nuts (K) and recover the vacuum fan with the motor (L).

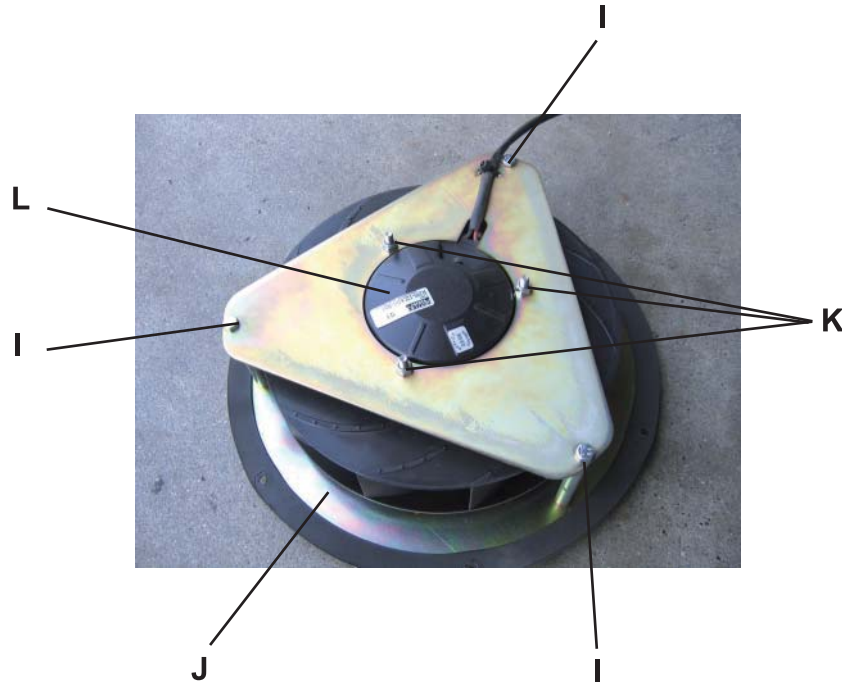
Assembly

1. Assemble the components in the reverse order of disassembly.



DUST AND DEBRIS COLLECTION SYSTEM

VACUUM FAN DISASSEMBLY/ASSEMBLY [All versions] (Continues)



S301808

DUST AND DEBRIS COLLECTION SYSTEM

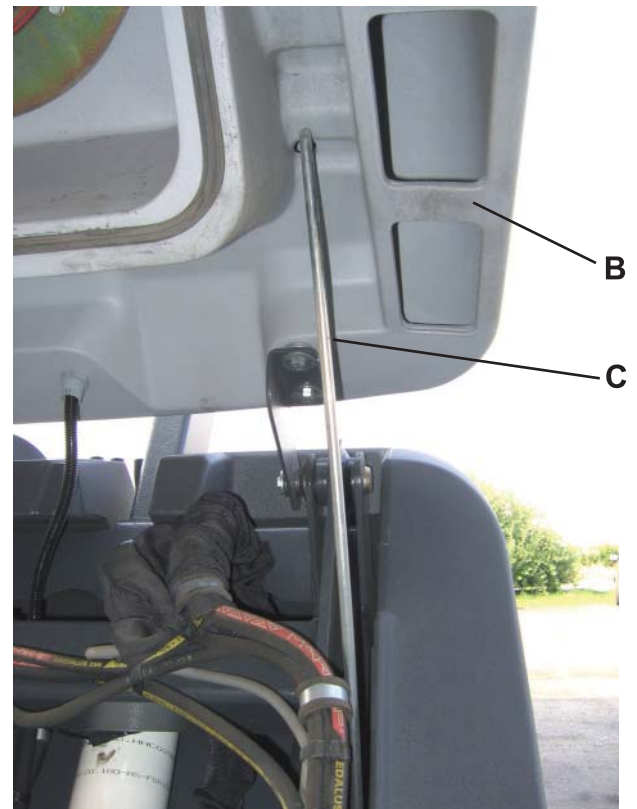
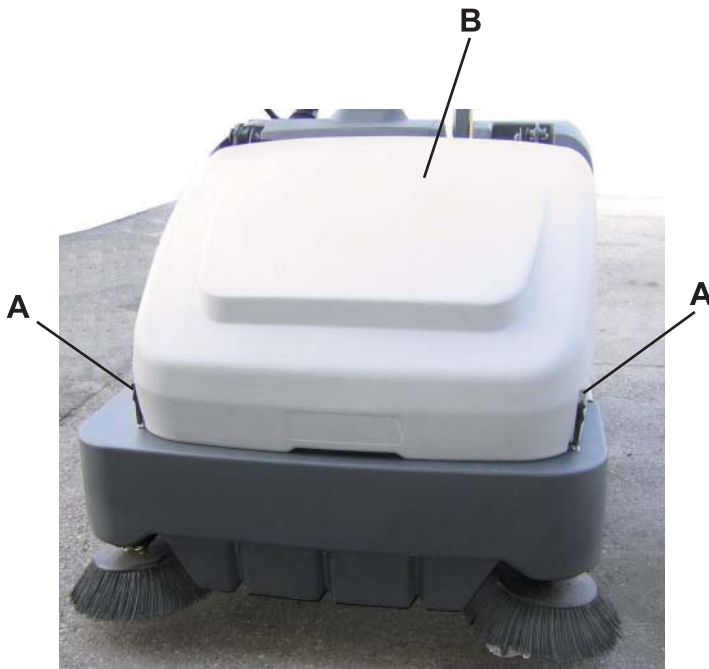
PANEL FILTER SHAKER MOTOR DISASSEMBLY/ASSEMBLY [All versions]

Disassembly

1. Engage the parking brake.
2. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
3. Release the rear hood (1) with the lever (25), then fully lift it.
4. Disconnect the battery negative pole (3).
5. Open the latches (A) of the front hood (B).
6. Open the front hood (B) and hold it with the support rod (C).
7. Disconnect the electrical connection (D) of the filter shaker motor (E).
8. Loosen the filter shaker assembly mounting knobs (F).
9. Grasp the handles (G) and remove the filter shaker assembly (H).
10. Unscrew the nuts (I) and remove the mounting brackets (J) of the filter shaker motor (K).
11. Remove the filter shaker motor (K).

Assembly

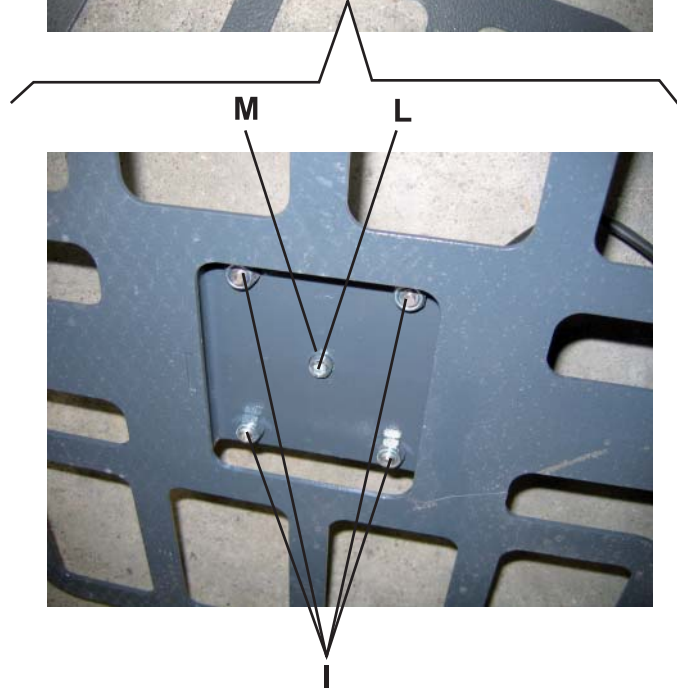
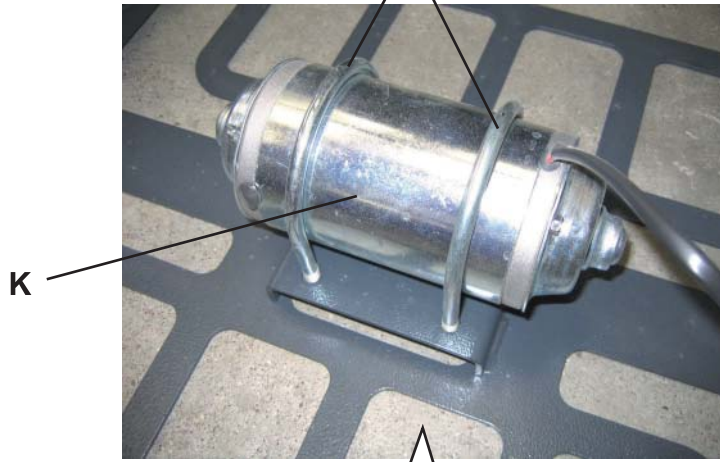
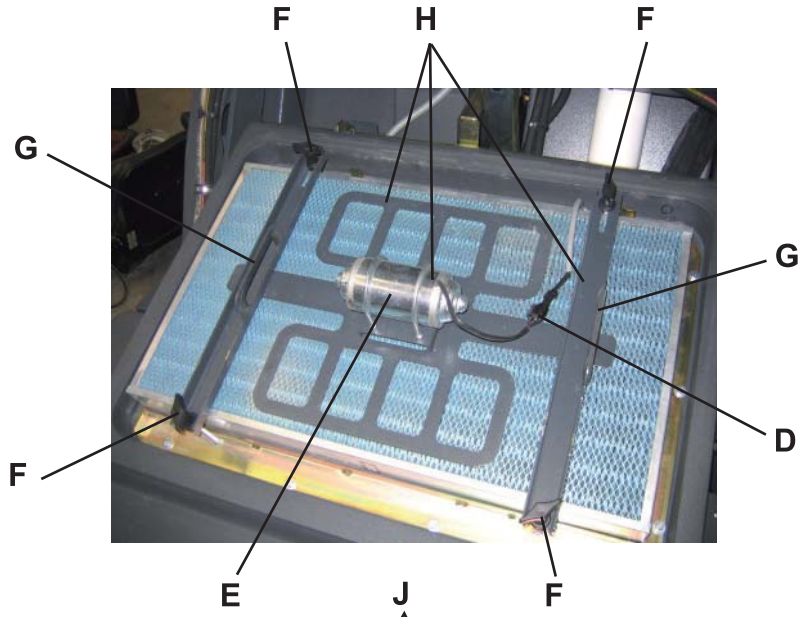
1. Assemble the components in the reverse order of disassembly, and note the following:
 - Install the filter shaker (K) with the screw (L) placed at the hole (M) on the holder.



S301803

DUST AND DEBRIS COLLECTION SYSTEM

PANEL FILTER SHAKER MOTOR DISASSEMBLY/ASSEMBLY [All versions] (Continues)



S301810

DUST AND DEBRIS COLLECTION SYSTEM

CLOSED POCKET FILTER SHAKER MOTOR DISASSEMBLY/ASSEMBLY [All versions]

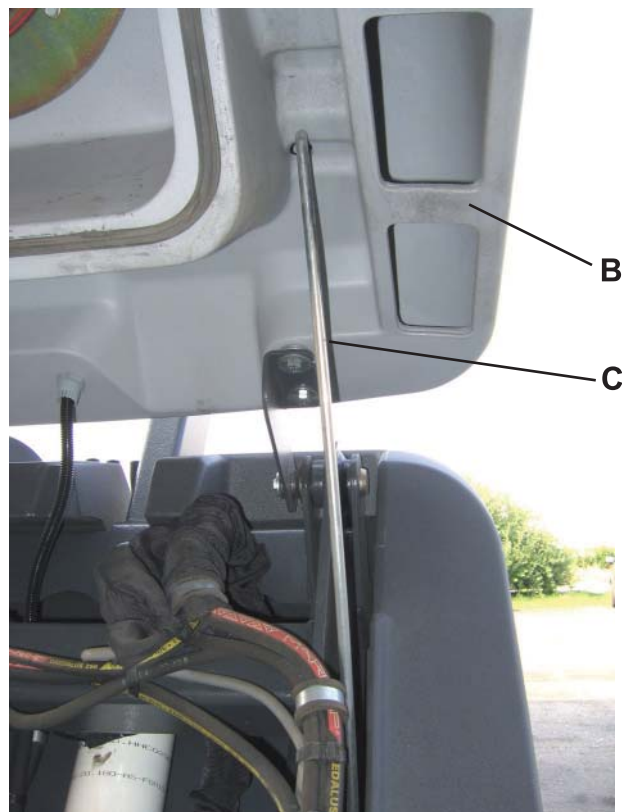
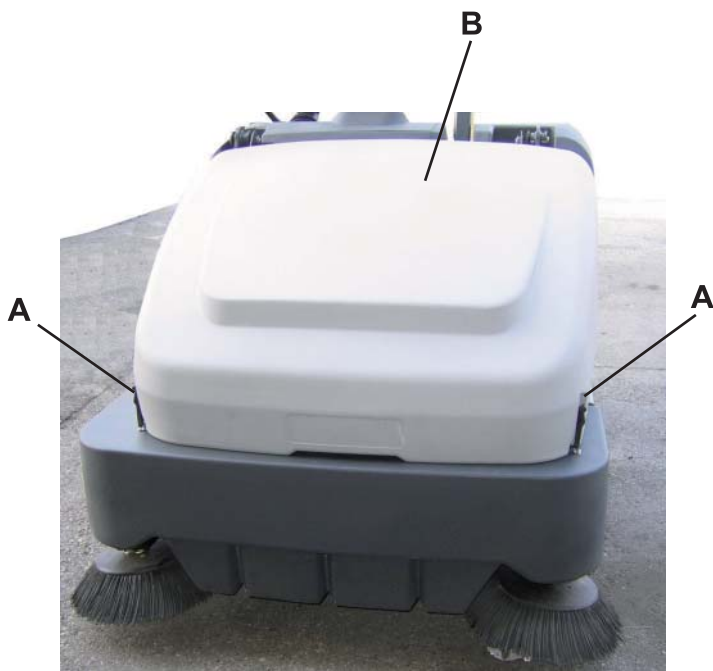
(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. (*) Drive the machine on a level ground and engage the parking brake.
2. (*) Turn on the filter shaker to remove dust from the closed pocket filter as much as possible.
3. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
4. Release the rear hood (1) with the lever (25), then fully lift it.
5. Disconnect the battery negative pole (3).
6. Open the latches (A) of the front hood (B).
7. Open the front hood (B) and hold it with the support rod (C).
8. Loosen the knobs (D) and remove the mounting frame (E) of the closed pocket filter.
9. Loosen the nuts (F).
10. With the help of two operators, lift the closed pocket filter with the frame (G) and disconnect the filter shaker motor electrical connection; then lay the closed pocket filter assembly on the floor.
11. Remove the screws (H) and the guard (I).
12. Remove the screws with the nuts (J) and remove the cross member assembly with the filter shaker motor (K).
13. Remove the nuts (L) and the brackets (M).
14. Recover the filter shaker motor (N) by disengaging the dowel (O) from its seat (P).

Assembly

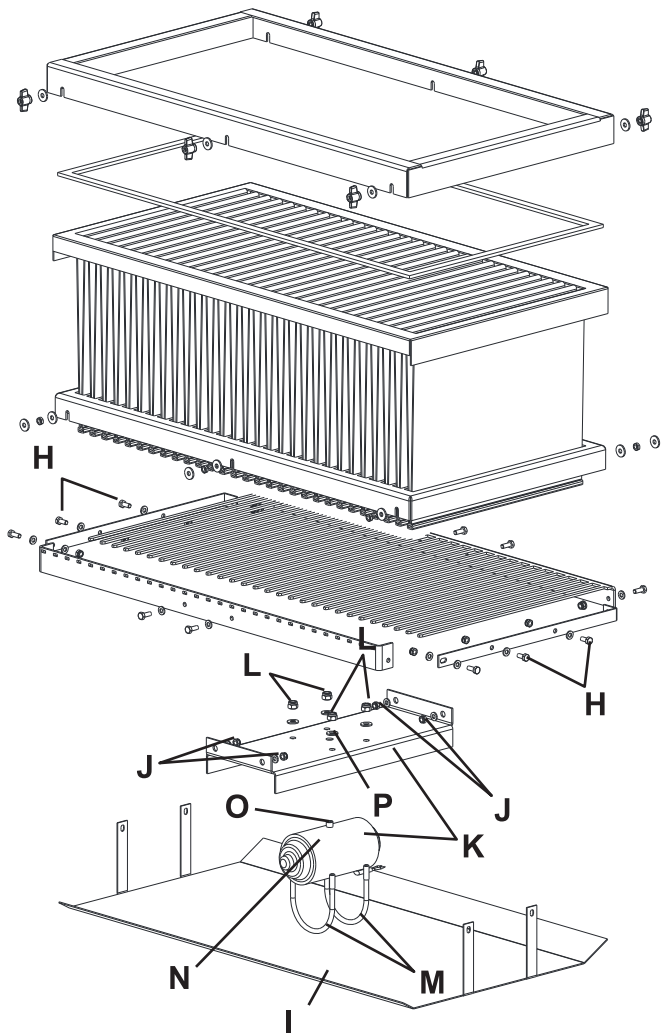
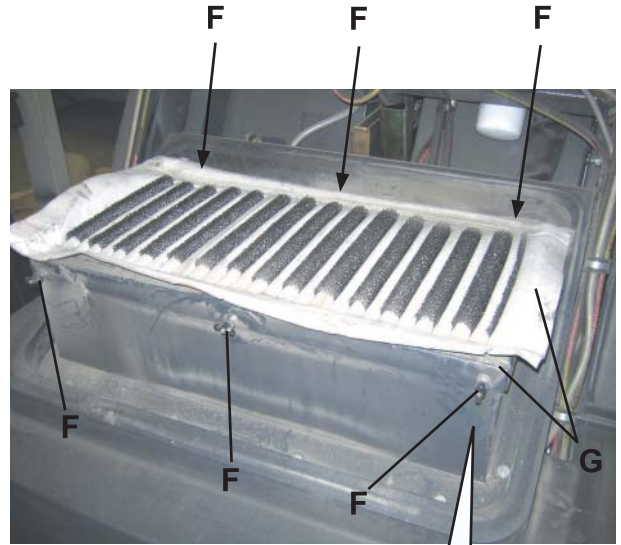
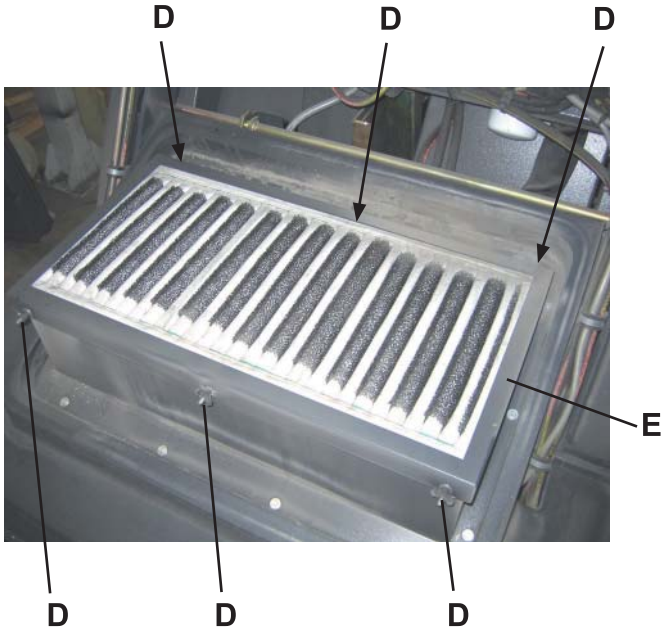
1. If necessary, before installing the filter shaker motor, clean the closed pocket filter (see the procedure in the relevant paragraph).
2. Assemble the components in the reverse order of disassembly.



S301803

DUST AND DEBRIS COLLECTION SYSTEM

CLOSED POCKET FILTER SHAKER MOTOR DISASSEMBLY/ASSEMBLY [All versions] (Continues)



S301812

DUST AND DEBRIS COLLECTION SYSTEM

HOPPER DOOR OPENING/CLOSING HYDRAULIC CYLINDER DISASSEMBLY/ASSEMBLY [All versions]


CAUTION!

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. (*) Empty the hopper; if it contains a small quantity of material, it is not necessary to empty it.
2. (*) Drive the machine on a solid and level ground, then engage the parking brake.
3. (*) Fully lift the hopper.
4. To avoid that the hopper lowers by accident, install the safety support as shown below.
 - Pull the handle (A) fully backwards and, by keeping it in this position, lower the hopper by pushing the lever (B) forward until the hopper stops on the safety support.
 - Release the lever (B) and the handle (A).


WARNING!

It is essential to insert the safety support under the lifted hopper, even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

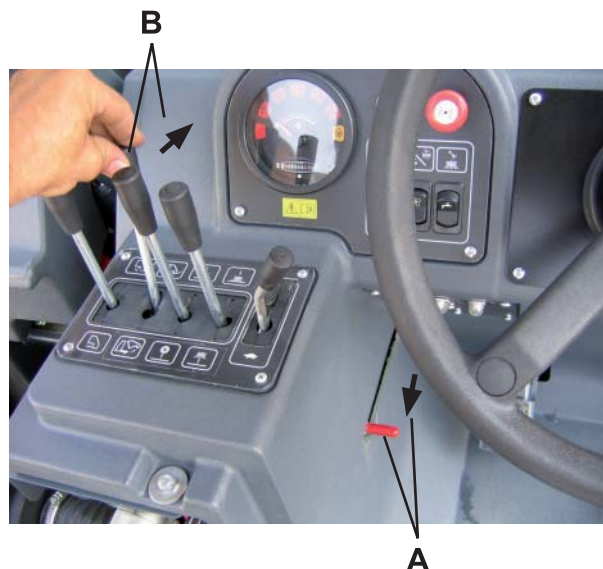
5. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
6. Unscrew the nuts (C) and disconnect the hoses (D) from the door opening/closing cylinder (E).
7. Remove the screw (F) and the pin with the flange (G).
8. Remove the screw (H).
9. Remove the hydraulic cylinder with the lever (I).
10. If necessary, at the workbench:
 - Loosen the loosen (J) and unscrew the lever (K) from the cylinder rod.
 - Unscrew the fittings (L) and (M).


CAUTION!

The fitting (L) has a calibrated hole and must not be mistaken for the fitting (M).

Assembly

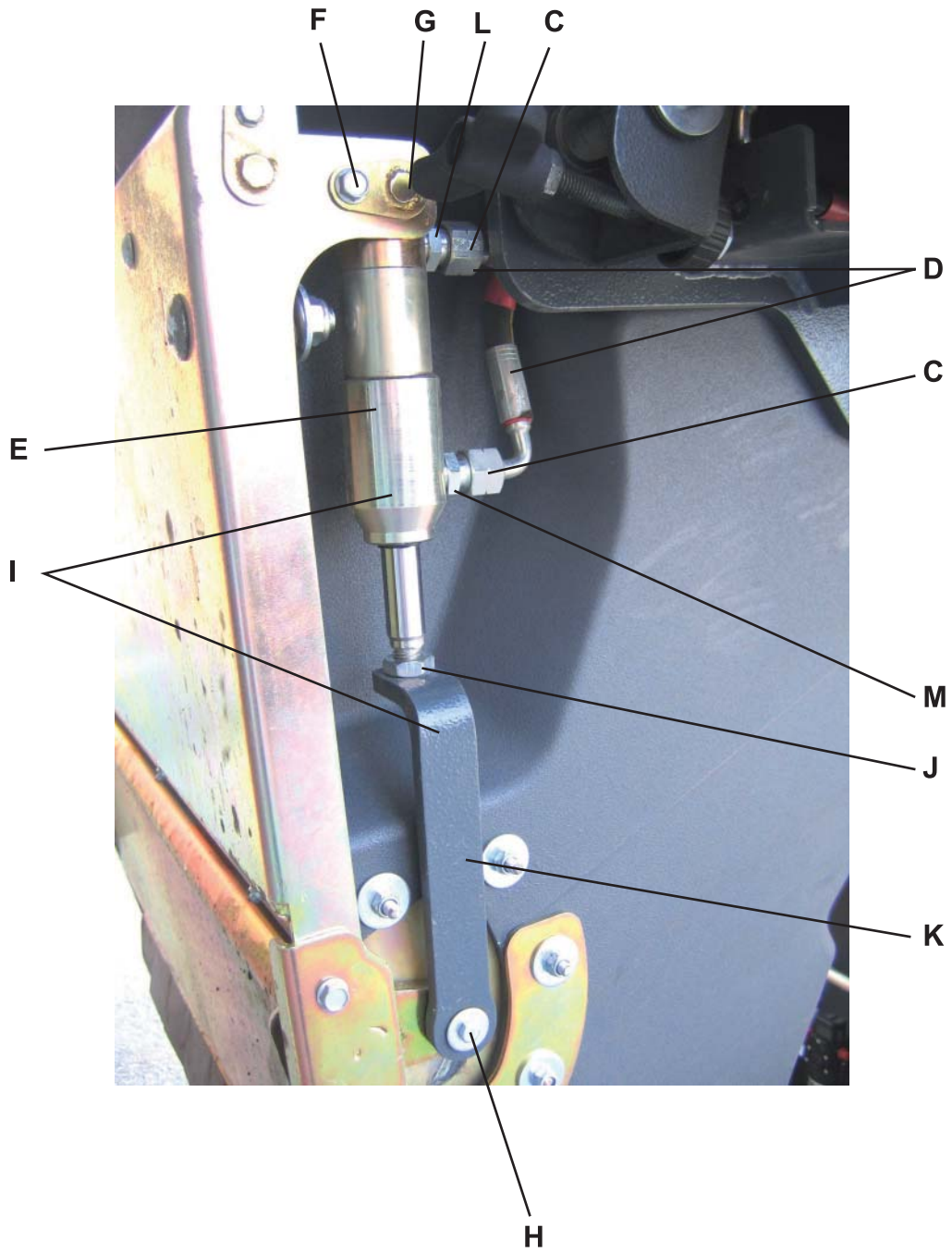
1. Assemble the components in the reverse order of disassembly.
2. Check and adjust the hopper closure (see the procedure in the relevant paragraph).



S301792

DUST AND DEBRIS COLLECTION SYSTEM

HOPPER DOOR OPENING/CLOSING HYDRAULIC CYLINDER DISASSEMBLY/ASSEMBLY [All versions] (Continues)



S301816

DUST AND DEBRIS COLLECTION SYSTEM

HOPPER LIFTING HYDRAULIC CYLINDER DISASSEMBLY/ASSEMBLY [All versions]

**CAUTION!**

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.

**CAUTION!**

If necessary, remove "Bonded" washers and replace them.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. (*) Empty the hopper.
2. (*) Drive the machine on a solid and level ground, then engage the parking brake.
3. (*) Lift the hopper nearly to the end-of-stroke.
Open the hopper door (A).
Lower the hopper until the side profiles (B) are horizontal, then lay the rear profile (C) on a proper holder (D). Take into consideration that, when removing the hydraulic cylinder, the holder (D) must bear the whole weight of the hopper (approximate weight: 661 lb (300 kg)).
If necessary, before laying the profile (C) on the holder (D), remove the gasket (E) to prevent it from damage.
4. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
5. Release the rear hood (1) with the lever (25), then fully lift it.
6. Remove the retaining ring (F).
7. Mark the position of the shim rings (G) for proper assembly.
8. Remove the pin (H) and recover the shim rings (G).
9. Remove the rod (I).
10. Disconnect the hoses (J) from the hopper hydraulic lifting cylinder (K).

**WARNING!**

Hydraulic system oil is highly corrosive, wear rubber gloves.

11. Remove the screw (L) of the flange with mounting pin (M) of the hydraulic cylinder base.
12. On the opposite side, move aside the cool air vacuum hose (N) of the engine.
13. Tap on the mounting pin (O) of the hydraulic cylinder bottom and remove it.
14. Remove the hopper lifting cylinder (K) from the front side of the machine.

Assembly

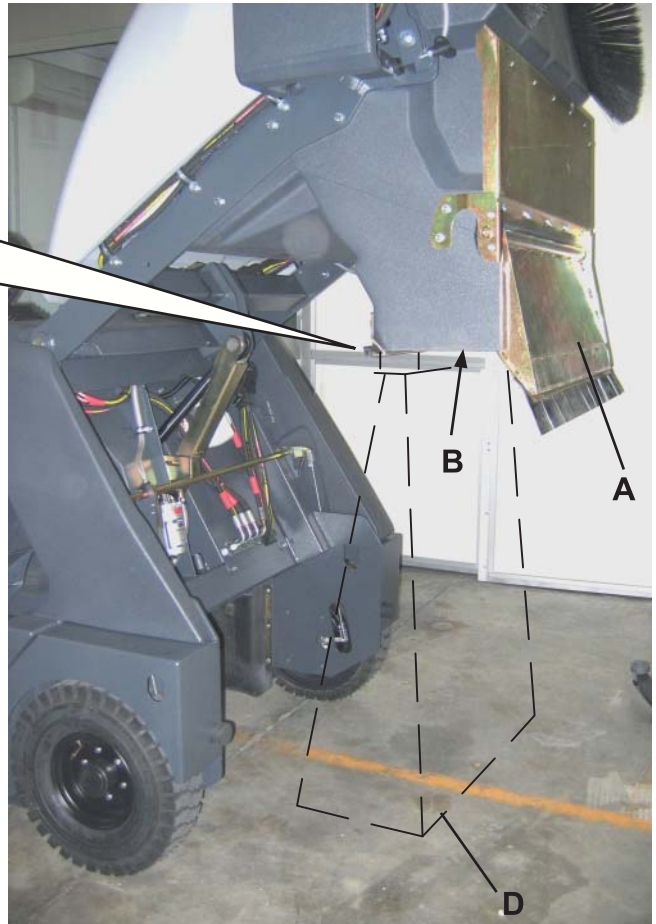
1. Assemble the components in the reverse order of disassembly.
2. (*) Start the machine and check the hopper for proper lifting/lowering operation; then stop the machine, check the hydraulic system oil level (see the procedure in the relevant paragraph) and, if necessary, top up.

DUST AND DEBRIS COLLECTION SYSTEM

HOPPER LIFTING HYDRAULIC CYLINDER DISASSEMBLY/ASSEMBLY [All versions] (Continues)



C



B

A

D



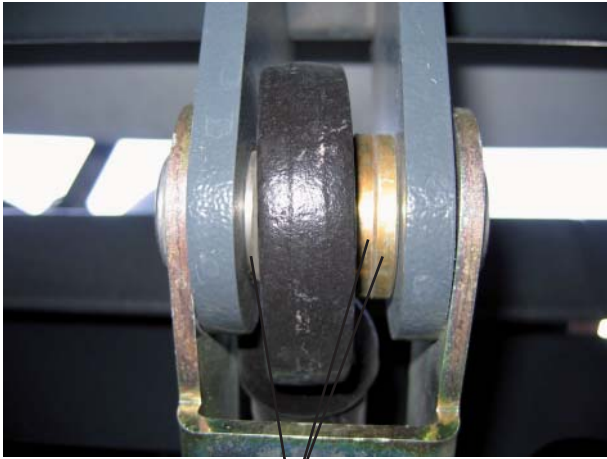
E

C

S301814

DUST AND DEBRIS COLLECTION SYSTEM

HOPPER LIFTING HYDRAULIC CYLINDER DISASSEMBLY/ASSEMBLY [All versions] (Continues)



G



F

H

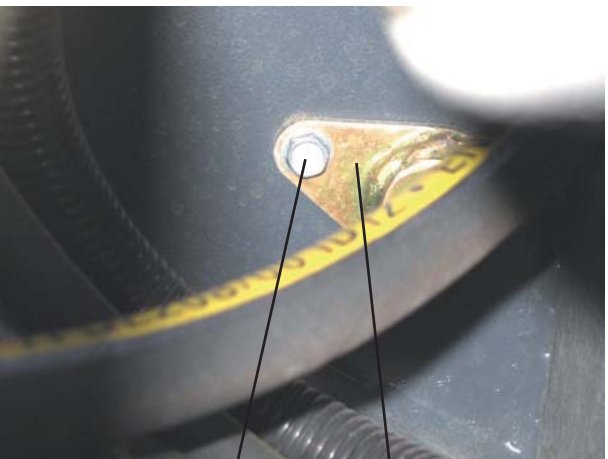
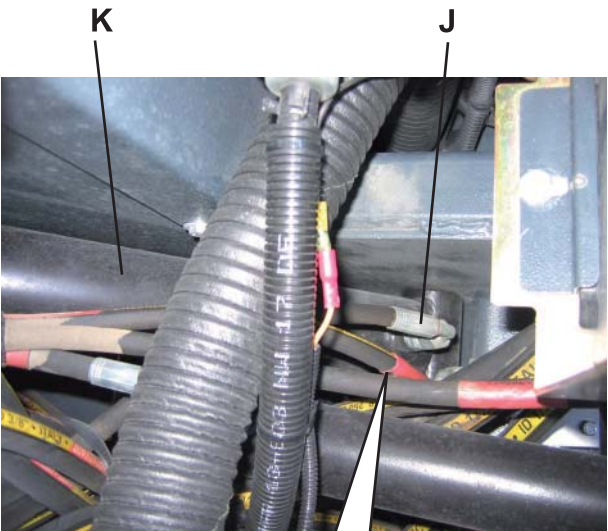
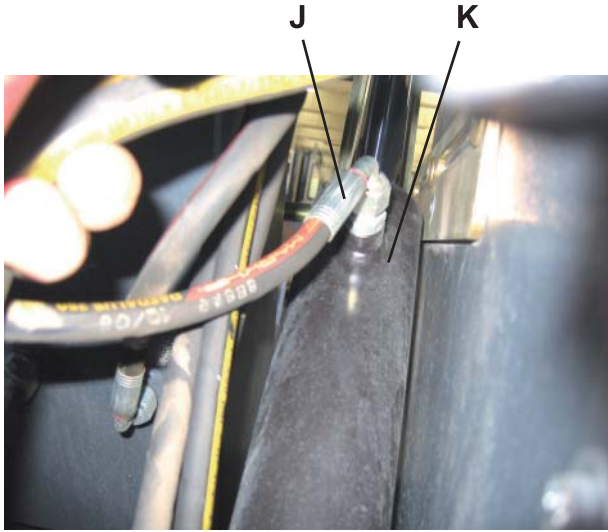
I



S301817

DUST AND DEBRIS COLLECTION SYSTEM

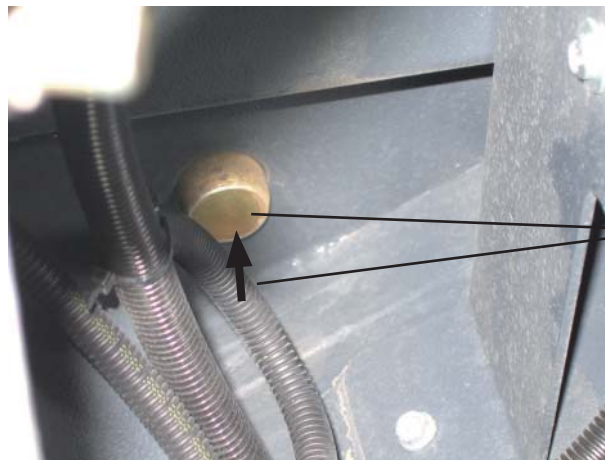
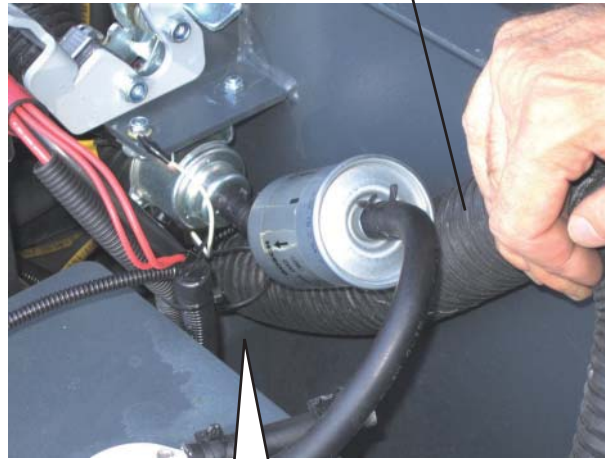
HOPPER LIFTING HYDRAULIC CYLINDER DISASSEMBLY/ASSEMBLY [All versions] (Continues)



DUST AND DEBRIS COLLECTION SYSTEM

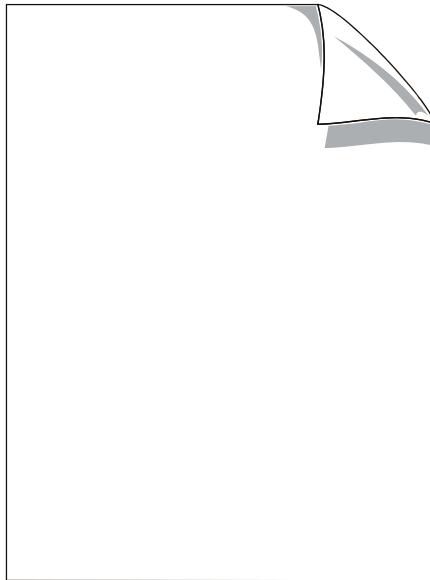
HOPPER LIFTING HYDRAULIC CYLINDER DISASSEMBLY/ASSEMBLY [All versions] (Continues)

N



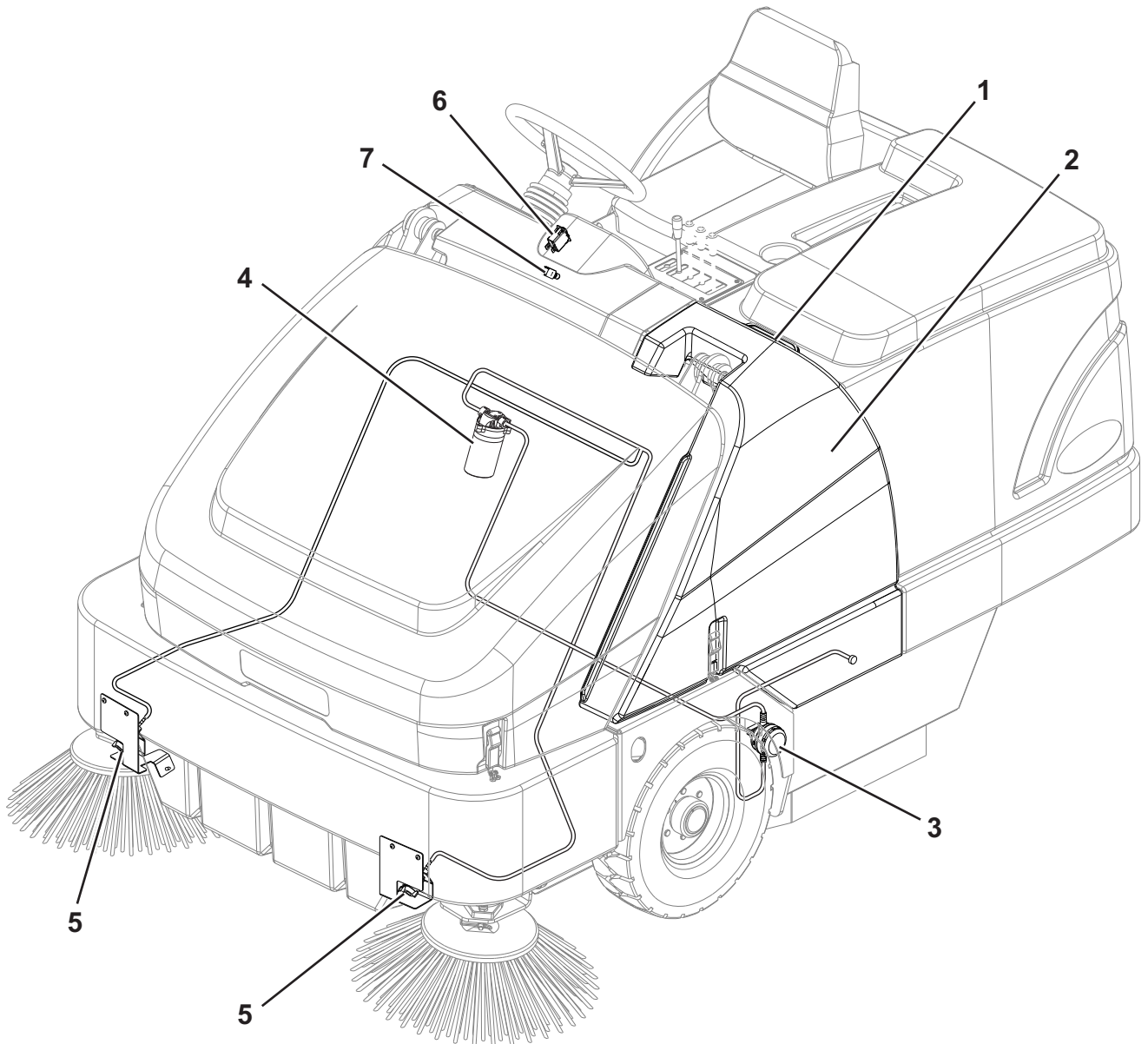
S301819

DUST AND DEBRIS COLLECTION SYSTEM



DUST CONTROL SYSTEM**DUST CONTROL SYSTEM****SYSTEM DIAGRAM [All versions]**

1. Water tank cap
2. Water tank
3. Water filter
4. Water pump
5. Nozzles
6. Control switch
7. Circuit breaker



S301809

TROUBLESHOOTING**No water from the nozzles**

Possible causes

1. The switch is faulty (replace).
2. The water filter is clogged (clean/replace).
3. The nozzles are clogged (clean).
4. The circuit protection fuse is deactivated (reset).

