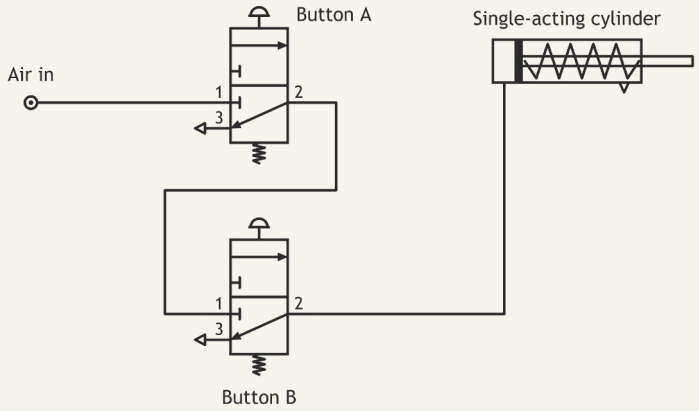
Daily Review



1. **Name** the valve OR needs.
2. **State** which buttons work OR.
3. **Find** P: F = 60 N, A = 300 mm^2.
4. **State** check 1 when fault-finding.
5. Two switches in series: **state** when it is on.

AND Control

Two buttons. Both must be pressed.



S3 Engineering Science

By the end of this lesson…



1. I can **build** and **test** an **AND** circuit
2. I can **explain** where the air stops in AND
3. I can **choose** OR or AND for a job

