Service Manual

ICC 1 S D

1.142-...

5.905-432
03.01
Foreword

Good servicing requires extensive and relevant training as well as comprehensible reference documents.

We therefore regularly offer all service technician both basic and advanced training courses for the full range of our products.

In addition we produce service handbooks for the major equipment which can be used initially as instructional material and later as sources of reference.

Furthermore we regularly distribute service information bulletins that provide details about further developments to the products.

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Technical Features

The ICC 1 S D is a high-performance sweeping machine designed for professional use in industrial service and municipal fleet applications.

The unit may be licensed for road traffic.

Depending on the country of operation, single-unit approval by the responsible Highway Traffic Authority may be required.

Drive power
- 3-cyl. Kubota D722 water-cooled diesel engine (similar to KMR 1700 D).
- Forward and reverse, variable speed control with two separate foot pedals.

Brake
- Foot brake serves as operating brake, acting on both front wheels via brake cables. Parking brake can be set via separate brake lever.
- Braking action on rear wheels only via hydraulic system.

Sweeping system
- 2 inward rotating side brushes
- Sweeping roller not required

Vacuum system
- Sweeping debris is shredded by impeller fan, picked up by vacuum stream, and conveyed into debris container.
- Impeller fan, driven via magnetic clutch and V-belt with magnetic brake.

Water system
- Water tank with filter and water pump
- Water jets on side brushes and in air channel to reduce dusting, and for lubricating air channel.

Steering
- Hydraulic steering on front wheels

Hydraulic system
- Rear wheels, individually powered by hydraulic motors.
- 2 side brushes, individually powered by hydraulic motors, and raised by hydraulic cylinders.
- Debris container, raised by two hydraulic cylinders.
- Electrical cooling fan for hydraulic fluid and engine cooling.
Equipment Features – Front view

1. Cover, debris container
2. Debris container
3. Dual-circuit radiator (hydraulic fluid / engine coolant)
4. Operator seat
5. Support caster, vacuum intake
6. Side brush, LH
7. Bumper
8. Turn signals
9. Side brush, RH
10. Head lamps
11. Air exhaust, debris container
Equipment Features – Sidebrush view

1  Pressurized gas spring, side brush
2  Stop screw, side brush bottom position
3  Adjusting screws, side brush sweeping pattern
4  Hydraulic motor, LF side brush
5  LH side brush
6  RH side brush
7  Bumper
1 Safety beacon
2 Filler neck, fuel tank
3 RH side brush
4 Side cover panel
5 Rear cover panel
6 Water tank
7 Filler neck, water tank
Equipment Features – Raised debris container view

1 Debris container
2 Air exhaust
3 Debris container cover
4 Water tank
5 Rear cover panel
6 Removable grille, dual-circuit radiator (hydraulic fluid / engine coolant)
7 LH side brush
8 Vacuum channel
Equipment Features – Control elements

1. Switch, four-way flashers (S12)
2. Combination instrument (P1)
3. Steering wheel
4. Ignition switch (S1)
5. Combination switch (S13)
6. Switch (S16), working spotlights (option)
7. Switch, windshield wiper (S6)
8. Switch, cabin heater fan (S7)
9. Switch, windshield defroster fan (S15)
10. Switch, safety beacon (S14)
11. Drive pedal, reverse
12. Drive pedal, forward
13. Lever, Raise / Lower debris container
14. Lever, Raise / Lower side brush and vacuum inlet (with brush speed control)
15. Lever, Open / Close coarse debris flap
16. Switch, impeller fan (S9)
17. Switch, water pump (S8)
18. Operating hours counter, impeller fan (option) (P2)
19. Manual throttle, engine speed control
20. Metering valve, side brush water volume
21. Metering valve, vacuum channel water volume
22. Pedal, parking brake / operating brake
23. Changeover button, parking brake / operating brake
Equipment Features – Combination instrument

Indicator lights and displays

1  Debris container raised
2  Pre-glow cycle activated
3  Excessive engine coolant temperature
4  Spare
5  Low charging current warning
6  Low engine oil pressure warning
7  Blocked air cleaner warning
8  Headlamps ON
9  Turn signal ON
10  Operating hours counter
11  Fuel level indicator
Equipment Features – Fuse box

Fuses
- F1 Ignition switch
- F2 Four-way flashers
- F3 Impeller fan brake
- F4 Magnetic clutch
- F5 Water pump
- F6 Fan, cabin heater
- F7 Windshield wiper
- F8 Turn signals / horn
- F9 Headlamps
- F10 Position lamps, RH
- F11 Position lamps, LH
- F12 Engine stop solenoid
- F13 Safety beacon
- F14 Fan, windshield defroster
- F15 Stop lights
- F16 Headlamps

Relays
- K1 Ignition switch
- K2 Fan, cabin heater
- K3 Water pump
- K4 Safety beacon
- K5 Turn signals
- K6 Windshield wiper
- K7 Fan, windshield defroster
- K8 Headlamps
- M5 Fan, windshield defroster
- X1 Plug connector

Note:
The fuse box is located below the instrument panel.
Equipment Features – Control console, open view

