

GENERIC INSTALLATION GUIDE

Trimble® GCS900 for Skid Steer Attachments



Part Number: 98616-10
Models: Grading Attachments
Revision: A
Date: June 2016



MACHINE SPECIFICATIONS

TYPE:	Skid Steer Loader
MAUNUFACTURER:	All
MODELS:	Grading Attachments
SERIAL NUMBERS:	All
ELECTRICAL SYSTEM:	12/24 Volt DC, Negative Ground

SYSTEM INTERFACE

CONTROLLER:	CB450 & CB460 Version 12.62+
BASE KITS:	74060-20/30/40
SYSTEM CABLE DIAGRAM:	96616-10

CONFIGURATIONS

Attachment Type	Attachment Manual Control
Generic	Existing OEM
ATI	ATI
Generic	VM435
Bobcat Grader	Bobcat Skid Steer
Bobcat Grader	VM435
Generic – Attachment Mounted Display	VM435



Installation is to be performed by trained and qualified personnel only.

Installation Preparations

This manual contains machine specific installation information. Refer to the system installation manuals provided with the system for general installation information.

To facilitate the installation of the Trimble Control System, it is necessary to have the following equipment and supplies available at the job site:

- Arc Welder / Welding Rods
- Volt/Ohm Meter
- Mechanical and Electrical hand Tools
- Clean Container for Hydraulic Oil
- Clean Rags

The machine should be steam-cleaned, or pressure washed concentrating on the points of hydraulic connections and welding areas.

Important Safety Information for Working on Mobile Hydraulics

Protective Equipment

Always wear protective glasses, protective shoes, and other protective equipment as required by job conditions and machines. In particular, wear protective glasses when using pressurized air to clean surfaces, or cleaning overhead areas. Use welder's gloves, hood or goggles, apron and other protective clothing appropriate to the welding job being performed.

Do not wear loose clothing or jewelry that can catch on machine parts or tools.

Pressurized Items

Lower the blade, ripper, and other attachments to the ground before performing any work on the machine. Relieve all pressure in oil, air, or water system before any lines, fittings, or related items are disconnected or removed. Use caution when checking the machine for hydraulic leaks, and system operation. Do not use bare hands to check for leaks. Pinhole leaks can result in a high velocity fluid stream that can penetrate the skin and cause serious injury. Stand clear when checking for leaks and on initial start-ups.

Mounting and Dismounting

Use steps and handrails when mounting or dismounting a machine, facing the machine.

Hot Fluids

To avoid burns, be alert for hot parts and hoses on machines that have just been stopped. Be careful when removing fill caps, breathers, and hose connections on the machine. Use proper safety/protection equipment to prevent being sprayed by liquids under pressure.

Pre-Installation

Before starting to disconnect hydraulic and electrical components, disconnect the battery cable and attach a "Do Not Operate" or similar tag in the operator's compartment. A "lock-out" box should also be placed and





General

locked onto the battery terminal to avoid the battery from being reconnected and the machine possibly started.





If possible, make all modifications to the machine parked on a level, hard surface. Block the wheels to prevent from rolling, while working on or under the machine.

Read through these instructions to familiarize yourself with the installation requirements.

BOLT TORQUE CHART

	GRADE	Nominal Size (inches)								
		1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	1"
	SAE 2	6	11	19	30	45	66	93	150	300
	SAE 5	9	18	31	50	75	110	150	250	580
	SAE 8	13	28	46	75	115	165	225	370	890
	SOCKET HEAD	14	30	50	80	120	175	240	390	960

Maximum torque values in FT-LB
Applicable to clean, dry, course threads in iron

	GRADE	Nominal Size (mm)							
		6	8	10	12	14	16	18	20
	4.6, 4.8	3	8	16	27	43	60	90	120
	8.8	7	17	33	59	100	130	180	280
	10.9	10	25	48	85	130	200	280	400
	12.9	12	29	57	100	150	230	---	---

Maximum torque values in FT-LB
Applicable to clean, dry, course threads in iron

1. Loader Install

1.1 Display Mounting



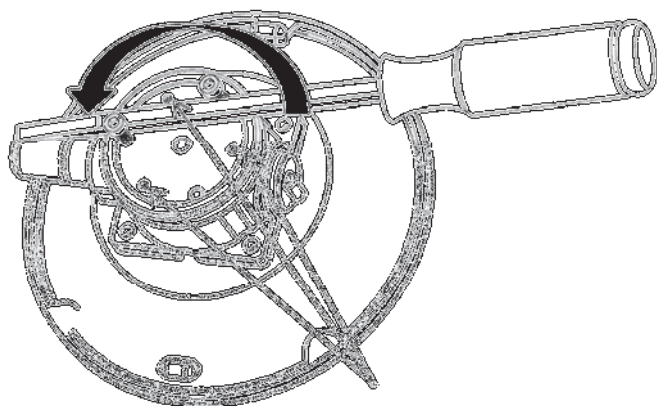
The Display can be mounted using two different methods:

1. Suction Cup Mount: Use the provided suction cup mount and double ball RAM mount. The suction cup can be attached to either the front door glass or a side window. If mounting to the front door, it is recommended to mount on the hinge side. Clean the area well with alcohol wipes prior to mounting the suction cup. Attach the suction mount by pumping the white knob until mount is stable and secure.

Note: The suction cup mount bleeds off and will occasionally need pumped. It is not recommended to leave the display on the suction cup mount when not in use.



2. Clamp to the Protective Guard: The double ball RAM mount, 10-32 x 3/4" screws, and the circular disk from the suction cup assembly will be used. The circular disk will be used to clamp the ram ball to the cage. It is recommended to use a location close to a rigid edge of the lattice.



To remove the circular disk from the suction cup mount:

- a. Remove the Ram ball
- b. Remove the 3 set screws
- c. Partially thread in two #10-32 socket head cap screws
- d. Use a screw driver to unthread the plate.

1.2 Display Harness



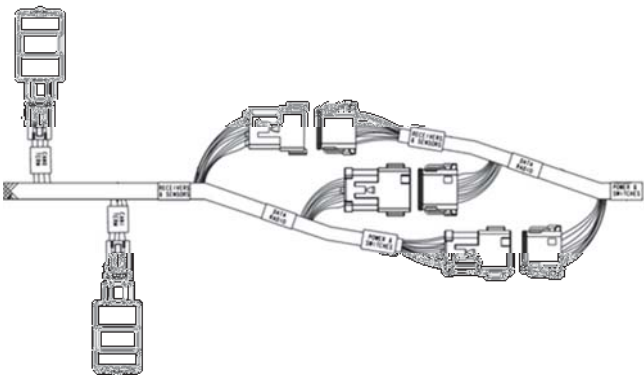
The display harness, 201623, will route along the right or left side of the cab. If the cab splits when tilted up, it is recommended to be affixed to the same portion that the display is mounted to. The display harness will plug into the plastic 31 pin bulkhead connector of the chassis/loader boom harness, 201624. The bulkhead connector of 201624 can be mounted in the back wall of the cab by creating an appropriate sized hole with a hole saw.

1.3 Loader Boom Connector



Mount the provided bulkhead connector mounting plate near the attachment connectors on the loader boom. M8 x 20 mm fasteners are provided for mounting the flat plate. An M3 screw and washer are provided for attaching the dust cap chain that comes as part of the chassis/loader boom harness, 201624.

1.4 Chassis/Loader Boom Harness



To facilitate routing the chassis/loader boom harness, 201624, it can be separated into two halves. To separate it, disconnect the 3 staggered 12 pin Deutsch connectors and remove the active terminators. The divided harness allows it to pass through smaller openings than the 31 pin bulkhead connectors will allow. The connectors shown are intended to be located in the engine/chassis area.

1.4 Chassis/Loader Boom Harness



The loader boom portion can either be routed through the loader boom or by affixing it to the outside of the structure.

When routing through the loader boom, follow the existing harness and hoses. On some machines, gaining access to this passage way may not be possible, in which case affixing to the outside of the structure may be necessary.

Adhesive mount tie wrap bases are provided for this. They can be placed periodically along the length of the loader arm to support the cable. Use alcohol wipes to clean area before attaching. Allow 24 hours of cure time to achieve full strength. Large tie wraps may be wrapped around the loader boom to help fixture the adhesive mounted tie wrap bases during the curing process.



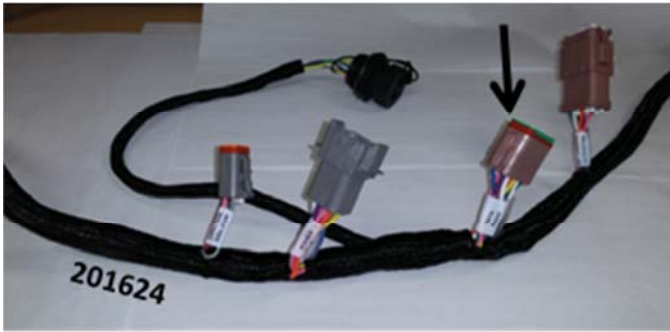
The transition area from the loader boom to the chassis needs to be well protected and carefully mounted due to the motion occurring in this area. Be careful to avoid sharp edges or provide adequate protection. Do not bind the harness too tightly to hydraulic hoses, as they can be abrasive to the harness.

Every attempt should be made to attach the Trimble harness to non-vibrating machine structure (frame). Never attach the harness to the engine or engine mounted components.



Follow the machine harness from the chassis to the isolated cab in a way that does not impact the OEM wiring. Pay attention to the routing path so that the harness does not come under tension or gets pinched as the cab is raised or lowered. Refer to section 1.2 for entry into the cab.

1.5 Data Radio Connection



Both the SNR radio and the SNM are to be mounted in the same location. When mounting on the skid steer, they will connect to the brown connector on harness 201624. Install the dust plug provided with harness 201624 in the mating brown connector found on harness 201624. Reference sheet 2 of diagram 96616-10.

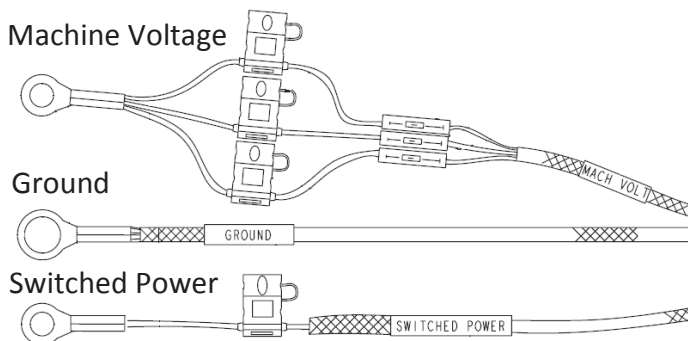
Refer to section 2.6 when mounting on the attachment.

1.6 Power Connections

Connecting power cable 102513 to the machine will be dependent upon if a power module is used or not. The power module should be used if:

- EM400 masts are being used.
- Delayed shutdown for GCS after the key switch is turned off. (3D systems)
- Reducing switched power consumption is needed
- Solenoid Valves are being driven

Power Cable 102513



1. Power Module Installed
 - a. Switched Power – Connect to a key switched power source.
 - b. Machine Power – Connect to a constant power supply
 - c. Ground – Connect to a suitable chassis ground

Note: With Power Module Jumpers 102515 & 102518, the Valve Module operates on switched power so that manual control of the attachment using is possible without the GCS display being present.

2. No Power Module Installed
 - a. Switched Power – Connect to a key switched power source.
 - b. Machine Power – Connect to a key switched power source.
 - c. Ground – Connect to a suitable chassis ground

1.7 Backup Alarm Connection



The backup alarm cable and active terminator connect to the appropriate connector on harness 201624, in the engine compartment area. The flying leads connect to the backup alarm to detect when voltage is present. Ring terminals are provided for connecting to alarms equipped with input studs. The cable should be routed so it will not be pinched while opening and closing the rear engine access door.

