INSTALLATION MANUAL

SBGuidance Onland Plough

Onland Plough steering

(Original Instructions)

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Preface

This configuration manual is intended for persons responsible for installing and configuring a SBGuidance Onland Plough set. The manual contains important instructions that should be complied with when commissioning, operating and servicing the SBGuidance system.

This manual has been compiled with the utmost care. SBG Precision Farming assumes no responsibility for any errors or omissions in this document.

Any comments or questions can be sent to service-eu@ravenind.com.

SBG Precision Farming nor any of its suppliers will accept no liability for physical or material damage caused whilst using the SBGuidance system.

The installed SBG systems produces less than 70 dBA.

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Disclaimer

Warning!:
Always switch off the tractor before installing or repairing hydraulic and electrical components of the SBGuidance system.

Warning!
The system contains moving parts! Make sure the immediate environment is clear of people before operating the system

Warning!
Always wear personal protective equipment when operating/adjusting/repairing the system outside of the tractor cabin.

Warning!
In case of system failure or breakdown switch of the tractor and disconnect the electrical power source to avoid further damage. Contact SBG for further instructions on how to repair your system.

Warning!:
The safety instructions contained in the manuals of the tractor or implements must be complied with at all times.

Warning!:
It is strictly prohibited to use the SBGuidance system on public roads.

Warning!:
It is strictly prohibited to leave a driving vehicle unattended whilst the SBGuidance steering system is switched on. The driver is always responsible for the direction and course of the vehicle.

Warning!:
In order to prevent personal injury or fire, defective or blown fuses may only be replaced by fuses of the same type and amperage**.**

Warning!:
The SBGuidance steering system is not capable of identifying and avoiding obstacles. Any obstacles along the driving path must be avoided by the driver.

Warning!:
Only allow authorized/qualified persons to operate the system. Authorized/qualified persons include: persons who have read and understood the operating manual and who are both physically and mentally fit to operate the system.

Caution!:
Always start the machine first, before activating the SBGuidance steering system in order to prevent the occurrence of a peak voltage.

Caution!:
Only touch the touch-screen with your finger or by using a special touch-screen stylus/pen. Operating the touch-screen with sharp objects may cause permanent damage to the screen.

Caution!:
Only clean the screen using a damp cloth. Never use caustic or other aggressive substances.

Please note!
If the terminal is not used for a long period, better remove the terminal from the tractor and store in a heated environment. This will extend the life span of the electronic components.

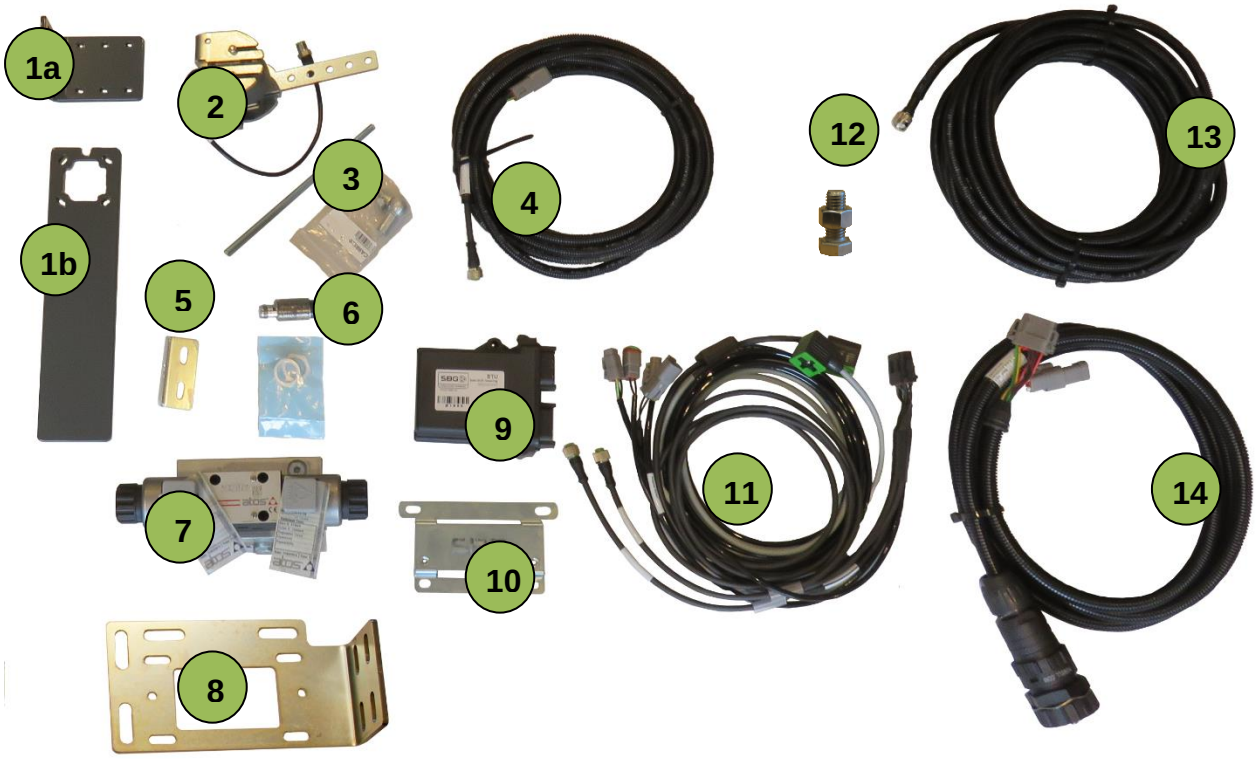
Please note!
To prevent theft, it is better to not let the terminal and GPS-antenna unattended in the tractor on the field.

1. Instructions for installing SBGuidance Onland Plough

This manual is a general guide and is not intended for any specific brand or type. This section provides an overview of all basic components. The exact content of the Onland Plough steering set depends on brand and type of machine.

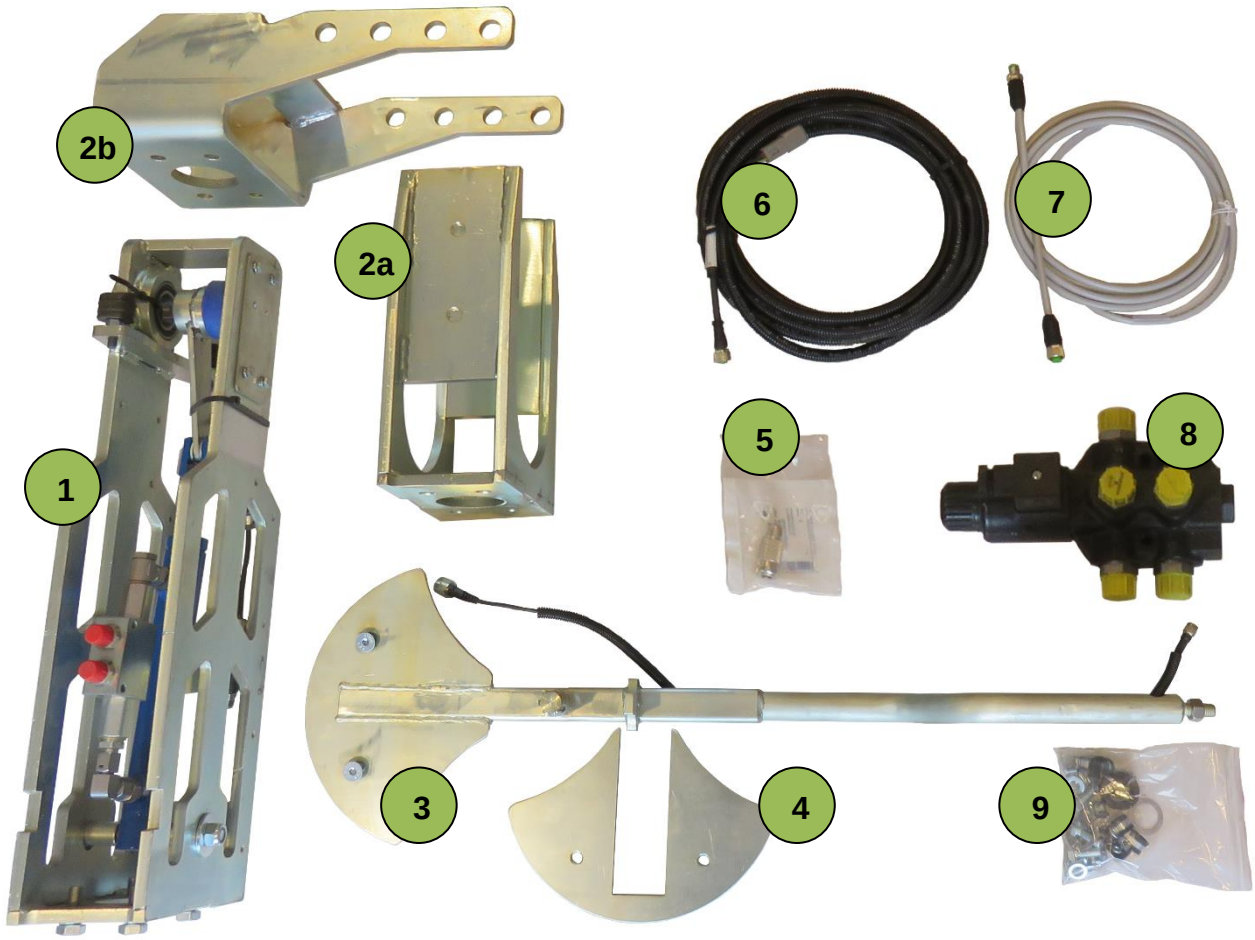
All necessary parts are supplied, including this manual. Verify that all items listed on the packing list are actually present.