No water to the nozzles

Possible causes

1. The water pump relay is blown (replace).
2. The pump does not work (repair/replace).

NOZZLE AND FILTER CLEANING [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly and cleaning

1. (*) Empty the hopper; if it contains a small quantity of material, it is not necessary to empty it.
2. (*) Drive the machine on a solid and level ground, then engage the parking brake.
3. (*) Lift the hopper as necessary to reach the dust control system nozzles (A).

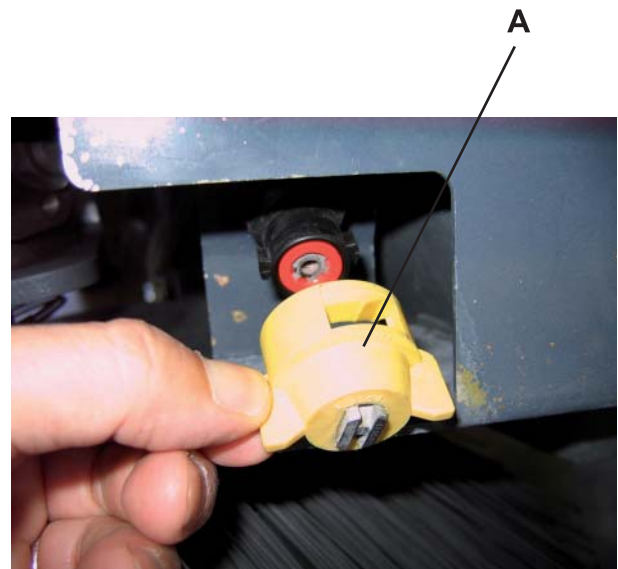
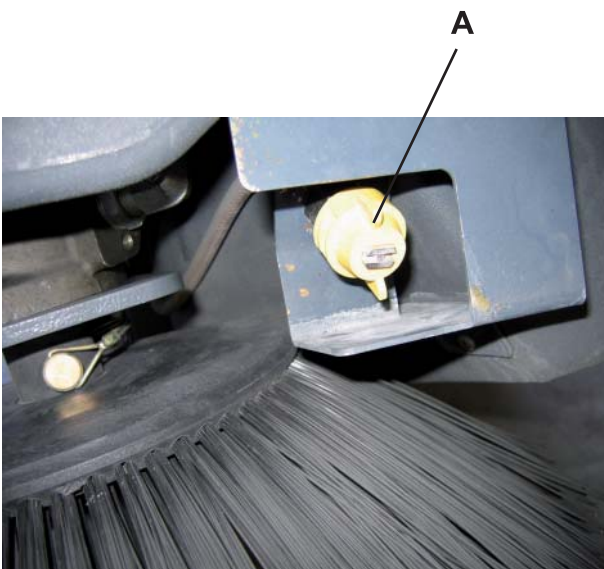
**WARNING!**

No people must pass under the lifted hopper (47), even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

4. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
5. Remove both nozzles (A) from the side brooms (bayonet joint) then remove the relevant filters (B).
6. Clean the nozzles and filters; if necessary, first keep them soaked into a proper limescale solution.

Assembly

1. Assemble the components in the reverse order of disassembly.



S301820

DUST CONTROL SYSTEM

WATER FILTER DISASSEMBLY/ASSEMBLY AND CLEANING [All versions]

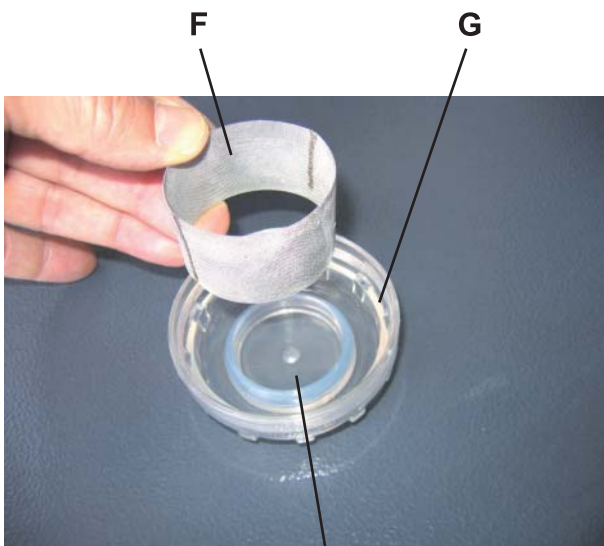
(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly and cleaning

1. (*) Drive the machine on a level ground and, if necessary, to a place where the dust control system water tank can be drained.
2. Engage the parking brake.
3. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
4. Remove the mounting screw (A) on the left panel (B) of the main broom compartment.
5. Remove the left panel (B) by disengaging the fasteners (C).
6. Disconnect the quick coupling (D) from the tank hose. This operation prevents the water from coming out of the dust control system tank when the cover (E) with the filter (F) are removed.
If the dust control system water tank must be drained, do not remove the tank hose quick coupling (D).
7. Unscrew the water filter transparent cover (E) and remove it together with the filter (F) and the gasket (G). If the quick coupling (D) has not been disconnected the water tank will be fully drained.
8. Clean the filter (F), the gasket (G) and the cover (E). If necessary, replace the filter and the gasket (G).

Assembly

1. Assemble the components in the reverse order of disassembly.
2. (*) If necessary, fill the dust control system water tank.



S301821

WATER TANK DISASSEMBLY/ASSEMBLY [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. (*) Drive the machine on a solid and level ground.
2. Engage the parking brake.
3. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
4. (*) Fully lift the hopper.
5. To avoid that the hopper lowers by accident, install the safety support as shown below.
 - Pull the handle (A) fully backwards and, by keeping it in this position, lower the hopper by pushing the lever (B) forward until the hopper stops on the safety support.
 - Release the lever (B) and the handle (A).

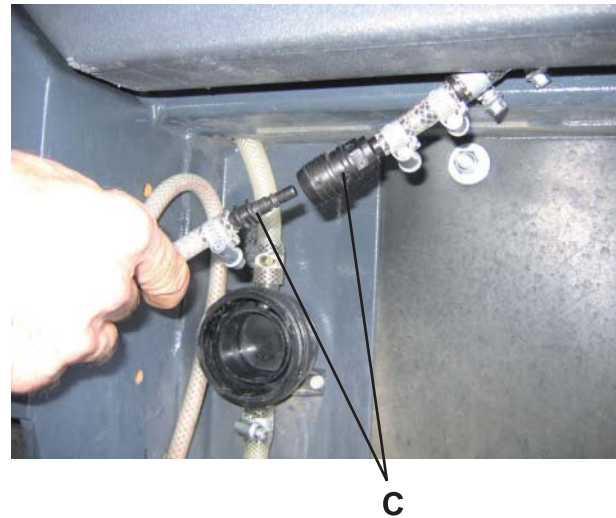
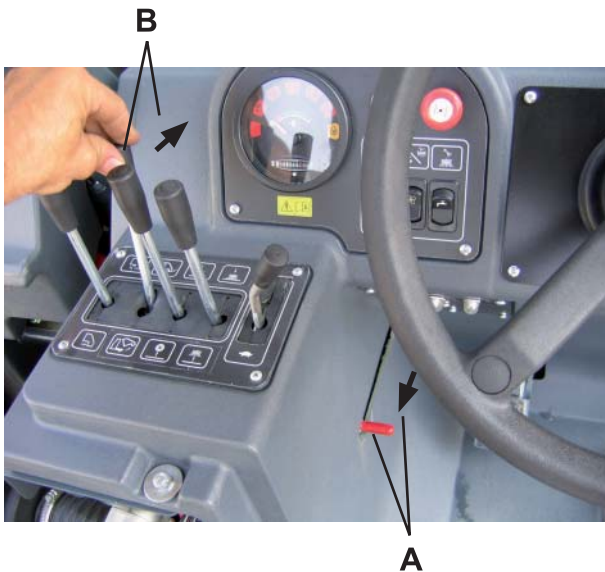
**WARNING!**

It is essential to insert the safety support under the lifted hopper, even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

6. Release the rear hood (1) with the lever (25), then fully lift it.
7. Remove the dust control system filter (see the procedure in the relevant paragraph) and, without disconnecting the tank hose, fully drain the water tank.
8. Disconnect the quick coupling (C).
9. Disconnect the fastener (D).
10. Remove the dust control system water tank (E) by disengaging the mounting pins (F).

Assembly

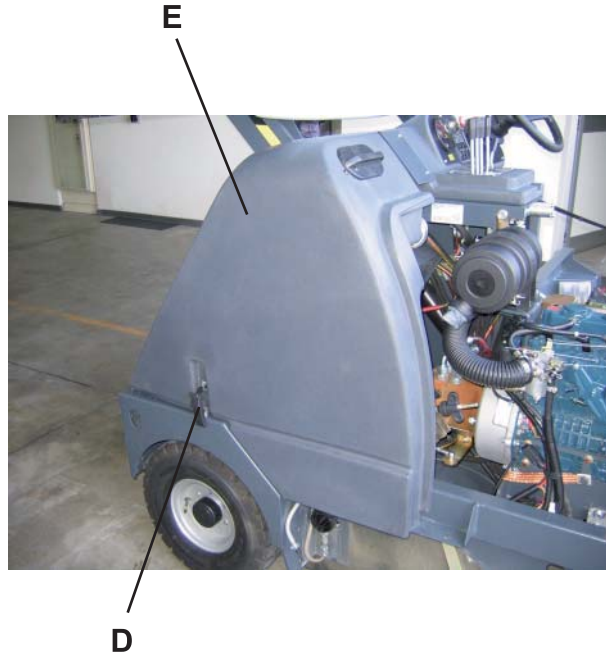
1. Assemble the components in the reverse order of disassembly.
2. (*) Fill the dust control system water tank.



S301822

DUST CONTROL SYSTEM

WATER TANK DISASSEMBLY/ASSEMBLY [All versions] (Continues)



S301823

WATER PUMP DISASSEMBLY/ASSEMBLY [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. (*) Drive the machine on a solid and level ground.
2. Engage the parking brake.
3. (*) Fully lift the hopper.
4. To avoid that the hopper lowers by accident, install the safety support as shown below.
 - Pull the handle (A) fully backwards and, by keeping it in this position, lower the hopper by pushing the lever (B) forward until the hopper stops on the safety support.
 - Release the lever (B) and the handle (A).

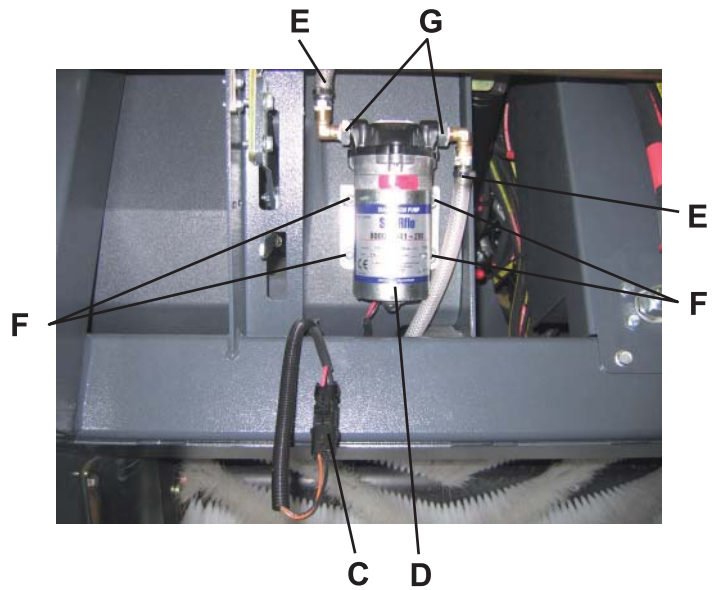
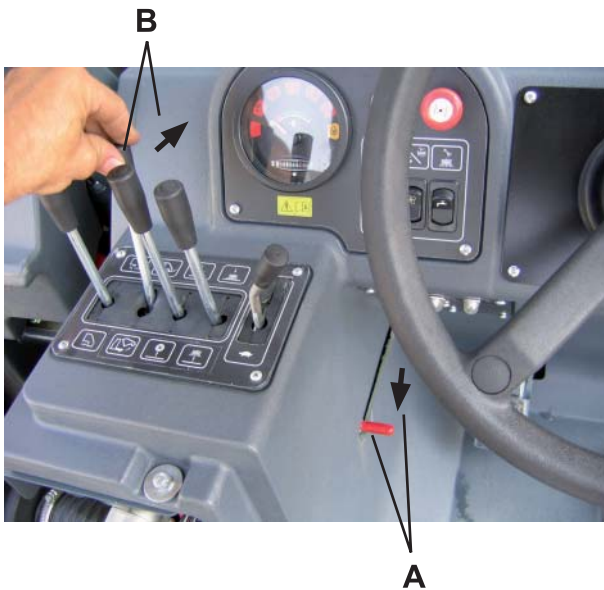
**WARNING!**

It is essential to insert the safety support under the lifted hopper, even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

5. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
6. On the front side of the machine, remove from the frame the electrical connection (C) of the dust control system water pump (D), then disconnect it.
7. Disconnect the water pump hoses (E).
8. Remove the screws (F).
9. Remove the dust control system water pump (D).
10. If necessary, unscrew the fittings (G) from the filter (D) at the workbench.

Assembly

1. Assemble the components in the reverse order of disassembly.



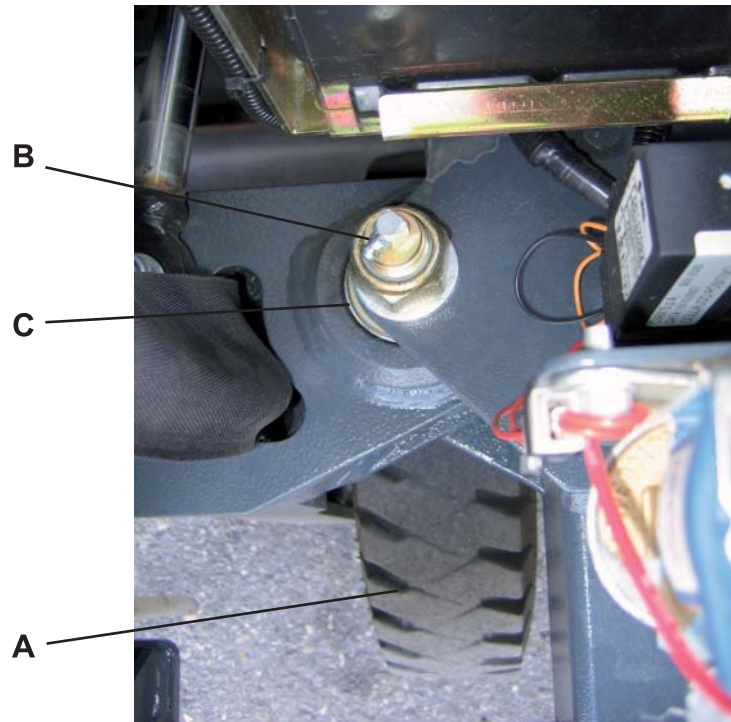
S301824

STEERING SYSTEM

STEERING SYSTEM

STEERING ASSEMBLY BEARING GREASING [All versions]

1. Drive the machine on a level ground.
2. Engage the parking brake.
3. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
4. Release the rear hood (1) with the lever (25), then fully lift it.
5. Operating above the drive wheel (A), apply grease to the steering assembly bearings with the grease nipple (B). Stop greasing when the grease starts to come out from the round slit (C).
Use SKF LGMT2 grease or equivalent.
6. Close the rear hood (1) with great care, and ensure that it engages the fastening mechanism.

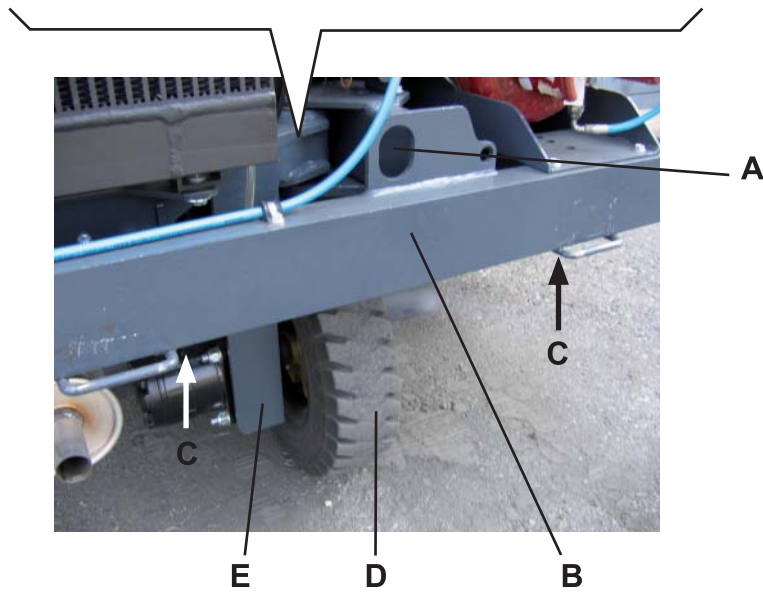
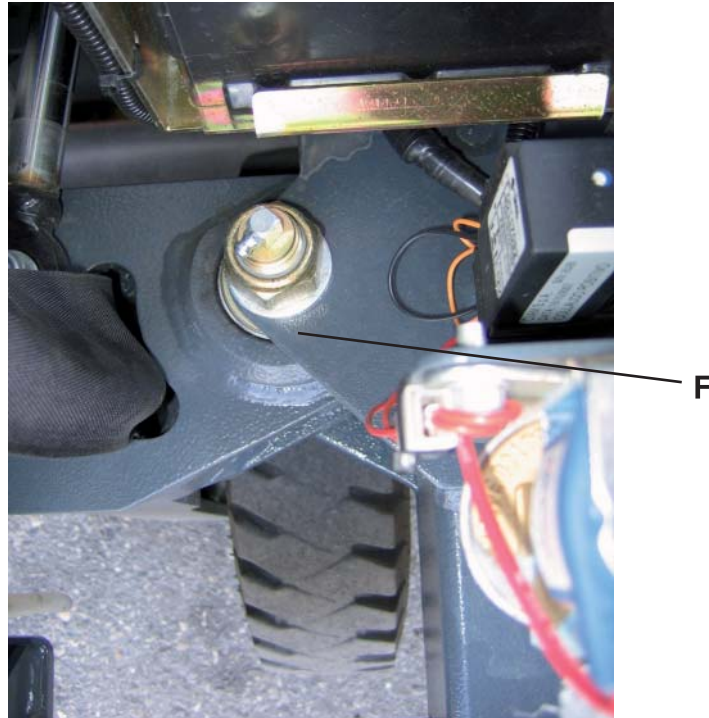


S301825

STEERING SYSTEM

STEERING ASSEMBLY TAPER BEARING CHECK AND ADJUSTMENT [All versions]

1. Remove the rear hood (see the procedure in the relevant paragraph).
2. With a proper safety system lift the rear side of the machine for a few inches (centimeters) by using the anchor (A) or a jack to be placed under the side sill (B).
Then place two safety stands under both outer middle areas (C) of the side sill (B); the safety stands must be high enough to keep the drive wheel (D) lifted a few inches (centimeters) from the ground and must be equipped with safety forks to be fastened to the side sill (B).
Lower the machine and lay it on the safety stands.
3. Manually try to move the steering system (E) forward, backward, to the left and to the right, and check for clearance on the axis of rotation.
If necessary, adjust the clearance by gradually tightening the mounting nut (F).
4. With a proper safety system lift again the rear side of the machine and remove the safety stands, then lower the machine.
5. Install the rear hood (see the procedure in the relevant paragraph).



S301826

STEERING SYSTEM

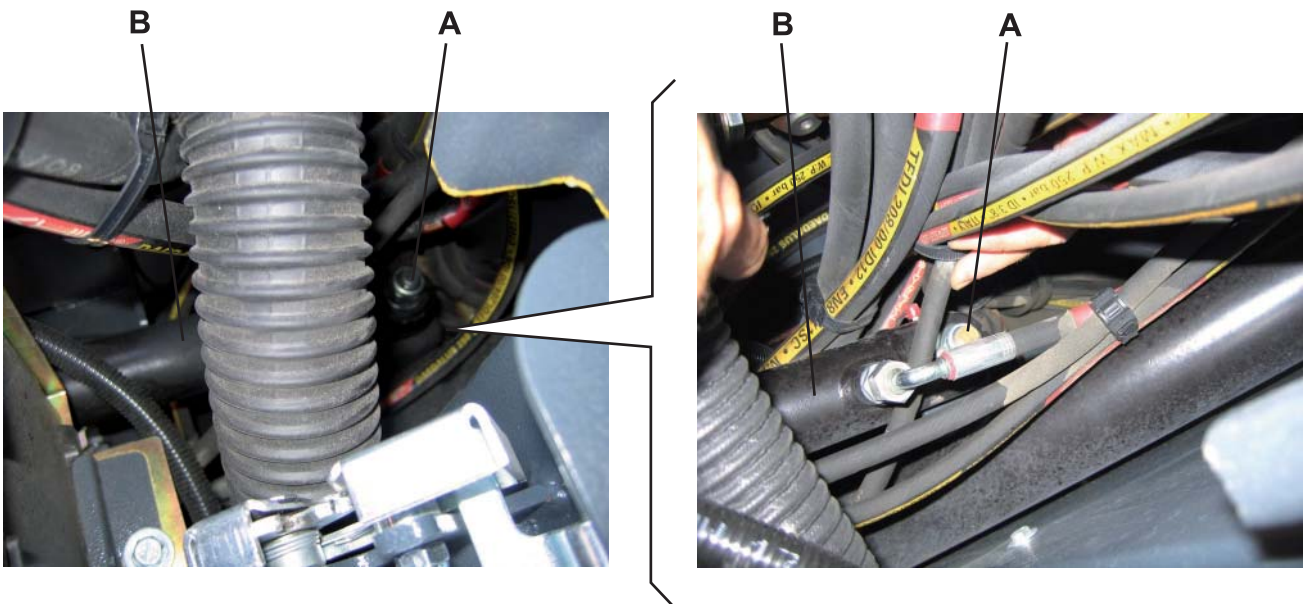
STEERING ASSEMBLY REMOVAL/INSTALLATION [All versions]

Disassembly

1. Remove the drive system motor (see the procedure in the relevant paragraph).
2. Loosen the front nut (A) of the hydraulic steering cylinder (B).
3. Loosen the rear nut (C) of the hydraulic steering cylinder (D).
4. With a lever, disconnect the head (E) of the cylinder rod from the threaded pin (F).
5. Loosen the mounting nut (G) of the steering assembly (H).
6. Remove the hoses (I) from the steering assembly (H).
7. Remove the pin (J).
8. Remove the steering assembly (H) by lifting the machine as necessary with the safety system used to remove the rear wheel.
9. Recover the space washers (K) and (L).
10. Recover the dust rings (M) and (N).
11. At the workbench, remove the bearings (O) and (P) if necessary. To remove the bearing outer rings (Q) and (R), tap slightly and continuously, with a proper tool, along the perimeters (S) and (T).

Assembly

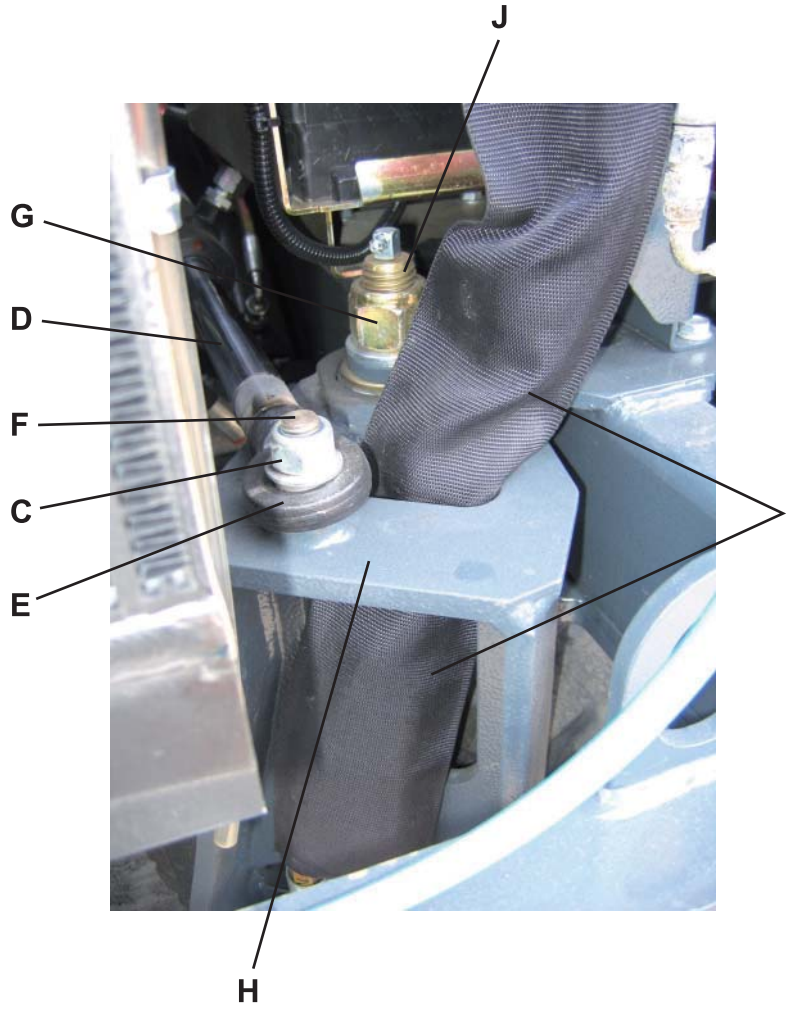
1. Assemble the components in the reverse order of disassembly, and note the following:
 - Tighten the nut (C) at 150 lb-ft (200 N·m).



S301827

STEERING SYSTEM

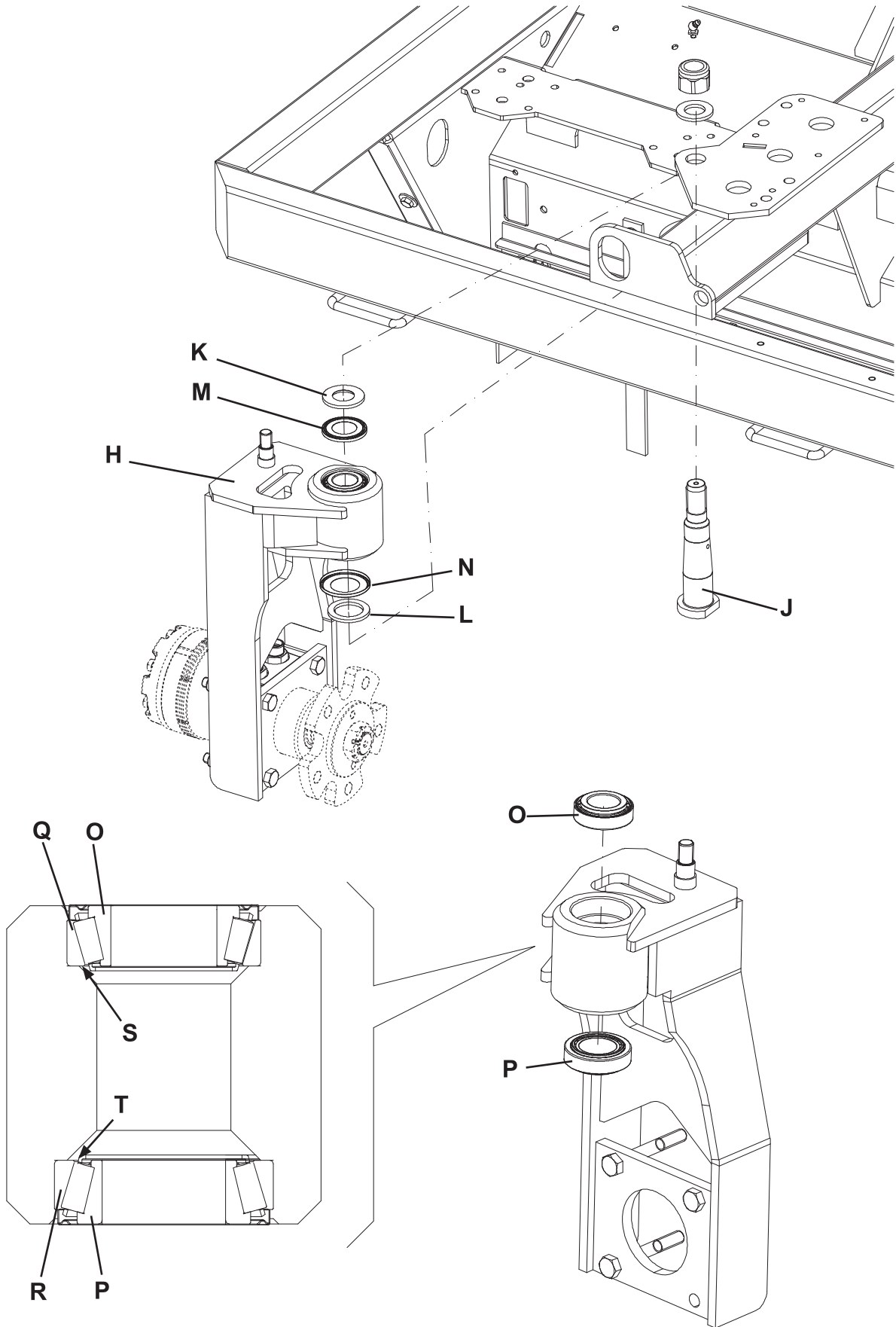
STEERING ASSEMBLY REMOVAL/INSTALLATION [All versions] (Continues)



S301828

STEERING SYSTEM

STEERING ASSEMBLY REMOVAL/INSTALLATION [All versions] (Continues)



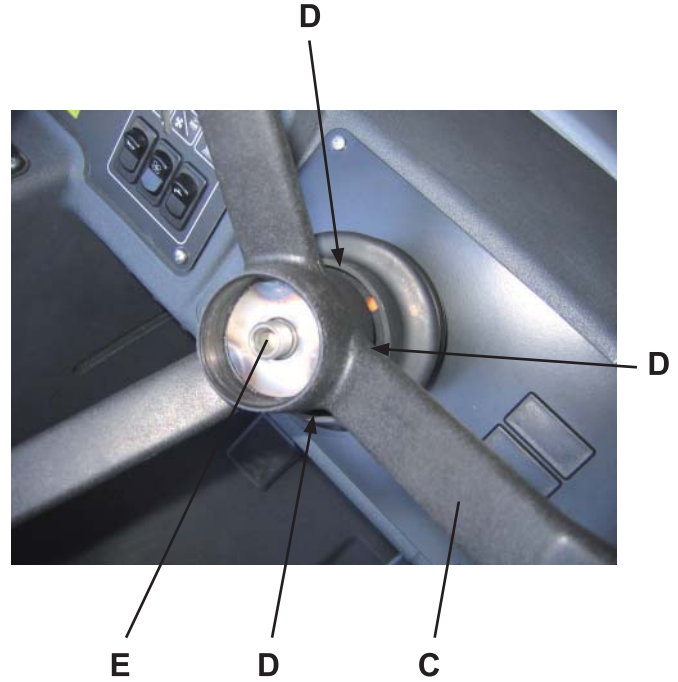
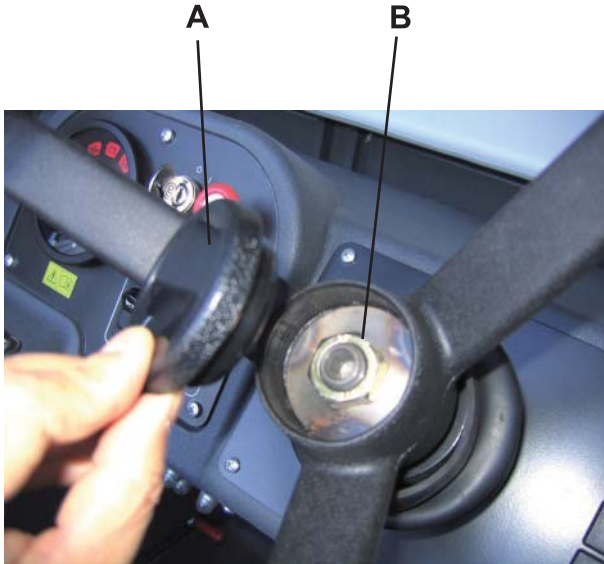
S301815

STEERING WHEEL DISASSEMBLY/ASSEMBLY [All versions]**Disassembly**

1. Remove the steering wheel center cover (A) by releasing the fasteners.
2. Unscrew the nut (B).
3. Remove the steering wheel (C) by using, if necessary, a remover in the areas (D) and (E). In the areas (D) insert metal shims between the steering wheel and the remover to prevent the steering wheel from damage.

Assembly

1. Assemble the components in the reverse order of disassembly.



S301829

STEERING SYSTEM

POWER STEERING ASSEMBLY REMOVAL/INSTALLATION [All versions]


CAUTION!

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.

Disassembly

1. Remove the steering wheel (see the procedure in the relevant paragraph).
2. Remove the bellows (A).
3. Remove the screws (B), then remove the cover (C).
4. Remove the screws (D) and slightly extract the power steering assembly (E).
5. Mark the position of the four hoses (F) of the power steering assembly (G) (for proper assembly).
6. Disconnect the four hoses (F) of the power steering assembly (G).
Recover the O-rings.

