Daily Review

1. **State** the formula for pressure.

   P = F/A

2. **Find** F: P = 0.2 N mm^{-2}, A = 300 mm^2.

   60 N

3. **State** check 1 when fault-finding.

   Regulator at 0

4. **Name** the rod moving out.

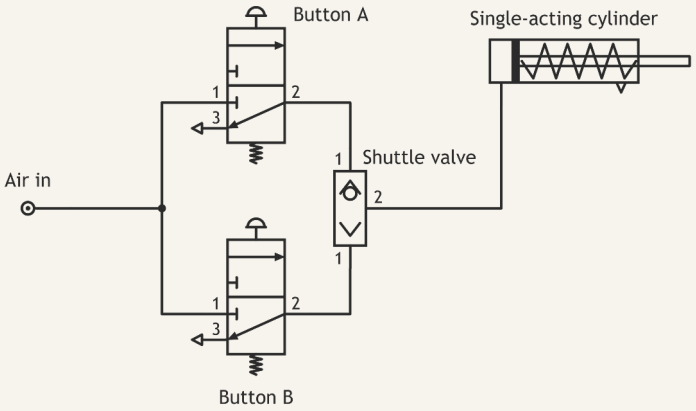
   The outstroke

5. Two switches in parallel: **state** when the lamp is on.

   When either is closed

OR Control

Two buttons. Either one works the cylinder.



S3 Engineering Science

By the end of this lesson...



1. I can **build** and **test** an **OR** circuit
2. I can **explain** how a **shuttle valve** works
3. I can **name** the **tee piece** and the **junction dot**

Meet the Parts: the Shuttle Valve

Shuttle valve

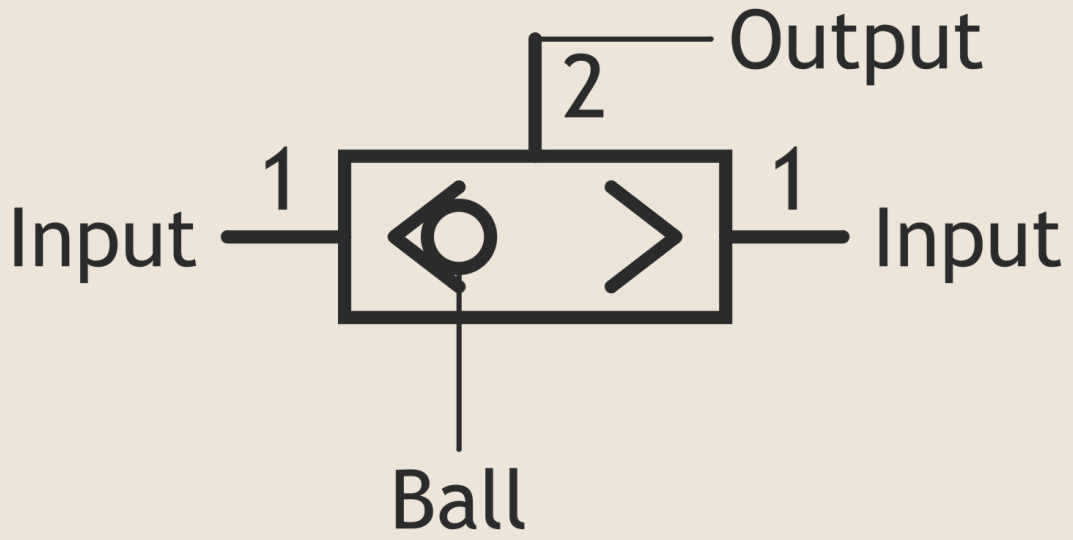
two inputs, **one** output

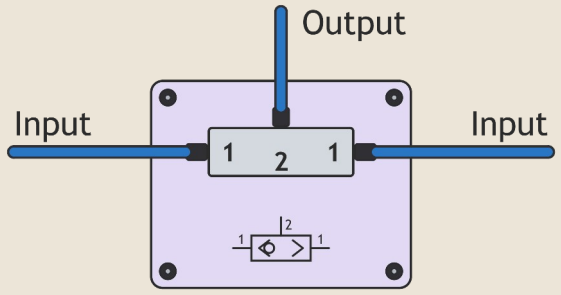
Inputs

both numbered **1**

Output

port **2**





The real shuttle valve.

