Workshop manual

Park
2000-2007

STIGA

1 General instructions

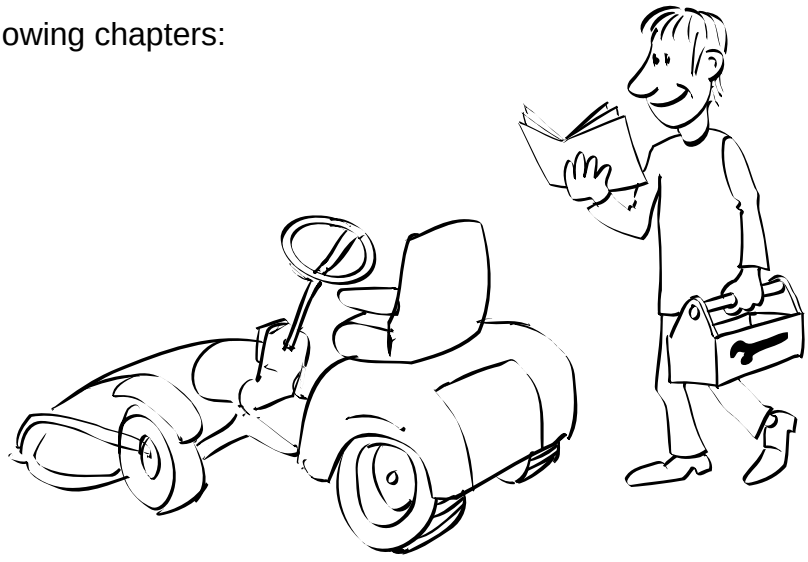
Contents in this chapter

General

This Workshop Manual is intended for Stiga Park models 2000-2007. The article numbers and product names are designated in the tables under “Technical specification” at page 21.

This Manual do not cover repair instructions for the motors. Regarding motors, contact the respective representative in the actual country.
This Manual and its specifications are valid for machines in their original design. In case of modified or changed machine, i.e. the motor is replaced, the manual accordance is limited.

The manual is divided in the following chapters:
Chapter 1 is this chapter
Chapter 2 Chassis
Chapter 3 Steering
Chapter 4 Hydraulic system
Chapter 5 Belts
Chapter 6 Control Wires
Chapter 7 Electrical system



1.1 Introduction

1.1.1 Responsibility declaration

In spite of the great care we have taken there may be errors in this publication.
The author cannot be made liable for incorrect or missing information.
GGP SE reserves the right to regularly change product specifications without prior notice.
All the information in this book is based on the information available at the time of production. Illustrations and photographs may be arranged schematically, which implies that one picture may cover several models and therefore not correspond exactly with all models.

1.1.2 How this manual is used

To make this manual easy to understand we have divided the machine into its main systems and components. These parts are now the different chapters in the book.
Each chapter is divided up into sections.
There is a quick-guide on the cover of this book, which refers to the different chapters. In each chapter there is a detailed table of contents so that you can easily and quickly find what you are looking for.

For example, if you are looking for information on the Accessory Lifter you will find this in chapter 3, Chassis and Body. On the first page in chapter 3 there is a detailed table of contents which refers to the correct section, in this case section 3.1.

Always check that you are reading the right chapter for your particular machine before starting the repair work.

1.1.3 Abbreviations

The following abbreviations are used in this manual:

HST Hydrostatic Transmission PTO Power Take Off

1.2 Safety Precautions

This manual has been written primarily for trained mechanics working in a well-equipped workshop. Nevertheless, the manual contains such detailed information that it can also be of use to owners who wish to carry out simple service and repairs on their machine.
A basic knowledge of repairs, tools and repair instructions is, however, always a prerequisite for first-rate results.

A qualified mechanic should always be consulted if the owner does not have sufficient knowledge to carry out repairs.

During the warranty period all service must be carried out by an Authorised Workshop for the warranty to be valid.

The following basic points should be observed if the machine is to function perfectly:

- Follow the service schedule.
- Be on the alert for sudden vibrations or abnormal noise to avoid major breakdowns.
- Always use Genuine Spare Parts
- Follow the descriptions in this manual carefully. Do not take any short cuts.

1.2.1 Symbols and general warnings

Warning!

This symbol indicates a risk of personal injury or damage if the instructions are not followed.

Note!
This text indicates a risk of damage to the material or risk of unnecessarily complicated work if the instructions are not followed.

1.2.2 Warm parts

Please observe that engine and exhaust system picks up a lot of heat during use. This applies above all to the silencer of machines equipped with catalytic converter.
To avoid injuries, allow the machine to cool before any kind of repairs are made to or near parts of the engine or exhaust system.

1.2.3 Moving parts

The machines are all equipped with v-belt transmissions. Always stop the engine and remove the starter key before inspections or repairs are carried out.
Always use extreme caution when testing systems with moving parts to avoid injuries.

Always use Genuine Spare Parts during service work.

1.2.4 Lifting and blocking up

Before work under the machine, always make sure that lifting devices and jack-stands are approved for the weight.
Work safe!

1.2.5 Cleanliness

Clean the machine before starting repairs. Dirt that penetrates into sensitive components can seriously influence the service life of the machine.

1.2.6 Tightening torque

Unless otherwise stated the tightening torque in the tables in the section Technical specifications must be used for the different sizes of screws. This does not refer to self-tapping screws, which are mainly used for the assembly of body parts.

1.2.7 Sharp edges

Watch out for sharp edges, especially when working with the mower deck. The blades can be very sharp. Always wear gloves when working with the blades.

1.2.8 Replacement parts

Always use Genuine Spare Parts during service work.

1.2.9 Inspection

Each part dismantled in conjunction with service work must be inspected.
Examine for: wear, cracks, out of roundness, straightness, dents, discolouring, abnormal noise and jamming.

1.3 Guarantee

1.3.1 Guarantee period

For consumer use: two years from date of purchase.

For professional use: 200 hours or three months, whichever comes first.

1.3.2 Extended guarantee

The guarantee period can be extended to a maximum of 300 hours or 3 years from the date of purchase provided that the prescribed basic services have been carried out at an authorised Stiga Service workshop during the relevant guarantee period. The services must be verified in the service book.

1.3.3 Component guarantee, chassis

Faults occurring in the machine's bearing in the articulated steering joint, as well as the front and rear chassis, are covered by a 10 year component guarantee from the date of purchase

The guarantee is valid provided that the prescribed basic services have been carried out at an authorised service workshop during the relevant guarantee period. The services must be verified in the service book.

1.3.4 Exeptions

The extended warranty does not cover damage due to the following:

- Neglect by users to acquaint themselves with accompanying documentation.
- Carelessness.
- Incorrect and non-permitted use or assembly.
- The use of non-genuine spare parts.
- The use of accessories not supplied or approved by the manufacturer.

Neither does the warranty cover:

- Wearing components such as blades, belts, wheels,battery and cables.
- Normal wear.
- Engine and transmission. These are covered by the engine manufacturer's warranties, with separate terms and conditions.

The purchaser is covered by the national laws of each country. The rights to which the purchaser is entitled with the support of these laws are not restricted by this warranty.

1.3.5 Conditions for validity of the warranties

The fully completed warranty card must be sent to Stiga´s subsidiary or distributor.

In the event of a claim, the service history must be confirmed with a copy of the service book.

1.4 Unpacking and assembly

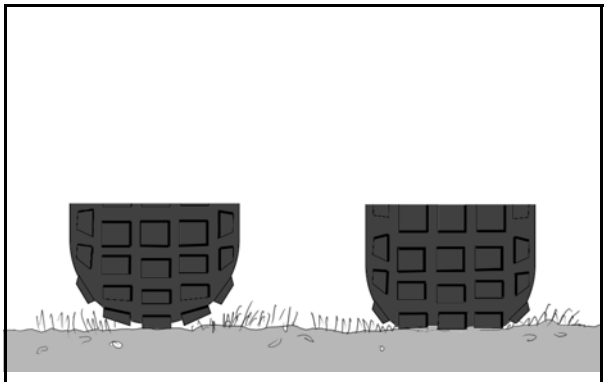
Every Stiga Park has undergone an extensive control programme before delivery. The machines are delivered as completely assembled as possible.
Thanks to this the assembly on delivery is rapid and easy.
The correct and careful assembly of the machine on delivery is a simple way of ensuring satisfied customers!

! Note!
The machine shall remain placed on the pallet during the unpacking and assembly.

1.4.1 Unpacking

Open up the crate and release the part as follows:

1. Check the air pressure in the tyres. The pressure is designated on the floor mat. The air pressure in the tyres is of critical importance for the performance and handling of the machine. The correct air pressure for mowing is 0.6 bar (9 psi) in the front tyres, and 0.4 bar (6 psi) in the rear tyres.
   When using heavy accessories, e.g. snow thrower, it may be necessary to increase the pressure somewhat. However, the maximum permitted pressure is always 0.8 bar (12 psi).
   Too high pressure in the tyres leads to that the machine drives poor due to:
- A small surface in contact to the ground.
- Hard tyre = less flexibility = self cleaning characteristic deteriorate.



2. Remove the following parts from the package and put them on the floor.
- The battery (some models).
- The steering wheel.
- The plastic bag, containing owners manuals, information video and assembly screws.

1.4.2 Battery

The battery can be of the following two types, depending on tha actual machine:

- Valve regulated type (A)
- Dry charged type (B)

Depending on the battery type, load and assemble the battery, following the actual instruction below.

A

B

Valve regulated battery

This battery needs limited maintenance. Is has no electrolyte levels or plugs.

Warning!

Do not wear rings, metallic bracelet, chain round the neck or similar metal objects when working with the battery. It can cause short-circuit, burns and fire.

Warning!

The battery must be fully charged before being used for the first time. The battery must always be stored fully charged. If the battery is stored while discharged, serious damage will occur.

Charging with the engine

The battery can be charged using the engine's generator as follows:

1. Install the battery in the machine as shown below.
2. Place the machine outdoors or install an extraction device for the exhaust fumes.
3. Start the engine according to the instructions in the user guide.
4. Allow the engine to run continuously for 45 minutes.
5. Stop the engine. The battery will now be fully charged.

Charging using battery charger

When charging using a battery charger, a battery charger with constant voltage must be used.

Ordering number: 1136-0602-01.

The battery can be damaged if a standard type battery charger is used.

Dry charged battery

Dry charged batteries are delivered without battery acid in their cells.

Warning!
Filling with battery acid shall take place in a well illuminated and ventilated place with rapidly access to fluiding water for rinsing.

Warning!
Wear rubber gloves and eye protection and handle the acid with great care to avoid spillage.

Warning!
The acid can burn the skin and destroy clothing and other materials it comes in contact with.

Warning!
Do not wear rings, metallic bracelet, chain round the neck or similar metal objects when working with the battery. It can cause short-circuit, burns and fire.

Maintain the dry charged battery as follows:

1. Fill carefully all cells with battery acid. The acid level shall be ca 5 mm above the cell packet edges.
2. Let the battery acid draw in into the cell material during 20 minutes. Adjust after that the cell levels again.
3. Let the battery stand for 2 hours before use. During this time it is suitably to assemble the rest of the machine as described below.
4. After 2 hours, install the battery as described below.

Installation of battery

See also the respective installation manual, delivered with the machine.

After the battery is charged, remove the motor casing and install it in the machine. Connect first the red cable to plus (+) and then the black cable to minus (-).

If the cables are disconnected/ connected in the wrong order, there is a risk of a short-circuit and damage to the battery.

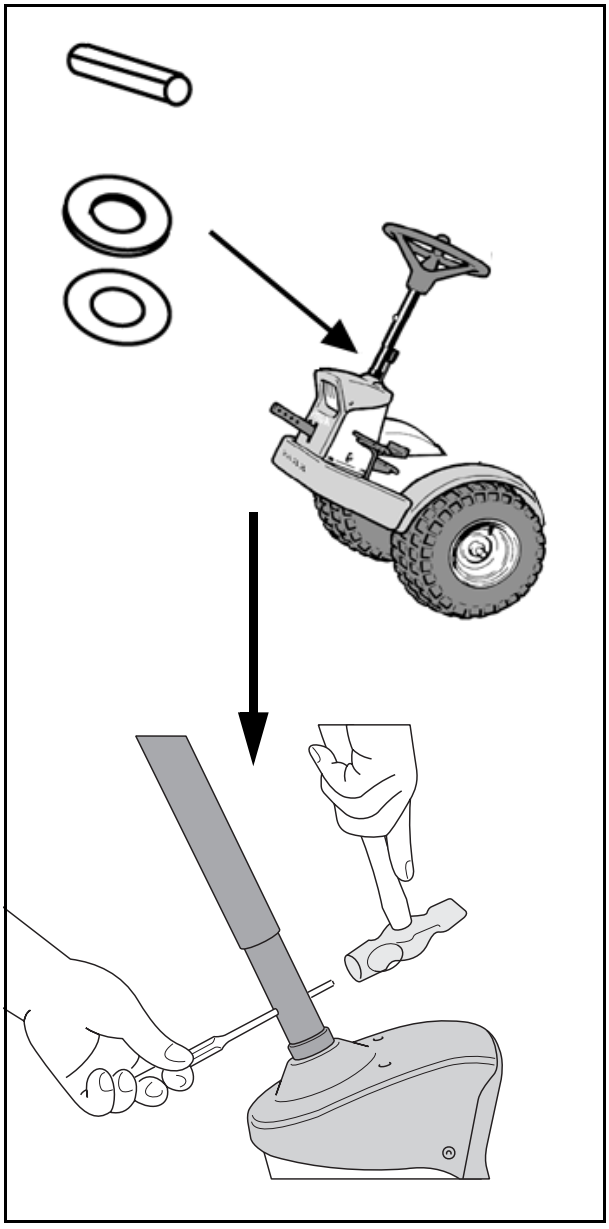
If the cables are interchanged, the generator and the battery will be damaged.

The engine must never be driven with the battery disconnected. There is a risk of serious damage to the generator and the electrical system.

1.4.3 Assembly

The assembly procedure shall take place in a clean, well illuminated and dry place.

Assemble the machine as follows:



Assembly of steering wheel

Instructions for machines with mechanic steering:

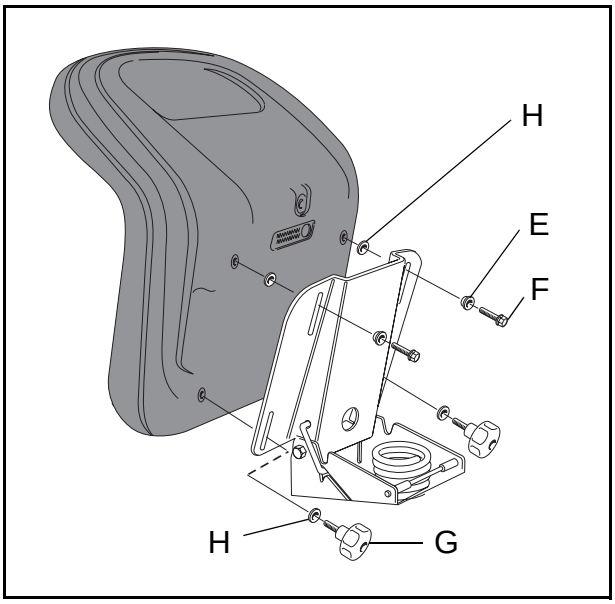
The machine is delivered with two shims, one with a thickness of 0.5 mm and one with a thickness of 1.0 mm.
In order to minimise the axial play in the steering column, the shim washers (0.5 mm) and/or (1.0 mm) must be installed on the steering column between the steering column jacket and the bracket as follows.

1. Install the steering column jacket on the steering column and secure by knocking in the tension pin approximately 1/3 of its length.
2. Pull the steering column jacket and the steering column up.
3. From the outside, check whether no washers, the 0.5 mm washer, the 1.0 mm washer or both washers can be inserted into the gap. The washer/washers must not be forced in, as there must be a little axial play.
4. Pull out the cotter pin and dismantle the steering wheel jacket.
5. Install the washer/washers in accordance with point 3 above.
6. Install the steering column jacket on the steering column and secure by knocking in the tension pin fully. Use a counterhold. Also make sure that the logo on the steering wheel is in the correct position.

Instructions for machines with hydraulic steering:

1. Adjust the machine in the straight forward direction.
2. Attach the steering wheel with the logotype readable from the driver position.

Assembly of seat (adjusting knobs under)



Install the mounting in the rear (upper) holes as follows:

1. Install the shoulder washers (E) on the screws (F).
2. Insert the screws through the slots in the bracket. Place a washer (H) between the seat and the bracket.
3. Tighten the screws in the seat. Tightening torque: 9±1.7 Nm.

If the screws are tightened more than 9±1.7 Nm, the seat will be damaged.

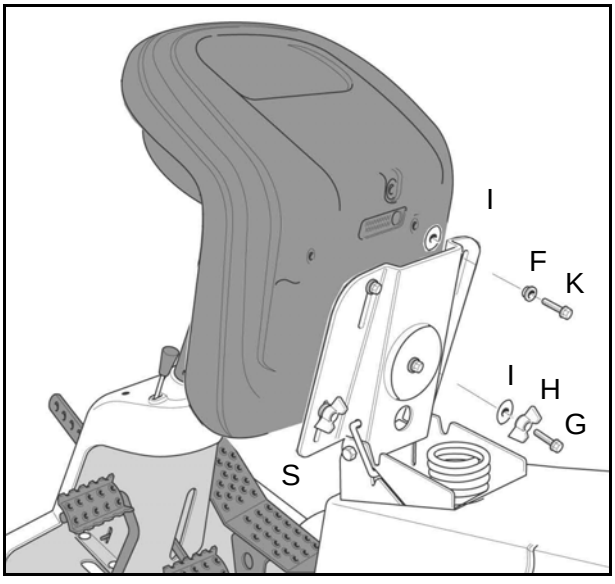
4. Check that the seat moves easily in the slots in the bracket.

Install the mounting in the front (lower) holes as follows:

1. Install a washer (H) on each knob (G).
2. Insert the knobs through the slots in the bracket and tighten by hand in the seat.
3. Fold the seat down and place it in the desired position.
4. Tighten the screw knobs (G) by hand.

The screw knobs (G) and the seat will be damaged if tools are used.

Assembly of seat (adjusting wings under)



Release the catch (S) and fold up the seat bracket.

Install the mounting in the rear (upper) holes as follows:

1. Install the shoulder washers (F) on the screws (K).
2. Insert the screws through the slots in the bracket. Place a washer (I) between the seat and the bracket.
3. Tighten the screws in the seat. Tightening torque: 9±1.7 Nm.

If the screws are tightened more than 9±1.7 Nm, the seat will be damaged.

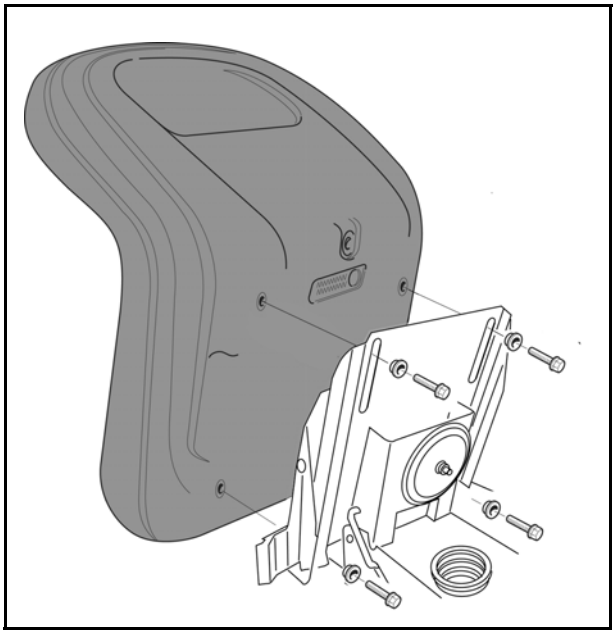
4. Check that the seat moves easily in the slots in the bracket.

Install the mounting in the front (lower) holes as follows:

1. Install the screw knobs (H) on the screws (G).
2. Install a washer (I) on each screw.
3. Insert the screws through the slots in the bracket and tighten by hand in the seat.
4. Fold the seat down and place it in the desired position.
5. Tighten the screw knobs (H) by hand.

The screw knobs (H) and the seat will be damaged if tools are used.

Assembly of seat (adjusting by lever)



1. Remove the following components from the seat bracket:
   - 4 Nuts (for transport locking, not used).
   - 4 Screws.
   - 4 Shoulder washers.
2. Position the seat over the mounting in the seat bracket.
3. Install the shoulder washers on the screws.
4. Insert the screws with the attached shoulder washers through the slots in the seat bracket and the holes in the seat plate. Screw the seat into place.

Tightening torque: 9±1.7 Nm.

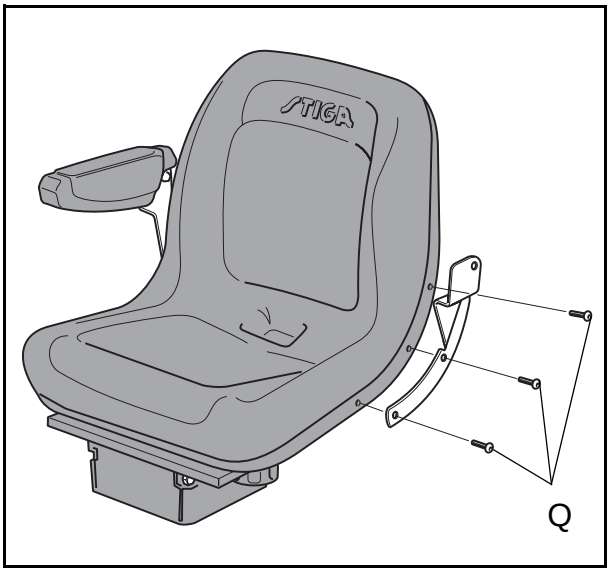
If the screws are tightened more than 9±1.7 Nm, the seat will be damaged.

5. Check that the seat moves easily in the slots in the bracket.

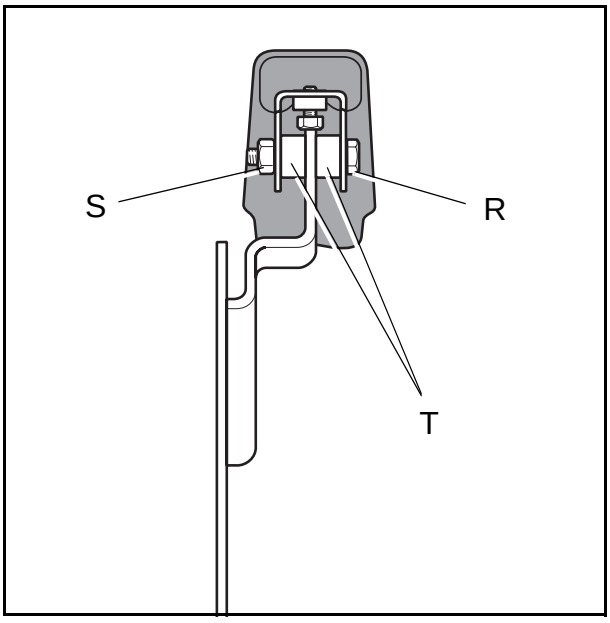
Arm rest (if applicable)

The arm rests and the installation components are supplied in a separate box. Assemble as follows:

1. Assemble the left and right mounts onto the seat. Use 3 screws (Q) supplied at each side.



2. Assemble the arm rests with screws (R), nuts (S) and spacers (T).
3. Tighten the screws so that the arm rests simply can be folded up/down.



Towing plate

Fitting according to customer requirements.

Engine oil

Check the oil level in the engine and top up if necessary.

HST oil

Check the oil level in the HST’s expansion tank after test driving, and top up if necessary.

1.4.4 Final checks

Removing from pallet

All the above measures shall have been done with the machine standing on the pallet. Now, loosen the remaining straps and roll off the machine from the pallet.
Fit and adjust accessories.

Test driving

Warning!

Do not drive without a work equipment (mover deck) attached. Risk for turning over.

Drive the machine for a few minutes. Test all the functions. Pay special attention to the safety functions. If the machine is to be delivered with mower deck or other accessories, fit these before test driving the machine.

HST oil

Check the oil level in the HST's expansion tank after test driving, and top up if necessary.

Steering chain / Steering wire

Check that the steering chain / steering wire is sufficiently taut. Adjust if necessary.

Miscellaneous

Give the machine a general inspection.
- Is the machine clean?
- Is there any oil leakage?
- Abnormal noise or rattle?

Receipt

By filling in the guarantee certificate you guarantee that the delivery service has been correctly conducted.
Remember to make sure that the customer receives all the documentation when the machine is collected / delivered.

1.5 Service

Every new machine is delivered with a service book. This service book is part of the active post-market programme and shall be kept in a safe place during the entire lifetime of the machine. Hand over the service book if the machine is sold in 2:nd hand.

Service should generally be carried out at least every 50 operating hours (exception of the first service), although in accordance with the conditions below.

There are three different grades of service events. Every service event consists of a number of service points as described in the following paragraphs. Every service point has a number which refer to a describing text after the schedules.

Some service points do not coincide with the scheduled service intervals, but shall be performed in connection with a scheduled service when possible. E.g. some items shall be performed at every second service and some also between two services. These service points are described with procedure and interval in the respective “Instruction for use”.

Typical service points wich not coincide with scheduled service intervals are:
- Cleaning/changing air filter in some motors.
- Change of oil in some motors.
- Valve adjustments for some motors.
- Change of transmission oil in 4 WD machines.
- Change of spark plug in some motors.

1.5.1 First Service

The first service shall be performed within 5 hours of running and includes the service points as per the table below.

This service is very important to safeguard the continuing function of the machine.

Number	Service point
1	Safety check.
2	Tyres, air pressure.
3	Engine oil, change. Machines with filter, replace it together with the oil.
4A	Oil level in HST, check (Valid for machines with HST only).
5	Belt transmissions, check.
6	Steering adjustment.
7	Battery check.
21	Test driving.
*	Transmission oil, change and tank filter/HST filter, clean. (Valid for 4WD machines only)
*	Filter for transmission oli, change. (Valid for 4WD machines with external hydraulic only)

*) See section 4.

1.5.2 Intermediate Service

The intermediate service shall be conducted between two basic services. That means:

For Pro Diesel: 100 hours after a basic service.

For all other machines: 50 hours after a basic service.

Number	Service point
1	Safety check.
2	Tyres, air pressure.
3	Engine oil, change.
4A	Oil level in HST, check. (Valid for machines with HST only).
6	Steering adjustment.
9	Air filter, cleaning.
10	Air filter catalytic converter, cleaning.
11	Cooling fins, clean.
12	Lubrication

The intermediate service is not as extensive as the Basic Service and can therefore be conducted by the customer, or by an authorised Service Workshop. Regardless of who conducts the service, it must be documented in the service book.

1.5.3 Basic Service

The basic service shall be conducted as follows:

For Pro Diesel: Every 200 hours or every year, which first occur.

For all other machines: Every 100 hours or every year, which first occur.

The Basic Service must always be conducted by an authorized Service Workshop, and documented with a stamp in the service book.

Number	Service item
1	Safety check
2	Tires, air pressure
3	Engine oil, change. Machines with filter, replace it together with the oil.
4B	Oil in HST, check/replace. Machines with filter, replace it together with the oil. (Valid for machines with HST only)
5	Belt transmissions, check
6	Steering adjustment
7	Battery check
8	Air filter for engine, clean/ replace

Number	Service item
9	Air filter catalytic converter, clean (Valid for machines with catalytic converter only)
10	Cooling fins, clean
11	Spark plug, check/replace
13	Transmission, check
14	Speed check
15	Bearing boxes, check**
16	Exhaust system, check*
17	Electrical system, check*
18	Mower deck, check**
19	Blades, check**
20	Power take-off, check
21	Control check
22	Valve play***
23	Test driving

*) See also “Safety check”.

**) See also the mover deck manual.

***) See the motor manual.

1.5.4 Description of service points

1. Safety check

Check the safety functions. It is often appropriate to do this check in conjunction with test driving. The following items shall be checked at all machines:

- No leakage on fuel lines and connections.
- No mechanical damages to the electrical cables. All insulation intact.
- The muffler shall be undamaged and its screws tightened. No exhaust leakage in connections.

The electrical check items at the respective machine up to model 2004 are listed in the tables below. For models 2005 and up, see the respective “Instructions for use”.

Senator, electrical safety check

Test	Status	Action	Result
1	Brake pedal not pressed. PTO activated. No gear activated.	Turn the key and make a start attempt.	Motor shall not start.
2	Brake pedal pressed. PTO activated. No gear activated.	Turn the key and make a start attempt.	Motor shall not start.
3	Brake pedal not pressed. PTO not activated. A gear is activated.	Turn the key and make a start attempt.	Motor shall not start.
4	Motor running. PTO activated.	Operator rises from the seat.	Motor shall stop.
5	Motor running. A gear activated.	Operator rises from the seat.	Motor shall stop.
6	Motor running.	Disconnect cable from the shut off valve.	Motor shall stop after a few minutes.

President and Comfort, electrical safety check

Test	Status	Action	Result
1	Brake pedal not pressed. PTO not activated.	Turn the key and make a start attempt.	Motor shall not start.
2	Brake pedal pressed. PTO activated.	Turn the key and make a start attempt.	Motor shall not start.
3	Motor running. PTO activated.	Operator rises from the seat.	Motor shall stop.
4	Motor running.	Disconnect cable from the shut off valve.	Motor shall stop after a few minutes.

Royal and Pro 16, electrical safety check

Test	Status	Action	Result
1	Brake pedal not pressed. PTO not activated.	Turn the key and make a start attempt.	Motor shall not start.
2	Brake pedal pressed. PTO activated.	Turn the key and make a start attempt.	Motor shall not start.
3	Motor running. PTO activated.	Operator rises from the seat.	Motor shall not start.
4	Cruise control activated.	Operator rises from the seat.	Cruise control shall disengage
5	Motor running.	Disconnect cable from the shut off valve.	Motor shall stop after a few minutes.

Pro 20, electrical safety check

Test	Status	Action	Result
1	Brake pedal not pressed. PTO magnetic clutch not activated.	Turn the key and make a start attempt.	Motor shall not start.
2	Brake pedal pressed. PTO magnetic clutch activated.	Turn the key and make a start attempt.	Motor shall not start.
3	Motor running. PTO magnetic clutch activated.	Operator rises from the seat.	PTO magnetic clutch shall disengage.
4	Cruise control activated.	Operator rises from the seat.	Cruise control shall disengage.
5	Hydraulic lift in neutral position.	Attempt to engage the PTO magnetic clutch.	PTO magnetic clutch shall not engage.
6	Motor running.	Disconnect cable from the shut off valve.	Motor shall stop after a few minutes.

Pro Diesel, electrical safety check

Test	Status	Action	Result
1	Brake pedal not pressed. PTO magnetic clutch not activated.	Turn the key and make a start attempt.	Motor shall not start.
2	Brake pedal pressed. PTO magnetic clutch activated.	Turn the key and make a start attempt.	Motor shall not start.
3	Motor running. PTO magnetic clutch activated.	Operator rises from the seat.	PTO magnetic clutch shall disengage.
4	Cruise control activated.	Operator rises from the seat.	Cruise control shall disengage
5	Hydraulic lift in neutral position.	Attempt to engage the magnetic clutch.	PTO magnetic clutch shall not engage.

2 Tyres, air pressure

Check the air pressure. Adjust if necessary. The recommended air presure is designated at the floor mat.

3 Engine oil and oil filter

See the “Instructions for use”, delivered with the machine or “Instructions for use” at page 29. See also the engine manufacturer manual.

4 Oil, HST

See the “Instructions for use”, delivered with the machine.

5 Belt transmissions, check

Check the condition of all the belts and belt tensioners.

6 Steering, adjustment

See section 3.

7 Battery, check

Valid for dry charged batteries only. Check the acid level. Top up with distilled water if necessary. See page 6-7.

8 Engine air filter

See the “Instructions for use”, delivered with the machine. See also the engine manufacturer manual.

9 Catalytic converter air filter

See the “Instructions for use”, delivered with the machine. See also the engine manufacturer manual.

10 Cooling fins

Remove protective covers from the engine and cleans between cooling fins. Use a brush and compressed air. See also the engine manufacturer manual.

11 Spark plug

Remove the spark plug (not valid for Pro Diesel) and clean it or replace if necessary. See also the engine manufacturer manual.

12 Lubrication

Lubricate the articulation point (4 nipples) and all moving parts such as wires and levers. See also the instruction manual, delivered with the machine.

13 Transmission

Listen for abnormal noise.
Manual models: Check that the drive function works properly at all gears. Adjust if required.

14 Speed check

Check that the speed corresponds to the specified value. See pages 18-22.

15 Bearing boxes

Listen for abnormal noise from the bearings. Check that there are no wear, play or seizure.

16 Exhaust system

Check that there are no cracks, leakage or other damages. Check the attachment devices. See also the engine manufacturer manual.

17 Electrical system

Check that there are no damaged cables, contacts or other devices. Check that all cables are properly secured to the chassis and with cable holders. Check that there is no friction between cables and chassis, which can result in cable damage and short circuit.

18 Mower deck

Warning!

The blades are sharp. Always wear gloves when working with the blades to avoid injury.

Check if there are collision damages or wear at the deck body and painting. Align, repair and touch up the painting as required.

Check the tightening of the bearing boxes screws and tighten.

Rotate the blades and check the the shafts are correct, not bent, no abnormal bearing noise and no plays.

Check the belts and their tensions, see section 4.

Check that the lifting mechanism moves evenly, not jammed and no play and that it locks in desired position.

Check the electrical function of the electrikal mower lifter (if applicable).

Check the plastic guide bar between the blades. Replace if required.

19 Blades

Warning!

The blades are sharp. Always wear gloves when working with the blades to avoid injury.

Check that the blades are sharp. Sharpen as reqiured.

20 Power take-off (PTO)

Check that the magnetic clutch (if applicable) engage the work equipment rotation in the desired time and that it not slips during normal load. Replace the clutch if necessary.

Check that the power take-off belt (if applicable) engage the work equipment rotation in the desired time and that it not slips during normal load. Adjust if necessary. See section 4.

Check that the power take-off brake (if applicable) brakes the rotation movement in the desired time. Adjust if necessary. See section 4.

21 Control check

Check that all controls function properly, that there are no jammings or excessive plays. Adjust if nesaccary. See section 5.

22 Valve play

See the engine manual regarding procedure and interval.

23 Test driving

Drive the machine during a few minutes and make the following attentions in different speeds and turnings in right and left. Check that all functions work evenly and proper and without any abnormal noise.

- Brake function
- Clutch function
- Power take-off
- Steering

Check that there are no abnormal vibrations.

1.6 Technical specifications

1.6.1 Machines

2000/2001 Models	SENATOR 13-6112-11 13-6112-12	COMFORT 13-6113-22	PRESIDENT 13-6113-11 13-6113-12	ROYAL 13-6114-11 13-6114-12	PRO 16 13-6216-11 13-6216-12	PRO 18 13-6218-11 13-6218-12	PRO 20 13-6221-11 13-6221-12
MOTOR							
B&S I/C	x	x	x				
B&S Vanguard					x	x	x
B&S Intek				x			
Cylinders/Hp	1/12,5	1/15,5	1/12,5	2/16	2/16	2/18	2/20
FUEL							
12 litres	x	x	x	x	x	x	x
Fuel meter				x	x	x	x
External fuel cap	x	x	x	x	x	x	x
TRANSMISSION							
Gearbox 5+R	MST205						
HST		K46	K46	K46	K62	K62	K66
Switchable differential lock					x	x	x
Wheel shaft dia	3/4"	3/4"	3/4"	3/4"	1"	1"	1"
SPEED							
Max speed km/h	9	10	10	10	11	11	13
STEERING							
Servoassisted							x
Steering knob							x
Height adjustable steering wheel			x	x	x	x	x
Chain/wire	x	x	x	x			
Chain/chain					x	x	x
SEAT							
Backrest with additional height					x	x	x
Foldable armrest							x
Suspended seat	x	x	x				
Comfort suspended seat				x	x	x	x
WHEEL							
16"	x	x	x	x			
17"					x	x	x
Double ball bearings					x	x	x
FEATURES							
Mechanic PTO	x	x	x	x	x		
Electrical PTO						x	x
Elektrical cutting height adj.					x	x	x
Speed cruiser					x	x	x
Switch and socket for rear rake							x
Harness for rear rake					x	x	x
Switch and socket for sand spreader							x
Pedal implement lifter	x	x	x	x	x		
Pedal implement lifter, servoassisted						x	x

2002 Models	SENATOR 13-6112-13	PRESIDENT 13-6113-13	COMFORT 13-6113-23	POWER 13-6113-93	ROYAL 13-6114-13	PRO 16 13-6216-13	PRO 20 13-6221-13	PRO 20 Cat 13-6221-23	PRO DIESEL 13-6231-13
MOTOR									
B&S I/C Quiet	x	x	x						
B&S Vanguard				x		x	x	x	
Honda GCV 520					x				
Hatz 1B40W									x
Cylinders/Hp	1/12,5	1/12,5	1/15,5	2/18	2/14	2/16	2/20	2/20	1/11
FUEL									
Big Tank	x	x	x	x	x	x	x	x	x
Fuel meter					x	x	x	x	
External fuel cap	x	x	x	x	x	x	x	x	
TRANSMISSION									
Gearbox 5+R	MST205								
HST		K46	K46	K46	K46	K62	K66	K66	K66
Switchable differential lock						x	x	x	x
Wheel shaft dia	3/4"	3/4"	3/4"	3/4"	3/4"	1"	1"	1"	1"
SPEED									
Max speed km/h	9	10	10	10	10	11	12	12	12
STEERING									
Servoassisted							x	x	x
Steering knob							x	x	x
Height adjustable steering wheel		x	x	x	x	x	x	x	x
Chain/wire	x	x	x	x	x				
Chain/chain						x	x	x	x
SEAT									
Backrest with additional height						x	x	x	x
Foldable armrest							x	x	x
Suspended seat	x	x	x	x					
Comfort suspended seat					x	x	x	x	x
WHEEL									
16"	x	x	x	x	x				
17"						x	x	x	x
Double ball bearings						x	x	x	x
FEATURES									
Mechanic PTO	x	x	x	x	x	x			
Electrical PTO							x	x	x
Elektrical cutting height adj.					x	x	x	x	x
Speed cruiser					x	x	x	x	x
Switch and socket for rear rake							x	x	x
Harness for rear rake						x	x	x	x
Switch and socket for sand spreader							x	x	x
Harness for sand spreader						x	x	x	x
Pedal implement lifter	x	x	x	x	x	x			
Hydraulic implement lifter							x	x	x

2003 Models	SENATOR 13-6112-14	COMFORT 13-6113-24	C UNLIMITED 13-6113-34	PRESIDENT 13-6113-14	GOVERNOR 13-6113-84	POWER 13-6113-94	ROYAL 13-6114-14	PRO 16 13-6216-14	PRO 20 13-6221-14	PRO 20 Cat 13-6221-24	PRO DIESEL 13-6231-14
MOTOR											
B&S mod 28	x			x	x						
B&S mod 282H I/C		x	x				x				
B&S Intek						x					
Honda GCV 530							x				
B&S Vanguard								x	x	x	
Hatz 1B40W											x
Cylinders/Hp	1/12,5	1/15,5	1/15,5	1/12,5	1/12,5	1/18	2/14	2/16	2/20	2/20	1/11
FUEL											
Big Tank	x	x	x	x	x	x	x	x	x	x	x
Fuel meter			x				x	x	x	x	
External fuel cap	x	x	x	x	x	x	x	x	x	x	
TRANSMISSION											
Gearbox 5+R	MST205										
HST		K46	K46	K46	K46	K46	K46	K62	K66	K66	K66
Switchable differential lock								x	x	x	x
Wheel shaft dia	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	1"	1"	1"	1"
SPEED											
Max speed km/h	9	10	10	10	10	10	10	11	12	12	12
STEERING											
Hydraulic servoassisted									x	x	x
Steering knob									x	x	x
Height adj. steering wheel		x	x	x	x	x	x	x	x	x	x
Chain/wire	x	x	x	x	x	x	x				
Chain/chain								x	x	x	x
SEAT											
Backrest with additional height								x	x	x	x
Foldable armrest									x	x	x
Suspended seat, pivot	x	x		x	x	x					
Suspended seat, vertical			x								
Comfort suspended seat							x	x	x	x	x
WHEEL											
16"	x	x	x	x	x	x	x				
17"								x	x	x	x
Double ball bearings								x	x	x	x
FEATURES											
Mechanic PTO	x	x	x	x	x	x	x	x			
Electrical PTO									x	x	x
Elektrical cutting height adj.							x	x	x	x	x
Speed cruiser							x	x	x	x	x
Switch and socket for rear rake									x	x	x
Harness for rear rake								x	x	x	x
Switch/socket, sand spreader									x	x	x
Harness for sand spreader								x	x	x	x
Pedal implement lifter	x	x	x	x	x	x	x	x			
Hydraulic implement lifter									x	x	x

2004 Models	COMFORT 13-6113-25	PRESIDENT 13-6113-15	ROYAL 13-6114-15	COMPACT 13-6101-15	COMPACT HST 13-6103-15	POWER 13-6113-95	JUBILEE 13-6113-55	PRO 16 13-6216-15	PRO 20 13-6221-15	PRO 20 Cat 13-6221-25	PRO DIESEL 13-6231-15
MOTOR											
B&S mod 21		x		x							
B&S mod 282H I/C	x				x						
B&S Intek						x					
Honda GCV 530			x								
B&S Vanguard							x	x	x	x	
Hatz 1B40W											x
Cylinders/Hp	1/15,5	1/13,5	2/14	1/12,5	1/15,5	2/18	2/16	2/16	2/20	2/20	1/11
FUEL											
Fuel meter			x					x	x	x	
External fuel cap	x	x	x	x	x	x	x	x	x	x	
TRANSMISSION											
Gearbox 5+R				Dana							
HST	K46	K46	K46		K46	K46	K46	K62	K66	K66	K66
Switchable differential lock								x	x	x	x
Wheel shaft dia	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	1"	1"	1"	1"
SPEED											
Max speed km/h	10	10	10	10	10	10	10	11	12	12	12
STEERING											
Hydraulic servoassisted									x	x	x
Steering knob									x	x	x
Height adj. steering wheel	x	x	x	no	no	x	no	x	x	x	x
Chain/wire	x	x	x	x	x	x	x				
Chain/chain								x	x	x	x
SEAT											
Backrest with additional height								x	x	x	x
Foldable armrest									x	x	x
Suspended seat, pivot	x	x		x	x	x	x				
Suspended seat, vertical											
Comfort suspended seat			x					x	x	x	x
WHEEL											
16"	x	x	x	x	x	x	x				
17"								x	x	x	x
Double ball bearings								x	x	x	x
FEATURES											
Mechanic PTO	x	x	x	x	x	x	x	x			
Electrical PTO									x	x	x
Elektrical cutting height adj.			x					x	x	x	x
Speed cruiser			x					x	x	x	x
Switch and socket for rear rake									x	x	x
Harness for rear rake								x	x	x	x
Switch/socket, sand spreader									x	x	x
Harness for sand spreader								x	x	x	x
Pedal implement lifter	x	x	x	x	x	x	x	x			
Hydraulic implement lifter									x	x	x

2005 Models	COMFORT 13-6122-11	ROYAL 13-6123-11	COMPACT 13-6101-16	COMPACT 13-6102-16	COMPACT 13-6103-16	PRO 16 13-6216-16	PRO DIESEL 13-6231-16
MOTOR							
B&S mod 21			x	x			
B&S mod 282H I/C	x				x		
B&S Intek							
Honda GCV 530		x					
B&S Vanguard						x	
Hatz 1B40W							x
Cylinders/Hp	1/15,5	2/14	1/12,5	1/13,5	1/15,5	2/16	1/11
FUEL							
Fuel meter		x				x	
External fuel cap	x	x	x	x	x	x	
TRANSMISSION							
Gearbox 5+R			Dana				
HST	K46	K46		K46	K46	K62	K66
Switchable differential lock						x	x
Wheel shaft dia	3/4"	3/4"	3/4"	3/4"	3/4"	1"	1"
SPEED							
Max speed km/h	10	10	10	10	10	11	12
STEERING							
Hydraulic servoassisted							x
Steering knob							x
Height adj. steering wheel	x	x	x	x	x	x	x
Chain/wire			x	x	x		
Chain/chain	x	x				x	x
SEAT							
Backrest with additional height						x	x
Foldable armrest							x
Suspended seat, pivot	x		x	x	x		
Suspended seat, vertical		x				x	x
WHEEL							
16" x 6.00			x	x	x		
16" x 7.50	x	x					
17" x 8.00						x	x
Double ball bearings						x	x
FEATURES							
Mechanic PTO	x	x	x	x	x	x	
Electrical PTO							x
Elektrical cutting height adj.		x				x	x
Speed cruiser		x				x	x
Switch and socket for rear rake							x
Harness for rear rake						x	x
Switch/socket, sand spreader							x
Harness for sand spreader						x	x
Pedal implement lifter	x	x	x	x	x	x	
Hydraulic implement lifter							x

2006 Models	COMPACT 13-6101-17	COMPACT HST 13-6102-17	COMPACT HST 13-6103-17	COMPACT 4WD 13-6104-17	EXCELLENT 13-6113-56	PRESIDENT 13-6113-17	FARMER 13-6133-36	COMFORT 13-6182-12	ROYAL 13-6183-12	PRESTIGE 4WD 13-6185-12	DIESEL 13-6180-32	DIESEL 4WD 13-6181-32	PRO 16 4WD 13-6241-12	PRO Svan 4WD 13-6241-22	PRO 20 4WD 13-6244-12	PRO 25 4WD 13-6246-12
MOTOR																
B&S mod21 I/C	X															
B&S mod 21 I/C		X				X										
B&S mod282H I/C			X	X												
Honda GCV530									X							
Honda GXV530														X		
B&S Vanguard					X								X			
B&S Vanguard															X	
Kohler Courage SV 540										X						
Kohler Command Pro																X
Hatz B40 Diesel							X				X	X				
Cylinders/Hp	1/12,5	1/13,5	1/15,5	1/15,5	2/16	1/13,5	1/11	2/16	2/16	1/18	1/11	1/11	2/16	2/16	2/20	2/25
PETROL TANK																
6 L	X	X	X	X												
12 L					X	X		X	X	X	X	X				
14 L													X	X	X	X
TRANSMISSION																
Gearbox 5+R	Dana															
HST K46		X	X		X	X	X	X	X		X					
KTM -7 4WD				X						X		X				
KTM -10 4WD													X	X	X	X
Wheel shaft dia	3/4"	3/4"	3/4"	3/4"	3/4"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"
SPEED																
Max speed km/h	9	9	9	9	10	10	10	10	10	10	10	10	11	11	11	11
STEERING																
Hydraulic servoassisted												X		X	X	X
Steering knob								X	X		X	X		X	X	X
Chain/wire	X	X	X	X	X	X	X									
Chain/chain								X	X	X	X	X	X	X	X	X
Height adj. steering wheel					X	X	X	X	X	X	X	X	X	X	X	X
Bushings steering rod	X	X	X	X	X	X	X	X	X	X	X					
Ball bearings steering rod												X	X	X	X	X
SEAT																
Backrest with additional height												X	X	X	X	X
Foldable armrest												X		X	X	X
Suspended seat, pivot	X	X	X	X	X	X	X	X	X	X	X					
Suspended seat, vertical												X	X	X	X	X
WHEEL																
16" x 6.00	X	X	X	X												
16" x 7.50					X	X	X	X	X	X	X	X				
17" x 8.00													X	X	X	X
FEATURES																
Mechanic PTO	X	X	X	X	X	X	X	X	X	X	X	X				
Electrical PTO													X	X	X	X
Elektrical cutting height adj.								X	X	X	X	X	X	X	X	X
Speed cruiser						X		X	X	X	X	X	X	X	X	X
Switch and socket for rear rake												X		X	X	X
Harness for rear rake												X	X	X	X	X
Switch/socket, sand spreader												X		X	X	X
Harness for sand spreader												X	X	X	X	X
Pedal implement lifter	X	X	X	X	X	X	X	X	X	X	X		X			
Hydraulic implement lifter												X		X	X	X

2007 Models	COMPACT 13-6101-18	COMPACT HST 13-6102-18	COMPACT HST 13-6103-18	COMPACT 4WD 13-6104-18	UNLIMITED 14 13-6184-53	PRESIDENT 14 13-6184-03	POWER 18 13-6187-13	EXCELLENT 16 13-6189-03	UNLIMITED 2WD 13-6190-03	UNLIMITED 4WD 13-6191-13	COMFORT 13-6182-13	ROYAL 13-6183-13	PRESTIGE 4WD 13-6185-13	DIESEL 13-6180-33	DIESEL 4WD 13-6181-33	PRO 16 4WD 13-6241-13	PRO Svan 4WD 13-6241-23	PRO 20 4WD 13-6244-13	PRO 25 4WD 13-6246-13
MOTOR																			
B&S mod 21 I/C	X																		
B&S mod 21 I/C		X			X	X													
B&S mod282H I/C			X	X							X								
B&S Intec 18									X	X									
Honda GCV530												X							
Honda GXV530																	X		
B&S Vanguard								X								X			
B&S Vanguard																		X	
Kohler Courage SV 540							X						X						
Kohler Command Pro																			X
Hatz B50 Diesel														X	X				
Power, Hp	12,5	13,5	15,5	15,5	13,5	13,5	18	16	18	18	15,5	16	18	12	12	16	16	20	25
Cylinders	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	2	2	2	2
PETROL TANK																			
6 L	X	X	X	X															
12 L					X	X	X	X	X	X	X	X	X	X	X				
14 L																X	X	X	X
TRANSMISSION																			
Gearbox 5+R	Dana																		
HST K46		X	X		X	X	X	X	X		X	X		X					
KTM -7 4WD				X						X			X		X				
KTM -10 4WD																X	X	X	X
Wheel shaft dia	3/4"	3/4"	3/4"	3/4"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"
SPEED																			
Max speed km/h	9	9	9	9	10	10	10	10	10	10	10	10	10	10	10	11	11	11	11
STEERING																			
Hydraulic servoassisted															X		X	X	X
Steering knob									X		X	X		X	X		X	X	X
Chain/wire	X	X	X	X	X	X													
Chain/chain							X	X	X	X	X	X	X	X	X	X	X	X	X
Height adj. steering wheel											X	X	X	X	X	X	X	X	X
Bushings steering rod	X	X	X	X	X	X	X	X	X	X	X	X	X	X					
Ball bearings steering rod															X	X	X	X	X
SEAT																			
Backrest with additional height															X	X	X	X	X
Foldable armrest															X		X	X	X
Suspended seat, pivot	X	X	X	X	X	X	X	X	X	X	X	X	X	X					
Suspended seat, vertical															X	X	X	X	X
One hand sliding control					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WHEEL																			
16" x 6.00	X	X																	
16" x 7.50			X	X	X	X	X	X	X	X	X	X	X	X	X				
17" x 8.00																X	X	X	X
FEATURES																			
Mechanic PTO	X	X	X	X	X	X	X	X	X	X	X	X	X	X					
Electrical PTO															X	X	X	X	X
Elektrical cutting height adj.								X	X	X	X	X	X	X	X	X	X	X	X
Speed cruiser															X	X	X	X	X
Switch and socket for rear rake															X	X	X	X	X
Harness for rear rake															X	X	X	X	X
Switch/socket, sand spreader															X	X	X	X	X
Harness for sand spreader															X	X	X	X	X
Pedal implement lifter	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X			
Adjustable drive pedal									X	X	X	X	X	X	X	X	X	X	X
Hydraulic implement lifter with hand lever valve															X		X	X	X

Campain machines

Outside the ordinary sortiment, the following campain machines are manufactured during 2000-2005.

Introduction time	Article number	Name	Motor	Transm.	PTO	Deck	Remark/ Other items are similar to
Autumn 2000	13-6113-11	President	B&S I/C 12,5	HST	mechanic	102M	Incl. snow equipm.
Autumn 2001	13-6113-22	Comfort	B&S I/C 15,5 OHV	HST	mechanic	107M plus	President
Spring 2002	13-6113-93	Power	B&S Vanguard 18	HST	mechanic		President
Autumn 2002	13-6113-13	President	B&S I/C 12,5	HST	mechanic	92M	
Spring 2003	13-6113-94	Power	B&S intek 18	HST	mechanic		President
Spring 2003	13-6113-34	Comfort Unlimited	B&S I/C 15,5 OHV	HST	mechanic		Seat susp Fuel meter Comfort
Autumn 2003	13-6113-84	Governor	B&S I/C 12,5	HST	mechanic	92M	President
Autumn 2003	13-6113-24	Comfort	B&S I/C 15,5 OHV	HST	mechanic	107M	President
Autumn 2004	13-6113-55	Jubilee	B&S Vanguard 16	HST	mechanic		President
Spring 2005	13-6113-15	President	B&S 13.5 OHV	HST	mechanic	107M	Older steering

1.6.2 Motors

Below is listed only oil and filter data for the motors.

Regarding additional information about motors, contact the respective representative in the actual country.

Oil and filter data	Oil filter change interval	Oil change interval	Volume without filter	Volume with filter	Oil quality	Oil grade
MOTOR						
B&S single cylinder	-	50 h/12 m		1.4 L	SF or higher	SAE 30/<4°C, 5W-30
B&S Intek twin	100 h	50 h/12 m	1,8 L	1,9 L	SF or higher	SAE 30/<4°C, 5W-30
B&S Vanguard twin	100 h	50 h/12 m	1,3 L	1,4 L	SF or higher	SAE 30/<4°C, 5W-30
Honda twin	-	100 h/6 m		0.9 L	SF or higher	SAE 10W-40/<-20°C, 5W-30
Hatz diesel	*	200 h/12 m		1.7 L	API CD or higher	SAE 10W-40
Kohler Courage	100 h/12 m	100 h/12 m	1,9 L	2,0 L	SF or higher	SAE 10W-30
Kohler Command	200 h/12 m	100 h/12 m	2,0 L	2,1 L	SF or higher	SAE 10W-30

*** = Metal filter, shall be cleaned and refitted after 1000 hours of operation.**

1.6.3 General tightening torque

Unless otherwise stated, the following tightening torque are applicable for screws and nuts on the machine:

Tightening torques

Thread	Torque
M5	5 Nm
M6	9 Nm
M8	22 Nm
M10	45 Nm

1.7 Instructions for use

Some procedures, e.g. changing motor oil, motor filter etc., are refered to the instruction for use, delivered with the actual machine.

The table below shows the numbers of the documents for the respective machines.

Most of the instruction of use are written in 16 languages. If 2 numbers are denoted, the instruction for use is divided in two parts. The first part always contains the languages SV, FI, DA, NO, DE, EN, FR and NL.

Item number	Denomination	Manual
13-6101-16	Park Compact	8211-1031-01 8211-1032-01
13-6101-17	Park Compact	8211-0553-01 8211-0554-01
13-6101-18	Park Compact 13	8211-0001-70 8211-0002-70
13-6102-16	Park Compact HST	8211-1031-01 8211-1032-01
13-6102-17	Park Compact HST	8211-0553-01 8211-0554-01
13-6102-18	Park Compact 14	8211-0001-70 8211-0002-70
13-6102-47	Park Compact HST	8211-0553-01 8211-0554-01
13-6103-16	Park Compact HST	8211-1031-01 8211-1032-01
13-6103-17	Park Compact HST	8211-0553-01 8211-0554-01
13-6103-18	Park Compact 16	8211-0001-70 8211-0002-70
13-6103-46	Park Compact HST	8211-1031-01 8211-1032-01
13-6103-47	Park Compact HST	8211-0553-01 8211-0554-01
13-6103-48	Park Compact 16	8211-0001-70 8211-0002-70
13-6104-17	Park Compact HST 4WD	8211-0553-01 8211-0554-01
13-6104-18	Park Compact 16 4WD	8211-0001-70 8211-0002-70
13-6104-47	Park Compact HST 4WD	8211-0553-01 8211-0554-01
13-6104-48	Park Compact 16 4WD	8211-0001-70 8211-0002-70
13-6113-17	President	8211-0276-10
13-6113-55	Park Jubilee	8211-0276-06 8211-0276-07
13-6113-56	Park Excellent	8211-0276-08 8211-0276-09
13-6122-11	Park Comfort	8211-0276-06 8211-0276-07
13-6122-41	Park Comfort	8211-0276-06 8211-0276-07
13-6123-11	Park Royal	8211-0276-06 8211-0276-07
13-6123-41	Park Royal	8211-0276-06 8211-0276-07
13-6125-11	Park Prestige	8211-0540-01 8211-0545-01
13-6125-41	Park Prestige	8211-0540-01 8211-0545-01
13-6133-36	Park Farmer	8211-0551-01 8211-0552-01
13-6180-32	Park Diesel	8211-0555-01 8211-0556-01
13-6180-33	Park Diesel	8211-0007-70 8211-0008-70
13-6181-32	Park Diesel 4WD	8211-0555-01 8211-0556-01
13-6181-33	Park Diesel 4WD	8211-0007-70 8211-0008-70
13-6182-12	Park Comfort	8211-0562-01 8211-0563-01
13-6182-13	Park Comfort 16	8211-0003-70 8211-0004-70
13-6182-42	Park Comfort	8211-0562-01 8211-0563-01
13-6183-12	Park Royal	8211-0562-01 8211-0563-01
13-6183-13	Park Royal 16	8211-0003-70 8211-0004-70

Item number	Denomination	Manual
13-6183-42	Park Royal	8211-0562-01 8211-0563-01
13-6184-03	Park President 14	8211-0014-70 8211-0015-70
13-6184-53	Park Unlimited 14	8211-0014-70 8211-0015-70
13-6185-12	Park Prestige 4WD	8211-0562-01 8211-0563-01
13-6185-13	Park Prestige 18 4WD	8211-0003-70 8211-0004-70
13-6185-42	Park Prestige 4WD	8211-0562-01 8211-0563-01
13-6185-43	Park Prestige 18 4WD	8211-0003-70 8211-0004-70
13-6187-13	Park Power 18	8211-0014-70 8211-0015-70
13-6189-03	Park Excellent 16	8211-0014-70 8211-0015-70
13-6190-03	Park Unlimited	8211-0017-70
13-6191-13	Park Unlimited 4WD	8211-0017-70
13-6192-23	Park Power 4WD	8211-0063-70
13-6194-23	Park Power 4WD	8211-0064-70
13-6216-16	Park Pro 16	8211-0276-06 8211-0276-07
13-6231-16	Park Pro Diesel	8211-0315-03 8211-0325-03
13-6241-11	Park Pro 16	8211-0540-01 8211-0545-01
13-6241-12	Park Pro 16 4WD	8211-0540-02 8211-0545-02
13-6241-13	Park Pro 16 4WD	8211-0005-70 8211-0006-70
13-6241-22	Park Pro Svan 4WD	8211-0540-02 8211-0545-02
13-6241-23	Park Pro Svan 4WD	8211-0005-70 8211-0006-70
13-6241-41	Park Pro 16	8211-0540-01 8211-0545-01
13-6241-42	Park Pro 16 4WD	8211-0540-02 8211-0545-02
13-6241-43	Park Pro 16 4WD	8211-0005-70 8211-0006-70
13-6244-11	Park Pro 20	8211-0540-01 8211-0545-01
13-6244-12	Park Pro 20 4WD	8211-0540-02 8211-0545-02
13-6244-13	Park Pro 20 4WD	8211-0005-70 8211-0006-70
13-6244-21	Park Pro 20 Cat	8211-0540-01 8211-0545-01
13-6244-41	Park Pro 20	8211-0540-01 8211-0545-01
13-6244-42	Park Pro 20 4WD	8211-0540-02 8211-0545-02
13-6244-43	Park Pro 20 4WD	8211-0005-70 8211-0006-70
13-6246-11	Park Pro 25	8211-0540-01 8211-0545-01
13-6246-12	Park Pro 25 4WD	8211-0540-02 8211-0545-02
13-6246-13	Park Pro 25 4WD	8211-0005-70 8211-0006-70
13-6246-41	Park Pro 25	8211-0540-01 8211-0545-01
13-6246-42	Park Pro 25 4WD	8211-0540-02 8211-0545-02
13-6246-43	Park Pro 25 4WD	8211-0005-70 8211-0006-70

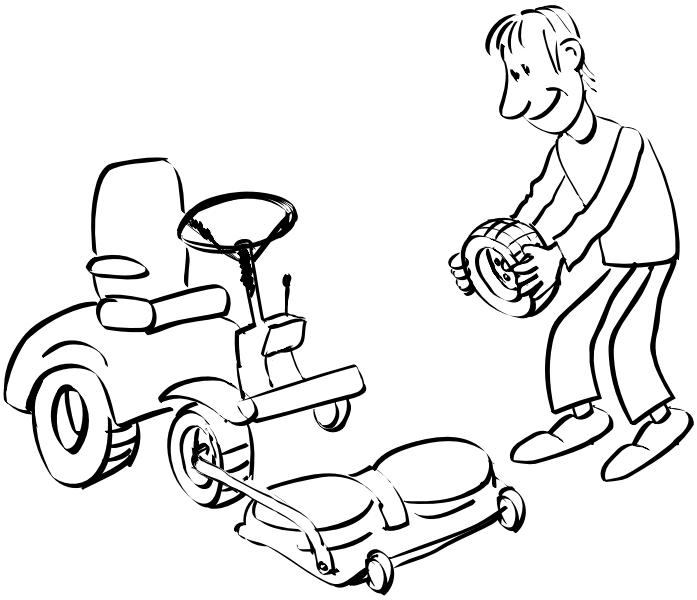
2 Chassis and body

Contents in this chapter

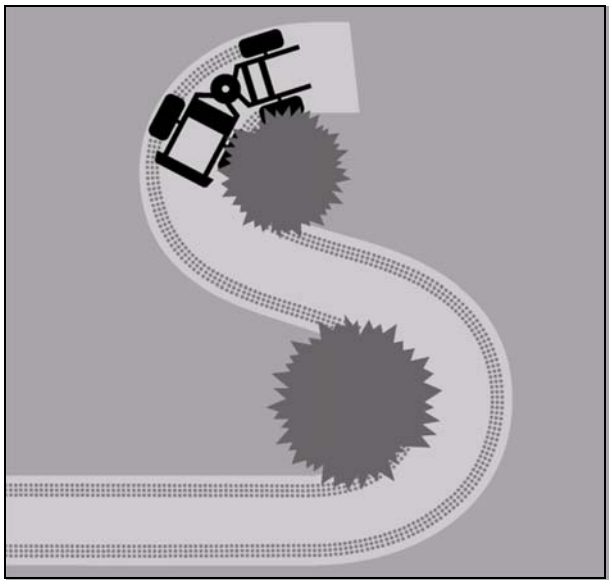
General

To facilitate the driving, handling of work equipment and to make it comfortable for the driver, the machines are equipped with a various number of aid equipments. These equipments are mainly the same for all the machines covered by this manual, but in some cases configurated in different ways. Where divergences occour between the machines, particular instructions are given for each particular equipment.

This chapter gives a brief description of the equipments and describes their repair and replacements.

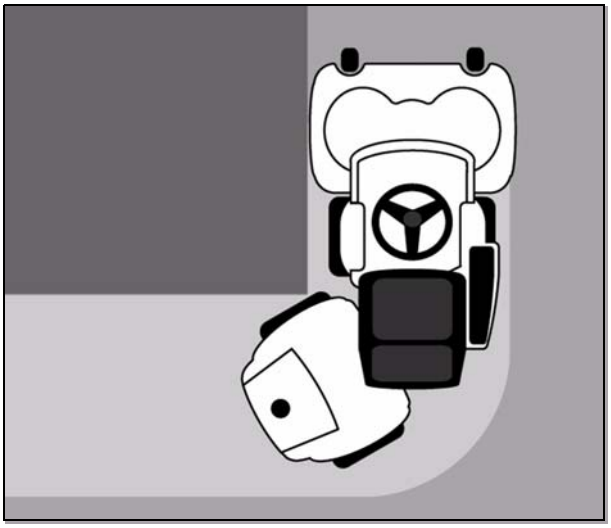


2.1 Description



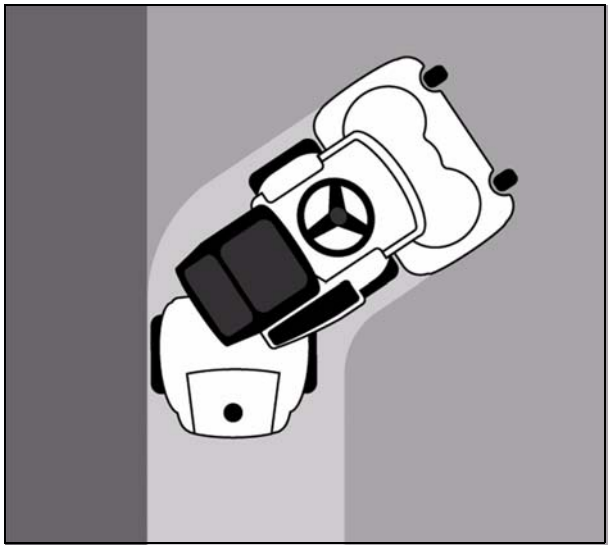
The chassis is built up on and around a articulated frame with its articulation point in the middle. This configuration imply that both the front wheels and the rear wheels participate in the turning actions and the rear wheels follow the traces of the front wheels. This is a great advantage in common and a requirement when cutting around trees and corners. The rear wheel will never pass a bend in an inner circle and interfere with the obstruction.

This configuration also gives an optimal small uncut circle, when driving with maximal turning.



The articulated frame is also articulating in the vertical plane with ±5°. This makes it possible for all the four wheels to press evenly against the ground when the ground is bumpy.

To the chassis is also fitted control organs, which conduct operator commands to the actual device at the machine. I.e. wire and rod between brake and pedal, PTO wire, lifting mechanism, throttle wire, etc.



2.2 Articulation point

2.2.1 Radial deterioration

Validation

The articulation point consists of the following parts:

- Two articulated plain bearings.
- Shaft.
- Bushings and washers according to the respective spare parts book.

When the machine is new, there is a small radial play in the upper and lower articulated plain bearings. After a long terms of use, this play will be increased.

