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# Joystick 16CH Hardware Manual

*Release 1.0*

**Embention**

**2024-04-15**



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**Joystick 16CH** is a joystick that sends the control signals through a CAN bus channel.

**Warning:** Select your version before reading any user manual. The following image shows where to select a version from any Embention user manual.

A screenshot of the Embention website. The top navigation bar includes 'Home', 'Version-4.8', 'Languages-EN', and 'Download'. A dropdown menu is open under 'Version-4.8', showing options for '4.5' and '4.8'. A red arrow points from the '4.8' option to the '1x Hardware Manual' page. The page content includes a search bar, a sidebar with navigation links, and the main heading '1x Hardware Manual'. Below the heading is a logo for Veronte Autopilots and a description of the Veronte Autopilot tx system. At the bottom, the version and date are listed: 'Version: UM.305.4.8' and 'Date: 2023-11-24'.



## INTRODUCTION



**Joystick 16CH** is a Joystick with 16 channels expandable up to 24. **Joystick 16CH** sends the control signals to a CAN bus through a specific connector, so it can be connected to one or more **PCS**.

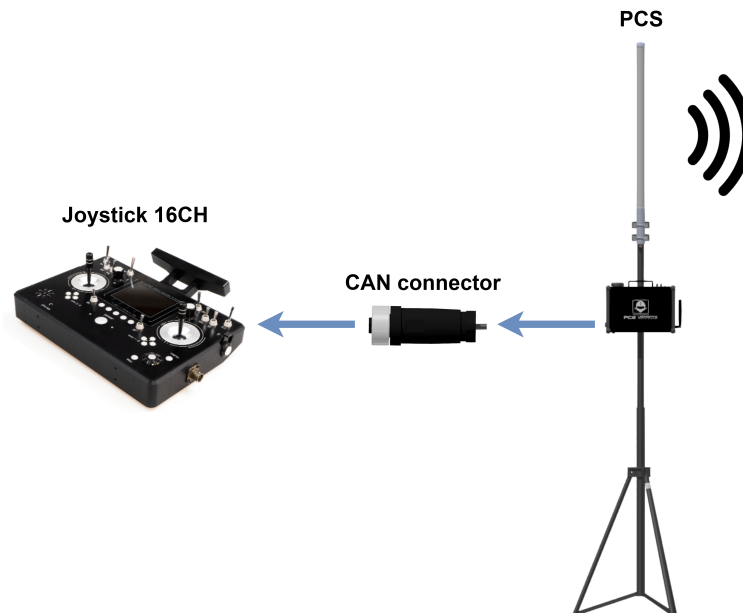




## QUICK START

### 2.1 Basic Connection Diagram

The following diagram shows the basic connection between **Joystick 16CH** and **PCS** to operate. To know more about connections of **PCS** read the [Quick Start](#) section of **PCS Hardware Manual**.



### 2.2 First Steps

To configure and operate the **Joystick 16CH**, first of all, read the [JETI user manual](#) for the transmitter **Duplex DC-16 II**.

**Danger:** The power supply connection of the **Joystick 16CH** differs from the one specified in the JETI user manual. Only the **CAN Joystick Harness** can be used for this function.

The **Joystick 16CH** can be used independently, since it has a small integrated antenna to transmit command signals to the aircraft. Nonetheless, it is recommended to be used with the Veronte system to extend the signal range. The system is composed of the following elements:

- Veronte PCS
- Veronte T28
- Veronte Datalink Kit
- Veronte Autopilot 1x or 4x

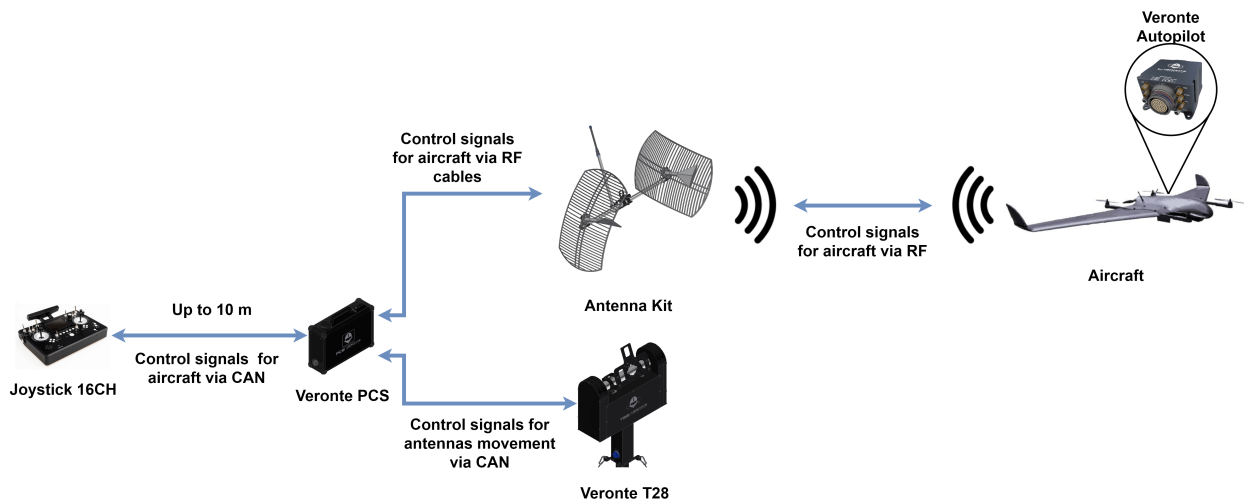


Fig. 1: Working diagram of Joystick 16CH with the Veronte system

## 2.3 Warnings

- Only use the CAN **Joystick Harness** to power the **Joystick 16CH**, do not use the JETI power supply connection.
- Connect **CAN Joystick Harness** exclusively to **Veronte PCS**. Any other type of connection may cause damage to the equipment, resulting in loss of warranty.
- **Joystick 16CH** should be operated only with original or manufacturer approved battery packs. The use of other battery packs will void the warrant.
- Before each flying session, and especially with a new model, it is important to perform a range check.

Do not shield and avoid contact of the transmitter antenna with your body. This might increase likelihood of range problem.

- Changes or modifications to this device not expressly approved by **Embention** could void the user's authority to operate the equipment.

Except for the **Veronte system** explained in the *First Steps* and *Hardware Installation* sections of this manual.

## 2.4 Requirements

A control station is required to receive the CAN bus signals from **Joystick 16 CH** and send to the aircraft. For example, a [Veronte PCS](#) can be employed with a [Veronte T28](#) and a [Veronte Datalink Kit](#).

To control an aircraft with the **Joystick 16CH**, a vehicle controller is required to receive the signal and command the actuators, such as the [Veronte Autopilot 1x](#) or the [Veronte Autopilot 4x](#).



## 3.1 Features

- **Screen**
  - **LCD display:** made of thin film transistor-liquid crystal with 3.5” and 320 x 240 resolution. Easily readable at any lighting condition
- **Communications**
  - **Small Integrated Antenna:** located behind fully integrated covers for protection against mechanical damage.
  - **USB Connector:** convenient connection to PC for data downloads. With fast firmware & sound upgrades.
  - **CAN bus:** with dedicated connector.
- **Battery**
  - **Li-Ion Battery:** with a capacity of 6200 mAh.
  - **Easy Charging:** simply connect the wall power supply, optional car charger, or any 12 V DC power supply to the charge port. It may also be charged through the USB to PC interface. The charging progress is shown on the display.
- **Configuration**
  - **Internal SD Card:** for storing models, sounds, and other data.
  - **Fast Navigation between Menus.**
  - **Digital Trims:** fully programmable trims with automatic trimming function.
  - **Swappable and Assignable Switches:** all switches can be easily moved and assigned to create a custom configuration.
  - **Programming:** follow the step-by-step screens. The creation of a new model can be accomplished with just a few easy steps.
  - **Sounds/Alarms:** with audible alarms included, it is possible the use of user-recordable alarms and sounds.
  - **Integrated Microphone:** with voice recognition capability. **Joystick 16CH** can be configured to respond to different voice commands.

## 3.2 Part List

Joystick 16CH includes the following items:

- Joystick.
- Black tray to hold the joystick.
- Shoulder strap to attach the joystick to the operator.
- **CAN Joystick Harness for PCS.**

Nonetheless, the RF receiver is not included.