1.1. Overview of basic components for the Onland plough steering



Sign	Part-number	Quantity	Description
1a	SBG11633	1x	Angle sensor bracket 90°
1b	SBG11630	1x	Angle sensor bracket straight
2	SBG11901-06	1x	Angle sensor 12V 90° in bracket
3	SBG10096-01, SBG10092	1x	Thread with junction balls
4	SBG11901-08	1x	Angle sensor cable (5,0 m)
5	11078000013	2x	Proximity sensor bracket
6	00-311-7579550	2x	Proximity sensor
7	SBG10690	1x	Hydraulic Implement manifold LS
8	SBG11823-01	1x	Manifold bracket
9	SBG10919-12	1x	STU – Onland Plough Steering
10	SBG12705-05	1x	STU bracket
11	SBG13710-073	1x	Harness STU – Onland Plough
12	SBG10002	1x	GPS antenna UNC bolt
13	SBG10049	1x	GPS antenna cable TNC-N (10,0 m)
14	SBG13713-03	1x	Harness Plough 2,5 m

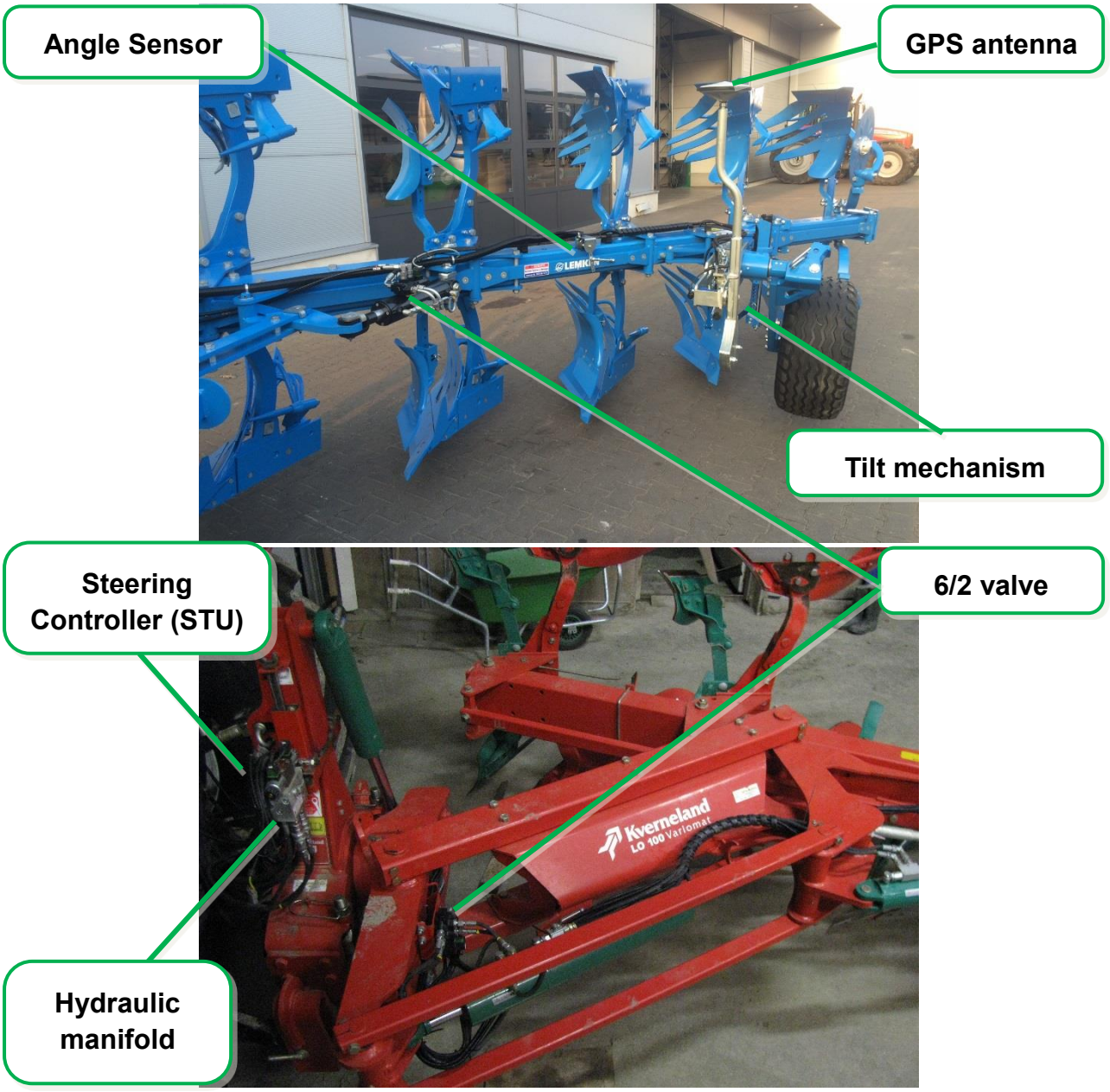
1.2. Overview components antenna tilt mechanism (optional)



Sign	Part-number	Quantity	Description
1	SBG14360-000	1x	Universal antenna tilt frame
2a	SBG14360-01	1x	Lemken Juwel 8 adapter frame
2b	SBG14360-02	1x	Kverneland LO/EO adapter frame
3	SBG14360-200	1x	Antenna support tilt mechanism
4	SBG14360-012	3x	Counterweight antenna support
5	SBG10586	1x	TNC-N Fe/Fe adapter
6	SBG11901-08	1x	Angle sensor cable (5,0 m)
7	SBG11383-08	1x	M12 angle sensor extension cable (3,0 m)
8	SBG10662-04	1x	6/2 hydraulic valve
9		1x	Mounting set antenna tilt mechanism

On mounted reversible ploughs the antenna tilt mechanism needs to be installed. On semi-mounted reversible ploughs the antenna tilt mechanism is not needed instead the GPS-antenna can be mounted on the trailed wheel of the plough.

1.3. Assembled Onland Plough steering



The most suited installation location of the components depends from brand and type of the plough. In the pictures above examples of installation are shown.

2. Installation basic components

It's advised to install the Onland Plough steering kit in the order as listed below:

1. Mounting of the angle sensor.
2. Checking of the hydraulic manifold.
3. Mounting of the manifold and connecting the hydraulic hoses.
4. Mounting of the Steering Controller.
5. Mounting of the proximity sensors.
6. Mounting of the GPS-antenna.
7. Placing and connecting of the cabling.

In this chapter of the installation manual the assumption is made that the steering kit is installed on an semi-mounted reversible plough without the antenna tilt mechanism. For installation instructions specific for the antenna tilt mechanism see chapter 3 of this manual.

2.1. Mounting the angle sensor

The angle sensor measures the exact operating width of the plough. Start with mounting the angle sensor to the plough main frame.

In an Onland Plough steering kit an angle sensor is delivered in an angle sensor bracket (Figure 1) by standard.

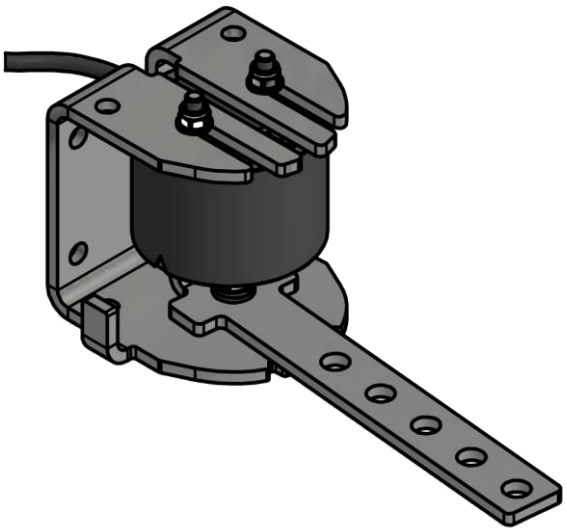


Figure 1 Angle sensor mounted in bracket

2.1.1. Mounting of the angle sensor in the bracket

Use the following description to mount the angle sensor in the bracket (Figure 2):

1. The sensor consist of two parts, both need to be mounted with M5 bolts. The smallest piece (little disc) needs to be mounted to the “arm”-bracket and the biggest piece (sensor housing) needs to be mounted to the “U”-shaped bracket.
2. The sensor bracket consists of two parts. Mount those parts in the following order: M6 bolt, washer, “U”-shaped bracket, fender washer, “arm”-bracket, washer, split lock washer and nylon insert lock nut.
3. Fasten the lock nut at its fullest then loosen a little.

