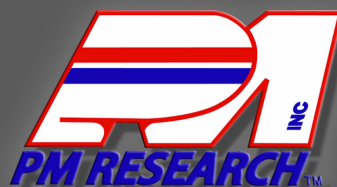
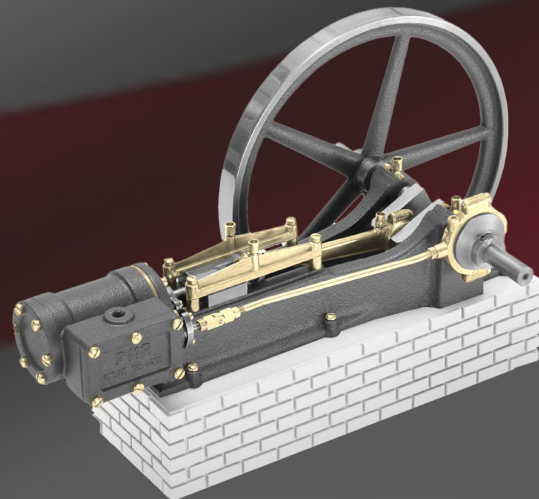


PM MODEL ENGINES

A PM Research Inc. Company

MODEL STEAM,
STIRLING &
GAS ENGINES

MACHINERY KITS
& ACCESSORIES



PMModelEngines.com

PM MODEL ENGINES

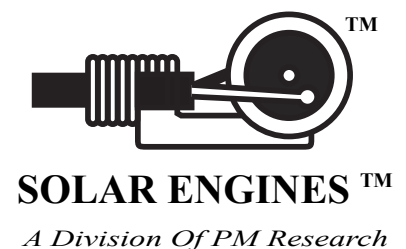
A PM Research Inc. Company



Thank you for browsing the pmodelengines.com catalog. PM Research began operations in 1973, manufacturing portable generators. We used the technology to develop steam, gas and solar engines, able to power fully functional, scale model machining kits.

Now, hobby enthusiasts of all ages are starting and continuing their creative journey by building complete miniature machine shops and creating their own designs. This comprehensive catalog includes our full line of products including engines, machining kits, pipe fittings, tools, and much more.

Our products are proudly made in the USA, at our plant in Wellsville, NY. Our commitment to quality and customer service is unmatched. Start YOUR creative journey by immersing yourself in the PM Model Engines catalog. Enjoy!



AIR COOLED RED WING MOTOR

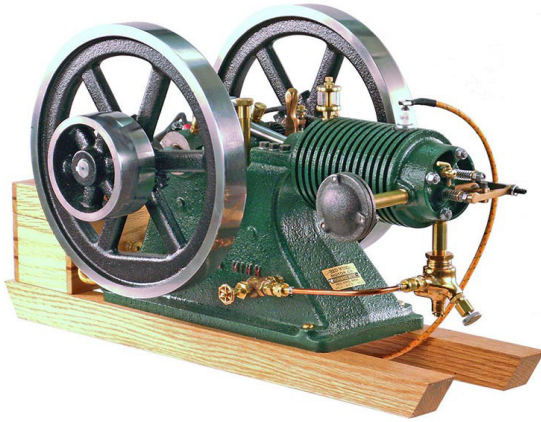
1/3 Scale - Air Cooled Engine - Casting Kit

Bore 1-1/4", Stroke 2", Gasoline Engine

The 2.5 HP air cooled Red Wing Engine was the inspiration for this fully functional one third scale model. It runs on regular gasoline and uses a buzz coil as an ignition source.

This Casting Kit includes 9 bronze castings and 11 iron castings and several small parts such as springs, gears, piston rings and other small parts needed to build your engine along with a complete set of working drawings. Barstock Kit, Drain Cocks, Lubricators, and Buzz Coil sold separately.

Assembled Dimensions: 14-1/2" long, 9-1/2" wide, by 9" high, 8-1/4" diameter flywheel.



**PROUDLY MADE
IN THE U.S.A.**

NOTE: Machining and Assembly Required.

STOCK NO.	DESCRIPTION
R-AC-C	Air Cooled Red Wing Motor - Kit Unmachined

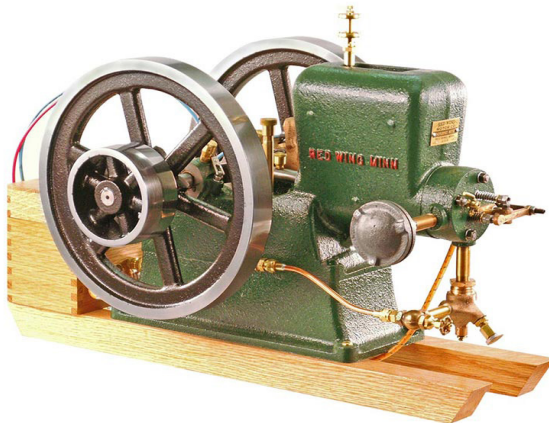
WATER COOLED RED WING MOTOR

1/4 Scale Water Cooled Engine - Casting Kit

Bore 1-1/4", Stroke 2", Gasoline Engine

The 5 HP Red Wing Engine was the inspiration for this fully functional quarter scale model. It runs on regular gasoline and uses a buzz coil as an ignition source.

The Casting Kit includes 9 bronze castings and 11 iron castings and several small parts such as springs, gears, piston rings and other small parts needed to build your engine along with a complete set of working drawings. Barstock Kit, Drain Cocks, Lubricators, and Buzz Coil sold separately.



**PROUDLY MADE
IN THE U.S.A.**

NOTE: Machining and Assembly Required.

STOCK NO.	DESCRIPTION
R-WC-C	Water Cooled Red Wing Motor - Kit Unmachined

1/4 Scale Water Cooled Engine - Completed Engine

Comes completely machined, painted, assembled, tested, and ready to run. Measures 14-1/2" long, 9-1/2" wide, 9" high, and has a 8-1/4" diameter flywheel.

NOTE: Assembly Required.

STOCK NO.	DESCRIPTION
R-WC-M	Water Cooled Red Wing Motor - Kit Machined

**COMING
SOON**









RED WING MOTOR COMPANY - ENGINE ACCESSORIES



	STOCK NO.	DESCRIPTION	
	R-BAR	<p>MATERIALS KIT</p> <p>A barstock package is available for those not lucky enough to have common materials laying around the shop. Materials like flat stock, round stock, hex stock, and all of the other metal and brass parts that are needed to build your engine. For either Red Wing Engine.</p>	
	MIX-1C	<p>LUNKENHEIMER 1/8" MIXER - CASTING KIT</p> <p>This mixer is used on both, the 1/4 scale 5 HP and the 1/3 scale 2.5 HP Red Wing Model Engines. Will also work on any engine with a 1/8 NPT intake.</p> <p>Kit includes the mixer casting and barstock as well as the main valve spring, needle valve o-ring, and a complete set of drawings.</p>	
	MIX-1M	<p>LUNKENHEIMER 1/8" MIXER - COMPLETED MIXER</p> <p>This mixer is used on both, the 1/4 scale 5 HP and the 1/3 scale 2.5 HP Red Wing Model Engines. Will also work on any engine with a 1/8 NPT intake. Includes a 1/8" O.D. tube connector.</p> <p>The completed mixer comes fully machined and assembled ready to run.</p>	
	DC-532	<p>RELIEF VALVE</p> <p>Thread size: 5/32-40</p>	
	DC-3	<p>RELIEF VALVE</p> <p>Thread size: 3/16-40</p>	
	BUZZ-1	<p>OAK BUZZ COIL</p> <p>This high quality Buzz Coil provides a powerful spark. We recommend using a 6 Volt lantern battery or rechargeable battery as the power source. The box measures 4-1/2" x 2-3/4" x 3-1/4" tall and is constructed from Oak.</p>	
	WIRE-O14	<p>SPARK PLUG WIRE</p> <p>14 GA cloth covered spark plug wire, orange (Oak) with red & black tracers. Will work for the Red Wing as well as other model engines.</p>	
	WIRE-R16	<p>PRIMARY WIRE RED</p> <p>16 GA cloth covered primary wire, red. Will work for the Red Wing as well as other model engines. Sold by the foot.</p>	
	WIRE-B16	<p>PRIMARY WIRE BLACK</p> <p>16 GA cloth covered primary wire, red. Will work for the Red Wing as well as other model engines. Sold by the foot.</p>	

RED WING MOTOR COMPANY - ENGINE ACCESSORIES



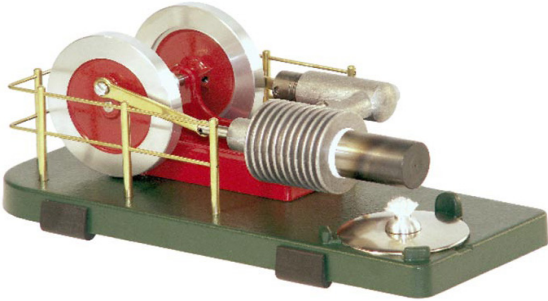
	STOCK NO.	DESCRIPTION	
	R-SP-CM6	SPARK PLUG The CM-6 is considered standard for the Red Wing as well as other model engines. Metric 10X1 thread.	
	T-M10X1	SPARK PLUG TAP Metric 10X1 Tap for threading the spark plug hole on your engine.	
	RING-1.25	PISTON RINGS These piston rings are for a 1.25 inch piston. They are 1.250 OD and 3/32 thick. Two per package.	
	R-FK-FL	FUEL LINE FITTING KIT This kit includes one 5/16 Angle Globe Valve, one 5/16 Nipple, two 5/16 to 1/8 Tube Connectors and one 1/8" OD X 5" Soft Copper Tube. For either Red Wing Engine.	
	R-AC-LUB	LUBRICATION KIT (AIR COOLED RED WING ENGINE) This kit includes one Drip Feed Oiler and three 10-32 Grease Cups.	
	R-WC-LUB	LUBRICATION KIT (WATER COOLED RED WING ENGINE) This kit includes one Drip Feed Oiler, three 10-32 Grease Cups, one 1/4-40 X 3" Nipple, and one 1/4-40 Coupling.	
	R-AC-SCR	SCREW PACK (AIR COOLED RED WING ENGINE) This pack includes all of the Special Model Size Hex Head Bolts, Nuts and Studs required to complete your Red Wing Engine.	
	R-WC-SCR	SCREW PACK (WATER COOLED RED WING ENGINE) This pack includes all of the Special Model Size Hex Head Bolts, Nuts and Studs required to complete your Red Wing Engine.	

SOLAR #1

OUR "ORIGINAL" STIRLING CYCLE HOT AIR ENGINE

This miniature Stirling Cycle Engine measures 7" x 4-1/4" and comes complete with built-in alcohol burner. Red flywheels and chassis mounted on a green base, these all metal beauties silently running at speeds in excess of 1,000 RPM attract attention and create awe wherever displayed. This model comes completely assembled and ready to run, accompanied by our "Stirling Cycle Engines" book.

NOTE: Ready To Run.



STOCK NO.	DESCRIPTION
SOLAR-1	"Original" Stirling Cycle Engine with book

STIRLING CYCLE ENGINES BOOK, by Andy Ross

This publication, the first of its kind, takes the reader on a 160-year tour through the world of Stirling Cycle Engines. The hot air principles of operation are explained in this easily read, lavishly illustrated, 128-page book. This book is included with the SOLAR-1 engine, or you may purchase the book separately.

STOCK NO.	DESCRIPTION
BAR395	"Stirling Cycle Engines" book only

Please review our complete book list on page 39 for additional information on Stirling Engines.

*We do not use Zinc (pot-metal) for any of our models.



**PROUDLY MADE
IN THE U.S.A.**

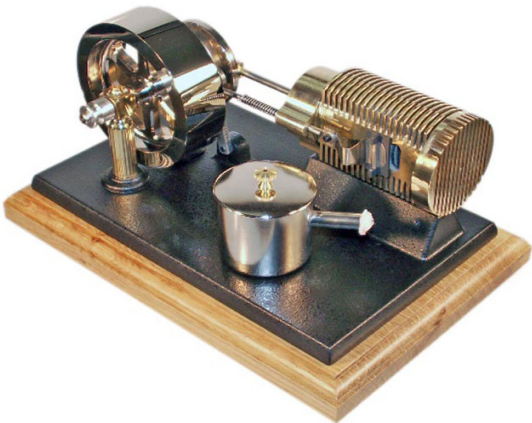
SOLAR #3

THE FLAME EATER *The Fantastic Vacuum Engine*

With a slight twist of the flywheel, the engine roars to life. The alcohol flame dances furiously and a lance of fire stabs through the rapidly working valve. The exhaust-like popping coupled with the clattering of the valve assembly causes a pleasant commotion that is music to the ears of those who enjoy the mechanical marvels of man. This is the exciting "Vacuum Engine" with a history that goes back to the early 1700s. It is the ultimate in craftsmanship, function and beauty of design. This engine has a beautiful combination of fine wood grain and black base. It is highlighted by a polished brass cylinder and standard. The massive flywheel and burner are nickel-plated.

The Flame Eater measures 6" x 9" and comes with its own alcohol burner. Completely assembled, factory-tested and ready to fascinate you and your audiences with speeds over 1,000 RPM. This engine is perfect for hobbyists, students, collectors, and experimenters. Completely assembled and ready to run.

NOTE: Ready To Run.



**PROUDLY MADE
IN THE U.S.A.**

STOCK NO.	DESCRIPTION
SOLAR-3	The Flame Eater

SOLAR #4

THE SUN RUNNER



The Sun Runner, a solar-powered Stirling Cycle Engine, offers a dramatic demonstration of energy conversion. This motor, with its parabolic mirror, can be attached to any conventional camera tripod. When properly aimed at the sun, incoming solar energy is focused on the heat cap of the engine and is converted to rotary motion. Each unit is test run at our factory.

Specifications: 2,000 RPM and up, 8-1/4" long x 3" wide, 3/4 inch bore, 3-1/4" flywheel, aluminum precision castings. Parabolic Mirror is 18" diameter.

Unit comes complete with motor, parabolic mirror, and wrenches. (Standard camera tripod not supplied.) Engine requires some assembly.

NOTE: This engine can also run as a horizontal engine with our #90 alcohol burner.

NOTE: Some Assembly Required.

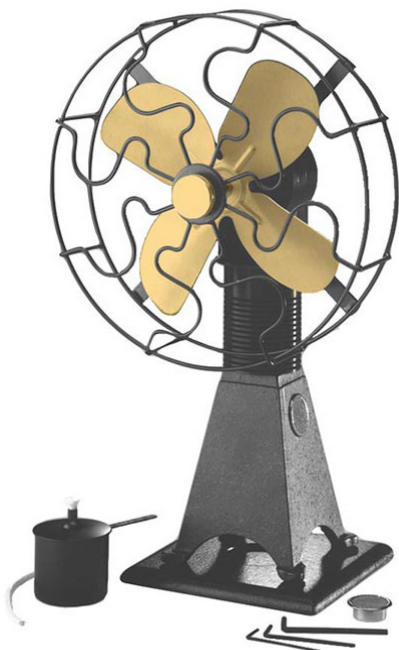
STOCK NO.	DESCRIPTION
SOLAR-4	The Sun Runner W/Mirror
SOLAR-4E	The Sun Runner Engine Only
MIRROR-4	Parabolic Mirror Only, 18" Dia.



**PROUDLY MADE
IN THE U.S.A.**

SOLAR #6

STIRLING CYCLE MOTOR DRIVEN FAN



These fans are of the same high quality you have found in our other engines. This ruggedly constructed Fan is reminiscent of the days gone by when quality was important. The brass components, contrasting with the black components, create an illusion of antiquity.

Each fan involves much painstaking hand craftsmanship and hours of time to assemble. Each fan is test run at the factory and shipped with an alcohol burner.

Specifications: 14" high, 6-1/2" diameter fan blade, the motor is a coaxial Stirling Cycle, the cylinder is black anodized aluminum, the base and platform is sand cast aluminum. We recommend using denatured alcohol as fuel. Completely assembled and ready to run.

NOTE: Ready To Run.

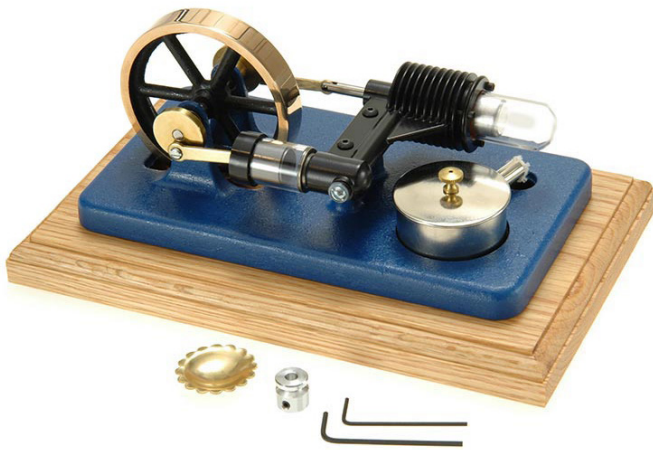
STOCK NO.	DESCRIPTION
SOLAR-6	Stirling Cycle Motor Driven Fan



**PROUDLY MADE
IN THE U.S.A.**

SOLAR #7

THE GLASSWORKS



See the pistons at work. Look inside the glass cylinders at the Stirling Cycle principle in action. This engine is extremely interesting to watch, is well built, and runs at speeds up to 1500 RPM. This is a hard combination to beat. Gyro-quality ball bearings, machined flywheel, sand cast frame which is painted royal blue, aluminum cooling fins and hardwood platform are only a few of the outstanding features incorporated into this engine. To illustrate the versatility of a Stirling Engine, we provide a burner for denatured alcohol and a platform for solid fuel. A sample quantity of ESBIT dry fuel is supplied with the engine as well.

Special features include: replaceable and adjustable Pyrex heat cap, replaceable Pyrex power cylinder, dual fuel capability, and a solid hardwood platform. Specifications: 9" length x 4" height x 5-1/2" width. Completely assembled and ready to run.



**PROUDLY MADE
IN THE U.S.A.**

NOTE: Ready To Run.

STOCK NO.	DESCRIPTION
SOLAR-7	The Glassworks

SOLAR #10

PEANUT RIDER



The first "RIDER" Engines were manufactured in 1880 by the De Lamater Iron Works. This engine was the inspiration for our "Peanut RIDER."

This all metal, black and brass engine with red flywheel is mounted on a solid hardwood platform. It is an excellent running engine and will make a handsome addition to your collection.

Each engine is test run at the factory and comes complete with an alcohol fuel cell, extra wick, allen wrenches and owner's manual.

Specifications: 5-1/2" x 6" base, 9" high, 5/8" stroke, 3-1/2" flywheel. Completely assembled and ready to run.



**PROUDLY MADE
IN THE U.S.A.**

NOTE: Ready To Run.

STOCK NO.	DESCRIPTION
SOLAR-10	Peanut Rider

SOLAR #12

1895 RIDER-ERICSSON HOT AIR PUMPING ENGINE

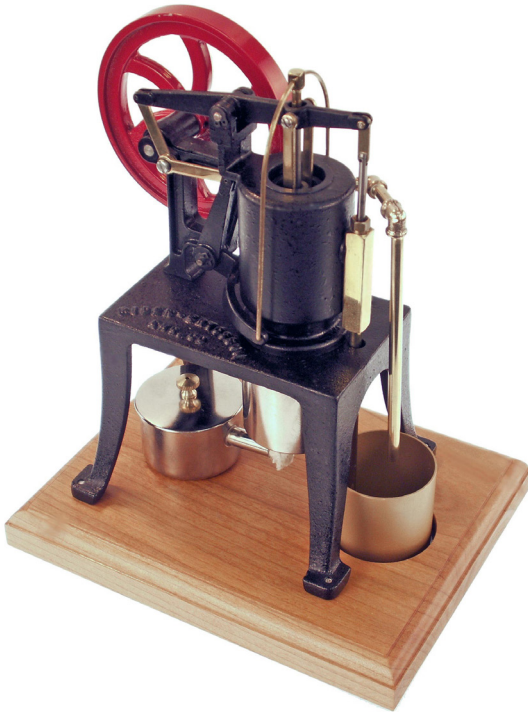
Now, you too can own the most sought-after model hot air engine!

The Rider-Ericsson is the only hot air engine that was actually manufactured in production quantities. This marvelous engine is fascinating to see run, with all of its moving parts and a pump that really works! It is a must for all model hot air collections.

Our Hot Air Engine measures 4" x 5" x 7-1/4". The curved spokes of the flywheel, the cast linkages, bedplate, water jacket, and crankshaft bracket all contribute to the air of authenticity.

The original Ericsson engines were all water-cooled. We are offering a water-cooled version complete with pump to circulate water through the engine. A free, 12-page leaflet containing interesting information on the original Ericsson engine is included with each model.

Each engine is tested at the factory and comes complete, ready to run, with an alcohol fuel burner, water tank, extra wick, allen wrenches and Owner's Manual. Mounted to a 5-1/2" x 7" wood base.



**PROUDLY MADE
IN THE U.S.A.**

NOTE: Ready To Run.

STOCK NO.	DESCRIPTION
SOLAR-12	Rider-Ericsson, includes leaflet

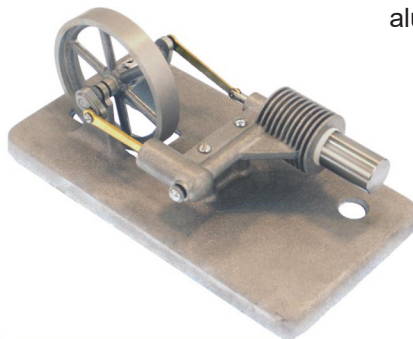
SOLAR #13

THE THINKING MAN'S ENGINE KIT *(Ideal for thinkers age 10 to 99)*



An ideal project for the beginning model builder. Easy-to-assemble and runs very well. All machining has been done for you. A dry fuel platform and a test quantity of "ESBIT" dry fuel is supplied. Denatured alcohol also works well as a fuel for Stirling Cycle Engines. For those persons who prefer using denatured alcohol, we have developed a handy burner, Stock No. 90, which is available for a small additional charge.

Specifications: 7-1/2" length x 3-1/2" height x 4" width, up to 1000 RPM, die cast aluminum cylinders, brass arms and a sand cast aluminum platform and flywheel.



**PROUDLY MADE
IN THE U.S.A.**

NOTE: Assembly Required.

STOCK NO.	DESCRIPTION
SOLAR-13	The Thinking Man's Engine Kit Machined

SOLAR #15

THE GLASSWORKS KIT Observe The Pistons In Action



ATTENTION MODEL MACHINISTS: Now you can build a Stirling Engine from a kit. At the request of many model builders, we are pleased to offer our famous Glassworks Engine as a machinist kit.

You can easily show off your hard work by showing the pistons at work. Look inside the glass cylinders at the Stirling Cycle principle in action. This engine is extremely interesting to watch, and runs at speeds up to 1500 RPM. This is a hard combination to beat. A Pyrex heat cap, replaceable Pyrex power cylinder, gyro-quality ball bearings, bronze flywheel, aluminum cooling fins, and sand cast aluminum frame are only a few of the outstanding features incorporated into this engine. The completed Glassworks kit measures 7-1/2" x 4" x 3-1/2".

