

## R-454



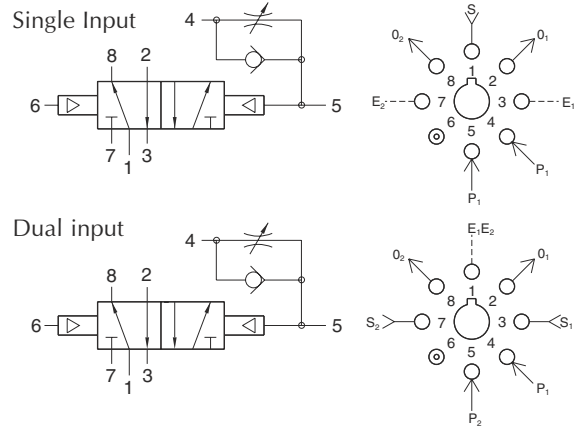
Four way delay valve

**Features:**

- Micro gap construction - snap action and no blow by
- Screwdriver slot needle adjustment deters tampering
- Balanced design allows speed control at exhausts

**Performance:**

Flow (SCFM @ 100 psi).....	9
Pilot pressure (psi) minimum.....	40
Temperature.....	32 to 180° F
Working pressure.....	0 to 150
Response time (milliseconds).....	10



**Description:**

R-454 is a 4-way, double pilot, fully ported 5 port valve with an adjustable flow control valve interconnected to one pilot. A pilot signal input in port 4 will be delayed in before actuating the valve. The R-454 can perform all 2, 3 and 4-way functions.

## R-461



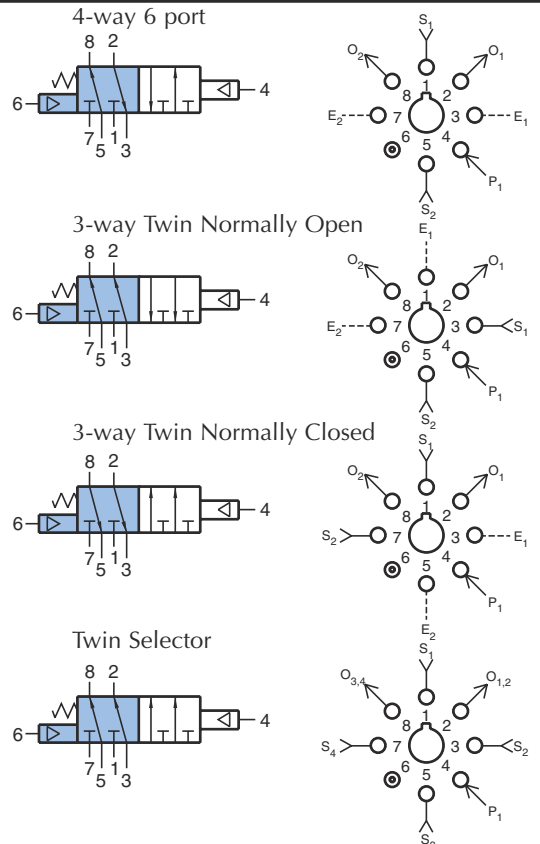
Four way valve, six ported

**Features:**

- Indicator shows valve in shaded position
- Micro gap construction - snap action and no blow by
- Balanced design allows speed control at exhausts

**Performance:**

Flow (SCFM @ 100 psi).....	9
Pilot pressure (psi) minimum.....	40
Temperature.....	32° to 180° F
Working pressure.....	0 to 150
Response Time (milliseconds).....	10



**Description:**

R-461 is a 6 ported, 4-way, spring return, fully ported, pilot operated valve. It is basically two fully ported 3-way valves with a common pilot. It can be used in a variety of applications including dual pressure operations with two independent inlets, outlets, and exhausts.



# MODULAR 4-WAY VALVES

## R-462



Four way valve, six ported

**Features:**

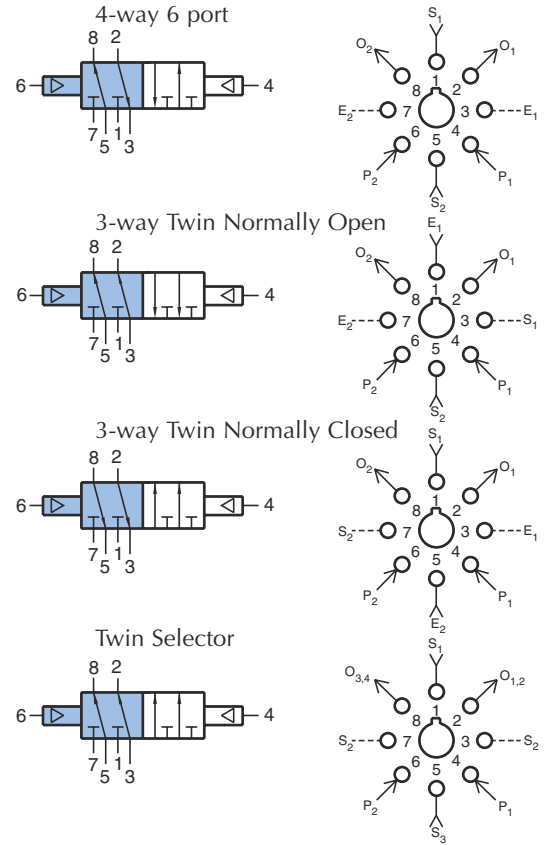
- Indicator shows valve in shaded position
- Micro gap construction - snap action and no blow by
- Balanced design allows speed control at exhausts

**Performance:**

Flow (SCFM @ 100 psi).....	9
Pilot pressure (psi) minimum.....	20
Temperature.....	32° to 180° F
Working pressure.....	0 to 150
Response time (milliseconds).....	10

**Description:**

R-462 is a 6 ported, 4-way, double piloted, fully ported, two position valve. It is basically two fully ported 3-way valves with a common pilot. It can be used in a variety of applications including dual pressure operations with two independent inlets, outlets and exhausts.



## R-465



Low pressure four way valve, six ported

**Features:**

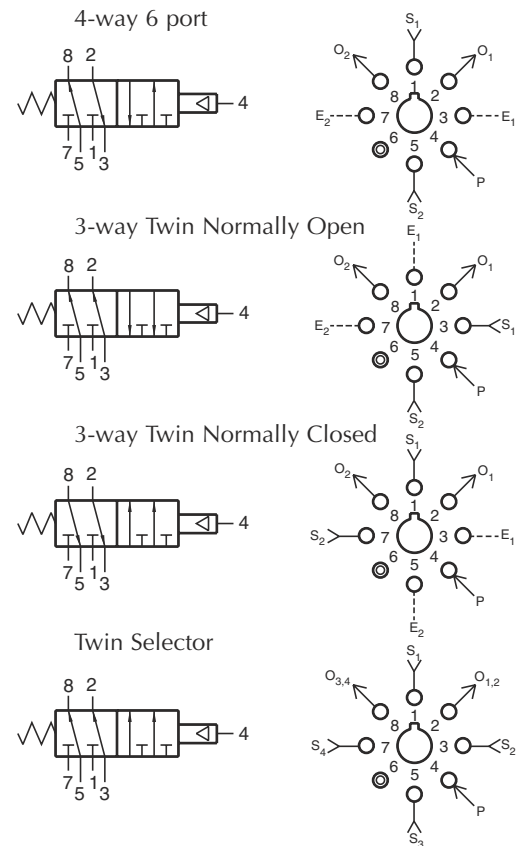
- Pilot actuates valve with low pressure signal
- Multiple porting speeds piping
- Micro gap construction - snap action and no blow by
- Balanced design allows speed control at exhausts

**Performance:**

Flow (SCFM @ 100 psi).....	9
Pilot pressure (psi) minimum.....	10
Temperature.....	32° to 180° F
Working pressure.....	0 to 150
Response time (milliseconds).....	10

**Description:**

R-465 is a 6-ported, 4-way, spring-return, fully ported valve with a low pressure pilot. Pilot pressures as low as 10 psi will actuate the valve. It is basically two fully ported 3-way valves with a common low pressure pilot. It can be used in a variety of applications including dual pressure operation, with two independent inlets, outlets and exhausts. The R-465 may be used in place of an R-461 where a lower pilot actuation pressure is desired.



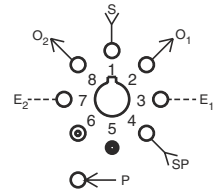
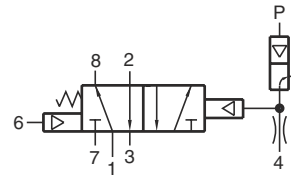
## R-471



Four way amplified pilot valve

**Features:**

- Micro gap construction - snap action and no blow by
- 3200 Fluidamp® bleed type amplifier section assures long life and repeatability
- Standard octoport plug-in design



**Performance:**

Flow (SCFM @ 100 psi).....	9
Pilot pressure (psi)	
Minimum.....	8" H <sub>2</sub> O on 1" H <sub>2</sub> O off
Pilot supply pressure (psi).....	45 to 100
Temperature.....	32° to 180° F
Working pressure.....	0 to 150
Response time (milliseconds).....	20
Bleed flow (amplifier orifice).....	.010"

**Description:**

R-471 is a 4-way, fully ported, spring return, amplified pilot valve. The R-471 is a hybrid combination of the R-401 and model 3200 snap action valve.

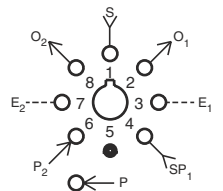
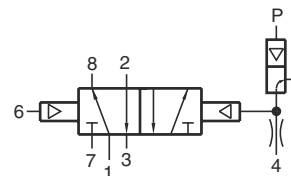
## R-472



Four way interface valve

**Features:**

- Micro gap construction - snap action and no blow by
- NFI 3200 Fluidamp® bleed type amplifier section assures long life and repeatability
- Standard octoport plug-in design



**Performance:**

Flow (SCFM @ 100 psi).....	9
Pilot pressure (psi)	
Minimum.....	8" H <sub>2</sub> O on 1" H <sub>2</sub> O off
Pilot supply pressure (psi).....	45 to 100
Temperature.....	32° to 180° F
Working pressure.....	0 to 150
Response time (milliseconds).....	20
Bleed flow (amplifier orifice).....	.010"

**Description:**

R-472 is a 4-way, fully ported, two position, amplified pilot valve. R-472 is a hybrid combination of the R-402 and model 3200 snap action valve.



# MODULAR 4-WAY ELECTRONICALLY PILOTED VALVES

## R-481-□



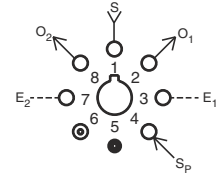
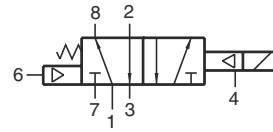
Electronic valve

**Features:**

- Extremely low power consumption
- Micro gap construction - snap action and no blow by
- Standard octoport plug-in design
- Provides interface between electronic and pneumatics

**Performance:**

Working range (psi).....0 to 150  
 Flow (SCFM @ 100 psi).....9  
 Pilot pressure (psi) .....40 to 105  
 (on port 4)  
 Response time (milliseconds).....20  
 Temperature.....32° to 180° F  
 Power consumption.....0.65 watt at  
 rated voltage



Voltage.....	R-481-6	6VDC
	R-481-12	12VDC
	R-481-24	24VDC

Duty.....Continuous duty at 150% of rated voltage

**Description:**

R-481 is a fully ported (five ported), 4-way valve. It is essentially a hybrid valve consisting of the R-401 valve and the Clippard model ET-3 electronic/pneumatic valve. The ET-3 responds to low current, low voltage signals and pneumatically actuates the R-401 4-way valve to which it is attached. A 40 psi pilot pressure must be present at port 4.

## R-482-□



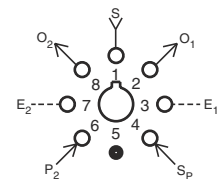
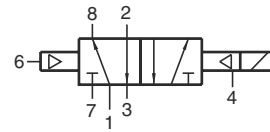
Electronic valve

**Features:**

- Extremely low power consumption
- Micro gap construction - snap action and no blow by
- Standard octoport plug-in design
- Provides interface between electronic and pneumatics

**Performance:**

Working range (psi).....0 to 150  
 Flow (SCFM @ 100 psi).....9  
 Pilot pressure (psi) .....20 to 105  
 At port 6 (min).....20  
 Response time (milliseconds).....20  
 Temperature.....32° to 180° F  
 Power consumption.....0.65 watt at  
 rated voltage



Voltage.....	R-482-6	6VDC
	R-482-12	12VDC
	R-482-24	24VDC

Duty.....Continuous duty at 150% of rated voltage (50% overload) permissible

**Description:**

R-482 is a fully ported (five ported), 4-way valve. It is essentially a hybrid valve consisting of the R-402 valve and the Clippard model ET-3 electronic/pneumatic valve. The ET-3 responds to low current, low voltage signals and pneumatically actuates the R-402 4-way valve to which it is attached. A 20 psi pilot pressure must be present at port 4.

