



FLUID POWER

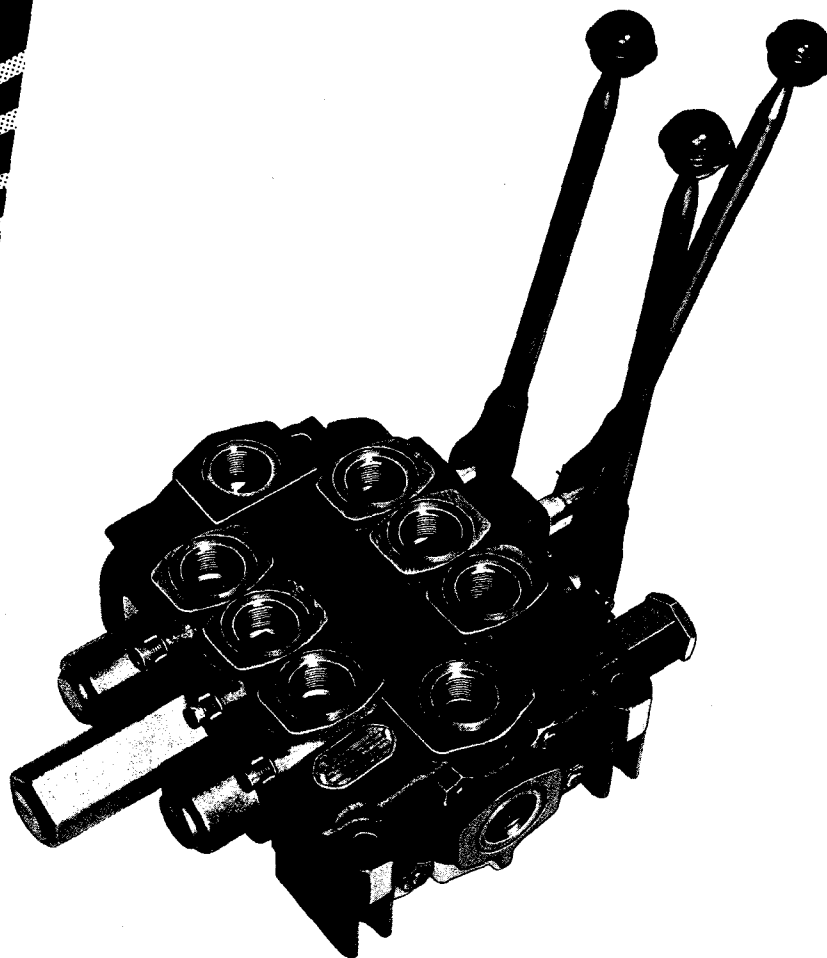
directional control valves

2500 PSI

CATALOG 100-C4



COMMERCIAL SHEARING & STAMPING COMPANY



FLUID POWER VALVES

for hydraulically operated heavy duty OEM equipment . . .

Presenting COMMERCIAL's all new fluid power valve story . . . all new valves tailored for this market, possessing overall efficiency far greater than other valves. This was accomplished by a basic objective in their design . . . "design for maximum flow within a minimum of cubage."

Model A directional control valves direct or prevent flow through selected work ports of the valve, thus, control and distribute flow in hydraulic power systems. Being "open center" type, they permit through flow to tank return and prevent or block all flow to work ports when spool is in neutral or center position. They are recommended to operate within a pressure range from 0 to 2500 psi, are available for series or parallel circuitry and are operated either manually or by differential pilot pressure. Model A valves are designed and constructed to direct or distribute flow from a hydraulic pump to hydraulic motors having

either linear or rotary action, to other valves placed "beyond" in the circuit or to the fluid storage reservoir of the circuit.

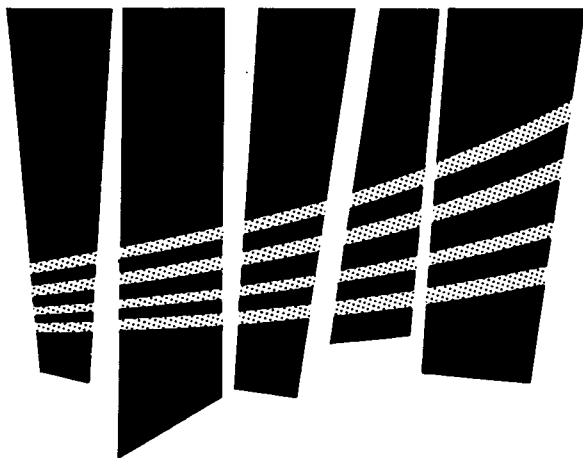
In addition, COMMERCIAL offers improved "inline" positioned accessory valves. Automatic sequence, counter balance, pressure relief, diversion and pilot operated check valves are fully described.

Completely covered herein is COMMERCIAL's entire fluid power valve story . . . from circuits and performance data to proper selection for best performing applications. A complete and efficient index is presented on pages 2 and 3.

All of COMMERCIAL's valves have been proven through extensive R & D and rugged field conditions. They are contributing to better operation of construction, materials handling, mining machinery, agriculture and ground support equipment.



Commercial Shearing & Stamping Company



flow direction

Facing any manually operated valve assembly with work ports on top and the clevis end of the working sections nearest you, flow through the valve is from left to right. The inlet section is always to the left and the outlet section is always to the right. Code numbers for any assembly can be specified by first determining the valve model, followed by inlet section codes, working section codes, mid section codes if required and finally outlet section codes in left to right assembly sequence.

engineering service

Highly trained, factory based engineers, skilled in all phases of hydraulic circuitry design and applications, offer experienced technical and field service.

The specifications contained herein were in effect at the time this material was approved for printing. Commercial Shearing & Stamping Company reserves the right to discontinue products at any time or to change specifications or design without incurring any obligations.

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		mid (split or combined flow)	none	none	22
		mid (split and combined flow)	manual	2 way • 2 position	22
		mid (unloading)	none	none	23
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			pilot	3 way • 3 position (ports blocked)	31
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				4 way • 4 position (ports blocked)	34
	series	mid	manual	4 way • 3 position (ports blocked)	35
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				4 way • 4 position (ports blocked)	37
outlet	parallel or series	end (convertible)	none	none	38
		end (tank return)	none	none	38
		end (divided flow)	none	none	39
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Model A35 (sections)	parallel or series	end	none	none	42
		mid (split or combined flow)	none	none	44
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working	parallel	mid	manual	3 way • 3 position (ports blocked)	46
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outlet	parallel or series	end (convertible)	none	none	58
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		end (pressure beyond)	none	none	60

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YOU GET MORE EFFICIENT FLUID POWER DISTRIBUTION WITH COMMERCIAL VALVES

- *have lowest pressure drop at equal flow conditions*

AND YOU GET ALL OF THESE IMPORTANT FEATURES

- *parallel and series circuit types*
- *manual or pilot operation*
- *sectional "stack type" assembly for maximum flexibility*
- *new built-in safety features*
- *improved "velvet touch" spool operation*

All of these features, and there are many more, offer advantages to the equipment manufacturer which will result in better operation and safer performance of his equipment. In addition, Model A performance rated valves show a greatly reduced internal pressure drop against flow under all conditions of operation. Proper valve selection is now a tangible factor because actual internal pressure drop can be predetermined.

internal pressure drop

Any valve, because of the nature of its operation and internal construction, presents resistance to flow with resultant pressure drop. The advanced design of COMMERCIAL's valve circulatory passages . . . has larger, more uniform cross section, smoother wall surfaces with the direction of travel free of abrupt angle change. Internal pressure drop in Model A valves is reduced by at least 50% as compared to previous models. The result: a marked reduction in wasted energy due to heat loss . . . making more fluid power available to perform work. In reality, Model A valves have higher overall efficiency than former valves. Performance data for all operating conditions of Model A valves is plotted in tables and charts on pages 16, 17, 18, 19, 40 and 41. Such data will enable you to determine the proper size valve to best meet your specific requirement.

sectional construction

Model A valves are of sectional "stack type" construction, assembled with one or more mid-sections capped by an end inlet and end outlet section. Mid-sections comprise working sections offered in many functional types and special inlet sections. Working sections of either series or parallel type can be assembled in any combination or sequence without affecting the performance of other working sections in the valve bank. Additional working sections can be inserted—a complete new valve is not required. It is only necessary to have on hand a good inventory of each type of section needed. Thus, substantial savings in inventory can be realized.

safety protection

Working sections with 3 or 4 spool positions having either spring centered or detented positioning to provide single acting, double acting, hold or float actions are all available. Complete hydraulic system and equipment protection can be built right into Model A valves without external piping. Provision for adding selective circuit and equipment overload protection in individual working sections can be accomplished by using a new style high profile type section.

"velvet touch" operation

The new, COMMERCIAL Model A valves permit loads to be positioned accurately with absolute smoothness. Thus, jerky, erratic movements of equipment, a fault of many common valves, is eliminated. "Velvet touch" hydraulic control of all operations of machine results from highly sensitive and positive flow metering action around spools.

plus features

Hi-strength semi-steel shell molded castings are used for all sections. Such castings are non-porous in grain structure and possess great strength. Their dimensional stability contributes to "non-sticking" spool operation. "O" ring seals, each held in position in individual locating grooves, insure against leakage between sections. External flow passages around solid spools of COMMERCIAL valves have larger area than small diameter orifices inside hollow plunger type valves. Solid spool construction offers less restriction to flow resulting in reduction of heat generated and lower pressure drop. All contact surfaces of spools are mirror smooth. All manually operated spools are treated with non-corrosive plating. Every spool is fitted within extremely close tolerances to its matched working section. Such expert craftsmanship assures smooth, positive, yet sensitive actuation. "O" rings, placed around the ends of the spools, prevent external leakage about the spools.



terminology

internal pressure drop—Pressure loss due to flow through a valve.

check valve—A valve which permits flow of fluid in only one direction.

closed center valve—A valve which blocks supply when spool is in the center position.

counter balance valve—A valve which maintains back pressure to prevent a load from falling.

detent positioned valve—A valve which has a device to hold it in position until actuated by an external force.

directional control valve—A valve whose primary function is to direct or prevent flow through selected passages.

flow control valve—A valve whose primary function is to control flow rate. (Sometimes referred to as a flow metering valve.)

flow dividing valve—A valve which divides the flow from a single source into two or more branches.

four position valve—A valve having four positions to give four selections of flow conditions.

four way valve—A directional control valve having four distinctive external working connections.

open center valve—A valve, when spool is in center position, which has the inlet and outlet ports interconnected, open to through flow and work ports blocked to flow.

pilot operated valve—A valve in which operating parts are actuated by pilot fluid.

relief valve—A valve whose primary function is to limit system pressure.

sequence valve—A valve whose primary function is to direct flow in a predetermined sequence.

spring centered valve—A valve whose operating parts are held in center position by means of a spring until moved by some external force.

three position valve—A valve having three positions to give three selections of flow conditions.

three way valve—A directional control valve having three distinctive external working connections.

two position valve—A valve having two positions to give two selections of flow conditions.

two way valve—A directional control valve having two distinctive external working connections.



MODEL A DIRECTIONAL CONTROL VALVES

- *their principle components*
- *their basic functions*

INLET SECTIONS

Pump discharge piped to tandem stack-type directional control valves enters through a port placed in an inlet section. Inlet sections are available in end-section or mid-section types furnished either with or without main cartridge type relief valve.

end inlet type

End inlet type section, capping the valve bank at the upstream end, receives the primary pump discharge. A port placed in top or side of this type of inlet provides for piping connection.

end inlet-tank return type

End inlet type section capping the valve bank at the upstream end, receives the primary pump discharge through top or side port. In addition, a port placed in the bottom provides for low pressure return flow to tank (bottom dump through direct mounting to tank).

mid inlet type—a COMMERCIAL exclusive

for split flow

A split flow mid inlet section, positioned between two working sections, is available and provides a method to pipe discharge from a secondary pump source into a bank of valves. The secondary pump discharge is independently directed to that portion of the valve bank downstream from the mid inlet. The primary pump discharge cannot be combined with this secondary pump discharge within the valve bank. One inlet port is placed in top to provide for piping into this section. Provision is made for inserting cartridge type relief in split flow type mid inlet to serve as a means of pressure control of secondary pump discharge.

for combined flow

A combined flow mid inlet section, positioned between two working sections, is available and provides a method to pipe discharge from a secondary pump source into a bank of valves. The secondary pump discharge is added to discharge from the primary pump in this section and the combined discharge flows to all working sections downstream from this point. One inlet port is placed in the top to provide for piping into this section. Additive discharge (gpm) from primary and secondary pumps cannot exceed flow capacity of valve bank.

for split or combined flow (manual selection)

A combination type mid inlet section, positioned between two working sections, is provided with an integral manually operated two position valve. In one position, secondary pump discharge is independently directed to that portion of the valve bank downstream from the mid inlet. The primary pump discharge does not combine with the secondary pump discharge. In the other position, secondary pump discharge is added to discharge of primary pump at

the end inlet section and combined discharge is available for use in all working sections. Additive discharge (gpm) from primary and secondary pumps cannot exceed maximum flow capacity of the valve bank.

for split or combined flow (pressure regulated)

A combination type mid inlet section, positioned between two working sections, is provided with a built-in cartridge type relief valve and a built-in unloading valve. The relief valve controls pressure of secondary pump discharge. Provision is made for piping discharge from a secondary pump source into this mid inlet section, flow of which combines with flow from primary pump at this point. The relief valve controls pressure of secondary pump discharge. When unloading valve functions, primary pump discharge is returned to tank and secondary pump discharge continues downstream from this point.

WORKING SECTIONS

Pump discharge piped into a tandem stack-type directional control valve bank can be directed to and from cylinders or motors by components called valve working sections. Ports in the top of these sections provide the ways through which external flow passes to or from them. A spool integrally built into each valve working section can be positioned at different locations by the operator to direct pump discharge in a predetermined flow pattern.

Exclusive with Model A valves, parallel and series type working sections can be stacked in tandem. Spool action is available for either manual or pilot operation. Spools can be detent positioned or have a spring return to neutral action. All working sections have a built-in load hold check.

Working sections are available with extra built-in features such as overload port relief, crossover relief, flow restrictor port check and anti-cavitation vacuum check.

Working sections provided with any of these built-in features must necessarily be of higher profile and are hereafter referred to as hi-boy style sections. Working sections without any special built-in features are usually furnished in the same low profile as inlet and outlet sections and are referred to as lo-boy style sections.

Working sections are available in several basic types of valve function.

3 way • 3 position type

*(work port blocked when spool in neutral)
(parallel circuitry only)*

In this type of working section, when valve spool is moved into work position, all of the flow is directed through work port and on to cylinder or motor. When spool is moved into opposite position, pump discharge flows directly through and beyond this working section and the work port is open to flow back to return line of circuit. In neutral (hold) position, pump discharge flows straight through the working section. Work port is blocked to all flow.

4 way • 3 position type

(work ports blocked when spool in neutral)

In this type of working section, when valve spool is moved into work position, all of the flow is directed through one work port and on to cylinder or motor. In parallel circuit working sections, the other work port is opened to return flow to tank. In series circuit working sections, the other work port is opened to return flow which is then directed to all downstream working sections from this point. When spool is moved into opposite position, all flow in both parallel and series sections is reversed. In neutral (hold) position, pump discharge flows straight through working section. Both work ports are blocked to all flow.

4 way • 3 position type

(work ports open when spool in neutral)

In this type of working section, when valve spool is moved into work position, all of the flow is directed to one work port and on to cylinder or motor. In parallel circuit working sections, the other work port is opened to return flow to tank. In series circuit working sections, the other work port is opened to return flow which is then directed to all downstream working sections from this point. When spool is moved into opposite position, all flow in both parallel and series sections is reversed. In neutral (no-hold or float) position, pump discharge flows straight through working section. Both work ports are blocked to flow from pump but are open to flow to or from return line.

4 way • 4 position type

**(work ports blocked when spool in neutral
—open in float position)**

In this type of working section, when valve spool is moved into work position, all of the flow is directed to one work port and on to cylinder or motor. In parallel circuit working sections, the other work port is opened to return flow to tank. In series circuit working sections, the other work port is opened to return flow which is then directed to all downstream working sections from this point. When spool is moved into opposite position, all flow in both parallel and series sections is reversed. When spool is moved into float position, both work ports are blocked to direct flow from pump but are open to flow to or from return line of circuit. Cylinders would be in float position and motors would “free wheel.” In neutral (hold) position, pump discharge flows straight through working section. Both work ports are blocked to all flow. Cylinders would be in hold position and motors would stop.

4 way • 4 position type

**(work ports blocked when spool in neutral
—regenerative flow in fourth position)
(parallel circuitry only)**

In this type of working section, when valve spool is moved

into work position, all of the flow is directed to one work port. At the same time, the other work port is opened to return flow to tank. When spool is moved into opposite position, all flow is reversed. When spool is moved into regenerative position, return flow back through one work port is combined with flow from pump and the additive flow is then directed into opposite work port. In neutral (hold) position, pump discharge flows straight through working section. Both work ports are blocked to all flow.

OUTLET SECTIONS

Pump discharge piped into tandem stack-type directional control valves leaves through ports placed in an outlet section capping the valve bank at the downstream end. Outlet sections are available in tank return, pressure beyond or combination types.

tank return type

Outlet ports in side and top of this type permit flow to be piped to return system in circuit. Connections can be made to either port, the opposite port being plugged.

pressure beyond type

Two outlet ports are located in the side, the port nearest center being a pressure port used for piping flow to another valve bank placed further along in the circuit. Flow from this port is for pressure beyond requirement and is available only when spools of all upstream working sections are in neutral position. The other port must be piped to return system in circuit. This type of outlet is sometimes referred to as “high-pressure carryover” section.

tank return type or pressure beyond type (convertible)

Two outlet ports located in side of this type permit either pressure beyond or return to tank piping. By inserting pressure beyond plug or end port plug in end opening, this section can be converted for either pressure beyond and return to tank or direct return to tank only. If relief-pressure control is desired in circuit beyond this outlet, a standard cartridge type relief can be inserted in this end opening.

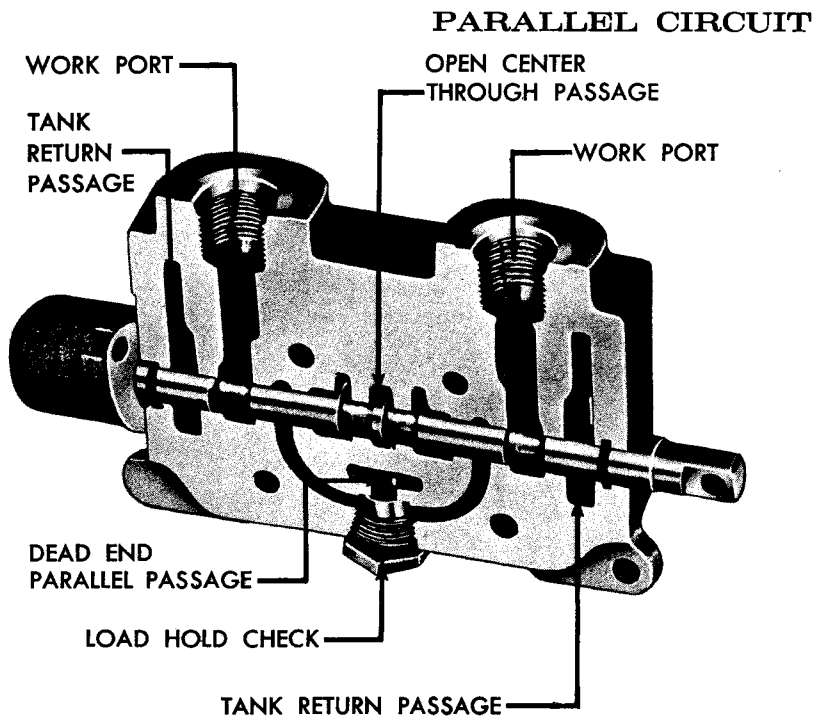
tank return type and pressure beyond type (divided flow)

Two ports are provided in this type of outlet section—one to permit piping for return to tank, the other for pressure beyond. Each of these ports can be located in the side or top of this section.

A spool type flow divider is built into this type outlet, which diverts a selected portion of total return flow at all times to the pressure beyond port. The remaining portion of total flow is piped to return system in the circuit.

VALVES FOR PARALLEL AND SERIES CIRCUITS

for the first time, COMMERCIAL offers valve working sections in two basic types—parallel or series circuit



Directional control valves connected in parallel are used to permit the control of one or more machine motions at any one time. Entire flow of circuit at full circuit pressure is directed to that machine motion when the valve to which it is piped is actuated. If more than one valve is actuated simultaneously, flow at full pressure will go to the load requiring the least amount of pressure to overcome its resistance to flow.

COMMERCIAL parallel circuit directional control valves have two flow passages running horizontally through the inlet section and all working sections. Flow is through the upper passage in the entire bank from inlet through outlet if all spools in a valve bank are in neutral position. This passage can be blocked to flow by spool movement. A lower parallel passage runs through the inlet and all working sections but dead ends at the outlet section.

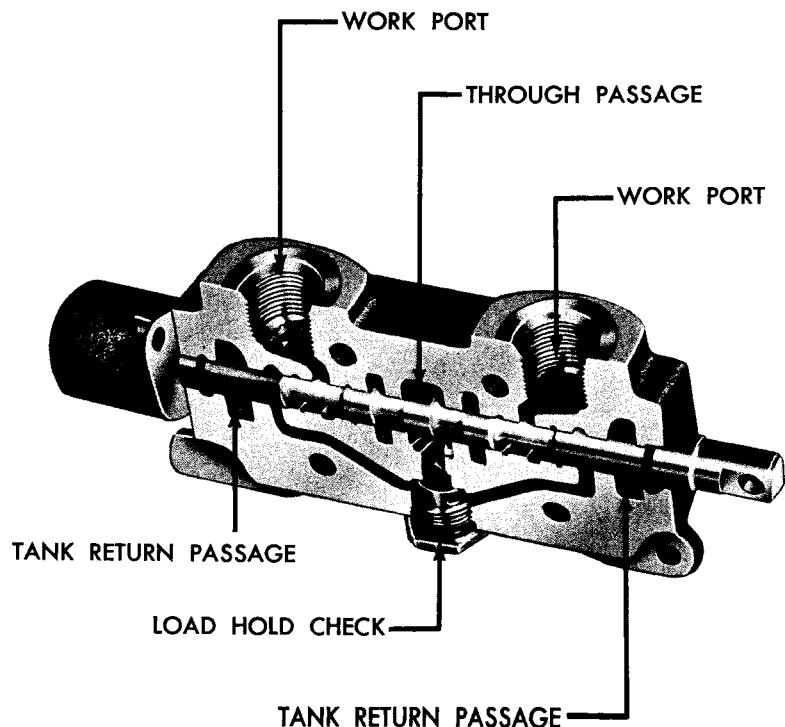
If any spool of a working section in a valve bank is moved to an operating position, through flow in the upper passage is blocked at this point and flow is diverted into the parallel passage. The entire parallel passage is pressurized because it is dead ended at the outlet section. Pressurized oil then forces open the load hold check of the actuated working section and flows out the open work port. Return flow into the working section is diverted to the tank return passage.

Directional control valves connected in series are commonly used to permit the control of more than one machine motion simultaneously. The entire flow of the circuit is directed to the machine motion connected to each valve which is actuated. If only one valve is actuated, full flow at full circuit pressure will be directed to the machine motion piped to this valve. If more than one valve is actuated, full flow will be directed to all machine motions piped to the valves that are actuated. The summation of the pressures required to overcome the resistance to flow of all machine motions to which flow is directed will equal the total pressure of the circuit.

COMMERCIAL series circuit directional control valves have only one flow passage which runs through the inlet section, all working sections and outlet section. When all working section spools are in neutral position full flow goes straight through all sections in the valve bank.

If any spool of a working section in a valve bank is moved to an operating position, full flow is diverted through the load hold check to the work port opened to flow. Return flow into the working section is directed to the passage downstream from the actuated working section.

SERIES CIRCUIT



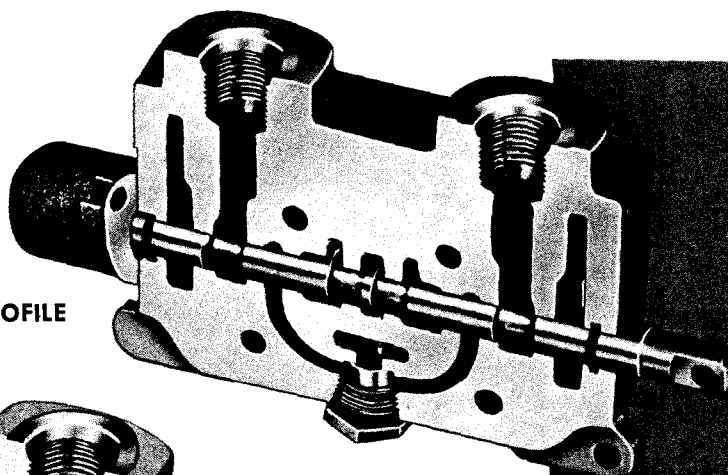


PARALLEL AND SERIES COMBINATION

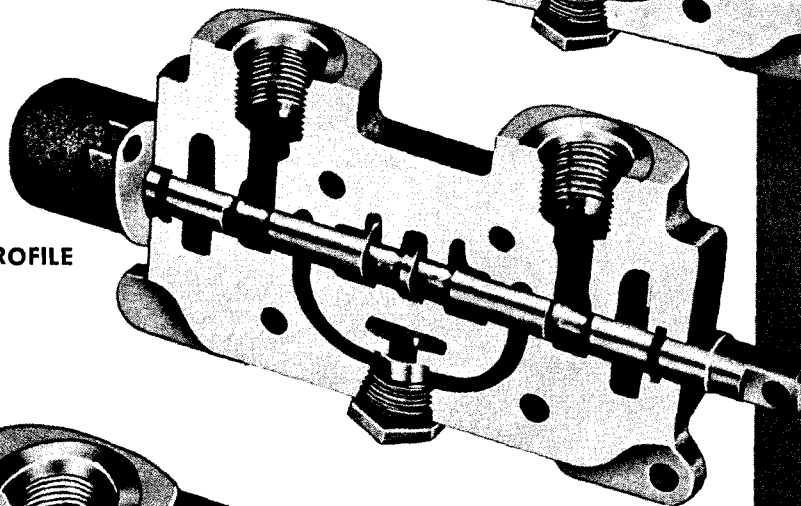
exclusive with COMMERCIAL model A valves

For the first time, it is now possible to combine parallel and series directional control valve working sections in one valve bank. Thus, by employing series circuit working sections, more than one machine operation can be employed simultaneously while parallel circuit working sections can be placed in the same bank to operate just one machine operation at one time.

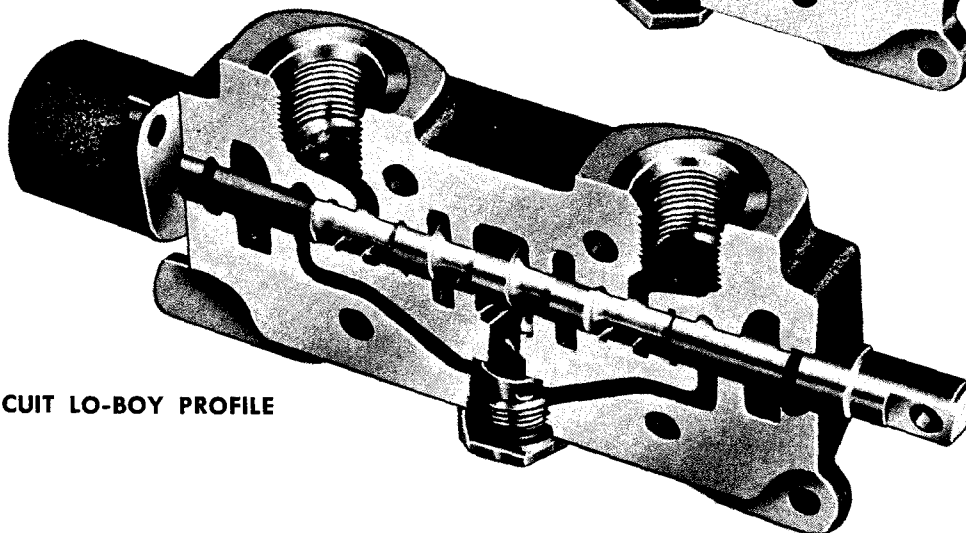
PARALLEL CIRCUIT HI-BOY PROFILE



PARALLEL CIRCUIT LO-BOY PROFILE



SERIES CIRCUIT LO-BOY PROFILE



DIRECTIONAL CONTROL VALVES

CHOICE OF SPOOL OPERATION

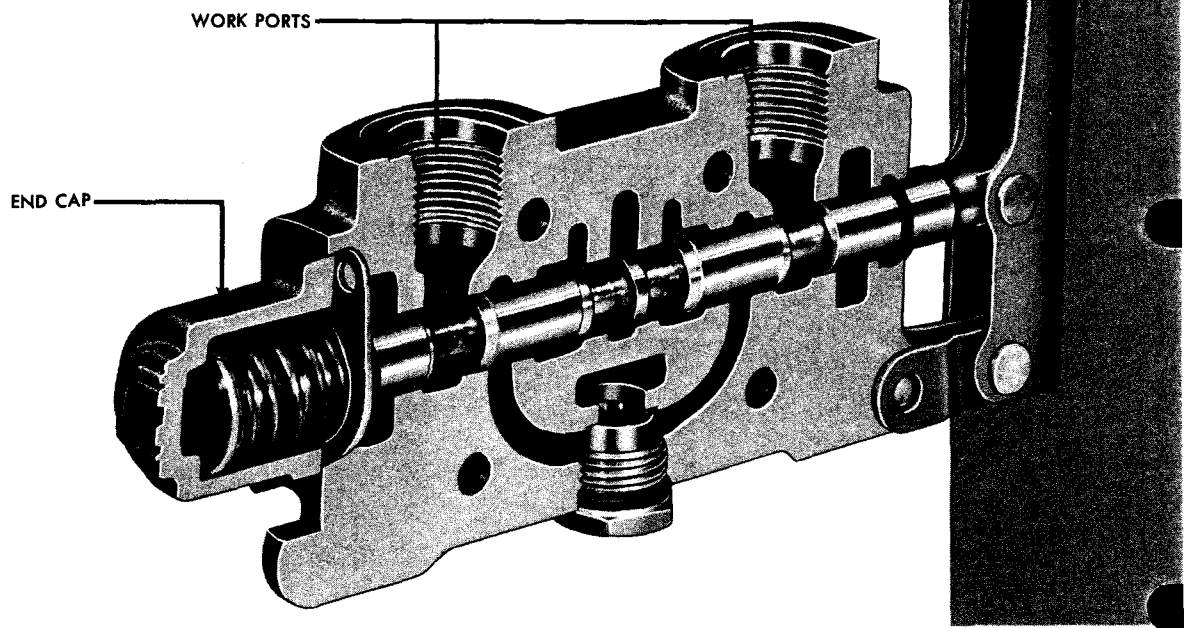
In designing the all new Model A directional control valves, provision has been made to provide for either of two methods to change the position of the spools in the working sections.

MANUAL OPERATION

Manual operation of spools is accomplished by applying force to handles connected to the spool ends. Spool action can be spring return to neutral or detent positioned. Manually operated valves are commonly used when the valve bank can be located in an area accessible to the operator. Manually operated valves are recommended and generally preferred.

force required to position spools

valve model	spool action	spool end force
A20	spring	56 lbs.
	detent	40 lbs.
A35	spring	75 lbs.
	detent	55 lbs.