A sample quantity of "ESBIT" dry fuel is supplied with the engine. Denatured alcohol also works well as a fuel for this engine. For those persons who prefer using denatured alcohol, we have developed a handy burner, Stock No. 90, which is available for a small additional charge.

BUILD YOUR OWN STIRLING ENGINE TODAY!

Comes complete with 3 castings, bar stock, screws, hardware, assembly and detailed drawings.



**PROUDLY MADE
IN THE U.S.A.**

NOTE: Machining and Assembly Required.

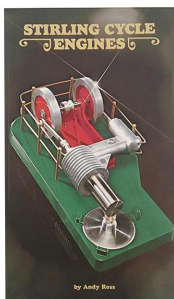
STOCK NO.	DESCRIPTION
SOLAR-15	The Glassworks Kit Unmachined

How Long Have Stirling Engines Been Around?

Stirling Engines were invented in 1816 by Rev. Robert Stirling.

How do they work?

Our Solar line of Stirling Engines all contain air that is trapped inside the engine. When we apply heat to the heat cap, the air inside the engine expands pushing the power piston back. The mechanical linkage moves the displacer piston in the opposite direction thus forcing the hot air to travel past the displacer piston to the cooling side. As the power piston reaches the end of its stroke the hot air reaches the cooling fins and is rapidly cooled creating a vacuum. Atmospheric pressure pushes the power piston forward to its starting point. The mechanical linkage moves the displacer piston to its starting point moving the cooled air past the displacer piston into the heat cap to be reheated. This completes the stroke. The piston continues to go back and forth as the air is alternately heated and cooled.

















Read "Stirling Cycle Engines" by Andy Ross to learn more:

This publication is the first of its kind and takes the reader on a 160-year tour through the world of Stirling cycle engines. The hot air principles of operation are explained in this easily read, lavishly illustrated book. 128p.

STOCK NO.	DESCRIPTION
BAR395	Stirling Cycle Engines Book

SOLAR ENGINE ACCESSORIES

STOCK NO.	DESCRIPTION	
	NO-82-1 ESBIT DRY FUEL Ideal for Hot Air and Steam Engines. Each box contains 20 tablets, 4g each. Try using half a tablet; you'll be amazed at the results.	
	NO-82-2 ESBIT DRY FUEL Ideal for Hot Air and Steam Engines. Each box contains 12 tablets, 14g each. Try using half a tablet; you'll be amazed at the results.	
	NO-81-1 DRY FUEL PLATFORM (SOLAR-1 Engine) This platform will directly replace the alcohol wick assembly in your SOLAR-1 engine. Drop the platform in place and instantly your engine is converted into a dry fuel SOLAR-1. We recommend using the "ESBIT" tablets with the platform.	PROUDLY MADE  IN THE U.S.A.
	NO-81-2 DRY FUEL PLATFORM (SOLAR 13 & SOLAR-15 Engines) This disk is smaller than the disk for the SOLAR-1. It is used for our SOLAR-13 and SOLAR-15 engines. We recommend using "ESBIT" tablets with the platform.	PROUDLY MADE  IN THE U.S.A.
	NO-83-2 WICK 1/8" x 3 ft. Please specify the engine model.	PROUDLY MADE  IN THE U.S.A.
	NO-83-3 WICK 3/16" x 3 ft. Please specify the engine model.	PROUDLY MADE  IN THE U.S.A.
	NO-80 CHIMNEY When this chimney is slipped into place, the efficiency of your Solar-1 Engine will greatly improve. Problems created by troublesome drafts will be eliminated. A higher engine RPM will be obtained using less fuel. The chimney is nickel-plated.	PROUDLY MADE  IN THE U.S.A.
	NO-68 FLEXIBLE DRIVE BELT (package of 5) Each belt is 10 inches in length. A unique method is employed to obtain a "Jointless" belt. Several of these belts may be combined to make longer belts, if they are required. These belts are manufactured in Germany.	
	NO-84-3 "V" GROOVE PULLEY for flexible belts #68 1/2" O.D. 3/16 bore.	PROUDLY MADE  IN THE U.S.A.
	NO-84-4 "V" GROOVE PULLEY for flexible belts #68 1/2" O.D. 1/4 bore.	
	LUB-KIT LUBRICATION KIT Contains a Funnel, 2oz. Bottle, 18ga. Needle w/Cover and a 22ga. Needle w/Cover.	
	NO-95 DRY POWDERED LUBRICANT, 6.5 gr Tube Recommended for lubricating the power piston on solar engines.	PROUDLY MADE  IN THE U.S.A.

SOLAR ENGINE ACCESSORIES

	STOCK NO.	DESCRIPTION	
	NO-90	ALCOHOL BURNER 90 for SOLAR-3, 4, 13 & 15 If you would prefer to use denatured alcohol to run your "Thinking Man's Engine," this alcohol burner will provide you that option. Please specify the model you are going to run with the alcohol burner.	
	NO-90-6	ALCOHOL BURNER 90-6 for SOLAR-6 Engine.	
	NO-90-7	ALCOHOL BURNER 90-7 for SOLAR-7, 10, 12 Engines.	
	NO-91	GLASS TUBE REPLACEMENT Replacement glass heat cap for glassworks engine, SOLAR 7 and SOLAR-15 Kit.	
	NO-91-2	LARGE STEEL HEAT CAP Large Steel Heat Cap for SOLAR-4, 6, 12.	
	NO-91-3	SMALL STEEL HEAT CAP Small Steel Heat Cap for SOLAR-1, 10, 13.	
	#3 CAM	#3 CAM SOLAR-3 CAM.	
	#3 VALVE	#3 VALVE SOLAR-3 VALVE.	
	#3 VALVE-GUIDE SP	#3 VALVEGUIDE SPRING SOLAR-3 VALVE GUIDE SPRING.	
	MIRROR-4	MIRROR-4 PARABOLIC MIRROR 18" diameter.	

DRILL PRESS KIT

ACTUAL WORKING MODEL 1890s DRILL PRESS



That's right! You can actually drill holes with this baby! This little darling was scaled down to 1/12 scale from the J.E. Snyder Company, 21" upright drill press as found in illustration #450 on page 116 of the "Charles A. Strelinger Company" catalog of 1895. You can purchase one of these 1895 catalogs from our book list, number B20692 on page 42 of our catalog. The drill press measures 6-1/2" high.

Picture this in your mind! A display representing an 1895 machine shop with wooden beam construction. At one end is the engine room, complete with one of our #5 engines and our #BLR-1 or #BLR-2 boilers. Then the rest of the 1895 machine shop with our beautiful little DP-1 drill press working away alongside our awesome EL-1 model lathe. What a sight! But wait, there's more! Much more to come.

Now picture this! You making chips with your own machine shop! You are the proprietor! You are the operator! In fact, you'd better wear suspenders 'cause you may just pop your buttons when you swell up with pride as you watch the beholder's eyes sparkle with pure delight.

Kit complete with 13 easy machining aluminum castings, all required hardware, material, bar stock, pre-cut gear stock, finished bevel gears, and complete working drawings.



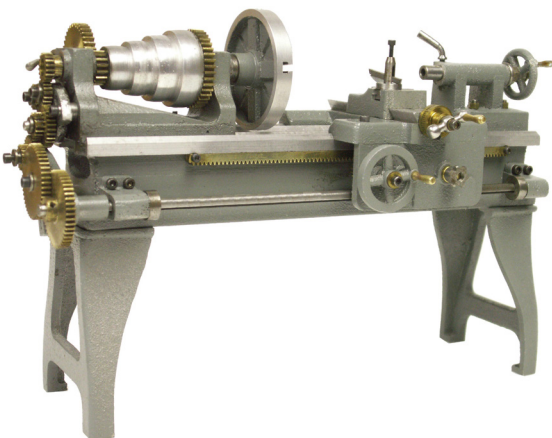
**PROUDLY MADE
IN THE U.S.A.**

NOTE: Machining and Assembly Required.

STOCK NO.	DESCRIPTION
DP-1	Drill Press Kit

ENGINE LATHE KIT

ACTUAL WORKING MODEL 1890s ENGINE LATHE



You read that right! This little beauty actually performs work like its full-size counterpart!

This lathe is a 1/12 scale replica, similar to figure 806 of the "Charles A. Strelinger Company" 16-inch lathe found on page 212 of their 1895 catalog. Our order number for the 1895 tool catalog is 20692. The lathe measures 6-1/2" in length and 4-1/2" in height.

Just think of it! An actual working lathe that you have built! Your friends will be awestruck! Your wife will be glad to have you out of her hair for a few hours! And all the children who see it will be delighted!

Team this lathe up with our DP-1 drill press and our line shaft accessories and you will have the beginning of your own model machine shop.

Kit complete with 19 easy machining aluminum castings, all required hardware, material, bar stock, gear stock and complete working drawings. Kit includes cone pulley for jack shaft and chuck material. Line shaft bearing block hangers, pulleys and shaft are available as separate accessories, see page 16.



**PROUDLY MADE
IN THE U.S.A.**

NOTE: Machining and Assembly Required.

STOCK NO.	DESCRIPTION
EL-1	Engine Lathe Kit

BENCH GRINDER KIT

ACTUAL WORKING MODEL 1890s BENCH GRINDER



Would any machine shop be complete without a bench grinder? We didn't think so! We told you to build your machine shop with expansion in mind. This little bench grinder will go perfectly with our other machine tools.

This bench grinder is a 1/12 scale replica of the Challenge Emery Grinder found on page 252 of the "Charles A. Strelinger Company" catalog of 1895. The bench grinder and stand measure 4" high, 1-7/8" wide and 1-1/2" deep.

Be Cautioned: If you keep expanding your workshop, your friends and family may not see much of you again!

Kit complete with 4 easy machining aluminum castings, all required hardware, material, bar stock, and complete working drawings.



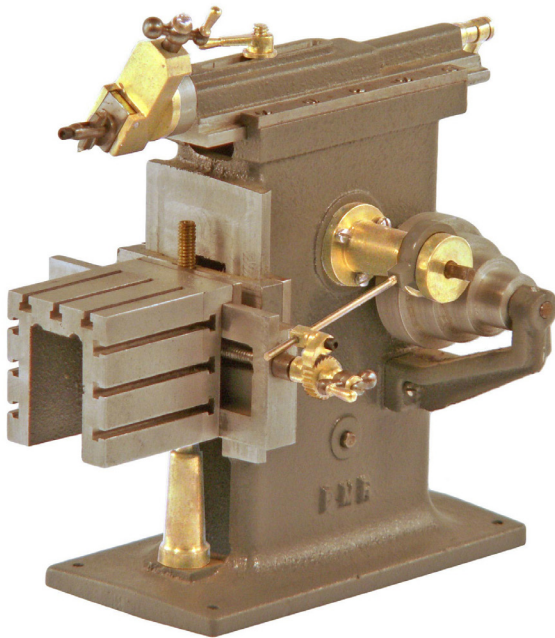
**PROUDLY MADE
IN THE U.S.A.**

NOTE: Machining and Assembly Required.

STOCK NO.	DESCRIPTION
BG-1	Bench Grinder Kit

CRANK SHAPER KIT

ACTUAL WORKING MODEL CRANK SHAPING MACHINE



HERE IT IS! The prettiest little shaper you will ever have the pleasure of running. This shaper is a 1/12 scale replica of the Figure 850 Crank Shaping Machine found on page 234 of the "Charles A. Strelinger Company" catalog of 1895. The crank shaper measures approximately 5" high, 5" long and 4" wide.

When you get this baby cranked up it has more parts moving in different directions than you can imagine. It will delight and fascinate all who see it.

We hope you listened when we told you to build your machine shop with expansion in mind. Watch for our next kit!

Kit complete with 11 easy machining aluminum castings, all required hardware, material, bar stock, precut gear stock, finished miter gears and complete working drawings. Kit includes cone pulley for jack shaft.



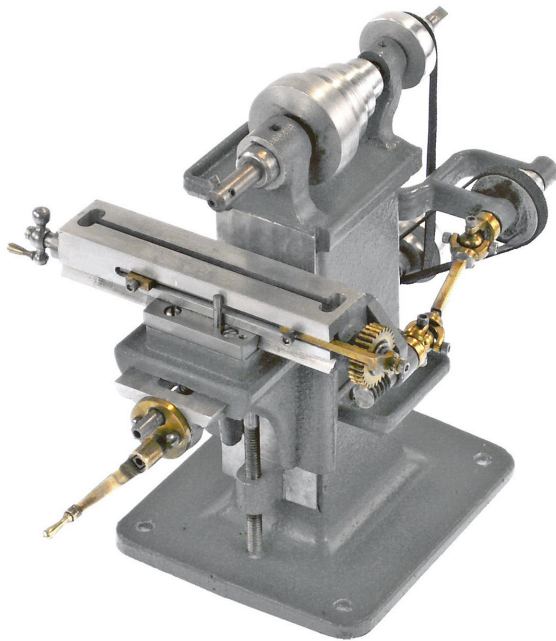
**PROUDLY MADE
IN THE U.S.A.**

NOTE: Machining and Assembly Required.

STOCK NO.	DESCRIPTION
CS-1	Crank Shaper Kit

MILLING MACHINE KIT

ACTUAL WORKING MODEL 1890s MILLING MACHINE



No machine shop is complete without a Milling Machine. So, here it is - and it is a beauty! This milling machine is a 1/12 scale replica of the Small Universal Milling Machine found on page 10 of the "Construction & Use of Universal Milling Machines," Brown & Sharpe Manufacturing Co. We also received information for the production of this milling machine from the Henry Ford Museum. (Which, by the way, is a great place to visit if you find yourself in the Detroit, Michigan area.) The milling machine measures approximately 4-1/8" high, 4-1/4" long and 3-1/2" wide.

Kit complete with 10 easy machining aluminum castings, all required hardware, material, bar stock, precut gear stock, finished miter gears and complete working drawings.



**PROUDLY MADE
IN THE U.S.A.**

NOTE: Machining and Assembly Required.

STOCK NO.	DESCRIPTION
MM-1	Milling Machine Kit

ARBOR PRESS KIT

ACTUAL WORKING MODEL 1890s ARBOR PRESS



IT'S NEW! That is what they were saying about the Arbor Press in the 1890s. It was a new invention then and it is still a great tool.

Well, it is new again! It is new in our line, and you will not find a prettier Arbor Press anywhere. Besides, you can fit ours in your pocket! No other production manufacturer can make that claim. The 1/12 scale Arbor Press measures 2" wide by 4-3/4" high. You'll love it!

Learn what the Arbor Press was originally invented to do on page 230 of the Chas. A. Strelinger 1895 catalog. You can order a copy of this catalog along with your Arbor Press. The Strelinger catalog (Stock # B20692) can be found on page 39.

Kit complete with 4 easy machining aluminum castings, all required hardware, material, bar stock, and complete working drawings.



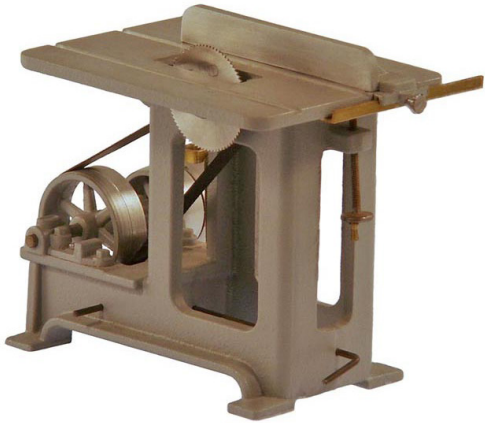
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IN THE U.S.A.**

NOTE: Machining and Assembly Required.

STOCK NO.	DESCRIPTION
AP-3	Arbor Press Kit

TABLE SAW KIT

ACTUAL WORKING MODEL OF 1912 "SAW TABLE"



Now here is one tool every shop needs. A good table saw. This simple but versatile piece of wood working equipment will find many uses in your shop. Uses such as pattern making, box and crate construction, equipment construction, building construction and the like.

The original can be found on pages 34 and 35 of "Crescent's" 1912 catalog.

This 1/12 scale replica of the #1 Crescent "saw-table" makes a great kit for beginning home shop machinists as well as the experienced hobbyist or professional. The machinist's kit comes complete with everything you need to build the finished "saw-table", which is 3-3/8" wide, 4-3/4" long, and 3-5/8" high.

You are going to love this project, and you will have a lot of fun showing it actually sawing wood.

Kit complete with 9 easy machining aluminum castings, all required hardware, material, bar stock, belting, saw blade, and complete working drawings.



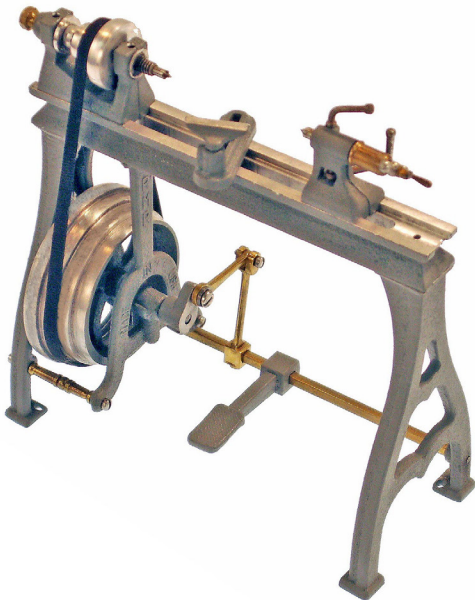
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IN THE U.S.A.**

NOTE: Machining and Assembly Required.

STOCK NO.	DESCRIPTION
TS-1	Table Saw Kit

WOOD LATHE KIT

ACTUAL WORKING MODEL 1890s WOOD LATHE



No engine? No power plant? No problem! In the 1890s, foot power was all that was needed to drive the Chas. A Strelinger #781 Reed Foot Lathe. Of course, ours is twice as cute and 1/12 the size and runs mostly on finger power. As always, you can hook it up to your line shaft power if you prefer. The wood lathe measures 4" long and 4-1/2" high.

Yes sir, this is the first of a line of woodworking tools we plan to add along with our fine line of metal working machine kits. Well, I guess it is time to add a wood shop to go along with your machine shop.

You can see this lathe originally featured on page 202 of the 1895 Chas. A. Strelinger catalog. You can order it on page 39 of this catalog (Stock #B20692).

Kit complete with 11 easy machining aluminum castings, all required hardware, material, bar stock, and complete working drawings.






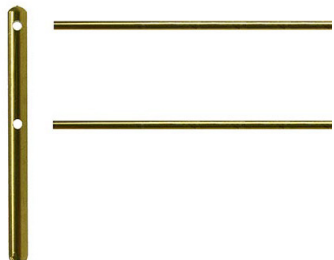




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NOTE: Machining and Assembly Required.

STOCK NO.	DESCRIPTION
WL-1	Wood Lathe Kit

1/12 SCALE MACHINE SHOP CONSTRUCTION SUPPLIES & ACCESSORIES

	STOCK NO.	DESCRIPTION	
	MS-DOOR1	TRADITIONAL WORKING DOOR Size: 3-7/16"W x 7-3/16"H. Fits opening 3"W x 7"H x 3/8"D.	
	MS-WIN1	TRADITIONAL WORKING WINDOW Size: 2-31/32"W x 5-5/16"H. Fits opening 2-9/16"W x 5-1/16"H x 1/2"D. Includes acrylic and interior trim.	
	MS-FLR1	RED OAK FLOORING Made of genuine wood veneer which has been laminated to a special paper to ensure easy staining, varnishing and installation. One sheet per package. Covers 187 sq. in. Size: 11" x 17".	
	MS-RF1	SQUARE BUTT SHINGLES Classic hand-split cedar shakes. 100 pcs. per package. Covers 76 square inches. Size: 1-1/4"H x 3/4"W.	
	MS-BRK1	1/12 SCALE JOINT COMMON BRICK SHEETS Approx. 63 sq. in. Styrene Plastic. Each brick: 1/4"W x 11/16"L x 1/8"D. Sheet size: 11-3/4" x 5-1/2".	
	MS-BRK2	1/12 SCALE COMMON JOINT BRICK CORNER Size: 3/4"W x 3/4"D x 11-1/2"L Styrene Plastic.	
	FP-51	BRASS FENCE POST Used on our Solar #1 Engine 1-5/8" Long 1/8" Dia.	PROUDLY MADE  IN THE U.S.A.
	RRB-1-3	1/16" ROUND BRASS ROD Used for Brass Fence Rail on our Solar #1 Engine - 3 feet long.	PROUDLY MADE  IN THE U.S.A.

LINE SHAFT ACCESSORIES, MINIATURE TOOLS, AND OFFICE FURNITURE

	STOCK NO.	DESCRIPTION	
	LSH-1	<p>LINE SHAFT HANGER</p> <p>Used for transmitting the engine's power to the machine shop tools (see photograph on back cover of catalog).</p> <p>NOTE: Casting kit. Machining required. Includes barstock, hardware, and drawing.</p>	<p>PROUDLY MADE  IN THE U.S.A.</p>
	LSP-100	<p>BELT PULLEY - 1" DIA. x 1/4" WIDE</p> <p>Used for transmitting the engine's power to the machine shop tools (see photograph on back cover of catalog).</p> <p>NOTE: Casting kit. Machining required.</p>	<p>PROUDLY MADE  IN THE U.S.A.</p>
	LSP-175	<p>BELT PULLEY - 1-3/4" DIA. x 5/8" WIDE</p> <p>Used for transmitting the engine's power to the machine shop tools (see photograph on back cover of catalog).</p> <p>NOTE: Casting kit. Machining required.</p>	<p>PROUDLY MADE  IN THE U.S.A.</p>
	LSB-4	BELTING 1/4" WIDE - .018" THICK BLACK (Per Ft.)	Per Ft.
	LSB-8	<p>BELTING 1/2" WIDE - .018" THICK BLACK (Per Ft.)</p> <p>NOTE: You may wish to allow a little extra material when ordering belting. We recommend you slightly overlap the ends and use super glue to fasten the belt to your required length. The standard package is 9 feet.</p>	Per Ft.
	RRS-3	SHAFT - 3/16" C.R.S. - 1 FOOT LENGTH (Per Ft.)	Per Ft.
	MS-TLBOX	<p>TOOL BOX</p> <p>Includes 8 tools, 1-1/2" long.</p>	
	MS-SAW	<p>MINIATURE SAWS</p> <p>Includes one 2" saw and one 1-1/4" saw</p>	
	MS-CLA10405	<p>WALNUT ROLL TOP DESK</p> <p>4-3/8" Wide x 4" high x 1-7/8" Deep</p>	
	MS-CLA10406	<p>WALNUT SWIVEL CHAIR</p> <p>3" high x 1-13/16" wide</p>	
	MS-CLA10408	<p>WALNUT FILE CABINET</p> <p>4-13/16" high x 1-3/4" wide</p>	

DYNAMO KIT

This Dynamo comes as an unmachined kit with a cast iron frame. The frame has four mounting ears and two aluminum end caps to contain the magnet, armature and brushes. You can paint this to suit your requirements. It will take about 10-15 hours to machine and assemble. This kit is also available as a machined kit for easy assembly. Kit includes a pulley for a flat belt.



