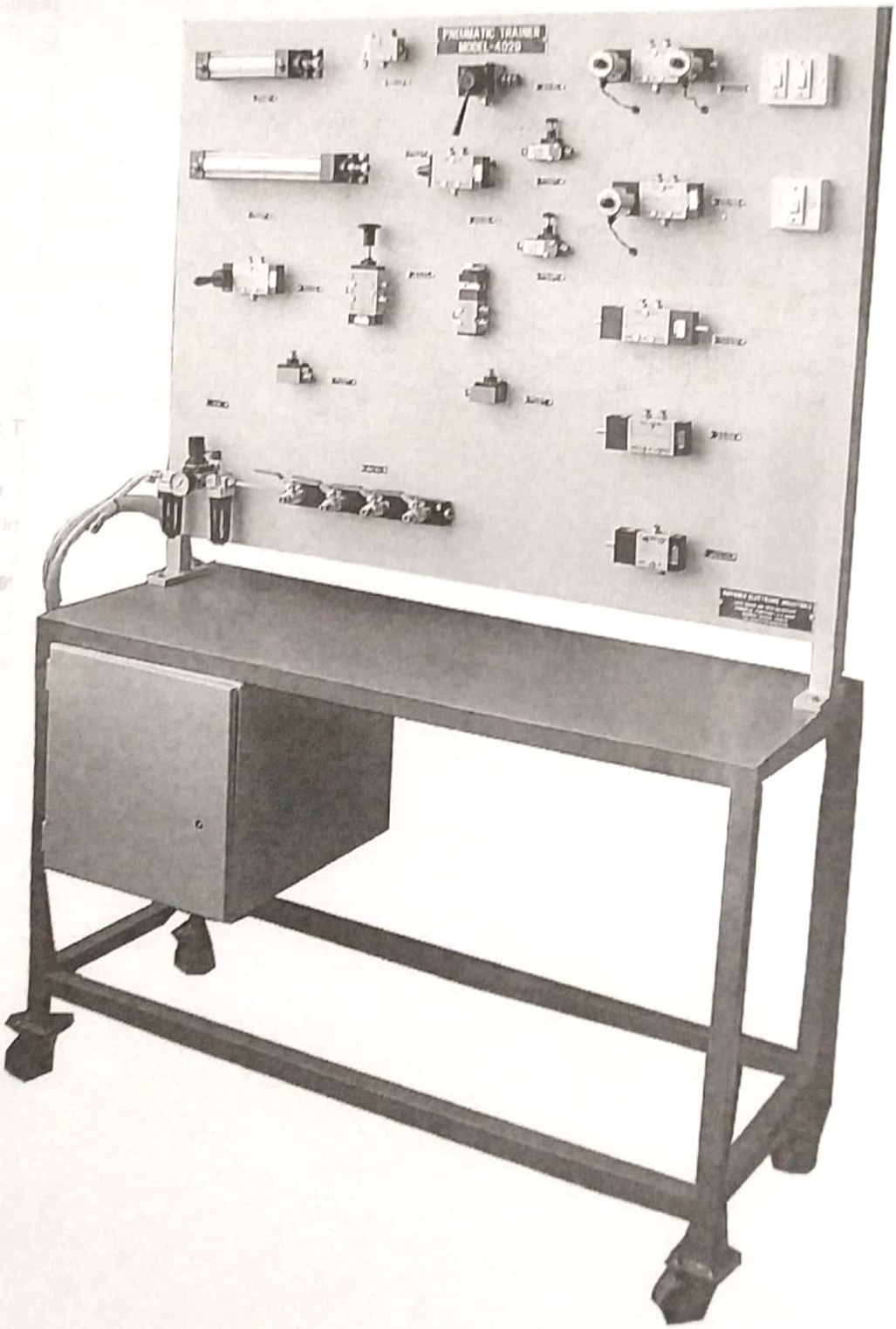
LAB MANUAL

PNEUMATICS & HYDRAULICS & AUTOMATION LAB

BRANCH-

MECHATRONICS Engg.



Pneumatic Trainer K
230V, Model Name/Number: 402

₹1.20 Lakh

Sold By - Advance Electronic Ind
Mumbai, Maharashtra

4.4/5 ★★★★★ (32 Review)