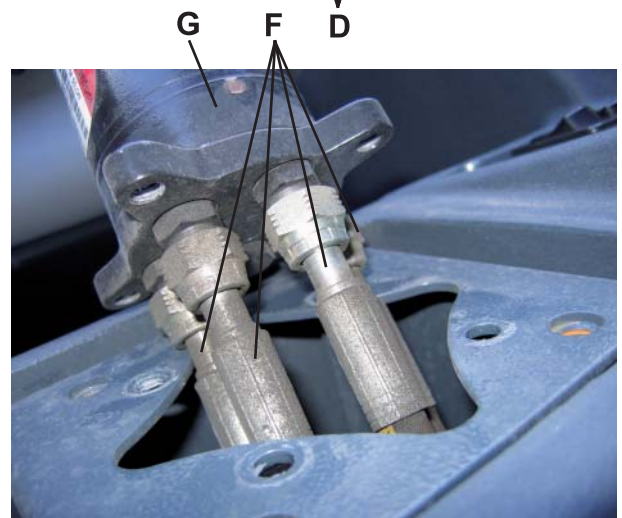
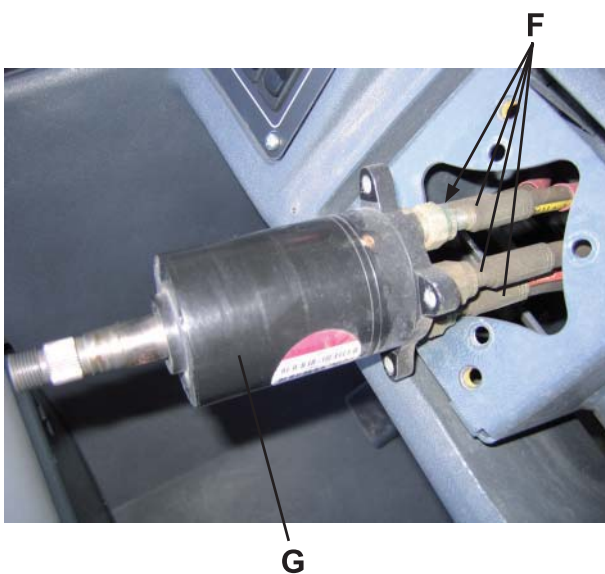
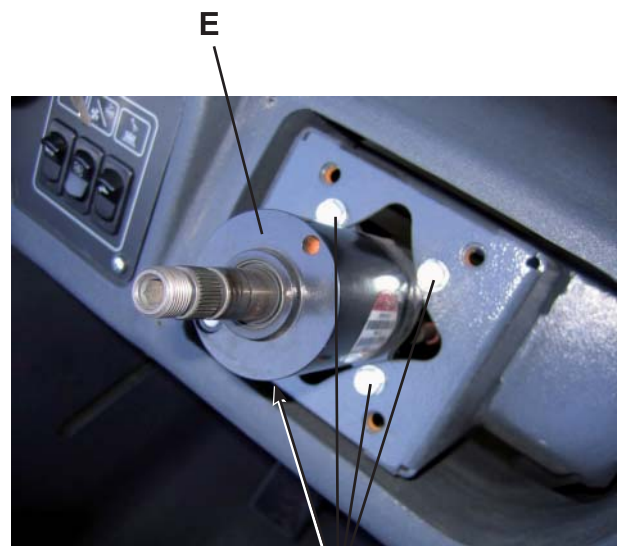
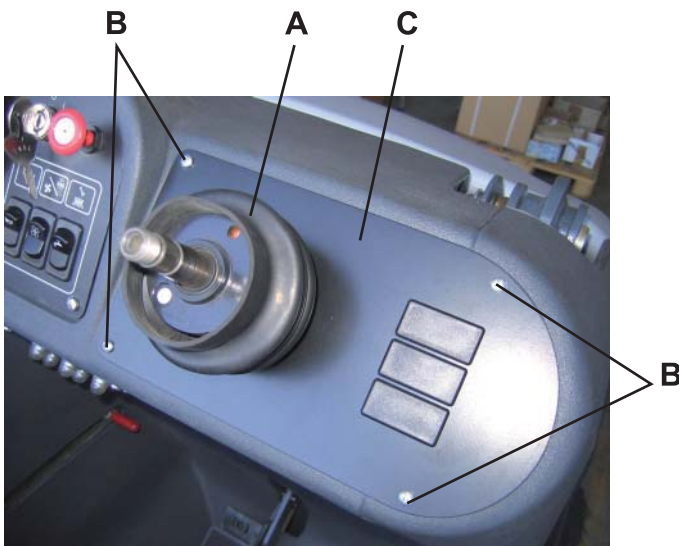

WARNING!

Hydraulic system oil is highly corrosive, wear rubber gloves.

7. Remove the power steering assembly (G).

Assembly

1. Assemble the components in the reverse order of disassembly.
2. Check the hydraulic system oil level (see the procedure in the relevant paragraph).



S301830

HYDRAULIC STEERING CYLINDER DISASSEMBLY/ASSEMBLY [All versions]



CAUTION!

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.

Disassembly

1. Remove the rear hood (see the procedure in the relevant paragraph).
2. Remove the battery and the relevant holder (see the procedure in the relevant paragraph).
3. Unscrew the hoses (A) and (B) from the hydraulic steering system (C).



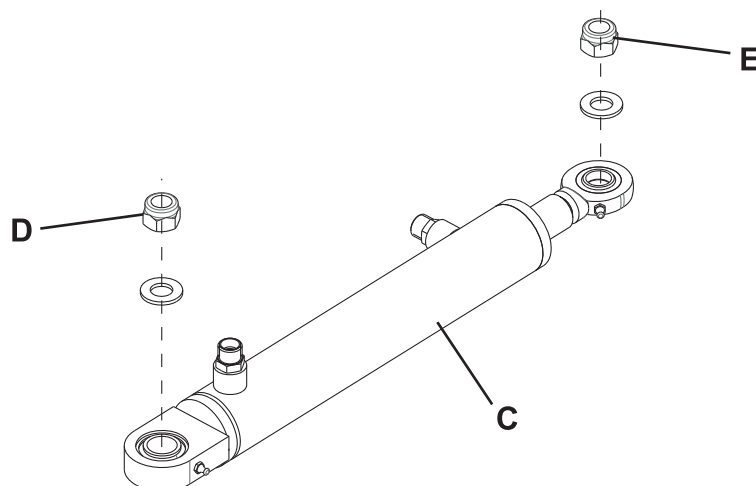
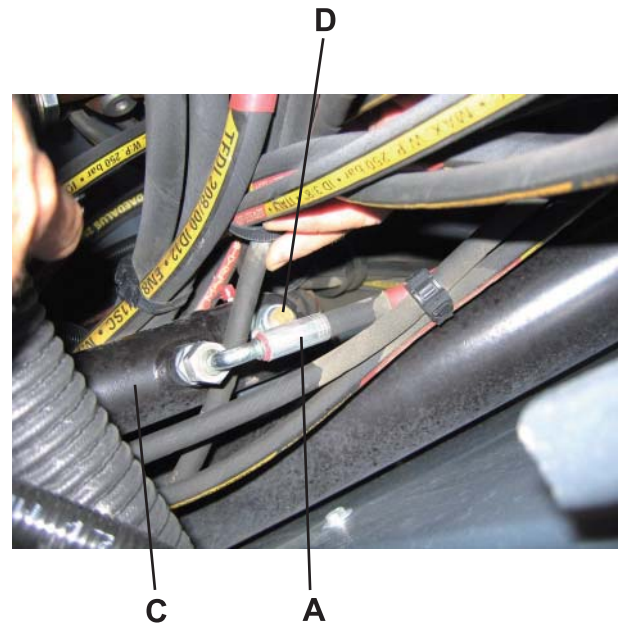
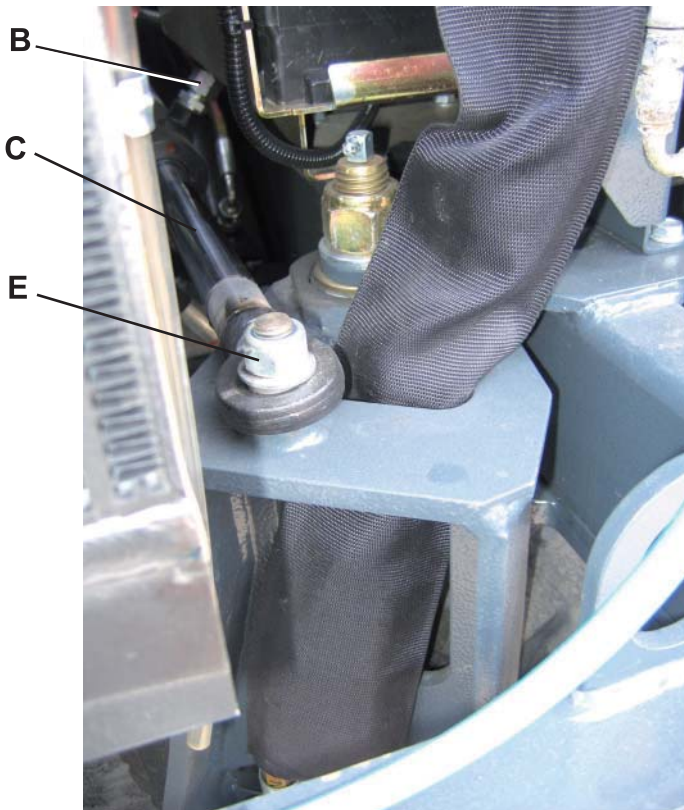
WARNING!

Hydraulic system oil is highly corrosive, wear rubber gloves.

4. Loosen the front and rear nuts (D) and (E) of the hydraulic steering cylinder (C).
5. Remove the hydraulic steering cylinder (C).

Assembly

1. Assemble the components in the reverse order of disassembly.
2. Check the hydraulic system oil level (see the procedure in the relevant paragraph).



S301831

BRAKE SYSTEM

BRAKE SYSTEM

PARKING BRAKE AND SERVICE BRAKE CHECK AND ADJUSTMENT [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

Check and adjustment

1. (*) Empty the hopper.
2. (*) Drive the machine on a level floor and straighten the rear wheel.
3. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
4. Do not engage the parking brake but apply wedges to the rear wheel, thus ensuring that the machine cannot move even when the front wheels will be lifted as shown below.
5. (*) Fully lift the hopper.
6. To avoid that the hopper lowers by accident, install the safety support as shown below.
 - Pull the handle (A) fully backwards and, by keeping it in this position, lower the hopper by pushing the lever (B) forward until the hopper stops on the safety support.
 - Release the lever (B) and the handle (A).



WARNING!

It is essential to insert the safety support under the lifted hopper, even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

7. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
8. Check that the teeth (C) and the relevant parking brake pedal coupler (D) are efficient.
9. With a proper safety system lift the left side of the machine for a few inches (centimeters) by using the side anchor (E), or a jack to be placed at the point (F); the jack must be equipped with a safety fork to be fastened to the machine structure at the point (F).

Insert a safety stand at point (G). The safety stand must:

- Be high enough to keep the front wheel (H) lifted a few inches (centimeters) from the ground.
- Be equipped with a safety fork to be fastened to the machine structure at the point (G).
- Not touch the front wheel (H).

Lower the machine and lay it on the safety stand.

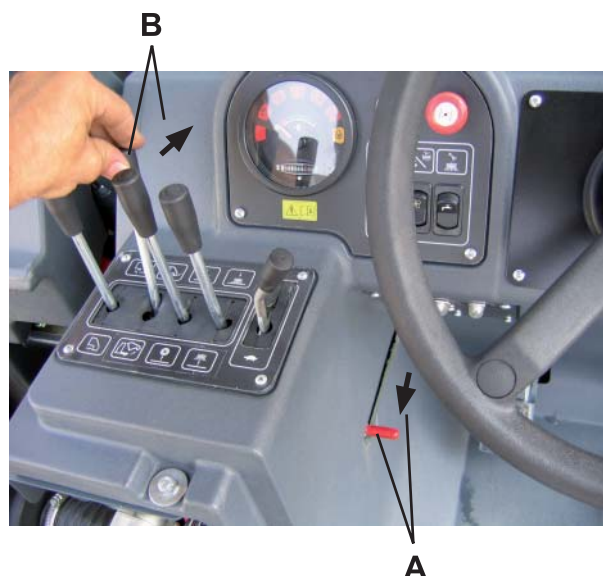
10. To lift the right side of the machine repeat step 8.
11. Manually turn the front wheels, then press the brake pedal and check for the following:
 - Breaking must not take place at the brake pedal end-of-stroke.
 - Wheels must brake simultaneously.

If necessary, remove the pins with the clips (K) and release the forks with the levers (L) then adjust the brakes by turning the forks (I) of the tie rods (J).

After adjusting, place the forks (I) on the levers (L) and install the pins with the clips (K).

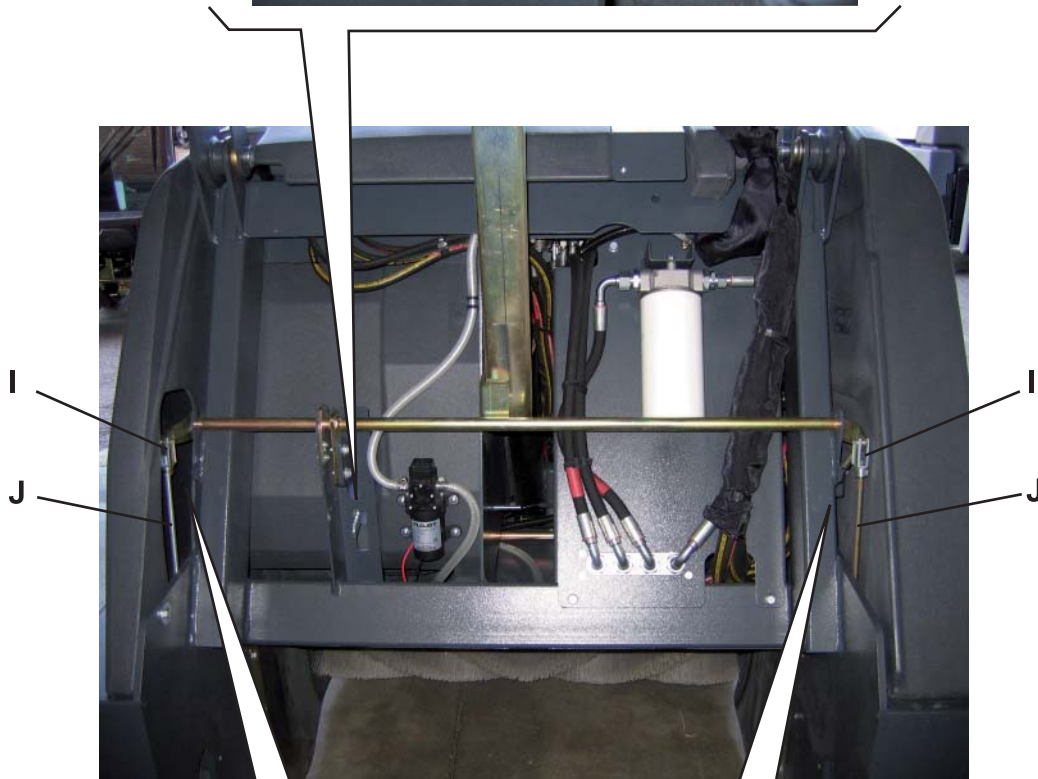
Reset

1. Perform steps 4, 5, 6, 9 and 10 in the reverse order.
2. (*) Perform hands-on tests to check the parking brake and service brake operation.

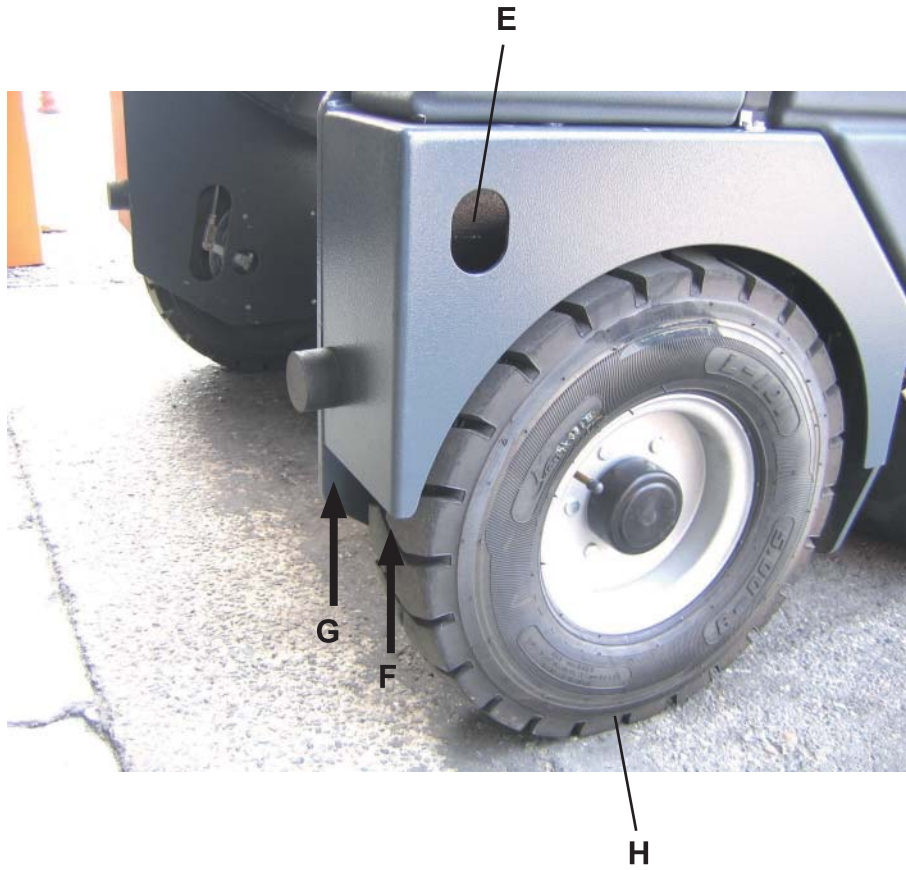


S301792

PARKING BRAKE AND SERVICE BRAKE CHECK AND ADJUSTMENT [All versions] (Continues)



S301833

BRAKE SYSTEM**PARKING BRAKE AND SERVICE BRAKE CHECK AND ADJUSTMENT [All versions] (Continues)**

S301834

BRAKE DISASSEMBLY/ASSEMBLY [All versions]**NOTE**

The following procedure refers to the left brake replacement; for the right brake, follow the same procedure.

**CAUTION!**

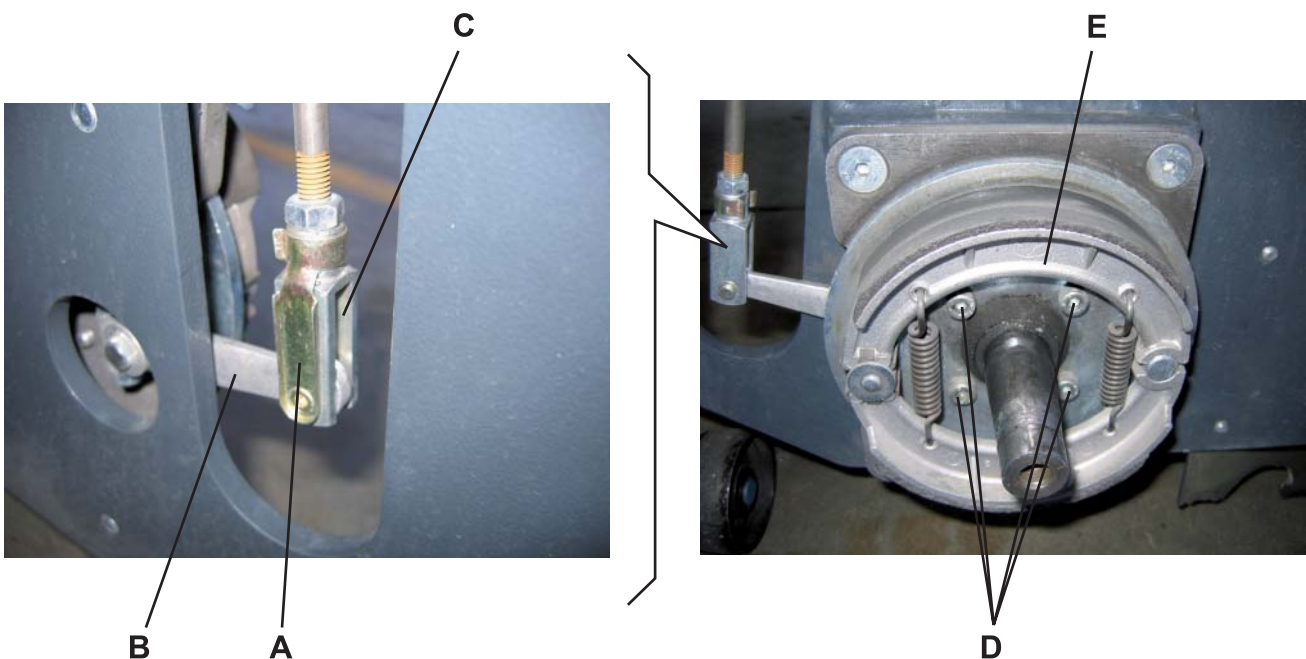
It is advisable to replace the brakes of both wheels.

Disassembly

1. Remove the front wheel (see the procedure in the relevant paragraph).
2. Remove the clip with the pin (A) and disconnect the brake lever (B) from the tie rod fork (C).
3. Remove the screws (D), then remove the brake (E).

Assembly

1. Assemble the components in the reverse order of disassembly.
2. Check and adjust the parking brake and service brake (see the procedure in the relevant paragraph).



S301835

DRIVE SYSTEM

DRIVE SYSTEM

TROUBLESHOOTING [All versions]

The machine does not move.

Possible causes

1. The drive system pump unlocking screw (for machine pushing/towing) is unscrewed (screw it down).
2. The parking brake is engaged (disengage).
3. There are oil leaks from the hydraulic system (repair).
4. The drive system pump is not operating properly (check the pump oil pressure/replace the pump).
5. The drive system motor is faulty (repair/replace).
6. The protection fuse is deactivated (reset).

The machine moves even if the forward/reverse gear pedal is not pressed

Possible causes

1. The forward/reverse gear pedal is misadjusted (adjust the neutral position of the pedal).

FORWARD/REVERSE GEAR PEDAL NEUTRAL POSITION CHECK AND ADJUSTMENT [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

Check

1. (*) Move the machine to warm up the hydraulic system oil.
2. (*) Drive the machine on a level ground.
3. Engage the parking brake.
4. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
5. With a proper safety system lift the rear side of the machine for a few inches (centimeters) by using the anchor (A) if the rear hood is disassembled, or a jack to be placed under the side sill (B).
Then place two safety stands under both outer middle areas (C) of the side sill (B). The safety stands must:
 - Be high enough to keep the drive wheel (D) lifted a few inches (centimeters) from the ground.
 - Be equipped with safety forks to be fastened to the side sill (B).Lower the machine and lay it on the safety stands.
6. (*) Start the machine, then check that the drive wheel (D) does not turn when the drive pedal (37) is not pressed.
If the drive wheel (D) turns, perform the adjustment procedure as shown below.

Adjustment

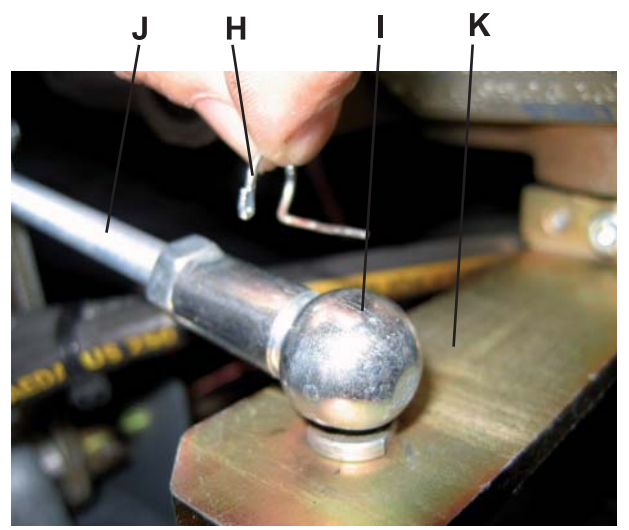
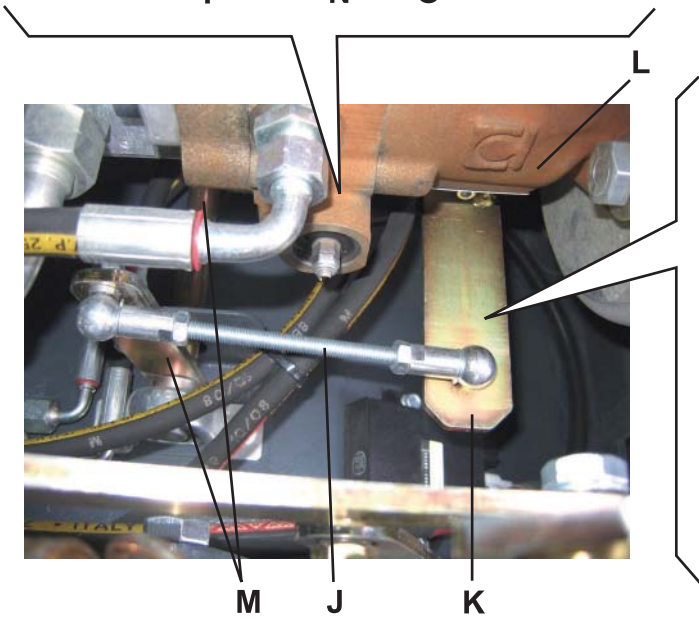
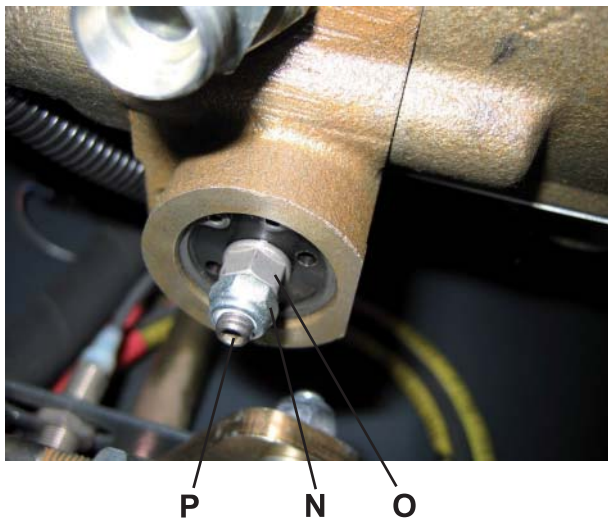
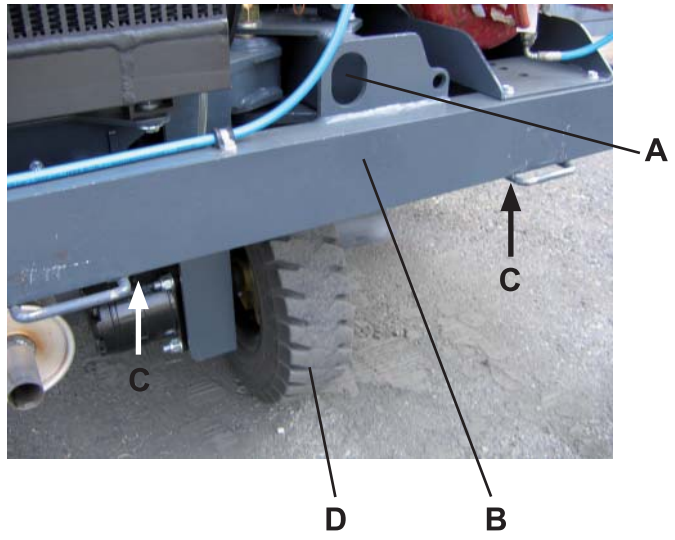
1. Remove the dust control system water tank (see the procedure in the relevant paragraph).
2. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
3. On the left side of the machine, remove the fastener (H), then release the ball end (I) of the tie rod (J) from the control lever (K) of the drive system pump (L) (this procedure allows to separate the linkage (M) of the drive pedal from the drive system pump).
4. Start the machine as shown in the Instructions for use, then check the drive wheel (D):
 - If the drive wheel (D) does not turn, the drive system pump is properly adjusted, so the fault must be in the drive pedal linkage (M). Remove any debris, foreign material, binding, friction from all parts of the linkage, starting from the forward/reverse gear pedal up to the tie-rod (J). If necessary, repair or replace the linkage.
 - If the drive wheel (D) turns, the drive system pump must be adjusted as shown below:
 - Loosen the nut (N) and, while holding the nut (O), turn the dowel (P) gradually, until the drive wheel (D) stops.
 - After adjusting, tighten the nut (N).
 - Check the linkage (M) for efficiency as previously shown.

Reset

1. Perform steps 5, 7 and 9 in the reverse order.

DRIVE SYSTEM

FORWARD/REVERSE GEAR PEDAL NEUTRAL POSITION CHECK AND ADJUSTMENT [All versions] (Continues)



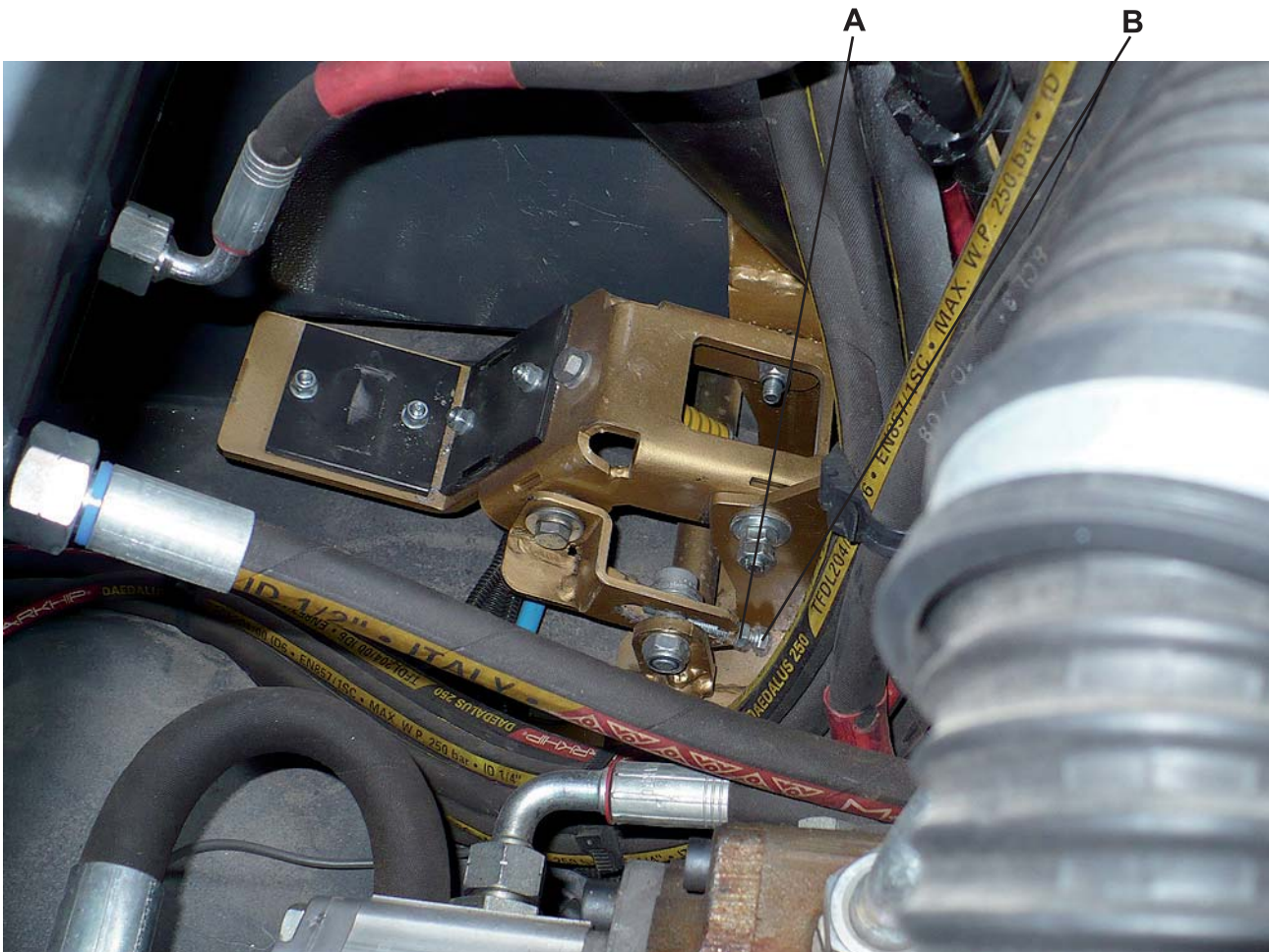
S301836

SPEED LIMITER ADJUSTMENT [All versions]

The speed limiter is calibrated so that when the hopper is lifted the machine speed is 1.9 mph (3 km/h). If the calibration is to be adjusted, proceed as follows.

(*) Where this symbol is shown, proceed according to the Instructions for use.

1. (*) Drive the machine on a level ground.
2. Engage the parking brake.
3. (*) Lift the hopper to activate the limiter.
4. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
5. Open the rear hood (1) and locate the speed limiter.
6. Loosen the nut (A).
7. Use the screw (B) to adjust the speed:
 - To decrease the speed, the screw must be tightened.
 - To increase the speed, the screw must be loosen.
8. Tighten the nut (A).



DRIVE SYSTEM

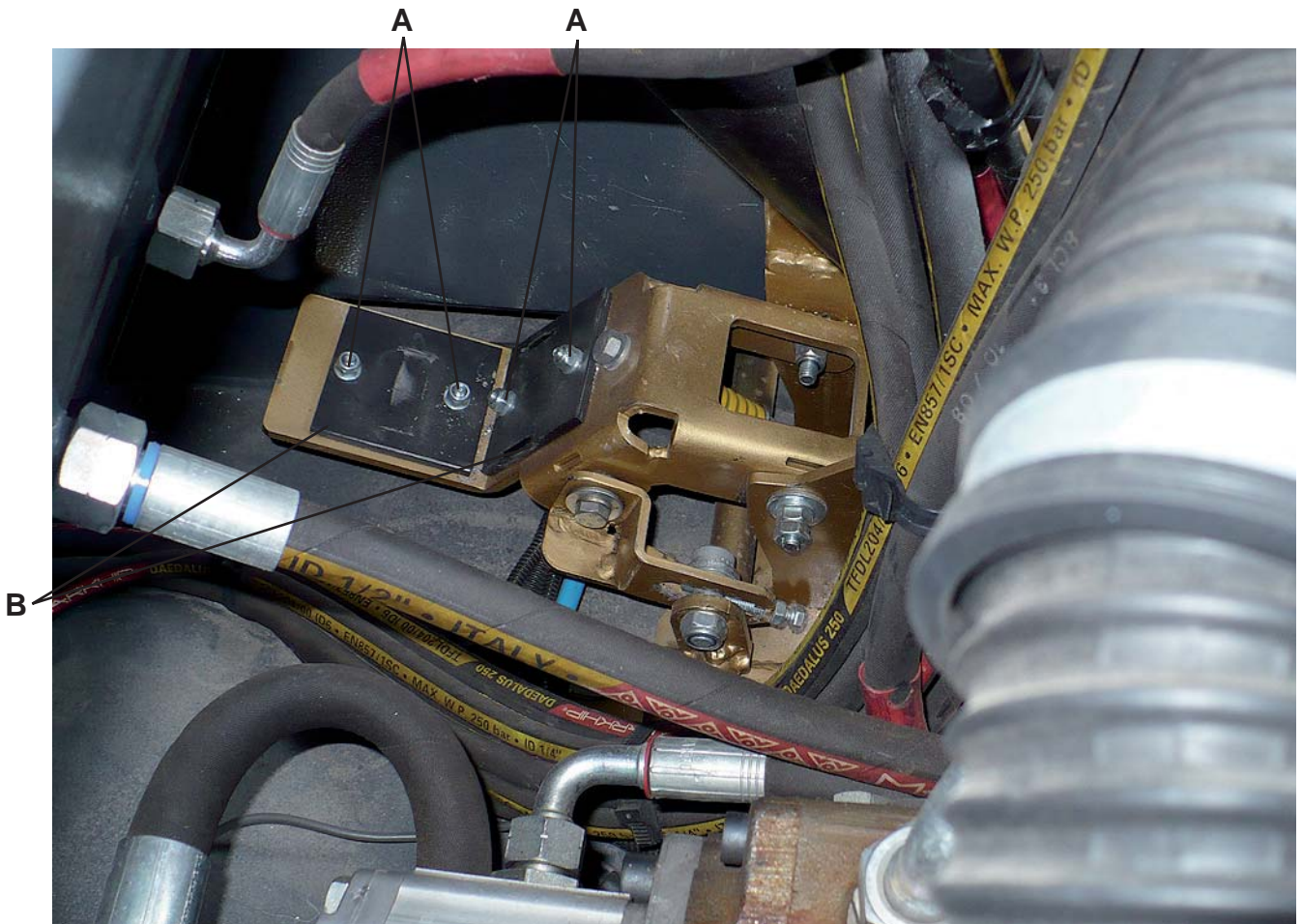
SPEED LIMITER PLATE ADJUSTMENT [All versions]

Disassembly

1. Drive the machine on a level ground.
2. Engage the parking brake.
3. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
4. Open the rear hood (1) and locate the speed limiter.
5. Loosen the nuts (A) and recover the screws and washers.
6. Remove the plates (B) check their conditions, and replace them if worn.

Assembly

7. Assemble the components in the reverse order of disassembly, and note the following:
 - Adjust the machine speed with the speed limiter activated (see the procedure in the previous paragraph).