The Dynamo can also be used
as a 12VDC Motor

Specifications:

Speed: 5300 RPM

Voltage: 10 VDC @ 10 Watts

Voltage no load: 12 VDC

Max Current: 2.4 Amps

Dimensions: 2-3/8" W x 3-1/2" L x 2-1/4" H

Shaft Diameter: 0.125"

NOTE: Machining and Assembly Required.

STOCK NO.	DESCRIPTION
DYN-1	Dynamo Kit

NOTE: Assembly Required.

STOCK NO.	DESCRIPTION
DYN-1M	Dynamo Kit - Machined

STEAM ENGINE #1

WORKING REPLICA 1880s STEAM DRILLING ENGINE

Bore 1"

Stroke 1-1/2"

Double Acting

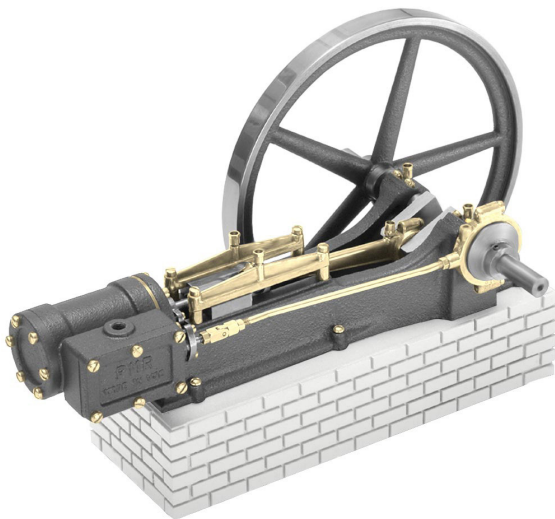
Long a mainstay of the Pennsylvania and New York oil fields, these engines can still be found in use today, although most have been converted to half breed gas engines.

This 1/8 scale replica has a 12" overall length and a 6-1/2" diameter flywheel. The kit comes complete with 17 sand castings, all the brass bar stock, gasket material, screws, etc. required and complete working drawings.

This kit is a machinist's delight no matter whether you are a pro or an amateur. **The satisfaction of seeing this engine run with all its moving parts operating is reward enough, but watching the fascination of others who see it work is truly gratifying.**

Kit including set of 17 easy machining bronze and iron castings, all necessary hardware, gasket material, bar stock and complete set of working drawings.

See Page 35 for typical piping arrangement to connect the model #1 to our BLR-2 horizontal boiler.



Brick base not included, materials available
on page 15 of this catalog.



**PROUDLY MADE
IN THE U.S.A.**

NOTE: Machining And Assembly Required.

STOCK NO.	DESCRIPTION
1Bl	Steam Engine #1 Kit Unmachined

STEAM ENGINE #2

WORKING MODEL OSCILLATING STEAM ENGINE

Bore 1/2"

Stroke 3/4"

Double Acting

Often adapted for small marine applications, this engine has a simple but unique porting system. ***The head oscillates as it runs, swinging the port holes from inlet to exhaust.***

A great novice engine as well as fun for the experienced enthusiast. This kit comes as a casting kit for the machinist. All hardware, gasket material, brass bar stock and 6 sand castings plus complete working drawings are included.

Total Height: 4-1/2"
Flywheel diameter is 2-1/4"

2A Kit complete with 6 easy machining aluminum castings, all required hardware, gasket material, brass bar stock and working drawings.

NOTE: Machining And Assembly Required.

STOCK NO.	DESCRIPTION
2A	Steam Engine #2 Kit Unmachined

This DVD video is one hour long and gives instructions including layout, set up and machining of our model 2A engine.

DESCRIPTION
Steam Engine #2 Instructional Video - FREE ON WEBSITE!

See page 34 for typical piping arrangement to connect the Model #2 to our BLR-1, vertical boiler.



**PROUDLY MADE
IN THE U.S.A.**

STEAM ENGINE #2AM

WORKING MODEL OSCILLATING STEAM ENGINE

Bore 1/2"

Stroke 3/4"

Double Acting

Often adapted for small marine applications, this engine has a simple but unique porting system. ***The head oscillates as it runs, swinging the port holes from inlet to exhaust.***

A great novice engine as well as fun for the experienced enthusiast. This kit comes all machined for easy assembly. All hardware, gasket material, machined parts, plus an assembly drawing are included. Cylinder is hard anodized for long wear.

Total Height: 4-1/2"
Flywheel diameter is 2-1/4"

Kit completely machined for easy assembly.

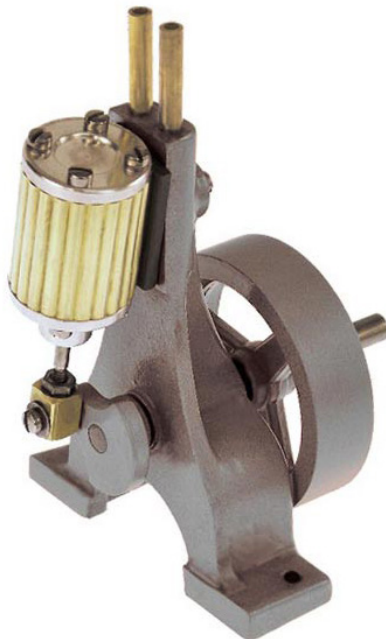
NOTE: Assembly Required.

STOCK NO.	DESCRIPTION
2AM	Steam Engine #2 Kit Machined



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See page 34 for typical piping arrangement to connect the Model #2 to our BLR-1, vertical boiler.



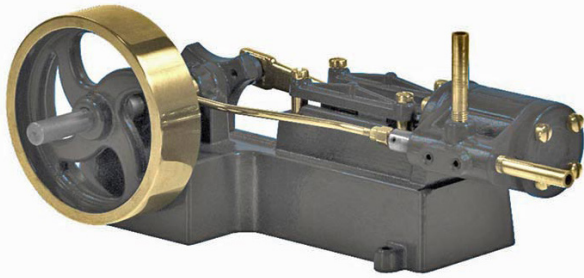
STEAM ENGINE #3

WORKING REPLICa STATIONARY STEAM MILL ENGINE

Bore 1/2"

Stroke 3/4"

Double Acting



See page 34 for typical piping arrangement to connect the Model #3 to our BLR-1, vertical boiler.

This engine is similar to those used to provide line shaft power to factories and mills in the 1800s. The line shafts conveyed the power to machinery via pulleys and flat leather belts.

With a 2-1/4 inch flywheel and an overall length of 6 inches, this kit will make a great project for the machinist with a small lathe. It is also available fully machined for easy assembly if you desire. Either way, all hardware, gasket material, bar stock, and 9 sand castings plus complete working drawings are included.

NOTE: Machining And Assembly Required.

STOCK NO.	DESCRIPTION
3A	Steam Engine #3 Kit Unmachined

3A Kit complete with 9 easy machining aluminum castings, all required hardware, gasket material, brass and steel bar stock and working drawings.

STOCK NO.	DESCRIPTION
3BI	Steam Engine #3 Kit Unmachined

3BI kit same as Model 3A except cast iron and bronze castings.

NOTE: Assembly Required.

STOCK NO.	DESCRIPTION
3BIM	Steam Engine #3 Kit Machined

3BIM Kit same as 3BI except completely machined for easy assembly.



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IN THE U.S.A.**

STEAM ENGINE #4

WORKING VERTICAL STEAM ENGINE

**This is not a scaled-down model,
but a full-size working steam engine.**

Bore 1-1/2"

Stroke 2-1/2"

Double Acting



This is a replica of a rare old steam engine used for various small portable power applications a century ago. This engine was sold as a casting kit in 1895 by the Chas. A Strelinger Co. of Detroit, MI. It can be found in their catalog on page 328. The castings were made by their foundry, the Leland & Faulconer Mfg. Co., 480-500 Trombly Ave., Detroit, MI. It was rated then as 1/4 H.P. You can order a copy of this old tool catalog from page 39 of our catalog.

Think of it! A full-size working engine that you have built. A machinist's delight! The total height is 19 inches and the flywheel diameter is 6-7/8 inches.

NOTE: Machining And Assembly Required.

STOCK NO.	DESCRIPTION
4CI	Steam Engine #4 Kit Unmachined

Kit complete with 15 iron and bronze castings, all required hardware, gasket material, bar stock and complete working drawings.



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IN THE U.S.A.**

STEAM ENGINE #5

WORKING VERTICAL COKE BOTTLE STYLE MILL ENGINE



This is a 1/8 scale model of an original engine manufactured by the Orr & Sembower Company of Reading, PA. The original engine was a six horsepower class "F" engine according to the Orr & Sembower literature. You may wish to purchase a reprinted copy of their original literature from our book list page 39.

Bore 5/8"

Stroke 7/8"

Double Acting

Overall Height 7-1/2"

Flywheel Diameter 3"

The original engine we scaled this from came out of a nitroglycerin plant. It was used to mix the acids and glycerin for making nitro. Even after gas engines and electric motors became commonplace, steam engines were considered much more dependable. When mixing, they couldn't stop; for if they did, it was time to run for your life. With the boiler in the distance and high torque at low RPMs, the steam engine was much safer.

This makes a beautiful model that you will be proud to own. But please don't make your own nitro plant. We like having you as a customer.

Kit complete with 18 bronze and iron castings, cast aluminum base, all required hardware, gasket material, bar stock and complete working drawings.

See Page 34 for typical piping arrangement to connect the model #5 to our BLR-1, vertical boiler.



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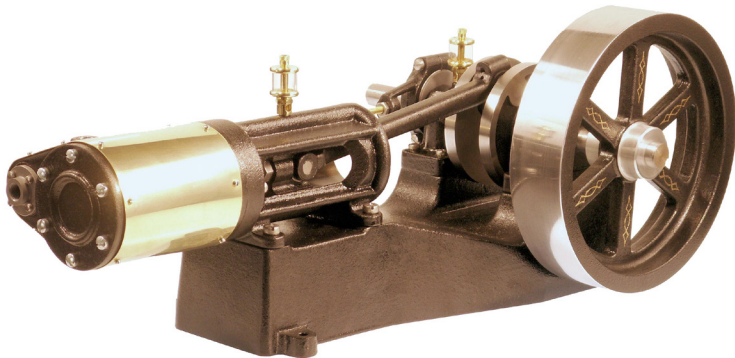
NOTE: Machining And Assembly Required.

STOCK NO.	DESCRIPTION
5BI	Steam Engine #5 Kit Unmachined

Drip Feed Oilers not included, they are available on pg 26 of this catalog

STEAM ENGINE #6

HORIZONTAL STATIONARY WORKING STEAM ENGINE



Bore 1-1/2"

Stroke 2-1/2"

Double Acting

This is the horizontal sister to our #4 Engine. Both engines were sold as casting kits by the Charles A. Strelinger Co. of Detroit, MI. It can be found in their catalog on page 328. Both were rated at 1/4 H.P.

Wow! Our second full size engine! You could build either one or both! The total height is 7-1/2 inches, the total length is 18 inches, the total width is 8 inches and the flywheel diameter is 6-7/8 inches.

Kit complete with 15 cast iron and bronze castings, all required hardware, gasket material, bar stock and complete working drawings.



**PROUDLY MADE
IN THE U.S.A.**

NOTE: Machining And Assembly Required.

STOCK NO.	DESCRIPTION
6CI	Steam Engine #6 Kit Unmachined

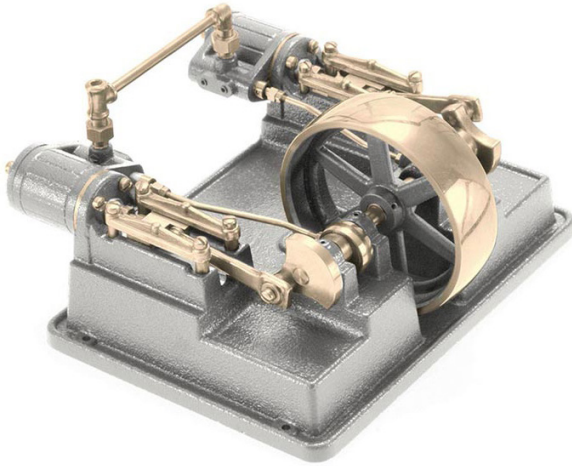
STEAM ENGINE #7 TWIN

WORKING REPLICA STATIONARY STEAM MILL ENGINE

Bore 1/2"

Stroke 3/4"

Twin Engine



With a 3-inch flywheel, an overall length of 6-1/4 inches, an overall width of 6-3/4 inches, and 3-1/2 inches high, this kit will make a great project for the machinist with a small lathe. All hardware, gasket material, bar stock and 16 sand castings plus complete working drawings are included.

Because of the twin cylinders, this engine has the unique ability to always start by just turning on the steam. There is no need to crank the flywheel. Our thanks to modeler Pete Rose for the idea.

7BI Kit complete with 16 easy machining bronze and iron castings, all required hardware, gasket material, brass and steel bar stock and working drawings.

NOTE: Machining And Assembly Required.

STOCK NO.	DESCRIPTION
7BI	Steam Engine #7 Twin Kit Unmachined

7BIM Kit complete as above except completely machined for easy assembly.

NOTE: Assembly Required.

STOCK NO.	DESCRIPTION
7BIM	Steam Engine #7 Twin Kit Machined



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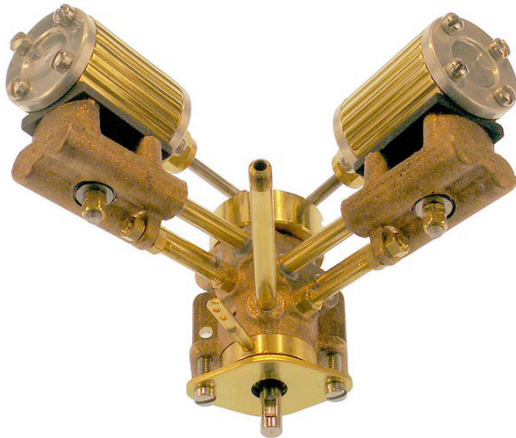
STEAM ENGINE #8M V-TWIN

TWIN CYLINDER OSCILLATING MARINE ENGINE

Bore 1/2"

Stroke 3/4" Twin Cylinder

Double Acting



AHOY MATES! Many of you have asked for it. Well, here it is! PM's first true marine engine. You are going to love this little Beauty!

This unique engine has forward, reverse and speed control capabilities, using a **single lever** which can be servo operated for radio control. **Think of it.** Just one servo does all of this! **Stop! Go Forward! Go Aft! And control the speed in both directions!**

This engine features a cast bronze base and frames, plus oilite bronze sleeve bearings on the crank shaft and piston rod. The crank pin bearings are machined from solid bronze which run on a ground pin. It also has a precision ground stainless steel piston rod with "O" ring seals. The light weight aluminum cylinders are hard anodized to give you long wear.

Approximate dimensions are 2-1/2" high, 4-1/2" wide and 3-1/8" long parallel to the shaft. The crankshaft is 3/16" diameter precision ground stainless steel. The steam inlet and outlet are both threaded 3/16-40. This kit comes completely machined for easy assembly.

NOTE: Assembly Required.

STOCK NO.	DESCRIPTION
8M	Steam Engine #8M V-TWIN Kit Machined



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BOILER #1

3-1/8" Diameter
x 12-5/8"
Overall Height
Including
4" High Stack

WORKING REPLICA VERTICAL 13 FLUE BOILER KIT



This boiler will easily run one of our well constructed #2, #3 and/or #5 steam engines for light-duty use and demonstration purposes.

Popular around the turn of the century because of their simplicity and small floor space requirement, the vertical multiflue boiler is still popular today for the same reasons. Today, however, it also makes a handsome showpiece. **Put life into your steam engines, run them on live steam. What a sight!**

The boiler is constructed of copper with 4 aluminum castings comprising the base, door, door frame and smoke box cover. Tube sheets are flanged and punched. All hardware, bar stock, silver solder, working drawings, etc. are included. A finished safety valve and water gauge are also included.

The firebox is 3" diameter x 2-1/2" high. The door opening is 1-1/2" high x 2" wide. The water space is 3-1/2" high. There are 13 3/8" diameter flues, 61 square inch heating surface, 20 cubic inch volume.

We recommend "ESBIT" dry fuel tablets (available on page 25 of this catalog) to run this boiler although other heat sources are possible. We also recommend the use of distilled water.

BLR-1 Kit including 4 easy machining aluminum castings, all copper tubing and tube sheets, all hardware and bar stock required, and a complete set of working drawings. Also includes one SOLDERFLUX Silver Solder and Flux kit, one WG-1 Water Gauge, and one SV-1 Safety Valve.



**PROUDLY MADE
IN THE U.S.A.**

NOTE: Machining And Assembly Required.

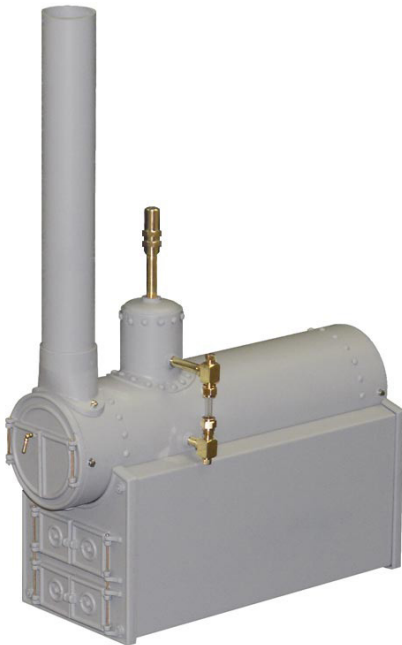
STOCK NO.	DESCRIPTION
BLR-1	Boiler #1 Kit Unmachined

See page 34 for typical piping arrangement to connect the BLR-1, vertical boiler to Model #2, #3 or #5.

BOILER #2

WORKING REPLICA HORIZONTAL STATIONARY TUBULAR TYPE FACTORY STYLE BOILER

11" Long
4-1/2" Wide
8-1/2" To Top of Steam Dome
9" Smoke Stack
16-1/2" To Top of Smoke
Stack



This boiler is offered in 1/12 scale to go with our machine shop tools. The boiler is constructed of copper and the firebox is steel with 10 aluminum castings consisting of the following: front, back, door frame, 6 doors, and a stack transition. All hardware, bar stock, silver solder, working drawings, etc. are included. A finished safety valve and water gauge are also included. Tube sheets are flanged and punched.

The door openings are 1-1/2" high x 2-5/8" wide. The water space is 3" dia. x 8" long. The fire box is 3" wide, 7" long x 1-3/4" high. It also has a cleanout door that opens to access the flues. It has five 5/8 dia. flues, 127 square inch heating surface and 44 cubic inch volume.

This mighty replica of the Puget Sound Machinery Depot's top line boiler is a classic beauty. We offer this fine boiler kit for those of you who will want to make your engines do some work. It is considerably larger in working capacity than our #1 boiler and will handle all of our model engines except for our full-size #4 and #6 engines. It is the perfect match to run your machine shop.

BLR-2 Kit including 10 easy machining aluminum castings, all copper tubing and tube sheets, all hardware and bar stock required, and a complete set of working drawings. Also includes one SODERFLUX Silver Solder and Flux kit, one WG-1 Water Gauge, and one SV-1 Safety Valve.

NOTE: Machining And Assembly Required.



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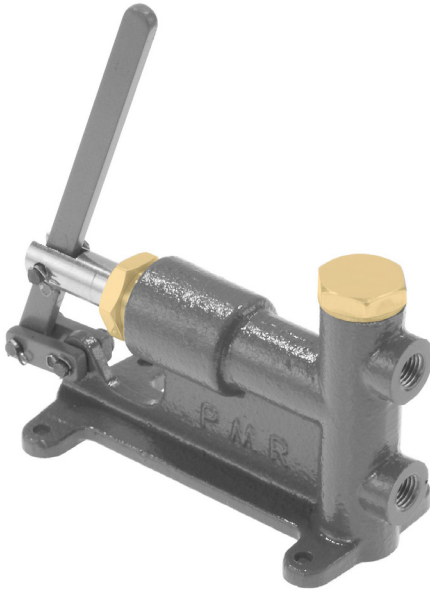
STOCK NO.	DESCRIPTION
BLR-2	Boiler #2 Kit Unmachined

See page 35 for typical piping arrangement to connect the BLR-2, horizontal boiler to our #1 Model.

BOILER FEED PUMP

3/8" Diameter Bore

3/4" Stroke



A small hand-operated, piston-type hydraulic pump used to replenish boiler water while boiler is in use and under pressure. Also used to hydrostatically test your boiler and other hydraulic applications. These pumps have been known to produce up to 400 psi.

Constructed of a cast bronze body, brass end cap and packing nut, with stainless steel piston and valves.

Overall dimensions are 3-3/4" length, 4" height, 1-3/4" width, threaded 5/16-27 (1/16 NPT).

BFP-1C Kit consisting of one bronze casting, all bar stock, hardware, complete working drawings, etc.

NOTE: Machining And Assembly Required.

STOCK NO.	DESCRIPTION
BFP-1C	Boiler Feed Pump Kit Unmachined

BFP-1M Kit same as BFP-1C above but completely machined and ready to assemble



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IN THE U.S.A.**

NOTE: Assembly Required.

STOCK NO.	DESCRIPTION
BFP-1M	Boiler Feed Pump Kit Machined

WATER TANK KIT



This tank is for use with our boiler feed pump and our BLR-1 or BLR-2.

3-1/8" OD x 4" high copper tank with copper tank end.

WTK-1 Kit includes one cast aluminum base, tank, tank end, and one 1/4-40 threaded bushing for outlet.

NOTE: Machining And Assembly Required.

STOCK NO.	DESCRIPTION
WTK-1	Water Tank Kit Unmachined

EXTRA TANK END

Available for making a closed tank.




**PROUDLY MADE
IN THE U.S.A.**

STOCK NO.	DESCRIPTION
WTK-1TE	Extra Tank End Unmachined

WATER GAUGE



STOCK NO.	DESCRIPTION	
WG-1	Water Gauge Threaded 1/4-40	
GT316	Glass Tubing - 3/16" OD (5mm) x 6" long (fits WG-1 above)	
GT416	Glass Tubing - 1/4" OD (6mm) x 6" long	
SRT-6	Silicone Rubber Tube for WG-1 packing (fits 3/16" glass) per 6-inch piece	

Plain water gauge without drain or stop cocks, suitable for small boilers. All brass. Threaded 1/4"-40; 3/16" glass, with bushings. Fittings mount 2-3/8" center to center.


To cut glass tube, make a small notch in the side of the glass tube using a small triangle shape file. Hold glass tube with both hands and make a bending motion at the notched point on the tube.

CAUTION: Wear leather gloves and eye protection while cutting glass.

SAFETY VALVE



These safety valves use a stainless steel ball and spring in a brass body. They are set to blow at approximately 60psi. Threaded 5/16-27 Female (1/16 NPT).

STOCK NO.	DESCRIPTION	
SV-1	Safety Valve	

PRESSURE GAUGE WITH SYPHON (Imported)



STOCK NO.	DESCRIPTION	
PG-1S	Pressure Gauge with Syphon	
PG-1	Pressure Gauge (Only) 3/4 Dia. 0-100 psi.	
PGS-2	Syphon (Only) Threaded 3/16-40	

MINIATURE PRESSURE GAUGE (Imported)




7/8" dial diameter brass housing with plastic cover, center back connection and geared movement. Center back connection NPT male threads and 10-32 female thread.