TrustSEAL Verified

Automation Grade: Manual
Capacity: 10
Usage/Application: Laboratory

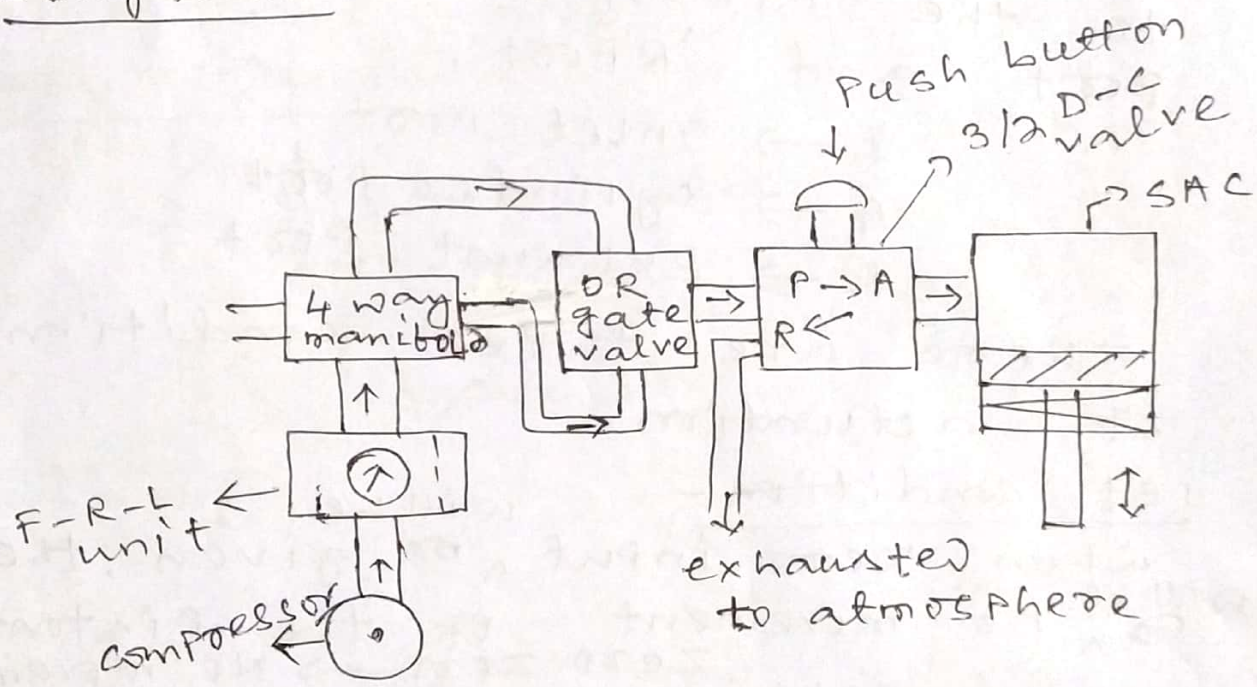
Experiment

Aim of the expt - The actuation of SAC by the help of 3/2 D-C valve and OR gate valve.

App. required -

1) SAC
2) 3/2 D-C valve
3) OR gate valve
4) F-R-L unit
5) Compressor.

Diagram -



Procedure -

- From the compressor the air will enter into the F-R-L unit for filteration, regulation and Lubrication.
- There will be two connections from 4-way manifold to the OR gate valve.
- When the push button will be

(02) Pushed, the compressed air will enter into the LHS of SAC. through 'P' port and 'A' port and through OR gate valve from the 4-way manifold. The piston with the piston rod will move to forward. When the piston will reach at the extreme position of the SAC, the push button will be pushed again. The piston with the piston rod will move to backward. The air which is present at the LHS of SAC will be exhausted to the atmosphere through 'A' port and 'R' port.

P → Inlet port
A → cylinder port
R → Exhaust port

There are three conditions of actuation.

1st condition -

When zero input will be given, there will be no movement of the piston rod.
zero zero → No movement

2nd condition -

When one input will be given, there will be movement of the piston rod. 0 1 → movement
1 0 → movement

3rd condition -

When two inputs will be given there will be movement of the piston rod. 1 1 → movement

(0,3)

Observation - from the above expt. We observed that the actuation of SAC under various conditions.

Conclusion - from the above expt. we concluded that actuation of SAC is possible under various conditions by using OR gate valve and 3/2 D-C valve.