## R-501 R-502



Flow control valve

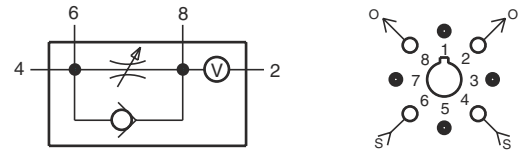
**Features:**

- Multiple porting speeds piping
- Knurled knob for fast, accurate adjustments - no tools needed
- Fine adjustment for pneumatic timing

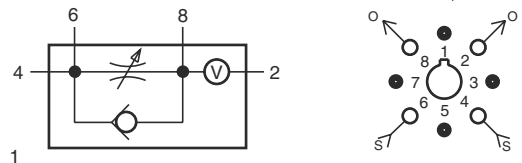
**Performance:**

Flow (SCFM @ 100 psi).....0 to 1  
 Pilot pressure (psi) minimum..... -  
 Temperature.....32° to 180° F  
 Working pressure.....0 to 150  
 Response time (milliseconds)..... -

R-501 Delay In Flow Control



R-502 Delay Out Flow Control



**Description:**

R-501 is an adjustable flow control designed to meter “IN” to an integral volume chamber to delay pressure build-up in one direction. Dual ports are provided to add extra volume or for multiple input-output connections.

R-502 is an adjustable flow control designed to meter “OUT” from an integral volume chamber to delay pressure decay in one direction.

## R-602 R-603



Dual shuttle valves

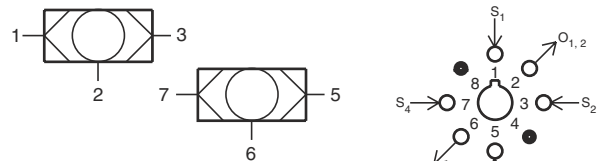
**Features:**

- R-602**
- Bubble tight operation
  - Two independent units in one module
  - Saves space
- R-603**
- Complete three input subcircuit in one module
  - Auxiliary outputs save fittings and time

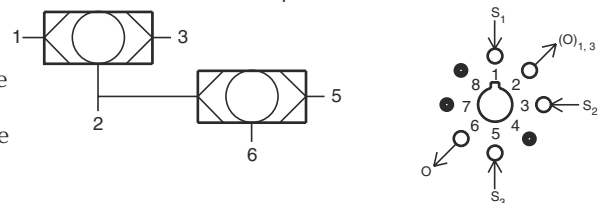
**Performance:**

Flow (SCFM @ 100 psi).....10  
 Pilot pressure (psi) minimum..... -  
 Temperature.....32° to 180° F  
 Working pressure.....5 to 150  
 Response time (milliseconds).....10

R-602 Dual Shuttle Valve



R-603 3-Input “OR”



**Description:**

R-602 is a dual element combination consisting of two completely independent shuttle valves in a single body.

R-603 is a dual element combination consisting of two shuttle valves which are interconnected into a subcircuit. It provides a 3-input “or” with port 2 available as an auxiliary. If not used, port 2 should be plugged.



# MODULAR REGULATOR & PULSE VALVES

## R-701

Pressure regulator

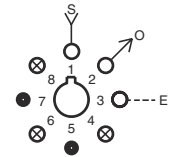
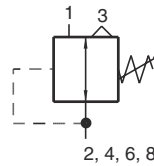


**Features:**

- Multiple porting speeds piping
- Knurled knob for fast, accurate adjustments - no tools needed
- Self-relieving

**Performance:**

Flow (SCFM @ 100 psi).....12  
 Pilot pressure (psi) minimum..... -  
 Temperature.....32° to 180° F  
 Working pressure.....0 to 150  
 Response time (milliseconds).....10



**Description:**

R-701 is a self-relieving, adjustable pressure regulator with multiple output ports. Pressure can be piped directly from ports 2, 4, 6 and 8. Eliminates need for additional fittings. Unused output ports should be plugged.

## R-711

Pulse valve

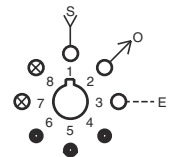
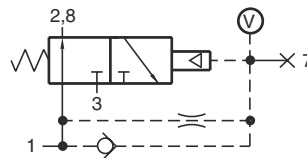


**Features:**

- Multiple porting speeds piping
- Micro Gap Construction - snap action and no blow by
- Complete function in one module

**Performance:**

Flow (SCFM @ 100 psi).....10  
 Pilot pressure (psi) minimum.....40  
 Temperature.....32° to 180° F  
 Working pressure.....40 to 150  
 Response time (milliseconds)..... -



**Description:**

R-711 is a 3-way, normally-OPEN, self-piloted valve that closes shortly after being pressurized and remains closed until signal pressure is exhausted. It converts a continuous input signal into a single pulse of approximately 50 milliseconds. Port 7 is provided for additional volume for extending pulse duration and should be plugged if not used.

## R-731

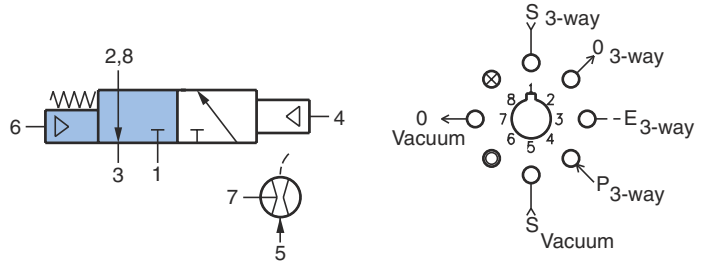


Modular vacuum generator

Turn pressure to vacuum generator on/off

**Features:**

- Indicator shows valve in shaded position
- Micro gap construction - snap action and no blow by



**Performance:**

**3-Way Valve**

Flow (SCFM @ 100 psi).....	9
Pilot pressure (psi) minimum.....	40
Temperature.....	32° to 180° F
Working pressure.....	0 to 150
Response time (milliseconds).....	10

**Vacuum Generator**

Vacuum (in. Hg@ 60 psig).....	25
Vacuum flow (scfm @ 60 psig).....	0.6
Air consumption (scfm @ 60 psig).....	1.7
Temperature.....	32° to 180° F

**Description:**

The R-731 is a combination venturi vacuum generator and an independent pilot actuated, spring return, fully ported 3-way valve. Applying pressure at port 5 creates a vacuum at port 7. The 3-way valve can be used to turn the vacuum generator on or off or it can be used to switch the vacuum on or off. 40 PSI is required to pilot the 3-way valve.

For mounting and muffler information see page 285.

## R-732

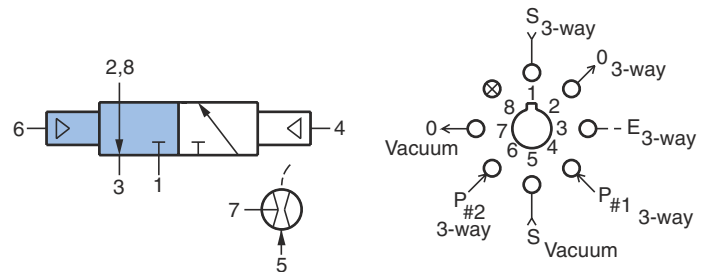


Modular vacuum generator

Select Pressure or Vacuum Output

**Features:**

- Indicator shows valve in shaded position
- Micro gap construction - snap action and no blow by



**Performance:**

**3-Way Valve**

Flow (SCFM @ 100 psi).....	9
Pilot pressure (psi) minimum.....	20
Temperature.....	32° to 180° F
Working pressure.....	0 to 150
Response time (milliseconds).....	10

**Vacuum Generator**

Vacuum (in. Hg@ 60 psig).....	25
Vacuum flow (scfm @ 60 psig).....	0.6
Air consumption (scfm @ 60 psig).....	1.7
Temperature.....	32° to 180° F

**Description:**

The R-732 is a combination venturi vacuum generator and an independent double pilot actuated, fully ported 3-way valve. Applying pressure at port 5 creates a vacuum at port 7. The 3-way valve can be used to turn the vacuum generator on or off or it can be used to switch the vacuum on or off. 20 PSI is required to pilot the 3-way valve.

For mounting and muffler information see page 285.



# VACUUM GENERATOR

## R-781-□



Modular vacuum generator

Turn Vacuum on/off

**Features:**

- Micro gap construction - snap action and no blow by

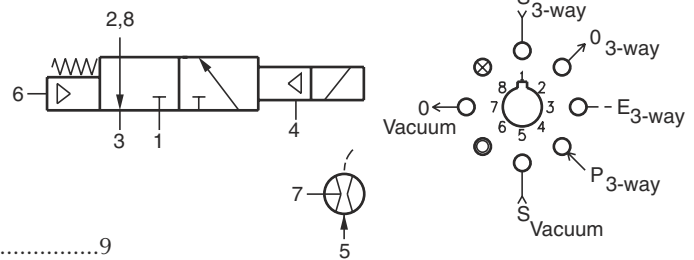
**Performance:**

**3-Way Valve**

Flow (SCFM @ 100 psi).....	9
Pilot pressure (psi) minimum.....	20
Temperature.....	32° to 180° F
Working pressure.....	0 to 150
Response time (milliseconds).....	10

**Vacuum Generator**

Vacuum (in. Hg@ 60 psig).....	25
Vacuum flow (scfm @ 60 psig).....	0.6
Air consumption (scfm @ 60 psig).....	1.7
Temperature.....	32° to 180° F
Available voltage.....	6, 12, 24, VDC



Voltage.....	R-781-6	6VDC
	R-781-12	12VDC
	R-781-24	24VDC

Power consumption.....0.65 W @ rated voltage  
 Duty.....Continuous duty to 150% of rated voltage

**Description:**

R-781 is a combination venturi vacuum generator and an independent pilot actuated electronically controlled, spring return, fully ported 3-way valve. Applying pressure at port 5 creates a vacuum at port 7. The 3-way valve can be used to turn the vacuum generator on or off or it can be used to switch the vacuum on or off. To shift the 3-way valve 40 PSI is required at port 4 along with the appropriate DC voltage being applied to the solenoid.

## R-782-□



Modular vacuum generator

**Features:**

- Micro gap construction - snap action and no blow by

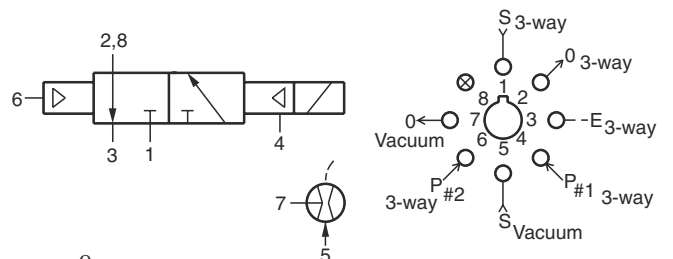
**Performance:**

**3-Way Valve**

Flow (SCFM @ 100 psi).....	9
Pilot pressure (psi) minimum.....	20
Temperature.....	32° to 180° F
Working pressure.....	0 to 150
Response time (milliseconds).....	10

**Vacuum Generator**

Vacuum (in. Hg@ 60 psig).....	25
Vacuum flow (scfm @ 60 psig).....	0.6
Air consumption (scfm @ 60 psig).....	1.7
Temperature.....	32° to 180° F
Available voltage.....	6, 12, 24, VDC



Voltage.....	R-782-6	6VDC
	R-782-12	12VDC
	R-782-24	24VDC

Power consumption.....0.65 W @ rated voltage  
 Duty.....Continuous duty to 150% of rated voltage

**Description:**

The R-782 is a combination venturi vacuum generator and an independent pilot actuated electronically controlled, air pilot return, fully ported 3-way valve. Applying pressure at port 5 creates a vacuum at port 7. The 3-way valve can be used to turn the vacuum generator on or off or it can be used to switch the vacuum on or off. To shift the 3-way valve 20 PSI is required at port 4 along with the appropriate DC voltage being applied to the solenoid. To return the valve a pilot pressure of 20 PSI is required at port 6.