Meet the Parts: Two Buttons in a Line

Parts

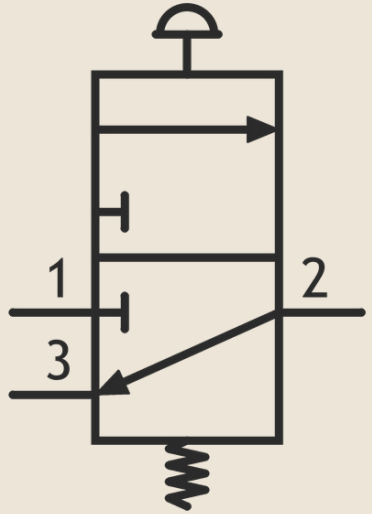
two **push-button** valves

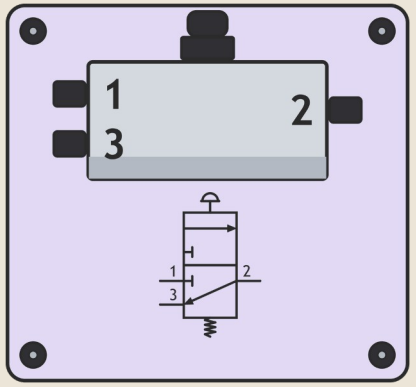
New

how they are **piped**

Out of A

into **B**, then the cylinder

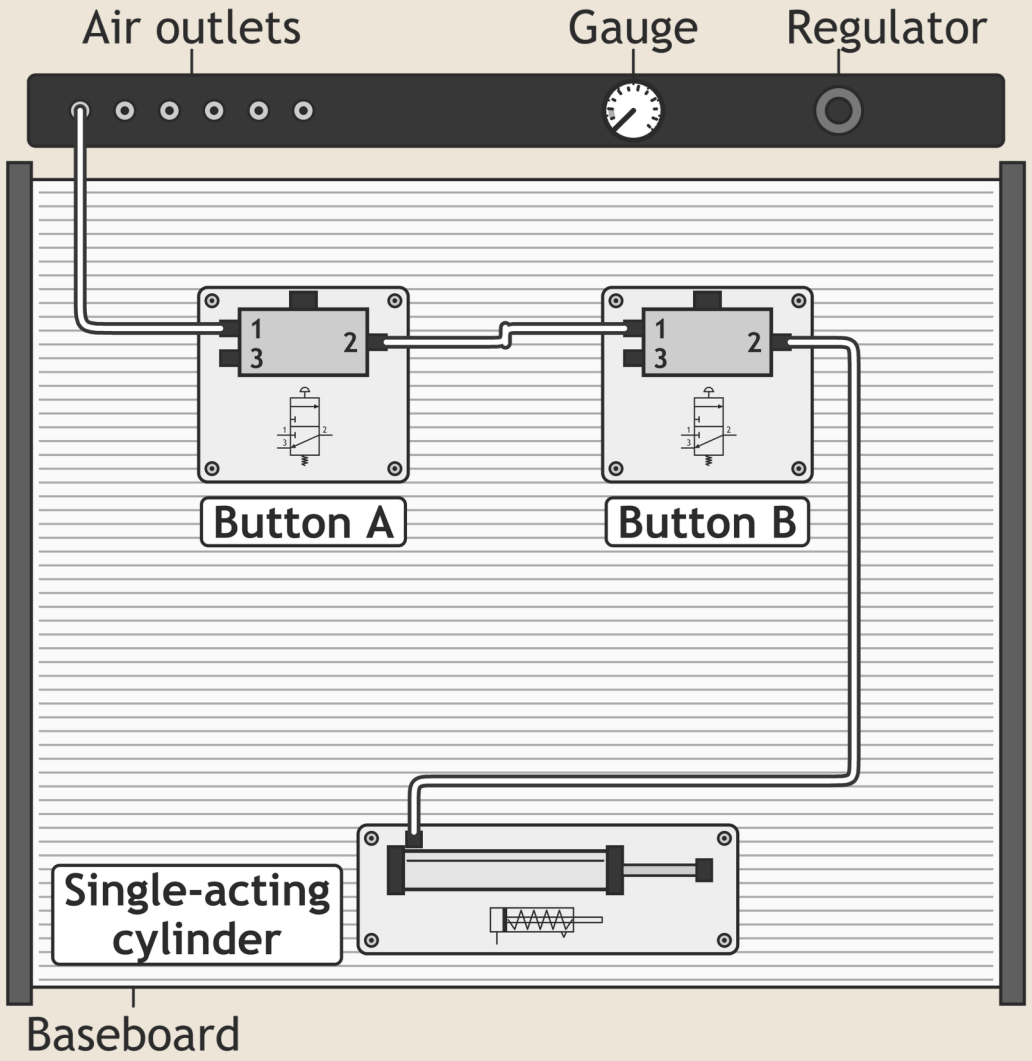




The real push-button valve.

Collect, Simulate and Build

Collect the parts on the layout, tubing and goggles.



SAFETY Regulator at 0 to build. 1 to 2 bar to test.

Simulate, **build**, hands up. Then **press** A, then B, then both.

What Did You Find?



1. **State** what the rod did when you pressed A only.

2. **State** what the rod did when you pressed B only.