STOCK NO.	PSI	DESCRIPTION	
PG-AL60-5	0-60 PSI	5/16-27 (1/16 NPT) Male Thread and 10-32 Female Thread	
PG-AL100-5	0-100 PSI	5/16-27 (1/16 NPT) Male Thread and 10-32 Female Thread	
PG-AL160-5	0-160 PSI	5/16-27 (1/16 NPT) Male Thread and 10-32 Female Thread	

SYPHON ADAPTER

Syphon Adapter connects syphon PGS-2 to 10-32 thread on miniature pressure gauge.




STOCK NO.	PSI	DESCRIPTION	
PGS-2A	N/A	Syphon Adaptor (Only)	



STEAM WHISTLE


Authentic scale model Steam Whistle with adjustable pitch. This beautiful little whistle has a nice crisp tone. It looks and works just like its full-size predecessor. Cast bronze valve and handle with brass pipe. Thread size 1/4-40. 2-3/4" high. **Let her blow!**

STOCK NO.	DESCRIPTION	
SW-4	Model Steam Whistle, 1/4-40 Thread	PROUDLY MADE  IN THE U.S.A.



1/8 NPT STEAM WHISTLE VALVE

Authentic larger size steam whistle valve in 1/8" NPT thread. Includes valve only, add your own whistle. Designed with the live steam railroader in mind!

STOCK NO.	DESCRIPTION	
SWV-1/8	1/8" NPT Steam Whistle Valve	PROUDLY MADE  IN THE U.S.A.




ESBIT DRY FUEL

STOCK NO.	DESCRIPTION	
NO-82-1	ESBIT 20 Tablets, 4g each	
NO-82-2	ESBIT 12 Tablets, 14g each	

We also recommend the "ESBIT" dry fuel tablets to run our boilers, although other heat sources are possible.



SOLDER & FLUX

STOCK NO.	DESCRIPTION	
SOLDERFLUX	1oz Silver Solder And Flux	PROUDLY MADE  IN THE U.S.A.

COPPER RIVETS



STOCK NO.	DESCRIPTION	
RIVTCP1/8KT	50EA 1/8 Copper Rivets	

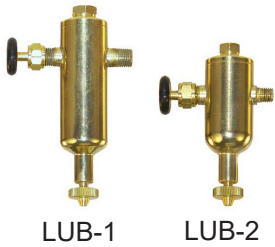
DISPLACEMENT LUBRICATOR

For cylinders from 1/2" up to 2" bore.

This lubricator should be attached to the steam chest or fitted to the steam line close to the engine by a tee.

Opening a needle valve lets steam pass into the lubricator. Steam condenses in the lubricator and sinks to the bottom. Oil is displaced by the water and passes into the steam line, lubricating the engine.

Lubricator may be refilled by closing the needle valve, opening the drain valve to remove water, and removing the cover plug to refill with oil.



STOCK NO.	DESCRIPTION	
LUB-1	Displacement Lubricator, Brass, 5/8" dia. body, approx 2-5/8" high, 1/4-40 thread.	
LUB-2	Displacement Lubricator, Brass, 5/8" dia. body, approx 2" high, 3/16-40 thread.	



CYLINDER OIL

STOCK NO.	DESCRIPTION	
CYL-OIL8	8 oz. Cylinder Oil for Steam Engines	
CYL-OIL	32 oz. Cylinder Oil for Steam Engines	



LUBRICATION KIT

STOCK NO.	DESCRIPTION	
LUB-KIT	Lubrication Kit, Includes: 1 - Funnel 1 - 2 oz. Bottle 1 - 18 ga. Needle w/ Cover 1 - 22 ga. Needle w/ Cover	



DRIP FEED OILER

STOCK NO.	DESCRIPTION	
DFO-3	Drip Feed Oiler - 1-1/2" Long, 3/16-40 Thread	
DFO-4	Drip Feed Oiler - 1-1/2" Long, 1/4-40 Thread	



OIL CUPS

STOCK NO.	DESCRIPTION	
OC-2-56	Oil Cup - 3/8" Long, 2-56 Thread	
OC-5-40	Oil Cup - 1/2" Long, 5-40 Thread	



GREASE CUPS

STOCK NO.	DESCRIPTION	
GC-5-40	Grease Cup - 3/8" Long, 5-40 Thread	
GC-8-32	Grease Cup - 3/8" Long, 8-32 Thread	
GC-10-32	Grease Cup - 9/16" Long, 10-32 Thread	

MODEL PIPE FITTINGS

Add authenticity to your models with model pipe fittings.

Cast bronze fittings (such as 90° ells, street ells, 45° ells, tees and crosses) are available for 3/16" OD pipe (3/16-40 thread), 1/4" OD pipe (1/4-40 thread), and 5/16" OD pipe (5/16-27 thread which is 1/16 NPT thread). These fittings are available as cast or completely machined.

Other fittings such as couplings, nipples, reducing bushings, plugs, unions and boiler bushings are available completely machined from brass bar stock.

Brass pipe is available in 3/16" OD, 1/4" OD, and 5/16" OD. Tube unions are available to connect from threaded pipe fittings to copper or brass tube. Copper and brass tube is available on page 29-31. Taps and dies are also available for the above pipe sizes, see page 41. We recommend Loctite PST 565 for a thread sealant, see page 30.

PM RESEARCH, INC. MODEL PIPE FITTINGS

Universal Straight and Taper (UST) pipe threads are tapered. When used together they screw up tighter than straight threads thereby reducing leakage and loosening during use. They can also be used with straight threads such as UNS (American Standard) and ME (British Threads). They are approximately 0.005" larger in pitch diameter than MTP (Model Taper Pipe) and are not interchangeable with them.

UST threads are used on all our model Steam Engines, Boilers, and Accessories. UST male threads can be easily converted to MTP threads by running a MTP die over them.

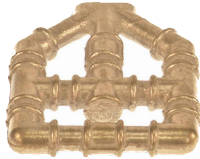
Model Taper Pipe (MTP) threads are derived from the national pipe thread formulas. MTP have the same pitch and taper as our UST pipe threads but are approximately 0.005" smaller in pitch diameter and are not interchangeable with our UST or with the UNS (American Standard) and ME (British Thread) straight threads.

American National Standard Tapered Pipe Thread (NTP) The 1/16 NPT is the smallest of the national pipe threads and not commonly available. It uses 5/16 O.D. pipe and is the same thread as our 5/16-27 UST and the 5/16-27 MTP.

Some thread designations are as follows:

MTP	Model Taper Pipe
ME	Model Engineering (British Straight Thread)
UNS	American National Standard Unified Special (Straight Thread)
UST	Universal Straight and Taper (P.M. Research Inc. Tapered Thread)
NPT	American National Standard Tapered Pipe Thread

MODEL PIPE FITTINGS UNMACHINED



UNMACHINED TREE OF NINE MODEL PIPE CASTINGS

1/8" O.D. PIPE	3/16" O.D. PIPE	1/4" O.D. PIPE	5/16" O.D. PIPE	PROUDLY MADE IN THE U.S.A.
STOCK NO.	STOCK NO.	STOCK NO.	STOCK NO.	
P92	P93	P94	P95	



UNMACHINED TREE OF MODEL PIPE CASTINGS - TEE

3/16"		1/4"		5/16"		PROUDLY MADE IN THE U.S.A.
STOCK NO.	QTY / TREE	STOCK NO.	QTY / TREE	STOCK NO.	QTY / TREE	
PT3C	6	PT4C	5	PT5C	5	



UNMACHINED TREE OF MODEL PIPE CASTINGS - CROSS

3/16"		1/4"		5/16"		PROUDLY MADE IN THE U.S.A.
STOCK NO.	QTY / TREE	STOCK NO.	QTY / TREE	STOCK NO.	QTY / TREE	
PX3C	7	PX4C	6	PX5C	5	



UNMACHINED TREE OF MODEL PIPE CASTINGS - STREET ELL

3/16"		1/4"		5/16"		PROUDLY MADE IN THE U.S.A.
STOCK NO.	QTY / TREE	STOCK NO.	QTY / TREE	STOCK NO.	QTY / TREE	
PS3C	7	PS4C	6	PS5C	5	



UNMACHINED TREE OF MODEL PIPE CASTINGS - 90° ELL

3/16"		1/4"		5/16"		PROUDLY MADE IN THE U.S.A.
STOCK NO.	QTY / TREE	STOCK NO.	QTY / TREE	STOCK NO.	QTY / TREE	
PL3C	8	PL4C	7	PL5C	6	



UNMACHINED TREE OF MODEL PIPE CASTINGS - 45° ELL

3/16"		1/4"		5/16"		PROUDLY MADE IN THE U.S.A.
STOCK NO.	QTY / TREE	STOCK NO.	QTY / TREE	STOCK NO.	QTY / TREE	
PF3C	8	PF4C	7	PF5C	6	

MODEL MACHINED PIPE FITTINGS



MACHINED MODEL PIPE FITTINGS - UST			
	3/16-40	1/4-40	5/16-27 (1/16 NPT)
DESCRIPTION	STOCK NO.	STOCK NO.	STOCK NO.
CROSS	PX3M	PX4M	PX5M
TEE	PT3M	PT4M	PT5M
90° ELL	PL3M	PL4M	PL5M
45° ELL	PF3M	PF4M	PF5M
COUPLING	PC3M	PC4M	PC5M
PLUG	PP3M	PP4M	PP5M
BOILER BUSHING	PB3M	PB4M	PB5M
UNION	PU3M	PU4M	PU5M
STREET ELLS	PS3M	PS4M	PS5M
REDUCING BUSHING		PR4M	PR5M
		(Reduces to 3/16) UST	(Reduces to 1/4) UST

PROUDLY MADE
 IN THE U.S.A.

MACHINED MODEL PIPE FITTINGS - MTP			
	3/16-40 *MTP	1/4-40 *MTP	5/16-27 (1/16 NPT)
DESCRIPTION	STOCK NO.	STOCK NO.	STOCK NO.
CROSS	PX3MTP	PX4MTP	PX5M
TEE	PT3MTP	PT4MTP	PT5M
90° ELL	PL3MTP	PL4MTP	PL5M
45° ELL	PF3MTP	PF4MTP	PF5M
COUPLING	PC3MTP	PC4MTP	PC5M
PLUG	PP3MTP	PP4MTP	PP5M
BOILER BUSHING	PB3MTP	PB4MTP	PB5M
UNION	PU3MTP	PU4MTP	PU5M
STREET ELLS	PS3MTP	PS4MTP	PS5M
REDUCING BUSHING		PR4MTP	PR5MTP
		(Reduces to 3/16) MTP	(Reduces to 1/4) MTP

*MTP = MODEL TAPERED PIPE THREAD

PROUDLY MADE
 IN THE U.S.A.

MACHINED MODEL PIPE FITTINGS - 1/8 NPT	
	1/8 NPT
DESCRIPTION	STOCK NO.
UNION	PU1/8M
REDUCING BUSHING	PR1/8M
Reduces 1/8 NPT to 5/16-27 (1/16 NPT)	

PROUDLY MADE
 IN THE U.S.A.

MODEL MACHINED SPECIAL FITTINGS AND PIPE NIPPLES



BOILER BUSHING



REDUCING BUSHING

SPECIAL FITTINGS			
DESCRIPTION	SIZE	STOCK NO.	
SPECIAL BOILER BUSHING	1/4-32	PB4M-32	
REDUCING BUSHING *MTP	5/16-27 (Reduces to 3/16-40 MTP)	PR53MTP	

MACHINED BRASS PIPE NIPPLES - UST					
		3/16-40 UST	1/4-40 UST	5/16-27 (1/16 NPT)	
DESCRIPTION		STOCK NO.	STOCK NO.	STOCK NO.	
CLOSE NIPPLE		PN3M	PN4M	PN5M	
PIPE NIPPLE	1/2"	P3M-0.5	P4M-0.5	PN5M	
PIPE NIPPLE	1"	P3M-1.0	P4M-1.0	P5M-1.0	
PIPE NIPPLE	1-1/2"	P3M-1.5	P4M-1.5	P5M-1.5	
PIPE NIPPLE	2"	P3M-2.0	P4M-2.0	P5M-2.0	
PIPE NIPPLE	2-1/2"	P3M-2.5	P4M-2.5	P5M-2.5	
PIPE NIPPLE	3"	P3M-3.0	P4M-3.0	P5M-3.0	
PIPE NIPPLE	5"	P3M-5.0	P4M-5.0	P5M-5.0	
PIPE NIPPLE	6"	P3M-6.0			

MACHINED BRASS PIPE NIPPLES - MTP					
		3/16-40 *MTP	1/4-40 *MTP	5/16-27 (1/16 NPT)	
DESCRIPTION		STOCK NO.	STOCK NO.	STOCK NO.	
CLOSE NIPPLE		PN3MTP	PN4MTP	PN5M	
PIPE NIPPLE	1/2"	P3MTP-0.5	P4MTP-0.5	PN5M	
PIPE NIPPLE	3/4"	P3MTP-0.75	P4MTP-0.75	P5M-0.75	
PIPE NIPPLE	1"	P3MTP-1.0	P4MTP-1.0	P5M-1.0	
PIPE NIPPLE	1-1/4"	P3MTP-1.25	P4MTP-1.25	P5M-1.25	
PIPE NIPPLE	1-1/2"	P3MTP-1.5	P4MTP-1.5	P5M-1.5	
PIPE NIPPLE	1-3/4"	P3MTP-1.75	P4MTP-1.75	P5M-1.75	
PIPE NIPPLE	2"	P3MTP-2.0	P4MTP-2.0	P5M-2.0	
PIPE NIPPLE	2-1/2"	P3MTP-2.5	P4MTP-2.5	P5M-2.5	
PIPE NIPPLE	5"	P3MTP-5.0	P4MTP-5.0	P5M-5.0	



*MTP = MODEL TAPERED PIPE THREAD



ADAPTER NIPPLES			
DESCRIPTION	STOCK NO.		
1/4-40 UST to 1/4-32 ADAPTER NIPPLE, 1/2" LONG	PN4M-3240		
3/16-40 UST to 3/16-40 *MTP ADAPTER NIPPLE, 3/8" LONG	*PN3MTPA		
1/4-40 UST to 1/4-40 *MTP ADAPTER NIPPLE, 3/8" LONG	*PN4MTPA		







PIPE THREAD SEALANT	
DESCRIPTION	STOCK NO.
Loctite PST565 Thread Sealant, 6 ml tube	PST565



MODEL PIPE AND TUBE UNIONS



	BRASS PIPE			
	STOCK NO.	SIZE	LENGTH	
	P3	3/16" OD x 1/8" ID	NOMINAL ONE FOOT	
	P3-3	3/16" OD x 1/8" ID	NOMINAL THREE FOOT	
	P4	1/4" OD x 3/16" ID	NOMINAL ONE FOOT	
	P4-3	1/4" OD x 3/16" ID	NOMINAL THREE FOOT	
	P5	5/16" OD x .212" ID	NOMINAL ONE FOOT	
P5-3	5/16" OD x .212" ID	NOMINAL THREE FOOT		


	COPPER TUBE			
	STOCK NO.	SIZE	LENGTH	
	118-36	3/32" OD x .014 WALL	NOMINAL THREE FOOT	
	120-36	1/8" OD x .014 WALL	NOMINAL THREE FOOT	
	119-36	5/32" OD x .014 WALL	NOMINAL THREE FOOT	
121-36	3/16" OD x .014 WALL	NOMINAL THREE FOOT		


	TUBE UNIONS - INCLUDES NUT & CONE - MALE PIPE THREAD				
	Connect from model pipe thread (UST) to copper or brass tube.				
	STOCK NO.	SIZE (O.D.)	PIPE THREAD SIZE	USES NUT	
	TUM3	3/32"	3/16-40	TUN3	
	TUM34	1/8"	3/16-40	TUN4	
	TUM35	5/32"	3/16-40	TUN4	
	TUM4	1/8"	1/4-40	TUN4	
	TUM45	5/32"	1/4-40	TUN4	
	TUM46	3/16"	1/4-40	TUN5	
	TUM5	5/32"	5/16-27	TUN5	
TUM56	3/16"	5/16-27	TUN5		

	TUBE UNION ELL				
	Connect from model pipe thread (UST) to copper or brass tube.				
	STOCK NO.	SIZE (O.D.)	PIPE THREAD SIZE	USES NUT	
TUL3	3/32"	3/16-40	TUN3		



	UNION CONES			
	STOCK NO.	TUBE SIZE	FITS UNION NUT	
	TUC3	3/32" OD	TUN3	
	TUC4	1/8" OD	TUN4	
	TUC45	5/32" OD	TUN4	
	TUC5	5/32" OD	TUN5	
TUC56	3/16" OD	TUN5		



	UNION NUTS			
	STOCK NO.	THREAD SIZE	HEX SIZE	
	TUN3	3/16-40	1/4"	
	TUN4	1/4-40	5/16"	
TUN5	5/16-32	3/8"		

	TUBE CONNECTOR		
	STOCK NO.	DESCRIPTION	
	TCM54	1/16 NPT to 1/8 OD Tube Connector	



	HOSE FITTING		
	STOCK NO.	DESCRIPTION	
	HFM56	1/16 NPT to 3/16 Hose Fitting	



GLOBE VALVES & CHECK VALVES



	GLOBE VALVES		
	Authentic scale model Globe Valves in cast bronze.		
	STOCK NO.	DESCRIPTION	
	GV3	Model Globe Valve 3/16-40	
	*GV3MTP	Model Globe Valve 3/16-40MTP	
	GV4	Model Globe Valve 1/4-40	
	*GV4MTP	Model Globe Valve 1/4-40MTP	
	GV5	Model Globe Valve 5/16-27 (1/16 NPT)	
GV1/8	Model Globe Valve 1/8-27 NPT		



	ANGLE GLOBE VALVES		
	Authentic scale model Globe Valves in cast bronze.		
	STOCK NO.	DESCRIPTION	
	GAV3	Model Angle Globe Valve 3/16-40	
	*GAV3MTP	Model Angle Globe Valve 3/16-40MTP	
	GAV4	Model Angle Globe Valve 1/4-40	
	*GAV4MTP	Model Angle Globe Valve 1/4-40MTP	
	GAV5	Model Angle Globe Valve 5/16-27 (1/16 NPT)	
GAV1/8	Model Angle Globe Valve 1/8-27 NPT		

*MTP = MODEL TAPERED PIPE THREAD



	GLOBE VALVE KITS		
	Complete with four cast bronze valve bodies and handles plus all required bar stock, packing material and complete working drawings to make four straight or angle globe valves.		
	STOCK NO.	DESCRIPTION	
	GVK3	Globe Valve Kit Unmachined 3/16"	
	GVK4	Globe Valve Kit Unmachined 1/4"	
GVK5	Globe Valve Kit Unmachined 5/16"		

	INLINE CHECK VALVE		
	STOCK NO.	DESCRIPTION	
	CVI4	Inline Check Valves Threaded 1/4-40 X 3/8 Long Brass Body With 1/8 Dia. S.S. Ball & Spring	

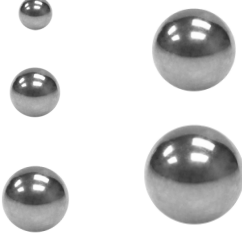
	CHECK VALVES		
	Authentic scale model Check Valves in cast bronze.		
	STOCK NO.	DESCRIPTION	
	CVH3	Model Check Valve 3/16-40	
	*CVH3MTP	Model Check Valve 3/16-40MTP	
	CVH4	Model Check Valve 1/4-40	
	*CVH4MTP	Model Check Valve 1/4-40MTP	
	CVH5	Model Check Valve 5/16-27 (1/16 NPT)	
CVH1/8	Model Check Valve 1/8-27 NPT		

	ANGLE CHECK VALVES		
	Authentic scale model Angle Check Valves in cast bronze.		
	STOCK NO.	DESCRIPTION	
	CVA3	Model Angle Check Valve 3/16-40	
	*CVA3MTP	Model Angle Check Valve 3/16-40MTP	
	CVA4	Model Angle Check Valve 1/4-40	
	*CVA4MTP	Model Angle Check Valve 1/4-40MTP	
	CVA5	Model Angle Check Valve 5/16-27 (1/16 NPT)	
CVA1/8	Model Angle Check Valve 1/8-27 NPT		

*MTP = MODEL TAPERED PIPE THREAD

	MACHINED VALVE HANDLES		
	Quality machined brass valve handles provide a great looking alternative to cast handles.		
	STOCK NO.	DESCRIPTION	
	GVKB1	1/2" Dia. Globe Valve Handle, 0.075" Sq Center Hole	
	GVKB2	5/8" Dia. Globe Valve Handle, 0.087" Sq Center Hole	
GVKB3	3/4" Dia. Globe Valve Handle, 0.087" Sq Center Hole		

STAINLESS STEEL BALLS

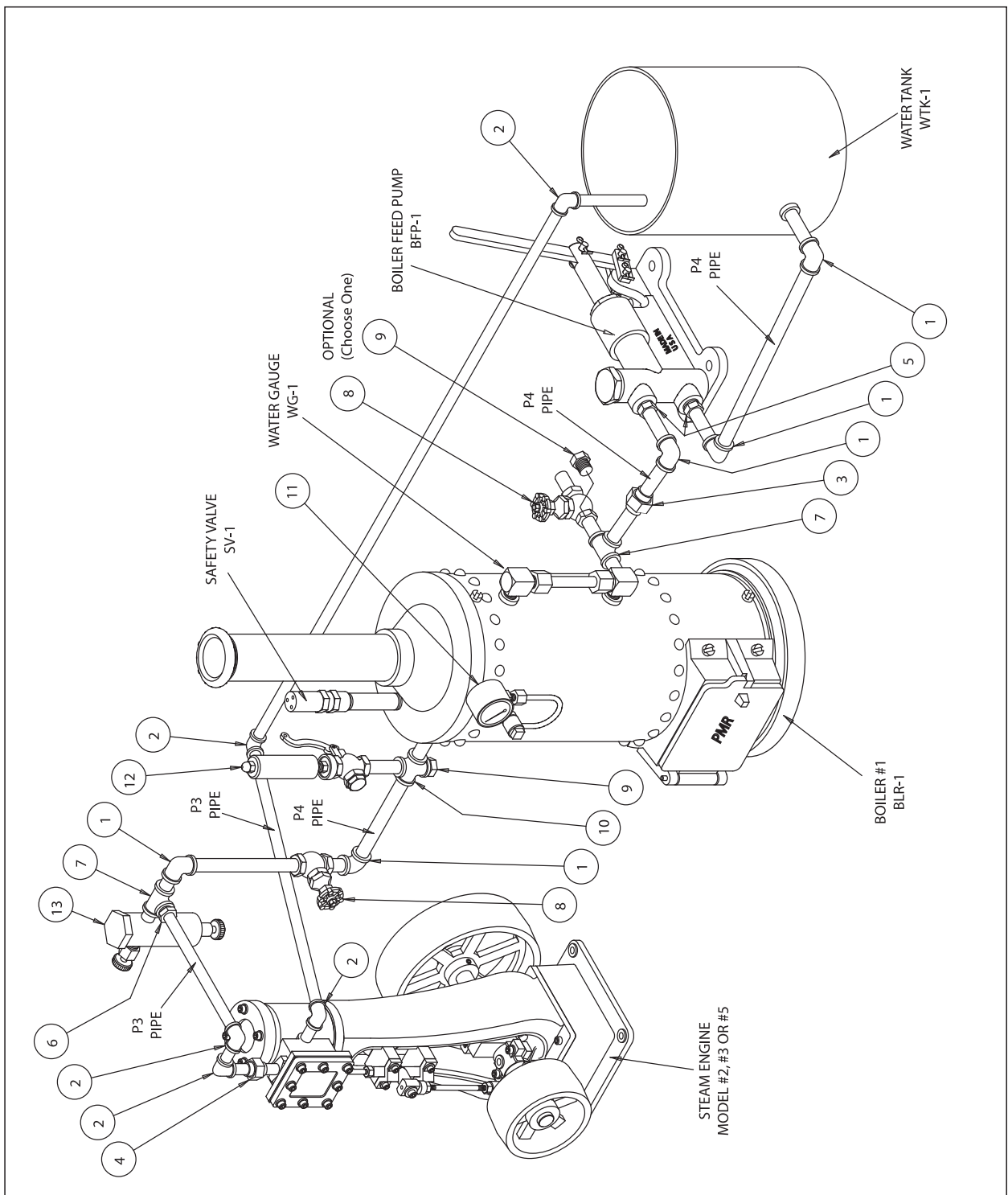
	STOCK NO.	DESCRIPTION	
	BALL1/8	1/8" Stainless Steel Ball	
	BALL5/32	5/32" Stainless Steel Ball	
	BALL3/16	3/16" Stainless Steel Ball	
	BALL1/4	1/4" Stainless Steel Ball	
	BALL5/16	5/16" Stainless Steel Ball	

PIPING ARRANGEMENT

TYPICAL PIPING ARRANGEMENT TO CONNECT A MODEL #2, #3 OR #5 STEAM ENGINE TO THE BLR-1 VERTICAL BOILER, BFP-1 BOILER FEED PUMP AND WTK-1 WATER TANK.

