DIESEL MECHANIC

MINING QUALIFICATIONS AUTHORITY

CODE: PN - 5

CONSTRUCT A CIRCUIT CONTROLLED FROM TWO DIFFERENT POINTS

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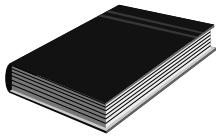
TRG 9

INDEX

The following elements are contained in this learning guide:



SOURCE REFERENCES

Demonstration by a competent person, e.g. a Training Officer.

FESTO – Pneumatics Basic Level Textbook

OBJECTIVE

You will be learning towards the outcome “Construct a circuit controlled from two different points”. Whilst learning towards the outcome you will be required to achieve the following:

- Know the function of a shuttle valve.
- Know the function of a dual pressure valve.
- Know how to construct a circuit controlled from two different points.

On completion of this module, the learner must be able to:

- State the function of a shuttle valve.
- State the function of a dual pressure valve.
- Construct a circuit controlled from two different points.

During this process you must adhere to certain specified requirements as listed in the Module.

ASSESSMENT AND EVALUATION CRITERIA

You will be assessed, when you are confident that you may achieve the outcomes as listed, to determine your competence as measured against the required criteria. This assessment will be in line with accepted best practices regarding assessment.

- Theoretical and practical assessments will be set during the module and must be completed without using reference.
- The learner will be required to answer all the questions without any reference.

HAZARD IDENTIFICATION AND CONTROL (HIAC) FORM

PN - 5

CONSTRUCT A CIRCUIT CONTROLLED FROM TWO DIFFERENT POINTS.

STEPS IN OPERATION / PROCESS	POTENTIAL ACCIDENT / INCIDENT	CONTROLS (BY RESPONSIBLE PERSON)
1. Construct a pneumatic circuit.	• Improper or careless handling of pneumatic components and pipes can lead to damage of equipment.	• Always handle components and pipes correctly, and with great care. • Wipe components and panel clean after use and store components.
2. Use of compressed air in a pressurised circuit.	• Circuit under pressure.	• Ensure circuit is depressurised before removing components or pipes
3. Insure work area is safe.	• Dirt particles in eyes and laceration of skin.	• Wear correct PPE.

NOTE: Before doing the practical work contained in this module, the learner must study the content of the above HIAC form again and then sign the statement below.

The above risks, which will be encountered in this module, are fully understood and will be controlled during the practical work.

Signature of learner: _____

Signature of Training Officer: _____

Date: _____

1. INTRODUCTION

ITEM / TASK: Introduction.

DESCRIPTION:

The shuttle valve requires at least one signal input (OR function) to produce an output and the dual pressure valve requires two signals (AND function) to produce an output. These are processing elements whereby two signals are processed internally and the resulting signal is output at port 2.

2. SHUTTLE VALVE (OR FUNCTION)

ITEM / TASK: Components of a shuttle valve.

DESCRIPTION:

A. The shuttle valve consist of the following components: (Fig 1)
   a. Housing
   b. Valve seat

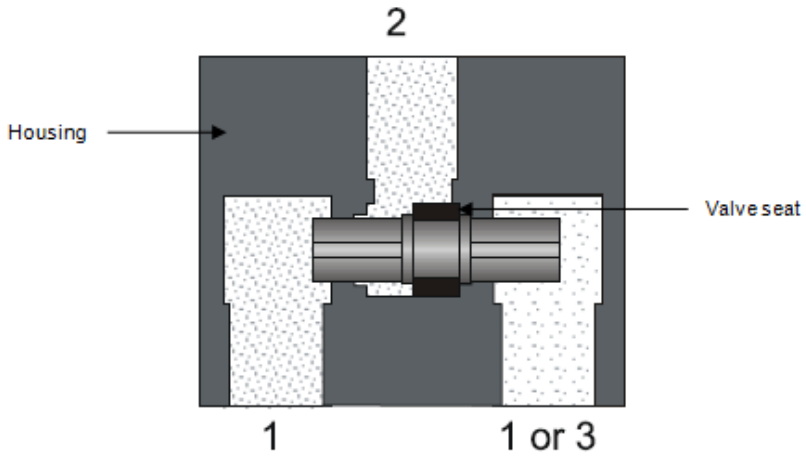


FIG 1.

B. The symbol for a shuttle valve is shown in Fig 2.

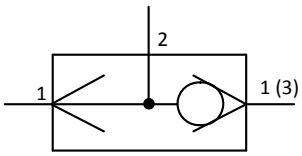


FIG 2.