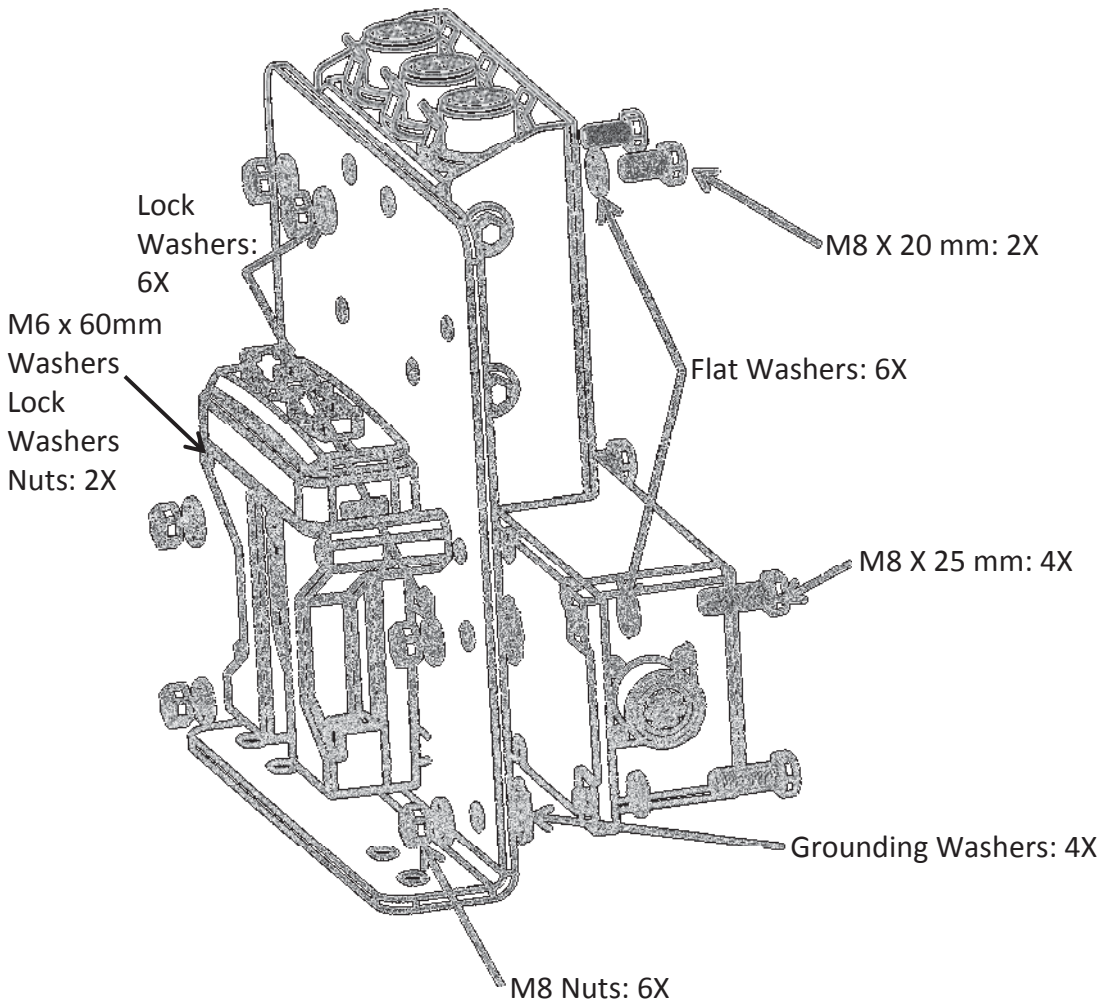


2. Attachment Install

2.1 Valve Module/Power Module/ Quick Disconnect Installation



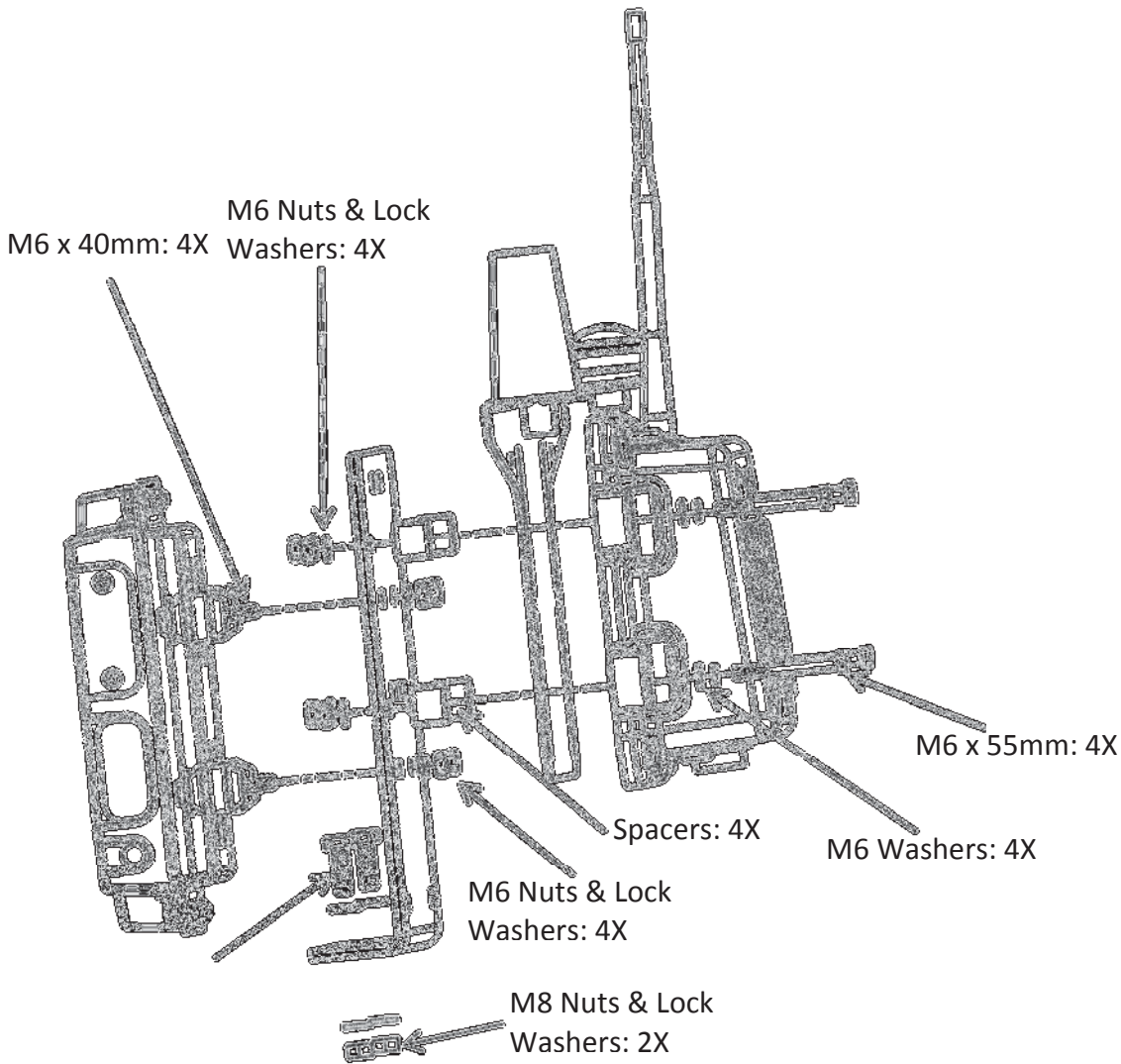
A combination mounting bracket, 105976, is provided for attaching the Quick Disconnect Assembly, Valve Module and Power Module to the attachment. The Power Module and Quick Disconnect housing can mount to 1 side and the Valve Module can mount to the opposing side. M8 x 25 mm fasteners and hardware are provided for mounting the assembly to the attachment.



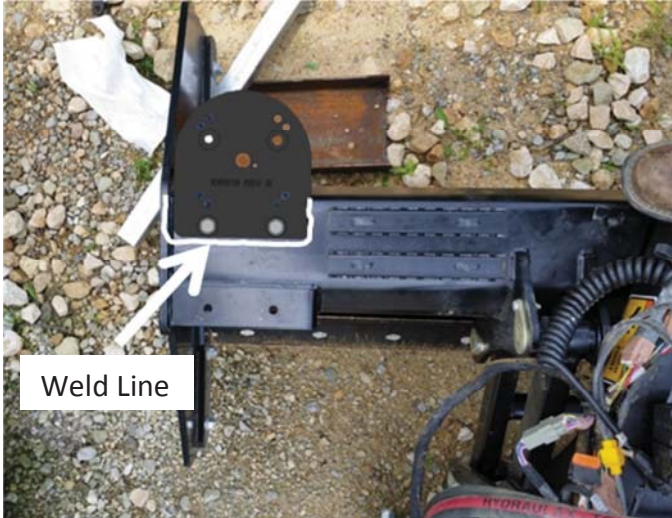
2.2 SNR Radio & SNM Mounting



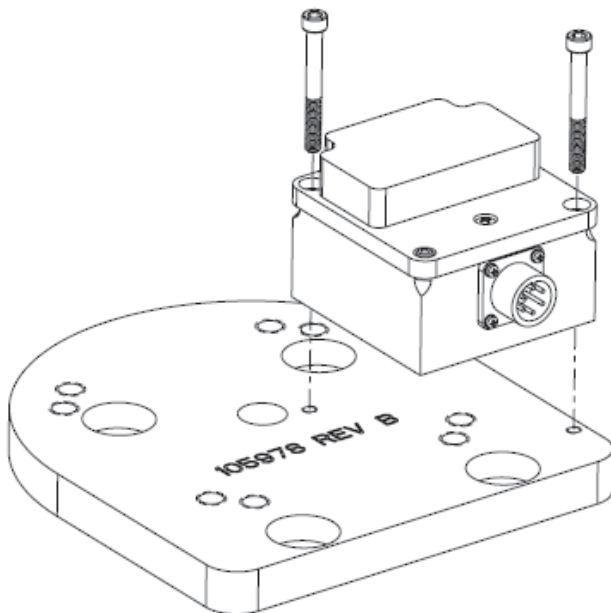
A combination mounting bracket, 105976, is provided for mounting the SNR Radio and SNM shock mounted on opposing sides. M8 x 25 mm fasteners and hardware are provided for mounting the assembly to the attachment.



2.3 Mast & Slope Sensor Mounting



Weld Line



Note: Pay close attention to sensor orientation when mounting the plate.

A pair of mounting plates are provided in the kit. The plate can be fastened to the attachment either by welding directly to the blade or by bolting to the blade. When bolting to the blade, the plate has recessed openings for M12 fasteners.

When mounting the plate the following needs to be considered:

- The plate can be mounted in most orthogonal orientations to the direction of travel.
- The large flat face needs to be parallel with the ground when the cutting edge is resting on the surface.
- Typically the loader boom height and bucket cylinder position will affect the blade pitch.
- The rectangular mast bolt pattern is replicated in two orientations.
- If manual masts are used, the plate will need to be positioned so that center bolt hole is accessible from below
- The blade slope sensor connector clearance should be verified.
- Check that the blade slope sensor is corrected oriented before permanently mounting the plate
- If the plate is overhung, support gussets should be added

The following mounting fasteners are provided for mounting items to the mast mount:

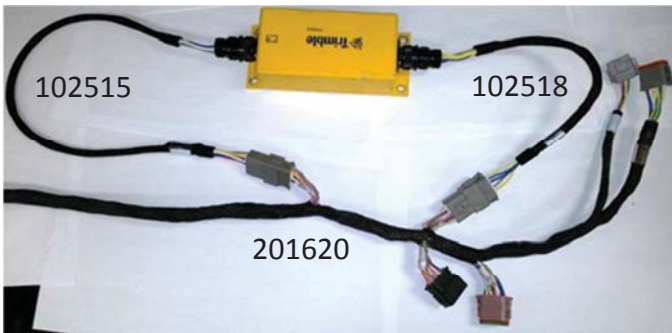
- Fixed Masts: M12 x 60mm & 3mm Washers
- EM400 & M4: M12 x 45mm
- AS400 or GS420: M6 x 55mm

2.4 Attachment Harness



The bulk of connectors on the attachments harness typically will be located in and around the valve & module mounting area on the attachment. The loader boom connector lead then will follow the attachment hydraulic hoses back to the loader boom.

