INSTALLATION MANUAL

# SBGuidance Auto

## Massey Ferguson AutoGuide

016-8000-094EN Rev. A1

# Content

# Preface

This installation manual is intended for persons responsible for installing a SBGuidance Massey Ferguson AutoGuide 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 or any of its suppliers will accept no liability for physical or material damage caused whilst using the SBGuidance system.**

The installed SBG system produces less than 70dB (A) noise.

This user guide uses a number of concepts for extra attention to a few things:

**Tip!:**
Provides recommendations on how certain activities can be performed much easier.

**Please note!:**
Indicates certain problems that the user should take note of.

**Caution!:**
Indicates that the machine can be damaged.

**Warning!:**
Indicates a risk of injury.

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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 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 when the SBGuidance system is switched on. The driver is always responsible for the direction and course of the vehicle.

**Warning!:**
To prevent injury or fire, replace defective fuses only with fuses of the same type and amperage.

**Warning!:**
The SBGuidance the operating system is not able to detect and avoid obstacles. If there is an obstacle in your path, you will always need to take action for it to be avoided.

**Warning!:**
Only allow authorized/qualified persons to operate the system. Authorized/qualified persons are defined as: persons who have read and understood the manual, have been given instructions by a product specialist, and who are both physically and mentally fit and able to operate the system.

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

**Caution!:**
In order to prevent power surges from occurring, always start the machine first, before initiating the SBGuidance control system.

**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!:**
Always consult your supplier as to which products are best suited first before cleaning the touch-screen with chemicals or alcohol.

**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.

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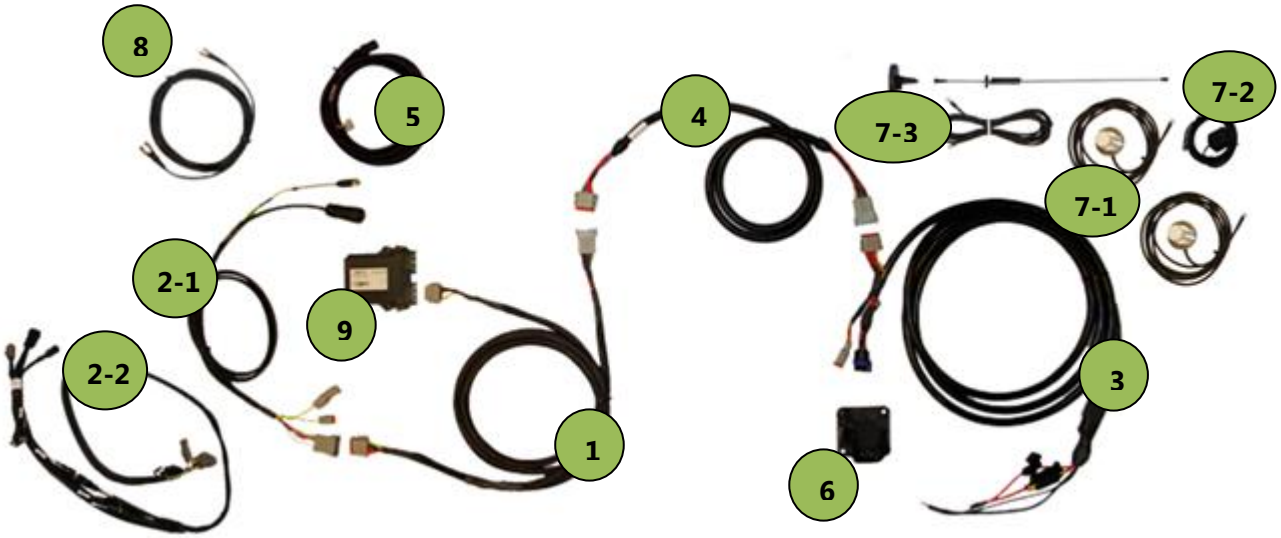
# 1. Instructions for installing the SBGuidance Auto on tractors

This manual is a guide for the Massey Ferguson AutoGuide tractors. This chapter provides overviews of the components that can be supplied with this tractor sets.

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

## 1.1. Overview of standard electronic components




| # | Part Number: | Description: |
|---|---|---|
| **1** | 11158000228 | HRNS, IN-CAB, DYNAMIQ |
| **2-1** | 11158000129 | HRNS, IN-CAB, TERMINAL, GEOSTR |
| **2-2** | 11158000008 | HRNS, IN-CAB, TERMINAL, VIPER4 |
| **3** | 11158000141 | HRNS, POWER, BASIC |
| **3** | 11158000060 | HRNS, POWER, IMPLEMENT READY |
| **4** | 11158000214 | HRNS, CHASSIS, EXTENSION, 2M |
| **5** | 11158000233 | HRNS, MF7600 AUTOGUIDE |
| **6** | 14084002131 | Implement socket (IBBC) |
| **7-1** | 11218000003 | ANTENNA, 4G/3G UMTS LAIRD 3.5M |
| **7-2** | 10638000015 | ANTENNA, PATCH, 4.5M |
| **7-3** | 11178000313 | KIT, RADIO ANTENNA TRC, MAGNET |
| **8** | 1115800011(0/1/2) | CBL, ANT. 3 / 4.5 / 6M, TNC-N |
| **9** | 10630173862 | DynamIQ ISO - Tractor |

