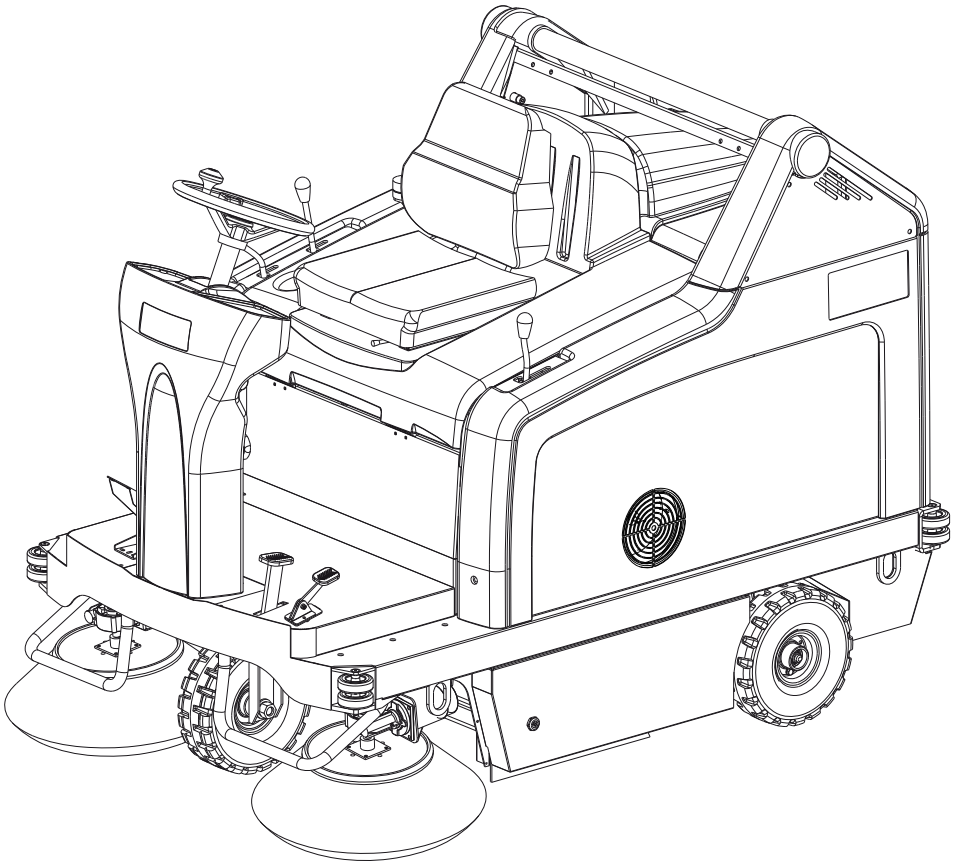
Terra™ 5200 B



SERVICE MANUAL
Advance model: 9084513010

Advance
by Nilfisk-Advance

1463546000(1)2008-07

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GENERAL INFORMATION

CONVENTIONS

Forward, backward, front, rear, left or right are intended with reference to the operator's position, that is to say on the driver's seat, with the hands on the steering wheel.

MACHINE LIFTING

WARNING!
Do not work under the lifted machine without supporting it with safety stands.

MACHINE TRANSPORT

WARNING!
Before transporting the machine, make sure that:
- ***All guards and hoods are closed.***
- ***The ignition key is removed.***
- ***The machine is securely fastened to the means of transport.***

PUSHING OR TOWING THE MACHINE

WARNING!
When pushing or towing the machine, carefully follow the instructions in the User Manual.
Failure to follow these instructions may cause damage to the machine.

OTHER REFERENCE MANUALS

The following Manuals are available at Advance Literature Service Department:
- Terra™ 5200 Spare Parts List – Form Number 1463544000
- Terra™ 5200 User Manual – Form Number 1463545000
- Terra™ 5200P Roof Kit Assembly – Form Number 146 2097 000
- Terra™ 5200 Roof Pivoting Light Kit Assembly – Form Number 146 2099 000
- Terra™ 5200 Hood Pivoting Light Kit Assembly – Form Number 146 1156 000
- Terra™ 5200 Working Light Kit Assembly – Form Number 146 1713 000
- Terra™ 5200 Closed Pocket Filter Kit Assembly – Form Number 146 1235 000

SAFETY

The following symbols indicate potentially dangerous situations. Always read this information carefully and take all necessary precautions to safeguard people and property.

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 careful 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 User Manual 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!

- ***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.***
- ***Keep sparks, flames and smoking materials away from the batteries. During the normal operation explosive gases are released.***
- ***Do not wear jewels when working near electrical components.***
- ***Do not work under the lifted machine without supporting it with safety stands.***
- ***When working under the open hood, ensure that it cannot be closed by accident.***
- ***Do not operate the machine near toxic, dangerous, flammable and/or explosive powders, liquids or vapours. This machine is not suitable for collecting dangerous powders.***
- ***When lead batteries (WET) are installed on this machine, do not tilt the machine more than 30° from its horizontal position to not allow the highly corrosive acid to leak out of the batteries. When the machine is to be tilted to perform maintenance procedures, remove the batteries.***
- ***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.***

WARNING!

- ***Carefully read all the instructions before performing any maintenance/repair procedure.***
- ***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 User Manual. Using other brooms could reduce safety.***
- ***Do not smoke while charging the batteries.***
- ***Before using the machine, close all doors and/or covers.***
- ***Do not use the machine in excessively dusty areas.***
- ***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 other people, and children especially.***
- ***Do not put any can containing fluids on the machine.***
- ***The machine storage temperature must be between 32°F and 104°F (0°C and +40°C).***
- ***The machine working temperature must be between32°F and 104°F (0°C and +40°C).***
- ***The 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.***
- ***The machine maximum capacity, operator's weight not included, is 242 lb (110 kg) (the weight of waste).***
- ***Do not allow the brooms to operate while the machine is stationary to avoid damaging the floor.***
- ***In case of fire, possibly use a powder fire extinguisher, not a water one.***
- ***Do not bump into shelves or scaffoldings, especially where there is a risk of falling objects.***
- ***Adjust the operation speed to suit the floor conditions.***
- ***Do not use the machine on slopes with a gradient exceeding the specifications.***
- ***This machine cannot be used on roads or public streets.***
- ***Do not tamper with the machine safety guards.***
- ***Follow the routine maintenance procedures scrupulously.***
- ***Do not remove or modify the plates affixed to the machine.***
- ***In case of machine malfunctions, ensure that these are not due to lack of maintenance. Otherwise, request assistance from the authorised personnel or from an authorised Service Center.***
- ***If parts must be replaced, require ORIGINAL spare parts from an Authorised Dealer or Retailer.***
- ***To ensure machine proper and safe operation, the scheduled maintenance shown in the relevant chapter of this Manual must be performed by the authorised personnel or by an authorised Service Center.***
- ***The machine must be disposed of properly, because of the presence of toxic-harmful materials (batteries, oils, plastics, etc.), which are subject to standards that require disposal in special centres (see the Scrapping chapter).***

TECHNICAL DATA

Dimensions and weights	Values
Machine length	70 in (1,776 mm)
Machine width (with one side broom)	47.6 in (1,208 mm)
Machine width (with two side brooms)	51.6 in (1,310 mm)
Front – rear wheelbase	42.9 in (1,090 mm)
Track (centres of front wheels)	38.7 in (982.7 mm)
Machine maximum height (at the steering wheel)	53.1 in (1,350 mm)
Machine maximum height/with canopy/with canopy and pivoting light	54.1/80/83.8 in (1,375/2,030/2,130 mm)
Driver's seat height	36.1 in (918.5 mm)
Minimum distance from the floor (skirts not included)	2.3 in (60 mm)
Approach angle	46% (25°)
Hopper maximum lifting height (horizontal position)	65 in (1,650 mm)
Minimum/maximum dumping height	10.6/54 in (270/1,370 mm)
Max overall height with the hopper lifted (HxLxW)	93.3 x 110.8 x 51.5 in (2,370 x 2,816 x 1,310 mm)
Working width (with one side broom)	41.5 in (1,054 mm)
Working width (with two side brooms)	51.5 in (1,308 mm)
Main broom size (diameter x width)	11.8 x 31.5 in (300 x 800 mm)
Side broom diameter	19.7 in (500 mm)
Minimum turning radius	66.3 in (1,685 mm)
Rear wheel specific pressure on the floor (*)	159 psi (1.1 N/mm^2)
Front wheel specific pressure on the floor (*)	159 psi (1.1 N/mm^2)
Front axle weight in running conditions	659 lb (299 kg)
Rear axle weight in running conditions	934 lb (424 kg)
Machine kerb weight (with operator)	1594 lb (723 kg)
Front steering wheel (diameter x width)	12 x 3.6 in (305 x 92 mm)
Rear driving wheel (diameter x width)	12 x 3.6 in (305 x 92 mm)

(*) 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 wheel and for rear wheels

GENERAL INFORMATION

Performance data	Values
Maximum forward speed	4.3 mi/h (7 km/h)
Maximum reverse speed	2.1 mi/h (3.5 km/h)
Gradeability at full load	9° (16%)
Main broom maximum speed	550 rpm
Side broom maximum speed	85 rpm
Panel filter surface	5580 in^2 (3.6 m^2)
Panel filter rating	15 ÷ 20 µ
Closed pocket filter surface	6510 in^2 (4.2 m^2)
Closed pocket filter rating	40 ÷ 60 µ
Main broom compartment vacuum	0.015 psi (10.9 mm/H_2O)
Maximum weight liftable by the hopper	242.5 lb (110 kg)
Hopper capacity	34,3 gal (130 litres)
Sound pressure level at workstation (ISO 11201, ISO 4871) (LpA)	67 dB(A) ±3 dB(A)
Machine output acoustic power (ISO 3744, ISO 4871) (LwA)	82 dB(A)
Vibration level at the operator's body (ISO 2631-1) (**)	< 98 in/s^2 (< 2.5 m/s^2)
Vibration level at the operator's arms (ISO 5349-1) (**)	256 in/s^2 (6.5 m/s^2)

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

Motor data		Values
Electrical system voltage		24 V
Vacuum system motor	Power	0.4 hp (310 W)
	Revolutions per minute	3,000 rpm
Main broom motor	Power	0.6 hp (500 W)
	Revolutions per minute	550 rpm
Drive system motor	Power	1 hp (750 W)
	Revolutions per minute	315 rpm
Side broom reduction unit	Power	0.12 hp (90 W)
	Revolutions per minute	85 rpm
Panel filter shaker motor	Power	0.12 hp (90 W)
	Revolutions per minute	5,700 rpm
Closed pocket filter shaker motor	Power	0.15 hp (110 W)
	Revolutions per minute	3,000 rpm

Refuelling data		Values
Hopper hydraulic lifting system	Tank capacity [whole circuit]	0.2 gal (0.75 litres) [0.37 gal (1.4 litres)]
	Oil type	AGIP Arnica 46 (*)

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

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.

GENERAL INFORMATION

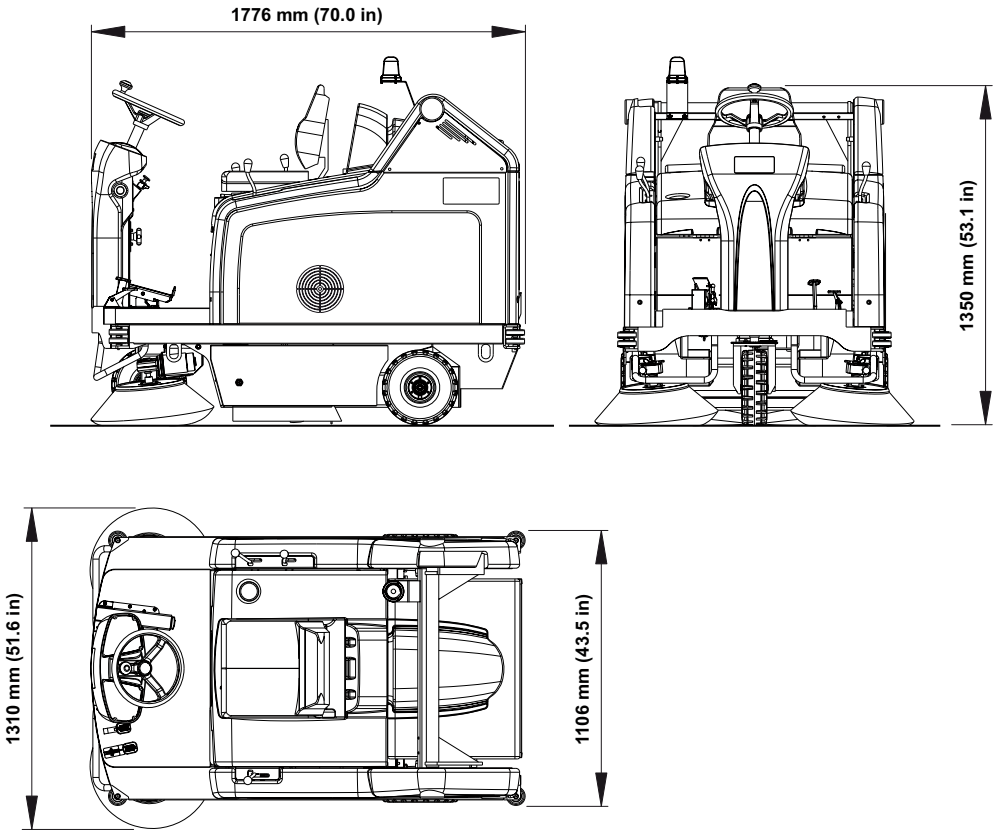
TECHNICAL DATA			
AGIP ARNICA		**46**	**32**
Viscosity at 104 °F (40°C)	in^2/s (mm^2/s)	0.07 (45)	0.05 (32)
Viscosity at 212 °F (100°C)	in^2/s (mm^2/s)	0,012 (7.97)	0,009 (6.40)
Viscosity index	/	150	157
Flash point COC	°F (°C)	419 (215)	396 (202)
Pour point	°F (°C)	-32.8 (-36)	-32.8 (-36)
Density at 59 °F (15°C)	lb/gal (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

Electrical system data		**Values**
System voltage		24 V
Propulsion battery	Standard WET batteries with acid electrolyte, in serial connection	4 x 6 V x 180 Ah@5h
	Optional WET battery with acid electrolyte	1 x 24 V x 240 Ah@5h
	Optional WET battery with acid electrolyte	1 x 24 V x 320 Ah@5h
	Battery capacity	330 Ah@5h
	Battery case dimensions	31.5 x 11.8 x 5.9 in (800 x 300 x 150 mm)
	Battery compartment maximum size	14.2 x 31.5 x 14.9 in (360 x 800 x 380 mm)

GENERAL INFORMATION

DIMENSIONS



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SCHEDULED MAINTENANCE

The lifespan of the machine and its maximum operating safety are ensured by proper and regular maintenance.

WARNING!
Before performing any maintenance procedure, carefully read the instructions shown in Safety chapter.

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.
The following paragraphs give further instructions about maintenance procedures listed in the Scheduled Maintenance Table.

SCHEDULED MAINTENANCE TABLE

Procedure	Upon delivery	Every 10 hours	Every 50 hours	Every 100 hours	Every 200 hours	Every 400 hours
Battery fluid level check		(1)				
Side and main broom height check						
Hopper hydraulic lifting system oil level check			(1)			
Skirt height and operation check						
Panel dust filter cleaning and integrity check						
Filter shaker operation check						
Driving wheel chain cleaning and tension check						
Visual inspection of the belt between motor and main broom						
Closed pocket filter cleaning and integrity check						
Brake adjustment						
Nut and screw tightening check				(2)		
Steering chain cleaning						
Vacuum system efficiency check						
Replacement of the timing belt between motor and main broom						
Hopper gasket integrity check						
Lifted hopper control microswitch adjustment check						
Horizontal hopper control microswitch adjustment check						
Motor carbon brush check and replacement						
Hydraulic system oil change						(3)

(1) Or before each start-up
(2) And after the first 8 running-in hours
(3) Change the oil for the first time after 500 hours, then every 2,000 hours or every year

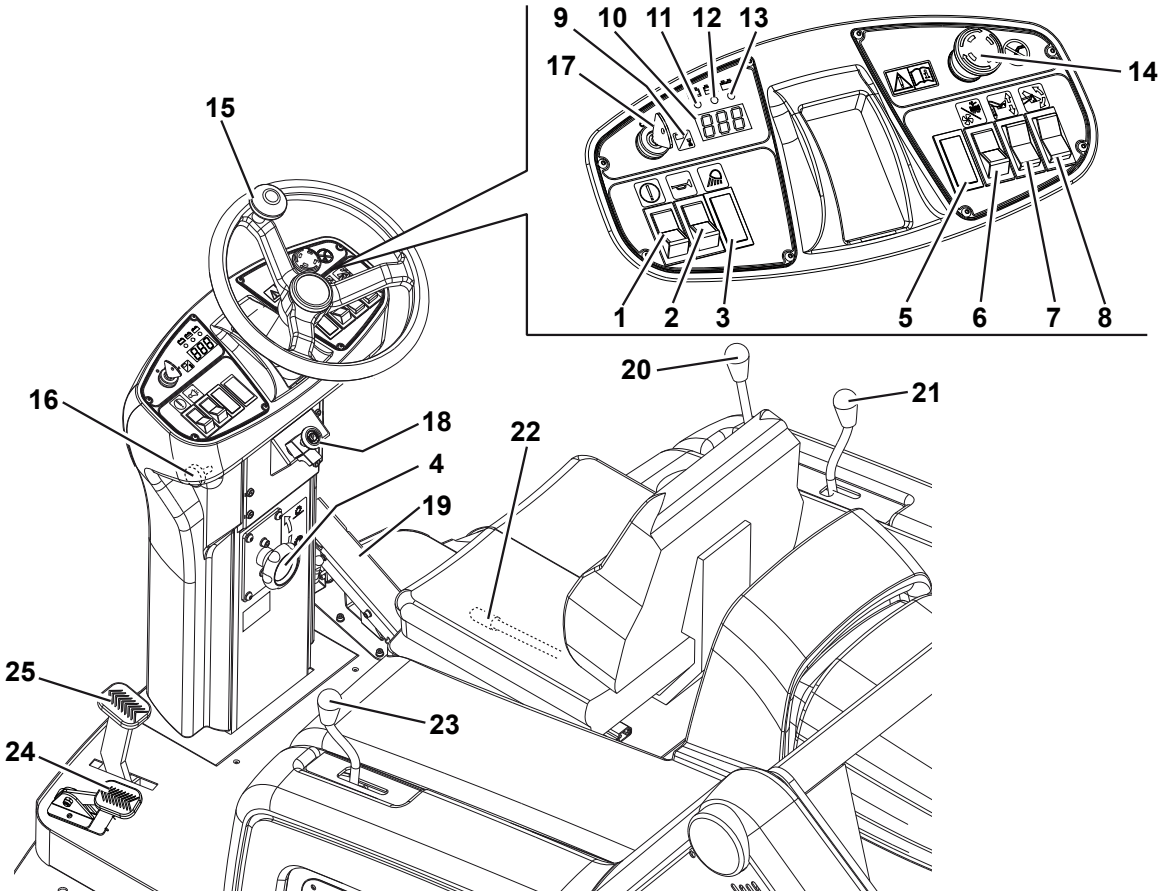
GENERAL INFORMATION

MACHINE NOMENCLATURE

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

1. Hopper lifting/lowering/dumping enabling switch
2. Horn switch
3. Working light switch (optional)
4. Main broom print adjusting knob
   - Turn it counter-clockwise to increase the broom print
   - Turn it clockwise to decrease the broom print
5. Position for optional switch
6. Switch
   - (Lower position) vacuum system activation
   - (Upper position) filter shaker activation
7. Hopper lifting/lowering switch
8. Hopper dumping switch
9. Display selection switch for the following functions, in sequence:
   - Working hours
   - Last digit of the hours - (dot) - minutes
   - Battery voltage (V)
10. Display
11. Discharged battery warning light (red)
12. Semi-discharged battery warning light (yellow)
13. Charged battery warning light (green)
14. Emergency push-button
15. Steering wheel
16. Steering wheel tilting control knob
17. Ignition key:
    - When turned to “0”, it turns the machine off and disables all functions.
    - When turned to “I”, it enables all machine functions; it also turns on the flashing light.
18. Parking brake lock control lever
    It locks the service brake (75) thus switching it to parking brake.
19. Forward/reverse gear pedal
20. Right side broom lifting/lowering lever
21. Left side broom lifting/lowering lever
22. Seat longitudinal position adjusting lever
23. Main broom lifting/lowering lever
24. Front skirt lifting pedal
25. Service brake pedal
28. Serial number plate/technical data/conformity certification
29. Flashing light (always on when the ignition key is turned to “I”) (optional)
30. Vacuum system motor cover
31. Hopper (empty it when it is full)
32. Left door (to be opened for performing maintenance procedures only)
33. Left closing fastener with safety mounting screw
34. Right door (for main broom removal)
35. Right fastener
36. Working light (optional)
37. Right side broom
38. Left side broom
39. Main broom
40. Battery compartment hood
41. Rear driving wheels on fixed axle
42. Front steering wheel
43. Left side skirt
44. Right side skirt
45. Front skirt
46. Rear skirt
47. Dust filter container
48. Working light aiming adjusting screws
49. Battery compartment hood (open)
50. Lead batteries (WET) or optional gel batteries (GEL)
51. Battery caps (for WET batteries only)
52. Battery connector
53. Main broom motor circuit breaker
54. Right side broom motor circuit breaker
55. Left side broom motor circuit breaker
56. Lamellar fuse box
57. Vacuum system motor connector
58. Battery connection diagram
59. Drive system motor
60. Electrical component box
61. Drive system electronic board
62. Hopper hydraulic lifting system oil tank
63. Hood support rod
64. Driver’s seat

MACHINE NOMENCLATURE (Continues)



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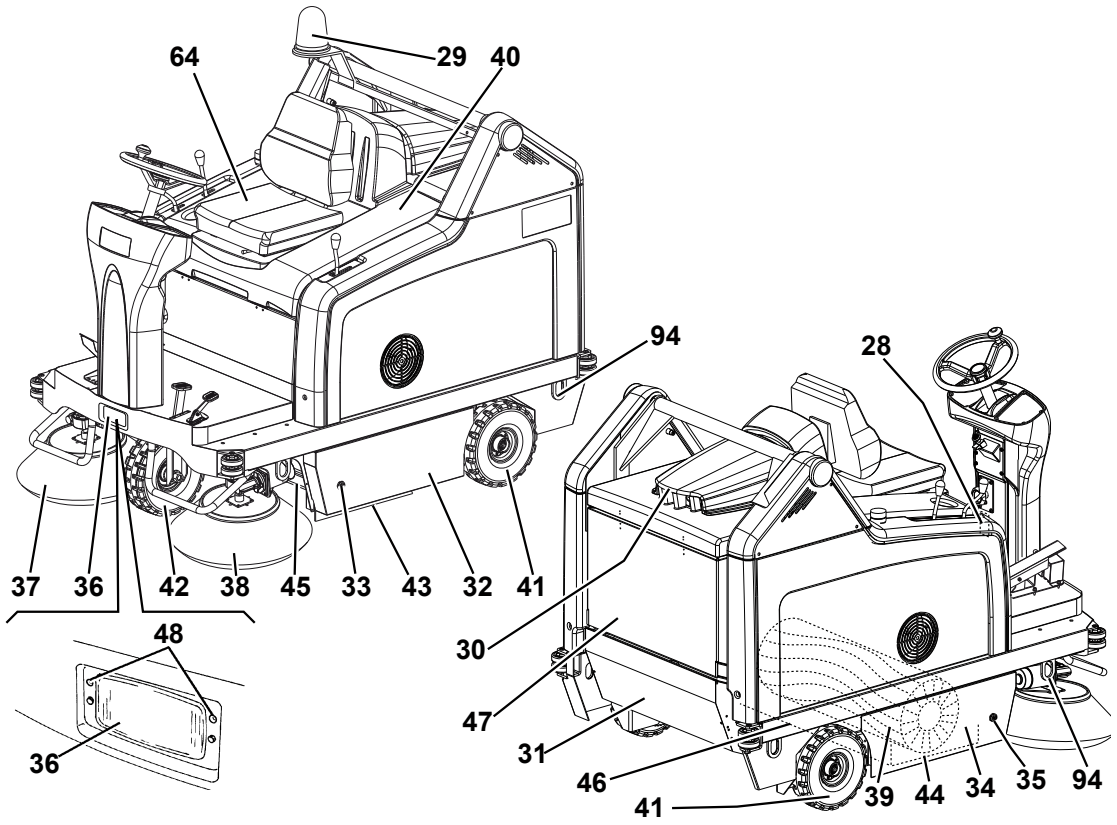

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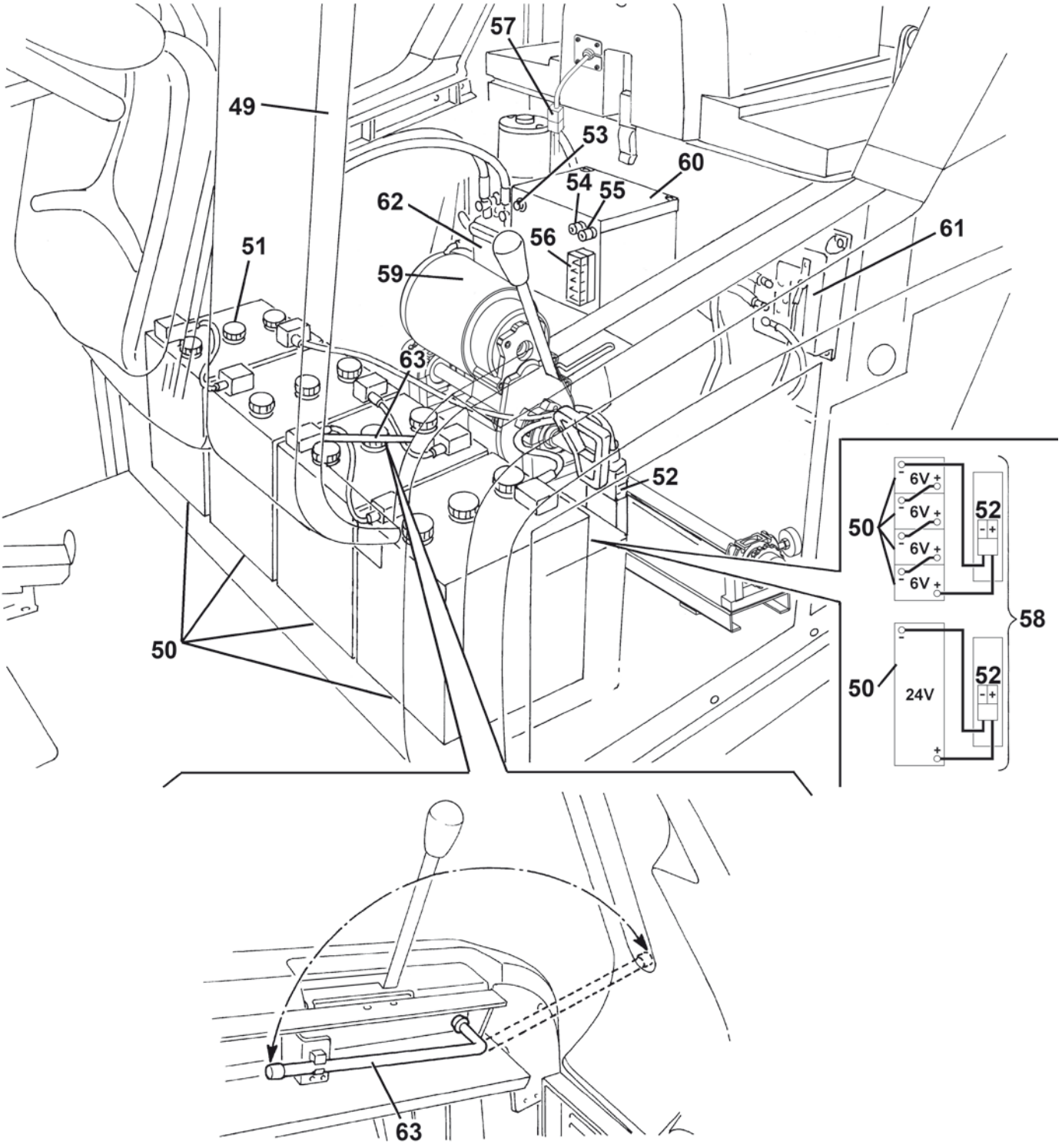
GENERAL INFORMATION

MACHINE NOMENCLATURE (Continues)



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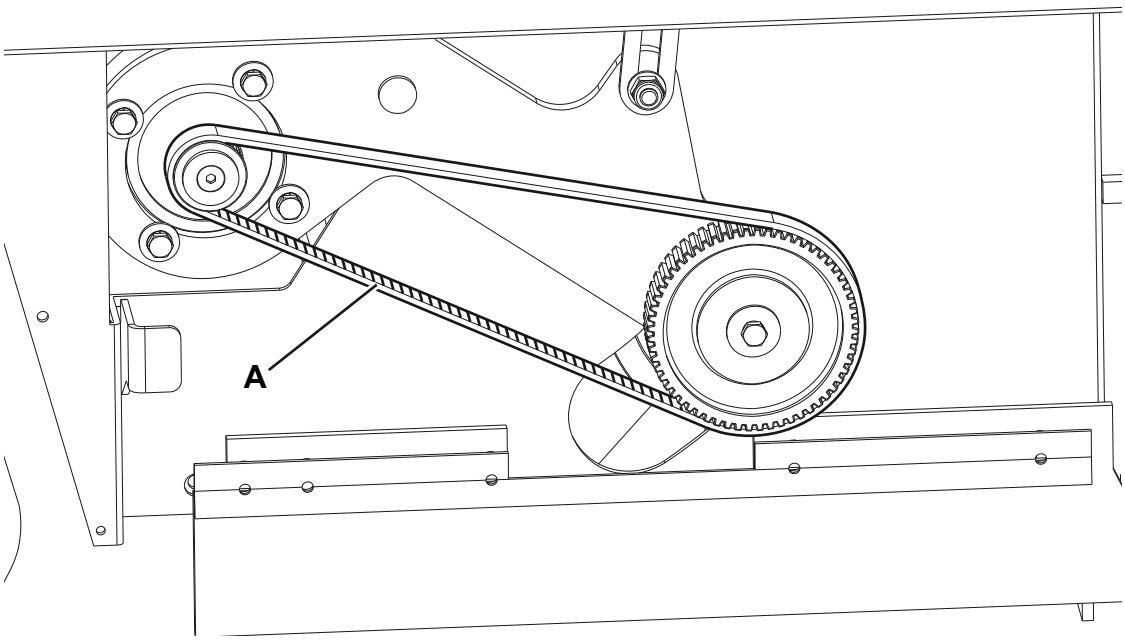
SWEEPING SYSTEM

MAIN BROOM DRIVING BELT VISUAL INSPECTION

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition key (17) to “0”.
3. Release the fastener (33) and open the left door (32).
4. Visually inspect the timing belt (A) for integrity, cracks or breaks, along its whole length; if necessary, replace it (see the procedure in the relevant paragraph).
   Tension belt adjustment is not necessary.
5. Close the left side door (32) and engage the fastener (33).



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SWEEPING SYSTEM

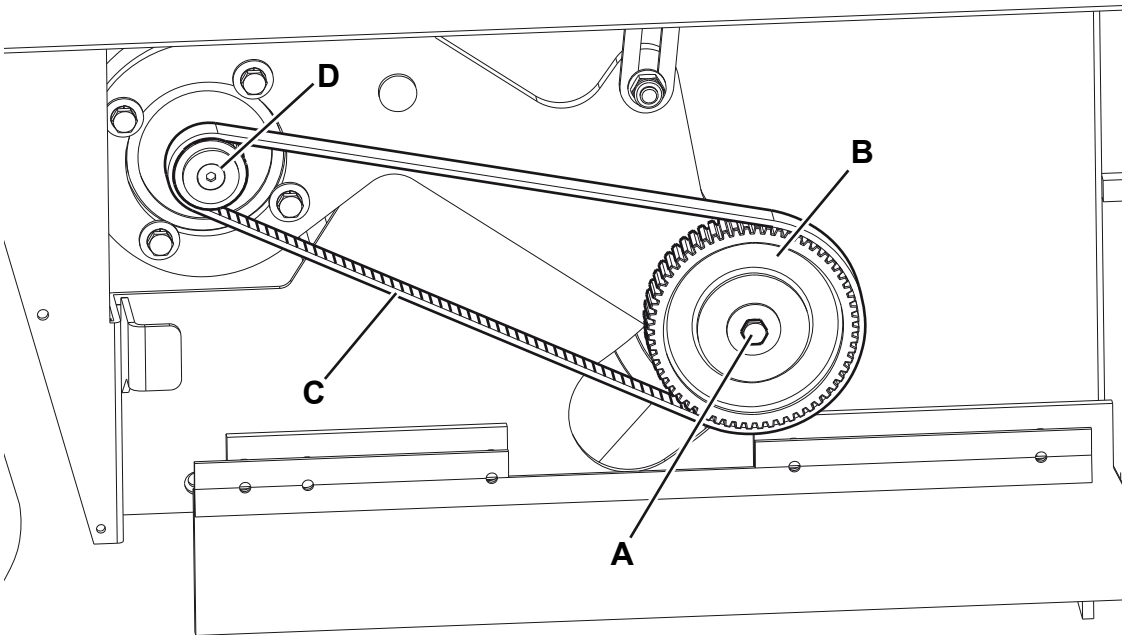
MAIN BROOM DRIVING BELT DISASSEMBLY/ASSEMBLY

Disassembly

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition key (17) to “0”.
3. Lower the main broom lever (23).
4. Release the fastener (33) and open the left door (32).
5. With a wrench on the screw (A) turn the pulley (B) clockwise, and disengage the timing belt (C) from the pulley.
6. Remove the belt (C) from the pinion (D).

Assembly

7. Install the belt (C) on the pinion (D).
8. With a wrench on the screw (A) turn the pulley (B) clockwise, and engage the timing belt (C) to the pulley.
9. Tension belt adjustment is not necessary.
10. Close the left side door (32) and engage the fastener (33).



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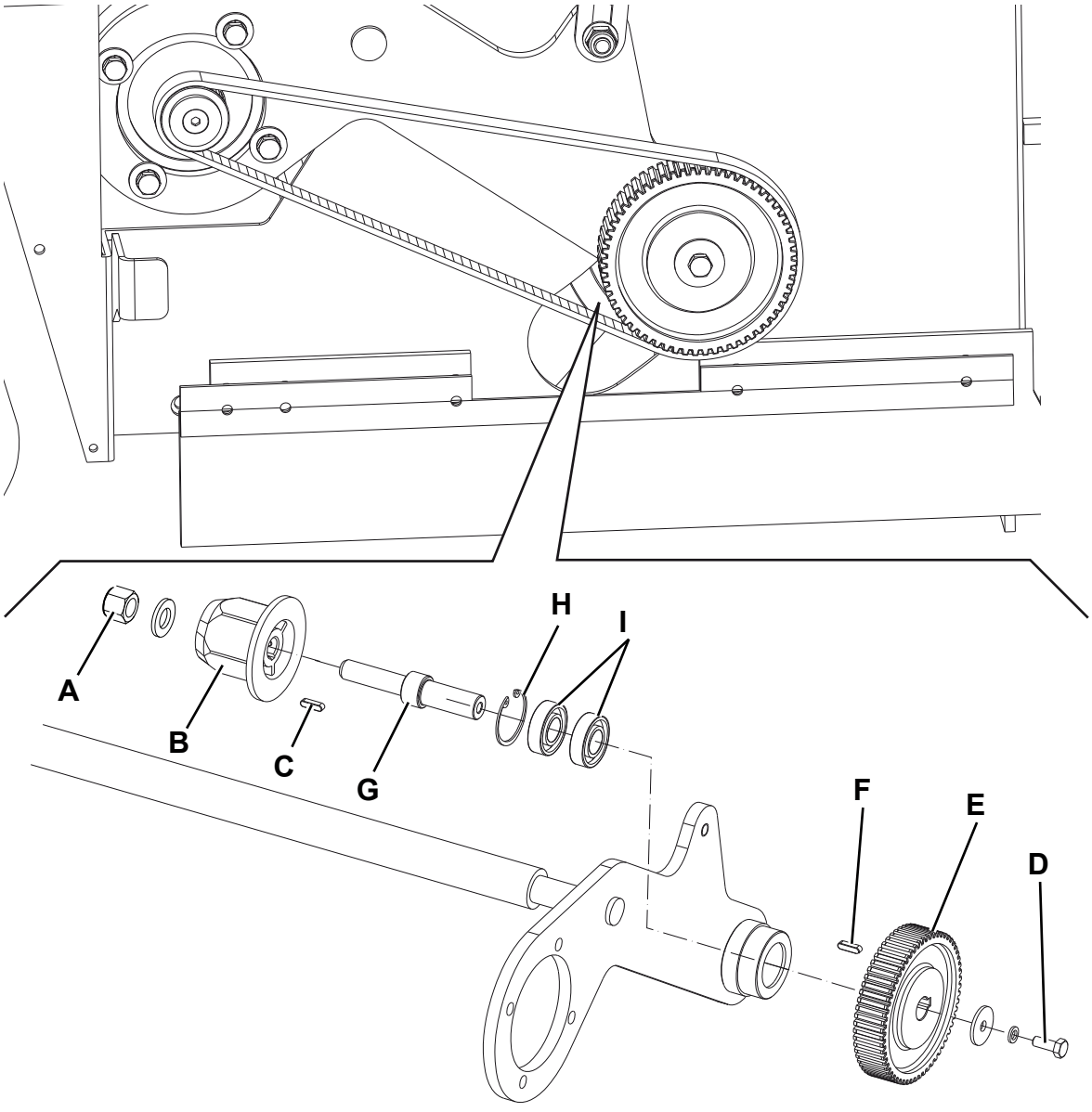
MAIN BROOM PULLEY BEARING REPLACEMENT

Disassembly

1. Drive the machine onto an appropriate lifting hook.
2. Engage the parking brake with the pedal and the lever (25 and 18).
3. Turn the ignition key (17) to “0”.
4. Operating according to the safety rules, lift the machine.
   If the lifting hook is not available, engage the machine to the four anchors (94), and lift it with a proper hoisting system, operating according to the safety rules.
5. Remove the main broom (see the procedure in the relevant paragraph).
6. Release the fastener (33) and open the left door (32).
7. Remove the nut (A).
8. Remove the holder (B) and recover the key (C).
9. Remove the screw (D).
10. Remove the pulley (E) and recover the key (F).
11. Remove the main broom joint (G).
12. Remove the retaining ring (H).
13. Remove the main broom pulley bearings (I) with a hammer and a special bearing remover.

Assembly

14. Assemble the components in the reverse order of disassembly, and note the following:
    - Insert the new bearings (I) by pressing them only on the external ring and using a metal pipe with proper diameter.



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SWEEPING SYSTEM

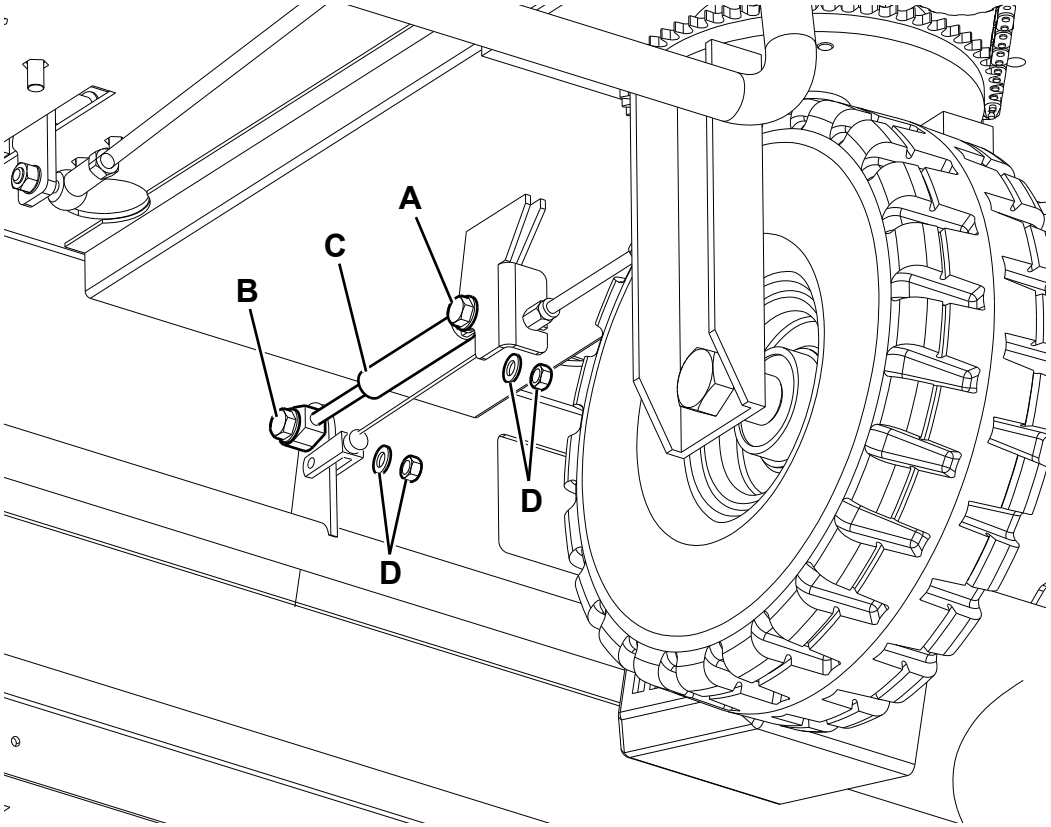
MAIN BROOM GAS SPRING DISASSEMBLY/ASSEMBLY

Disassembly

1. Drive the machine onto an appropriate lifting hook.
2. Engage the parking brake with the pedal and the lever (25 and 18).
3. Turn the ignition key (17) to “0”.
4. Lower the main broom with the lever (23).
5. Remove the main broom (see the procedure in the relevant paragraph).
6. Fully turn the knob (4) counter-clockwise.
7. Operating according to the safety rules, lift the machine.
   If the lifting hook is not available, engage the machine to the four anchors (94), and lift it with a proper hoisting system, operating according to the safety rules.
8. Remove the fastening screws (A) and (B) of the gas spring (C).
9. Remove the gas spring (C) and recover the nuts and the washers (D).