Meet the Parts: the T-Connector

T-connector

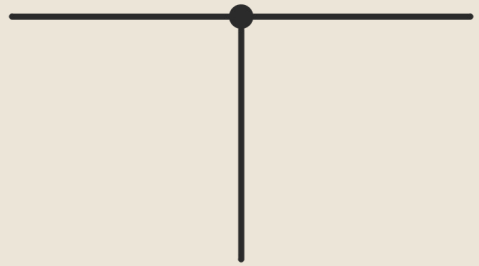
joins **three** pipes

Symbol

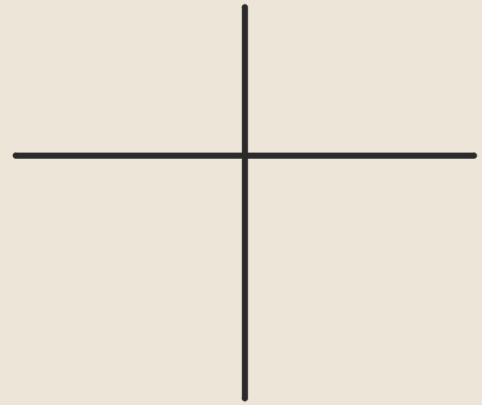
a **dot** where pipes join

No dot

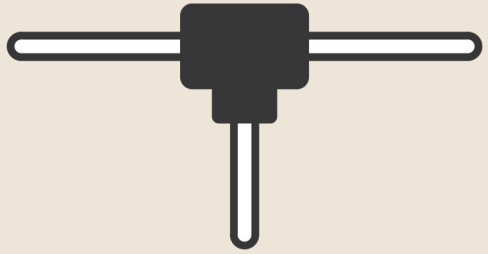
they **cross**: not joined



Dot: joined (a tee piece)



No dot: they cross



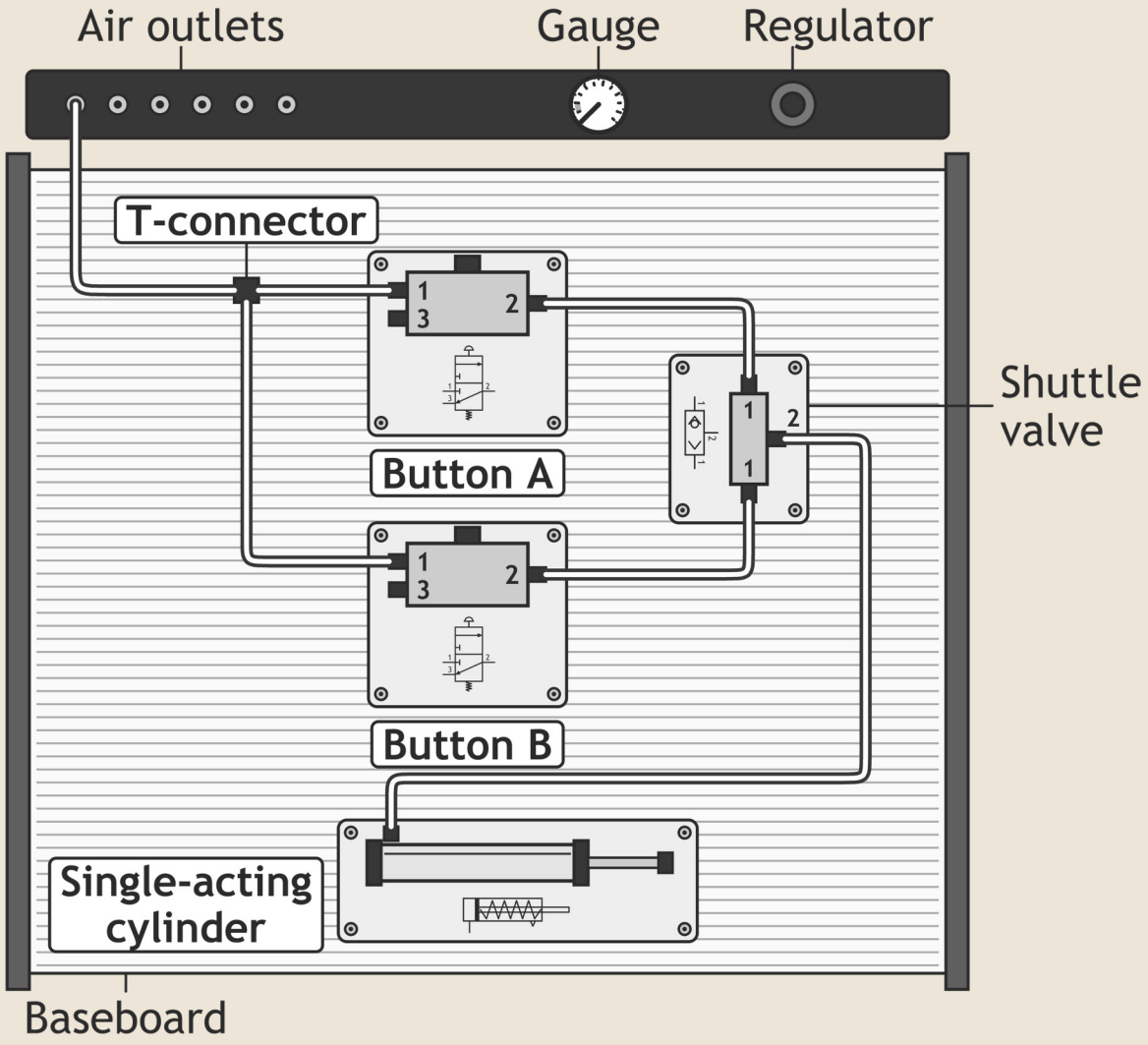
The real T-connector.