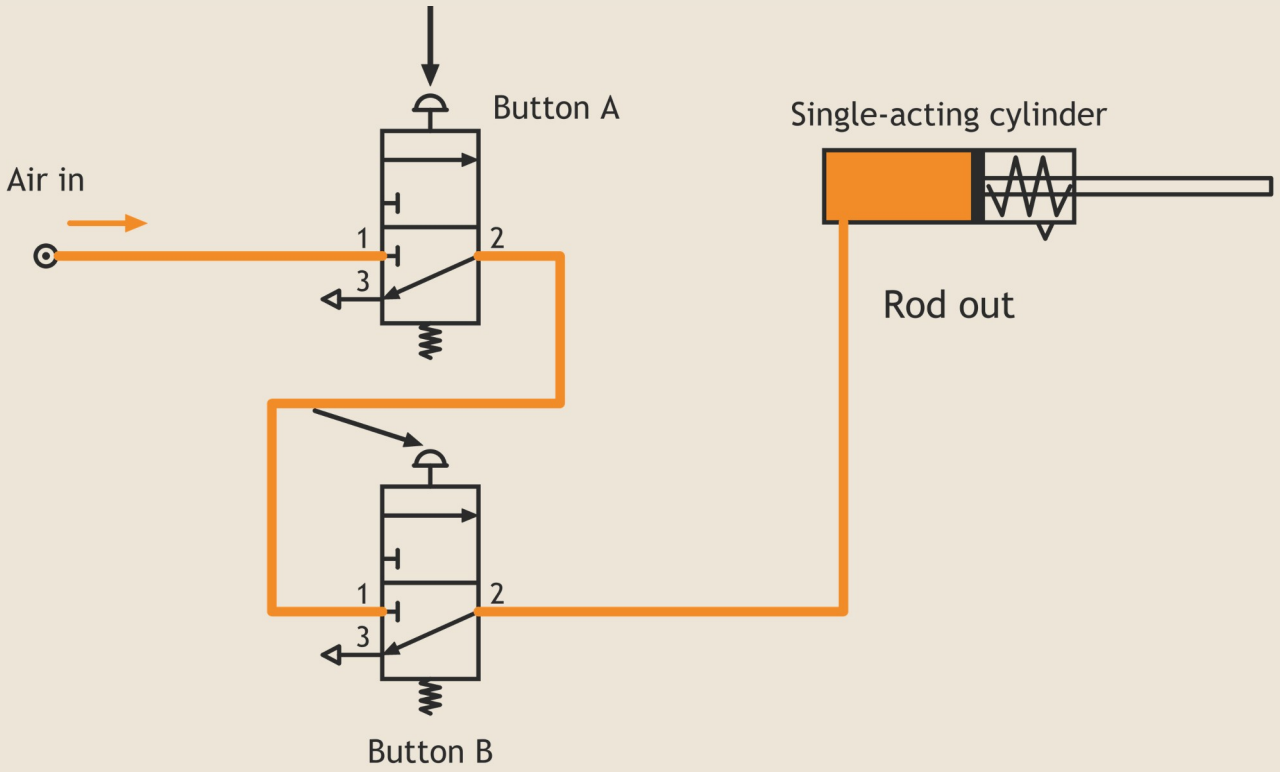
3. **State** what the rod did with both pressed.

4. **State** where the air stopped with A only.

Second Start

1. **State** which buttons work the AND circuit.
2. **State** where the air stops with A only.
3. **Name** the valve OR needs.
4. **State** which buttons work the OR circuit.
5. **State** the regulator setting while you build.