### 1.2. Overview of standard mechanical components


| # | Part Number: | Description: |
|---|---|---|
| **1** | 11078000125 | BRACKET, DYNAMIQ, V4 |
| **2** | 11078000081 | BRACKET, GPS/RADIO ANT GENERIC |
| **3** | 11030001040 | MOUNT, 1" RAIL, RAM D |
| **4** | 11178000311 | KIT, BOLT AND NUT UNC, ANTENNA |
| **5** | 11078000006 | BRACKET, IBBC, IR |
| **6** | 11078000131 | MOUNTINGPLATE, ANTENNA, ROOF |
| **7** | 14074001024 | TNC Dummy |
| **-** | 11178000341 | KIT, MOUNTING, TRACTOR |

# 2. Tractor kit assembly

It is recommended to accomplish the installation of the tractor in the following order (Figure 1):

1. Mount the entire wire harness from the battery.
2. Mount harness on Massey Ferguson AutoGuide CAN-BUS.
3. Mount GPS antenna and radio/gsm-antenna(s) + cables.
4. Mount DynamIQ ISO in cabin.
5. Mount terminal.


**Figure 1 overview Massey Ferguson AutoGuide components.**

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# 3. Mounting harness

Two options can be chosen; a CAN Basic harness or an Implement Ready (IR) harness.

### 3.1. CAN Basic harness

The Basic harness can only be used for tractor steering. If the tractor is mounted with this harness there is no possibility to use the tractor for implement steering (TWIN, plough).

### 3.2. CAN Implement Ready (IR) harness

The Implement Ready harness ensures that the tractor can be used for tractor and implement steering. Mounting the implement is possible through the IBBC-connector. The harness is mounted from the battery to the IBBC-connector at the back side of the tractor (Figure 2).

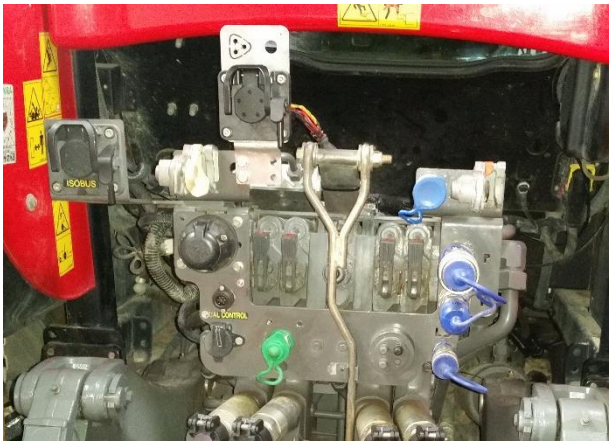


Figure 2 IBBC connector, IR harness.

### 3.3. Mount harness

The CAN basic harness and the CAN Implement Ready harness are divided in the following harnesses (ranked in order from the battery):

1. Power harness: This harness comes from the battery and goes to the rear axle along the chassis, wrapped in a hard casing. A Basic harness goes from the battery directly to the chassis harness (and not to the rear axle of the tractor). Mount the relays and fuses well nearby the battery. Find a place where they can be fastened firmly and vibration free (Figure 3).

Figure 3 mounted relays and fuses.

2. Extension harness: extends the power harness to the In-Cab harness. This harness is wrapped in a hard casing. This harness goes inside the cabin.

3. In-Cab harness (DynamIQ ISO): This harness comes from the chassis harness and is complete inside the cabin, wrapped in a braided sleeve casing. A branch is made to the DynamIQ ISO, which is mounted on the right- or left side of the chair (see Figure 4).

Figure 4 Mounted Dynamiq ISO

4. Harness In-Cab Terminal: this harness is connected with the In-Cab harness and the terminal. This harness is also connected with the MF AutoGuide harness. First disconnect the terminator resistor (Figure 5).

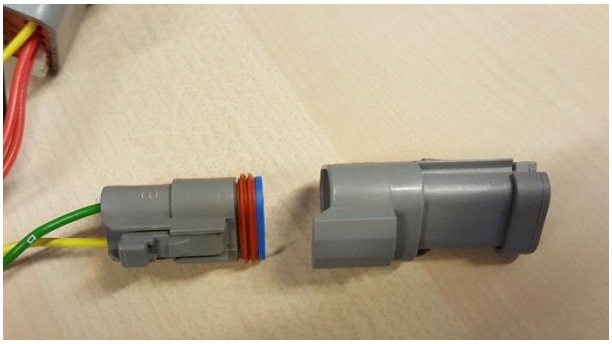

Figure 5 disconnected terminator resistor

5. Harness MF AutoGuide: connects the SBG system with the MF CAN system. The MF CAN connector is behind the floor protection cover on the right side of the chair (Figure 6). Remove the cover to find the connection. Connect the harness MF AutoGuide with the In-Cab Terminal harness and with the MF-CAN connector, label X230 (Figure 7).