Assembly

10. Assemble the components in the reverse order of disassembly, and note the following:
    - Tighten the screw (A) first, then the screw (B).
11. Adjust the main broom height (see the procedure in the relevant paragraph).



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MAIN BROOM HEIGHT CHECK AND ADJUSTMENT

NOTE
Brooms with harder or softer bristles are available. This procedure is applicable to all types of brooms.

Check

1. Check the main broom distance from the floor as shown below:
   - Drive the machine on a level floor.
   - Keep the machine stationary, lower the main broom and turn it on for a few seconds.
   - Stop and lift the main broom, then move the machine and switch it off.
   - Check that the main broom print (A), along its length, is 0.8 to 1.6 in (2 to 4 cm) wide.

   If the print (A) is not within specifications, adjust the main broom height according to the following procedure.

Adjustment of the overall broom pressure on the floor (the whole broom is too much or too little pressed to the floor)

2. Turn the knob (B) and consider that:
   - To increase the print width, the knob must be turned counter-clockwise.
   - To decrease the print width, lift the broom with the lever (80) and turn the knob clockwise.

NOTE
The knob can be used both to adjust the print and to adjust the broom according to the bristle wear.

3. Perform step 1 again to check the proper adjustment of the main broom height.
4. When the broom is too worn to be adjusted, replace it (see the procedure in the relevant paragraph).

Adjustment of the pressure evenness across the broom length (the broom pressure differs from one end to another)

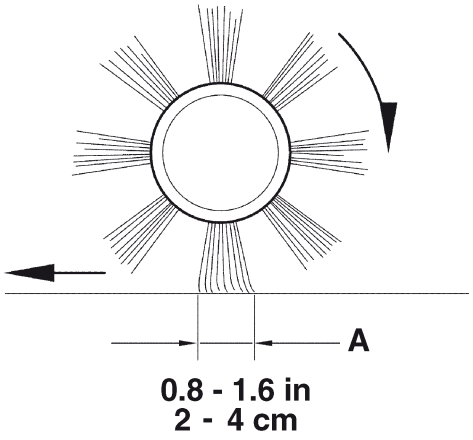
5. Release the fastener (35) and open the right door (34).
6. To adjust the broom pressure on the floor loosen the locknuts (C) and (D), and operate on the screws (E) and (F), and consider that: To lower the broom on the right side, the screw (E) must be tightened; to lift the broom on the right side the screw must be loosened.
7. Then adjust the screw (F) until it fits on the inner bushing (G) and tighten the nuts (C) and (D).
8. Perform step 1 again to check the proper adjustment of the main broom pressure evenness on the floor.

Machine reset

9. Close the left door (32) and engage the fastener (33).
10. Close the right door (34) and engage the fastener (35).

SWEEPING SYSTEM

MAIN BROOM HEIGHT CHECK AND ADJUSTMENT (Continues)



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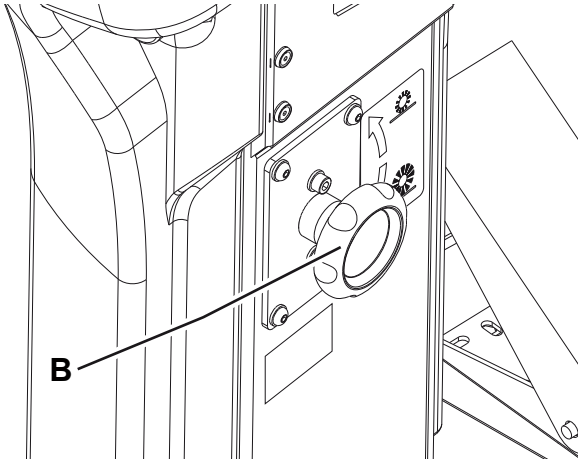

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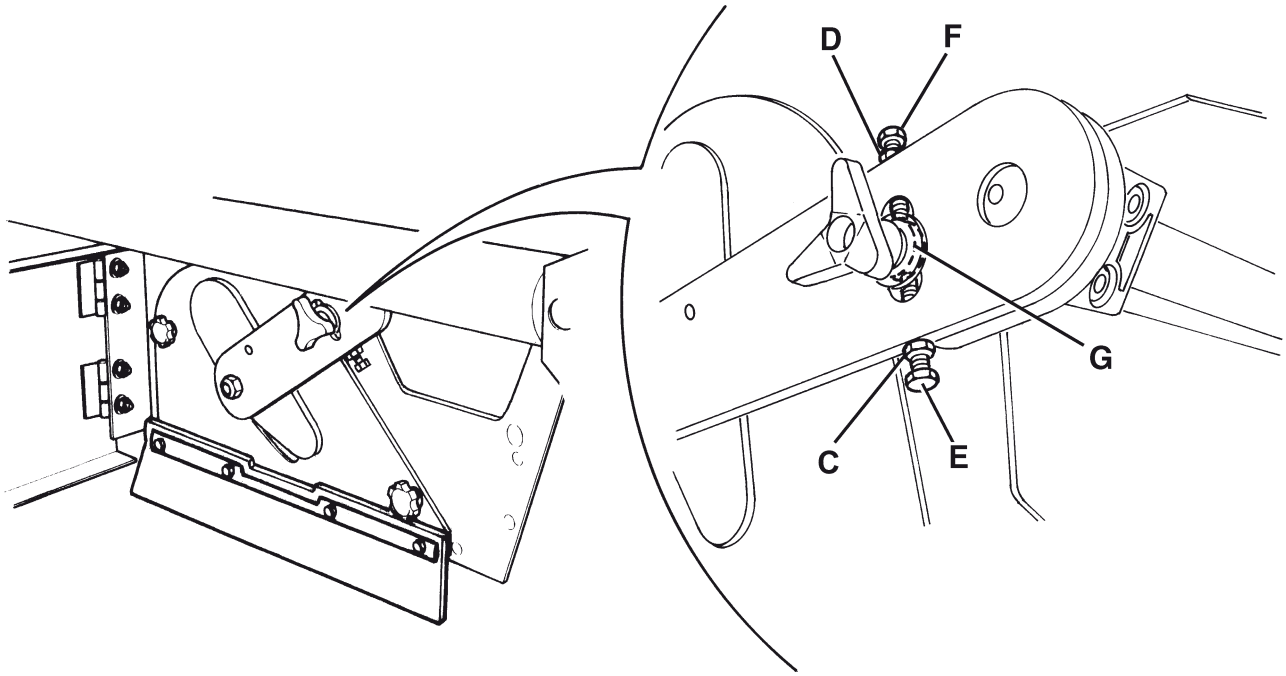

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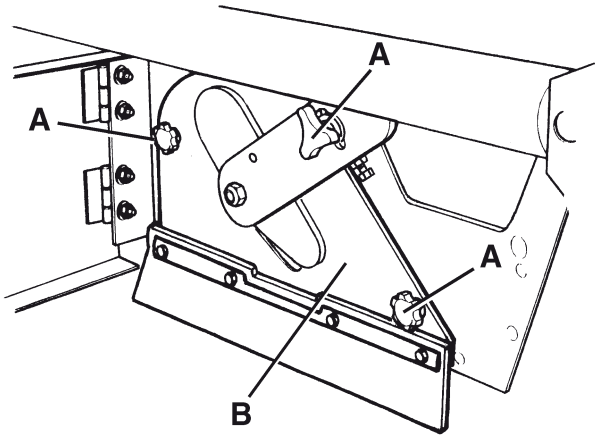
MAIN BROOM REPLACEMENT

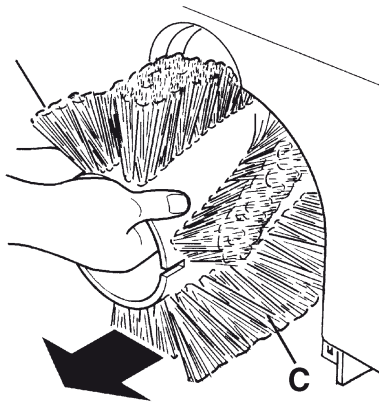
NOTE
Brooms with harder or softer bristles are available. This procedure is applicable to all types of brooms.

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

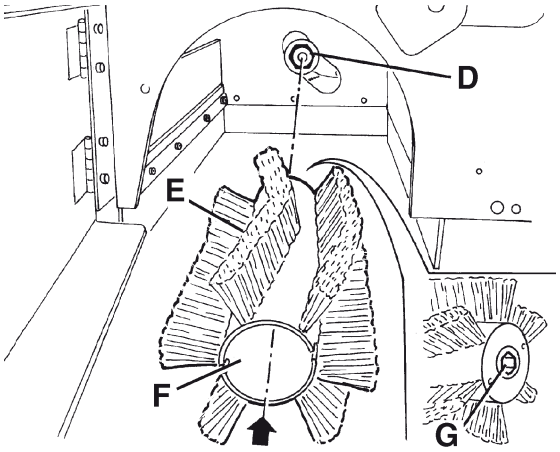
1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition switch (17) to “0”.
3. Open the hood (49) and fasten it with the support rod (63), then disconnect the battery connector (52).
4. Release the fastener (35) and open the right door (34).
5. Unscrew and remove the knobs (A).
6. Remove the broom compartment cover (B).
7. Remove the broom (C).
8. Check that the drive hub (D) is free from dirt or foreign materials (cords, rags, etc.) accidentally rolled up.
9. The new broom must be installed with the bristles (E) bent as shown in the figure.
10. Install the new broom (F) and ensure that the mesh (G) properly fits into the relevant drive hub (D).
11. Install the broom compartment cover (B) and screw the knobs (A).
12. Close the right door (34) and engage the fastener (35).
13. Connect the battery connector (52), disengage and place the support rod (63) in its housing, and close the hood (49).
14. Check the main broom pressure on the floor (see the procedure in the relevant paragraph).



S300523



S300524



S300525

SWEEPING SYSTEM

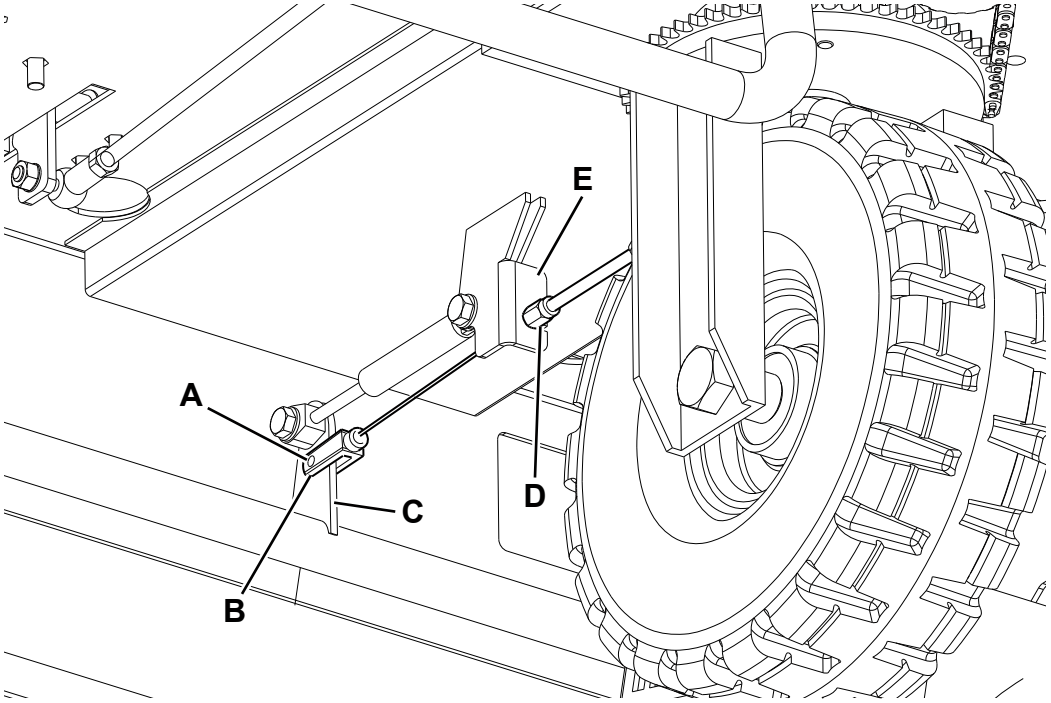
MAIN BROOM HEIGHT ADJUSTMENT CABLE REPLACEMENT

Disassembly

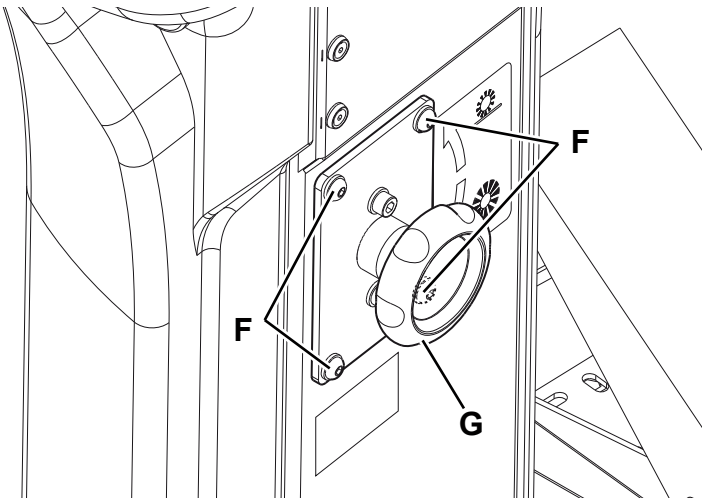
1. Drive the machine onto an appropriate lifting hook.
2. Engage the parking brake with the pedal and the lever (25 and 18).
3. Turn the ignition key (17) to “0”.
4. Lower the main broom with the lever (23).
5. Remove the main broom (see the procedure in the relevant paragraph).
6. Operating according to the safety rules, lift the machine.
   If the lifting hook is not available, engage the machine to the four anchors (94), and lift it with a proper hoisting system, operating according to the safety rules.
7. Disconnect the clip (A) and detach the end (B) from the holder (C).
8. Loosen the adjuster (D) and remove it from the holder (E).
9. Remove the screws (F) and remove the broom height adjusting knob (G).

Assembly

10. Assemble the components in the reverse order of disassembly.
11. Adjust the main broom height (see the procedure in the relevant paragraph).



P100264



P100265

SIDE BROOM HEIGHT ADJUSTMENT

NOTE
Brooms with harder or softer bristles are available. This procedure is applicable to all types of brooms.

Broom height adjustment

1. Check the side broom distance from the floor as shown below:
   - Drive the machine on a level floor.
   - Keep the machine stationary, lower the side brooms and turn them on for a few seconds.
   - Stop and lift the side brooms, then move the machine.
   - Check that the side broom prints are as shown in the figure (A).

   In case the prints are not within specifications, adjust the broom height, proceeding as shown in the following steps.
2. Engage the parking brake with the pedal and the lever (25 and 18).
3. Turn the ignition switch (17) to “0”.
4. Open the hood (49) and fasten it with the support rod (63).
5. (**Right side broom**): actuate the driving gear of the lever (B), by loosening the ring nut (C) and by adjusting the adjuster (D) until the proper broom print (A) is achieved. The broom should be touching the floor in a circle arc going from the “11 o’clock” position to the “4 o’clock” position. Finally lock the adjuster (D) into position with the ring nut (C).
   (**Left side broom**): actuate the driving gear of the lever (E), by loosening the ring nut (F) and by adjusting the adjuster (G) until the proper broom print (M) is achieved. The broom should be touching the floor in a circle arc going from the “8 o’clock” position to the “1 o’clock” position. Finally lock the adjuster (G) into position with the ring nut (F).
6. Perform step 1 again to check the proper adjustment of the side broom height.
7. If necessary, the height of the side brooms (L) can be adjusted with the screw and locknut (H) or by shifting the terminals (I).
8. When the broom is too worn to be adjusted, replace it as shown in the next paragraph.

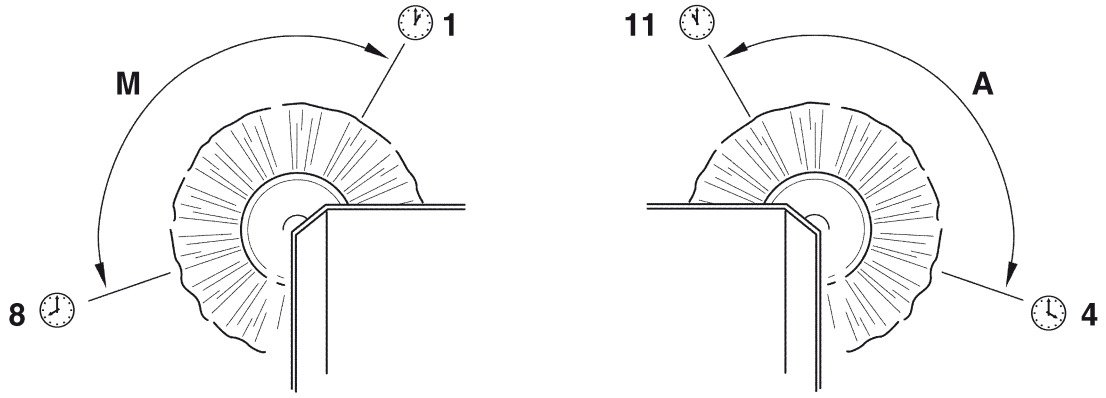
Broom tilting adjustment

NOTE
This adjustment should be performed only in case of real need.

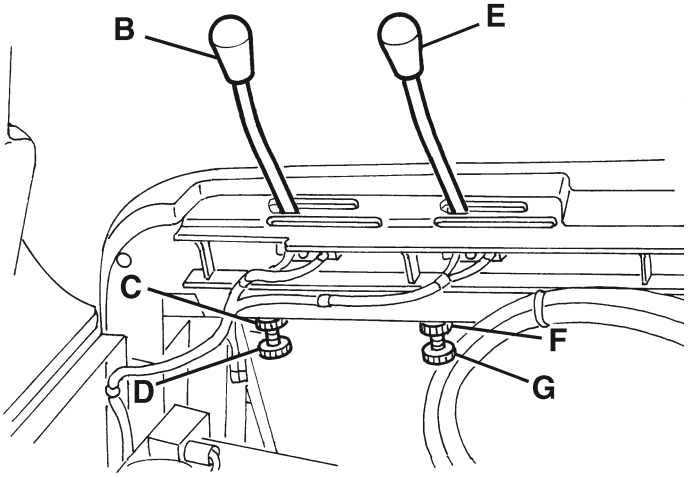
9. Loosen the locknut (J) and adjust the broom tilting by operating on the screw (K).
10. Tighten the locknut (J).
11. Perform step 1 again to check the proper adjustment of the side broom height and tilting.

SWEEPING SYSTEM

SIDE BROOM HEIGHT ADJUSTMENT (Continues)



S300526



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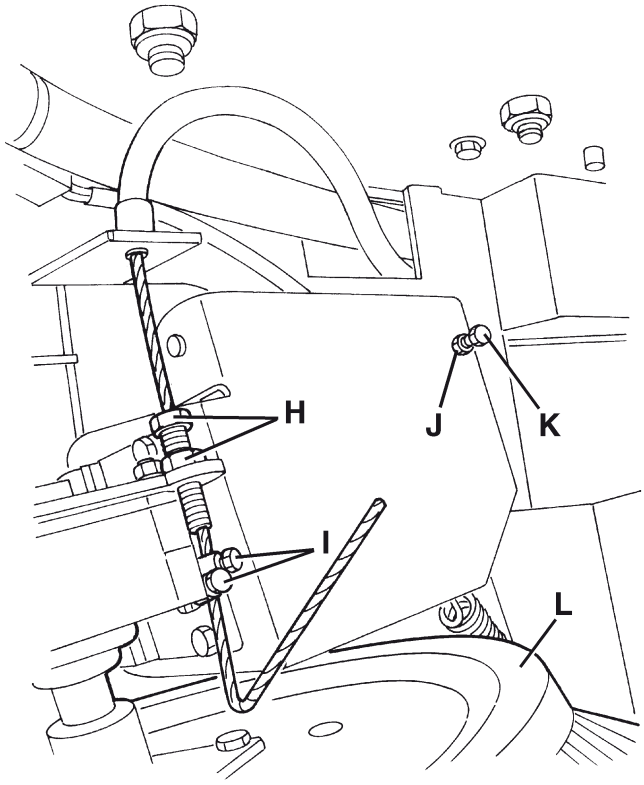


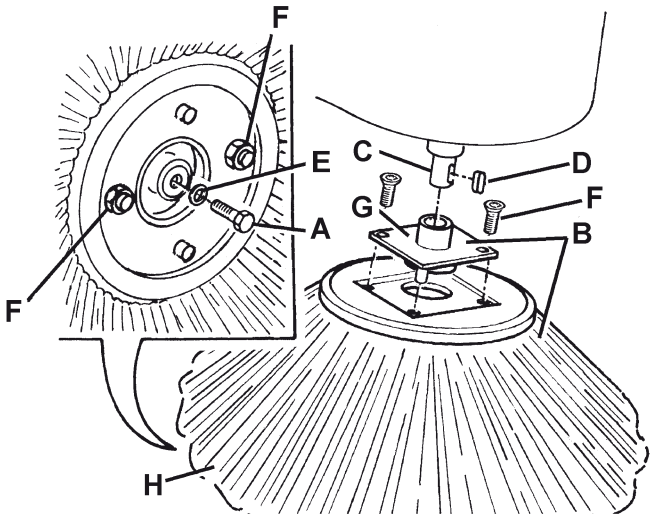
S300528

SIDE BROOM REPLACEMENT

NOTE
Brooms with harder or softer bristles are available. This procedure is applicable to all types of brooms.

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

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition switch (17) to “0”.
3. Lift the side broom which has to be removed with the lever (20 or 21).
4. Remove the screw (A) inside the side broom, then remove the broom with the hub (B) by disengaging it from the shaft (C). Recover the key (D) and the washer (E).
5. At the workbench, remove the screws (F) and separate the broom (H) from the hub (G).
6. Install the new broom (H) on the hub (G), and tighten the screws (F).
7. Fit the key (D) and install the broom with the hub (B). Install the washer (E) and tighten the screw (A).
8. Adjust the side broom height, as shown in the previous paragraph.

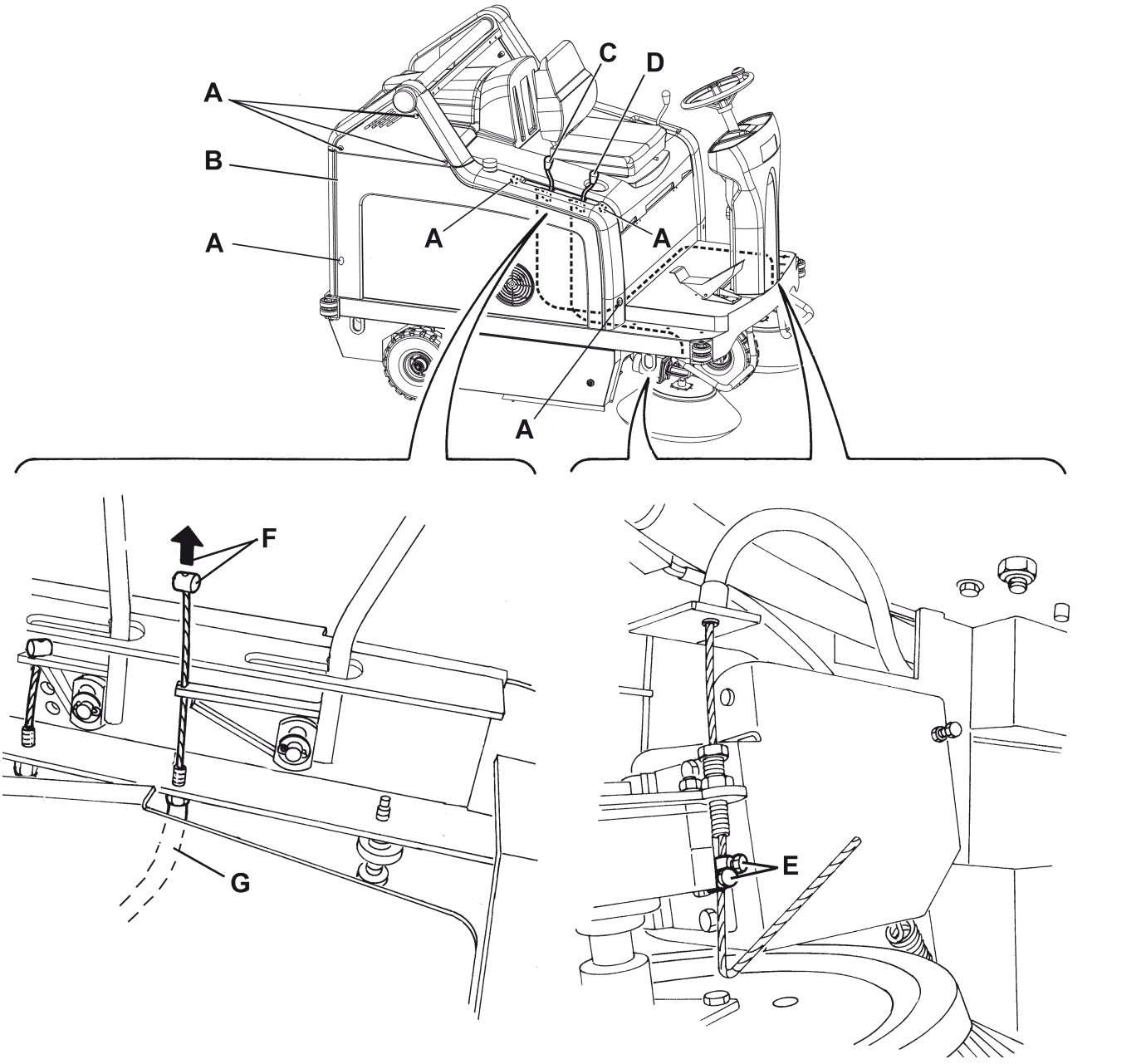


P100266

SWEEPING SYSTEM

SIDE BROOM LIFTING CABLE REMOVAL

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition switch (17) to “0”.
3. Remove the screws (A), then remove the body side (B).
4. Lower the broom with the lever (C) or (D).
5. Remove the terminals (E) from the cable.
6. Remove the side broom lifting cable (F) by disengaging it from the sheath (G), on the control lever side.
7. Assemble the components in the reverse order of disassembly, and note the following:
   - Before inserting the new cable (F) into the sheath (G), apply a thin coat of grease along the cable (so that it smoothly slides into the sheath).
8. Adjust the side broom height (see the procedure in the relevant paragraph).

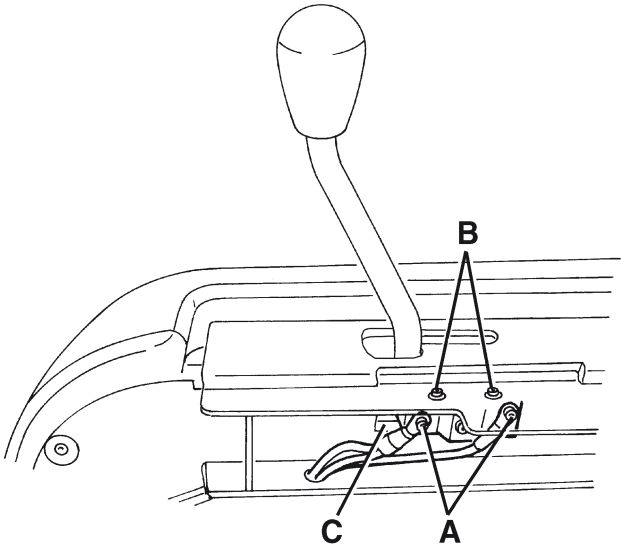


P100267

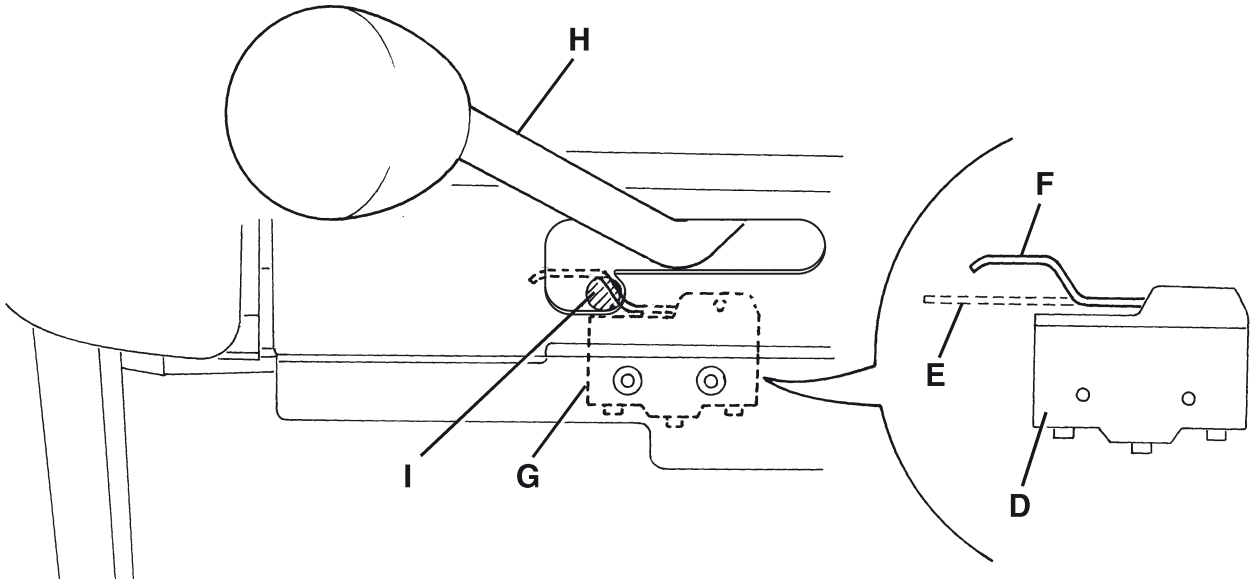
MICROSWITCH REPLACEMENT ON THE SIDE AND MAIN BROOMS LIFTING LEVERS

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition switch (17) to “0”.
3. Open the hood (49) and fasten it with the support rod (63).
4. Disconnect the battery connector (52).
5. Disconnect the electrical connections (A) from the microswitch to be replaced.
6. Remove the screws (B), then remove the microswitch (C).
7. On the new microswitch (D), bend the trigger plate (E) as shown in (F), so that when the microswitch is installed (G position) it will be triggered by the lever (H) when the latter is in the position (I) to lift the broom.
8. Assemble the components in the reverse order of disassembly, taking care to properly reconnect the electrical connections to the new microswitch; for the proper connections, see the table below.
9. Check the operation of the new microswitch.

MICROSWITCH CONNECTION TABLE		
Microswitch	Contact	Wire colour
Main broom	C	Orange
	NC	Black - Orange
Right side broom	C	Black - White
	NC	Black - Gray
Left side broom	C	Black - White
	NC	Black - Brown



S300531



S300532

SWEEPING SYSTEM

MAIN BROOM MOTOR ELECTRICAL INPUT CHECK

WARNING!
This procedure must be performed by qualified personnel only.

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Remove the main broom (see the procedure in the relevant paragraph).
3. Open the hood (49) and fasten it with the support rod (63).

WARNING!
Pay attention to the moving parts while performing the following steps.

4. Apply amperometric pliers on the battery positive cable.
5. Start the machine with the ignition key (17).
6. Lower the main broom with the lever (23) and check that the main broom motor electrical input is between the following values:
   - 3.8 to 4.5 A at 24 V.

   Lift the main broom with the lever (23).
   Turn the ignition key (17) to “0” and remove the amperometric pliers.
   If the electrical input is higher, perform the following procedures to detect the cause and correct the abnormal input:
   - Check the driving parts from the motor to the main broom.
   - If necessary, check the main broom motor carbon brushes (see the procedure in the relevant paragraph).
   - If necessary, disassemble the main broom motor (see the procedure in the relevant paragraph), clean it and check its moving parts.

   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).
7. Perform steps 2 and 3 in the reverse order.

MAIN BROOM MOTOR CARBON BRUSH CHECK AND REPLACEMENT

Check

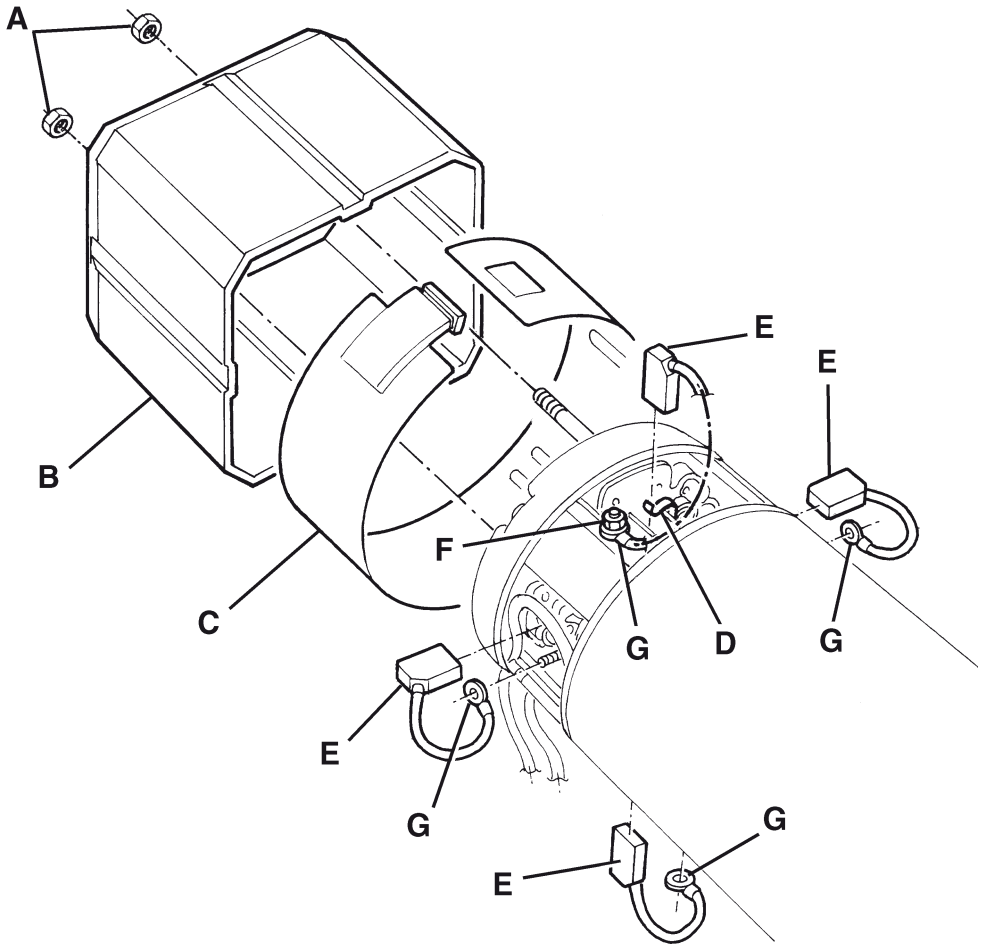
1. Remove the main broom motor (see the procedure in the relevant paragraph).
2. Remove the nuts (A) and the cover (B) at the workbench.
3. Remove dust and dirt from the motor exterior part; then disengage and remove the clamp (C).
4. Lift the retaining springs (D) and remove the four carbon brushes (E).
5. Check the 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.

Replacement

6. If necessary, unscrew the nuts (F) and disengage the lead-in wires (G), then remove the carbon brushes. Replace the carbon brushes as an assembly.

Reset

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



S301250

SWEEPING SYSTEM

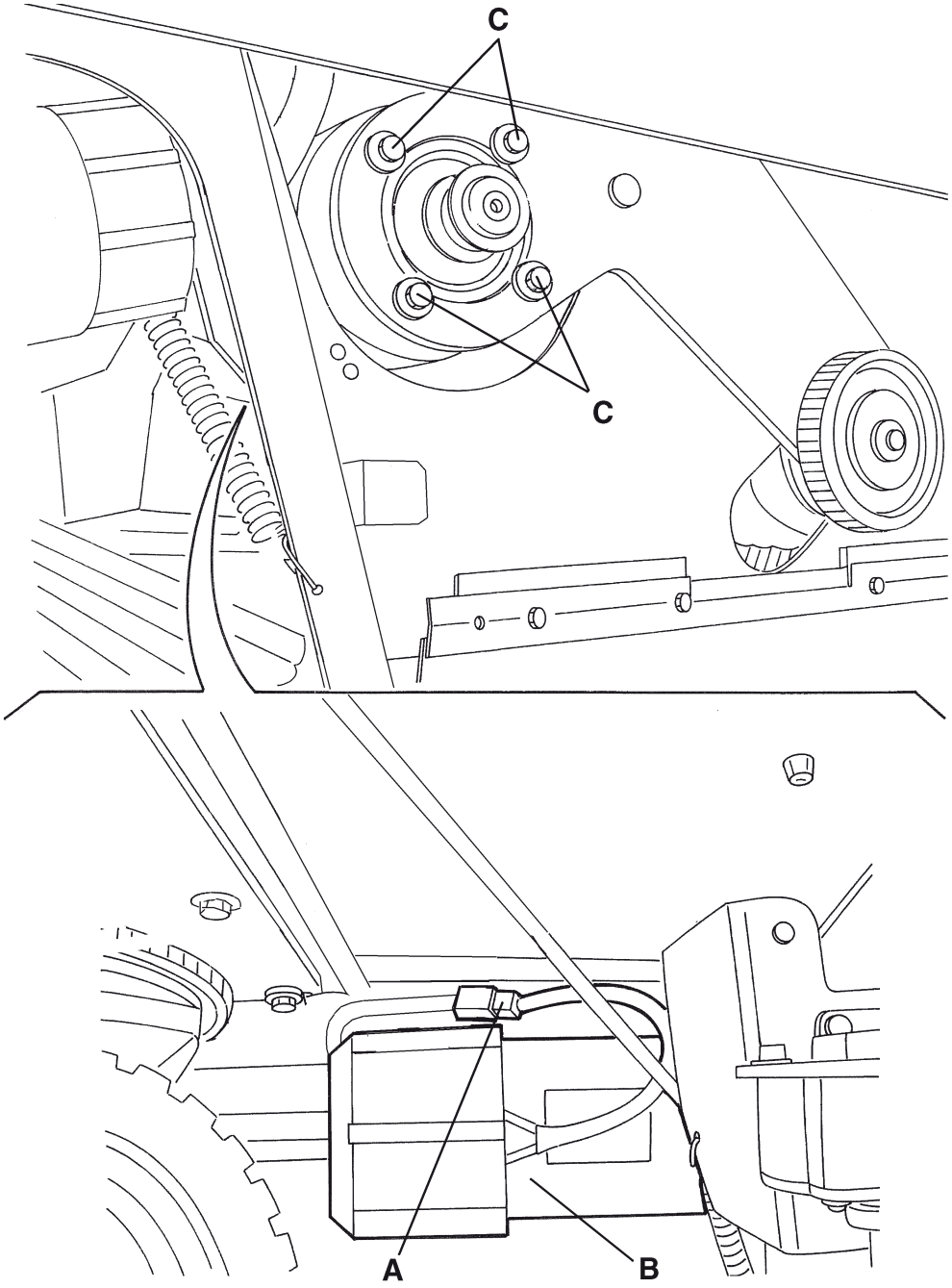
MAIN BROOM MOTOR DISASSEMBLY/ASSEMBLY

Disassembly

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Remove the main broom (see the procedure in the relevant paragraph).
3. Remove the main broom driving belt (see the procedure in the relevant paragraph).
4. Disconnect the main broom motor (B) electrical connection (A).
5. Remove the motor fastening screws (C).
6. Remove the main broom motor (B).

Assembly

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



P100268

SIDE BROOM MOTOR ELECTRICAL INPUT CHECK

NOTE
This procedure refers to the right broom: The procedure for the left broom is the same.

WARNING!
This procedure must be performed by qualified personnel only.

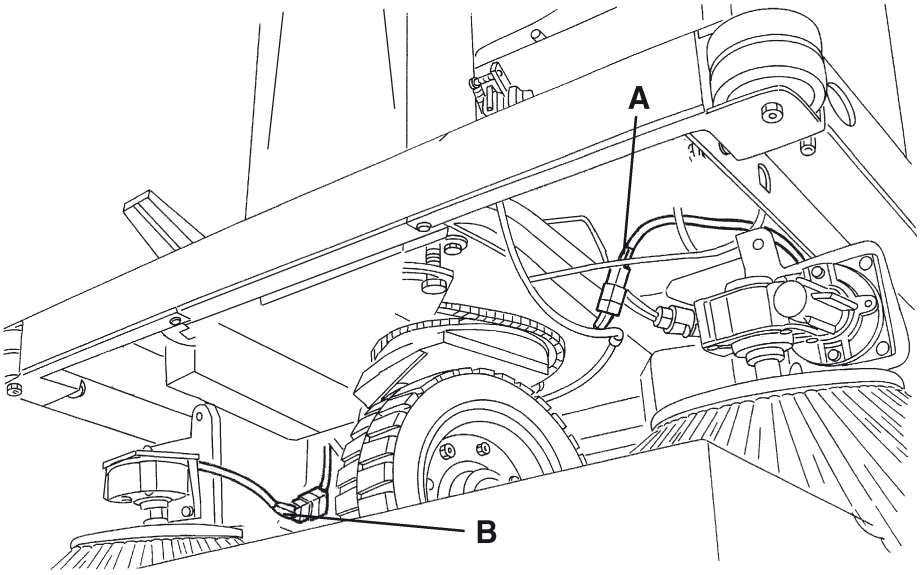
1. Remove the side broom motor to check it (see the procedure in the relevant paragraph).