D2  Control module, engine shut-off solenoid
S14 Switch, safety beacon
S15 Switch, windshield defroster fan
S7  Switch, cabin heater fan
S6  Switch, windshield wiper
S16 Switch, working spotlights (option)
S13 Combination switch
S1  Ignition switch
Equipment Features – Side console, open view

1 Mounting thread for lever, Raise / Lower debris container
2 Mounting thread for lever, Raise / Lower side brush and vacuum intake
3 Pressure relief valve
4 Bowden cable, coarse debris flap
5 Hydraulic line, Lower debris container
6 Hydraulic line, Lower brushes, Sweeping
7 Hydraulic fluid inlet
8 Hydraulic line, Raise brushes
9 Hydraulic line, Lower brushes
10 Manual throttle
11 Control module, impeller fan brake (D3)
12 Switch, debris container warning buzzer (S18)
13 Hydraulic line, Raise debris container
14 Hydraulic line, Sweeping operating
15 Hydraulic line to hydraulic fluid tank
Equipment Features – Engine compartment, view from left

1 Magnetic clutch, vacuum impeller fan
2 Filler neck, engine oil
3 Glow plug
4 Injector nozzle
5 Injection pump
6 Oil dip stick
7 Air intake hose
8 Fuel filter
9 Engine
10 Tension roller, V-belt
11 V-belt
12 Magnetic brake, vacuum impeller fan
Equipment Features – Engine compartment, view from right

1 Oil dip stick
2 Coolant radiator electric fan
3 Adjustment screw, V-belt tension
4 Magnetic brake, vacuum impeller fan
5 Exhaust manifold
6 Starter
7 Oil filler neck
8 Alternator
Equipment Features – Engine compartment, view toward rear

1. RH limit switch, debris container (S10)
2. LH limit switch, debris container (S11)
3. Air cleaner
4. Engine cover
5. LH stop screw, debris container
6. RH stop screw, debris container
Equipment Features – Fuel tank

1 Fuel level sensor
2 Fuel filler neck
3 Fuel tank
Equipment Features – Heater

1  Hot water supply hose
2  Heat exchanger
3  Warm water return hose
4  Heater fan shroud
Equipment Features – Engine compartment, view from rear
Equipment Features – Engine compartment, view from rear

1. Relay, radiator fan (K9)
2. Control module, pre-glow (D1)
3. Fuse, radiator fan (F18)
4. Fuse, glow plugs (F17)
5. Splash water guard
6. Hydraulic line, to hydraulic motor, RR wheel
7. Battery
8. Hydraulic line, to steering valve
9. Hydraulic line, to side brushes / debris container control block
10. Water pump
11. Hose, to water pump inlet
12. Hydraulic pumps, side brushes / debris container, steering
13. Hydraulic line, to hydraulic fluid tank
14. Hydraulic line, to hydraulic motor, RR wheel
15. Hydraulic line, from bypass valve
16. Bypass valve, with changeover lever, free-wheel
17. Water filter
18. Water shut-off valve
19. Hydraulic line, to bypass valve
20. Hydraulic line, to hydraulic motor, LR wheel
21. Hydraulic pump, driving operation
22. Hydraulic line, to hydraulic motor, LR wheel

**Note:**
When removing the battery, start by disconnecting the negative terminal (−), and then remove the positive terminal (+).
Function Groups – Sweeping & Vacuum system

1. Grille plate, deflection plate
2. Air exhaust
3. Chain curtain
4. Deflection plate
5. Cover
6. Debris container
7. Fresh water tank
8. Engine
9. Impeller fan
10. Vacuum duct
11. Support casters
12. Vacuum inlet
13. Side brush
14. Spray nozzles
Function Groups – Water system

1 Water tank
2 Shut-off valve
3 Water filter
4 Water pump
5 Non-return valve *
6 Metering valve, vacuum channel
7 Spray nozzle, vacuum channel
8 Spray nozzle (2x), side brushes
9 Metering valve, side brushes
10 Tank fill level indicator in operator cab

* Effective with serial no. 10200, solenoid valve was replaced by non-return valve.
Function Groups – Water system

1  Shut-off valve
2  Water filter
3  Water pump
4  Solenoid valve, water pump
**Engine – Fuel**

**Cleaning fuel filter**
- Close fuel shut-off valve (1) by turning counter-clockwise one-quarter turn.
- Loosen and unscrew knurled retaining ring (2), and remove fuel filter bowl (3) complete with contents.
- Replace fuel filter insert (3).

**Bleeding air from fuel system**
- Loosen air bleeding screw (4) approx. 2 turns.
- Start engine, and allow to run until exiting fuel no longer contains air bubbles.
- Tighten air bleeding screw (4) while engine is running.

1. Fuel shut-off valve
2. Knurled retaining ring
3. Fuel filter bowl
4. Air bleeding screw
Checking / topping up engine coolant
Prior to checking coolant level, allow engine to cool. The proportion of antifreeze in the engine coolant must not exceed 50 percent.

- Raise the debris container.
- Check coolant level in expansion tank.
- With engine cold, top up engine coolant to the "min" mark in expansion tank.

Checking cooling system for leaks
The radiator is a combination of two cooling circuits, one for hydraulic fluid, the other for engine coolant. The fan transports the cooling air from the outside into the engine compartment, passing it through the dual-circuit radiator. Check all radiator hoses, connections and the radiator itself for leaks.