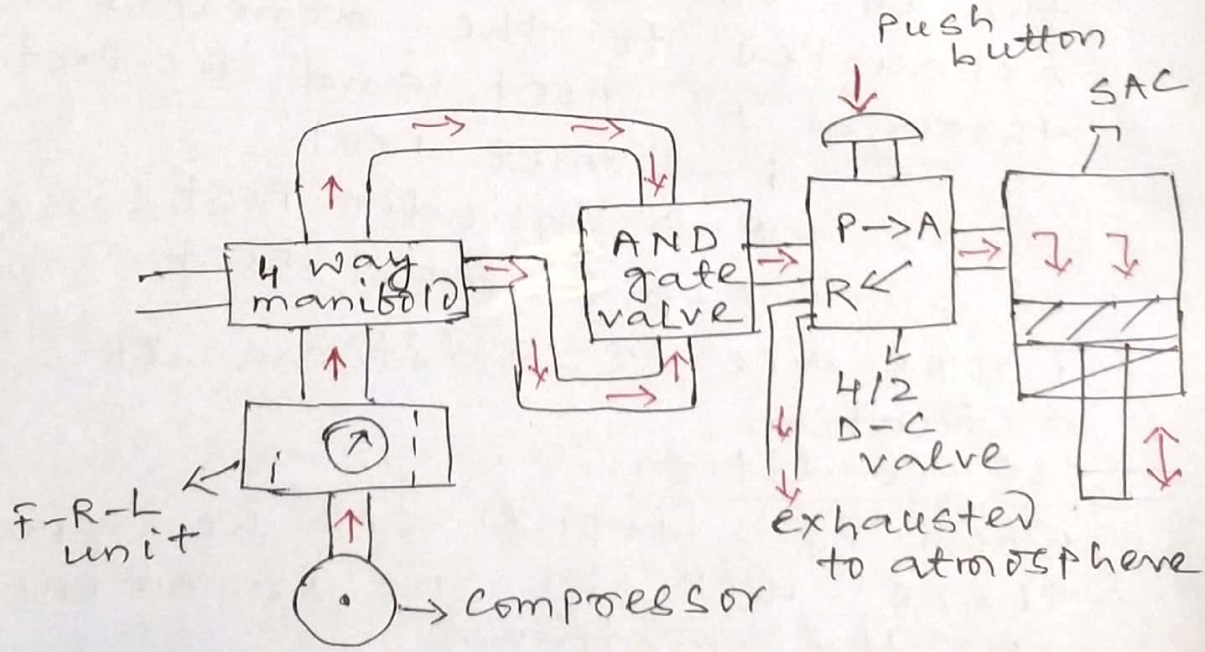
EXPERIMENT

Aim of the expt - The actuation of SAC by the help of 3/2 D-C valve and AND gate valve.

App. required -

1) SAC
2) 3/2 D-C valve
3) AND gate valve
4) F-R-L unit
5) compressor.

Diagram -



(04)

Procedure -

- From the compressor, the air will enter into the F-R-L unit for filtration, regulation and lubrication.
- There will be two connections from 4-way manifold to the AND gate valve.
- When the push button will be pushed, the compressed air will enter into the LHS of SAC through 'P' port and 'A' port and through AND gate valve from the 4-way manifold.
- The piston with the piston rod will move to forward.
- When the piston will reach at the extreme position of the SAC, the push button will be pushed again.
- The piston with the piston rod will move to backward.
- The air which is present at the LHS of SAC will be exhausted to the atmosphere through 'A' port and 'R' port.

P → Inlet port
A → Cylinder port
R → Exhaust port

There are 3 conditions of actuation.

1st condition -

When zero input will be given there will be no movement of the piston rod.

Zero zero → No movement.

2nd condition -

When one input will be given, there will be no movement of the piston rod.

0 1 → No movement

1 0 → No movement

3rd condition -

When two inputs will be given there will be movement of the piston rod.

one one → movement.
(1) (1)

Observation - From the above expt. We observed that the actuation of SAC under various conditions.

Conclusion - From the above expt. we concluded that actuation of SAC is possible under various conditions by using AND gate valve and 3/2 D-C valve.

EXPERIMENT

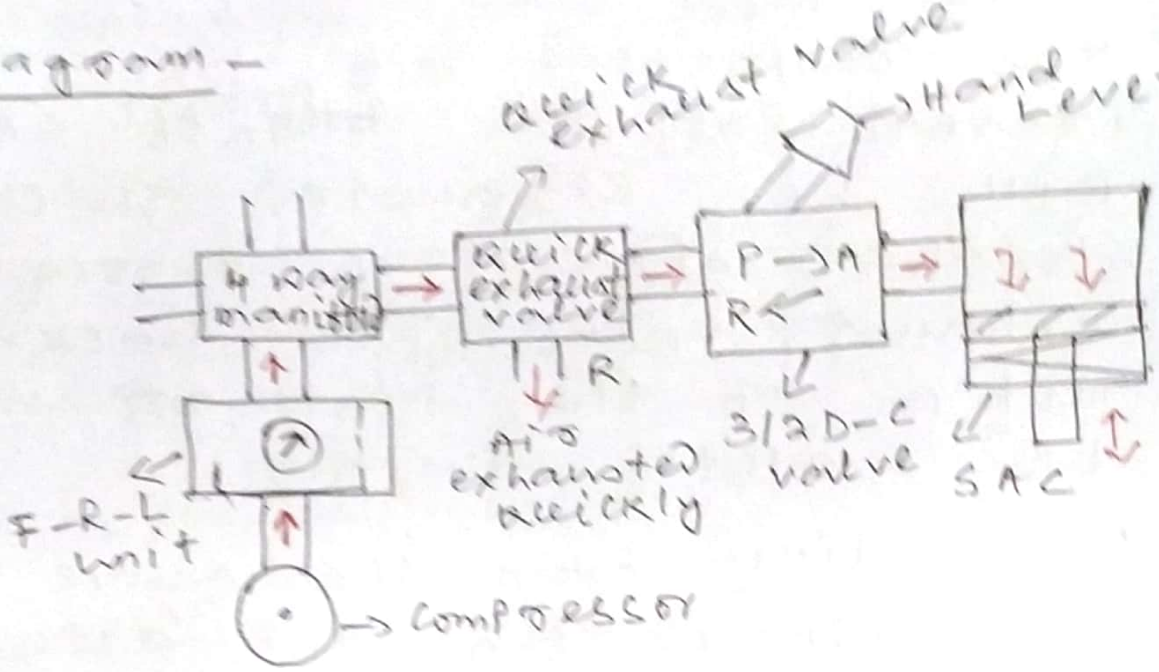
Aim of the expt. - Actuation of SAC by the help of 3/2 handlever operated D-C valve and quick exhaust valve.