WARNING!
Pay attention to the brooms and the moving parts while performing the following steps.

2. Apply amperometric pliers on a wire harness cable (A) or (B) of the motor to be checked.
3. Start the machine with the ignition key (17).
4. Lower the main broom with the lever (23).
5. Lower the side broom with the lever (77) and (78) and check that the side broom motor electrical input is between the following values:
   - 1.5 to 2.0 A at 24 V.

   Lift the side brooms with the levers (77) and (78).
   Lift the main broom with the lever (23).
   Turn the ignition key (17) to “0” and remove the amperometric pliers.
   If the electrical input is higher, perform the following procedures to detect the cause and correct the abnormal input:
   - Check the side broom motor carbon brushes (see the procedure in the relevant paragraph).
   - If necessary, disassemble the side broom motor (see the procedure in the relevant paragraph), clean it and check its moving parts.

   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 side broom of the motor which has to be checked (see the procedure in the relevant paragraph).



P100269

SWEEPING SYSTEM

SIDE BROOM MOTOR CARBON BRUSH CHECK AND REPLACEMENT

Check

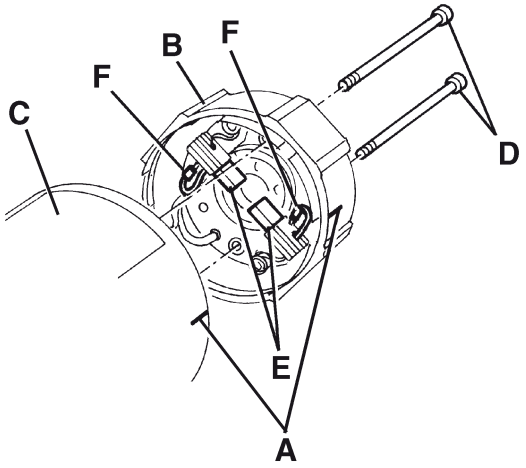
1. Remove the motor of the side broom to be checked (see the procedure in the relevant paragraph).
2. At the workbench, clean the outside of the motor, then mark the position (A) of the cover (B) and the motor body (C).
3. Remove the screws (D), then carefully remove the cover (B).
4. Check the carbon brushes (E) 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.

Replacement

5. If necessary, disengage the lead-in wires (F) and remove the carbon brushes.
   Replace the carbon brushes as an assembly.

Reset

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

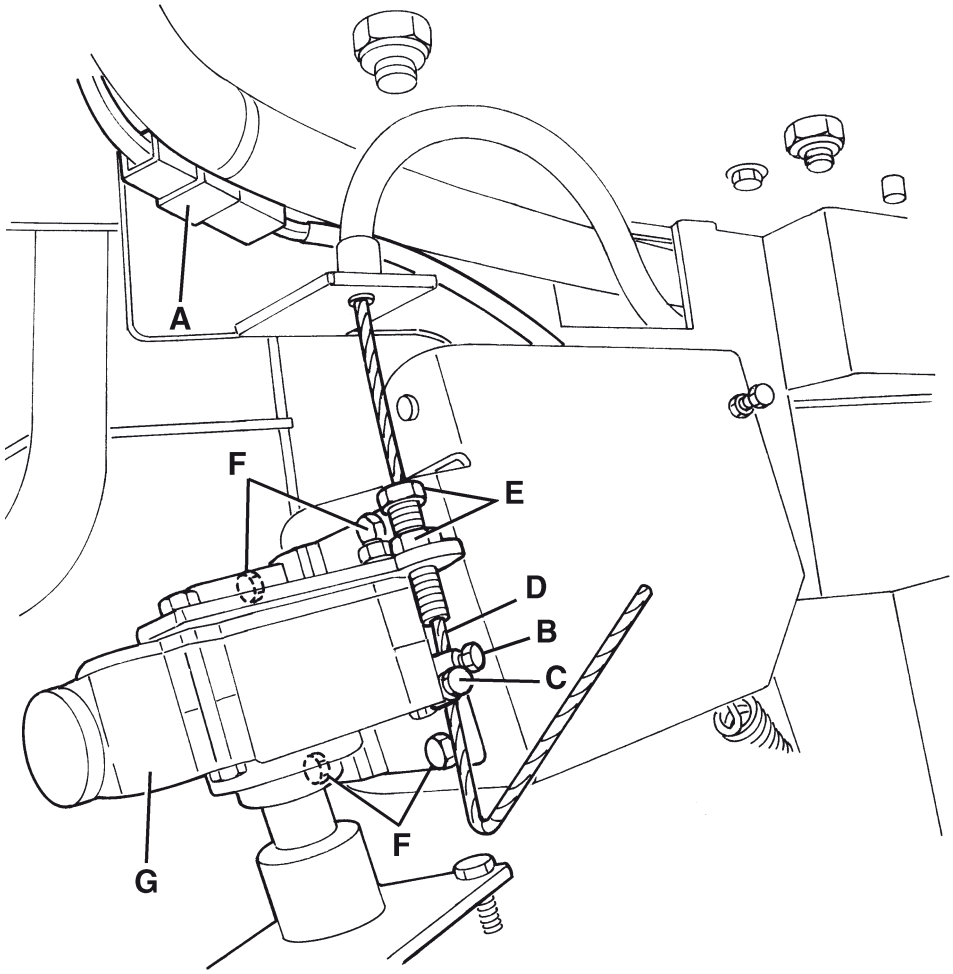


S300538

SIDE BROOM MOTOR REMOVAL

NOTE
This procedure refers to the right broom: The procedure for the left broom is the same.

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition switch (17) to “0”.
3. Open the hood (49) and fasten it with the support rod (63).
4. Disconnect the battery connector (52).
5. Remove the concerned side broom (see the procedure in the relevant paragraph).
6. Disconnect the motor electrical connection (A).
7. Disconnect the terminals (B) and (C) and then remove the cable (D) from the grommet (E).
8. Remove the mounting screws (F) of the reduction unit (G).
9. Remove the reduction unit (G).
10. Assemble the components in the reverse order of disassembly, tighten the terminals (B) and (C) on the cable (D) under the following conditions:
    - Lever (20) in lifted position
    - Side broom (37) lifted 0.8-1.2 in (2-3 cm) from the floor.
11. Adjust the side broom height (see the procedure in the relevant paragraph).



S300539

SWEEPING SYSTEM

TROUBLESHOOTING

Open circuit
The thermal fuses (FA), (FB), (FC) determine the open circuit. This system allows to prevent the broom circuits and motors from being damaged under overload conditions.
If there is an open in the circuit, the possible causes are the following.

Main broom motor; the thermal fuse (FC) activates and opens the circuit.
Possible causes:
1. There are bulky debris or cords around the broom or between the broom and the flange (remove the broom and the debris or cords).
2. The broom presses too much on the floor (check the broom height).
3. The broom motor electrical input is too high (check the electrical input).
4. Lock. Wait at least 2 minutes after the open circuit occurs and, when the problem is solved, push the push-button of the thermal fuse (FC).

Side broom motor; the thermal fuse (FA) or (FB) activates and opens the electrical circuit.
Possible causes:
1. There are bulky debris or cords around the broom or between the broom and the flange (remove the broom and the debris or cords).
2. The broom presses too much on the floor (check the broom height).
3. The broom motor electrical input is too high (check the electrical input).
   Wait at least 2 minutes after the open circuit occurs and, when the problem is solved, push the push-button of the thermal fuse (FA) or (FB).

The main broom does not turn.
Possible causes:
1. The battery voltage is too low; the warning light (11) is on (charge the battery).
2. The motor carbon brushes are worn (replace).
3. The motor is faulty (repair or replace).
4. The motor driving belt is inefficient or broken (adjust or replace).
5. The microswitch on the lifting/lowering lever does not operate (replace).
6. The wiring harness is damaged (repair).

The side broom does not turn.
Possible causes:
1. The battery voltage is too low; the warning light (11) is on (charge the battery).
2. The motor carbon brushes are worn (replace).
3. The motor is faulty (repair or replace).
4. The microswitch (allowing the lowered side broom to turn) on the lifting/lowering lever does not operate (replace).
5. The wiring harness is damaged (repair).

SKIRT

SKIRT HEIGHT AND OPERATION CHECK

Preliminary procedure

1. Empty the hopper (as shown in the User Manual), because the weight of the waste inside the hopper can affect the skirt height check.
   Drive the machine on a level floor that is suitable for checking the skirt height.
2. Engage the parking brake with the pedal and the lever (25 and 18).
3. Turn the ignition switch (17) to “0”.

Side skirts

4. Release the fasteners (35 and 33) and open the right and left door (34 and 32).
5. Check the side skirts (A) for integrity.
   Replace the skirts when they have cuts larger than 0.8 in (20 mm) (B) or cracks/tears larger than 0.4 in (10 mm) (C) (for skirt replacement see the following paragraphs).
6. Check that the distance from the floor of the side skirts (D) is within 0 - 0.12 in (0 – 3 mm) approximately (as shown in the figure).
7. If necessary, loosen the screws (E) and adjust the skirt position. Then tighten the screws (E).

Front and rear skirt

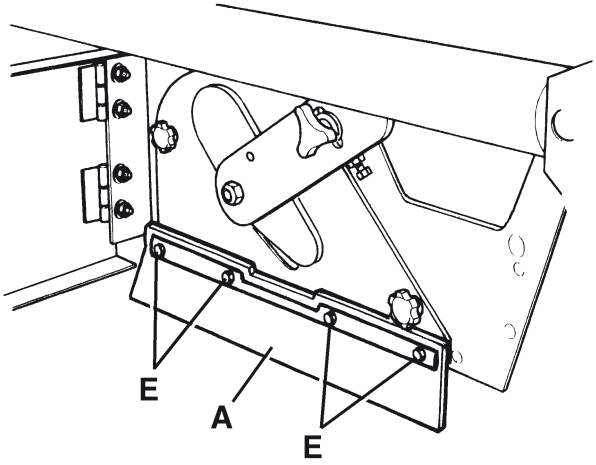
8. Remove the main broom, as shown in the relevant paragraph.
9. Check the front and rear skirts (F and G) for integrity.
   Replace the skirts when they have cuts larger than 0.8 in (20 mm) (B) or cracks/tears larger than 0.4 in (10 mm) (C) (for skirt replacement see the following paragraphs).
10. Check that the front and rear skirts (H) slightly touch the floor (as shown in the figure).
    If necessary, loosen the screws (E) and adjust the skirt position. Then tighten the screws (I).
11. Press the front skirt lifting pedal (24) completely and check that the front skirt lifts 2 in (5 cm) approximately.
    Release the pedal and check that the skirt does not remain in an intermediate position but returns to its initial position.
    If necessary, adjust the skirt lifting cable (L) with the adjuster (M), located on the front side of the skirt (if necessary, refer to the skirt control cable replacement in the following paragraphs).
    If necessary, loosen the screws (E) and adjust the skirt position. Then tighten the screws (I).

Assembly

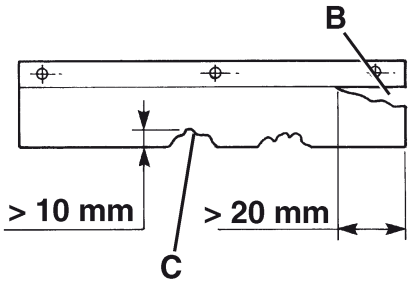
12. Assemble the components in the reverse order of disassembly.

SKIRT

SKIRT HEIGHT AND OPERATION CHECK (Continues)



S300540



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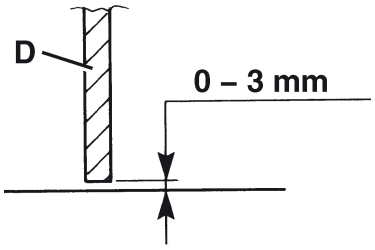

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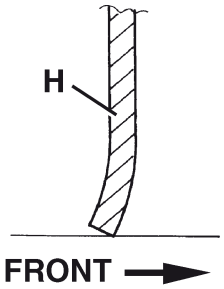
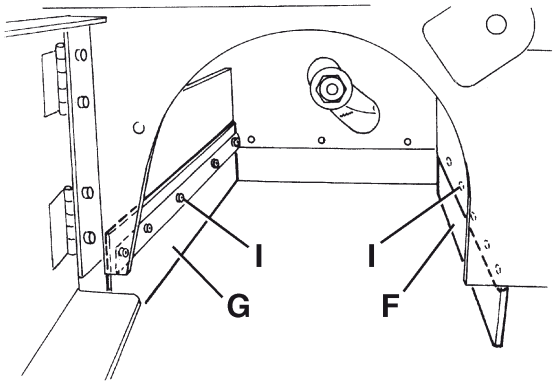
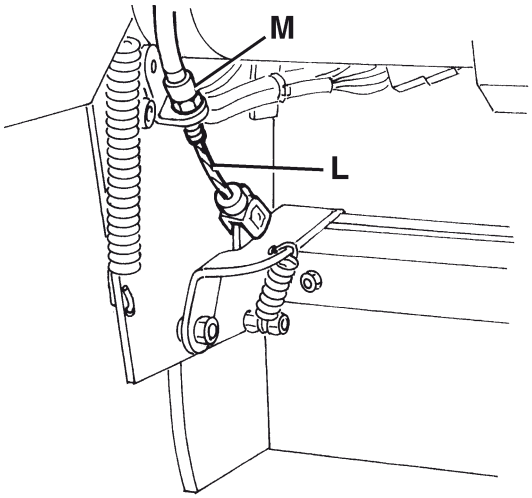


S300543



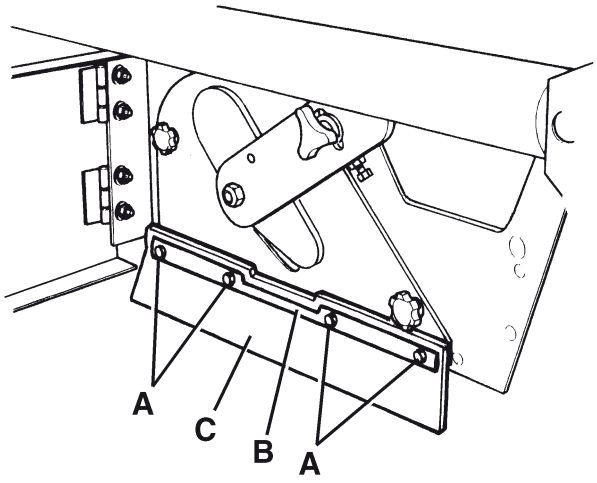
S300544



S300545

SIDE SKIRT REPLACEMENT

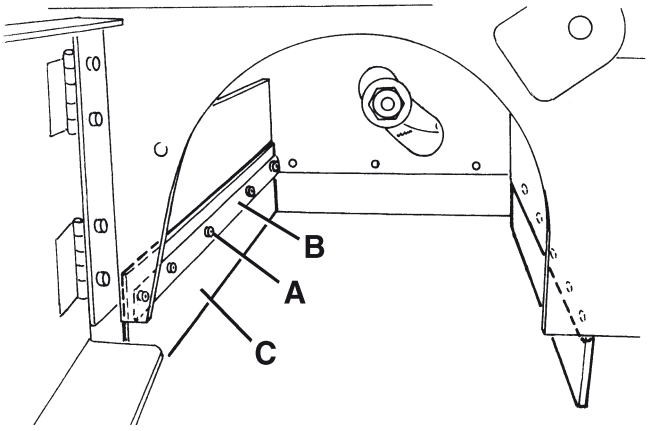
1. Drive the machine on a level floor that is suitable for checking the skirt height.
2. Engage the parking brake with the pedal and the lever (25 and 18).
3. Turn the ignition switch (17) to “0”.
4. Release the fasteners (35 and 33), then open the right and left door (34 and 32).
5. Remove the screws (A), the strap (B), the right and left side skirts (C).
6. Install the new side skirts (C) with the strap (B) and the screws (A).
7. Adjust the side skirt height as shown in the previous paragraph.
8. Close the right and left doors (34 and 32), and engage the fasteners (35 and 33).



S300546

REAR SKIRT REPLACEMENT

1. Drive the machine on a level floor that is suitable for checking the skirt height.
2. Remove the main broom, as shown in the relevant paragraph.
3. Remove the screws (A), the strap (B) and the rear skirt (C).
4. Install the new rear skirt (C) with the strap (B) and the screws (A).
5. Adjust the rear skirt height as shown in the previous paragraphs.
6. Assemble the main broom, as shown in the relevant paragraph.

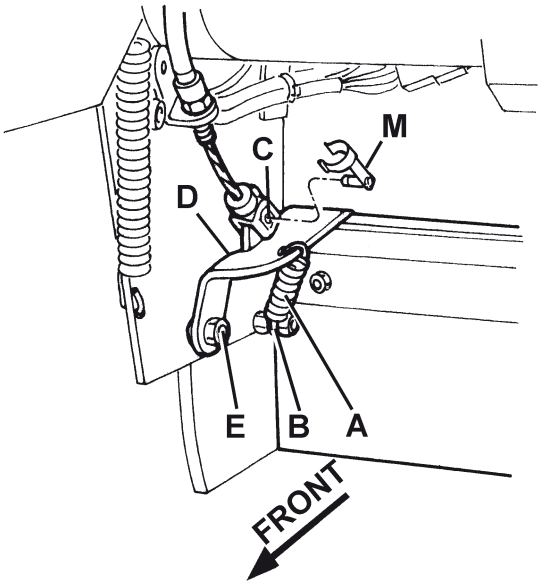


S300547

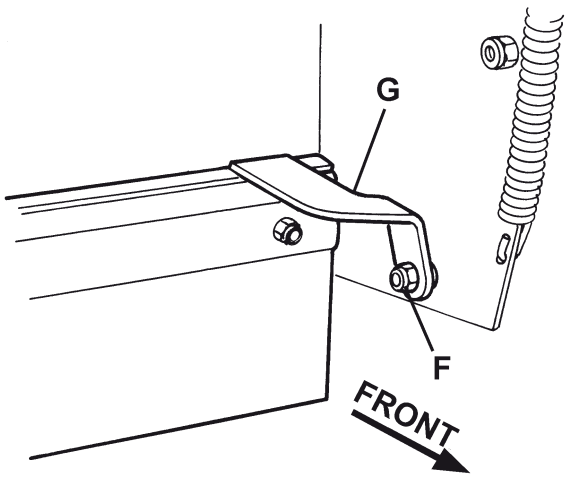
SKIRT

FRONT SKIRT REPLACEMENT

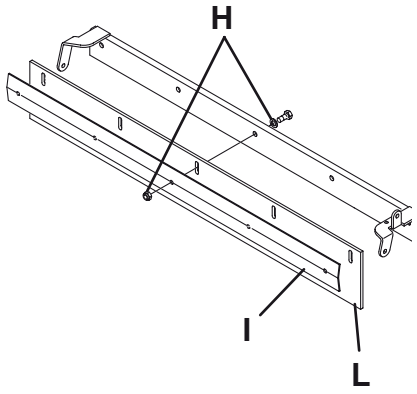
1. Drive the machine on a level floor that is suitable for checking the skirt height.
2. Engage the parking brake with the pedal and the lever (25 and 18).
3. Turn the ignition switch (17) to “0”.
4. Remove the right side broom (37) (see the procedure in the relevant paragraph).
5. Disengage the spring (A) on side (B), on the right front side of the front skirt.
6. Disconnect the clip (M) and detach the cable end (C) from the holder (D).
7. Loosen the nut (E).
8. Loosen the nut (F) on the left front side of the front skirt, and then remove the skirt with its holder (G).
9. At the workbench, remove the screws (H), the strap (I) and the front skirt (L).
   Install the new front skirt (L) with the strap (I) and the nuts (H).
10. Perform steps 5 to 8 in the reverse order.
11. Adjust the height and check the operation of the front skirt, as shown on the previous pages.
12. Perform steps 1 to 4 in the reverse order.



S300548



S300109



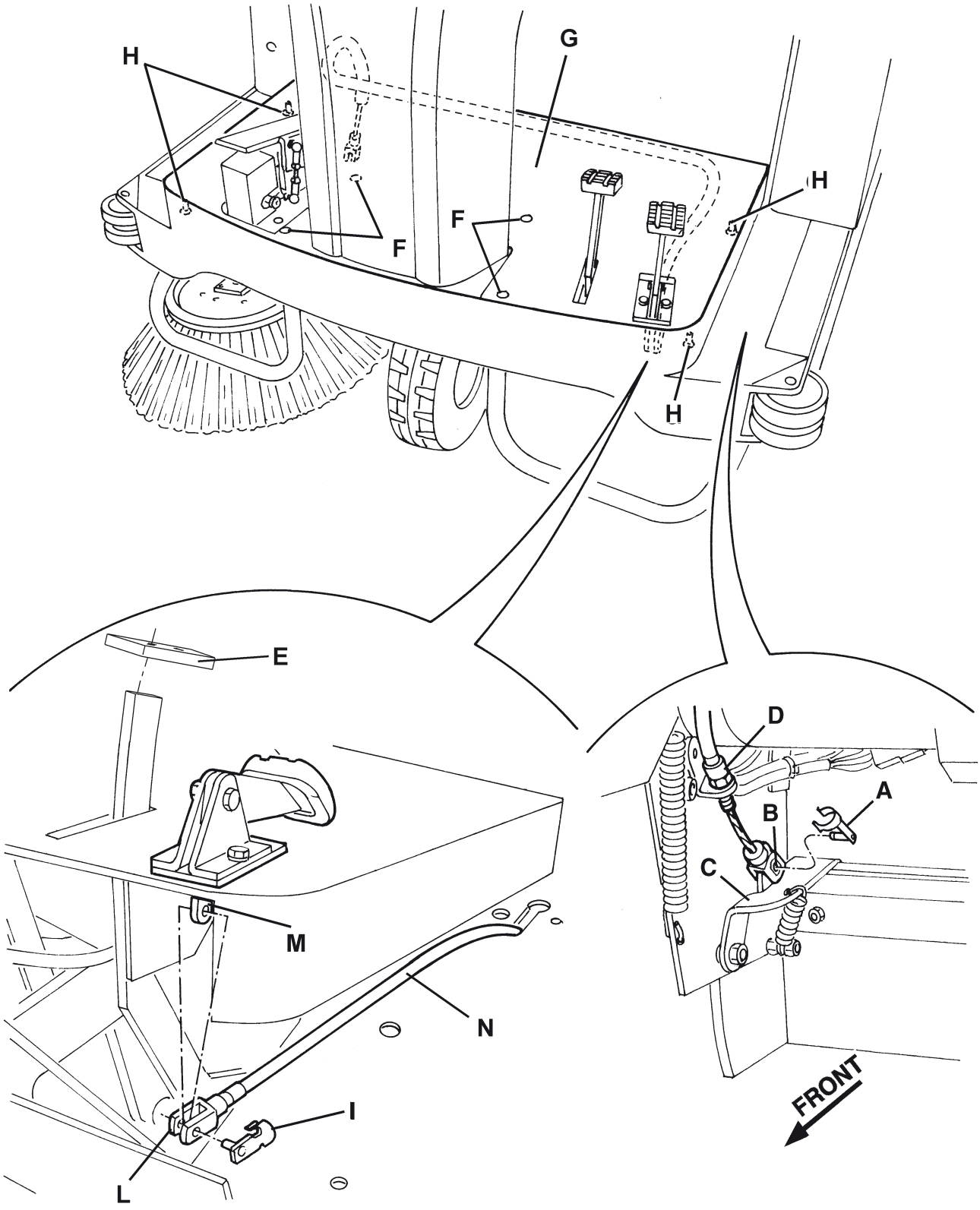
S300111

FRONT SKIRT CONTROL CABLE REPLACEMENT

1. Drive the machine on a level floor that is suitable for checking the skirt height.
2. Engage the parking brake with the pedal and the lever (26 and 19).
3. Turn the ignition switch (17) to “0”.
4. Remove the right side broom (38) (see the procedure in the relevant paragraph).
5. Disconnect the clip (A) on the right front side of the front skirt, then detach the cable end (B) from the holder (C).
6. Loosen the adjuster (D) and remove it from the holder.
7. Remove the forward/reverse gear pedal (see the procedure in the relevant paragraph).
8. Remove the brake pedal head (E).
9. Remove the upper mounting screws (F) of the footboard (G).
10. Remove the lower mounting screws (H) of the footboard (G).
11. Slightly lift the footboard (G), then disconnect the clip (I) and remove the cable end (L) from the lever (M).
12. Remove the front skirt control cable (N).
13. Perform steps 5 to 10 in the reverse order.
14. Adjust the height and check the operation of the front skirt according to the following procedure:
    - Press the front skirt lifting pedal (25) completely and check that the front skirt lifts 2 in (5 cm) approximately.
    - Release the pedal and check that the skirt does not remain in an intermediate position but returns to its initial position. If necessary, adjust the skirt lifting cable with the adjuster (D).
15. Perform steps 1 to 4 in the reverse order.

SKIRT

FRONT SKIRT CONTROL CABLE REPLACEMENT (Continues)



S300549

DUST AND DEBRIS COLLECTION SYSTEM

PANEL DUST FILTER CLEANING AND INTEGRITY CHECK

NOTE
Besides the standard paper filter, polyester filters are also available. The following procedure is applicable to each type of filter.

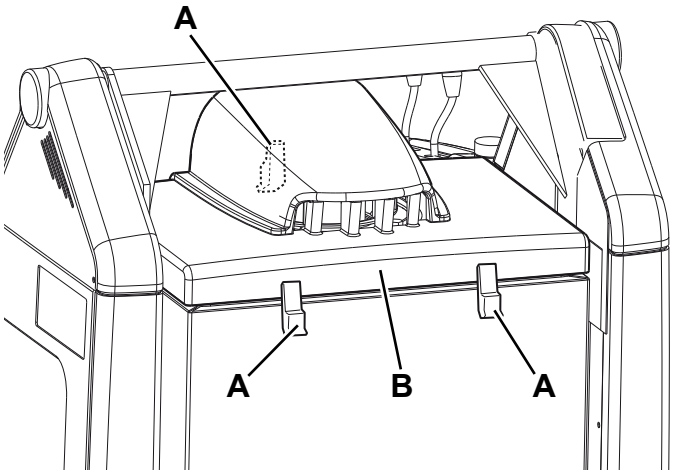
1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition switch (17) to “0”.
3. Open the hood (49) and fasten it with the support rod (63).
4. Disconnect the battery connector (52); keep the hood open.
5. Disconnect the vacuum system motor connector (57).
6. Release the fasteners (A) and remove the vacuum system motor cover (B).
7. Disconnect the electrical connector (C) from the filter shaker.
8. Remove the filter shaker support frame fastening handwheels (D).
9. Remove the filter shaker support frame (E).
10. Remove the dust filter (F).
11. In an outdoor area, clean the filter by shaking it on a level and clean surface, tapping the side (G), opposite to the wire gauze (H). Complete the cleaning procedure by using compressed air (I) at maximum 6 Bar, blowing only from the side protected by the wire gauze (H), at a minimum distance of 11.8 in (30 cm).
    According to the filter type, observe the following cautions:
    - Paper filter (standard): do not use water or detergents to clean it; the filter can be damaged;
    - Polyester filter (optional): To clean it, see the above-mentioned instructions. If necessary, 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. The use of inadequate detergents can damage the filter.

    Check the filter body for tears.
12. Clean the filter compartment rubber gasket (L) along its perimeter and check it for integrity. If necessary, replace it.
13. Assemble the components in the reverse order of disassembly.

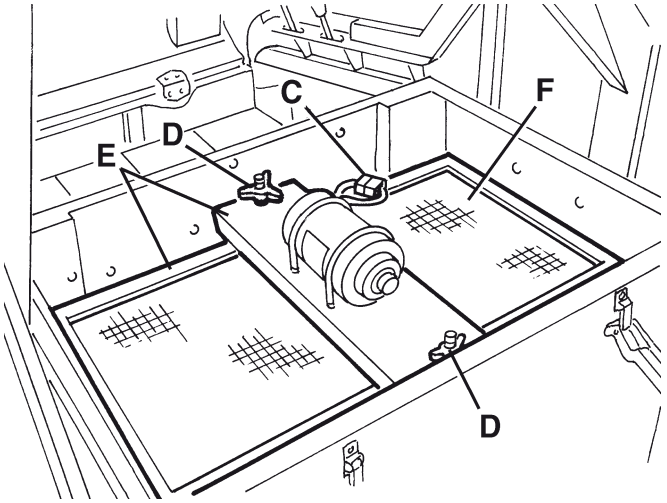
NOTE
When reinstalling the filter, the wire gauze (H) must be facing upward.

DUST AND DEBRIS COLLECTION SYSTEM

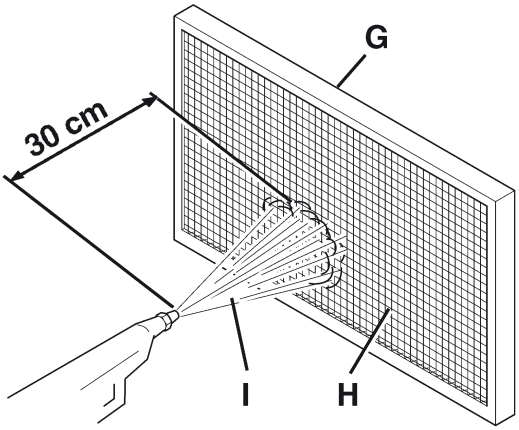
PANEL DUST FILTER CLEANING AND INTEGRITY CHECK (Continues)



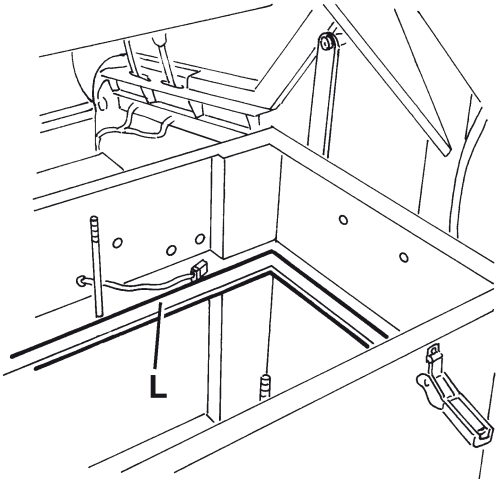
P100225



S300551



S300552



S300553

CLOSED POCKET FILTER CLEANING AND INTEGRITY CHECK

NOTE
The polyester closed pocket filters are normally kept clean by using the filter shaker supplied with the machine.
If necessary, they can be cleaned externally according to the following procedure.
When the filtration surfaces are no longer suitable, the filter must be replaced.

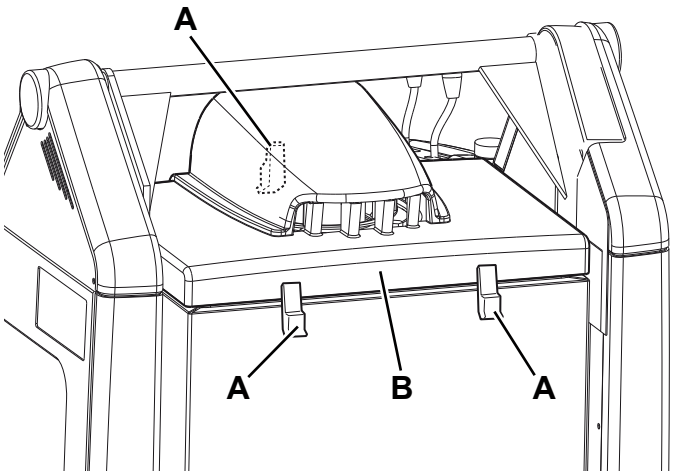
1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition switch (17) to “0”.
3. Open the hood (49) and fasten it with the support rod (63).
4. Disconnect the battery connector (52); keep the hood open.
5. Disconnect the vacuum system motor connector (57).
6. Release the fasteners (A) and remove the vacuum system motor cover (B).
7. Remove the handwheels (C) and the brackets (D).
8. Disconnect the filter shaker connector (F) and remove the dust filter (E).
9. In an outdoor area, and with the operator wearing suitable equipment (gloves, mask, glasses), remove the polyester filtering surface, according to the following procedure.
10. Remove the filter shaker motor (G) by removing the two relevant mounting screws.
11. Fully open the filter shaker motor support unit (H), thus releasing the filtering pocket tension rods (I).
12. Remove all the filtering pocket tension rods (J).
13. Open the upper retaining cord (K) of the closed pocket filter to remove it from the upper frame (L).
14. Remove the internal pocket separator (M).
15. Clean the polyester fibber surface (N) from the dirty side (by using an external vacuum cleaner), spreading it out completely or cleaning pocket by pocket. At the same time, clean both surfaces of the pocket separator (M), thus removing anything deposited on them. Check the filtering surface for tears and replace it if necessary. It is also possible to use compressed air (maximum 6 Bar), blowing the air from the clean side towards the dirty side.

WARNING!
Do not wash the filter with water. The polyester fibre may shrink and not be usable anymore.

16. Assemble the components in the reverse order of disassembly.
17. If necessary, clean the filter compartment rubber gasket (O) along its perimeter and check it for integrity. If necessary, replace it.
18. Assemble the components in the reverse order of disassembly.

DUST AND DEBRIS COLLECTION SYSTEM

CLOSED POCKET FILTER CLEANING AND INTEGRITY CHECK (Continues)



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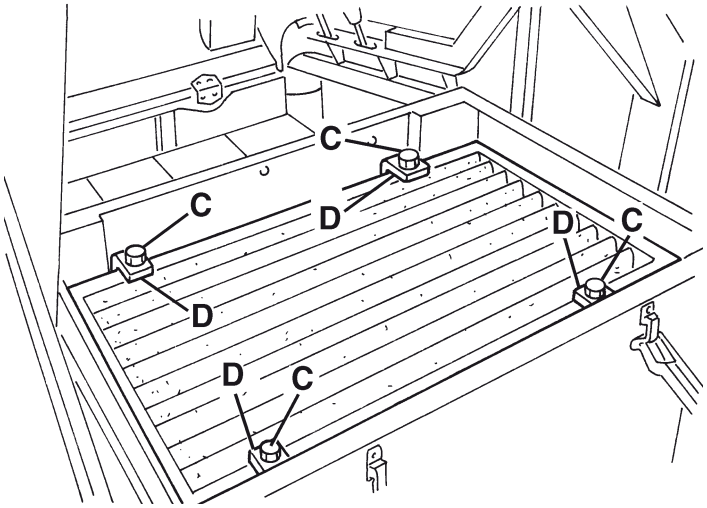
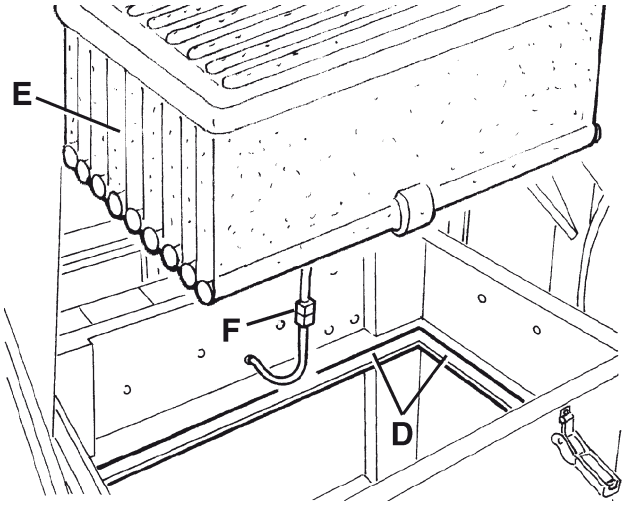
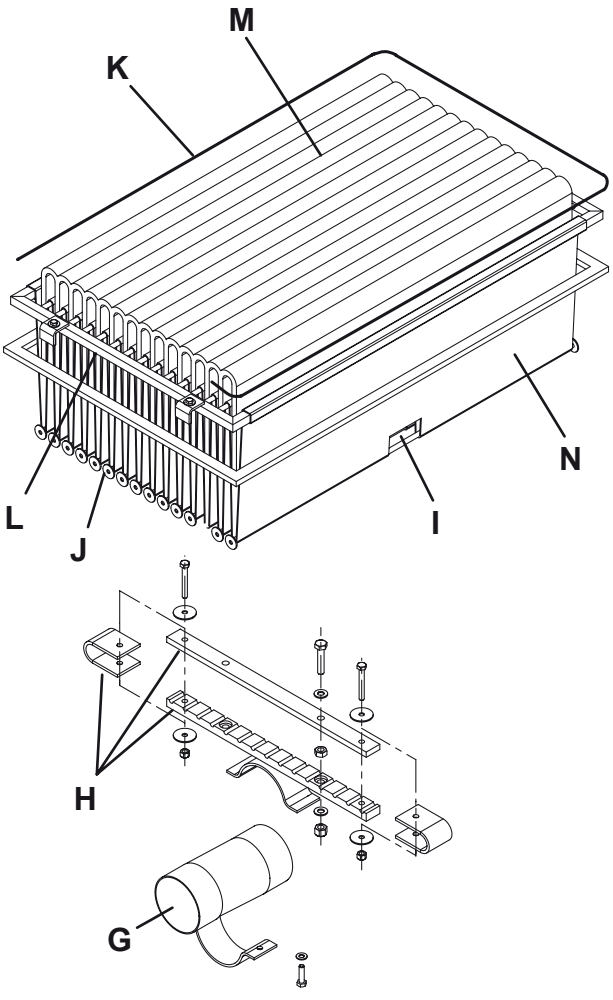


S310186



S310187



S310145

VACUUM FAN MOTOR ELECTRICAL INPUT CHECK

WARNING!
This procedure must be performed by qualified personnel only.

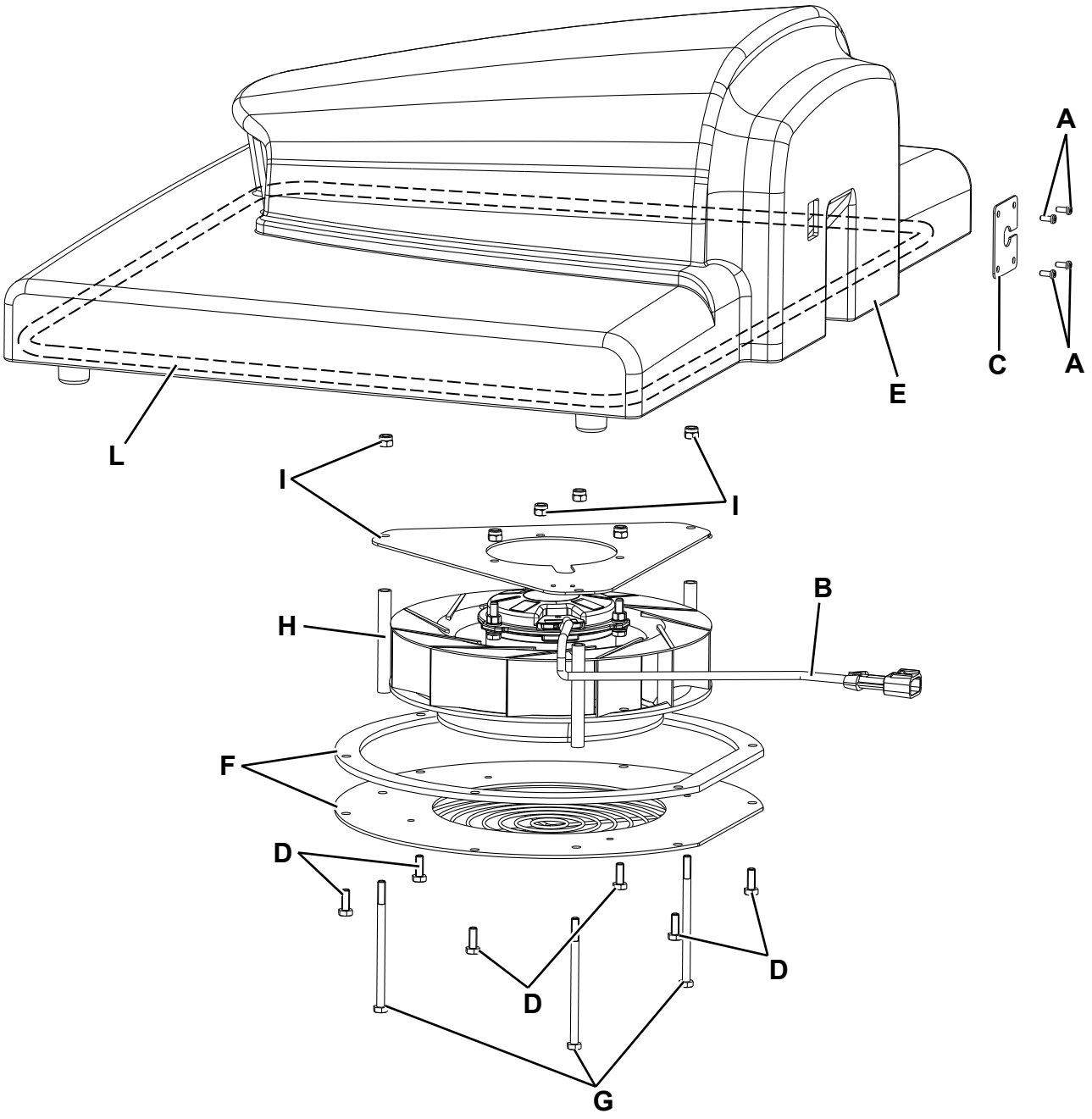
1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Open the hood (49) and fasten it with the support rod (63).
3. Apply amperometric pliers on the connector cable (57).
4. Start the machine with the ignition key (17).
5. Turn on the vacuum system with the switch (6) and check that the vacuum fan motor electrical input is between the following values:
   - 8 to 11 A at 24 V.