PILOT OPERATION

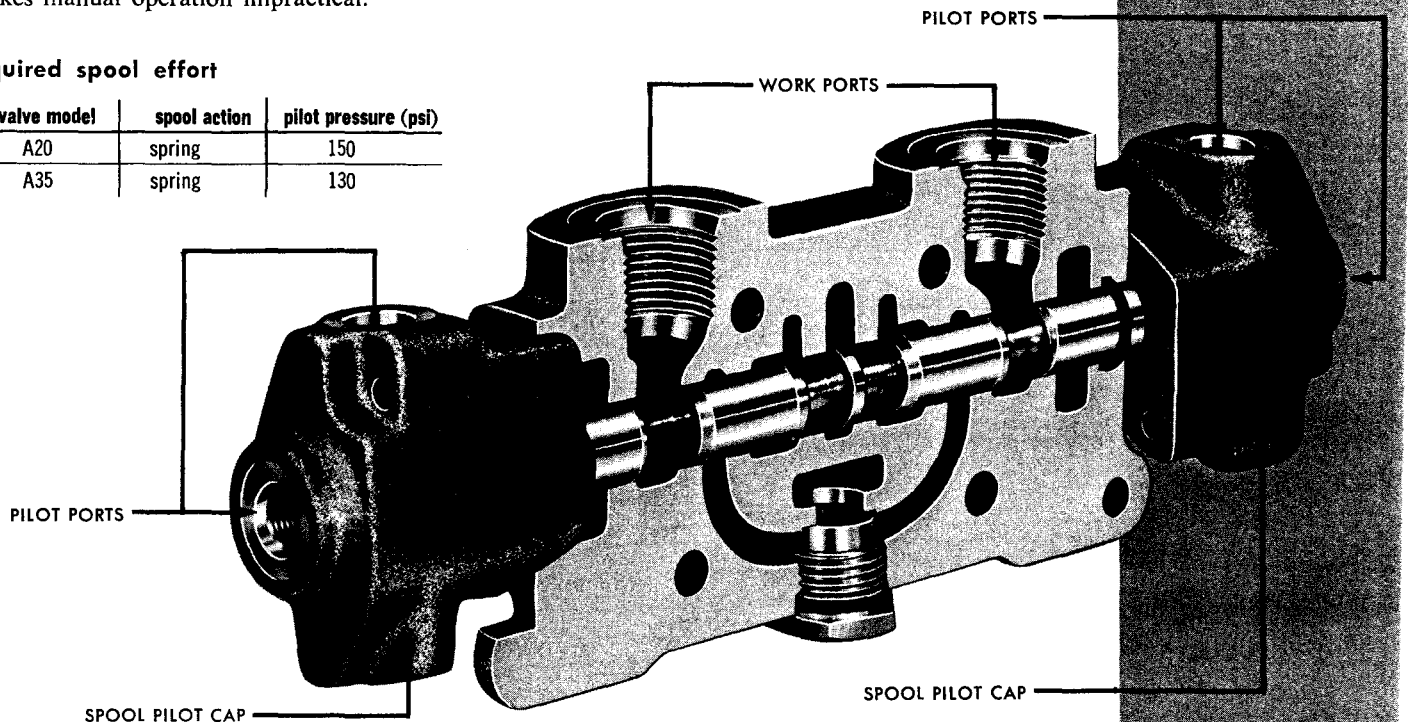
COMMERCIAL pilot operated valves have spools moved by the application of hydraulic force applied to either end of each spool. They are furnished with spring return to neutral action since hydraulic pressure is used only to overcome spring resistance and force spool into extreme operating position.

On each end of valve working section is an oil tight cap enclosing the spool end. Hydraulic pressure applied to a spool end forces the spool to move from neutral into a work position. This pilot pressure is controlled either manually, electrically, or automatically. When pilot pressure against the end of the spool is removed, the spool, by a spring action, returns to neutral position. Most commonly used sources of hydraulic pressure for these valves are "bleed off" from main power system, separate pilot pump and flow divider valves.

Pilot operated valves are used most often where physical location of the valve bank makes manual operation impractical.

required spool effort

valve model	spool action	pilot pressure (psi)
A20	spring	150
A35	spring	130



BUILT-IN FEATURES

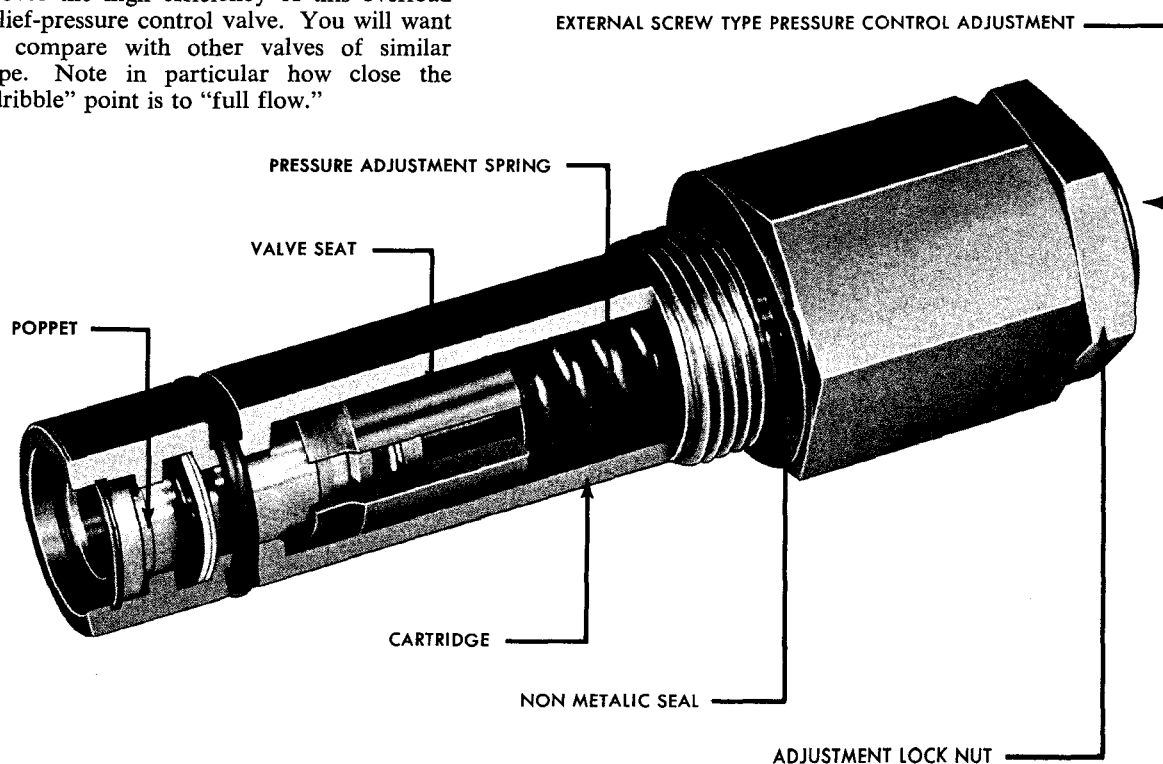
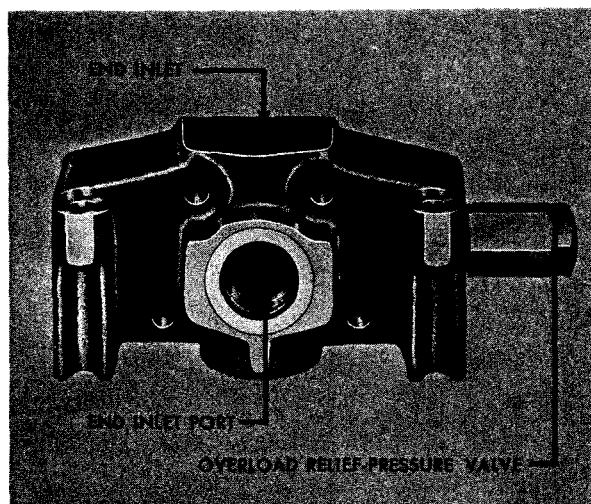
SYSTEM OVERLOAD RELIEF-PRESSURE CONTROL VALVE • • •

for use in end and mid inlet sections only

Safety protection for the hydraulic system plus overload protection for the equipment operated is the main function of a new, improved combination dual purpose overload relief . . . pressure control valve. The entire mechanism is contained in a cartridge which is located in an inlet section.

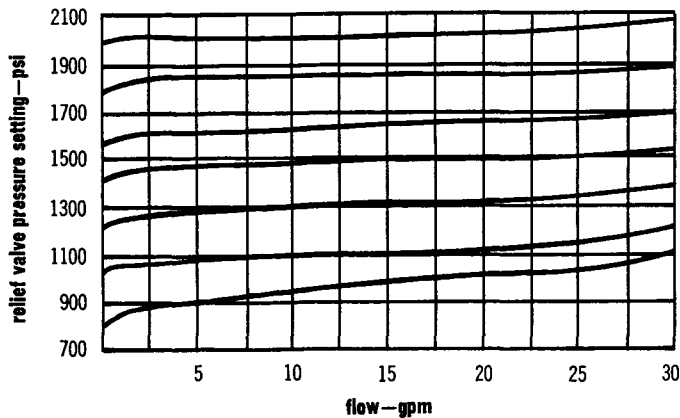
Should excessive pressure build up in the system, the relief will "blow-off" at a pressure established by predetermined setting . . . safety protection for the entire system. Often the relief valve is called upon to function also as a pressure control valve. To meet this demand usage, a pressure differential principle has been designed into this valve giving it large capacity, more accurate settings and much smaller increments between open and closed position. "Dribble" point has been brought close to "blow-off" point. Because of its inherent design, the pressure control action can be very frequent . . . practically continuous if necessary . . . without damage to the valve seats.

Performance data recorded on facing page proves the high efficiency of this overload relief-pressure control valve. You will want to compare with other valves of similar type. Note in particular how close the "dribble" point is to "full flow."

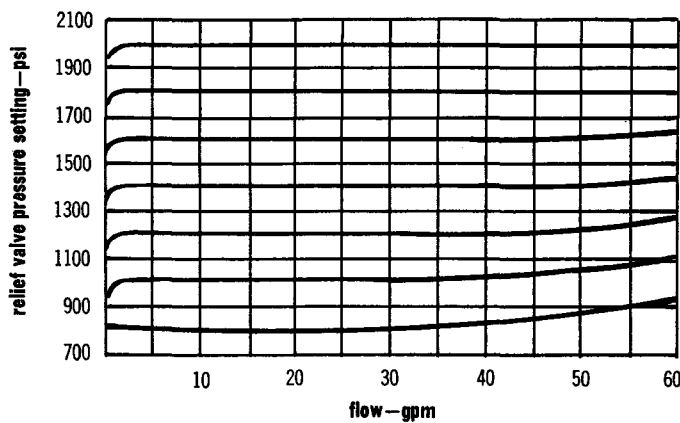


performance data

Model A20

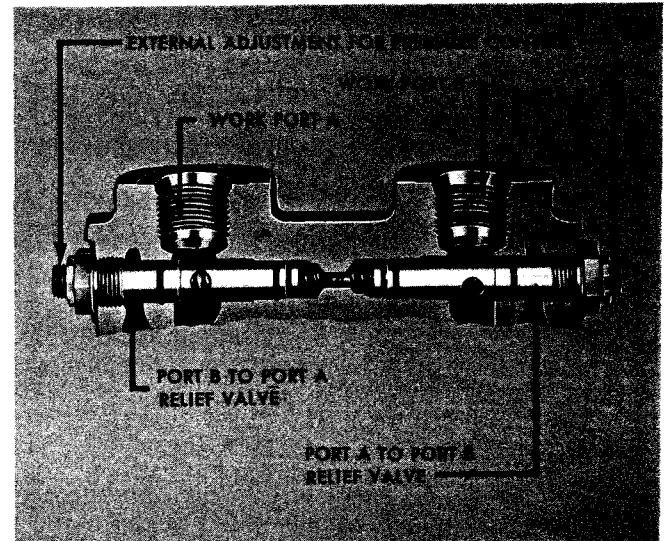


Model A35

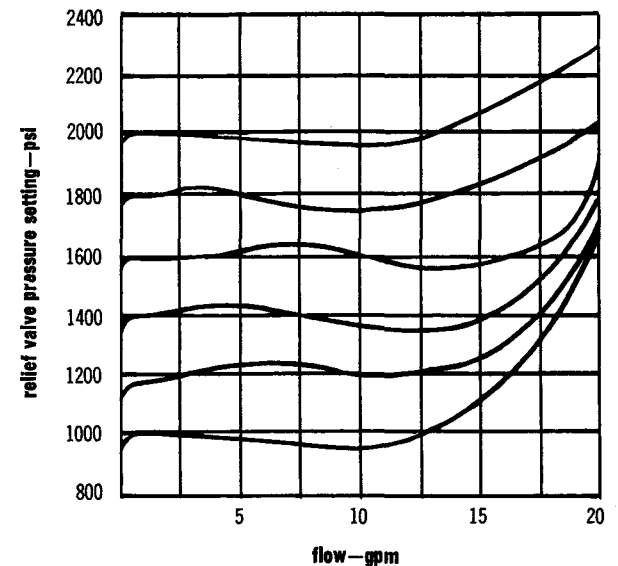


CROSSOVER RELIEF

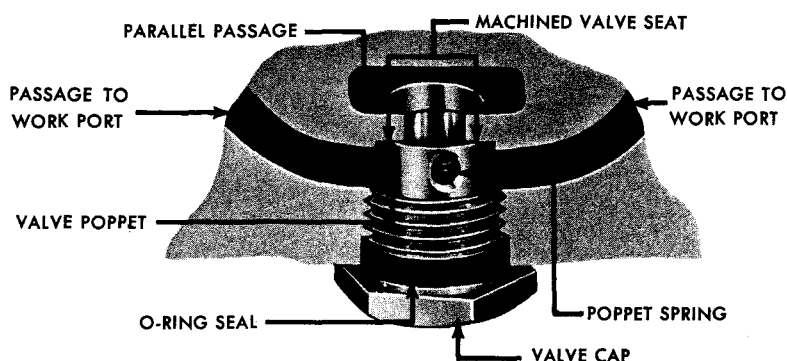
To protect that portion of the circuit piped to any working section against overload, a relief valve placed in each work port relieves excessive pressure buildup and allows high pressure oil to cross over from one work port to the other work port. These valves function only when spool of the working section is in neutral position. Because setting of the crossover relief valves is generally higher than the main relief, these valves are not functional when spool of the working section is in work position.



performance data



BUILT-IN FEATURES



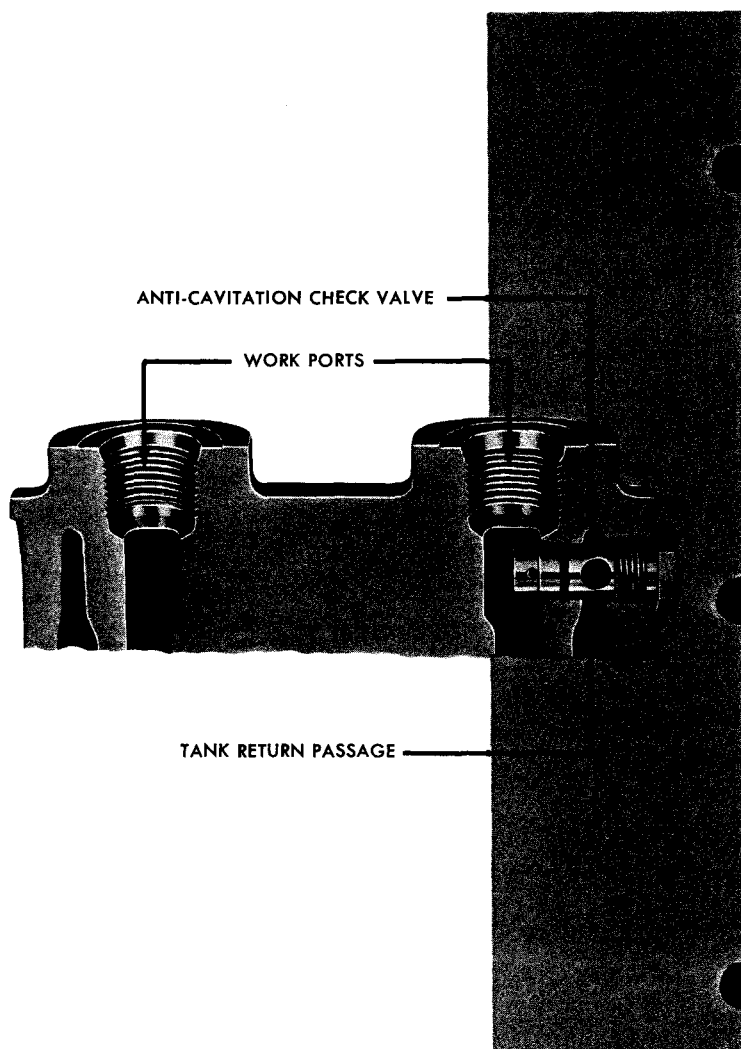
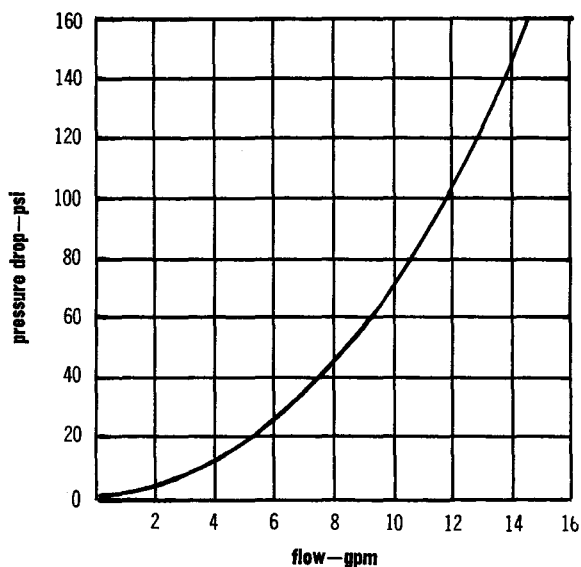
LOAD HOLD CHECK

Built into every working section is its individual check which blocks against all pressurized return flow until overcome by pressure build-up from pump. Danger resulting from erratic operation or one load dropping while another is being positioned is eliminated. Unique is the design of this check... positive its functioning... and it is so located as to cause no passageway constriction.

ANTI-CAVITATION VACUUM CHECK

To eliminate cavitation created beyond work ports, a vacuum check valve can be used in both the A20 and A35 valve working sections. When pressure in a cylinder is less than pressure in return passage, a vacuum is created. It can occur when cylinder is either moved by external mechanical force or drops rapidly due to gravity. The anti-cavitation vacuum check equalizes pressures by bleeding oil from the low pressure passage through the work port back to cylinder. The check can only be located in the hi-boy type working section, adjacent to the work port and functions when spool is in either work or neutral position.

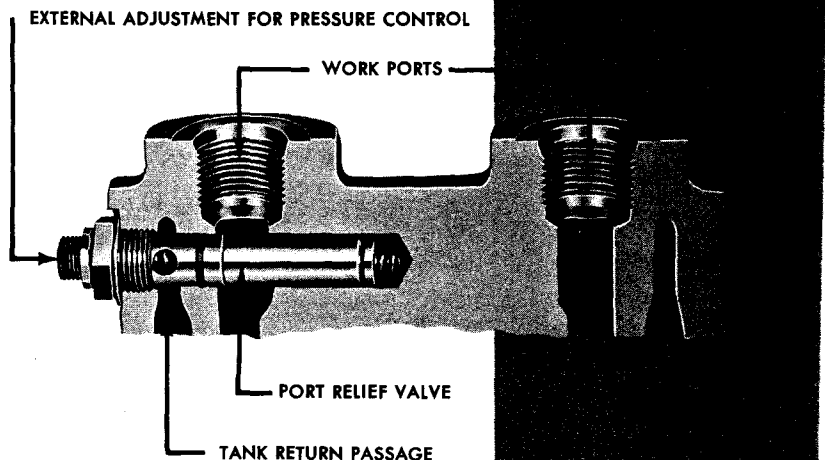
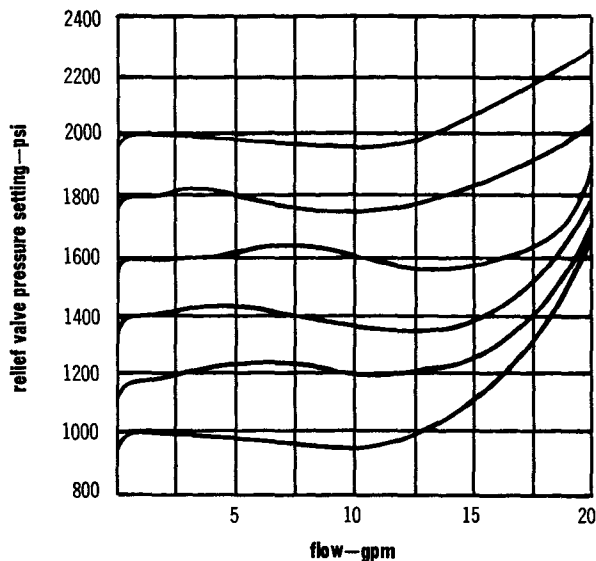
performance data



OVERLOAD PORT RELIEF

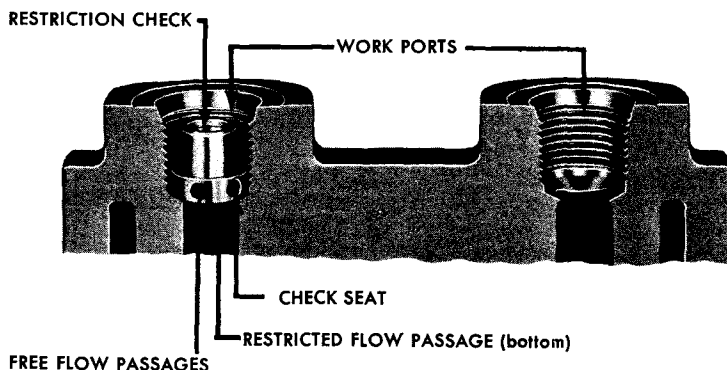
To relieve a pressure buildup in that part of the circuit piped to any given working section, an overload port relief can be placed in one or both ports of that working section. This valve functions when spool of work section is in neutral position and provides safety protection for the equipment which is controlled by individual working section in which it is placed. Because the setting of the overload port relief is generally higher than the main relief, this valve is not functional when spool of the working section is in a work position.

performance data



FLOW RESTRICTOR PORT CHECK

Located in either work port of a valve working section, a small restrictor check controls return flow from a cylinder. Pressurized flow to cylinder opens check and passes unrestricted through work port. Return flow to the work port forces check closed and then passes through an orifice in the check at a restricted rate. This orifice is of specified diameter to be determined by the application. Flow restrictor check functions when spool is in work position and can be placed in lo-boy and hi-boy working sections provided with straight thread fittings only.

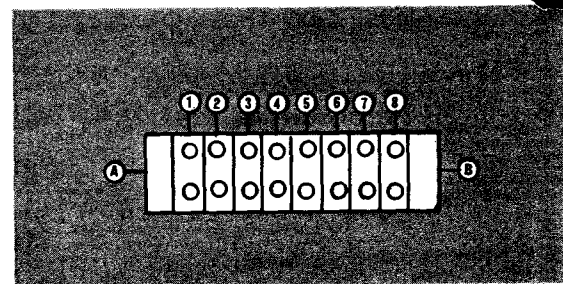


Model A20

performance data

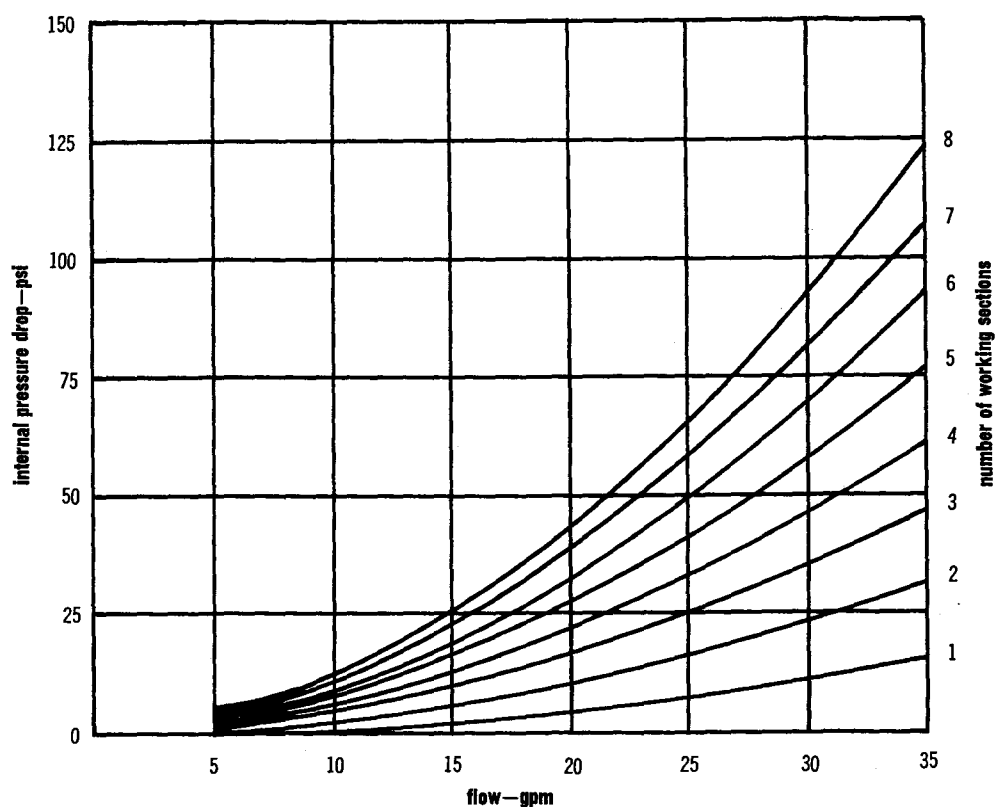
(parallel circuit)

Performance data, as recorded, is the result of averaging readings taken from tests of pressures between points externally adjacent to ports specified. All data is based on oil temperature at 140° F. and oil viscosity 180 SSU at at 100° F.



internal pressure drop

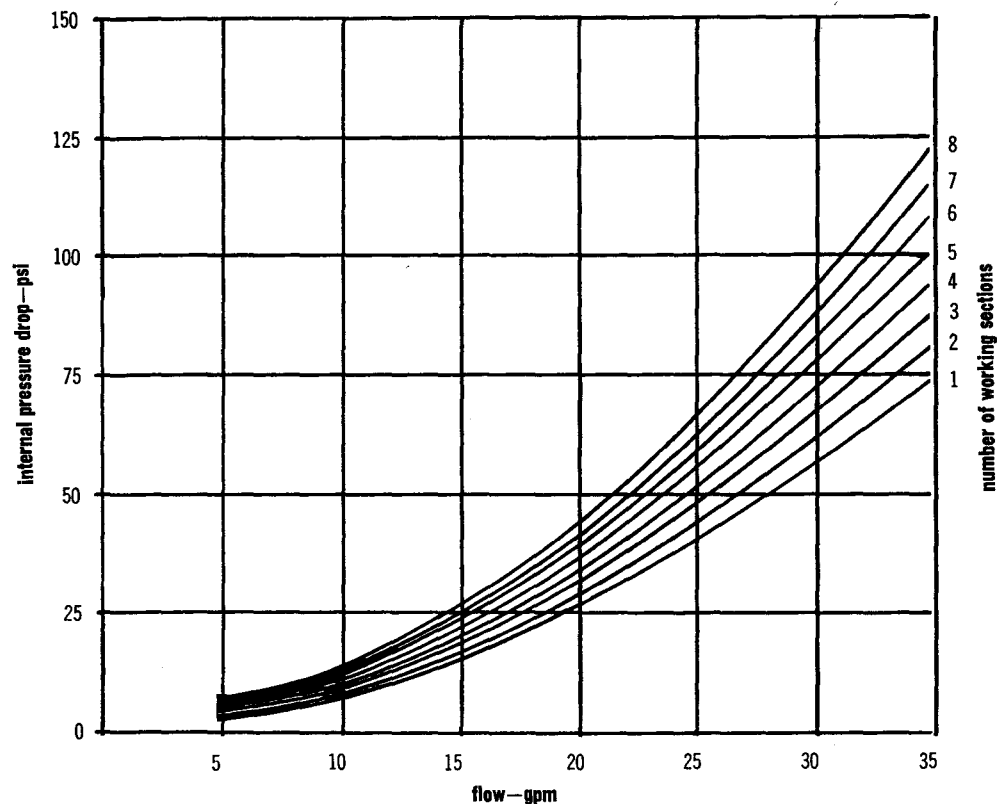
between 1" O.D. Tube inlet port A and 1" O.D. Tube outlet port B
(all spools in neutral position)



number working sections	flow—gpm						
	5	10	15	20	25	30	35
1	0.5	1.5	3.5	6.0	9.0	12.5	16.0
2	1.0	3.0	7.0	11.5	17.0	24.0	31.0
3	1.5	5.0	10.0	17.0	25.5	35.5	46.5
4	2.0	6.5	13.5	22.5	33.5	47.0	61.5
5	2.5	8.0	17.0	28.0	41.5	58.0	76.5
6	3.0	9.5	20.0	33.5	50.0	69.5	92.0
7	3.5	11.0	23.0	39.0	58.0	81.0	106.0
8	4.0	12.5	27.0	44.0	66.0	92.0	123.0

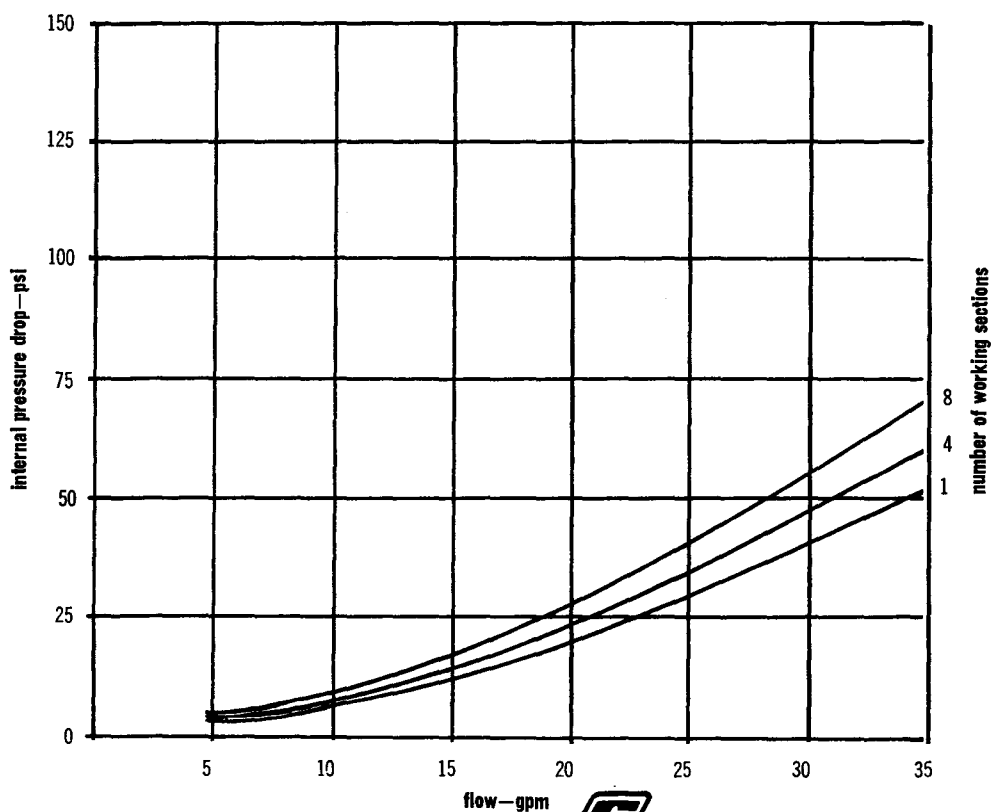
internal pressure drop

between 1" O.D. Tube inlet port A and $\frac{3}{4}$ " O.D. Tube work port
(selected spool in work position)



internal pressure drop

between $\frac{3}{4}$ " O.D. Tube work port and 1" O.D. Tube outlet port B
(selected spool in work position)