Apparatus required -

1) SAC
2) compressor
3) F-R-L unit
4) 4-way manifold
5) Quick exhaust valve
6) 3/2 D-C valve

06

Diagram -



Procedure -

- From the compressor the air will enter into the F-R-L unit for filtration, regulation and Lubrication.
- When the handlever will be operated 'P' Port will connect with 'A' Port.
- The compressed air will enter into the quick exhaust valve through 4 way manifold.
- When the hand lever will be operated, the compressed air will enter into the top part of SAC through 'P' Port and 'A' Port from the quick exhaust valve.
- The piston with the piston rod will move to forward.
- When the piston will reach at the end position of the SAC, the hand lever will be operated again
- The piston with the piston rod

(07)

will more to backward. The compressed air which is present at the top part of SAC will be exhausted quickly to the atmosphere through exhaust valve. The backward motion of the piston rod will be completed quickly.

Observation- From the above expt. we observed that the actuation of SAC by the help of quick exhaust valve.

Conclusion- From the above expt. we concluded that during backward movement of the piston rod, the air will be exhausted quickly to the atmosphere through the quick exhaust valve.

EXPERIMENT

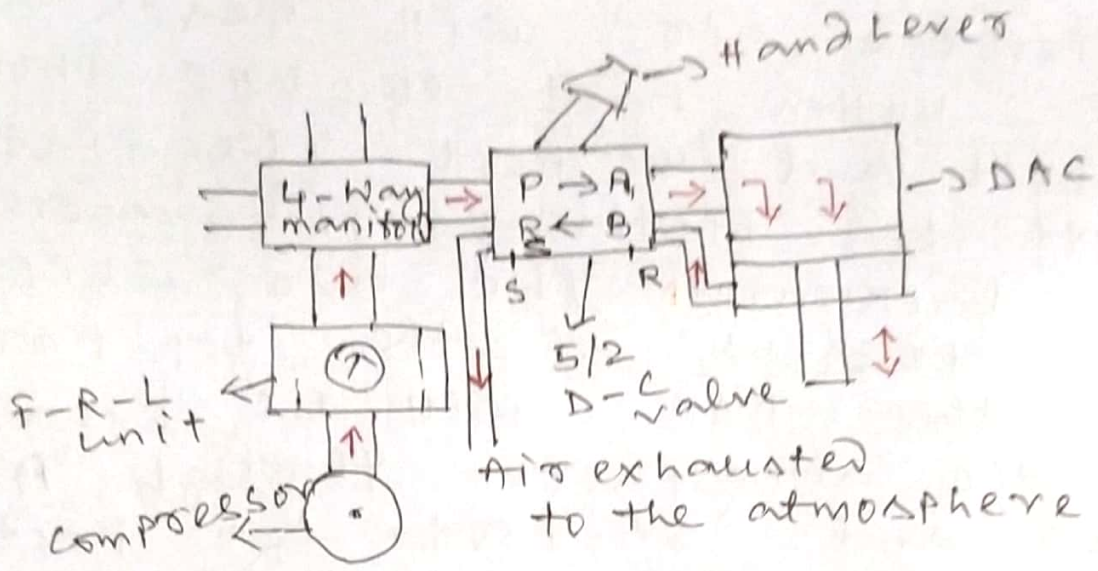
Aim of the expt. - Actuation of DAC by the help of 5/2 hand operated D-C valve.

Apparatus required -

1) Compressor.
2) F-R-L unit
3) 4-way manifold
4) 5/2 hand operated D-C valve
5) DAC.