**The Modular Vacuum Generator** is a combination venturi vacuum generator and 3-way valve, contained in a modular body for simplicity and ease of installation. This combination allows the user to control the pressure to the vacuum generator, vacuum from the generator, and other circuit functions as required.

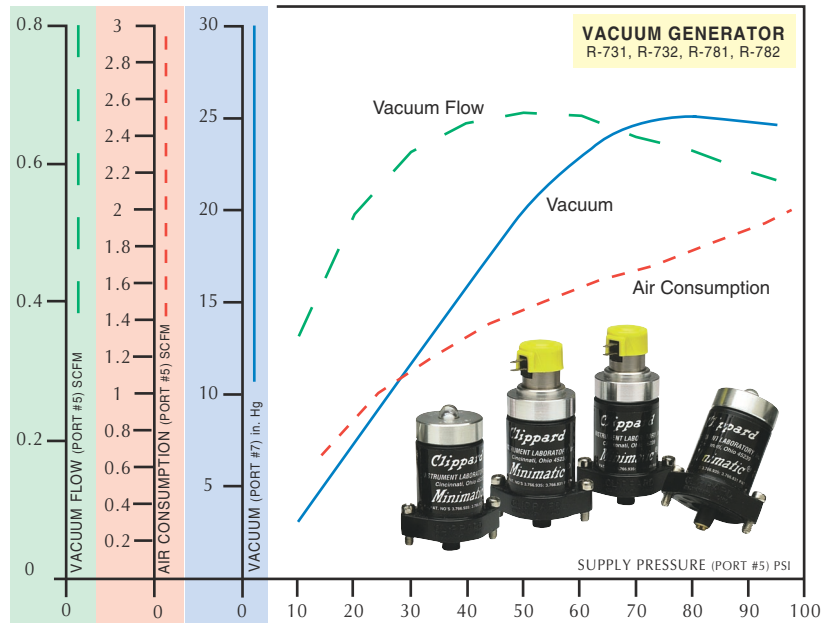
With 60 psig air to the modular generator, a vacuum of 25 in. Hg and 0.6 scfm is generated from the outlet. This vacuum may be used for pick, place, and hold applications, or liquid drawback circuits and is an energy efficient alternative to both electric and multi-stage air powered pumps.

The venturi vacuum generator provides a low cost vacuum source with no required maintenance. It contains a large flow path in a design that is self-cleaning, eliminating the need for a filtered air supply.

The 3-way valve is a proven Clippard modular valve design utilizing micro gap construction for a very short stroke of the balanced spool.

The Clippard modular vacuum generator uses a Delrin® body with a central valve cavity surrounded by (8) independent air passages that terminate at the base of the body in a circular, octoport pattern. The body mates with a manifold subplate (sold separately) that mounts the complete module and provides 10-32 tapped holes for standard hose fittings. A single octoport gasket (included with the module), held in place by two mounting screws, insures a positive seal.

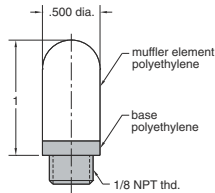
**Performance:** Clippard modular vacuum generators provide high vacuum flow with high vacuum levels and are field adjustable. The adjustment screw at the base of the modular allows setting to the optimum performance needed to perform the task.



### Muffler 3849-1



The 3849-1 muffler is constructed of durable polyethylene with a 1/8 NPT male thread which installs in the extension of either the R-101-10 or R-11-10 subplate.



### Gauge VG-30

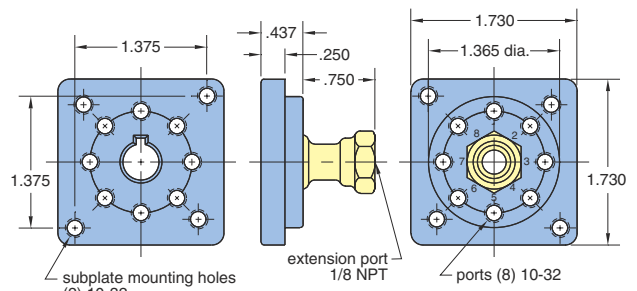
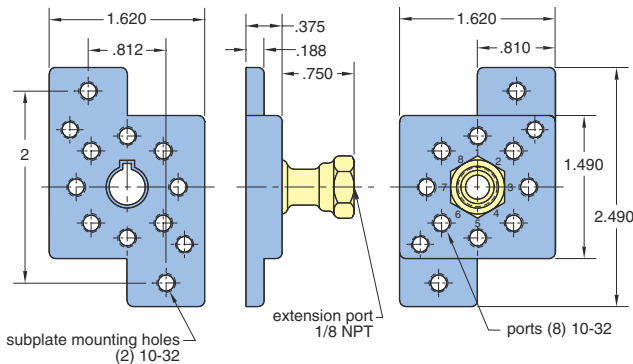


**Inlet Vacuum:** scale reading from 0 to -30 in. Hg. & 0 to -1 bar

**Construction:** black case, plastic face, dial shows two ranges; in. Hg in black, bars in red; built-in pressure snubber

**Ports:** connection located at rear is threaded both  
OD - male thread 1/8 NPT  
ID - tapped for 10-32 fitting

**Mounting:** Stud mount using 1/8 NPT center stud or panel mount using the zinc plated steel bracket supplied.



### Subplate Dimensions

The **R-101-10** subplate mounts to mounting strips with 10-32 screws and lockwashers provided. Ports on module base are numbered in the same pattern as on the subplate, making piping easy to identify. Module stem is keyed to fit center hole in subplate; assures fast insertion and proper positioning.

**R-111-10** subplate mounts in 1 3/8" hole in electrical box, control panel. Mounting screws and gasket provided seal subplate to mounting plate.





# MODULAR VOLUME CHAMBER, FILTER & SEQUENCE VALVE

## R-801



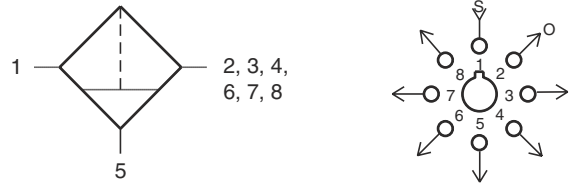
### Filter

#### Features:

- Multiple porting speeds piping
- Clean out port for easy maintenance
- Protects system - assures proper functioning
- Replaceable filter element (Part no. R-801-14)

#### Performance:

Flow (SCFM @ 100 psi).....12  
 Pilot pressure (psi) minimum..... -  
 Temperature.....32° to 180° F  
 Working pressure.....0 to 150  
 Response time (milliseconds)..... -



#### Description:

R-801 is a 25 micron filter with multiple outlets at ports 2, 3, 4, 6, 7 and 8 to minimize need for fittings. Port 5 is a drain and should be plugged; however, when the valve is mounted vertically port 5 can be tubed to a drain. Unused ports should be plugged.

## R-811

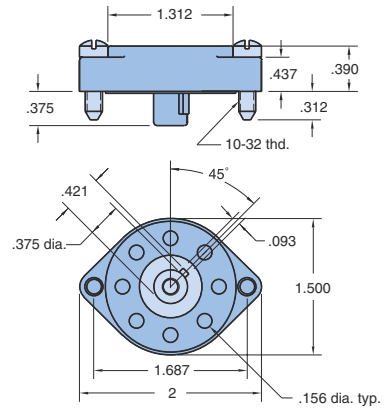


### Connector

Connects to subplate R-101, R-111 and manifolds

#### Description:

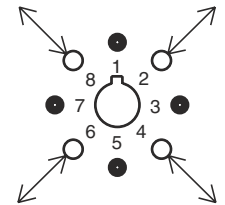
R-811 is an octoport connector that provides rapid and accurate connection of up to eight hoses. Truly a convenience connection; saves time; eliminates mistakes.



## R-821



### Volume chamber



#### Description:

Volume chamber provided in standard, plug-in Clippard Minimatic® module body, using standardized octoport. May be used for providing time delay in pneumatic circuits. This model has 1.2 cubic inch volume chamber.

## R-901



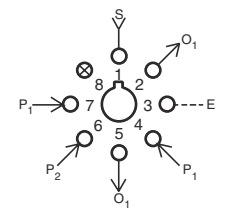
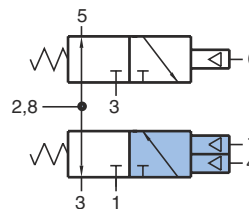
### Sequence valve

#### Features:

- Indicator shows valve position
- Micro gap construction - snap action and no blow by
- Balanced design allows speed control at exhausts

#### Performance:

Flow (SCFM @ 100 psi).....10  
 Pilot pressure (psi) minimum.....40  
 Temperature.....32° to 180° F  
 Working pressure.....0 to 150  
 Response time (milliseconds).....10



#### Description:

R-901 is a dual element combination consisting of a 3-way normally-closed, spring return air piloted valve and a 3-way normally-open, spring return, air piloted valve. One of the outputs of the N.C. valve is the input to the N.O. valve. A valve position indicator is provided for the N.C. valve. The R-901 is intended for use in sequential stepping control circuits.

## R-932



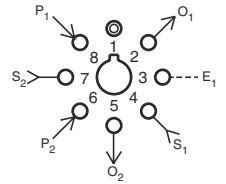
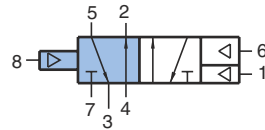
Sequence valve

**Features:**

- Indicator shows valve in shaded position
- Micro gap construction - snap action and no blow by

**Performance:**

Flow (SCFM @ 100 psi).....	9
Pilot pressure (psi) minimum.....	20
Temperature.....	32° to 180° F
Working pressure.....	0 to 150
Response time (milliseconds).....	10



**Uses:**

The R-932 Sequence Control Module is a compact, efficient component for creating a sequential system for control of a multi-step operation. It has many uses throughout industry: see page 292

**Description:**

R-932 is a 4-way, 5 ported, double piloted, two position valve designed for sequence control application. Availability of two supply and two output ports enables the module to perform the sequential function. One output controls the operation assigned to that step in the cycle. The other output maintains the next step in a hold mode until ready for release. Likewise, the R-932 uses differential pilots. This enables the signal at port 6 to cancel out the force of the opposite pilot at port 8. Shifting of the valve is not possible until the signal at port 6 is removed. When a step is completed, a limit feedback signal actuates the next step. At the end of the sequence the last step resets all the sequence valves, resetting the operation for the next cycle. For each step in the cycle, a separated R-932 module must be used.

## R-934



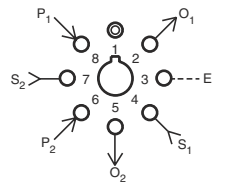
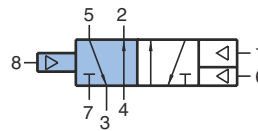
Sequence valve

**Features:**

- Indicator shows valve in shaded position
- Micro gap construction - snap action and no blow by

**Performance:**

Flow (SCFM @ 100 psi).....	9
Pilot pressure (psi) Minimum.....	20
Temperature.....	32° to 180° F
Working pressure.....	0 to 150
Response time (milliseconds).....	10



**Description:**

The R-934 sequence valve is the same as the R-932 sequence valve with the exception of ports 1 and 6. The R-934 port 6 pilot is the same size as the port 8 pilot. This provides a built in safety that if a limit valve is held actuated, the reset signal at port 6 will not reset the sequence, therefore stopping the system with the indicator being in the down position for trouble shooting. The R-934 sequence valve can only be used on the steps that do not have the input signal held normally open.



# MODULAR ELECTRONIC SEQUENCING VALVES

## R-982-□

Electronic piloted sequence valve

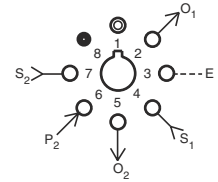
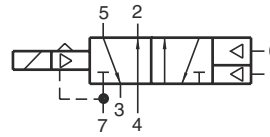


**Features:**

- Extremely low power consumption
- Patented micro gap valving for quick action, no blow by
- Standard octoport plug-in design
- Provides interface between electronics and pneumatics

**Performance:**

Working range (psi).....	20 - 105
Flow (SCFM @ 100 psi).....	9
Return pilot pressure (min).....	20
At port 6 (min).....	20
Response time (milliseconds).....	20
Temperature.....	32° to 180° F
Power consumption.....	0.65



Voltage.....	R-982-6	6VDC
	R-982-12	12VDC
	R-982-24	24VDC

Duty.....Continuous duty at 150% of rated voltage

**Description:**

R-982 electronic sequence valve is essentially a hybrid valve consisting of the R-932 valve and the Clippard model ET-3 electronic/pneumatic valve. The ET-3 responds to low current, low voltage signals and pneumatically actuates the R-932 sequence valve to which it is attached.