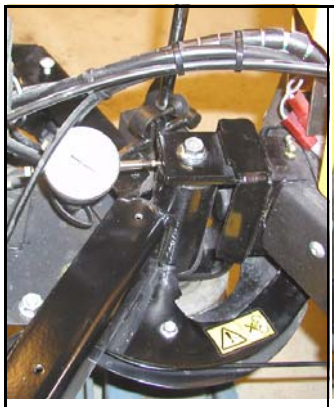
The limit value is 0.250 mm.

Wears can occour in the bearings themselves, between bearings and shaft and between shaft and clevis holes.

To measure the play in the upper part (upper bearing) proceed as follows:

1. Remove the motor hood and the spoiler in front of the motor.
2. Arrange a dial indicator with its adjustable stand as illustrated.
3. Read the value at the dial indicator.
4. Place a hydraulic jack under the pulley and lift carefully just until the articulation poins is unloaded.
5. Read the value at the dial indicator. The different between the two values is the radial play.

Since the upper part is most exposed to wear, it is not necessary to measure the lower part (lower bearing).



From right

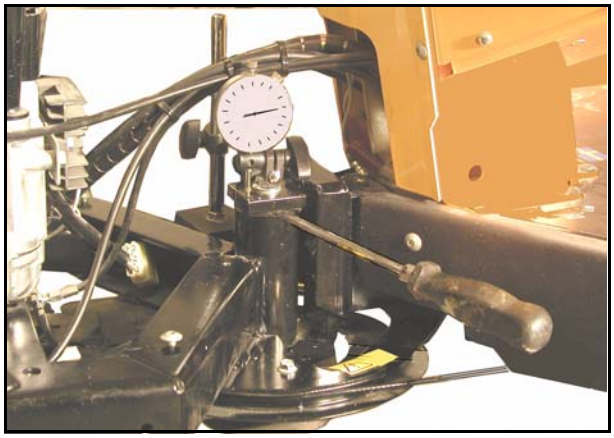
From left

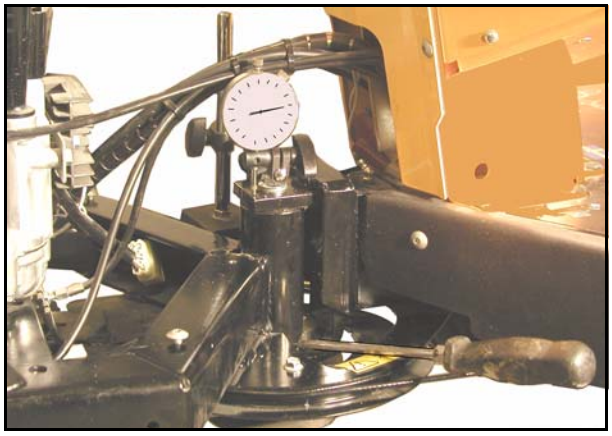
Repair

The clevis holes can be restored using an articulation point repair kit. The repair kit, with instructions, is supplied by the retail dealer.

2.2.2 Axial deterioration

After a long term of use, the axial play in the articulation point can increase. This have nothing to do with the machine performance or reliability, but can in some cases give a hearable noise. To validate and decrease the axial play proceed as follows:





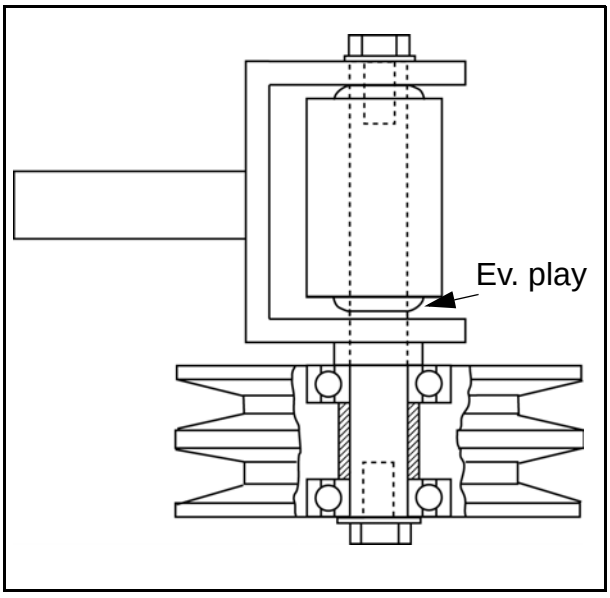
Validation

1. Remove the motor hood and the spoiler in front of the motor.
2. Arrange a dial indicator with its adjustable stand on the wire plate with the dial tip on the upper fork leg. See the figures.
3. Force the bearing tube, welded to the rear frame downwards. Use a big screwdriver as illustrated.
4. Read the value at the dial indicator.
5. Force the bearing tube upwards with the screwdriver. See the figure.
6. Read the value at the dial indicator. The different between the two values is the axial play.

Decreasing the axial play

Warning!

The axial play must be more than zero. The clevis is not allowed to press against the bearings. This will shorten the bearing durability.

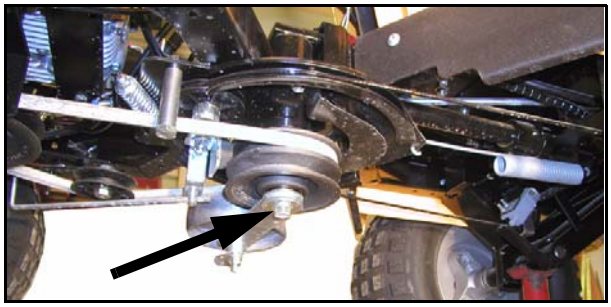


The axial play is determined of the distance between the clevis fork arms. The fork arms are pinched together when the screws in the shaft ends are tightened.

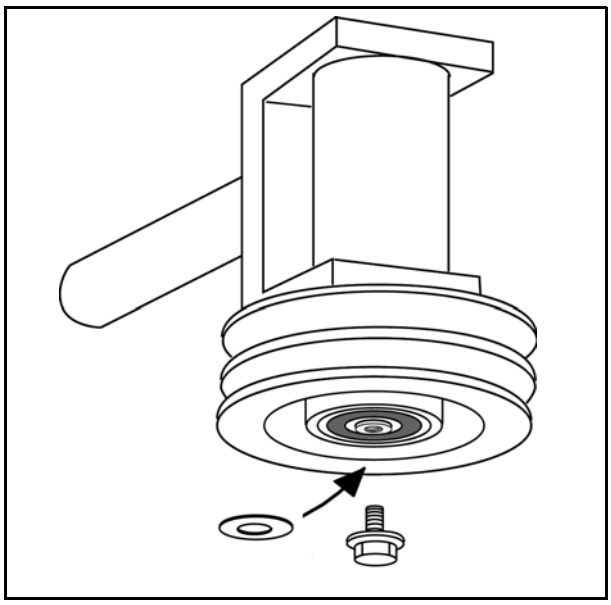
Since the screws can pinch the fork arms to an external distance which is similar to the shaft length, there can occour a remaining play.

This play is decreased if shim/shims is mounted against the bearing inner ring to force the fork legs further.

Mount she shim/shims as follows:



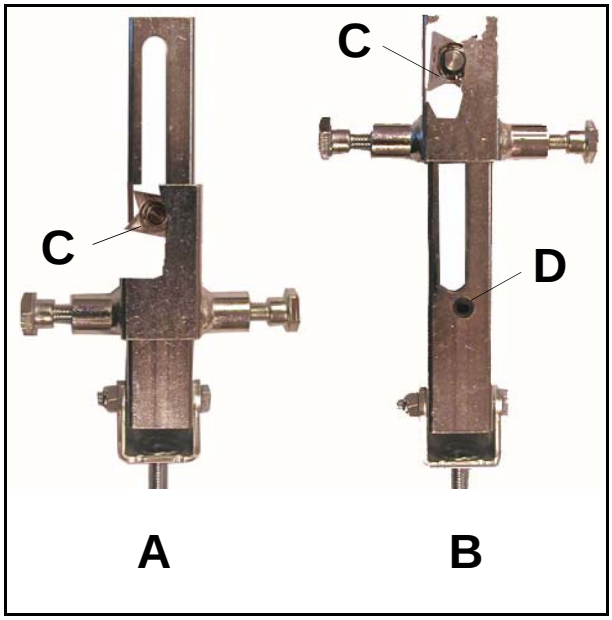
1. Remove the lower center screw from the shaft.
2. Remove the remaining details under the pulley, some models a washer only and some models have also a tension arm with bushings.
3. Now, the bearing inner ring is displayed. Choose shim/shims as follows:
   - The inner diameter of the shims shall be 17 mm. The shim shall press on the bearing inner ring. Not on the shaft.
   - The total thickness of the shim/shims is not allowed to exceed the axial play, determined under “Validation”.
     Ex. If the axial play is 1.1 mm, it is advisable to mount one shim, thickness 1.0 mm. This gives a play of 0.1 mm.
   - The remaining play shall not exceed 0.5 mm.



4. Apply some grease to the bearing and fit the desired shim/shims to the bearing inner ring.
5. Refit the details, dismounted under steps 1 and 2 above.

2.3 Lifting mechanism, manual

2.3.1 Description



The work equipment lifting arm is automatic locked in elevated position by pressing down the lifting pedal. Next time the pedal is pressed, the mechanism will release and the arm drops down.

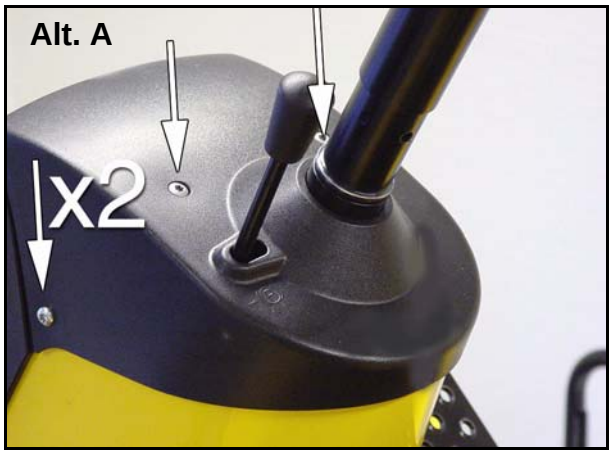
The locking function is created in the lifting lock. The principle is described below and shown in the figure.

A. Locked in lifted position by the ratchet (C).

B. Unlocked. Ratchet (C) is released.

C. Ratchet which is tilted by the pin (D) every time the pedal is pressed down.

2.3.2 Dismantling

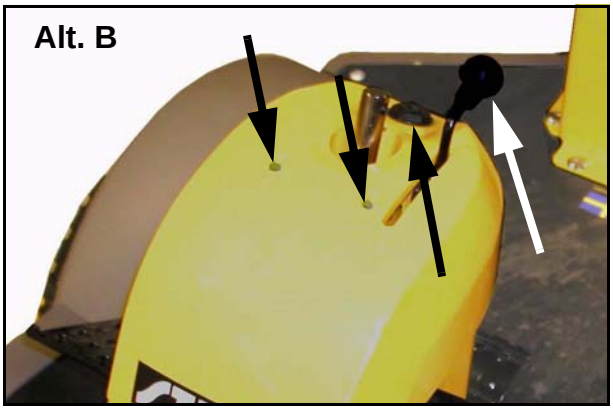


To dismantle the lifting lock it is normally necessary to dismantle the steering console. Nevertheless, it is possible for a skilful person to dismantle the lifting lock without releasing the steering console.

The dismantling is performed as follows:

1. Dismantle the steering wheel by tapping out the pin.

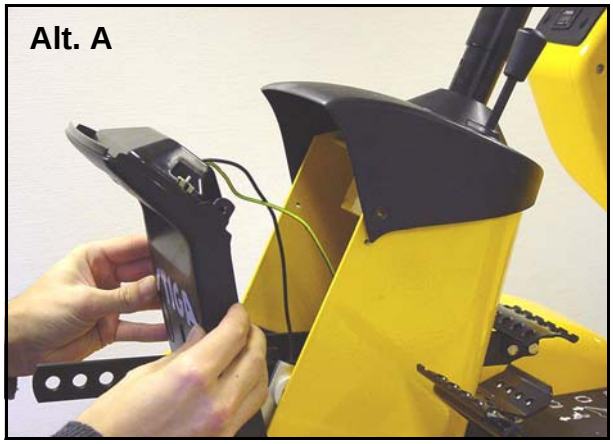
   If applicable, observe the spacers and the location when disassembly the steering wheel.
   See section 1.



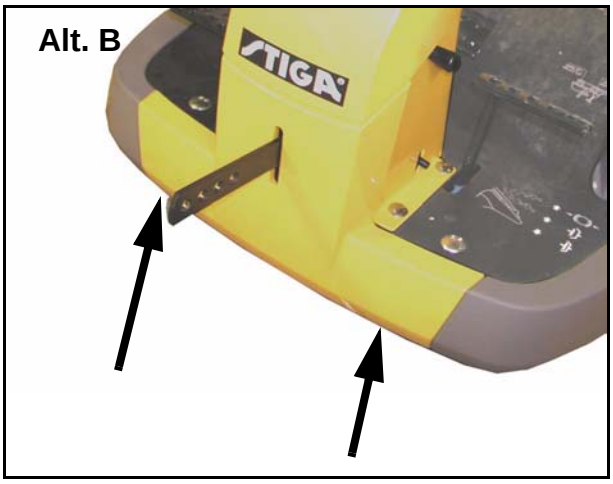
2. Remove the screws for the top cover according to alt. A or alt B..
   In alt. B (Compact) also remove the following:
   - The bullet from the throttle handle by twisting and pulling it simultaneously.
   - The ignition switch nut.

3. Alt. A:
   Dismantle the headlamp part of the front section.

   ! Note!
   It is not necessary to dismantle the top part of the front section, just lift it a few cm.

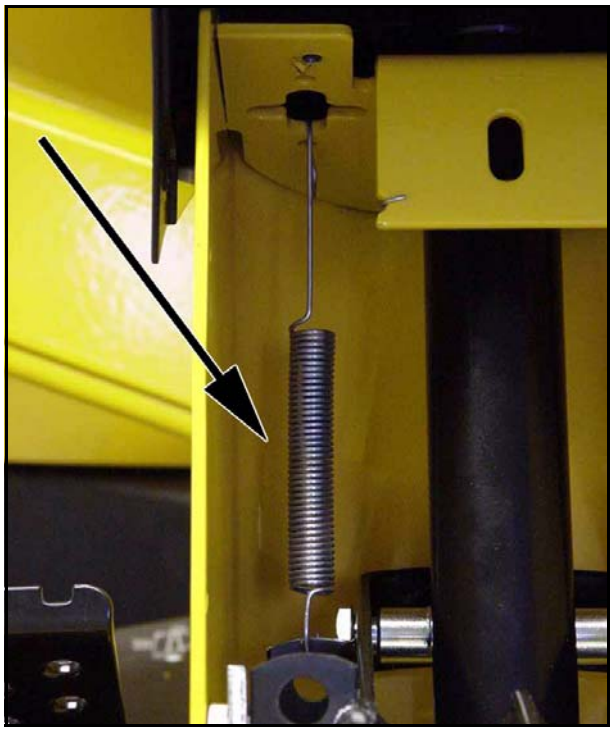


   Alt. B (Compact):
   Dismantle the front cover by unscrewing the two screws at the under side.

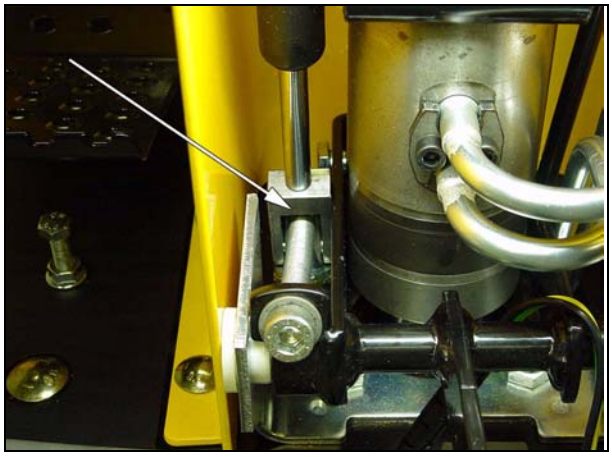


4A. <u>Implement lifter, equipped with mechanic return spring.</u>

   Unhook the return spring.



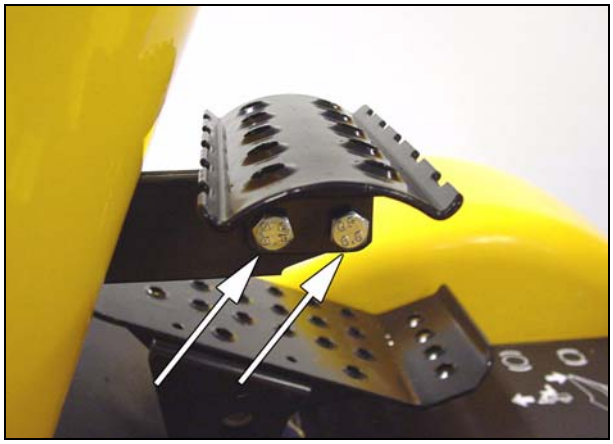
4B.Implement lifter, equipped with air spring.



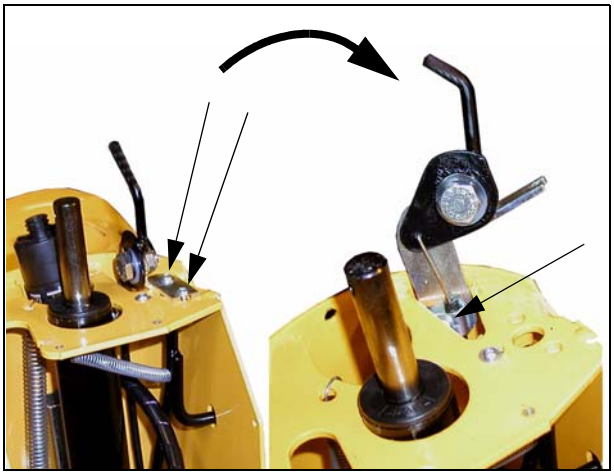
Warning!
The air spring pushes down the lifting fork with great force. To avoid personal injury it is extremely important to release the air spring before continuing.

Release the air spring by turning the adjusting screw so that the air spring comes as far as possible into the steering console.

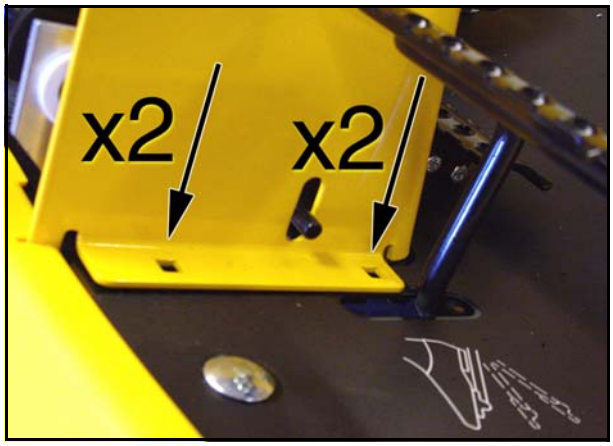
5. Dismantle the lifting pedal located on the lifting arm.



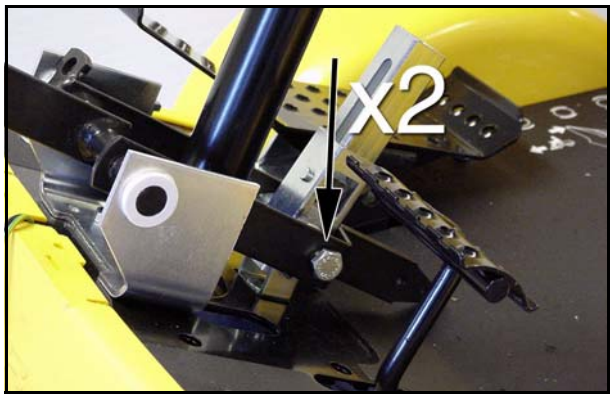
6. For Compact only:
   Dismantle the throttle control as follows:
   1. Loosen the control.
   2. Observe where the location of the conduit in the clamp to refit it in the same position.



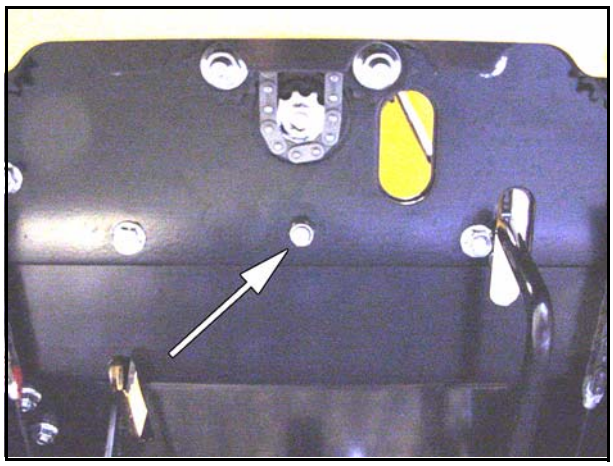
7. Remove the screws that hold the steering console at the floor plate, and lift off the steering console.



8. Remove the screws that hold the lifting fork at the lifting lock.

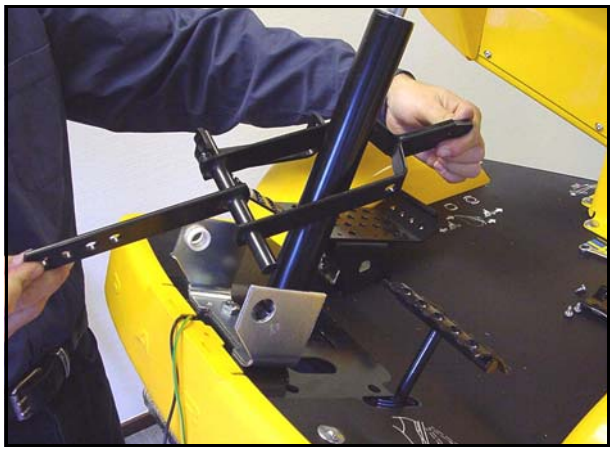


9. Remove the nut that holds the lifting lock on the underside of the floor plate, and remove the lifting lock.



10. Carefully dismantle the left bearing in the support with a screwdriver.

11. Remove the lifting fork from the support.

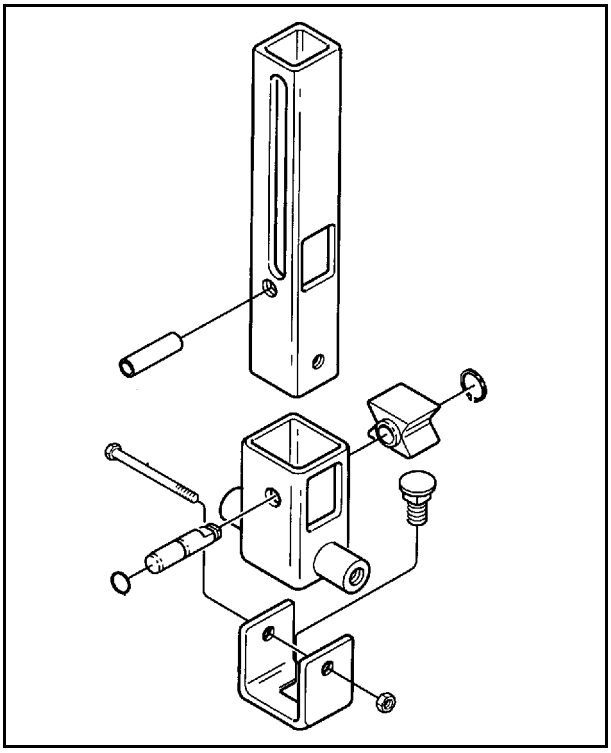


2.3.3 Repair of lifting lock

The lifting lock can be purchased as a complete spare part.

The parts can be lubricated with a thin lubricant, e.g. silicon spray, 5-56, WD40, or the like, if the lock jams.

Note!
Viscous lubricant such as consistent grease must not be used.



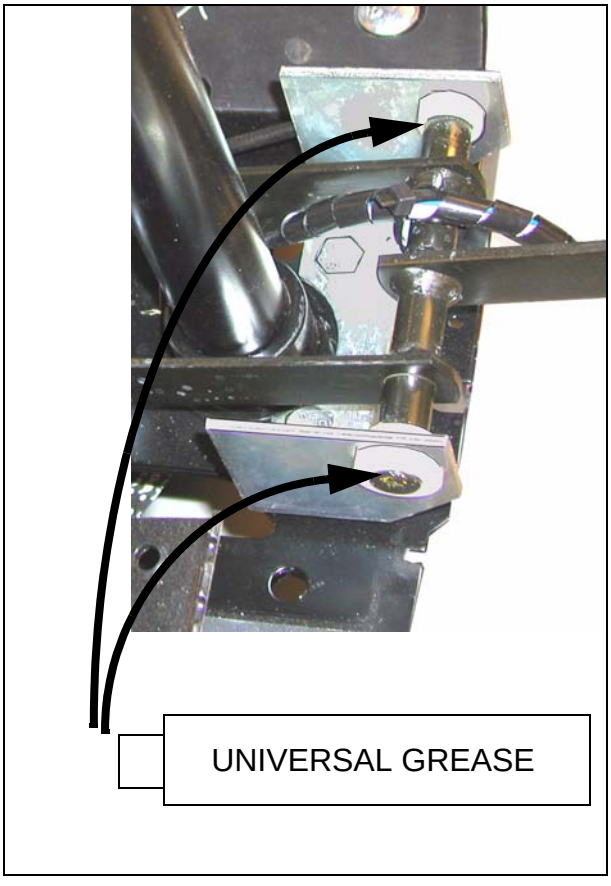
2.3.4 Assembly

Assemble in reverse order.
Check that the accessory lifter functions as intended by repeatedly lifting and lowering it.

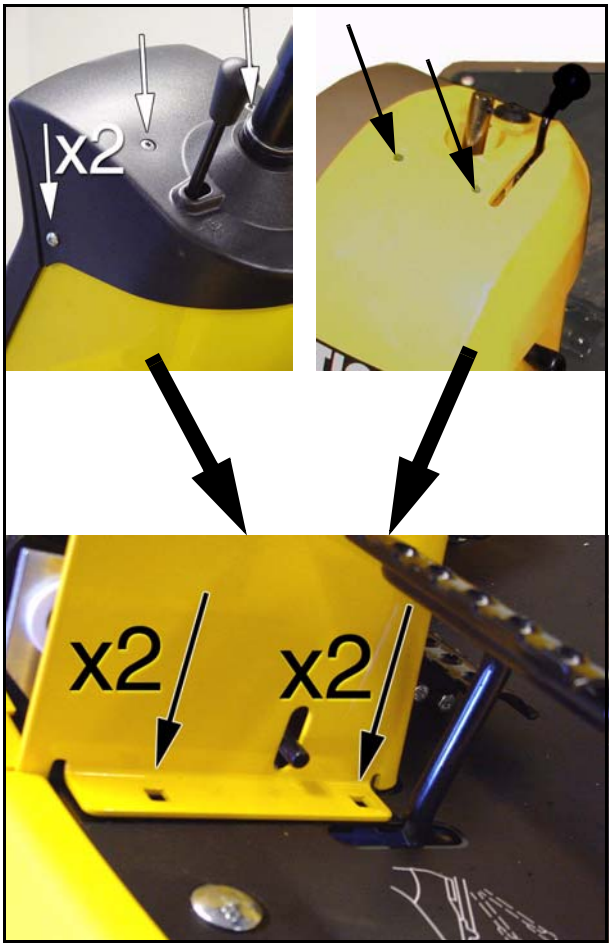
Notes!
Pay attention to the following notes during the assembly:

A. Apply a thin layer of universal grease to the plastic bushings at the lifter arm.

B. It does not matter how the lifting lock is fitted since it is symmetrical.



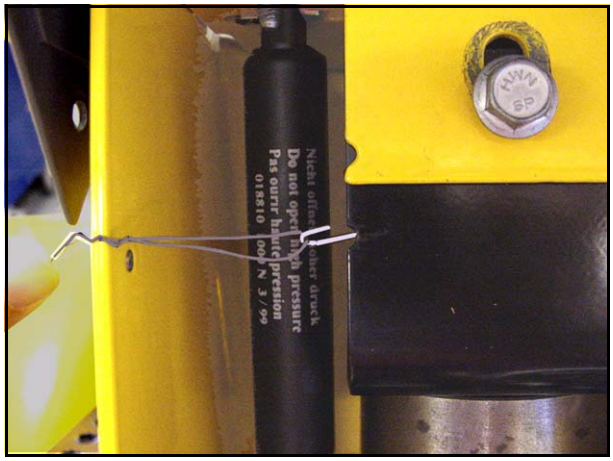
C. Fit the top cover before the consol screws are tightened.
The consol is aligned against the top cover.



D. The spring for the parking brake is easiest to fit with a hook of steel wire.

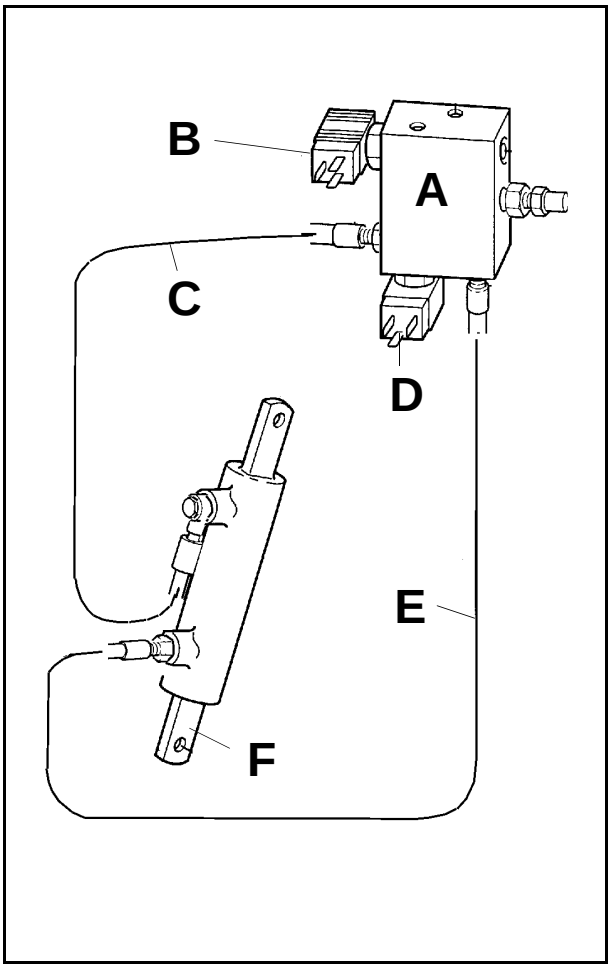
E. When fitting the throttle control at Compact, install the wire conduit as observed at the dismantling.

F. If applicable, observe the spacers and the location when reassembly the steering wheel.
See section 1.



2.4 Lifting mechanism, hydraulic

2.4.1 Description



Below is given a brief description about how the lifting cylinder works and its connection to the valves. For a complete description, see section 4 “Hydraulic system”. Section 4 describes how the lifting cylinder works together with the steering torque converter. It also describes the pressure division between the two systems and adjustments.

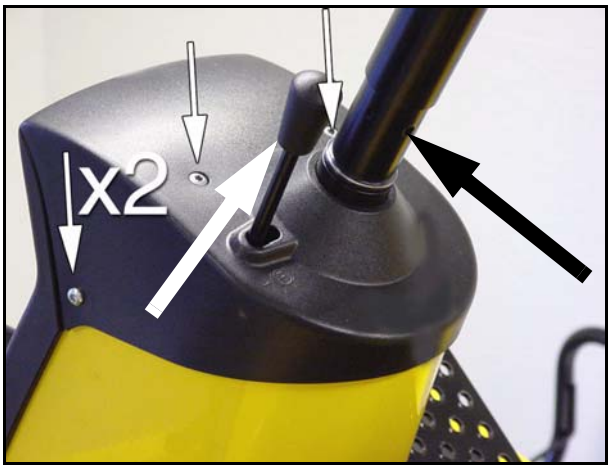
The work equipment lifting arm is lifted by the hydraulic cylinder and can be set in any position. The hydraulic cylinder is controlled by the hydraulic lift switch. The piston is forcing the arm upwards every time the switch is held depressed. Hydraulic oil from the HST is constant flowing through the valve block (A).

Function when lifting the work equipment:

The hydraulic lift switch activates the magneto valve (B), which opens the oil flow in the line (C) and the piston (F) is moving down. Magneto valve (D) is open to let the oil return to the HST.

Function when lowering the work equipment:

The hydraulic lift switch activates the solenoid valve (D), which opens the oil flow in the line (E) and the piston (F) is moving up, forced by the weight of the implement. Solenoid valve (B) is open to let the oil return to the HST.

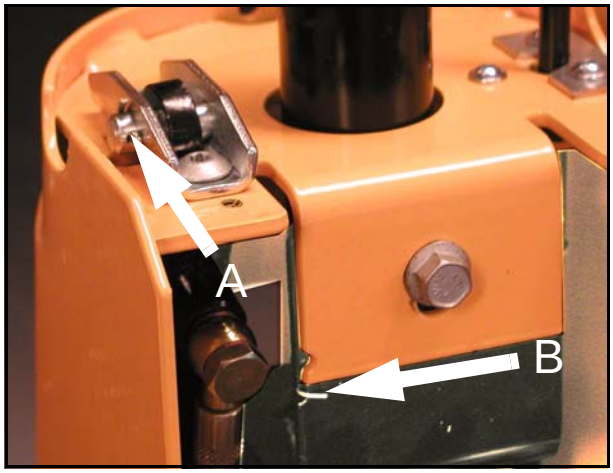


2.4.2 Dismantling

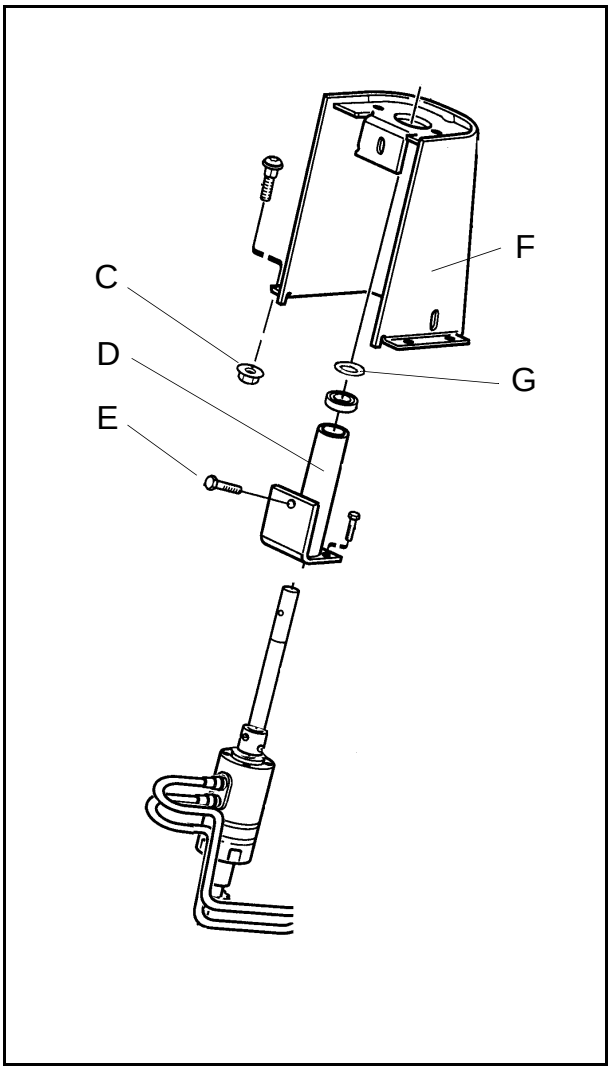
The dismantling is performed as follows:

1. Tap out the spring pin that holds the steering wheel. Remove the steering wheel.
2. Pull up the parking brake knob, remove the upper cover and the lamp section.

3. Remove the pin from the hydraulic lift bolt (A) and push out the bolt.
4. Remove the spring (B).



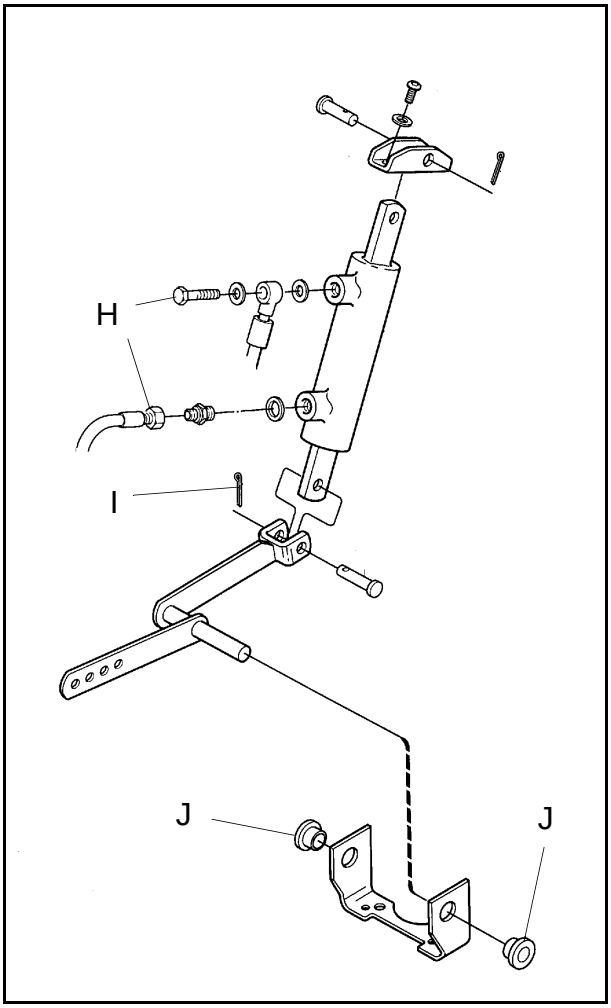
5. Remove the four nuts (C) from the underside and the screw (E), holding the steering console (F) and lift out the steering console with its four screws.



6. Unscrew the hydraulic connections (H) from the cylinder.

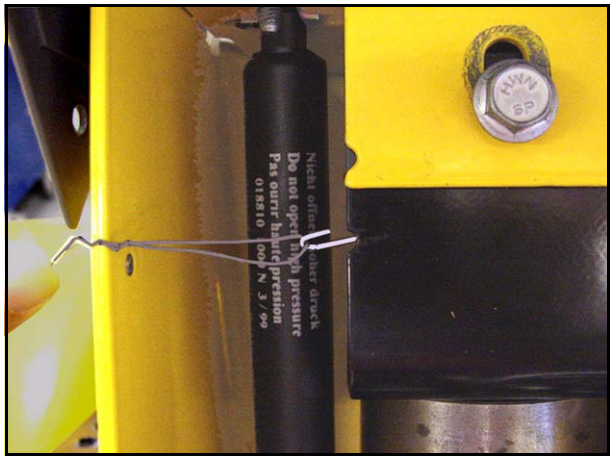
Warning!
When the hydraulic connections are disconnected, it is essential to protect the opened lines from dirt and other contamination. Attach protective covers over the four openings.

7. Remove the split pin (I) and the pin, holding the cylinder.
8. Replace defective parts. The bushings (J) are easily pushed out of their holders with help of a screwdriver or similar.



2.4.3 Assembly

The assembling is performed in the reverse order. Pay attention to the following notes during the assembly:

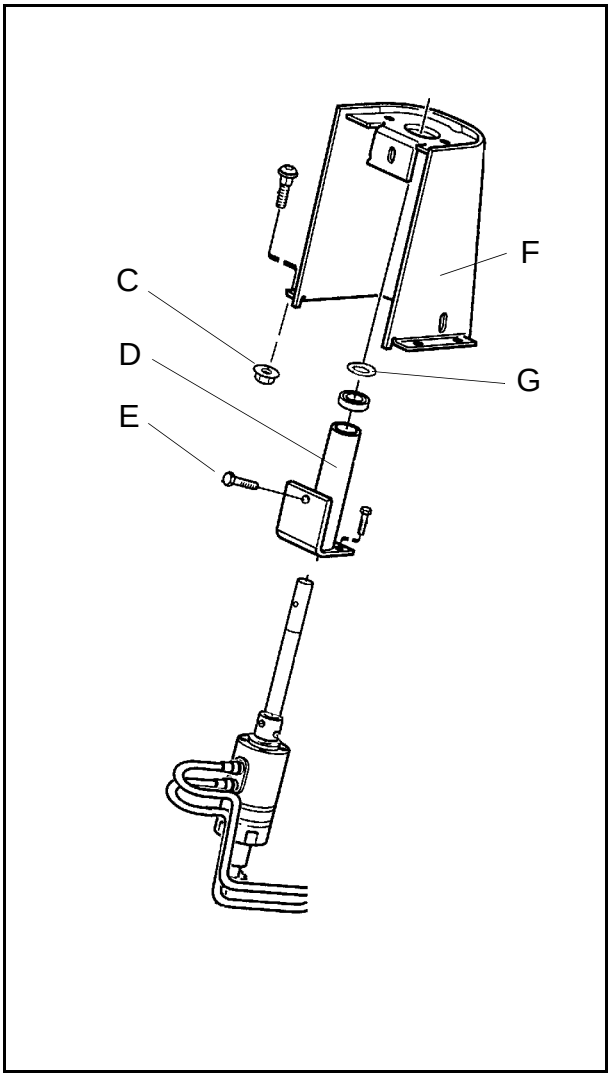


! Note!
The spring for the parking brake is easiest to fit with a hook of steel wire.

! Note!
Do not forget the washer (G) under the steering wheel.
The correct number of shims must be used to avoid tensions in the steering column.

! Note!
When fitting the steering wheel, make sure that the ev. text is readable from the operators seat.

! Note!
Start the motor and run it. Work the lift up and down in full strokes 4-5 times. During this time, the system will be bleeded and the lift shall work properly.



2.5 Seat suspension

2.5.1 Basic Type

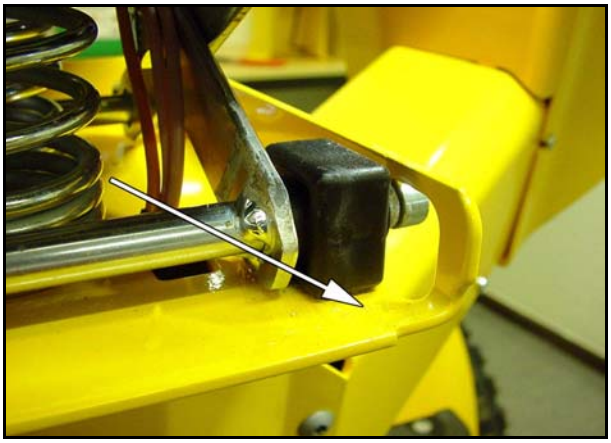
These instructions are valid for machines, equipped with the basic type seat suspension.

The folding seat can be adjusted lengthways. To avoid pinch injuries the seat is fitted with a catch.

Thanks to the simple design, the only maintenance the seat suspension needs is the lubrication of the hinges, when necessary.

The seat is provided with a hole at the lowest point for draining of water. This hole can also be used to attach cables for work equipment, i.e. wire to release grass collector.

2.5.2 Pro Type

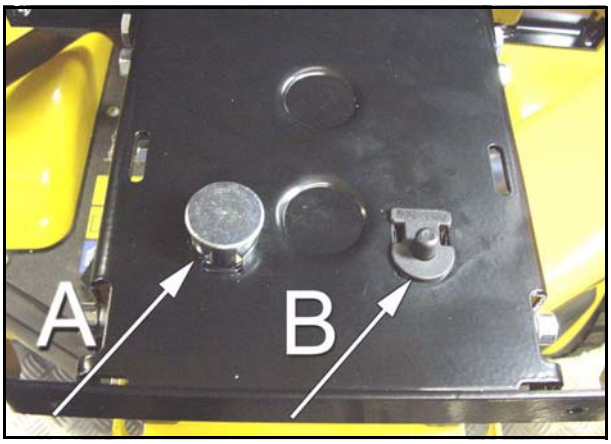


These instructions are valid for machines, equipped with the pro type seat suspension.

The pro type seat suspension is a comfort suspension. The folding seat can also be adjusted lengthways. The suspension results in a parallel suspension motion.

The seat is provided with a hole at the lowest point for draining of water. This hole can also be used to attach cables for work equipment, i.e. wire to release grass collector.

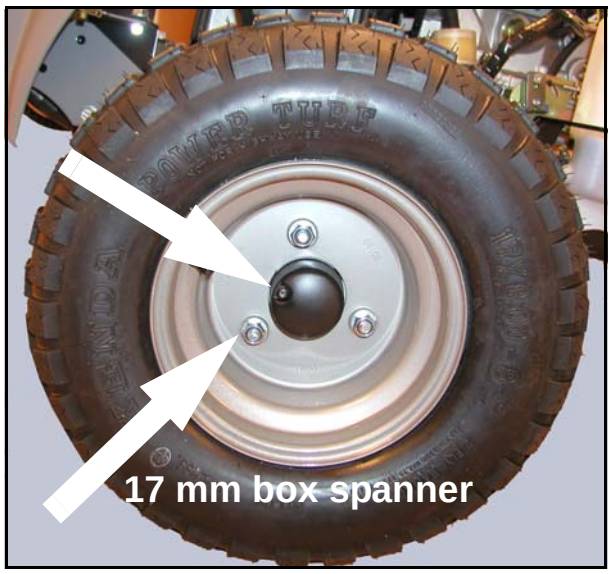
The suspension does not normally require any maintenance, but a little grease or oil under the sliding blocks once or twice a year prevents wear.



The seat suspension operates in two stages. The first stage is a safety function, connected to the seat switch. When the seat is unloaded the pressure pin pushes (A) up the seat so that the switch (B) can spring out.
The pressure pin should be lubricated a few times per season to eliminate problems with the safety circuit.

2.6 Rear wheel

2.6.1 Wheel with separate hub



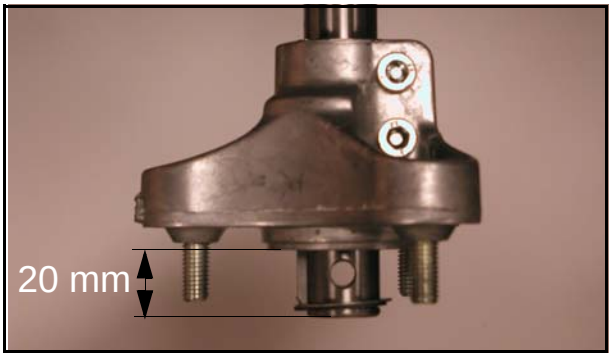
Dismantling and assembling of the rear wheel and its hub is performed according to the following instructions.

Dismantling

1. Block upp the machine and remove the three screws with a 17 mm box spanner.
2. Remove the rear wheel and the protecting cover.
3. Remove the circlip using a circlip plyers. Remove the washer.
4. Unscrew the two allen screws and back off the hub.

Assembly

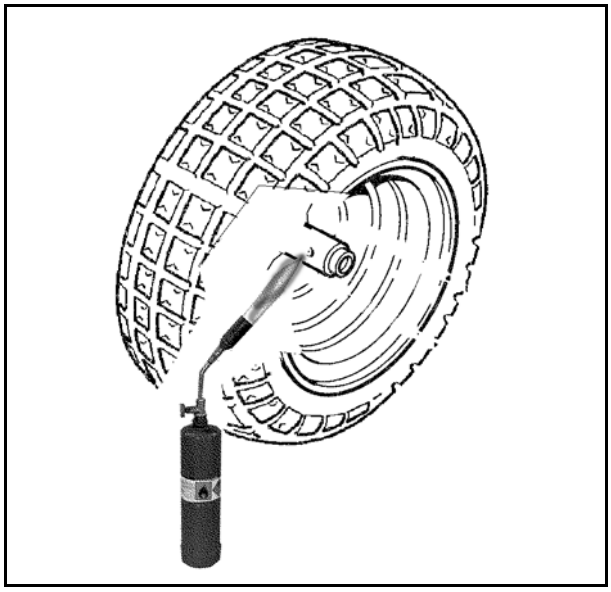
1. Push the hub on the shaft until it rests against the transmission body.
2. Assemble the washer and the circlip onto the shaft. The washer shall rest against the circlip.
3. Check the key and assemble it in the groove, against the washer.
4. Pull out the hub until a distance of 20 mm from the shaft end.
5. Tighten the two allen screws, using a 8 mm allen key.
   The tightening shall be performed in two steps. Tighten first to 18 Nm and then, finally to a torque of **24 Nm**.
6. Assemble the rear wheel and the protecting cover.



Asembly when tyre chains are used

To give place for the tyre chains, the distance 20 mm in pos. 4 above can be decreased. If necessary until the hub rests against the washer.

2.6.2 Wheel with direct mounted rim



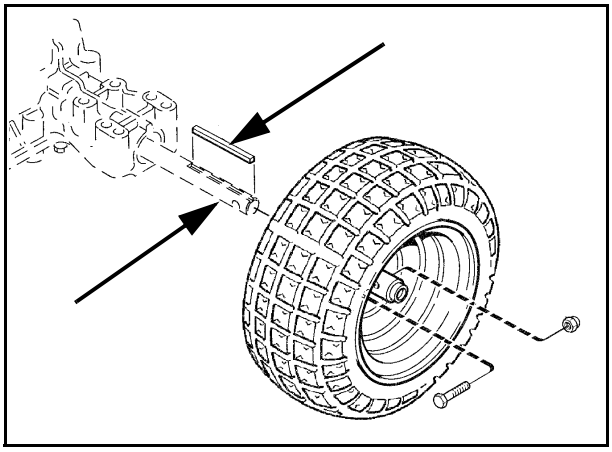
Removing

Remove the through screw and back off the rim from the shaft.

After a long term of use the shaft and rim may be corroded by rust, which can make it difficult to remove the rim.

In this case, enlarge the rim sleeve, by heating it carefully with a liquid-gas burner.

Assembly



Assemble the rim in the reverse order bearing in mind:

The key is an important part of the joint. Be sure that it will be correct fitted in the shaft.

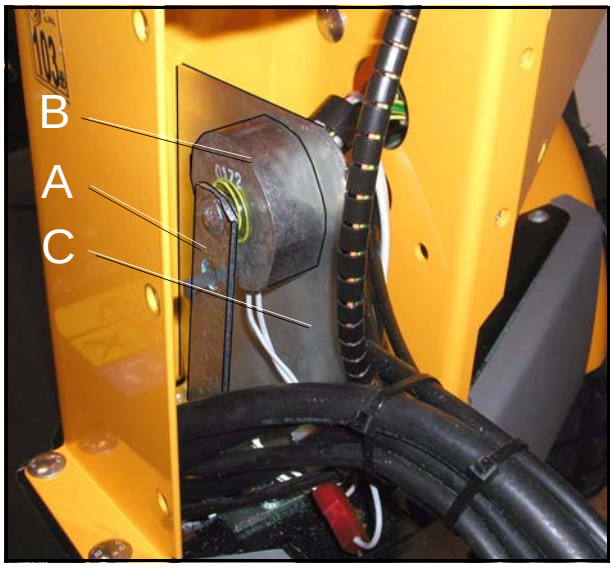
! Note!
To prevent corrosion and rust, apply a thin layer of grease on the shaft and on the key before the rim is fitted.

2.7 Cruise control

2.7.1 Description

The cruise control works as a temporary lock for the throttle pedal. The Lever (A) is mechanically connected to the throttle pedal.

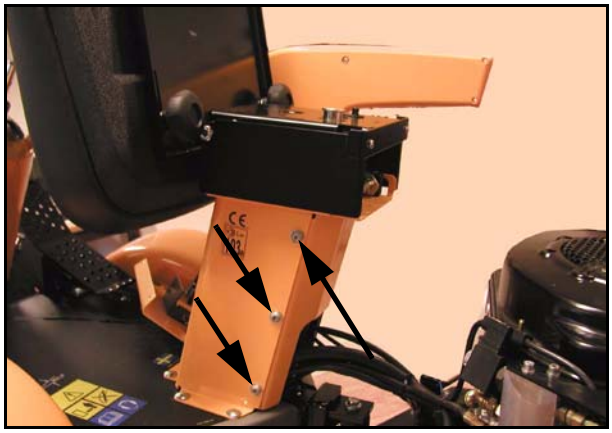
The electromagnet (B) is sliding along the Brake plate (C). When the cruise control engages, 12 V is connected to the electromagnet (B) which locks in its actual position against the brake plate (C).



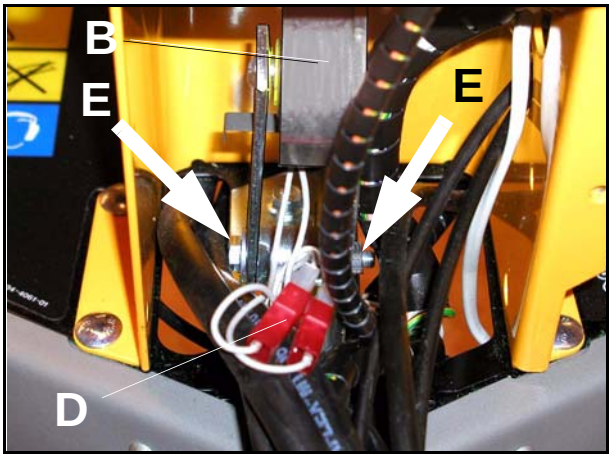
2.7.2 Replace and repair

To replace the cruise control electromagnet, proceed as follows:

1. Fold up the seat and remove the rear cover under the seat by unscrewing its 5 screws.
2. Disconnect the electrical cables at the terminals (D).
3. Loosen the screw-nut (E) about 1 cm and move out the lever (A).



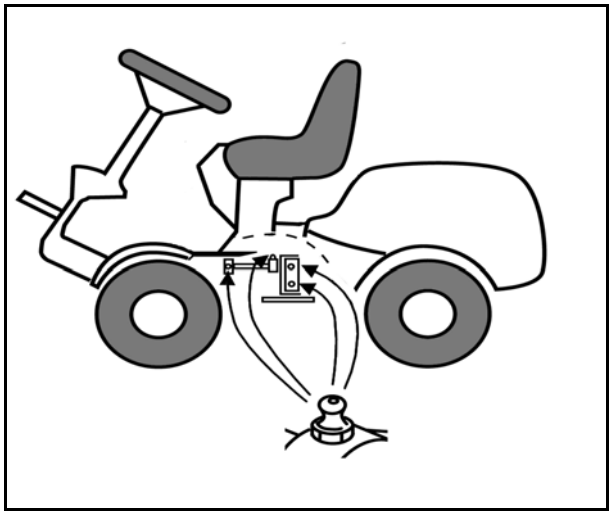
> **!** Note!
> Before the new magnet is mounted, check that the brake plate (C) is free from rust and other contaminations. If necessary, clean with a sand paper.



4. Replace the electromagnet (B).
5. The assembly is performed in the reverse order.

2.8 Lubrication chassis

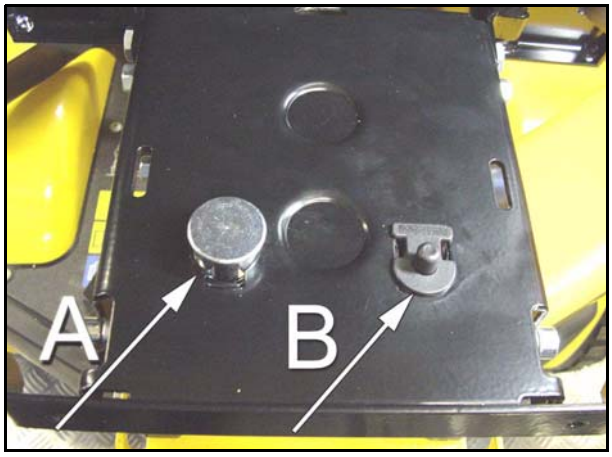
The bearing for the articulation must be lubricated in accordance with the service schedule. Other moving parts are lubricated once per season, although at least every 50 operating hours.



Note!
Lubrication is equally important for a machine that is only used for a few hours per year.

Note!
The lubricant provides not only protection from wear but also from rust.

Note!
The machine should always be lubricated before prolonged storage.



The bearing for the articulation has four grease nipples which must be lubricated with universal grease.

The steering chain must be lubricated with chain spray two or three times per season.
If the chains are heavily fouled: dismantle the chains and wash them.
Refit and lubricate them.

The pressure pin (A) in the seat suspension must be lubricated to avoid problems with the safety circuit.

Plastic bearings, e.g. the brake pedal bearing, hydrogear pedal bearing and steering-column bearing, must be lubricated with grease or lubricating spray.

Drop a little engine oil or lubricating spray in the ends of the control wires two or three times a year.

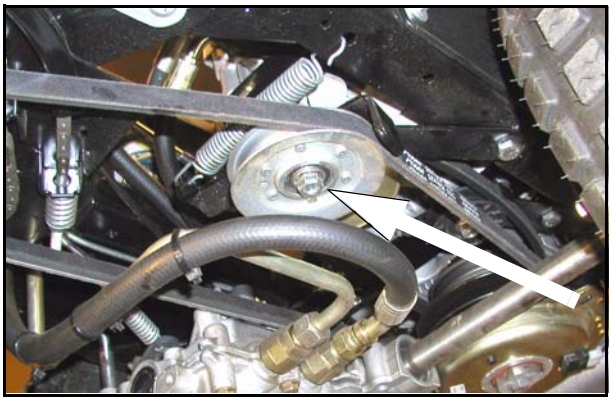
Note!
Wires on machines used in freezing conditions should not be lubricated with engine oil since this can lead to the control cables seizing in the cold.
The wires on such machines should be lubricated with a fluent, strongly penetrating lubricant, e.g. 5-56 or WD40.

2.9 Hydraul pump

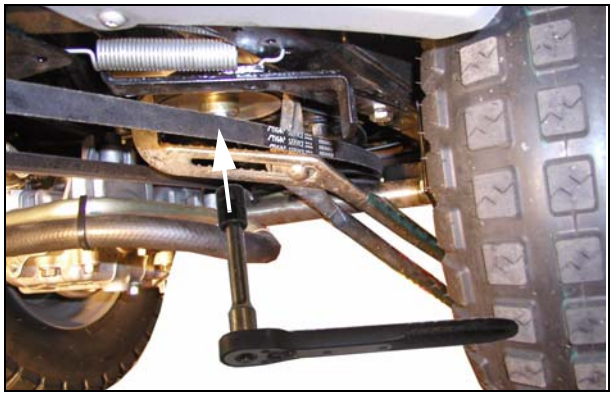
This section will describe the replacement procedure for the external hydraulic pump in 4WD Park machines.

2.9.1 Dismantling

1. Remove the battery. See the owners manual.
2. Block up the machine. Use a lifting table or highjack and yokes.
3. Activate the parking brake.
4. Discharge the oil in the hydraulic system. See the owners manual.
5. Remove the tension pulley by using a 15 mm and a 17 mm spanner. See the figure.



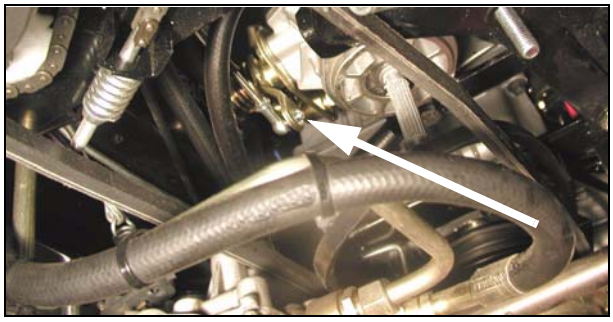
6. Use a large polygrip and hold the pump pulley in a securely grip. Fit the polygrip around the belt, not direct to the pylley. Back off the pulley nut with a 17 mm sleeve. See the figure.



Warning!

Be carefully not to damage the plastic fan during the removal.

7. Remove the following parts from the pump shaft:
   - Nut
   - Washer
   - Pulley
   - Distance sleeve
   - Fan
   - Distance sleeve
8. Remove the speed control cable from the hydraulic pump by backing off the nut. Use a 8 mm spanner. See the figure.



9. Back off the circlip from the release lever rod and disconnect the rod from the lever.

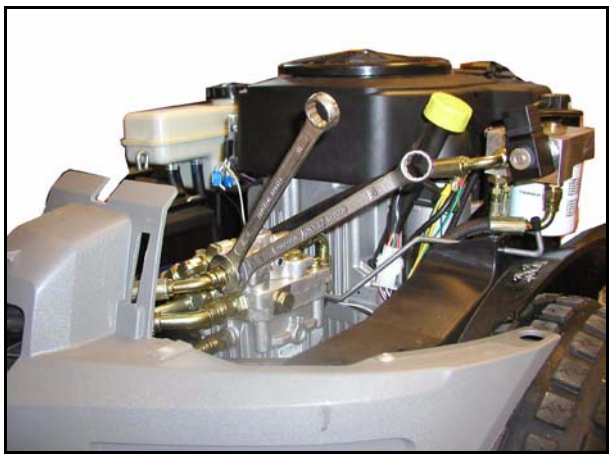
10. Place a collecting tray under the pump for collecting residual oil from the pump and hoses.

Warning!

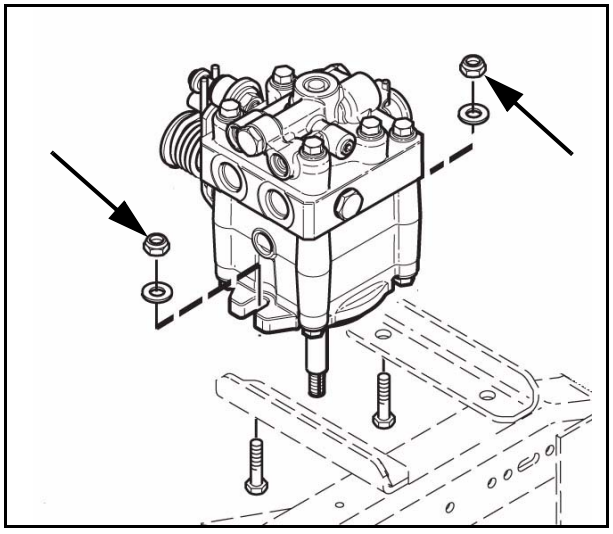
Do not spill any oil on the drive belts during the disconnection of hoses and tubes.

Warning!

Keep clean when handling hydraulic parts. Dirt in the oil will cause malfunctions and breakdowns.



11. Disconnect all hoses and tubes from the hydraulic pump. Always use two spanners, one to hold the respective connection in the pump and one to loosen the nut. See the figure.



12. Remove the pump from the chassis by unscrewing the two M10 mounting nuts and screws. Use two 17 mm spanners. See the figure.

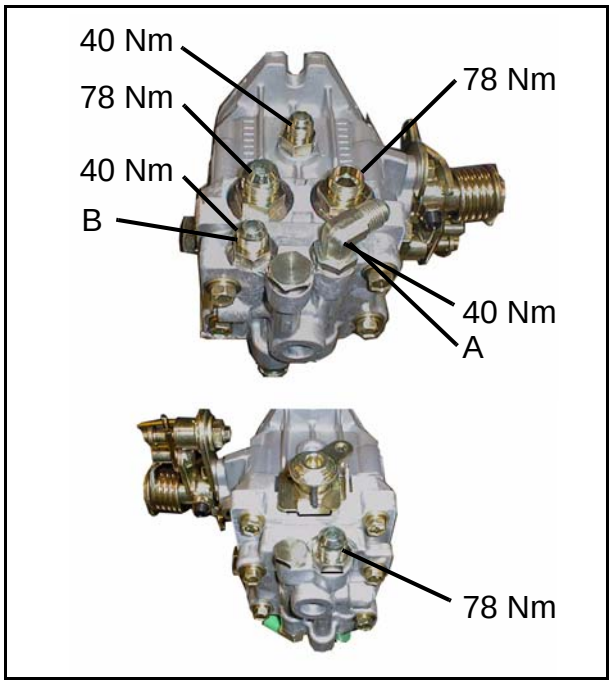
13. Place and fasten the pump in a table vice. Loosen the adapters from the pump.

14. Screw out the adapters and insert them in the corresponding places in the new pump one at a time. Check or replace the O-rings.

3. Place and fasten the new pump in a table vice. Tighten the adapters to torques according to the figures.

   When tightening the angle adapter (A), adjust it to 45° according to the horizontal line. Use one 14 mm and one 19 mm spanner.

   If a metal tube shall be fitted to the adapters A and B (machines without external hydraulics), the connection nuts shall be tightened with 41 Nm.



2.9.2 Assembly

Warning!

Keep clean when handling hydraulic parts. Dirt in the oil will cause malfunctions and breakdowns.

Warning!

Be carefully not to damage the plastic fan during the assembly.

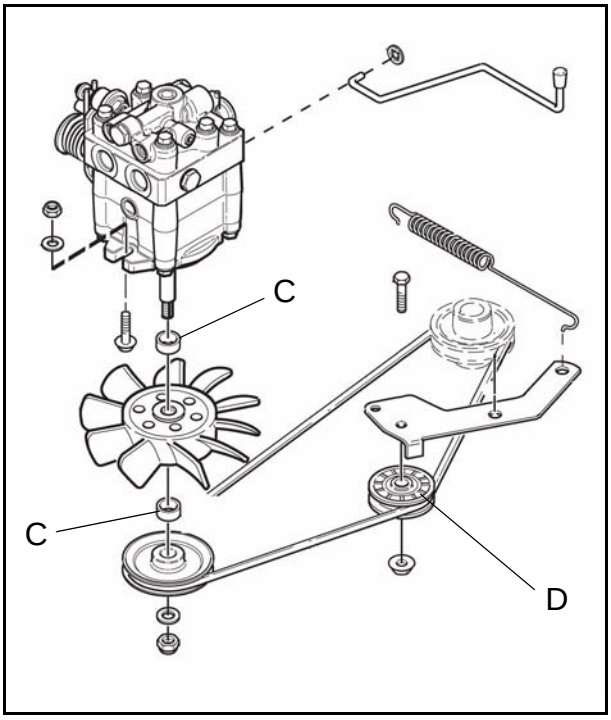
Assemble all parts in the reverse order.