ITEM / TASK: Function of a shuttle valve.

DESCRIPTION:

A. A shuttle valve permits the combination of two input signals into an OR function.
B. The OR gate has two inputs and one output. An output signal is generated, if pressure is applied at one of the two inputs.

ITEM / TASK: Operation of a shuttle valve.

DESCRIPTION:

A. The shuttle valve has the characteristic of an OR function, whereby at least either of two inputs 1 or 1(3) are required to generate an output at port 2 of the valve.
B. If compressed air is applied to port 1, the valve seat seals the opposing port 1(3) and the air flows from port 1 to port 2. If port 1 is closed, air passes from port 1(3) to port 2.
C. When the air flow is reversed, i.e. a cylinder or valve is exhausted, the seat remains in its previously assumed position because of the pressure conditions.

DO THE SELF TEST AND PRACTICE ON THE NEXT PAGES BEFORE CONTINUING WITH THE REST OF THE MODULE.

SELF TEST 1

1. What is the function of a shuttle valve?

Refer to your notes to check your answers.

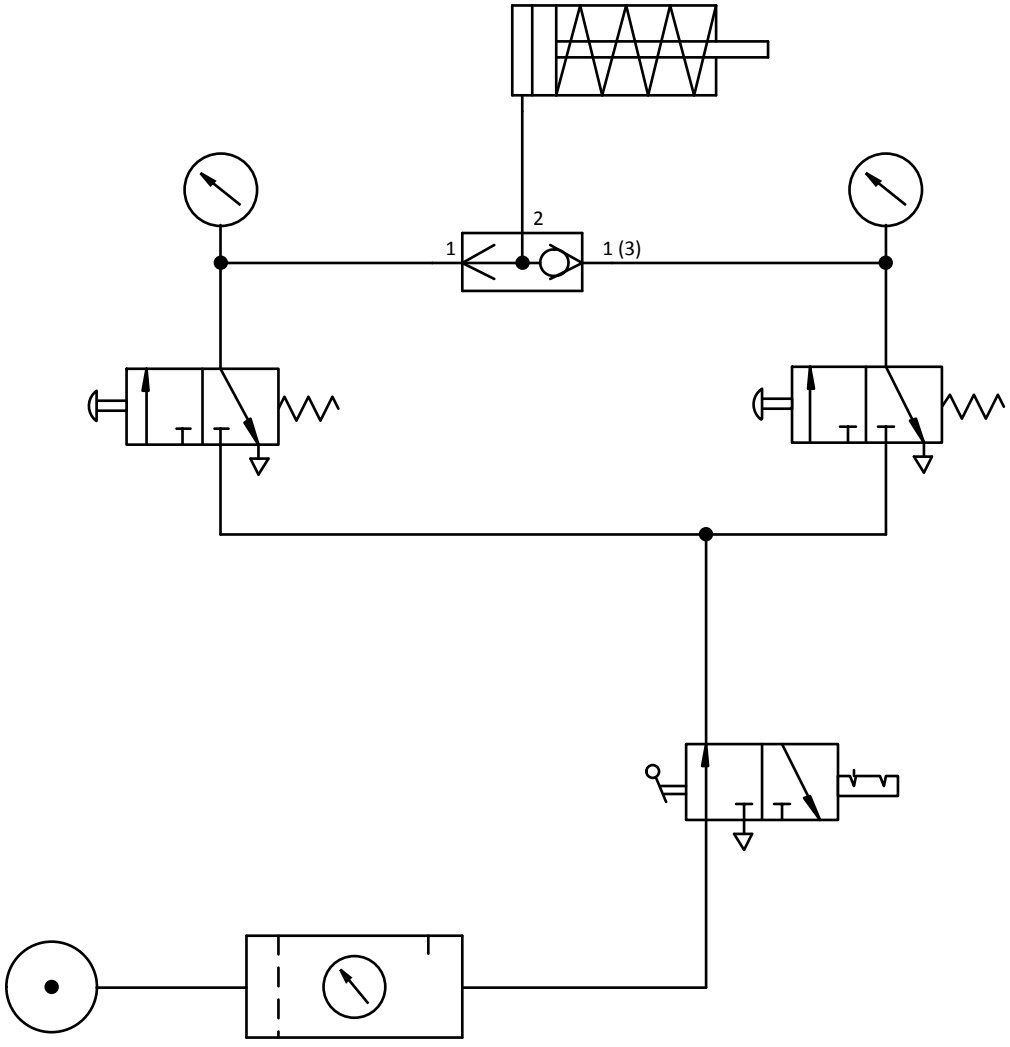
Ask your Training Officer to check your work and if it is correct, to sign below.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

PRACTICE

1. Practice drawing the symbol for a shuttle valve.

2. Identify the shuttle valve from the training panel / equipment.
3. Construct the circuit below on the training panel. Check the function of the circuit by alternately operating the two directional control valves.



