



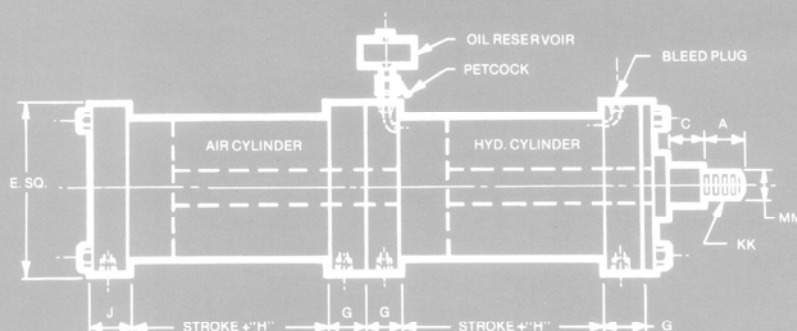
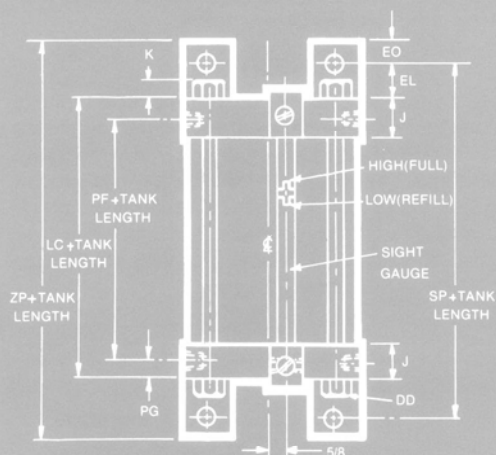
# Air-Oil Systems

**Air-Oil Tanks & Tank Circuits**

**Up To 150 PSI (maximum)**

**Air-Oil Tandem Cylinders & Circuits**

**Up To 250 PSI (maximum)**



# Low Cost AIR-OIL SYSTEMS

Miller Air-Oil Systems provide smooth, precision hydraulic power and control from shop air in simple circuits requiring one or only a few cylinders. Thus, they offer the simplicity, low initial cost, and low maintenance cost of shop air input operation compared to using the conventional hydraulic power input source requiring pump, motor, filter, pressure relief valve, etc. The hydraulic cylinder driven by the simple air-oil system is controlled exactly as the cylinder driven by the pump installation using the same control valves.

## AIR-OIL TANKS AND TANK CIRCUITS

For Up To 150 psi Operation

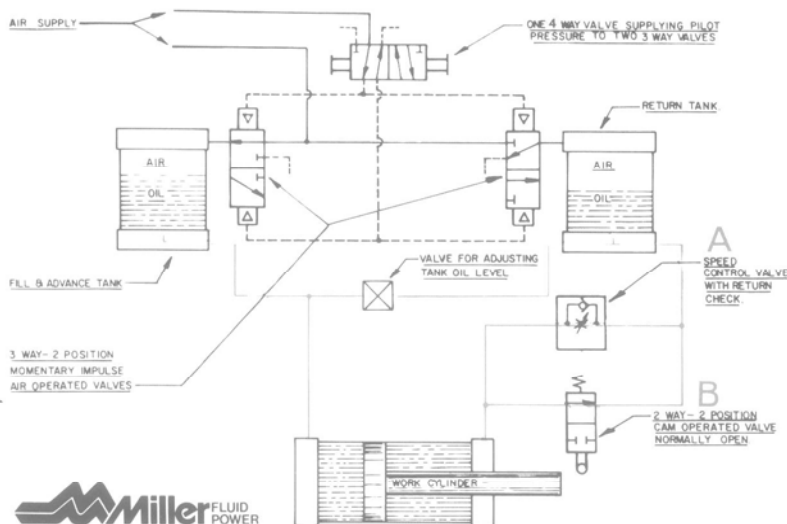


Shop air applied directly on the oil in an air-oil tank is a simple low cost method of obtaining hydraulic power for operation of one or more hydraulic cylinders simultaneously. The hydraulic power is obtained from the shop air in a 1 to 1 ratio, i.e.—80 psi shop air produces 80 psi hydraulic oil pressure.

The circuit becomes automatically self-bleeding merely by mounting the air-oil tanks above the cylinder. And the tanks may be installed wherever convenient, either on or off the machine containing the cylinder. The patented baffles of the Miller Air-Oil Tanks permit rapid discharge and intake of air and oil without churning, funnelling, foaming, aeration, or oil being blown from tanks.

