Leica iCON grade

Installation Manual for

Bobcat Grader attachment

Version: 2.0

PART OF HEXAGON

- when it has to be **right**

Leica Geosystems

Installation Manual

Manual # 953092

Machine type:	Grader
Manufacturer:	Bobcat skidsteer and Bobcat attachment
Model:	-
Manual version:	2.0
Made by:	Lrun

The purpose of this manual:

To describe how to interface Leica iCON Grade and Bobcat joystick with Bobcat attachment.
Bobcat attachments are prepared for Trimble machine control from factory.

NOTE: The CAN-Bus connection to the machine is only possible if both the skid steer and the attachment are Bobcat branded, and the machine uses a 7 pin connector to connect to the attachment. The CAN-Bus connection does not work with the older 14 pin connector systems that use analogue signals to control the attachment functions.

CAUTION: Installation manual only to be used by personal approved by LMC Support.

The Leica Geosystems support team can be contacted through the following channels:
LMC Support by mail: lmc.support@leica-geosystems.com
LMC Support by phone: +45 70 224 226

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Limitations of Use

Please observe the following:
To use the product in a permitted manner, please refer to the detailed safety directions in the User Manual.
The User Manual forms part of this manual and must be read in conjunction with this manual.

Important Safety Information

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 welding 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. Pin hole leaks can result in a high velocity fluid stream that can penetrate the skin and cause serious injury. Stand clear or use a board or cardboard to check for leaks.

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. Hold a rag over the cap or fitting 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 "lockout" box should also be placed and 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.

Very important

Leica Geosystems Machine Control Division (LMC) reserves the right to invalidate warranty in cases where non-approved valves, hoses and fittings are used without written consent of LMC.

Legal safety instructions from the country where the installation is made must be followed as well.

Machine Specifications

Manufacturer:	Bobcat skidsteer and Bobcat attachment
Model:	[--]
Hydraulic system:	[--]
Voltage:	12 Volt
Fitting:	[--]
Pressure maximum:	[--] bar
Flow rate:	[--] L/min
Hydraulic steering:	[--]

Serial No. Range

[--]

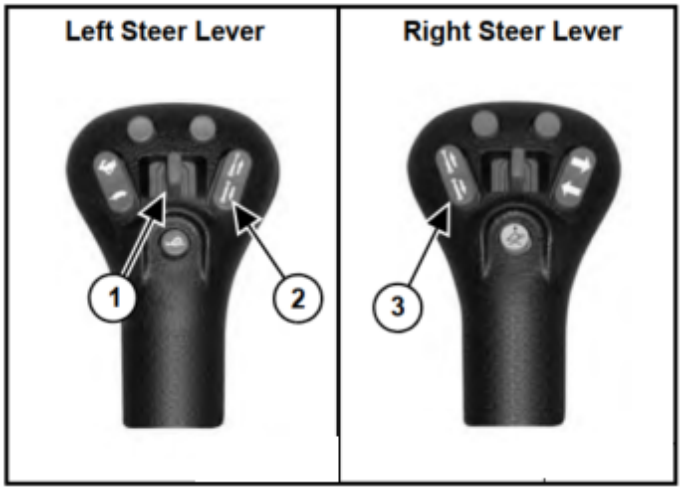
Kit Component

N/A

Bobcat system/ controls

The newer Bobcat skid steers use CAN-bus to communicate with the Bobcat attachments.
The operator can control the attachment and turn the auto function on/off with the joysticks' buttons.

- Button 1 Rotation Left/Right
- Button 2 Moldboard Left Up/Down
- Button 3 Moldboard Right Up/Down



Machine / attachment connector

Between the two hydraulic quick couplers is a seven-pin connector located. Here you connect the attachment to the machine.

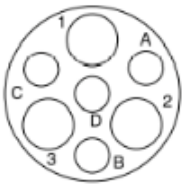
Do not try to connect the valve directly to the connector!
It could damage the electrical system of the machine!