Figure 6 Remove protection cover

**Tip!:**
*A schematic overview of the SBG CAN-harness on a Massey Ferguson AutoGuide tractor is shown in Figure 29.*

Furthermore there are some general instructions for mounting an SBG harness:

- Mount the relays fixed and in a dry, clean and accessible spot (Figure 3).
- The red wire is + (12V). The black wire is (ground). Make sure that the first part of the red wire (part in between battery and fuses) cannot damage during operation.

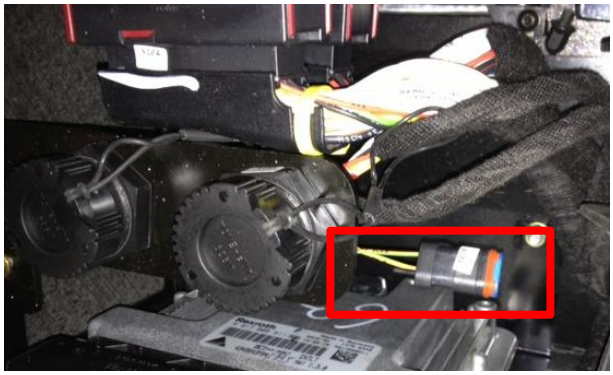

Figure 7 AutoGuide connector

- If necessary the positive and negative wires, in between the battery and the fuses, can be shortened. Be sure to use cable sockets with the correct size for proper connection.
- If a ground switch is used, connect the wiring harness behind the ground switch (not at the battery side of the ground switch!).
- If a main (12V) switch is used in the red wire, connect the wiring harness behind the main switch (not at the battery side of the main switch!).
- If no main switch is used, always connect the wiring harness directly to the battery.
- If the system is connected to a 24 Volt machine, always use a 24V to 12V converter. Never connect between the two batteries of a 24V machine!
- Lead the terminal harness along with the GPS and radio/GSM antenna cables through one pillar of the cab.
- Tie-wrap the wires so they are attached free from vibration and friction.

**Warning!:**
*It is Important to ensure that the wiring harness is always connected to the battery AFTER installing all wires and controllers!*

**Warning!:**
Be sure the cables do not damage during the installation!

**Please note!:**
*Push all connectors until they snap to be sure the connectors are properly connected!*

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# 4. Mounting GPS- and radio/gsm- antenna

A standard GPS bracket can be mounted on a MF AutoGuide tractor.

## 4.1. Mounting the standard GPS antenna bracket

Figure 8 shows an example of a standard GPS-antenna (with a radio antenna in this case) mounted on a standard GPS-antenna bracket. A GPS-dummy and an UNC bolt + nut are also mounted. The standard GPS-antenna bracket can be mounted with double sided tape on the cabin roof. In case of Figure 8 the standard GPS antenna bracket is a bit shortened, otherwise the window could not be opened anymore. For mounting a GPS-antenna a few general instructions are applicable:

**Figure 8 Standard GPS-antenna bracket + UNC bolt and nut mounted on a roof**

- Mount the GPS-antenna at least 60 cm in front of the rear axle.
- Mount the GPS-antenna in the middle of the tractor.
- Mount the GPS-antenna on the supplied UNC bolt.
- Mount the TNC-dummy on the GPS-antenna bracket (Figure 8).
- Wire the antenna cable connector with the largest connector through to the inside of the cabin.
- Fasten the antenna cable so that it cannot become pinched anywhere and conceal inside the cabin upholstery, together with the GPS patch antenna cable, radio antenna cable or UMTS antenna cable.
- Mount the GPS antenna cables in a way water cannot flow down into the cabin.
- Mount the antenna cable in such a way that no water is allowed to flow along the cable into the cabin.
- Label the antenna cable inside the cabin with label 'GPS1'.

### 4.2. Mounting Raven 600S antenna

Nowadays, it is also possible to use SBGuidance Auto in combination with a Raven 600S antenna (Figure 9).

In this manual the installation of the 600S antenna is explained. For the configuration of this antenna see the English configuration manual: '016-8000-025EN-A - Configuration manual – 600S smart antenna'.

On the bottom side of the 600S antenna, two magnets are built-in for attaching the antenna to steel surfaces. The new version of the GPS antenna bracket has a slope on both sides, so that the 600S antenna is well centred on the GPS antenna bracket (Figure 9). The GPS antenna bracket has to be mounted on the front of the cabin roof.

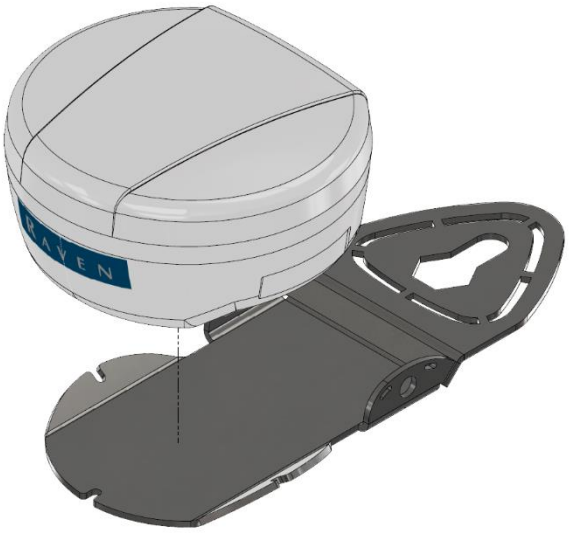


Figure 9 Raven 600S antenne.