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?

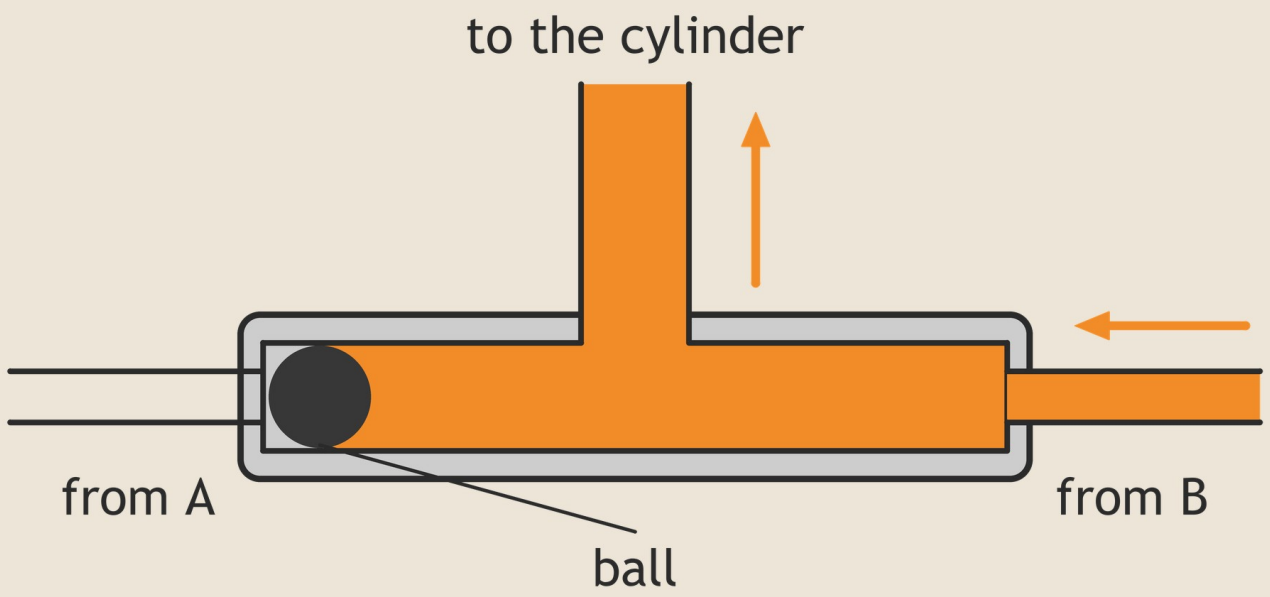


1	**State** what the rod did when you pressed A only.	Out
2	**State** what the rod did when you pressed B only.	Out
3	**State** what the rod did with both pressed.	Out
4	**State** what the rod did with neither pressed.	In

