µKOB KS Interface MkV
Reference Manual

Table of Contents

Introduction

This is the reference manual for the µKOB Key/Sounder/KOB/Paddle Interface MkV. It is not intended as a tutorial, and it is not a user manual for the µKOB device. It describes the external device connections to, and jumper settings of, the interface board.
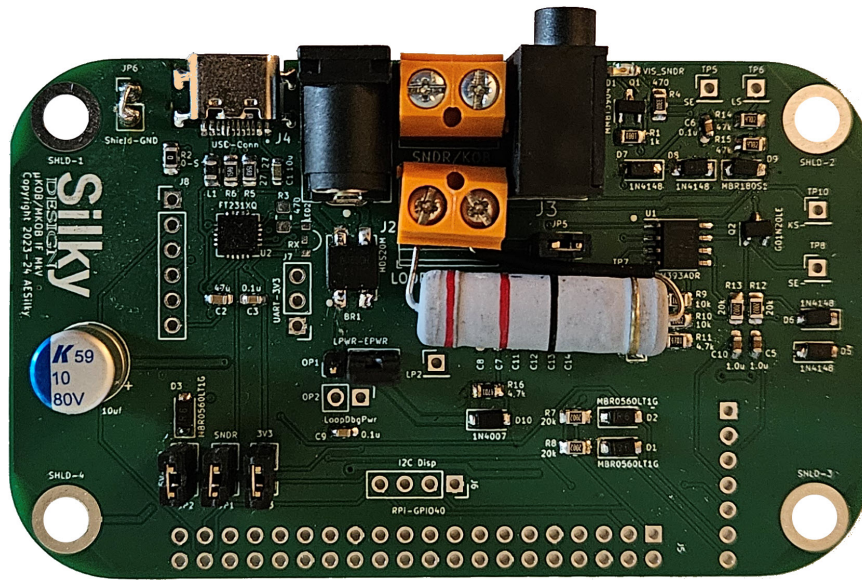
Preface

At a high level, the μKOB KS Interface (board) provides an interface between the μKOB main board and a KOB or a separate Key & Sounder. It is also capable of being used as a KOB/Key&Sounder interface for the MKOB application running on a Raspberry Pi through the GPIO connector,[1] or for the MKOB or MorseKOB application running on any system that supports a FTDI[2] USB serial port.

Depending on the intended application - μKOB, Raspberry Pi, or USB Serial - certain components may or may not, be populated. The possible options are:[3]

1. μKOB Only

2. μKOB + USB Serial

3. Raspberry Pi GPIO Only

4. Raspberry Pi + USB Serial

5. USB Serial Only

Following are sections that identify all of the connectors and option jumpers, setting the option jumpers for applications 1, 3, and 5 (2 and 4 can be deduced), connecting a KOB, a Key & Sounder, or a Paddle, including power options and current limit resistor.

This interface can be used with a KOB (*KOB* = *Key On Board*, a Sounder and Key connected in series, typically as a single unit on a base) or a separate key and sounder. Within this document, a KOB or a key and sounder connected in series, will sometimes be referred to as *The Loop Circuit*, *The Loop*, or simply, *Loop*.

[1] In this document the term *the GPIO* will be used to refer to the Raspberry Pi GPIO connector/connection.

[2] Future Technology Devices International (**FTDI**) is the manufacturer of the USB-Serial device used. The FTDI *Virtual Serial Port* driver is part of the Linux and MacOS kernel, and auto-installs on Windows.

[3] Since this interface board connects to μKOB and Raspberry Pi using a *piggyback* connector on the bottom of the board, it isn't possible to assemble a board that can be used on both a μKOB and a Raspberry Pi.

MKOB Suite Auto-Detect (USB Serial)

When using a single interface connected via the USB Serial and the MKOB Suite of applications (MKOB, MRT, Telegram, and the utilities), the configuration (preferences) can be set to auto-detect the interface. Using Configure (or the Preferences in MKOB) set the Serial Port value to **SDIF** (Silky Design Interface). The value must by typed in manually. With the serial port set to **SDIF**, the application will search for the interface and once found it will automatically be used.

If more than one Silky Design interface is connected, the first interface found will be used.