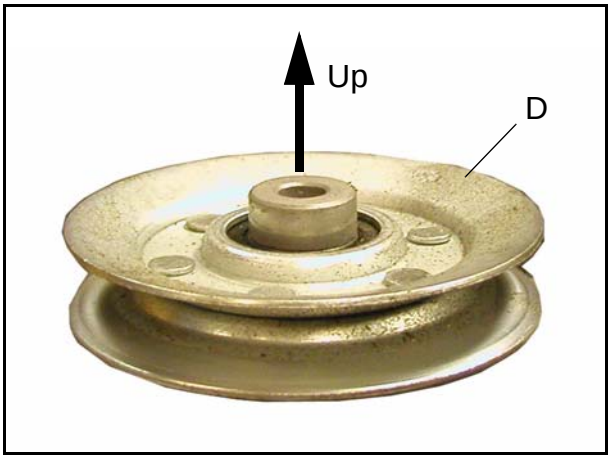
Note!
One distance sleeve (C) at each side of the fan.

Note!
The tension pulley (D) shall be fitted with the prolonged part of the sleeve upwards. See both figures.

Adjust the speed cable. See section 6.

When all parts are fitted and all actual tightening torques are applied, fill new oil and bleed the hydraulic system. See the owners manual.





3 Steering

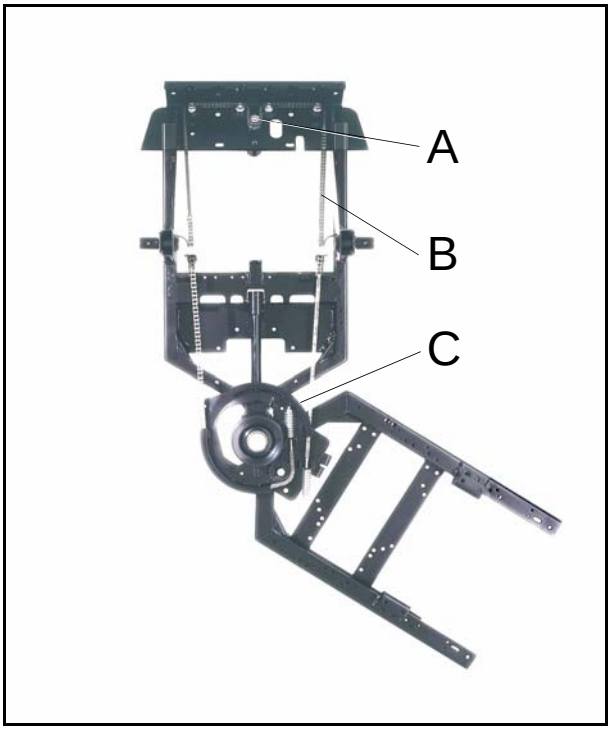
Contents in this chapter

General

The articulation steered machines are equipped with either a common mechanical system or a hydraulic assisted steering system. Both systems work with wires or chains, depending on the model. The hydraulic assisted system gets its power from the variable hydraulic transmission at the rear shaft.

This chapter contains a brief description of the function and describes repair, replacements and adjustments of stressed parts of the steering system.

3.1 Description



3.1.1 Mechanical system

The sprocket (A) is directly coupled to the stering wheel on the same shaft. A chain (and wires) (B) is engaged with the sprocket and connected to the steering disc (C) on the rear frame. Thus, the rear frame is forced into actual angles, related to the front frame when the driver turns the steering wheel.

3.1.2 Hydraulic assisted system

Below is given a brief description about how the steering torque converter works and its connection to the valves. For a complete description, see section 4 “Hydraulic system”. Section 4 describes how the lifting cylinder works together with the steering torque converter. It also describes the pressure division between the two systems and adjustments.

The power assisted steering is a hydraulic auxiliary system. The main components are the torque converter and the oil pump in the hydrogear.

As opposed to standard power steering (e.g. in a car), this power assisted steering has a limited capacity. This implies that in certain circumstances it has what may be experienced as negative characteristics.
At low engine speed, or in situations where extra steering power is required, the steering may be considered to be somewhat jerky.

The machine should always be in motion when the steering is used. Avoid turning the steering wheel when the machine is standing completely still and the accessory is in lowered working position.

The machine can be steered even when the engine is switched off. Nevertheless, it may require more force than normal to steer the

machine. This is particularly noticeable during cold weather.

Mainly, the hydraulic assisted system works similar to the machanical system. The different is a torque booster (D), atttached to the steering shaft between the steering wheel and the sprocket (A).

A oil flow from the HST is flowing through the torque booster via a filter.

As the driver turns the steering wheel, there occour a pressure drop over the torque booster. The pressure drop, multiplied with the flow, gives a moment (Ma), which is added to the moment from the driver (Md) and applied on the sprocket (A) as a moment (Ms).

The following items are shown in the figure:

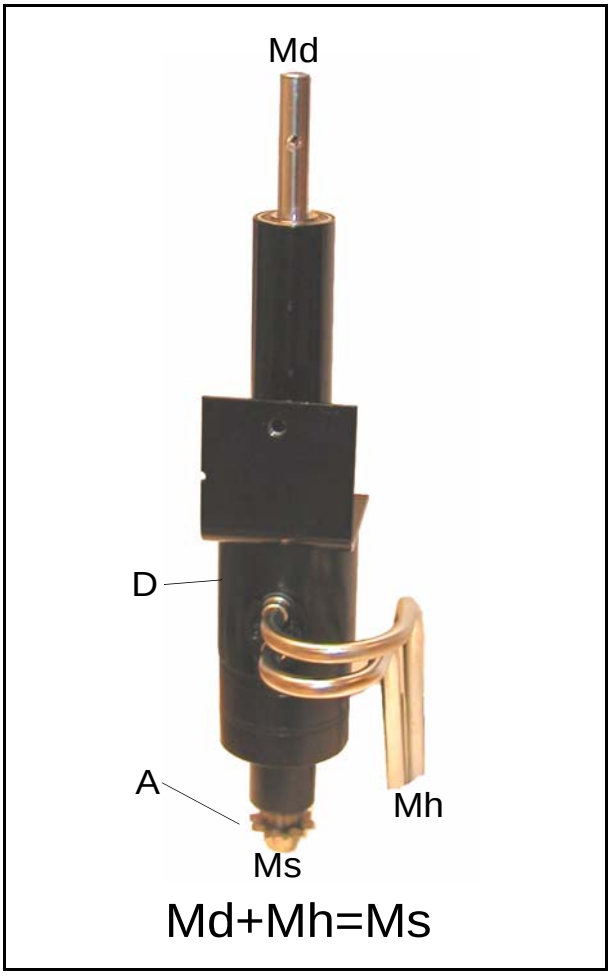
A Sprocket of driving the steering chain.

D Torque booster.

Mh Steering power (moment) from the hydraulic transmision.

Md Hand power (moment) from the driver.

Ms The sum of Ma and Md as steering power (moment on sprocket A).



Hydraul connections

The hydraul lines have two alternative connections:

- Pressure plate with O-rings around the tubes.
- Banjo fitting.

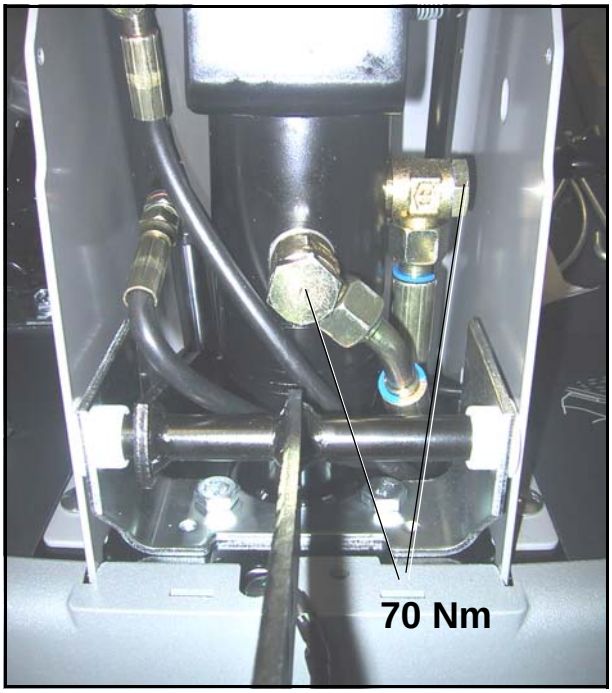
Pressure plate

Always mount new O-rings when assembling.

Banjo fitting

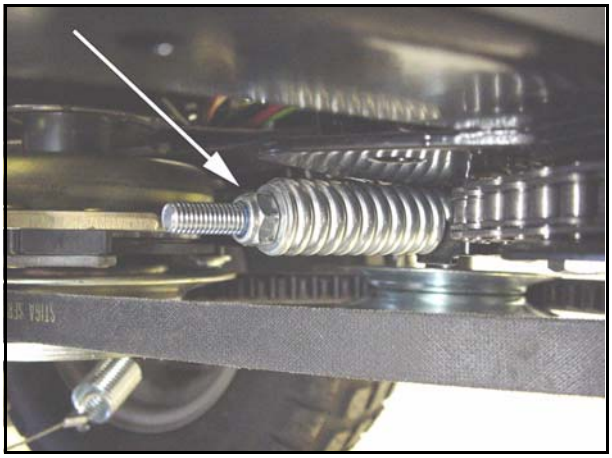
The connection have no gaskets.

Always tighten the banjo nipples with **70 Nm** when assembling. See the figure.

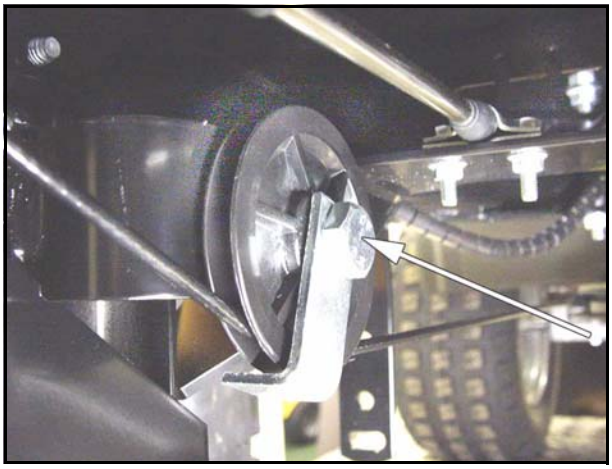


3.2 Steering wires

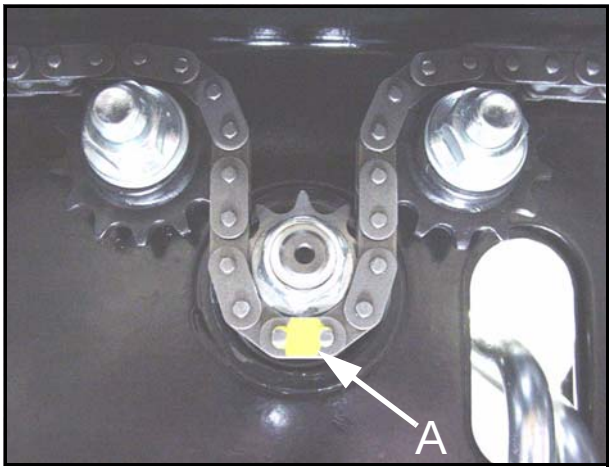
3.2.1 Replacement



1. Loosen the nuts on the steering wire. Brace with a spanner so that the wire does not rotate.

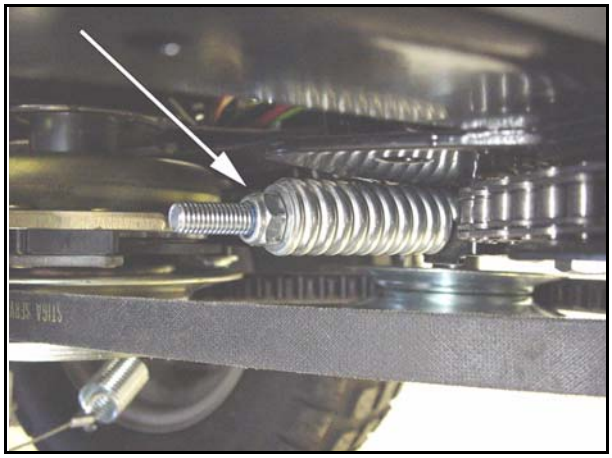


2. Loosen the screws that hold the pulley so that the wire can be taken out between the pulley and the wire retainer.



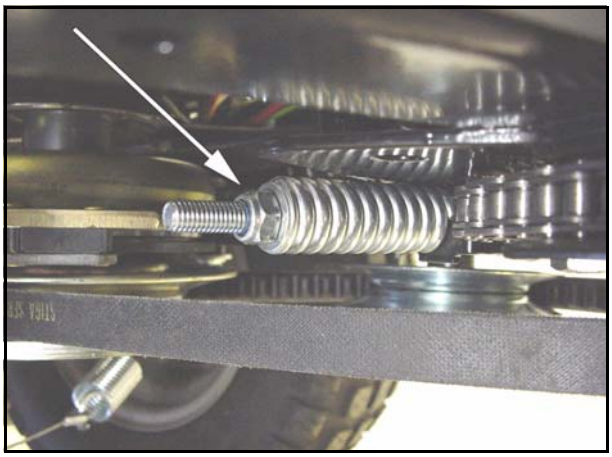
3. Unhook the chain at the front chain sprockets.
   It can sometimes be easier to get the chain off by slightly unscrewing the screws that hold the chain sprockets.
4. Measure up the middle link (mark A) on the new chain and mark it.
5. Place the chain on the chain sprockets. Make sure that the wheel is straight and that the marked middle link is placed on the middle of the chain sprocket.
6. Place the wire in the pulley and tighten the screws to the wire retainers.
7. Fit the washer and nut on the threaded rear ends of the steering wire.

3.2.2 Adjustment

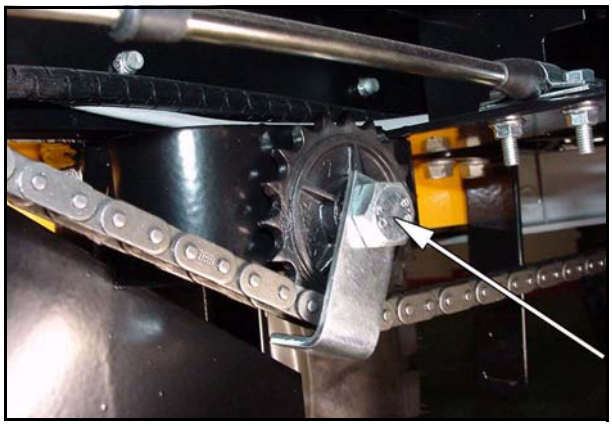


1. Tension the wire nuts equally on both sides so that the wheel is straight when the machine is straight.
   Brace with a spanner so that the wire does not twist.
2. Turn the wheels fully out in both directions. Check that the chain does not go into the pulley and that the wire does not go into the chain sprocket.
3. Test drive. Check the tension of the wire after test driving.

3.2.3 Steering chains



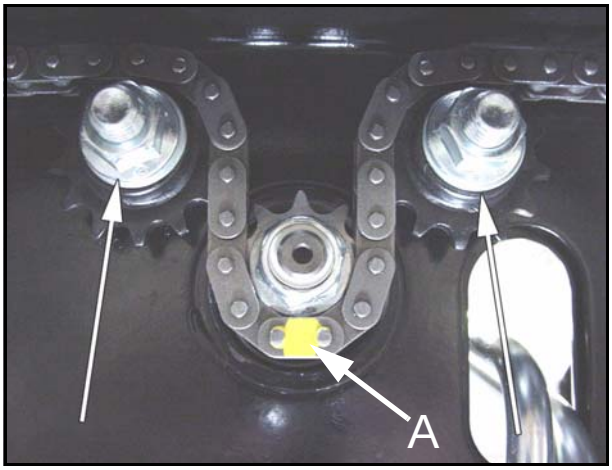
1. Loosen the nuts on the steering chain.



2. Loosen the screws that hold the chain sprockets so that the chain can be taken out between the chain sprocket and wire retainer.

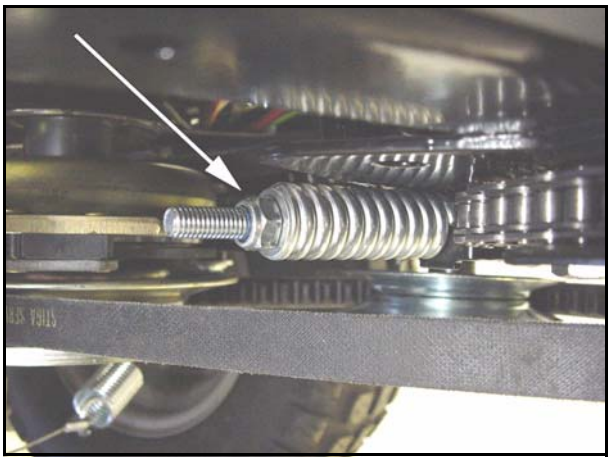
3. Unhook the chain at the front chain sprockets.
   It can be easier to get the chain off by slightly unscrewing the screws that hold the chain sprockets.

4. Measure up the middle link (A) on the new chain and mark it.
5. Place the chain on the chain sprockets. Make sure that the wheel is straight and that the marked middle link (A) is placed on the middle of the chain sprocket.
6. Place the wire on the chain sprockets and tighten the screws to the wire retainers.
7. Fit the washer and nut on the threaded rear ends of the steering chain.
8. Adjust as described below.



Adjustment

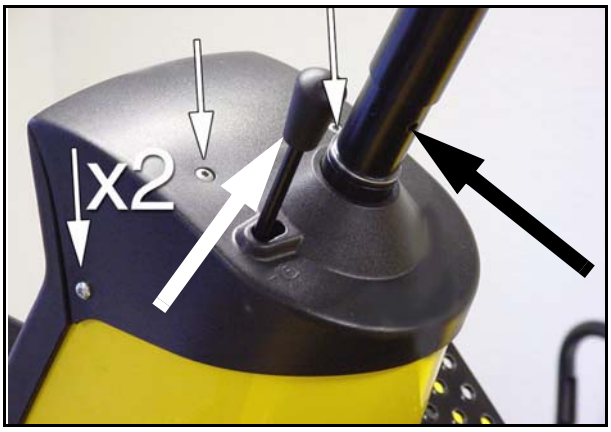
1. Tension the nuts equally on both sides so that the wheel is straight when the machine is straight.
2. Turn the wheels fully out in both directions. Check that there is no abnormal noise or abnormal resistance.
3. Test drive. Check the tension of the chain after test driving.



3.3 Bearings, steering shaft

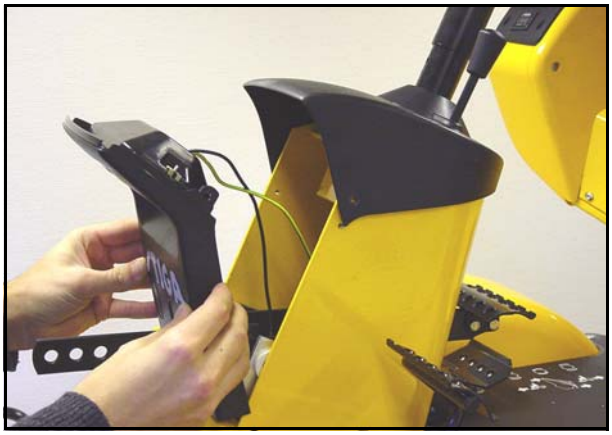
The steering shaft bearings are configurated in one of the following three ways:

- Two sliding bearings of the composite type.
- Two sealed ball bearings.
- One sealed ball bearing (upper) and one ball bearing in the torque booster (lower).

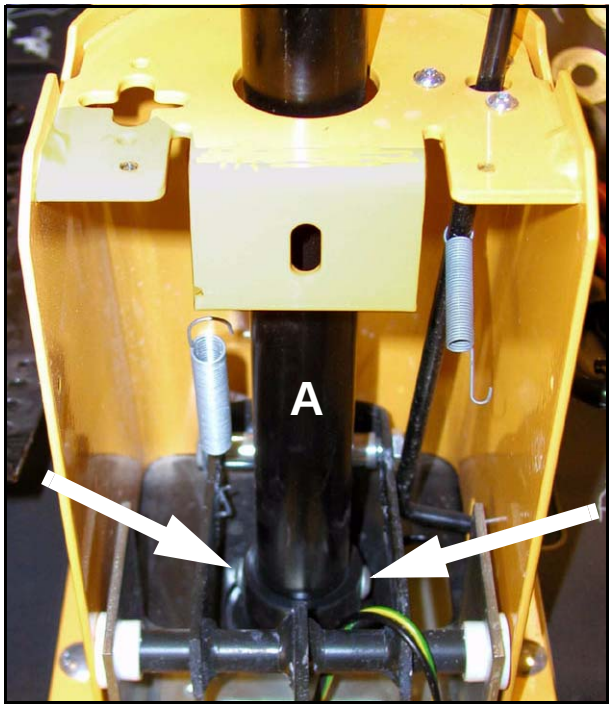


3.3.1 Replacement of sliding bearings and ball bearings

1. Remove the chain from the lower sprocket. See previous sections.
2. Tap out the spring pin that holds the steering wheel. Remove the steering wheel.
3. Pull up the parking brake knob, remove the upper cover and the lamp section.

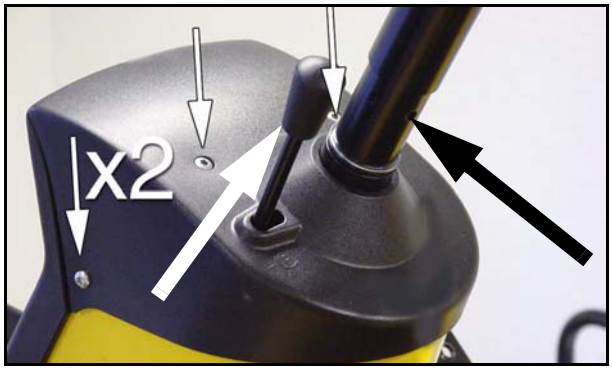


4. Remove the to screws, holding the steering column and remove the steering column (A).



5. Tap out the bearings with a long drift, bar or similar.
6. Tap in the new bearings with a rubber mallet.
7. Reassemble in the reverse order and adjust the chain/wire. See previous sections.

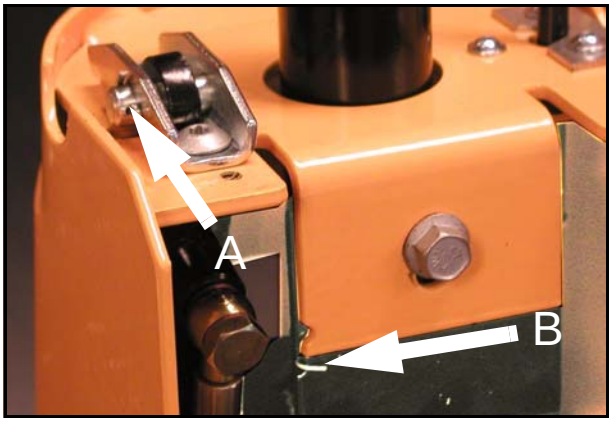
3.3.2 Replacement of upper ball bearing (with steering booster)



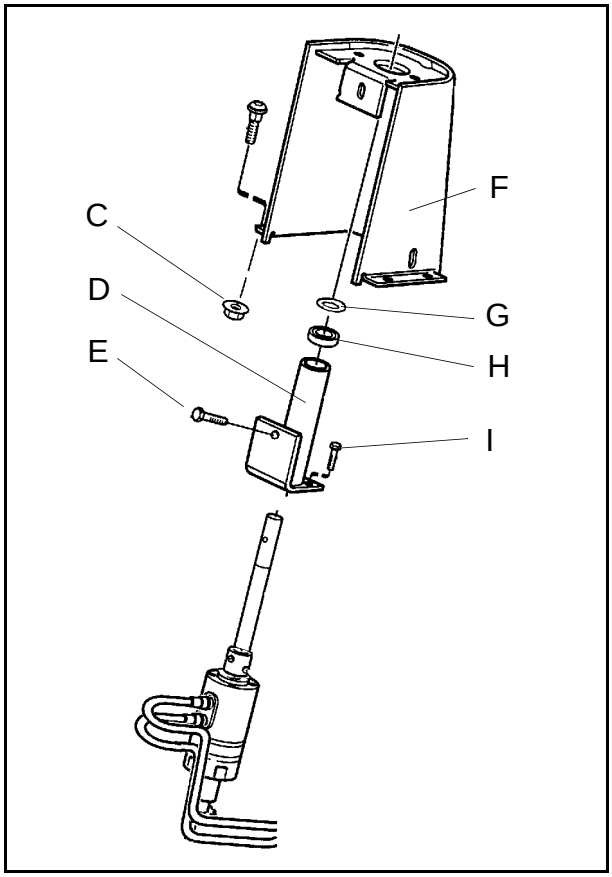
1. Tap out the spring pin that holds the steering wheel. Remove the steering wheel.
2. Pull up the parking brake knob, remove the upper cover and the lamp section.

! Note!
Do not forget the washer (G).

The correct number of shims must be used to avoid tensions in the steering column.



3. Remove the split pin from the hydraulic lift bolt (A) and push out the bolt.
4. Remove the spring (B).
5. Remove the four nuts (C) from the underside and the screw (E), holding the steering console (F) and lift out the steering console with its four screws.
6. Remove the three M8-screws (I) from the lower steering tube (D) and pull up the steering tube with the washer (G).
7. Press or knock out the ball bearing (H) from the steering tube and assemble a new bearing with help of a rubber mallet.
8. The assembling is performed in the reverse order.



! Note!
Do not forget the washer (G).

The correct number of shims must be used to avoid tensions in the steering column.

3.3.3 Trouble shooting

One prerequisite for the function of the power assisted steering is the play in the steering. This play must always spring back to the starting position when the wheel is released.
Test by slowly turning the wheel in one direction when the engine is switched off. At first there is a slight resistance, which increases when the machine begins to turn. Release the wheel. It should now return to the middle position.

The wheel should spring back approx. 10-20 mm when the wheel is released after turning. However, the machine will not automatically “drive straight forward” after turning in the same way as a car.

If the machine always turns in the same direction as soon as the engine is started, there is probably a fault in the torque converter.

Another conceivable fault can be that the bearing in the steering column tube is jamming, so that the steering wheel cannot automatically return to the neutral position.

Note!
If the steering does not function this does not mean that there is always a fault in the torque converter. Faults can also occur in more simple mechanical parts such as chains and gear wheels.

4 Hydraulic system

Contents in this chapter

General

The four wheel drive Park machines are equipped with hydraulic power transmission. I.e. the engine drives an hydraulic pump, which pumps oil through the rear and front axle drives. There are two main configurations; separate hydraulic pump and the hydraulic pump integrated in the rear axle drive.

The front axle and rear axle are connected in series, which means that the front wheels and rear wheels are forced to rotate at the same speed. To make turning easier, both axles are equipped with a differential.

Some of the machines, both 2WD and 4WD, are also equipped with hydraulic assisted steering and implement lifter.

Front-mounted implements are powered via drive belts.

This chapter contains a description of the hydraulic system, trouble shooting to isolate faults and information about adjustments and corrective measures.

Since the steering torque converter and lifting cylinder belong to the respective chapter (2 and 3), these components are described in detail in these chapters.

4.1 Safety

Hydraulic oil under pressure can be very dangerous if hoses, lines or other distribution parts are leaking. To avoid personal injuríes, always wear protection gloves and protection goggles during works with the hydraulic system.

Before starting the motor, place the machine outdoors or install an extraction device for the exhaust fumes. Otherwise the personel will be poisoned.

Cleanliness is mandatory at all works with the hydraulic system. Foreign substances and contaminations will jeopardize the function and reliability of the system. Always protect and close openings of hoses, lines and connections when replacing components.

4.2 Configuration

The 4WD machines are equipped with one of the systems, listed below:

- Hydraulic pump integrated in the rear axle drive.
- Hydraulic pump integrated in the rear axle drive and hydraulic assisted steering and implement lifter.
- Separate hydraulic pump for the power transmission.
- Separate hydraulic pump for the power transmission and hydraulic assisted steering and implement lifter.

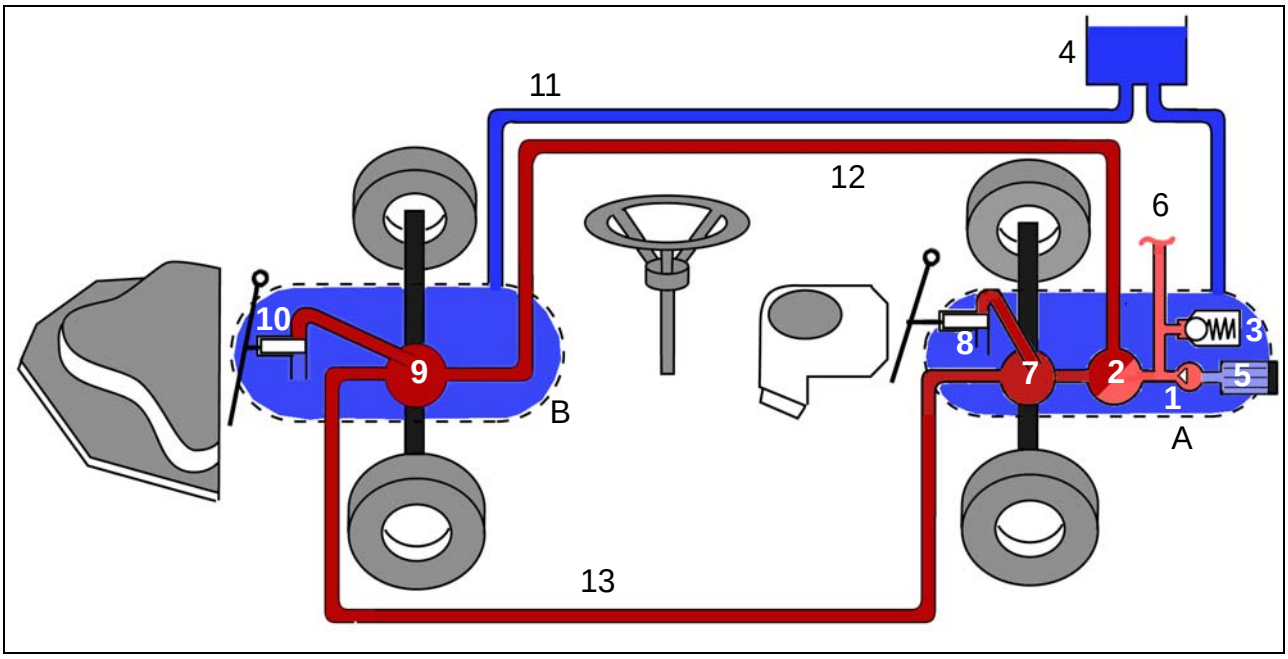
The power transmission and the hydraulic assisted steering and implement lifter work with the same oil, but in two separate parallel systems. Therefore, the descriptions are divided in the following headings:

- Hydraulic pump integrated in the rear axle drive. See "Hydraulic pump integrated in the rear axle drive" at page 3.
- Separate hydraulic pump for the power transmission. See "Separate hydraulic pump for the power transmission" at page 6.
- Hydraulic assisted steering and implement lifter. See "Hydraulic assisted steering and implement lifter, models up to 2006" at page 10 and "Hydraulic assisted steering and implement lifter, model 2007" at page 16.

The sections below will explane the physical arrangement of the hydraulic components and a functional description.

4.3 Hydraulic pump integrated in the rear axle drive

4.3.1 Physical description



A. Rear axle drive.
The parts 1-3 and 5-8 below are built in the rear axle drive.

1. Charge pump, 35-45 bar.
2. Main pump.
3. Pressure limit valve for the charge pressure.
4. Oil container.
5. Oil filter.
6. Connection to the external hydraulics (steering converter and implement lifter).
7. Hydraulic motor, rear axle.
8. By-pass valve, rear axle.

B. Front axle drive. The parts 9 and 10 below are built in the front axle drive.

9. Hydraulic motor, front axle.
10. By-pass valve, front axle.
11. Leak flow line.
12. Main flow line.
13. Main flow line.

<u>Colour - Pressure</u>

Red is the feeding pressure to the main pump and to the external hudraulics.

Dark red is the working pressure to the hydraulic motors.

Blue is the atmospheric pressure in the oil container and housings.

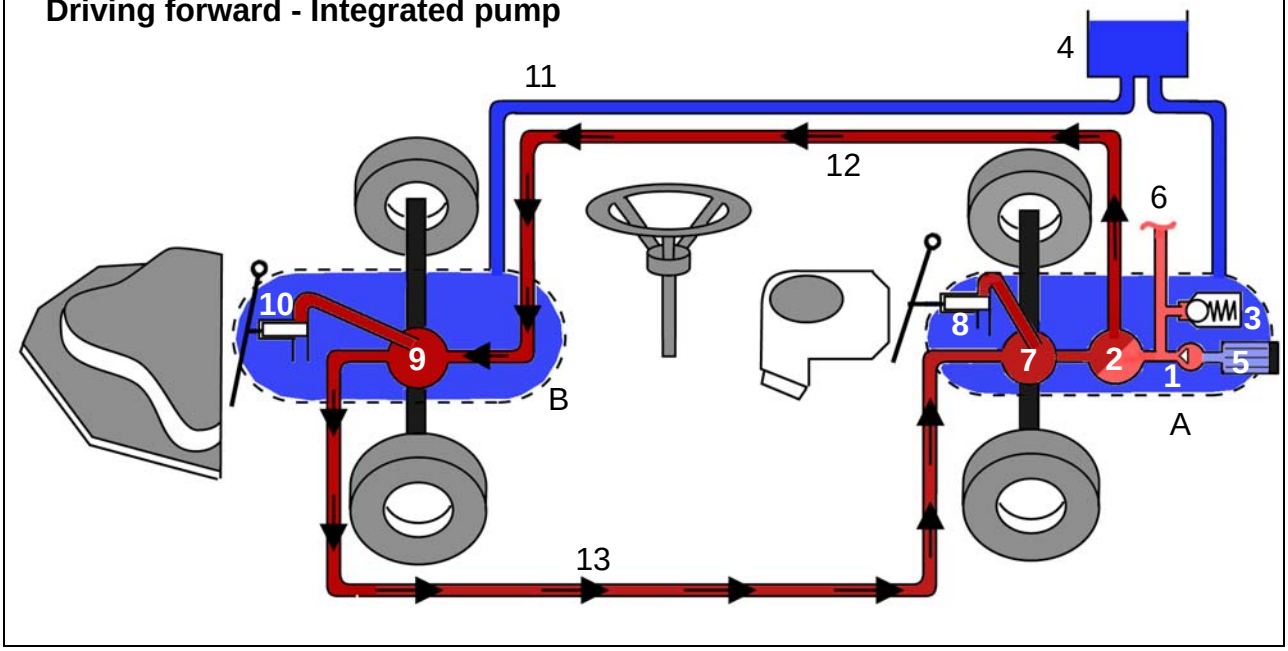
Light blue is below the atmospheric pressure (pump suction side).

4.3.2 Functional description

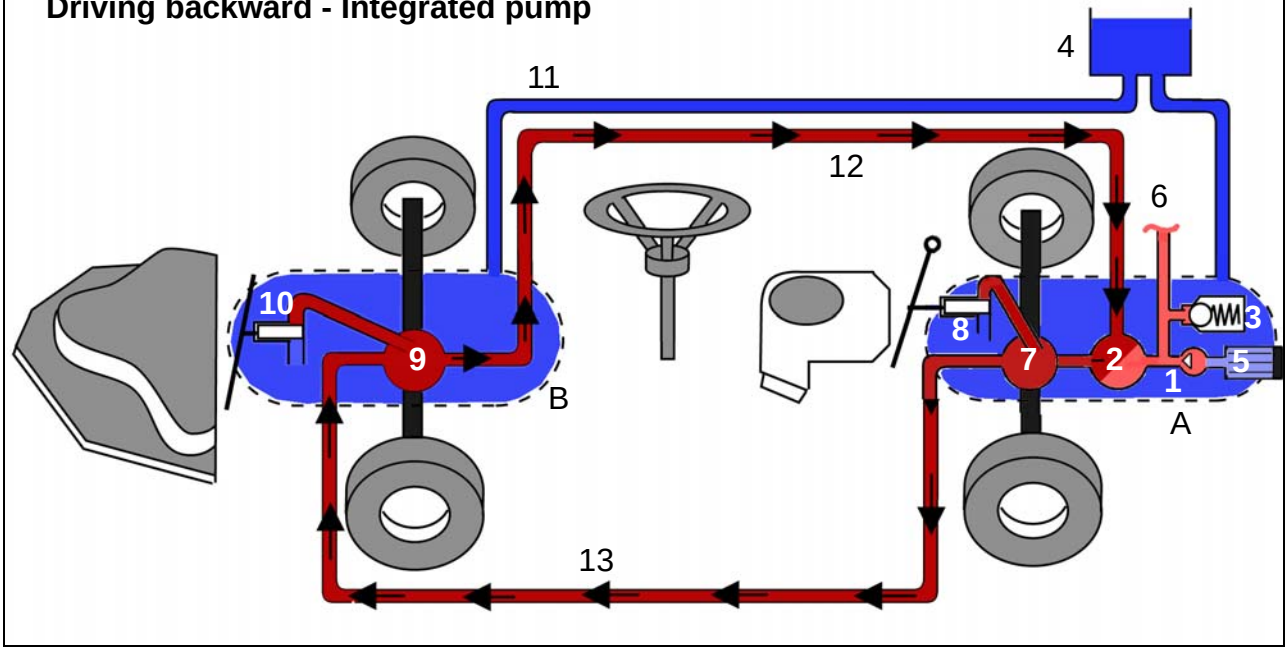
Driving

The oil flows when driving forwards respectively backwards are showh in the diagrams below.

Driving forward - Integrated pump



Driving backward - Integrated pump



The engine drives the charge pump (1) and the main pump (2) with a constant speed. The charge pump is feeding the main pump. The oil, fed into the main pump during operation, is a replacement for the leak oil from the front and rear axle drives (A and B).

The charge pump sucs its oil from the rear axle drive volume and through the filter (5). The rear axle drive is supplied with oil from the oil container (4).

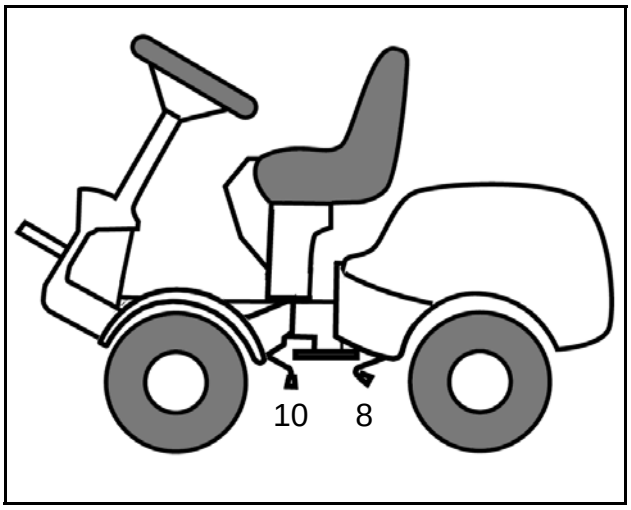
The oil flow and the flow direction through the main pump (2) - front hydraulic motor (9) - rear hydraulic motor (7) is controlled by the speed pedal, mechanical connected to the main pump (2) in the rear axle drive (A). The main pump pressure is depending on the power requirements at the wheel axles and is limited by the engine power.

The hydraulic motors have a small oil leakage (1-4%), which increases with increased power requirement (increased pressure). The leakage oil is collected inside the axle drive housings an forwarded back to the oil tank through the leak flow lines.

The motors are connected in serie with the front motor (9) first, when driving forwards. This means, due to the leakage in the front motor, that the machine under normal conditions drives on the front wheels only. When the front wheels begin to slip (rotate with 1-4% higher speed than the rear wheels) also the rear wheels start to drive and the slipping is avoided. This fact is not noticed by the operator, since the machine is driven with its four wheels after demand.

By-pass valves

The axle drives are equipped with by-pass valves. Each by-pass valve is connected to their clutch release lever. When the by-pass valve (10) is open, it allows oil to flow into the motor housing and the pressure drop over the motor is such neutralized. The by-pass valve is intended to make it possible to push the machine without heavy resistance from the axle drive.



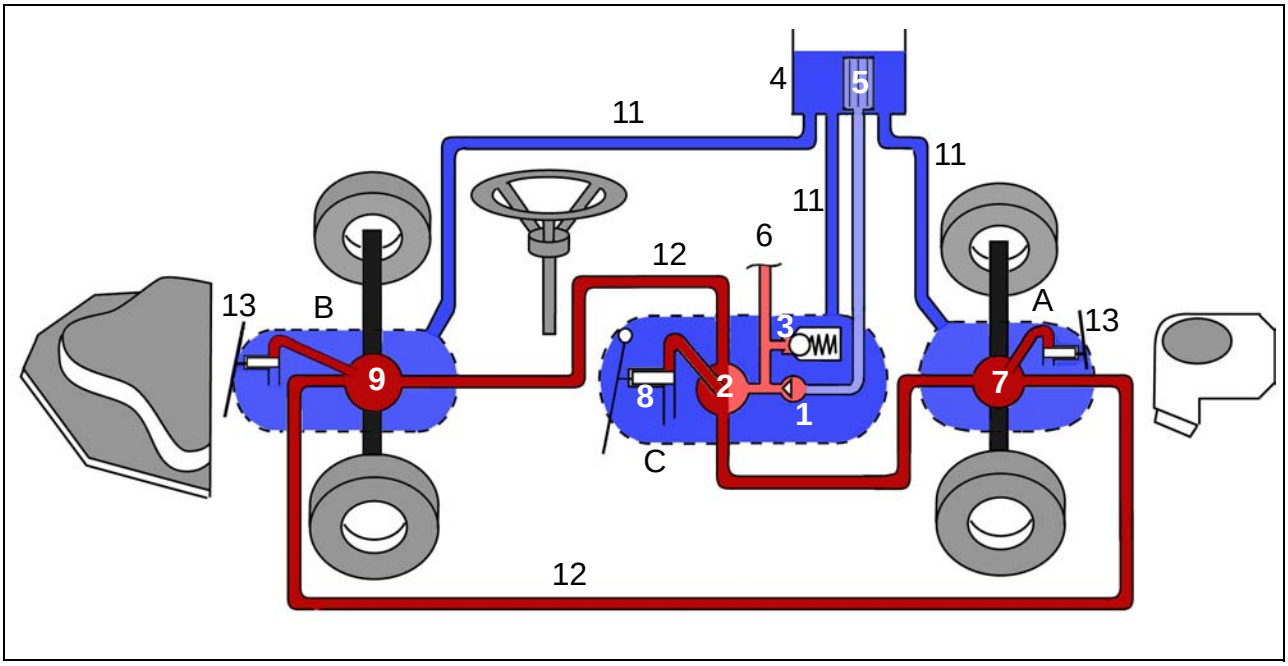
The front by-pass valve is equipped with a mechanic interlock which always resets the valve, if previously opened, at driving attempts forwards

An attempted to drive the machine forwards with the rear by-pass valve (8) closed and the front by-pass valve (10) open will result in an powerful oil flow into the front axle drive housing. Since the leak flow line (11) not are dimensioned for this flow and the main flow line (13) is blocked, it will result in a hazardous pressure rise in the front axle drive housing. This pressure rise forces the oil to presses out through the sealings and can cause damages.

8. Rear clutch release lever, connected to the rear by-pass valve.
10. Front clutch release lever, connected to the front by-pass valve.

4.4 Separate hydraulic pump for the power transmission

4.4.1 Physical description



A. Rear axle drive with its hydraulic motor (7).

B. Front axle drive with its hydraulic motor (9).

C. Hydraulic pump. The parts 1-3 and 8 below are built in the hydraulic pump.

1. Charge pump, 35-45 bar.
2. Main pump.
3. Pressure limit valve for the charge pressure.
4. Oil container.
5. Oil filter.
6. Connection to the external hydraulics (steering converter and implement lifter).
7. Hydraulic motor in the rear axle drive (A).
8. By-pass valve in the main pump (C).
9. Hydraulic motor in the front axle drive (B).
11. Leak flow lines.
12. Main flow lines.
13. B-pass valve (only used when oil change)

<u>Colour - Pressure</u>

Red is the feeding pressure to the main pump and to the external hudraulics.

Dark red is the working pressure to the hydraulic motors.

Blue is the atmospheric pressure in the oil container and housings.

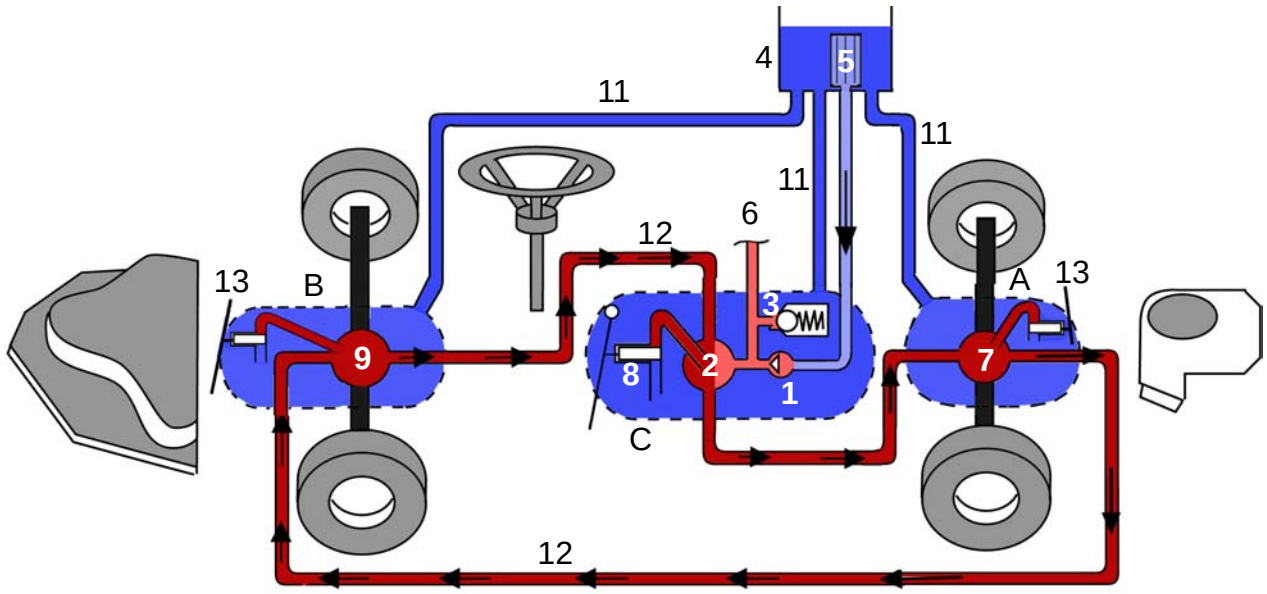
Light blue is below the atmospheric pressure (pump suction side).

4.4.2 Functional description

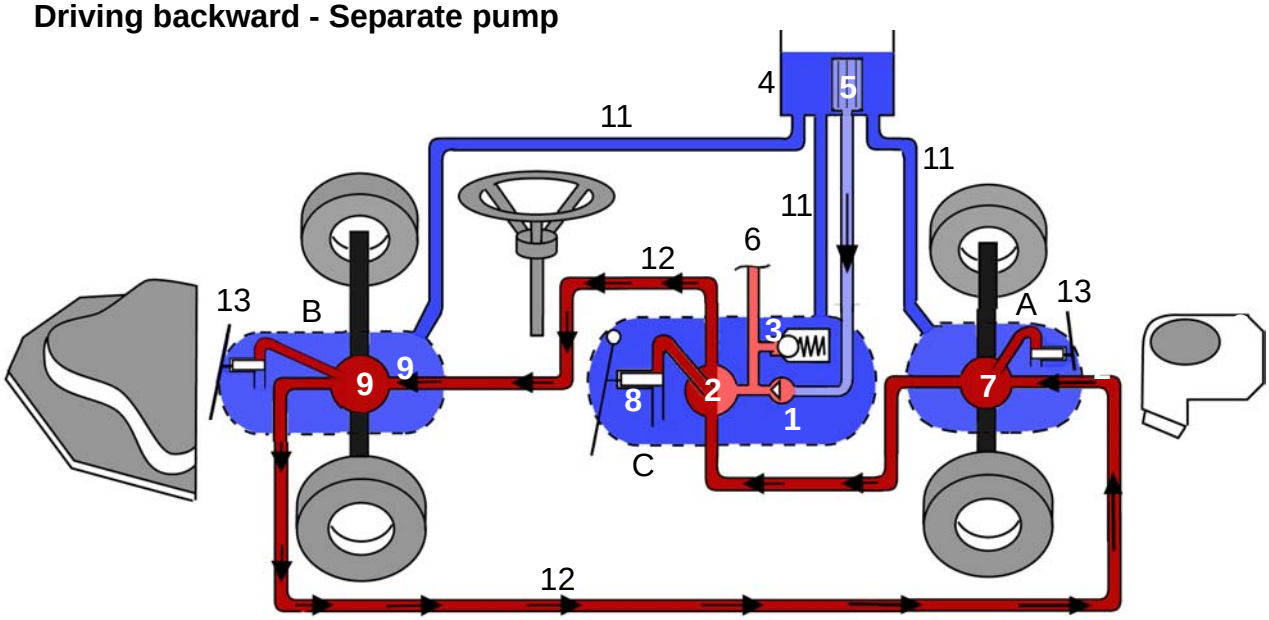
Driving

The oil flows when driving forwards respectively backwards are showh in the diagrams below.

Driving forward - Separate pump



Driving backward - Separate pump



The charge pump (1) and the main pump (2) are integrated into one unit, the hydraulic pump (C) which is located separat in front of the engine.

The engine drives the the hydraulic pump (C) with a constant speed. The charge pump (1) is feeding the main pump (2) with 35-45 bar. The oil, fed into the main pump during operation, is a replacement for the leak oil from the front and rear axle drives (A and B) and the main pump (2).

The charge pump sucs its oil from the oil container (4) and through the filter (5).

The oil flow and the flow direction through the main pump (2) - front hydraulic motor (9) - rear hydraulic motor (7) is controlled by the speed pedal, mechanical connected to the main pump (2). The main pump pressure is depending on the power requirements at the wheel axles and is limited by the engine power.

The hydraulic motors and the hydraulic pump have a small oil leakage (1-4%), which increases with increased power requirement (increased pressure). The leakage oil is collected inside the unit housings an forwarded back to the oil tank through the leak flow lines.

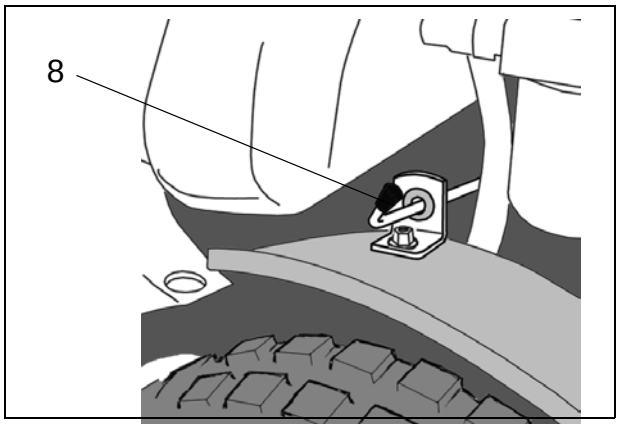
The motors are connected in serie with the rear hydraulic motor (7) first, when driving forwards. This means, due to the leakage in the rear motor, that the machine under normal conditions drives on the rear wheels only. When the rear wheels begin to slip (rotate with 1-4% higher speed than the front wheels) also the front wheels start to drive and the slipping is avoided. This fact is not noticed by the operator, since the machine is driven with its four wheels after demand.

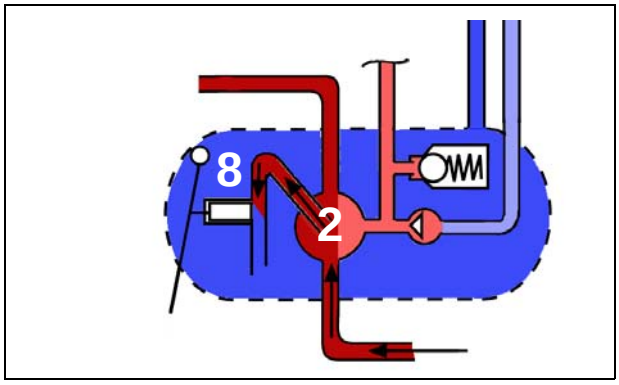
By-pass valve

The main pump (2) is equipped with a by-pass valve (8), connected to its clutch release lever. When the by-pass valve is open, the main pump is disconnected from the oil circuit by an open passage out into the housing.

The pressure drop over the pump is such neutralized and the oil can flush free in the system. See the figure.

The by-pass valve is intended to make it possible to push the machine without heavy resistance from the main pump.

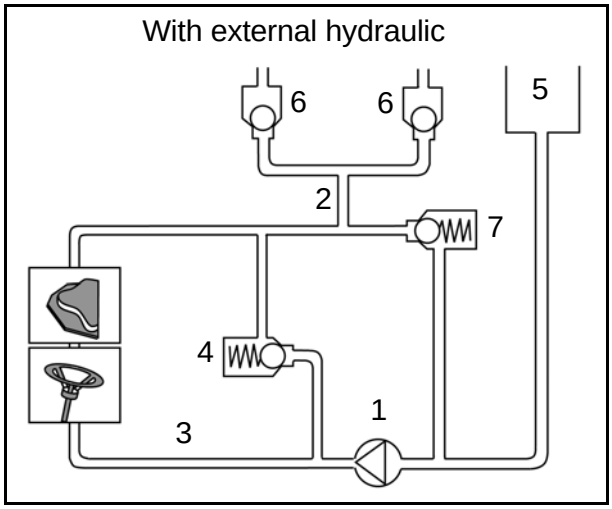




Charge pump

The charge pump has two tasks:

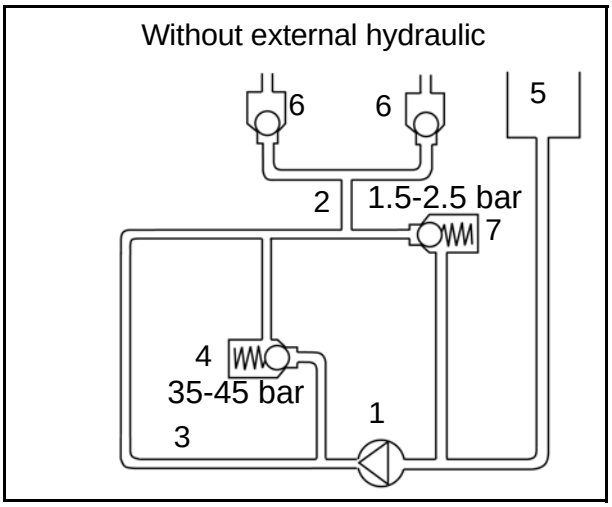
- To feed the external hydraulic with 35-45 bar.
- To feed the main pump with its initial pressure, 1,5-2,5 bar.



External hydraulic

The charge pump (1) sucks oil from the oil container (5).

When the external hydraulics (if the machine is equipped with external hydraulic) are in use, the pressure in the out line (3) is limited to 35-45 bar by the pressure valve (4).



Without external hydraulic

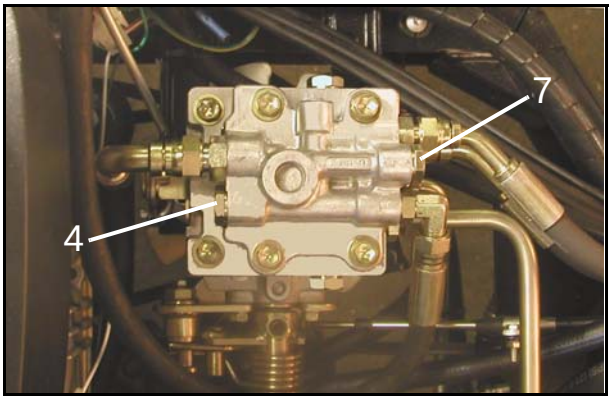
The connections for the external hydraulics are connected to each other. Compare the two figures.

The charge pump (1) sucs oil from the oil container (5).

The pressure valve (4) has no function because the pressure valve (7) is set to a much lower pressure (see below).

Feeding the main pump

The line (2) feeds oil to the main pump respective suction lines (depending on driving forwards or backwards) through the respective back valves (6). The pressure in the line (2) is limited to 1,5-2,5 bar by the pressure valve (7).

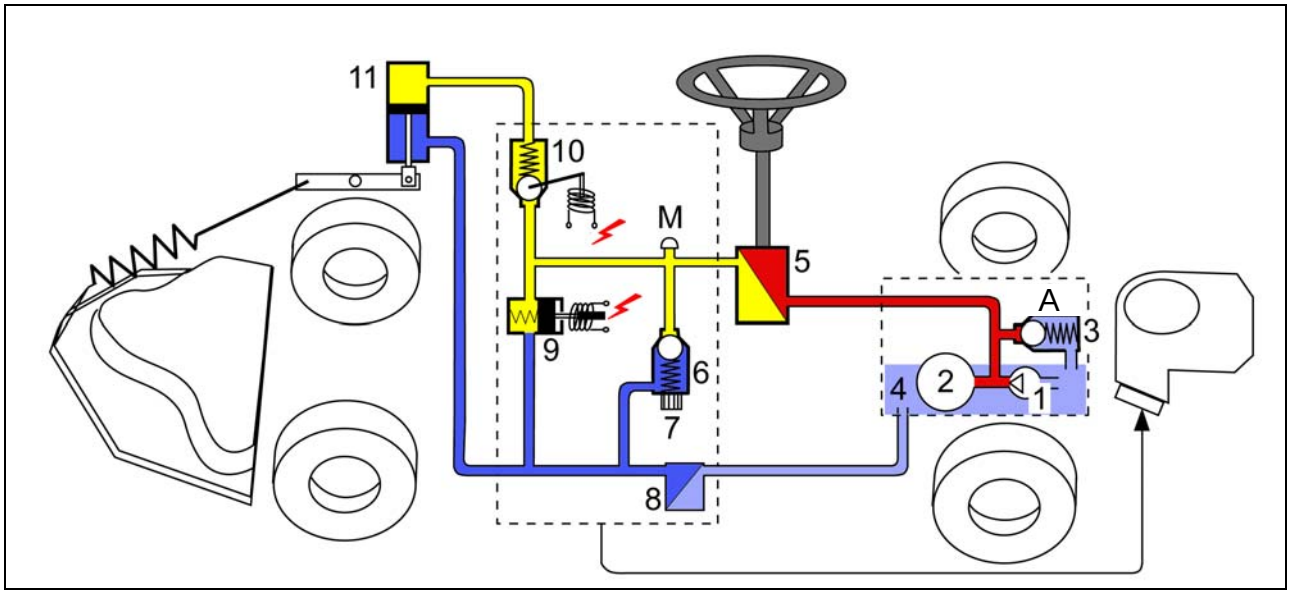


4.5 Hydraulic assisted steering and implement lifter, models up to 2006

This section is valid for both 2WD and 4WD machines.

4.5.1 Physical description, models up to 2006

This section explanes the physical arrangement of the hydraulic components and the different maximal pressures in the system.



A. The dashed box indicates parts (1-4) which are builtin the rear axle drive or arranged separat in front of the engine.

1. Charge pump.
2. Main pump. This pump belongs to the driving system and supplies the oil pressure/flow.
3. Pressure limit valve.
4. Oil container.
5. Steering torque converter.
6. Pressure limit valve.
7. Pressure adjustment screw.
8. Filter in the return line.
9. Normal open valve. Closes for movement up.
10. Non-return valve. The non-return function is inhibited for movement down.
11. Single acting lifting cylinder.

M. Testpoint.

Red lines indicate the maximum total pressure from the HST when the torque converter (5) works.

Yellow lines indicate the maximum pressure to the lifting cylinder when it lifts the implement.

Blue lines indicate return oil with low pressure (>1-3 bar) before the filter.

Light blue lines indicate return oil with a very low pressure (>0 bar) after the filter.

4.5.2 Functional description, models up to 2006

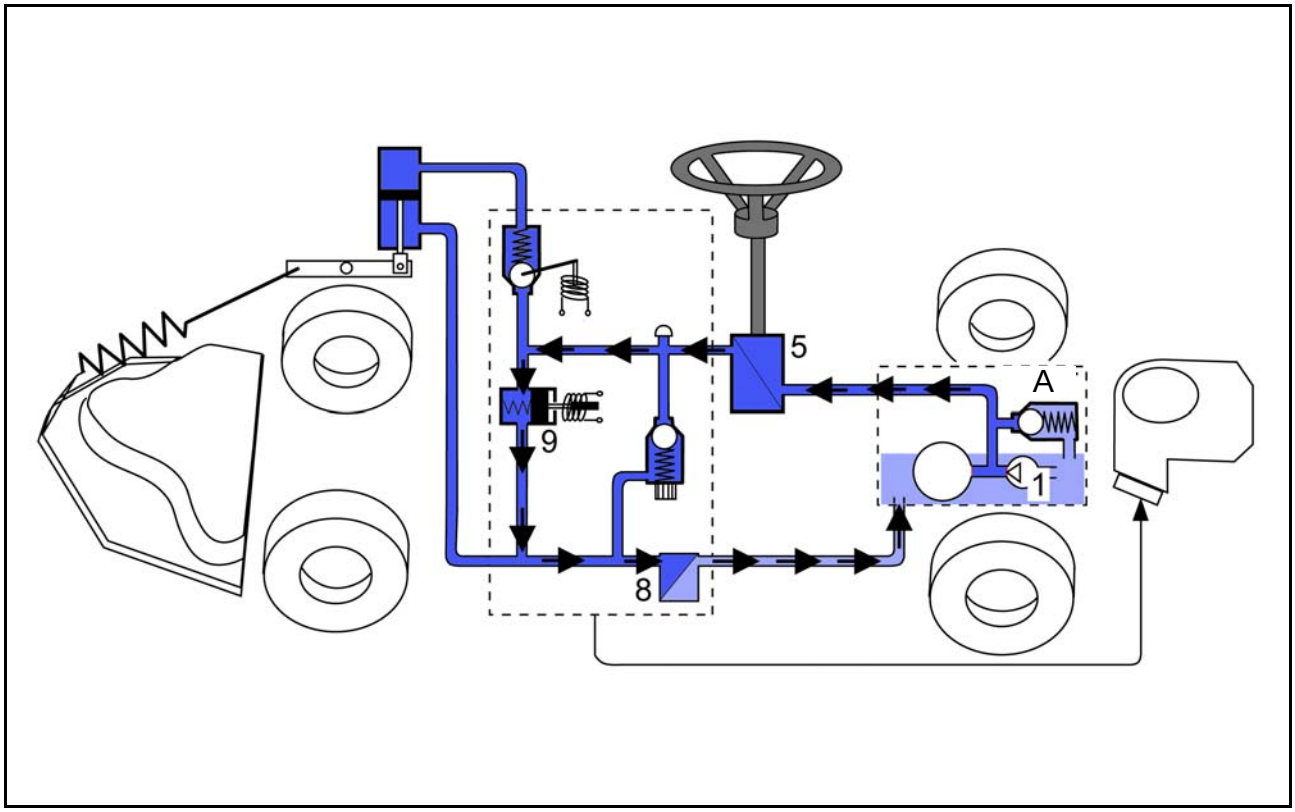
Normal condition

Operation state:

- Motor is running in full speed.
- The steering wheel is not actuated.
- The implement lifter is not activated.

The loading pump (1) is forcing oil through the steering converter (5), the open valve (9) and the filter (8).

The oil flow is indicated with arrows in the figure below. Since neither of the two items are working, the resistance can be ignored and the pressure is very low (>1-3 bar).



Steering wheel actuated

Operation state:

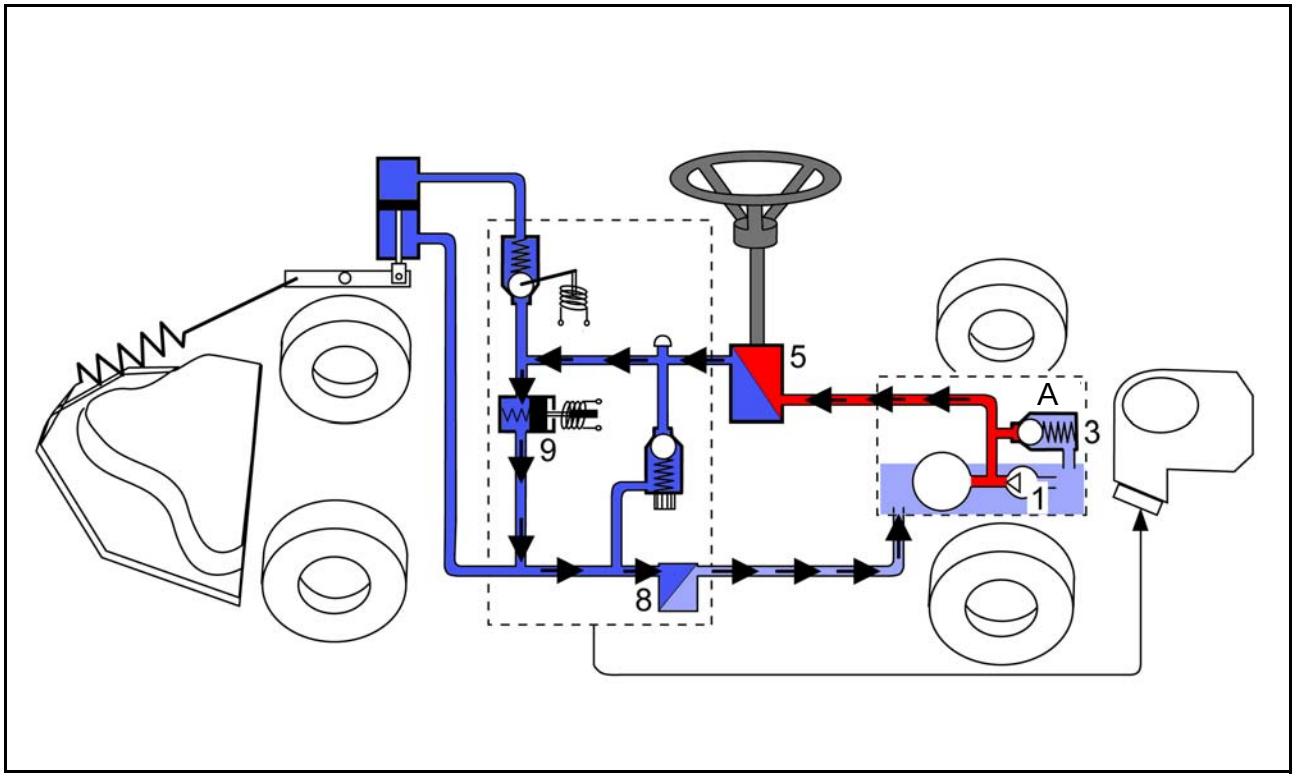
- Motor is running in full speed.
- The steering wheel is actuated.
- The implement lifter is not activated.