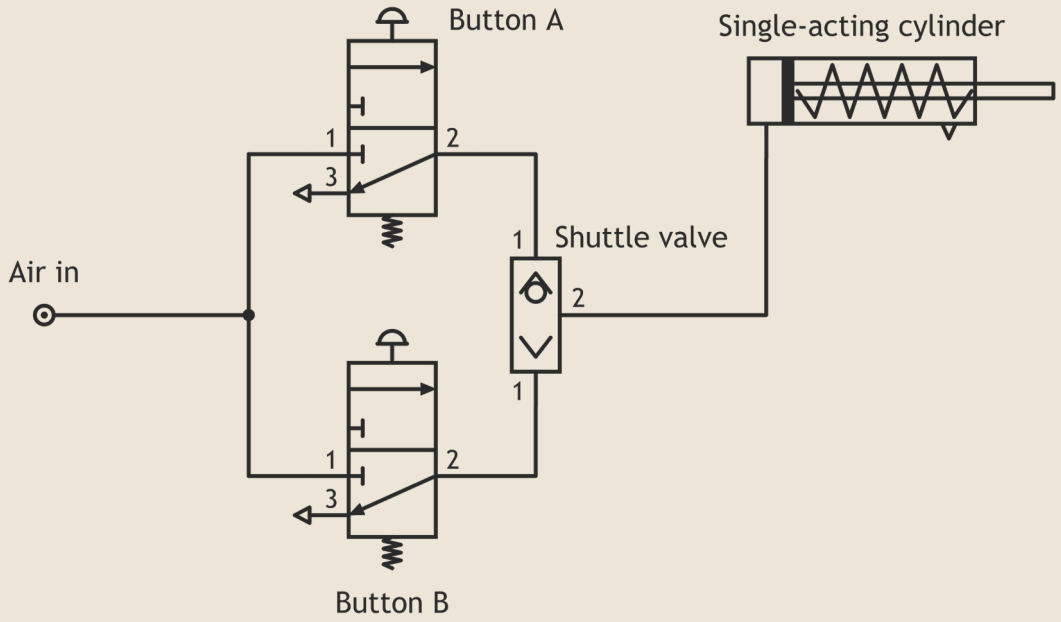
Why: Follow the Air



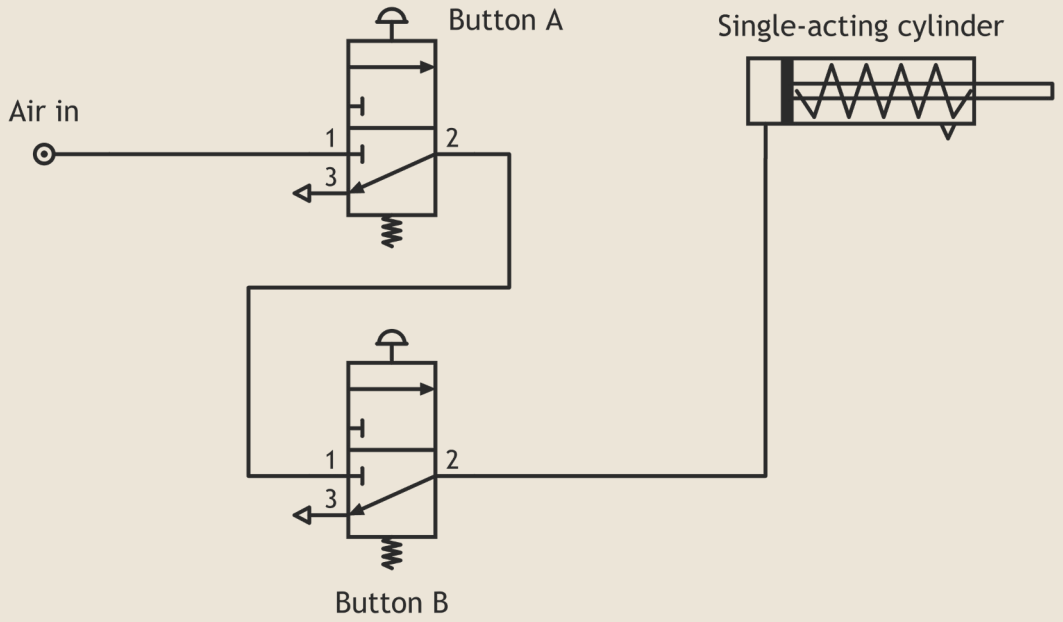
1 Press A only: air goes through A and **stops** at B. Rod **in**.

2 Press A and B: air goes through A, then B. The rod goes **out**.

Same Valves, Different Pipes



OR: side by side



AND: in a line

We Do: OR and AND



Button A	Button B	OR: rod	AND: rod
-	-	In	In
Pressed	-		
-	Pressed		
Pressed	Pressed		