## R-984-□

Electronic piloted sequence valve

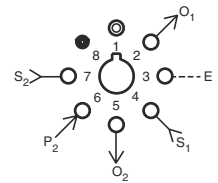
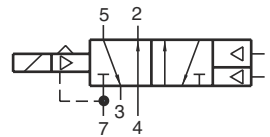


**Features:**

- Extremely low power consumption
- Micro gap construction - snap action and no blow by
- Standard octoport plug-in design
- Provides interface between electronics and pneumatics

**Performance:**

Working range (psi).....	20-105
Flow (SCFM @ 100 psi).....	9
Return pilot pressure (min).....	20
At port 6 (min).....	20
Response time (milliseconds).....	20
Temperature.....	32° to 180° F
Power consumption.....	0.65



Voltage.....	R-984-6	6VDC
	R-984-12	12VDC
	R-984-24	24VDC

Duty.....Continuous duty at 150% of rated voltage

**Description:**

The R-984 electronic sequence valve is essentially a hybrid valve consisting of the R-934 valve and the Clippard model ET-3 electronic/pneumatic valve. The ET-3 responds to low current, low voltage signals and pneumatically actuates the R-934 sequence valve to which it is attached.

## APPLICATION

ap-pli-ca-tion \ap-lā-'kâ-shən\ n 1 : the act of applying 2 : assiduous attention 3 : REQUEST; also : a form used in making a request 4 : something placed or spread on a surface 5 : capacity for use

The following circuits show a few of the many useful ways to use Clippard Minimatic® modular components in practical pneumatic circuitry. The drawings presented here are combinations of ANSI and pictorial symbols and Octoport piping diagrams. For more information and application assistance contact your nearest Clippard distributor.

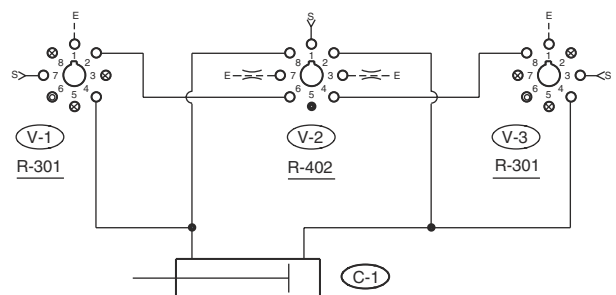
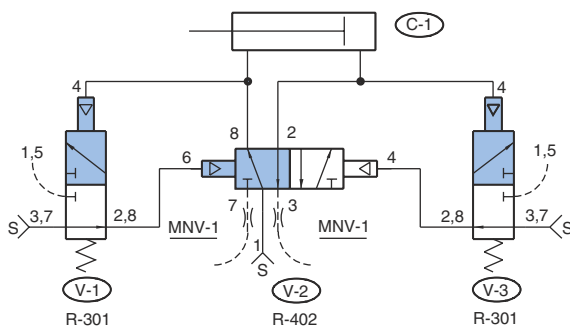
### Initial Approach to Designing a Pneumatic Control

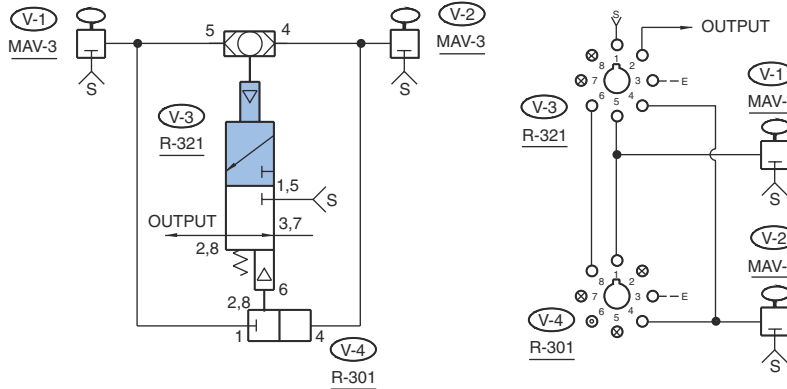
1. Have a clear verbal understanding of the sequence of operations desired.
2. Put down on paper:
  - A. Manual controls necessary or required and what their function is to be.
  - B. Other available input signals from:
    1. Limit valves
    2. Sensors
    3. Other controls or control media
  - C. All output devices (cylinders, piloted valves, electrical motors, etc.) that are to be controlled.
3. Determine all mechanical interlocks that exist.
4. Determine all the safety interlocks that must exist.
5. Work out the logic portion of the control utilizing the inputs and outputs at hand. Employ the functional circuit concept. Remember even the most complicated control circuits are composites of smaller functional circuits.
6. Check the final circuit for proper actuation during:
  - A. Start up
  - B. Shut down
  - C. Loss of air
  - D. Panic stops in the middle of cycle
  - E. Restarts in the middle of the cycle
  - F. Control during other events that are likely to occur

### Cycling Without Limit Valves

This circuit enables a double acting cylinder to reciprocate without the use of limit valves and to control its speed in each direction. As C-1 retracts, it creates a back-pressure behind the piston which is further increased by restricting the exhaust air at port 3, V-2, to slow the return of the cylinder rod. This back pressure holds the pilot closed on V-3. When C-1 has fully returned, the back pressure diminishes. When there is insufficient pressure to hold the pilot down on V-3, the spring shifts the valve, which sends pressure to the right hand pilot, port 4, of V-2. This causes V-2 to shift, which starts C-1 to extend and pilots V-3 exhausting the pressure on the right hand pilot of V-2.

As C-1 extends, an identical sequence occurs between V-1 and V-2, causing the 4-way valve to shift when C-1 has fully extended.





## Exclusive "OR" Circuit

The exclusive "OR" circuit operates as follows: When V-1 is depressed, the signal goes to both V-3 and V-4. The signal at V-4 is blocked. The signal at V-3 actuates the valve and provides an output signal. If V-2 is actuated independently, the same sequence occurs.

If both V-1 and V-2 are actuated, the output at V-4 energizes the bottom pilot which, together with the spring, overrides the opposite pilot of V-3, nullifying both signals, V-3 thus remains off.

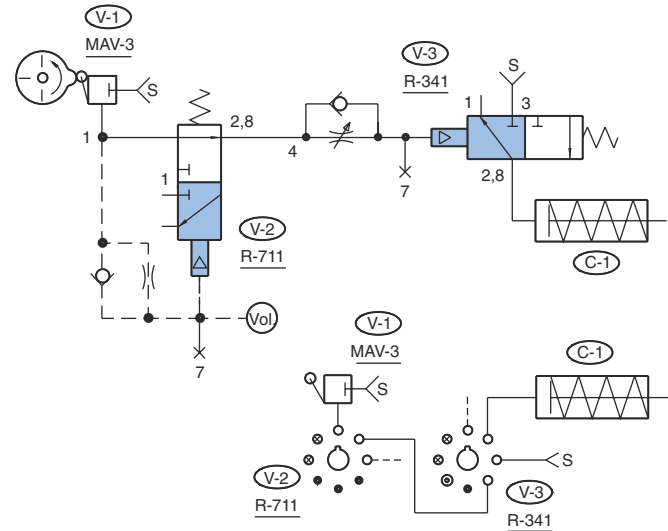
### Circuit Function

INPUTS	V-1	off	off	on	on
	V-2	off	on	off	on
OUTPUT	V-3	off	on	on	off

## Motion Sensing Circuit

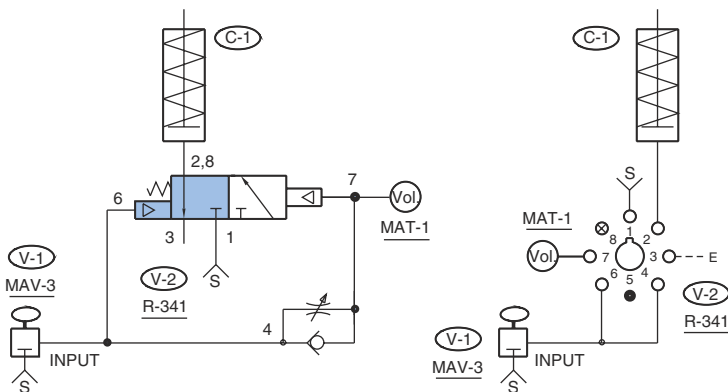
V-1 is actuated by rotary or linear cam. Pressure from V-1 goes to a pulse valve (V-2) where it is converted to a uniform pulse each time V-1 is actuated. Each pulse goes through the check valve of V-3 and holds the pilot down on the valve. C-1 is retracted. The pressure holding the pilot of V-3 is constantly trying to exhaust through the adjustable needle valve V-3 and out to atmosphere through the exhaust port of the pulse valve V-2.

When motion stops (or falls below a pre-determined C.P.M.) the pressure on the pilot of V-3 exhausts and the spring shifts the valve, which causes C-1 to extend. The R-341 is shown as normally closed. It can also be used as normally open, a selector, or a diverter.



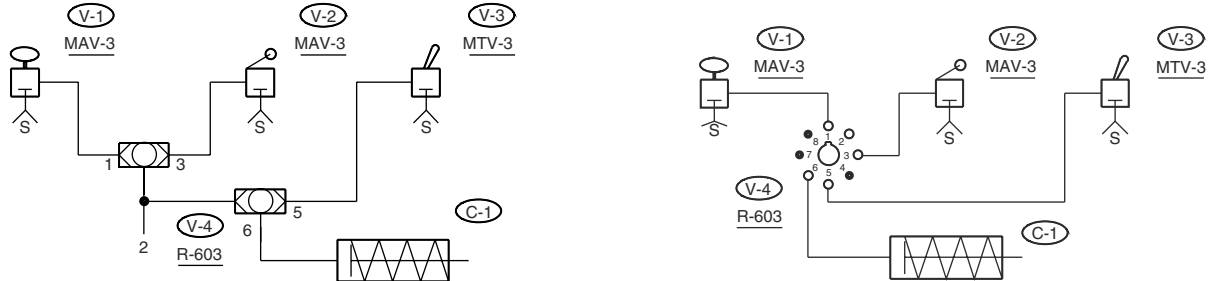
## Signal Release Pulse Circuit

This circuit gives a single pulse output of adjustable duration when its input signal is released (exhausted). Upon actuation of the input 3-way valve, V-1, air is supplied to both valve pilots simultaneously so the valve, V-2, remains in the closed position. Upon release of the input signal the pilot on the spring side of the valve is exhausted immediately. This allows the "trapped" air in the volume tank to actuate the valve causing the output to come on. The valve remains actuated until the trapped air bleeds off through the adjustable needle valve.



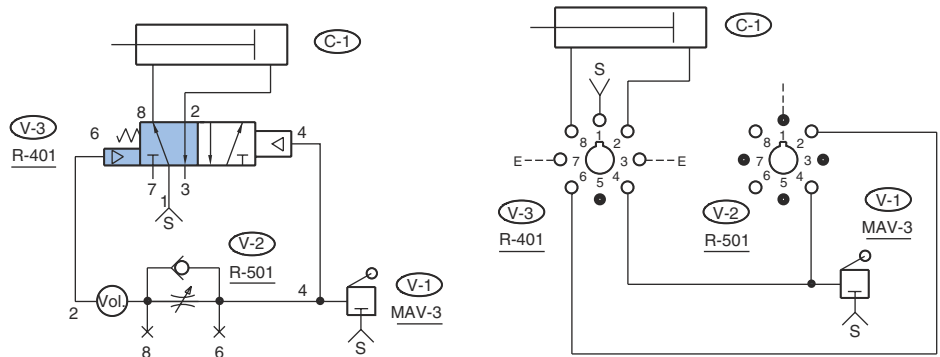
## Use of Shuttle Valves

The R-603 is a three input shuttle valve sometimes called a three input "OR". Actuation of V-1 or V-2 or V-3 will give an output at port 6, of V-4, and extend C-1.



