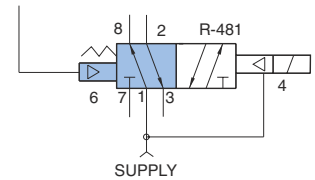
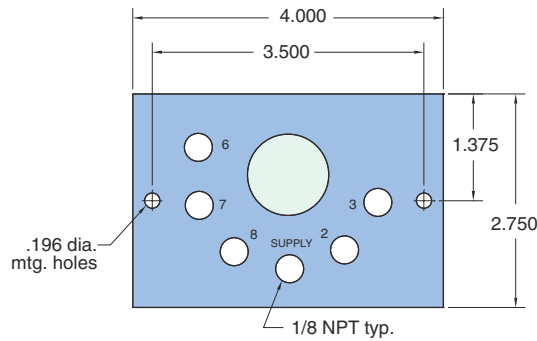


## CM-07

Circuit board for R-471/472/481/482 with 1/8" NPT ports

**Size:** 4" x 2 3/4" x 5/8" thick - 1 module

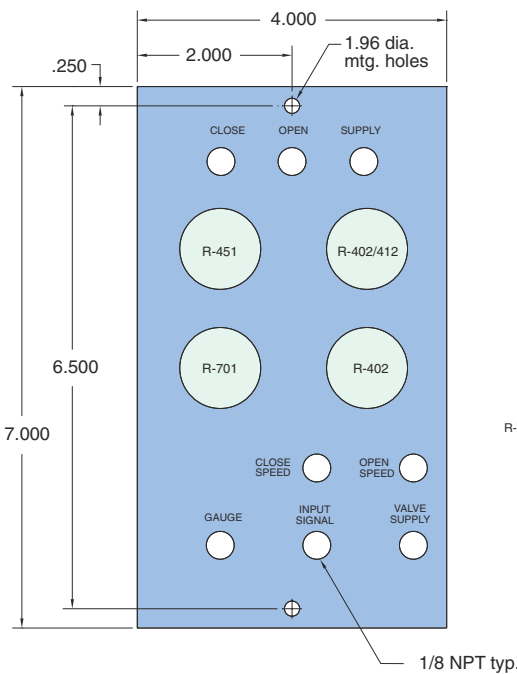
**Use:** Port #4, the supply to the pilot valve, is connected to the main supply port #1. Provides 1/8" NPT ports in the top of the circuit board.



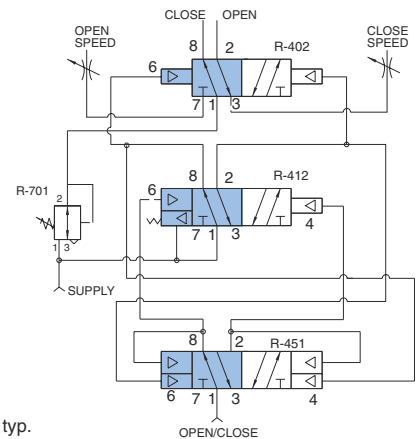
## CM-08

Circuit board for binary clamp control with adjustable clamp pressure

**Size:** 4" x 7" x 1" thick - 4 modules plus controls and fittings  
Just PUSH for "On"  
Just PUSH for "Off"



The Clippard CM-08 circuit board and the control valves that mount on it form a single push button pneumatic "OPEN/CLOSE". Binary clamp control with pressure and speed controls. The components are sold separately and can be assembled in a few minutes by the user. The use of this CM-08 package offers special user benefits: saves time; reduces cost and labor of piping; automates product tasks with easy to apply unit; binary push button operation; speed control built-in; pressure regulation included; may be operated remotely; equipped with "Auto-Reset" feature.





# STANDARD PNEUMATIC CIRCUIT BOARDS

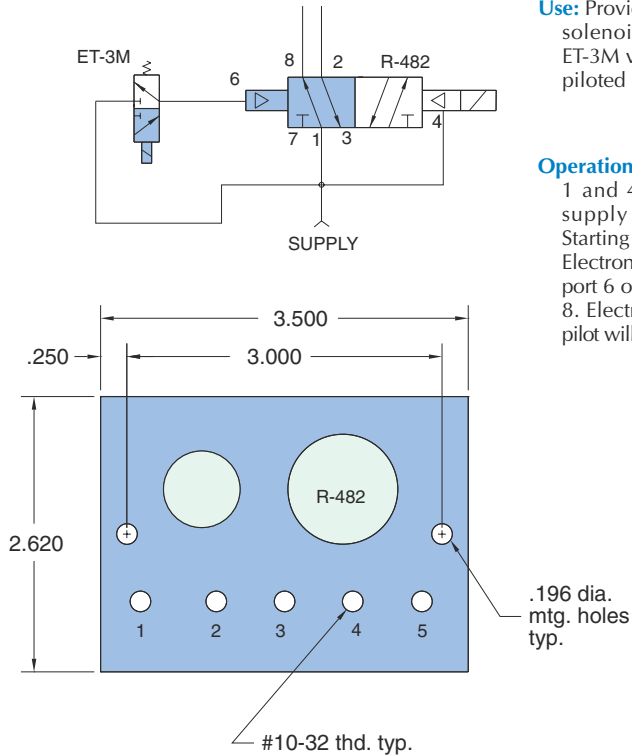
## CM-010

Circuit board for double electronic piloted valve

**Size:** 3 1/2" x 2 5/8" x 5/8" thick - 1 module and one ET-3M-xx valve

**Use:** Provides mounting for one R-482 solenoid operated valve and one ET-3M valve for a double electronic piloted control circuit.

**Operation:** Supply air passes to ports 1 and 4 of the R-482 and to the supply port of the ET-3M valve. Starting position of R-482 may vary. Electronic signal to ET-3M will pilot port 6 of R-482 giving output at port 8. Electronic signal to the R-482 ET pilot will shift valve to output at port 2.



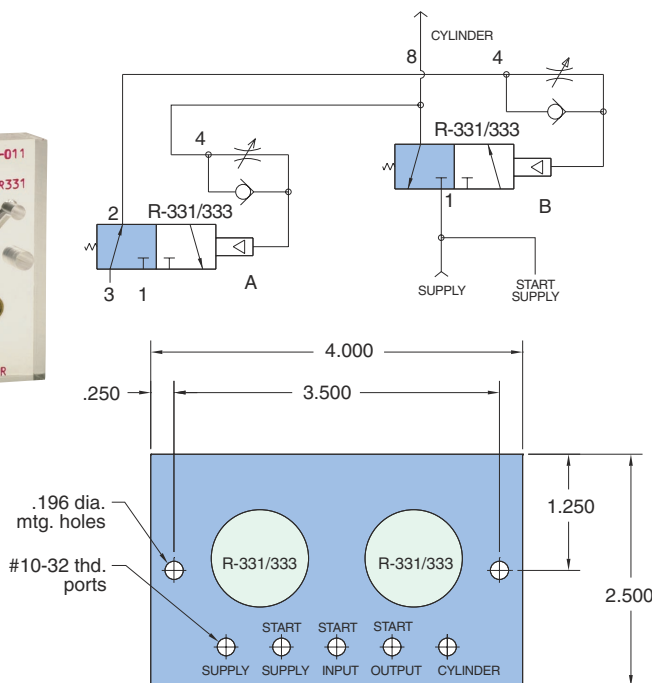
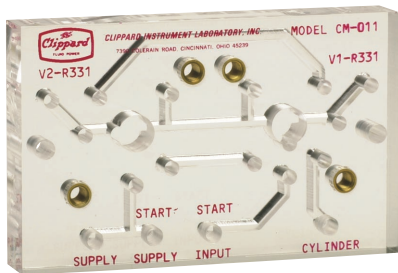
## CM-011

Circuit board for autocycling of single acting cylinder

**Size:** 4" x 2 1/2" x 9/16" thick - 2 modules

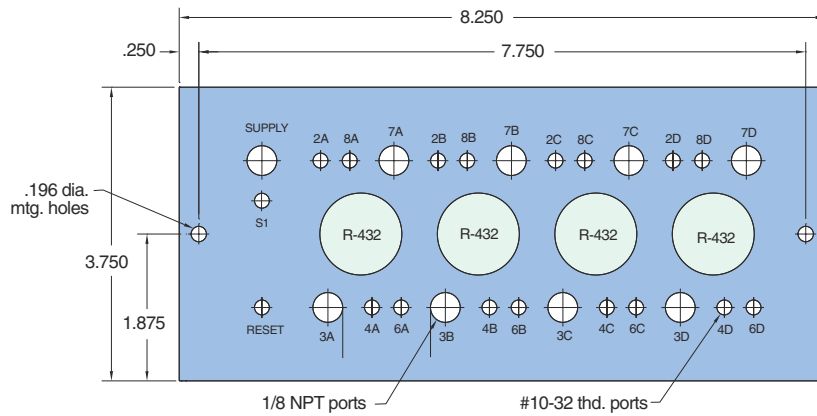
**Use:** Provides mounting for two R-331 or R-333 modular valves. Circuit provides for automatic cycling of the two modular valves. The needle valve adjustments in the modular valves allow for controlled on/off delay signal providing variable cycle speed.