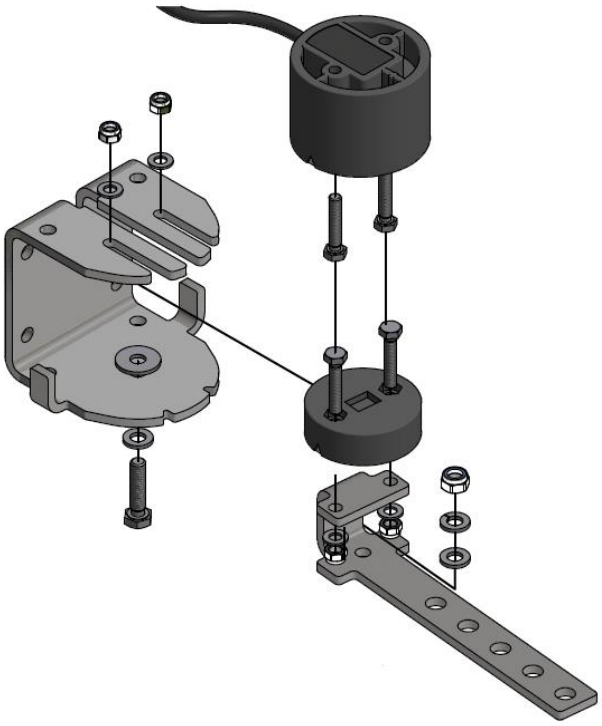


Figure 2 overview of angle sensor bracket

Before mounting, check if the sensor disc can move freely in the sensor housing when turning the sensor arm.

Make sure the little triangular markings on both sensor disc and housing more or less align when the sensor is in its centre position.

2.1.2. Mounting of the angle sensor to the plough frame

1. Find a suited place on the ploughs main frame with enough room so the sensor can move freely (Figure 3). The plough width regulation beam can move independent from the main frame. Thus, make sure the arm of the angle sensor can move freely. The angle sensor bracket can be bolted directly to the main frame. Drill two 6,8 mm holes in the main frame and two holes in the bracket (two holes of the bracket should fit the ones on the frame). Tap the holes in the main frame with M8 thread. In Figure 3 a 90° angle sensor bracket is used to install the angle sensor to the plough frame. If drilling does not work, the bracket can also be welded to the frame or clamped by using two pieces of threaded rod (Figure 4).
2. Determine the range of the angle sensor by marking the minimal and maximal plough width on the plough width regulation beam (Figure 5). Place the sensor arm in its centre position facing downwards. Put the plough in its widest position and mark that position on the plough width regulation beam. Put the plough in its narrowest position and mark again. The range between the two markings presents the distance the sensor arm needs to travel during operation. Determine the centre between the min and max and put the plough in that position.

Figure 3 Angle sensor mounted on plough with plough width regulation beam

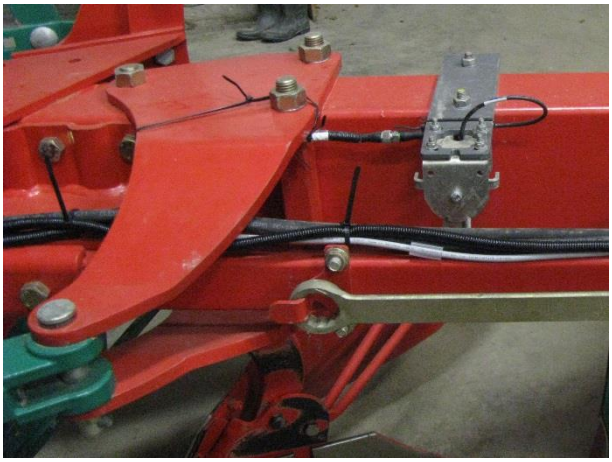


Figure 4 Angle sensor bracket straight clamped to the frame with two pieces of threaded rod

Figure 5 Angle sensor range on width regulation beam

3. Depending on the range choose a hole in the sensor arm to mount the ball joint. To determine see Table 1and Figure 6. By choosing the optimal hole an as wide as possible voltage range in the sensor is obtained. Now the position of the ball joint on the regulation beam can be determined. Mark that place, drill a hole and tap thread.

Table 1 Holes angle sensor arm

Range sensor (cm)	Hole to use on sensor arm
< 3,5	1
3,5 – 5,5	2
5,5 – 7,5	3
7,5 – 9,5	4
9,5 – 12,5	5

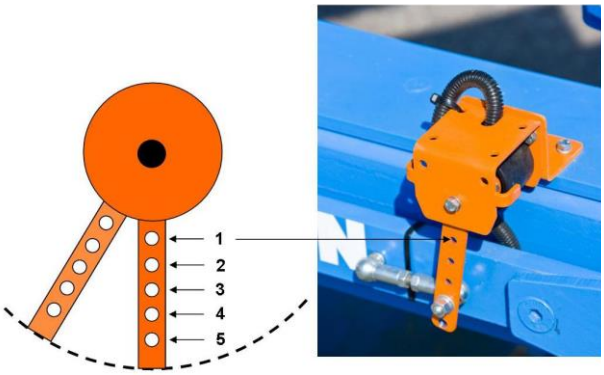


Figure 6 Holes angle sensor arm

4. After installation check if the sensor can move freely and if the movement is within the linear range (1,0 to 4,0 V) of the sensor.

The linear range of the angle sensor lies between 1,0 and 4,0V.

5. Connect the sensor cable to the sensor and guide it towards the front of the plough. Mount the cable in a protective tube and make sure the cable isn't pinched or squeezed while turning and/or modifying plough width.

2.2. Checking the hydraulic manifold

The hydraulic implement manifold is suited for use in both Load-Sense (L.S.) and Open Centre (O.C.) hydraulic systems. Depending on the type of installation a different type of selector plug must be installed in the manifold (Table 2, Figure 7).
Check the type of the selector plug (Figure 8) before mounting the manifold.

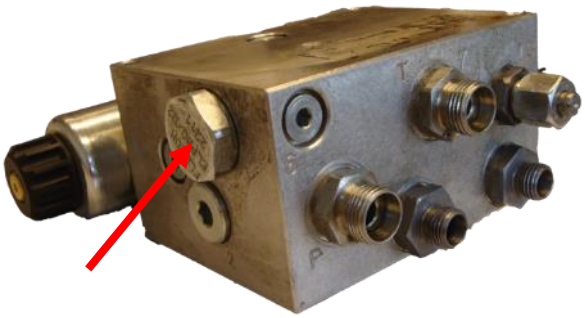


Figure 8 Selector plug

Table 2 Selector plug manifold

Type of hydraulics	Selector plug
Load Sense	SBG10810 Blind plug without imprint
Open Centre	SBG10820 ELP30/D2

Figure 7 Selector plug. Left: L.S. Right O.C.

If the manifold is connected to the auxiliary hydraulic connectors at the rear of the tractor, the manifold must be configured in Open Centre mode. The LS connector must be capped.

When Open Centre is chosen, other selector plugs need to be used in the manifold when Load Sense is used!

The implement manifold is equipped with two double controlled non-return valves by default (Flucom CAP20/M). If the hydraulic system of the plough is already equipped with such plugs, the ones in the manifold need to be replaced with blind plugs (Figure 9).

Figure 9 Above: blind plug Under: double controlled non return valves (Flucom CAP20/M)

The double controlled non-return valves need to be replaced by blind plugs when the hydraulic system of the plough is already equipped with similar valves.

2.3. Mounting the hydraulic manifold

For mounting purposes the manifold is equipped with 3x M8 holes with internal thread. Attach the manifold to the supplied manifold bracket (Figure 10).

Place the manifold in such a way that the hydraulic hoses from the manifold can be easily directed towards the tractor and the control cylinder. Ensure that the DIN connectors on the valve can be connected after fitting the manifold. Connect the control cylinder to **A** and **B** of the manifold.

Load Sense
Connect the pressure line to **P**, the return line to **T** and the sensor line to **LS** on the manifold. Use the Load Sense (L.S.) connections of the tractor.

Open Centre
Connect the pressure line to **P** and the return line to **T** on the manifold. Use the external hydraulics valve of the tractor.