Other features of the Miller Tanks are: sturdy, transparent, plastic sight gauge\* that tells, at a glance, amount of oil in tanks; convenient fill and drain ports in sight gauge fitting; availability of oversize ports for faster cylinder speeds. The tanks are available in a wide choice of sizes to meet desired volume requirements. See tank selection information in Table below and dimensional data on page 4.

\*Compatible with most hydraulic fluids. Contact Miller Fluid Power Application Engineering Department for use with special, or synthetic fluids. Plastic gauge is strengthened by metal guard. Guard should not be removed.



## Basic Circuit Operation

In the circuit at left, the Advance Stroke Air-Oil Tank is connected to the cap end port of the hydraulic cylinder and the Return Stroke Tank, to the rod end port of the cylinder. Shop air (from the system's 4-way air control valve) is fed alternately (through 3-way air valves) to the two tanks. The 3-way valves indicated are Miller "Port Mounted" Valves that permit faster cylinder speeds. The oil in the "Advance" Tank is driven (by the air) into the cap end of the cylinder, forcing the piston rod to extend at the same fast speed throughout its entire stroke. At the same time, the rod end cylinder oil is forced into the "Return" Tank. Air on this Tank causes reversal of oil flow, returning piston rod and forcing cap end cylinder oil back into "Advance" Tank to complete the stroke cycle.

## Speed Control

As shown in Circuit at left above, speed and flow control valves (A and B) can be installed in the return oil line to provide any desired combination of rapid advance and slower working stroke of the piston rod. The valves can be similarly installed in the line between the "Advance" Tank and cylinder to similarly control the return stroke of the cylinder. Recommended air pressure for this air-oil system is 100 psi. For very slow cylinder speeds and oil velocities, up to 150 psi.



## USABLE TANK VOLUME IN CUBIC INCHES

Tank Length (Inches)	Tank Bore Diameters (Inches)								Fluid Working Height "
	3 1/4	4	5	6	8	10	12	14	
4	8.	12.	19.	28.	50.	78.	113.	153.	1
5	15.	23.	36.	53.	94.	147.	212.	288.	1 1/8
6	22.	34.	54.	77.	138.	216.	311.	423.	2 3/4
7	30.	45.	71.	102.	182.	284.	410.	558.	3 3/8
8	37.	56.	88.	127.	226.	353.	509.	692.	4 1/2
9	44.	67.	105.	152.	270.	422.	607.	827.	5 3/8
10	51.	78.	122.	176.	314.	490.	706.	962.	6 1/4
11	59.	89.	139.	201.	358.	559.	805.	1096.	7 1/8
12	66.	100.	157.	226.	402.	628.	904.	1231.	8
13	73.	111.	174.	250.	446.	697.	1003.	1366.	8 7/8
14	80.	122.	191.	275.	490.	765.	1102.	1500.	9 3/4
15	88.	133.	208.	300.	534.	834.	1201.	1635.	10 3/8
16	95.	144.	225.	325.	578.	903.	1300.	1770.	11 1/2
17	102.	155.	243.	349.	622.	971.	1399.	1905.	12 3/8
18	109.	166.	260.	374.	666.	1040.	1498.	2039.	13 1/4
19	117.	177.	277.	399.	710.	1109.	1597.	2174.	14 1/8
20	124.	188.	294.	424.	754.	1178.	1696.	2309.	15
21	131.	199.	311.	448.	798.	1246.	1795.	2443.	15 7/8
22	139.	210.	328.	473.	841.	1315.	1894.	2578.	16 3/4
23	146.	221.	346.	498.	885.	1384.	1993.	2713.	17 3/8
24	153.	232.	363.	523.	929.	1453.	2092.	2847.	18 1/2

## How to Select Proper Tank Size

The bore and stroke of the hydraulic cylinder are known. Then—

1. Determine the cubic inch oil displacement of the cylinder piston by multiplying the square inch area of the piston by the inches of stroke.
2. Locate, on selector chart at left, the volumes closest to the volume obtained and read up to tank diameters and to the left for tank lengths. In general, tanks of smaller diameters and greater lengths are less costly than larger diameter, shorter tanks of approximately equal volume.