Checking cooling fan functions
The fan must start as soon as the ignition key is turned to position "1".

- Check electrical connections and fuses, and replace as required.
- Measure voltage applied to electric motor.
- If required, replace connecting cable / relay / electric motor.

When replacing the fan, it must be noted that the cable inlet connection on the electric motor points downward.
Checking engine coolant temperature switch

- Start engine.
- If the "Engine Coolant Temperature" indicator light on the combination instrument illuminates also when the engine is cold, the connecting cable must be checked for a short-circuit against vehicle ground.
- With engine running, bridge the connector (1) to vehicle ground (indicator lamp must illuminate and buzzer must sound).
- Replace temperature switch (2) as required.

Note:
A radiator that is blocked by dirt and debris will cause overtemperature of engine coolant and hydraulic fluid. Therefore, when the indicator lamp illuminates, the first step to be taken should be to investigate the radiator for free air passage.

When the indicator lamp lights up, the engine will not be shut off.
### Adjusting idle speed

**Note:**

Engine speed may be checked with the use of a stroboscope, digital tachometer or vibration tachometer (refer to Special Tools).

- Push manual throttle lever on right-hand side panel all the way in.
- Adjust Bowden cable (8) in such a way that throttle lever (5) contacts adjusting screw (3). Make necessary corrections on clamp bolt (6) or adjusting nut (7) as required.
- Refer to Specifications for idle speed settings.

### Adjusting operating speed

- Accelerate engine until operating speed has been reached.
- Hold tachometer in close contact with valve cover or engine block.
- Turn rotating plate of vibration tachometer until resonance spring attains maximum deflection.
- Read engine speed on tachometer.
- Adjust Bowden cable (8) in such a way that throttle lever (5) touches adjusting screw (4). Make necessary corrections on clamp bolt (6) or adjusting nut (7) as required.
- Refer to Specifications for operating speed settings.

**Note:**

The adjusting screws (3 and 4) are preset and sealed at the factory. They must not be adjusted. Breaking the seal will void manufacturer's warranty and operating license.
Engine – Engine shut-off solenoid valve

Engine shut-off solenoid valve

As soon as the ignition switch (S1) is set to position "0" with the engine running, the engine shut-off control responds, and the solenoid valve (1) attracts. This shuts off the fuel supply inlet, causing the engine to stop. After about 15 seconds, solenoid valve switches off again, and opens fuel supply inlet.

1 Solenoid valve, engine shut-off
2 Lever, engine stop

In the event that the solenoid valve (1) fails to shut off the fuel supply when the ignition key is set to position "0", the solenoid valve can also be actuated manually.

Shut off engine:
– Move engine shut-off lever in direction of arrow until it stops, and hold until engine comes to a standstill.

Caution!
Stay clear of rotating components!

Checking engine shut-off solenoid valve

– Check fuse F 12.
– Set ignition switch to "0" position.
– Measure magnetic field on solenoid valve no later than 5 seconds after setting ignition key to "0" position.
– If a switching voltage is present, and the solenoid valve does not attract, it must be replaced.
– If no switching voltage is present, connecting cables and D2 engine shut-off control module must be checked and replaced as required.
Checking / replacing air cleaner

When the "Air Cleaner Warning" indicator light in the combination instrument illuminates, the air cleaner must be cleaned or its cartridge replaced.

- Detach air cleaner cover (5), and clean together with air cleaner housing (1), do not wash.
- Loosen clamp (4).
- Clean or replace filter cartridge (3).
- Press in warning switch button (2) to reset.

Checking air cleaner

1 Air cleaner housing
2 Warning switch/reset button
3 Filter cartridge
4 Clamp
5 Air cleaner cover
Engine – Engine oil

Checking engine oil level
- After shutting off engine, allow at least five minutes to pass before checking oil level.
- Oil level must be between "MIN" and "MAX" marks on oil dip stick (arrow).
- If oil level is found to be below "MIN" mark, top up with engine oil immediately.
- Do not overfill engine oil to above "MAX" mark! Refer to Specifications for type of engine oil required.

Checking oil pressure switch
- Start engine. Oil pressure indicator lamp must extinguish.
- If indicator lamp fails to extinguish, check / top up engine oil first.
- Check for switching voltage on terminal of connecting cable.
- If a voltage is present, oil pressure switch must be replaced.
- If no voltage is present, connecting cable must be checked for possible short-circuit against vehicle ground.

Note:
When the indicator lamp lights up, the engine will not be shut off.

Changing oil filter
- Drain engine oil.
- Remove oil filter (2) using cartridge wrench.
- Clean sealing surface at filter base.
- Apply thin film of engine oil to rubber seal of new filter cartridge.
- Start new filter cartridge on threaded base, and turn until hand-tight.
Engine – Drive Pump belt

Changing drive pump belt

– Loosen and remove six mounting bolts (1).
– Pull pumps (2) far enough toward the rear to separate coupling sleeve (3) from engine drive shaft (gap wide enough to allow drive belt to be passed through).
– Loosen belt tensioning roller.
– Replace drive pump belt (4).
– Re-adjust belt tension roller.