*The width cylinder of the plough can also be manually steered by pressing the pin on the proportional valve (*Figure 11*)*

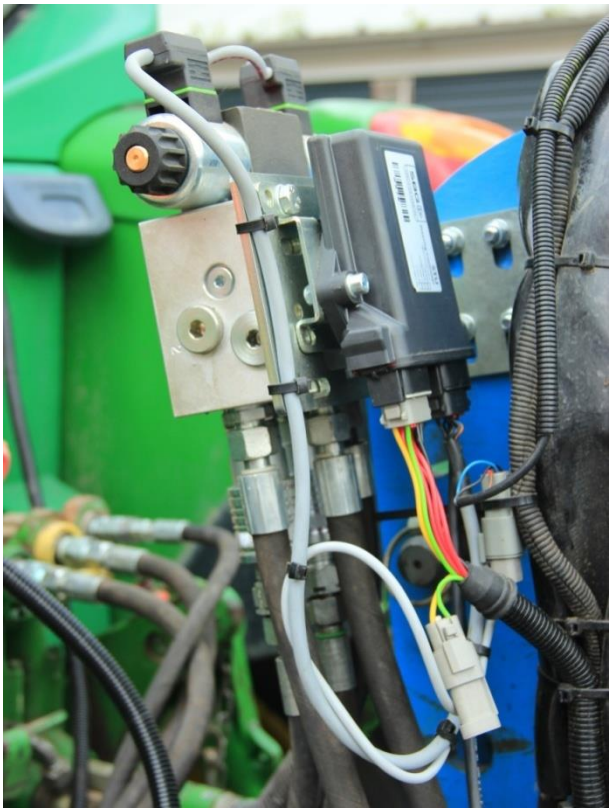


Figure 10 Manifold and steering controller installed using the delivered brackets

Figure 11 Manual control hydraulic valve

2.4. Mounting of the Steering Controller

The Steering Controller (STU – Onland Plough Steering) can be mounted to the manifold with the aid of an STU bracket (Figure 10).
It is recommended to mount the STU with the connectors directed downwards, to prevent water collecting on the connectors.

2.5. Mounting of the proximity sensors

To determine the actual plough position it's needed to install two proximity sensors on the rear-mounted three-point linkage of the plough (Figure 12). The position of the plough is needed to determine the correct centre offset for the GPS-antenna. On mounted reversible ploughs the proximity sensors also determine the actual moment the antenna tilt mechanism needs to flip the antenna in order to be in an upwards position during ploughing.

Figure 12 Proximity-sensors mounted on the rear mounted three-point linkage of the plough

Find an appropriate place to install the proximity sensors on the rear-mounted three point linkage of the plough. Keep in mind that as soon as the plough starts to flip over the proximity sensor mustn't measure anything. When both proximity sensors aren't measuring anything the system know the plough is flipping over and the GPS-antenna will align with the plough frame. The antenna will rise up when the plough is completely flipped over. It's also important that when the plough is in its left or right position the proximity sensors get a solid measurement. If not the GPS-antenna will align with the plough frame during ploughing, thus making it impossible to get good GPS signals for steering. To know which cable needs to be connected to which sensor check the labels on the cable itself.

Important!: *When the plough is in its left or right position it's important that the proximity sensors get a solid measurement, but as soon as the plough starts to flip the sensors need to be idle*!

Mount, if needed, an extra metal strip for a better read-out of the sensor when the plough is in ploughing position.

Drill two holes of 5 mm in both sides of the rear-mounted three-point linkage of the plough to mount the proximity sensor brackets (Figure 12). Cut M6 thread in the holes. Mount the brackets with two M6 x 20 bolts and washers. Afterwards mount the proximity sensors in the brackets.
In Figure 13 an alternative mounting place for the proximity sensors is shown. If mounting on the standard position isn't possible, it could be an option to mount the proximity sensors in such a way that the cylinder for flipping the plough is used to determine the position of the plough. The downside of this way of mounting is that it takes longer for the sensor to get idle when the plough is flipping over.

Make sure the proximity sensors stay free of contact during the flipping over of the plough!

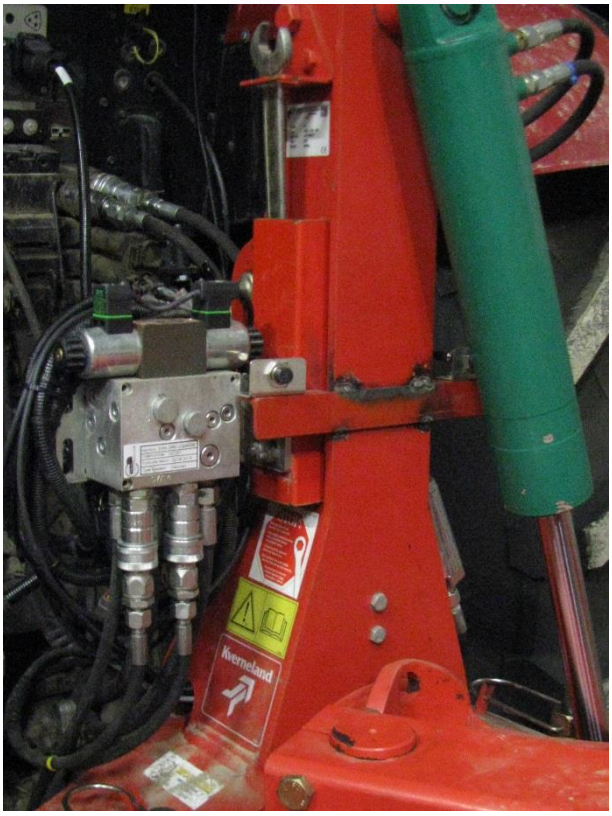


Figure 13 Alternative mounting position for proximity sensors

2.6. Mounting of the GPS-Antenna

On a semi-mounted reversible plough the GPS-antenna needs to be mounted near the trailed wheel. Try to place the antenna as low as possible and make sure the antenna stays free of any contact during the flipping over process of the plough. Keep in m the distance between antenna and plough bodies. If the GPS-antenna is mounted a little before the trailed wheel, the distance to the plough bodies increases. This results in a better satellite view for the antenna. Figure 14 shows an example installation on an semi-mounted reversible plough in transport position. In this figure the antenna is mounted ca. 2m before the trailed wheel. In Figure 15 the same plough is shown, but now in ploughing position.

Figure 14 GPS-antenna on semi-mounted reversible plough in transport position

Figure 15 GPS-antenna mounted on semi-mounted reversible plough in ploughing position

On a mounted reversible plough the antenna needs to be mounted on the antenna tilt mechanism in order to rotate the antenna when the plough is flipped over.

In chapter 3 the mounting and parts of the antenna tilt mechanism are described.

2.7. Placing and connecting cabling

An Implement Ready cable harness is required on the tractor for connecting the Onland plough steering. The IBBC connector ensures that connection (Figure 16).

Figure 16 IBBC bracket with connector

Section 2.8 shows a schematic view of the cable connecting circuit. The CAN implement lead ensures that the STU is connected to the tractor. In addition, the hydraulic harness needs to be connected to the STU. This hydraulic harness ensures the control of the hydraulic valve and the readout of the sensors.

For an easy installation of cabling use the hydraulic hoses already present on the plough as a guide. Figure 17 shows an example where the cabling is mounted using protective tubing for the cables and pipe clamps for fixation.

Figure 17 Guiding of cabling

Mount the CAN implement harness in such a way that the separate conductors coming from the protective sleeve are directed downwards. This will prevent any penetration of water into the protective sleeve.

Ensure that the leads are not damaged when installed.

Tip: Tie-wrap the cables in such a way that they are attached free from vibration and friction.

Press the connectors firmly into place until they click!

A panel mount antenna connection mounted on the IBBC bracket is optional (Figure 18). An antenna cable can be concealed in the cabin between the terminal and the IBBC bracket.

Tip: If the 10m GPS antenna cable is to short, it's better to use the panel mount antenna connection on the IBBC bracket instead of the standard cable extension adapter piece.