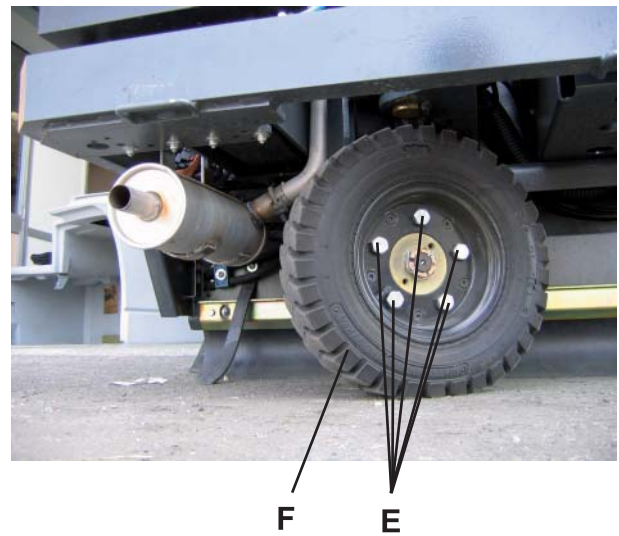
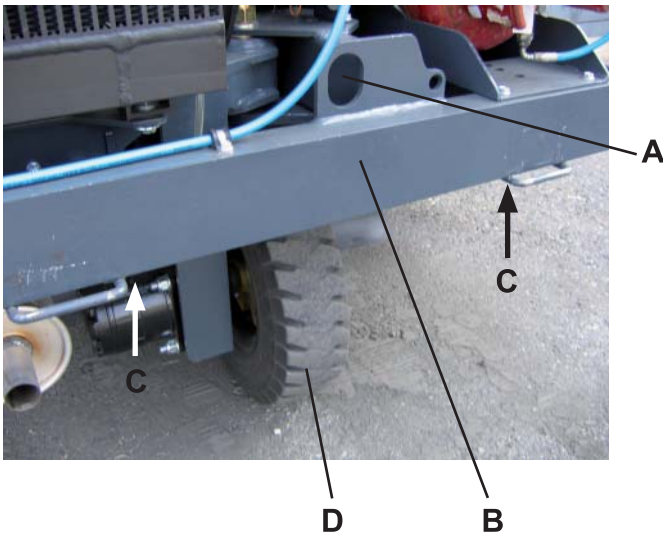


REAR WHEEL DISASSEMBLY/ASSEMBLY [All versions]**Disassembly**

1. Drive the machine on a level ground.
2. Engage the parking brake.
3. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
4. With a proper safety system lift the rear side of the machine for a few inches (centimeters) by using the anchor (A) if the rear hood is disassembled, or a jack to be placed under the side sill (B). Then place two safety stands under both outer middle areas (C) of the side sill (B). The safety stands must:
 - Be high enough to keep the drive wheel (D) lifted a few inches (centimeters) from the ground.
 - Be equipped with safety forks to be fastened to the side sill (B).Lower the machine and lay it on the safety stands.
5. Steer the wheel and remove the screw (E).
6. Remove the wheel (F).

Assembly

1. Install the wheel (F) and tighten the screws (E) at 103 lb-ft (140 N·m).
2. With a proper safety system lift again the rear side of the machine and remove the safety stands, then lower the machine.



S301837

DRIVE SYSTEM

FRONT WHEEL DISASSEMBLY/ASSEMBLY [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

- (*) Drive the machine on a solid and level ground.
- Do not engage the parking brake, but ensure that the machine cannot move, even when the wheel to be replaced will be lifted from the ground, by applying wedges to the other front wheel.
- (*) Lift the hopper for 30-40 rotation degrees.



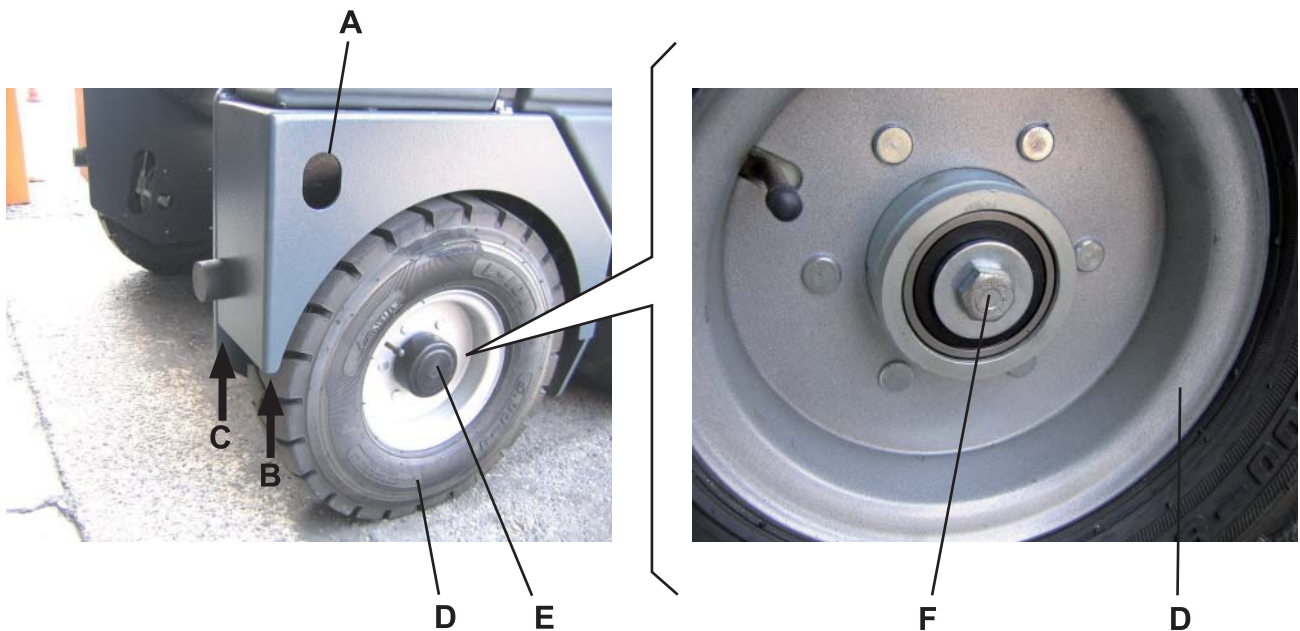
WARNING!

No people must pass under the lifted hopper (47), even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

- Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
- With a proper safety system lift the rear side of the machine, where the wheel must be removed, for a few inches (centimeters) by using the side anchor (A), or a jack to be placed at the point (B); the jack must be equipped with a safety fork to be fastened to the machine structure at the point (B).
Insert a safety stand at point (C). The safety stand must:
 - Be high enough to keep the front wheel (D) lifted a few inches (centimeters) from the ground.
 - Be equipped with a safety fork to be fastened to the machine structure at the point (C).
 - Not touch the front wheel (D).
- Lower the machine and lay it on the safety stand.
- With a screwdriver or a lever, engage the cover (E).
- Remove the screw (F).
- Remove the wheel (D).

Assembly

- Assemble the components in the reverse order of disassembly, and note the following:
 - Tighten the screw (F) at 70 lb·ft (95 N·m).



S301834

DRIVE SYSTEM MOTOR DISASSEMBLY/ASSEMBLY [All versions]**CAUTION!**

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.

Disassembly

1. Remove the rear hood (see the procedure in the relevant paragraph).
2. Remove the rear wheel (see the procedure in the relevant paragraph).
3. Remove the cotter pin (A).
4. Unscrew the nut (B).
5. Apply a remover on the holes (C) and center (D), then remove the hub (E). Recover the key.
6. Turn the steering assembly to the right.
7. Mark the position of the drive system motor hoses (F) and (G) (for proper assembly).
8. Disconnect the hoses (F) and (G) from the motor.

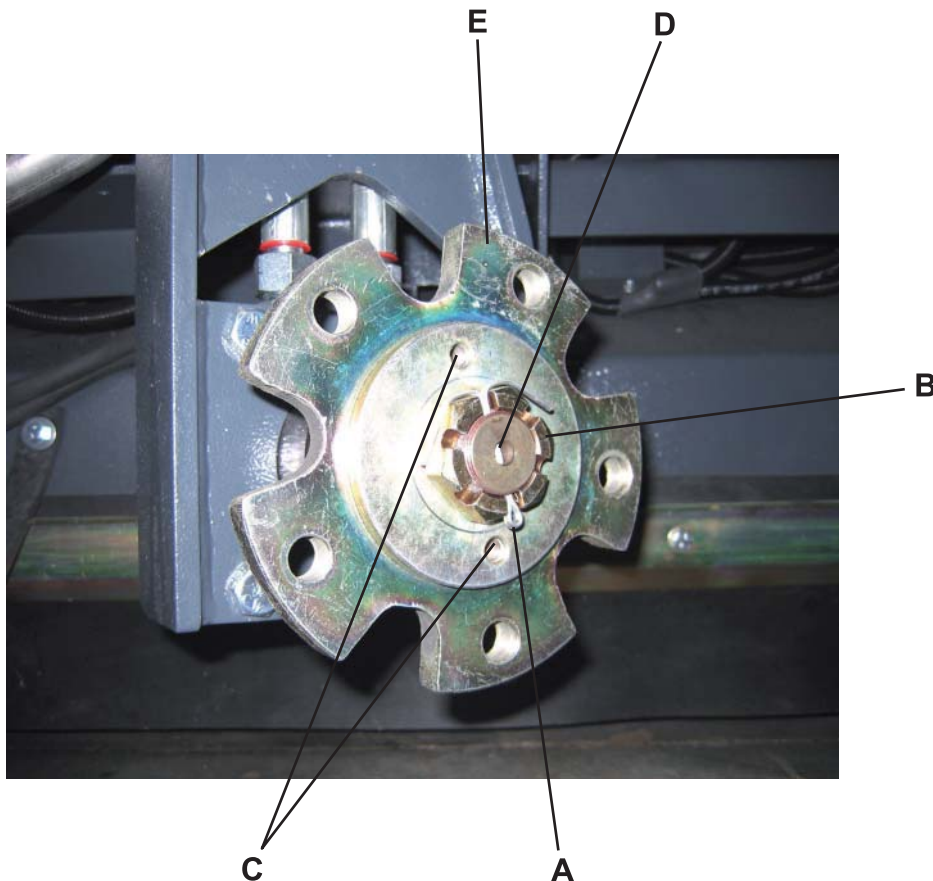
**WARNING!**

Hydraulic system oil is highly corrosive, wear rubber gloves.

9. Remove the nuts (H).
10. Remove the drive system motor (I).
11. If necessary, unscrew the fittings (J) from the drive system motor.

Assembly

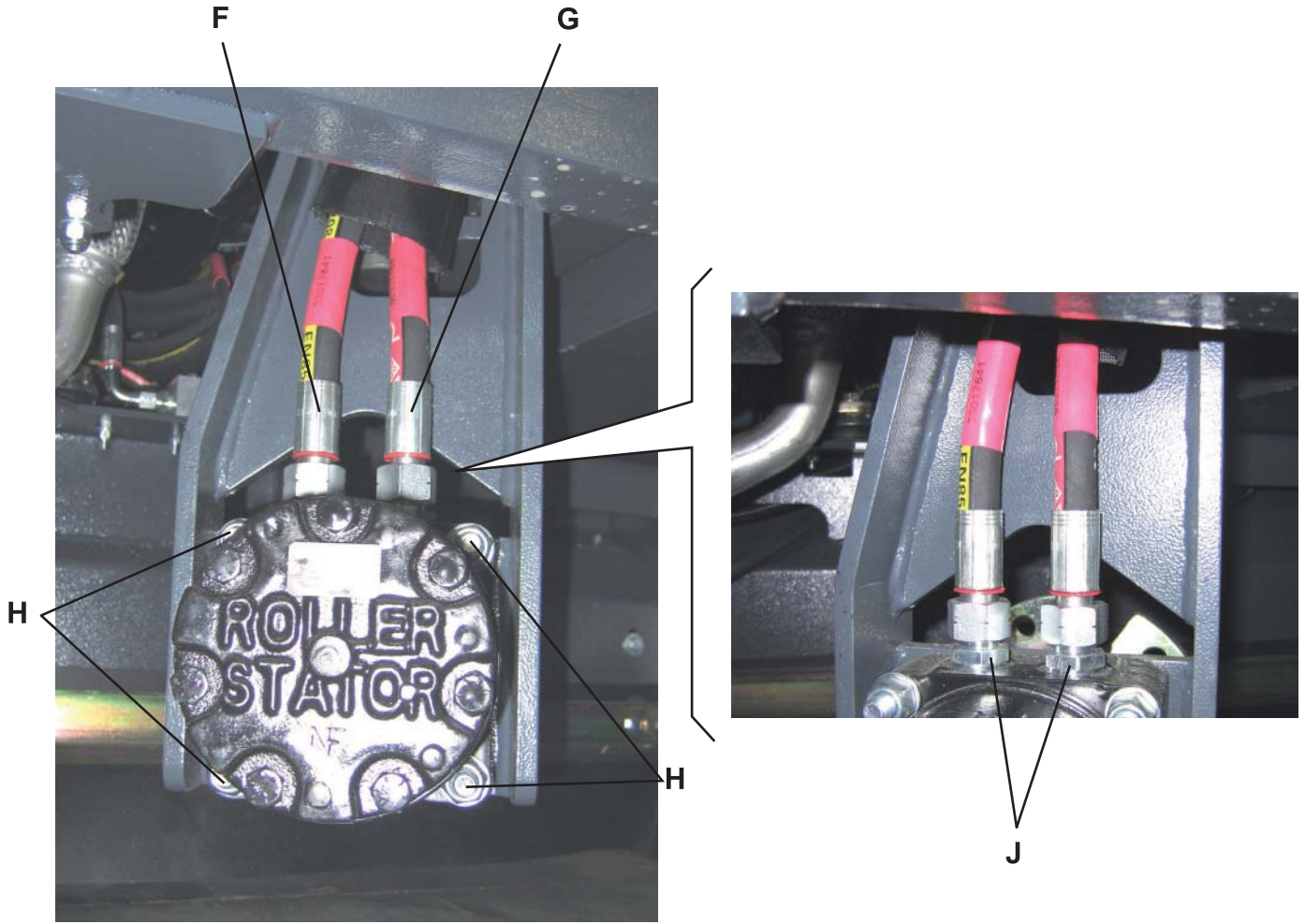
1. Assemble the components in the reverse order of disassembly, and note the following:
 - Install the rear wheel, then tighten the nut (B) at 150 lb-ft (200 N·m).



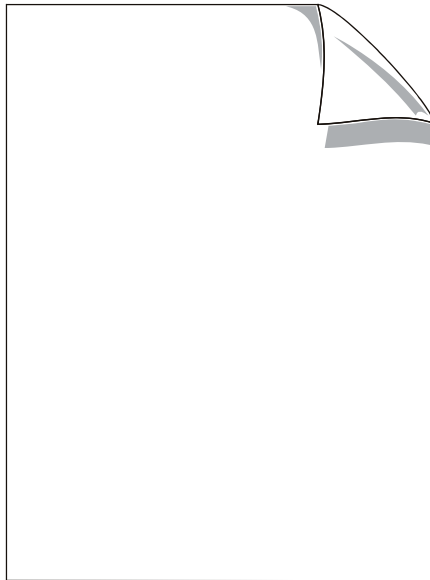
S301839

DRIVE SYSTEM

DRIVE SYSTEM MOTOR DISASSEMBLY/ASSEMBLY [All versions] (Continues)



S301840



MOTOR

MOTOR

OVERVIEW [Battery]

To perform motor maintenance procedures, it is necessary to:

- Drive the machine on a level ground.
- Engage the parking brake.
- Release the rear hood (1) with the lever (25), then fully lift it.

The maintenance procedures shown in this chapter are those for which it is necessary to operate differently from what indicated above.

MAIN MOTOR ELECTRICAL INPUT CHECK [Battery]



WARNING!

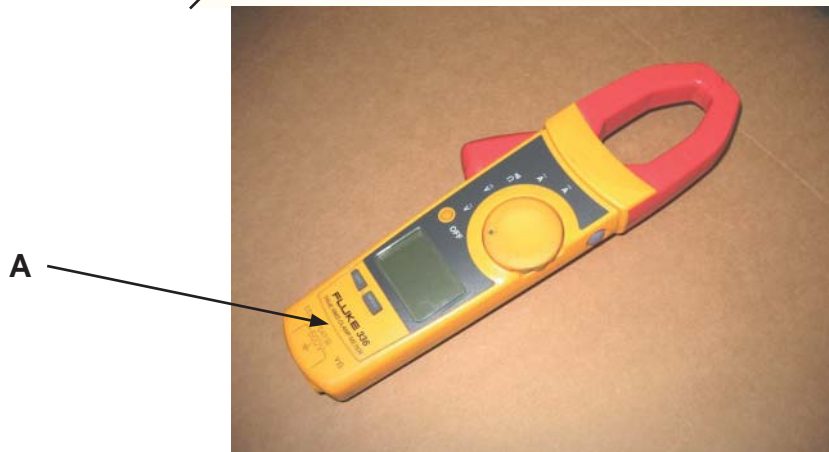
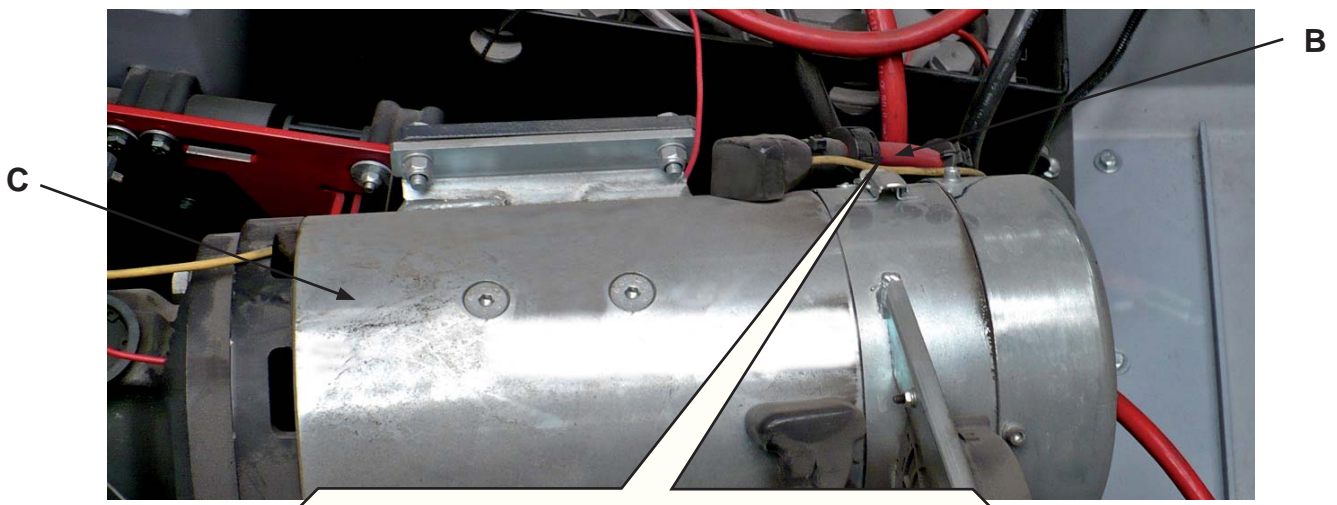
This procedure must be performed by qualified personnel only.

1. Drive the machine on a level ground. Engage the parking brake.
2. Release the rear hood (1) with the lever (25), then fully lift it.
3. Apply amperometric pliers (A) on the cable (B) of the main motor (C).
4. Turn the ignition key (85) to start the main motor.
5. Check that the batteries are fully charged and the green LEDs (77) are on.
6. Check that the electrical input of the main motor (C) is within the following:
 - Stopped, with all the accessories off: 60 - 75 A a 48 V.
 - Stopped, with side and main brooms running: 110 - 130 A a 48 V.
 - Moving, with side and main brooms running: 140 - 160 A a 48 V.

Turn the ignition key (85) to "0" and remove the amperometric pliers (B).

If the electrical input is higher, perform the motor carbon brush check (see the procedure on the following pages). If necessary, disassemble the main motor (see the procedure on the following pages), clean it, clean the cooling fan, and check its moving parts.

If the above-mentioned procedures do not lead to a correct electrical input, the motor must be replaced (see the procedure on the following pages).



MAIN MOTOR CARBON BRUSH REPLACEMENT [Battery]



WARNING!

This procedure must be performed by qualified personnel only.

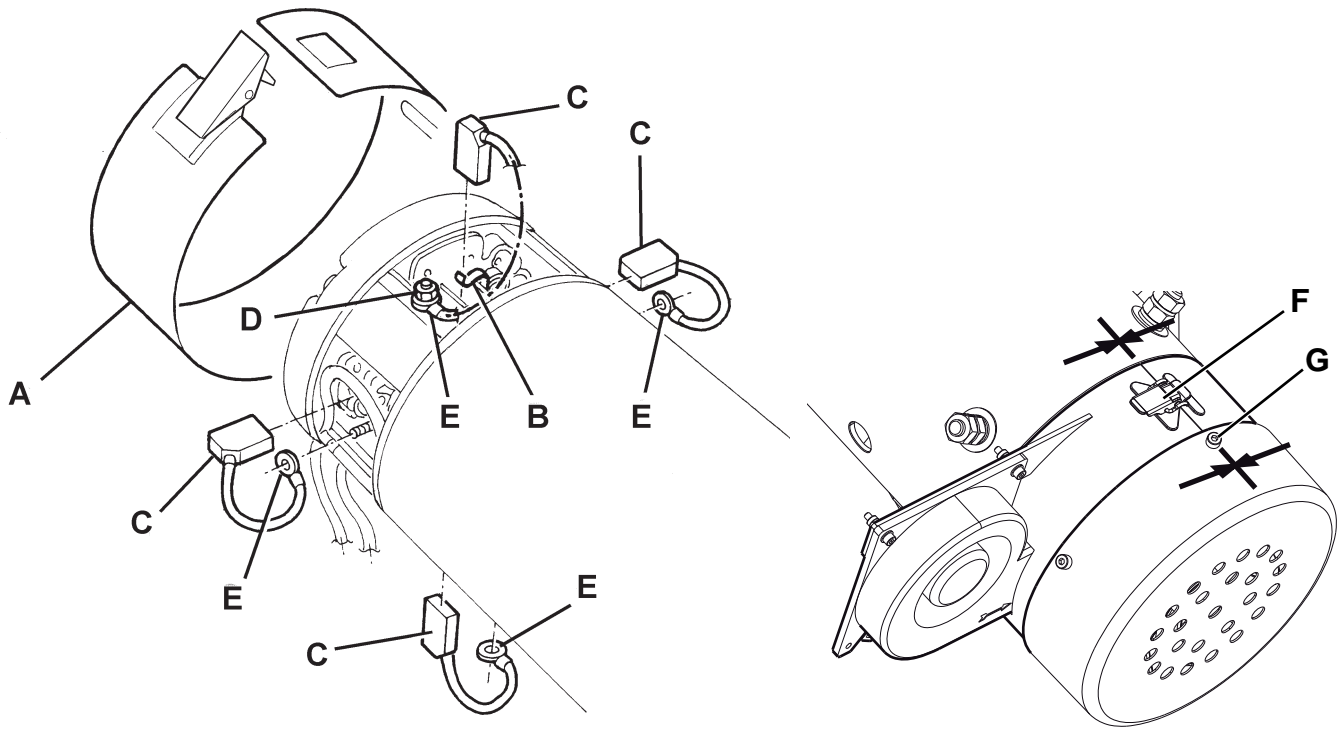
1. Drive the machine on a level ground.
2. Engage the parking brake.
3. Turn the ignition key (85) to "0" and remove it.
4. Disconnect the battery connector (57).
5. Release the rear hood (1) with the lever (25), then fully lift it.
6. Disconnect the cooling fan connector, then remove dust and dirt from the motor exterior part; then disengage and remove the clamp (A).
7. For each of the four carbon brushes, lift the retaining spring (B) and remove the carbon brush (C).
8. Check the four carbon brushes for wear. Replace the carbon brushes when: the contact with the motor armature is insufficient, the carbon brushes are worn, the carbon brush contact surface is not integral, the thrust spring is broken, etc. The minimum length of the carbon brushes (C) is 6 mm, then they must be replaced.

Replacement

9. If necessary, remove the nuts (D) and disengage the lead-in wires (E), then remove the carbon brushes. Replace the carbon brushes as an assembly.

Reset

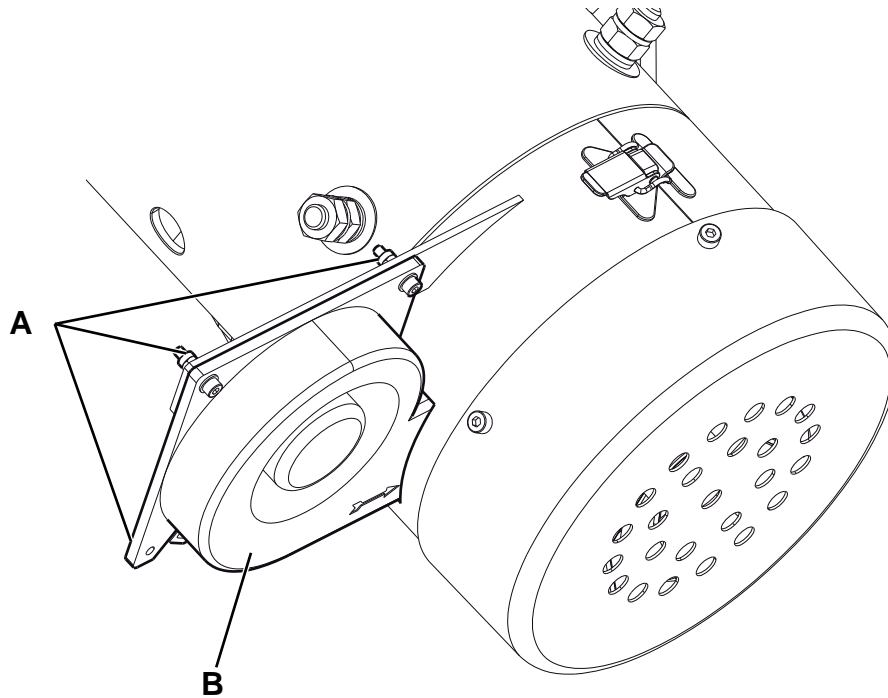
10. Assemble the components in the reverse order of disassembly, and note the following:
 - Install the clamp as shown in the figure, by aligning the lever (F) with the screw (G).



MOTOR

MAIN MOTOR COOLING FAN REPLACEMENT [Battery]

1. Drive the machine on a level ground.
2. Engage the parking brake.
3. Turn the ignition key (85) to "0" and remove it.
4. Disconnect the battery connector (57).
5. Release the rear hood (1) with the lever (25), then fully lift it.
6. Disconnect the cooling fan connector.
7. Loosen the nuts (A), recover the washers and the screws, then remove the cooling fan (B).
8. Assemble the new fan in the reverse order of disassembly.



MAIN MOTOR REMOVAL/REPLACEMENT [Battery]**Disassembly**

1. Drive the machine on a level ground.
2. Engage the parking brake.
3. Turn the ignition key (85) to "0" and remove it.
4. Disconnect the battery connector (57).
1. Remove the rear hood (see the procedure in the relevant paragraph).
2. Disconnect the carbon brush cooling fan connector.
3. Remove the clamp with the cooling fan (A), then keep it to use it again.
4. Disconnect the wiring harness (B) on the main motor.
5. Loosen the screws (C) fastening the motor to the main pump (D). Recover the washers (E).
6. Loosen the nuts (F) and recover the washers and the screws (G).

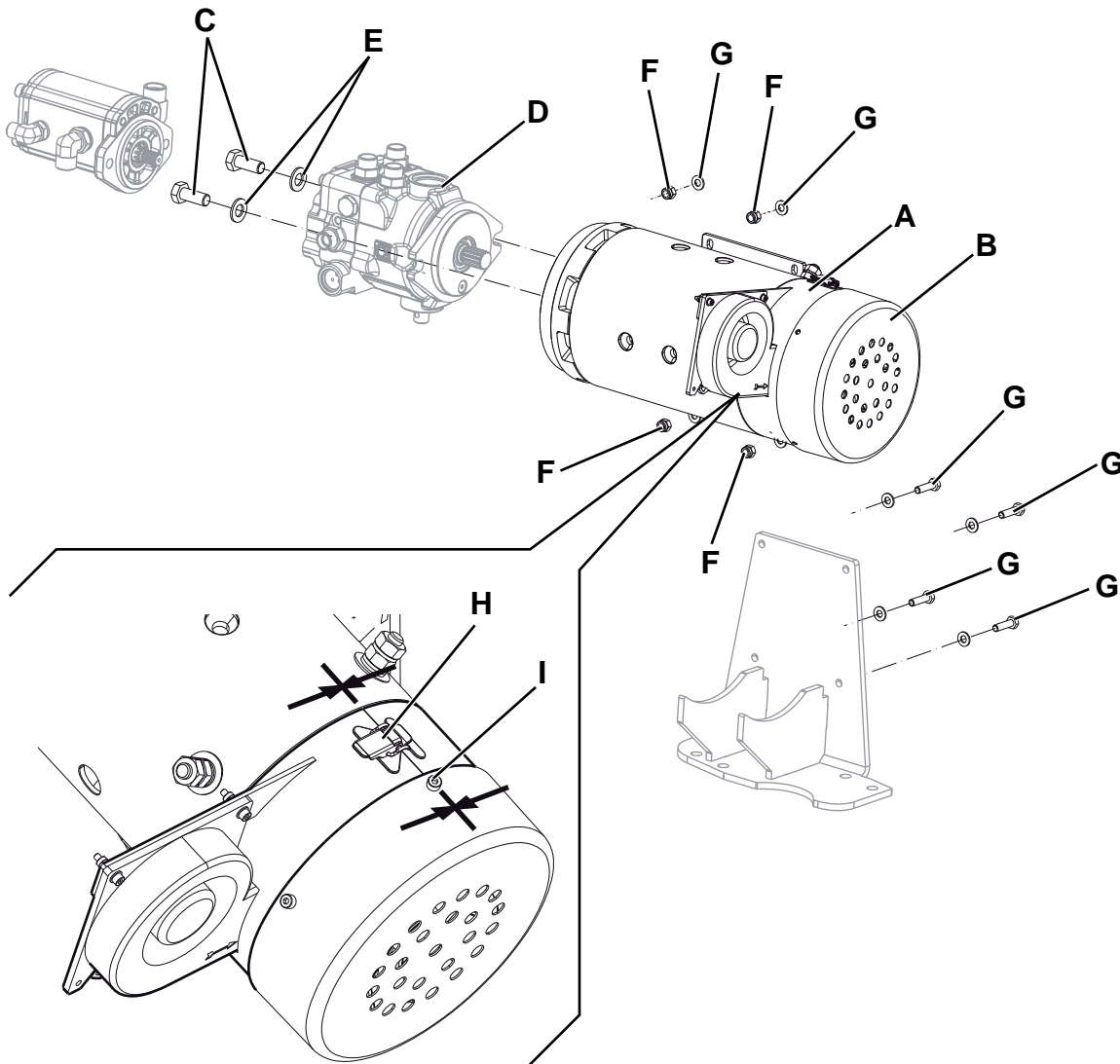
**WARNING!**

Use a proper safety system to keep the main motor lifted (motor weight: 99.2 lb (45 kg)).

7. Remove the motor (B) from the main pump.

Assembly

8. Assemble the components in the reverse order of disassembly, and note the following:
 - Install the main motor by using a proper safety system.
 - Install the clamp as shown in the figure, by aligning the lever (H) with the screw (I) on the main motor.



P100281

ENDOTHERMIC ENGINE

ENDOTHERMIC ENGINE

OVERVIEW [Diesel / LPG / Gasoline]

To perform engine maintenance procedures, shown in the relevant Manual, it is necessary to:

- Drive the machine on a level ground.
- Engage the parking brake.
- Turn the ignition key (86) to “0” and remove it.
- Release the rear hood (1) with the lever (25), then fully lift it.
- Proceed as shown in the Engine Manual.

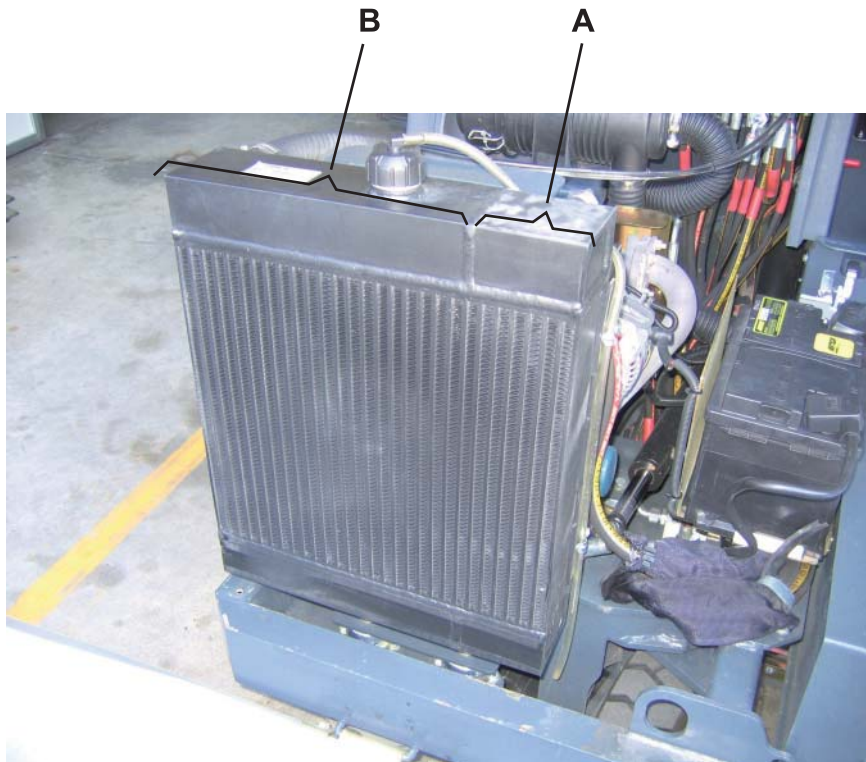
The maintenance procedures shown in this chapter are those for which it is necessary to operate differently from what indicated above.

COOLANT RADIATOR FINS CHECK [Diesel / LPG / Gasoline]

1. Remove the rear hood (see the procedure in the relevant paragraph).
2. Consider that the part (A) of the radiator is for cooling the hydraulic system oil, while the part (B) is the engine coolant radiator.
3. Check the radiator cooling fins for dirt and bends. If necessary:
 - Clean the fins with compressed air (maximum 87.0 psi (6 Bar)); to remove debris from the fins, blow the compressed air in the opposite direction of the cooling air flow.
 - Straighten any buckled fins, using a suitable tool (screwdriver, etc.).
4. Install the rear hood (see the procedure in the relevant paragraph).

**NOTE**

The image shown refers to the Diesel version.



S301841

ENDOTHERMIC ENGINE

AIR FILTER DISASSEMBLY/ASSEMBLY [Diesel / LPG / Gasoline]

Disassembly

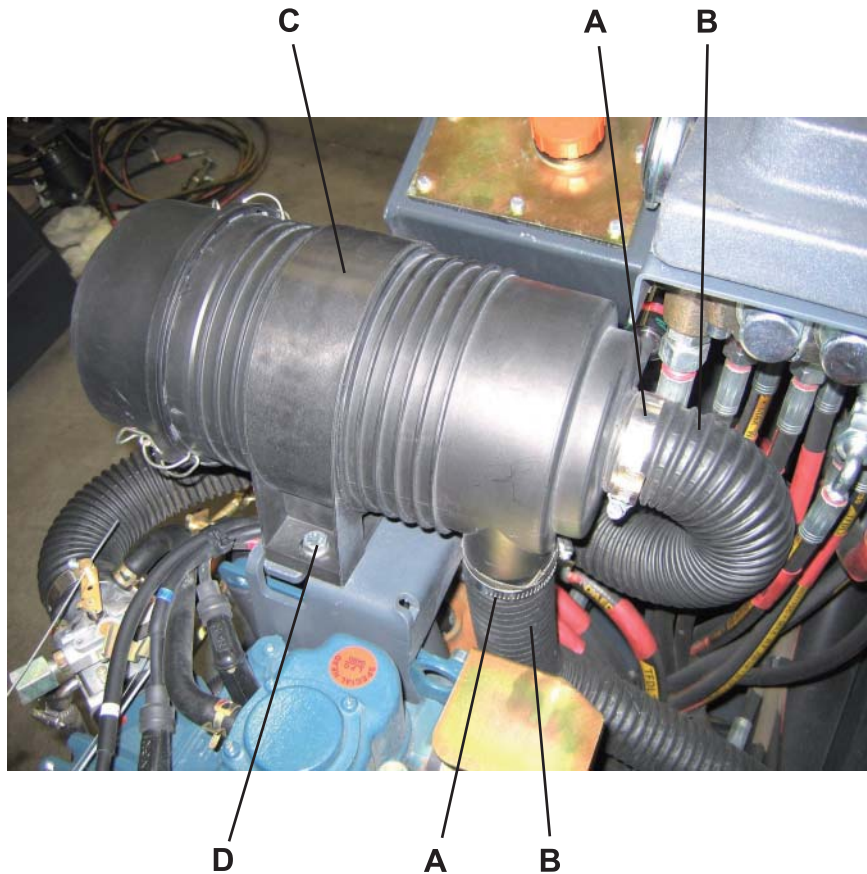
1. Remove the dust control system water tank (see the procedure in the relevant paragraph).
2. Loosen the clamps (A) and disconnect the hoses (B) from the air filter assembly (C).
3. Remove the two screws (D), then remove the air filter assembly (C).

Assembly

1. Assemble the components in the reverse order of disassembly.

**NOTE**

The image shown refers to the Diesel version.



S301842

COOLING FAN BELT DISASSEMBLY/ASSEMBLY [Diesel / LPG / Gasoline]

Disassembly

**WARNING!**

Wait until the diesel engine radiator cools down.