   Press the switch (6) to turn off the vacuum system.
   Turn the ignition key (17) to “0” and remove the amperometric pliers.
   If the electrical input is higher, disassemble the vacuum fan motor (see the procedure in the relevant paragraph), clean it and check its moving parts.
   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. Perform step 2 in the reverse order.

DUST AND DEBRIS COLLECTION SYSTEM

VACUUM FAN MOTOR REMOVAL/REPLACEMENT

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition switch (17) to “0”.
3. Open the hood (49) and fasten it with the support rod (63).
4. Disconnect the battery connector (52); keep the hood open.
5. Disconnect the vacuum system motor connector (57).
6. At the workbench, remove the screws (A), the connector cable (B) and recover the plate (C).
7. Remove the screws (D), remove the vacuum system from the hood (E) and recover the holder with the gasket (F).
8. Remove the screws (G), remove the vacuum fan motor (H) and recover the nuts (I) with the holder.
9. Remove the vacuum fan motor (H).
   Check the hood gasket (L) for cracks or tears which can adversely affect its sealing capability. If necessary, replace the gasket.
   Assemble the components in the reverse order of disassembly.



P100270

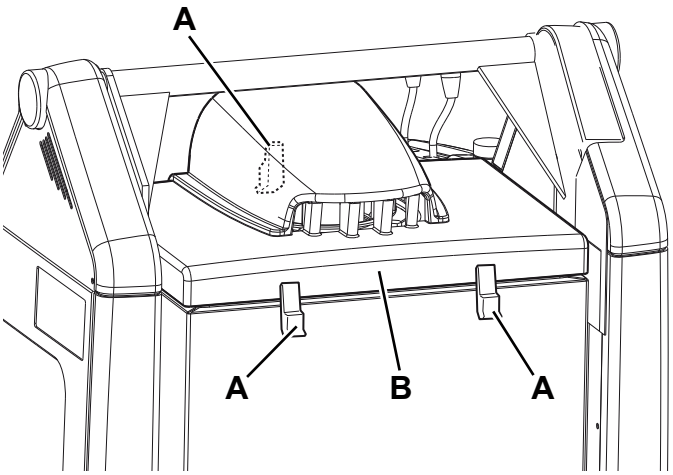
DUST AND DEBRIS COLLECTION SYSTEM

FILTER SHAKER OPERATION CHECK

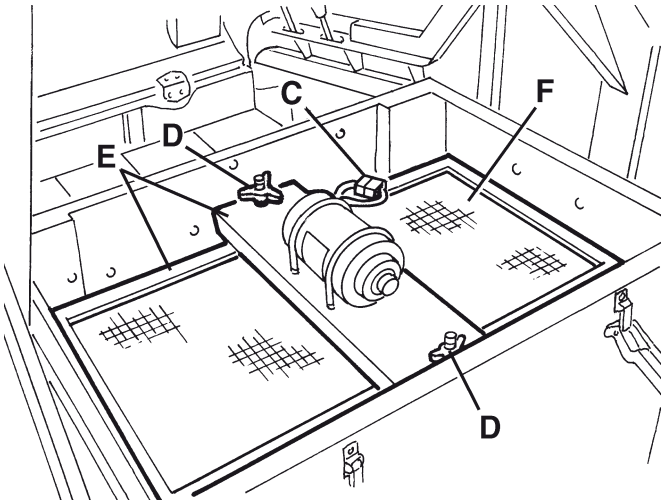
1. During machine operation, when the panel filter is supposed to be clogged, turn off the vacuum system with the switch (6), then press the filter shaker switch (6) and check that the typical noise is audible. Restart the machine and check that the filter has been properly shaken. If so, this should result in an appreciable improvement in the machine vacuum capability.
2. If necessary, check or replace the filter shaker motor, as shown below.

FILTER SHAKER MOTOR REMOVAL

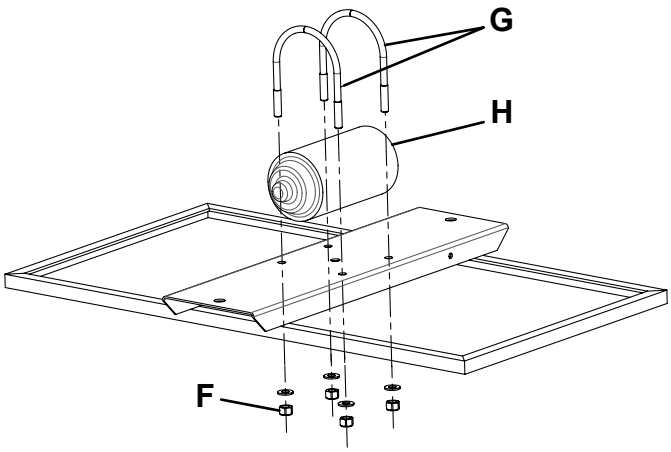
1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition switch (17) to “0”.
3. Open the hood (49) and fasten it with the support rod (63).
4. Disconnect the battery connector (52); keep the hood open.
5. Disconnect the vacuum system motor connector (57).
6. Release the fasteners (A) and remove the vacuum system motor cover (B).
7. Disconnect the electrical connector (C) from the filter shaker.
8. Remove the filter shaker support frame fastening handwheels (D).
9. Remove the filter shaker support frame (E).
10. At the workbench, remove the nuts (F) and the two collars (G).
11. Recover the filter shaker motor (H).
12. Assemble the components in the reverse order of disassembly.



P100225



S300551



S300556

DUST AND DEBRIS COLLECTION SYSTEM

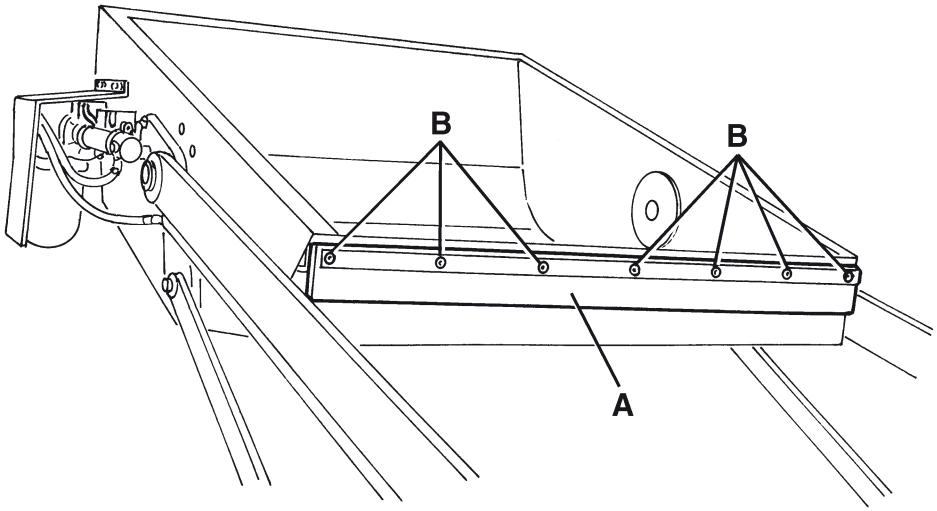
HOPPER GASKET CHECK AND REPLACEMENT

NOTE
A poor integrity of the hopper gaskets can affect the machine vacuuming capabilities.

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Lift the hopper (31) completely (see the procedure in the User Manual).
3. Turn the ignition switch (17) to “0”.
4. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

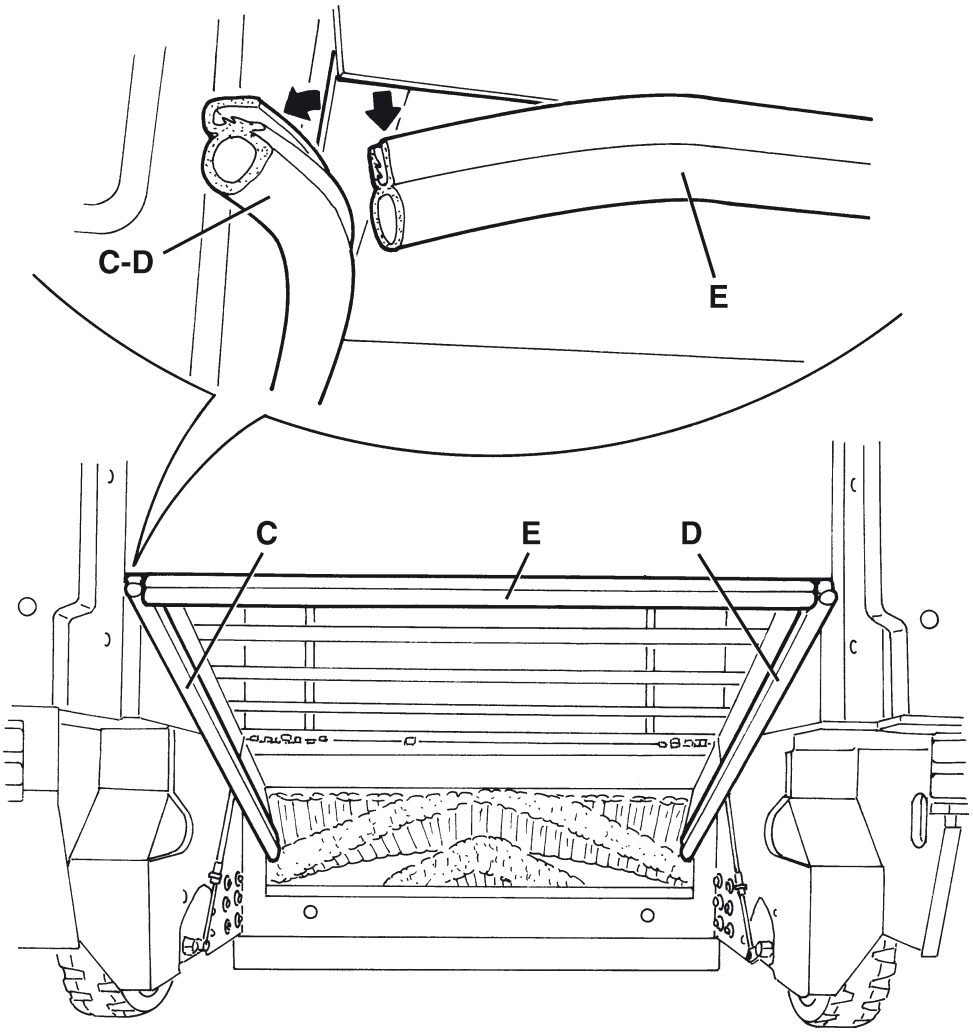
WARNING!
Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

5. Check the hopper gasket (A) for cracks or tears which can reduce its sealing capability.
6. If necessary, remove the screws (B) and replace the gasket (A).
7. Check on the machine structure the gaskets (C), (D) and (E) for cracks or tears which can reduce their sealing efficiency.
8. If necessary, release the fasteners and replace the gaskets.
9. Perform steps 1 to 4 in the reverse order.



S3005558

HOPPER GASKET CHECK AND REPLACEMENT (Continues)



S300559

DUST AND DEBRIS COLLECTION SYSTEM

HORIZONTAL HOPPER CONTROL MICROSWITCH CHECK AND ADJUSTMENT

CHECK

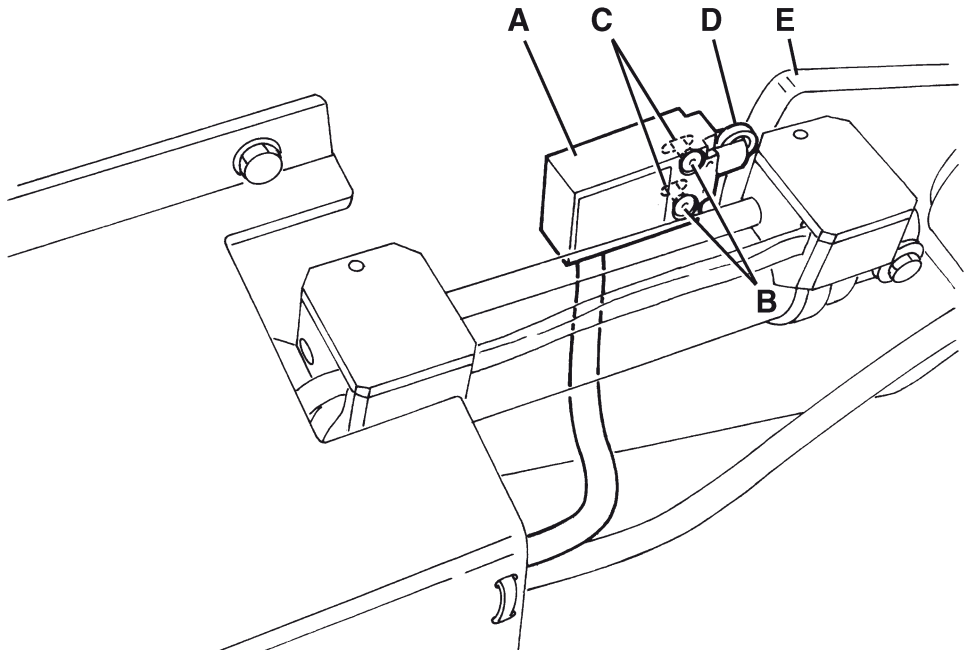
1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Lift the hopper (31) (see the procedure in the User Manual) until the side microswitch (A) is accessible.
3. Partially turn the hopper (31) (see the procedure in the User Manual), then lower it and check that this operation is inhibited, otherwise the microswitch (A) must be adjusted according to the following procedure.

ADJUSTMENT

4. Fully turn the hopper (31) to horizontal position (see the procedure in the User Manual).
5. Turn the ignition switch (17) to “0”.
6. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

WARNING!
Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

7. Loosen the mounting screws (B) of the microswitch (A).
8. Using the slots (C), turn the microswitch (A) in the position in which it is activated by the relevant terminal (D) in contact with the cam (E) (determine the activation point by moving forward and backward the microswitch so that a “click” sound is heard), then tighten the screws (B).
9. Perform steps 5 and 6 in the reverse order.
10. Check the microswitch operation by performing step 3 again.
11. Fully retract the hopper (31) (see the procedure in the User Manual), then turn the ignition switch (17) to “0”.



S300560

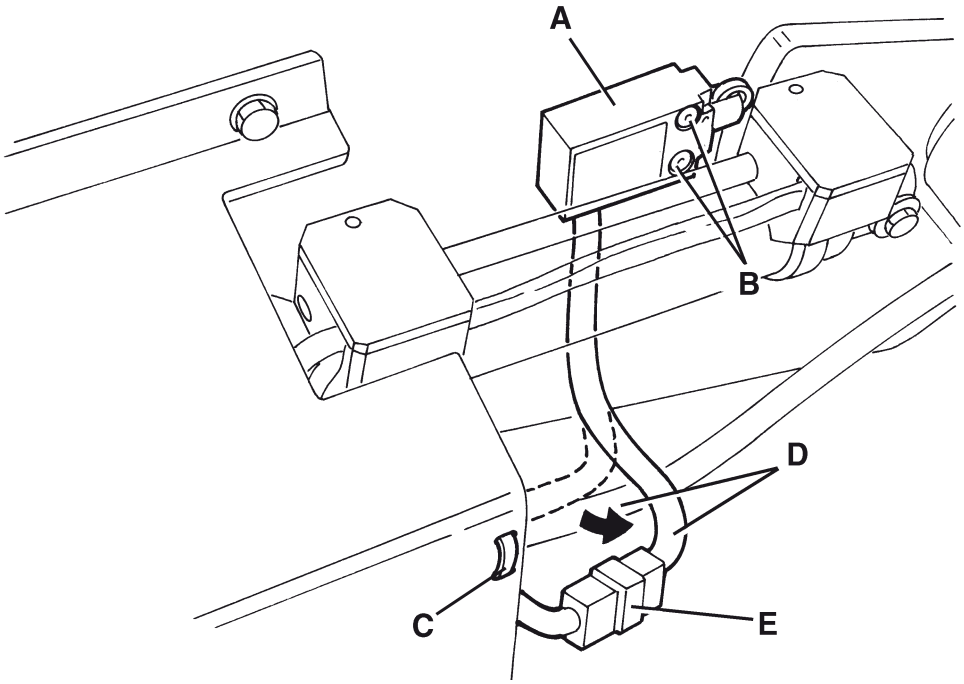
DUST AND DEBRIS COLLECTION SYSTEM

HORIZONTAL HOPPER CONTROL MICROSWITCH REPLACEMENT

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Lift the hopper (31) (see the procedure in the User Manual) until the side microswitch (A) is accessible.
3. Turn the ignition switch (17) to “0”.
4. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

WARNING!
Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

5. Remove the screws (B) and move the microswitch (A).
6. Cut the cable clamp (C) and remove the wiring harness (D).
7. Disconnect the electrical connector (E).
8. Recover the microswitch (A) with bridle.
9. Assemble the components in the reverse order of disassembly.
10. Adjust the horizontal hopper microswitch according to the procedure shown in the previous paragraph.



S300561

DUST AND DEBRIS COLLECTION SYSTEM

LIFTED HOPPER CONTROL MICROSWITCH CHECK AND ADJUSTMENT

Check

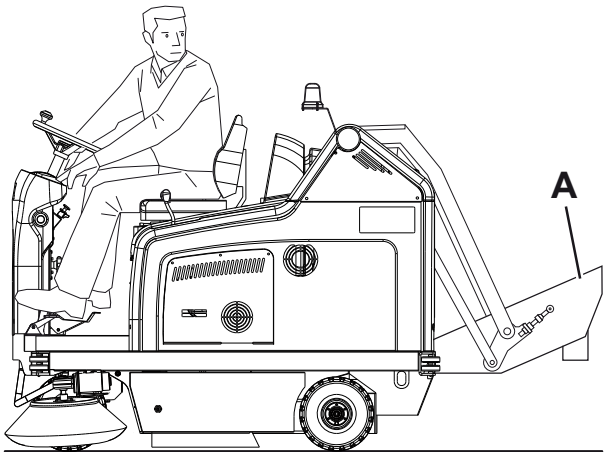
1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Lift the hopper (31) (see the procedure in the User Manual) until it reaches the position (A). In this position try to dump the hopper and confirm that the procedure cannot be performed.
3. Lift the hopper (31) (see the procedure in the User Manual) until it reaches the position (B). In this position try to dump the hopper and confirm that the procedure can be performed.

Adjustment

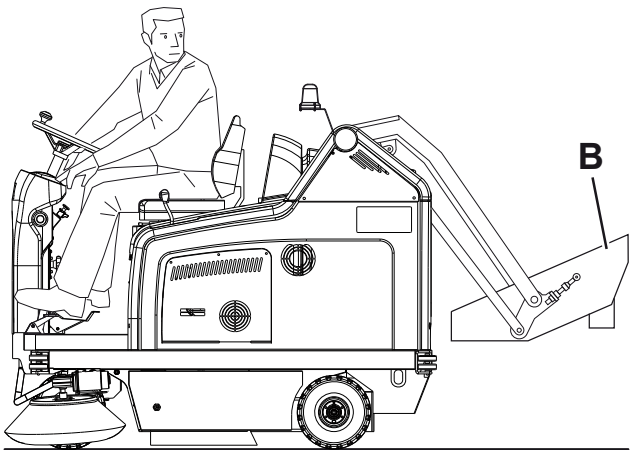
4. In case it is impossible to obtain one or both the conditions shown in the two previous steps, adjust the position of the relevant microswitch according to the following procedure.
5. Check that the hopper (31) is in position (B); then turn the ignition switch (17) to “0”.
6. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

WARNING!
Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

7. Remove the screws (C) and the right guard (D).
8. Loosen the nuts (E) with the mounting screws (F) of the lifted hopper control microswitch (G).
9. Using the slots (H), turn the microswitch (G) in the position in which it is activated by the relevant terminal (I) (determine the activation point by moving forward and backward the microswitch so that a “click” sound is heard); check also that the terminal (I) is just inside the arc (L) of the activation cam (M) (as shown in the figure); then tighten the nuts (E) with screws (F).
10. Assemble the components in the reverse order of disassembly.
11. Check the microswitch operation by performing step 2 - 4 again.



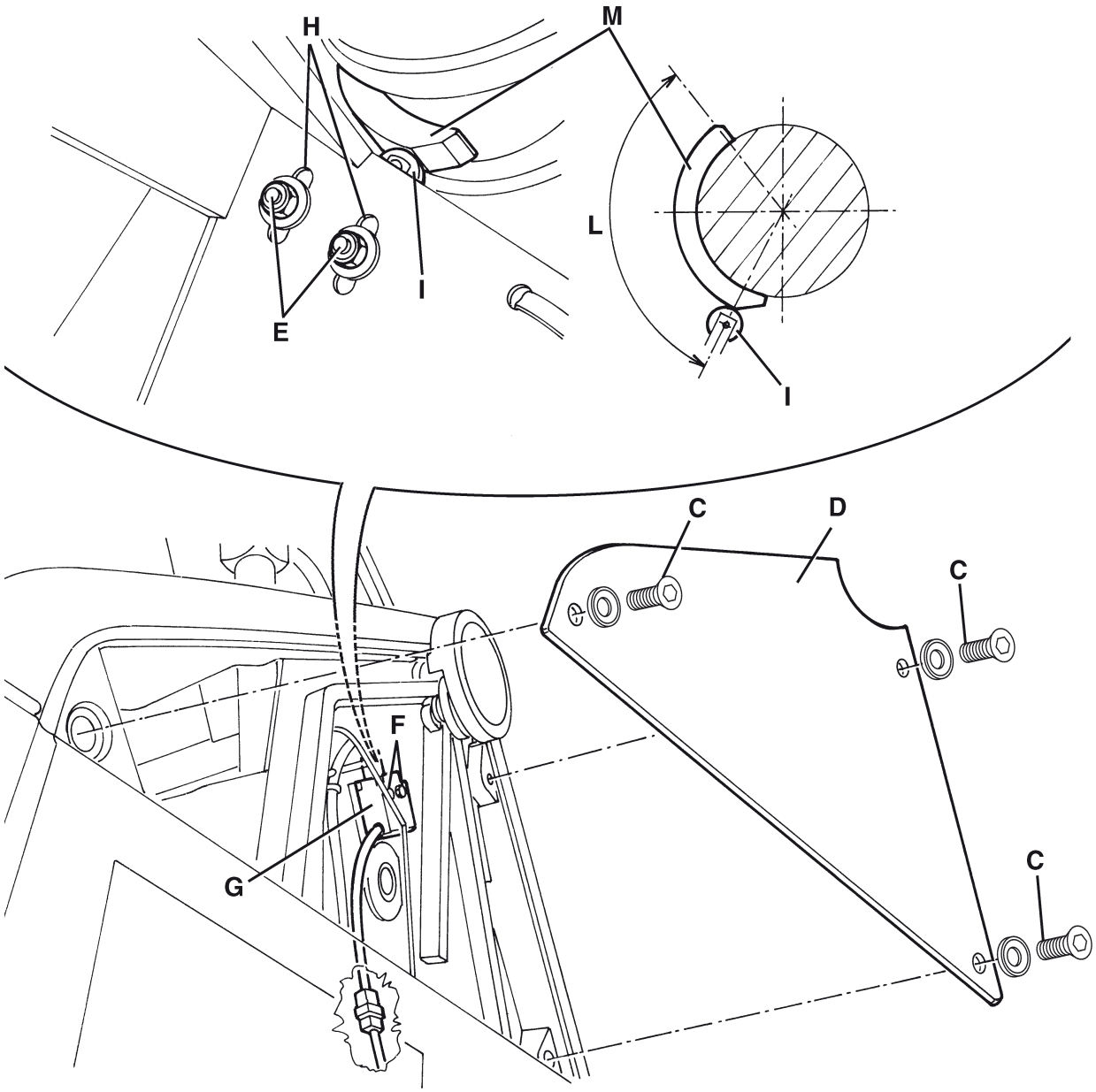
P100271



P100272

DUST AND DEBRIS COLLECTION SYSTEM

LIFTED HOPPER CONTROL MICROSWITCH CHECK AND ADJUSTMENT (Continues)



S300564

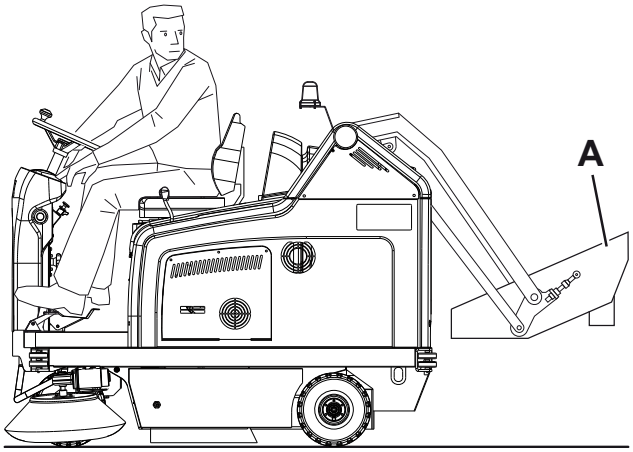
DUST AND DEBRIS COLLECTION SYSTEM

LIFTED HOPPER CONTROL MICROSWITCH REPLACEMENT

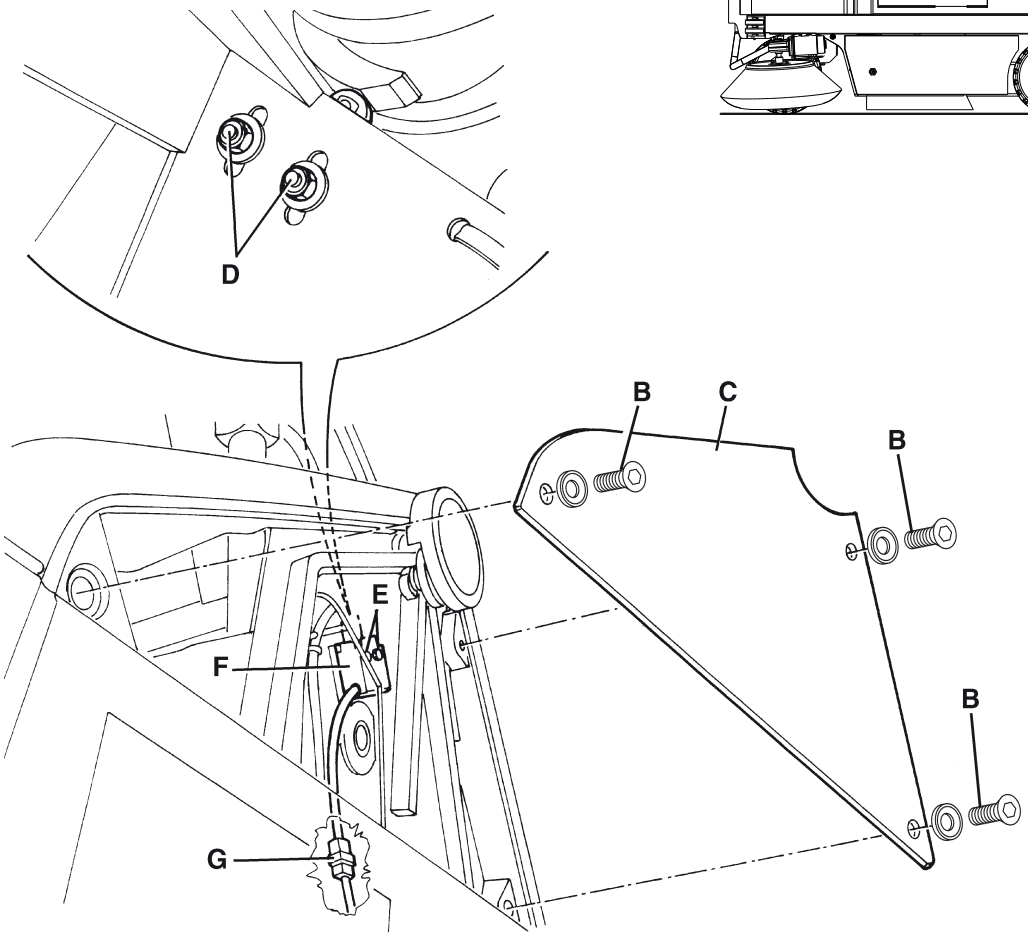
1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Lift the hopper (31) (see the User Manual) until it reaches the position (A); then turn the ignition switch (17) to “0”.
3. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

WARNING!
Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

4. Remove the screws (B), then remove the right guard (C).
5. Loosen the nuts (D) with screws (E) and remove the lifted hopper control microswitch (F).
6. Disconnect the electrical connector (G) and recover the microswitch (F).
7. Install the new microswitch by performing steps 5 and 6 in the reverse order.
8. Adjust the microswitch as shown in the previous paragraph.
9. Perform steps 1 to 4 in the reverse order.



P100273



S300566

HOPPER ROTATION ACTUATOR CHECK AND ADJUSTMENT

Check

1. Remove the main broom (see the procedure in the relevant paragraph).
2. Slightly lift the hopper (31) (see the procedure in the User Manual); then lower the hopper (31) again but stop it when the upper rear side (A) is at 0.8 in (2 cm) (B) from the machine frame.
3. Turn the ignition switch (17) to “0”.

WARNING!
The hopper (31) can close accidentally.

4. When the distance (B) is reached, check that the front distance (E) of the hopper from the machine frame is 0.4-0.8 in (1-2 cm) bigger than the distance (B). If the measures are not as shown in step 4, adjust the hopper rotation actuator (F), according to the following procedure.

Adjustment

5. Lift the hopper (31) in order that the hopper rotation actuator (A) is high enough to allow adjustment (for hopper handling, see the procedure in the User Manual).
   Do not dump the hopper, keep it horizontal.
6. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

WARNING!
Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

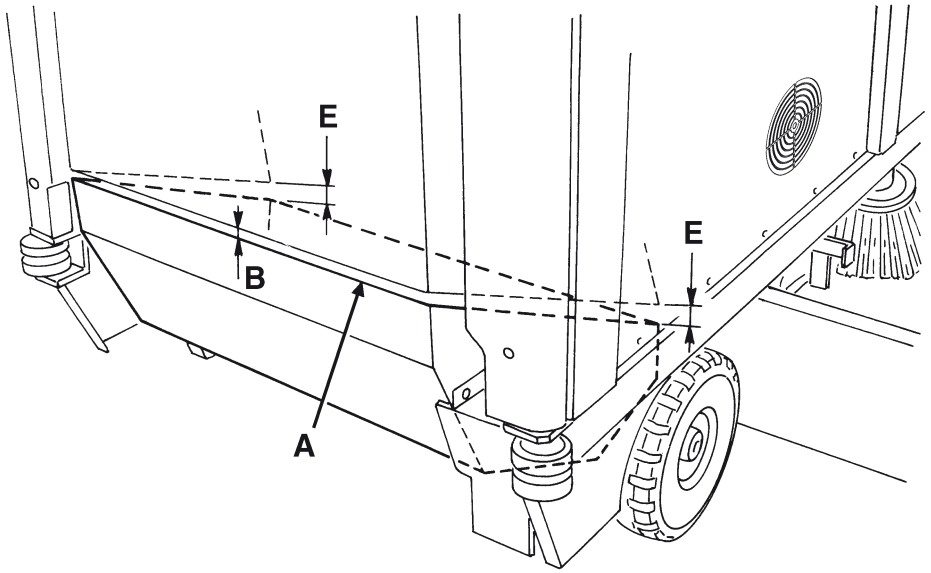
7. Remove the nuts (H) and insert the threaded pins (I) of the limit switch for approximately 0.2 in (5 mm).
8. Remove the microswitch protection covers (L) by releasing the relevant inner fasteners.

NOTE
To adjust the hopper rotation actuator, take into consideration that:
- *The microswitch (M) indicates that the hopper is horizontal.*
- *The microswitch (N) indicates the hopper maximum vertical position.*
- *When the hopper is in the horizontal position, the tilted head of the stem (P) is in the position (O) as to the microswitch (M).*
- *When the hopper is in the maximum vertical position, the tilted head of the stem (P) is in the position (Q) as to the microswitch (N).*

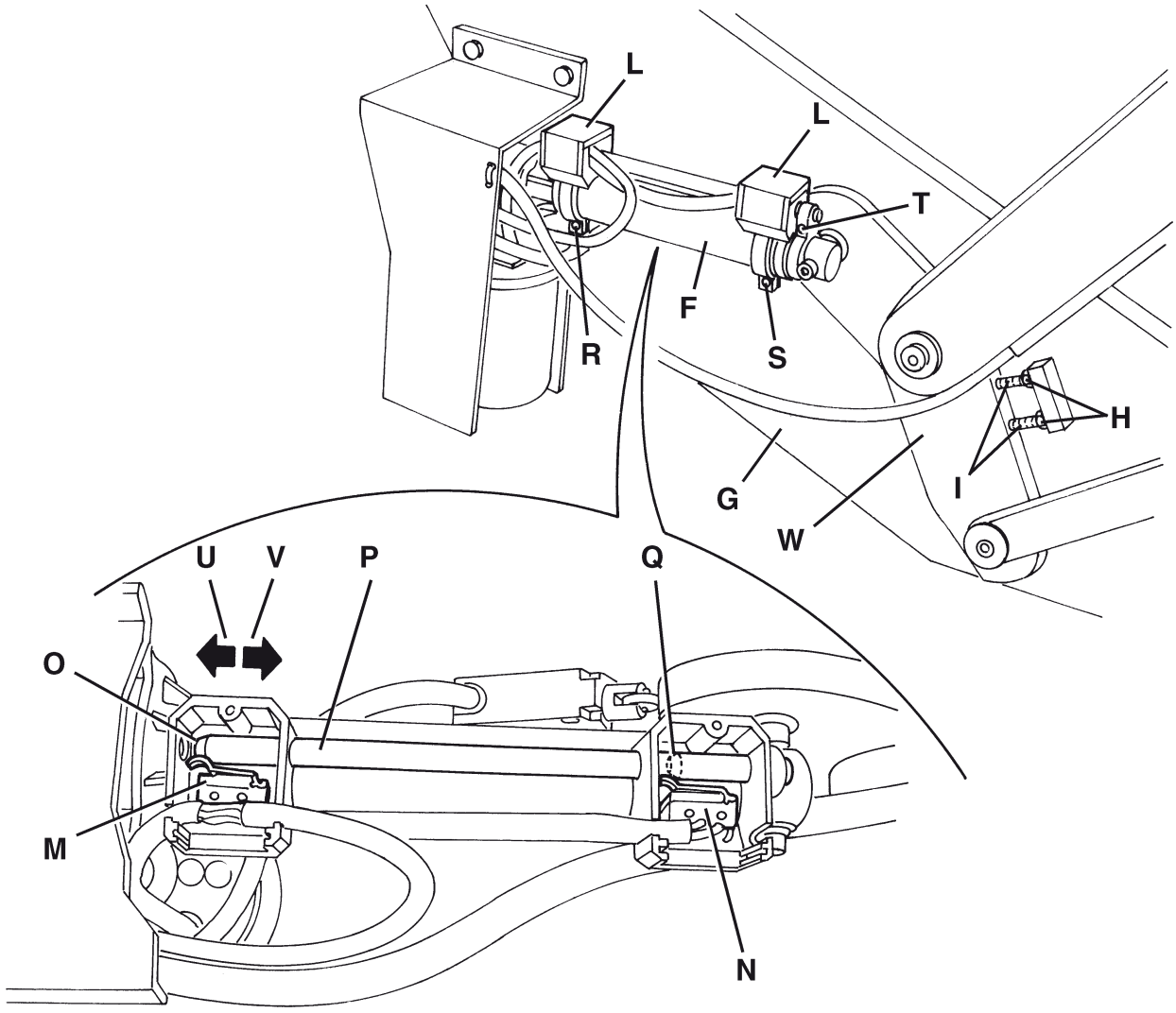
9. Check the mounting screws (S) and (T) of the microswitch collars (N) and stem collars (P) for proper tightening, otherwise tighten them.
10. Loosen the screw (R) and adjust the position of the collar/microswitch assembly (M), as shown below:
    - If the distance (E) should be increased, move slightly the collar/microswitch assembly (M) in the direction of the arrow (U), then tighten the screw (R)
    - If the distance (E) should be decreased, move slightly the collar/microswitch assembly (M) in the direction of the arrow (V), then tighten the screw (R).
11. Perform again the above check (see steps 1 through 4).
12. Remove the threaded pins (I) until they reach the lever (W); then tighten the nuts (H).
13. Fully retract the hopper (31).
14. Install the main broom (see the procedure in the relevant paragraph).

DUST AND DEBRIS COLLECTION SYSTEM

HOPPER ROTATION ACTUATOR CHECK AND ADJUSTMENT (Continues)



S300567



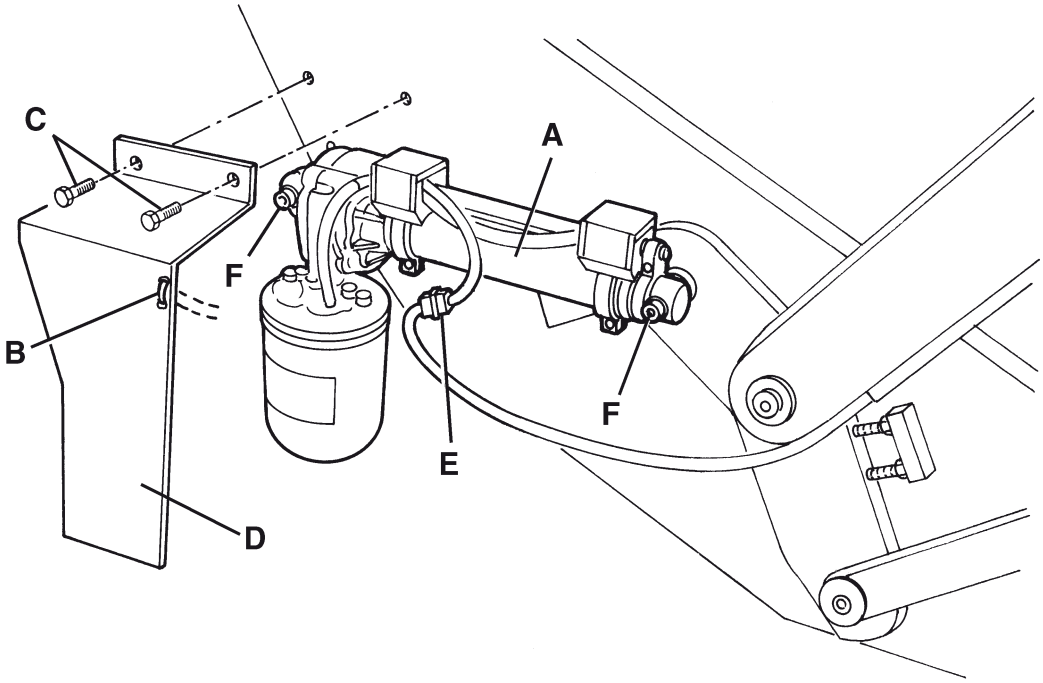
S300568

HOPPER ROTATION ACTUATOR REPLACEMENT

1. Lift the hopper (31) in order that the hopper rotation actuator (A) is high enough to allow adjustment (for hopper handling, see the procedure in the User Manual).
2. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

WARNING!
Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

3. Cut the wiring harness retaining clamp (B).
4. Remove the screws (C), then remove the cover (D).
5. Disconnect the actuator electrical connection (E).
6. Remove the screws (F) and the actuator (A).
7. Assemble the components by performing steps 2 to 6 in the reverse order.
8. Adjust the hopper rotation actuator (see the procedure in the relevant paragraph).



S300569

DUST AND DEBRIS COLLECTION SYSTEM

HOPPER MECHANICAL STABILIZER CHECK AND ADJUSTMENT

Check

1. Lift the hopper (31) in order that the hopper mechanical stabilizer (A) is high enough to allow adjustment (for hopper handling, see the procedure in the User Manual).

WARNING!
The hopper (31) can lower accidentally.

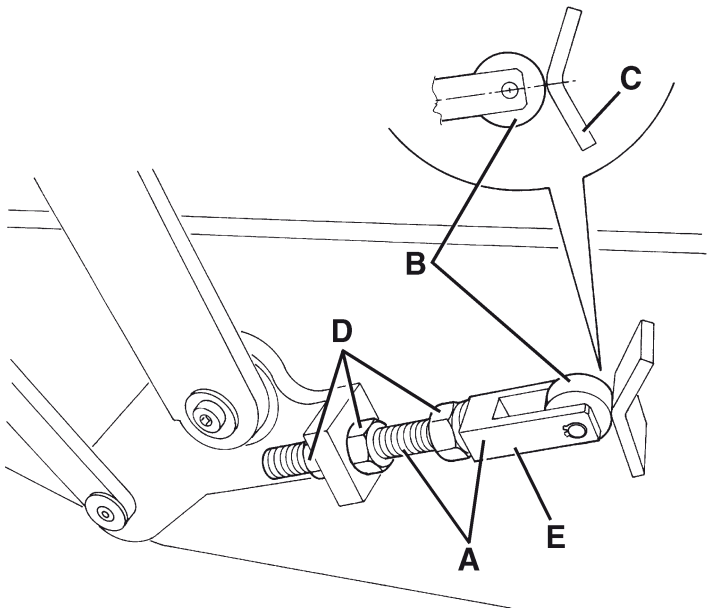
2. The hopper mechanical stabilizer (A) is properly adjusted when, during the hopper rotation, the wheel (B) comes slightly in contact with the top of the cam (C) (as shown in the figure).
3. Turn the hopper and, with the help of an assistant, check that the hopper is in the condition shown in the previous step. Otherwise, adjust the mechanical stabilizer (A) according to the following procedure.