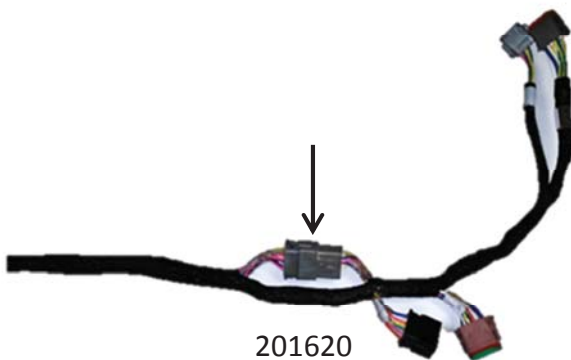
2.5 Power Module Cables



Refer section to 1.6 for more details on Power Module usage.

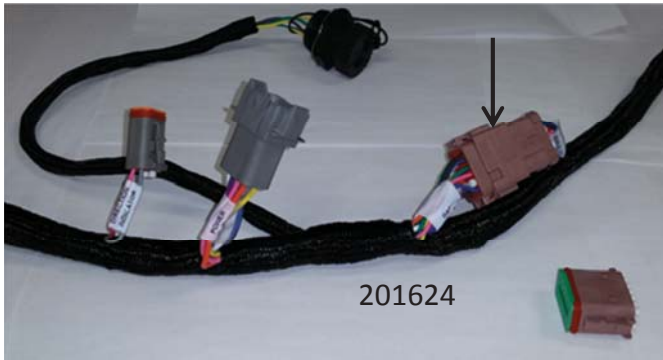
When a power module is used, additional power module adapters will be needed:

- Power Module Input: 102515
- Power Module Output: 102518



When no power module is used, the connectors labeled “Power Source” and “Power Input” on harness 201620 will be mated together.

2.6 Data Radio Connection



Both the SNR radio and the SNM are to be mounted in the same location. When mounting on the attachment, they will connect to the brown connector on harness 201620. Be sure the mating brown connectors found on 201624 are connected. The provided brown connector dust plug with 201624 will not be used. Reference sheet 1 of diagram 96616-10.

Refer to section 1.5 when mounting on the skid loader.

3. VM435

3.1 Introduction

Often it is desired to share a proportional valve between manual operator controls and the GCS900 system. Due to the complex drivers used to accurately actuate the valves, when more than 1 valve driver is connected to the same valve it can generate faults. To remedy this situation, the VM435 has been created that will accept digit manual control inputs as well as valve drive requests from GCS900. Additionally the same digital inputs to the VM435 can be used for remote switch inputs to GCS900 simultaneously.

3.2 System Requirements

In order for GCS900 to correctly work with the VM435, V12.62B or later is required.

3.3 Installation: Valve Cables

The standard VM430 valve cables can be used for connecting to Proportional Current, Proportional Time and Proportional Voltage valves for Lift &Tilt and Lift-Lift configurations per the list below. For the grader configuration, valve cable 201614 will be needed for PWM and PT valves.

- PWM & PT valve types: 89610-46
- PWM & PT valves with load sense: 89620-046
- Danfoss valve types: 89650-21
- Danfoss valve types with load sense: 89660-21
- Grader Attachment with PWM & PT valves: 201614

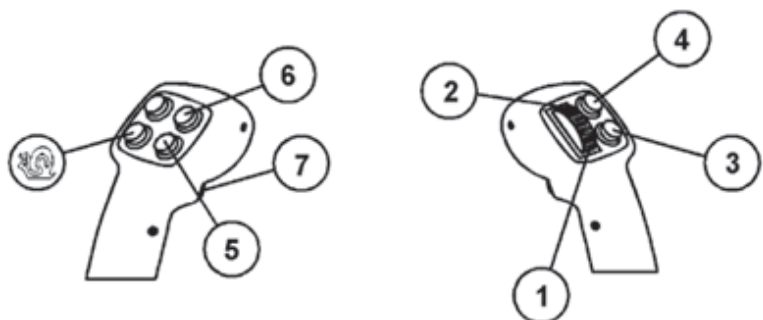
3.4 Installation: Switch Inputs

The VM435 uses the digital inputs listed below on the input connector. When machine voltage is applied to the input it will actuate the function.

Input Connector Pin	Function	Button Reference Number
6	Up Left	6
7	Down Left	5
10	Up Right	4
11	Down Right	3
12	Trigger	7

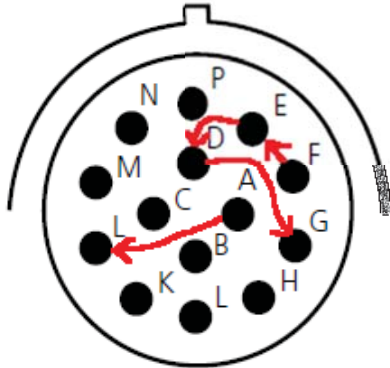
• Skid Steer Integrated Joystick Switches

- Joystick switches which supply machine power to pins on the attachment connector located typically on the front left corner of the loader boom. 5 switch outputs are typically needed.
- Cat D Series and newer machines equipped with the optional 14 pin work tool connector will be connected to the input connector on the VM using cables 201611 & 201612.

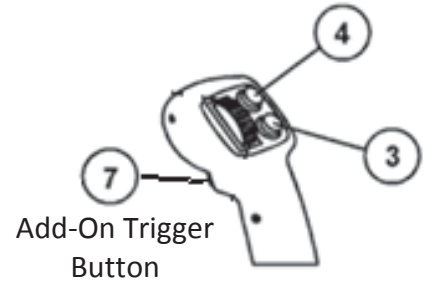
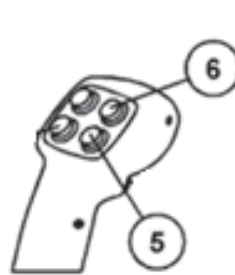


- John Deere E Series machines equipped with the 14 pin connector, cables 201611 & 201612 will be used. An additional momentary normally open push button acting as a trigger will need added to one of the joysticks. Cable 201612 will need modified by moving wire positions in the 14 pin connector to match up to the machine. The momentary trigger will connect to the 12 pin remote switch connector on 201623 using pin 3 (switched power) and pin 6 (trigger input).

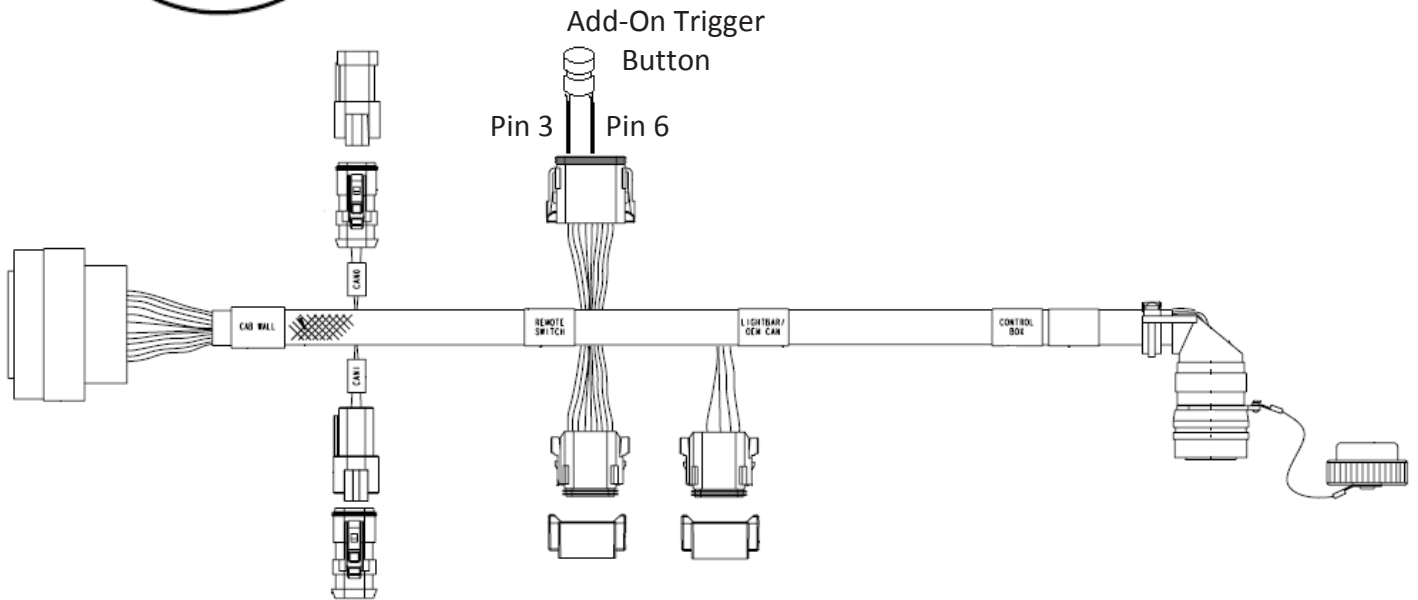
201612 Modifications



Move Pin D to G
 Move Pin E to D
 Move Pin F to E
 Move Pin A to L

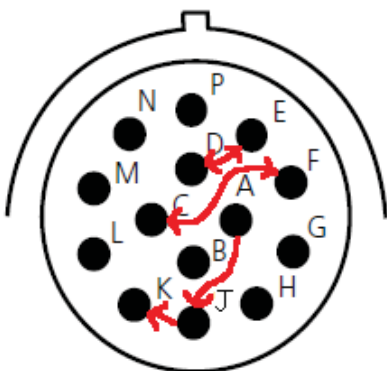


Add-On Trigger Button

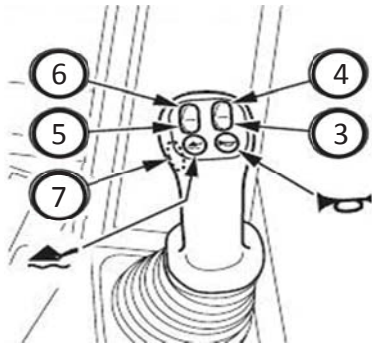


- Takeuchi machines equipped with the 14 pin connector, cables 201611 & 201612 will be used. Cable 201612 will need modified by moving wire positions in the 14 pin connector to match up to the machine.

201612 Modifications

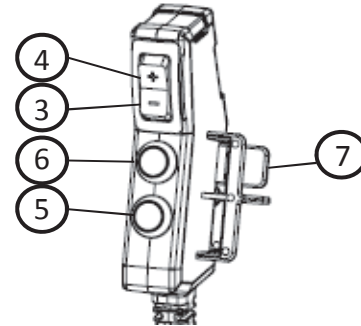


Swap Pins C & F
 Swap Pins D & E
 Move Pin J to K
 Move Pin A to J



- Remote Switch 150409-015

- If the skid steer is not equipped with appropriate joystick switches, remote switch 150409-015 can be used. It connects directly to display cable 201623 or by using cables 201611 & 201613-60.
- Switch mounting is ordered separately. The swivel mount is required and will be used with the appropriate joystick attachment kit.
 - 108069-30: Swivel Mount – Required
 - 108069-20: Flange Joystick Mount – Option 1
 - 108069-10: Straight Joystick Mount – Option 2



3.5 Remote Switch Usage

There are 5 different options for how the digital inputs to the valve module control the attachment and actuate the GCS remote switch functions based on the control type selected. Control type 0 is the default. Each control type is best suited for certain applications described more below. See section 3.8 for detailed switch input definitions.

Control Type		Application
0	Switch Option A	Lift & Tilt Attachments where the Skid Steer has fewer than 5 Joystick Outputs and a separate GCS remote switch will be used.
1	Switch Option B Independent	Lift & Tilt Attachments where the Skid Steer has 5 Joystick Outputs or Remote Switch 150409-015 will be used.
2	Switch Option B Coordinated	Lift – Lift Attachments where the Skid Steer has 5 Joystick Outputs or Remote Switch 150409-015 will be used. Manual control is Lift & Tilt*.
3	Switch Option B Hybrid	Lift – Lift Attachments where the Skid Steer has 5 Joystick Outputs or Remote Switch 150409-015 will be used. Manual control is independent Left & Right**.
4	Switch Option Grader	Grader Attachments where the Skid Steer has 5 Joystick Outputs or Remote Switch 150409-015 will be used

* Accomplished by left & right cylinders moving in unison for lift and in opposing directions for tilt.