(0.8)

· Diagram -



Description -

P → Inlet Port
A, B → Cylinder Ports
S, R → Exhaust Ports

From the compressor the compressed air will enter into the F-R-L unit for the filtration, regulation and lubrication. From the F-R-L unit the compressed air will enter into the 4-way manifold. When the hand lever will be operated, the compressed air will enter into the top part of the DAC through 'P' port and 'A' port. The piston with the piston rod will move to forward. The air which is present at the bottom part of DAC will be exhausted to the atmosphere through 'B' port and 'R' port. 'S' port will remain silent. When the piston will reach at the

09

end position of DAC, the hand Lever will be operated again. The compressed air will reach at the bottom part of DAC through 'P' port and 'B' port. The piston with the piston rod will move to backward. The air which is present at the top part of the DAC will be exhausted to the atmosphere through 'A' port and 'S' port. 'R' port will remain silent.

Observation - From the above expt. We observed that the actuation of DAC by the help of 5/2 hand operated D-c valve.

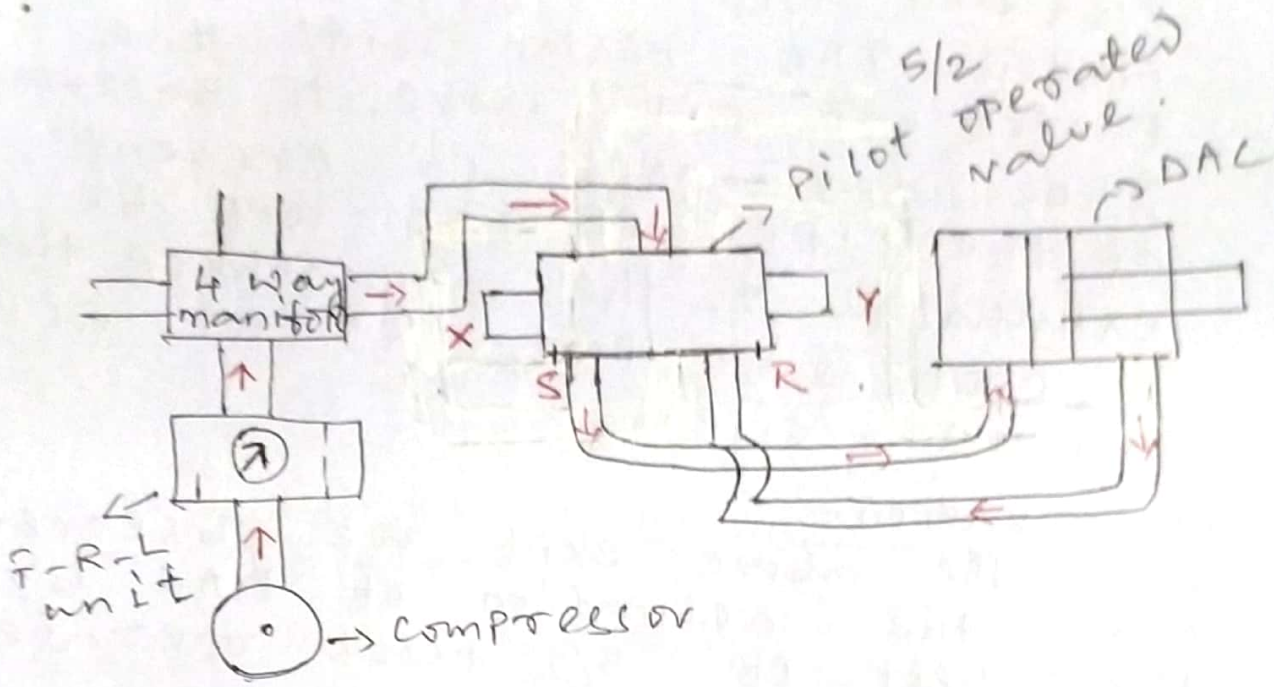
Conclusion - From the above expt. we concluded that the actuation can be done by the help of 5/2 hand operated D-c valve

EXPERIMENT

Aim of the expt - Actuation of DAC by the help of 5/2 Pilot operated D-c valve.

Apparatus required -

1) Compressor
2) F-R-L unit
3) 4-way manifold.
4) 5/2 Pilot operated D-c valve.
5) DAC



Procedure -

From the compressor the compressed air will enter into the F-R-L unit for the filtration, regulation and Lubrication. From the F-R-L unit the air will enter into the 4-way manifold.