Connectors, Controls, and Option Jumpers

Connectors and Controls

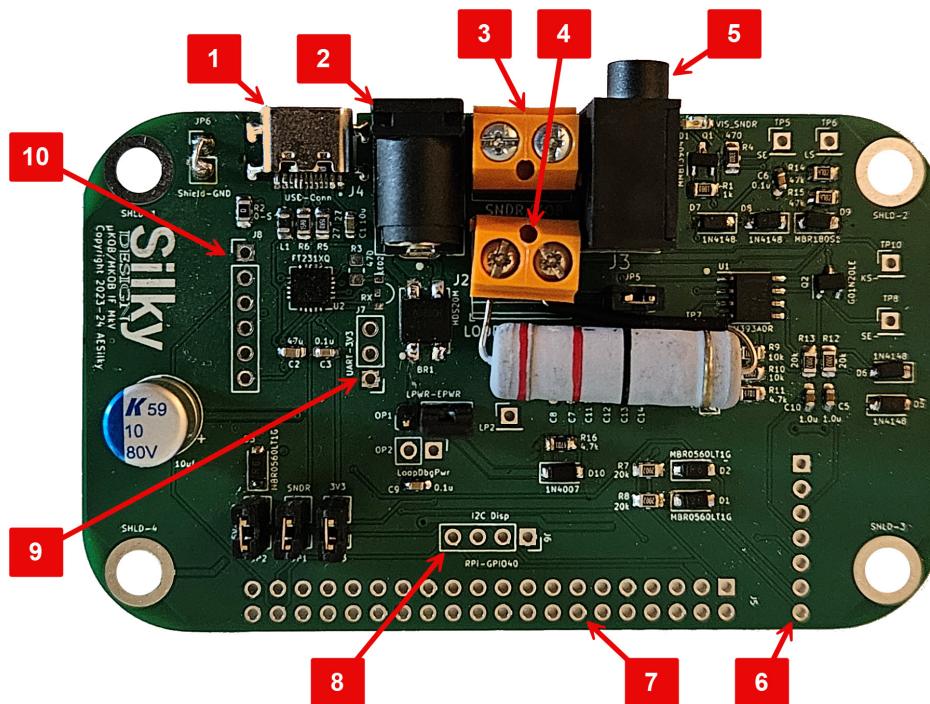Going clockwise around the board, the connectors are:

Table 1. Interface Board Connectors

#	Connector / Control	Usage	Schematic Designator
1	USB (USB-C): Serial interface and logic power	Serial connection to a host running MKOB or MorseKOB. This is also used to supply power to the logic portion of the interface board when being used *stand-alone*. **IMPORTANT:** If the interface board is attached to a **µKOB** or a **Raspberry Pi**, refer to the Option Jumpers section, and **DO NOT CONNECT** to this USB connector.	J4

#	Connector / Control	Usage	Schematic Designator
2	Power Jack 2x5.5mm: Sounder/Loop Power	This barrel connector is a typical size for *wall wart* and small *inline* power supplies in the 9v-24v range that can be used to power the sounder or KOB loop. Typically the center pin is positive, but either polarity will work. Refer to the Sounder / KOB Loop Connection section for suggestions on selecting a power source.	J2
3	2pos Screw Terminal: Sounder/KOB	The connection to the Sounder/KOB. This is **The Loop**. Refer to the Sounder / KOB Loop Connection section for notes about connecting to a loop that is externally powered.	ST1
4	2pos Screw Terminal (inward facing): Sounder Current Limit	Used to connect a current limiting resistor for the sounder or KOB loop power. Refer to the Sounder / KOB Loop Connection section for suggestions on selecting an appropriate resistor value.	ST2
5	1/8" Stereo (TRS): Key/Paddle	Key/Paddle input for use with a separate Key & Sounder. Refer to the Key/Paddle Input section for connection details.	J3
6	1x7 Socket: µKOB	Connection to a µKOB main board. The 7-pin socket connector is populated on the bottom of the board.	J1
7	2x20 Socket: GPIO	Connection to a Raspberry Pi GPIO connector. The 40-pin socket connector is populated on the bottom of the board.	J5
8	1x4 Socket: I2C Disp	Connection for an I2C display panel for a Raspberry Pi through the GPIO connector. This 4-pin socket connector is connected to the I2C-1 GPIO pins for use with a small OLED panel.	J6
9	3 Pin Serial Data	This 3-pin header row is labeled on the back of the board. It provides a logic-level serial connection to a µKOB for debugging.	J9
10	6 Pin Serial Handshake	This 6-pin header row is labeled on the back of the board. It provides a connection to the switch when used **ONLY** as a MRT Selector Switch.	J8

