

EPPro8 Challenge

Engineer Problem Solve Innovate

Secret Agent

You work for the spy agency and your job is to design
A secret code and communication system that can be
used to send top secret messages over long distances.

It will be able to send warning signals and
messages between Spy HQ and the Field Office.



This challenge contains optional activities
using the EPro8 Electronics Starter Kit.



Long Distance Alarm

Criteria	A lever is installed at Spy HQ (the front of the classroom). The lever is spring loaded. It can be pulled and then released. A rope runs from Spy HQ to the Field Office (the rear of the classroom). Pulling the lever pulls on the rope. This shakes a tin of bolts – making a sound.
Hint	Use rubber bands to spring load the lever. Clamp two blue joiners onto the tin to create a hook.



Short Telegraph Cable

Criteria	Pushing a button at Spy HQ causes a light at Spy HQ to turn on.
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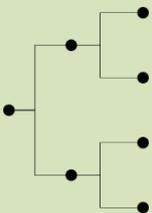
Long Telegraph Cable

Criteria	Extend the cable to the light with an extra-long cable from front of the class to the back of the class. A button at the front of the class triggers the light at the rear of the class.
Hint	The extra-long cable doesn't have the EPro8 plugs on it. You can strip the end of the extra-long cable and wind it around the EPro8 plugs. You will need break the colour matching rule here as the extra long cable won't be the correct colours.

Warning / All Clear

Criteria	<p><i>You don't need to do this part if you have done the electronics parts</i></p> <p>A torch is in the Field Office (the rear of the classroom). The torch's beam is blocked by a piece of cardboard. This piece of cardboard is mounted on an axle. The lever at Spy HQ is pulled - this pulls a rope - which rotates the axle revealing the torch. If the torch is revealed for three seconds this means DANGER. If the torch is revealed for one second this means ALL CLEAR.</p>
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Efficient Communication

Criteria	<p>Send a short or a long signal. Now send a second short or a long signal. By sending only TWO signals, what are all the different signal combinations can you send?</p>
Criteria	<p>By sending only THREE signals, what are all the different signal combinations can you send? Draw these combinations of signals in a tree structure.</p>
Criteria	How many times do you need to pull the lever to have a unique combination for every letter of the alphabet?
Hint	<p>A tree structure is a good way of showing all possible options or combinations.</p> <p>Each different option becomes another branch of the tree.</p> 

Secret Letter - One Way Communication

Criteria The Chief Agent (a.k.a. your teacher) will give Spy HQ a letter (A-Z)
Spy HQ must transmit this letter to the Field Office.
They must pull the lever the least possible number of times.
The Field Office writes the letter down and returns it to the Chief Agent.

Hint

Develop a code with each letter being represented by a pattern of short and long signals.

Long Distance Buzzer (Simulator)

Criteria Use the online electronics simulator, code **SCRT**.
Note: You will need two devices for this challenge.
A wire has been run from Spy HQ to the Field Office.
When a button is pushed at Spy HQ a buzzer sounds at the Field Office.

Hint

Make sure both ends have the same 4 digit code. This is how the simulator knows which device you are connected to.

Secret Password

Criteria The chief agent (a.k.a. your teacher) will give the Spy HQ a secret seven letter password.
Spy HQ must transmit this password to the Field Office.
They can only use signals sent through the button / buzzer.
Field Office must write the password down and return it to the Chief Agent.

Two Way Communication

Criteria The communication system is modified so that it can send signals in both directions.

Question and Answer

Criteria	<p>The Chief Agent (your teacher) will tell the Field Office the name of a country. Using only the button / buzzer the Field Office must transmit this country to Spy HQ.</p> <p>Located at Spy HQ is the Spy Ledger which has the name of the Spy Agency in each country.</p> <p>Spy HQ must reply with the name of the Spy Agency in that country. Field Office must write the country down correctly and return it to the chief agent.</p>
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After you have attempted this challenge watch the tutorial to see our solution at www.EPro8Challenge.co.nz/Tutorial and enter the Challenge Code **SCRT**.

Spy Ledger

To be placed at Spy HQ (the front of your class)

Country	Spy Agency
Australia	ASIO
Brazil	ABIN
Canada	CSIS
Denmark	PET
Egypt	GIS
France	DGSI
Germany	BND
Hong Kong	CIB
Iran	VAJA
Japan	CIRO

TOP SECRET