PIPE LENGTHS AND EQUIPMENT MAY BE RE-ARRANGED TO SUIT YOUR INDIVIDUAL APPLICATION.

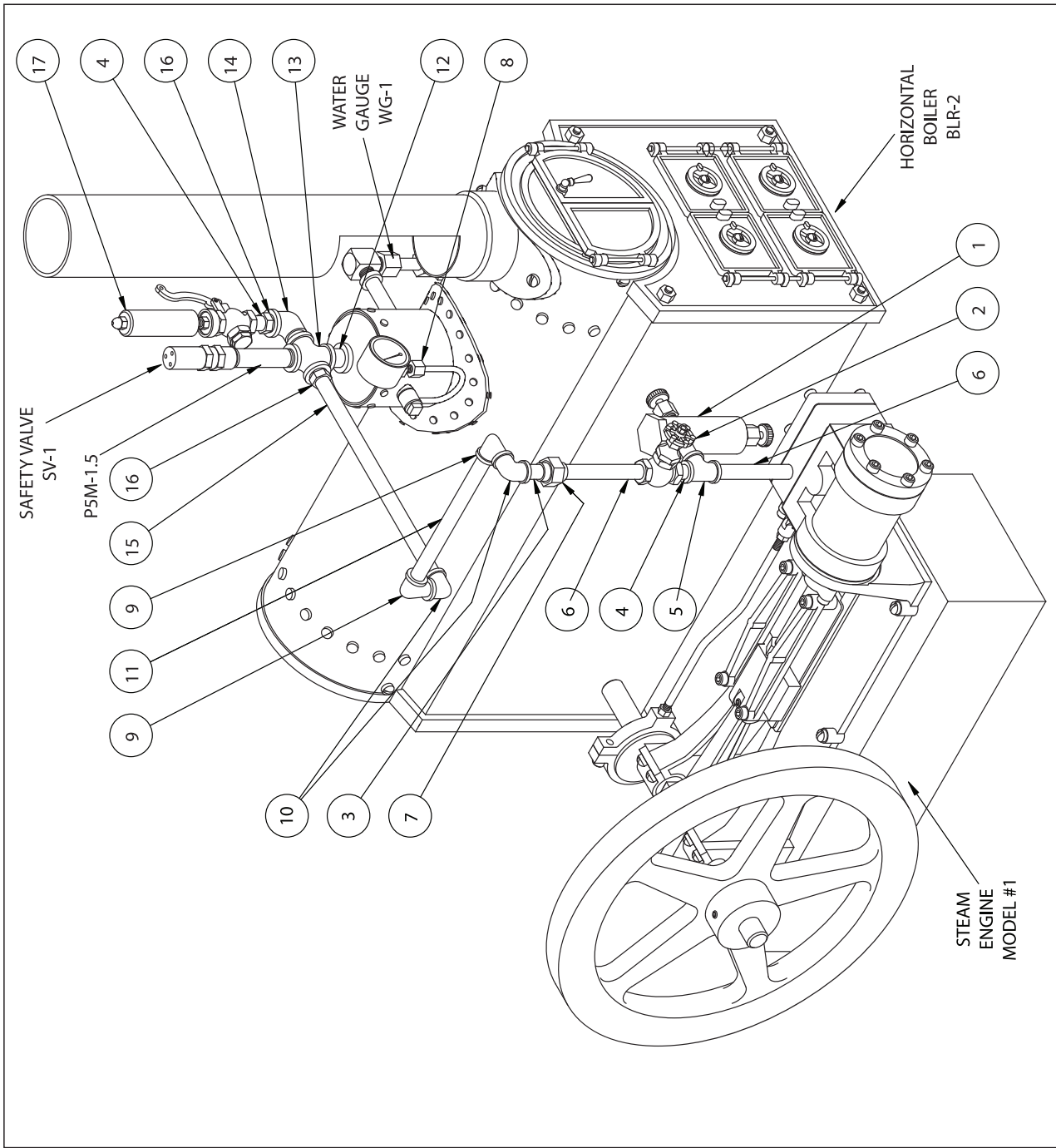
SYSTEM IS SHOWN ARRANGED IN THIS FASHION ONLY FOR CLARITY OF PRESENTATION.



ITEM	QTY	DESCRIPTION	PART NO
A/R		3/16 PIPE - Length to suit	P3
A/R		1/4 PIPE - Length to suit	P4
13	1	LUBRICATOR	LUB-1
12	1	STEAM WHISTLE	SW-4
11	1	PRESSURE GAUGE/SYPHON	PG-1S
10	1	1/4 CROSS	PX4M
9	2	1/4 PIPE PLUG (1 Optional)	PP4M
8	2	1/4 GLOBE VALVE (1 Optional)	GV4
7	2	1/4 TEE	PT4M
6	1	1/4 - 3/16 REDUCER	PR4M
5	2	5/16 - 1/4 REDUCER	PR5M
4	1	3/16 UNION	PUB3M
3	1	1/4 UNION	PU4M
2	5	3/16 90° ELL	PL3M
1	5	1/4 90° ELL	PL4M
ITEM	QTY	DESCRIPTION	PART NO


PIPING ARRANGEMENT

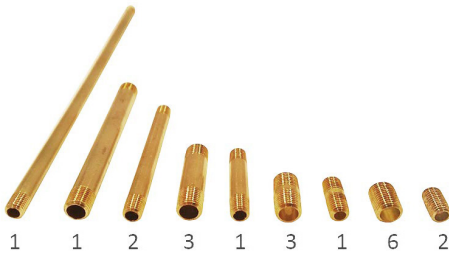
TYPICAL PIPING ARRANGEMENT TO CONNECT A MODEL #1 STEAM ENGINE TO THE BLR-2 BOILER. PIPE LENGTHS MAY BE VARIED TO SUIT INDIVIDUAL APPLICATIONS.





ITEM	QTY	DESCRIPTION	PART NO
17	1	WHISTLE	SW-4
16	2	REDUCER 5/16 - 1/4	PR5M
15	1	PIPE - 1/4x 5	P4
14	1	5/16 90° STREET ELL	P55M
13	1	5/16 CROSS	PX5M
12	1	5/16 CLOSE NIPPLE	PN5M
11	1	PIPE - 1/4 x 3	P4
10	2	1/4 90° ELL	PL4M
9	2	1/4 90° STREET ELL	PS4M
8	1	PRESSURE GAUGE & SYPHON	PG-15
7	1	1/4 UNION	PU4M
6	2	PIPE - 1/4x 1-1/2	P4M-1.5
5	1	1/4 TEE	PT4M
4	2	1/4 CLOSE NIPPLE	PN4M
3	1	PIPE - 1/4x 1/2	P4M-5
2	1	1/4 GLOBE VALVE	GV4
1	1	LUBRICATOR	LUB-1

PIPE FITTING KITS


	BOILER #1 FITTINGS KIT			
	For connecting Boiler #1, Boiler Feed Pump, Water Tank, & Model 2, 3, or 4 Steam Engine. Also requires Globe Valve GV4, Lubricator LUB-1, & optional Steam Whistle SW-4			
	QTY	INCLUDES	DESCRIPTION	STOCK NO.
	1	PU3M	UNION	FK-C5PM
	1	PU4M	UNION	
	5	PL3M	90° ELL	
	5	PL4M	90° ELL	
	2	PT4M	TEE	
	1	PX4M	CROSS	
	1	PR4M	REDUCING BUSHING	
2	PR5M	REDUCING BUSHING		
1	C-122	DRAWING		

 <p style="text-align: center;">1 1 2 3 1 3 1 6 2 QTY.</p>	BOILER #1 NIPPLE KIT			
	For connecting Boiler #1, Boiler Feed Pump, Water Tank, & Model 2, 3, or 4 Steam Engine.			
	QTY	INCLUDES	DESCRIPTION	STOCK NO.
	2	PN3M	3/16-40 CLOSE NIPPLE	NK-C5PM
	1	P3M-0.5	3/16-40 x 1/2" NIPPLE	
	1	P3M-1.0	3/16-40 x 1" NIPPLE	
	3	P3M-2.0	3/16-40 x 2" NIPPLE	
	1	P3M-6.0	3/16-40 x 6" NIPPLE	
	6	PN4M	1/4-40 CLOSE NIPPLE	
	3	P4M-0.5	1/4-40 x 1/2" NIPPLE	
	3	P4M-1.0	1/4-40 x 1" NIPPLE	
	1	P4M-2.5	1/4-40 x 2-1/2" NIPPLE	
	1	C-124	DRAWING	

	BOILER #2 FITTINGS KIT			
	For connecting Boiler #2 & Model #1 Steam Engine. Also requires Globe Valve GV4, Lubricator LUB-1, & optional Steam Whistle SW-4			
	QTY	INCLUDES	DESCRIPTION	STOCK NO.
	1	PU4M	UNION	FK-1BLR2
	2	PL4M	90° ELL	
	2	PS4M	STREET ELL	
	1	PS5M	STREET ELL	
	1	PT4M	TEE	
	1	PX5M	CROSS	
	2	PR5M	REDUCING BUSHING	
1	C-121	DRAWING		

 <p style="text-align: center;">1 1 2 1 2 1 QTY.</p>	BOILER #2 NIPPLE KIT			
	For connecting Boiler #2 & Model #1 Steam Engine.			
	QTY	INCLUDES	DESCRIPTION	STOCK NO.
	2	PN4M	1/4-40 CLOSE NIPPLE	NK-1BLR2
	1	P4M-0.5	1/4-40 x 1/2" NIPPLE	
	2	P4M-1.5	1/4-40 x 1-1/2" NIPPLE	
	1	P4M-3.0	1/4-40 x 3" NIPPLE	
	1	P4M-5.0	1/4-40 x 5" NIPPLE	
	1	PN5M	5/16-27 CLOSE NIPPLE	
1	C-121-B	DRAWING		

PIPE FITTING KITS


	BOILER FEED PUMP FITTINGS KIT			
	For connecting Boiler Feed Pump to a Boiler #1 or Boiler #2.			
	QTY	INCLUDES	DESCRIPTION	STOCK NO.
	1	PU4M	UNION	FK-BFP1
	3	PL4M	90° ELL	
	1	PT4M	TEE	
2	PR5M	REDUCING BUSHING		
1	A-144	DRAWING		
(NOTE: This Kit is included in Stock #FK-C5PM)				


FLYWHEEL CASTINGS





STOCK NO.	APPROXIMATE CASTING DIMENSIONS					USED ON ENGINE
	RIM DIA.	RIM WIDTH	HUB DIA.	WEIGHT	MATERIAL	
FWC-5AP	1-7/8	7/8	5/8	1-1/2 oz.	ALUMINUM	#5A Belt Pulley
FWC-5BP	1-7/8	7/8	5/8	5 oz.	BRONZE	#5B Belt Pulley
FWC-2A	2-3/8	5/8	1/2	2-1/2 oz.	ALUMINUM	#2A
FWC-3A	2-3/8	5/8	1/2	2-1/2 oz.	ALUMINUM	#3A
FWC-3B	2-3/8	5/8	1/2	7-1/2 oz.	BRONZE	#3BI
FWC-S13	3	9/16	7/16	2-1/2 oz.	ALUMINUM	Solar #13
FWC-S7	3	9/16	7/16	7-1/2 oz.	BRONZE	Solar #7
FWC-5B	3-1/8	7/8	5/8	12 oz.	BRONZE	#5BI
FWC-S4	3-1/2	1/2	1/2	2-3/4 oz.	ALUMINUM	Solar #4 & #10
FWC-S3A	3-1/4	1-1/16	9/16	8 oz.	ALUMINUM	Solar #3
FWC-S3B	3-1/4	1-1/16	9/16	1-1/2 lbs.	BRONZE	Solar #3
FWC-1CI	6-1/2	3/8	3/4	1-1/4 lbs.	CAST IRON	#1BI
FWC-4CI	7	1-5/8	1-1/4	8 lbs.	CAST IRON	#4CI & #6CI
FWC-S12A	3-1/2	1/2	1/2	2-1/2 oz.	ALUMINUM	Solar #12
FWC-S12B	3-1/2	1/2	1/2	7-1/2 oz.	BRONZE	Solar #12
FWC-RW	8-1/4	7/8	1-1/8	5 lbs. 10 oz.	CAST IRON	R-AC & R-WC
FWC-RWP	3-1/8	1-1/2	1	1 lbs. 9 oz.	CAST IRON	R-AC & R-WC


SPECIAL SHAPES

 HEXAGON ROD - BRASS ONE FOOT LENGTH		
STOCK NO.	DESCRIPTION	SIZE
RHB-2	HEXAGON ROD	1/8"
RHB-3	HEXAGON ROD	3/16"
RHB-4	HEXAGON ROD	1/4"
RHB-5	HEXAGON ROD	5/16"
RHB-6	HEXAGON ROD	3/8"
RHB-7	HEXAGON ROD	7/16"
RHB-8	HEXAGON ROD	1/2"
RHB-10	HEXAGON ROD	5/8"


 ROUND ROD - BRASS ONE FOOT LENGTH		
STOCK NO.	DESCRIPTION	SIZE
RRB-1	ROUND ROD	1/16
RRB-332	ROUND ROD	3/32
RRB-2	ROUND ROD	1/8"
RRB-3	ROUND ROD	3/16"
RRB-4	ROUND ROD	1/4"
RRB-5	ROUND ROD	5/16"
RRB-6	ROUND ROD	3/8"
RRB-7	ROUND ROD	7/16"
RRB-8	ROUND ROD	1/2"
RRB-10	ROUND ROD	5/8"
RRB-12	ROUND ROD	3/4"
RRB-16	ROUND ROD	1"
RRB-18	ROUND ROD	1-1/8"


 SQUARE ROD - BRASS ONE FOOT LENGTH		
STOCK NO.	DESCRIPTION	SIZE
RSB-2	SQUARE ROD	1/8"
RSB-3	SQUARE ROD	3/16"
RSB-4	SQUARE ROD	1/4"
RSB-5	SQUARE ROD	5/16"
RSB-6	SQUARE ROD	3/8"

WATER HARDENING STEEL DRILL ROD ONE FOOT LENGTH, GROUND O.D. ± 0.0005 "			
	STOCK NO.	DESCRIPTION	SIZE
	RRD-4	WATER HARDENING DRILL ROD	0.250"
	RRD-6	WATER HARDENING DRILL ROD	0.375"
	RRD-8	WATER HARDENING DRILL ROD	0.500"
	RRD-10	WATER HARDENING DRILL ROD	0.625"
	RRD-12	WATER HARDENING DRILL ROD	0.750"
	RRD-16	WATER HARDENING DRILL ROD	1.000"

 HALF ROUND - BRASS ONE FOOT LENGTH		
STOCK NO.	DESCRIPTION	SIZE
RHRB-4	HALF ROUND	1/4" x 1/8"
RHRB-5	HALF ROUND	5/16" x 5/32"

NOMINAL - ONE FOOT LENGTH MINUS SAW CUT

 MITER GEAR - BRASS USED IN OUR DRILL PRESS KIT DP-1							
STOCK NO.	PITCH	TOOTH	BORE DIA.	HUB DIA.	PITCH DIA.	O.D.	MOUNTING DISTANCE HUB TO GEAR AXIS
GMB15T48P	48	15	0.125	0.250	0.312	0.340	0.312

 GEAR STOCK - 64 PITCH / 20° PRESSURE ANGLE NOMINAL - 6" LENGTH MINUS SAW CUT				
STOCK NO.	MATERIAL	TEETH	PITCH DIA.	O.D.
GB8T64P	BRASS	8	0.125	0.156
GB12T64P	BRASS	12	0.188	0.219
GB16T64P	BRASS	16	0.250	0.281
GB18T64P	BRASS	18	0.281	0.313
GB28T64P	BRASS	28	0.438	0.469
GB48T64P	BRASS	48	0.750	0.781

BOOKS OF INTEREST

	DESCRIPTION	STOCK NO.
	<p>STIRLING CYCLE ENGINES</p> <p>This publication is the first of its kind and takes the reader on a 160-year tour through the world of Stirling cycle engines. The hot air principles of operation are explained in this ease-to-read, lavishly illustrated book by Andy Ross. 122 pages.</p>	<p style="text-align: center;">BAR395</p>
	<p>A BOOK OF TOOLS, MACHINERY, & SUPPLIES</p> <p>This exquisitely detailed 524 page catalog illustrates every tool an 1895 machinist could possibly want. Features tools used by engineers, blacksmiths, model makers, founders, moulders, factories, mills, and mines. A book any machinist, designer, or tool collector should have. Written by Chas A Strelinger & Co. Detroit, MI.</p>	<p style="text-align: center;">B20692</p>
	<p>THE STEAM DONKEY ENGINE</p> <p>This 54 page book by William M. Harris offers a complete set of working drawings and plans for building your own 1-1/2" scale steam donkey engine which was used primarily in the logging industry.</p>	<p style="text-align: center;">BSDKY</p>
	<p>ORR & SEMBOWER, INC. ENGINES & BOILERS BULLETIN</p> <p>This 4 page bulletin by Orr & Sembower of Reading, PA illustrates the original advertisement and specifications for eight stationary and marine style steam engines. Features a sectional breakdown Class "A" horizontal engine used for mountain transport and our #5 "coke bottle" style vertical steam engine.</p>	<p style="text-align: center;">B102</p>
	<p>MODEL HIT AND MISS ENGINE</p> <p>This 42 page book teaches you how to build a 1-1/8" bore x 1-1/2" stroke hit-and-miss gas model engine. Contains complete sets of working drawings and plans to take you step by step through the machining and construction process. All parts may be machined from solid materials so there is no need for castings.</p>	<p style="text-align: center;">B1252</p>
	<p>STIRLING HOT AIR ENGINE PLANS</p> <p>Designed by Arlan Climes, this 10 page book presents plans for building an intriguing, easy-to-build engine involving the use of lathe, electric drill, small hand tools. All parts may be constructed from solid materials without castings. Plans are for a 2-3/4" diameter flywheel. This engine runs beautifully with a candle or low wattage bulb. It is a fun, air-cooled engine, built with cans and invites conversation from all.</p>	<p style="text-align: center;">BRL123</p>
	<p>ROBINSON HOT AIR ENGINE PLANS</p> <p>Build your own scaled-down version of a Robinson Stirling Engine. This 19 page book contains plans for constructing the engine by use of a lathe and/or milling machine, electric drill, and small hand tools. All parts may be fashioned from solid materials without the use of castings. Designed for a 4" diameter flywheel. This is a distinctive appearing engine with power linkages at 90 degree angles.</p>	<p style="text-align: center;">BRL122</p>

HIGH SPEED STEEL - GROUND THREAD TAPS AND DIES



THREAD SIZE	TAP	DIE	DIE STOCK
	STOCK NO.	STOCK NO.	SIZE
0-80	T-0-80	D-0-80	13/16" dia.
0-80 LH	TL-0-80	DL-0-80	13/16" dia.
1-72	T-1-72	D-1-72	13/16" dia.
1-72 LH	TL-1-72	DL-1-72	13/16" dia.
2-56	T-2-56	D-2-56	13/16" dia.
3-48	T-3-48	D-3-48	13/16" dia.
4-40	T-4-40	D-4-40	13/16" dia.
5-40	T-5-40	D-5-40	13/16" dia.
5-40 LH	TL-5-40	DL-5-40	13/16" dia.
6-32	T-6-32	D-6-32	13/16" dia.
6-40	T-6-40	D-6-40	13/16" dia.
8-32	T-8-32	D-8-32	13/16" dia.
8-36	T-8-36	D-8-36	13/16" dia.
10-24	T-10-24	D-10-24	13/16" dia.
10-32	T-10-32	D-10-32	13/16" dia.
1/4-20	T-1/4-20	D-1/4-20	13/16" dia.
1/4-28	T-1/4-28	D-1/4-28	13/16" dia.

LH = Left Hand Thread

TAP WRENCH AND DIE STOCKS	
STOCK NO.	DESCRIPTION
TW-1	TAP WRENCH 0-1/4
DS-1	DIE STOCK 13/16 DIA.
DS-2	DIE STOCK 1" DIA.

SPECIAL TOOLS FOR BUILDING KITS	
STOCK NO.	DESCRIPTION
TPR-1	#1 Taper Pin Reamer for MM-1
TPR-4	4/0 Taper Pin Reamer for EL-1
TPR-5	5/0 Taper Pin Reamer for DP-1
TPR-6	6/0 Taper Pin Reamer for WL-1
D-50-6	#50 x 6" Drill for #5 Engine
SF-1	.100" Sq. File for EL-1, DP-1, CS-1

PIPE THREAD TAPS AND DIES



THREAD SIZE	TAP	DIE	DIE STOCK
	STOCK NO.	STOCK NO.	SIZE
3/16-40 ME Straight Thread	T-3/16-40M	D-3/16-40M	13/16" dia.
1/4-32 ME Straight Thread	T-1/4-32M	D-1/4-32M	13/16" dia.
1/4-40 ME Straight Thread	T-1/4-40M	D-1/4-40M	13/16" dia.
3/16-40 UST Tapered Thread	T-3/16-40MTP	D-3/16-40UST	13/16" dia.
3/16-40 MTP Tapered Thread	T-3/16-40MTP	D-3/16-40MTP	13/16" dia.
1/4-40 UST Tapered Thread	T-1/4-40MTP	D-1/4-40UST	13/16" dia.
1/4-40 MTP Tapered Thread	T-1/4-40MTP	D-1/4-40MTP	13/16" dia.
5/16-27 (1/16 NPT) Tapered Thread	T-5/16-27T	D-5/16-27	1" dia.