**Operation:** With no start input, cylinder will remain in retracted position. Turning on the start input signal causes valve "A" to output from port 2 to port 4 of "B". This signal is restricted in and pilots "B" to shift. When "B" has shifted, air flows through "B" from port 1 to 2 extending the cylinder. This output also goes to port 4 of valve "A" and is restricted in. When sufficient pressure builds to shift "A", the output of "A" drops out exhausting the port 4 pilot of "B" which allows the cylinder to retract to the starting position. Adjustment of the respective flow controls allows individual frequency controls of the extend and retract strokes.



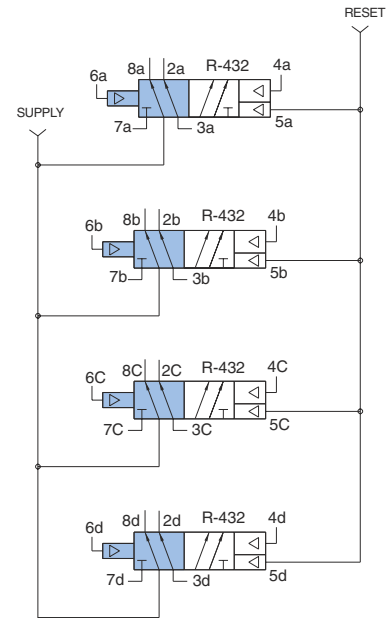
## CM-016

Four way valve circuit board  
(common supply)



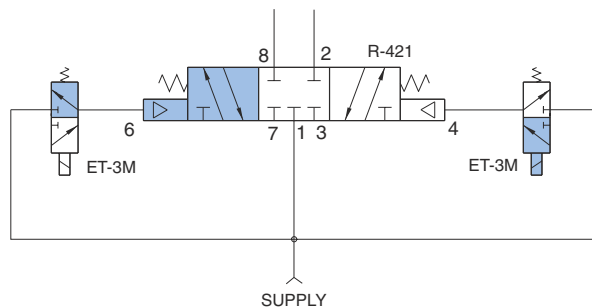
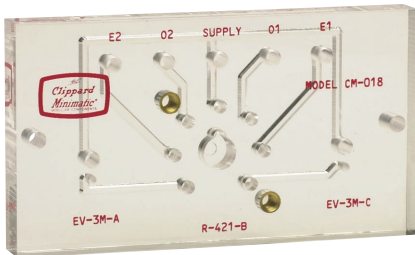
**Size:** 3 3/4" x 8 3/16" x 9/16" thick - 4 modules

**Use:** Provides mounting for four 4-way modular valves operating from a common supply. May utilize Clippard R-401, R-402, R-405, R-410, R-412, R-421, R-431, R-432, R-441, or R-442 valves. Supply and exhaust are tapped 1/8" NPT. Outputs are 10-32 tapped ports in the circuit board.



## CM-018

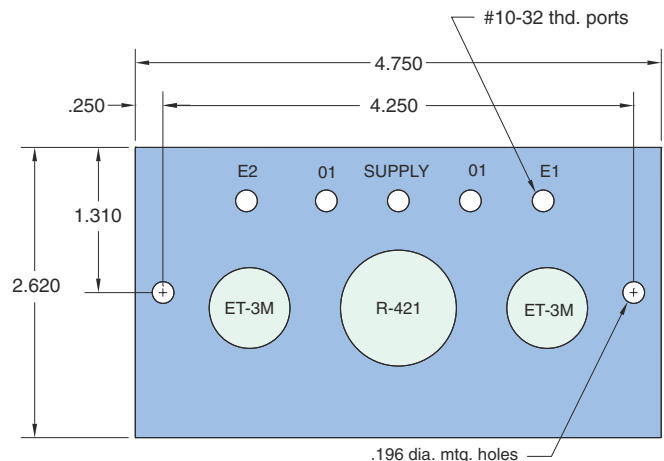
Circuit board for double electronically piloted  
4-way valves



**Size:** 2 5/8" x 4 3/4" x 9/16" thick - 1 module;  
2 ET-3M-xx valves

**Use:** Provides mounting platform for one R-402, R-412 or R-421 pneumatically operated valve and two ET-3M valves for a double electronic piloted control circuit

**Operation:** Supply air passes to port 1 of the R-421 and to supply ports of the ET-3M valves. R-421 is a three position, center closed valve, spring centered. Electronic signal to either ET-3M will pilot R-421 giving corresponding output as long as that ET valve remains energized. Energizing both ET valves simultaneously will cancel out opposing pilots. Springs will return R-421 to center-closed position.





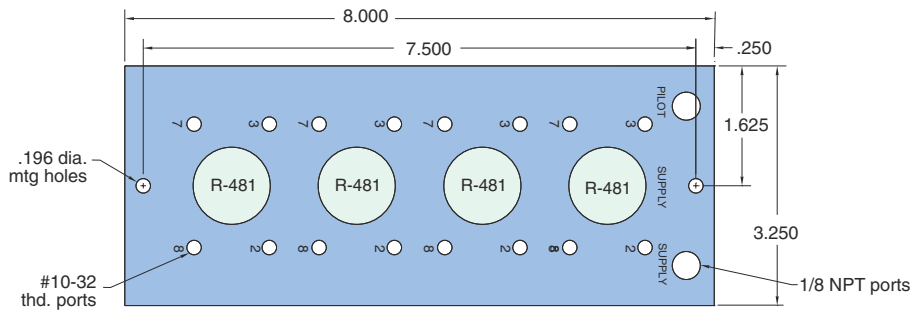
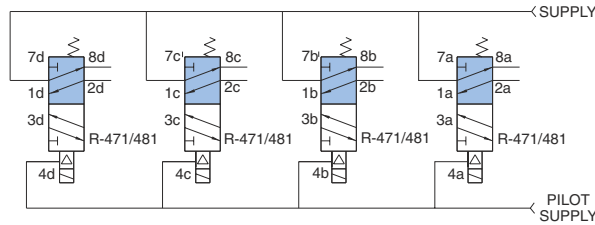
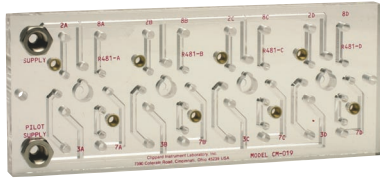
# STANDARD PNEUMATIC CIRCUIT BOARDS

## CM-019

Circuit board for four R-471/481 4-way valves

**Size:** 3 1/4" x 8" x 9/16" thick - 4 modules

**Use:** Convenient and compact mounting for a group of four electronically piloted or low pressure piloted 4-way modular valves. Separate main valve supply and pilot supply 10-32 ports provided for access to exhaust for speed control.