Engine mounted pumps

1 Mounting screws (6x)
2 Pumps
3 Coupling sleeve
4 Belt, drive pump
5 V-belt, alternator

Alternator V-belt
Sweeping Mechanism – Sweeping pattern

**Adjusting sweeping pattern**

- Check tire pressure (see Specifications).
- Loosen clamp bolts (1).
- Adjust lateral inclination of side brush (2).
- Tighten clamp bolts (1).

1 Clamp bolts (2x)
2 Side brush
3 Stop screw
4 Lock nut

- Loosen lock nut (4).
- Turn stop screw (3) to adjust side brush contact pressure on ground.
- Tighten lock nut (4).

**Checking sweeping pattern**

The sweeping pattern should be formed like a moon-shaped sickle (approx. 120° to 150°).

- Raise side brushes.
- Drive sweeping machine onto flat and level ground that is evenly covered with dust.
- Lower side brushes, and allow to run for a few seconds.
- Raise side brushes, back up machine.
- Check sweeping pattern.

Direction of travel
Sweeping Mechanism – Spray nozzles

Cleaning spray nozzles on side brush

- Loosen union nut (1), and remove nozzle.
- Blow out spray nozzle with pressurized air from front (2). Replace as required.
- Install spray nozzle (2), and tighten union nut (1).

Spray nozzles on side brush

1 Union nut
2 Spray nozzle
### Adjusting vacuum intake

- Lower vacuum intake.
- Loosen clamp bolts (3) on both sides.
- Loosen lock nuts (5) on both sides.
- Using adjustment screws (4), adjust vacuum intake in such a way that the front sealing lip (2) at the coarse dirt flap (1) has about 0 to 1 mm ground clearance.
- Using guide rods (7), adjust sealing lip (2) to provide about 10 to 18 mm ground clearance at rear.
- After each adjustment, again check the other measurements.

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<table>
<thead>
<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Coarse dirt flap</td>
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<tr>
<td>2</td>
<td>Sealing lip</td>
</tr>
<tr>
<td>3</td>
<td>Caster adjusting clamp bolt (4x)</td>
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<tr>
<td>4</td>
<td>Adjusting screw</td>
</tr>
<tr>
<td>5</td>
<td>Lock nut</td>
</tr>
<tr>
<td>6</td>
<td>Support caster, vacuum intake</td>
</tr>
<tr>
<td>7</td>
<td>Adjusting guide rods (2x)</td>
</tr>
</tbody>
</table>
Sweeping Mechanism – Warning buzzer, debris container

Adjusting warning buzzer switch

- Pull knobs off control levers (2, 3).
- Remove panel mounting screws (4).
- Detach Bowden cable at injection pump (see page 28).
- Lift cover panel (5).
- Unscrew union nut (7).
- Detach Bowden cable (8).

1 Lever, coarse dirt flap
2 Lever, side brushes and vacuum intake
3 Lever, debris container
4 Panel mounting screws (4x)
5 Cover panel
6 Manual throttle
7 Union nut
8 Bowden cable
9 Switch, warning buzzer (S18)

- Set lever (3) to “Neutral” position.
- Turn switch clockwise until (9) switching noise is heard.
- Turn switch (9) counter-clockwise one-half turn.

Note:
Due to confined working space, removal or rotation of hydraulic hoses on control block may be required.
Sweeping Mechanism – Debris container

Removing debris container

- Raise debris container until level, and shut off engine.
- Attach rope slings to crane hook and debris container as shown.
- Carefully raise crane hook until rope is taut.
- Remove retaining bolts (3) on LH and RH lifting cylinders.
- Remove both container swivel bolts (2) on LH and RH side panels.
- Using suitable tools, push LH and RH side panels outward, and raise crane hook to lift off debris container.
Running Gear – Grease fittings

Lubricating steering knuckles

- Lubricate grease fittings on both steering knuckles (arrow) on front axle with 3-5 shots from grease gun.

Lubricating axle mounting

- Lubricate grease fittings (arrow) on front axle mounting with 3-5 shots from grease gun.

Lubricating side brush suspension

- Lubricate grease fittings (arrow) on side brush suspension with 3-5 shots from grease gun.
Running Gear – Brake

Adjusting brakes

Note:
Parking brake and operating brake act on both front wheels via brake cables (drum brake). Braking action on rear wheels is by hydraulics only.

The Bowden brake cables are adjusted by means of the adjusting screw (1).

– Loosen lock nut (4).
– Turn adjusting screw (1) to adjust brake.

When the front wheel is raised with a floor jack, it must turn freely without chafing of brake linings on brake drum.

1 Adjusting screw
2 Drum brake
3 Brake lever
4 Lock nut
Replacements stop light switch

- Remove actuating spring from eyelet (2).
- Pull off protective cap (3) from stop light switch.
- Remove electrical cable.
- Replace stop light switch.