NOTE: UST & MTP INTERNAL THREADS ARE CUT WITH THE SAME TAP

	HEX WRENCHES	
	STOCK NO.	DESCRIPTION
	NO-86-035	.035" Hex Wrench
	NO-86-050	.050" Hex Wrench
	NO-86-116	1/16" Hex Wrench
	NO-86-564	5/64" Hex Wrench
	NO-86-332	3/32" Hex Wrench
	NO-85	7/64" Hex Wrench

REFERENCE INFORMATION

1. Drilling Information

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2. Milling & Turning Information

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3. Hardening and Tempering Information

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4. Ohm's Law

TABLE 4.A. Ohm's Law	Page 48
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TABLE 1. A. RECOMMENDED TAP DEPTH FOR COMMON MATERIALS

MATERIAL	MINIMUM THREAD ENGAGEMENT
Aluminum	2.0 x Thread O.D.
Cast Iron	1.5 x Thread O.D.
Brass	1.5 x Thread O.D.
Bronze	1.5 x Thread O.D.
Steel	1.0 x Thread O.D.

TABLE 1. B. TAP DRILL SIZE AND PERCENTAGE OF THREADS FORMULA FOR OBTAINING TAP DRILL SIZES

$$\text{Outside Diameter of Thread} - \frac{.01299 \times \text{Desired percentage of full thread}}{\text{No. of threads per inch}} = \text{Drill Hole Size}$$

NOTE: For most applications the percentage of thread should be 50-80%.

NOTE: Select nearest commercial stock drill.

PERCENTAGE OF FULL THREAD FOR OTHER DRILL SIZES

$$\text{No. of Threads per Inch} \times \left(\frac{\text{Outside Diameter of Thread} - \text{Selected Drill Diameter}}{.01299} \right) = \text{Percentage of Full Thread}$$

TABLE 1.C. DECIMAL EQUIVALENTS AND TAP DRILL SIZES

Fraction or Drill Size	Decimal Equivalent	Tap Size	Fraction or Drill Size	Decimal Equivalent	Tap Size
80	.0135		38	.1015	5-40
79	.0145		37	.1040	5-44
1/64	.0156		36	.1065	6-32
78	.0160		7/64	.1094	
77	.0180		35	.1100	
76	.0200		34	.1110	
75	.0210		33	.1130	6-40
74	.0225		32	.1160	
73	.0240		31	.1200	
72	.0250		1/8	.1250	
71	.0260		30	.1285	
70	.0280		29	.1360	8-32, 36
69	.0292		28	.1405	
68	.0310		9/64	.1406	3/16-40 MTP
1/32	.0312		27	.1440	
67	.0320		26	.1470	3/16-40 UST
66	.0330		25	.1495	10-24
65	.0350		24	.1520	
64	.0360		23	.1540	
63	.0370		5/32	.1562	3/16-40 Straight
62	.0380		22	.1570	
61	.0390		21	.1590	10-32
60	.0400		20	.1610	
59	.0410		19	.1660	10-40
58	.0420		18	.1695	
57	.0430		11/64	.1719	
56	.0465		17	.1730	
3/64	.0469	0-80	16	.1770	12-24
55	.0520		15	.1800	
54	.0550		14	.1820	12-28
53	.0595	1-64, 72	13	.1850	12-32
1/16	.0625		3/16	.1875	
52	.0635		12	.1890	
51	.0670		11	.1910	
50	.0700	2-56, 64	10	.1935	
49	.0730		9	.1960	
48	.0760		8	.1990	
5/64	.0781		7	.2010	1/4-20
47	.0785	3-48	13/64	.2031	1/4-40 MTP
46	.0810		6	.2040	
45	.0820	3-56	5	.2055	
44	.0860		4	.2090	1/4-40 UST
43	.0890	4-40	3	.2130	1/4-28
42	.0935	4-48	7/32	.2188	1/4-40 Straight
3/32	.0938		2	.2210	1/4-32
41	.0960		1	.2280	
40	.0980		A	.2340	
39	.0995		15/64	.2344	

TABLE 1.C. (Continued) DECIMAL EQUIVALENTS AND TAP DRILL SIZES

Fraction or Drill Size	Decimal Equivalent	Tap Size	Fraction or Drill Size	Decimal Equivalent	Tap Size
B	.2380		19/32	.5938	11/16-11
C	.2420		39/64	.6094	
D	.2460	5/16-27 MTP	5/8	.6250	11/16-16
D	.2460	1/16 NPT	41/64	.6406	
D	.2460	5/16-27 UST	21/32	.6562	3/4-10
1/4 - E	.2500		43/64	.6719	
F	.2570	5/16-18	11/16	.6875	3/4-16
G	.2610		45/64	.7031	1/2-14 NPT
17/64	.2656		23/32	.7188	
H	.2660		47/64	.7344	
I	.2720	5/16-24	3/4	.7500	
J	.2770		49/64	.7656	7/8-9
K	.2810		25/32	.7812	
9/32	.2812		51/64	.7969	
L	.2900		13/16	.8125	7/8-14
M	.2950		53/64	.8281	
19/64	.2969		27/32	.8438	
N	.3020		55/64	.8594	
5/16	.3125	3/8-16	7/8	.8750	1-8
O	.3160		57/64	.8906	
P	.3230		29/32	.9062	
21/64	.3281		59/64	.9219	3/4-14 NPT
Q	.3320	3/8-24	15/16	.9375	1-12, 14
R	.3390	1/8-27 NPT	61/64	.9531	
11/32	.3438	3/8-32	31/32	.9688	
S	.3480		63/64	.9844	1 1/8-7
T	.3580		1	1.0000	
23/64	.3594		1 3/64	1.0469	1 1/8-12
U	.3680	7/16-14	1 7/64	1.1094	1 1/4-7
3/8	.3750		1 1/8	1.1250	
V	.3770		1 5/32	1.1563	1-11 1/2 NPT
W	.3860		1 11/64	1.1719	1 1/4-12
25/64	.3906	7/16-20	1 7/32	1.2188	1 3/8-6
X	.3970		1 1/4	1.2500	
Y	.4040		1 19/64	1.2969	1 3/8-12
13/32	.4062		1 11/32	1.3438	1 1/2-6
Z	.4130		1 3/8	1.3750	
27/64	.4219	1/2-13	1 27/64	1.4219	1 1/2-12
7/16	.4375	1/4-18 NPT	1 1/2	1.5000	1 1/4-11 1/2
29/64	.4531	1/2-20	1 47/64	1.7344	1 1/2-11 1/2 NPT
15/32	.4688		2 7/32	2.2188	2-11 1/2 NPT
31/64	.4844	9/16-12	2 5/8	2.6250	2 1/2-8 NPT
1/2	.5000		3 1/4	3.2500	3-8 NPT
33/64	.5156	9/16-18	3 3/4	3.7500	3 1/2-8 NPT
17/32	.5312	5/8-11	4 1/4	4.2500	4-8 NPT
35/64	.5469				
9/16	.5625				
37/64	.5781	5/8-18			

**TABLE 2.A. SPEED AND FEED DATA for High Speed End Mill
Applications in Various Materials**

Materials	Heat-Resistant Ferritic Base Alloys, Medium Strength Stainless Steels, Unalloyed Titanium, Tool Steels (30-40C)		"Machine Steel, Hard Brass and Bronze, Electrolytic Copper, Mild Steel Forgings (20-30C)"		Cast Iron, Mild Steel, Half-Hard Brass and Bronze		Brass Bronze, Alloyed Aluminum, Abrasive Plastics		Aluminum, Plastics, Wood	
	High Speed Steel End Mills, 2 or More Flutes		High Speed Steel End Mills, 2 or More Flutes		High Speed Steel End Mills 2 or More Flutes, Surface Treatment Helpful in C.I. Applications		1 to 6 Flute, High Speed Steel End Mills of High Helix Type		1 to 6 Flute, High Speed Steel End Mills of High Helix Type	
Types and Styles of End Mills	Speed 40-60 SFM		Speed 60-80 SFM"		Speed 80-100 SFM"		Speed 100-200 SFM"		"Speed 200-600 SFM"	
	RPM	Chip Load Per Tooth	RPM	Chip Load Per Tooth	RPM	Chip Load Per Tooth	RPM	Chip Load Per Tooth	RPM	Chip Load Per Tooth
1/16	2444-3667	.0002-.0005	3667-4888	.0002-.0005	4888-6111	.0002-.0005	6111-12222	.0002-.0005	12222 Up	.0002-.0005
3/32	1629-2750	.0002-.0005	2750-3259	.0002-.0005	3259-4073	.0002-.0005	4073-8146	.0002-.0005	8146 Up	.0002-.0005
1/8	1222-1833	.0002-.0005	1833-2440	.0002-.001	2440-3056	.0002-.001	3056-6112	.0002-.001	6112 Up	.0002-.001
3/16	815-1222	.0002-.0005	1222-1625	.0002-.001	1625-2037	.0002-.001	2037-4074	.0002-.001	4074-Up	.0002-.001
1/4	611-917	.0002-.001	917-1222	.0005-.002	1222-1528	.0005-.002	1528-3056	.0005-.002	3056-9168	.0005-.002
5/16	489-733	.0002-.001	733-978	.0005-.002	978-1222	.0005-.002	1222-2444	.0005-.002	2444-7332	.0005-.002
3/8	407-611	.0005-.002	611-815	.001-.003	815-1019	.001-.003	1019-2038	.0005-.003	2038-6114	.0005-.002
7/16	349-524	.0005-.002	524-698	.001-.003	698-873	.001-.003	873-1746	.0005-.003	1746-5238	.0005-.002
1/2	306-458	.001-.003	458-611	.001-.003	611-764	.001-.003	764-1528	.0005-.003	1528-4584	.0005-.002
9/16	272-412	.001-.003	412-543	.001-.004	543-678	.001-.004	678-1356	.0005-.004	1356-4071	.0005-.003
5/8	244-367	.001-.004	367-489	.001-.004	489-611	.001-.004	611-1222	.0005-.004	1222-3666	.0005-.003
11/16	222-337	.001-.004	337-444	.001-.004	444-555	.001-.004	555-1110	.0005-.004	1110-3330	.0005-.003
3/4	203-306	.001-.004	306-407	.001-.004	407-509	.002-.006	509-1018	.001-.006	1018-3054	.001-.004
13/16	189-284	.001-.004	284-379	.002-.006	379-469	.002-.006	469-938	.001-.006	938-2814	.001-.004
7/8	175-262	.002-.006	262-349	.002-.006	349-436	.002-.006	436-872	.001-.006	872-2616	.001-.004
15/16	163-246	.002-.006	246-326	.002-.006	326-407	.002-.006	407-814	.001-.006	814-2442	.001-.004
1"	153-229	.002-.006	229-306	.002-.006	306-382	.002-.006	382-764	.002 Up	764-2292	.002 Up
1-1/8	136-204	.002-.006	204-272	.002-.006	272-340	.003 Up	340-680	.002 Up	680-2040	.002 Up
1-1/4	122-183	.002-.006	183-244	.003 Up	244-306	.003 Up	306-612	.002 Up	612-1836	.002 Up
1-3/8	111-167	.003 Up	167-222	.003 Up	222-278	.003 Up	278-556	.002 Up	556-1668	.002 Up
1-1/2	102-153	.003 Up	153-204	.003 Up	204-255	.003 Up	255-510	.003 Up	510-1530	.002 Up
1-5/8	94-141	.003 Up	141-188	.003 Up	188-235	.003 Up	235-470	.003 Up	470-1410	.002 Up
1-3/4	87-131	.003 Up	131-175	.003 Up	175-218	.003 Up	218-436	.003 Up	436-1308	.002 Up
1-7/8	81-122	.003 Up	122-163	.003 Up	163-204	.003 Up	204-408	.003 Up	408-1224	.003 Up
2"	76-115	.003 Up	115-153	.003 Up	153-191	.003 Up	191-382	.003 Up	382-1146	.003 Up
2-1/8	72-108	.003 Up	108-144	.003 Up	144-179	.003 Up	198-358	.003 Up	358-1074	.003 Up
2-1/4	68-102	.003 Up	102-136	.003 Up	136-170	.003 Up	170-240	.003 Up	340-1020	.003 Up
2-3/8	64-97	.003 Up	97-128	.003 Up	128-161	.003 Up	161-322	.003 Up	322-966	.003 Up
2-1/2	61-92	.003 Up	92-122	.003 Up	122-153	.003 Up	153-306	.003 Up	306-918	.003 Up
2-5/8	58-88	.003 Up	88-116	.003 Up	116-145	.003 Up	145-290	.003 Up	290-870	.003 Up
2-3/4	56-83	.003 Up	83-111	.003 Up	111-139	.003 Up	139-278	.003 Up	278-834	.003 Up
2-7/8	53-80	.003 Up	80-106	.003 Up	106-132	.003 Up	132-264	.003 Up	264-792	.003 Up
3"	51-76	.003 Up	76-102	.003 Up	102-127	.003 Up	127-254	.003 Up	254-762	.003 Up

**NOTE: ALL OF THE SPEEDS AND FEEDS SHOWN ARE SUGGESTED STARTING POINTS.
NOTE: SFM = SURFACE FEET PER MINUTE**

**TABLE 2.B. CUTTING SPEEDS FOR LIGHT ROUGHING & FINISH CUTS
ON MATERIALS USED IN P.M. RESEARCH KITS**

MATERIAL INCLUDED IN PMR KITS	CUTTING SPEED IN SURFACE FEET PER MINUTE (SFM)					
	TURNING		MILLING		DRILLING	REAMING
ALUMINUM ALLOYS	HSS	CARBIDE	HSS	CARBIDE	HSS	HSS
SAND CASTINGS	600	1100	600	1100	500	500
DIE CASTINGS	125	550	125	550	300	300
WROUGHT 6061 T6, ALL BAR STOCK	500	1100	500	1100	350	350
COPPER ALLOYS	HSS	CARBIDE	HSS	CARBIDE	HSS	HSS
COPPER 110 DRAWN TUBE	110	225	110	225	60	50
BRASS FREE CUTTING 360, ALL BAR STOCK	350	600	350	600	175	175
CAST BRONZE 937 AS CAST	300	650	300	650	160	160
PHOSPHOR BRONZE 544 BARSTOCK	300	650	300	650	160	160
IRON ALLOYS	HSS	CARBIDE	HSS	CARBIDE	HSS	HSS
PLAIN CARBON STEEL 1010-1020, NON-ROUND	110	400	110	400	90	60
FREE MACHINING STEEL 12L 14, HEX & ROUND	145	560	130	625	120	80
TOOL STEEL W1 DRILL ROD ANNEALED	100	325	85	250	85	55
STAINLESS STEEL 303 COLD DRAWN	80	325	75	300	70	45
GREY CAST IRON CLASS 25 AS CAST	90	350	80	325	90	60

TABLE 2.C. SURFACE SPEED TABLE

Surface Feet Per Minute	40	50	60	70	80	90	100	110	120	140	160	180	200	250	300	350	400	450	500	600	800	1000	1250
Diameter Inch	REVOLUTIONS PER MINUTE																						
1/4"	611	764	917	1070	1222	1375	1528	1681	1834	2139	2445	2750	3056	3820	4584	5348	6112	6876	7640	9168	12224	15280	19100
3/8"	407	509	611	713	815	917	1019	1121	1222	1426	1630	1834	2037	2547	3056	3565	4075	4584	5093	6112	8149	10187	12733
1/2"	306	382	458	535	611	688	764	840	917	1070	1222	1375	1528	1910	2292	2674	3056	3438	3820	4584	6112	7640	9550
5/8"	244	306	367	428	489	550	611	672	733	856	978	1100	1222	1528	1834	2139	2445	2750	3056	3667	4890	6112	7640
3/4"	204	255	306	357	407	458	509	560	611	713	815	917	1019	1273	1528	1783	2037	2292	2547	3056	4075	5093	6367
7/8"	175	218	262	306	349	393	437	480	524	611	699	786	873	1091	1310	1528	1746	1965	2183	2619	3493	4366	5457
1"	153	191	229	267	306	344	382	420	458	535	611	688	764	955	1146	1337	1528	1719	1910	2292	3056	3820	4775
1-1/8"	136	170	204	238	272	306	340	374	407	475	543	611	679	849	1019	1188	1358	1528	1698	2037	2716	3396	4244
1-1/4"	122	153	183	214	244	275	306	336	367	428	489	550	611	764	917	1070	1222	1375	1528	1834	2445	3056	3820
1-3/8"	111	139	167	194	222	250	278	306	333	389	445	500	556	695	833	972	1111	1250	1389	1667	2223	2778	3473
1-1/2"	102	127	153	178	204	229	255	280	306	357	407	458	509	637	764	891	1019	1146	1273	1528	2037	2547	3183
1-3/4"	87	109	131	153	175	196	218	240	262	306	349	393	437	546	655	764	873	982	1091	1310	1746	2183	2729
2"	76	96	115	134	153	172	191	210	229	267	306	344	382	478	573	669	764	860	955	1146	1528	1910	2388
2-1/4"	68	85	102	119	136	153	170	187	204	238	272	306	340	424	509	594	679	764	849	1019	1358	1698	2122
2-1/2"	61	76	92	107	122	138	153	168	183	214	244	275	306	382	458	535	611	688	764	917	1222	1528	1910
2-3/4"	56	69	83	97	111	125	139	153	167	194	222	250	278	347	417	486	556	625	695	833	1111	1389	1736
3"	51	64	76	89	102	115	127	140	153	178	204	229	255	318	382	446	509	573	637	764	1019	1273	1592
3-1/4"	47	59	71	82	94	106	118	129	141	165	188	212	235	294	353	411	470	529	588	705	940	1175	1469
3-1/2"	44	55	65	76	87	98	109	120	131	153	175	196	218	273	327	382	437	491	546	655	873	1091	1364
3-3/4"	41	51	61	71	81	92	102	112	122	143	163	183	204	255	306	357	407	458	509	611	815	1019	1273
4"	38	48	57	67	76	86	96	105	115	134	153	172	191	239	287	334	382	430	478	573	764	955	1194
4-1/2"	34	42	51	59	68	76	85	93	102	119	136	153	170	212	255	297	340	382	424	509	679	849	1061
5"	31	38	46	53	61	69	76	84	92	107	122	138	153	191	229	267	306	344	382	458	611	764	955
5-1/2"	28	35	42	49	56	63	69	76	83	97	111	125	139	174	208	243	278	313	347	417	556	695	868
6"	25	32	38	45	51	57	64	70	76	89	102	115	127	159	191	223	255	287	318	382	509	637	796
6-1/2"	24	29	35	41	47	53	59	65	71	82	94	106	118	147	176	206	235	264	294	353	470	588	735
7"	22	27	33	38	44	49	55	60	65	76	87	98	109	136	164	191	218	246	273	327	437	546	682
7-1/2"	20	25	31	36	41	46	51	56	61	71	81	92	102	127	153	178	204	229	255	306	407	509	637
8"	19	24	29	33	38	43	48	53	57	67	76	86	96	119	143	167	191	215	239	287	382	478	597

TO USE THIS CHART: find the proper surface speed in the top row and refer to the work diameter columns at extreme left. The correct R.P.M. is shown in the center table.

TABLE 2.D. CALCULATING SPINDLE SPEED (RPM'S)

<p>FOR MILLING, DRILLING AND REAMING</p> <p>Spindle Speed (RPM's) = 3.82 $\frac{\text{Cutting Speed (SFM)}}{\text{Tool Diameter (Inches)}}$</p>
<p>FOR TURNING</p> <p>Spindle Speed (RPM's) = 3.82 $\frac{\text{Cutting Speed (SFM)}}{\text{Work Piece Diameter (Inches)}}$</p>

Table 3.A. TEMPERATURE AND COLORS
Their Relation to Steel Treatment

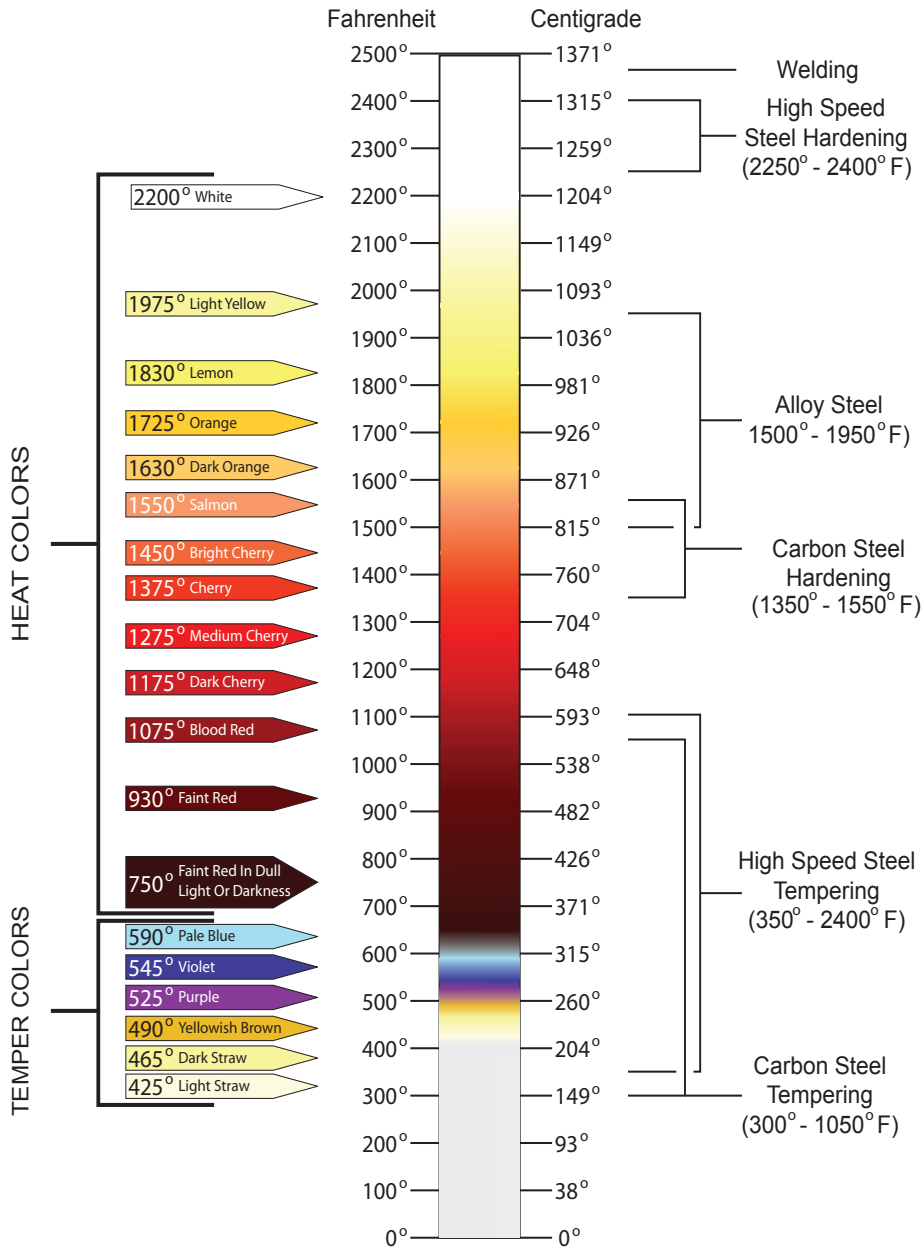


TABLE 3.B TEMPERATURE CONVERSION TABLE

(Celsius figures rounded to nearest whole number)

C	F	C	F	C	F
-34	-30	-8	17	17	64
-34	-29	-8	18	18	65
-33	-28	-7	19	19	66
-33	-27	-7	20	19	67
-32	-26	-6	21	20	68
-32	-25	-6	22	21	69
-31	-24	-5	23	21	70
-31	-23	-5	24	22	71
-30	-22	-4	25	22	72
-29	-21	-3	26	23	73
-29	-20	-3	27	23	74
-28	-19	-2	28	24	75
-28	-18	-2	29	24	76
-27	-17	-1	30	25	77
-27	-16	-1	31	25	78
-26	-15	0	32	26	79
-26	-14	1	33	26	80
-25	-13	1	34	27	81
-24	-12	2	35	27	82
-24	-11	2	36	28	83
-23	-10	3	37	28	84
-23	-9	3	38	29	85
-22	-8	4	39	30	86
-22	-7	4	40	31	87
-21	-6	5	41	31	88
-21	-5	5	42	32	89
-20	-4	6	43	32	90
-19	-3	6	44	33	91
-19	-2	7	45	33	92
-18	-1	8	46	34	93
-18	0	8	47	34	94
-17	1	9	48	35	95
-17	2	9	49	36	96
-16	3	10	50	36	97
-16	4	11	51	37	98
-15	5	11	52	37	99
-14	6	12	53	38	100
-14	7	12	54	38	101
-13	8	13	55	39	102
-13	9	13	56	39	103
-12	10	14	57	40	104
-12	11	14	58	41	105
-11	12	15	59	41	106
-11	13	15	60	42	107
-10	14	16	61	42	108
-9	15	16	62	43	109
-9	16	17	63	43	110

TABLE 3.C. TEMPERATURE CONVERSION

Fahrenheit to Celsius:

$$^{\circ}\text{F} = 1.8 \times ^{\circ}\text{C} + 32$$

OR

$$^{\circ}\text{F} = \frac{(9 \times ^{\circ}\text{C})}{5} + 32$$

Celsius to Fahrenheit:

$$^{\circ}\text{C} = \frac{^{\circ}\text{F} - 32}{1.8}$$

OR

$$^{\circ}\text{C} = \frac{5(^{\circ}\text{F} - 32)}{9}$$

For interpolation, a change of 1°C = 1.8°F

TABLE 4.A. - OHM'S LAW

Ohm's law gives us the relationship between voltage, current, resistance, and power in an electrical circuit. When we know any two values, we can find either of the others by using the appropriate formula.