X - Pilot port

Y → pilot port

When X pilot port is pushed, P will connect with A port. The compressed air will enter into the LHS of DAC and will apply force on the piston. The piston with the piston rod will move to forward. The air which is present at the RHS of DAC will be exhausted to the atmosphere through B port and 'R' port. 'S' port will remain silent. When the piston will reach at the end position of DAC, Y pilot port will be pushed. The compressed air will enter into the RHS of

(11) of DAC through 'P' port and 'B' port and will apply force on the piston. The piston with the piston rod will move to backward. The air which is present at the LHS of DAC will be exhausted to the atmosphere through 'A' port i.e. 'S' port. 'R' port will remain silent.

Observation - From the above expt. we observed that the actuation of DAC by the help of 5/2 pilot operated D-c valve.

Conclusion - From the above expt. we concluded that the actuation of DAC is possible by the help of 5/2 pilot.

EXPERIMENT

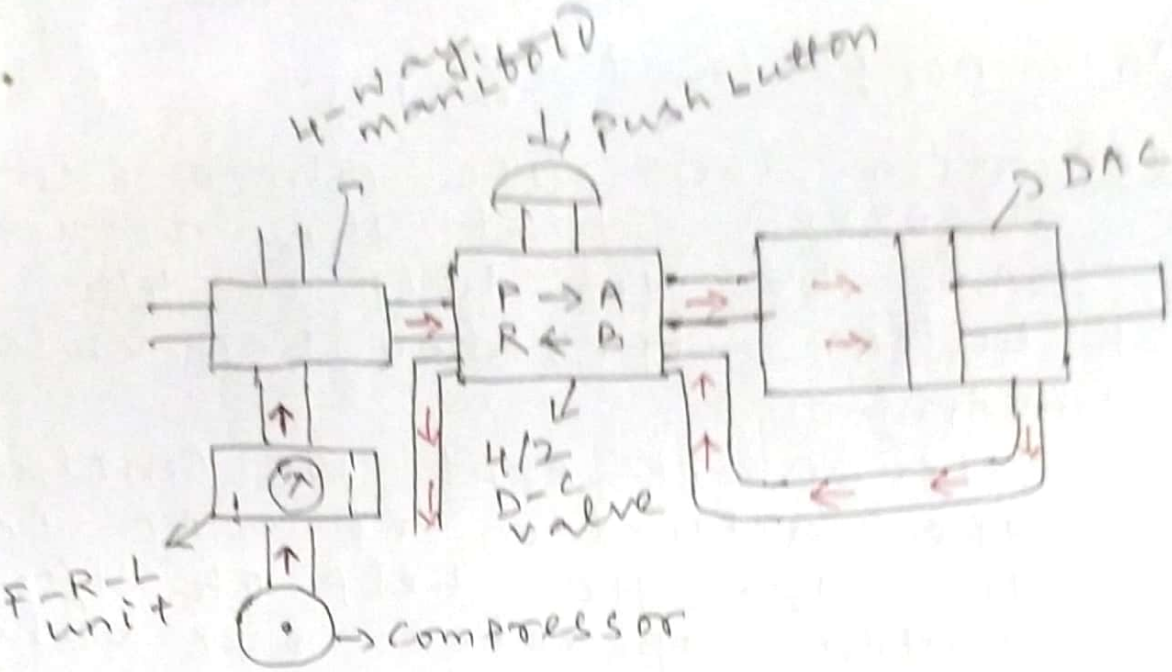
Aim of the expt. - Actuation of DAC by the help of 4/2 push button operated D-c valve.

Apparatus required -

1) DAC
2) 4/2 D-c valve
3) compressor
4) 4-way manifold
5) F-R-L unit.

Procedure - The compressed air will enter into the F-R-L unit for the filtration, regulation and Lubrication. After completing filteration, regulation and Lubri-

(12).



cation, the compressed air will enter into the 4-way manifold. When the push button will be pushed the air will enter into the LHS of the DAC through 'P' port and 'A' port. The piston with the piston rod will move to forward. The air which is present at the RHS of DAC will be exhausted to the atmosphere through 'B' port and 'R' port. When the piston will reach at the extreme position of the DAC, the push button will be pushed again. The air will enter into the RHS of DAC through the 'P' port and 'B' port and will apply force on the piston. The piston with the piston rod will move to backward. The air which is present at the LHS of DAC will be exhausted to the atmosphere through the

(13) 'A' port and 'R' port.

Observation - From the above expt. we observed that the actuation of DAC by the help of 4/2 push button operated D-C valve.

Conclusion -

From the above expt. we concluded that the actuation of DAC is possible by the help of 4/2 push button operated D-C valve.

