

Morse with the Calliope mini



Lio and the signals

Lio remembers grandpa's morse phone, with which he used to transmit messages. Grandpa could only talk to other people via short and long signals. Could Lio also build a morse phone with the Calliope mini?

Hint: Please be aware that if you have successfully completed the following exercise you can no longer connect the Calliope mini via Bluetooth. In order to do so again the demo software is needed. You'll find it here: calliope.cc/en/ble.

The morse code

About 180 years ago the American inventor Samuel Morse built an instrument, which enabled people to transmit encrypted letters electrically and later using radio technology over long distances.

Samuel Morse had the idea of translating all letters into combinations of two characters: short or/and long sounds. These sounds can also be represented as a dot for the short sound and a dash for the long sound.

The code

In our morse program, each letter is converted into a sound and a light signal. Up to four light signals stand for one letter.

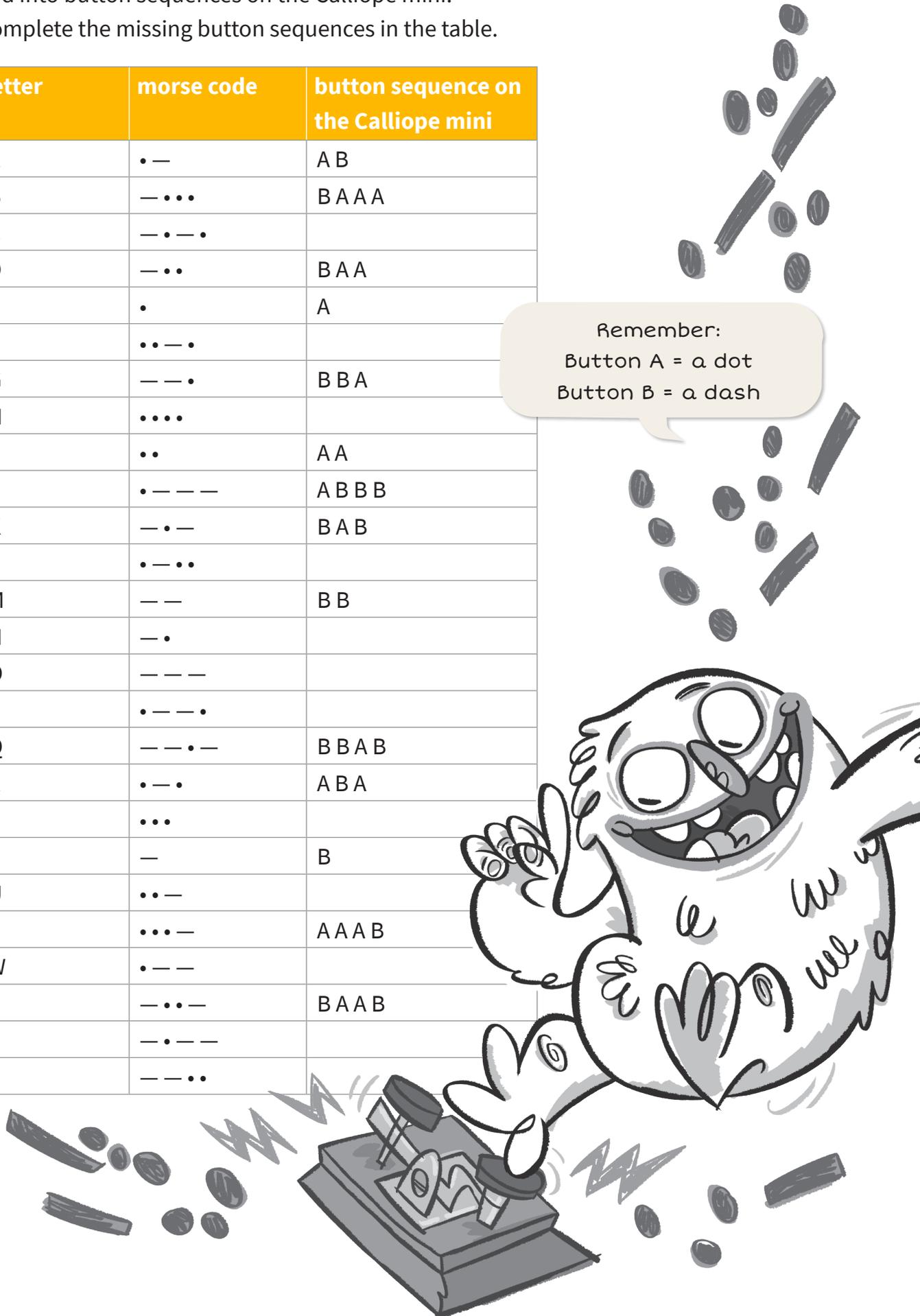
On the Calliope mini, pressing the "A" button produces a dot and a short sound, and pressing the "B" button produces a dash and a long sound. Sent dots and dashes are thin, received dots and dashes are displayed boldly on the LED screen*.