Option Jumpers

The option jumpers described in this section may or may not be configurable (via pins and jumpers) depending on how the interface board was assembled. It is possible that the options are hard-jumpered a specific way and cannot be changed. Unless noted, the option jumpers are either ON (jumpered) or OFF (open). Option jumper OP1 is the one 2-position option (left-right).

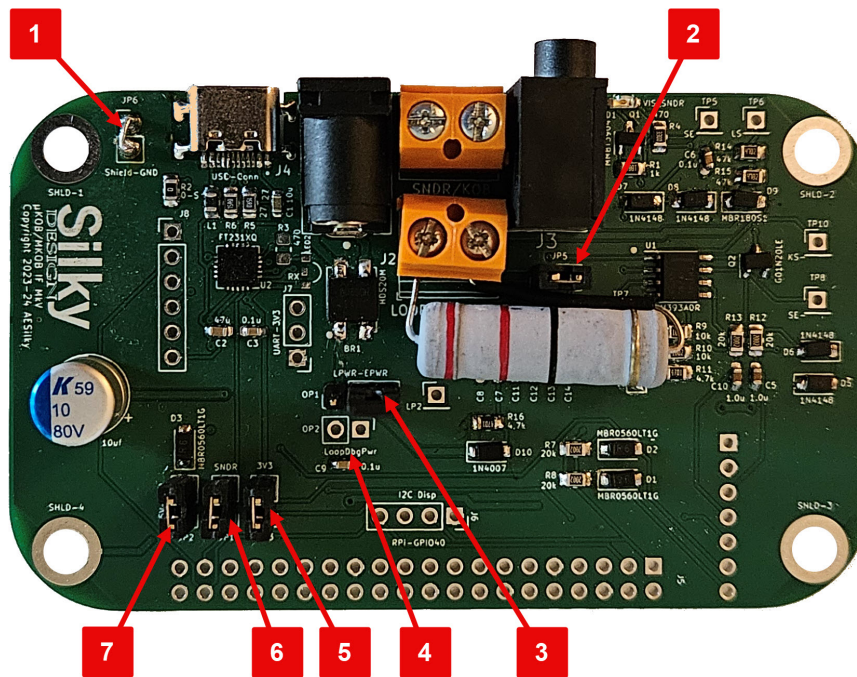Going clockwise around the board, the option jumpers are:

Table 2. Interface Board Option Jumpers

#	Name	Usage	Schematic Designator
1	Shield-GND	When jumpered, the shield (Altoids Tin) is connected to power/signal ground.	JP6
2	SNBR EN	When jumpered, the snubber circuit is connected to the Loop. The snubber circuit reduces electrical noise (radio interference) generated by driving the sounder.	JP5

#	Name	Usage	Schematic Designator
3	LPWR-EPWR	This 2-position jumper selects how the Sounder / KOB Loop is powered. Selecting *LPWR* (left) powers the Sounder/Loop from the *LOCAL* (on-board) power connector (J2). Selecting *EPWR* (right) configures the interface to allow the Sounder/Loop to be powered externally.	OP1
4	LoopDbgPwr (**DEBUG ONLY**)	When jumpered, power is supplied to the Sounder / KOB Loop circuit from the 5V board (logic) power.	OP2
5	3V3	When jumpered, 3.3 volt power to the board is supplied by the USB connection. When open, 3.3 volt power is supplied by the µKOB or GPIO.	JP3
6	SNDR	When jumpered, the sounder drive is from the USB (serial) RTS line. When open, the sounder drive is from the µKOB or GPIO.	JP1
7	5V-USB	When jumpered, 5 volt power to the board is supplied by the USB connection. When open, 5 volt power is supplied by the µKOB or GPIO.	JP2
NA	KeyJack-NP	This must be jumpered when the Key/Paddle Jack (J3) is not installed. The jumper and markings are located within the border of the jack.	JP4
NA	TPn	There are a number of *test points* on the board. These are used for circuit test. See schematic for details.	TP5-TP10

Option Settings

Following are the option settings for the different applications of the interface board.

