

**BUCKEYE**  
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**BUCKEYE**



**FIXTURED DRILLS**



Cooper Power Tools Division has attained ISO 9001 Quality System Certification for four of our facilities.

The driving force behind the implementation of the Quality System is the commitment "to provide our customers with the **best value delivered** by offering only products and services **that meet or exceed their expectations**".



Lexington, South Carolina



Hicksville, Ohio



Westhausen, Germany

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## Warranty

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Cooper warrants products and parts sold by it, insofar as they are of its own manufacture, against defects of material and workmanship, under normal use and service in accordance with its written instructions, recommendations, and ratings for installation, operation, maintenance, and service of products, for a period of **ONE YEAR FROM THE DATE OF INITIAL USE, BUT IN NO EVENT SHALL THE WARRANTY EXCEED 24 MONTHS FROM DATE OF DELIVERY TO DISTRIBUTOR.** Proof of Purchase with shipment date must be furnished by the user to validate the warranty. This warranty applies only to products manufactured by Cooper and specifically excludes products manufactured by others. Products not manufactured by Cooper are warranted only to the extent and in the manner warranted to Cooper by the manufacturer and then

only to the extent Cooper is able to enforce such warranty. Cooper's warranty with respect to products manufactured by it is limited to the repair or replacement, as Cooper may elect, of any defective part regarding which the Distributor has given 5 days written notice from the discovery of such defect. Installation and transportation costs are not included. Cooper shall have the option of requiring the return to it of the defective material, transportation prepaid, for inspection. No allowance will be made for repairs without Cooper's approval. **COOPER MAKES NO OTHER WARRANTY OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, AND HEREBY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

## Lubrication Products

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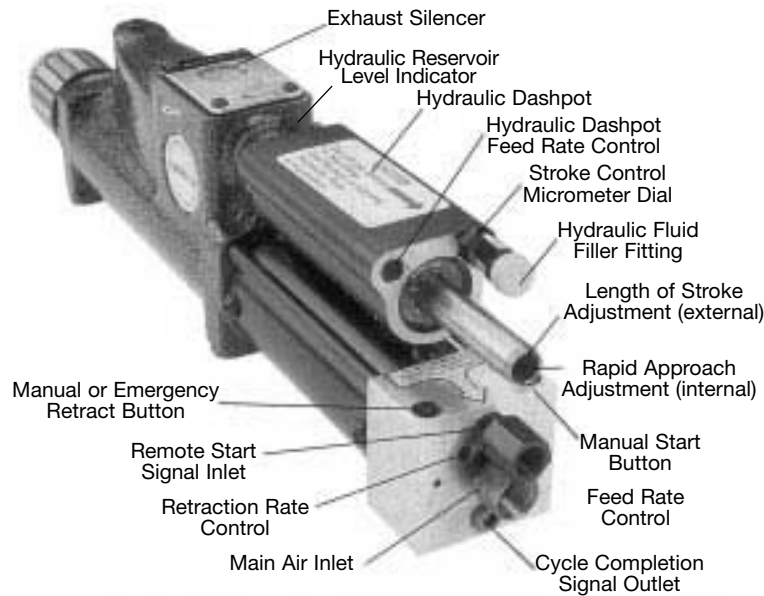
Cooper Power Tools' products are classified as non-hazardous manufactured items, defined in the OSHA 1910.1200 Hazard Communication Standard as "Articles". These products, under conditions of normal use, do not release or cause exposure to a hazardous chemical.

Under normal conditions of use, lubrication products sold separately for or used within these tools should not cause an exposure hazard. Refer to the Material Safety Data Sheet (M.S.D.S.) for Safety and Disposal Information. M.S.D.S. sheets are available upon request from Cooper Power Tools.

Cooper is also aware of, and complies with, the provisions of section 611 amendments to the Clean Air Act of 1990. No ozone depleting chemicals have been used in the manufacture of our products.

If you resell or distribute these products, you have the responsibility for ensuring that the Material Safety Data Sheets are provided to the purchaser.

Proper lubrication is essential to the economical operation of pneumatic tools. Gardner-Denver, Dotco, Doler, DGD & Buckeye tools perform better and their life is extended by using the recommended lubricants. All lubricants that are



Cooper Power Tools has combined years of application experience with modern engineering expertise, in the development of the self-feed drills to bring industry this superior line of fixtured drilling equipment.

The modular construction of these units permits the user to select only the components that include features which are required for his application. Components are available to provide for successful precision drilling of virtually every material.

## Rugged Construction

The rugged construction of these tools enables them to withstand heavy punishment while providing extra versatility, including the feature of both foot and nose mounting. They can also be mounted within optional aircraft type nose pieces.

## Quiet Operation

Cooper Power Tools is particularly attentive to the design of the exhaust system for every tool. For operator comfort and improved working conditions, motor exhaust is efficiently muffled to insure that the lowest practical noise levels are maintained. Optional accessory mufflers are available for some tools to direct the exhaust away from the operator.

### AUTOMATIC OR NON-AUTOMATIC CONTROL

Automatic and Non-Automatic refer to the control of the advance and return functions of the drill. With automatic control, a built-in four-way valve controls advance and return of the drill bit. The four-way valve may be actuated manually, at the tool or by momentary pressure signals generated at a remote location. On the non-automatic tool, remote valving must be used to control the advance and return of the drill.

On both automatic and non-automatic models, motor (on-off) valve operates automatically. The motor starts as soon as forward motion occurs and stops when return travel is completed. A built-in, two-way valve (actuated when the drill reaches the bottom of its stroke) provides the pressure pilot signal to operate the four-way valve which returns the drill.

## Stroke Length

In selecting a stroke length, it is necessary to consider depth of the hole to be drilled, length of the drill bit, and the drill bit travel

required to contact the workpiece. Additional considerations will depend on other specific requirements of the application.

## Drill Speeds (RPM)

A wide selection of drilling speeds are offered in order that the recommended surface feet-per-minute for each drill size and material can be approximated. It should be noted, in selecting a drill speed for an application, that the specification chart lists the rated free speed of the tool. Actual drilling speed will depend on drill size and feed rate setting.

## Hydraulic or Aircheck Feed Control (Accessory)

Feed rate control for the Aircheck type drill is accomplished by controlling the flow of air from the exhaust side of the feed piston and is sufficiently accurate for many of the easy-to-drill applications. When more accurate control of the feed rate is required on harder-to-drill materials, or when hole finish or breakthrough control is critical, it is advisable to use a Hydraulic Feed Control.

## Dwell (46L Series)

Dwell at the bottom of the stroke is advisable for blind hole applications where hole-bottom cleanup is important, or in countersink and counterbore operations. Also used where depth control is very important.

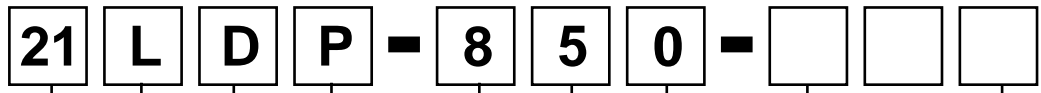
## Auxiliary Signal

The Auxiliary Signal should be considered when a pneumatic signal is required to indicate that tool has moved to the required position. The signal can be used to actuate related equipment - start another drill or tapper, or perform an unclamp operation.

## Piped Exhaust (Accessory)

The sound level of Buckeye self-feed drills is below the level where piped exhaust (strictly for noise control) is required, unless great quantities of tools are to be used on a single fixture. A Piped Exhaust Kit is offered for those applications where it is desirable to direct exhaust air to an exhaust manifold to eliminate the presence of oil contaminants in the air.

# Buckeye® Model Number System



**Motor Series**

- 21 .4 HP
- 31 .6 HP
- 42 .9 HP
- 46 1.0 HP

**Self-Feed Tool**

**Accessory Items**

- D = Dashpot (*"D" Model*)
- K = Outboard Dashpot Kit (*"K" Model*)
- P = Pistol Grip Handle (*no dashpot*)
- H = Offset Head (*no dashpot*)

**Accessory Items**

- P = Pistol Grip Handle (*combined with dashpot*)
- H = Offset Head (*combined with dashpot*)

**Family Type**

- 7 = With Gy-Roll multi-spindle heads (*21 series only*)
- 8 = Standard drill, fully controlled valve-in-head
- 9 = Rear head without valves
- 86 = Nutsetter

**Tool Code**

- 0 = Standard Drill
- 1 = Taper
- 3 = Screwdriver
- 4 = Nutrunner
- 5 = Peck Drill

**Speed Code**

21 Series	31 Series	42 Series	46 Series
0 = 22,000	0 = 20,000	9 = 9,000	1 = 4,400
1 = 4,750	1 = 5,000	8 = 6,000	2 = 3,250
2 = 3,500	2 = 3,000	1 = 5,000	3 = 1,800
3 = 2,800	3 = 1,850	2 = 3,000	5 = 900
5 = 900	5 = 1,100	3 = 1,850	6 = 600
	6 = 750	6 = 750	7 = 430
	7 = 450	7 = 450	8 = 285

**Termination Code**

Product description, if required, to specify chuck variations, multiple spindle heads, alternate dashpots, etc.

## Drill Speed Guide

The table below is offered to assist in the selection of the proper spindle speeds to suit the most common drilling applications. This data is intended as a guide only, inasmuch as the operating conditions may vary widely.

Keep in mind that high speed air drills deliver maximum horsepower when they are loaded to a point where the listed free speed is reduced about one-half. It may also be necessary to deviate from these speeds in order to insure satisfactory cutting tool life.

Material	Surface Feet per Minute	Suggested Revolutions per Minute Required for Proper Surface Feet per Minute											
		Drill Size											
		1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4
Stainless Steel	30-40	2100	1100	700	550	400	350	300	250	230	200	190	175
Forged Steel	40-50	2700	1350	900	675	550	450	400	350	300	275	250	225
High Nickel Steel or Monel	40-50	2700	1350	900	675	550	450	400	350	300	275	250	225
Titanium Alloy Sheet	50-60	3300	1650	1100	850	650	550	450	400	375	325	300	275
High Carbon Steel	70-80	4600	2300	1500	1100	900	750	650	575	500	450	400	375
Malleable Iron	80-90	5200	2600	1700	1300	1000	850	750	650	575	525	475	425
Mild Steel	80-110	6100	3000	2000	1500	1200	1000	900	750	675	600	550	500
Mild Steel Sheet	80-110	6700	3350	2250	1650	1350	1100	950	850	750	675	600	550
Medium Hard Cast Iron	70-100	5200	2600	1700	1300	1000	850	750	650	575	525	475	425
Soft Cast Iron	100-150	7600	3800	2500	1900	1500	1100	950	850	750	700	700	650
Plastic and Bakelite	100-150	7600	3800	2500	2000	1500	1250	1100	950	850	750	700	650
High Tensile Bronze	70-150	6700	3300	2250	1650	1350	1100	950	850	750	675	600	550
Commercial Brass or Bronze	200-300	15000	7600	5100	3800	3000	2500	2200	2000	1700	1500	1400	1300
Aluminum	200-300	15000	7600	5100	3800	3000	2500	2200	2000	1700	1500	1400	1300
Aluminum Sheet	200-300	18000	9100	6100	4500	3500	3000	2500	2250	2000	1700	1500	1400
Magnesium	250-400	18500	9200	6100	4600	3600	3100	2600	2250	2000	1900	1800	1650
Wood	300-400	18500	9200	6100	4500	3600	3000	2600	2250	2100	2000	1900	1800

NOTE: This table is for use with High Speed Steel drills only. Carbon Steel drills should run at 40-50% of listed speeds.

## Drill Horsepower and Thrust Chart

Material	Specification For	Drill Size								
		1/16	3/32	1/8	3/16	1/4	5/16	3/8	7/16	1/2
<b>Brass</b>	R.P.M.	4000	4000	4000	3000	2200	1800	1500	1300	1100
	Feed"/Rev.	.0004	.0005	.0008	.0012	.0017	.0021	.0025	.003	.0035
	H.P.	.010	.012	.022	.047	.100	.150	.200	.250	.300
	Thrust (lbs.)	3	6	10	20	35	50	70	90	100
<b>Aluminum</b>	R.P.M.	4000	4000	4000	4000	3000	2500	2000	1700	1500
	Feed"/Rev.	.0005	.0007	.0010	.0015	.0020	.0025	.0030	.0035	.0040
	H.P.	.010	.020	.040	.080	.140	.220	.300	.375	.450
	Thrust (lbs.)	2	3	6	12	20	40	60	80	100
<b>Cast Iron</b>	R.P.M.	4000	2850	2100	1400	1000	850	700	600	525
	Feed"/Rev.	.0005	.0007	.0010	.0015	.0020	.0022	.0027	.0030	.0035
	H.P.	.010	.020	.035	.060	.100	.125	.175	.210	.250
	Thrust (lbs.)	6	12	30	45	90	100	140	180	225
<b>B1112 Mild Steel</b>	R.P.M.	3600	2400	1800	1200	900	750	600	525	450
	Feed"/Rev.	.0005	.0007	.0010	.0015	.0022	.0027	.0032	.0037	.0045
	H.P.	.015	.025	.040	.075	.125	.175	.250	.300	.365
	Thrust (lbs.)	8	12	25	50	85	130	175	250	310
<b>1045 Steel</b>	R.P.M.	3600	2400	1800	1200	900	750	600	525	450
	Feed"/Rev.	.0005	.0007	.0010	.0015	.0022	.0027	.0032	.0037	.0045
	H.P.	.03	.05	.09	.15	.22	.25	.40	.60	.65
	Thrust (lbs.)	12	20	25	75	140	200	280	350	450



## BUCKEYE®

### 21L Series

- .4 Horsepower
- 130 lbs. Thrust (578 N) @ 90 PSI
- 1-1/4" (32mm) & 2" (51mm) Stroke
- Cycle completion signal

### 21L-800 & 870 Series Automatic

- Internal rear-head valves
- Automatic retract
- Manual start & retract
- Remote start

### 21L-900 & 970 Series Non-Automatic

- Requires external valves for operation
- Independent operation of motor & air piston
- Remote start & retract with external valving



The Dashpot accessory is recommended for drilling metal. To order with a Dashpot, add "D" to the model number after the "L". Example: 21LD-XXX to receive 1024850 - 1" stroke Dashpot.

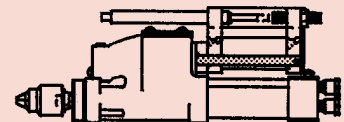
Models		Free Speed RPM	Nominal Drilling Capacities						Thrust @90PSI		Std. Chuck Capacity		Spindle
Stroke Length			Mild Steel		Alum.		Wood		lb.	N	in.	mm	
1-1/4" (32mm)	2" (51mm)		in.	mm	in.	mm	in.	mm					
<b>Automatic</b>													
21L-870	21L-800	22000	—	—	3/32	2.4	—	—	130	578	5/32	4.0	#0 JT
21L-871	21L-801	4750	1/8	3.2	3/16	4.8	3/16	4.8	130	578	1/4	6.4	3/8"-24
21L-872	21L-802	3500	5/32	4.0	7/32	5.6	1/4	6.4	130	578	1/4	6.4	3/8"-24
21L-873	21L-803	2800	3/16	4.8	1/4	6.4	5/16	7.9	130	578	1/4	6.4	3/8"-24
21L-875	21L-805	900	1/4	6.4	1/4	6.4	1/2	12.7	130	578	1/4	6.4	3/8"-24
<b>Non-Automatic</b>													
21L-970	21L-900	22000	—	—	3/32	2.4	—	—	130	578	5/32	4.0	#0 JT
21L-971	21L-901	4750	1/8	3.2	3/16	4.8	3/16	4.8	130	578	1/4	6.4	3/8"-24
21L-972	21L-902	3500	5/32	4.0	7/32	5.6	1/4	6.4	130	578	1/4	6.4	3/8"-24
21L-973	21L-903	2800	3/16	4.8	1/4	6.4	5/16	7.9	130	578	1/4	6.4	3/8"-24
21L-975	21L-905	900	1/4	6.4	1/4	6.4	1/2	12.7	130	578	1/4	6.4	3/8"-24

#### SPECIFICATIONS:

Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 1/4" N.P.T.  
 Remote Control Ports: 1/8" N.P.T.  
 Recommended Hose Size: 3/8" (9.5 mm) I.D.  
 Offset (side-to-center): 7/8" (22.2 mm)  
 Tool Weight (maximum): 5.6 lbs. (2.5 kg)  
 Optional Chucks: page 49

#### EXTRA COST ACCESSORIES:

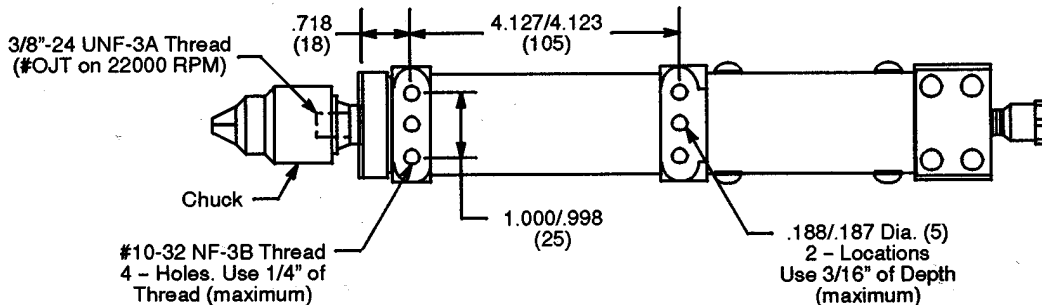
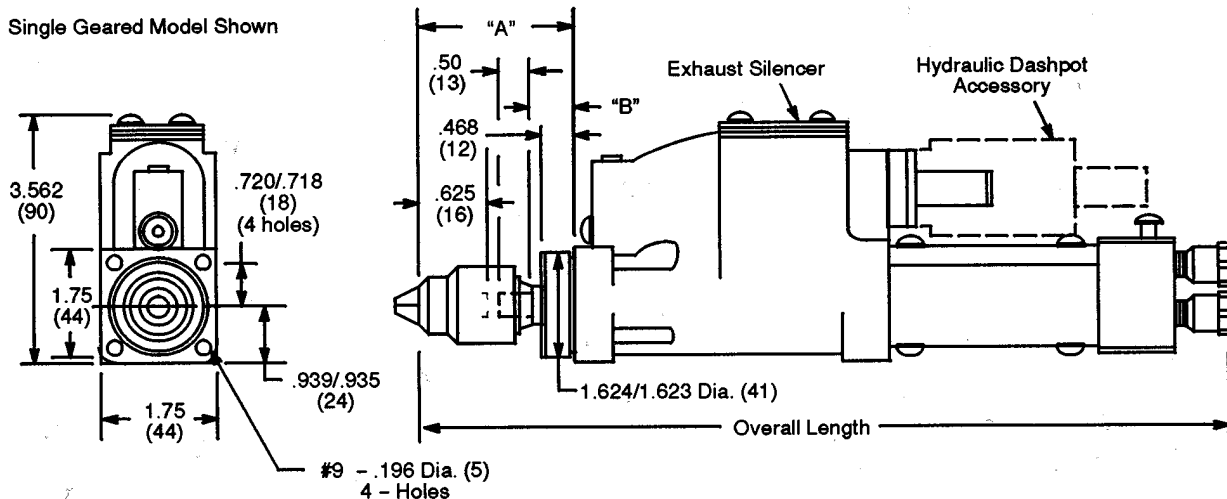
Hydraulic Dashpot: model code "D" page 47  
 Optional Outboard Dashpots: page 47  
 L - Bracket: 1021862  
 Aircraft Noses: page 54  
 Collet Type Chucks: page 48  
 Various 3-Jawed Chucks: page 49



# 21L Series Mounting Dimensions

Designer's full scale dimensional layouts available on request.

Single Geared Model Shown



Free Speed of Tool (RPM)	Overall Length				"A"		"B"	
	Stroke Length							
	1-1/4" (32mm)		2" (51mm)		in.	mm	in.	mm
	in.	mm	in.	mm				
22000	11.50	292	12.13	308	1.92	49	0.62	16
4750	11.69	297	12.44	316	2.19	56	0.62	16
3500	11.69	297	12.44	316	2.19	56	0.62	16
2800	11.69	297	12.44	316	2.19	56	0.62	16
900	12.75	324	13.50	343	3.28	83	1.71	43

# Self-feed Drills

## BUCKEYE®

### 31L Series

- .6 Horsepower
- 200 lbs. Thrust (889 N) @ 90 PSI
- 3" (76mm) Stroke
- Cycle completion signal

### 31L-800 Series Automatic

- Internal rear-head valves
- Automatic retract
- Manual start & retract
- Remote start

### 31L-900 Series Non-Automatic

- Requires external valves for operation
- Independent operation of motor & air piston
- Remote start & retract with external valving



The Dashpot accessory is recommended for drilling metal. To order with a Dashpot, add "D" to the model number after the "L". Example: 31LD-XXX to receive 1024852 - 2" stroke Dashpot.

Models	Free Speed	Nominal Drilling Capacities						Thrust @90PSI		Std. Chuck Capacity		Spindle
		Mild Steel		Alum.		Wood		lb.	N	in.	mm	
		in.	mm	in.	mm	in.	mm					

#### Automatic

31L-800	20000											
31L-801	5000	1/8	3.2	3/16	4.8	1/4	6.4	200	889	3/8	9.5	3/8"-24
31L-802	3000	3/16	4.8	5/16	7.9	3/8	9.5	200	889	3/8	9.5	3/8"-24
31L-803	1850	3/16	4.8	3/8	9.5	1/2	12.7	200	889	3/8	9.5	3/8"-24
31L-805	1100	5/16	7.9	3/8	9.5	5/8	15.9	200	889	3/8	9.5	3/8"-24
31L-806	750	3/8	9.5	3/8	9.5	7/8	22.2	200	889	3/8	9.5	3/8"-24
31L-807	450	3/8	9.5	3/8	9.5	1	25.4	200	889	3/8	9.5	3/8"-24

#### Non-Automatic

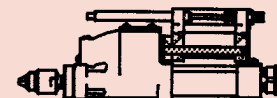
31L-900	20000											
31L-901	5000	1/8	3.2	3/16	4.8	1/4	6.4	200	889	3/8	9.5	3/8"-24
31L-902	3000	3/16	4.8	5/16	7.9	3/8	9.5	200	889	3/8	9.5	3/8"-24
31L-903	1850	3/16	4.8	3/8	9.5	1/2	12.7	200	889	3/8	9.5	3/8"-24
31L-905	1100	5/16	7.9	3/8	9.5	5/8	15.9	200	889	3/8	9.5	3/8"-24
31L-906	750	3/8	9.5	3/8	9.5	7/8	22.2	200	889	3/8	9.5	3/8"-24
31L-907	450	3/8	9.5	3/8	9.5	1	25.4	200	889	3/8	9.5	3/8"-24

#### SPECIFICATIONS:

Recommended Air Pressure:	90 PSI (6.2 bar)
Air Inlet Size:	1/4" N.P.T.
Remote Control Ports:	1/8" N.P.T.
Recommended Hose Size:	3/8" (9.5 mm) I.D.
Offset (side-to-center):	1" (25.4 mm)
Tool Weight (maximum):	9.7 lbs. (4.4 kg)
Optional Chucks:	page 49

#### EXTRA COST ACCESSORIES

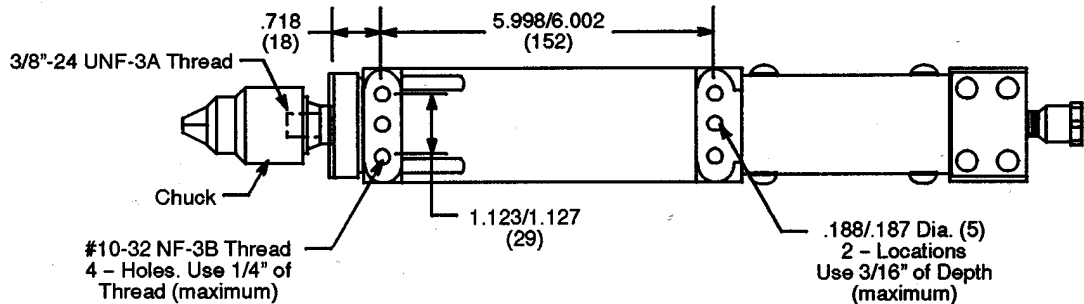
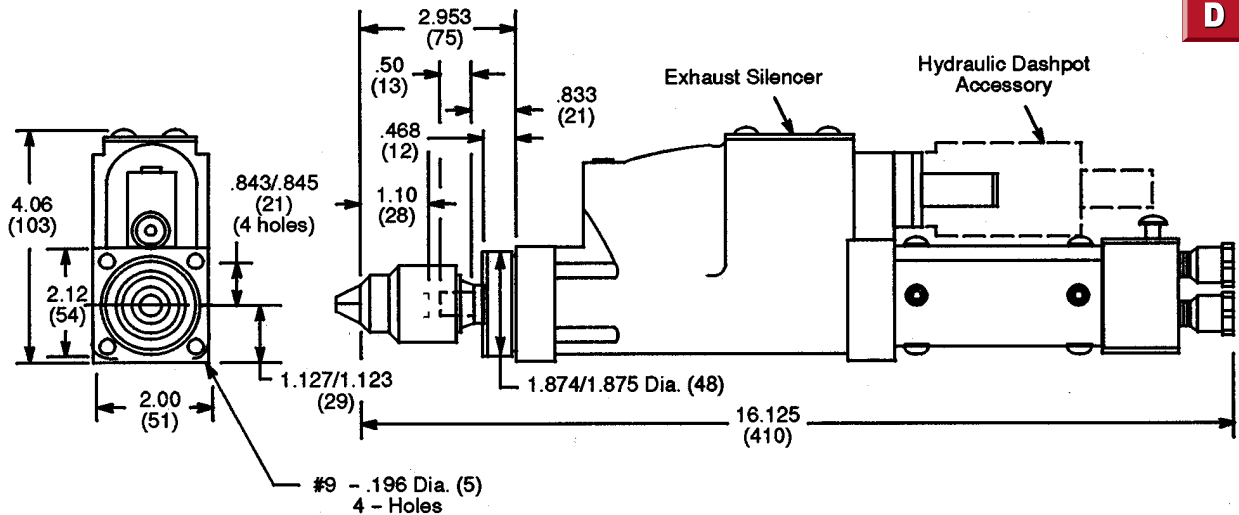
Hydraulic Dashpot: model code "D"	page 47
Optional Outboard Dashpots:	page 47
L - Bracket:	1023793
Aircraft Noses:	page 54
Collet Type Chucks:	page 48
Various 3-Jawed Chucks:	page 49



# 31L Series Mounting Dimensions

Designer's full scale dimensional layouts available on this CD.

**DXF**



# Self-Feed Drills

## BUCKEYE®

### 42L Series

- .9 Horsepower
- 250 lbs. Thrust (1111 N) @ 90 PSI
- 3" (76mm) Stroke
- Cycle completion signal

### 42L-800 Series Automatic

- Internal rear-head valves
- Automatic retract
- Manual start & retract
- Remote start

### 42L-900 Series Non-Automatic

- Requires external valves for operation
- Independent operation of motor & air piston
- Remote start & retract with external valving



The Dashpot accessory is recommended for drilling metal. To order with a Dashpot, add "D" to the model number after the "L". Example: 42LD-XXX to receive 1024852 - 2" stroke Dashpot.