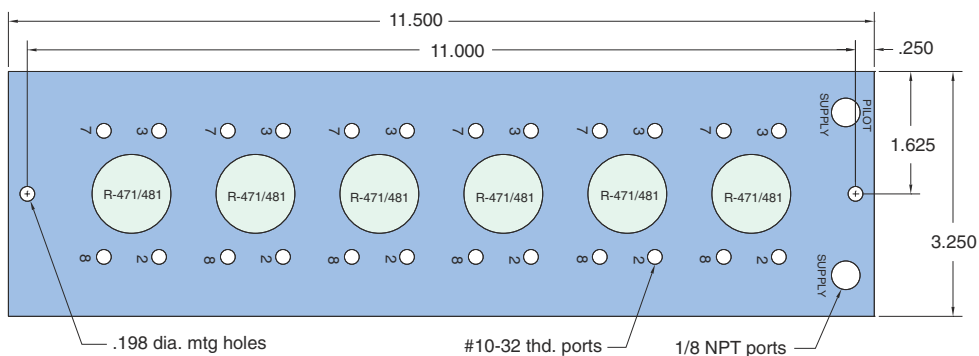
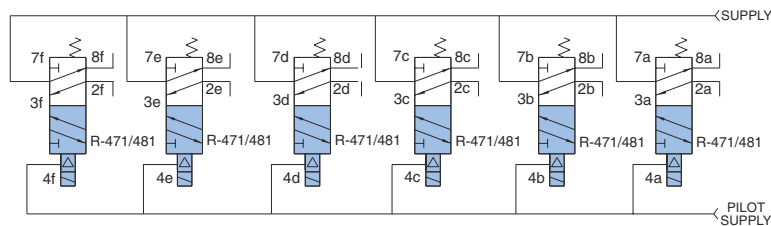


## CM-020

Circuit board for six R-471/481 4-way valves

**Size:** 3 1/4" x 11 1/2" x 9/16" thick - 6 modules

**Use:** Convenient and compact mounting for a group of six electronically piloted or low pressure piloted 4-way modular valves. Separate main valve supply and pilot supply for solenoids. 10-32 ports provided for access to exhaust for speed control.

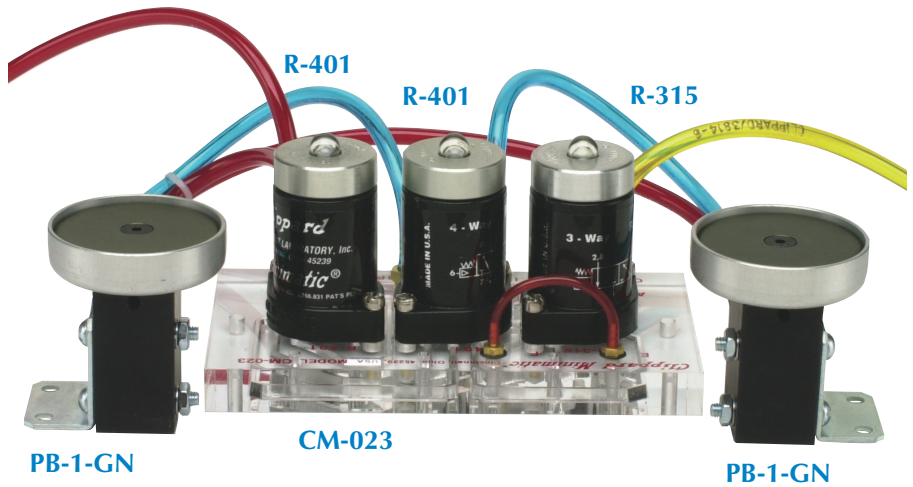


# STANDARD PNEUMATIC CIRCUIT BOARDS

## TWO HAND NO TIE DOWN



The Clippard Minimatic® CM-023 pneumatic circuit board is a self-contained modular circuit board with all interconnections needed to provide a two hand no tie down (THNTD) pneumatic circuit. The board is designed to be used with three Clippard modular plug-in control valves and to eliminate the piping time and materials normally associated with circuitry. Use of the CM-023 will assure simple and rapid installation of your two hand no tie down circuit.



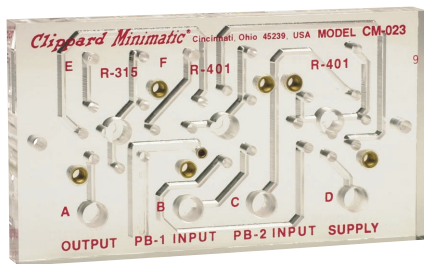
The CM-023 THNTD control circuit requires two separate input signals that must be received approximately at the same instant before an output signal is obtained. Both input signals must be spontaneous and neither can be "tied down" or made constant. The main function of this control is to require a machine operator to use both hands to actuate the machinery, helping to insure that the operators hands are not in a position to be injured by the machine as it is actuated. When used with the Clippard PB guarded palm button valves which have been properly positioned and mounted, the CM-023 THNTD control will provide an output to actuate machinery only when the operator pushes each button simultaneously.

The growing emphasis on employee safety and governmental regulations requiring safe work conditions have encouraged the widespread use of two hand no tie down controls to protect workers from injury. Numerous types of THNTD controls have been introduced to the market. Many are cumbersome, bulky and expensive. The Clippard Minimatic® THNTD package offers ease of installation and maintenance in a compact size.

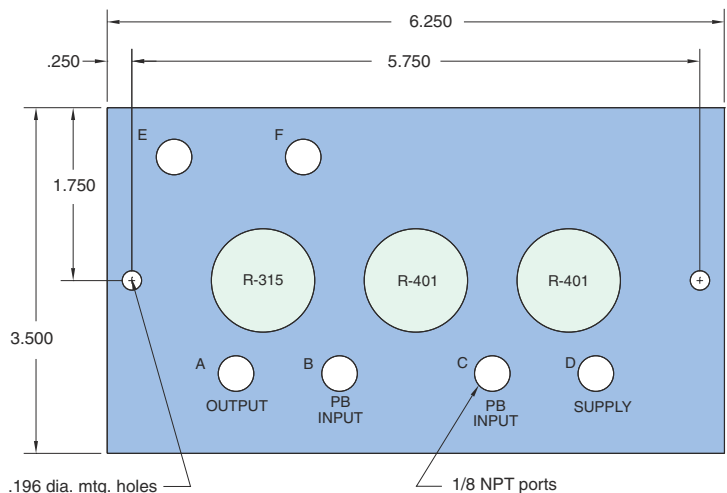
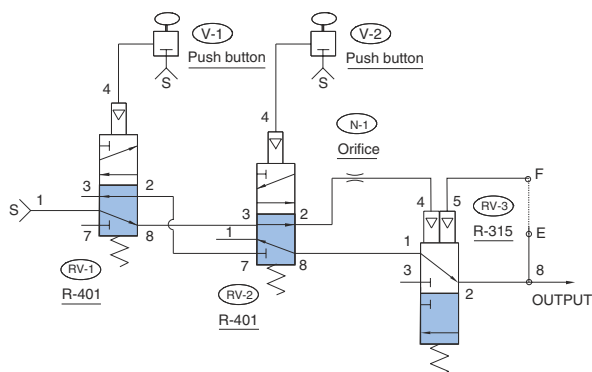
### CM-023

Circuit board for two R-401 and one R-315 valves  
Warning: See instructions shipped with product

Size: 6 1/4" x 3 1/2" x 9/16" thick - 3 modules



**Use:** The Clippard Minimatic® CM-023 circuit board is a self-contained modular circuit board with all interconnections needed to provide a Two Hand No Tie Down (THNTD) pneumatic circuit. Use of the CM-023 will assure simple and rapid installation of your two hand no tie down circuit.

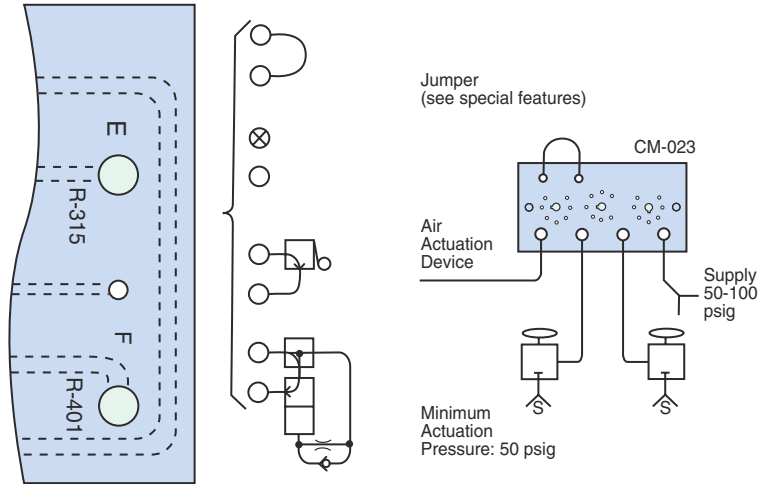


### Circuit Operation

RV-3 is held open by supply air that passes through RV-1, RV-2 and N-1. When RV-1 is actuated alone, the pilot air for RV-3 flows back through the N-1 and RV-2 to atmosphere at RV-1 and RV-3 is closed by the spring. When RV-2 is actuated alone, the same sequence occurs except the pilot air from RV-3 exhausts to atmosphere via RV-2. Restriction N-1, which determines the time span during which both signals must be received in order to obtain an output.