Adjustment

4. Loosen the nuts (D).
5. Turn carefully the hopper until the wheel (B) is aligned with the top of the cam (C) (as shown in the figure).
6. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

WARNING!
Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

7. Screw/unscrew the stabilizer (A) until the condition shown in step 2 is reached.
8. Tighten the nuts (D) by holding the fork (E) in vertical position, as shown in the figure.
9. Perform steps 5 and 6 in the reverse order.
10. Turn and lower the hopper (31) until it is fully retracted (see the procedure in the User Manual).



S300570

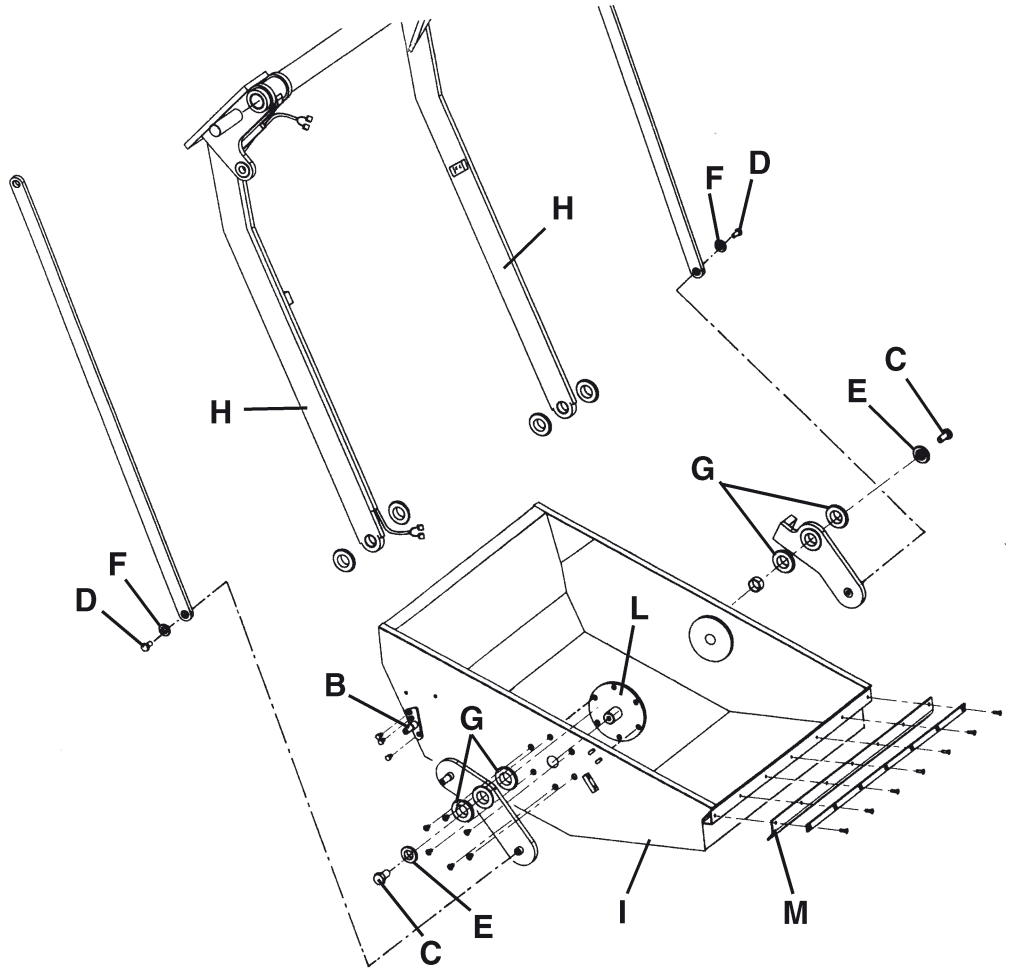
DUST AND DEBRIS COLLECTION SYSTEM

HOPPER REMOVAL

1. Lift the hopper (31) in order that it is high enough to allow operation on its fasteners (for hopper handling, see the procedure in the User Manual).

WARNING!
The hopper (31) can lower accidentally.

2. Place a stand under the hopper to support it when detached.
   Lower the hopper (31) until it is completely seated on the stand.
3. Remove the hopper rotation actuator (see the procedure in the relevant paragraph).
4. Remove the horizontal hopper control microswitch (see the procedure in the relevant paragraph).
5. From both sides of the hopper, remove the screws (C) and (D), then recover the washers (E) and (F) and the spacers (G).
6. Slightly extend the arms (H) and remove carefully the hopper (I).
7. If necessary, remove the actuator fastening pin (B), the hopper pin (L) and the gasket (M).
8. Assemble the components by performing steps 1 to 7 in the reverse order.
9. Adjust the hopper rotation actuator (see the procedure in the relevant paragraph).
10. Adjust the hopper mechanical stabilizer (see the procedure in the relevant paragraph).
11. Adjust the hopper end-of-stroke (see the procedure in the relevant paragraph).



L310004

DUST AND DEBRIS COLLECTION SYSTEM

ADJUSTMENT HOPPER END-OF-STROKE [SR 1301 B/SR 1301 P]

Check

WARNING!
This procedure must be performed by qualified personnel only.

NOTE
Failure adjustment of hopper end-of-stroke affects the functionality of the dust collecting system and the main broom motor.

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Open the hood (49) and fasten it with the support rod (63).

WARNING!
Pay attention to the moving parts while performing the following steps.

3. Apply amperometric pliers on the battery positive cable.
4. Start the machine with the ignition key (17).
5. Verify if the hopper is in closed position.
6. Lower the main broom with the lever (23) and check that the main broom motor electrical input is 16A.
7. If the electrical input is bigger, due to an excessive hopper rubbing with with the central broom, perform operations below.

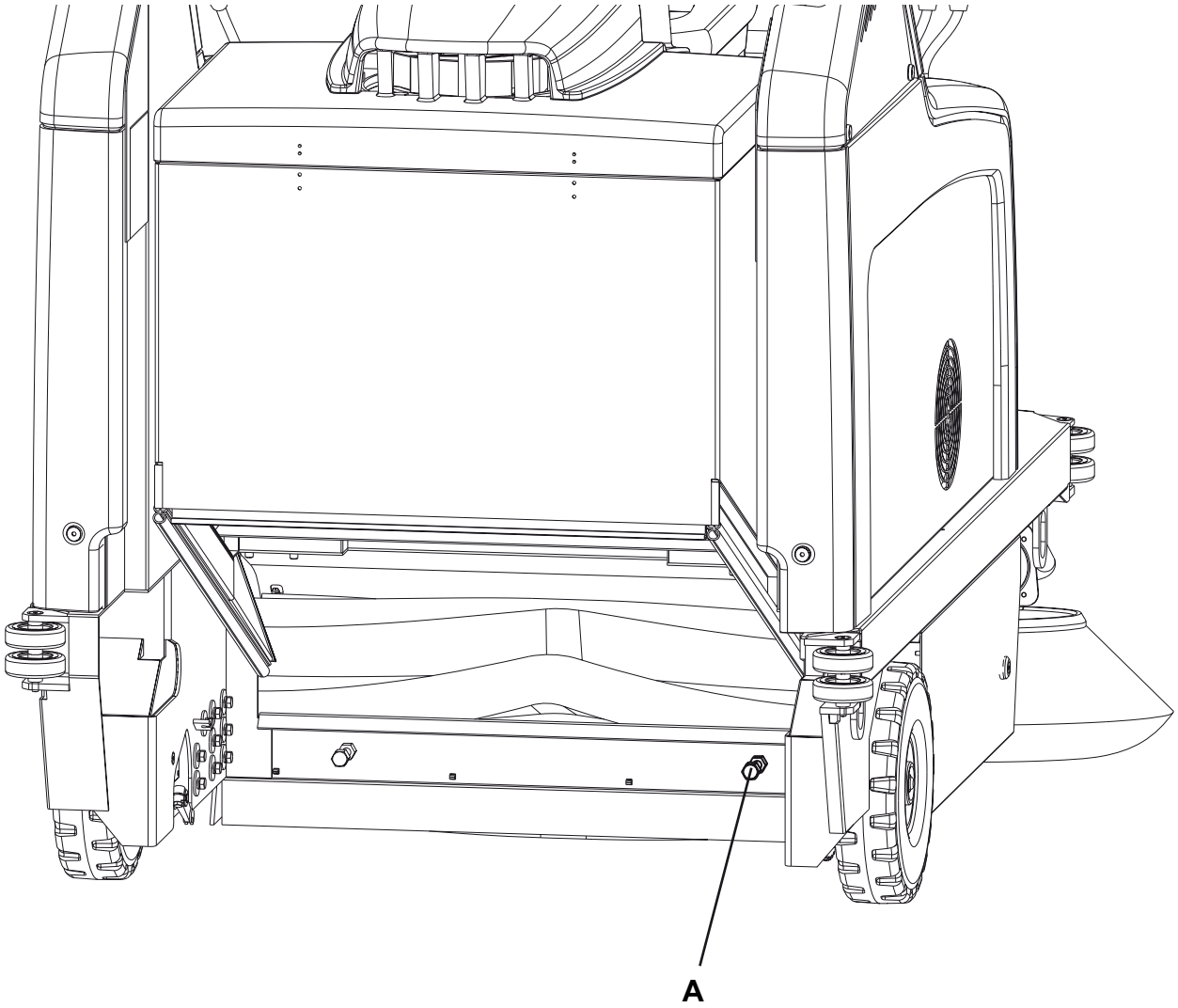
Adjustment

8. Completely lift the hopper (31) (see the operator manual).
9. Under hopper opening, loosen the lock nut of the screw (A) unscrew it for adjusting the hopper end-of-stroke. Tighten the lock nut.

NOTE
Regolate only the right screw (A), lifting cylinder side.

10. Lower completly the hopper (31) in closed position.
11. Check if the electrical input is 16A, otherwise repeate the adjustment in the above steps 9 and 10.

ADJUSTMENT HOPPER END-OF-STROKE [SR 1301 B/SR 1301 P] (Continues)

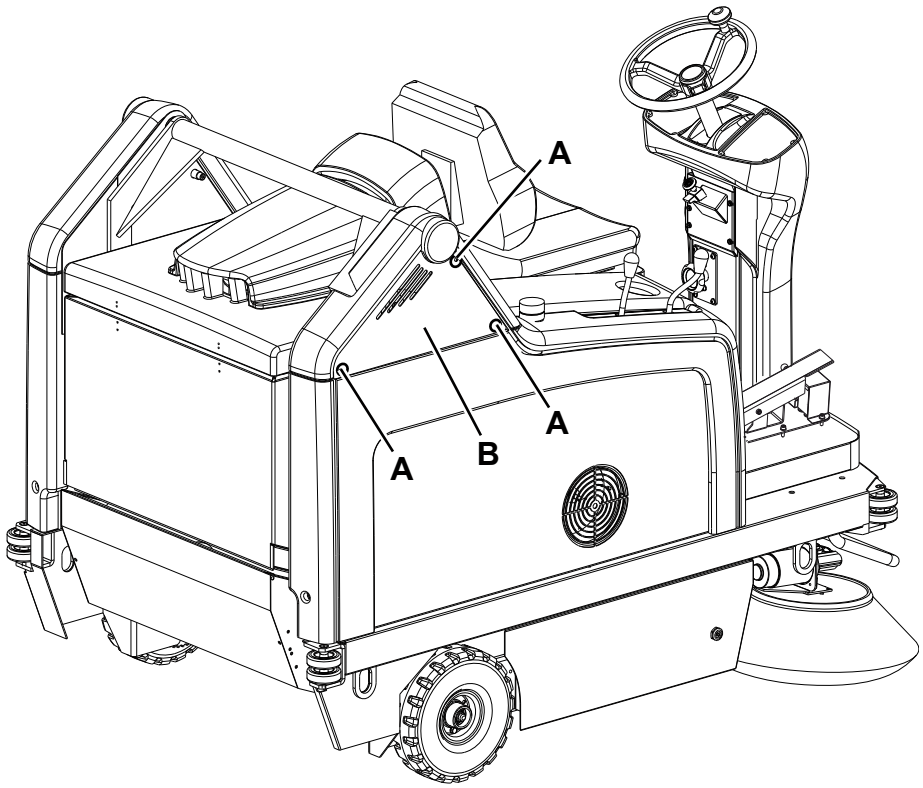


S300559

DUST AND DEBRIS COLLECTION SYSTEM

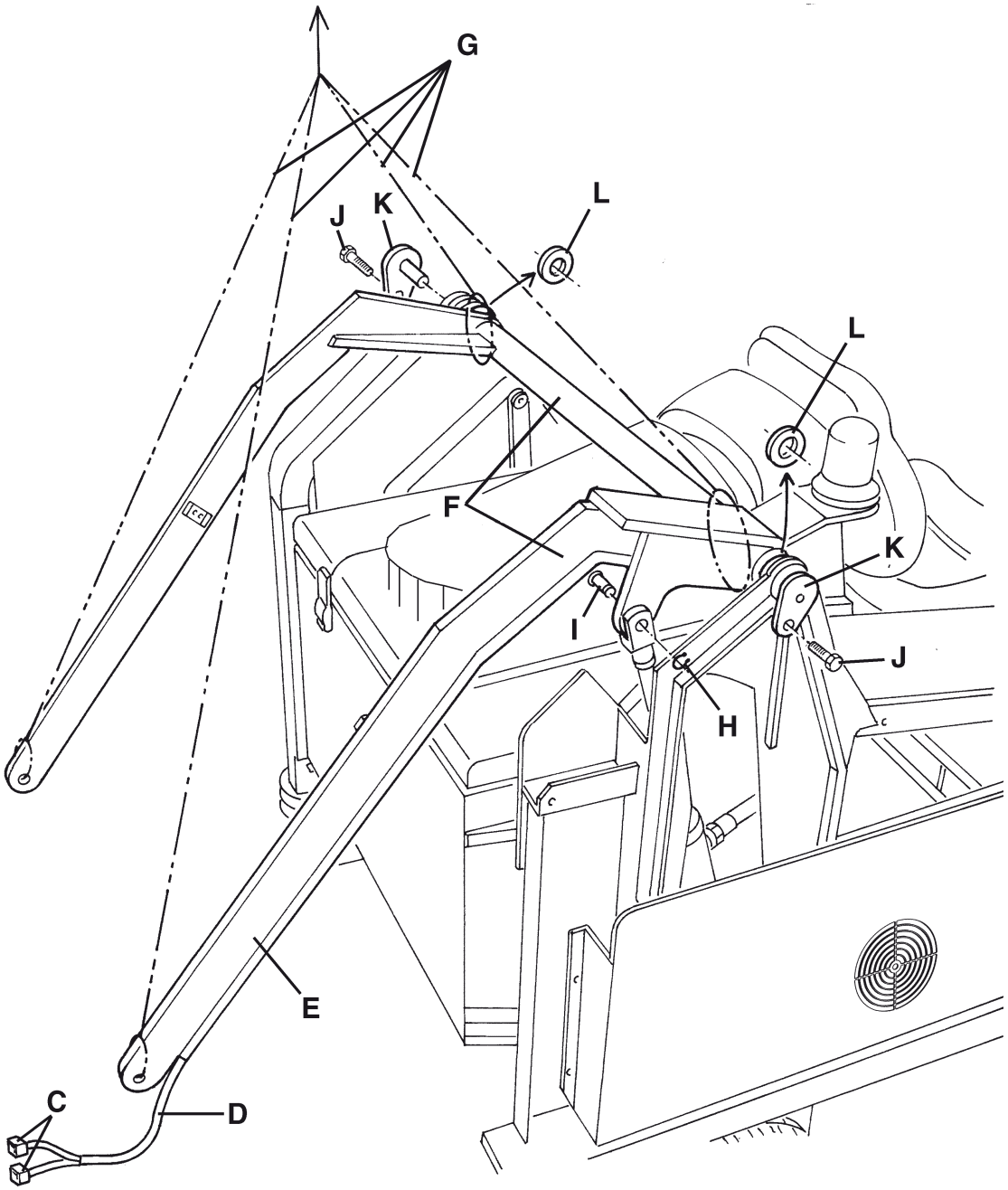
HOPPER LIFTING LEVER ASSEMBLY REMOVAL

1. Remove the hopper (see the procedure in the relevant paragraph).
2. On both sides of the machine, remove the screws (A), then remove the body sides (B).
3. Disconnect the connectors (C) from the relevant electrical cables (D).
4. Remove the electrical cables (D) from the duct (E).
5. Fasten the hopper lifting lever assembly (F) with a proper sling (G).
   Using a proper hoisting system slightly put the sling (G) under tension in order to support the hopper lifting lever assembly (F).
6. Disengage the snap ring (H) and remove the cylinder fastening pin (I).
7. On both sides of the machine, remove the screws (J) and the pins (K). Recover the shims (L).
8. Using the sling (G), remove carefully the hopper lifting lever assembly (F).
9. Assemble the components by performing steps 1 to 8 in the reverse order.



P100274

HOPPER LIFTING LEVER ASSEMBLY REMOVAL (Continues)



L310005

DUST AND DEBRIS COLLECTION SYSTEM

TROUBLESHOOTING

Open circuit
The relays and the lamellar fuses in the box (56) determine the open circuit. This system allows to prevent the motor circuits from being damaged under overload conditions.
If there is an open in the circuit, the possible causes are the following.

Vacuum fan motor: The relevant lamellar fuse in the box (56) burns and opens the electrical circuit.
Possible causes:
1. Vacuum fan lock (repair).
2. The vacuum fan motor is faulty (repair or replace).
3. Short circuit in the wiring harness (repair).

Filter shaker motor: The relevant lamellar fuse in the box (56) burns and opens the electrical circuit.
Possible causes:
1. The motor is faulty (replace).
2. Short circuit in the wiring harness (repair).

After the activation of the emergency push-button, in order to restore the machine functions, turn the push-button clockwise, as shown by the arrow on the push-button; make sure to perform this operation.

Poor operation of the vacuum fan
Possible causes:
1. The dust filter is clogged (clean).
2. The vacuum fan fins are broken/worn (replace the vacuum fan).
3. The hopper gaskets are damaged (replace).
4. The vacuum system motor hood gaskets are damaged (replace).
5. The vacuum system switch (6) is damaged (replace).

The filter shaker motor does not work.
Possible causes:
1. The motor is faulty (repair or replace).
2. The filter shaker switch (6) is damaged (replace).
3. The wiring harness is damaged (repair).

The hopper does not dump.
Possible causes:
1. The lifted hopper control microswitch is misadjusted or damaged (adjust or replace).
2. The switch is damaged (replace).
3. The hopper rotation actuator microswitches are damaged (replace).
4. The hopper rotation actuator is damaged (replace).
5. The F7 fuse in the box (56) is damaged (replace).

The hopper does not lower.
Possible causes:
1. The lifted hopper control microswitch is misadjusted or damaged (adjust or replace).
2. The switch is damaged (replace).
3. The control relay is damaged (replace).

The hopper does not move (the pump does not operate).
Possible causes:
1. The switch is damaged (replace).
2. The drive relays are damaged (replace).
3. The wiring harness is damaged (repair).
4. The pump is faulty (replace).
5. The F4 or F7 fuse in the box (56) is damaged (replace).

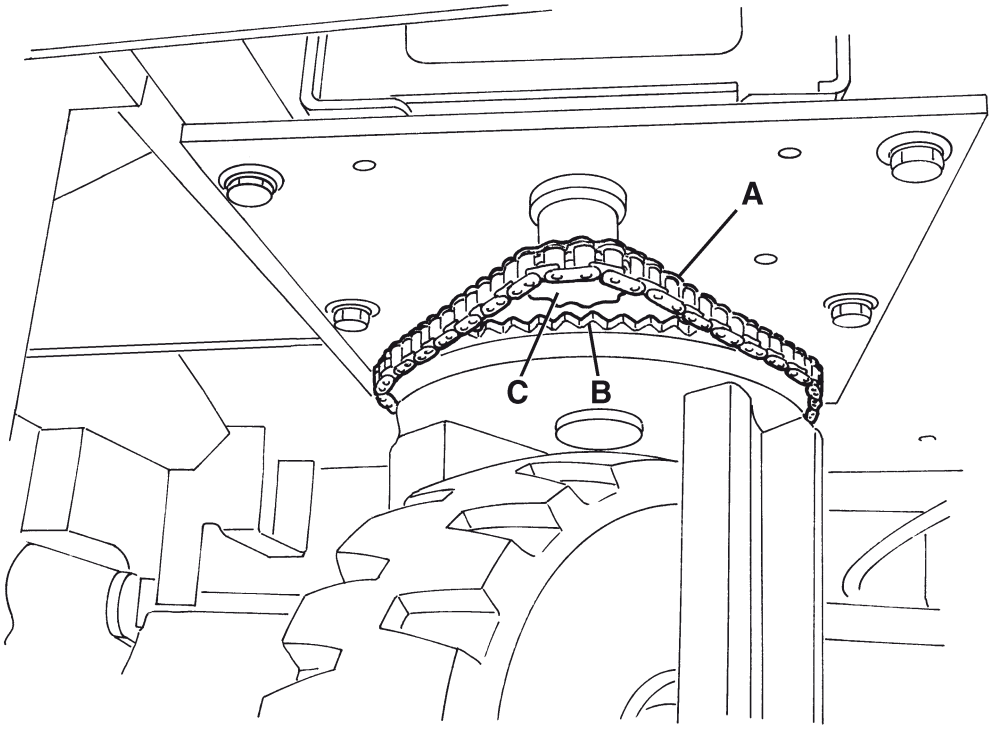
STEERING SYSTEM AND BRAKE SYSTEM

STEERING CHAIN CHECK AND CLEANING

NOTE
The steering chain is not adjustable.

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition switch (17) to “0”.
3. Check that the steering chain (A) and the relevant ring gears (B and C) are free from dirt or foreign materials (cords, clothes, etc.) and excessive dirt. If necessary, wipe the debris off the chain with a brush and a solvent, making the whole chain (A) slide in the accessible area, by moving the steering wheel.
   Wipe off the solvent from the machine parts.

WARNING!
Do not lubricate the chain after cleaning.



S300574

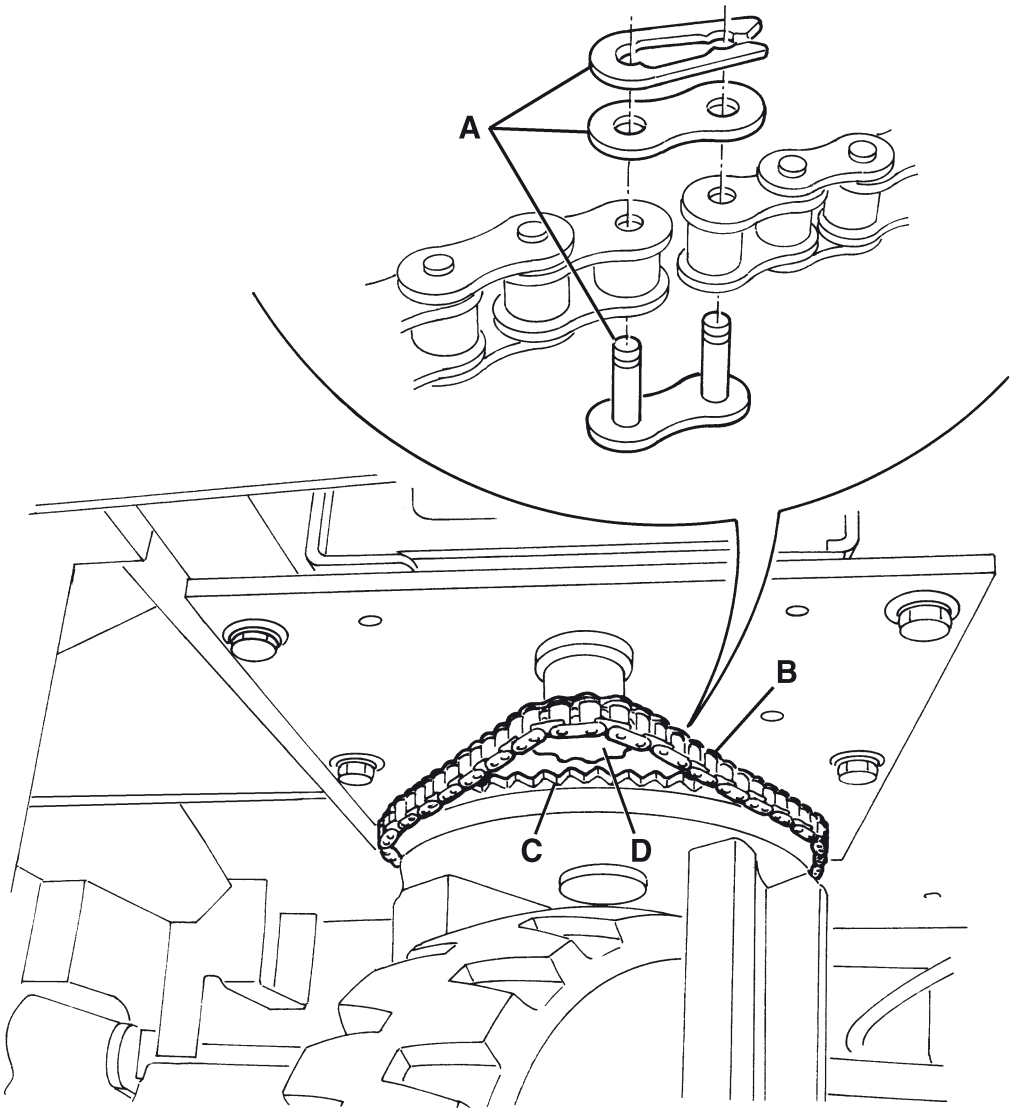
STEERING SYSTEM AND BRAKE SYSTEM

STEERING CHAIN REPLACEMENT

NOTE
The steering chain is not adjustable.

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition switch (17) to “0”.
3. By turning the steering wheel, take the steering chain junction link (A) at an accessible position.
4. Open the junction link (A) and remove the chain (B) from the two ring gears (C) and (D).
5. If necessary, wipe off debris and dust off the ring gears (C) and (D) using a broom and a solvent. Wipe off the solvent from the machine parts.
6. Assemble the components in the reverse order of disassembly.

WARNING!
Do not lubricate the chain after installation.



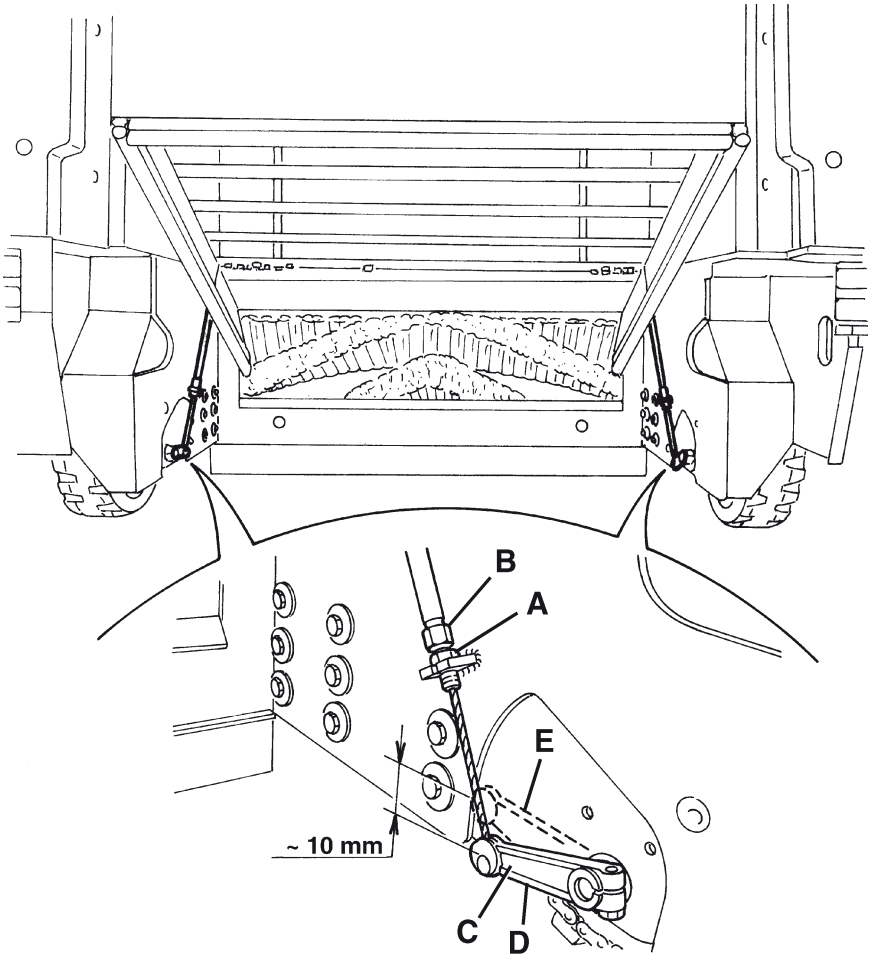
S300575

BRAKE SYSTEM ADJUSTMENT

1. Drive the machine on a level floor.
2. Do not engage the parking brake with the pedal and the lever (25 and 18), but make sure that the machine cannot move independently.
3. Lift the hopper (31) completely (see the procedure in the User Manual).
4. Turn the ignition switch (17) to “0”.
5. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

WARNING!
Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

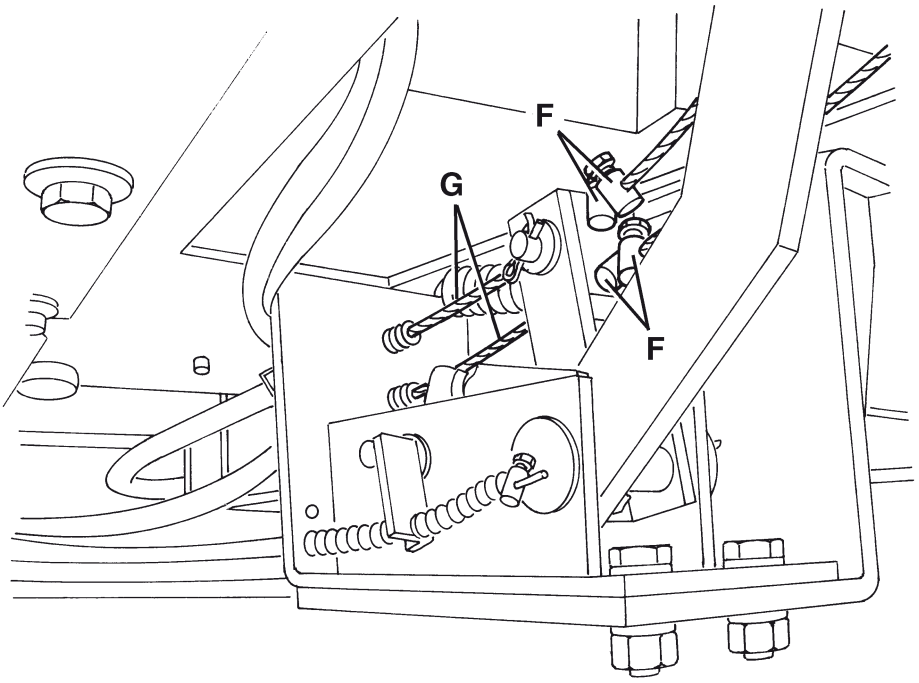
6. Loosen the locknuts (A) under the lifted hopper (31) and adjust the brakes with the adjusters (B) until the following condition is reached:
   - On both sides of the machines, the stroke of the lever (C) between the position (D) (released brake) and the position (E) (braking elements in contact with the drum) should be 0.4 in (10 mm) approximately.
7. Tighten the locknuts (A).
8. If it is not possible to achieve the condition shown in the previous step for one or both brakes, modify the position of the terminals (F) of the brake cables (G), located under the brake pedal, then repeat steps 6 and 7.
9. Perform steps 1 to 5 in the reverse order.
10. Perform some tests to check the brake operation.



S300576

STEERING SYSTEM AND BRAKE SYSTEM

BRAKE ADJUSTMENT (Continues)



S300577

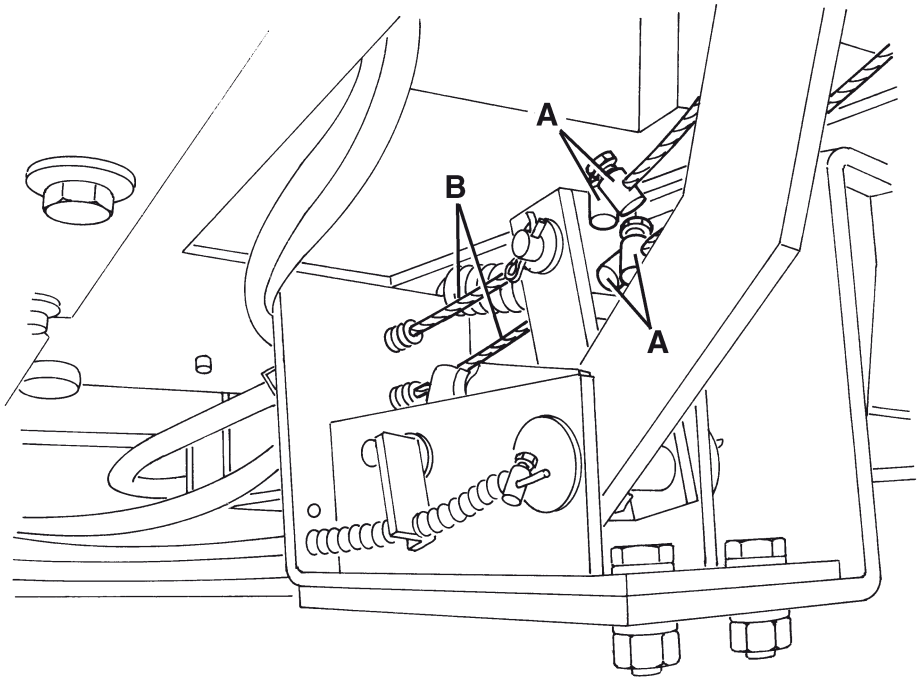
BRAKE CONTROL CABLE REPLACEMENT

1. Drive the machine on a level floor.
2. Do not engage the parking brake with the pedal and the lever (25 and 18), but make sure that the machine cannot move independently.
3. Lift the hopper (31) completely (see the procedure in the User Manual).
4. Turn the ignition switch (17) to “0”.
5. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

WARNING!

Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

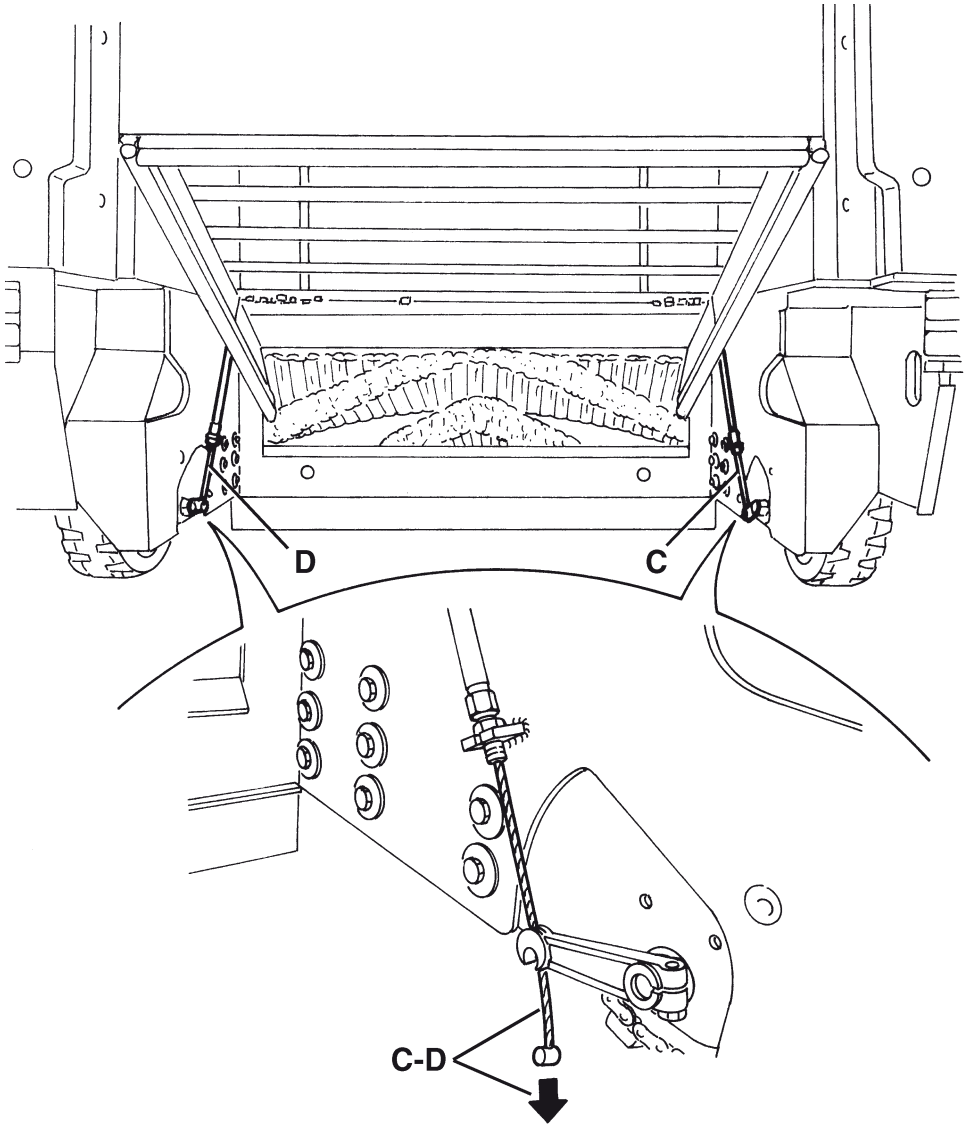
6. Remove the terminals (A) from the brake control cables (B) under the brake pedal.
7. Remove the brake control cables (C) and (D) from their housings under the lifted hopper (31).
8. Insert the new cables (C) and (D) into their housings and apply a thin coat of grease along the cable (so that it smoothly slides into the sheaths).
9. Insert and tighten the terminals (A) of the brake control cables (B).
10. Adjust the brakes as shown in the previous paragraph.



S300578

STEERING SYSTEM AND BRAKE SYSTEM

BRAKE CONTROL CABLE REPLACEMENT (Continues)



S300579

BRAKE REPLACEMENT

NOTE
The following procedure refers to the right brake replacement; the procedure to replace the left brake is the same.

1. Drive the machine on a level floor.
2. Do not engage the parking brake with the pedal and the lever (25 and 18), but make sure that the machine cannot move independently, applying wedges (Z) to the left wheel.
3. Turn the ignition switch (17) to “0”.
4. Open the hood (49) and fasten it with the support rod (63).
5. Remove the mounting screws (B), then remove the right body side (A).
6. Operating according to the safety rules and by using a proper hoisting system, lift the right rear side of the machine for few centimetres, using the lifting anchor (W). Keep the machine lifted with the hoisting system.
7. Carefully lift the hopper (H) completely (see the procedure in the User Manual).
8. Place a hard wooden holder (E) under the end side (G) of the machine frame as shown in the figure. The holder (E) must be placed so that the wheel (F) is slightly lifted from the floor in order to remove it.
   With the hoisting system, lower the machine and lay it on the stand (E), then check that the wheel (F) remains lifted from the floor to allow removal.
   However, the hoisting system must be kept slightly tensioned on the anchor (W).

   WARNING!
   The stand (E) must engage the machine frame end (G), without touching the wheel (F) that has to be removed.

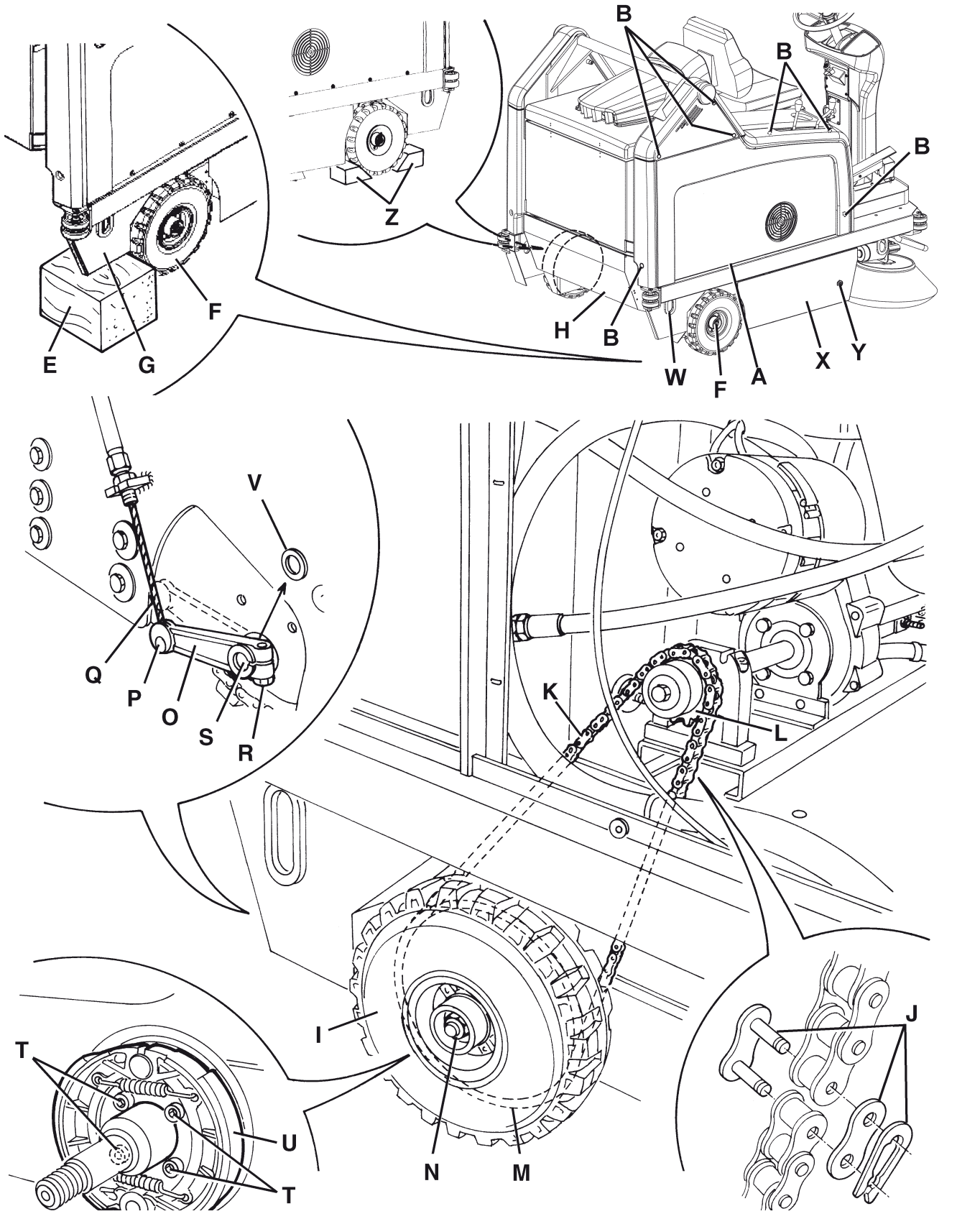
9. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

   WARNING!
   Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

10. Release the fastener (Y), then open the right door (X).
11. Turn the wheel (I) gradually, to take the junction link (J) of the drive chain (K) at an accessible position.
12. Open the junction link (J) and remove the drive chain (K) from the relevant ring gears (L) and (M).
13. Remove the nut (N), then remove the wheel (I).
14. Manually turn the brake lever (O) upward, and disconnect it from the head (P) of the cable (Q).
15. Mark the position of the lever (O) and of the pin (S) (for proper reassembly), then loosen the screw (R) and remove the lever (O). Recover the shim (V).
16. Remove the screws (T) and the brake (U).
17. Assemble the components in the reverse order of disassembly.
18. Perform some tests to check the brake operation.