Figure 18 IBBC bracket with panel mount for antenna connection

2.8. CAN implement harness Onland Plough (schematics)

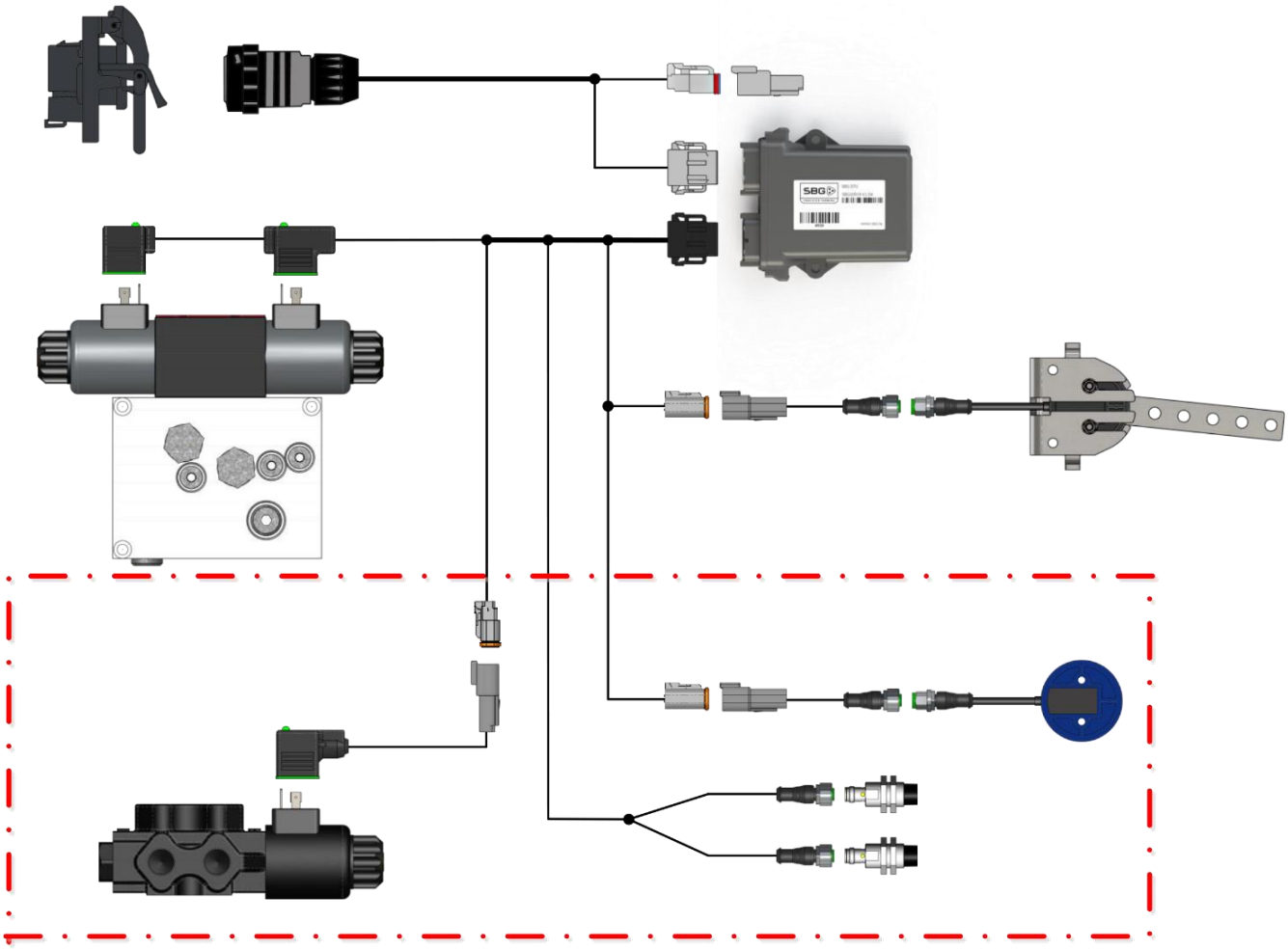


Figure 19 CAN Implement harness Onland Plough

3. Mounting antenna tilt-mechanism

When a mounted reversible plough is used for Onland Plough steering the antenna tilt mechanism needs to be installed. The mechanism makes sure that the GPS antenna always is in the upwards position regardless of the position of the plough. After installing the basic components, as described in chapter 2, the following components need to be installed:

1. Mounting of the tilt mechanism.
2. Mounting of the 6/2 hydraulic valve.
3. Mounting of the hydraulic hoses.
4. Connecting cabling.

The mounting of the cabling is already described in chapters 0 and 2.8.

3.1. Mounting of the tilt mechanism

The tilt mechanism consists of a universal frame combined with a brand/type specific adapter piece. At this moment the specific adapter pieces are available for Lemken and Kverneland ploughs. See chapter 1.2 for an overview of the available adapter pieces. The mounting of the universal frame is shown in Figure 20.

Make use of the bolts, washers and nuts that are included in the installation kit.

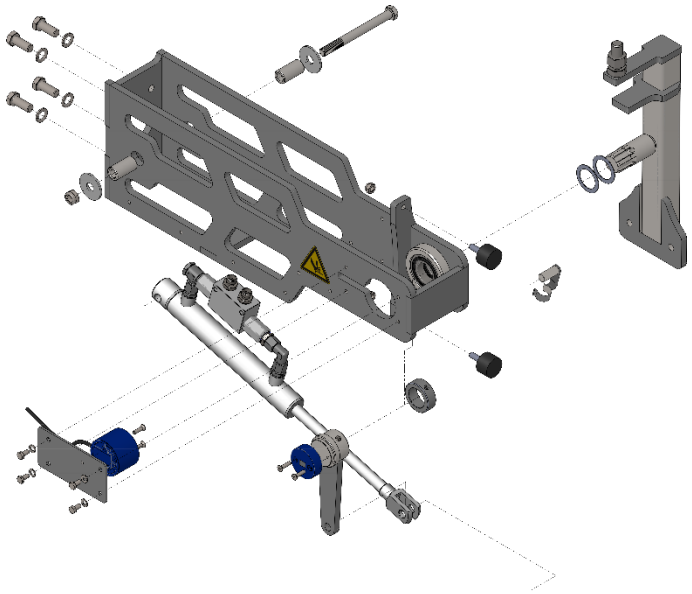


Figure 20 schematic view of the universal frame

3.1.1. Lemken Juwel 8

The Lemken Juwel 8 adapter piece needs to be mounted on that part of the plough frame that holds the trailed wheel (Figure 21).

Place the adapter piece over the plough frame and mark the positions of the mounting holes. Remove the adapter frame and drill holes of 10,2 mm on the marked places on the plough frame (four holes in total need to be drilled). Afterwards cut M12 x 1.75 thread in those four holes then mount the adapter frame again and fixate it with four M12 x 30 bolts.

Figure 21 Lemken Juwel 8

Mount the universal frame of the tilt mechanism to the adapter piece in such a way that the GPS-antenna moves on the outside of the plough.

3.1.2. Kverneland LO/EO

The Kverneland LO/EO adapter piece needs to be mounted on the end of the main frame of the plough. This is also the place where the trailed wheel is connected to the main frame (Figure 22).

The trailed wheel is mounted to the main frame of the plough through eight M18 bolts. Replace six of those eight bolts by 10.9 M18 x 60 bolts, so that the adapter piece can be mounted in-between.

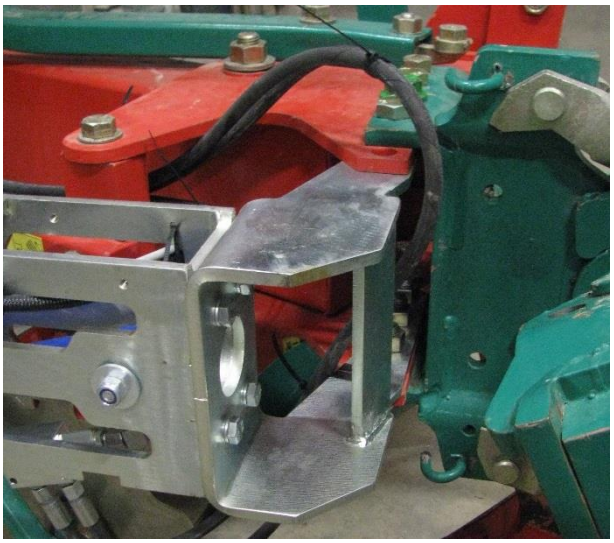


Figure 22 Kverneland LO/EO

Afterwards mount the universal of the tilt mechanism to the adapter piece in such a way that the GPS-antenna moves on the inside of the frame.

3.2. Mounting of the 6/2 hydraulic valve

The cylinder present in the antenna tilt mechanism is operated through the implement manifold. To switch between operating the antenna tilt cylinder and the width regulation cylinder on the plough a 6/2 hydraulic valve needs to be installed. The proximity sensors mounted on the rear-mounted three-point linkage of the plough determine which cylinder needs to be operated: in ploughing position the width regulation cylinder needs to be operated and during the flipping over process the antenna tilt cylinder needs to be operated.

Mount the 6/2 hydraulic valve somewhere between the manifold and the width regulation cylinder. When connecting the hydraulic hoses try to open the existing hydraulic system where there are already hydraulic fittings present. Figure 24 shows an installation of the 6/2 valve on top of the width regulation cylinder while Figure 23 shows an installation between existing hydraulic fittings.

Connect hydraulic hoses according to the hydraulic schedule in Figure 25.