Inside the attachment you will find a control module that have a 7 pin connector. This module communicates with the machine via CAN-Bus and drives the hydraulic valves on the attachment.

There are several connectors mounted on the sides of the attachment for Trimble sensors, where we can connect our system to the attachment. The connectors contain CAN-Bus and Power pins, so it is possible to get the power connection for the Junction Box

Connector description

The sensor connector has the following pin configuration:



Shell Size 14
3 Power
4 Signal

C → CAN High

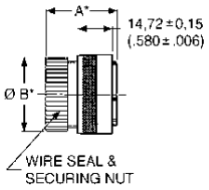
D → CAN Low

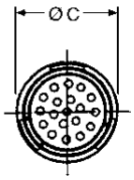
1 → Power

3 → Gnd

The connector type is: ITT Cannon Trident Neptune Metal series connector.
The receptacle and the pins have to be ordered separately.

In the table below you will find the items you need.





Standard Plugs
for Pin Contacts

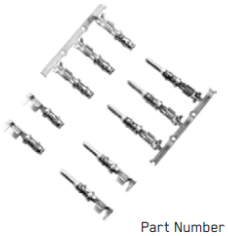
With Wire Seal and Securing Nut

Shell Size	Contact Layout	Part Number	Single Piece Connector Nomenclature	A	ØB	ØC	
10	00 04	192993-0011	TNM6S10-0004P1L	42,50 (1.673)	17,50 (.689)	21,60 (.850)	
12	00 08	192993-0012	TNM6S12-0008P1L	42,50 (1.673)	20,60 (.811)	24,80 (.976)	
14	03 04	192993-0695	TNM6S14-0304P1L	42,50 (1.673)	24,30 (.957)	28,00 (1.102)	
14	00 12	192993-0013	TNM6S14-0012P1L	42,50 (1.673)	24,30 (.957)	28,00 (1.102)	
16	00 19	192993-0014	TNM6S16-0019P1L	42,50 (1.673)	27,00 (1.063)	31,20 (1.229)	

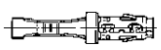
Power Pins

APK
Power Contacts

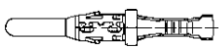
- 30 A current rating.



Socket



Pin

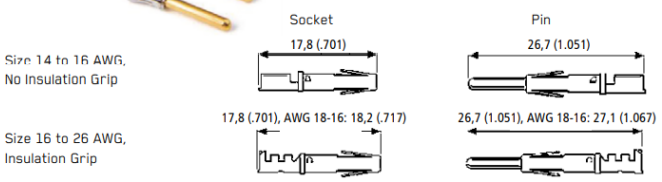


Wire Range mm²	Wire Size	Contact	Part Number Description*	Loose (100) Tin Plated	Reeled (3000) Tin Plated	Insulation Diameter	Strip Length
0,50 - 1,00	20-18 AWG	Pin	APK-PB25A10	031-8717-020	121668-0000	1,40 (.055) - 2,00 (.078)	5,00 (.196)±0,25 (.009)
0,50 - 1,00	20-18 AWG	Socket	APK-SB25A10	031-8717-120	121668-0100	1,40 (.055) - 2,00 (.078)	5,00 (.196)±0,25 (.009)
1,50 - 2,50	16-14 AWG	Pin	APK-PB25A25	031-8717-021	121668-0001	2,00 (.078) - 2,90 (.114)	5,00 (.196)±0,25 (.009)
1,50 - 2,50	16-14 AWG	Socket	APK-SB25A25	031-8717-121	121668-0101	2,00 (.078) - 2,90 (.114)	5,00 (.196)±0,25 (.009)
2,50 - 4,00	14-12 AWG	Pin	APK-PB25A40	031-8717-022	121668-0002	2,90 (.114) - 3,60 (.141)	5,00 (.196)±0,25 (.009)
2,50 - 4,00	14-12 AWG	Socket	APK-SB25A40	031-8717-122	121668-0102	2,90 (.114) - 3,60 (.141)	5,00 (.196)±0,25 (.009)

CAB-Bus Pins

Formed (Stamped) Crimp Contacts – Standard Brass Material

- 13 A current rating.
- Three plating styles available.
- Separate retention spring.
- Up to 200 mating cycles.
- Wide range of wire sizes.
- Full support tooling available, see pages 73-74.
- Two part design.