Common

The option jumper settings in this section are common to all applications of the interface board.

Table 3. Common Option Jumpers

Name / Designator	Typical Setting	Alternate Setting Use
LPWR-EPWR / OP1	LEFT = Local power supplied to the Sounder/Loop. RIGHT = Sounder/Loop is externally powered.	Must be jumpered to left or right for the Sounder/Loop to operate.
SNBR EN / JP5	JUMPERED. Connects the snubber circuit to the Loop to reduce electrical noise (radio interference) generated by driving the sounder.	Open to remove the snubber.
LoopDbgPwr / OP2	OPEN	Jumper to provide 5 volt power to the loop circuit for board testing.
Shield-GND / JP6	JUMPERED. This connects the shield to the board's (electrical) ground.	Open to isolate the shield from the board. When this is done, one of the shield screws can be used to attach an external ground for the shield.

µKOB (Configurations 1 and 2)

In addition to the common option jumper settings, the following settings apply when the interface board is being attached to a µKOB via piggyback connector J1. If the board is only being used with a µKOB, the board most likely does not have the USB interface populated. If that is the case, many of the jumpers in this section will also not be populated, and therefore will be OPEN.

Table 4. µKOB Option Jumpers

Name / Designator	Setting	Operation
SNDR / JP1	OPEN	USB interface sounder drive signal is disconnected from the board.
3V3 / JP3	OPEN	USB interface 3.3 volt source is disconnected from the board.
5V-USB / JP2	OPEN	USB interface 5 volt source is disconnected from the board.
RPI-GPIO40 / J5	NON-EXISTENT	A Raspberry Pi cannot be connected.
I2C Disp / J6	NON-EXISTENT	The I2C is only connected to the GPIO connector for the Raspberry Pi.

Raspberry Pi GPIO (Configurations 3 and 4)

In addition to the common option jumper settings, the following settings apply when the interface board is being attached to a Raspberry Pi via piggyback connector J5. If the board is only being used with a Raspberry Pi, the board most likely does not have the USB interface populated. If that is the case, many of the jumpers in this section will also not be populated, and therefore will be OPEN.

Table 5. Raspberry Pi Option Jumpers

Name / Designator	Setting	Operation
SNDR / JP1	OPEN	USB interface sounder drive signal is disconnected from the board.
3V3 / JP3	OPEN	USB interface 3.3 volt source is disconnected from the board.
5V-USB / JP2	OPEN	USB interface 5 volt source is disconnected from the board.
I2C Disp / J6	OPTIONAL	Connects an I2C OLED Display panel to the Raspberry Pi GPIO (Pin1=GND, Pin2=3.3V/P1, Pin3=SCL/GP3/P5, Pin4=SDA/GP2/P3).
µKOB / J1	NON-EXISTENT	A µKOB cannot be connected.

USB Serial (Configuration 5, plus 2 and 4)

In addition to the common option jumper settings, the following settings apply when the interface board is being used through the USB Serial connection to a system running MKOB or MorseKOB. If the board is assembled for use only with the USB Serial interface, the options in this section are most likely permanently jumpered.

Table 6. USB Serial Option Jumpers

Name / Designator	Setting	Operation
SNDR / JP1	JUMPERED	USB interface sounder drive signal is driving the board circuit.
3V3 / JP3	JUMPERED	USB interface 3.3 volt source is powering the board.
5V-USB / JP2	JUMPERED	USB interface 5 volt source is powering the board.
µKOB / J1	NO	A µKOB cannot be connected.
RPI-GPIO40 / J5	NO	A Raspberry Pi cannot be connected.

Sounder / KOB Loop Connection

A Sounder or a KOB Loop (key and sounder connected in series) are connected to the interface board using the screw-terminal block ST1. A user-supplied current limiting resistor must be connected to screw-terminal block ST2. The resistor is positioned on the inside to reduce radio interference and to help guard against touching it, as it may become warm during operation.