1 Floor panel
2 Actuating spring, stop light switch
3 Protective cap, stop light switch (S 19)
4 Bowden cable, to LH drum brake
5 Bowden cable, to RH drum brake
6 Bowden cable, for setting parking brake
Running Gear – Wheel change / Steering wheel

Changing rear wheel
- Secure unit to prevent rolling, and loosen wheel bolts.
- Insert round steel bar (20 mm dia.) into rear jacking eye.
- Place hydraulic jack under protruding round bar, and jack up unit.
- Support unit with block.
- Change wheel, tighten wheel nuts, then torque to finish (refer to Specifications for torque rating).

Note:
Round steel bar must be cradled in jack head notch.

Changing front wheel
- Secure unit to prevent rolling, and loosen wheel bolts.
- Place hydraulic jack under front axle near wheel to be changed, and jack up unit.
- Support unit with block.
- Change wheel, tighten wheel nuts, then torque to finish (refer to Specifications for torque rating).

Removing steering wheel
- Pull center cap off steering wheel (1).
- Remove center nut from steering shaft.
- Install suitable pulling tool using tapped holes (2).
- Pull off steering wheel.

1 Steering wheel
2 Tapped holes (2x)
Running Gear – Toe-in adjustment

Adjusting toe-in

- Set steering wheel for straight-ahead travel.
- Hook measuring tape into one of the tire tread grooves.

- Pass measuring tape under unit and across to opposite wheel.
- Read measurement "x" on tread groove corresponding to opposite wheel.

With toe-in properly adjusted, dimension "x" at the front of tyres is 5 mm smaller than the dimension at rear of tyres.
Replacing shock absorber

- Move unit with one wheel onto loading ramp (2) of approx. 150 mm height.
- Turn steering wheel to the left or right.
- Remove upper shock absorber mounting bolt (1).
- Remove lower shock absorber mounting bolt (3).
- Take out shock absorber (4).

Note:
New shock absorber must be manually extended to proper length before installation.
Running Gear – Towing and transport

Important:
The unit may be towed only with bypass valve open. Towing with closed bypass valve will damage hydraulic drive components. Towing speed must not exceed walking speed, and towed distance must be less than 250 m. Otherwise, hydraulic motors on rear wheels may be damaged.

- Attach tow rope to towing eye (arrow).
- Winch unit onto transport vehicle, and secure to tie-down points.
Hydraulic System – Hydraulic fluid

Note:
When carrying out procedures on the hydraulic system, care must be taken to maintain extreme cleanliness throughout. Even minor contaminations may cause component damage or complete system failure.

Checking hydraulic fluid level
The inspection glass for checking the level in the hydraulic fluid tank is located in the front left wheel well.

Topping up hydraulic fluid
The filler neck is located beneath the operator seat.

Note:
When installing the threaded cover, ensure that it can be turned easily. Otherwise, thread damage through cross-threading may result. Install cover only hand-tight.

1 Dip stick
2 Pressure gauge, return pressure
3 Cover
Hydraulic System – Hydraulic fluid filter

Replacing hydraulic fluid filter

Replacement of the hydraulic fluid filter is required when indication of pressure gauge is in red range.

Note:
Engine must be shut off before the filter can be changed.

- Tilt up operator seat.
- Unscrew filler neck cover.
- Remove filter element (1) with protective tube (2) by pulling both out of filler neck (3).
- Insert new filter element (1) in protective tube (2).
- Install protective tube (2) with filter element (1) in filler neck (3).
- Replace cover, start thread clockwise, and turn until hand-tight.
Hydraulic System – Emergency pump (option)

To carry out repairs, the emergency pump (1) can be used to raise the debris container without the need to start the engine.

- To raise debris container, set the "Debris Container" lever (2) on the side console to "Raise" position, hold lever, and actuate emergency pump lever (1) in a pumping motion until debris container has been raised to desired height.

- To lower debris container, set the "Debris Container" lever (2) on the side console to "Lower" position, hold lever, and actuate emergency pump lever (1) in a pumping motion until debris container has been lowered to desired position.
Basic Settings and Service Procedures

Hydraulic System – Drive pedal

Setting NEUTRAL on hydraulic drive pump

If the unit creeps forward or backward without drive pedals being actuated, setting the NEUTRAL position on the hydraulic drive pump will be required.

- Loosen lock nut on cam bolt.
- Turn cam bolt (arrow) until unit no longer creeps.
- Tighten lock nut on cam bolt.

Adjusting drive pedal inclination

When in rest position, the "Forward" drive pedal must be positioned in parallel with the "Reverse" drive pedal. The drive pedal position can be adjusted at each linkage pivot point.

- Detach fork (2) from lever (1).
- Loosen lock nut (5).
- Turn fork (2) on the threaded rod (4) in pedal linkage (3) clockwise or counter-clockwise as required.
- Reattach fork (2) to lever (1).

Note:

When making adjustments, ensure that pedal linkage travels freely and without chafing.
Hydraulic System – Checking working pressures

1 Connecting union on testing setup
2 T-joint
3 Connecting union on bypass line
4 Bypass line
5 Connecting union on bypass valve
6 Bypass valve
7 Testing set (special tool)
8 Hydraulic drive pump

Checking drive hydraulic pressure

– Secure unit by setting parking brake.
– Unscrew connecting union (3) from T-joint (2).
– Loosen connecting union (5) from bypass valve (6). Swivel bypass line (4) sideways.
– Close bypass line (4) with blind plug to prevent admission of contaminants.
– Screw connecting union (1) of testing set (7) onto T-joint (2), and tighten.
– Start engine, and run at full throttle.
– Fully depress "Forward" drive pedal.
– With all hydraulic components working properly, a pressure of 150 to 180 bar must be indicated on testing gauge.
– After conclusion of pressure test, remove testing set, and return all hydraulic connectors to their previous positions. Ensure that connections are tight.