Enkay Enterprises Hydraulic Trainer K

₹3.45 Lakh

Sold By - Enkay Enterprises , Ne

3.3/5 ★★★★★ (9 Review)

Verified Supplier

Brand: Enkay Enterprises
Material: SS
Capacity: 20 Litre

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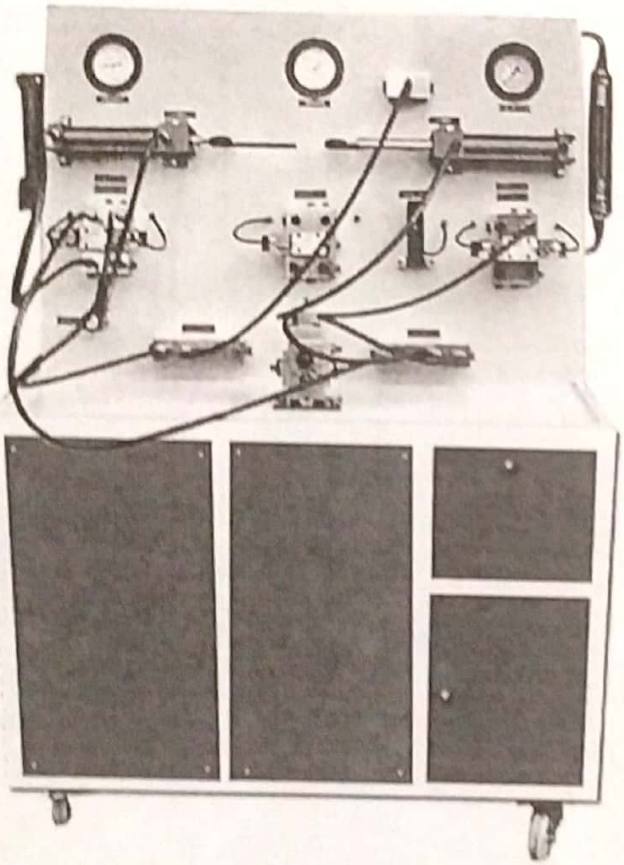

AIM OF THE EXPERIMENT :-

To detail study about the various elements of hydraulic circuit trainer.

Equipment required :-

Hydraulic circuit trainer
Hydraulic oil pump
Hydraulic oil tank

Description :-

1. Single acting cylinder (SAC) :
The oil pressure which is supplied at one end of the cylinder is known as single acting cylinder (SAC).

2. Double acting cylinder (DAC) :
The oil pressure which is supplied at both the ends of the cylinder is known as double acting cylinder. (DAC).

3. Oil tank :
It contains hydraulic oil.

4. Hydraulic oil pump :
It's function is to lift oil from low level to the pump.

5. Contaminants from the oil :-
Pressure relief valve - It's main purpose is to limit the pressure in system.

6. DC Valve (Direction control valve) :
The direction control valve operated by a hand lever is known as hand operated DC valve.

7. Dial gauge :
The oil pressure can be observed on the dial gauge.

8. Limit switch :
These are used as electrical devices to deliver positional message.

9. Solenoid operated DC valve:
It is otherwise known as electrical actuated valve. The main function of the solenoid is to open and close the passanges by moving spool.

10. Hydraulic motor:
It's function is to give the rotational motion.

11. By pass valve: ~~It function is to give the~~ .
A by pass valve is essentially a basic pressure regulation The by pass fluid from an outlet of a pump back to the reservoier.

12. Flow control valve:
The regulator the flow or pressure of a fluid flow control valve controls the flow in one direction.

13. Pressure reducing valve: It controls the pressure of a fluid to a required valve.

14. Sequential valve: A sequential valve is directional valve allowing flow to occur. It is a pressure control valve that is used to force two actuators to be operated one after another.

Observation: From the above experiment we observed the function of the above hydraulic elements.

Conclusion:
From the above experiment, we concluded that we are well aquanted with operation of each hydraulic element.

AIM OF THE EXPERIMENT :-

Actuation of SAC by the help of a 3/2 hand operated DC valve.

Equipment required :-

1. SAC (single acting cylinder)
2. 3/2 hand operated DC valve
3. Hydraulic pump with motor
4. Hydraulic oil tank
5. Hydraulic hosses

Procedure :-

The oil will be lifted from the low level to high level by the help of the hydraulic oil pump. Before entering into the system the oil will be filtered by the help of oil filter. The aim of oil filtration is to remove contaminants and any other foreign materials present in the oil when the handlever will operate P will open to A the oil from the oil tank will enter into the L.H.S of the SAC. through 'P' port and 'A' port and will generate and extend force on the piston will reach at the extream end of the SAC. we have to operate hand lever again.

By the help of spring poach the piston with the piston rod will moved to backward the oil which is present at the L.H.S of SAC will return back to the oil tank through the 'A' port & 'P' port 'P' port - Intel port

'A' port - Cylinder port

'T' port - tank port.

3/2 3 means having 3 ports

2 means two positions

one is forward position another is backward positions.

Observation :-

From the above experiment we observed that the actuation of SAC by the help of 3/2 hand operated DC valve.