## 3.3 Mechanical Specifications

### 3.3.1 Dimensions

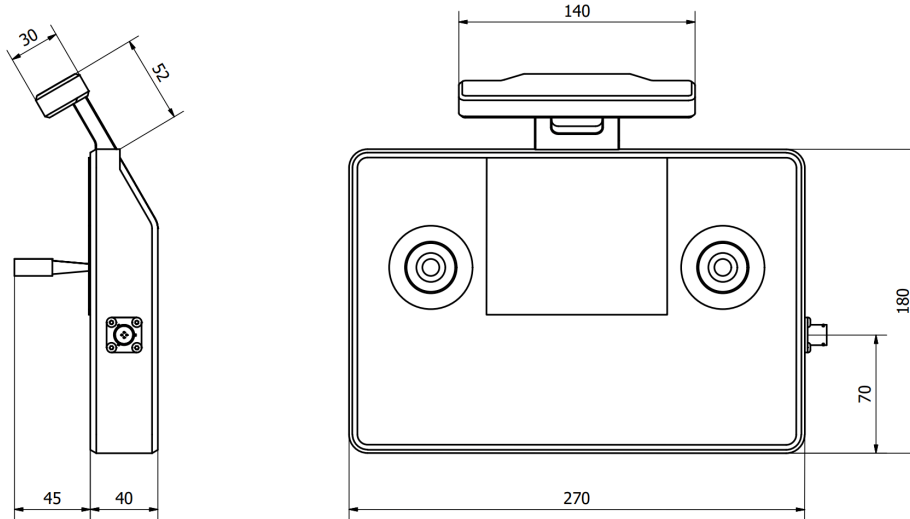


Fig. 1: Joystick 16CH dimensions (mm)

Specification	Value
Weight	1600 g
Case Material	Aluminum
Gimbals and Buttons material	

## 3.4 Electrical Specifications

Specification	Value		
Capacity Battery	6200 mAh		
Screen	3.5"	320 x 240 pixels	High contrast
RF module 900 MHz	863 - 870 MHz (EU)	902 - 928 MHz (US)	
Flight Modes	10		
Free Mixes	20, configurable to 25		
Logical Switches	16, configurable to 24		
Remote Commands			
Channels			
Servo Sequencer	6, configurable to 10		
Timers	10		
Sound on Events	20, configurable to 30		
Alarms	40		
Voice Commands	0, configurable to 15		
Lua Apps	10		

### 3.4.1 Included Features

- Audio Player
- Microphone
- Servo Balancer
- Function Curves
- Double Path
- Flight Mode Trim
- Variometer
- Throttle Limiter (helicopter)

## 3.5 Interfaces

The only interface available in **Joystick 16CH** is the CAN bus connection on one side of the case.



### 3.5.1 CAN Joystick Harness

The **CAN Joystick Harness** is a cable provided with the system to connect the **Joystick 16CH** to the **Veronte PCS**, it has the Embention reference P009010 B001468.

Next figure and table describe the equipped connectors and their functionalities.



N°	Connector	Description
1	Male jack	PPM input for Joystick
2	Power Supply	24 V DC input
3	USB type A	Ready to connect a computer
4	Maintenance button	Hold to force maintenance mode
5	ON/OFF button	Push to turn on and off
6	Ethernet	Ready to connect an Ethernet cable to a computer
7	CAN bus connector	To communicate <b>Joystick 16CH</b> and <b>PCS</b> with CAN protocol
8	FGW.LM.368.XLCT	Main connector to <b>PCS</b>

**Warning:** Do NOT connect any harness provided for other Veronte units. ONLY use **CAN Joystick Harness**, which is included with **Joystick 16CH**.

### 3.5.2 Mating Connectors to CAN Joystick Harness

Harness connector	Mating connector for harness
Ethernet	Regular ethernet connector
USB	USB female type A
Male jack	HI-J35S-Screw-F
Power source	PT06A-10-6S(005)
CAN bus connector	PT02A-8-4P



## HARDWARE INSTALLATION

The **Joystick 16CH** does not require any hardware installation to operate with its own integrated antenna. Nonetheless, to operate with the **Veronte** system (**PCS + T28 + Antenna kit**), the following installation is required.