Note:
A pressure reading below 100 bar indicates a defective drive pump or drive motor.
Hydraulic System – Checking working pressures (continued)

Checking hydraulic pressure for side brushes and debris container

- Unscrew pressure line to control block (3) from pressure-side connection (1).
- Install T-joint (2) between pressure-side connection (1) and pressure line (3).
- Install testing set (4) on T-joint (2).
- Start engine, and run at full throttle.
- Raise side brush cylinders until they rest against the stops.
- With side brushes engaged and rotating, a pressure of 60 to 80 bar must be indicated on testing gauge.
- For adjustment of pressure relief valve, refer to page 51.
Hydraulic System – Pressure relief valve

Adjusting pressure relief valve

The pressure relief valve is used to adjust the working pressure for functions such as "Raise / Lower Debris Container" and raising / lowering side brushes and vacuum intake.

– Remove mounting screws (2x), see arrows
– Tilt up seat.
– Remove mounting screws (2x), see arrows.
– Lift side console approx. 30 mm until pressure relief valve can be seen.

Note:
As a prerequisite, the unit must have been prepared as described on page 50.
Hydraulic System – Pumps

Removing hydraulic pumps

The hydraulic pumps powering the working hydraulics and steering are mounted beneath the battery (3) as an extension of the engine drive shaft.

– Drain hydraulic fluid into clean container.
– Remove all hydraulic lines from pumps (2).
– Remove a total of six mounting bolts (1).
– Pull pumps off toward the rear.

Installing hydraulic pumps

– Install pumps, complete with connecting sleeve (4), engine drive shaft.
– Install, then tighten, a total of six mounting bolts (1).
– Connect all hydraulic lines.

Note:

When mounting bolts have been tightened, connecting sleeve (4) must still have free axial travel.

Binding connecting sleeves may cause damage to hydraulic pump bearings and to engine.

1 Mounting bolts
2 Hydraulic pumps
3 Battery
4 Connecting sleeve, engine/hydraulic pump
5 Alternator
Impeller fan

Changing impeller fan

- Raise front of unit approx. 200 mm or drive on inclined ramp.
- Raise debris container to highest position and secure.
- Loosen and remove bolts (5) on strut (6) attached to front axle carrier (3).
- Remove heater assembly, and place toward rear with heater hoses still attached.
- Remove seat.
- Tilt up seat panel (90° angle), and detach pressurized gas spring.
- Loosen hose clamp (2) on vacuum hose (1), and pull off vacuum hose toward the front.
- Remove mounting screws from impeller fan front panel, leaving suction channel in place.

1 Vacuum hose
2 Hose clamp
3 Front axle carrier
4 Front wheel
5 Mounting bolts
6 Strut (frame support)
7 Fuel tank
Impeller fan (continued)

– Deflect steering all the way to the left.
– Remove hydraulic lines from steering cylinder.
– Detach accelerator cable at side panel (see page 36).
– Slide out impeller fan front panel sideways between fuel tank and axle.
– Remove center bolt and washer (1) from impeller fan (2).
– Pull off impeller fan (2) toward the front.
– Grease impeller shaft.
– Install new impeller fan on shaft. Install retaining bolt and washer (1), and tighten.
– Assemble all components in reverse order of disassembly.
– Ensure proper seating of seal between vacuum channel and debris container.

1 Retaining bolt
2 Impeller fan

Changing impeller fan (continued)
Impeller fan

1 Air gap
2 Brake lining
3 Shim (7.343-026)
4 Bolt
5 Magnet coil

Adjusting magnetic brake

To ensure proper functioning of the magnetic brake, the air gap (1) between brake lining (2) and drive plate must be adjusted.

An adjustment will be required only if the magnetic brake has been replaced.