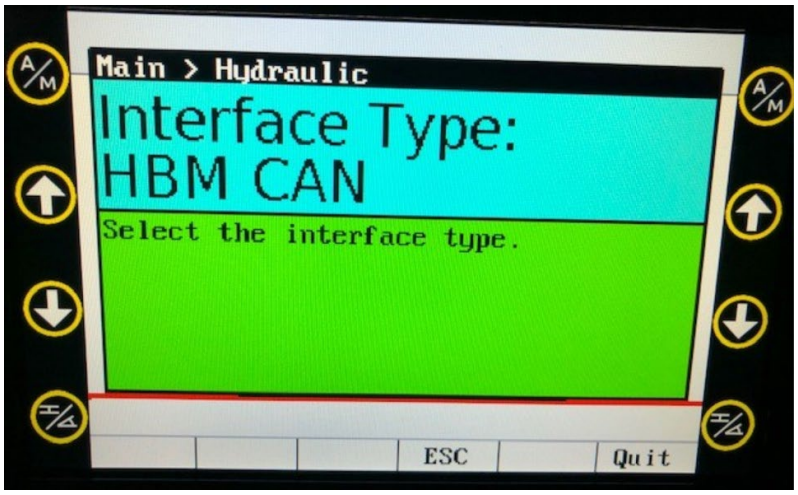
Wire Range mm²	Wire Size	Contact	Part Number Pack (100) Tin Plating	Gold Flash	0,8 µm (32 µ in.) Gold Plating	Part Number Reeled (3000) Tin Plating	Gold Flash	0,8 µm (32 µ in.) Gold Plating	Insulation Diameter	Strip Length
0,14 - 0,25	26-24 AWG	Pin	192990-0020	192990-0080	192900-0448	192990-2510	192990-2650	192900-0406	0,89 (.035) - 1,58 (.062)	3,95 (.155)±0,25(.009)
0,14 - 0,25	26-24 AWG	Socket	192990-0030	192990-0090	192900-0452	192990-2550	192990-2690	192900-0410	0,89 (.035) - 1,58 (.062)	3,95 (.155)±0,25(.009)
0,32 - 0,50	22-20 AWG	Pin	192990-0040	192922-1460	192900-0447	192990-2500	192990-2640	192900-0405	1,17 (.046) - 2,08 (.081)	3,95 (.155)±0,25(.009)
0,32 - 0,50	22-20 AWG	Socket	192990-0050	192922-1470	192900-0451	192990-2540	192990-2680	192900-0409	1,17 (.046) - 2,08 (.081)	3,95 (.155)±0,25(.009)
0,75 - 1,50	18-16 AWG	Pin	192990-0060	192990-0100	192900-0446	192990-2490	192990-2630	192900-0404	2,00 (.078) - 2,70 (.106)	3,95 (.155)±0,25(.009)
0,75 - 1,50	18-16 AWG	Socket	192990-0070	192990-0110	192900-0450	192990-2530	192990-2670	192900-0408	2,00 (.078) - 2,70 (.106)	3,95 (.155)±0,25(.009)
1,50 - 2,50	16-14 AWG	Pin	192990-1240	192990-1220	192900-0445	192990-2480	192990-2620	192900-0403	Without insulation support	5,60 (.220)±0,25(.009)
1,50 - 2,50	16-14 AWG	Socket	192990-1250	192990-1230	192900-0449	192990-2520	192990-2660	192900-0407	Without insulation support	5,60 (.220)±0,25(.009)