Models	Free Speed	Nominal Drilling Capacities						Thrust @90PSI		Std. Chuck Capacity		Spindle
		Mild Steel		Alum.		Wood		lb.	N	in.	mm	
		in.	mm	in.	mm	in.	mm					
Stroke Length 3" (76mm)	RPM											

#### Automatic

42L-809	9000	1/16	1.6	1/16	1.6	3/32	2.4	250	1111	3/8	9.5	3/8"-24
42L-808	6000	1/8	3.2	1/8	3.2	3/16	4.8	250	1111	3/8	9.5	3/8"-24
42L-801	5000	3/16	4.8	1/4	6.4	1/4	6.4	250	1111	3/8	9.5	3/8"-24
42L-802	3000	1/4	6.4	3/8	9.5	3/8	9.5	250	1111	3/8	9.5	3/8"-24
42L-803	1850	3/8	7.9	3/8	9.5	7/8	22.2	250	1111	3/8	9.5	3/8"-24
42L-805	1100	3/8	9.5	3/8	9.5	1	25.4	250	1111	3/8	9.5	3/8"-24
42L-806	750	3/8	9.5	3/8	9.5	1	25.4	250	1111	3/8	9.5	3/8"-24
42L-807	450	3/8	9.5	3/8	9.5	1	25.4	250	1111	3/8	9.5	3/8"-24

#### Non-Automatic

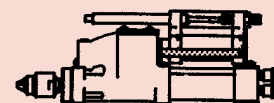
42L-909	9000	1/16	1.6	1/16	1.6	3/32	2.4	250	1111	3/8	9.5	3/8"-24
42L-908	6000	1/8	3.2	1/8	3.2	3/16	4.8	250	1111	3/8	9.5	3/8"-24
42L-901	5000	3/16	4.8	1/4	6.4	1/4	6.4	250	1111	3/8	9.5	3/8"-24
42L-902	3000	1/4	6.4	3/8	9.5	3/8	9.5	250	1111	3/8	9.5	3/8"-24
42L-903	1850	3/8	7.9	3/8	9.5	7/8	22.2	250	1111	3/8	9.5	3/8"-24
42L-905	1100	3/8	9.5	3/8	9.5	1	25.4	250	1111	3/8	9.5	3/8"-24
42L-906	750	3/8	9.5	3/8	9.5	1	25.4	250	1111	3/8	9.5	3/8"-24
42L-907	450	3/8	9.5	3/8	9.5	1	25.4	250	1111	3/8	9.5	3/8"-24

#### SPECIFICATIONS:

Recommended Air Pressure:	90 PSI (6.2 bar)
Air Inlet Size:	1/4" N.P.T.
Remote Control Ports:	1/8" N.P.T.
Recommended Hose Size:	3/8" (9.5 mm) I.D.
Offset (side-to-center):	1" (25.4 mm)
Tool Weight (maximum):	9.6 lbs. (4.4 kg)
Optional Chucks:	page 49

#### EXTRA COST ACCESSORIES

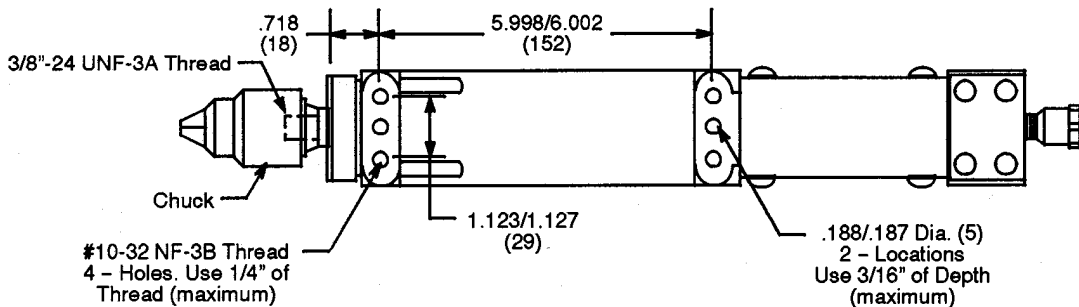
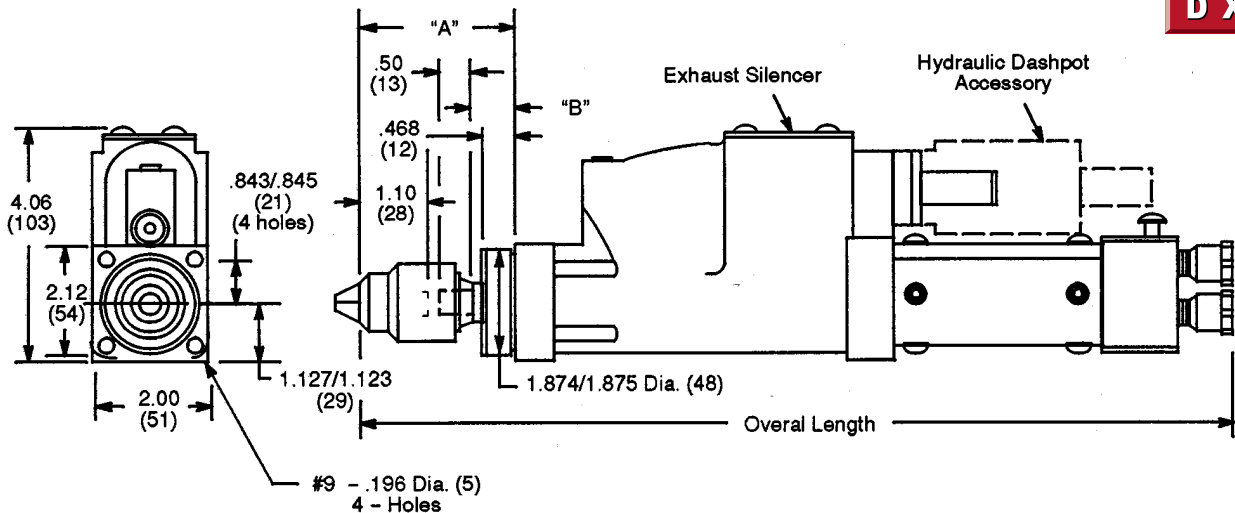
Hydraulic Dashpot: model code "D"	page 47
Optional Outboard Dashpots:	page 47
L - Bracket:	1023793
Aircraft Noses:	page 54
Collet Type Chucks:	page 48
Various 3-Jawed Chucks:	page 49



# 42L Series Mounting Dimensions

Designer's full scale dimensional layouts available on this CD.

**DXF**



Free Speed of Tool (RPM)	Overall Length		"A"		"B"	
	Stroke Length					
	3" (76mm)		in.	mm	in.	mm
	in.	mm	in.	mm	in.	mm
9000	17.06	433	3.97	101	2.43	62
6000	16.12	410	2.95	75	0.76	19
5000	16.12	410	2.95	75	0.76	19
3000	16.12	410	2.95	75	0.76	19
1850	16.12	410	2.95	75	0.76	19
1100	16.62	422	3.45	87	1.26	32
750	16.62	422	3.45	87	1.26	32
450	16.62	422	3.45	87	1.26	32

## BUCKEYE®

### 46L Series

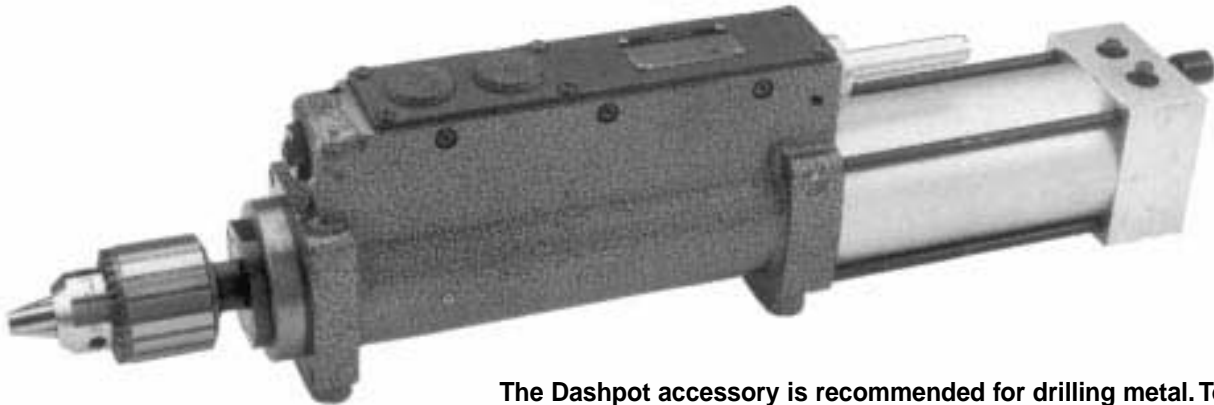
- 1.0 Horsepower
- 440 lbs. Thrust (1956 N) @ 90 PSI
- 4" (102mm) Stroke

### 6L-800 Series Automatic

- Built-in dwell control
- Internal rear-head valves
- Automatic retract
- Manual start & retract
- Remote start
- Cycle completion signal

### 46L-900 Series Non-Automatic

- Requires external valves for operation
- Independent operation of motor & air piston
- Remote start & retract with external valving



The Dashpot accessory is recommended for drilling metal. To order with a Dashpot, add "D" to the model number after the "L". Example: 46LD-XXX to receive 1023636 - 3" stroke Dashpot.

Models Stroke Length 4" (102mm)	Free Speed RPM	Nominal Drilling Capacities						Thrust @90PSI		Std. Chuck Capacity		Spindle
		Mild Steel		Alum.		Wood		lb.	N	in.	mm	
		in.	mm	in.	mm	in.	mm					
<b>Automatic</b>												
46L-801	4400	1/8	3.2	3/16	4.8	-	-	440	1956	1/2	12.7	1/2"-20
46L-802	3250	3/16	4.8	5/16	7.9	-	-	440	1956	1/2	12.7	1/2"-20
46L-803	1800	3/16	4.8	3/8	9.5	-	-	440	1956	1/2	12.7	1/2"-20
46L-805	900	5/16	7.9	3/8	9.5	-	-	440	1956	1/2	12.7	1/2"-20
46L-806	600	3/8	9.5	3/8	9.5	-	-	440	1956	1/2	12.7	1/2"-20
46L-807	430	3/8	9.5	3/8	9.5	-	-	440	1956	1/2	12.7	1/2"-20
46L-808	285	1/2	12.7	5/8	15.9	-	-	440	1956	1/2	12.7	1/2"-20
<b>Non-Automatic</b>												
46L-901	4400	1/8	3.2	3/16	4.8	-	-	440	1956	1/2	12.7	1/2"-20
46L-902	3250	3/16	4.8	5/16	7.9	-	-	440	1956	1/2	12.7	1/2"-20
46L-903	1800	3/16	4.8	3/8	9.5	-	-	440	1956	1/2	12.7	1/2"-20
46L-905	900	5/16	7.9	3/8	9.5	-	-	440	1956	1/2	12.7	1/2"-20
46L-906	600	3/8	9.5	3/8	9.5	-	-	440	1956	1/2	12.7	1/2"-20
46L-907	430	3/8	9.5	3/8	9.5	-	-	440	1956	1/2	12.7	1/2"-20
46L-908	285	1/2	12.7	5/8	15.9	-	-	440	1956	1/2	12.7	1/2"-20

#### SPECIFICATIONS:

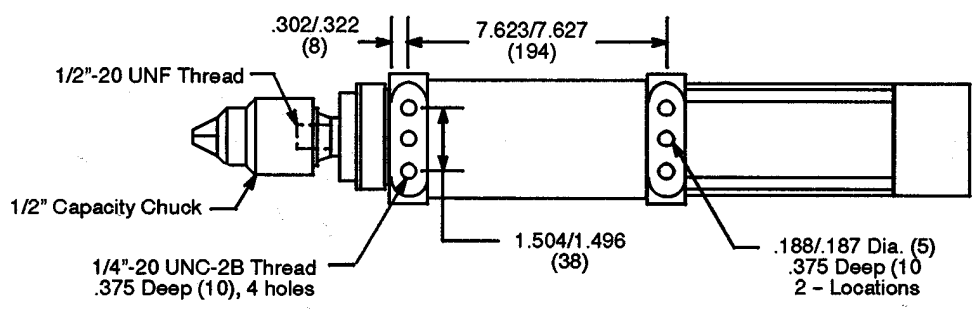
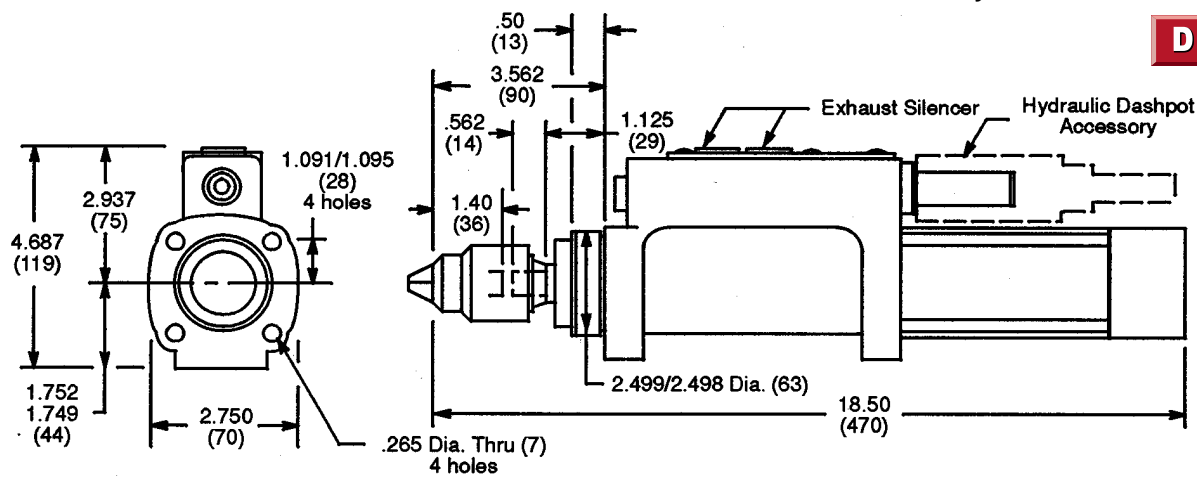
Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 3/8" N.P.T.  
 Remote Control Ports: 1/8" N.P.T.  
 Recommended Hose Size: 1/2" (12.7 mm) I.D.  
 Offset (side-to-center): 1-3/8" (35 mm)  
 Tool Weight (maximum): 23 lbs. (10.4 kg)  
 Optional Chucks: page 49

#### EXTRA COST ACCESSORIES

Hydraulic Dashpot: model code "D" page 47  
 L - Bracket: 1024262  
 Aircraft Noses: page 54  
 Collet Type Chucks: page 48  
 Various 3-Jawed Chucks: page 49

# 46L Series Mounting Dimensions

Designer's full scale dimensional layouts available on this CD.





# Self-Feed Offset Drills

## BUCKEYE®

### 21LH Series

- .4 Horsepower
- 130 lbs. Thrust (578 N) @ 90 PSI
- 2" (51mm) Stroke
- Offset head with 1" (25mm) minimum drill center potential with adjacent units
- Cycle completion signal

### 21LH-800 Series Automatic

- Internal rear-head valves
- Automatic retract
- Manual start & retract
- Remote start

### 21LH-900 Series Non-Automatic

- Requires external valves for operation
- Independent operation of motor & air piston
- Remote start & retract with external valving



The Dashpot accessory is recommended for drilling metal. To order with a Dashpot, add "D" to the model number after the "L". Example: 21LDH-XXX to receive 1024850 - 1" stroke Dashpot.

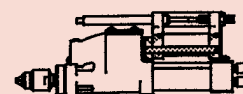
Models Stroke Length 2" (51mm)	Free Speed RPM	Nominal Drilling Capacities						Thrust @90PSI		Std. Chuck Capacity		Spindle
		Mild Steel		Alum.		Wood		lb.	N	in.	mm	
		in.	mm	in.	mm	in.	mm					
<b>Automatic</b>												
21LH-801	4750	1/8	3.2	3/16	4.8	3/16	4.8	130	578	1/4	6.4	3/8"-24
21LH-802	3500	5/32	4.0	7/32	5.6	1/4	6.4	130	578	1/4	6.4	3/8"-24
21LH-803	2800	3/16	4.8	1/4	6.4	5/16	7.9	130	578	1/4	6.4	3/8"-24
21LH-805	900	1/4	6.4	1/4	6.4	1/2	12.7	130	578	1/4	6.4	3/8"-24
<b>Non-Automatic</b>												
21LH-901	4750	1/8	3.2	3/16	4.8	3/16	4.8	130	578	1/4	6.4	3/8"-2
21LH-902	3500	5/32	4.0	7/32	5.6	1/4	6.4	130	578	1/4	6.4	3/8"-24
21LH-903	2800	3/16	4.8	1/4	6.4	5/16	7.9	130	578	1/4	6.4	3/8"-2
21LH-905	900	1/4	6.4	1/4	6.4	1/2	12.7	130	578	1/4	6.4	3/8"-2

#### SPECIFICATIONS:

Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 1/4" N.P.T.  
 Remote Control Ports: 1/8" N.P.T.  
 Recommended Hose Size: 3/8" (9.5 mm) I.D.  
 Tool Weight (maximum): 11.25 lbs. (5.1 kg)  
 Optional Chucks: page 49

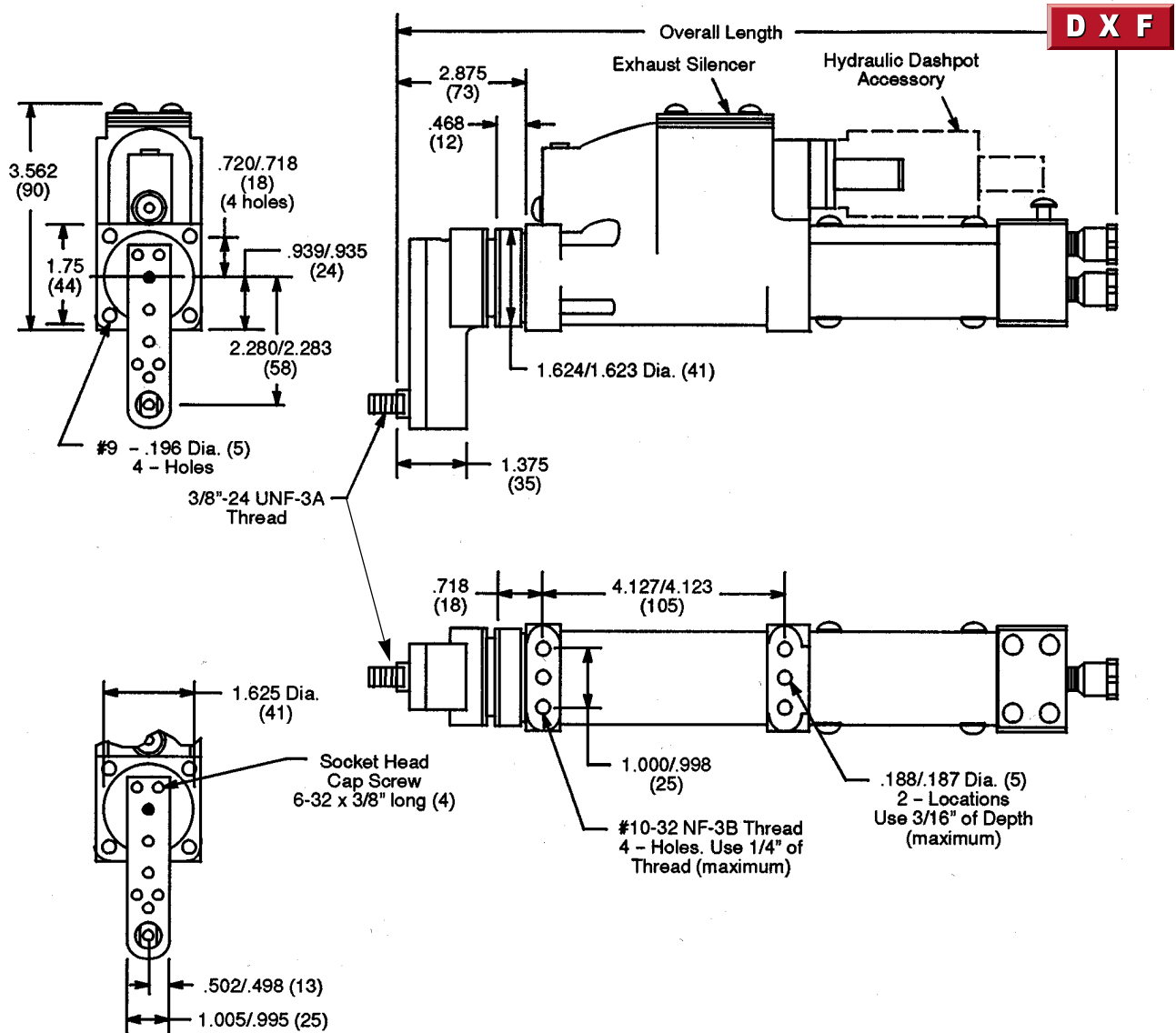
#### EXTRA COST ACCESSORIES

Hydraulic Dashpot: model code "D" page 47  
 Optional Outboard Dashpots: page 47  
 L - Bracket: 1021862  
 Aircraft Noses: page 54  
 Collet Type Chucks: page 48  
 Various 3-Jawed Chucks: page 49



# 21LH Series Mounting Dimensions

Designer's full scale dimensional layouts available on this CD.



# Self-Feed Offset Drills

## BUCKEYE®

### 31LH Series

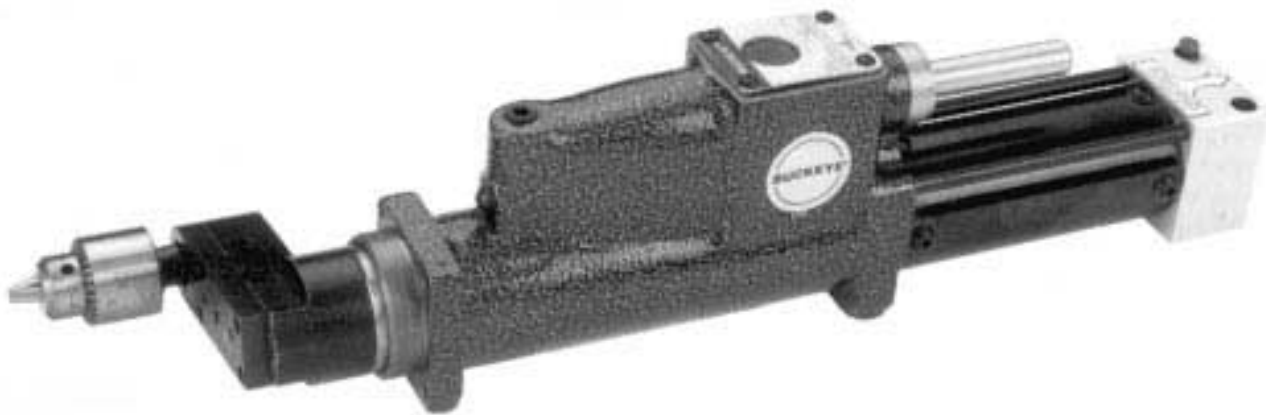
- .6 Horsepower
- 200 lbs. Thrust (889 N) @ 90 PSI
- 3" (76mm) Stroke
- Offset head with 1" (25mm) minimum drill center potential with adjacent units.
- Cycle completion signal

### 31LH-800 Series Automatic

- Internal rear-head valves
- Automatic retract
- Manual start & retract
- Remote start

### 31LH-900 Series Non-Automatic

- Requires external valves for operation
- Independent operation of motor & air piston
- Remote start & retract with external valving



The Dashpot accessory is recommended for drilling metal. To order with a Dashpot, add "D" to the model number after the "L". Example: 31LD-XXX to receive 1024852 - 2" stroke Dashpot.

Models	Free Speed	Nominal Drilling Capacities						Thrust @90PSI		Std. Chuck Capacity		Spindle
		Mild Steel		Alum.		Wood		lb.	N	in.	mm	
		in.	mm	in.	mm	in.	mm					
Stroke Length	RPM											
3" (76mm)												
<b>Automatic</b>												
31LH-801	5000	1/8	3.2	3/16	4.8	1/4	6.4	200	889	3/8	9.5	3/8"-24
31LH-802	3000	3/16	4.8	5/16	7.9	3/8	9.5	200	889	3/8	9.5	3/8"-24
31LH-803	1850	3/16	4.8	3/8	9.5	1/2	12.7	200	889	3/8	9.5	3/8"-24
31LH-805	1100	5/16	7.9	3/8	9.5	5/8	15.9	200	889	3/8	9.5	3/8"-24
31LH-806	750	3/8	9.5	3/8	9.5	7/8	22.2	200	889	3/8	9.5	3/8"-24
31LH-807	450	3/8	9.5	3/8	9.5	1	25.4	200	889	3/8	9.5	3/8"-24
<b>Non-Automatic</b>												
31LH-901	5000	1/8	3.2	3/16	4.8	1/4	6.4	200	889	3/8	9.5	3/8"-24
31LH-902	3000	3/16	4.8	5/16	7.9	3/8	9.5	200	889	3/8	9.5	3/8"-24
31LH-903	1850	3/16	4.8	3/8	9.5	1/2	12.7	200	889	3/8	9.5	3/8"-24
31LH-905	1100	5/16	7.9	3/8	9.5	5/8	15.9	200	889	3/8	9.5	3/8"-24
31LH-906	750	3/8	9.5	3/8	9.5	7/8	22.2	200	889	3/8	9.5	3/8"-24
31LH-907	450	3/8	9.5	3/8	9.5	1	25.4	200	889	3/8	9.5	3/8"-24

#### SPECIFICATIONS:

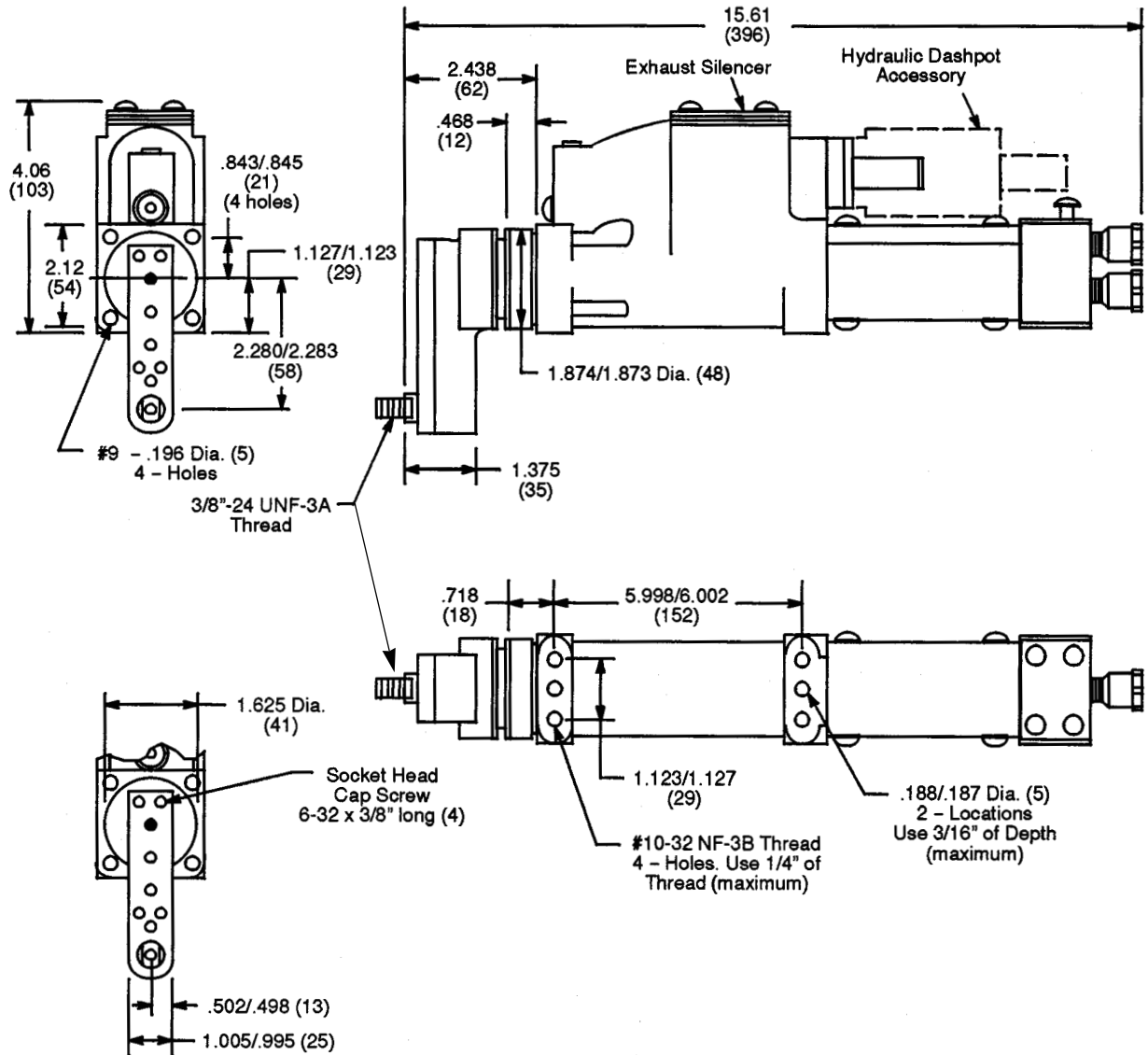
Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 1/4" N.P.T.  
 Remote Control Ports: 1/8" N.P.T.  
 Recommended Hose Size: 3/8" (9.5 mm) I.D.  
 Tool Weight (maximum): 11.25 lbs. (5.1 kg)  
 Optional Chucks: page 49

#### EXTRA COST ACCESSORIES

Hydraulic Dashpot: model code "D" page 47  
 L - Bracket: 1023793  
 Aircraft Noses: page 54  
 Collet Type Chucks: page 48  
 Various 3-Jawed Chucks: page 49

# 31LP Series Mounting Dimensions

Designer's full scale dimensional layouts available on request.