- Using the feeler gauge, check air gap (1) once around the entire circumference.
- To adjust air gap, add a sufficient number of shims (3) under the bolts (4) until an even air gap of 0.3 ± 0.1 mm has been achieved.
# Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Remedy</th>
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</thead>
</table>
| Starter fails to turn engine | – Check / replace fuse F1  
– Check ground connection between engine and chassis  
– Check battery G1 (voltage, electrolyte level & density)  
– Check / replace ignition switch S1  
– Check voltage at starter relay  
– Check voltage at starter terminals  
– Check / replace starter |
| Starter turns engine but engine does not start | – Check battery voltage  
– Check fuel level, top up as required  
– Check / replace fuel filter  
– Check / replace air cleaner element  
– Check / replace fuse F12  
– Check / replace fuse F1  
– Check / replace glow plug control module D1  
– Check / replace engine shutoff solenoid valve Y1  
– Check starter drive gear |
| Battery Charge indicator lamp illuminates | – Check cable connections on alternator  
– Check alternator  
– Check / adjust V-belt tension |
| Multifunctional display – Excessive engine coolant temperature | – Check engine coolant level, top up as required  
– Check / adjust V-belt tension (alternator,water pump)  
– Check radiator for leaks and clogging  
– Check / replace cooling fan motor |
| Oil Pressure indicator lamp illuminates | – Check / top up engine oil level  
– Check / replace oil pressure switch S2, connections and lamps |
| Defective vehicle lighting | – Check / replace fuses, connectors, lamps |
| Warning beacon without function | – Check plug connectors  
– Check / replace fuse F13  
– Check / replace lamp |
| Windshield wiper without function | – Check / replace fuse F7  
– Check / replace relay K6  
– Check / replace wiper motor M4 |
| Windshield wiper fails to return to parking position | – Replace wiper motor M4 |
| Stop light without function | – Check / replace fuse F15  
– Check / replace stop light switch S19 |
| Engine runs but machine fails to move | – Release parking brake  
– Close bypass valve  
– Check brake pedal return  
– Check throttle linkage  
– Check / adjust pressure on drive hydraulics |
# Troubleshooting

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<td>– Check / replace ignition switch S1</td>
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<tr>
<td></td>
<td>– Check / replace engine shutoff solenoid valve Y1</td>
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<tr>
<td>No fuel tank level indication</td>
<td>– Check / replace fuel level sensor B1</td>
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<td>– Check pressure in working hydraulic circuit</td>
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<td>Blower without function</td>
<td>– Check / replace switches S10 / S11 on debris container</td>
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<td></td>
<td>– Check / adjust V-belt</td>
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<td></td>
<td>– Check magnetic clutch</td>
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<tr>
<td>Vacuum intake cannot be lowered / raised</td>
<td>– Check linkage for obstruction or blockage</td>
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<tr>
<td></td>
<td>– Check / replace valve on control block</td>
</tr>
<tr>
<td></td>
<td>– Check pressure in working hydraulic circuit</td>
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<tr>
<td></td>
<td>– Adjust pressure relief valve</td>
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<tr>
<td>Debris container cannot be raised</td>
<td>– Check / replace valve on control block</td>
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<tr>
<td></td>
<td>– Check pressure in working hydraulic circuit</td>
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<td>– Adjust pressure relief valve</td>
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<td>– Check / replace valve on control block</td>
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<td>Fuse, engine shutoff</td>
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</tr>
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<td>F13</td>
<td>Fuse, warning beacon</td>
<td>Front fuse box</td>
</tr>
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<td>F14</td>
<td>Fuse, windshield defroster</td>
<td>Front fuse box</td>
</tr>
<tr>
<td>F15</td>
<td>Fuse, stop lights</td>
<td>Front fuse box</td>
</tr>
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<td>F16</td>
<td>Fuse, headlamps</td>
<td>Front fuse box</td>
</tr>
<tr>
<td>F17</td>
<td>Fuse, glow plugs</td>
<td>Rear fuse box</td>
</tr>
<tr>
<td>F18</td>
<td>Fuse, radiator fan</td>
<td>Rear fuse box</td>
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<td>G1</td>
<td>Battery</td>
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<tr>
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<td>Alternator</td>
<td>Engine compartment</td>
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<tr>
<td>H1</td>
<td>Turn signal, LF</td>
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<tr>
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<td>Turn signal, RR</td>
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<td>Turn signal, RF</td>
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<td>H5</td>
<td>Warning buzzer, reversing, debris container</td>
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<td>H8</td>
<td>Stop light, L</td>
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<td>Stop light, R</td>
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<td>Relay, heater fan</td>
<td>Front fuse box</td>
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<td>Relay, water pump</td>
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<td>Relay, warning beacon</td>
<td>Front fuse box</td>
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<td>Relay, turn signals</td>
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<td>Front fuse box</td>
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<td>Relay, headlamps</td>
<td>Front fuse box</td>
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<td>K9</td>
<td>Relay, radiator fan</td>
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<td>M1</td>
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<td>M3</td>
<td>Heater fan, cab</td>
<td>Cab rear wall</td>
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<td>Windshield wiper</td>
<td>Cab</td>
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<tr>
<td>M5</td>
<td>Fan, windshield defroster</td>
<td>Cab</td>
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<td>M6</td>
<td>Radiator fan</td>
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<td>R</td>
<td>Glow plugs</td>
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<td>Instrument panel</td>
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<td>Oil pressure switch</td>
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<td>Temperature switch, engine coolant</td>
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<td>S4</td>
<td>Vacuum switch, air cleaner</td>
<td>Air cleaner</td>
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<td>S5</td>
<td>Switch, folding seat</td>
<td>Cab, under seat</td>
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<tr>
<td>S6</td>
<td>Switch, windshield wiper</td>
<td>Control console</td>
</tr>
<tr>
<td>S7</td>
<td>Switch, heater fan</td>
<td>Control console</td>
</tr>
<tr>
<td>S8</td>
<td>Switch, water pump</td>
<td>Side console</td>
</tr>
<tr>
<td>S9</td>
<td>Switch, magnet, clutch, impeller fan</td>
<td>Side console</td>
</tr>
<tr>
<td>S10</td>
<td>Switch, debris container, LH</td>
<td>Engine compart.</td>
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<tr>
<td>S11</td>
<td>Switch, debris container, RH</td>
<td>Engine compart.</td>
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<td>S12</td>
<td>Switch, four-way flashers</td>
<td>Instrument panel</td>
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<td>S13</td>
<td>Combination switch</td>
<td>Instrument panel</td>
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<tr>
<td>S14</td>
<td>Switch, warning beacon</td>
<td>Control console</td>
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<tr>
<td>S15</td>
<td>Switch, windshield defroster fan</td>
<td>Control console</td>
</tr>
<tr>
<td>S16</td>
<td>Switch, working spotlight (option)</td>
<td>Control console</td>
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<td>Switch, warning buzzer, reversing</td>
<td>Engine compart.</td>
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<td>S18</td>
<td>Switch, warning buzzer, debris contain.</td>
<td>Side console</td>
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<td>S19</td>
<td>Switch, stop lights</td>
<td>Brake pedal</td>
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<thead>
<tr>
<th>Pos</th>
<th>Designation</th>
<th>Installed location</th>
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<tr>
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<tr>
<td>V2</td>
<td>Diode</td>
<td>On connecting wire</td>
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<td>V6</td>
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<td>X1</td>
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<td>Plug connector</td>
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<td>Plug connector</td>
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<tr>
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<td>Solenoid valve, engine shutoff</td>
<td>Engine compartment</td>
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<tr>
<td>Y2</td>
<td>Magnetic clutch, impeller fan</td>
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<td>Solenoid valve, water pump</td>
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<td>Y4</td>
<td>Impeller fan brake</td>
<td>Engine compartment</td>
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</table>
**Hydraulic block diagram 0.088-258**