4. What happen if both the directional control valves are operated at the same time?

5. Indicate the flow of air for each position of the directional control valves on the above schematic drawing.

Ask your Training Officer to check your work and if it is correct, to sign below.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

3. DUAL PRESSURE VALVE (AND FUNCTION)

ITEM / TASK: Components of a dual pressure valve. (2-pressure valve)

A. The dual pressure valve consist of the following components: (Fig 3)
   a. Housing
   b. Double piston with seals

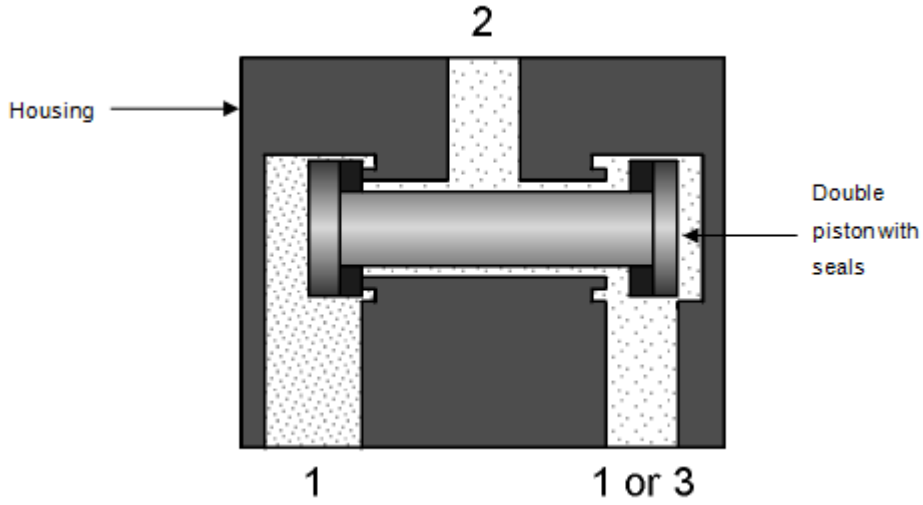


FIG 3.

B. The symbol for a dual pressure valve is shown in Fig 4.

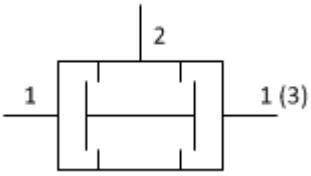


FIG 4.

ITEM / TASK: Function and operation of a dual pressure valve.

A. The dual pressure valve has two inlets, port 1, port 1(3) and one outlet, port 2. Compressed air flows through the valve only if signals are applied to both ports 1 and 1(3). One input signal at port 1 or port 1(3), blocks the flow due to the differential forces at the piston slide. If signals are applied to both port 1 and port 1(3), the signal which is last applied passes to the outlet. If the input signals are of different pressures, the larger of the two pressures closes the valve and the smaller air pressure is transferred to the outlet port 2. The dual pressure valve is used mainly for interlocking controls, safety controls, check functions and logic AND operations. (Fig 5)

B. The dual pressure valve requires two signals (AND function) to produce an output. These are processing elements whereby two signals are processed internally and the resulting signal is output at port 2. (Fig 5)

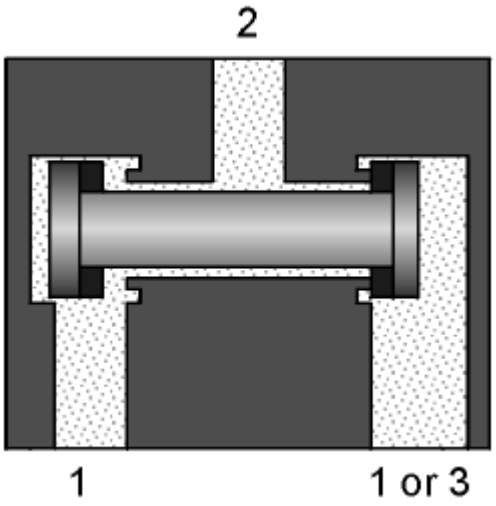


FIG 15.