When RV-1 and RV-2 are actuated together, supply air is directed through RV-1, RV-2 and RV-3 to the output providing a momentary output signal that is determined by N-1. If a maintained output is required, a jumper between "E" + "F" maintains an output as long as the operator is depressing both palm buttons.

The indicator on RV-3 (R-315) must be down for an output to be obtained. If either RV-1 or RV-2 is actuated separately, their respective indicator will go up, but after approximately one second the indicator on RV-3 (R-315) will go down showing that the valve has shifted and an output cannot be obtained. Circuit performance and sequence should be periodically observed to verify proper function. Absolutely no alterations or modifications should be made to this circuit or its component parts.



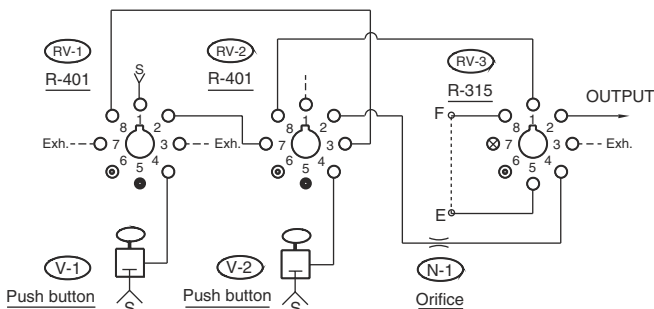
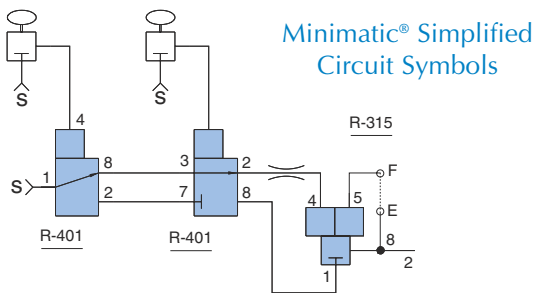
**Maintained Output** occurs as long as both pushbuttons are held. Release of either button terminates the output. (Connect E to F)

**Momentary Output** gives a single output pulse that is about 50 MS in duration. (Plug E with 11755 screw plug; F is open)

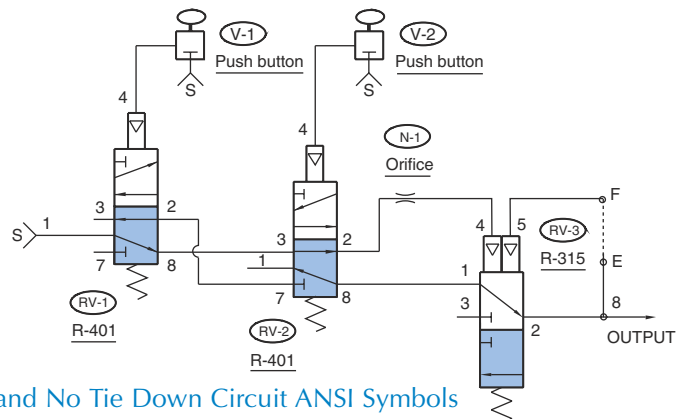
**Cancelable Output** terminates the output after a normally open 3-way limit valve has been tripped, even if both pushbuttons are still held. (Interpose normally open 3-way valve)

**Cancel Output after Time Delay** is a variation of cancelable output (above) where pneumatic delay valve such as Clippard Model R-331 is set to cancel the output after a designated time interval has elapsed. (Interpose normally open 3-way delay valve)

It is the *user's responsibility* to determine which special feature can be safely used in his particular application.



Octoport Piping Diagram



Two Hand No Tie Down Circuit ANSI Symbols

Shown below is a schematic for connecting additional R-932/R-934 stages. This technique would apply if connecting two CM-024's, CM-024 to a CM-026 or a CM-027, or a CM-024 to a CM-025 as shown.

**1** The supply into the "supply port" on the CM-024 through the jumper line provides supply to the additional R-932 stage board.

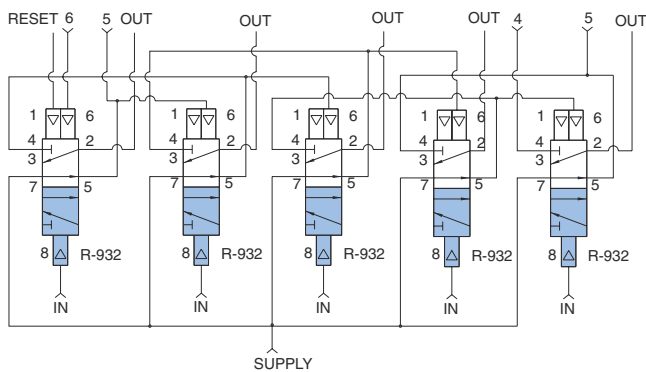
Port 5 on the first CM-024 board and the last additional R-932 must be plugged, (Use Clippard P/N 11755 screw plug.)

**3** The output of valve 7 on the CM-025 is connected to port 6 on the CM-024. The purpose is to establish the next cycle. The connection from the end port on the additional stage R-932 / R-934 connects to port 4 of that board. This provides pressure to port 6 of CM-024 when valve 7 of CM-025 shifts to the "output" mode. (This is the last step in the cycle.)

Modification of circuits can be easily accomplished by changing the input/output sequence. Refer to the Clippard Designer's Guide for additional information on this unusual and easy to use pneumatic control circuit sequence system.

## CM-024

Five valve sequence circuit board used as the starter subplate **Size:** 9 1/2" x 2 1/2" x 13/16" thick - 5 modules

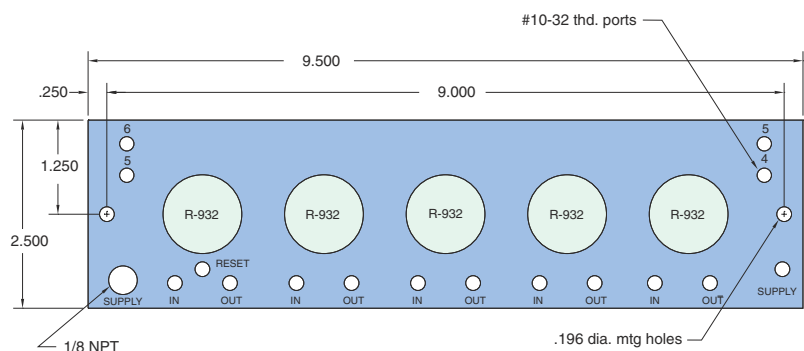


**Operation:** This five valve sequence circuit board is used as the starter; 10-32 port connections provided for signal inputs, step outputs, reset input, and jumper connections for linking multiple boards together. May be linked to CM-024, -025, -026, -027, or -035 or any combination thereof to achieve sequential steps. 1/8 NPT port provided for incoming supply with 10-32 port provided for linking supply to downstream expander units. In addition, step-by-step input requirements make integration of this manifold, with various others shown in the catalog, quick and easy for development of complex control circuitry.