The loading pump (1) is forcing oil through the steering converter (5), the open valve (9) and the filter (8).

The oil flow is indicated with arrows in the figure below. Since the steering converter (5) is working, a pressure drop will be built up over it.

The pressure drop =
the pressure in the red line - the pressure after the steering converter (5)

The pressure drop is depending on the steering power needed and is limited of the built in valve (3).



Implement lifter actuated upwards

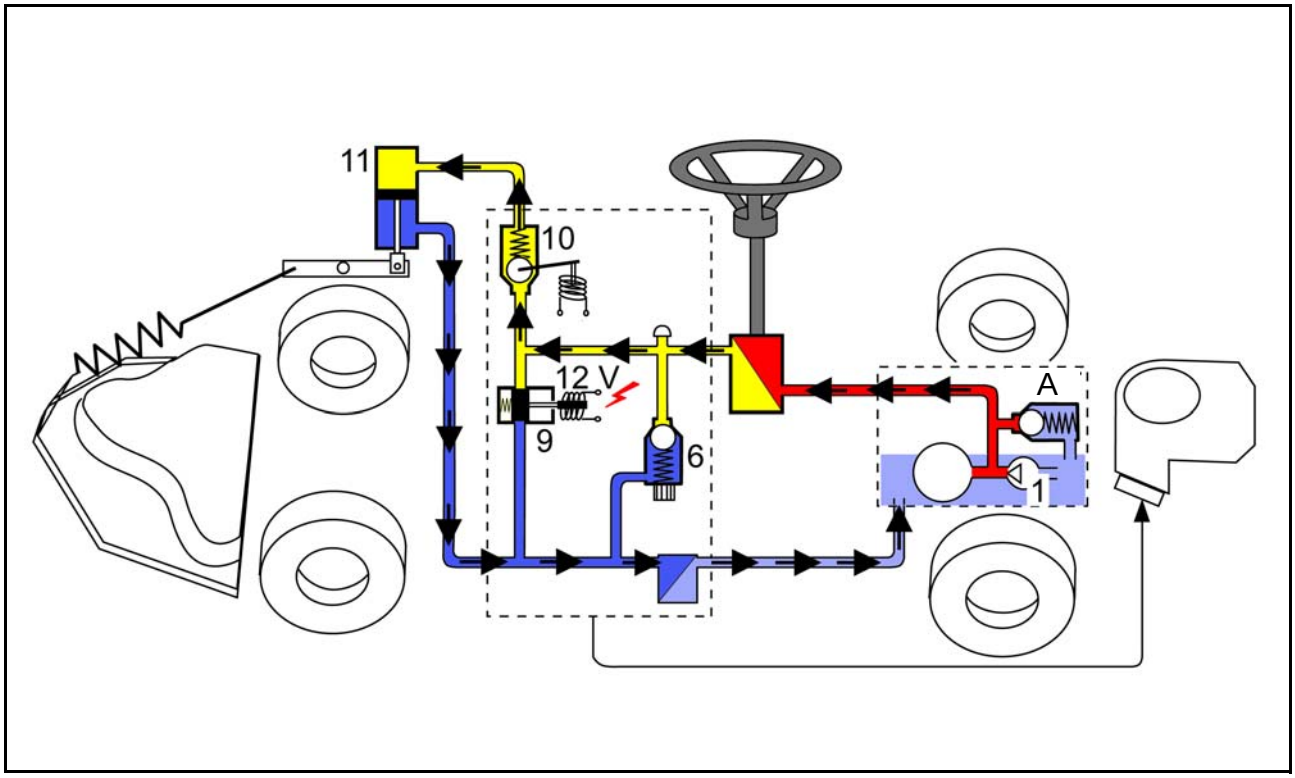
Operation state:

- Motor is running in full speed.
- The steering wheel is actuated or not.
- The implement lifter is activated upwards.

An electromagnet closes valve (9) and oil forces through the non-return valve (10) and presses out the piston in hydraulic cylinder (11). The pressure is now limited by the pressure limit valve (6). That means that oil is flowing both into the cylinder and through valve (6).

When the piston in cylinder (11) is fully extended and the lifting switch still is activated, the oil will flow only through the valve (6) and a noice will be heard from the valve. Provided that the steering wheel not is actuated during the lifting procedure, there will be the same pressure both in the red and yellow lines.

When the lifting switch is released, valve (9) will reurn to its opened position and the system switches over to its normal state, except that the piston in the hydraulic cylinder (11) is locked in its extended position by the non-return function in valve (10).



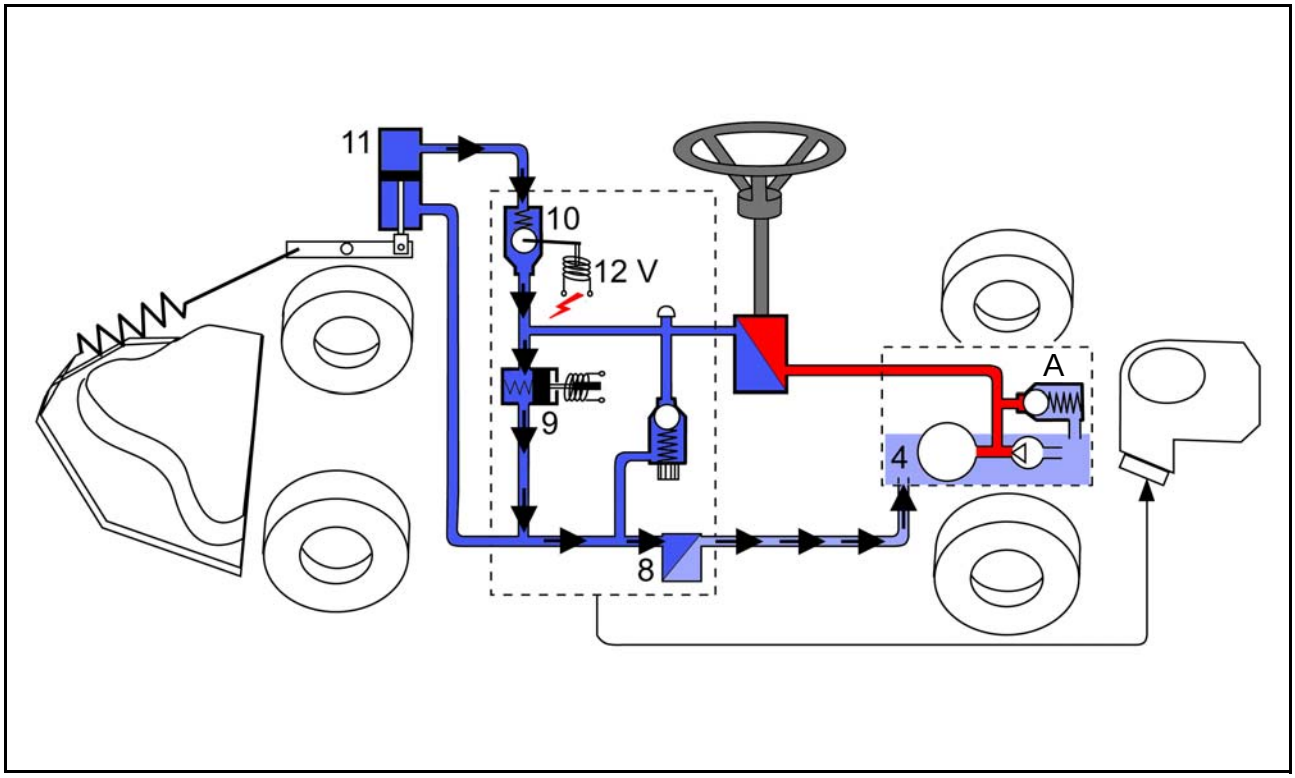
Implement lifter downwards

Operation state:

- Motor is running in full speed.
- The steering wheel is actuated or not
- The implement lifter is in its upper position.
- The implement lifter is activated downwards.

An electromagnet release and inhibites the the non-return function in valve (10) and the piston in the hydraulic cylinder (11) presses the oil back through valve (9), filter (8) and into the oil tank (4). The piston is forced of the implement weight.

After that, the system switches over to its normal state.



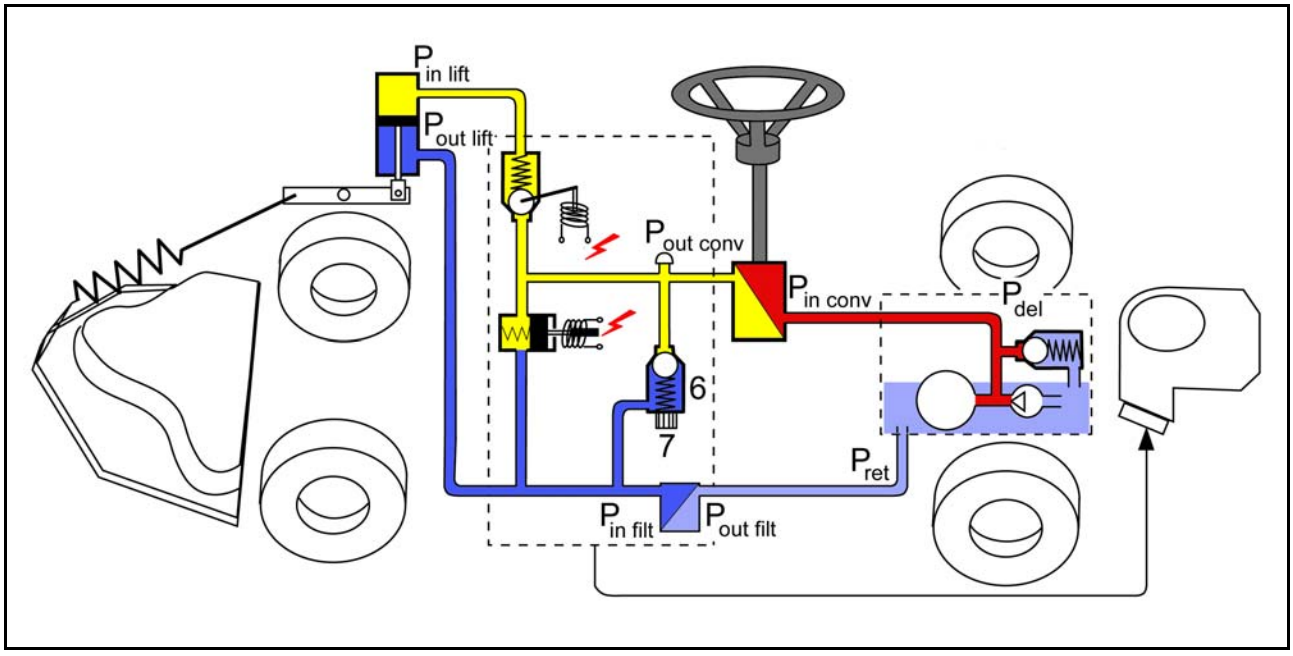
Pressure theory

The HST loading pump (1) delivers energy to the torque converter (5) and the lifting cylinder (11). The energy is defined as “the flow x the pressure drop over the circuit”. Since the flow is almost constant (except if the system is blocked), the two units have to share the pressure drop, i.e. sharing the energy from the loading pump (1).

Ex. The supplied energy to the torque converter is “the flow x its pressure drop”, where the pressure drop is the the different between the pressures in the lines to and from the torque converter.

The pressure drop over an item varies with the power required.

Ex. A havier implement gives a higher pressure drop over the lifting cylinder and turning the steering wheel when the machine stands still gives a higher pressure drop over the torque converter.



Relations between pressures and power:

$P_{in\ conv} - P_{out\ conv}$ = Pressure drop (power) over the steering converter.

$P_{in\ lift} - P_{out\ lift}$ = Pressure drop (power) over the lifting cylinder.

$P_{del} - P_{ret}$ = Pressure drop (power) over the entire system, delivered from pump (1).

$P_{out\ conv} = P_{in\ lift}$ $P_{out\ lift} = P_{in\ filt}$ $P_{out\ filt} = P_{ret}$

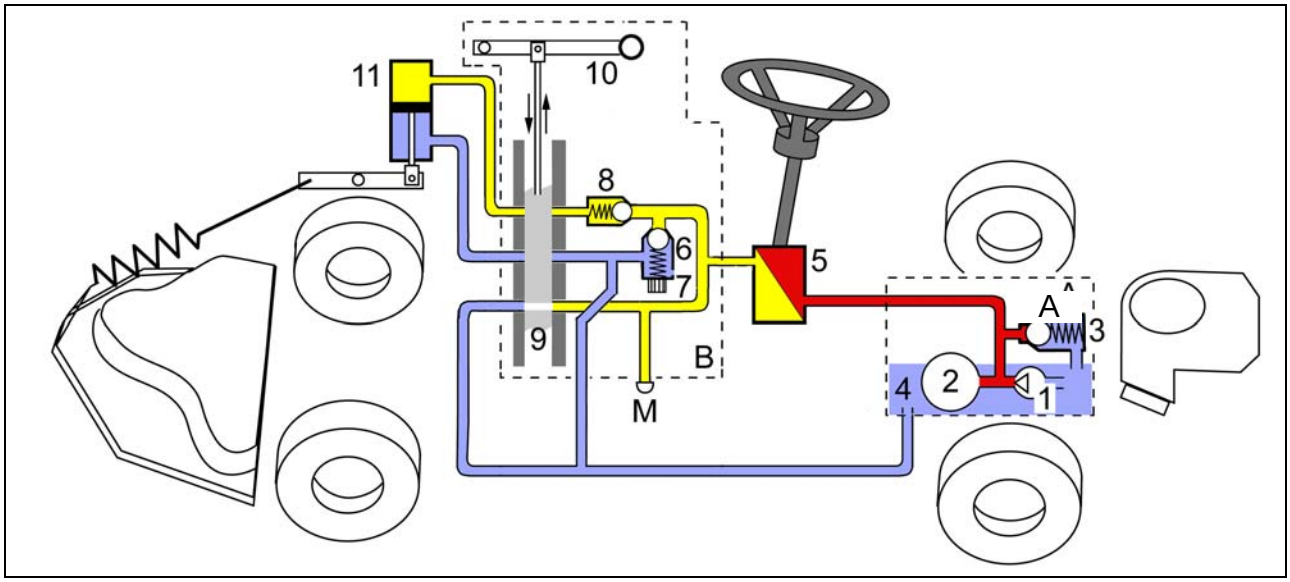
The setting of the adjusting screw (7) at pressure limit valve (6) decides how the delivered pressure shall be shared between the lifting cylinder and torque converter.

4.6 Hydraulic assisted steering and implement lifter, model 2007

This section is valid for both 2WD and 4WD machines, model 2007.

4.6.1 Physical description, model 2007

This section explanes the physical arrangement of the hydraulic components and the different maximal pressures in the system.



A. The dashed box indicates parts (1-4) which are builtin the rear axle drive or arranged separat in front of the engine.

B. Hand operated valve unit with the built in parts 6-10.

1. Charge pump.
2. Main pump. This pump belongs to the driving system and supplies the oil pressure/flow.
3. Pressure limit valve.
4. Oil container.
5. Steering torque converter.
6. Pressure limit valve.
7. Pressure adjustment screw.
8. Non-return valve.
9. Slide with 4 different hole patterns for the resp. functions. Illustrated in normal status.
10. Hand lever, connected to the slide.
11. Double acting lifting cylinder.

M. Testpoint.

Red lines indicate the maximum total pressure from the HST when the torque converter (5) works.

Yellow lines indicate the maximum pressure to the lifting cylinder when it lifts the implement.

Blue lines indicate return oil with low pressure (>1 bar).

4.6.2 Functional description, model 2007

Normal condition

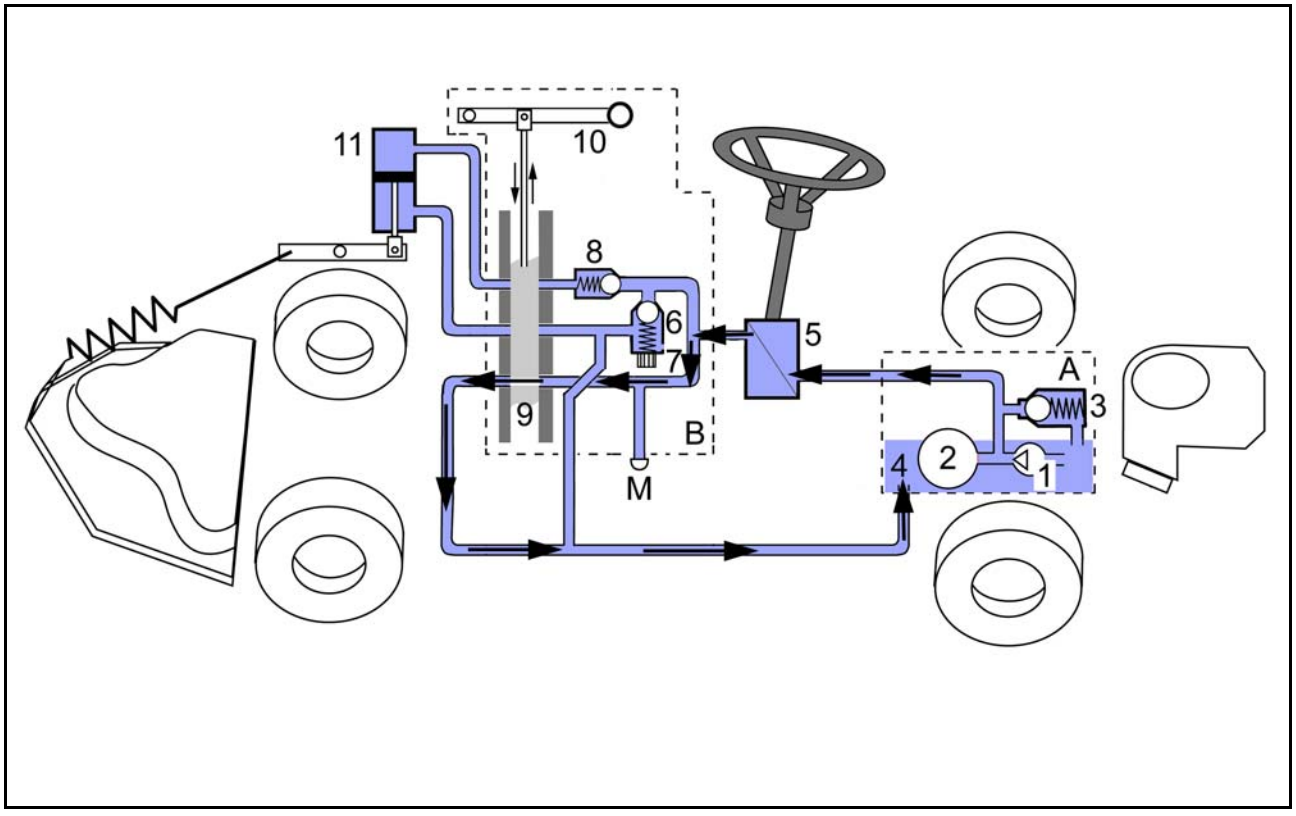
Operation state:

- Motor is running in full speed.
- The steering wheel is not actuated.
- The implement lifter is not activated.

The loading pump (1) is forcing oil through the steering converter (5), and the open valve (9).

The oil flow is indicated with arrows in the figure below. Since neither of the two items are working, the resistance can be ignored and the pressure is very low (>1 bar).

In the normal condition, the lifting cylinder (11) is locked in its set position, because no oil can flow out or in since the oil lines are shut by the slide (9).



Steering wheel actuated

Operation state:

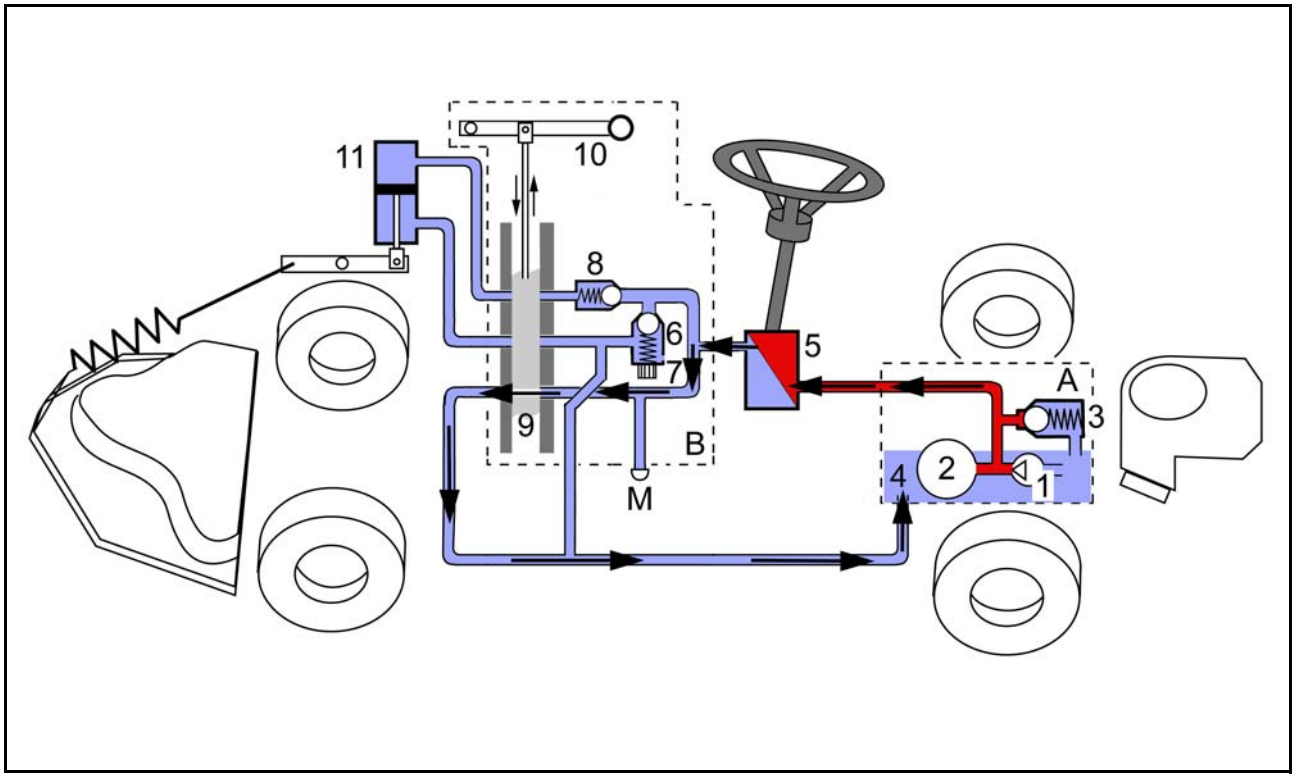
- Motor is running in full speed.
- The steering wheel is actuated.
- The implement lifter is not activated.

The loading pump (1) is forcing oil through the steering converter (5), and the open valve (9).

The oil flow is indicated with arrows in the figure below. Since the steering converter (5) is working, a pressure drop will be built up over it.

The pressure drop =
the pressure in the red line - the pressure after the steering converter (5)

The pressure drop is depending on the steering power needed and is limited of the built in valve (3).



Raising

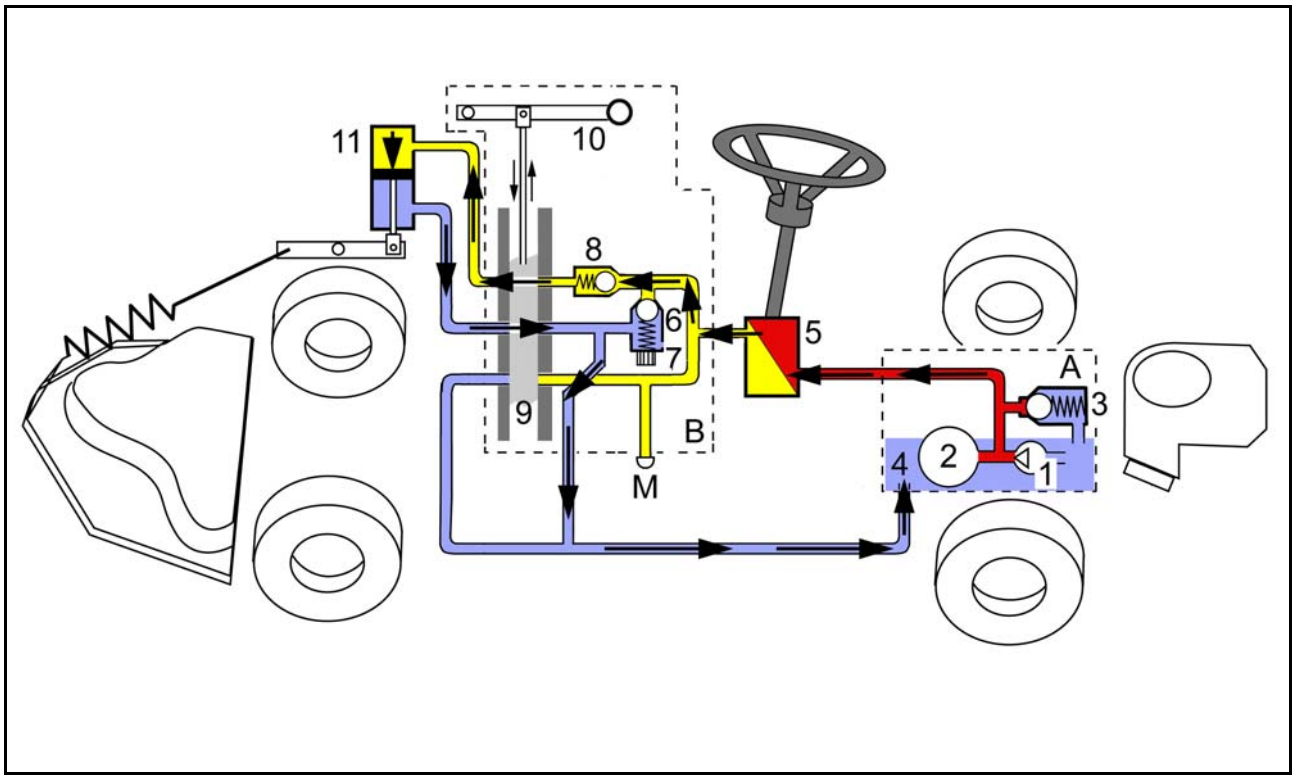
Operation state:

- Motor is running in full speed.
- The steering wheel is actuated or not.
- The implement lifter is activated upwards.

The operator has actuated the hand lever (10) to its raising position (rear position), which moves the slide (9) to change the hole pattern between the connections in the valve. The hole pattern is adapted for the raising procedure. Oil forces through the non-return valve (8), through the slide (9) and presses out the piston in hydraulic cylinder (11).

When the piston in cylinder (11) is fully extended and the hand lever still is activated, the oil will flow only through the valve (6) and a noice will be heard from the valve.

When the hand lever is released, valve (9) will reurn to its neutral position and the system switches over to its normal state. The piston in the hydraulic cylinder (11) is then locked in its actual position.



Lowering

Operation state:

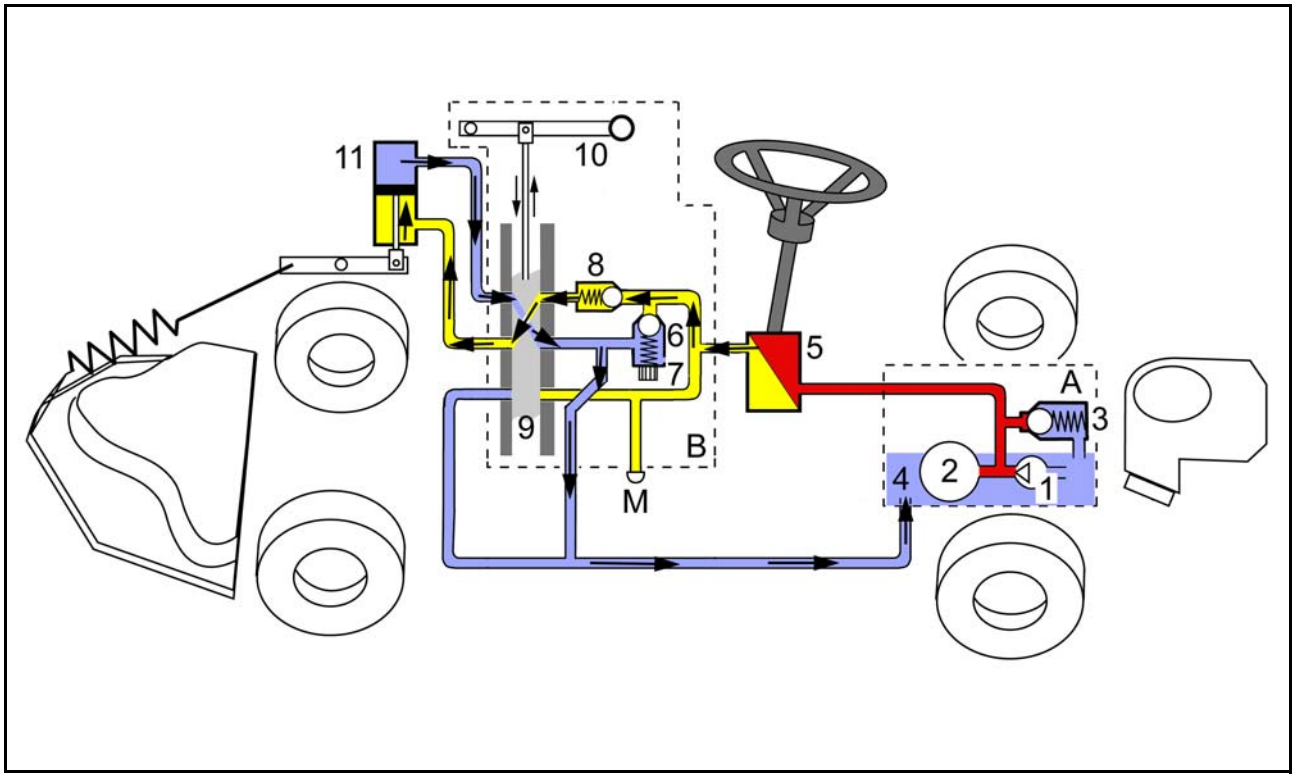
- Motor is running in full speed.
- The steering wheel is actuated or not.
- The implement lifter lever is activated upwards.

The operator has actuated the hand lever (10) to its lowering position (one step forwards), which moves the slide (9) to change the hole pattern between the connections in the valve. The hole pattern is adapted for the lowering procedure (crossed in the figure below). Oil forces through the non-return valve (8), through the slide (9) and presses back the piston into the hydraulic cylinder (11).

In this arrangement, the implement is forced down, irrespective its weight.

When the piston in cylinder (11) has reached its bottom position and the hand lever still is activated, the oil will flow only through the valve (6) and a noice will be heard from the valve.

When the hand lever is released, valve (9) will reurn to its normal position and the system switches over to its normal state. The piston in the hydraulic cylinder (11) is then locked in its actual position.



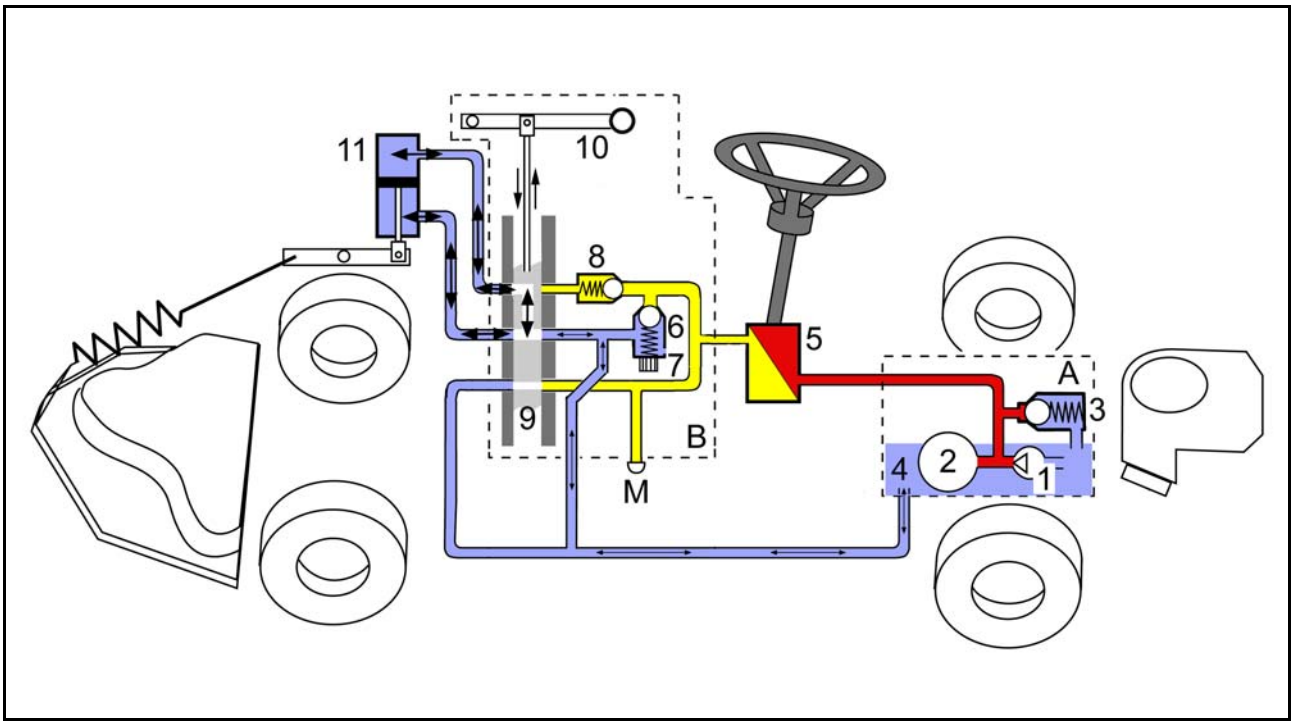
Floating position

Operation state:

- Motor is not running or is running in full speed.
- The steering wheel is actuated or not.
- The implement lifter is in its upper position.

The operator has actuated the hand lever (10), to its floating position (locked in front position) which moves the slide (9) to change the hole pattern between the connections in the valve. The hole pattern is adapted for the floating status. Both sides of the lifting cylinder (11) is connected to each other and to the return line in the slide (9). I.e. no pressure can reach any side of the cylinder. No oil pressure affects the cylinder. The main part of the oil is flowing between the upper part and the lower part of the cylinder. A smaller part is flowing between the oil container (4) and the cylinder due to the displacement of the piston rod. See the arrows in the picture below.

In the floating position, the implement always rests against the ground with the same force (the weight of the implement) and follows the contours of the ground.



Pressure theory

See actual parts of "Pressure theory" at page 15.

4.7 Trouble shooting

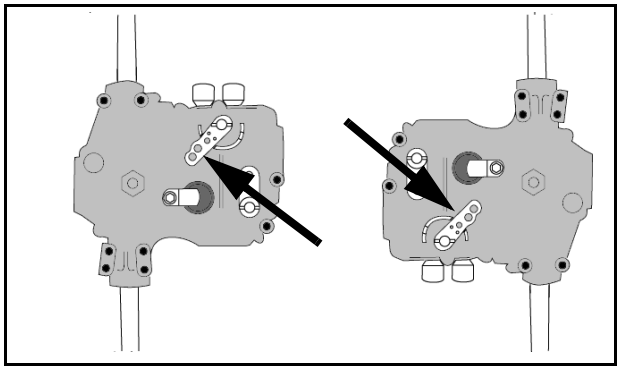
Warning!

Hydraulic oil under pressure can be very dangerous if hoses, lines or other distribution parts are leaking. To avoid personal injuríes, always wear protection gloves and protection goggles during works with the hydraulic system.

4.7.1 Drive system

Before the trouble shooting takes place, it is provided that the following states are fulfilled:

- Machines with external pump; the axle by-pass valves are in drive position. See the figure.
- The clutch release lever (levers) shall be in the drive position.
- Oil level in the oil containes as desired.
- No air in the hydraulic oil.



Symptom	Valid for	Fault	Measure
The machine drives forwards but not backwards.	Machines with separate hydraulic pump.	Front by-pass valve open. Big leakage in the front axle drive.	Close the by-pass valve. Replace the front axle drive.
The machine drives backwards but not forwards.	Machines with separate hydraulic pump.	Rear by-pass valve open. Big leakage in the rear axle drive.	Close the by-pass valve. Replace the rear axle drive.
Reduced speed forwards and possibly faster backwards.	Machines with separate hydraulic pump.	Speed control cable housing is moved.	Adjust the cable housing.
Reduced speed and uneven drive.	All machines.	The suction filter (5) is clogged.	Clean the filter.
The front wheels don´t drive.	All machines.	One of the axle keys is broken.	Replace the actual key.
The rear wheels don´t drive.	All machines.	One of the axle keys is broken.	Replace the actual key.
Reduced or no speed.	Machines with separate hydraulic pump.	The belt between motor and pump is slipping. Check if the fan and pulley at the pump rotate.	Worn belt Replace the belt. Maladjusted clutch wire Adjust the wire.
		Big leakage in the external pump.	Replace the external pump.
		The charge pump defective.	Replace the external pump.
		The pressure limit valve (1,5-2,5 bar) for the charge pump defective.	Check the valve and its spring. See “"Charge pump" at page 9” at page 9.
	Machines with integrated hydraulic pump.	The belt between motor and pump is slipping. Check if the fan and pulley at the pump rotate.	Worn belt Replace the belt. Maladjusted clutch wire Adjust the wire.
		Big leakage in the rear axle drive.	Replace the rear axle drive.
	All machines.	Speed control cable loose or mowed.	Repair/adjust the speed control cable.

4.7.2 External hydraulic

Warning!

Hydraulic oil under pressure can be very dangerous if hoses, lines or other distribution parts are leaking. To avoid personal injuríes, always wear protection gloves and protection goggles during works with the hydraulic system.

Warning!

Before starting the motor, place the machine outdoors or install an extraction device for the exhaust fumes. Otherwise the personel will be poisoned.

This section describes the trouble shooting procedures in absence of proper functions at the hydraulic assisted steering and implement lifter. It also describes the correction measures in each actual case. When following the trouble shooting table, it is provided that the following states are fulfilled:

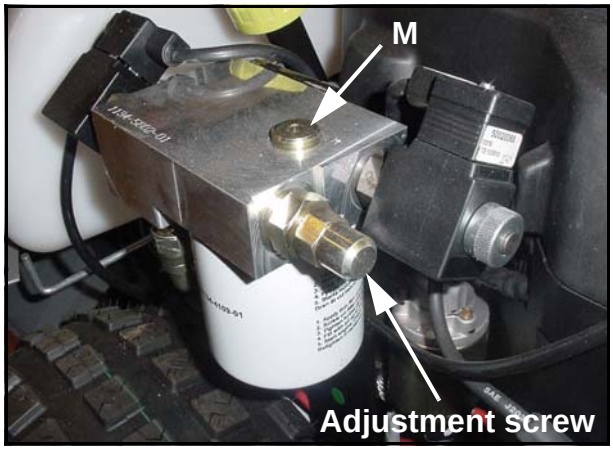
- Manometer connected to the testpoint. See the figure.
- Parking brake not activated.
- Motor is running in full speed.
- The oil reservoir level shall be adjusted.
- The machine is warmed up during at least 10 minutes.

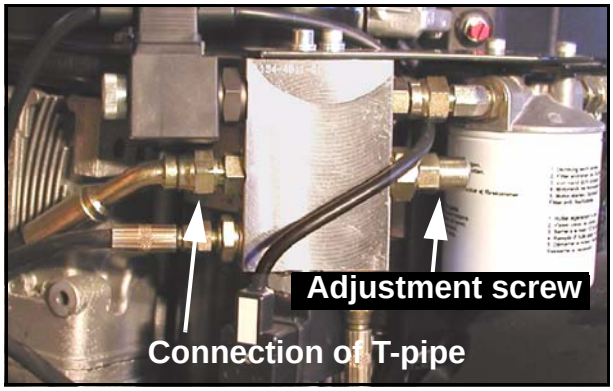
Connection of manometer, models up to 2006

The valve blocks are different designed on different models. The earlier models are not provided with any testpoint (M). To measure the “yellow” pressure on these models, a T-pipe must be fitten on the line into the valve block (the thicker hose connection). See the figure.

The manometer is then connected to the T-pipe.

Other models, with testpoint (M) are also different designed. The figure shows an example. The testpoint (M) is always an insex plug and the adjustment screw is always protected and locked by a box nut. The items have the same look on all models, but can be different located.

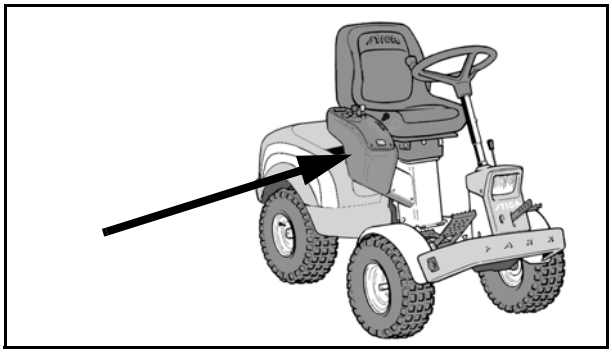




Connection of manometer, models up to 2006

To get access to the adjustment screw and the testpoint (M), dismantle the right cover.

The testpoint (M) is an insex plug and the adjustment screw is locked by a counter nut.



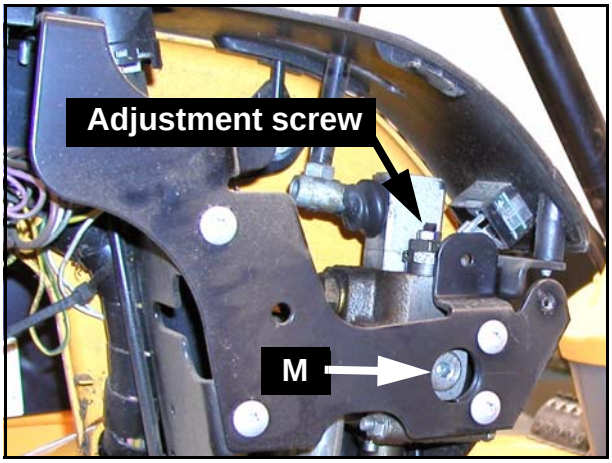
Connection - Adjustment

Unscrew the plug (M) and connect the manometer to the thread.

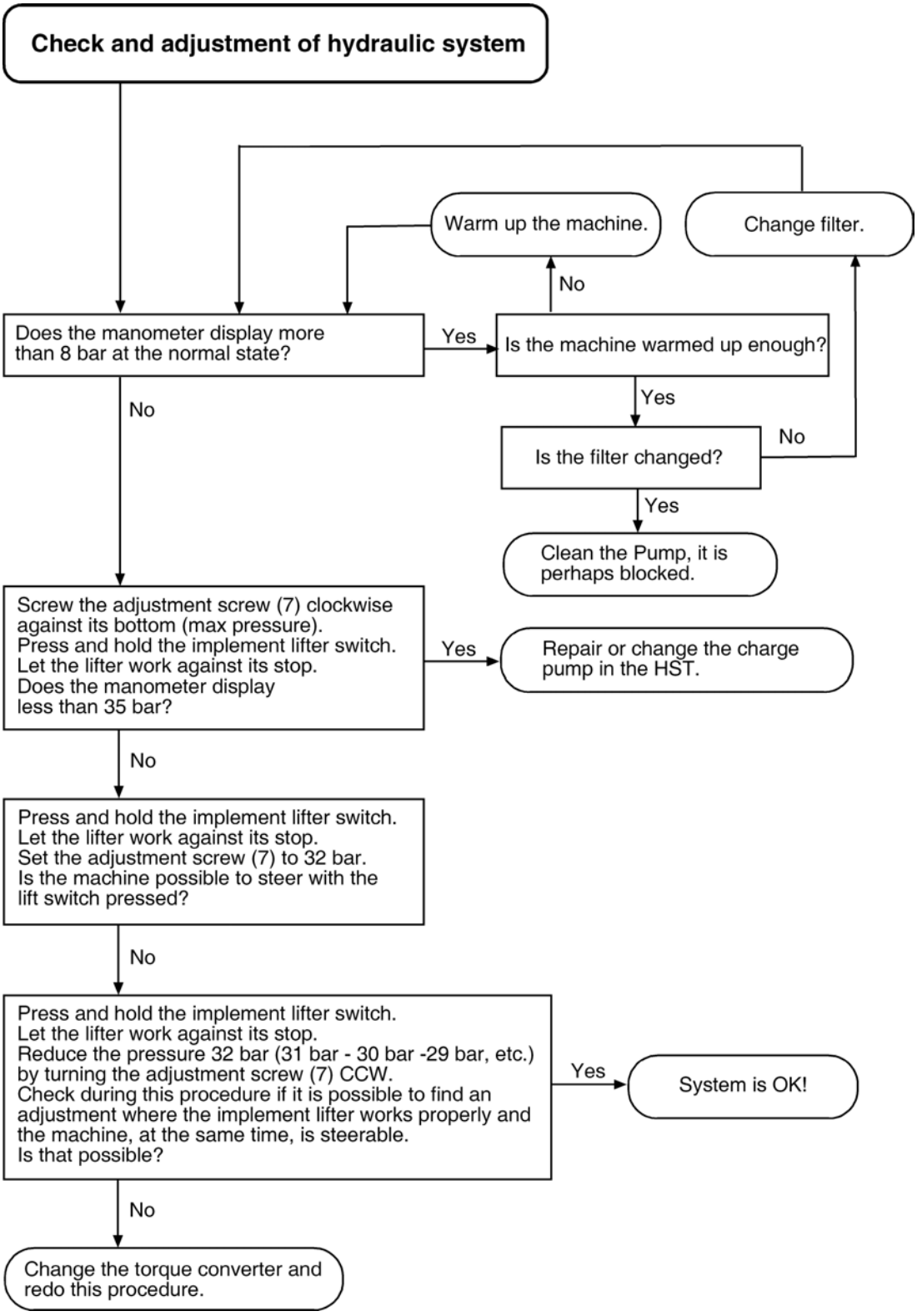
Adjust the pressure (yellow line) by loosing the counter nut and rotate the adjustment screw.

Turn right to increase the presure.
Turn left to decrease the pressure.

Lock the counternut and refit the plug after the adjustment is finished.

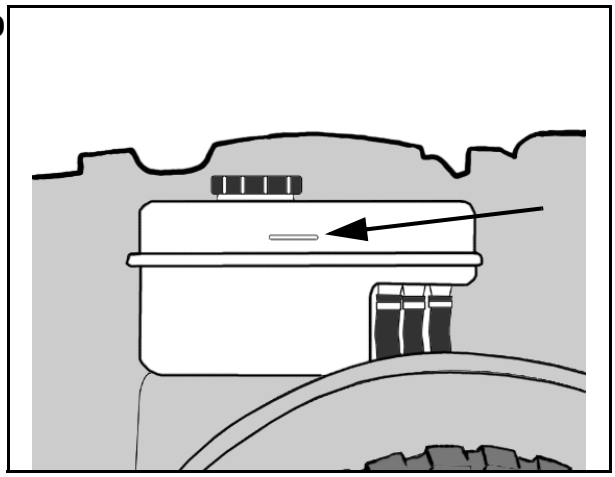


Trouble shooting



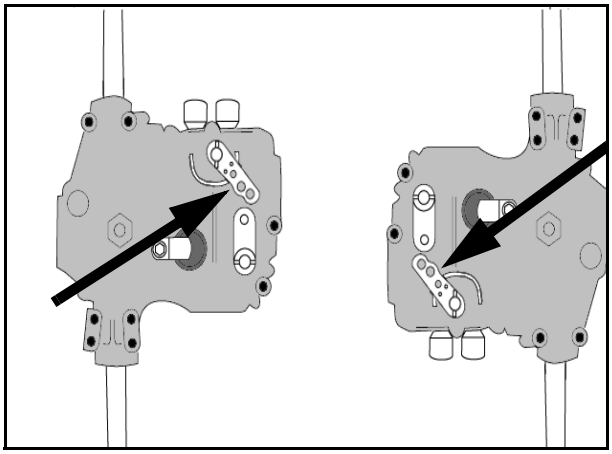
4.8 Change of transmission oil, 4WD

4.8.1 Transmission with external pump



The oil and the filter in the hydraulic power transmission must be checked/adjusted or replaced at intervals according to the table below.

Action	1st time	Then at interval
	Hours of operation	
Check – adjusting level.	-	50
Changing oil. Cleaning tank filter.	5	200
Replace filter in the hydraulic circuit. Pro20, Pro25	5	200

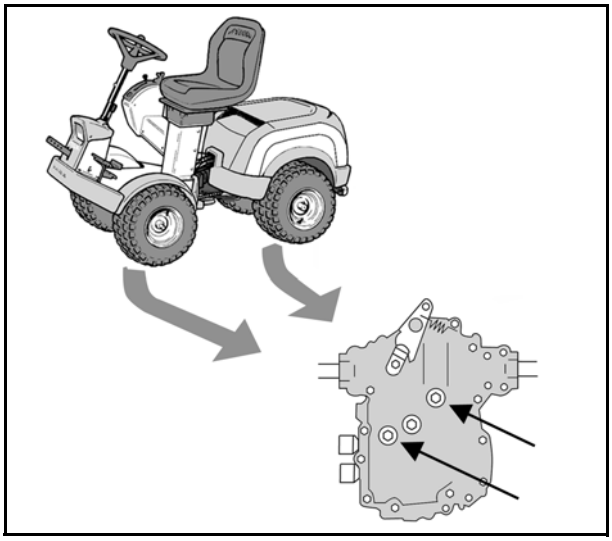


Oil type: Synthetic oil 5W-50.

Oil volume at change: approx. 4.2 litres.

Check – adjustment

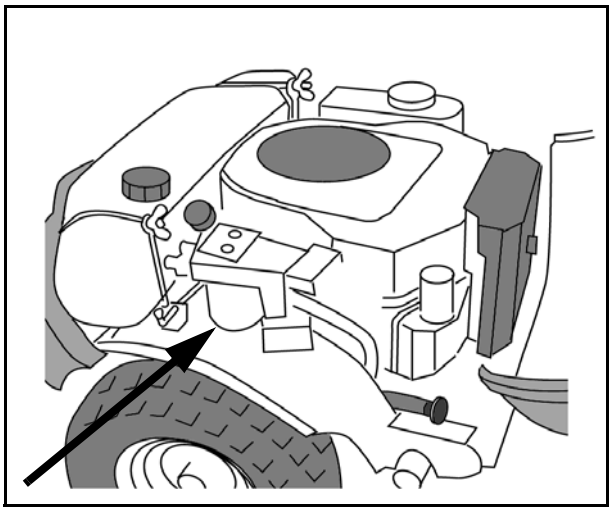
1. Place the machine on a flat surface.
2. Read off the oil level in the reservoir. See the figure. The level should be level with the line.
3. If necessary, top up with more oil.

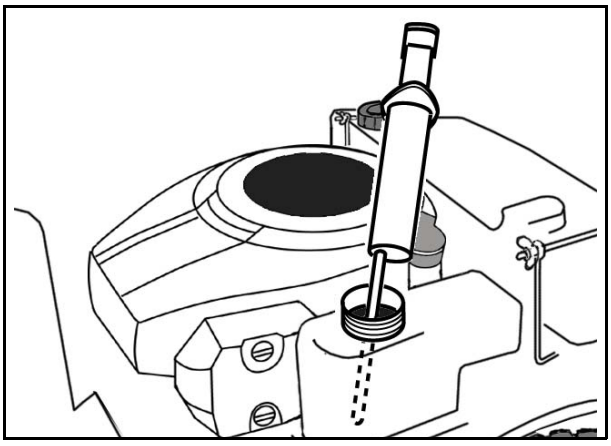


Draining

1. Operate the machine at varying speeds for 10-20 minutes in order to warm up the transmission oil.
2. Open the drive shafts' valves in accordance with the figure.
3. Place one collection trough under the rear axle and one under the front axle.
4. Remove 2 drainage plugs from each axle. Use a 12 mm socket wrench. See the figure.

5. Remove the filler cap from the oil tank.
6. Machines with externa hydraulic: Clean the area around the hydraulic circuit's filter and dismantle the filter. See the figure.
7. Allow all the oil to run out into the collection trough.
8. Draw out the oil from the deeper section of the reservoir using an oil extractor. See the figure.
9. Hand in the oil for disposal in accordance with local provisions.



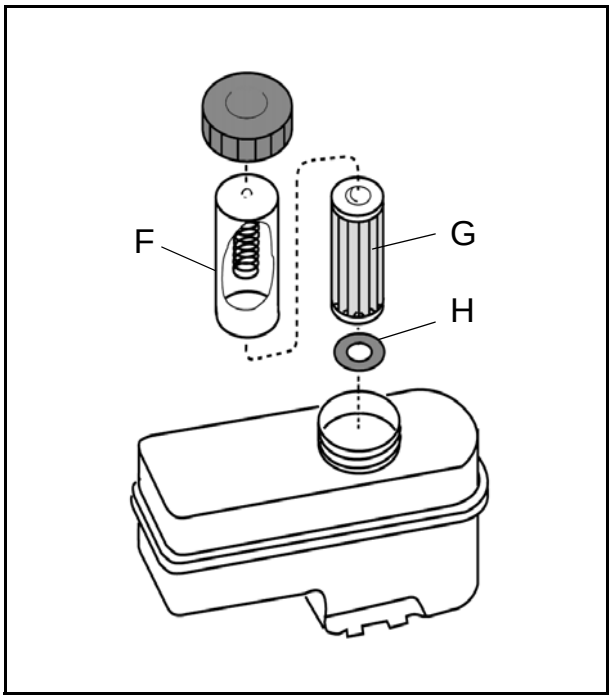


Cleaning/replacing the tank filter

Measures:

Metal filters shall be cleaned.
Paper filter shall be replaced.

1. Press the filter casing (F) down into the upper section of the tank and move the casing forwards to the hole.
2. Pull up the filter casing together with filter and spring.
3. Pull the filter (G) out of the casing.
4. Metal filter only: Clean the filter with a suitable solvent and compressed air.
5. Check that the rubber gasket (H) in the bottom of the filter is intact.
6. Reinstall/fit the new filter and spring in the casing. Insert the filter until it snaps into position in the casing.
7. Reinstall the unit in the tank. The upper part of the filter casing must snap into position in the slot in the upper section of the tank.

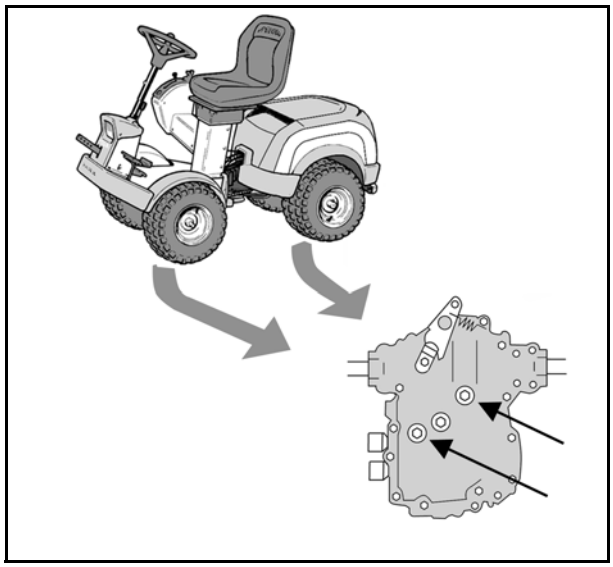


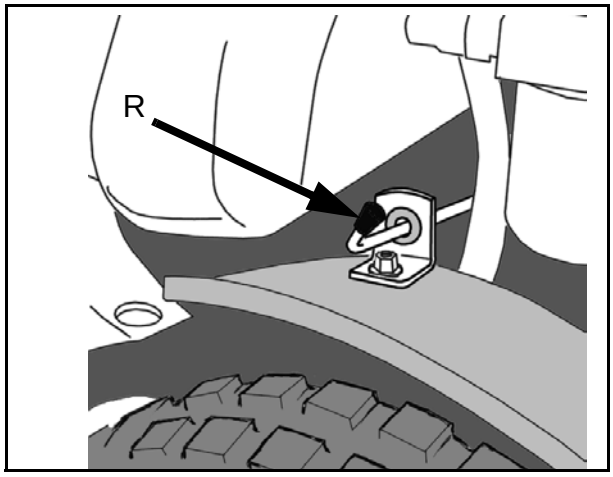
Filling

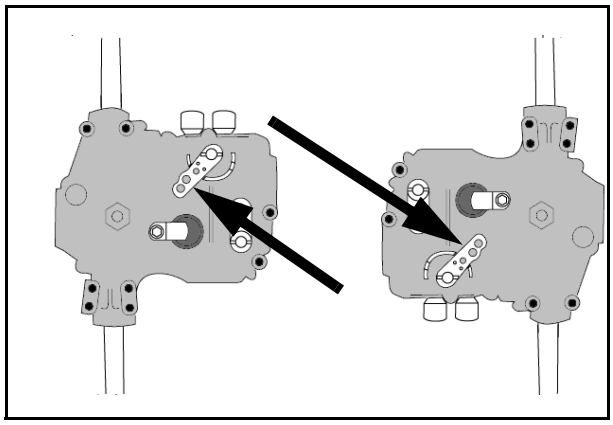
1. Check that the gaskets on the 4 drainage plugs are intact. Reinstall the plugs. Tightening torque: 15-17 Nm.
2. Machines with externa hydraulic:
   Moisten the new filter's gasket with oil and install the filter.
3. Fill the oil reservoir with the new oil.
4. Check that the clutch release lever (R) is in the outer position (drive position).

   If the engine is to be run indoors, an exhaust extraction device must be connected to the engine's exhaust pipe.
5. Prepare a suitable vessel with the new oil.

   NOTE! The oil is sucked into the system very quickly. The reservoir must always be kept topped up. Under no circumstances may air be sucked in.
6. Fill the oil reservoir with new oil.
7. Start the engine and allow it to idle. Gradually top up the oil in the reservoir so that the level constantly reaches the mark.
8. Reinstall the oil filler cap and close the engine casing.
9. Reset the drive shafts' valves in accordance with the figure.
10. Drive the machine 8-10 metres forwards and 8-10 metres backwards. If the machine has hydraulic power assisted steering, apply full steering lock at the same time.
11. If the machine has a hydraulic implement lifter, raise and lower the lifter 3-4 times.
12. Adjust the oil level in the reservoir.







4.8.2 Transmission with the hydraulic pump in the rear axle drive

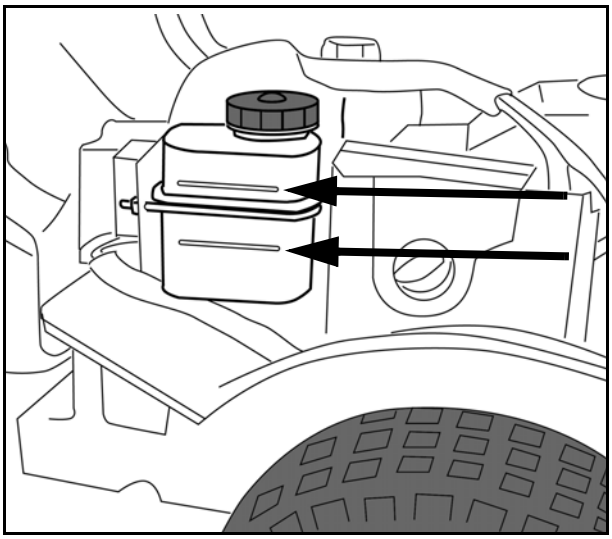
The oil and filter in the hydraulic power transmission must be checked/adjusted and changed at the intervals given in the table below.

Action	1st time	Then at intervals of
	Hours of operation	
Checking – adjusting level.	-	50
Changing the oil Cleaning the filter.	5	200

The type of oil is dependent on the hours of operation according to the table below:

Hours of operation	Oil type
More than 100 hours of operation/ year	Synthetic oil 5W-50
Less than 100 hours of operation/year	Synthetic oil 5W-50

Oil quantity when changing: approximately 3.5 litres.

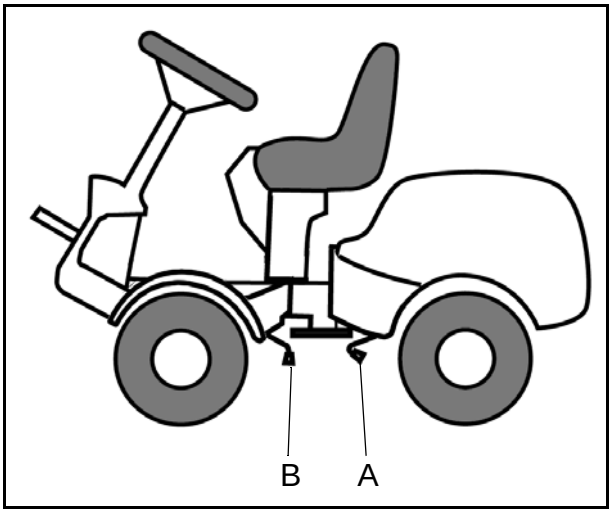


Check – adjustment

1. Place the machine on a flat surface.
2. Read off the oil level in the reservoir. See the figure. The level should be level with the line.
3. If necessary, top up with more oil.

Draining

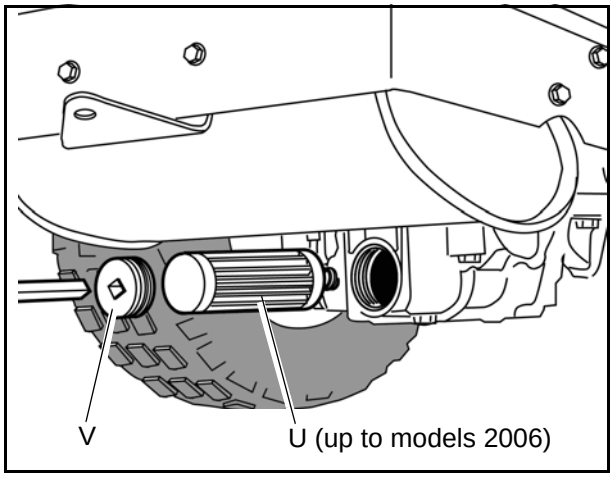
1. Run the machine at variable speeds for 10-20 minutes to heat up the transmission oil.
2. Position the machine completely horizontally.
3. Pull out both disengagement levers A and B according to the figure.



4. Place one container under the rear axle and one under the front axle.
5. Open the oil reservoir by removing the cover.

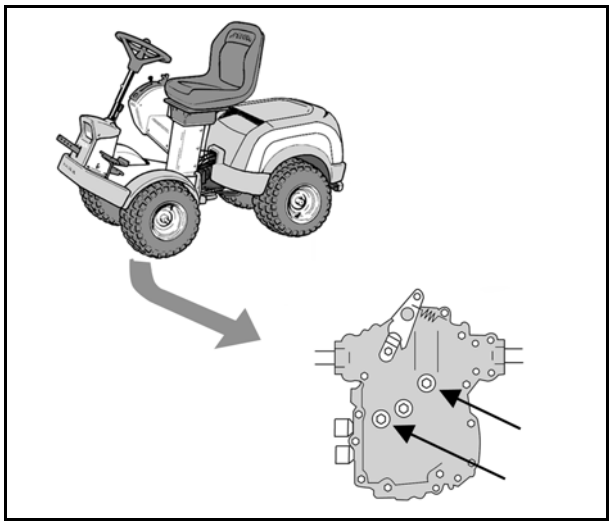
Only a 3/8” square drive may be used for the plug. Other tools will damage the plug.

6. Remove the plug from the rear axle. Clean the hole and use a 3/8” square drive. If the machine is equipped with filter, remove the filter and allow the oil in the rear axle and reservoir to run out. See the figure.

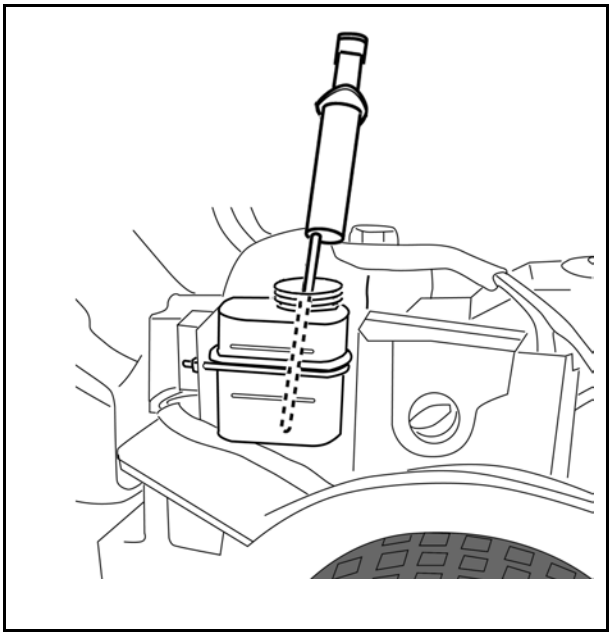


7. Remove 2 drain plugs from the front axle. Use a 12 mm socket. Allow the oil in the front axle and pipes to run out. See the figure.
8. If the machine is equipped with filter, change the filter (U).
9. Check that the gaskets on the drain plugs of the front axle are intact. See the figure. Reinstall the plugs. Tightening torque: 15-17 Nm.

The plug will be damaged if it is tightened more to than 5 Nm.



10. Check that the gasket on the plug (V) of the rear axle is intact. Reinstall the (filter) and plug in the rear axle. Tighten the plug to 5 Nm.
11. Draw out the oil from the deeper section of the reservoir using an oil extractor. See the figure.
12. Dispose of the oil according to local regulations.



Filling.