# Self-Feed Tappers

## BUCKEYE®

### 21L Series

- .4 Horsepower
- 130 lbs. Thrust (578 N) @ 90 PSI
- 2" (51mm) Stroke
- 1/4" (6.4mm) Tap capacity

### 31L Series

- .6 Horsepower
- 200 lbs. Thrust (889 N) @ 90 PSI
- 3" (76mm) Stroke
- 3/8" (9.5mm) Tap capacity

### 46L Series

- 1.0 Horsepower
- 440 lbs. Thrust (1956 N) @ 90 PSI
- 4" (76mm) Stroke
- 5/8" (16mm) Tap capacity



The Dashpot accessory is recommended for tapping metal. To order with a Dashpot, add "D" to the model number after the "L". Example: 21LD-XXX. 31LD-XXX or 46LD-XXX.

Model	Speed RPM	Tap Range		Length		Weight		Thrust		Spindle	Offset (Side to Center)	
		in.	mm	in.	mm	lbs.	Kg	lbs.	N		in.	mm
<b>21 Series Self-Feed Tapper</b>												
21L-815	900	#0-1/4	#0-6.4	15.4	391	6.3	2.9	130	578	3/8"-24	1.00	25
<b>31 Series Self-Feed Tappers</b>												
31L-815	1100	1/4-3/8	6.4-9.5	20.3	517	11.0	5.0	200	889	3/8"-24	1.38	35
31L-816	750	1/4-3/8	6.4-9.5	20.3	517	11.0	5.0	200	889	3/8"-24	1.38	35
31L-817	450	1/4-3/8	6.4-9.5	20.3	517	11.0	5.0	200	889	3/8"-24	1.38	35
<b>46 Series Self-Feed Tappers</b>												
46L-815	900	1/2-5/8	13-16	24.0	610	26.5	12.0	440	1956	1/2"-20	1.38	35
46L-816	600	1/2-5/8	13-16	24.0	610	26.5	12.0	440	1956	1/2"-20	1.38	35
46L-817	430	1/2-5/8	13-16	24.0	610	26.5	12.0	440	1956	1/2"-20	1.38	35
46L-818	285	1/2-5/8	13-16	24.0	610	26.5	12.0	440	1956	1/2"-20	1.38	35j22

#### SPECIFICATIONS:

Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size (21L & 31L): 1/4" N.P.T.  
 Air Inlet Size (46L): 3/8" N.P.T.  
 Remot Control Ports: 1/8" N.P.T.  
 Recommended Hose Size: 1/2" I.D. (12.7mm)

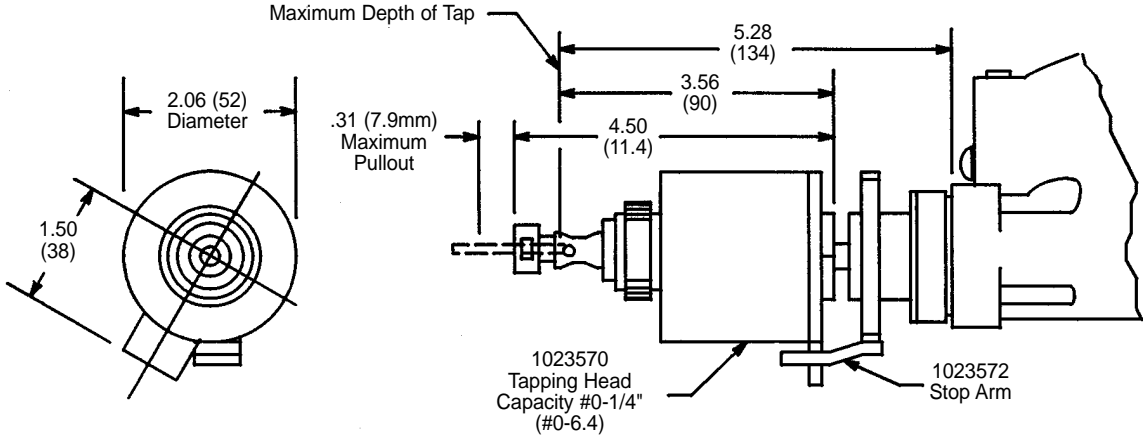
#### EXTRA COST ACCESSORIES

1" (25mm) Stroke Dashpot (21L): 1024850  
 2" (51mm) Stroke Dashpot (21L): 1024851  
 2" (51mm) Stroke Dashpot (31L): 1024852  
 3" (76mm) Stroke Dashpot (46L): 1023636

**Mounting Dimensions**  
 Designer's full scale dimensional layouts available on request.

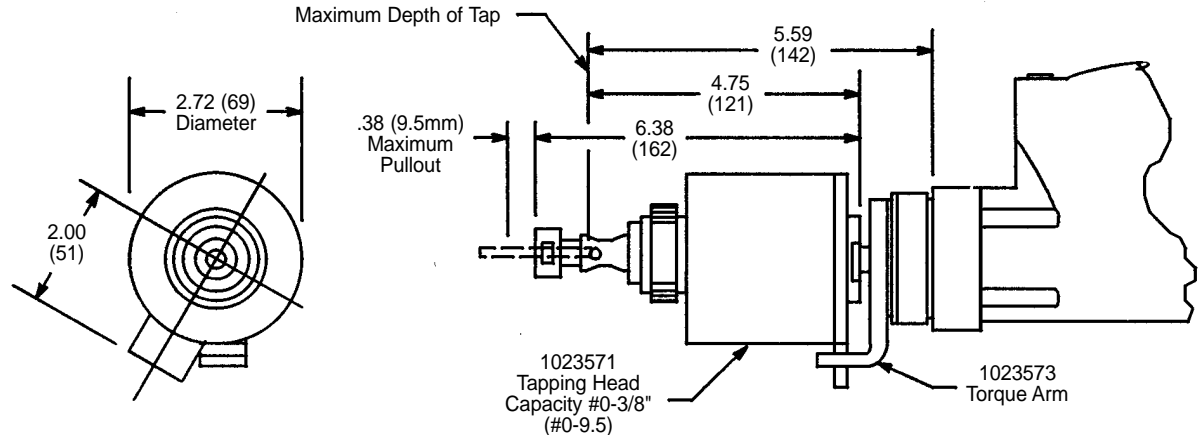
**21L Series**

For tool dimensions, refer to page 9. These dimensions are with pullout adjustment set at maximum.



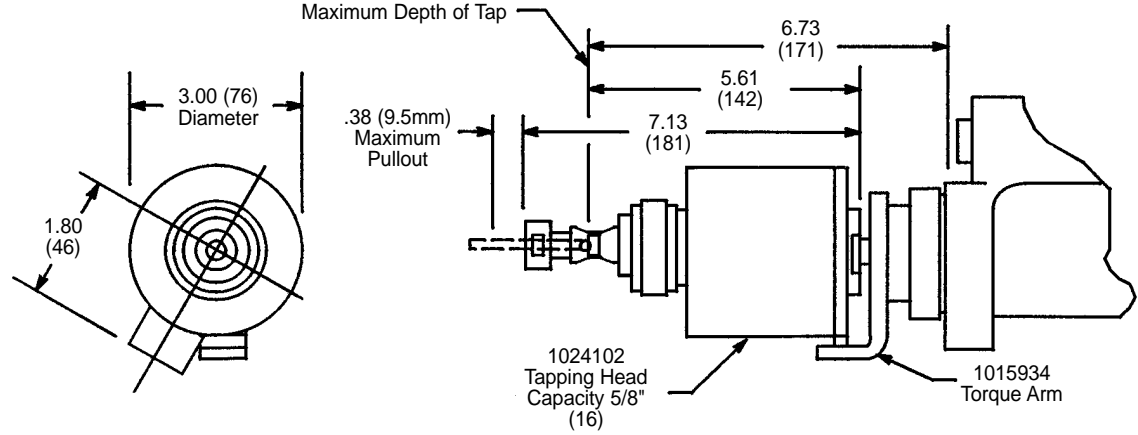
**31L Series**

For tool dimensions, refer to page 11. These dimensions are with pullout adjustment set at maximum.



**46L Series**

For tool dimensions, refer to page 15. These dimensions are with pullout adjustment set at maximum.



# Self-Feed Pistol Grip Drills

## BUCKEYE®

### 21LP Series

- .4 Horsepower
- 130 lbs. Thrust (578 N) @ 90 PSI
- 1-1/4" (32mm) & 2" (51mm) Stroke
- Cycle completion signal
- Light weight aluminum housing
- Pistol Grip operation
- Trigger start
- Automatic retract



\*Does not include nosepiece.

To order with a Dashpot, add "D" to the model number after the "L". Example: 21LDP-XXX to receive 1024850 - 1" stroke Dashpot.

Models		Free Speed RPM	Nominal Drilling Capacities						Thrust @90PSI		Std. Chuck Capacity		Spindle
Stroke Length			Mild Steel		Alum.		Wood		lb.	N	in.	mm	
1-1/4" (32mm)	2" (51mm)		in.	mm	in.	mm	in.	mm					
21LP-870	21LP-800	22000	-	-	3/32	2.4	-	-	130	578	5/32	4.0	#0 JT
21LP-871	21LP-801	4750	1/8	3.2	3/16	4.8	3/16	4.8	130	578	1/4	6.4	3/8"-24
21LP-872	21LP-802	3500	5/32	4.0	7/32	5.6	1/4	6.4	130	578	1/4	6.4	3/8"-24
21LP-873	21LP-803	2800	3/16	4.8	1/4	6.4	5/16	7.9	130	578	1/4	6.4	3/8"-24
21LP-875	21LP-805	900	1/4	6.4	1/4	6.4	1/2	12.7	130	578	1/4	6.4	3/8"-24

#### SPECIFICATIONS:

Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 1/4" N.P.T.  
 Recommended Hose Size: 3/8" (9.5 mm) I.D.  
 Tool Weight (nominal): 5.7 lbs. (2.6 kg)  
 Optional Chucks: page 49

#### EXTRA COST ACCESSORIES

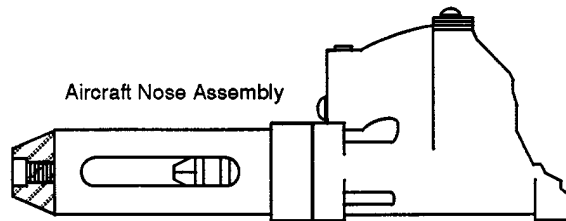
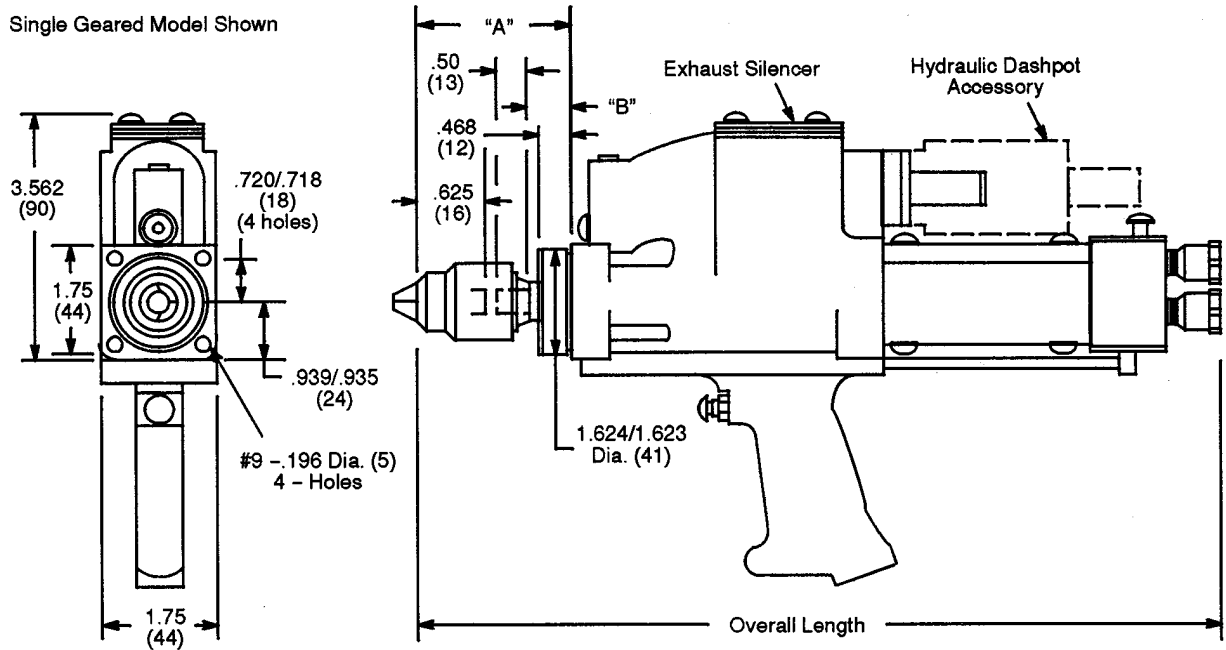
Hydraulic Dashpot: model code "D" page 47  
 L - Bracket: 1021862  
 Aircraft Noses: page 54  
 Collet Type Chucks: page 48  
 Various 3-Jawed Chucks: page 49

# 21LP Series

## Mounting Dimensions

Designer's full scale dimensional layouts available on request.

Single Geared Model Shown



Refer to page 54 for Aircraft Nose Assemblies.

Free Speed of Tool (RPM)	Overall Length				"A"		"B"	
	Stroke Length							
	1-1/4" (32mm)		2" (51mm)		in.	mm	in.	mm
	in.	mm	in.	mm				
22000	11.50	292	12.13	308	1.92	49	0.62	16
4750	11.69	297	12.44	316	2.19	56	0.62	16
3500	11.69	297	12.44	316	2.19	56	0.62	16
2800	11.69	297	12.44	316	2.19	56	0.62	16
900	12.75	324	13.50	343	3.28	83	1.71	43



# Self-Feed Pistol Grip Drills

## BUCKEYE®

### 31LP Series

- .6 Horsepower
- 200 lbs. Thrust (889 N) @ 90 PSI
- 3" (76mm) Stroke
- Cycle completion signal
- Light weight aluminum housing
- Pistol Grip operation
- Trigger start
- Automatic retract



\*Does not include nosepiece.

To order with a Dashpot, add "D" to the model number after the "L". Example: 31LDP-XXX to receive 1024852 - 2" stroke Dashpot.

Models	Free Speed	Nominal Drilling Capacities						Thrust @90PSI		Std. Chuck Capacity		Spindle
		Mild Steel		Alum.		Wood		lb.	N	in.	mm	
		in.	mm	in.	mm	in.	mm					
31LP-801	5000	1/8	3.2	3/16	4.8	1/4	6.4	200	889	3/8	9.5	3/8"-24
31LP-802	3000	3/16	4.8	5/16	7.9	3/8	9.5	200	889	3/8	9.5	3/8"-24
31LP-803	1850	3/16	4.8	3/8	9.5	1/2	12.7	200	889	3/8	9.5	3/8"-24
31LP-805	1100	5/16	7.9	3/8	9.5	5/8	15.9	200	889	3/8	9.5	3/8"-24
31LP-806	750	3/8	9.5	3/8	9.5	7/8	22.2	200	889	3/8	9.5	3/8"-24
31LP-807	450	3/8	9.5	3/8	9.5	1	25.4	200	889	3/8	9.5	3/8"-24

#### SPECIFICATIONS:

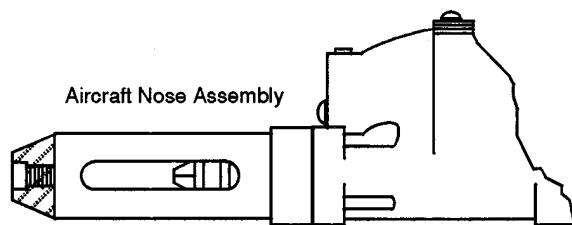
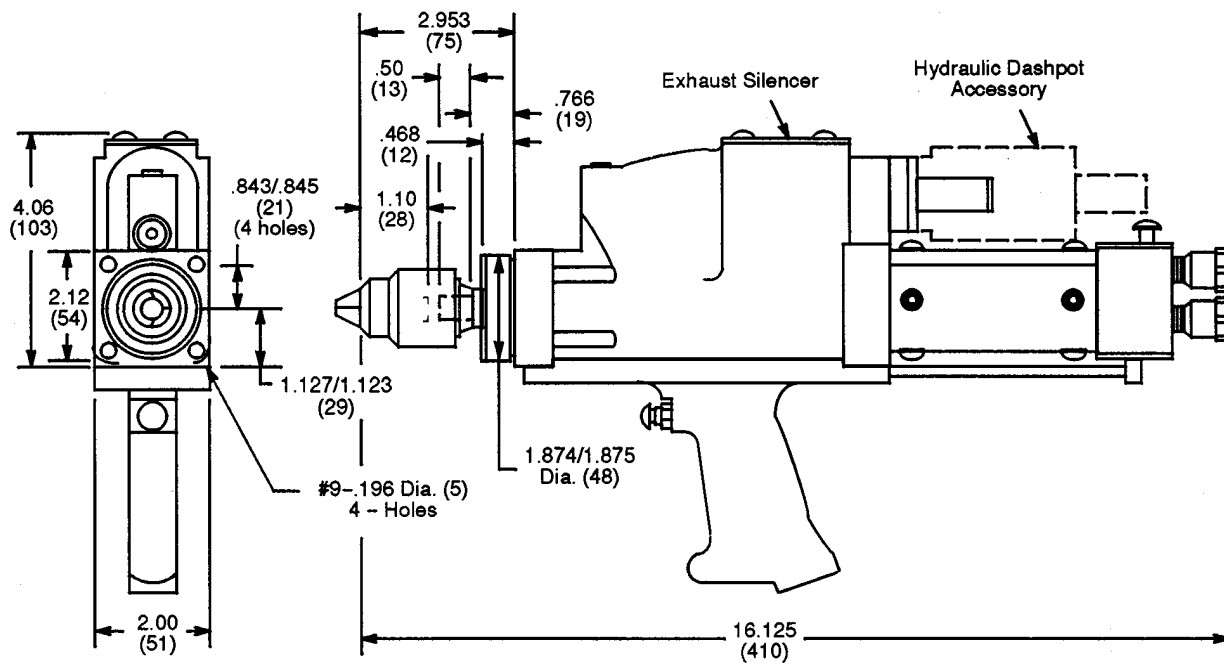
Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 1/4" N.P.T.  
 Recommended Hose Size: 3/8" (9.5 mm) I.D.  
 Tool Weight (maximum): 8.5 lbs. (3.9 kg)  
 Optional Chucks: page 49

#### EXTRA COST ACCESSORIES

Hydraulic Dashpot: model code "D" page 47  
 L - Bracket: 1023793 page 54  
 Aircraft Noses: page 54  
 Collet Type Chucks: page 48  
 Various 3-Jawed Chucks: page 49

# 31LP Series Mounting Dimensions

Designer's full scale dimensional layouts available on this CD.



Refer to page 54 for Aircraft Nose Assemblies.

# Self-Feed Pistol Grip Drills

## BUCKEYE®

### 42LP Series

- .9 Horsepower
- 250 lbs. Thrust (1111 N) @ 90 PSI
- 3" (76mm) Stroke
- Cycle completion signal
- Light weight aluminum housing
- Pistol Grip operation
- Trigger start
- Automatic retract



\*Does not include nosepiece.

To order with a Dashpot, add "D" to the model number after the "L". Example: 42LDP-XXX to receive 1024852 - 2" stroke Dashpot.

Models Stroke Length 3" (76mm)	Free Speed RPM	Nominal Drilling Capacities						Thrust @90PSI		Std. Chuck Capacity		Spindle
		Mild Steel		Alum.		Wood		lb.	N	in.	mm	
		in.	mm	in.	mm	in.	mm					
42LP-809	9000	1/16	1.6	1/16	1.6	3/32	2.4	250	1111	3/8	9.5	3/8"-24
42LP-808	6000	1/8	3.2	1/8	3.2	3/16	4.8	250	1111	3/8	9.5	3/8"-24
42LP-801	5000	3/16	4.8	1/4	6.4	1/4	6.4	250	1111	3/8	9.5	3/8"-24
42LP-802	3000	1/4	6.4	3/8	9.5	3/8	9.5	250	1111	3/8	9.5	3/8"-24
42LP-803	1850	3/8	7.9	3/8	9.5	7/8	22.2	250	1111	3/8	9.5	3/8"-24
42LP-805	1100	3/8	9.5	3/8	9.5	1	25.4	250	1111	3/8	9.5	3/8"-24
42LP-806	750	3/8	9.5	3/8	9.5	1	25.4	250	1111	3/8	9.5	3/8"-24
42LP-807	450	3/8	9.5	3/8	9.5	1	25.4	250	1111	3/8	9.5	3/8"-24

#### SPECIFICATIONS:

Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 1/4" N.P.T.  
 Recommended Hose Size: 3/8" (9.5 mm) I.D.  
 Tool Weight (maximum): 10.8 lbs. (4.9 kg)  
 Optional Chucks: page 49

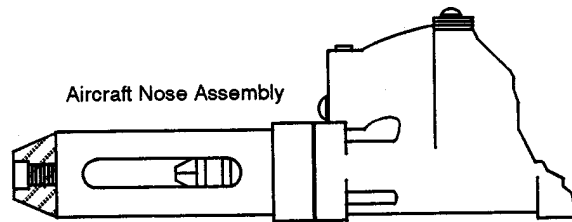
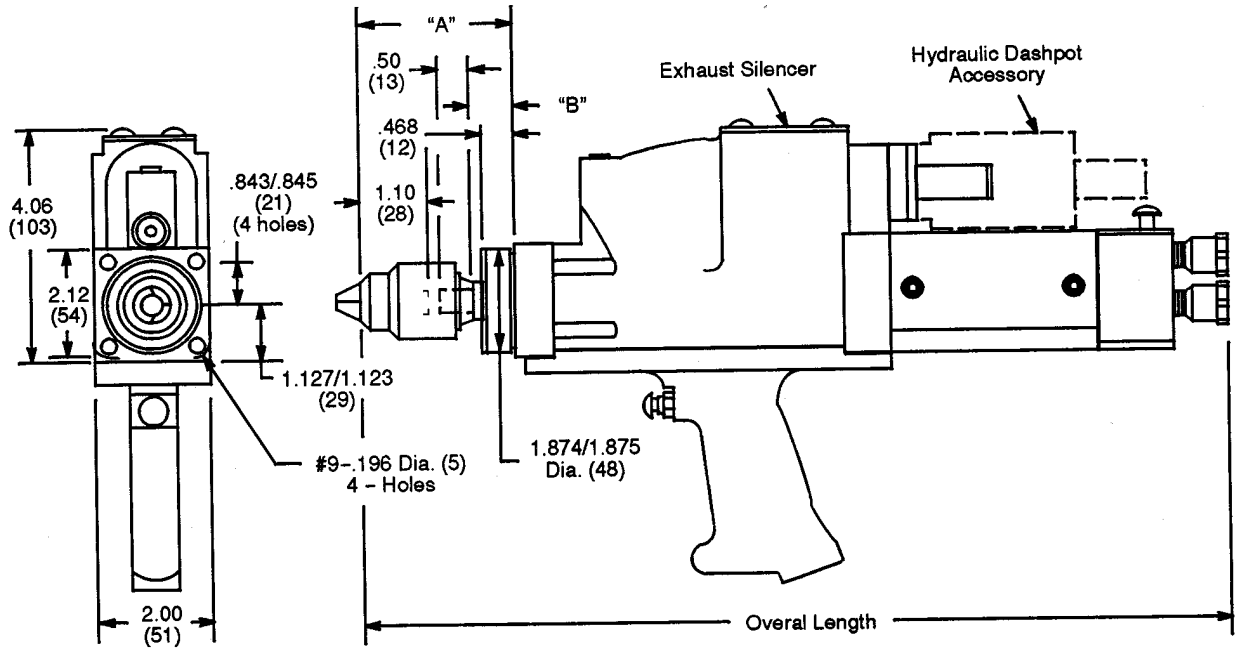
#### EXTRA COST ACCESSORIES

Hydraulic Dashpot: model code "D" page 47  
 L - Bracket: 1023793  
 Aircraft Noses: page 54  
 Collet Type Chucks: page 48  
 Various 3-Jawed Chucks: page 49

# 42LP Series Mounting Dimensions

Designer's full scale dimensional layouts available on this CD.

**D X F**



Refer to page 54 for Aircraft Nose Assemblies.

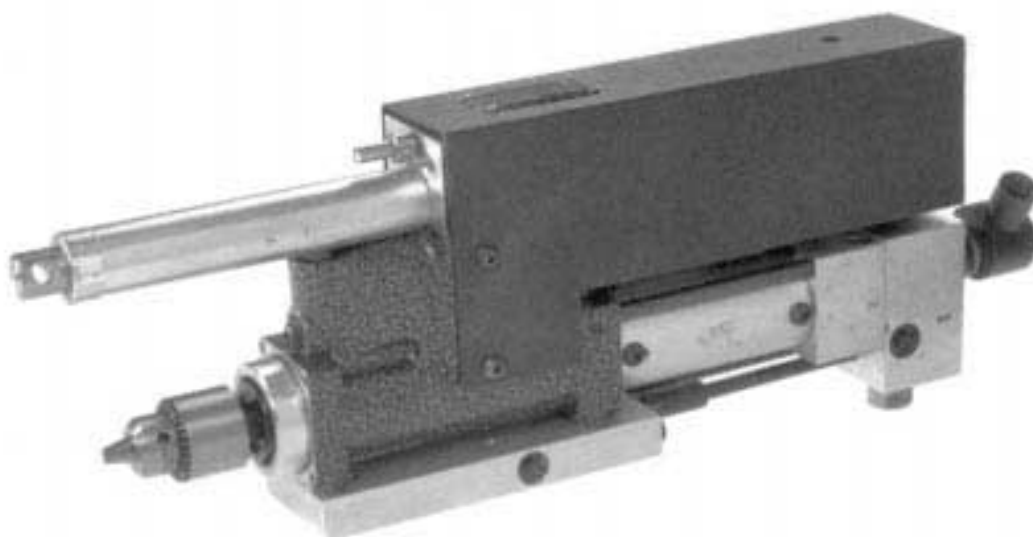
Free Speed of Tool (RPM)	Overall Length		"A"		"B"	
	Stroke Length					
	3" (76mm)		in.	mm	in.	mm
	in.	mm	in.	mm	in.	mm
9000	17.06	433	3.97	101	2.43	62
6000	16.12	410	2.95	75	0.76	19
5000	16.12	410	2.95	75	0.76	19
3000	16.12	410	2.95	75	0.76	19
1850	16.12	410	2.95	75	0.76	19
1100	16.62	422	3.45	87	1.26	32
750	16.62	422	3.45	87	1.26	32
450	16.62	422	3.45	87	1.26	32

# Self-Feed Peck Drills

## BUCKEYE®

### 21LD Series

- .4 Horsepower
- 130 lbs. Thrust (578 N) @ 90 PSI
- 2" (51mm) Stroke
- Light weight aluminum housing
- Automatic setback control
- Tamper-proof frequency control
- 2" (51mm) Stroke Dashpot



To order with a Pistol Grip handle, add "P" to the model number after the "D". Example: 21LDP-XXX.