An adapter/split cable is supplied with this antenna. The antenna is connected through this adapter cable and the '600S to Viper 4' cable to the terminal harness. The adapter cable should remain to the GPS antenna when it is removed from the tractor.


Figure 10 Raven 600S antenna on a cabin.

If also a Slingshot modem is used for RTK corrections, a 'modem to receiver' cable has to be connected. Make sure that the connectors on the roof are provided with protective caps (Figure 11). With these protective caps no dust and water can enter the connectors.

Figure 11 Cables to the Raven 600S antenna.

Furthermore, the following guidelines must be observed when installing the GPS antenna:

- Mount the GPS-antenna with the connectors backwards (Figure 10).
- Mount the GPS-antenna at least 60 centimetres in front of the rear axle.

### 4.3. Mounting the radio antenna

Figure 12 shows the standard radio antenna with magnetic base. Preferably, this standard antenna should be used. The components of this standard antenna are shown in Table 1.

**Table 1 Standard parts for radio antenna**

| Symbol | Description |
|---|---|
| **1** | Radio antenna |
| **2** | Antenna lead |
| **3** | Connector to terminal |
| **4** | Magnetic base |


**Figure 12 Radio antenna components.**

A number of specific conditions should be met before installing and mounting the radio antenna:

- Preferably mount the radio antenna with the magnetic base on the standard GPS antenna bracket.
- Do not mount the radio antenna next to a steel construction, but above it.
- Mount magnetic base on a sufficiently large steel surface (at least the size of the standard GPS antenna bracket). A larger steel base surface can improve signal strength and prevent problems, especially at greater distances (> 9 km).
- Label the antenna cable inside the cabin with label 'Radio'.

### 4.4. Mounting the GPRS/UMTS antenna

If a SlingShot modem is used, in addition to the GPS-antenna, two GPRS / UMTS antennas and a GPS patch should be mounted.

The GPRS / UMTS-antennas should be mounted at least 100 cm of each other (like the CNH antenna-bracket in Figure 14). If a standard GPS-antenna bracket is mounted, one of the GPRS / UMTS-antennas should be mounted on this bracket (Figure 13). The second GPRS / UMTS-antenna should be mounted on a metal bracket on the cabin (Figure 15).

It is important that the following conditions are met at all times:

- The GPRS/UMTS antenna is equipped with a magnetic base and must be placed on top of the cabin.
- The antennas should have a clear reception all round.
- Label the GPRS/UMTS antenna cables inside the cabin with labels 'Cellular' and 'Diversity' (Figure 16).
- Mount a grey SMA grip on both connectors (Figure 16).


**Figure 13 GPS antenna bracket with a Laird UMTS antenna.**

**Figure 14 Brand specific bracket with GPS-antenna, GPS patch antenna and two GPRS/UMTS antennas.**

**Figure 15 GPRS/UMTS-antenna and GPS patch antenna on a metal bracket.**

### 4.5. Mounting GPS Patch antenna

When using a SlingShot modem also a GPS Patch antenna should be mounted (Figure 15). The GPS Patch antenna is magnetic. Mount the GPS Patch antenna always on the roof of the cabin. Be careful with mounting the GPS patch antenna; the GPS patch antenna cable is quite thin and fragile. Label the GPS Patch antenna cable inside the cabin with label 'GPS' and mount a blue SMA grip to the connector (Figure 16).


**Figure 16 Antenna cables with labels and SMA-grip set.**

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# 5. Mounting DynamIQ ISO

The following guidelines have been established for mounting the DynamIQ ISO:

- Preferably, place the DynamIQ ISO next to and at the right side of the seat. Use the standard DynamIQ ISO mounting plate (Figure 17).
- If it is not possible to attach the DynamIQ ISO to the seat bolts, the DynamIQ ISO should be attached in an appropriate place in the cabin that is free from vibrations.
- A DynamIQ ISO may only be mounted in a horizontal position (with the sticker side up). The connectors may be orientated in four directions (0, 90, 180, 270 degrees).
- By default, the orientation of the DynamIQ ISO is set to: horizontal position with connectors pointing towards the rear (as shown in Figure 17). Any other orientation should be set in the software!

**Figure 17 DynamIQ ISO on a mounting plate.**

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# 6. Mounting the terminal

The terminal can be mounted with a supplied RAM-D/RAM-C pipe bracket on a Massey Ferguson AutoGuide tractor (Figure 18).

Figure 18 Viper 4 mounted with pipe bracket.

The following guidelines have been established for mounting the terminal:

- Always contact the customer about the terminal position in the cabin.
- Always use a RAM-D or RAM-C ball attachment.
- Mount the terminal free of vibrations with a solid bracket. A variety of mounting brackets are available for this purpose.
- Conceal all cables in one pillar (e.g. A-pillar or B-pillar).
- Mount in such a way that the display is directed straight towards the driver.
- Mount in such a way that driver has a clear view all around.