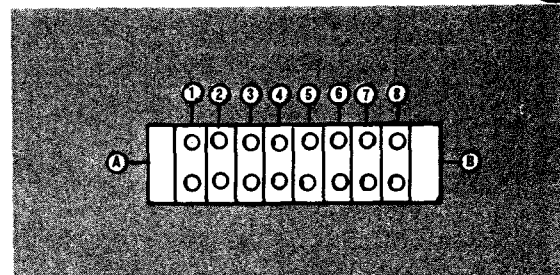


Model A20

performance data

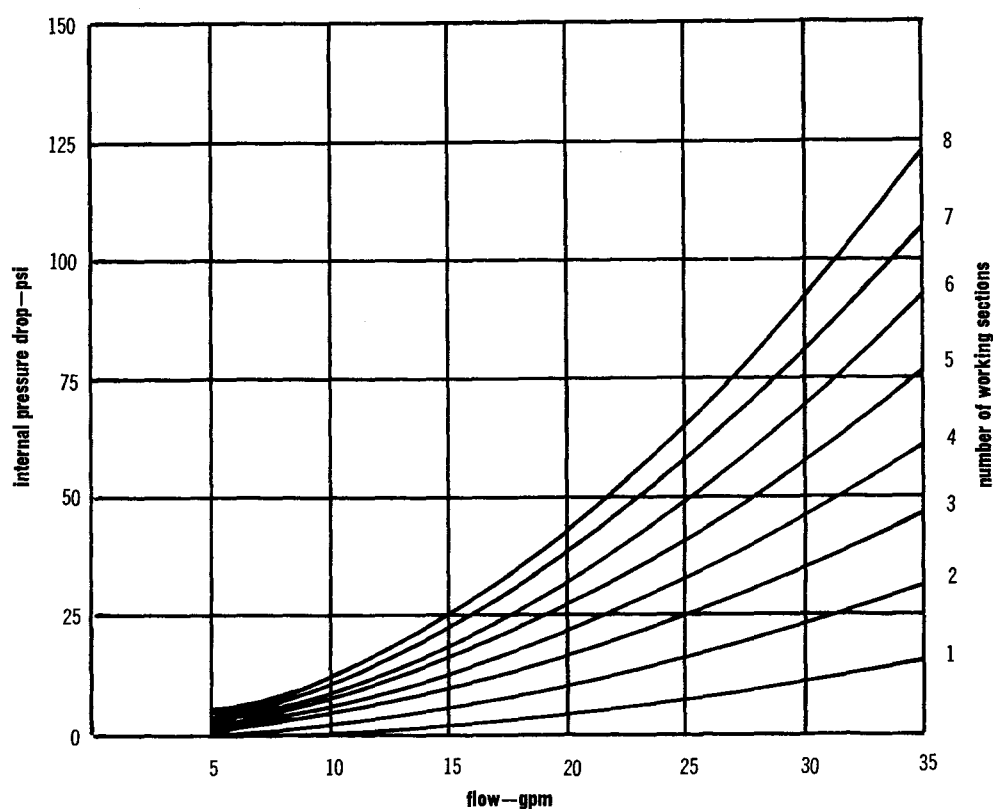
(series circuit)

Performance data, as recorded, is the result of averaging readings taken from tests of pressures between points externally adjacent to ports specified. All data is based on oil temperature at 140° F. and oil viscosity 180 SSU at 100° F.



internal pressure drop

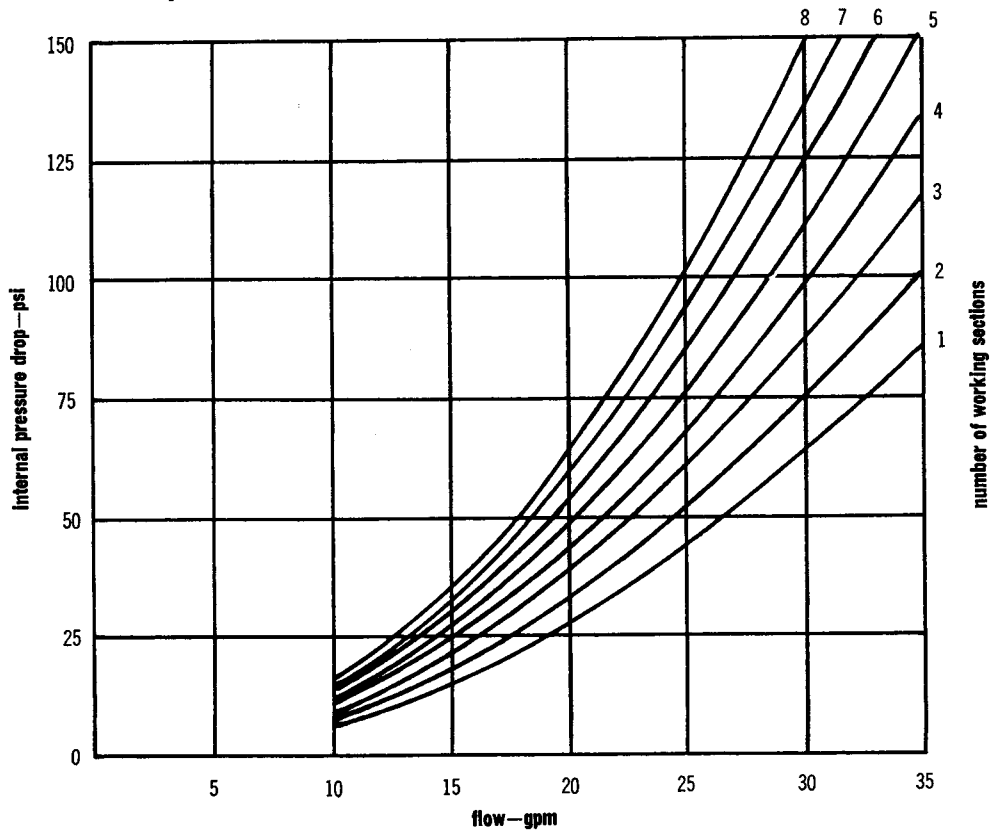
between 1" O.D. Tube inlet port A and 1" O.D. Tube outlet port B
(all spools in neutral position)



number working sections	flow—gpm						
	5	10	15	20	25	30	35
1	0.5	1.5	3.5	6.0	9.0	12.5	16.0
2	1.0	3.0	7.0	11.5	17.0	24.0	31.0
3	1.5	5.0	10.0	17.0	25.5	35.5	46.5
4	2.0	6.5	13.5	22.5	33.5	47.0	61.5
5	2.5	8.0	17.0	28.0	41.5	58.0	76.5
6	3.0	9.5	20.0	33.5	50.0	69.5	92.0
7	3.5	11.0	23.0	39.0	58.0	81.0	106.0
8	4.0	12.5	27.0	44.0	66.0	92.0	123.0

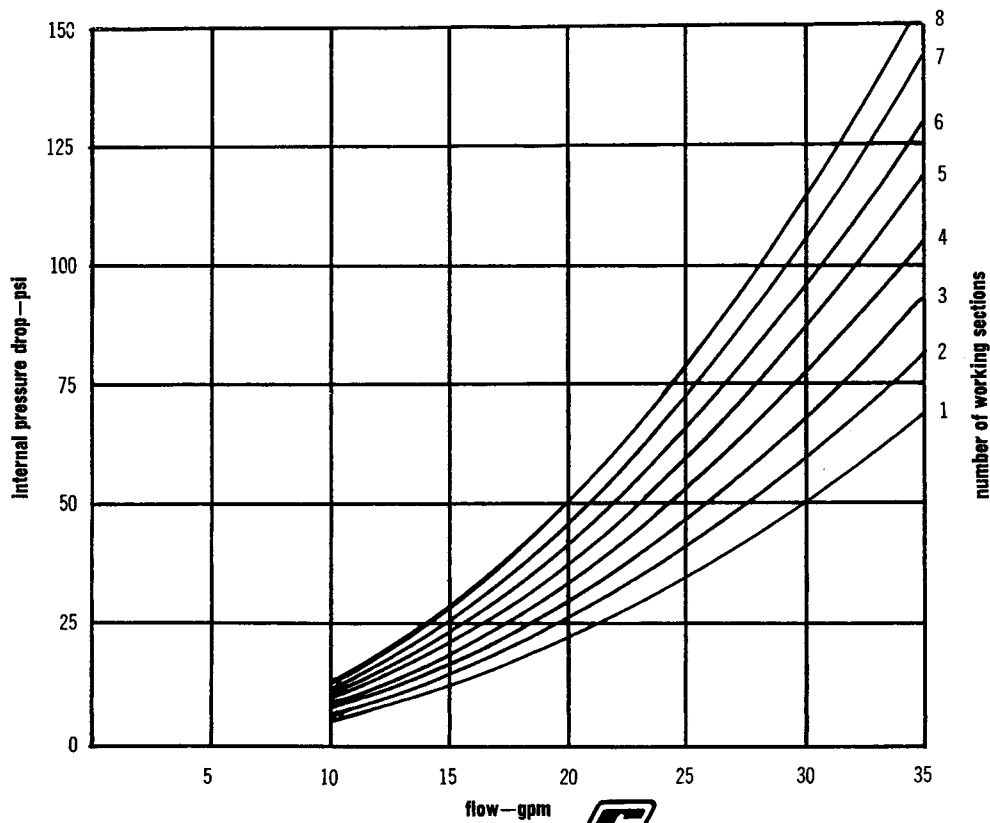
internal pressure drop

between 1" O.D. Tube inlet port A and $\frac{3}{4}$ " O.D. Tube work port
(selected spool in work position)



internal pressure drop

between $\frac{3}{4}$ " O.D. Tube work port and 1" O.D. Tube outlet port B
(selected spool in work position)

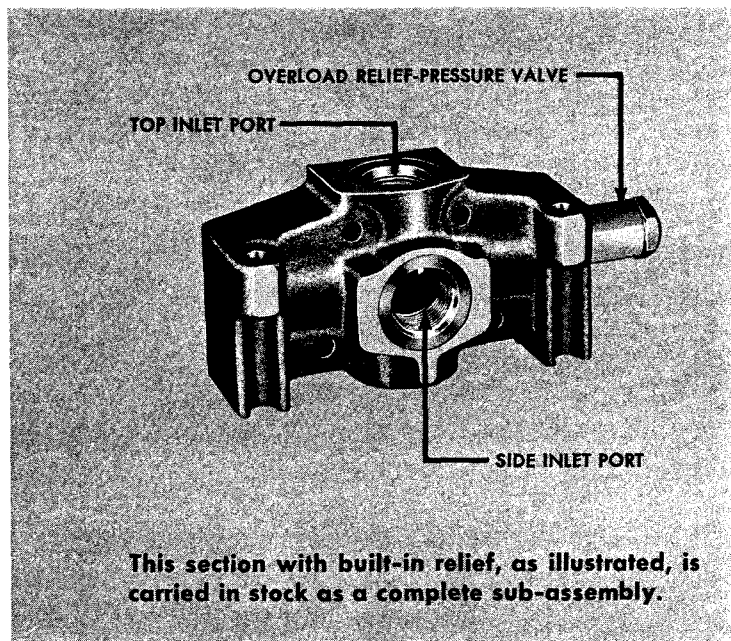


A20

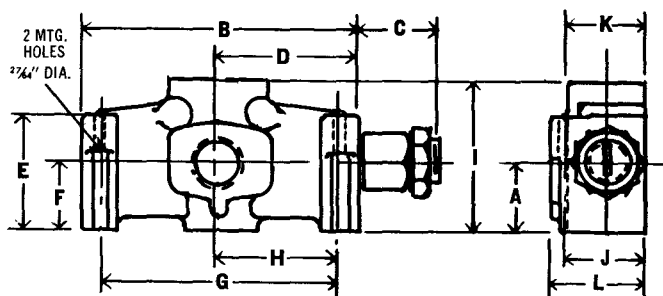
END INLET SECTIONS

parallel or series circuit

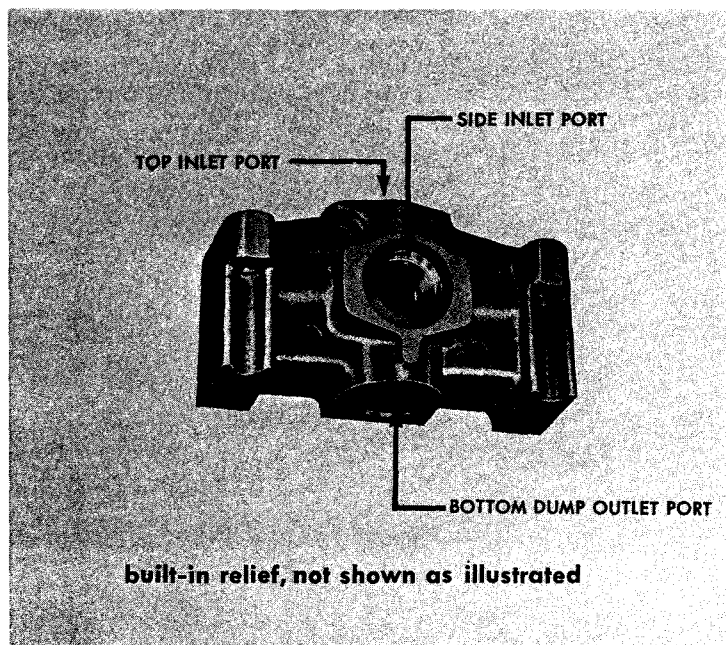
standard type



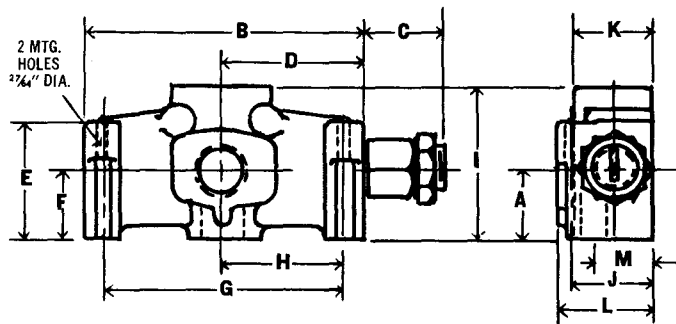
Functions as a cap to the upstream end of a valve bank. It has an inlet port to receive the discharge from a pump. Piping from pump is fitted to inlet port placed either in top or side of this section. All end inlet sections are available with or without cartridge type system overload relief—pressure control valve.



bottom dump to tank type



Functions the same as the standard end inlet type section except an additional outlet port is placed in the bottom of this section to permit direct mounting to top of tank, thus providing bottom dump tank return.



dimensional data

relief valve	envelope dimensions (inches)											
	A	B	C	D	E	F	G	H	I	J	K	L
none	2 1/16	7 1/4	9/32	3 5/8	3 1/8	1 7/8	6 1/4	3 1/8	3 15/16	2 1/16	2	2 1/2
screw adjusted type	2 1/16	7 1/4	2	3 5/8	3 1/8	1 7/8	6 1/4	3 1/8	3 15/16	2 1/16	2	2 1/2

selection data

type	relief valve		blow-off setting *	port size, style and location	
	location			1" NPT (side and top)	1" O.D. TUBE (side and top)
				CODE	CODE
none	—	—	—	CA 128	CA 127
screw adjusted	front		800 to 2500 psi	AA 128	AA 127

*Unless otherwise specified, relief valve setting will be 1100 psi.

unit weight approx. 11 lbs.

dimensional data

relief valve	envelope dimensions (inches)												
	A	B	C	D	E	F	G	H	I	J	K	L	M
none	2 1/16	7 1/4	9/32	3 5/8	3 1/8	1 7/8	6 1/4	3 1/8	3 15/16	2 1/16	2	2 1/2	1 1/16
screw adjusted type	2 1/16	7 1/4	2	3 5/8	3 1/8	1 7/8	6 1/4	3 1/8	3 15/16	2 1/16	2	2 1/2	1 1/16

selection data

type	relief valve		blow-off setting *	port size, style and location	
	location			1" NPT (side, top, bottom)	1" O.D. TUBE (side) 1" NPT (bottom)
				CODE	CODE
none	—	—	—	CA 132	CA 63
screw adjusted	front		800 to 2500 psi	AA 132	AA 63

*Unless otherwise specified, relief valve setting will be 1100 psi.

unit weight approx. 11 lbs.

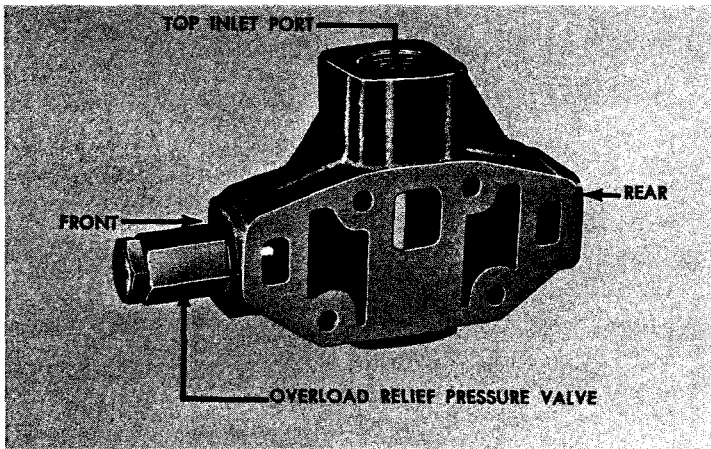
A20

MID INLET SECTION

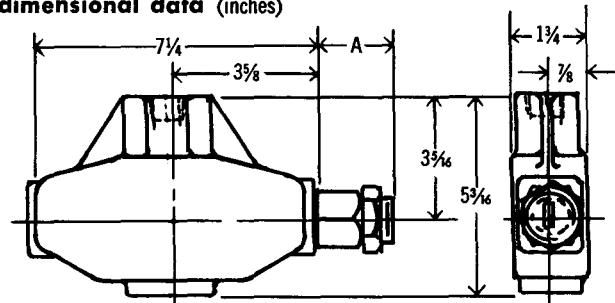
parallel or series circuit

split flow type—combined flow type

Provides the means to pipe a secondary pump discharge into a valve bank. Two types are available. A split flow type directs only the secondary pump discharge downstream from this section. A combined flow type directs the primary and secondary pumps discharge downstream from this section. A cartridge type pressure relief can be built into both the split flow and combined flow type.



dimensional data (inches)



unit weight approx. 9 lbs.

A— $\frac{1}{2}$ without relief
2 with screw adjusted type relief

selection data

port size, style and location

flow	relief valve*	$\frac{3}{4}$ " NPT (top) CODE	$\frac{3}{4}$ " O.D. TUBE (top) CODE
split	screw adjusted	EAA103	EAA110
	none	ECA103	ECA110
combined	screw adjusted	EAA3	EAA11
	none	ECA3	ECA11

*Relief valve blow-off setting 800—2500 psi. Unless otherwise specified, relief valve setting 1100 psi.

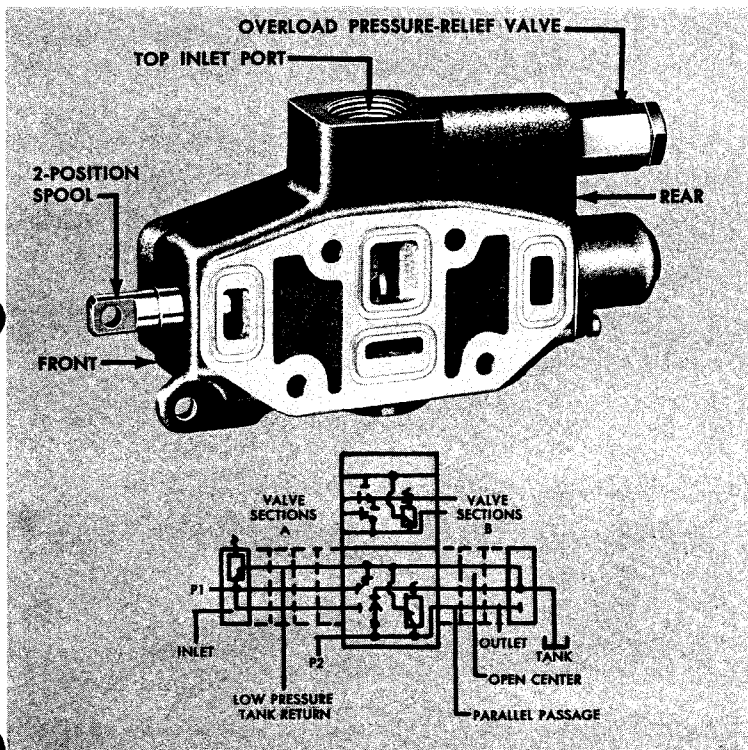
A20

MID INLET SECTION

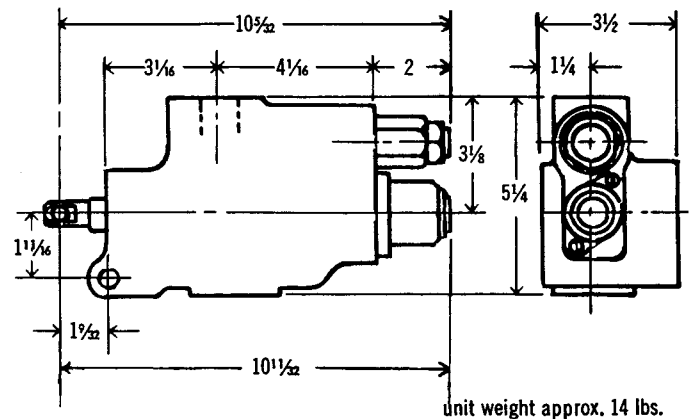
parallel or series circuit

split or combined flow type (manual operation)

This type of inlet permits manual operation of a work function at two different speeds at system pressure. It has a built-in 2 position manually operated directional valve. In one position secondary pump discharge only flows to downstream working sections. In the other position all flow is combined and available to all working sections.



dimensional data (inches)



selection data

port size, style and location

flow	relief valve*	spool action	3/4" NPT (top) CODE	3/4" O.D. TUBE (top) CODE
split or	screw adjusted	spring	EAB202	EAB212
combined	none	spring	ECB202	ECB212

*Relief valve blow-off setting 800—2500 psi. Unless otherwise specified, relief valve setting 1100 psi.

Spool operating handles not shown or included. For handle details, refer to page 65.

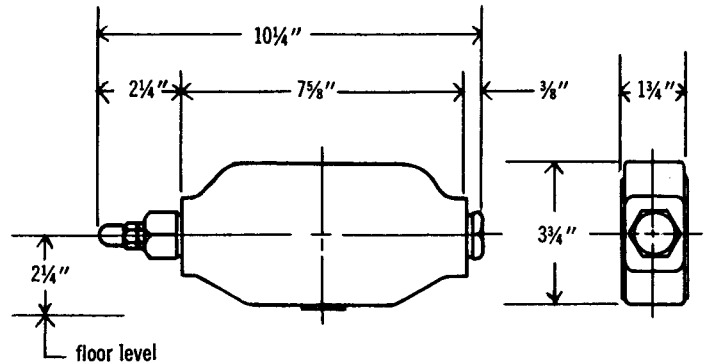
A20

FLOW CONTROL

parallel circuit

mid flow • pressure compensated

The flow control mid-section is a pressure compensated flow control which meters the flow rate to the downstream sections. The rate of flow is determined by the size of an orifice within the section. Six sizes of orifices are available. The pressure drop across the orifice is maintained at a constant value by means of an assembled restriction, automatically determined by a sliding spool, spring loaded and pressure positioned. Excess flow is diverted to the tank return connection.

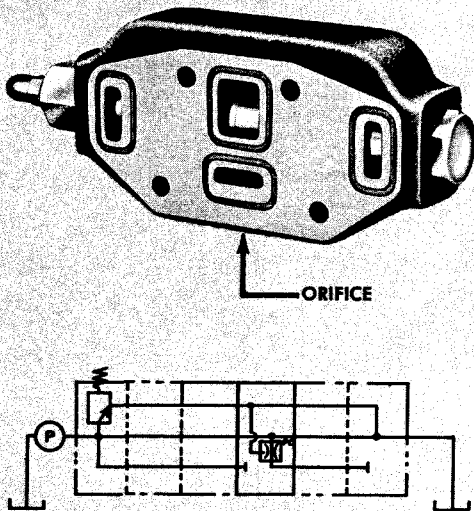


unit weight approx. 10 lbs.

CODE SELECTION

orifice (inches)	rate of flow (gpm)*	CODE
1/8	3	E400
3/16	5.5	E401
7/32	8	E402
1/4	10	E403
5/16	13	E404
3/8	16	E405

*These figures are approximate and dependent on oil temperature, viscosity and certain characteristics of the valve section itself.



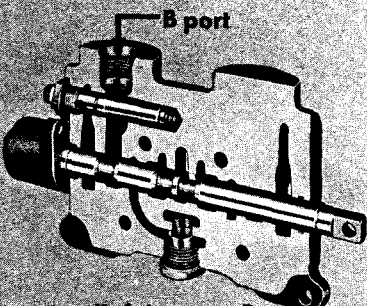
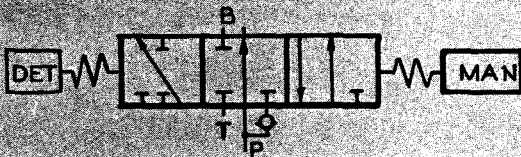
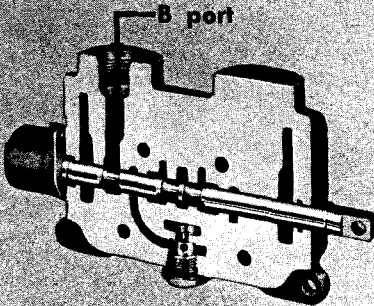
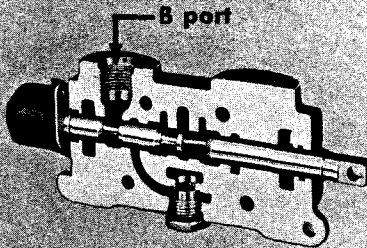
A20

WORKING SECTIONS

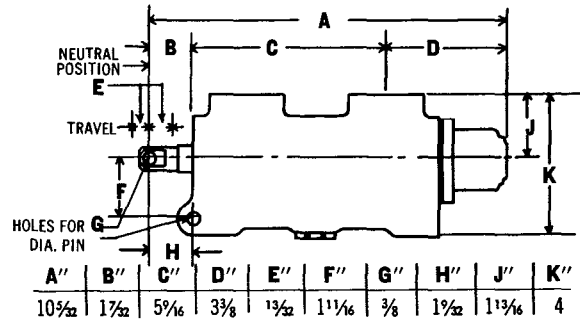
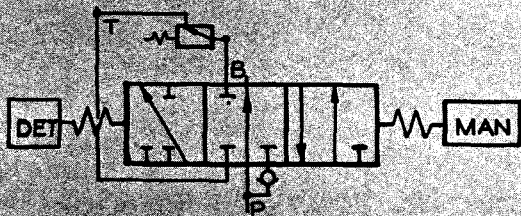
parallel circuit · manually operated

3 way · 3 position (work ports blocked to flow when spool is in neutral position)

Used in controlling and directing flow to single acting cylinders requiring push and hold power actions and gravity return. Also used to start and stop fluid motors having one direction of rotation.



overload port relief in port B

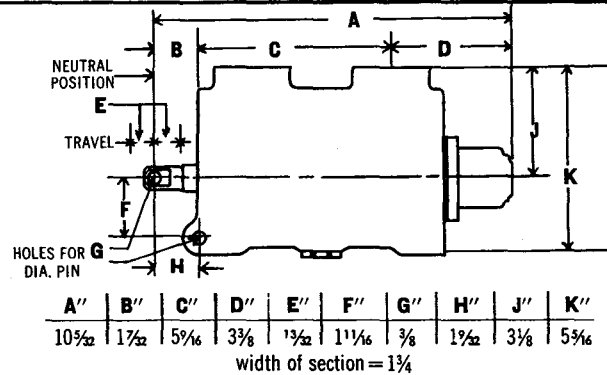


CODE SELECTION

port size and style

spool action	3/4" NPT	3/4" O.D. TUBE
	CODE	CODE
spring return	SA 53	SA 57
detent positioned	SB 53	SB 57

unit weight approx. 9 lbs.

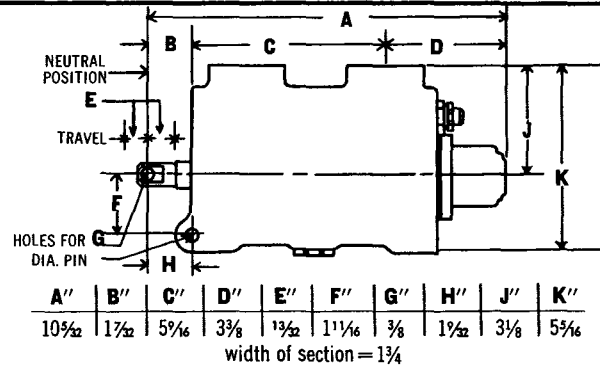


CODE SELECTION

port size and style

spool action	3/4" NPT	3/4" O.D. TUBE
	CODE	CODE
spring return	JA 53	JA 57
detent positioned	JB 53	JB 57

unit weight approx. 13 lbs.



CODE SELECTION

port size and style

spool action	3/4" NPT	3/4" O.D. TUBE
	CODE	CODE
spring return	JA 190	JA 194
detent positioned	JB 190	JB 194

unit weight approx. 13 lbs.

Spool operating handles not shown or included. For handle details, refer to page 65.



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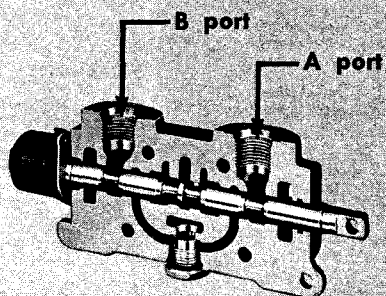
A20

WORKING SECTIONS

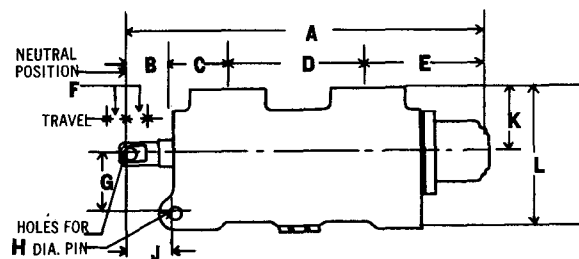
parallel circuit • manually operated

4 way • 3 position (work ports blocked to flow when spool is in neutral position)

Used in controlling and directing flow to double acting cylinders requiring push, pull and hold power actions. Also used to start, stop and reverse fluid motors requiring rotation in either direction.



This section having spring return to neutral spool action, as illustrated, is carried in stock as a complete sub-assembly.



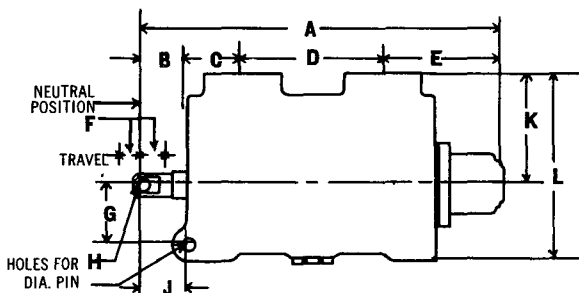
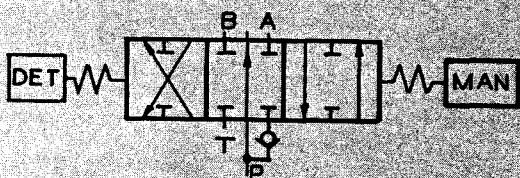
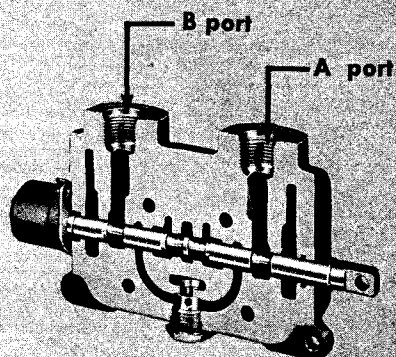
A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"
10 $\frac{3}{32}$	1 $\frac{1}{32}$	1 $\frac{1}{16}$	4	3 $\frac{3}{8}$	1 $\frac{3}{32}$	1 $\frac{1}{16}$	$\frac{3}{8}$	1 $\frac{1}{32}$	1 $\frac{1}{16}$	4

width of section = 1 $\frac{3}{4}$

CODE SELECTION

spool action	port size and style	
	$\frac{3}{4}$ " NPT	$\frac{3}{4}$ " O.D. TUBE
spring return	DA 53	DA 57
detent positioned	DB 53	DB 57

unit weight approx. 9 lbs.