Power for the sounder/loop is normally provided by a user-supplied power module connected via J2. Refer to the Externally Powered Loop section below if connecting to a powered telegraph loop.

Selecting the appropriate power module voltage and the current limiting resistor value depends on the sounder being used. The following table provides values that can be used as a starting point.

The values in the table are meant to be used with this interface board and a Sounder or KOB for enjoying and practicing land-line telegraphy. They are not meant to indicate what was used in actual telegraph circuits *of the day*.

Some telegraphy enthusiasts use higher voltages and/or lower valued current limiting resistors to get a more *SNAPPY* sound/response. Just remember that, in most cases, you are dealing with antique equipment that, if damaged, can be impossible to repair. If the sounder windings are over-powered long enough, or too many times, it can cause the (very thin) insulation coating the (extremely fine) wire to fail, causing an internal short. This results in the sounder becoming an interesting paper weight or conversation provoking door stop, rather than a functional telegraph instrument. It is suggested that you start with a lower voltage and/or higher resistor value. Then, if the sound produced isn't satisfactory, slightly increase the voltage **or** decrease the resistor value until a good, solid, **CLICK** is produced. Note that the **CLACK** is produced by the spring and other adjustments of the sounder, so voltage and resistance values don't really affect it.

Table 7. Example Sounder / KOB Loop Voltage and Current Limit Resistor Values

Instrument	Nominal Current	Voltage Drop	Power Supply Voltage (J2)	Current Limit Resistor Ohms (ST2)
Line Sounder, 30 Ohms	70 ma	2.1v	9v / 12v	39 / 150 1W
Line Sounder, 120 Ohms	40 ma	4.0v	12v / 18v	180 / 330 1W
Local Sounder / KOB, 4 Ohms	240 ma	0.96v	9v / 12v	16 / 47 3W
Local Sounder, 50 Ohms	110 ma	5.5v	12v / 18v	56 / 110 3W
Local Sounder, 400 Ohms	30 ma	12v	18v / 24v	200 / 400 1W

Externally Powered Loop

The interface board is designed to make it easy to set up a personal telegraph station by providing a convenient way to provide power to the Sounder / KOB Loop. However, rather than powering the Sounder / KOB Loop from a power supply connected to J2, the interface board can be connected into a powered telegraph loop if the following conditions are met:

- The loop power must be DC

- The loop voltage must not exceed 80 volts (regardless of the amperage)

- The loop amperage must not exceed 1 amp (regardless of the voltage)

- The loop wattage must not exceed 3 watts (all sounders and other equipment in the loop energized)

If the existing telegraph loop has appropriate current limiting, the current limit resistor normally connected to ST2 can be replaced by a jumper wire. ST2 must have a resistor or a jumper wire in order to complete the loop circuit.

When connecting to a powered telegraph loop the LPWR-EPWR / OP1 jumper should be to the right (EPWR).

The interface board must be connected into the telegraph loop with the positive side of the loop circuit connected to the screw terminal nearer the J2 Power Jack (right side when viewing the face of the terminal block) and the negative side of the loop circuit connected to the screw terminal away from the J2 Power Jack (left when viewing the face of the terminal block). The interface board will introduce a 0.5 volt drop into the telegraph loop circuit.

Key/Paddle Input

When using a separate key and sounder, or a paddle, the key or paddle is connected to the 1/8 inch (3.175 mm) phone jack J3.
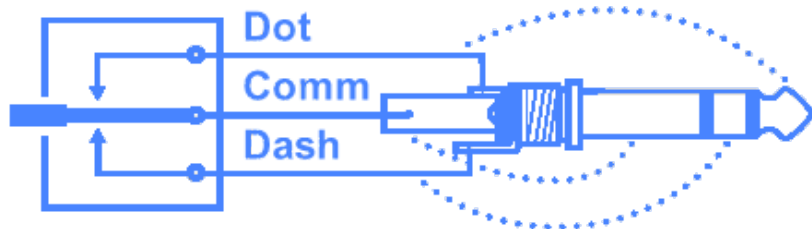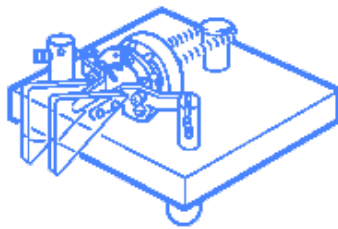
⛔ No power should be applied to this connection.