** When GCS is in Manual, the switch inputs will move each cylinder independently (Control Type 1.) When GCS is in Auto, switch inputs 6 & 5 will move the cylinders in unison (Control Type 2.)

Note: Control types work with the auxiliary hydraulics in the forward direction.

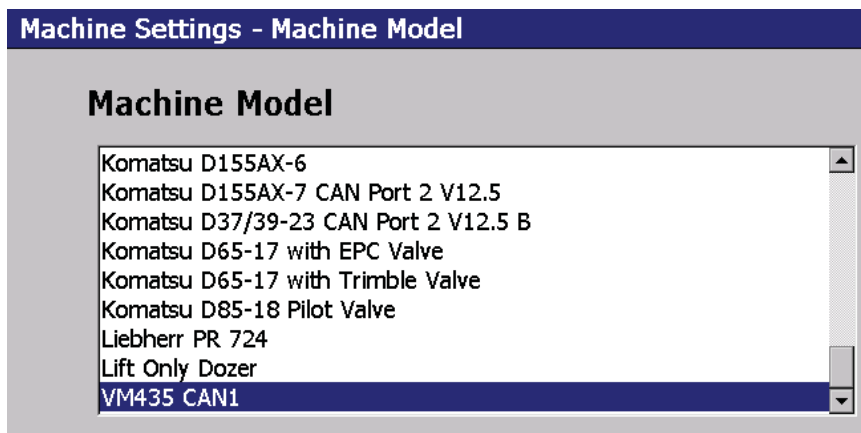
3.6 GCS900 Configuration & Diagnostics

Partial Settings File

For GCS900 to properly function with the VM435, a Partial Settings File (PSF) will need to be used. PSF files are machine type dependent, so the appropriately labeled file will need to be used. The VM435 PSF files are:

- VM435_CAN1_Dozer.psf
- VM435_CAN1_Grader.psf

To use a PSF file, it needs to be loaded onto the display by placing the appropriate file into the Machine Control Data/All folder on a USB drive and sync it to the display. Once on the display, go through the Machine Settings wizard. On the Machine Model screen, select VM435 CAN1 from the alphabetical list.



Diagnostics

The VM435 with the proper PSF file loaded, will show up in Diagnostics as VM435. The last two digits of the Loader version will indicate the current configuration of the VM435. The last digit will indicate the valve type and the next to last digit will indicate the control type of the VM435. In the example below, it is at default with a Control Type of “0” and a Valve Type of “1”.

Device	Status	App.	Loader
---Required---			
CB460	Connected	V12.80	
AS400 - Blade Slope	Connected	V1.94	V1.04
GNSS - Left	Not Found		
GNSS - Right	Not Found		
VM435	Connected	V1.01	V54.01
Radio	Not Found		

Control Type Valve Type
 ↙ ↘

3.7 Valve Type


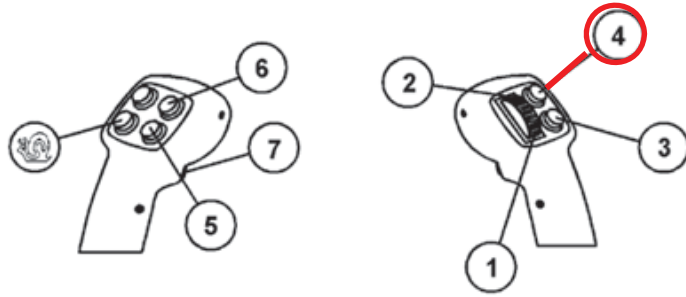
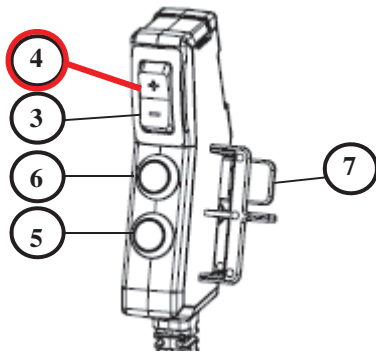
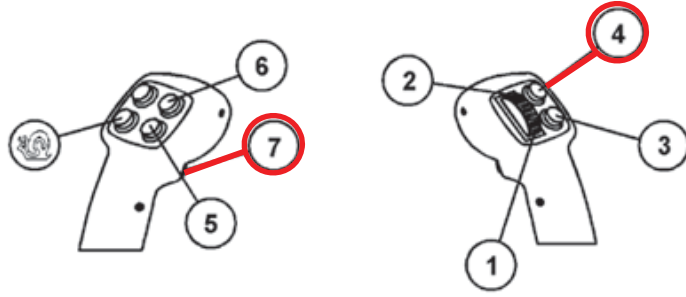
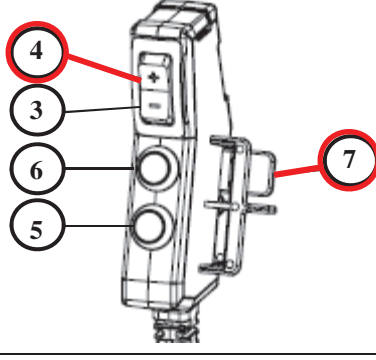
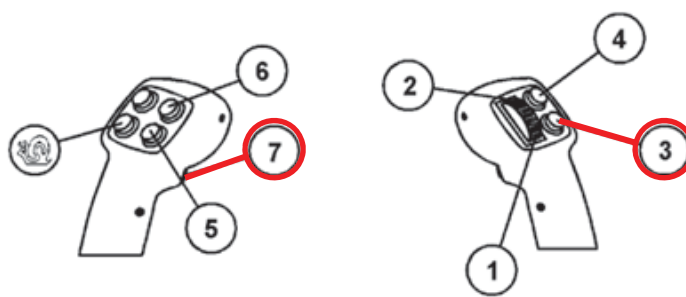
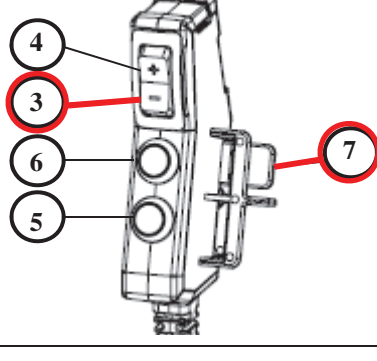
The VM435 has eight different valve types that it can be configured for. The numeric value below is what will show in Diagnostics.

- 0: Proportional Voltage (Danfoss Valves)
- 1: Proportional Current 400-1600 mA (Parker/Vickers Valves – Default)
- 2: Proportional Current 300-2400 mA (Bosch Valves)
- 3: Proportional Current 100-1500 mA (Rexroth Valves)
- 4: Proportional Current 500-1200 mA (Pilot Series II Valves)
- 5: Proportional Current Custom (Use the service tool to adjust the current ranges)
- 6: Proportional Time (PT/On-Off Valves)
- 7: Digital Output for Bobcat Grader Attachment control (Only available with Switch Option Grader)

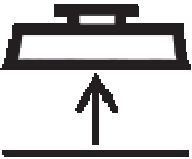
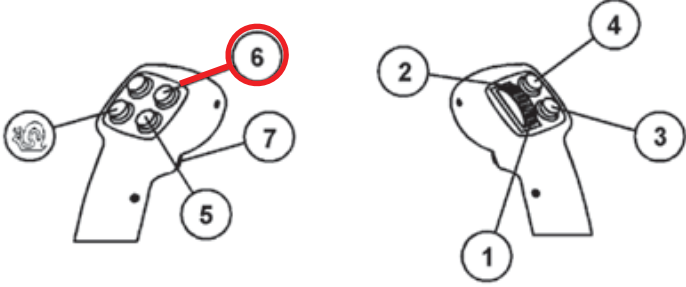
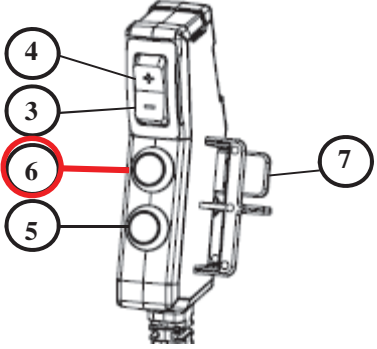

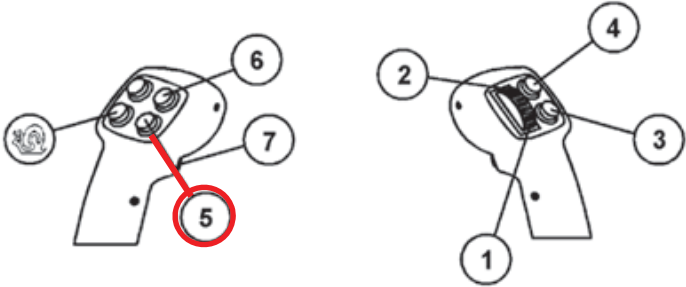
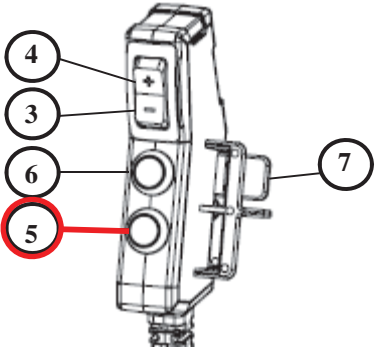

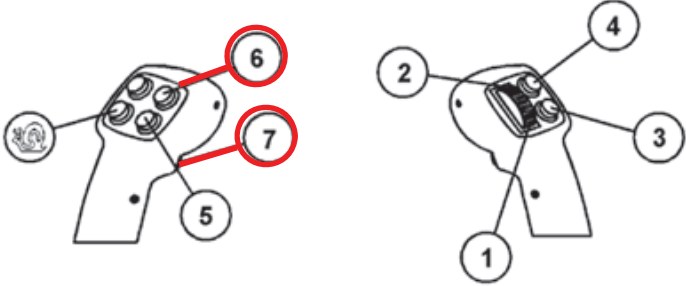
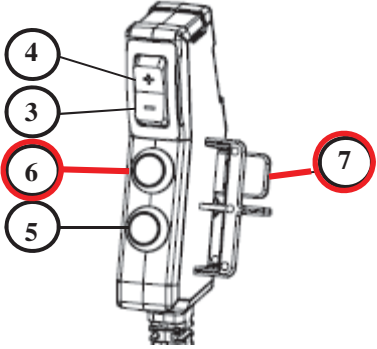

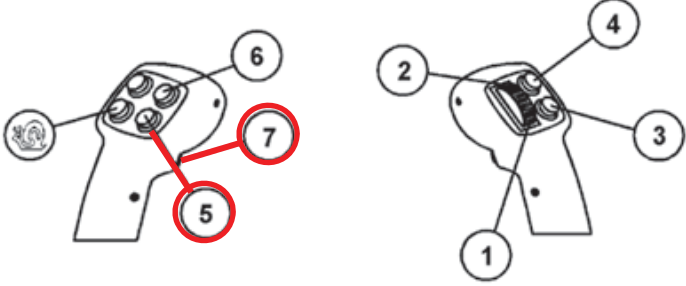
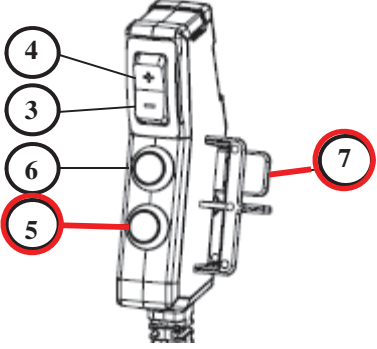
3.8 Control Type Switch Functions