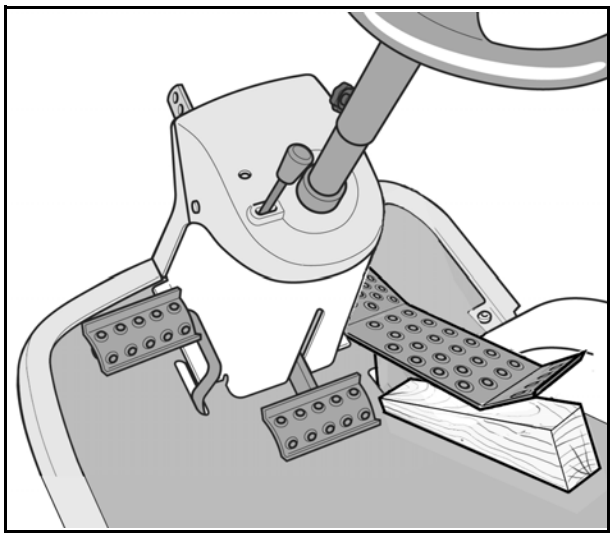
The engine must never be run when the rear clutch release lever is pushed in and the front clutch release lever is pulled out.

This will damage the front axle seals.

1. Fill the oil reservoir with the new oil.

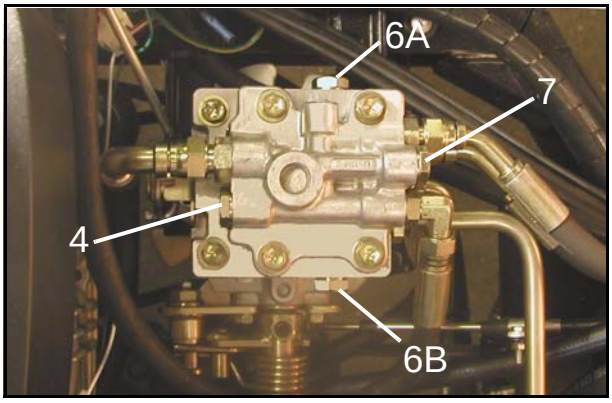
If the engine is run indoors, exhaust extraction equipment must be connected to the engine's exhaust pipe.

2. Check that the rear axle's clutch release lever is pulled out.
3. Start the engine. When the engine is started, the front axle's clutch release lever slides inwards automatically.
4. Pull out the front axle's clutch release lever.
   NOTE! The oil is drawn into the system very quickly. The reservoir must always be topped up. Air must never be drawn in.
5. Set the accelerator pedal to the forward position by blocking it using a wooden wedge. See the figure. Fill the oil reservoir by hand using new oil.
6. Run in the forward position for one minute.
7. Move the wooden wedge and set the accelerator pedal to the reverse position. Continue filling with oil.
8. Run in reverse mode for one minute.
9. Change driving direction once every minute as above and continue filling with oil until the bubbling in the reservoir stops.
10. Switch off the engine, install the oil reservoir cover and close the engine cover.
11. Test drive for several minutes and adjust the oil level in the reservoir.



4.9 Repair

4.9.1 Repair of the external pump, 4WD



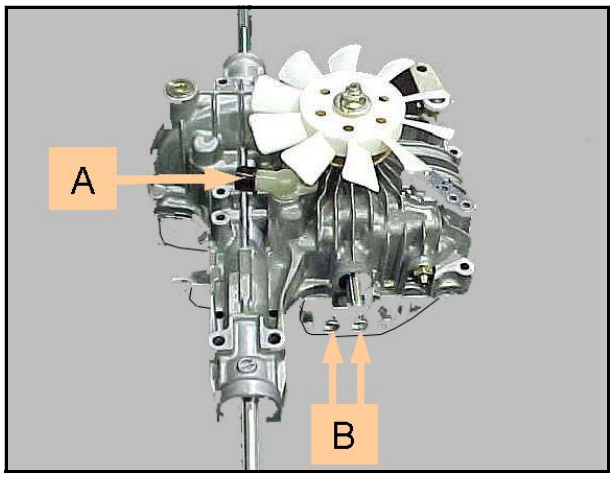
Repair

The following items are exchangeable parts in the charge pump:

- Valves 4 and 7 with their springs, gaskets and plugs.
- Back valves (6A and 6B) with their springs, gaskets and plugs.
- Hose and line adapters. See section 2. according to tightening torques.
- Sealing rings.
- Other external mechanical parts. See the spare parts manual.

In case of other faults, the entire external pump shall be replaced. See section “2 Chassi”.

4.9.2 Repair of charge pump in the HST, 2WD



1. Upon removal of the K66 transmission from the machine place plugs (# 4) and cap (#5), provided in kit, on:

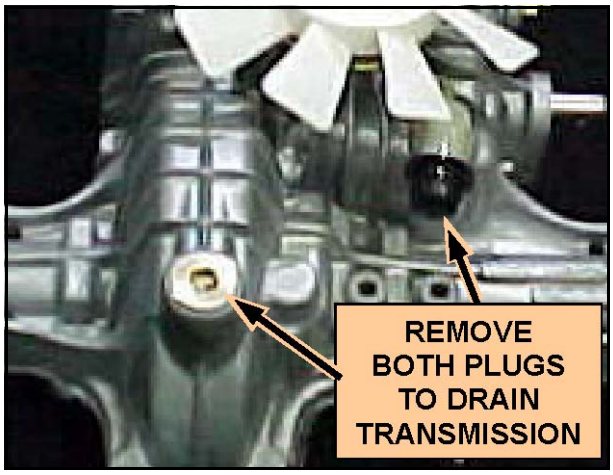
A: Fill port plastic elbow fitting.

B: Remote hydraulic ports.

This prevents contamination and oil leakage while handling and during repairs.

2. Clean outside surface of transmission.

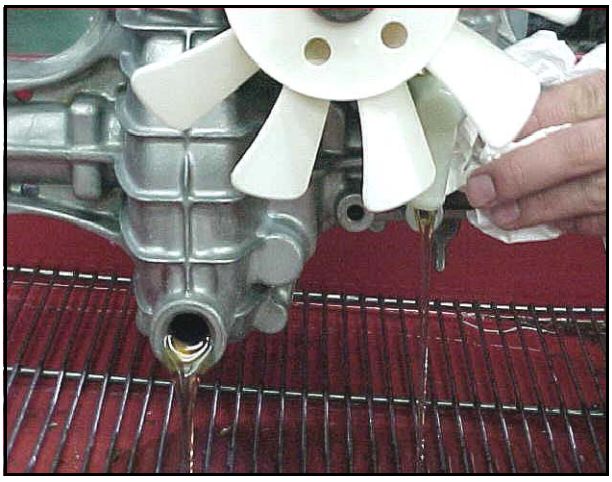
3. Provide a clean work area. Cover work bench with clean paper. This is extremely important as just one grain of sand can cause damage to the hydrostatic transmission.



4. Remove plugs shown in order to drain the transmission.

   A 10 mm hex wrench is needed for removal of the flat screw plug in fill port.

5. Drain oil from transmission.

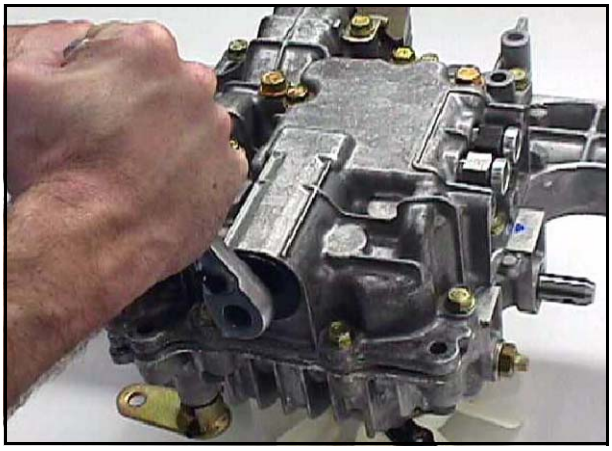


6. After sufficient oil is drained from the transmission reinstall both plugs that were removed in step #4 above.

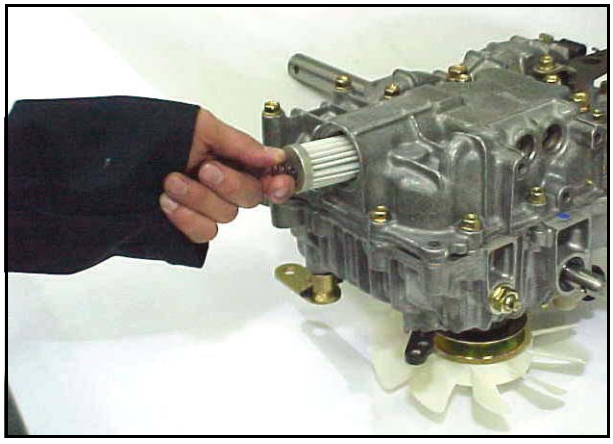
7. Invert the K-66 transmission.

8. Using a 13/16" SAE (21 mm) socket wrench remove the (2) remote hydraulic connectors as shown.

9. Remove the filter cap with a 3/8" drive ratchet wrench.



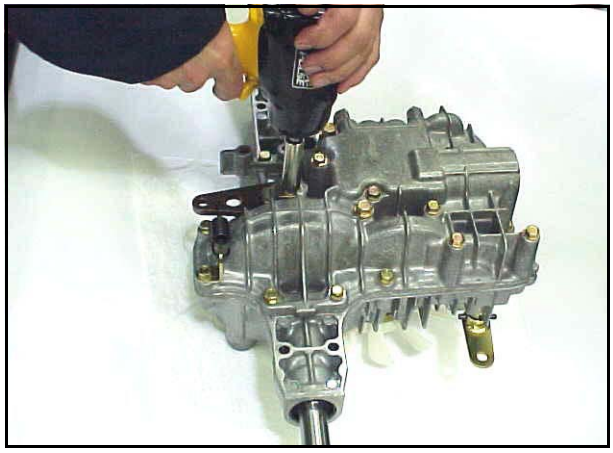
10. Remove filter.



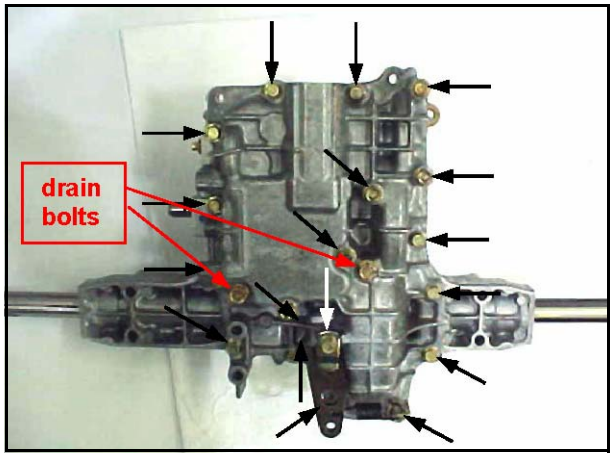
11. By using a 12 mm socket, on either a pneumatic or ratchet wrench, remove all (17) bolts securing lower case to top case. (see location of bolts in following photo)

    Also, remove the M8 screw that secures diff-lock lever retainer clip. (Being removed in photo to left and indicated by white arrow in lower photo).

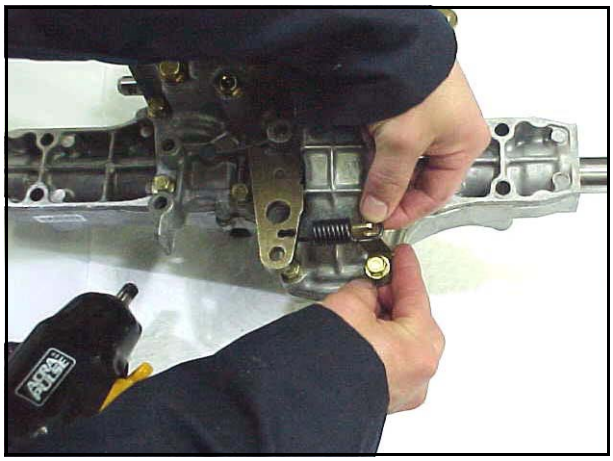
    Note:There is no need to remove the (2) M10 drain bolts (14mm bolt heads) (See location in lower photo).



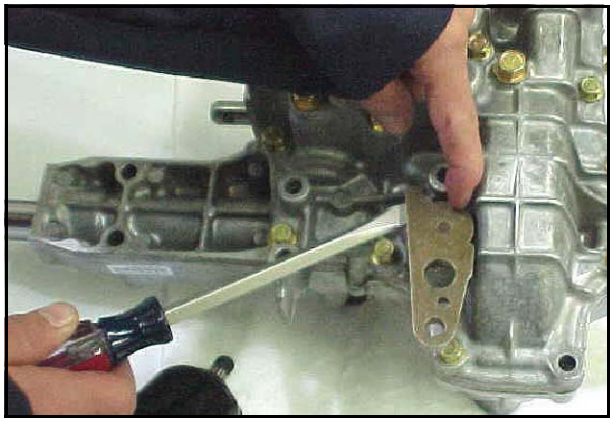
12. Case bolt Location.



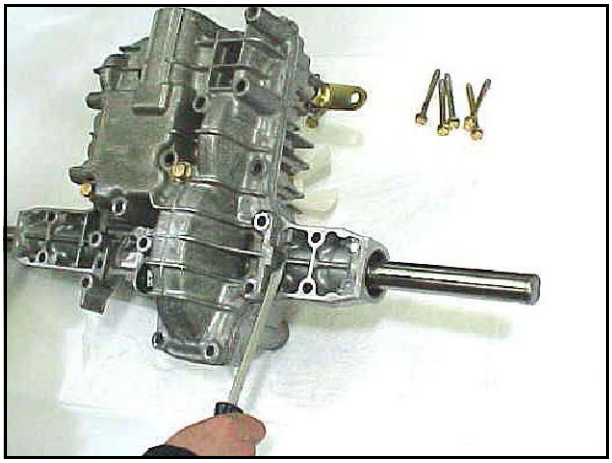
13.Remove the diff-lock lever spring & hook clip.



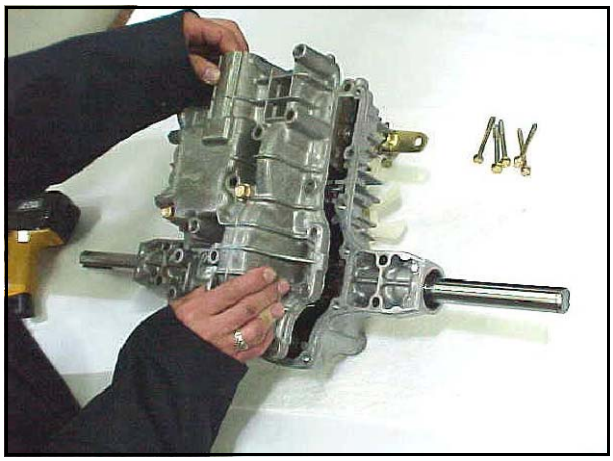
14.Remove the diff-lock lever.



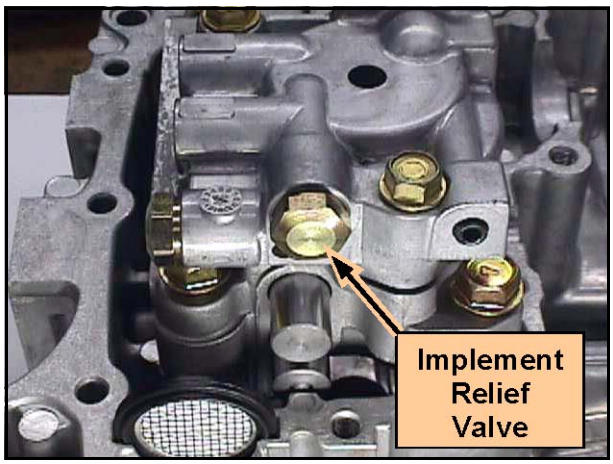
15.Open the transmission case by prying up on the lower case at tabs located around the edge of the lower case.



16. Lift off the lower case.



17.The rework involves replacing spring & plunger of Implement relief valve shown.

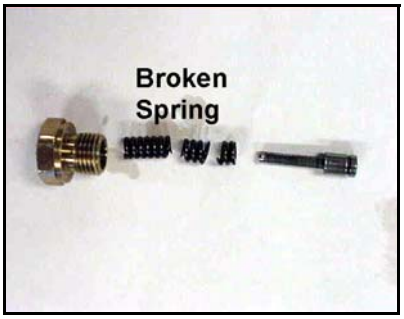


18 Break loose relief valve with a 15 mm socket wrench.

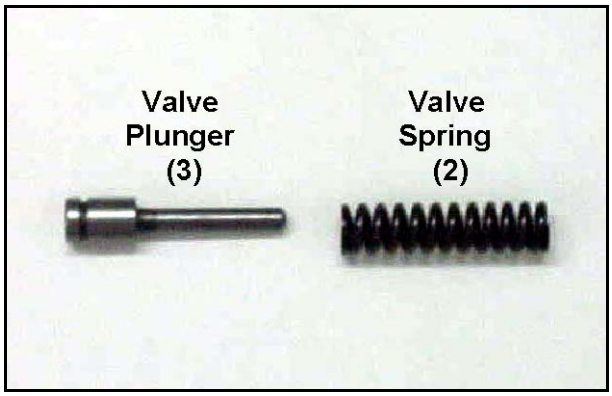
19. Remove check valve.

20. Low oil pressure in circuit may be due to:

* Broken spring
* Broken Plunger
* Weakened Spring

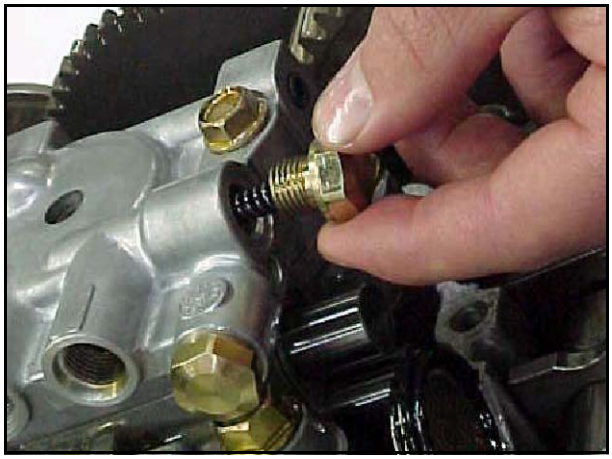


21.New relief valve spring (2) & valve plunger (3) provided in kit.



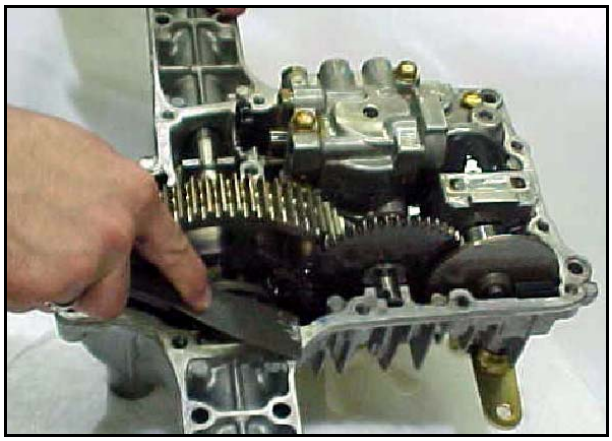
22.Reinstall new relief valve parts.

Note: Large diameter of valve plunger (3) inserted first, then valve spring (2); then, held in place by the valve cap.

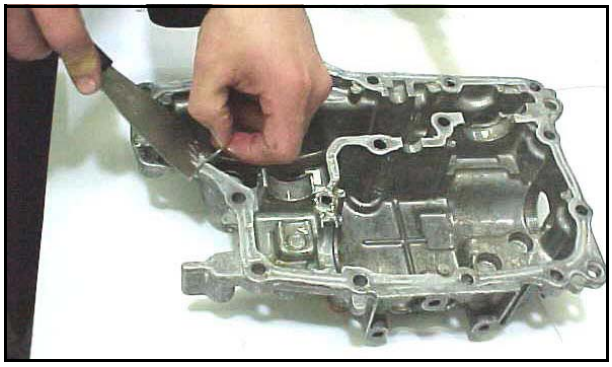


23. Apply 25 Nm torque to valve cap.

24.Remove old sealant from seam surface of upper case.

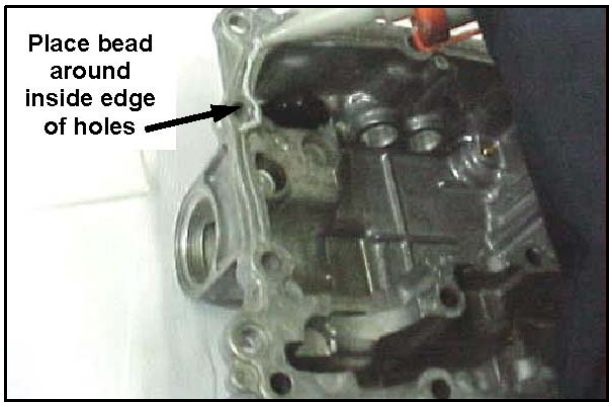


25.Remove old sealant from seam surface of lower case.
Use cloth to wipe seam surfaces clear of oil.



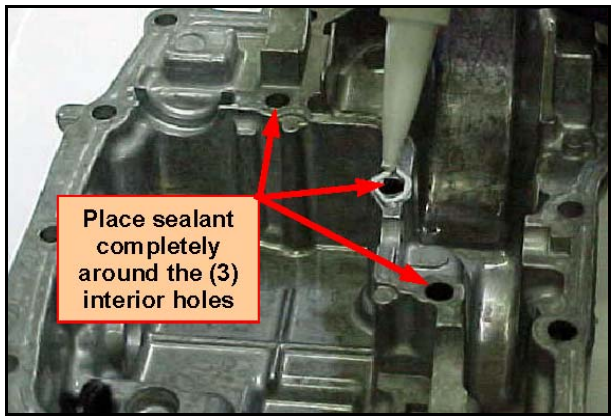
26.Apply a narrow bead of 3-Bond sealant (1) (furnished in kit) to sealing surface of lower case.

Note: Make certain to place sealant bead around inside edge of holes.

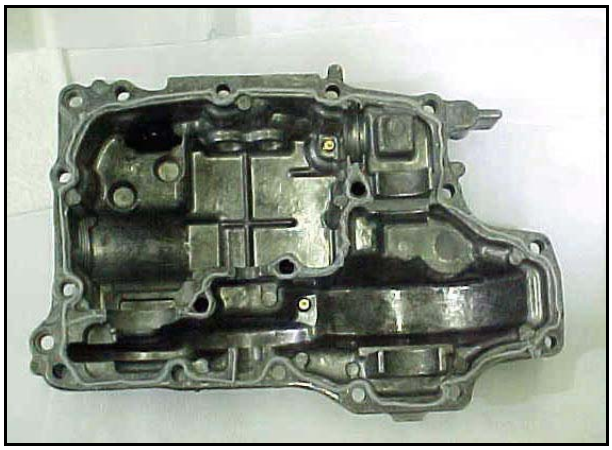


27.Place a bead of sealant on sealing surface of inner wall. Make sure that sealant bead is placed completely around the (3) interior holes.

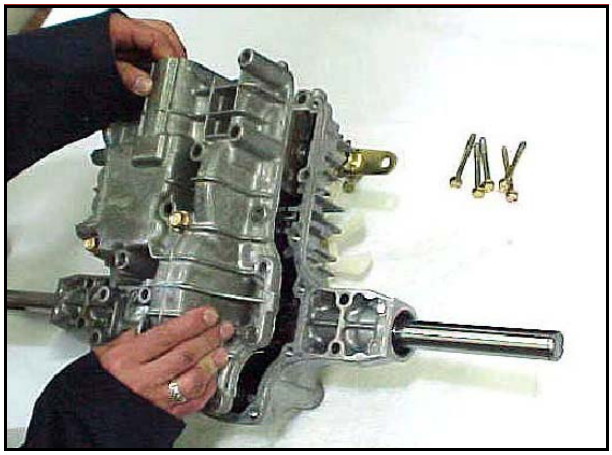
Note:To accelerate the curing time of the sealant bead, let the lower case set for several minutes to air dry sealant.



28.Photo on left shows lower case after sealant bead is applied.

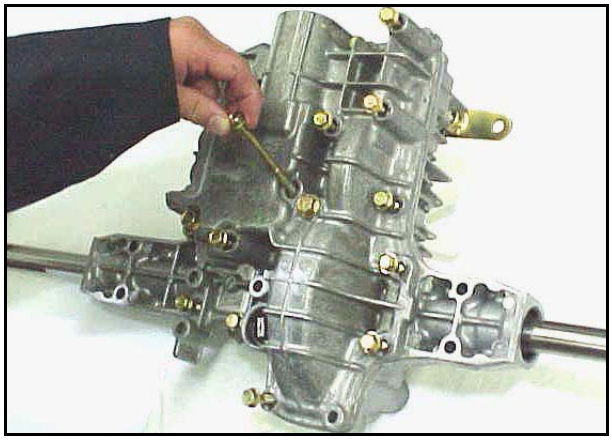


29. Install lower case onto upper case.



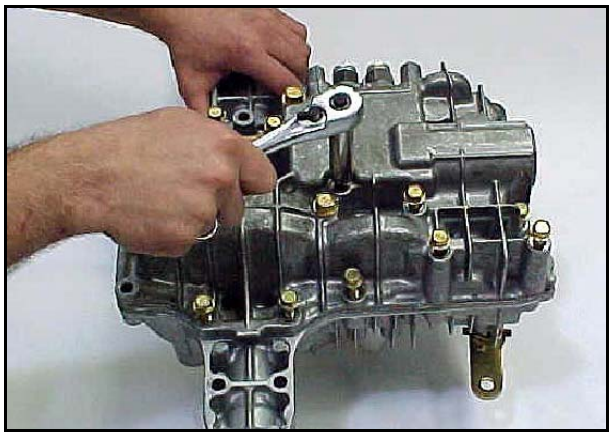
30.Install case bolts back into their appropriate holes. There are (5) 8 x 75 cap screws and (12) 8 x 30 self-threading screws.

Note:Manually, turn each bolt several revolutions to assure that they are using same threads.



31. Turn screws in with a M12 socket and ratchet.

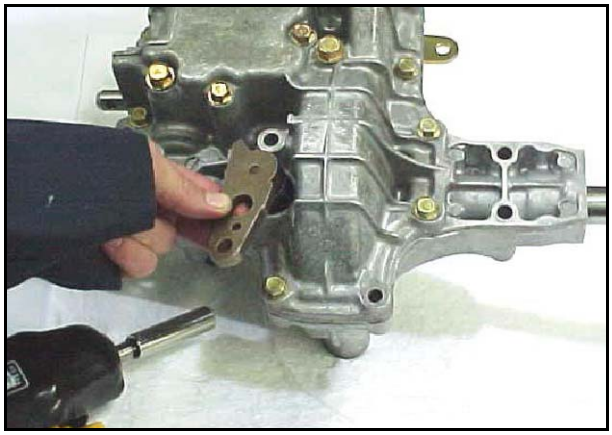
    Note:We do not recommend using a pneumatic wrench for fear of stripping treads in soft aluminum case.



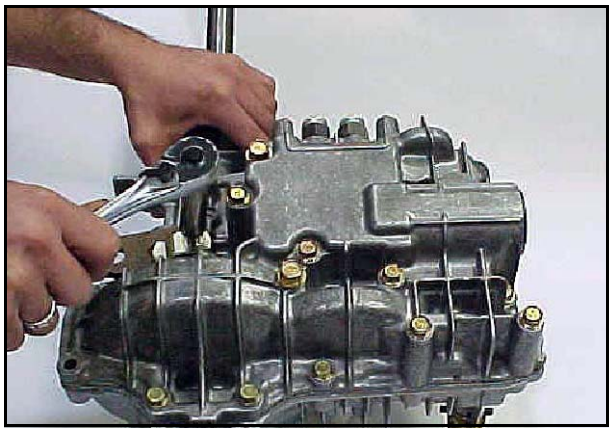
32. Liberally, coat O-rings on diff-lock lever with grease to assist their entry into the diff-lock port when installing lever.

33. Install diff-lock lever.

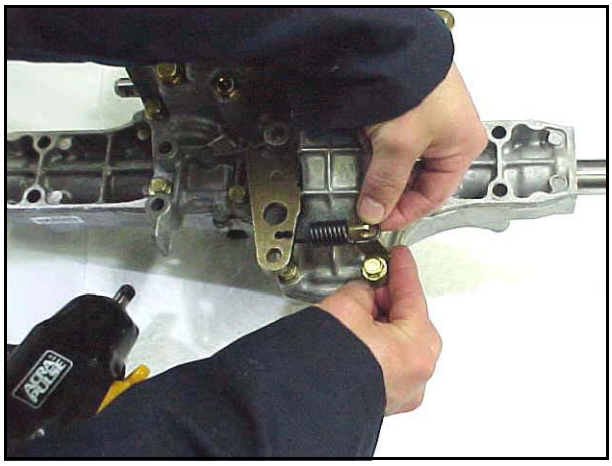
    Note:Special attention should be directed to O-ring care while installing lever. The O-rings can be easily pinched and damaged.



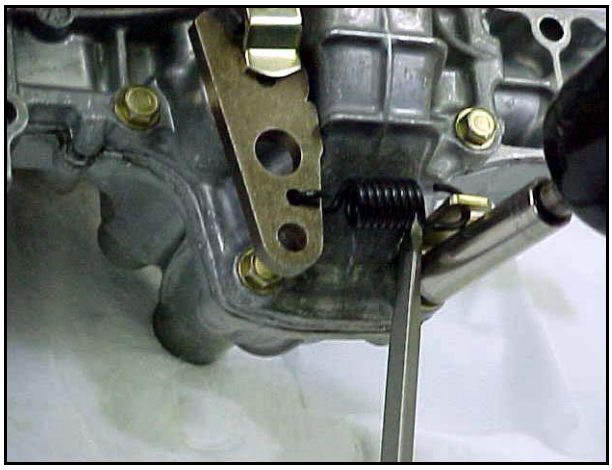
34.Secure diff-lock lever clip with 8 x 30 self-threading screw.



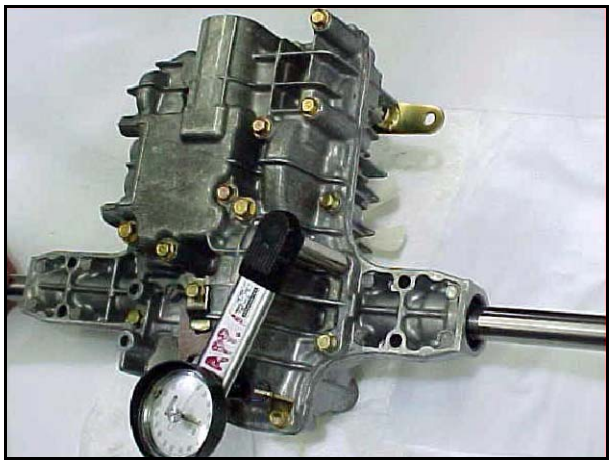
35. Reinstall diff-lock spring and hook retainer.



36.While securing hook retainer use screwdriver to take slack out of spring.

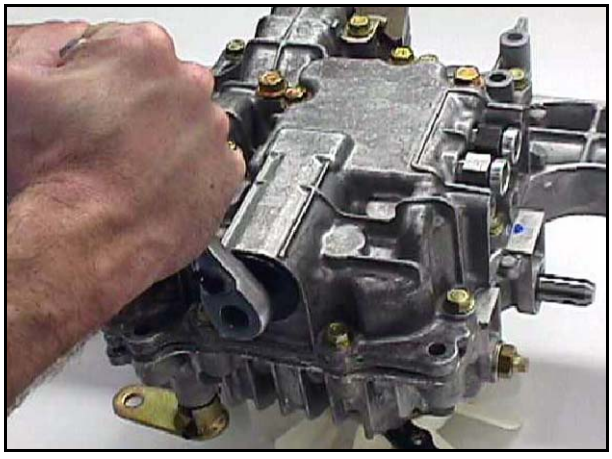


37.Check case hardware to be sure that it is tightened to 25 Nm.



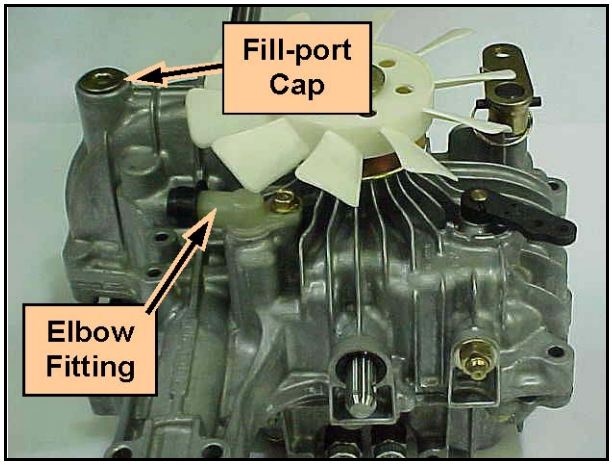
38. Install filter.

39.Install filter cap and tighten snuggly with a 3/8" drive ratchet.



40. Reinstall the remote hydraulic connectors and tighten them to 23 Nm.

41. Flip transmission upright and remove the fill port cap of gear-room and the 90° (white plastic elbow fitting located near the fan.



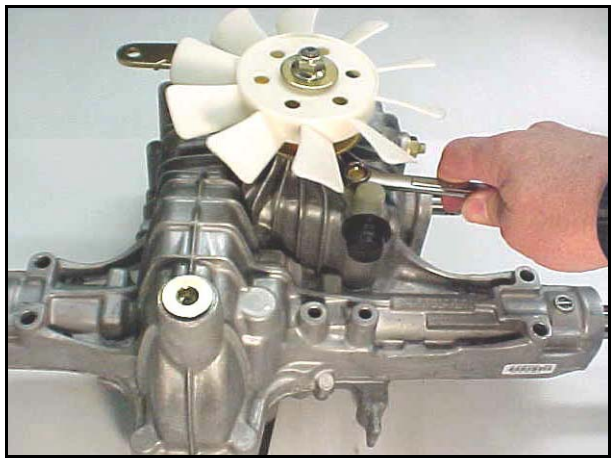
42.Add new oil to transmission through thehydrostatic compartment port. About 3liters of oil are required to completely fillthe K66 transaxle. Use oil according to the specification.

43. Top off gear room of transmission with same oil as above.

44. Install cap in gear room oil port with 10 mm hex wrench. Tighten to 3 Nm.

45. Reinstall plastic elbow fitting on hydrostatic compartment port. Tighten the M8 x 20 bolt to 10 Nm.

46. Transmission is now ready for reinstallation into the machine.



5 Belts

Contents in this chapter

General

All mechanical power, delivered by the motor, is conducted to the different power consuments by a belt system. The belt system has in general the same configuration in all the machines covered by this manual. Where divergences occour between the machines, particular instructions are given for each machine. The maximum tension of each belt is regulated by a spring loaded belt tensioner.

This chapter gives a brief description of the belt system and describes replacements of belts and adjustments of their tensions.

5.1 Description

5.1.1 2WD-machines

Belt A

Belt A belongs to the work equipment and is connected to the machine at the lower pulley at the articulation point. The belt is tensioned by the tension pulley (2) which is mounted on a spring loaded lever.

Belt B

Belt B is intended to deliver motor power to the articulation point, where it can be picked up of the work equipment independent of the steering position. The belt is tensioned by the tension pulley (4) which is mounted on a spring loaded lever.

Engagement of PTO is performed as follows:

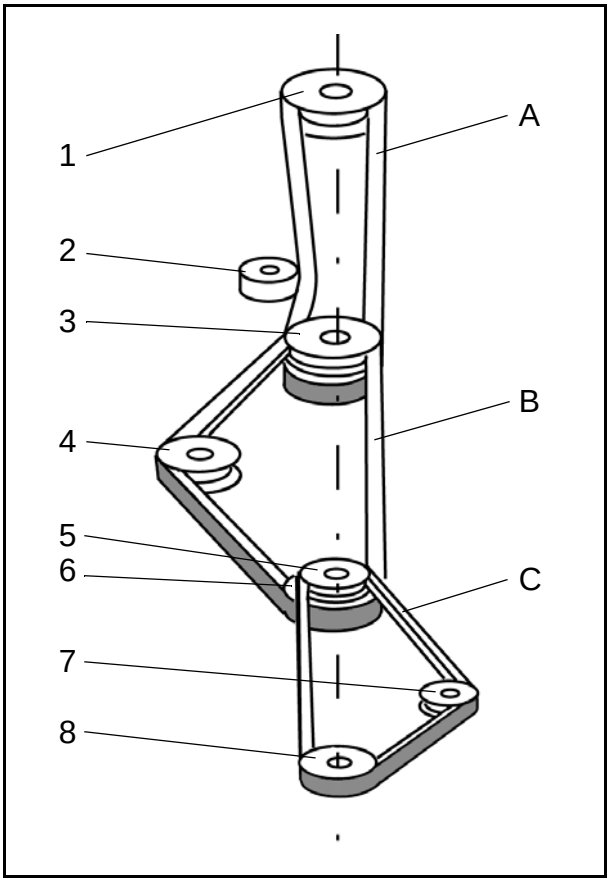
For Senator, President, Comfort, Royal and Pro 16:
The pulley (4) is forced inwards by a wire connected to the pulley lever. Such the belt tension disappear. Simultaneously a link system engages a blade brake against the pulley (3) for a rapidly stop of the rotation.

For Pro 20 and Pro Diesel:
An magneto coupling with a built in brake on the motor shaft engages/disengages the drive pulley. Simultaneously as the pulley disengages, the brake activates or a rapidly stop of the rotation.

Belt C

Belt C is intended to deliver motor power to the HST, where it is geared to a suitable ratio for the rear/drive shaft. The belt is tensioned by the tension pulley (7) which is mounted on a spring loaded lever.

The tensioning force is disengaged from the belt when the parking brake is activated.



1. Pulley at the work equipment.
2. Tension pulley.
3. Pulley (double) at the articulation point.
4. Tension pulley.
5. Equipment pulley at the motor shaft.
6. Drive pulley at the motor shaft.
7. Tension pulley.
8. Pulley at the HST.

A. PTO belt.

B. Belt motor-articulation point.

C. Belt motor-HST.

5.1.2 4WD machines, ext pump

This description is valid for all 4WD machines with external hydraulic pump.

Belt A

Belt A belongs to the work equipment and is connected to the machine at the upper pulley above the front shaft. The belt is tensioned by the tension pulley (2) which is mounted on a spring loaded lever.

Belt B

Belt B is intended to deliver motor power from the articulation point pulley to the pulley above the front shaft where it can be picked up of the work equipment. The belt is tensioned by the tension pulley (2) which is mounted on a spring loaded lever.

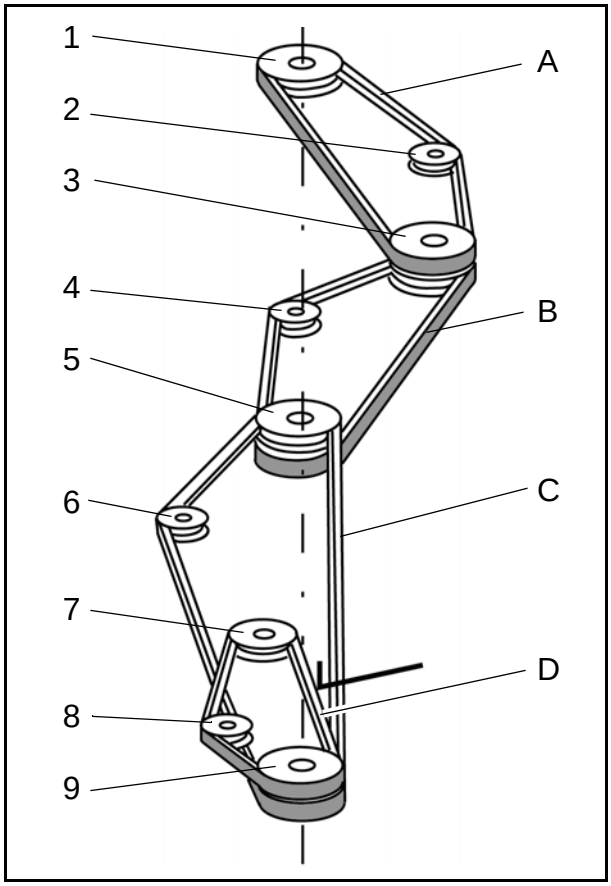
Belt C

Belt B is intended to deliver motor power to the articulation point, where it can be picked up independent of the steering position. The belt is tensioned by the tension pulley (6) which is mounted on a spring loaded lever.

Engagement of PTO is performed as follows: An magneto coupling with a built in brake on the motor shaft engages/disengages the drive pulley. Simultaneously as the pulley disengages, the brake activates for a rapidly stop of the rotation.

Belt D

Belt D is intended to deliver motor power to the hydraulic pump. The belt is tensioned by the tension pulley (8) which is mounted on a spring loaded lever. The tensioning force is disengaged from the belt when the parking brake is activated.



1. Pulley at the work equipment.
2. Tension pulley.
3. Pulley (double) above the front shaft.
4. Tension pulley.
5. Pulley (double) at the articulation point.
6. Tension pulley.
7. Pump pulley.
8. Tension pulley.
9. Drive pulleys at the motor shaft.

A. PTO belt.

B. Belt, articulation point - forwards.

C. Belt ,motor-articulation point.

D. Belt, motor - hydraulic pump.

5.1.3 4WD-machines, int. pump

This description is valid for all 4WD machines with internal hydraulic pump.

Belt A

Belt A belongs to the work equipment and is connected to the machine at the upper pulley above the front shaft. The belt is tensioned by the tension pulley (2) which is mounted on a spring loaded lever.

Belt B

Belt B is intended to deliver motor power from the articulation point pulley to the pulley above the front shaft where it can be picked up of the work equipment. The belt is tensioned by the tension pulley (2) which is mounted on a spring loaded lever.

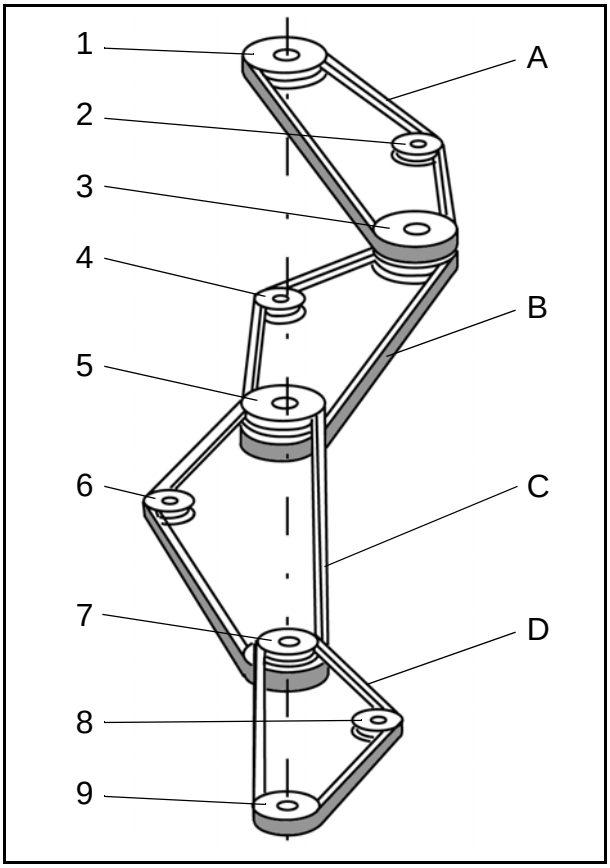
Belt C

Belt B is intended to deliver motor power to the articulation point, where it can be picked up independent of the steering position. The belt is tensioned by the tension pulley (6) which is mounted on a spring loaded lever.

Engagement of PTO is performed as follows: An magneto coupling with a built in brake on the motor shaft engages/disengages the drive pulley. Simultaneously as the pulley disengages, the brake activates for a rapidly stop of the rotation.

Belt D

Belt D is intended to deliver motor power to the rear HST. The belt is tensioned by the tension pulley (8) which is mounted on a spring loaded lever. The tensioning force is disengaged from the belt when the parking brake is activated.



1. Pulley at the work equipment.
2. Tension pulley.
3. Pulley (double) above the front shaft.
4. Tension pulley.
5. Pulley (double) at the articulation point.
6. Tension pulley.
7. Drive pulleys at the motor shaft.
8. Tension pulley.
9. HST pulley.

A. PTO belt.

B. Belt, articulation point - forwards.

C. Belt, motor-articulation point.

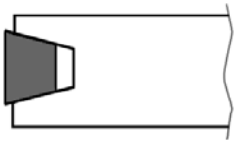
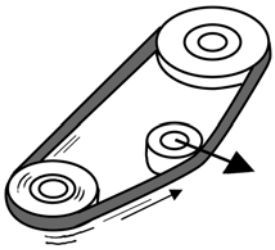
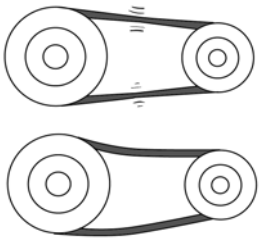
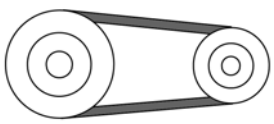
D. Belt, motor - HST.

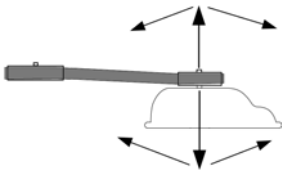
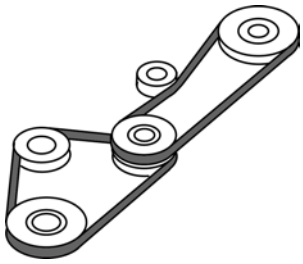
5.2 Belt theory

5.2.1 Why it is so important to use original belts from the retail dealer?

The table below shows the demands on normal commercial grade belts compared to demands on original spare parts belts from the retail dealer. The later are designed and manufactured in close connection between the subcontractor and the rider manufacturer.

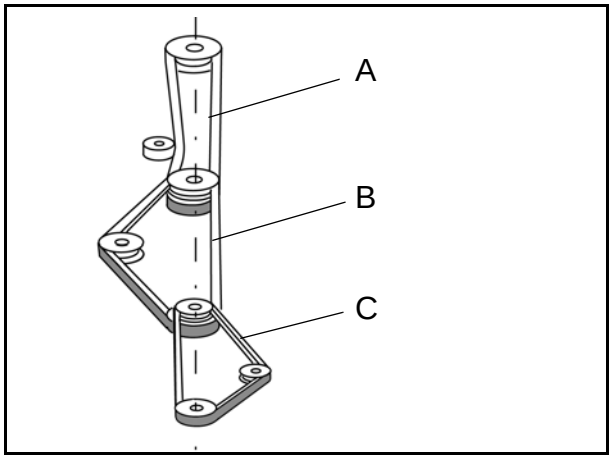
The table is intended to display the importance to use the original belts.

Case	**Commercial grade belts**	**Original spare parts belts**	**Remarks**
Fitness to pulleys. 	The belt shall rest with its angled sides against the pulleys. There must be a space between belt and pulley bottom.	The belt shall rest with its angled sides against the pulleys. There must be a space between belt and pulley bottom.	Same demands. Original belts guarantee that the belt fits against the pulleys.
Acceleration. . 	The belt follows the motor rpm in a continuous acceleration up to full speed.	Some belts shall engage to the pulleys with the motor running in full speed, which gives an excessive generation of heat.	Common belts are made of natural rubber, which can resist temperatures up to 70° only. Original belts are made of chloroprene rubber, which can resist temperatures up to 90°
Length	Manufactured in standard lengths in steps.. 	Manufactured in preedefined lengths to fit between the pulleys.. 	The distance between the pulleys is fix. The belt tensioner gives the original belt an optimal tension.

Case	**Commercial grade belts**	**Original spare parts belts**	**Remarks**
Floating pulley at the implement. 	Designed to transmit power between aligned, paralell and fixed pulleys.	The original PTO belt is designed to operate, even if the pulleys are moving up and down and are tilting at the same time	The implement follows the ground which involves that its pulley is constant moving. To resist the excessive operating conditions, the original belts are made of fibre reinforced rubber.
Bending in two directions 	Designed to bend around pulleys in one direction only	Most of the belts at the machine have tension rollers, actuating from the outside of the belt. This means the the belt has to bend both inwards and outwards during the operation.	All original belts which operate with tension rollers actuating from the outside have reinforcements. The reinforcement is special designed for the actual case.
Noise 	Manufactured without any special respect to the actual case.	The original belts are carefully selected to give the lowest noise increment to the machine during operation.	Depending on the function of the belt, any of the following belt types are itemised: • Wrapped • Non-friction • Raw-edge

5.3 Replacement of belts 2WD

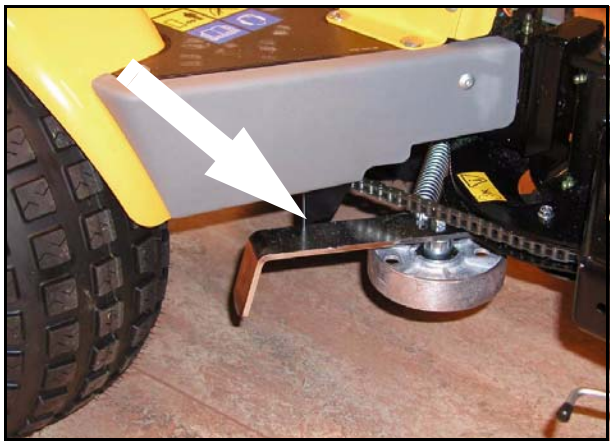
This section describes belt changing and connected adjustments for 2WD machines.



5.3.1 Replacing belt A

As the belt A belongs to the work equipment, the complete procedure is described together with the actual equipment. To disconnect/ connect the belt from the pulley (3), perform as follows:

1. Hook up the tension pulley lever. See the figure.
2. Back off the belt from the pulley (3).
3. The new belt is mounted in the reverse order.

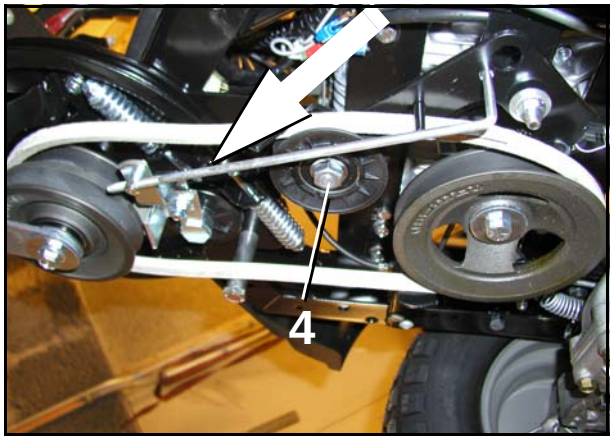


5.3.2 Replacing belt B

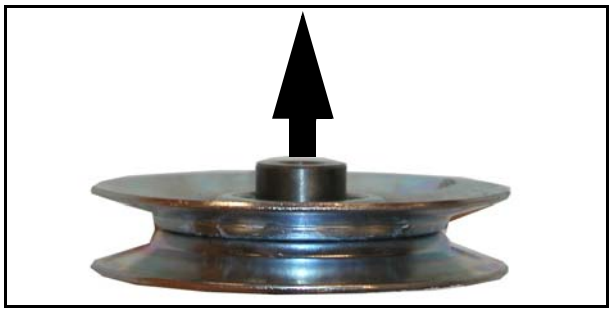
Senator, President, Comfort, Royal and Pro 16

Note!
To facilitate the replacement it is suitable to block up the machine at the left side.

1. Dismantle belt A as described above.
2. Set the work equipment lever in disengaged position. See the figure.
3. Loosen the brake linkage nut at the front attachment. See the figure
3. Dismantle the pulley (4) from the lever. Use 2 pcs 17 mm spanners.
4. Dismantle the used belt and assemble the new, together with the tension pulley (4).



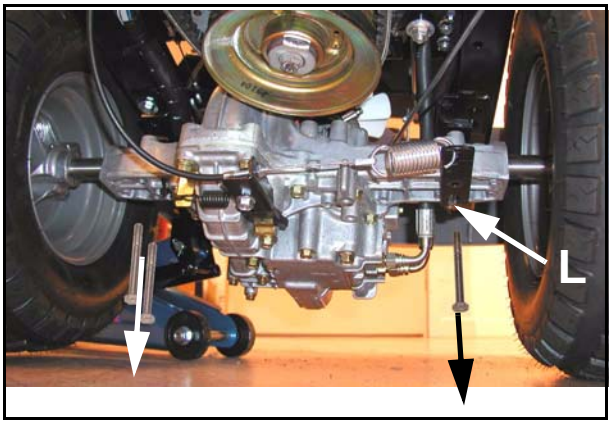
Note!
The prolonged part of the pulley hub shall face upwards.



5. Assemble the brake linkage.
6. Assemble the belt A as described above.
7. Adjust the power take-off brake and the work equipment lever. See section 6.

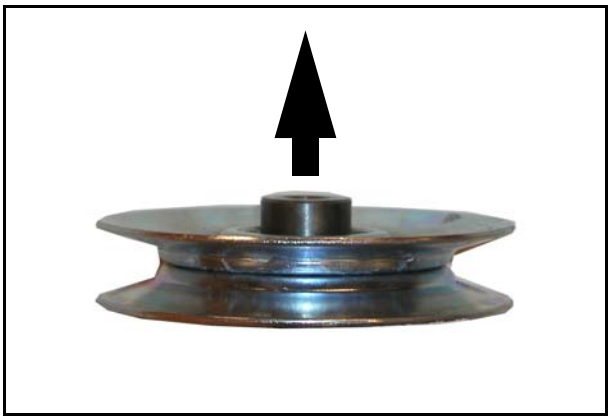
Pro 20 and Pro Diesel

Note!
To facilitate the replacement it is suitable to block up the machine 30-40 cm at the front and a few cm at the rear right.



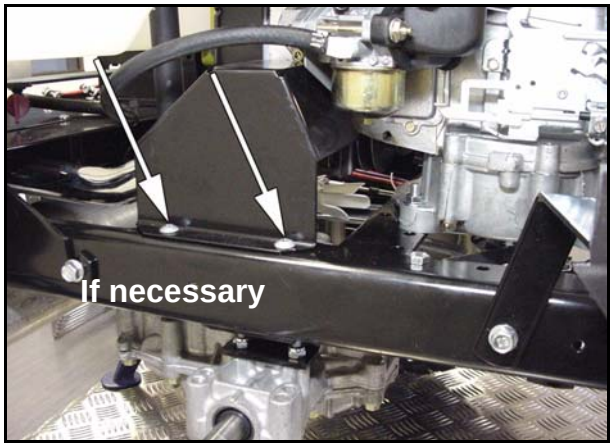
1. Dismantle belt A as described above.
2. Dismantle the pulley (4) from the lever. Use 2 pcs 15 mm spanners.
3. Remove three screws with their nuts from the HST and loosen the fourth screw (L)..
4. Force the HST backwards at the rear side of the machine and hold. In this position, the belt can be moved out between the HST housing and pulley.
5. Dismantle the used belt and assemble the new.
6. Refit the three HST screws with their nuts and tighten all four screws.
7. Assemble the tension pulley (4) with the belt.

Note!
The prolonged part of the pulley hub shall face upwards.



8. Assemble the belt A as described above.

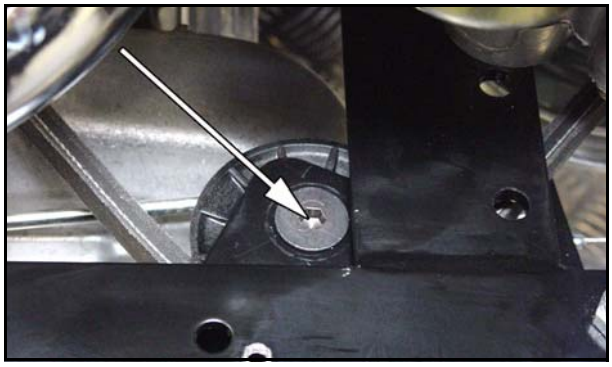
5.3.3 Replacing belt C



Senator, President, Comfort and Royal

1. Dismantle the belts A and B as described above.
2. If necessary, remove the exhaust cover.
3. Activate the parking brake
4. Remove the tension pulley for the clutch.

Note!
Clean carefully the allen hole in the pulley screw.



5. Remove the tension pulley (7). Use a 6 mm allen wrench and a 17 mm spanner.

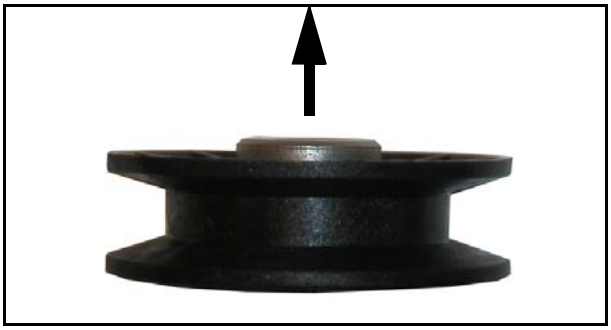
Warning!

Be carefully not to damage the plastic fan. Damage results in insufficient cooling of the HST.

6. Carefully remove the used belt.

7. Reassembly all parts in the reverse order.

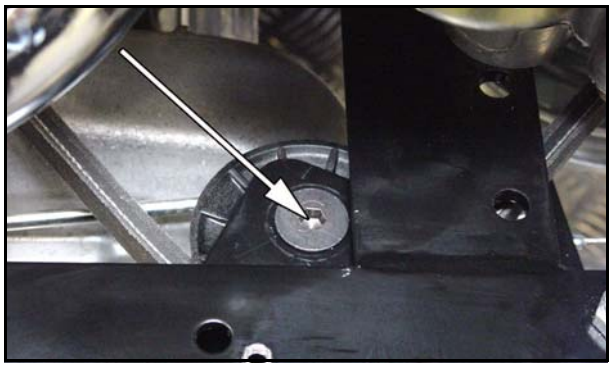
Note!
Assemble the tension pulley with the flange upwards.



8. Adjust the brake and clutch as described later.

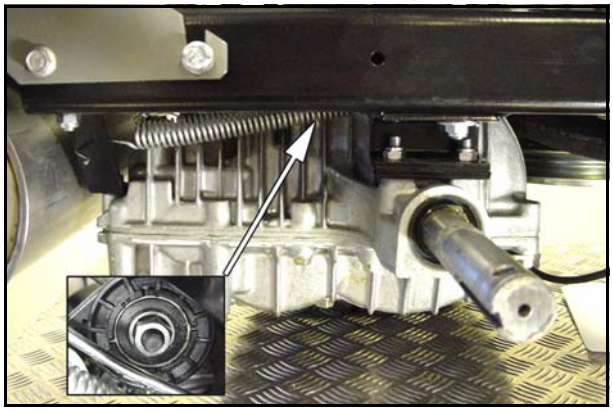
Pro 16

1. Dismantle the belts A and B as described above.
2. Block up the rear frame and remove the right rear wheel.

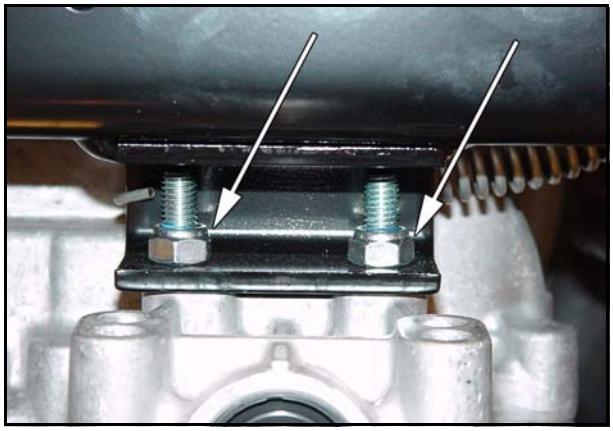


Note!
Clean carefully the insex hole in the pulley screw.

3. Remove the nut for the tension pulley. Activate the parking brake and take off the drive belt from the tension pulley. Release the parking brake.



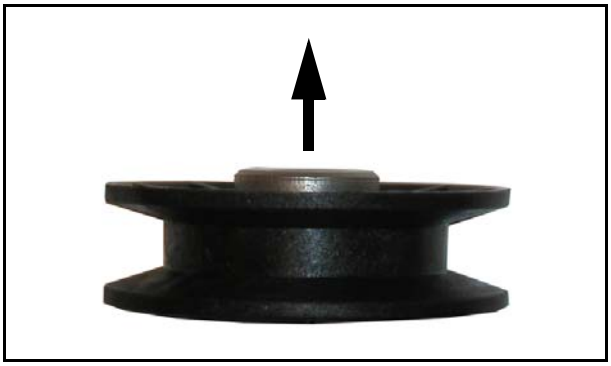
4. Release the screws that hold the HST. The screws do not need to be removed, just losened a few turns..



Note!
Be carefully not to damage the plastic fan. Damage results in insufficient cooling of the HST.

5. Carefully remove the used belt and assemble the new one.

6. Reassembly all parts in the reverse order.

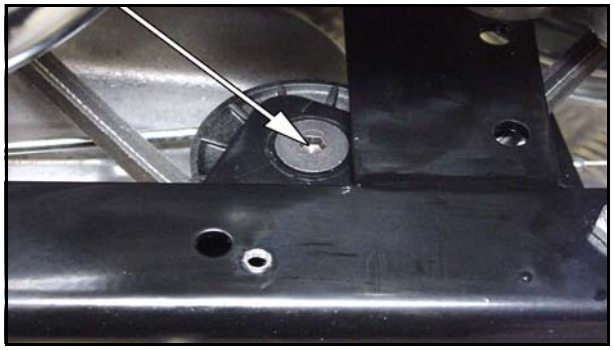


Note!
Assemble the tension pulley with the flange upwards.

7. Adjust the brake and clutch as described later.

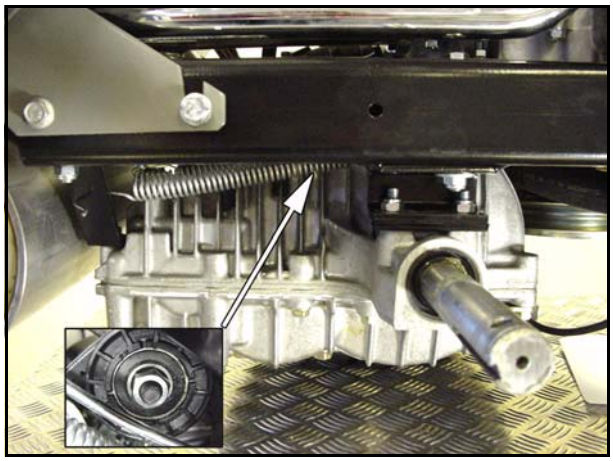
Pro 20

1. Dismantle the belts A and B as described above.
2. Block up the rear frame and remove the right rear wheel.

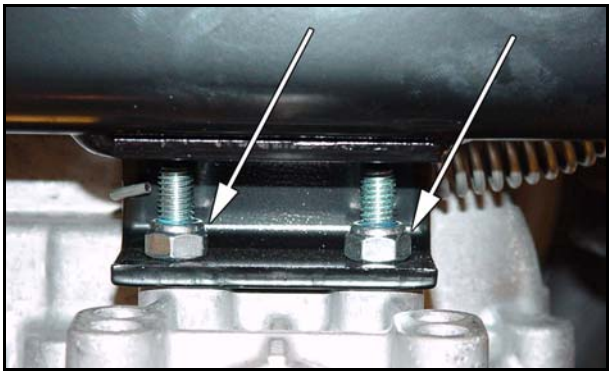


> **!** Note!
> Clean carefully the insex hole in the pulley screw.

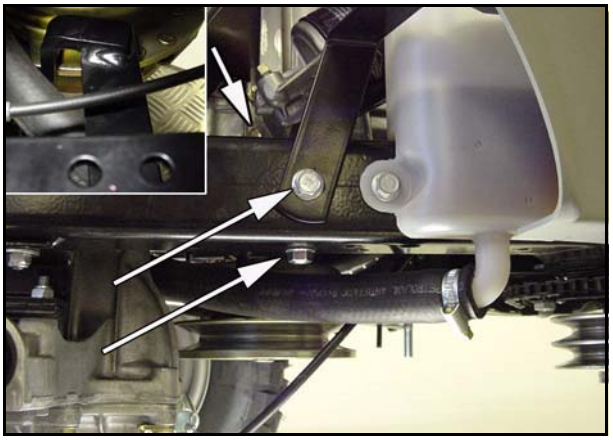
3. Remove the nut for the tension pulley. Activate the parking brake and take off the drive belt from the tension pulley. Release the parking brake.



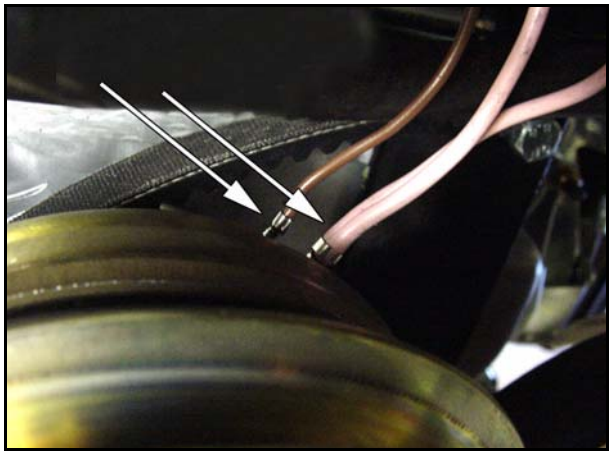
4. Release the screws that dold the HST. The screws do not need to be removed, just losened a few turns.



5. Remove the screws which hold the support rod and remove the rod.



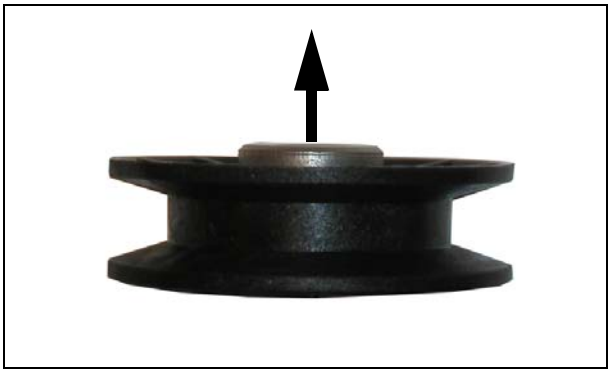
6. Remove the electrical contacts for the PTO clutch.



Note!

Be carefully not to damage the plastic fan. Damage results in insufficient cooling of the HST.