Conclusion :-

From the above experiment we concluded that the actuation of SAC is possible by the help of 3/2 hand operated DC valve.

AIM OF THE EXPERIMENT :-

Actuation of DAC by the help of 4/2 hand operated DC valve

Equipments Requared :-

1) DAC
2) 4/2 hand operated DC valve
3) Oil tank
4) Hydraulic pump
5) Hydraulic hoses

PROCEDURE :-

The oil will be lifted from the low level to high level by the help of hydraulic pump the oil will be filtered by the help of oil filter before going to the system. When the hand lever will be operated 'P' port will open to with 'A' port. The oil from the tank will enter into the L.H.S of DAC through 'P' port and 'A' port & will apply external force on the piston. The piston with the pistonod will move to forward. The oil which is present at the L.H.S of the DAC will return back to the oil tank through the 'B' and 'T' port. When the piston will reached the end position of DAC 'P' will connect with 'B'. The oil from oil tank will enter into R.H.S of DAC through 'P' port and 'B' port & will apply external force on the piston. The piston with the piston rod will move to backward. The oil which is present at the L.H.S of DAC will return back to the oil tank through the 'A' port and 'B' port.

'P' port - inset port

'A' 'B' port - cylinder port

'T' - tank port

4/2 means having four & two positions

two position - forward position

- Back position

OBSERVATION :-

From the above expt we observe that the activation of DAC by the help of 4/2 hand operated valve.

CONCLUSION :-

From the above expt we concluded that the activation of DAC is possible by the help of 4/2 DC valve.

Exp-4

AIM OF THE EXPERIMENT :-

Actuation of DAC by the help of solenoid DC valve.

Equipment required :-

1. Solenoid operated DC valve
2. DAC (Double acting cylinder)
3. Limit switch
4. Hydraulic switch
5. Hydraulic pump
6. Oil tank

Procedure :-

The oil will be lifted by the help of hydraulic pump the before going to the system oil will be filtered from dirt, dust particles & any other contaminants. When switch will be on the electric will be passed into solenoid. The solenoid will be energyed. The valves spool will be shifted from it's origional position. 'P' port will open to 'A' port. The oil will be entred to the L.H.S of DAC through 'P' port & 'A' port. The piston with the piston rod will move the forward. The oil which is present at the R.H.S of DAC will return back to the oil tank through 'B' port & 'T' port. When piston with piston rod will reach at the end position of DAC, The valve spool will return back to it's origional position 'P' port will open to 'B' port. The oil will entre into the R.H.S of DAC & will, apply force on the piston. The piston with the piston rod will move to background. The oil which is present at the L.H.S of DAC will return back to the oil tank through 'A' port & 'T' port. The movement at the piston rod will not be stoped. It will move to & flow contineously. There is a limit switch which is provide the give the positional message of the piston rod to us. Limit switch which is an electromaggnetic switch.

Observation :-

From the above experiment we observe that the actuation of DAC by the help of solenoid operated DC valve.

Conclusion :-

From the above experiment we concluded that the actuation of DAC is repeated manner is possible by the help of 4/2 solenoid operated DC valve.

AIM OF THE EXPERIMENT :-

Rotation of hydraulic motor by the help of 4/2 hand operated DC valve.

Equipment required :-

1. Hydraulic motor
2. 4/2 hand operated DC valve
3. Hydraulic forces
4. Oil tank
5. Hydraulic pump with motor
6. Oil tank

Procedure :-

The oil will be lifted by the help of hydraulic pump from the low level from the high level. Before going to the system the oil will be filtered from the dust, dirt & other out materials. When the handlever will be operated 'P' port will open with 'A' port. The oil from the tank will reach at the left of the hydraulic motor will apply force on the spool. Then the motor will rotated in clockwise direction. The oil which is present at the right hand end of the spool will return back to the oil tank through 'B' port & 'T' port. When the handlever is operated again, 'P' will open with 'B' port. & The oil will entred into the right hand end of the spool, through 'P' port & 'B' port. The hydraulic motor will rotated in anticlockwise direction. The oil which is present at the left hand end of the spool oil return back to the oil tank through 'A' port & 'P' port.

The pressure relief valve is fitted before the 4/2 DC valve. The function of pressure relief valve is that it will negative the consultant pressure of the hydraulic system. If at any condition more quantity of oil will entred into the pressure relief valve.

It will allowed amount of oil the system & it will allowed amount of oil to return back to the oil tank.

Observation :-

From the above experiment we observe that the actuation of hydraulic motor by the help of 4/2 hand operated DC valve

Conclusion :-

From the above experiment we concluded that the rotation of hydraulic motor in clockwise direction & also in anticlockwise direction is possible by the help of hand operated DC valve.