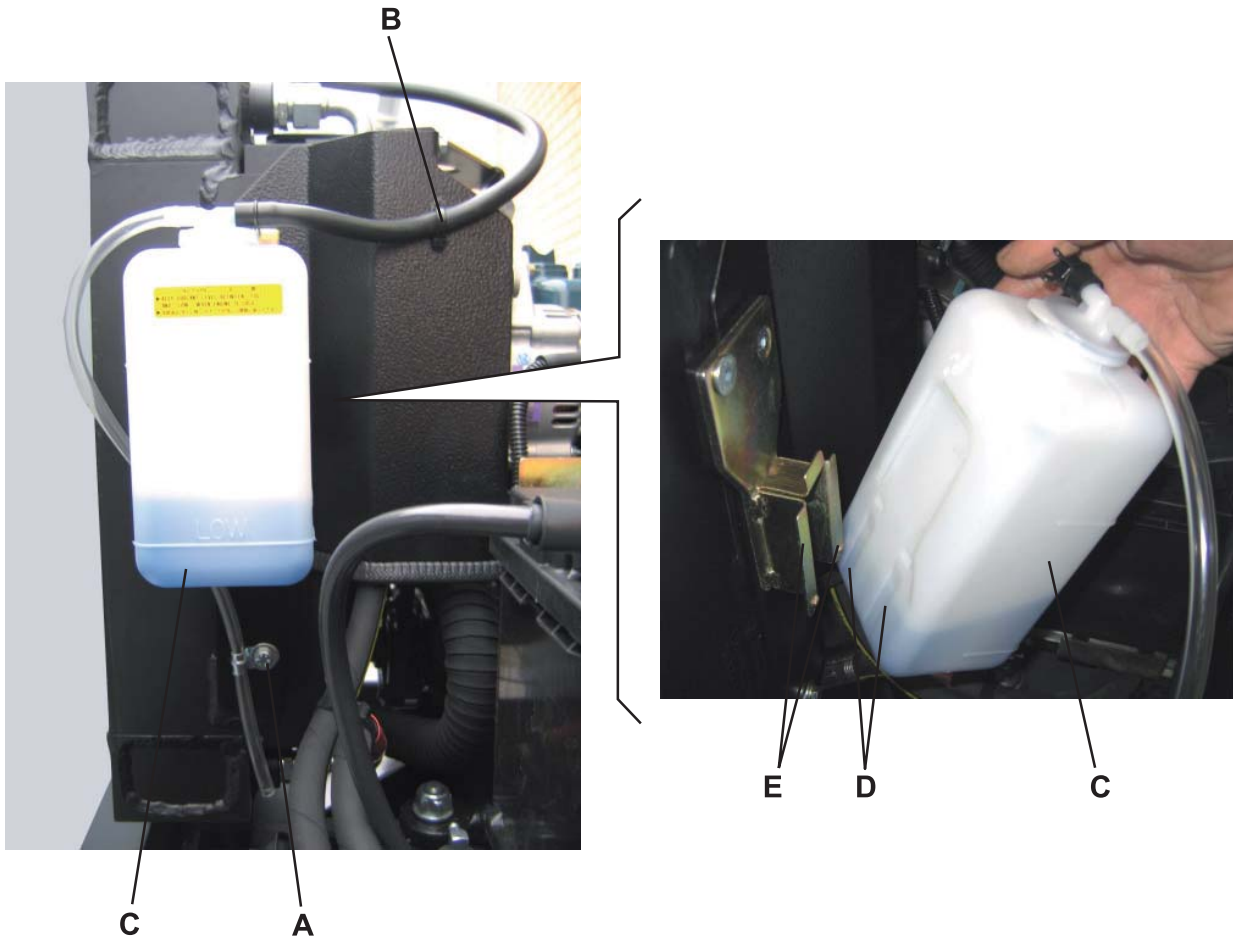
1. Remove the rear hood (see the procedure in the relevant paragraph).
2. Disconnect the battery negative pole (3).
3. On the right side of the diesel engine radiator, loosen exhaust pipe clamp screw (A).
4. Cut the clamp (B).
5. Lift the coolant tank (C) by disengaging the fasteners (D) from the holder (E).
6. Move aside and fasten the tank in the position (F).
7. Remove the screws (G), then remove the shield (H).
8. Remove the screws (I) and slightly move the upper part (J) of the radiator backwards.
9. Install a screw with nut and locknut (K) on one of the radiator vibration-dampers (L), then use a wrench on the locknut (M) to loosen the vibration-damper (L) for a few turns. Loosen the other vibration-damper (L) in the same way.
10. Remove the screws (N) on the left side of the radiator.
11. Remove the protection grid (O).
12. Loosen the screws (P) and move aside the alternator (Q) thus detensioning the cooling fan belt (R). Disengage the belt (R) from the cooling fan pulley and from the other two pulleys.
13. Remove the belt (R) by disengaging it from the cooling fan (S).

Assembly

1. Assemble the components in the reverse order of disassembly, and note the following:
 - Before tightening the screws (P), adjust the tension of the cooling fan belt (R) as shown in the Engine Manual.

**NOTE**

The image shown refers to the Diesel version.



S301865

ENDOTHERMIC ENGINE

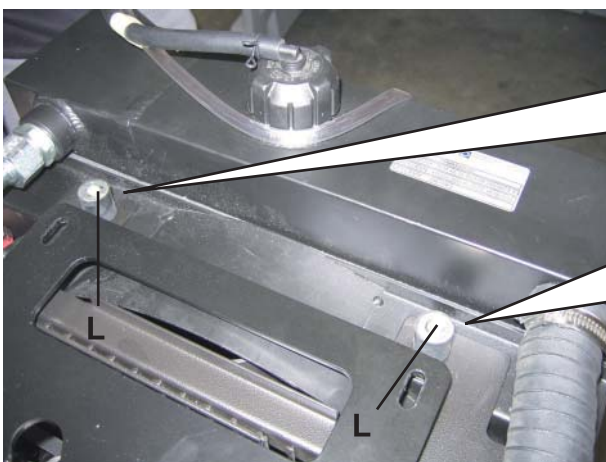
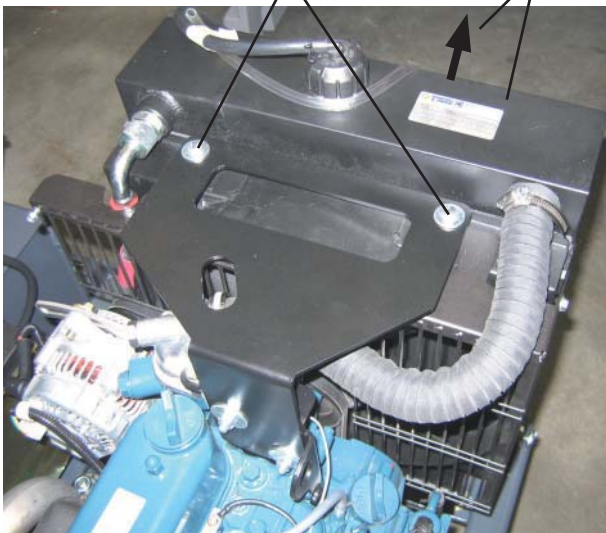
COOLING FAN BELT DISASSEMBLY/ASSEMBLY [Diesel / LPG / Gasoline] (Continues)



F

I

J



L

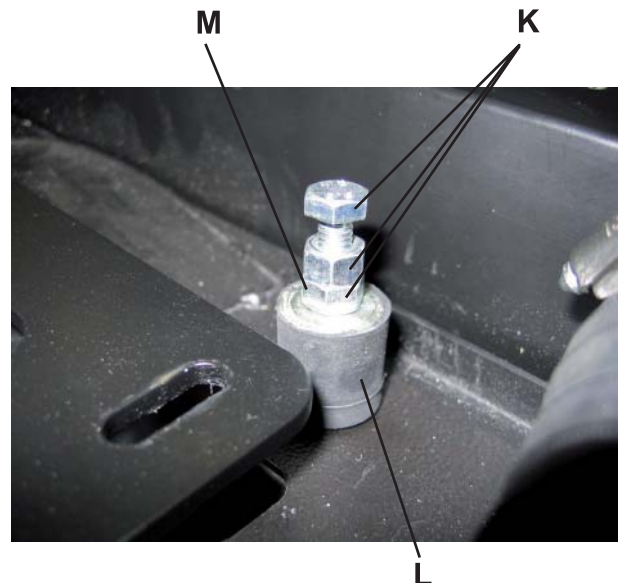
L



G

G

H



M

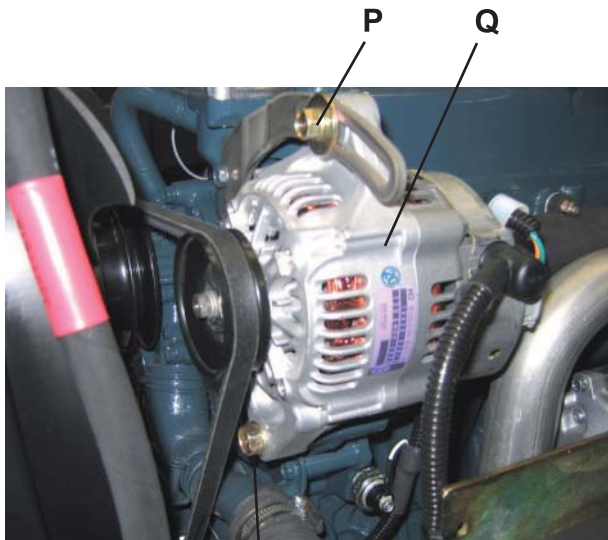
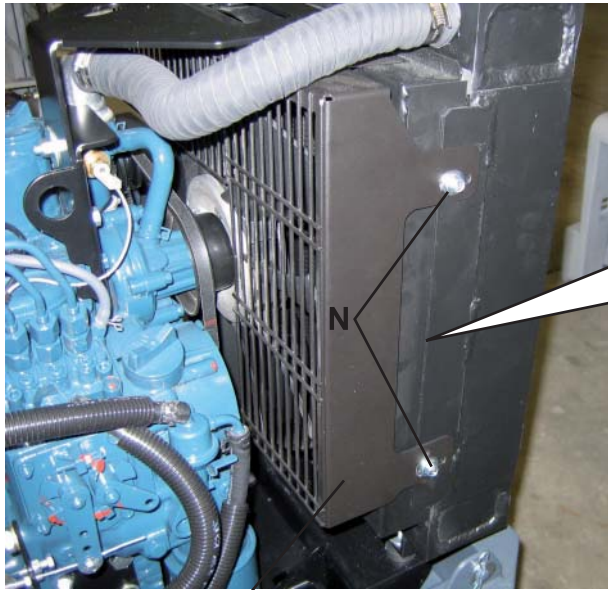
K

L

S301866

ENDOTHERMIC ENGINE

COOLING FAN BELT DISASSEMBLY/ASSEMBLY [Diesel / LPG / Gasoline] (Continues)



S301867

ENDOTHERMIC ENGINE

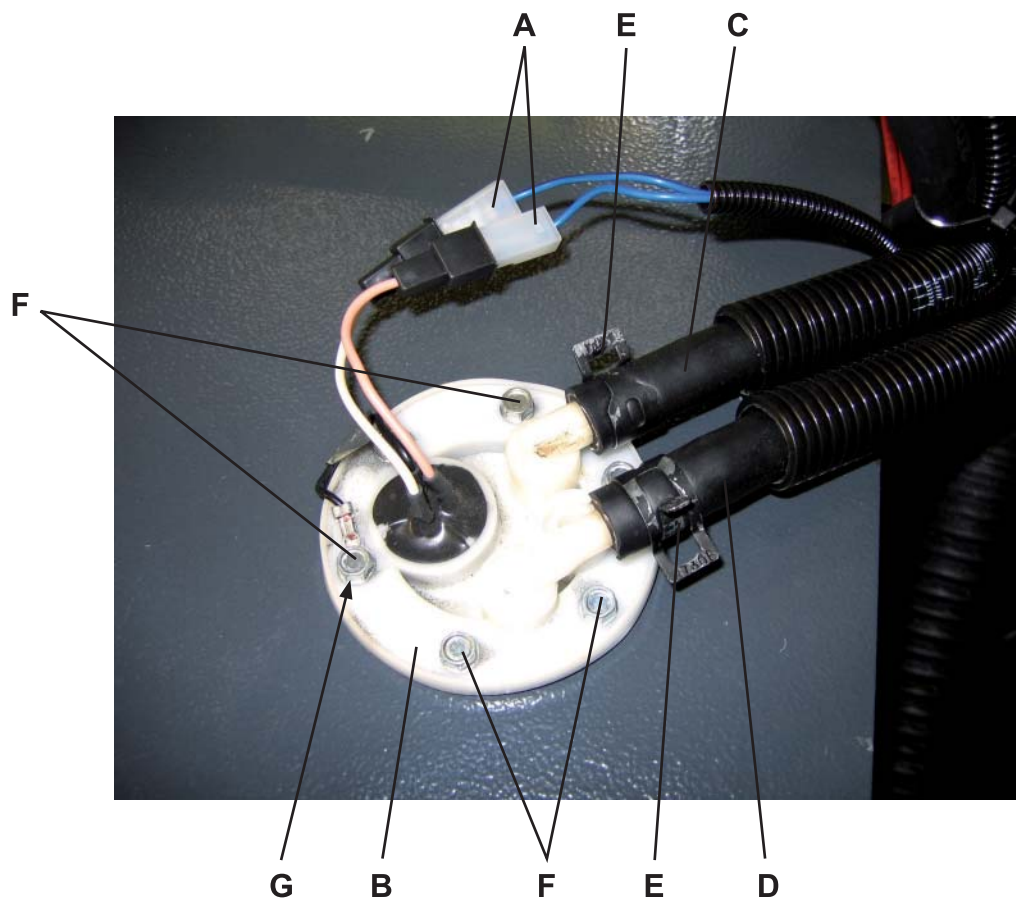
FUEL FLOAT DISASSEMBLY/ASSEMBLY [Diesel / Gasoline]

Disassembly

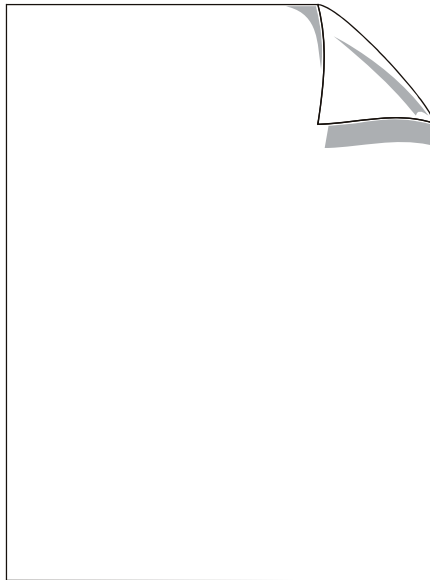
1. Drive the machine on a level ground. If the machine is indoor, ensure that the place has a proper ventilation, to avoid fuel vapor concentrations that can be produced during the disassembly/assembly procedures.
2. Engage the parking brake.
3. Turn the ignition key (86) to "0" and remove it.
4. Release the rear hood (1) with the lever (25), then fully lift it.
5. Disconnect the electrical connections (A) from the fuel tank float assembly (B).
6. Mark the position of the fuel hoses (C) and (D) (for proper assembly).
7. Disengage the clamps (E) and disconnect the hoses (C) and (D) from the float assembly (B).
8. Remove the screws (F).
9. Move aside the ground terminal (G).
10. Remove the float assembly (B) from the fuel tank.

Assembly

1. Assemble the components in the reverse order of disassembly.



S301843



OTHER SYSTEMS

OTHER SYSTEMS

CHECKING FOR LEAKS AND TIGHTENING OF SCREWS AND NUTS [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

1. (*) Empty the hopper.
2. (*) Drive the machine on a solid and level ground, then engage the parking brake.
3. (*) Fully lift the hopper.
4. To avoid that the hopper lowers by accident, install the safety support as shown below.
 - Pull the handle (A) fully backwards and, by keeping it in this position, lower the hopper by pushing the lever (B) forward until the hopper stops on the safety support.
 - Release the lever (B) and the handle (A).



WARNING!

It is essential to insert the safety support under the lifted hopper, even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

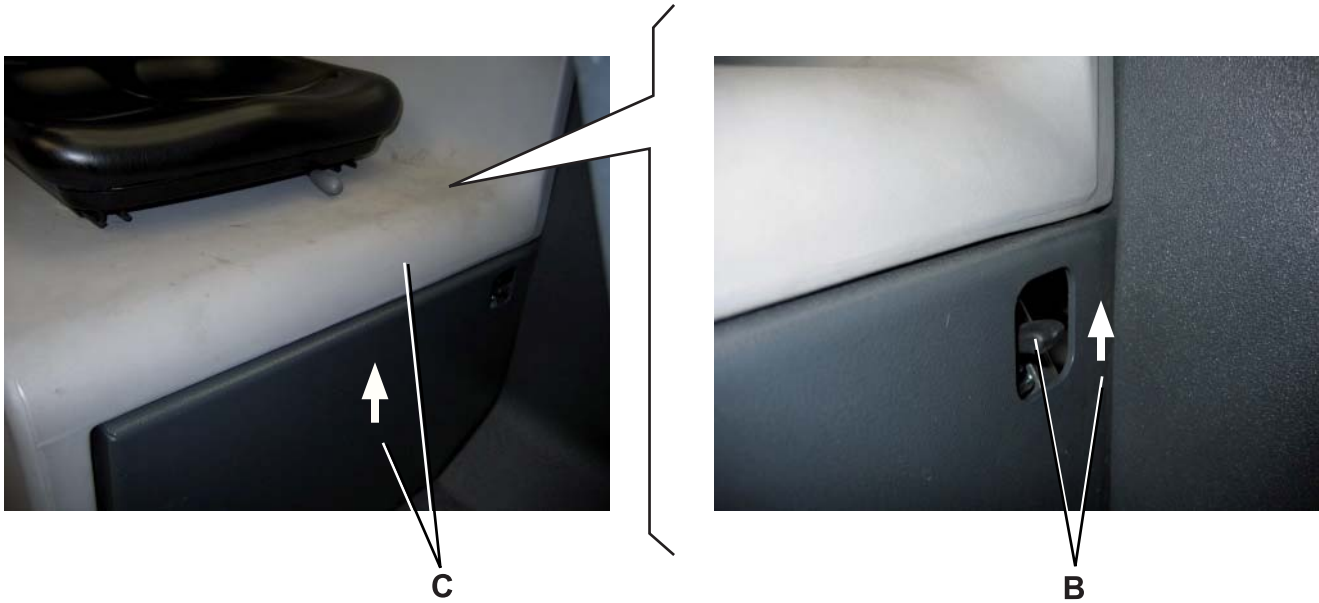
5. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
6. Release the rear hood (1) with the lever (25), then fully lift it.
7. Check for:
 - Tightening of mounting screws and nuts;
 - Correct position of the fasteners;
 - Pinched hoses, ducts, cables;
 - Visible faults in the components;
 - Oil leaks, etc.
8. Perform steps 4 and 6 in the reverse order.

REAR HOOD DISASSEMBLY/ASSEMBLY [All versions]**Disassembly**

1. Drive the machine on a level ground.
2. Engage the parking brake.
3. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
4. Lift the release lever (B), then fully open the rear hood (C).
5. If present, disconnect the electrical connection (D) which connects the electrical system to the rear hood.
6. Support the rear hood properly (the hood weight is 121 lb (55 kg) approximately) then, on both sides of the hood, remove the cotter pins (E) and recover the washers (F), disengage the tie rods (G) from the pins (H) and carefully lower the rear hood to the ground.
7. Lift the rear hood (I) by disengaging the brackets (J) from their housings, then remove it.

Assembly

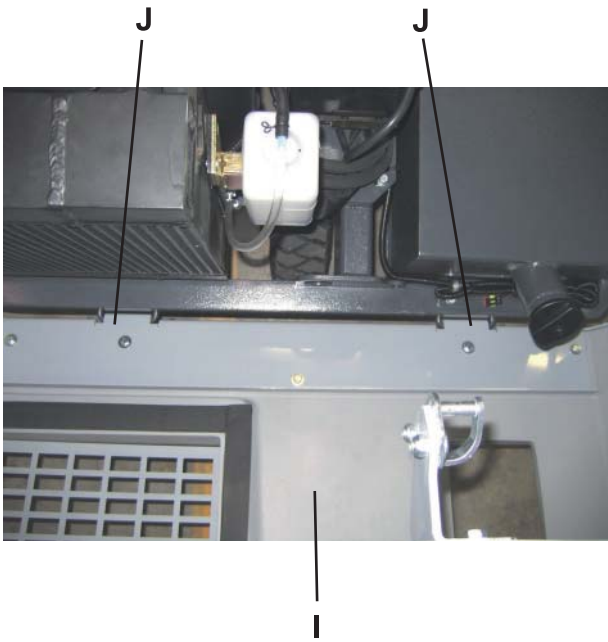
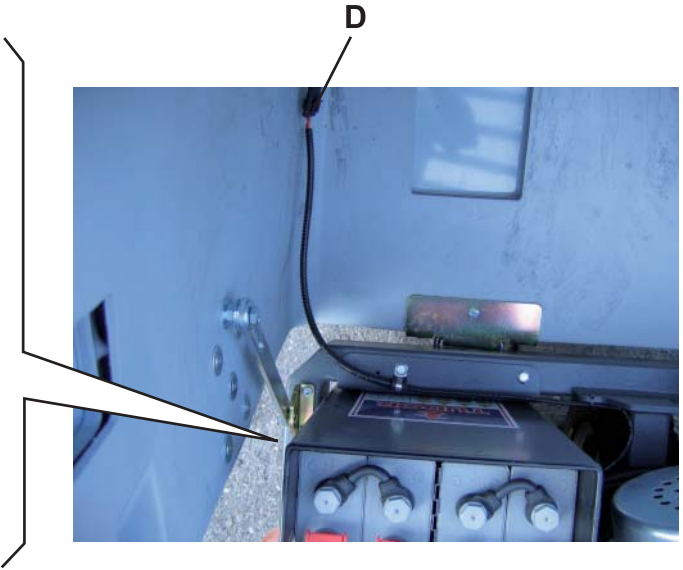
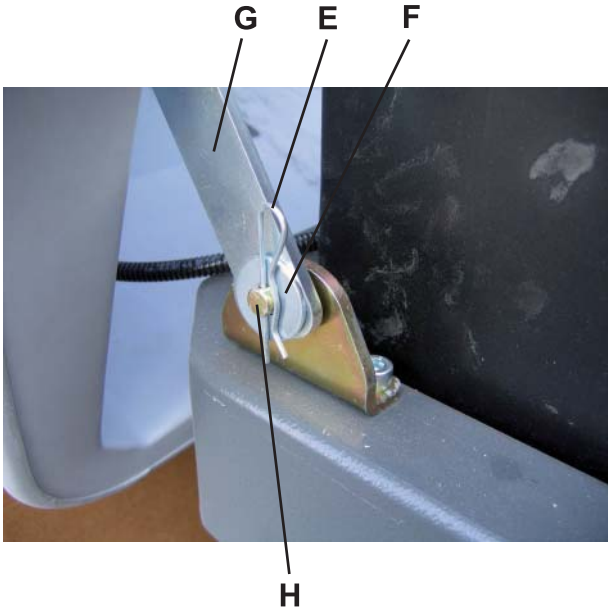
1. Assemble the components in the reverse order of disassembly, and note the following:
 - When closing the rear hood, ensure that it engages properly to the fastening mechanism.



S301844

OTHER SYSTEMS

REAR HOOD DISASSEMBLY/ASSEMBLY [All versions] (Continues)



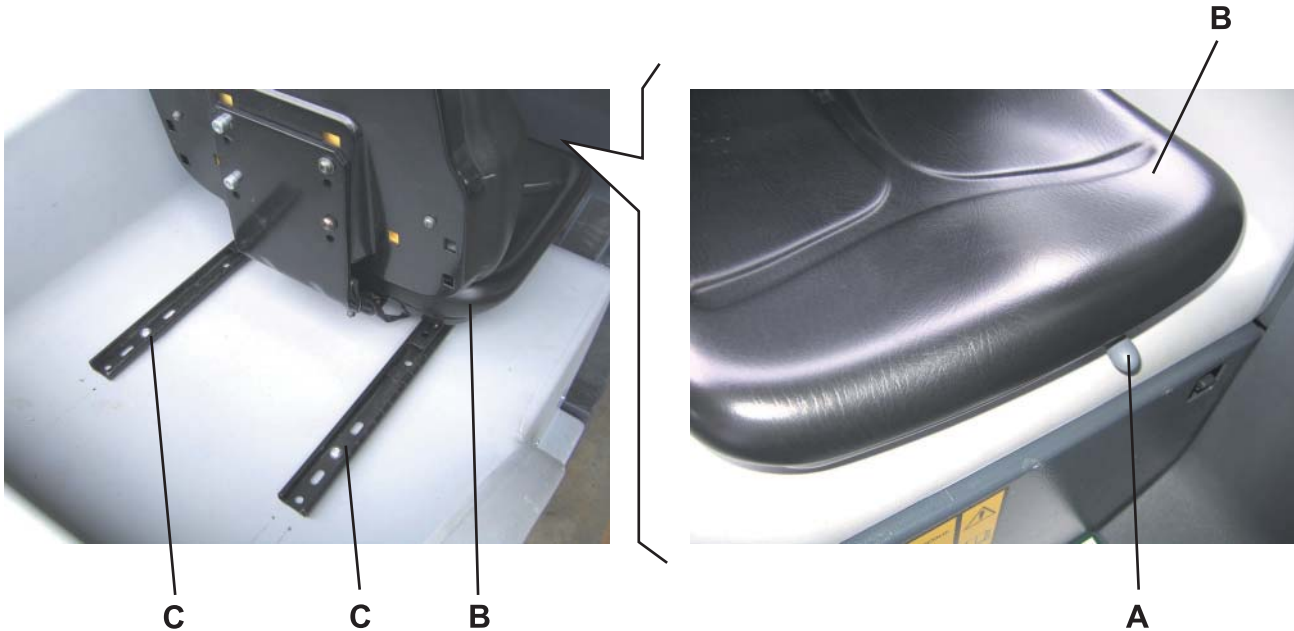
S301845

DRIVER'S SEAT DISASSEMBLY/ASSEMBLY [All versions]**Disassembly**

1. Engage the parking brake.
2. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
3. With the lever (A) disengage the driver's seat fastener (B), then slide the driver's seat forward to release it from the rails (C).
4. Remove the driver's seat (B).

Assembly

1. Assemble the components in the reverse order of disassembly.



S301846

OTHER SYSTEMS

HYDRAULIC CYLINDER JOINT GREASING [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

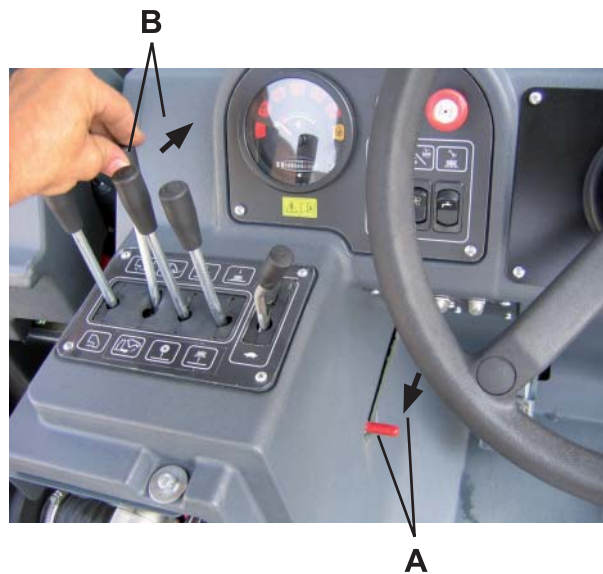
1. (*) Empty the hopper; if it contains a small quantity of material, it is not necessary to empty it.
2. (*) Drive the machine on a solid and level ground, then engage the parking brake.
3. (*) Fully lift the hopper.
4. To avoid that the hopper lowers by accident, install the safety support as shown below.
 - Pull the handle (A) fully backwards and, by keeping it in this position, lower the hopper by pushing the lever (B) forward until the hopper stops on the safety support.
 - Release the lever (B) and the handle (A).



WARNING!

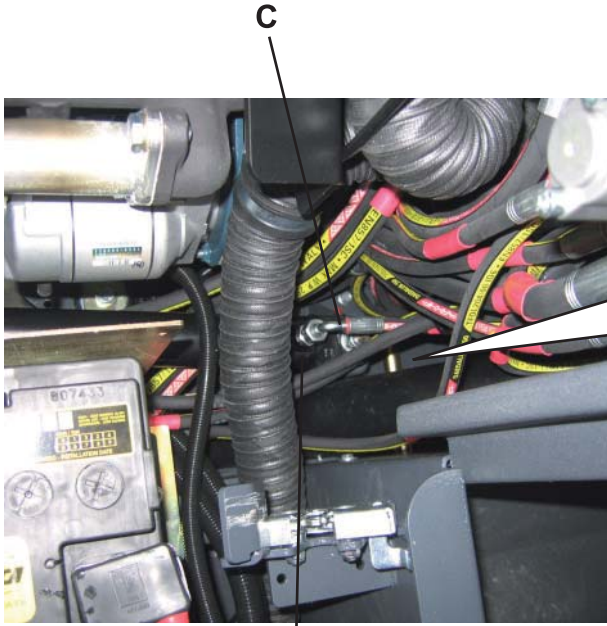
It is essential to insert the safety support under the lifted hopper, even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

5. Release the rear hood (1) with the lever (25), then fully lift it.
6. Remove the plug (C) of the grease nipple (D) which is on the front hydraulic cylinder joint (E).
7. Apply grease to the hydraulic cylinder joint with the grease nipple (D). Stop greasing when the grease starts to come out from the round slit (F).
Use SKF LGMT2 grease or equivalent.
8. Remove the plug (G) of the grease nipple (H) which is on the front hopper hydraulic lifting cylinder joint (I).
9. Apply grease to the hydraulic cylinder joint with the grease nipple (H). Stop greasing when the grease starts to come out from the round slits (J).
Use SKF LGMT2 grease or equivalent.
10. Close the rear hood (1) with great care, and ensure that it engages the fastening mechanism.
11. (*) Lower the hood and turn off the machine.



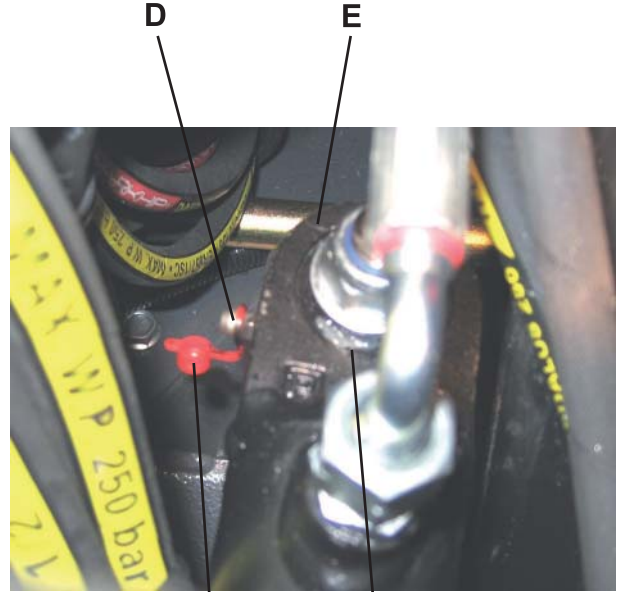
S301792

HYDRAULIC CYLINDER JOINT GREASING [All versions] (Continues)



C

E

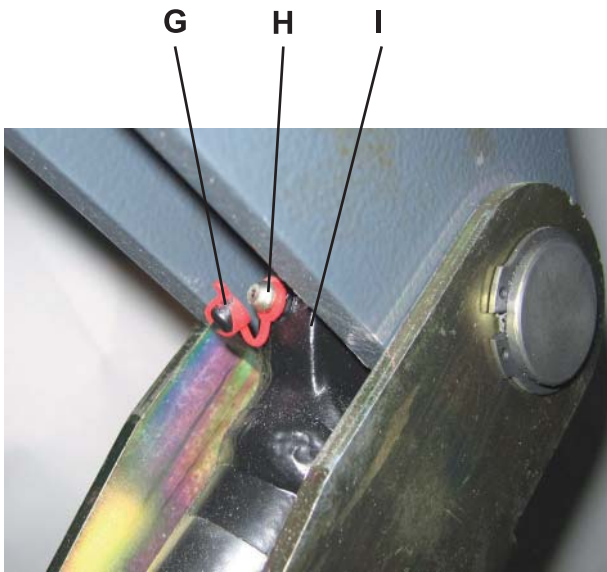


D

E

C

F



G

H

I



I

J

S301869

HYDRAULIC SYSTEM

HYDRAULIC SYSTEM

TROUBLESHOOTING

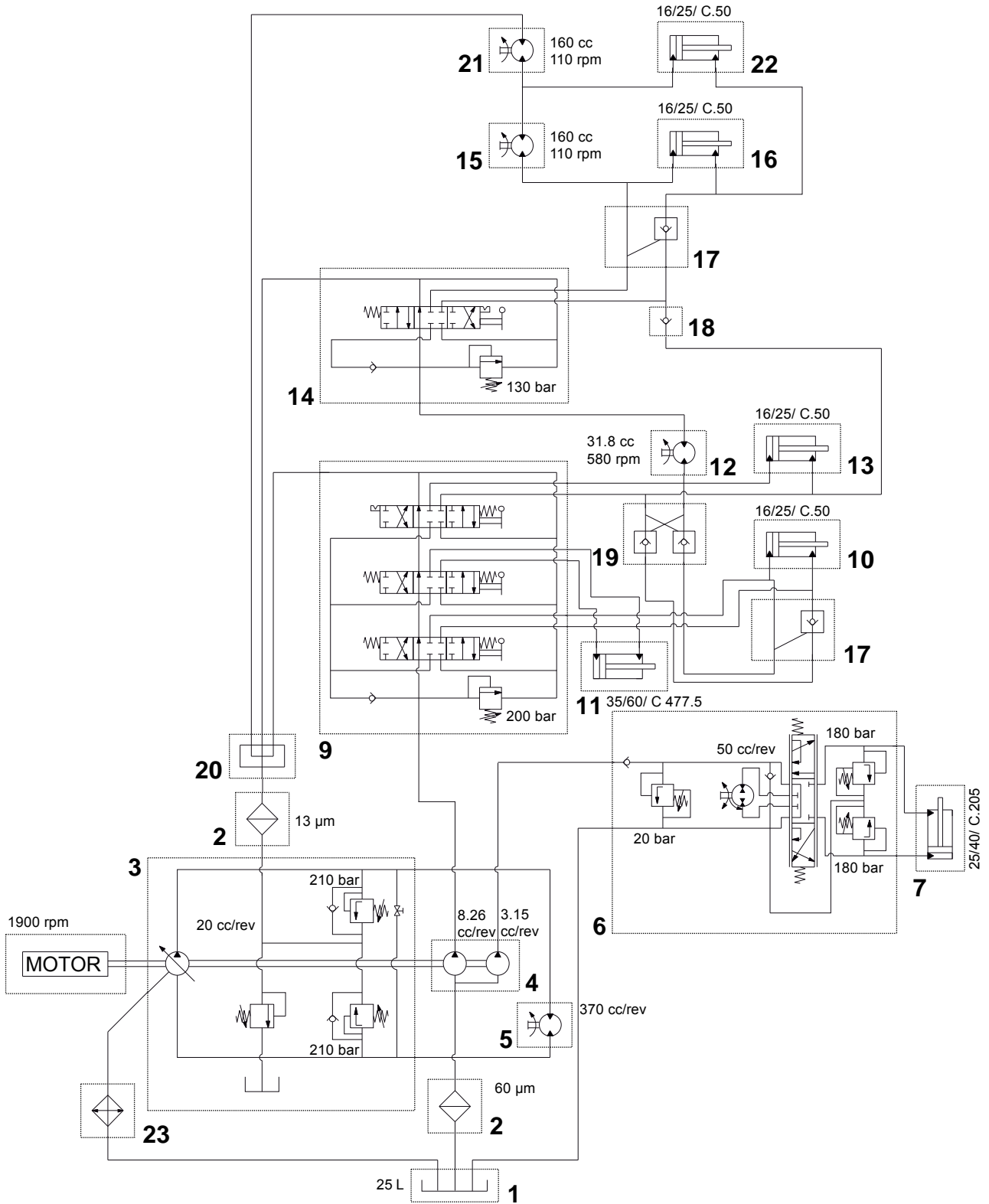
See the previous chapters relevant to the use of the hydraulic system.