7. Carefully remove the used belt.



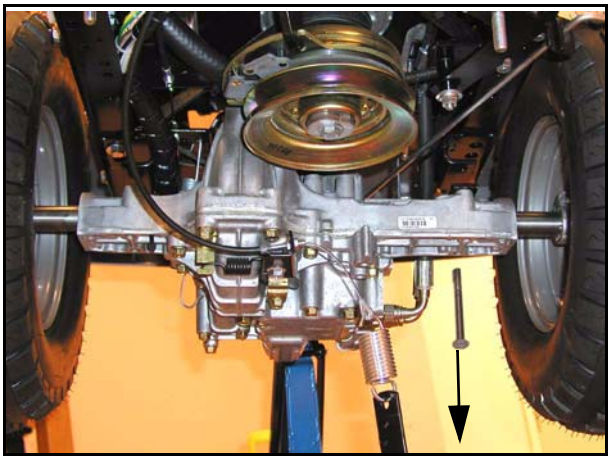
8. Reassembly all parts in the reverse order.

Note!
Asemble the tension pulley with the flange upwards.

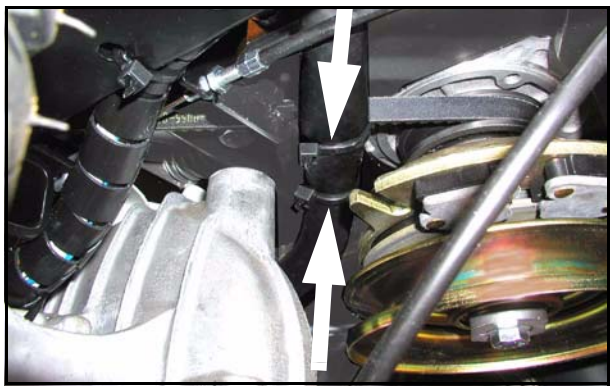
9. Adjust the brake and clutch as described later.

Pro Diesel

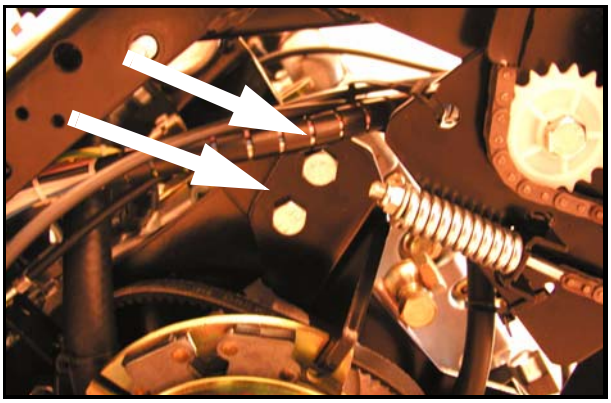
1. Dismantle the belts A and B as described above.
2. Block up the rear frame and remove the fourth screw, holding the HST. Let the HST hang down about 5 cm in its rear rod and hydraulic hoses.



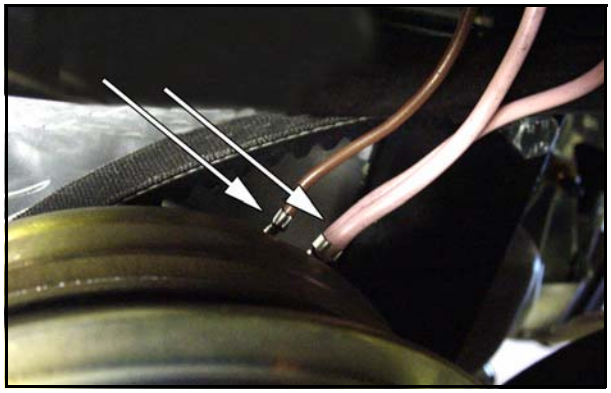
3. Cut the cable holders, holding the hose to the oil tank.



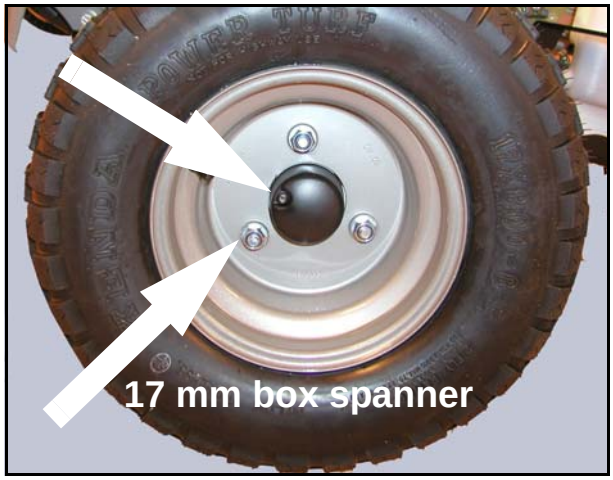
4. Remove the PTO clutch bracket by unscrewing the two screws with two 17 mm spanners.



5. Remove the electrical contacts for the PTO clutch.

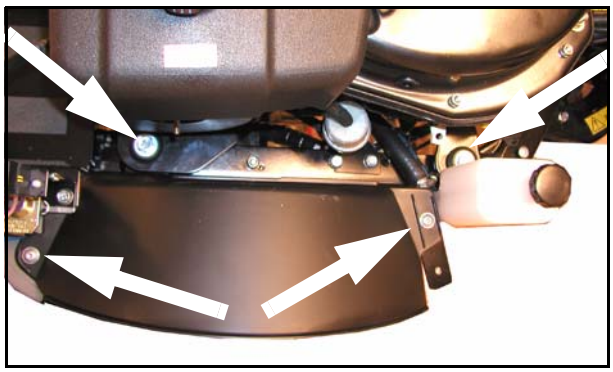


6.Remove the right rear wheel.

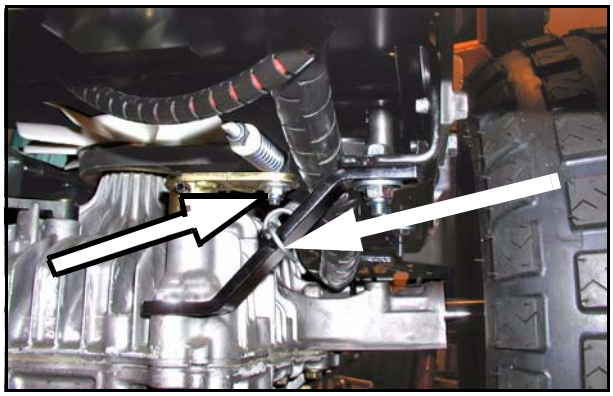


7. Remove the air filter cover and rear wheel cover.

8. Loosen the motor attachments at the right side.



9. Remove the brake rod with a 10 mm wrench and hang off the tension pulley spring using a polygrip.

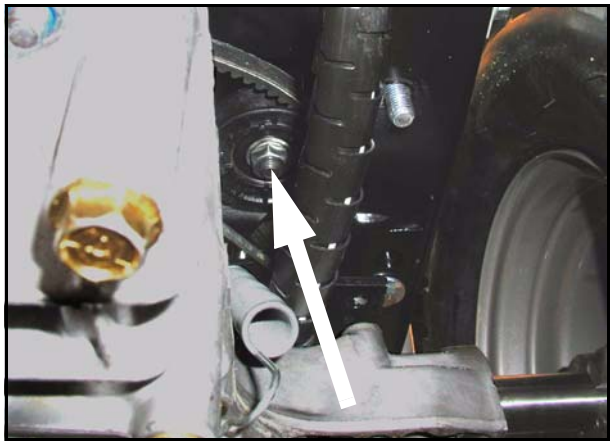


10.Lift the motor plate a few cm at the right rear end and support the plate with a socket spanner (17 mm) or similar.

! Note!
In this position, clean carefully the allen hole in the pulley screw.

11. Hold the screw with a 6 mm allen key and screw off the pulley nut with a 17 mm socket spanner.

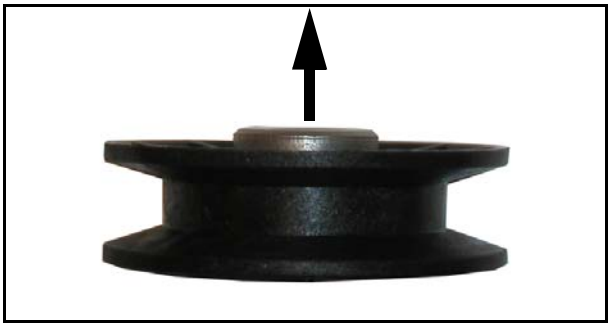
12.Remove the tension pulley with its sleeve.



Note!

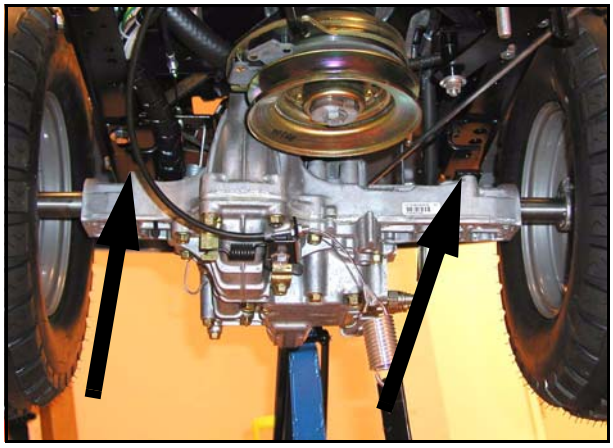
Be carefully not to damage the plastic fan. Damage results in insufficient cooling of the HST.

13.Carefully remove the used belt.



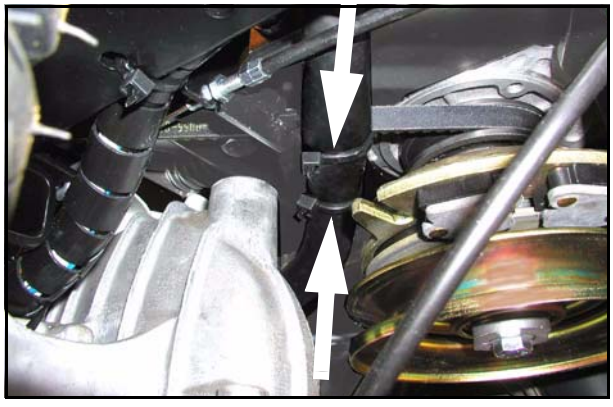
14.Reassembly all parts in the reverse order.

Note!
Assemble the tension pulley with the flange upwards.



Note!
When mounting the HST to the frame, do not forget to assemble the distance plates.

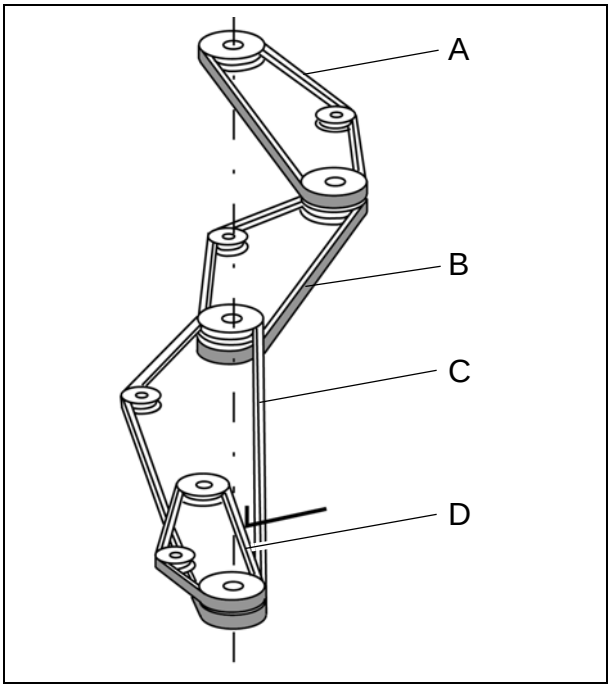
Note!
It is essential to lock the tank hose to its bracket with two cable ties.



15.Adjust the brake and clutch as described in section 5.

5.4 Replacement of belts 4WD with ext. pump

This section describes belt changing and connected adjustments for 4WD machines with **external** hydraulic pump.

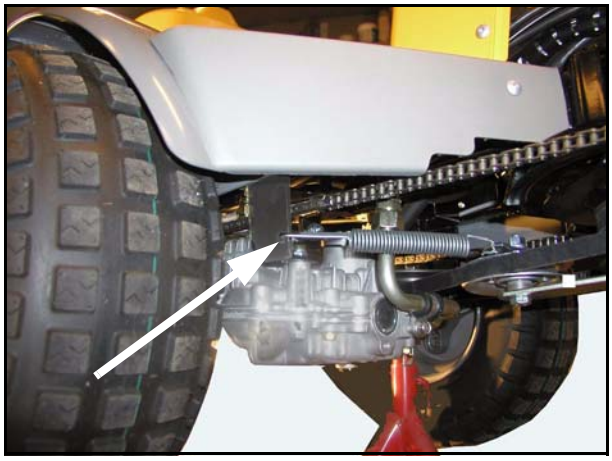


5.4.1 Belt A

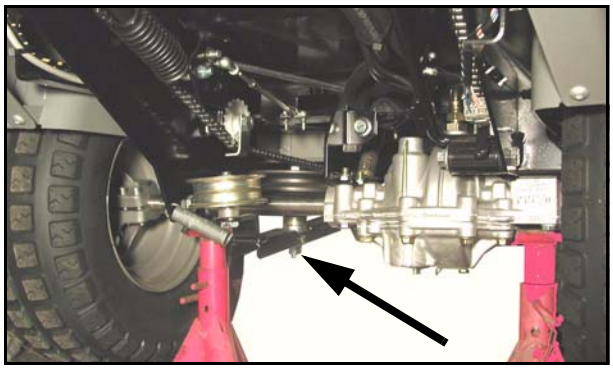
Belt A belongs to the work equipment and is not described here. The description is included in the respective work equipment manual.

5.4.2 Belt B

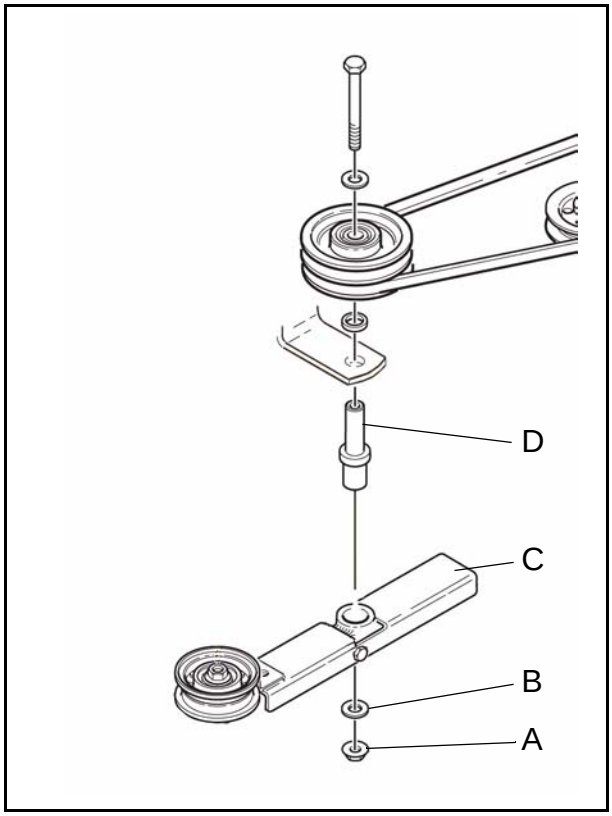
1. Unhook the belt tensioner. See the figure.



2. Unscrew the front pulley nut. Use a 15 mm wrench and hold the screw with a 17 mm wrench.
3. Remove the following parts:
   A. Nut
   B. Washer
   C. Arm
   D. Sleeve

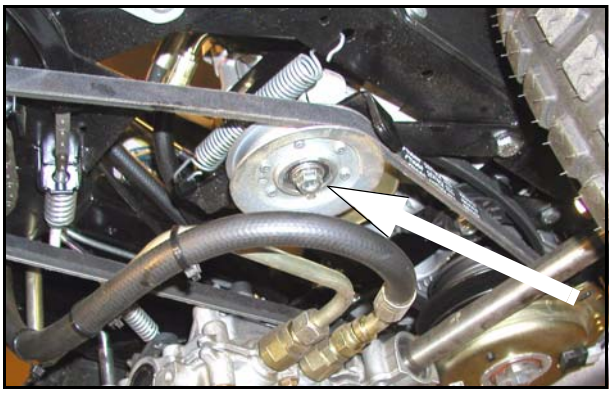


4. Hook off and remove the belt without removing the front pulley and its screw.
5. Fit the new belt and assemble the front pulley with parts according to the figure.
6. Tighten the front pulley nut. Use a 15 mm wrench and hold the screw with a 17 mm wrench.
7. Hook up the belt tensioner.

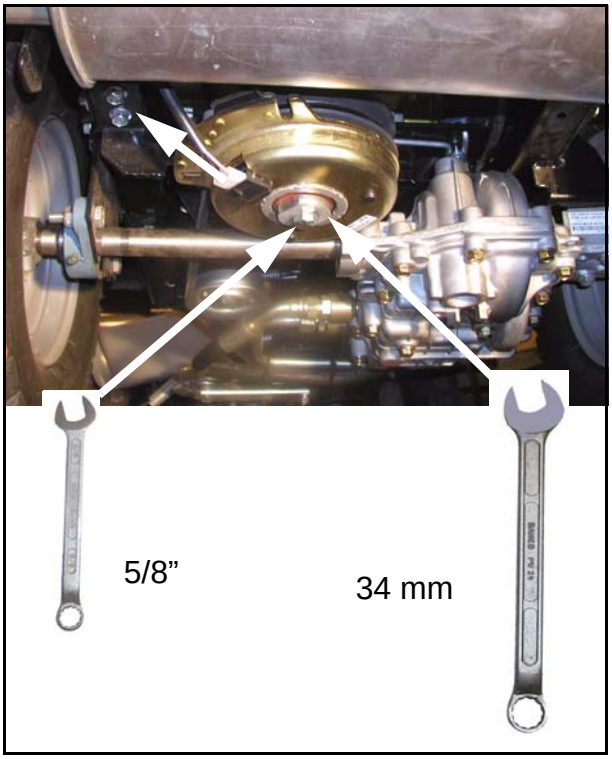


5.4.3 Belt C

1. Remove belt A and B. See above.
2. Remove the tension pulley by using a 15 mm and a 17 mm spanner. See the figure.



3. Remove the magnetic clutch cables.

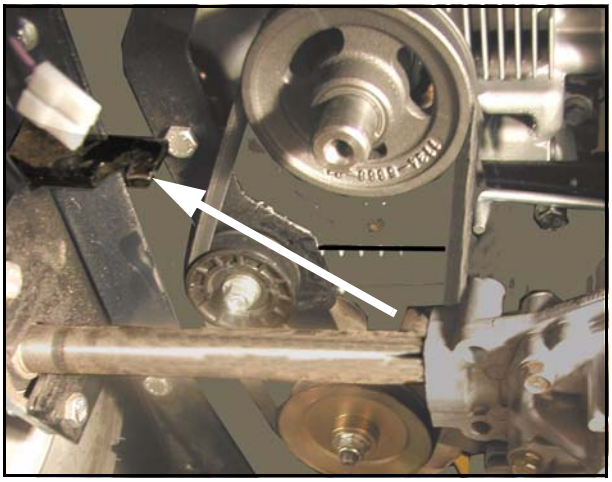


Warning!

The magnetic clutch is heavy. Be careful when removing.

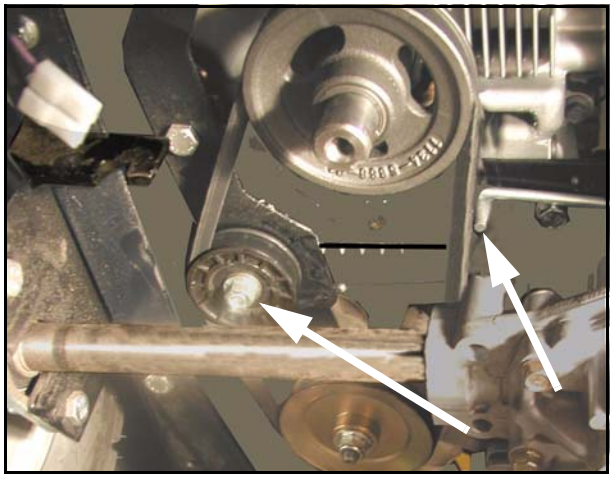
4. Screw out the magnetic clutch screw and pull down the clutch.
5. Replace the belt and reassemble in the reverse order.

Note!
Check that the dog fits in the hole in the magnetic clutch. See the figure.



Tightening torque
magnetic clutch screw: **50 Nm.**

5.4.4 Belt D



1. Remove belt A, B and C. See above.

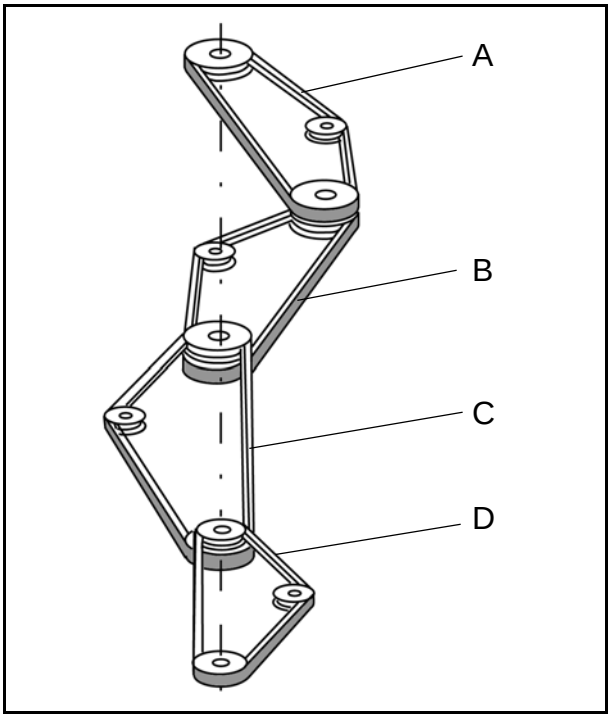
Warning!

Do not bend the lever when loosening or tightening the pulley nut.

2. Remove the tension pulley by using two 15 mm wrenches.
3. Replace the belt and reassemble in the reverse order.

Note!
The belt guide shall support the belt from its outside.

5.5 Replacement of belts 4WD with int. pump



This section describes belt changing and connected adjustments for 4WD machines with **internal** hydraulic pump.

5.5.1 Belt A

Belt A belongs to the work equipment and is not described here. The description is included in the respective work equipment manual.

5.5.2 Belt B

See “Belt B” at page 16.

5.5.3 Belt C

See “Belt C” at page 17.

5.5.4 Belt D

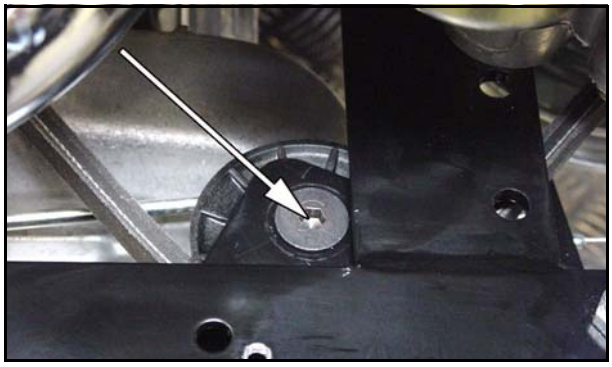
1. Remove belt A, B and C. See above.
2. Activate the parking brake

Note!
Clean carefully the allen hole in the pulley screw.

3. Remove the tension pulley. Use a 6 mm allen wrench and a 17 mm spanner.

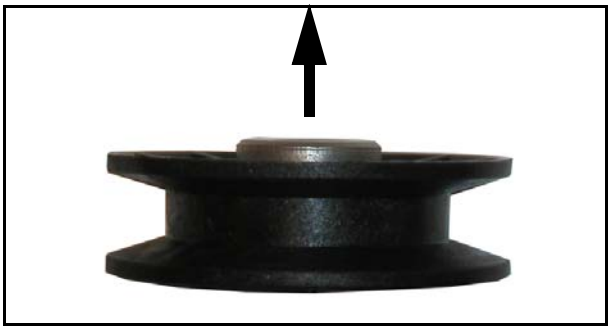
Warning!

Be carefully not to damage the plastic fan. Damage results in insufficient cooling of the HST.



4. Carefully remove the used belt.
5. Reassembly all parts in the reverse order.

Note!
Assemble the tension pulley with the flange upwards.



6. Adjust the brake and clutch as described in section 6.

6 Control Wires

Contents in this chapter

General

All the manoeuvring functions are incorporated on the control panel. This is an excellent solution in terms of ergonomics and comfort. It also simplifies the service work since all the controls and adjustments can be accessed in one place.

All mechanical control movements from the operator to the respective device on the machine are conducted by wires and in some cases with rods.

These equipments are mainly the same for all the machines covered by this manual, but in some cases configurated in different ways. Where divergences occour between the machines, particular instructions are given for each particular equipment.

This chapter gives a brief description of the equipments and describes their repair and replacements.

6.1 Description

All wires consist of a wire and a conduit. In the wire ends one part, the wire or the conduit, is fastened to the body and the other part to a lever. The levers are connected to the operator control and to the controlled device. I.e. PTO wire, throttle wire, etc.

The wires are also in most cases fitted with adjustments sleeves with locking nuts or angle links at one or both ends.

Wires (except the HST wire) can only transfer traction forces. The return forces for the wires are maintained by return springs.

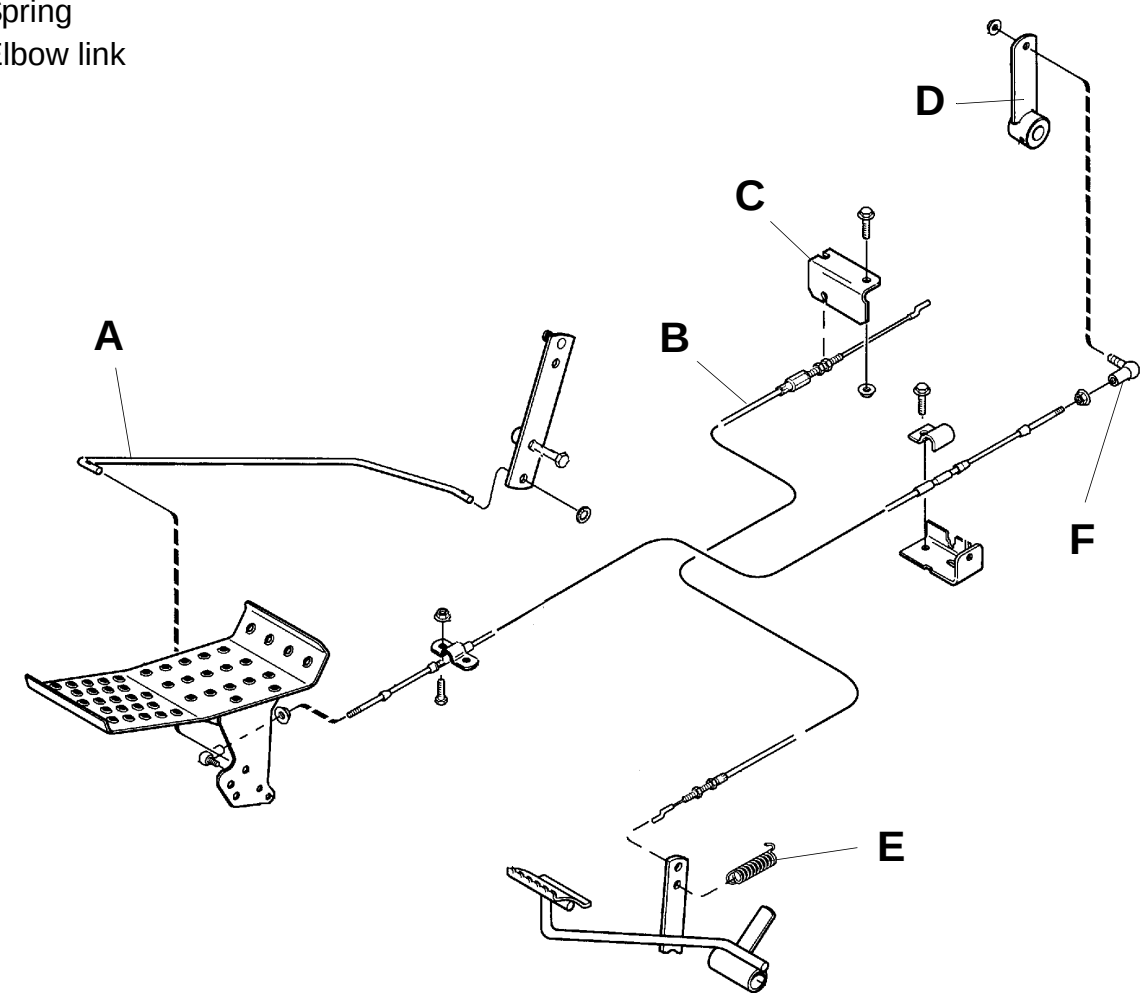
The HST wire is dimensioned to transfer also pushing forces.

To transfer higher forces and both pushing and traction forces, rods are used, i.e. brakes, etc.

A. Rod
B. Wire with conduit
C. Fastening to body
D. Lever
E. Spring
F. Elbow link

Maintenance of wires:

Drop a little engine oil or lubricating spray in the ends of the control wires two or three times a year.

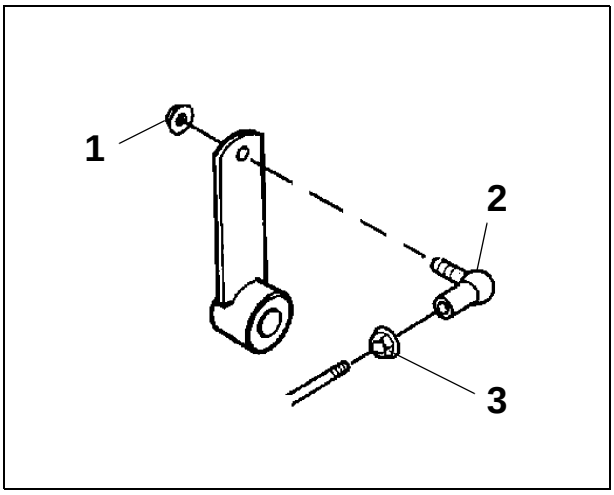


6.2 General measures

6.2.1 Elbow links

In many cases there are elbow links mounted at the wire ends. The elbow links have two functions as follows:

- To transmit the movement to/from the actual lever.
- For wire adjustment purpose. The wire tension is adjusted by screwing the link on/off the threaded rod at the wire.



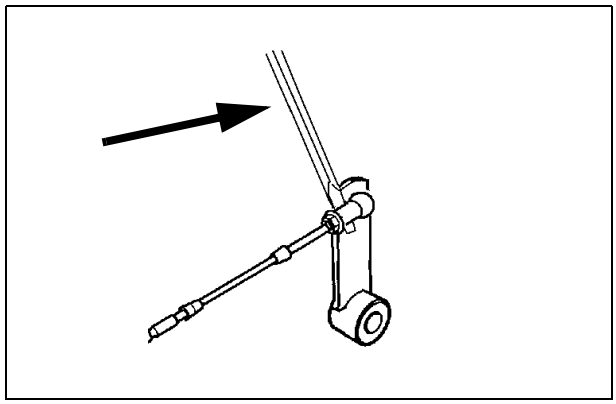
! Note!
At the adjustment, at least 5 threads shall be engaged.

To change a elbow link

1. Loosen the nut (3) with a 8 mm wrench.
2. Remove the nut (1) with a 8 mm wrench. Hold the elbow stud with a 7 mm wrench.
3. Screw the elbow link off the rod.
4. The assembly is performed in the reverse order.
5. After the assembly, adjust the wire.

To apart a elbow link

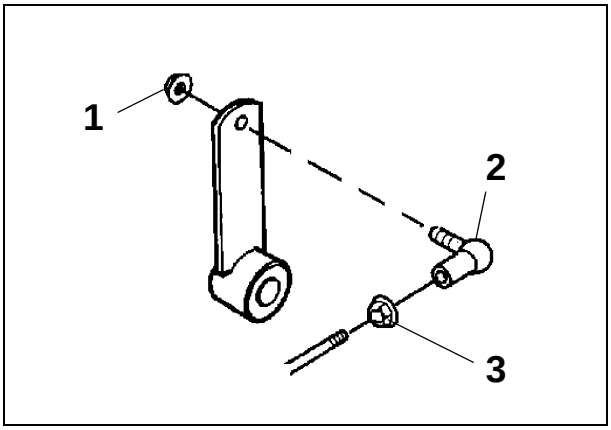
1. Fold up the circlip (4) from the elbow link body.
2. Pull out the circlip.
3. Pry off the link body from the stud sphere by help of a screwdriver or similar.
4. The assembly is performed in the reverse order. The link body is pressed onto the sphere by help of a polygrip or similar.



! Note!
It is important that the circlip (4) is inserted in both holes in the elbow link body, otherwise the link will separate during operation.

Adjustment

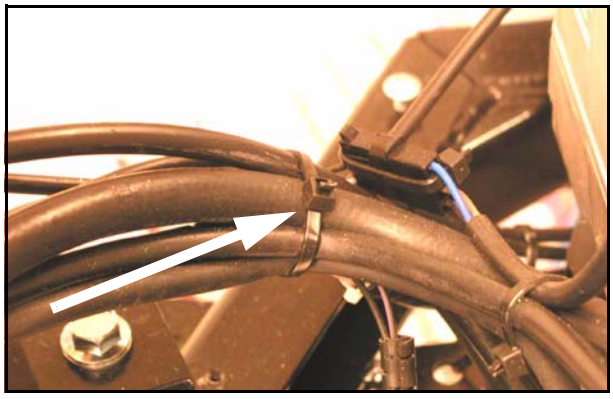
1. Loosen the nut (3) with a 8 mm wrench.
2. Apart the elbow link as described above.
3. Screw the link body in the desired direction on the wire stud. If neseccary, move the nut (3) on the stud.
4. Check the adjustment result by pressing on the elbow link onto the sphere and without assembling the circlip.
5. After adjustment, assemble in the reverse order and tighten the nut (3) against the elbow link body.



Note!
It is important that the circlip (4) is inserted in both holes in the elbow link body, otherwise the link will separate during operation.

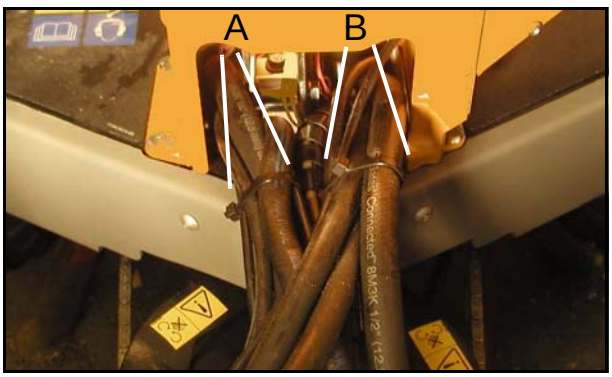
6.2.2 Cable holders

Warning!
It is essential that all cable holders are fitted properly. If not, there is risk of short circuit and fire.



All wires, electrical cables and other conductors are fitted to the chassis with cable holders. Always, after removal or replacement of wires, new cable holders shall be fitted in places where they were original mounted.

Loose wires and cables cause unneseccary wear of components which finally result in electrical short circuit, paint removal and damages of plastic covers etc.



4WD-machines

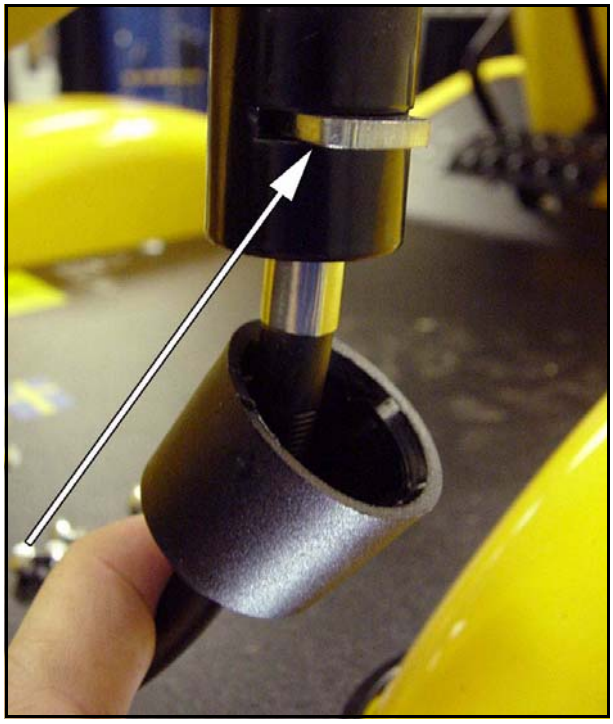
A. All cables and oil hoses drawn to the left part of the front frame shall be bundled together.

B. All cables and oil hoses drawn to the right part of the front frame shall be bundled together.

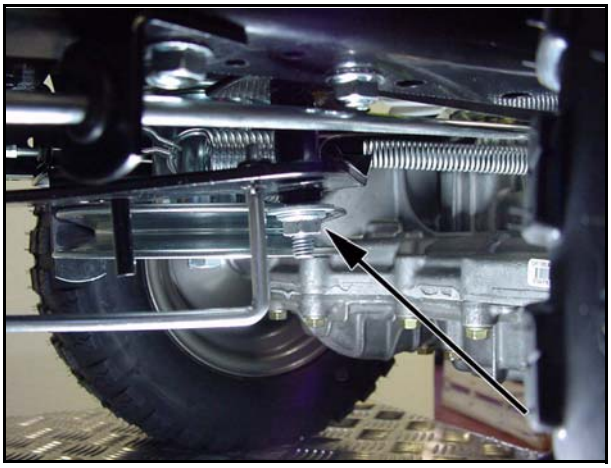
6.3 Gearshift wire

This section is valid for machines equipped with manual gearbox only. I.e. Senator.

6.3.1 Replacement



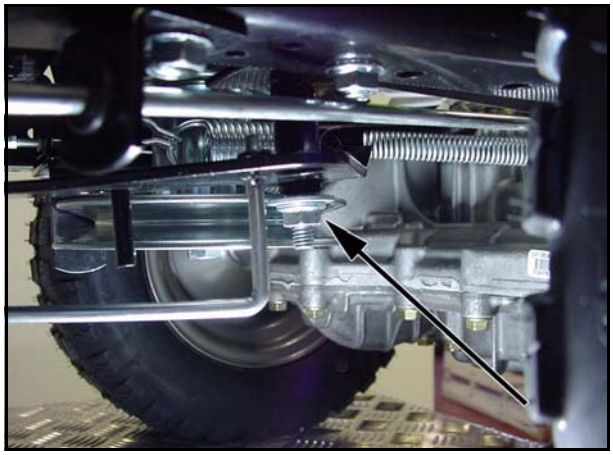
1. Dismantle the cover and back of the control panel.
2. Release the elbow links in both ends of the wire. See “Elbow links” at page 3.
3. Work off the plastic top at the gearshift tube and pull out the locking clamp.



4. Remove the screw that holds the cap at the rear control wire attachment, and lift the control wire out of the slot.
   The screw that holds the cap is the same screw that the belt tensioner for the engagement of the deck is fixed with.
5. Dismantle the control wire.

6. Do not forget to cut off the cable holder that holds the cables and wires at the articulation point.
   Notice how the control wire is routed, since it considerably simplifies fitting if the new wire is routed in the same way as the old one.
7. Move over the ball cups from the old wire to the new one.
8. Fit the new control wire.
9. Fit the wire in the rear attachment, and tighten the screw.

10. Check that the belt tensioner for the engagement of the deck functions correctly when the screw has been tightened, since the screw is also a link for the tensioning arm.
11. Thread the control wire in the gearshift tube and replace the locking clamp and plastic top.
12. Replace the elbow links in both ends of the wire. See “Elbow links” at page 3.
13. Fit the cover and the back of the control panel.



Note!
Refit all cable holders. See “Cable holders” at page 4.

Follow-up work

Adjust the gear wire, see below.

6.3.2 Adjustment

This adjustment is valid for machines equipped with a manual 5+1 geared gearbox, i.e. Senator. The gear positions are fixed in the gearbox, and therefore the adjustment of the position of the gearshift must be made by adjusting the length of the control wire.
The adjustment can be made both at the gearbox and from inside the control panel.

See “Elbow links” at page 3.

If the ball cup part is moved so that the control wire becomes **longer** the gearshift will be moved **backwards**.

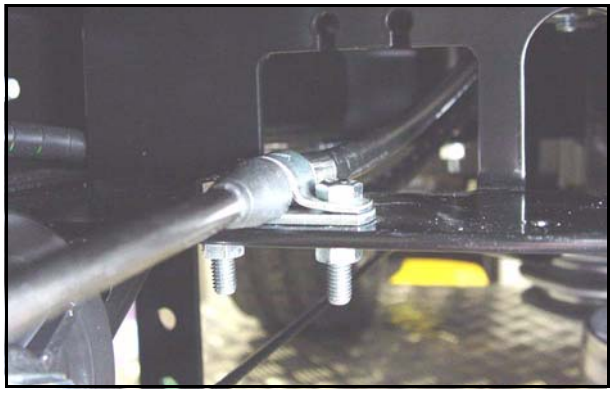
Follow-up work

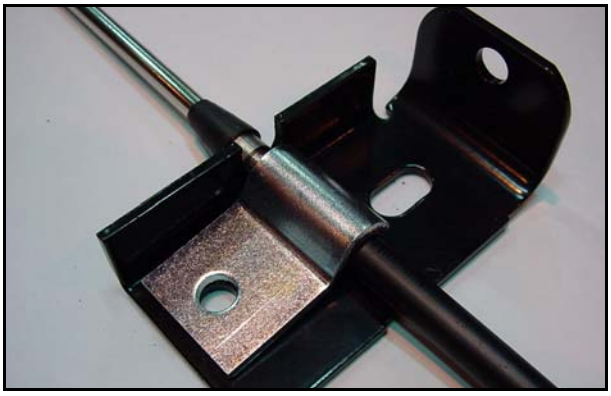
Test driving.

6.4 HST control wire (2WD and 4WD with int. pump)

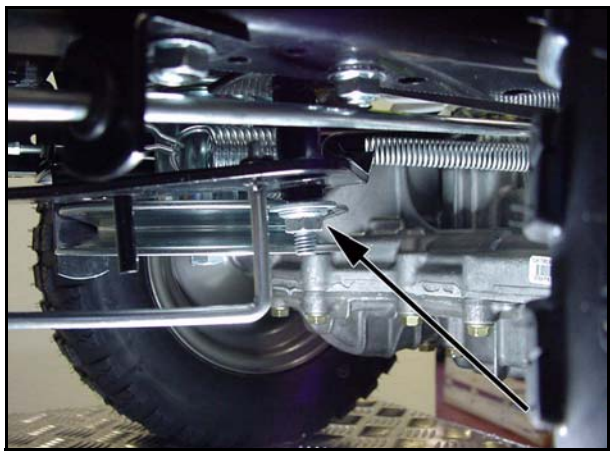
6.4.1 Replacement

1. Apart the elbow links in bothe ends of the wire. See “Elbow links” at page 3.
2. Unscrew the elbow link bodys and their locking nuts.
3. Remove the front clamp.
4. Remove the screw that holds the cap at the rear control wire attachment, and lift the control wire out of the slot.





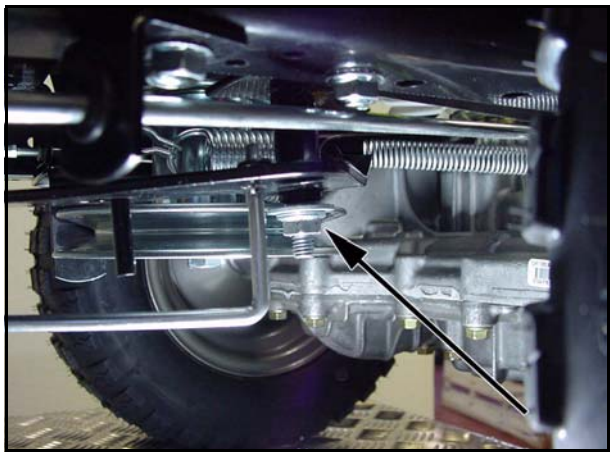
5. The screw that holds the cap is the same screw that the belt tensioner for the engagement of the deck is fixed with.
6. Dismantle the control wire.
   It is easiest to pull out the control wire forwards. Do not forget to cut off the bundling strap that holds the cables and wires in the articulation point.
   Notice how the control wire is routed, since it considerably simplifies fitting if the new wire is routed in the same way as the old one.



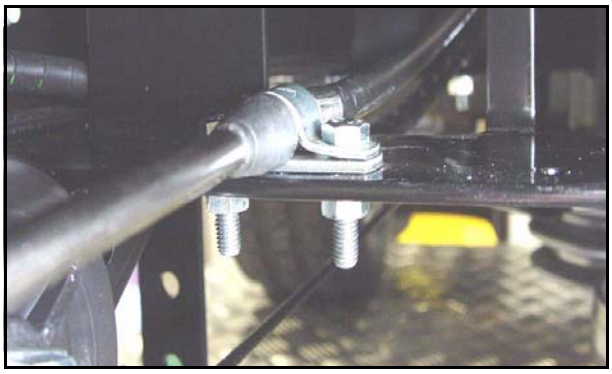
7. Fit the new control wire. Check that the wire is fitted in the right direction.
   The arrow on the wire casing should always point forwards.

8. Fit the wire in the rear attachment, and tighten the screw.

9. Check that the belt tensioner for the engagement of the deck functions correctly when the screw has been tightened, since the screw is also a link for the tensioning arm.

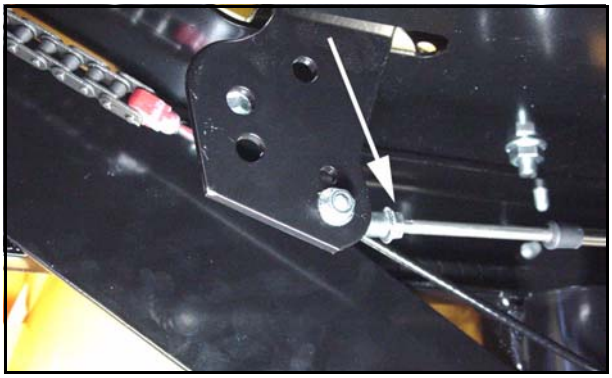


10. Fit the wire in the front attachment. Check that the slot on the control wire coincides with the bulge in the cap. If these parts are fitted incorrectly it will be difficult to adjust the control wire since the wire will slide in the attachment.



11. Thread the stop nuts on both ends of the control wire and fit the elbow link bodies. See “Elbow links” at page 3.

Note!
Refit all cable holders. See “Cable holders” at page 4.

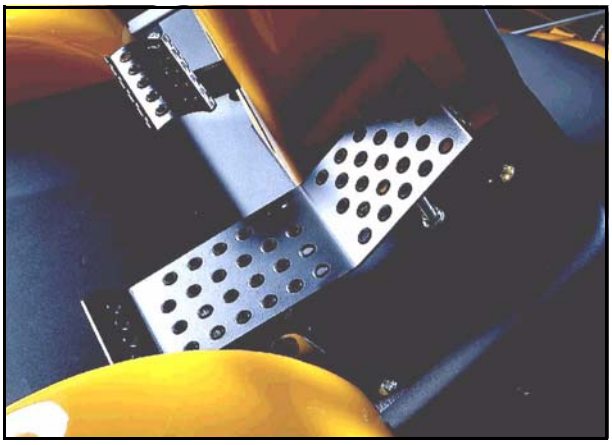


Follow-up work

Adjustment of control wire as described below.

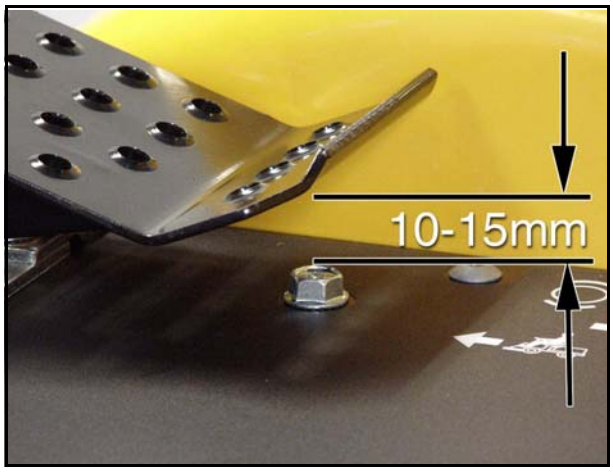
6.4.2 Adjustment (2WD)

In theory this machine can go just as fast both forwards and backwards. It is therefore important that the basic position of the hydrogear pedal is correctly adjusted.



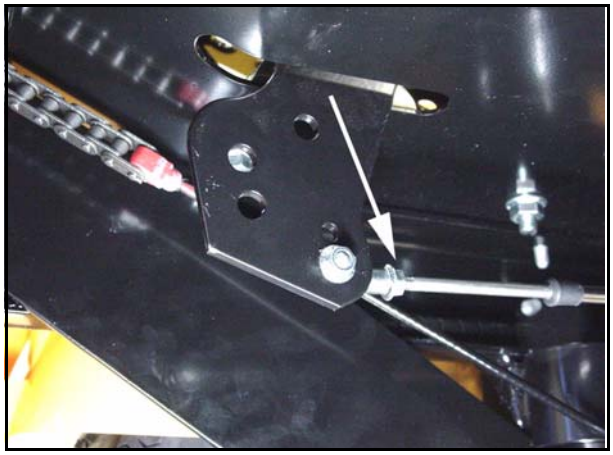
Procedure

The pedal should in its rest position have a distance of 10-15 mm from the rear stop screw.



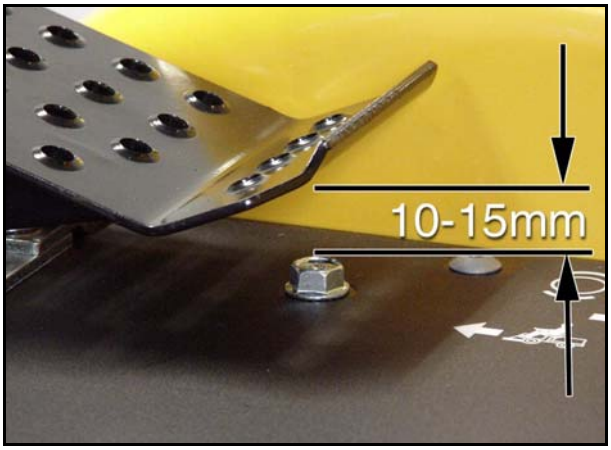
! Note!
This distance can be adjusted to increase the reversing speed. However, the distance must never exceed 15 mm. The rear stop screw must always be screwed down as far as possible.

1. Adjust the distance by moving the elbow links on the control wire. See “Elbow links” at page 3.



2. The distance between the pedal and the rear stop screw shall be 10-15 mm. Tighten the stop nut and insert the locking wire.

   If the ball elbow link body is moved so that the control wire becomes **longer** the distance between the pedal and the rear stop screw will be **reduced**.



3. Release the upper nut on the stop screw and screw down the screw a few turns.

4. Press the pedal forwards as far as possible. Screw up the stop screw so that it touches the pedal.
5. Release the pedal and then screw up the stop screw a further ½ - 1 turn. Tighten the stop nut.

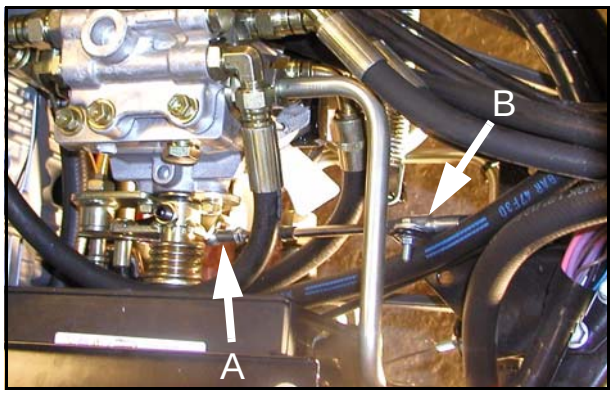
! Note!
The movement of the pedal must always be limited by the stop screw, to avoid overloading the control wire.

Follow-up work:

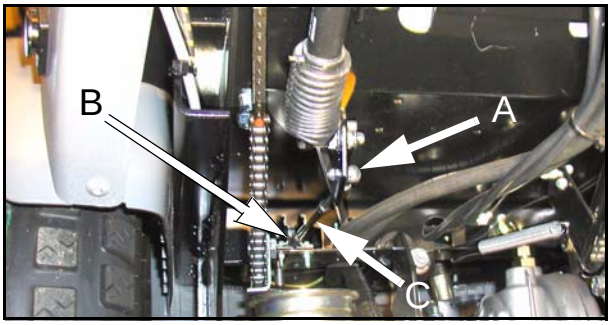
Test driving.

6.5 HST control wire (4WD with external pump)

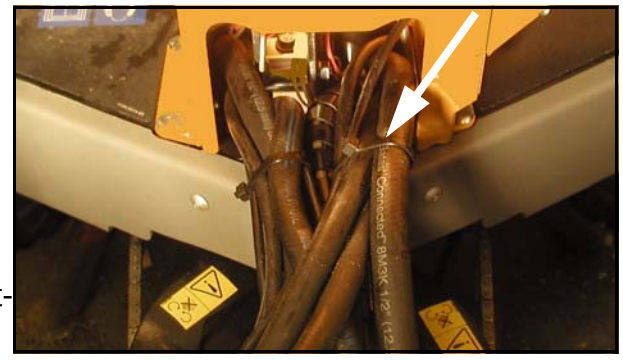
6.5.1 Replacement



1. Apart the elbow links in bothe ends of the wire (A). See “Elbow links” at page 3.
2. Unscrew the elbow link bodys and their locking nuts.
3. Remove the front and rear clamps (B).

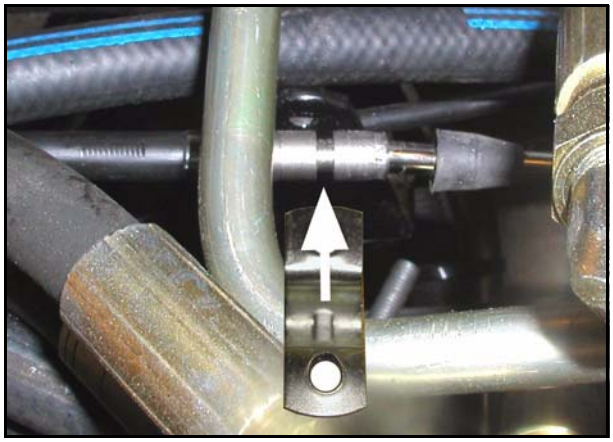


4. Remove the cable holder for the right cable bundles. See the figure.
5. Pull out the control wire.
6. Fit the new wire in the same location as the old one.



> **!** Note!
> The longer support tube (C) shall be located forwards.

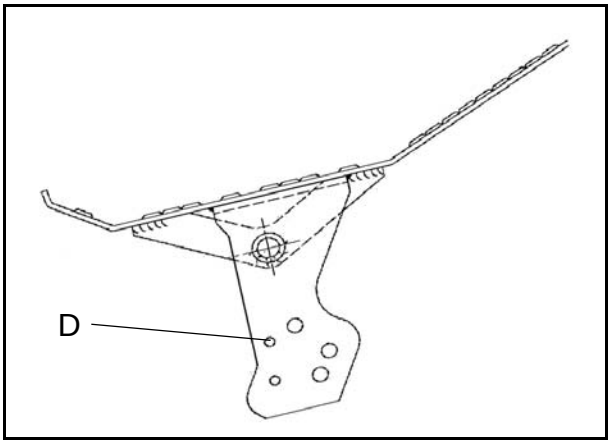
7. Check the elbow links for damage or wear. Replace with new links if necessary. Fit the elbow links with their locking nuts at the wire ends.
   The links shall be screwed onto the wire ends about 1 cm.
8. Fit the front and rear clamps (B). Make sure that the dogs at the clamps fit in the grooves in the wire cover. Both front and rear. Se the figure.



7. Fit the elbow links to the levers. See “Elbow links” at page 3. The front elbow link shall be fitted to the pedal in hole (D). See the figure.
8. Assemble a new cable holder for the right cable bundles.

   Note!
   See “Cable holders” at page 4.

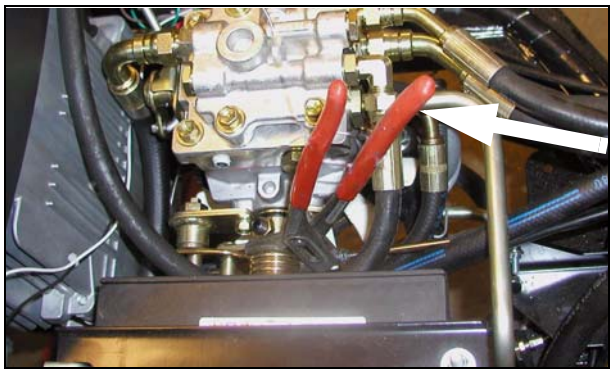
9. Adjust the control wire as described below.



6.5.2 Adjustment (4WD with external pump)

The length of the wire is adjusted by screwing the elbow links in the desired direction. Perform the adjustment at both links. The links shall be screwed onto the wire about the same amount. See “Elbow links” at page 3.

1. Set the rear stop screw in its lowest position.
2. Block up the pedal with a piece of wood or similar until the pedal rests against its rear stop. If the pedal doesn´t reach its rear stop, adjust the elbow links.
3. Check that the pump lever has fully reach its stop position. If not, adjust the elbow links.



4. Block up the pedal with a piece of wood or similar until the pedal rests against its front stop. If the pedal doesn´t reach its front stop, adjust the stop upwards.

5. Check that the pump lever has fully reach its stop position. If not, adjust the elbow links.

When the control wire is properly adjusted, the following conditions shall be fulfilled:

- Both elbow links shall be screwed onto the wire ends about the same amount.
- The pedal shall easily reach its rear stop (moved backwards). Simultaneously shall the pump lever reach its stop position.
- The pedal shall easily reach its front stop (moved forwards). Simultaneously shall the pump lever reach its stop position.

Warning!

If the pump lever reach its stop and the pedal not, abnormal push/pull forces will occour in the wire. This will limit the wire durability.

6.6 Brake/clutch

6.6.1 Senator

Replacement of wire

1. Release the wire at the attachment to the brake pedal.
2. Remove the adjusting nipples at the brake pedal.
3. Unhook the wire at the rear attachment point and remove the rear adjusting nipples.
4. Pull out the wire.
5. Do not forget to cut off the bundling strap that holds the cables and wires in the articulation point.
   Notice how the wire is routed, since it considerably simplifies fitting if the new wire is routed in the same way as the old one.
6. Fit the adjusting nipples and hook on the wire.

> **!** Note!
> Refit all cable holders. See “Cable holders” at page 4.

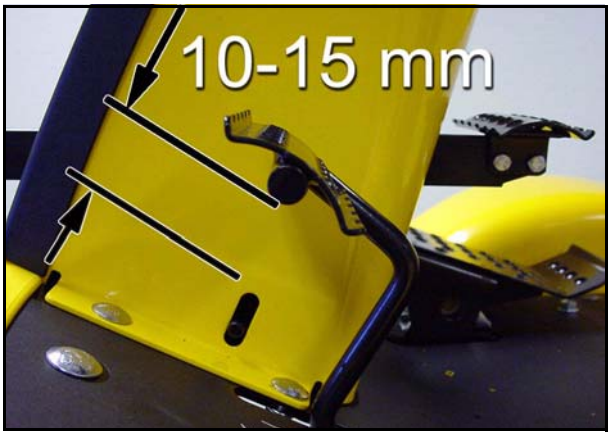
Follow-up work

Adjust the brake, see below.
Adjust the clutch, see “Adjustment of clutch” at page 16.

Adjustment of brake

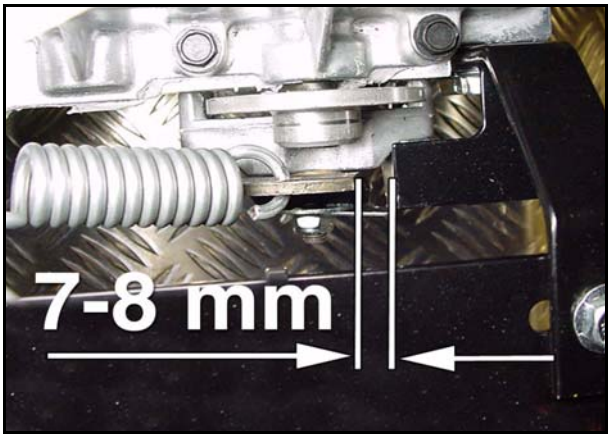
The brake and clutch are two separate systems on Senator. However, the systems are operated by a joint pedal.

Warning!
The clutch must always be activated before the brake comes into operation to avoid unnecessary wear and overloading of the brake.



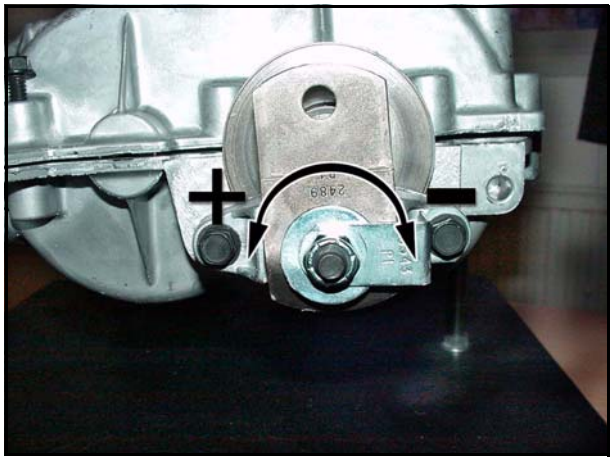
Procedure

1. Check that there is a play of 10-15 mm in the combined brake/clutch pedal before the brake arm is actuated.
   Adjust if necessary by using the adjusting screws on the wire casing.
2. Activate the parking brake. Check that the spring that actuates the brake arm is tensioned somewhat.
3. When the parking brake is activated the distance between the brake arm's rear stop and the brake arm should be 7-8 mm.
   In the illustration the brake arm's return spring has been dismantled to make the picture more explicit.
4. If the distance is not correct it is adjusted by turning the nut on the brake calliper. Release the parking brake and turn towards + to increase the distance, and towards – to reduce the distance.



Follow-up work

Test driving.



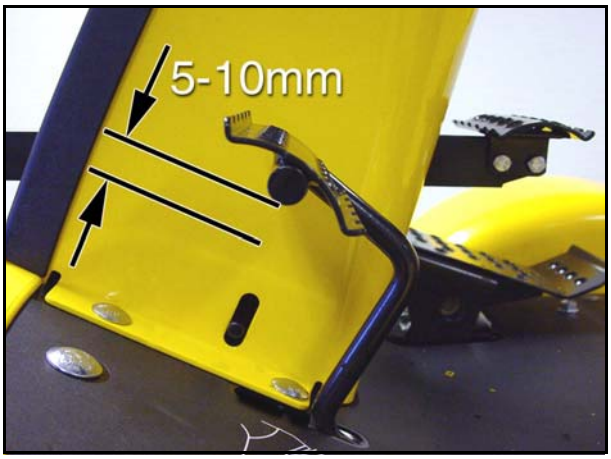
Adjustment of clutch

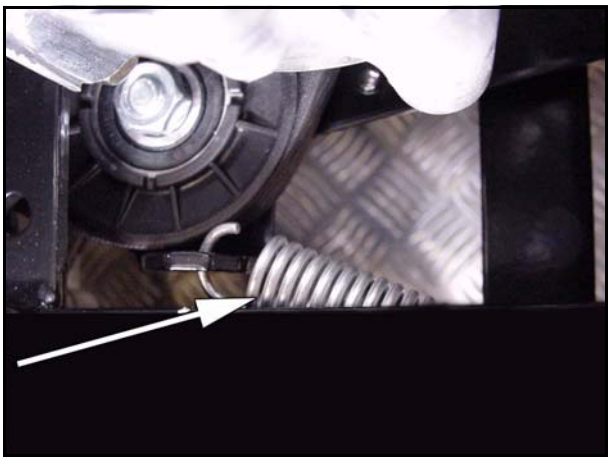
The brake and clutch are two separate systems on Senator. However, the systems are operated by a joint pedal.

Warning!
The clutch must always be activated before the brake comes into operation, to avoid unnecessary wear and overloading of the brake.

Procedure

1. Check that there is a play of 5-10 mm in the combined clutch / brake pedal before the tensioning arm is actuated.
   Adjust if necessary by using the adjusting screws on the wire casing.





2. Check that the spring for the tensioning arm is still tensioned. If the spring is completely contracted then the belt is too long and must be replaced.

Note!
If the spring does not tension the belt properly the clutch will slip.

3. Activate the parking brake and check whether the belt tensioner disengages properly.

Follow-up work

Test driving.

Note!
Refit all cable holders. See “Cable holders” at page 4.

6.6.2 President, Royal, Pro 16, Pro 20, Pro Diesel

5.9 Replacement of brake / clutch wire

1. Release the nuts at the wire's rear and front attachments, and dismantle the wire from the supports. Unhook the Z nipples.
2. Dismantle the wire.
   Pay careful attention to how the wire is routed. It simplifies fitting if the new wire is routed the same way.
3. Fit the wire.
   Make sure that the new wire is not bent unnecessarily since this will shorten its service life.
4. Hook the Z nipple in the brake arm and fit the adjusting screw in the support.
5. Hook the Z nipple in the tensioning arm and fit the adjusting screw in the support.

! Note!
Refit all cable holders. See "Cable holders" at page 4.