A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"
10 $\frac{3}{32}$	1 $\frac{1}{32}$	1 $\frac{1}{16}$	4	3 $\frac{3}{8}$	1 $\frac{3}{32}$	1 $\frac{1}{16}$	$\frac{3}{8}$	1 $\frac{1}{32}$	3 $\frac{3}{8}$	5 $\frac{1}{16}$

width of section = 1 $\frac{3}{4}$

CODE SELECTION

spool action	port size and style	
	$\frac{3}{4}$ " NPT	$\frac{3}{4}$ " O.D. TUBE
spring return	HA 53	HA 57
detent positioned	HB 53	HB 57

unit weight approx. 12 lbs.

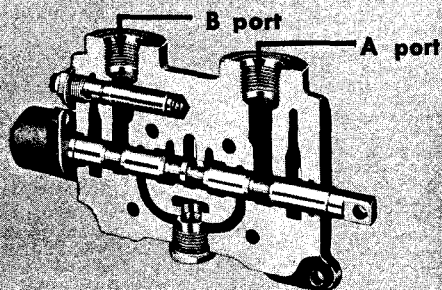
A20

WORKING SECTIONS

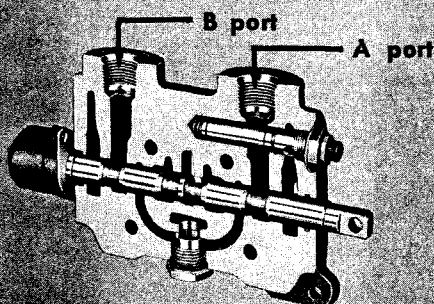
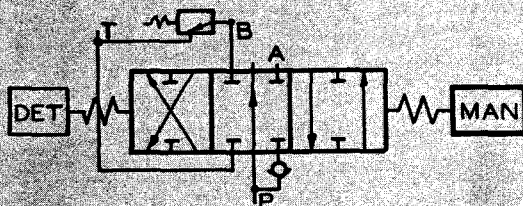
parallel circuit • manually operated

4 way • 3 position (work ports blocked to flow when spool is in neutral position)

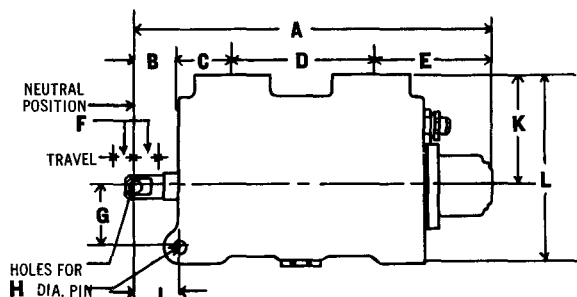
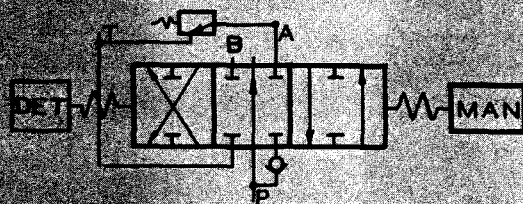
Used in controlling and directing flow to double acting cylinders requiring push, pull and hold power actions. Also used to start, stop and reverse fluid motors requiring rotation in either direction.



overload port relief in port B



overload port relief in port A



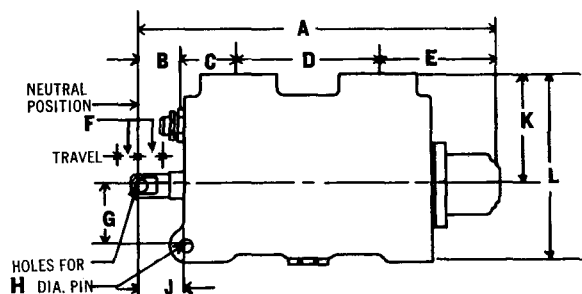
A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"
10 $\frac{1}{2}$ "	17 $\frac{1}{2}$ "	1 $\frac{1}{4}$ "	4	3 $\frac{3}{8}$ "	1 $\frac{3}{4}$ "	1 $\frac{11}{16}$ "	$\frac{3}{8}$ "	1 $\frac{1}{2}$ "	3 $\frac{1}{8}$ "	5 $\frac{1}{4}$ "

width of section = 1 $\frac{3}{4}$ "

CODE SELECTION

spool action	port size and style	
	$\frac{3}{4}$ " NPT	$\frac{3}{4}$ " O.D. TUBE
spring return	HA 190	HA 194
detent positioned	HB 190	HB 194

unit weight approx. 13 lbs.



A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"
10 $\frac{1}{2}$ "	17 $\frac{1}{2}$ "	1 $\frac{1}{4}$ "	4	3 $\frac{3}{8}$ "	1 $\frac{3}{4}$ "	1 $\frac{11}{16}$ "	$\frac{3}{8}$ "	1 $\frac{1}{2}$ "	3 $\frac{1}{8}$ "	5 $\frac{1}{4}$ "

width of section = 1 $\frac{3}{4}$ "

CODE SELECTION

spool action	port size and style	
	$\frac{3}{4}$ " NPT	$\frac{3}{4}$ " O.D. TUBE
spring return	HA 178	HA 182
detent positioned	HB 178	HB 182

unit weight approx. 13 lbs.

Spool operating handles not shown or included. For handle details, refer to page 65.



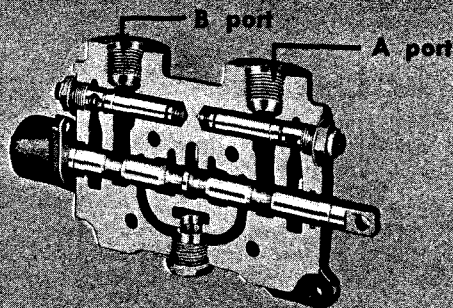
Commercial Shearing & Stamping Company

A20

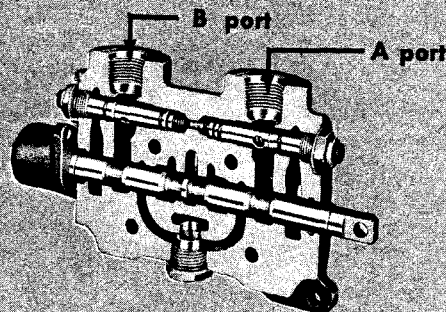
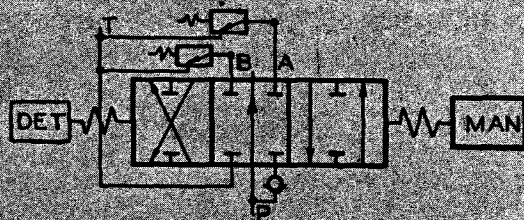
WORKING SECTIONS

parallel circuit · manually operated

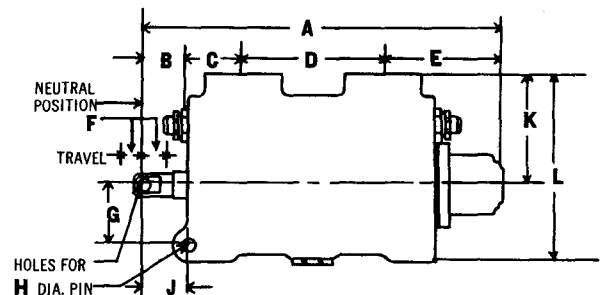
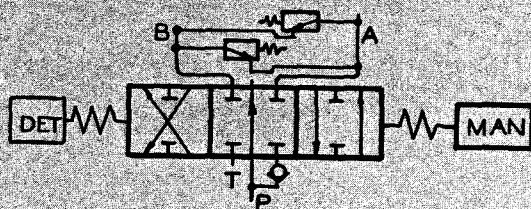
4 way · 3 position (work ports blocked to flow when spool is in neutral position)



overload port relief in port A and B



crossover relief in port A and B

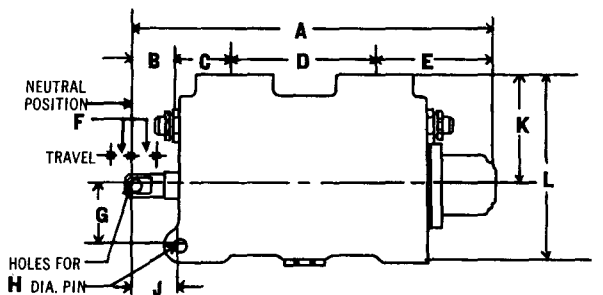


A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"
10 $\frac{1}{2}$	17 $\frac{1}{2}$	1 $\frac{1}{4}$	4	3 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{4}$	$\frac{3}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{8}$	5 $\frac{1}{4}$
width of section = 1 $\frac{3}{4}$										

CODE SELECTION

spool action	port size and style	
	$\frac{3}{4}$ " NPT	$\frac{3}{4}$ " O.D. TUBE
spring return	HA 166	HA 170
detent positioned	HB 166	HB 170

unit weight approx. 13 lbs.



A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"
10 $\frac{1}{2}$	17 $\frac{1}{2}$	1 $\frac{1}{4}$	4	3 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{4}$	$\frac{3}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{8}$	5 $\frac{1}{4}$
width of section = 1 $\frac{3}{4}$										

CODE SELECTION

spool action	port size and style	
	$\frac{3}{4}$ " NPT	$\frac{3}{4}$ " O.D. TUBE
spring return	HA 653	HA 657
detent positioned	HB 653	HB 657

unit weight approx. 13 lbs.

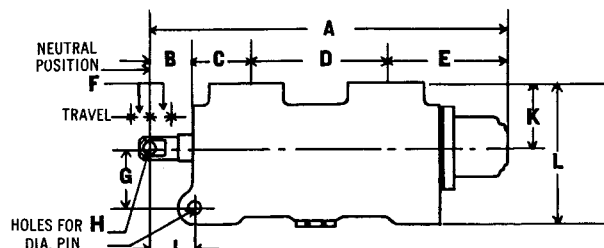
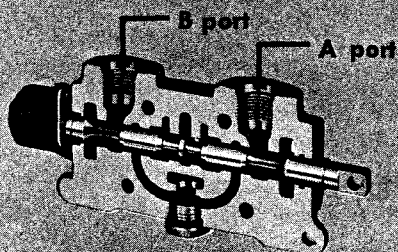
A20

WORKING SECTIONS

parallel circuit · manually operated

4 way · 3 position (work ports open to flow when spool is in neutral position)

Used in controlling and directing flow to double acting cylinders requiring push, pull and float actions. Also used to start, reverse and "free wheel" fluid motors requiring rotation in either direction.



A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"
10 $\frac{1}{32}$	1 $\frac{1}{2}$	1 $\frac{1}{16}$	4	3 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{16}$	$\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{16}$	4

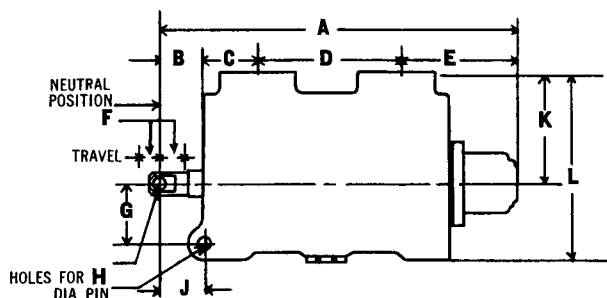
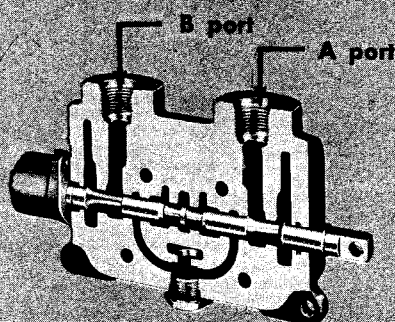
width of section = 1 $\frac{3}{4}$

CODE SELECTION

port size and style

spool action	$\frac{3}{4}$ " NPT	$\frac{3}{4}$ " O.D. TUBE
	CODE	CODE
spring return	MA 53	MA 57
detent positioned	MB 53	MB 57

unit weight approx. 9 lbs.



A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"
10 $\frac{1}{32}$	1 $\frac{1}{2}$	1 $\frac{1}{16}$	4	3 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{16}$	$\frac{3}{8}$	1 $\frac{1}{2}$	3 $\frac{3}{8}$	5 $\frac{1}{16}$

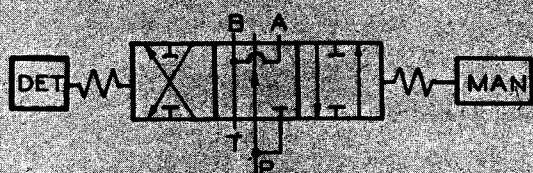
width of section = 1 $\frac{3}{4}$

CODE SELECTION

port size and style

spool action	$\frac{3}{4}$ " NPT	$\frac{3}{4}$ " O.D. TUBE
	CODE	CODE
spring return	LA 53	LA 57
detent positioned	LB 53	LB 57

unit weight approx. 12 lbs.



Spool operating handles not shown or included. For handle details, refer to page 65.



Commercial Shearing & Stamping Company

A20

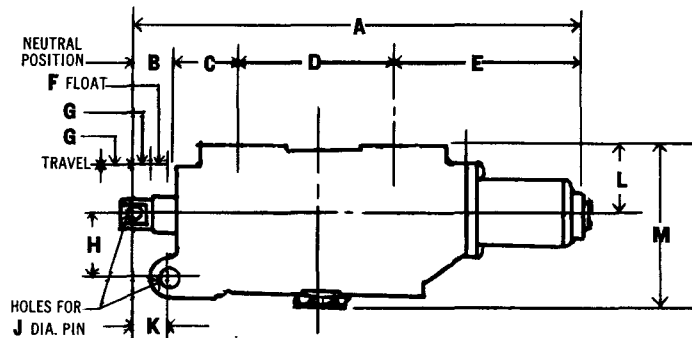
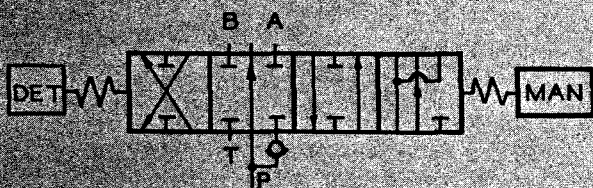
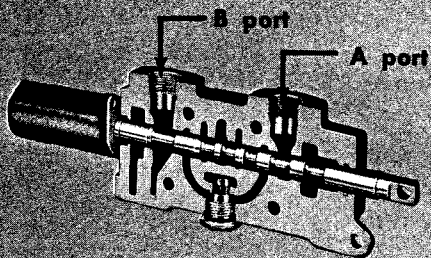
WORKING SECTIONS

parallel circuit • manually operated

4 way • 4 position (work ports blocked to flow when spool is

in neutral position—open in float position)

Used in controlling and directing flow to double acting cylinders requiring push, pull, hold and float actions. Also used to start, stop, reverse and "free wheel" fluid motors.



	A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"	M"
FC	13 ³ / ₁₆	1 ¹ / ₂	2 ¹ / ₄	4	5 ¹ / ₂	⁵ / ₁₆	1 ³ / ₂	1 ¹ / ₁₆	³ / ₈	1 ¹ / ₂	1 ¹ / ₁₆	4
FB	11 ¹ / ₂	1 ¹ / ₂	2 ¹ / ₄	4	3 ³ / ₁₆	⁵ / ₁₆	1 ³ / ₂	1 ¹ / ₁₆	³ / ₈	1 ¹ / ₂	1 ¹ / ₁₆	4

width of section = 1³/₄

CODE SELECTION

port size and style

spool action	3/4" NPT	3/4" O. D. TUBE
	CODE	CODE
spring return *	FC 53	FC 57
detant positioned	FB 53	FB 57

*detent in float position

unit weight approx. 13 lbs.

Spool operating handles not shown or included. For handle details, refer to page 65.

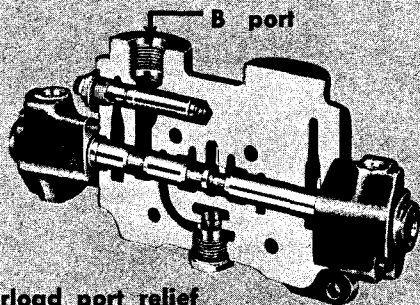
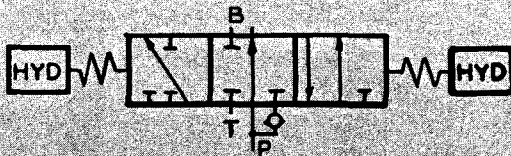
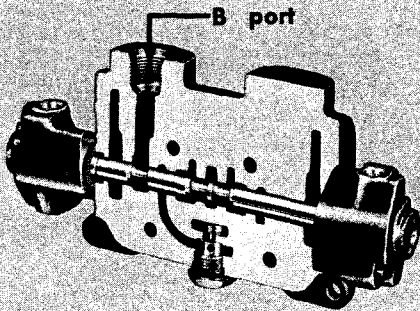
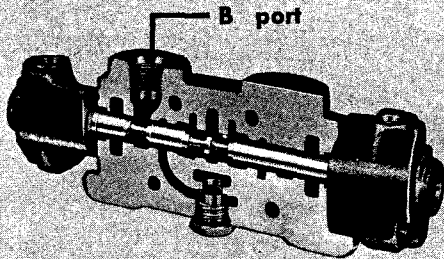
A20

WORKING SECTIONS

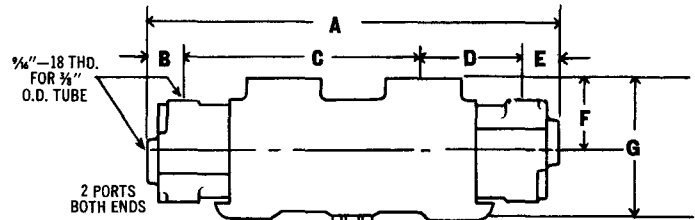
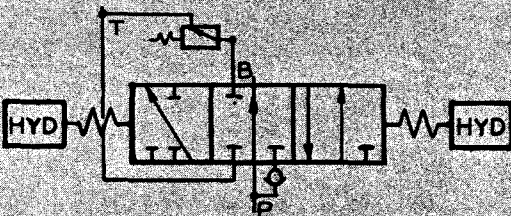
parallel circuit • pilot operated

3 way • 3 position (work ports blocked to flow when spool is in neutral position)

Used in controlling and directing flow to single acting cylinders requiring push and hold power actions and gravity return. Also used to start and stop fluid motors having one direction of rotation.



with overload port relief

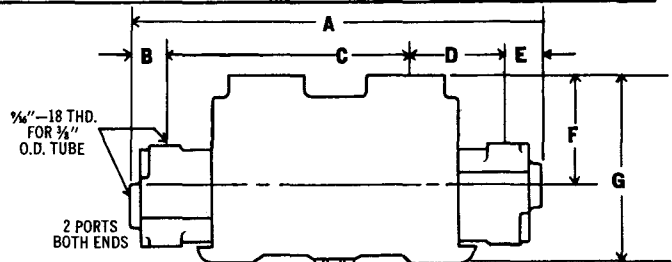


A''	B''	C''	D''	E''	F''	G''
12 1/8	1 1/2	6 29/32	2 29/32	1 1/2	1 13/16	4
width of section = 1 3/4						

CODE SELECTION

spool action	port size and style	
	3/4" NPT	3/4" O.D. TUBE
spring return	SS 3	SS 7

unit weight approx. 11 lbs.

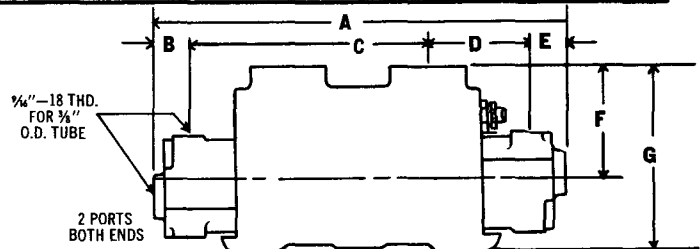


A''	B''	C''	D''	E''	F''	G''
12 1/8	1 1/2	6 29/32	2 29/32	1 1/2	3 3/8	5 5/16
width of section = 1 3/4						

CODE SELECTION

spool action	port size and style	
	3/4" NPT	3/4" O.D. TUBE
spring return	JS 3	JS 7

unit weight approx. 14 lbs.



A''	B''	C''	D''	E''	F''	G''
12 1/8	1 1/2	6 29/32	2 29/32	1 1/2	3 3/8	5 5/16
width of section = 1 3/4						

CODE SELECTION

spool action	port size and style	
	3/4" NPT	3/4" O. D. TUBE
spring return	JS 140	JS 144

unit weight approx. 15 lbs.



Commercial Shearing & Stamping Company

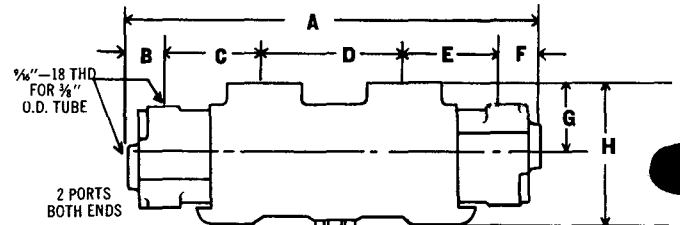
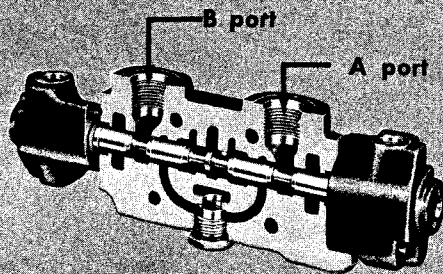
A20

WORKING SECTIONS

parallel circuit • pilot operated

4 way • 3 position (work ports blocked to flow when spool is in neutral position)

Used in controlling and directing flow to double acting cylinders requiring push, pull and hold power actions. Also used to start, stop and reverse fluid motors requiring rotation in either direction.



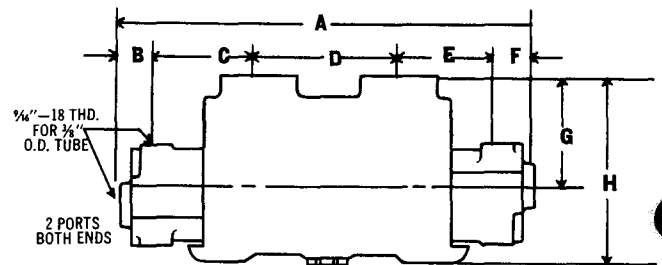
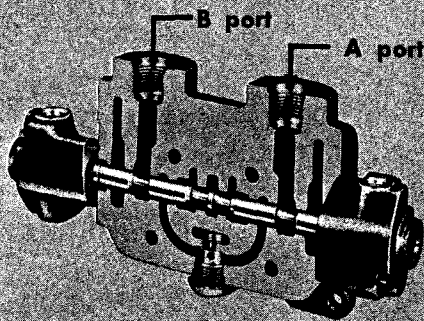
A"	B"	C"	D"	E"	F"	G"	H"
12 1/8	1 1/2	2 29/32	4	2 29/32	1 1/2	1 13/16	4

width of section = 1 3/4

CODE SELECTION

spool action	port size and style	
	3/4" NPT	3/4" O.D. TUBE
spring return	DS 3	DS 7

unit weight approx. 11 lbs.



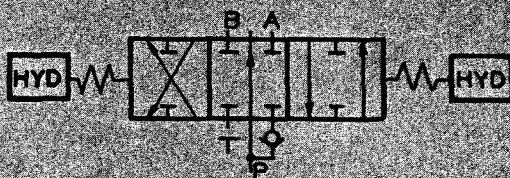
A"	B"	C"	D"	E"	F"	G"	H"
12 1/8	1 1/2	2 29/32	4	2 29/32	1 1/2	3/8	5 1/8

width of section = 1 3/4

CODE SELECTION

spool action	port size and style	
	3/4" NPT	3/4" O.D. TUBE
spring return	HS 3	HS 7

unit weight approx. 14 lbs.



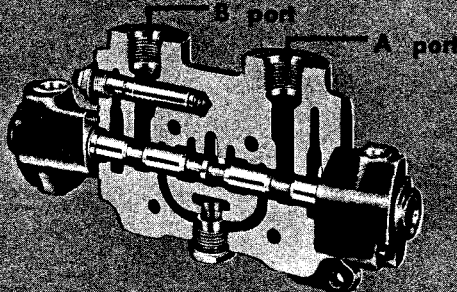
A20

WORKING SECTIONS

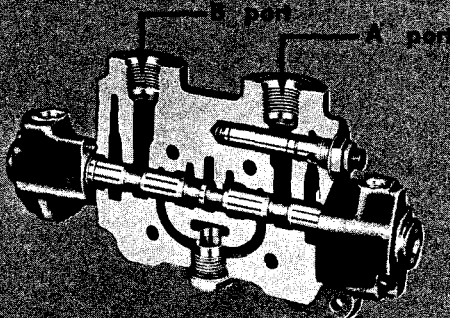
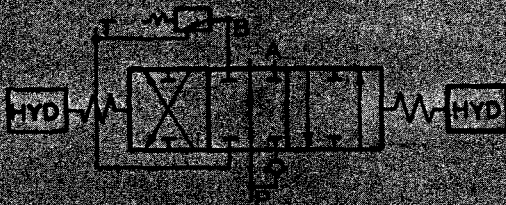
parallel circuit • pilot operated

4 way • 3 position (work ports blocked to flow when spool is in neutral position)

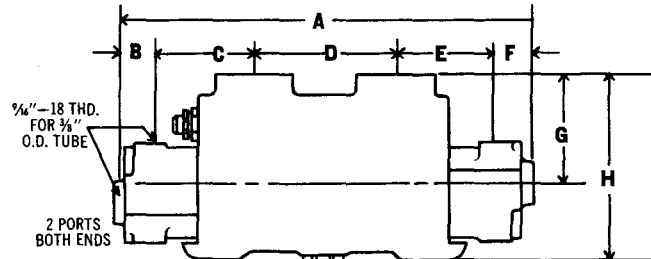
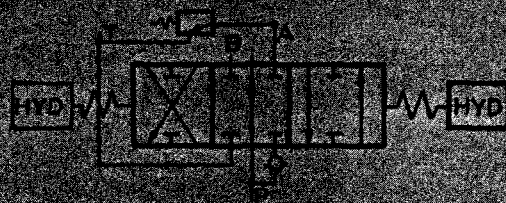
Used in controlling and directing flow to double acting cylinders requiring push, pull and hold power actions. Also used to start, stop and reverse fluid motors requiring rotation in either direction.



overload port relief in port B



overload port relief in port A



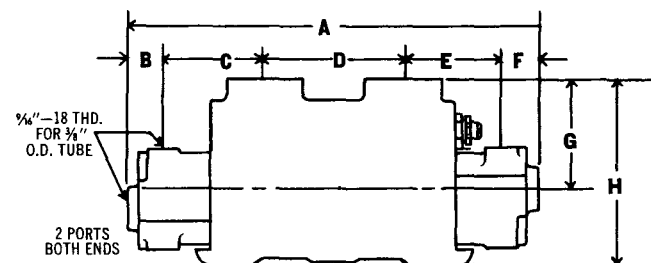
A"	B"	C"	D"	E"	F"	G"	H"
12 1/8	1 1/2	2 29/32	4	2 29/32	1 1/2	3 1/8	5 5/16

width of section = 1 3/4

CODE SELECTION

	port size and style	
	3/4" NPT	3/4" O.D. TUBE
spool action	CODE	CODE
spring return	HS 140	HS 144

unit weight approx. 14 lbs.



A"	B"	C"	D"	E"	F"	G"	H"
12 1/8	1 1/2	2 29/32	4	2 29/32	1 1/2	3 1/8	5 5/16

width of section = 1 3/4

CODE SELECTION

	port size and style	
	3/4" NPT	3/4" O.D. TUBE
spool action	CODE	CODE
spring return	HS 128	HS 132

unit weight approx. 14 lbs.

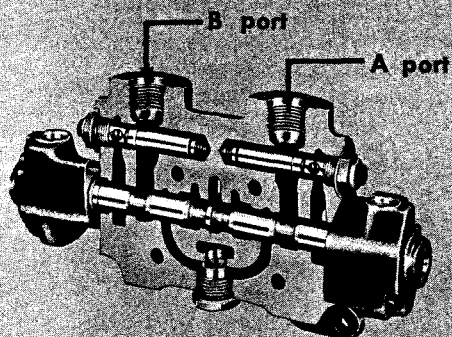


A20

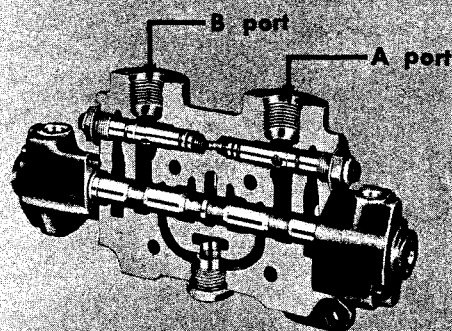
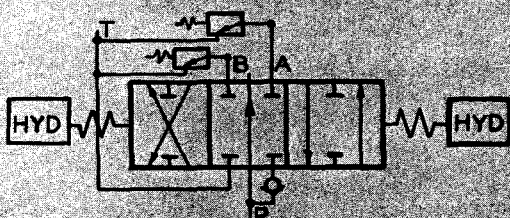
WORKING SECTIONS

parallel circuit · pilot operated

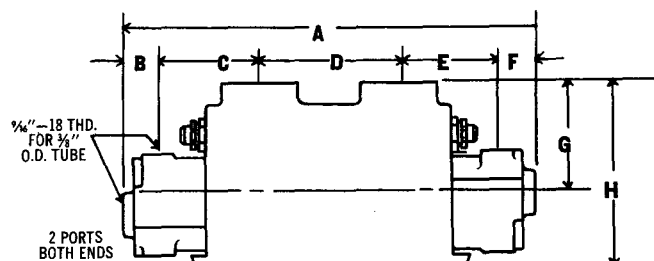
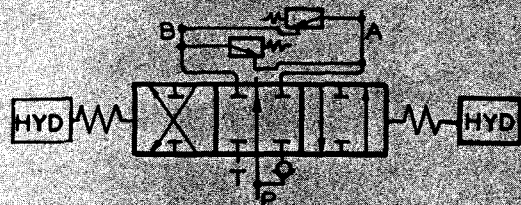
4 way · 3 position (work ports blocked to flow when spool is in neutral position)



overload port relief in port A or B



crossover relief in ports A and B

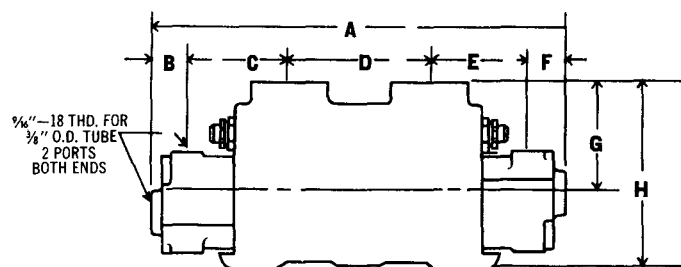


A"	B"	C"	D"	E"	F"	G"	H"
12 $\frac{1}{8}$	1 $\frac{1}{2}$	2 $\frac{29}{32}$	4	2 $\frac{29}{32}$	1 $\frac{1}{2}$	3 $\frac{1}{8}$	5 $\frac{1}{4}$
width of section = 1 $\frac{3}{4}$							

CODE SELECTION

spool action	port size and style	
	$\frac{1}{4}$ " NPT	$\frac{3}{4}$ " O.D. TUBE
spring return	HS 116	HS 120

unit weight approx. 15 lbs.



A"	B"	C"	D"	E"	F"	G"	H"
12 $\frac{1}{8}$	1 $\frac{1}{2}$	2 $\frac{29}{32}$	4	2 $\frac{29}{32}$	1 $\frac{1}{2}$	3 $\frac{1}{8}$	5 $\frac{1}{4}$
width of section = 1 $\frac{3}{4}$							

CODE SELECTION

spool action	port size and style	
	$\frac{1}{4}$ " NPT	$\frac{3}{4}$ " O.D. TUBE
spring return	HS 603	HS 607

unit weight approx. 15 lbs.