1. In the table, the letters are translated into the morse alphabet and into button sequences on the Calliope mini. Complete the missing button sequences in the table.

letter	morse code	button sequence on the Calliope mini
A	•—	A B
B	—•••	B A A A
C	—•—•	
D	—••	B A A
E	•	A
F	••—•	
G	—•—•	B B A
H	••••	
I	••	A A
J	•—••	A B B B
K	—•—	B A B
L	•—••	
M	—•—	B B
N	—•	
O	—•—•	
P	•—••	
Q	—•—•—	B B A B
R	•—•	A B A
S	•••	
T	—	B
U	••—	
V	•••—	A A A B
W	•—•—	
X	—••—	B A A B
Y	—•—•—	
Z	—•—••	

Remember:
 Button A = a dot
 Button B = a dash

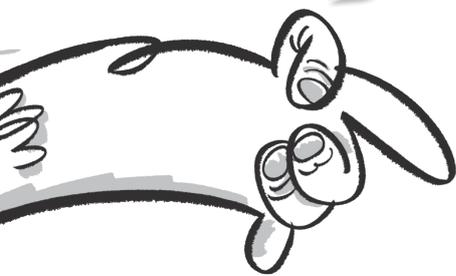


2. Enter the morse code for the word "L U N C H" in the empty field below. Use a vertical line between the letters to indicate a pause.

	L	U	N	C	H
morse code	--				
button sequence	B B				

3. Using the morse program on page 26, two or more Calliope mini can send and receive messages between them, as long as they have programed the same radio channel. Each Calliope mini requires a program with a transmitter and a receiver module. Program the code for the transmitting and receiving section in the NEPO® editor . Proceed step by step.

Look at the transmitting part. You can certainly program it on your own now. But you should definitely have a look at the small hint below.



Hint:

Transmitting part of the code

The block "send message" with the text block  executes the following:

if button* A is pressed this  will be sent and

if button B is pressed, this  will be sent.

```

+ start
- variable code : String ← ""
set channel to 10
repeat indefinitely
do
+ if button A pressed?
do
show image [5x5 grid with dot at (2,2)]
send message String "" . " with strength 7
play sixteenth note c'
else if button B pressed?
do
show image [5x5 grid with dashes at (2,0), (2,1), (2,2), (2,3), (2,4)]
send message String "" - " with strength 7
play quarter note c'
wait ms 200
clear display

```

Receiving part of the program

This part of the program displays the messages sent by another Calliope mini. If the Calliope mini receives the message “.” it displays this on the LED screen  and plays a short sound. If the Calliope mini receives the message “-” it displays this on the LED screen  and plays a long sound.



4. ▶ Transfer the code to the Calliope mini and run the program.



5. Send single letters with your Calliope mini.

Your other classmates must use their Calliope mini and the morse alphabet to identify the letters. In order to identify them, you have to take a short break between the sent letters.

```

+ start
- variable code : String ← "."
set channel to 10
repeat indefinitely
do
+ - if button A pressed?
do
show image [5x5 grid with dot at (0,0)]
send message String "." with strength 7
play sixteenth note c'
else if button B pressed?
do
show image [5x5 grid with dash at (0,0)]
send message String "-" with strength 7
play quarter note c'
wait ms 200
clear display
set code to receive message String
+ - if code = "."
do
show image [5x5 grid with dot at (0,0)]
play sixteenth note c'
else if code = "-"
do
show image [5x5 grid with dash at (0,0)]
play quarter note c'
wait ms 200
clear display
  
```

receiving part



6. Think of a word and write down the morse code for the word.
Then send the code.

Notice when sending:

- It should be a short word with no more than five letters.
- Pay attention to the breaks between the letters.
- Agree with the other students who is allowed to send.
Only one student can send at a time.
The other students can receive the morse characters.

Transmitted word:

letters					
morse code					
button sequence on the Calliope mini					

Notice when receiving:

- Work in groups of two: One student announces the morse code received, another student writes it down.
You then translate the signs with the morse code table on page 24.
- Remember to pay attention to the breaks between the letters.

Received word:

morse code					
letters					

Received word::

morse code					
letters					

If transmitting and receiving with the short words worked, you can also transmit and receive longer words or even whole sentences.

The small coding encyclopedia

instruction When you receive an instruction, you can execute it. For example:

(= command) "Hang the wet socks on the clothes horse to dry."

The same is true for the computer. It executes instructions that clearly describe what it should do. A code/program is built from instructions.

loop with a condition A loop allows a sequence of instructions to be executed over and over again. For example:

"Hang up socks as long as there's laundry in the basket."

The **loop** is: "Hang up socks as long as (repeat) ..."

The **condition** of the loop is: "Is there still laundry in the basket?"

Answer: "Yes!"

In the loop, **four instructions** are executed one after the other:

1. Take a wet piece of laundry
2. Hang the piece of laundry on the clothes horse
3. Use two clothespins
4. Fasten the piece of laundry with the clamps

If the answer to the condition "Is there still laundry in the basket?"

is "No!", the program continues behind the loop:

"Bring the basket to the bathroom."

infintite loop An infinite loop **has no condition** und and will run until the Calliope mini is switched off.

variable A variable is a container for a specific value (number, word, etc.), image or something else that is set at the beginning of the program. Each variable needs a unique name and you have to decide if the variable should store a number, a word (→ string), an image or something else.

branch with a condition Every branch in a program needs a condition. The condition defines the next instructions in the program.

There are two ways of doing this, for example:

Condition: "Is the laundry on the clothes horse still wet?"