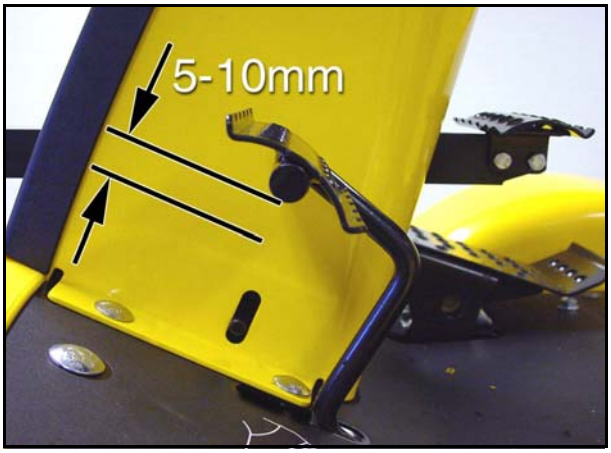
Follow-up work

Adjustment the brake and clutch, see below.

Adjustment of brake and clutch

The brake articulation consists of two parts. A front brake wire and a rear pull bar. The relative adjustment between these parts is very important for the satisfactory functioning of the brake and clutch. The governing principle is that the drive belt should always be disengaged before the brake comes into operation.

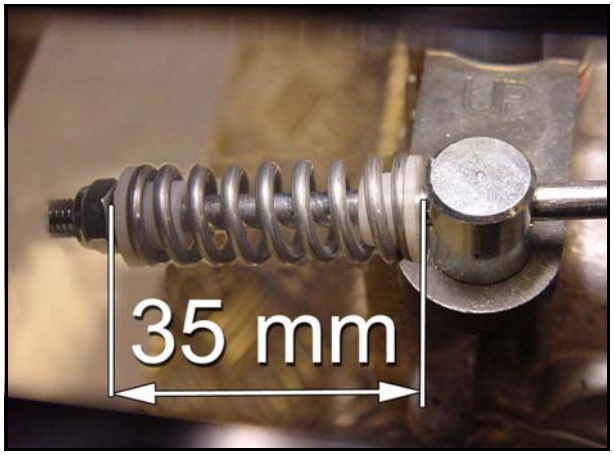
Warning!
It is extremely important that these parts are correctly adjusted. Incorrect adjustment leads to increased wear. The machine can also be difficult to manoeuvre.



Procedure

1. Release the stop nuts at the ends of the wire.
2. The clutch pedal should have a clearance of 10-15 mm. Adjust if necessary.

3. Activate the parking brake.
   The length of the brake arm spring should be 35 mm when the parking brake is activated. Adjust if necessary by turning the nut.



4. Test drive.
   A comprehensive test drive is required to check the function of the brake and transmission.

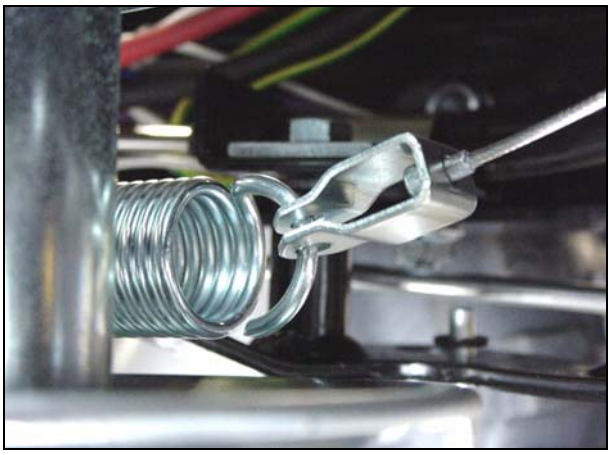
   A. Test the disengaging function by driving slowly forwards and simultaneously pressing down the brake pedal half way. The machine should slowly stop as the drive belt is disengaged.

   B. Release the clutch and the machine should start to move forwards again.
   Now press the brake fully down, more quickly than the former test. The machine should now stop immediately.

   C. Now park the machine on a slope and activate the parking brake.
   Switch off the engine. Check that the machine does not move. If the machine moves, adjust the parking brake as above.

6.7 Replacement of PTO wire

6.7.1 Machines with the control panel to the right



This procedure is valid for machines with the control panel to the right of the operator, e.g. Comfort, Royal, Senator etc.

Dismantling of PTO engagement wire

1. Remove the cover over the control panel.
2. Release the wire from the tension spring at the belt tensioner.
3. Release the nuts at the wire's lower attachment point, and dismantle the wire from the support.
4. Release the nuts at the wire's upper attachment point, unhook the Z nipple from the control arm, and remove the wire from the machine.
   Cut off the cable holder that holds the cables and wires in the articulation point. Notice how the wire is routed, since it simplifies fitting if the new wire is routed in the same way as the old one.

Assembly of PTO engagement wire

Assemble in the reverse order.

It is often easier to fit the wire from underneath, since the Z nipple is easier to guide correctly through the seat bracket than the spring attachment in the bottom end of the wire.

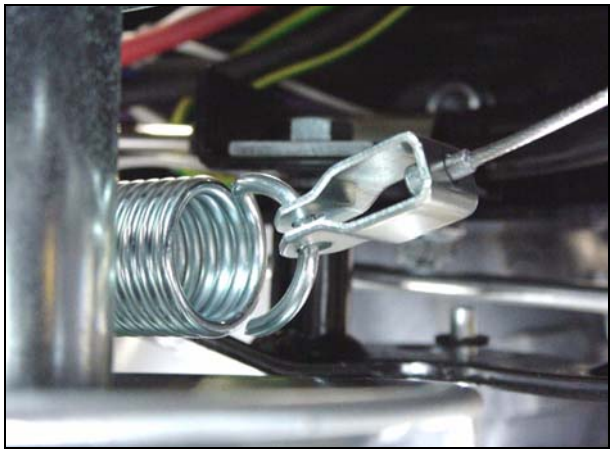
Follow-up work

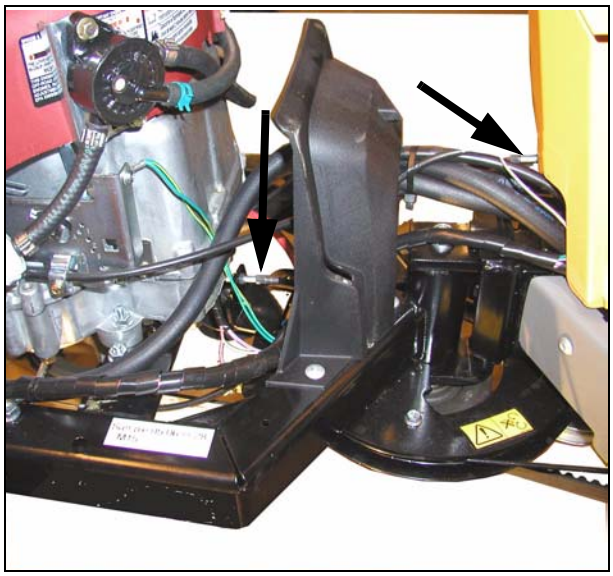
Warning!

The PTO brake is part of the machine's safety system. It is therefore especially important that it is checked and adjusted correctly.

Adjust the wire and the PTO brake.
See "Adjustment of PTO wire and brake" at page 21.

6.7.2 Compact





This procedure is valid for Compact machines wich have the control panel in front of the operator.

Dismantling of PTO engagement wire

1. Release and unhook the upper and lower adjustment sleeves.
2. Release the wire from the tension spring at the belt tensioner.
3. Release the wire Z nipple from the lever under the seat.
4. Remove the wire from the machine.
   Do not forget to cut off the cable holder that holds the cables and wires in the articulation point.
   Notice how the wire is routed, since it simplifies fitting if the new wire is routed in the same way as the old one.

Assembly of PTO engagement wire

Assemble in the reverse order.

It is often easier to fit the wire from underneath, since the Z nipple is easier to guide correctly than the spring attachment in the bottom end of the wire.

Follow-up work

Warning!

The PTO brake is part of the machine's safety system. It is therefore especially important that it is checked and adjusted correctly.

Adjust the wire and the PTO brake.
See "Adjustment of PTO wire and brake" at page 21.

6.7.3 Adjustment of PTO wire and brake

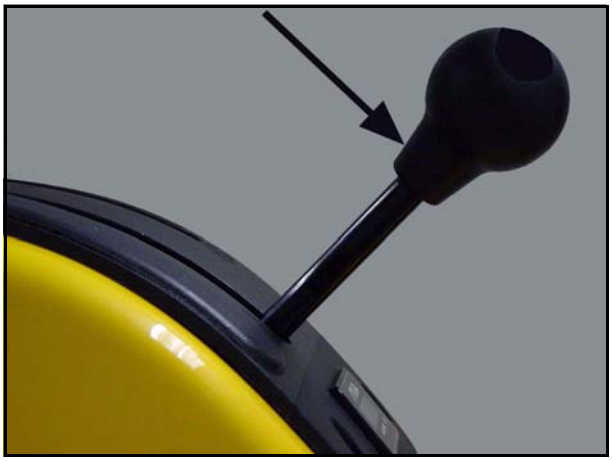
This procedure is valid for machines with the brake mechanically linked to the tension pulley only.

The wire tension and the brake are working together.

Adjusting influences both the power take-off engagement and the power take-off brake, and must always be conducted thoroughly.

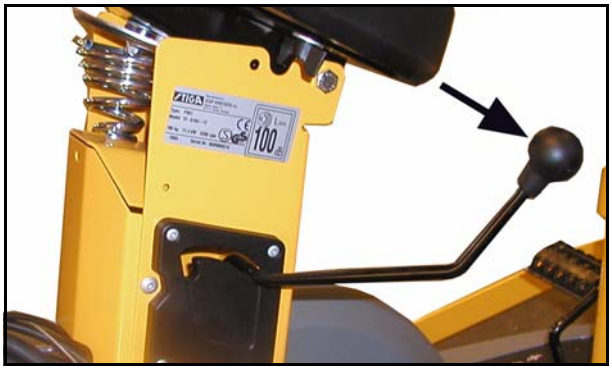
Warning!

The power take-off brake is part of the machine's safety system. It is therefore especially important that it is checked and adjusted correctly.

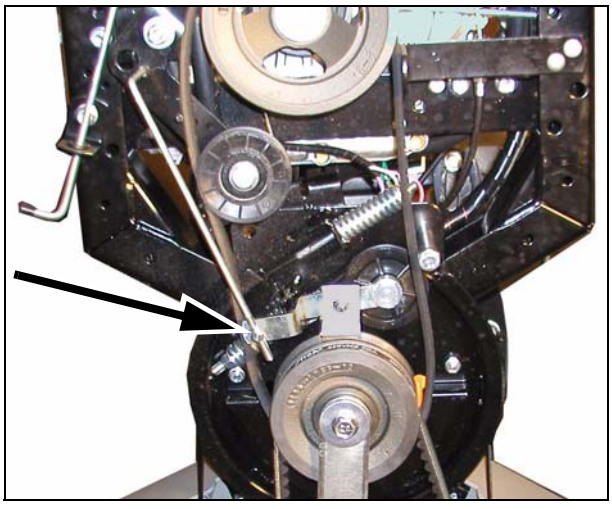


Procedure

1. Disengage the power take-off.

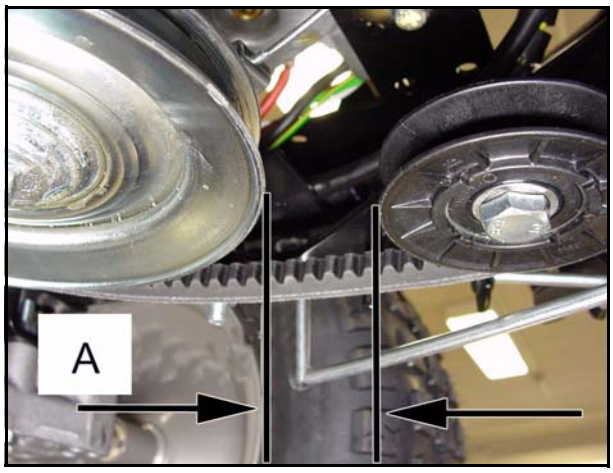


2. Disconnect the brake rod from the brake shoe arm.



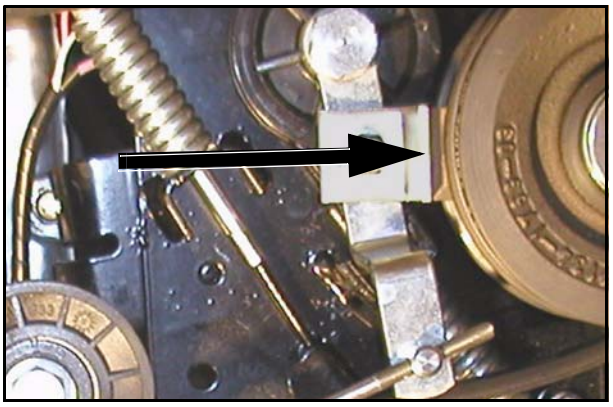
3. Adjust at the wire adjusting sleeves until the space (A) between the tension pulley and motor pulley coincide with the table below:

Machine	Measure (A)
2WD machines with the control panel to the right of the operator, e.g. Comfort, Royal, Senator etc.	30 mm
4WD machines with the control panel to the right of the operator, e.g. Comfort, Royal, Senator etc.	35 mm
Compact	20 mm



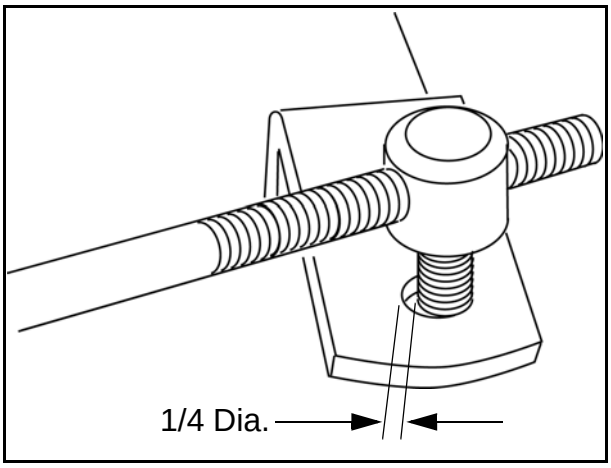
Warning!

It is important that the movement of the tensioning arm is always stopped by the brake pad, and not by the engagement wire. If the wire stops the movement, the braking capacity can be completely lost when the parts become worn.



4. Press the brake shoe hard against the pulley.

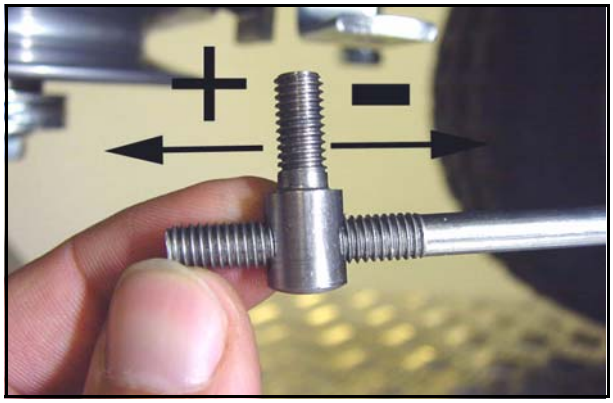
   In this position, 1/4 of the hole shall be visible when the nipple is compared with its hole.



5. Adjust the nipple towards **+** to increase the distance between the tension pulley and the engine belt pulley, or towards **-** to reduce.
6. When 1/4 of the hole is visible, fit the nipple in the hole and assemble the nut as follows:

   A. Screw on and tighten the nut moderately.

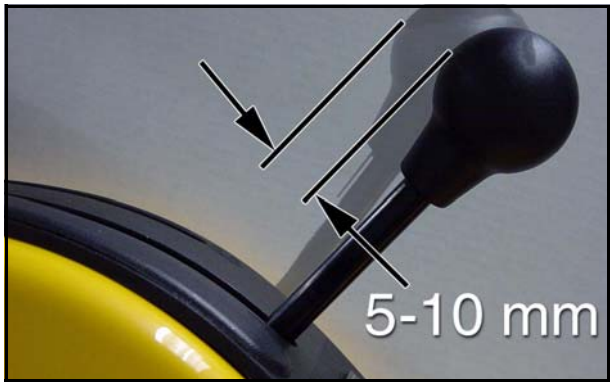
   B. Loosen the nut 1/2 turn.

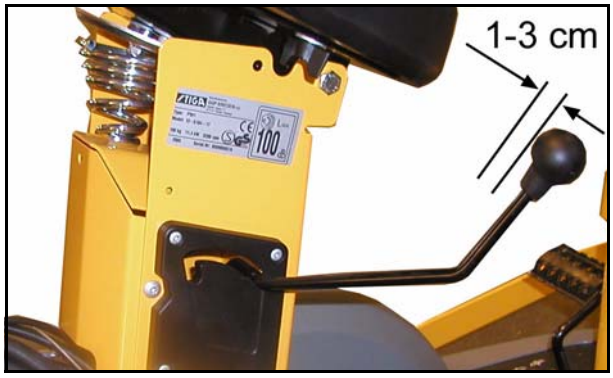


The nipple shall be movable in the hole.

Warning!
If the nipple is tight in its hole, unnormal stress will occour to the mechanical parts.

7. When the adjustment is complete, the following items shall be fulfilled:
   - There is a clearance of 5-10 mm respective 10-30 mm at the engagement lever.
   - Engage the power take-off and check that the brake pad no longer brakes the articulation belt pulley. If the brake pad still brakes the belt pulley, move the nipple some more.
   - The brake pad will never completely leave the groove in the belt pulley. When the brake is correctly adjusted the brake pad should be pulled out approx. 1 mm from the innermost position.
   - Disengage the power take-off and check that the power-take off brake works.
     If everything is correctly adjusted the brake should be applied just enough for the articulation belt pulley to be turned round by hand only with extreme force.





6.8 Differential lock wire

6.8.1 Replacement

Dismantling of differential lock wire

1. Remove the cover over the control panel.
2. Release the nuts at the wire's upper attachment point, unhook the Z nipple from the control arm, and remove the wire from the machine.
3. Release the wire from the tension spring at the arm on the hydrogear.
4. Release the nuts at the wire's lower attachment point, and dismantle the wire from the lever.
5. Do not forget to cut off the bundling strap that holds the cables and wires in the articulation point.
   Notice how the wire is routed, since it simplifies fitting if the new wire is routed in the same way as the old one.

Assembly of differential lock wire

Assemble in the reverse order.

It is often easier to fit the wire from underneath, since the Z nipple is easier to guide correctly through the seat bracket than the spring attachment in the bottom end of the wire.

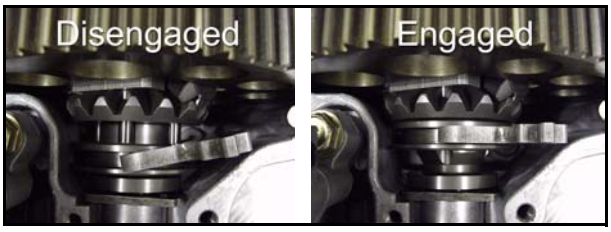
! Note!
Refit all cable holders. See “Cable holders” at page 4.

Follow-up work

Adjustment of differential lock wire,
See below.

6.8.2 Adjustment

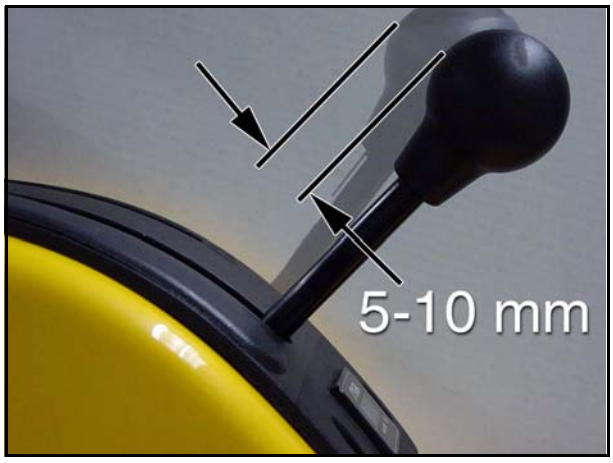
The differential lock is a real lock that locks the two output shafts to improve accessibility in difficult conditions.



The design of the differential lock may make it necessary to turn somewhat for the lock to be disengaged. This is completely normal.

The lock can be used all the time if so required, without the risk of malfunction. However, the machine is more difficult to steer when the differential lock is engaged. The ground can also be damaged when turning with the differential lock engaged.
The manufacturer therefore recommends only using the lock when justified in terms of accessibility.

Procedure



1. Check that there is a play of 5-10 mm in the engagement lever for the differential lock.
   Adjust if necessary.

   ! Note!
   The internal wire is normally used to engage the functions.
   However, the wire casing is used for the differential lock.

2. Adjust the play by using the adjusting screws on the wire. The play can also be adjusted inside the control panel if the trimming allowance is not sufficient.

Follow-up work

Test driving.

7 Electrical System

Contents in this chapter

General

Each machine has its own electrical system, configurated to fit the purpose and demand of the actual machine. The electrical system has two main duties, to maintain the machine safety and to make the different functions easy to handle.

The main part of this chapter consists of trouble shooting of the electrical system to isolate faults and to give information about corrective measures. The electrical system is also described. There are also given instructions about general repair and replacement procedures.

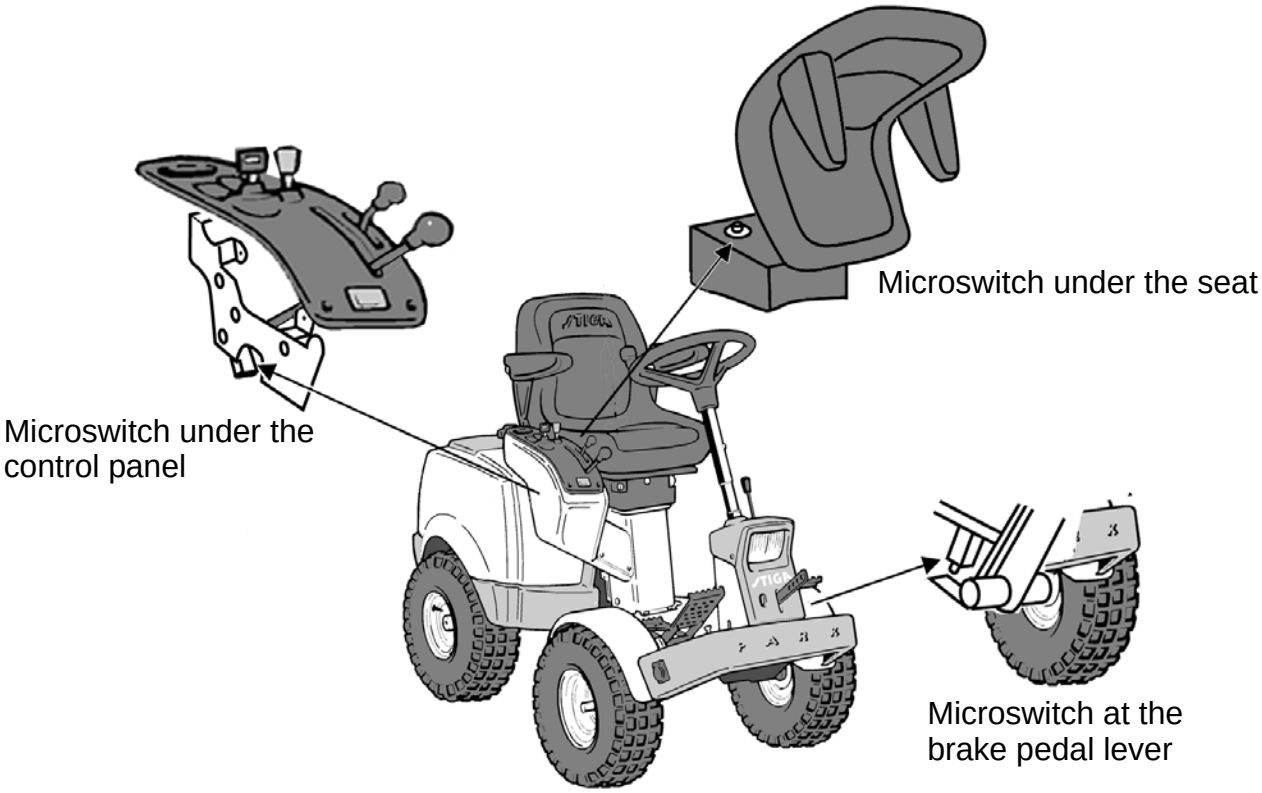
7.1 Description

The electrical components are connected with cables, integrated in a complete insulated harness, which is unique for each machine model. Thus the cables are protected against wear, contaminations and other stresses. The cables are connected to the actual components with tab or screw connectors and in some cases with multi-contact connectors.

The electrical system contains several safety circuits. Therefore actual levers and pedals are provided with micro switches. The micro switches are shown in the figure below. The signals from the micro switches are used to interlock the actual circuit in case of a forbidden manoeuvre attempt. Some manual switches and relays have also built in interlocks, related to the safety system.

The wiring diagrams are presented separately in the respective spare parts manual. To achieve a complete understanding of the electrical system for a certain machine, read also the actual wiring diagram.

All current consumption circuits except the start circuit are protected by 1-3 fuses, depending on the machine model.



7.2 Trouble Shooting

Warning!

Do not wear rings, metallic bracelet, chain round the neck or similar metal objects when working with the electrical system. It can cause short-circuit, burns and fire.

This section describes the trouble shooting procedures in absence of an electrical function. It also describes the correction measures in each actual case. When following the trouble shooting schedules, it is provided that the following states are fulfilled:

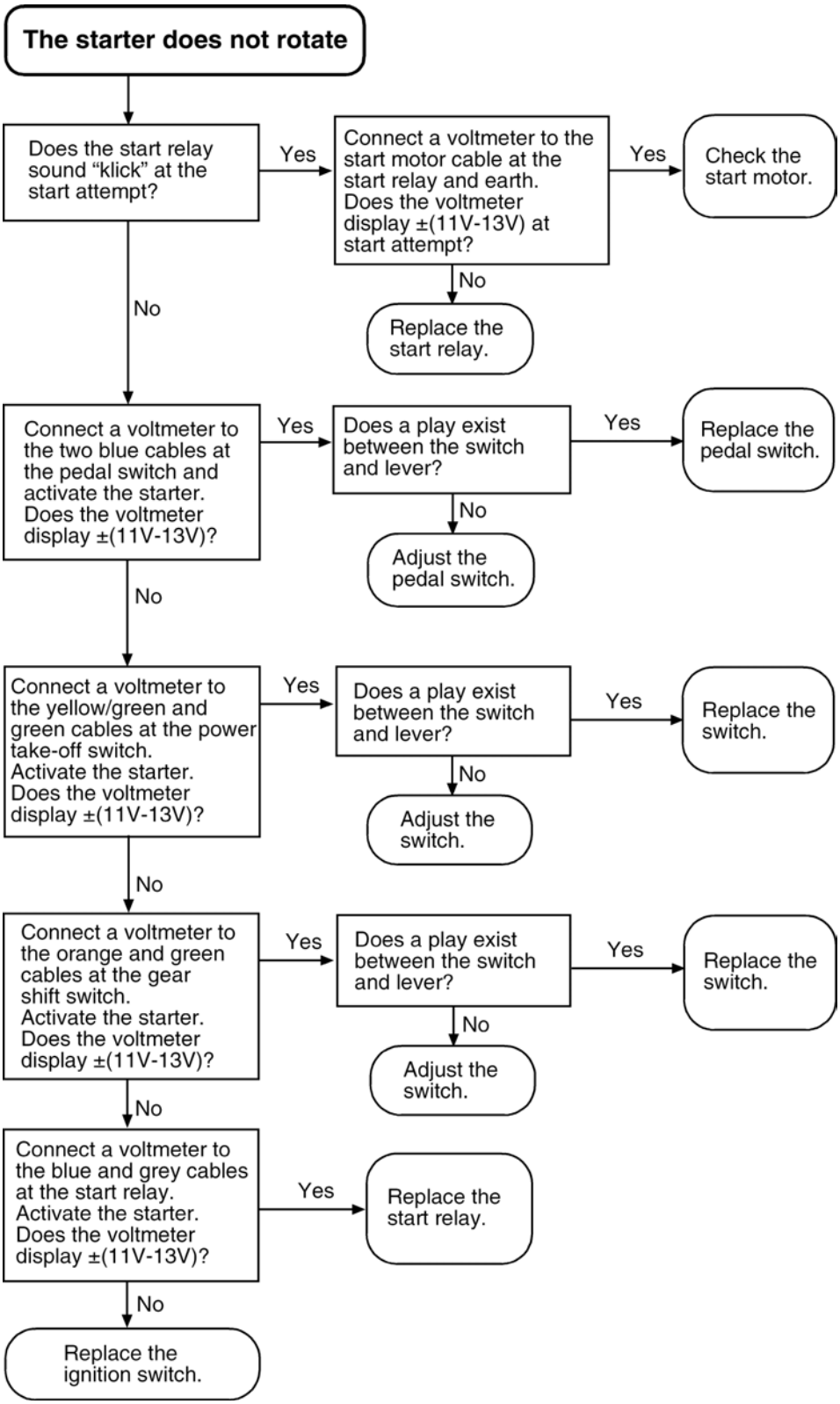
- All fuses are checked and, if necessary replaced.
- The battery shall be charged.
- The requirements for the actual measure shall be fulfilled. E.g. if it is advised to perform a start attempt, the operator shall sit down on the seat, press the brake pedal and the power take off shall be in disengaged position.

When following the trouble shooting shedules, it is in normal cases assumed that conductors and connectors to conductors are OK. However, in some cases, after a long period of use or in case of mechanical damages, the cables at the articulating point can be damaged. The circuit diagrams are presented in the respective spare parts manual.

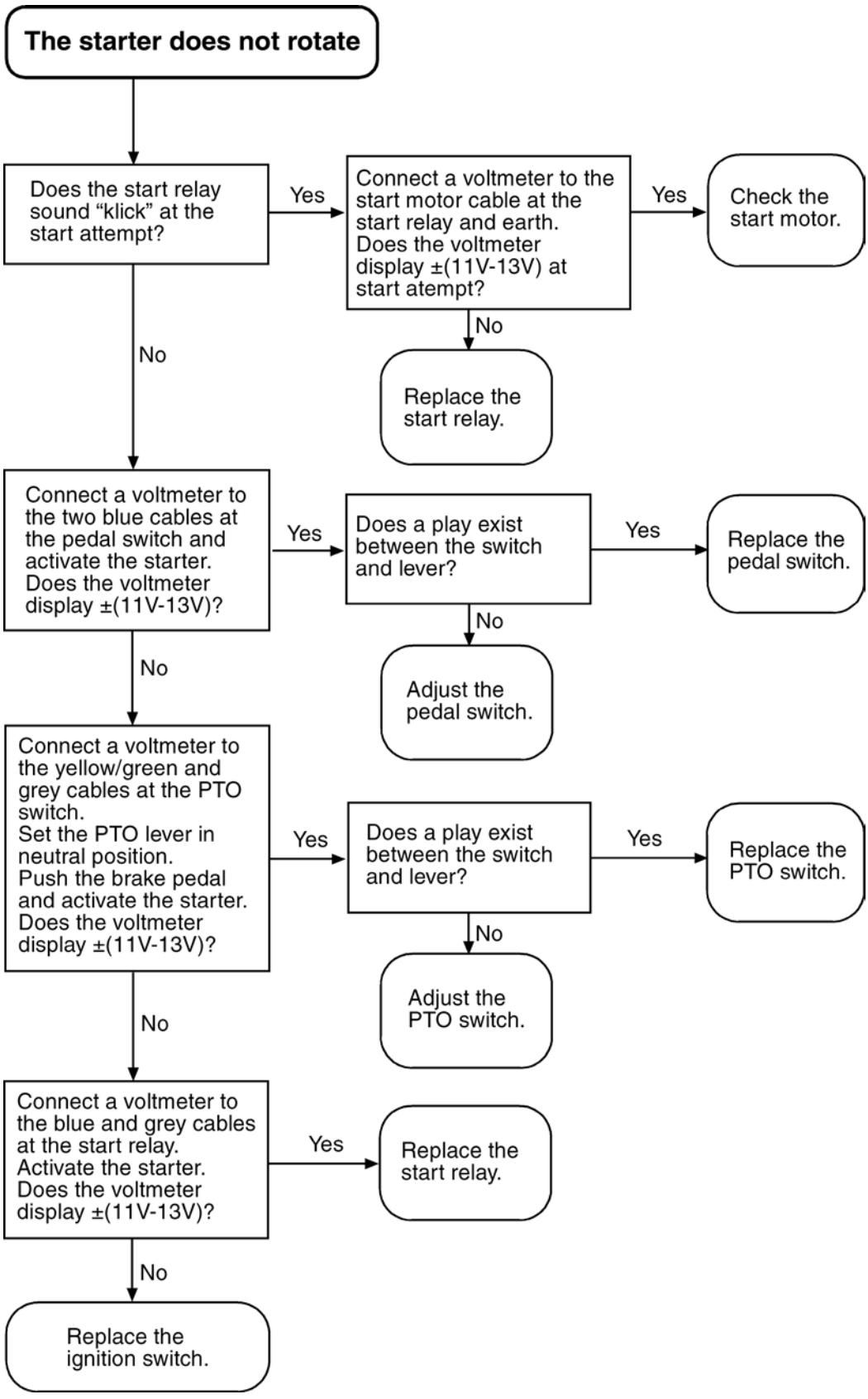
The following operation faults for models 2002-2006 are described.

7.2.17 The starter does not rotate

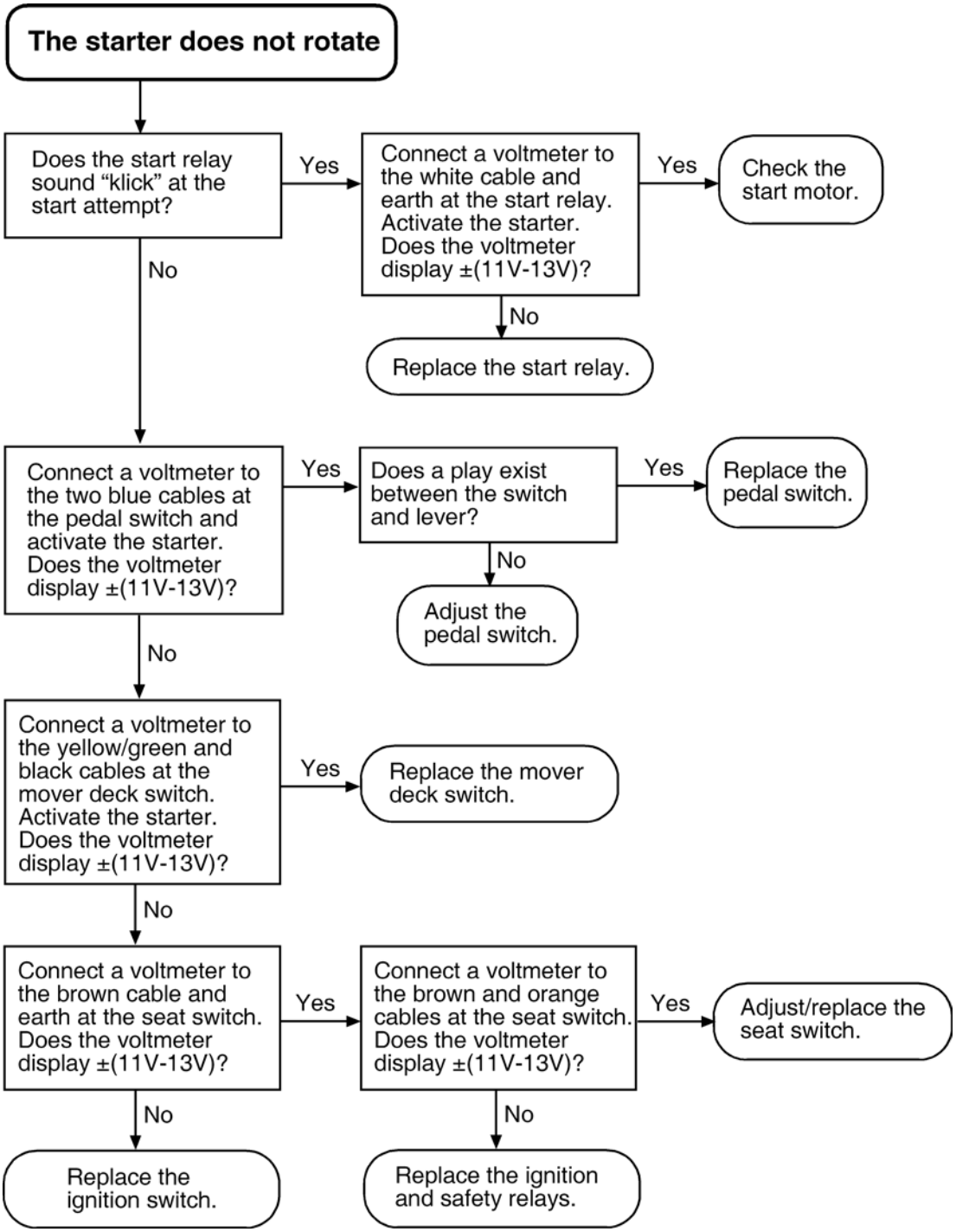
Senator



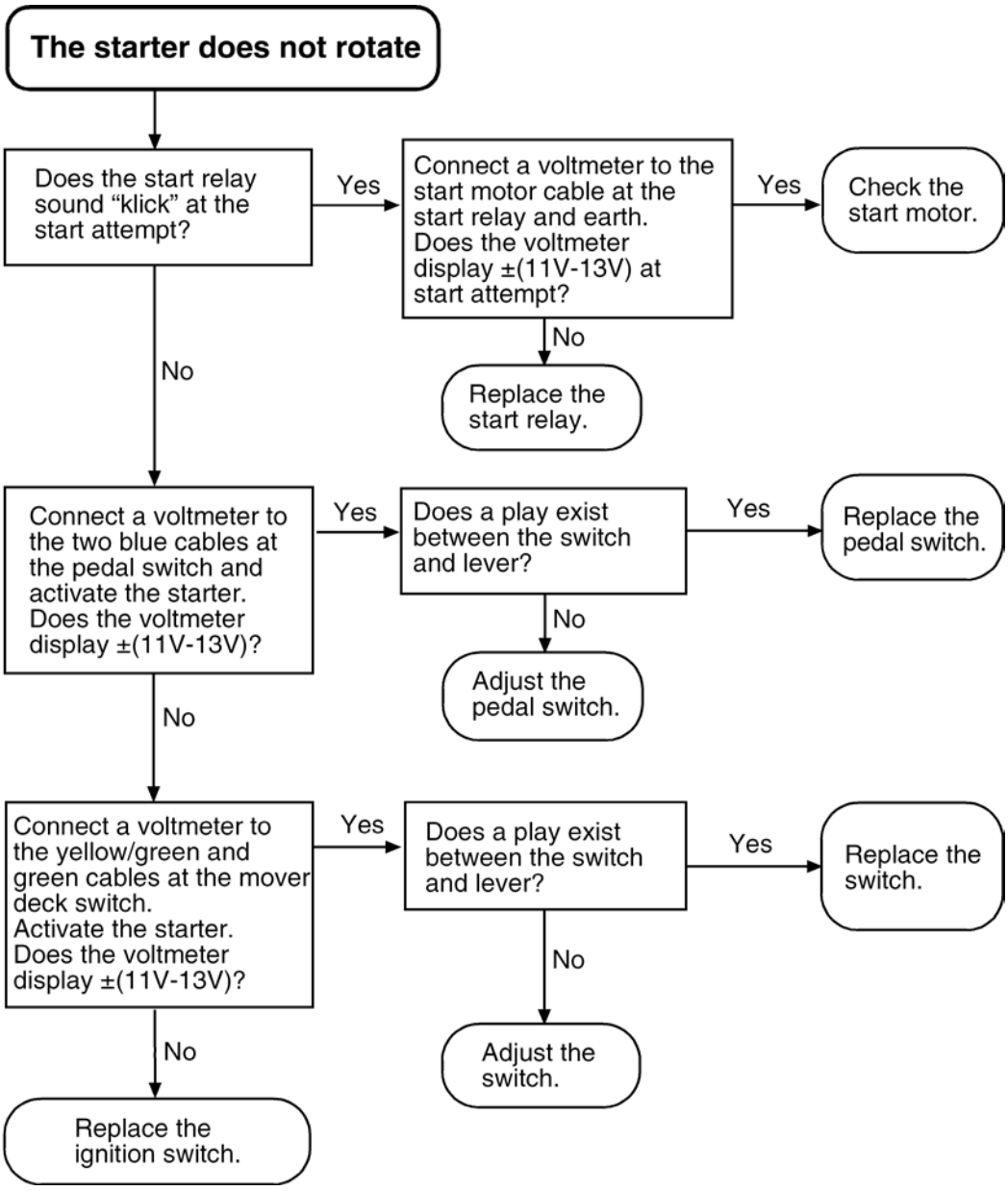
President and Comfort



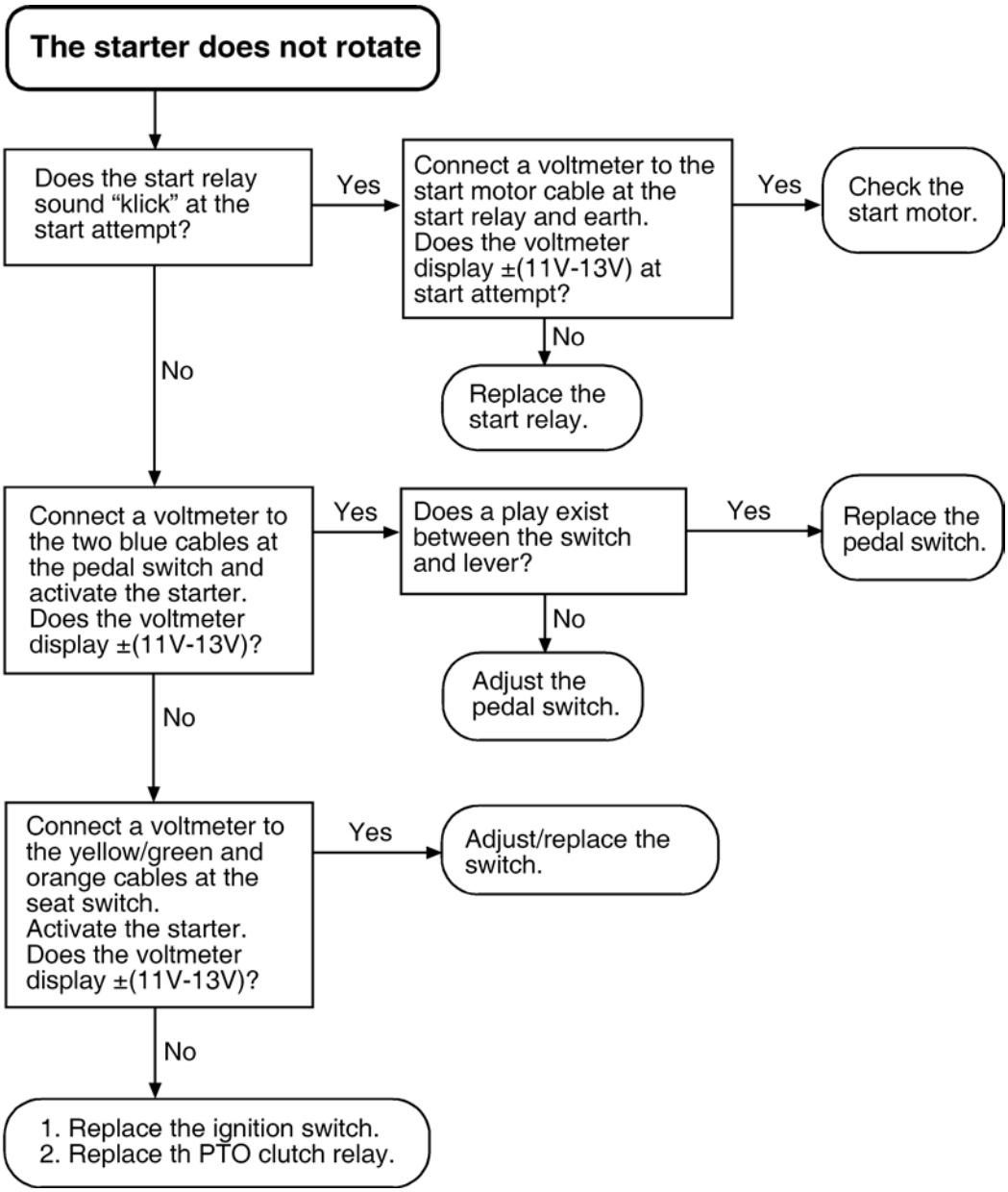
Royal


The starter does not rotate
Does the start relay sound “klick” at the start attempt?
Yes
Connect a voltmeter to the white cable and earth at the start relay. Activate the starter. Does the voltmeter display ±(11V-13V)?
Yes
Check the start motor.
No
Replace the start relay.
No
Connect a voltmeter to the two blue cables at the pedal switch and activate the starter. Does the voltmeter display ±(11V-13V)?
Yes
Does a play exist between the switch and lever?
Yes
Replace the pedal switch.
No
Adjust the pedal switch.
No
Connect a voltmeter to the yellow/green and black cables at the mover deck switch. Activate the starter. Does the voltmeter display ±(11V-13V)?
Yes
Replace the mover deck switch.
No
Connect a voltmeter to the brown cable and earth at the seat switch. Does the voltmeter display ±(11V-13V)?
Yes
Connect a voltmeter to the brown and orange cables at the seat switch. Does the voltmeter display ±(11V-13V)?
Yes
Adjust/replace the seat switch.
No
Replace the ignition switch.
No
Replace the ignition and safety relays.

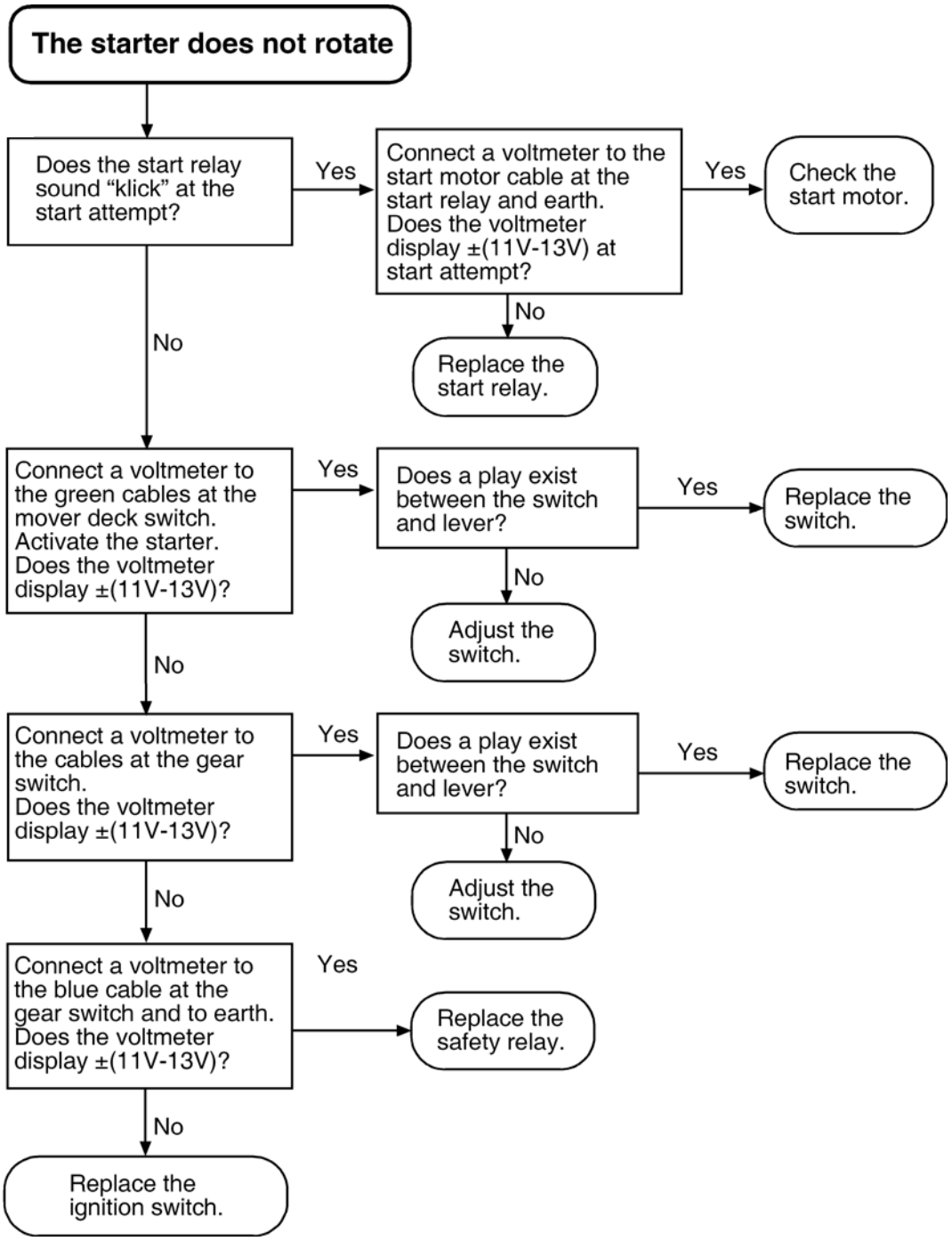
Pro 16, 2WD


The starter does not rotate
Does the start relay sound “klick” at the start attempt?
Yes
Connect a voltmeter to the start motor cable at the start relay and earth. Does the voltmeter display ±(11V-13V) at start attempt?
Yes
Check the start motor.
No
Replace the start relay.
No
Connect a voltmeter to the two blue cables at the pedal switch and activate the starter. Does the voltmeter display ±(11V-13V)?
Yes
Does a play exist between the switch and lever?
Yes
Replace the pedal switch.
No
Adjust the pedal switch.
No
Connect a voltmeter to the yellow/green and green cables at the mover deck switch. Activate the starter. Does the voltmeter display ±(11V-13V)?
Yes
Does a play exist between the switch and lever?
Yes
Replace the switch.
No
Adjust the switch.
No
Replace the ignition switch.

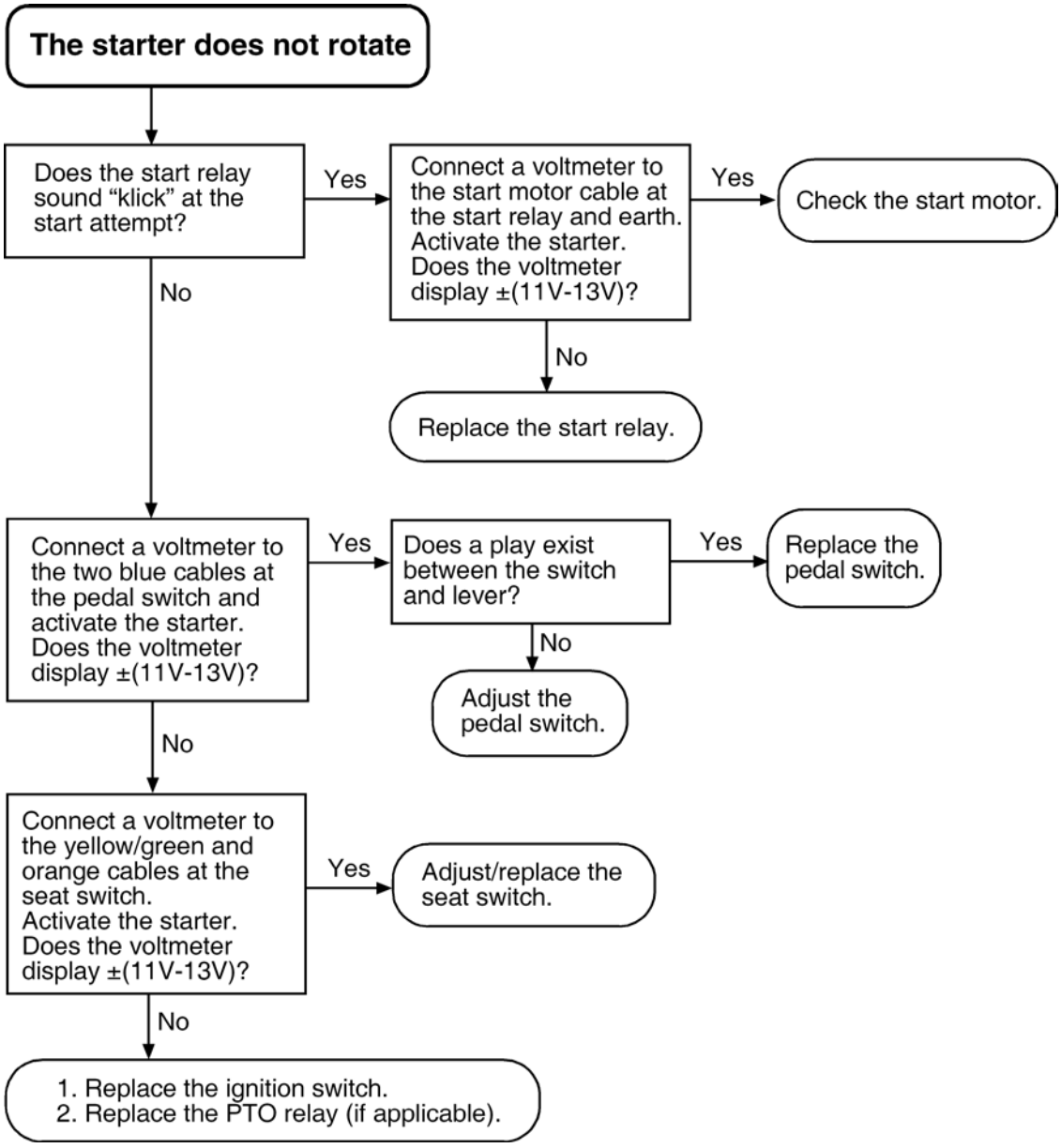
Pro 20, 2WD


The starter does not rotate
Does the start relay sound “klick” at the start attempt?
Yes
Connect a voltmeter to the start motor cable at the start relay and earth. Does the voltmeter display ±(11V-13V) at start attempt?
Yes
Check the start motor.
No
Replace the start relay.
No
Connect a voltmeter to the two blue cables at the pedal switch and activate the starter. Does the voltmeter display ±(11V-13V)?
Yes
Does a play exist between the switch and lever?
Yes
Replace the pedal switch.
No
Adjust the pedal switch.
No
Connect a voltmeter to the yellow/green and orange cables at the seat switch. Activate the starter. Does the voltmeter display ±(11V-13V)?
Yes
Adjust/replace the switch.
No
1. Replace the ignition switch.
2. Replace th PTO clutch relay.

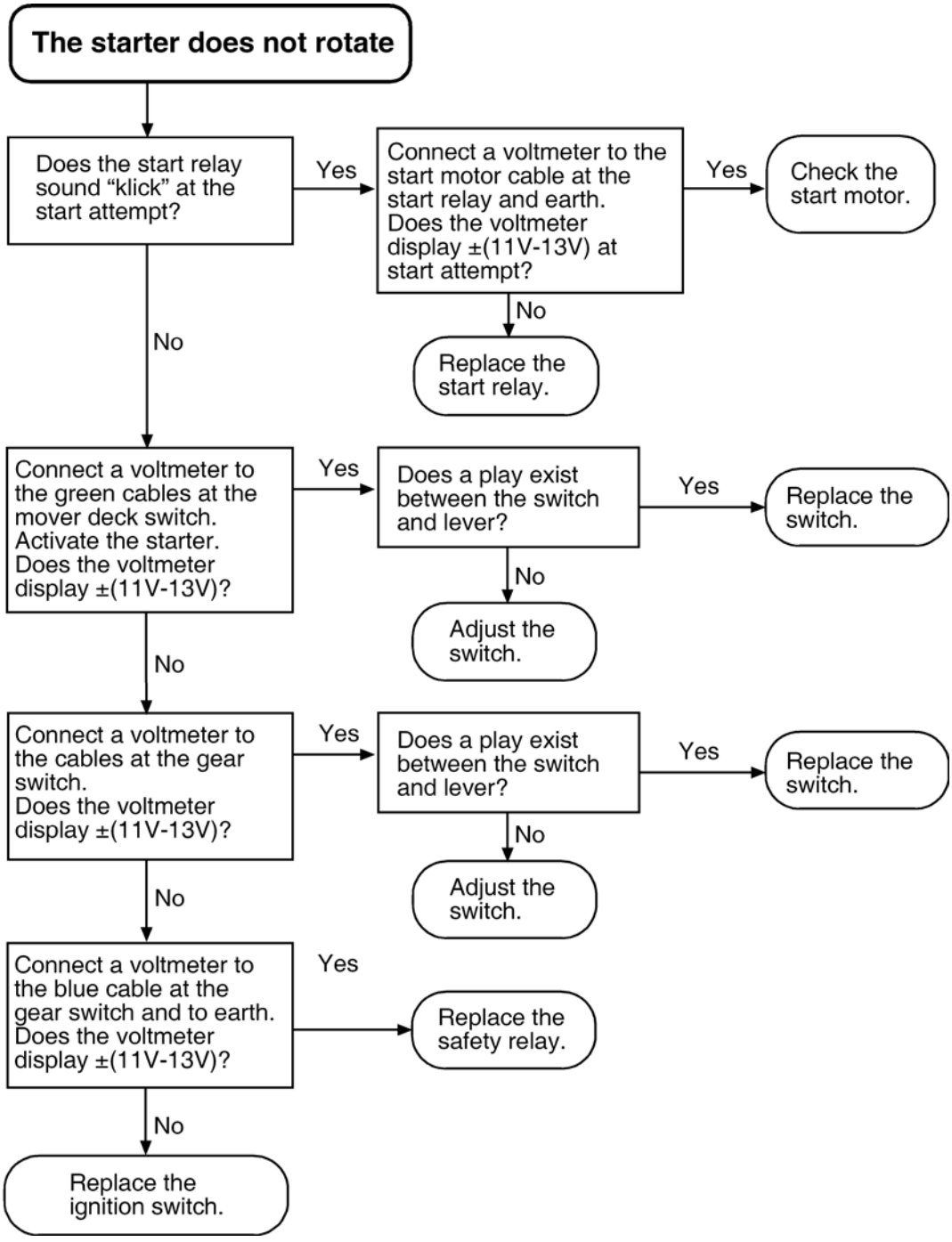
Pro Diesel, 2WD



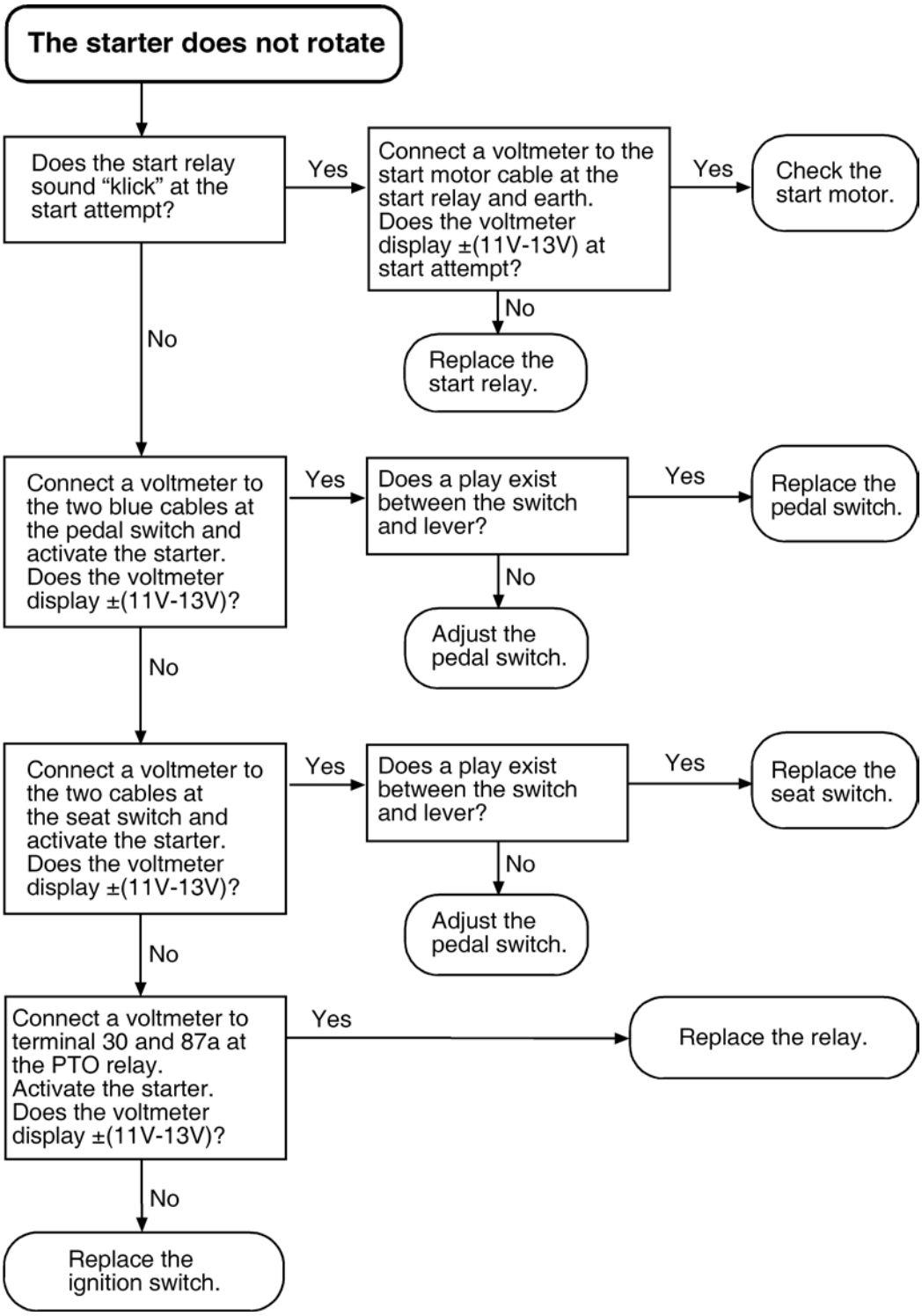
Compact, HST


The starter does not rotate
Does the start relay sound “klick” at the start attempt?
Yes
Connect a voltmeter to the start motor cable at the start relay and earth. Activate the starter. Does the voltmeter display ±(11V-13V)?
Yes
Check the start motor.
No
Replace the start relay.
No
Connect a voltmeter to the two blue cables at the pedal switch and activate the starter. Does the voltmeter display ±(11V-13V)?
Yes
Does a play exist between the switch and lever?
Yes
Replace the pedal switch.
No
Adjust the pedal switch.
No
Connect a voltmeter to the yellow/green and orange cables at the seat switch. Activate the starter. Does the voltmeter display ±(11V-13V)?
Yes
Adjust/replace the seat switch.
No
1. Replace the ignition switch.
2. Replace the PTO relay (if applicable).