HYDRAULIC DIAGRAM

Legend

1	Oil tank
2	Oil filter
3	Drive system pump
4	Accessory pump
5	Drive system motor
6	Power steering
7	Steering cylinder
8	Priority valve
9	Manifold 3 levers
10	Hopper cylinder
11	Skirt cylinder
12	Main broom motor
13	Main broom cylinder
14	Manifold 1 lever
15	Right side broom motor
16	Right side broom cylinder
17	Check valve
18	One-way valve
19	Double check valve
20	Manifold block
21	Left side broom motor (optional)
22	Left side broom cylinder (optional)
23	Radiator

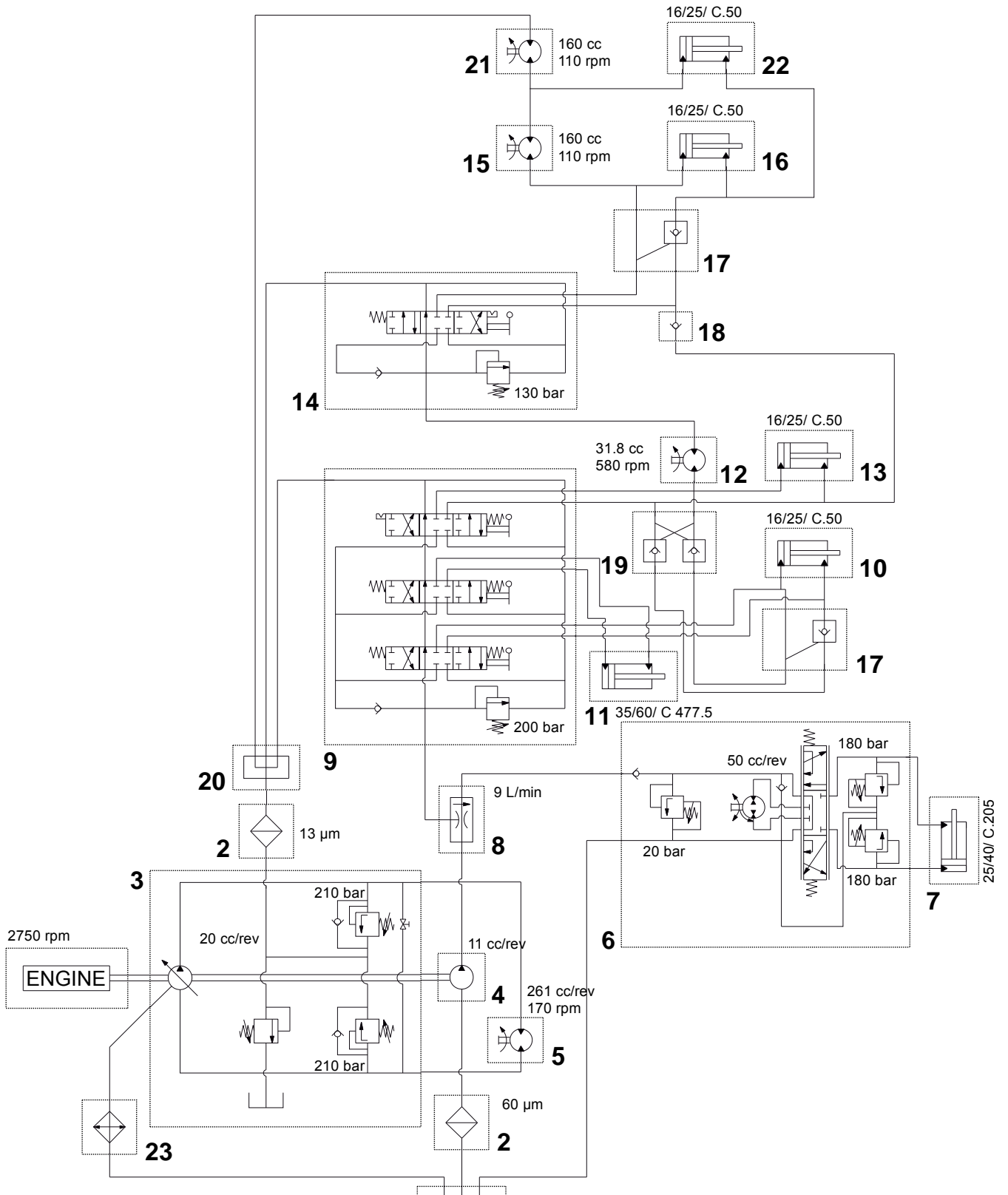
HYDRAULIC DIAGRAM [Battery]



P100328

HYDRAULIC SYSTEM

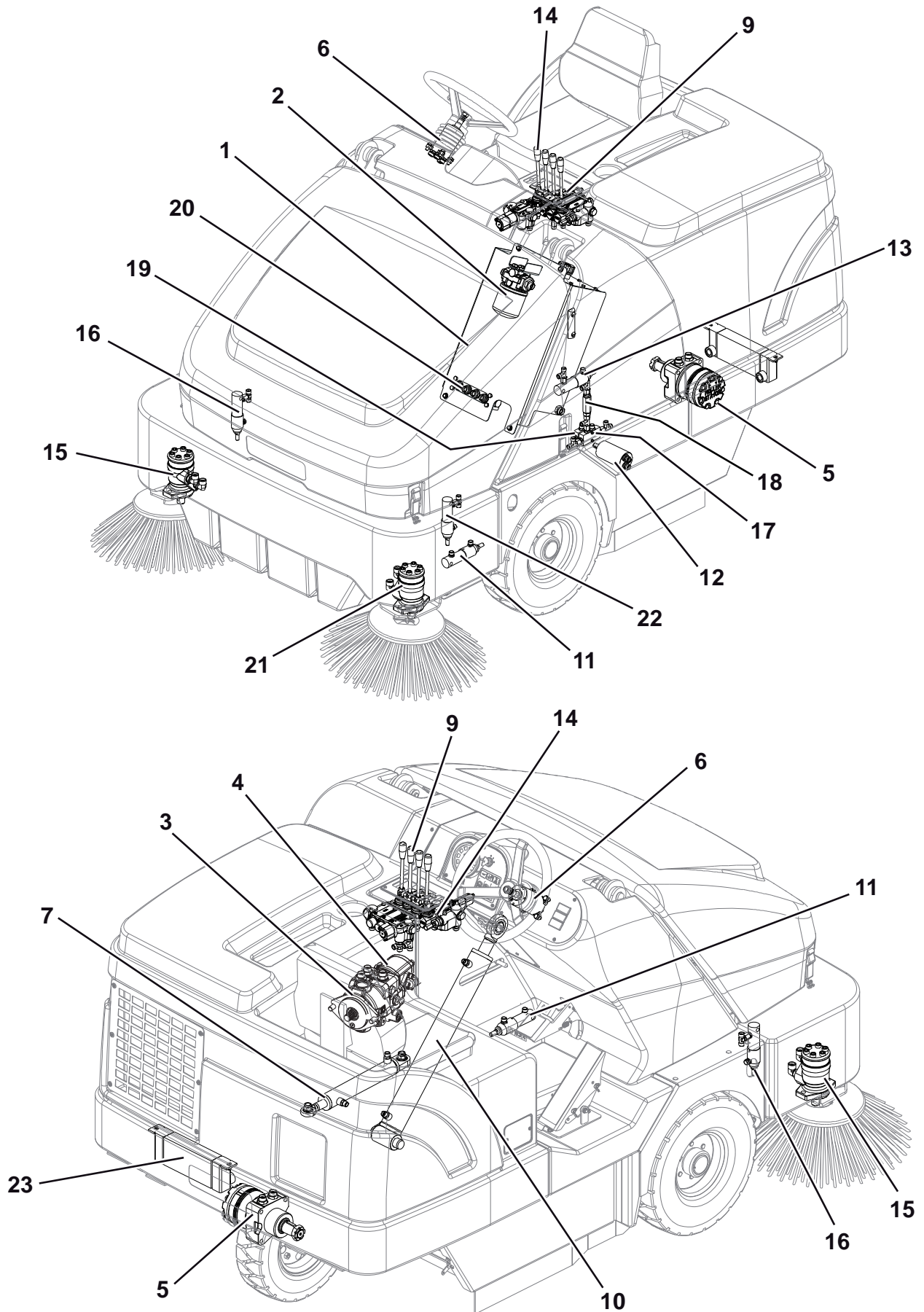
HYDRAULIC DIAGRAM [Diesel / LPG / Gasoline]



S301847

HYDRAULIC SYSTEM

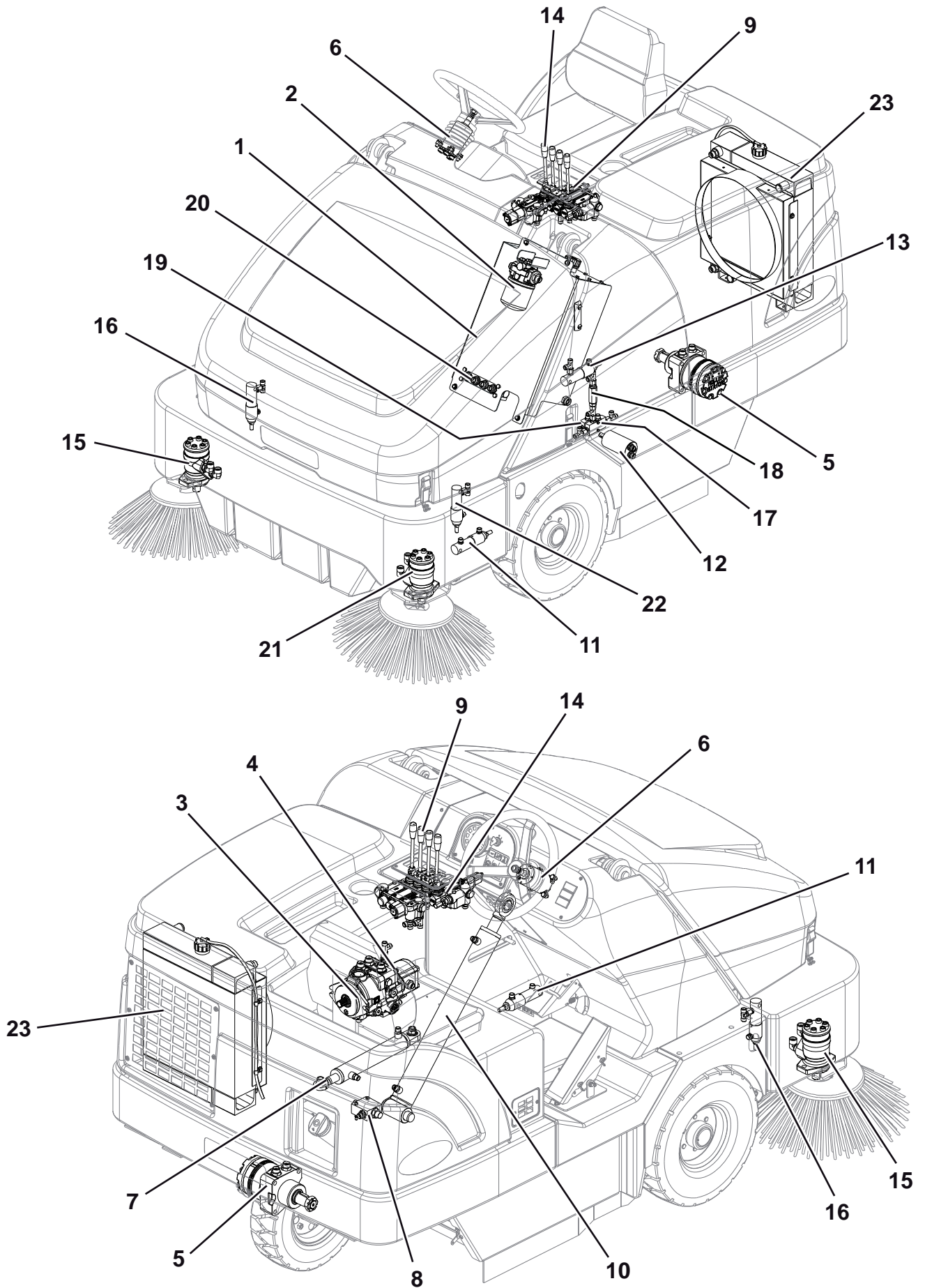
COMPONENT LAYOUT [Battery]



S301848

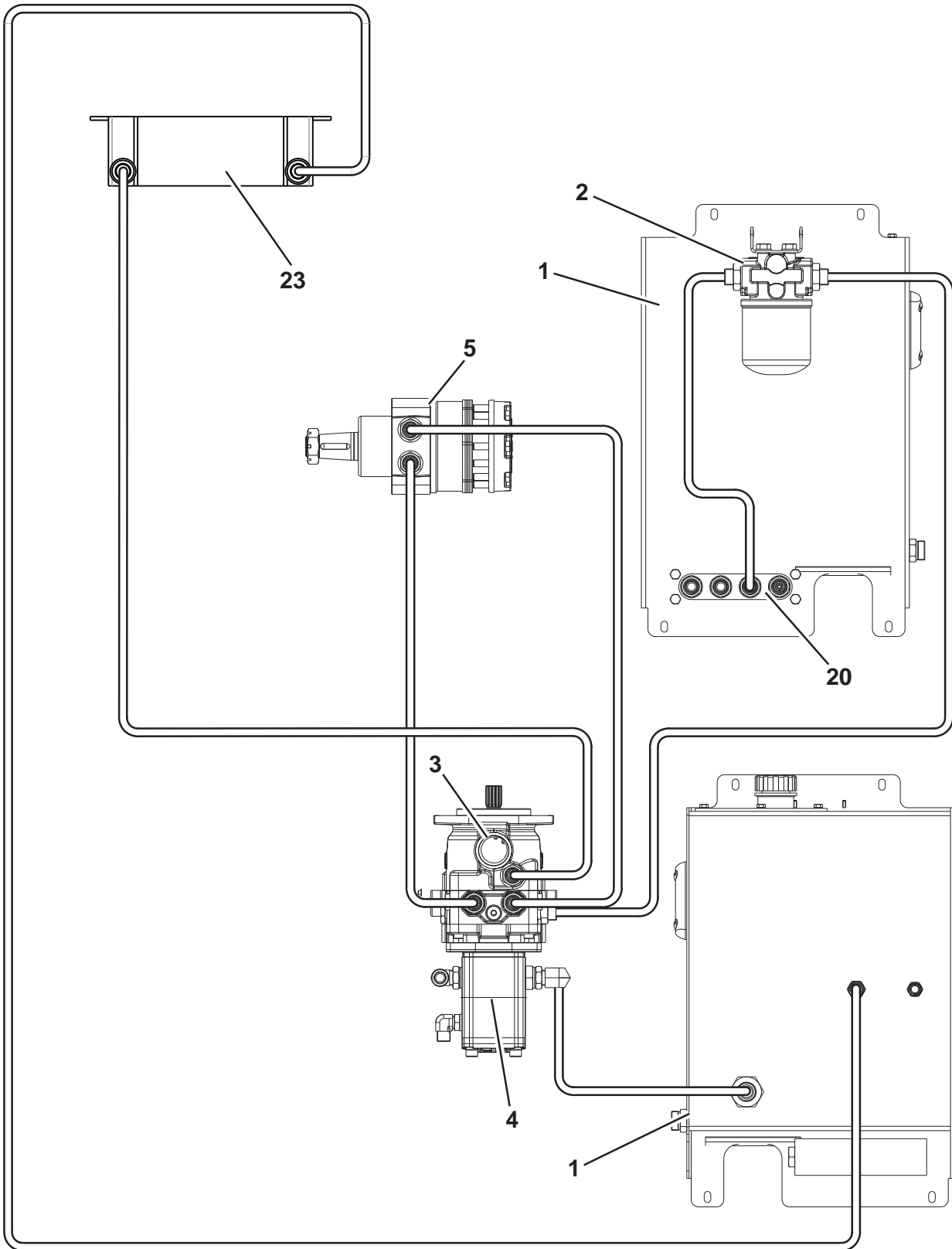
HYDRAULIC SYSTEM

COMPONENT LOCATION [Diesel / LPG / Gasoline]



S301848

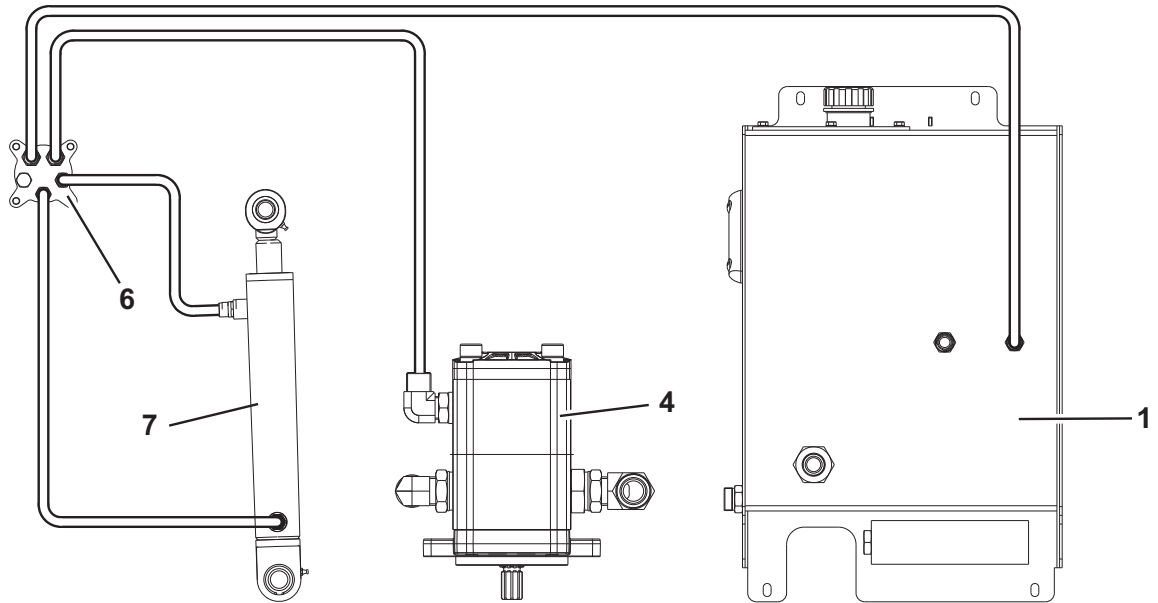
DRIVE SYSTEM HOSE AND COMPONENT LAYOUT [Battery]



S301848C

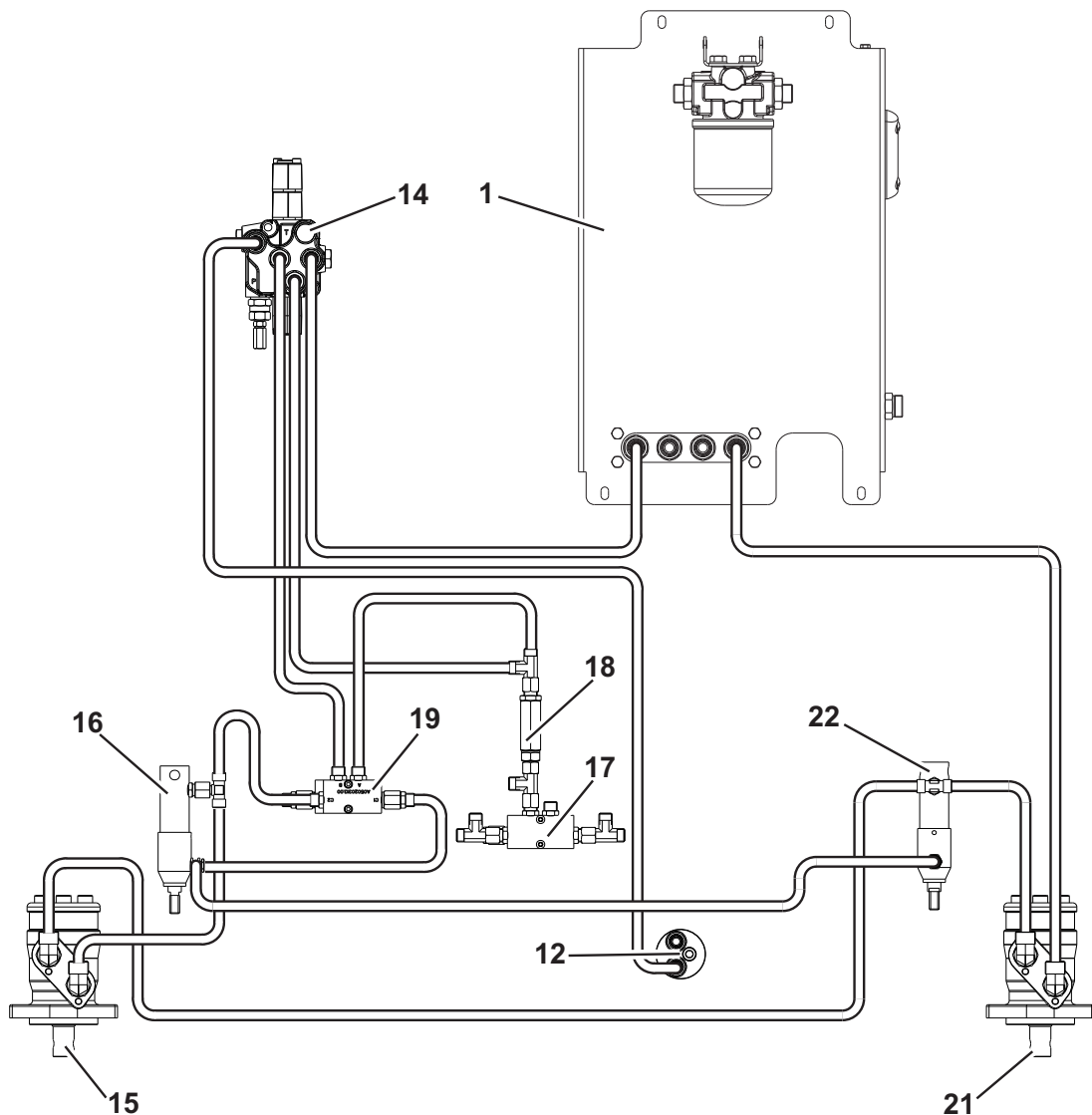
HYDRAULIC SYSTEM

STEERING SYSTEM HOSE AND COMPONENT LAYOUT [Battery]



S301848D

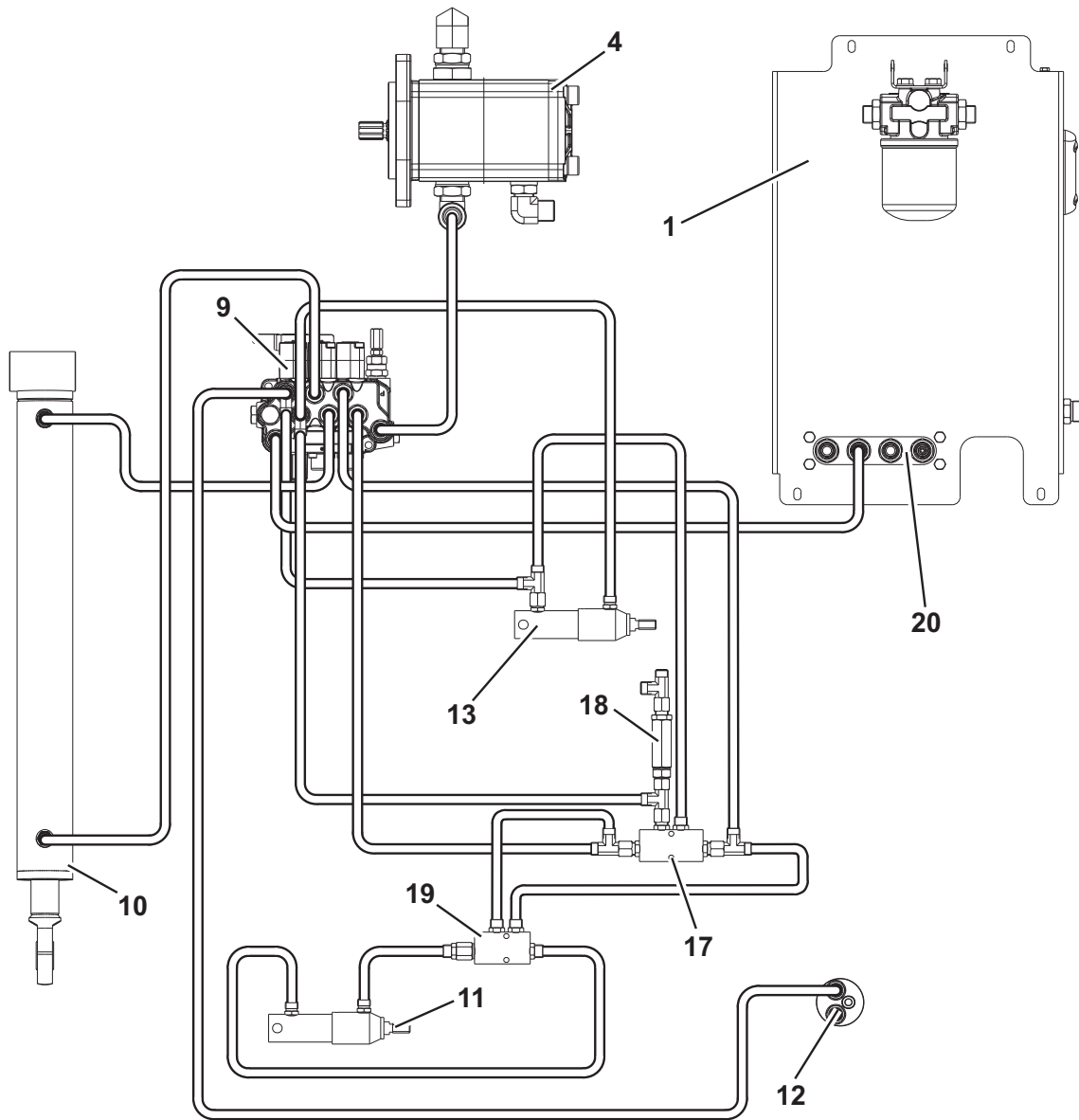
SIDE BROOM SYSTEM HOSE AND COMPONENT LAYOUT [Battery]



S301848E

HYDRAULIC SYSTEM

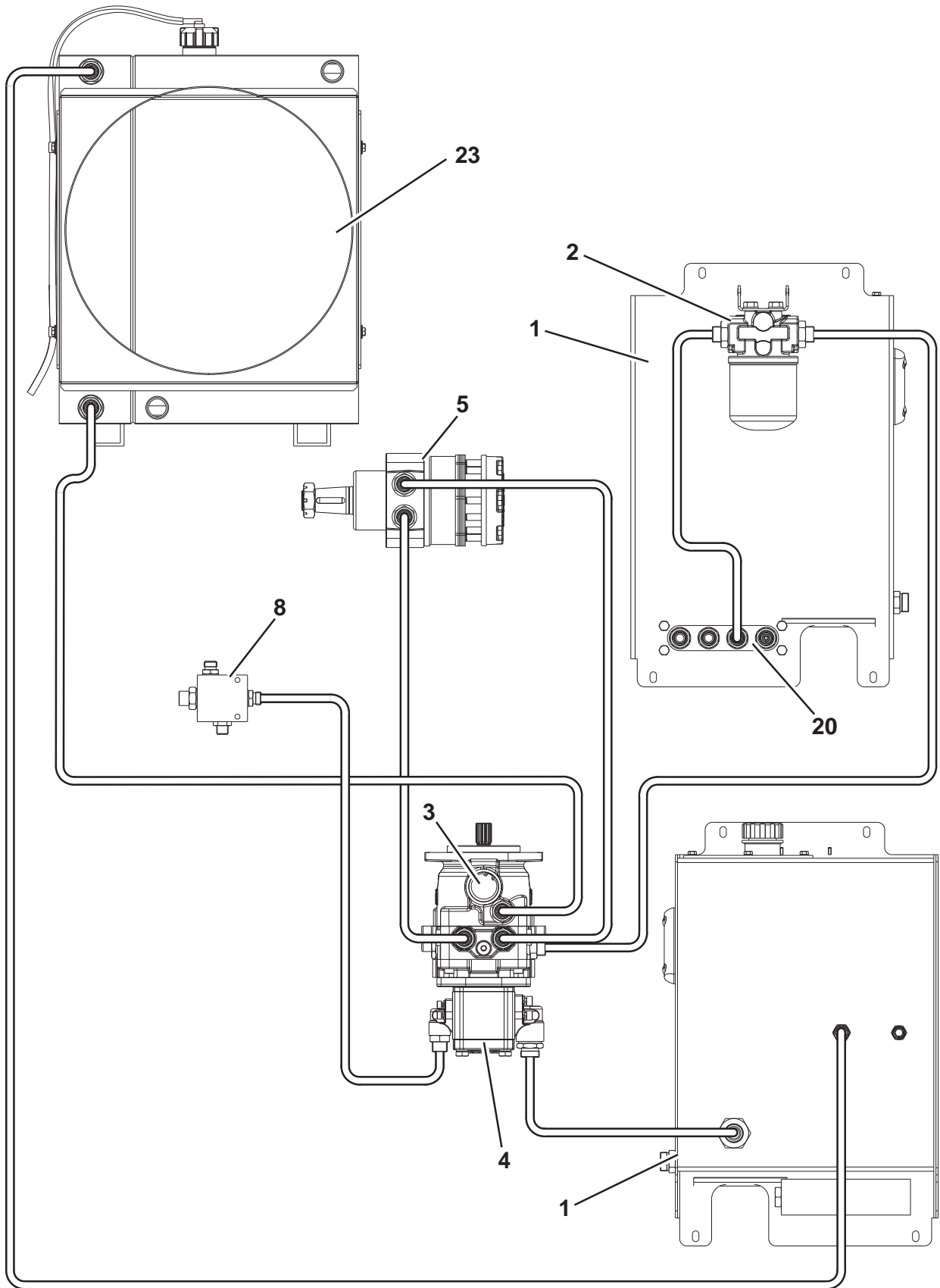
MAIN BROOM AND HOPPER HOSE AND COMPONENT LAYOUT [Battery]



S301848F

HYDRAULIC SYSTEM

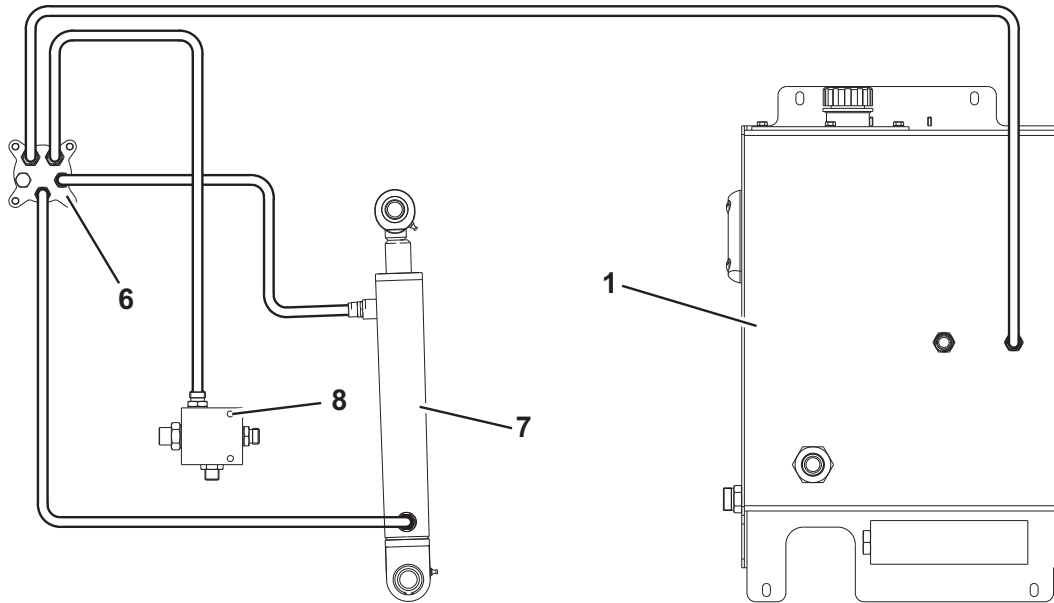
DRIVE SYSTEM HOSE AND COMPONENT LAYOUT [Diesel / LPG / Gasoline]



S301848C

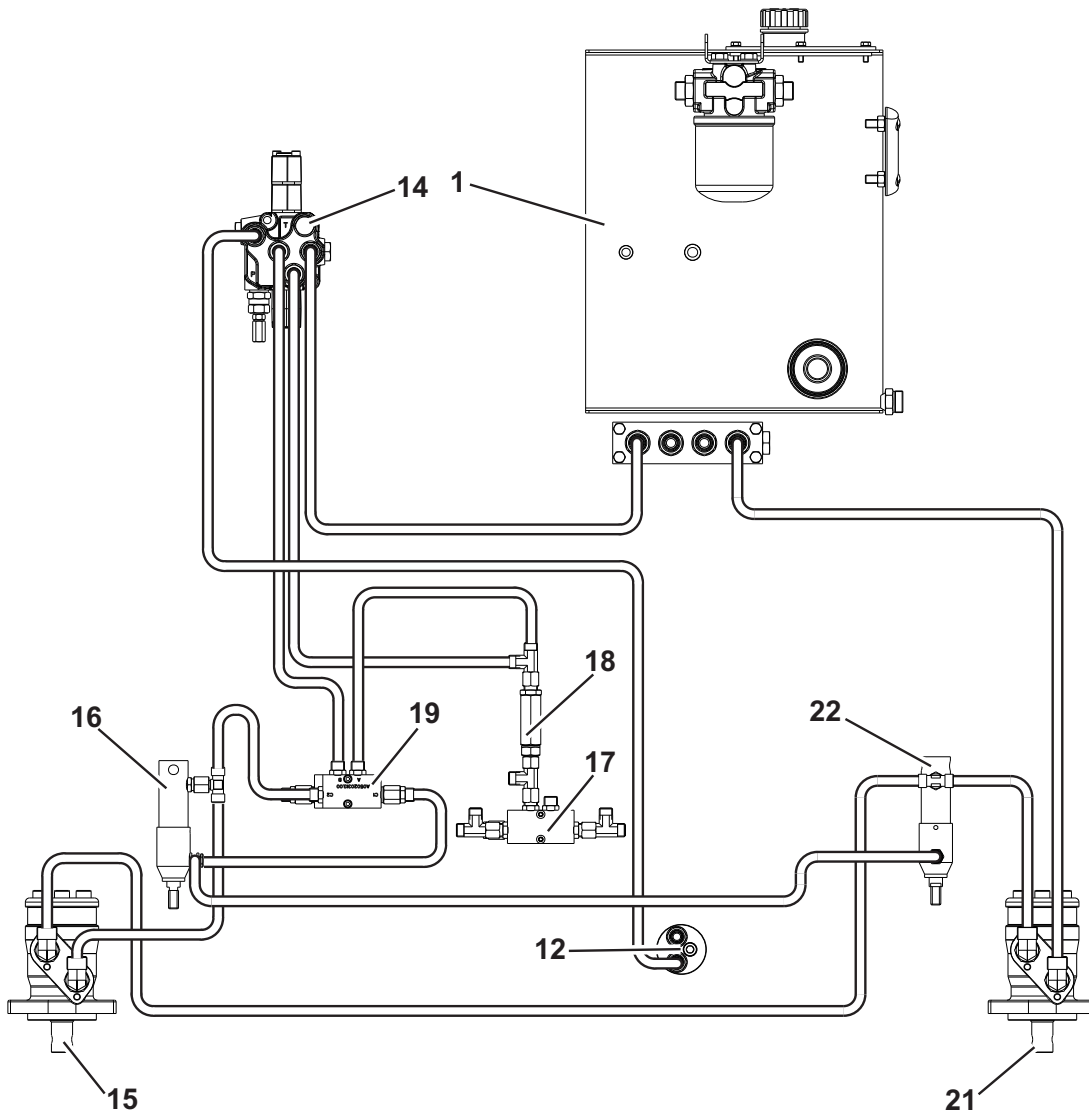
HYDRAULIC SYSTEM

STEERING SYSTEM HOSE AND COMPONENT LAYOUT [Diesel / LPG / Gasoline]



S301848D

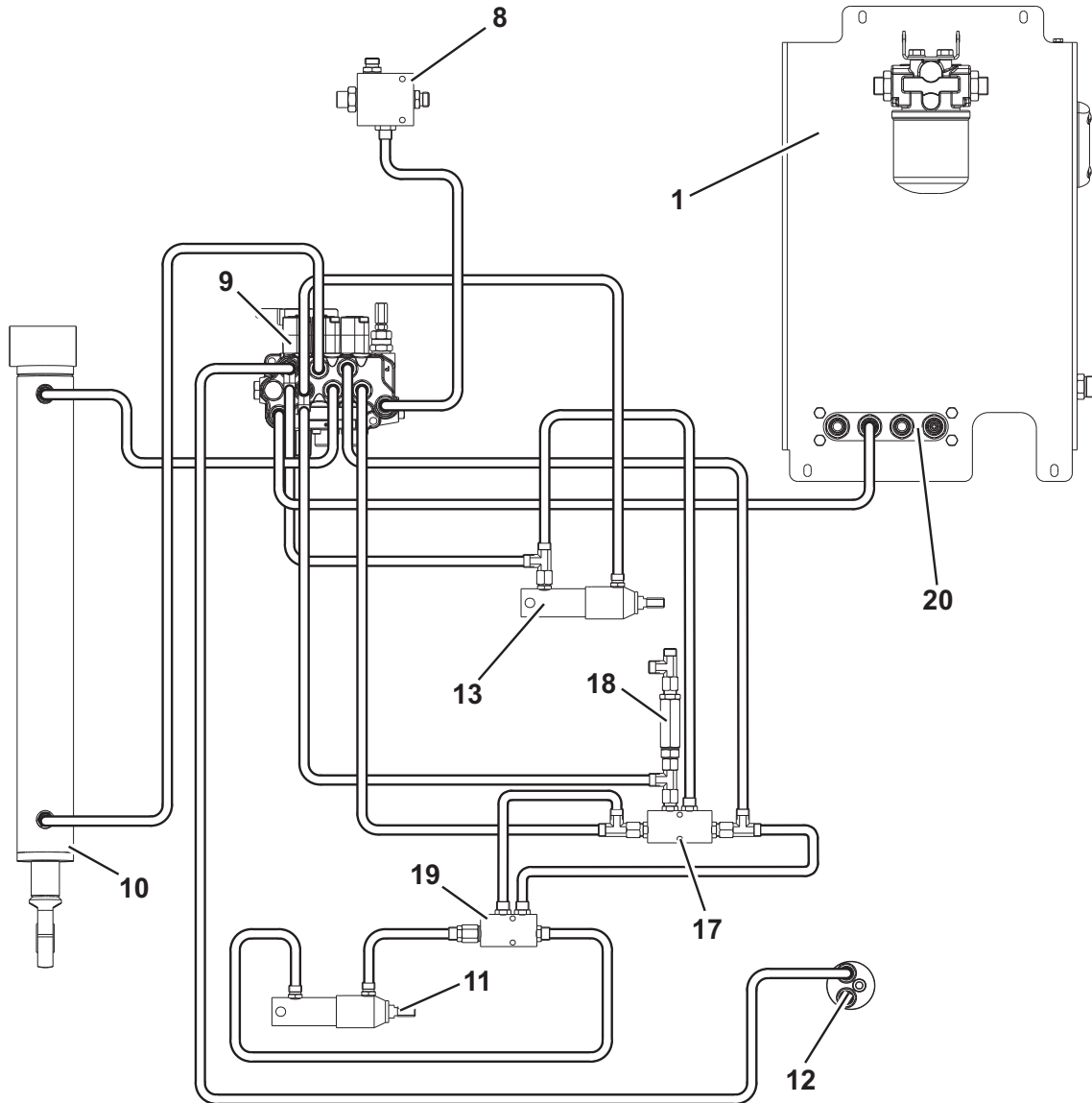
SIDE BROOM SYSTEM HOSE AND COMPONENT LAYOUT [Diesel / LPG / Gasoline]



S301848E

HYDRAULIC SYSTEM

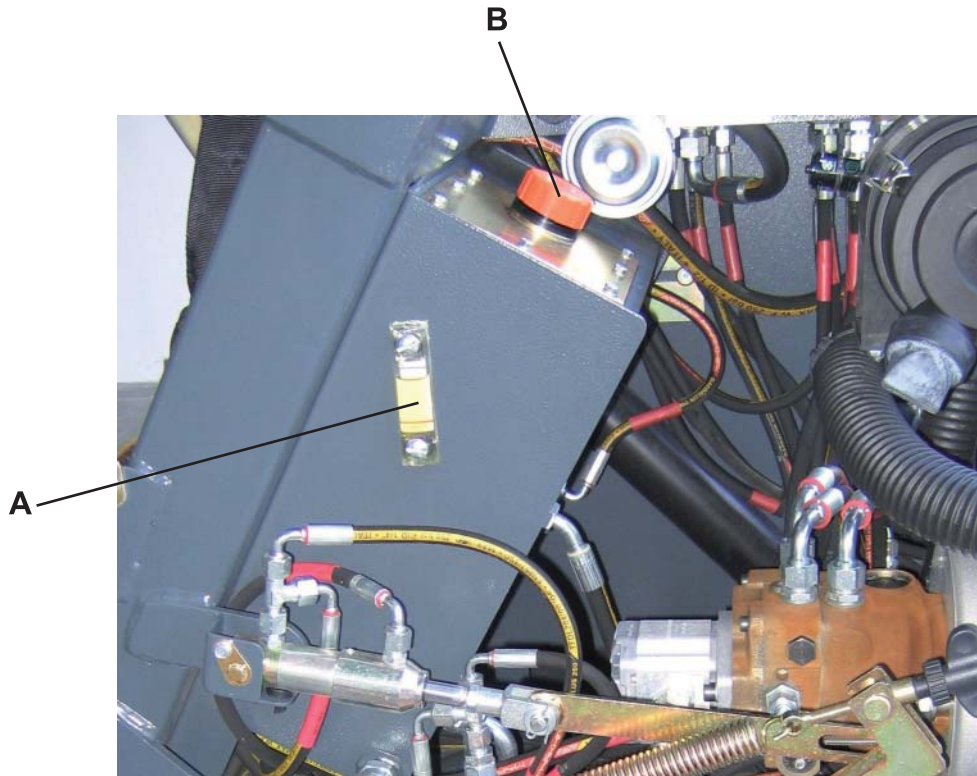
MAIN BROOM AND HOPPER HOSE AND COMPONENT LAYOUT [Diesel / LPG / Gasoline]



S301848F

HYDRAULIC SYSTEM OIL LEVEL CHECK [All versions]**Preliminary operations**

1. Remove the left side hood or the dust control system water tank (optional) (see the procedure in the relevant paragraph).
2. Check that hydraulic system oil level is between the Minimum and Maximum marks of the indicator (A) (basically in an intermediate position). If the level is lower, remove the plug (B) and top-up. For the type of oil to be used, see the Technical Data chapter.
3. Screw down the plug (B).
4. Install the left side hood or the dust control system water tank (optional) (see the procedure in the relevant paragraph).