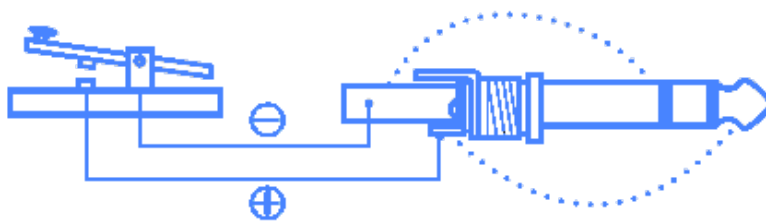The connection is the same as many common HAM radios. It is illustrated below:

Table 8. Key/Paddle Connection

Tip	Key or Paddle Dot
Ring	Paddle Dash
Sleeve	Common

Connection Diagrams
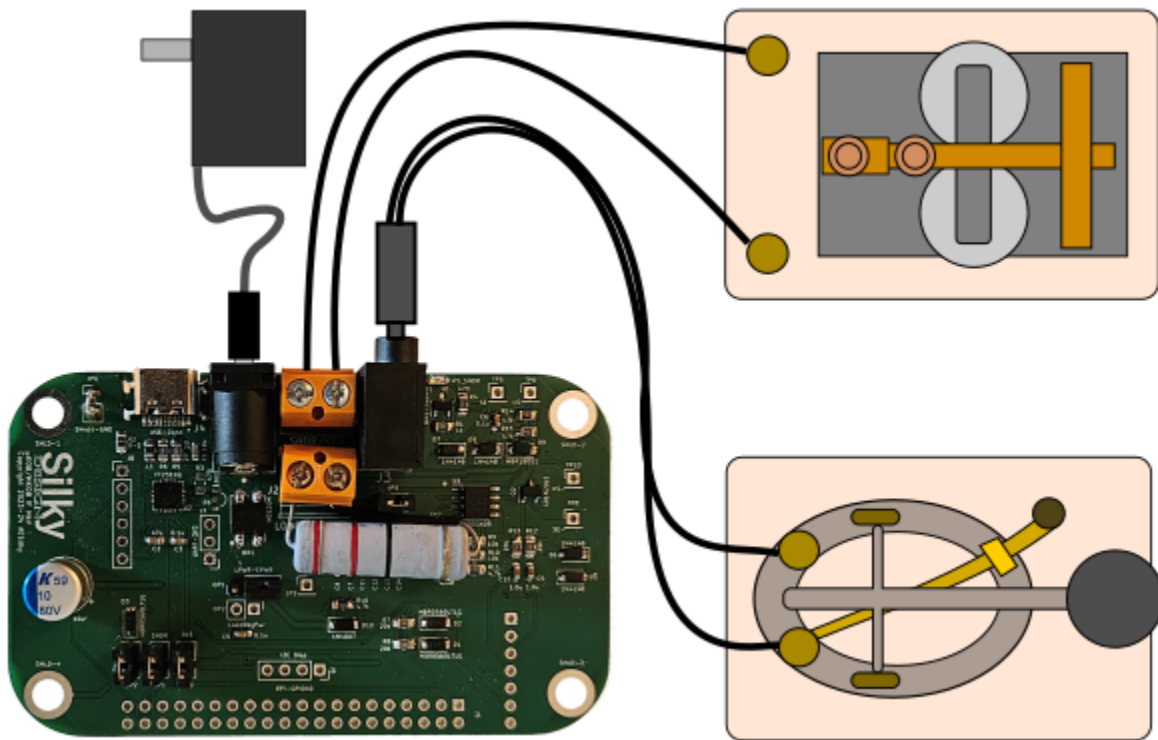