Switch Option A


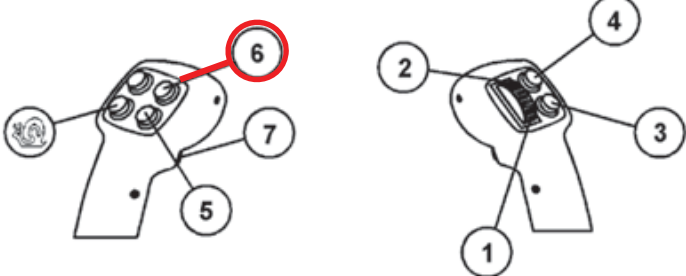
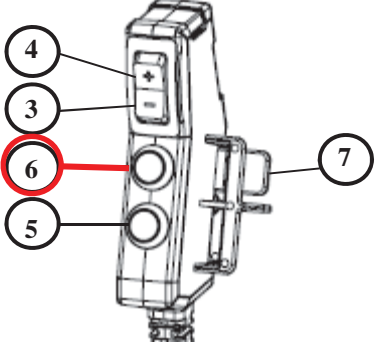

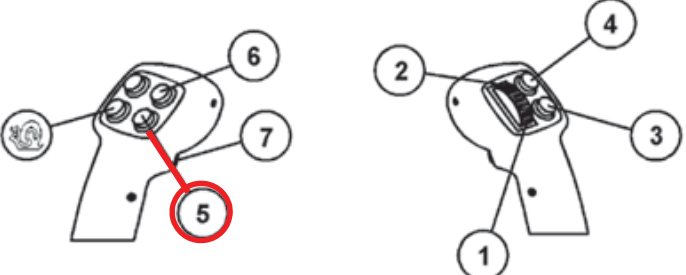
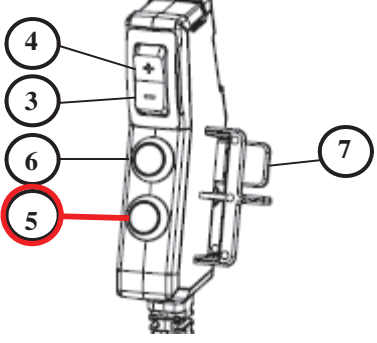

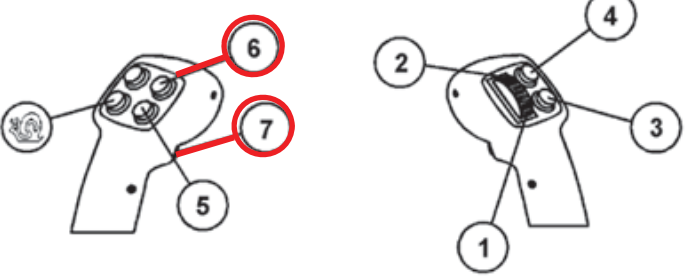
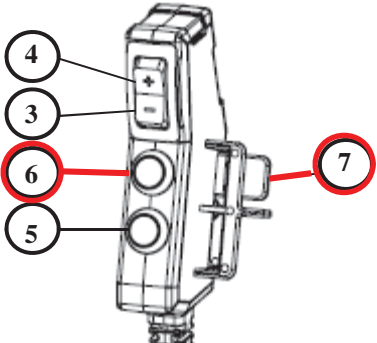

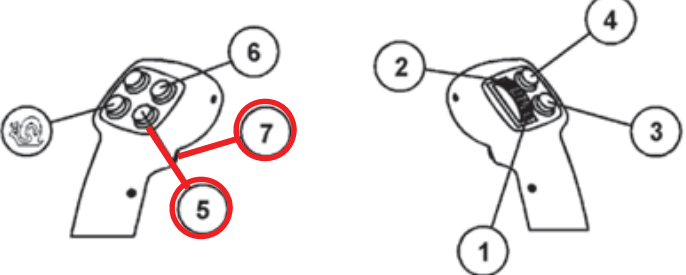
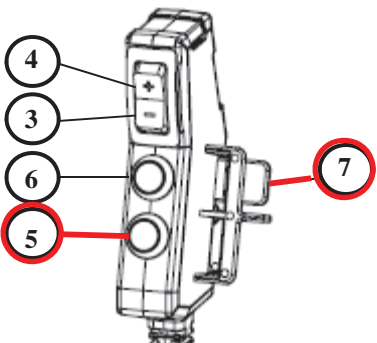
- Default control type.
- If the machine joysticks are only equipped with 3 buttons (i.e. switches 5, 6 & 7), traditional GCS remote switches can be used in place of switches 3&4.

Switch Option A GCS Remote Switch Functions		
Function	Cat Joystick Switches	Trimble Remote Switch
<p>AUTO</p> 		
<p>+</p>		
<p>-</p>		

Switch Option A Lift & Tilt Blade Functions


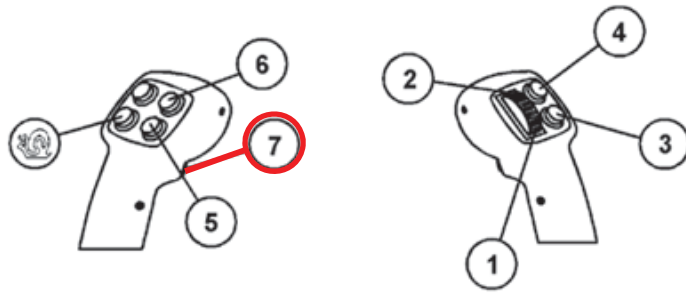
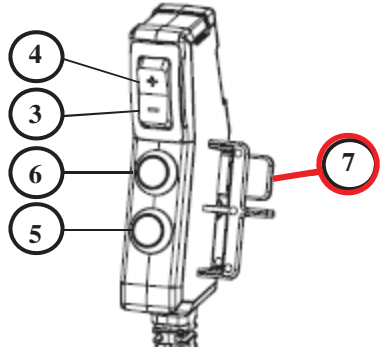
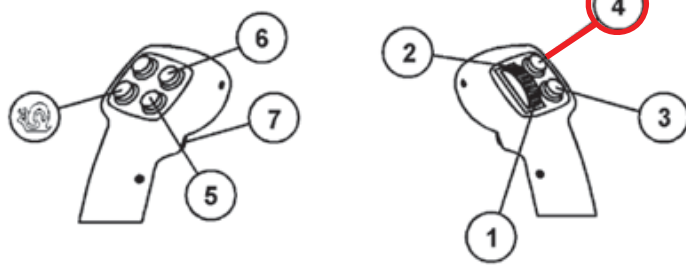
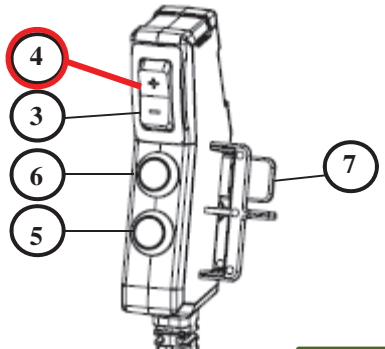
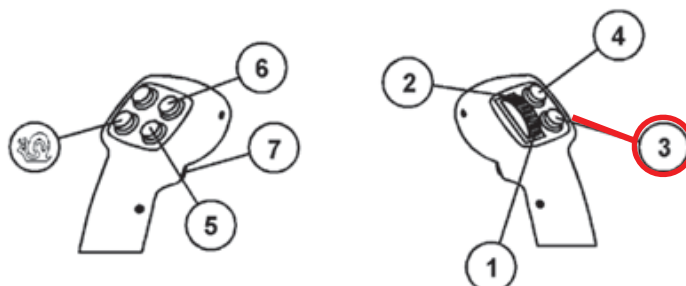
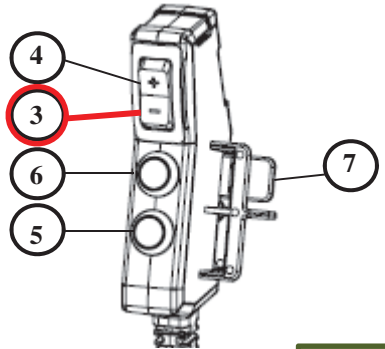
		
		
		
		

Switch Option A
Lift - Lift Blade Functions

Switch Option B


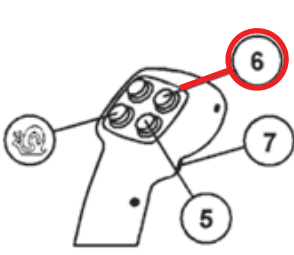
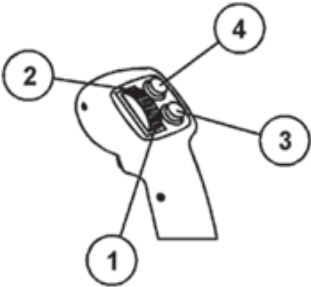
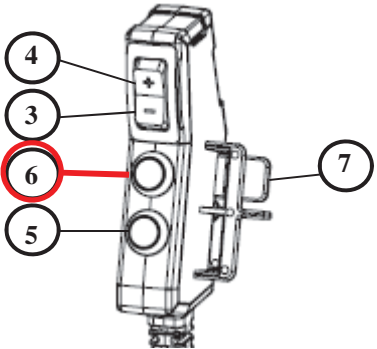

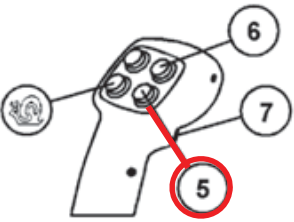
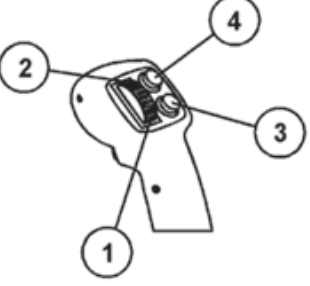
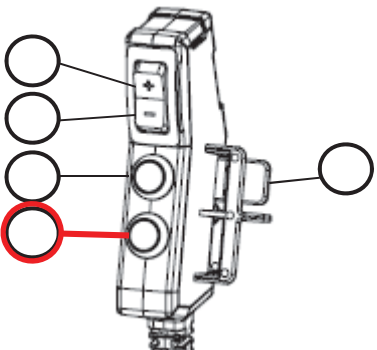

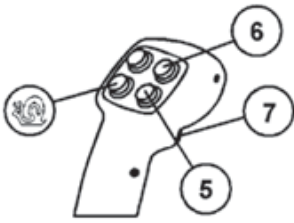
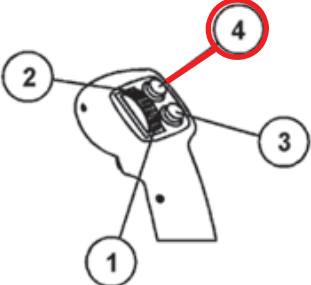
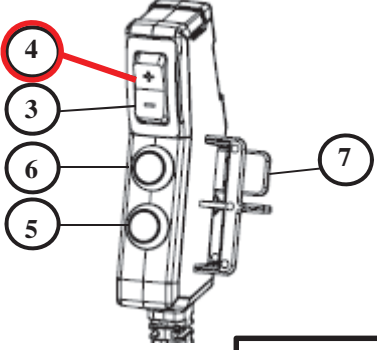

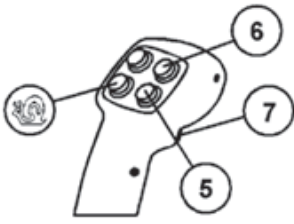
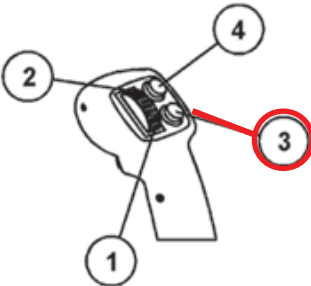
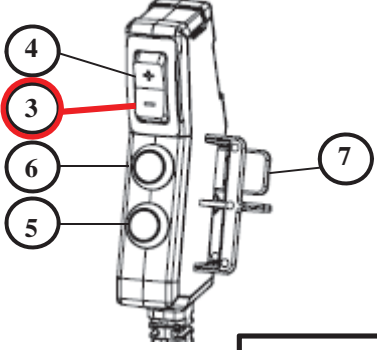
- Switch Option B which has three different controls subsets
 - Independent mode controls each valve individually which is suitable for lift and tilt attachments.
 - Coordinated mode for controlling two valves at once so that a lift-lift type attachment controls like a lift-tilt attachment.
 - Hybrid mode of the independent and coordinated modes for lift-lift attachments, where in manual the left and right are independent, but when in Auto, they control as coordinated.