Why: AND Control

AND

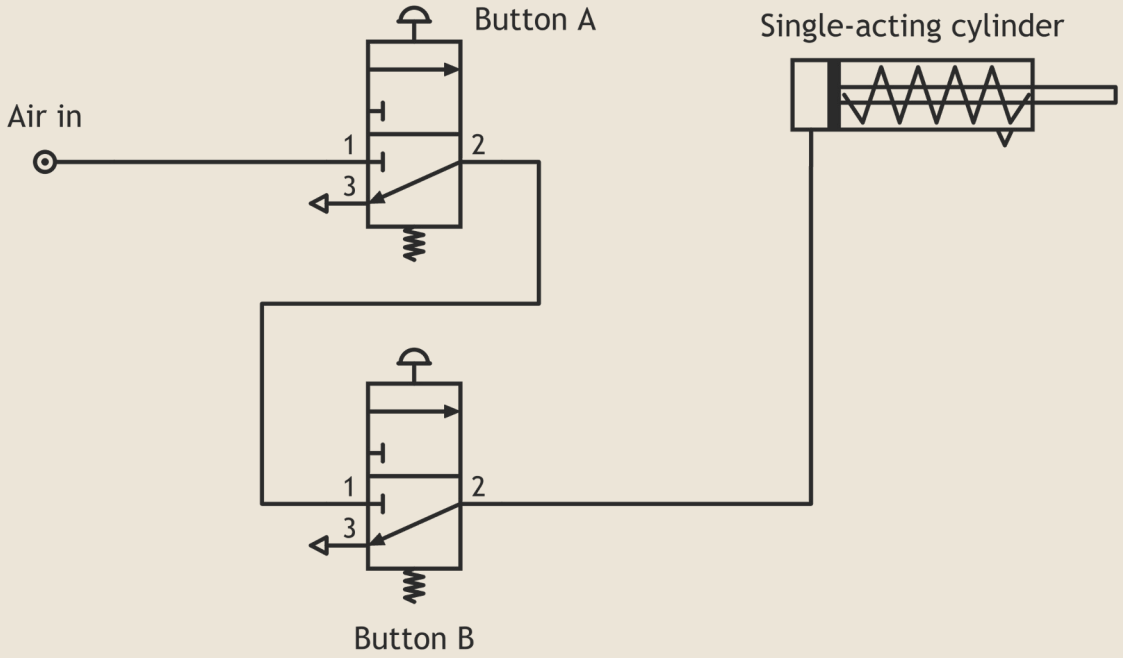
valve A AND valve B, **both** on

Pipes

in a **line**: out of A, into B

Where

a press: **two-hand** safety



Meet the Parts: Pilot Air

Pilot air

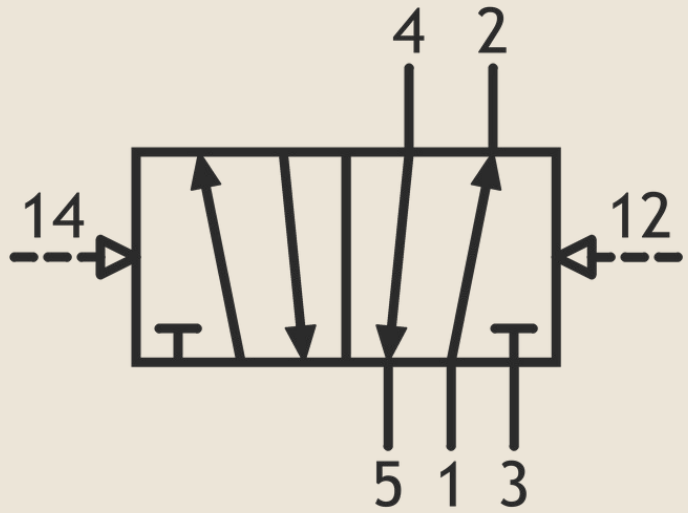