Models	Free Speed	Nominal Drilling Capacities						Thrust @90PSI		Std. Chuck Capacity		Spindle
		Mild Steel		Alum.		Wood		lb.	N	in.	mm	
		in.	mm	in.	mm	in.	mm					
21LD-850	22000	–	–	3/32	2.4	–	–	130	578	5/32	4.0	#0 JT
21LD-851	4750	1/8	3.2	3/16	4.8	3/16	4.8	130	578	1/4	6.4	3/8"-24
21LD-852	3500	5/32	4.0	7/32	5.6	1/4	6.4	130	578	1/4	6.4	3/8"-24
21LD-853	2800	3/16	4.8	1/4	6.4	5/16	7.9	130	578	1/4	6.4	3/8"-24
21LD-855	900	1/4	6.4	1/4	6.4	1/2	12.7	130	578	1/4	6.4	3/8"-24

#### SPECIFICATIONS:

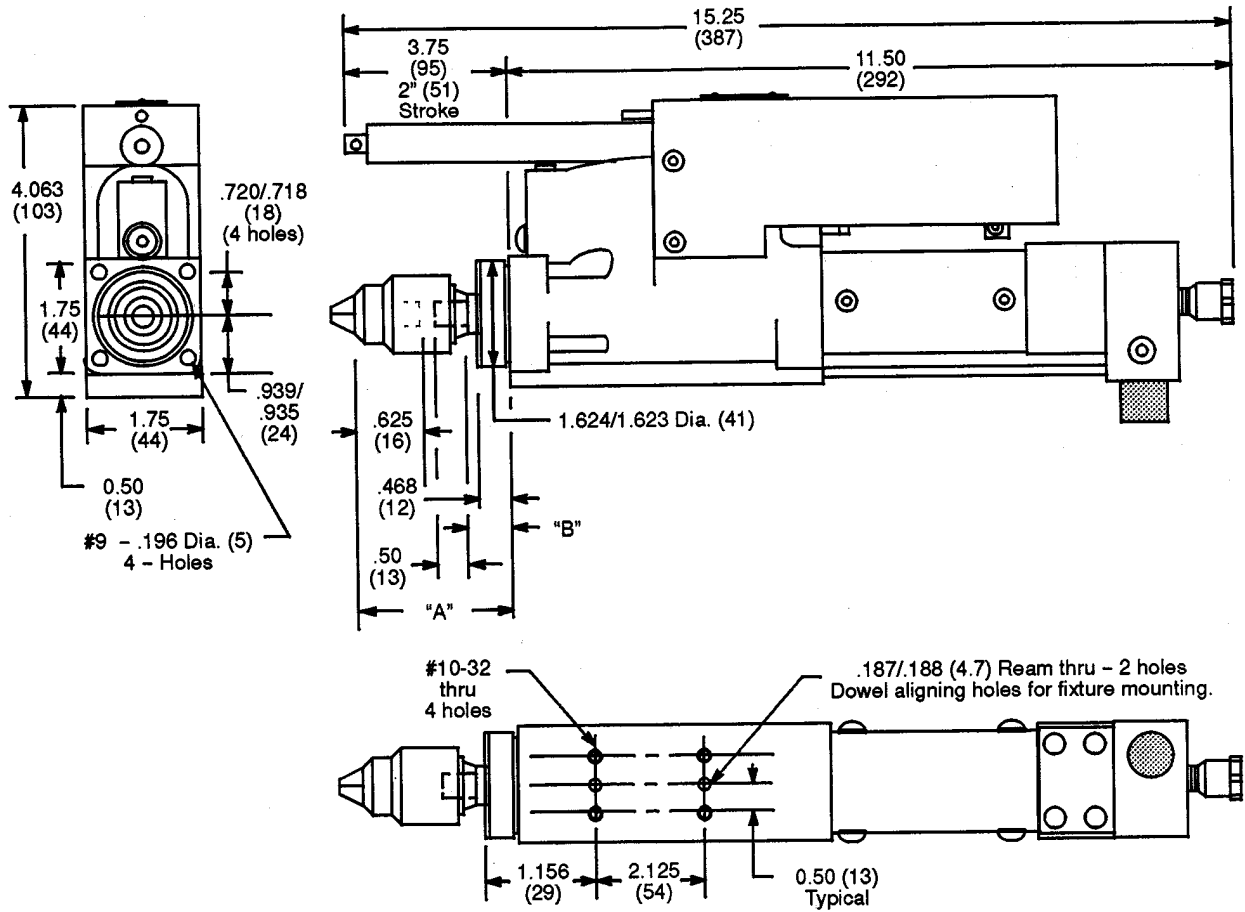
Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 1/4" N.P.T.  
 Recommended Hose Size: 3/8" (9.5 mm) I.D.  
 Tool Weight (nominal): 5.7 lbs. (2.6 kg)  
 Optional Chucks: page 49

#### EXTRA COST ACCESSORIES

Aircraft Noses: page 54  
 Collet Type Chucks: page 48  
 Various 3-Jawed Chucks: page 49

# 21LD Series Mounting Dimensions

Designer's full scale dimensional layouts available on request.



Free Speed of Tool (RPM)	"A"		"B"	
	in.	mm	in.	mm
22000	1.92	49	0.62	16
4750	2.19	56	0.62	16
3500	2.19	56	0.62	16
2800	2.19	56	0.62	16
900	3.28	83	1.71	43

# Self-Feed Peck Drills

## BUCKEYE®

### 31LD Series

- .6 Horsepower
- 200 lbs. Thrust (889 N) @ 90 PSI
- 3" (76mm) Stroke
- Light weight aluminum housing
- Automatic setback control
- Tamper-proof frequency control
- 3" (76mm) Stroke Dashpot



To order with a Pistol Grip handle, add "P" to the model number after the "D". Example: 31LDP-XXX.

Models Stroke Length 3" (76mm)	Free Speed RPM	Nominal Drilling Capacities						Thrust @90PSI		Std. Chuck Capacity		Spindle
		Mild Steel		Alum.		Wood		lb.	N	in.	mm	
		in.	mm	in.	mm	in.	mm					
31LD-851	5000	1/8	3.2	3/16	4.8	1/4	6.4	200	889	3/8	9.5	3/8"-24
31LD-852	3000	3/16	4.8	5/16	7.9	3/8	9.5	200	889	3/8	9.5	3/8"-24
31LD-853	1850	3/16	4.8	3/8	9.5	1/2	12.7	200	889	3/8	9.5	3/8"-24
31LD-855	1100	5/16	7.9	3/8	9.5	5/8	15.9	200	889	3/8	9.5	3/8"-24
31LD-856	750	3/8	9.5	3/8	9.5	7/8	22.2	200	889	3/8	9.5	3/8"-24
31LD-857450	3/8	9.5	3/8	9.5	1	25.4		200	889	3/8	9.5	3/8"-24

#### SPECIFICATIONS:

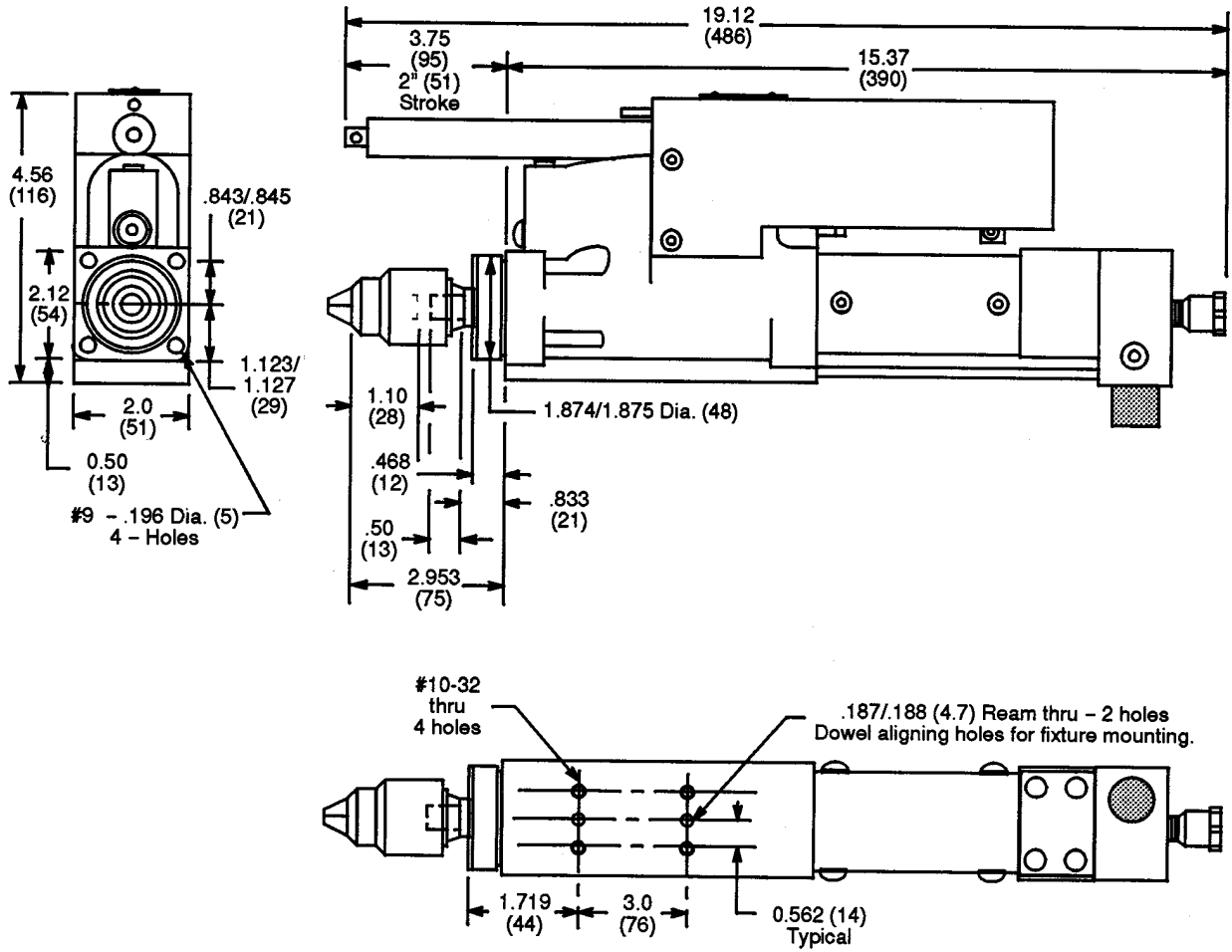
Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 1/4" N.P.T.  
 Recommended Hose Size: 3/8" (9.5 mm) I.D.  
 Tool Weight (maximum): 11.0 lbs. (5.0 kg)  
 Optional Chucks: page 49

#### EXTRA COST ACCESSORIES

Aircraft Noses: page 54  
 Collet Type Chucks: page 48  
 Various 3-Jawed Chucks: page 49

# 31LD Series Mounting Dimensions

Designer's full scale dimensional layouts available on request.





# Self-Feed Peck Drills

## BUCKEYE®

### 42LD Series

- .9 Horsepower
- 250 lbs. Thrust (1111 N) @ 90 PSI
- 3" (76mm) Stroke
- Light weight aluminum housing
- Automatic setback control
- Tamper-proof frequency control
- 3" (76mm) Stroke Dashpot



To order with a Pistol Grip handle, add "P" to the model number after the "D". Example: 42LDP-XXX.

Models Stroke Length 3" (76mm)	Free Speed RPM	Nominal Drilling Capacities						Thrust @90PSI		Std. Chuck Capacity		Spindle
		Mild Steel		Alum.		Wood		lb.	N	in.	mm	
		in.	mm	in.	mm	in.	mm					
42LD-859	9000	1/16	1.6	1/16	1.6	3/32	2.4	250	1111	3/8	9.5	3/8"-24
42LD-858	6000	1/8	3.2	1/8	3.2	3/16	4.8	250	1111	3/8	9.5	3/8"-24
42LD-851	5000	3/16	4.8	1/4	6.4	1/4	6.4	250	1111	3/8	9.5	3/8"-24
42LD-852	3000	1/4	6.4	3/8	9.5	3/8	9.5	250	1111	3/8	9.5	3/8"-24
42LD-853	1850	3/8	7.9	3/8	9.5	7/8	22.2	250	1111	3/8	9.5	3/8"-24
42LD-855	1100	3/8	9.5	3/8	9.5	1	25.4	250	1111	3/8	9.5	3/8"-24
42LD-856	750	3/8	9.5	3/8	9.5	1	25.4	250	1111	3/8	9.5	3/8"-24
42LD-857	450	3/8	9.5	3/8	9.5	1	25.4	250	1111	3/8	9.5	3/8"-24

#### SPECIFICATIONS:

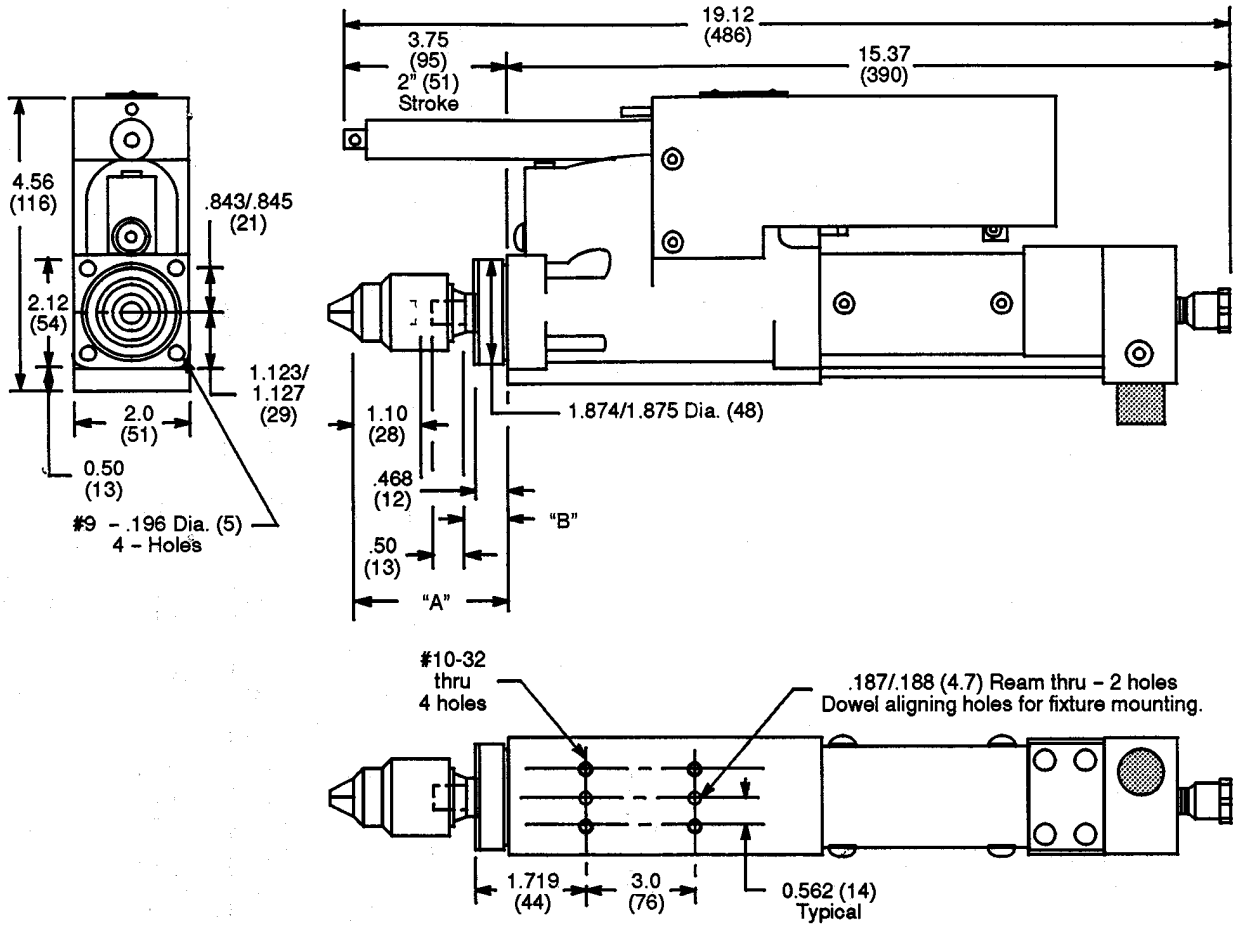
Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 1/4" N.P.T.  
 Recommended Hose Size: 3/8" (9.5 mm) I.D.  
 Tool Weight (maximum): 11.0 lbs. (5.0 kg)  
 Optional Chucks: page 49

#### EXTRA COST ACCESSORIES

Aircraft Noses: page 54  
 Collet Type Chucks: page 48  
 Various 3-Jawed Chucks: page 49

# 42LD Series Mounting Dimensions

Designer's full scale dimensional layouts available on request.



Free Speed of Tool (RPM)	"A"		"B"	
	in.	mm	in.	mm
9000	3.97	101	2.43	62
6000	2.95	75	0.76	19
5000	2.95	75	0.76	19
3000	2.95	75	0.76	19
1850	2.95	75	0.76	19
1100	3.45	87	1.26	32
750	3.45	87	1.26	32
450	3.45	87	1.26	32

# Self-Feed Multiple Spindle Head Drills

## BUCKEYE®

### 21L Series

- .4 Horsepower
- 130 lbs. Thrust (578 N) @ 90 PSI
- 1-1/4" (32mm) & 2" (51mm) Stroke
- Spindle position easily adjusts
- Heavy-duty roller thrust bearings
- Hardened precision-ground steel spindles
- Caged needle roller bearings for lateral stability



To order with a Dashpot, add "D" to the model number after the "L". Example: 21LD-XXX-XXX to receive Dashpot.

Models		Free Speed RPM	Maximum Collet Size		Nominal Drilling Capacity		Maximum Torque per Spindle		Thrust @ 90 PSI	
Stroke Length					Mild Steel					
1-1/4" (32mm)	2" (51mm)		in.	mm	in.	mm	in.-lb.	Nm	lb.	N
<b>Type 400 Multiple Spindle Head</b>										
21L-771-402	21L-701-402	4750	.156	4.0	1/8	3.2	19.2	2.2	130	578
21L-772-402	21L-702-402	3500	.156	4.0	5/32	4.0	19.2	2.2	130	578
21L-773-402	21L-703-402	2800	.156	4.0	5/32	4.0	19.2	2.2	130	578
<b>Type 650 Multiple Spindle Head</b>										
21L-771-652	21L-701-652	4750	.250	6.4	1/8	3.2	26.4	3.0	130	578
21L-772-652	21L-702-652	3500	.250	6.4	5/32	4.0	26.4	3.0	130	578
21L-773-652	21L-703-652	2800	.250	6.4	5/32	4.0	26.4	3.0	130	578
21L-775-652	21L-705-652	900	.250	6.4	5/32	4.0	26.4	3.0	130	578

#### SPECIFICATIONS:

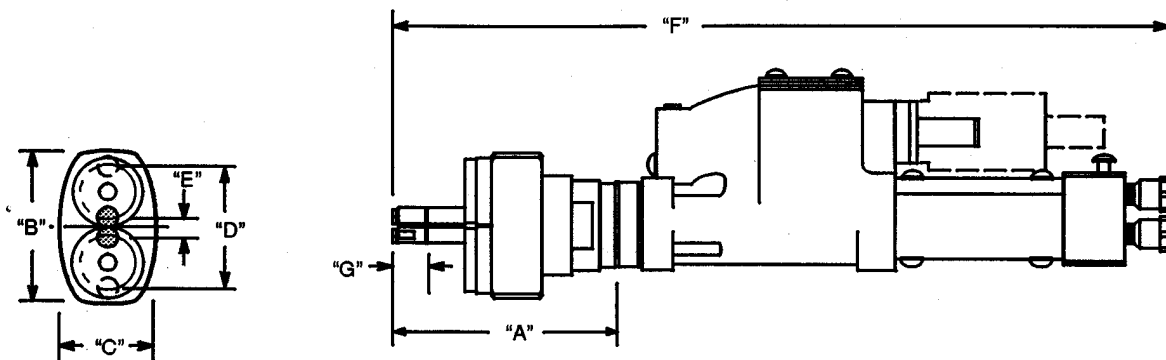
Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 1/4" N.P.T.  
 Remote Control Ports: 1/8" N.P.T.  
 Recommended Hose Size: 3/8" (9.5 mm) I.D.

#### EXTRA COST ACCESSORIES

Hydraulic Dashpot: model code "D" page 47  
 Collets: page 43  
 L - Bracket: 1021862  
 NOTE: Contact factory for pricing and additional head configurations available.

# 21L Series Mounting Dimensions

Designer's full scale dimensional layouts available on request.



Refer to page 9 for additional mounting dimensional information.

Multiple Spindle Head		Part Number	Dimensions													
Type	Code		A		B		C		D		E		F		G**	
			in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
<b>1-1/4" (32mm) Stroke Models</b>																
400	-402	1025767	6.92	176	2.84	72	2.00	51	2.125	54	.375	9.5	16.42	417	.875	22
650	-652	1025768	7.09*	180	3.25	83	2.05	52	2.500	64	.500	13	16.59	421	.937	24
<b>2" (51mm) Stroke Models</b>																
400	-402	1025767	6.92	176	2.84	72	2.00	51	2.125	54	.375	9.5	17.17	436	.875	22
650	-652	1025768	7.09*	180	3.25	83	2.05	52	2.500	64	.500	13	17.34	440	.937	24

\* Note: "A" Dimension for 900 RPM tool is 8.15" (207).

\*\* Note: "G" Dimension indicates collet depth.

Note:

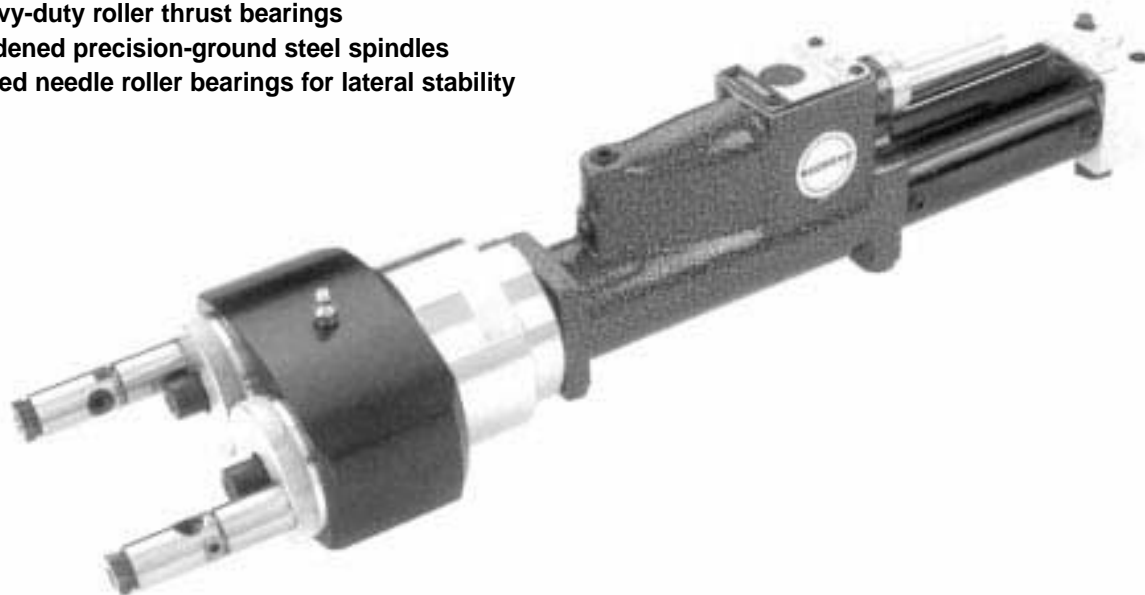
- 1) Specify collet diameter desired when placing an order. Price of collets not included in price of assembly package.
- 2) Assembly number includes all hardware needed to mount the chosen multi spindle onto the applicable self-feed drill.

# Self-Feed Multiple Spindle Head Drills

## BUCKEYE®

### 31L Series

- .6 Horsepower
- 200 lbs. Thrust (889 N) @ 90 PSI
- 3" (76mm) Stroke
- Spindle position easily adjusts
- Heavy-duty roller thrust bearings
- Hardened precision-ground steel spindles
- Caged needle roller bearings for lateral stability



To order with a Dashpot, add "D" to the model number after the "L". Example: 31LD-XXX-XXX to receive Dashpot.

Models Stroke Length 3" (76mm)	Free Speed RPM	Maximum Collet Size		Nominal Drilling Capacity		Maximum Torque per Spindle		Thrust @90 PSI		
		in.	mm	Mild Steel		in-lb.	Nm	lb.	N	
				in.	mm					
<b>Type 650 Multiple Spindle Head</b>										
31L-801-652	5000	.250	6.4	1/8	3.2	26.4	3.0	200	889	
31L-802-652	3000	.250	6.4	3/16	4.8	26.4	3.0	200	889	
<b>Type 800 Multiple Spindle Head</b>										
31L-801-802	5000	.312	7.9	1/8	3.2	50.4	5.7	200	889	
31L-802-802	3000	.312	7.9	3/16	4.8	50.4	5.7	200	889	
31L-803-802	1850	.312	7.9	3/16	4.8	50.4	5.7	200	889	
31L-805-802	1100	.312	7.9	5/16	7.9	50.4	5.7	200	889	
<b>Type 950 Multiple Spindle Head</b>										
31L-801-952	5000	.375	9.5	1/8	3.2	79.2	8.9	200	889	
31L-802-952	3000	.375	9.5	3/16	4.8	79.2	8.9	200	889	
31L-803-952	1850	.375	9.5	3/16	4.8	79.2	8.9	200	889	
31L-805-952	1100	.375	9.5	5/16	7.9	79.2	8.9	200	889	
31L-806-952	750	.375	9.5	3/8	9.5	79.2	8.9	200	889	

#### SPECIFICATIONS:

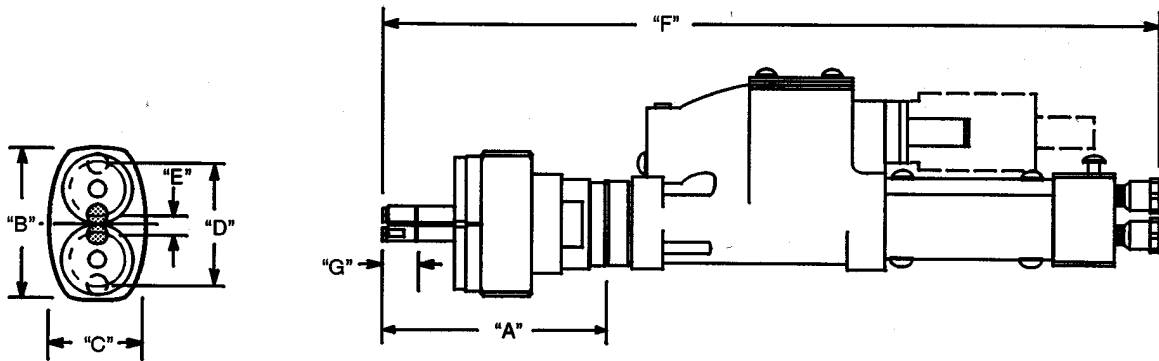
Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 1/4" N.P.T.  
 Remote Control Ports: 1/8" N.P.T.  
 Recommended Hose Size: 3/8" (9.5 mm) I.D.

#### EXTRA COST ACCESSORIES

Hydraulic Dashpot: model code "D" page 47  
 Collets: pages 43 & 44  
 L - Bracket: 1023793  
 NOTE: Contact factory for pricing and additional head configurations available.

# 31L Series Mounting Dimensions

Designer's full scale dimensional layouts available on request.



Refer to page 11 for additional mounting dimensional information.

Multiple Spindle Head		Part Number	Dimensions													
Type	Code		A		B		C		D		E		F		G*	
			in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
650	-652	1025771	6.64	169	3.25	83	2.05	52	2.500	64	.500	13	19.81	503	0.937	24
800	-802	1025772	7.44	189	4.00	102	2.50	64	3.125	79	.625	16	20.61	523	1.156	29
950	-952	1025773	8.09	205	4.87	124	3.05	77	3.750	95	.750	19	21.26	540	1.375	35

\* Note: "G" Dimension indicates collet depth.