STEERING SYSTEM AND BRAKE SYSTEM

BRAKE REPLACEMENT (Continues)



S300580

DRIVE SYSTEM

DRIVE SYSTEM MOTOR ELECTRICAL INPUT CHECK

WARNING!
This procedure must be performed by qualified personnel only.

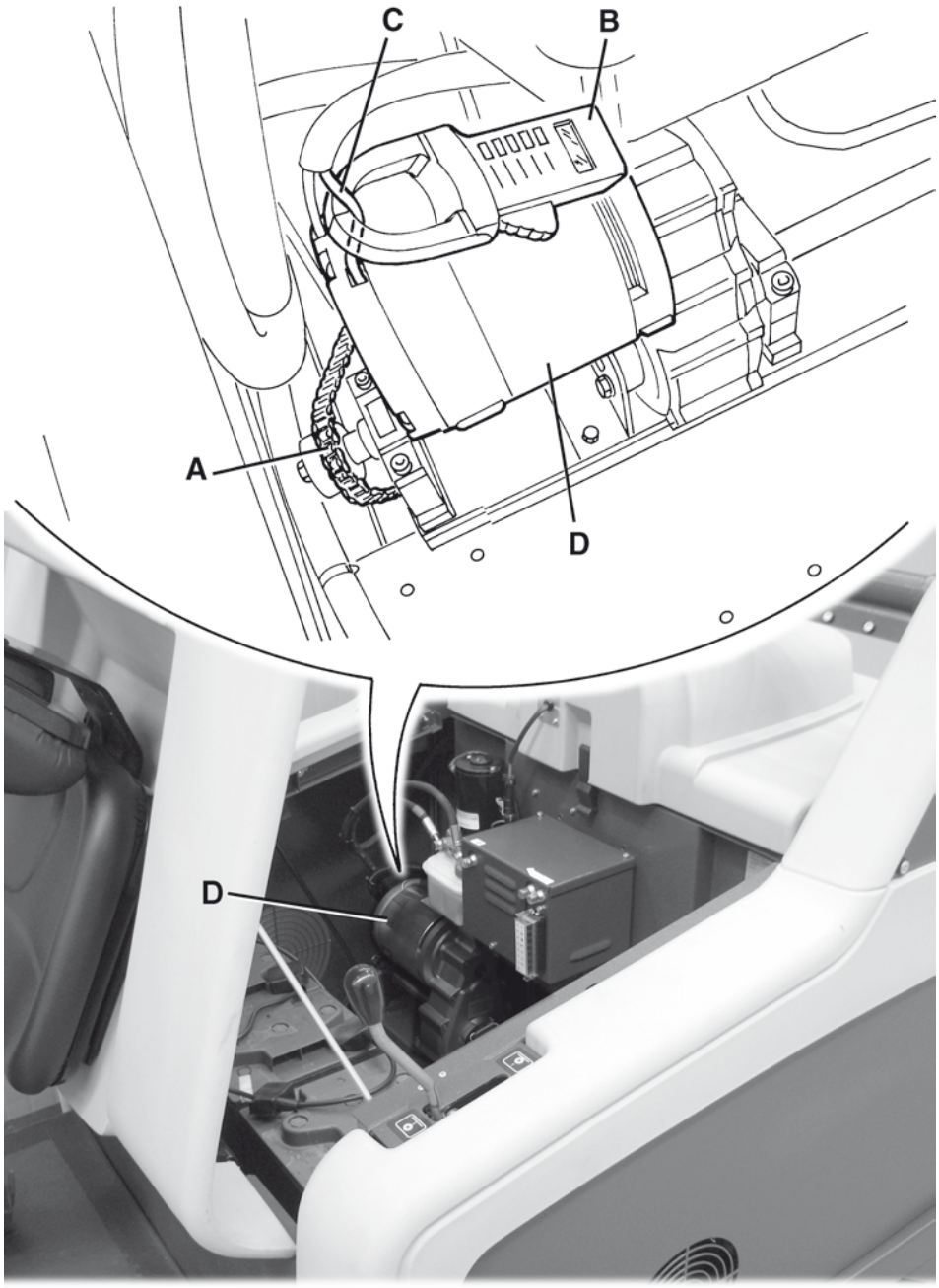
1. Drive the machine on a level floor.
2. Do not engage the parking brake with the pedal and the lever (25 and 18), but make sure that the machine cannot move independently.
3. Check that brooms and vacuum system are tuned off.
4. Turn the ignition switch (17) to “0”.
5. With a proper and safe hoisting system, hook the machine on the rear lifting anchors (94), then lift it until the rear wheels (41) are at 0.8-1.6 in (4-5 cm) from the floor.
6. Open the hood (49) and fasten it with the support rod (63).

WARNING!
Pay attention to the chain (A) and shaft rotation while performing the following steps.

7. Apply amperometric pliers (B) on a cable (C) of the drive system motor (D).
8. Turn the ignition switch (17) to “I”.
9. Press the forward gear pedal (19) until the end of the stroke, and check that the electrical input of the drive system motor (D) is 15 - 20 A at 24 V. Release the pedal (19). Turn the ignition switch (17) 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 vacuum system motor (see the procedure on the following page), clean it and check its moving parts.
   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).
10. Perform steps 1 to 6 in the reverse order.

DRIVE SYSTEM

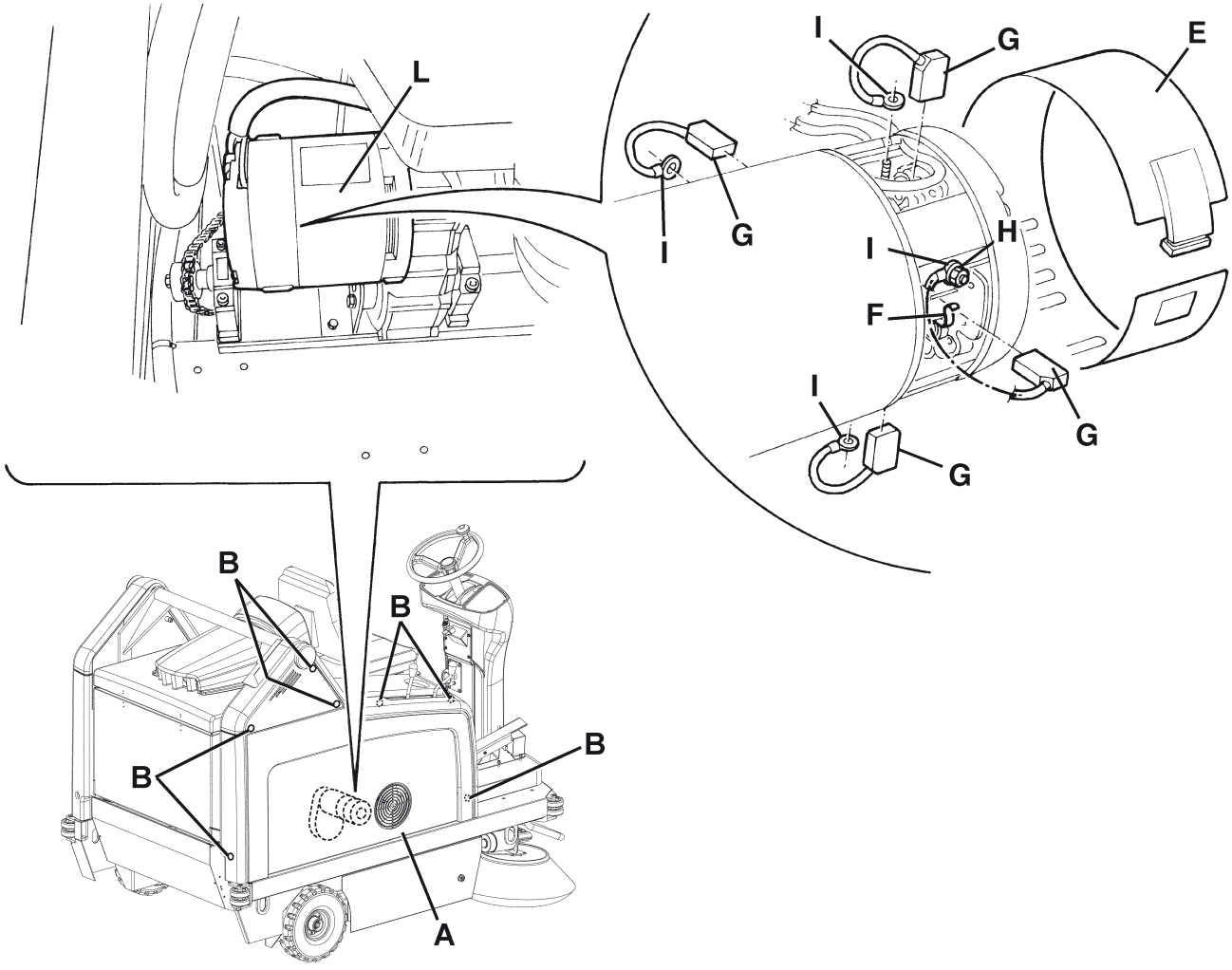
DRIVE SYSTEM MOTOR ELECTRICAL INPUT CHECK (Continues)



S300581

DRIVE SYSTEM MOTOR CARBON BRUSH CHECK AND REPLACEMENT

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition switch (17) to “0”.
3. Open the hood (49) and fasten it with the support rod (63).
4. Disconnect the battery connector (52).
5. Remove the mounting screws (B), then remove the right body side (A).
6. Disengage and remove the clamp (E) of the drive system motor (L), after cleaning its outside part.
7. Lift the retaining springs (F) and remove the four carbon brushes (G).
8. Check the 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 (G) is 0.23 in (6 mm), then they must be replaced.
9. If necessary, unscrew the nuts (H) and disengage the lead-in wires (I), then remove the carbon brushes. Replace the carbon brushes as an assembly.
10. Assemble the components in the reverse order of disassembly.



S300582

DRIVE SYSTEM

DRIVE SYSTEM MOTOR REMOVAL

Disassembly

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Lift the hopper (31) completely.
3. Turn the ignition switch (17) to “0”.
4. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

WARNING!
Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

5. Open the hood (49) and fasten it with the support rod (63).
6. Disconnect the battery connector (52).
7. On both sides of the machine, remove the screws (B), then remove the body sides (A).
8. Remove the drive system mounting screws (E) under the lifted hopper (31).
9. On both sides of the machine, loosen the locknuts (F) and operate on the tie rods (G) thus loosening the drive chains (H), then disconnect the chains from the pinions (I) and (S).
10. Disconnect the drive system motor harness (M) from the electrical connections of the drive system electronic board (L).
11. Disconnect the drive system motor harness (M) from the machine fasteners.
12. Disconnect the clamp (O) from the stand.
13. Remove the drive reduction unit assembly (P) with the stand and take them to the workbench; if necessary, when removing, slightly turn the assembly (P) according to the direction shown by the arrow (Q) to disengage the left pinion (S).

Disassembly at the workbench

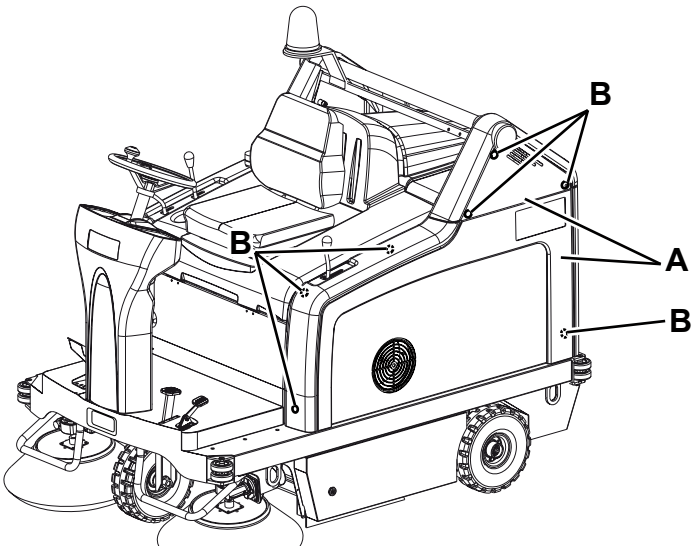
14. At the workbench, unscrew the dowels (T).
15. Move the two driveshafts (U) and (V) outward, until they come out from the reduction unit (W).
16. Remove the four screws (X).
17. Remove the reduction unit (Y).

Assembly at the workbench and installation

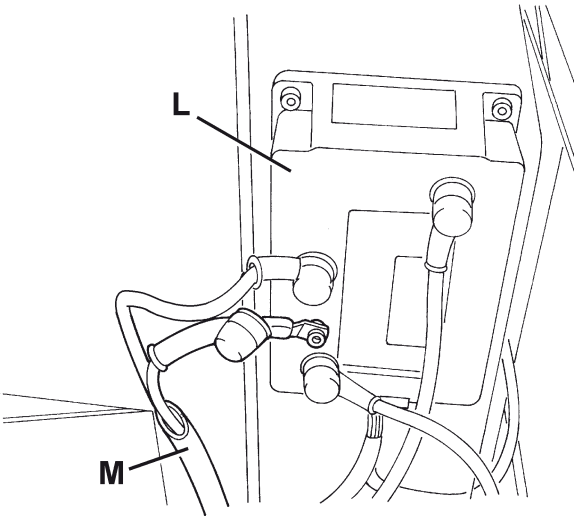
18. Assemble the components in the reverse order of disassembly, and note the following:
    - Make sure that the driveshafts (U) and (V) are properly inserted in their housing inside the reduction unit (W)
    - Before fastening the two pinions (AA) with the dowels (T), set the pinions at the values shown in the figure (to have the wheels driven pinions properly aligned).
    - In case of installation of a new reduction unit, after assembling at the workbench, fill the reduction unit with oil through the plug (Z); use the type and quantity shown below:
      – Oil type: FINA GIRAN 220 or equivalent (see the following table)
      – Quantity: 0.06 - 0,09 gal (0.25 - 0.35 litres)
    - Install the chains (H) on the pinions (I) and (S), then adjust the drive chain tension, as shown in the relevant paragraph.

DRIVE SYSTEM MOTOR REMOVAL (Continues)

LUBRICANT OIL TABLE	
Ambient temperature	86°F ÷ 149°F (+30°C ÷ +65°C)
ISO VG Viscosity	220
Viscosity °E/50°C	15 ÷ 18
AGIP - IP	MELLANA - BLASIA 220
BP-MACH	ENERGOL GR-HP220
CASTROL	ALPHA SP 220
CHEVRON	NL GEAR COMPOUND 220
ELF	REDUCTELF SP 220
ESSO	SPARTAN EP 220
FINA	GIRAN 220
IP	MELLANA 220
MOBIL	MOBILGEAR 630
SHELL	OMALA EP 220
TOTAL	CARTER EP 220
KLUBER	KLUBER OIL GEM 1-220



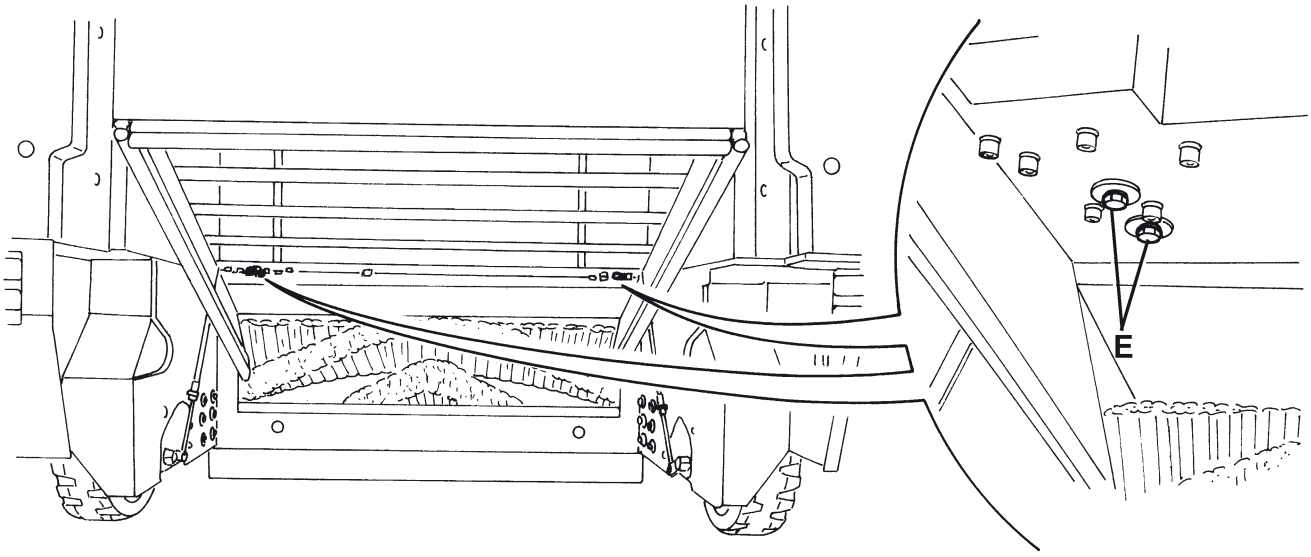
S300583



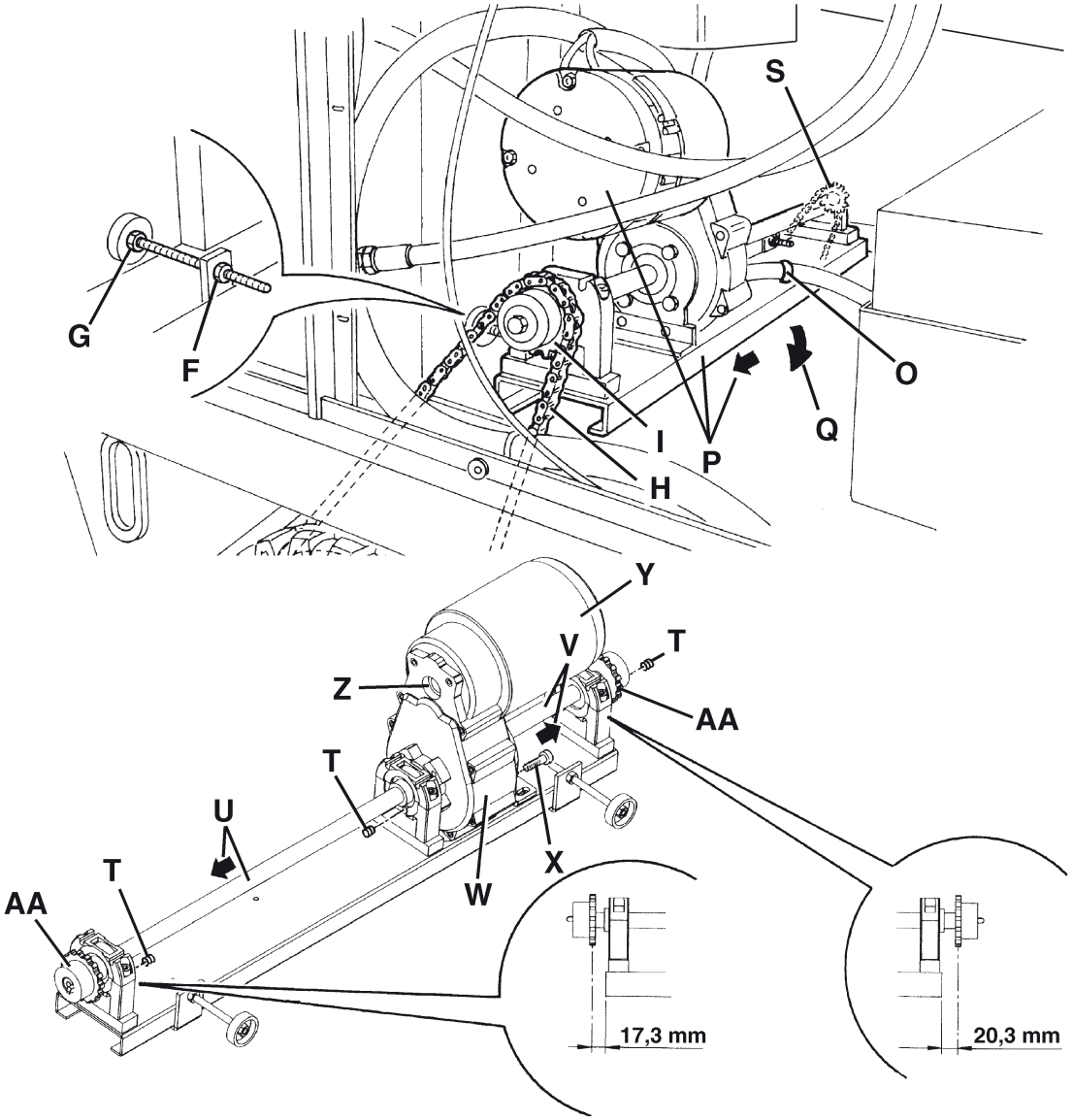
S300584

DRIVE SYSTEM

DRIVE SYSTEM MOTOR REMOVAL (Continues)



S300585



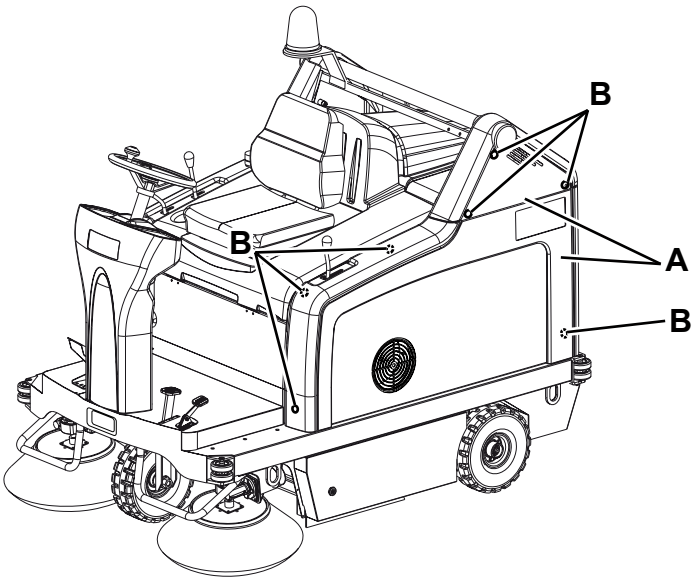
S300586

DRIVESHAFT BEARING REPLACEMENT

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Lift the hopper (31) completely (see the procedure in the User Manual).
3. Turn the ignition switch (17) to “0”.
4. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

WARNING!
Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

5. Open the hood (49) and fasten it with the support rod (63).
6. Disconnect the battery connector (52).
7. On both sides of the machine, remove the screws (B), then remove the body sides (A).
8. Loosen the drive system mounting screws (E) under the lifted hopper (31).
9. On both sides of the machine, loosen the locknuts (F) and operate on the tie rods (G) thus loosening the drive chains (H), then disconnect the chains from the pinions (I) and (J).
10. Remove the screws (K) and the pinions (L). Recover the keys (M).
11. Move the two driveshafts (P) and (Q) outward, until they come out from the reduction unit (R).
12. Loosen the dowels (T), remove the bolts (N) from the bearing carriers (O) and remove the bearings (S) from the driveshafts (P) and (Q).
13. Assemble the components in the reverse order of disassembly, and note the following:
    - Before fastening the two pinions (L) with the dowels (T), set the pinions at the values shown in the figure (to have the wheels driven pinions properly aligned).
    - Install the chains (H) on the pinions (I) and (J), then adjust the drive chain tension, as shown in the relevant paragraph.



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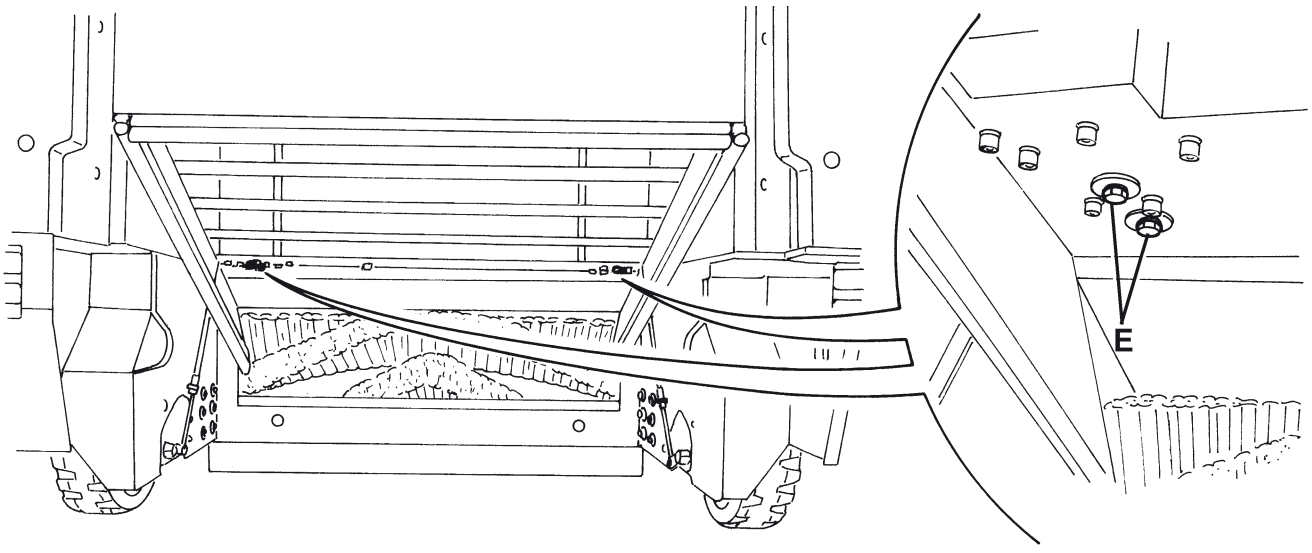
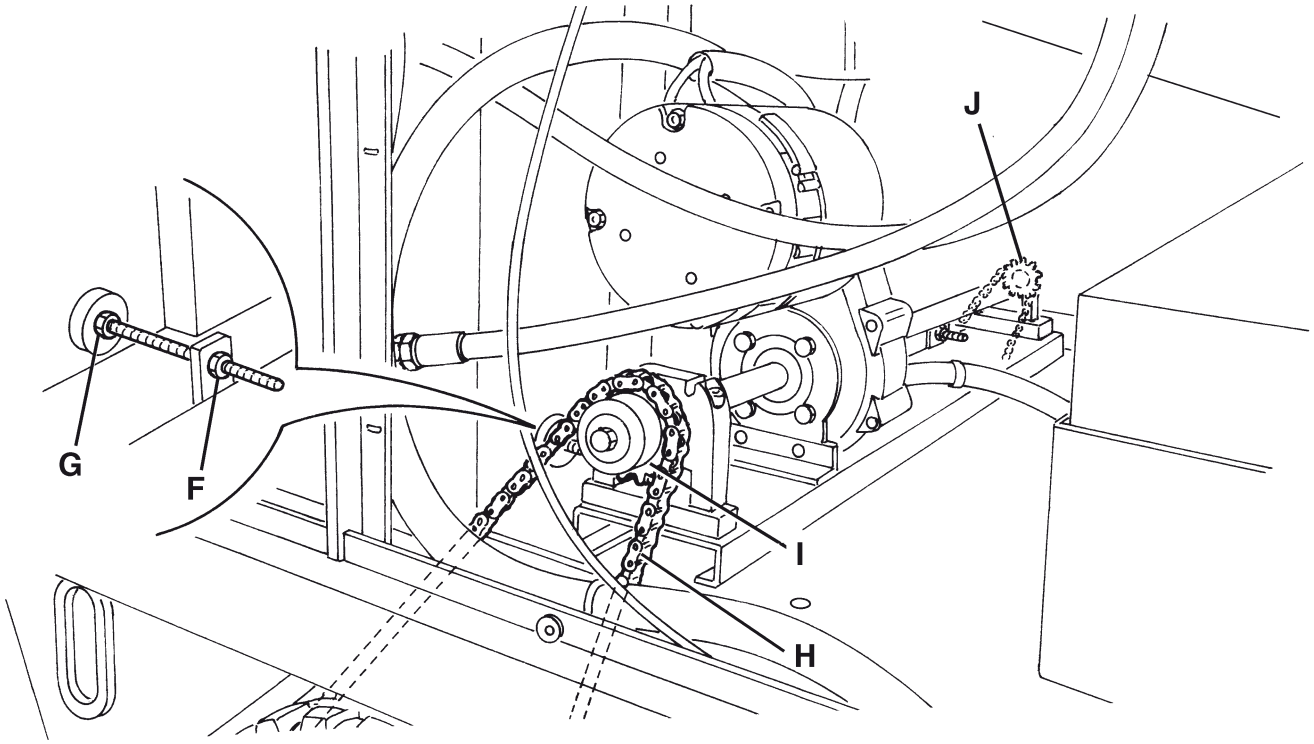


S300585

DRIVE SYSTEM

DRIVESHAFT BEARING REPLACEMENT (Continues)



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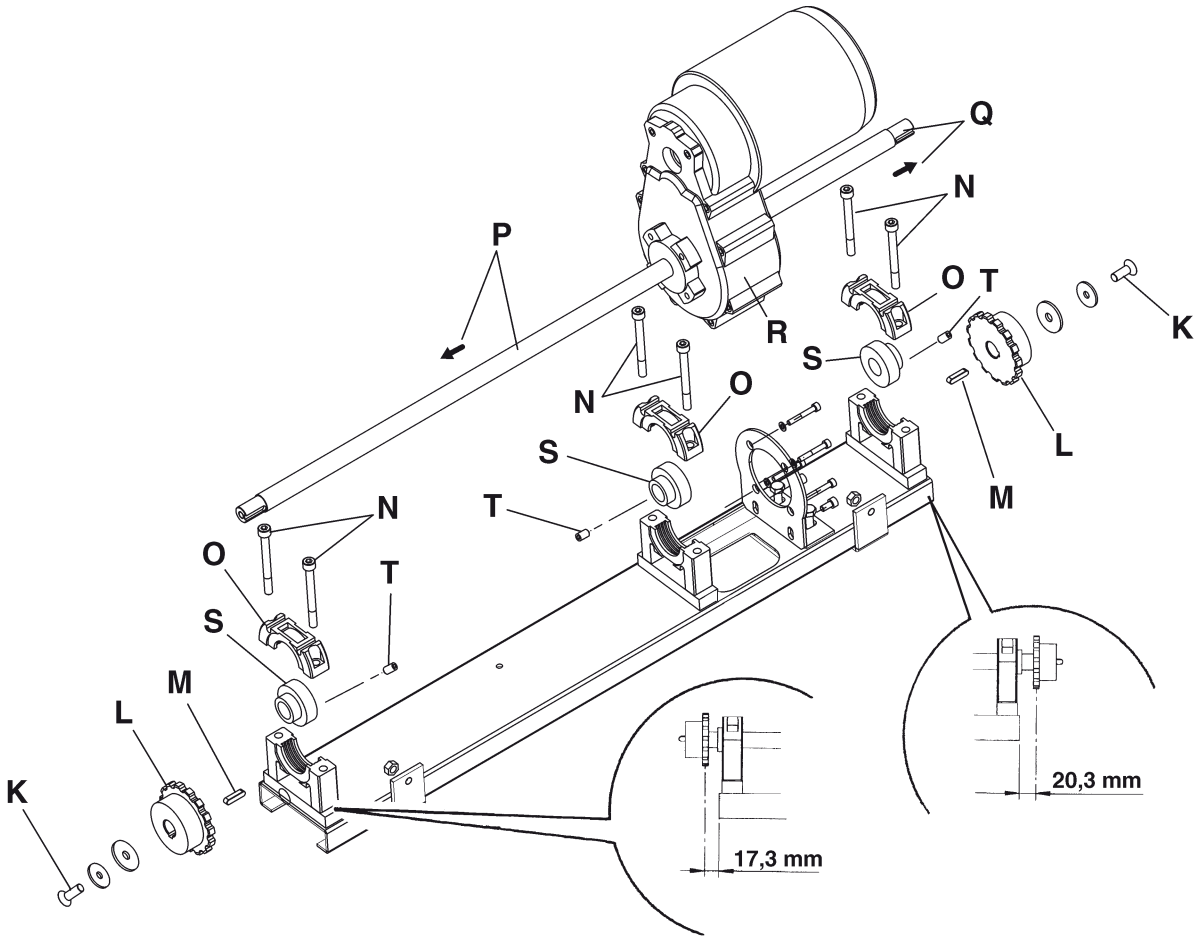


S300590

DRIVE CHAIN CLEANING AND TENSION CHECK

Cleaning and tension check

1. Drive the machine on a level floor.
2. Do not engage the parking brake with the pedal and the lever (25 and 18), but make sure that the machine cannot move independently.
3. Turn the ignition switch (17) to “0”.
4. Open the hood (49) and fasten it with the support rod (63).
5. Release the fasteners (35 and 33), then open the right and left door (34 and 32).
6. On both sides of the machine, check that the drive chains (A) and the relevant ring gears (B) and (C) are free from debris (cords, clothes, etc.) and excessive dust. If necessary, wipe the debris off the chain with a brush and a solvent, making the whole chain (A) slide in the accessible area, by slowly moving the machine.
   Wipe off the solvent from the machine parts.
7. On both sides of the machine, check that the drive chains (A) are slightly loose. If necessary, adjust the tension following the instructions below.

WARNING!
Do not lubricate the chain after the cleaning.

Tension adjustment

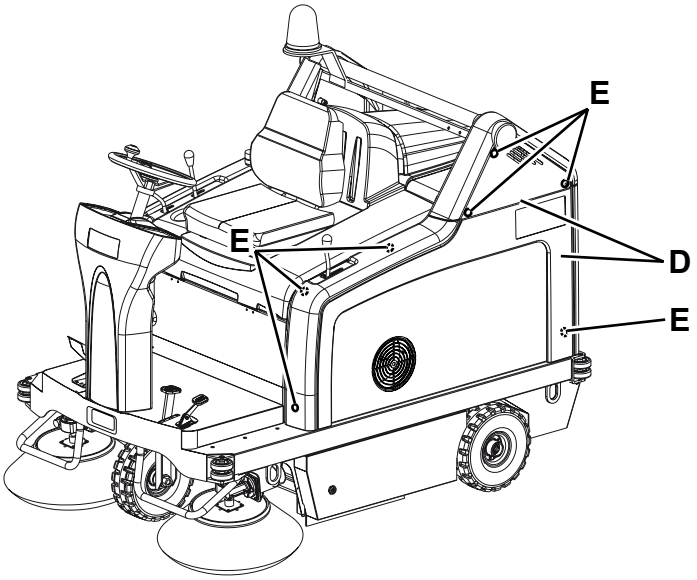
8. Engage the parking brake with the pedal and the lever (25 and 18).
9. Disengage and place the support rod (43) in its housing and close the hood (49).
10. Lift the hopper (31) completely (see the procedure in the User Manual).
11. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

WARNING!
Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

12. On both sides of the machine, remove the screws (E), then remove the body sides (D).
13. Loosen the drive system mounting screws (H) under the lifted hopper (31).
14. On both sides of the machine, loosen the locknuts (I) and operate on the tie rods (L) until the drive chain (A) tension is correct. Tighten the locknuts (I).

Assembly

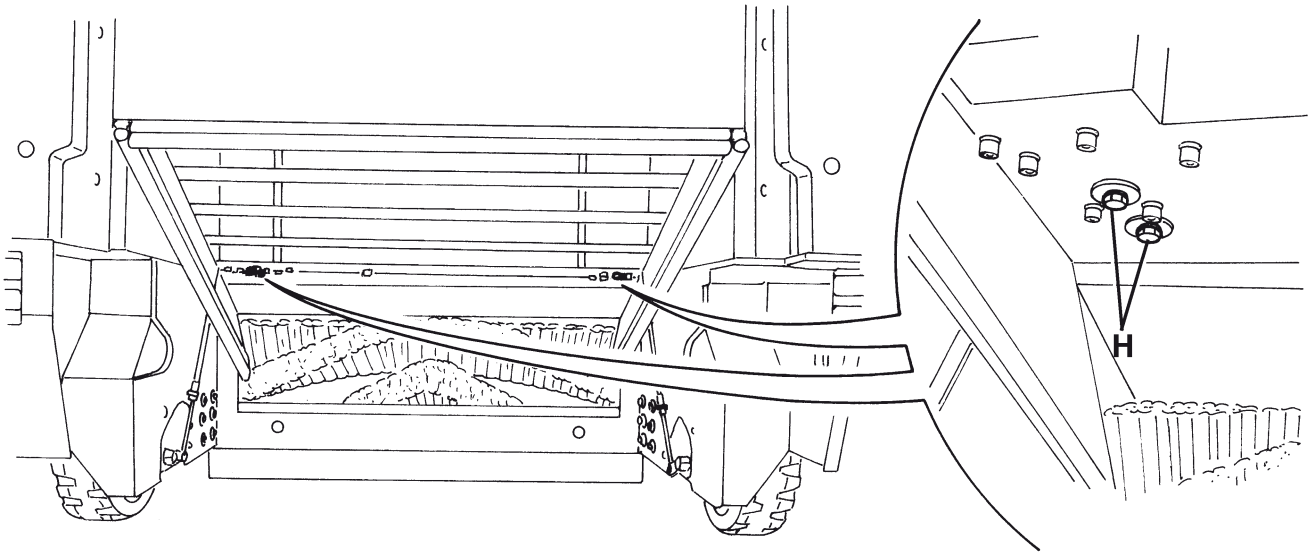
15. Assemble the components in the reverse order of disassembly.



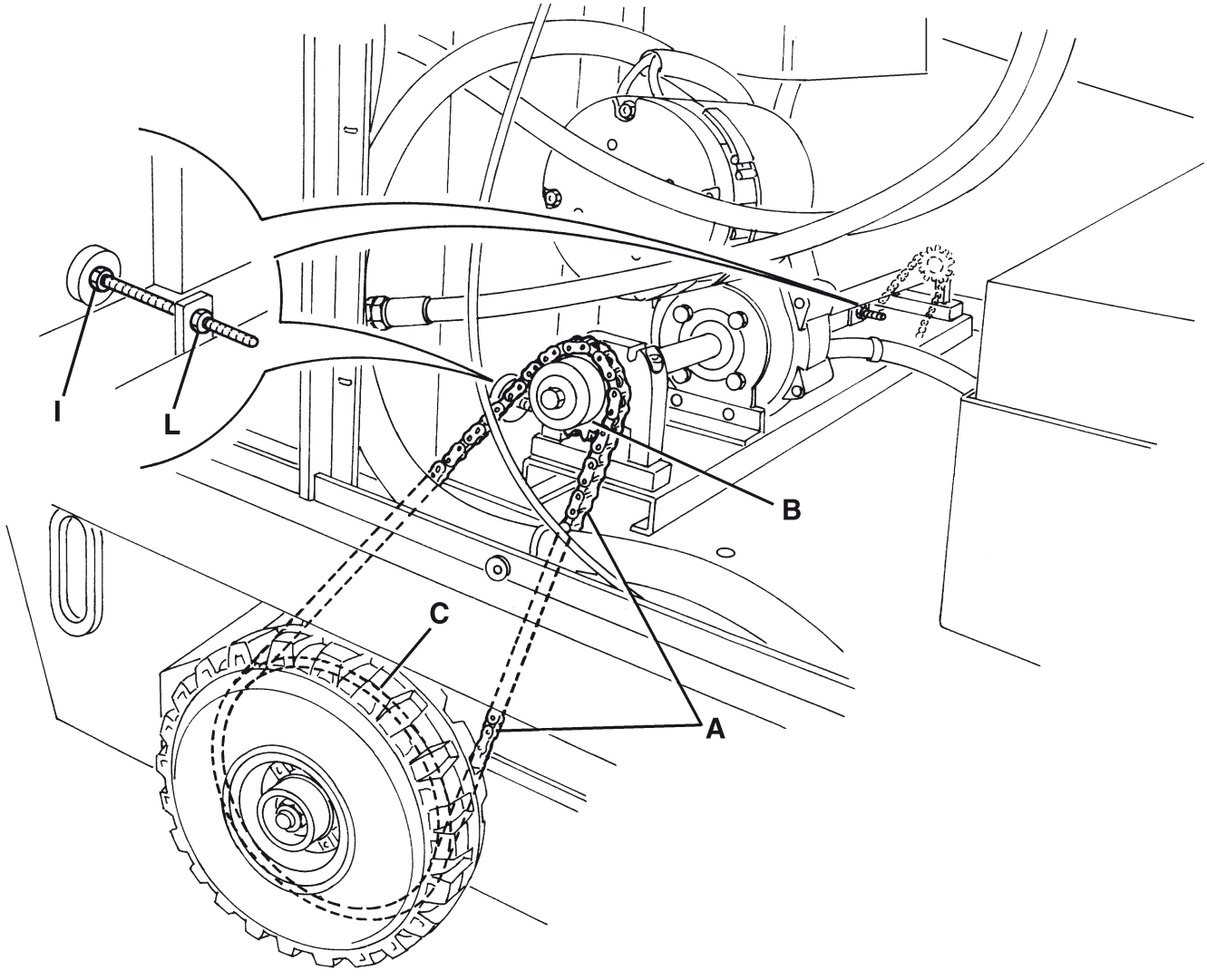
S300591

DRIVE SYSTEM

DRIVE CHAIN CLEANING AND TENSION CHECK (Continues)



S300592



S300593

DRIVE CHAIN REPLACEMENT

CAUTION!
It is advisable to replace both chains at the same time.