Second Start

1	**Name** the valve with two inputs and one output.	Shuttle valve
2	**Name** the part that joins three pipes.	T-connector
3	**State** what a dot on a diagram shows.	Pipes joined
4	**State** which button works the OR circuit.	Either one
5	**State** the pressure we test at.	1 to 2 bar

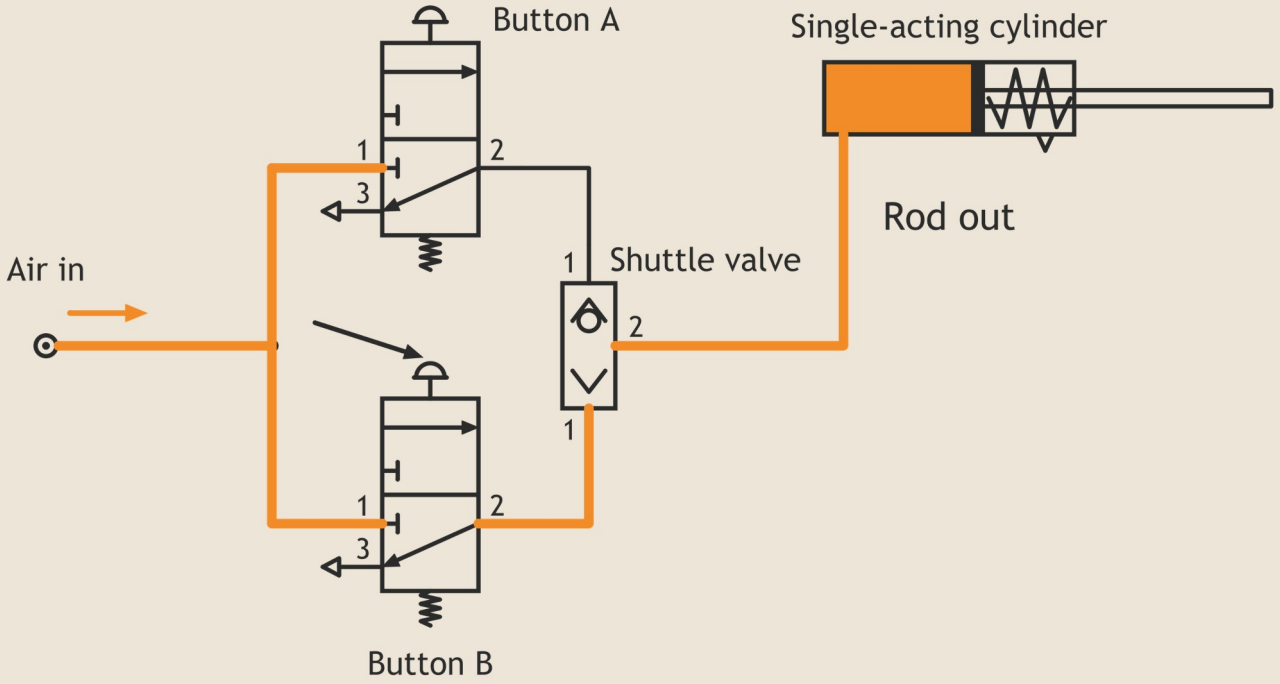
Why: How the Shuttle Valve Works



1 Air from A pushes the ball **right**. It **blocks** B's side: air goes to the cylinder.

2 Air from B pushes the ball **left**. Air still goes to the cylinder.

Why: Follow the Air



1 Press A: air goes through A and the **shuttle**. The rod goes **out**.

2 Press B: air goes through B and the shuttle. The rod goes **out**.

Why: OR Control

OR

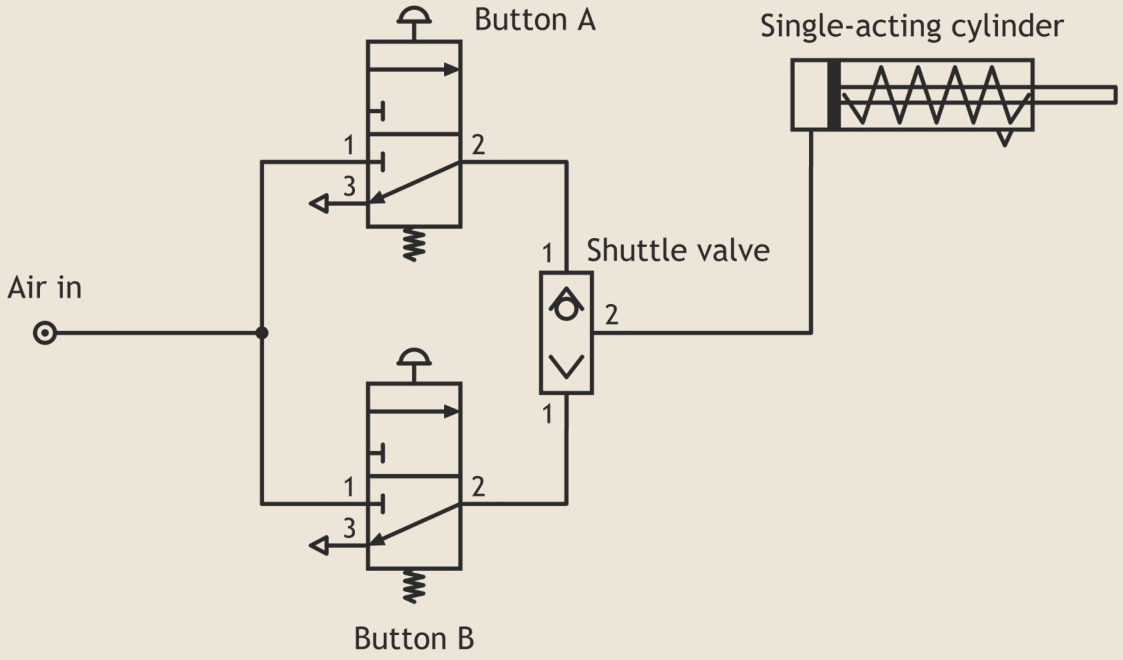
valve A **OR** valve B works it

Pipes