1. Hydraulic fluid tank
2. Hydraulic fluid filter, return line
3. Oil cooler
4. Combustion engine
5. Assembly, drive components
   5.1 Precharge valve
   5.2 Precharge pump
   5.3 Hydraulic pump, drive
   5.4 Non-return valve
   5.5 Control valve, low acceleration
6. Bypass valve
7. Hydraulic motor, R & L drives
8. Hydraulic pump, steering
9. Valve block, steering
10. Steering valve
11. Steering cylinder
12. Hydraulic pump, side brushes / debris container
13. Control block
   13.1 Pressure relief valve
   13.2 Proportional valve for pos. 16 and 17
   13.3 Control valve, debris container
14. Pipe-break safety valve
15. Hydraulic cylinder, debris container
16. Hydraulic motors, side brushes
17. Hydraulic cylinder, side brushes / vacuum intake
18. Throttle valve
19. Emergency hand pump (option)
Hydraulic line diagram 2.706-010
Hydraulic line diagram 2.706-010

1. Hydraulic motor, LH side brush
2. Steering valve
3. Hydraulic motor, RH side brush
4. Hydraulic cylinder, steering
5. Valve block, steering
6. Control block, side console
7. Hydraulic pump, steering
8. Hydraulic pump, side brushes and debris container
9. Hydraulic cylinder, debris container
10. Hydraulic motor, RH drive motor
11. Hydraulic pump, drive components
12. Hydraulikzylinder, side brushes and vacuum intake
13. Bypass valve
14. Hydraulic cylinder, debris container
15. Hydraulic motor, LH drive motor
16. Hydraulic fluid tank
17. Emergency pump (option)
18. Hydraulic oil cooler
## Specifications

<table>
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<tr>
<th>Specification</th>
<th>Details</th>
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<tr>
<td>Diesel engine</td>
<td>Type KUBOTA D722</td>
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<tr>
<td>Operating speed</td>
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<td>Idle speed</td>
<td>RPM 800 – 900</td>
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<td>Sound noise level</td>
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<td>Battery, voltage</td>
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<tr>
<td>Driving speed, reverse max.</td>
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<td>Width of sweeping path, total</td>
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<tr>
<td>Side brushes, max. speed</td>
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<td>Ground clearance, w/ side brushes raised</td>
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<td>Ground clearance, w/ vacuum intake lowered</td>
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<tr>
<td>Ground clearance, w/ vacuum intake raised</td>
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<td>Debris container, raised height</td>
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<td>Hydraulic pressure, side brushes at operating speed</td>
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<tr>
<td>Tyre size, rear</td>
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## Fuses

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<td>F1</td>
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<td>F2</td>
<td>Four-way flashers</td>
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<td>Impeller fan brake</td>
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<tr>
<td>F4</td>
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<td>F6</td>
<td>Heater fan</td>
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<tr>
<td>F7</td>
<td>Windshield wiper</td>
<td>7.5 A</td>
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<tr>
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<td>Turn signals / horn</td>
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<tr>
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<td>Headlights</td>
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<tr>
<td>F10</td>
<td>Position lamps, R</td>
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</tr>
<tr>
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<td>Position lamps, L</td>
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Special tools

Testing equipment ................................................................. 2.639-387
Tachometer ............................................................................. 6.491-361
Magnetic field tester ............................................................. 6.803-003

Assembly torque ratings

Rear wheels ............................................................................. 100 Nm
Front wheels ........................................................................... 90 Nm