**Use:** The R-932 sequence control circuit board is a compact efficient system for integrating sequential control of a multi-step operation. It has many uses throughout industry. For example:

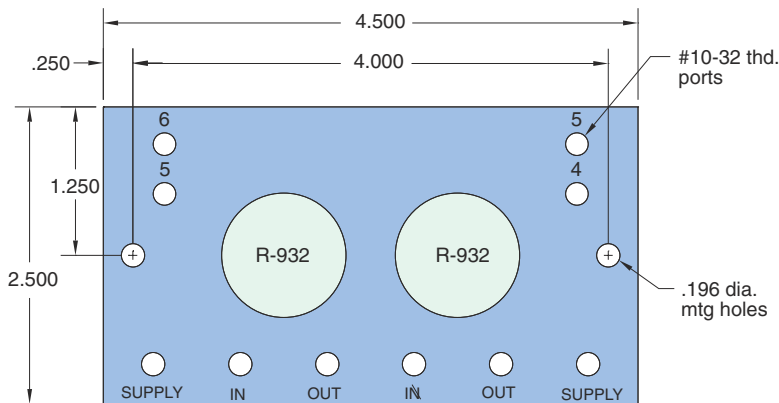
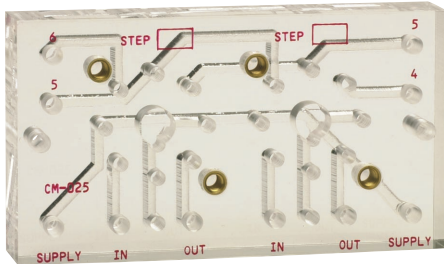
- Metalworking: multiple drilling, tapping, etc. Operation where workpiece must be clamped, worked, released, and transferred in a precise order with no overlapping steps.
- Production: where a unit is sized, wrapped, and cut in proper sequence.
- Assembly: insertion of product in package, closure, and delivery to a conveyor. The CM-024 may be linked to CM-025, -026, -027, or -035 as required to provide additional sequence steps.

**Note:** Output of last step must be connected to port 6.



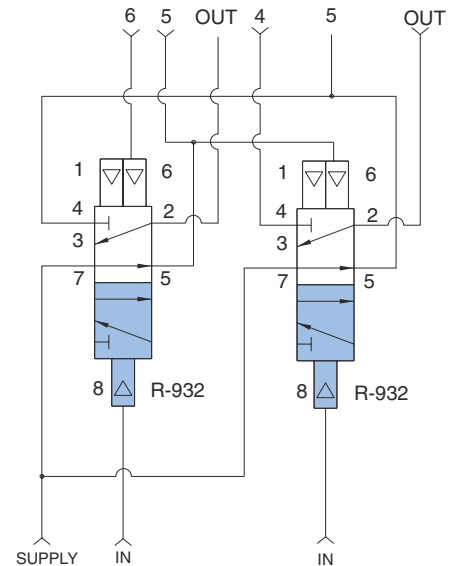
## CM-025

Circuit board for R-932 sequencing system using two modular valves



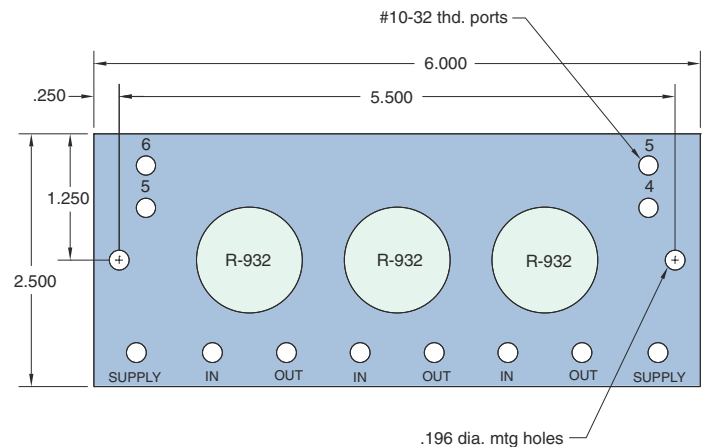
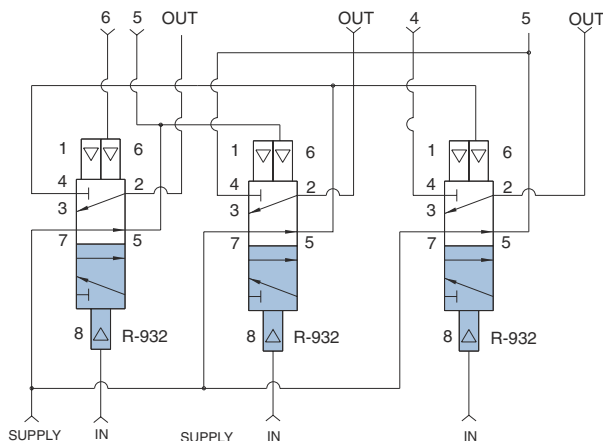
**Size:** 4 1/2" x 2 1/2" x 13/16" thick - 2 modules

**Use:** 2-valve sequence circuit board used as an expansion unit. 10-32 port connections provided for signal inputs, step outputs, supply, and jumper connections for linking multiple boards together. May serve as a final segment of circuit or be inserted between two other sequencing circuit board.



## CM-026

Circuit board for R-932 sequencing system using three modular valves



**Size:** 6" x 2 1/2" x 13/16" thick - 3 modules

**Use:** 3-valve sequence circuit board used as an expansion unit. 10-32 port connections provided for signal inputs, step outputs, supply and jumper connections for linking multiple boards together. May serve as final segment of circuit or be inserted between two other sequencing subplates.



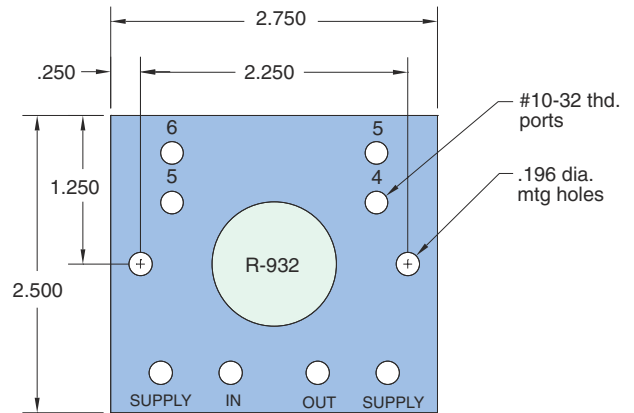
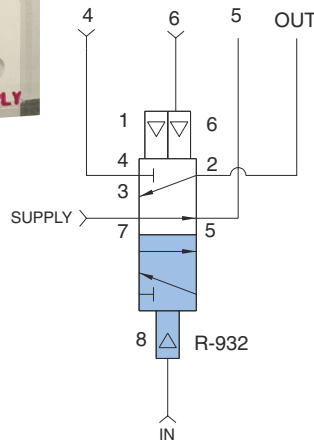
# STANDARD PNEUMATIC CIRCUIT BOARD



## CM-027

Circuit board for R-932 sequencing system using one modular valve

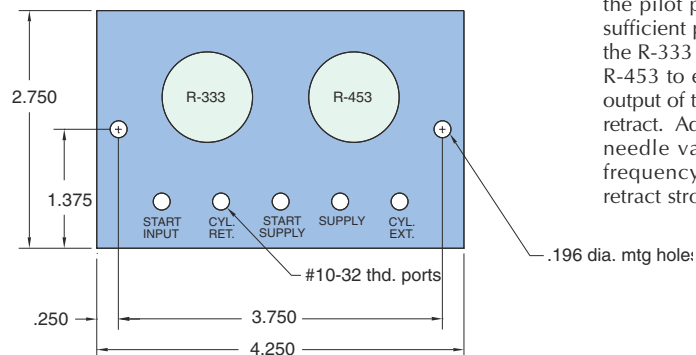
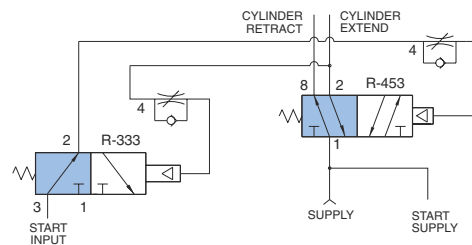
**Size:** 2 3/4" x 2 1/2" x 9/16" thick - 1 module  
**Use:** Single valve sequence circuit board used as an expansion unit. 10-32 port connections provided for signal inputs, step outputs, supply and jumper connectors for linking multiple boards together. May serve as final segment of circuit or be inserted between two other sequencing subplates.