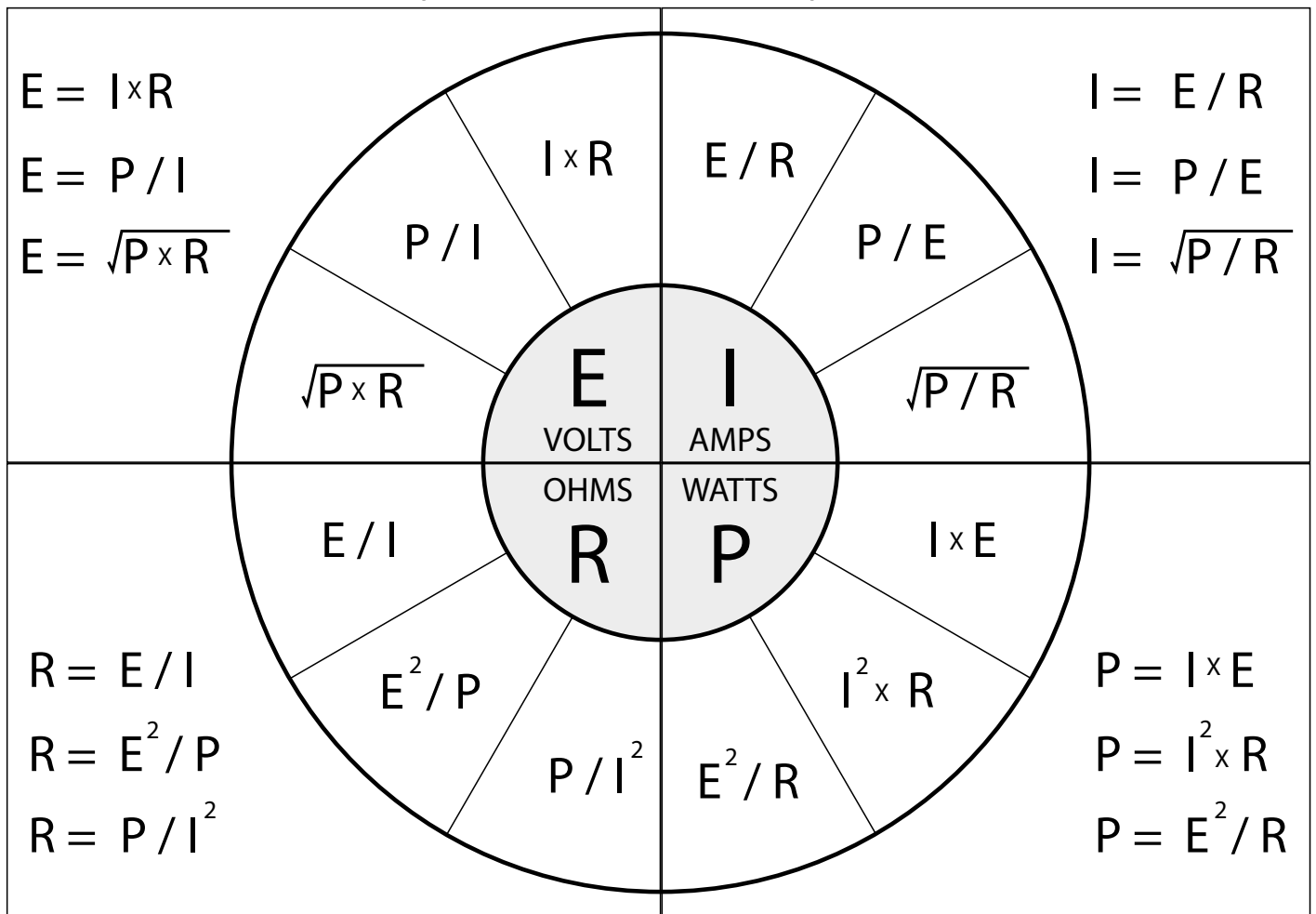
E = VOLTAGE (VOLTS)

I = CURRENT (AMPS)

R = RESISTANCE (OHMS)

P = POWER (WATTS)

The shaded value is the product or the quotient of the unshaded equation



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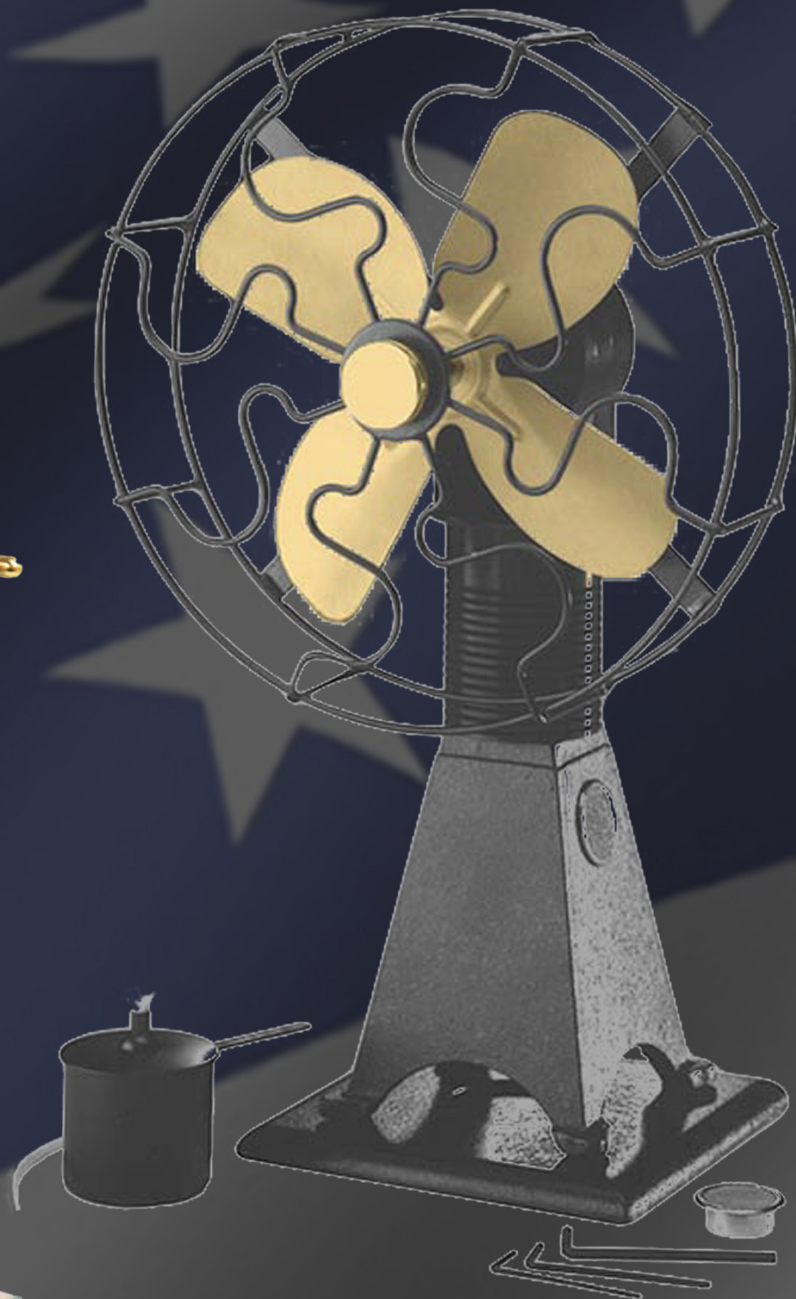
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#3VALVE	#3 Valve after Anodized	\$9.75
#3VALVEGUIDESP	Solar-3 Valve Guide Spring	\$4.50
118-36	Copper Tube 3/32 OD x .014 x 3'	\$7.75
119-36	Copper Tube 5/32"x.014"x36"	\$9.25
120-36	Copper Tube 1/8" x .014" x 3'	\$8.75
121-36	Copper Tube 3/16"x.014"x36"	\$12.00
1BI	1BI 1880's Steam Drilling Eng	\$159.00
2A	2A Oscillating Steam Eng-Alum	\$69.00
2AM	2AM Mach Oscillating Steam Eng	\$124.00
3A	3A Stationary Steam Mill-Alum	\$89.00
3BI	3BI Bronze/Iron Mill Engine	\$104.00
3BIM	3BIM Machined Steam Mill Engin	\$179.00
4CI	4CI Vertical Steam Eng-Br/Iron	\$399.00
5BI	Coke Bottle Style Eng-Iron/Brz	\$149.00
6CI	6CI Hor Stationary Eng-Br/Iron	\$359.00
7BI	Steam Engine #7 Twin Kit Unmachined	\$179.00
7BIM	7BI Machined Twin Cylinder Steam Mill Engine	\$329.00
8M	Twin Marine Steam Engine Machined	\$199.00
AP-3	AP-3 Arbor Press	\$59.00
B102	B102 Orr & Sembower	\$3.50
B113	Engines & Boilers	\$12.25
B1252	1252 Model Hit and Miss Engine Plan	\$22.00
B20692	1895 Tool Catalog	\$27.00
BALL1/4	Ball, 1/4" Type 440C SS Grd 100	\$1.00
BALL1/8	Ball, 1/8" Type 440C SS Grd 100	\$1.00
BALL3/16	Ball, 3/16" Type 440 SS Grd 100	\$1.00
BALL5/16	Ball, 5/16" Type 440 SS Grd 100	\$1.00
BALL5/32	Ball, 5/32" Type 440 SS Grd 100	\$1.00
BAR395	Stirling Cycle Engines by Andy Ross	\$15.00
BAR395 - 2nd	Stirling Cycle Engines by Andy Ross	\$6.00
BFP-1C	BFP-1C Boiler Feed Pump Kit	\$54.00

SKU	Product	Updated Price
BFP-1M	Machined Boiler Feed Pump Kit	\$69.00
BG-1	BG-1, Bench Grinder Kit	\$54.00
BLR-1	BLR-1 Vertical Boiler Kit	\$289.00
BLR-2	BLR-2 Horizontal Boiler Kit	\$389.00
BRL122	Robinson Hot Air Engine Plans	\$13.00
BRL123	Stirling Hot Air Engine Plans	\$13.00
BSDKY	Steam Donkey Engine	\$17.00
BUZZ-1	Oak Buzz Coil	\$269.00
CS-1	CS-1 Crank Shaper Kit	\$159.00
CVA1/8	CVA1/8 1/8"NPT Angle Check Valve	\$31.00
CVA3	CVA3 Angle Check Valve 3/16-40	\$24.00
CVA3MTP	CVA3MTP Angle Check Valve 3/16-40MTP	\$24.00
CVA4	CVA4 Angle Check Valve 1/4-40	\$26.00
CVA4MTP	CVA4MTP Angle Check Valve 1/4-40	\$26.00
CVA5	CVA5 Angle Check Valve 5/16-27	\$29.00
CVH1/8	CVH1/8 1/8"NPT Check Valve	\$31.00
CVH3	CVH3 Horiz Check Valve 3/16-40	\$24.00
CVH3MTP	CVH3MTP Horiz Check Valve 3/16-40	\$24.00
CVH4	CVH4 Horiz Check Valve 1/4-40	\$26.00
CVH4MTP	CVH4MTP Horiz Check Valve 1/4-40	\$26.00
CVH5	CVH5 Horiz Check Valve 5/16-27	\$29.00
CVI4	Check Valve, Inline	\$24.00
CYL-OIL	Cylinder Oil, 32oz bottle	\$26.00
CYL-OIL8	Cylinder Oil, 8 oz bottle	\$12.00
D-0-80	Die, 0-80	\$15.00
D-1-72	Die, 1-72	\$15.00
D-1/4-20	Die, 1/4-20	\$14.50
D-1/4-28	Die, 1/4-28	\$15.00
D-1/4-32M	Die, 1/4-32 ME Straight Thread	\$19.00
D-1/4-40M	Die, 1/4-40 ME Straight Thread	\$19.00
D-1/4-40MTP	Die, 1/4-40 Model Tapered Pipe	\$39.00
D-1/4-40UST	Die, 1/4-40 UST Thread	\$39.00
D-10-24	Die, 10-24	\$15.00
D-10-32	Die, 10-32	\$15.00
D-2-56	Die, 2-56	\$15.00
D-3-48	Die, 3-48	\$15.00
D-3/16-40M	Die, 3/16-40 ME Straight Thread	\$19.00
D-3/16-40MTP	Die, 3/16-40 Model Tapered Pipe	\$39.00
D-3/16-40UST	Die, 3/16-40 UST Thread	\$39.00
D-4-40	Die, 4-40	\$15.00
D-5-40	Die, 5-40	\$15.00
D-5/16-27	Die, 5/16-27 (1/16 NPT) Tapered Thread	See Website
D-50-6	Drill, #50 x 6" (for No 5 Engine)	\$6.00
D-6-32	Die, 6-32	\$16.00
D-6-40	Die, 6-40	\$15.00

SKU	Product	Updated Price
D-8-32	Die, 8-32	\$15.00
D-8-36	Die, 8-36	\$15.00
DFO-3	Drip Feed Oiler - 3/16	\$31.00
DFO-4	Drip Feed Oiler 1/4	\$34.00
DL-0-80	Die, 0-80 Left Hand Thread	\$17.00
DL-1-72	Die, 1-72 Left Hand Thread	\$17.00
DL-5-40	Die, 5-40 Left Hand Thread	\$17.00
DP-1	DP-1 Drill Press	\$119.00
DS-1	Die Stock, 13/16" dia	\$13.00
DS-2	Die Stock, 1" dia	\$15.00
DYN-1	DYN-1 Dynamo Kit	\$59.00
DYN-1M	DYN-1M Machined Dynamo Kit	\$109.00
EL-1	EL-1 Engine Lathe Kit	\$189.00
FK-1BLR2	Fittings Kit, No1/BLR2, Mach'd	\$59.00
FK-BFP1	Fittings Kit, Boiler Feed Pump	\$39.00
FK-C5P	Fittings Kit-C5P, Unmachined	\$39.00
FK-C5PM	Fittings Kit-C5P, Machined	\$99.00
FP-51	Brass Fence Post	\$1.00
FWC-1CI	1BI Cast Iron Flywheel Casting	\$24.00
FWC-2A	2A Flywheel Casting	\$8.00
FWC-3A	3A Flywheel Casting	\$9.00
FWC-3B	3B Flywheel Casting	\$19.00
FWC-4CI	4CI, 6CI Flywheel Casting (Grey Iron)	\$44.00
FWC-5AP	5A Belt Pulley Casting	\$8.00
FWC-5B	5BI Bronze Flywheel Casting	\$27.00
FWC-5BP	5BI Bronze Belt Pulley Casting	\$14.00
FWC-RW	RW Fly Wheel Casting	\$45.00
FWC-RWP	RW Drive Pulley Casting #48	\$17.00
FWC-S12A	#12 Flywheel Alum Casting	\$13.00
FWC-S12B	#12 Flywheel Bronze Casting	\$24.00
FWC-S13	#13 Flywheel Casting	\$9.00
FWC-S3A	#3 Flywheel Alum Casting	\$14.00
FWC-S3B	#3 Flywheel Bronze Casting	\$41.00
FWC-S4	#4 Flywheel Casting	\$9.00
FWC-S7	#7 Flywheel Casting	\$17.00
GAV1/8	GAV1/8 1/8"NPT Angle Globe Valve	\$49.00
GAV3	GAV3 3/16-40 Angle Globe	\$36.00
GAV3MTP	GAV3 3/16-40 MTP Angle Globe	\$36.00
GAV4	GAV4 1/4-40 Angle Globe Valve	\$39.00
GAV4MTP	GAV4 1/4-40 MTP Angle Globe Valve	\$39.00
GAV5	GAV5 5/16-27 Angle Globe Valve	\$44.00
GB12T64P	12 Tooth Gear Stock x 6"	\$15.00
GB16T64P	16 Tooth Gear Stock x 6"	\$16.00
GB18T64P	18 Tooth Gear Stock x 6"	\$19.00
GB28T64P	28 Tooth Gear Stock 6" x 0.468" dia	\$21.00

SKU	Product	Updated Price
GB48T64P	48 Tooth Gear Stock x 6" x 0.781" diam.	\$31.00
GB8T64P	8 Tooth Gear Stock x 6"	\$14.00
GC-10-32	Grease Cup, 10-32	\$6.00
GC-5-40	Grease Cup, 5-40	\$5.50
GC-8-32	Grease Cup, 8-32	\$5.50
GMB15T48P	Miter Gear 15T48P, 0.125 bore dia, .250 hub dia	\$7.00
GT316	Glass Tubing 3/16"OD (5mm) x 6"	\$3.50
GT416	Glass Tubing 1/4"OD (6mm) x 6"	\$3.50
GV1/8	GV1/8 1/8"NPT Globe Valve	\$49.00
GV3	GV3 3/16-40 Globe Valve	\$36.00
GV3MTP	GV3 3/16-40 MTP thd Globe Valve	\$36.00
GV4	Globe Valve 1/4-40	\$39.00
GV4MTP	Globe Valve 1/4-40MTP	\$39.00
GV5	Globe Valve 5/16-27	\$44.00
GVK3	GVK3 3/16-40 Globe Valve Kit	\$19.00
GVK4	GVK4 1/4-40 Globe Valve Kit	\$21.00
GVK5	GVK5 5/16-27 Globe Valve Kit	\$25.00
GVKB1	1/2" Globe Valve Knob, for 3/16" and 1/4" valves	\$6.00
GVKB2	5/8" Globe Valve Knob for 5/16" Valve	\$7.00
GVKB3	3/4" Globe Valve Knob for 1/8" valve	\$8.00
HFM56	1/16 NPT to 3/16 Hose Fitting	\$6.00
LSB-4	Belting 1/4" wide x .018" thick (per ft)	\$3.50
LSB-8	Belting 1/2" wide x .018" thick (per ft)	\$5.50
LSH-1	LSH-1 Line Shaft Hangar Kit	\$8.00
LSP-100	LSP-100 Belt Pulley Kit, 1" dia x 1/4" W	\$4.50
LSP-175	LSP-175 Belt Pulley Kit, 1-34" dia x 5/8" W	\$8.00
LUB-1	LUB-1 Displacement Lubricator	\$35.00
LUB-2	LUB-2 Displacement Lubricator	\$35.00
LUB-KIT	Lubrication Kit	\$21.00
MIRROR-4	Parabolic Mirror	\$109.00
MIX-1C	Lunckenheimer 1/8" Scale Mixer - casting Kit	\$65.00
MIX-1M	Lunckenheimer 1/8" Scale Mixer - completed mixer	\$145.00
MM-1	MM-1 Milling Machine Kit	\$149.00
MS-BRK1	Styrene Brick Sheet #8206	\$22.00
MS-BRK2	Brick Corner #8207	\$12.00
MS-CLA10405	Walnut Roll Top Desk	\$31.00
MS-CLA10406	Walnut Swivel Chair	\$14.00
MS-CLA10408	Walnut Large File Cabinet	\$21.00
MS-DOOR1	Traditional Door #6007	\$13.00
MS-FLR1	Red Oak Flooring Sheet #2386	\$25.00
MS-RF1	Sq Butt Shingle (pkg 100) Assembly	\$7.50
MS-SAW	Saw set, 2 piece	\$4.00
MS-TLBOX	Tool Set, 9 piece with box	\$5.00
MS-WIN1	Traditional Window #5000	\$12.00