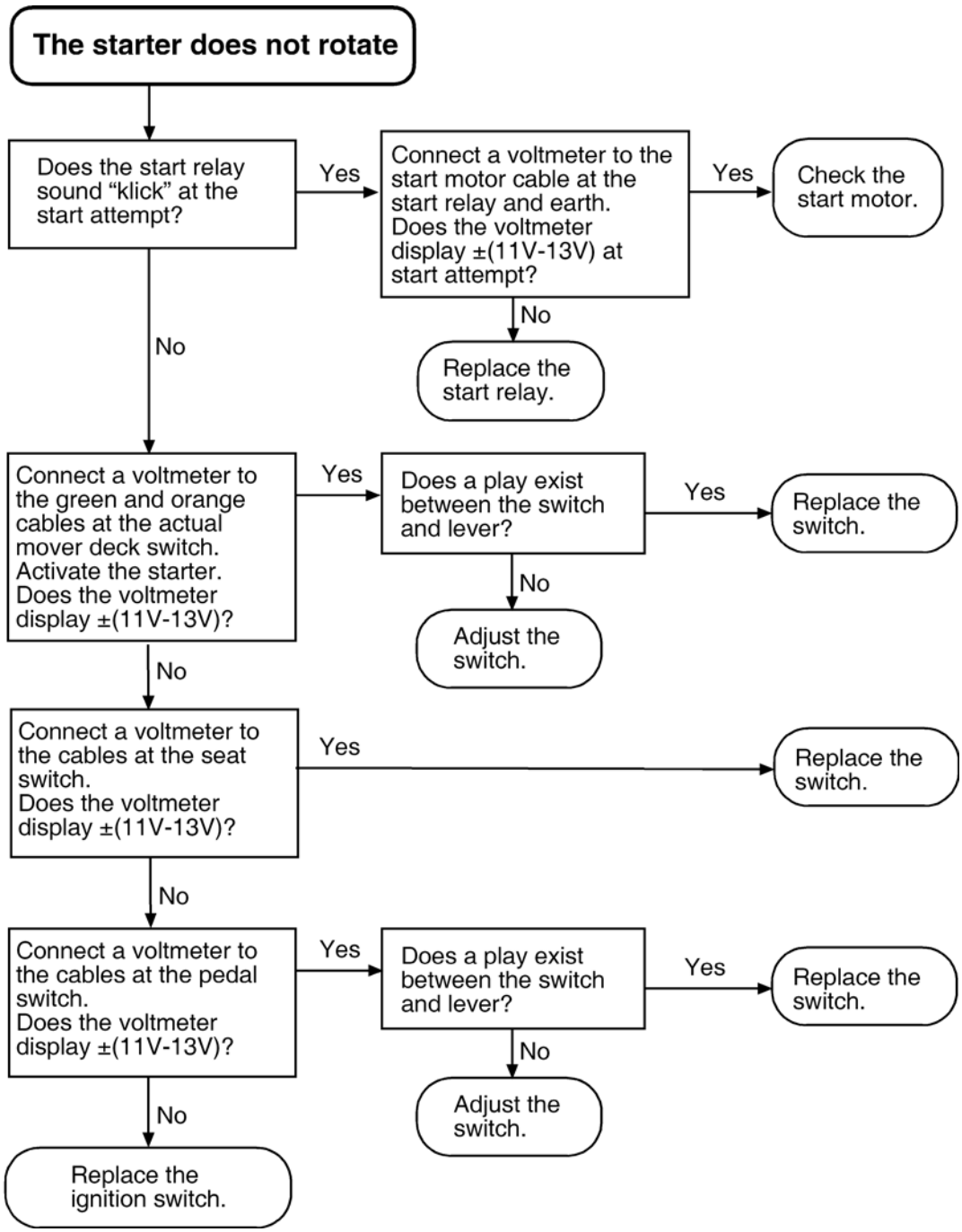
Compact with manual gearbox



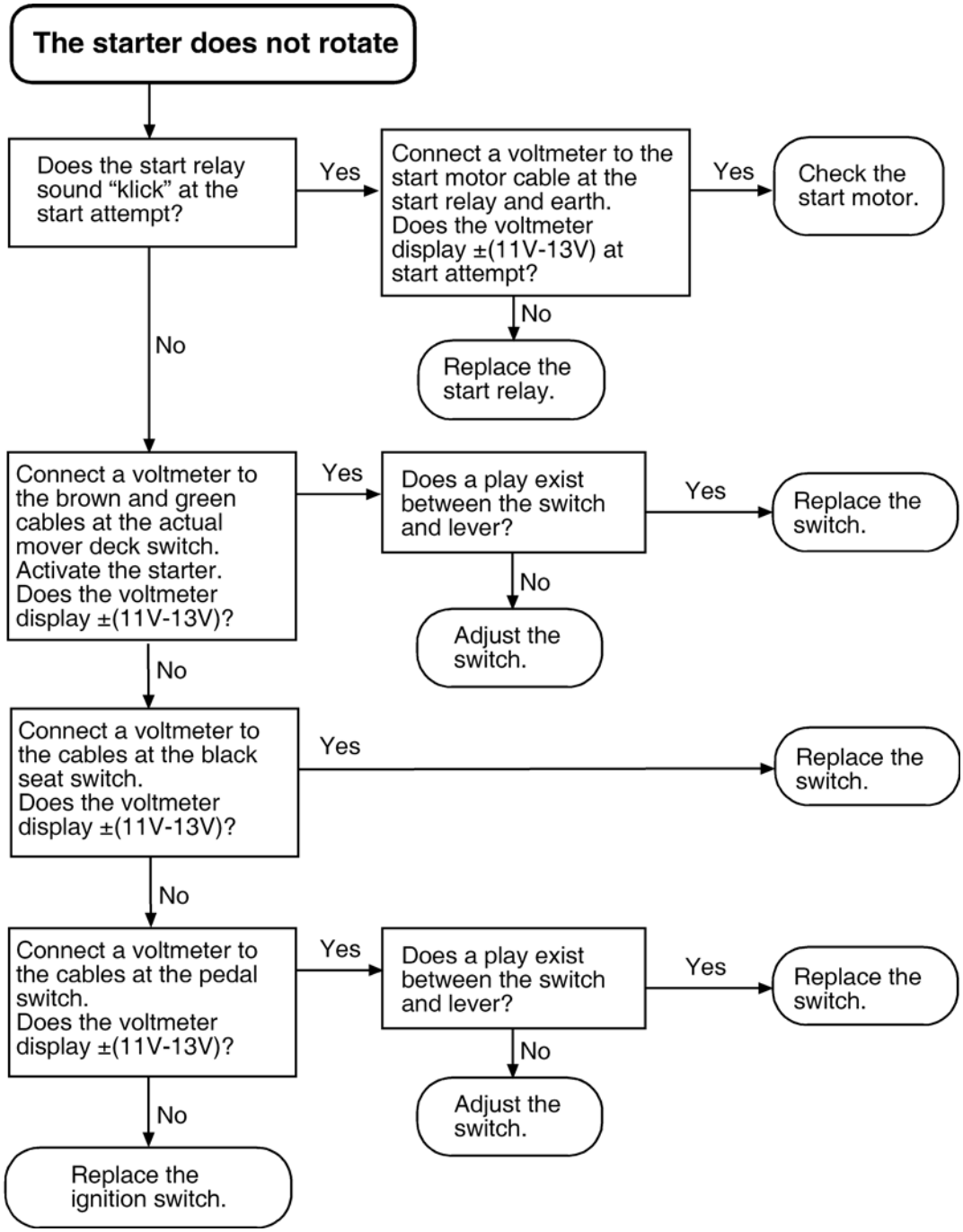
All 4WD Pro


The starter does not rotate
Does the start relay sound “klick” at the start attempt?
Yes
Connect a voltmeter to the start motor cable at the start relay and earth. Does the voltmeter display ±(11V-13V) at start attempt?
Yes
Check the start motor.
No
Replace the start relay.
No
Connect a voltmeter to the two blue cables at the pedal switch and activate the starter. Does the voltmeter display ±(11V-13V)?
Yes
Does a play exist between the switch and lever?
Yes
Replace the pedal switch.
No
Adjust the pedal switch.
No
Connect a voltmeter to the two cables at the seat switch and activate the starter. Does the voltmeter display ±(11V-13V)?
Yes
Does a play exist between the switch and lever?
Yes
Replace the seat switch.
No
Adjust the pedal switch.
No
Connect a voltmeter to terminal 30 and 87a at the PTO relay. Activate the starter. Does the voltmeter display ±(11V-13V)?
Yes
Replace the relay.
No
Replace the ignition switch.

Diesel 4WD, Farmer

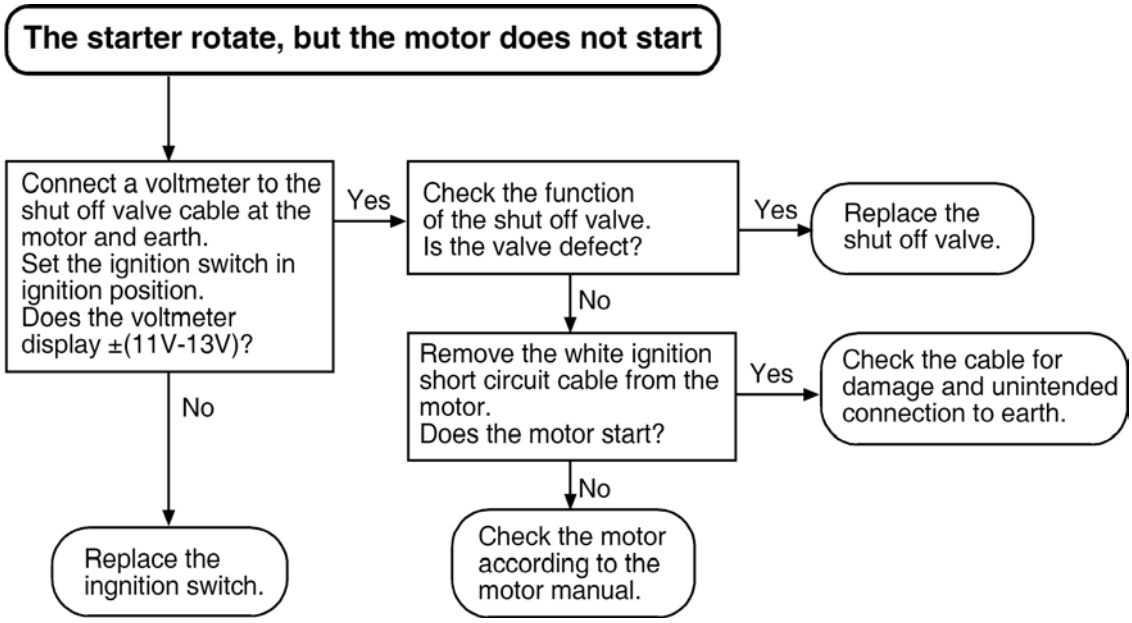


Diesel 2WD from 2005

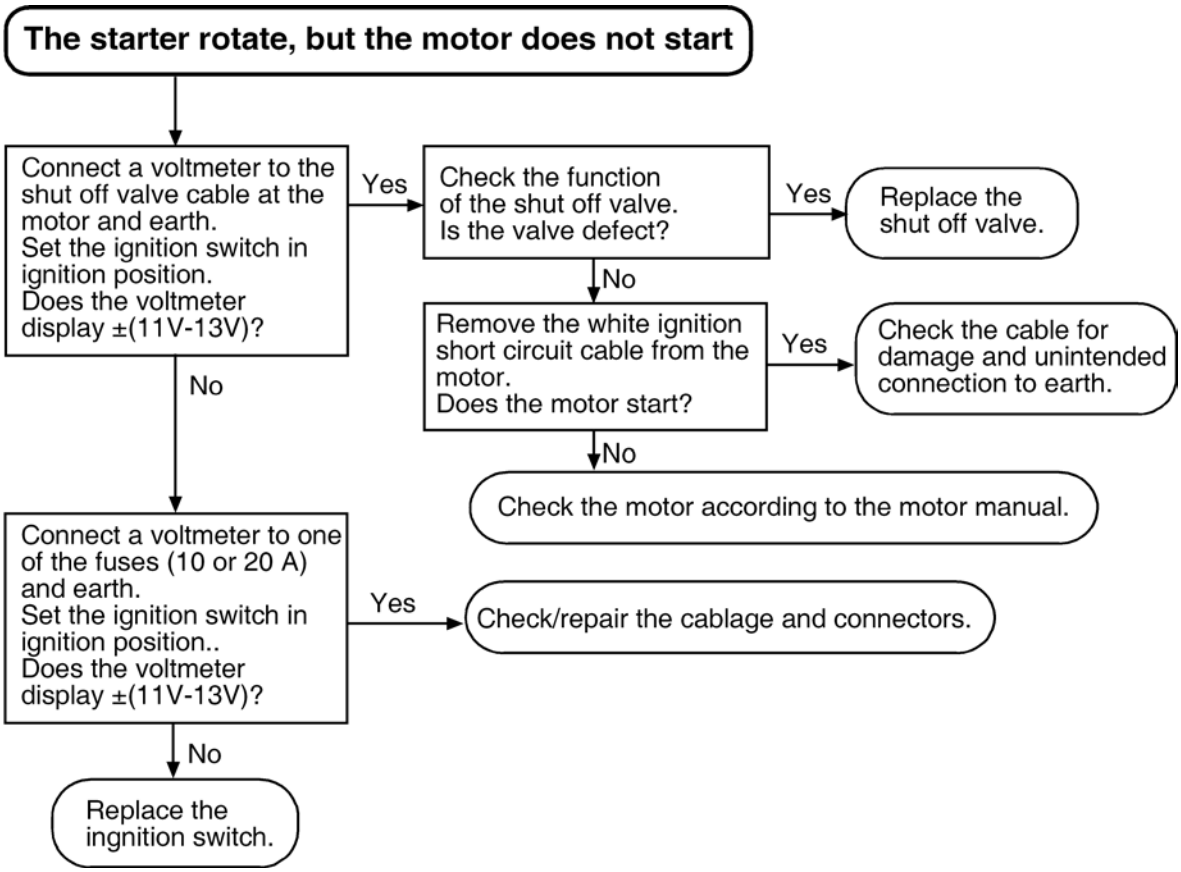


7.2.18 The starter rotate, but the motor does not start

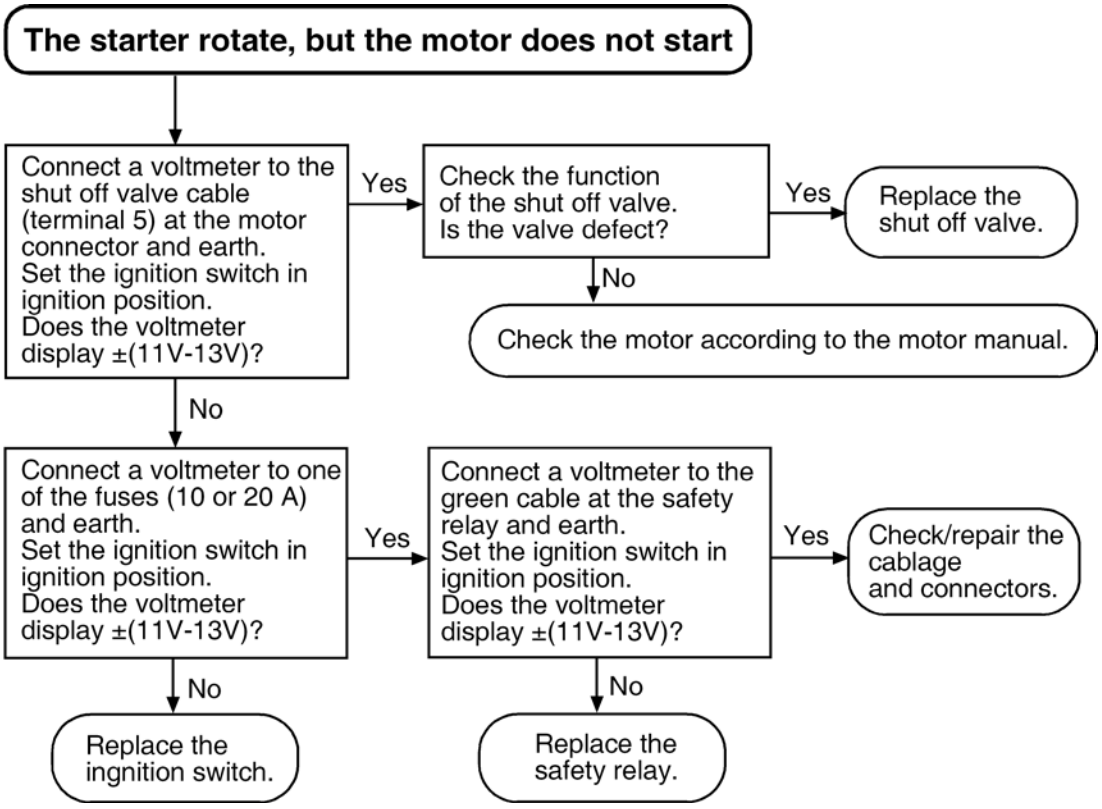
Senator, President and Comfort



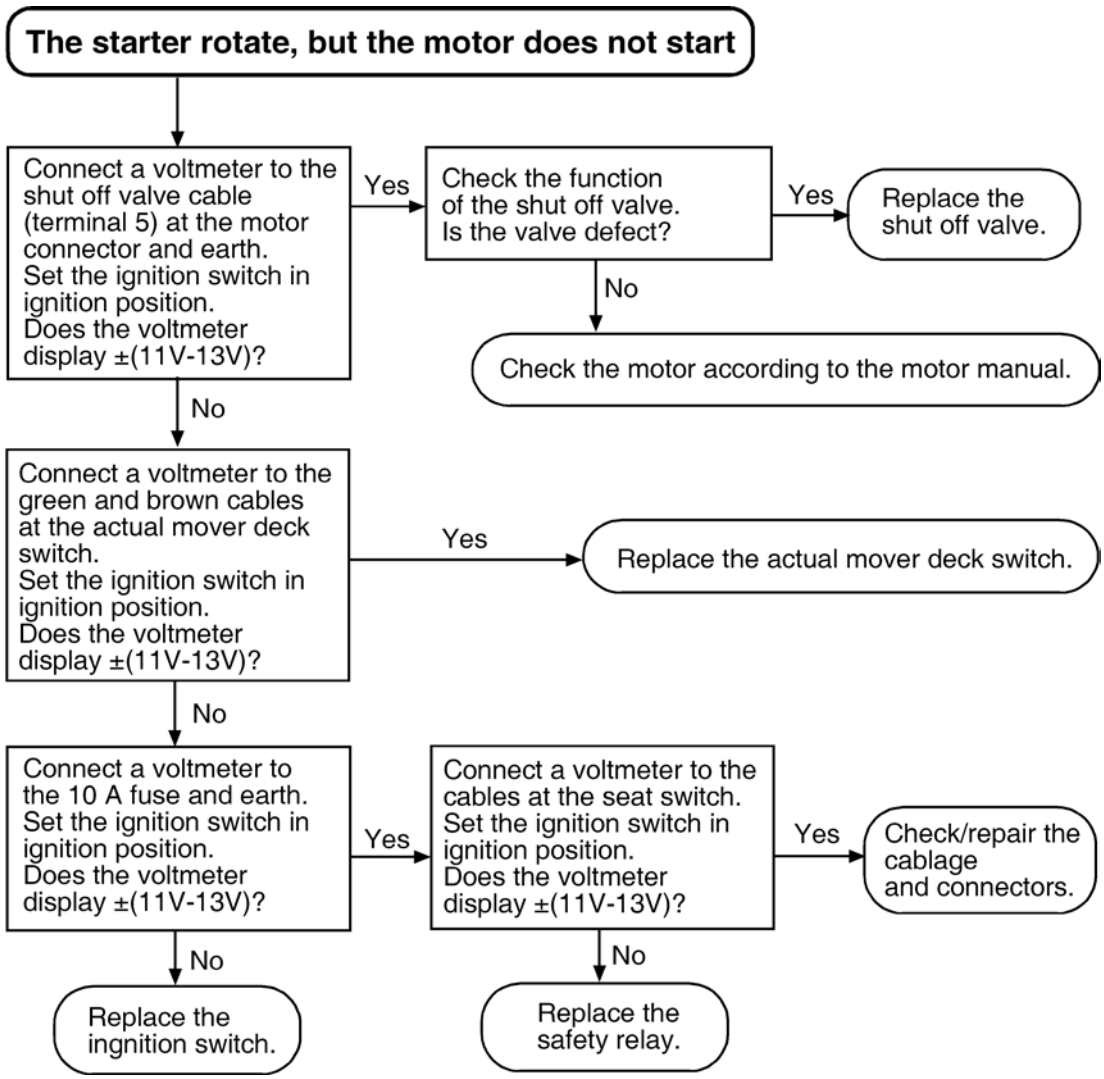
Royal, Pro 2WD up to 2004, Prestige 4WD and Pro 4WD



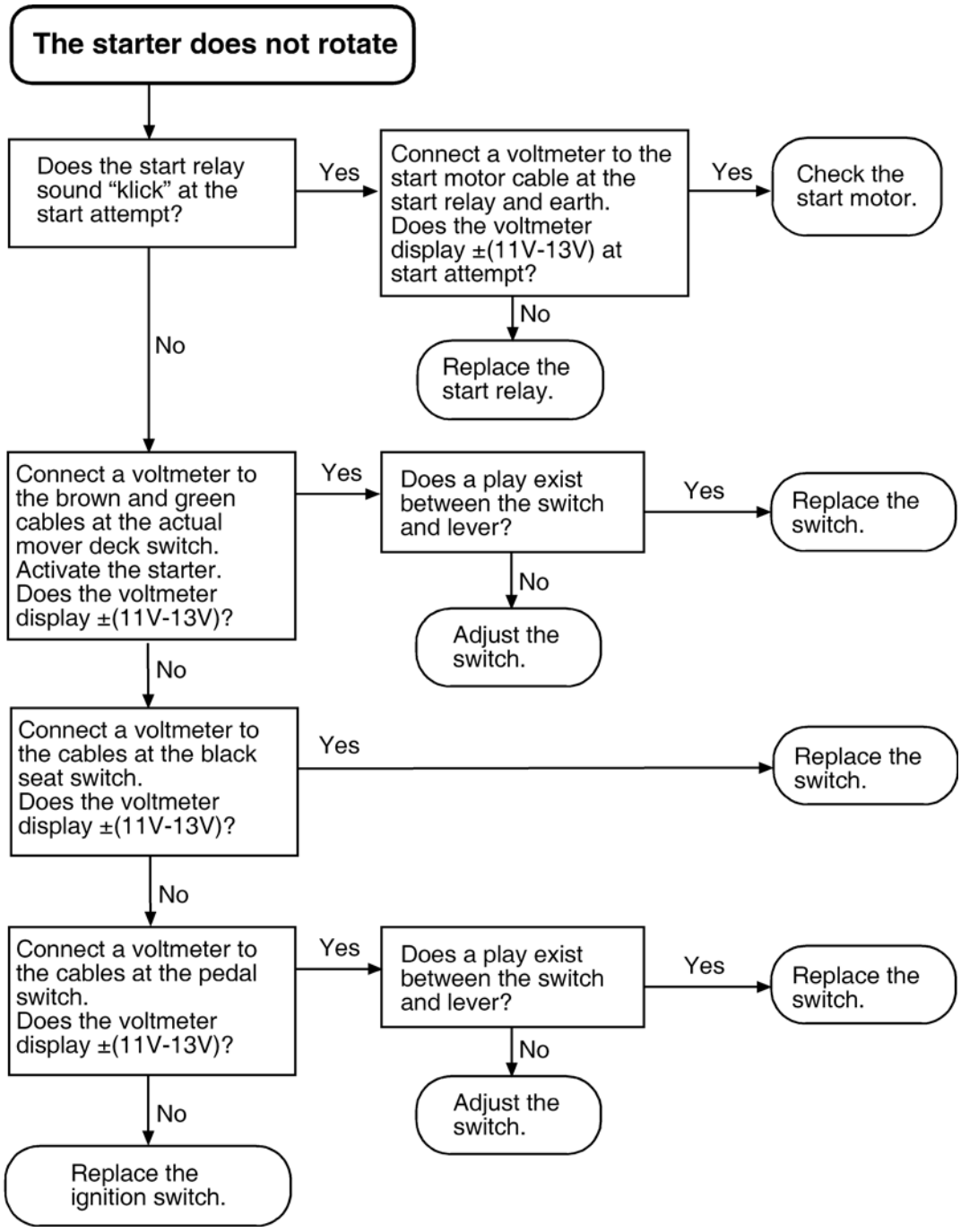
Pro Diesel up to 2004 2WD



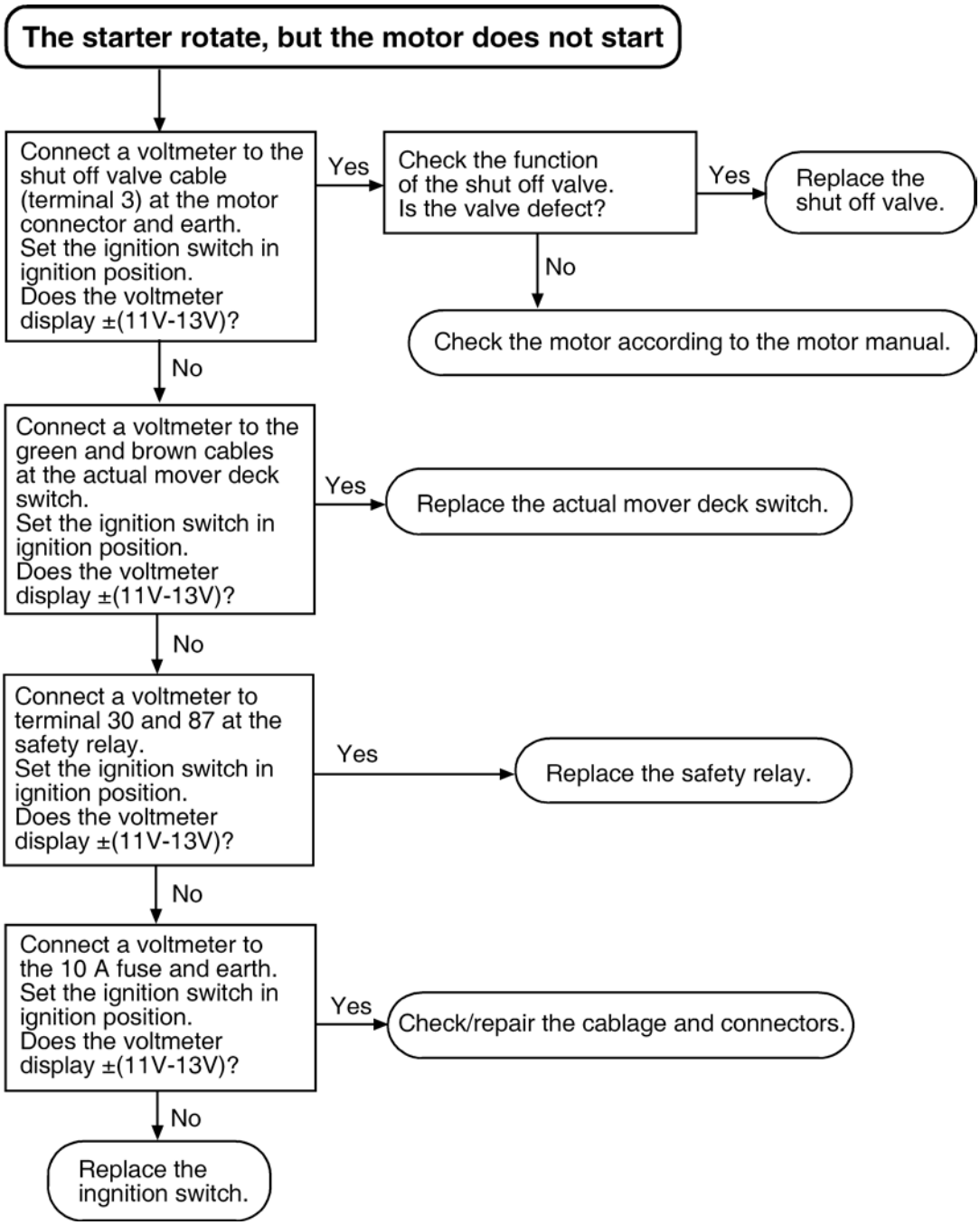
Farmer 2WD Diesel



Diesel 2006 2WD

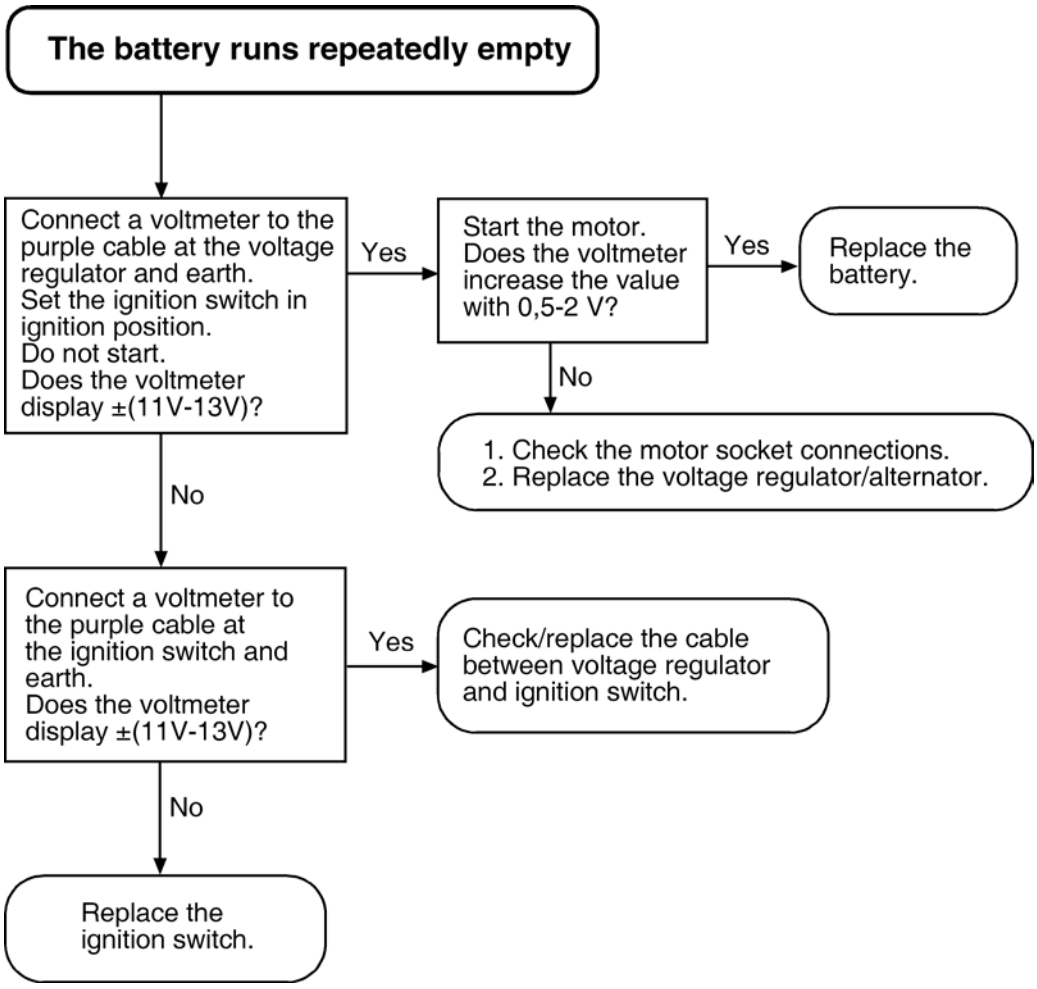


Diesel 2006 4WD

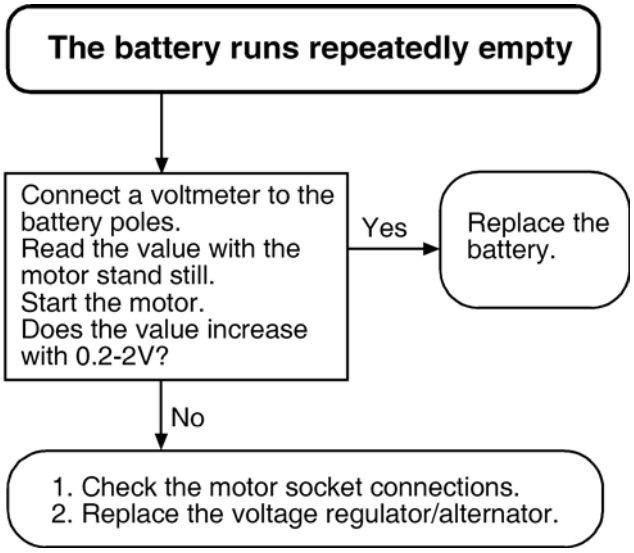


7.2.19 The battery runs repeatedly empty

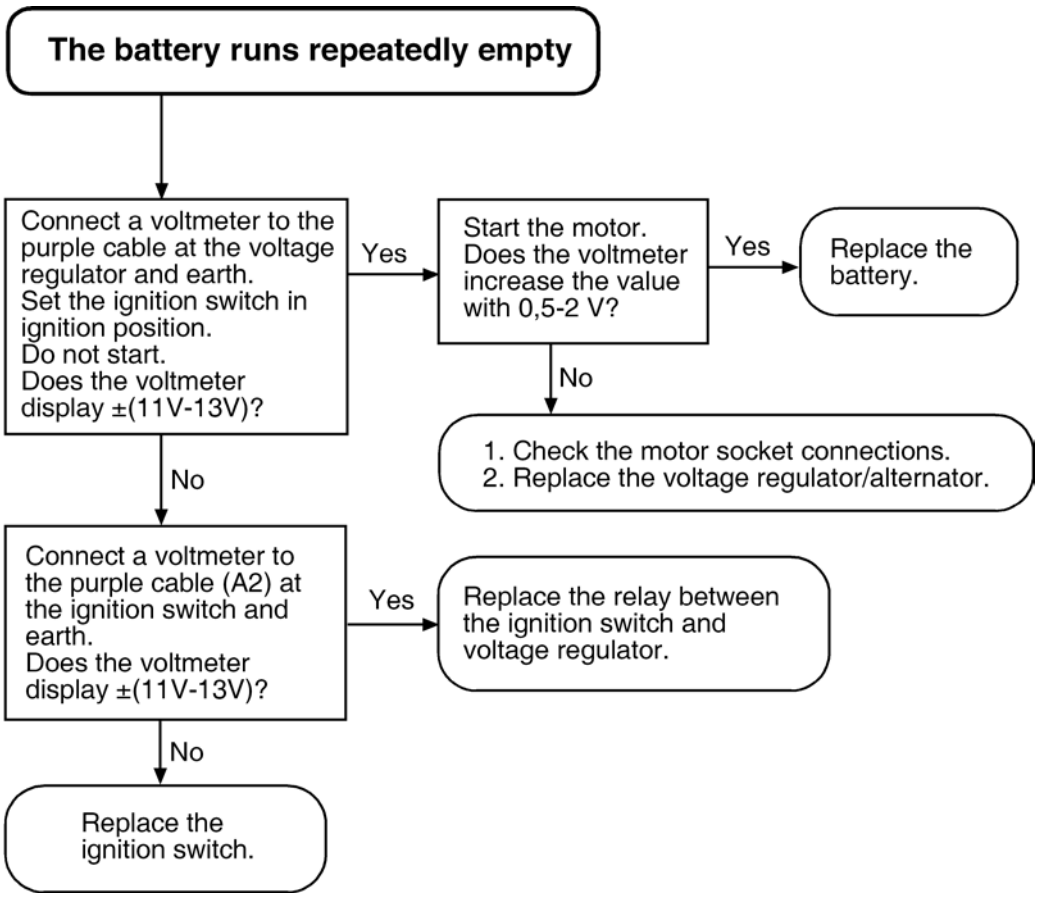
Senator, President, Comfort, Pro 16 2WD, Pro 20 2WD and Compact



Royal and Pro Diesel, Farmer, Diesel 2WD, Diesel 4WD

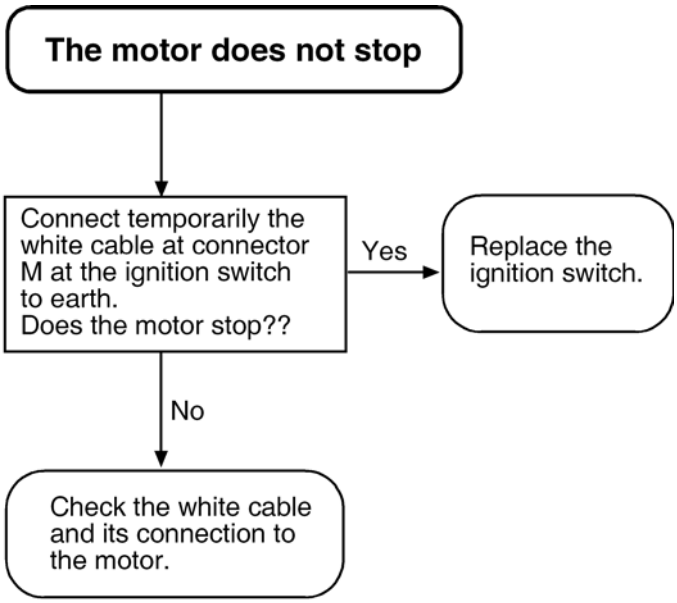


Pro 4WD

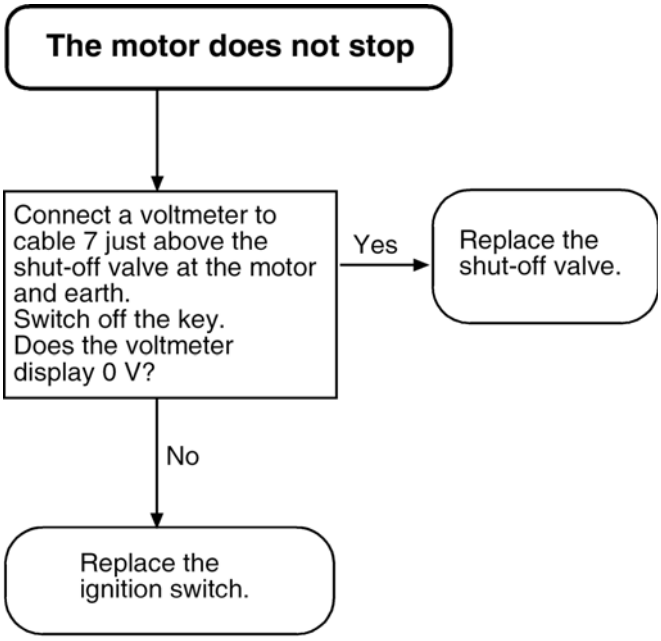


7.2.20 The motor does not stop

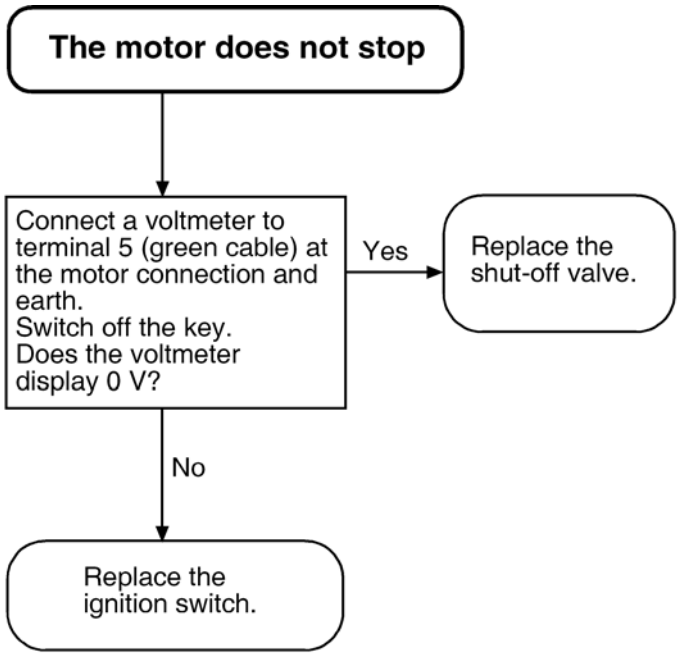
All petrol machines



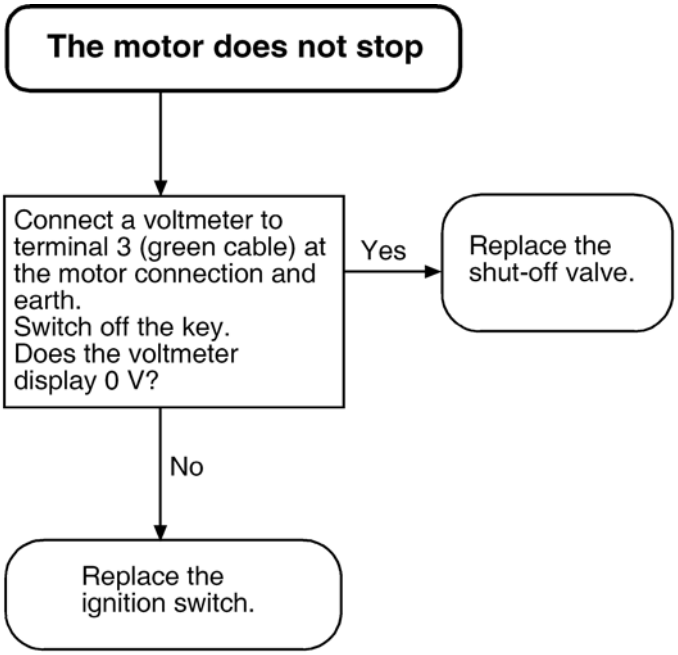
Pro Diesel up to 2004



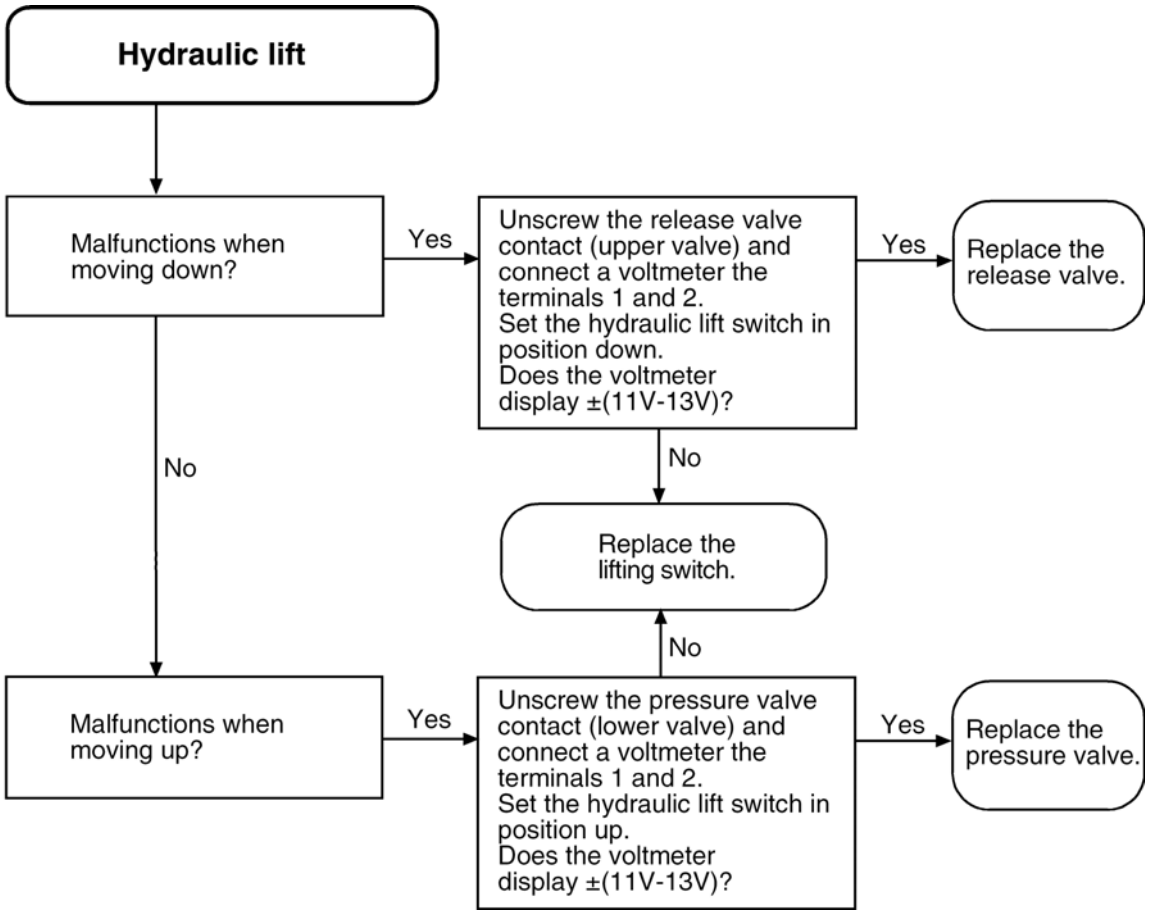
Farmer Diesel



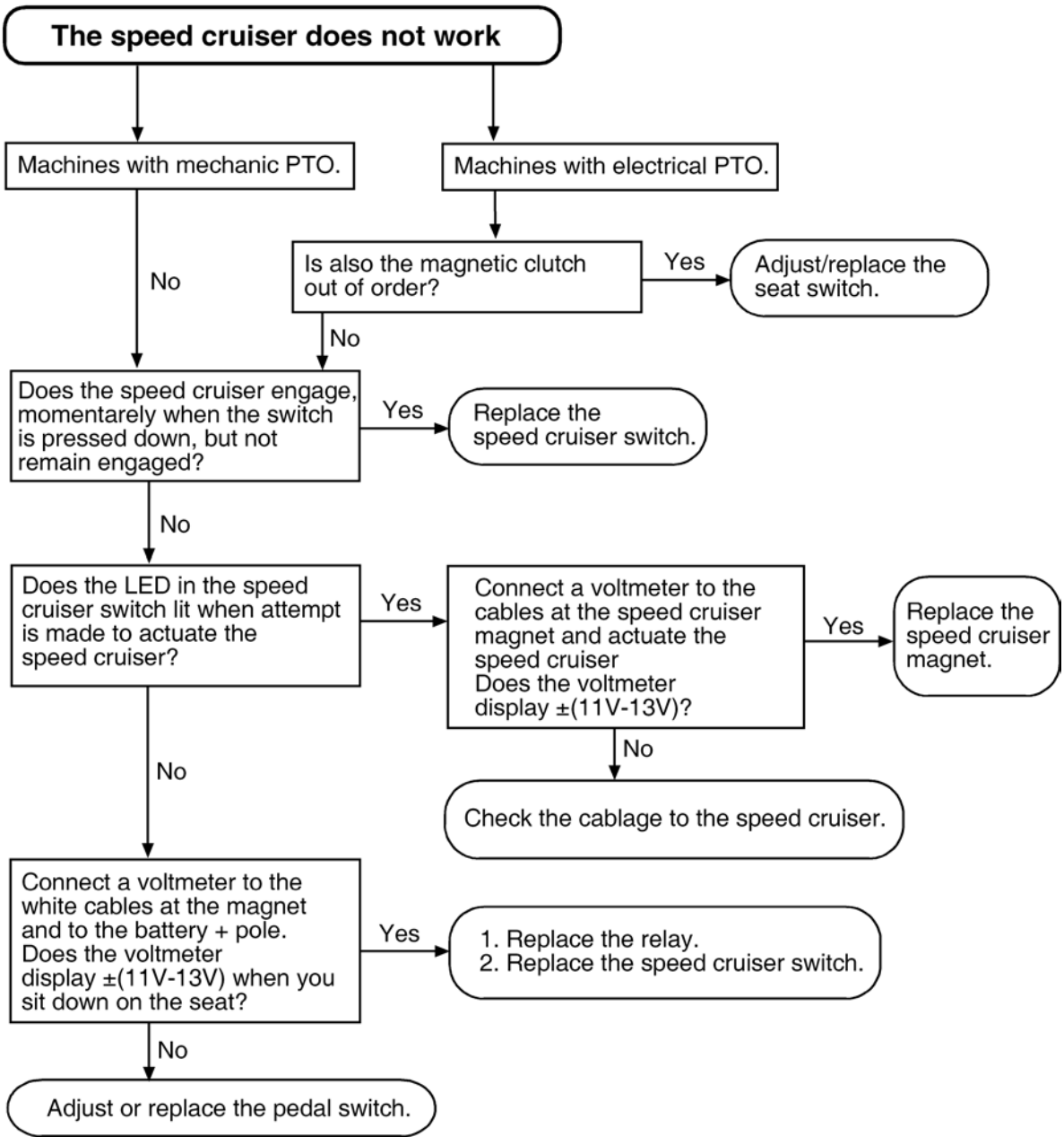
Diesel 2WD and Diesel 4WD from 2005



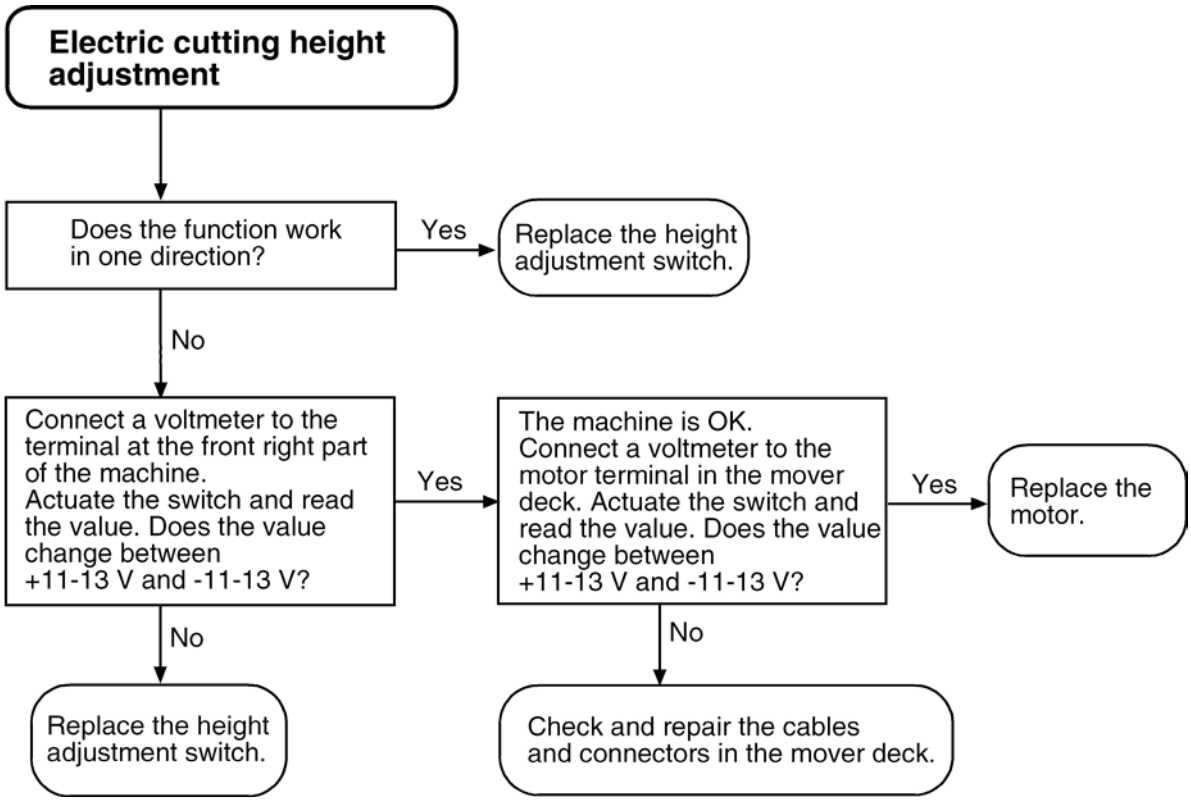
7.2.21 Hydraulic lift



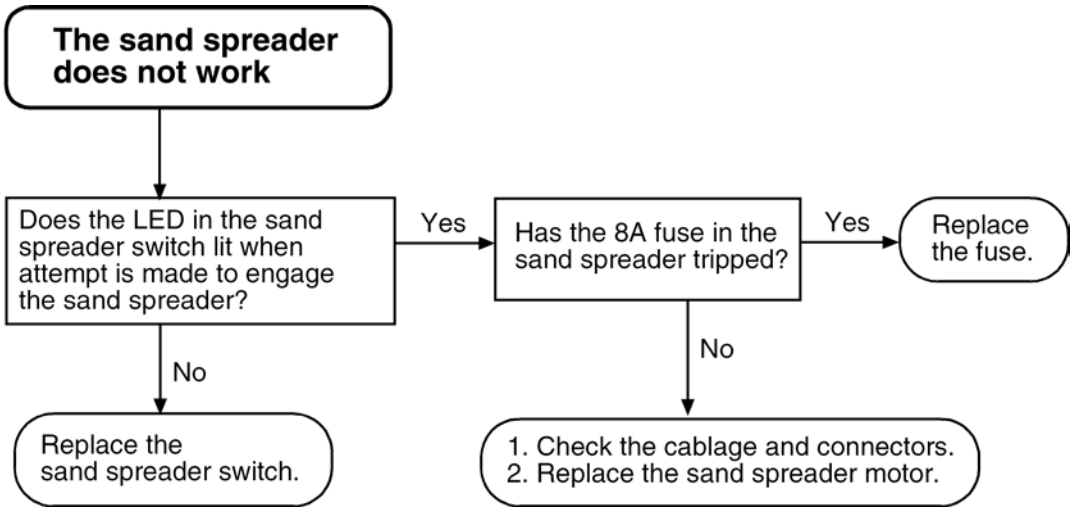
7.2.22 The speed cruiser does not work



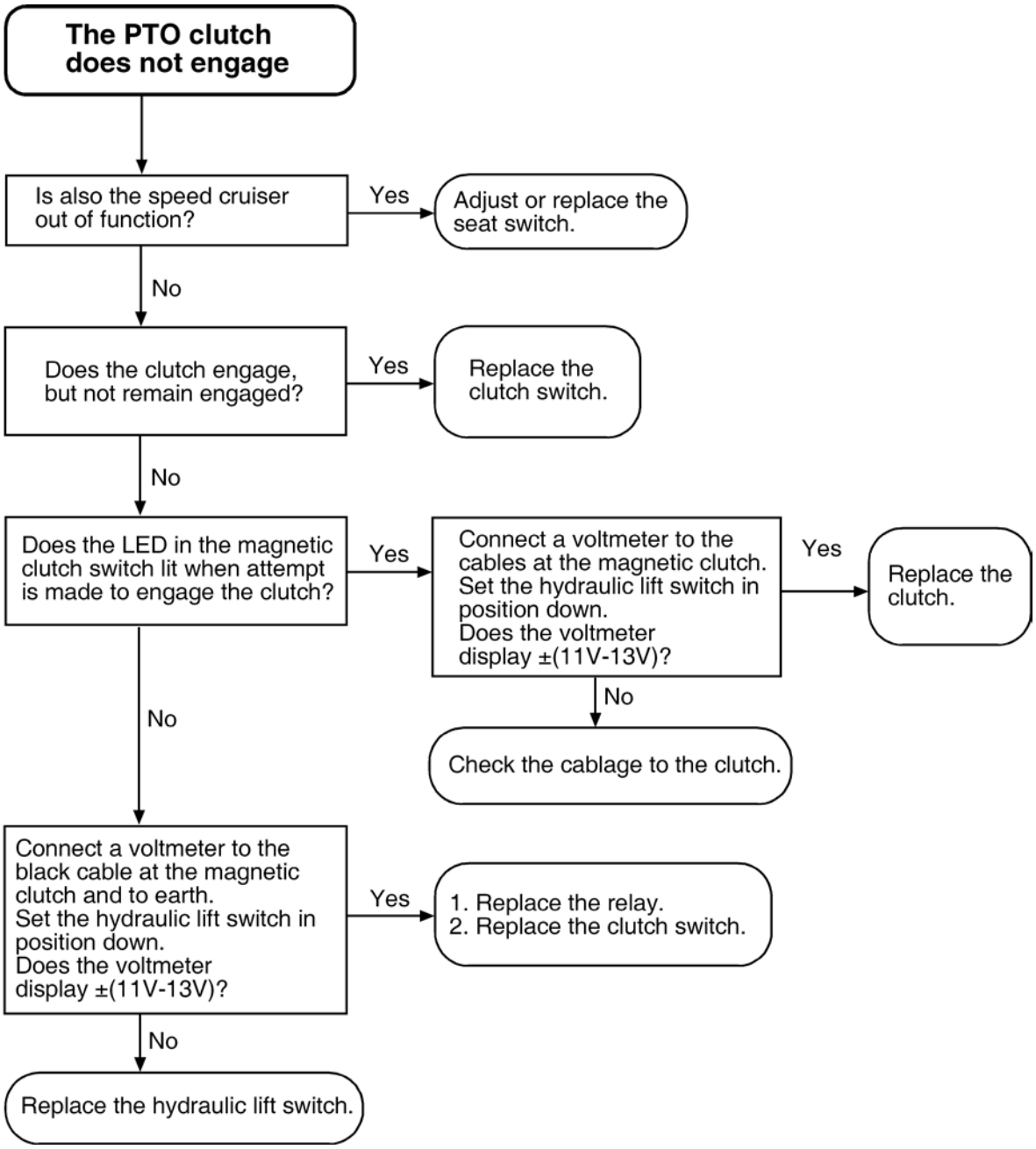
7.2.23 Electric cutting height adjustment



7.2.24 The sand spreader does not work

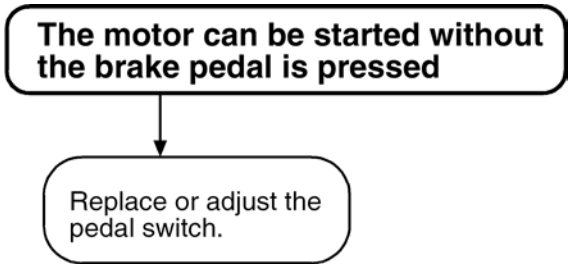


7.2.25 The PTO clutch does not engage



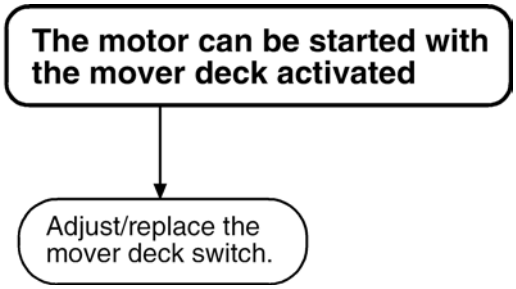
7.2.26 The motor can be started without the brake pedal is pressed

All machines except machines with manual gearboxex



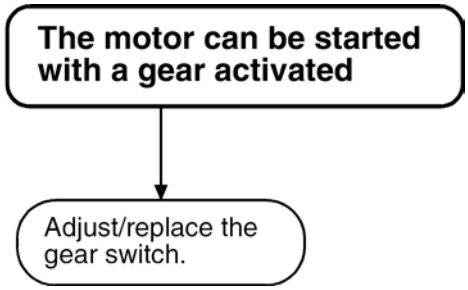
7.2.27 The motor can be started with the mover deck activated

All machines with mechanic PTO



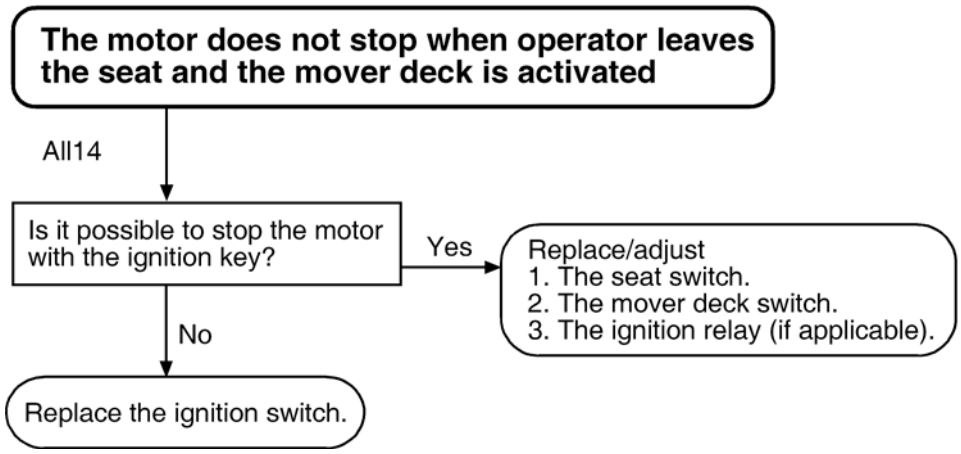
7.2.28 The motor can be started with a gear activated

Machines with manual gearboxes



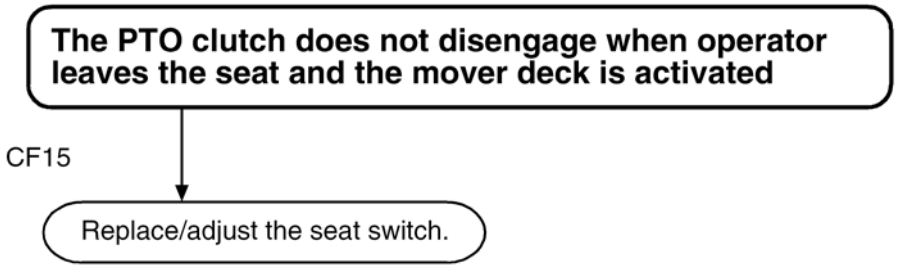
7.2.29 The motor does not stop when the operator leaves the seat and the mover deck is activated

All machines with mechanic PTO

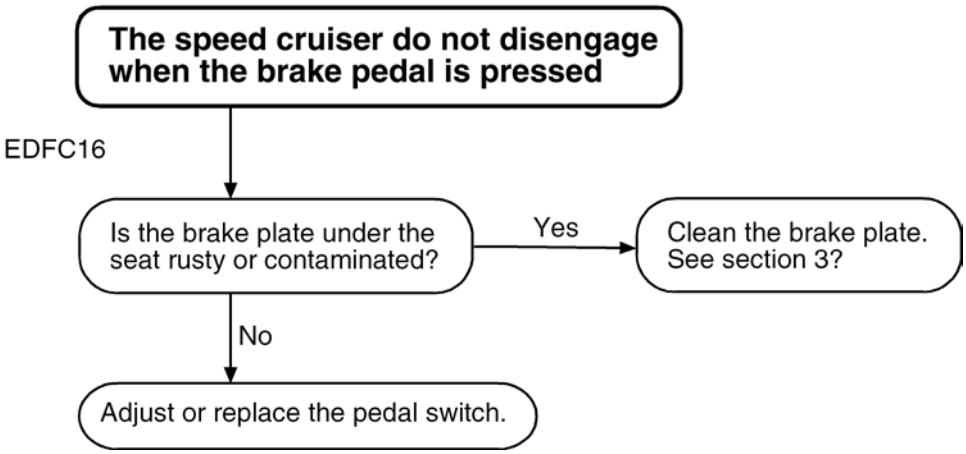


7.2.30 The PTO clutch does not disengage when the operator leaves the seat and the mover deck is activated

All machines with electric PTO clutch

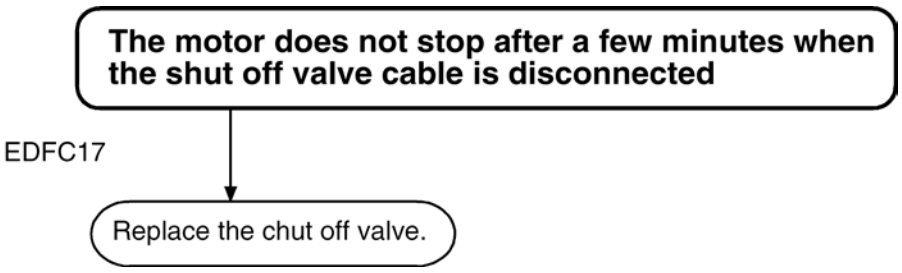


7.2.31 The speed cruiser does not disengage when the brake pedal is pressed



7.2.32 The motor does not stop after a few minutes when the shut off valve cable is disconnected

All machines with electric shut off valve in the fuel system



7.3 Repair and replacements

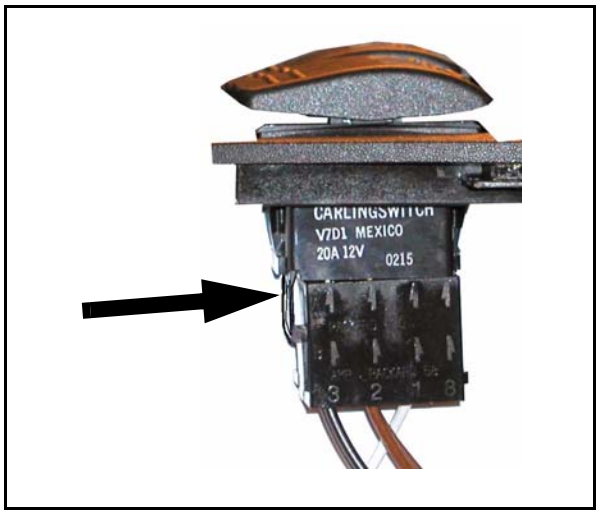
Warning

Do not wear rings, metallic bracelet, chain round the neck or similar metal objects when working with the electrical system. It can cause short-circuit, burns and fire.

7.3.1 Replacement of switches

All switches are pressed into place in their rectangular holes at the control panel. To change a switch proceed as follows:

1. Remove the actual cover to get access to the switch.
2. Press the fixation pig at the connector and pull the connector from the switch.
   See the figure.
   Some connectors have 2 pigs.
3. Press the fixation tongues on both sides of the switch against the switch. Use a screwdriver or similar and work up the switch.
   See the figure.



7.3.2 Replacement of switch knob

To replace the switch knob, there is a special tool available. Regarding reference number, see the spare parts list

Remove the knob by pushing in the tool backwards and press until the knob jumps up.

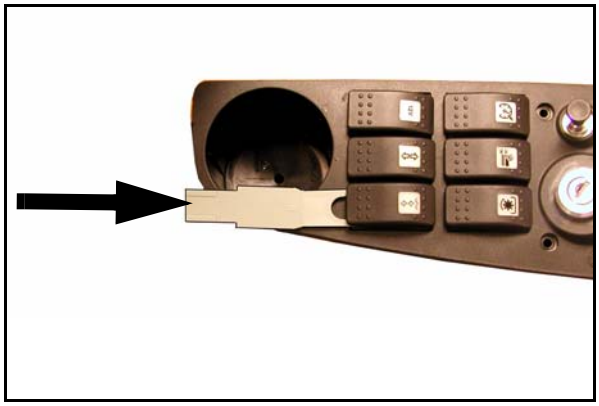
The knob is easily assembled by pressing it down in its hole in the switch.

7.3.3 Connections

The machine is equipped with three kinds of connectors:

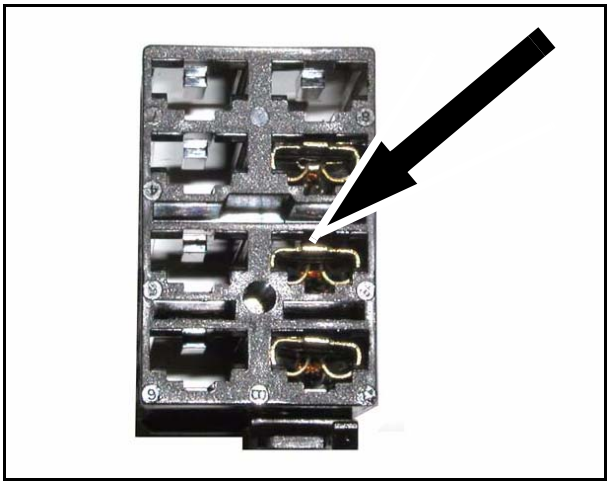
- Fixed connectors in plastic holders.
- Tab connectors
- Screw connectors

All connectors shall be kept free from contamination, corrosion and damp.



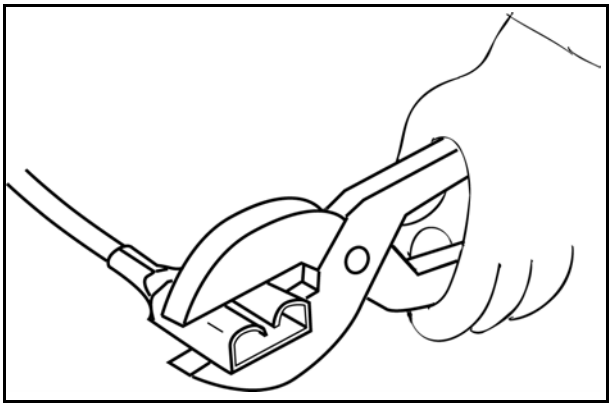
Fixed connectors in plastic holders

To remove the connectors from the plastic holder, put a small screwdriver behind the connector, hold the cable and pull out the connector.
See the figure.



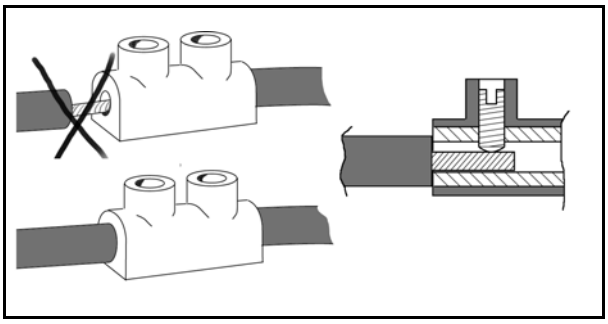
Tab connectors

To restore tab connectors if bad crimp forces occur, e.g. after a long time of use, the connector can be pinched by a pliers.
See the figure.



Screw connectors

When cables shall be connected into screw connectors, the cable shall be stripped off 5 mm only. No metallic conductor is allowed to be exposed outside the terminal.



Warning!
Exposed conductors can cause short-circuit and fire.