## CM-028

Circuit board For autocycling of double acting cylinder

**Size:** 4 1/4" x 2 3/4" x 9/16" thick - 2 modules  
**Use:** For automatic cycling of double acting cylinders without the use of limit valves or magnetic sensors.

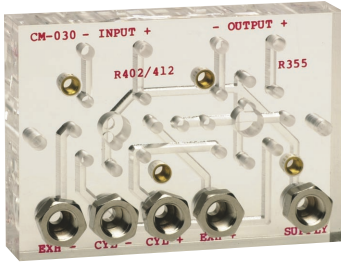


**Operation:** With no start input, turning supply air on will produce output from cylinder retract (port 8) of R-453. Sending signal to start input passes through normally open R-333, ports 3 to 2, and is metered through flow control circuit of R-453 shifts output to cylinder extend (port 2). This also sends air to the flow control circuit of the R-333 which meters air into the pilot port of the R-333. When sufficient pilot pressure is reached, the R-333 closes allowing port 4 of R-453 to exhaust, thereby shifting output of the valve back to cylinder retract. Adjustment of the respective needle valves allows individual frequency control of extend and retract strokes.

## CM-030

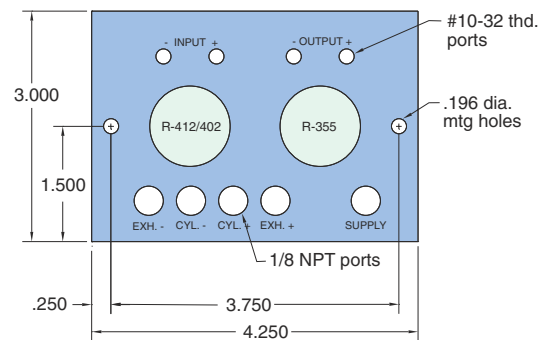
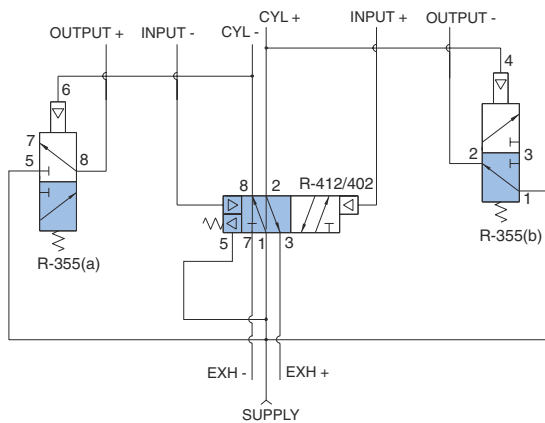
Back pressure sensing for double acting cylinders

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



**Use:** Highly versatile autocycler manifold for use as an accessory to an R-932 sequencer manifold to accomplish a cycling subroutine.

**Operation:** When supply air is first turned on, the "memory" feature of R-412 shifts output to port 8 for known starting point. When port 4 of R-355 allows air to flow from port 1 to 2 providing a signal at output (-) port. This output may be used to signal an R-932 sequencer that a step has been completed or the signal may be looped directly back into the input (+) port. This will pilot port 4 of the R-412 shifting the valve output to port 2 giving cylinder + output. As the cylinder reaches full extension, back pressure to port 6 of the R-355 decays allowing output from port 8 of that valve. This output may be used to signal an R-932 sequencer that a step has been completed or may be looped directly back into the input (-) port to repeat the cycle. Cylinder exhaust ports are provided in the manifold in 1/8 NPT to facilitate use of needle valves for speed control.



## CM-031

Back pressure sensing for double acting cylinder

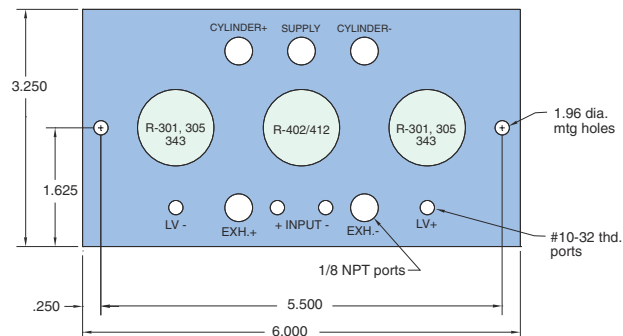
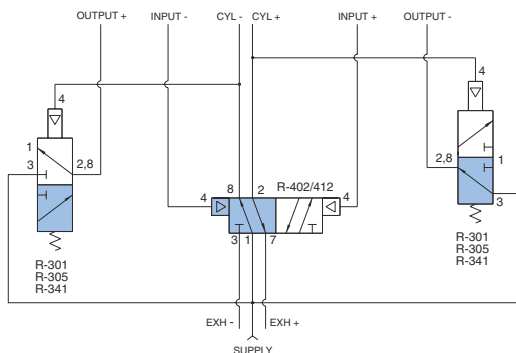
**Size:** 6" x 3 1/4" x 13/16" thick -3 modules



**Use:** This is a new version of cycling without limits. The system interfaces with the sequencing system using R-932 modular valves. From this operation, you can go back to input the next sequencing function. This is cycling with back pressure, which also has a sensing option, and delay.

**Operation:** The CM-030 and CM-031 are back pressure sensing circuits similar to the CM-017 and CM-06. The circuits are identical in that they both use a power valve for directional control and two normally open three way valves in one body (R-355) while the CM-031 provides additional control options because it uses three valves. The output signal and pilot input signals are externally available. This allows for additional control options and interfaces without 932 sequence control system. With the cylinder at rest in the retracted position air pressure from port 8 of the power valve (R-402 or R-412) is directed to the rod end of the cylinder. It is also referenced to the pilot port of a normally open

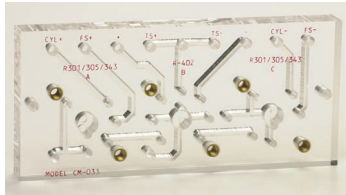
way (b) maintaining that valve closed. At this time there is an output at the - output port which comes from the working port of the other normally open three way valve (a). Connecting this output to the + input will shift the power valve, sending pressure to the cap end of the cylinder and allowing air to exhaust from the rod end. The air going to the cap end also pilots the three way valve (a), which cancels the pilot signal to the power valve. While the cylinder is extending, a back pressure decays allowing that valve (b) to open, producing a signal at the + output port. Connecting this port to the - input will pilot port 6 of the power valve and cause the cylinder to retract. This pressure will turn off valve (b) and the back pressure at the cap end of the cylinder keeps valve (a) closed. The CM-031 requires a separate valve at (a) and (b) but offers additional versatility because a time delay can be incorporated by using our R-341 module and using module R-305 maximizes the pressure differential across the piston. Access to the power valve pilot ports (+ and - inputs) and the + and - outputs enables these circuit boards to be used with the 932 sequence control in applications where it is not convenient to mount limit valves. These controls can also be used to sequence several operations by adding 1 or 2 more valves.



## CM-033

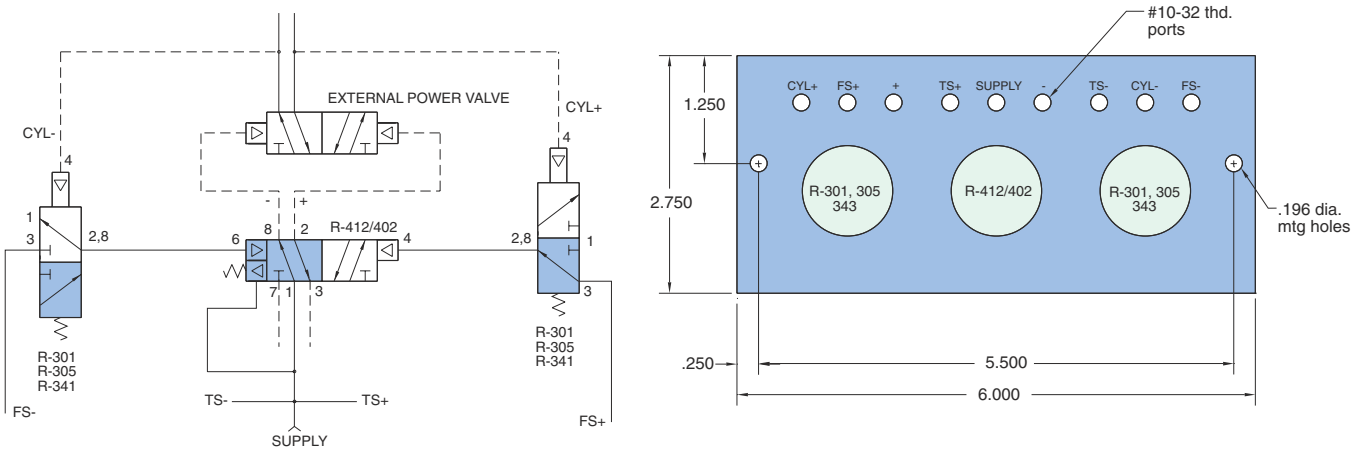
### Cycling without limits with external power valve

**Size:** 6" x 2 3/4" x 9/16" thick - 3 modules



**Use:** When cycling without limits function is desired from cylinder with bore or stroke requiring very high flow rates to achieve desired cycle speed.