**Tip!**:
*Mount the terminal in such a way that it does not obstruct the view of the driver over the top of the right-hand fender, but also so that the inside of the front wheel on the ground is still clearly visible.*

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# 7. Configuring tractor

For configuring a Massey Ferguson AutoGuide see general configuring Manual – SBGuidance Auto – CAN – EN (016-8000-100). However, some settings are different. The different parts of configuring a Massey Ferguson AutoGuide tractor are described in this chapter.

## 7.1. Starting automatic steering

After starting the SBGuidance software the automatic steering on the Massey Ferguson tractor should be switched on before the automatic steering can be activated. To do this press the button with the steering wheel (red circle in Figure 19). When activated, the button will light up.

Figure 19 activating automatic steering.

## 7.2. SBGuidance Configurator settings

In the SBGuidance Configurator go to the machine settings. Select MF / Valtra AutoGuide in page ISOBUS of the machine settings (Figure 20).

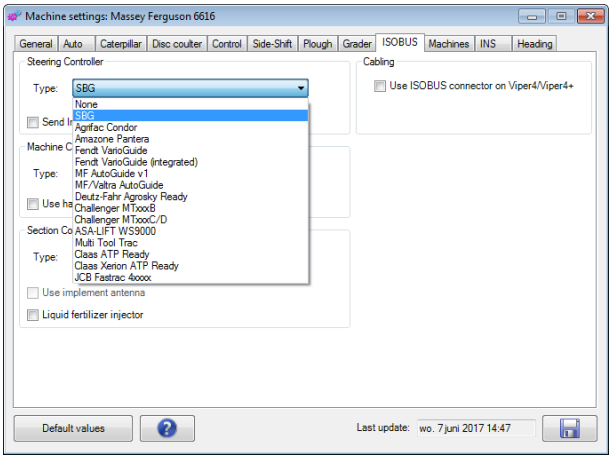


Figure 20 select type in machine settings.

## 7.3. CANTool

Open the CANtool (use CANtool 2.0.24 or newer).

Depending on the cabling and the terminal, choose the Hardware manufacturer and Hardware channel. Press 'Initialize' to get communication with the CANbus (Figure 21).

Make sure there is communication with the CANbus (received frames is running and Busload > 0%); see red rectangles in Figure 21.

Open the tab 'Modules' (green circle in Figure 21) and select the Sauer-Danfoss PVED-CL module to get to the programming tool.

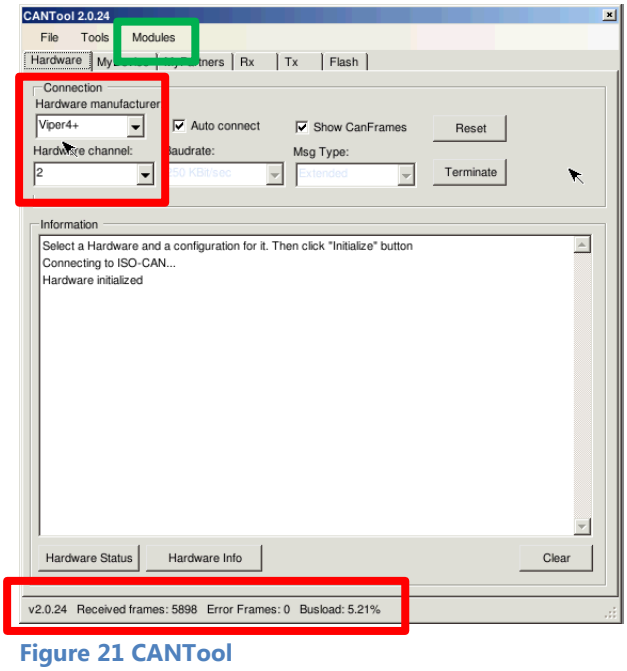


Figure 21 CANTool

Press 'Connect' to establish communication with the hydraulic valve (Figure 22).

If there is communication, information about the valve will show up in the module (Figure 22).

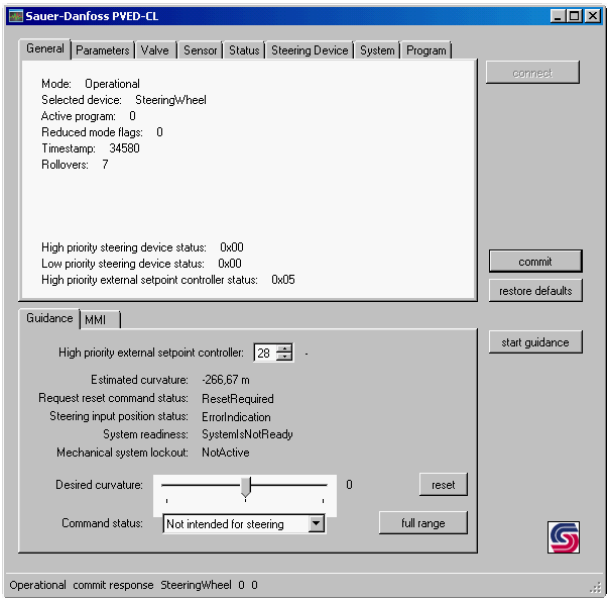


**Figure 22 Information about the valve.**

### 7.3.1. Steer sensor

To make the system work properly the values of the steering angle sensor has to be checked and possibly changed. Three steering values are necessary; position completely left, right and centre. Open the tab 'Sensor'. Press 'Get parameters', wait 5 seconds and press 'refresh'. After pressing these buttons, all parameters are shown in the tab (Figure 23).