Switch Option B All Modes: GCS Remote Switch Functions		
Function	Cat Joystick Switches	Trimble Remote Switch
<p>AUTO</p> 		
<p>+</p>		
<p>-</p>		


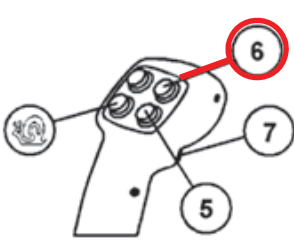
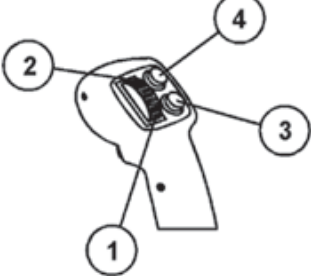
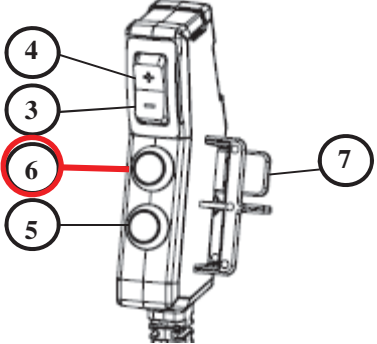

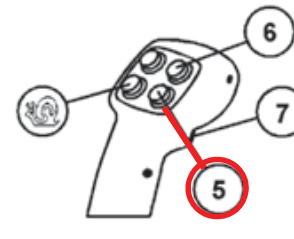
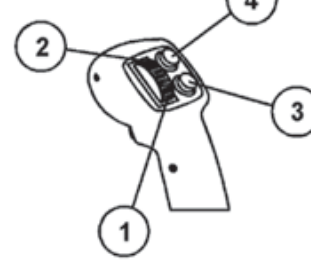
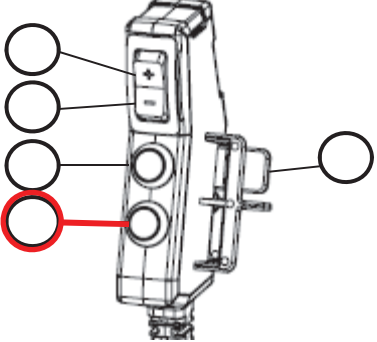

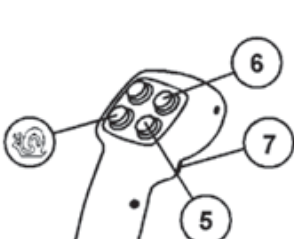
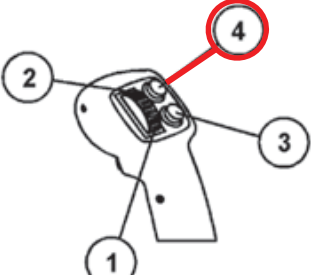
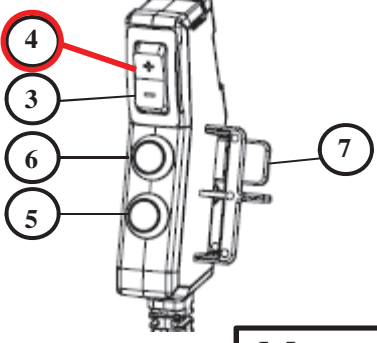

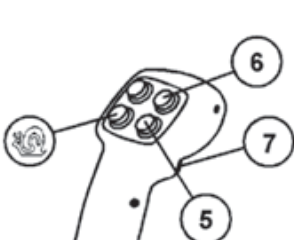
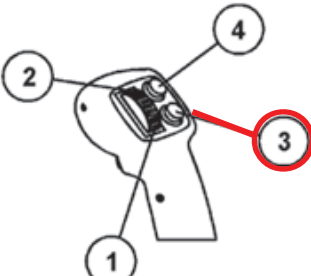
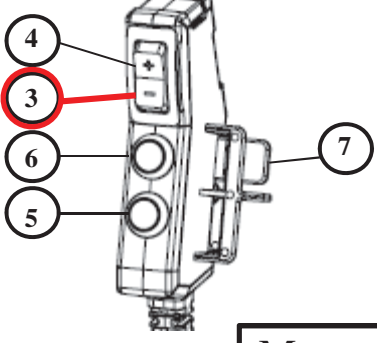
Switch Option B

Independent Mode: Lift & Tilt Blade Functions

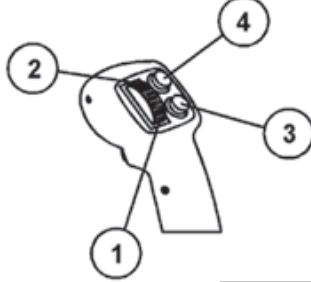
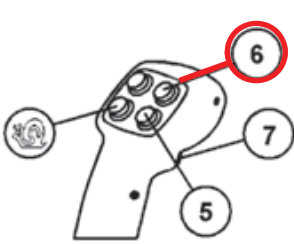
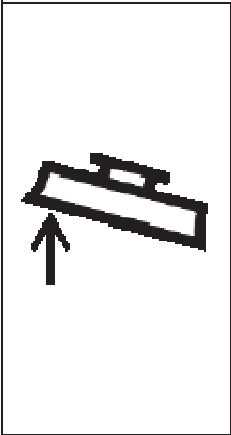
Coordinated Mode: Lift – Lift Blade Functions

	 	
	 	
	  <p style="text-align: right;">Manual</p>	 <p style="text-align: right;">Manual</p>
	  <p style="text-align: right;">Manual</p>	 <p style="text-align: right;">Manual</p>

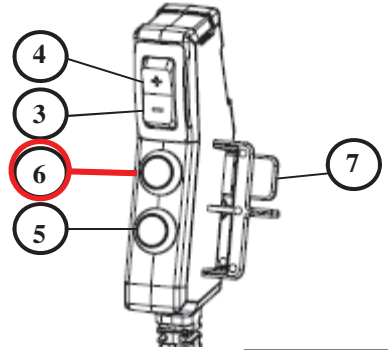
Switch Option B
Independent Mode: Lift – Lift Blade Functions

	 	
	 	
	 	 <p style="text-align: right;">Manual</p>
	 	 <p style="text-align: right;">Manual</p>

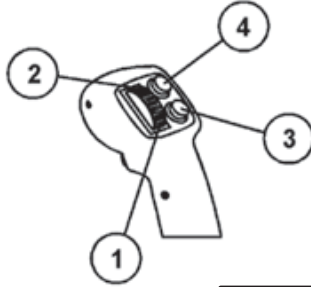
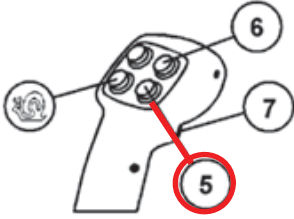
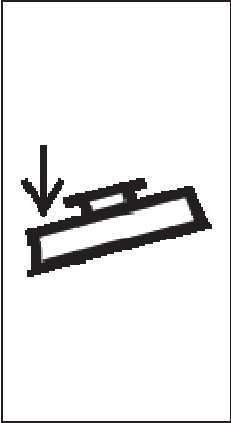
Switch Option B
Hybrid Mode: Lift – Lift Blade Functions



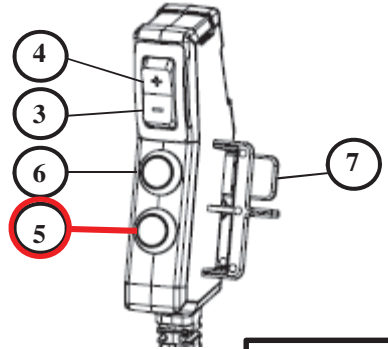
Manual



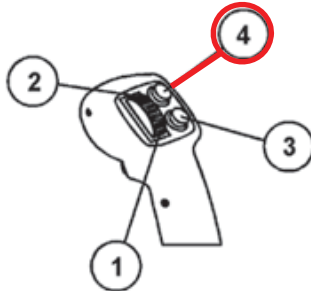
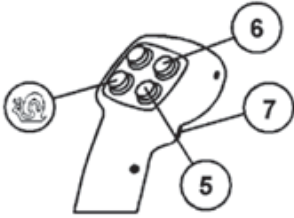
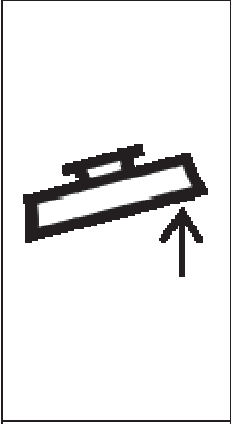
Manual



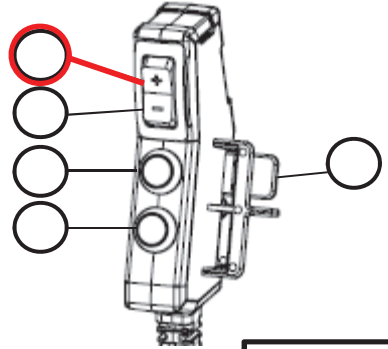
Manual



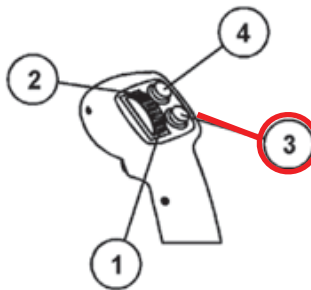
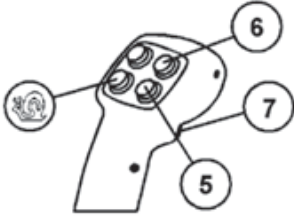
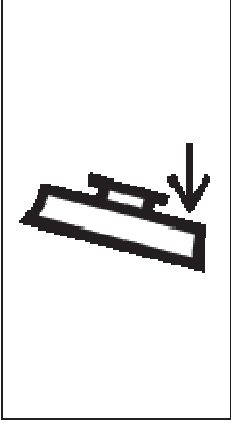
Manual



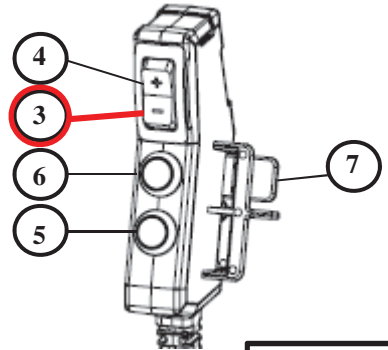
Manual



Manual


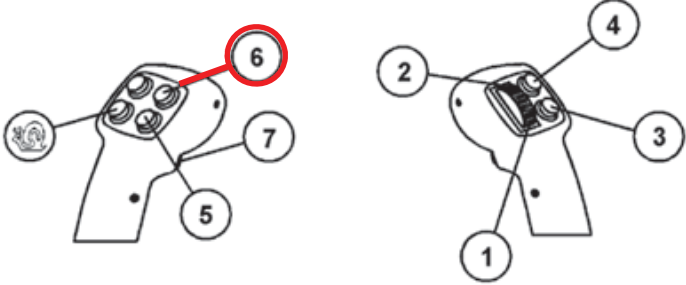
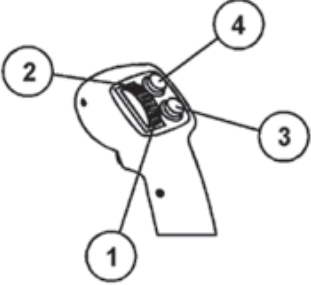
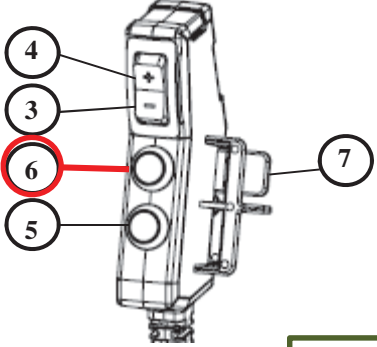