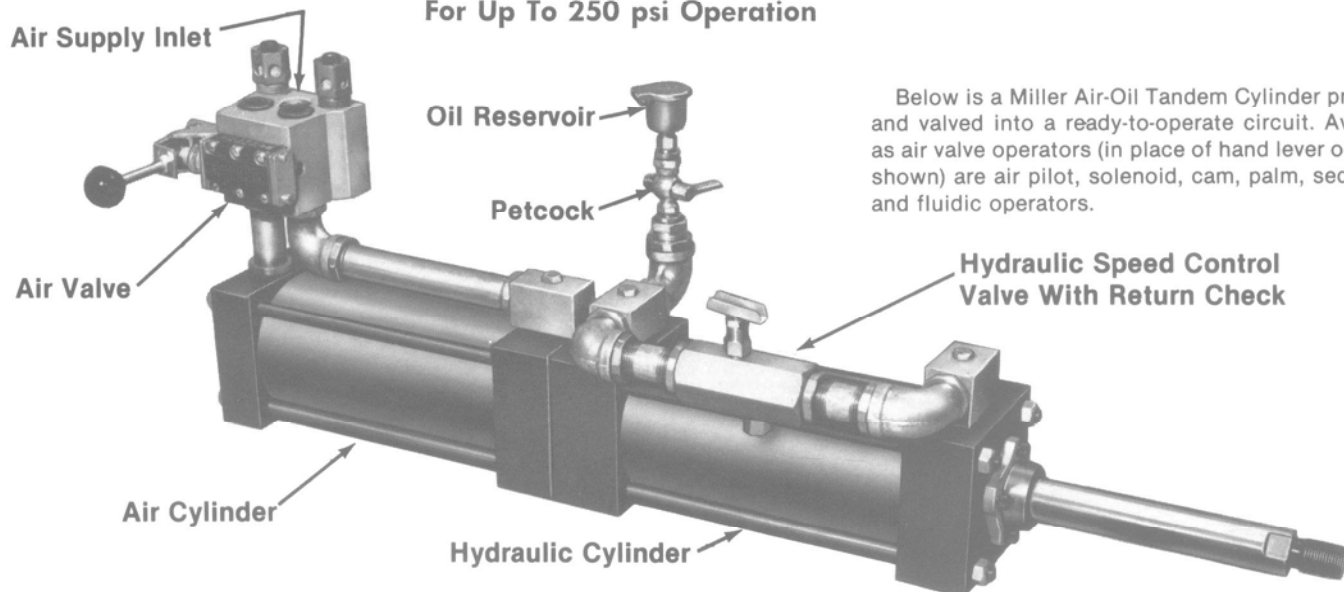
**EXAMPLE:** To find the tank size needed for a 6" bore, 4" stroke hydraulic cylinder (according to formula above): The oil displacement of the piston is 113.09 cu. in. From the selector chart at left, select a volume higher than 113 and that gives you the tank size that best fits the available space. Thus, a 3 1/4" bore x 19" long tank, or a 4" bore x 14" long tank, or a 5" bore x 10" long tank could be selected.



# have advantages over pump circuits

In the two Miller Air-Oil Systems shown below, the advance stroke of the cylinder to the work can be rapid throughout its entire stroke—or any combination of rapid and slow speed strokes can be easily accomplished in either the advance or return cylinder strokes merely by proper placement of valving and controls in the circuits.

## AIR-OIL TANDEM CYLINDERS AND CIRCUITS For Up To 250 psi Operation



Below is a Miller Air-Oil Tandem Cylinder prepped and valved into a ready-to-operate circuit. Available as air valve operators (in place of hand lever operator shown) are air pilot, solenoid, cam, palm, sequence, and fluidic operators.

## Miller Tandem Cylinders

A Miller Air-Oil Tandem Cylinder is a standard Miller Model A Air Cylinder joined, in tandem, with a standard Miller Model J Hydraulic Cylinder so that the combined unit, though air driven, operates as a hydraulic cylinder in providing smooth hydraulic power and motion.

The unit requires no air-oil tanks but is not self-bleeding.

The Model A and J sizes range from 1½" through 20" bores in a wide selection of mounting styles (see page 4 for dimensional information). The price of a Tandem unit is the combined price of a single rod end Model A air cylinder and a double rod end Model J oil cylinder, thus providing economical first cost. The Tandem Unit is available prepped and valved (as illustrated above) at extra cost.

## Circuit Operation

As shown in the circuit at right, air alternately enters the cap and head end ports of the air cylinder through the system's 4-way valve. As the air piston cycles back and forth, the hydraulic piston, connected to the same piston rod, must also cycle back and forth, thus alternately forcing oil through the connecting line, from one end of the hydraulic cylinder to the other.