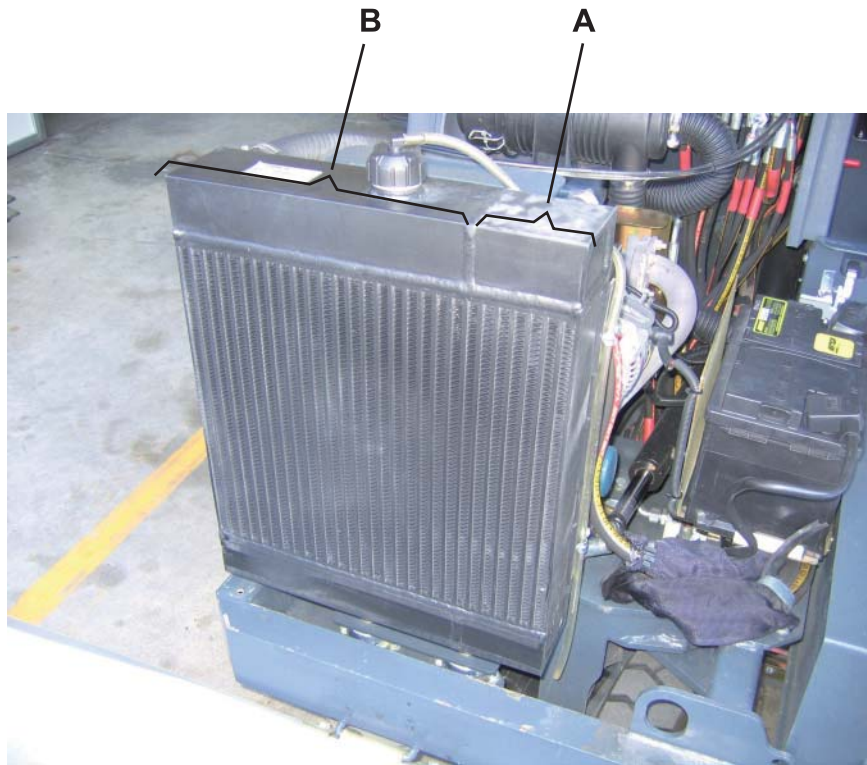


S301849

HYDRAULIC SYSTEM

HYDRAULIC SYSTEM OIL COOLER FIN CHECK [Diesel / LPG / Gasoline]

1. Remove the rear hood (see the procedure in the relevant paragraph).
2. Consider that the part (A) of the radiator is for cooling the hydraulic system oil, while the part (B) is the engine coolant radiator.
3. Check the radiator cooling fins for dirt and bends. If necessary:
 - Clean the fins with compressed air (maximum 87.0 psi (6 Bar)); to remove debris from the fins, blow the compressed air in the opposite direction of the cooling air flow.
 - Straighten any buckled fins, using a suitable tool (screwdriver, etc.).
4. Install the rear hood (see the procedure in the relevant paragraph).



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HYDRAULIC SYSTEM OIL COOLER FIN CHECK [Battery]

1. Check the radiator cooling fins (56) for dirt and bends. If necessary:
 - Clean the fins with compressed air (maximum 87.0 psi (6 Bar)); to remove debris from the fins, blow the compressed air in the opposite direction of the cooling air flow.
 - Straighten any buckled fins, using a suitable tool (screwdriver, etc.).
2. Also check that the cooling fan (54) is clean. If necessary clean with compressed air (maximum 87.0 psi (6 Bar)).

DRIVE SYSTEM PUMP INTAKE OIL FILTER REPLACEMENT [All versions]**CAUTION!**

It is advisable to replace the oil filter when the oil is to be changed.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. (*) Drive the machine on a solid and level ground.
2. Engage the parking brake.
3. (*) Fully lift the hopper.
4. To avoid that the hopper lowers by accident, install the safety support as shown below.
 - Pull the handle (A) fully backwards and, by keeping it in this position, lower the hopper by pushing the lever (B) forward until the hopper stops on the safety support.
 - Release the lever (B) and the handle (A).

**WARNING!**

It is essential to insert the safety support under the lifted hopper, even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

5. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
6. Unscrew and remove the oil filter (C).

**WARNING!**

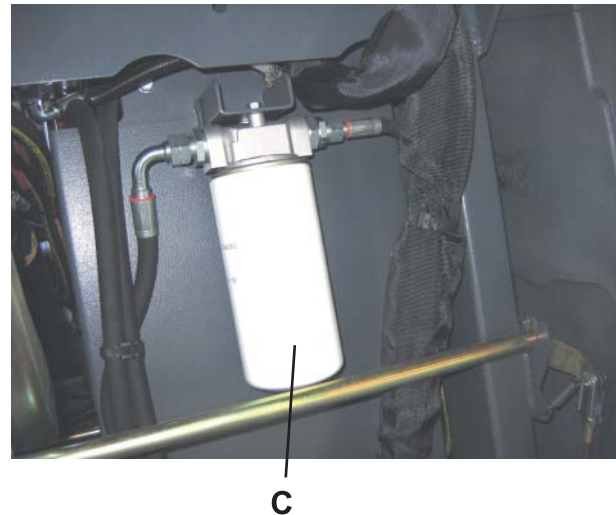
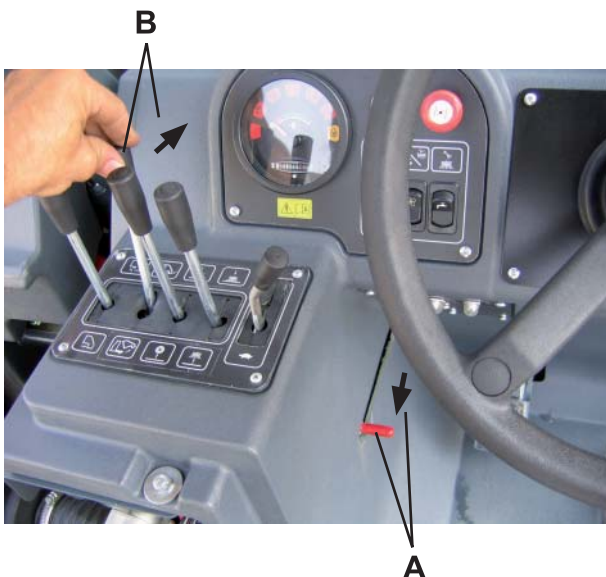
Hydraulic system oil is highly corrosive, wear rubber gloves.

**CAUTION!**

The hydraulic system oil and the filters should be disposed of properly according to the environmental laws in force.

Assembly

1. Assemble the components in the reverse order of disassembly.
2. Check the hydraulic system oil level (see the procedure in the relevant paragraph).



S301851

HYDRAULIC SYSTEM

HYDRAULIC SYSTEM OIL FILTER REPLACEMENT [All versions]



CAUTION!

It is advisable to replace the oil filter when the oil is to be changed.

Disassembly

1. Drain the hydraulic system oil from the tank (see the procedure in the relevant paragraph).
2. Remove the screws (A) of the hydraulic system oil tank cover (B).
3. With a cutter separate the cover (B) from the sealant applied along the outer perimeter of the cover.



CAUTION!

Pay attention in order to prevent the sealant from entering into the tank.

4. Remove the filter (C) inside the tank.



WARNING!

Hydraulic system oil is highly corrosive, wear rubber gloves.



CAUTION!

The hydraulic system oil and the filters should be disposed of properly according to the environmental laws in force.

Assembly

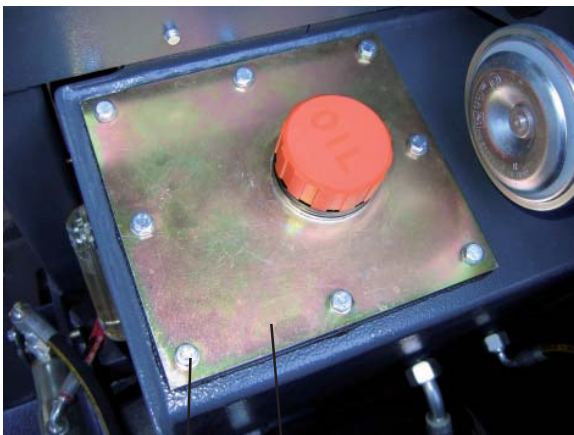
1. Remove any debris and dirt inside the tank.
2. Clean the tank upper perimeter edge (D) and the matching profile (E) of the cover (B).
3. Apply "WÜRTH SaBesto BLACK 250" sealant, or a specific sealant, along the upper perimeter edge (D) of the tank, then install the cover (B) and tighten the screws (A).



CAUTION!

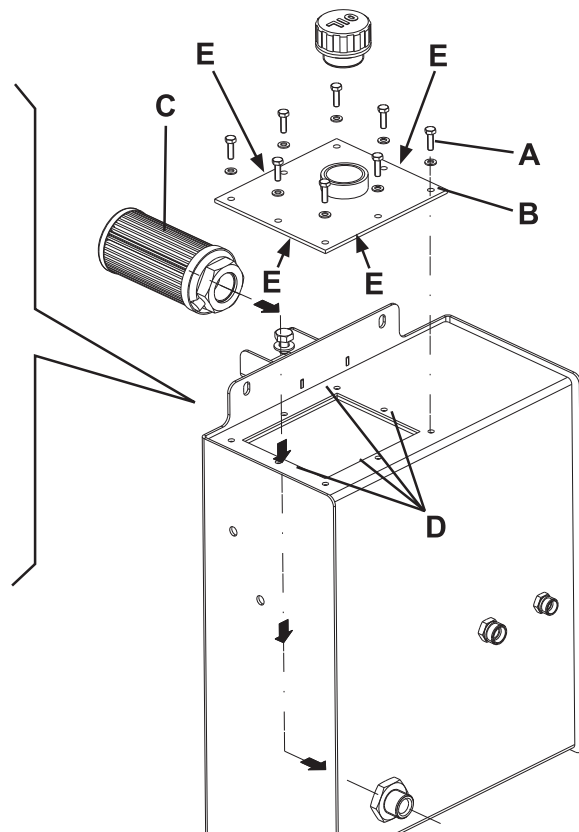
Pay attention in order to prevent the sealant from entering into the tank.

4. Pour hydraulic system oil in the tank (see the procedure in the relevant paragraph).



A

B



S301852

HYDRAULIC SYSTEM OIL DRAINING/FILLING [All versions]

(*) Where this symbol is shown, proceed according to the Instructions for use.

Draining

1. (*) Drive the machine on a solid and level ground.
2. Engage the parking brake.
3. (*) Fully lift the hopper.
4. To avoid that the hopper lowers by accident, install the safety support as shown below.
 - Pull the handle (A) fully backwards and, by keeping it in this position, lower the hopper by pushing the lever (B) forward until the hopper stops on the safety support.
 - Release the lever (B) and the handle (A).

**WARNING!**

It is essential to insert the safety support under the lifted hopper, even if the hopper lifting cylinder is equipped with a safety system that prevents the hopper from lowering accidentally in case of break/leakage from a hose on the hydraulic system.

5. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
6. Release the rear hood (1) with the lever (25), then fully lift it.
7. Remove the dust control system water tank (see the procedure in the relevant paragraph).
8. Remove the hydraulic system oil drain hose (C).
9. Unscrew the filler plug (D).
10. Remove the hydraulic system oil drain plug (E) and drain the oil into a suitable container.

**WARNING!**

Hydraulic system oil is highly corrosive, wear rubber gloves.

**CAUTION!**

The hydraulic system oil should be disposed of properly according to the environmental laws in force.

11. If necessary, replace the filter inside the hydraulic system oil tank (see the procedure in the relevant paragraph).

Filling

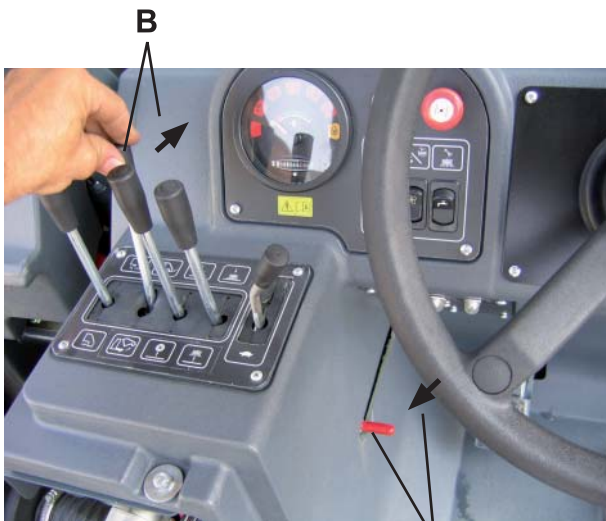
1. Tighten the hydraulic system oil drain plug (E).
2. Install the hydraulic system oil drain hose (C).
3. Pour the oil into the tank (F) through the filler (D). For the type and quantity of oil to be used, see the Technical Data chapter. Top up to the MAX mark on the indicator (G).
4. Tighten the filler plug (D) of the hydraulic system oil tank (F).
5. Perform steps 7 to 3 in the reverse order.
6. (*) Start the machine, turn on the drive system, and lift and lower the hopper a few times; then stop the machine, check the hydraulic system oil level (see the procedure in the relevant paragraph) and, if necessary, top up.

HYDRAULIC SYSTEM

HYDRAULIC SYSTEM OIL DRAINING/FILLING [All versions] (Continues)

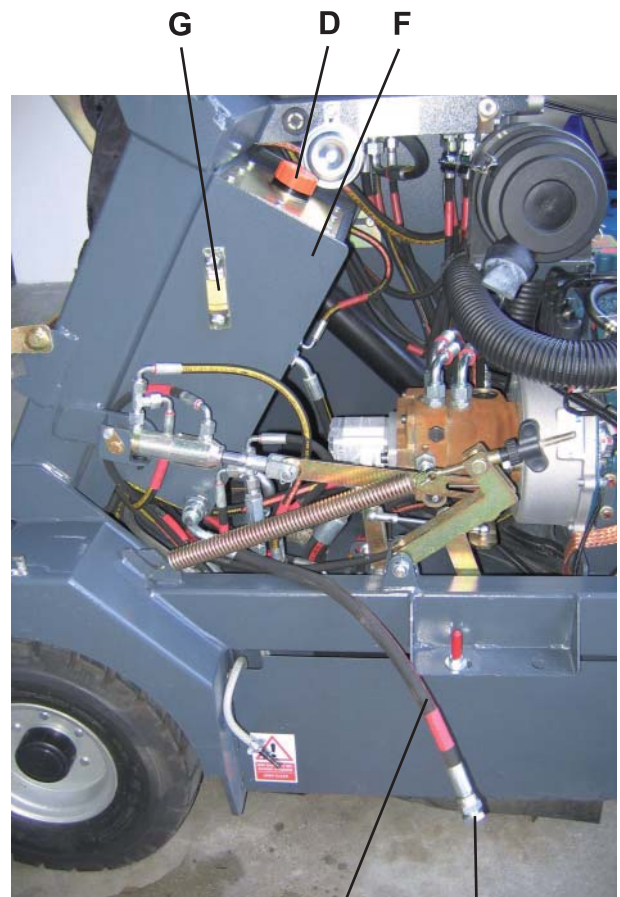


C



B

A



G

D

F

C

E

S301853

PRIORITY VALVE DISASSEMBLY/ASSEMBLY [All versions]**CAUTION!**

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.

**CAUTION!**

If necessary, remove "Bonded" washers and replace them.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. Remove the battery and the relevant holder (see the procedure in the relevant paragraph).
2. Inside the battery compartment, mark the position of the hoses (A) of the priority valve (B) (for proper assembly).
3. Disconnect all the hoses (A) from the priority valve (B).

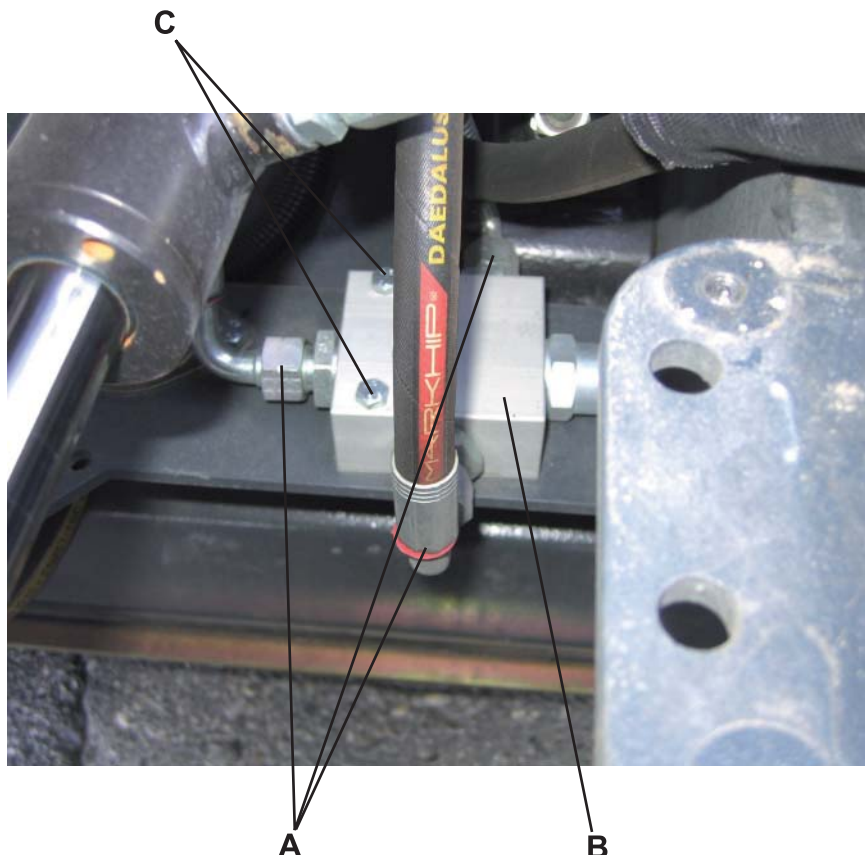
**WARNING!**

Hydraulic system oil is highly corrosive, wear rubber gloves.

4. Remove the screws (C).
5. Remove the priority valve (B).
6. If necessary, remove the priority valve fittings at the workbench.

Assembly

1. Assemble the components in the reverse order of disassembly.
2. (*) Start the machine and check the hydraulic functions (especially the power steering) for proper operation; then stop the machine, check the hydraulic system oil level (see the procedure in the relevant paragraph) and, if necessary, top up.



S301854

HYDRAULIC SYSTEM

ACCESSORY HYDRAULIC SYSTEM DISTRIBUTOR DISASSEMBLY/ASSEMBLY [All versions]

**CAUTION!**

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.

**CAUTION!**

If necessary, remove "Bonded" washers and replace them.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. Remove the engine air filter assembly (see the procedure in the relevant paragraph).
2. Drive the machine on a level ground.
3. Engage the parking brake.
4. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
5. Remove the screws (A).
6. Remove the panel (B).
7. Loosen the nuts (C).
8. Unscrew the levers (D).
9. Remove the shaped plate (E).
10. Mark the position of the hoses (F) of the accessory system distributor (G) (for proper assembly).
11. Disconnect the hoses (F) from the accessory system distributor (G).

**WARNING!**

Hydraulic system oil is highly corrosive, wear rubber gloves.

12. Remove the mounting screws (H) of the accessory system distributor (G).
13. Remove the accessory system distributor (G).
14. If necessary, remove the distributor fittings at the workbench.

Assembly

1. Assemble the components in the reverse order of disassembly.
2. (*) Start the machine and check the accessories (steering system, broom lifting, hopper lifting) for proper operation; then stop the machine, check the hydraulic system oil level (see the procedure in the relevant paragraph) and, if necessary, top up.

HYDRAULIC SYSTEM

ACCESSORY HYDRAULIC SYSTEM DISTRIBUTOR DISASSEMBLY/ASSEMBLY [All versions]
(Continues)



S301855

HYDRAULIC SYSTEM

SIDE BROOM DISTRIBUTOR DISASSEMBLY [All versions]



CAUTION!

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.



CAUTION!

If necessary, remove "Bonded" washers and replace them.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. Remove the engine air filter assembly (see the procedure in the relevant paragraph).
2. Drive the machine on a level ground.
3. Engage the parking brake.
4. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
5. Remove the screws (A), then remove the plate (B).
6. Unscrew the lever (C).
7. Mark the position of the hoses (D) of the side broom distributor (E) (for proper assembly).
8. Disconnect the hoses (D) from the side broom distributor (E).



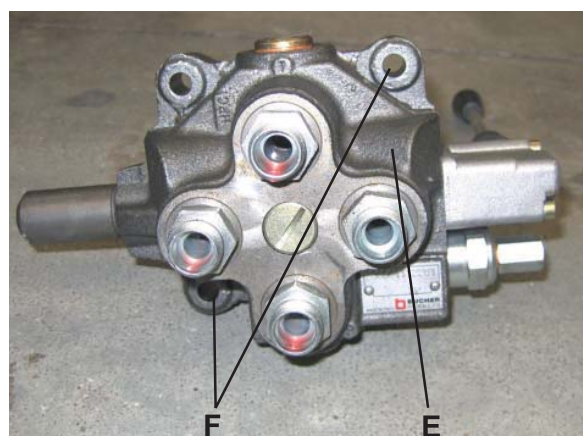
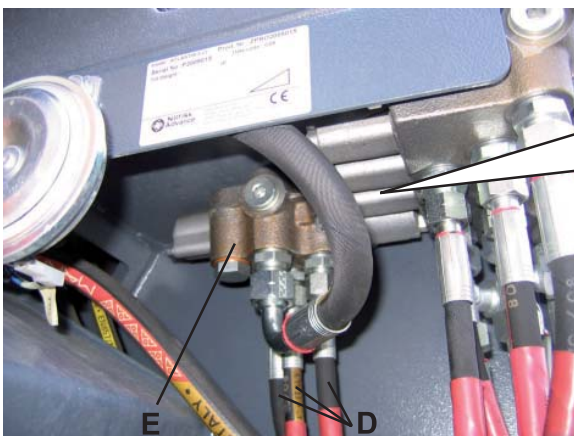
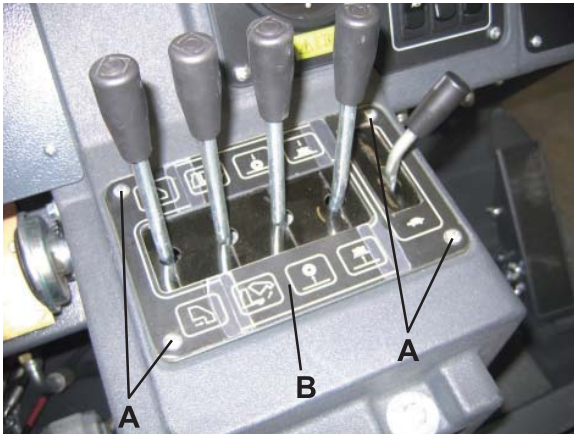
WARNING!

Hydraulic system oil is highly corrosive, wear rubber gloves.

9. Remove the mounting screws (F) of the side broom distributor (E).
10. Remove the side broom distributor (E).
11. If necessary, remove the distributor fittings at the workbench.

Assembly

1. Assemble the components in the reverse order of disassembly.
2. (*) Start the machine and check the side brooms for proper lifting/lowering operation; then stop the machine, check the hydraulic system oil level (see the procedure in the relevant paragraph) and, if necessary, top up.



S301856

ACCESSORY PUMP DISASSEMBLY/ASSEMBLY [All versions]

**CAUTION!**

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.

**CAUTION!**

If necessary, remove "Bonded" washers and replace them.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. Remove the dust control system water tank (see the procedure in the relevant paragraph).
2. Drain the hydraulic system oil from the tank (see the procedure in the relevant paragraph).
3. Release the rear hood (1) with the lever (25), then fully lift it.
4. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
5. Disconnect the hoses (A) and (B) of the accessory pump (C).

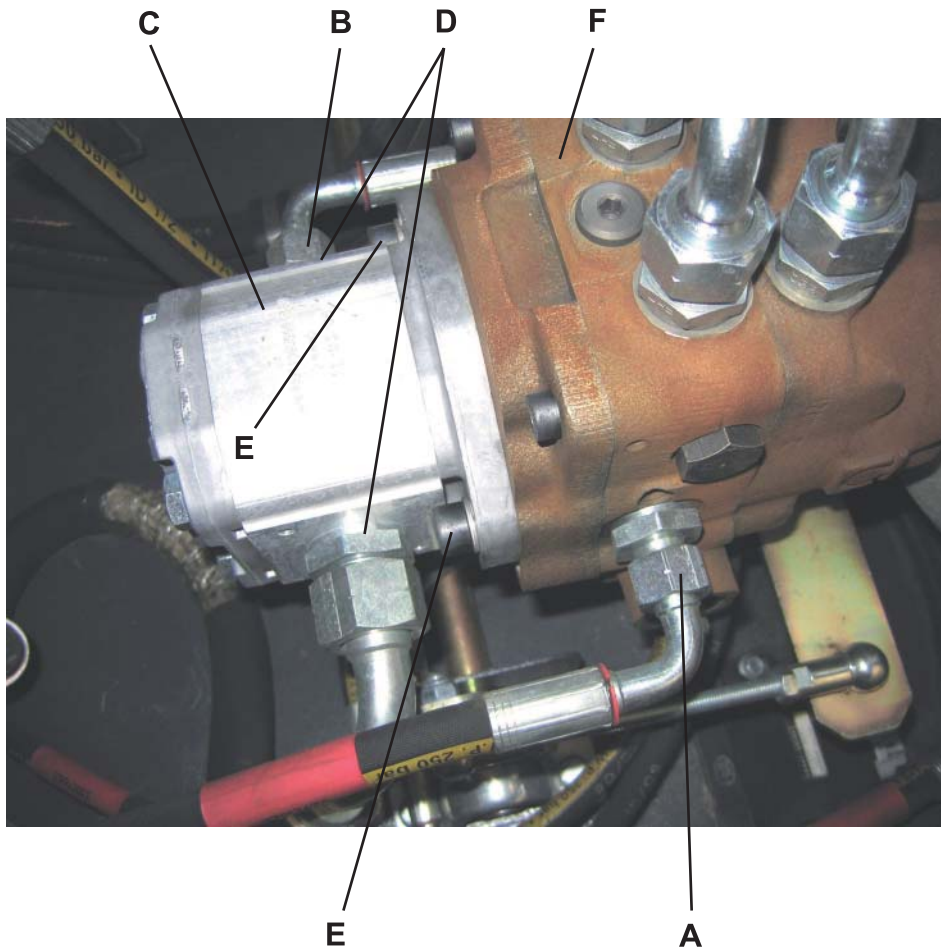
**CAUTION!**

Hydraulic system oil is highly corrosive, wear rubber gloves.

6. If necessary unscrew the fittings (D).
7. Remove the screws (E).
8. Remove the accessory pump (C) by disengaging the relevant propeller shaft from the drive system pump (F).

Assembly

1. Assemble the components in the reverse order of disassembly.
2. (*) Start the machine and check the accessories (steering system, broom lifting, hopper lifting) for proper operation; then stop the machine, check the hydraulic system oil level (see the procedure in the relevant paragraph) and, if necessary, top up.



S301857

HYDRAULIC SYSTEM

DRIVE SYSTEM PUMP DISASSEMBLY/ASSEMBLY [All versions]

**CAUTION!**

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.

**CAUTION!**

If necessary, remove "Bonded" washers and replace them.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. Remove the dust control system water tank (see the procedure in the relevant paragraph).
2. Drain the hydraulic system oil from the tank (see the procedure in the relevant paragraph).
3. Release the rear hood (1) with the lever (25), then fully lift it.
4. Turn the ignition key (85, Battery - 86, Engine) to "0" and remove it.
5. Disconnect the hoses (A) and (B) of the accessory pump (C).

**WARNING!**

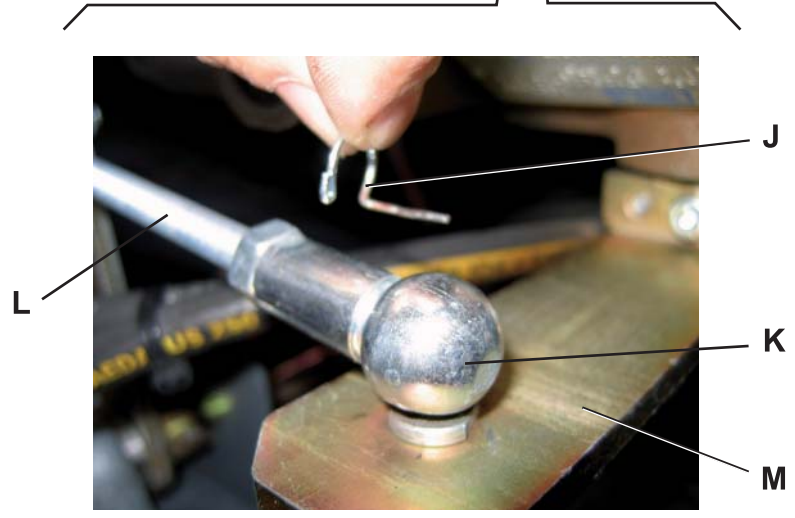
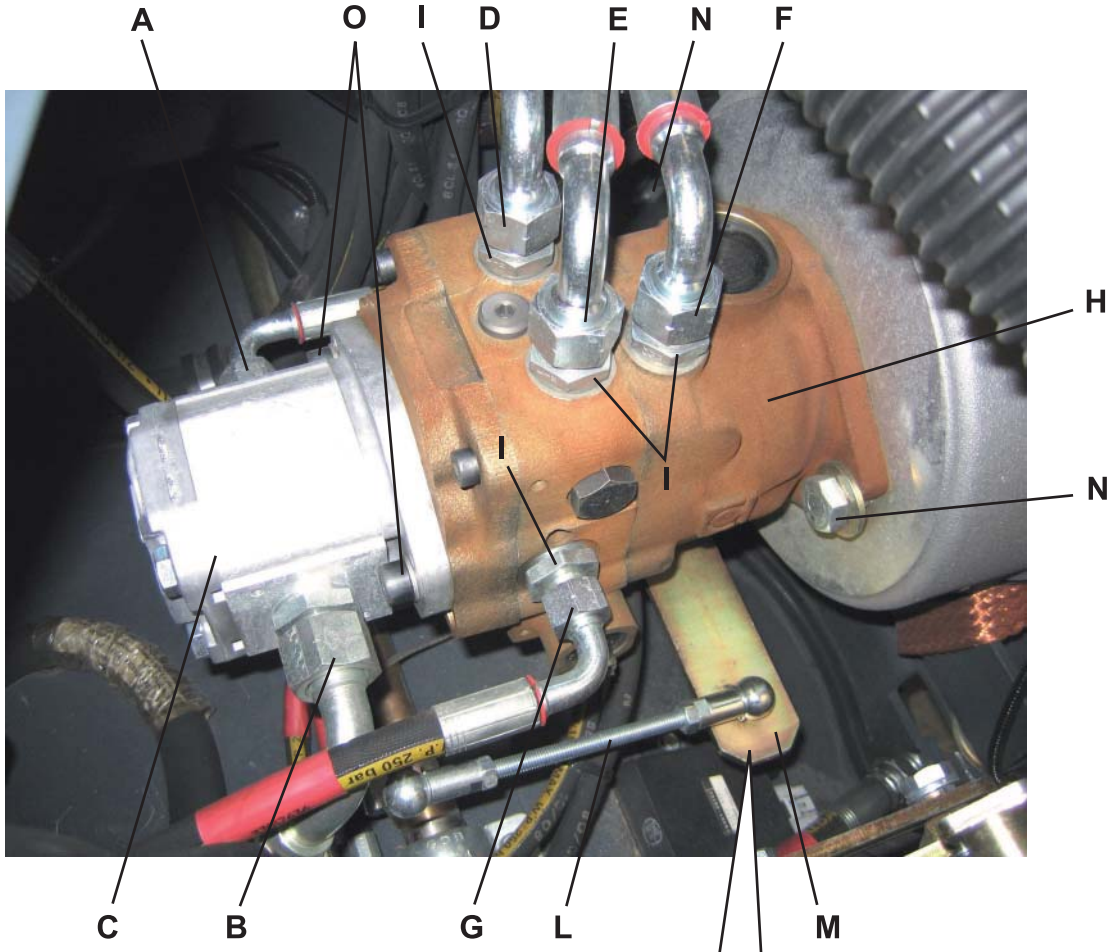
Hydraulic system oil is highly corrosive, wear rubber gloves.

6. Mark the position of the hoses (D), (E), (F) and (G) of the drive system pump (H) (for proper assembly).
7. Disconnect the hoses (D), (E), (F) and (G) of the drive system pump (H).
8. If necessary unscrew the fittings (I).
9. Remove the fastener (J), then release the ball end (K) of the tie rod (L) from the control lever (M) of the drive system pump (H).
10. Remove the screws (N).
11. Remove the drive system pump (H) by disengaging it from the engine transmission joint (the weight of the drive system pump with accessory pump: 44 lb (20 kg)).
12. At the workbench, if necessary, remove the screws (O) and separate the accessory pump (C) from the drive system pump (H) by disengaging the propeller shaft which connects the pumps.

Assembly

1. Assemble the components in the reverse order of disassembly.
2. (*) Start the machine and check the hydraulic functions for proper operation; then stop the machine, check the hydraulic system oil level (see the procedure in the relevant paragraph) and, if necessary, top up.
3. Adjust the forward/reverse gear pedal neutral position (see the procedure in the relevant paragraph).

DRIVE SYSTEM PUMP DISASSEMBLY/ASSEMBLY [All versions] (Continues)



S301858

HYDRAULIC SYSTEM

OIL COOLER AND COOLING FAN DISASSEMBLY/ASSEMBLY (Battery)


CAUTION!

Close the hydraulic fittings with proper plugs to avoid oil leakages and prevent dirt from entering the hydraulic system.


CAUTION!

If necessary, remove "Bonded" washers and replace them.

(*) Where this symbol is shown, proceed according to the Instructions for use.

Disassembly

1. (*) Drive the machine on a solid and level ground.
2. Engage the parking brake.
3. Fully turn the steering wheel counter-clockwise (to the left).
4. (*) Open the engine hood (1).
5. (*) Remove the left battery box (51).
6. Remove the water tank (4) (see the procedure in the relevant paragraph).
7. Remove the anti-skid mat from the battery box compartment.
8. Remove the 4 screws (A) from the battery box to remove the fan and oil cooler deflector (B).
9. Remove the 2 screws (C), recover the washers and remove the oil cooler (D).
10. Disconnect the hoses from the inlets (E) of the oil cooler.