a small air **signal**

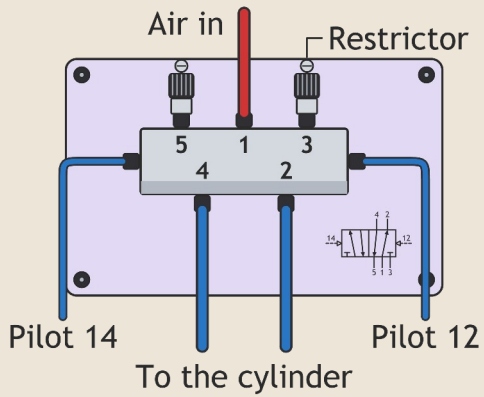
Drawn

as a **dashed** line

Pilot 14, 12

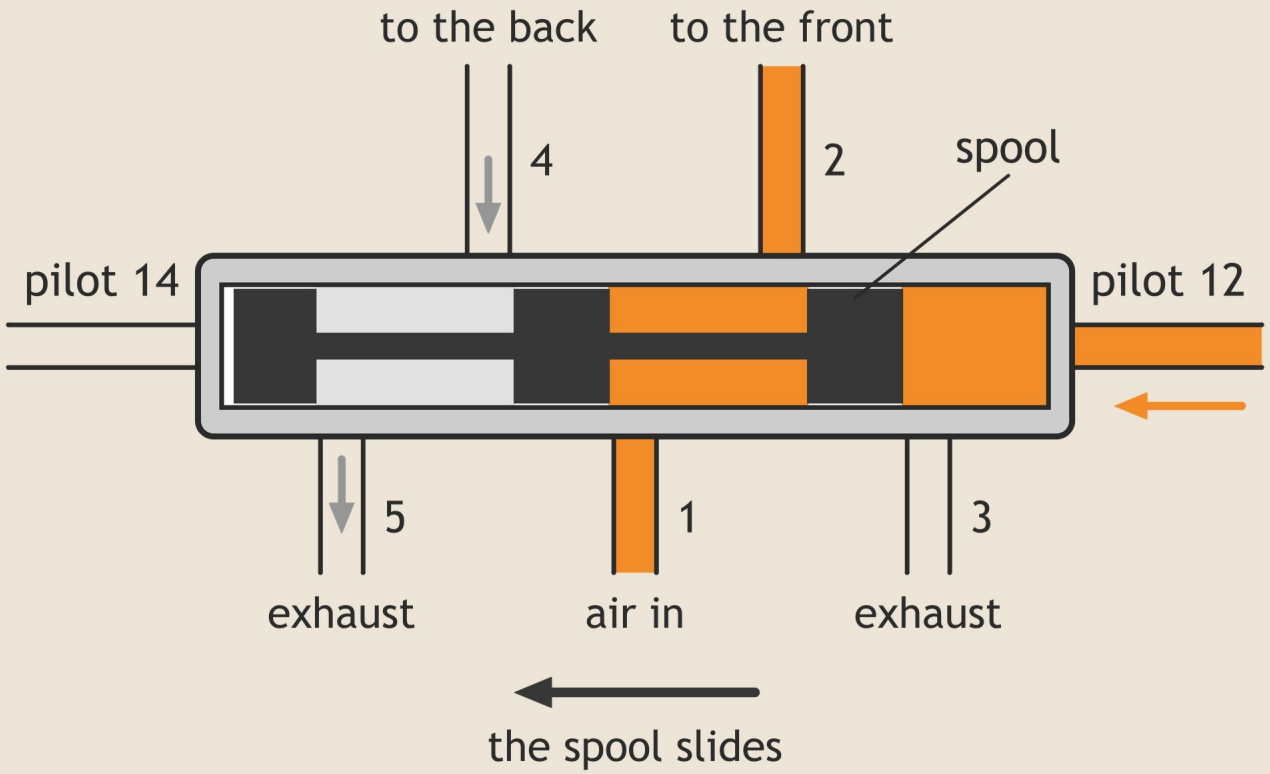
slide the 5/2 valve to its other **state**





The real 5/2 pilot valve.