side by side, into a **shuttle** valve

Where

a door: inside OR outside button

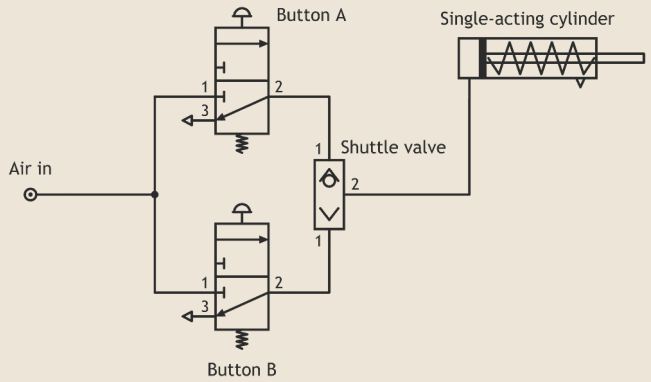


Review Questions

Booklet page 15

Answer Questions 1 to 5 on your own.

Finished? Try the Challenge.



Answers: Review Questions

Question	Answer
1	shuttle
2	out; out; in
3	or
4	T-connector; joined
5	air; exhaust
Challenge	A: air through A and shuttle, rod out (1). Let go: in (1)

Look back — by the end of this lesson…



1. I can **build** and **test** an **OR** circuit
2. I can **explain** how a **shuttle valve** works
3. I can **name** the **tee piece** and the **junction dot**

Credits

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

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

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

R Stewart - October 2026