**Operation:** Similar to CM-06 except output of R-402 is used to pilot a larger pneumatically piloted power valve. Operates as either a straight back pressure sensing system or the use of an R-341 will provide time delay after pressure decay.

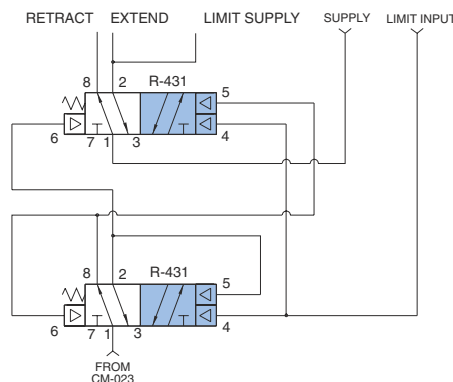
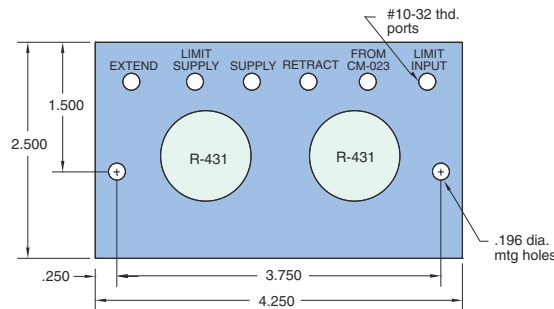


## CM-034

### Subplate for back pressure latched with clamp operated with CM-023

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

**Use:** For operation of a clamp or collet system where two hand no tie down input is required to be held continuously until clamp is fully engaged. Two hand no tie down circuit is reengaged to release the clamp mechanism.



**Operation:** Output of the CM-023 goes to port 1 or R-431 (a). This provides output at port 8 which latches in port 6 and port 5 of R-431 (b). R-431 (b) output shifts to port 2 giving clamp close output and also gives output to LV supply. The CM-023 must remain actuated until the valve is actuated or the spring on the R-431 will return both valves to the clamp open position. When the clamp has fully closed the limit valve is actuated and its output enters at limit input piloting ports 4 of both R-431 (a) and (b). This now latches both valves in the clamp closed position. A new input from the CM-023 now sends a signal from port 1 through port 2 of R-431 (a) which latches port 5 of R-431 (a) and pilots port 6 of R-431 (b). Power output from (b) now shifts to port 8 to unclamp. When the CM-023 palm buttons are released, both valves return to the starting position as shown and the circuit is ready for another operation.

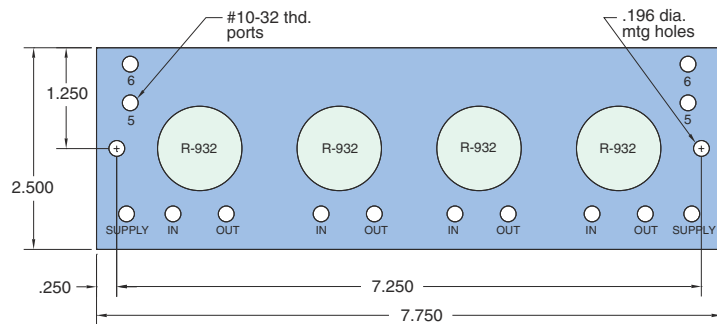
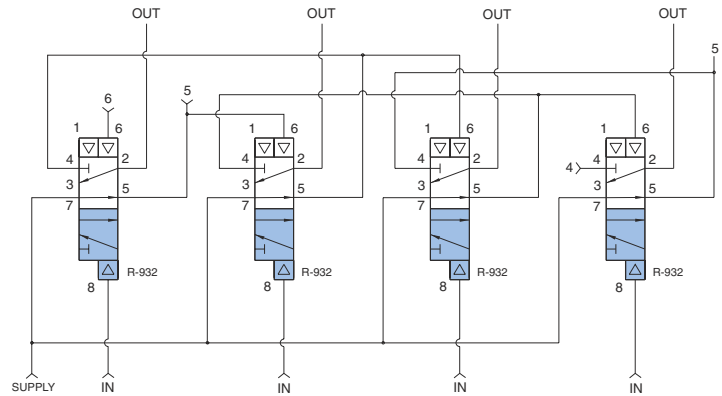
## CM-035

Circuit board for R-932 sequencing system using four modular valves

Size: 7 3/4" x 2 1/2" x 13/16" thick - 4 modules



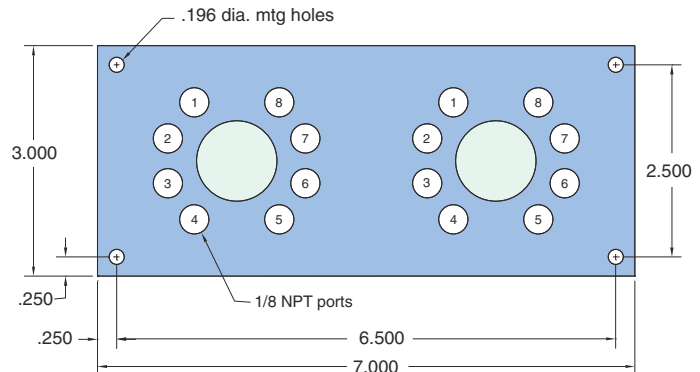
**Use:** 4-valve sequence circuit board used as an expansion unit. 10-32 port connections provided for signal inputs, step outputs, supply and jumper connections for linking multiple boards together. May serve as final segment of circuit or be inserted between other sequencing circuit board.