**Left value** = AD1_1000_Left

**Centre value** = AD1_1000_Neutral

**Right value** = AD1_1000_Right

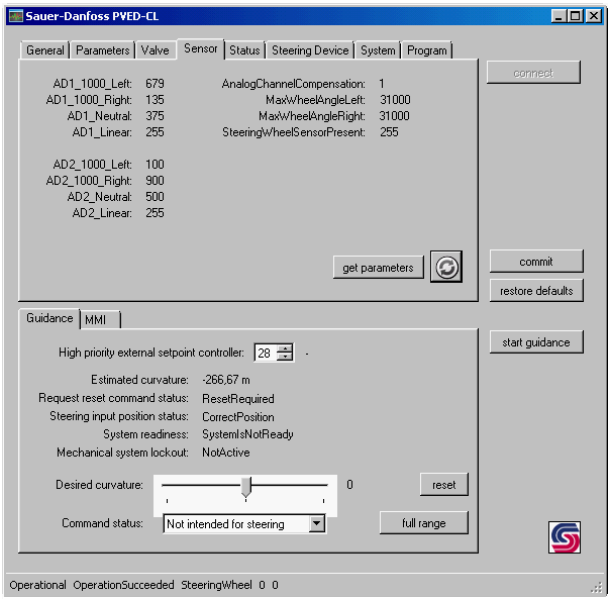


**Figure 23 Values steer sensor.**

To check these values, open the tab 'Status' and press 'Enable status set no. 1'.

The value which is visible behind 'AD1:' is the value of the steer sensor (see Figure 24).

Turn the wheels completely to the left and read the value. Compare this value with the value in the tab 'Sensor' (AD1_1000_Left).

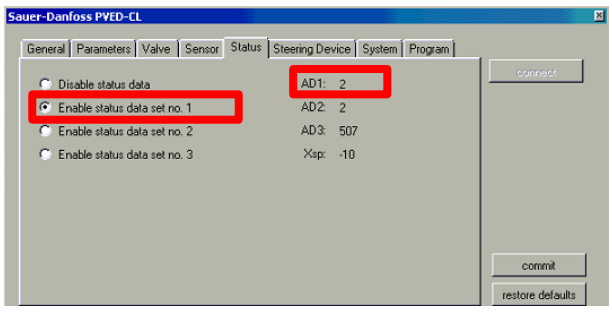


**Figure 24 Steering sensor value.**

If the value is not correct, open the tab 'Parameters' (Figure 25) to change the value. Search the value, double-click on it and it will be shown in the bar (see red rectangle in Figure 25). Overwrite the old value with the correct value and press 'Set'.

Do the same for the centre- and right value. After changing any of these values press 'Commit'.

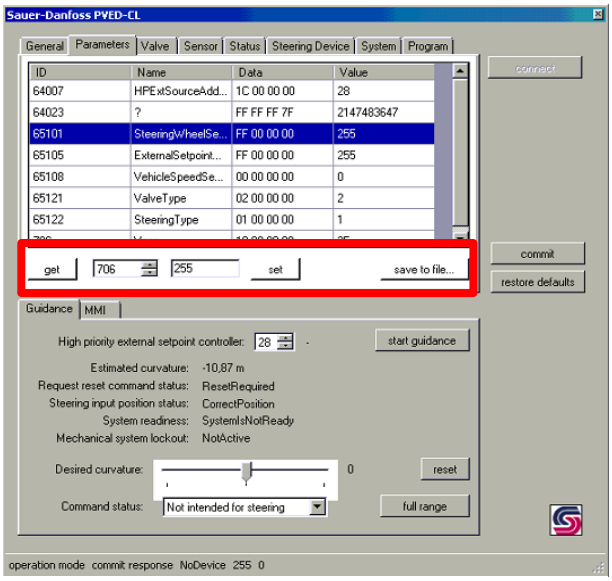


**Figure 25 Tab parameters.**

**Please note!:**
*If any value has changed, press 'Commit' before proceeding the procedure.*

### 7.3.2. Calibration mode

The hydraulic valve has two modes, the Operation mode and the Calibration mode. In calibration mode it is possible to calibrate these values. Open the tab 'MMI' (Figure 26) and press the button 'enter calibration mode'. To get in the calibration mode, the valve needs to be powered off- and on again. To do this follow the steps to get in the Calibration mode. In the lower left corner, the mode is shown (Figure 26).