Note:

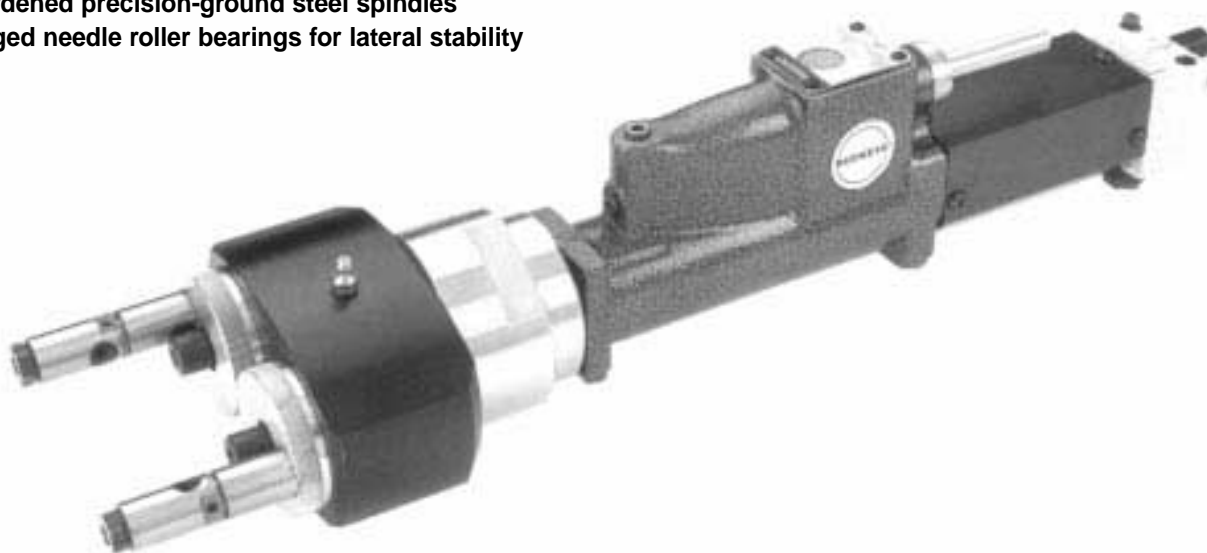
- 1) Specify collet diameter desired when placing an order. Price of collets not included in price of assembly package.
- 2) Assembly number includes all hardware needed to mount the chosen multi spindle onto the applicable self-feed drill.

# Self-Feed Multiple Spindle Head Drills

## BUCKEYE®

### 42L Series

- .9 Horsepower
- 250 lbs. Thrust (1111 N) @ 90 PSI
- 3" (76mm) Stroke
- Spindle position easily adjusts
- Heavy-duty roller thrust bearings
- Hardened precision-ground steel spindles
- Caged needle roller bearings for lateral stability



To order with a Dashpot, add "D" to the model number after the "L". Example: 42LD-XXX-XXX to receive Dashpot.

Models	Free Speed RPM	Maximum Collet Size		Nominal Drilling Capacity		Maximum Torque per Spindle		Thrust @90 PSI	
				Mild Steel					
		Stroke Length 3" (76mm)	in.	mm	in.	mm	in-lb.	Nm	lb.
<b>Type 650 Multiple Spindle Head</b>									
42L-801-652	5000	.250	6.4	1/8	3.2	26.4	3.0	250	1111
42L-802-652	3000	.250	6.4	3/16	4.8	26.4	3.0	250	1111
<b>Type 800 Multiple Spindle Head</b>									
42L-801-802	5000	.312	7.9	1/8	3.2	50.4	5.7	250	1111
42L-802-802	3000	.312	7.9	3/16	4.8	50.4	5.7	250	1111
42L-803-802	1850	.312	7.9	3/16	4.8	50.4	5.7	250	1111
<b>Type 950 Multiple Spindle Head</b>									
42L-801-952	5000	.375	9.5	1/8	3.2	79.2	8.9	250	1111
42L-802-952	3000	.375	9.5	3/16	4.8	79.2	8.9	250	1111
42L-803-952	1850	.375	9.5	3/16	4.8	79.2	8.9	250	1111
42L-805-952	1100	.375	9.5	5/16	7.9	79.2	8.9	250	1111

#### SPECIFICATIONS:

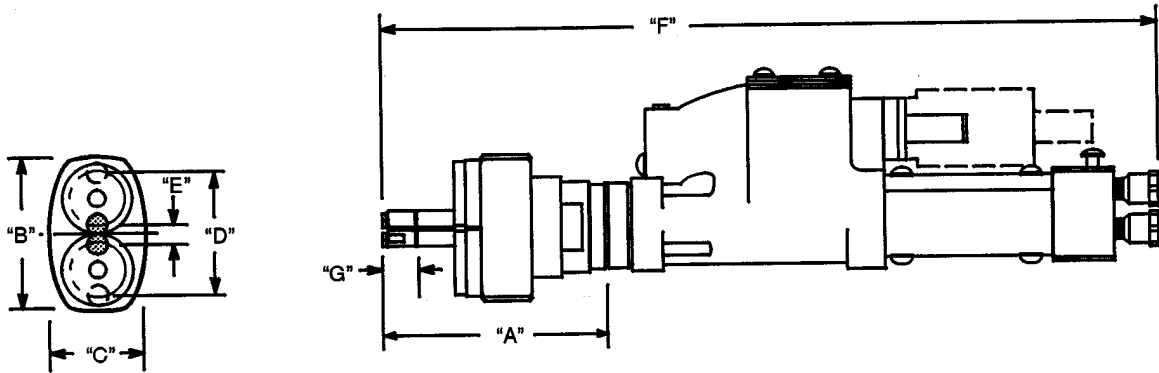
Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 1/4" N.P.T.  
 Remote Control Ports: 1/8" N.P.T.  
 Recommended Hose Size: 3/8" (9.5 mm) I.D.

#### EXTRA COST ACCESSORIES

Hydraulic Dashpot: model code "D" page 47  
 Collets: pages 43 & 44  
 L - Bracket: 1023793  
 NOTE: Contact factory for pricing and additional head configurations available.

# 42L Series Mounting Dimensions

Designer's full scale dimensional layouts available on request.



Refer to page 13 for additional mounting dimensional information.

Multiple Spindle Head		Part Number	Dimensions													
Type	Code		A		B		C		D		E		F		G*	
			in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
650	-652	1025771	6.64	169	3.25	83	2.05	52	2.500	64	.500	13	19.81	503	0.937	24
800	-802	1025772	7.44	189	4.00	102	2.50	64	3.125	79	.625	16	20.61	523	1.156	29
950	-952	1025773	8.09	205	4.87	124	3.05	77	3.750	95	.750	19	21.26	540	1.375	35

\* Note: "G" Dimension indicates collet depth.

Note:

- 1) Specify collet diameter desired when placing an order. Price of collets not included in price of assembly package.
- 2) Assembly number includes all hardware needed to mount the chosen multi spindle onto the applicable self-feed drill.

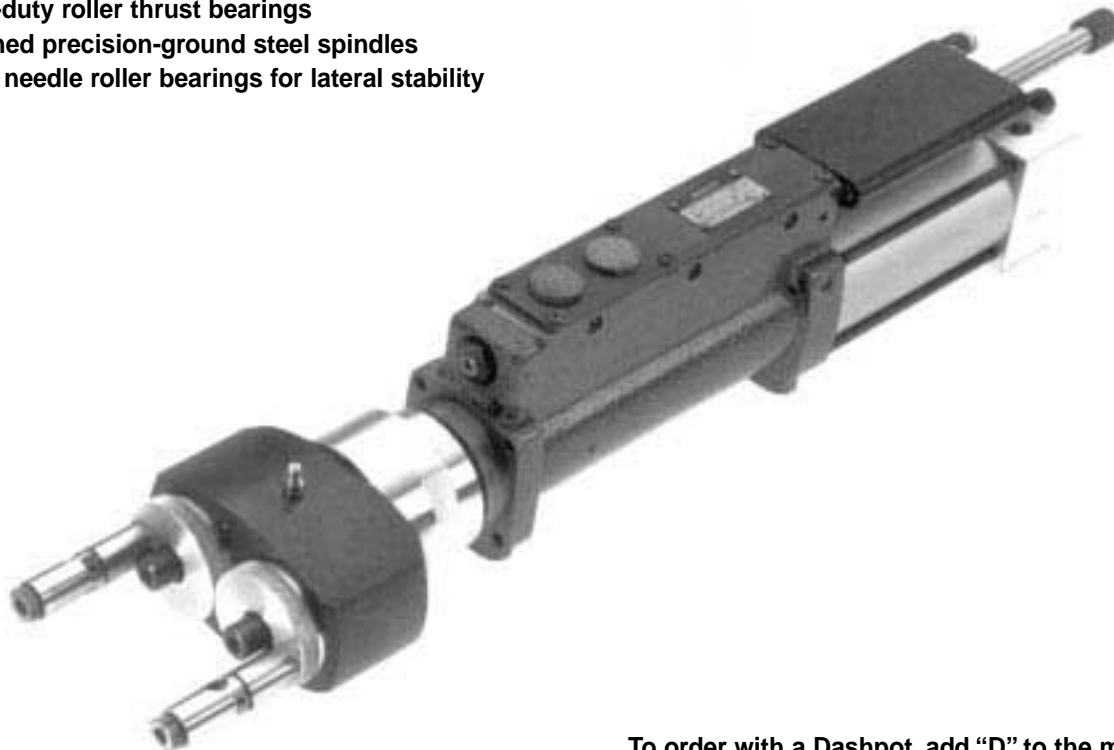


# Self-Feed Multiple Spindle Head Drills

## BUCKEYE®

### 46L Series

- 1.0 Horsepower
- 440 lbs. Thrust (1956 N) @ 90 PSI
- 4" (102mm) Stroke
- Spindle position easily adjusts
- Heavy-duty roller thrust bearings
- Hardened precision-ground steel spindles
- Caged needle roller bearings for lateral stability



To order with a Dashpot, add "D" to the model number after the "L". Example: 46LD-XXX-XXX to receive Dashpot.

Models	Free Speed RPM	Maximum Collet Size		Nominal Drilling Capacity		Maximum Torque per Spindle		Thrust @ 90 PSI		
				Mild Steel						
		Stroke Length	in.	mm	in.	mm	in.-lb.	Nm	lb.	N
4"										
(102mm)										
<b>Type 950 Multiple Spindle Head</b>										
46L-802-952	3250	.375	9.5	3/16	4.8	79.2	8.9	440	1956	
46L-803-952	1800	.375	9.5	3/16	4.8	79.2	8.9	440	1956	
46L-805-952	900	.375	9.5	5/16	7.9	79.2	8.9	440	1956	
<b>Type 1250 Multiple Spindle Head</b>										
46L-802-122	3250	.500	13	3/16	4.8	120.0	13.6	440	1956	
46L-803-122	1800	.500	13	3/16	4.8	120.0	13.6	440	1956	
46L-805-122	900	.500	13	5/16	7.9	120.0	13.6	440	1956	
46L-806-122	600	.500	13	3/8	9.5	120.0	13.6	440	1956	
46L-807-122	430	.500	13	3/8	9.5	120.0	13.6	440	1956	

#### SPECIFICATIONS:

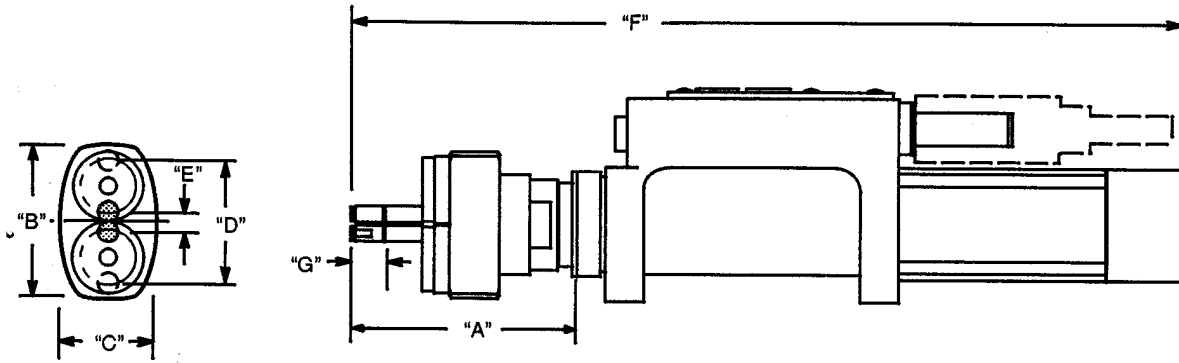
Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 3/8" N.P.T.  
 Remote Control Ports: 1/8" N.P.T.  
 Recommended Hose Size: 1/2" (13 mm) I.D.

#### EXTRA COST ACCESSORIES

Hydraulic Dashpot: model code "D" page 47  
 Collets : page 44  
 L - Bracket: 1024262  
 NOTE: Contact factory for pricing and additional head configurations available.

# 46L Series Mounting Dimensions

Designer's full scale dimensional layouts available on request.



Refer to page 15 for additional mounting dimensional information.

Multiple Spindle Head		Part Number	Dimensions													
Type	Code		A		B		C		D		E		F		G*	
			in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
950	-952	1025774	8.44	214	4.87	124	3.05	77	3.750	95	.750	19	23.11	587	1.375	35
1250	-122	1025775	11.69	297	6.50	165	4.02	102	5.000	127	1.000	25	26.36	670	2.000	51

\* Note: "G" Dimension indicates collet depth.

Note:

- 1) Specify collet diameter desired when placing an order. Price of collets not included in price of assembly package.
- 2) Assembly number includes all hardware needed to mount the chosen multi spindle onto the applicable self-feed drill.

# Multiple Spindle Drill Head Assembly

Buckeye Twin-Spindle adjustable center heads for use with Self-Feed tools for two hole drilling operations. Available as factory installed on tool order. For use on 21L, 31L, 42L, and 46L Self-Feed tools. Dashpot accessory is recommended for drilling metal. To order with a dashpot, add "D" to the model number. EXAMPLE: 21LD-XXX

## Type 400

3/8" (9.5mm) to 2-1/8" (54mm) between holes.

- Drill sizes up to: 5/32" (4.0mm)
- Tap sizes up to: 5/32" (4.0mm)
- Maximum input: 10000 RPM

## Type 650

1/2" (13mm) to 2-1/2" (64mm) between holes.

- Drill sizes up to: 1/4" (6.5mm)
- Tap sizes up to: 3/16" (5.0mm)
- Maximum input: 7000 RPM

## Type 800

5/8" (16mm) to 3-1/8" (79mm) between holes.

- Drill sizes up to: 5/16" (8.0mm)
- Tap sizes up to: 1/4" (6.5mm)
- Maximum input: 6000 RPM

## Type 950

3/4" (19mm) to 3-3/4" (95mm) between holes.

- Drill sizes up to: 3/8" (9.5mm)
- Tap sizes up to: 5/16" (8.0mm)
- Maximum input: 5000 RPM

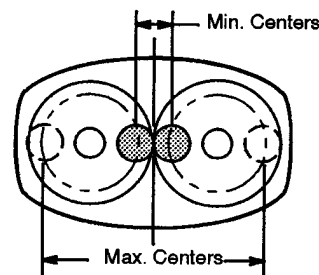
## Type 1250

1" (25mm) to 5" (127mm) between holes.

- Drill sizes up to: 1/2" (13mm)
- Tap sizes up to: 3/8" (10mm)

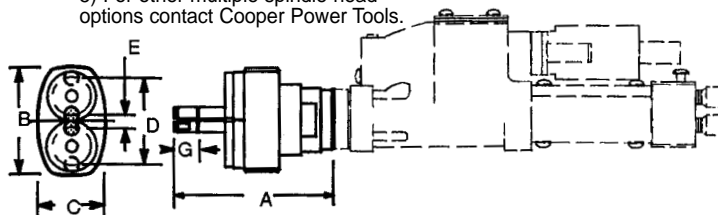
## Spindle Centers

Type	Spindle Centers			
	Minimum		Maximum	
	inch	mm	inch	mm
400	.375	9.5	2.125	54
650	.500	12	2.500	64
800	.625	16	3.125	79
950	.750	19	3.750	95
1250	1.00	25	5.000	127



### MULTIPLE SPINDLE HEADS† ORDERING INFORMATION:

- 1) The Multiple Spindle Heads (M.S.H.) are sold only as accessories to the Self-Feed tools.
  - 2) When specifying the tool speed code be sure to take into account the maximum input RPM.
  - 3) When ordering only a M.S.H. specify the assembly part number only.
  - 4) When ordering a M.S.H. head with a Self-Feed tool, specify the head code number from the table below.
- EXAMPLE: 31L-803-652 (1025771 multiple spindle head) or 21L-705-652 (1025768 multiple spindle head).
- 5) For other multiple spindle head options contact Cooper Power Tools.



*Multiple Spindle Head		Part Number	Drill Cap. Mild Steel & Max. Collet Size		Dimensions												Max. Torque Per Spindle	
Type	Code		in.	mm	A		B		C		D		E		G**		in-lb	mm

### Use on 21L

400	-402	1025767	.156	4.0	6.92	176	2.84	72	2.00	51	2.125	54	.375	9.5	.875	22	19.2	2.2
650	-652	1025768	.250	6.4	7.09*	180	3.25	83	2.05	52	2.500	64	.500	13	.937	24	26.4	3.0

### Use on 31L and 42L

650	-652	1025771	.250	6.4	6.64	169	3.25	83	2.05	52	2.500	64	.500	13	.937	24	26.4	3.0
800	-802	1025772	.312	7.9	7.44	189	4.00	102	2.50	64	3.125	79	.625	16	1.156	29	50.4	5.7
950	-952	1025773	.375	9.5	8.09	205	4.87	124	3.05	77	3.750	95	.750	19	1.375	35	79.2	8.9

### Use on 46L

950	-952	1025774	.375	9.5	8.44	214	4.87	124	3.05	77	3.750	95	.750	19	1.375	35	79.2	8.9
1250	-122	1025775	.500	13	11.69	297	6.50	165	4.02	102	5.000	127	1.000	25	2.000	51	120.0	13.6

\* Note: "A" Dimension for 900 RPM tool is 8.15" (207mm).

\*\* Note: "G" Dimension indicates collet depth.

† NOTE: 21L-800 series tools require conversion parts to accept the multiple spindle drill head assembly. Contact the factory for details. 31L, 42L, and 46L series do not require conversion.

NOTE: Refer to appropriate tool series page for overall length (dimension "F") of tool with multiple spindle drill head assembly.

- 1) Specify collet diameter desired when placing an order. Price of collets not included in price of assembly package.
- 2) Assembly number includes all hardware needed to mount the chosen multi spindle onto the applicable self-feed drill.

\*Additional three, four, and five adjustable and fixed spindle heads are available upon request as well as multi-spindle tappers. Contact Technical Support for more information.

# Multiple Spindle Drill Head Collets

Bore Dia.	Drill Sizes			Collet Number
	inch	No	mm	

Bore Dia.	Drill Sizes			Collet Number
	inch	No	mm	

Bore Dia.	Drill Sizes			Collet Number
	inch	No	mm	

### Collets for Type 400

.039	61	1.0	P1809.010	
.043	57	1.1	P1809.011	
.047	3/64	56	1.2	P1809.012
.052	55	1.3	P1809.013	
.055	54	1.4	P1809.014	
.059	53	1.5	P1809.015	
.063	1/16	52	1.6	P1809.016
.067	51	1.7	P1809.017	
.071	50	1.8	P1809.018	
.075	48	1.9	P1809.019	
.079	5/64	47	2.0	P1809.020
.083	45	2.1	P1809.021	
.087	44	2.2	P1809.022	
.091	43	2.3	P1809.023	
.094	3/32	42	2.4	P1809.024
.098	40	2.5	P1809.025	
.102	38	2.6	P1809.026	
.106	36	2.7	P1809.027	
.110	7/64	35	2.8	P1809.028
.114	33	2.9	P1809.029	
.118	32	3.0	P1809.030	
.122	31	3.1	P1809.031	
.126	1/8	30	3.2	P1809.032
.130	29	3.3	P1809.033	
.134	29	3.4	P1809.034	
.138		3.5	P1809.035	
.142	9/64	28	3.6	P1809.036
.146	26	3.7	P1809.037	
.150	25	3.8	P1809.038	
.154	23	3.9	P1809.039	
.157	5/32	22	4.0	P1809.040

### Collets for Type 650

.039	61	1.0	P1039.010	
.043	57	1.1	P1039.011	
.047	3/64	56	1.2	P1039.012
.052	55	1.3	P1039.013	
.055	54	1.4	P1039.014	
.059	53	1.5	P1039.015	
.063	1/16	52	1.6	P1039.016
.067	51	1.7	P1039.017	
.071	50	1.8	P1039.018	
.075	48	1.9	P1039.019	
.079	5/64	47	2.0	P1039.020
.083	45	2.1	P1039.021	
.087	44	2.2	P1039.022	
.091	43	2.3	P1039.023	
.094	3/32	42	2.4	P1039.024
.098	40	2.5	P1039.025	
.102	38	2.6	P1039.026	
.106	36	2.7	P1039.027	
.110	7/64	35	2.8	P1039.028
.114	33	2.9	P1039.029	
.118	32	3.0	P1039.030	
.122	31	3.1	P1039.031	

### Collets for Type 650 (cont'd)

.126	1/8	30	3.2	P1039.032
.130		30	3.3	P1039.033
.134		29	3.4	P1039.034
.138			3.5	P1039.035
.142	9/64	28	3.6	P1039.036
.146		26	3.7	P1039.037
.150		25	3.8	P1039.038
.154		23	3.9	P1039.039
.157	5/32	22	4.0	P1039.040
.161		20	4.1	P1039.041
.165		19	4.2	P1039.042
.169		18	4.3	P1039.043
.173	11/64	17	4.4	P1039.044
.177		16	4.5	P1039.045
.181		14	4.6	P1039.046
.185		13	4.7	P1039.047
.189	3/16	12	4.8	P1039.048
.193		10	4.9	P1039.049
.197		9	5.0	P1039.050
.201		7	5.1	P1039.051
.205	13/64	5	5.2	P1039.052
.209		4	5.3	P1039.053
.213		3	5.4	P1039.054
.216			5.5	P1039.055
.220	7/32	2	5.6	P1039.056
.224			5.7	P1039.057
.228		1	5.8	P1039.058
.232			5.9	P1039.059
.236	15/64	6	6.0	P1039.060
.240			6.1	P1039.061
.244			6.2	P1039.062
.248			6.3	P1039.063
.252	1/4	6	6.4	P1039.064
.256			6.5	P1039.065

### Collets for Type 800

.039	61	1.0	P3464.010	
.043	57	1.1	P3464.011	
.047	3/64	56	1.2	P3464.012
.052	55	1.3	P3464.013	
.055	54	1.4	P3464.014	
.059	53	1.5	P3464.015	
.063	1/16	52	1.6	P3464.016
.067		51	1.7	P3464.017
.071		50	1.8	P3464.018
.075		48	1.9	P3464.019
.079	5/64	47	2.0	P3464.020
.083		45	2.1	P3464.021
.087		44	2.2	P3464.022
.091		43	2.3	P3464.023
.094	3/32	42	2.4	P3464.024
.098		40	2.5	P3464.025
.102		38	2.6	P3464.026
.106		36	2.7	P3464.027
.110	7/64	35	2.8	P3464.028

### Collets for Type 800 (cont'd)

.114		33	2.9	P3464.029
.118		32	3.0	P3464.030
.122		31	3.1	P3464.031
.126	1/8		3.2	P3464.032
.130		30	3.3	P3464.033
.134		29	3.4	P3464.034
.138			3.5	P3464.035
.142	9/64	28	3.6	P3464.036
.146		26	3.7	P3464.037
.150		25	3.8	P3464.038
.154		23	3.9	P3464.039
.157	5/32	22	4.0	P3464.040
.161		20	4.1	P3464.041
.165		19	4.2	P3464.042
.169		18	4.3	P3464.043
.173	11/64	17	4.4	P3464.044
.177		16	4.5	P3464.045
.181		14	4.6	P3464.046
.185		13	4.7	P3464.047
.189	3/16	12	4.8	P3464.048
.193		10	4.9	P3464.049
.197		9	5.0	P3464.050
.201		7	5.1	P3464.051
.205	13/64	5	5.2	P3464.052
.209		4	5.3	P3464.053
.213		3	5.4	P3464.054
.216			5.5	P3464.055
.220	7/32	2	5.6	P3464.056
.224			5.7	P3464.057
.228		1	5.8	P3464.058
.232			5.9	P3464.059
.236	15/64	6	6.0	P3464.060
.240			6.1	P3464.061
.244			6.2	P3464.062
.248			6.3	P3464.063
.252	1/4	6	6.4	P3464.064
.256			6.5	P3464.065
.260			6.6	P3464.066
.264	17/64	6	6.7	P3464.067
.268			6.8	P3464.068
.272			6.9	P3464.069
.276			7.0	P3464.070
.280	9/32	7	7.1	P3464.071
.283			7.2	P3464.072
.287			7.3	P3464.073
.291			7.4	P3464.074
.295			7.5	P3464.075
.299	19/64	7	7.6	P3464.076
.303			7.7	P3464.077
.307			7.8	P3464.078
.311	5/16	7	7.9	P3464.079
.315		8	8.0	P3464.080

# Multiple Spindle Drill Head Collets

Bore Dia.	Drill Sizes			Collet Number
	inch	No	mm	

Bore Dia.	Drill Sizes			Collet Number
	inch	No	mm	

Bore Dia.	Drill Sizes			Collet Number
	inch	No	mm	

## Collets for Type 950

.079	5/64	47	2.0	P1052.020
.083		45	2.1	P1052.021
.087		44	2.2	P1052.022
.091		43	2.3	P1052.023
.094	3/32	42	2.4	P1052.024
.098		40	2.5	P1052.025
.102		38	2.6	P1052.026
.106		36	2.7	P1052.027
.110	7/64	35	2.8	P1052.028
.114		33	2.9	P1052.029
.118		32	3.0	P1052.030
.122		31	3.1	P1052.031
.126	1/8		3.2	P1052.032
.130		30	3.3	P1052.033
.134		29	3.4	P1052.034
.138			3.5	P1052.035
.142	9/64	28	3.6	P1052.036
.146		26	3.7	P1052.037
.150		25	3.8	P1052.038
.154		23	3.9	P1052.039
.157	5/32	22	4.0	P1052.040
.161		20	4.1	P1052.041
.165		19	4.2	P1052.042
.169		18	4.3	P1052.043
.173	11/64	17	4.4	P1052.044
.177		16	4.5	P1052.045
.181		14	4.6	P1052.046
.185		13	4.7	P1052.047
.189	3/16	12	4.8	P1052.048
.193		10	4.9	P1052.049
.197		9	5.0	P1052.050
.201		7	5.1	P1052.051
.205	13/64	5	5.2	P1052.052
.209		4	5.3	P1052.053
.213		3	5.4	P1052.054
.216			5.5	P1052.055
.220	7/32	2	5.6	P1052.056
.224			5.7	P1052.057
.228		1	5.8	P1052.058
.232			5.9	P1052.059
.236	15/64		6.0	P1052.060
.240			6.1	P1052.061
.244			6.2	P1052.062
.248			6.3	P1052.063
.252	1/4		6.4	P1052.064
.256			6.5	P1052.065
.260			6.6	P1052.066
.264	17/64		6.7	P1052.067
.268			6.8	P1052.068
.272			6.9	P1052.069
.276			7.0	P1052.070
.280	9/32		7.1	P1052.071
.283			7.2	P1052.072

## Collets for Type 950 (cont'd)

.287			7.3	P1052.073
.291			7.4	P1052.074
.295			7.5	P1052.075
.299	19/64		7.6	P1052.076
.303			7.7	P1052.077
.307			7.8	P1052.078
.311	5/16		7.9	P1052.079
.315			8.0	P1052.080
.319			8.1	P1052.081
.323			8.2	P1052.082
.327	21/64		8.3	P1052.083
.331			8.4	P1052.084
.335			8.5	P1052.085
.339			8.6	P1052.086
.342	11/32		8.7	P1052.087
.346			8.8	P1052.088
.350			8.9	P1052.089
.354			9.0	P1052.090
.358	23/64		9.1	P1052.091
.362			9.2	P1052.092
.366			9.3	P1052.093
.370			9.4	P1052.094
.375	3/8		9.5	P1052.095

## Collets for Type 1250

.252	1/4		6.4	P2847.064
.256			6.5	P2847.065
.260			6.6	P2847.066
.264	17/64		6.7	P2847.067
.268			6.8	P2847.068
.272			6.9	P2847.069
.276			7.0	P2847.070
.280	9/32		7.1	P2847.071
.283			7.2	P2847.072
.287			7.3	P2847.073
.291			7.4	P2847.074
.295			7.5	P2847.075
.299	19/64		7.6	P2847.076
.303			7.7	P2847.077
.307			7.8	P2847.078
.311	5/16		7.9	P2847.079
.315			8.0	P2847.080
.319			8.1	P2847.081
.323			8.2	P2847.082
.327	21/64		8.3	P2847.083
.331			8.4	P2847.084
.335			8.5	P2847.085
.339			8.6	P2847.086
.342	11/32		8.7	P2847.087
.346			8.8	P2847.088
.350			8.9	P2847.089
.354			9.0	P2847.090
.358	23/64		9.1	P2847.091