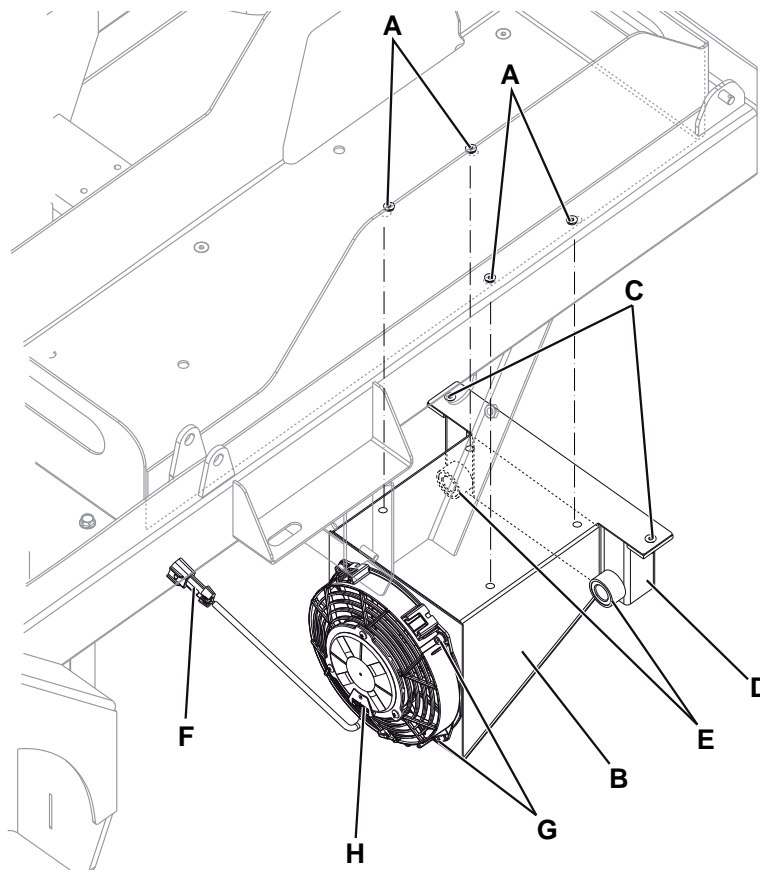

CAUTION!

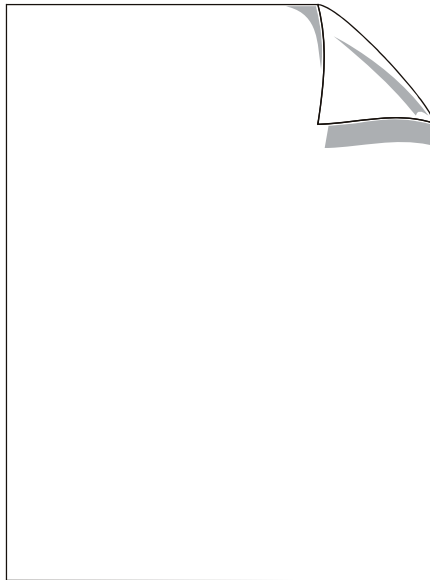
Hydraulic system oil is highly corrosive, wear rubber gloves.

11. Disconnect the connector (F) from the cooling fan.
12. Remove the 4 screws (G), recover the washers and remove the fan (H) from the deflector (B).

Assembly

13. Assemble the components in the reverse order of disassembly.
14. (*) Start the machine and check the hydraulic functions for proper operation; then stop the machine, check the hydraulic system oil level (see the procedure in the relevant paragraph) and, if necessary, top up.





ELECTRICAL SYSTEM

ELECTRICAL SYSTEM

TROUBLESHOOTING [All versions]

See the previous chapters relevant to the use of the electrical system.

Other possible causes:

1. The batteries are discharged or the connections are not efficient (charge the batteries or clean the connections).
2. The fuses are blown (replace).
3. The wiring harness is cut or pinched (repair).

COMPONENT LAYOUT [Battery]**Legend**

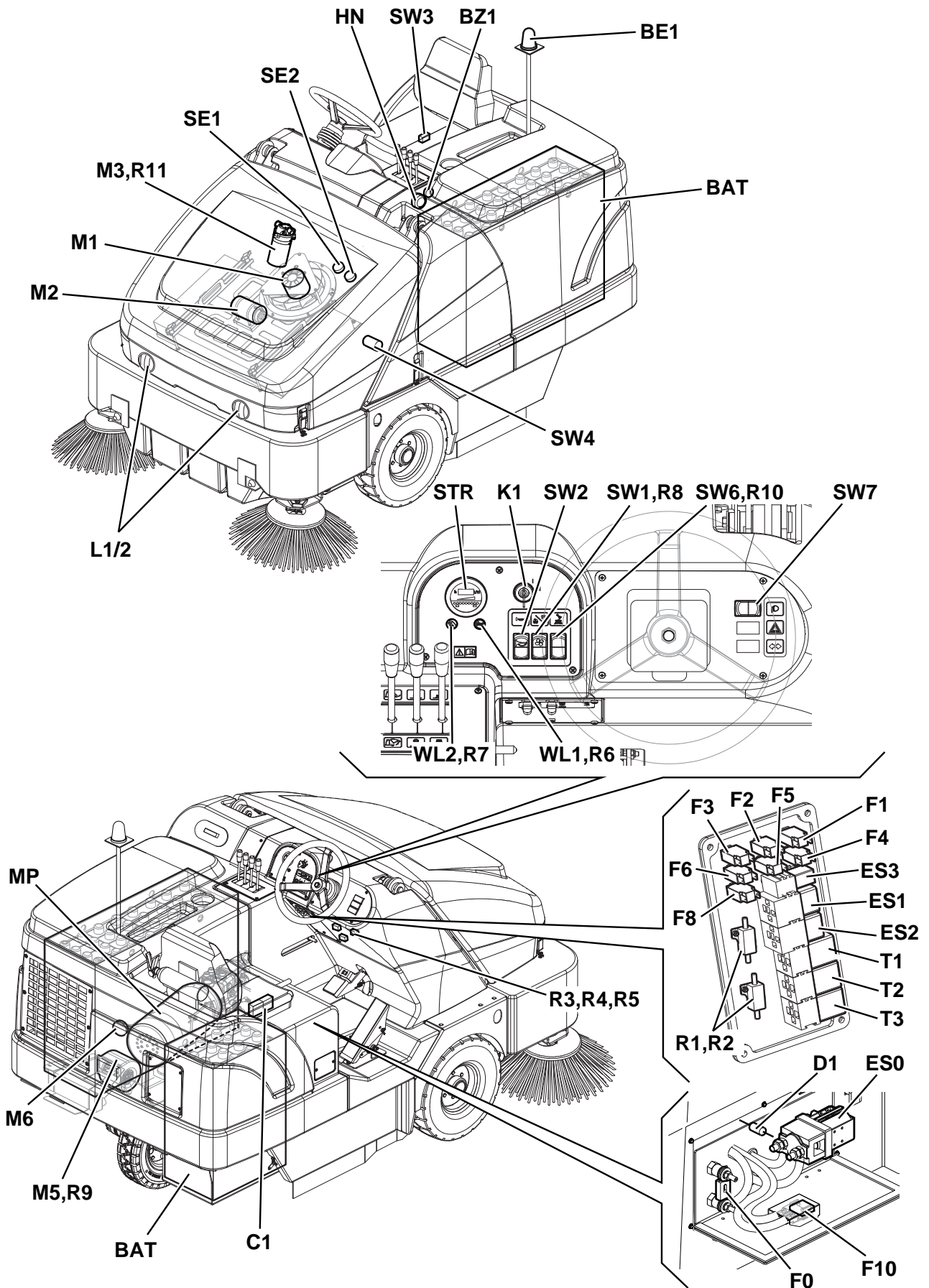
BAT	Battery 48V
BE1	Pivoting light
BZ1	Reverse gear buzzer
C1	Battery connector
D1	Diode
ES0	Primary hydraulic pump contactor
ES1	Vacuum system motor relay
ES2	Filter shaker relay
ES3	Start relay
F0	Primary hydraulic pump fuse (250 A)
F1	Vacuum system circuit breaker (10 A)
F2	Filter shaker circuit breaker (10 A)
F3	Water pump circuit breaker (30 A) (optional)
F4	Ignition key circuit breaker (16 A)
F5	Motor accessory circuit breaker (10 A)
F6	Work lights circuit breaker (10 A) (optional)
F8	Cab fan circuit breaker (optional)
F10	Auxiliary fuse (30 A)
HN	Horn
K1	Ignition switch
L1/2	Work lights (optional)
M1	Vacuum system motor
M2	Filter shaker motor
M3	Water pump (optional)
M4	Cab fan (optional)
M5	Oil cooler fan
M6	MP cooler fan
MP	Primary hydraulic pump
R1	T1, T2, BZ1 resistor
R2	T1, T2, BZ1 resistor
R3	ES1 resistor
R4	ES2 resistor
R5	ES3 resistor
R6	WL1 resistor (optional)
R7	WL2 resistor (optional)
R8	SW1 resistor
R9	M5 resistor
R10	SW6 resistor
R11	M3 resistor (optional)
STR	Gage
SE1	Plugged filter sensor (optional)
SE2	Hopper temperature sensor (optional)
SW1	Vacuum system/filter shaker switch
SW2	Horn switch
SW3	Seat switch
SW4	Reverse gear proximity sensor
SW5	Fan switch
SW6	Water pump switch
SW7	Work lights switch (optional)
T1	Primary filter shaker timer
T2	Secondary filter shaker timer
T3	Seat switch timer
WL1	Plugged filter led (optional)
WL2	Hopper temperature led (optional)

Color

BK	Black
BU	Light blue
BN	Brown
GN	Green
GY	Grey
OG	Orange
PK	Pink
RD	Red
VT	Violet
WH	White
YE	Yellow

ELECTRICAL SYSTEM

COMPONENT LAYOUT [Battery] (Continues)



S301860B

ELECTRICAL SYSTEM

COMPONENT LOCATION [Diesel / LPG / Gasoline]

Legend

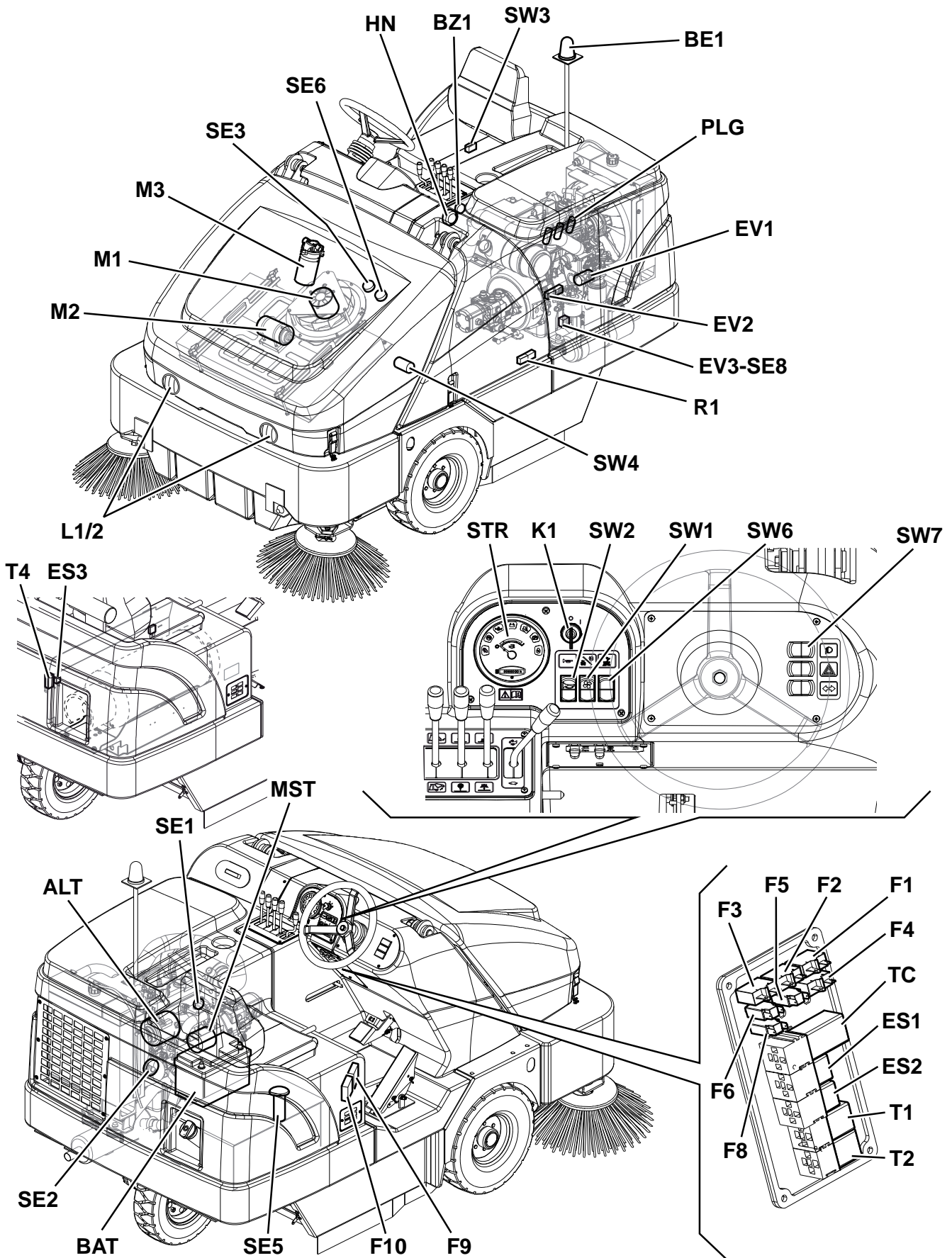
ALT	Alternator
BAT	Battery
BE1	Pivoting light
BZ1	Reverse gear buzzer
ES1	Vacuum system relay
ES2	Filter shaker relay
ES3	LPG safety relay (LPG)
EV1	Solenoid valve (diesel)
EV2	LPG solenoid valve (LPG)
EV3	LPG safety solenoid valve (LPG)
F1	Vacuum system circuit breaker (30 A)
F2	Filter shaker circuit breaker (16 A)
F3	Water pump circuit breaker (10 A) (optional)
F4	Ignition key circuit breaker (30 A)
F5	Engine accessory circuit breaker (16 A)
F6	Working light fuse (10 A) (optional)
F8	Cab blower circuit breaker (optional)
F9	Glow plug fuse (50 A)
F10	Alternator fuse box and fuse (50 A)
F11	Hood inner light fuse (1 A) (optional)
HN	Horn
K1	Ignition switch
L1/2	Front working light (optional)
L3	Driver's side working light (optional)
L4	Rear working light (optional)
L5	Hood inner light (optional)
M1	Vacuum system motor
M2	Filter shaker motor
M3	Water pump motor (optional)
M4	Cab blower (optional)
MST	Starter
PLG	Glow plugs (diesel)
R1	Glow plug warning light resistance (diesel)
SE1	Oil pressure sensor
SE2	Water temperature sensor
SE3	Clogged air filter sensor (optional)
SE5	Fuel tank float (diesel)
SE6	Hopper temperature sensor (optional)
SE7	Engine speed sensor (LPG / Gasoline)
SE8	Low fuel sensor (LPG / Gasoline)
SPK	Glow plug coils (LPG / Gasoline)
STR	Gauge
SW1	Vacuum system/filter shaker switch
SW2	Horn switch
SW3	Driver's seat microswitch
SW4	Reverse gear proximity sensor
SW5	Cab blower switch (optional)
SW6	Water pump switch (optional)
SW7	Working light switch (optional)
SW13	Driver's side working light switch (optional)
SW14	Rear working light switch (optional)
SW15	Hood inner light switch (optional)
T1	Filter shaker timer
T2	Filter shaker timer 2
T3	Driver's seat timer
T4	Timer LPG (LPG)
TC	Glow plug timer (diesel)

Color

BK	Black
BU	Light blue
BN	Brown
GN	Green
GY	Grey
OG	Orange
PK	Pink
RD	Red
VT	Violet
WH	White
YE	Yellow

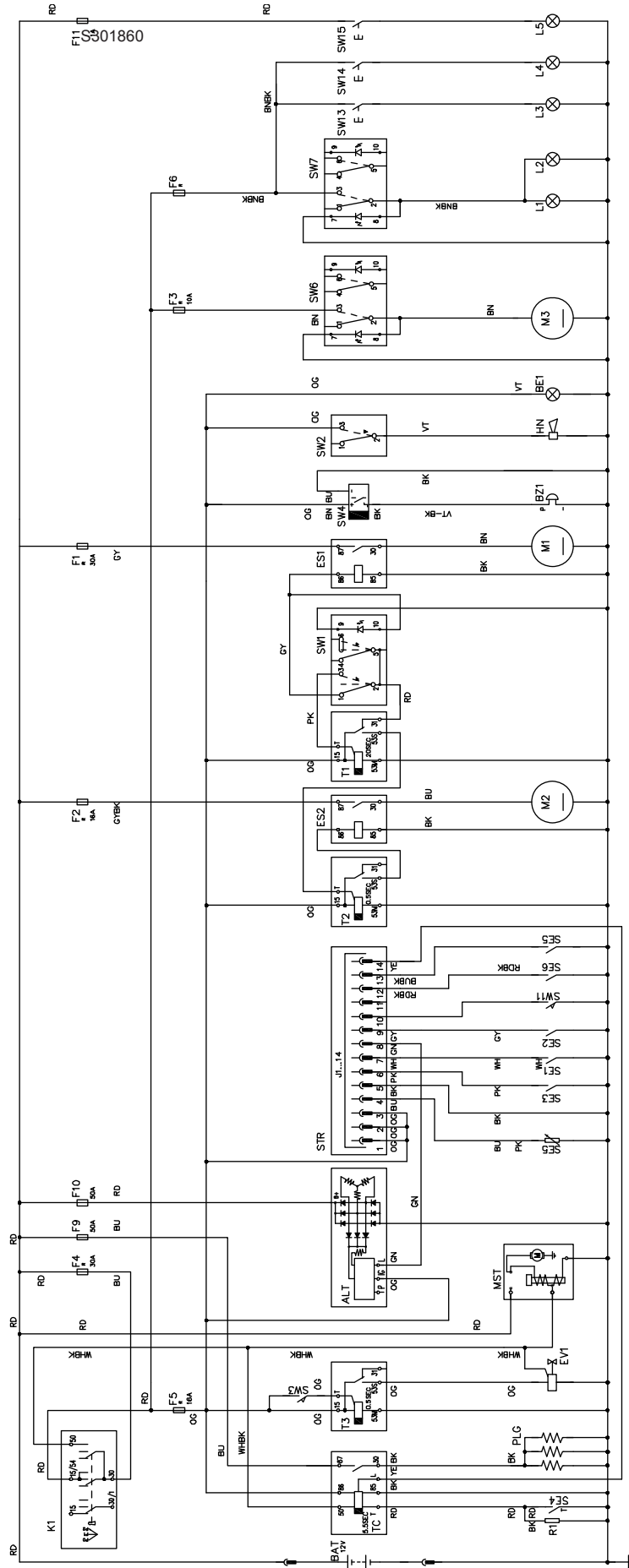
ELECTRICAL SYSTEM

COMPONENT LOCATION [Diesel / LPG / Gasoline] (Continues)

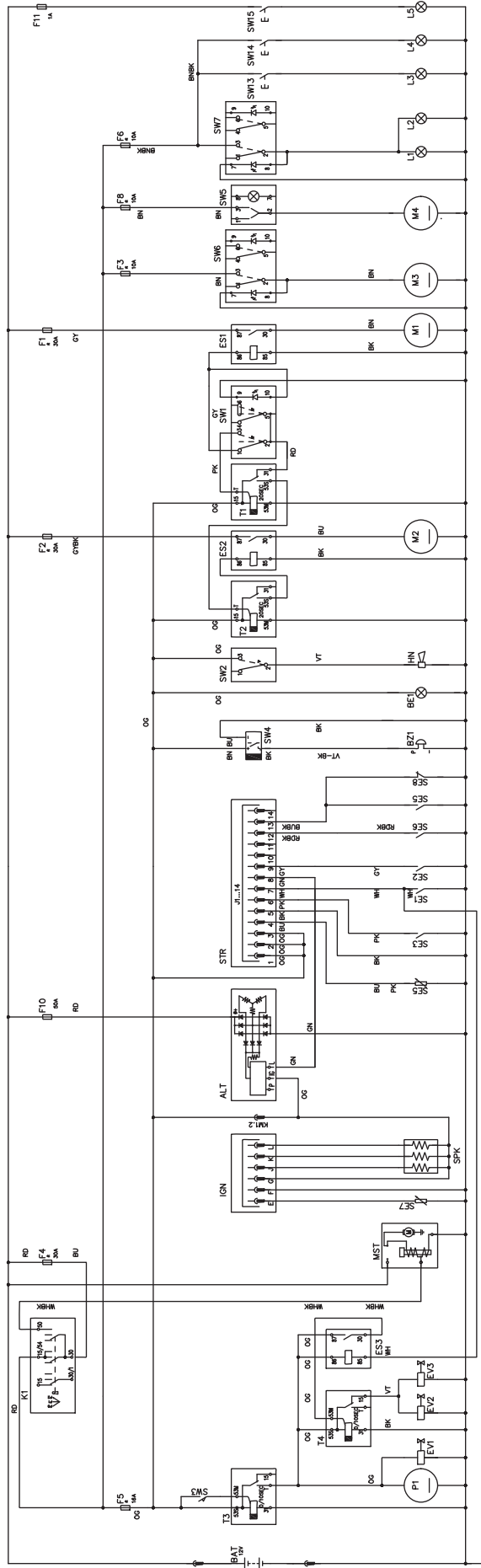


ELECTRICAL SYSTEM

WIRING DIAGRAM [Diesel]



WIRING DIAGRAM [LPG / Gasoline]



ELECTRICAL SYSTEM

BATTERY FLUID LEVEL CHECK [Battery]

**WARNING!**

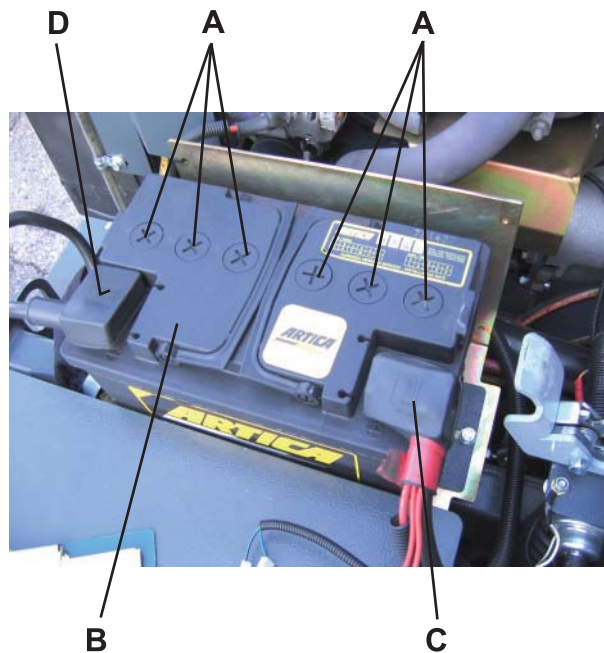
Always protect body parts (eyes, hair, hands, etc.) when checking or cleaning the batteries.

1. Drive the machine on a level ground.
2. Engage the parking brake.
3. Turn the ignition key (85) to "0" and remove it.
4. Disconnect the battery connector (57) with the quick release control (50).
5. Release the rear hood (1) with the lever (25), then fully lift it.
6. Open the plugs (A) and check the electrolyte level of batteries (B) and (C). For the proper level of the battery electrolyte refer to the Battery Manual. If necessary add distilled water to restore the electrolyte level. The electrolyte level must be the same in all the elements so that the electrolyte density is even.
Check the terminals (D) and (E) of the battery (B) for oxidation.
Check the battery terminals (E), (F), (G) and (H) for oxidation.
Clean and dry the battery surface.
7. Connect the battery connector (57).
8. Close the rear hood (1).

BATTERY FLUID LEVEL CHECK [Diesel / LPG / Gasoline]**WARNING!**

Always protect body parts (eyes, hair, hands, etc.) when checking or cleaning the battery.

1. Drive the machine on a level ground.
2. Engage the parking brake.
3. Turn the ignition key (86) to "0" and remove it.
4. Release the rear hood (1) with the lever (25), then fully lift it.
5. Open the plugs (A) and check the electrolyte level of battery (B). For the proper level of the battery electrolyte refer to the Battery Manual. If necessary add distilled water to restore the electrolyte level. The electrolyte level must be the same in all the elements so that the electrolyte density is even.
Check the battery terminals (C) and (D) for oxidation.
Clean and dry the battery surface.
6. Close the rear hood (1).



S301861

ELECTRICAL SYSTEM

FUSE CHECK/REPLACEMENT/RESET [Battery]

Fuse check/reset

1. Drive the machine on a level ground.
2. Engage the parking brake.
3. Turn the ignition key (85) to "0" and remove it.
4. On the panel (38), check for deactivation of one of the following fuses:
 - (A): F1 (10 A), dust vacuuming
 - (B): F2 (10 A), filter shaker
 - (C): F4 (16 A), ignition key
 - (D): F5 (10 A), motor auxiliary
 - (E): F3 (2 A), dust guard system (if equipped)
 - (F): F6 (10 A), working lights (optional)
 - (G): F8, cab blower (optional)

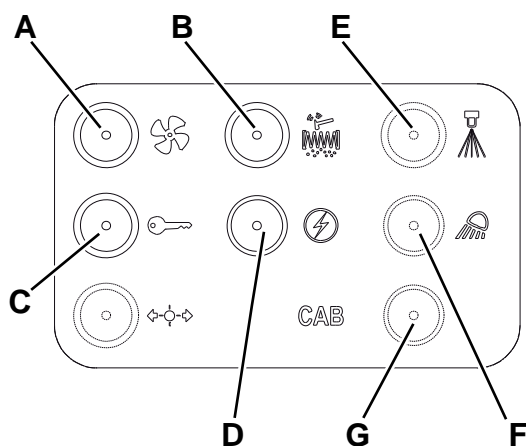
Reset any deactivated fuse, when the component that caused deactivation has fully cooled down.

Fuse and lamellar fuse check/replacement

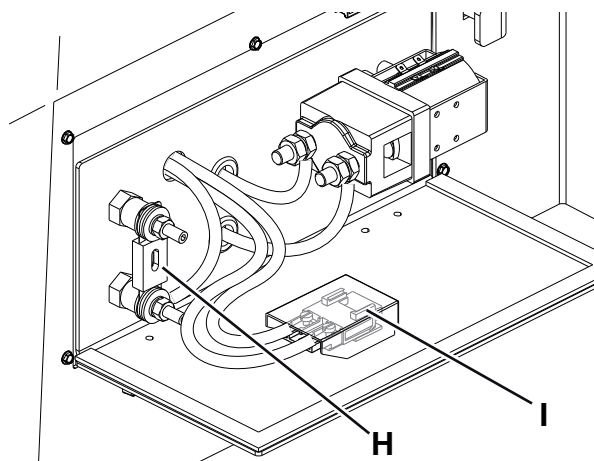
1. Drive the machine on a level ground.
2. Engage the parking brake.
3. Turn the ignition key (85) to "0" and remove it.
4. Open the fuse box cover (53).
5. Check the following fuses for integrity:
 - (H): F0 (250 A), main pump motor
 - (I): F10 (30 A), auxiliary circuits

Replace any open fuse.

6. Close the fuse box (53).



P100338



P100339S

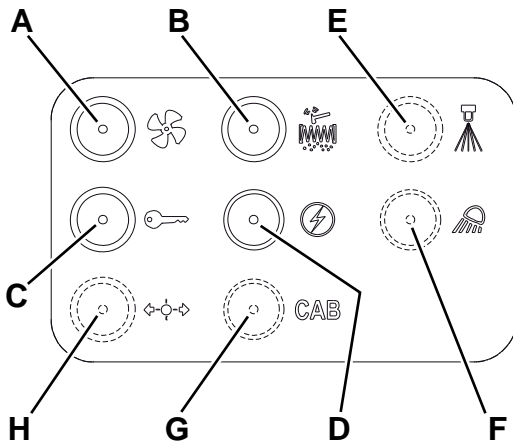
FUSE CHECK/REPLACEMENT/RESET [Diesel / LPG / Gasoline]**Fuse check/reset**

1. Drive the machine on a level ground.
2. Engage the parking brake.
3. Turn the ignition key (86) to "0" and remove it.
4. On the panel (38), check for deactivation of one of the following fuses:
 - (A): F1 (30 A), dust vacuuming
 - (B): F2 (16 A), filter shaker
 - (C): F4 (30 A), ignition key
 - (D): F5 (16 A), engine accessories
 - (E): F3 (10 A), DustGuard system (if equipped)
 - (F): F6 (10 A), working lights (optional)
 - (G): F8, cab blower (optional)
 - (H): F7, light system (optional)

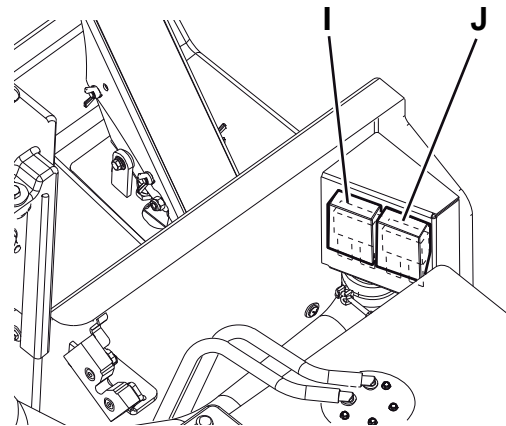
Reset any deactivated fuse, when the component that caused deactivation has fully cooled down.

Fuse check/replacement

1. Drive the machine on a level ground.
 2. Engage the parking brake.
 3. Turn the ignition key (86) to "0" and remove it.
 4. Open the rear hood (1) by using the unlocking push-button (25).
 5. In the driver's seat area, remove the covers and check the following fuses for integrity:
 - (I): F9 (50 A), pre-heating glow plug
 - (J): F10 (50 A), alternator
- Replace any open fuse. Install the covers.
6. Close the rear hood (1).



P100326



P100327S

ELECTRICAL SYSTEM

BATTERY DISASSEMBLY/ASSEMBLY [Battery]

**WARNING!**

*Do not tilt the lead batteries (WET) to prevent the highly corrosive acid from leaking out of the batteries.
Do not connect, not even accidentally, the battery positive and negative terminals by using tools, keys, etc. This could cause dangerous short-circuits.*

For approved battery types, see the Technical Data paragraph.
The batteries must be installed as shown in the diagram (59).

**WARNING!**

*WET batteries are inside an appropriate container to prevent the acid form leaking.
Do not install WET batteries without an appropriate container.*

Disassembly

1. Drive the machine on a level ground and engage the parking brake.
2. Check that the ignition key (85) has been removed.
3. Disconnect the battery connector (57) with the control (50).
4. Open the battery compartment hood (1) by using the unlocking push-button (25).
5. Disconnect the battery wiring harness (51 and 52).
6. Check that WET battery caps (60) are closed, to prevent the highly corrosive acid from leaking out of the batteries.
7. With the help of an assistant and an appropriate hoisting system, remove the batteries (51 and 52).

Assembly

8. With the help of an assistant and an appropriate hoisting system, install the batteries and connect them as shown in the diagram (59).
9. Connect the battery connector (57) and close the hood (1).
10. If necessary, charge the batteries (see the procedure in the Instructions for use).

BATTERY AND BATTERY HOLDER DISASSEMBLY/ASSEMBLY [Diesel / LPG / Gasoline]**Preliminary operations**

1. Drive the machine on a level ground.
2. Engage the parking brake by pressing the pedals (35) and (36).
3. Turn the ignition key (86) to "0" and remove it.
4. To remove the battery only, release the rear hood (1) with the lever (25), then fully lift it.
To remove the battery holder too, the rear hood must be removed (see the procedure in the relevant paragraph).

Battery disassembly

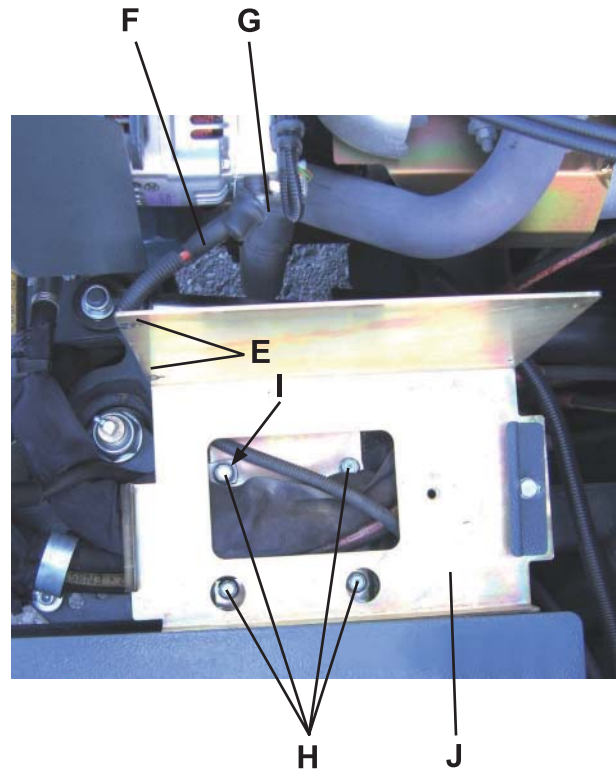
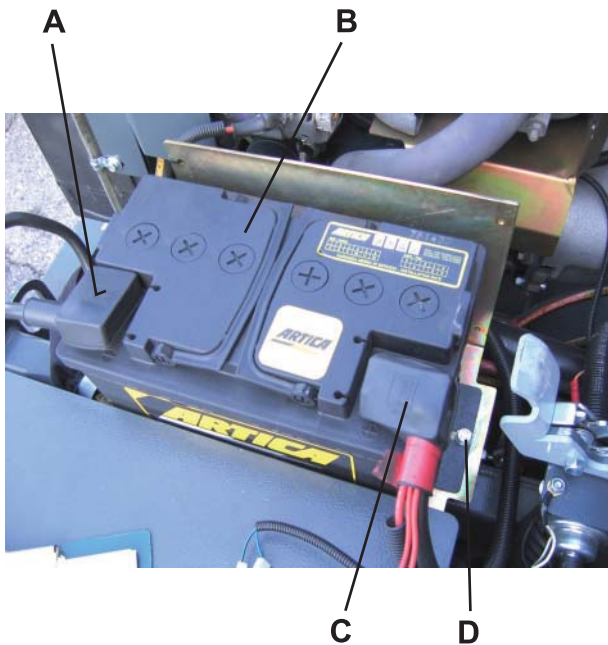
1. Disconnect the terminal (A) of the battery negative pole (B).
2. Disconnect the terminal (C) of the battery positive pole (B).
3. Remove the screw (D).
4. Remove the battery (B) by disengaging it from the fasteners.

Battery holder disassembly

1. Cut the clamps (E) of the wiring harness (F).
2. Disconnect the wiring harness (F) from the connection (G) of the alternator.
3. Remove the mounting screws (H) of the battery holder (J).
4. Move aside the ground terminal (I).
5. Remove the battery holder (J).

Assembly

1. Assemble the components in the reverse order of disassembly.



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ELECTRICAL SYSTEM

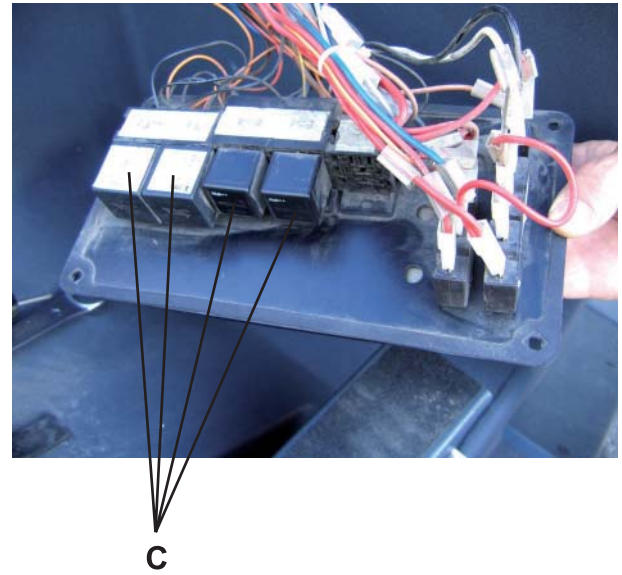
RELAY DISASSEMBLY/ASSEMBLY [All versions]

Disassembly

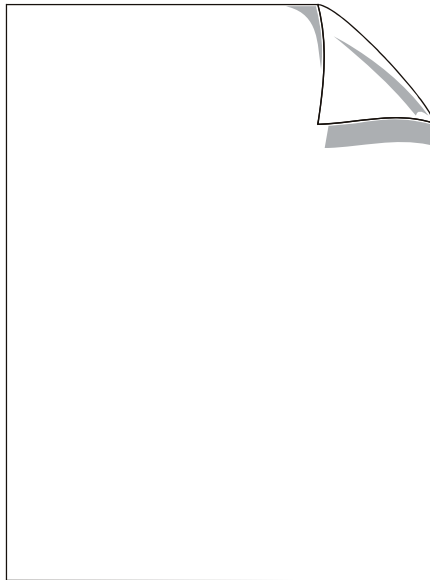
1. Release the rear hood (1) with the lever (25), then fully lift it.
2. Engage the parking brake by pressing the pedals (35) and (36).
3. Turn the ignition key (86) to "0" and remove it.
4. Remove the screws (A) and move aside the panel (B) under the steering wheel.
5. Remove the relevant relays (C).

Assembly

1. Assemble the components in the reverse order of disassembly.



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Nilfisk-Advance, Inc.

14600 21st Avenue North
Plymouth, MN, 55447-3408
www.nilfisk-advance.com

Phone: 800-989-2235

Fax: 800-989-6566

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Plymouth, MN 55447-3408

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