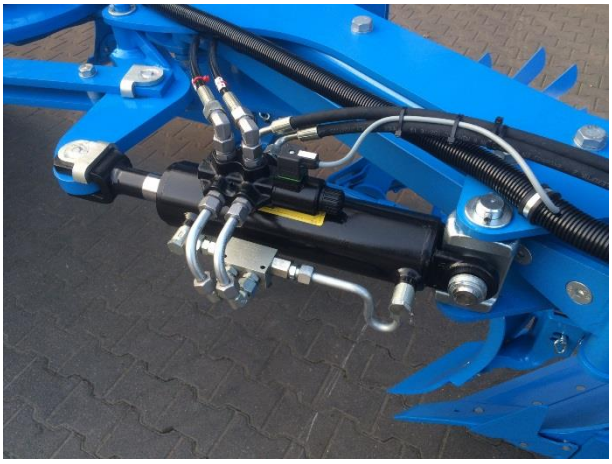


Figure 24 6/2 hydraulic valve mounted on the width regulation cylinder

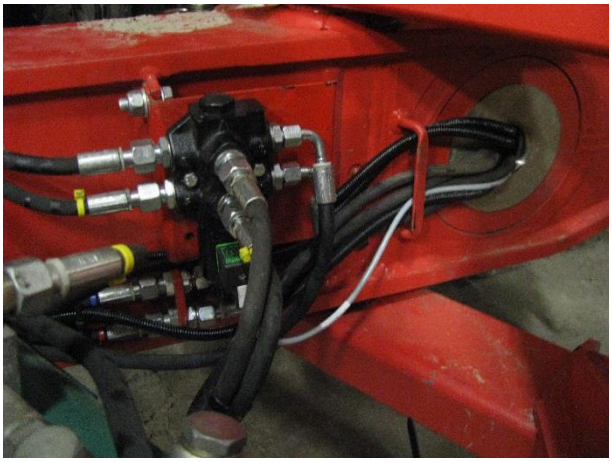


Figure 23 6/2 valve mounted between the existing hydraulic couplers

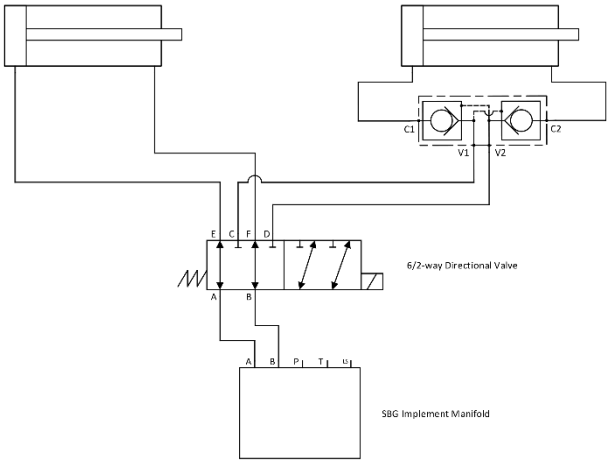


Figure 25 Hydraulic schematics tilt mechanism

4. Configuration and calibration

The following software and firmware versions are required for the setup, calibration and use of the Onland Plough steering:

- CAN-Tool 1.29 or more recent version.
- Onland Plough-steering firmware *STU_Onland_Plough_3.0.25* or newer
- SBGuidance 4.0.x or newer.

Check the download page on www.sbg.nl for the most recent software and firmware versions.

View Configuration manual – CANbus controllers for updating a steering controller.

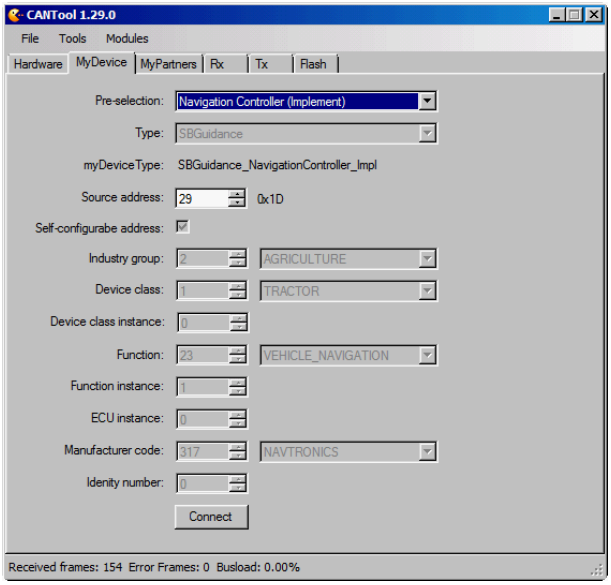


Figure 26 CANTool MyDevice Implement Controller

4.1. Configuration CAN-Tool

Initialize the CAN tool. At Hardware, choose manufacturer "**Viper 4**" in case of a Viper4 terminal and "**SBG**" in case of a GeoSTAR terminal and press on *Initialize*.
After initializing the connection with the CAN bus, a bus load must be displayed. Received frames must be in increasing increments. The bus load and received frames are displayed at the bottom of the screen. If this is not the case, check the cable connections.

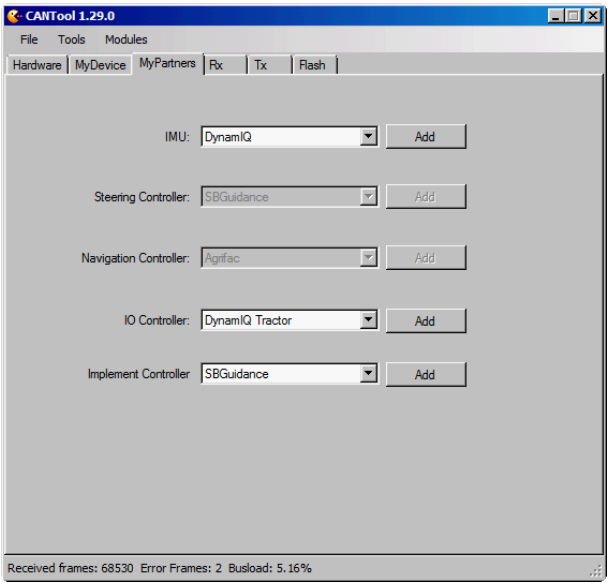


Figure 27 CANTool Mypartners Implement Controller

Go to the tab page MyDevice (Figure 26) and at Pre-selection select "**Navigation Controller (Implement)**". Then press "*Connect".*
Go to the tab page MyPartners (**Fout! Verwijzingsbron niet gevonden.**). At Implement Controller press "*Add*". This will open the setup screen for the Onland Plough steering (Figure 28).

The steering controller is recognized if the status is on *Running*, if an *SW Version* is displayed and the correct type of STU is detected. In addition, a sensor value should be displayed and a yellow line should be visible in the graphic display. The sensor value should change when the steering controller is used (Figure 28).

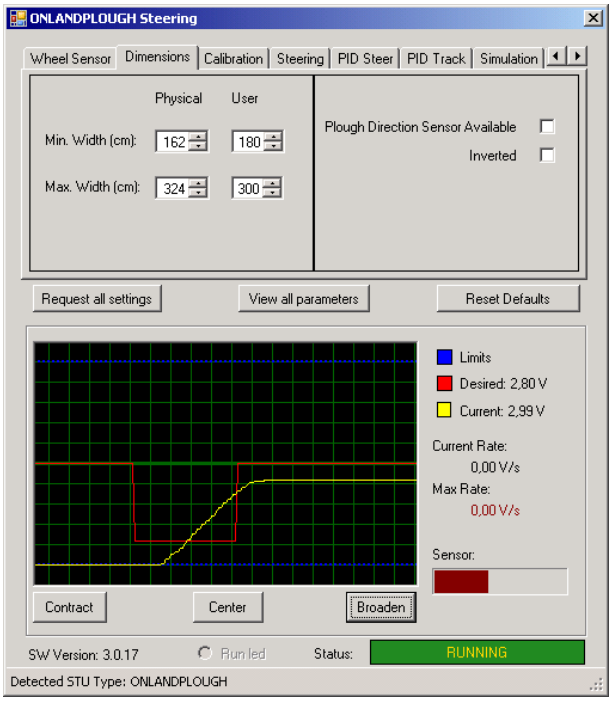


Figure 28 CANTool Onland Plough Steering

Check whether the Steering Controller is recognized before you continue to set up and calibrate the Onland Plough steering.

4.2. Determine control speeds

The manifold is equipped with a proportional valve.