## Collets for Type 1250 (cont'd)

.362			9.2	P2847.092
.366	9		.3	P2847.093
.370			9.4	P2847.094
.375	3/8		9.5	P2847.095
.378			9.6	P2847.096
.382			9.7	P2847.097
.386			9.8	P2847.098
.390	25/64		9.9	P2847.099
.394			10.0	P2847.100
.398			10.1	P2847.101
.402			10.2	P2847.102
.406	13/32		10.3	P2847.103
.410			10.4	P2847.104
.414			10.5	P2847.105
.418			10.6	P2847.106
.422	27/64		10.7	P2847.107
.425			10.8	P2847.108
.429			10.9	P2847.109
.433			11.0	P2847.110
.437	7/16		11.1	P2847.111
.441			11.2	P2847.112
.445			11.3	P2847.113
.449			11.4	P2847.114
.453	29/64		11.5	P2847.115
.457			11.6	P2847.116
.461			11.7	P2847.117
.465			11.8	P2847.118
.469	15/32		11.9	P2847.119
.472			12.0	P2847.120
.476			12.1	P2847.121
.480			12.2	P2847.122
.484	31/64		12.3	P2847.123
.488			12.4	P2847.124
.492			12.5	P2847.125
.496			12.6	P2847.126
.500	1/2		12.7	P2847.127
.504			12.8	P2847.128
.508			12.9	P2847.129
.512			13.0	P2847.130

## BUCKEYE®

### 31L Series

- .6 Horsepower
- 3" (76mm) Stroke
- 1/4" (6.4mm) Hex Drive (female)
- Optional Dashpot for Precise Feed Rate Control
- Automatic shut-off when desired torque is reached
- Fully controllable
- Automatic motor start



Model Number		Speed	Bolt Capacity		Torque Range			
1/4" hex Drive			RPM	Grade 5	Grade 9.8	Ft. Lbs.		Nm
w/o Dashpot	with Dashpot			in.	mm	High	Low	High
31L-8633	31LD-8633	1850	#10	M5	4.1	1.0	7.5	1.4
31L-8635	31LD-8635	1100	1/4	M6	6.1	3.0	11	4.1
31L-8636	31LD-8636	750	1/4	M7	9.9	3.0	17	4.1
31L-8637	31LD-8637	450	5/16	M8	16	5.0	29	6.8

#### SPECIFICATIONS:

Recommended Air Pressure: 90 PSI (6.2 bar)  
 Air Inlet Size: 1/4" N.P.T.  
 Remote Control Ports: 1/8" N.P.T.  
 Recommended Hose Size: 3/8" (9.5 mm) I.D.  
 Offset (side-to-center): 1" (25.4 mm)  
 Tool Weight (maximum): 9.7 lbs. (4.4 kg)

#### EXTRA COST ACCESSORIES

2" Stroke Dashpot: 1024852  
 L - Bracket: 1023793

## BUCKEYE®

### 31L Series

- .6 Horsepower
- 3" (76mm) Stroke
- 3/8" (9.5mm) Square Drive (male)
- Optional Dashpot for Precise Feed Rate Control
- Automatic shut-off when desired torque is reached
- Fully controllable
- Automatic motor start

### 42L Series

- .9 Horsepower
- 3" (76mm) Stroke
- 3/8" (9.5mm) Square Drive (male)
- Optional Dashpot for Precise Feed Rate Control
- Automatic shut-off when desired torque is reached
- Fully controllable
- Automatic motor start



Model Number		Speed	Bolt Capacity		Torque Range			
3/8" Square Drive			RPM	Grade 5	Grade 9.8	Ft. Lbs.		Nm
w/o Dashpot	with Dashpot			in.	mm	High	Low	High

#### 31L Series

31L-8643	31LD-8643	1850	#10	M5	4.1	1.0	7.5	1.4
31L-8645	31LD-8645	1100	1/4	M6	6.1	3.0	11	4.1
31L-8646	31LD-8646	750	1/4	M7	9.9	3.0	17	4.1
31L-8647	31LD-8647	450	5/16	M8	16	5.0	29	6.8

#### 42L Series

42L-8643	42LD-8643	1850	1/4	M7	10	3.0	13	4.1
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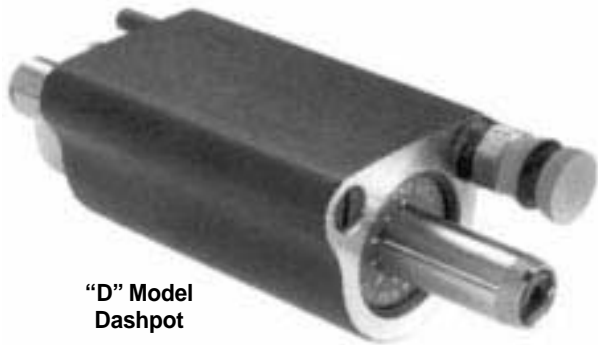
#### SPECIFICATIONS:

Recommended Air Pressure:	90 PSI (6.2 bar)
Air Inlet Size:	1/4" N.P.T.
Remote Control Ports:	1/8" N.P.T.
Recommended Hose Size:	3/8" (9.5 mm) I.D.
Offset (side-to-center):	1" (25.4 mm)
Tool Weight (maximum):	9.7 lbs. (4.4 kg)

#### EXTRA COST ACCESSORIES

2" Stroke Dashpot:	1024852
L - Bracket:	1023793

## Hydraulic Dashpots



**"D" Model Dashpot**

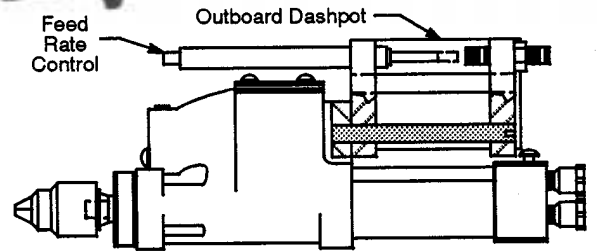
To order with hydraulic dashpots listed in the following chart, add "D" to the model number after the "L".  
Example: 21LD-XXX.

An asterisk (\*) indicates the standard hydraulic dashpot provided with the tool when ordered with a dashpot.

When ordering a non-standard dashpot, add termination "-D2" or "-D3" to the model number to indicate a 2" or 3" dashpot (where available). Example: 21LD-XXX-D2 (2").

Part Number	Stroke		Tool Used On
	In.	mm	
*1024850	1	25	21L
1024851	2	51	21L
*1024852	2	51	31L & 42L
*1023636	3	76	46L

## Outboard Dashpot (Optional)



To order with outboard dashpots listed in the following chart, add "K" to the model number after the "L". Example: 21LK-XXX.

Note: The "K" style dashpot is not available on 46L series tools. The 46L series can only be equipped with the standard 3" (76mm) Hydraulic Dashpot (see chart above).

An asterisk (\*) indicates the standard hydraulic dashpot provided with the tool when ordered with a dashpot.

When ordering a non-standard dashpot, add termination "-D2" or "-D3" to the model number to indicate a 2" or 3" dashpot (where available). Example: 21LK-XXX-D2 (2").

## Hydraulic Adjusting Wrench

Part Number: 1022148

Part Number	Stroke		Tool Used On
	In.	mm	
*1024800	1	25	21L
1024801	1	25	31L & 42L
*1024802	2	51	31L & 42L
*1024822	3	76	31L & 42L

## Exhaust Deflectors



**1022922 Exhaust Deflector**

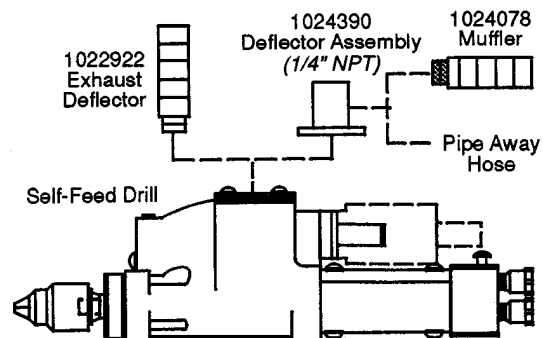


**1024390 Deflector Assembly**



**1024078 Muffler**

Part Number	Description	Tool Used On
1022922	Exhaust Deflector	21L, 31L, 42L
1024390	Deflector Assembly	21L, 31L, 42L
1024078	Muffler	21L, 31L, 42L





# Self-Feed Tool Accessories

## Chuck Body Assemblies

When ordering Chuck Body assemblies with other than standard collet, denote the appropriate collet code, from the collet charts on this page.

EXAMPLE: 21LD-802-01 would assemble the tool with collet chuck assembly 14-1151 and 1/8" collet 204. The standard collet size will be used. 21LD-802-01 would include 1/4" collet 208. Collet size variations from standard must be specified as a second line item order.



Part No.	Std. Collet	Mtg. Thread	Collet Range	Tool Used On
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### 300 Series - Termination 36

14-3050 1/4" 3/8"-24 3/64-1/4 21L, 31L, 42L

### 200 Series - Termination 01

14-1151 1/4" 3/8"-24 1/8-3/8 21L, 31L, 42L

14-2131 1/4" 1/2"-20 1/8-3/8 46L

### "K" Series - Termination 62

14-2132 3/8" 1/2"-20 1/8-1/2 46L

## Series 300 Collets

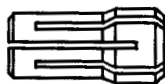
When ordering a tool with other than the standard collet, add the appropriate collet code to the tool model number.



Termination 36						
Part No.	Collet Code	Size	Capacity			
			Minimum		Maximum	
			in.	mm	in.	mm
301	03	3/64"	1/64	0.4	3/64	1.2
302	05	5/64"	3/64	1.2	5/64	2.0
303	06	3/32"	1/16	1.6	3/32	2.4
304	08	1/8"	3/32	2.4	1/8	3.2
305	10	5/32"	1/8	3.2	5/32	4.0
306	12	3/16"	5/32	4.0	3/16	4.8
307	14	7/32"	3/16	4.8	7/32	5.6
308	16	1/4"	7/32	5.6	1/4	6.4
310	M6	6 mm	-	5.2	-	6.0
311	M3	3 mm	-	2.2	-	-

## Series 200 Collets

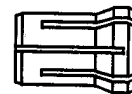
When ordering a tool with other than the standard collet, add the appropriate collet code to the tool model number.



Termination 01						
Part No.	Collet Code	Size	Capacity			
			Minimum		Maximum	
			in.	mm	in.	mm
203	06	3/32"	1/16	1.6	3/32	2.4
204	08	1/8"	3/32	2.4	1/8	3.2
205	10	5/32"	1/8	3.2	5/32	4.0
206	12	3/16"	5/32	4.0	3/16	4.8
207	14	7/32"	3/16	4.8	7/32	5.6
208	16	1/4"	7/32	5.6	1/4	6.4
209	18	9/32"	1/4	6.4	9/32	7.1
210	20	5/16"	9/32	7.1	5/16	7.9
211	22	11/32"	5/16	7.9	11/32	8.7
212	24	3/8"	11/32	8.7	3/8	9.5
213	M6	6 mm	-	5.2	-	6.0
216	M8	8 mm	-	7.2	-	6.0

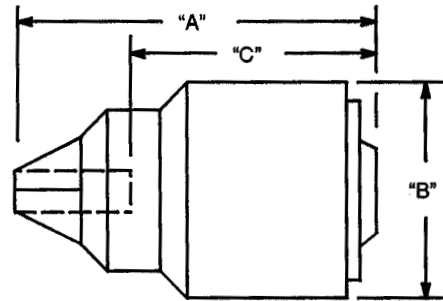
## Series "K" Collets

When ordering a tool with other than the standard collet, add the appropriate collet code to the tool model number.



Termination 62						
Part No.	Collet Code	Size	Capacity			
			Minimum		Maximum	
			in.	mm	in.	mm
120	08	1/8"	3/32	2.4	1/8	3.2
121	12	3/16"	5/32	4.0	3/16	4.8
122	16	1/4"	7/32	5.6	1/4	6.4
123	20	5/16"	9/32	7.1	5/16	7.9
124	24	3/8"	11/32	8.7	3/8	9.5
125	28	7/16"	13/32	10.3	7/16	11.1
126	32	1/2"	15/32	11.9	1/2	12.7
127	36	9/16"	17/32	13.5	9/16	14.3
133	M6	6mm	-	5.2	-	6.0
134	M8	8mm	-	7.2	-	8.0
135	70	10mm	-	9.2	-	10.0
136	71	12mm	-	11.2	-	12.0

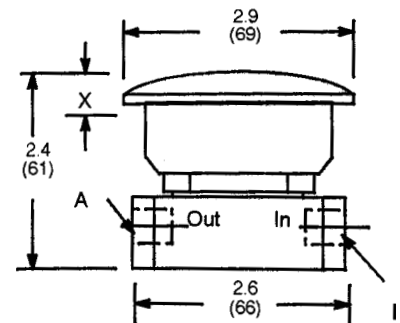
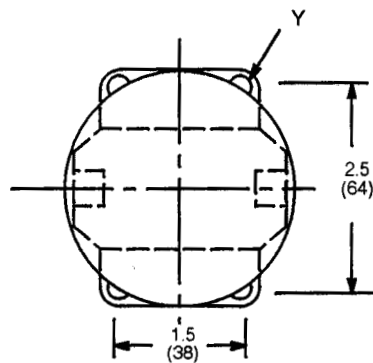
## Industrial 3-Jaw Chucks



Number	Term	Mount	Cap.	"A"		"B"		"C"	
				in.	mm	in.	mm	in.	mm
<b>21L Series Only</b>									
1005953	—	#OJT	5/32	1.09	28	0.850	22	0.59	15
<b>21L, 31L, &amp; 42L Series</b>									
1005078	-38	3/8-24	1/4	1.56	40	1.117	28	0.93	24
1001505	-42	3/8-24	1/4HD	1.71	43	1.290	33	1.02	26
1004422	-43	3/8-24	3/8HD	2.16	55	1.670	42	1.09	28
1001252	-51	3/8-24	3/8	1.93	49	1.420	36	1.09	28
1009726	-53	3/8-24	1/2	2.42	61	1.790	45	1.28	33
<b>46L Series</b>									
1005398	-38	1/2-20	1/4	1.75	44	1.320	34	1.08	27
1005000	-47	1/2-20	3/8	1.93	49	1.420	36	1.13	29
1005020	-51	1/2-20	3/8	2.31	59	1.790	45	1.36	35
1000434	-53	1/2-20	1/2	2.42	61	1.790	45	1.28	33

NOTE: Termination number used ONLY when specifying a chuck which is not standard equipment.

## 1022162 Remote Start Valve

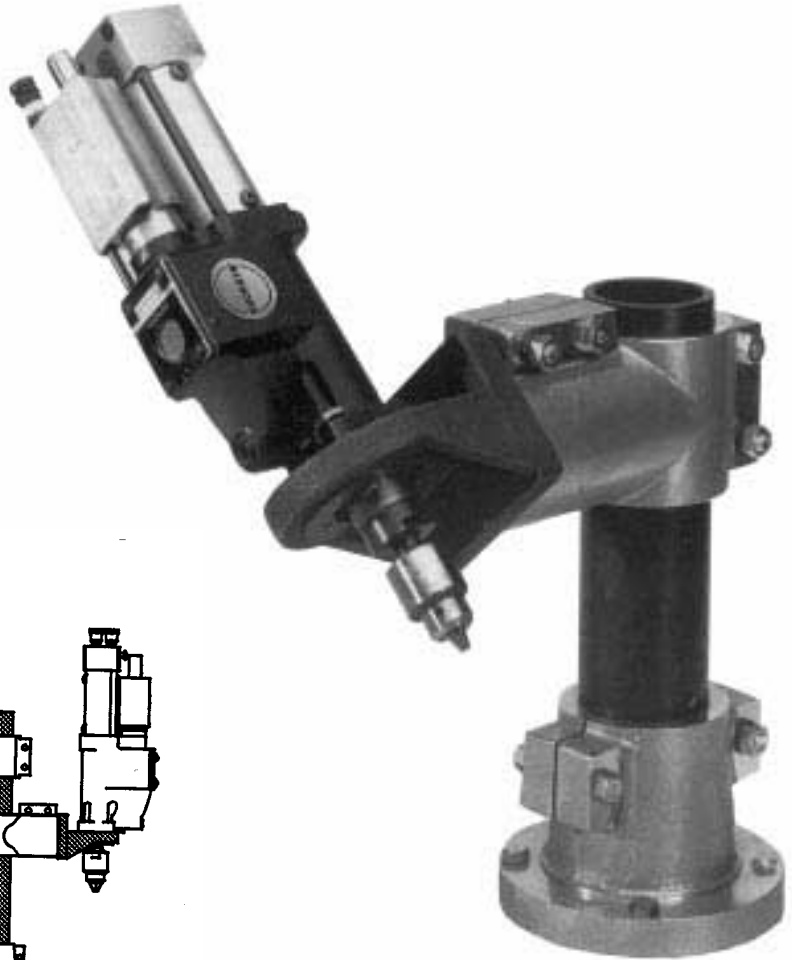
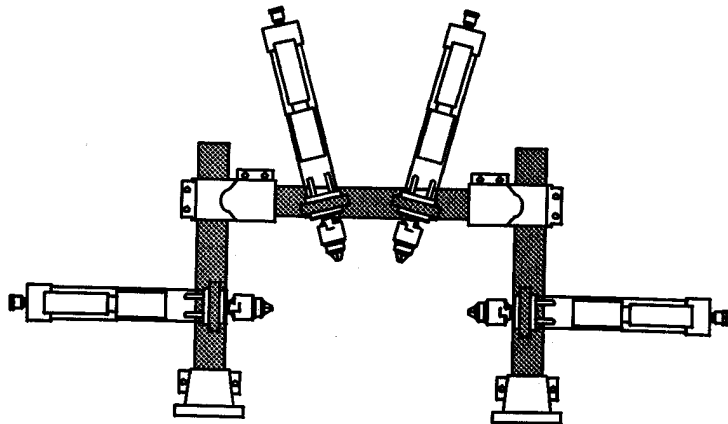
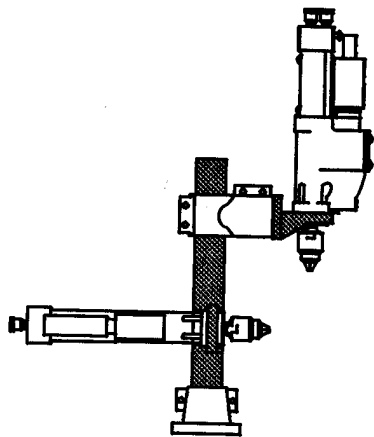
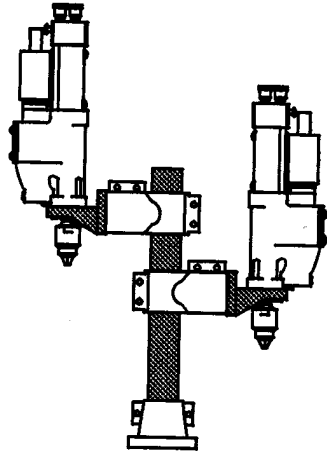
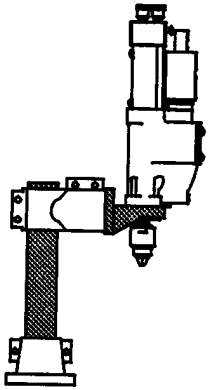


Dimension	Description
A	1/4" Outlet Port
P	1/4" Inlet Port
X	.2" (5.1mm) Travel
Y	.28" (7.1mm) Dia. - 4 Places

# Fixture Post Mounting Components

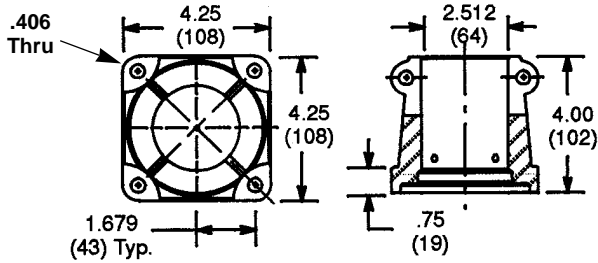
Cooper Power Tools' fixture post mounting components provide the mounting versatility to permit the positioning of Buckeye self-feed tools to meet your application requirements.

The illustrations below depict only a few of the endless configurations possible with these fixture post mounting components.



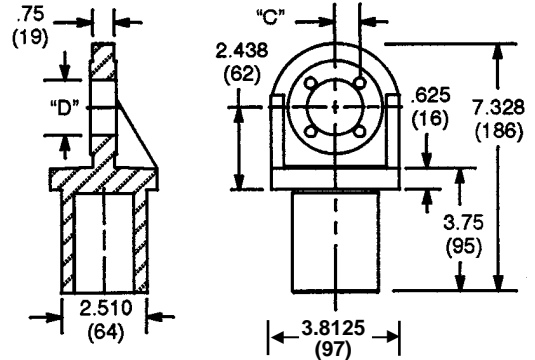
# Fixture Post Mounting Components

## 1110493 Base Mount Assembly

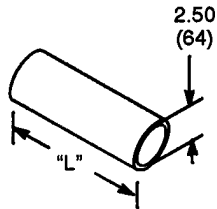


## Tool Mount Assembly

Designed to hold Buckeye 21L, 31L, 42L and 46L Self-Feed Drills.



## 1110496-(XX) Mounting Tube



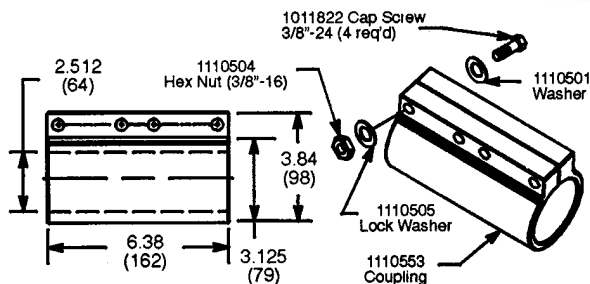
Tool Series	Tool Mount Assembly	Diameter "D"		Dimension "C"	
		in.	mm	in.	mm
21L, 21LD	1110494	1.625/1.627	41	0.718/0.720	18
31L, 31LD	1110494	1.625/1.627	41	0.718/0.720	18
42L, 42LD	1110507	1.875/1.877	48	0.843/0.845	21
46L, 46LD	1110508	2.501/2.503	64	1.091/1.095	28

Tube Part No.	Length "L"*	
	in.	mm
1110496-06	6	152
1110496-12	12	305
1110496-18	18	457
1110496-24	24	610
1110496-30	30	762

\* Longer tubes available upon request.

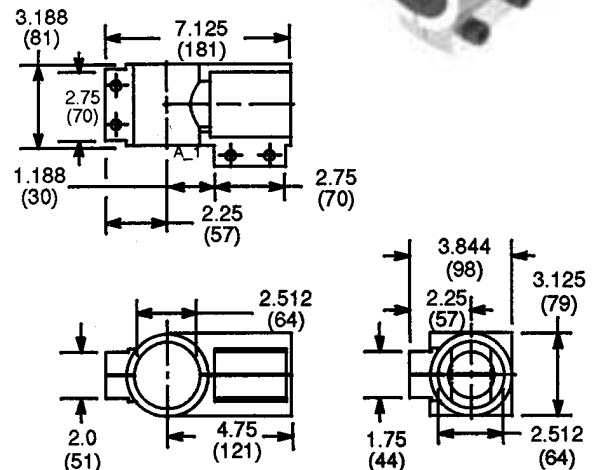
## 1110553 Coupling Assembly

Used in conjunction with mounting tubes to permit elongation of mounting assembly either horizontally or vertically.



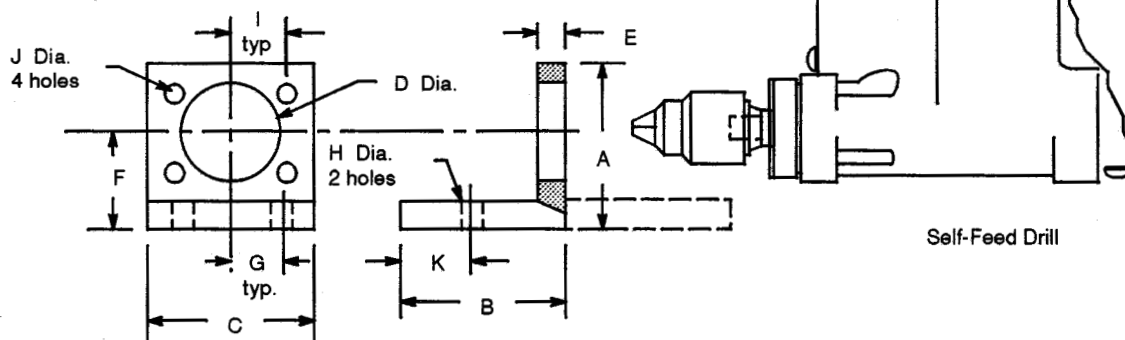
## 1110495 Tee Mount

Forms a right angle from mounting tube to allow for proper positioning of the tool to the workpiece.



# Self-Feed Tool Accessories

## L - Bracket Mount

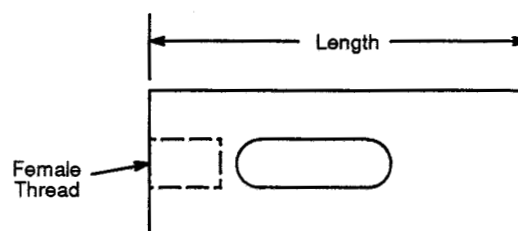


Part No.	Tool Series	Dimensions											
		A		B		C		D		E		F	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
1021862	21L	3.00	76	3.00	76	3.00	76	1.626	41	.438	11	1.75	44
1023793	31L, 42L	3.00	76	3.00	76	3.00	76	1.628 1.875	48	.438	11	1.88	48
1024262	46L	4.13	105	3.50	89	3.88	99	1.876 2.502	64	.563	14	2.50	64

Part No.	Tool Series	Dimensions Continued									
		G		H		I		J		K	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
1021862	21L	1.00	25	.328	8.3	0.719	18	.196	5.0	1.75	44
1023793	31L 42L	1.00	25	.328	8.3	0.844	21	.196	5.0	1.75	44
1024262	46L	1.48	38	.344	8.7	1.094	28	.265	6.7	2.13	54

## Morse Taper Adapter (female thread)

For use with 46L series tools only. Order as a second line item with a tool termination code of -40.