## Speed Control

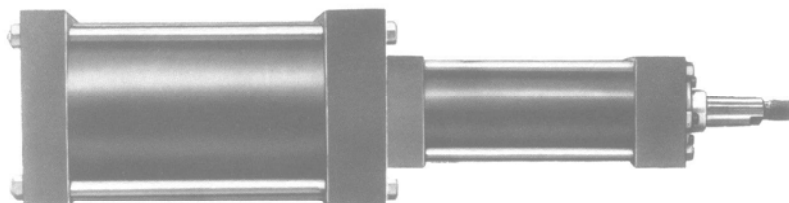
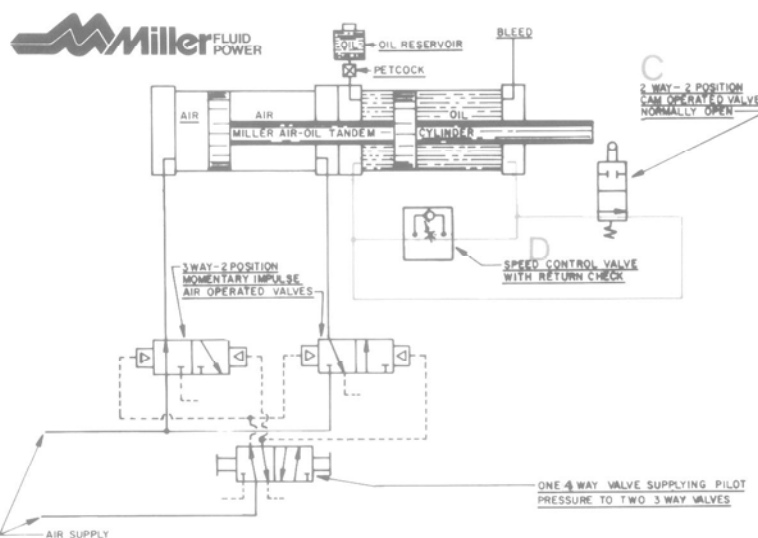
As shown in circuit at right, speed and flow control valves (C and D) can be installed in the oil line connecting the hydraulic cylinder ports, to provide any desired combination of rapid advance stroke and slower working stroke of the piston rod.

## High Speed Operation

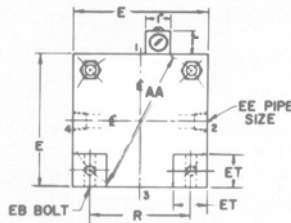
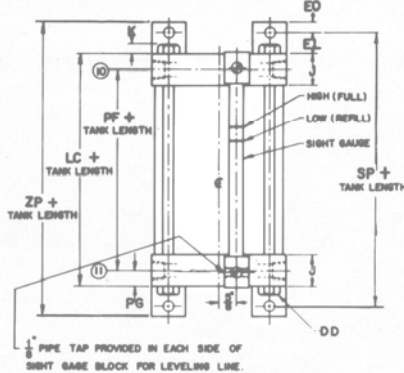
For high speed, high power operation, when the flow of oil would be excessive if the hydraulic and air cylinders were the same size, a hydraulic cylinder smaller in diameter than the air cylinder is used (as illustrated at right) to obtain higher speed with less flow.

## Continuous Automatic Cycling

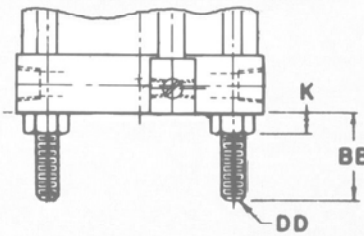
Continuous automatic cycling is most economically obtained without complicated, costly arrangements of cams, micro switches, etc., by using a Miller Solid State Timer integrally mounted on the Air Valve (See Bulletin 3474).



## MODEL A77 TANK



## \*MODEL A53 TANK



\*All other dimensions are the same as for Model A-77 Tank shown at left. Note: Model A52 Tank (tie rod extended top end) and A50 Tank (tie rods not extended beyond nuts) also available.