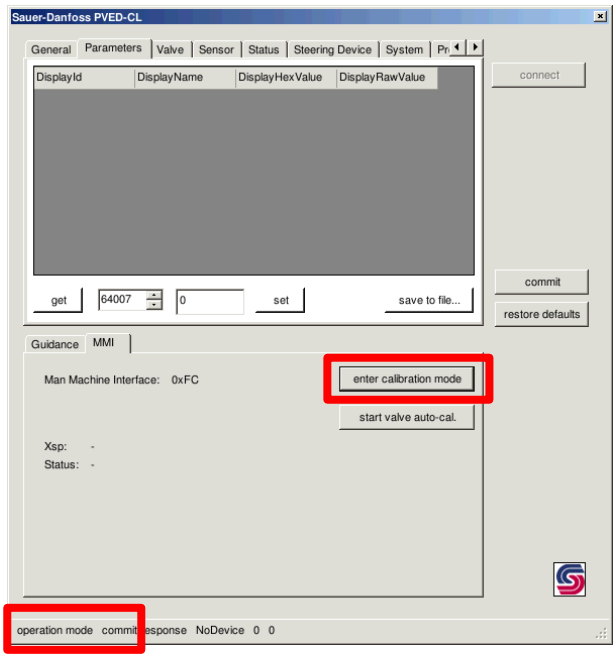


**Figure 26 Calibration mode.**

When the valve is in Calibration mode, press 'Start valve auto-cal.'. Do not touch the steering wheel while calibrating!

When the calibration is successful, press 'set' and 'Commit'.

**Please note!:**
*If any value has changed, press 'Commit' before proceed further.*

Power off- and on again to get back in the Operation mode.

### 7.3.3. Proportional gain

There are two values in the PVED-CL which are equal to the Proportional Gain when using the SBG system. These are the Kp and the Vcap, in which the Kp value will be the one with the most result. Increasing this values will result in more accurate steering, decreasing this value will result in a less aggressive (less 'nervous') steering system.

To change the Kp, open the tab 'Steering device'. Press 'Get parameters', wait 5 seconds and press 'refresh' (sometimes it's needed to press these buttons multiple times). After pressing these buttons, all parameters are shown in the tab; see Figure 27.

After the parameters are visualized in this tab, go to the tab 'Parameters'. Double-click on the value and it will be shown in the bar (Figure 28). Overwrite the old value and press 'Set'. The new value will be shown after the value.

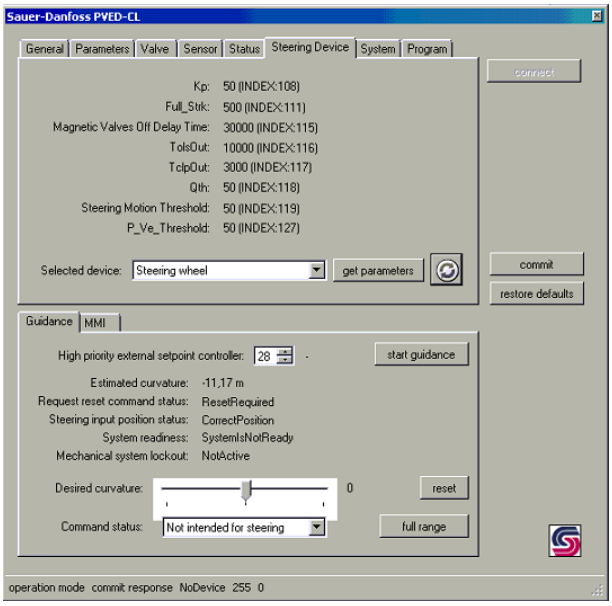


**Figure 27 Get Kp value.**

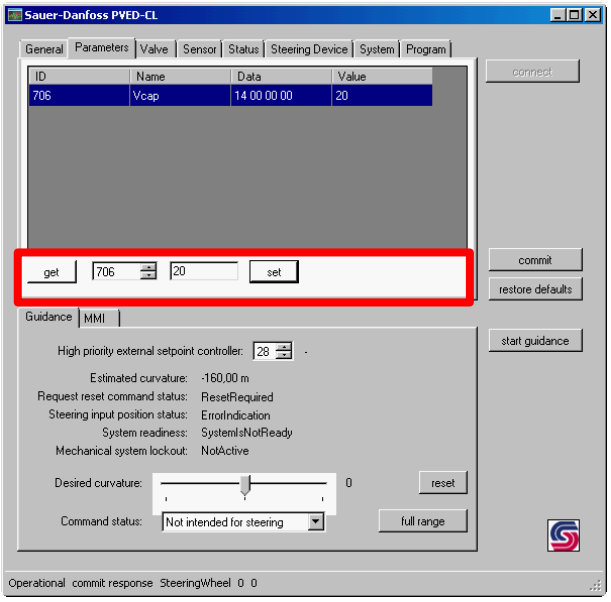


**Figure 28 Change Vcap value.**

If changing the Kp value does not result in an accurate steering system, the Vcap value can also be adjusted.

To change the Vcap, open the tab 'Valve'. Press 'Get parameters', wait 5 seconds and press 'refresh' (sometimes it's needed to press these buttons multiple times). After pressing these buttons, all parameters are shown in the tab. Go to the tab 'Parameters' and the Vcap should also be shown here. Double click the parameter and it's possible to change the value.