Part No.	Description	Thread	Length	
			in.	mm
529279	#1 Morse Taper	1/2"-20	3.69	94
527989	#2 Morse Taper	1/2"-20	4.12	105

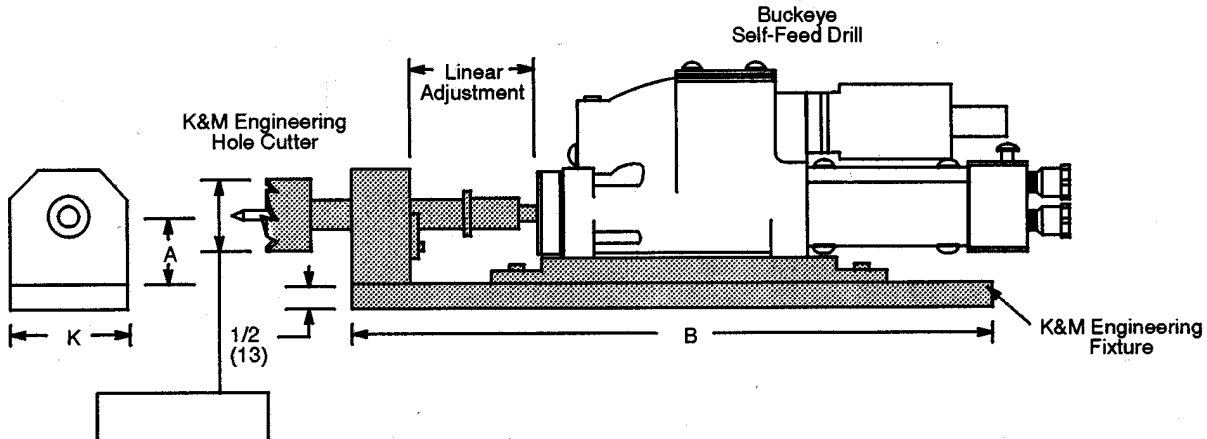
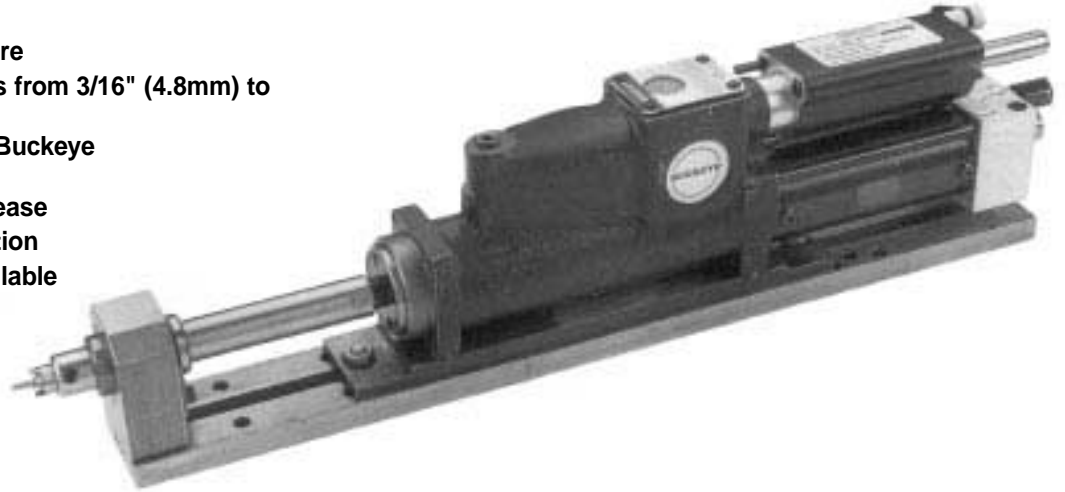
## K&M Engineering Hole Cutters & Fixtures

Hole Cutters by K&M Engineering - to expand the hole capacity of Buckeye Self-Feed Drills

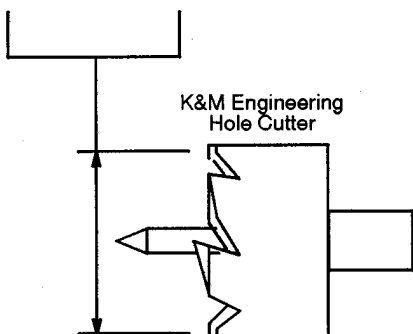
NOTE: Cooper Power Tools DOES NOT provide hole cutters or fixtures. They must be ordered from: K&M Engineering, P.O. Box 384, Farmington, Michigan 48332, Phone - 248-442-8550, Fax - 313-442-8555.

### Features:

- Quick change tool fixture
- Hole capacity increases from 3/16" (4.8mm) to 2-3/4" (70mm)
- Adapts to all standard Buckeye Self-Feed drills
- Self contained plug release
- Rugged steel construction
- Slug holding arbor available

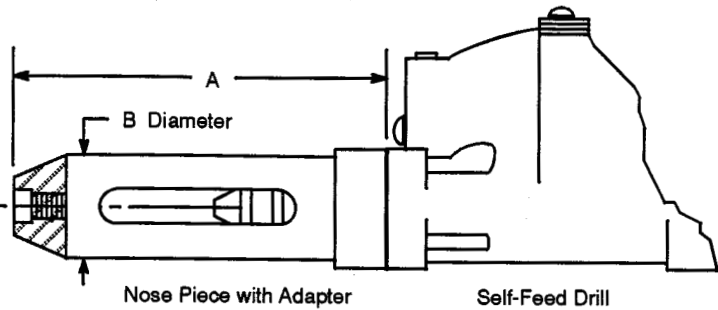
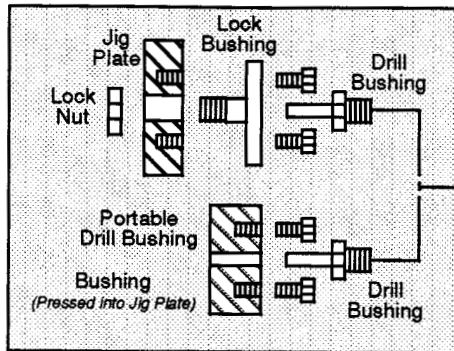


Hole Size Range		Fixture Assembly Number	Self-Feed Drill Series	A Dim.		B Dim.		K Dim.	
in.	mm			in.	mm	in.	mm	in.	mm
3/16 - 1/4	4.8 - 6.4	CMT 621	21LD	1.50	38	14.50	368	1.75	44
3/8 - 13/16	9.5 - 21	CMT 622	31LD	1.50	38	14.50	368	1.75	44
7/8 - 1-3/8	22 - 35	CMT 622	42LD	1.50	38	14.50	368	1.75	44
1-3/8 - 2-3/4	35 - 70	CMT 624	46LD	2.63	67	20.00	508	2.75	70



# Self-Feed Tool Accessories

## Aircraft Nose Mount



NOTE: Items in the shaded area are NOT supplied by Cooper Power Tools.

Part No.	A		B		Series	Description
	in.	mm	in.	mm		

### Tool Used On 21L

1025199	5.41	137	1.69	43	24000	Aluminum Material
1024259	6.50	165	1.69	43	21000	Aluminum Material
1024258	5.41	137	1.69	43	21000	Aluminum Material
1025302	7.00	178	1.69	43	21000	Aluminum Material
1025433	7.50	191	1.69	43	21000	Aluminum Material

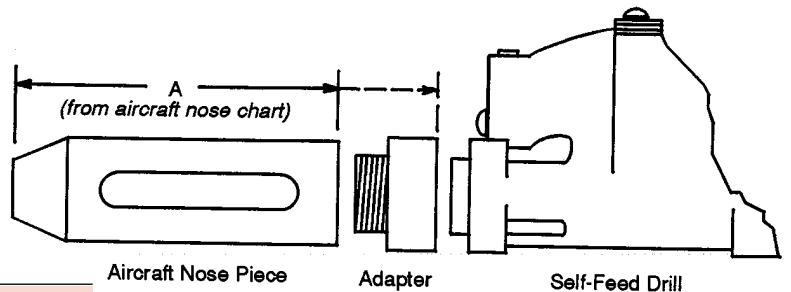
### Tool Used On 31L, 42L

1025097	7.72	196	2.00	51	21000	Aluminum Material
1024260	7.72	196	2.00	51	22000	Aluminum Material
1024261	7.72	196	2.00	51	23000	Aluminum Material
1025351	7.44	189	2.00	51	21000	Steel Material (includes 1024823 Adapter)
1025352	7.69	195	2.00	51	22000	Steel Material (includes 1024823 Adapter)
1025353	7.69	195	2.00	51	23000	Steel Material (includes 1024823 Adapter)
1025354	7.69	195	2.00	51	24000	Steel Material (includes 1024823 Adapter)
1019119	7.72	196	2.00	51	21000	Aluminum Material (vacuum pick-up)
1019120	7.72	196	2.00	51	22000	Aluminum Material (vacuum pick-up)
1019121	7.72	196	2.00	51	23000	Aluminum Material (vacuum pick-up)
1019122	7.72	196	2.00	51	24000	Aluminum Material (vacuum pick-up)

### Tool Used On 46L

1024266	10.22	260	2.48	63	22000	Steel Material (includes 1015949 Adapter)
1024265	10.22	260	2.48	63	23000	Steel Material (includes 1015949 Adapter)
1024264	10.22	260	2.48	63	24000	Steel Material (includes 1015949 Adapter)
1024263	10.22	260	2.48	63	25000	Steel Material (includes 1015949 Adapter)

## Aircraft Nose Adapters



Part No.	Thread C	Description
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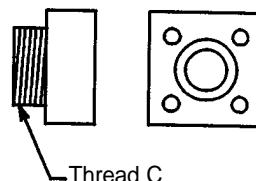
### Tool Used On 31L, 42L

1024823	1.825"-18 L.H.	Threaded Adapter - Steel Material
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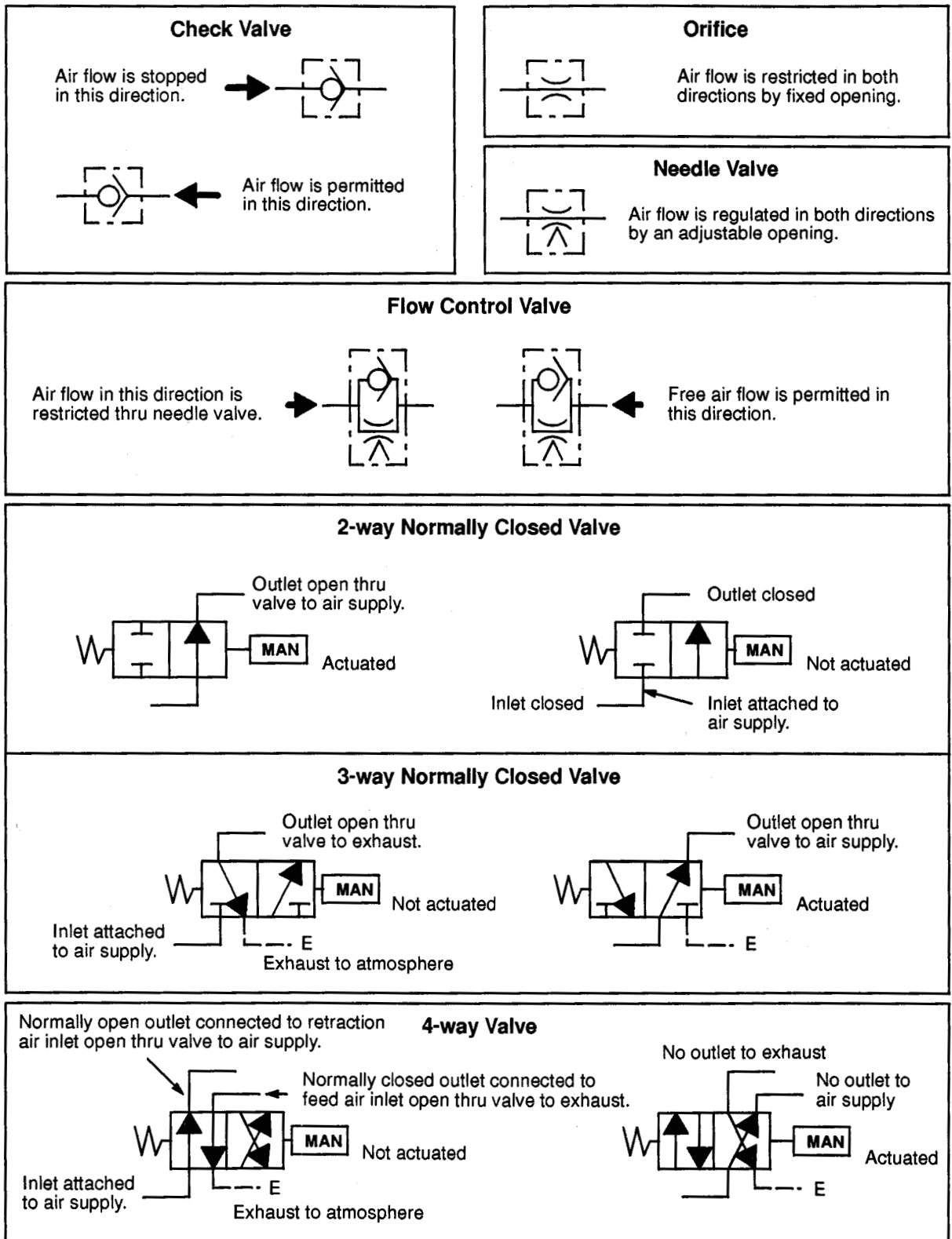
### Tool Used On 46L

1015949	2.250"-20 L.H.	Threaded Adapter - Steel Material
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NOTE: Adapters are included with the aircraft nose as required.



## Valve Schematic Descriptions





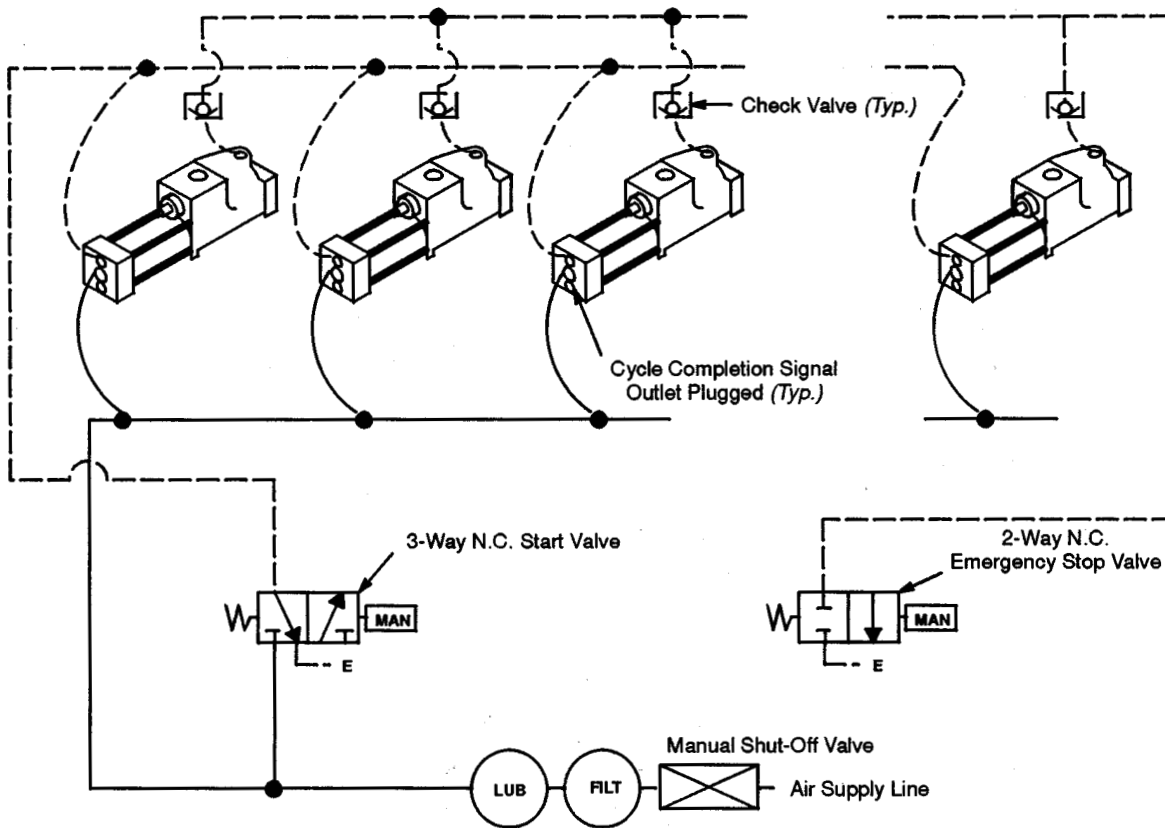
# Self-Feed Air Tool Circuitry

## Multiple 800 Series Tools with Emergency Retract

### SEQUENCE OF OPERATIONS

To start cycle: Momentarily depress start valve (green button) thus pressurizing the start signal inlet and pilot chamber in each tool. Tools retract automatically individually as front pilot valve is engaged.

To stop cycle: Remotely depress stop valve (red button) exhausting start signal circuit of each tool and retracting tools to normal start position.



Required	Identification	Description
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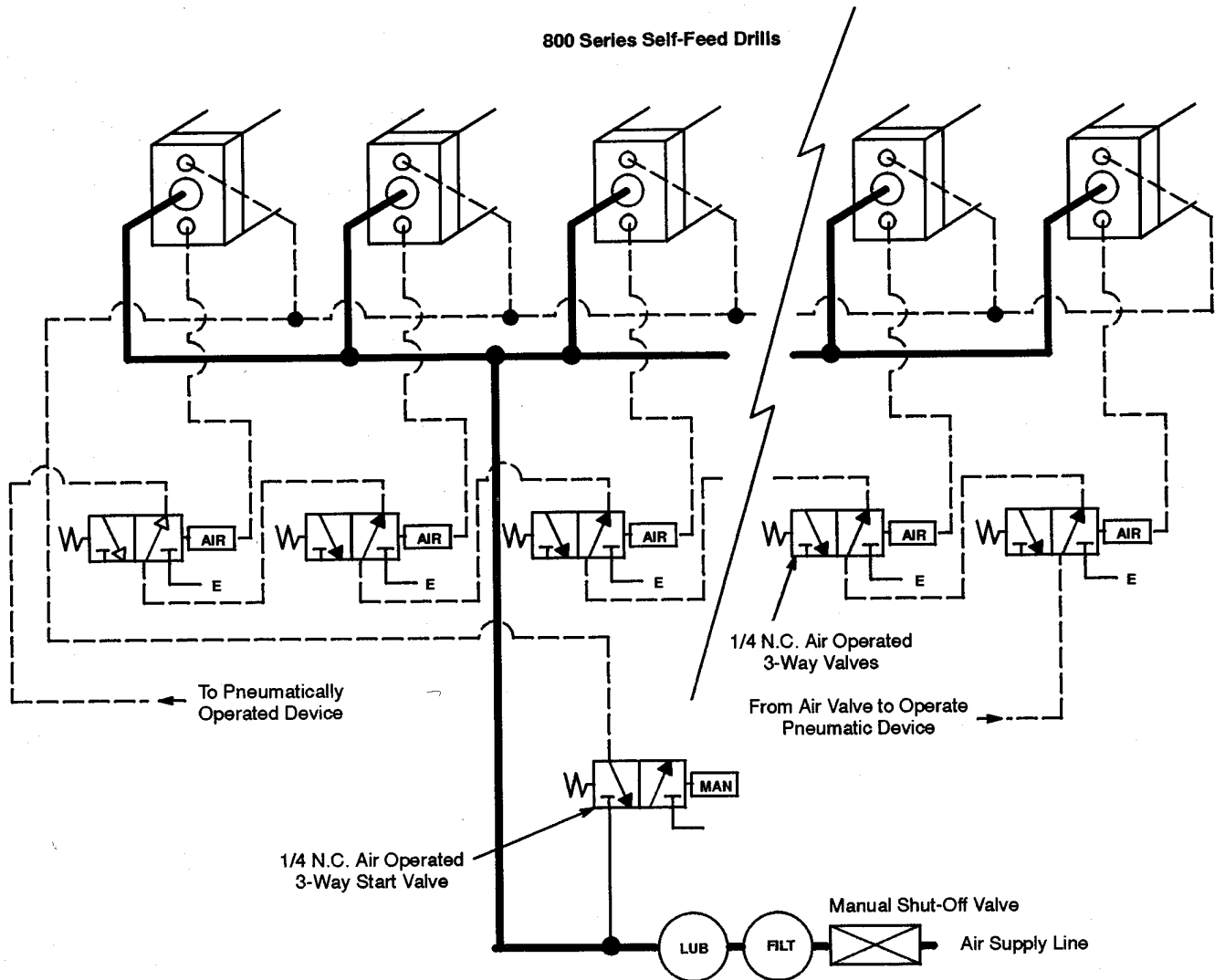
### Component List

1	Check Valve	1/4" (6.4mm) check valve male pipe threads at both ends.
1	3-way N.C. start valve	1/4" (6.4mm) 3-way normally closed manually actuated valve (green palm button)
1	2-way N.C. emergency stop valve	1/4" (6.4mm) 2-way normally closed manually actuated valve (red palm button)

## Multiple 800 Series Tools with Cycle Completion Circuit

### SEQUENCE OF OPERATIONS

Momentarily depressing manual 3-way valve pressurizes the start signal inlets of the 800 series tools, thus starting the tools and exhausting the cycle completion signal outlets.



Required	Description
----------	-------------

### Component List

- |                   |   |
|-------------------|---|
| 1                 | 1/4" (6.4mm) 3-way normally closed palm button operated valve |
| One for each tool | 1/4" (6.4mm) 3-way normally closed air operated valve         |

# Self-Feed Air Tool Circuitry

## Multiple 800 Series Tools with Clamping Cylinder

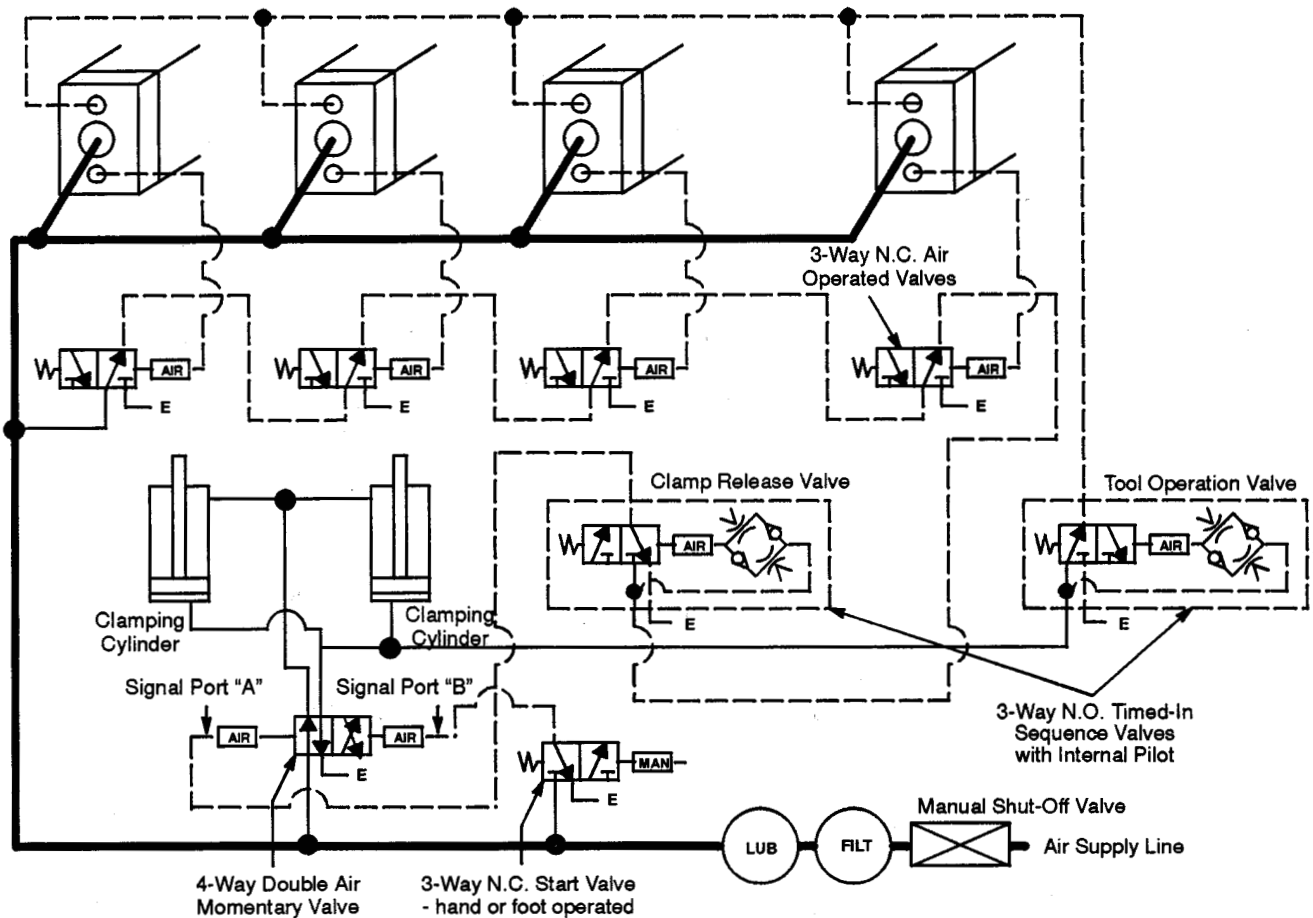
### SEQUENCE OF OPERATIONS

Momentary depression of start valve pressurizes the "B" signal port of the 4-way valve, thus shifting it to operate the clamping cylinders. An air line leading from the clamp side of these cylinders sends pressurized air to the inlet port of the tool operation sequence valve.

This normally open 3-way valve has the timed operator set for a time delay on operation, thus when pressure is applied to the inlet port, the valve remains open. At the same time air is metered through the sequence head. After the preset delay, inlet closes and outlet opens to exhaust. This action sends a momentary pressure to the start signal inlet of the self-feeding tools, thus starting their cycle of operation.

When the tools return to their fully retracted position, a continuous pressure is sent from the cycle completion assembly to the operators of their respective 3-way air operated valves. As the last tool is completely retracted, the pressurized air series circuit is again open pressurizing the inlet of the clamp release valve.

This too is a normally open 3-way sequence valve that sends a momentary signal thru it when its inlet is pressurized. The outlet of the clamp release valve is connected to signal port "A" of the 4-way valve. When this outlet is momentarily pressurized it returns the 4-way valve to its normal position where air is exhausted from the clamp side of the clamping cylinders and air is sent into the release side. Thus releasing the clamp.



Required	Description
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### Component List

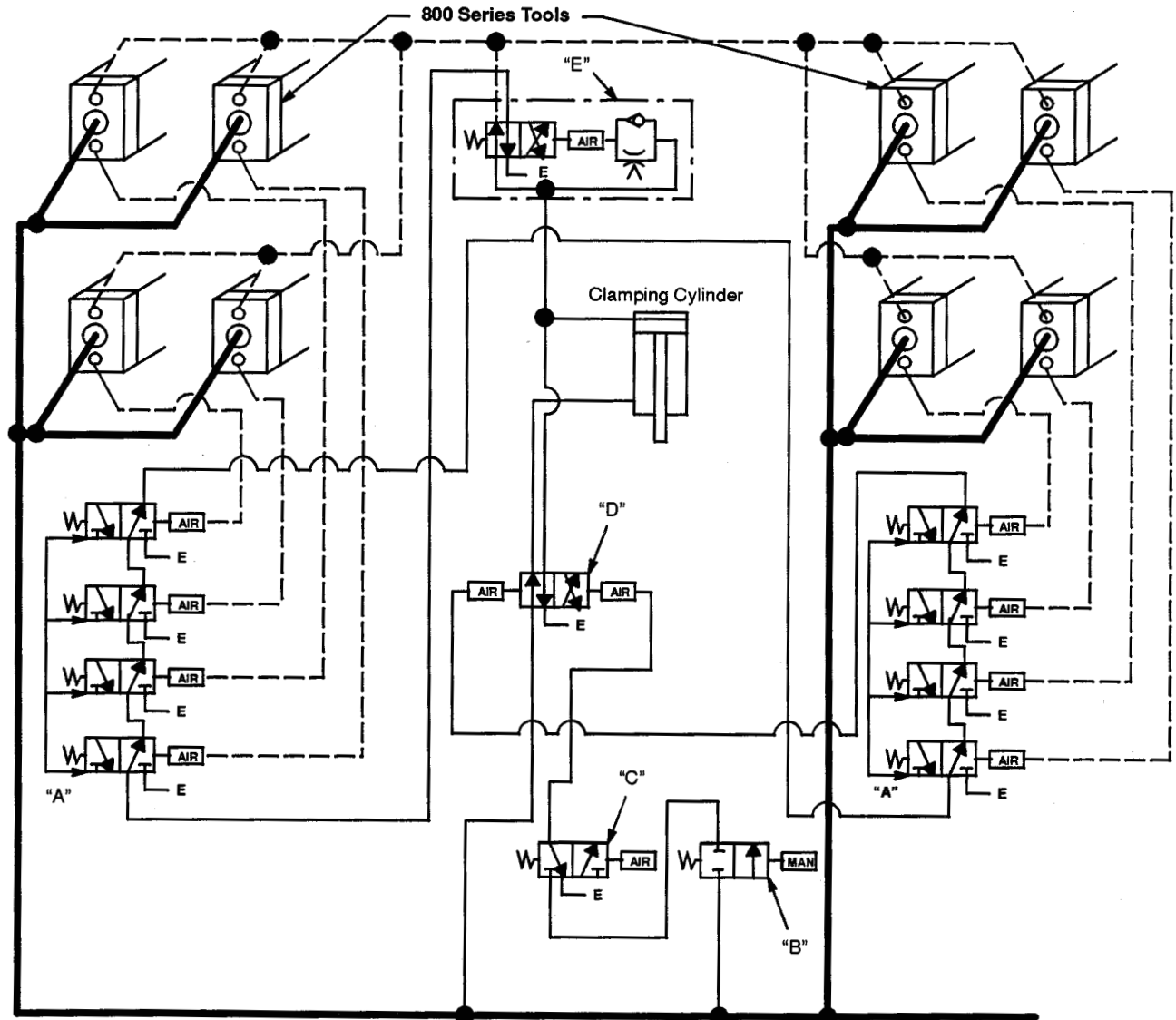
1 per tool	3-way N.C. air operated
2	3-way N.O. timed-in sequence
1	4-way double air momentary
1	3-way N.C. start

## Two Groups Of Four 800 Series Tools Arranged To Sequence In Conjunction With Clamping Cylinder

### SEQUENCE OF OPERATIONS

1. Push start button.
2. Clamp cylinder closes.
3. Tools feed and retract.
4. Clamp cylinder releases.

To stop cycle: Remotely depress stop valve (red button) exhausting start signal circuit of each tool and retracting tools to normal start position.