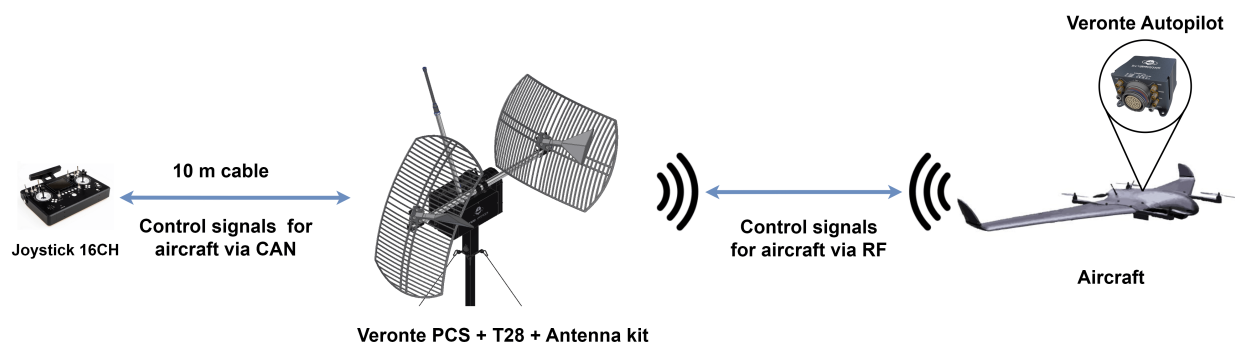


Fig. 1: Veronte system diagram

The integration of **T28** in **PCS** is explained in the [Hardware Installation](#) section of the **T28 Hardware Manual**.

The hardware installation for each **Antenna kit** can be read in the [Tracker Antenna Kit Installation - Integration Examples](#) section of the **T28 Hardware Manual**.

**Joystick 16CH** and **PCS** can be connected plugging the CAN bus connector of the **PCS harness** to the CAN bus port of the **Joystick 16CH**.



Fig. 2: CAN bus connector of PCS harness



Fig. 3: CAN bus port of Joystick 16CH

## 4.1 Pinout

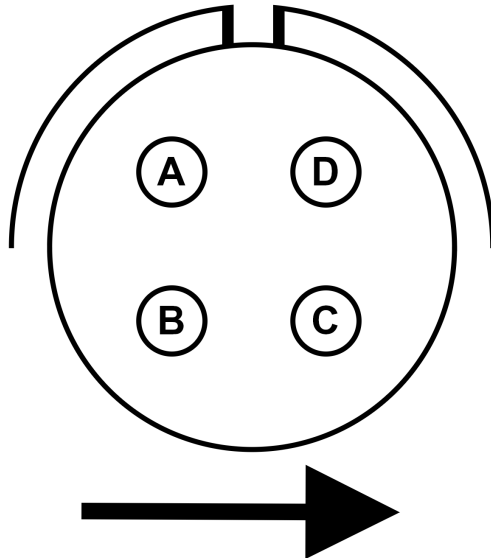


Fig. 4: CAN bus port of Joystick 16CH

Pin	Signal	Comments
A	Power supply	Power supply for the controller.
B	Ground	Ground for the CAN bus controller.
C	CAN P	High signal of the CAN bus.
D	CAN N	Low signal of the CAN bus.

### ADVANCED TIP

The CAN communications of **Joystick 16CH** are managed by an internal **MEX module**. The CAN port is connected directly to **MEX** as follows:

CAN bus port pin	MEX pin
A	1 & 3
B	2 & 4
C	22
D	23

To know each function of the **MEX** pinout, read the [Pinout - Hardware Installation](#) section of the **MEX Hardware Manual**.

To establish communication between a computer and **MEX**, it is recommended to do through a CAN tunnel with an **Autopilot 1x**. To do it, read [CEX/MEX - Integration examples](#) section of **1x PDI Builder** user manual.

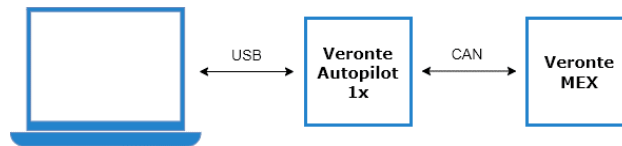


Fig. 5: Tunnel connection through Autopilot 1x

Once the connection has been established, the internal **MEX** can be configured with [MEX PDI Builder](#).



## MAINTENANCE

Apart from cleaning, no extra maintenance is required to guarantee the correct operation of the **Joystick 16CH**.

In order to clean **Joystick 16CH** properly follow the next recommendations:

- Turn off the device before cleaning.
- Use a clean, soft, damp cloth to clean the unit.
- Do not immerse the unit in water to clean it.



**ACRONYMS AND DEFINITIONS**

CAN	Controller Area Network protocol
GNSS	Global Navigation Satellite System
LCD	Liquid Crystal Display
Li-Ion	Lithium-Ion
MEX	Magnetometer CAN EXpander
PC	Personal Computer
PCS	Pole Control Station
PPM	Pulse Position Modulation
RF	Radio Frequency
SD card	Secure Digital card
USB	Universal Serial Bus
V DC	Voltage on Direct Current





## CONTACT DATA

You can contact Embention if you need further help and support.

Embention contact data is as follows:

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