CAN-Bus connection, requirements and setup

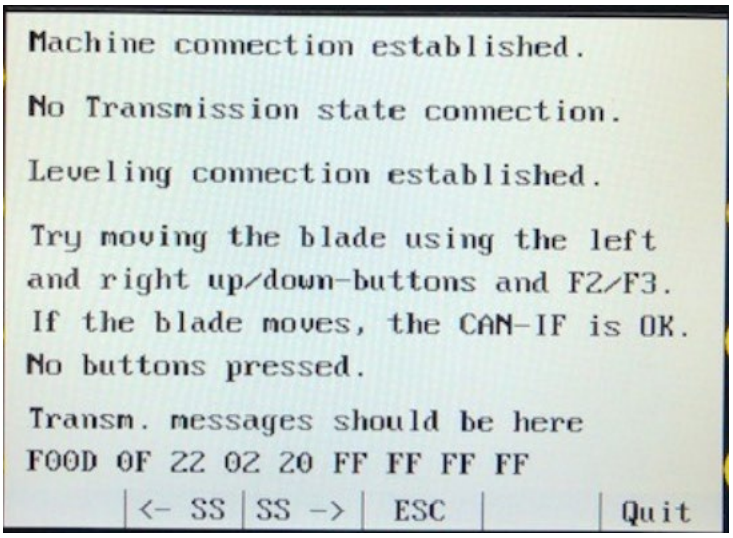
NOTE: The CAN-Bus connection to the machine is only possible if both the skid steer and the attachment are Bobcat branded, and the machine uses a 7 pin connector to connect to the attachment. The CAN-Bus connection does not work with the older 14 pin connector systems that use analogue signals to control the attachment functions.

The machine CAN-Bus has to be connected to the CAN2 port on the docking station/cradle.
A CAN terminator (845956) is necessary to achieve the proper CAN performance.

In the hydraulic menu, choose HBM CAN as interface type and change switch type to Toggle.

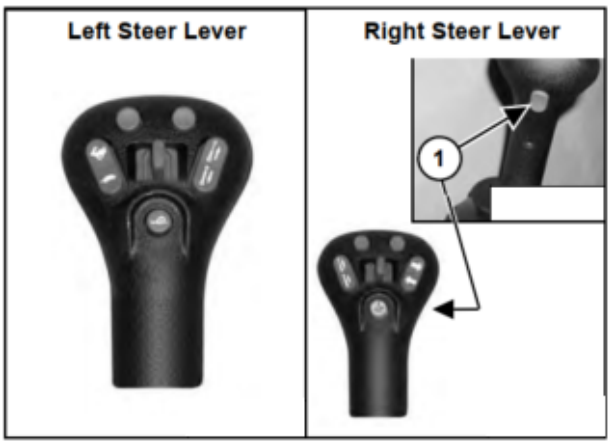


In the CAN Test menu, the connection can be tested.



The attachment type and the Auto control has to be selected on the machine's display. From main screen, press arrow to the right, select attachment grader, open the toolbox, press auto button (auto turn green on bobcat screen).
To operate the attachment in auto mode, on the same screen (grader attachment) the two auto functions (button 1 and 6) must be enabled (prepared).

The Auto function can be switched On-Off with the Auto/Manual button (Button 1) on the joystick.



Checking the valve calibration

To check if the valve controller is calibrated or not, use the bobcat manual control buttons on the joysticks:

- If the valve controller is not calibrated, a single tip on the buttons to lower or rise the blade will act as on/off and there is no fine movement of the blade
- If the valve controller is calibrated, a single tip will cause a small (proportional) lift or lower of the blade. Press and hold the button will open the valve more for fast and big movements of the cylinder.

If the Bobcat Valve controller is not calibrated, or the calibration is incorrect, the local Bobcat dealer can recalibrate the controller with a Bobcat Service Computer (using a Bobcat Ultrasonic Sensor, automatic routine).