## CM-036

Two valve mounting subplate with 1/8" ports

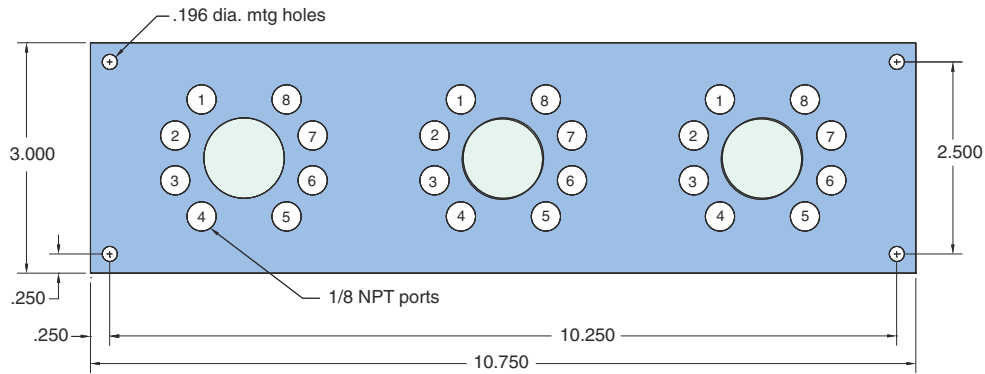
Size: 7" x 3" x 5/8" thick - 2 modules



## CM-037

Three valve mounting subplate with 1/8" ports

Size: 10 3/4" x 3" x 5/8" thick - 3 modules



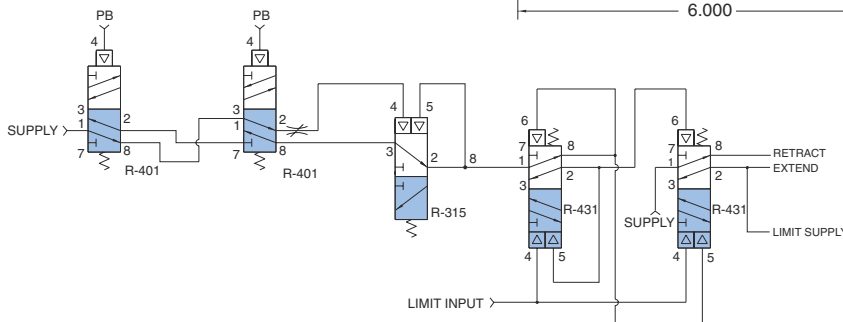
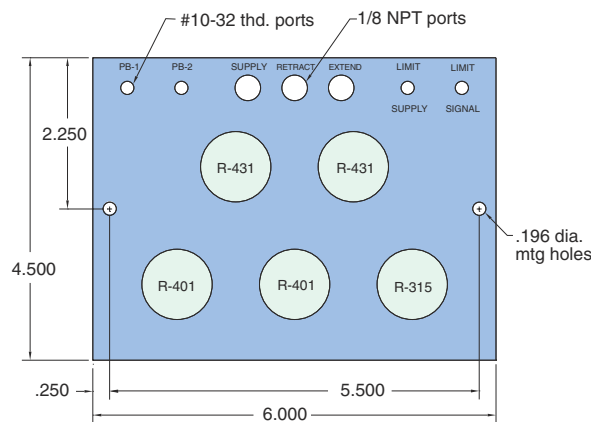
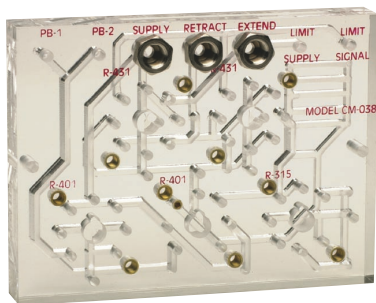
## CM-038

Two hand no tie down circuit with latching output

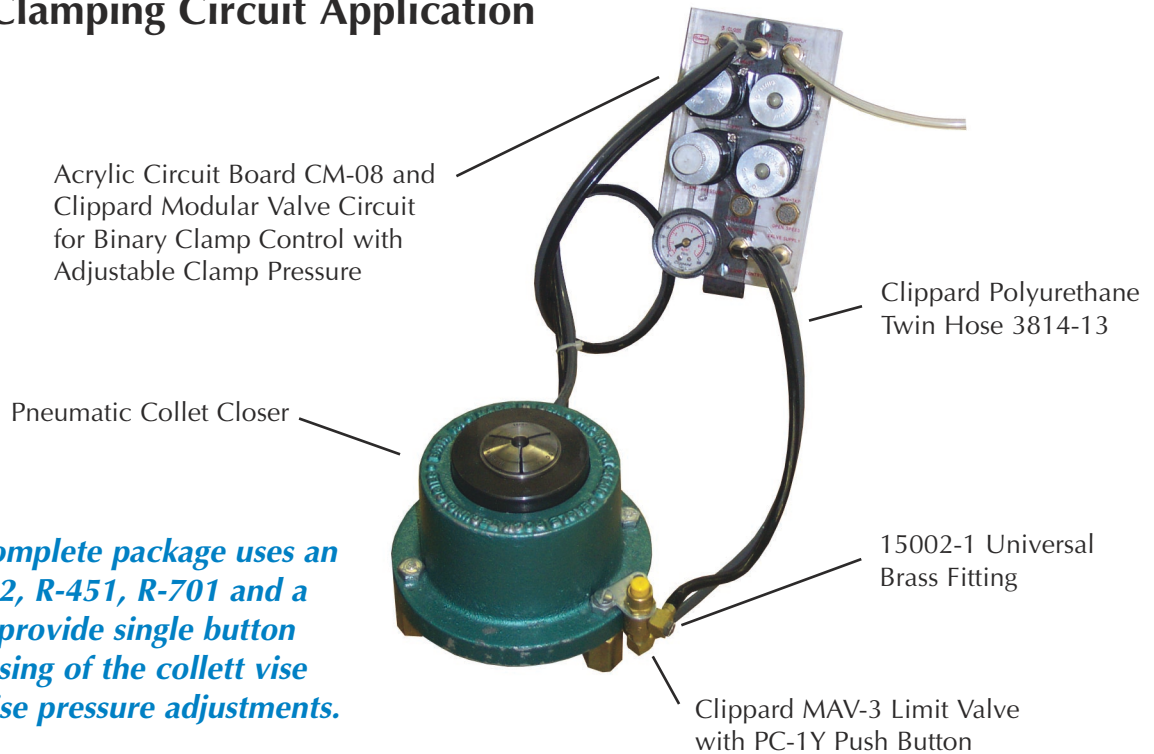
Size: 6" x 4 1/2" x 13/16" thick - 5 modules

**Operation:** The CM-038 combines the functions of the CM-023 two hand no tie down with the CM-034 latching circuit. This control requires that the operator push both palm buttons simultaneously and maintain contact until the work member contacts a limit valve\*. If the operator removes either hand prior to the limit valve being contacted, the cylinder will return to the home position. Once the limit valve is contacted, the cylinder will remain in place with out the need for operator contact. In order to return to the home position, the operator must depress both buttons simultaneously.

\*A back pressure sensing circuit can be used in lieu of a limit valve in applications where it is not practical to mount a limit valve. For more details see CM-023 and CM-034 or consult factory.



## Pneumatic Clamping Circuit Application



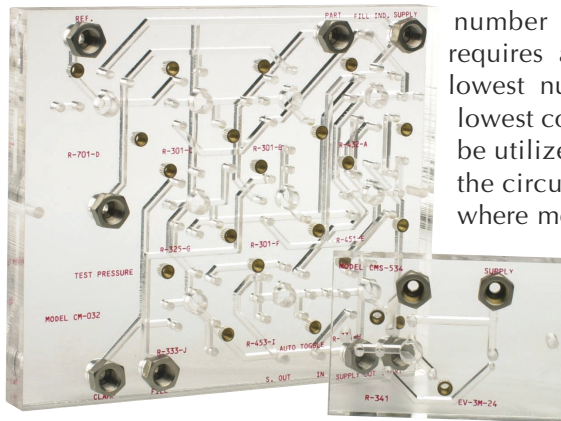
*This CM-08 complete package uses an R-401, R-412, R-451, R-701 and a PG-100 to provide single button opening/closing of the collett vise allowing precise pressure adjustments.*

## Custom Pneumatic Circuit Boards Special Features

Clippard pneumatic circuit boards can be custom-made. Once established, you can depend on your circuit's interconnections to be identical every time.

Component identification is silk-screened on the acrylic board surface for convenience. Each input, output and modular valve is identified to assure proper assembly. Completed circuits may be visually inspected to confirm proper component placement.

Every circuit board uses the exclusive (patented) Clippard "octoport" system to provide standard porting as pioneered throughout Clippard modular valves. Valves are held snugly to the circuit board by two captivated screws furnished with each modular valve. Valve module mounting screw holes are threaded brass inserts for extra strength. Changing valves takes less than a minute. Any valve module may be easily removed without disturbing the other modules, or affecting the circuit interconnections.



Use any number of Clippard plug-in valves and controls. Sophisticated pneumatic circuitry becomes simple to assemble and install using custom pneumatic circuit boards.

Thickness of the pneumatic circuit board subplate is determined by circuit complexity. Greater number of interconnection crossovers requires additional layers of material. The lowest number of plastic layers yields the lowest cost. However, additional layers may be utilized to minimize length and width of the circuit board, an important consideration where mounting space is restricted. Standard circuit board configuration is with all components and connections on the top of the circuit board.

In addition to Clippard modular control valves, the Clippard EV and ET series of electronic interface valves may be mounted on the circuit boards to function as a part of the control circuit. These electronic valves are actuated by 6, 12, & 24 VDC, drawing a low 0.67 watts. They are cool running and fast acting.