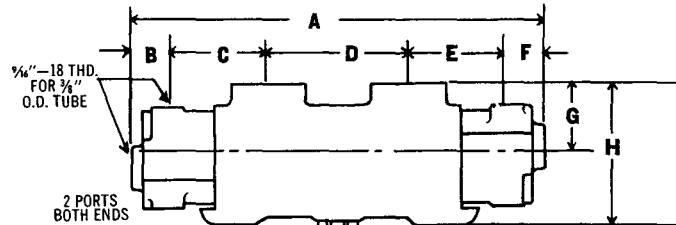
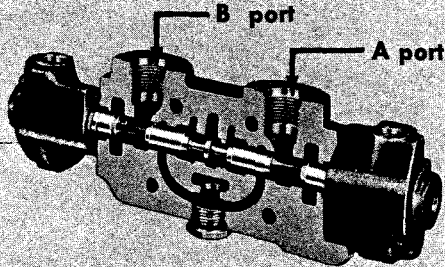
A20

WORKING SECTIONS

parallel circuit · pilot operated

4 way · 3 position (work ports open to flow when spool is in neutral position)

Used in controlling and directing flow to double acting cylinders requiring push, pull and float actions. Also used to start, reverse and "free wheel" fluid motors requiring rotation in either direction.

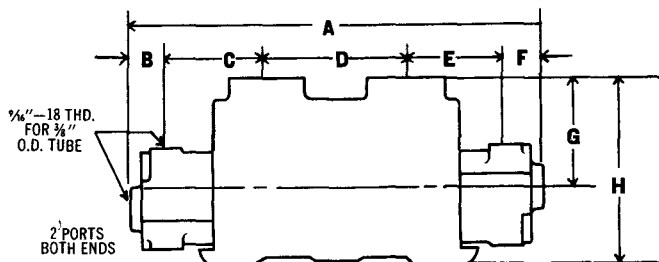
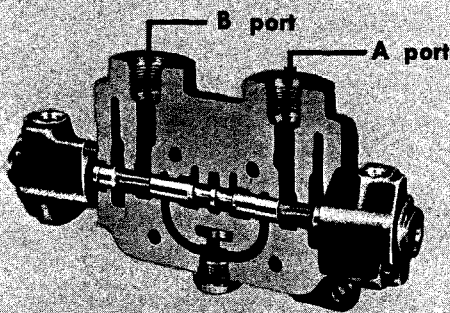


A''	B''	C''	D''	E''	F''	G''	H''
12 $\frac{1}{8}$	1 $\frac{3}{32}$	2 $\frac{29}{32}$	4	2 $\frac{29}{32}$	1 $\frac{3}{32}$	1 $\frac{13}{16}$	4
width of section = 1 $\frac{3}{4}$							

CODE SELECTION

spool action	port size and style	
	$\frac{3}{4}$ " NPT	$\frac{3}{4}$ " O.D. TUBE
spring return	CODE MS 3	CODE MS 7

unit weight approx. 11 lbs.

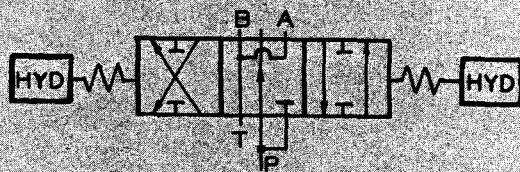


A''	B''	C''	D''	E''	F''	G''	H''
12 $\frac{1}{8}$	1 $\frac{3}{32}$	2 $\frac{29}{32}$	4	2 $\frac{29}{32}$	1 $\frac{3}{32}$	3 $\frac{3}{8}$	5 $\frac{1}{16}$
width of section = 1 $\frac{3}{4}$							

CODE SELECTION

spool action	port size and style	
	$\frac{3}{4}$ " NPT	$\frac{3}{4}$ " O.D. TUBE
spring return	CODE LS 3	CODE LS 7

unit weight approx. 14 lbs.



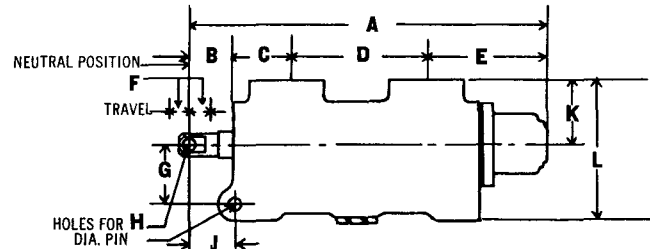
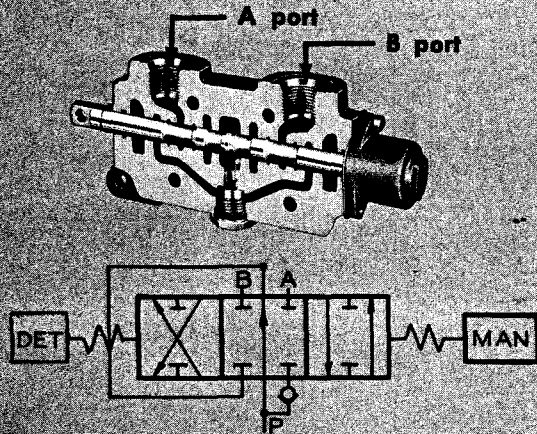
A20

WORKING SECTIONS

series circuit • manually operated

4 way • 3 position (work ports blocked to flow when spool is in neutral position)

Used in controlling and directing flow to double acting cylinders requiring push, pull and hold power actions. Also used to start, stop and reverse fluid motors requiring rotation in either direction.



A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"
10 $\frac{1}{32}$	17 $\frac{1}{32}$	1 $\frac{1}{16}$	4	3 $\frac{3}{8}$	1 $\frac{1}{32}$	1 $\frac{1}{16}$	$\frac{3}{8}$	1 $\frac{1}{32}$	1 $\frac{1}{16}$	4

width of section = 1 $\frac{3}{4}$

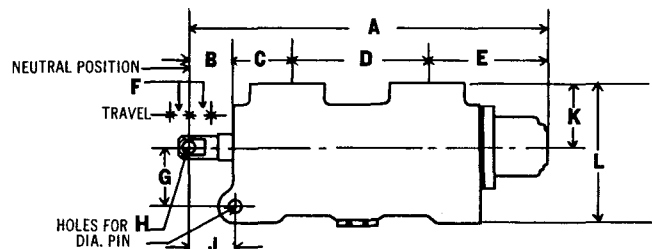
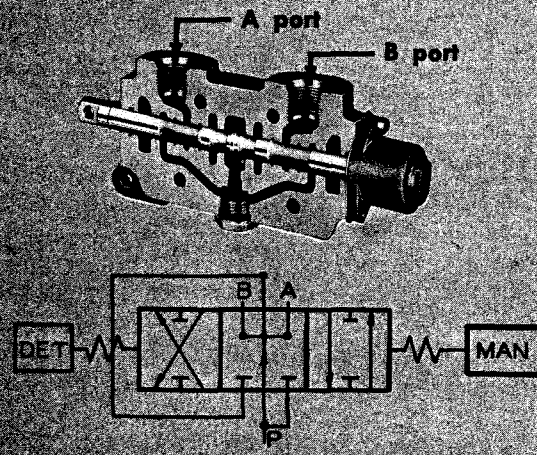
CODE SELECTION

spool action	port size and style	
	$\frac{3}{4}$ " NPT	$\frac{3}{4}$ " O. D. TUBE
spring return	WDA 53	WDA 57
detent positioned	WDB 53	WDB 57

unit weight approx. 9 lbs.

4 way • 3 position (work ports open to flow when spool is in neutral position)

Used in controlling and directing flow to double acting cylinders requiring push, pull and float actions. Also used to start, reverse and "free wheel" fluid motors requiring rotation in either direction.



A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"
10 $\frac{1}{32}$	17 $\frac{1}{32}$	1 $\frac{1}{16}$	4	3 $\frac{3}{8}$	1 $\frac{1}{32}$	1 $\frac{1}{16}$	$\frac{3}{8}$	1 $\frac{1}{32}$	1 $\frac{1}{16}$	4

width of section = 1 $\frac{3}{4}$

CODE SELECTION

spool action	port size and style	
	$\frac{3}{4}$ " NPT	$\frac{3}{4}$ " O. D. TUBE
spring return	WMA 53	WMA 57
detent positioned	WMB 53	WMB 57

unit weight approx. 9 lbs.

D

D

D

D

D



A20

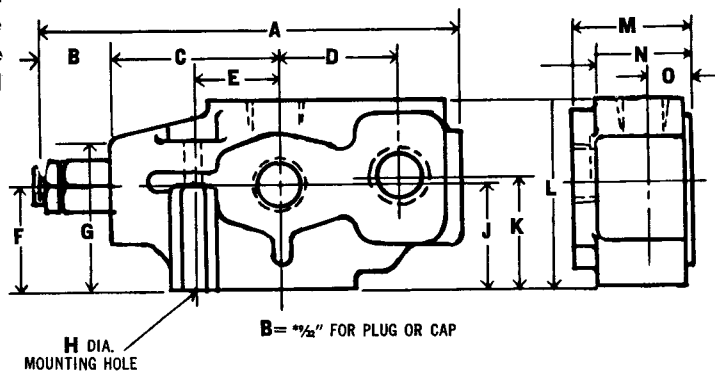
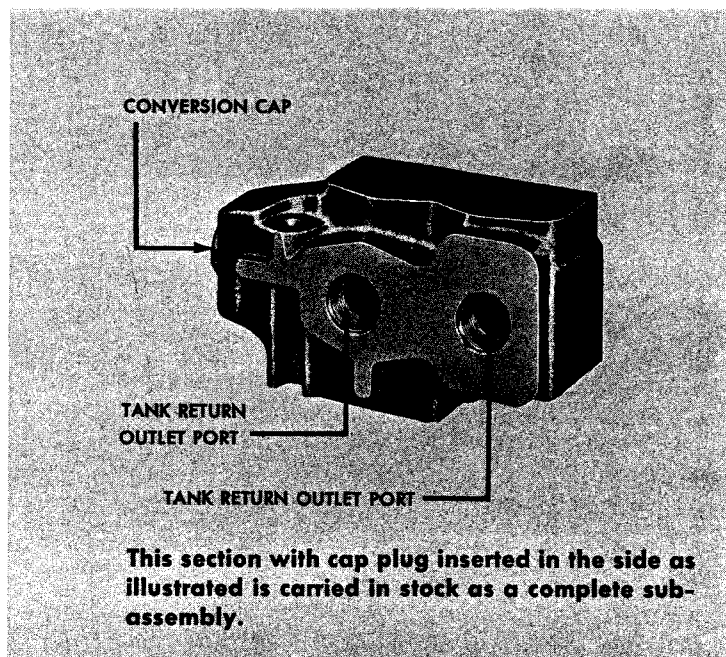
OUTLET SECTIONS

parallel or series circuit

pressure beyond or tank return type (convertible)

Functions as a cap to the downstream end of a valve bank, piping flow beyond or to tank by direct return. Here is a dual function type of end outlet which, by a simple conversion, can be made to direct all flow either to pressure beyond requirements or direct return to tank. When a long cartridge plug is inserted into the side, the section is converted to a pressure beyond outlet with one port open to receive high pressure carryover piping and another port open to low pressure return to tank piping.

If a cap plug is inserted instead of the cartridge, all outlet ports are low pressure ports available for return to tank piping. Outlet ports not piped to tank must be plugged. Porting can be furnished for top or side piping.



A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"	M"	N"	O"
9 1/2	2 3/4	3 3/8	2 1/2	1 1/4	2 1/4	3 3/8	2 3/4	2 1/4	2 1/4	3 1/4	2 1/2	2 1/4	1 3/4

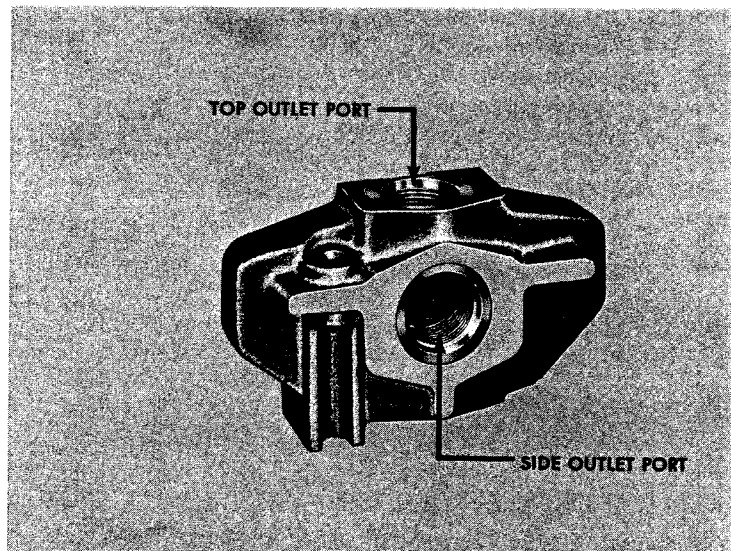
CODE SELECTION

port size, style and location

	1" NPT (two side ports)	1" O.D. TUBE (two side ports)	1" NPT (two top ports)	1" O.D. TUBE (two top ports)
	CODE	CODE	CODE	CODE
Direct return to tank (cap plug in side)	DY 606	DY 658	DY 612	DY 682
pressure beyond (cartridge in side)	CY 606	CY 658	CY 612	CY 682
pressure beyond (cartridge relief in side)	AY 606	AY 658	AY 612	AY 682

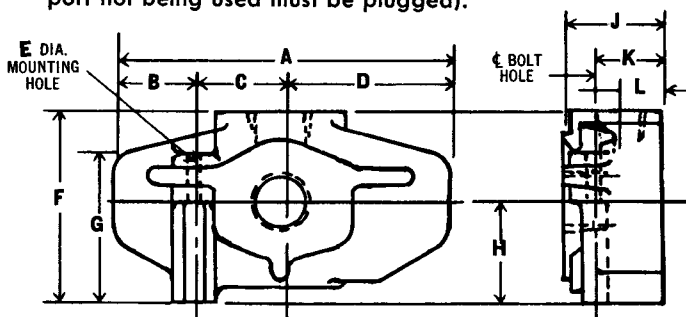
unit weight approx. 12 lbs.

tank return type



unit weight approx. 7 lbs.

Functions as a cap to the downstream end of a valve bank piping flow back to tank by direct return. It has an outlet port placed in either top or side of this section (the port not being used must be plugged).



A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"
6 3/8	1 3/8	1 1/4	3 3/4	2 3/4	3 1/4	3 3/8	2 3/8	2	1 3/4	7/8

CODE SELECTION port size, style and location

1" NPT (side and top)	1" OD TUBE (side and top)
CODE	CODE
Z 16	Z 14

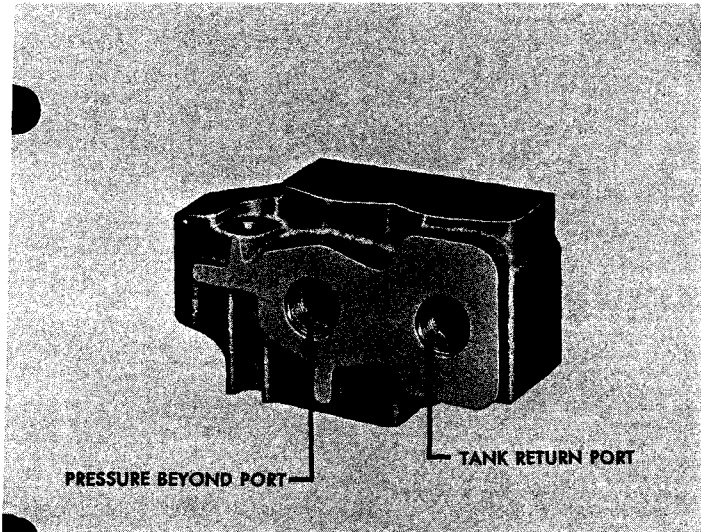
A20

OUTLET SECTIONS

parallel or series circuit

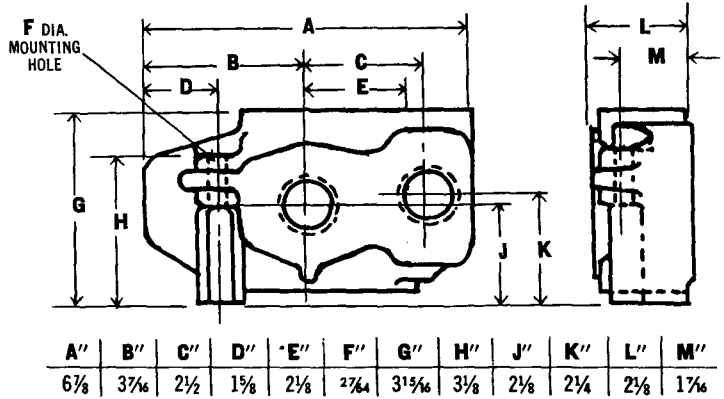
pressure beyond type

Functions the same as the tank return type except an outlet port is placed in the center of either top or side of this section to permit piping to pressure beyond. Connection to tank return must always be made.



(COMBINATION PORTING AVAILABLE
WITH ENGINEERING APPROVAL)

unit weight approx. 12 lbs.



CODE SELECTION

port size, style and location

1" NPT (side ports)	1" NPT (top ports)	1" OD TUBE (side ports)	1" OD TUBE (top ports)
CODE	CODE	CODE	CODE
Y 6	Y 12	Y 58	Y 82



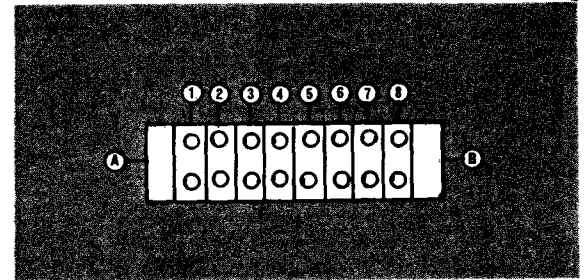
Commercial Shearing & Stamping Company

Model A35

performance data

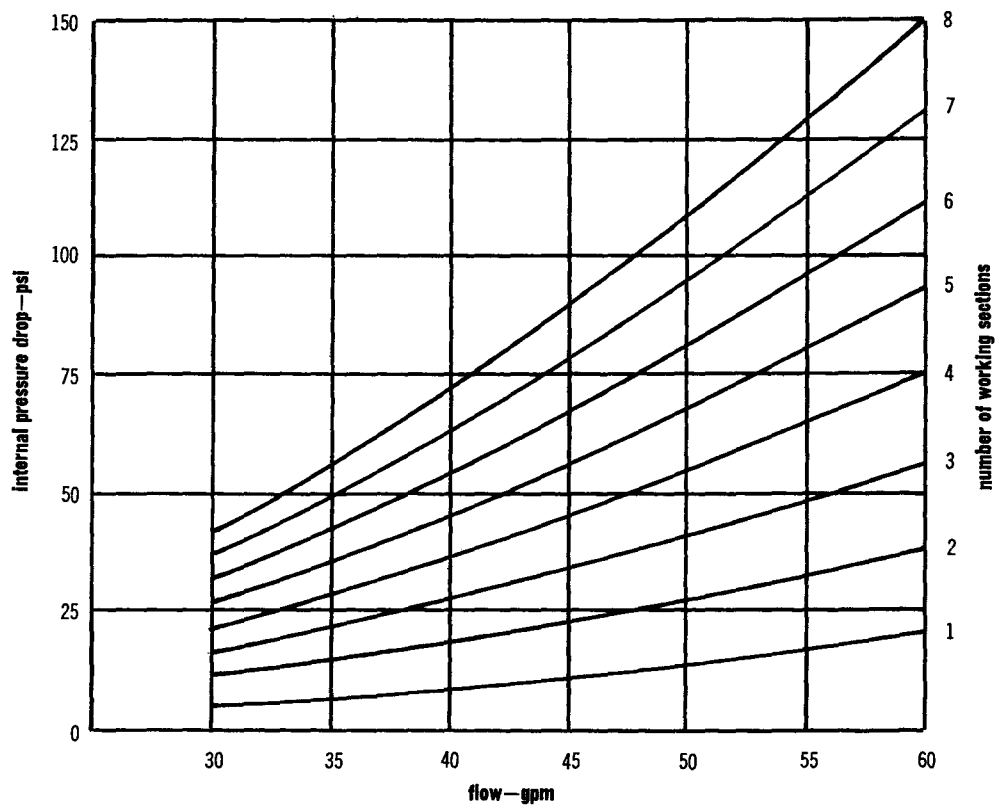
(parallel circuit)

Performance data, as recorded, is the result of averaging readings taken from tests of pressures between points externally adjacent to ports specified. All data is based on oil temperature at 140° F. and oil viscosity 180 SSU at 100° F.



internal pressure drop

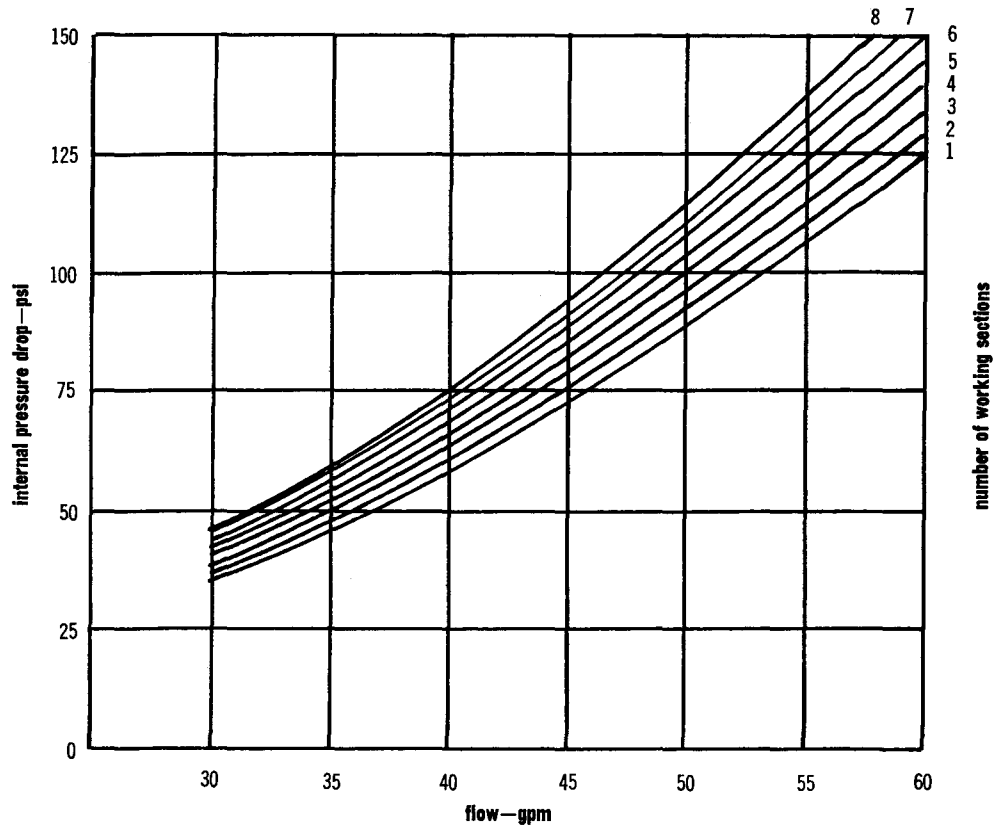
between 1 1/4" O.D. Tube inlet port A and 1 1/4" O.D. Tube outlet port B
(all spools in neutral position)



number working sections	flow—gpm						
	30	35	40	45	50	55	60
1	6.0	7.5	9.5	12.0	14.5	17.5	21.0
2	11.5	15.0	19.0	23.0	28.0	33.0	38.5
3	16.5	22.0	28.0	34.5	41.5	49.0	57.0
4	22.0	29.0	36.5	45.0	55.0	65.0	75.5
5	27.0	35.5	45.5	56.5	68.0	81.0	94.0
6	32.5	43.0	55.0	67.0	81.0	96.0	112.0
7	38.0	50.0	63.5	78.5	95.0	112.5	131.0
8	43.0	57.0	72.5	90.0	108.5	128.5	149.0

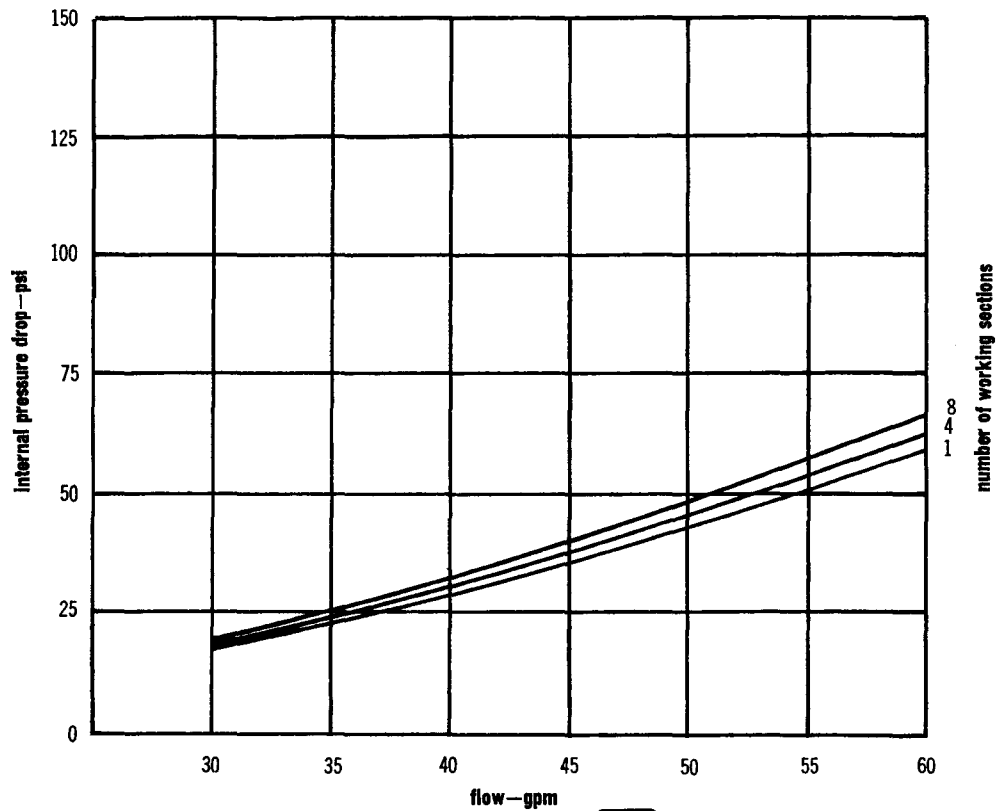
internal pressure drop

between 1 1/4" O.D. Tube inlet port A and 1" O.D. Tube work port
(selected spool in work position)



internal pressure drop

between 1" O.D. Tube work port and 1 1/4" O.D. Tube outlet port B
(selected spool in work position)

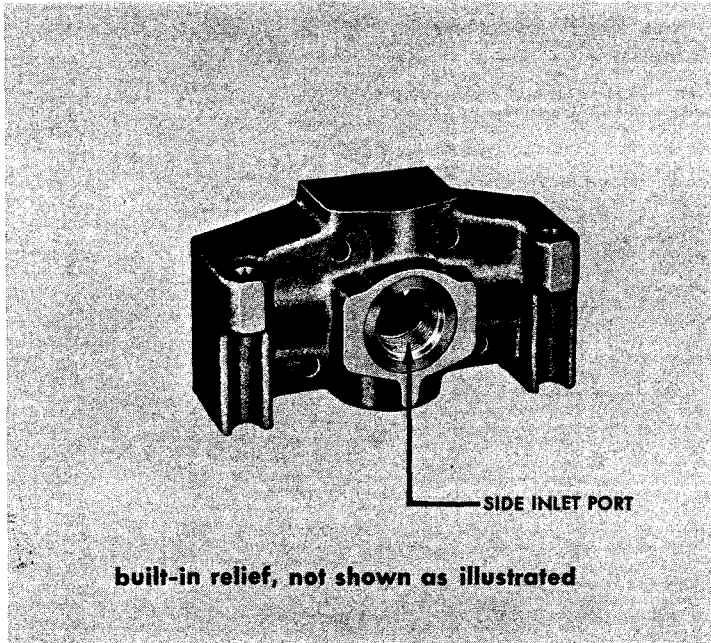


A35

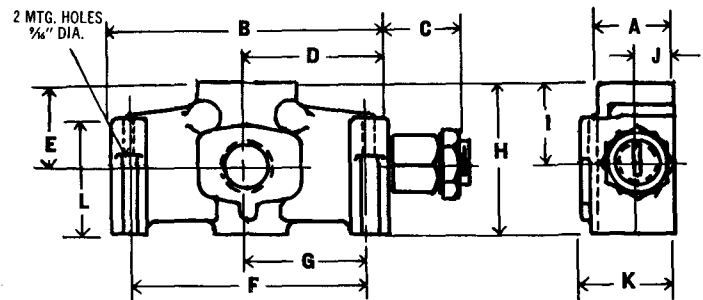
END INLET SECTIONS

parallel or series circuit

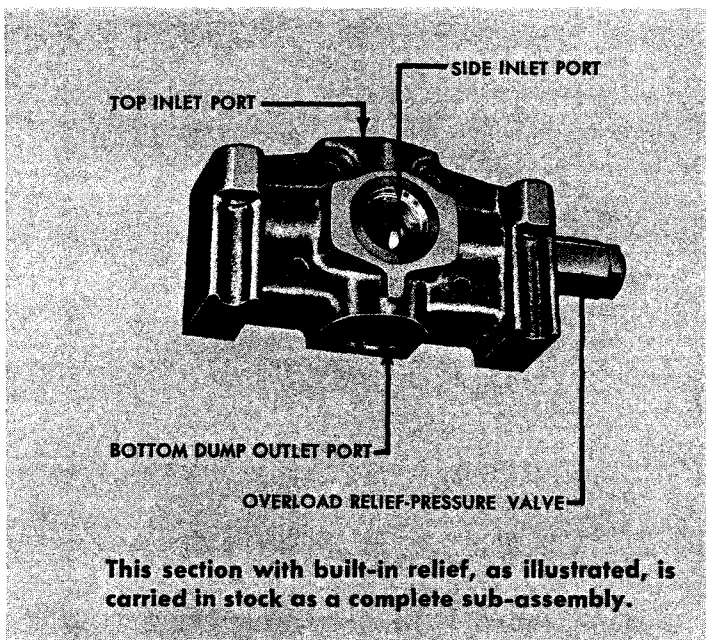
standard type



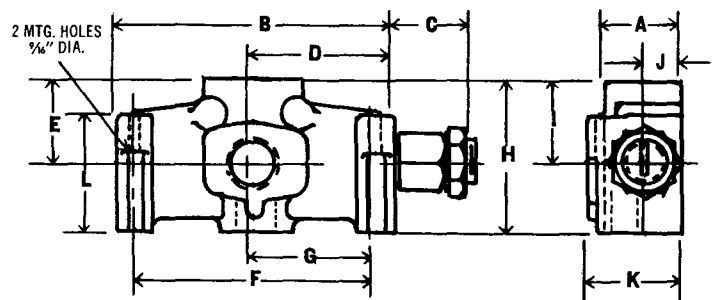
Functions as a cap to the upstream end of a valve bank. It has an inlet port to receive the discharge from a pump. Piping from pump is fitted to inlet port placed either in top or side of this section. All end inlet sections are available with or without cartridge type system overload relief-pressure control valve.



bottom dump to tank type



Functions the same as the standard end inlet type section except an additional outlet port is placed in the bottom of this section to permit direct mounting to top of tank, thus providing bottom dump tank return.



dimensional data

relief valve	envelope dimensions (inches)											
	A	B	C	D	E	F	G	H	I	J	K	L
none	2¼	8⅞	⅞	4⅞	2⅞	7	3½	4⅞	2¼	1¼	2⅞	3⅞
screw adjusted type	2¼	8⅞	2⅞	4⅞	2⅞	7	3½	4⅞	2¼	1¼	2⅞	3⅞

selection data

type	relief valve		blow-off setting *	port size, style and location	
	location			1" NPT (side and top)	1¼" O.D. TUBE (side)
none	—	—	—	CODE CA 4	CODE CA 14
screw adjusted	front	—	800 to 2500 psi	AA 4	AA 14

*Unless otherwise specified, relief valve setting will be 1100 psi.

unit weight approx. 15 lbs.

dimensional data

relief valve	envelope dimensions (inches)											
	A	B	C	D	E	F	G	H	I	J	K	L
none	2¼	8⅞	⅞	4⅞	2⅞	7	3½	4⅞	2¼	1¼	2⅞	3⅞
screw adjusted type	2¼	8⅞	2⅞	4⅞	2⅞	7	3½	4⅞	2¼	1¼	2⅞	3⅞

selection data

type	relief valve		blow-off setting *	port size, style and location	
	location			1" NPT (side, top, bottom)	1¼" O. D. TUBE (side) 1" NPT (bottom)
none	—	—	—	CODE CA 97	CODE CA 42
screw adjusted	front	—	800 to 2500 psi	AA 97	AA 42

*Unless otherwise specified, relief valve setting will be 1100 psi.

unit weight approx. 15 lbs.