## TANK DIMENSIONS

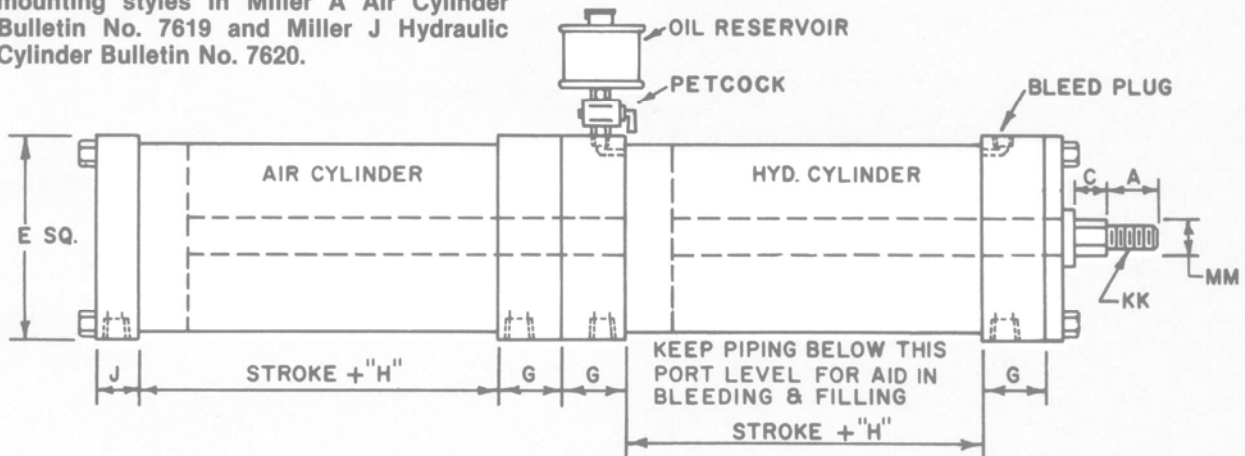
BORE	3 3/4	4	5	6	8	10	12	14
AA	3.9	4.7	5.8	6.9	9.1	11.2	13.3	15.4
BB	1 3/8	1 3/8	1 3/8	1 3/8	2 1/8	2 1/8	2 1/8	3 1/8
DD	3/8-24	3/8-24	1/2-20	1/2-20	3/8-18	3/8-16	3/8-16	3/8-14
E	3 3/4	4 1/2	5 1/2	6 1/2	8 1/2	10 3/8	12 3/4	14 3/4
*EB	3/8	3/8	1/2	1/2	3/8	3/8	3/8	3/8
EE	1/2	1/2	1/2	3/4	3/4	1	1	1 1/4
EL	3/8	1	1 1/8	1	1 1/8	1 1/8	1 1/8	1 1/2
EO	3/8	3/8	1/2	1/2	3/8	3/8	3/8	3/8
ET	1	1 1/8	1 3/8	1 3/8	2 1/8	2 1/8	3 1/8	3 1/8
J	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	2	2	2 1/4
K	3/8	3/8	3/8	3/8	3/8	1 1/8	1 1/8	1 1/8
LC	2 1/2	2 1/2	2 1/2	3	3	4	4	4 1/2
PF	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	2	2	2 3/8
PG	9/16	9/16	9/16	1 1/16	1 1/16	1	1	1 1/16
R	2.76	3.32	4.10	4.88	6.44	7.92	9.40	10.90
SP	4 1/4	4 1/2	4 3/8	5	5 1/4	6 3/8	6 3/8	7 1/2
ZP	5	5 1/4	5 3/8	6	6 1/2	7 3/8	7 3/8	9

\*Mounting holes are 1/16 larger than bolt size shown in table.

## MILLER TANDEM CYLINDER DIMENSIONS

The figures for the dimensional letters below are given for the various bore sizes and mounting styles in Miller A Air Cylinder Bulletin No. 7619 and Miller J Hydraulic Cylinder Bulletin No. 7620.

IF HYD. PORTS ARE ON TOP INSTALL TEES AND CONNECT RESERVOIR AND BLEED INTO TEES



## Cylinders and Valves — Ordering and Delivery

For use with Miller Air-Oil Tanks in air-oil tank circuits, we recommend the use of Miller Model J Hydraulic Cylinders and Port Mounted Miller Air Valves. The Model J cylinder is very economical in price and has all the quality design and construction features of the Miller Model H Cylinder. The Port Mounted Air Valves save on air and piping and provide faster circuit operation. Save time and money by ordering from our stock selection of Air-Oil Tanks and Model J Hydraulic Cylinders. Shipment in 1-3 days. For fast service,

• Miller Fluid Power Bensenville  
(800) 323-2520—Toll Free

• Miller Fluid Power Canada Ltd.  
(800) 268-0205—Ontario & Quebec