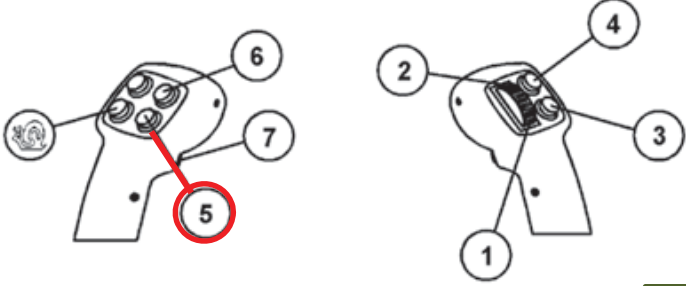
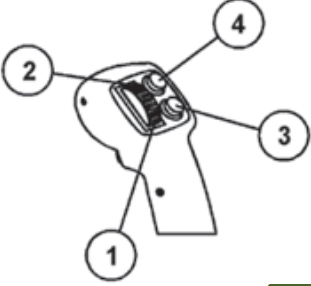
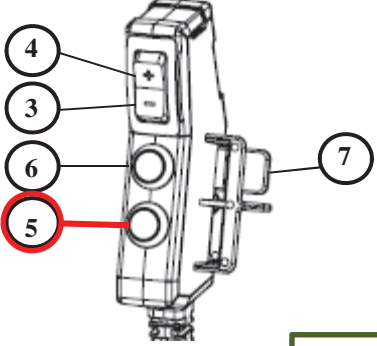


Manual




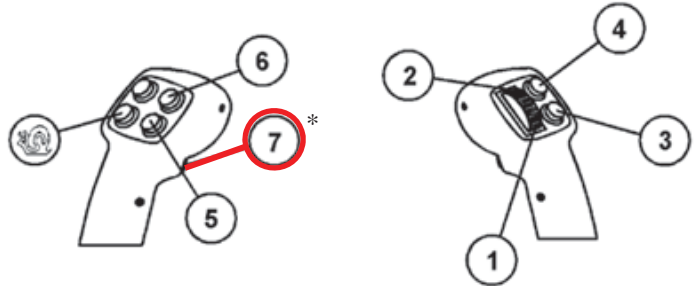
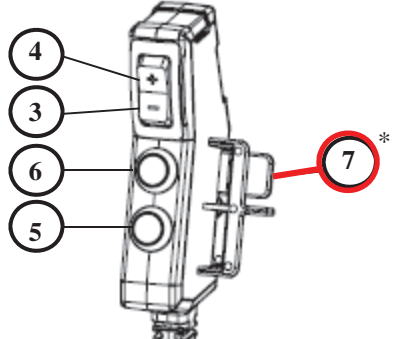
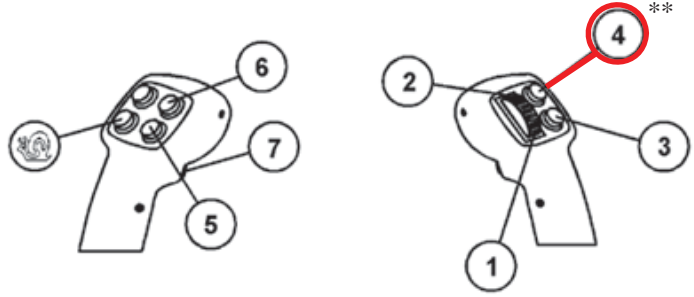
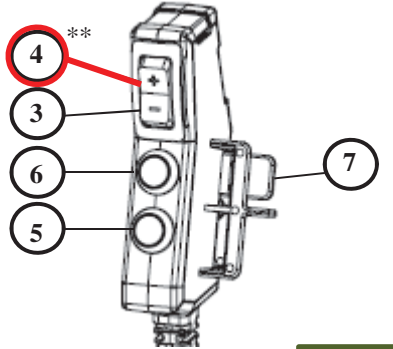
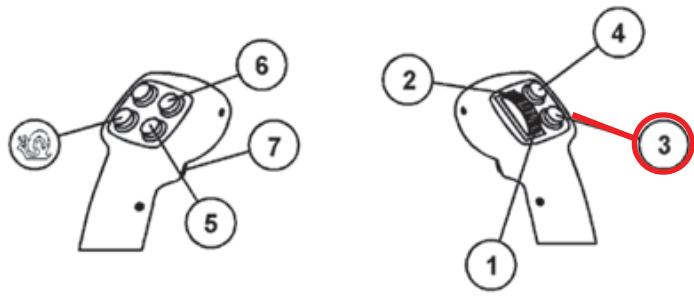
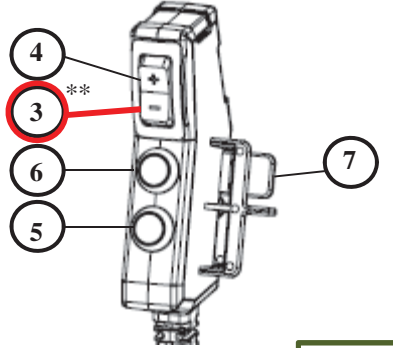
Manual

Switch Option B
Hybrid Mode: Lift – Lift Blade Functions (con't)

	  <p>Auto</p>	 <p>Auto</p>
	  <p>Auto</p>	 <p>Auto</p>

Switch Option Grader


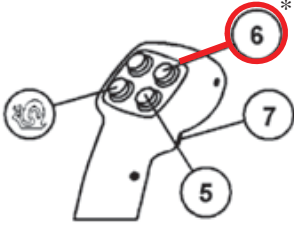
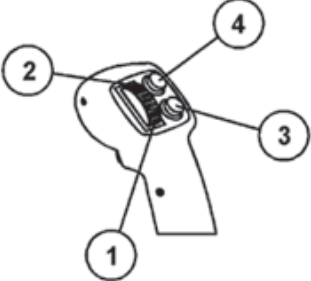
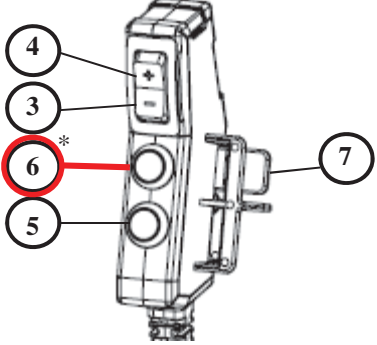

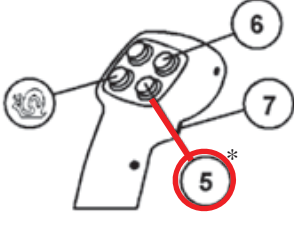
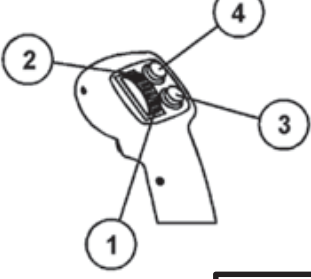
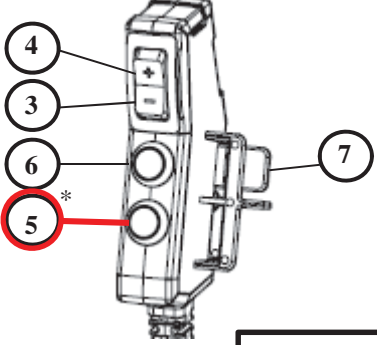

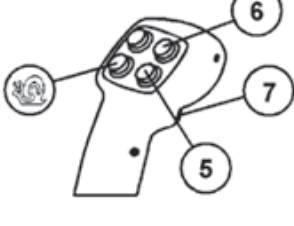
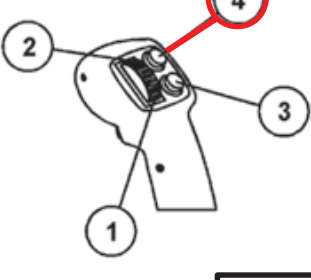
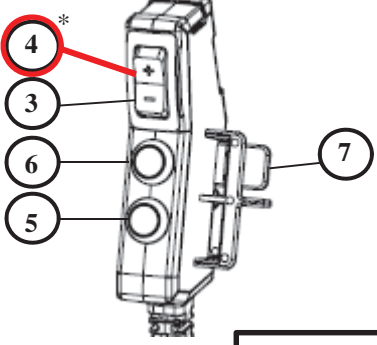

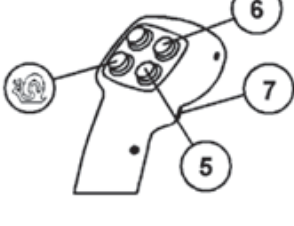
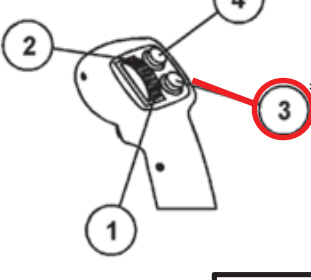
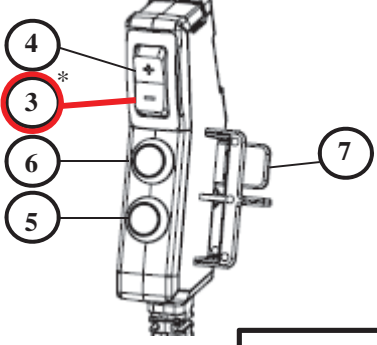
The switch functions for this option are similar to Switch Option B – Hybrid Mode with additional functionality added for side shift and blade rotation. To add the extra functionality the the trigger will function a little differently.

Switch Option Grader		
Function	Cat Joystick Switches	Trimble Remote Switch
<p>AUTO</p> 		
<p>+</p>		
<p>—</p>		

*No other buttons can be pressed after button 7 is actuated and before it is released. Auto/Manual state change occurs on release of the button.

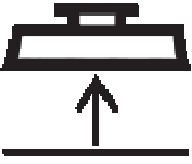
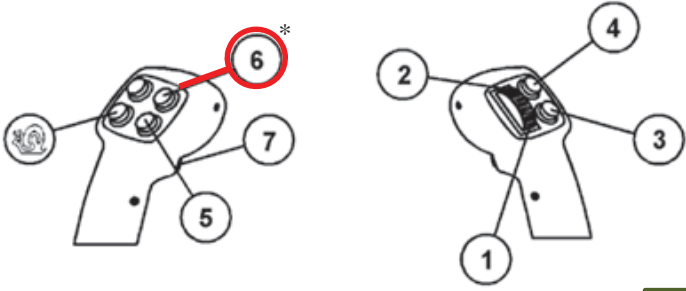
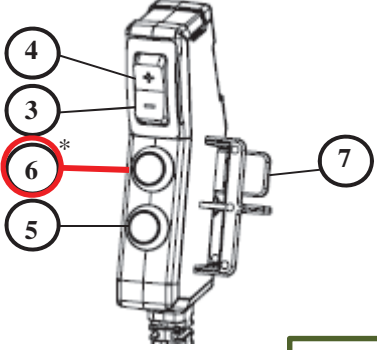

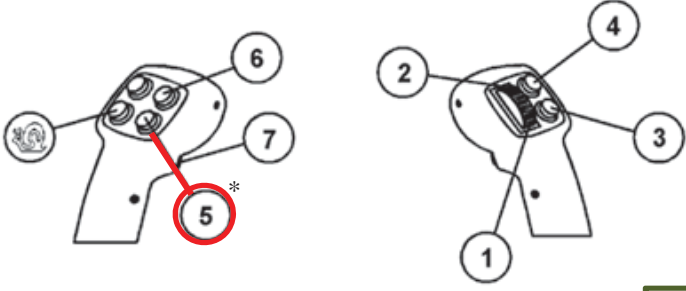
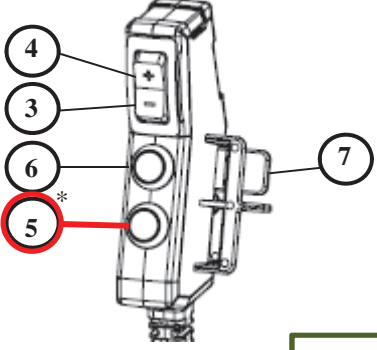
**Once a button is actuated and the GCS Auto/Manual state changes before the button is released, the function of the button will persist until released.