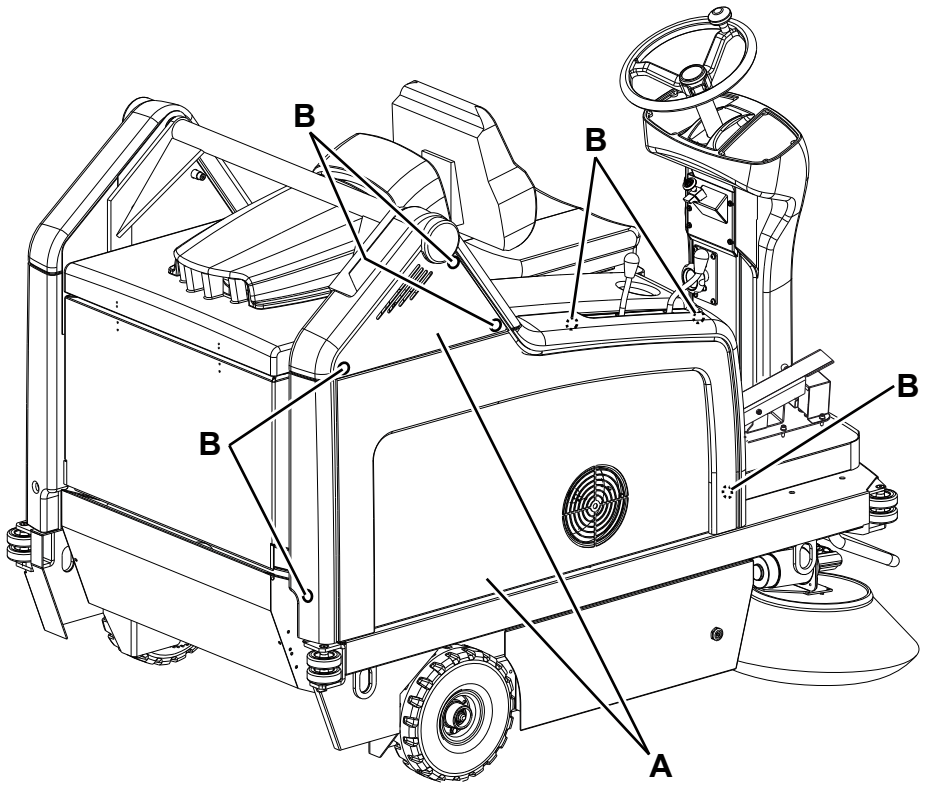
1. Drive the machine on a level floor.
2. Do not engage the parking brake with the pedal and the lever (25 and 18), but make sure that the machine cannot move independently.
3. Turn the ignition switch (17) to “0”.
4. Open the hood (49) and fasten it with the support rod (63).
5. On both sides of the machine, remove the screws (B), then remove the body sides (A).
6. Release the fasteners (35 and 33), then open the right and left door (34 and 32).
7. Slowly move the machine to set the junction links (E) of the drive chains (F) at an accessible position.
8. Open the junction links (E) and remove the drive chains (F) from the relevant ring gears (G) and (H).
9. Engage the parking brake with the pedal and the lever (25 and 18).
10. Disengage and place the support rod (63) in its housing and close the hood (49).
11. Carefully lift the hopper (31) completely (see the procedure in the User Manual).
12. Apply a proper safety stand under the lifted hopper to prevent it from lowering incidentally.

WARNING!
Apply a proper safety stand under the lifted hopper even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

13. If necessary, on both sides of the machine, wipe debris and dust off the ring gears (G) and (H) with a brush and a solvent. Wipe off the solvent from the machine parts.
14. Install the new chains (F) by engaging them on the relevant ring gears (G) and (H), then connect them by the junction links (E).

WARNING!
Do not lubricate the chains and the ring gears after cleaning/installation.

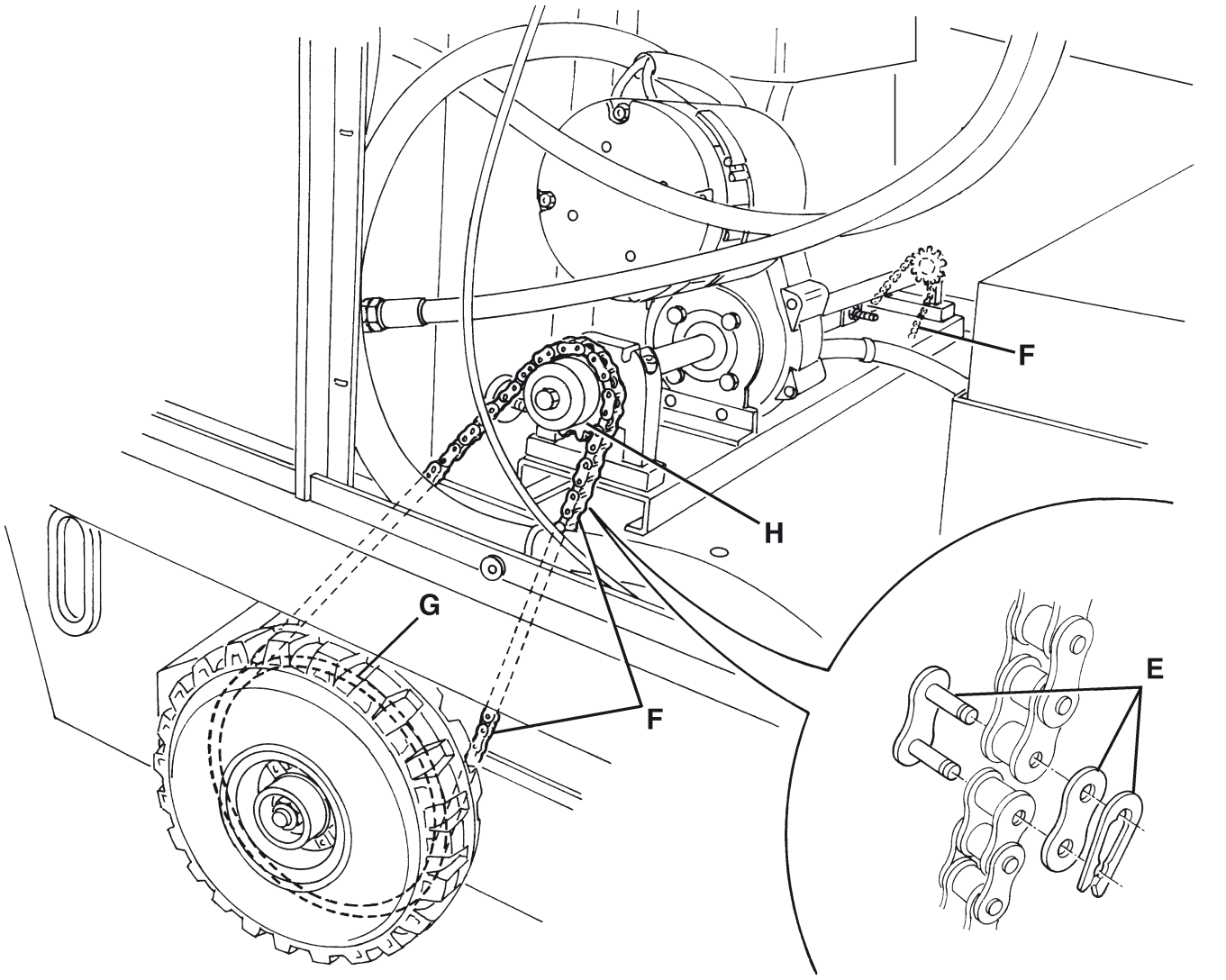
15. On both sides of the machine, check that the drive chains (F) are slightly loose. If necessary, adjust the tension as shown in the previous paragraph.
16. Assemble the components in the reverse order of disassembly.



P100275

DRIVE SYSTEM

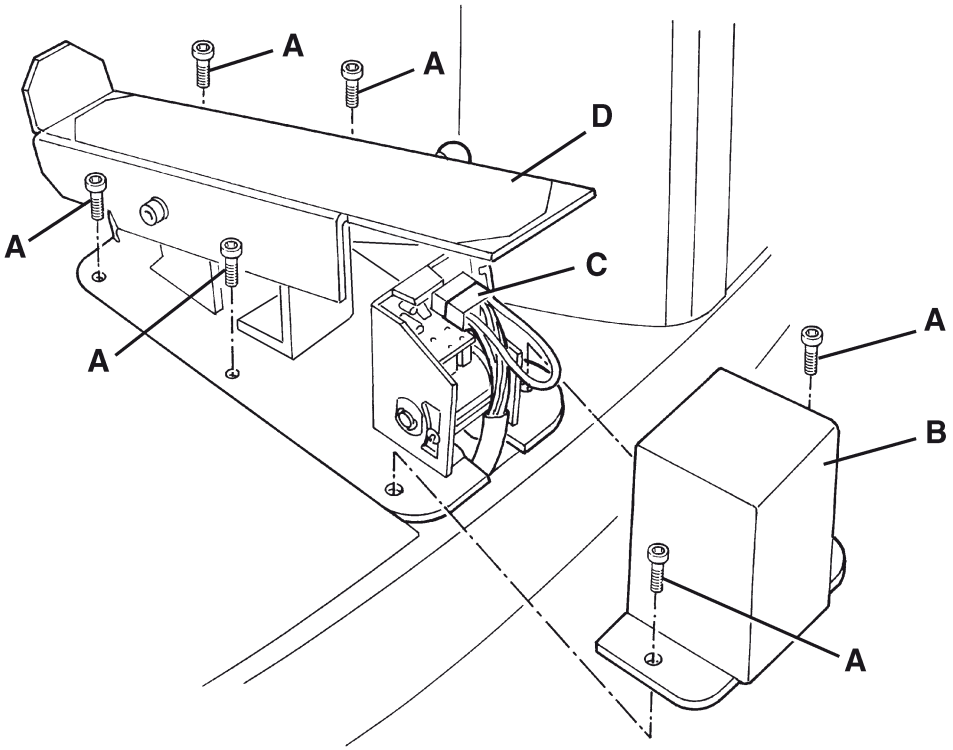
DRIVE CHAIN REPLACEMENT (Continues)



S300595

FORWARD/REVERSE GEAR PEDAL CONTROL BOARD REPLACEMENT

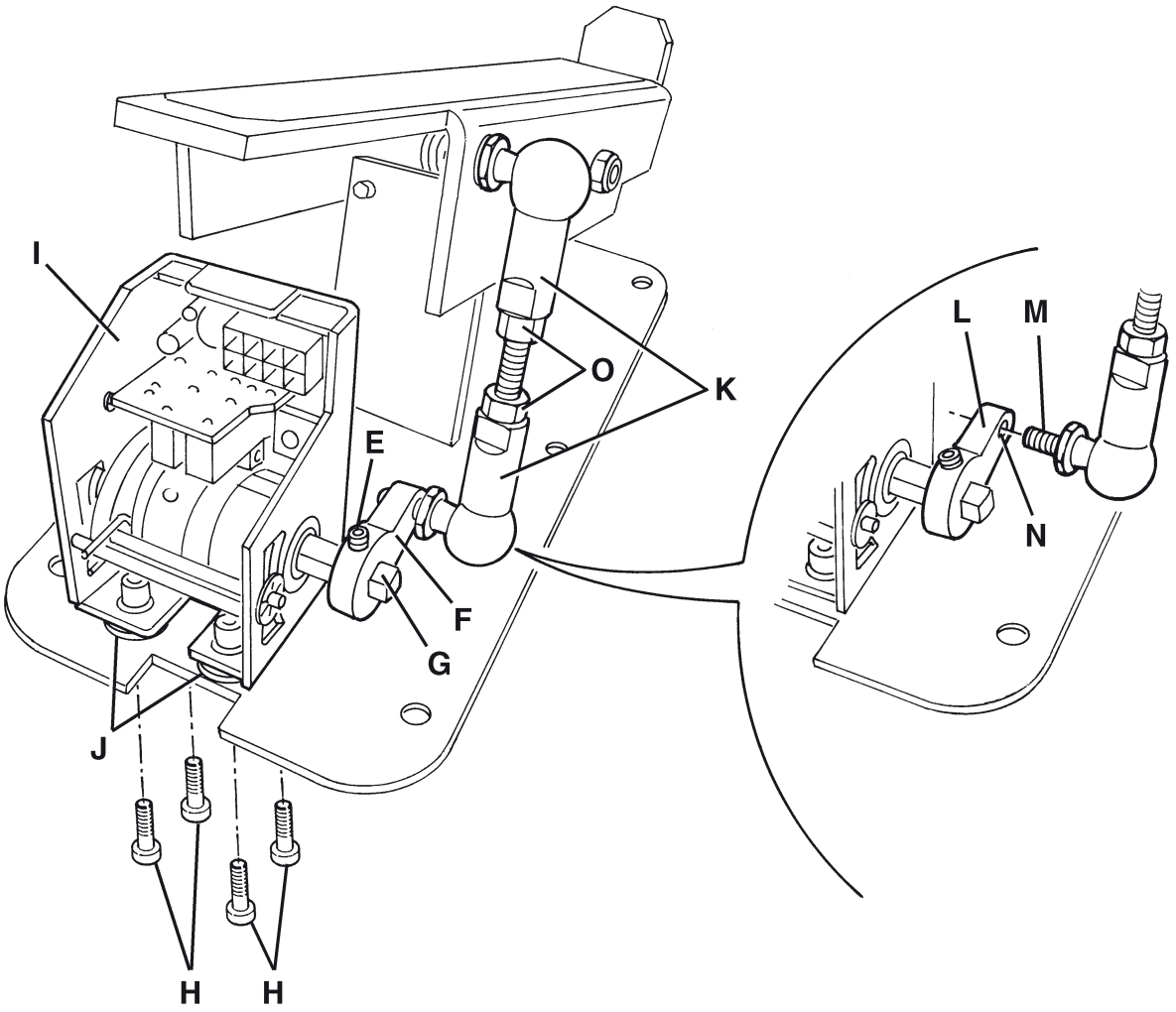
1. Drive the machine on a level floor.
2. Engage the parking brake with the pedal and the lever (25 and 18).
3. Turn the ignition switch (17) to “0”.
4. Remove the forward/reverse gear pedal mounting screws (A).
5. Remove the cover (B).
6. Disconnect the electrical connector (C) by disengaging the fastener on the lower side.
7. Remove the forward/reverse gear pedal (D).
8. Loosen the dowel (E) at the workbench.
9. Remove the connecting rod (F) from the pin (G).
10. Remove the screws (H).
11. Remove the board assembly (I).
12. Remove the shims (J).
13. Assemble the components in the reverse order of disassembly, and note the following:
    - Normally the tie rod (K) does not require adjustment, however, when the electronic board (I) and the connecting rod (F) are reinstalled check that the tie rod (K) is properly adjusted as shown below:
      – Remove the terminal (M) from the connecting rod (L).
      – When the connecting rod is released, check that the terminal (M) is aligned with the connecting rod hole (N) (as shown in the figure).
        If necessary, perform the alignment by adjusting the nuts (O) and the tie rod (K); then, tighten the nuts.
      – Install the terminal (M) on the connecting rod (L).
14. Perform some operation tests on the forward/reverse gear pedal (19) and check the following conditions with the ignition switch (17) in “I”:
    - When the pedal (19) is released the machine should not move.
    - When the pedal (19) is slightly pressed forward or backward, the machine should start moving slowly.



S300596

DRIVE SYSTEM

FORWARD/REVERSE GEAR PEDAL CONTROL BOARD REPLACEMENT (Continues)



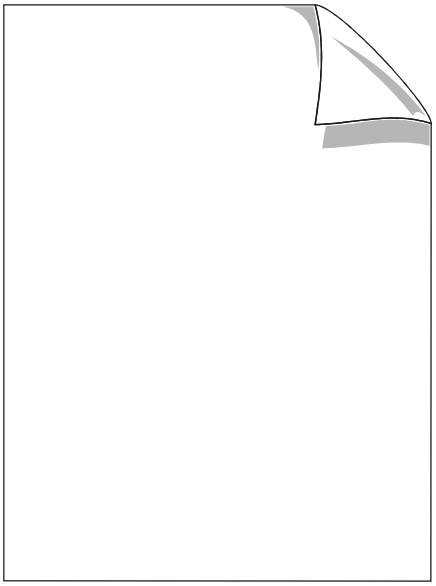
S300597

TROUBLESHOOTING

The machine does not move

Possible causes:

1. The motor carbon brushes are worn (replace).
2. The motor is faulty (repair or replace).
3. There are foreign materials clogging the drive chain (remove).
4. The under-seat switch is damaged (replace).
5. The potentiometric accelerator is damaged (replace).
6. The brake is engaged (disengage).
7. The drive system has been turned off with the pushing/towing switch (60) (if equipped) (turn on).
8. The drive system electronic board is damaged (replace).



HOPPER HYDRAULIC LIFTING SYSTEM

HYDRAULIC SYSTEM OIL CHANGE

CAUTION!
Replacement to be performed with the hopper (31) fully retracted (as shown in the figure).

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition switch (17) to “0”.
3. Open the hood (49) and fasten it with the support rod (63).
4. Disconnect the battery connector (52).
5. Put a waterproof sheet and absorbing clothes under the oil tank (A) to protect the parts under the tank against oil dripping during the removal.

WARNING!
Oil is highly corrosive.

6. Remove the screws (B), then remove the oil tank (A).
7. Empty the oil tank (A) completely.

CAUTION!
The discharged oil should be disposed of properly according to the environmental Laws in force.

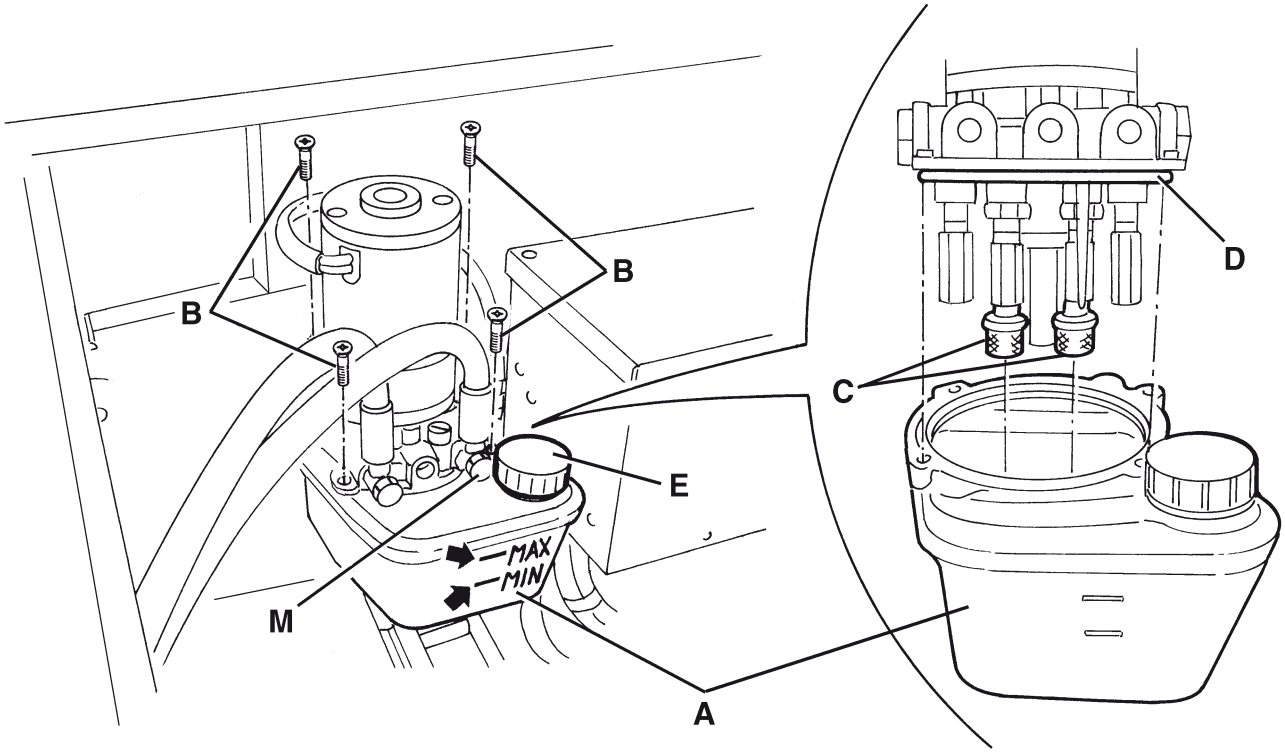
8. Clean the filters (C) with a brush.
9. Remove the mounting screws (G), then remove the right body side (F).
10. Disconnect the hose connection (L) and drain the oil into a container.
11. Connect the connection (L).
12. Install the oil tank (A) and the gasket (D), then fasten it with the screws (B).
13. Pour oil (viscosity grade 32 cSt) into the tank (A) through the plug (E) until the oil level reaches the MAX mark [total quantity 0.37 gal (1.4 litres)].
14. On the hydraulic unit, disconnect the connection (M) of the hose (N) from the stem side of the hydraulic cylinder and drain the oil into a container.
15. Temporarily connect the battery connector (51).
16. Start the machine and turn the ignition switch (17) to “I”.
17. Carefully lift the hopper (31) completely (see the procedure in the User Manual), drain the oil from the pipe end (M) and collect it into a container.
18. Turn the ignition switch (17) to “0”.
19. Connect the hose connection (M) to the hydraulic unit.
20. Start the machine and turn the ignition switch (17) to “I”.
21. Lower the hopper (31) completely (see the procedure in the User Manual).
22. Pour the oil into the tank (A) through the plug (E), until the oil level is between the MIN and MAX marks.

WARNING!
Oil should not be over the above-mentioned intermediate level, otherwise, during the next operations, the oil may flow out of the tank plug (E).

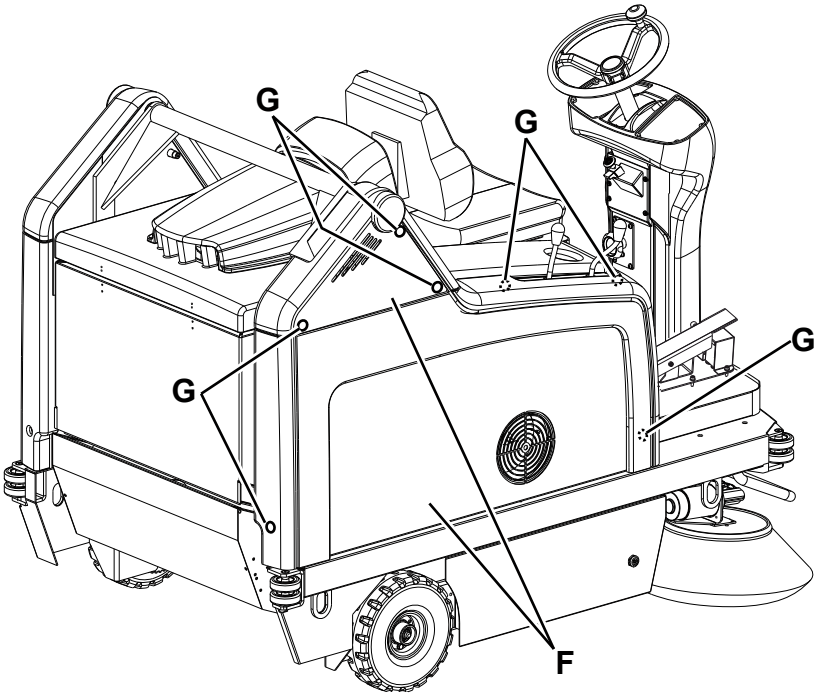
23. Perform steps 3 to 5 in the reverse order.
24. Move the hopper (31) to simulate some emptying operations (see the procedure in the User Manual).
25. Turn the ignition switch (17) to “0”.
26. Open the hood (49) and fasten it with the support rod (63).
27. Check that the oil level in the tank (A) is between the MIN and MAX marks shown in the figure, otherwise top up, then close the hood (49).

HOPPER HYDRAULIC LIFTING SYSTEM

HYDRAULIC SYSTEM OIL CHANGE (Continues)

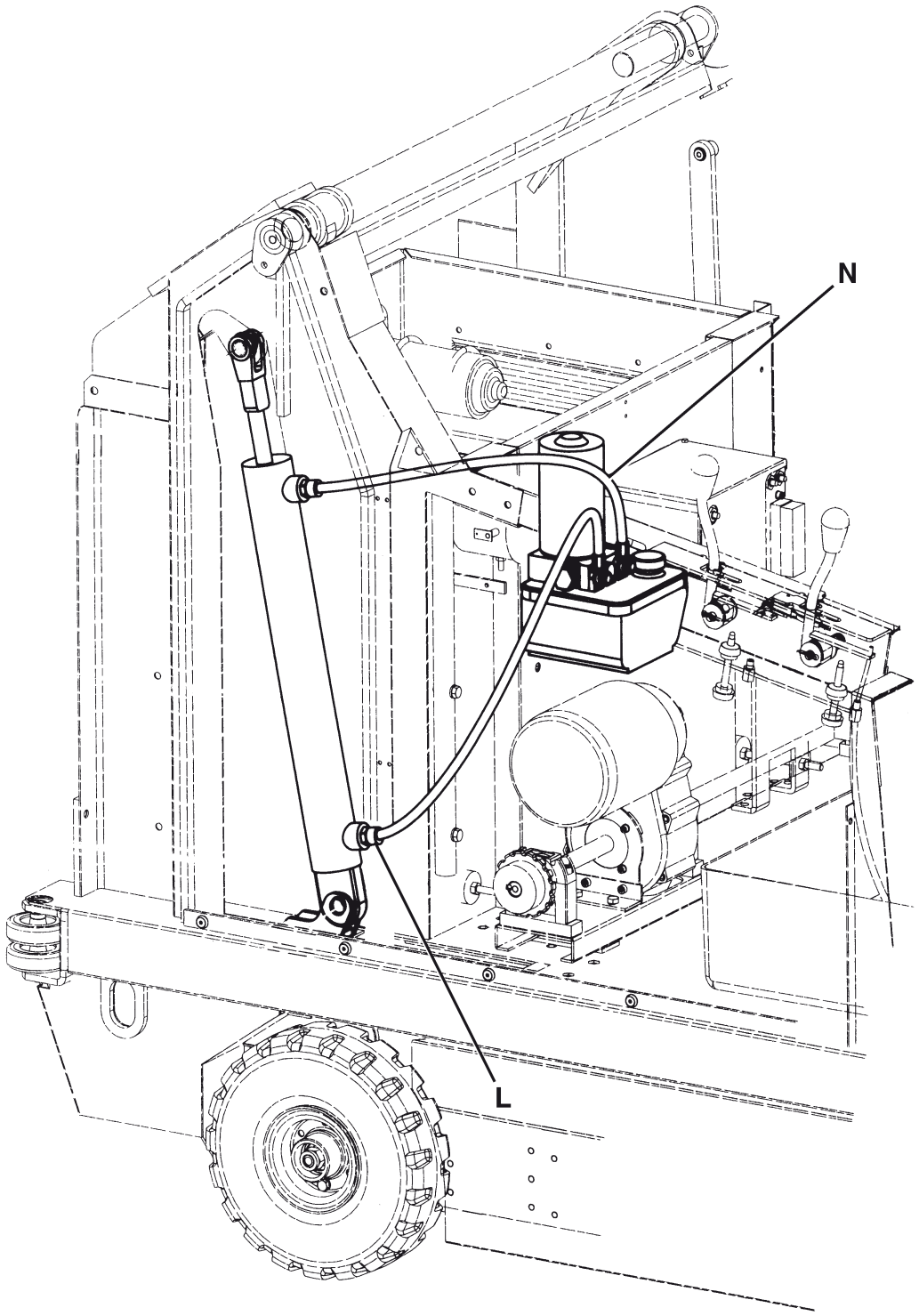


S300598



P100293

HYDRAULIC SYSTEM OIL CHANGE (Continues)



S300600

HOPPER HYDRAULIC LIFTING SYSTEM

HOPPER LIFTING SYSTEM PUMP REMOVAL

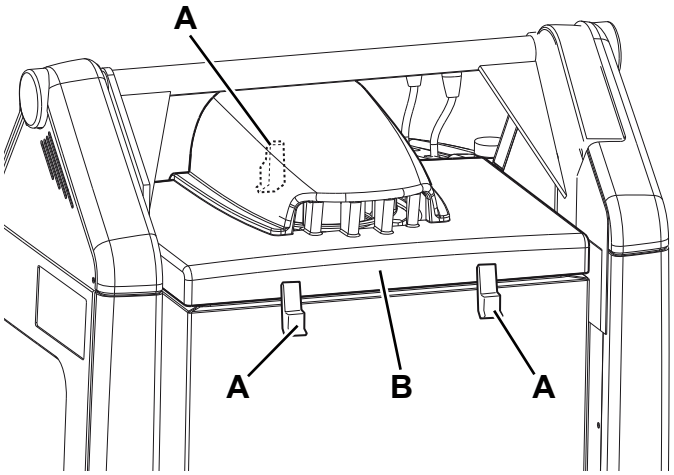
1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Ensure that the hopper (31) is fully retracted.

WARNING!
While removing the pump, the hopper (31) should not be in the lifted position or in intermediate positions, even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

3. Turn the ignition switch (17) to “0”.
4. Open the hood (49) and fasten it with the support rod (63).
5. Disconnect the battery connector (52).
6. Release the fasteners (A) and remove the dust filter cover (B).
7. Disconnect the electrical connector (C) from the pump.
8. Put a waterproof sheet and absorbing clothes under the pump (D) to protect the parts under the pump from oil dripping during removal.

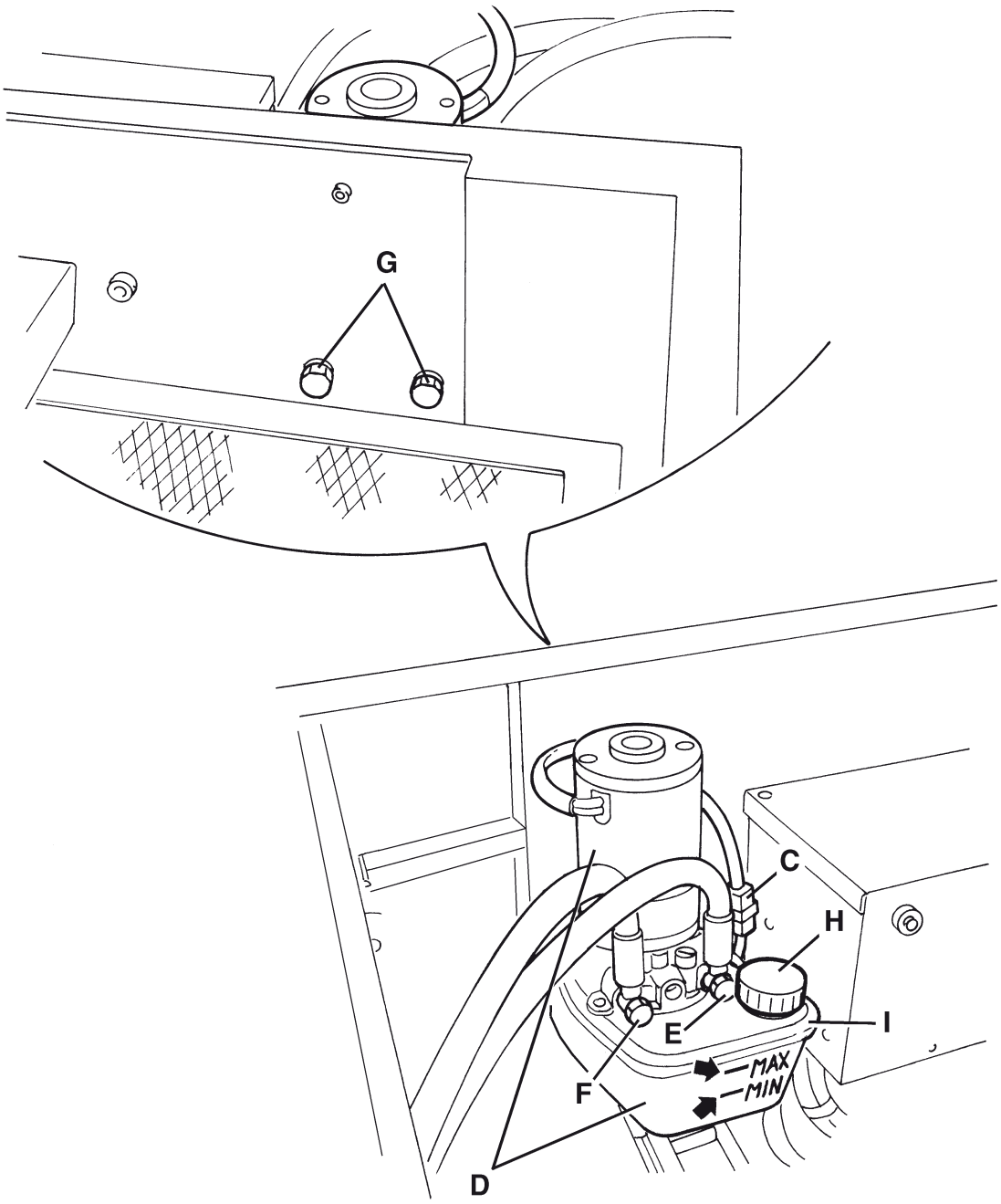
WARNING!
Oil is highly corrosive.

9. Mark the position of the pump fittings (E) and (F) (for proper reassembly), then disconnect them.
10. Remove the screws (G) from the dust filter compartment, then remove the pump (D).
11. Assemble the components by performing steps 5 to 10 in the reverse order.
12. Pour the oil in the tank (I) through the plug (H), until the oil level reaches the MAX mark; use oil with 32 cSt viscosity grade only.
13. Disengage and place the support rod (67) in its housing and close the hood (48).
14. Move the hopper (31) to simulate some emptying operations (see the procedure in the User Manual).
15. Turn the ignition switch (17) to “0”.
16. Open the hood (48) and fasten it with the support rod (67).
17. Check the pump fittings (E) and (F) for oil leaks.
18. Check that the oil level in the tank (A) is between the MIN and MAX marks shown in the figure, otherwise top up; then disengage the support rod (67) and close the hood (48).



P100225

HOPPER LIFTING SYSTEM PUMP REMOVAL (Continues)



S300602

HOPPER HYDRAULIC LIFTING SYSTEM

HOPPER LIFTING HYDRAULIC CYLINDER REMOVAL

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Lift the hopper (A) partially, as shown in the figure, until the hydraulic cylinder upper fork (B) is accessible (see the procedure in the User Manual).
   Put a proper stand (C) under the hopper (A).
   Lower the hopper (A) and lay it on the stand (C), so that the pin (D) is free from any load and, therefore, extractible.

WARNING!
While removing the hydraulic cylinder, the hopper (31) will lean completely on the stand (C).

3. Remove the mounting screws (E), then remove the right body side (F).
4. Remove the snap ring (G).
5. Remove the pin (D) by pushing it inward.
6. Retract the cylinder stem (H) completely by operating the hopper lowering controls (see the procedures in the User Manual).

WARNING!
Some protection bulkheads have been removed from the machine, therefore some moving parts are not protected.

7. Mark the position of the cylinder body fittings (I) and (J) (for proper reassembly), then remove them. With absorbing clothes, recover the oil which has flown out.

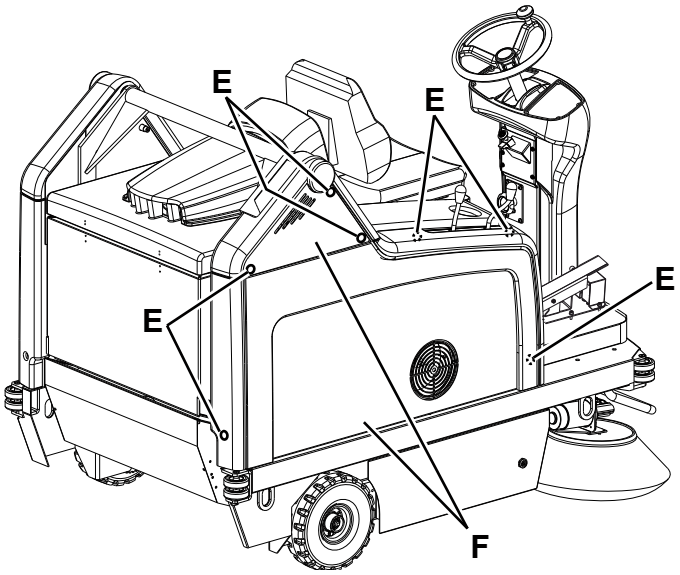
WARNING!
Oil is highly corrosive.

8. Remove the hydraulic cylinder lower mounting screw (K). Recover the shims (L).
9. Remove the hydraulic cylinder (M).
10. Install the hydraulic cylinder by performing steps 5 to 10 in the reverse order.
11. Pour the oil in the tank (N) through the plug (O), until the oil level reaches the MAX mark; use oil with 32 cSt viscosity grade only.
12. Disengage and place the support rod (63) in its housing and close the hood (49).
13. Move the hopper (31) to simulate some emptying operations, then retract it (see the procedure in the User Manual).

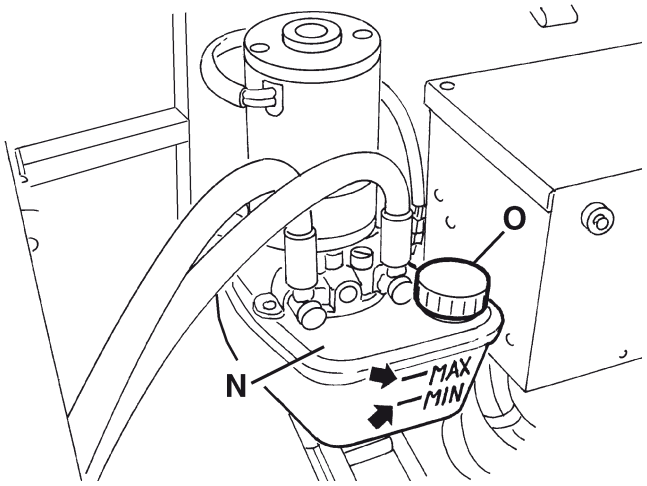
WARNING!
Some protection bulkheads have been removed from the machine, therefore some moving parts are not protected.

14. Turn the ignition switch (17) to “0”.
15. Open the hood (49) and fasten it with the support rod (63).
16. Check the hydraulic cylinder fittings (I) and (J) for oil leaks.
17. Check that the oil level in the tank (N) is between the MIN and MAX marks shown in the figure, otherwise top up; then disengage the support rod (63) and close the hood (49).
18. Install the right body side (E) and fasten it with the relevant mounting screws (F).