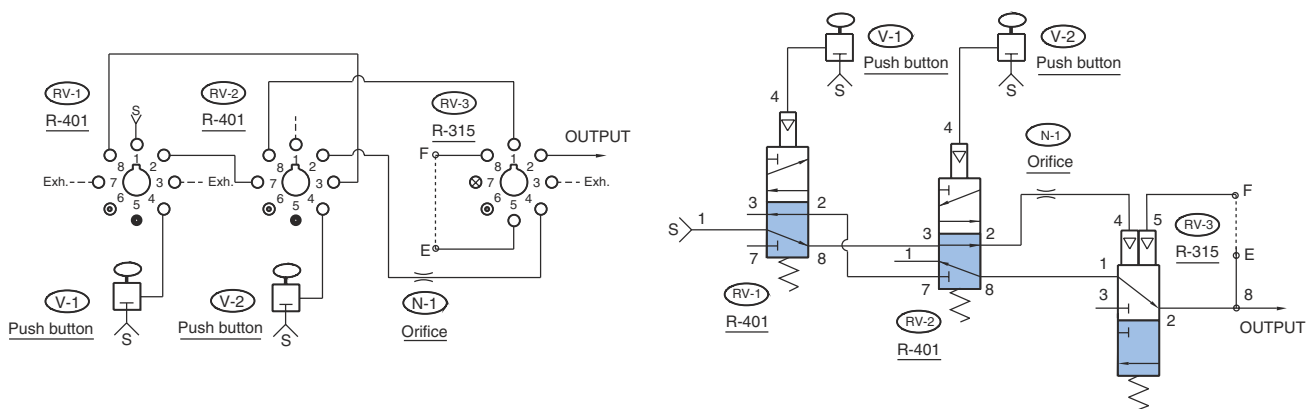
## Adjustable 4-Way Pulse

When V-1 is actuated a signal pilots port 4, V-3, extending C-1. The signal is also going to the auxiliary pilot but is delayed by the flow control V-2. When pressure builds up on the pilot, port 6, V-3, it, together with the spring, overcomes the opposite pilot and shifts the valve. C-1 then retracts. V-3 will not cycle again until V-1 is released.



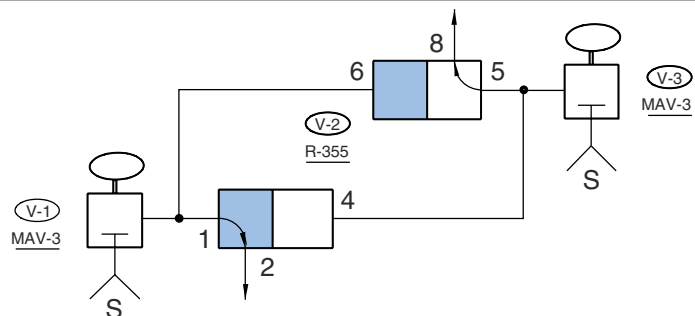
## Two Hand No Tie Down

This circuit provides an output signal to power or pilot a piece of machinery when two push buttons are manually pressed simultaneously. Neither button can be tied down. The output will cease if either button is released. See CM-023 in the Pneumatic Circuit Board section for more details.



## Pilot Signal Priority Lockout

Application of a pilot signal from either push button will pneumatically lock out the output of the other push button to eliminate the possibility of a dual output.



## 932 Sequence Control Circuit

A typical sequence circuit is shown below. It includes five R-932 sequence modules, two R-402 4-way modular valves, (power valves) and two cylinders, each equipped with two limit valves. This typical circuit is designed for Cylinder A to extend and return, then Cylinder B to extend and return.

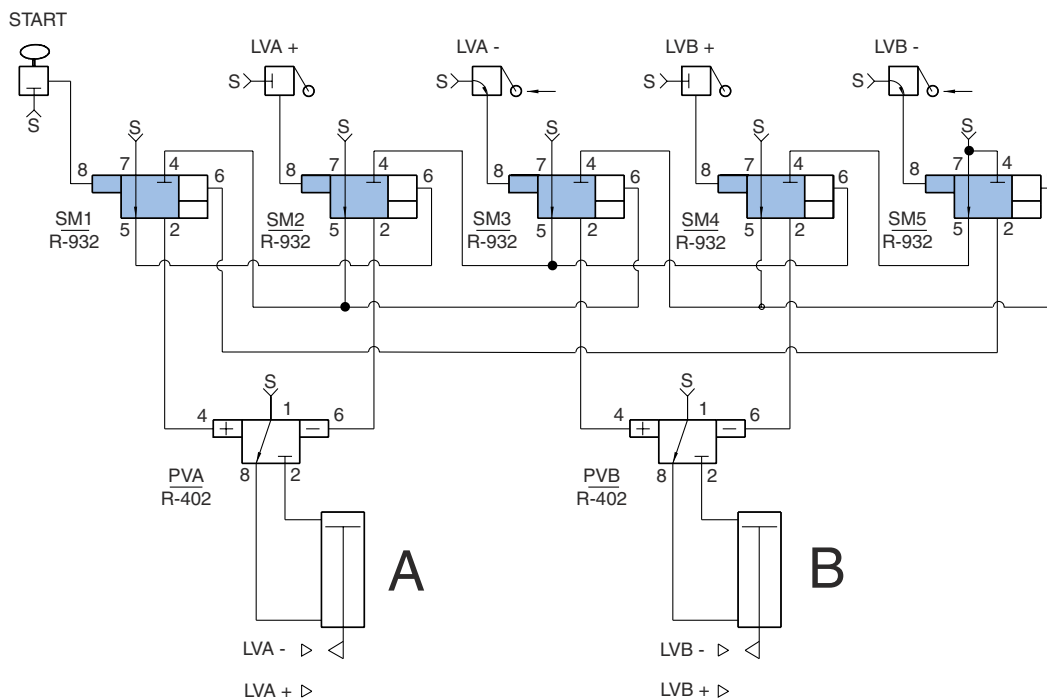
In inactive mode, LVA- and LVB- are held passing, supplying pressure to port 8 of both SM3 and SM5. The valves will not actuate because there is air already at port 6 which connects to a larger pilot.

When the start button is actuated, pilot pressure is applied to SM1, shifting the valve which pressurizes port 4 of power valve "A" (PVA) pressure at its port 4. This shifts PVA, extending the cylinder. When SM1 shifts, it also removes pressure from SM2 at port 6 preparing it for step 2.

Extension of cylinder A actuated LVA+. This shifts SM2, providing pressure to port 6 of PVA which shifts and powers the retraction of Cylinder A. The shifting of SM2 also removes supply from port 4 of step 1 allowing the cylinder retraction, and removes supply from port 6 of SM3, preparing it for step 3.

As a result, when LVA- attains passing position this time, there is no pressure on the larger pilot of SM3. It shifts, providing supply to port 4 of PVB. The power module shifts, with resultant flow extending Cylinder B. The sequence cycle continues through retraction and stops unless the start button remains actuated. Continuous cycling can be accomplished by using a toggle or selector valve for the start button.

Retraction of cylinder B actuates LVB- causing a chain reaction for resetting the sequence valves for the next cycle.



NOTE: The SEQUENCE IS FOLLOWED by the indicator in the valve. The last indicator down is the last step actuated. This is helpful when trouble shooting a circuit.

The circuit described above is an example of a typical sequence circuit. Most applications will require additional functions. Therefore, the number of sequence valves will increase, but the procedure for connections and applications of the R-932 remain.

It is important to remember the input signals can come from other types of input devices such as: proximity sensors, gap sensors, back pressure sensors, pressure sensors, limit valves, electronic Hall Effect sensing, liquid level sensing, part sensing, etc.

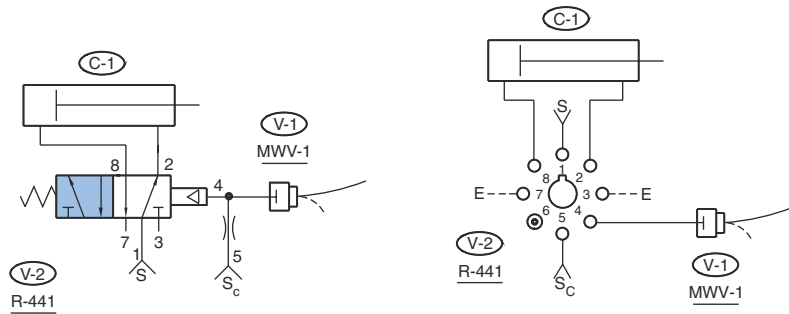
By using modular components found in this catalog, additional functions such as "Delay IN (R-333) "AND" (R-301) can be added to the sequence circuits.

The sequence circuit can also be used with larger air power valves or air piloted hydraulic valves.



## Bleed Piloted 4-Way Valve

Pressure in line 4 pilots valve V2 so that the cylinder is retracted on the valve V-2 and C-1 retracted. When V-1 is actuated, the pressure is exhausted from 4 faster than the restricted supply at 5 can make it up. The spring then shifts the valve and C-1 extends.

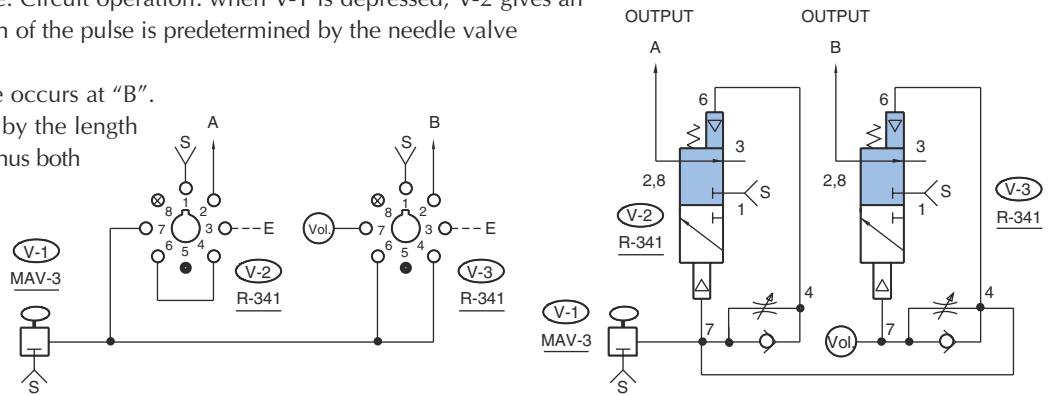


## Unique OPEN-CLOSE Pulse Circuit

This pulse circuit can be adapted to a wide variety of uses. It consists of an MAV-3 3-way valve and two standard R-341 modular valves, and is being used to open and close a collet vice on a milling fixture. Circuit operation: when V-1 is depressed, V-2 gives an output pulse at "A". The length of the pulse is predetermined by the needle valve adjustment on V-2.

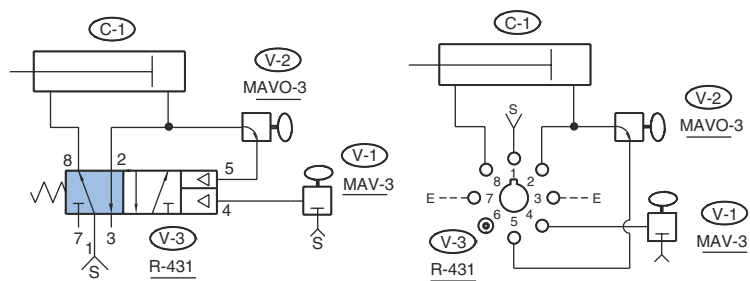
When V-1 is released, a pulse occurs at "B".

This pulse is also determined by the length of the needle valve on V-3. Thus both pulses are independently adjustable. Note that the R-341 allows supply to be segregated from the pilot signal which allows for different pressures or gases to be controlled.



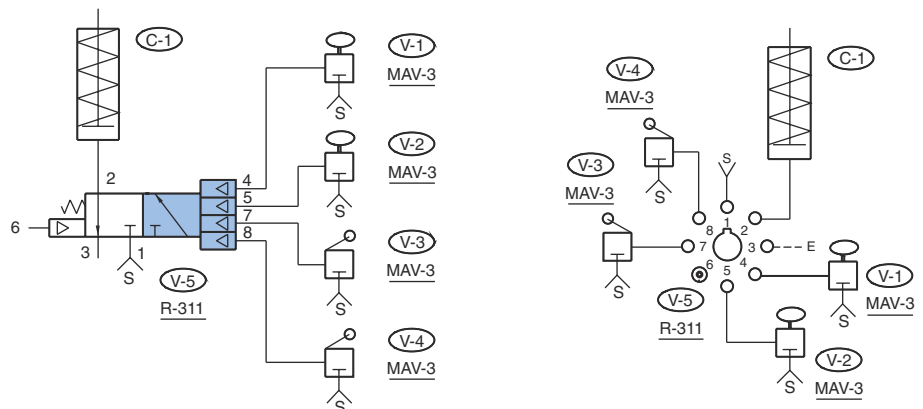
## "Latch" Circuit

Actuation of V-1 pilots V-3 and extends C-1. The same pressure that extends C-1 also passes through V-2 and holds the twin pilot down locking C-1 in the out position even though V-1 is released. When V-2 is actuated, breaking the line between port 2 & 5, V-3, and exhausting the pilot, the spring will shift the valve V-3, causing C-1 to retract.