A35

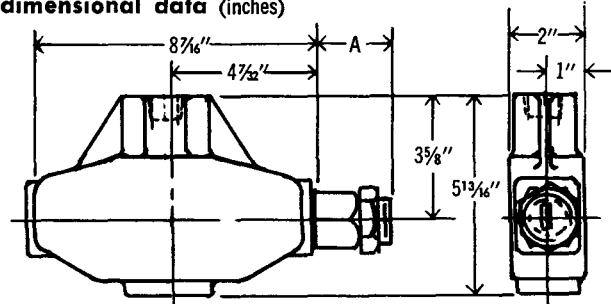
MID INLET SECTION

parallel or series circuit

split flow type—combined flow type

Provides the means to pipe a secondary pump discharge into a valve bank. Two types are available. A split flow type directs only the secondary pump discharge downstream from this section. A combined flow type directs the primary and secondary pumps discharge downstream from this section. A cartridge type pressure relief can be built into both the split flow and combined flow type.

dimensional data (inches)



unit weight approx. 12 lbs.

A— $\frac{1}{2}$ " without relief
 $2\frac{3}{8}$ " with screw adjusted type relief

selection data

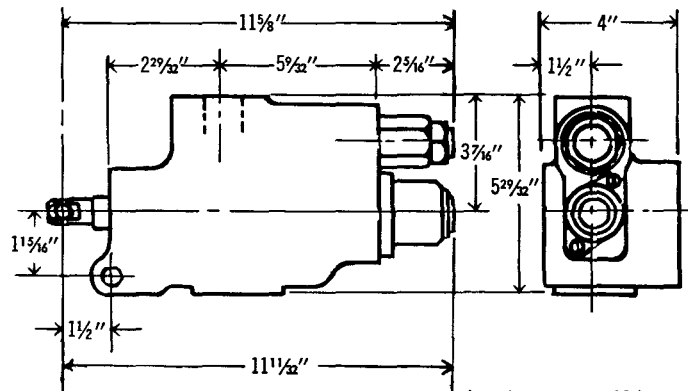
flow	relief valve*	port size, style and location	
		1" NPT (top) CODE	1" O.D. TUBE (top) CODE
split	screw adjusted	EAA103	EAA112
	none	ECA103	ECA112
combined	screw adjusted	EAA3	EAA14
	none	ECA3	ECA14

*Relief valve blow-off setting 800—2500 psi. Unless otherwise specified, relief valve setting 1100 psi.

split or combined flow type (manual operation)

This type of inlet permits manual operation of a work function at two different speeds at system pressure. It has a built-in 2 position manually operated directional valve. When spool of this valve is positioned "in," flow from primary and secondary pumps is combined and available to upstream and downstream working sections. When spool is positioned "out" flow from primary pump is available to upstream working sections and flow from secondary pump feeds downstream working sections.

dimensional data (inches)



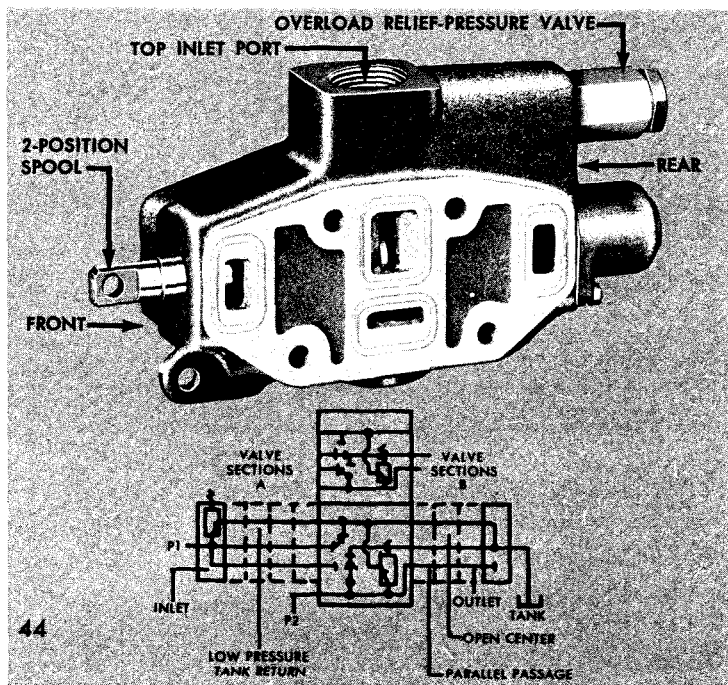
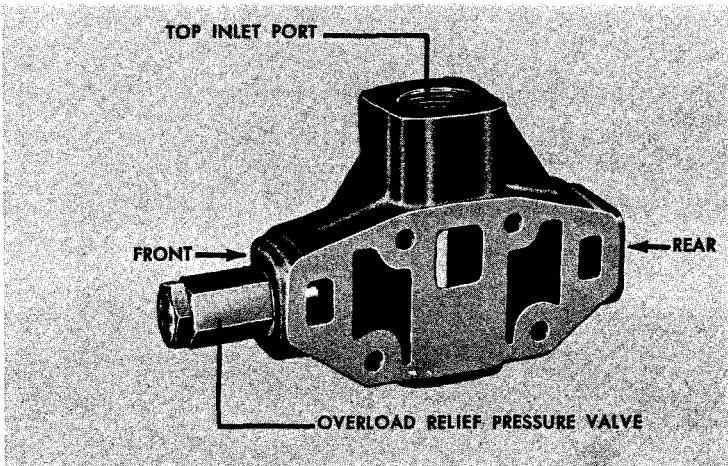
unit weight approx. 16 lbs.

selection data

flow	relief valve*	spool action	port size, style and location	
			1" NPT (top) CODE	1" O.D. TUBE (top) CODE
split or combined	screw adjusted	spring	EAB203	EAB216
	none	spring	ECB203	ECB216
	screw adjusted	detent	EDB203	EDB216

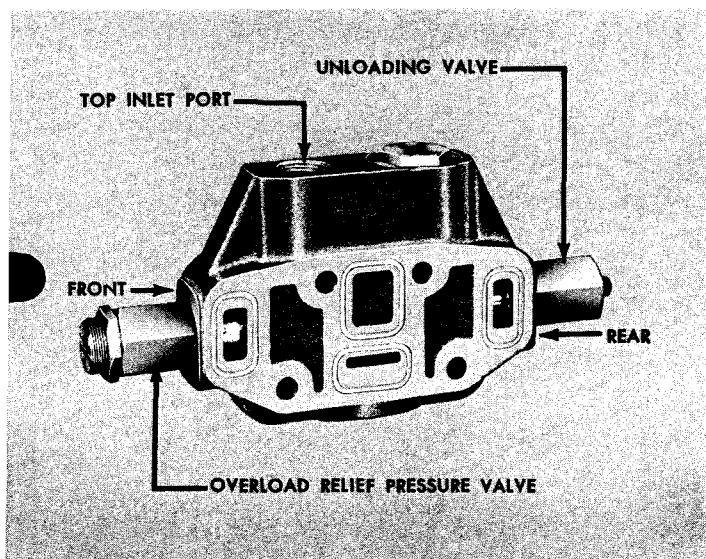
*Relief valve blow-off setting 800—2500 psi. Unless otherwise specified, relief valve setting 1100 psi.

Spool operating handles not shown or included.
For handle details, refer to page 65.

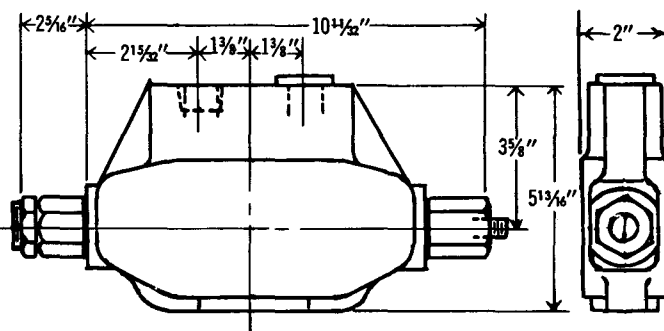


for unloading primary pump discharge

This type of inlet provides automatic two-speed operation of a work function when controlled downstream from the mid inlet section. It has a built-in unloading valve with predetermined pressure setting lower than the main system relief setting. When system pressure build-up is less than unloading valve setting, combined primary and secondary pump discharge flows to all downstream sections from this point. High speed initial operation results. When system pressure builds up to actuate the unloading valve, primary pump discharge is unloaded direct to tank and only secondary pump discharge flows to downstream sections from this point. Lower speed continuing operation results, subject to pressure control by predetermined setting of a built-in relief valve in this section.



dimensional data (inches)



unit weight approx. 15 lbs.

selection data

relief valve*	port size, style and location	
	1" NPT (top) CODE	1" O.D. TUBE (top) CODE
screw adjusted	EAA303	EAA314

*Relief valve blow-off setting 800—2500 psi. Unless otherwise specified, relief valve setting 1100 psi.



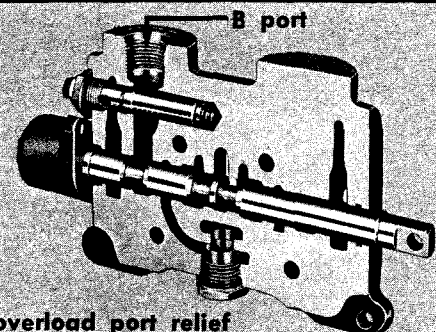
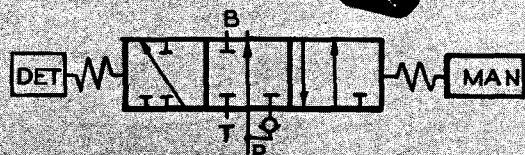
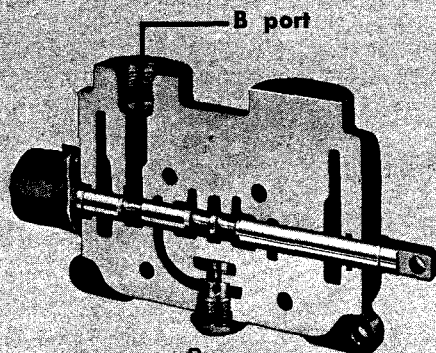
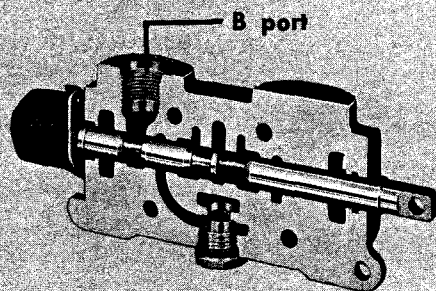
A35

WORKING SECTIONS

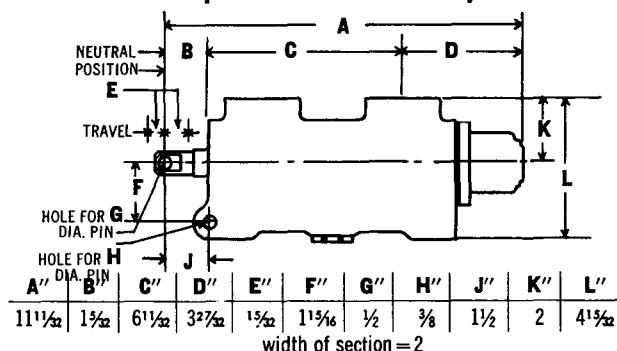
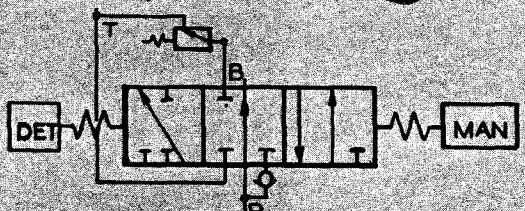
parallel circuit • manually operated

3 way • 3 position (work port blocked to flow when spool is in neutral position)

Used in controlling and directing flow to single acting cylinders requiring push and hold power actions and gravity return. Also used to start and stop fluid motors having one direction of rotation.



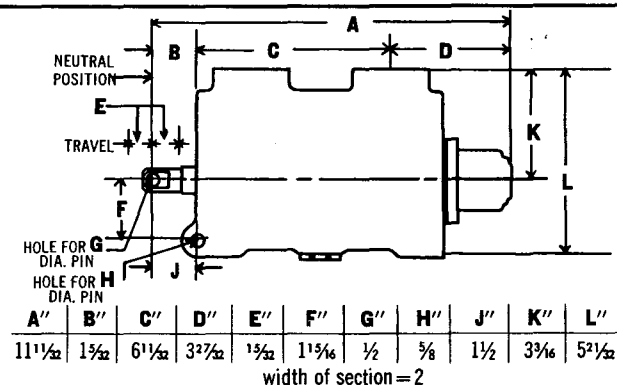
with overload port relief



CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return	SA 53	SA 59
detent positioned	SB 53	SB 59

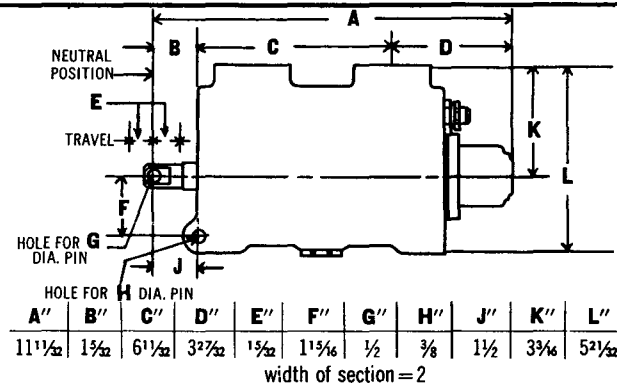
unit weight approx. 13 lbs.



CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return	JA 53	JA 59
detent positioned	JB 53	JB 59

unit weight approx. 18 lbs.



CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return	JA 190	JA 196
detent positioned	JB 190	JB 196

unit weight approx. 18 lbs.

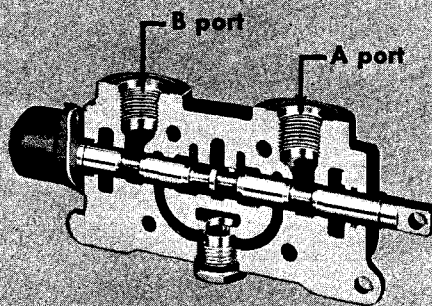
A35

WORKING SECTIONS

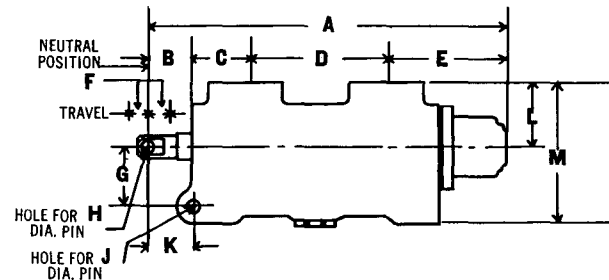
parallel circuit • manually operated

4 way • 3 position (work ports blocked to flow when spool is in neutral position)

Used in controlling and directing flow to double acting cylinders requiring push, pull and hold power actions. Also used to start, stop and reverse fluid motors requiring rotation in either direction.



This section having spring return to neutral spool action, as illustrated, is carried in stock as a complete sub-assembly.



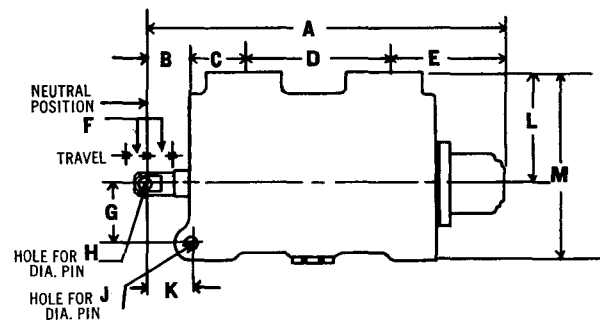
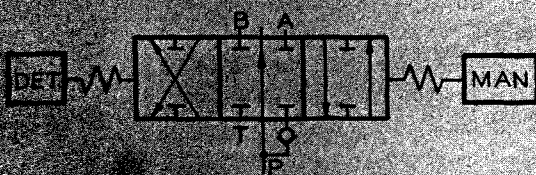
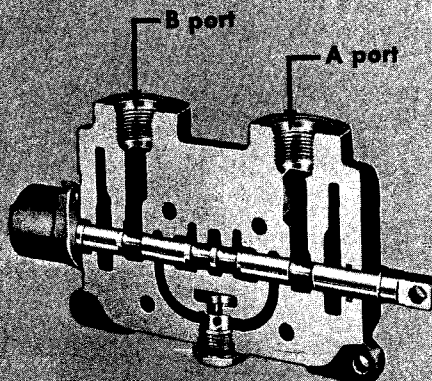
A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"	M"
11 1/2	1 1/2	1 2/3	4 1/2	3 2/3	1 1/2	1 1/4	1/2	3/8	1 1/2	2	4 1/2

width of section = 2

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return	DA 53	DA 59
detent positioned	DB 53	DB 59

unit weight approx. 13 lbs.



A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"	M"
11 1/2	1 1/2	1 2/3	4 1/2	3 2/3	1 1/2	1 1/4	1/2	3/8	1 1/2	3 3/4	5 1/2

width of section = 2

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return	HA 53	HA 59
detent positioned	HB 53	HB 59

unit weight approx. 17 lbs.



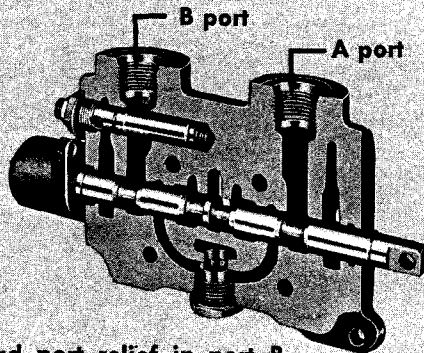
A35

WORKING SECTIONS

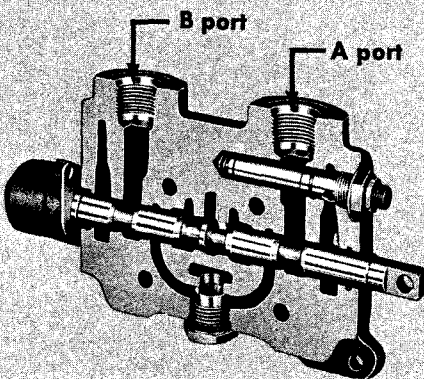
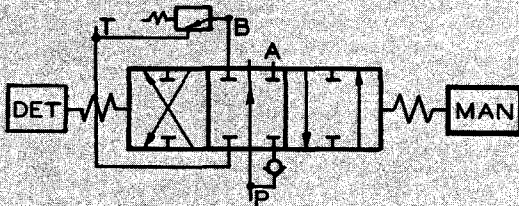
parallel circuit • manually operated

4 way • 3 position (work ports blocked to flow when spool is in neutral position)

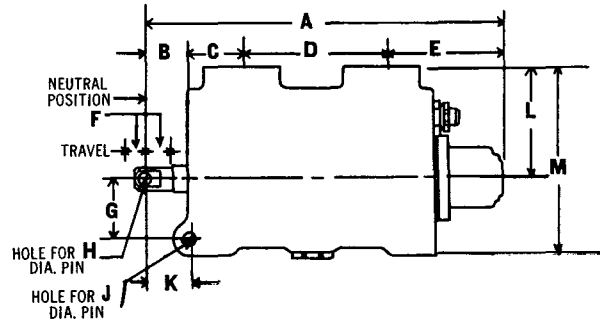
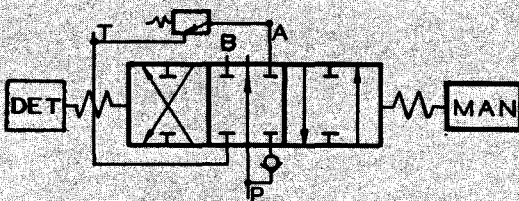
Used in controlling and directing flow to double acting cylinders requiring push, pull and hold power actions. Also used to start, stop and reverse fluid motors requiring rotation in either direction.



overload port relief in port B



overload port relief in port A

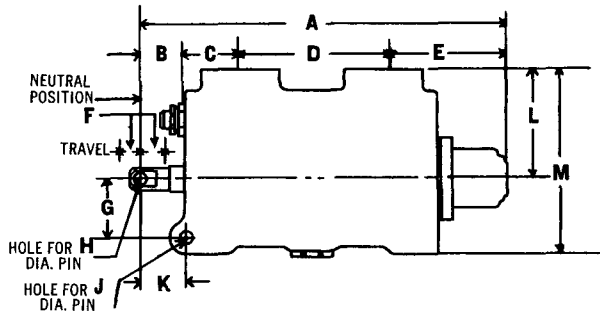


A''	B''	C''	D''	E''	F''	G''	H''	J''	K''	L''	M''
11 ¹ / ₂	1 ³ / ₂	1 ² / ₂	4 ¹ / ₂	3 ² / ₂	1 ⁵ / ₂	1 ¹ / ₆	1/2	3/8	1 ¹ / ₂	3 ³ / ₄	5 ² / ₂
width of section = 2											

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return	HA 190	HA 196
detent positioned	HB 190	HB 196

unit weight approx. 18 lbs.



A''	B''	C''	D''	E''	F''	G''	H''	J''	K''	L''	M''
11 ¹ / ₂	1 ³ / ₂	1 ² / ₂	4 ¹ / ₂	3 ² / ₂	1 ⁵ / ₂	1 ¹ / ₆	1/2	3/8	1 ¹ / ₂	3 ³ / ₄	5 ² / ₂
width of section = 2											

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return	HA 178	HA 184
detent positioned	HB 178	HB 184

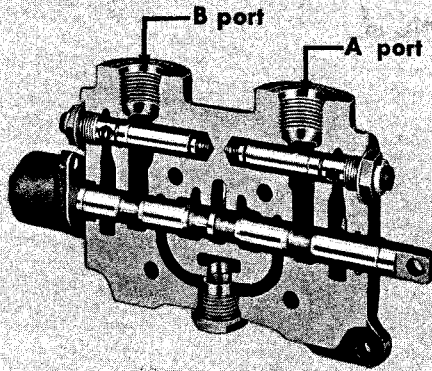
unit weight approx. 18 lbs.

A35

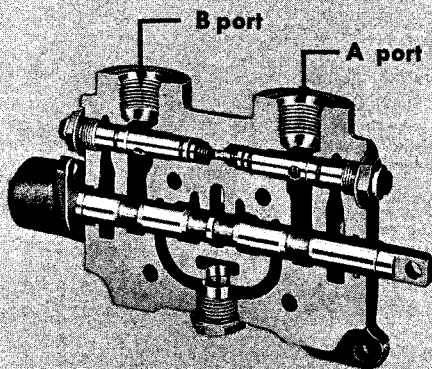
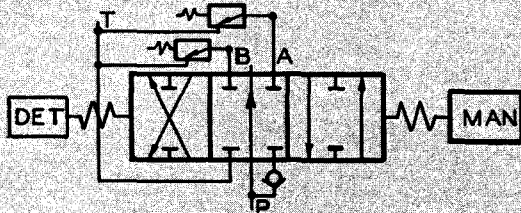
WORKING SECTIONS

parallel circuit · manually operated

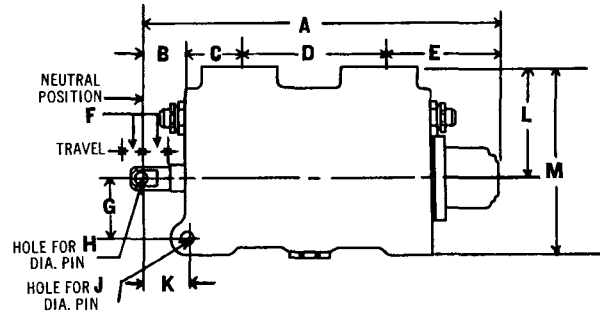
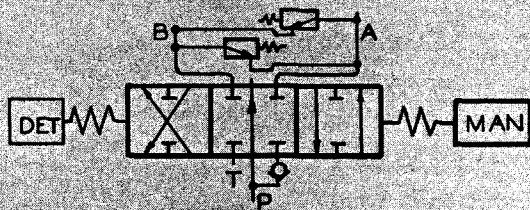
4 way · 3 position (work ports blocked to flow when spool is in neutral position)



overload port relief in port A and B



crossover relief in port A and B



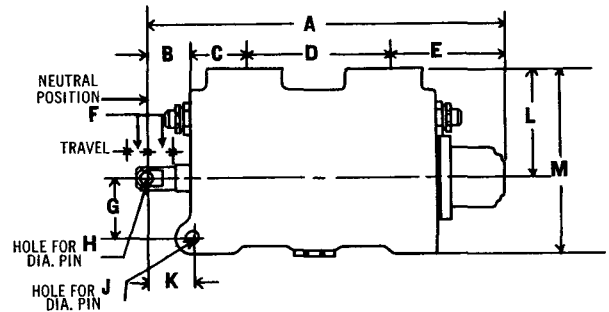
A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"	M"
11 1/2	1 1/2	1 7/8	4 1/2	3 7/8	1 5/8	1 1/4	1/2	3/8	1 1/2	3 3/4	5 1/2

width of section = 2

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return	HA 166	HA 172
detent positioned	HB 166	HB 172

unit weight approx. 18 lbs.



A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"	M"
11 1/2	1 1/2	1 7/8	4 1/2	3 7/8	1 5/8	1 1/4	1/2	3/8	1 1/2	3 3/4	5 1/2

width of section = 2

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return	HA 653	HA 659
detent positioned	HB 653	HB 659

unit weight approx. 18 lbs.



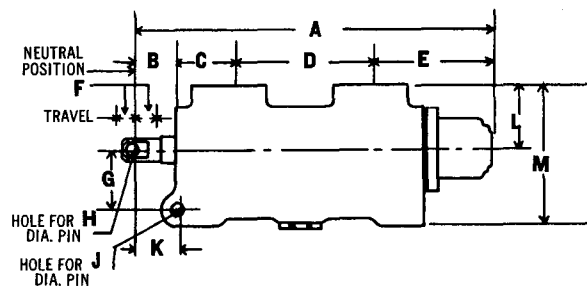
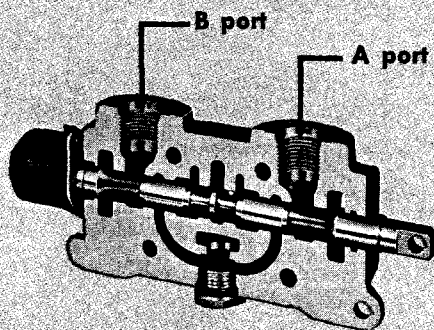
A35

WORKING SECTIONS

parallel circuit • manually operated

4 way • 3 position (work ports open to flow when spool is in neutral position)

Used in controlling and directing flow to double acting cylinders requiring push, pull and float actions. Also used to start, reverse and "free wheel" fluid motors requiring rotation in either direction.

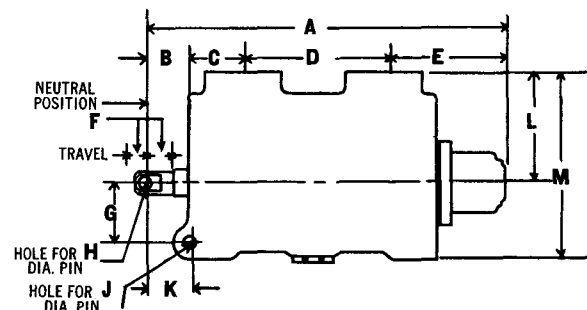
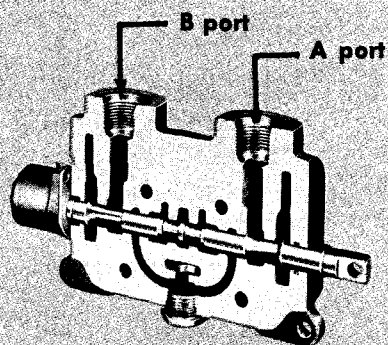


A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"	M"
11 1/2	1 1/2	1 7/8	4 1/2	3 7/8	1 1/2	1 1/4	1/2	3/8	1 1/2	2	4 1/2
width of section = 2											

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return	MA 53	MA 59
detent positioned	MB 53	MB 59

unit weight approx. 13 lbs.

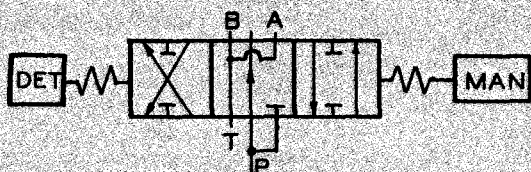


A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"	M"
11 1/2	1 1/2	1 7/8	4 1/2	3 7/8	1 1/2	1 1/4	1/2	3/8	1 1/2	3 3/8	5 1/2
width of section = 2											

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return	LA 53	LA 59
detent positioned	LB 53	LB 59

unit weight approx. 17 lbs.



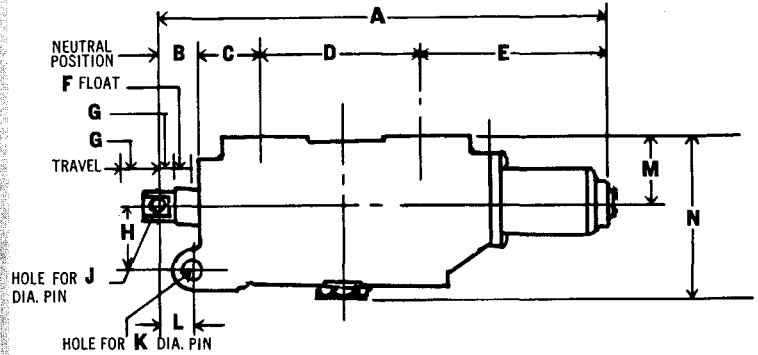
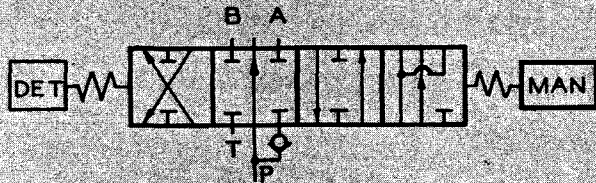
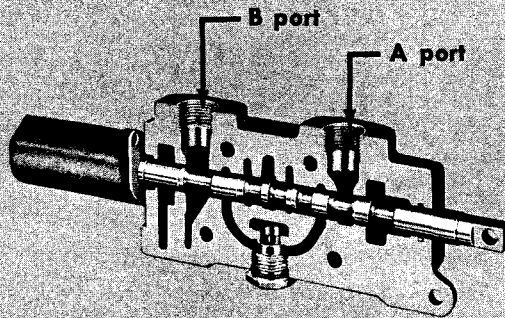
A35

WORKING SECTIONS

parallel circuit • manually operated

4 way • 4 position (work ports blocked to flow when spool is in neutral position—open in float position)

Used in controlling and directing flow to double acting cylinders requiring push, pull, hold and float actions. Also used to start, stop, reverse and "free wheel" fluid motors.



	A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"	M"	N"
FC	15 $\frac{5}{16}$	1 $\frac{1}{16}$	2 $\frac{13}{16}$	4 $\frac{1}{2}$	6 $\frac{5}{16}$	1 $\frac{3}{32}$	1 $\frac{5}{32}$	1 $\frac{3}{16}$	$\frac{1}{2}$	$\frac{3}{8}$	1 $\frac{1}{16}$	2	4 $\frac{15}{32}$
FB	13 $\frac{3}{4}$	1 $\frac{1}{16}$	2 $\frac{13}{16}$	4 $\frac{1}{2}$	4 $\frac{1}{4}$	1 $\frac{3}{32}$	1 $\frac{5}{32}$	1 $\frac{3}{16}$	$\frac{1}{2}$	$\frac{3}{8}$	1 $\frac{1}{16}$	2	4 $\frac{15}{32}$

width of section = 2

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return *	FC 53	FC 59
detent positioned	FB 53	FB 59

unit weight approx. 18 lbs.