**Please note!:**
*If any value has changed, press 'Commit' before proceed further.*

### 7.3.4. Parameters

For Massey Ferguson AutoGuide tractors we have experience with some settings which are needed; see Table 2. To set these settings, go to the tab 'Parameters', fill in the parameter ID (in the text box behind the button 'Get') and press 'Get'. Change the value and press 'Set' and 'Commit' to save the new set value.

**Table 2 Overview parameters**

| Parameter ID: | Name: | Value: |
|---|---|---|
| 64007 | HPExtSourceAddress | 28 |
| 65101 | SteeringWheelSensorPresent | 255 |
| 706 | Vcap | 30 |
| 508 | KP | 75 |
| 64023 | StwActivationTimeout | 2147483647 |
| 65105 | EsternalSetpointControllerPresent | 255 |
| 65108 | VehicleSpeedSensorPresent | 0 |
| 65121 | ValveType | 2 |
| 65122 | SteeringType | 1 |

# 8. Annexes

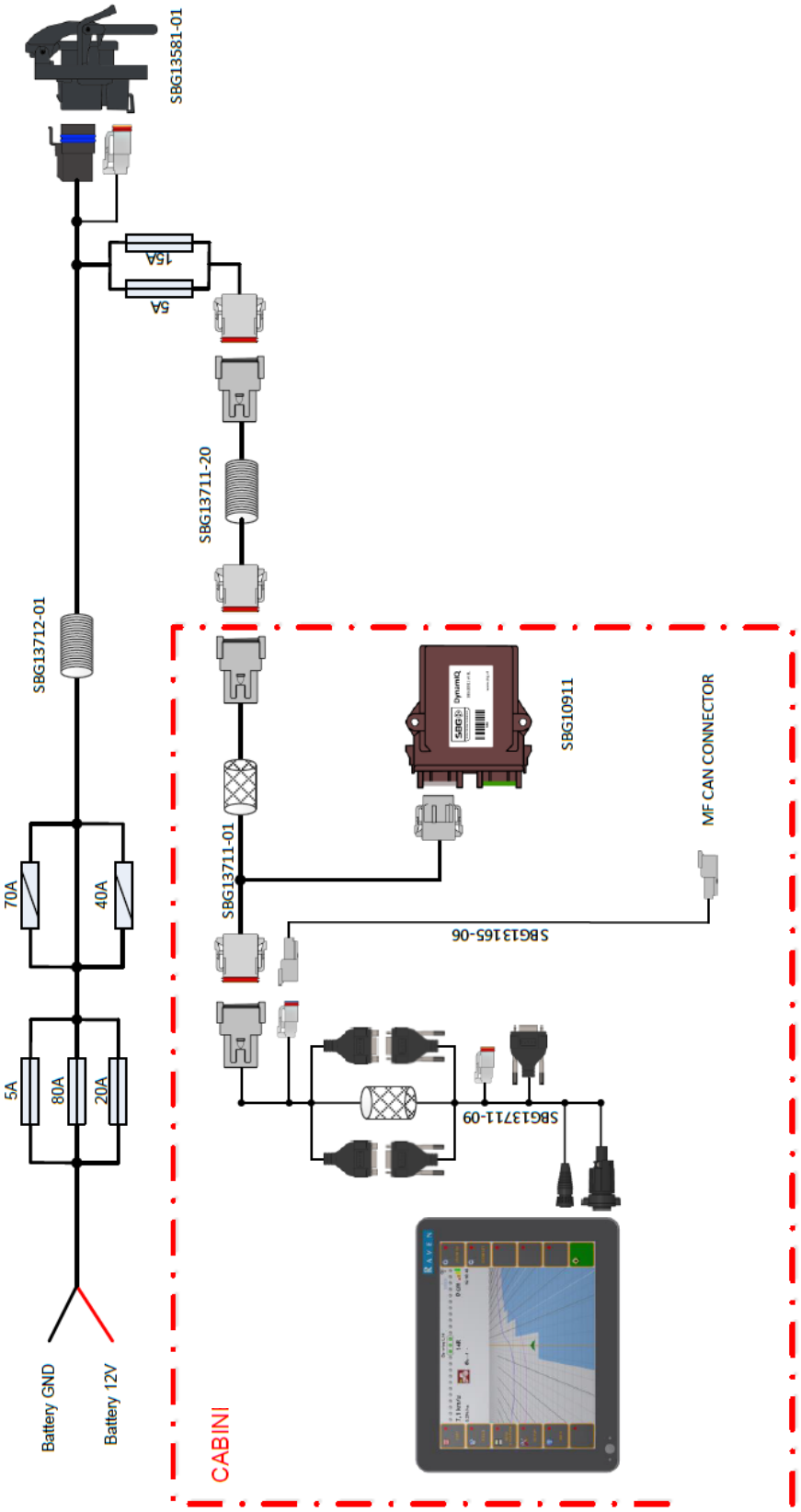


Figure 29 schematic overview Massey Ferguson AutoGuide.