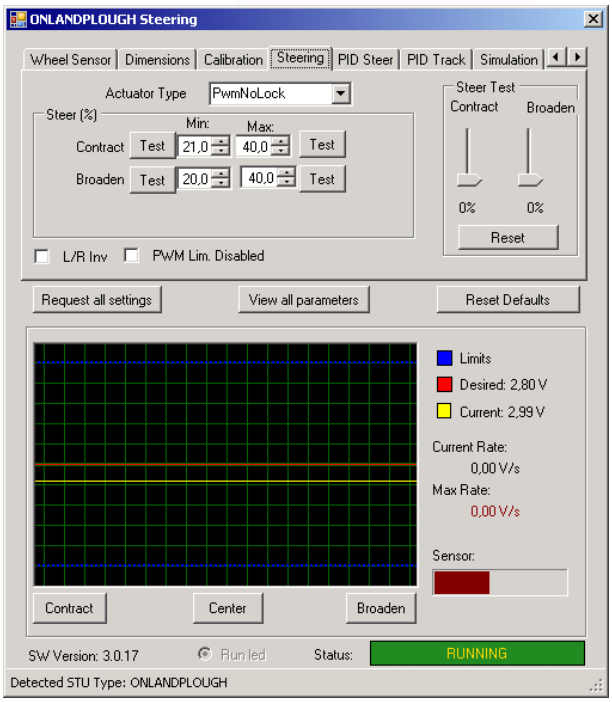


Figure 29 CANTool tabblad Steering

1. In the tab page Steering (Figure 29) select Actuator Type: *PWM No Lock* to use proportional steering.

Allow the oil from the tractor to warm up before starting the determination of the control rates.

The steering can be checked by pressing one of the Test buttons on the tab page Steering and by observing whether any of the LED lights on the DIN connectors light up.

2. Use the Test-buttons to determine if contracting and broadening the plough is consistent with reality. If not, mark the L/R Inv box to invert the contract/broaden functionality.
3. Use the "**Test**"-buttons on the right hand side of the steering percentages to determine the maximal steering speed. Start with a value of 70% and decrease until the actual maximal steering speed starts to decrease.

Set the maximal steering speeds in such a way that the actual maximal steering speed of the plough is reached.

4. Use the "**Test**" buttons on the left of the control percentages to steer at the minimum control speed. Determine the Contract and Broaden control speeds independently so that both minimum control speeds correspond to approx.

0.05 V/sec. The plough width regulation cylinder should respond immediately if the minimum values are set. Otherwise, increase the minimum control values.

Important: *When minimum control values are applied, the control response to contract or broaden should be just as quick.*

Important: *The plough regulation cylinder should respond immediately with the minimum values that are set.*

During field operation it's possible to change the minimal steering percentages throughout SBGuidance to enhance steering performance (Figure 30).

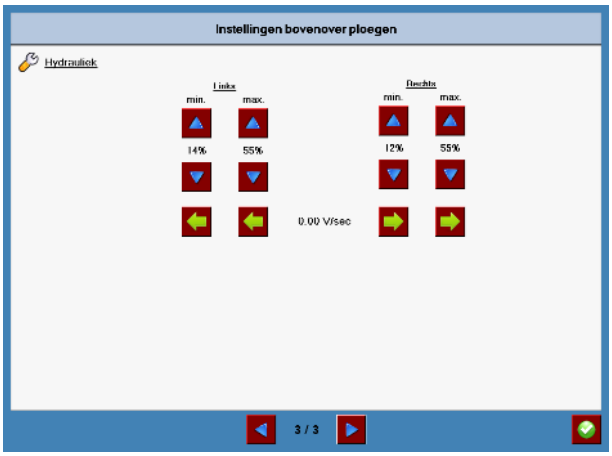


Figure 30 SBGuidance Calibration wizard: Steering percentages

4.3. Calibrating angle sensor

The angle sensor is placed to measure the actual plough width. Calibrating the plough width is needed so the angle sensor voltages correspond correctly with the actual plough width. Calibration can be done throughout the tab page Wheel Sensor (Figure 32) and Dimensions (Figure 33), but it's also possible to determine them throughout SBGuidance (Figure 34).

1. Place the plough in its most narrow position and set the corresponding sensor value by pressing the **Narrowest** –button in the Wheel Sensor tab page (Figure 32).
2. Place the plough in its widest position and set the corresponding sensor value by pressing the **Widest** –button in the Wheel Sensor tab page.

Figure 31 Measuring plough width

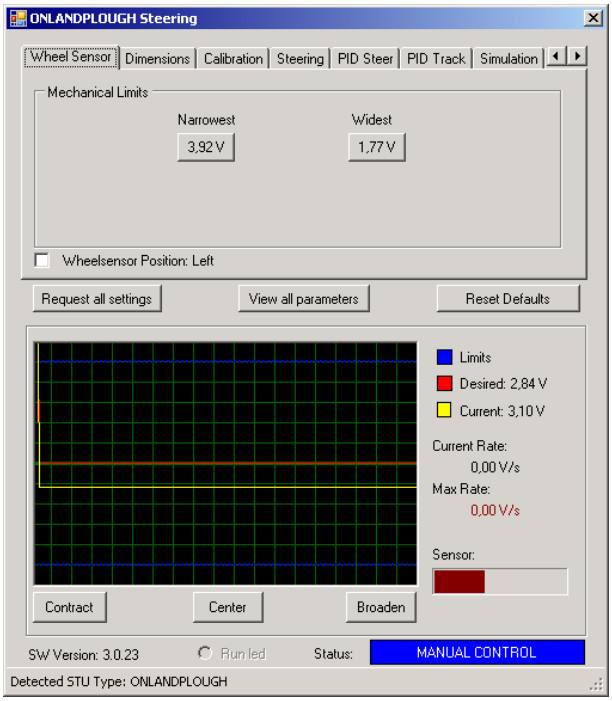


Figure 32 CAN Tool tab page Wheel Sensor

3. When the plough is in its widest position, measure the actual plough width. For easy measuring it might be useful to clamp a straight metal bar to the landside of the last plough body (Figure 31). Calculate the total plough width. For example, plough with 4 bodies: measure distance between metal bar (attached to landside of the last body) and the tip of the first plough, measured value is plough width over 3 bodies. Divide the measured value by 3 and multiply by 4 to know the actual plough width.
   Enter the calculated value at **Physical Maximum Width** in tab page Dimensions (Figure 33).
4. Put the plough in its most narrow position and measure the actual plough width using the same method as for determining the maximal plough width. Enter the value at **Physical Minimum Width** in the tab page Dimensions.

Calibrating the plough width is also possible throughout SBGuidance. Go to Setup >> Vehicle (Figure 34).

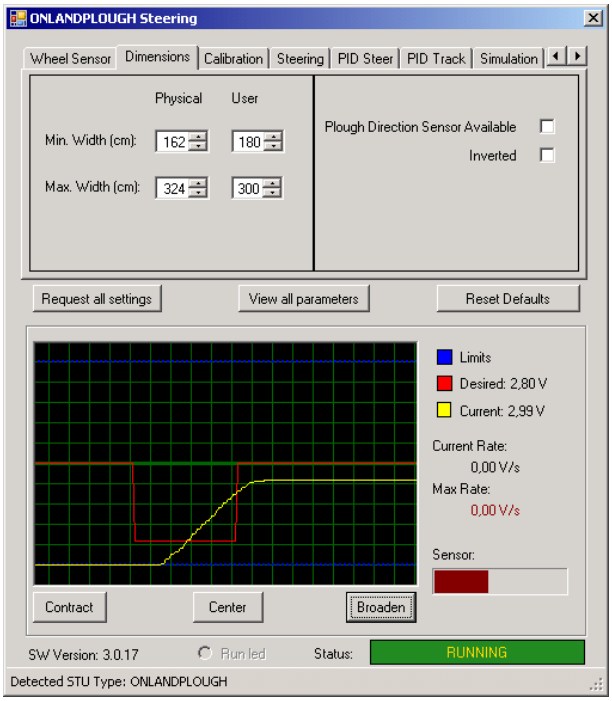


Figure 33 CAN Tool tab page dimensions

Figure 34 Calibration wizard SBGuidance: calibrating plough width

4.4. Configuration PID controllers

Use the default settings for the PID controllers (PID Steer and PID Track). The default settings can be obtained by pressing the *Restore Group Defaults* button. The response of the controllers can be adjusted by changing the dealer gain percentages.

Dealer gain PID Steer = hydraulic percentage.

Increase the hydraulic percentage (PID Steer Dealer Gain) to obtain a more aggressive response. The hydraulic percentage influences the steering speed from one plough position to an other

The lower the max steering speed are set, the higher the hydraulic percentage can be.

Dealer gain PID Track = gain percentage.

Increase the gain (PID Track) if the deviation to the reference line isn't moving fast enough to 0.

Determine the Gain while ploughing in the field for the best result.

*The user can adjust the gain and the hydraulics in SBGuidance under Settings > Vehicle > Tuning > tab page Implement (**Fout! Verwijzingsbron niet gevonden.**).*

4.5. Calibrating Antenna tilt mechanism

A mounted reversible plough is equipped with an antenna tilt mechanism. In the tab page Antenna Tilt (Figure 35) the angle sensor, tilt speed and steering speeds for the tilt mechanism need to be calibrated.