Figure 1. Separate Key and Sounder, powered through the interface
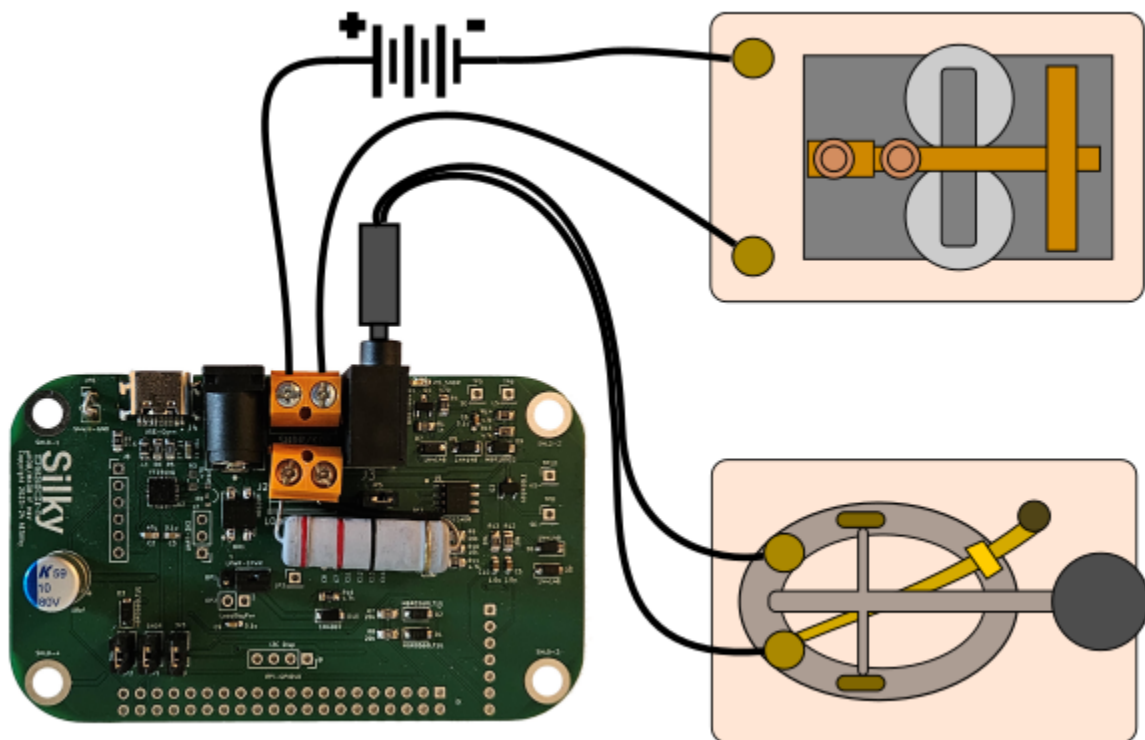
Figure 2. Separate Key and Sounder with external power
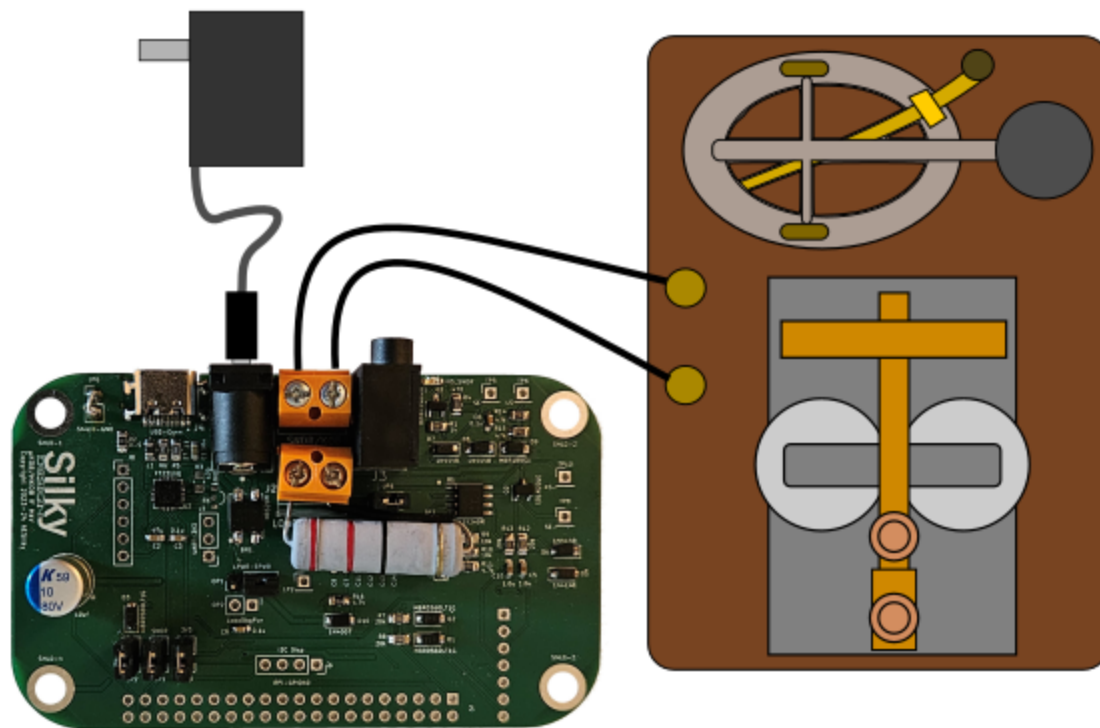
Figure 3. KOB or Loop, powered through the interface
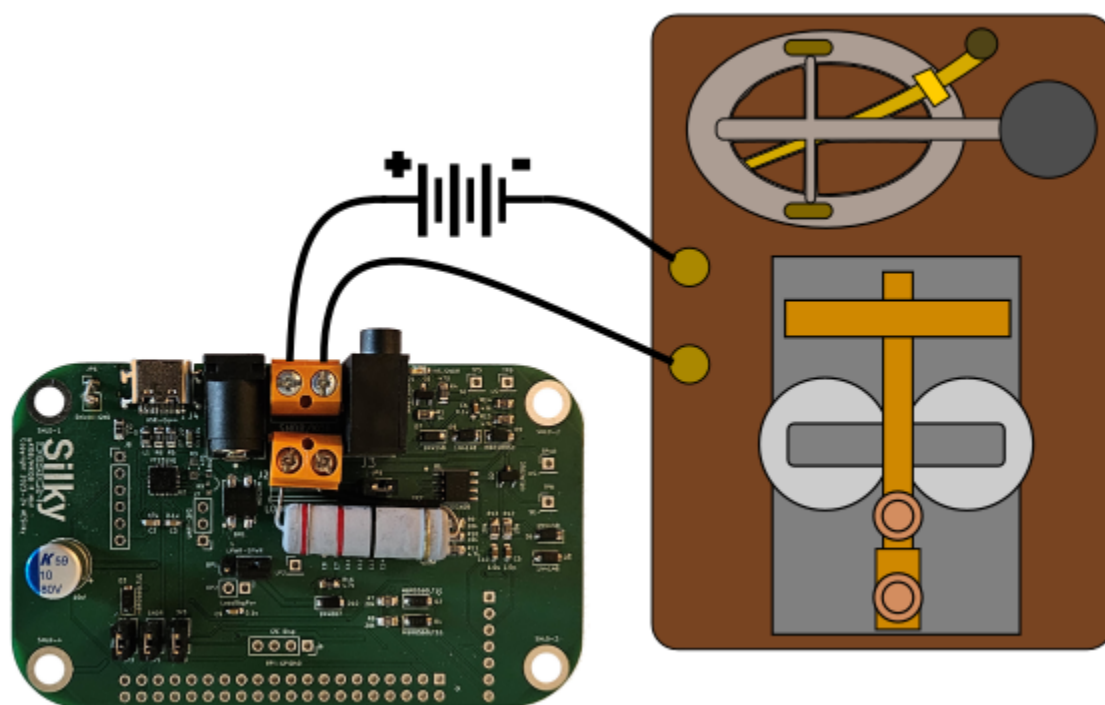
Figure 4. KOB or Loop with external power

Index

Colophon

This document is for PCB: μKOB/MKOB IF MkV v1.0

Document version: 1.0 (20240821)

MIT License

Copyright (c) 2023-24 AESilky

This document is authored using **asciidoc**, and the PDF version rendered through **asciidoctor-pdf**.