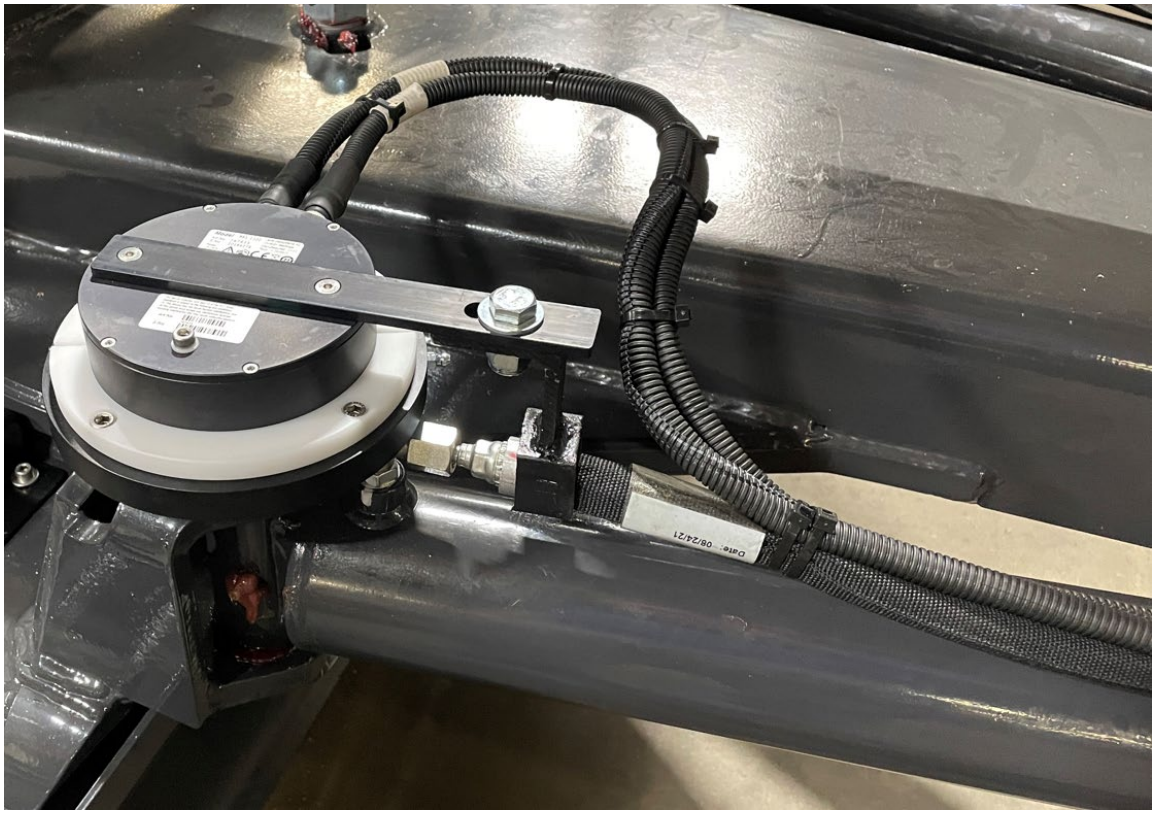
Installation suggestions:

Junction box installation

The junction box can be mounted to the back part of the attachment, with 761119 Bracket with legs for Junction Box.
The arrow on the junction box has to point forward, and the direction of the junction box has to be aligned with the direction of the attachment.

Rotation sensor installation

There is a factory prepared mounting spot on the back part of the right side blade rotating cylinder. The MRS1300 rotation sensor can be mounted onto this bracket by drilling four M6 bolt to fix the rotation sensor base. The upper part of the sensor can be fixed to the hydraulic hose, as shown in the picture below.



Slope sensor installation

The slope sensor can be bolted directly onto the frame, behind the rotation sensor as shown below. Align the sensor with the cutting edge.