DO THE SELF TEST AND PRACTICE ON THE NEXT PAGES BEFORE ATTEMPTING THE ASSESSMENT.

SELF TEST 2

1. What is the function of a dual pressure valve?

Refer to your notes to check your answers.

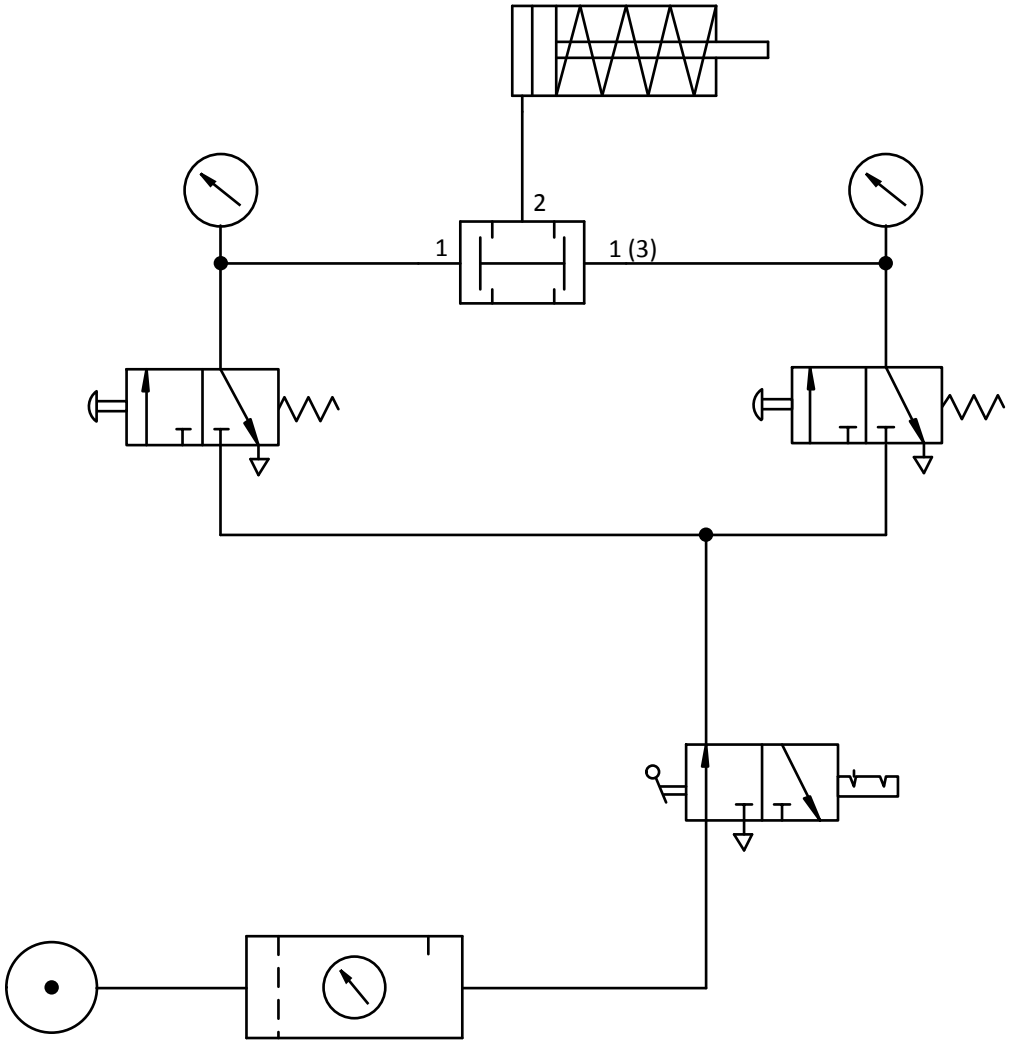
Ask your Training Officer to check your work and if it is correct, to sign below.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

PRACTICE

1. Practice drawing the symbol for a dual pressure valve.

2. Identify the dual pressure valve from the training panel / equipment.
3. Construct the circuit below on the training panel. Check the function of the circuit by operating the two directional control valves at the same time.



4. What happen if only one of the directional control valves is operated?

5. Indicate the flow of air for each position of the directional control valves on the above schematic drawing.

Ask your Training Officer to check your work and if it is correct, to sign below.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

REMEMBER ALWAYS WORK SAFE

Once you have passed the entirepractices, you are now at liberty to requesta Formative Assessment from your Assessor.