Symbol	Quantity	Description
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### Component List

A	8	1/8" (3.2mm) 3-Way N.C. air operated valve
B	1	1/4" (6.4mm) 2-Way N.C. palm button valve
C	1	1/4" (6.4mm) 3-Way N.C. palm button valve
D	1	1/4" (6.4mm) 4-Way double air momentary valve
E	1	1/4" (6.4mm) 4-Way air operated timed sequence valve (TDF)

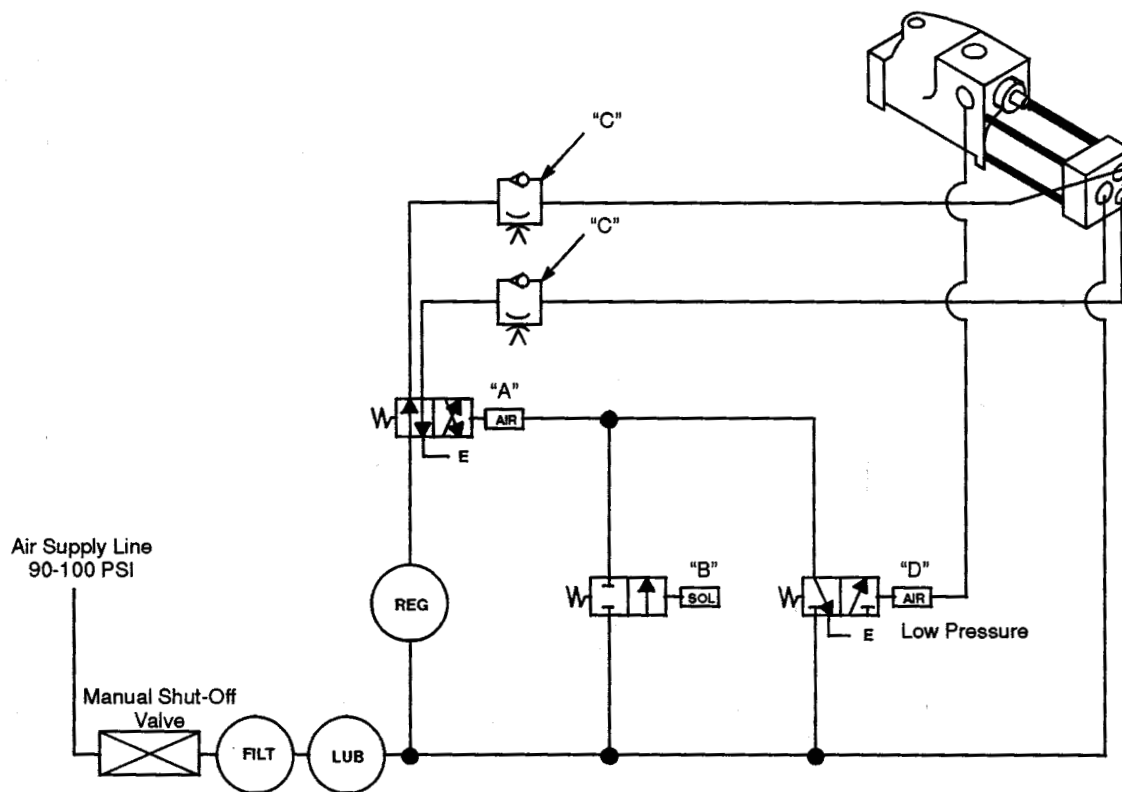
# Self-Feed Air Tool Circuitry

## Self-Feeding Torque Control Shut Off Fastening Tools

### SEQUENCE OF OPERATION

Valve "B" is momentarily actuated either manually or automatically. It in turn pressurizes the pilot chamber of valve "A", sending line pressure to the back side of the feed cylinder. As the piston starts its forward stroke it opens the built-in motor air valve and starts the motor. The motor exhaust will signal valve "D" to open, holding valve "A" in its present position until the screw is torqued up, and the motor shuts off. Valve "D" then shifts back to exhaust and allows valve "A" to shift, which retracts the tool. The tool then resets itself for the next cycle.

Feed rate of the tool must be adjusted to coincide with the advance of the fastener being driven. Therefore, it is recommended that a hydraulic dashpot be employed for precise feed rate control.



Symbol	Quantity	Description
--------	----------	-------------

### Component List

A	1	1/4" (6.4mm) 4-Way air actuated valve
B	1	1/4" (6.4mm) 2-Way N.C./Base, Grommet
C	2	1/8" (3.2mm) Flow control valve
D	1	1/4" (6.4mm) 3-Way N.C. air operated valve ultra low pilot

## Air Pressure Gage Kit



## 45-0982 Push Type Grease Gun



Part Number	Description
A13157	Air pressure gage kit includes gage, hypodermic needle, protector cap & case.
13158	Hypodermic needle - package of one

## 1021662 Hydraulic Filler Gun (used with all tools equipped with a Dashpot)



## Lubricants

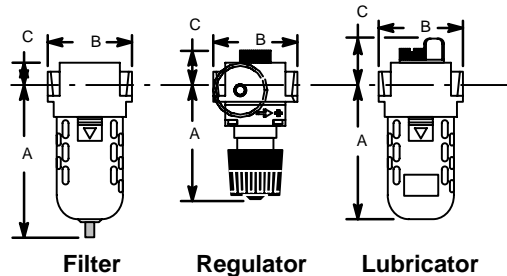
Part Number	Size	Description	M.S.D.S. No.
<b>Oils</b>			
540397	1 qt. plastic	Air Line Oil	CPT-153
533485	1 gal. metal	Air Line Oil	CPT-153
536333	1 gal. metal	High Film Strength Air Line Oil	CPT-154
26185	4 oz. tube	O-Ring Lubricant	CPT-144
1021775	1 qt.	Hydraulic Fluid	CPT-158
<b>Greases</b>			
513156	16 oz. can	Teflon Grease	CPT-145
540395	2 oz. tube	Teflon Grease	CPT-145
540394	8 oz. tube	Molykote Gear Grease	CPT-146

NOTE: Under normal conditions of use, lubrication products sold separately for or used within these tools should not cause an exposure hazard. Refer to the Material Safety Data Sheet (M.S.D.S.) for Safety and Disposal information. M.S.D.S. sheets shown in the above chart are available upon request from Cooper Power Tools.

# General Accessories

## Filters, Regulators, Lubricators

### ■ Modular Construction



Model Number	NPT	Air Flow		Bowl Capacity		"A"		"B"		"C"	
	in.	SCFM	m <sup>3</sup> /min	oz.	liter	in.	mm	in.	mm	in.	mm

#### Filters

F03-M	3/8	44	12.9	5.0	0.15	5.6	142	3.0	76	0.9	23
F04-M	1/2	138	39.1	10	0.30	6.4	163	3.4	86	1.0	25

#### Lubricators – Economist (Standard Mist)

L03-EP	3/8	48	6.2	5.0	0.15	4.8	122	3.0	76	1.6	41
L04-EP	1/2	102	13.6	10	0.30	5.4	137	3.4	86	1.6	41

#### Lubricators – Atomist (Fine Mist)

L03-AP	3/8	48	6.2	5.0	0.15	4.8	122	3.0	76	1.6	41
L04-AP	1/2	102	13.6	10	0.30	5.4	137	3.4	86	1.6	41

Model Number	NPT	Air Flow		Maximum Pressure		"A"		"B"		"C"	
	in.	SCFM	m <sup>3</sup> /min	psig	bar	in.	mm	in.	mm	in.	mm

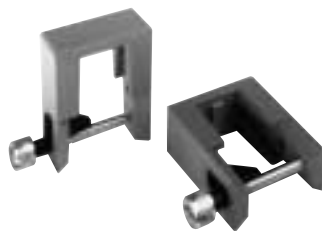
#### Regulators

R03-G	3/8	80	10.8	125	8.5	3.9	99	3.0	76	1.3	33
R04-G	1/2	195	26.1	125	8.5	5.6	142	3.4	86	1.4	36

#### Modular Sleeve (with O-Ring)

Model: MS101

Unique modular sleeve design easily and quickly connects one or more units and accessories together without pipe nipples. Hand tightening the threaded pin provides a tight seal between the units. Modular sleeves do not add length to combination assemblies, and make a more compact installation.



#### Modular End Blocks (sold in pairs)

Models: EB-103 (3/8"), EB-104 (1/2")

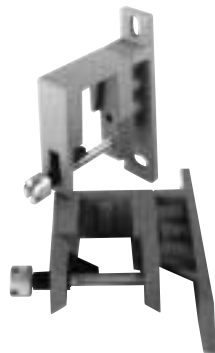
The threaded End Blocks, together with the modular sleeve, allows a single unit or a combination of units to be piped into the air system in the modular mode. This feature allows ease of unit servicing or replacement without disturbing the airline connections. End blocks add 1.19" (30 mm) to each end of the unit where used. NOTE: The 3/4" end blocks are designed only to adapt to 3/4" piping systems and do not increase flow ratings listed for any unit.



#### Modular Sleeve & Bracket (with O-Ring)

Model: MS102

Combination sleeve/wall mounting bracket as shown. Designed for mounting a single unit or combination of units directly to the wall. The sleeve and mounting bracket can be ordered assembled from the factory, or just the mounting bracket alone to be used on existing modular sleeves.



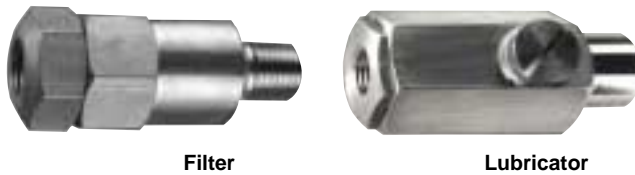
#### Automatic Drain

Model: AD-101

Automatic Mechanical Drain is a float-type mechanism with a 1/8" NPT threaded drain port completely enclosed in the filter bowl. The float is constructed of rigid cellular rubber. The drain will operate automatically under air pressure ranging from 20 to 175 psig (1.5 to 12 bar).



## Airline Filter and Lubricator



Part Number	Description	NPT	Air Flow		Max. Pressure	
		in.	SCFM	dm <sup>3</sup> /s	psig	bar
45-211	Filter w/cartridge*	1/4	17	8.0	100	6.9
45-0212	Filter cartridge	—	—	—	—	—
45-0201	Lubricator**	1/4	22	10	100	6.9
45-0301	Lubricator**	3/8	22	10	100	6.9

GENERAL: Use where inconvenient for standard filter or lubricator.  
 (\*) NOTE: Filter will not remove water  
 (\*\*\*) NOTE: One ounce reservoir good for an average eight hour shift.

## Air Hoses



Part Number	Hose I.D.		Fittings (NPT)		Length	
	in.	mm	in.	in.	ft.	m
A110026	3/16	4.7	1/8	3/8-24*	6.0	1.8
A139856	3/16	4.7	1/8	1/8	6.0	1.8
45-1307	3/16	4.7	1/8	1/4	7.0	2.1
45-1408	1/4	6.4	1/4	1/4	8.0	2.4
45-1409	1/4	6.4	1/8	1/4	8.0	2.4
45-1508	5/16	7.9	1/4	1/4	8.0	2.4
45-1610	3/8	9.5	3/8	3/8	10	3.0
45-1620	3/8	9.5	3/8	3/8	20	6.1
45-1630	3/8	9.5	3/8	3/8	30	9.1
45-1810	1/2	12.7	3/8	1/2	10	3.0
45-1812	1/2	12.7	1/2	1/2	12	3.7
45-1825	1/2	12.7	1/2	1/2	25	7.6
45-1850	1/2	12.7	1/2	1/2	50	15.2

GENERAL: 3/16" & 1/4" hoses have braided covers, all others have neoprene covers.

(\*) NOTE: 3/8"-24 is a straight thread

## Activeswivel



Part Number	NPT	Air Flow		Max. Pressure		Weight	
	in.	SCFM	m <sup>3</sup> /min	psig	bar	lbs.	kg
SW-102	1/4	25	7.1	150	10.4	0.20	0.09
SW-103	3/8	45	12.7	150	10.4	0.40	0.18
SW-104	1/2	65	18.4	150	10.4	0.80	0.36
SWR-102*	1/4	25	7.1	150	10.4	0.25	0.11

(\*) NOTE: Equipped with a built-in flow regulator

## Swivel Hose Couplings

Part Number	NPT
	in.
A20744	1/4
A20741	3/8
A20764	1/2



## Air Pressure Gage Kit

Part Number	Description
A13157	Gage, needle, cap & case
13158	Hypodermic needle (1)



## Quick Disconnect Fittings

Fitting Type*	NPT	Nominal Size		
	in.	1/4"	3/8"	1/2"

### Coupler (male NPT)

	1/8	45-0710	—	—
	1/4	45-0711	45-0713	—
	3/8	45-0712	45-0714	45-0716
	1/2	—	45-0715	45-0717

### Coupler (female NPT)

	1/8	45-0730	—	—
	1/4	45-0731	45-0733	—
	3/8	45-0732	45-0734	45-0736
	1/2	—	45-0735	45-0737

### Nipple (male NPT)

	1/8	45-0720	45-0723	—
	1/4	45-0721	45-0724	—
	3/8	45-0722	45-0725	45-0726
	1/2	—	—	45-0727

### Nipple (female NPT)

	1/8	45-0740	—	—
	1/4	45-0741	45-0744	—
	3/8	45-0742	45-0745	45-0746
	1/2	—	—	45-0747

s)

	1/4**	45-0748	45-0750	—
	3/8**	45-0749	45-0751	45-0752
	1/2**	—	—	45-0753

(\*) NOTE: Nipples of one size will not fit couplers of another size.

(\*\*) NOTE: Indicates inside diameter of hose

NOTE: 1/4" nominal will pass 49 cfm free air @ 90 psi, but pressure drop exceeds 10 psi with air flow over 30 cfm.

3/8" nominal will pass 90 cfm free air @ 90 psi, but pressure drop exceeds 10 psi with air flow over 53 cfm.

1/2" nominal will pass 168 cfm free air @ 90 psi, but pressure drop exceeds 10 psi with air flow over 109 cfm.



# TRAINING

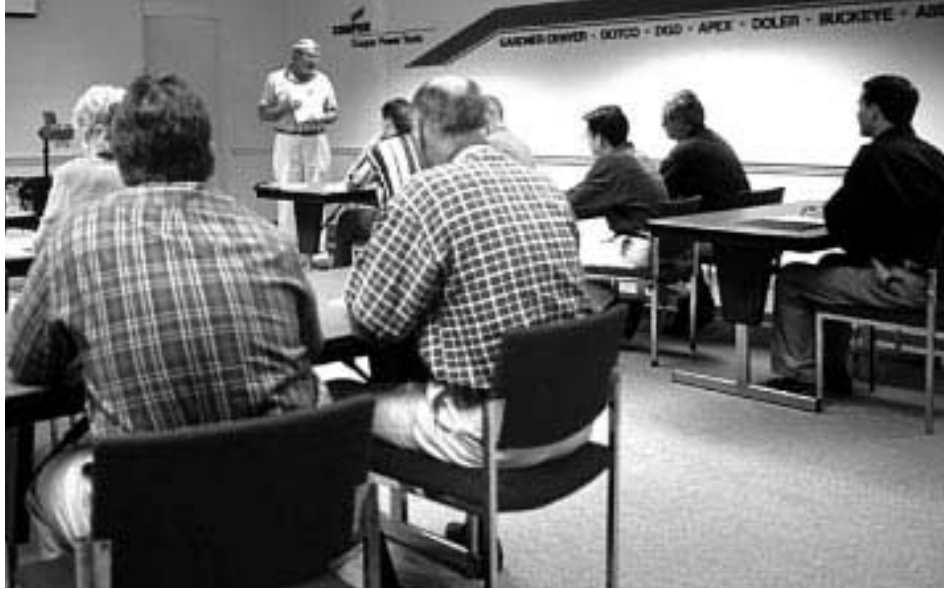
### Our Commitment To Your Success

The Buckeye, Dotco, and Gardner-Denver brands of tools are carefully designed and built from the finest materials available in order to provide years of trouble free service. But, as with any piece of equipment, service problems can occur. All tools are designed to be easy to service . . . that is, of course, if you know what you are doing.

To facilitate quick repairs, and limit downtime . . . Cooper Power Tools conducts training seminars covering all aspects of every tool we make.

Introductory training seminars are designed to fully acquaint students with the entire line of tools and their fundamental operation. The emphasis is on thoroughly understanding each tool . . . its features, uses, and the best ways to demonstrate the tool to a potential buyer.

Advanced training seminars, which are often tailored to individual needs, are designed to hone the skills of the experienced student. Hands-on experience, with an emphasis on troubleshooting and repairing, are the focus of this training. For additional information contact Cooper Power Tools.



# Conversion Chart

mm	Dec.	in.	mm	Dec.	in.	mm	Dec.	in.	mm	Dec.	in.	mm	Dec.	in.
0.100	.0039		5.159	.2031	13/64	10.200	.4016		15.300	.6024		20.300	.7992	
0.200	.0079		5.200	.2047		10.300	.4055		15.400	.6063		20.400	.8031	
0.300	.0118		5.300	.2087		10.319	.4063	13/32	15.478	.6094	39/64	20.500	.8071	
0.397	.0156	1/64	5.400	.2126		10.400	.4094		15.500	.6102		20.600	.8110	
0.400	.0157		5.500	.2165		10.500	.4134		15.600	.6142		20.638	.8125	13/16
0.500	.0197		5.556	.2188	7/32	10.600	.4173		15.700	.6181		20.700	.8150	
0.600	.0236		5.600	.2205		10.700	.4213		15.800	.6220		20.800	.8189	
0.700	.0276		5.700	.2244		10.716	.4219	27/64	15.875	.6250	5/8	20.900	.8228	
0.794	.0313	1/32	5.800	.2283		10.800	.4252		15.900	.6260		21.000	.8268	
0.800	.0315		5.900	.2323		10.900	.4291		16.000	.6299		21.034	.8281	53/64
0.900	.0354		5.953	.2344	15/64	11.000	.4331		16.100	.6339		21.100	.8307	
1.000	.0394		6.000	.2362		11.100	.4370		16.200	.6378		21.200	.8346	
1.100	.0433		6.100	.2402		11.113	.4375	7/16	16.272	.6406	41/64	21.300	.8386	
1.191	.0469	3/64	6.200	.2441		11.200	.4409		16.300	.6417		21.400	.8425	
1.200	.0472		6.300	.2480		11.300	.4449		16.400	.6457		21.431	.8438	27/32
1.300	.0512		6.350	.2500	1/4	11.400	.4488		16.500	.6496		21.500	.8465	
1.400	.0551		6.400	.2520		11.500	.4528		16.600	.6535		21.600	.8504	
1.500	.0591		6.500	.2559		11.509	.4531	29/64	16.669	.6563	21/32	21.700	.8543	
1.588	.0625	1/16	6.600	.2598		11.600	.4567		16.700	.6575		21.800	.8583	
1.600	.0630		6.700	.2638		11.700	.4606		16.800	.6614		21.828	.8594	55/64
1.700	.0669		6.747	.2656	17/64	11.800	.4646		16.900	.6654		21.900	.8622	
1.800	.0709		6.800	.2677		11.900	.4685		17.000	.6693		22.000	.8661	
1.900	.0748		6.900	.2717		11.906	.4688	15/32	17.066	.6719	43/64	22.100	.8701	
1.984	.0781	5/64	7.000	.2756		12.000	.4724		17.100	.6732		22.200	.8740	
2.000	.0787		7.100	.2795		12.100	.4764		17.200	.6772		22.225	.8750	7/8
2.100	.0827		7.144	.2813	9/32	12.200	.4803		17.300	.6811		22.300	.8780	
2.200	.0866		7.200	.2835		12.300	.4843		17.400	.6850		22.400	.8819	
2.300	.0906		7.300	.2874		12.303	.4844	31/64	17.463	.6875	11/16	22.500	.8858	
2.381	.0938	3/32	7.400	.2913		12.400	.4882		17.500	.6890		22.600	.8898	
2.400	.0945		7.500	.2953		12.500	.4921		17.600	.6929		22.622	.8906	57/64
2.500	.0984		7.541	.2969	19/64	12.600	.4961		17.700	.6968		22.700	.8937	
2.600	.1024		7.600	.2992		12.700	.5000	1/2	17.800	.7008		22.800	.8976	
2.700	.1063		7.700	.3031		12.800	.5039		17.859	.7031	45/64	22.900	.9016	
2.778	.1094	7/64	7.800	.3071		12.900	.5079		17.900	.7047		23.000	.9055	
2.800	.1102		7.900	.3110		13.000	.5118		18.000	.7087		23.019	.9063	29/32
2.900	.1142		7.938	.3125	5/16	13.097	.5156	33/64	18.100	.7126		23.100	.9094	
3.000	.1181		8.000	.3150		13.100	.5157		18.200	.7165		23.200	.9134	
3.100	.1220		8.100	.3189		13.200	.5197		18.256	.7188	23/32	23.300	.9173	
3.175	.1250	1/8	8.200	.3228		13.300	.5236		18.300	.7205		23.400	.9213	
3.200	.1260		8.300	.3268		13.400	.5276		18.400	.7244		23.416	.9219	59/64
3.300	.1299		8.334	.3281	21/64	13.494	.5313	17/32	18.500	.7283		23.500	.9252	
3.400	.1339		8.400	.3307		13.500	.5315		18.600	.7323		23.600	.9291	
3.500	.1378		8.500	.3346		13.600	.5354		18.653	.7344	47/64	23.700	.9331	
3.572	.1406	9/64	8.600	.3386		13.700	.5394		18.700	.7362		23.800	.9370	
3.600	.1417		8.700	.3425		13.800	.5433		18.800	.7402		23.813	.9375	15/16
3.700	.1457		8.731	.3438	11/32	13.891	.5469	35/64	18.900	.7441		23.900	.9409	
3.800	.1496		8.800	.3465		13.900	.5472		19.000	.7480		24.000	.9449	
3.900	.1535		8.900	.3504		14.000	.5512		19.050	.7500	3/4	24.100	.9488	
3.969	.1563	5/32	9.000	.3543		14.100	.5551		19.100	.7520		24.200	.9528	
4.000	.1575		9.100	.3583		14.200	.5591		19.200	.7559		24.209	.9531	61/64
4.100	.1614		9.128	.3594	23/64	14.288	.5625	9/16	19.300	.7598		24.300	.9567	
4.200	.1654		9.200	.3622		14.300	.5630		19.400	.7638		24.400	.9606	
4.300	.1693		9.300	.3661		14.400	.5669		19.447	.7656	49/64	24.500	.9646	
4.366	.1719	11/64	9.400	.3701		14.500	.5709		19.500	.7677		24.600	.9685	
4.400	.1732		9.500	.3740		14.600	.5748		19.600	.7717		24.606	.9688	31/32
4.500	.1772		9.525	.3750	3/8	14.684	.5781	37/64	19.700	.7756		24.700	.9724	
4.600	.1811		9.600	.3780		14.700	.5787		19.800	.7795		24.800	.9764	
4.700	.1850		9.700	.3819		14.800	.5827		19.844	.7813	25/32	24.900	.9803	
4.763	.1875	3/16	9.800	.3858		14.900	.5866		19.900	.7835		25.000	.9843	
4.800	.1890		9.900	.3898		15.000	.5906		20.000	.7874		25.003	.9844	63/64
4.900	.1929		9.922	.3906	25/64	15.081	.5938	19/32	20.100	.7913		25.100	.9882	
5.000	.1969		10.000	.3937		15.100	.5945		20.200	.7953		25.200	.9921	
5.100	.2008		10.100	.3976		15.200	.5984		20.241	.7969	51/64	25.300	.9961	
												25.400	1.000	1

## Torque Conversion – In. Lbs (Nm)

In. Lbs.	Nm	In. Lbs.	Nm	In. Lbs.	Nm
5	0.6	50	5.7	140	15.8
10	1.1	60	6.8	150	17.0
15	1.7	70	7.9	160	18.1
20	2.3	80	9.0	170	19.2
25	2.8	90	10.2	180	20.3
30	3.4	100	11.3	190	21.5
35	4.0	110	12.4	200	22.6
40	4.5	120	13.6		
45	5.1	130	14.7		

## Torque Conversion – Ft. Lbs (Nm)

Ft. Lbs.	Nm	Ft. Lbs.	Nm	Ft. Lbs.	Nm
1	1.36	43	58.3	85	115.3
2	2.7	44	60.0	86	117.0
3	4.1	45	61.0	87	118.0
4	5.4	46	62.4	88	119.3
5	6.8	47	63.7	89	121.0
6	8.1	48	65.1	90	122.0
7	9.5	49	66.4	91	123.4
8	10.9	50	67.8	92	125.0
9	12.2	51	69.2	93	126.1
10	13.6	52	70.5	94	127.5
11	14.9	53	71.9	95	129.0
12	16.3	54	73.2	96	130.2
13	17.6	55	74.6	97	131.5
14	19.0	56	75.9	98	133.0
15	20.3	57	77.3	99	134.2
16	21.7	58	78.7	100	135.6
17	23.1	59	80.0	110	149.2
18	24.4	60	81.4	115	156.0
19	25.8	61	82.7	120	163.0
20	27.1	62	84.1	125	170.0
21	28.5	63	85.4	130	176.3
22	29.8	64	86.8	135	183.1
23	31.2	65	88.1	140	190.0
24	32.5	66	90.0	145	197.0
25	33.9	67	90.9	150	203.4
26	35.3	68	92.2	155	210.2
27	36.6	69	93.6	160	217.0
28	38.0	70	94.9	165	224.0
29	39.3	71	96.3	170	231.0
30	40.7	72	97.6	175	237.3
31	42.0	73	99.0	180	244.1
32	43.4	74	100.3	185	251.0
33	44.8	75	102.0	190	258.0
34	46.1	76	103.1	195	264.4
35	47.5	77	104.4	200	271.2
36	48.8	78	105.8	225	305.1
37	50.2	79	107.1	250	339.0
38	52.0	80	108.5	275	373.0
39	52.9	81	110.0	300	407.0
40	54.2	82	111.2	350	475.0
41	55.6	83	112.6	400	542.4
42	57.0	84	114.0		

## Torque Conversion Factors

To Convert	Into	Multiply By
Inch Pounds	Foot Pounds	0.0835
Inch Pounds	Newton meters	0.1130
Inch Pounds	Kg-meters	0.0115
Inch Pounds	Kg-Cm	1.1519
Foot Pounds	Inch Pounds	12.0000
Foot Pounds	Newton meters	1.3560
Foot Pounds	Kg-meters	0.1382
Foot Pounds	Kg-Cm	13.8240
Newton meters	Inch Pounds	8.8440
Newton meters	Foot Pounds	0.7370
Newton meters	Kg-meters	0.1020
Newton metes	Kg-Cm	10.2000
Kg-meters	Inch Pounds	86.8100
Kg-meters	Foot Pounds	7.2340
Kg-meters	Newton meters	9.8040
Kg-Cm	Inch Pounds	0.8681
Kg-Cm	Foot Pounds	0.0723
Kg-Cm	Newton meters	0.0980

## Miscellaneous Conversion Factors

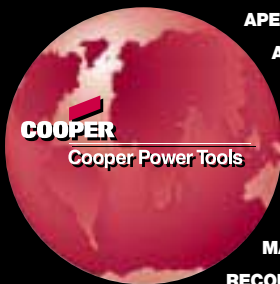
To Convert	Into	Multiply By
Inches	Millimeters	25.4000
Millimeters	Inches	0.0394
Pounds	Kilograms	0.4536
Kilograms	Pounds	2.2050
psi	bar	0.069
bar	psi	14.5

## Air Pressure Conversion

PSI	kPa*	Bar**
85	586	5.9
90	620	6.2
95	655	6.6
100	690	6.9
125	860	8.6

(\*) Preferred: Approximate to the nearest 5 kPa.

(\*\*) Approximate to the nearest 0.5 Bar.



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