Why: Pilot Air Moves the Spool



1 Air at **pilot 14**: the spool slides. Air 1 to **4**.

2 Pilot air gone: the spool **stays** put.

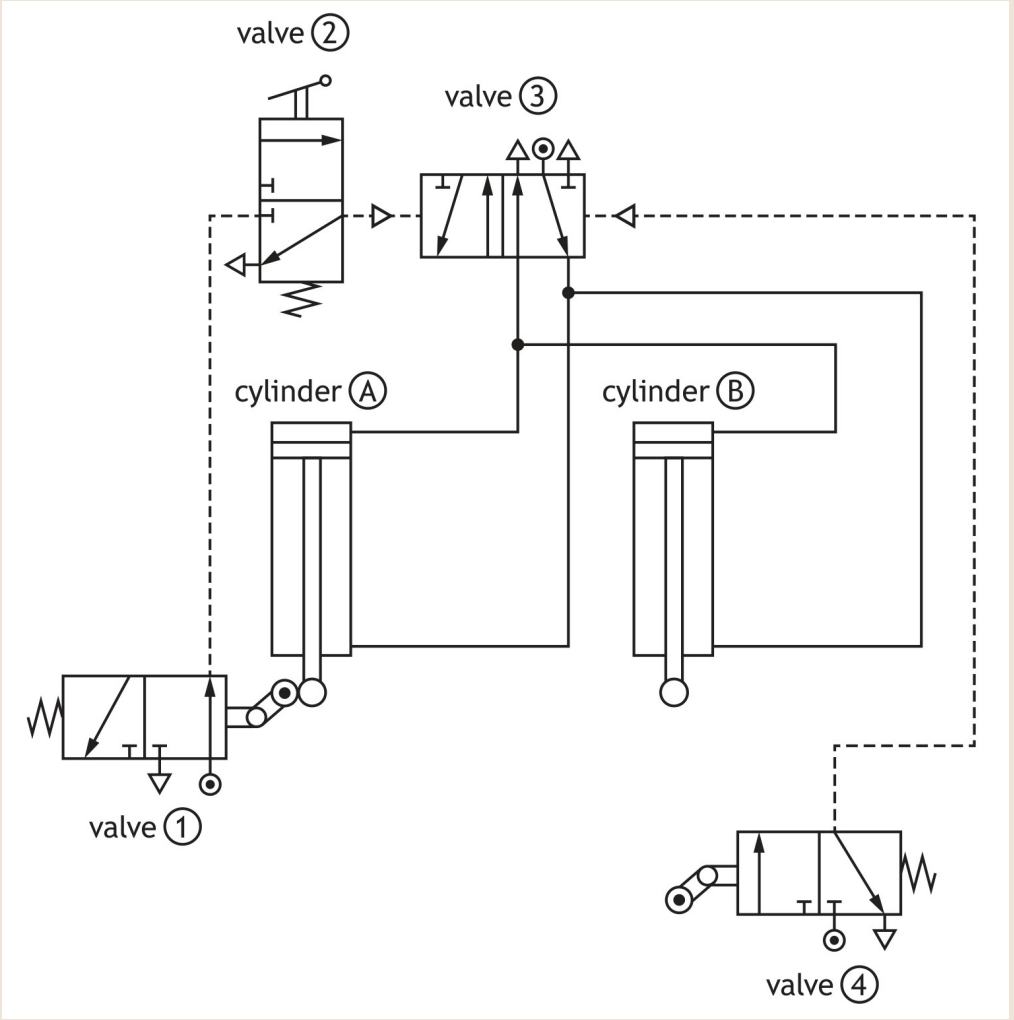
3 Air at **pilot 12**: the spool slides **back**. Air 1 to 2.

Exam Question: 2025 Q8(a) (1 mark)

State the type of control created by the piping of valves 1 and 2.

Hint

follow the pipe out of valve 1

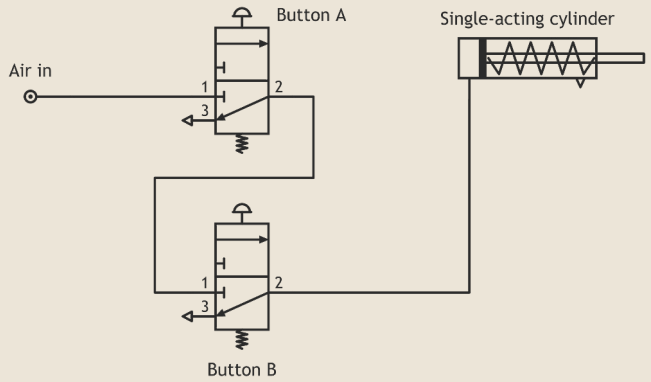


Review Questions

Booklet page 17

Answer Questions 1 to 5 on your own.

Finished? Try the Challenge.



Answers: Review Questions



Question	Answer
1	
2	
3	
4	
5	
Challenge	

Look back — by the end of this lesson…



1. I can **build** and **test** an **AND** circuit
2. I can **explain** where the air stops in AND
3. I can **choose** OR or AND for a job

Credits

Real part drawings: Sources: kit drawings by R Stewart, from the Matrix CP2080 kit.

Kit layout: Sources: AND circuit, kit layout and air-path drawings by R Stewart, from the Matrix CP2080 kit.

OR and AND circuits: Sources: AND circuit, kit layout and air-path drawings by R Stewart, from the Matrix CP2080 kit.

AND circuit: Sources: AND circuit, kit layout and air-path drawings by R Stewart, from the Matrix CP2080 kit.

Exam Question: 2025 Q8(a): © Qualifications Scotland (SQA). N5 Engineering Science 2025, Question 8(a): the circuit and the marking instructions.

R Stewart - October 2026