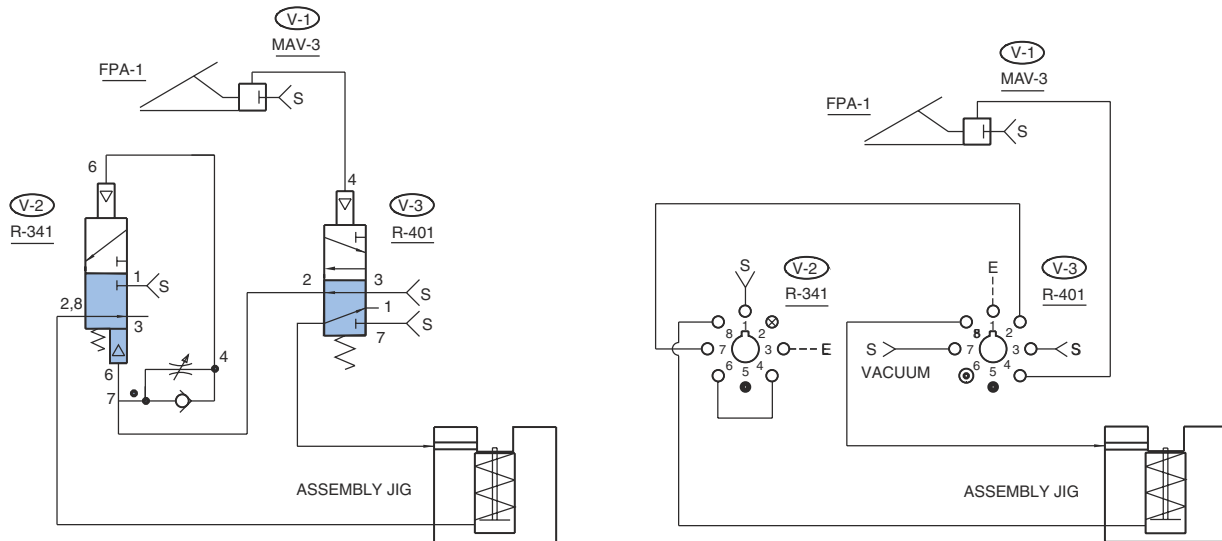
## "Active Or" Circuit

Actuation of any one or all of the input signal valves, V-1, V-2, V-3, V-4, will cause an active output (an output from a separate air supply source).



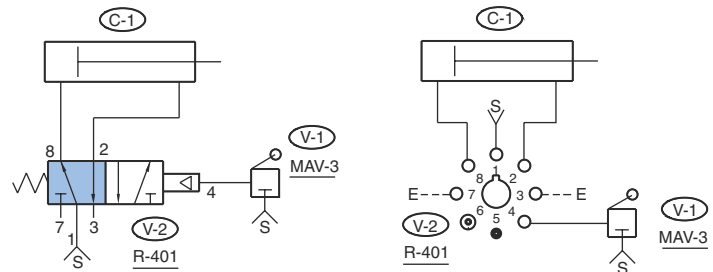
## Assembly Jig Control

This circuit is used with an assembly jig that draws a vacuum on a part inserted into it. When the operator has finished working on the part, a spring return knock out cylinder pushes the part out of the jig. Depressing V-1 pilots V-3 which draws a vacuum on the jig. Releasing V-1 allows the spring in V-3 to shift the valve, connecting air to V-2, an adjustable pulse valve, which gives a controlled pulse of air to the knock out cylinder in the jig.



## Piloted 4-Way Valve

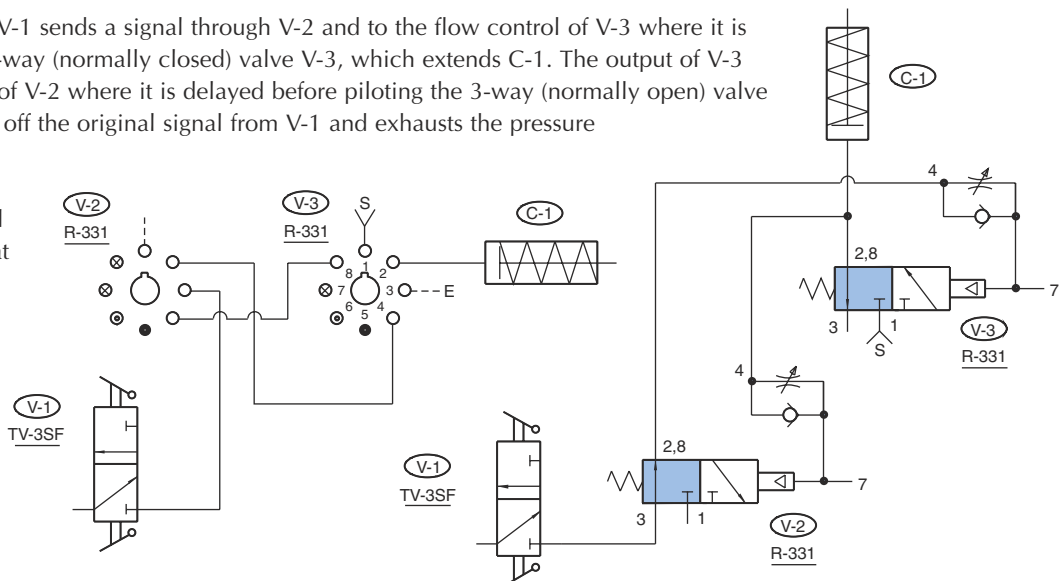
When V-1 is actuated, pressure forces the pilot to overcome the spring and shift the valve V-2, causing C-1 to retract. Releasing V-1 exhausts the pressure on the pilot and allows the spring to shift the valve extending C-1.



## Automatic Cycler

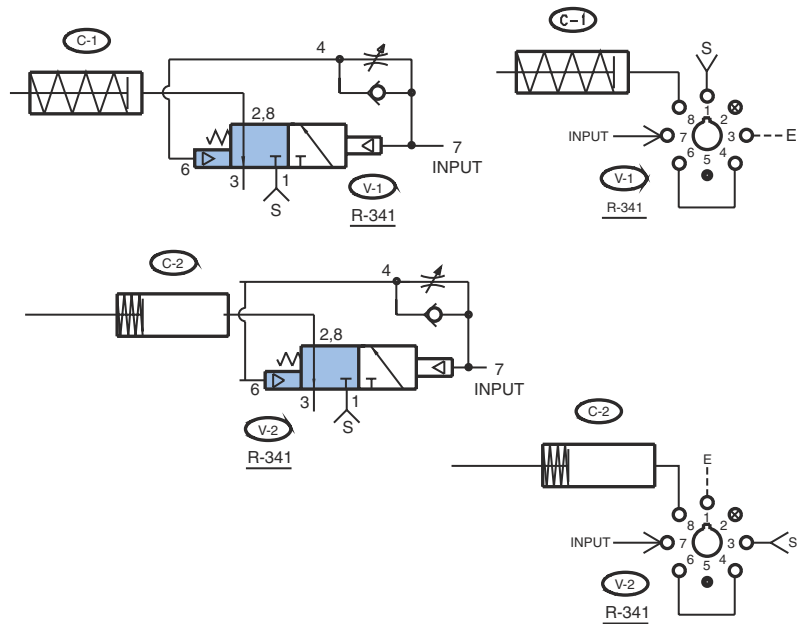
Turning on the toggle switch V-1 sends a signal through V-2 and to the flow control of V-3 where it is delayed before piloting the 3-way (normally closed) valve V-3, which extends C-1. The output of V-3 also goes to the flow control of V-2 where it is delayed before piloting the 3-way (normally open) valve V-2. When V-2 shifts, it shuts off the original signal from V-1 and exhausts the pressure that has piloted V-3, allowing the spring to shift the valve.

This causes C-1 to retract and also exhausts the pressure that has piloted V-2, allowing the spring to shift the valve. This allows the signal from V-1 to start the cycle over again. The adjustment on V-3 controls the "IN" duration, and the adjustment on V-2 controls the "OUT" duration at C-1.



## Adjustable Pulse Valve

The R-341 delay valve may be used to provide an adjustable pulse (N.C.) or adjustable off (N.O.) signal. When an input occurs at port 7 it immediately pilots the valve and gives a signal at ports 2 & 8, which extends C-1. The same input is also being delayed through the flow control (between 7 & 4) until enough pressure builds up to actuate the auxiliary pilot which, together with the spring, overcomes the opposite pilot and shifts the valve shutting off the output. C-1 then retracts. The input must be removed before the valve will reset and cycle again. Since the input is separate from the supply and output valving, separate pressures or fluids can be used in the valve. Pulse times can range from 25 MS to 5 seconds. The second drawing shows the R-341 piped normally open. The same sequence applies as above, only the valve is going off for a period instead of on.

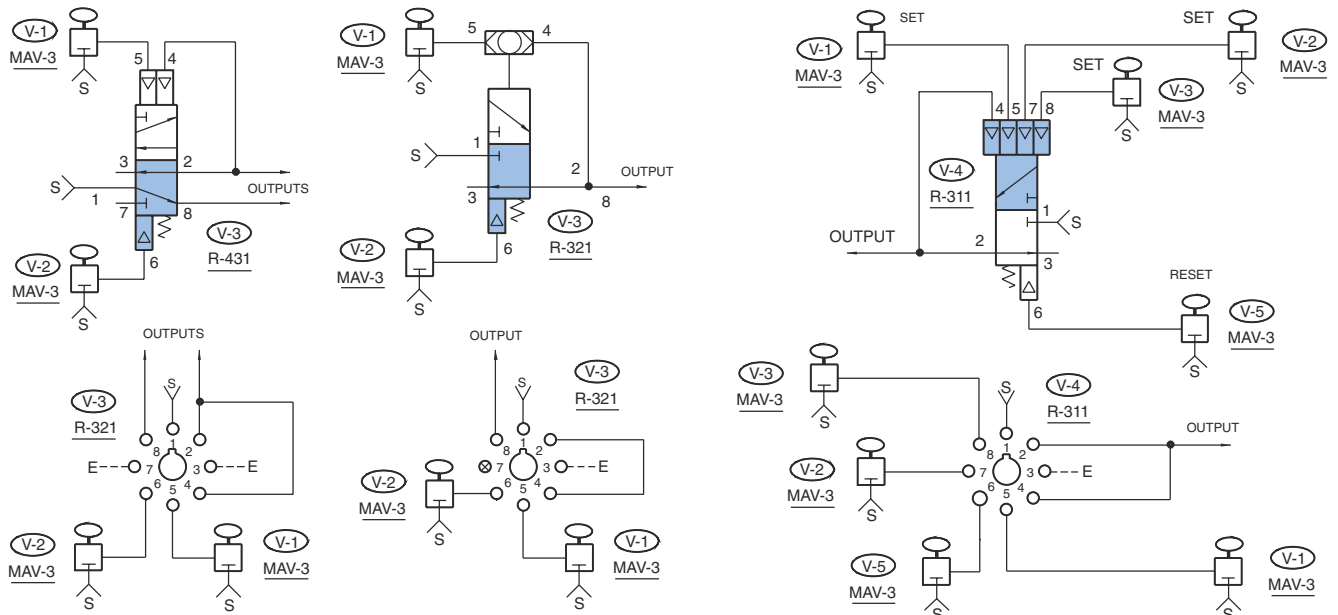


## Set-Reset Circuits

Shown are three examples of set-reset circuits, also called "latch" circuits. There are many ways to set or reset a valve or group valves. These examples make use of the unique auxiliary pilots available on many of the modular valves.