HOPPER LIFTING HYDRAULIC CYLINDER REMOVAL (Continues)



P100294



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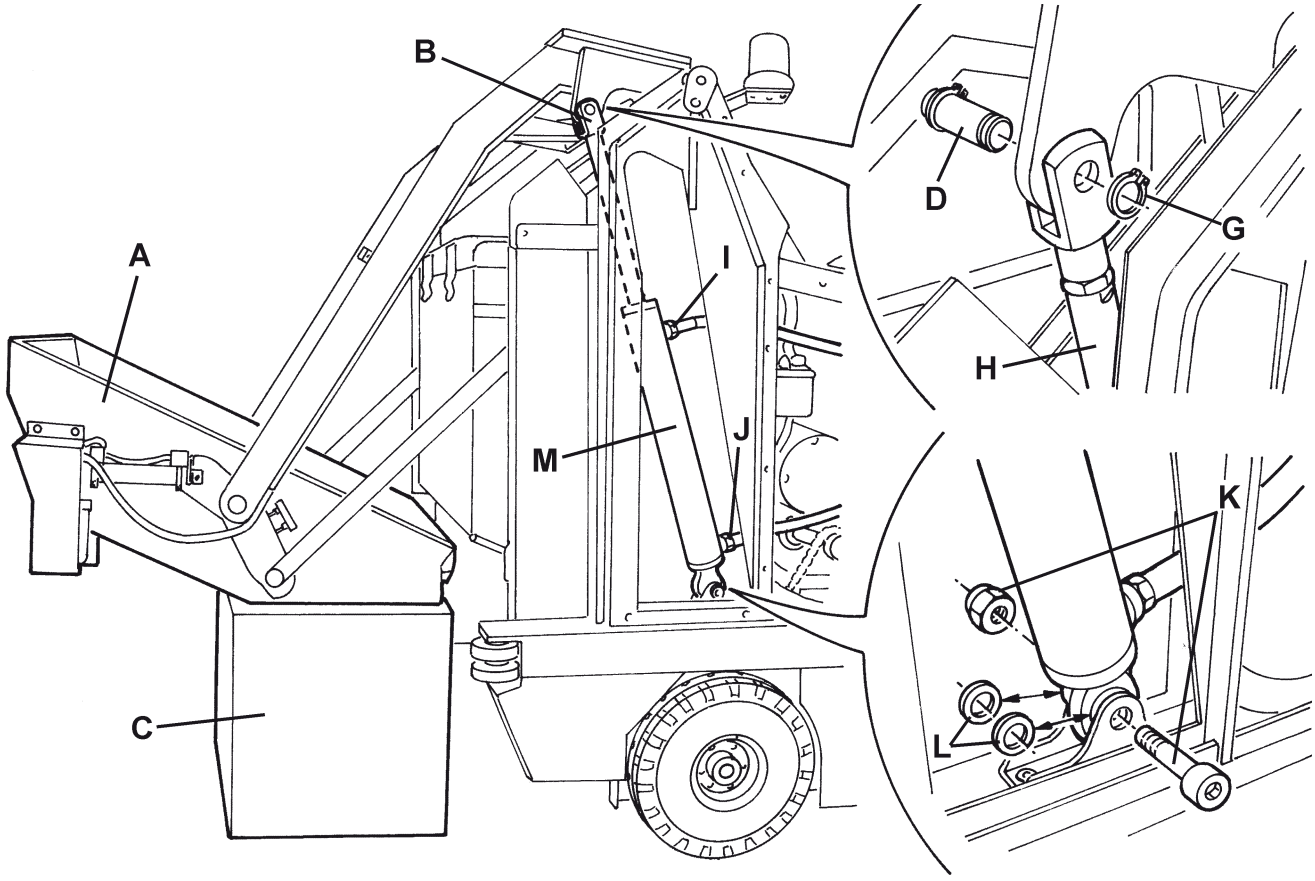


L310010

HOPPER HYDRAULIC LIFTING SYSTEM

PUMP-TO-HYDRAULIC CYLINDER FEED AND/OR RETURN HOSES REMOVAL (Continues)

19. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
20. Ensure that the hopper (A) is completely retracted.

WARNING!
While removing the pump, the hopper (31) should not be in the lifted position or in intermediate positions, even if the hopper lifting hydraulic cylinder is equipped with a parachute valve which prevents the hopper from lowering suddenly in case a hose breaks or leaks.

21. Remove the mounting screws (B), then remove the right body side (C).
22. Mark the position of the cylinder body fittings (F) and/or (G) (for proper reassembly), then remove them. With absorbing clothes, recover the oil which has flown out.

WARNING!
Oil is highly corrosive.

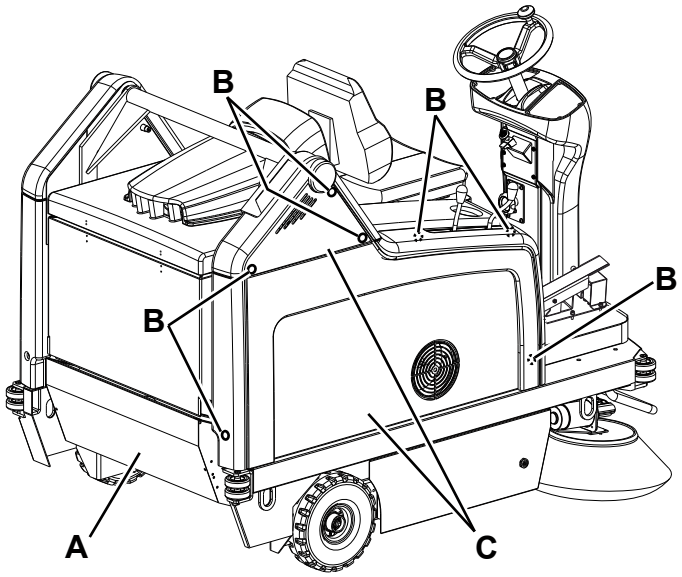
23. Put absorbing clothes under the pump (H) to protect the parts under the pump from oil dripping during hose removal.
24. Mark the position of the cylinder body fittings (I) and/or (J) (for proper reassembly), then remove them.
25. Remove the hoses (K) and/or (L).
26. Assemble the hoses by performing steps 5 to 8 in the reverse order.
27. Pour the oil in the tank (H) through the plug (M), until the oil level reaches the MAX mark; use oil with 32 cSt viscosity grade only.
28. Disengage and place the support rod (63) in its housing and close the hood (49).
29. Move the hopper (31) to simulate some emptying operations, then retract it (see the procedure in the User Manual).

WARNING!
Some protection bulkheads have been removed from the machine, therefore some moving parts are not protected.

30. Turn the ignition switch (17) to “0”.
31. Open the hood (49) and fasten it with the support rod (63).
32. Check the hydraulic cylinder fittings (F) and/or (G) and the pump fittings (I) and/or (J) for oil leaks.
33. Check that the oil level in the tank (H) is between the MIN and MAX marks shown in the figure, otherwise top up; then disengage the support rod (63) and close the hood (49).
34. Install the right bulkhead (C) and fasten it with the relevant mounting screws (B).

HOPPER HYDRAULIC LIFTING SYSTEM

PUMP-TO-HYDRAULIC CYLINDER FEED AND/OR RETURN HOSES REMOVAL (Continues)



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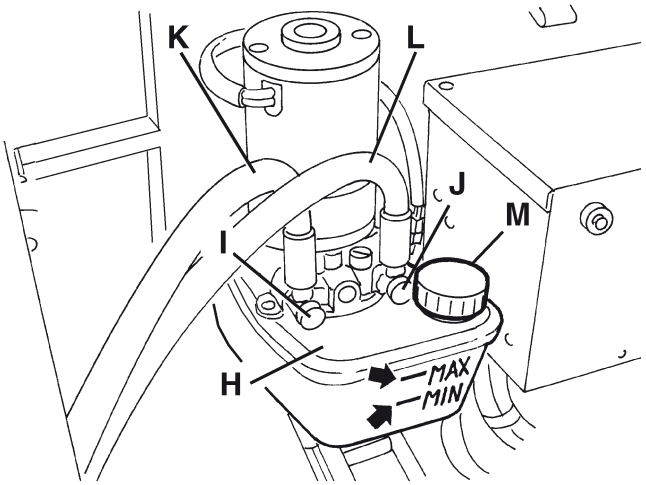

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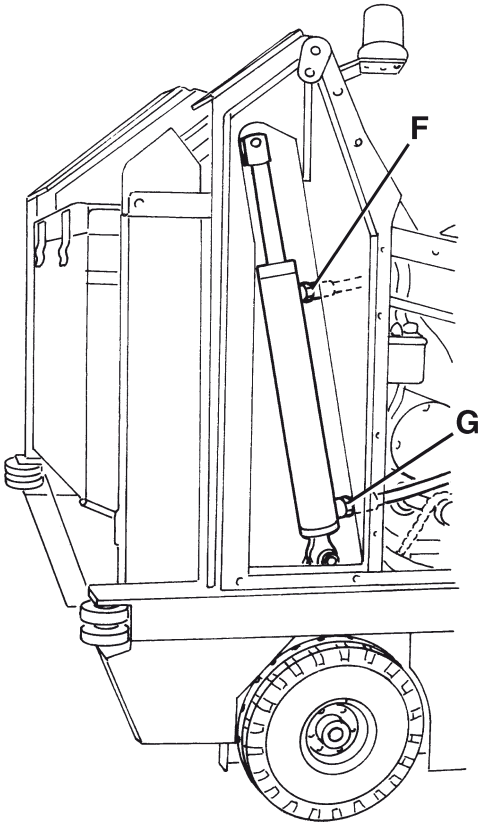
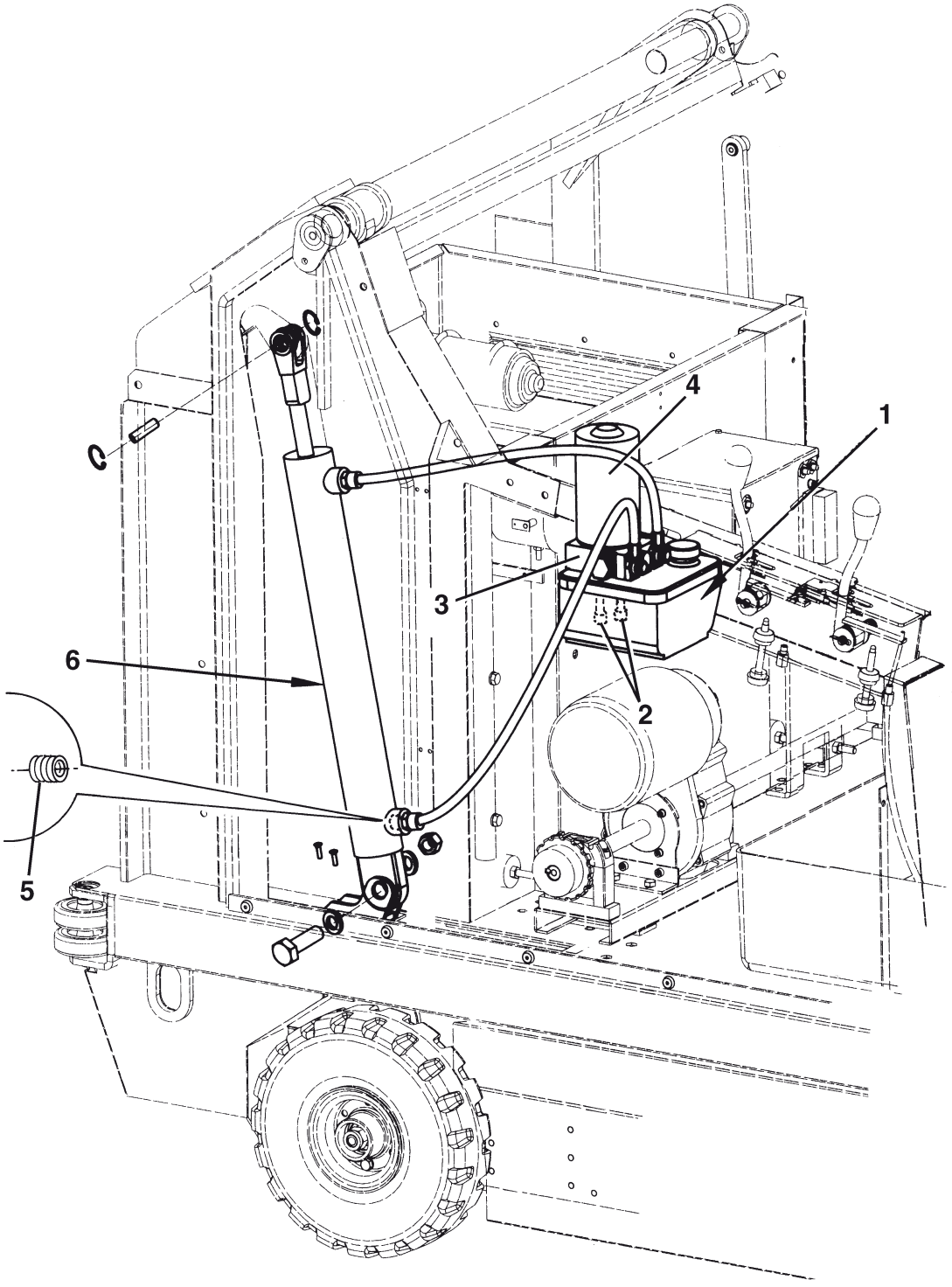


S300608

HOPPER HYDRAULIC LIFTING SYSTEM

COMPONENT LOCATION

1. Oil tank
2. Oil filter
3. Pump
4. Motor
5. Parachute valve
6. Hopper hydraulic lifting cylinder

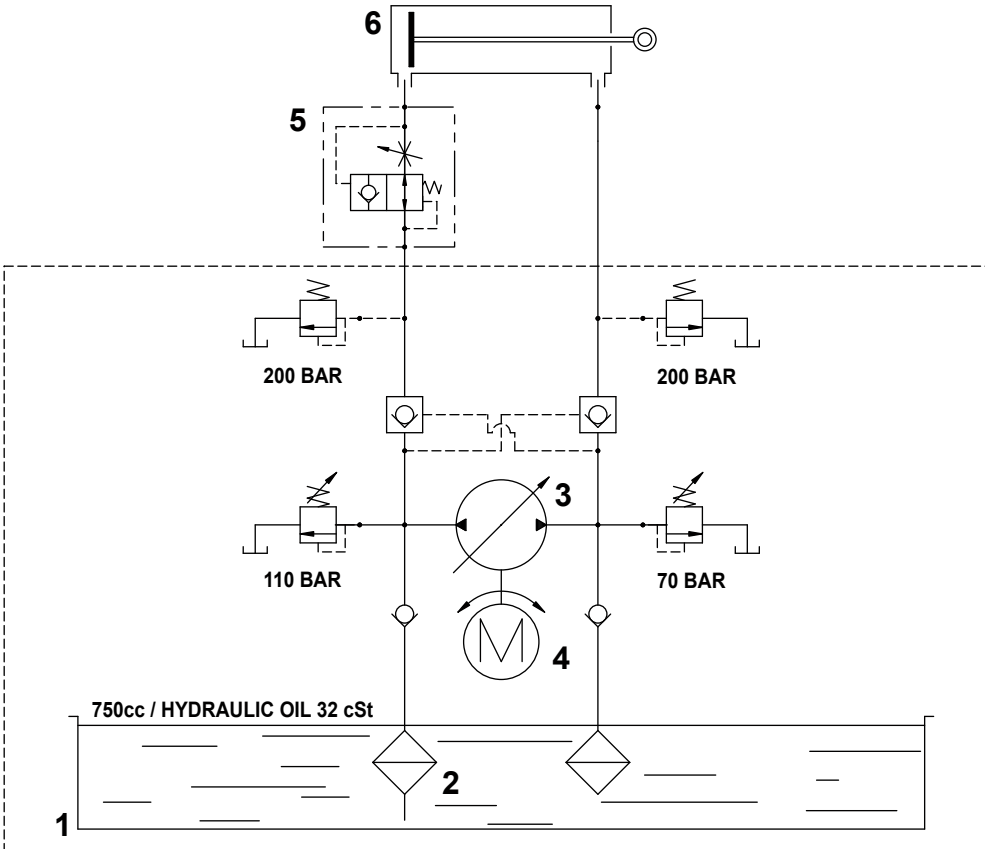


S300609

HYDRAULIC DIAGRAM

Key

1. Oil tank
2. Oil filter
3. Pump
4. Motor
5. Parachute valve
6. Hopper hydraulic lifting cylinder



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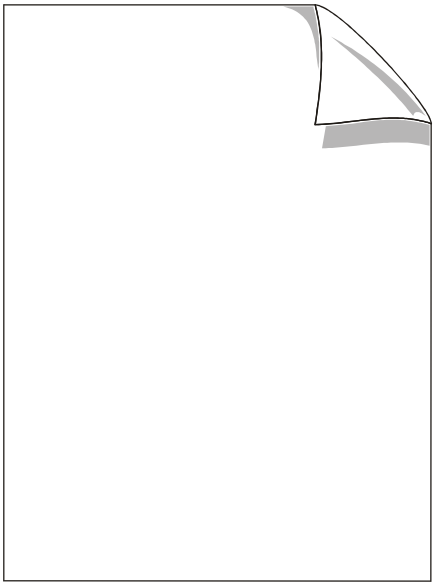
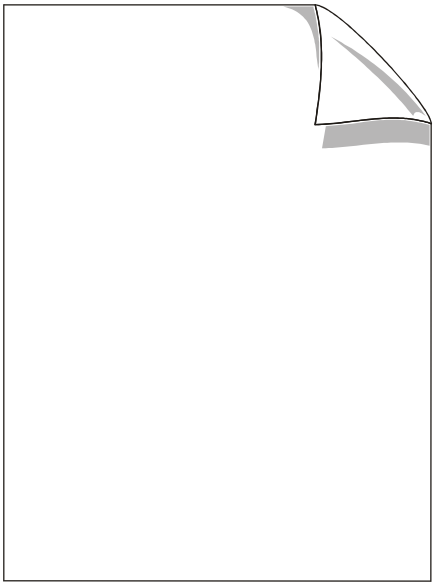


OTHER SYSTEMS

SCREW AND NUT TIGHTENING CHECK

1. Drive the machine on a level floor.
2. Engage the parking brake with the pedal and the lever (25 and 18).
3. Turn the ignition switch (17) to “0”.
4. Open the hood (79) and fasten it with the support rod (73).
5. Disconnect the battery connector (52).
6. Check the following:
   - Tightening of mounting screws and nuts.
   - Proper position of fasteners.
   - Part and component visible faults.
7. Perform steps 3 to 4 in the reverse order.



ELECTRICAL SYSTEM

BATTERY REMOVAL, INSTALLATION, MAINTENANCE AND CHARGING

See the User Manual.

FUSE CHECK/REPLACEMENT/RESET

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (25 and 18).
2. Turn the ignition key (17) to “0”.
3. Open the hood (49) and fasten it with the support rod (63).
4. Disconnect the battery connector (52).

Lamellar fuse check/replacement

5. Remove the cover (A) and mark the positions of the fuses shown on the adhesive.
6. Check/replace the relevant fuse among the following (B):
   - F1 fuse (30 A): Key circuit
   - F2 fuse (30 A): Filter shaker
   - F3 fuse (30 A): Vacuum system
   - F4 fuse (30 A): Hydraulic pump
   - F5 fuse (10 A): Flashing light (optional)
   - F6 fuse (10 A): Working light (optional)
   - F7 fuse (10 A): Hopper actuator
   - F8 fuse (30 A): Spare fuse

Main fuse check/replacement

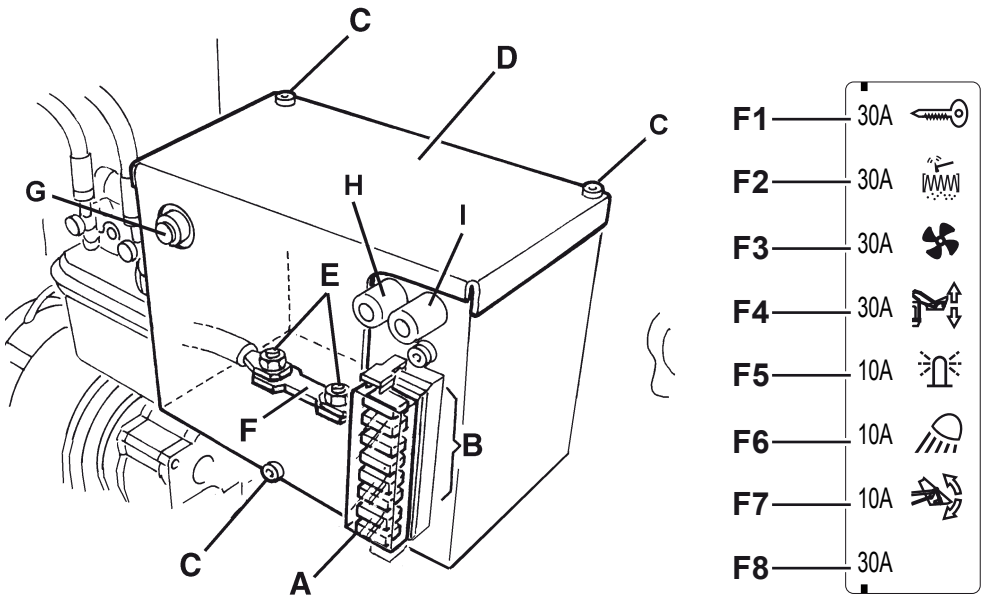
7. Remove the screws (C), then remove the cover (D).
8. Remove the nuts (E).
9. Check/replace the main fuse F0 (150 A) (F)

Circuit breaker check

10. Check for deactivation of one of the following fuses, then reset it after the relevant motor has cooled down:
    - FA fuse (10 A) (H): Right side broom motor circuit breaker
    - FB fuse (10 A) (I): Left side broom motor circuit breaker
    - FC fuse (30 A) (G): Main broom motor circuit breaker

Assembly

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



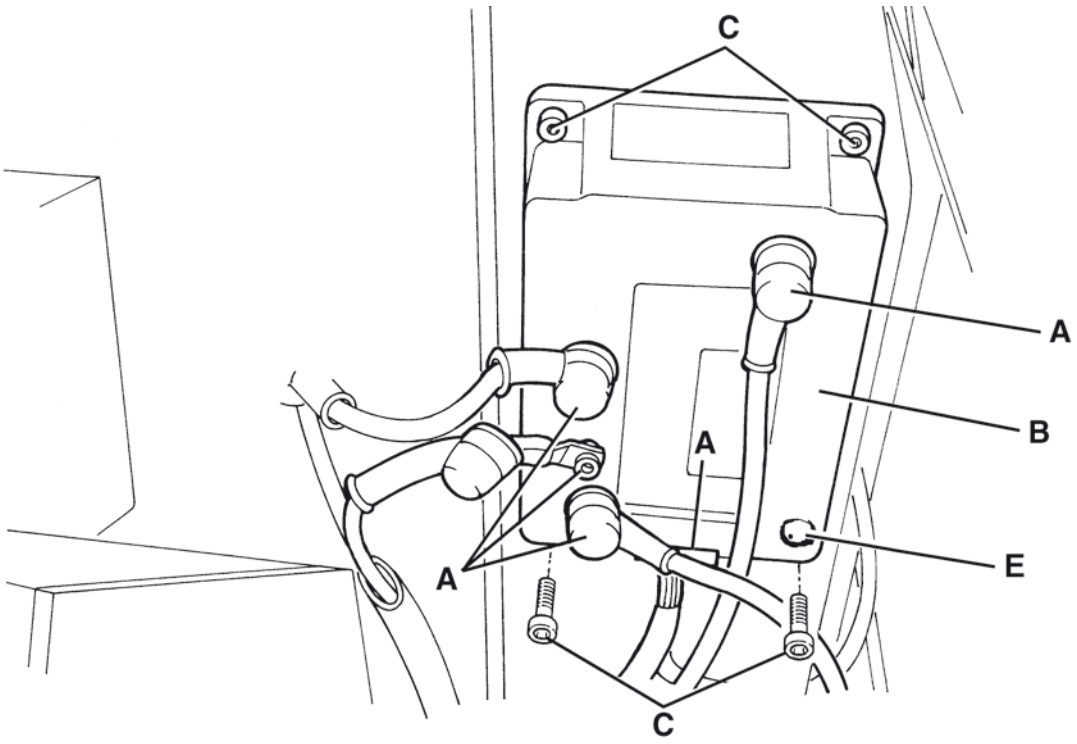
S311447

ELECTRICAL SYSTEM

DRIVE SYSTEM ELECTRONIC BOARD REPLACEMENT

NOTE
After installing a new drive system electronic board installation, neither the machine nor the electronic board should be reprogrammed.

1. Drive the machine on a level floor and engage the parking brake with the pedal and the lever (26 and 19).
2. Turn the ignition switch (17) to “0”.
3. Open the hood (48) and fasten it with the support rod (67).
4. Disconnect the battery connector (51).
5. Disconnect the electrical connections (A) from the drive system electronic board (B).
6. Remove the screws (C) and the drive system electronic board (B).
7. Assemble the components in the reverse order of disassembly.



S300612

TROUBLESHOOTING

In case of drive system malfunction, check if the drive system electronic board diagnostic warning light (E) turns on.
Check the number of flashes and refer to the following table:

No. of flashes	Description	Causes and remedies
1	Pedal pressed upon ignition.	Check that the forward/reverse gear pedal is not pressed. Turn off the machine and then turn it on again.
2	Low battery voltage.	Check that the batteries are charged and not damaged. Charge the batteries, or replace them if necessary.
3	Not used.	
4	Open circuit in the motor.	The connection between electronic board and motor is damaged. Replace. The motor carbon brushes must be replaced. The motor is damaged. Replace.
5	Faulty electronic board.	Replace the electronic board.
6	Faulty accelerator potentiometer.	Check the wiring harness between pedal and electronic board. Replace the pedal electronic board.
7	Excessive temperature.	Let the machine cool down and retry. Check the drive system motor electrical input as shown in the relevant paragraph.
8	The machine has been turned on with the ignition key while it was moving.	The machine must be turned on and off only when it is stationary.
9	Damaged electronic board.	Replace.
10	Motor overcurrent.	Check for short-circuits in the wiring harness between the electronic board and the motor; if necessary replace the drive system motor.
11	Damaged electronic board.	Replace.
12	Damaged electronic board.	Replace.
13	Damaged electronic board.	Replace.
14	Damaged electronic board.	Replace.

TROUBLESHOOTING

See the previous chapters relevant to the use of the electrical system.
Other possible causes:

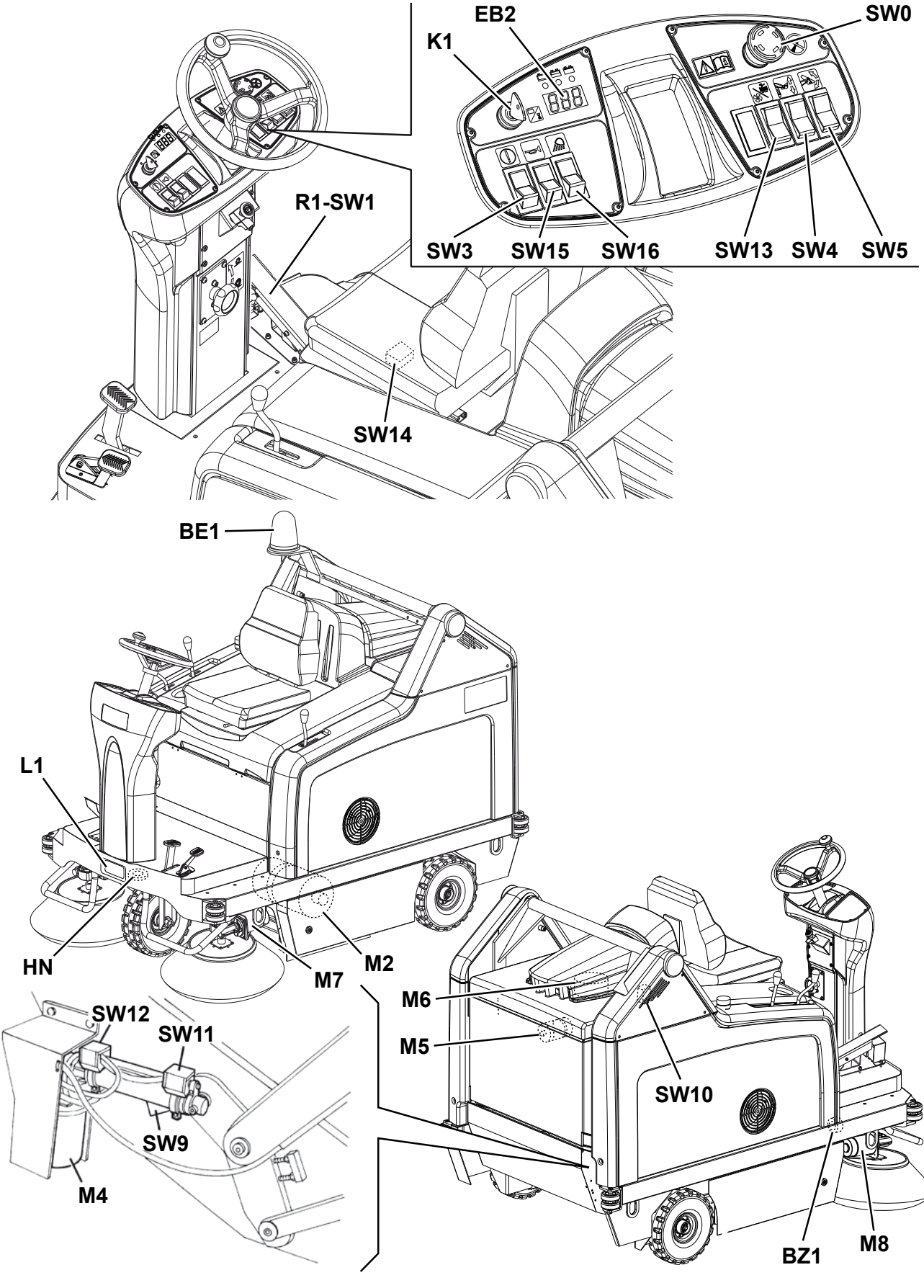
1. Discharged battery or inefficient connections (charge the battery or clean the connections).
2. Blown fuses (replace).
3. Defective battery electrical connector (replace).
4. The wiring harness is cut, squashed or shorted (repair).

ELECTRICAL SYSTEM

COMPONENT LOCATION

BE1	Flashing light (optional)
BZ1	Reverse gear buzzer/horn
C1	Battery connector
EB1	Drive system electronic board
EB2	Display electronic board
ES1	Line electromagnetic switch
ES2	Main broom electromagnetic switch
ES3	Hopper lifting pump relay
ES4	Hopper lowering pump relay
ES5	Vacuum system relay
F0	Main fuse (150 A)
F1	Key fuse (30 A)
F2	Filter shaker fuse (30 A)
F3	Vacuum system fuse (30 A)
F4	Hydraulic pump fuse (30 A)
F5	Reverse gear buzzer and pivoting light fuse (10 A)
F6	Working light fuse (10 A)
F7	Actuator fuse (10 A)
FA	Right side broom circuit breaker (10 A)
FB	Left side broom circuit breaker (10 A)
FC	Main broom circuit breaker (30 A)
HN	Horn
K1	Ignition key
L1	Working light (optional)
M1	Drive system motor
M2	Main broom motor
M3	Hydraulic pump
M4	Actuator
M5	Filter shaker motor
M6	Vacuum system motor
M7	Right side broom motor
M8	Left side broom motor
R1	Accelerator potentiometer (built in the pedal)
SW0	Emergency push-button
SW1	Forward/reverse gear switch (built in the pedal)
SW2	Main broom microswitch
SW3	Hopper enabling switch
SW4	Hopper lifting/lowering switch
SW5	Hopper dumping switch
SW7	Right side broom microswitch
SW8	Left side broom microswitch
SW9	Horizontal hopper microswitch
SW10	Lifted hopper microswitch
SW11	Opened hopper microswitch
SW12	Closed hopper microswitch
SW13	Filter shaker/vacuum system switch
SW14	Driver’s seat safety microswitch
SW15	Horn switch
SW16	Working light switch (optional)
BATT	Batteries
BATT. DIAGRAM	Battery installation diagram

COMPONENT LOCATION (Continues)



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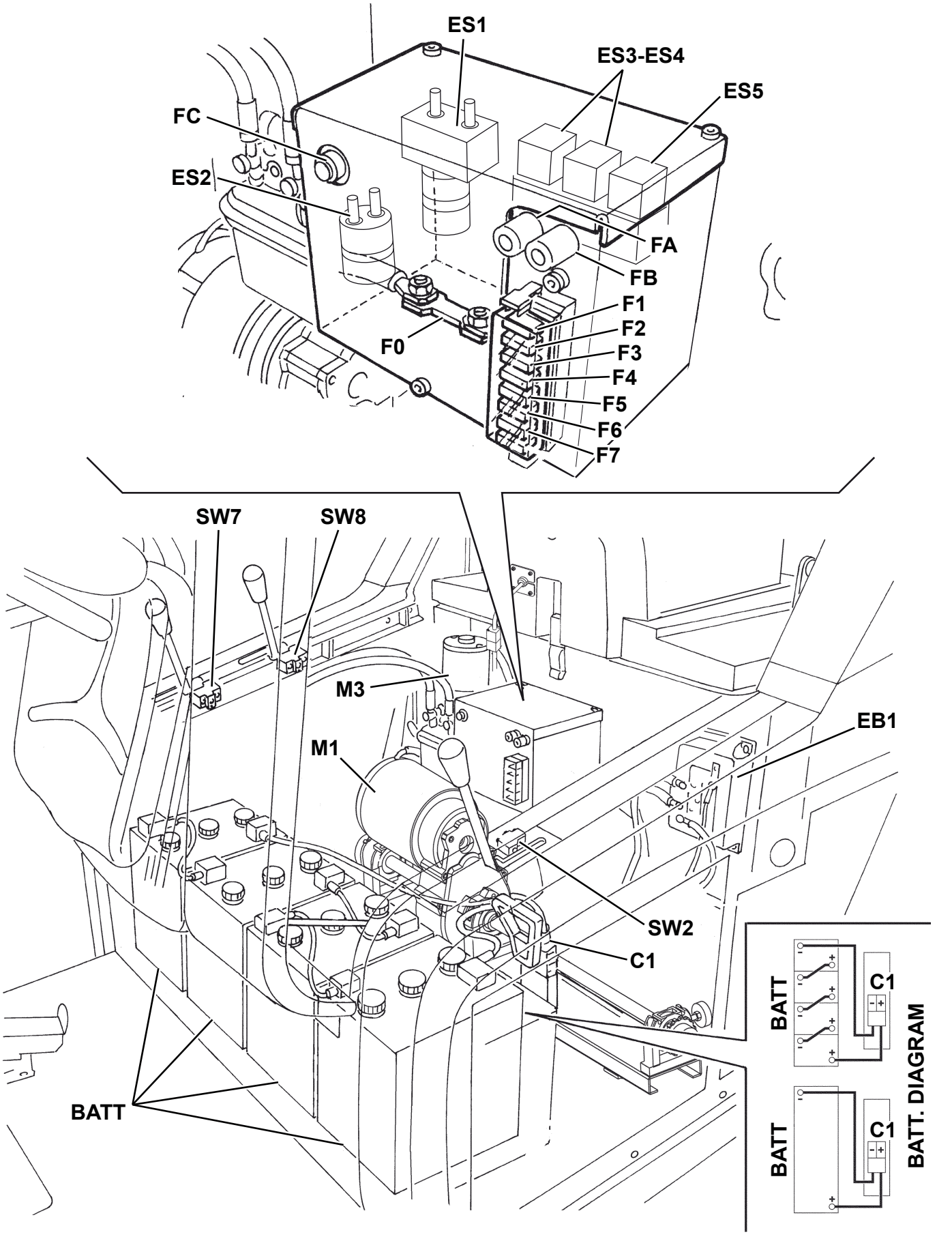
ELECTRICAL SYSTEM

COMPONENT LOCATION (Continues)



P100297

WIRING DIAGRAM

Key

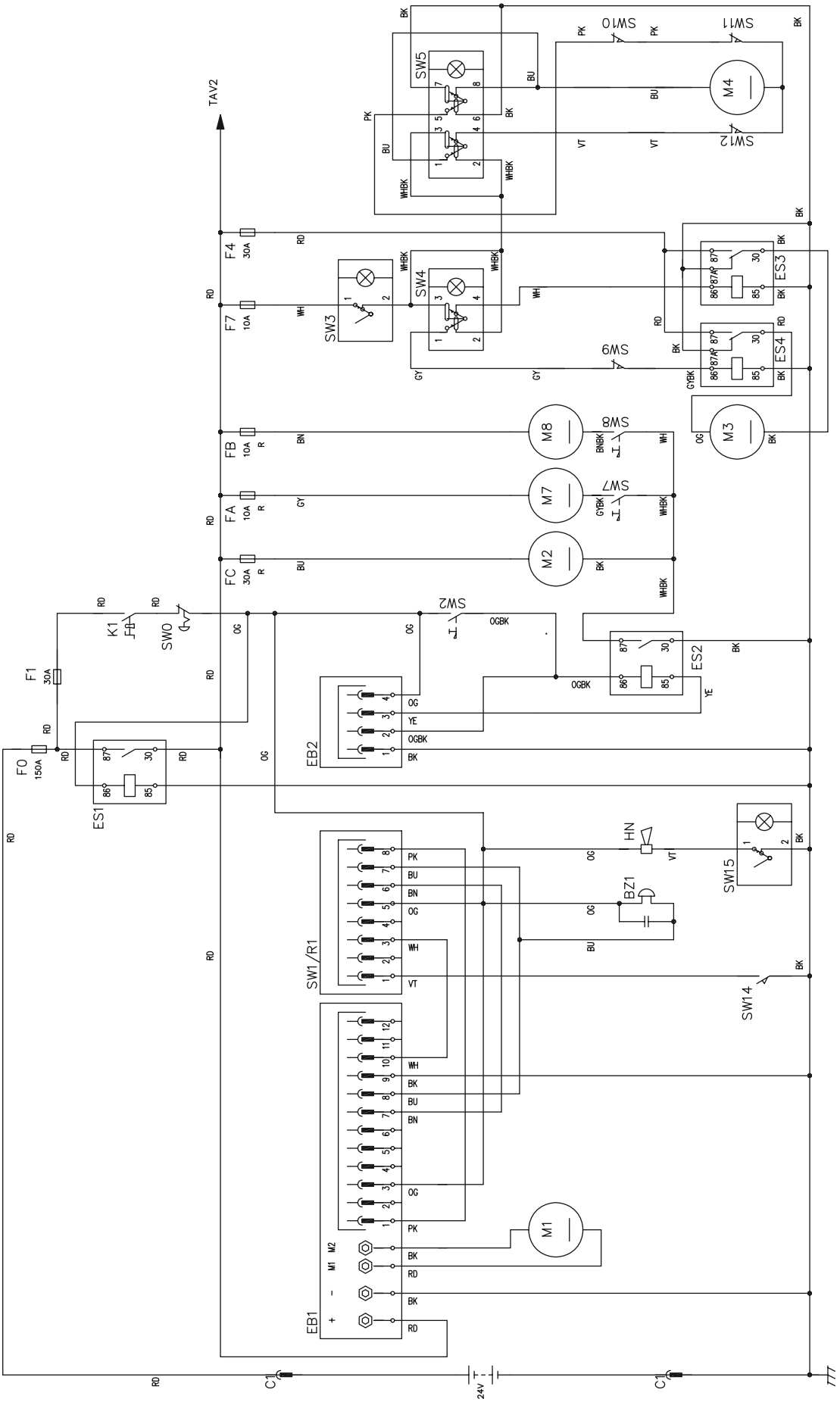
BE1	Flashing light (optional)
BZ1	Reverse gear buzzer/horn
C1	Battery connector
EB1	Drive system electronic board
EB2	Display electronic board
ES1	Line electromagnetic switch
ES2	Main broom electromagnetic switch
ES3	Hopper lifting pump relay
ES4	Hopper lowering pump relay
ES5	Vacuum system relay
F0	Main fuse (150 A)
F1	Key fuse (30 A)
F2	Filter shaker fuse (30 A)
F3	Vacuum system fuse (30 A)
F4	Hydraulic pump fuse (30 A)
F5	Flashing light fuse (10 A)
F6	Working light fuse (10 A)
F7	Actuator fuse (10 A)
FA	Right side broom circuit breaker (10 A)
FB	Left side broom circuit breaker (10 A)
FC	Main broom circuit breaker (30 A)
HN	Horn
K1	Ignition key
L1	Working light (optional)
M1	Drive system motor
M2	Main broom motor
M3	Hydraulic pump
M4	Actuator
M5	Filter shaker motor
M6	Vacuum system motor
M7	Right side broom motor
M8	Left side broom motor
R1	Accelerator potentiometer (built in the pedal)
SW0	Emergency push-button
SW1	Forward/reverse gear switch (built in the pedal)
SW2	Main broom microswitch
SW3	Hopper enabling switch
SW4	Hopper lifting/lowering switch
SW5	Hopper dumping switch
SW7	Right side broom microswitch
SW8	Left side broom microswitch
SW9	Horizontal hopper microswitch
SW10	Lifted hopper microswitch
SW11	Opened hopper microswitch
SW12	Closed hopper microswitch
SW13	Filter shaker/vacuum system switch
SW14	Driver’s seat safety microswitch
SW15	Horn switch
SW16	Working light switch (optional)

Colour code

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

ELECTRICAL SYSTEM

WIRING DIAGRAM (Continues)



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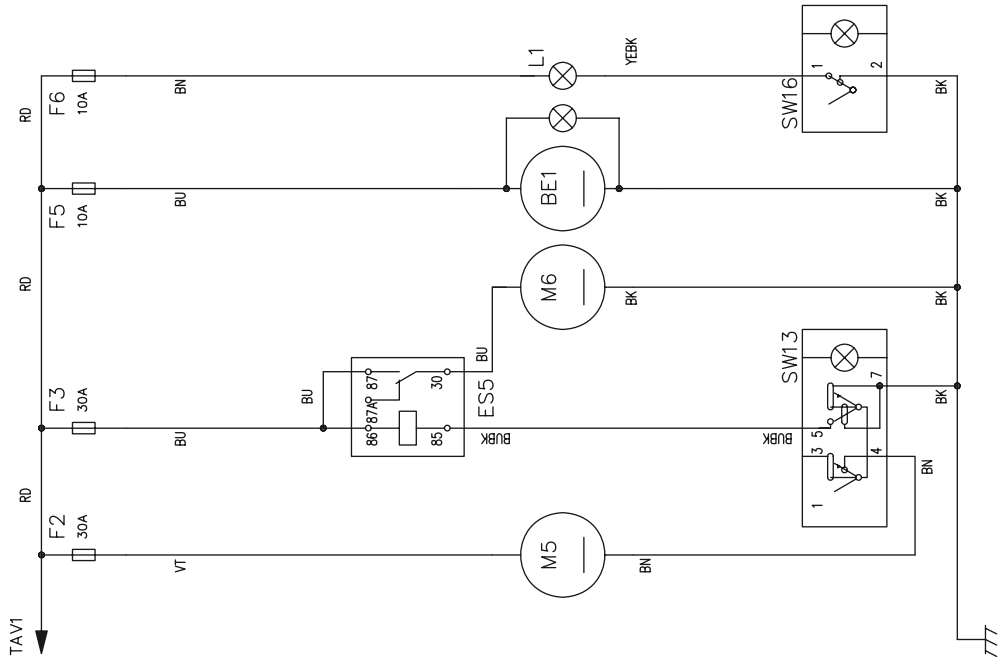
WIRING DIAGRAM (Continues)



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