* detent in float position



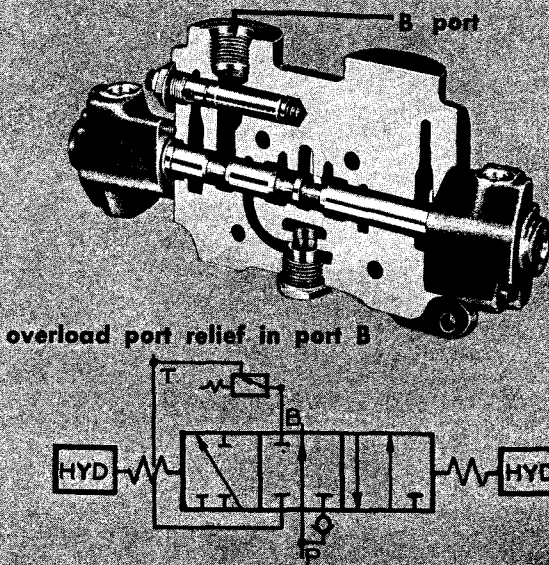
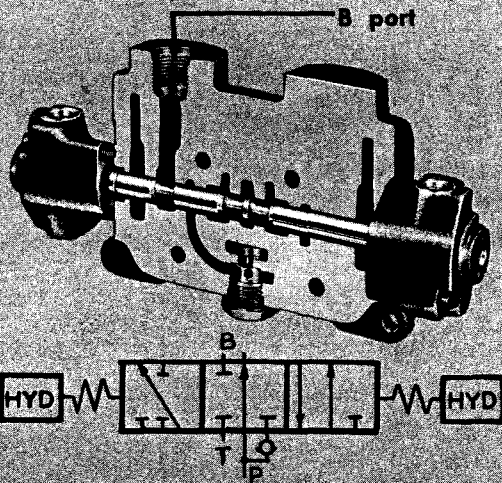
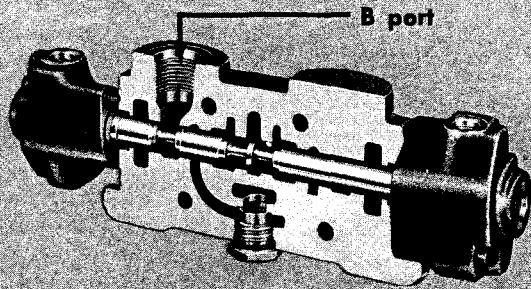
A35

WORKING SECTIONS

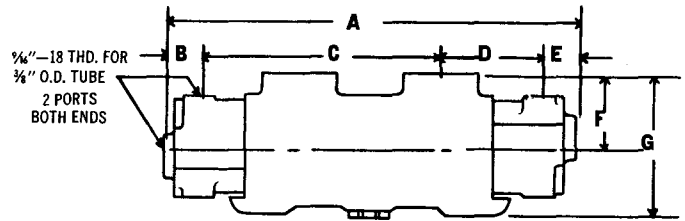
parallel circuit • pilot operated

3 way • 3 position (work port blocked to flow when spool is in neutral position)

Used in controlling and directing flow to single acting cylinders requiring push and hold power actions and gravity return. Also used to start and stop fluid motors having one direction of rotation.



overload port relief in port B

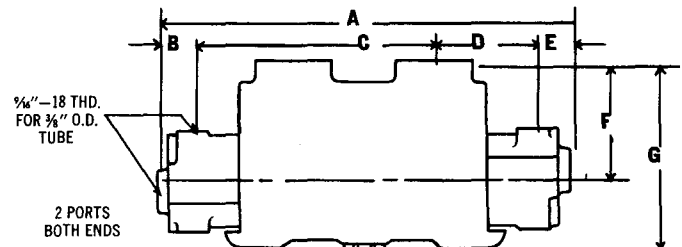


A''	B''	C''	D''	E''	F''	G''
13 ³ / ₈	1 ³ / ₁₆	7 ⁷ / ₈	3 ³ / ₈	1 ³ / ₁₆	2	4 ¹ / ₂
width of section = 2						

CODE SELECTION

spool action	port size and style	
	1" NPT CODE	1" O.D. TUBE CODE
spring return	SS 3	SS 9

unit weight approx. 14 lbs.

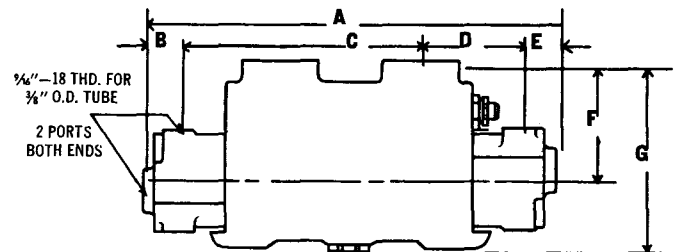


A''	B''	C''	D''	E''	F''	G''
13 ³ / ₈	1 ³ / ₁₆	7 ⁷ / ₈	3 ³ / ₈	1 ³ / ₁₆	3 ³ / ₁₆	5 ² / ₃₂
width of section = 2						

CODE SELECTION

spool action	port size and style	
	1" NPT CODE	1" O.D. TUBE CODE
spring return	JS 3	JS 9

unit weight approx. 19 lbs.



A''	B''	C''	D''	E''	F''	G''
13 ³ / ₈	1 ³ / ₁₆	7 ⁷ / ₈	3 ³ / ₈	1 ³ / ₁₆	3 ³ / ₁₆	5 ² / ₃₂
width of section = 2						

CODE SELECTION

spool action	port size and style	
	1" NPT CODE	1" O.D. TUBE CODE
spring return	JS 140	JS 146

unit weight approx. 19 lbs.

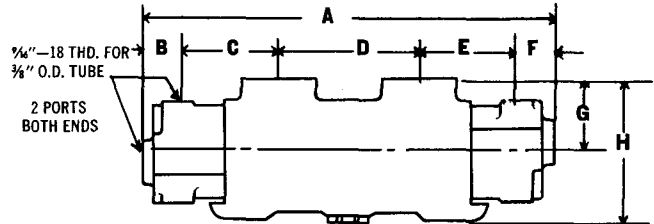
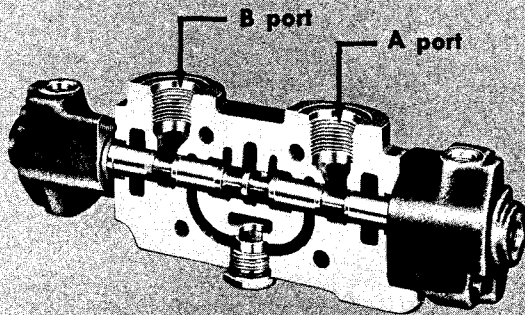
A35

WORKING SECTIONS

parallel circuit · pilot operated

4 way · 3 position (work ports blocked to flow when spool is in neutral position)

Used in controlling and directing flow to double acting cylinders requiring push, pull and hold power actions. Also used to start, stop and reverse fluid motors requiring rotation in either direction.



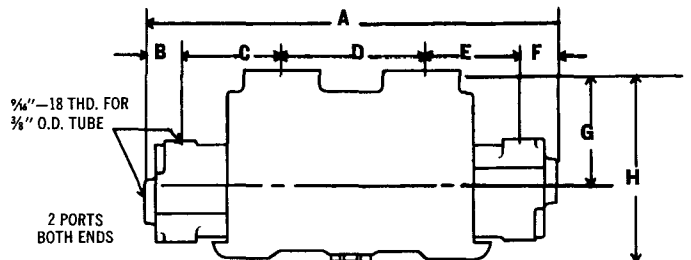
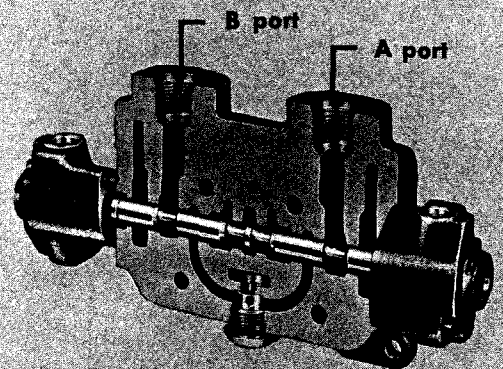
A''	B''	C''	D''	E''	F''	G''	H''
13 $\frac{3}{8}$	13 $\frac{1}{16}$	3 $\frac{3}{8}$	4 $\frac{1}{2}$	3 $\frac{3}{8}$	13 $\frac{1}{16}$	2	41 $\frac{1}{32}$

width of section = 2

CODE SELECTION

spool action	port size and style	
	1" NPT CODE	1" O.D. TUBE CODE
spring return	DS 3	DS 9

unit weight approx. 14 lbs.



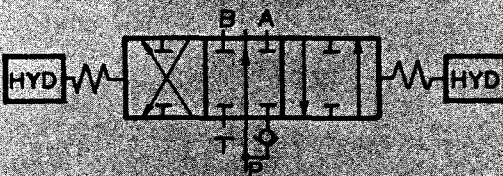
A''	B''	C''	D''	E''	F''	G''	H''
13 $\frac{3}{8}$	13 $\frac{1}{16}$	3 $\frac{3}{8}$	4 $\frac{1}{2}$	3 $\frac{3}{8}$	13 $\frac{1}{16}$	3 $\frac{3}{16}$	52 $\frac{1}{32}$

width of section = 2

CODE SELECTION

spool action	port size and style	
	1" NPT CODE	1" O.D. TUBE CODE
spring return	HS 3	HS 9

unit weight approx. 19 lbs.



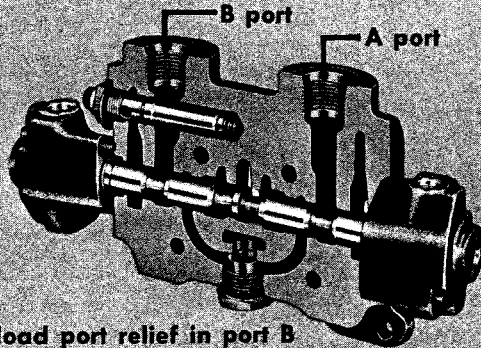
A35

WORKING SECTIONS

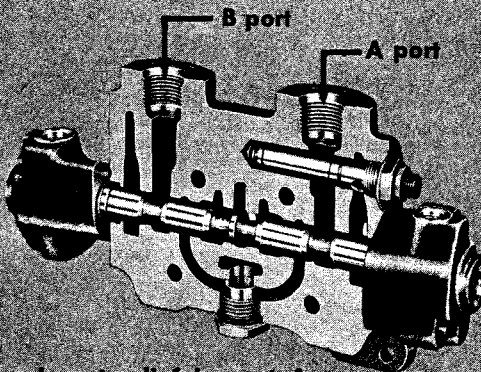
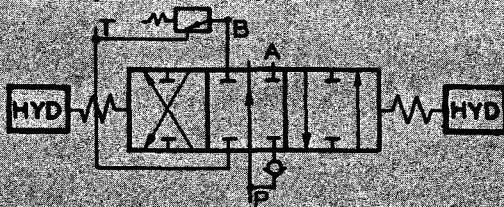
parallel circuit • pilot operated

4 way • 3 position (work ports blocked to flow when spool is in neutral position)

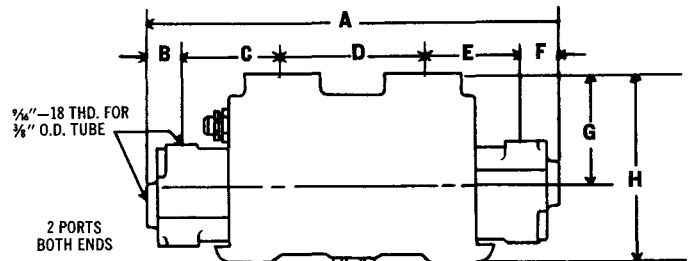
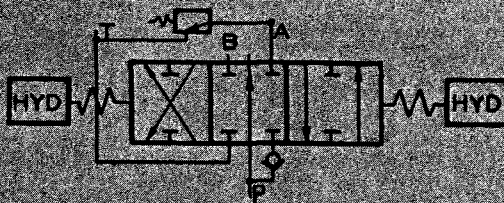
Used in controlling and directing flow to double acting cylinders requiring push, pull and hold power actions. Also used to start, stop and reverse fluid motors requiring rotation in either direction.



overload port relief in port B



overload port relief in port A

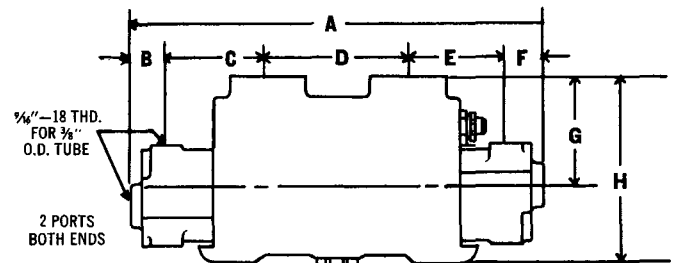


A''	B''	C''	D''	E''	F''	G''	H''
13 ⁵ / ₈	13 ¹ / ₁₆	3 ³ / ₈	4 ¹ / ₂	3 ³ / ₈	13 ¹ / ₁₆	33 ¹ / ₁₆	52 ¹ / ₃₂
width of section = 2							

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return	HS 140	HS 146

unit weight approx. 20 lbs.



A''	B''	C''	D''	E''	F''	G''	H''
13 ⁵ / ₈	13 ¹ / ₁₆	3 ³ / ₈	4 ¹ / ₂	3 ³ / ₈	13 ¹ / ₁₆	33 ¹ / ₁₆	52 ¹ / ₃₂
width of section = 2							

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
spring return	HS 128	HS 134

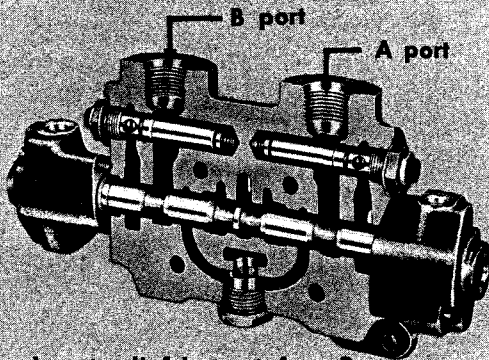
unit weight approx. 20 lbs.

A35

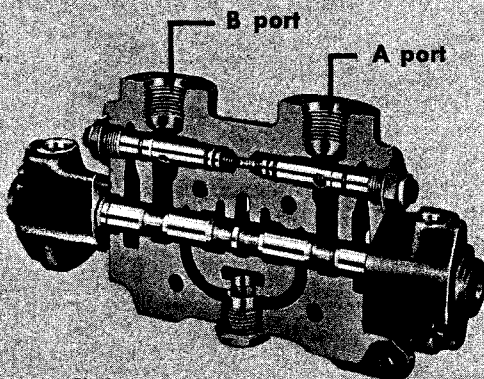
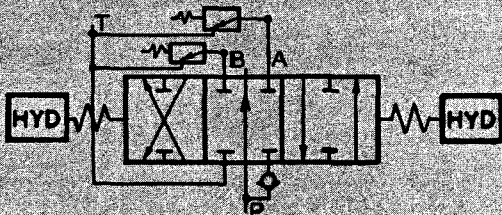
WORKING SECTIONS

parallel circuit · pilot operated

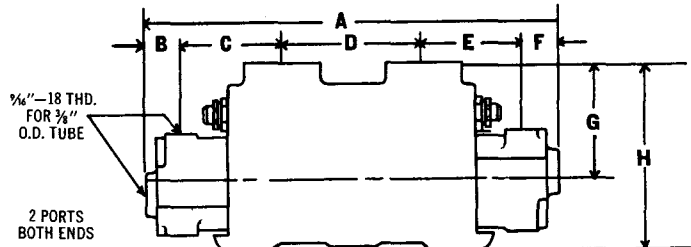
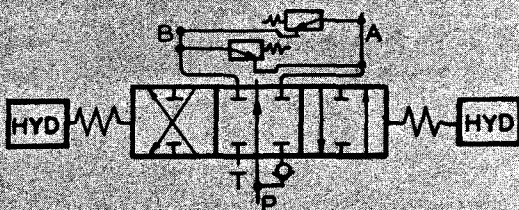
4 way · 3 position (work parts blocked to flow when spool is in neutral position)



overload port relief in port A or B



crossover relief in ports A and B



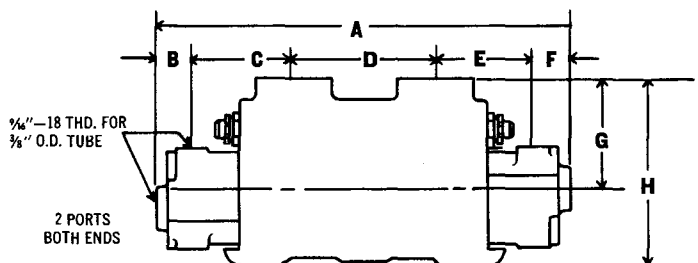
A''	B''	C''	D''	E''	F''	G''	H''
13 ³ / ₈	1 ³ / ₁₆	3 ³ / ₈	4 ¹ / ₂	3 ³ / ₈	1 ³ / ₁₆	3 ³ / ₁₆	5 ²¹ / ₃₂

width of section = 2

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
CODE	CODE	CODE
spring return	HS 116	HS 122

unit weight approx. 20 lbs.



A''	B''	C''	D''	E''	F''	G''	H''
13 ³ / ₈	1 ³ / ₁₆	3 ³ / ₈	4 ¹ / ₂	3 ³ / ₈	1 ³ / ₁₆	3 ³ / ₁₆	5 ²¹ / ₃₂

width of section = 2

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
CODE	CODE	CODE
spring return	HS 603	HS 609

unit weight approx. 20 lbs.



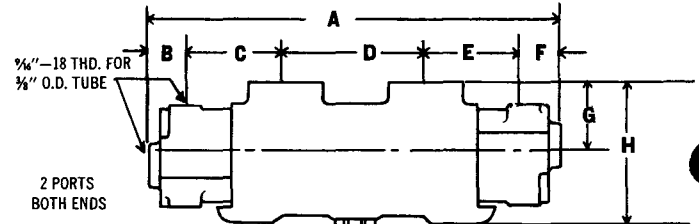
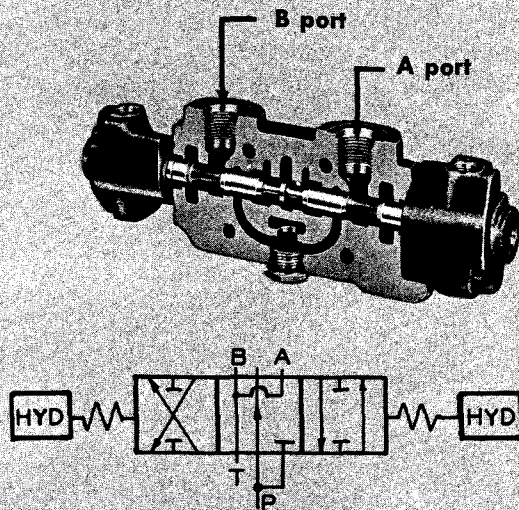
A35

WORKING SECTIONS

parallel circuit • pilot operated

4 way • 3 position (work ports open to flow when spool is in neutral position)

Used in controlling and directing flow to double acting cylinders requiring push, pull and float actions. Also used to start, reverse and "free wheel" fluid motors requiring rotation in either direction.

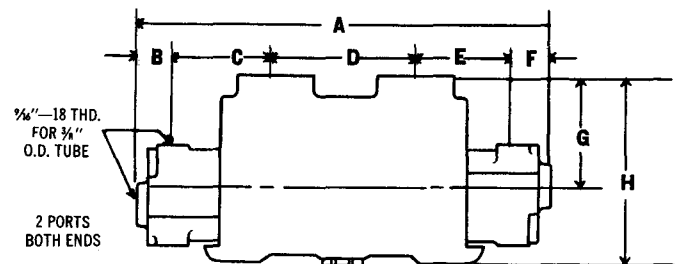
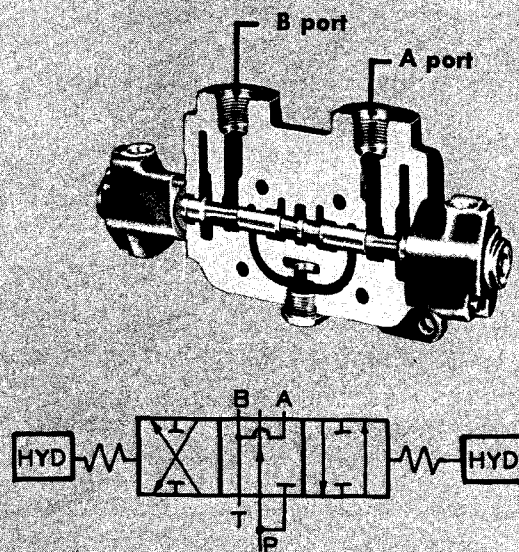


A''	B''	C''	D''	E''	F''	G''	H''
13 $\frac{3}{8}$	1 $\frac{3}{16}$	3 $\frac{3}{8}$	4 $\frac{1}{2}$	3 $\frac{3}{8}$	1 $\frac{3}{16}$	2	4 $\frac{1}{2}$
width of section = 2							

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
	CODE	CODE
spring return	MS 3	MS 9

unit weight approx. 14 lbs.



A''	B''	C''	D''	E''	F''	G''	H''
13 $\frac{3}{8}$	1 $\frac{3}{16}$	3 $\frac{3}{8}$	4 $\frac{1}{2}$	3 $\frac{3}{8}$	1 $\frac{3}{16}$	3 $\frac{3}{16}$	5 $\frac{1}{2}$
width of section = 2							

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
	CODE	CODE
spring return	LS 3	LS 9

unit weight approx. 19 lbs.

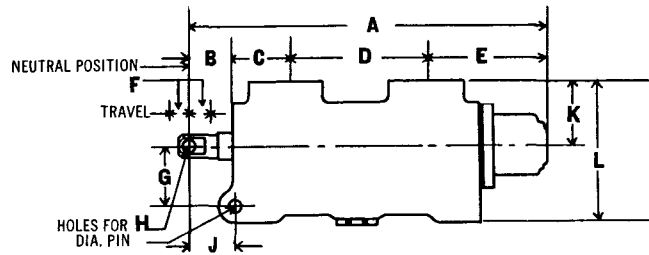
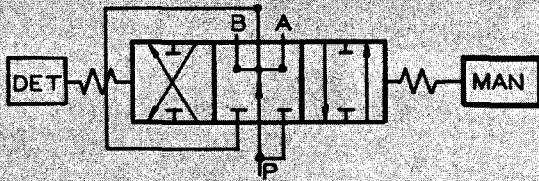
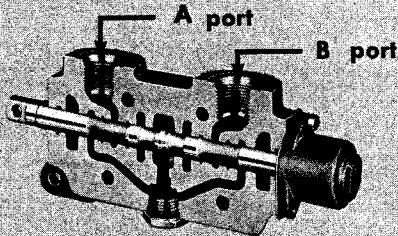
A35

WORKING SECTIONS

series circuit • manually operated

4 way • 3 position (work ports open to flow when spool is in neutral position)

Used in controlling and directing flow to double acting cylinders requiring push, pull and float actions. Also used to start, reverse and "free wheel" fluid motors requiring rotation in either direction.



A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"
11 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	1 $\frac{7}{8}$ "	4 $\frac{1}{2}$ "	3 $\frac{3}{4}$ "	1 $\frac{1}{2}$ "	1 $\frac{5}{8}$ "	$\frac{1}{2}$ "	1 $\frac{1}{2}$ "	2"	4 $\frac{1}{2}$ "

width of section = 2

CODE SELECTION

spool action	port size and style	
	1" NPT	1" O.D. TUBE
CODE	CODE	CODE
spring return	WMA 53	WMA 59
detent positioned	WMB 53	WMB 59

unit weight approx. 13 lbs.

Spool operating handles not shown or included. For handle details, refer to page 65.

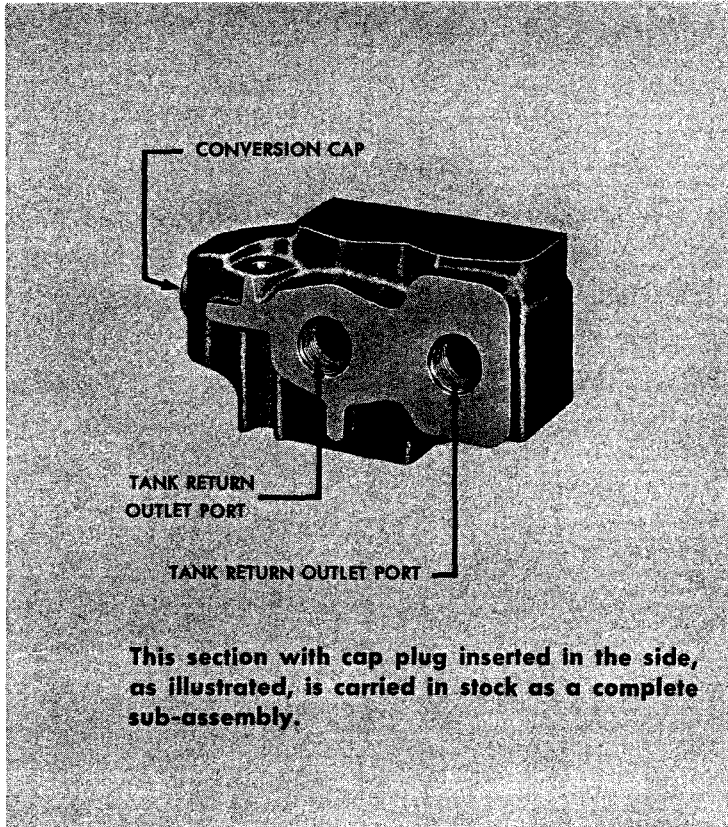


A35

OUTLET SECTIONS

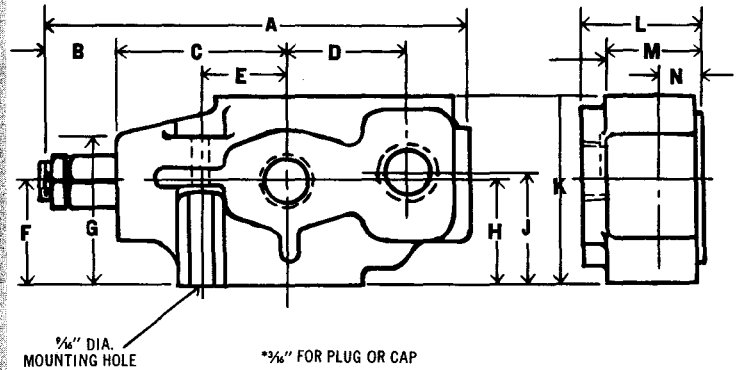
parallel or series circuit

pressure beyond or tank return type (convertible)



Functions as a cap to the downstream end of a valve bank, piping flow beyond or to tank by direct return. Here is a dual function type of end outlet which, by a simple conversion, can be made to direct all flow either to pressure beyond requirements or direct return to tank. When a long cartridge plug is inserted into the side, the section is converted to a pressure beyond outlet with one port open to receive high pressure carryover piping and another port open to low pressure return to tank piping.

If a cap plug is inserted instead of the cartridge, all outlet ports are low pressure ports available for return to tank piping. Outlet ports not piped to tank must be plugged. Porting can be furnished for top or side piping.



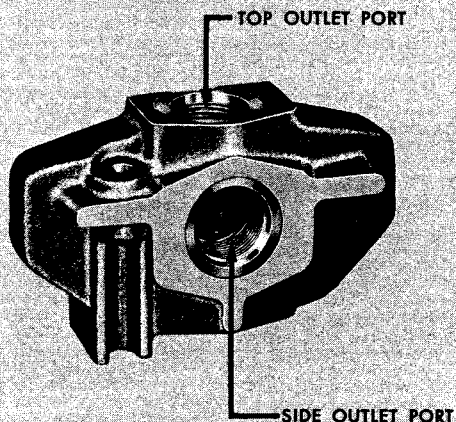
A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"	M"	N"
8 1/2	2 3/4	4 1/4	2 7/8	2 1/8	2 3/8	3 7/8	2 7/8	2 1/8	4 7/8	3	2 3/8	1 1/8

CODE SELECTION

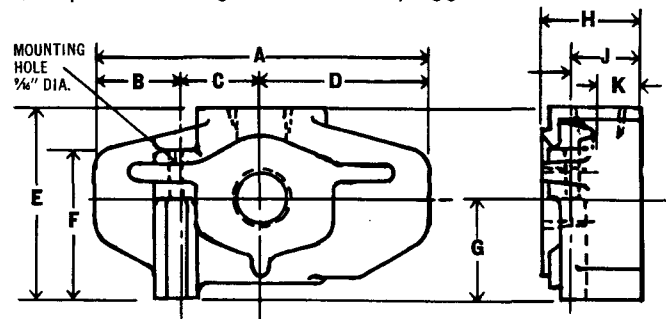
conversion type	port size, style and location			
	1 1/4" NPT (two side ports)	1 1/4" O.D. TUBE (two side ports)	1 1/4" NPT (two top ports)	1 1/4" O.D. TUBE (two top ports)
	CODE	CODE	CODE	CODE
direct return to tank (cap plug in side)	DY 606	DY 663	DY 612	DY 689
pressure beyond (cartridge in side)	CY 606	CY 663	CY 612	CY 689
pressure beyond (cartridge relief in side)	AY 606	AY 663	AY 612	AY 689

unit weight approx. 16 lbs.

tank return type



Functions as a cap to the downstream end of a valve bank piping flow back to tank by direct return. It has an outlet port placed in either top or side of this section (the port not being used must be plugged).



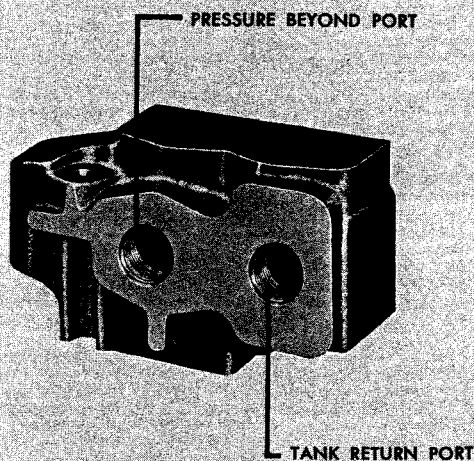
A"	B"	C"	D"	E"	F"	G"	H"	J"	K"
8 1/16	1 3/32	2 1/16	4 1/32	4 7/16	3 7/16	2 7/16	2 3/16	1 5/8	1 1/16

CODE SELECTION port size, style and location

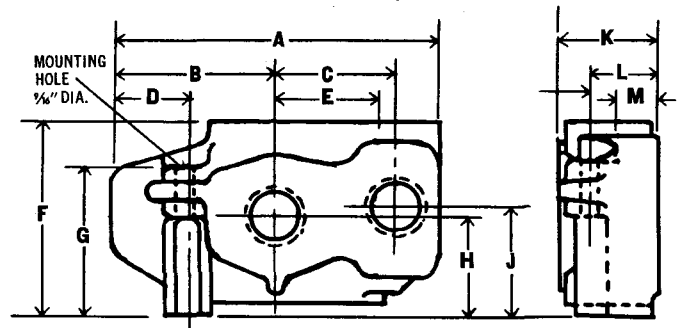
1 1/4" NPT (top and side)	1 1/4" O.D. TUBE (side)
CODE	CODE
Z 16	Z 15

unit weight approx. 10 lbs.

pressure beyond type



Functions the same as the tank return type except an outlet port is placed in the center of either top or side of this section to permit piping to pressure beyond. Connection to tank return must always be made.