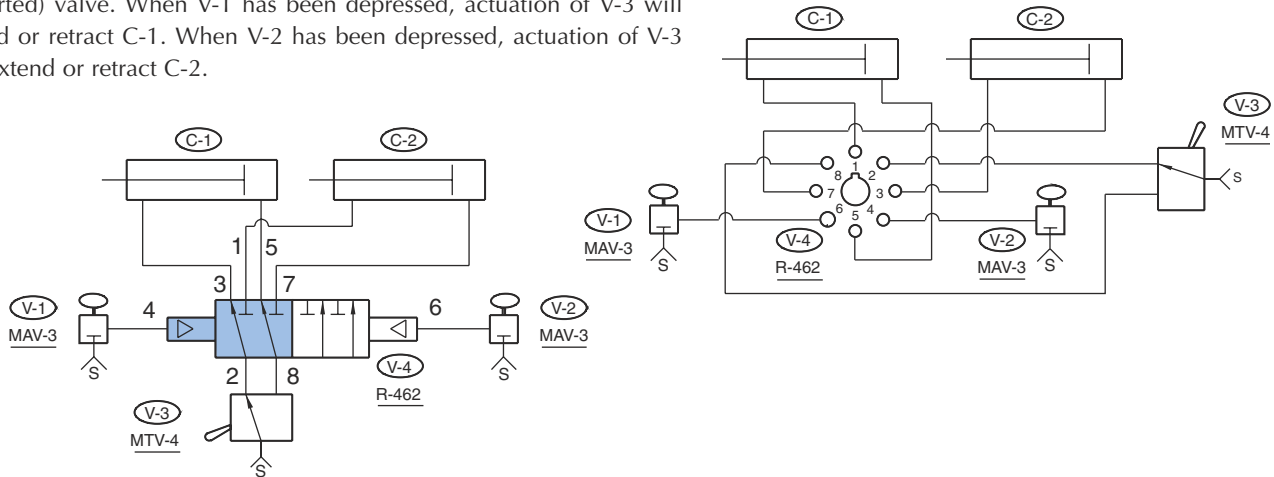
A set occurs when a valve is actuated and part of the output is used to hold the valve in the actuated position, even though the original pilot signal may be gone.

Generally a circuit is reset by interrupting the "set" pilot line or air supply to the valve when an opposite pilot is present to shift the valve. The modular auxiliary pilot, in combination with the valve spring, will overcome any or all opposite pilot(s) to reset the circuit.



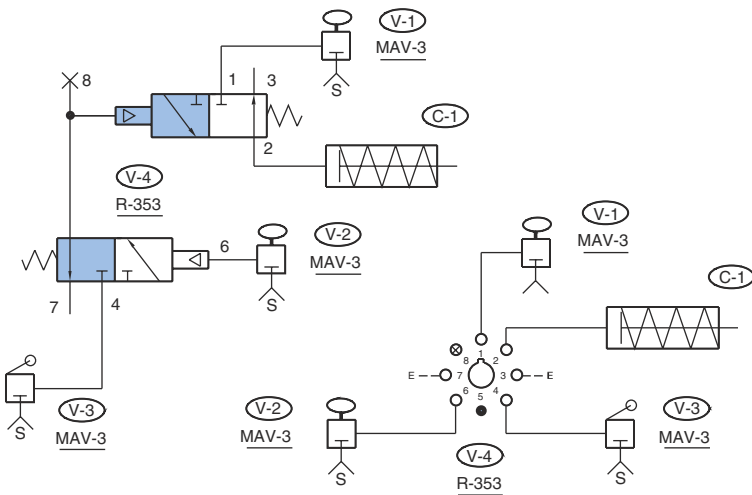
## Six Ported 4-Way

This circuit controls two double acting cylinders with a single 4-way (6 ported) valve. When V-1 has been depressed, actuation of V-3 will extend or retract C-1. When V-2 has been depressed, actuation of V-3 will extend or retract C-2.



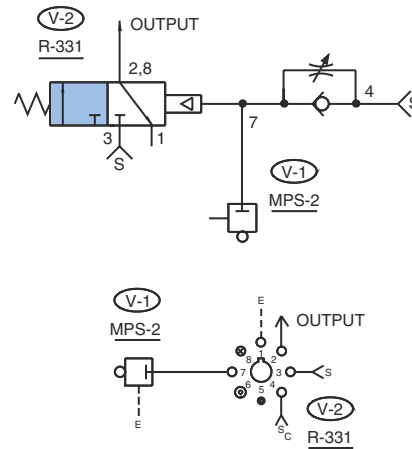
## Three Input "And"

The R-353 valve will give an output at C-1 only when V-1, V-2, and V-3 are depressed. Remove any of the three inputs and the output ceases.



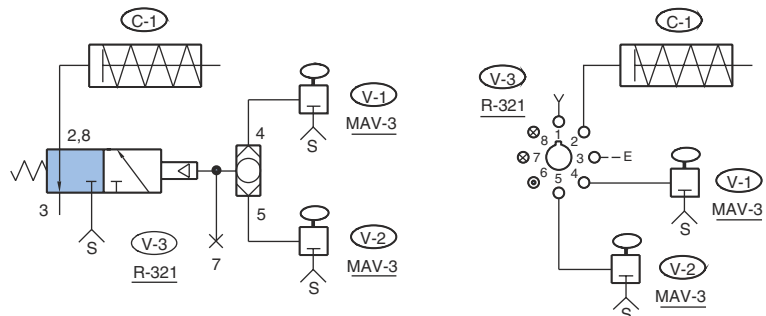
## Exhaust Piloted 3-Way Valve

Pressure in line 7 holds pilot down on the valve V-2 which has no output signal. When V-1 is actuated, pressure is exhausted from line 7 faster than the adjusted supply can make it up. The spring then shifts the valve giving an output at ports 2 & 8. (Port 8 is shown as blocked.)

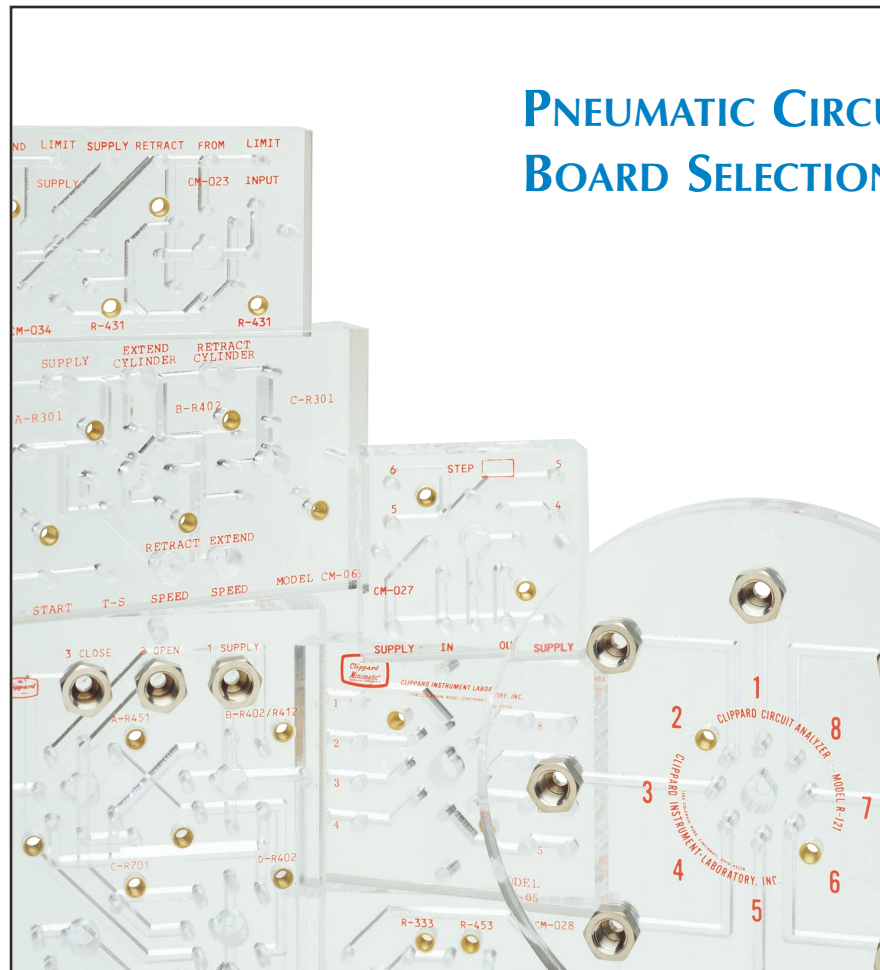


## Piloting From Two Inputs

Actuating of either V-1 or V-2 will pilot V-3 causing C-1 to extend. The R-321 is shown normally closed. It may also be used normally open, as a selector, or as a diverter. An R-315 provides the same function by having two separate pilots.



## PNEUMATIC CIRCUIT BOARD SELECTION GUIDE



- |        |  |        |   |
|--------|--|--------|---|
| CM-01  | Circuit Analyzer                                   | CM-024 | Sequencing Circuit, 5 step                    |
| CM-02  | Adapter Manifold, 1/8" NPT                         | CM-025 | Sequencing Circuit, 2 step                    |
| CM-03  | Binary Circuit                                     | CM-026 | Sequencing Circuit, 3 step                    |
| CM-04  | Adapter Manifold, 10-32 Single                     | CM-027 | Sequencing Circuit, 1 step                    |
| CM-05  | Adapter Manifold, 10-32 Dual Ports                 | CM-028 | Oscillator, Double Acting                     |
| CM-06  | Auto Cycling                                       | CM-030 | Auto Cycling, Input / Output Flexibility      |
| CM-07  | R-471 / R-481 Manifold, Single                     | CM-031 | Auto Cycling, Enhanced Flexibility            |
| CM-08  | Binary Clamp Control                               | CM-033 | Auto Cycling Control for External Power Valve |
| CM-010 | Double Electronically Piloted Valve                | CM-034 | Latching Circuit For Two Hand No Tie Down     |
| CM-011 | Oscillator, Single Output                          | CM-035 | Sequencing Circuit, 4 step                    |
| CM-016 | 4 Valve Manifold, 4-way                            | CM-036 | Adapter Manifold, 2 Valves                    |
| CM-018 | Double Electronically Piloted Valve, Closed Center | CM-037 | Adapter Manifold, 3 Valves                    |
| CM-019 | R-471 / R-481 Manifold, 4 Valves                   | CM-038 | Two Hand No Tie Down with Latch Circuit       |
| CM-020 | R-471 / R-481 Manifold, 6 Valves                   |        |   |
| CM-023 | Two Hand No Tie Down                               |        |   |



## FEATURES & BENEFITS

### Circuit Boards and Clippard Modular Components



Clippard clear acrylic pneumatic circuit boards are designed to provide a compact and highly efficient pneumatic control system, with the use of Clippard modular components and other Clippard products.

Many valving systems require a considerable amount of piping, tubing and fittings to create the necessary circuitry. The piping originates beneath the valve and often needs extra space and clearance to complete. The acrylic circuit board provides a place to mount the components and easy methods to hook-up the circuit, generally on the top side of the circuit board. For a single circuit the original assembly method can be the best direction to take... but where a number of identical circuits are prepared, the acrylic circuit board technology offers a series of distinct advantages.



In addition to the Clippard modular line of products, the circuit boards also accommodate Clippard EV/ET manifold mount valves, and many other valves, gauges, mufflers, as well as hose barb fittings. The combination of Clippard pneumatic circuit boards, valves, fittings, and accessory items can provide a complete pneumatic circuit system with the knowledge of dependability and success.

### FEATURES

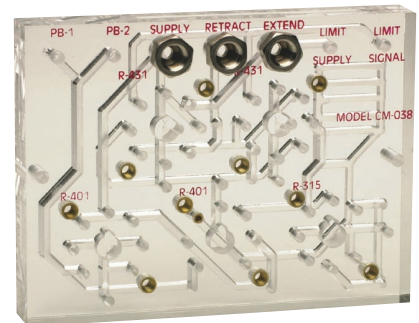
- Custom-made pneumatic circuit boards hold all components
- Simplifies assembly
- Reduces piping
- Helps assure accuracy of connections
- Component ID silk-screened on subplate surface
- Inputs and outputs clearly marked
- Threaded brass inserts hold components securely
- Change valves quickly without affecting connections
- Use any number of components
- Makes sophisticated circuitry manageable
- Circuit boards also accept Clippard electronic interface valves
- Saves assembly costs

## Pneumatic Circuit Boards

This section provides detailed information about a series of circuit boards for popular uses. These range from the very simple single-module circuit, to more complex multi-step sequencing circuits using pneumatic control to automate machine or process cycles. The descriptive materials include photographs, dimensional drawings, circuit diagrams where applicable, lists of products required, and descriptions of the function of the circuit.