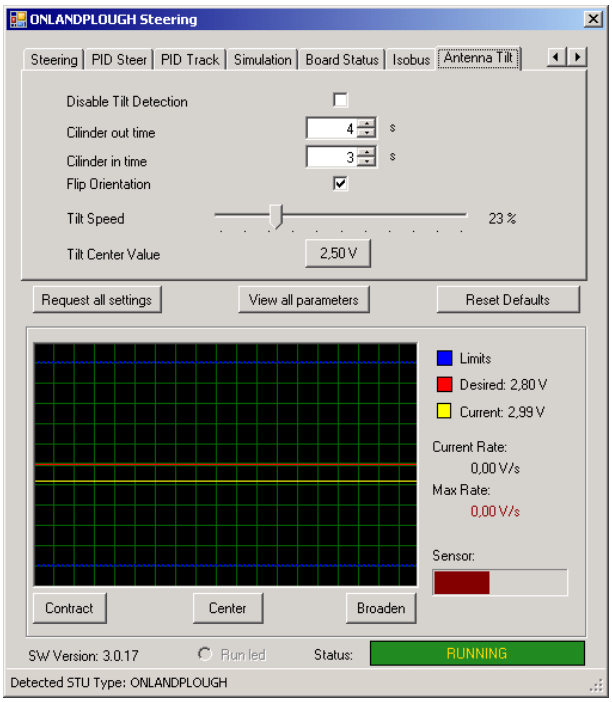


Figure 35 CAN Tool tab page Antenna Tilt

*When the plough is not equipped with a tilt mechanism check the **Disable Tilt Detection** box.*

1. By default check the **Flip Orientation** box. This setting determines which sensor voltage corresponds with which plough position. By looking at the sensor voltage the system checks if the counter weight of the antenna pole is positioned downwards before steering the tilt cylinder. If the tilt cylinder isn't steered and the counter weight is facing downwards uncheck the **Flip orientation** box.
2. Set the **Tilt Centre Value** by aligning the antenna pole exactly with the plough frame and press the Tilt Centre Value-button. Keep in mind that the moment the antenna pole aligns with the plough frame during the tilting operation is just a small fraction of time because of the counter weight.

Setting the angle sensor voltage needs to be done very precise to guarantee the tilt mechanism functions correctly!

Tip: Ask a colleague for help so the antenna pole can be manually held exactly aligned with the plough frame.

3. Set both steering times (Cilinder In/Out time) at 6 seconds to start with.
4. Determine the steering speed by tilting the plough several times. Start with a **Tilt Speed** of 25%. Decrease or increase the steering speeds until the antenna pole moves smoothly during the tilting operation.
5. Decrease the steering times so that the antenna still moves fully up or flat while turning the plough. Set the **Cilinder Out Time** and **Cilinder In Time** independent from each other.

Important! *Set the steering speed and the steering times as accurate as possible. The antenna pole needs to move in a smooth manner to increase the life span of the GPS-antenna.*

4.6. Configurator setup

Add an machine profile to the loader screen and name it appropriately.

Refer to the SBGuidance Auto CAN setup and configuration manual for further information on how to install SBGuidance and use.

Open SBGuidance Configurator for this machine profile. Under Machine settings in the SBGuidance Configurator, setup and configure the system and guidance type. Select system type “**CAN**” and Guidance type “**SBGuidance Onland Plough**”.

No parameters are required on the tab page Plough.

4.7. Checking centre adjustments

The GPS-antenna on the plough is placed out of the centre of the machine. Depending on the used working width value it's needed to adjust the centre offset of the plough antenna. If centre offset isn't set correctly the actual plough width of the plough will not correspond correctly with the set value for ploughing.

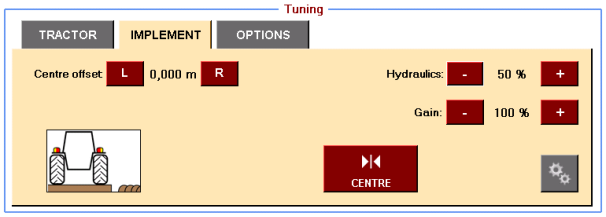


Figure 36 Centre offset Onland Plough steering

Follow the steps described below:

1. First check the centre of the tractor. Does the tractor drive back and forth over the same track? If not adjust the centre offset of the tractor and/or calibrate the DynamIQ of the tractor. A correct centre offset of the tractor ensures a consistent alignment with the previous operation pass.
2. Check if the correct working width has been entered.
3. Start ploughing and make sure the first plough furrow is straight.
4. Manually put the plough in the desired ploughing width (=chosen working width).
5. Start ploughing with tractor steering only. Adjust the centre offset of the plough antenna until the deviation is 0.
6. Go and plough several lines with activated tractor and plough steering.
7. Measure the actual plough width several times by placing a marker post on the field.
    a. Place the post at ci. 3 meters from the plough furrow. Make sure the distance is large enough so it's possible to pass the post on the next working pass without hitting it. Measure the exact distance between plough furrow and post.

b. Plough the next pass and look at the actual plough width viewed in SBGuidance during ploughing.
c. Measure the distance between the newly created furrow and the post. The difference of the two measured values is the real plough width.

8. If the real plough width is smaller than the entered working width, increase the centre offset of the plough according the difference in measurement. If real plough width is larger than the entered plough width, decrease the centre offset of the plough according the difference in measurement.
9. If the real plough width deviates from the actual plough width, than the calibration of the plough width is not correct. When the error between the two values is to large this will have a negative effect on steering quality. Adjust minimal and maximal plough width a little so the measured actual plough width corresponds better with the real plough width.

5. Annex

5.1. Pin-out STU

Table 3 STU B-connector (Black)

Pin	Description
1	VCC / PWM
2	ACT Ground
3	ACT Switched (6/2 valve)
4	ECU Power (12V sensor power)
5	Input 3 (proximity sensor)
6	Input 4 (angle sensor antenna)
7	Input 1 (proximity sensor)
8	Input 2 (angle sensor ploughing width)
9	ECU Power (12V sensor power)
10	ECU Ground (sensor ground)
11	ACT Ground
12	VCC / PWM

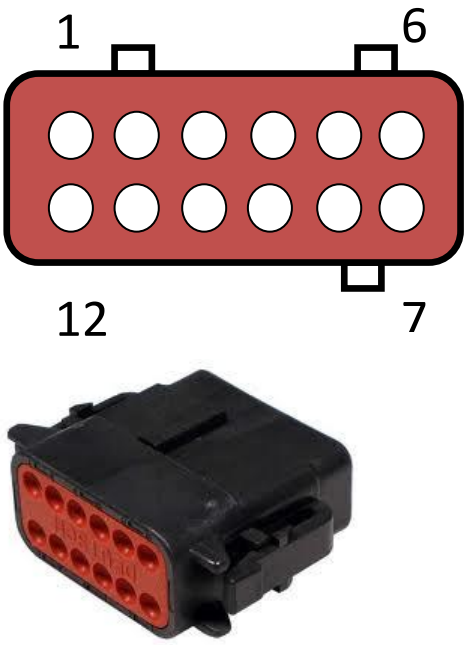
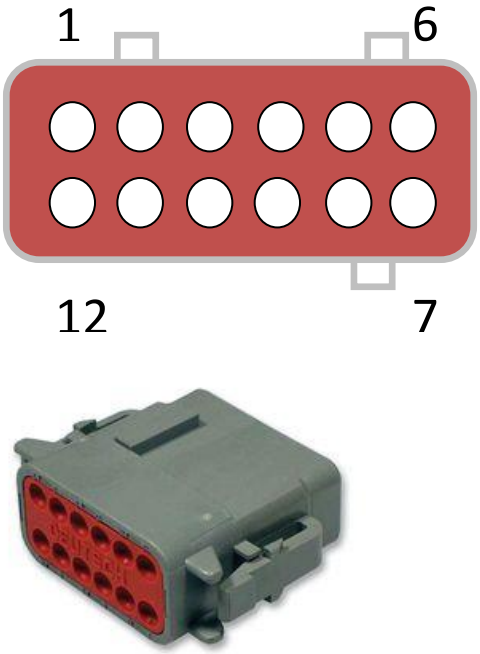


Table 4 STU A-connector (Grey)

Pin	Description
1	ACT Power
2	ACT Power
3	ECU Power
4	N.C.
5	N.C.
6	CAN High
7	CAN Low
8	N.C.
9	N.C.
10	ECU Ground
11	ACT Ground
12	ACT Ground



5.2. Pin-out Angle sensor

Table 5 Deutsch DTM06-4S angle sensor 12V

Pin	Description	Wire colour
1	5V sensor power	-
2	ECU ground	Blue
3	Sensor signal	Black
4	12V sensor power	Brown