SKU	Product	Updated Price
NK-1BLR2	Nipple Kit for BLR2	\$24.00
NK-C5PM	Nipple Kit for Steam Plant	\$49.00
NO-68	Flexible Drive Belt, 1/8" x 10", pkg of 5	\$12.50
NO-80	#1 Chimney	\$21.00
NO-81-1	#1 Fuel Platform Accesory	\$6.50
NO-81-2	Fuel Platform for 7, 13, 15	\$4.00
NO-82-1	Esbit Fuel, Box of 20 4g Tablets	\$9.00
NO-82-2	Esbit Fuel, Box of 12 14g Tablets	\$12.00
NO-83-2	Wick, 1/8"x3' Cotton	\$4.00
NO-83-3	Wick, 3/16"x3' Cotton	\$4.50
NO-84-3	#1 Pulley, 3/16" bore x 1/2" O.D.	\$4.00
NO-84-4	#3 Pulley 1/4" bore	\$4.00
NO-85	Allen Wrench, 7/64" Hex	\$1.00
NO-86-028	Allen Wrench, .028" Hex	\$1.00
NO-86-035	Allen Wrench, .035" Hex	\$1.00
NO-86-050	Allen Wrench, .050" Hex	\$1.00
NO-86-116	Allen Wrench, 1/16" Hex	\$1.00
NO-86-332	Allen Wrench, 3/32" Hex	\$1.00
NO-86-564	Allen Wrench, 5/64" Hex	\$1.00
NO-90	Alcohol Burner for Solar 1, 3, 4, 13, 15	\$25.00
NO-90-6	Alcohol Burner for Solar 6	\$23.00
NO-90-7	Alcohol Burner for Solar 7, 10, 12	\$25.00
NO-91	Glass Tube Replacement for Solar-7 or Solar-15	\$9.00
NO-91-2	#4,#6,#12 Large Steel Heat Cap	\$7.50
NO-91-3	#1,#10,#13 Small Steel Heat Cap	\$7.00
NO-95	Dry Graphite in 6.5gr Tube	\$9.00
OC-2-56	Oil Cup, 2-56	\$3.00
OC-5-40	Oil Cup, 5-40	\$3.00
P3	Brass Pipe, 3/16"OD x 1/8"ID x 12"	\$3.00
P3-3	Brass Pipe, 3/16"OD x 1/8"ID x 3'	\$9.00
P3M-0.5	Pipe Nipple, 3/16-40 x 1/2"	\$3.00
P3M-0.75	Pipe Nipple, 3/16-40 x 1/2"	\$3.00
P3M-1.0	Pipe Nipple, 3/16-40 x 1"	\$3.00
P3M-1.25	Pipe Nipple, 3/16-40 x 1-1/4"	\$3.25
P3M-1.5	Pipe Nipple, 3/16-40 x 1-1/2"	\$3.00
P3M-1.75	Pipe Nipple, 3/16-40 x 1-3/4"	\$3.50
P3M-2.0	Pipe Nipple, 3/16-40 x 2"	\$3.25
P3M-2.5	Pipe Nipple, 3/16-40 x 2-1/2"	\$3.50
P3M-3.0	Pipe Nipple, 3/16-40 x 3"	\$3.75
P3M-5.0	Pipe Nipples, 3/16-40 x 5"	\$4.00
P3M-6.0	Pipe Nipples, 3/16-40 x 6"	\$4.25
P3MTP-0.5	Pipe Nipple, 3/16-40 x 1/2" Model Taper Thread	\$3.00
P3MTP-0.75	Pipe Nipple, 3/16-40 x 3/4" Model Taper Thread	\$3.00
P3MTP-1.0	Pipe Nipple, 3/16-40 x 1" Model Taper Thread	\$3.00

SKU	Product	Updated Price
P3MTP-1.25	Pipe Nipple, 3/16-40 x 1-1/4" Model Taper Thread	\$3.25
P3MTP-1.5	Pipe Nipple, 3/16-40 x 1-1/2" Model Taper Thread	\$3.25
P3MTP-1.75	Pipe Nipple, 3/16-40 x 1-3/4" Model Taper Thread	\$3.50
P3MTP-2.0	Pipe Nipple, 3/16-40 x 2" Model Taper Thread	\$3.50
P3MTP-2.5	Pipe Nipple, 3/16-40 x 2-1/2" Model Taper Thread	\$3.50
P3MTP-3.0	Pipe Nipple, 3/16-40 x 3" Model Taper Thread	\$3.75
P3MTP-5.0	Pipe Nipple, 3/16-40 x 5" Model Taper Thread	\$3.75
P3MTP-6.0	Pipe Nipple, 3/16-40 x 6" Model Taper Thread	\$4.25
P4	Brass Pipe, 1/4"OD x 3/16"ID x 12"	\$3.00
P4-3	Brass Pipe, 1/4"OD x 3/16"ID x 3'	\$9.00
P4M-0.5	Pipe Nipple, 1/4-40 x 1/2"	\$3.25
P4M-0.75	Pipe Nipple, 1/4-40 x 3/4"	\$3.25
P4M-1.0	Pipe Nipple, 1/4-40 x 1"	\$3.25
P4M-1.25	Pipe Nipple, 1/4-40 x 1-1/4"	\$3.25
P4M-1.5	Pipe Nipple, 1/4-40 x 1-1/2"	\$3.50
P4M-1.75	Pipe Nipple, 1/4-40 x 1-3/4"	\$3.50
P4M-2.0	Pipe Nipple, 1/4-40 x 2"	\$3.50
P4M-2.5	Pipe Nipple, 1/4-40 x 2-1/2"	\$3.75
P4M-3.0	Pipe Nipple, 1/4-40 x 3"	\$4.00
P4M-5.0	Pipe Nipple, 1/4-40 x 5"	\$4.50
P4M-6.0	Pipe Nipple, 1/4-40 x 6"	\$5.00
P4MTP-0.5	Pipe Nipple, 1/4-40 x 1/2" Model Taper Thread	\$3.25
P4MTP-0.75	Pipe Nipple, 1/4-40 x 3/4" Model Taper Thread	\$3.25
P4MTP-1.0	Pipe Nipple, 1/4-40 x 1" Model Taper Thread	\$3.25
P4MTP-1.25	Pipe Nipple, 1/4-40 x 1-1/4" Model Taper Thread	\$3.25
P4MTP-1.5	Pipe Nipple, 1/4-40 x 1-1/2" Model Taper Thread	\$3.50
P4MTP-1.75	Pipe Nipple, 1/4-40 x 1-3/4" Model Taper Thread	\$3.50
P4MTP-2.0	Pipe Nipple, 1/4-40 x 2" Model Taper Thread	\$3.75
P4MTP-2.5	Pipe Nipple, 1/4-40 x 2-1/2" Model Taper Thread	\$4.00
P4MTP-3.0	Pipe Nipple, 1/4-40 x 3" Model Taper Thread	\$4.00
P4MTP-5.0	Pipe Nipple, 1/4-40 x 5" Model Taper Thread	\$4.50
P4MTP-6.0	Pipe Nipple, 1/4-40 x 6" Model Taper Thread	\$5.00
P5	Brass Pipe, 5/16"OD x .212" ID x 12"	\$5.00
P5-3	Brass Pipe, 5/16"OD x .212" ID x 3'	\$15.00
P5M-0.75	Pipe Nipple, 5/16-27 x 3/4"	\$3.50
P5M-1.0	Pipe Nipple, 5/16-27 x 1"	\$3.50
P5M-1.25	Pipe Nipple, 5/16-27 x 1-1/4"	\$3.50
P5M-1.5	Pipe Nipple, 5/16-27 x 1- 1/2"	\$3.75
P5M-1.75	Pipe Nipple, 5/16-27 x 1-3/4"	\$3.75
P5M-2.0	Pipe Nipple, 5/16-27 x 2"	\$4.00
P5M-2.5	Pipe Nipple, 5/16-27 x 2-1/2"	\$4.50
P5M-3.0	Pipe Nipple, 5/16-27 x 3"	\$5.00
P5M-5.0	Pipe Nipple, 5/16-27 x 5"	\$6.50
P5M-6.0	Pipe Nipple, 5/16-27 x 6"	\$7.25

SKU	Product	Updated Price
P92	Tree of Castings, 1/8"	\$7.00
P93	Tree of Castings, 3/16"	\$8.00
P94	Tree of Castings, 1/4"	\$12.00
P95	Tree of Castings, 5/16"	\$16.00
PB3M	Mach Boiler Bushing, 3/16-40	\$2.00
PB3MTP	Mach Boiler Bushing, 3/16-40 MTP Thread	\$2.00
PB4M	Mach Boiler Bushing, 1/4-40	\$2.25
PB4M-32	Machined Boiler Bushing, 1/4-32	\$2.25
PB4MTP	Mach Boiler Bushing, MTP thd 1/4-40	\$2.25
PB5M	Mach Boiler Bushing, 5/16-27	\$2.75
PC3M	Machined Coupling, 3/16-40 thread	\$2.25
PC3MTP	Machined Coupling, 3/16-40 MTP thread	\$2.25
PC4M	Machined Coupling, 1/4-40 thread	\$2.50
PC4MTP	Machined Coupling, 1/4-40 MTP thread	\$2.50
PC5M	Machined Coupling, 5/16-27	\$2.75
PF3C	Tree of 8 45 Deg Ell Castings, 3/16"	\$7.00
PF3M	Machined 45 deg Elbow, 3/16-40 thread	\$5.50
PF3MTP	Machined 45 deg Elbow, 3/16-40 MTP thread	\$5.50
PF4C	Tree of 7 45 Deg Ell Castings, 1/4"	\$9.00
PF4M	Machined 45 deg Elbow, 1/4-40 thread	\$7.00
PF4MTP	Machined 45 deg Elbow, 1/4-40 MTP thread	\$7.00
PF5C	Tree of 6 45 Deg Ell Castings, 5/16"	\$10.00
PF5M	Machined 45 deg Elbow, 5/16-27 thread	\$8.00
PG-1	Pressure Gauge, 0-100 lbs	\$59.00
PG-1S	Pressure Gauge with Syphon	\$84.00
PG-AL100-5	MiniPres. Gauge 0-100, 1/16-27 NPT	\$17.00
PG-AL160-5	Air Logic MiniPres. Gauge 0-160, 1/16-27 NPT thrd	\$17.50
PG-AL60-5	MiniPres Gauge 0-60, 1/16-27 NPT	\$18.00
PGS-2	Miniature Syphon 3/16-40 thrd	\$29.00
PGS-2A	PGS-2 Syphon Adapter for 10-32 Thread	\$4.00
PL3C	Tree of 8 Ell Castings, 3/16"	\$7.00
PL3M	Machined 90 deg Elbow, 3/16-40 UST thread	\$5.50
PL3MTP	Machined 90 deg Elbow, 3/16-40 MTP thread	\$5.50
PL4C	Tree of 7 Ell Castings, 1/4"	\$9.00
PL4M	Machined 90 deg Elbow, 1/4-40 UST thread	\$7.00
PL4MTP	Machined 90 deg Elbow, 1/4-40 MTP thread	\$7.00
PL5C	Tree of 6 Ell Castings, 5/16"	\$10.00
PL5M	Machined 90 deg Elbow, 5/16-27 thread (1/16 NPT)	\$7.00
PN3M	Pipe Nipple, 3/16-40 Close	\$2.00
PN3MTP	Pipe Nipple, 3/16-40 MTP Thrd	\$2.00
PN3MTPA	3/16-40 UST to 3/16-40 MTP Adapter Nipple, 1/2" long	\$3.00
PN4M	Pipe Nipple, 1/4-40 Close	\$2.25
PN4M-3240	1/4-40 UST to 1/4-32 Adapter Nipple, 1/2" long	\$3.00
PN4MTP	Pipe Nipple, 1/4-40 MTP Close	\$2.25

SKU	Product	Updated Price
PN4MTPA	1/4-40 UST to 1/4-40 MTP Adapter Nipple, 3/8" long	\$3.00
PN5M	Pipe Nipple, 5/16-27 Close	\$3.00
PP3M	Machined Plug, 3/16-40	\$2.00
PP3MTP	Machined Plug, 3/16-40 MTP thread	\$2.00
PP4M	Machined Plug, 1/4-40	\$2.25
PP4MTP	Machined Plug, 1/4-40 Model Taper Thread	\$2.25
PP5M	Machined Plug, 5/16-27	\$2.50
PR1/8M	Reducing Bushing, 1/8"NPT to 5/16-27 (1/16" NPT)	\$3.50
PR4M	Reducing Bushing, 1/4-40 to 3/16-40	\$3.25
PR4MTP	Reducing Bushing, 1/4-40 MTP to 3/16-40 MTP	\$3.25
PR53MTP	Reducing Bushing, 5/16-27 to 3/16-40 MTP	\$3.50
PR5M	Reducing Bushing, 5/16-27 to 1/4-40	\$3.50
PR5MTP	Reducing Bushing, 5/16-27 to 1/4-40 MTP	\$3.50
PS3C	Tree of 7 St Ell Castings, 3/16"	\$7.00
PS3M	Mach Street Ell, 3/16-40 thread	\$6.00
PS3MTP	Mach Street Ell, 3/16-40 MTP thread	\$6.00
PS4C	Tree of 6 St Ell Castings, 1/4"	\$8.50
PS4M	Mach Street Ell, 1/4-40 thread	\$6.50
PS4MTP	Mach Street Ell, 1/4-40 MTP thread	\$6.50
PS5C	Tree of 5 St Ell Castings, 5/16"	\$10.00
PS5M	Mach Street Ell, 5/16-27 thread	\$7.00
PST565	Loctite 565 PST Thrd Slnt 6 Mil	\$22.00
PT3C	Tree of 6 Tee Castings, 3/16"	\$7.00
PT3M	Machined Tee, 3/16-40 thread	\$6.50
PT3MTP	Machined Tee, 3/16-40 MTP thread	\$6.50
PT4C	Tree of 5 Tee Castings, 1/4"	\$8.00
PT4M	Machined Tee, 1/4-40 thread	\$7.50
PT4MTP	Machined Tee, 1/4-40 MTP thread	\$7.50
PT5C	Tree of 5 Tee Castings, 5/16"	\$9.00
PT5M	Machined Tee, 5/16-27 thread	\$9.50
PU1/8M	PU1/8M Machined Union	\$9.00
PU3M	PU3M Machined Union 3/16-40	\$6.50
PU3MTP	PU3MTP Machined Taper Thread Union 3/16-40	\$6.50
PU4M	PU4M 1/4-40 Machined Union	\$7.00
PU4MTP	PU4MTP, Machined 1/4-40MTP Union	\$7.00
PU5M	PU5M 5/16-27 Machined Union	\$8.00
PX3C	Tree of 7 Cross Casting, 3/16"	\$8.00
PX3M	Machined Cross, 3/16-40 thread	\$7.00
PX3MTP	Machined Cross, 3/16-40 MTP thread	\$7.00
PX4C	Tree of 6 Cross Casting, 1/4"	\$10.00
PX4M	Machined Cross, 1/4-40 thread	\$10.00
PX4MTP	Machined Cross, 1/4-40 MTP thread	\$10.00
PX5C	Tree of 5 Cross Casting, 5/16"	\$11.00
PX5M	Machined Cross, 5/16-27	\$11.00

SKU	Product	Updated Price
R-AC-C	Air Cooled Red Wing Motor Casting Kit	\$669.00
R-AC-LUB	Lubrication Kit (Air Cooled Red Wing Engine)	\$52.00
R-AC-SCR	Screw Pack (Air Cooled Red Wing Engine)	\$52.00
R-BAR	Red Wing Materials Kit	\$99.00
R-FK-FL	Fuel Line Fitting Kit	\$59.00
R-SP-CM6	Spark Plug, NGK CM-6	\$13.00
R-WC-C	Water Cooled Red Wing Motor -	\$669.00
R-WC-LUB	Lubrication Kit (Water Cooled)	\$51.00
R-WC-SCR	Screw Pack (Water Cooled Red Wing Engine)	\$51.00
RHB-10	Brass Hex Rod, 5/8" x 12"	\$16.00
RHB-2	Brass Hex Rod, 1/8" x 12"	\$2.00
RHB-3	Brass Hex Rod, 3/16" x 12"	\$3.00
RHB-4	Brass Hex Rod, 1/4" x 12"	\$4.00
RHB-5	Brass Hex Rod, 5/16" x 12"	\$5.00
RHB-6	Brass Hex Rod, 3/8" x 12"	\$7.00
RHB-7	Brass Hex Rod, 7/16" x 12"	\$9.00
RHB-8	Brass Hex Rod, 1/2" x 12"	\$11.00
RHRB-4	Brass Half Round Rod, 1/4"x1/8"x12"	\$3.00
RHRB-5	Brass Half Round Rod, 5/16"x5/32"x12"	\$4.00
RING-1.25	Set of 2 Piston Rings, 1.250 OD x 3/32 thick	\$16.00
RIVTCP1/8KT	Rivet., Bag of 50 1/8" x 1/4" Rd Hd Copper	\$11.50
RRB-1	Brass Round Rod, 1/16" x 12"	\$1.75
RRB-1-3	Brass Round Rod, 1/16" x 3'	\$3.50
RRB-10	Brass Round Rod, 5/8" x 12"	\$17.00
RRB-12	Brass Round Rod, 3/4" x 12"	\$26.00
RRB-16	Brass Round Rod, 1" x 12"	\$35.00
RRB-18	Brass Round Rod, 1-1/8" x 12"	\$44.00
RRB-2	Brass Round Rod, 1/8" x 12"	\$2.00
RRB-3	Brass Round Rod, 3/16" x 12"	\$3.00
RRB-332	Brass Round Rod, 3/32" x 12"	\$2.00
RRB-4	Brass Round Rod, 1/4" x 12"	\$4.00
RRB-5	Brass Round Rod, 5/16" x 12"	\$5.00
RRB-6	Brass Round, 3/8" x 12"	\$7.50
RRB-7	Brass Round Rod, 7/16" x 12"	\$9.00
RRB-8	Brass Round Rod, 1/2" x 12"	\$11.00
RRD-10	Drill Rod, 5/8" x 12" Round	\$15.00
RRD-12	Drill Rod, 3/4" x 12" Round	\$20.00
RRD-16	Drill Rod, 1" x 12" Round	\$34.00
RRD-4	Drill Rod, 1/4" x 12" Round	\$8.00
RRD-6	Drill Rod, 3/8" x 12" Round	\$12.00
RRD-8	Drill Rod, 1/2" x 12" Round	\$13.00
RRS-3	Line Shaft, 3/16" x 1' CRS	\$4.00
RSB-2	Brass Square Rod, 1/8" x 12"	\$2.00
RSB-3	Brass Square Rod, 3/16" x 12"	\$3.00

SKU	Product	Updated Price
RSB-4	Brass Square Rod, 1/4" x 12"	\$4.00
RSB-5	Brass Square Rod, 5/16" x 12"	\$6.00
RSB-6	Brass Square Rod, 3/8" x 12"	\$9.00
S-3	Square Bar 3/32" x 12"	\$4.00
SF-1	Sq File, .100"/EL-1, DP-1, CS-1	\$6.00
SOLAR-1	Solar-1, Original Stirling Cycle Engine	\$189.00
SOLAR-10	Solar-10, Peanut Rider Engine	\$219.00
SOLAR-12	Solar-12, Water Cooled Ericsson	\$489.00
SOLAR-13	Solar-13, Thinking Man's Engine	\$139.00
SOLAR-15	Solar-15, Glassworks Kit	\$189.00
SOLAR-3	Solar-3, Flame Eater Engine	\$419.00
SOLAR-4E	Solar-4, Sun Runner Engine Only	\$219.00
SOLAR-6	Solar-6. Stirling Engine with Fan	\$359.00
SOLAR-7	Solar-7, Glass Works Engine an	\$329.00
SOLDERFLUX	BLR-1/BLR-2 Solder & Flux Pack	\$14.00
SRT-6	Silicone Rubber Tube, 6" (WG-1)	\$5.00
SV-1	SV-1 Safety Valve	\$21.00
SW-4	SW-4 Model Steam Whistle	\$52.00
SWV-1/8	SWV-1/8 Whistle Valve	\$47.00
T-0-80	Tap, 0-80	\$11.00
T-1-72	Tap, 1-72	\$10.50
T-1/4-20	Tap, 1/4-20	\$5.50
T-1/4-28	Tap, 1/4-28	\$5.50
T-1/4-32M	Tap, 1/4-32 ME Straight Thread	\$19.00
T-1/4-40M	Tap, 1/4-40 ME Straight Thread	\$19.00
T-1/4-40MTP	Tap, 1/4-40 MTP Model Tapered Thread	\$59.00
T-10-24	Tap, 10-24	\$6.00
T-10-32	Tap, 10-32	\$6.00
T-2-56	Tap, 2-56	\$8.00
T-3-48	Tap, 3-48	\$6.50
T-3/16-40M	Tap, 3/16-40 ME Straight Thread	\$13.00
T-3/16-40MTP	Tap, 3/16-40 MTP Model Tapered Thread	\$59.00
T-4-40	Tap, 4-40	\$5.50
T-5-40	Tap, 5-40	\$6.50
T-5/16-27T	Tap, 5/16-27 (1/16 NPT) Tapered Thread	\$21.00
T-6-32	Tap, 6-32	\$6.00
T-6-40	Tap, 6-40	\$6.50
T-8-32	Tap, 8-32	\$6.00
T-8-36	Tap, 8-36	\$6.00
T-M10X1	Tap, 10 x 1 Metric Fine Thread	\$41.00
TCM54	1/16 NPT to 1/8 OD Tube Connector	\$5.00
TL-0-80	Tap, 0-80 LH Thread	\$32.00
TL-1-72	Tap, 1-72 LH Thread	\$10.00
TL-5-40	Tap, 5-40 LH Thread	\$10.00

SKU	Product	Updated Price
TPR-1	Taper Pin Reamer No. 1 (MM-1)	\$31.00
TPR-4	Taper Pin Reamer, 4/0 (EL-1)	\$35.00
TPR-5	Taper Pin Reamer, 5/0 (for DP-1)	\$35.00
TPR-6	Taper Pin Reamer, 6/0 (WL-1)	\$37.00
TS-1	Table Saw Kit	\$109.00
TT-42-12	TT42-12 Rd Tel tubing 1/16 x .014 x 12"	\$2.00
TUC3	Tube Union Cone, 3/32" tube	\$2.00
TUC4	Tube Union Cone, 1/8" tube	\$2.00
TUC45	Tube Union Cone, 5/32" tube x 1/4-40	\$2.00
TUC5	Tube Union Cone, 5/32" tube x 5/16-32	\$2.00
TUC56	Tube Union Cone, 3/16" tube x 5/16-32	\$2.00
TUL3	Tube Union, 3/32 tube male ell 3/16-40 thread	\$8.50
TUM3	Tube Union, 3/32" tube x 3/16-40 thread	\$6.50
TUM34	Tube Union, 1/8" tube x 3/16-40 thread	\$6.50
TUM35	Tube Union, 5/32" tube x 3/16-40 thread	\$6.50
TUM4	Tube Union, 1/8" tube x 1/4-40 thread	\$7.00
TUM45	Tube Union, 5/32" tube x 1/4-40 thread	\$7.00
TUM46	Tube Union, 3/16" tube x 1/4-40 thread	\$7.00
TUM5	Tube Union, 5/32" tube x 5/16-27 thread (1/16 NPT)	\$8.00
TUM56	Tube Union, 3/16" tube x 5/16-27 thread (1/16 NPT)	\$8.00
TUN3	Tube Union Nut 3/16-40 thread	\$2.00
TUN4	Tube Union Nut 1/4-40 thread	\$2.00
TUN5	Tube Union Nut 5/16-32 thread	\$2.00
TW-1	Tap Wrench 0-1/4	\$15.00
WG-1	WG-1 Water Gauge (BLR-1)	\$31.00
WIRE-B16	Primary Wire, 16 GA Black	\$2.00
WIRE-O14	Spark Plug Wire, 14 GA Orange(Oak) with red and black tracers	\$2.00
WIRE-R16	Primary Wire, 16 GA Red	\$2.00
WL-1	WL-1, Wood Lathe Kit	\$115.00
WTK-1	WTK-1 Water Tank Kit	\$69.00
WTK-1TE	Extra Tank End, unmachined	\$10.00

PM MODEL ENGINES

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