The circuit boards included in our price list are maintained in stock with our distributors and/or in our finished goods inventory at our factory. They are available for fast delivery.

For assistance in selecting a circuit board to suit your use, ask your local Clippard distributor to discuss your application.



## Custom Pneumatic Circuit Boards

You can have a faster, more dependable way to produce multiples of the same pneumatic circuit... a system that enables you to speed circuit assembly while assuring accurate hookups.

Using Clippard modular components, valves and controls mounted on a custom circuit board, you get the same circuit time after time.

Assembly time and effort are reduced. A large number of parts, fittings, and lengths of tubing are no longer needed. The resulting circuit is

compact, neat in appearance, and can be easily mounted for permanent installation. No more "haywire" plumbing. Piping errors are eliminated, and an efficient, dependable, and attractive control results.

Each custom circuit board is individually produced with the same high quality standards associated with the Clippard name. By utilizing Clippard's unique manufacturing process, these clear acrylic units provide sealed internal passageways between valves without the need for gaskets, clamps, or piping.

Sizes and dimensions will vary according to your application. By adapting your control requirements to the versatility of Clippard Modular Valves, your Clippard distributor can provide you with detailed application information.

To complete your pneumatic control, just plug in the modular valves and tighten the two captivated screws on each valve. Connect inputs and outputs to the circuit board and the circuit is ready to run. It's the fastest most efficient circuit system available.





# STANDARD PNEUMATIC CIRCUIT BOARDS

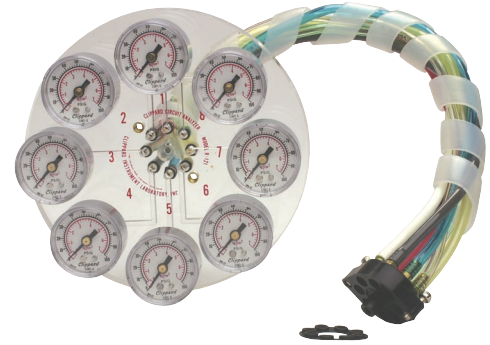
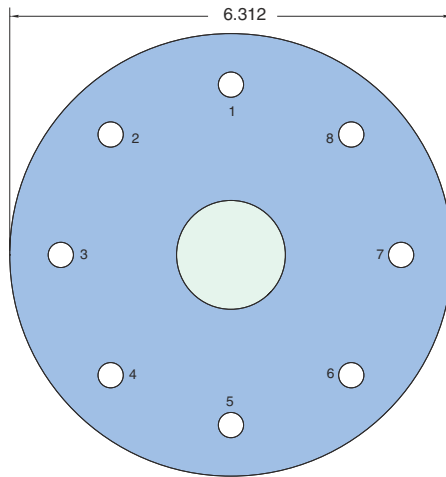
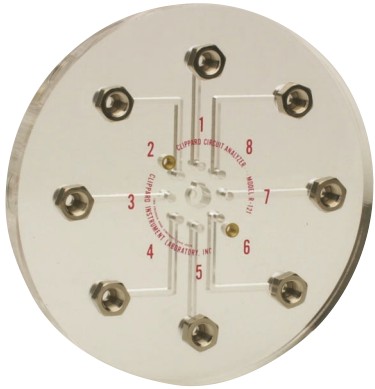
## CM-01

Circuit board for octoport circuit analyzer

**Size:** 6 5/16" dia. by 3/4" thick. Holds one module - plus 8 Clippard pressure gauges

**Use:** For testing and to analyze Clippard modular valve circuits. To order circuit board only: specify part #CM-01

To order analyzer complete with pressure gauges, hose and connections, specify Part # R-121.

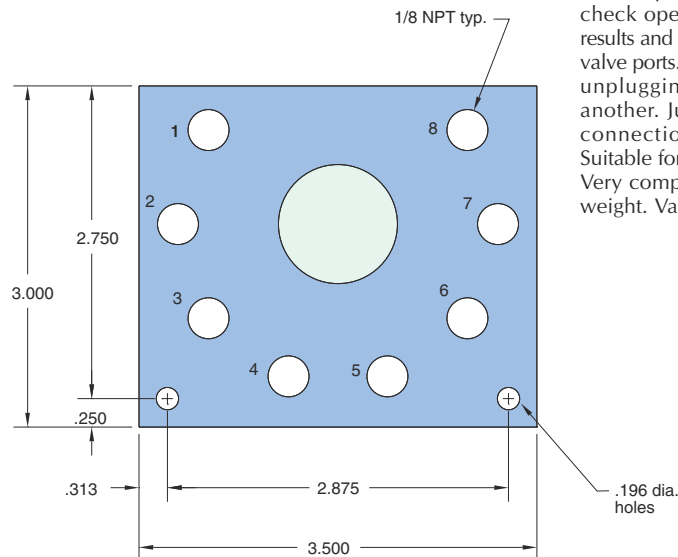


## CM-02

Adapter circuit board single module

**Size:** 3 1/2" x 3" x 9/16" - 1 module

**Use:** Provides mounting for a single modular valve, with 8 individual 1/8" NPT ports furnished on the top side of the circuit board. Beneficial in experimenting or bread boarding a new circuit or one operation of a circuit. You can quickly connect input and outputs on a temporary basis, and check operation of the module through results and pressures resulting at the various valve ports. Test several modules by merely unplugging one, and replacing it with another. Just two screws to loosen. All connections are automatically made. Suitable for building a one module circuit. Very compact size. Easy to mount. Light weight. Valves are easily replaced.

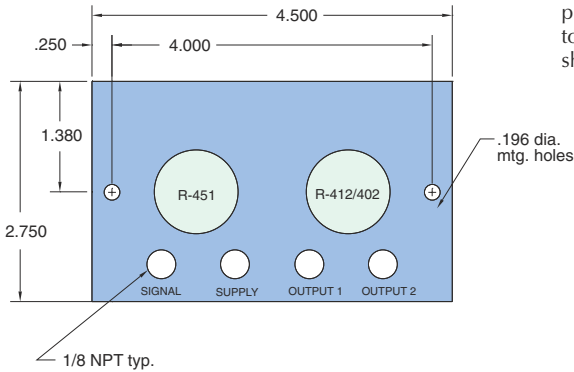
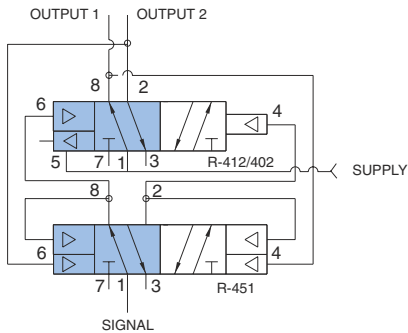






## CM-03

### Binary redirect circuit boards



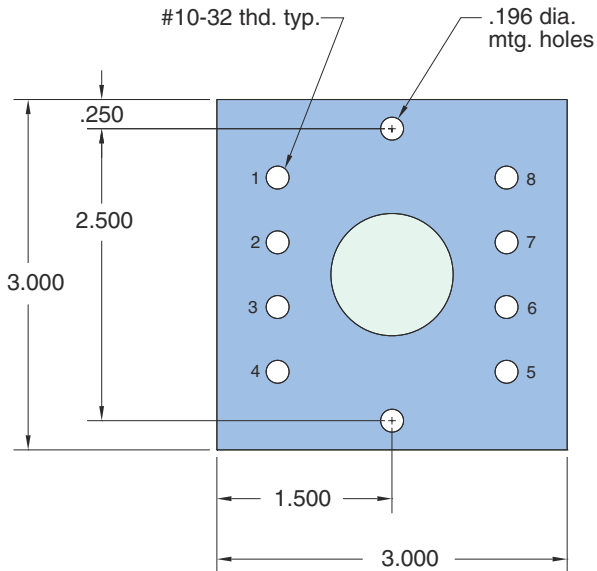
**Size:** 4 1/2" x 2 3/4" x 13/16" thick - 2 modules

**Use:** Combines the R-451 and R-402 or R-412 in a binary redirect or flip-flop circuit. Provides 1/8" NPT ports for all connections.

**Operation:** Use of the R-412 provides a "memory" function to return the output to a known position (port 8) whenever air is first turned on to the circuit. This output pilots port 4 of the R-451 positioning it for the next signal. A signal input passes through the R-451, ports 1 to 2, and pilots port 4 of the R-412. The output of the R-412 shifts to port 2 and also pilots port 6 of the R-451. When the next signal input is received, it passes through the R-451, ports 1 to 8, and pilots port 6 of the R-412, shifting its output back to port 8.

## CM-04

### Universal 10-32 circuit board



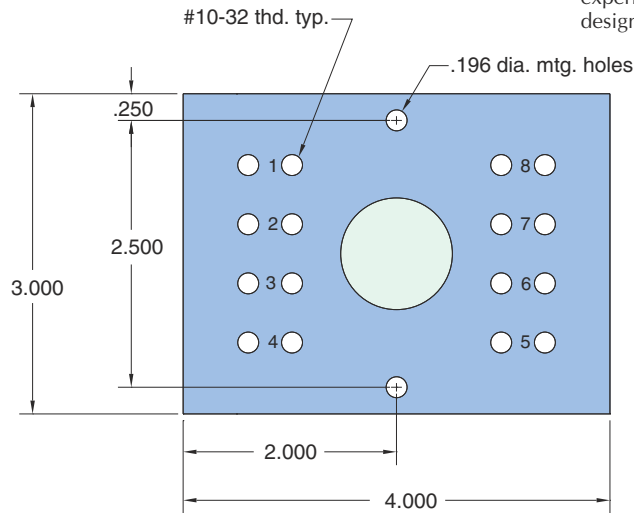
**Size:** 3" x 3" x 5/8" thick - 1 module

**Use:** Provides mounting for a single modular valve, and provides 10-32 ports on the top side of subplate. Similar to CM-02, but ports are 10-32 threaded instead of 1/8" NPT.

Handy for circuit development and single module circuits

## CM-05

Adapter circuit board with dual 10-32 ports

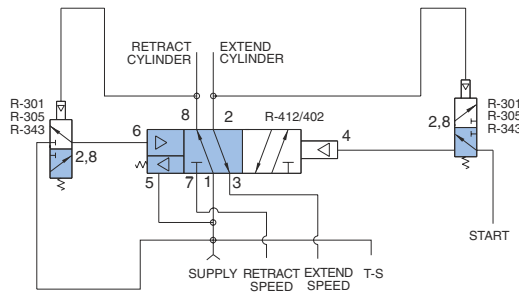
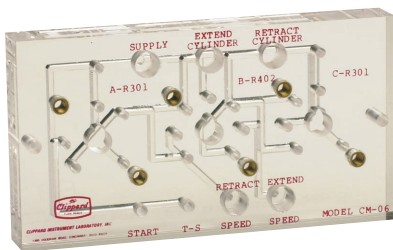


**Size:** 4" x 3" x 5/8" thick - 1 module

**Use:** Provides mounting for a single modular valve, and provides TWO 10-32 ports for each valve outlet. Ports are on the top side of the circuit board. Dual port arrangement is helpful where outputs need to be directed to more than one circuit location. Also helps work on alternate circuit uses, circuit splits, experimental design, testing, and circuit design verification.

## CM-06

Automatic cycler without limits



**Size:** 6" x 3 1/4" x 13/16" thick - 3 modules

**Use:** Circuit board has 1/8" NPT cylinder outlet ports, 10-32 ports for "on-off" toggle valve, for the cycling of a double acting cylinder without the use of limit valves.

**Operation:** This circuit enables a double acting cylinder to reciprocate without the use of limit valves and to control its speed in each direction. As C-1 retracts, it creates a back pressure behind the piston. It is further increased by restricting the exhaust air at port 3 of V-2 to slow the return of the cylinder rod. This back-pressure holds the pilot down on V-3. When C-1 has fully returned, the back pressure diminishes. When there is insufficient pressure to hold the pilot down on V-3, the spring shifts the valve, which sends pressure to the right hand pilot (port 4) of V-2. This causes V-2 to shift, which starts C-1 to extend and pilots V-3 exhausting the pressure on the right hand pilot of V-2. As C-1 extends, an identical sequence occurs between V-1 and V-2 causing the 4-way valve to shift when C-1 has fully extended.