Switch Option Grader (con't)

	  <p style="text-align: right;">Manual</p>	 <p style="text-align: right;">Manual</p>
	  <p style="text-align: right;">Manual</p>	 <p style="text-align: right;">Manual</p>
	  <p style="text-align: right;">Manual</p>	 <p style="text-align: right;">Manual</p>
	  <p style="text-align: right;">Manual</p>	 <p style="text-align: right;">Manual</p>

*Once a button is actuated and the GCS Auto/Manual state changes before the button is released, the function of the button will persist until released.

Switch Option Grader (con't)

Auto


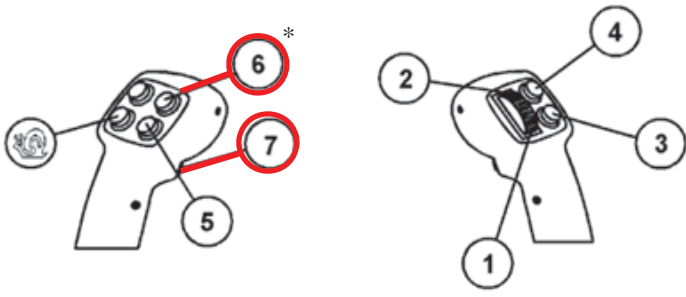
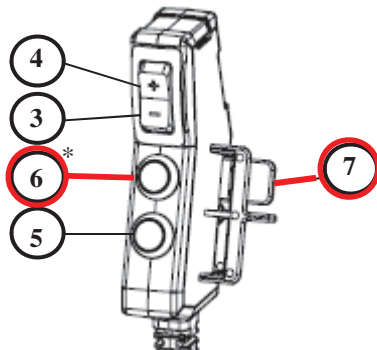

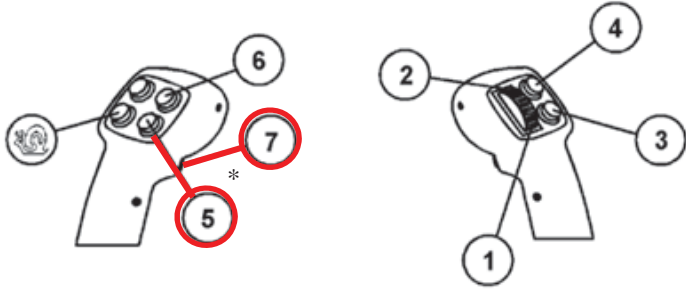
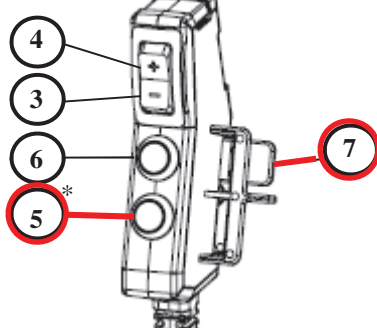

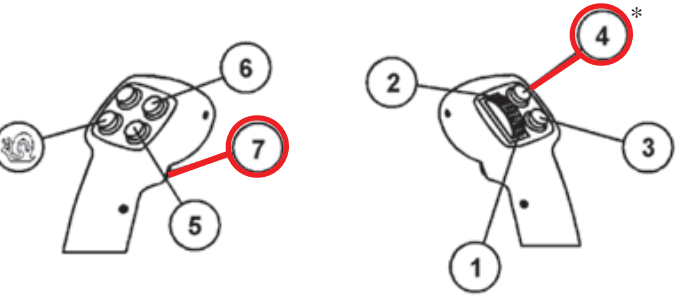
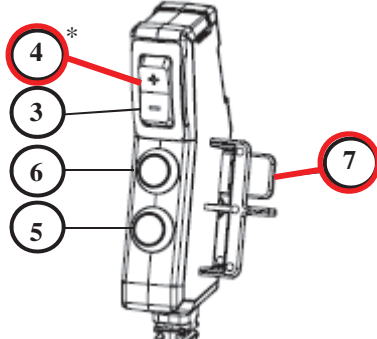

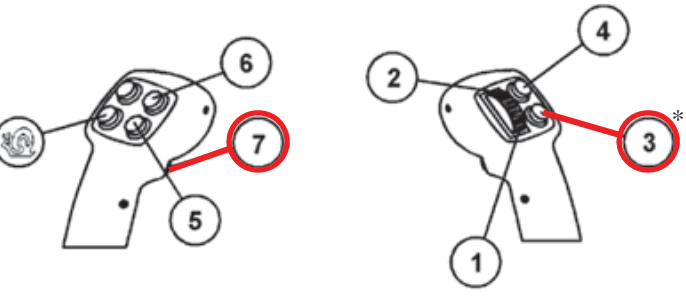
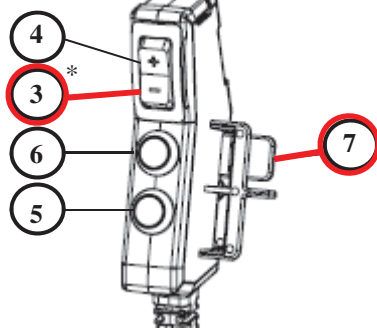
Auto

Auto

Auto

*Once a button is actuated and the GCS Auto/Manual state changes before the button is released, the function of the button will persist until released.

Switch Option Grader (con't)

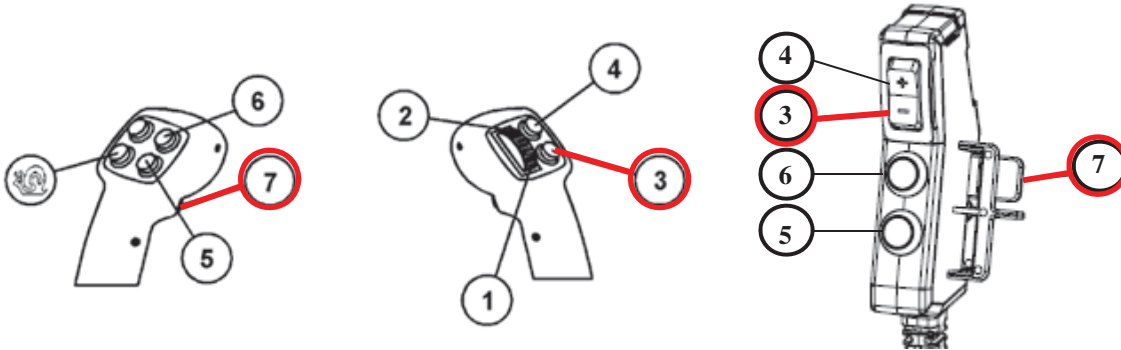
*Button 7 must be actuated first. If Button 7 is released without pressing any other button, the Auto/Manual state will change. Once both buttons are actuated, if button 7 is released first the function will persist until the other button is released

3.9 Changing Control Type & Valve Type

There are 2 ways to change the control type and valve type. The first method uses a button sequence at startup to increment from one type to the next. The second way to do it is by using the Danfoss Service Tool. The button sequence method is described in more detail below.

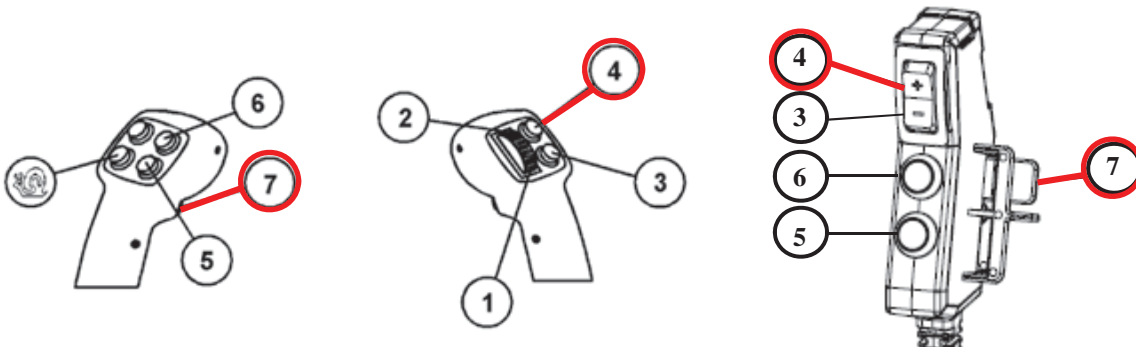
Control Type

To advance to the next control type, press & hold buttons 3 & 7 for 10 seconds at startup. If the GCS display is not turned off for this sequence, it is helpful to navigate to the Diagnostics screen. It may be necessary to push recheck for the updated control type to be shown in Diagnostics. Refer to the beginning of Section 3.5 for the listing of control types and the corresponding numeric value.



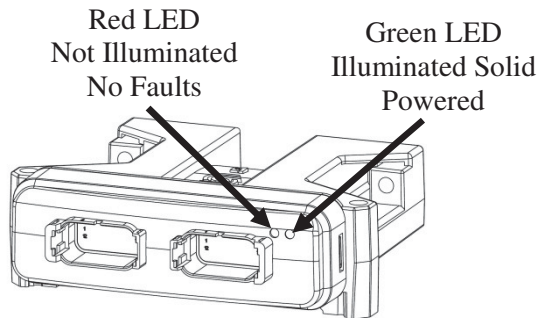
Valve Type

To advance to the next valve type, press & hold buttons 4 & 7 for 10 seconds at startup. If the GCS display is not turned off for this sequence, it is helpful to navigate to the Diagnostics screen. It may be necessary to push recheck for the updated control type to be shown in Diagnostics.



3.10 Status LED's

The two front panel LED's provide status information. The image below the desired condition:



Green LED - Functional Definition	
Condition	Blink Pattern, Tenths of a Second
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
No Power	[40 empty boxes]
CAN Failure	[40 boxes: 1-5 solid green, 6-10 empty, 11-15 solid green, 16-20 empty, 21-25 solid green, 26-30 empty, 31-35 solid green, 36-40 empty]
Power On, CAN Good	[40 solid green boxes]
Error	Description
No Power	Unit has not powered up
CAN Failure	CAN fault; internally detected by Sauer Plus+1 Guide CAN functional block <u>Possible causes</u> <ul style="list-style-type: none"> - CAN controller is in "Bus Off" mode - CAN driver could not be initialized - CAN controller is in passive error state - Overflow of internal CAN message queue; a CAN message may have been lost
Power On, CAN Good	No detectable CAN faults

Red LED - Functional Definition	
Condition	Blink Pattern, Tenths of a Second
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
No Faults	[40 empty boxes]
Fault Condition 1	[40 solid red boxes]
Fault Condition 2	[40 boxes: 1-4 solid red, 5-8 empty, 9-12 solid red, 13-16 empty, 17-20 solid red, 21-24 empty, 25-28 solid red, 29-32 empty, 33-36 solid red, 37-40 empty]
Fault Condition 3	[40 boxes: 1-5 solid red, 6-10 empty, 11-15 solid red, 16-20 empty, 21-25 solid red, 26-30 empty, 31-35 solid red, 36-40 empty]
Fault Condition 4	[40 boxes: 1-4 solid red, 5-8 empty, 9-12 solid red, 13-16 empty, 17-20 solid red, 21-24 empty, 25-28 solid red, 29-32 empty, 33-36 solid red, 37-40 empty]
Error	Description
No Faults	No detectable faults
Fault Condition 1	Non-volatile memory fault <u>Possible causes</u> <ul style="list-style-type: none"> - Non-volatile memory checksum incorrect; this may occur after first boot with a new application if non-volatile memory utilization has been changed - Reset routine cannot assess non-volatile memory due to a hardware problem
Fault Condition 2	Invalid valve type/ID; no valve drive when this fault is active
Fault Condition 3	I/O overload condition
Fault Condition 4	Externally generated Danfoss valve fault PWM/PVE block fault <u>Possible status related causes</u> <ul style="list-style-type: none"> - Block isn't calibrated - Block is currently in calibration cycle - Parameters are corrupt - Invalid setup/calibration - Checksum error - Time out error <u>Possible fault related causes</u> <ul style="list-style-type: none"> - Input value is too low - Input value is too high - Open circuit - Short circuit - Value out of range