A"	B"	C"	D"	E"	F"	G"	H"	J"	K"	L"	M"
8 1/16	4 1/32	2 7/8	1 31/32	2 5/8	4 7/16	3 7/16	2 7/16	2 3/16	2 5/16	1 5/8	1 1/16

CODE SELECTION port size, style and location

1 1/4" NPT (side)	1 1/4" NPT (top)	1 1/4" O.D. TUBE (side)	1 1/4" O.D. TUBE (top)
CODE	CODE	CODE	CODE
Y 6	Y 12	Y 63	Y 89

unit weight approx. 17 lbs.

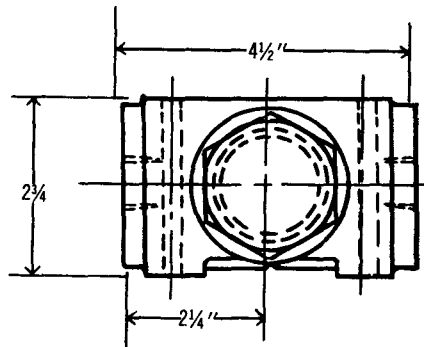
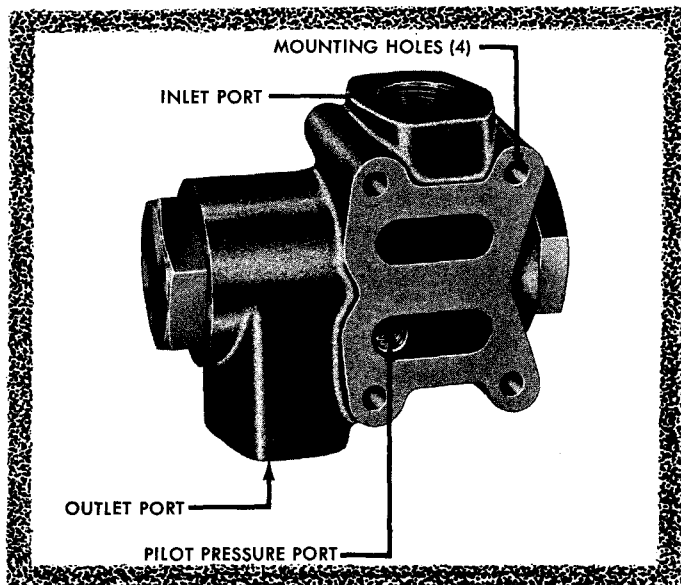
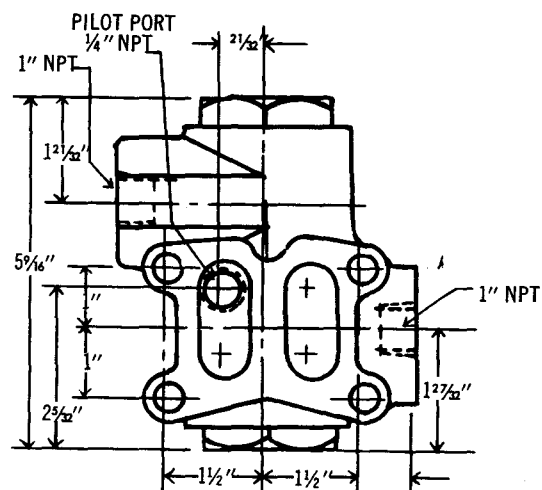


in-line accessory valves

pilot operated load hold check

This load hold check valve is specifically designed and will prevent cylinder drift when under load. Its built-in check blocks all return flow. The valve must be piped in circuit line and should be placed adjacent to the piston end port of the cylinder.

Flow through the pilot operated load hold check valve is unrestricted when flowing into a cylinder. Its check valve blocks all return flow from the cylinder until pilot line to this valve is pressurized to approximately 180 psi, opening the check and thus permitting return flow from cylinder. Maximum flow capacity is 30 gpm.



port size and style	CODE
¾" NPT	CL 6625K-1
1" NPT	CL 6625K-2

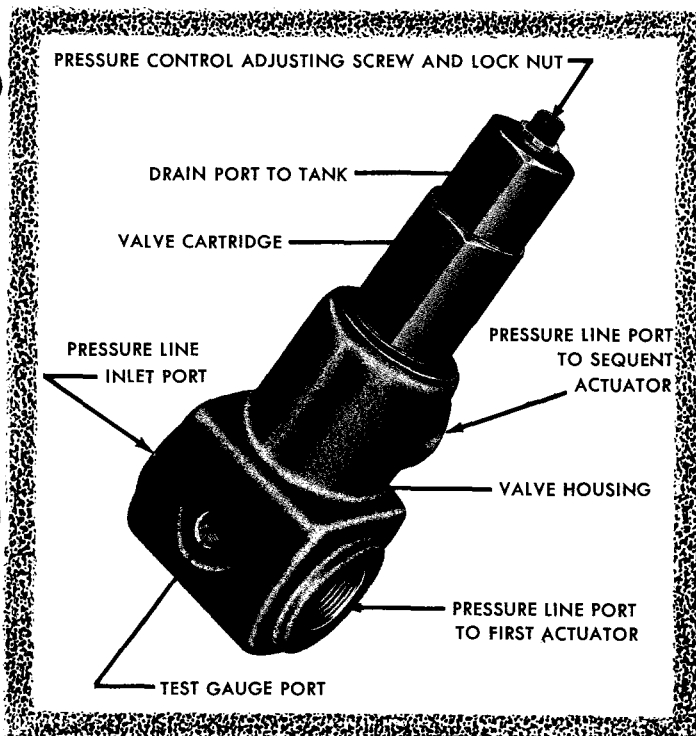
unit weight approx. 10 lbs.

sequence valve

This type of valve will automatically control the operation of two work functions, one following the other and always in the same sequence. It is located in line beyond a directional control working section. It is piped so that flow leaving one work port enters the sequence valve and is directed to the work function requiring the least amount of pressure. Flow continues until this work function reaches a predetermined limit. Pressure build-up continues until a relief valve, which is built into the sequence valve, opens and redirects flow to a second work function. When the limit of the second work function is reached, flow continues and pressure build-up increases until relieved by the main relief valve of the circuit.

A $\frac{1}{4}$ " return to tank drain line is piped from the spring retainer housing drainage of the relief valve.

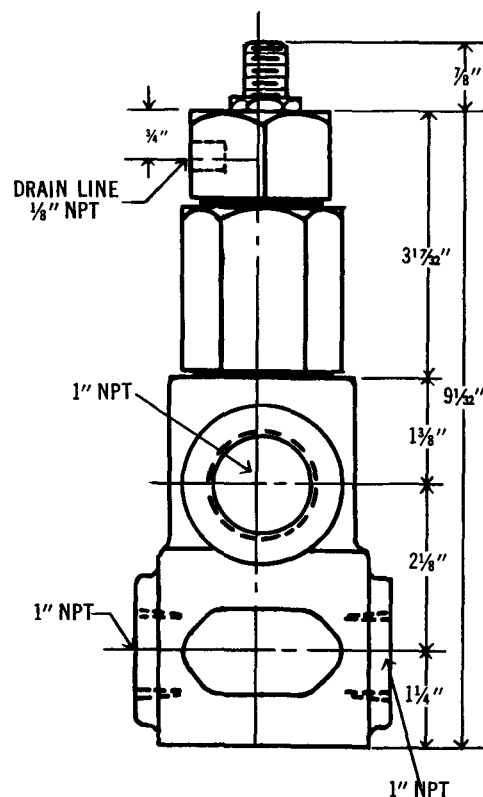
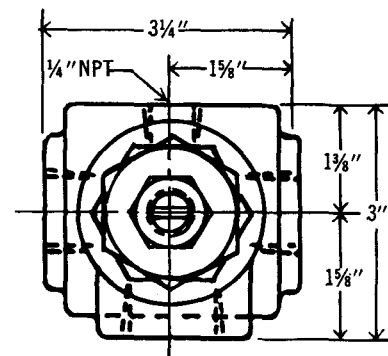
Flow capacity of this sequence valve is up to 30 gpm and its pressure range is from 50 psi to 1500 psi. The sequence valve would enable an operator to control two work functions automatically, one after the other, by merely operating one directional valve working section. An internal check valve provides free flow in the opposite direction.



port size and style
1" NPT

CODE
1000-1500 psi
EN 6625K-1

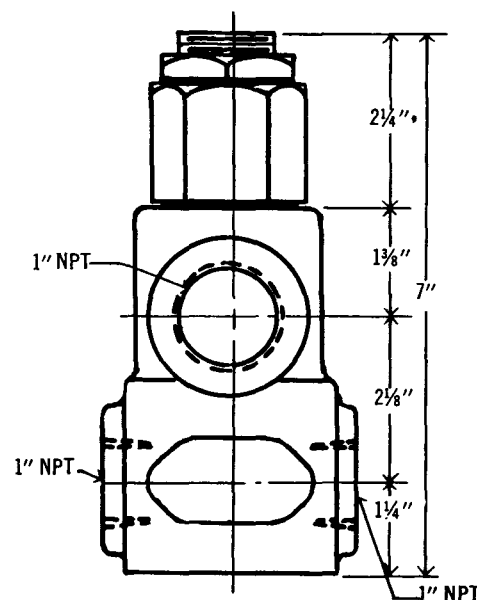
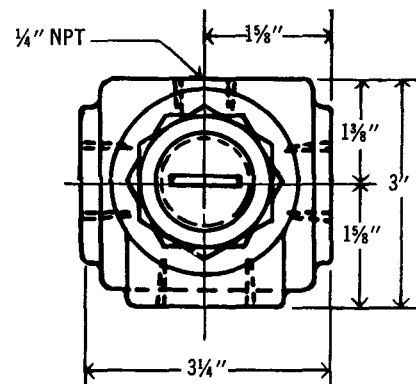
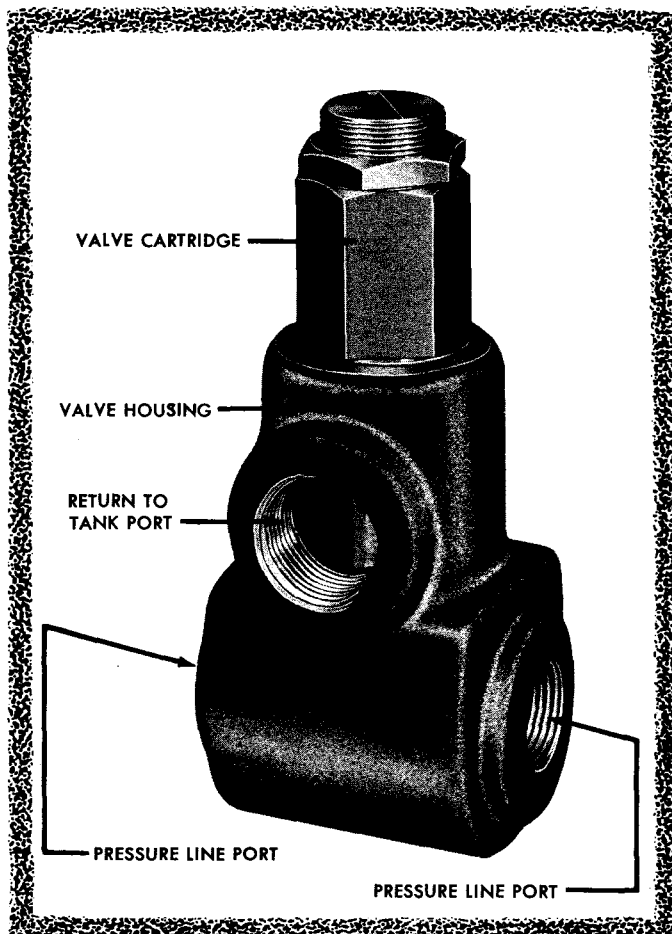
unit weight approx. 7 lbs.



combination overload relief-pressure control valve

When it is desirable to provide safety protection for a selected portion of a hydraulic circuit located at a position separated from another portion of the circuit, this combination overload relief-pressure control valve should be inserted in the line near as possible to the portion of the circuit requiring selective protection. Because of its unique construction and design, this is a combination type relief valve which not only affords protection against overload due to excessive pressure build-up in the circuit but also functions as a pressure control serving to protect the structural members of the tool or machine against overloads.

Should excessive pressure build up in the system, the relief will "blow off" at a pressure established by predetermined setting. Often the relief valve is called upon to also function as a pressure control valve. To meet this demand usage, a pressure differential principle has been designed into this valve giving it large capacity (10 to 50 gpm), more accurate settings and much smaller increments between open and closed position. "Dribble" point has been brought close to "blow-off" point by an ingenious follow up travel opposed to spring pressure. Because of its inherent design the pressure control action can be very frequent—practically continuous if necessary—without damage to the valve seats. Such operating characteristics enable the operator to give crowding movements to the tool of his machine without endangering its structural members. Installation can be made directly into the line. No T fitting is required, the construction of this valve is such that it provides its own built-in T.



pressure range (psi)	port size and style 1" NPT CODE
75—400	BA 6625K—12
400—800	BA 6625K—11
800—2000	BA 6625K—1

unit weight approx. 7 lbs.

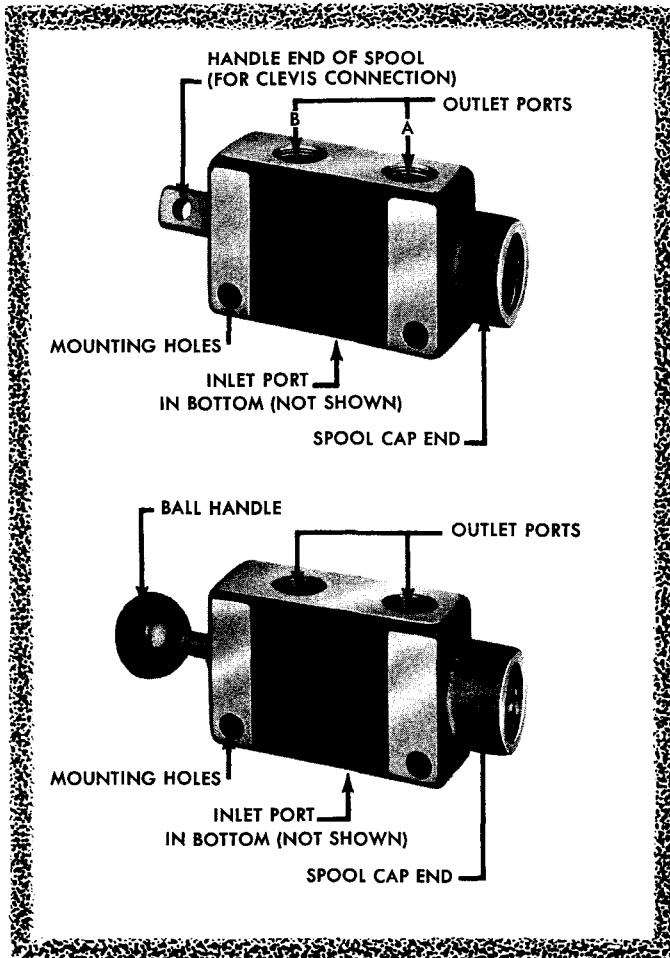
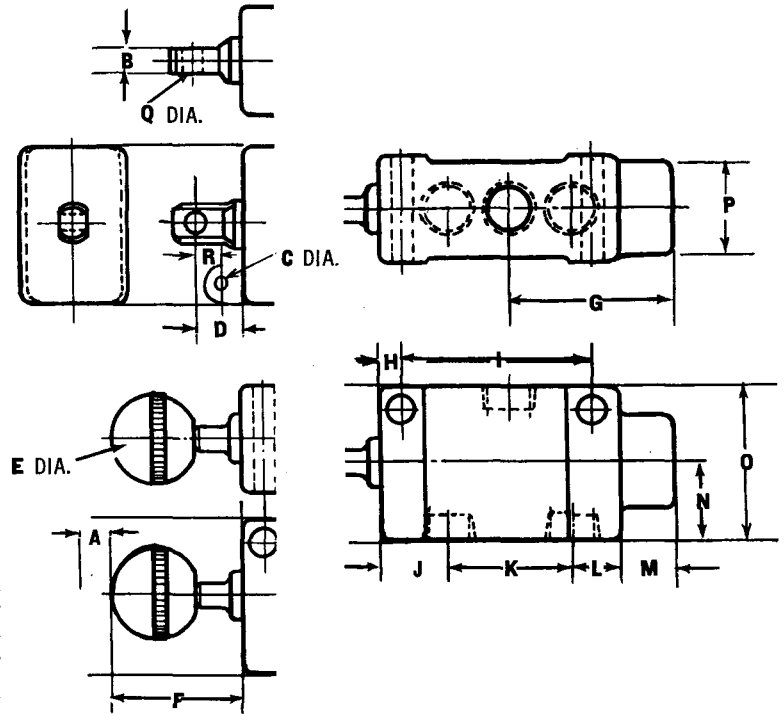
selective flow-direction-(diversion)-valve

3 way • 2 position

manual operation

This type of valve provides a means to direct flow of a hydraulic circuit to either of two possible objectives, the selection of either being at the discretion of the operator. When the spool of the valve is manually moved to the "in" position, flow entering through the inlet port (not shown) passes through the valve and leaves through outlet port "A". When the spool is in "out" position, flow leaves through outlet port "B".

Diversion valves, with capacities from 25 to 50 gpm, are used in applications involving circuits which can be broken into two separate working branches, each in operation at different times—never at the same time. This type of valve will route the flow of fluid power from one pump to either of the working portions of the circuit and block all flow to the other portion—all subject to the option of the operator.



dimensions (inches)									
all ports	A	B	C	D	E	F	G	H	I
3/4" NPT	1/2	9/16	—	1	1 1/4	2 3/4	3 3/8	1/2	4
1" NPT	5/8	1 1/16	3/8	1 1/8	1 3/4	2 1/2	3 1/4	1/2	5

dimensions (inches)									
all ports	J	K	L	M	N	O	P	Q	R
3/4" NPT	1 5/8	2 3/8	1	1 1/8	1 1/2	3 1/4	2 1/8	7/16	—
1" NPT	1 15/16	2 7/8	1 3/8	1	2 1/8	4 1/4	3 1/8	3/8	5/8

all ports	capacities	weight	handle type	CODE
3/4" NPT	25—30 gpm	8.2 lbs.	clevis	L—1320—2
	25—30 gpm	8.3 lbs.	ball	L—1320—3
1" NPT	up to 50 gpm	17.4 lbs.	clevis	D—1330—1
	up to 50 gpm	17.5 lbs.	ball	D—1330—2

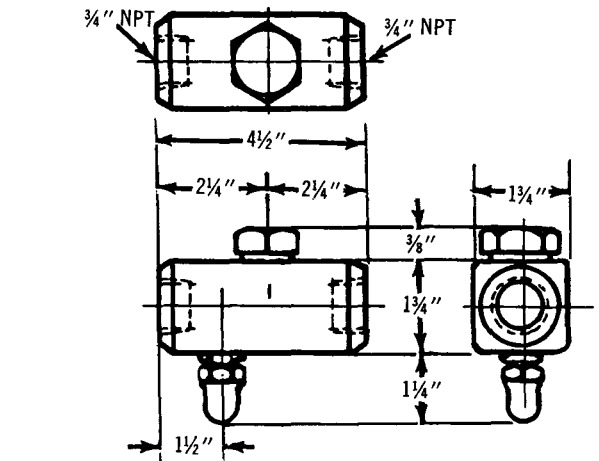
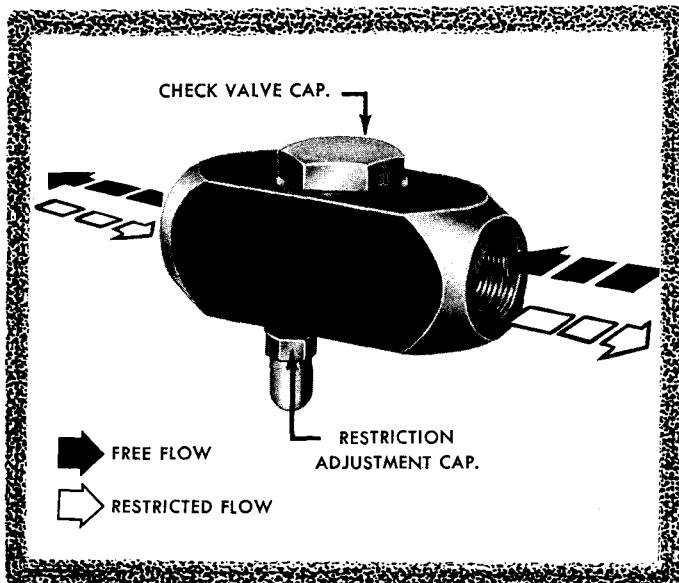
one-way flow control valve (adjustable restriction)

This valve restricts flow in one direction and permits free flow in the opposite. The direction of free flow is indicated by an embossed arrow on the housing. Restriction can be regulated by a screw adjustment.

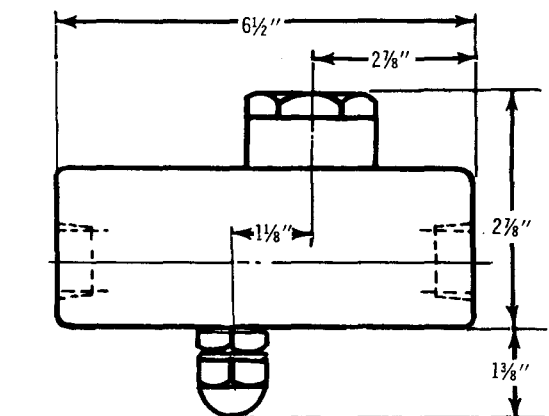
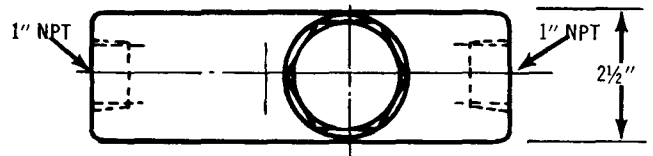
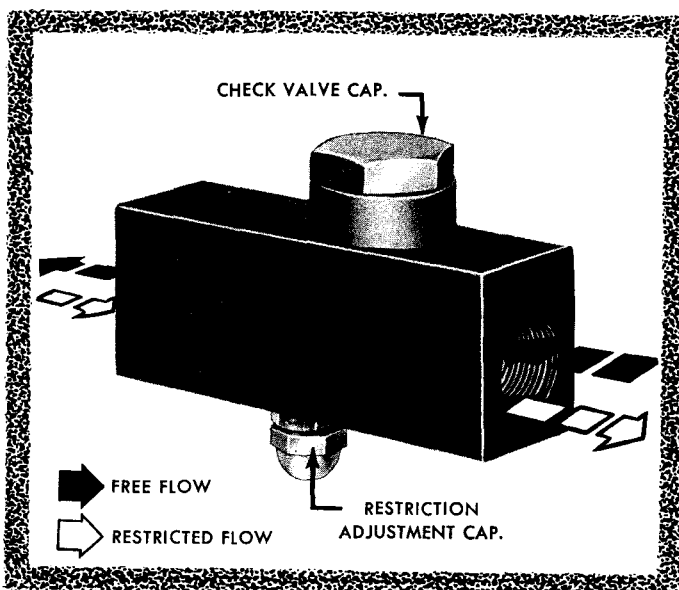
The most common use of one-way flow control valves is to restrict the speed of cylinders in one direction, while permitting free flow in the other.

For vertical movement, this restrictor valve impedes the rate of descent of a cylinder under load. It thus provides a measure of protection against line breakage or abrupt spool movement caused by the operator or pilot control. At the same time, it permits full-rated lift speed. To control the speed in both directions, two valves are used which are generally installed to control the flow-rate discharging from the cylinder.

Maximum operating pressure is 2500 psi.

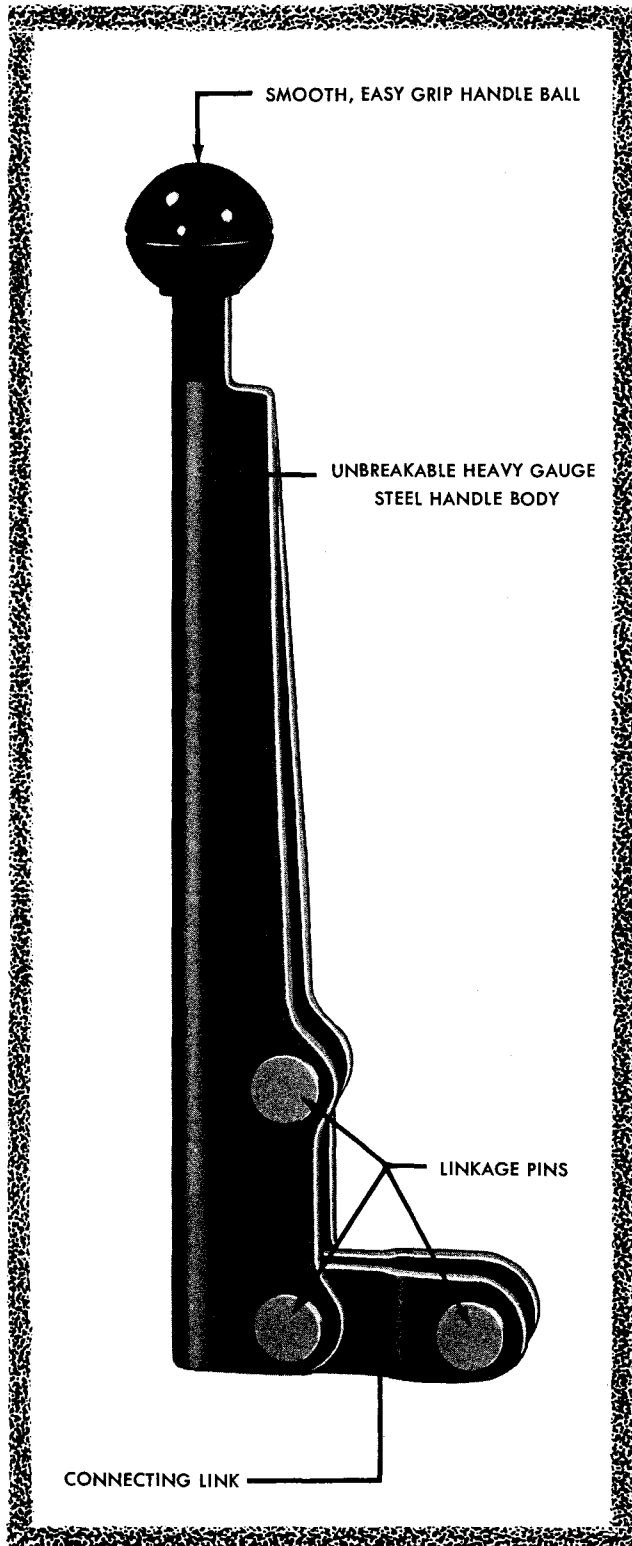


all ports	approx. wt.	capacity	CODE
3/4" NPT	3 lbs.	25 gpm	C 1043-3K

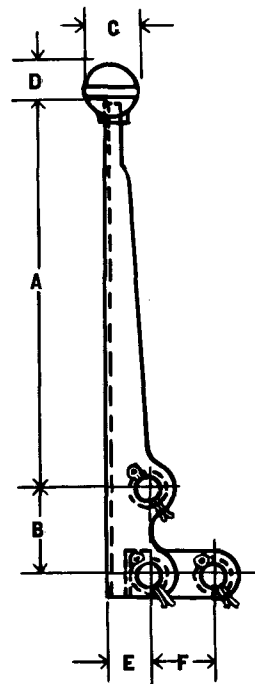


all ports	approx. wt.	capacity	CODE
1" NPT	8 lbs.	50 gpm	C 1043-6K
1 1/4" NPT	8 lbs.	50 gpm	C 1043-7K

new improved handles

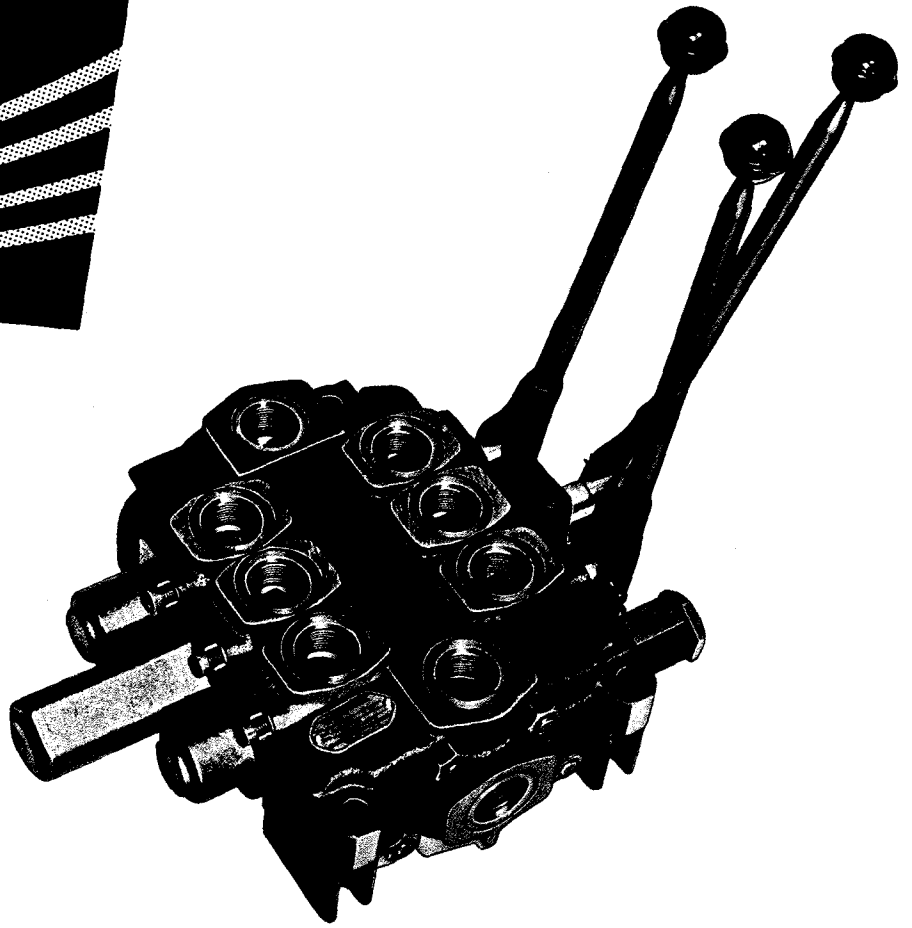
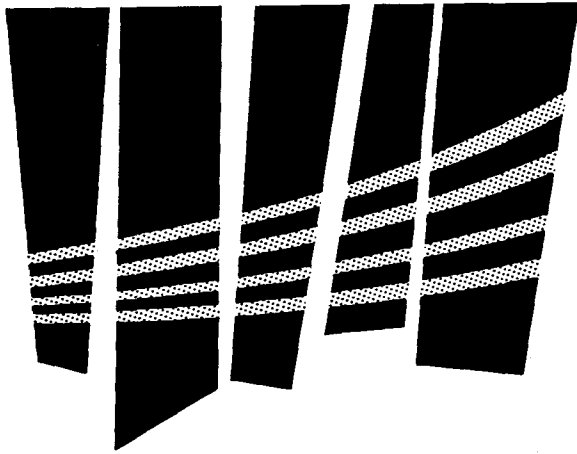


Valve handles are used to manually operate the spools in directional control valve working sections. They are made of pressed steel—are strong, rugged and well balanced. From hard plastic hand ball to the heavy linkages and pins that hold them in place, these handles let the operator “feel” the action going on inside the working section. They are designed for easy direct attachment to all working sections.



model	dimensions (inches)						CODE
	A	B	C	D	E	F	
A20	6	1 $\frac{1}{16}$	1 $\frac{3}{16}$	$\frac{5}{8}$	$\frac{7}{8}$	1 $\frac{1}{2}$	V1526K-6
	8	1 $\frac{1}{16}$	1 $\frac{3}{16}$	$\frac{5}{8}$	$\frac{7}{8}$	1 $\frac{1}{2}$	V1526K-8
	10	1 $\frac{1}{16}$	1 $\frac{3}{16}$	$\frac{5}{8}$	$\frac{7}{8}$	1 $\frac{1}{2}$	V1526K-10
A35	6	1 $\frac{1}{16}$	1 $\frac{3}{8}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	U1526K-6
	8	1 $\frac{1}{16}$	1 $\frac{3}{8}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	U1526K-8
	10	1 $\frac{1}{16}$	1 $\frac{3}{8}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	U1526K-10





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